AMPAC

ADVANCED WARNING SYSTEMS

LoopSense

Fire Alarm Control Panel
(NZS 4512:2010)

Installation & Commissioning

MAN 2997-1

WORLD LEADER OF INNOVATIVE SOLUTIONS
IN FIRE DETECTION AND ALARM SYSTEMS

Responding to a Fire

Access Level 1

Indicators

Controls

The **OVERRIDE** key is pressed to override any delays to outputs

Activating the "SILENCE ALARMS. BRIGADE USE ONLY" Key will silence all Alarm Outputs.

Access Level 2

The **EVACUATE** key is pressed to turn ON all alarm devices.

The **SILENCE/RESOUND** key is pressed to silence any silence-able outputs that have been activated.

The **ALARMS LED** will be illuminated to indicate that the silence-able outputs have been silenced and resound is available. The operation of the SILENCE key will be logged.

The **RESET** key is pressed to reset the fire condition. All outputs activated in response to the fire will deactivate and the panel will revert to the normal condition providing there are no other abnormal conditions present. – RESET IS LOGGED.

Disabling a Zone

The following example DISABLES a ZONE. Place the Keyswitch in the ENABLED position.

Press 


```
CONTROL MENU
1►ZONE                3|PANEL
2|DEVICE              4|GLOBAL CONTROL
```

Then 

to open the "Control" menu. By following the screen prompts select the type of control, 1 to 4. Once selected simply step through the menu again to implement.

Press 

to open the "Zone" menu.

Selecting the Zone Control menu prompts the user to select the zone number using the generic zone point selection screen followed by the corresponding zone control menu. (Sounder access is available at Level 3 only)

```
Zzzz                  <status>
<zone descriptor>
1:DISABLE INPUTS      2:DISABLE SOUNDERS
3:SILENT WALK TEST    4:WALK TEST DEVICE►
```

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1. About This Manual

1.1 Introduction

This manual contains all the information required to install, commission and operate the ***LoopSense*** series Fire Alarm Control Panel (FACP) and is only available to and for the use of personnel engaged in its installation, commissioning and operation.

1.2 General Requirements

The ***LoopSense*** has been designed and manufactured from high quality commercial components so as to comply with major world standards. To ensure these standards are not compromised in any way installation staff and operators should;

- Be qualified and trained for the task they undertake
- Be familiar with the contents of this manual prior to the installation, commissioning or operation of a ***LoopSense*** FACP
- Observe anti-static pre-cautions at all times
- Be aware that if a problem is encountered or there is any doubt with respect to the operational parameters of the installation the supplier should be contacted.

1.3 References

LoopSense Operation & On Site Programming Manual

Apollo Detector / Device Manuals

Ampac Product Data Sheets

New Zealand Standard:

NZS4512: 2010 - Maintenance of Fire Protection Systems and equipment - Fire Detection and Alarm Systems.

1.4 Symbols

ⓘ Important operational information

☞ **Note:** Configuration considerations

Observe antistatic precautions

Mains supply earth

DANGER mains supply present

2. Introduction

2.1 System Overview

The purpose of the ***LoopSense*** Fire Alarm Control Panel (FACP) is to monitor changes in inputs, report those changes and update selected outputs as programmed.

The FACP processes changes in inputs such as fire, fault, pre-alarm, emergency, security, user, transparent and system and has a built-in menu structure to view its status, perform operational tests, and modify the panel's configuration and programming.

2.2 System Components

The following illustrates the main components of the system and the connectivity between them.

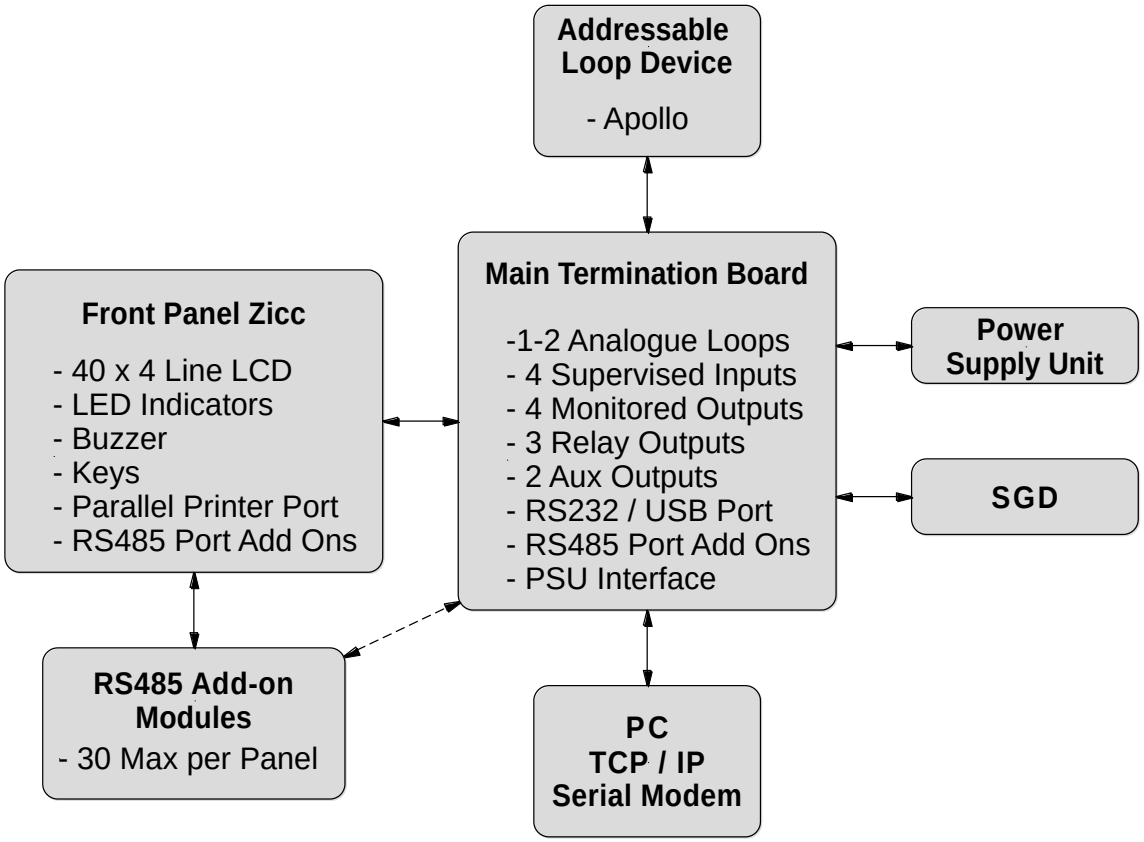


Figure 1: The LoopSense Concept

3. Overview & Key Features

LoopSense is a 1 - 2 loop Intelligent Analogue / Addressable FACP capable of supporting the following modules:

- Apollo protocol - 126 detectors / devices per loop
- SmartTerminal
- NZ LED Index
- 2nd. Loop enablement by way of a “Loop Activation Key” and programming
- Signal Generating Device (SGD)

☞ **Note:** *Only devices compatible with **LoopSense** should be used in an installation.*

3.1 Features

- The front panel 40 x 4 line LCD, navigation keys ◄ ► ▲ ▼, alpha numeric keypad and the Menu/Enter keys allow the ***LoopSense*** to be programmed □on site□. The same LCD and keys are also used for panel operation and interrogation
- 4 X supervised input and outputs connections
- 3 X relay outputs
- Password entry
- Flush or surface mountable enclosure. A surround is required for the metal cabinet
- Controls have tactile and audible feedback of operation
- All terminals cater for 2.5mm cables

3.1.1 Device Alarm LED activation

Due to the limited current available from the analogue loop, the number of alarm LED’s allowed to be illuminated simultaneously is limited to the first 10 devices in fire on each loop; after this limit is reached any new devices in fire will not have its alarm LED’s illuminated until the original fires have been cleared on that loop.

3.1.2 Analogue Loops

Each FACP supports up to 2 loops. The standard configuration is one loop, enabling the second loop involves obtaining and plugging in the “Loop Activation Key” into CN7 on the main termination board and activating it within ***LoopMaster***. The number of loops enabled and the protocol used is selectable in the configuration software and is site configurable.

3.1.3 FACP Main Termination Board Inputs & Outputs

1 to 4 Supervised Inputs:

- TB1 6-9.-Programmable digital inputs compatible with voltage free type outputs supervised for open, short and earth faults. EOL is 10k. I/P4 is only available if a SGD is not fitted. Do not fit the EOL to I/P4.
- Inputs default configurations are:
- IP1 DBA
- IP2 Door Switch
- IP3 Fault
- IP4 SGD Interlock (Reserved when SGD fitted)

1 to 4 Supervised Sounder Outputs:

- TB3 - Programmable Supervised switched 24VDC output sourcing up to 750mA and supervised for short, open and earth faults. O/P's are also supervised for overload when they are ON. EOL is 10K
- Output default configurations are:
- Sounder Outputs 1-4.

1 to 2 Open Collector Outputs: (Reserved when SGD fitted)

- Ancillary Output1 TB6/2 – low current (limited to 30mA); activated when there is a Fire condition present on the FACP.
- Ancillary Output2 TB6/3– low current (limited to 30mA); activated when there is a Fault condition present on the FACP.

1 to 3 Relay Outputs:

- TB4 – Programmable Voltage free relay contacts. Consists of NC, C and NO contacts.
- Relay default configurations are:
- Fire
- General Purpose
- Fault

1 to 2 Auxiliary 24VDC Outputs:

- TB1 3 and 4 & TB5- Programmable, supervised for over current, switched 24VDC output sourcing up to 1A. Set to continuous as default

3.1.4 Loop Activation Key Mounting CN7

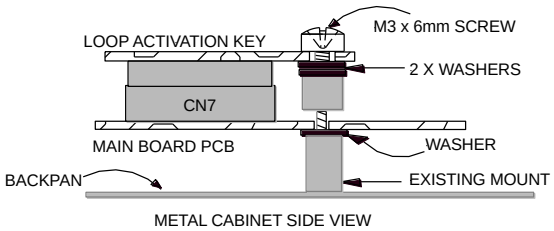


Figure 2: Loop Activation Key Mounting

The loops consist of a positive and common and are able to source up to 500mA of current. The loops;

- Operate in single ended and redundant configurations
- Are monitored for over current and short circuit in single ended mode
- Monitored for over current, short circuit and open circuit in the redundant mode.

☞ **Note:** A loop test function is available via the FACP user interface.

4. Mechanical

The basic LoopSense FACP consists of:

- Main PCB
- Front Panel control and indicator board
- 3Amp switch-mode power supply for the metal version;
- 2 X 12 Volt batteries connected in series.
- Access keys
- Loop activation key for the 2 Loop version.

4.1 Mounting the Enclosure

The panel MUST be mounted in an area that is NOT subject to conditions likely to affect its performance, e.g. damp, salt-air, water ingress, extremes of temperature, abuse etc. is at an easily accessible height and such that the indicators are at eye level.

Typical locations for the panel are the first and most obvious point of contact for emergency services or a security office that is likely to be permanently staffed.

4.1.1 Enclosure Details

LoopSense can be surface or semi-flush mounted, is supplied with a detachable door, a mountable back box with backpan, power supply and a minimum of two separate PCBs.

4.1.2 Fixing the Chassis to the Wall

Taking into account the weight of the panel securely mount it by using, the three keyhole mounting holes, suitably sized screws and plugs for the type of mounting surface.

Mounting is best achieved by positioning the box against the surface it is to be mounted to, marking the holes, taking the box well away from the surface and then drilling the holes.

Caution: Any dust or swarf created during the fixing process must be kept out of the panel and great care is taken not to damage any wiring or components.

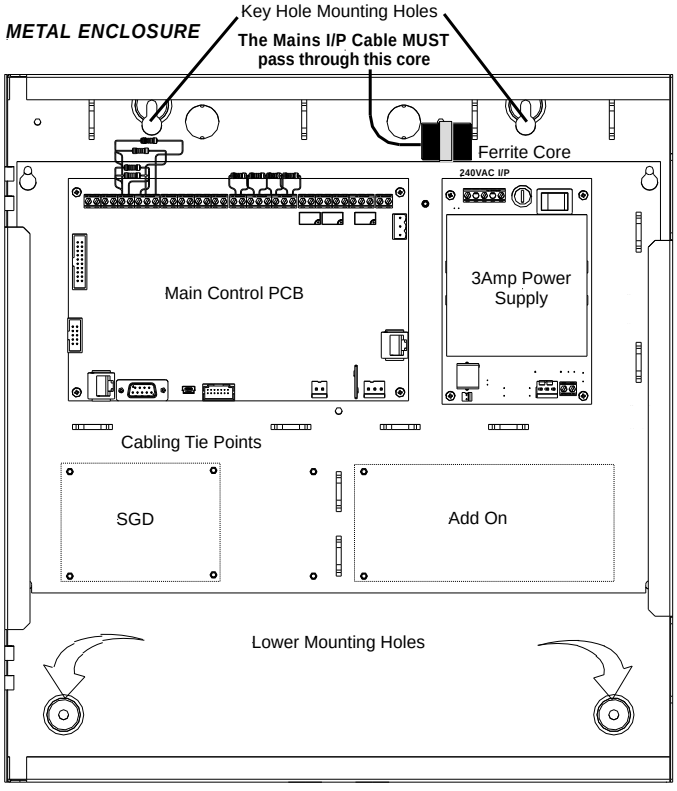


Figure 3: Typical Layout and Location of Keyholes for the Metal Enclosure

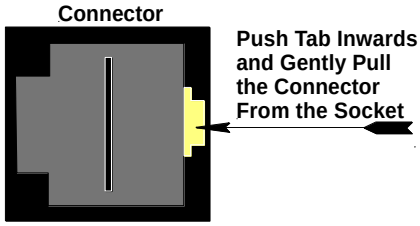
4.1.3 PCB Removal / Replacement

If the PCB's have to be removed the following precautions should be observed;

- Removing the door will provide better access to the boards and ensure the hinges are not accidentally stressed.
- Personal anti- static procedures must be followed.
- When disconnecting the 20 way connecting cable from the PCB, make sure that the cable remains connected to at least one board to prevent it being misplaced.

☞**Note:** *Care should be taken when detaching this connector as it is necessary to depress the small locking tab to unlock the connector from its base. To reconnect the cable the connector must first be correctly aligned then pushed into the socket so it locks into position.*

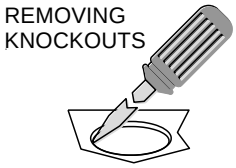
- Carefully remove the retaining screws at each corner of the board taking care not to damage any of the components.
- Place each board into anti- static storage once removed.



4.1.4 Removing the Knockouts

Carefully decide how the wiring will be brought into the panel then remove the required knock-outs for the bushes and cables.

The knock-outs should be removed with a sharp tap in the rim of the knock-out using a flat broad-bladed screwdriver. Use of excessive force could damage the enclosure around the knock-out.



Always ensure if a knock-out is removed, the hole is filled with a good quality cable gland. *Any unused knock-outs must be securely blanked off.*

5. Electrical

5.1 Primary Power Supply

The ***LoopSense*** Power Supply PCB combines the functions of;

A Mains to DC. switch mode power supply unit that operates from a supply of; 204 - 264VAC @ 47 – 63Hz supplying the system while all zones are in alarm

A battery charging and monitoring unit

A mains fail is detected when the PSU voltage drops below 24V.

5.1.1 Mains wiring

The requirement for the mains supply to the FACP is fixed wiring, using three core cable (no less than 0.75mm″ and no more than 2.5mm″) or a suitable three conductor system, fed from an isolating switch fuse spur, fused at 3A. This should be secured from unauthorised operation and be marked 'FIRE ALARM: DO NOT SWITCH OFF. The Mains supply must be exclusive to the FACP.

5.1.2 Connecting the Panel

Connecting ***LoopSense*** internal connections and PCBs is best undertaken immediately prior to commissioning. Before beginning ensure all devices on the circuits are correctly connected and that cable integrity is verified throughout the installation.

ⓘ **Important:** *DO NOT use an insulation tester ('Megger') with any electronic devices connected. Faults occurring in the wiring which are not picked up at this stage will almost certainly result in spurious and intermittent faults when the equipment is energised.*

ⓘ **Important:** *Under no circumstances should the **LoopSense** panel be operated without the Power Supply PCB correctly mounted in the enclosure and the retaining screws securely tightened.*

5.1.3 Connecting the Mains

The technician should NOT attempt to connect Mains to the Panel until fully conversant with the layout and features of the Power Supply PCB.

The incoming Mains cable should be brought into the Panel at the top right hand side of the enclosure, fed through the ferrite core and correctly terminated on the Chassis Earth Terminal and then to the Power Supply connector block.

☞ **Note:** *Fuse F1 (2Amp (3A supply) 250VAC M205) is field replaceable*

Before switching on the Power Supply the Earth MUST be connected to the chassis earth terminal.

- All earth cabling must be terminated to the Panel Chassis Earth Terminal in a Star configuration.
- The earth cable closest to the cabinet body must have an M4 SPW beneath the lug then an M4 SPW and M4 nut.
- Each additional earth cable must be terminated with an M4 SPW and M4 nut.
- An additional M4 nut and M4SPW are fitted to the earth terminal for installers to connect the mains earth

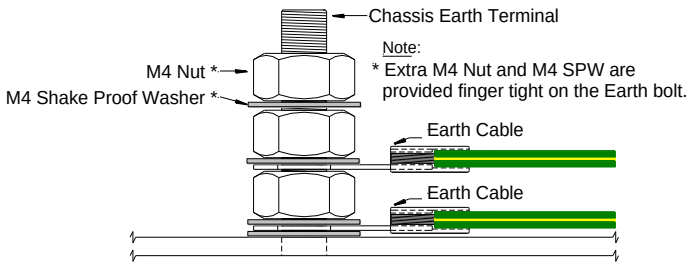


Figure 4: Chassis Earth Terminal Connection

5.1.4 Earth & Earth Fault

If a resistance of <50Ω exists between 0V and the building earth a fault indication will be indicated.

Resistance to Earth	Status
< 50Ω	Earth Fault
50 ≤ to ≤ 500 KΩ	Indeterminate
> 500 KΩ	Normal

5.2 Battery Charger

The battery charger is an integral part of the Power Supply and is capable of

- Recharging standard sized system batteries within 24 hours
- Detecting a missing, damaged or undercharged battery
- Protecting the battery against reverse or a short circuit condition
- Charging batteries in line with Sealed Lead Acid battery manufacturers circuit temperature compensation guidelines

The following table contains the thresholds for the corresponding battery faults:

Battery Voltage	Battery Fault Condition
VBATT < 23.5V	BATTERY LOW
VBATT < 20V	BATTERY MISSING
*VBATT < 22V	BATTERY DAMAGED

☞ **Note:** *Battery disconnect has been incorporated to prevent the battery from discharging through the battery charger should the charging voltage be less than the battery voltage.*

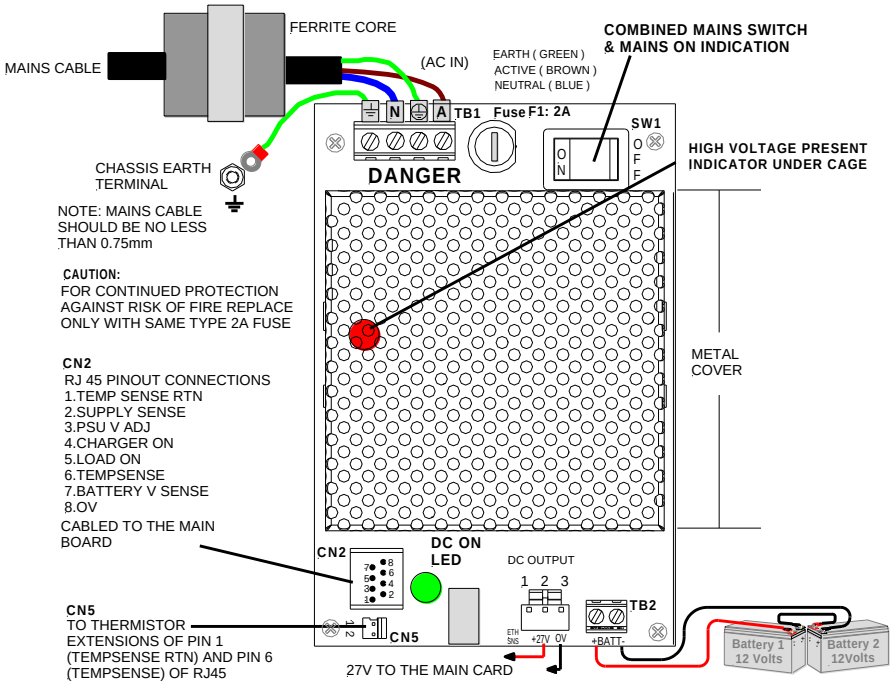


Figure 5: Power Supply Battery Charger Wiring (3A PSU SHOWN)

5.2.1 Connecting the Stand-By Batteries

The capacity of the batteries to be installed depends on the panel configuration and required stand-by time. To calculate the required AH capacity of the batteries refer to the calculation guide located in the rear of this manual.

Two new, good quality and fully charged 12V Sealed Lead Acid batteries are required as the emergency stand-by power supply for the Panel. They are to be mounted in the bottom of the cabinet. In the ABS version a protective tray is supplied in the packaging.

The batteries should be connected in series using the series link wire provided and located within the panel enclosure. The red and black battery leads from the Power Supply (TB2) should be run to the batteries in such a way that there is no risk of them being damaged, and then connect the red wire to the positive terminal and the black wire to the negative terminal.

The panel's sophisticated battery monitoring protects the batteries against deep discharge by activating a cut off circuit when the stand-by supply voltage reaches approx 21 volts. If batteries are not fitted, are discharged or in poor condition, the “FAULT" LED will be illuminated.

5.2.2 Battery Cable Test

Battery cable fault detection is only available when using the PSU 2397 3 Ampere power supply.

A “BATTERY CABLE FAULT” is registered when the combined internal resistance of the battery and the resistance of the battery leads exceed approximately 1.2Ω. This test is conducted every 8 seconds in conjunction with the check for battery missing.

5.2.3 Battery Capacity Test

This test is conducted every 36 hours for duration of 36 minutes provided the system is not in the Fire condition.

During the test, the charger is turned off and the PSU dummy load is engaged; if the battery voltage drops below 24.4V during this time, the load shall be disengaged and a “BATT CAPACITY FAULT” shall be reported and latched for the remaining duration of the test.

If the system enters the Fire condition during the test, the test shall be aborted and if the system is in Fire prior to the test commencing, the test shall suspended until the Fire condition is reset.

Note: While the Battery Capacity test is in progress, the Battery Cable Fault and Charger Fault tests are suspended as they cannot be conducted concurrently.

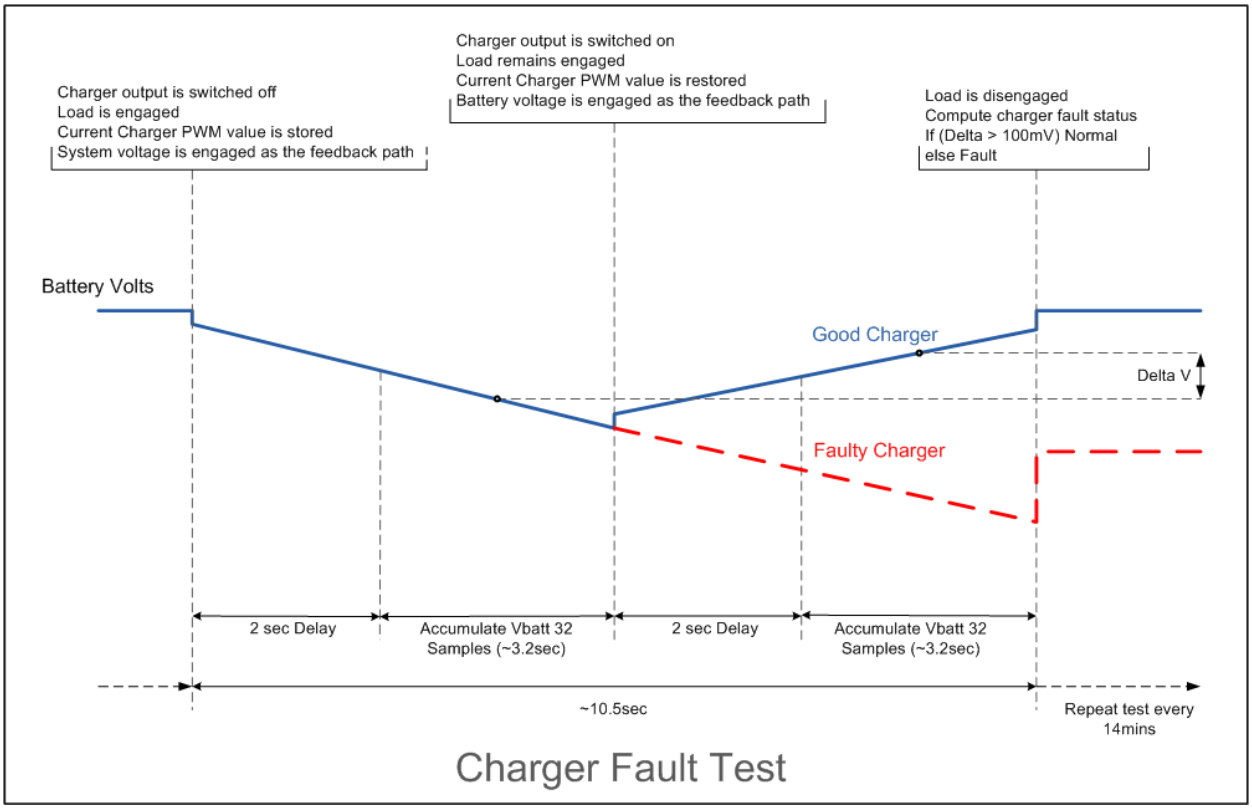
5.2.4 Charger Voltage Test

A charger low condition is recognized when the charger voltage drops less than 0.8V below the optimal charger voltage for a given temperature. A charger high condition is recognized when the charger voltage is more than 0.8V above the optimal charger voltage for a given temperature.

Temperature (°C)	Optimal Voltage (V_C)	Charger Low (V_C - 0.8V)	Charger High (V_C + 0.8V)
-8	28.2	27.4	29.0
-4	28.1	27.3	28.9
0	28.0	27.2	28.8
4	27.8	27.0	28.6
8	27.7	26.9	28.5
12	27.5	26.7	28.3
16	27.4	26.6	28.2
20	27.3	26.5	28.1
24	27.2	26.4	28.0
28	27.0	26.2	27.8
32	26.9	26.1	27.7
36	26.7	25.9	27.5
40	26.6	25.8	27.4
44	26.5	25.7	27.3
48	26.4	25.6	27.2

5.2.5 Charger Fault Test

A Charger fault test is performed every 14 minutes for duration of approximately 10.5 seconds. It effectively confirms if the charger is able to recharge the battery by discharging the battery slightly using the PSU dummy load then attempting to recharge the battery. If the charger has successfully recharged the battery (Delta V > 100mV) then no fault is reported, otherwise a charger fault is reported.



5.3 Cable Types and Limitations

All System wiring should be installed in accordance with the national wiring regulations where the panel is being installed.

To comply with EMC (Electro Magnetic Compatibility) regulations and to reduce the risk of electrical interference in the system wiring, we recommend the use of Fire-resistant screened cables throughout the installation, examples of which include the following:

6. *Front Panel Control Card*

The Front Panel Control Card interfaces to the Main Control Board by way of CN5, and supports;

- All the controls and functional indicators
- The FACP Reset
- The Configuration (CONFIG) control

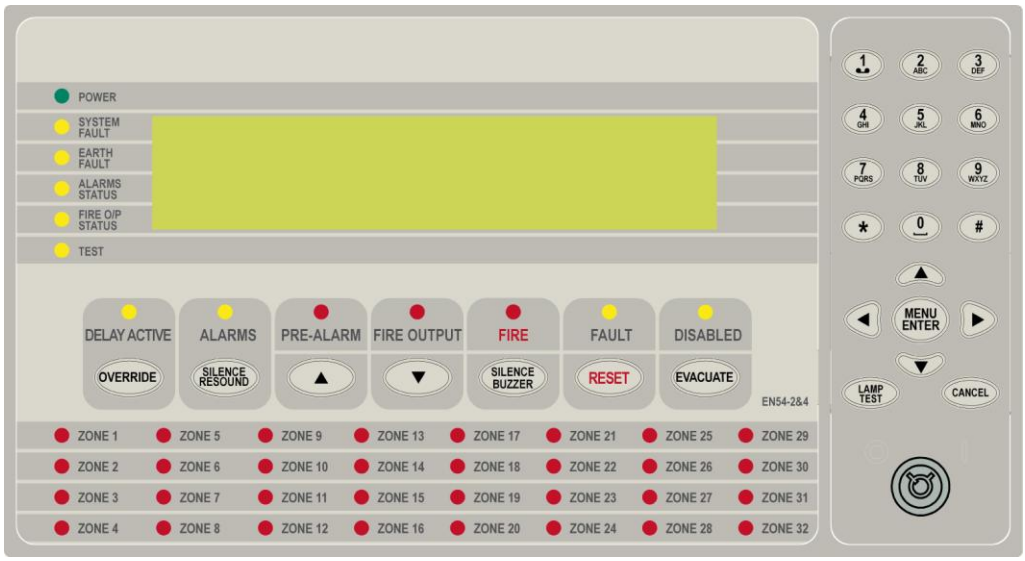


Figure 6: Front Panel Layout

6.1 Levels of Access

The FACP supports three levels of access.

Access Level 1 (Untrained User):

The FACP is in Access Level 1 by default.

Only the OVERRIDE, PREVIOUS, NEXT, SILENCE BUZZER and LAMP TEST controls are active.

Access Level 2 (Authorised User):

The key switch is optional. If the key switch is not used, then a pass-code is entered (using the alpha numeric keys) to gain access to level 2 or 3.

To enter Access Level 2 the user has to enter a password using the alpha numeric keys. The password entry screen will be presented if any higher access level key is pressed. Alternatively turning the Keyswitch to the ON position will force the panel into access level 2. The user is able to navigate through the menu system in access level 2 however the ENTER PASSWORD menu item will be displayed in place of the PROGRAMMING and SETUP menus.

☞ **Note:** *PROGRAMMING and SETUP menus are not accessible during a Fire condition*

If ENTER PASSWORD is selected, the password entry screen will be presented allowing the user to enter the access level 3 password. The user is able to enter the password when the password screen is presented.

The access level 1 controls are active as well as SILENCE RESOUND, RESET, EVACUATE and MENU ENTER controls. All menu items are active apart from the programming menu.

The Door switch if fitted can facilitate entry into access level 2.

Access Level 3 (Authorised Service Technician/Engineer):

All access level 1 and 2 controls, PROGRAMMING, SETUP menus and individual sounder output disable options are active.

If ENTER PASSWORD is selected, the password entry screen will be presented allowing the user to enter the access level 3 passwords.

6.1.1 Passwords

The FACP will support 99 user programmable passwords. Each password includes an access level which can be either 2 or 3 corresponding to the access levels and a unique ID which ranges from 1 to 99. There is also a facility in the access level 3 SETUP menu to add, edit or delete passwords.

☞ **Note:** *Onsite programming only allows for the editing of ID1 and ID2 all other ID's need to be set using the* ***LoopMaster*** *configuration tool*

All passwords are a 4 digit numeric entry and the system default passwords are as follows:

ID	Password	Access Level
1	3333	3
2	User Defined	User Defined

Password Conditions

1. All password IDs that have not been assigned a password are set to access level 1 to prevent false entries.
2. The entering of a password will be logged using the ID.
3. If no key is pressed for 5 minutes the access level will timeout to the default access level being 2 or 1 depending on the key-switch position.
4. The access level timeout and key-switch operations will also be logged.
5. The intervals between key presses when entering the password must not exceed 30 seconds otherwise the password entry screen will timeout returning the panel to the default access level.
6. The FACP can also be forced to the default access level by pressing the CANCEL key 4 times while default screen is displayed.

6.1.2 Misplaced Password

In the situation, where access to the panel is required, and the passwords are not available, there is a facility for the appropriate service personnel to gain access to the panel.

The procedure is as follows:

1. The password " 

, 
, 
, 
, 
, 

" is entered.
2. The panel responds by displaying a unique 10 digit key
3. Contact the local Ampac Service Centre and they will issue a temporary password
4. The temporary password is entered, and access is gained to the panel. The operator can now access the password menu and set the passwords up as appropriate for the installation

The temporary password will be deleted, the next time a password is successfully entered into the FACP.

6.2 System Controls & Indicators

The front panel has fourteen push button controls, a key switch and an alpha numeric keypad.

Controls, Normal – Enabled (Key Switch)

CONTROLS ENABLE KEY SWITCH. = OFF, = ON

If the key switch is in the OFF position (access level 1), then the OVERRIDE, PREVIOUS, NEXT, SILENCE BUZZER and LAMP TEST controls are active.

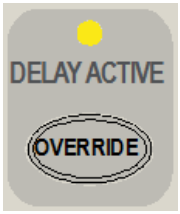
If the key switch is in the ON position (access level 2), then the SILENCE RESOUND, RESET, EVACUATE and MENU ENTER controls are also active.

The key switch is optional. If the key switch is not used, then a pass-code is entered (using the alpha numeric keys) to gain access to level 2 or 3.

☞ **Note:** *Keys, when pressed, will present an audible feedback "beep" to the user.*

Delay Active / Override

Available at access level 1 and above



Delay Active – Indicator is illuminated steady when one or more zones are configured with Investigation delays and Delay Mode is active. The indicator will flash if any Investigation delay timer is running.

If the override control or evacuate control is activated while the investigation delay timer is running, then the indicator will go steady and the investigation zone enters the fire condition.

The indicator will only be OFF if:

- The Delay Mode is OFF
- No investigation delays are configured
- The panel has switched to day or night mode where no delays have been configured.

Override – Momentary push button. When Delay Mode is ON and one or more zones configured with investigation delays have their delay timer running, activating the OVERRIDE control overrides the investigation delay timer allowing the zone or zones to enter the fire condition immediately.

Alarm - Silence / Resound Alarms

Available at access level 2 and above

Alarms – The indicator is lit when all the sounders in the system are disabled indicating that re-enablement is available via the SILENCE RESOUND control.

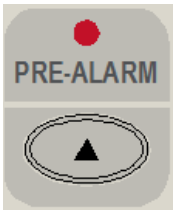
Silence Resound – Momentary push button. Used to disable all the alarm devices in the system. Toggle function to re-enable the alarm devices, if the ALARMS indicator is lit.

If the panel door is closed when sounders are disabled, the sounders inoperative buzzer shall sound continuously until the door is re-opened or sounders re-enabled.

Available at access level 2 and above

Pre-Alarm / Previous ▲

Available at access level 1 and above

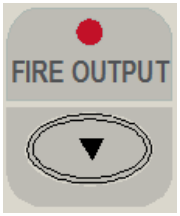


Pre-alarm – Illuminated when one or more devices are in the pre-alarm condition and not disabled

Previous ▲ Momentary push button. Used to scroll the LCD display to view the previous available entry.

Fire Output / Next ▼

Available at access level 1 and above



Fire Output – Illuminated steady if a designated fire output has been activated and flashes if a FARE input is configured and active and remains so until the fire alarm condition is reset.

Next ▼ Momentary push button. Used to scroll the LCD display to view the next available entry.

Fire / Silence Buzzer

Available at access level 2 for the alarm buzzer, available at access level 1 and above for the fault buzzer

Fire – Indicator is illuminated when one or more devices are reporting a FIRE condition or the evacuate control has been activated.

Silence Buzzer – Silences the panel buzzer. Buzzer is activated under the following conditions:

Alarm Buzzer -

- Fire condition

Fault Buzzer -

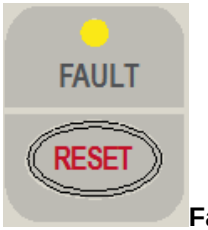
- Fault with loop devices
- Fault with the loops
- Fault with the fire alarm routing equipment or fault warning routing equipment
- Fault with alarm devices or circuit
- Fault with connected modules, cards and boards
- Fault with secondary power supply
- Fault with main power supply

☞**Note:** *Both the Fire and Fault Buzzers are disabled by default and can be programmed to be enabled.*

☞**Note:** *Sounders Inoperative and SGD Interlock are not silence-able.*

Fault / Reset

Available at access level 2 and above



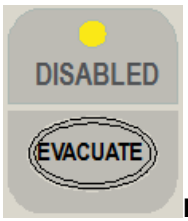
Fault – Indicator illuminated when there are one or more faults on the system.

- Fault with loop devices
- Fault with the loops
- Fault with the fire alarm routing equipment or fault warning routing equipment
- Fault with alarm devices or circuit
- Fault with connected modules, cards and boards
- Fault with secondary power supply
- Fault with main power supply
- Lit in conjunction with System Fault indicator

Reset – Momentary push button. Pressing RESET returns the FACP to its normal default state, by clearing all fire alarm conditions, updating the relevant indicators and outputs. If fault conditions are cleared they shall be re-established within 20 seconds

Disabled – Evacuate

Available at access level 2 and above



Disabled – The indicator is illuminated when one or more zone detectors, loop devices or panel outputs are disabled.

Evacuate - Momentary push button. Turns on all alarm devices, illuminates the FIRE indicator, activates the output to the fire alarm routing equipment and announces the evacuate condition on the LCD.

Also if there any alarm devices configured with delays, the evacuate key will override these and force the alarm devices into evacuate.

☞ **Note:** *If there are any zones configured for Investigation or Dependency A, B or C, these shall be bypassed when the EVACUATE key is pressed.*

Lamp Test – Pressed for 2 to 3 seconds turns ON all indicators (including any ancillary cards), segments of the LCD and the local buzzer in a logical sequence.

Cancel – Used to cancel a navigation step or entry in the MENU function

MENU / ENTER, 0-9, *, #, CANCEL and ◄▼▲► - Provides a means for entering the menu system, and carrying out interrogation, control and programming activities

Illuminated to show the presence of mains power and flashes when the mains have failed

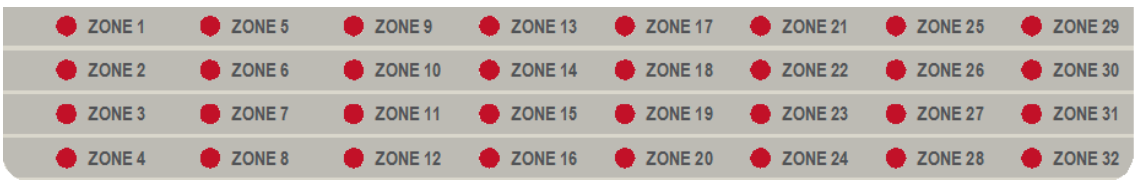
Illuminated when the FACP is unable to provide mandatory functions. Indicator is latched, until cleared by the RESET control

Illuminated when there is an earth fault detected on the panel

Illuminated steady if any of the alarm devices (sounders and/or strobes) have been disabled and flashes if any of the alarm devices (sounders and/or strobes) are in fault. Disable has priority over fault

Illuminated steady if the fire output has been disabled and flashes if the fire output is in fault (open or short circuit condition). Disable has priority over fault

Illuminated when the panel is in the “Walk Test” mode.



Illuminated when the associated zone1-32 is in alarm.

6.3 Front Panel Control Keys

6.3.1 Trial Evacuation

On the door of the ***LoopSense*** a key switch is provided for Evacuation, operating this key switch will cause the system to operate the bells. This will override any other bell isolate or silence condition.

☞**Note:** *Operation of the Evacuation Key will not initiate a call to the Remote Receiving Station*

6.3.2 Silence Alarms Brigade Use Only

The Brigade Silence input is used for connection with a Bulgin 6083/C key switch labelled “SILENCE ALARMS. BRIGADE USE ONLY”.

When activated (upon restoration of the switch to the normal position from the silence position),

- Fires originating from conventional zones, detectors and manual call points shall have their “FIRE” condition replaced with a “BRIGADE SILENCED” status. Note this includes Fire conditions undergoing a zone Dependency C or Investigation function and fires from the Agent add-on fire input.
- All outputs and sounders programmed to activate upon a fire condition from any of the above sources shall de-activate when the source condition becomes “BRIGADE SILENCED”.
- The “BRIGADE SILENCED” status is categorised as a fault condition status and hence shall perform all functions associated with the fault condition including activation of the defect signal on the SGD.
- The “BRIGADE SILENCED” fault condition is latching and can only be cleared upon a reset; it cannot be overridden by any other impending status condition from the same source.

After activation of the silence alarms key switch, all zones and devices which are not silenced shall function as normal and perform all standard operations including entering into the fire condition.

The active state of the DBA and Trial Evacuation inputs cannot be brigade silenced.

Changes of state of the Brigade silence input shall be logged under the system events.

☞**Note:** *This is a Brigade use only Keyswitch*

6.4 Liquid Crystal Display

LCD is used to display abnormal conditions and for interrogation, control and programming activities. When the FACP is in its normal state a default screen is displayed.

The associated backlight is energised;

- In access level 1 during initialisation
- for 1 hour if a new fire or fault event occurs
- for 25 seconds following any key press, otherwise it shall be switched OFF.

In access level 2 or higher the backlight shall always be ON.

Alarm, Fault and Isolate information is accessed through the Main Menu.

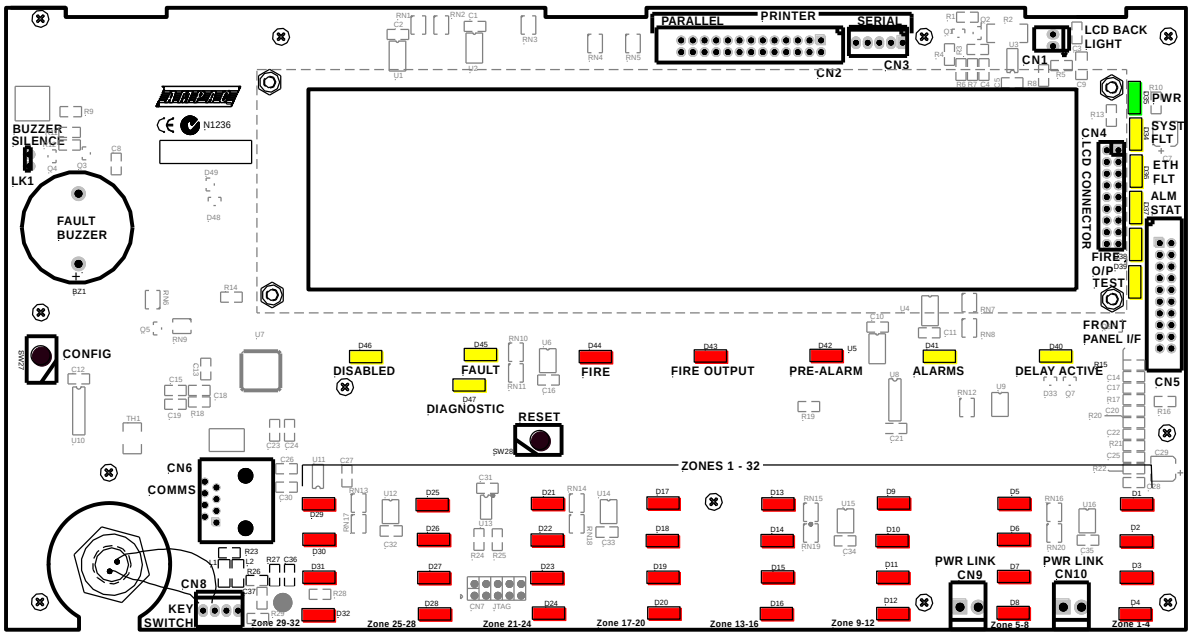


Figure 7: Control Card PCB Layout

7. Main Control Card

The Main Control Card and its front display panel combined with the Power Supply / Battery Charger / batteries forms the basis for the LoopSense FACP.

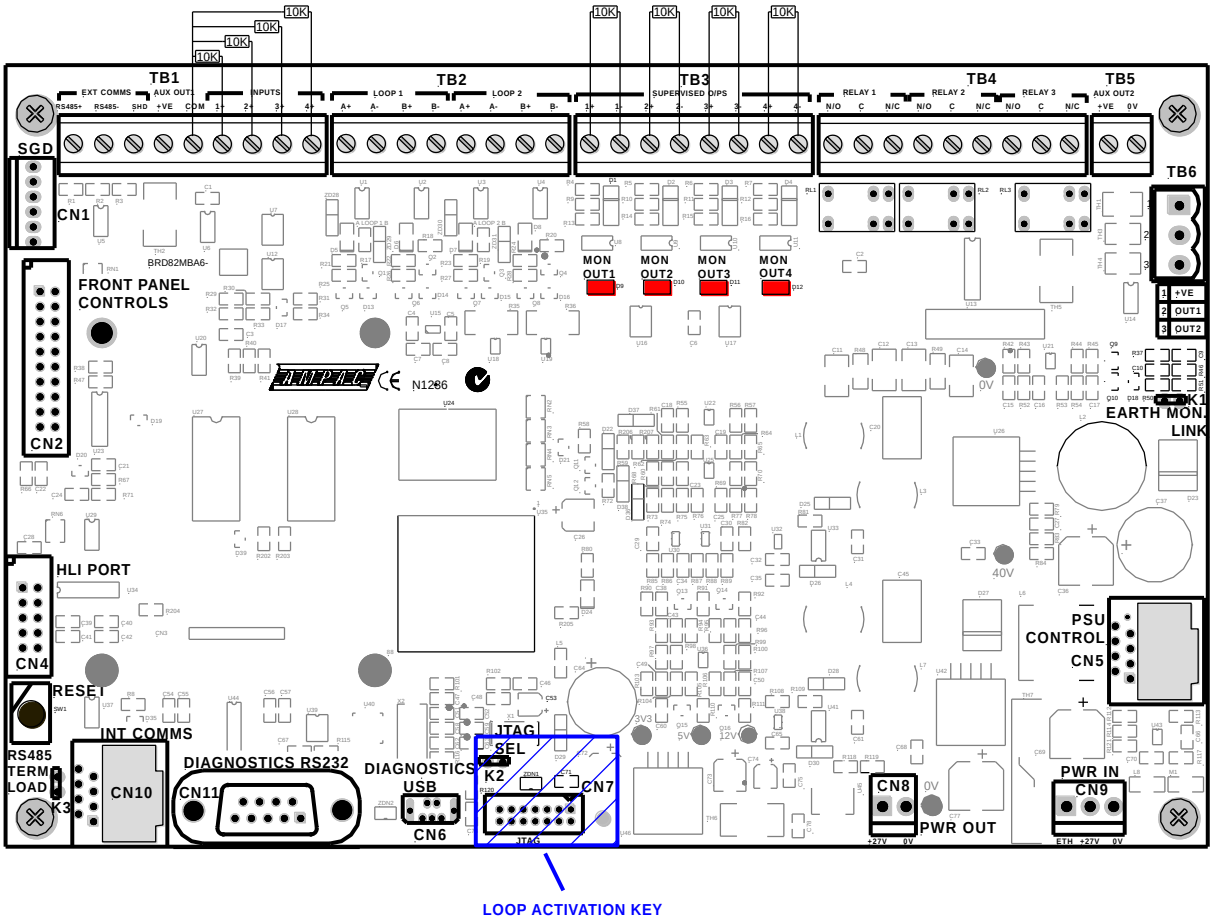


Figure 8: Main Control Card Top and Bottom Layout

7.1 Input / Output System Connections

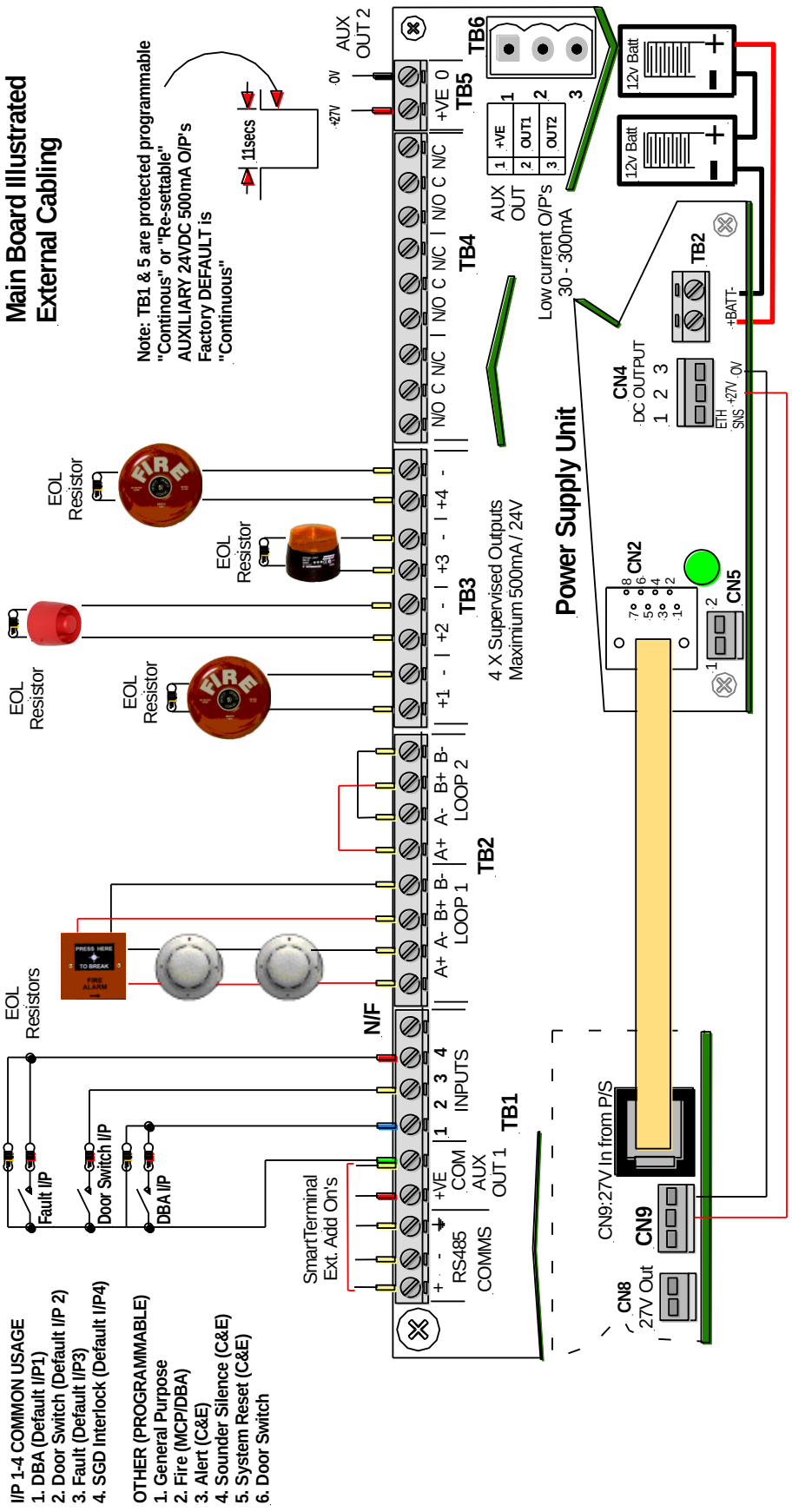


Figure 9: Simple Wiring Diagram of the FACP

Cabling

Connector	**Purpose /Pins**
CN1	Not used.
CN2	Front panel Control / LCD Interface
CN3	Network Connection (Future)
CN4	High Level Interface (Future)
CN5	Monitoring / Coms from the Power Supply.
Pins	❶ & ❽ 0V ❷ PSU Sense ❸ PSU Adjust ❹ Charger ON ❺ Batt Load ❻ Temp sense ❼ Batt V Sense.
CN6	USB Diagnostics
CN7	Loop Activation Key for second loop
CN8	+/- 27VDC Out
Pins	❶ +27VDC ❷ 0V
CN9	+/- 27VDC and earth from the Power Supply / Charger.
Pins	❶ Earth ❷ +27VDC ❸ 0V
CN10	Coms and +/- 27VDC and earth to internal Add-Ons.
Pins	❶ &❽ 27VDC ❷ & ❼ + 0V, ❸ & ❹ RS 485 Bus, ❺ Tx. Enable
CN11	Diagnostics RS232
	❶ CD, ❷ RXD, ❸ TXD, ❹ DTR, ❺ 0V, ❻ DSR, ❼ RTS, ❽ CTS, ❾ RI

8. Wiring to the Main Card

8.1 Introduction

The system is microcontroller based, with the main processor situated on the Main Board. A secondary microcontroller is used on the front panel card to control the user interface functions such as the display and keyboard. System program and configuration memory is "flash" EEPROM in design. Common interfaces are built onto the main board while other interfaces are provided via Add-On boards.

8.2 Communication Interfaces

- *RS485 Add-On Module Port* – RJ-45 (CN10) and terminal block connectors (TB1 1, 2, 3), switchable for internal and external communications, connect to Ampac designed Add-Ons.
- *PC Interface port* – USB Device CN6 and RS232 DB9 connectors (CN11). If the USB port is connected it will disable the RS232 port. This port is for panel diagnostics, firmware and configuration download, remote FACP control, TCP/IP and serial modem interfacing.
- *JTAG Interface* – 14-way IDC connector (CN2) for panel firmware development
- *Power Supply Interface* – RJ-45 connector (CN5) - monitoring and battery charger control.
- *Fire Only Mode* - The Fire Only mode will allow the panel to only print fire events.
- *Event Mode* - Event mode will allow the panel to print all printable event updates.

8.2.1 External RS485 Communications Port (TB1)

An RS485 9600 baud communications port is provided to allow connection of remote Add-Ons.

Remote Cards

The number of and type of Add-On's that can be installed on the external communications bus are:

- SmartTerminal
- LED Index

This port;

- Must always be terminated
- Has a nominal cabling impedance of 100Ω
- Termination impedance is AC coupled to reduce the systems quiescent current
- The cable to the port is terminated into a screw terminal block
- A fault on lines to external add-ons does not impede communications to any internal modules

The RS 485 output drives the remote cards and mimics up to a distance of 1.2km from the panel itself. The external cabling (2x2 shielded pair plus power) is wired to TB2 +, - and earth.

☞**Note:** *If a fault occurs on the communications bus the common FAULT LED is illuminated. The fault details can be displayed on the LCD by selecting the Faults Menu.*

Main Card Comms Link K3

LK3 **MUST** be inserted when only the Main Card is used as an FACP. If this is not the case and any RS485 add-ons are connected a link is inserted in the last board to complete the communication circuit.

8.2.2 Internal Communications Port

The 9600 baud internal communications port is provided to permit the connection of Add-Ons within the FACP. The port also provides the 27VDC (up to 400mA) to power the modules. The port conforms to AMPAC's standard RJ45 8 pinned design.

Pin	Function
1	Power +VE
2	Power –VE
3	Direction (future use)
4	RS 485 communications A
5	RS 485 communications B
6	NC
7	Power –VE
8	Power +VE

8.3 Inputs

8.3.1 Supervised Digital Inputs

Four supervised inputs are provided. Each input is supervised independently and designed to operate with a 10K end-of-line resistor. Termination is via a 5mm pitch screw terminal block.

	INPUT 1	INPUT 2	INPUT 3	INPUT 4
COMMON	General Purpose			
USAGE	Fire (MCP/DBA)			
CONFIGURATION SETTINGS OF INPUTS 1 – 4 BESIDE THE DEFAULTS LISTED BELOW	Fault/Defect Class Change Evacuate Alert (C&E) Sounder Silence (C&E) Master Reset Door Switch FARE			
NZ DEFAULT	I/P 1 DBA	I/P 2 DOOR SW	I/P 3 FAULT	I/P4 SGD INTERLOCK

Resistance and Operational Criteria

Line resistance	Sensed condition
0Ω – 325Ω	Short circuit
325Ω – 6KΩ	Active condition
6KΩ – 17.5KΩ	Normal condition
Above 17.5 KΩ	Open circuit

8.4 Fire Detector Analogue Loop Interface TB2

Two loop driver circuits capable of sourcing a maximum of 500mA of current for loop devices are provided. The connection to the analogue loop is capable of communication with devices using Apollo Discovery/XP95 protocols. Termination is via a 5mm pitch screw terminal block.

The loop is capable of being driven and sensed from either side or both sides of the loop simultaneously. To reduce heating effects the driver is based on D-class switching topology and operates in redundant mode.

The return signal of the loop is sensed using analogue to digital converters which allows analysis of total loop current and improves rejection of incorrect signals. A noise reduction technique utilizing common mode noise rejection has also been employed.

☞ **Note:** *The Loop Out wiring should always be terminated to the Loop IN. Open ended loops are disallowed under the NZ standard.*

8.4.1 Detector loop Isolator Installation

In applications where it is not necessary to use an isolating base for each detector, up to 20 detectors may be installed between isolating bases.

☞ **Note:** *Refer to Apollo Isolating specifications and guidelines for further details.*

If a short circuit or abnormally low impedance occurs, the base isolates the negative supply in the direction of the fault. When the short circuit is removed the power will automatically be restored.

☞ **Note:** *Isolating base is polarity sensitive.*

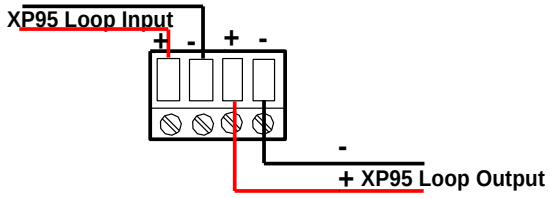


Figure 10: Terminal Block Connections

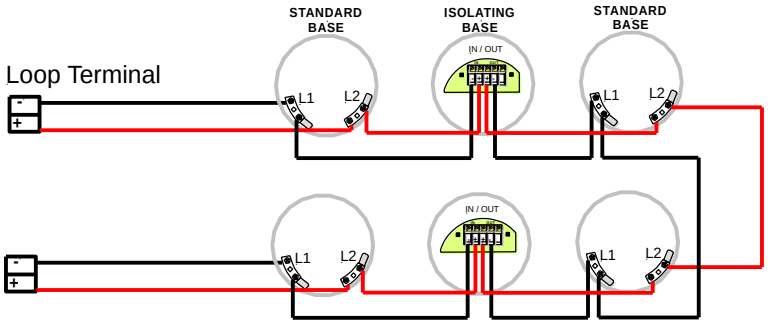


Figure 11: Typical Loop Arrangement

The number of isolating devices on the loop can limit the maximum loop cable length depending on the type of cable used and the total loop current. Refer to the tables below for reference.

Number of Isolators	0	5	10	15	20	25	30	35	40	45	50
Loop Current Total(mA)	MAX CABLE LENGTH using 1.5mm²										
50	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
200	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	960
250	1000	1000	1000	1000	973	933	893	853	813	773	733
300	971	931	891	851	811	771	731	691	651	611	571
350	850	810	770	730	690	650	610	570	530	490	450
400	756	716	676	636	596	556	516	476	436	396	356
450	680	640	600	560	520	480	440	400	360	320	280
500	618	578	538	498	458	418	378	338	298	258	218

Number of Isolators	0	5	10	15	20	25	30	35	40	45	50
Loop Current Total(mA)	MAX CABLE LENGTH using 2.5mm²										
50	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
100	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
150	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
200	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
250	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
300	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	952
350	1000	1000	1000	1000	1000	1000	1000	950	883	817	750
400	1000	1000	1000	1000	993	926	859	793	726	659	593
450	1000	1000	1000	933	867	800	733	667	600	533	467
500	1000	964	897	830	764	697	630	564	497	430	364

8.5 Outputs

8.5.1 Supervised Outputs TB3

Four supervised output are provided on the Main Board. These supervised switched outputs supply a nominal 24VDC, at up to 750mA. Outputs are independently controlled and supervised. Supervision of the outputs for short, open and earth faults applies in both the ON and OFF state.

The supervised outputs use a 10K resistor as an end-of-line device. Line conditions are supervised as outlined below. Dependant on the usage of the input some conditions may be ignored.

Line impedance	**Reported condition**
0 – 1.5KΩ	Short Circuit fault
1.5K – *12KΩ	Normal
*12KΩ to ∞	Open Circuit fault
I >= 650mA when Output is ON	Over Current

*The open circuit threshold in the ON condition may vary significantly with tolerance and temperature approximately ranging between 11K and 20K. Termination is via a 5mm pitch screw terminal block.

8.5.2 Relay Outputs TB4

Three relay outputs are provided. These outputs are designed to be able to switch loads considered to be predominately resistive as listed below.

Switching voltage	**Maximum switching current**
24 V DC	1 A
24 V AC	1 A
50 V DC	250 mA
40 V AC	250 mA

The relay contacts are “voltage free” and have some degree of protection in reference to the system voltage. Termination is via a 5mm pitch screw terminal block.

8.5.3 Auxiliary 24VDC Outputs TB1 & 5

Programmable Continuous / Re-settable (11 seconds) independently switched 24V DC (nominal) 1A output.

Each auxiliary output is supervised for continuity of power output hence a short circuit on the output terminal will register as a fault. Overload circuit protection is also included to prevent a short circuit on the output from damaging the system. Termination is via 5mm pitch screw terminal block.

8.5.4 Low current outputs TB6

Two low current open collector outputs suitable for driving the coil of a relay are provided.

The outputs are capable of supplying a minimum of 30mA but no more than 300mA when an overload is applied for more than 5 seconds.

☞ **Note:** *Low Current Outputs are defaulted to Fire and Fault when a SGD board is fitted and are reserved for SGD use.*

8.5.5 Debug Connection CN6 & 11

The main board provides a debug connection with only one connection being operational.

8.5.6 Universal Serial Bus Connection CN6

A Universal Serial Bus connection is provided. Generally this will be for connection to a laptop. Compatibility will be to USB standard V2.0 minimum. Termination is via a USB Type B connector or USB Type B connector.

8.5.7 RS 232 Connection CN11

A serial connection compatible with RS232 standard is provided. The serial port is DTE style (Device Terminal Equipment) which enables connection to a MODEM communicating at up to 115,200 bps.

The communication lines are

- TXD - Transmitted data from system.
- RXD - Data received by system.

The following lines can also be provided.

- RI - Ring indication
- DSR - Data Set Ready
- DTR - Data Terminal Ready
- CD - Carrier detect.

Termination is via a 9 pin 'D' canon connector designed to be compatible with the IBM PC pin configuration for serial communication interfacing.

8.5.8 Earth Monitoring

The system provides earth monitoring to detect a short circuit from system cabling to the building earth.

Earth Detection Limits

A resistor of 50Ω placed between a circuit and building earth should be registered as a fault, whereas a single resistor of value greater than 500KΩ should not be registered as a fault.

8.5.9 Signal Generating Device (SGD) Connections (CN1)

The SGD (302-678) interfaces the Main Control Board to a line transmitter to facilitate monitoring by a Fire Brigade or monitoring service.

Interconnection is from the SGD (CN2) to the Main Control Board (CN1).

Test of the FACP and SDG monitoring should be carried out in accordance with the LTX SDG Input Interface Specifications.

To comply with the latest standards the software has been upgraded to Version 3.

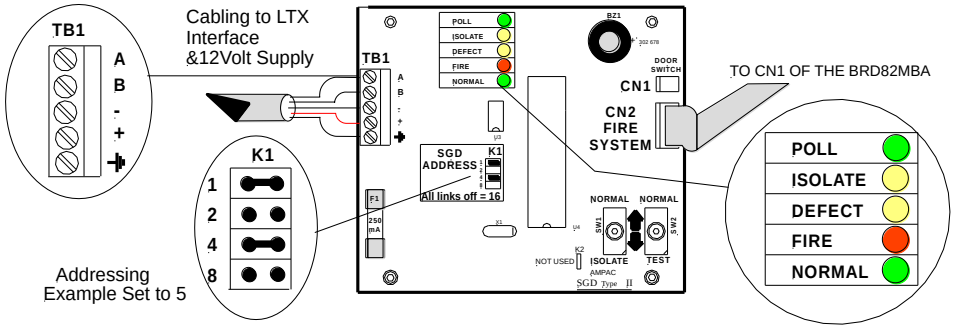


Figure 12: SGD Layout

Size	96mm x 120mm
Power requirements	9 – 15VDC
Maximum Current	25mA
Inputs	Four normally closed contacts, must be voltage free
Output	RS485
Data Rate	300 baud per second
Impedance	470Ω
Indicators	4 x Input state and 1 x Polling LED

9. *Adding Control and Monitoring Facilities*

The internal communications connector CN10 provides RS485 serial communications to internal Add-Ons. CN10 on the Main Card cables to CN1 or 2 on the internal Add-Ons and TB1/1, 2, 3 cables to CN1 or 2 on the remote cards.

9.1 LED Index

The LED Index is designed to provide remote indication of the current status of a NZ ***LoopSense*** FACP.

The LED Index provides common Fire, Defect, DBA and system Normal indicators as well as up to 28 Zone Alarm Indicators.

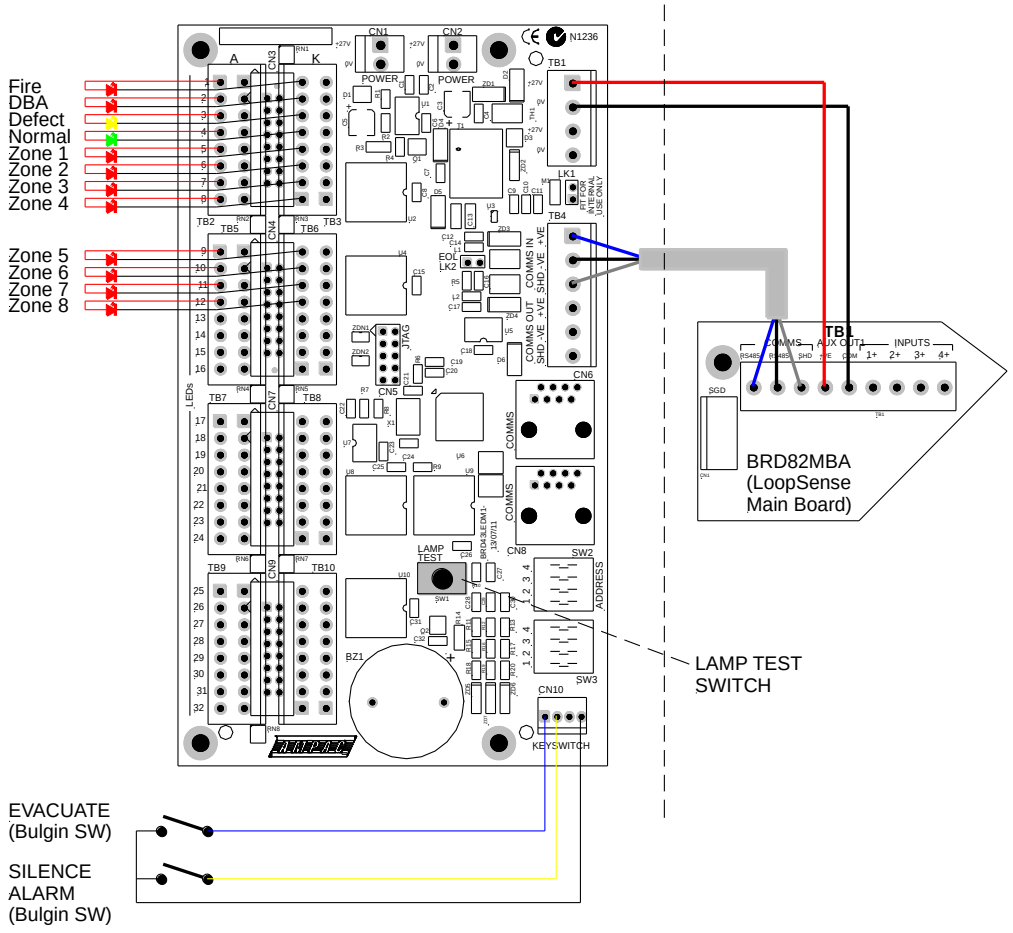
LED Function	Active State	LED Colour	Functional Operation
FIRE	ON STEADY	RED	Illuminated when Fires are present in the system
DBA	ON STEADY	RED	Illuminated when the DBA condition is active
DEFECT	ON STEADY	AMBER	Illuminated when Faults are present in the system
NORMAL	ON STEADY	GREEN	Illuminated when the System is in its Normal State

The LED Index also provides connection for the Brigade Silence Alarm and Evacuation Key.

The LED Index is connected to the Main PCB via RS485 Communications and Common Power

The LED Index is supplied as a completely configurable panel and can be formatted as either a Front or Rear Service Panel.

The panel is provided with a poly carbonate plate which can be silk screened / engraved showing the layout of Zones within the Building.



Note:

***T**he Brigade Silence and Trial Evacuation key switches are consistent in operation to the matching key switches located at the panel.*

9.2 Alert / Evacuation Amplifier

The EVAC50W24V is a 100VRMS-Line Amplifier whose features include;

- The generation of the 'Alert' and 'Evacuation' tones with verbal messages as specified by NZS4512:2003.
- Driving up to 50W (with a 27.4VDC supply) into 100V PA loud speakers,
- The 100Vrms output line is overload and short-circuit protected and is monitored by the amplifier circuit with the status transmitted to the panel.
- Control through a set of signal (BELL) inputs. Multiple amplifiers can be daisy chained together (BELL IN – BELL OUT) or individually zone operated if connected to a Bell Sounder Control Board.
- The ability to be powered directly from the panel battery or from a separate DC source.
- Low current draw - when not active (100V line monitoring only) the amplifier draws less than 35mA.
- An optional microphone input board is available which can be used for public address (PA) or 'Fire Microphone' operation.

Board Dimensions:	97mm x 150mm. Height 50mm from bottom of PCB
Mounting Dimensions:	89mm x 130mm.
Operating Voltage:	20 - 29Vdc, nominal 27.4Vdc
Quiescent Current:	30mA RS485: <30mA @ 27.4Vdc
Operating Current:	2.5A @ 27.4Vdc nominal with 50W load.
Power Output:	50W @ 100V line: 27.4Vdc supply – overload and short-circuit protected
Tone:	Evacuation tone and verbal message, compliant to NZS4512:2003. Programmed using the LED base address dials and program-jumpers.
Monitoring:	Fully monitored for open, short circuit or overload (10kΩ, 1W EOL resistor)

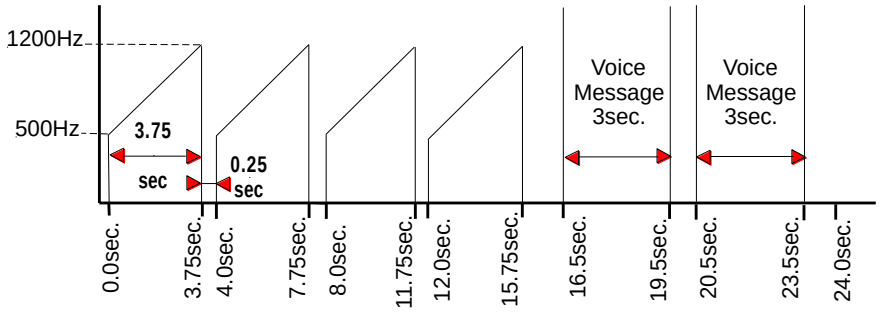


Figure 13: NZS4512 Evacuation Signal with Voice Messaging

Operation:

The Amplifier is connected to the FACP Warning System output as shown in the connection diagrams. The '+' and '-' terminals are connected to the corresponding '+' and '-' terminals on the amplifier.

In the 'Normal' state, the FACP monitors the 100V line 10K 1W EOL resistor by applying an inverted voltage to the amplifier input terminals. In this state the amplifier connects the 10K 1W EOL line resistor to the Bell input. A 10K 1W EOL resistor must be used across the 100Vrms line for correct operation of the amplifier monitoring circuit.

In the 'Alarm' state, the FACP reverses the bell voltage causing the amplifier to activate and output a repeating 'Evacuation Tone followed by a voiced Evacuation Message' onto the 100Vrms loudspeaker circuit. The amplifier is NOT monitored during the 'Alarm' state.

If the amplifier output is overloaded, or the supply voltage becomes 'Off-Normal', the amplifier will signal a defect by turning on the Defect/Fault LED (See Table Below).

Fault LED	ON LED	Defect Description
Off	Off	Amplifier inactive
Off	Steady	Amplifier active
Steady	Flashing	Supply Voltage below 10V or above 15V
Flashing	Steady	Amplifier output is overloaded

The 100Vrms Line may have a maximum of three spurs. For these configurations an EOL resistor of the appropriate value must be installed at the end of each spur (See Table Below).

Number Of Spurs	Number Of Spurs
1	1 x 10K 1W
2	1 x 22K 1W on each spur
3	1 x 33K 1W on each spur

Installation Criteria:

- Capacitively-coupled 100Vrms PA Speakers must be used with the 50W Amplifier. The capacitor must be bipolar and able to withstand 250V peak line voltage. The value should be around 1uF per watt of power for each speaker.
- 100Vrms speaker wiring must be separated from ELV (Extra Low Voltage) wiring.
- Loading of the 100Vrms line must not exceed 50W.
- An excessive load will cause the Amplifier to current limit and shutdown. The symptoms for this may be interruptions in the audio output and two or more amplifiers broadcasting out of synchronization.
- Loading of the bell output must not exceed the maximum fuse (FACP Bell Circuit Fuse 4 = 2A) or relay (50W Amplifier Line Relay maximum contact current = 3A) rating.

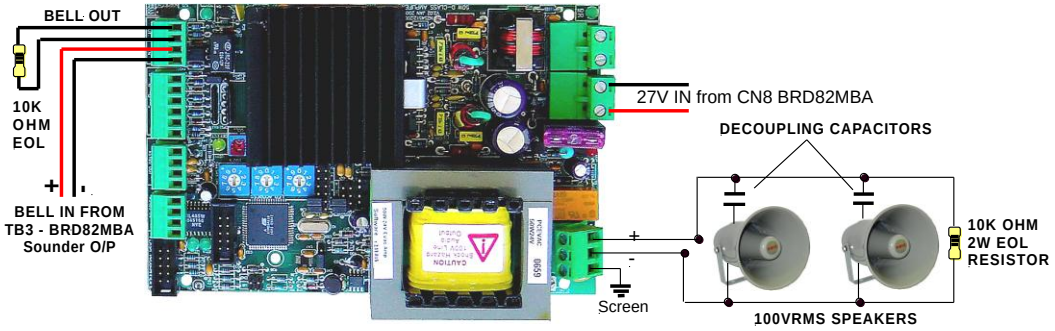


Figure 14: Basic Connection Diagram

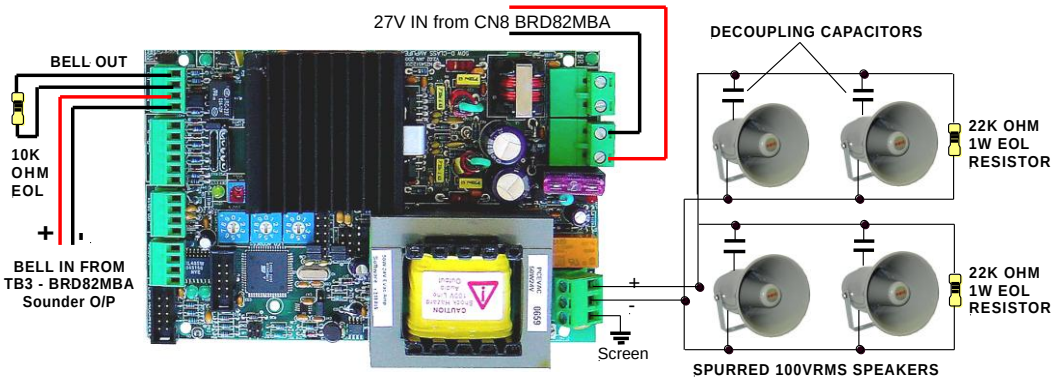


Figure 15: Spurred Speaker Wiring Diagram

9.3 *SmartTerminal*

SmartTerminal connects to the ***LoopSense*** Fire Alarm Control Panel (FACP) via the RS485 multidrop communication port. Generally it is designed to be used anywhere where the status of the FACP is required to be monitored by local personnel and limited control is required.

SmartTerminal complies with NZS4512 and designed for use with the ***LoopSense*** series of FACP's.

- 4 line by 40 character LCD with backlight and navigation keys ▲ ▼ keys allow the SmartTerminal to be used for FACP operation and interrogation. Note the backlight is only energised when alarms are present, a key has been pressed or controls enable key switch is enabled
- Buzzer and system Reset. For NZS4512 the Reset control on the Smart Terminal is configurable to perform a global reset by default or a Local Fire Reset which only resets the Local (non-brigade calling) Fire inputs/devices.
- System expansion capabilities / options:
- Flush or surface mountable enclosure.
- Controls have tactile and audible feedback of operation.
- All terminals cater for 2.5mm cables.
- Reports events from devices that are accessible to the host FACP. For example if the host FACP is configured with global access then the connected SmartTerminal reports events from all devices. If the host FACP is configured as local then the connected SmartTerminal reports events from devices that are directly connected to the host FACP.

9.3.1 Overview

SmartTerminal essentially consists of three PCBs;

1. SmartTerminal Termination Board. A Termination Board is mounted in each SmartTerminal to protect and interface the RS485 communications and 27VDC supply to the LCD Board
2. BRD82ZICC – Control, LCD Communications and LCD Driver Board

☞ **Note:** *A maximum of 30* ***SmartTerminal's*** *may be connected to the communications bus over a distance of approximately 1.2Kms*

9.3.2 Mechanical

(Externally powered) and BX1 ABS (internally powered) and consists of;

The Main Card, with all controls and indicators mounted directly onto it

- 1 X Termination Board
- 2 X ABS door keys
- 2 X 003 Enable / Disable keys
- 2 X Jumper links
- 2A Power Supply only if internally powered

☞ **Note:** A Communications Extender Board will be required if the Comms Bus in the FACP is fully utilised and / or if one is not fitted.

The front door of the ABS version is locked by way of two clips on the right hand side of the cabinet. A special locating key which has two raised pins that are inserted into the side of the cabinet unlocks the door.

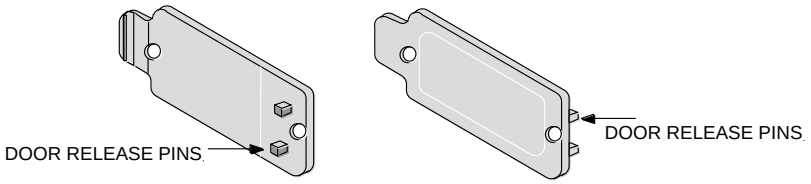


Figure 16: ABS Door Key and Front Panel Add On Card Surround Release Clip

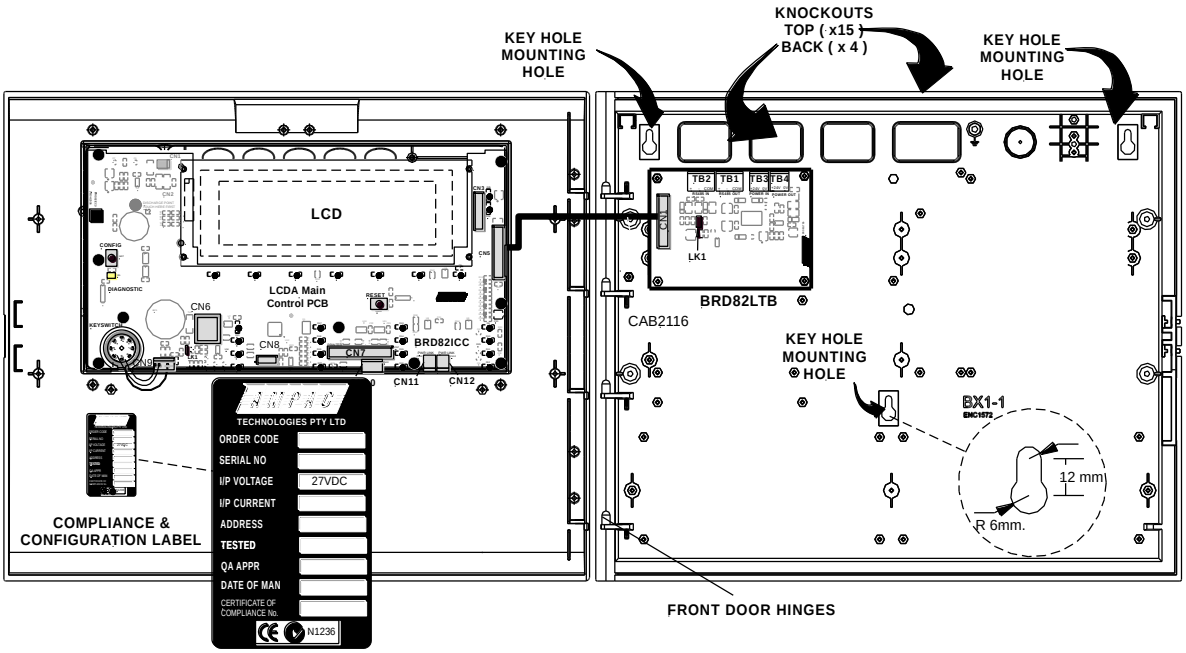


Figure 17: Typical Layout (Externally Powered) and Location of Keyholes

9.3.3 Installation & Cabling

SmartTerminal is connected to the FACP as shown below.

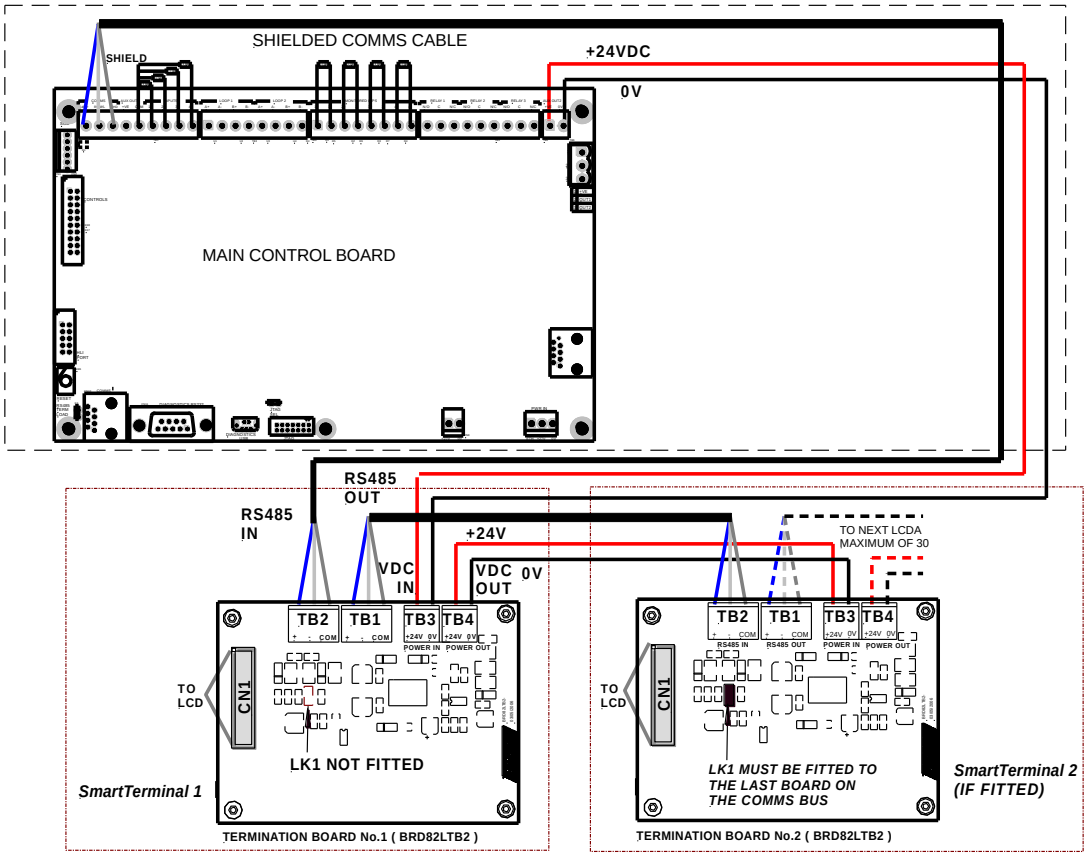


*Figure 18: Connecting **SmartTerminal's** to the FACP*

9.3.4 Setting the *SmartTerminal* Address

Open the front door; locate the "CONFIG" button situated on the left hand side of the PCB and press for 3 seconds. The buzzer and "Config" LED will double beep and flash respectively to indicate that the Configuration mode has been entered. The LCD will now display the Configuration screen. This screen consists of the code version number, current address and four adjustment markers. These markers A-, A+, C-, and C+ are used to indicate the keys that adjust the address and LCD contrast.

Use the "PREVIOUS (A-) and NEXT" (A+) keys to select the desired address. The default value for this address is 255 which is not a valid SmartTerminal address. The user must then select an address value from 1 to 30, i.e. the same address as that set in the FACP. The keys corresponding to C- (SILENCE BUZZER) and C+ (RESET) are used in a similar manner to decrease and increase the LCD contrast level. There is audible feedback for all key presses.

Once the address has been set press the "CONFIG" button again for 3 seconds and the screen will return to its default and the "DIAGNOSTIC" LED will return to a slow flash. This slow flash indicates SmartTerminal and the FACP are communicating normally i.e. the LED flashes if communications data is being received from the FACP.

☞ **Note:** *If the address is not set within the time out period of approximately 75 seconds **SmartTerminal** will return to its previous state.*

9.3.5 Operation

The operation of ***SmartTerminal*** can be considered to be in one of three states, these are;

1. Power up - when the ***SmartTerminal*** is initialising
2. Normal - when the ***SmartTerminal*** address has been set and is communicating with the FACP, reporting normal / abnormal conditions and controlling the FACP via the front panel controls
3. Fault where the ***SmartTerminal*** is in fault and/or is unable to communicate with the FACP.

Power Up

The LCD displays a message telling the operator ***SmartTerminal*** is being powered up and that the hardware is being initialized. Once the hardware has been successfully initialized set the address and ***SmartTerminal*** should automatically transition to the normal state. Should a failure occur on power up press the “RESET” button located on the LCD PCB and check the address is correct.

Normal

The Normal state is entered from the “Power-up” or a return from the “Fault” state and is displayed on the LCD if the ***SmartTerminal*** is communicating with the FACP and operating correctly. In this state the front panel Power indicator is illuminated.

Fault

SmartTerminal enters the Fault state upon;

- A hardware failure
- LCD module failure or
- A loss of communications with the FACP (indicated by the “DIAGNOSTIC” LED – not flashing and the “no communications “ message being displayed)

In a Fault condition the front panel NORMAL indicator is extinguished and the details of the fault are displayed on the LCD. The FACP will also indicate a fault in a similar manner.

Access levels

There are two levels of access.

Access level 1 only the silence buzzer, previous, next and override front panel controls are operative. All other controls operate in access level 2.

Access level 2 is entered when the key-switch is in the ENABLED position.

Figure 19: Keyswitch in the Disabled Position

Figure 20: Keyswitch in the Enabled position

9.3.6 *SmartTerminal* Controls and Indicators

All controls, except for the controls Enable / Disable Keyswitch, are of a momentary push button style and operate in exactly the same way as does the FACP itself.

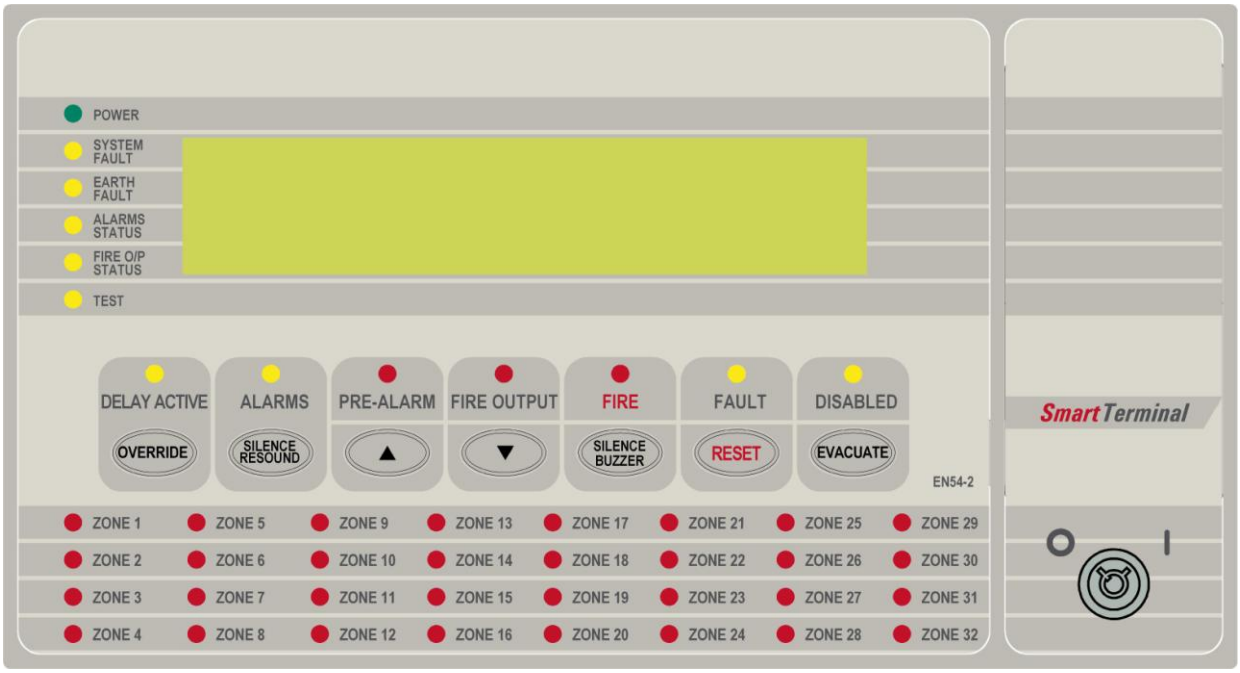


Figure 21: SmartTerminal Front Panel Layout

9.3.7 *SmartTerminal* Screen Format

There are 3 events that can be reported and displayed by SmartTerminal. The types of event are;

1. Fire
2. Faults
3. Disables.

The types of events are only associated with loop devices and detectors hence faults associated with modules, loops O/C – S/C, power supplies and so forth are not reported on the LCD.

The ***SmartTerminal*** has front panel indicators for each type of event. When the ***SmartTerminal*** is configured not to report a type of event and that event type is present (and the corresponding front panel indicator is illuminated on the ***SmartTerminal***), then a standard information screen is displayed on the LCD stating the system is not normal and the operator should see the FACP.

FIRE: If configured the screen format for reporting fire condition is:

```
<point location>      FIRE
<point descriptor>              <type>
<date> <time>                 CONTROL*
FIRE XXX OF XXX                 ◄ZONE
```

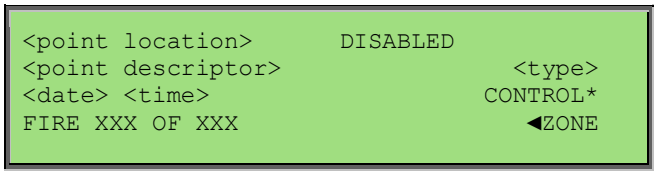
Fault: If configured the screen format for reporting fault condition is:

```
<point location>      FAULT
<point descriptor>              <type>
<date> <time>                 CONTROL*
FIRE XXX OF XXX                 ◄ZONE
```

☞ **Note:** *The fault types only relate to devices.*

In the event of a loss of communications, for a period of greater than 15 seconds the LCDA will default to the No Communications screen. The format for this screen is:

Device Isolate / Disables: If configured the screen format for reporting loop / sensor / zone disable condition is:



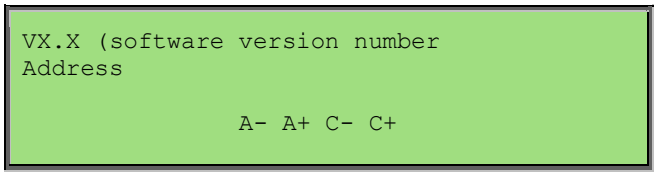
Normal / Default: The format for reporting that everything is normal is:

The screen is only displayed when there are no alarms, fault or disables on the panel.

The default screen is only displayed when there are no device alarms, device faults or device disables present on the system. The highest priority current system status will be displayed and can be one of the following listed in order of highest to lowest priority:

1. "SYSTEM EVACUATE"
2. "SYSTEM FIRE"
3. "TRIAL EVACUATION"
4. "SYSTEM DBA"
5. "SGD INTERLOCK"
6. "SOUNDERS INOPERATIVE
7. "SYSTEM GENERAL FAULT"
8. "SYSTEM PRE-ALARM"
9. "SYSTEM EMERGENCY"
10. "SYSTEM SECURITY"
11. "SYSTEM USER"
12. "SYSTEM DISABLE"
13. "PARTIAL DISABLE"
14. "SYSTEM NORMAL"

Config: The Config screen displays the following



A - , A+ : adjusts the address 1 to 30, 30 being the maximum number of ***SmartTerminal's*** that can be connected to the FACP, (default is 255 which is not a valid address).

The function keys perform the following; A – press "Previous" A+ press "Next"

C - C+: decreases [-] and increases [+] the LCD contrast level.

The function keys perform the following; C – press "Silence Buzzer" C+ press "Reset"

10. Battery Capacity Calculation

INTRODUCTION

The standby power source capacity, or battery capacity, determines how long the system will continue to operate in the event of the loss of the primary power source. It therefore becomes necessary to calculate the battery and hence power supply / battery charger capacity required for each installation.

The following calculator has been designed to determine the required capacity to meet the required standard. Should an existing panel be expanded the required battery and power supply capacity should be recalculated to ensure the panel continues to operate within the standard.

DESCRIPTION

Enter the number of units listed in the left hand column which go to make up the panel, complete the multiplication to obtain the quiescent current then multiply by the standby and alarm hours required by the standard.

POWER SUPPLY RATING

The minimum Power Supply Rating (4) is obtained by calculating the manufacturers recommended battery charge current and (see Note) (1) then adding the quiescent current of the entire system (2) and the alarm current (3).

1.	Battery Capacity (AH) (determined from Calculator) / 24 x 0.8		=	Amps
2.	**Add**	Quiescent Current of the System (Iq)	=	Amps
3.	**Add**	the extra current that is drawn when in alarm (Ia.)	=	_____Amps
4.	Minimum Current Rating of Power Supply is		=	_____Amps

☞**Note:** *The capacity of the battery shall be such that in the event of failure of the primary power source the batteries shall be capable of maintaining the system in normal working (quiescent) condition for at least 24 h, after which sufficient capacity shall remain to operate two worst case AZF's and associated ACF's for 30 min.*

☞**Note:** *When calculating battery capacity, allowance shall be made for the expected loss of capacity over the useful life of the battery. A new battery shall be at least 125% of the calculated capacity requirements, based on a loss of 20% of its capacity over the useful life of the battery.*

POWER SUPPLY & BATTERY CALCULATOR

	Criteria			Example		
Panel Configuration	***Iq Calculation*** No Off	X mA	***Iq*** = Iq	***Iq Calculation*** No Off	X mA	***Iq*** = Iq
Basic 1 Loop Panel		115		1	115	**115**
Basic 2 Loop Panel		135				**0**
						0
						0
						0
Interface Cards/Boards						
LED INdex		3				**0**
SmartTerminal		12.4		1		**12.4**
						0
						0
Loop Devices (using Loop calc)						**0**
L1 Iq				100		**30**
L2 Iq						**0**
						0
						0
						0
						0
						0
		Iq =			***Iq =***	**157.4**
Devices activating when the system is in alarm						
L1 I alarm (max 500mA)				100		**150**
Relays				10	20	**200**
Bells				4	80	**320**
Outputs = Total in mA					=	**150**
Other						**0**
		Ida=			***Ida=***	**820**
Devices de-activating when the system goes into alarm						
Aircon Relays				2	20	**40**
Electric locks				4	100	**400**
Other						**0**
		Idd=			***Idd=***	**440**

I Alarm (Ia = Iq + Ida – Idd) = mA

Ia = 157.4 + 820 – 440 = 537.4

		Criteria		*Example*
Battery capacity at end of battery life	=	(Iq x 24) + (Ia x 0.5)	=	(Iq x 24) + (Ia x 0.5) (rounded)
	=		=	(157mA x 24) + (537mA x 0.5)
	=		=	3768 + 269 = 4037 mA
Note: 1,000ma = 1Amp	=	Ah	=	4.037 Ah
New battery capacity requirement	=	Ah x 1.25	=	3.329 x 1.25
	=	Ah	=	5.04625 Ah
Rounded up to nearest available		Ah		7 Ah

PRIMARY POWER SOURCE CALCULATIONS

Battery Charger Current

Requirement: Battery is charged for 24 hrs to provide 5Iq + 0.5Ia

	=	(5x Iq) + (0.5 x Ia)	=	(5x Iq) + (0.5 x Ia)
	=		=	(5 x 157) + (0.5 x 537)
	=		=	785 + 269
Ah Requirement	=	Ah	=	1.054Ah
Battery Charging Current Required Where **e** is the battery efficiency, 0.8	=	Ah above / 24 x **e**	=	1.054 / 24 x e
	=	A	=	.055A

Power Supply Requirement
Select the greater, 1 or 2

1. Ia + non- battery backed ancillary alarm loads

2. Iq + non – battery backed quiescent loads

If the power supply is used as the charger the current rating of the supply shall be [(1 or 2) + battery charger current].

☞ **Note:** *Remember to take into account ALL outputs that will be switched on when calculating Ida.*

Abbreviations Used

Ia:	CURRENT DRAW IN ALARM
Ida:	CURRENT DRAW IN ALARM WITH DEVICES ACTIVATED
Idd:	CURRENT DRAW IN ALARM WITH DEVICES DEACTIVATED
Iq:	QUIESCENT CURRENT

11. Maintenance and Trouble Shooting Chart

11.1 Maintenance

The ***LoopSense*** FACP should be maintained so as to comply with all standards / regulations applicable to the country and location it has been installed. Failure to do so could put at risk compliance and the integrity of the system. As a minimum it is recommended the following be used as a guide to periodic maintenance especially if there is an absence of standards regulations.

General

To implement a site maintenance regime, responsibilities should be established by responsible persons, training implemented if required, maintenance delegates appointed and all outcomes clearly communicated to all parties.

Daily Operations (operator level)

- The delegated operator checks for normal operation
- If any faults are detected, record them in an established “Site Log Book” and report them to the assigned body.
- Ensure all faults are signed off as they are resolved and follow up on those that are still outstanding.

Monthly Operations (operator level)

- In addition to Daily Operational checks
- Visually inspect in and around the panel for any signs of pests, moisture or general damage
- Ensure any non FACP standby power facilities are in a state of operational readiness
- Force a suitable device, such as an MCP or detector, into an alarm state so that it generates a know alarm outcome. This process should be controlled and established in consultation with all interested parties (installing engineers include) so that maximum benefit is obtained from the test.
- Ensure the Site Log Book” is up to date, faults have been attended to and the latest test are recorded

Quarterly Operations (service contractor)

- In addition to Monthly Operational checks
- Check all internal connections and perform “alarm”, “fault” and site specific tests
- Perform a “walk around” of the site to determine if the system integrity is free of possible faults
- Ensure the Site Log Book” is up to date, faults have been attended to and the latest test are recorded

Annual Operations (service contractor)

- In addition to Monthly Operational checks
- Initiate both a “lamp” and “walk” test and any other tests as determined necessary for the site
- Inspect and test (as per the manufacturers specifications) batteries
- Ensure the Site Log Book” is up to date, faults have been attended to and the latest test are recorded

Replacement Components (service contractor)

Batteries and fuses are seen as the only field replaceable components.

If a board field change is required all necessary anti-static precautions must be taken.

☞ **Note:** *If the Main Board is changed the power supply may require re-calibration.*

11.2 Trouble Shooting *LoopSense*

ⓘ Resolution of all suspected faults MUST only be carried out by suitably qualified technical operatives.

Problem	Solution
No Mains Power	Check mains Fuse
Power LED flashing	Check output voltage it should be set to 27.2V. Low = (less than 26.5V) High = (greater than 28V)
Earth Fault LED illuminated	Check the battery has been connected properly Check all input and output cabling and wiring assemblies for short to ground
System Fault LED illuminated	Ensure correct panel configuration Check all connections for loose wiring
RS485 Communication Loop not working	Refer to LCD. This may identify where there is a break in the communication line
Can not access a menu	Incorrect Password entered
Forgotten Password	Ring AMPAC
Alarms Status	Make sure you have a 10KΩ EOL resistor fitted and a diode (1N4004) in series with any sounders

11.3 Trouble Shooting *SmartTerminal*

Problem	Solution
Normal Supply LED not illuminated	Check supply voltage it should be set to 27.2VDC. Nominal fault voltages are; Low = (< 18VDC) High = (> 28VDC)
FACP Earth Fault LED illuminated	Check all input and output cabling and wiring assemblies for short to ground
FACP System Fault LED illuminated	Ensure correct panel configuration Check all connections for loose wiring
RS485 Communication Bus not working	Refer FACP LCD. This may identify where there is a break in the communication line. Check the SmartTerminal Diagnostic Config LED is flashing. If not the FACP is not communicating with the ***SmartTerminal.*** Check the RS485 cabling. If flashing check the SmartTerminal address.

12. Compatible Devices

AMPAC Type Code	Auto Learn Default	Device type	Displayed Type (19 Chars)	Type Desc
		Optical		
05h	✓	XP95 Optical	XP95 PHOTO	PHOTO
05h		XP95 Optical with base sounder	XP95 PHOTO + SNDR	PHOTO
05h		S90 Optical	S90 PHOTO	PHOTO
05h		Xplorer Optical	XPLORER PHOTO	PHOTO
05h		Xplorer Optical with base sounder	XPLR PHOTO + SNDR	PHOTO
05h		XP95 Beam	XP95 BEAM	PHOTO
0Dh	✓	XP95 Reflective beam	XP95 REFLECT BEAM	BEAM
105h	✓	Discovery Optical	DISC PHOTO	PHOTO
105h		Discovery Optical with base sounder	DISC PHOTO + SNDR	PHOTO
11Dh	✓	Discovery Multisensor	DISC MULTISENSOR	MULTI
11Dh		Discovery Multisensor with base sounder	DISC MULTI + SNDR	MULTI
11Dh		Discovery 0.5% Multisensor	DISC 0.5% MULTI	0.5%OB
15h	✓	XP95 Flame	XP95 FLAME	FLAME
1Dh	✓	XP95 Multisensor	XP95 MULTISENSOR	MULTI
1Dh		XP95 Multisensor with base sounder	XP95 MULTI + SNDR	MULTI
31Dh	✓	Enhanced Discovery Multisensor	EDSC MULTISENSOR	MULTI
31Dh		Enhanced Discovery Multi + base sounder	EDSC MULTI + SNDR	MULTI
		Heat Detectors		
06h	✓	XP95 Heat	XP95 HEAT	HEAT
06h		XP95 Heat with base sounder	XP95 HEAT + SNDR	HEAT
06h		S90 Heat	S90 HEAT	HEAT
06h		Xplorer Heat	XPLORER HEAT	HEAT
06h		Xplorer Heat with base sounder	XPLR HEAT + SNDR	HEAT
0Eh	✓	XP95 Hi temp	XP95 HI HEAT	HHEAT
0Eh		XP95 Hi temp with base sounder	XP95 HI HEAT + SNDR	HHEAT
0Eh		Xplorer Hi temp	XPLORER HI HEAT	HHEAT
0Eh		Xplorer Hi temp with base sounder	XPLR HI HEAT + SNDR	HHEAT
106h	✓	Discovery Heat	DISC HEAT	HEAT
106h		Discovery Heat with base sounder	DISC HEAT + SNDR	HEAT
16h	✓	Ampac Heat Detector	AMPAC HEAT	AHEAT
		Ionisation		
03h	✓	XP95 Ion	XP95 ION	ION
03h		XP95 Ion with base sounder	XP95 ION + SNDR	ION
03h		S90 Ion	S90 ION	ION
103h	✓	Discovery Ion	DISC ION	ION
103h		Discovery Ion with base sounder	DISC ION + SNDR	ION
10Bh	✓	Discovery Carbon Monoxide	DISC CO	CO
10Bh		Discovery Carbon Monoxide with base sndr	DISC CO + SNDR	CO
		Manual Call Points		
07h	✓	S90 MCP	S90 MCP	MCP

11Fh	✓	Discovery MCP	DISC MCP	MCP
1Fh	✓	XP95 MCP	XP95 MCP	MCP
1Fh		XP95 Mini switch monitor with interrupt	XP95 MINI SW + INT	MCP
1Fh		Xplorer MCP	XPLORER MCP	MCP
		Sounders		
01h	✓	XP95 sounder / sounder control unit	XP95 SOUNDER	SNDR
01h		XP95 integrated base sounder	XP95 INTGR BSE SNDR	SNDR
01h		XP95 Intelligent base sounder	XP95 INTEL BSE SNDR	SNDR
01h		XP95 sounder beacon base	XP95 SND BEACN BSE	SNDR
01h		XP95 loop powered beacon	XP95 LOOP PWR BEACN	SNDR
01h		S90 sounder control unit	S90 SCU	SNDR
111h	✓	Discovery sounder beacon base/open area	DISC SOUNDER BEACN	SNDR
		I/O Units		
02h	✓	XP95 input / output module	XP95 I/O	I/O
02h		XP95 three channel input / output module	XP95 3I/O	I/O
02h		XP95 output module	XP95 OUTPUT	I/O
02h		XP95 mains switching input / output module	XP95 MAINS I/O	I/O
02h		S90 single channel I/O unit	S90 SINGLE I/O	I/O
02h		S90 3 channel I/O unit	S90 3I/O	I/O
02h		S90 3 channel analogue I/O unit	S90 3I/O + ANALOGUE	I/O
02h		S90 switch monitor unit	S90 SWITCH	I/O
02h		Xplorer output module	XPLORER OUTPUT	I/O
		Zone Monitors		
04h	✓	XP95 zone monitor	XP95 ZONE MONITOR	CONV
04h		S90 zone monitor	S90 ZONE MONITOR	CONV
0Ch	✓	XP95 switch monitor	XP95 SWITCH	SWITCH
0Ch		XP95 mini switch monitor	XP95 MINI SWITCH	SWITCH
0Ch		XP95 switch monitor plus	XP95 SWITCH PLUS	SWITCH
1Ch	✓	FastSense XP95 APIC	XP95 FASTSENSE	FSENSE
		User Defined		
08h	✓	XP95 AM	XP95 AM	AM
10h	✓	XP95 AAF	XP95 AAF	AAF

13. Certification Information

The ***LoopSense*** is designed and manufactured by:

AMPAC TECHNOLOGIES PTY LTD

7 Ledgar Rd

Balcatta

WA 6021

Western Australia

PH: 61-8-9201 6100

FAX: 61-8-9201 6101

HEAD OFFICE

Manufactured to: _____

Certificate of Compliance Number: _____

Equipment Serial Number: _____

Date of Manufacture: _____

14. Glossary of Terms

ACKD :	ACKNOWLEDGED
AH:	AMP HOUR
ALM :	ALARM
COM :	RELAY COMMON CONTACT (WIPER)
CN :	CONNECTOR
C/O :	CHANGE OVER CONTACTS
CPU :	COMMON PROCESSOR UNIT
EOL :	END OF LINE
FACP :	FIRE ALARM CONTROL PANEL
FLT :	FAULT
GND :	GROUND (0 VOLTS) NOT EARTH
I/O :	INPUT/OUTPUT
LCD :	LIQUID CRYSTAL DISPLAY
LED :	LIGHT EMITTING DIODE
MCP :	MANUAL CALL POINT
N/C :	NORMALLY CLOSED RELAY CONTACTS
N/O :	NORMALLY OPEN RELAY CONTACTS
PCB :	PRINTED CIRCUIT BOARDS
P/S :	POWER SUPPLY
TB :	TERMINAL BLOCK

15. Specifications

	Metal
Standard	
NZS4512-2010	OPUS Approved
Mechanical	
Dimensions Cabinet: (mm)	425 (H) x 400 (W) x 125 (D)
Environmental	
Temperature:	0ºC to + 40ºC
Humidity:	25% to 95%
Mains Input	
Input Voltage:	204 - 264VAC
Protection (Quick Acting Fuse):	2Amp M205
Minimum Cable Requirements:	Not less than 0.75mm²
Power Supply	
Voltage with Mains connected:	25 – 29VDC
Power Supply Ripple Voltage:	<100mV
Power Supply Fault Indication	
Volts High (at room temperature)	28VDC
Volts Low	26.5VDC
Power Supply Output Current:	3Amps
Imax A	3Amps
Protection	Current Limiting
Batteries / Battery Charger	
Charger O/P Voltage	26.6-28.1VDC
(Temp compensated):	(27.3VDC nom)
Battery Type:	2x12V Sealed Lead Acid
Max Battery Capacity:	17AH (No SGD Board or Add-Ons fitted)
Max Charger Current Limited:	600mA
Battery Supply Current Limited:	3A and 2A PTC
Battery Low:	<23.5VDC
Battery Discharged Cut-off Voltage:	<21VDC
Battery Damaged:	<22VDC
Max Battery Resistance	1.2Ω
Main Card	
Quiescent Current (QI) 1 Loop	115mA
1 Loop in Alarm (Min)	155mA
Quiescent Current (QI) 2 Loop	135mA
2 Loop in Alarm (Min)	180mA
Loop	
Maximum Number of Zones:	32 in total (for 1 or 2 loop panel)
Maximum Number of Devices:	126 / loop
Loop Current	500mA / loop
Cabling Requirements:	2 core 1.5 -2.5mm2 Max length 1km
Fault supervision:	O/C, S/C , over current
Outputs	
Supervised Alarm (Current Limited)	24VDC @ 750mA Max O/C, S/C, 10K EOL
Alarm / Fault Relay Contacts	24VDC @ 1A
Auxiliary VDC – Protected	24VDC @ 1A
Cabling Requirements:	2 core 1 -2.5mm2 Max length 1km
Inputs	
Supervised	O/C, S/C, 10K EOL
Cabling Requirements:	2 core 1 -2.5mm2 Max length 1km
Communications	
Internal to FACP	RS485
External to FACP	RS485

16. Address Setting

BINARY ADDRESS SETTING (APOLLO)

SERIES XP95 - ADDRESS DATA

DIL SWITCH: ON = 1 OFF = 0 ADDRESS TAG FOR DETECTORS (I/O DEVICES)

DIL switch setting		DIL switch setting		DIL switch setting		DIL switch setting		DIL switch setting	
Addr	**1234567**	**Addr**	**1234567**	**Addr**	**1234567**	**Addr**	**1234567**	**Addr**	**1234567**
1	1000000	26	0101100	51	1100110	76	0011001	101	1010011
2	0100000	27	1101100	52	0010110	77	1011001	102	0110011
3	1100000	28	0011100	53	1010110	78	0111001	103	1110011
4	0010000	29	1011100	54	0110110	79	1111001	104	0001011
5	1010000	30	0111100	55	1110110	80	0000101	105	1001011
6	0110000	31	1111100	56	0001110	81	1000101	106	0101011
7	1110000	32	0000010	57	1001110	82	0100101	107	1101011
8	0001000	33	1000010	58	0101110	83	1100101	108	0011011
9	1001000	34	0100010	59	1101110	84	0010101	109	1011011
10	0101000	35	1100010	60	0011110	85	1010101	110	0111011
11	1101000	36	0010010	61	1011110	86	0110101	111	1111011
12	0011000	37	1010010	62	0111110	87	1110101	112	0000111
13	1011000	38	0110010	63	1111110	88	0001101	113	1000111
14	0111000	39	1110010	64	0000001	89	1001101	114	0100111
15	1111000	40	0001010	65	1000001	90	0101101	115	1100111
16	0000100	41	1001010	66	0100001	91	1101101	116	0010111
17	1000100	42	0101010	67	1100001	92	0011101	117	1010111
18	0100100	43	1101010	68	0010001	93	1011101	118	0110111
19	1100100	44	0011010	69	1010001	94	0111101	119	1110111
20	0010100	45	1011010	70	0110001	95	1111101	120	0001111
21	1010100	46	0111010	71	1110001	96	0000011	121	1001111
22	0110100	47	1111010	72	0001001	97	1000011	122	0101111
23	1110100	48	0000110	73	1001001	98	0100011	123	1101111
24	0001100	49	1000110	74	0101001	99	1100011	124	0011111
25	1001100	50	0100110	75	1101001	100	0010011	125	1011111
								126	0111111

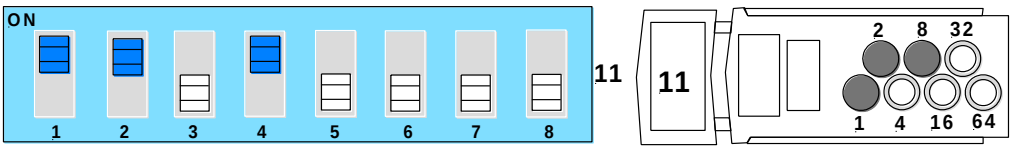


Figure 22: Switch and Tab Set to 11

UNCONTROLLED DOCUMENT

NOTE: Due to AMPAC's commitment to continuous improvement specifications may change without notice.