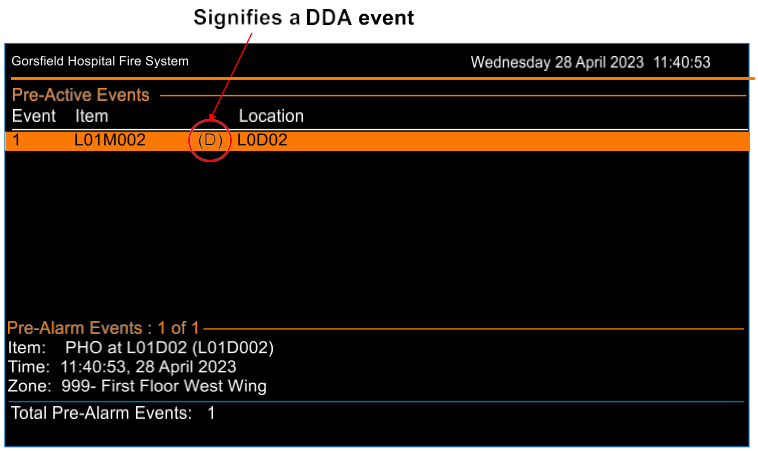
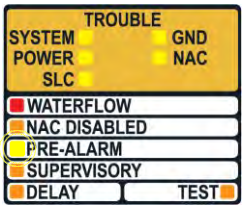
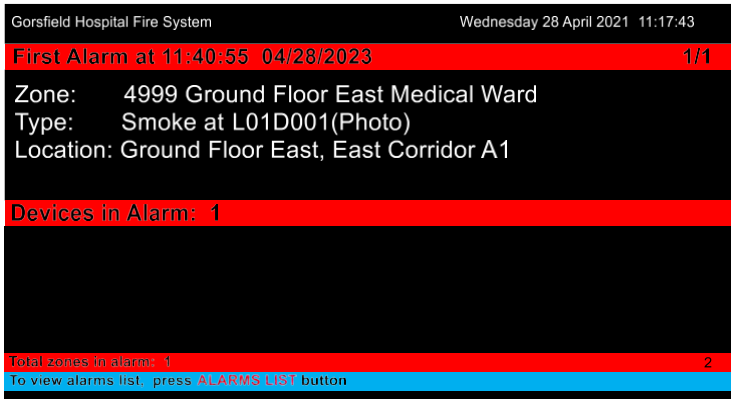


When the first DDA enabled detector is activated,

- the Pre-Alarm event screen is displayed and
- the yellow Pre-Alarm indicator will be ON





- When the second DDA enabled detector is activated, the Pre-Alarm indicator will turn OFF,
- OR, when a detector which is not DDA enabled is activated, the Pre-Alarm indicator will remain ON,
- In both cases, the Primary Alarm screen will also be displayed.

8.11 LEDs

In Pertronic terminology, the term LED not only refers to the physical light emitting devices on panels and annunciators but also to virtual devices which can be configured to activate functions and events within a F220 Fire Panel or across an F220 network. For example, an output from a Detector, Zone, System Event or Logic Block can be configured to start a timer or trigger a SLC relay.

8.11.1 Implementation in FireUtils

Configuring LEDs is accomplished in FireUtils using the various editors Input and/or Output Managers (Refer to Table 8-13 below). The maximum number of LEDs is 2048.

Function	Input Manager	Output Manager
SLC	-	Outputs 1 to 4
Zone	-	Outputs 1 to 8
Groups	-	Outputs 1 to 15

Timers	Start, Reset, Disable, Override	T1 Outputs 1,2; T2 Outputs 1,2
System Events	-	Outputs 1 to 6
Logic Blocks	Inputs 1 to 8	Outputs 1 to 4

Table 8-13: Configuring LED Inputs and Outputs

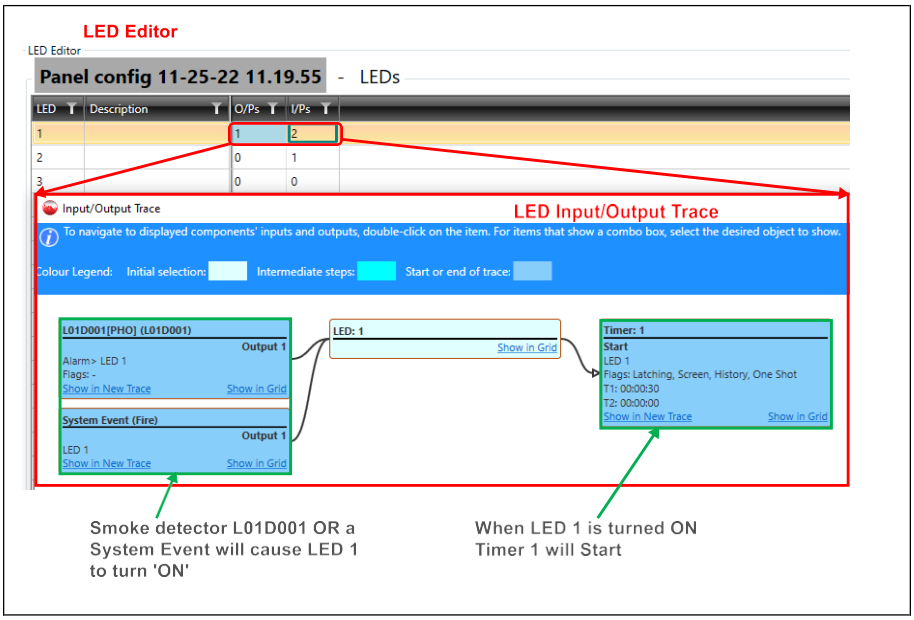


Figure 8-23: LED I/O Trace

8.12 Auxiliary Outputs

Eight configurable auxiliary outputs are available for internal panel use only; they are not field wire connections. These outputs are available on connector K35, located on the right-hand edge of the F220 Mainboard (refer to Figure 19-1). Each output uses a current sink driver rated at 100 mA (8 drivers at 100% duty cycle).

8.12.1 Implementation in FireUtils

In FireUtils, Auxiliary Outputs are configured through accessing the Output Managers of SLC, Zone, Group, System Events, Timer and Logic Blocks Editors. They are also mapped to Input Managers of Timer, System Events and Logic Block. As no mapping can be configured in the Auxiliary Output Editor, its primary function is for displaying which outputs are driving which Aux Output.

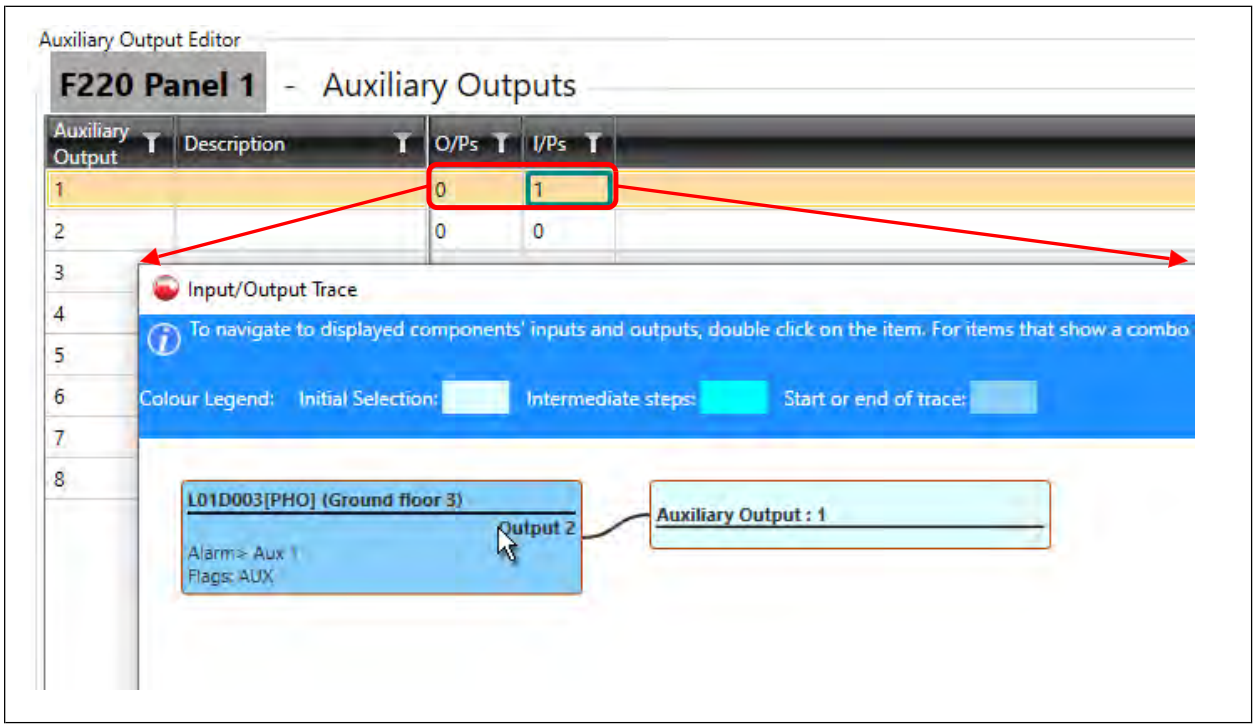


Figure 8-24: Auxiliary Output I/O Trace

8.13 Supervisory Signals

The F220 can monitor input signals that relate to an abnormal status (other than a Trouble) from other systems that are attached and monitored by the fire alarm system such as sprinkler valves, CO devices, and pressure switches.

These signals are identified as 'Supervisory' by setting the Supervisory Flag for the modules associated with the signal input.

Supervisory signals are handled within the Supervisory queue where they can be viewed (Menu > 2. History Logs > 4. Supervisory Log).

Whenever a supervisory signal is present the Supervisory LED will FLASH, and the buzzer will sound. If this event is currently the highest priority, the Supervisory screen will also be displayed.

8.13.1 Viewing and Resetting Supervisory Signals

If there are current Supervisory events available for viewing these will be displayed in the Supervisory Events list providing these are the highest priority current events. If this is not the case press the OK key repeatedly until the 'Supervisory Events' screen appears.

A latched Supervisory signal must be manually reset at the panel. To reset latched Supervisory events, select the event using the up or down arrow keys and then press 'Reset'.

8.13.2 Supervisory Signal Log

Historic Supervisory Signal events can be viewed within the Supervisory Log—option 4 in the History Log menu. This log can contain up to 500 events and the oldest events will be overwritten with the latest events when this capacity is exceeded (Refer to Section 2.2.6).

9. OPERATING THE EMERGENCY RESPONSE FACILITY

NOTE:

For information on the controls and indicators of the F220 front panel, and the System Panel in particular, refer to *Section 2: F220 Front Panel Controls and Display*

The Fire Panel highlights, and provides key controls, to enable an alarm to be satisfactorily dealt with by fire fighters or emergency response providers. For reference, the layout of the Fire Panel is shown below.

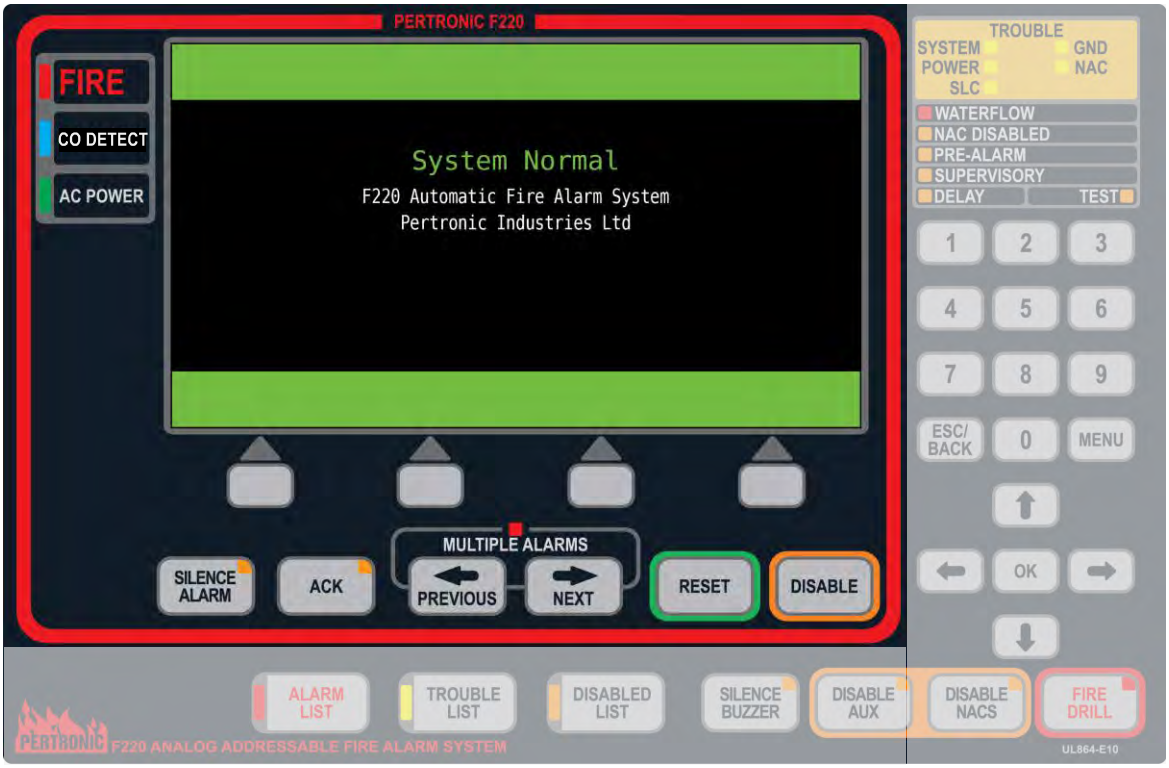


Figure 9-1: The Emergency Response window on the Front Panel

9.1 Responding to a Fire Alarm

The following diagrams are examples of the indicators, switches and screens that a fire fighter or emergency response provider may access on the F220, once on site, to determine the location and extent of the fire, and finally reset the system.

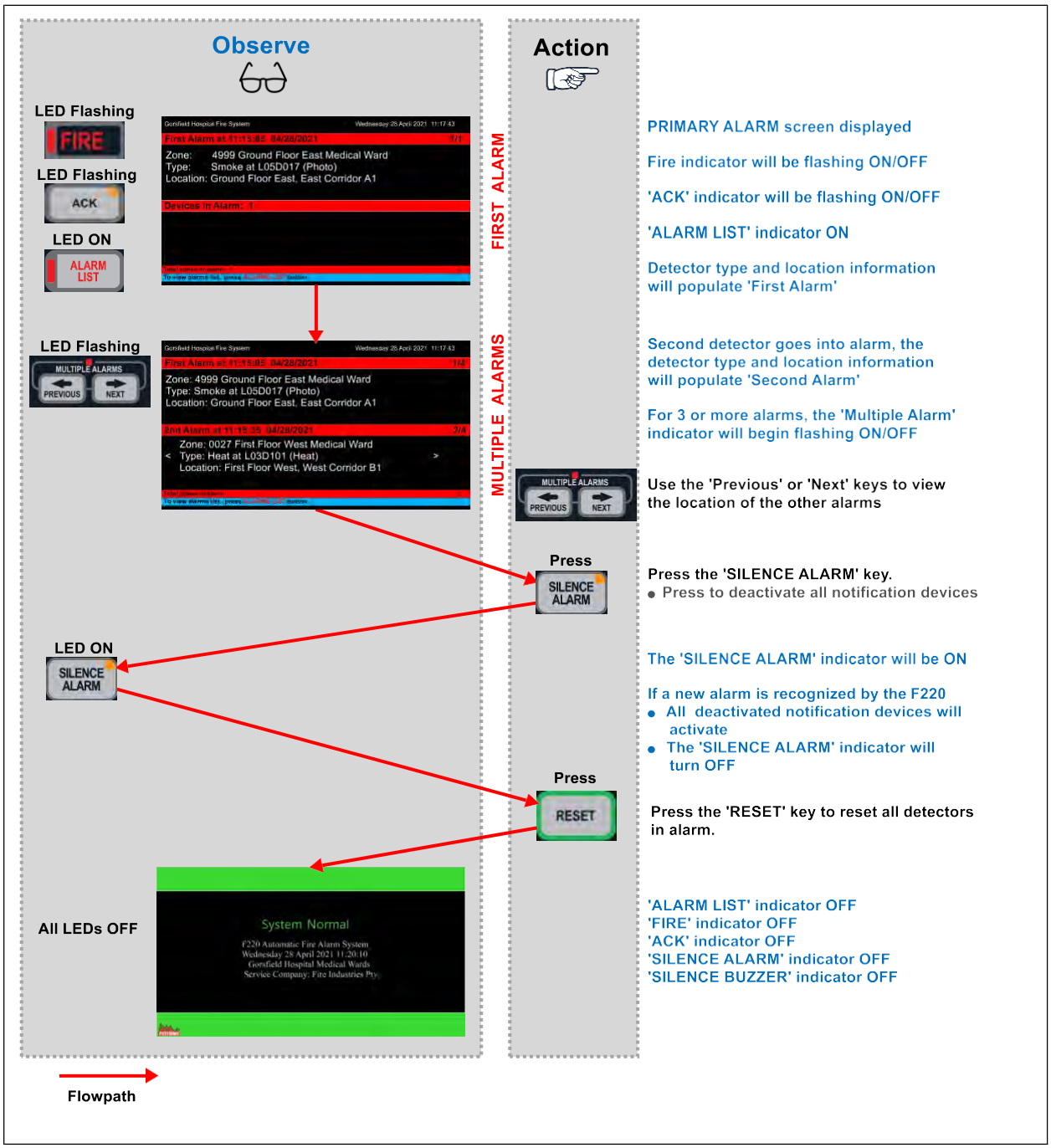


Figure 9-2: Responding to a Fire Alarm

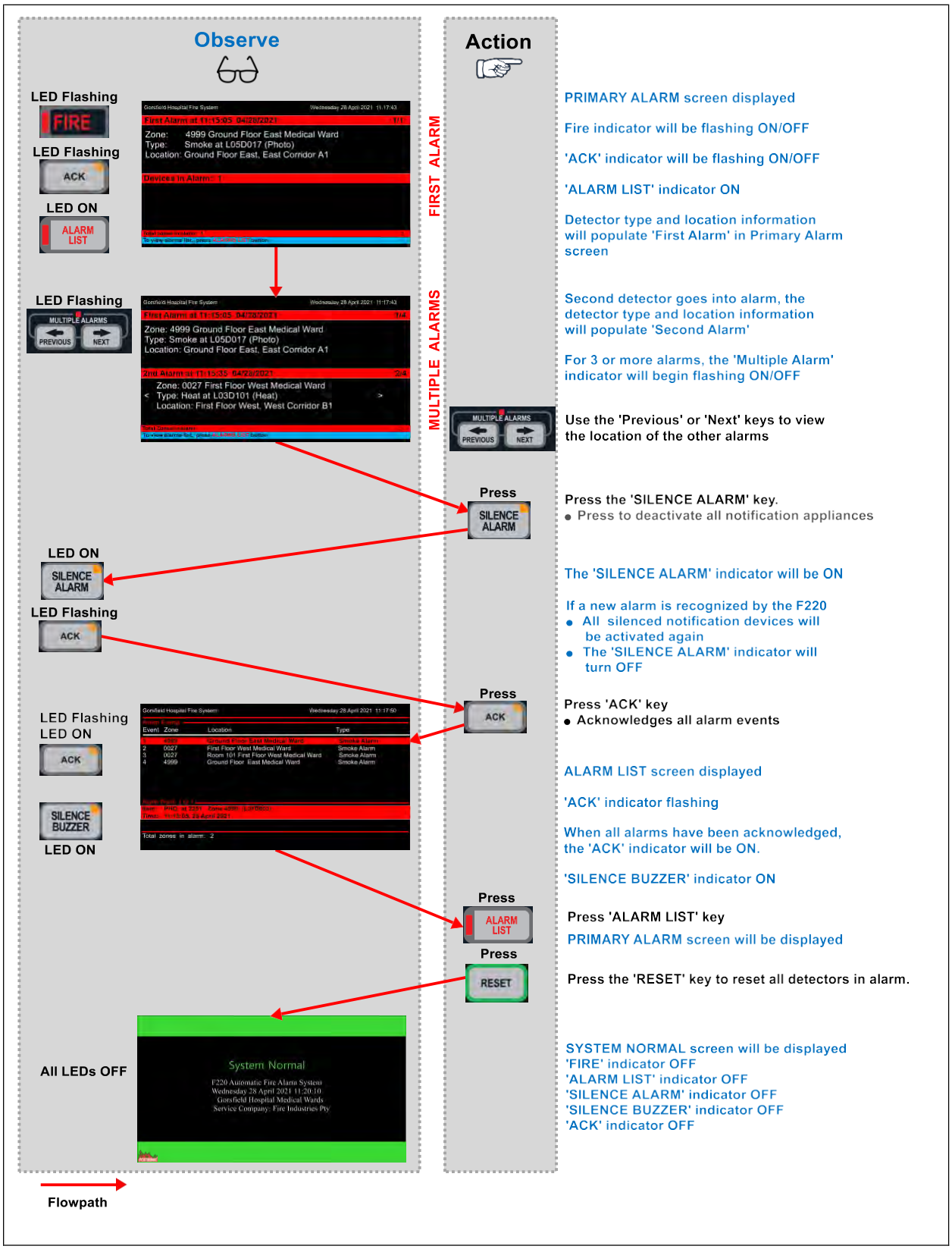


Figure 9-3: Responding and Acknowledging a Fire Alarm

10. OPERATING THE USER MENU

The F220 can be configured using the Keyboard-Display and selecting the appropriate items from the following menu tree.

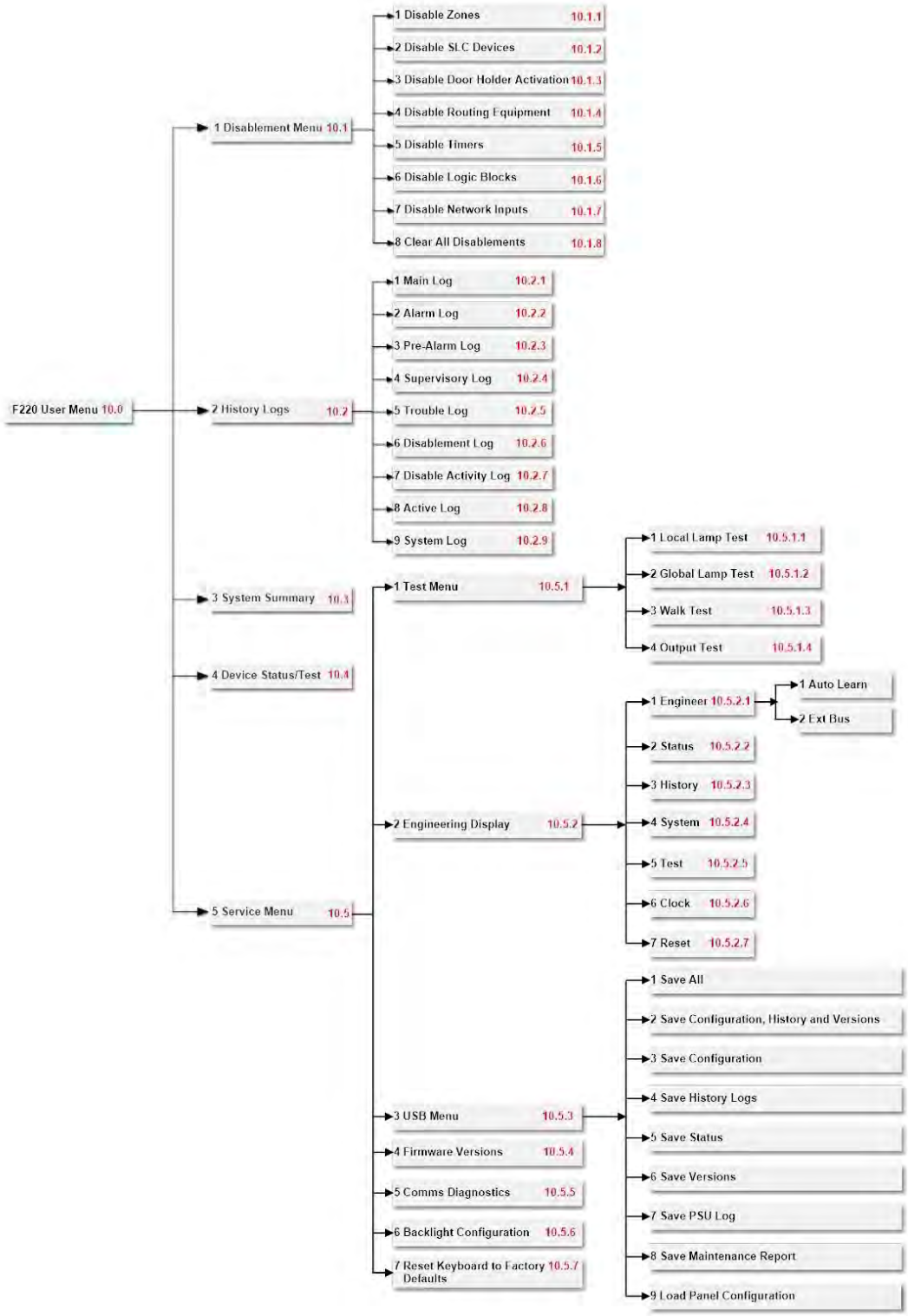
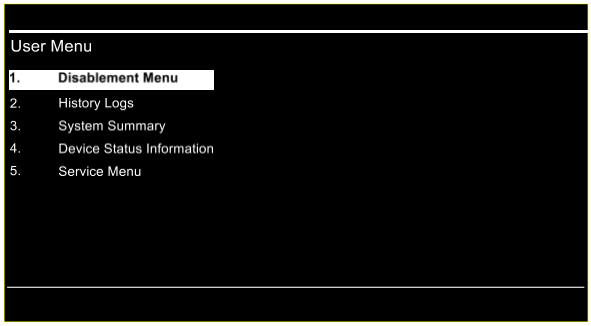


Figure 10-1: F220 User Menu Tree

NOTE:

The first, or top, level of the 'User Menu' can be reached by pressing the 'Menu' key on the front panel (Menu>)

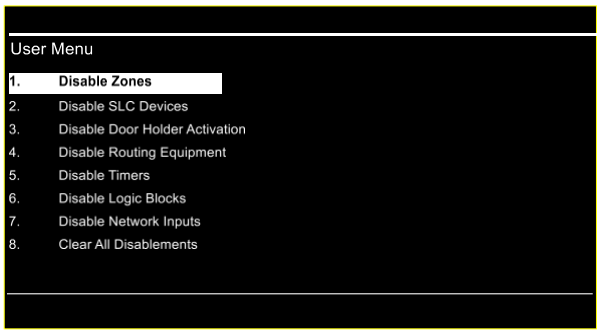


Items in the 'User Menu' can be selected by pressing either the numeric keys, or by moving the selection highlight using the arrow keys, then pressing 'OK'.

User Menu >

Press 'Esc/Back' to move back to a higher level in the 'User Menu' tree

10.1 User Menu - Disablement menu (Menu option 1)

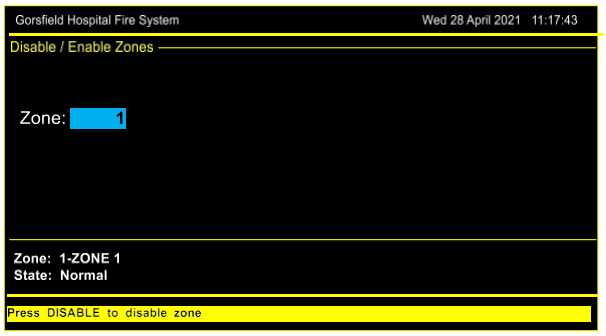


Press Disablement Menu in the User Menu

User Menu> Disablement Menu

Press the corresponding numeric key to select the Disablement type required.

10.1.1 Disable Zones (Menu option 1.1)



In the Disablement Menu, select Disable Zones

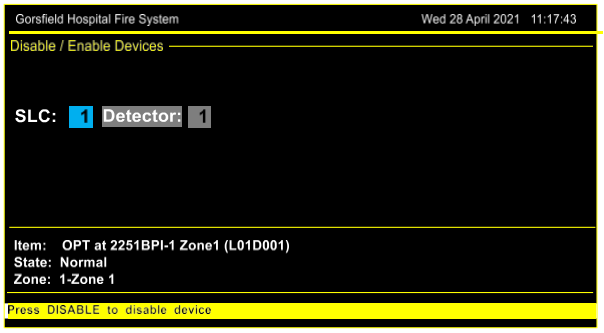
User Menu>Disablement Menu>Disable Zones

Enter the required Zone number using the numeric keys.

The zone descriptor and current state are shown below.

Press DISABLE to disable the selected zone.

10.1.2 Disable SLC Devices (Menu option 1.2)



In the Disablement Menu, select 'Disable SLC Devices'

User Menu>Disablement Menu>Disable SLC Devices

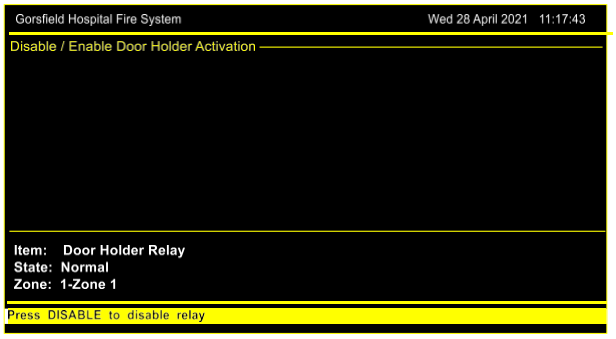
Move between SLC and Detector/ Module fields using the left/right arrow key.

Enter 'SLC number' either by using up/down arrow keys or numeric keypad.

Select between 'Detector/Module' using up/down arrow keys.

Enter 'Detector/Module number' either by using up/down arrow keys or numeric keypad.

10.1.3 Disable Door Holder Activation (Menu option 1.3)



In the 'Disablement Menu', select 'Disable Door Holder Activation'.

User Menu>Disablement Menu>Disable Door Holder Activation.

All Door Holders – Outputs Relays 1 and 2 on the Mainboard, if enabled in FireUtils Panel Editor, and SLC Relays configured as Door Holders in FireUtils - are disabled by pressing the `DISABLE` key.

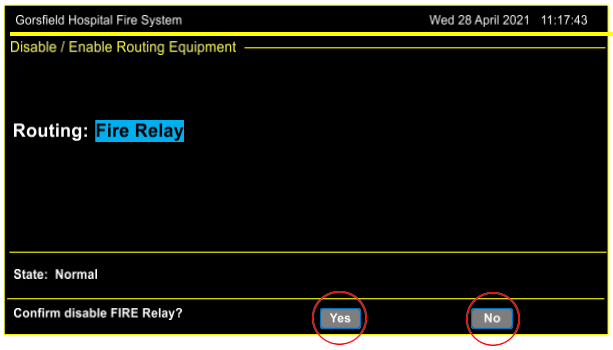
10.1.4 Disable Routing Equipment (Menu option 1.4)

In the ‘Disablement Menu’, select ‘Disable on-board Relays’.

User Menu>Disablement > Disable On-board Relays

There are two options: the ‘Fire Relay’ or the ‘Trouble Relay’. Select the item to be disabled using the up/down arrow keys.

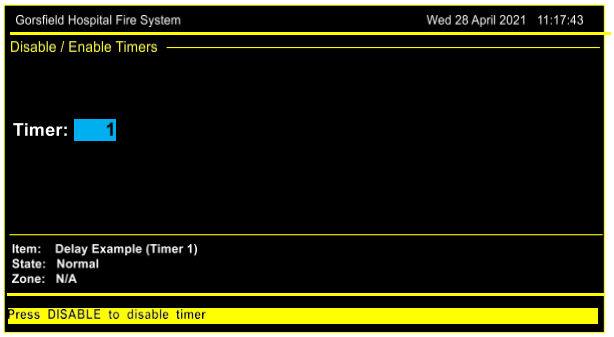
Press the `DISABLE` switch on the front panel to disable the item or, if it is already disabled, to enable it.



NOTE:

1. Confirmation will be required to disable the Fire Relay (Ringed soft keys in diagram opposite).
2. No confirmation is required to disable the ‘Trouble Relay’.

10.1.5 Disable Timers (Menu option 1.5)



In the ‘Disablement Menu’, select ‘Disable Timers’

User Menu>Disablement Menu>Disable Timers

Enter Timer number using numeric keys or the up/down arrows.

Press ‘DISABLE’

Press ‘DISABLE’ again to enable the timer

10.1.6 Disable Logic Blocks (Menu option 1.6)

In the ‘Disablement Menu’, select ‘Disable Logic Blocks’

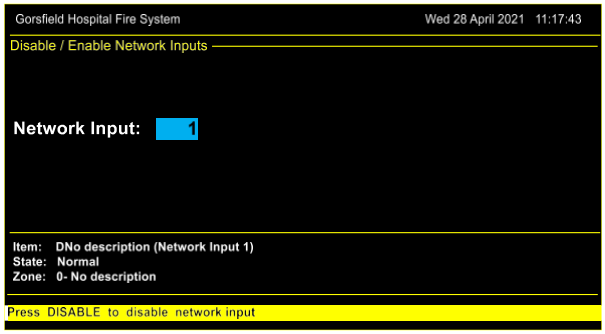
User Menu>Disablement Menu>Disable Logic Blocks

Enter Logic Block number using numeric keys or the up/down arrows.

Press ‘DISABLE’

Press ‘DISABLE’ again to enable the Logic Block

10.1.7 Disable Network Inputs (Menu option 1.7)



In the ‘Disablement Menu’, select ‘Disable Network Inputs’

User Menu>Disablement Menu>Disable Logic Blocks

Enter ‘Network Input number’ using numeric keys or the up/down arrows.

Press ‘DISABLE’

Press ‘DISABLE’ again to enable the Network Input

10.1.8 Clear All disablements (Menu option 1.8)

In the ‘Disablement Menu’, select ‘Clear All Disablements’

User Menu>Disablement Menu>Clear All Disablements

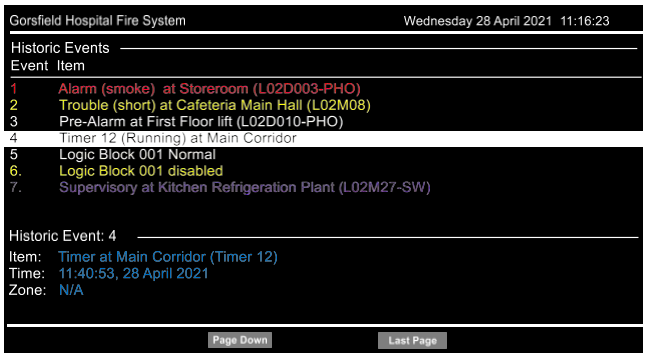
Pressing `8` will bring up confirmation (Yes) or cancel (No) soft-key labels as shown

10.2 User Menu - History Logs (User menu option 2)

History Logs is option 2 in the top level of the User Menu

User Menu > History Logs

10.2.1 Main Log (Menu option 2.1)



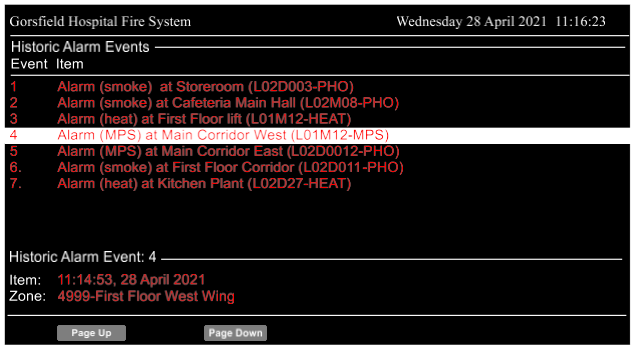
Selecting Main Log lists all the historic events in reverse order in which they occurred. The most recent event (event 1) is at the top of the list.

User Menu > History Logs > Main Log

Use 'Esc/Back' to return to the History Logs menu.

Use 'Page Up', 'Page Down' and 'Last Page' soft keys to scroll through the list of Historic Events

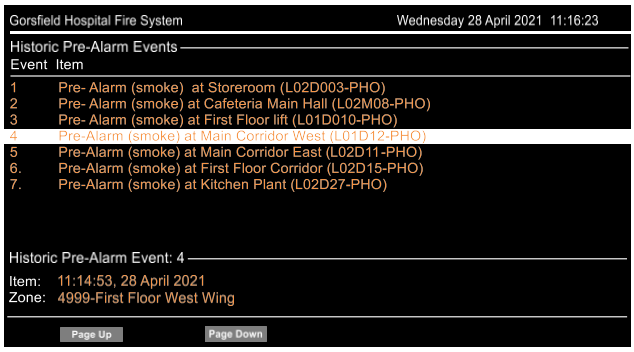
10.2.2 Alarm Log (Menu option 2.2)



The 'Historic Alarm Events log is option 2 in the History Logs menu.

User Menu > History Logs > Alarm Log

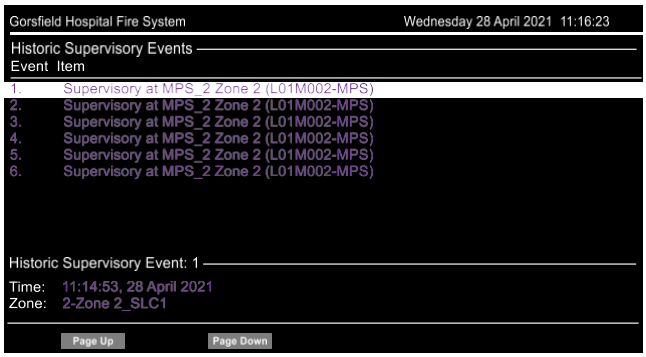
10.2.3 Pre-Alarm Log (Menu option 2.3)



The Historic Pre-Alarm Events log is option 3 in the History Logs menu.

User Menu > History Logs > Pre-Alarm Log

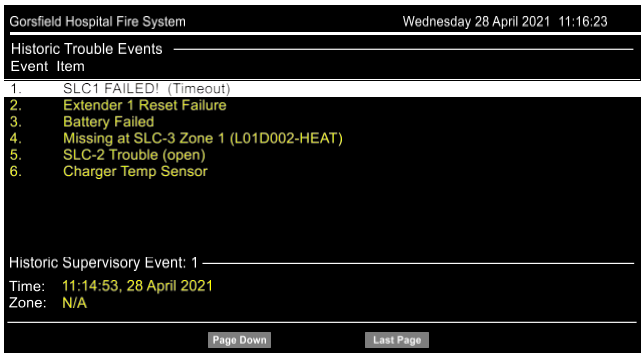
10.2.4 Supervisory Log (Menu option 2.4)



The Supervisory Log is option 4 in the History Logs menu.

User Menu > History Logs > Supervisory Log

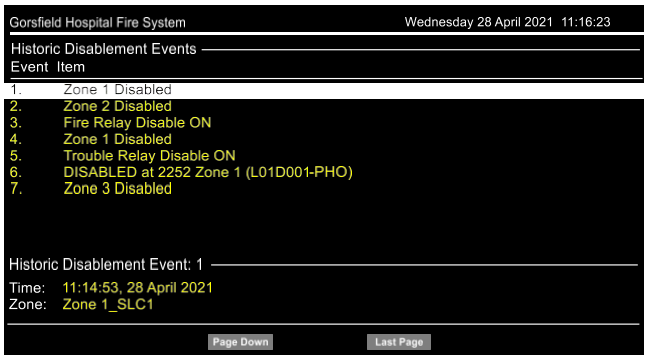
10.2.5 Trouble Log (Menu option 2.5)



The Historic Trouble Log is option 5 in the History Logs menu.

User Menu > History Logs > Trouble Log

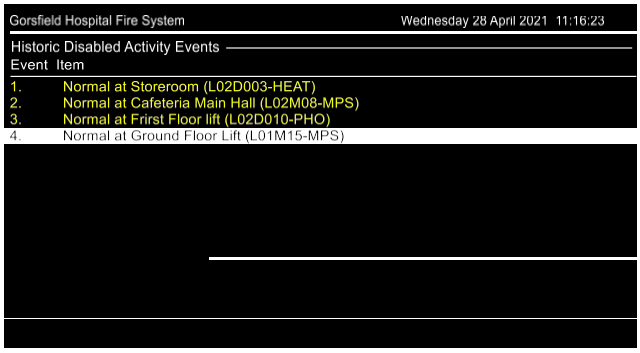
10.2.6 Disablement Log (Menu option 2.6)



The Disablement Log is option 6 in the History Logs menu.

User Menu > History Logs > Disablement Log

10.2.7 Disabled Activity Log (Menu option 2.7)

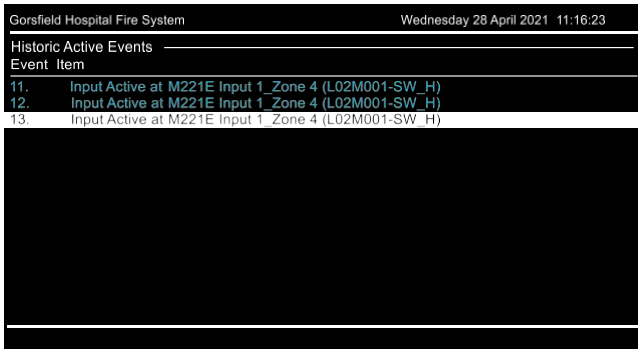


The Disabled Activity Log is option 7 in the History Logs menu.

The log records any events on a device when its disabled.

User Menu > History Logs > Disabled Activity Log

10.2.8 Active Log (Menu option 2.8)

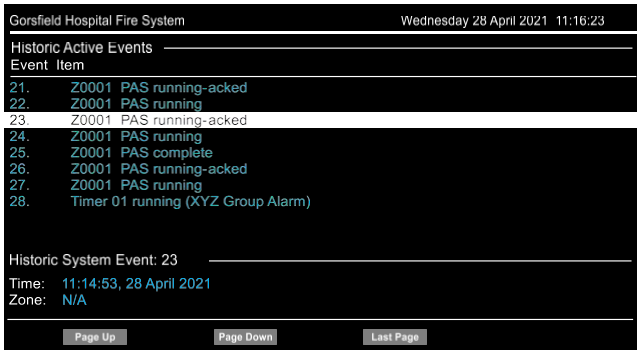


The Historic Active Events log is option 8 in the History Logs menu.

The log records the events on detectors, modules, running/complete timers, active/delay AVF, PAS running etc., attached annunciators, panel door, output testing, lamp test, fire drill etc.

User Menu > History Logs > Active Log

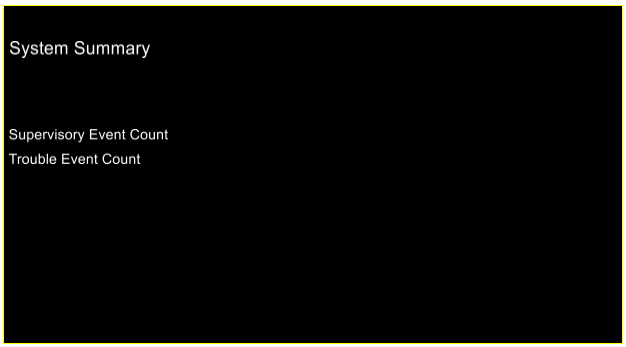
10.2.9 System Log (Menu option 2.9)



The Historic System Events Log is option 9 in the History Logs menu.

User Menu > History Logs > System Log

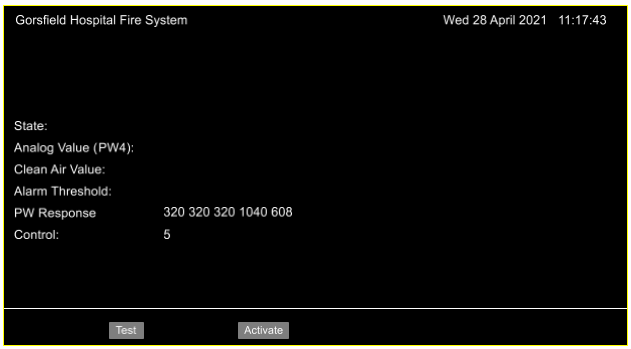
10.3 User Menu - System Summary (Menu option 3)



System Summary is option 3 in the User Menu

User Menu > System Summary

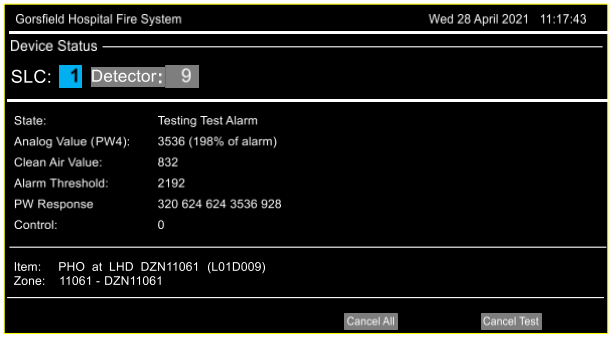
10.4 User Menu - Device Status/Test (Menu option 4)



Device Status/Test is option 4 in the User Menu.

User Menu > Device Status/Test

Device status can be displayed as well as initiating device testing. Device testing will cause the Test LED to be lit, the Alarm screen to be displayed, the NACs, the Aux, Fire, and Trouble relays to activate. Activity is logged in the Alarm log

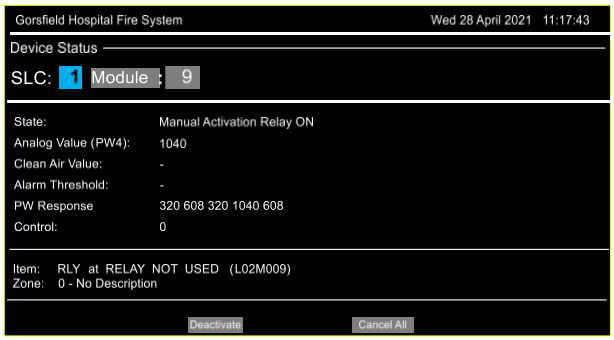


Device tests, and output module activations can be initiated using the softkeys below the display.

Device tests and output module activations can be cancelled or deactivated using the softkeys below the display.

If there are devices in test and manually activated output modules, pressing the “Cancel All” softkey will raise a prompt to either cancel all the devices in test or cancel all the manually activated devices.

Disabled devices and modules can be put into test or manually activated without creating an alarm or activating the NACs.



Output modules may also be manually activated. Manual activations and deactivations may be recorded in the Active Events log and recorded/ displayed elsewhere depending on the module configuration.

10.4.1 Device Status Descriptors

The status descriptors are:

Descriptor	Meaning
NORMAL	The device is in its ‘Normal’ state. The text “(non-existent)” is displayed when the current device is not configured and ‘Normal’ (Dis) when disabled.
ALARM (MPS) ALARM (SMOKE) ALARM (TEST) ALARM TESTING TEST ALARM (DIS)	The device is in ‘Alarm’. Devices may generate different qualifiers depending on the type.
ACTIVE	A device programmed as an ‘Input’ is in ‘Alarm’.
TROUBLE	A generic ‘Trouble’ message if the particular Trouble doesn’t match any of the specific Trouble conditions defined below.
MISSING	The device is not present on the SLC or is not responding to a poll.

Descriptor	Meaning
MISMATCH	The device found at this address doesn't match the programmed device type.
EXTRA	The device found at this address is not supposed to exist, i.e., it has not been programmed into the configuration memory.
TEST FAIL	The device failed its automatic self-test.
PREALARM	The device is in 'Pre-Alarm'. A 'Pre-Alarm' condition indicates that the device is close to the 'Alarm' threshold.
DUPLICATE	Two or more devices are responding to the same address.
ISOLATOR	The built-in SLC isolator relay has triggered, indicating a short-circuit beyond the device.
SUPPLY TBL	A SLC Relay board has detected a trouble in the external power supply (if used).
HI TROUBLE	Caused by a detector failing its internal threshold adjustment (same as MAINT DEF for some types).
LO TROUBLE	This Trouble is a symptom of a problem with the sensing electronics on a detector resulting in abnormally low analog readings. Replace the detector.
SHORT	A SLC has detected a short-circuit condition. This will generate a 'Trouble' condition.
OPEN	A SLC has detected an open-circuit condition.
MAINT FLT	Maintenance Trouble. The detector's Clean Air value has increased beyond a safe level and the SLC Driver board can no longer maintain the detector's sensitivity. The detector should be cleaned.
AVF INIT	A device with AVF (Automatic Verification Facility) has triggered once and is in the AVF window awaiting a second activation to trigger an 'Alarm'.
OFF	A 3-Position Switch (type SW3) is in the OFF position.
ON	A 3-Position Switch (type SW3) is in the ON position.
DIS/ISO	A FAAST device has been disabled or isolated via its local control panel.

Table 10-1: Device Status Descriptors

10.5 User Menu - Service Menu (Menu option 5)

Service Menu is option 5 in the User Menu

User Menu > Service Menu

10.5.1 Test Menu (Option 5.1)

The Test Menu is option 1 of the Service Menu

User Menu > Service Menu > Test Menu

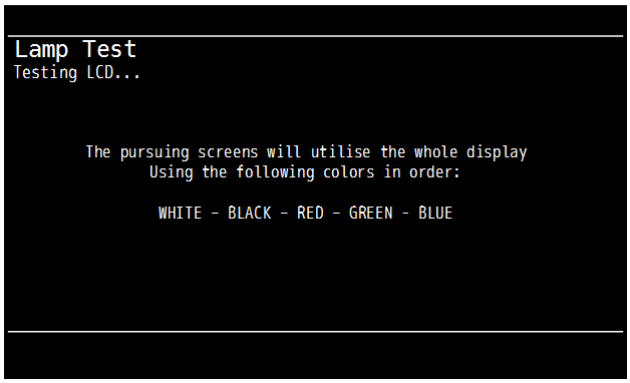
10.5.1.1 Local Lamp Test (Option 5.1.1)

Local Lamp Test is option 1 of the Test Menu.

User Menu>Service Menu>Test Menu >Local Lamp Test.

The test turns on and off each LED on the system's Front Panel in sequence.

Neither the Local nor Global Lamp Test events are recorded in the History Log.



At the completion of the LED test, the 5 colors used on the LCD are displayed in sequence, followed by the testing of the local buzzer.

The Local Lamp Test will repeat before exiting to the Test Menu.

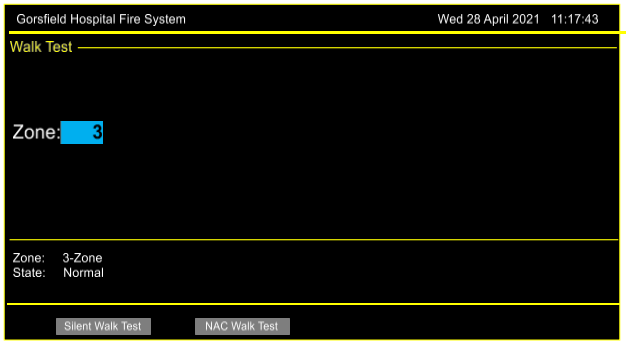
10.5.1.2 Global Lamp Test (option 5.1.2)

Global Lamp Test is option 2 of the Test Menu.

User Menu > Service Menu > Test Menu > Global Lamp Test

The same tests that are performed in the Local Lamp Test are performed in the Global Lamp Test.

10.5.1.3 Walk Test (option 5.1.3)



Walk Test is option 3 of the Test Menu.

User Menu > Service Menu > Test Menu > Walk Test

Enter the zone number using the numeric keys.

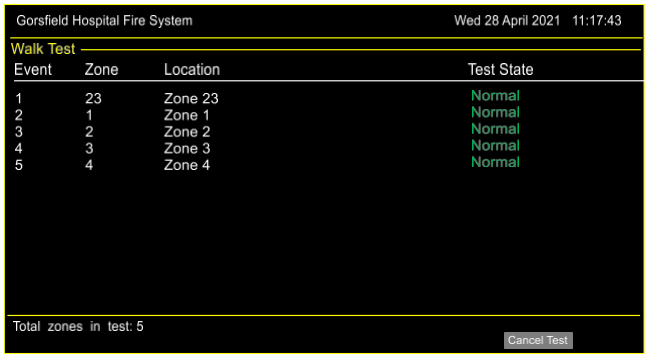
Select option ‘Silent Walk Test’ or ‘NAC Walk Test’ using the appropriate soft key.

The ‘TEST LED’ will now be ON.

NOTE:

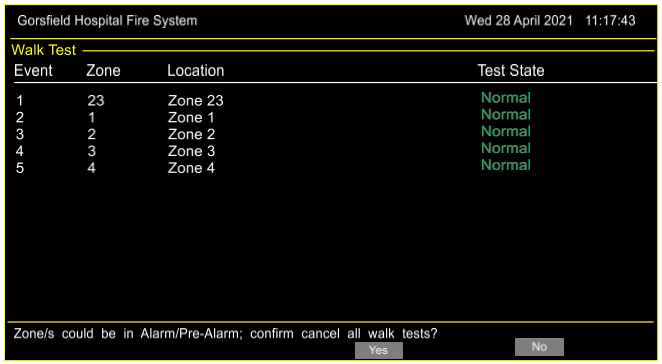
1. When in ‘Walk Test’, the F220 switches into a self-resetting, non-latching mode. Panel operation is essentially identical, except that when the operated device is restored to ‘Normal’, the F220 automatically resets that circuit.

2. Once an initial zone has been selected with the “Silent” or “NAC” option then any additional zones selected can only have that option—there will be only one soft-key option available.



After zones have been selected for test the ‘Walk Test’ screen will be displayed and the ‘Test’ LED will be ON. The current test status of each test zone is shown.

Once testing is completed test zones can be reset to normal by selecting with the up/ down arrow keys and then pressing the ‘Cancel Test’ soft key



Alternatively, pressing ‘Reset’ will cancel all zones in test however a confirmation message will appear

NOTE:

1. If the cabinet door is closed with the F220 in the ‘Walk Test’ condition, the internal buzzer sounds, and a ‘Trouble’ condition (Door Interlock Trouble) is signaled.
2. Devices in Walk Test will have all activation delays (6 sec confirmation poll, AVF) temporarily suppressed for the duration of the test. This feature aims to improve the response time of the device under Walk Test. At the end of the walk test, if the F220 is reset, or the walk test is cancelled, the activation delays are restored.

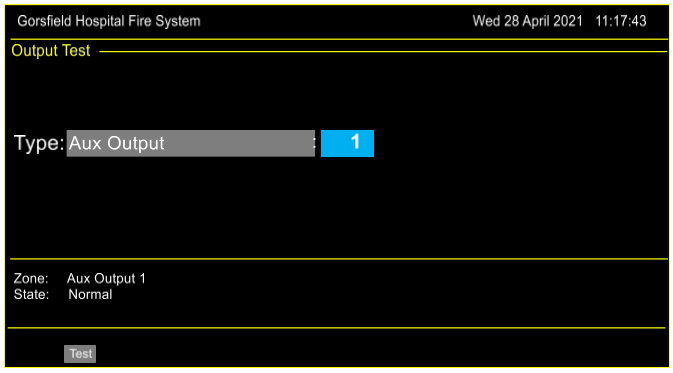
10.5.1.4 Output Test (option 5.1.4)

All outputs from the F220 main board can be tested. Outputs for testing can be selected using the keyboard arrow keys. These include the Fire Relay, Trouble Relay, Aux Relay, Supervisory Relay, Output Relays 1 to 3, NACs 1 to 4, Auxiliary Outputs 1 to 8, and LEDs 1 to 2048.

The ‘Test’ softkey activates the selected output on the mainboard and turns on the Test indicator on the Panel.

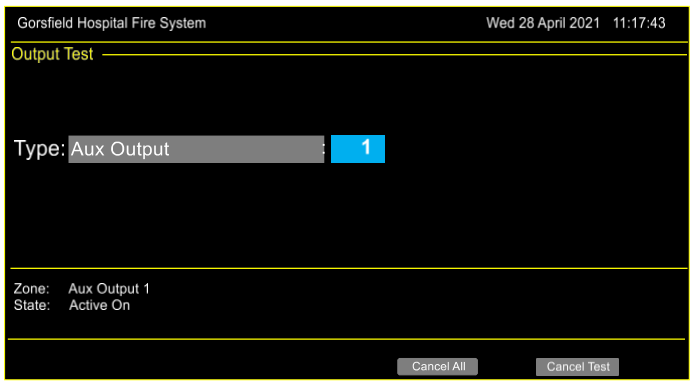
The test remains active until cancelled using either the ‘Cancel All’ or ‘Cancel Test’ softkeys. The output test can only set outputs from the normal to activated state. The state of the output under test is set by a logical OR of the output test and whatever other signal that

may be driving the output. Multiple output tests can run concurrently. All output tests are cancelled in the event of an Alarm and the system will jump to ‘Fire Department’ view. Any test alarm will not cancel an output test.



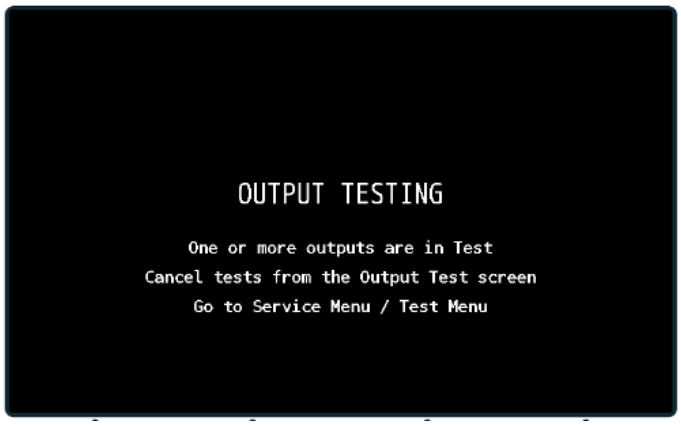
Output Test is option 4 of the Test Menu

User Menu > Service Menu > Test Menu > Output Test



The ‘Cancel Test’ softkey will cancel testing of the output currently displayed.

The ‘Cancel All’ softkey will cancel all output tests on the F220 panel. If the F220 panel is part of a network, then tests on that panel originating from the network will also be cancelled.



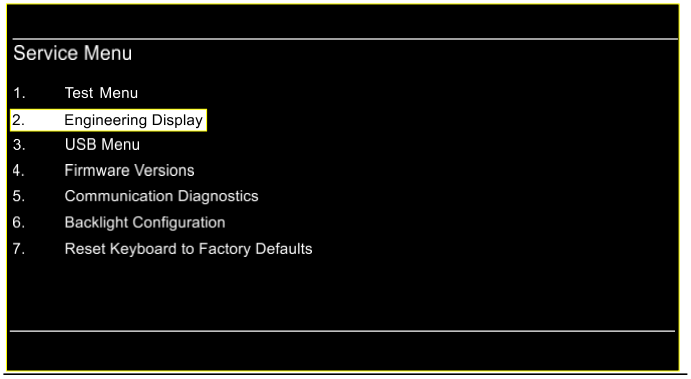
A warning screen is displayed in place of the normal screen when output testing is in progress.

10.5.2 Engineering Display Menu (Menu option 5.2)

To configure the F220 system and program the array of advanced features provided, the service technician or engineer will need to use the FireUtils configuration tool.

It is possible, however, to interrogate the system using the Keyboard-Display to determine what detectors and modules are currently attached to the SLCs. The primary use of the Engineering

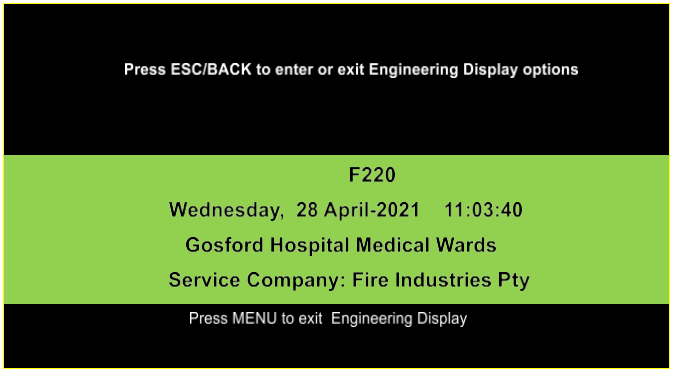
Display is during the initial installation of the panel. It allows the installer to get the system up and running quickly, to identify possible cabling errors, and ensure that all devices are responding.



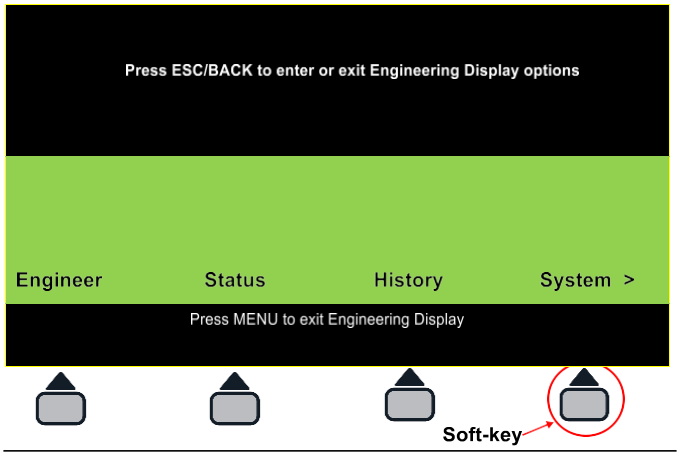
The Engineering Display Menu is option 2 of the Service Menu.

User Menu > Service Menu > Engineering Display

Press ‘OK’ to enter the Engineering Display Menu



Press ‘OK’ or ‘ESC/BACK’ to enter the User Menu



The User Menu has 7 submenus; ranging from ‘Engineer’ through to ‘Reset’.

Use the arrow keys to scroll along the menu titles

Select the desired menu by pressing the soft key immediately below it.

The diagram below shows the interaction between the “Engineering Display” mode and the full color F220 Keyboard-Display.

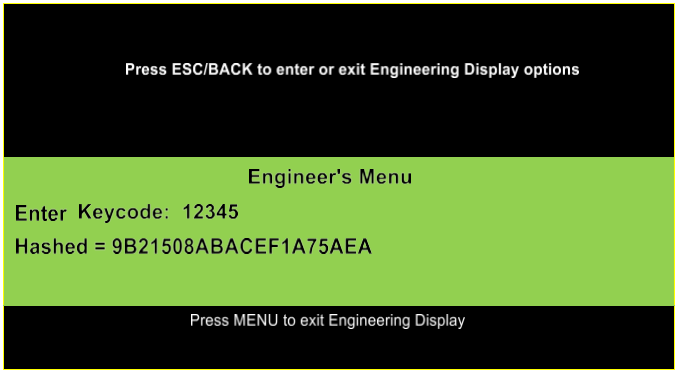
Figure 10-2: Accessing the Engineering Display using front panel buttons

10.5.2.1 Engineer`s Menu

The operator must enter a 5-digit keycode before being allowed to proceed. The keycode is entered using the numeric keypad on the front panel and then pressing `OK`. The default code is ‘10000’.

The Engineer's Menu is entered

If, after ten (10) different attempts to enter a keycode that is incorrect, the LCD will display a hash code similar to the one shown below.



The F220 generates a one-time random keycode that is encoded into the displayed hash value.

The user must contact the local Pertronic Industries' distributor to obtain the new correct keycode, which can then be entered to gain access to the Learn Menu.

Contact details of the local Pertronic Industries can be found in Section 24**.**

When the correct keycode has been entered, the 'Engineer's Menu' will be displayed. The 'Engineer's Menu' has 2 options; 'Learn' and 'Ext Bus'.

- 'Learn' allows each SLC loop in the current configuration to be interrogated.
- 'Ext Bus' allows any SLC Drive boards that are not part of the current configuration file to be detected.

Menu > Service Menu > Engineering Display > [OK]

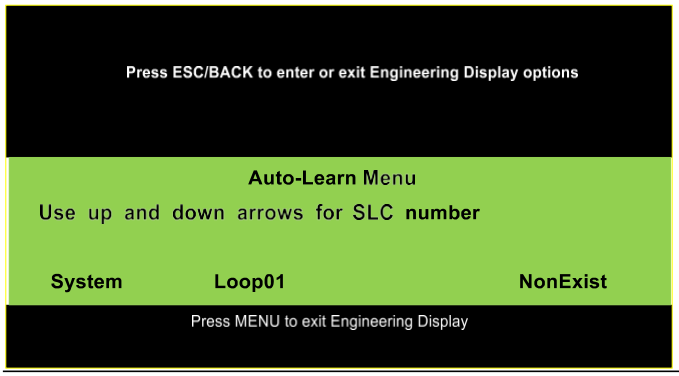
User Menu > Engineer > [Enter Keycode] [OK]

10.5.2.1.1 Learn Function

The ‘Learn’ mode allows each SLC to be interrogated. Any devices detected, not in the current configuration file, are included in the system configuration.

There are three options: ‘System’, ‘SLCxx’, and ‘NonExist’.

- Select ‘System’ to learn all the devices attached to all the SLCs,
- Select ‘SLC’, followed by a circuit number of interest, to learn what devices are attached to that SLC, or
- Select ‘NonExist’ to erase any configured devices that are present beyond the last known SLC on the system, for example an SLC driver board has been removed. This option avoids generating “missing” events for such devices.



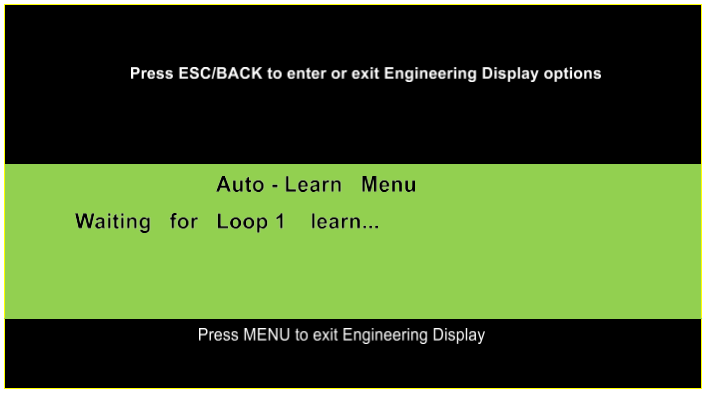
Menu > Service Menu > Learn Menu > Auto Learn.

Three options will be displayed on the LCD.

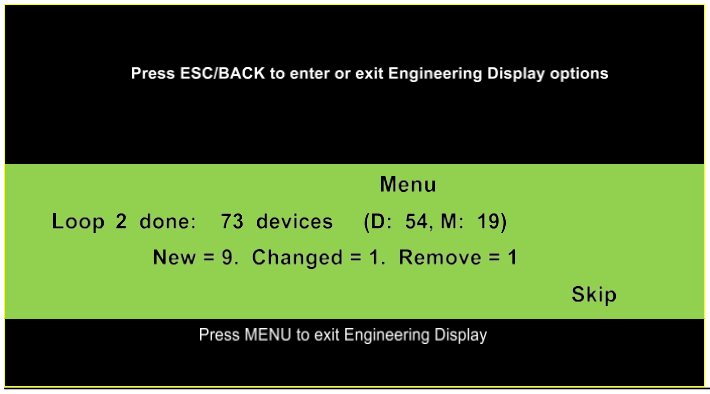
Use the softkey below the option to select it.

Options 1 and 2: System and SLCxx

If either of the first options above are selected, the results of the interrogation process will be displayed on the LCD as shown below.



It takes between 5 -10 seconds for the first SLC to be interrogated, and 1 second for each SLC thereafter.



The LCD, when the Auto-Learn process has been completed, shows the total number of devices (Detectors and Modules) found in each SLC, and indicates the number of new, changed (e.g., device type), or removed (i.e., no longer present) devices.

The user now has the choice of what to do with the results. The four available options, selected using the 4 softkeys, are:

Update New devices found are updated in the system configuration, non-existent devices are removed. Each new device is given the default settings for that device type.

Defaults Each detected device is given the default settings for that device type. Non-existent devices are removed.

AddOnly Similar to Update, but non-existent devices are not removed from the configuration.

Skip No changes are saved and the results for the next SLC are shown. Pressing Menu has the same effect.

NOTE:
With the ‘Update’, ‘Defaults’ and ‘AddOnly’ options, the configuration file is automatically updated and saved in the Panel’s non-volatile memory. No changes are saved if the `Skip` softkey is used.

Repeat the Auto-Learn process for each loop.

Option 3: Non-existent

The LCD screen after the 'NonExist' option has been selected.

Erasing devices will require confirmation.

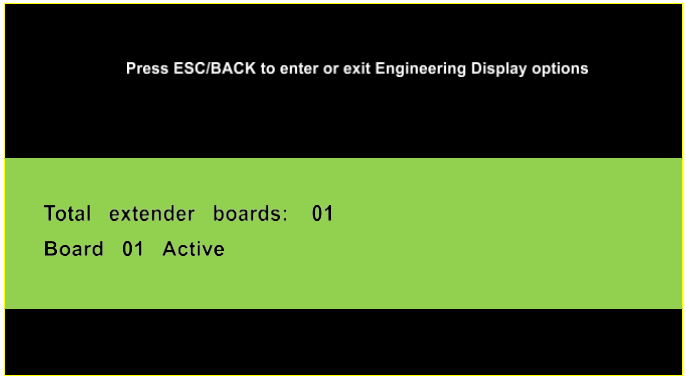
Press either the `Yes` or `No` softkey.

NOTE:
If changes have been made to the configuration file in the Auto Learn Function, then either:

- Save the file to a USB stick (Option 3 in the USB Menu in Section 10.5.3) and import it in to FireUtils (In FireUtils, select Panel > Import New Panel Config from File), or
- Upload the file to FireUtils from the connected Panel. (In FireUtils, select Panel > Receive and Create Configuration from Connected Panel).

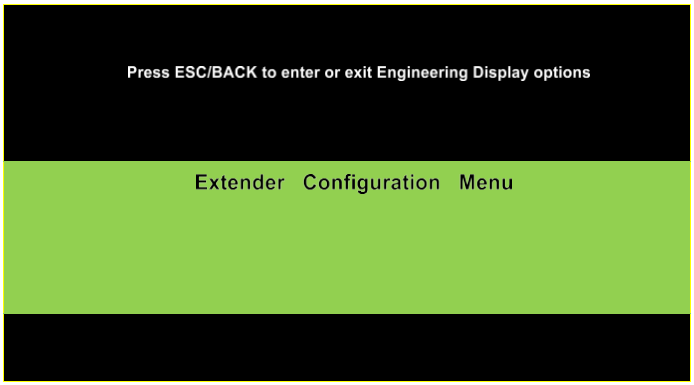
10.5.2.1.2 Ext Bus

This function allows Extension Bus boards (SLC Drivers) to be configured. This step is required after the SLC Driver has been installed for the learn process to discover devices on the new SLCs.



Pressing the `Detect` softkey causes the system to interrogate the Extension Bus for the number of SLC driver boards.

The total number of SLC Driver boards for the system may be changed using the arrow keys.



If any changes are made, pressing the `OK` key produces this prompt on the LCD.

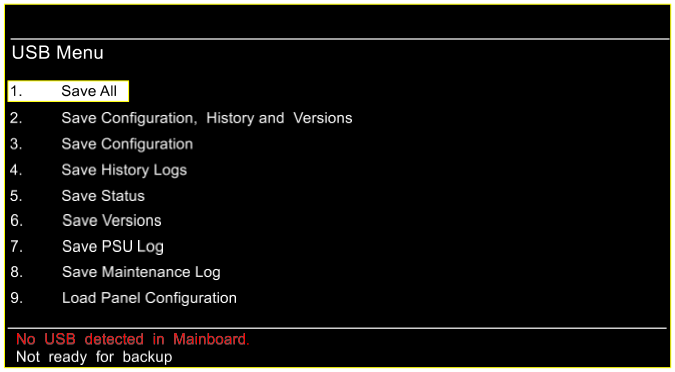
Press the softkey `Yes` or `OK` to save the new configuration information.

NOTE:
If changes to the configuration file have been saved, then either:

- Upload the file to FireUtils from the connected Panel. (In FireUtils, select Panel > Receive and Create Configuration from Connected Panel), or
- Save the file to a USB stick (Option 3 in the USB Menu in Section 10.5.3) and import it in to FireUtils (In FireUtils, select Panel > Import New Panel Config from File).

10.5.3 USB Menu (Menu option 5.3)

The USB menu allows users to save configuration, history, status and other information to USB memory devices. It also allows Panel Configuration files generated by FireUtils to be uploaded. This is only valid for non-networked panels. Network configurations must be uploaded/downloaded using FireUtils using an Ethernet connection on a Net2Card.



The USB Menu is option 3 of the Service Menu.

User Menu > Service Menu > USB Menu

NOTE:

Before selecting an option ensure that a USB device is plugged into the mainboard. If a valid device is detected the message 'USB Connected' will appear at the bottom of the screen.

If no USB device is plugged into the port, the message 'No USB detected in Mainboard' will be displayed

There are 9 options in the USB Menu

- Save All
- Save Configuration, History and Versions
- Save Configuration
- Save History Logs
- Save Status
- Save Versions
- Save PSU Log
- Save Maintenance Report
- Load Panel Configuration

10.5.3.1 The 'Save' Options

The first 8 of the 9 menu options are for saving configuration, status, log and other files. Time stamped files are placed in automatically created directories on the USB drive. Wait for the 'SUCCESS' message before removing the USB drive.

10.5.3.2 Uploading a Panel Configuration

The panel's configuration file can be uploaded from FireUtils using a USB drive as follows.

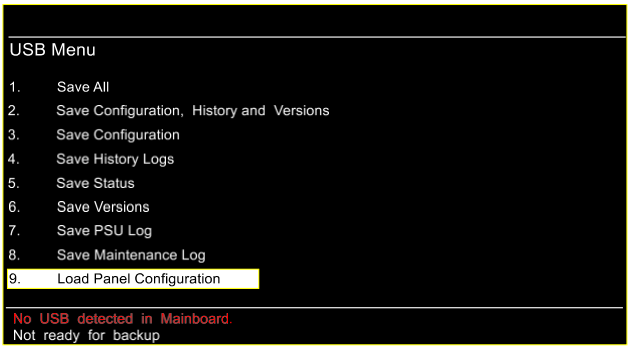
NOTE:

Refer to Sections 7.3 and 7.4 for details on USB file structures and file system format.

In FireUtils' Menu Bar, select 'Panel' and 'Export Configuration "*Panel config <date> <time>*" to File', 'for import into FireUtils or F220 (via USB)'

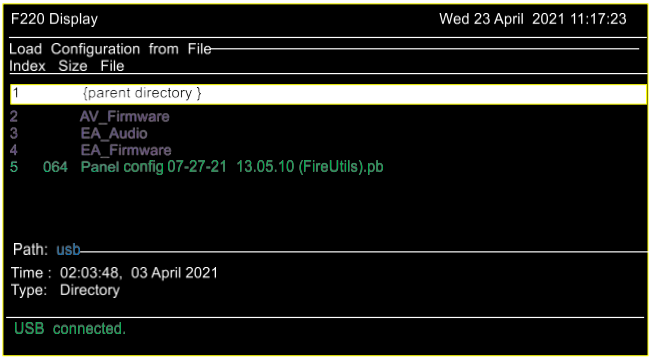
Save the configuration file to the root directory of the USB drive.

A single file is created, *Panel config <date> <time>.f220cfg.*



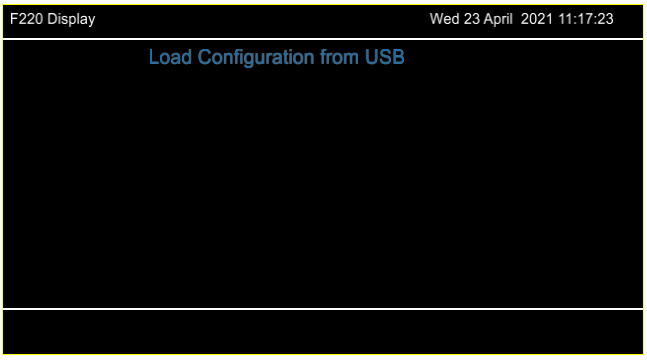
User Menu > Service Menu > USB Menu

Insert the USB drive into the USB socket on the Mainboard.



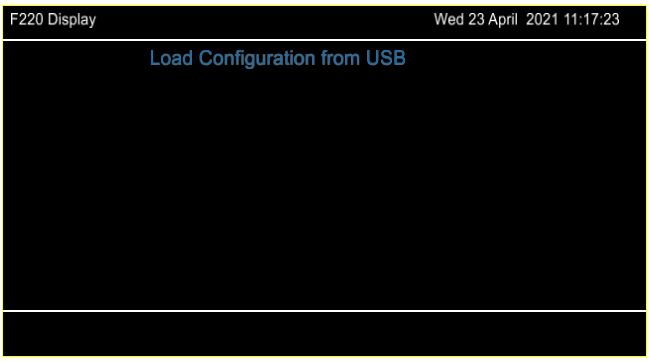
Using the 'Up' and 'Down' arrow keys on the front panel, move the cursor to the *Panel config file.pb* (highlighted in green).

Press 'OK'

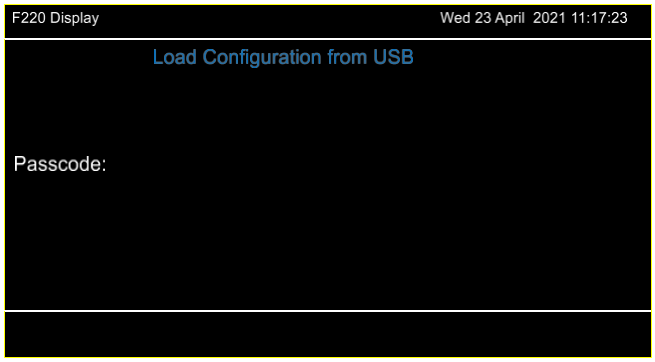


Enter the passcode using the numeric keypad.

And press the 'Load Config' softkey.



If an incorrect passcode is entered, the configuration file will not be uploaded.

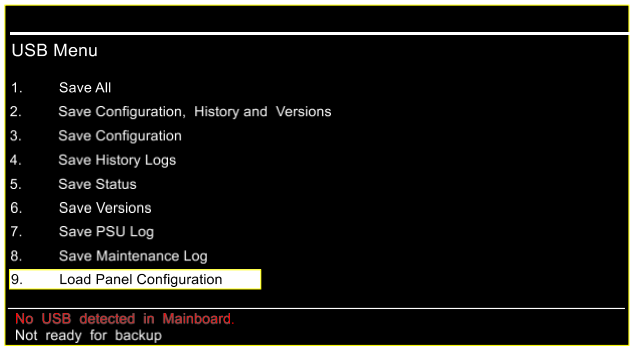


If the configuration file is successfully loaded, the F220 will respond with 'OK' and 'Complete'.

Press the 'Return' softkey

10.5.3.3 Restore to a Blank Configuration

There may be instances where it is necessary to start with a 'clean', blank configuration. This can be undertaken through the User Menu as follows:



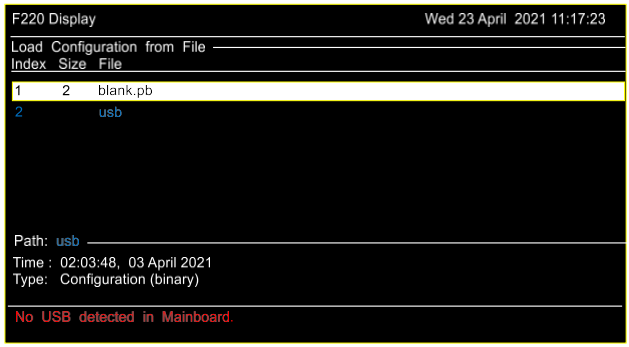
User Menu > Service Menu > USB Menu

Do <u>not</u> insert a USB stick.

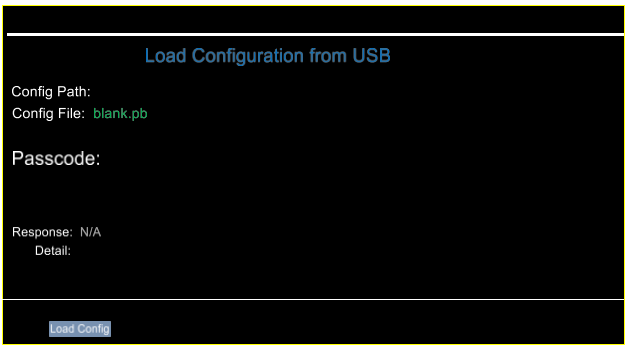
Select 'Load Panel Configuration' and Push 'OK'

The `Load Configuration from File' screen will be displayed.

Push 'OK'.

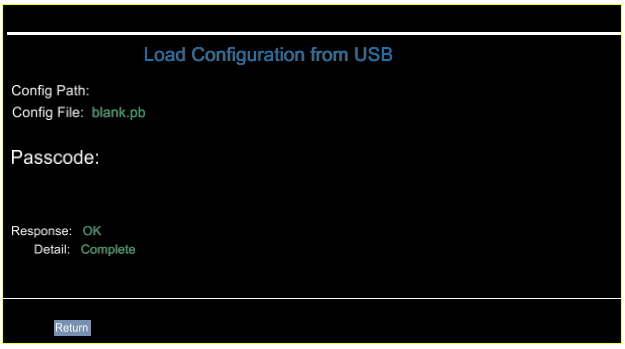


Select 'blank.pb' and push 'OK'.



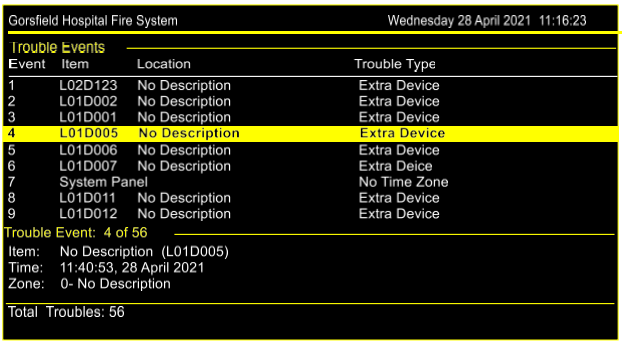
Enter the passcode using the numeric keypad

and press the 'Load Config' soft key.



The F220 will restore the blank configuration file.

Press the 'Return' soft key.



With a blank configuration file loaded, the F220 will display the Trouble Events screen.

10.5.4 Firmware Versions (Menu option 5.4)

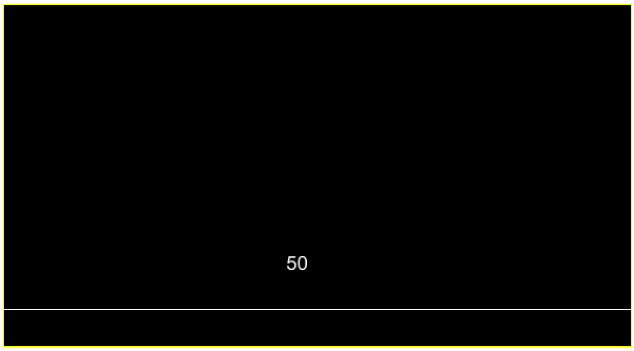
Firmware Versions is option 4 of the Service Menu.

User Menu > Service Menu > Firmware Versions

10.5.5 Communications Diagnostics (Menu option 5.5)

This function is reserved for use by Pertronic support staff.

10.5.6 Backlight Configuration (Menu option 5.6)



Backlight is option 6 of the Service Menu.

User Menu > Service Menu > Backlight Configurations

The F220 Keyboard-Display uses a backlight that must be on to view the display.

The backlight configuration option allows the user to set an active and an inactive brightness level for the display.

Min /Max Brightness

Pressing this soft key option will toggle the display between the minimum and maximum brightness levels that the display can be set to.

Adjusting the Active and Inactive Brightness levels

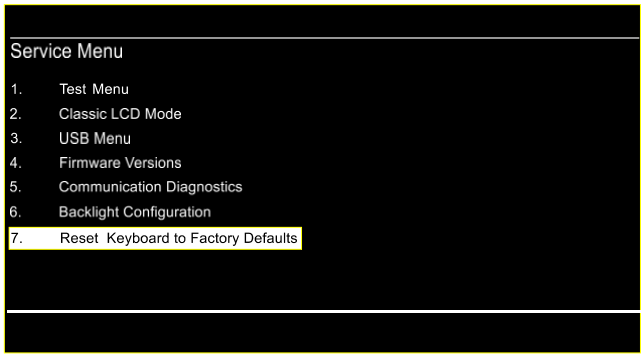
Use the left and right arrow keys to adjust the display to a desired brightness level. To set this level into the display configuration memory press the ‘Save As Active’ or ‘Save As Inactive’ soft keys.

The current saved values are displayed on the configuration screen.

NOTE:

Users should be aware that high brightness levels will increase the quiescent current drain on the system power supply.

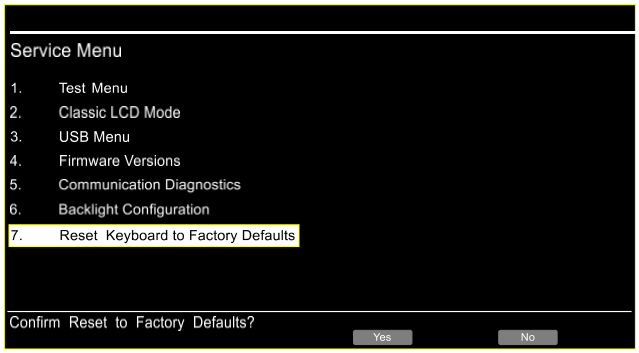
10.5.7 Reset Keyboard-Display to Factory Defaults (Menu option 5.7)



Reset Keyboard-Display to Factory Defaults is option 7 of the Service Menu

User Menu > Service Menu > Reset Keyboard-Display

Select this option to reset the display brightness levels to the factory default options.



Press `Yes` to confirm or `Cancel` to return to the 'Service Menu'.

11. SYSTEM FEATURES

11.1 Fire Relay (Master Alarm)

The FIRE relay is de-energized when the F220 is in the 'Normal' or non-Fire condition; it energizes for the 'Fire' condition.

An F220 'Fire' condition occurs when a device is in the 'Alarm' condition, the device has not been disabled, and when the device has 'Fire Relay' set in its configuration.

One set of relay contacts is available via screw terminals. The contacts are rated 2.0A @ 30V (resistive load).

A second set of relay contacts is available via an IDC header (K5). The terminals are available, together with contacts from the 'Trouble' relay, for use by digital communicators, or other devices that call the Central Station or Fire Department. The contacts are rated 2.0A @ 30V (resistive). The K5 connector is not for field wiring use and can only be used with UL approved accessories.

11.2 Trouble Relay

This relay is energized when the F220 is in the 'Normal' condition (i.e., no 'Trouble') and is de-energized when a 'Trouble' occurs.

An F220 'Trouble' condition occurs when:

- A trouble exists in the fire alarm system (SLC, NAC, low battery, missing detector, etc.) occurs.
- The system microprocessor fails.
- All power to the F220 is lost (battery and AC power).

Refer to Section 13: F220 Keyboard Display Messages for information on the types of Trouble detected and displayed by the F220.

The system microprocessor periodically updates a 'watchdog timer'. If the system microprocessor fails, the watchdog timer is no longer updated and times out, causing a 'Trouble' condition.

When power to the F220 is lost, the Trouble relay de-energizes causing a 'Trouble' condition.

One set of relay contacts is available via screw terminals - the contacts are rated 2.0A @ 30V (resistive load).

A second set of relay contacts is provided via an IDC header (K5) for use by digital communicators and other devices. The contacts are rated 2.0A @ 30Vdc (resistive).

11.3 Fire Drill

A fire drill is a method of practicing how a building or other structure would be evacuated in the event of a fire or other emergency. Pressing the 'FIRE DRILL' button, located on the front panel, will activate all the notification appliances attached to the four NAC circuits, activate the SLC relays configured as 'NAC Relays', cause the Fire Drill LED to turn ON,

and display 'Fire Drill Activated' on the F220's Keyboard-Display.

The Fire Relay will not be activated.

The 'Fire Drill' button has a toggle function. Alternate pressing of the push-button will activate or deactivate the NAC and SLC NAC relays.

11.4 Notification Appliance Circuits (NAC)

The F220 provides four independent, supervised Notification Appliance Circuits (NACs) to drive audible, visual and textual notification appliances such as bells, sirens, buzzers, audible and visual notification appliances, text and graphic displays. Each NAC circuit can be configured as either Class A or Class B.

Class A uses the 4 physical terminals (A-, A+, B-, B+) to create a single, continuous two-wire loop, from the panel to the first device, through to the final device, and back to the panel. A Class B circuit uses a single two-wire circuit terminating with a 10kΩ EOL resistor. Both circuits are supervised to give a 'System Normal' indication. Unused NACs need to be terminated with an EOL resistor across the B+ and B- terminals or looped back, A+ to B+ and A- to B- (See Figure 11-1).

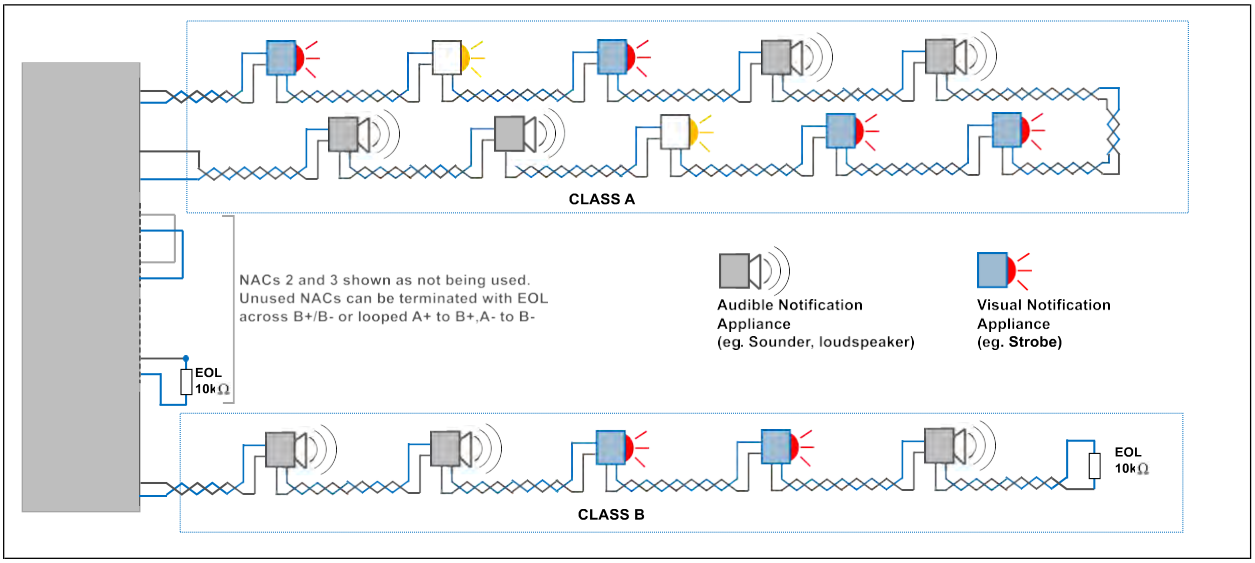


Figure 11-1: Class A and Class B NAC wiring diagrams

NOTE:

1. Each NAC driver on the mainboard can drive 1 notification circuit only; that is, one class A, or one class B circuit.
2. Class B NACs are driven from the B+ and B- terminals only; not A+ and A-. The A+ and A- terminals are used with Class A circuits only.
3. Power is limited to 3.0 Amps max. per circuit.
4. Total load on the NACs should not exceed the capacity of the power supply (5A or 7A)
5. The maximum number of NAC devices per circuit is 50.
6. The maximum total number of NAC devices per control unit is 100.

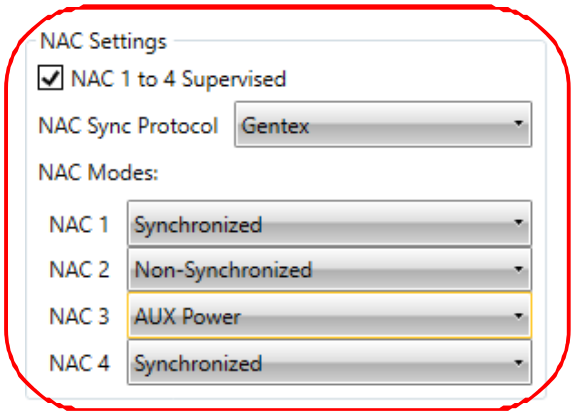
NAC Modes:

1. NAC Synchronization

Synchronization is a feature that controls the activation of audible and visual notification appliances in such a way that all the devices attached to the panel will turn off and on at exactly the same time. This is of importance, in particular, when activating strobes to avoid potential hazard to individuals through random activation.

Pressing the 'Silence Alarm' button on the front panel disables all the audible and visual notification appliances on the four NAC and SLC circuits.

Panel Editor



Three selectable proprietary sync protocols are supported; System Sensor, Gentex, and Wheelock.

NOTE:

Only one protocol can be configured to operate on the panel's NACs at a time. That is, different protocols cannot be "mixed and matched" on different NACs.

Other panels on the same network can be configured to operate different synchronized protocols

2. Non-Synchronized Mode.

This option allows individual NACs to 'opt-out' of using the selected synchronization protocol. When the 'Non-sync Mode' is applied, the sync protocol for that NAC is switched off. The notification devices on the NAC will still operate but they will not turn on or off at the same time as devices on synchronized NACs.

For both the Synchronized and Non-Synchronized Modes,

- Pressing the 'Silence Alarm' button will deactivate the NAC circuits, silencing the sounders and turning off the strobes.

- Pressing the ‘Disable NACs’ button disables both the visual and audible notifications devices on the NACs.

3. AUX Power

AUX Power is a special application that allows individual NACs to be powered ON permanently and used as a power supply to external devices. The circuit will remain ON regardless of the state of the ‘Silence Alarms’, ‘Disable NACs’ and ‘Fire Drill’ functions. Power drawn by the load should be limited to a maximum of 300mA per circuit. In AUX Power mode, this circuit can meet the class B requirements only when connected to addressable modules. If the addressable modules require Class A or Class X power, either a suitable UL 864 listed power supply will be required, or the device must be in the same room and connected in up to 20ft. of conduit to the AUX power from the panel. The circuit operates as a Class D circuit, detecting only ground fault conditions.

These configuration options are found in FireUtils’ Panel Editor and highlighted in the diagram (above right).

The defaults are:

1. NAC Settings: NACs 1 to 4 Supervised
2. NAC Sync Protocol: System Sensor
3. NAC Modes: NACs 1 to 4 Synchronized.

Power is limited to 3.0 Amps max. per circuit (See Aux Power above) and the total load on the NACs should not exceed the capacity of the power supply.

Except in AUX Power mode, if a NAC has an open-circuit, short-circuit or a partial short, a Trouble Signal is generated and, unless overwritten by a message with higher priority, the trouble message will be shown on the Keyboard-Display.

NOTE:

1. SLC Relays will activate automatically when configured as ‘NAC Relays’ in FireUtils (In FireUtils: SLC Editor > Device Type Selector > O/P Module > NAC Relay or NAC Relay (Supervised)).

   ‘Silence Alarm’ also de-activates these relays.
2. The ‘Fire Drill’ front panel button will activate/deactivate all 4 NACs and SLC ‘NAC Relays’ except when a NAC is configured as AUX Power.
3. Notification Appliances connected to a SLC will not be synchronized (using the SpectrAlert protocol) unless used in conjunction with a System Sensor MDL3R sync module.
4. When AUX Power is selected for a NAC in FireUtils’ Panel Editor, the corresponding NAC tick-boxes in other Editors (such as SLC, Timer etc.) are disabled.

Each NAC circuit can be individually tested via the ‘Output Test’ option in the ‘User Menu’ (Menu>Service Menu>Test Menu>Output Test). Refer to Section 10.5.1.4

11.5 Auxiliary Relay

The ‘Auxiliary’ on-board relay provides an unsupervised contact for auxiliary control purposes. The relay when activated provides a 28V DC output switched via a contact rated at 2.0A@ 30V (resistive).

The relay is activated when a device is in the alarm condition, the device has not been disabled, and the device has ‘AUX’ set in its configuration.

The operation of ‘DISABLE AUX’ push-button de-activates the AUX Relay.

NOTE:

SLC relays configured as ‘Aux Relays’ are activated independently through the mapping system. ‘DISABLE AUX’ de-activates these relays.

11.6 Disable AUX

The push-button ‘DISABLE AUX’ is located on the front panel and is used to disable the Auxiliary relay located on the Mainboard, and all SLC relays configured as ‘AUX’ or ‘AUXS’.

When the ‘DISABLE AUX’ is pushed, the button’s LED will turn ON, all AUX relays are disabled, the buzzer activated, and a trouble is generated. If the LED is OFF, the AUX relays are enabled. When the disablement is acknowledged (ACK pushbutton), the buzzer is silenced. However, for another disablement, the buzzer will reactivate.

The ‘DISABLE AUX’ push button has a toggle function. Alternate presses will enable or disable the AUX relays. All AUX relays are de-energized when the ‘Disable Aux’ function is active.

11.7 Supervised Output 1, Output 2

The OUTPUT 1 and OUTPUT 2 are provided for auxiliary control purposes (e.g., door holders etc.) which required 24VDC to activate. Both are configurable by accessing the Panel Editor in FireUtils (Figure 11-2). By default, the outputs are supervised (10kΩ EOL resistor) and de-energized. The relays, when activated, provide a power limited 28V/1.0A DC output. The relays are protected by PTC resettable fuses.

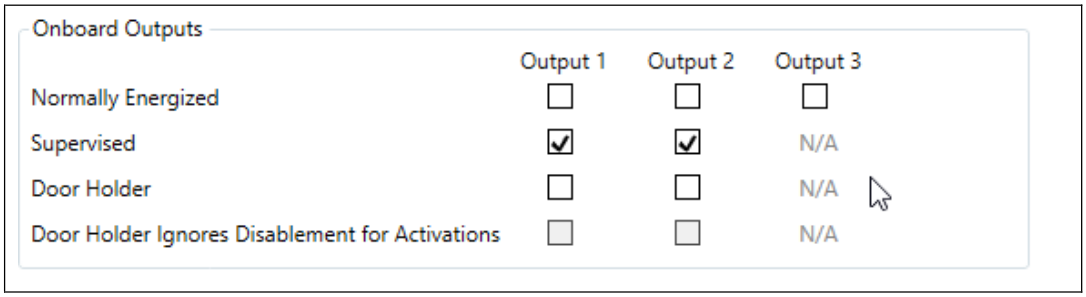


Figure 11-2: Configuring OUTPUTs 1, 2 and 3 options in FireUtils

11.8 Output 3 Unsupervised Relay

The on-board relay, OUTPUT 3, provides clean change-over contacts (rated 5A @ 30V) for control purposes. The contacts on Output 3 are not supervised and the relay is normally (by default) de-energized. It is energized when a mapped initiating device, such as a timer, or logic block, becomes active or by checking the 'Normally Energized' tick box in FireUtils' Panel Editor (Figure 11-2).

11.9 CO Monitoring

Carbon Monoxide (CO) is an asphyxiant gas, released through the incomplete combustion of fossil fuels. As the potential exists for dangerous levels of CO to accumulate in almost any building, legislation mandating the use of CO detection in commercial spaces has been instigated in many jurisdictions.

The F220 FACP can be connected to a CO device through the detector's clean contact relay outputs which are monitored by an Input Module on a SLC loop (Refer to Figure 19-17). The CO device must be independently powered, have battery backup, an internal sounder capable of generating a temporal 4 audio alarm pattern, and two relays, one to signal a CO Device activation, and the other to signal a CO Device Trouble.

As the CO gas-sensing element of the detector has a limited life, the CO device is electrically supervised by the panel and able to generate a Trouble signal if the detector has reached its End-of-Life, or the sensor has been removed or has failed.

When the CO device activates, the detector's internal sounder will alert nearby occupants, and the F220 will activate the blue CO LED on its front panel. As the CO device can be reset locally either by pressing its reset button or the CO levels return to normal, the CO signal can be latched at the panel, if required, by enabling the Latching flag in FireUtils. **(NOTE**: CO activation is not latched by default). Enabling Latching ensures that any CO activation, however brief, will be detected by the F220 and must be reset at the panel.

A Supervisory alarm event is generated when the 'Super' flag is set (enabled by default), and the event recorded in the 'Supervisory Log' (Menu > History Logs > Supervisory Log).

A CO event can be configured, using FireUtils, as an Input Type to activate a System Event, Logic Block or Timer (refer to Table 8-4).

IMPORTANT NOTE:

1. All CO devices, and accompanying wiring, must be installed in compliance with
   - NFPA 72, National Fire Alarm and Signaling Handbook, Section 17.12
   - All applicable state and local codes, and
   - Meet any special requirements of the local Authority Having Jurisdiction (AHJ).
2. The CO gas-sensing element of system connected CO device is a limited-life component. The CO device must, therefore, be electrically supervised by the panel (UL Standard 2034) and generate a Trouble Signal if the detector has reached its End-of-Life, or the sensor has been removed or has failed.
3. UL 2034 requires the Trouble Signal generated by the CO device to be annunciated at the panel to which the detector is connected.

11.10 Waterflow Monitoring

A water flow detector is an electro-mechanical device designed to send an alarm to the fire alarm panel when a continuous flow of water occurs through the fire sprinkler system's piping from an activated sprinkler head or leak in the system. The alarm is triggered when the waterflow reaches a preset rate, for example 10 gallons per minute, but only after a configurable delay or retard period which ensures that the water flow is constant. The delay minimizes the risk of false alarms occurring through sudden changes in water pressure (e.g., water hammer, trapped air) in the sprinkler system. The flow switch will reset when the flow decreases below a preset value (e.g., 4 gallons or less per minute).

When a waterflow alarm occurs, the waterflow LED on the F220's front panel will turn ON and a System Event, identifying the source of the event, will be created. By default, latching the waterflow alarm and activating the AUX relay (see Section 11.5) are enabled in FireUtils. The waterflow alarm can also be mapped to any of the Output Types listed in Table 8-2.

NOTE:

The 'Latched' tick box in FireUtils is enabled by default as a waterflow detector can be reset if the flow drops below a preset value,

11.11 Door Holder Disable

All Door Holder relays are de-energized when the 'Door Holder Disable' function is active.

The Door Holder Disable function is part of the User Menu (User Menu>Disablement Menu>Disable Door Holder Activation, see Section 10.1.3). In the 'Disablement Menu', select option 3, and push the 'Disable' pushbutton located on the front panel. This push button has a toggle function; alternate presses of 'Disable' will either enable or disable the Door Holder relays. When the door holders are disabled, the 'Disabled List' LED will be ON.

NOTE:

With the exception of Class D circuits (i.e., fail safe operation), for standards compliance the door holder output must be fitted with a monitoring device.

11.12 Device and Zone Disablement & Re-enablement

Refer to section 10.1: User Menu - Disablement menu (Menu option 1)

11.13 Buzzer (Internal Sounder)

The Buzzer is activated when any alarm or trouble condition is active. The Buzzer will sound with the following cadences:

ALARM: Rapid ON / OFF

TROUBLE: ON continuously

Pressing the 'Silence Buzzer' switch will silence the buzzer. It will also be silenced with events that are acknowledged (e.g., Alarm and PAS) using the 'ACK' switch. The buzzer, however, will re-sound if a new Alarm or Trouble condition is detected. If the Buzzer is still silenced 4 hours after an Alarm or 24 hours after a Trouble, it is automatically reactivated.

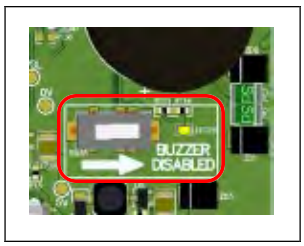
The 'Silence Buzzer' LED will blink if the buzzer has been silenced in one or more panels in a network, and ON, if the buzzer has been silenced on all scoped panels.

Terminals are provided on the Keyboard-Display for the connection of an external sounder see Section 11.24.

NOTE:

1. 'Buzzer on Trouble' can be globally enabled or disabled in FireUtils' Network Editor.
2. The text on 'Buzzer on Trouble' (Network Editor, Panel Editor) and 'Buzzer on Pre-Alarm' (Panel Editor) will be highlighted in red as an indication of a potential non-compliance issue when they are disabled (unticked). See section 2.2.7.1Trouble Events

11.14 Buzzer Disable

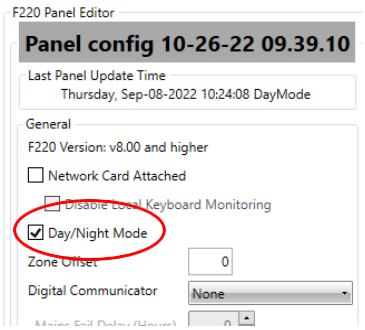
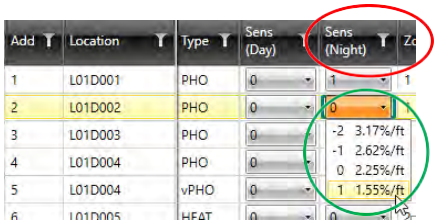


A 'Buzzer Disable' switch is located on the rear of the Keyboard-Display PCB. Placing the switch in the disabled position will turn on the associated LED on the board, and cause a message 'Local Buzzer Disabled' to flash periodically at the bottom of the display

11.15 Day/Night Mode

Day/Night Mode is a feature that, when initiated, allows detectors to have two sensitivity levels; one for use during the day and the other at night (Refer to Sensitivity Tables Table 14-1). When Night Mode is selected, the panel's night sensitivities are utilized instead of the standard (Day)

sensitivity levels. This feature allows the F220 to operate with enhanced smoke or heat sensitivity when the building occupation changes during a 24-hour period. For example, in a factory environment a detector's sensitivity could be increased at 6:00pm when machines are shut down and there are few or no people on site, and returned to the day sensitivity levels at 6:00am before work begins for the day.

Day/Night Mode is enabled in FireUtils Panel Editor by ticking the Day/Night Mode box. Ticking the Day/Night Mode, creates an additional column, labelled 'Sen (Night)', in the SLC Editor.	
Select the appropriate sensitivity level in the dropdown box (green oval). Higher/positive numbers are more sensitive; lower/negative numbers are less sensitive.	

Night Mode can be activated manually (for example, via an input module, external timer or security system) or automatically via a timed logic function. (See example Figure 11-3).

Refer to the FireUtils User Guide for more information.

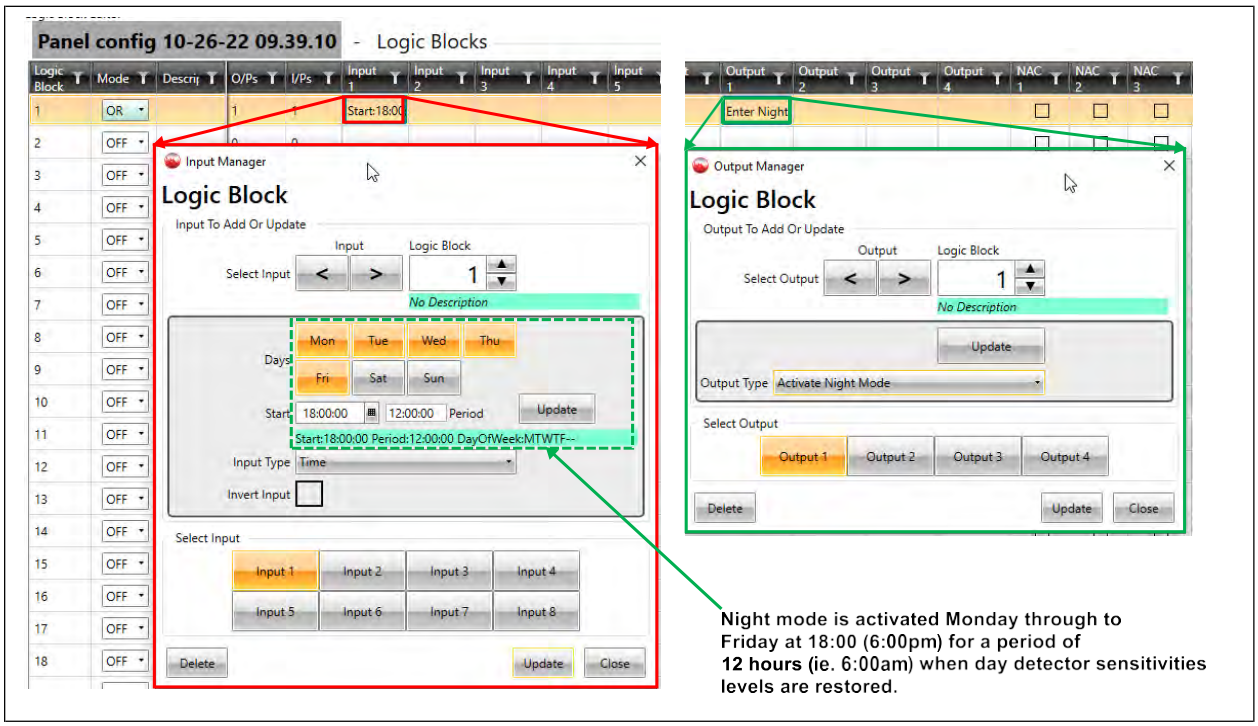


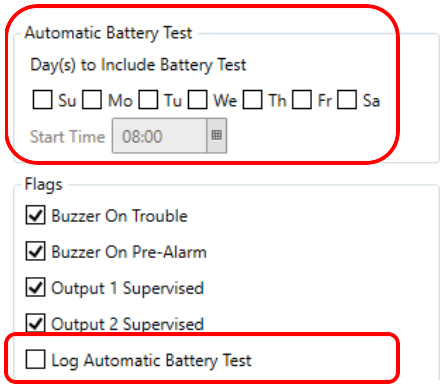
Figure 11-3: Configuring a logic block to automatically activate/deactivate night mode

11.16 Regular Automatic Power Supply Test

At specified times (configured in FireUtils' Panel Editor) the system can be set to automatically execute a battery test.

The charger controller switches the power source so that the system is operating from the battery supply (secondary power source) for a period of 40 minutes. During this time, the batteries will supply the systems quiescent load. The battery voltage must remain above 22.0Vdc otherwise a low battery error will result. If this error occurs, the appropriate Trouble message is displayed on the LCD, and the 'Power Trouble' LED illuminates.

If an 'Alarm' or 'Trouble' condition exists on the F220 before



the commencement of the test, or occurs during the test, the test is aborted.

At the end of the test period the charger controller re-connects the primary power source while at the same time disconnecting the secondary supply.

The battery charger is then turned on and the battery charged to restore its pre-test capacity.

The results of the Automatic Test can be logged, if required, by checking the 'Log Automatic Test' tick box.

11.17 PCB Master Reset Switch

The RESET push-button on the F220 PCB provides a software reset of the processor. This initializes and restarts the microprocessor, clears any latched ‘Fire’ conditions and energizes the ‘Trouble’ relay (‘Normal’ state).

Any troubles generated during the start-up procedure are displayed, and a ‘Trouble’ signal is transmitted by de-energizing the TROUBLE relay.

11.18 F220 Door Interlock

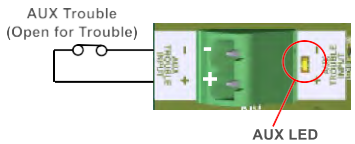
The F220 uses a microswitch to determine whether the panel door is open or closed. A ‘Door Interlock’ Trouble signal is generated on closing the door if certain states are active or switches are ‘Off Normal’.

These states and switches will generate a DOOR INTERLOCK Trouble		
Disable NACs	AC power Lost	SLCs Resetting
Walk Test	Disable Aux	Door Interlock Input
Extension Board Reset	Door Holder Disable	Remote Annunciator Door Open

Table 11-1: Door Interlock Troubles

The interlock messages remain on the display until the door is opened or the condition is cleared.

11.19 AUX Trouble Input



This input can be connected to trouble contacts of external equipment. In the normal condition the input terminals must be shorted, opening the connection will indicate an ‘External Trouble’ on the display and also turn ON the LED adjacent to the AUX TROUBLE INPUT connector.

An Aux Trouble event can be configured in FireUtils to activate or trigger other actions such as the Supervised Outputs 1 and 2.

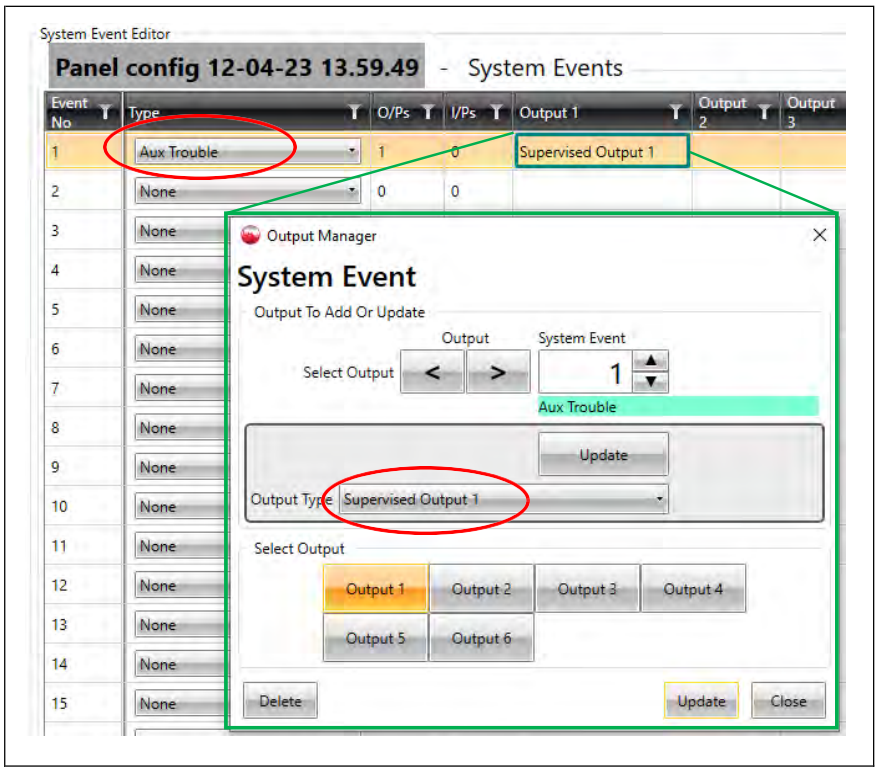


Figure 11-4: Using the Aux Trouble signal to trigger another action

11.20 Event Logs

The F220 maintains a 10000 general event log. All events that occur, including the 'Door Open', are stored in the event log with the time and date associated with the event. Other pertinent data such as SLC number and address for a device 'Trouble' are also stored when applicable.

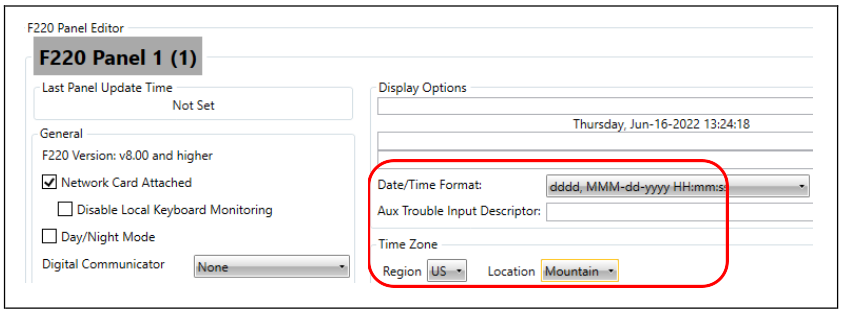
The F220 also has additional independent specialized logs for: Alarms (2000), Pre-alarms (500), Troubles (500), Supervisory (500), Disablements (500), Disablement Activity (500), Active events (500) and System events (500).

For example: an event, such as a pre-alarm, will initially be stored in both the general log and the pre-alarms log. Over time, other events may push that pre-alarm event off the end of the general event log, but it will still be retained in the pre-alarms log (provided there has not been a large number of pre-alarm events).

For further details see Section 10.2

11.21 Event Date and Time

A real-time clock maintains the F220 date and time. The date and time are updated using the 'Time Zone' and 'Date/Time Format' in FireUtils' Panel Editor.



11.22 SLC Driver Boards

Up to four (4) 2-loop SLC Drivers can be connected to the F220, through the Extender Bus (F220 Mainboard: K36 to SLC Driver: K1). Refer to Figure 19-21:

For convenience, panel mounted SLC devices may connect to the SLCs via IDC connectors (Extension board: K4 and K5) mounted adjacent to the screw terminal SLC connectors (Extension board: K2 and K3) on the SLC Driver PCBs.

11.23 Ground Connection and Monitoring

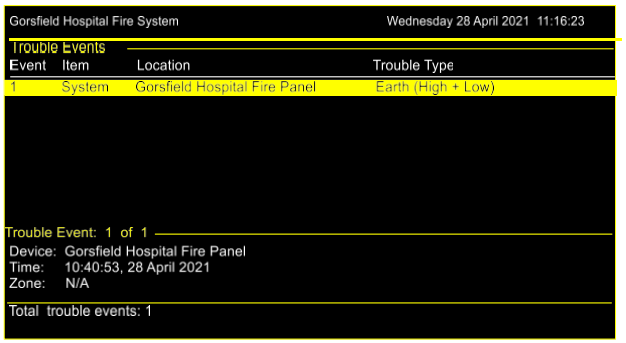
11.23.1 Connections

It is important that a good Ground connection is made to the F220 for transient protection. Screw terminals are provided on the F220Main-UL, F220LCD-UL, F220AP2LDB-UL, and NET2CARD-UL PCBs for this purpose. These Ground terminals should be connected to the panel Ground, which in turn is connected to the AC Power Ground (Refer to Figure 19-21 and Figure 20-46)

11.23.2 Monitoring

The SLCs, NAC circuits, RS485 busses, Aux Power and other external circuits are monitored for possible ground connection. The case, chassis and other metal parts are tied to AC power ground.

If any component of the F220 has a hard or partial short to Ground, Ground leakage detection circuitry on the F220 will detect that condition, transmit a Trouble, write to the LCD display and turn on the Ground Trouble LED on the Mainboard.



The Ground trouble detection circuit also indicates whether the Ground detected is to a high or low level (or both, in the case of transients or communications activity on SLCs)

11.23.3 Ground Trouble Indicator LED

A dedicated Ground/Earth Trouble Indicator is provided on the F220 Mainboard.

Service personnel will find this useful when determining the location of a trouble or troubles that generate a large number of related trouble messages.

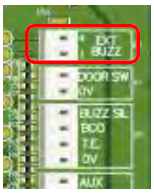
Identify the trouble connection by removing connections one at a time and checking whether the Ground Trouble indicator turns OFF.

NOTE:

If there is more than one connection with a ground fault, these trouble conditions can be identified by reconnecting circuits one at a time and observing if the Ground Trouble Indicator turns ON.

11.24 External Sounder

No connection. If required, terminals are provided (Ext Buzz) on the Keyboard-Display for the connection of an external sounder. 24Vdc is provided at the (+) terminal, and the (-) terminal is pulled down to 0V, through an 820Ω resistor when the buzzer is active.



11.25 Auxiliary Outputs

Eight configurable, unsupervised, open-collector auxiliary outputs are available for internal panel use only. These outputs are available on connector K35 located at the right-hand edge of the F220 Mainboard.

Each output uses a current sink driver rated at 100 mA (8 drivers at 100% duty cycle)

Pin No.	Description
1	+27 Vdc
2	Output 1
3	Output 2
4	Output 3
5	Output 4
6	Output 5
7	Output 6

8	Output 7
9	Output 8
10	0 V

Table 11-2: Auxiliary Output

12. POWER SUPPLIES

12.1 Power Sources

Two power supply sources are provided for the F220 system: the primary power source and the secondary power source (battery).

The primary power source is derived from AC and has sufficient capacity to supply the full Alarm Load, plus the battery charging requirement for the secondary supply.

During normal operation, the F220 is supplied solely by DC from the AC power supply.

In the event of AC power failure, the secondary battery supply is connected by the Charger Controller.

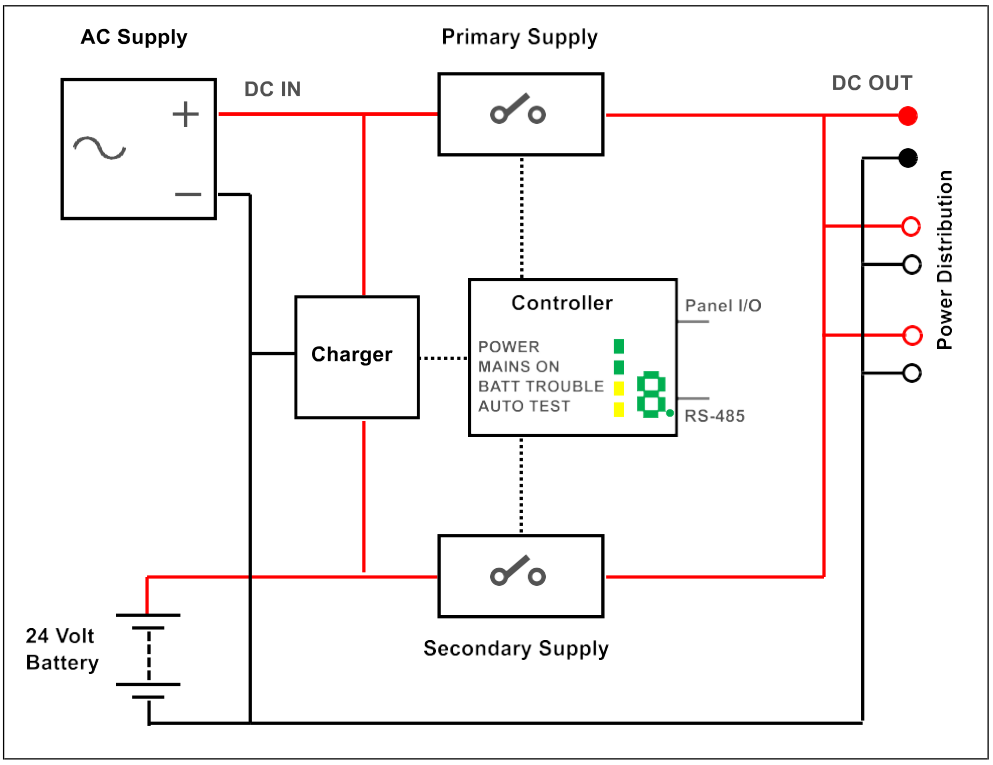


Figure 12-1: F220 Supervised Power Supply Block Diagram

The choice of power supply and battery capacity depends on the system load. This depends on the number and type of optional extras, together with the number and type of external devices powered by the F220 fire alarm panel power supplies.

The battery size calculator assumes the average battery operating temperature is between 60°F (15°C) and 86°F (30°C). If the battery is operating outside this temperature range the battery compensation factor may need to be adjusted.

12.2 Primary Power Source Options

Currently two power supply options are available for the F220 system: 5 Amp and 7 Amp.

Primary Supply Option	System Load	Charging Output Current
5 Amp (Nominal)	< 2.7 Amp	2.1 Amp
	2.7 to 4.5 Amp	0.2 Amp
7 Amp (Nominal)	< 4.7 Amp	2.1 Amp
	4.7 to 6.7 Amp	0.2 Amp

Table 12-1: Primary Power Source Specifications

12.3 Secondary Power Source (Battery) Options

The Secondary Power Source consists of a series-connected pair of 12-volt sealed (or valve-regulated) lead-acid batteries. Refer to Specifications (section 1.3) for information on available batteries.

NOTE:

It is important to select the correct battery capacity to ensure that the F220 functions properly in the absence of AC power, and to satisfy regulatory requirements.

System loading includes, among other considerations, devices on the intelligent addressable SLC, warning devices and devices on the RS-485 bus.

The formula for battery capacity, based on NFPA 72 section 10.6.7.2, is:

Required battery capacity (Amp-hours) = $F_S [(T_S \times I_S) + (T_A \times I_A)]$

Where:

T_S = required standby time (hours)
= 24 hours min (NFPA 72 10.6.7.2.1)

I_S = total system standby current (A)

F_S = safety factor
= 1.2 (NFPA 72 10.6.7.2.1.1)

T_A = required alarm time (hours)
= 5 minutes or 0.0833 hours (NFPA 72 10.6.7.2.1)

I_A = total alarm current (A)

NOTE:

1. The maximum current drawn from the battery by the power supply unit when the Primary Power Source is disconnected is 15 mA.
2. NFPA 72 Local, Proprietary, Central, Auxiliary and Remote Station Fire Alam Systems require 24 hours of standby power followed by 5 minutes in alarm.

12.4 Battery Calculation Example

The following is an example for determining the size of battery required in a F220 based system comprising 50 Smoke Detectors, 20 Manual Pull Stations and 10 Notification Appliances using the formula in Section 12.3

Required Standby Time = 24 Hours

Required Alarm Time = 5 Mins (or 0.0833 Hours)

ITEM	PRODUCT CODE	STANDBY CURRENT PER UNIT (A)		QTY		STANDBY CURRENT PER UNIT (A)	ALARM CURRENT PER UNIT (A)		QTY		SYSTEM ALARM CURRENT (A)
Mainboard	F220MAIN-UL	0.075	X	1	=	0.075	0.135	X	1	=	0.135
Keyboard Display	F220LCD-UL	0.042	X	1	=	0.042	0.08	X	1	=	0.08
Charger Controller	CCONx-UL	0.031	X	1	=	0.031	0.031	X	1	=	0.031
SLC Driver	F220AP2LDB-UL	0.045	X	2	=	0.09	0.045	X	2	=	0.09
Network Card	NET2CARD-UL	0.075	X	1	=	0.075	0.075	X	1	=	0.075
Fiber Module	FIBNET-SM-ST-UL	0.01	X	2	=	0.02	0.01	X	2	=	0.02
Fiber Module	FIBNET-MM-ST-UL	0.012	X	0	=	0	0.012	X	0	=	0
Local Annunciator	F220-FFANN	0.042	X	0	=	0	0.08	X	0	=	0
Network Annunciator	NET2-FFANN	0.042	X	0	=	0	0.08	X	0	=	0
Pull Station	MPS-PI	0.002	X	20	=	0.04	0.003	X	20	=	0.06
Smoke Detector	2351B	0.00035	X	50	=	0.0175	0.002	X	50	=	0.1
Notification Appliance	B200SR	0.001	X	10	=	0.01	0.035	X	10	=	0.35
		TOTAL SYSTEM STANDBY CURRENT I_S (A)				0.4005	TOTAL SYSTEM ALARM CURRENT I_A (A)				0.941

REQUIRED STANDBY TIME Ts (HOURS)		TOTAL SYSTEM STANDBY CURRENT I_S (A)		REQUIRED STANDBY CAPACITY (Ah)
24	X	0.4005	=	9.612
REQUIRED ALARM TIME T_A (HOURS)		**TOTAL SYSTEM ALARM CURRENT I_A (A)**		**REQUIRED ALARM CURRENT (Ah)**
0.0833	X	0.941	=	0.0784

REQUIRED STANDBY CAPACITY		REQUIRED ALARM CAPACITY (Ah)		TOTAL REQUIRED CAPACITY (Ah)
9.612	+	0.0784	=	9.690

SAFETY FACTOR (20%)		REQUIRED BATTERY CAPACITY (Ah)
x 1.2	=	11.628

12.5 Manual Worksheet

ITEM	PRODUCT CODE	STANDBY CURRENT PER UNIT (A)		QTY		STANDBY CURRENT PER UNIT (A)	ALARM CURRENT PER UNIT (A)		QTY		SYSTEM ALARM CURRENT (A)
Mainboard	F220MAIN-UL	0.075	X	1	=	0.075	0.135	X	1	=	0.135
Keyboard Display	F220LCD-UL	0.042	X	1	=	0.042	0.08	X	1	=	0.08
Charger Controller	CCONx-UL	0.031	X	1	=	0.031	0.031	X	1	=	0.031
SLC Driver	F220AP2LDB-UL	0.045	X		=		0.045	X		=	
Network Card	NET2CARD-UL	0.075	X		=		0.075	X		=	
Fiber Module	FIBNET-SM-ST-UL	0.01	X		=		0.01	X		=	
Fiber Module	FIBNET-MM-ST-UL	0.012	X		=		0.012	X		=	
Local Annunciator	F220-FFANN	0.042	X		=		0.08	X		=	
Network Annunciator	NET2-FFANN	0.042	X		=		0.08	X		=	
		TOTAL SYSTEM STANDBY CURRENT I_S (A)					TOTAL SYSTEM ALARM CURRENT I_A (A)				

REQUIRED STANDBY TIME Ts (HOURS)		TOTAL SYSTEM STANDBY CURRENT I_S (A)		REQUIRED STANDBY CAPACITY (Ah)
24	X		=	
REQUIRED ALARM TIME T_A (HOURS)		**TOTAL SYSTEM ALARM CURRENT I_A (A)**		**REQUIRED ALARM CURRENT (Ah)**
0.0833	X		=	

REQUIRED STANDBY CAPACITY (Ah)		REQUIRED ALARM CAPACITY (Ah)		TOTAL REQUIRED CAPACITY (Ah)
	+		=	

SAFETY FACTOR (20%)		REQUIRED BATTERY CAPACITY (Ah)
x 1.2	=	

12.6 Battery Size

Table 12-2 lists example specifications of 3 sealed (valve-regulated) lead acid batteries that are both readily available and suitable for use in Pertronic Fire Panels.

	7Ah	17Ah	24Ah
Nominal Voltage (V)	12	12	12
Rated Capacity (Ah)	7	17	24
Dimensions	W: 2.56 in (65 mm) L: 5.94 in (151 mm) H: 3.70 in (94 mm)	W: 2.99 in (76 mm) L: 7.13 in (181 mm) H: 6.57 in (167 mm)	W: 6.54 in (160 mm) L: 6.89 in (175 mm) H: 4.92 in (125 mm)
Weight	5.3lbs (2.4kg)	13.0 lbs. (5.9 kg)	19.9 lbs. (9.0 kg)
Charging Voltage (V)	13.5 to 13.8 V (Standby), 14.4 to 15.0 V (Cycle)		
Max. Charging Current (A)	2.1 A	4.5 A	7.2 A

NOTE:

1. The choice of power supply and battery capacity depends on the system load. This depends on the number and type of optional extras, together with the number and type of external devices powered by the F220 fire alarm panel power supplies.
2. The maximum battery size for batteries stored in the F220-2S panel is 15Ah. The maximum battery size for batteries stored in the F220-2L panel is 26 Ah.
3. If larger capacity batteries are required and they are unable to fit in the F220 cabinet, those external batteries must be located in a UL 864 enclosure that is “close-nippled” to the F220 cabinet.

Table 12-2: Battery Specification

12.7 Charger Controller

The Charger Controller is mounted on the primary (AC) power supply unit. The Charger Controller implements the following system functions:

1. Monitoring of Primary and Secondary supply status.
2. Connecting and disconnecting Primary and Secondary supplies.
3. Float charge voltage temperature compensation.
4. Automatic Battery Capacity and Battery Presence tests.
5. Displaying trouble status on local display (see Table 12-6: Power Supply Trouble Indication).
6. Operating external trouble.
7. Monitoring and reporting the following parameters to the F220 Mainboard:
    a. Input / Output DC Voltage
    b. Battery Voltage
    c. Charger Voltage
    d. Float Voltage
    e. Temperature
    f. Trouble Status
    g. Charger Current

h. Firmware Version

The Charger Controller must be correctly configured to power an F220 fire alarm panel. This unit has two operating modes: Panel mode, for powering a fire alarm panel; and Standalone mode, for use as a standalone battery charger and power supply.

NOTE: The standalone option is not available at present. Refer to section 12.7.4 for configuration information.

In Panel mode, the Charger Controller communicates with the F220 Mainboard over the Internal High-Speed RS-485 Bus (section 5.2).

12.7.1 Temperature, Voltage and Current Measurements

The following table shows the various power supply parameters that are measured and their sampling interval.

Parameter	Update Interval
Charge Current	Measured every 100ms. Updates the panel via the RS-485 bus with the averaged value every second.
Output Current	Measured every second. Updates the panel via the RS-485 bus with the averaged value every minute.
Battery Voltage	Measured and updated every minute after battery presence test.
Temperature	Measured every 10 minutes. Updates the panel via the RS-485 bus with the averaged value every hour.
AC power/Charge/Output Voltage	Measured every 100ms
Float Voltage	Calculated every 100ms based on the temperature measurement

Table 12-3: Temperature, current and voltage measurement intervals

12.7.2 Switch SW1 Operation

Switch SW1 (Figure 19-18) operates in 2 modes.

- **Historic Trouble Mode**.
  This mode is initiated when the switch is pressed for 1 to 2 seconds. The Charger Controller will cycle through all the historic trouble states since power-up and display it on the 7-segment display (refer to Table 12-6). In this mode the decimal point on the display will flash rapidly (200ms On/Off). After 30 seconds the 7-segment display will come out of this mode. If there has been no historic troubles since power-up, this mode will last for 5 seconds.

- **Auto-test Mode**.
  Auto-test is only valid in the Standalone mode (Do not use this option with panel mounted Charger Controllers). In this mode, initiated when the switch is pressed for 3 to 5 seconds, the charger will either start or stop the 24-hour test. The decimal point on the 7-segment display will flash normally (500ms On/Off)

12.7.3 Charging Modes

The Charger Controller can operate in three charging modes.

When the charge current

- Is below 500mA for more than 60 seconds, the charger controller enters the 'Normal Charge' mode.
- Is greater than 1A for more than 60 seconds, the charger controller enters the 'Boost Charge' mode. It leaves, or exits, this mode when the charge current drops below 500mA for more than 60 seconds.

Normal Charge Mode	Boost Charge Mode	
	Entering threshold	Exiting threshold
Charge current < 500mA, for > 60 secs	Charge current > 1A, for > 60 secs	Charge current < 500mA, for > 60 secs

Table 12-4: Normal and Boost charging modes

12.7.3.1 Normal Charging Mode

In this mode:

- The float voltage is temperature compensated. Temperature readings are gathered from the sensor every 10 minutes.
- The regular 'Battery Presence' check is performed 15 seconds after bootup, then once every 60 seconds during normal operation
- The 'Battery Capacity' check (or '24-hour test') is initiated by the Panel (see section 12.7.4).
- Actual battery voltage will be reported to the Panel.
- The decimal point on the Charger Controller 7 segment display will flash once a second.

12.7.3.2 Boost Charge Mode

In this mode:

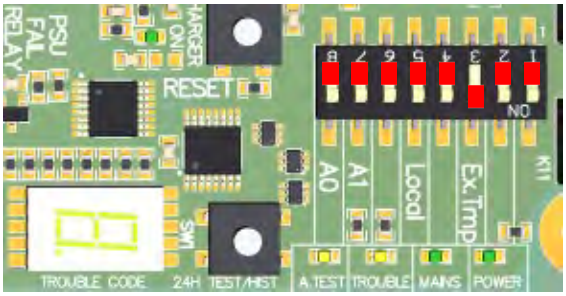
- The float voltage is boosted to its maximum value (approximately 28 volts). There is no temperature compensation.
- The Charger Controller can operate in this mode for a maximum of 48 hours.
- The regular 'Battery Presence' check is suspended until the charger comes out of the 'Boost Charge' mode. However, if the battery is disconnected, the charger controller will automatically exit Boost Charge Mode due to low current draw.

- The ‘Battery Capacity’ check. To ensure that the batteries are charged for the entire ‘Boost Charge’ duration (max 48 hours), the controller will ignore all the ‘Battery Capacity’ checks.
- After 48 hours, the charger controller will exit the ‘Boost Charge’ mode, even if the charge current is greater than the respective threshold limits. It must return to the ‘Normal Charge' mode before it can enter the ‘Boost Charge’ mode again.
- Battery voltage will be reported as equal to the charger voltage.
- The decimal point on the Charger Controller 7 segment display will be on continuously.

12.7.3.3 Trickle Charge Mode

When the system current exceeds a particular threshold (refer to Table 12-1), the Charger Controller enters the ‘Trickle Charge’ mode. It exits this mode, and returns to the ‘Normal Charging’ mode, when the system current consistently drops below the threshold listed in Table 12-1 for over 60 seconds.

12.7.4 Charger Controller Option Settings and Indicators



A DIP switch (SW2) is provided for configuring Charger Controller options.

SW2-1,	Not Used	Off	
SW2-2,	Not Used	Off	
SW2-3,	Ex.Tmp	On	To enable the external temperature sensor
SW2-4,	-	Off	
SW2-5,	Local	Off	Panel mode, or
		On	Standalone mode (do not use)
SW2-6,	-	Off	
SW2-7,	A1	Off	
SW2-8,	A0	Off	

Figure 12-2: Charger Controller Settings and Indicators

Indicator	LED Details
A.TEST	Turns ON when ‘Battery Capacity’ test is operating
TROUBLE	Turns ON when a trouble condition is present
AC POWER	ON when AC power is present
POWER	ON if Primary or Secondary power is available
TROUBLE CODE	7-segment display. Refer to Table 12-6 for details.

Table 12-5: Charger controller indicator

12.7.5 External Temperature Sensor (K16)

An external temperature sensor is connected to the Charger Controller and is supplied as standard with F220 systems.

The wiring provided will allow the sensor to be restrained against the batteries in the bottom of the cabinet—this ensures accurate representation of the battery temperature.

The Charger Controller is also fitted with an on-board temperature sensor. However, in almost all cases it is preferable to enable the external temperature sensor.

NOTE:

If the temperature sensor is disconnected from the controller, a Trouble will be generated. Either reconnect the temperature sensor or set the Ex.Tmp DIP switch to OFF to use the alternative on-board sensor.

12.7.6 PSU Fail Relay (K18)

This relay provides a set of relay contacts that can be used to indicate to external equipment that the PSU has failed

The relay is energized in the Normal state (**NOTE**: The PSU Fail Relay LED is ON) and released to indicate that the PSU has failed (**NOTE**: The PSU Fail Relay LED is OFF)

Rating: 2A, 30 VDC, resistive.

NOTE:

1. In Panel mode, the PSU Fail Relay will only operate (i.e., de-energize) if the Charger Controller's DCOUT voltage drops below 19V and is cleared when the output voltage is above 20V.
2. The PSU Fail Relay is not intended for field wiring. For any connection to a device outside the F220 cabinet, the device must be in the same room, within 20 feet of the panel and connecting cable enclosed in conduit.

12.7.7 Power Supply Trouble Indication

If a power supply trouble occurs, the Power Trouble LED turns ON immediately. For all troubles, a 'Trouble' condition is also generated by the 'Trouble' relay and remains active until the trouble is rectified. The cause of the Trouble is also shown on the Keyboard-Display.

Possible causes for power supply troubles are shown in the following table:

Trouble	LCD Message (Keyboard-Display)	Comments	Controller Code (Local 7 segment display)	Trouble Relay De-energized
AC Power Lost	AC power Supply Trouble	Occurs when input DC supply is less than 19.8 V. Clears when supply voltage is greater than 20.8 V and is stable for at least 1 second.	'1'	N
Supply Low Voltage	Charger Low	Occurs when input DC supply falls below 25.2 V. Clears when supply voltage is 26.2 V or higher continuously for at least 1 second.	'2'	N
Supply High Voltage	Charger High	Occurs when input DC supply is greater than 29.5 V. Clears when supply voltage falls below 28.5 V.	'3'	N
Battery Missing	Battery Disconnected	Occurs when battery connected is less than 19 V or battery voltage falls below 19 V. Cleared when battery voltage is equal to 20V or higher. The first battery presence check is performed 15 seconds after boot-up (giving the user sufficient time to connect the batteries) and subsequent battery presence checks are undertaken once every minute. Battery missing trouble will be cleared within 10 seconds once the battery is connected or the battery voltage is greater than 20 Volts.	'b'	N
Battery Low	Battery Low	In normal operation, a battery low trouble occurs when the mains supply is missing, and battery voltage falls below 22V. The trouble is cleared when the battery voltage is 23 V or higher. During an automatic test, a battery low trouble will be indicated when the voltage drops below a threshold range of 19V and 0.9 x float voltage. When the battery voltage goes below 0.9 x float voltage, the auto test will be aborted, and the battery low trouble will be latched.	'L'	N
Charger Trouble	Charger Trouble	In normal conditions, this trouble occurs when charge voltage is below 24v or greater than 30.5V with mains supply present. The charger trouble clears when charge voltage is greater than (0.9 x float voltage) + 1V. In boost charge mode, this trouble is indicated only when the charge voltage is greater than 30.5volts. This is because, if the batteries are accepting	'5'	N

Trouble	LCD Message (Keyboard-Display)	Comments	Controller Code (Local 7 segment display)	Trouble Relay De-energized
		>250mA (boost charge scenario) the charger cannot be low.		
External Temperature Sensor Missing	Temp Sensor	Occurs when there is a read error from external/internal temperature sensor. It is not limited to only the external temperature sensor. It can also occur when the external temperature is missing or not connected	‘6’	N
DC Out Indication		Occurs when output DC voltage is below 24.4 V or higher than 29.0 V. This state will only be indicated on the PSU’s 7-segment display. It is not a Trouble condition and will not activate the Trouble relay. Clears when output DC voltage is in the range 24.7 V – 28.7 V Will not occur during automatic ‘Battery Capacity’ test. Will not occur if the AC power is missing.	‘7’	N
Battery Charger Current High	Current High	Except for the threshold values across different product variants the logic to set/clear the trouble remains the same. For 5A/7A variant: Charger high threshold is set to 3.5A	‘8’	N
Charger Comms Lost	Comms Lost	Occurs when the communications between the panel and the charger board is lost for 10 seconds.	‘9’	N
Charger Program CRC failure	Program CRC	Occurs when computed CRC value is not the same as the value stored in flash memory.	‘C’	N
Load Shutdown		Output DC voltage is cut off when AC power supply is missing, and battery voltage falls below 13.5V. Clears when AC power supply is turned on or battery voltage is 23V or higher.	‘F’	N
Auto Test		Not a Trouble. Indicates that the Charger Controller is running the Automatic Battery Capacity test. Test runs for 40 minutes. Test will automatically abort of • Mains is disconnected (i.e., no mains) • Battery is disconnected (i.e., no battery) • Battery discharges to (0.9*float voltage) (i.e., it has reached the battery low threshold)	‘A’	N/A
Watchdog Reset		Occurs when the most recent reset of Charger Controller was due to watchdog failure	‘d’	N

Trouble	LCD Message (Keyboard-Display)	Comments	Controller Code (Local 7 segment display)	Trouble Relay De-energized
Trickle Charge		Only indicated on 7-segment display and not present on 485 data output. PSU enters trickle charge mode when system current exceeds the thresholds list in Table 12-4.The PSU switches back into normal charging mode when system current falls below the thresholds listed in Table 12-4.	't'	N/A

Table 12-6: Power Supply Trouble Indication

NOTE:

1. The decimal point of the 7-segment display will toggle every half second (500ms On, 500ms Off) in Normal Charge mode and be on, steadily, when the charger is in 'Boost Charge' mode.
2. Every 100mS the charge current is measured. However, on the RS-485 interface reporting to the panel, the charge current will be updated every second by averaging the previous 10 measured values.

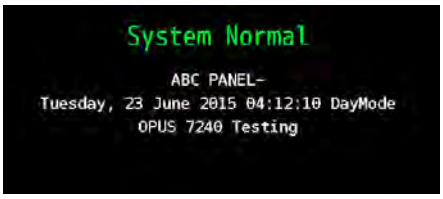
13. F220 KEYBOARD DISPLAY MESSAGES

The LCD messages are of five main types - General Information, General Trouble Warning, Device Alarm Warning, Start-Up dialogue, and the User Menu dialogue.

The sections below outline the LCD messages that may appear on the F220, either in the Current Event queue or from the Historical Event list as viewed from the User Menu.

13.1 General Information Messages

Normal operation - no ‘Alarms’, ‘Troubles’, or other messages:



The following messages are informative only and are shown in the current event queue along with Trouble events:

Message	Description
Walk Test ON Door Holder Disable ON	The specified function has been activated. All of these conditions are common across all Remote Annunciators.
Annunciator n Door	The door is open on the specified annunciator panel. This will generate a Door Interlock Trouble if the main panel door is closed.
Input Active	An SLC device configured as input-only (no Fire Relay flag set) has been activated. See Section 2.2.11

Table 13-1: LCD General Information Messages

13.2 Troubles

These are troubles detected on the F220 panel, other than those generated by SLC devices.

Message	Description
SLC nn open	An open-circuit condition exists on the specified SLC. Note that this may in fact be due to a line short between SLC isolator devices (Class A) which have activated to cause the SLC to open.
SLC nn short	A short-circuit condition exists on the specified SLC. This will be generated where the short occurs (on a Class A circuit) between the SLC driver and the first isolator device on the SLC.
SLCs x+y FAILED!(Timeout)	The specified SLCs are offline, as the SLC driver controlling them has failed to respond to commands sent by the Controller.

Message	Description
NAC n Trouble	The specified NAC circuit is open or short-circuit.
OUTPUT n Monitor Trouble	OUTPUT n relay is open or short-circuited.
System Panel Ground Trouble (msg)	The Ground monitor circuit has detected a connection to AC power Ground (see Section 11.23: Ground Connection and Monitoring). The value of “msg” is one of ‘high’, ‘low’ or ‘high +low’
Program ROM CRC Check Failed	An error in the Program ROM area has been detected. This may indicate that panel operation will be unreliable.
Config ROM CRC Check Failed	An error in the Configuration ROM has been detected. The second line indicates the affected area. This may indicate that panel operation will be unreliable but limited to the affected data only.
NAND Trouble	An error in one of the two copies of the boot flash memory has been detected. The panel will still boot on one good copy.
Aux Trouble Active	The AUX TROUBLE input on the F220 Mainboard is open.
Door Interlock Trouble	The main panel door has been closed with certain panel functions active (see Section 11.18: F220 Door Interlock).
{All Power Supply Trouble indications}	See Section 12.7.7 Power Supply Trouble Indication
Annunciator n Timeout	An Annunciator has not responded to commands sent by the F220 Mainboard.
Annunciator n Extra	There are more devices detected on the RS-485 bus than are programmed into the configuration.
Annunciator n Disp Trouble	There is a trouble in the Annunciator display board hardware.
Annunciator n Interlock	The interlock circuitry on the relevant Annunciator is off-normal.
Annunciator n Ext Trouble	The External Trouble input on the Annunciator is active
Annunciator n Trouble	A trouble condition other than the above has occurred on the Annunciator
Main LCD Timeout	The primary LCD display board is not responding.
[COM PORT TIMEOUT] RS-485 FAILURE !!	Shown on various Remote Annunciators when there are lost communications from the Mainboard. These messages are generated on-board by the display hardware, as they are not receiving data from the panel.

Table 13-2: F220 Trouble Messages

13.3 SLC Device Events/Messages

Message	Description
ALARM	Applies to an SLC input device: detector, Manual Pull station, or input module when the device activates. The alarm may be one of the following: Smoke — An intelligent addressable smoke detector activated input. Pull station — Either an MPS-type device or a Manual Pull station activation from a SLC circuit. Heat — Thermal detector.
Trouble	Generally, Troubles can be decoded to one of the causes listed below, however for some events this is not possible.
Pre-Alarm	Applies to detectors only. The analog value being returned is approaching the 'Alarm' level.
Duplicate Device	Two SLC devices on the same SLC have been assigned the same address.
Missing	A SLC device that has been configured in the system memory is not present on the SLC.
Extra Device	The SLC driver board has detected one or more of: • Device(s) that don't exist in the panel configuration. • Device(s) with SLC address 000 (or 00 for modules) All detectors set to address 000 will have their LEDs turned on as though in alarm. Modules set to address 00 will not have their LEDs turned on.
Maintenance Alarm	The SLC driver's internal drift compensation has reached its threshold limit - the detector requires cleaning.
Type Mismatch	A SLC device does not match with the configuration assigned to it in the system memory.
Self-Test Fail	A SLC device has failed its regular auto test.
DIS	A SLC device has been disabled through the DISABLE push-button on the front panel display or the User Menu.
Alarm Reset	A SLC device that was in 'Alarm' has been 'Reset' through the RESET push-button on the front panel display.
Low Trouble	Generated by sensing chamber troubles in System Sensor detectors
High Trouble	Generated by sensing chamber troubles in System Sensor detectors - this can mean that the chamber is too dirty for the detector's internal drift compensation algorithm to operate.
Short Circuit	A supervised relay has a short-circuit.
Open Circuit	Generated by an open-circuit condition on either supervised SLC relays or modules.
Supply Trouble	There is either a 'Trouble' in the detector supply, or the external power supply on a Pertronic SLC Relay board is out of range.

Message	Description
Isolator Active	The on-board isolator relay on a SLC Relay has activated due to a short-circuit on the SLC.
AVF Stage 1	A SLC device with AVF enabled has been triggered once and is in the AVF delay period awaiting a second trigger.
Input Active	A SLC device programmed with no output flags (i.e., one not generating an 'Alarm' event) has activated.
Comms Error	Indicates that there is a SLC device present at the location, but the data has been corrupted and cannot be interpreted.
Manual OFF	A SW3 device has been switched off.
Manual ON	A SW3 device has been switched on.

Table 13-3: Messages Generated by SLC-Connected Intelligent Addressable Devices

13.4 Network Messages

These are messages reported to the F220 from a connected network and are logged by the F220. Each message will be prefixed by a network node number apart from the "SYSTEM OFFLINE" message.

Message	Description
SYSTEM OFFLINE Network Service Mode	The network the F220 is connected to has been put into "Service Mode". Network Service Mode is used for updating configurations for all nodes and all panels across the network from a single location. In network service mode, the network does not transfer normal operational information from panels so therefore no normal network functions are available. Each panel in the network will remain in service and operate independently, but the panels will not be able to send fire indications or trouble indications over the network. F220 panels and mimics treat Network Service Mode as a System Event. Normal keyboard and display functions remain available (by pressing the keyboard buttons such as "ok" or "menu").
Node X Node Config Mismatch Trouble	The connected network card configuration does not match that stored by the other network cards. This trouble will be reported identically on all panels within the scope of the connected network card. The trouble location will identify the network card (node) with the configuration mismatch.
Node X Panel Config Mismatch Trouble	The panel configuration does not match that stored by the connected network card. This trouble will be reported identically on all panels within the scope of the connected network card. The trouble location will identify the panel with the configuration mismatch.
Node X Timeout Trouble	Network Card X is not responding
Node X Earth Trouble	Network Card X has detected an earth or ground trouble condition.

Message	Description
Node X Net In Timeout Trouble	Network Card X has reported the loss of network data at the IN connection
Node X Net Out Timeout Trouble	Network Card X has reported the loss of network data at the OUT connection
Node X Panel Comms Errors	Network Card X has communications errors with its connected panel
Node X UBoot CRC Trouble	Network Card X has detected a critical file which has been corrupted
Node X Aux Trouble I/P Trouble	Network Card X has an active Aux Trouble input
Node X Timezone Mismatch Trouble	There are differences between panels configured time zone settings
Node X Net Disabled Trouble	Network Card X is connected to a panel which has not had networking enabled in its configuration

Table 13-4: F220 Panel Network Messages

14. DETECTORS AND MODULES

14.1 Alarm Sensitivity Levels

For each detector, the SLC driver has an ‘Alarm Level’ (AL), which represents the PW4 level that must be reached before the detector is recognized as being in Alarm. Each ‘AL’ corresponds to a sensitivity level stored in both the F220 Panel and SLC Driver. The SLC Driver can therefore use any value to set as an ‘Alarm Level’.

Pertronic uses this feature to provide a number of sensitivity levels as defined in Table 14-1: Detector Sensitivity Table. The range of sensitivity levels is used in other applications; ‘Virtual Detectors’ (Section 4.4), Day/Night mode (Section 11.15) and ‘Pre-Alarm' (Section 14.2).

The Photo, Ion, and Heat detectors have PW4 levels that vary as the sensor level varies. Others have fixed ‘Alarm’ levels specified by their manufacturer. (Refer to Table 14-1: Detector Sensitivity Table)

.

14.2 Pre-Alarm Sensitivity Levels

Each Detector also has a Pre-Alarm Level. For the Ion, Heat, and Photo detectors, this is calculated as 67% of the difference between the nominal ‘Clean-Air’ value and the ‘Alarm Level’.

For the fixed ‘Alarm’ level detectors, the Pre-Alarm is calculated as the ‘Alarm Level’ Number minus one. (i.e., if the Alarm Level is 8, then the Pre-Alarm level is Alarm Level 7).

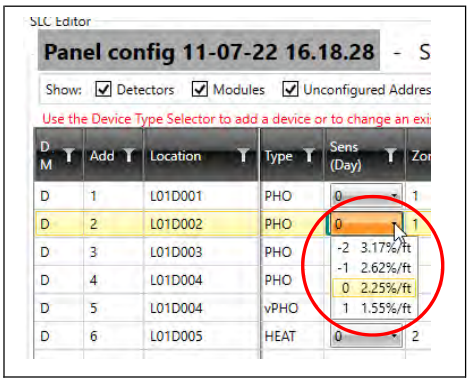
There is no Pre-Alarm level for Alarm Level 1 as there is no higher sensitivity.

14.3 Selecting a Detector’s Sensitivity Level using FireUtils

In the SLC Editor of FireUtils, click on the arrow in the drop-down box (red circle) and select the appropriate sensitivity level.

Higher/positive numbers are more sensitive; lower/negative numbers are less sensitive.

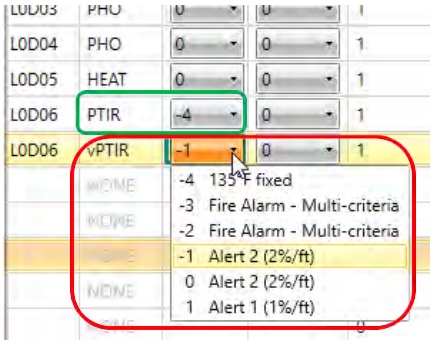
The default is level 0.



14.4 Configuring Multi-Criteria Detectors using FireUtils

With multi-criteria detectors such as the 2351TIR which is a combination heat and smoke detector, select the detector from the Device Type Selector and the appropriate sensitivity (green square) from the drop-down sensitivity (day) list. In this example, 135 deg F for the heat detector.

Now in the row immediately below, select Virtual Detector from the Device Type Selector (refer to Section 4.4.2) and the appropriate sensitivity level (red square).



NOTE:

1. '135ºF' is a fixed heat sensitivity, 'Fire Alarm–Multi-criteria' is a preset combination of heat and smoke sensitivities and 'Alert' has 1 fixed smoke sensitivity.
2. The 'parent' or base detector should always be the least sensitive (i.e., -4 in the figure above) and the 'virtual' have a higher sensitivity level (i.e., +1 in the figure above)

14.5 Maintenance Level

Smoke detectors, whether Drift Compensated or not, can arrive at a point where the chamber becomes so dirty that there is a significant increase in detector sensitivity. Before this state is reached, a 'Maintenance Alarm' event is generated.

Detectors with internal Drift Compensation generate a maintenance signal internally, but for Photo, Ion, and Beam detectors, the SLC Driver tracks the PW4 value to determine if it has drifted from the normal operating range.

Smoke detector PW4 values are sampled and averaged over time to calculate the 'Clean-Air' (CA) value and determine whether a 'Maintenance Alarm' exists. The CA value represents the long-term baseline detector level under 'Normal' conditions. The CA level slowly tracks the PW4 value of the detector, so is immune to any transient conditions affecting the device. CA is averaged and adjusted every 24 hours.

At SLC Driver start-up, or after a missing detector condition has been restored, the CA value assumes the value of PW4 after the detector has reached a stable level - 60s after detector power-up.

High Sensitivity (e.g., HPHO), multi-criteria (e.g., PTIR) detectors have internal drift compensation. This provides a steady PW4 level, even when the detector is nearing its compensation limit. When the PW4 value exceeds its drift limit, the detector abruptly changes its PW4 value to a predetermined level to indicate that maintenance is required. This method has the disadvantage that the service agent does not know how dirty a detector is by looking at its PW value. There is no method for predicting when a detector will fail.

Heat Detectors do not have a maintenance level, as their PW4 can drift beyond the 'Normal' range due to normal ambient temperature fluctuations.

14.6 Low Trouble Signal

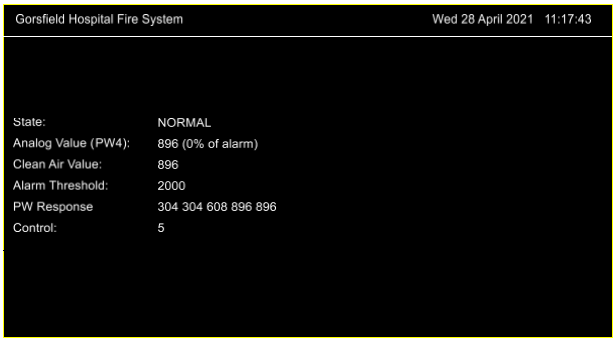
PW4 may drift below the 'Normal' operating range raising a 'Low Trouble' when it drops below 10% of the 'Normal' range. This is not a maintenance trouble, as a low PW4 usually signifies a trouble, not a dirty detector.

14.7 Selecting Detectors for Maintenance

Selecting the detectors to clean depends upon several factors:

a. the sensitivity at which a particular detector is configured – the higher the sensitivity, the lower the Alarm level and the sooner and more often the detector must be cleaned.
b. the 'Clean Air' value of the detector as measured by the F220– the higher the CA value, the sooner the detector should be cleaned.
c. the relative 'cleanliness' of the area in which the detector is installed – the 'dirtier' the area, the sooner and more often the detector must be cleaned.

From the F220 User menu select Option 4 (Also see section 10.4)



Analog value (PW4): 896 is the 'live' value returned by the photo detector.

Clean Air Value: 896 is the mean 'Clean-Air' value calculated during the preceding 24-hour period.

Alarm threshold: 2000 is the value which is required to activate the detector into 'Alarm'.

The 'Maintenance' level of a detector with AL=2000 (Sensitivity = 0) is 1328. Refer to: Table 14-1: Detector Sensitivity Table

Sensitivity	AL	CA	Maintenance	Contamination
0	2000	1200	1328	75.8%
-1	2192	1200	1424	64.1%
-2	2496	1200	1568	52.1%

As a general rule, clean all detectors whose 'Clean-Air' value is greater than 1200.

14.8 Detector Sensitivity Table

Table 14-1 provides a guide to the detector sensitivity configured and the actual level required to generate an 'Alarm'.

TYPE	LEVEL	NORMAL	LOW DEFECT	MAINT-ENANCE	PRE-ALARM (for CA = 800)	ALARM		
		PW4 (µs)	PW4 (µs)	PW4 (µs)	PW4 (µs)	PW4 (µs)	Obscuration/ Temperature	
							%/ft	%/m

Photo (2351B)	+1	528 - 976	≤480	≥1168	>1328	≥1600	1.55%/ft	5.01%/m
	0			≥1328	>1600	≥2000	2.25%/ft	7.27%/m
	-1			≥1424	>1728	≥2192	2.62%/ft	8.34%/m
	-2			≥1568	>1936	≥2496	3.17%/ft	10.02%/m
Thermal Fixed (5351B)	+1	832 - 1408 (10 - 35°C)	≤400	none	>1600 (40°C)	≥1888	126°F (52°C)	
	0				>1832 (50°C)	≥2000	133°F (56°C)	
	-1				>2192 (65°C)	≥2448	165°F (74°C)	
	-2				>2464 (75°C)	≥2640	178°F (81°C)	
PTIR Multicriteria (2351TIR)	+1	760 - 840	≤192	240 - 352	N/A	≥1280	1%/ft	3.2%/m
	0				>1280	≥1648	2%/ft	6.4%/m
	-1				>1648	≥1968	2%/ft	6.4%/m
	-2				>1968	≥2400	4%/ft	12.5%/m
	-3				>2400	≥2784	4%/ft	12.5%/m
	-4					≥3200	135°F (57°C)	
HPHO High Sensitivity (7351)	+3	864 - 928	≤192	240 - 688	N/A	≥1280	.02%/ft	0.066%/m
	+2				>1280	≥1440	.03%/ft	0.098%/m
	+1				>1440	≥1728	.05%/ft	0.164%/m
	0				>1728	≥1840	.10%/ft	0.328%/m
	-1				>1840	≥2048	.20%/ft	0.665%/m
	-2				>2046	≥2288	.50%/ft	1.631%/m
	-3				>2288	≥2512	1.0%/ft	3.244%/m
	-4				>2512	≥2640	1.5%/ft	4.838%/m
	-5				>2640	≥2928	2.0%/ft	6.413%/m

Heat

Table 14-1: Detector Sensitivity Table

NOTE:

1. At the lowest sensitivity (-4), the PTIR are Heat only detectors.

14.9 Compatible Initiating Devices

The following is a short list of addressable devices that may be connected to the F220.

14.9.1 Detectors

System Sensor 2351B AA Photoelectric Smoke Detector

System Sensor 2351BR AA Photoelectric with Remote Test

System Sensor 5351B AA Fixed Temperature Heat Detector.

System Sensor 5351RB AA Fixed temperature and Rate-of-Rise Heat Detector.

System Sensor 2351TIR AA PTIR Detector

System Sensor 2351TB AA Photoelectric and Temperature Detector

System Sensor 5351H AA Programmable Temperature Detector

System Sensor 7351 AA High Sensitivity Photoelectric Detector

14.9.2 System Modules

System Sensor M500MAP Single Input Addressable Monitor Module

System Sensor M500X Isolator for SLC Loops

System Sensor M500SAP Single Output Control Module

System Sensor M500RAP Single DPDT Relay Control Module

System Sensor M501MAP Miniature Single Input Monitor

System Sensor M502MAP Zone Interface Module for Intelligent Addressable SLC

System Sensor M500DMAP Dual Monitor Module

14.9.3 Vesda Air Sampling Detectors

The F220 is compatible with all Listed Vesda Air Sampling Detectors by monitoring them using one of the addressable input modules listed above. The Vesda unit is to be installed using the companion power supply to which it has been evaluated for compatibility.

15. CONNECTING ALARM & TROUBLE SIGNALING EQUIPMENT

The RS232 interface on the main board (or, with a Net2 Network, on the Net2Card) is used for both controlling and transmitting alarm, trouble and other information to a wireless digital communicator, such as the AES 7707P-88M Fire Subscriber or a Napco Starlink Max Communicator. The digital communicator provides communication to the Central Station.

Regulations require that the communicator must be located outside the F220 cabinet, but in the same room and within 20 feet of the panel. The RS232 cable and any power cable between the F220 Cabinet and the digital communicator must also be enclosed in a conduit. For a Starlink Max communicator, the RS232 cable must be less than 6 feet (1.8m) in length.

15.1 RS232 RJ11Connector

Signal Name	Signal	Panel/ Net2Card Signal Direction	F220 Panel RJ11 Pins (K16)	Net2Card RJ11 Pins (K5)	AES RF Subscriber RJ12 Pins (J7)	Starlink Max RJ12 Pins (J3)
Transmit Data	TxD	Out	2	2	3	3
Receive Data	RxD	In	3	3	2	4
Ground	GND	-	1	1	1	6

Table 15-1: RS232 Header Pinout

15.2 Contact ID Codes

The Contact-ID protocol, used to communicate between the panel via either communicator, and the Central Station, is listed in Table 15-2.

Code	Description
110	Uncategorized Fire Alarm
111	Smoke Alarm
113	Waterflow Alarm
114	Heat Alarm
115	MCP Alarm
118	Prealarm
162	CO supervisory
200	Supervisory Alarm
300	Generic Panel Troubles
301	AC Lost
302	Battery Low
303	Config CRC Trouble (Internal RAM-based CRC)
304	Program CRC Trouble

309	Battery Test Failure
310	Ground Trouble
311	Battery Fail/Disconnect
312	Charger Overcurrent
321	NAC 1 Trouble
322	NAC 2 Trouble
323	Monitored Fire Relay Trouble
324	Monitored Trouble Relay Trouble
326	NAC 3 Trouble
327	NAC 4 Trouble
330	System Peripheral Trouble (Loop Driver, Network, Amp, Interlock, Aux)
331	Loop Open
331	Loop Short
380	Other loop device Trouble
385	Smoke Detector High Trouble
386	Smoke Detector Low Trouble
389	Detector self-test failure
393	Maintenance Alert
523	Fire Relay Isolate
524	Trouble Relay Isolate
570	Zone Isolate
604	Test Alarm
607	Enter Walk Test
621	Erase History
625	Clock Adjust
626	Time not set
627	Service Mode Entry
628	Service Mode Exit

Table 15-2: List of Contact ID Protocol Codes

15.3 AES 7707P-88M Fire Subscriber

The AES 7707P-88M is an “always on”, UL-certified device capable of wirelessly sending alarm, trouble, supervisory signals and other reports over a 450-470 MHz private mesh network to an alarm processing center or central station, and/or an IP connection over the Internet

15.3.1 AES 7707P-88M Specifications

Ports	
RS232 (J7)	Connects AES 7707P to F220’s Isolated RS232 Port (K16). Message, contact code communication. Cable in the same room, within 20 feet, inside conduit.

Ethernet	For message communication and configuration
USB	For software upgrade
Outputs and Reporting	
Central Station	Contact ID, SIA, Pulse 4/2 and Modem IIe/IIIa Internet
Relay Output	Trouble, Form C, 24V/1A resistive, unsupervised, fail secure
Reporting	• AC failure • Low battery • Zone Input Ground Trouble • Antenna cut • Battery charger failure
Visual Indicators	• 2x20 alphanumeric backlit LCD • Trouble LED • Power LED Internally mounted status LED indicators • Alarm (different blink patterns for different alarm conditions. Refer to 7707 Instruction Manual)) • Trouble (Blinking = trouble condition) • Tx (On= radio transmitting) • Rx (On=radio receiving RF signal) • WA (Waiting Ack from last transmission)
Radio Specifications	
Frequency range	450-470 MHz
Transmit Power	2 Watts
Antenna	2.5 dB tamper resistant antenna, mounted on enclosure. Optional remote mounting available.
Environmental Specifications	
Operating Temperature	32°F to 120°F (0°C to 49°C)
Relative Humidity	0 to 93% RHC, non-condensing
Mechanical Specifications	
Dimensions	13.0H x 8.5W x 4.5D inches
Weight without battery	5.8 lbs. without battery, 13lbs with 10Ah battery
Enclosure material	Steel, with red painted finish
Power Requirements	
AC Source	Class 2 16.5V AC nominal output, 1.9A max
DC Source	24V DC regulated
Rechargeable Battery	10 – 12Ah sealed lead acid gel cell
Current Consumption	
Fully charged battery	Standby 200 mA, 1.2 A Transmitting
Battery charging	Standby 900 mA, 1.9 A Transmitting (max)

Table 15-3: AES 7707P-88M Specifications

15.3.2 Connecting to an AES 7707P-88M

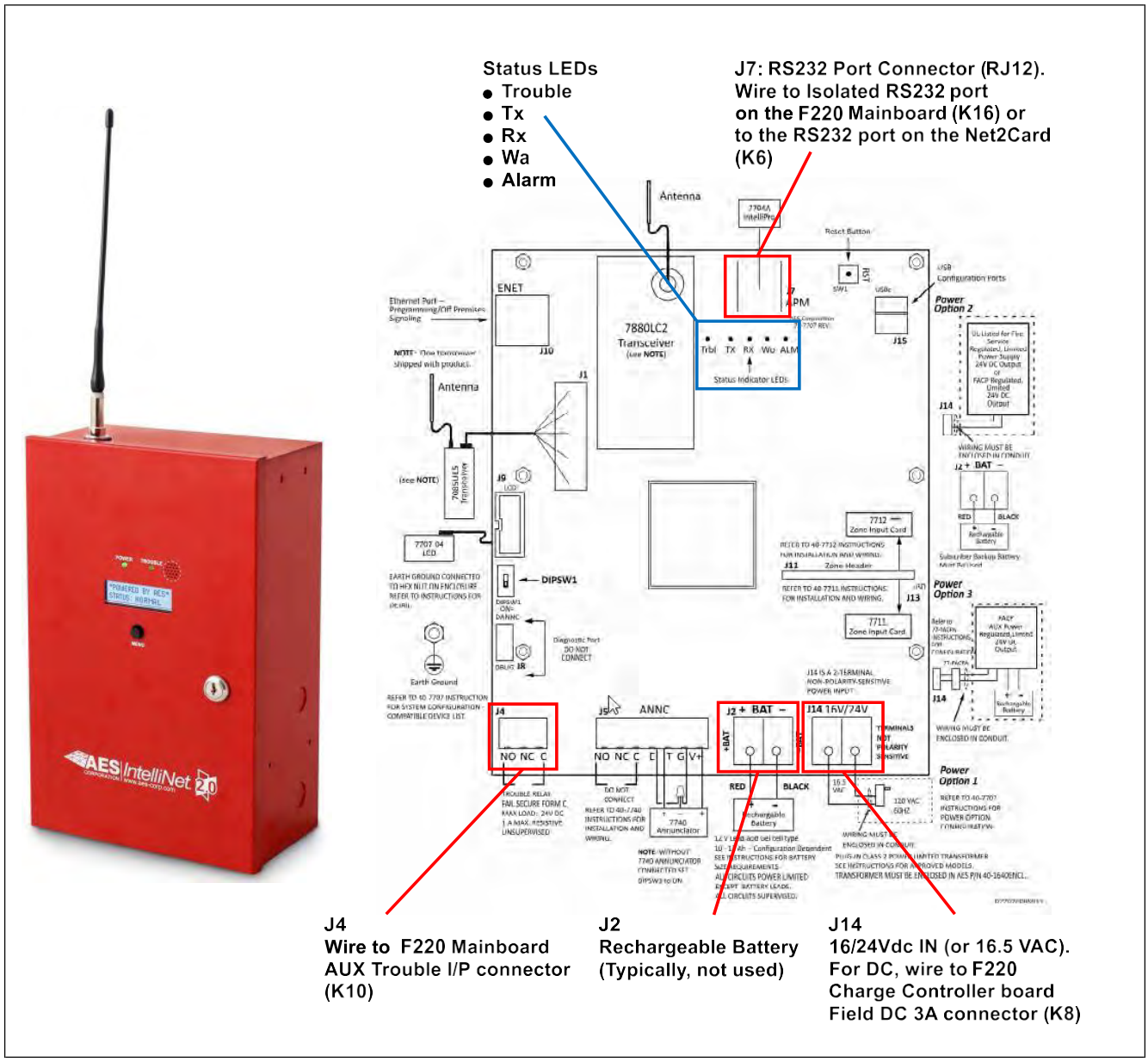


Figure 15-1: AES 7707P-88M Fire Subscriber enclosure and PCB connectors

The AES 7707-88M is connected (J7 RS232 Communication Port) to the F220's Isolated RS-232 interface (K16) or, in a Net2 Network, to the RS232 port (K6) on the Net2Card.

The AES 7707P-88M is independently powered from a 16.5 VAC, a 1.9A AC power source or a 24V DC regulated power source.

The unit contains a 10 or 12 Ah lead acid gel cell backup battery, where the size is dependent on the subscriber`s configuration.

NOTE: Use AES 7707P-88M version x7.2.12.4926M or greater

15.4 Napco Starlink Communicator

Napco have a series of Starlink Max “always on”, UL-certified communicators that are capable of sending wirelessly alarm, trouble, supervisory signals and other reports to an alarm processing center or Central Station, and/or an IP connection over the Internet.

15.4.1 Generic Specifications

Ports	
RS232 (J3)	Connects Starlink to F220’s Communication Port (J14). Message, contact code communication. Cable in the same room, within 6 feet, inside conduit.
Ethernet	For message communication and configuration
Inputs and Outputs	
Central Station	Contact ID, SIA, Pulse 4/2 Internet
Relay Output	Two Form C Relays
Inputs	• 5 general purpose digital inputs
Visual Indicators	• RF Signal Strength LED • Operational Status LED • Diagnostic LED • Trouble LED • IP Network Connection LED • IP Network Trouble LED • IP Network Status LED • Power LED • Cell carrier selected (for dual SIM models)
Radio Specifications	
Frequency range	Model dependent
Transmit Power	Model dependent
Antenna	Dual antennas, mounted on enclosure. Optional remote mounting available.
Environmental Specifications	
Operating Temperature	32°F to 120°F (0°C to 49°C)
Relative Humidity	0 to 93% RHC, non-condensing
Mechanical Specifications	
Dimensions	Model dependent. Example: Plastic: 5.5H x 8.0W x 1.5D inches Metal: 9.5H x 11.5W x 3.5D inches

Enclosure material	Model dependent: ABS Plastic, or metal
Power Requirements	
DC Source	Model dependent. 10v/24VDC, 12 to 24VDC regulated.
AC Source	120VAC.
Current Consumption	Model dependent. Example: Standby 85 mA, Peak 325mA

Table 15-4: Starlink Max Communicator Specifications

15.4.2 Connecting to a Napco Starlink Max Communicator

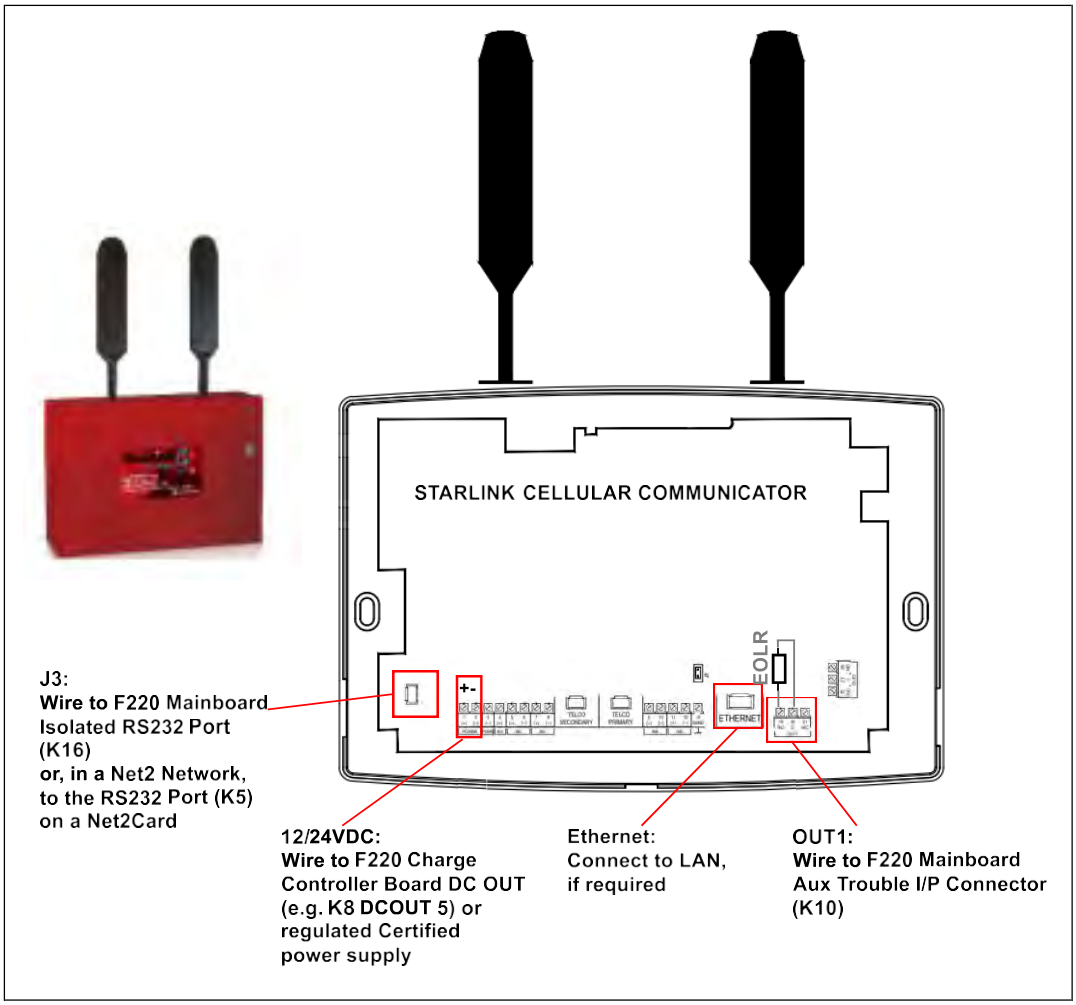


Figure 15-2: Napco Starlink Max Connections

Two connections are required for all the versions of the Napco Starlink Max communicator

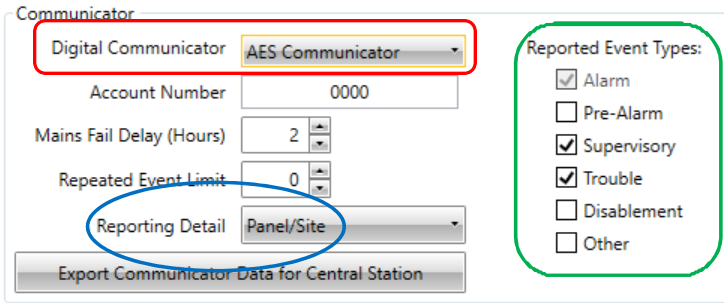
- J3, the Communicator's RS232 Communication Port, is connected to the F220's Isolated RS-232 interface (K16) or, with a Net2 Network, to the RS232 port (K5) on the Net2Card. The current state of the panel, for example Fire, Trouble, Supervisory, and other report are transmitted to the Communicator via this channel.

- Power. The Starlink Max can be connected to one of the DCOUT connectors on the F220's Charger Controller, for example DCOUT5 (K8). Alternatively, it can be connected to a 24VDC Certified regulated power supply.

NOTE: Napco recommends for Starlink Max communicators powered from 24VDC or above to install a SLE-FIRE-VR Zener voltage drop kit between the positive power terminal on the Starlink Max's terminal strip and the positive power supply terminal.

15.5 Configuring the Communicator in FireUtils

For a communicator connected to a F220 Panel rather than to a Network Node, select the digital communicator in FireUtils' Panel Editor (red square in the figure opposite), which events will be reported to the Central Station (green square) and the level of detail that will be reported (blue oval).



With a panel communicator, there are 3 levels of reporting detail

- Panel/Site which is low level, where one ContactID will be used to signal all the selected event types.
- Zone – medium level, where up to 1000 ContactID addresses will be used for signaling the selected event types, and
- Point - high level, where up to 6000 ContactID addresses will be used for signaling the selected event types.

To find out the difference between the different reporting levels, let the mouse cursor hover over the communicator name

The default Digital Communicator setting in FireUtils is: None

In a F220 network, if a digital communicator is connected to a network node rather than to a panel, set the communicators' parameters in FireUtils' Network Node Editor. Refer to the example in Section 20.5.4.5, and Figure 20-39: Assigning Node 3 to the Digital Communicator.

16. INSTALLATION INSTRUCTIONS

Installation of a F220 Fire Panel System must be performed by suitably qualified personnel.

The following instructions are a guide to the successful installation and commissioning of an F220 Fire Alarm system.

16.1 Pre-Installation Check

- Before opening the F220 system packaging, inspect the packaging for external damage.
- Remove the F220 from its packaging and inspect the cabinet for external damage.
- Check that the cabinet key is attached to the top of the cabinet.
- Open the cabinet and visually check that all circuit boards and other components including cabling are firmly in place.

16.2 Panel Installation and Power Connection

- Install the cabinet to its assigned position and height as required by the relevant installation standards.
- The anchors used must be of sufficient strength to reliably carry the weight of the cabinet and its contents. The anchors must also use the existing cabinet mounting holes.
- If drilling is required to mount, for example, the panel on a concrete wall, then the cabinet can be put in place and the locations of the mounting holes marked on the wall from inside the cabinet. Remove the cabinet for drilling so that no drilling debris or swarf enters the cabinet.
- Mount the cabinet and ensure that the F220 is clean internally and that no residual contamination, such as metal filings, is present.
- Ensure that all supervised outputs requiring an EOL resistor are correctly terminated at the end of line. (It is assumed that the external SLC and other external site wiring has been installed, but not connected to the F220 at this point).
- Ensure that all external inductive loads, such as relays, magnetic door holders, etc., are fitted with suitable diodes across the inductive load to reduce the effect of back-EMF which can cause damage and/or malfunction of the equipment. The diode should always be fitted at the inductive load end and not at the drive end of the circuit. Pertronic equipment is always supplied with back-EMF diodes already fitted.
- Ensure that a detailed plan and address assignment table is available for each SLC.
- Remove the knockout panels as required for the external wiring and fit suitable wiring protection, such as conduit, cable glands or grommet edging.
- Before connecting the external SLCs and other external wiring, install the AC power (115Vac ±10%) - do NOT connect the batteries.
- Check that the system is correctly grounded.
- Apply the AC power to the system and observe that the F220 goes through its initialization phase - this takes about 30 seconds. Troubles will be detected (such as SLC troubles and battery missing events) but ignore these at this stage.
- Connect the batteries and reset the system with the RESET pushbutton on the F220 Mainboard

CAUTION:	**RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.** **DISPOSE OF USED BATTERIES ACCORDING TO THE LOCAL REGULATIONS.**

16.3 Cable Requirement

All cabling for the Pertronic F220 shall comply with National Fire Protection Association (NPFA) and National Electric Code (NEC) regulations, together with relevant project requirements and local codes or regulations.

The AC circuit supplying power to the F220 panel (cable min. 14 AWG) shall be supplied from a circuit breaker with a rated capacity no greater than 15 Amps.

16.4 Intelligent Addressable SLC Cabling

Intelligent addressable SLCs must be configured according to Section 4 of this Manual.

NOTE:

The maximum allowable SLC cable resistance (combined length of the two conductors) is 50 Ω for Class A, and 40 Ω for Class B SLC cabling. See Section 4.2.1 for more detail. A SLC length calculator is available on the Pertronic Industries Pty Limited website.

16.5 SLC Device Configuration

Configuration of the SLC devices may be performed by using FireUtils and sending the configuration data:

- from a file on a USB stick (see Section 7 Firmware uploads), or
- from the PC through the Ethernet port (see Section: 6.3 Ethernet Port).
- Or over the NET2 Network through the Net2Card's Ethernet port.

Connect SLC 1, and either 'Learn' what is connected, if not networked (see Section 10.5.2) or configure each device using FireUtils.

Deal with any Trouble - for SLC or device Troubles, investigate the source of the Trouble (for example, wrong configuration data, duplicate addressing, etc.), and correct the problem. For other (system) Troubles, locate and deal with these before proceeding.

When SLC1 has been configured correctly, and no other Troubles are present, connect SLC 2 to the F220 and repeat the configuration and test process.

Repeat this for other SLCs as applicable.

16.6 Other External Devices

When the SLCs have been successfully configured and tested, connect and test the sounders connected to the appropriate NAC.

Test the operation of the SLC relays.

Connect and test any other devices that are a requirement of the system.

Test the system as a complete functional unit, testing all input and output devices.

17. PERIODIC INSPECTION, TESTING & MAINTENANCE

All inspections, testing and maintenance on F220 Fire Alarm and signaling systems shall be carried out by suitably trained and qualified personnel in accordance with the requirements of the relevant US Standards, in particular NFPA 72, and Authorities Having Jurisdiction (AHJ).

17.1 Notifications

To avoid unnecessary occupant reaction, it is important to notify all affected parties prior to any scheduled testing of the fire alarm system. These include, but are not limited to, people and facilities receiving alarm, supervisory or trouble signals. For example, building occupants and the monitoring company, central station or fire department as appropriate (NFPA 72 section 14.2.4).

17.2 Documentation Requirements

An important requirement of the inspecting, testing and maintenance process is documentation. NFPA requires that a historical record of all the inspection, testing and maintenance processes are kept by the system owner and held for a minimum of 10 years. This also includes a record of the initial installation, changes or additions to the fire alarm system (e.g. addition/removal of system components, adjustments to system hardware or wiring, changes to site-specific software etc.), and its environment (e.g. wall removal, change in the use of the area etc.), an inventory of all the system components, logs of the semi-annual and annual inspections and testing, and smoke detector sensitivity tests. A test plan also needs to be developed to clearly establish the scope of the testing. That plan and the results need to be documented with the testing records.

NFPA 72 has a range of example inspecting and testing forms in section 7.8.

17.3 Overview of Inspecting, Testing and Maintenance

The following is a list that highlights the minimum requirements for the inspecting, testing and maintaining of a Pertronic F220 Fire Alarm System.

17.3.1 Visual Inspection

Visual inspection involves checking system components to verify that they are in place, in the correct operating condition, unobstructed, not damaged, and/or readily visible.

Item	Frequency
Supervisory signal devices	Quarterly
Waterflow devices	Quarterly
Alarm Notification Appliances	Semiannually
VRLA batteries (manufacture date, connections, damage free)	Semiannually
Panel trouble signals	Semiannually
Emergency voice/Alarm communications equipment	Semiannually

Initiating devices – MCPs, air sampling, duct detectors, heat detectors, smoke detectors, CO devices	Semiannually
Electromechanical releasing devices – e.g., door holders	Semiannually
Remote annunciators	Semiannually
Transient suppressors	Semiannually
Interface equipment	Semiannually
Digital communicator	Semiannually
Panel LEDs	Annually
Interfaced equipment	Annually
Primary power supply	Annually
Fiber optic cable connections	Annually
All equipment (check for changes that affect equipment performance)	Annually

NOTE:

1. As an alternative means of compliance, components and systems can be inspected under a performance-based program subject to approval of the AHJ. Refer to NFPA 72 Section 14.2.9.
2. Visual inspection should be conducted before any testing.
3. Frequencies listed in the visual and testing tables are the minimum recommended in NFPA 72. The AHJ may require more frequent visual and testing of the fire system.

17.3.2 Testing

The complete F220 fire alarm system is required to be thoroughly inspected, tested and maintained each year by an approved servicing company in accordance with NFPA 72, tables 14.3.1 and 14.4.3.2. Testing must include all the panels, panel functions, remote annunciators, power supplies (primary), initiating devices and alarm notification appliances. After completing the tests, all results should be entered into the system logbook.

VRLA Batteries - Charger, temperature, load voltage, ohmic tests	Semiannually
Emergency voice/Alarm communications equipment	Semiannually
Panel - functions, interfaced equipment, LEDs, primary PSU	Annually
Alarm Notification Appliances (audible, visual, textual)	Annually
VRLA Batteries – charger test, load voltage test, discharge test,	Annually
All F220 Panels – functionality, interfaced equipment, LEDs, primary power supply, fiber optic cables, trouble signals	Annually

Initiating devices – duct detectors, heat detectors, smoke detectors, waterflow devices, valve tamper switches, MCPs, CO devices, supervisory signal devices.	Annually
Electromechanical releasing devices – e.g., door holders	Annually
Remote annunciators	Annually
Interface equipment	Annually
Digital Communicator	Annually
Smoke detector sensitivities	Biannually

NOTE:

SLA batteries must be replaced every 4 years, or before as needed

18. AN OVERVIEW OF FIREUTILS

This section is a brief overview of FireUtils. It includes a guide to connecting FireUtils to an F220 Panel or to a Pertronic Net2 Network. For detailed instructions, refer to the FireUtils User Guide.

FireUtils is a computer application that allows users to configure and analyze Pertronic Fire Panels and Networks. It displays configuration data in a series of panes and tables for inserting and editing Networking and Panel configurations, SLC devices, zones, timers, groups, logic blocks, PAS/AVF/DDA functions, auxiliary and supervisory outputs.

18.1 FireUtils Main Application Window

The main FireUtils window has 5 areas: the standard Windows Title, Menu and Tool bars as well as the Component Tree and Editor Pane.

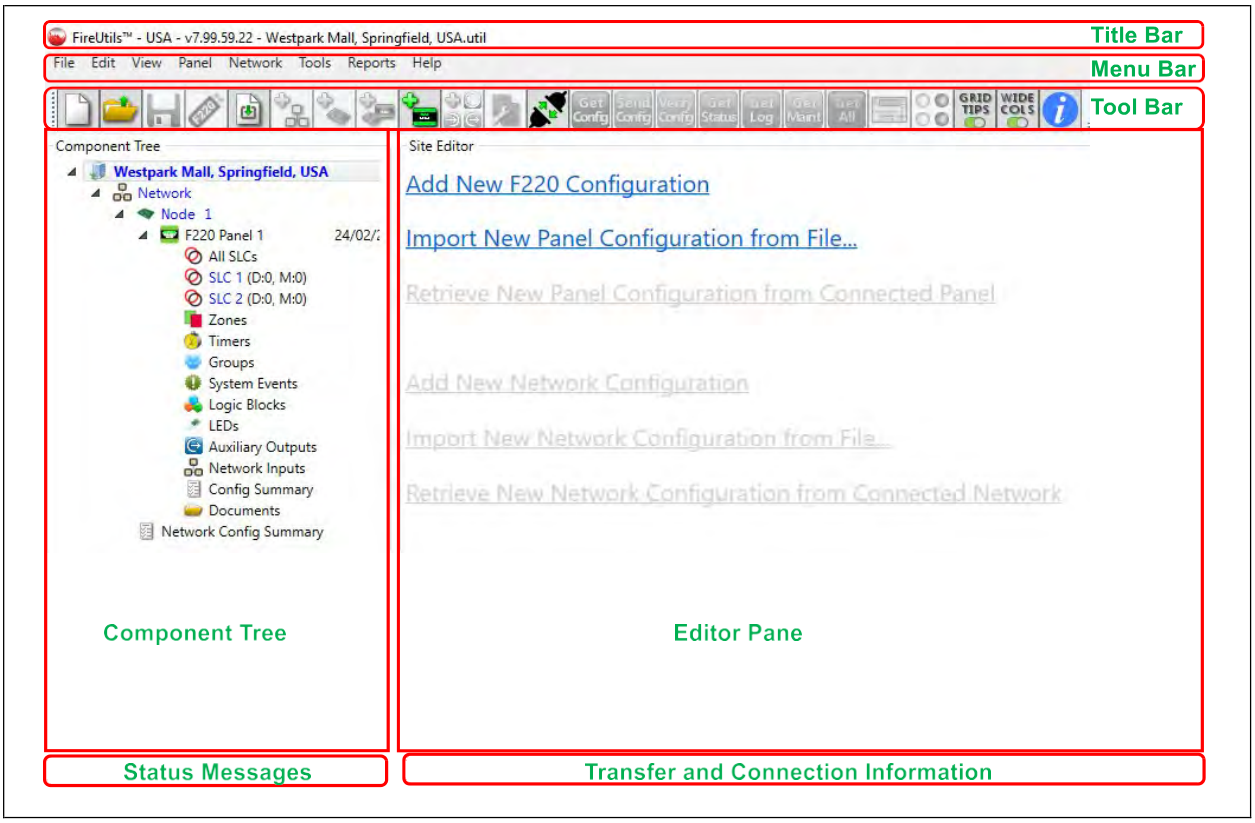


Figure 18-1: FireUtils Main Application Window

The Component Tree lists the components, devices, and functions that comprise the site's configuration data. Items in the component tree can be expanded or collapsed by left-clicking on the small triangle symbol to the left of each item.

The Editor Pane content is determined by the item selected in the Component Tree window. Selecting: sites, networks, network nodes and panels in the Component Tree Window will bring

up forms and lists with configurable items, or selectable actions, which are relevant to the item selected in the Component Tree.

NOTE:

Before Opening or creating a New Project, ensure that the correct Country Setting has been selected. In the Menu Bar, select Edit > Preferences, and check the USA radio button in the drop-down menu. Once a project has been opened, this function will be disabled.

18.2 FireUtils Tool Bar summary

The following is a summary of the functions of the icons displayed in the Tool Bar. Refer to the FireUtils User Guide for details.

	New Project…	Get Config	Receive Configuration
	Open Project…	Send Config	Send Configuration
	Save Project	Verify Config	Verify Configuration
F220	Export F220 Configuration	Get Status	Retrieve Device Status
	Import Configuration	Get Log	Shows a popup menu of those logs that can be downloaded from the Panel that do not have their own individual tool bar buttons.
	Add New Network Configuration	Get Maint	Retrieve Maintenance Report
	Add New Network Node Configuration	Get All	Receive Configuration, Status, and full History Log
	Add New Network Node with F220 Configuration		LCD Simulator

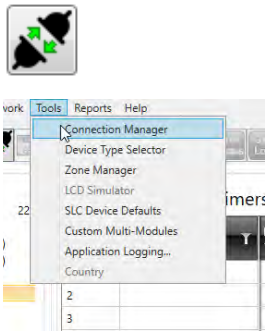
	Add New F220 Configuration		Network Service Node
	Device Type Selector	GRID TIPS	Hovering over fields in the editor window triggers pop up information windows.
	Zone Manager	GRID TIPS	Pop up information windows inactive.
	Network Mapping Manager	WIDE COLS	The full text in the editor window check box column headings is shown.
	Connect	WIDE COLS	Abbreviated text in the editor window check box column headings is shown.
	Disconnect		Show Start-up Tips window

18.3 Connecting FireUtils to a Panel

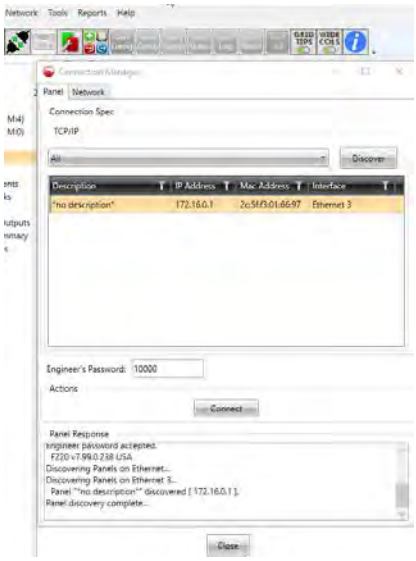
For a stand-alone (or non-networked) panel connection, plug an Ethernet cable into the Ethernet port on the F220 Mainboard (Figure 19-21).

In FireUtils,

- Click on the Connect icon in the Tool bar, or
- Select Tools > Connection Manager from the Menu bar



- Select the ‘Panel’ tab, click on ‘All’ in the drop-down box (TCP/IP section) and hit ‘Discover’.
- Multiple TCP / IP connections can be entered, and individual TCP / IP connections can be deleted by pressing the “Del” key on the keyboard.
- Click the “Connect” button.
- If successful, the connection status will be displayed in the lower right corner of the main application window.
- If unsuccessful, an error message will be displayed.



NOTE:

1. A password is required to connect FireUtils to a Panel or to a Net2 network. The password is ‘10000’ by default.
2. The password can be reset in FireUtils once a connection to a panel has been established. Access is through FireUtils’ Menu Bar. Panel > Reset Password

- Once connected, the ‘Connect’ toolbar button will become the ‘Disconnect’ toolbar button

18.4 Sending a Configuration File to a F220 Panel

Once FireUtils is connected to the F220 Panel, either:

- Select the ‘Send Config’ icon in the Tool Bar or,
- Panel > Send “F220 Panel” Configuration to Connect Panel, in the Menu Bar

to send the configuration file.

NOTE:

Icons in FireUtils’ Tool bar will be greyed out if the incorrect editor has been selected in the Component Tree.

18.5 Connecting FireUtils to a Network

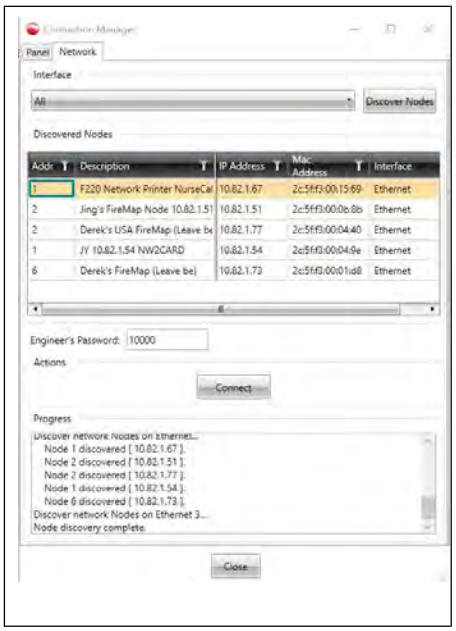
F220 Panels may communicate with each other over a network. For a panel to be part of a network it must have an attached NET2CARD. An overview of the architecture of a F220 Network is given in Section 20.1.

For a Net2 Network, plug the Ethernet cable in to the Ethernet port on the Net2Card that is connected to the panel network (Refer Figure 20-46).

File name

In FireUtils,

- Either click on the ‘Connect’ icon in the Tool bar as above or select ‘Connection Manager’ in the Tools Menu bar.
- Select ‘Network Tab’ and click on the button labelled ‘Discover Nodes’.
- If successful, a list of nodes will populate the section called ‘Discovered Nodes’.
- Select the node requiring connection.
- Click the ‘Connect’ button.
- If successful, the connection status will be displayed in the lower right corner of the main application window, and the Network Service Mode window will automatically appear.
- If unsuccessful, an error message will be displayed.
- Once connected, the ‘Disconnect’ toolbar button will replace the ‘Connect’ toolbar button.

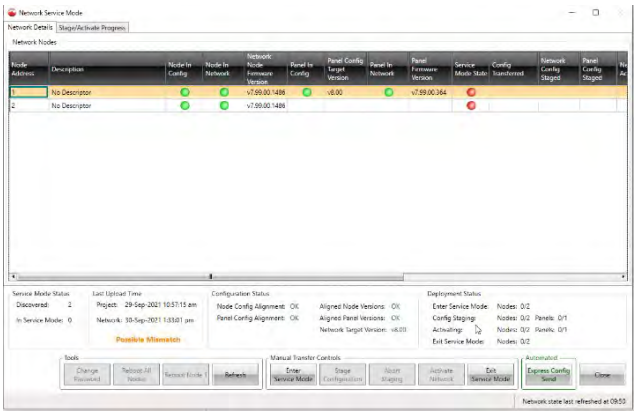


18.6 Sending a Configuration File to a Net2 Network

Before a configuration file can be successfully sent, or downloaded, to a Net2 Network, the configurations of all the Panels, Nodes and Network Mapping must be completed.

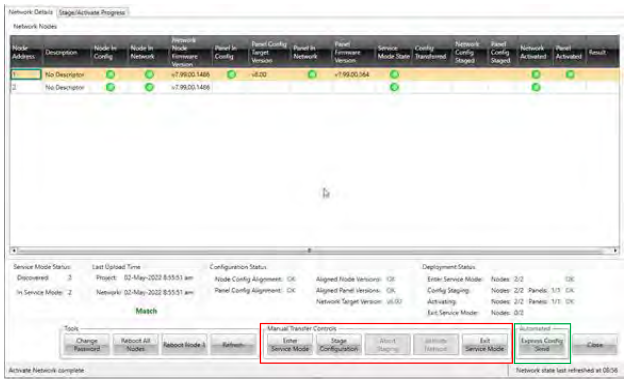
The Network Service Mode window within FireUtils provides a means of updating the configurations in the network cards and the panels in the Net2 Network from one point in the network. It opens automatically once the connection to the network is complete (Section 18.5 above).

- The Network Service Mode window lists all the discovered nodes on the network and if they have connected panels. In this simple network there are just 2 nodes, one of which is connected to a panel.
- It compares the connected network to the network configuration currently in FireUtils.
- Colored dots indicate the status of the comparison. Green – ok, Red – not ok, Grey – something has been found on the network, but status could not be determined.



- Versions of the firmware installed in all the network nodes and panels are also displayed and any incompatibilities shown in red text.

- For a network configuration update to be made, the network nodes must be set into service mode. This process can be manual using the “Manual Transfer Controls” (red highlight) or “Automated” (green highlight).



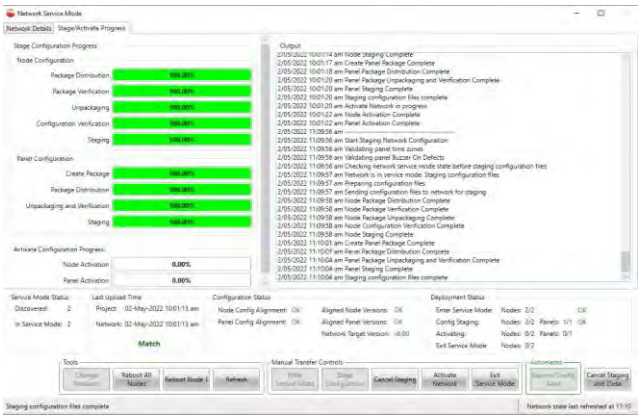
Automated

- To start the automatic network update process, click on the ’Express Config. Send’ button.
- Once the automated process has started, the ‘Express Config Send’ button changes to ’Abort’. Clicking this button immediately halts the process.
- Once the process has completed, click ’Close’ to exit Network Service Mode

Manual

The automatic process above can also be undertaken manually using the following 4 steps.

- Click on the ‘Enter Service Mode’ button.
- The ‘Service Mode State’ dots turn from red to green.
- To start the configuration process, click on ‘Stage Configuration’ button.
- This will automatically start 3 actions:
  - Transfer the new configuration over the network.



  - Stage the network in the network cards.
  - Stage the panel configurations in the panels.

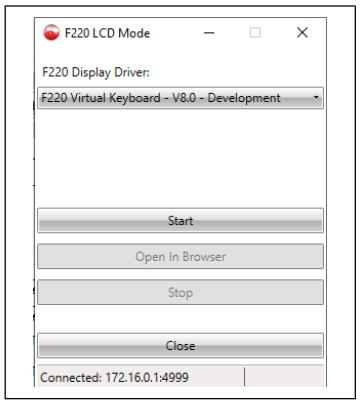
- In the ‘Network Detail’ tab, green dots should appear in the ‘Config Transfer’, ‘Network Config Staged’, and ‘Panel Config Staged’ columns when the actions have been successful.
- The progress of the configuration process can be followed in the ‘Stage/Activate’ tab.
- When the configuration process is complete, click on ‘Activate Network’ button.

- In the ‘Network Details’ tab, if all has gone well, green dots will appear in the ‘Network Activated’ and ‘Panel Activated’ columns.
- Click the ‘Exit Service Mode’ button, followed by the ‘Close’ button.

More details of operation and function of the Network Service Mode are in the FireUtils User Manual.

18.7 LCD Simulator

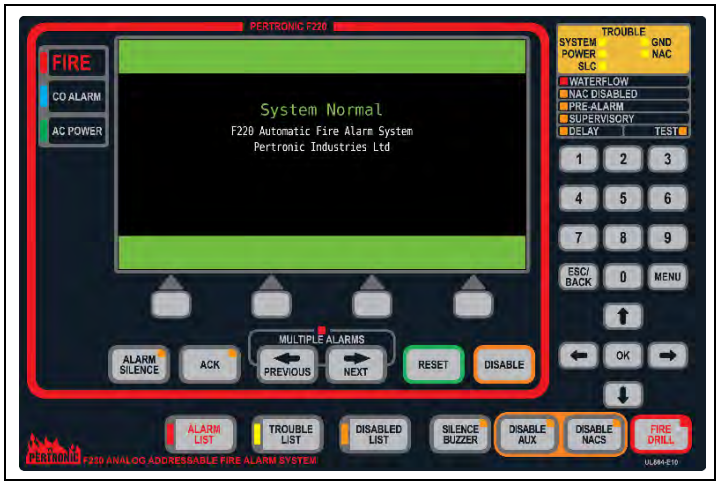
The LCD Simulator allows the user to control the Panel via a virtual keyboard and display on the attached PC. To access the Simulator requires an Ethernet connection from the PC to the panel or Net2Card.



In FireUtils,

- Click the LCD Simulator icon in the Tool bar or select 'LCD Simulator' from the Tool menu.
- The 'F220 LCD Mode' window (right) will appear.
- Select 'Start' and, once the simulator is running, 'Open in Browser'.

- The size of the display can be altered using the slider immediately above the front panel.
- The simulated panel buzzer can be disabled by ticking the Sound check box.
- Use the mouse left-click button to activate the panel's switches.
- To exit, select 'Stop' and 'Close' to exit.



19. BOARD DETAILS, LAYOUTS, FIELD WIRING

19.1 F220 Mainboard

19.1.1 Mainboard PCB Connector and Switch Layout

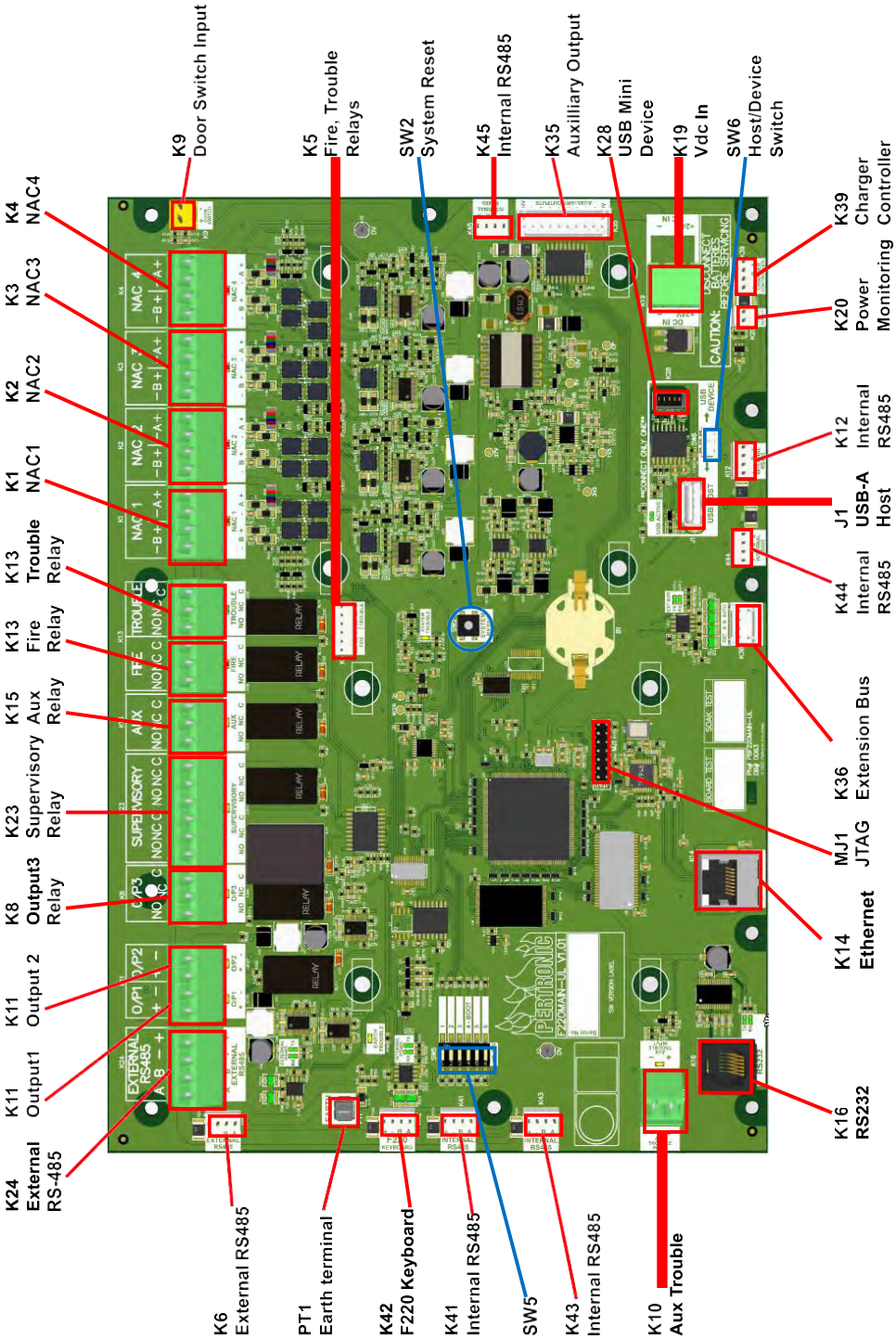


Figure 19-1: F220 Mainboard PCB Layout

19.1.2 Mainboard PCB Field Wiring

Connectors									
Connector Designator Header/Plug	**Connector Description**	**Connector Header/ Plug**	**Connector PCB Label**	**Input/ Output**	**Protocol/Rating/ Signaling Type**	**Wiring size range AWG Solid/ (Stranded)**	**Supervised**	**Power Limited**	**Output: Max Frequency Max Current Max Voltage**
K1/Plug1	NAC 1	XCFR2 FW2/FW2	NAC1 -B +B –A +A	I/O	Non-Sync 24 VDC or special application (programmable), • System Sensor, • Gentex • Wheelock	12-22 (12-22)	Class A or Class B or Class D Special Application (AUX)	Power limited	Per NAC: 3A limited: 24V Regulated 0.3A DC (synced) Special Application: 3A (synced) 28V peak: 19.8 V unfiltered, half wave rectified RMS, Class D supervised grounds only
K2/Plug2	NAC 2		NAC 2 -B +B –A +A	I/O					
K3/Plug10	NAC 3		NAC3 -B +B –A +A	I/O					
K4/Plug14	NAC 4		NAC4 -B +B –A +A	I/O					
K5	'Fire' Relay: Small		NO NC C Fire	OUT	Common 3A 30VDC, resistive	- (22-26)	Unsupervised	Not power limited	Not intended for field wiring
K5	'Trouble' Relay: Small		NO NC C Trouble	OUT	Common 3A 30VDC, resistive	- (22-26)	Unsupervised	Not power limited	Not intended for field wiring
K6	External RS-485		+ - B A Ext RS485	I/O	RS485 and 24VDC supply	- (22-26)		Power limited	Not intended for field wiring
K8/Plug9	O/P 3	XCFR2 FW2/FW2	O/P 3 NO NC C	OUT	Programmable 5A, 30VDC	12-22 (12-22)	Unsupervised	Not power limited	N/A
K9	Door Switch		+ - Door Switch	IN		- (22-26)	Supervised	Power limited	Not intended for field wiring
K10/Plug13	Auxiliary 'Trouble'	XCFR2 FW2/FW2	+ - Aux Trouble I/P	IN	Common	12-22 (12-22)	Unsupervised	Power limited	N/A

K11/Plug11	Supervised O/P1	XCFR2 FW2/FW2	O/P1 + -	OUT	Programmable	12-22 (12-22)	Class B	Power limited	Special Application 28 VDC, 1.0 A
K11/Plug12	Supervised O/P2		O/P1 + -	OUT	Programmable	12-22 (12-22)	Class B	Power limited	Special Application 28 VDC, 1.0 A
K12	Internal HS-485		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring
K13/Plug4	'Fire' Relay	XCFR2 FW2/FW2	Fire NO NC C	OUT	Common (when enabled) 2A, 30 VDC, resistive	12-22 (12-22)	Unsupervised	Not power limited	N/A
K13/Plug5	'Trouble' Relay	XCFR2 FW2/FW2	Trouble NO NC C	OUT	Common (when enabled) 2A, 30 VDC, resistive	12-22 (12-22)	Unsupervised	Not power limited	N/A
K14	Ethernet Connector		Ethernet	I/O	Ethernet 10/100 Mbps	RJ45		Power limited	Not intended for field wiring
K15/Plug6	'Auxiliary' Relay	XCFR2 FW2/FW2	Aux NO NC C	OUT	Programmable 2 A 30 VDC resistive	12-22 (12-22)	Unsupervised	Not power limited	N/A
K16	Isolated RS232	DUXR2	RS232	I/O	RS232 9600 baud, 8 bit, No parity, 1 stop bit. Intended for connection to external digital communicator	(26-28)	Class B	Power limited	The digital communicator must be located in the same room, within 20 feet of the F220 and the cable housed in a conduit.
K19	+27.4Vdc Input		DC IN + 24V -	Power Supply In		12-22 (12-22)	(Input)		Not intended for field wiring
K20	AC Power Monitoring		Power Supply	OUT		- (22-26)		Power limited	Not intended for field wiring
K23/Plug7/ Plug8	'Supervisory' Relay	XCFR2 FW2/FW2	Supervisory NO NC C NO NC C	OUT	Common 2A 30 VDC resistive	12-22 (12-22)	Unsupervised	Not power limited	N/A

K24/Plug15	External RS-485	XCFR2 FW2/FW2	External RS485 A B - +	I/O	RS485 and 24 VDC supply	12-22 (12-22)	Class B	Power limited	24 VDC, 3.0 A max
K28	USB Mini B		USB Mini B	I/O				Power limited	Not intended for field wiring
K31	Signal Ground		0V			N/A	Not intended for field wiring		
K32	Signal Ground		0V			N/A	Not intended for field wiring		
K35	Auxiliary Output		0V 87654321+27V Auxiliary Outputs	OUT	Programmable 100mA max per open-collector output	1. - (22-26)	Unsupervised	+27V pin 1 power limited. Open collector outputs are not power limited	Supply 28V DC max, 500mA Max sink current (total of all outputs) Not intended for field wiring.
K36	Extension Bus		RST A B Auto Ext Bus	I/O		- (22-26)		Power limited	Not intended for field wiring
K39	Charger Controller		+ - B A Charger Controller	I/O		- (22-26)		Power limited	Not intended for field wiring
K41	Internal RS-485		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring
K42	F220 Keyboard		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring
K43	Internal RS-485		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring
K44	Internal RS-485		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring
K45	Internal RS-485		+ - B A Internal RS485	I/O		- (22-26)		Power limited	Not intended for field wiring

MJ1	JTAG		JTAG	I/O			- (26-28)		Power limited	Not intended for field wiring
PT1	Ground Terminal		Ground				N/A	Not intended for field wiring		
J1	USB-A Host		USB A Host	I/O			N/A		Power limited	Not intended for field wiring

Table 19-1: F220 Mainboard PCB Field Wiring Data

19.1.3 Mainboard Switches and Switch Default Settings

19.1.3.1 Mainboard Switches

Switches			
Component	**Description**		**Default**
SW2	System Reset		-
SW5	DIP switch 6-way	SW5-1	ON
(see below)		SW5-2	ON
		SW5-3	OFF
		SW5-4	OFF
		SW5-5	OFF
		SW5-6	OFF
SW6	USB Host / Device select		Host

Table 19-2: Mainboard switch settings

19.1.3.2 SW5 DP Switch Default Settings

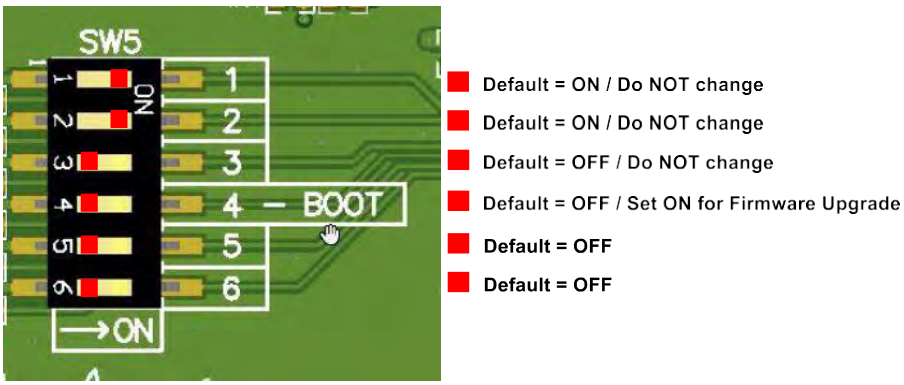


Figure 19-2: DIP Switch SW5 default settings

19.1.4 Mainboard Test Points (Top Layer)

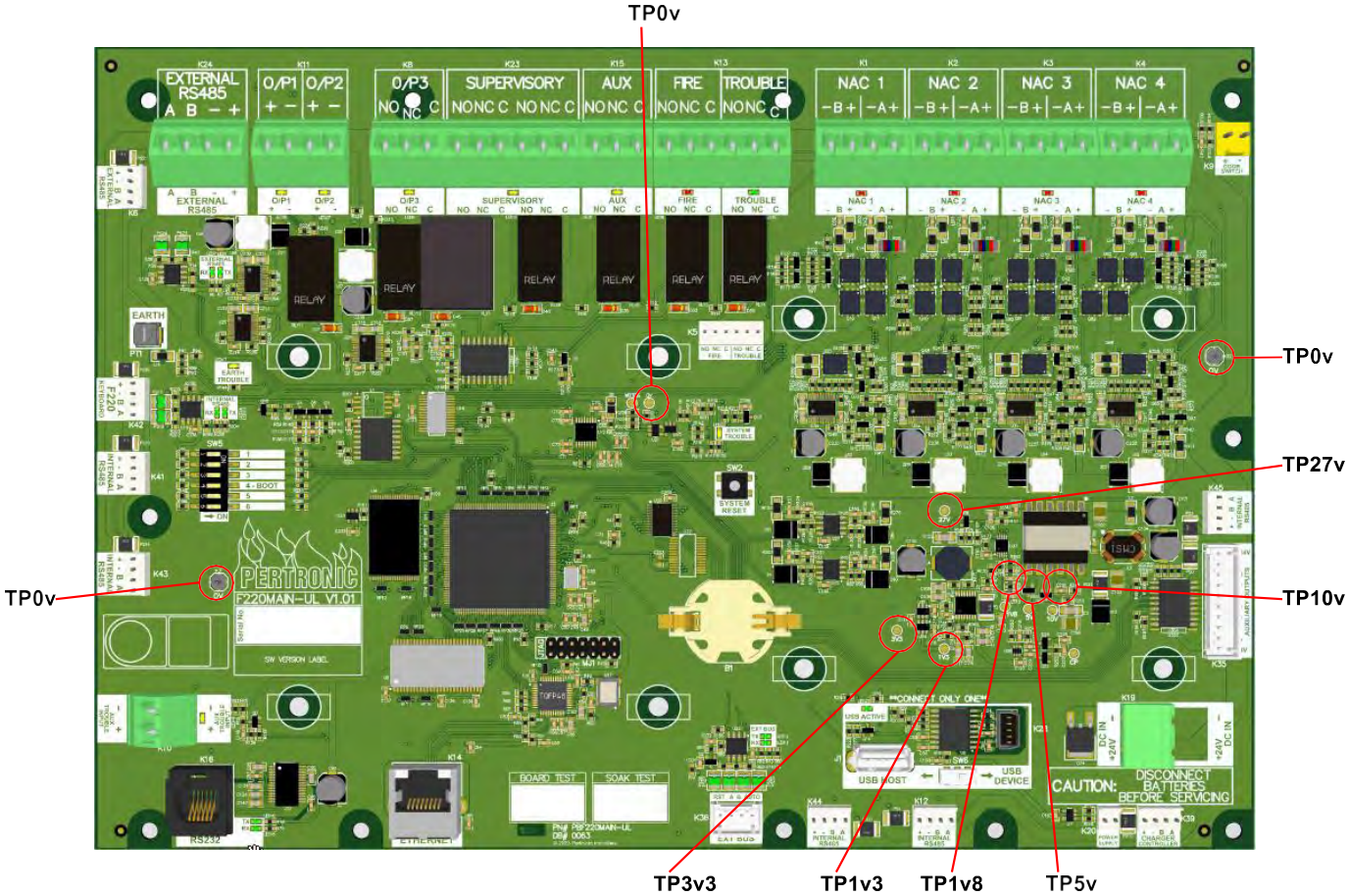


Figure 19-3: F220 Mainboard Test Points (top layer)

Test Points	
Designation	**Description**
TP27	+27 Vdc
TP10v	+10 Vdc
TP5v	+5 Vdc
TP3v3	3V3 dc
TP1v8	1V8 dc
TP1v3	1V3 dc
TP0v	0V

19.1.5 Mainboard Test Points (Bottom Layer)

Sec

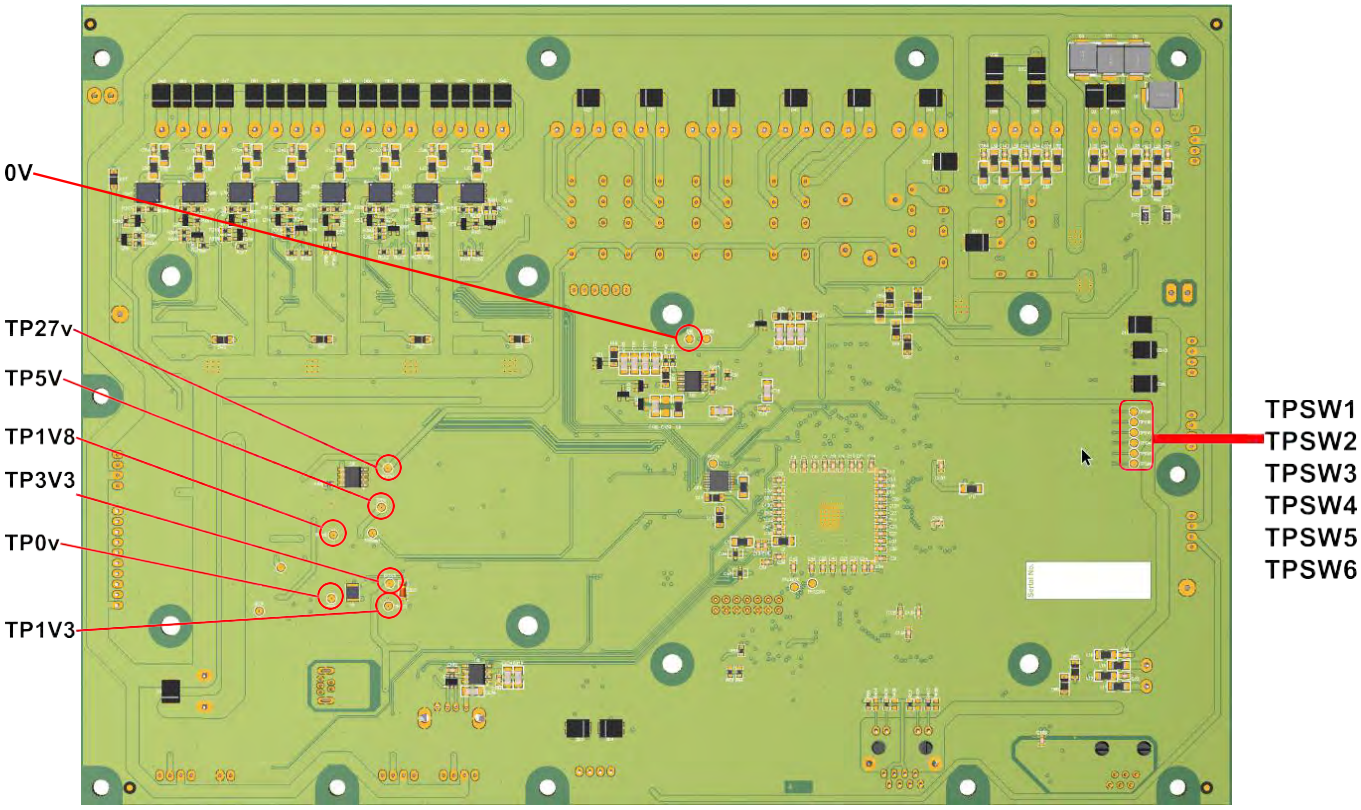


Figure 19-4: F220 Mainboard Test Points (bottom layer)