FIRE

4100ES Fire Indicator Panel
Installation & Maintenance

Australian Installation & Maintenance Manual

LT0350
Iss 1.51

Simplex

Copyrights and Trademarks

Approvals

Australian Standard AS 4428.1

ActivFire Listing Number afp1682

Manufacture

The 4100ES is a Fire Indicator Panel manufactured for Tyco Fire Protection Products:

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Product / Site

Name	
Serial #	
Manufacture Date	

Non-Disclosure Agreement

End User Liability Disclaimer

The 4100ES Fire Alarm System provides a configuration programming facility, which may be accessed via a programming computer using a “dongle”. Because this programming facility allows the user to define in detail the operation of the 4100ES System being customised, changes may be made by the user that prevent this installation from meeting statutory requirements.

The Company, therefore cannot accept any responsibility as to the suitability of the functions generated by the user using this programming facility.

Model Number & Firmware Revision

This manual applies to product with the following:
Model number : 4100ES
Firmware revision : 1.02.04 and on

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Amendment Log

14 May, 2004	Issue 1.0.6	Original based on 574-848 Rev G
16 June, 2005	Issue 1.0.7	Added Tyco 614 detectors to Appendix F
30 Oct, 2005	Issue 1.0.8	Added System Sensor detector 885WP-B to List of Approved Devices in Appendix F.
6 October 2006	Issue 1.0.9	References to LT0432 and 1976-181 Wiring Diagrams added.
30 Nov. 2006	Issue 1.0.10	Updated drawings 1976-181 Sheets 102, 203, 500.
23 Jan. 2007	Issue 1.0.11	Clarification to RUI cabling limits (Chapter 3), Checking wiring (Appendix C), T-GEN connection.
9 Aug. 2012	Issue 1.2	Changes for 4100ES introduction.
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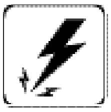
29-Jan-15	Issue 1.4	Battery charger adjustment updated.
25-Feb-15	Issue 1.5	Updated drawing 1976-174 sheet 1.
17-Aug-15	Issue 1.51	Re-PDF to remove {xe…} text all the way through.

Cautions, Warnings, and Regulatory Information

READ AND SAVE THESE INSTRUCTIONS. Follow the instructions in this installation manual. These instructions must be followed to avoid damage to this product and associated equipment. Product operation and reliability depends upon proper installation.

DO NOT INSTALL ANY SIMPLEX® PRODUCT THAT APPEARS DAMAGED. Upon unpacking your Simplex product, inspect the contents of the carton for shipping damage. If damage is apparent, immediately file a claim with the carrier and notify your Simplex product supplier.

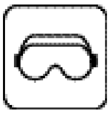
SAFETY HAZARD - The 4100ES CPU Card includes a lithium battery. There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.



ELECTRICAL HAZARD - Disconnect electrical field power when making any internal adjustments or repairs. All repairs should be performed by a representative or authorized agent of your local Simplex product supplier.

STATIC HAZARD - Static electricity can damage components. Therefore, handle as follows:

- Ground yourself before opening or installing components (use the 553-484 Static Control Kit).
- Prior to installation, keep components wrapped in anti-static material at all times.



EYE SAFETY HAZARD - Under certain fibreoptic application conditions, the optical output of this device may exceed eye safety limits. Do not use magnification (such as a microscope or other focusing equipment) when viewing the output of this device.

RADIO FREQUENCY ENERGY - This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits defined in AS 4428.0-1997 and Amendment 1 : 2002.

CLASS A PRODUCT – In a domestic environment this product may cause radio interference. In which case the user may be required to take adequate measures.

SYSTEM REACCEPTANCE TEST AFTER SOFTWARE CHANGES - To ensure proper system operation, this product must be tested in accordance with AS 1670 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions, known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, should also be tested and proper system operation verified.

IMPORTANT: Verify 4100ES System Programmer, Executive, and Slave Software compatibility when installing or replacing system components. Refer to Solution Bulletin SB11002 for compatibility information.

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Chapter 1
Introduction to the 4100ES Fire Alarm System

Introduction

The 4100ES is an expandable fire alarm system that can be used as a standalone system with one host panel, or as a wide-ranging system with several remote cabinets, with one or more host panels. This chapter is an overview of standalone, MINIPLEX, and network 4100ES system concepts.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

System Configurations

Overview

The 4100ES is available as a standalone system with one host panel, or as an expanded system with several remote cabinets, with one or more host panels. The type of configuration used depends on the size of the site into which it is being installed.

The following types of configurations are offered:

Standalone. Comprised of one FIP and its assorted warning devices, initiating devices, and signaling line circuit devices.

MINIPLEX/Remote Transponders. A standalone system plus remote transponder cabinets, which allow for additional slave modules to be used. Typically used for multi-level buildings and small multi-building applications.

Network. A multi-FIP system connected by network cards. Each panel maintains the status and control of its own circuit points while monitoring and controlling activity at other locations. Network nodes may perform similar tasks, or may be dedicated to specific functions.

This chapter outlines the fundamental concepts of each configuration.

Standalone Configuration

Overview

The standalone version of the 4100ES is used for smaller or single-building applications that require a limited number of notification appliances and initiating devices.

If a small building is being expanded, or if other buildings are being constructed in the same general area (as in a campus application), the standalone 4100ES can be expanded into one of the larger systems described later.

System Design

The standalone 4100ES uses one FIP (one, two, or three bays) containing the following:

- CPU.
- System Power Supply for the 4100ES (Universal Power Supply for the 4100).
- Optional slave cards.

All appliances and devices are connected to this FIP, as shown in Figure 1-1.

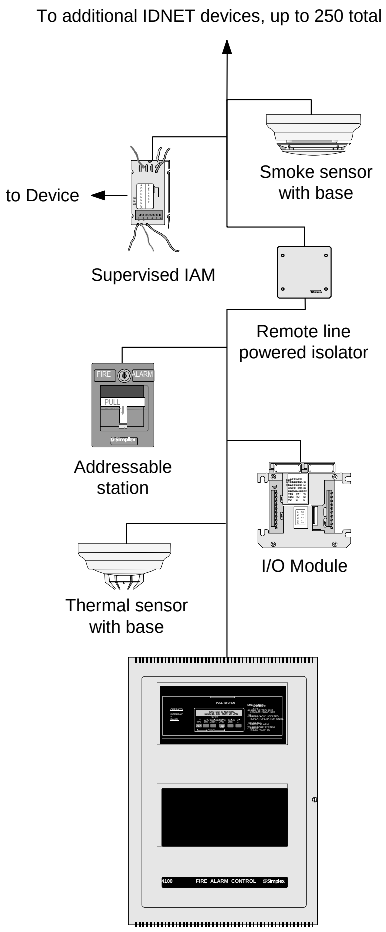

Figure 1-1. Standalone 4100ES System

MINIPLEX/RTU Configuration

Overview

The MINIPLEX/Remote Transponder version of the 4100 Fire Alarm System is designed for moderately larger applications than the standalone configuration, and allows up to 1000 monitor and/or control points and 2000 annunciator points to be controlled by a single FIP.

Like the standalone system, only one CPU is used. Remote Unit Interface (RUI) data, and optionally power, is distributed from the host panel to the Remote Transponder Units (RTU) remote boxes called *transponder cabinets.*

4100ES *Transponder interface cards (TICs)*, located in RTU cabinets, take the RUI data directly from the CPU motherboard and distribute it to the modules in the RTU cabinet.

System Design

The MINIPLEX 4100ES FIP must contain the following:

- CPU.
- System Power Supply for the 4100ES.
- Optional slave cards.

Each transponder cabinet must contain a Transponder Interface Card (TIC) and any number of optional slave cards.

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RUI Communication

The 4100 internal communications bus can carry data from the CPU in the main cabinet to expansion equipment in an adjacent cabinet. 4100 data from the CPU may be routed to remote cabinets (RTUs) in a MINIPLEX system by using the external RUI communications bus. An RUI line, routed from the CPU Motherboard in the 4100ES, allows the data to travel long distances. Once the RUI line terminates at a remote cabinet, the TIC (4100ES) in that cabinet distributes the CPU's data to the other modules within the cabinet.

Power has to be supplied locally within each RTU, or routed from the main FIP. Figure 1-2, below, outlines this process in a typical MINIPLEX setup.

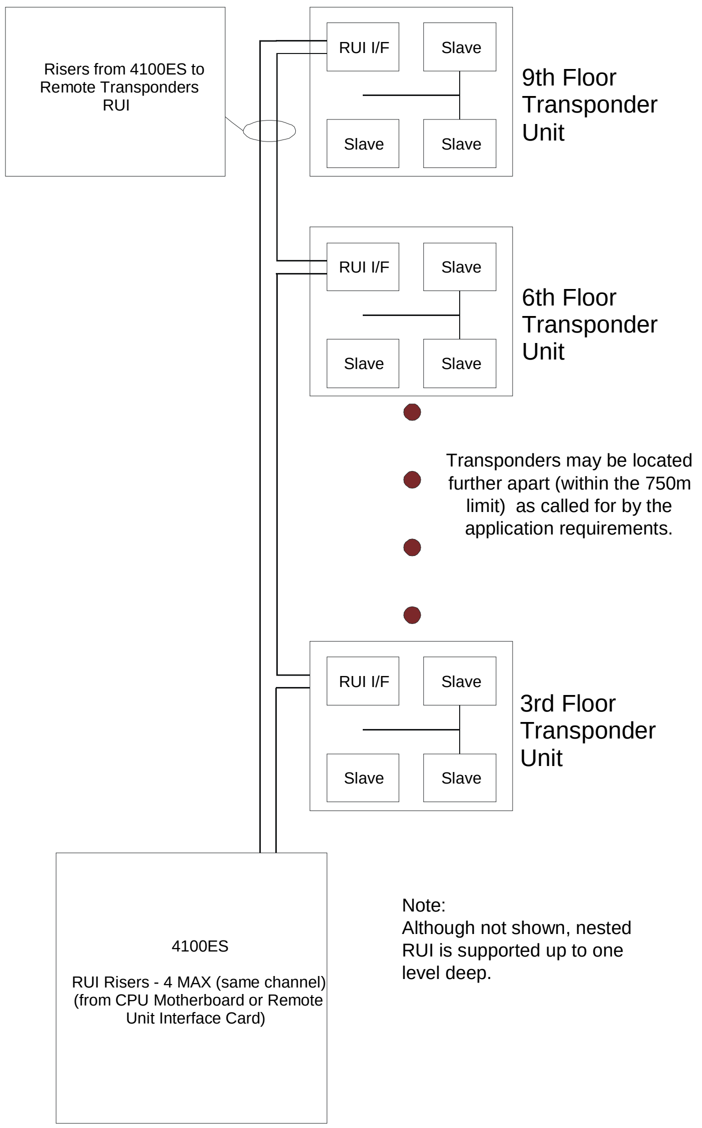

Figure 1-2. MINIPLEX/RTU 4100ES System

Network Configuration

Overview

The 4100ES can be expanded to become a network system by using network interface cards (NICs). When a NIC is installed into a 4100ES host panel, it is used to connect to other network nodes. Nodes may be other host 4100 panels, or they may be other things such as Graphical Command Centers (GCCs), and Visual Command Centers (VCCs). A node is a self-sufficient CPU that controls appliances and devices, which also has the capability of controlling and communicating with other nodes.

The network configuration supports two basic architectures (or wiring configurations): **ring** or **star**. A networked system can also use a combination of the two.

Hub and Star Configurations

The ring configuration consists of a main loop with nodes connected sequentially. The star configuration consists of several nodes connected directly to one common node. Physical bridge cards are used in the hub node for the star connections. A combination of the two styles is illustrated in Figure 1-3.

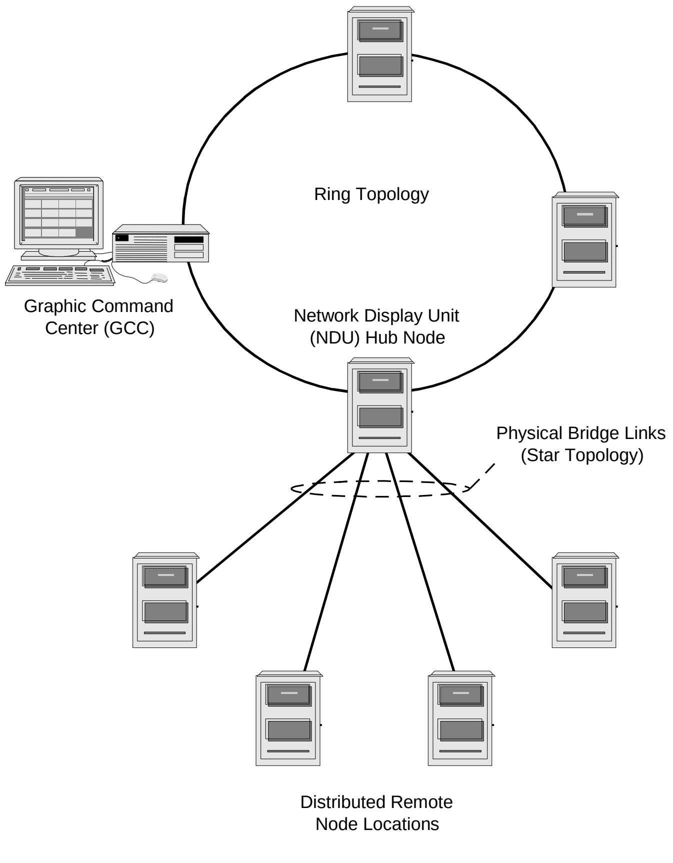

Figure 1-3. Star/Ring Configuration

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Connecting Loops

Network loops can be joined via physical bridge cards. There may be no more than two Style 7 network loops connected in tandem. For every two loops that are interconnected (using one physical bridge), there can be a maximum of three physical bridges used in a star configuration. See Figure 1-4.

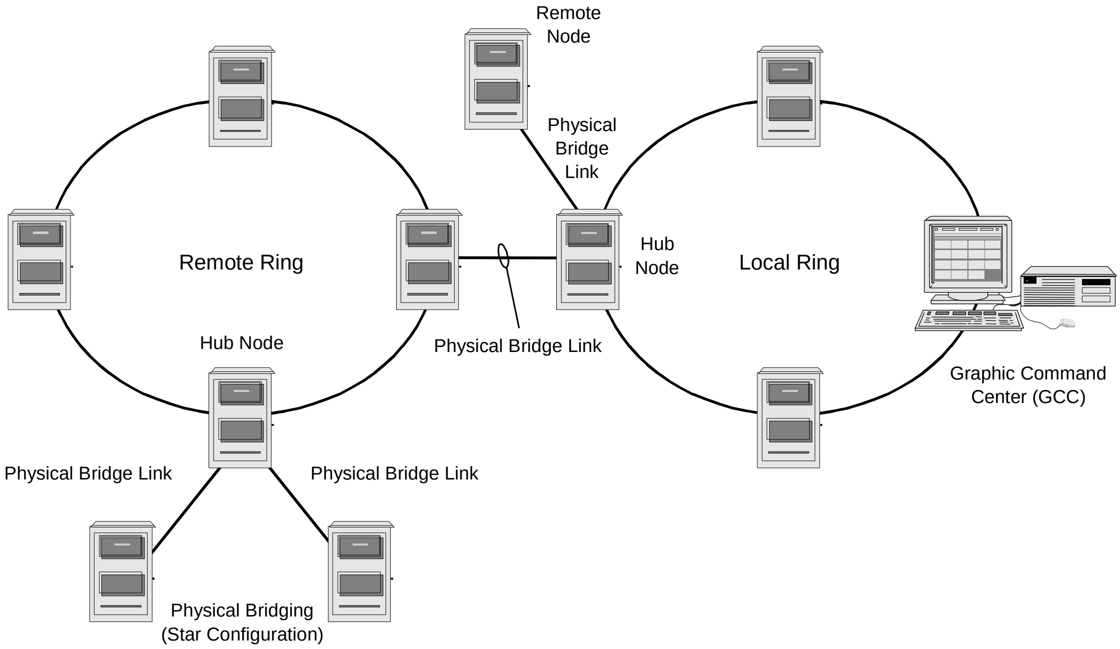

Figure 1-4. Interconnected Loop Configuration

System Design

To be used as a network node, a 4100ES panel must contain the following:

- CPU.
- System Power Supply.
- 4100ES Network Interface Card.
- Optional slave cards.

Network Communication

Network connections require 4100-6014 Network Interface Cards (NICs). Each network node requires a NIC. Once the FIP is a network node, it may be programmed to be fully in control of other nodes, or to be fully passive, or anywhere in between.

Glossary

AZF	Alarm Zone Facility – means of grouping multiple detectors or devices, and providing common indication and control.
Class A Wiring	Method of connecting multiple devices or units in a loop. This requires up to twice as much wire but means that a short or open circuit in any one section will not prevent communication with every device.
Class B Wiring	Connection of multiple devices sequentially, or with spurs, uses the minimum amount of cable, but a single wiring fault can affect all devices at once.
FIP	Fire Indicator Panel – usually abbreviated to “panel”.
GPO	General Power Outlet – mains power socket.
IDNet	Individual Device Network – latest generation of Simplex analogue addressable devices and the 2-wire loop that connects them.
InfoAlarm	Graphic LCD user interface. Sometimes referred to as a FUI (Flexible User Interface). Up to six InfoAlarm units can be connected to a 4100ES FIP.
MAPNet	Multi-Application Peripheral Network – an earlier version of addressable device communication superseded by IDNet. Some MAPNet devices can be used on IDNet loops.
NAC	Notification Appliance Circuit – switched DC output, usually with supervision, for powering notification appliances and warning system devices.
NIC	Network Interface Card – provides network communications between multiple 4100/4100ES panels.
PID	Product Identification (part number).
PDI	Power Distribution Interface – method of mounting and powering 4100 modules in a bay.
RTU	Remote Transponder Unit – remotely located cabinet, containing slave modules controlled by a 4100ES master panel.
RUI	Remote Unit Interface – 2-wire communications loop used to connect 4100/4100ES master panels with remote transponders.
SPS	System Power Supply – the main 4100ES power supply and battery charger module. Also includes an IDNet loop, three NAC outputs, and the brigade relay card.

Chapter 2
Installing 4100ES FIP Components

Introduction

4100ES cabinets are available in one-, two-, and three-bay sizes. Each can be equipped with a solid or windowed door. This chapter describes how to mount all types of 4100ES cabinets to a wall, and how to mount system card bays into the cabinets, modules to bays, etc.

FIPs are assembled to order within the factory. Steps 2 to 6 below are therefore not typically required in the field, but are included in case of in-field system expansion.

The section Introduction to FIPs describes the various components that make up the FIP.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Introduction to FIPs (4100ES)

Overview

4100ES FIP cabinets contain the CPU, Operator Interface, system power supply (SPS), backup batteries, and any additional modules that the panel requires. The FIP is the central hub (often referred to as a host panel) of a standalone or MINIPLEX fire alarm system. In a networked system, the FIP can be connected to other FIPs, so that each host panel is a node on the network.

CPU Bay

In the Australian 4100ES, the SPS is fitted to a bracket behind the hinged 8U door that has the InfoAlarm operator I/F on it. The CPU Motherboard is fitted to the right hand side of an expansion bay mounted directly below the power supply bay. This bay has a PDI fitted so can house 4"x 5"cards as well as legacy cards.

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Master Motherboard

The 4100ES Master motherboard (see Figure 2-1) that mounts the CPU card is central to the 4100ES system.

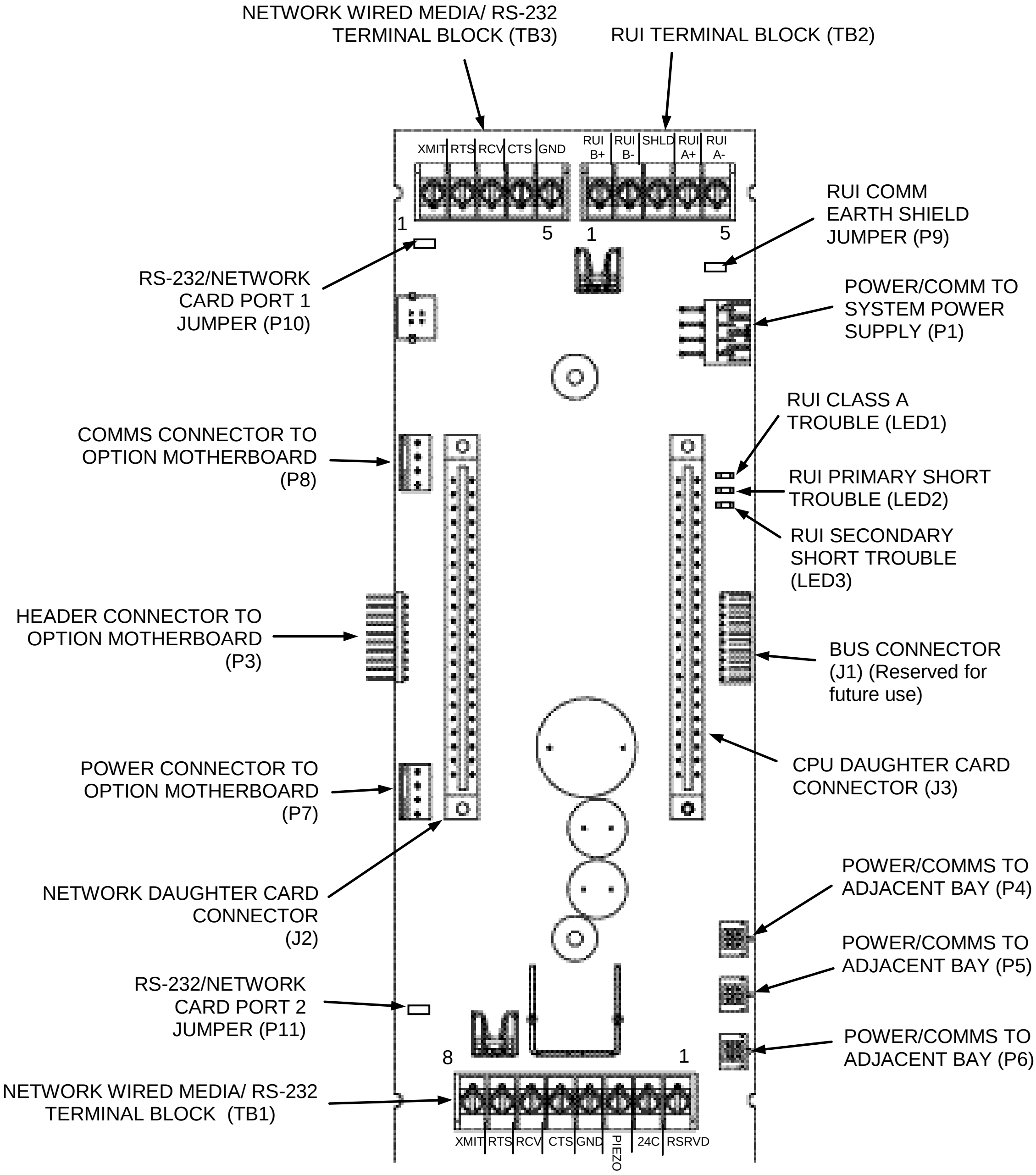

Figure 2-1. Master Motherboard (566-227)

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CPU Card

The CPU Card (see Figure 2-2) mounts onto the master motherboard. The CPU card contains an Ethernet service port, an LCD user interface connection, and a serial port for a service modem.

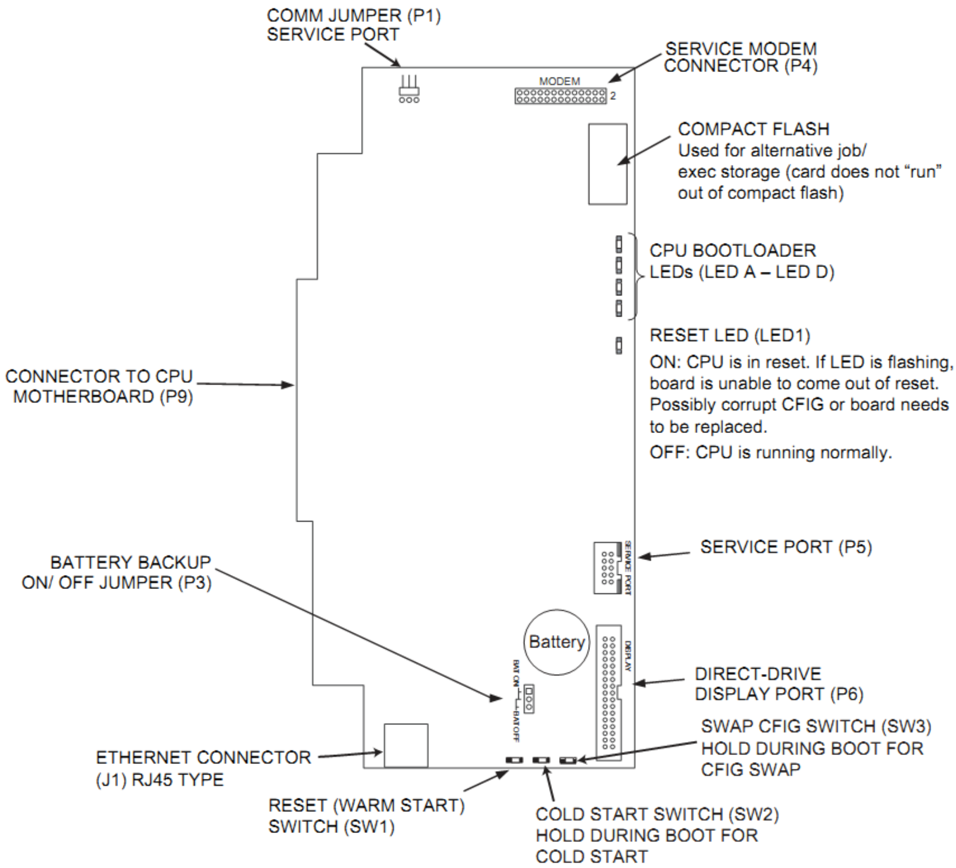

Figure 2-2. CPU Card (566-719)

Additional Modules

The master motherboard is also commonly used to mount the **Network Interface Card (NIC), for** 4100 networking operations. The NIC can be installed with the 4100-6056 Wired Media Card and/or the 4100-6057 Fiber Media Card.

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CPU Card LEDs

The CPU card LEDs indicate Bootloader status during system start up as shown in the table below.

Table 2-1. CPU Card LEDs 1 through 4

Status Condition	LED4	LED3	LED2	LED1
Bootloader Initialization	On (0.25s), Off (0.25s)	On (0.25s), Off (0.25s)	On (0.25s), Off (0.25s)	On (0.25s), Off (0.25s)
Bad Master CRC or No Master Present	On	Off	Off	Off
Diagnostic Fail – RAM	On	Off	Off	On
Diagnostic Fail – Bootloader CRC	On	Off	On	Off
Downloading Master	On	Off	On	On
Downloading CFIG	On	On	Off	Off
Downloading MsgLib	On	On	Off	On
Downloading BootLoader	On	On	On	Off
Download Successful	On	On	On	On

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Operator Interface

The Operator Interface lets a user operate the panel. It provides alarm, fault, and isolate status alerts, and lets the user review historical logs and perform diagnostics.

The 4100ES uses an InfoAlarm graphic display as its user interface.

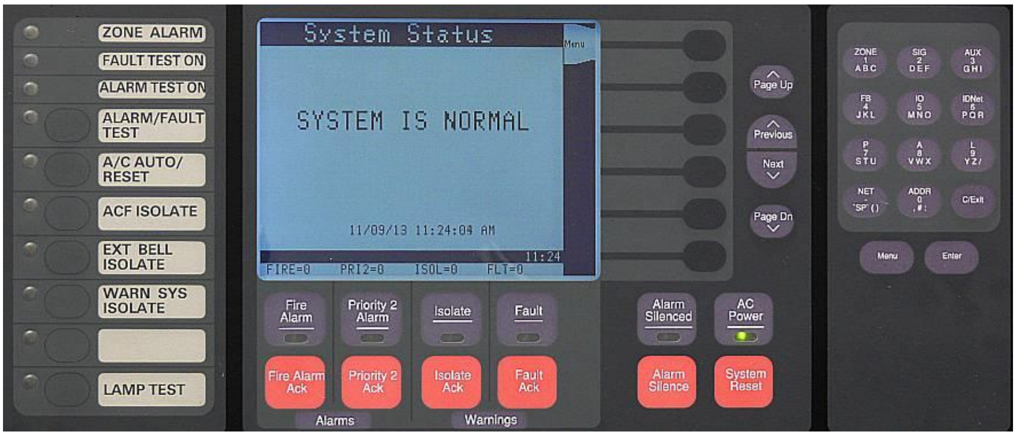

Figure 2-3. InfoAlarm Operator Interface

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System Power Supply (SPS)

In Australian 4100ES FIPs, only one power supply variant (SPS) is currently available, and it has hardware and software that are specific to Australia. This unit is used as the main power supply, but additional units may also be fitted directly to a card bay as an expansion supply.

The system power supply (SPS) is mains powered and has backup batteries that get switched in on mains failure. It is the initial power source for the CPU and the host cabinet. The SPS provides 24V card power to the CPU motherboard and the other cards. It also supplies 24V power on a separate bus to the outputs, e.g. Notification Appliance Circuits (NACs).

The SPS also has three on-board NACs that support reverse polarity supervision. It provides an IDNet channel, auxiliary power, an auxiliary relay, and it mounts and drives the Alarm Relay Card.

The SPS performs functions such as brownout detect, battery transfer, battery recharge, earth fault detection, and power limiting of outputs. It provides voltage and current information to the CPU card, which can then be displayed on the user interface.

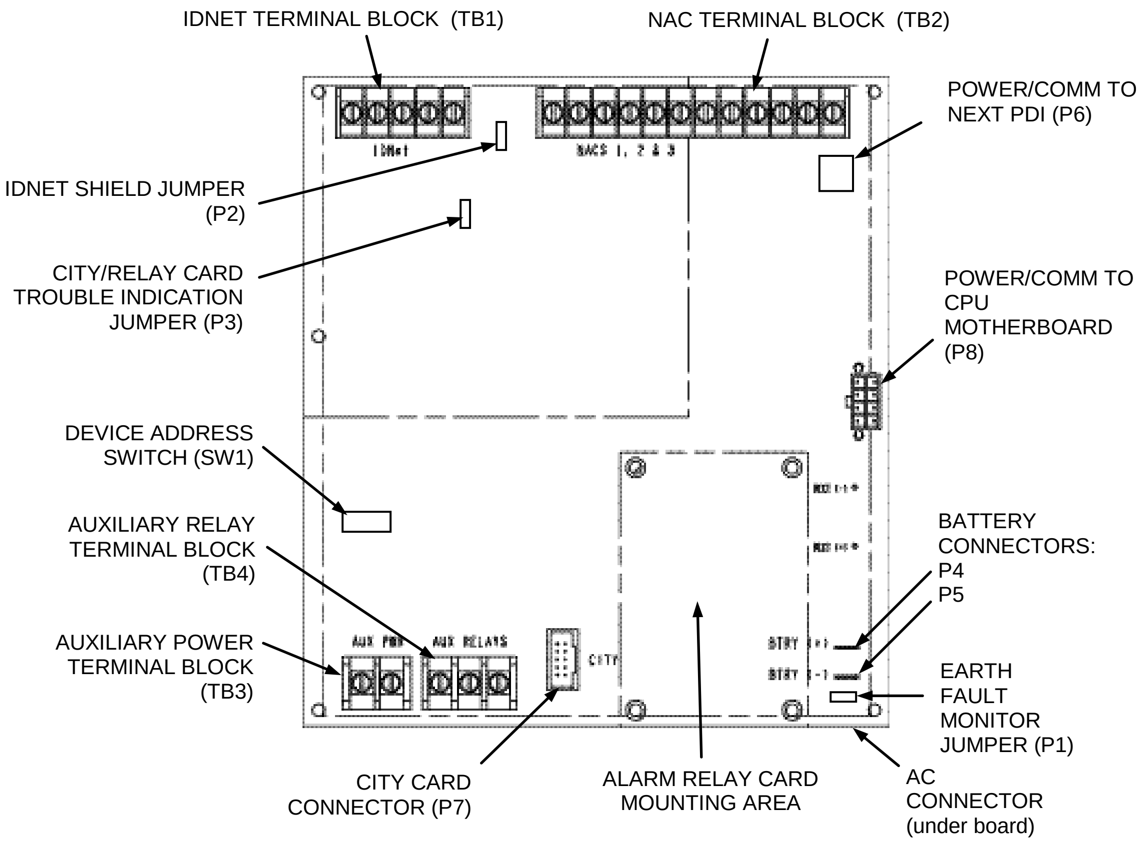

Figure 2-4. System Power Supply

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Introduction to FIPs (4100ES), *Continued*

System Power

The FIP is powered by the SPS (System Power Supply) which gets its primary power from the AC mains and its secondary power from the backup batteries.

The 24VDC bulk power on the SPS is unregulated, and is divided into three feeds, i.e. 24V Card, 24V Signal, and 24V Aux Power. 24V Card, which supplies the slave cards, and Aux power, which is accessible on screw terminals, are each rated at 2A and protected by a PTC. The 27.3V regulated battery charger is powered from the bulk supply and is switched off during alarm. The batteries only get connected to the bulk supply when the mains supply fails. The charger has two programmable options of rating, 1.4A for 6-18Ahr, and 3.3A for batteries above 18Ahr.

The “heavy” 24V Signal feed is only accessible via the NACs on the SPS, or via a wire harness.

IMPORTANT: AC power must be provided to the 4100ES from a dedicated branch circuit.

The Power Distribution Interface (PDI)

In expansion bays, power and data are distributed via the power distribution interface (PDI). The PDI is a wiring board with eight card slots, each of which can accommodate a 4-inch x 5-inch slave card. If legacy motherboards are used, they must be mounted over the PDI using metal standoffs.

Standard cards used in Australian 4100ES, e.g. IDNet, are plugged onto the PDI and only access the 24V Card supply.

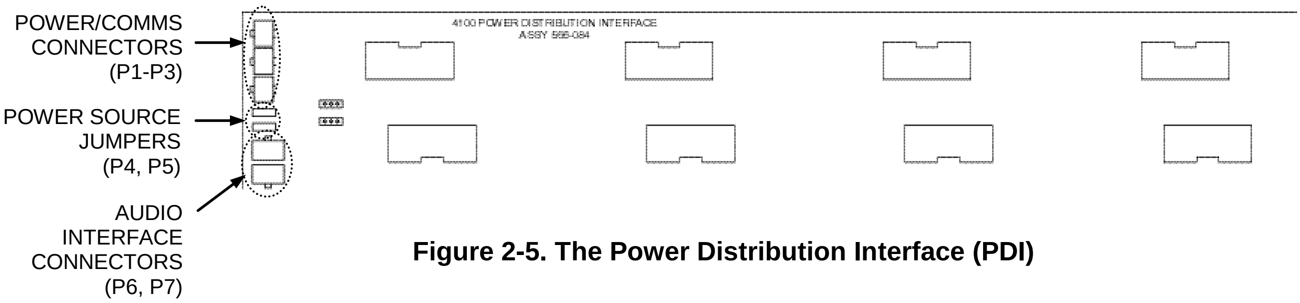

Figure 2-5. The Power Distribution Interface (PDI)

Step 1. Mounting Cabinets (4100ES)

Overview

The important aspects of mounting the cabinet are:

- Access for the operator;
- Height of displays and controls;
- Free space for door opening;
- Cable entry for field wiring.

Refer to AS 1670.1 for the height requirement and minimum access requirements for the cabinet.

In general, 18U – 28U cabinets will need to be wall mounted. Mounting holes and cabinet dimensions are shown in drawing 1919-22.

Door opening left/right should be specified with the order. The cabinets are symmetrical, top to bottom, so door opening can be swapped by removing the equipment, rotating the cabinet 180°, then re-fitting the equipment.

Step 2. Mounting Card Bays to Cabinets (4100ES)

Overview

FIPs are ordered from the factory with bays and cards fitted as per the panel order spreadsheet.

There are two formats used for bay mounting.

In the earlier format, used with the 4U LCD user interface door, the bays are mounted to the front of the cabinet, with fold-down display doors fitted to the cabinets, and a 9U dress panel fastened in front of each bay.

In the current format, used with the InfoAlarm graphic LCD user interface, the bays are mounted to the rear of the cabinet. The InfoAlarm and Zone LED displays are mounted on hinged doors mounted to the front of the cabinet. This allows the number of bays and number of display doors to be independently chosen, and allows better internal access for field wiring.

Additional mounting bays may be ordered to fit to an existing cabinet.

Front Mounting Bays

If the cabinet uses the earlier bay mounting format, the ordering code for a new bay is 4100-KT0446 which includes the 19” rack mounting brackets and earth loom.

Attach each mounting bracket to the two studs in the top and bottom of the front of each bayside plate as shown in Figure 2-6.

Fit M6 cage nuts to the appropriate 19”rack holes, then attach the bay using M6 countersunk screws.

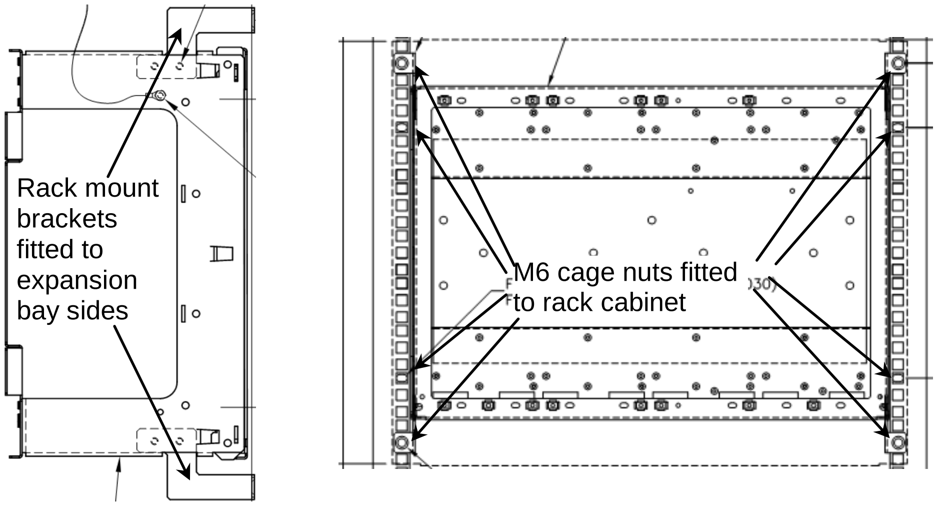

Figure 2-6. Bracket and Bay Mounting – earlier style

Rear Mounting Bays

If the cabinet uses the newer bay mounting format (back of cabinet), the ordering code for an expansion bay is also 4100-KT0446 which will have some surplus parts.

Fit four M4 screws to the correct holes in the mounting rails on the back of the cabinet, as shown below. Hang the expansion bay on the screws and tighten them up.

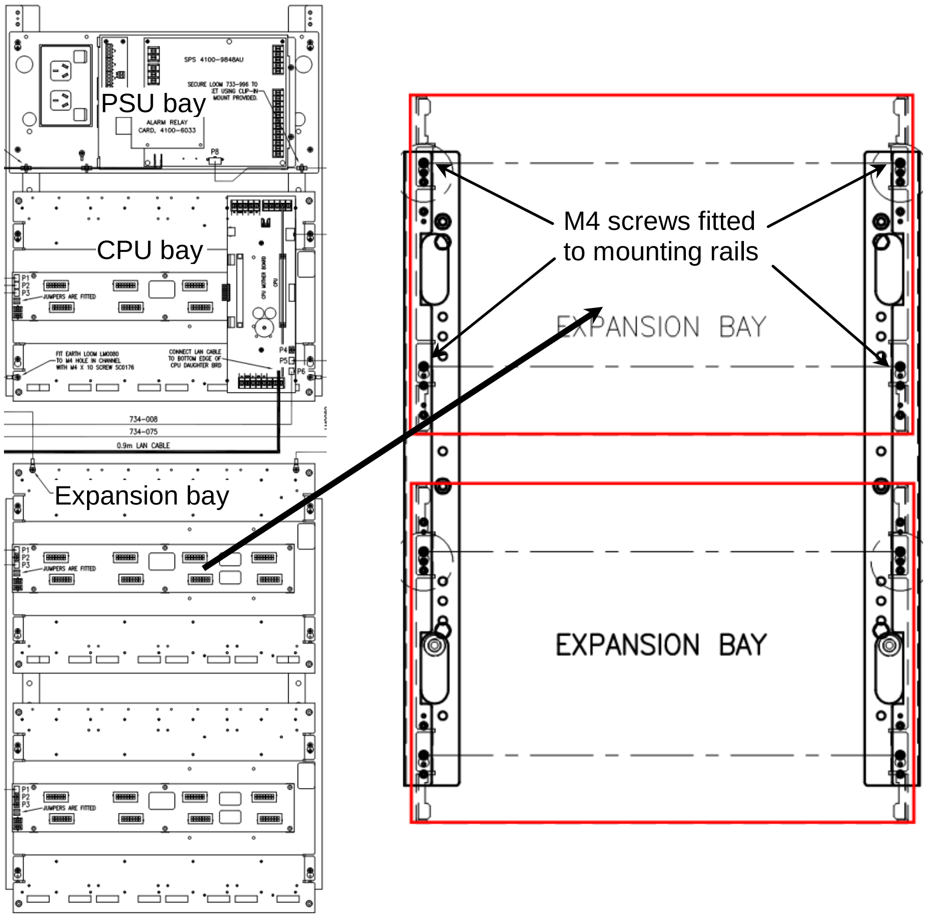

Figure 2-7. Bay Mounting – later style

Step 3. Configuring Cards (4100ES)

Overview

The CPU, SPS, and all other modules to be mounted in the FIP cabinets must be configured to operate correctly in the system via their DIP switch and jumper ports. This section describes the hardware configuration for the CPU and SPS, since they will always be used in the CPU bay.

Master Motherboard Configuration

The Master motherboard must be jumpered as follows:

P9 determines whether the RUI SHIELD signal is connected to 24 C or Earth:
- Position 1 – 2: SHIELD to 24 C (default). Set to this position **unless** the system uses a TrueAlert Power Supply (not listed for use in Australia).
- Position 2 – 3: SHIELD to Earth. Set to this position **only if** the system uses a TrueAlert Power Supply.

Note: Some devices that connect to RUI have inherently grounded shield terminals, in which case 24 C cannot be used. If 24 C is used, a Negative Ground Fault will occur.

P10/P11: P10 is associated with Port 1 and P11 is associated with Port 2. P10 and P11 are used to set the CPU motherboard up to be attached to either a network card or a RS-232/2120 card:
- Position 1 – 2: Network card (NIC) fitted to CPU motherboard (default).
- Position 2 – 3: RS-232 card fitted to CPU motherboard.

CPU Card Configuration

The CPU card must be jumpered as follows:

P1 is used for engineering diagnostics (COMLAB):
- Position 1 – 2 : Download or no connection.
- Position 2 – 3 : Diagnostic mode.

P3 configures the RAM battery as ON or OFF:
- Position 1 – 2 : ON (use for normal operation).
- Position 2 – 3 : OFF.

SPS Configuration

The SPS must be configured as follows:

SW1: Using DIP switch SW1, set the SPS slave address. Use the address table in Appendix A.

P2: If the SPS IDNet outputs are being used, you may change P2 to configure the IDNet shield connection:
- Position 1 – 2 (bottom) : Connects the shield to 0 V (default).
- Position 2 – 3 (top) : Connects the shield to earth ground.

P3 configures relay 3 on the 4100-6033 Alarm Relay Card:
- Position 1 – 2 (top) : Removes fault monitoring on relay 3 (default).
- Position 2 – 3 (bottom) : Makes relay 3 activate when there is a fault.

P1: Earth connect jumper:
- Position 1 – 2 (rhs): Enables Earth fault monitoring. Set to this position **unless** the system uses a TrueAlert Power Supply under common 0V.
- Position 2 – 3 (lhs): Disables Earth fault monitoring. Set to this position **only if** the system uses a TrueAlert Power Supply under common 0V.

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Step 3. Configuring Cards (4100ES), *Continued*

PDI Configuration

P4/P5: The PDI backplane can be configured to draw its power from different sources via P4 and P5:

- To draw power from an XPS on the PDI, set jumpers on P4 and P5 to position 2 – 3.
- To draw power from P1 (from the previous bay), set jumpers on P4 and P5 to position 1 – 2 (default).
- To remove power from the PDI, remove the jumper from P4.

Configuring Other Cards

Refer to the appropriate installation instructions to configure other cards that are located in CPU and expansion bays.

Step 4. Interconnecting Modules and Bays

Overview

Each card has to be interconnected with every other card in its bay. At the same time, bays in the FIP also have to be connected together. Read this section to ensure that cards and bays are interconnected.

Guidelines

Review the following guidelines before interconnecting modules and bays:

- The SPS provides 24V power to the CPU motherboard.
- The CPU motherboard provides 8 V (3 A capacity) for use by Legacy 4100 slave cards. 24 V card power is routed through the motherboard for slave card use.
- 4100 internal comms and power are harnessed to other bays. Do not connect the 8 V at P7 to an 8 V converter on a Goldwing power supply or remote interface card.
- 24 V Card power from the SPS is rated at 2 A.
- The 4-wire communications and power harness carries only the 24 V Card supply to a PDI, and not the 24V Signal supply.
- Some of the wire harnesses supplied with cards are not required. These can be stored in case of future requirements.

Continued on next page

Card Interconnections in the CPU Bay

Use the following directions to connect the CPU to the SPS and other motherboards:

1. Connect P3 on the SPS to P1 on the CPU motherboard using the 8 wire harness 733-998.
2. Make sure the 10 way right angle header, connector P3 on the master motherboard is secured to J1 on the next motherboard to the left. Repeat this for the third (leftmost) motherboard, and on if applicable.

Card Interconnections Within Expansion Bays

The power distribution interface (PDI) mounted to the back of each expansion cabinet carries 24V Card power and data to each 4"x 5" card.

Refer to "Step 5: Installing Modules into Expansion Bays (4100ES)" for instructions on mounting 4"x 5" cards to the PDI. Also bear in mind the following variations:

- In a Remote Transponder Unit (RTU), a transponder interface card (TIC) requires additional interconnections. Refer to Chapter 3.
- Regular motherboards require non-PDI interconnections to each other and to the CPU. Refer to "Step 5: Installing Modules into Expansion Bays (4100ES)."

Basic Bay-To-Bay Interconnections

The 4 wire harness 734-008 is used to carry 24V Card power and comms from bay to bay. Connector P1 on the PDI receives power from P3 on the previous PDI or from P6 on the SPS or from P7 or P8 on the CPU Motherboard. P2 on the PDI is used to carry power and comms to a 64/64 Controller. P3 is used to carry power and comms to the next PDI.

Jumpers P4 and P5 on the PDI are normally set to positions 1-2 (left) to provide card power to the bay from P1 on the PDI. Set P4 and P5 to positions 2-3 (right) to provide card power to the bay only if an expansion SPS is fitted in that bay.

Note: Interconnections can become more involved if 4100 motherboards are used. Refer to "Step 5: Installing Modules into Expansion Bays (4100ES)" if this is the case.

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Step 4. Interconnecting Modules and Bays, *Continued*

Basic Bay-To-Bay Interconnections (*continued*)

Figure 2-8, below, shows the interconnections between three bays in a host panel.

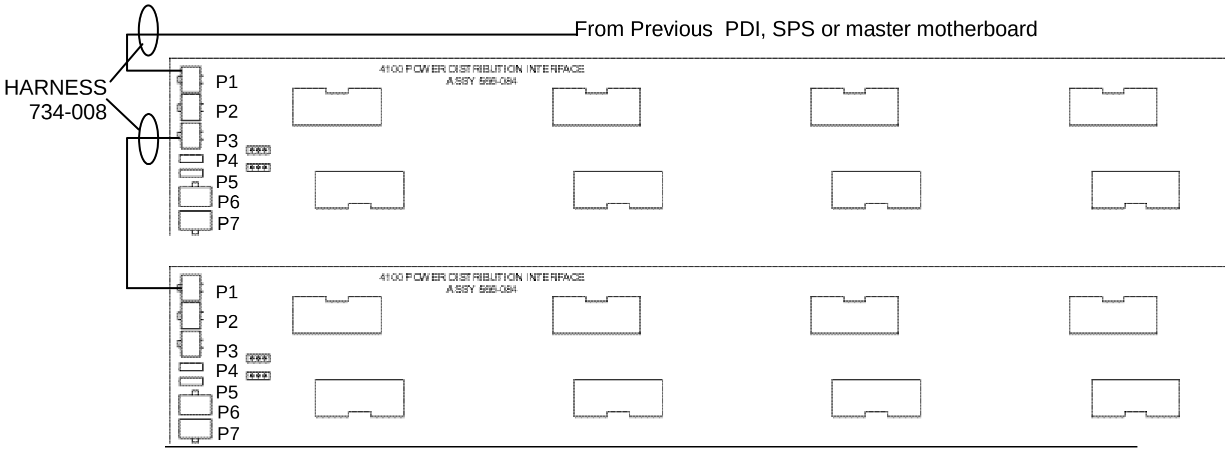


Figure 2-8. Bay-to-Bay Interconnections

Connecting to Motherboards

Panels with motherboards on the left side of the expansion bays require some non-PDI connections. If you need to connect a harness to a motherboard, refer to Figure 2-9 and follow these steps. Make sure to route the power and communication wiring on the left side of the bay.

1. Connect one end of the 733-525 Harness to a motherboard in an adjacent bay.

   If the adjacent bay is a CPU bay with no additional motherboards, connect the harness to the P8 and P7 connectors of the CPU motherboard:

   - Insert the harness connector with the blue wire into the P8 connector. Note that the P8 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.

   - Insert the harness connector with the white wire into the P7 connector. Note that the P7 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.

   If the adjacent bay is an expansion bay or a CPU bay with additional motherboards, connect the harness to the P2 and P3 connectors of the motherboard installed in the leftmost slot. Connect the harness as follows:

   - Insert the harness connector with the blue wire into the P2 connector. Note that the P2 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.
   - Insert the harness connector with the white wire into the P3 connector. Note that the P3 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.

Continued on next page

Connecting to Motherboards (*continued*)

2. Connect the other end of the harness to the leftmost motherboard in the next bay, as described below. Make sure to route the wiring on the left side of the bay.
   - Insert the harness connector with the blue wire into the P2 connector. Note that the P2 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.
   - Insert the harness connector with the white wire into the P3 connector. Note that the P3 connector has eight pins. Insert the harness connector on either the top four pins or the bottom four pins, not in the middle.

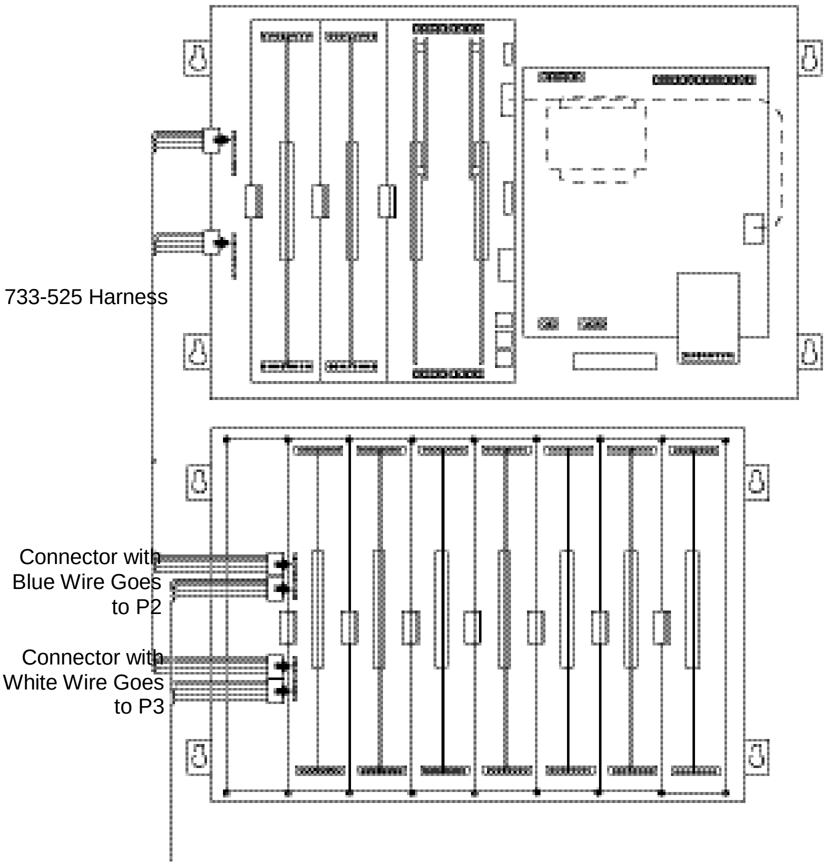


Figure 2-9. Power and Communication Wiring for Motherboards

Step 5. Installing Modules into Expansion Bays (4100ES)

Overview

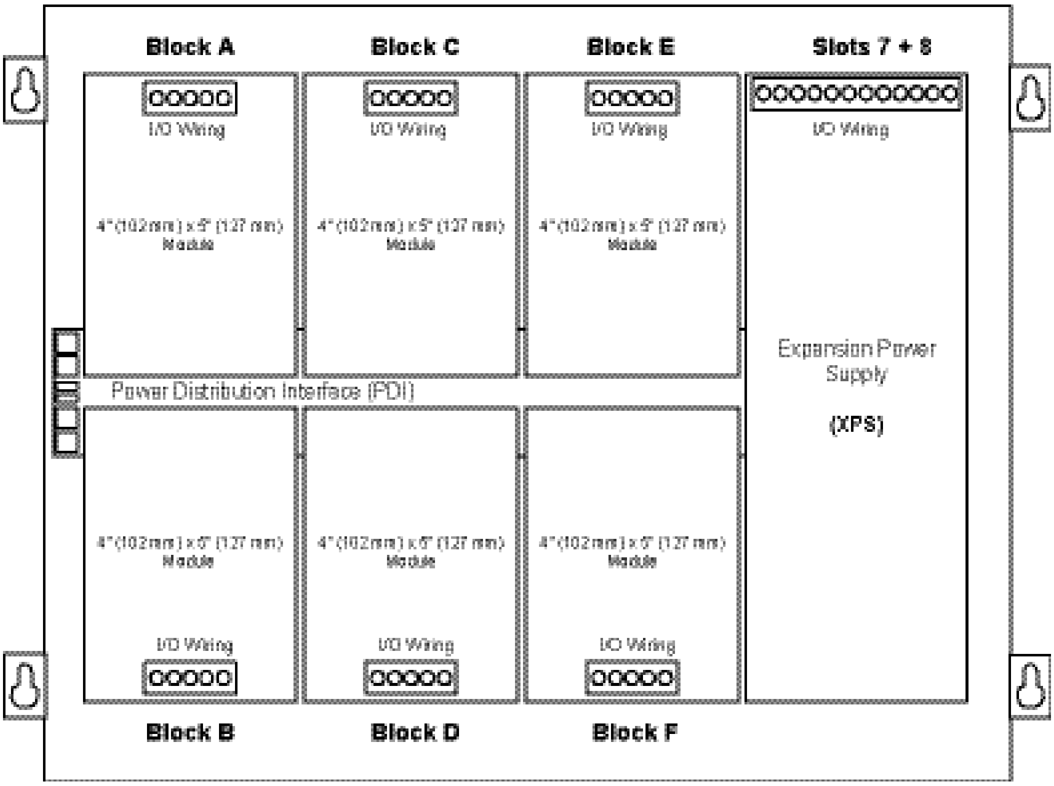
This section contains guidelines and instructions on installing 4"x 5" cards and traditional motherboards into 4100ES card bays.

IMPORTANT: This section applies to after market modules for expansion bays only. If you do not need to install any after market modules at all, and if you have followed Steps 1 through 6, you have completed the panel installation and can apply AC power.

Placement Guidelines

Refer to the following guidelines before mounting 4" x 5" cards and/or motherboards to an expansion bay:

- Each expansion bay assembly includes a chassis, two end supports, one LED/switch frame, and a power distribution interface (PDI) board.
- An expansion bay holds up to eight 4" x 5" modules. A double-size module, such as the expansion power supply (XPS), takes up two blocks of space as shown below. The Australian SPS takes up four blocks of space (note, the XPS is not listed for use in Australia).
- Cards should be added from right to left if an SPS is fitted.



(Note. Australian SPS is 4 slots wide. XPS is not available in Australia.)

Figure 2-10. Expansion Bay 4"x 5" Card Placement

Continued on next page

Placement Guidelines (*continued*)

- Legacy motherboards can be installed on top of the PDI in expansion bays. The data and power that would normally be bussed via the PDI is instead routed across the boards.
- Up to eight 2” x 11 ½” motherboards can be installed in an expansion bay **if no 4”x 5”PDI modules are installed in the bay, and if the pins on the left connector (P1) on the leftmost motherboard are removed.**
- Relay motherboards must be the rightmost motherboards.
- The CPU motherboard generates the 8V supply required for legacy motherboards. It also has the 4100A style Molex connectors to which a harness can be fitted as in Figure 2-8.

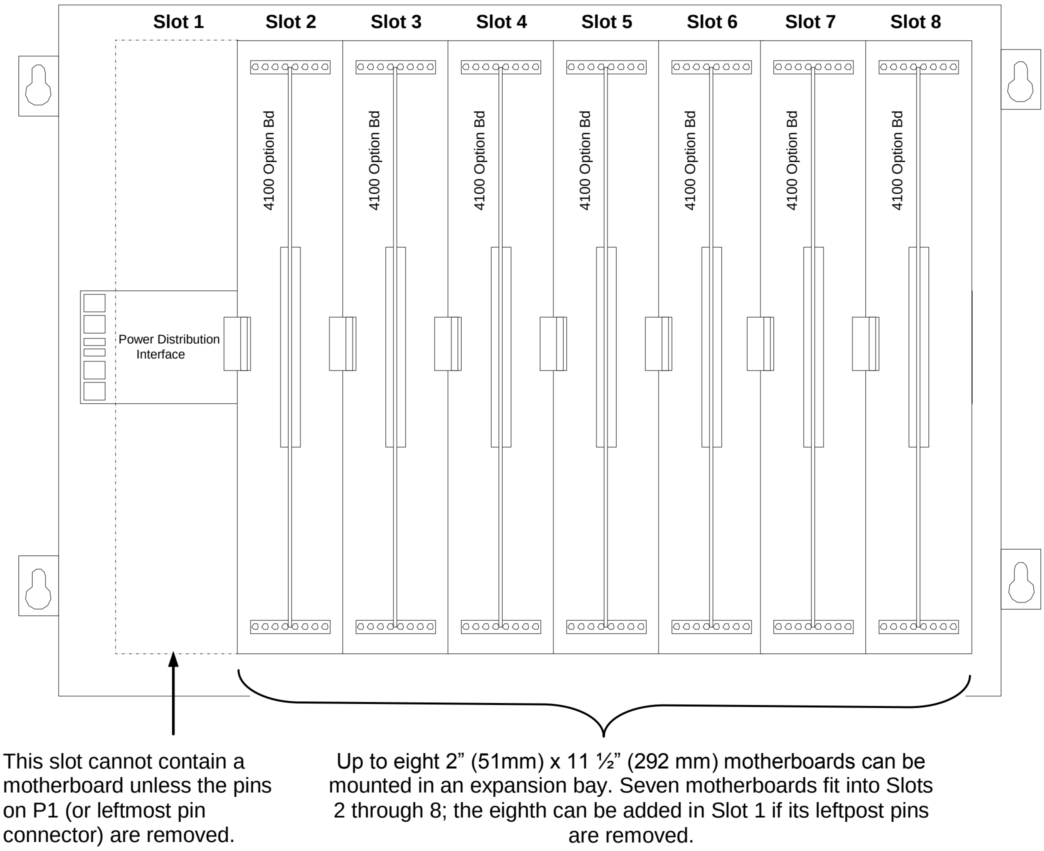
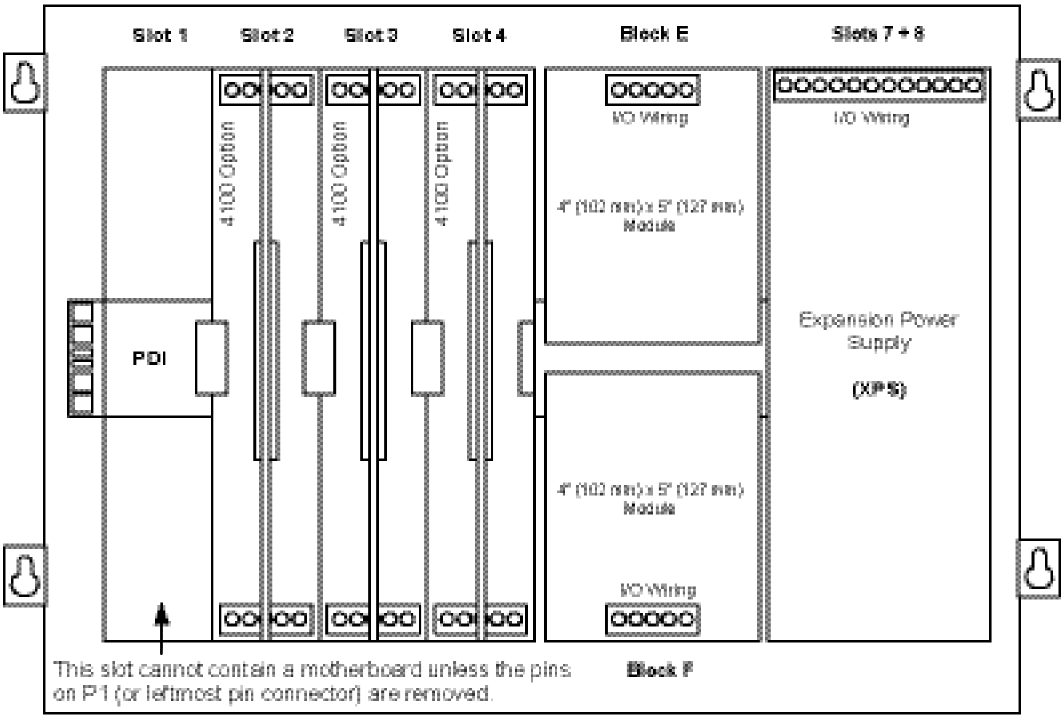


Figure 2-11. Expansion Bay Motherboard Placement

Continued on next page

Placement Guidelines (*continued*)

- As shown in the Figure 2.12 below, motherboards can be installed alongside 4”x 5” cards, if necessary.



(Note. Australian SPS is 4 slots wide. XPS is not available in Australia.)

Figure 2-12. Mixed Module Placement

Continued on next page

Step 5. Installing Modules into Expansion Bays (4100ES), *Continued*

Installing 4” X 5” Cards

The power distribution interface (PDI) is mounted to the back of each expansion cabinet. The PDI contains slots for up to eight 4”x 5” slave cards. Since the PDI carries power and data across the entire bay, it solves most interconnection issues, especially between 4”x 5” cards.

Use the following instructions and the Figure 2.13 below to mount 4”x 5” slave cards to an expansion cabinet:

1. Screw two standoffs and washers to the appropriate holes in the back of the cabinet. These holes must line up with the screw holes in the 4”x 5” card.

   Plug the 4”x 5” card into the appropriate PDI connector. Seat the card firmly onto the PDI when installing to ensure complete insertion of the power connector into the PDI.

2. Secure the top of the card to the standoffs with two #6 torx screws and washers.

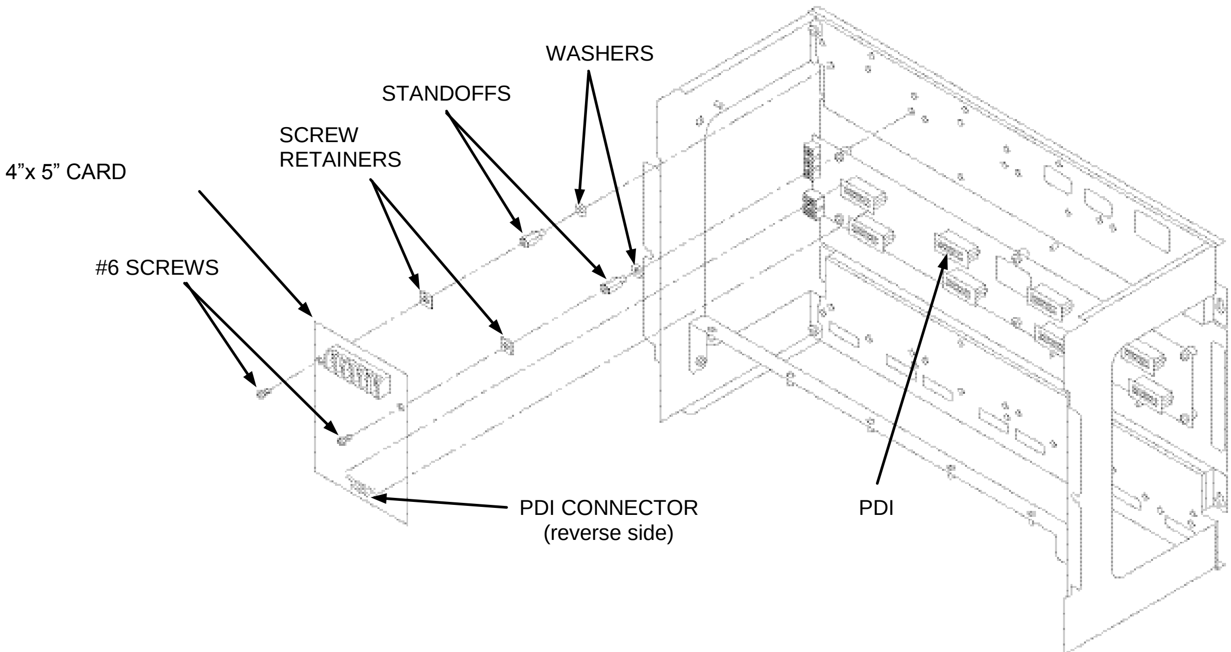


Figure 2-13. Slave Card/PDI Connection

Continued on next page

Installing Motherboards

Use the following procedure when installing motherboards in an expansion bay. If practical, start at the left and fill to the right. The pins of the left connector (P1) on the leftmost motherboard must be removed. The motherboard mounting items are available as 4100-KT0468.

1. Orient the motherboard with connector J1 on the right and header P1 on the left.
2. Attach the four metal threaded standoffs and lockwashers into the screw holes on the chassis.
3. Attach two grey plastic standoffs to the motherboard socket mounting screws.
4. Secure the motherboard to the standoffs using four #6 Torx screws as shown below.

WARNING: If the expansion bays are mounted to the front of the cabinet (earlier style), a 4100 Motherboard with daughter card cannot be fitted directly behind a 64/64 LED/Switch Controller. The same applies to modules mounted on the bay mounting bracket (FA2255), e.g. ME0426 T-GEN.
With the newer rear-mounted expansion bays, this restriction does not apply.

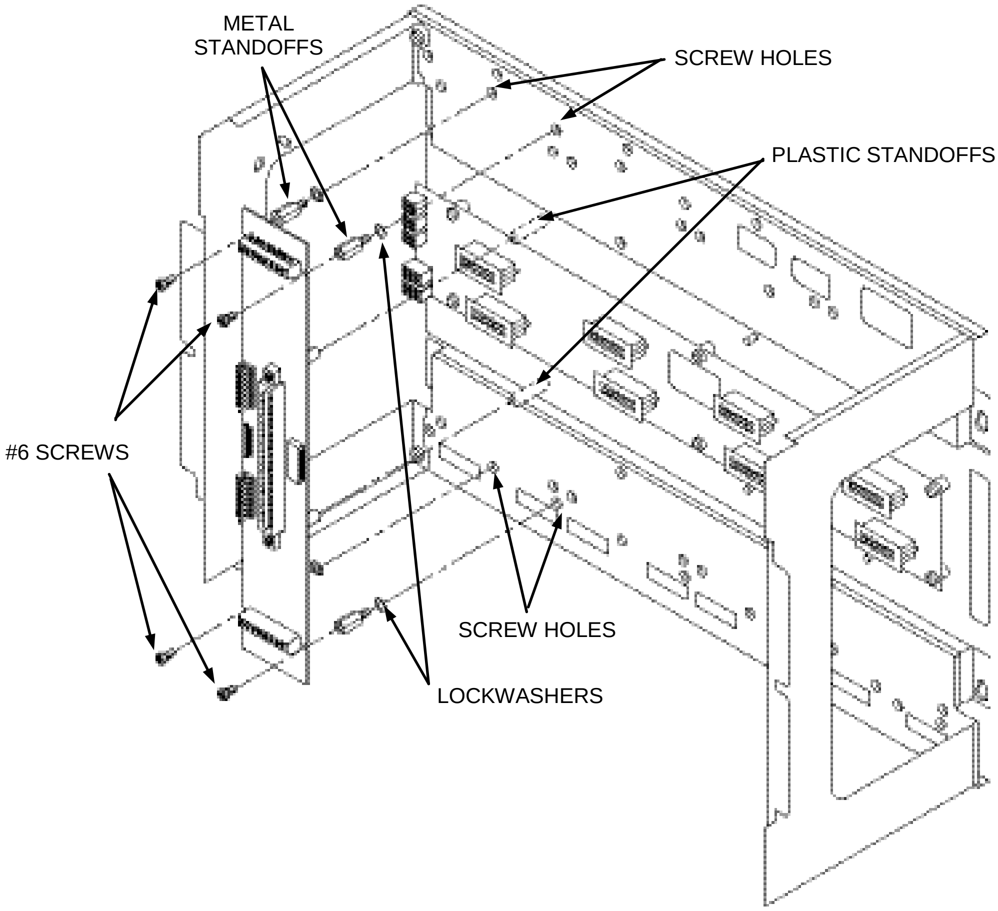


Figure 2-14. Installing the Motherboard in a 4100ES Expansion Bay

Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES)

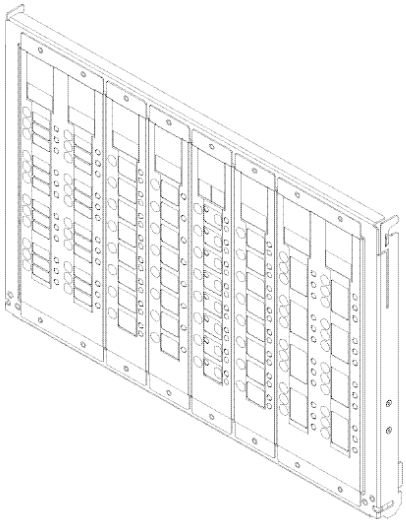
Overview

The LED/switch user interface consists of a variety of modules, which are configured via the ES Programmer. Each display module contains between 8 and 24 switches and LEDs, each one separately configurable.

User interface functionality is driven by the 64/64 LED/Switch Controller Card, which mounts behind two of the display modules (typically in positions 1 and 2). The range of available modules is listed in Appendix K.

The LED/Switch User Interface

Figure 2-15 shows the two mounting versions of a LED/switch bay.



Earlier style fold-down door

Newer style 7U hinged door

Figure 2-15. LED/Switch Modules

LED/Switch Controller Card

The LED/switch controller card mounts behind two LED/switch modules. The LED/switch controller handles up to 64 switches and 64 LEDs on the modules and communicates their status to the 4100ES CPU. When a button is pressed on a module, the controller acknowledges the signal and reacts according to how that switch was configured via the ES Programmer.

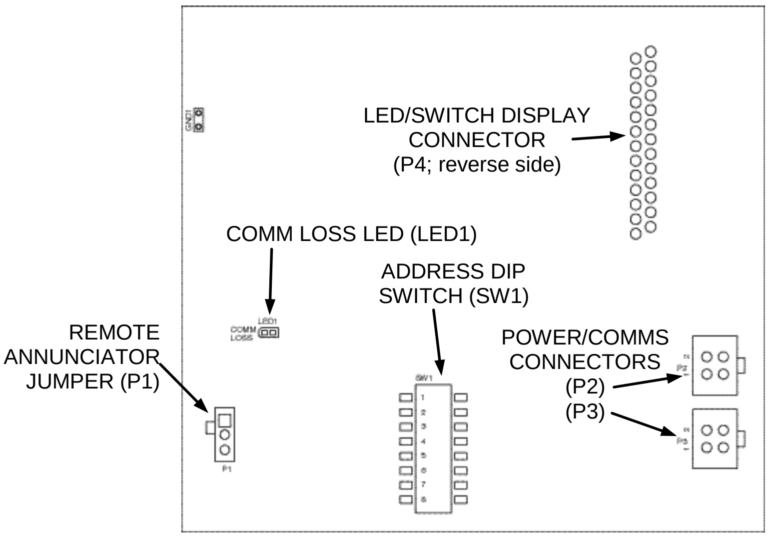


Figure 2-16. LED/Switch Controller

Continued on next page

Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES), *Continued*

LED/Switch Controller Card, (*continued*)

If more than 64 LEDs or 64 switches are required, a second controller may be installed on a display door.

LED 1. This LED illuminates if communication loss between the controller and the CPU occurs. It is independent of jumper P1 (which configures different communication loss features).

LED/Switch Modules

All types of modules are mounted to the front of a bay, and are connected to each other via a ribbon cable. Each module operates by the same rules: when a button is pressed, the controller card sends the CPU the information, and the event programmed for that button occurs.

Configuring the LED/Switch Controller Card

The 64/64 LED/switch controller requires physical configuration, but the LED/Switch modules do not. Configuration consists of setting jumper P1 and setting the device address. Device Address is covered in Appendix A.

Activating the Communication Loss Feature

If the LED/switch controller is used in a remote annunciator, it can make the LED/Switch modules annunciate a communication loss condition. If communication loss occurs when this setting is activated, LED 1 of the first connected display card illuminates, and the piezo on the LED/switch controller sounds. The indication is silenced via the corresponding switch (switch 1 on the first display card).

Use jumper port P1 to activate or deactivate the communication loss feature.

- Position 1 - 2 deactivates the feature (default).
- Position 2 - 3 activates the communication loss feature.

Continued on next page

Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES), *Continued*

Mounting LED/Switch Modules to the Expansion Bay

Refer to the Figure 2.17 below to mount the display cards to the front of the expansion box.

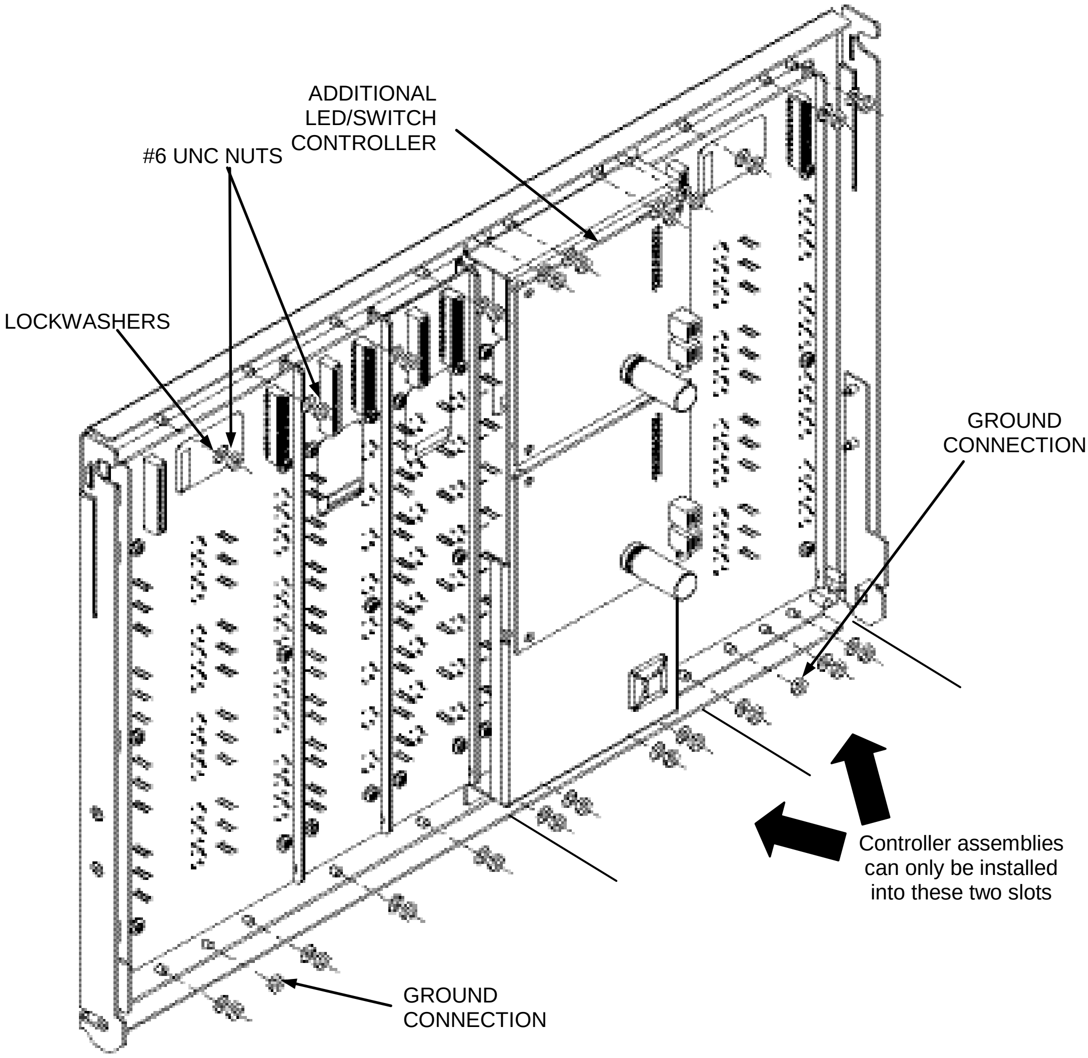


Figure 2-17. LED/Switch Card Mounting on a bay mounted door (earlier style)

Continued on next page

Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES), *Continued*

Mounting the Controller Card Assembly

Refer to the figures and instructions below to mount the controller card assembly to the back of one of the LED/switch cards:

1. Use four #6-32 Nuts and four #6 Washers to secure the bracket to the inside front of the expansion box.
2. Attach the header connector on the back side of the controller (P4) to the connector on the back side of one of the LED/switch modules.
3. Secure the controller card to the board using four #6 screws, as shown in Figure 2-18.

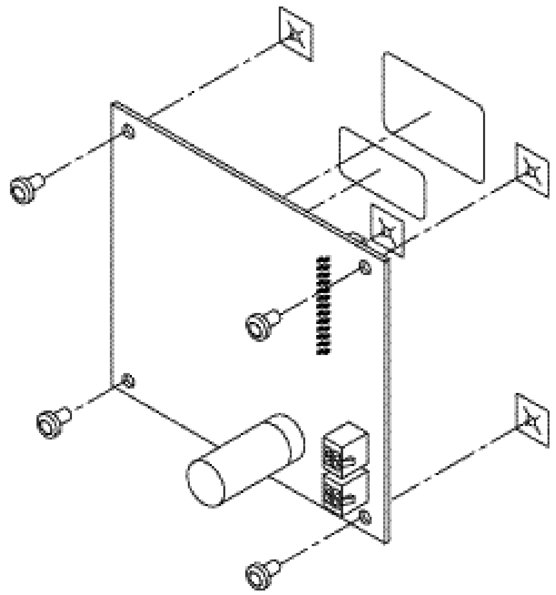


Figure 2-18. Controller Card Mounting

WARNING: The 64/64 Controller Card cannot be mounted directly in front of a 4100 Motherboard or a bay-mounting bracket such as one that mounts a T-GEN.

Changing Display Card LEDs

The 4100-1276 LED display card contains eight red LEDs and the 4100-1277 card contains 16 alternating red/yellow LEDs. The LED colors may be configured differently, as described in this section.

Only the following LEDs are to be used to change colour configurations. LEDs are available in sets of eight, as follows:

- 4100-9843 (yellow)
- 4100-9844 (green)
- 4100-9845 (red)

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Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES), *Continued*

Changing Display Card LEDs, (*continued*)

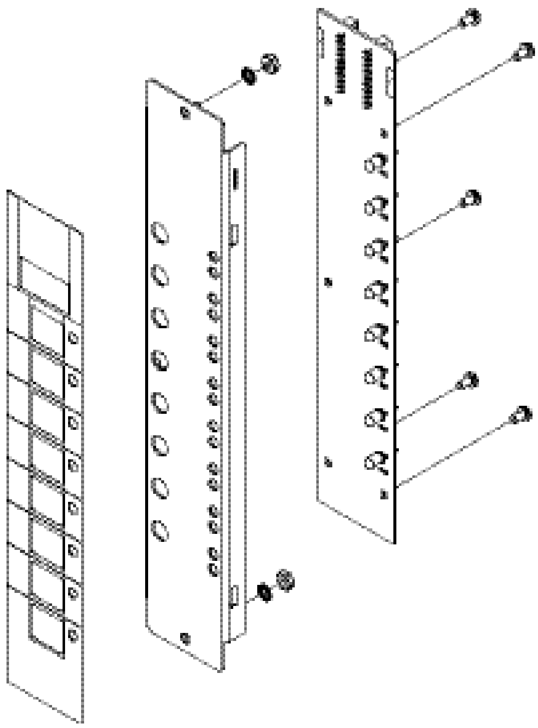

Figure 2-19. Assembling / Disassembling the LED Display Card (pluggable LED version, only)

Interconnecting Cards

User interface wiring consists of connecting the LED/switch controller card to the expansion bay's power distribution interface (PDI), and connecting display cards to each other. This section describes both procedures.

Continued on next page

Step 6. Installing LED/Switch Modules into Expansion Bays (4100ES), *Continued*

Wiring Instructions

The following directions are complete instructions on interconnecting display cards and connecting the controller card to a power source:

1. Use Harness 734-008 to connect P2 on the controller card to one of the 4-pin connectors on the PDI.
2. If there are multiple controller cards, use Harness 734-036 to connect P3 on the controller card to P2 on another controller card.
3. Interconnect all LED/switch display cards with the ribbon cables (provided). Connector P1 is the input; connector P2 is the output.

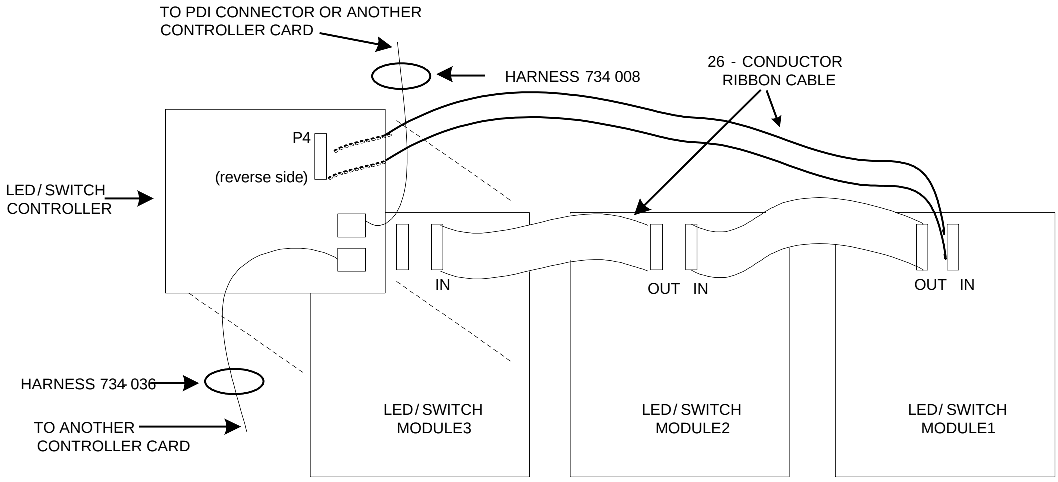

Figure 2-20. LED/Switch Controller Wiring

Chapter 3
Installing 4100ES MINIPLEX/RTU Components

Introduction

MINIPLEX transponder interface cards (TICs) allow for data and power interconnections between the 4100ES host panel and remote locations. This chapter describes the transponder installation for 4100ES MINIPLEX/RTU systems.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Introduction to MINIPLEX Transponders (4100ES)

Overview

The 4100ES MINIPLEX/RTU system is comprised of a host panel containing everything required in a standalone cabinet (see Chapter 1), plus:

- One or more remote MINIPLEX transponder cabinets.
- A transponder interface card (TIC) in each transponder cabinet.

Transponder Cabinets

RUI Communication wiring from the RUI module in the host panel can be extended to a transponder interface card (TIC) in a remote transponder unit (RTU). The transponder cabinet has at least one TIC module in it.

Transponder Interface Cards (TICs)

Australian 4100ES uses the Basic Transponder Interface Card (TIC) Module. Other versions of TIC are not listed for use in Australia.

Transponder Interface Cards (TICs) transfer data from the 4100ES CPU to the slave cards in the RTU.

Basic TIC

The Basic TIC is an addressable slave card that contains RUI outputs, an audio riser output, a user interface output, and a power and comms output for connecting to legacy motherboards.

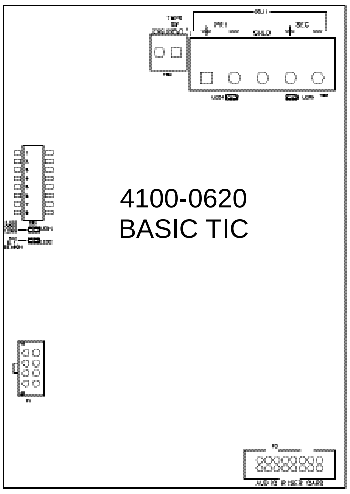

Figure 3-1. Transponder Interface Cards

The Basic TIC has the following LED indicators:

LED1. indicates communication loss with the CPU.

LED2. Indicates when an RUI ground fault search is active.

LED4. Indicates an RUI Style 7 primary trouble.

LED5. Indicates an RUI Style 7 secondary trouble.

Card Specifications

Table 4-1 lists the specifications for the TIC.

Table 3-1. TIC Specifications

Electrical Specifications	
Input Voltage	18-33 VDC
Output Voltage	8 V @ 1 A; 100 mV p-p ripple
Input Current	87 mA, excluding the 8V load from legacy slave cards powered by theTIC.
Environmental Specifications	
Operating Temperature	32° to 120° F (0° to 49° C)
Humidity	10% to 93% relative humidity at 90° F (32° C)

MINIPLEX System Guidelines (4100ES)

Overview

The rules on this page apply exclusively to MINIPLEX systems. Review each guideline before installing a MINIPLEX 4100ES system.

Guidelines

- All wiring is between 0.75mm^2 (minimum) and 2.5mm^2 (maximum).
- All wiring is supervised and power-limited.
- All wiring that leaves the building requires overvoltage protection. Install the protection module inside an electrical box wherever the wiring enters or leaves the building. A maximum of four 2081-9044 protection modules may be connected to one RUI channel. The 2081-9044 is rated for 200mA (maximum).
- AS 1670 allows no more than 40 detectors/addressable devices to be lost by a single fault. This is particularly relevant for Class B (spur) configurations.
- For Class B (spur) operation:
  - The maximum direct cable distance from the host panel to any transponder is 760m.
  - "T" spurs are allowed.
  - The sum of all the cable lengths (including all "T" spurs) must be less than 3,000m.
  - Maximum allowed line-to-line capacitance ("+" to "-" terminals) is 0.58 uF. For applications with shielded wire, be sure that the total capacitance from line to line plus the shield to either line is no more than 0.58 uF (this is usually only a problem when using MIMS cables).
- For Class A (loop) operation, the maximum cable distance around the loop is 760m. "T" spurs are not allowed.
- Annunciators and transponder interface cards support loop operation when the system is wired Class A.
- The master control panel must be a 4100ES Fire Alarm Control Panel.
- Up to 4 RUI cards in the 4100ES Control Panel can be used for distributing transponder wiring in different directions or for supporting different wiring requirements (such as using a Style 7 (Class A) RUI for serial annunciators).
- Up to a total of 31 transponders can be controlled from the 4100ES Control Panel, and can be distributed as required among the RUI cards.

Configuring Cards (4100ES)

Overview

The TIC and all other cards mounted in the transponder cabinet and attached expansion bays must be configured to operate correctly in the system via their DIP switch and jumper ports. The CPU motherboard may have to be configured as well.

CPU Motherboard DIP Switch

P9 on the CPU motherboard determines whether the RUI SHIELD signal is connected to 24 C or Earth.

- Position 1 – 2: SHIELD to 24 C (default).
- Position 2 – 3: SHIELD to Earth.

Note: Some devices that connect to RUI have inherently grounded shield terminals, in which case 24 C cannot be used. If 24 C is used, a Negative Ground Fault will occur.

TIC Configuration

The TIC must be assigned a device address via DIP switch SW1. Refer to Appendix A for the address switch table.

Configuring Other Cards

Refer to the respective installation sheets to configure the other cards that are located in the transponder cabinet and attached expansion bays.

TIC/Riser Mounting (4100ES)

Overview

TICs are mounted like any other 4-inch (102 mm) X 5-inch (127 mm) card.

Mounting Instructions

Use the following instructions and Figure 3-2, below, to mount 4"x 5" slave cards to an expansion bay.

IMPORTANT:

1. Screw two standoffs and washers to the appropriate holes in the back of the cabinet. These holes must line up with the screwholes in the 4-inch (102 mm) X 5-inch (127 mm) card. See Figure 3-2.
2. Plug the 4-inch (102 mm) x 5-inch (127 mm) card into the PDI connector (P8).
3. Secure the top of the card to the standoffs with two #6 Torx screws and washers.

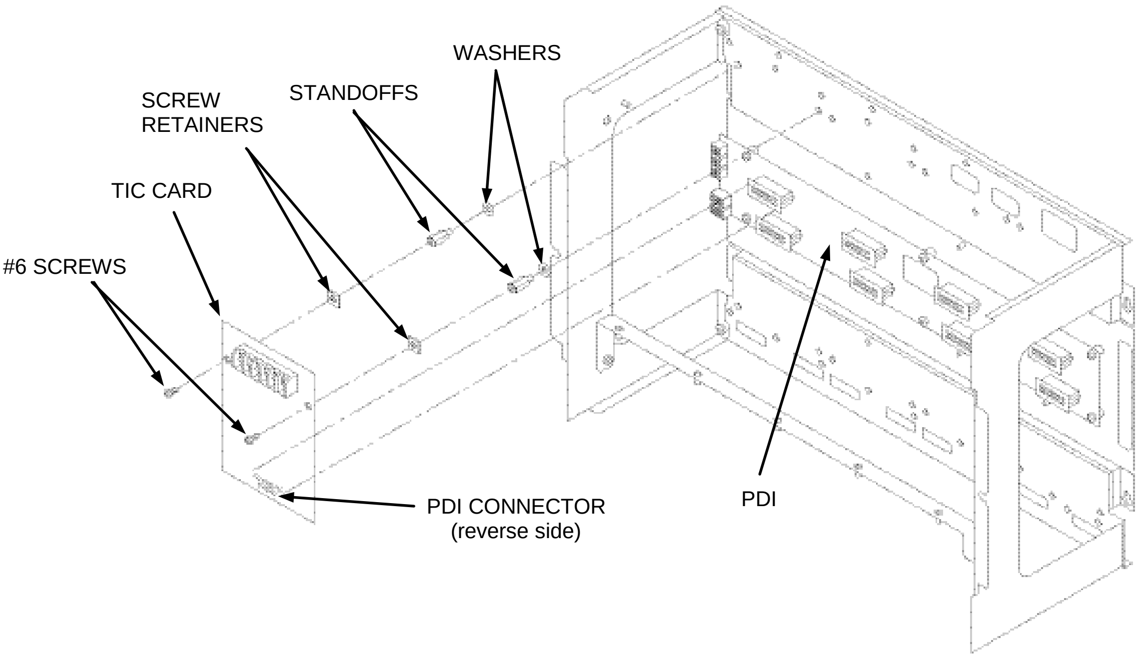

Figure 3-2. TIC Mounting

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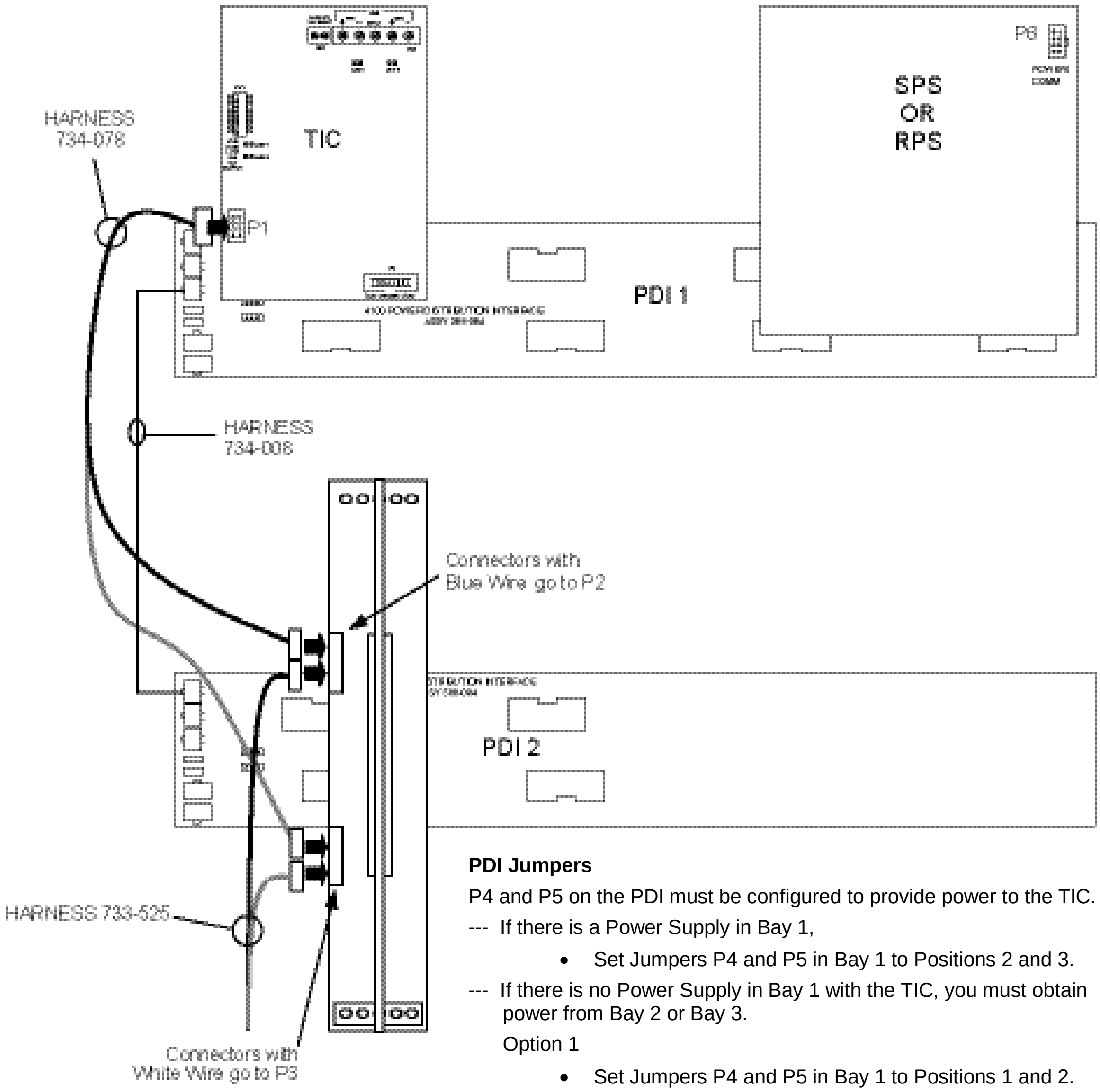
TIC/Motherboard Interconnections (4100ES)

Use Figure 3-3 to connect the TIC to a motherboard in another bay.



PDI Jumpers

P4 and P5 on the PDI must be configured to provide power to the TIC.

--- If there is a Power Supply in Bay 1,

- Set Jumpers P4 and P5 in Bay 1 to Positions 2 and 3.

--- If there is no Power Supply in Bay 1 with the TIC, you must obtain power from Bay 2 or Bay 3.

Option 1

- Set Jumpers P4 and P5 in Bay 1 to Positions 1 and 2.
- Connect one end of Harness 734-008 to Power/Comm plug on the SPS or RPS (P6) (or P2 on XPS) located in Bay 2 or Bay 3. Connect the other end of the harness to P1 in Bay 1.

Option 2

- Set Jumpers P4 and P5 in Bay 1 to Positions 1 and 2.
- Set Jumpers P4 and P5 to Positions 2 and 3 in bay with power supply that will provide power to the TIC in Bay 1.
- Connect one end of Harness 734-008 to P2 or P3 in bay that will provide power to the TIC in Bay 1. Connect the other end of the harness to P1 in Bay 1.

Figure 3-3. Transponder Cabinet Interconnections

RUI Wiring (4100ES)

Overview

The TIC must be connected to the host panel via RUI cabling. This section explains how to wire the two together, and how to set up a system with multiple transponders connected to the same host panel.

Wiring Configurations

RUI cabling can be accomplished either through Class A (loop) or Class B (spur) wiring.

Class A wiring allows transponder cabinets to communicate with the host panel even in the event of a single open or short circuit somewhere in the loop.

Class B wiring allows “T” tapping, and therefore requires less wiring run per installation than Class A.

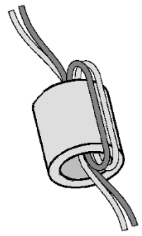


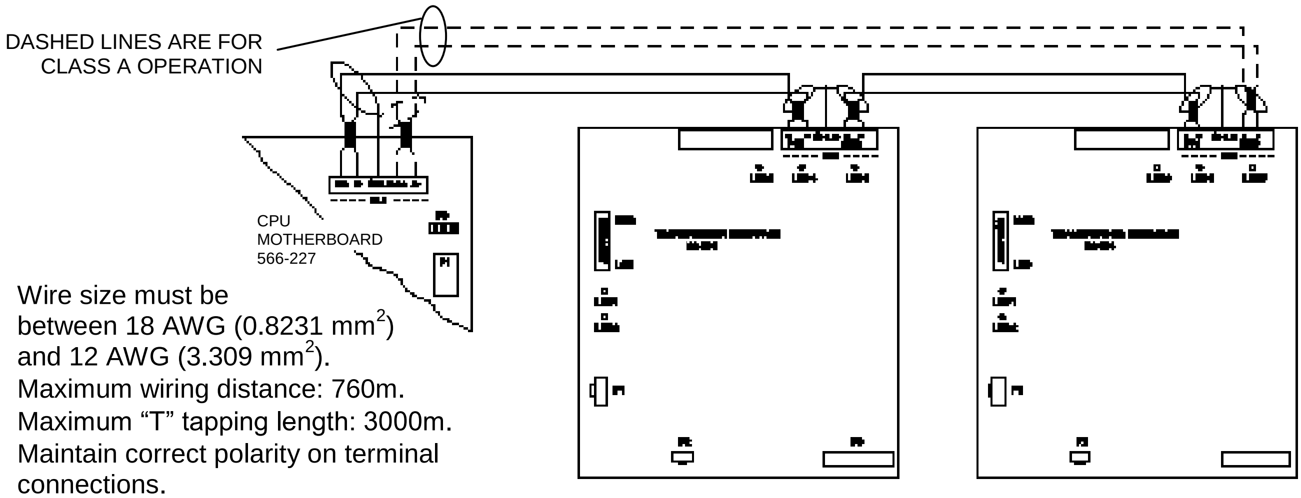
Figure 3-4
The Ferrite Bead

If the transponder(s) have more than 40 detectors connected to them in total, Class A (loop) wiring must be used to meet the requirements of AS 1670.1.

RUI wiring does not require end-of-line resistors, because each TIC communicates directly to the CPU.

Note: Use the supplied ferrite beads with TICs. Loop wires once through the ferrite bead(s) as shown in Figure 3-5.

The illustration below shows both types of wiring.



- Wire size must be between 18 AWG (0.8231 mm^2) and 12 AWG (3.309 mm^2).
- Maximum wiring distance: 760m.
- Maximum “T” tapping length: 3000m.
- Maintain correct polarity on terminal connections.
- Do not loop wires under terminals.

Figure 3-5. TIC Wiring to the Host Panel

Chapter 4
Networking

Introduction

A standalone or MINIPLEX 4100 system becomes a network node when a 4100 Network Interface Card (NIC) or other compatible network card is installed and connected to another network node. How network cards connect to each other depends on the type of media network cards being used.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Getting Started

Overview

This chapter describes how to turn a standalone or MINIPLEX FIP into a network node. This process consists of the following:

Step 1. Configuring cards for operation (using DIP switches and jumper ports).

Step 2. Mounting media cards to the network interface card (NIC).

Step 3. Mounting network cards.

Step 4. Wiring network cards.

Each step is described in this chapter. Before beginning the installation, review the next few pages for a detailed description of network cards and the media cards that mount onto them.

Introduction to the 4100 Network Interface Card (NIC)

Overview

The Network Interface Card (NIC) is a slave card that uses the internal 4100 serial bus to communicate with the master. The NIC connects FIPs in a network, allowing for communication between each panel via optical fibre, modem, or twisted shielded pair wire.

The NICs are designed to be connected in a ring arrangement, so that one circuit fault does not cause the entire system to fail. The ring arrangement provides the most secure and fault-tolerant wiring possible.

Two types of media boards of either type can be used with the NIC card:

- The Fiber-Optic Media Card can be used for electrically noisy environments or for connecting externally to other buildings.
- The Wired Media Card is used in all other types of applications.

Up to two media boards of either type can be plugged into each NIC. The same NIC can use a combination of two types of media boards (for example, a NIC may have a wired media card connected to port 1 and a fibreoptic media card connected to port 2).

Note: other types of network interfaces are available for special functions, such as single mode fibre modems and TCP/IP bridge cards. Please contact your Simplex representative for more details about these.

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Network Interface Card

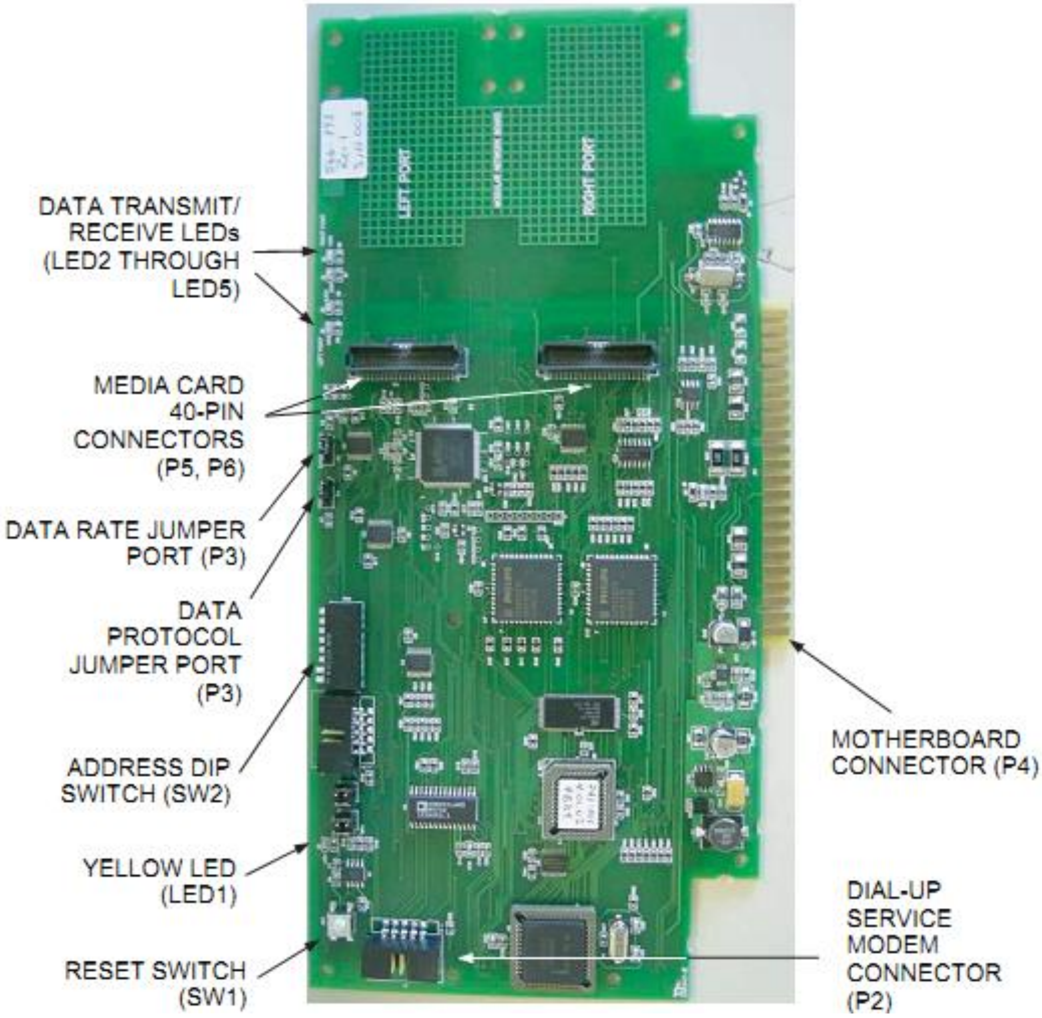

Figure 4-1. 4100-6014 Network Interface Card

NIC Card LED Indications

The 4100-6014 NIC has the following LEDs:

LED1 (yellow). Illuminates when:

- The host 4100 requests it to illuminate.
- A transmission fails.
- The NIC is off-line with the 4100 host.
- The NIC needs to be configured.

LED2 (red). Illuminates when a data ‘0’ is received at the right port.
LED3 (green). Illuminates when a data ‘0’ is transmitted at the right port.
LED4 (red). Illuminates when a data ‘0’ is received at the left port.
LED5 (green). Illuminates when a data ‘0’ is transmitted at the left port.

Continued on next page

NIC Media Cards

There are two approved media cards that can be plugged onto the 4100-6014 NIC:

- 4100-6057 Fiber-Optic Media Card (565-261).
- 4100-6056 Wired Media Card (565-413).

Each module is shown below.

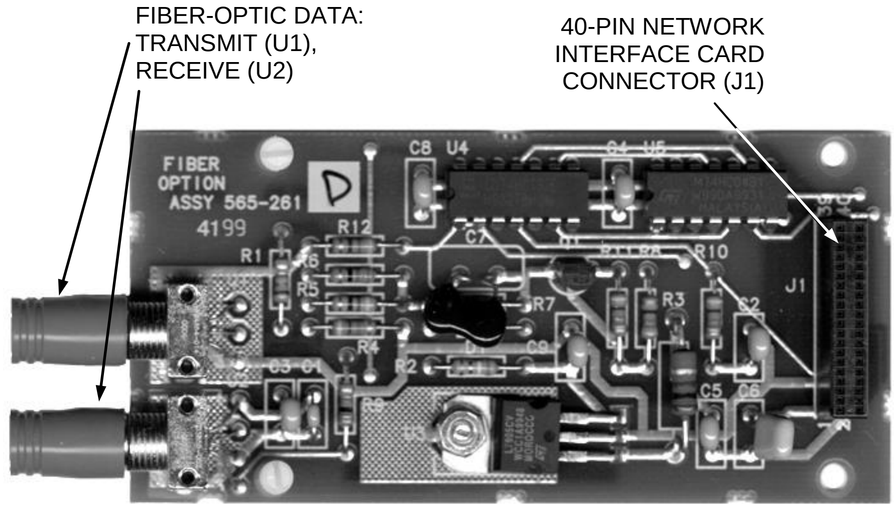

Figure 4-2. The 4100-6057 Fiber-Optic Media Card

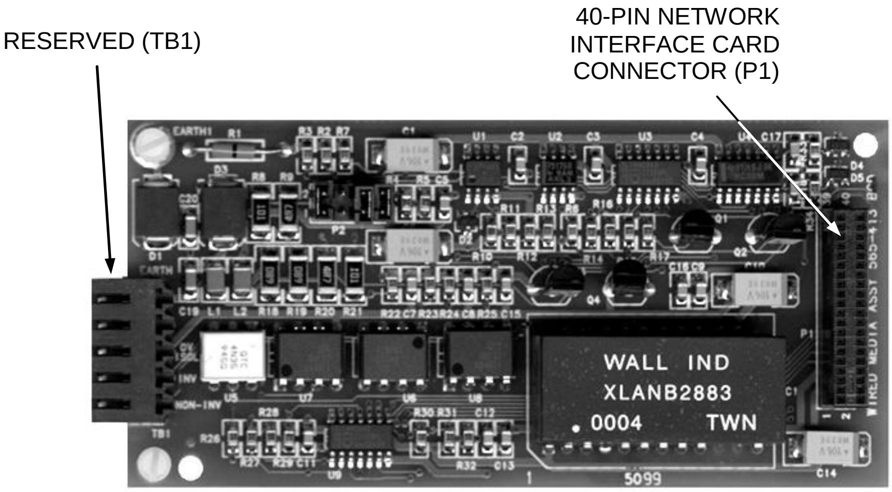

Figure 4-3. The 4100-6056 Wired Media Card

Continued on next page

Requirements and Limitations

Table 4-1. 4100 NIC & Media Cards - Electrical and Environmental Specifications

Electrical Specifications	
Network Interface Card	Startup, no media cards: 8 VDC @ 110 mA Nominal, no media cards: 20 to 32 VDC @ 0 mA
Fiber Media Card	Using 24 V power supply: 20 VDC @ 140 mA max. Using 5 V power supply (GCC/NPU): 5 VDC @ 130 mA max.
Wired Media Card	4.75 to 5.25 VDC @ 170 mA max.
Environmental Specifications (All Modules)	
Operating Temperature	32° to 120° F (0° to 50° C)
Humidity	10% to 93% relative humidity at 90° F (32° C)

Step 1. Configuring Network Cards

Motherboard Jumper Settings

Master Motherboard 566-227 has these settings associated with fitting a NIC to it:

P10: Port 1 settings.
P11: Port 2 settings.

- P10/P11 position 1 – 2: Network card (NIC) attached to CPU motherboard (default).
- P10/P11 position 2 – 3: RS-232/2120 card attached to CPU motherboard.

NIC Card Address Setting

Use **SW2** on the NIC to set the NIC card address. Refer to Appendix A for the address table.

Continued on next page

Step 1. Configuring Network Cards, *Continued*

NIC Card Jumper Settings

There are two shunt jumper ports on the NIC card that need to be set: P3 and P4.

P3: Determines the NIC data transmission rate, 57.6 kbits/second or 9600 bits/second.
- Position 1 – 2 (the right two pins) *or* no pins jumpered: 57.6 kbits/second.
- Position 2 – 3 (the left two pins): 9600 bits/second.

P4: Determines the data protocol, 8-bit or 9-bit, that the NIC card is using.
- Position 1 – 2 (the right two pins) *or* no pins jumpered: 9-bit.
- Position 2 – 3 (the left two pins): 8-bit.

All settings are labelled on the card.

Wired Media Card Jumper Settings

P2: Tells the system which wire type is to be used.
- Positions 1 – 2, 5 – 6, and 7 – 8: 18 AWG shielded, twisted pair wiring.
- Remove all jumpers to specify 24 AWG twisted pair telephone cable wiring.

IMPORTANT: When using the wired media card, the Earth fault detection is performed on the left port only. Remove R1 (1 Ohm resistor) from the media card on the right port.

Step 2. Mounting Media Cards to the NIC

Overview

The 4100-6014 Network Interface Card (NIC) uses media cards to connect to other NICs. This section describes how the media cards are mounted onto NICs.

Media Card Mounting

NICs connect to each other via the media cards. The types of media cards in the right and left ports are determined by the type of wiring that is being used between cards.

Connect P1 on the wired media card, *or* J1 on the fibre media card, to P5 (the left port) on the NIC.

To connect a second media card to the same NIC, connect it as described above, but use P6 (the right port) on the NIC. Note that any two types of media cards can be connected to the same NIC.

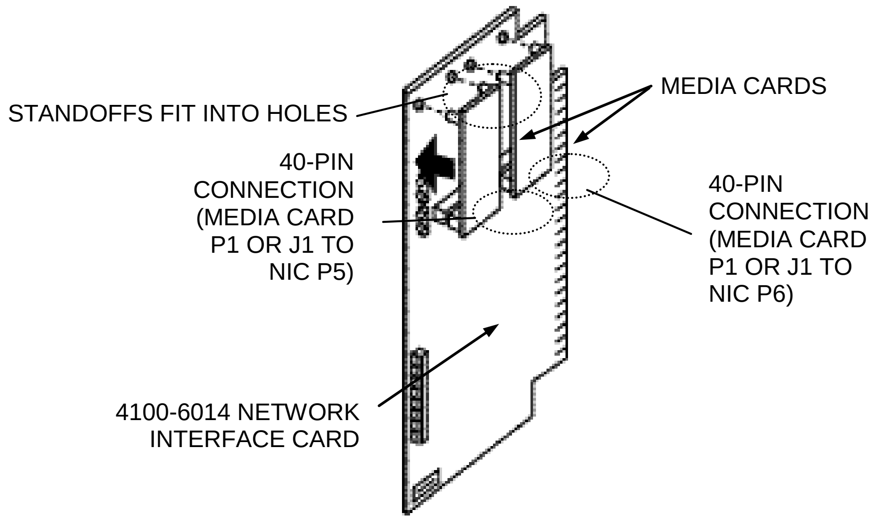

Figure 4-4. Media Card Mounting

Step 3. Mounting Network Cards

The 4100 NIC, shown in Figure 4-5 below, inserts into its motherboard as follows:

- If the 565-274 Master Motherboard is being used, the NIC daughter card is inserted into connector J1.
- If the 566-227 Master Motherboard or 565-275 Motherboard is used, the NIC daughter card is inserted into connector J2.

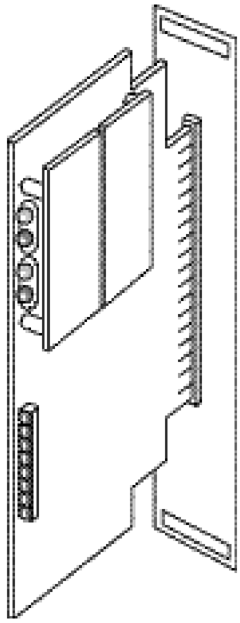

Figure 4-5. Installing the NIC

Step 4. Wiring Network Cards

Overview

The nodes in the network now have to be wired together, so that the NIC in one host panel connects to the NIC in the next panel. This section contains guidelines and instructions for NIC wiring.

Wiring Guidelines

Refer to the following guidelines whenever field wiring the NICs:

- Network nodes must be wired right to left port, regardless of the media type selected.
- Style 7 protection is achieved by wiring the nodes in a loop. A single fault (except an Earth fault) will cause the network to reconfigure for degraded Style 7 (Style 4) operation. A second fault (except an Earth fault) will result in the network dividing into two separate networks.
- Style 4 is achieved by wiring the nodes in a linear fashion. Style 4 networks are not fault-tolerant and a single fault (except an Earth fault) will result in the network dividing into two separate networks.
- Earth fault detection is performed on the left port only. When a network Earth fault occurs, the trouble is only reported on the node whose left port is connected to the link with the earth fault.
- All 18 AWG (0.8231 mm^2) wiring used with 4100-6056 Wired Media Cards must be twisted-shielded pair. All 24 AWG (0.2047 mm^2) (telephone cable) used with 4100-6056 must be twisted pair. When shielded cable is used, the shield must be terminated to chassis Earth on the left port only.
- It is permissible to use mixed media in a network. For example, some spans may be “wired media” while others are optical fibre.
- Each NIC has a jumper for selecting between network data rates of 57.6kbps and 9.6kbps. All cards in the network must be set for the same rate. (When physical bridging is used, the data rate must be set for 9.6kbps).
- Each NIC has a jumper for selecting between 8- and 9-bit network protocols. All cards in the network must be set for the same network protocol. (When physical bridging is used, the protocol must be set for 8-bit).
- All network wiring except the shield is supervised and power limited.
- When wiring leaves the building, 2081-9044 Overvoltage Protectors are required. One overvoltage protector is installed where wiring leaves the building; another is installed where wiring enters the next building.

Continued on next page

Wiring Distances

Maximum wiring distances are shown in the Table below and in Appendix J.

Table 4-2. Wiring Distances

Media Type	Size	Data Rate	Max Distance
Wired	24 AWG ($0.20\ mm^2$)	57.6 kbps	7,000 ft (2,130 m)
		9.6 kbps	12,000 ft (3,650 m)
	18 AWG ($0.82\ mm^2$)	57.6 kbps	10,000 ft (3,050 m)
		9.6 kbps	17,000 ft (5,200 m)
Optical Fiber	50/125 um	57.6 or 9.6 kbps	10,000 ft (3,050 m)
	62.5/125 um	57.6 or 9.6 kbps	15,000 ft (4,500 m)
RS-232	18 AWG ($0.82\ mm^2$)	57.6 kbps	50 ft (15 m)
		9.6 kbps	300 ft (91 m)

Notes:

- The characteristics for $0.75\ mm^2$ are shown in Appendix J.
- 18 AWG ($0.82\ mm^2$) fire-rated twisted, shielded pair must not exceed 200pF per metre and be not more than 21 ohms per kilometre.
- 24 AWG ($0.20\ mm^2$) twisted, unshielded telephone cable must not exceed 72pF per metre and be less than or equal to 81 ohms per kilometre.

Related Documentation

Refer to the 900-242 Field Wiring Specifications or 900-143 Fiber Tutorial for additional NIC wiring information.

Continued on next page

Step 4. Wiring Network Cards, *Continued*

Fiber-Optic Wiring

Connectors U1 (transmitter) and U2 (receiver) on the 4100-6057 Fiber-Optic Media Card are used to connect 4100-6014 NICs across parts of a network.

Note: ST connectors with long strain relief boots are to be used with the fibreoptic cable.

Figure 4-6 shows how two network nodes are connected via fibreoptic cable.

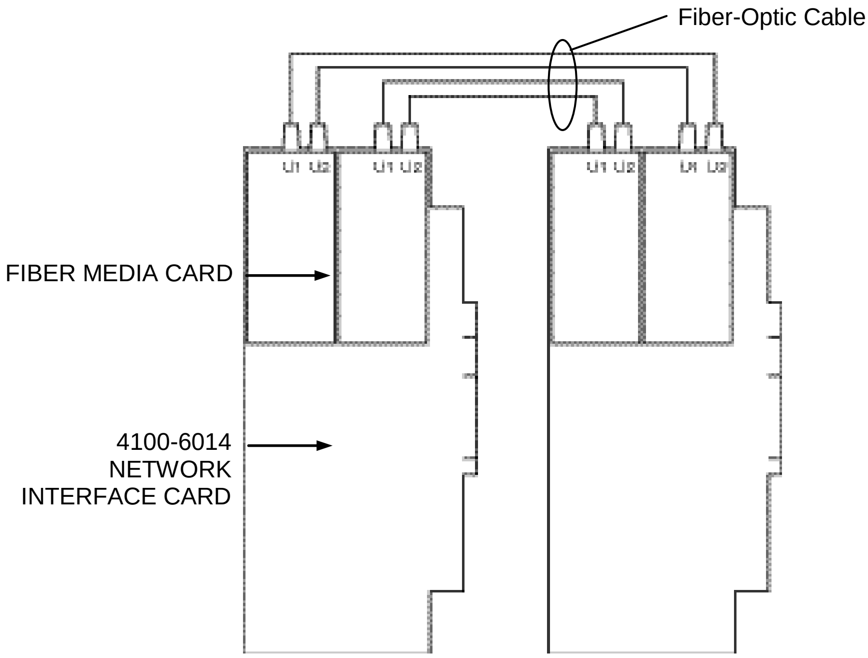

Figure 4-6. Fiber Wiring

Fiber Optic Connection Types

Dual Fiber Optic Cable Connections. The standard fibreoptic connection between network nodes uses two fibreoptic cables, one for transmit, and the other for receive. This connection allows for optimum communications distance.

The available communications distance is determined by the properties of the specific fibre cable used. Distances can be determined using the information and examples shown below in Table 4-3.

Single Fibre Optic Cable Connections. For applications where a single fibre cable is available, or where use of a single cable is desired, using a model 4190-9010 Bi-Directional Coupler at each node combines the separate transmit and receive signals into a single path (refer to the requirements list).

This connection allows use of a single fibre cable, but it does reduce communications distance as indicated in the information and examples shown below in Table 4-4.

Continued on next page

4190-9010 Coupler Requirements

The 4190-9010 Coupler (271-012) is used with the Fiber Optic Media Board, revision "C" or higher. Two 4190-9010 Bi-Directional Couplers are required per connection, one at each node.

The 4190-9010 is equipped with type ST connectors. To make type ST to type ST connections, an ST to ST coupler, by others, is required. ST to ST Couplers are available from:

Black Box, part # FO200
Fiber Instrument Sales, part # F1-8101
Newark Electronics, part # 95F2097
(or equivalent)

Table 4-3. Dual Fiber Optic Cable Communications Distance Examples

Fiber Type [1*]	MIFL [2]	Power Margin	Distance [3]	Budget [3]
50/125 numerical aperture = 0.2	4 dB/km	4 dB	10,000 ft (3.05 km)	17 dB
	3 dB/km	3 dB	15,000 ft (4.57 km)	
62.5/125 numerical aperture = 0.275	4 dB/km	4 dB	13,000 ft (3.96 km)	21.4 dB
	3.75 dB/km	3 dB	15,000 ft (4.57 km)	

*See notes at bottom of page.

Table 4-4. Single Fiber Optic Cable Communications Distance Examples Using 4190-9010 Bi-Directional Couplers

Fiber Type [1]	MIFL [2]	Power Margin	Distance [3]	Budget [3]	4190-9010 Coupler Loss	ST to ST Coupler Loss
50/125 numerical aperture = 0.2	3 dB/km	2 dB	7,650 ft (2.33 km)	21.4 dB	9.4 dB	3 dB
62.5/125 numerical aperture = 0.275	3.2 dB/km		8,200 ft (2.5 km)			2 dB

Notes for Tables Above:

1. Cable specifications are for 50 or 62.5 micron core with 125 micron cladding, multi-mode graded index fibre. Wavelength = 850 nm.
2. MIFL = Maximum Individual Fiber Loss. Numbers shown are for example reference only, refer to specific cable for exact specification.
3. Maximum cable length is determined by distance listed or by reaching budget value, whichever is shorter. Maximum distances listed for dual fibre cable are shorter than would be calculated. Budget using 4190-9010 Bi-Directional Coupler is the same with either size cable because the coupler input cables are 62.5/125 fibre allowing launch power to be the same.

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Step 4. Wiring Network Cards, *Continued*

4190-9010 Coupler Requirements (*continued*)

The illustration below shows coupler wiring.

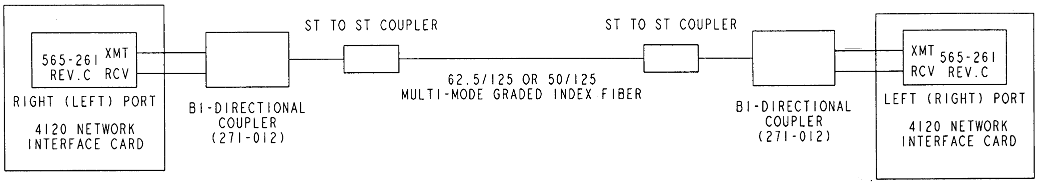

Figure 4-7. Coupler Wiring

Wiring with the Wired Media Card

Refer to the guidelines and figures in this topic to use wired media cards.

IMPORTANT: TB1 on the wired media card must not be used when it is connected to the 4100-6014 NIC.

- The shield should only be connected at one end of each link between each FIP. The shield is connected to the left port.
- When wiring leaves the building, 2081-9044 Overvoltage Protectors are required. One overvoltage protector is installed where wiring leaves the building; another is installed where wiring enters the next building.

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Wiring with the Wired Media Card (continued)

The Table below lists the 4100ES master motherboard connections for the wired media card.

Table 4-5. 566-227 CPU Motherboard Wired Media Connections

Motherboard Port for Media Card Connected to P5	Wired Media Card Connection (Left Port)
TB1-4	0 V
TB1-5	Earth ground
TB1-6	INV (-)
TB1-7	None
TB1-8	NONINV (+)
Motherboard Port for Media Card Connected to P6	**Wired Media Card Connection (Right Port)**
TB3-1	NONINV (+)
TB3-2	Reserved
TB3-3	INV (-)
TB3-4	Earth ground
TB3-5	0 V

Figure 4-8, below, shows how two CPU motherboards with wired media network cards connect to each other in the 4100ES.

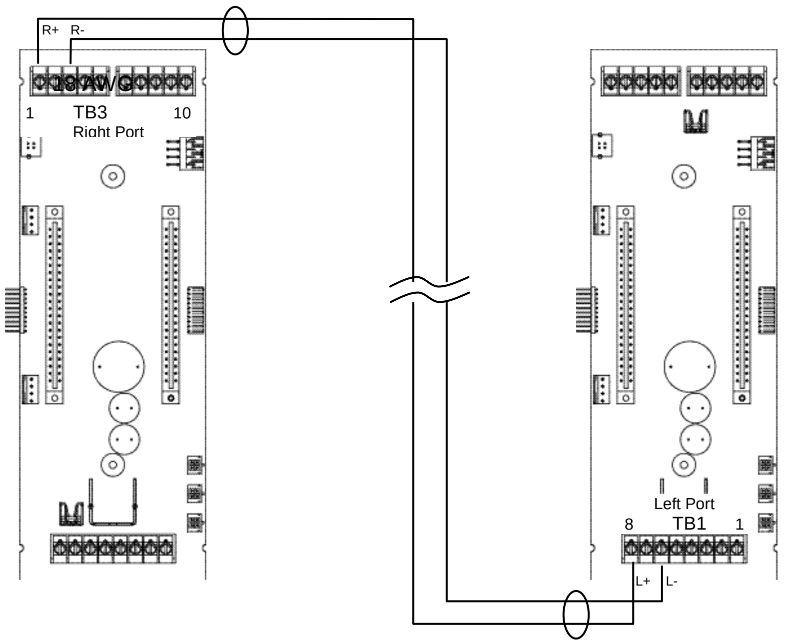

Figure 4-8. Wired Media Interconnections between 4100ES Master Motherboards

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Step 4. Wiring Network Cards, *Continued*

Loop Wiring, mixed Fibre and Cable

Figure 4-9 shows an example of loop network cabling using a mixture of fibre optical cable and twisted pair. Note that the left port of each network card is connected to the right port of the next network card regardless of whether the connection is fibre or copper.

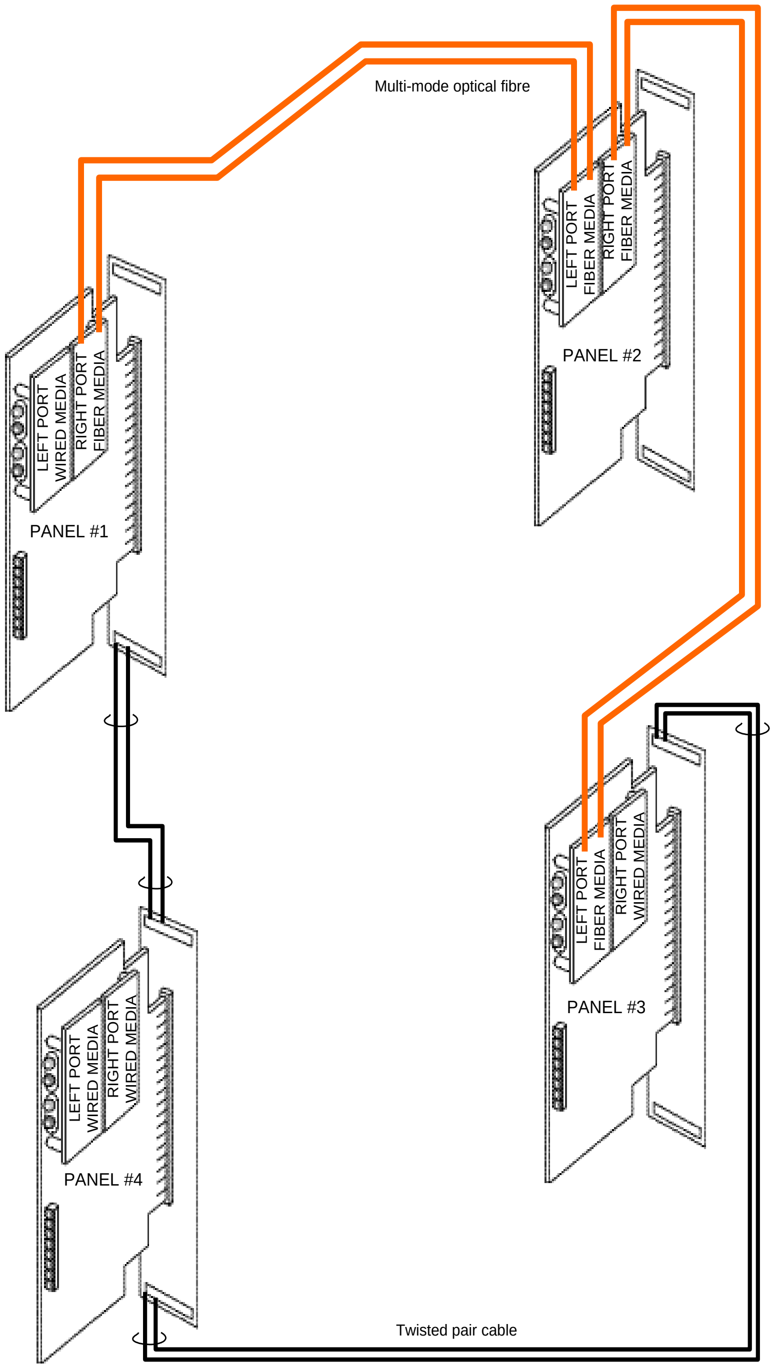

Figure 4-9. Example of Ring/Loop NetworkWiring

Chapter 5
The System Power Supply & Alarm Relay Card

Introduction

The SPS is introduced in Chapter 2. A picture is shown in Figure 2.4.

This chapter has the current and voltage ratings of the system power supply (SPS) and describes how it is installed and configured by the factory. It also describes the Alarm Relay Card that mounts onto the SPS to provide 3 extra relays.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

SPS Specifications

Input/Output/Battery Specifications

The following table summarizes the specifications for the SPS.

Table 5-1. SPS Input and Output Specifications

AC Input Specifications	
SPS in Standard Australian FIP 4100-9848AU	2 A Maximum 240 VAC + 6% -10% @ 50 Hz
DC Output Specifications	
Voltage	Nominal 28VDC Minimum: 19.5 VDC Maximum: 32 VDC Ripple: 2 VDC p-p @ full load (9A)
Total Current (max)	9A alarm load. Includes: NACs (+24V Sig); +24V Card; +24V Aux; SPS card power including on-board IDNet. 5A non-alarm load. Includes as per above, allows for battery charging at high rate.
24V Card 24V Aux	2A max. See note. 2A max
Each NAC (total A+B)	3A max alarm load 2A max non-alarm load (used as Aux 24V power).
SPS IDNet Output	30 V or 35 V (see note below)
Battery Charger Specifications	
Input Voltage Range	21-33 VDC
Output Float Voltage	27.3 VDC ±200 mV @ 20°C, temperature compensated at approximately -36mV/°C (0° C to 50° C)
Supervision Voltages (nominal at 20°C)	Charger High 28.4Vdc Charger Low 26.2Vdc Battery Low 24.3Vdc Battery Depleted 19.4Vdc
Output Current Limit	1.4 A (For 6.2 – 18 Ah battery) 3.3 A (Default; for 18-110 Ah battery)

Notes:

- AC power must be provided to the 4100ES from a dedicated AC branch circuit. The AC input is supervised.
- A mains fail fault is generated when the DC voltage drops below 20.3V (nominally 204Vac).
- *240 VAC:* The service branch circuit breaker should be sized to handle at least 150 percent of the total required by all of the power supplies in the system.

Continued on next page

SPS Specifications, *Continued*

- The bulk supply (rated at 9A max) which feeds 24V Sig, 24V Card, 24V Aux also supplies the SPS Card including the on board IDNet, and the battery charger. The charger is disabled during alarm conditions so as to make the 9A available on the other busses. (See the following table for the SPS current.)
- +24V Sig is used to supply the NACs. It can be made accessible by configuring a NAC as an AUXPWR power output (which is normally energized).
- The battery circuit is supervised every 29 seconds. The standard configuration does a battery test for one hour every week.
- The battery is connected to the charger but is normally disconnected from the bulk supply. During mains fail, and the 1 hour battery test, the battery is connected to the bulk supply.
- The IDNet output is 30V in the normal condition. When it is necessary to activate large numbers of output devices on IDNet peripherals (such as piezo sounders), the output voltage is increased to 35V to provide sufficient voltage at the end of the wire to activate the sounder bases. The higher voltage output is an alarm condition for the purpose of standby battery calculation.

SPS Current Consumption

The following table summarizes standby battery consumption for the SPS. Voltage assumed is 24 V, which is the rated battery voltage for lead-acid type batteries.

Table 5-2. SPS Current Specifications

Standby Conditions	Current
• No alarms (NACs normal) • IDNet LED ON, no IDNet devices connected	175 mA
Add to above for each additional set of 50 IDNet devices in standby, with IDNet at 30 V	40 mA
Total current for fully loaded IDNet channel (250 devices) in standby	375 mA
Alarm Conditions	**Current**
• 3 NACs ON • IDNet LED ON, no IDNet devices connected	185 mA
Add to above for each set of 50 IDNet devices in alarm, 20 LEDs ON	80 mA
Add to above for each set of 50 IDNet devices in alarm, LEDs OFF	50 mA
Total current for a fully loaded IDNet channel (250 devices) in alarm, 20 LEDs ON	475 mA

Notes:

- *Additional standby conditions:* Fault relay activated, power fault LED on, IDNet LED on, battery charger off, auxiliary power load = 0 mA

Continued on next page

SPS Specifications, *Continued*

- *Additional alarm conditions:* Fault relay activated, power fault LED on, IDNet LED on, battery charger off, auxiliary power load = 0 mA, NAC alarm load = 0 mA, IDNet = 35 V

Environmental Requirements

The range of possible temperatures under which the SPS may function are between 0° C and 50° C (120° F).

The SPS operates normally under non-condensing humidity conditions up to 93% relative humidity at 32° C.

SPS Configuration

Overview

This section contains information about SPS jumpers, DIP switches and potentiometers.

Jumper Settings

P2: If the SPS IDNet outputs are being used, you may change P2 to configure the IDNet shield connection.

- Position 1 – 2 (bottom): Connects the shield to 0 V (default).
- Position 2 – 3 (top): Connects the shield to earth ground.

P3: City Card and Relay Card operation

- Position 1-2 (top): Install in pos. 1-2 only if a relay card 4100-6033 is installed and has relay 3 programmed for operation other than "Fault (Trouble)"
- Position 2-3 (bottom): (default) For use with 4100-6033 if relay 3 is programmed for "activate on fault (trouble)" operation. (This option is used for Brigade connection)

P1: Earth connect jumper.

- Position 1 – 2 (rhs): Enables Earth fault monitoring. Set to this position **unless** the system uses a TrueAlert Power Supply under common 0 V.
- Position 2 – 3 (lhs): Disables Earth fault monitoring. Set to this position **only if** the system uses a TrueAlert Power Supply under common 0 V.

Setting the Device Address

Refer to Appendix A to set the device address for the SPS with DIP switch SW1.

Adjusting Voltages

There are two small potentiometers on the 4100-9848AU SPS, situated below the centre of the PCB. These are adjusted in the factory and typically will not need adjusting in the field.

If it is necessary to adjust them, turning the potentiometer clockwise increases the setting.

R341 Battery Charger Voltage
Adjust this potentiometer to achieve a charger voltage of 27.3V ± 0.1V at 20°C. (Allow -36mV/°C for temperatures different to 20°C). Disconnect the battery while making this adjustment, and measure the charger output at the SPS terminals. Reconnect the battery after making the adjustment.

R342 Voltage Measurement Calibration
Adjust this potentiometer to match the indication of charger voltage on the panel user

interface with that on a calibrated voltmeter measuring the charger output. Use the “Card Status” option of the menu. Match the two readings to within 0.05V DC.

SPS LED Indications

LEDs

The SPS has the following LED indicators:

LED1 (yellow). Illuminates when NAC 1 is ON or in Fault.

LED2 (yellow). Illuminates when NAC 2 is ON or in Fault.

LED3 (yellow). Illuminates when NAC 3 is ON or in Fault.

LED4 (yellow). Illuminates to indicate a communications loss with the system CPU; normally off. If this LED is blinking, try re-loading the slave exec from the master.

LED5 (yellow). Indicates IDNet status.

- Slow blink: Class A open circuit Fault.
- Fast blink: Short circuit Fault.
- On steady: No devices detected/ channel failure.
- Normally off.

LED6 (yellow). Indicates power supply status.

- Single blink: Positive earth fault.
- Double blink: Negative earth fault.
- Triple blink: Battery Fault.
- Quadruple blink: Charger Fault.
- On steady: Overcurrent fault.
- Normally off.

LED7 (green). Illuminates when the power supply is powered from the AC line. Off when the mains is off, or when it is using battery backup power.

Troubleshooting an SPS

Overview

This section contains explanations of fault messages that may appear on the 4100ES user interface when using the SPS. Heading text in the left margin shows the error message, while the paragraph next to it describes the likely cause of the message.

IDNet Power Monitor Trouble

There is no output voltage from the power supply.

Extra Device

Appears if one or more extra devices are present on the loop, i.e., devices that have not been configured for the IDNet channel.. Only one message appears, regardless of the number of extra devices found.

Class A Trouble

There is an open circuit fault detected on the IDNet channel. A hardware reset is required to reset the fault indication.

Earth Fault Search

Comes up during the Earth Fault Search diagnostic function. Once the search is initiated, the front panel display indicates how far along the search process has progressed (10%, 25%… 75%), and then shows the results of the search. The result either identifies the offending circuit or indicates that the earth fault could not be found. SPS circuits (IDNet, NAC, and aux power) are searched. System alarm and fault processing is suspended during the search.

Short Circuit

Appears when a short circuit fault is detected on the IDNet channel. This status clears automatically when the short circuit is removed.

Channel Fail

Appears when each device on the IDNet channel has been configured, but none of the configured devices are communicating on the channel. This message does not appear if there are no configured devices on the IDNet channel.

No Answer/ Bad Answer

Occurs when the 4100ES is put into a diagnostic mode and finds a device not responding, or responding unreliably. Refer to the *4100 Fault Finding Guide (LT0565)* for information on how to perform this diagnostic.

Output Abnormal

Occurs when 24V is not present on TrueAlarm devices or when TrueAlarm sensor bases with relay driver outputs are not properly supervised or when isolator devices are in isolation mode.

The Alarm Relay Card

Overview

The Alarm Relay Card mounts on, and is driven by, the SPS. It has 3 relays, each providing one set of voltage-free contacts.

The relays are able to be configured under custom control, but the default operation is for system status, i.e. Fault (Trouble), Isolate (Supervisory), and Alarm, respectively. These are commonly used to drive the Brigade signalling.

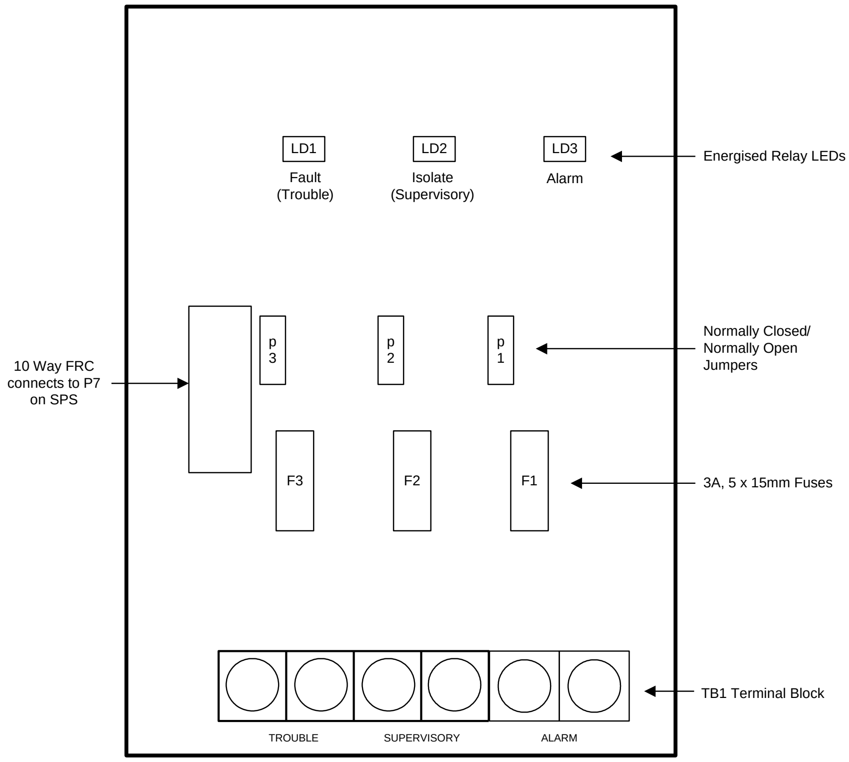

Figure 5-1. The Alarm Relay Card

Mounting

The Alarm Relay Card mounts on the SPS adjacent to the largest relay K3. With the power disconnected, fit the card using the 3 plastic stand-offs and one Torx screw with plastic sleeve.

Connect P4 on the relay card to P7 on the SPS with the 10 way FRC provided.

Configuration

The relays have one set of voltage-free contacts (see note below) connected to one pair of terminals via a header. The two terminals are configured for normally closed or normally open by positioning a jumper on the header.

Table 6-3. Alarm Relay Card Jumper Positions

Relay	Header	Normally Closed	Normally Open
Alarm	P1	1-2 (top)	2-3 (bottom)
Isolate (Supervisory)	P2	1-2 (top)	2-3 (bottom)
Fault (Trouble)	P3	1-2 (top)	2-3 (bottom)

Notes

- The common contact of each relay has a transient suppressor to earth, and must not be used to switch voltages greater than its rating.
- The common contact is protected with a 3A fuse.
- For default configuration the relays are normally de-energised and energise on Fault/Isolate/Alarm.
- The corresponding LED illuminates when the relay is energized.
- The relays may be configured under custom control to operate other than default.

Warning

If relay RL3 is configured for operation other than Fault (Trouble), jumper P3 on the SPS must be shifted to positions 1-2 (top).

Specification

CARD	
Input Voltage	20-32Vdc
Input Current	15mA @ 24V, quiescent
(nominal)	37mA @ 24V, all relays on
RELAYS	
Form	Voltage-free changeover, suppresses to earth
Voltage	30Vac, 32Vdc
Current	2A, resistive load
FUSE	
F1, F2, F3	5 x 15mm, Glass Cartridge, 3A (208-163)

Chapter 6
SPS Field Wiring (4100ES)

Introduction

This chapter shows how various devices are wired to an SPS. It includes connection to NACs, IDNet, relays, and power circuits.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

General Field Wiring Guidelines

General Guidelines

Make sure these guidelines are accounted for before wiring:

- All field wires must be 0.75 mm^2 or greater and comply with AS 1670.1 and the wiring code.
- Conductors must test free of all grounds.
- All wiring must be done using copper conductors only, unless noted otherwise.
- If shielded wire is used,
  - the metallic continuity of the shield must be maintained throughout the entire cable length.
  - the entire length of the cable must have a resistance greater than 1 Megohm to earth ground.
- Underground wiring must be free of all water.
- In areas of high lightning activity, or in areas that have large power surges, the 2081-9027 Transient Suppressor should be used on monitor points.
- Wires that run in plenum should be in conduit.
- A system ground must be provided for earth detection and lightning protection devices. This connection must comply with approved earth detection.
- Only system wiring should be run together in the same conduit.
- Use supplied ferrite beads with all SPS field wiring including the Aux 24V. Loop wires twice through the supplied ferrite bead(s) as shown in Figure 6-1. (See Appendix K for ordering part numbers.)

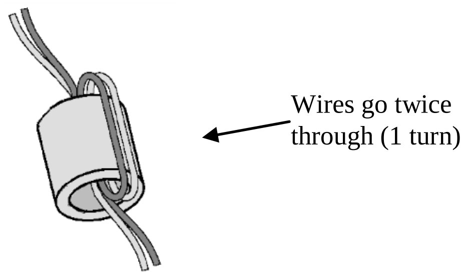

Figure 6-1. The Ferrite Bead

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SPS NAC Field Wiring Guidelines

Overview

Each of the 3 NACs has two pairs of driven outputs (A+/A-, B+/B-) which operate together.

NAC B outputs have polarity reversal supervision and expect a 10k EOLR. Each connected device must have a suitably rated blocking diode.

NAC A outputs have an integral 10kΩ to accommodate Class A (loop) wiring. Class A wiring is not mandatory under AS 1670.1.

The 3A max rating applies to each NAC, B + A outputs combined. NAC load current may be read on the LCD.

The Australian SPS has extra decoupling capacitors fitted to the NAC outputs, and cannot be used to drive the Simplex range of addressable appliances.

NACs may be programmed to be normally on and the terminals used as power supply outputs. See the SPS Auxiliary Power Wiring section following.

Guidelines

These rules apply to NAC field wiring:

- All wiring should be 0.75 mm^2 to 4 mm^2.
- All wiring is supervised and power-limited.
- The maximum alarm current is 3A per circuit. The supervisory current is 2mA at 24 VDC.
- The nominal voltage rating is 24 VDC, 2V p-p ripple (maximum).
- The total available current (Card Power + NAC power + AUX Power outputs) from the SPS is 9A.
- Terminal designations "+" and "-" are for the alarm state of the NAC, not the supervision/idle state.

Continued on next page

Class A NAC Wiring

To connect the SPS to reverse-polarity, non-addressable notification appliances using Class A wiring, read the following instructions and refer to the Figure 6.2 below:

1. Route wire (between 0.75 mm^2 and 4 mm^2) from the "B+", "B-", outputs on TB2 of the SPS to the appropriate inputs on a peripheral notification appliance. Use NAC1, NAC2, or NAC3 as configured.
2. Route wire from the first appliance to the next one. Repeat for each appliance.
3. Route wire from the last appliance to the A+ and A- inputs on the same NAC circuit of TB1 of the SPS.
4. Repeat steps 1 through 3 for each NAC output you want to use.
5. Leave the 10 K, ½ W, brown/black/orange resistor (378-030) on the "B+" to "B-" terminals of each unused NAC. No external end-of-line resistor is needed for circuits in use.
6. If the appliance/device to be used does not have an integral diode, a sufficiently rated blocking diode must be fitted between the incoming +ve wire and the +ve terminal of the device with cathode to the device.

Important: Conductors must test free of all grounds.

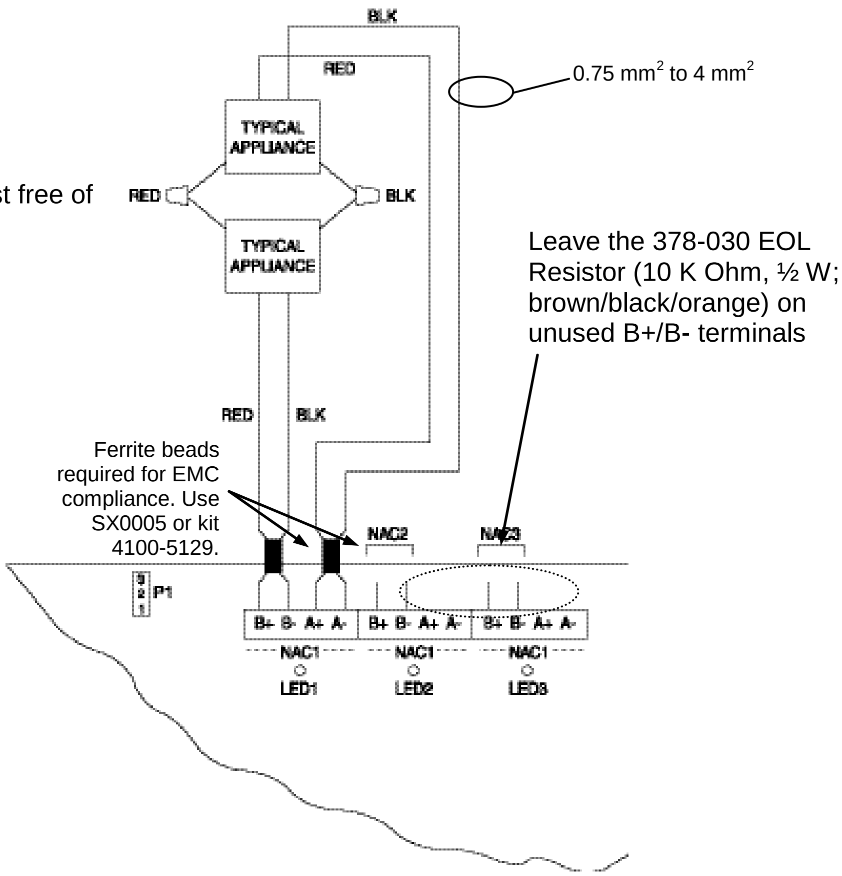

Figure 6-2. Class A NAC Wiring

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Class B NAC Wiring

To connect the NAC output to alarm devices using Class B wiring:

1. Route wire (between 0.75 mm^2 and 4 mm^2) from the B+, B- outputs on TB2 of the SPS to the appropriate inputs on a peripheral notification appliance. Use NAC1, NAC2, or NAC3, as configured.
2. Route wire from the first appliance to the next one. **“T” tapping is not allowed.** Repeat for each appliance.
3. Route wire from the last appliance to the supplied EOLR or a 4081-9008 EOL Harness (10 K Ohm, ½ W; brown/black/orange).
4. Repeat steps 1 through 3 for each NAC output you want to use.
5. Leave the 378-030 EOL Resistor (10 K Ohm, ½ W; brown/black/orange) on each unused circuit. The resistor must connect “B+” to “B-” terminals.
6. If the appliance/device to be used does not have an integral diode, a blocking diode must be fitted between the incoming +ve wire and the +ve terminal of the device with cathode to the device.

The illustration below shows Class B wiring.

Important: Conductors must test free of all grounds.

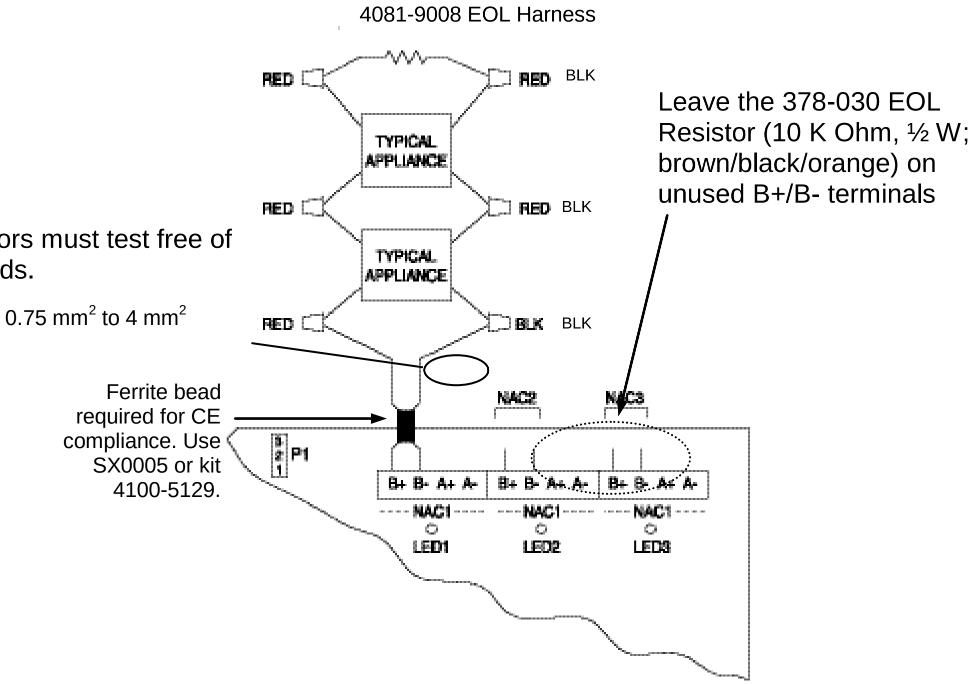

Figure 6-3. Class B Wiring

Power Supply Wiring Distances

Overview

Before wiring from any type of power supply to notification appliances, check Tables 6-1 and 6-2 for wiring distances.

Class A NAC Wiring Table

Table 6-1 lists the maximum distances from the NAC terminal block to the last appliance in a Class A configuration, depending on wire gauge and current. Use Table 6-1 to calculate wire distances for your application if you are using Class A wiring.

Table 6-1. Class A Wiring Distances

Alarm Current @ 24V	0.75 mm^2	1.00 mm^2	1.50 mm^2	2.50 mm^2	4.00 mm^2	DC Resistance
0.25A	120m	150m	230m	380m	620m	6.0 ohms
0.50A	58m	77m	120m	190m	310m	3.0 ohms
0.75A	38m	51m	77m	130m	210m	2.0 ohms
1.00A	29m	38m	58m	96m	150m	1.5 ohms
1.25A	23m	31m	46m	77m	120m	1.2 ohms
1.50A	19m	26m	38m	64m	100m	1.0 ohms
1.75A	16m	22m	33m	55m	88m	0.86 ohms
2.00A	14m	19m	29m	48m	77m	0.75 ohms
2.25A	13m	17m	26m	43m	68m	0.67 ohms
2.50A	12m	15m	23m	38m	62m	0.60 ohms
2.75A	10m	14m	21m	35m	56m	0.55 ohms
3.00A	10m	13m	19m	32m	51m	0.50 ohms

Notes:

- Max Distance = distance from SPS to last appliance.
- This table is calculated at 50°C.
- Distances are based on a 3V drop, and take into account the worst-case panel output voltage. These distances are worst case to allow for one single load at the furthest point.
- If circuit integrity wire is used instead of housing cable in a fire rated enclosure, reduce wiring distances by 12m for every 3m of potential exposure.

Continued on next page

Power Supply Wiring Distances, *Continued*

Class B NAC Wiring Table

Table 6-2 lists the maximum distances from the NAC terminal block to the last appliance in a Class B configuration, depending on wire gauge and current. Use Table 6-2 to calculate wire distances for your application if you are using Class B wiring.

Table 6-2. Class B Wiring Distances

Alarm Current @ 24V	0.75 mm^2	1.00 mm^2	1.50 mm^2	2.50 mm^2	4.00 mm^2	DC Resistance
0.25A	230m	310m	460m	770m	1200m	12.0 ohms
0.50A	120m	150m	230m	380m	620m	6.0 ohms
0.75A	77m	100m	150m	260m	410m	4.0 ohms
1.00A	58m	77m	120m	190m	310m	3.0 ohms
1.25A	46m	62m	92m	150m	250m	2.4 ohms
1.50A	38m	51m	77m	130m	210m	2.0 ohms
1.75A	33m	44m	66m	110m	180m	1.7 ohms
2.00A	29m	38m	58m	96m	150m	1.5 ohms
2.25A	26m	34m	51m	85m	140m	1.3 ohms
2.50A	23m	31m	46m	77m	120m	1.2 ohms
2.75A	21m	28m	42m	70m	110m	1.1 ohms
3.00A	19m	26m	38m	64m	100m	1.0 ohms

Notes:

- Max Distance = distance from SPS to last appliance.
- This table is calculated at 50°C.
- Distances are based on a 3V drop, and take into account the worst-case panel output voltage. These distances are worst case to allow for one single load at the furthest point.
- If circuit integrity wire is used instead of housing cable in a fire rated enclosure, reduce wiring distances by 12m for every 3m of potential exposure.

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Using T-GEN 50 with 4100ES

Overview

AS 1670.1 requires fire alarm warning systems to produce sounds complying with AS 2220 or ISO 8201. One way of meeting this requirement in a 4100ES system is to use a T-GEN 50 tone generator, which is capable of driving up to 50W of load on a 100V speaker line.

The recommended version of the T-GEN 50 for use in 4100ES-S1 is available as part 4100-0766K. This consists of a T-GEN 50 mounted on a metal bracket which is mounted into the expansion bay in the same way as a legacy 4100 motherboard. This part code includes the necessary mounting hardware.

The best place to mount this bracket is in the right-most free slot in the expansion bay, next to the mains socket bracket. The bracket should be installed with the T-GEN 50 facing to the left - this is “upside down” compared to some other uses of this bracket. Note also that the heat sink of the T-GEN 50 intrudes slightly into the space above the next slot to the left. This will probably clash with other motherboards or modules and make this slot unusable.

Powering the T-GEN 50

The T-GEN 50 must be continuously powered from nominal 24VDC, i.e., not just during Alarm conditions, so that it can supervise the 100V speaker line.

The recommended method is to power the T-GEN 50 from the AUX POWER terminals of the SPS power supply. This output is rated at 2A, which is just sufficient to drive one fully loaded T-GEN 50. However, this leaves no reserve for any other equipment to be powered from these terminals, e.g., a brigade signalling device.

If 24V DC is required for other ancillary devices as well, this can be supplied from one of the NAC outputs via the Fused Distribution Board PA0915. The wiring for this is shown in Figure 6-4.

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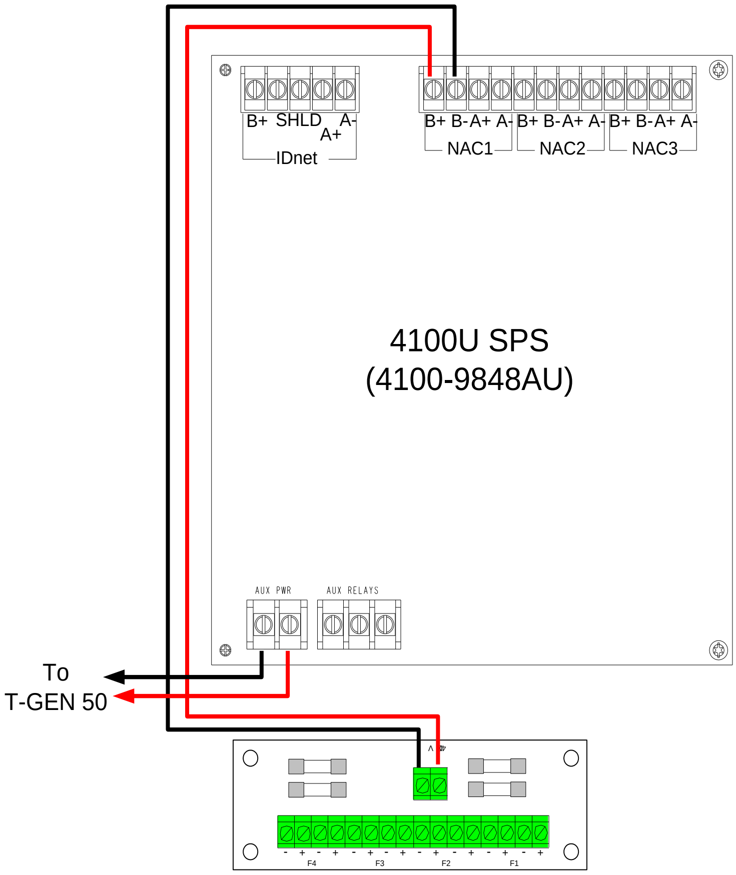


Figure 6-4. Taking Ancillary Power from NAC1

To make this work, NAC1 must be programmed as AUXPWR to make it turn on continuously without supervision. The NAC output capacity is 2A overall.

In the current AS 4428 configuration template, NAC1 is normally assigned to the Ancillary Control Facility (ACF). If NAC1 is used for an ancillary supply, and an ACF output is required, the AUX RELAY contacts on the SPS can be used. These provide a single clean set of changeover contacts, with no supervision or power. To make this work, the 4100ES configuration must be amended to control the Auxiliary Relay from ACF.

The T-GEN 50 should not be powered from a NAC output. T-GEN 50 draws a large in-rush current when it is first turned on, which produces an “SPS Over Current” fault in the system that can only be cleared by pressing the 4100ES System Reset button. This is not acceptable operation.

Controlling a T-GEN 50 with a Relay Module

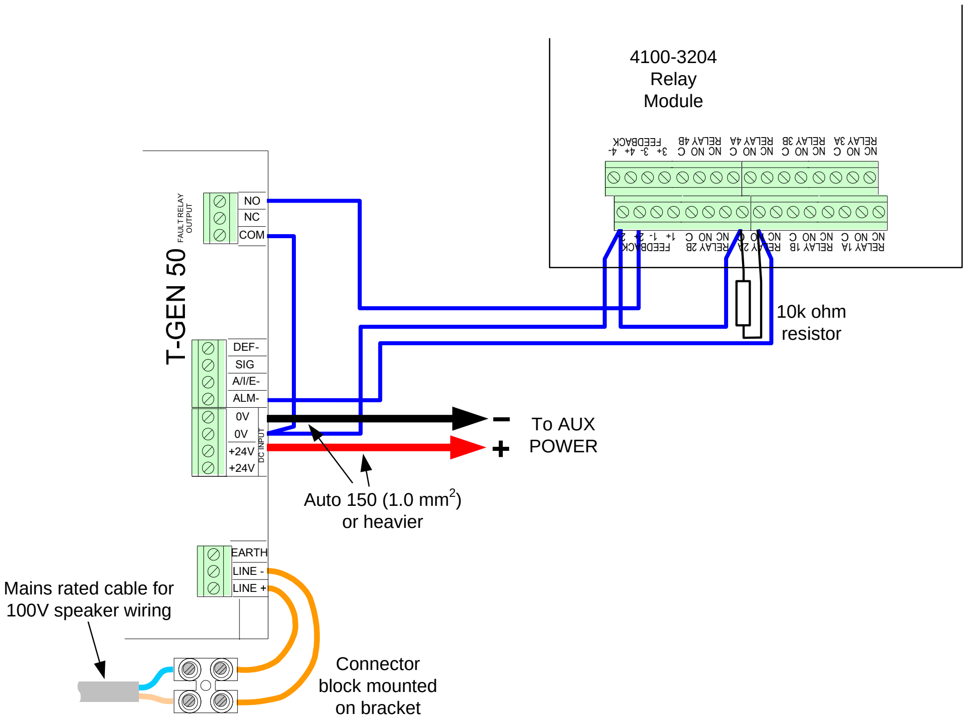


Figure 6-5. Relay Module Connection to a T-GEN 50

A T-GEN 50 can be operated and supervised using a 4100-3204 relay module. The relay module is used to control the ALM- input to the T-GEN 50 and to monitor the state of its Fault relay. The T-GEN 50 is configured to supervise the ALM- wiring from the relay module and the 100V wiring to the loudspeakers.

Figure 6-5 shows the wiring between the T-GEN 50 and the relay module. The detail of the 24V supply is not shown, but the T-GEN 50 0V MUST be common with the 4100ES 0V (this will always be the case when using the AUX POWER supply, as described earlier).

T-GEN 50 Setting for Relay Operation

These switch and link settings should be used. These apply to T-GEN 50 software version 1.7.

Table 6-3. T-GEN 50 Settings for Relay Operation

Alert to Evacuate Change-Over Time			
SW1 (T0)	**SW2 (T1)**	**SW3 (T2)**	**Setting on T-GEN 50**
OFF	OFF	OFF	0 sec
ON	OFF	OFF	30 sec
OFF	ON	OFF	1 min
ON	ON	OFF	1.5 min
OFF	OFF	ON	3 min
ON	OFF	ON	5 min
OFF	ON	ON	10 min
ON	ON	ON	Alert Only

Table 6-4. T-GEN 50 Switch Settings for Relay Operation

SWITCH	Name	Setting on T-GEN 50
SW4	ALM I/P Supervision	ON (Supervision enabled)
SW5	ALM I/P	OFF (Non-latching)
SW6	Evac Tone	OFF
SW7		OFF for AS 2220 tone ON for ISO 8201 + Keywords
SW8	Evac Message	OFF for Evac Message 1 or Field Recorded message, ON for Evac Message 2 or Keywords only in ISO 8201

Table 6-5. T-GEN 50 Link Settings for Relay Operation

Link	Name	Setting on T-GEN 50
1	BIAS	FITTED if PA or Background Music not required.
2	MASTER	FITTED
3	REC EN	Fit to record message.
4	TEST	Fit for test tone during installation
5	SLAVE	NOT FITTED
6	SLAVE / MASTER	MASTER
7	FAULT= DEF-/RELAY	RELAY

Controlling a T-GEN 50 from a NAC Output

A T-GEN 50 can be controlled and supervised using a NAC output. The NAC is used to control the ALM- input to the T-GEN 50 and to supervise its Fault relay output. The T-GEN 50 is configured to supervise the 100V wiring to the loudspeakers.

Figure 6-6 shows the wiring between the T-GEN 50 and the NAC terminals.

The detail of the 24V supply is not shown, but the T-GEN 50 0V MUST be common with the 4100ES 0V (this will always be the case when using the AUX POWER supply as described earlier).

The NAC output must be programmed as a SIGNAL point type, so that it automatically operates on Alarm, and provides reverse polarity supervision to the 10kΩ EOLR.

The configuration templates already have NAC3 programmed as a suitable output to drive the T-GEN 50.

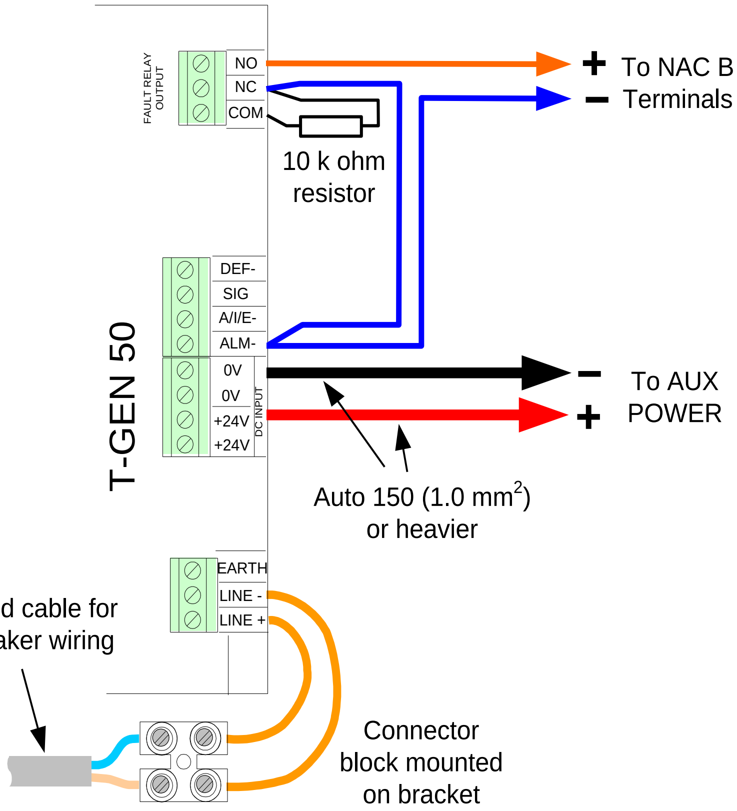


Figure 6-6. NAC Connection to a T-GEN 50

T-GEN 50 Settings for NAC Operation

These switch and link settings should be used. These apply to T-GEN 50 software version 1.7.

Table 6-6. T-GEN 50 Settings for NAC Operation

Alert to Evacuate Change-Over Time			
SW1 (T0)	**SW2 (T1)**	**SW3 (T2)**	**Setting on T-GEN 50**
OFF	OFF	OFF	0 sec
ON	OFF	OFF	30 sec
OFF	ON	OFF	1 min
ON	ON	OFF	1.5 min
OFF	OFF	ON	3 min
ON	OFF	ON	5 min
OFF	ON	ON	10 min
ON	ON	ON	Alert Only

SW1 to SW3 settings have no effect on Slave T-GEN 50s.

Table 6-7. T-GEN 50 Switch Settings for NAC Operation

SWITCH	Name	Setting on T-GEN 50
SW4	ALM I/P Supervision	OFF (Supervision disabled)
SW5	ALM I/P	OFF (Non-latching)
SW6	Evac Tone	OFF
SW7		OFF for AS 2220 tone ON for ISO 8201 + Keywords
SW8	Evac Message	OFF for Evac Message 1 or Field Recorded message, ON for Evac Message 2 or Keywords only in ISO 8201

Table 6-8. T-GEN 50 Link Settings for NAC Operation

Link	Name	Setting on T-GEN 50
1	BIAS	Can be FITTED if PA or Background Music not required
2	MASTER	FITTED
3	REC EN	Fit to record message.
4	TEST	Fit for test tone during installation
5	SLAVE	NOT FITTED
6	SLAVE / MASTER	MASTER
7	FAULT= DEF-/RELAY	RELAY

Fitting an EvacuationControl

An optional three-position control ME0460 allows the T-GEN 50 to be switched from the front panel between automatic operation, being Isolated, or producing Evacuation tone, regardless of the state of other control inputs.

With the control in the ISOLATE position, the T-GEN 50 will not respond to the ALM-input, or activate its FAULT output if a fault is present.

With the control in the EVAC position, the T-GEN 50 will immediately produce Evacuation tone.

Figure 6-7 shows how to connect an Evacuation Control to a T-GEN 50.

The control can be fitted to an FP0935 or FP0937 4U Brigade Interface door as used in 4100ES-S1, or fitted to a 4100-1279 blank display module (requires a 9.5mm hole to be drilled in the display module – the ME0460 includes an installation guide with drilling details).

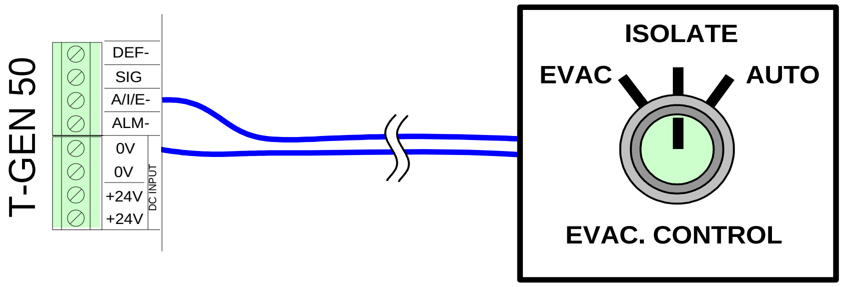


Figure 6-7. Wiring an Evacuation Controller to a T-GEN 50

SPS Auxiliary Power Wiring

Overview

The panel, battery-backed, unregulated dc bulk power is available from the SPS via the NAC and the 24V Aux power terminals (1 pair only, as in Figure 6-8). NACs not configured as switched outputs may be configured as auxiliary power point type in the 4100 Programmer. All of these are power-limited.

Guidelines

Review the following guidelines before using the SPS for auxiliary power:

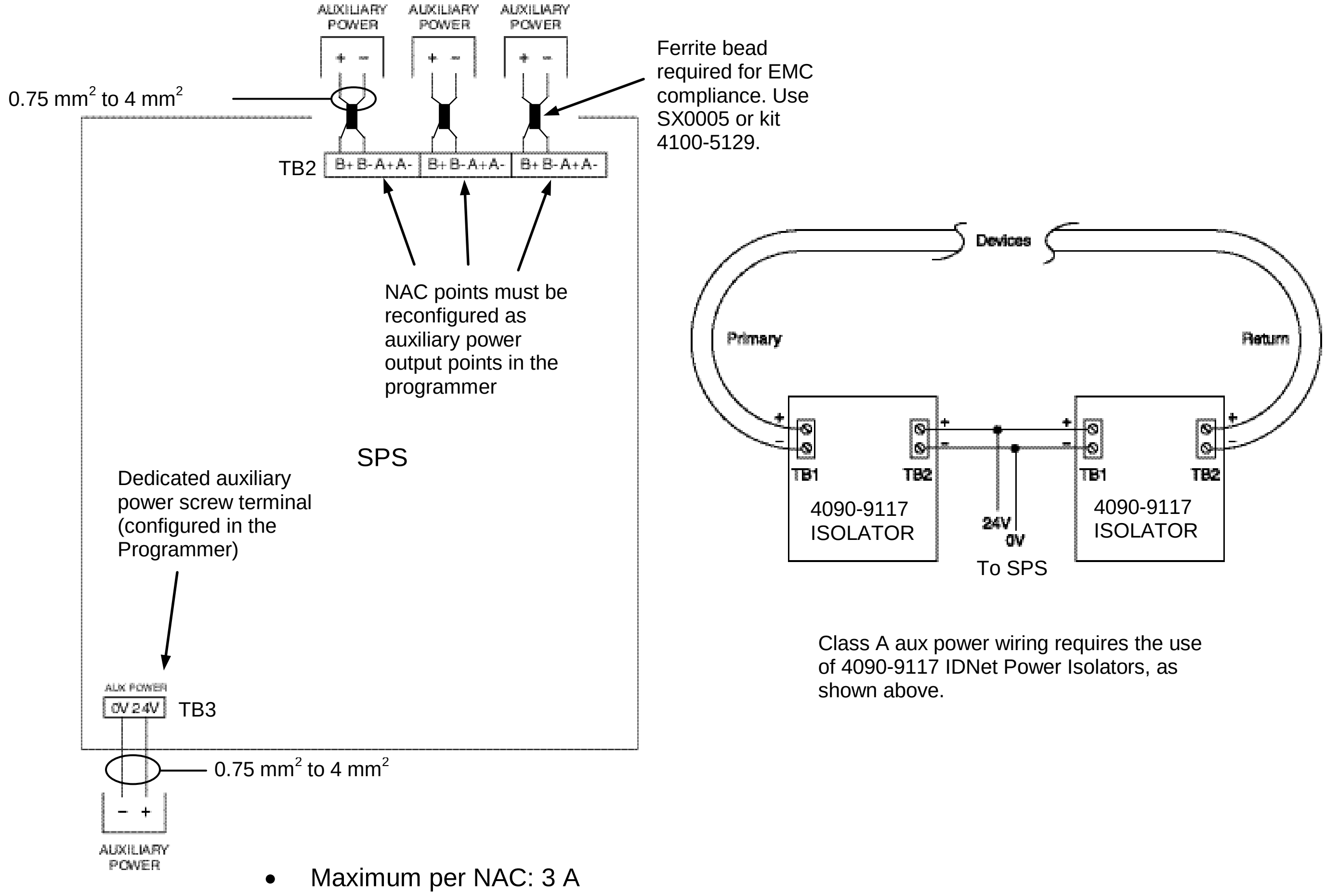
- Voltage rating: 24 VDC (nominal), 2 V P-P ripple (maximum).
- The total auxiliary current available for non-alarm is 5 A. The total current available for the entire SPS is 9 A, including NAC, auxiliary, and card power.
- All wiring is 0.75 mm^2 to 4 mm^2.
- All SPS powered field wiring requires a ferrite bead (refer Fig 6.1).
- All wiring that leaves the building requires overvoltage protection. Install module 2081-9044 wherever wire enters or exits the building. A maximum of four 2081-9044 Modules may be connected to one channel.
- When a NAC is configured as an auxiliary power circuit, no end-of-line resistor is used.
- External wiring is not supervised unless an end-of-line relay is wired, coil to auxiliary power, and Normally Open contacts are monitored by a system power point. Relay current must be considered as part of the load.
- Programming is required for the dedicated Auxiliary Power output (TB3).
- The following devices may be connected to the 2A Auxiliary Power:
  - 2190-series monitor and signal ZAMs
  - 4090-series IDNet ZAMs
  - 4098-series four-wire smoke detectors and duct detectors
  - 4190-9050 4-20 mA MZAM
  - 4603-9101 LCD Annunciator
- The Auxiliary Power output is rated at 2 A dc.
- Where multiple loads are to be connected with individual protection, a Fused DC Distribution board may be fitted directly to the SPS bracket adjacent to TB3.

Continued on next page

SPS Auxiliary Power Wiring, *Continued*

Wiring

The SPS can connect to auxiliary power appliances via the dedicated auxiliary power tap (TB3). If more power is needed, any of the unused NAC outputs can be used for auxiliary power.



- Maximum per NAC: 3 A
- Maximum per Auxiliary Power output: 2 A
- Class A wiring is possible only if 4090-9117 Power Isolators are used.
- EMC compliant systems require ferrite beads. See Appendix K for ordering part codes.

Figure 6-8. Auxiliary Power Wiring

SPS Relay Wiring

Overview

The SPS has one programmable relay, AUX 1, with one set of voltage-free contacts (see below). It also has provision for mounting a 4100-6033 Alarm Relay that has 3 relays, each with one set of normally open (or normally closed) contacts available on a screw terminal block (see Figure 5-1).

Aux 1 Relay

- The relay must be configured in the ES Programmer.
- The relay circuit is rated to switch 2 A at 30 VAC or 32 VDC, resistive load.
- Relay contacts are Form C voltage-free contacts (but with a 40V transorb from common to Earth). Do not switch voltages greater than the rating, or damage may result.
- When power through the relay contacts is provided by the SPS 2 A Auxiliary Power, wiring is power-limited.
- The relay circuit is not supervised.

Alarm Relay Card

The three relays have default functions of Fault (trouble), Isolate (supervisory) and Alarm, and are typically used for Brigade Signalling:

- The relays may be configured by the ES Programmer for alternate functions.
- If used as Brigade relays, the jumper must be fitted to the bottom position on P3 on the SPS. If Fault (trouble) is programmed for an alternate function it must be fitted to the top position.
- Only one pair of contacts is available for each, and is configured as normally open (NO) or normally closed (NC) by fitting a jumper on the adjacent headers P1 (Alarm), P2 (Isolate) and P3 (Fault). Use top position for NC and bottom position for NO.
- The relays are each fuse protected (fuse 5 x 15mm, rating 3 A).
- Relays are not supervised.

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SPS Auxiliary Relay Wiring, *Continued*

Relays

Figure 6-9 below shows the SPS relays.

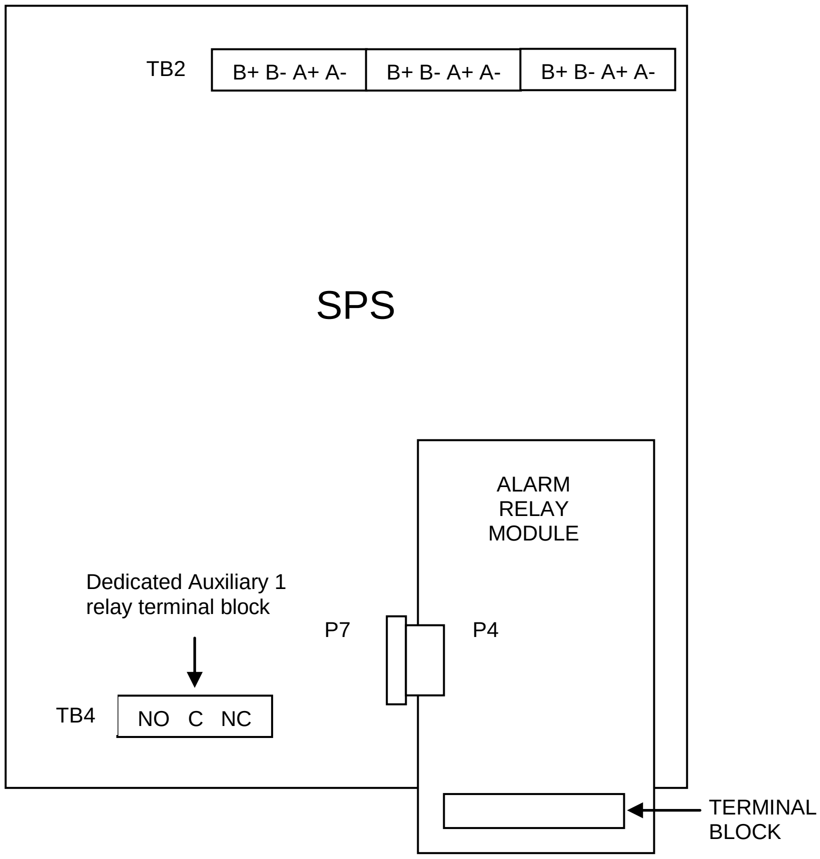

Figure 6-9. Auxiliary Relay & Alarm Relay Card Relays

Chapter 7
IDNet Wiring Rules

Introduction

The 4100ES supports IDNet ports on several different slave cards. Each IDNet port provides a connection to a wiring loop of up to 250 addressable detectors and devices.

These IDNet ports use Mapnet Protocol and communicate with existing Mapnet detectors/devices plus the new IDNet devices.

The 4100ES slave modules with IDNet ports are:

- 4100-9848AU SPS System Power Supply
- 4100-3101AU IDNet card
- 4100-3107AU IDNet+ card

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

IDNet Ports in 4100ES

Overview

There are three 4100ES slave modules with IDNet ports:

- 4100-9848AU SPS System Power Supply – this supports up to 250 devices in a single loop or string. The IDNet port is not isolated from the system 24V supply.
  The SPS is described in Chapter 6.
- 4100-3101AU IDNet card – this supports up to 250 devices in a single loop or string. The IDNet port is not isolated from the system 24V supply.
  The IDNet module is a 4x5" PDI card.
- 4100-3107AU IDNet+ card – this supports up to 246 devices in up to four loops or strings. Each loop or string is isolated from faults in the other loops or strings. The number of devices in each loop or string is arbitrary.
  The IDNet ports are electrically isolated from the system 24V supply.
  The IDNet+ module is an 8x5" PDI card, i.e., double width.

Mounting of PDI cards in equipment bays is described in Chapter 2. When purchased as spares, the IDNet and IDNet+ modules are supplied with comprehensive installation and configuration instructions.

IDNet Port Characteristics

- Voltage output to IDNet devices is normally 30VDC.
- Output is increased to 35 VDC when LEDs, piezos, or other outputs are activated, particularly in the alarm state.
- The 30/35V supply for each IDNet port is rated at at least 350mA. Overcurrent protection is provided by a PTC.
- Up to 250 IDNet devices are supported by each IDNet port.
  The IDNet+ slave uses four addresses internally for fault isolation, so only 246 addresses are available for external devices.
- The IDNet module keeps track of which LEDs should be on at all times, and powers up to 20 at any given time.
- Up to 43 coded piezo sounders are supported by each IDNet channel.

Continued on next page

Wiring to IDNet Devices

Overview

Up to 250 IDNet slave devices, such as smoke detectors and manual call points, can be connected to the IDNet card using Class A (loop) or Class B (spur or string) wiring, with the following restrictions.

Class A wiring allows the devices to communicate with the IDNet card even in the event of an open circuit somewhere in the loop. Class A wiring requires that two wires are routed from the IDNet card to each IDNet device, and then back again to the IDNet card. Under AS 1670.1 requirements, each group of up to 40 devices must be separated by a loop isolator.

Class B wiring allows “T” tapping, and therefore requires less wiring distance per installation than Class A. Under AS 1670.1 requirements, no more than 40 devices may be connected with Class B wiring.

See Appendix E for a list of compatible devices and their ratings.

Guidelines

- Use ferrite beads on each pair of wires leaving the 4100ES cabinet. See Figure 7-1. See Appendix K for ordering part numbers.

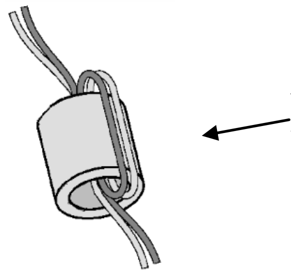

Figure 7-1. Ferrite Bead Wiring

- Shielded cable is recommended in electrically noisy environments.
- IDNet cabling should not be run adjacent to other cabling, especially non-fire system cabling, such as mains.
- The limiting factors on the length of the twin core cable connecting the IDNet devices to the IDNet card are cable capacitance (attenuates the superimposed coms signal) and resistance (causes voltage drop of the supply voltage and comms signals).
- The maximum capacitance of 0.58uF core to core must also include the mutual capacitance of core to earth. Shielded cable has a much higher capacitance to earth than unshielded cable.
- Rather than do voltage drop calculations, Figure 7-2 can be used to check that cable limits have not been reached. For a Class A (loop) circuit, cable distance refers to the full distance around the loop. For a Class B (spur) circuit, cable distance refers to the distance from the panel to the furthest end of the cable.
- Sounder bases and 6 point I/O modules do not draw the alarm load from the loop, but are powered from separate 24V terminals.
- Where devices such as sounder bases are wired from a 24V source (e.g. supplied by 24V AUX Power or a NAC), and are in more than one zone, the power cable must also be isolated between zones by a 4090-9117AU Power Isolator Module.

Continued on next page

Notes

1. The current allowance per device on the loop is 0.5mA with the LED off, 2mA with the LED on. A maximum of 20 LEDs will be turned on at any time by the IDNet Card, e.g. in alarm.

2. The minimum voltage allowed at the furthest device to guarantee operation is 24.9Vdc. The IDNet boosts its output voltage from 30V to 35V during alarm.

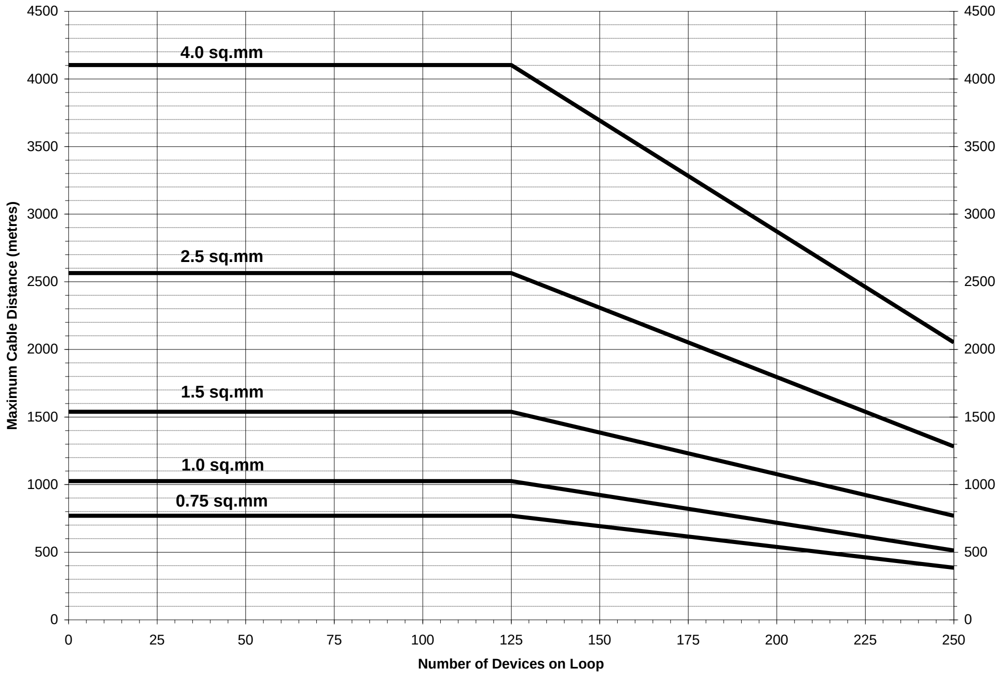

Figure 7-2. Cable Distance & Device Limits for Common Cable Sizes

Note: Cable distance refers to the full distance around the loop (Class A), or the distance from the panel to the furthest end of the cable run (Class B).

Continued on next page

Class A Wiring

To connect the IDNet card to devices using Class A (loop) wiring, see Figure 7-5 and the following:

1. Route wire from the IDNet B+, IDNetB- outputs on TB1 of the IDNet card to the appropriate inputs on a peripheral IDNet device.
2. Route wire from the first IDNet device to the next IDNet device. Repeat for each device.
3. Route wire from the last IDNet device back to the IDNet A+ and IDNet A- inputs on the same IDNet port.
4. Separate every 40 devices (at most) with a IDNet communications isolator, e.g. 4090-9116 isolator module or 4098-9793EA isolator base.
5. Separate the power feed to sounder bases or 6 point I/O modules in different zones using the 4090-9117 Power Isolate module.

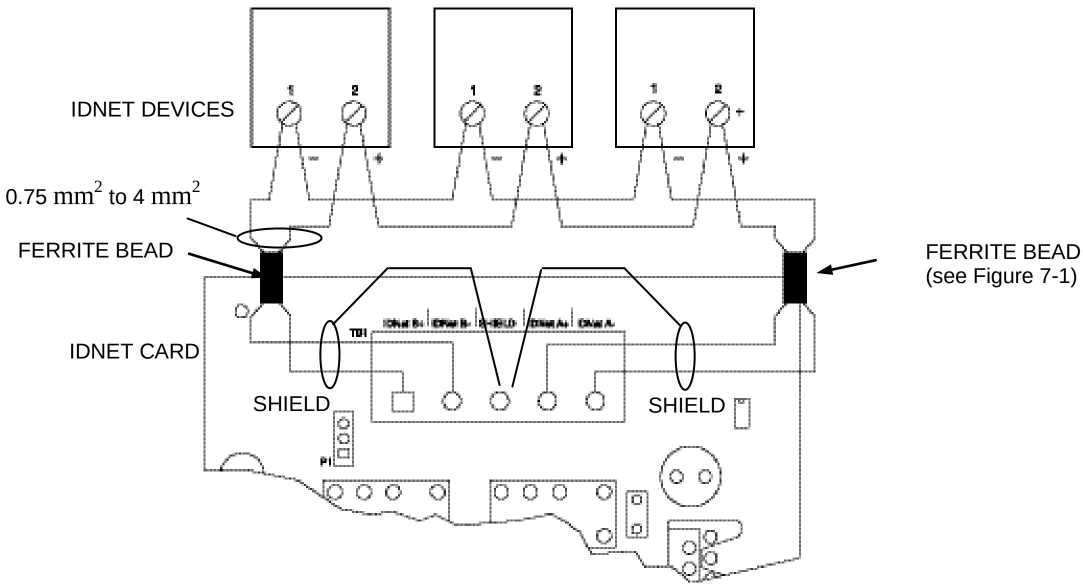

Figure 7-3. Class A (loop) Wiring

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Wiring to IDNet Devices, *Continued*

Class B Wiring

To connect the IDNet card to devices using Class B (spur or string) wiring:

1. On the IDNet port, connect IDNet B+ to IDNet A+, and IDNet B- to IDNet A-. If this connection is not made, a Class A Fault (open circuit loop) will be registered by the 4100ES.
2. Route wire from the IDNet A+ and IDNet A- outputs of the IDNet port to the first device, then on to the following devices.
3. For compliance with AS 1670.1 compliance, connect no more than 40 devices maximum for the whole circuit.
4. Sounder bases or 6 Point I/O modules in separate zones may not be wired in Class B (string).

Figure 7-4 shows Class B wiring.

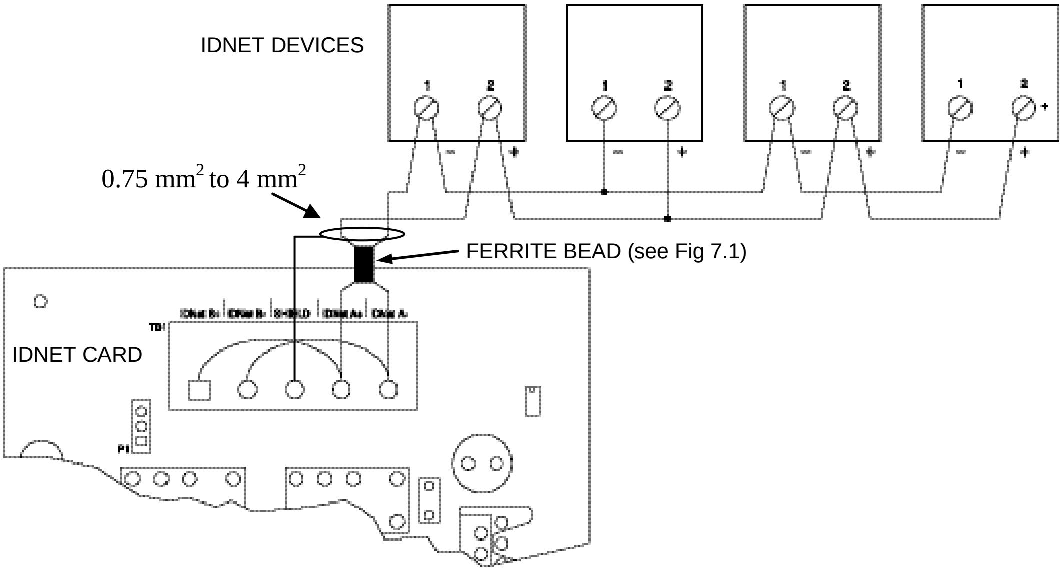

Figure 7-4. Class B (spur or string) Wiring

Note: Maintain correct polarity on terminal connections. Do not loop wires under terminals.

Troubleshooting IDNet Faults

Overview

This section describes the messages that may appear on the 4100 display when using the IDNet card. Fault messages appear in the headings on the left, and possible causes are listed in the text.

IDNet Power Monitor Trouble

There is no output voltage from the IDNet power supply. Replace the IDNet card.

Extra Device

Appears if one or more extra devices (i.e., devices that have not been configured for the IDNet channel) are found on the ID-Net loops, or if a device is at an incorrect address. Only one message appears, regardless of the number of extra devices found. Viewing the fault log will reveal the extra device address.

Class A Trouble

There is an open circuit on the IDNet channel. After fixing the wiring fault, a hardware reset is required to reset the trouble.

Earth Fault Search

Appears while the IDNet card is searching for earth faults on the IDNet line. When this message is displayed, the IDNet card cannot show any alarms or other statuses.

Short Circuit

Appears when a short circuit is detected on the IDNet channel. This status clears automatically when the short circuit is removed.

Channel Fail

Appears when devices have been configured, but none of the devices are communicating on the channel. This message does not appear if there are no configured devices on the IDNet channel.

No Answer

Appears when a device is missing.

Bad Answer

Appears when there is a faulty device or a noisy communications channel.

Output Abnormal

Occurs during any of these conditions:

- 24 V is not present on TrueAlarm devices.
- TrueAlarm sensor bases with relay driver outputs are not properly supervised.
- Isolator devices are in isolation mode.

Chapter 8
Using Install Mode

Introduction

Install Mode is a 4100ES facility which is useful during panel installation.

While a 4100ES panel is being installed and commissioned, there will often be periods when many internal modules or external devices are not yet connected, or are not in a normal state for some reason.

With the full configuration loaded in the 4100ES, each missing or off-normal device gives rise to a fault. Having the fault list full of faults from devices that are known to be missing or off-normal can make it difficult to work with the faults from devices that are actually present.

Install Mode provides a means to hide "known" faults from being displayed.

Any internal module or external device can be added to the Install Mode list, using the front panel interface. If there is any device in the Install Mode list, there will be a single fault indication "Install Mode Active". However, the devices in the Install Mode list will not produce fault indications, even if they are missing or faulty. All the individual device faults are hidden behind a single Install Mode Active fault.

As modules and devices are progressively added to the system and normalised, they can be removed from the Install Mode list. When the system is fully commissioned, the Install Mode list should be empty.

This chapter describes how to add and remove devices from Install Mode.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Adding Devices to Install Mode

Adding a Single Device to Install Mode

Devices can be added individually to the Install Mode list.

NOTE: this requires being logged in at Level 3. Refer to the Operator Manual, if necessary, to do this.

The example Fault List in Figure 8-1 shows a fault from a missing slave card in the panel.

Figure 8-1. Sample Fault List Display Showing a Missing Card

If necessary, move the highlight on the display to the missing card, using the <Up>, <Down>, <Page Up> or <Page Dn> keys. Press the <More> softkey for more info.

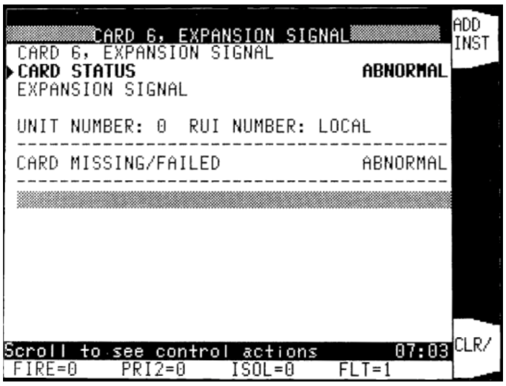

Figure 8-2. MoreInfo on this Fault with Add Inst Option

Move the highlight down to the CARD STATUS line as shown in Figure 8-2. A softkey option <ADD INST> will appear. Pressing this softkey will add this point to the Install Mode list and display an ACCEPTED screen briefly.

Continued on next page

Adding Devices to Install Mode, Continued

Pressing the <Fault Ack> key will show the Fault List, now with a single entry as shown in Figure 8-3.

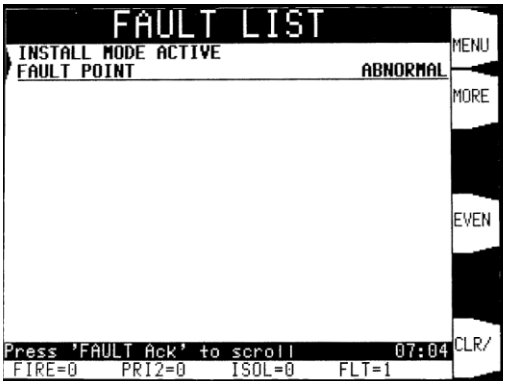

Figure 8-3. Fault List Now With Only a Single Install Mode Fault

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Adding Multiple Devices to Install Mode

Where there are many missing devices, all producing faults, as in Figure 8-4 below, there are simple ways to quickly add these to the Install Mode list in bulk.
NOTE: this requires being logged in at Level 3. Refer to the Operator Manual, if necessary, to do this.

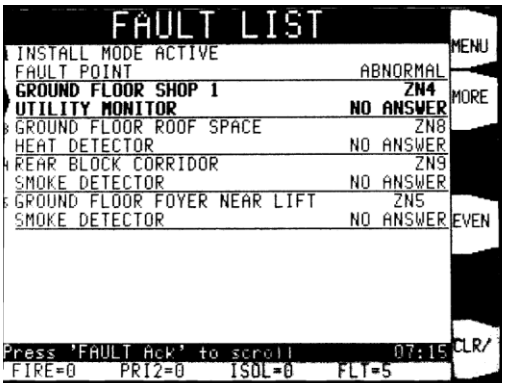


Figure 8-4. Fault List with Additional Missing Devices

Press <MENU>, then scroll the highlight to the Service/Diagnostics option as in Figure 8-5 and press the <SELE> softkey to select it.

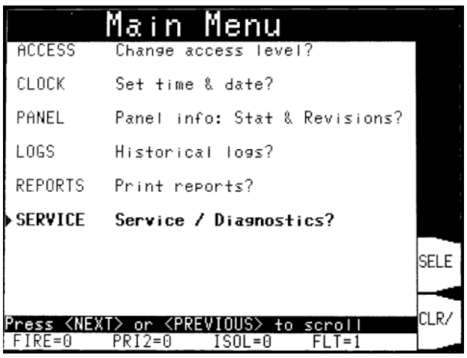


Figure 8-5. Service/Diagnostics Option on Main Menu

Continued on next page

Adding Devices to Install Mode, Continued

In the Diagnostic menu screen, scroll down to the Install Mode option as in Figure 8-6. There are many diagnostic options, so using <PgDn> to jump a screen at a time will be faster. Press the <SELE> softkey to select it.

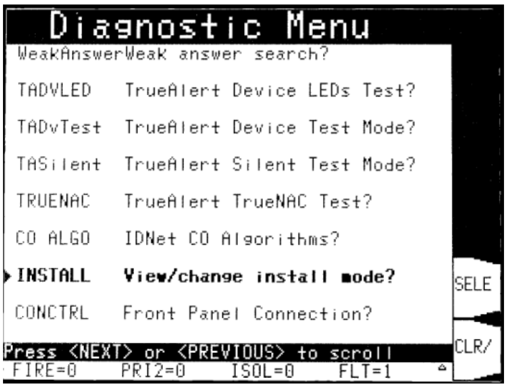


Figure 8-6. Install Mode Option on Diagnostic Menu Screen

In the Install Mode menu, move the highlight to the ADD MISSING option as in Figure 8-7 below, and press <SELE> to select this option.

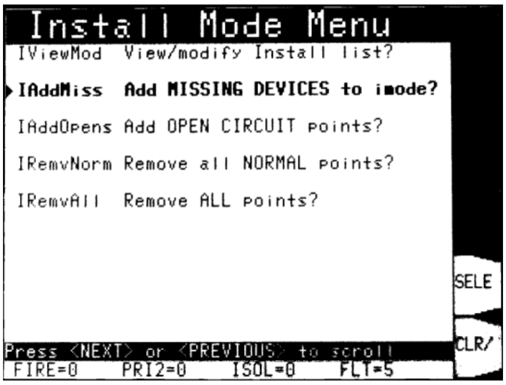


Figure 8-7. Add Options on the Install Mode Menu Screen

The panel will take a few seconds to search for all missing devices and add them to the Install Mode list. Note that the fault count has changed from 5 in Figure 8-7 above to just 1 in the Figure 8-8 below. The single remaining fault is the Install Mode fault.

Viewing Devices in Install Mode

Viewing Contents of Install Mode list

The contents of the Install Mode list can viewed with the VIEW option of the Install Mode menu, as in Figure 8-8. See Figures 8-5 and 8-6 for the menu selections to reach this menu. Viewing this menu does not require being logged in.

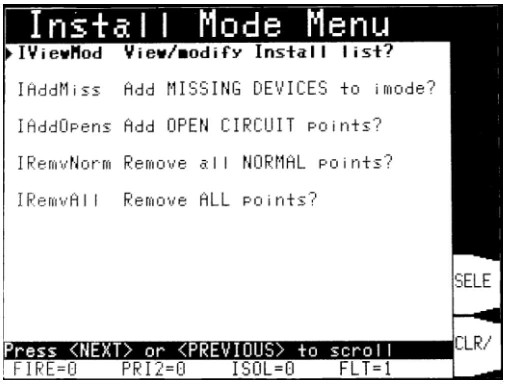


Figure 8-8. View Option on the Install Mode Menu Screen

The Install Mode display shows the device count, and a list of devices and modules, with their current status, as in Figure 8.9. The <MORE> softkey will provide More Info for the highlighted entry in the list.

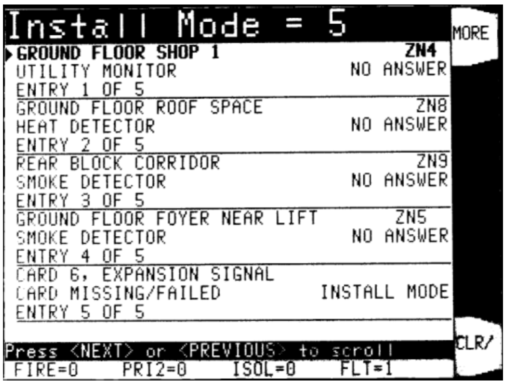


Figure 8-9. Displaying Contents of Install Mode List

Removing Devices from Install Mode

Removing Individual Devices from Install Mode

If you are logged at Level 3, you can remove individual devices from the Install Mode list.
Display the Install Mode list as in Figure 8-9, move the highlight to the device you wish to remove, and press the <MORE> softkey to see More Info.
Move the highlight to the CARD STATUS or DEVICE STATUS line, when a <REMO INST> softkey option will appear, as in Figure 8-10.

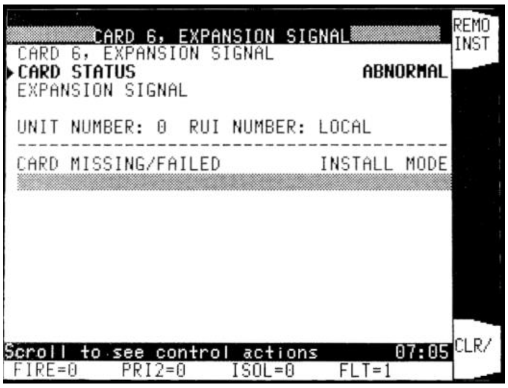


Figure 8-10. More Info on a Device in the Install Mode List

Pressing the <REMO INST> softkey will remove this device from the Install Mode list. If the device is still in fault, the system fault count will increase and the Fault indicator will flash for a new fault.

Removing Many Points from Install Mode

Just as many missing devices can be added to the Install Mode list quickly, so can many devices be removed from the list.

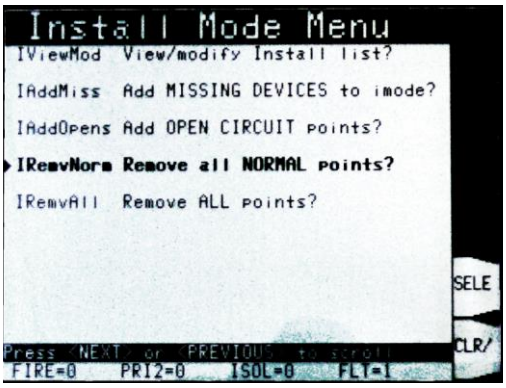


Figure 8-11. Remove Options on the Install Mode Menu Screen

In the Install Mode menu screen, you can choose to remove all devices in the Install Mode list that are now normal, using the IRemvNorm option as in Figure 8-11. This is probably the most useful bulk option, since it will automatically leave the devices in fault behind, and allow them to easily viewed as in Figure 8-9.
If all the devices in the Install Mode list are normal, then selecting this action will also cancel the Install Mode fault.

Alternatively, you can choose to remove all devices from the Install Mode list, regardless of their status, with the IRemvAll option. Note that this may result in a large number of new fault indications if there are faulty devices.

Chapter 9
PC Software Connections

Introduction

The service port on the door with the Operator Interface enables the 4100ES to connect to PCs running important utilities, such as diagnostics, programming, CPU firmware downloading, and channel monitoring.

The recommended connection method is using the Ethernet service port. However, a serial data connection can be used if the Ethernet option is not available for some reason. The ES Programmer supports both methods of connection.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Connection and Modes

Overview

The 4100ES can connect to PCs running important utilities, such as diagnostics, programming, CPU firmware downloading, and channel monitoring. It connects to PCs running all of these utilities via the service port on the CPU card.

Connection can be made by a serial data cable, or by Ethernet cable (preferred).

Connections and Modes

There are two basic software modes for the service port connection:

- Service and Diagnostics Mode.
- Data Transfer Mode.

Service and Diagnostics Mode.
This mode provides application startup messages, a command line interface to diagnostic commands, and event reporting.

This is the default mode when a PC is connected to the 4100ES serial service port (Figure 9 1). The PC must be running terminal emulation software, e.g., Hyperterm. The ES Programmer provides a suitable terminal emulation program for this. Connection is made via a PC serial port using a 733-794 download cable. This cable must be plugged into the Service Port connector on the front edge of the CPU card (P5).

When using an Ethernet connection, as in Figure 9 2, the Teraterm application installed with the ES Programmer must be used as the terminal emulation program. The Ethernet cable is plugged into the RJ-45 service port connector on the front panel of the 4100ES.

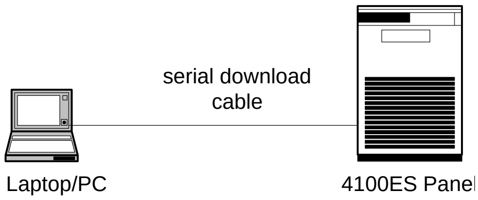


Figure 9-1. Serial Connection (slower)

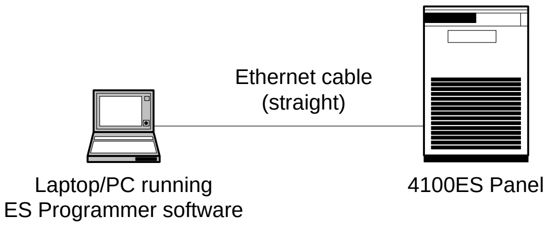


Figure 9-2. Ethernet Connection (fast)

Data Transfer Mode. This mode is automatically used by the ES Programmer when downloading configurations or other system files.

The Ethernet connection method is strongly recommended for downloads, since it is faster and provides more functionality, such as roll-back to older configurations.

Chapter 10
Australian Version Specifics

Introduction

This chapter provides detail on format and components that are specific to the Australian version 4100ES that complies with AS 4428.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Summary of Australian Version Specifics

Overview

The Australian fire alarm standards differ from those in the USA. Shipping costs from USA to Australia are significant, and the Australian market is small compared to the USA market. It is therefore necessary to:

- Have an Australian specific panel format that differs from the standard USA panel format.
- Have some Australian specific components.
- Limit the number of system components available in the Australian version.

AS 4428 Requirements

The 4100ES Operator Interface does not comply with the AS 4428.1 requirements for an FF (Firefighter Facility) that uses only an alphanumeric display for alarm zone status indication. The basic firmware of 4100ES does not accommodate zones as described in AS 4428.1. The standard SPS (System Power Supply) does not have the required charger and battery supervision and test facilities. Therefore the following are required for an Australian 4100ES:

- Use a different Operator Interface front label (overlay) and keypad with “Trouble” changed to “Fault”, “Supervisory” changed to “Isolate”. This overlay is also smaller and has different text in the instructions on the bottom.

- Use an Australian version of the message library with “Trouble” changed to “Fault”, “Supervisory” changed to “Isolate”.

- Configure the programmable control keys and indications on the Operator Interface with the functions shown in Figure 2-3.

- Fit 8 Switch/16 LED Red/Yellow modules such that there is one switch plus one red and one yellow LED per zone to give individual zone isolate and alarm indications.

- Configure zone and battery test functionality in custom control. The custom control programming requirements are covered in Appendix B.

- Use an Australian version of the SPS (with a modified PCB and firmware). Because of low quantity, only one format is available. Note that in a Brigade connected FIP, the SPS controls the Brigade Interface relays. If the CPU Card fails, or if the SPS CPU fails, the Fault (Trouble) relay turns on. This watchdog action provided by the SPS is a requirement.

Australian Panel Format

Overview

Australian 4100ES panels are assembled in the Australian (Tyco) range of 19” rack cabinets.

Australian / USA Differences

Some further specific differences follow:

- Only the Expansion Bay is used, with the Controller CPU and Motherboard mounted in the right hand side of the first one. The standard US Controller Bay is not used.
- The InfoAlarm Operator Interface is fitted to an Australian specific 8U hinged bracket mounted in front of the SPS.
- The zone displays and Fan Controls are mounted on a 7U hinged door.
- Australian specific bay mounting brackets and trims are used. This includes the standard range of 19” rack mount panels and brackets.
- Only one version of SPS is available. This mounts on a specific bracket and also to an expansion bay, and is unique to Australia.
- 4100-3101 IDNet and 4100-3107 IDNet+ cards are used but require specific Australia slave software.
- Two of the addressable modules are modified specifically for AS 4428, i.e. 4090-9117AU Addressable Power Isolations, and the 4090-9120AU 6 Point I/O.
- Other cards / modules not used in Australia include the large range of Evacuation products and some modems.

4100ES/4100A Differences

Standard 4100 motherboards and cards fit in a 4100ES bay. The following 4100A items however, do not fit:

- Older 4100 Switch/LED display modules.
- The range of Australian brackets that mount to the front of a 4100 bay. This includes some EWIS products, Brigade interface brackets, T-GEN bracket, and printer.
- Note that although 4100 cards fitted to motherboards, and the bay mounting brackets, can be fitted in directly behind Switch/LED modules, they **cannot be fitted behind the 64/64 Switch/LED Controller** mounted to the inside of the bay door. This is typically mounted behind the LED/Switch Modules fitted to the 1st and 2nd positions from the left.

4100ES Fan Control Module

Overview

ME0456 is a 4100ES style Switch/LED display module specifically designed for fan control. It complies with the requirements of AS 1668.1, 1998. It has rotary switches and LEDs for 4 fans. In order to accommodate the required rotary switches, the front plate is joggled forward so that it protrudes through the trim.

Labeling

The Fan Control switch positions of ON, AUTO and OFF, as per the standard, are permanently marked on the faceplate label.

The labelling of the LEDs, ON, FLT, and OFF is marked on the removable fan name label card, LB0605, supplied with the module.

The card may be reversed and different LED labelling used, e.g., as required for damper controls.

The name area accommodates 3 rows of 6 letters at 5mm text height.

A "soft" version of this label is available on the Fireplace website (https://www.tycosafetyproducts-anz.com) as LB0605. This template allows entry of the fan name on a PC for local printing. LED names may also be revised.

Mounting & Connection

The Fan Control module mounts to the frame of the 4100ES Expansion bay door, from the front, by the studs on the module with the nuts and washers provided.

Connection from "Out" of the adjacent Switch/LED module (or 64/64 Controller if it is the first module on that Controller) to "In" on the module is by the flat flexible cable provided (SX0039).

Programming

The Module is programmed as a standard 4100-1282 8 Switch/16 LED module. Up to 4 can be driven by one 64/64 Switch/LED Controller.

Each fan control with one rotary switch uses two of the 8 "switches", and 3 of the 16 LEDs of an 8 Switch/16 LED module as per Table 9-1. The other 4 LEDs are not fitted so must not be programmed.

Table 10-1. Switch/LED Format

Fan Control	Switches	LEDs		
		ON	FLT	OFF
1	SW1, SW2	LD1	LD2	LD3
2	SW3, SW4	LD5	LD6	LD7
3	SW5, SW6	LD9	LD10	LD11
4	SW7, SW8	LD13	LD14	LD15

The switch functions for Fan Control 1 are shown in Table 9-2. The state with both switches closed is not physically achievable.

Table 10-2. Switch Status

SW1	SW2	Control Status
Closed (up)	Open (centre)	On
Open (centre)	Closed (up)	Off
Open (centre)	Open (centre)	Auto

Continued on next page

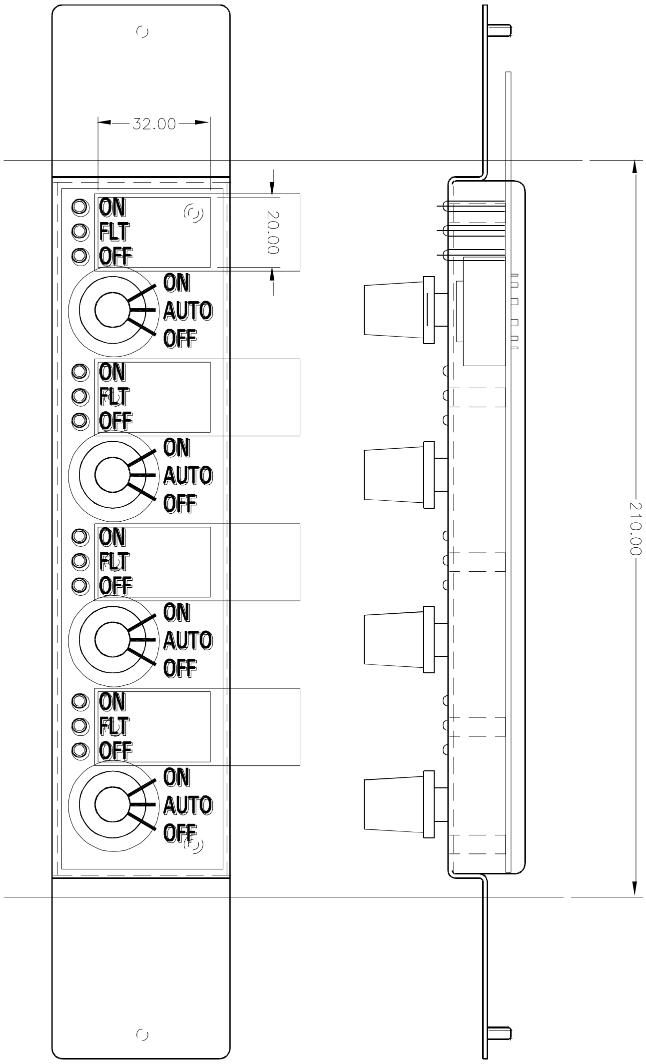


Figure 10-1. Fan Control Module

Brigade Interfaces

Overview

The Alarm Relay Card is typically used to provide a Brigade Interface. The default configuration is for the three relays to operate on Fault (Trouble), Isolate (Supervisory) and Alarm, respectively.

The connection drawings for the Centaur ASE, Western Australia AIU and Queensland PPU are included in the appendix.

Format

These relays are normally de-energised and energise on the respective status. They have voltage-free contacts that are connected to two terminals and can be configured as normally open or normally closed by the positioning of links. Refer to Chapter 5 for details.

If a normally energized relay is required to provide activation on complete loss of system power (Standby), the Aux Relay on the SPS can be programmed as normally on and its contacts connected in series/parallel with the contacts of the Fault (Trouble) relay as is applicable, i.e., series for normally closed, parallel for normally open. Where the Brigade interface is powered from the system power and monitored by the central station, this is not typically required.

Note that the Aux relay is programmed as normally energised, de-energising on Fault cannot be used to replace the Fault relay on the Alarm Relay Card as the latter is link connected to a hardware signal of “SPS CPU Fault”.

Applications

Standard rack mounting, 3U, Brigade Interface brackets are available as follows. FZ9028 includes the wiring loom. KT0199 requires KT0207 to provide the wiring loom with the encapsulated Interface (FP0740).

Standard rack mounting, 4U, Brigade Interface brackets are available in black finish. FP0935 (Centaur ASE) or FP0937 (WA/Cube ASE). Both these kits include mounting hardware, Centaur ASE FAS unit, and wiring to supply power to the ASE from the SPS.

Connection for the Centaur ASE is shown in drawing 1976-174 Sheet 1.
Connections for the Cube ASE and WA ASE are shown in drawing 1922-96.

For the WA ASE, the links on the Alarm Relay Card are fitted for normally open contacts. For the Centaur ASE, the links are fitted for normally closed contacts.

Chapter 11
Installation Checklist, Commissioning & Maintenance

Introduction

When a branch designs a system and orders a 4100ES panel, a “Configuration Sheet” is prepared. The factory builds the panel to the configuration sheet. This includes fitting, connecting and configuring cards and modules.

The factory programs and tests the panel to the configured sheet.

The CPU Card and any 4100 style (legacy) cards that are fitted to motherboards are then removed and packaged with the panel for shipping.

When the panel arrives on site the installer must unpack and check the panel, mount the cabinet, refit any packaged cards, and check the configuration before applying power.

A registered electrician must connect the mains. The panel should then be powered up and checked for correct operation.

With the mains turned off and the batteries disconnected, the field wiring is checked and connected to the field terminals on the various cards.

The panel should then be powered up and re-programmed to accommodate all the connected field devices. Faults in the field wiring, misaddressed detectors / devices, mismatched detectors / devices will be displayed on the LCD. These should be cleared one at a time and then the system (panel plus connected devices) should be commissioned.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Installation Checklist

Overview

The following checklist should be completed by the installer. (Note that all pcbs are electronically tested and adjusted before being fitted to the FIP).

1. CABINET & GENERAL

A)	Cabinet colour - Standard Cream Wrinkle (BFF 998 CW) - Other: ____________________________________	☐
B)	Cabinet undamaged (Paint OK)	☐
C)	Door aligned correctly	☐
D)	Window undamaged and fitted correctly	☐
F)	Cabinet Door locks firmly, operates microswitch (if fitted)	☐
G)	Lock - 003 Type & two keys supplied	☐
H)	Door seals fitted to top and sides	☐
I)	InfoAlarm door fitted correctly	☐
J)	Label LB0666 fitted to l.h.s. of InfoAlarm Operator Interface	☐
K)	Card bays fitted	☐
L)	Operator Manual and battery leads included	☐
M)	Panel rating label completed, fitted	☐
N)	AS 1668 Warning label fitted if Fan Control Modules used	☐
O)	Applique label fitted to front.	☐

2. MODULES, CARDS & WIRING

A)	SPS fitted securely, pcb & components undamaged	☐
B)	LED switch modules fitted correctly, spaced evenly	☐
C)	FRCs connecting 64/64 Controller & modules fitted correctly	☐
D)	Earth wires fitted to display door, card bays and bay front panels	☐
E)	All 4100 style cards fitted to motherboards	☐
F)	All 4100 style motherboards connected	☐
G)	All 4” x 5” modules fitted securely	☐
H)	All cards, modules addressed as per configuration sheet (see note 1 below)	☐
I)	The Lithium battery is fitted to the holder on the CPU card	☐
J)	Link P3 on the CPU card is fitted to the BAT ON position (see note 2)	☐
K)	The CPU card is fitted to its motherboard	☐
I)	All fan control zone name labels fitted.	☐

Notes:

1. The 64/64 Controller Modules are addressed but the LED/Switch modules are not.
2. The Lithium battery on the CPU Card (Master Controller) that stores time and date is disconnected during shipping by fitting link P3 to the BAT OFF position. It must be reconnected at time of installation.

Alignment & Adjustment

Overview

All the 4100ES cards and modules are tested and aligned in the factory before being supplied to the customer or fitted to a FIP. The only field adjustment that may be necessary is to set the battery charger voltage. This has been set and should not need re-adjusting.

R341 Battery Charger Voltage

Should the battery charger voltage need adjusting, the method is as follows:

1. Run the system with the batteries connected and the door closed for at least 30 minutes to allow components to stabilise.

2. Calculate the required no-load battery charging voltage by taking 27.3V for 20°C and subtracting approximately 0.1V for every 3°C above 20°C, or adding approximately 0.1V for every 3°C below 20°C.

3. With the system not in Alarm, disconnect the batteries.

4. Measure the voltage at the battery terminals and adjust to the voltage calculated in Step 2 by turning pot R341.

5. Re-connect the batteries.

Power Up & Placing into Operation

To place the 4100ES FIP into operation, perform the following steps:

STEP 1 Ensure that the Mains Isolate Switch is OFF.

STEP 2 Ensure that 240 VAC is connected to the panel from the mains distribution switchboard.

STEP 3 Ensure that the Lithium battery is fitted to the battery holder on the CPU card, and link P3 is fitted to the BAT ON position.

Turn the Mains Switch ON.

STEP 4 Check that the green "MAINS ON" LED indicator on the InfoAlarm user interface is on.
The Controller performs tests on its memory, electronics, and the LCD.

STEP 5 Check that the buzzer sounds and the LCD displays “CPU Serial Number”.

STEP 6 Check that the LCD has good visibility.

STEP 7 Install and connect the batteries.
Take care not to short the battery leads or connect in reverse polarity when connecting.

STEP 8 Press the Lamp Test key on the Operator I/F and check that all LEDs turn on, and the LCD shows all black squares.

STEP 9 Clear all faults one at a time.

A full commissioning test should be carried out as per AS 1670.1. Refer to the appendix in this manual for detail on checking wiring, and earth fault detection. Refer to the Operator’s Manual LT0351 for detail of the walk test that may be used for verifying correct detector operation.

Maintenance

The 4100ES system must be kept free from faults and tested on a regular basis to verify that it is operating correctly. The tests required by the standard *AS 1851 Maintenance of Fire Protection Equipment* are detailed in the 4100ES InfoAlarm Operator’s Manual, LT0568.

The Operator’s manual also provides detail of report printing and performing tests that are useful for checking the system.

Appendix A
The Device Configuration DIP Switch

Overview

Addressable cards include a bank of eight DIP switches. From left to right (see Figure A-1, below) these switches are designated as SW*x*-1 through SW*x*-8. The function of these switches is as follows:

- **SW*x*-1**. This switch sets the baud rate for the internal 4100 communications line running between the card and the CPU. Set this switch to ON.
- **SW*x*-2 through SW*x*-8**. These switches set the card's address within the 4100 FIP. Refer to Table A-1 for a complete list of the switch settings for all of the possible card addresses.

  Note: You must set these switches to the value assigned to the card by the 4100 Programmer.

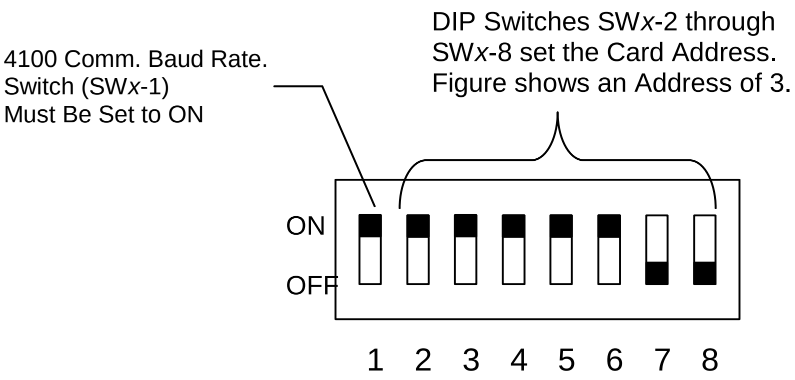


Figure A-1. DIP Switch SW*x*

Continued on next page

Overview,
(*continued*)

Table A-1. Card Addresses

Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	Address	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8
1	ON	ON	ON	ON	ON	ON	OFF	61	ON	OFF	OFF	OFF	OFF	ON	OFF
2	ON	ON	ON	ON	ON	OFF	ON	62	ON	OFF	OFF	OFF	OFF	OFF	ON
3	ON	ON	ON	ON	ON	OFF	OFF	63	ON	OFF	OFF	OFF	OFF	OFF	OFF
4	ON	ON	ON	ON	OFF	ON	ON	64	OFF	ON	ON	ON	ON	ON	ON
5	ON	ON	ON	ON	OFF	ON	OFF	65	OFF	ON	ON	ON	ON	ON	OFF
6	ON	ON	ON	ON	OFF	OFF	ON	66	OFF	ON	ON	ON	ON	OFF	ON
7	ON	ON	ON	ON	OFF	OFF	OFF	67	OFF	ON	ON	ON	ON	OFF	OFF
8	ON	ON	ON	OFF	ON	ON	ON	68	OFF	ON	ON	ON	OFF	ON	ON
9	ON	ON	ON	OFF	ON	ON	OFF	69	OFF	ON	ON	ON	OFF	ON	OFF
10	ON	ON	ON	OFF	ON	OFF	ON	70	OFF	ON	ON	ON	OFF	OFF	ON
11	ON	ON	ON	OFF	ON	OFF	OFF	71	OFF	ON	ON	ON	OFF	OFF	OFF
12	ON	ON	ON	OFF	OFF	ON	ON	72	OFF	ON	ON	OFF	ON	ON	ON
13	ON	ON	ON	OFF	OFF	ON	OFF	73	OFF	ON	ON	OFF	ON	ON	OFF
14	ON	ON	ON	OFF	OFF	OFF	ON	74	OFF	ON	ON	OFF	ON	OFF	ON
15	ON	ON	ON	OFF	OFF	OFF	OFF	75	OFF	ON	ON	OFF	ON	OFF	OFF
16	ON	ON	OFF	ON	ON	ON	ON	76	OFF	ON	ON	OFF	OFF	ON	ON
17	ON	ON	OFF	ON	ON	ON	OFF	77	OFF	ON	ON	OFF	OFF	ON	OFF
18	ON	ON	OFF	ON	ON	OFF	ON	78	OFF	ON	ON	OFF	OFF	OFF	ON
19	ON	ON	OFF	ON	ON	OFF	OFF	79	OFF	ON	ON	OFF	OFF	OFF	OFF
20	ON	ON	OFF	ON	OFF	ON	ON	80	OFF	ON	OFF	ON	ON	ON	ON
21	ON	ON	OFF	ON	OFF	ON	OFF	81	OFF	ON	OFF	ON	ON	ON	OFF
22	ON	ON	OFF	ON	OFF	OFF	ON	82	OFF	ON	OFF	ON	ON	OFF	ON
23	ON	ON	OFF	ON	OFF	OFF	OFF	83	OFF	ON	OFF	ON	ON	OFF	OFF
24	ON	ON	OFF	OFF	ON	ON	ON	84	OFF	ON	OFF	ON	OFF	ON	ON
25	ON	ON	OFF	OFF	ON	ON	OFF	85	OFF	ON	OFF	ON	OFF	ON	OFF
26	ON	ON	OFF	OFF	ON	OFF	ON	86	OFF	ON	OFF	ON	OFF	OFF	ON
27	ON	ON	OFF	OFF	ON	OFF	OFF	87	OFF	ON	OFF	ON	OFF	OFF	OFF
28	ON	ON	OFF	OFF	OFF	ON	ON	88	OFF	ON	OFF	OFF	ON	ON	ON
29	ON	ON	OFF	OFF	OFF	ON	OFF	89	OFF	ON	OFF	OFF	ON	ON	OFF
30	ON	ON	OFF	OFF	OFF	OFF	ON	90	OFF	ON	OFF	OFF	ON	OFF	ON
31	ON	ON	OFF	OFF	OFF	OFF	OFF	91	OFF	ON	OFF	OFF	ON	OFF	OFF
32	ON	OFF	ON	ON	ON	ON	ON	92	OFF	ON	OFF	OFF	OFF	ON	ON
33	ON	OFF	ON	ON	ON	ON	OFF	93	OFF	ON	OFF	OFF	OFF	ON	OFF
34	ON	OFF	ON	ON	ON	OFF	ON	94	OFF	ON	OFF	OFF	OFF	OFF	ON
35	ON	OFF	ON	ON	ON	OFF	OFF	95	OFF	ON	OFF	OFF	OFF	OFF	OFF
36	ON	OFF	ON	ON	OFF	ON	ON	96	OFF	OFF	ON	ON	ON	ON	ON
37	ON	OFF	ON	ON	OFF	ON	OFF	97	OFF	OFF	ON	ON	ON	ON	OFF
38	ON	OFF	ON	ON	OFF	OFF	ON	98	OFF	OFF	ON	ON	ON	OFF	ON
39	ON	OFF	ON	ON	OFF	OFF	OFF	99	OFF	OFF	ON	ON	ON	OFF	OFF
40	ON	OFF	ON	OFF	ON	ON	ON	100	OFF	OFF	ON	ON	OFF	ON	ON
41	ON	OFF	ON	OFF	ON	ON	OFF	101	OFF	OFF	ON	ON	OFF	ON	OFF
42	ON	OFF	ON	OFF	ON	OFF	ON	102	OFF	OFF	ON	ON	OFF	OFF	ON
43	ON	OFF	ON	OFF	ON	OFF	OFF	103	OFF	OFF	ON	ON	OFF	OFF	OFF
44	ON	OFF	ON	OFF	OFF	ON	ON	104	OFF	OFF	ON	OFF	ON	ON	ON
45	ON	OFF	ON	OFF	OFF	ON	OFF	105	OFF	OFF	ON	OFF	ON	ON	OFF
46	ON	OFF	ON	OFF	OFF	OFF	ON	106	OFF	OFF	ON	OFF	ON	OFF	ON
47	ON	OFF	ON	OFF	OFF	OFF	OFF	107	OFF	OFF	ON	OFF	ON	OFF	OFF
48	ON	OFF	OFF	ON	ON	ON	ON	108	OFF	OFF	ON	OFF	OFF	ON	ON
49	ON	OFF	OFF	ON	ON	ON	OFF	109	OFF	OFF	ON	OFF	OFF	ON	OFF
50	ON	OFF	OFF	ON	ON	OFF	ON	110	OFF	OFF	ON	OFF	OFF	OFF	ON
51	ON	OFF	OFF	ON	ON	OFF	OFF	111	OFF	OFF	ON	OFF	OFF	OFF	OFF
52	ON	OFF	OFF	ON	OFF	ON	ON	112	OFF	OFF	OFF	ON	ON	ON	ON
53	ON	OFF	OFF	ON	OFF	ON	OFF	113	OFF	OFF	OFF	ON	ON	ON	OFF
54	ON	OFF	OFF	ON	OFF	OFF	ON	114	OFF	OFF	OFF	ON	ON	OFF	ON
55	ON	OFF	OFF	ON	OFF	OFF	OFF	115	OFF	OFF	OFF	ON	ON	OFF	OFF
56	ON	OFF	OFF	OFF	ON	ON	ON	116	OFF	OFF	OFF	ON	OFF	ON	ON
57	ON	OFF	OFF	OFF	ON	ON	OFF	117	OFF	OFF	OFF	ON	OFF	ON	OFF
58	ON	OFF	OFF	OFF	ON	OFF	ON	118	OFF	OFF	OFF	ON	OFF	OFF	ON
59	ON	OFF	OFF	OFF	ON	OFF	OFF	119	OFF	OFF	OFF	ON	OFF	OFF	OFF
60	ON	OFF	OFF	OFF	OFF	ON	ON								

Appendix B
Programming Requirements

Introduction

This appendix identifies the programming that is required to comply with AS 4428.

It does not provide equations or detail of programming. The separate 4100ES Programming Manual (LT0400) tells how to use the PC-based 4100ES Programmer.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

Required Features

The following is a list of functions that must be programmed under custom control. Functionality must comply with AS 4428.1, and be as described in the InfoAlarm Operator's Manual LT0568.

- Individual zone alarm indication, flashing until isolated, steady when isolated.
- Common Zone Alarm indication, flashing when any unisolated zone is in alarm, steady when all zones in alarm are isolated.
- Individual zone isolate pushbutton and indication.
- Zone Alarm Test pushbutton and indication.
- Zone Fault Test pushbutton and indication.
- Warning System Isolate pushbutton and indication.
- Ancillary Control Function and Isolate pushbutton and indication as required.
- Weekly 1 hour battery test.
- Fault indication after 8 hours of isolate.

Notes

- The panel format is different to that on the programmer because the CPU card is fitted on the RHS of the first expansion bay, and extra cards may be fitted to the left of it.
- The US options for power supply and AVF are selected, not the Canadian ones.
- Features that do not comply with AS 4428 must not be enabled, e.g., Alarm cut-out times.
- Features that are statutory in AS 4428 must not be pass-code protected, e.g., zone isolate, zone test (Fault and Alarm).

Appendix C
Checking System Wiring

Overview

This appendix contains instructions on how to use a volt/ohm meter to check field wiring to the 4100ES.

Using the Volt/ Ohm Meter

When using the volt/ohm meter to check each circuit, make sure to adhere to the notes and instructions below.

Notes:

- Ensure that no power is applied to the 4100ES fire alarm panel and that all internal panel wiring is properly connected (terminal blocks, LED/switch module ribbon cables, etc).
- Use the earth stud in the control panel as the earth connection for all measurements to ground.
- Disconnect the wires for each circuit from the 4100ES terminals before testing it.
- Measuring resistances between 4100ES terminals or to ground will give meaningless results.

Use the volt/ohm meter as described in the steps below to check each circuit type:

1. At the 4100ES panel, disconnect the wires for each circuit from the terminals before testing it. If it is a Class A (loop) type of circuit, e.g., IDNet loop, ensure that both ends of the loop are disconnected from the 4100ES.
2. Check each circuit for extraneous voltage by setting the volt/ohm meter to a 300VAC range. Place the meter probes so that the black probe is on the "-" wire and the red probe is on the "+" wire. Meter readings must show less than 1V.
3. Set the volt/ohm meter to a 60VDC range and repeat step 2. The meter must read less than 0.5V.
4. Set the volt/ohm meter to OHMS and place the meter probes as described in step 2. Check the circuits using the resistance measurements in Table D-1. Locate and correct any abnormal conditions at this time.
   Note: If the reading indicates an open circuit in a detector circuit, make sure the smoke detector heads are properly mounted and seated. The circuit may also be open if smoke detector power is not present, and if separately powered 4-wire devices are used.
5. Repeat steps 1-4 for all field wiring, to verify that each circuit is free of grounds and extraneous voltages.

Continued on next page

Meter Readings

Table C-1 lists the correct meter readings for indicating appliances and initiating devices.

Table C-1. Acceptable Zone and Signal Circuit Meter Readings

Circuit Type	Meter Reading
Class B (spur) Detector Circuit	
From zone + to zone – (each zone)	3.3kΩ (EOLR)
From zone + to ground	Open circuit
From zone - to ground	Open circuit
Class B (spur) Notification Appliance Circuit (each signal circuit)	
From + to ground	Open circuit
From - to ground	Open circuit
Resistance across circuit: In one direction In the opposite direction	 10 kΩ (EOLR) Low resistance (Load)
Class A (loop) Notification Appliance Circuit (each signal circuit)	
From + to ground	Open circuit
From - to ground	Open circuit
From + OUT to + IN	Less than 50Ω
From - OUT to - IN	Less than 50Ω
Resistance across circuit: In one direction In opposite direction	 Open circuit Low resistance (Load)
Shielding	
Shield to ground	Open circuit
Shield to -	Open circuit
Shield to +	Open circuit
MAPNET/IDNet Loops	
From MAPNET/IDNet + to ground	Open circuit
From MAPNET/IDNet - to ground	Open circuit
Note: measuring from MAPNET/IDNet B+ to A+, or B- to A- will nearly always read as an open circuit due to the channel isolators in the loop.	

Appendix D
Earth Fault Detection

Overview

This appendix contains instructions on how to use the Earth Fault Search feature of the 4100ES diagnostics menus.

Earth Fault Search is a diagnostic search of external field wiring that assists in locating circuits with earth faults. An earth fault occurs when an electrical circuit is shorted to ground. Although most circuits operate with a single earth fault, multiple earth faults can disable communications. Because of this, earth faults must be located and repaired.

Earth Fault Search is conducted by the FIP. The diagnostic may be activated using either the front panel interface or the Computer Port Protocol (CPP), via a service port.

The 4100ES supports two types of Earth Fault Searches:

- **Location Search.** Searches all circuits at a location, such as a transponder or the main panel. For the purposes of Earth Fault Searching,
  - A *location* is composed of a group of slaves connected to each other via 4100 Comm (local RUI).
  - The *main panel* is defined as all slaves local to the Master CPU.
  - A *transponder* denotes all slaves associated with a single Transponder Interface Card (TIC)/Local Mode TIC slave.
- **IDNet Channel Search.** Selectively enables channel isolators and repeaters to detect which segment of the channel wiring has a fault.
  - Earth faults are detected by one of the following:
  - A single designated power supply at a location. The power supply that detects the fault is designated via a jumper setting on the power supply slave. For any given location, only one power supply should detect earth faults.
  - Each 4009 IDNet NAC Extender on an IDNet channel.

General Guidelines

Review the guidelines below before initiating an Earth Fault Search.

- The Detect Earth Fault jumper must be installed at each SPS for earth fault detection to occur.
- Only one power supply per location is configured to detect earth faults.
- For more reliable earth fault searching:
  - Use IDNet channel isolators to isolate channel faults to a specific segment of channel wiring.
  - Set IDNet channel isolator addresses to the lowest IDNet device addresses, increasing with communication distance from the IDNet card.
- If an earth fault is suspected on the IDNet channel with multiple isolators, start an IDNet Channel Search before doing a Location Search. If the Location Search is done first, it may not yield the correct location (this is a by-product of the extended amount of time required for the IDNet channel to initialize during a Location Search).
  Note*:* The 4009 IDNet NAC Extender has a common ground fault trouble that reports to the panel without running the Earth Fault Search.
- Earth Fault Search detects only one fault at a time. Multiple faults require fixing the first fault and then repeating the search.
- The 4100ES panel suspends normal operation for the duration of the Earth Fault Search.
- Location Earth Fault Searches optionally allow exclusion of auxiliary power circuits from the search, so that modules connected to the 24 V auxiliary outputs can remain in operation during the search.
- The option to exclude auxiliary power circuits does not apply to IDNet devices, because the entire IDNet communication channel is isolated during each search.
- During the search, all related troubles are suppressed and a single trouble pseudo-point is activated (P438).
- At the completion of the search, all slaves are restarted and normal panel operation resumes.
- Earth Fault Search is supported only by new 4100ES modules. 4100 Legacy (slot format) modules are not supported, with the following exceptions:
  - MAPNET channel isolation during location search

IMPORTANT: The fire panel cannot provide fire protection during an Earth Fault Search.

Earth Fault Searching from the Front Panel

Overview

This section describes how to conduct an Earth Fault Search, from selecting the appropriate access code to correcting the fault.

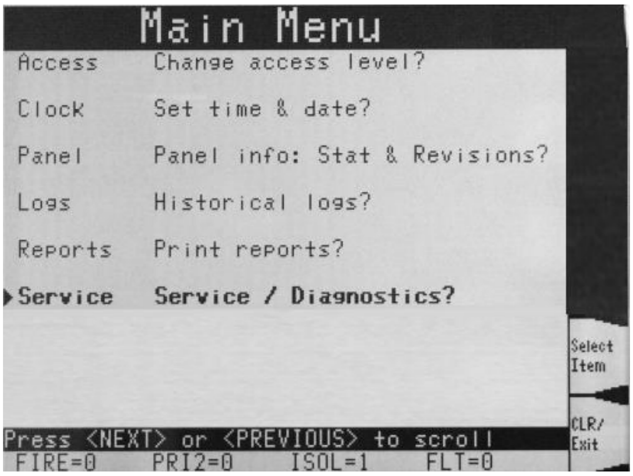
Access Level Selection

The panel must be at the appropriate access level in order to run diagnostics. If necessary, refer to the InfoAlarm Operator Manual supplied with the 4100ES, for the detail of how to log in at a higher level than 1.

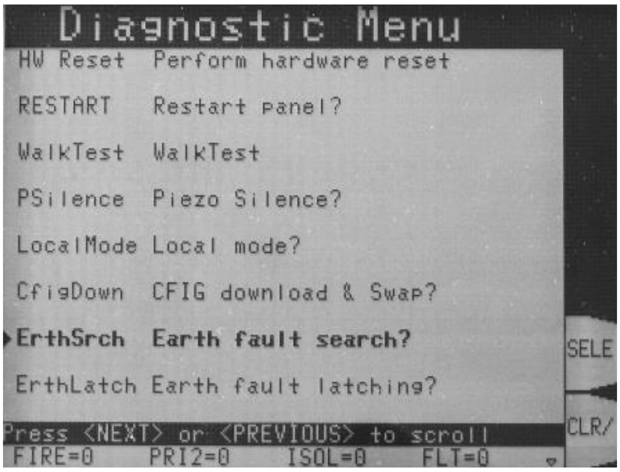
You can now open the diagnostic menu as described in the next topic.

Starting the Earth Fault Search

To start an Earth Fault Search, open the Main Menu on the InfoAlarm. Select the Service/Diagnostics menu.



Select Earth Fault search in the diagnostics menu.



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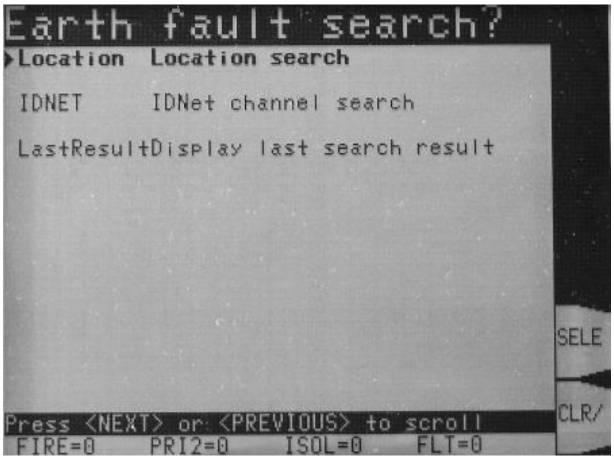
Earth Fault Searching from the Front Panel, *Continued*

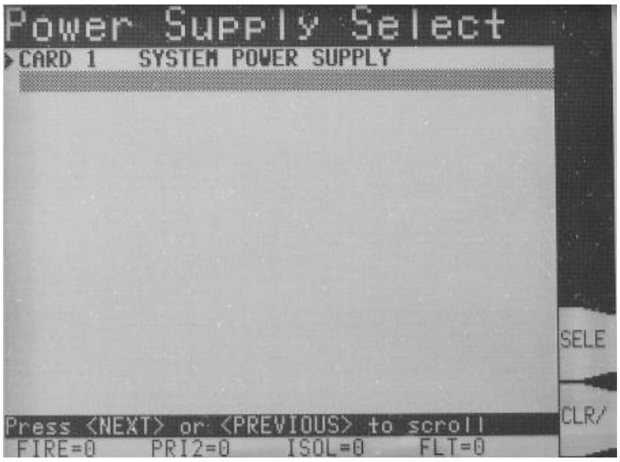
Starting the Earth Fault Search, Continued

The search types are described below.

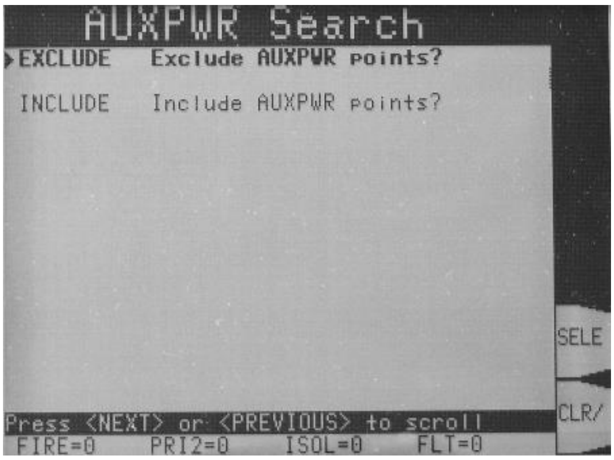


Location Search

If you select the Location Search menu item, a list of searchable cards is presented. Use the Next and Previous buttons to scroll through the list, if necessary.



Having selected a power supply to search, the Aux Power Select option comes up.



If you exclude the auxiliary power circuit from the search, that circuit will continue to operate normally.

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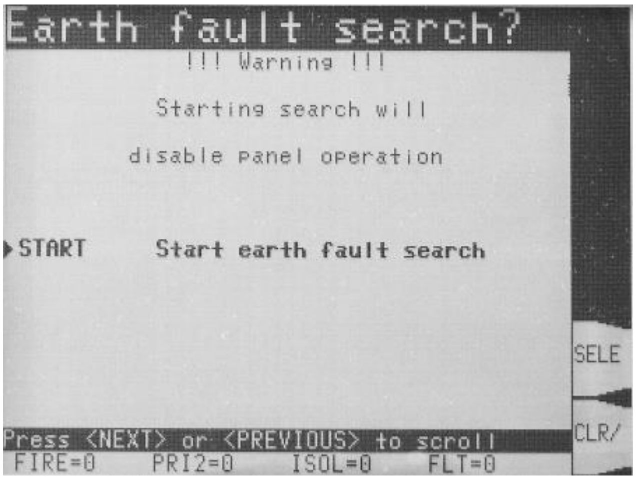
Earth Fault Searching from the Front Panel, *Continued*

Now you are prompted to start the search.



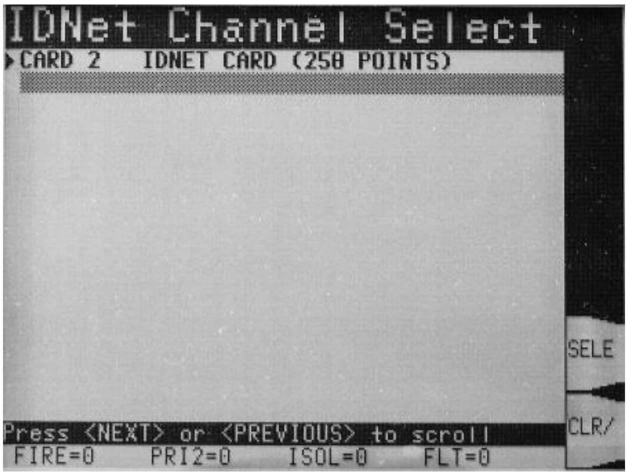
NOTE: The FIP suspends normal operation for the duration of the search.

Press the Enter button to start the search.

Skip ahead to the "Completing the Search" topic.

IDNet Channel Search

If you select the IDNet Channel Search menu item, a list of available IDNet channels to search is displayed.



Use the Next and Previous buttons to scroll through the list if necessary.
Press SELECT or OK to select the IDNet channel to search. Now you are prompted to start the search.

NOTE: The FIP suspends normal operation for the duration of the search.

Press the Enter button to start the search.

Skip ahead to the "Completing the Search" topic.

Earth Fault Searching from the Front Panel, *Continued*

Last Search Result

This option simply displays the last Earth Fault Search result. If there has been no search since the last system startup, or if the last search was aborted, the panel displays "RESULT NOT AVAILABLE."

Completing the Search

When a Location or IDNet Channel Search completes, all of the following occurs:

- All slaves automatically reset.
- The FIP turns off the Earth Fault Search trouble pseudo-point.
- The panel displays the specific fault information.

The panel can return only one Earth Fault Search result at a time. If another fault exists, it can be found only via diagnostics after the first fault is cleared. Faults will continue to appear, one by one, until each one has been found and corrected.

IMPORTANT: Once you have been directed to an earth ground fault and corrected it, it is recommended that you restart the system (warm- or cold-start). Refer to the InfoAlarm Operator Manual for details of how to do this.

Search Results

Overview

There are several types of results that can display at the end of an Earth Fault Search. This section covers all types of results.

IMPORTANT: Once you have been directed to an earth ground fault and corrected it, it is recommended that you restart the system (warm- or cold-start).

Non-Point Faults

A non-point fault indicates a ground that cannot be traced to an addressable point (for example, a shield).
Non-point faults can be displayed for each of the following items:

- Channel Output (IDNet Card; MAPNET Interface Card).
- RUI Channel (Master Controller Card).

Point Faults

A point fault indicates a ground at a specific addressable point.
Point faults can be found at any point in the system that connects to field wiring.

Some IDNet channel point fault examples are illustrated below.

Fault not cleared. The message below shows that an IDNet channel that has been isolated for fault detection still has the earth fault:

```
CARD 2, IDNET CARD (250 POINTS)
M1, EARTH FAULT SEARCH  FAULT CLEAR FAIL
```

Fault between channel output and first isolator. The message below shows a fault between the IDNet channel output and the first isolator on the line:

```
CARD 2, IDNET CARD (250 POINTS)
M1, CHANNEL OUTPUT           EARTH FAULT
```

4009 IDNet NAC Extender/TrueAlert Addressable Controller faults. The message below shows a fault detected on the 4009 IDNet NAC Extender **before** the repeater connected to that circuit is turned on:

```
CARD 2, IDNET CARD (250 POINTS)
M1-18, 4009A NAC             EARTH FAULT
```

Conversely, the following example shows a fault detected **after** the repeater connected to that circuit is turned on:

```
CARD 2, IDNET CARD (250 POINTS)
M1-18, 4009A REPEATER        EARTH FAULT
```

IDNet isolator fault. The message below shows a fault detected after the IDNet isolator was turned on:

```
CARD 2, IDNET CARD (250 POINTS)
M1-3, IDNET ISOLATOR        EARTH FAULT
```

Continued on next page

Search Results, *Continued*

Fault Not Found

If the message reads FAULT NOT FOUND (for a Location Earth Fault Search) or FAULT CLEAR FAIL (for an IDNet Channel Earth Fault Search), it means the search could not locate the fault, but it acknowledges that a fault exists.

There are several main possibilities behind this message:

- There are one or more internal wiring earth(s) in the system.
- There are system defects (hardware or software, such as a failed isolation circuit).
- An intermittent earth exists in the system (it occurs inconsistently and is therefore difficult to track via diagnostics).
- The cable to the service port may be grounded due to the remote PC's 3-prong plug. Use a non-grounded plug adapter to the remote PC to get rid of the earth ground.
- The fault is on an auxiliary output that was excluded from the search.

The problem may have to be found manually and then corrected in some of the above scenarios.

No Fault

If the message reads NO FAULT, it means the IDNet channel search could not locate any earth faults on that channel.

Result Not Available

If the message reads RESULT NOT AVAILABLE, it means there is no result to view. This message comes up only when you have selected "Last Search Result" on the menu.

Earth Fault Search Example

The illustration below shows a MINIPLEX system with one transponder that has three earth faults:

- SPS NAC on the SPS in the Main Panel.
- AUXPWR output on the SPS in Transponder 1.
- IDNet channel in Transponder 1.

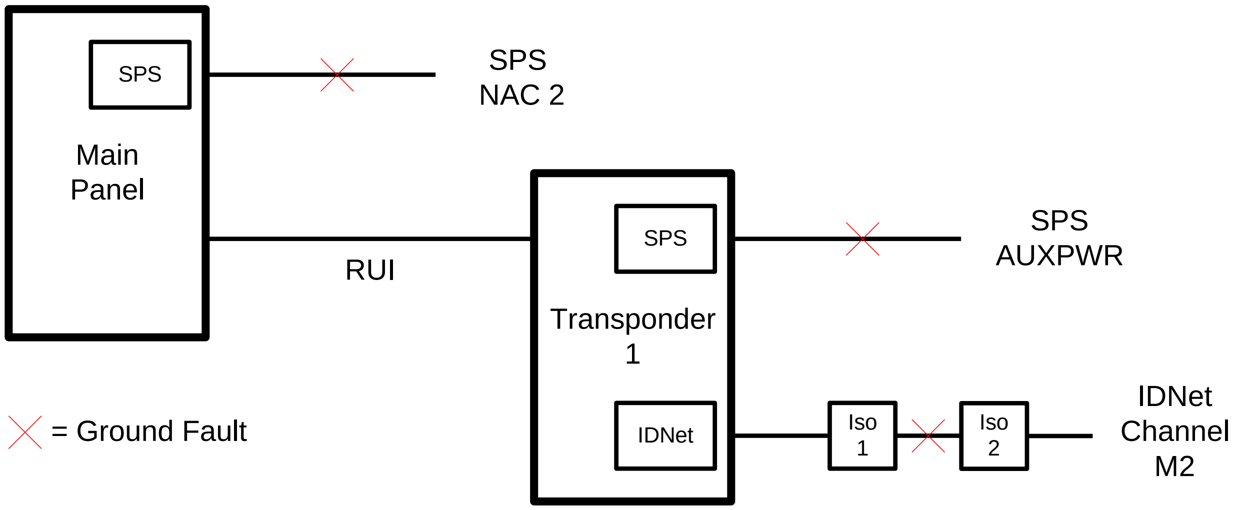


Figure D-1. Earth Fault Example

The panel reports two earth faults—one for each power supply. The third fault is as yet unreported.

The example below shows the progression of events in finding and repairing the three faults. They are presented as instructions to a technician who does not yet know about the third fault.

A. Find and repair the fault in the main panel.

1. After opening the Earth Fault Search diagnostic menu option, select Location Search.
5. Select the SPS located in the Main Panel (this selects the Main Panel as the location for the search).
6. When prompted, select exclusion of AUXPWR circuits.
7. Start the search. (The panel turns on the earth fault search trouble pseudo-point and the keypad inactivity utility pseudo-point to disable timeout during the search).
8. The search completes. The panel indicates that NAC 2 on the SPS has the earth fault. All slaves are reset (and the panel turns off the earth fault search trouble pseudo-point).
9. Repair the earth fault on NAC 2. When this is done, the trouble from the SPS clears but the trouble from the Transponder SPS is still indicated.

Continued on next page

B. Find and repair the indicated fault on Transponder 1.

1. Select Location Search.
2. Select the SPS located in Transponder 1 (this selects Transponder 1 as the location for the search).
3. When prompted, select exclusion of AUXPWR circuits.
4. Start the search. (The panel turns on the earth fault search trouble pseudo-point and the keypad inactivity utility pseudo-point to disable timeout during the search).
5. The search completes. The panel indicates FAULT NOT FOUND because the fault is on the excluded AUXPWR circuit. All slaves in Transponder 1 are reset (and the panel turns off the earth fault search trouble pseudo-point).
6. Repeat the search but include the AUXPWR circuit this time.
7. The search completes. The panel indicates a fault on the AUXPWR point on the SPS. All slaves in Transponder 1 are reset (and the panel turns off the earth fault search trouble pseudo-point).
8. Repair the earth fault on AUXPWR.

Even though you have fixed the fault, the trouble from the Transponder SPS is still not clearing. Remember that the only two faults you could see at first were from the two SPS. It is time to find and clear the next fault.

C. Find and repair the next indicated fault on Transponder 1.

1. Select Location Search.
2. Select the SPS located in Transponder 1.
3. When prompted, select exclusion of AUXPWR circuits.
4. Start the search.
5. The search completes. The panel indicates a fault on IDNet Channel M2.
6. Start another search, this time an IDNet Channel Search on Channel M2.
7. When prompted, select exclusion of AUXPWR circuits.
8. The search completes. The panel indicates a fault on the IDNet channel between isolators 1 and 2.
9. Repair the earth fault. The trouble from the SPS is cleared.

Appendix E
Compatible Actuating Devices

Introduction

This appendix lists devices that have been approved as compatible devices for use with the 4100ES FIP. It lists the devices approved for use with the IDNet and shows the number allowed per loop.

In this Chapter

Refer to the page number listed in this table for information on a specific topic.

List of Approved Devices

Simplex Range - Conventional Detectors

4098-9413	Heat detector Type A
4098-9414	Heat detector Type B
4098-9415	Heat detector Type C
4098-9416	Heat detector Type D
2098-9201	Photoelectric smoke detector
2098-9576	Ionisation smoke detector

Detector Type	4100-5004 8 Zone Module	2190-9156 Monitor ZAM	4090-9101 Monitor ZAM
4098-9601EA Photoelectric	30	20	20
4098-9603EA Ionisation	30	20	20
4098-9618EA Heat Type A	30	20	20
4098-9619EA Heat Type B	30	20	20
4098-9621EA Heat Type D	30	20	20

Tyco Range - Conventional Detectors

Detector Type		4100-5004 8 Zone Module	2190-9156 Monitor ZAM	4090-9101 Monitor ZAM
614CH	CO/Heat Detector	37	25	25
614I	Ionisation Detector	40	29	29
614P	Photo-electric Detector	28	19	19
T614	Heat Detectors – Type A, B, C, D	30	20	20

System Sensor Range - Conventional Detectors

Detector Type		4100-5004 8 Zone Module	2190-9156 Monitor ZAM	4090-9101 Monitor ZAM
885WP-B	Weatherproof Heat Detector Type B @	40	40	40

@ Remote indicator output cannot be wired in common with Tyco 614 series or the Minerva M614 series (and most other Tyco/Olsen) detectors.

Continued on next page

List of Approved Devices, *Continued*

Hochiki Range - Conventional Detectors

DCA-B-60R MK V	Type A heat detector
DCC-A	Heat Type A
DCC-C	Heat Type C
DCD-A	Heat Type A
DCD-C	Heat Type C
DFE-60B	Type B heat detector
DCA-B-90R MK 1	Type C heat detector
DFE-90D	Type D heat detector
DFG-60BLKJ	Type B heat detector
DFJ-60B	Heat Type B
DFJ-90D	Heat Type D
SPA-AB	Beam type smoke detector
SIH-AM	Ionisation smoke detector
SIF-A MK 1	Smoke
SIJ-ASN	Smoke
SLK-A	Photoelectric smoke detector
SLG-A MK 1	Smoke
SLG-AM MK 1	Photoelectric smoke detector
SLR-AS	Smoke
HF-24A MK 1	Ultraviolet smoke detector
YBC-R/3A	Plain - non indicating base
YBF-RL/4AH4	LED Indicating base

Olsen Range - Conventional Detectors

B111B	Beam type smoke detector
C24B	Ionisation smoke detector
C29BEX	Ionisation smoke detector
FW81B	Heat detector cable, Type E
P24B	Photoelectric smoke detector
P29B	Photoelectric smoke detector
R23B	Infrared flame detector
R24BEX	Dual spectrum infrared flame detector
T54B	Probe type heat detector type E
T56B	Heat detector types A,B,C,D with Z55B base
T56B	Heat detector types A,B,C,D with Z54B base
V41B/V42B	Ultraviolet flame detector

Apollo Range - Conventional Detectors

Series 60 Heat detector Type A
Series 60 Heat detector Type B
Series 60 Heat detector Type C
Series 60 Heat detector Type D
Series 60 55000-310 Aus Photoelectric smoke detector
Series 60 55000-240 Aus Ionisation smoke detector

Continued on next page

Brooks Range - Conventional Detectors

PFS-A	Heat detector Type A
PFS-B	Heat detector Type B
PFS-C	Heat detector Type C
PFS-D	Heat detector Type D
PFS-P	Photoelectric smoke detector
PFS-P MK II	Photoelectric smoke detector
PFS-I	Ionisation smoke detector
PFS-I MK II	Ionisation smoke detector

Cerberus Range - Conventional Detectors

D01191A	Beam
DL01191A	Beam

The following range of detectors may be used with MAPNET Modules.

Simplex Range - Analog Addressable Sensors

4098-9701	High / Very High sensitivity Photoelectric smoke
4098-9716	Ionisation smoke
4098-9731	Type A / Type B Heat
4098-9781	Addressable LED Indicating base
4098-9782	Addressable LED Indicating base with Sounder
4098-9783	Addressable LED Indicating base with Relay driver
4098-9714/9714EA	TrueAlarm Photoelectric smoke
4098-9717/9717EA	TrueAlarm Ionization smoke
4098-9733/9733EA	TrueAlarm Type A / Type B Heat
4098-9754/9754EA	TrueAlarm Multi-Sensor Photo / Type A / Type B Heat
4098-9789/9789EA	TrueAlarm Addressable LED Indicating base
4098-9794/9794EA	TrueAlarm Addressable LED Indicating base with Sounder
4098-9795/9795EA	TrueAlarm Addressable Multi-Sensor LED Indicating base with Sounder
4098-9796/9796EA	TrueAlarm Addressable Multi-Sensor LED Indicating base
4098-9752/9752EA	TrueAlarm Addressable Photoelectric Duct Probe
4098-9755/9755EA	TrueAlarm Addressable Photoelectric Duct Probe

Continued on next page

List of Approved Devices, *Continued*

Simplex MAPNET 2 Range – Addressable Field Devices

2190-9156	Mapnet 2 Monitor ZAM
2190-9162	Mapnet 2 Signal ZAM
2190-9164	Mapnet 2 Control ZAM
2190-9169	Mapnet 2 Line Powered Short Circuit Isolator
2190-9172	Mapnet 2 Supervised IAM
2190-9173	Mapnet 2 Loop powered 2 Point Input / Output Module
4099-9032NL	Mapnet 2 Addressable Manual Call Point
4099-9701	IDNet Addressable Manual Call Point with LED
4099-9702	IDNet Addressable Manual Call Point without LED

Compatible Detectors, IDNET

The following lists the detectors approved for use with IDNet and shows current rating and numbers allowed per loop.

Device Type	Operating Current mA	Maximum Number Allowed Per Loop	Maximum Number Allowed Per Line
4098-9714E Analogue Photoelectric Smoke Detector	0.5 (2 with LED on)	250	40*
4098-9717E Analogue Ionisation Smoke Detector	0.5 (2 with LED on)	250	40*
4098-9733E Analogue Heat Type A & B Detector	0.5 (2 with LED on)	250	40*
4098-9754E Analogue Multi (Heat/Photo) Detector	0.5 (2 with LED on)	250	40*

* Maximum allowed by AS 1670.1.

The above with -9714E, -9717E and -9733E use a (4098-) 9789E addressable base or -9794E addressable sounder base, or -9793 addressable isolator base. The -9754E uses a 9796E addressable base or -9795E sounder base.

The maximum specified loop/line resistance is 40Ω.

The maximum number of LEDs switched on by an IDNet in alarm is 20.

Compatible Addressable Field Devices, IDNet

The following lists the addressable devices approved for use with IDNet and shows current rating and numbers allowed per loop.

Device Type	Operating Current mA	Maximum Addressable Point On Analogue Loop	Maximum Addressable Points on Analogue Line
4090-9116 IDNet Comms Isolator	0.5 (2 with LED on)	250	40*
4090-9118 Relay IAM with T-sense	0.5 (2 with LED on)	250	40*
4090-9117 Addressable Power Isolator	0.5 (2 with LED on)	250	40*
4090-9119 Relay IAM with unsupervised Input	0.5 (2 with LED on)	250	40*
409-9120 6 Point I/O	0.5	250	40*
4090-9001 Supervised IAM	0.65 (2.8 with LED on)	250	40*
4090-9051 Supervised IAM (encapsulated)	0.65 (2.8 with LED on)	250	40*
4090-9101 Monitor ZAM	0.65 (2.8 with LED on)	250	40*
4099-9032 4099-9701 4099-9702 Manual Call Point	0.65 (2.8 with LED on)	250	40*
4090-9007 Signal IAM	1.0 (2.5 with LED on)	125	40*

* Maximum allowed by AS 1670.1.

The maximum specified loop/line resistance is 40Ω.

The maximum number of LEDs switched on by an IDNet in alarm is 20.

The 6 Point I/O LED is powered from the external 24V supply, not from the loop.

Note: The relays on the 6 Point I/O are not approved for switching field loads, i.e. the contacts may only be used to switch loads within an earthed cabinet.

Appendix F
Compatible Batteries

The following batteries are compatible with the 4100ES:

- Power Sonic PS12 Series.
- Century Power Sonic PS12 series.
- Sonnenschein A200 Series.
- Sonnenschein A300 Series.
- Century Yuasa NP Series.
- Auscell CJ12 series.
- Power Block PB12 series.

Appendix G
4100ES Specifications

General

System Capacity	2,000 points of addressable points, plus 2,000 points of annunciation. Expansion up to capacity above. Up to 119 Addressable cards
Cabinet Size	Dependent on system configuration
Cabinet Material	1.6mm Zintec
Cabinet Finish	Powder coated
Cabinet Colour	Cream Wrinkle
Mounting	Wall mount
Mains Input	240V AC, +6%, -10%, 50Hz
Internal Power Supply	24V DC @ 9A
Standby Battery	24V sealed lead acid up 110Ah
Battery Charger	27.3V DC (nominal)
PSU Supervision	Charger high/low, Battery low/fail
Temperature	-5°C to 45°C
Humidity	10% to 90% RH non-condensing

Fuses

Alarm Relay Card:
F1 Alarm, 3A, 15 x 5mm, Glass Cartridge
F2 Supervisory, 3A, 15 x 5mm, Glass Cartridge
F3 Trouble, 3A, 15 x 5mm, Glass Cartridge

Fused Distribution Board (if fitted):
F1 24V Out, 1A 20 x 5mm Glass Cartridge
F2 24V Out, 1A 20 x 5mm Glass Cartridge
F3 24V Out, 1A 20 x 5mm Glass Cartridge
F4 24V Out, 1A 20 x 5mm Glass Cartridge

Firmware Features

- WALK TEST System Test.
- 4 Operator Access Levels.
- Event Historical Logging.
- Device selectable Alarm Verification.
- Individual Zone Isolate.
- Addressable device disable/enable.
- Non-volatile Flash EPROM for field editable program changes.
- Expansion cards firmware upgraded via download to flash EPROMs.

Voltage & Current Ratings of Modules & Assemblies

The DC input voltage range of the following modules is 18-33VDC. The current listed is nominal for 24VDC, and may be used for battery capacity calculations.

Module	Name	Quiescent	Alarm
N/A	Master Controller Assembly (includes SPS, CPU, CPU Motherboard with RUI I/F, Operator Interface with LCD)	373mA	470mA
4100-6035	Alarm Relay Card	15mA	37mA
4100-3101	IDNet Module without Devices - per device add - with 250 devices add	75mA 0.8mA 200mA	115mA 1mA 250mA
4100-1289	64/64 Controller plus Switch LED Modules - no LED on - per LED on add - with 64 LEDs on add	 20mA 3mA 210mA	 3mA 210mA
4100-0620	Transponder Interface, Basic Unit	87mA	87mA
4100-0625	Transponder Interface, Local Mode	112mA	112mA
4100-6014	Network Interface Card	28mA	28mA
4100-6056	Wired Media Module	55mA	55mA
4100-6057	Fibre Optic Media Module	25mA	25mA
4100-6038	Dual RS232 Interface	132mA	132mA

Appendix H
Power Supply & Battery Capacity Calculations

Power Supply

Part of the system design includes calculating that the quiescent load and the alarm load are each less than the rating of the power supply.

Note that the quiescent load includes devices such as door holders that are normally energized, but get switched off during alarm.

The SPS rating is included in the specifications in Chapter 5.

Refer to AS 1670.1 Section 8.2.3 for a definition of the loads to be calculated.

Battery Capacity

Battery capacity requirements are specified in AS 1670.1, 2004, Section 3.16.4 with an example shown in Appendix C1.

Calculate the quiescent load (Iq) and alarm load (Ia) from the currents listed in the specifications (Appendix G of this manual). Follow the example in AS 1670.1.

Note that the system current for both the quiescent and the alarm state can be checked on the panel by use of the System Current status point under Card Status for the SPS.

Appendix J
Cable Characteristics

IDNet

The IDNet cabling requirements are detailed in Chapter 7 of this manual.

4100 MAPNET II

Line Characteristics

Note: In the following paragraphs the term "MAPNET channel" is used to mean those lines connected to any one Mapnet Transceiver board. Parallel runs from the same board do not constitute separate channels. The term "continuous run" refers to the loop distance from the primary output, through all devices and back to the secondary output.

Line characteristics are based on 0.58uF and/or 35 Ohms total line resistance.

Total length of line on one MAPNET channel shall not exceed 3,000 m including all T-taps and parallel runs.

Maximum length for ONE continuous MAPNET run is 1200 m for up to 128 MAPNET devices using 1.5 mm sq cable.

When the run exceeds 850 m it is necessary to use twisted, shielded pair.

NETWORK

Copper Line Characteristics

Network "Wired" *(formerly called* RS-485) Communication wiring must be 0.75 mm sq twisted, shielded pair (TSP), or 0.22 mm sq twisted pair (TP). Shielded Cable is recommended for new installations. When shielding is used, the shield shall be connected to Earth Ground, at the Left Port end of span only.

No T-tapping of the Network conductors is allowed. Network wiring is point-to-point, only.

Maximum line length between ports at 57,600 and 9600 bits per second is shown in the table below.

Table J- 1 Network: Maximum Transmission Distances, "Wired" Network

	Maximum Wiring Distance	
Communication Speed	0.75mm sq TSP Wire. (Maximum capacitance between conductors is 174 pf. per meter)	0.22mm sq TP Wire. (Maximum capacitance between conductors is 66 pf. per meter)
57,600 bps	3,000 m	2,300 m
9600 bps	5,600 m	4,000 m

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Fibre Optic Cable Characteristics

All fibre cables must be multimode, graded index. ST style connectors must be used. No physical strain should be put on the cables. There must be no cable bends of less than a 50mm radius.

Two methods are available for joining fibre cable. Splices provide a permanent, very low loss, fibre-to-fibre connection. Couplers provide temporary connection between two ST style connectors with a loss of 1.2dB. Both methods are permitted on a fibre network.

The characteristics of the 4100-0143 fibreoptic media card are as follows:
Mininum Launch Power into a 50/125µm cable is 50µW (-13dBm).
Minimum Launch Power into a 62.5/125µm cable is 109.5µW (-8.6dBm).
The maximum value for the minimum input sensitivity of the receiver is 1.0µW (-30 dBm).

Maximum line lengths for 50/125 and 62.5/125 cable are shown in the table below.

Table J-2 Network: Maximum Distances, Optical Fibre

Fibre Cable	Loss Per Kilometer	Power Margin	Maximum distance
50/125 Fibre	4 dB	4 dB	3,050 meters
50/125 Fibre	3 dB	3 dB	4,500 meters
62.5/125 Fibre	4 dB	4 dB	4,000 meters
62.5/125 Fibre	3.75 dB	3 dB	4,500 meters

All the information above is based on the **minimum** launch power of the transmitter into the specified cable and the **maximum value** of the minimum input sensitivity of the receiver.

Appendix K
List of Spare Parts

Spare Part Order Codes

This table lists the ordering codes for the spare parts that may be needed to maintain this 4100ES panel. The first column lists the expected numbers that may be readily visible on the part being replaced as an aid to identifying what it is, if this is not obvious from other information.

Possible markings on the part	Description	Order code for replacement spare part
CPU Card and Motherboard		
0566719 578-643	4100ES NXP CPU Upgrade Kit	4100-7158K
566-227	4100ES/4100U CPU Motherboard only	742-516
Front display doors and display modules		
743-327	INFOALARM ON 8U DOOR, AU SPARE	4100-ME0498
743-327	INFOALARM,AU SPARE/UPGRADE KIT, BAY MOUNTED	4100-7155K
none	7U ZONE LED DOOR EMPTY SPARE	4100-KT0549K
4100-1288 566-060 741-206	64/64 LED/Switch Controller and mounting frame (1st controller in a bay)	4100-1288
566-060 741-206	64/64 LED/Switch Controller (2nd controller in a bay)	4100-1289
4100-1277 742-983	8 Red and 8 Yellow LED Module	4100-1277
4100-1280 742-509	8 Pushbutton 8 Red LED Module	4100-1280
4100-1284 742-407	8/16 Push Button/Red-Green LED Module	4100-1284
4100-1282 742-408	8/16 Push Button/Red-Yellow LED Module	4100-1282
4100-1281 742-508	8 Pushbutton 8 Yellow LED Module	4100-1281
4100-1287 742-506	24 Push Button 24 LED Module	4100-1287
1976-149 PA1029	4 x AS1668 Control Module	4100-ME0456
4100-1279 742-519	Single Blank Display Cover (4100ES or 4100U)	4100-1279
4100-9443AU	INFOALARM REMOTE DISPLAY PLATINUM	4100-9443AU

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Spare Part Order Codes
Continued

Possible markings on the part	Description	Order code for replacement spare part
Internal slave modules		
562-789	4100 24 Point Graphic I/O PCB with standard motherboard	4100-0302K
562-789	4100 24 Point Graphic I/O PCB with relay motherboard	4100-3024K
565-045	4100 8 point Aux Relay PCB (legacy)	4100-3003K
566-403	4100 8 point Aux Relay PCB (PDI/flat)	4110-3206
566-401	4100 4 point Aux Relay PCB (PDI/flat)	4100-3204
565-226	4100 8 Zone Monitor / Security PCB (5004 Card)	4100-5004K
565-452	4100 6 Circuit Signal PCB	4100-4321K
565-453	4100 6 Circuit Signal PCB-current model	4100-4321K
566-044 741-754 742-146 SF0373	IDNet Module for PDI bus (250 points) - Australian Software	4100-3101AU
566-675 742-146	IDNet+ Module for PDI bus (4 loops, 246 points) - Australian Software	4100-3107AU
562-976	4100 Mapnet II Transceiver Board	4100-0110K
565-158	4100 Mapnet Quad Isolator PCB	4100-0111K
565-217	4100 RUI PCB	4100-0304K
565-415	4100 RS232 Modem Ready PCB	4100-0113K
565-744	4100 Vesda High Level Interface Card	4100-0154K
566-035	4100ES Basic TIC Module	4100-0620
ME0455 1976-99 PA0987	Legacy Adaptor bracket	4100-KT0496
Power Supply parts		
4100-9848AU	Australian XSPS Power Supply	4100-9848AU
002-109	Australian SPS fuse board	4100-KT0448
566-058	Alarm Relay Module	4100-6033
Tone Generator parts		
PA0766 T-GEN 50	T-GEN 50 on legacy mounting bracket	4100-0766K
None	T-GEN50,ROTARY SWITCH,NO BRACKET	ME0460
None	T-GEN/4100U PA MIC WITH EXTENDED LEAD	ME0490

Continued on next page

Spare Part Order Codes
Continued

Possible Markings on the part	Description	Order Code for Replacement Spare Part
Networking Modules		
565-407 565-516 4100-6014	4100 Modular Network Interface card	4100-6078
565-413	4100 RS485 Wired Media Module	4100-6056
565-261	4100 Fibre Optic Media Module	4100-6057
4100-6072 743-716	Fibre Optic MODEM Left port Single Mode	4100-6072
4100-6073 743-717	Fibre Optic MODEM Right port Single Mode	4100-6073
Looms, Bays and Wiring Parts		
733-542	96" 8 way Legacy Cabinet to Legacy Cabinet Harness	733-542
733-952	SPS to Alarm Relay board Harness	733-952
733-996	SPS to CPU Motherboard Harness	733-996
734-008	2ft 4 way PDI Bay to PDI Bay Harness	734-008
734-075	8ft 4 way PDI Cabinet to PDI Cabinet Harness	734-075
734-078	TIC to Legacy Card Power and Comms Harness	734-078
None	Expansion Bay (PDI) for 19” Cabinet (old style front mount)	4100-KT0446
None	Expansion Bay (PDI) for 19” Cabinet (new style rear mount)	4100-KT0446
None	Legacy motherboard mounting kit	4100-KT0468
none	Ferrite Bead single	740-836
none	Ferrite Beads (set of 3)	4100-5129

Appendix L
List of Drawings

The following drawings are included as they are referred to in this manual.

1922-96 Sheet 1 WA ASE Wiring & Mounting Details
1922-96 Sheet 2 Cube ASE Wiring & Mounting Details
1976-174 Sheet 1 Centaur ASE Wiring & Mounting Details

Additional wiring instructions for 4100 modules and addressable devices can be found in the 1976-181 drawings, which are collected in LT0432 4100ES Australian Wiring Diagrams.

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