

Issue 02 Aug. 2007

Syncro

Multi-loop Analogue Addressable Fire Control Panel

Networking Manual



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1.0 General

The Syncro system enables information to be transmitted between control panels using a secure network connection.

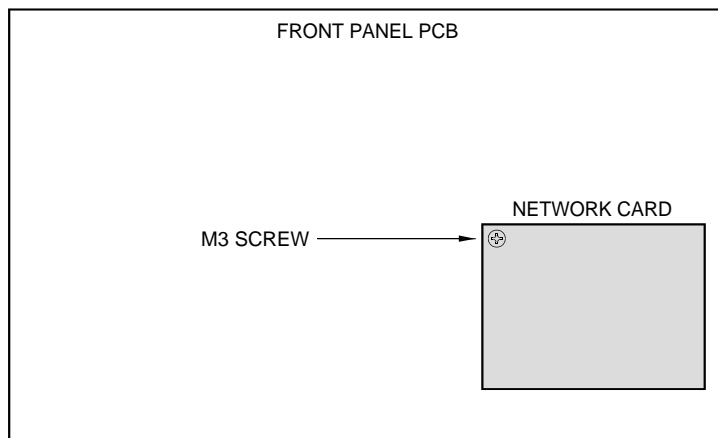
The network connection takes the form of a two-core cable, which is connected between all of the control equipment as a loop.

Up to sixty-four control panels can be connected together and the system can be configured such that selected information can be displayed or acted upon at each panel. As well as control panels, repeat indicator panels can be connected to the network to provide indication in areas where detection and control are not required.

2.0 The Network Card

To enable control panels to be connected together as a network, each panel must be fitted with a network card (part number S555).

This card fits to the main circuit board (K6001) on the rear of the panel door and is held in position by a single M3 screw.



To fit a network card, the mains and battery power **must first be switched off** and the metal cover over the front panel PCB removed.

The network card can then be plugged into the two connectors (J1 and J3) in the bottom right of the main panel PCB and secured in position with the M3 screw.

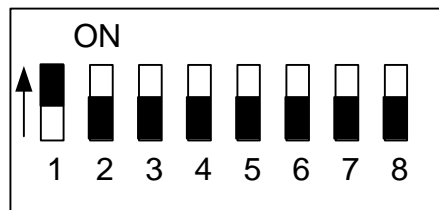
OBSERVE STATIC PRECAUTIONS WHEN HANDLING CIRCUIT BOARDS

To enable panels or repeaters to identify other panels or repeaters on the network, each one must be allocated an address.

This is done by setting the DIL switch on the network card to the required binary number as shown below.

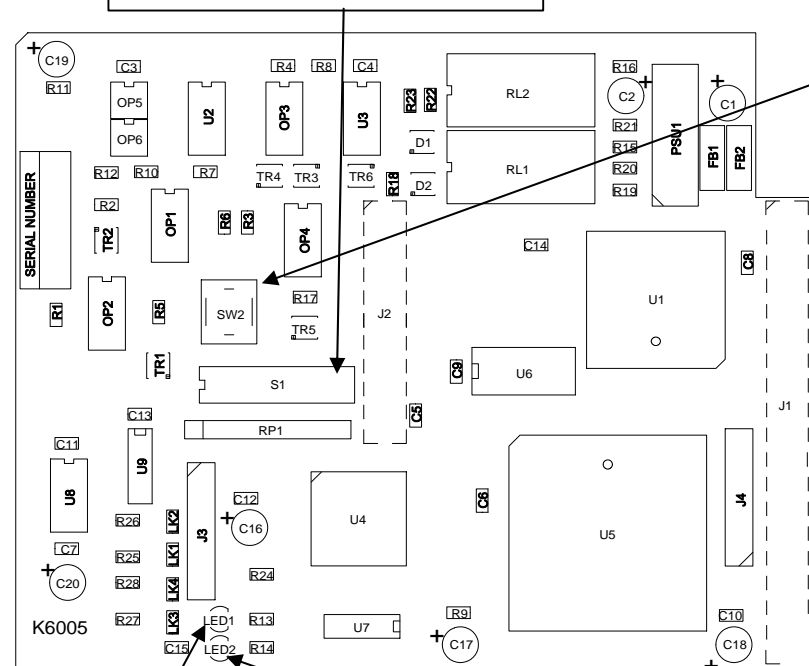
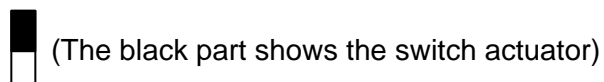
It is important that each panel has a different address for correct operation so care must be taken to set and record the network card address for each panel.

Always set the address on the DIL switches with power to the panel **switched off**.



This switch setting shows address number one.

Switch position up selects the binary digit, so a switch with 1,2 and 3 up would represent address number 7.



Processor reset switch

The network card has a green and a yellow LED indicator fitted to show the status of the incoming and outgoing communications. Under normal circumstances, both LEDs will be flickering, indicating that the card is communicating with both of its neighbours or on both lines if only two panels are connected. If one or both of the LEDs are not lit then the connection to neighbouring panels is not sound. The diagnostic LEDs are visible through a hole in the PCB cover.

LED1-GREEN = OUTGOING CONNECTION OK

LED2-RED = INCOMING CONNECTION OK

3.0 Cable Length

The Syncro network communications protocol has been designed to be extremely tolerant to interference and data corruption, however as with any system, there have to be limitations set to guarantee correct operation.

The specified transmission distance limit for the communications method used is 1200 metres and because the data is re-transmitted at each network card, in theory, there can be 1200 metres between each card if required.

Using the above cable distances however, does not take into account the failure of a network card to communicate with the system through total power failure or a card fault.

In this situation, the network card would disconnect itself from the network and connect the network cable such that it bypasses the card in question. This means that the total cable length between the cards either side of the disconnected one could be 2400 metres, which is outside of the specification for the communications method used.

This fault scenario could clearly be extended to more network cards and this would add 1200 metres of cable length in each case.

A sensible fault tolerance limit has therefore to be suggested to enable the performance of the system to be predicted.

Because of the nature of the fire protection system, its design is biased towards inherent reliability and failure of a network card, although possible, is very unlikely.

Fire control panels also have substantial back up power systems, therefore, the likelihood of a total power failure under operational conditions, is also extremely rare.

A suggested tolerance level of one card failure is therefore recommended.

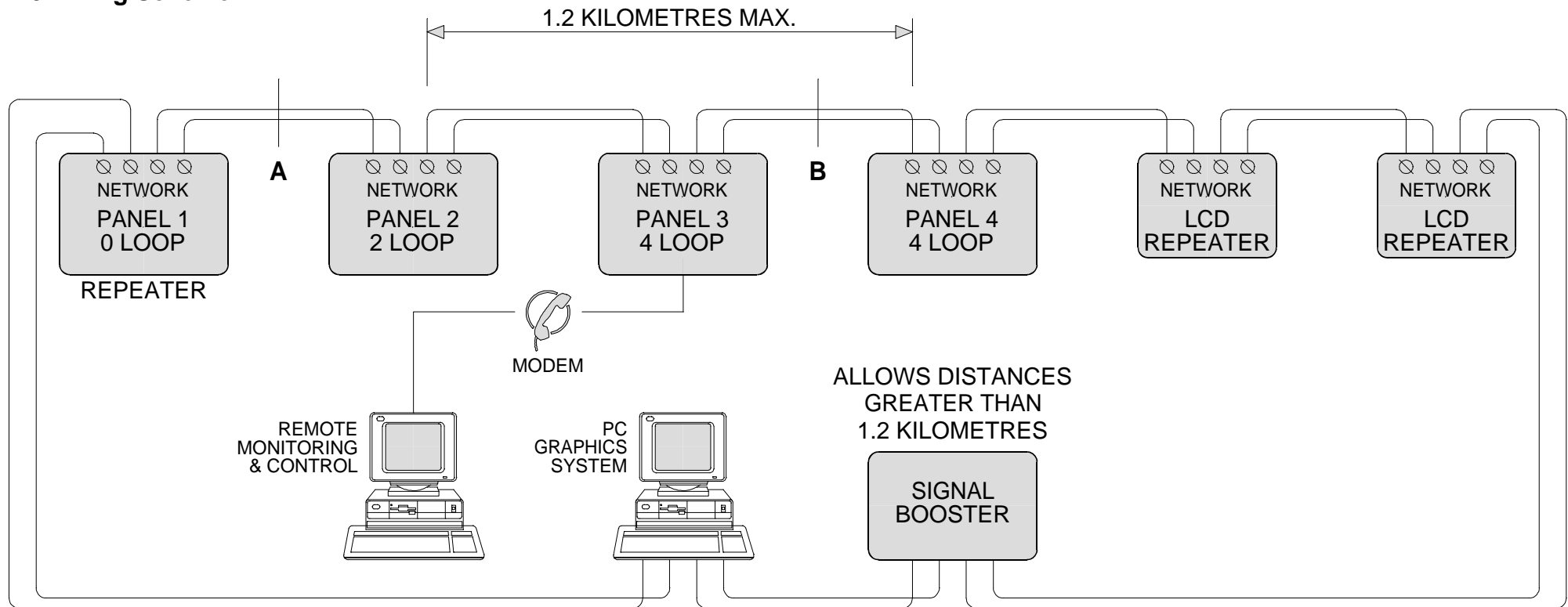
To guarantee operation of the system with one card failure it is necessary to arrange the cabling such that the failure will not introduce more than 1200 metres of cable between the two cards, which would be connected together by the failure.

This means that the total cable length between adjacent cable segments should not be more than 1200 metres. It is not important how the 1200 metres is made up i.e. it could be 100 metres and 1100 metres or 600 metres and 600 metres.

Using these general rules and the specified or equivalent cable types will provide a guaranteed performance of networks with plenty of tolerance.

In reality, the networked system will operate quite satisfactorily with longer cable runs and if a system is required which is outside of the parameters specified, the manufacturer should be consulted for guidance on specific designs.

4.0 Wiring Scheme



Syncro Network Cabling

- 1) Cabling wired as a ring which visits all panels.
- 2) Short circuit detection at each network connection and automatic isolation of the shorted section of cable.
- 3) 1200 metres maximum cable length between two adjacent segments
- 4) A short circuit at point A will automatically disconnect the shorted section and announce a fault condition at all panels but the entire network will continue communicating.
- 5) A short circuit at points A and B will automatically disconnect both sections and announce faults at all panels. Communication will continue between panels 1 and 4 and between panels 2 and 3.
- 6) All panels will compute whether the faults will prevent operation of any cause and effects configurations and either assume inputs to be true (if configured to default to "true upon network fault") or display, print and log the cause and effects which are affected.
- 7) Open circuit faults will allow the network to continue operating in the same way as short circuit faults.
- 8) Network cabling to be either standard Belden RS485 suited type or optical fibre.
- 9) Up to 64 node

5.0 Cable Type

The cable type used for the network connection should be suitable for RS-485 applications and equivalent to the ones listed below.

Up to 600 metres distance between panels

BELDEN NUMBER	NOMINAL OUTSIDE DIAMETER	NOMINAL CAPACITANCE	NOMINAL IMPEDANCE	VELOCITY OF PROPOGATION
9271	6.1mm	40pF/m	124 OHMS	66%

Up to 1200 metres distance between panels

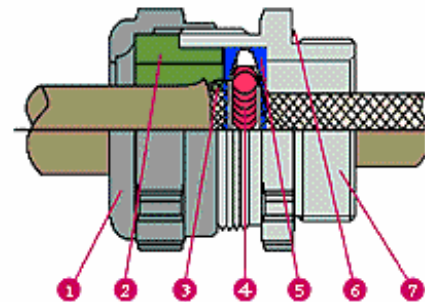
BELDEN NUMBER	NOMINAL OUTSIDE DIAMETER	NOMINAL CAPACITANCE	NOMINAL IMPEDANCE	VELOCITY OF PROPOGATION
9860	11.18mm	35pF/m	124 OHMS	78%

6.0 Cable entry

Contrary to earlier preferred methods of terminating the shield on shielded cables, today's EMC noisy environments require that the shields of these cables be bonded to earth at all points on the system.

The most effective method of achieving this is to use EMC cable glands, which connect the shield to the gland and earth in a 360-degree ring. Simply stripping back the insulation of the cable and connecting "pigtailed" to earth is not recommended.

When using this method it is also important to ensure that the gland body is electrically bonded to the panel enclosure.



- 1 – Compression nut
- 2 – Seal
- 3 – Cable screening
- 4 – Endless spring
- 5 – Tapered ring
- 6 – "O" ring
- 7 - Gland body

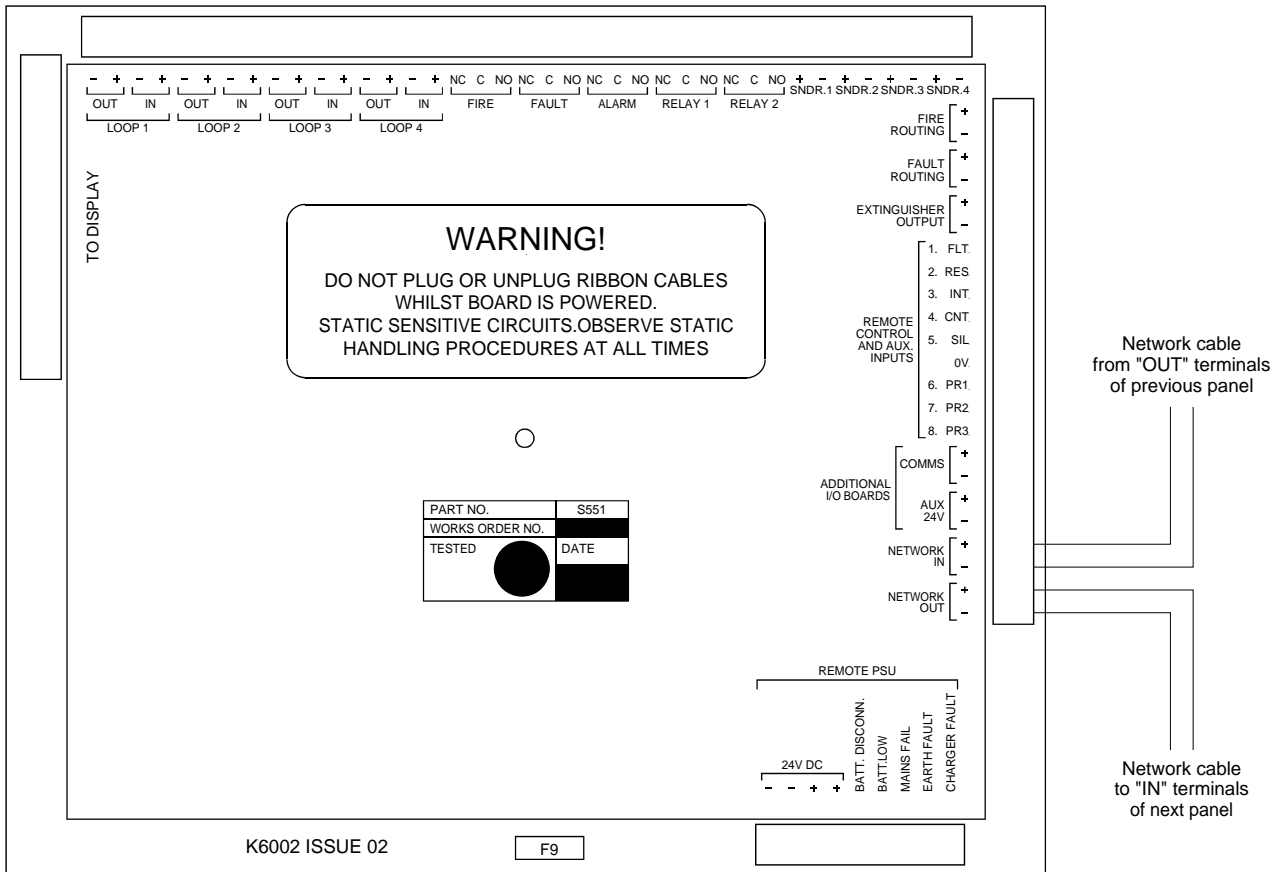
7.0 Connecting the network cable

All panels will have two cables connected to another panel or panels. If either of these are not connected then a fault will be displayed.

The connection is polarity sensitive. The + and – from one panel must connect to the + and – of the next panel and so on.

The temperature of the cable should not exceed 55 degrees centigrade.

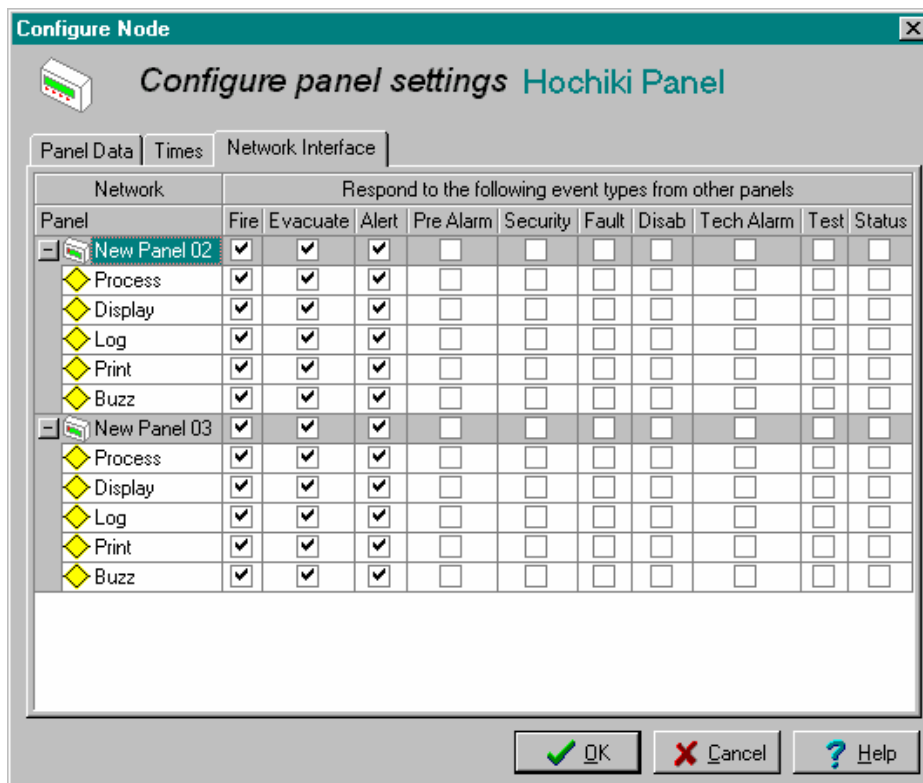
It is important to ensure that the connection from the OUT+ from one panel, connects to the IN+ terminal of the next and the OUT- from one panel connects to the IN- of the next panel and so on.



8.0 Getting it working

With all network cards allocated an address and all panels connected as described, it is now possible to get the panels communicating with each other by doing an AUTOLEARN at each one.

In this configuration all panels will respond to the default setting which is to process, display, log, print and operate the panel buzzer for all, FIRE, EVACUATE and ALERT events from all other panels. This is fine for initial testing but is unlikely to be what is finally required.



Default configuration as displayed in Loop Explorer configuration programme showing how Panel 03 will respond to events from Panels 01 and 02

9.0 Using the Loop Explorer PC configuration

To enable selection of which panels respond to which events it is necessary to configure panels using the Loop Explorer configuration programme.

Loop Explorer allows extensive configuration of the system and the details of this are contained within the programmes help files.

For the purposes of this manual only network configuration details are discussed.

There are five options for all events as listed below.

Process

The process option instructs the panel receiving a network event operate outputs exactly as it would if a device on the loop or a panel input had started the event.

For example, if a fire event comes from a call point, the panel would be expected to operate the sounder outputs and fire relays.

Selecting the process option ensures that the panel does this. If the process option were not selected, the panel would not operate the sounder outputs and fire relay.

Display

The display option instructs the panel receiving the network event to display the event exactly as it would be displayed if a device on the loop or a panel input had started the event.

Log

This gives the option to store the network event in the event log. For example if a panel is designated as a master panel, it may be required that the master panel logs all events on the network whereas other panels log only their own events.

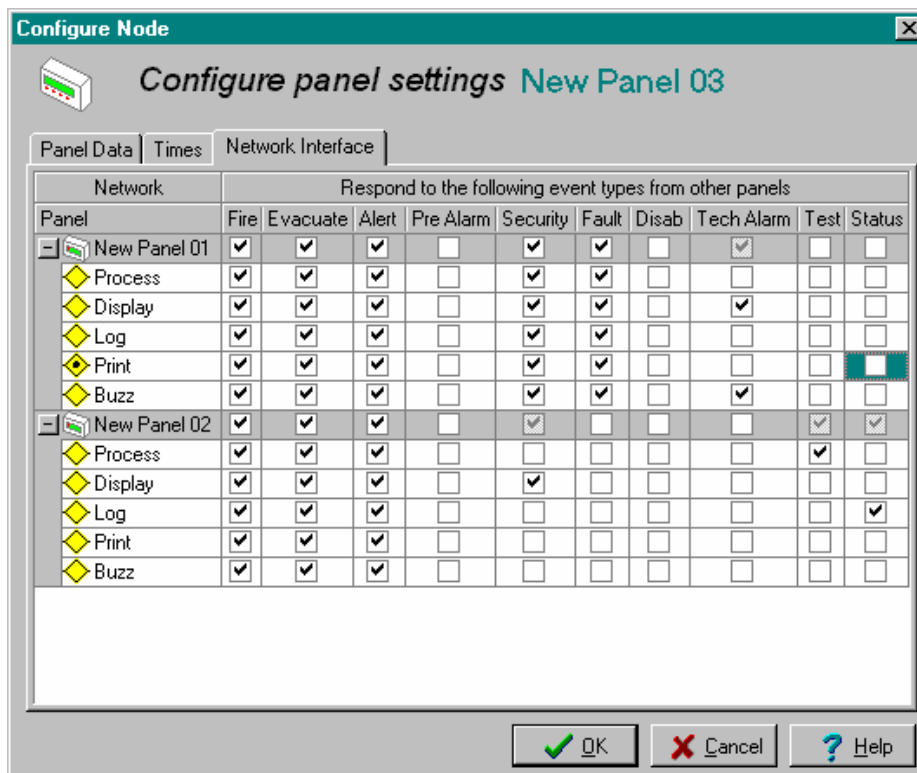
Print

This gives the option to print the network event. It may be that a master panel is required to print all events and that other panels print only local events.

Buzz

This gives the option to operate the panel buzzer upon a network event.

The example below shows how Panel 03 will respond to events at Panel 01 and Panel 02. It can be clearly seen that any panel can be configured to process, display, log or print events of any type, from any other panel, by simply ticking the appropriate boxes.



The ease and versatility of programming the network interface ensures that changing site requirements can be swiftly accommodated with a minimum of effort. A brief description of all event types is listed over the page.

9.1 Fire action

Being a fire control panel, the fire action will probably be the most widely used and a fire input will be announced by the following:

COMMON FIRE LEDS
ZONAL FIRE LED (IF USED)
PULSING BUZZER
SOUNDERS
ALARM CONTACT
FIRE CONTACT
FIRE ROUTING OUTPUT
LCD FIRE MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.2 Evacuate action

The evacuate action allows all sounder outputs and sounders to be operated continuously from an input anywhere on the system with the following response at the panel:

COMMON FIRE LED's
CONTINUOUS BUZZER
PANEL SOUNDER OUTPUTS CONTINUOUS
LCD EVACUATE MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.3 Alert action

The alert action allows all sounder outputs and sounders to be operated in a pulsing mode from an input anywhere on the system with the following response at the panel:

CONTINUOUS BUZZER
PANEL SOUNDER OUTPUTS PULSING
LCD FIRE ALERT MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.4 Pre-alarm action

Sensors or inputs can generate a pre-alarm. The control panel will respond as follows to a pre-alarm:

PRE-ALARM LED
CONTINUOUS BUZZER
LCD PRE-ALARM MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.5 Security action

The security action allows all sounder outputs and sounders to be operated in a fast pulsing mode from an input anywhere on the system with the following response at the panel: (NOT CURRENTLY IMPLEMENTED)

LCD SECURITY ALERT MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.6 Fault action

Inputs attributed the fault action will be announced by the control panel as follows:

GENERAL FAULT LED
CONTINUOUS BUZZER
FAULT CONTACT
FAULT ROUTING OUTPUT
LCD FAULT MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.7 Disablement action

Disablement inputs are used to disable a part or parts of the system via cause and effects configuration (normally for testing purposes).

When an input designated as a disablement is operated, the panel will display the following:

GENERAL DISABLEMENT INDICATOR
CONTINUOUS BUZZER
CAUSE AND EFFECT TEXT
LCD DISABLEMENT MESSAGE, ADDRESS AND LOCATION TEXT OF INPUT

9.8 Tech. alarm action (Technical alarm)

To allow a message to appear at the panel without necessarily performing any actions, technical alarm input is available which produces the following response by the panel:

CONTINUOUS BUZZER
LCD TECHNICAL ALARM MESSAGE
CAUSE AND EFFECT TEXT

9.9 Test action

Inputs given the test mode attribute activate a special type of cause and effect which enables the system to be tested without activating selected parts of the system (plant shutdown relays for instance). When a test mode input is operated, the panel will respond as follows:

ON TEST LED
LCD ON TEST MESSAGE
CAUSE AND EFFECT TEXT

9.10 Status

If the Process Status event is enabled, then pressing Acknowledge, Re-sound and Reset controls from that panel will cause the same response on the selected panel as if the local buttons have been pressed. Therefore if a panel is set to process / display a fire event from another panel, the local outputs cannot be silenced / resounded by that panel unless the Process Status event is set. The Display Status event allows the local panel to show Status events for the other panel (Initialising etc) although these events cannot be processed as there is not process associated with them.

INITIALISING A DEVICE
INITIALISING A PANEL
AUTOLEARNING A PANEL
RE CONFIGURE BY PC
ACKNOWLEDGE
RE SOUND
RESET

10.0 Keeping a record

When a network has been configured, the configuration data file keeps a record of the configuration which can be copied into other documents as shown in the example below.

SYNCRONETWORK CONFIGURATION

File : C:\My Documents\New Site.kml
Date : 20/10/2000 17:21

Panel - New Panel 01

- Panel Text
- Network Address 1
- Ringing Mode Common
- Default dB(A) 85
- Default Tone 1
- Access 2 Code 2222
- Access 3 Code 3333
- Number of Loops 2
- Number of Zones 48
- Calibration Time 07:00
- Day of week Start End
- Sunday 08:00 18:00
- Monday 08:00 18:00
- Tuesday 08:00 18:00
- Wednesday 08:00 18:00
- Thursday 08:00 18:00
- Friday 08:00 18:00
- Saturday 08:00 18:00

New Panel 01 - Network Interface

Panel/ Event	Fire	Evac- uate	Alert	Pre- Alarm	Sec- urity	Fault	Tech. Alarm	Test	Status
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New Panel 02

Process	Yes	Yes	Yes	No	No	No	No	No	No
Display	Yes	Yes	Yes	No	No	No	No	No	No
Log	Yes	Yes	Yes	No	No	No	No	No	No
Print	Yes	Yes	Yes	No	No	No	No	No	No
Buzz	Yes	Yes	Yes	No	No	No	No	No	No

New Panel 03

Process	Yes	Yes	Yes	No	No	No	No	No	No
Display	Yes	Yes	Yes	No	No	No	No	No	No
Log	Yes	Yes	Yes	No	No	No	No	No	No
Print	Yes	Yes	Yes	No	No	No	No	No	No
Buzz	Yes	Yes	Yes	No	No	No	No	No	No

11.0 Using zones

The use of zones on a Syncro network is an important issue and employs a philosophy that may be unfamiliar to some.

This page has been included to highlight the importance of understanding how zones are used on this system and should be fully understood before system design is started.

Unlike some other networked systems, zones on the Syncro system are network wide. This means that for example, device number 1 on loop 1 can be in the same zone as device number 126 on loop 4 of panel 64 and so on. This gives the system great flexibility where zones need to be shared across panels such as risers or lift shafts but this philosophy must be understood from the outset to enable a system design to be implemented effectively.

The system can have up to 500 zones and any device or input, on any panel, can be placed in any zone. Identification of the alarm is by a unique address in the form : -

Event type, Device type, Zone, Address, Loop, Panel name, Location text.

For this reason it is recommended that networked Syncro panels are not fitted with zonal LED indicators but that the display is used to view the information relating to the location of the event.

If zonal indicators are required, then LED indicators can only be provided for zones 1 to 48 on panels with ABS fronts and zones 1 to 96 on all steel panels.

System designers must be aware however that the entire system can only have one zone 1, one zone 2 etc. On smaller systems where the numbers of zones is likely to be much less than 500, spare zones can be used to good effect to simplify network wide cause and effects by using zones as groups and operating upon these rather than individual devices to achieve the required functionality.

12.0 Network faults

Whilst commissioning a networked system there are various fault messages, which may appear. Listed below are the messages, which may appear, and a brief description of what they mean.

12.1 Network open or short circuit fault

This is quite self explanatory and indicates a cabling fault between two nodes. However, by observing the green and yellow LEDs on the network card it is possible to see whether the fault is on the upper two terminals of the network connector (incoming) or the lower two (outgoing).

If the yellow LED is off then the fault is on the cable connected to the upper two terminals and if the green LED is off the fault is on the lower two terminals.

Thus, if there are two panels with network LEDs not lit (one a yellow on one and a green on the other) the fault can be identified as between those two panels.

12.2 Unexpected network card

Should a network card be fitted to a control panel which is already configured and working and does not expect to have a network card then this fault message will appear.

The panel must be configured by Autolearn with the network card fitted or PC configuration to enable it to expect a network card.

12.3 Unexpected network node

If a new network panel is connected to an already working network, the rest of the network will not expect to see an additional node and will announce this fault.

The unexpected network panel will respond to network events as per the default configuration shown on page 4 and all other panels will respond to events from the new network panel as per the default configuration.

All panels must be configured to see the number of panels connected from the PC or by Autolearn.

12.4 Network node missing

This message will be displayed on all panels if a network node they are expecting to communicate with does not answer within around 100 seconds.

This may occur if a control panel loses all power or if both the in and out network connections are disconnected from the panel.

12.5 Network card not fitted

If a control panel is configured to be part of a network by Autolearn or PC configuration and a network card is not fitted to the panel this message will be displayed.

12.6 Network card address incorrect

Once a panel is configured to expect a network card to be present it will also know which address (set on the network card DIL switch) to expect. If it detects that a card is fitted but the address does not match the one expected then this fault message will be displayed.

If the address of a network card must be changed then this should be done with both the main and backup power off.

12.7 Network comms fault

Highly sophisticated error checking and filtering is used in the Syncro network protocol but it is possible under extreme conditions for data packets to become corrupted and not be received by a panel. In these circumstances this fault message will be displayed.

This indicates a very degraded transmission path and occurrence of this fault should be investigated. Possible causes are cable lengths greater than those specified, cable specification other than that specified or high levels of electromagnetic interference.

12.8 Unknown network type

New types of network device are planned as future additions to the Syncro system but these cannot be clearly defined at present. This mechanism has been put in place to enable a control panel to identify a new network node type, which is not supported by its current version of software.

12.9 Unspecified network event

The development of the Syncro system is ongoing and new features and functionality will be added from time to time. This mechanism has been put in place to enable a control panel to identify a new network event type, which is not supported by its current version of software.