Nexus 1-8 Loop (A1557)
Analogue Addressable Control Panel

Installation and Commissioning Manual

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Appendices

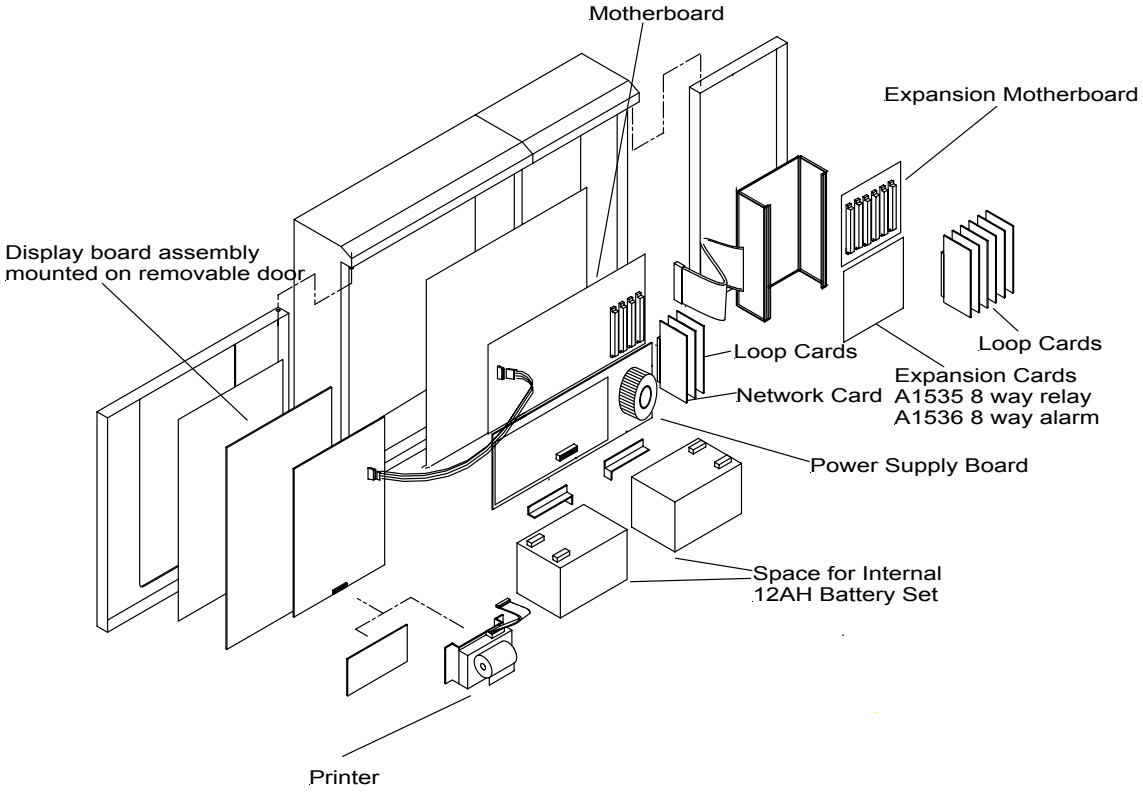
1.0 Introduction

Thank you for purchasing this Nexus 1-8 loop analogue addressable control panel. This range of panels is designed to comply with to the requirements of BS5839 part 4 1988. The Nexus 1-8 loop panel will provide the user with many years of reliable service.

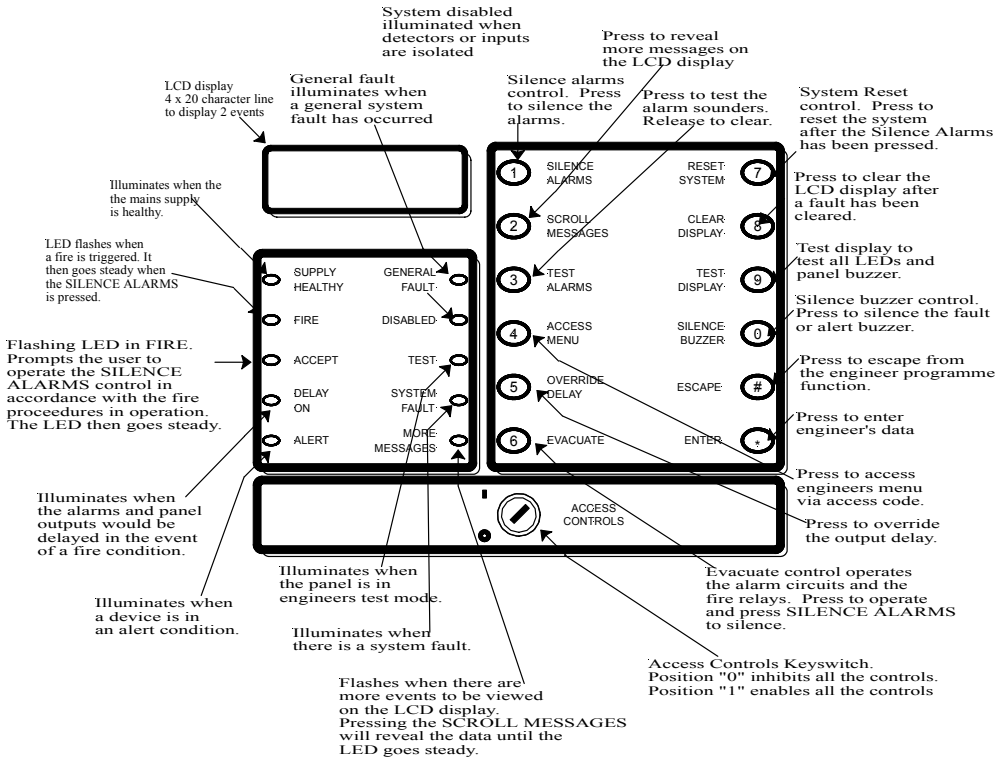
IMPORTANT NOTE: Read the instructions carefully before commencing installation and commissioning.

1.1 Guided Tour

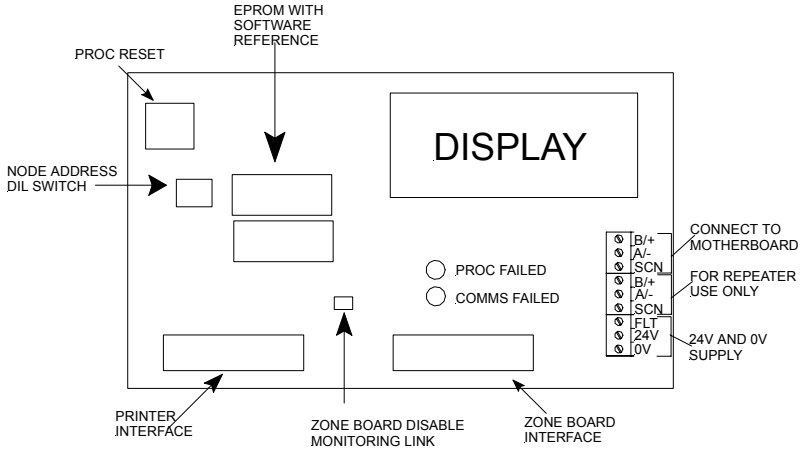
1.1.1 Exploded View and Mechanical Data/Text Identification



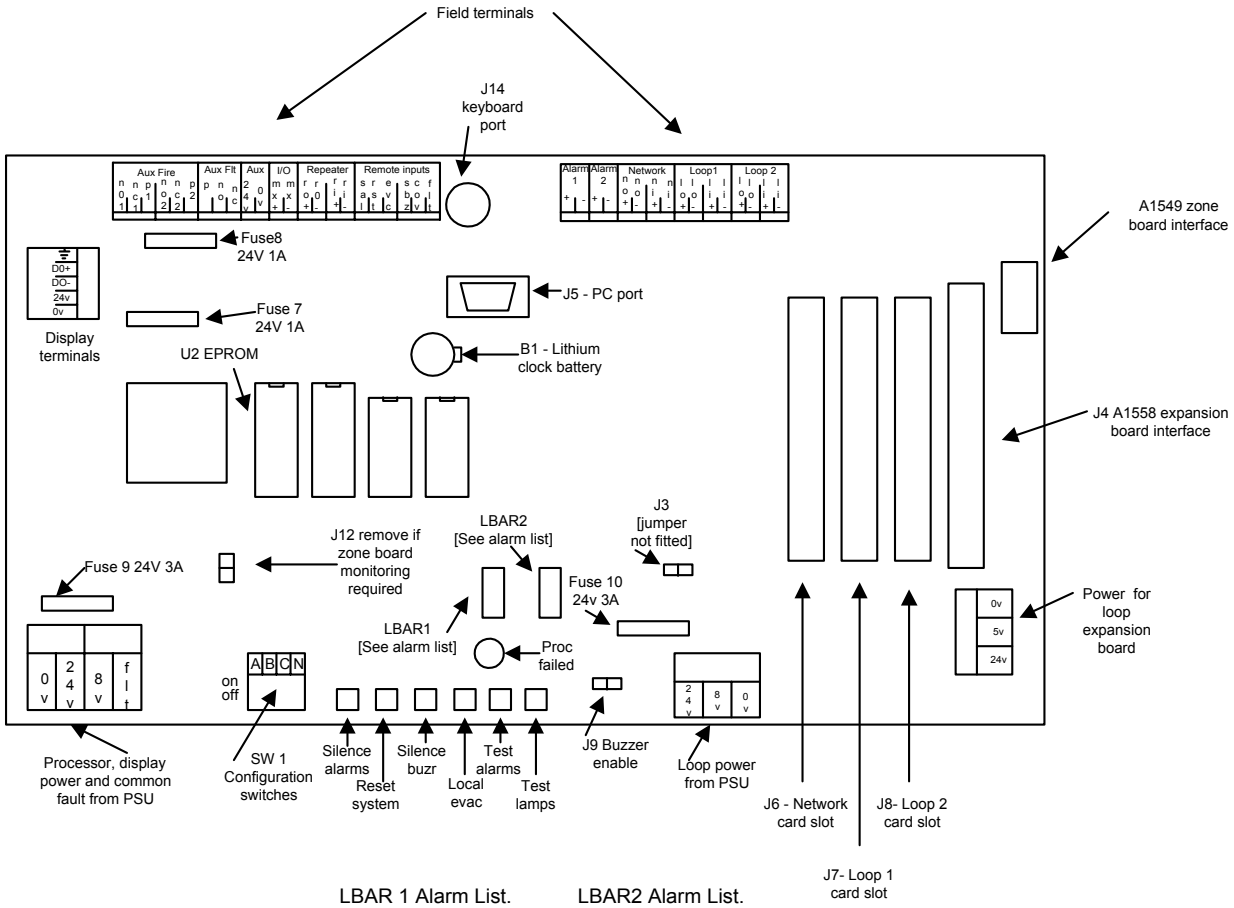
1.1.2 User Controls & Indications



1.1.3 Display Printed Circuit Boards as Viewed from Inside Cabinet



1.1.5 A1557 Motherboard Showing Essential Engineering Components



LBAR 1 Alarm List.
Comm failed.
Fire.
Alert.
Fault.
Isolated.
Supply fault.
Alarm fault.
Sil alarms.
Sil buzzer.
Sys reset.

LBAR2 Alarm List.
Net enable.
LP1 enable.
LP2 enable.
LP3 enable.
LP4 enable.
LP5 enable.
LP6 enable.
LP7 enable.
LP8 enable.

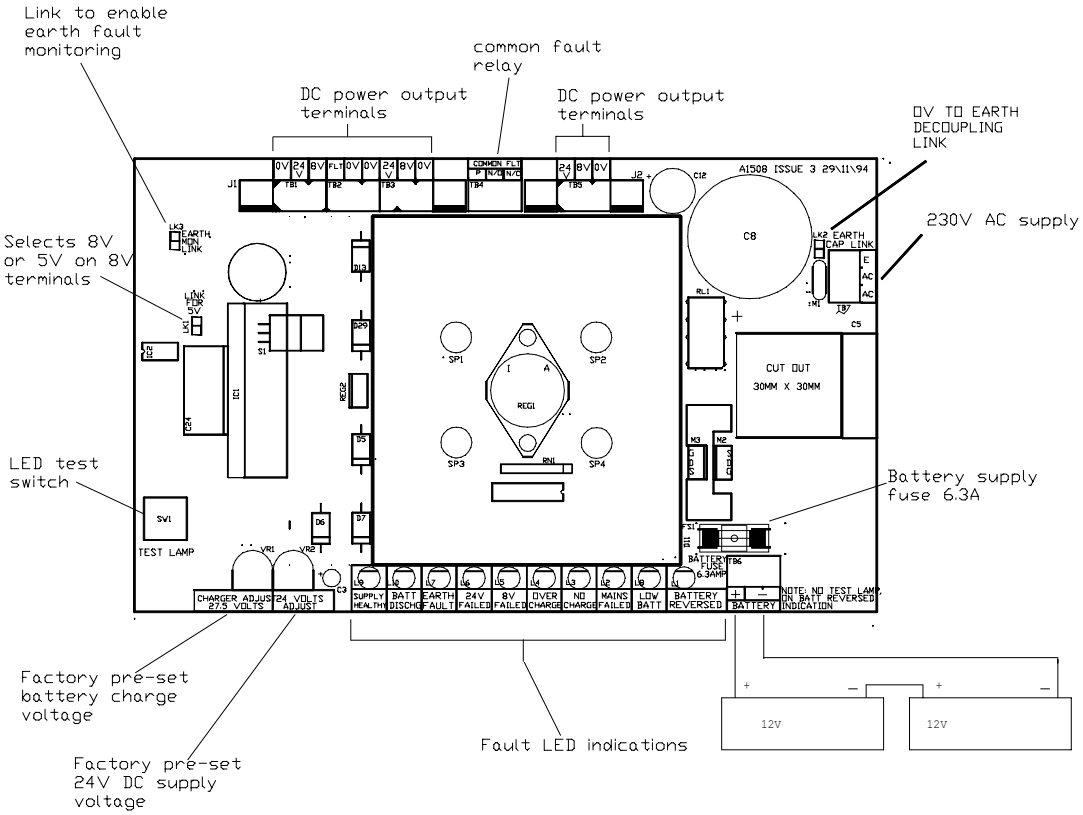
Lithium Battery

Caution - danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturers instructions. This battery should be replaced by trained service personnel only.

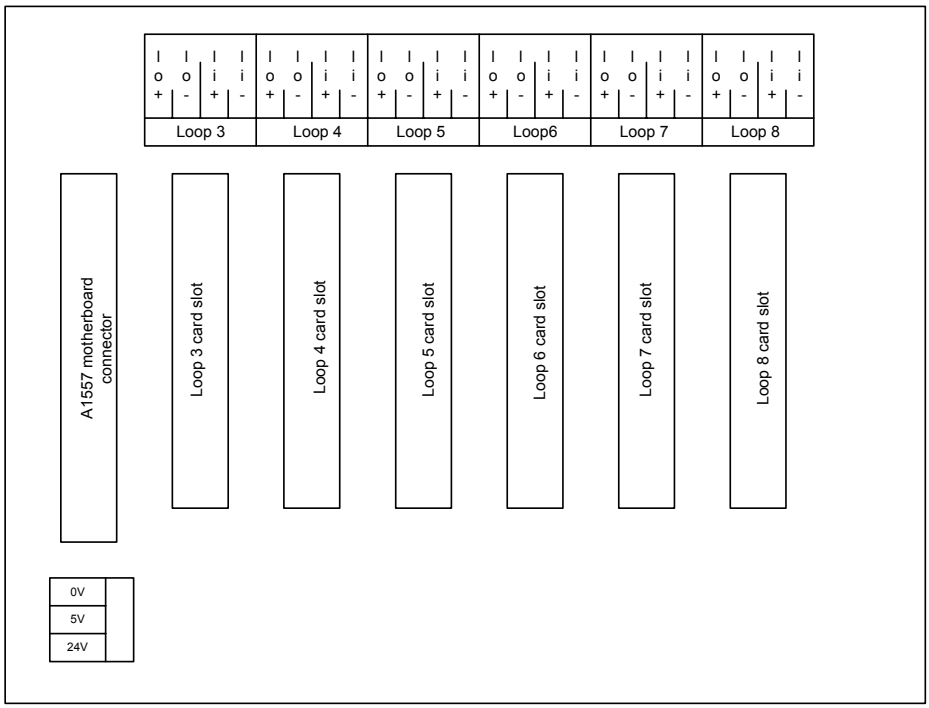
A1557 Field Terminal List [Listed along the top edge of the PCB from left to right]

Terminal	Ident.	Function	Terminal	Ident.	Function
Aux Fire	NO 1	Fire relay normally open 1	Alarm 1	+	Sounder circuit 1 + [Active polarity]
	NC1	Fire relay normally closed 1		-	Sounder circuit 1 - [Active polarity]
	P1	Fire relay pole 1	Alarm 2	+	Sounder circuit 2 + [Active polarity]
	NO 2	Fire relay normally open 2		-	Sounder circuit 2 - [Active polarity]
	NC2	Fire relay normally closed 2	Network	NO +	Panel network out +
	P2	Fire relay pole 2		NO-	Panel network out -
Aux Flt	P	Fault relay pole		NI +	Panel network in +
	NO	Fault relay normally open		NI -	Panel network in -
	NC	Fault relay normally closed	Loop 1	LO+	Loop 1 out +
Aux	24V	Aux DC supply [24V]		LO-	Loop 1 out -
	0V	Aux DC supply [0V]		LI+	Loop 1 in +
I/O	MX+	Local I/O expansion port +		LI-	Loop 1 in -
	MX-	Local I/O expansion port -	Loop 2	LO+	Loop 2 out +
Repeater	RO +	Repeater out +		LO-	Loop 2 out -
	RO -	Repeater out -		LI+	Loop 2 in +
	RI +	Repeater in +		LI-	Loop 2 in -
	RO -	Repeater in -			
Remote Inputs	SAL	Silence alarms			
	RST	Reset			
	EVC	Evacuate			
	SBZ	Silence buzzer			
	COV	Class change alarm			
	FLT	Fault			

1.1.6 Power Supply Illustration



1.1.7 Loop Card Expansion Motherboard



1.1.8 Programmable Expansion Boards

Up to 31 A1535 (relay) and A1536 (alarm) programmable expansion boards may be connected to the Nexus 1-8 loop (A1557) panel. Two boards may be housed internally, the remainder require other enclosures. Refer to the A1535/A1536 Installation & Commissioning Manuals for further details.

(i) A1535 8 Way Programmable Input/Output Relay Board

The A1535 board provides 8 programmable inputs and 8 programmable relay circuit outputs.

(ii) A1536 8 Way Programmable Input/Output Alarm Board

The A1536 board provides 8 programmable inputs (0V switched) and 8 programmable alarm circuit outputs.

2.0 Cabinet Installation

WARNING: ***Please read this section completely before commencing installation.***

Prior to commencing installation of the control panel, ensure that adequate precautions are taken against static damage to the sensitive electronic components on the control board. You should discharge any static electricity you may have accumulated by touching a convenient earthed object, e.g. an unpainted copper radiator pipe. You should repeat the process at regular intervals during the installation process, especially if you are required to walk over carpets.

The panel must be powered down before removing or replacing any card or module. Failure to observe this may cause damage to the loop cards and the motherboard.

When changing any plug-in cards, observe anti-static precautions. Ensure that all power is removed from the system. Failure to do so may result in damage to the cards or panel.

The panel must be located in a clean, dry position which is not subject to shock or vibration and at least 2 metres away from pager systems or any other radio transmitting equipment. The maximum temperature range is 0ºC - 40ºC; maximum humidity is 95%.

This equipment contains dangerous voltages. To prevent electric shock to unqualified personnel ensure that the door is locked at all times when the panel is left unattended. Do not leave the key to open the panel door with unqualified personnel. There are no user-serviceable parts inside.

IMPORTANT NOTES ON BATTERIES:

DANGER: Batteries are electrically live at all times, take great care never to short circuit the battery terminals.

DANGER: A lithium "coin cell" is fitted to the motherboard PCB. There is a danger of explosion if this battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. The replacement of this battery must be carried out by trained service personnel only.

WARNING: Batteries are often heavy, take great care when lifting and transporting batteries. For weights above 24 kilos, lifting aids should be used.

WARNING: Do not attempt to remove battery lid or tamper with the battery internal workings. Electrolyte is a highly corrosive substance, and presents significant danger to yourself and to anything else it touches. In case of accidental skin or eye contact, flush the affected area with plenty of clean, fresh water and seek immediate medical attention.

VRLA batteries are "low maintenance" requiring no electrolyte top-up or measurement of specific gravity.

WARNING: If required, clean the case with a cloth that has been soaked or dampened with distilled water. Do not use organic solvents (such as petrol, paint thinner, benzene or mineral spirits) and other materials can substantially weaken the case.

WARNING: Avoid operating temperatures outside the range of -15ºC/5ºF to +50°C/122°F for float/standby applications.

DANGER: Do not incinerate batteries. If placed in a fire, the batteries may rupture, with the potential to release hazardous gases and electrolyte. VRLA batteries contain substances harmful to the environment. Exhausted batteries must be recycled. Return them to the battery manufacturer or take them to your Council tip for appropriate disposal.

We recommend that isolators are installed at both ends of each loop, immediately the loop leaves the panel.

The volt-free relay contacts provided within the panel must not be used directly to switch any voltage which exceeds 50VAC or 75VDC. (Please also refer to relay rating data).

This equipment requires a 230V AC supply. All installation work should be carried out in accordance with the recommendations of BS5839 Part 1 and the current edition of the IEE regulations by suitably qualified and trained personnel.

The panel must be earthed.

Locate the panel keys and the Installation Kit containing installation spares as follows:

2 off resistors 3K9
5 off 20mm glass fuses (assorted)
1 set of battery leads (positive, negative and a jumper lead)

Open the display door with the key provided. Carefully remove the control panel interior by releasing the cables to the display (carefully noting the connections), the top two chassis screws (located top left and right through the motherboard) and removing the lower two screws (located bottom left and right) on the chassis plate. Open the right hand door and remove chassis in similar manner.

Note: The chassis screws are bright chrome finnish

Fix the empty enclosure to the wall using the fixing hole(s) in the upper section of the enclosure. Complete the fixing operation using the remaining fixing holes in the enclosure.

Gland installation wiring into the enclosure using the cable entry points provided. Leave plugs in any unused cable entry holes.

Replace and fix the control panel chassis. Reconnect any internal earth wires.

3.0 Engineer's Functions

A number of engineering functions are provided by the control unit in order to allow the system to be configured specifically to accommodate site requirements. Further functions are provided to assist in commissioning and servicing the finished fire detection system.

There are three separate codes for access to the three engineer function levels. When the codes have been entered, the user is guided through the sequence of operations, for the chosen function, by text displayed on the LCD.

Prior to entering the engineers function menus, it is necessary to check that the panel is configured to the correct quantity of loops, open the display door and locate the 4 position DIL switch marked SW1. The switch settings are tabulated below:

SW1-3	SW1-2	SW1-1	NUMBER LOOPS
OFF	OFF	OFF	1 LOOP
OFF	OFF	ON	2 LOOP
OFF	ON	OFF	3 LOOP
OFF	ON	ON	4 LOOP
ON	OFF	OFF	5 LOOP
ON	OFF	ON	6 LOOP
ON	ON	OFF	7 LOOP
ON	ON	ON	8 LOOP

SW1-4 should be in the OFF position if the panel is to operate as a standard system. If the panel is to operate as part of a network system then SW1-4 should be in the ON position.

Notes: The time/date function is now backed up by an internal lithium "coin cell". This battery is non rechargeable but at 70 mAh, will support the clock in conditions of total power failure, for 10 years. The replacement of this battery is intended to be carried out by service engineers only. The part number is CR1620.

The download lead is a standard "null-modem" RS232 lead with 9 pin D type connectors. This can be supplied by CEL or obtained direct from Maplins - catalogue ref VD76H. New lead connections below:

Panel end		PC end	
Pin	Link	Pin	Link
2		3	
3		2	
7		8	
8		7	
5		5	
1		4	
6			
4		1	
		6	
9		9	

The "Cherry" keyboard in current use can be connected directly to the motherboard via J14 5 pin Din socket without use of the converter lead.

4.0 Panel Check

Ensure that the mains supply has been inspected and tested in accordance with BS5839 Part 1 and the current IEE regulations and that the system is correctly earthed.

4.1 Leave all test resistors in place and connect the 230V mains supply.

4.2 Switch on. The control panel should react as follows:

(i) The internal buzzer will sound
(ii) The "System on" LED will illuminate
(iii) The LCD will display a time [which needs to be checked)

5.0 Panel Configuration – Engineer's Operating Instructions

NOTE: ***Please read the panel configuration options before proceeding to commissioning.***

5.1 Introduction

The functions are intended to allow a complete system to be set up at site level. Three levels of engineer functions are provided. The access system is arranged such that level 1 access only is possible with code 1, levels 1 & 2 with code 2 and all levels with code 3. Level 1 functions are intended for the end user. When the engineer functions are selected, the control panel in most cases still fully operational i.e. an alarm condition will fully activate the panel. The only options which cause the panel not to be fully operational are described later under "Status - disabled" and "Sensor test".

All engineering menu functions are available after operating the ACCESS CONTROLS key switch and then pressing ENGINEER on the display, followed by input of the appropriate four-digit access code.

If system is left in the engineers mode without controls being pressed, the panel will "time out" to normal operation. Time-out periods vary, depending upon option selected, from 1 to 15 minutes.

5.2 Overview of Engineer's Menu Options

5.2.1 Access level 1 1278

1:SET TIME/DATE	
2:ISOLATE DEVICES	Single device, range, de-isolate all, read.
3:EDIT DEV/LOGO TEXT	Via PC or special QWERTY keyboard.

5.2.2 Access level 2 7218

4:CONFIGURE LOOP	The panel will identify and report the type and quantity of sensors

	used on the loop (i.e. ionisation smoke, optical smoke, or heat sensor)
5:DEVICE STATUS	The analogue value can be identified & the detector self-tested, the detector LED and the Remote LED can be turned on either in the enabled mode or the disabled mode.
6:LOOP CONTENTS	Panel reports loop content on the display.
7:ZONE ALLOCATION	255 zones (of which 64 are visible indication zones), programmable across 8 loops and/or panel inputs.
8:ALARM TEST	Sounders operate for 1 second every 10 seconds.
9:DEVICE TEST	Illuminates the device LED. Pulses the fire LED on the panel and sounds the internal buzzer. No sounder operation, System automatically resets after 25 seconds ready for the next device test.
0:EXTENDED MENU	Provides access to extended menu as detailed below:

1:ALERT TRIP LEVELS	Analogue values 35 - 50 in increments of 5.
2:FIRE TRIP LEVELS	Analogue values 55 - 70 in increments of 5.
3:PANEL DELAY	Overridden by Delay Override, BGU or Evacuate. Set enable period day/night, delay time 1-10 minutes Enable/disable.
4:READ MEMORY	64 events - most recent first.
5:CLEAR PRINT QUEUE	Clears events in printer queue.
6:NUMBER OF DISPLAYS	Sets number of panel displays/repeaters.
7:PRINT MEMORY	64 events - most recent first.
8:PRINT C/E DATA	Single output, loop address or full listing.

5.2.3 Access level 3 8812

9:EDIT C/E DATA	Panel and loop (See Cause/effect programming guide).
0:NETWORK	Configures panels in a network.

5.3 Accessing Engineer's Menu

Note: You must operate the ACCESS CONTROLS keyswitch for all engineer's and user functions.

Step 1 - Press (4) ACCESS MENU to reveal the following:

```
        09:04:26
      Panel Name
--------------------
ENTER CODE, PRESS *
```

Step 2 - Press appropriate Engineer's code as section 4.2 above
eg (7)(2)(1)(8)(*) to reveal the following:

```
SELECT LEVEL2 OPTION
1:SET TIME/DATE
2::ISOLATE DEVICES
*  NEXT PAGE  #  QUIT
```

Step 3 - Press (*) to scroll through the Engineer's Menu.

NOTE: ***No facility is accessible unless it is shown on-screen.***

Step 4 - Select the number of the engineer's facility required by pressing the corresponding number button.

5.4 Setting Time & Date

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 1:SET TIME/DATE.

```
SELECT LEVEL 2 OPTION
ENTER TIME hh mm ss

# BACKSPACE * ENTER
```

Time is entered as two digits for each of the hours, minutes and seconds; eg 8am is 08:00:00.

The clock starts, at the time set, when the * ENTER key is pressed.

The date may then be entered as two digits for each of the day, month and year for example, the 3rd of August 1997 is 03:08:97. It is not necessary to press the ENTER key after entering the date, the system automatically returns to normal operation.

5.5 Isolate

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 2:ISOLATE DEVICES.

Within this sub-menu, the following four options are available. Use the * to view these options (if not currently displayed). Select the required option by pressing the corresponding number button and then follow the on-screen instructions for each option.

```
  ISOLATION FACILITY
1. SENSORS
2. PANEL INPUTS
* NXT PAGE    # QUIT
```

Enables the engineer to isolate/de-isolate loop devices

Enables engineer to isolate/de-isolate programmable panel inputs

To select next page (printer isolate)

Selecting Option 1. SENSORS reveals the following screen:

```
SENSOR ISO/DE-ISO
1. SINGLE   2. RANGE
3. READ     4. DEIS ALL
      # = QUIT
```

Enables the engineer to isolate/de-isolate a range of devices

Enables the engineer to de-isolate all the devices

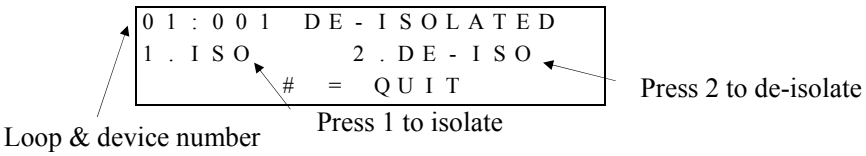
Enables the engineer to view the devices isolated

Enables the engineer to isolate/de-isolate a single device

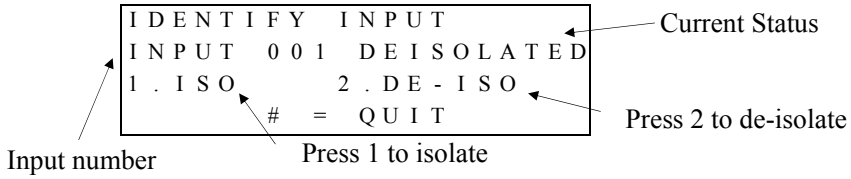
Within options 1 and 2 above of the Sensor Iso/Deiso screen, follow the on-screen instructions to enter loop and sensor number(s). Press * ENTER at each stage. A screen similar to the following will appear:

```
IDENTIFY DEVICE
```

Current Status



Selecting Option 2 . PANEL INPUTS on the ISOLATION FACILITY screen reveals the following where the user is prompted to enter the input number followed by (*) ENTER.



When any device is isolated, the DISABLED LED indicator on the panel will illuminate.

5.6 Edit

This option is used to enter device location messages and to enter the company name of the installation. Text editing must be done using either the PC download facility or special keyboard.

WARNING: ***We strongly recommend that no text editing should be attempted without the use of the PC down-load facility due to the extensive range of options available. However, if direct panel programming is unavoidable, a separate document entitled "Programming the Nexus 1-8 Loop Analogue Addressable Control Panel Without a PC" is available.***

5.7 Configure Loop

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 4:CONFIGURE LOOP. Then follow on-screen instructions.

All devices on a loop must be configured using this option in order for the panel to respond to these devices.

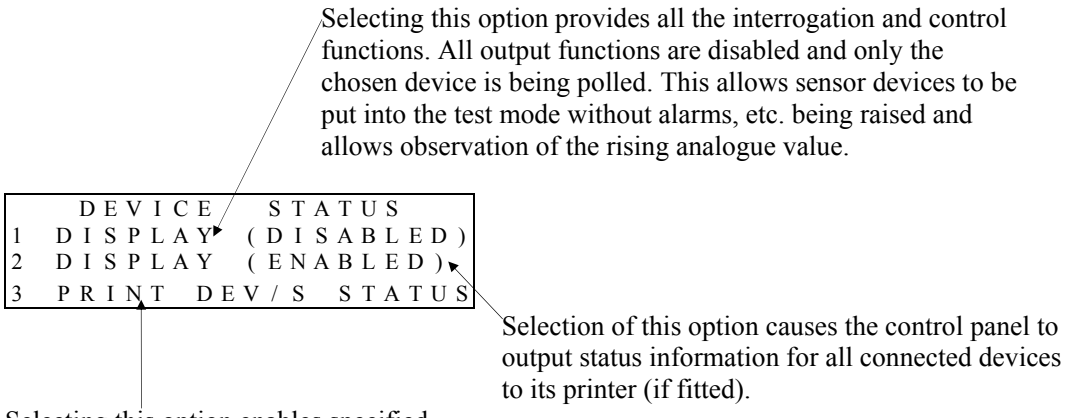
The control panel is automatically searching the detection loop circuit and noting the type of devices at the various addresses. The process takes approximately 16 seconds to complete and provides the following report:

PRIORITIES	000
SMOKE DETECTORS	000
HEAT DETECTORS	000
OUTSTATIONS	000

5.8 Device Status

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 5:DEVICE STATUS.

Selection of this option provides interrogation and control of individual loop devices. Within this sub-menu, the following three options are available:



5.8.1 Status Disabled/Enabled

Selecting Status options 1 or 2 will allow the engineer to enter the loop and device numbers. The display then shows the following:

```
ADR VAL TYPE STS CMD
100   23   ION   000  000
 ZONE 12 CMD BITS=123
 4)PREV 5)NEXT #)END
```

The typical display example shown above is interpreted as follows:

The device address (ADR) is 100
The analogue value (VAL) is 23
The device type (TYPE) is ionisation smoke (ION)
The input status (STS) is 000
The control panel command status (CMD) is 000
The allocated zone for the device is 12

Key 4 allows the user to move to the previous device. The above example will be decreased to address 99.

Key 5 allows the user to advance the address of the device being interrogated. The above example will be advanced to address 101.

Key # to escape.

The device TYPES which may be indicated are as follows:

SOU	-	Sounder circuit controller	- Device type code reference no. 1
O/S	-	Input/Output device	- Device type code reference no. 2
ION	-	Ionisation smoke sensor	- Device type code reference no. 3
MON	-	Monitor (zone monitor, control monitor)	- Device type code reference no. 4
OPT	-	Optical smoke sensor	- Device type code reference no. 5
HEAT	-	Heat sensor	- Device type code reference no. 6
BGU	-	Call point or call point monitor	- Device type code reference no. 7

The keypad keys 1, 2 & 3 become control switches for the 3 control panel command bits. (Indicated by the numbers 123 under the CMD indicators).

Pressing key 1 causes command bit 1 to toggle between 0 and 1, key 2 for bit 2 and key 3 for bit 3.

The 3 command bits have different purposes depending upon the device type. In the case of smoke (ion and opt) and heat sensors, the command bit allocation is as follows:

1 Turn on Remote LED
2 Enter self test mode
3 Turn on Sensor LED

Break glass units respond to bits 2 & 3 only.

For command functions of other devices, refer to relevant literature.

Typical control example:

When a command bit is sent to a device, after a short delay, the status confirmation - returned from the device - will be shown on the LCD. With the display as shown above, pressing key 3 turns on the sensor LED at device number 100. Pressing key 3 again turns it off.

WARNING: ***In the enabled condition the response of devices to the command codes will be relatively slow due to the fact that the control panel is polling all connected devices and command bits are required to be sent to the device twice.***

When an ionisation sensor is tested, the display may briefly show an "ALERT" condition as the sensor output rises. Other sensors react more quickly and appear to reach FIRE condition immediately.

WARNING: ***If tests are carried out in the disabled mode, it is essential that the command bits for each device be returned to 000 before moving on to another device. Failure to observe this requirement will mean that, if a device has been left in the test mode, upon returning to normal operation a fire alarm condition will be raised.***

The control panel does clear the command bits upon return to normal operating condition but the sensor devices respond too slowly and the control panel reads this as a fire alarm condition.

To exit from the status option, press the # key. This returns the control panel to normal operation.

5.8.2 Status To Printer

The format of the printed status report is shown in the short example below:

```
06/09/97  11:13:05
LOOP STATUS REPORT

ADR VAL TYPE  ZONE
 001  25    ION      1
```

025 16 BGU 2
123 21 HEAT 4

END OF LOOP REPORT

5.9 Loop Contents

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 6:LOOP CONTENTS.

Selecting option 6 causes the display to show a list of the devices currently configured without actually re-configuring the system. The format of the report is as shown under the CONFIGURE Loop option previously explained (see section 4.7 above).

5.10 Zones

WARNING: ***We strongly recommend that no zone editing should be attempted without the use of the pc down-load facility due to the extensive range of options available. However, if direct panel programming is unavoidable, a separate document entitled "Programming the Nexus 1-8 Loop Analogue Addressable Control Panel Without a PC" is available.***

5.11 Alarm Test

The purpose of the Alarm Test facility is for audibility testing.

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 8:ALARM TEST and follow on-screen instructions.

In this condition the control panel will automatically sound the panel and loop alarms and the internal panel buzzer for 10 seconds every 15 seconds. This will continue until key 2 is pressed or for a maximum of 15 minutes whichever occurs first.

All auxiliary outputs are disabled.

5.12 Device Test (Also known as the One Man Test Mode)

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 9:DEVICE TEST.

In this condition sensors may be triggered manually. Device operation illuminates the device and LED pulses the fire LED on the panel and sounds the internal buzzer. No sounder operation, System automatically resets after 25 seconds ready for the next device test. All other outputs are disabled in this mode.

5.13 Extended Menu

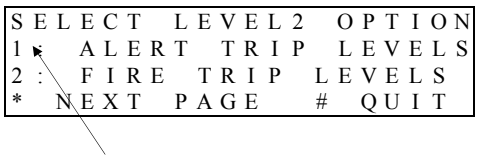
At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.

For options available within this extended menu, see section 5.2.1 above. Use (*) to scroll through options.

5.14 Alert Trip Level

This gives the option of adjusting the alert trip level of individual devices to suit particular installation conditions. To adjust the trip level follow the procedure below:

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.



Select 1: ALERT TRIP LEVELS & follow on-screen instructions, selecting loop & device no.

By repeatedly pressing the button designated TOGGLE, the engineer may view the various pre-alarm levels available.

The required level may be selected by pressing (*) OK, then (#) to quit.

5.15 Fire Trip Level

This gives the option of adjusting the fire trip level of individual devices to suit particular installation conditions. To adjust the trip level follow the procedure below:

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU. Select 2: FIRE TRIP LEVELS.

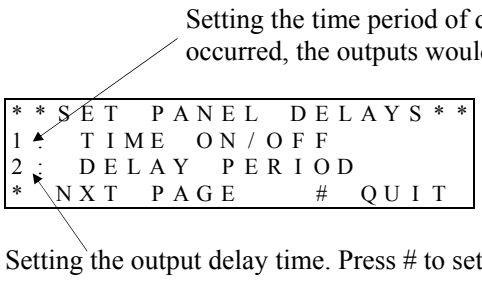
By repeatedly pressing the button designated TOGGLE, the engineer may view the various fire trip levels available.

The required level may be selected by pressing (*) OK, then (#) to quit.

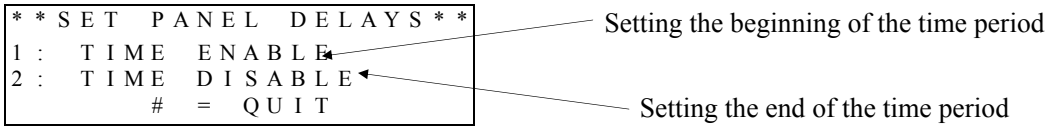
5.16 Panel Delay

This gives the option to have a delayed response of panel and loop alarms & auxiliary relays to a fire condition. This facility is programmed to be active during a specified period of the day/night. The engineer must firstly set the time on/off period; this is the time of day/night during which - if an alarm event were to occur - a delay would be effective. Secondly he must select the period of the delay (1 - 10 minutes). Thirdly he must enable the delay for it to be effective.

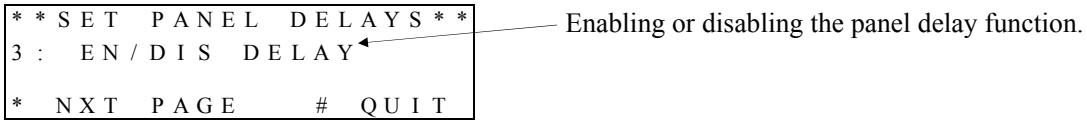
At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU. Select 3:PANEL DELAY. This will reveal the following:



Selecting 1: TIME ON/OFF will reveal the following two sub-menu options:



Selecting (*) NXT PAGE in the SET PANEL DELAYS main menu, will reveal the following:



5.17 Read Memory

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.

Selecting option 4 will cause the display to show the last 64 events held in the panel's memory. Press (*) to scroll through the events. Press (#) to exit to the main menu. The events are displayed in reverse order i.e. most recent event first.

5.18 Clear Print Queue

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.

Select option 5 to clear all outstanding reports from the printer queue.

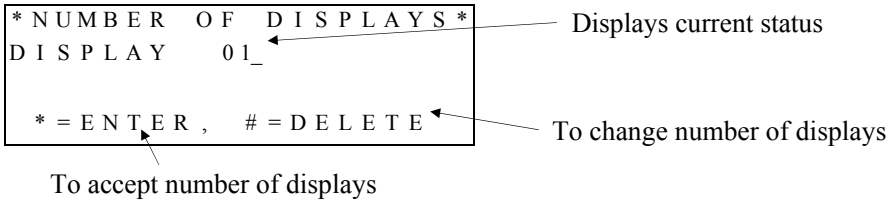
5.19 Programming the Number of Displays (Repeaters)

Select Option 6: NUMBER OF DISPLAYS

This function is used to view/configure the number of displays connected to the control panel. Display 01 is the panel's own display. Displays 02 to 15 must be used for repeater panels.

NOTE: ***This function tells the main panel how many displays to look for. It must be used in conjunction with the Nexus repeater panel manual where repeaters are used. Each display***

has its own DIL switch address setting. These addresses must be set in accordance with the repeater panel manual. The panel's own display DIL switch setting must not be changed.



5.20 Print Memory Contents

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.

Select 7: PRINTER MEMORY.

The format of the printer memory report is shown in the short example below:

```
PANEL NAME
1:063 Z01 BGU FIRE

00:02:35          01/01/98
```

```
ALARMS SILENCED
00:02:42          01/01/98
```

```
SYSTEM RESET
00:02:45          01/01/98
```

5.21 Print Cause and Effect Data

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU.

Selecting 8: PRINTER C/E DATA will print all local cause & effect information.

5.22 Options Available at Access Level 3

At Step 4 within the Engineer's Menu (see Section 5.3 above), select 0:EXTENDED MENU. Three options are available:

1) Edit Local Cause/Effect
2) Edit Network Cause/Effect
3) Print Network Cause/Effect

Select 9: EDIT C/E DATA.

WARNING: ***We strongly recommend that no local cause/effect editing should be attempted without the use of the pc down-load facility due to the extensive range of options available. However, if direct panel programming is unavoidable, a separate document entitled "Programming the Nexus 1-8 Loop Analogue Addressable Control Panel Without a PC" is available.***

Select 0: NETWORK

WARNING: ***We strongly recommend that no network cause/effect editing should be attempted without the use of the pc down-load facility due to the extensive range of options available. However, if direct panel programming is unavoidable, a separate document entitled "Programming the Nexus 1-8 Loop Analogue Addressable Control Panel Without a PC" is available.***

6.0 Commissioning

6.1 Introduction

The following equipment should be available where possible to minimise commissioning time:

(i) VHF/UHF Portable Radio (for two engineers)
(ii) Multi-meter or equivalent

6.1.1 Checklist

Before commissioning, the engineer should check the following:

(i) All field wiring has been inspected and tested in accordance with CEL wiring recommendations, BS5839 part 1 and current IEE wiring regulations.
(ii) All field cables are glanded into the control panel cabinet.
(iii) Detector bases are terminated but detector heads are not fitted. Any devices with electronic components are not fitted. Terminations to devices with electronic components should be linked through to maintain cable continuity.
(iv) Call points are not connected but cable is linked through to maintain continuity.
(v) No end-of-line devices (eg alarm circuit EOL resistor) are fitted.

6.1.2 The following information should be available to the commissioning team:

(i) Detection layout drawings and address information
(ii) Wiring schematic diagram
(iii) Panel Planning Sheet and Cause/Effect Sheet (where applicable)
(iv) PC or QWERTY keyboard for programming
(v) Control Panel installation manuals
(vi) Installation manuals for all equipment connected to the system

6.1.3 Experience has shown that tracing wiring faults on long circuits which are routed through risers etc. can be difficult without knowledge of the wiring route.

It is recommended that the electrical installer is made available until basic wiring continuity is proven. A minimum of two persons (e.g. engineer and mate) is recommended for efficient commissioning.

6.2 An Overview of the Commissioning Procedure

The approach to be used when commissioning a fire alarm system is to check each circuit and function in turn to ensure correct operation of the entire system. In this way any faults may be located quickly and accurately. The general procedures are as follows:

Alarm circuits should be checked first. The correct operation of each sounder should be checked for correct audibility as specified in BS5839 part 1, using the "Test Alarms" facility.

Detection loops should be commissioned next. The purpose is to establish the correct functioning of each device and checking for correct indication at the control panel. Any auxiliary circuits may then be tested.

WARNING: ***Before testing, the engineer must be aware both of the operation of all devices fitted to the auxiliary circuits and of the consequences of their operation.***

6.3 Pre-Commissioning Wiring Check

NOTE: ***This pre-commissioning wiring check procedure should be followed to test all wiring prior to specific commissioning of any detection, alarm and auxiliary circuits.***

6.3.1 The following assumes that the control panel has been installed in accordance with the installation procedure and is powered with only the "Power On" LED illuminated. Do not connect field wiring at this stage.

6.3.2 Ensure that there are no devices connected to the loop and alarm circuits but the cables are linked through at the device locations to achieve a continuous circuit.

6.3.3 Ensure that resistance of all cables to earth and between cores is more than 1MΩ.

Check the following:

(i) Positive to earth resistance is greater than 1MΩ
(ii) Negative to earth resistance is greater than 1MΩ
(iii) Positive to negative resistance is greater than 1MΩ
(iv) Place a short circuit across the ends of the loop and alarm circuits. Measure the resistance across the positive and negative cables of each of the circuits and ensure that the value does not exceed the value calculated on the Loop Calculator Spreadsheet. Remember to remove the short circuits after the tests.

Correct polarity throughout all circuits must be maintained. Rectify any faults.

6.3.4 Power down panel. All bells, detector heads and call points should now be connected and alarm circuit end-of-line resistors fitted. Use the spare end-of-line resistors supplied and leave the EOL resistors in the panel terminals at this stage. Be very careful to maintain correct polarity at each device.

6.4 Commissioning Procedure

6.4.1 Alarm Circuits

After completion of the pre-commissioning wiring check, this procedure should be followed:

(i) Remove the resistor from the first alarm circuit terminal and connect the first alarm circuit wiring to the terminals, observing correct polarity. Check that any alarm fault indications clear after a few seconds.

(ii) Press the "Evacuate" switch. Check that all sounders connected to the alarm circuit operate.

(iii) Press "Silence Alarms" and "Reset".

(iv) Repeat steps (5.4.1) to (5.4.3) for the second and any subsequent alarm circuits.

6.4.2 Commissioning Loops

NOTE: ***The pc down-load facility may be used at any stage up to Section (v).***

(i) Insulate and physically protect the positive and negative ends of one end of the detection loop wiring. Connect the other end of the wiring to the panel terminals LO+ and LO- for loop 1.

(ii) Enter the engineers test mode at level 2 and select option 4 (Configure). After the configuration period, the panel will report the numbers of the different types of sensors. If the numbers and types of sensor agree with the physical check already carried out, proceed to the next stage (iv).

(iii) If double addressing of detectors is found on the loop, the LCD display will show a report of the device numbers affected. The engineer may also notice a device missing from the expected total quantity of loop devices.

(iv) When all required sensors have been configured, select engineer's Option 5: STATUS and using the STATUS DISABLED option, interrogate the devices on an individual basis. To view correct electronic operation, press button for command bit 2 (self test mode). Press again to return detector to quiescent state. To turn a device LED on (to identify its correct location), press button for command bit 3. Press again to return detector to quiescent state. To turn a remote device LED on (to identify its correct location), press button for command bit 1. Press again to return detector to quiescent state.

(v) Repeat sections (i) to (iv) for each loop.

(vi) Sensor installation is now complete and the return end of the detection loop may now be connected to the LI+ and LI- terminals.

WARNING: ***Before connecting, ensure that the returning polarity is correct.***

The final phase of the sensor commissioning involves replacing all the short circuit isolators. The supply polarity to isolators is ***important*** and must be checked and corrected if necessary before fitting the isolator.

WARNING: ***If the isolator polarity is found to be incorrect, it is absolutely essential that the polarity is corrected at each termination point throughout the wiring. Failure to observe this will result in the polarity of the return end of the cable becoming incorrect with the possibility of damage to the control panel.***

6.5 A1535 (Programmable Relay Expansion Boards) and A1536 (Programmable Alarm Expansion Boards)

Refer to the Installation & Commissioning Manuals for these boards.

6.6 Auxiliary Circuits

Any auxiliary circuits or equipment which is not supplied as a standard part of the fire alarm panel is the responsibility of the installer and must be tested for safe and correct operation by the commissioning engineer. If special output facilities are provided as extra equipment, refer to separate drawings and manuals for commissioning information.

6.7 Cause & Effect Editing

The Nexus panel may now be programmed with the text, zone and cause & effect information.

WARNING: ***We strongly recommend that no cause & effect programming should be attempted without the use of the pc down-load facility due to the extensive range of options available. However, if direct panel programming is unavoidable, a separate document entitled "Programming the Nexus 1-8 Loop Analogue Addressable Control Panel Without a PC" is available.***

6.7.1 Cause & Effect Testing

Testing of the panel's fire and fault relays and all cause & effect outputs must be done with the system fully functional. There are two options:

(i) Operate field devices and physically check programmed output devices for correct operation.
(ii) Select engineer's option 5: STATUS and operate devices with the System Enabled option as described in the Nexus 1-8 Loop Installation Manual. This will cause selected devices to go into fire and operate the panel's cause & effect programming. Physically check programmed output devices for correct operation.

6.8 Final Commissioning

6.8.1 Select engineer's Option 9: DEVICE TEST and carry out tests on ***all*** sensor devices.

6.8.2 Testing of the panel's fire and fault relays and all cause & effect outputs must be done with the system fully functional.

There are two options for testing the panels cause & effect:

(i) Operate devices as required
(ii) Use engineer's Option 5: STATUS, selection 1 SYSTEM ENABLED to operate devices

Appendices

i Technical Specifications

NOTE: ***Due to the wide scope of panel options, we strongly recommend the use of our battery calculation chart which is available on PC disk or as hard copy. The information below should not be used to calculate standby battery size.***

Power Supplies

Mains input voltage:	230V AC -6% + 10%
System operating voltage:	24V DC
Quiescent current at 24V DC:	375mA (A1557. A1508, A1575 – no loop cards)
Quiescent loop card current	65mA + 1.3 x loop current
Loop card max. current	200mA
Power supply max:	5 Amps @ 24V DC
Alarm power output max:	1 Amp per circuit @ 24V DC (*Note 3*)
Auxiliary output max:	0.5 Amp @ 24V DC (*Note 4*)
Battery charger output:	1.5 Amps (*Note 5*)
Battery type:	24V sealed lead acid

Output Circuits

Alarm circuits:	2
Alarm circuit monitoring:	Open/short circuit (*Note 6*)
Repeater output:	Serial data RS485 (*Note 7*)
Printer output:	Parallel
Multiplex inputs/outputs:	248 (via A1535/A1536 boards)
Panel Network:	Connection of 15 panels via Network data link
Alarm fuse rating:	1 Amp thermal resetable fuse
Battery fuse rating:	6.3 Amp (20mm glass)
Auxiliary fuse rating:	0.5 Amp (20mm glass)
Mains fuse rating:	3 Amp (20mm glass)

Input Circuits

Detection loops:	Cable 1.5mm (max. length - 2km)
Detection loop fuse rating:	250mA thermal resetable
No. of sensors on loop:	126 maximum (*Note 9*)

Relay Outputs

2 independent relays are provided which operate as follows:

Fire relay:	1 double pole changeover, operates on any fire alarm
Fault relay:	1 single pole changeover operates on any fault signal

All relay contacts are rated at 24V DC 1 Amp.

Cable Terminations

Mains terminals:	Shrouded, marked & fused, accept max 2.5mm^2 cables
Alarm and loop terminals:	Screw terminals, accept max. 2.5mm^2 cables
All other terminals:	Screw terminals, accept max. 2.5mm^2 cables

All terminal functions are identified by screen printing on the circuit boards.

NOTES:

1. We strongly recommend the use of the Battery and Loop calculator for assessing the correct size of the standby batteries and correct loop function in all conditions.

2. Quiescent current is stated assuming mains failure conditions, therefore the general fault LED will be illuminated and the fault buzzer will sound.

3. The total current drawn by both alarm circuits operating must not exceed 2 Amps.

4. The total DC auxiliary current drawn must not the values stated in the Technical Specification. The power supply current limiting will operate if ratings are exceeded.

5. The battery charger employed is the constant voltage type and the current will be dependent upon the state of charge of the battery.

6. Alarm line monitoring operates using polarity reversal. All alarm sounders and/or visual alarms must be made polarity sensitive for line monitoring to operate correctly.

7. Repeater data output is available at terminals in the control panel. Two cores are required for the connection of repeater panels. The maximum cable length between the control unit and any repeater unit is 2000 metres. The cable must be suitable for RS485 data such as Belden 8132 or equivalent. If power is provided from the control unit, 2 additional cores are required.

8. The control panel provides an RS485 multiplex data link for driving additional output devices such as zonal relays, alarms, mimic indicators etc. The output functions are programmable at site level.

9. The number of sensor devices may need to be reduced due to the power requirements of the devices themselves. Fire sensors, heat smoke, call points etc. may be fitted in any combination up to the maximum (126) addressing capability of the protocol. Zone monitors in particular require a higher operating voltage and also draw significantly more current from the control unit; reference to the system design manual is necessary if zone monitors are to be used on the loop.

10. If any devices which contain an inductive coil (relays etc.) are connected to the panel, these should be suppressed by connecting a diode across the positive and negative connections of the coil.

ii Other Relevant Documentation

Sales Literature
Nexus 1-8 Loop Application Guide
Nexus 1-8 Loop User Instructions
Nexus Repeater Documentation
A1535 8 Way Relay Board Documentation
A1536 8 Way Alarm Board Documentation
PC-Based Software Programming Guide
Wiring Recommendations
Battery and loop Calculation Software

iii Compatible Loop Devices and Panel Responses

The following table shows all devices compatible with the panel. It shows the panel's response to events from each device type, and indicates the change in analogue value and input bits that will be displayed in the status mode. Note that some device types automatically receive cause effect outputs by default. Any such programming is indicated in the default cause and effect column.

Device type	Type Code	Condition	Panel response	Analogue Value	Status bits (210)	Output bits	Default cause and effect	Comments
CEL sounder controller	1	Quiescent Input 1 operated Input 2 operated Input 3 operated Circuit fault	None Mode 1 Mode 2 Remote fault Remote fault	AV = 16 AV = 64 AV = 48 AV = 4 AV = 4	000 000 000 000 000	0 = evacuate 1 = alert 2 = relay	Bit 0 set on evacuate	
CEL Loop powered sounder	1	Quiescent Fault	None Remote fault	AV = 16 AV = 4	Echo output bits	0 = evacuate 1 = alert 2 = not used	Bit 0 set on evacuate	
Series 90 sounder/ sounder controller	1	Quiescent Circuit fault or fault input operated	None Remote fault	AV = 16 AV = 4	Echo output bits	0 = evacuate 1 = alert 2 = not used	Bit 0 set on evacuate	
XP95 sounder/ sounder controller	1	Quiescent Circuit fault	None Remote fault	AV = 16 AV = 4	Echo output bits	0 = evacuate 1 = alert 2 = not used	Bit 0 set on evacuate	
CEL I/O unit	2	Quiescent Input 1 operated Input 2 operated Input 3 operated or power supply failed	None Fire Input Remote fault	AV = 16 AV = 64 AV = 48 AV = 4	000 000 000 000	0 = relay 1 1 = relay 2 2 = relay 3		
Series 90 3-way I/O unit	2	Quiescent Input 1 operated Input 2 operated Input 3 operated	None Fire Input Remote fault	AV = 16 AV = 16 AV = 16 AV = 16	000 1XX 01X 001	0 = relay 1 1 = relay 2 2 = relay 3		X means status does not affect panel status

Device type	Type Code	Condition	Panel response	Analogue Value	Status bits (210)	Output bits	Default cause and effect	Comments
Series 90 3-way I/O analogue unit	2	Quiescent Input 1 operated Input 2 operated Input 3 operated	None Fire Input Remote fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	000 1XX 01X 001	0 = relay 1 1 = relay 2 2 = relay 3		X means status does not affect panel status. See note 2.
Series 90 1-way I/O unit	2	Quiescent Input operated	None Fire	AV = 16 AV = 16	000 001	0 = relay 1 = not used 2 = not used		
Series 90 switch monitor unit	2	Quiescent Input operated	None Fire	AV = 16 AV = 16	000 100	0 = remote indicator 1 = not used 2 = not used		
XP95 I/O unit	2	Quiescent Input operated Opto input active Input fault	None Fire Input Remote fault	AV = 16 AV = 16 AV = 16 AV = 4	000 1X0 010 000	0 = remote indicator 1 = not used 2 = not used		Fire overrides input which in turn overrides remote fault
XP95 output unit	2	Quiescent	None	AV = 16	000	0 = relay		
Series 90 ionisation smoke	3	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 ionisation smoke	3	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
CEL zone monitor	4	Quiescent Input 1 operated Input 2 operated Input 3 operated	None Fire Alert Remote fault	AV = 16 AV = 64 AV = 48 AV = 4	000 000 000 000	0 = relay 1 1 = relay 2 2 = relay 3	Bit 0 set on reset or clear faults	

Device type	Type Code	Condition	Panel response	Analogue Value	Status bits (210)	Output bits	Default cause and effect	Comments
Series 90 zone monitor	4	Quiescent Fire Circuit fault	None Fire Remote fault	AV = 16 AV = 64 AV = 4	Echo output bits	0 = reset 1 = test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
Series 90 control unit monitor	4	Quiescent Alarm Circuit fault	None Fire Remote fault	AV = 16 AV = 64 AV = 4	Echo output bits	0 = fault test 1 = alarm test 2 = remote LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 Mini-switch monitor	4	Quiescent Alarm Alert Circuit fault	None Fire Alert Remote fault	AV = 16 AV = 64 AV = 45 - 51 AV = 4	Echo output bits	0 = fault test 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 Switch monitor	4	Quiescent Alarm Alert Circuit fault	None Fire Alert Remote fault	AV = 16 AV = 64 AV = 45 - 51 AV = 4	Echo output bits	0 = not used 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 Switch monitor plus	4	Quiescent Alarm Alert Circuit fault	None Fire Alert Remote fault	AV = 16 AV = 64 AV = 45 - 51 AV = 4	Echo output bits	0 = opto-reset 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 Zone Monitor	4	Quiescent Alarm Circuit fault	None Fire Remote fault	AV = 16 AV = 64 AV = 4	Echo output bits	0 = reset 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 control unit monitor	4	Quiescent Alarm Circuit fault	None Fire Remote fault	AV = 16 AV = 64 AV = 4	Echo output bits	0 = reset 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	Program LED bit in cause effect if required
XP95 Radio Interface	4	Quiescent Alarm Circuit fault	None Fire Remote fault	AV = 16 AV = 64 AV = 4	Echo output bits	0 = reset 1 = alarm test 2 = LED	Bit 0 set on reset or clear faults	

Device type	Type Code	Condition	Panel response	Analogue Value	Status bits (210)	Output bits	Default cause and effect	Comments
Series 90 optical smoke	5	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 optical smoke	5	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 beam Detector	5	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 flame detector	5	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 multi-sensor opt/heat detector	5	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
Series 90 heat detector	6	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
XP95 heat detector standard	6	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.

Device type	Type Code	Condition	Panel response	Analogue Value	Status bits (210)	Output bits	Default cause and effect	Comments
XP95 heat detector high	6	Quiescent Fire Alert Fault	None Fire Alert Data fault	AV = 8 to 44 AV = 55 to 127 AV = 45 to 54 AV = 0 to 7	Echo output bits	0 = remote LED 1 = self test 2 = LED	Bit 0 and bit 2 set when device is in fire	See note 1.
Series 90 callpoint/ callpoint monitor	7	Quiescent Alarm Fault	None Fire Fault	AV = 16 AV = 64 AV = 4	L10 L01 L10	0 = remote LED 1 = self test 2 = LED	Bit 2 set when in fire	Input bit 2 confirms LED operation and is represented by L
XP95 callpoint	7	Quiescent Alarm Fault	None Fire Fault	AV = 16 AV = 64 AV = 4	L10 L01 L10	0 = remote LED 1 = self test 2 = LED	Bit 2 set when in fire	Input bit 2 confirms LED operation
XP95 Mini switch monitor with interrupt	7	Quiescent Alarm Fault	None Fire Fault	AV = 16 AV = 64 AV = 4	L10 L01 L10	0 = remote LED 1 = self test 2 = LED	Bit 2 set when in fire	Input bit 2 confirms LED operation
XP95 USA mini priority switch monitor	7	Quiescent Alarm Fault	None Fire Fault	AV = 16 AV = 64 AV = 4	L10 L01 L10	0 = remote LED 1 = self test 2 = LED	Bit 2 set when in fire	Input bit 2 confirms LED operation

Notes:

The analogue thresholds for analogue detectors can be changed for both fire and alert. See the installation and commissioning manual for details.

On the S90 3-way analogue unit, either the analogue value or logic inputs can raise alarms. The analogue thresholds can also be changed for fire and alert on this device. See the installation and commissioning manual for details.

The number of devices with LEDs operated is limited to eight per loop.

If a device has more than one condition active then only the highest level event will be reported although lower level alarms may be present on the display. For example, if a smoke detector enters an alert condition this will be indicated on the panel. If the device subsequently enters a fire condition the alert will clear but the alert LED will become steady to indicate the event occurred.