Federal Signal Integrated Systems DIGITAL P.A./G.A. System Installation, Operation & Maintenance Manual

PAGASYS
P.A. / G.A. SYSTEM

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CONTENTS

1. INTRODUCTION 5

1.1 AUDIO LEVELS 6

1.2 SYSTEMS DESIGN 6

1.3 INSTALLATION 7

1.4 Warning 7

2. OPERATION 8

2.1 POWER DISTRIBUTION 8

2.2 ZONE ALLOCATION 8

2.3 ALARMS 8

2.4 ACCESS PANELS 9
2.4.1 Paging 9
2.4.2 Emergency Paging 9
2.4.3 Manual Alarm Operation 10
2.4.4 Test functions 10
2.4.5 Fault accept 10
2.4.6 Entertainment 10

2.5 PABX INTERFACE (optional) 10

2.6 TALKBACK INTERFACE (optional) 11

2.7 OPERATION PRIORITIES 12

2.8 SYSTEM FAULT ALARM 12

2.9 MONITORED ALARM OPERATION (OPTIONAL) 13

2.10 AMPLIFIERS 13

2.11 SPEAKER & AMPLIFIER MONITORING 13

2.12 AUDIO FAULT MONITORING 13

3. HARDWARE DESCRIPTION 14

3.1 CONTROL CABINET: 14
3.1.1 Rack: 14
3.1.2 Amplifiers (Monitored): 14
3.1.3 Internal Monitoring: 14
3.1.4 Alarm Tone/Voice Storage messages 14
3.1.5 Loudspeaker Active Line Monitoring: 14
3.1.6 Fault/Status Reporting: 15

3.2 COPPER WIRE TERMINATIONS 15

4. FUNCTIONAL DESCRIPTION OF EQUIPMENT 16

4.1 CONTROL INTERFACE BACKPLANE (P-CIB) 6173107 17

4.1.1 Control rack backplane Signal routing 18

4.2 AMPLIFIER BACKPLANE 5173062 19

4.3 PROCESSOR/NETWORK CARD (P-NET) 4000020 20

4.4 DIGITAL SIGNAL PROCESSOR (P_DSP) CARD (6000155) 21

4.5 AMP INTERFACE CARD (P_AIC) 4000019 23

4.6 CLASS 'D' AMPLIFIERS (P_A250) 106136 24

4.7 Features and Specifications 25

4.8 SPEAKER MONITORING SYSTEM (P-M250) (4000014) 26

4.9 Access Panel Interface Controller (P-APIC) 2005396A 27
4.9.1 Expanding the I2C system to contain multple P-APIC cards 27
4.9.2 PAPIC PCB LEDs 27
4.9.3 P-APIC DC Power supply connection 28
4.9.4 P-APIC I2C interface board connection. 28
4.9.5 P-APIC I2C interface board connection. 28
4.9.6 API connector 29
4.9.7 RS232 29
4.9.8 RS422 29

4.10 Access Panel Interface (P-API) 2005390A 30
4.10.1 P-API board LEDs 30
4.10.2 P-API 24V DC Power supply connection 31
4.10.3 P-APIC ribbon cable connector 31
4.10.4 Remote access panel terminal blocks 31
4.10.5 Audio terminals blocks 32

4.11 ACCESS PANEL DRIVER BOARD 821709 33

4.12 8 CHANNEL DIGITAL INPUT PCB P-8DIN 2005435B 34
4.12.1 PCB LEDs 34
4.12.2 DC supply connection 34
4.12.3 Field-wiring terminal blocks 35
4.12.4 P-8DIN I2C interface board connection. 35
4.12.5 P-8DIN I2C base address 35

4.13 8 CHANNEL MONITORED INPUT PCB P-8MIN 2005440B 36
4.13.1 Monitored input circuit function 36
4.13.2 P-8MIN PCB LEDs 37
4.13.3 DC power supply connection 37
4.13.4 Field-wiring terminal blocks 37
4.13.5 P-8MIN I2C interface board connection 38
4.13.6 P-8MIN I2C base address 38

4.14 5 CHANNEL DPDT RELAY PCB P-5DPDT 2005426B 39
4.14.1 PCB LEDs 39
4.14.2 P-5DPDT 24V DC Power supply connection 39
4.14.3 P-5DPDT I2C interface board connection. 40
4.14.4 Field-wiring terminal blocks 40
4.14.5 Audio routing jumpers. 40
4.14.6 P-5DPDT I2C base address 42

4.15 8 CHANNEL SPDT RELAY PCB P-8SPDT 2005403B 43
4.15.1 PCB LEDs 43
4.15.2 P-8SPDT DC Power supply connection 43
4.15.3 P-8SPDT I2C interface board connection 44
4.15.4 Field wiring terminal blocks 44

4.15.5 P-8SPDT I2C base address 44

4.16 4 CHANNEL BEACON MONITORING AND CONTROL PCB 2005407B P-BKMON . 45
4.16.1 PCB LEDs 45
4.16.2 P-BKMON DC Power supply connection 46
4.16.3 P-BKMON I2C interface board connection. 46
4.16.4 P-BKMON PCB I2C device configuration 48

4.17 POWER SUPPLY UNIT (AC - DC) MER12WRB-P27D10 49

5. STORAGE/PRESERVATION, INSTALLATION & BASIC COMMISSIONING 50

5.1 Preservation 50

5.2 Handling and Lifting Requirements. 50

5.3 Installation 50

5.4 Basic Commissioning 51

6. MAINTENANCE AND FAULT FINDING/TROUBLESHOOTING 52

6.1 MAINTENANCE 52
6.1.1 General System Maintenance 52
6.1.2 Adjustment of the Access Panel Audio Levels 52
6.1.3 System Audio level adjustment 52

6.2 SERVICE AND MAINTENANCE 53

6.3 FAULT FINDING AND TROUBLESHOOTING 53

7. TECHNICAL INSTALLATION GUIDE FILES 55

1. INTRODUCTION

This document covers the Installation, Operation and Maintenance of the PAGASYS P.A./G.A System. The Manufacturing Data Record book should also be referred to for drawings and part lists.

The Digital Public Address and General Alarm system is comprised of Federal Signal manufactured and proprietary components housed in metal cabinets.
The system is software controlled with the pre-programmed parameters held in memory in the processor module.
Some of the set-up parameters are user changeable by use of a mimic program on a PC (not supplied) connected by a serial cable to the processor module.

Federal Signal Drawings 001 & 101 shows rack 'A' & rack 'B' external general arrangement, 000 shows the system block diagram.

The system is duplicated over two racks 'A' & 'B' that work in a 'master' 'slave' configuration with separate control lines from the Access panels and external control system and outputs to interleaved A/B loudspeakers and beacons. Each rack has its own control system, alarm signal generators and amplifiers that are able to operate independently from the other if there is a inter-rack communications failure. The two racks are to be located in safe areas on opposite sides of the platform. No single failure will be able to render both systems inoperable at the same time.

Each rack is powered from two AC feeds from the Main switchboard with automatic change-over to a UPS fed from the Emergency switchboard. Alternatively the system can be factory configured to accept power from redundant DC supplies.

Each rack houses 250W 100V line class 'D' amplifiers that power speakers split into individual broadcast zones.
Mutable lines are wired to speakers in rooms where the access panels are located in order to stop feedback occurring when the microphones are in use.
All speakers are monitored using impedance or ISMT monitoring.

There are switched power feeds to multiple field Beacon circuits which are initiated during Emergency broadcasts, General Alarm and additional Alarm conditions as required.
Yellow beacons are normally initiated during Emergency speech broadcasts and General Alarm Conditions with Red beacons during Toxic Gas Alarm.

The system accepts inputs from the Fire & Gas and ESD systems to automatically initiate alarms.
System fault outputs are provided for interfacing with an external system.

Audio inputs for announcements are from PAGA Access Panels units typically located in the Control Room, the Radio Room, the Drillers Cabin or the Engineers test panel (ETP) fitted into each rack. Emergency Speech Microphone Stations are located at the lifeboat muster area or additional areas as required. Additional Audio Inputs are available from telephones via a PABX interface in the rack, Talkback System via a intercom paging interface in the rack or other external systems.
The PAGA access panels and ETP also give a means of raising alarms and testing the Speakers and Beacons.

All PAGASYS PAGA System Cabinets are serialized per Federal Signal Corporation ISO 9001:2008 Quality Assurance Management System Standard. Refer to PAGASYS product Datasheet for PAGA System Variants.

1.1 AUDIO LEVELS

The speaker installation must be designed by the main integrator and approved by the end user to ensure that:-
1. The General Alarm in all interior and exterior spaces is a minimum of 80dB SPL and at least 10dB over ambient, in sleeping areas and bathrooms a minimum of 75dB SPL and at least 10dB over ambient.
2. The Public Address Announcements in all interior and exterior spaces is a minimum of 80dB SPL and at least 15dB over ambient, in sleeping areas and bathrooms a minimum of 75dB SPL and at least 20dB over ambient.

The Audio level shall not exceed 120dB in any space.
The protection of PAGA System Audio levels is via a password protected P-DSP Configuration Software. Write jumpers must also be enabled on P-DSP cards to change Audio Levels. Reference SAP/MIMIC Manual and P-DSP TIG.

1.2 SYSTEMS DESIGN

The speaker system shall be split into a number of loops, each loop designed to be loaded up too 200 watts (80% amplifier load) and not exceeding 250 watts.

Where the layout of the plant requires smaller loops, multiple loops in the same deck area may be connected together so long as they do not exceed the amplifier load requirement above.

Each loop shall be connected back to individual amplifiers via switch disconnect terminations in the PA cabinet or MDF.

Each area shall have speaker loops fed from both A & B systems with the cable routes segregated, so that if one loop fails the PA/GA shall still be audible.

Each Amplifier is protected by individual circuit breakers on its power input, and short circuit/overload protected on its output by internal self resetting circuitry.

Speaker loops shall be fed to all parts of the installation including accommodation, normal crew working spaces and muster stations in order that the PA/GA is audible, each cabin shall have individual loudspeakers installed.
In areas where there is a high ambient noise level additional flashing lights shall be installed.

If the installation is on a ship with a separate whistle/siren/typhoon warning device, an output from the PA/GA system shall be connected to operate this during a General Alarm. Relay Outputs to external systems are via Normally Closed Volt free contacts, monitored contacts or 24VDC powered outputs.

System Cabinets must be installed a minimum distance of 5m away from the ships compass.

1.3 INSTALLATION

Telecommunications systems and equipment shall be designed, built, installed and tested in compliance with the following Acts, Regulations, Standards, Recommendations, and Publications issued by the following sources, but not necessarily be limited to:
International Electro Technical Institute (IEC)
• IEC 60079 Electrical Apparatus For Explosive Gas Atmospheres
• IEC 60331 Tests On Electric Cables Under Fire Conditions – Circuit Integrity
• IEC 60332 Tests On Electric And Optical Fiber Cables Under Fire Conditions
• IEC 60529 Degrees Of Protection Provided By Enclosure (IP Code)
• IEC 60839 Alarm Systems
• IEC 60849 Sound Systems For Emergency Purposes
• IEC 61000 Electromagnetic Compatibility (EMC) –
Part 4-2: Testing And Measurement Techniques- Electrostatic Discharge Immunity Test.
• DNV Rules Pt. 3 Ch 3. Sec. 10
• IMO SOLAS/MODU Code/HSC, IMO A.830 (19)
• IMO A.830 (19)
• IMO MSC Corc 808

Field cabling shall be installed to comply with the following standards:

BS5308	Instrumentation cable construction
IEC60332 part 3 category C	Tests on bucked wires or cables
IEC60332 part 1	Tests on a single vertical insulated wire or cable
IEC60331	Tests for electric cables under fine conditions
IEC60502 part 1	Cables for rated voltages of 1KV (Um = 1.2KV) and 3KV (Um = 3.6KV)

16th Edition, IEE Wiring **Regulations.**

1.4 Warning

Note 1 ELECTRIC SHOCK

Extreme caution must be observed when working on the system, as High voltages may be present when the system is energised. When ever possible, the system should be isolated before work is carried out. Precautions should be taken to ensure that loose items do not fall into the equipment. Equipment equipped safety devices, e.g. shrouds designed to prevent finger access, should not be breached.

It is recommended that test or servicing is performed in an area restricted to trained personnel and that normal precautions for working on live equipment are followed.

Abreviations

AC	Alternating Current
API	Access Panel Interface board
APD	Access Panel Driver board
DC	Direct Current
EM. PTT	Emergency broadcast Press To Talk
GA	General Alarm
I/O	Input / Output
LED	Light Emiting Diode
MCB	Miniature Circuit Breaker
PA	Public Address
PCB	Printed Circuit Board
PSU	Power Supply Unit
PTT	Press To Talk
DSP	Digital Signal Processor
ETP	Engineers Test Panel installed in PAGA Cabinets

2. OPERATION

2.1 POWER DISTRIBUTION

(Drawing 020)

Power input to the racks is 110V/220V 50/60Hz AC supply. Isolation of the incoming supplies is by external circuit breakers provided by the installer.
Internally the power supply units and beacons can be isolated separately by MCB's in the AC feed.

The main power supply unit provides a 24V DC supply to the amplifiers and control equipment, a secondary 12V DC PSU provides the power to the Microphone Stations and PABX Interface.

The output of the Power supply unit is connected to the amplifiers via individual circuit breakers and to the control system via a circuit breaker and fused terminal blocks for distribution to the rest of the system.

Lifting the blades in the terminal blocks can isolate individual sections of the system.

2.2 ZONE ALLOCATION

(Drawing 012)

This system has broadcast zones for announcements and alarms. The speakers from each rack shall be split into loudspeaker circuits. Terminals are provided for field cabling wired in loop back configuration. Broadcast zone requirements include but are not limited to Work Areas Zone and Accommodations Areas Zone. Routine Announcements are broadcast only to Work Areas. Emergency Speech, General Alarm and Toxic Gas Alarm are broadcast to Work Areas and Accommodations Areas.

2.3 ALARMS

The Alarm tones are stored on four IC's in each of the DSP cards, 'wav' files of the required tones or messages can be downloaded from a PC to the DSP cards.

The IMO and DNV General Alarm is 7 short blasts followed by 1 long blast which is clearly audible in all areas. Other alarms tones may be pre-recorded and configured using the set-up menu for operation in different fleets, oil fields or during movement.

The Alarms can be raised either manually from an Access Panel, or automatically from the Fire & Gas or Emergency Shutdown systems. Manually raised alarms will continue to sound until manually cleared by the access panel which raised the alarm.
The LED indication on the access panels is steady on the panel that initiated the alarm and flashing on all other panels, also flashing if raised by the F&G system.

The Alarms can be interrupted by use of the Emergency Speech PTT key on the Access Panels or Muster Stations and during this time the Alarm tone is muted. When the Emergency Speech button is released the Alarm tone is reinstated.
To prevent prolonged interruption of alarm broadcast, the Emergency PA broadcast has a pre-set timeout of 30 seconds. The 30 second duration of EM PTT key timeout is configurable under a password protected field.

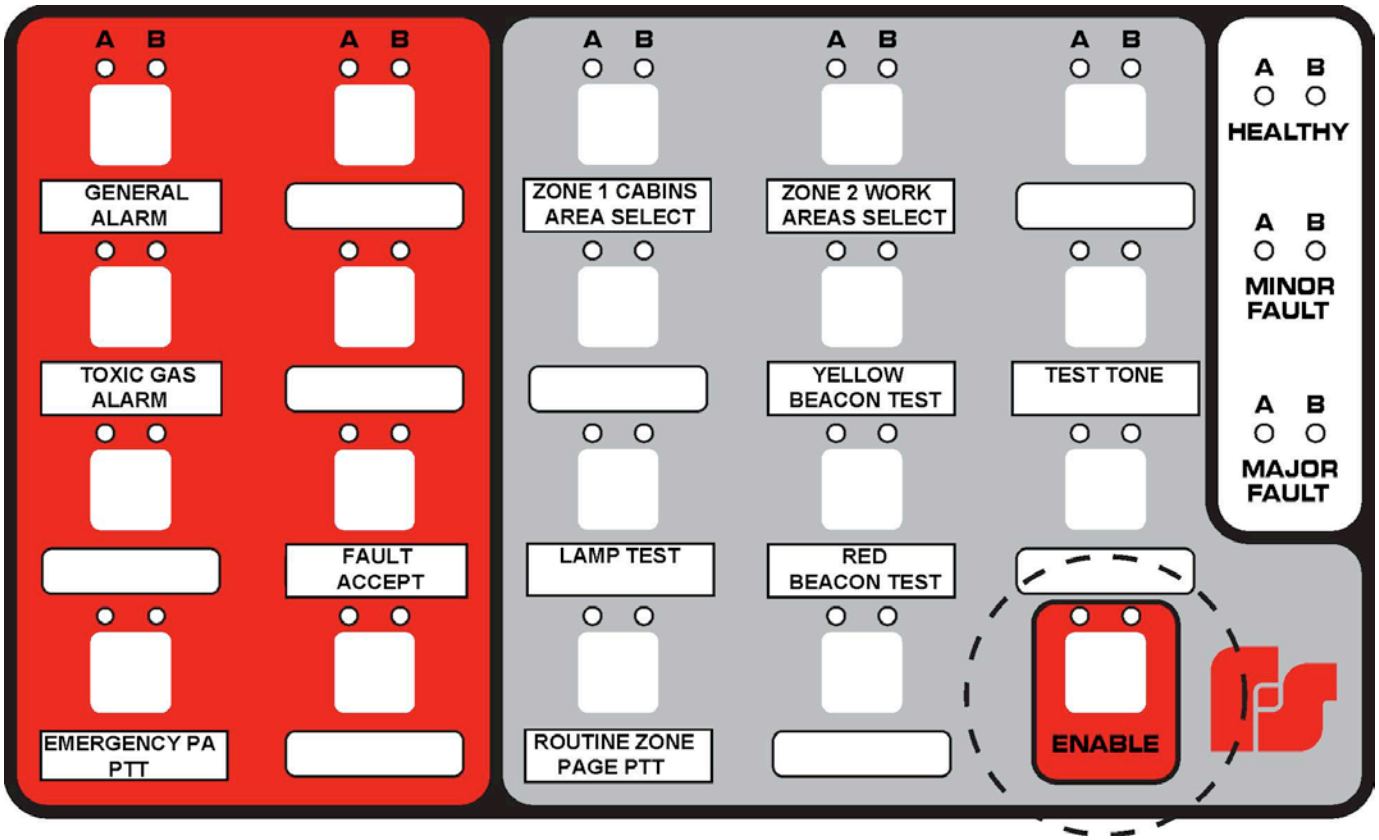
The highest broadcast priority is Emergency Speech which overrides all system functions and is broadcast to all areas. The General Alarm broadcast is priority 2 which is broadcast to all areas and can be temporarily muted by Emergency Speech.

2.4 ACCESS PANELS

The general arrangements of the PAGA Access units are shown on Federal Signal drawings 201, 203 & 205. The units supplied are indoor safe area or I.S. with flush mount keypads, which are installed on the control console front panels along with gooseneck microphones. Safe Area or I.S. Deskmount, wallmount PAGA Access Units with gooseneck or handheld microphones are also available. Weatherproof I.S. or Safe Area PAGA Access Units have IP65 pushbuttons and the AP enclosure is fitted within an outer IP66 enclosure where AP access is via quarter turn thumb latches.

The Access Panel keys and LED indicators interact with the system software so that when a button is pressed an acknowledge signal then operates the respective LED. If a function is operated from the Fire & Gas system then the respective LED will flash repeatedly.

The 'Enable' key must be pressed before any of the keys in the alarm section, the enable function stays active for 60 seconds to allow for multifunction selection or de-selection. Pressing the 'Enable' key does not alter any system broadcasts or functions.



PRESS ENABLE KEY PRIOR TO SELECTING KEYS IN RED SECTION OF KEYPAD

TYPICAL KEYPAD LAYOUT

2.4.1 Paging

Select the required zone/s then hold down the PTT key. Speech from the microphone is broadcast to all speakers in the selection except those local to the microphone whilst the PTT key is held.

2.4.2 Emergency Paging

Emergency paging is a high-priority broadcast, which can interrupt any other paging or alarm broadcast. It is broadcast to all speakers except those local to the microphone whilst the EM. PTT key is held, the 'Enable' key must be pressed prior to this key. The enable key must be pressed again if the enable timeout duration has expired. Emergency Page broadcasts have

a timeout to prevent active F&G alarms to be overridden indefinitely. If a 30 second timeout of the EM PTT is required by flag, this is configurable within a password protected field of the ETP SAP/MIMIC Software.

2.4.3 Manual Alarm Operation

Pressing the 'Enable' key followed by the 'ABANDON' key performs manual operation of the Evacuation Alarm.
The tone will be broadcast to all areas, and the 'YELLOW' Beacons operate.
Re-pressing the key cancels the alarm if enabled.

Pressing the 'Enable' key followed by the 'GENERAL' key performs manual operation of the General Alarm.
The tone will be broadcast to all areas, and the 'YELLOW' Beacons operate.
Re-pressing the key cancels the alarm if enabled.

Pressing the 'Enable' key followed by the 'FIRE' key performs manual operation of the Fire Alarm.
The tone will be broadcast to all areas, and the 'YELLOW' Beacons operate.
Re-pressing the key cancels the alarm if enabled.

Pressing the 'Enable' key followed by the 'GAS' key performs manual operation of the Toxic Gas Alarm.
The tone will be broadcast to all areas, and the 'RED' Beacons operate.
Re-pressing the key cancels the alarm if enabled.

2.4.4 Test functions

Pressing the 'Enable' key followed by the 'TICK TONE' key enables an intermittent ping to be broadcast every two seconds over all the speakers.
Re-pressing the key cancels the test.

Pressing the 'Enable' key followed by the 'BEACON TEST' key operates all the beacons.
Re-pressing the key cancels the test.

Holding in the 'LAMP TEST' key illuminates all the LED indicators on the panel.

2.4.5 Fault accept

When a fault has occurred on the system the local buzzer in the panel will sound pressing the 'fault accept' button will silence the buzzer until another fault occurs.

2.4.6 Entertainment

The entertainment is over-ridden by any announcements or alarms, this is by means of a 'volt-free' contact output from the PAGA system connected to the entertainment system control or power

2.5 PABX INTERFACE (optional)

A PABX interface is provided so that announcements can be made from telephone handsets.

When the number allocated to the P.A. system is dialled, a acknowledge tone will be heard, the message is then spoken and recorded.
If the caller is not happy with the message he is recording he may press # and start recording again.
Key 8 is then dialled to terminate the call and the message will then be broadcast to work areas.

To broadcast to zone 1 only, key 1 should be pressed before speaking.
To broadcast to zone 2 only, key 2 should be pressed before speaking.

To broadcast to zone 3 only, key 3 should be pressed before speaking.

If the P.A. system is busy broadcasting an alarm or announcement the recorded message will be held until the P.A. system is available.
If someone else is using the PABX interface then an engaged tone will be heard.
See PABX Interface manual for further information. The broadcast priority of the PABX Interface is below the routine page announcements from PAGA Access units and above the Tick Tone broadcast.

2.6 TALKBACK INTERFACE (optional)

An ECHO interface is provided so that announcements can be made from the Talkback system handsets.

When the number allocated to the P.A. system is dialled, a ringing tone will be heard, then a direct announcement can be broadcast over the P.A. system zone 1. The broadcast priority of the Talkback System Paging Interface is below the routine page announcements from PAGA Access units and above the Tick Tone broadcast.

2.7 OPERATION PRIORITIES

When more than one broadcast request is being made at the same time, the system decides which to make on a priority basis. The priority list is (highest priority first):

Function	Priority.
Emergency page from AP1 access panel	1
Emergency page from AP2 access panel	2
Emergency page from AP3 access panel	3
Spare Emergency Page slot	4
Spare Emergency Page slot	5
Spare Emergency Page slot	6
Spare Emergency Page slot	7
Spare Emergency Page slot	8
Spare Emergency Page slot	9
Spare Emergency Page slot	10
Abandon platform (If Applicable)	11
General Alarm	12
Fire	13
Gas	14
Spare Alarm slot	15
Spare Alarm slot	16
Spare Alarm slot	17
Spare Alarm slot	18
Spare Alarm slot	19
All clear. Automatically initiated at the end of alarm broadcast for a configurable period of time	20
Routine page from AP1 access panel	21
Routine page from AP2 access panel	22
Routine page from AP3 access panel	23
Routine page from ECHO Talkback system	24
Routine page from PABX	25
Spare Page Slot	26
Spare Page Slot	27
Spare Page Slot	28
Spare Page Slot	29
Spare Page Slot	30
Test tone broadcast	31
Internal test tone, Automatically initiated every half hour for 10 seconds to monitor amps	
	32
	33
	34
No Broadcast	35

2.8 SYSTEM FAULT ALARM

There is a Fault output provided for connection to a central system on the rig.
The contact outputs will be held closed when the system is functioning correctly and de-energise to normally open to indicate an fault condition.

2.9 MONITORED ALARM OPERATION (OPTIONAL)

The P.A. / G.A. system interfaces with volt free contact outputs from the host alarm system, these contacts are to be fitted with a 1K resistor in series and a 1k resistor in parallel for monitoring purposes.
When an alarm is initiated the system detects the change in resistance and a pre-programmed alarm tone is broadcast to the speakers.
If a fault occurs on the interface cabling, i.e. short or open circuit this is detected and reported to the access panels, the P.C. mimic can then be attached to see what the fault is, the corresponding alarm tone is also broadcast over the PA system.

The alarm tone broadcast is cancelled when the input returns to the normal state.

2.10 AMPLIFIERS

Class ‘D’ Amplifiers are used to amplify audio signals in the system and sent out 100V line level to the Loudspeakers.

A standby amplifier is provided, which will take over, should a dedicated amplifier fail.

2.11 SPEAKER & AMPLIFIER MONITORING

After each broadcast, and at half hourly intervals (if no broadcast has been made) the amplifiers are monitored for faults, and the speaker loops are monitored for earth leaks and high or low impedance faults. These faults are reported on the access panels, the P.C. mimic can then be attached to see what the fault is.

2.12 AUDIO FAULT MONITORING

When the system is not making a broadcast, or monitoring the amplifiers and speakers, the internal and external audio paths of the system are monitored. Any failure is reported on the access panels, the P.C. mimic can then be attached to see what the fault is.

3. HARDWARE DESCRIPTION

3.1 CONTROL CABINET:

3.1.1 Rack:

The Central Control/Amplifier equipment is housed in 600mm by 800mm by 2000mm high racks fitted with standard 19" mountings, the frame is painted Grey RAL7035
The design is for front access only, with solid rear and side panels fitted.
The rack is supplied with a 100mm high modular plinth.
Cable entry can be either through the roof or floor of the rack

Control/Terminal card-frame consists of a dual Processor Network module with watchdog, serial ports and a number of I2C channels, DSP modules each with four balanced line audio inputs and four message/alarm stores, an amplifier interface module for control of up to 12 amplifiers, and a input/output module.
The card-frame back-plane has terminals to wire to audio inputs and outputs, serial comms ports and control relays. It also has ribbon cable connectors for connection to the amplifier card-frames and input/output and access panel interfaces, which provide electrical isolation and EMC protection. The termination cards then connect to the field wiring, monitoring inputs and so forth.

3.1.2 Amplifiers (Monitored):

The system includes 250 Watt monitored Class D Amplifiers in each rack, one of these is a hot stand-by amplifier.

Additionally there are spare amplifier slots for further expansion.

3.1.3 Internal Monitoring:

The System is totally self-contained and continuously monitors itself and the status of the other nodes in the configuration; no single failure of the System will result in a total loss of the PA/GA System. In addition the control board sends out a 20KHz test tone after every broadcast, which is used to monitor the critical audio path. The System is parameterised and will only relay errors outside the calibrated window. All faults are reported to the access panels and can be viewed on a PC mimic.

3.1.4 Alarm Tone/Voice Storage messages

The system is able to store four Alarm tones or pre recorded voice messages on each DSP card, two cards are fitted in this system.

3.1.5 Loudspeaker Active Line Monitoring:

The system provides a 45Hz test tone for monitoring of the loudspeaker loops within set impedance parameters. Any change outside the window of impedance on individual amplifier loops will raise an alarm on the buzzer located in the Engineering Panel and will be logged on the LCD display. Fault reporting includes open circuit, short circuit, earth leakage and amplifier fail. Upon the fault being rectified the system automatically resets.

3.1.6 Fault/Status Reporting:

There is an RS232 serial socket to allow connection to a dedicated or portable PC, providing a system mimic/set up facility. Software for which is included.

3.2 COPPER WIRE TERMINATIONS

All incoming and outgoing field copper cables are interfaced with 2.5mm² screw terminals with knife switch isolators.

4. FUNCTIONAL DESCRIPTION OF EQUIPMENT

This section provides a general understanding of the system equipment and its functional operation within the PA/GA System. It also provides the user with the ability to identify the system equipment and processes, know where each item is installed and be capable of performing basic maintenance procedures.

The following list of system equipment and processes are discussed further in this section:

4.1 CONTROL INTERFACE BACKPLANE (P-CIB) 6173107 17

4.2 AMPLIFIER BACKPLANE 5173062 19

4.3 PROCESSOR/NETWORK CARD (P-NET) 4000020 20

4.4 DIGITAL SIGNAL PROCESSOR (P_DSP) CARD (6000155) 21

4.5 AMP INTERFACE CARD (P_AIC) 4000019 23

4.6 CLASS 'D' AMPLIFIERS (P_A250) 106136 24

4.8 SPEAKER MONITORING SYSTEM (P-M250) (4000014) 26

4.11 ACCESS PANEL DRIVER BOARD 821709 33

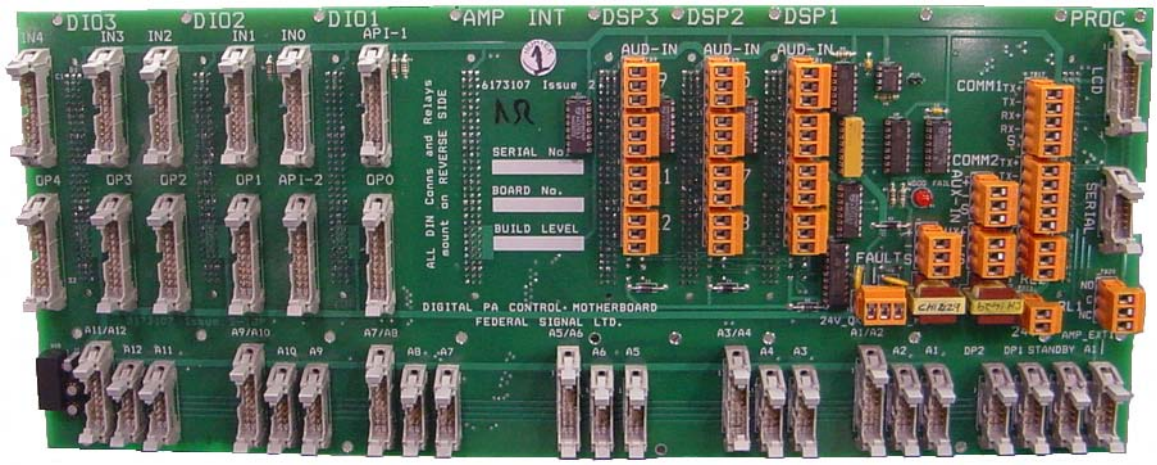
4.12 8 CHANNEL DIGITAL INPUT PCB P-8DIN 2005435B 34

4.13 8 CHANNEL MONITORED INPUT PCB P-8MIN 2005440B 36

4.1 CONTROL INTERFACE BACKPLANE (P-CIB) 6173107

See Technical Installation Guide 6173107 TIG

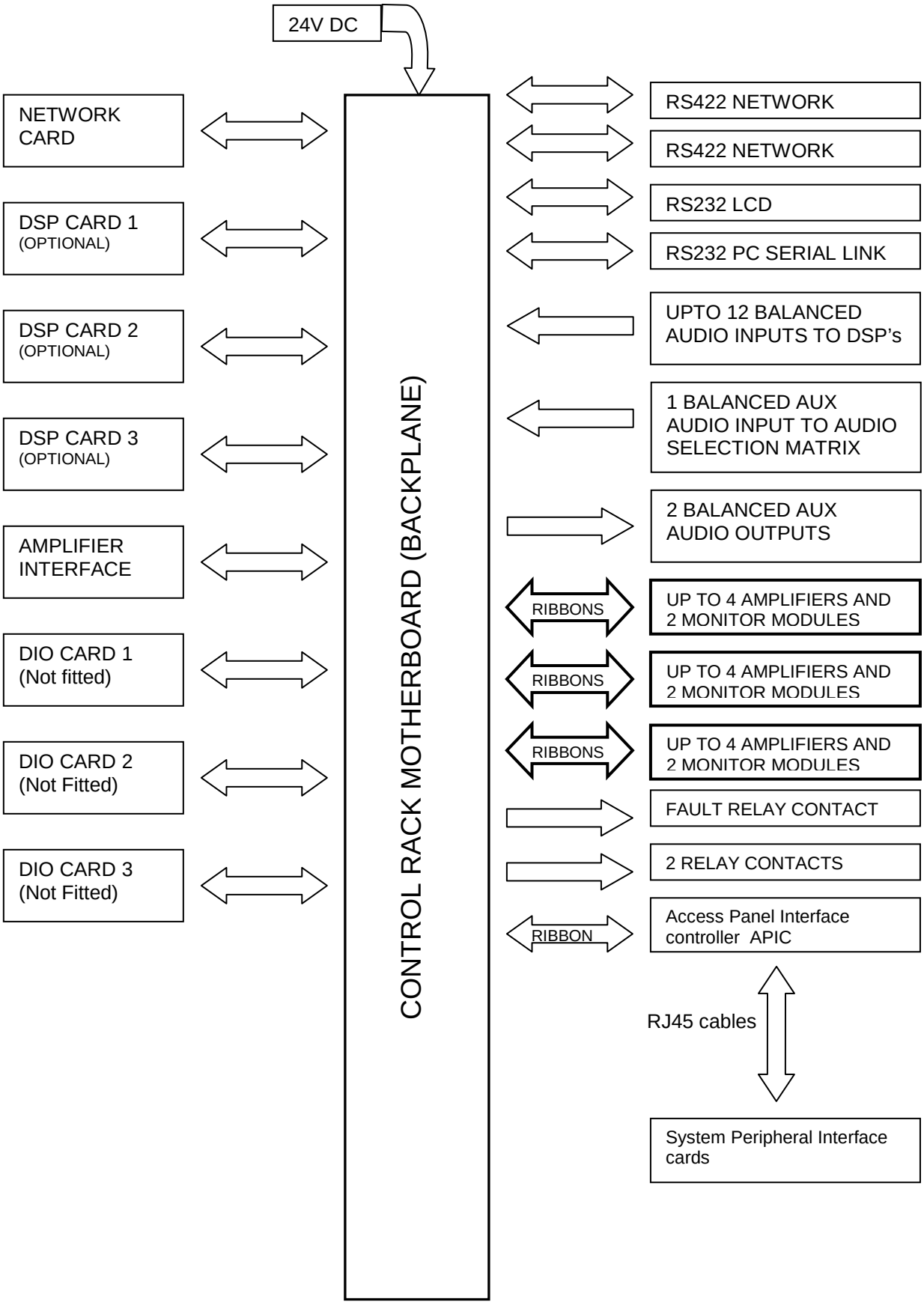
The Digital PA's Card Frame Backplane provides an electrical control interface between the Card Frame plug-in card modules and the external system interface cards and terminations mounted in the control rack. The backplane also provides the electronic circuitry required to interface between the various plug-in card modules. Finally the backplane provides the electrical interface required to control and monitor up to 12 amplifiers circuits.



CONTROL INTERFACE BACKPLANE REAR CONNECTIONS

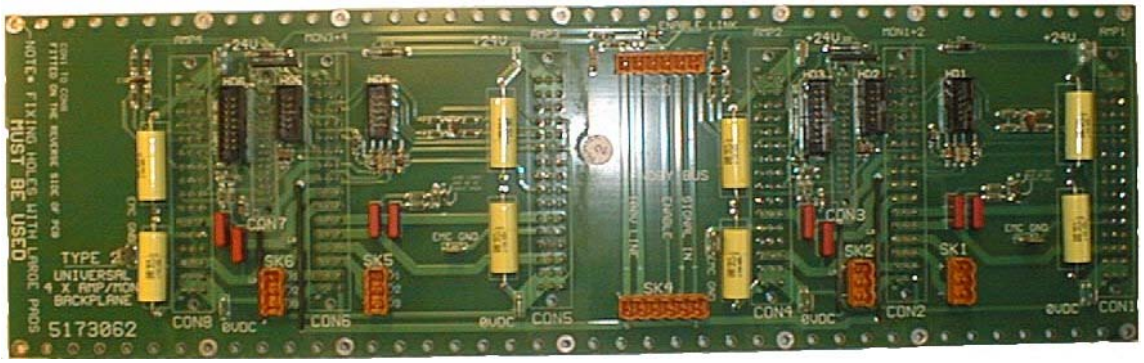
Starting from the right hand side the top ribbon connector can be used for connection to a serial driven display or PC, the second connector is either to a 9 pin 'D' socket on the front of the rack or to a built-in PC for set-up and mimic purposes.
The orange connectors below on the right are RL1 (relay 1) change-over contacts normally used to control the PABX interface 'ready' signal, and the one to the left is the 24V power input for the control system
COMM1 and COMM2 orange connectors are the RS422 network ports that are wired to terminals in the PA rack for connection to a duplicate rack or racks, below them is RL2 (relay 2) which is normally used to control the PABX interface 'PA busy' signal.
To the left of these we have the AUX-IN and AUX-OUT1, which are wired to terminals in the rack and used for the Audio connections from and too a duplicate rack, AUX-OUT2 may be used to feed audio to another system or monitor speakers.
The Fault output is available for connection if required (see TIG) but a separate relay under software control is usually used instead.
The twelve AUD-IN connections are wired as required to terminals in the PA rack for audio inputs from the Microphone Access Panels or from the PABX interface or other audio sources, DSP card 1 must be fitted for inputs 1 to 4, card 2 for inputs 5 to 8, and card 3 for inputs 9 to 12.
Towards the left of the backplane there are twelve 20 pin ribbon connectors associated with the 3 DIO cards: DIO1, DIO2 and DIO3. These 3 DIO cards are no longer used in the PA/GA system. Hence their associated ribbon cable connectors: API-1 and API-2, IN0 to IN4 and OP0 to OP4 are now redundant and should not have any ribbon cable connected to them.
The 10 and 16 way ribbon connectors along the bottom of the backplane are for connection to the Amplifier backplanes. (note, these ribbons are fitted with ferrite cores)
The 10 way ribbon AMP_EXT1, provides an I2C communication link between the processor network card and the Access interface controller.
10way ribbon cables DP1, DP2 and Standby A1 are not normally used, but are there for future expansion in systems with more than twelve amplifiers
Ribbon cable connectors: A1, A2, A3, A4, A1/A2 & A3/A4 connect to amplifier cardframe 1, A5, A6, A7, A8, A5/A6 & A7/A8 connect to amplifier cardframe 2 if fitted, A9, A10, A11, A12, A9/A10 & A11/A12 connect to amplifier cardframe 3 if fitted.

4.1.1 Control rack backplane Signal routing



4.2 AMPLIFIER BACKPLANE 5173062

The Amplifier Backplane provides the electrical interface between the 'plug-in' amplifier and monitoring modules and the DC power supply, outgoing loudspeaker terminations and the control system.
Each backplane has connections for four amplifiers and two dual channel monitoring modules.



AMPLIFIER BACKPLANE REAR CONNECTIONS

The black ribbon headers are connected back to the Control Backplane.

HD1 (amp 1), HD2 (amp 2), HD4 (amp 3) & HD5 (amp 4).
Ten pin ribbon - Amplifier Signal header

Pin	Signal	Pin	Signal
1	PGND	2	+12V
3	N/C	4	Speaker circuit fault
5	Amp fault	6	Sleep/control
7	PGND	8	Input audio -
9	Input audio +	10	N/C

HD3 (amps 1 & 2) & HD6 (amps 3 & 4) – Sixteen pin ribbon - Line monitor header

Pin	Signal	Pin	Signal
1	Speaker circuit fault A	2	30Hz monitor -B
3	30Hz monitor +B	4	Speaker circuit fault A
5	Speaker circuit fault A	6	30Hz monitor +A
7	Speaker circuit fault A	8	30Hz monitor -A
9	ISMT TX +	10	ISMT TX -
11	ISMT RX +	12	ISMT RX -
13	Speaker circuit fault B	14	Speaker circuit fault B
15	Speaker circuit fault B	16	Speaker circuit fault B

The power connections +24V, 0VDC and EMC GND are ¼" 6.35 x 0.8mm spades that accept 'faston' or push-on crimp terminals.
These are wired back to 16A 'K' type circuit breakers and 0V distribution terminals using 1.5mm^2 or 16AWG screened pair cable, with the screen wire connected at the backplane end only.

4.3 PROCESSOR/NETWORK CARD (P-NET) 4000020

See Technical Installation Guide 4000020 TIG

The Processor/Network Card is located in the rack across. The card comprises of two PCBs on which are mounted two microprocessors and a number of communication links. The software imbedded in these processors determines the operational parameters of the system.

The card is the hub of the local system collecting data via the communication links from all the other system modules, receiving instructions from external equipment and from this information determining the action required.

Example: - When a message or alarm tone is to be broadcast to certain areas of the plant, it is the control instructions from this card, which via the DSP determines the message and by switching on the appropriate amplifiers, which zones receive the message.

On the system, as delivered, the Subsonic Speaker Monitoring System carries out the detection of faults on the loudspeaker circuits.

The Processor/Network Card takes control of this function determining the frequency and measures the time of the line tests.

4.4 DIGITAL SIGNAL PROCESSOR (P_DSP) CARD (6000155)

See Technical Installation Guide 6000155TIG

The Digital Signal Processor (DSP) Card is located in the rack. The card controls the audio processing functions and fits into a standard ISA slot. The card can make a broadcast selection from one of eight possible audio sources; four external audio sources e.g. microphone, CD player or 100 V line system together with four internal messages, stored on the same PCB as the card and each capable of playing up to forty seconds of pre-recorded audio.

In brief, the main functions of the card are:

- To provide for four external analogue audio inputs of 0 dB line level.
- To provide access control of each audio input via a Press To Talk (PTT) input. These can be configured via a PC Mimic program to be normally open or normally closed.
- To provide each audio input with a configurable priority, a configurable chime (Bing Bong, etc.) and a configurable fault monitoring tone, which are selectable via the PC Mimic program.

- To provide selection of the following fault monitoring modes:

  30 Hz

  20 kHz (18 kHz – 22 kHz)

  Wide Band (30 Hz – 22 kHz).

- To provide four internal message stores each with configurable priority and chime
- Each message store can store a message of up to 40 seconds in length
- A link on the PCB (JP9) allows the overwriting of the stored messages via a *.wav file
- Each message has four configurable playback options: one-shot; continuous; intermittently repeating or non-latching
- The card looks for the presence of a fault monitoring tone (default 30 Hz) superimposed on the audio input signals and audio output signals as set via the PC Mimic program and in hardware. Any fault detected will be reported to the fault reporting system within 100s of occurrence
- The card scans the messages and PTT inputs. On receipt of a valid route request, the card connects the input or message to the audio output provided no higher priority request exists
- The card is able to accept configuration data from a PC Mimic program which is connected via a RS232 serial line
- Write protect links (JP10 = EEPROM, JP9 = Message Stores) are provided and should be removed whilst in normal operation to prevent corruption of the flash memories. Alternatively, if the card has a RUN/CONFIG switch then the EEPROM can be write enabled by setting the switch in the CONFIG position. It should be returned to the RUN position in normal operation.

4.5 AMP INTERFACE CARD (P_AIC) 4000019

See Technical Installation Guide 4000019TIG.

The Amp Interface Card is located in the racks. The main function of the card is to control the interface to the amplifiers.

The card, using information received from the central processor, can control up to 12 amplifiers and up to four standby amplifiers in a system. Depending on the message requirements, the amplifiers become operational once zone selection has been activated. The message is then broadcast to the external loudspeakers.

The card also monitors the amplifiers and their associated monitor modules and transmits the fault information to the central processor for display locally.

4.6 CLASS 'D' AMPLIFIERS (P_A250) 106136

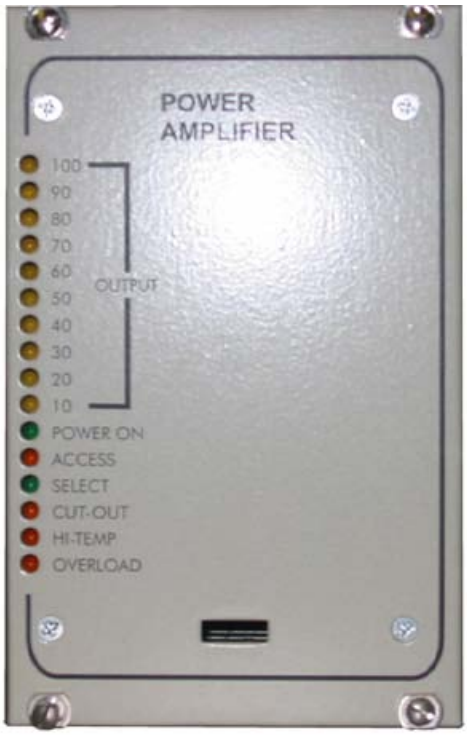
See Technical Installation Guide 250Wamp TIG.

There are a number of Class 'D' Amplifiers located in the rack. The amplifier receives control signals from the Amplifier Interface module and audio from the DSP module via ribbon cables from the control back-plane; the output signals generated are then fed to the loudspeakers. The amplifier is suited to both parallel banking and conventional PA/GA configurations. It also incorporates self-monitoring of fault conditions; therefore continuously giving the PA/GA System an accurate report on DC power supply, input signal status and amplifier failure. The rack also has a standby amplifier, so if an amplifier develops a fault, the standby amplifier provides back-up.

The amplifier incorporates LEDs to indicate the following:

- OUTPUT – (Output level - 10 LEDs from 10 to 100%)
- POWER-ON – (Power supply achieved)
- ACCESS – (100 V Line selected)
- SELECT – (Amplifier is awake)
- CUT-OUT – (Amplifier is forced into sleep mode for two possible reasons: High temperature or long term overload)
- HI-TEMP – (When temperature reaches 90 °C)
- OVERLOAD – (Input signal higher than 850 mV, with full load).

The highly efficient Class D amplification reduces heat generation and ensures that the system avoids power surge at start up. At full power the amplifier offers an efficiency level higher than 84 %, which allows the UPS to be significantly downsized.



4.7 Features and Specifications

Power Supply:	28 V d.c.
Rated Power Output (r.m.s.):	250 W
Current Supply (at 24 V d.c.):	12.25 A (full power)
Frequency Response (at 25 V r.m.s. out):	
Mode 1:	-3 dB points at 50 Hz and 19 kHz – passband within 1 dB
Mode 2 (selectable with on-board jumper):	-3 dB points at 180 Hz and 22 kHz – passband within 1.5 dB
Total Harmonic Distortion (at 1 kHz):	Less than 1 % (full power)
Residual Noise (audible):	-70 dB (full power)
Input Sensitivity:	0.775 V (r.m.s.)
Operating Temperature:	-10 °C to +50 °C
Weight:	3.04 kg
Dimensions:	128 mm H x 80 mm W x 362 mm D

4.8 SPEAKER MONITORING SYSTEM (P-M250) (4000014)

See Technical Installation Guide 4000014TIG

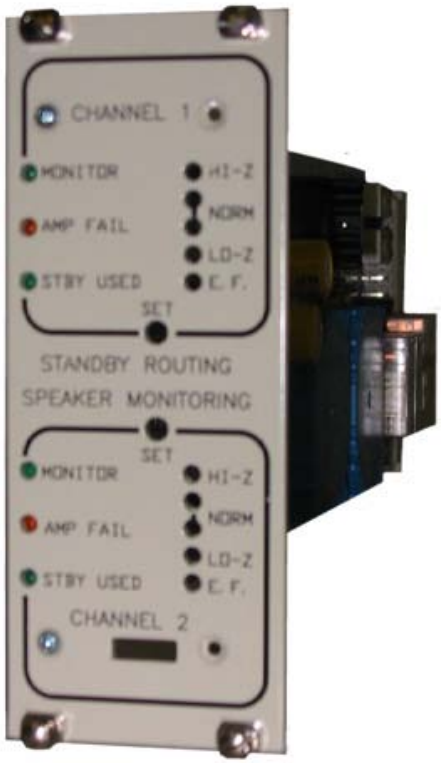
The Speaker Monitoring System (Subsonic) and combined Amplifier Standby Routing both function as a dual channel module, which monitors two amplifiers and their associated loudspeaker loops. There are a number of modules located in the rack.

The monitoring system detects faults on a cable to which a varying number of loudspeakers may be connected. The basis of the monitoring system is the generation of a 30 Hz signal that is injected onto the line and the detection circuit calibrated to the speaker loop parameters during installation. Deviation from these parameters can be interpreted as open circuit or short circuit cable faults in the speaker loop, or loss of a loudspeaker. The low frequency signal is chosen because the effects of the cable inductance and capacitance are greatly reduced making a more efficient and stable monitoring system.

The front of the module displays a number of LCDs, which provide ongoing status reports.

The monitoring system is only part of the module with the remainder being an automatic standby amplifier routing system in the event of one of the monitored amplifiers developing a fault. On a multi-zone, multi-amplifier system a number of standby amplifiers may be required to provide the degree of security necessary unless the standby amplifier can be free to back-up more than one faulty amplifier.

Within the overall system an amplifier is designated as the standby and this amplifier is used to provide back up to any amplifier, which develops a fault. When an amplifier that is faulty is required to broadcast, the automatic routing system re-routes the signal via the standby amplifier to broadcast the message. At the end of the communication the standby amplifier is released to become the standby for any other amplifier in the system.



4.9 Access Panel Interface Controller (P-APIC) 2005396A

See Technical Installation Guide P_APIC

The P-APIC is a microprocessor based PCB providing control and monitoring of 4 remotes access panels via an Access Panel Interface board (P-API). The P-API is a separate PCB providing the necessary circuitry (opto-isolation, etc) to interface the P-APIC board to 4 remote access panels.

The P-APIC transmits to and receives data from the P-NET module via an I2C bus. The P-NET module is the I2C master and the P-APIC board is the I2C slave device.

Via the I2C bus, the P-NET module receives data from the P-APIC board regarding the status of each access panel's push buttons and sends data to the P-APIC board instructing the P-APIC microprocessor how to control each of the access panel's LEDs (On, Off, flash, etc). The P-APIC's on board software has a fixed role within the PAGASYS system and contains no project specific code.

The P-APIC board also contains an I2C bus multiplexer circuit, which enables controllable routing or switching of the I2C bus signals to 7 off-board I2C busses. The 7 off-board I2C busses are used by the P-NET module to route I2C signals to and from other PAGASYS I/O boards. These I/O boards have been designed specifically for integration in to the Federal Signal PA/GA rack.

4.9.1 Expanding the I2C system to contain multple P-APIC cards

Additional P-APIC boards can be connected to each of the 7 off-board I2C busses. In this manner the I2C bus architecture can be expanded to beyond that which the basic I2C bus specification would permit. To differentiate between the different P-APIC cards on a single i2C bus, each P-APIC card should be given a unique i2C address which is determines by the position of P-APIC Hex switch SW2.

4.9.2 PAPIC PCB LEDs

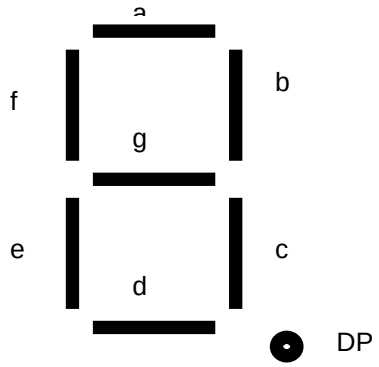
The P-APIC board is fitted with 2 PCB mount LEDs and a 7-segment display (U1) whose function detailed in the table below.

P-APIC PCB LEDs

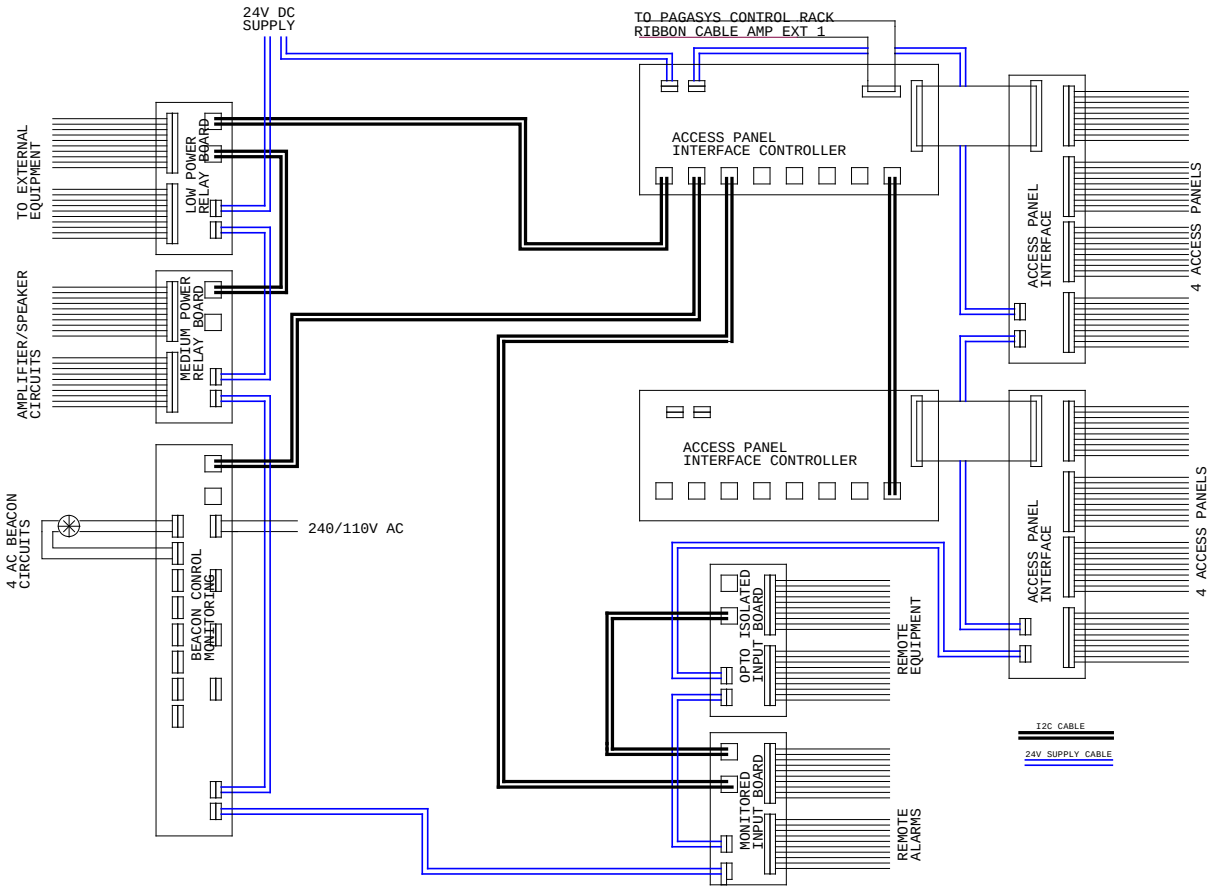
LED	On Function	Off Function	Comment
D2	24V DC supply present	24V DC supply fault	
D3	Isolated 5V DC supply present	Isolated 5V DC supply Fault	

U1	On Function	Off Function	Comment
segment a	Transmitting I2C data	Not Transmitting I2C data	
segment b	Receiving I2C DATA	Not Receiving I2C DATA	
segment c	Resetting onboard I2C ports	Resetting onboard I2C ports	
segment d	TBD		
segment e	TBD		
segment f	TBD		
segment g	TBD		
DP	Board watchdog failure	Board watchdog OK	Software failure

U1 Seven Segment LED display



Typical system containing PIC PCBs



4.9.3 P-APIC DC Power supply connection

The DC power supply is routed in to and out of the P-APIC board via TB1 and TB2

The Table below shows the pin allocation of DC Supply terminal blocks

Table 5. DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.9.4 P-APIC I2C interface board connection.

The I2C bus signals are routed to the P-APIC card from the control Interface backplane (P-CIB), via 10 way ribbon cable header HD1.

4.9.5 P-APIC I2C interface board connection.

The 7 Multiplexed I2C busses are routed from the P-APIC board to other I/O boards via 7 x RJ45 connectors: J2, J3, J4, J5, J6 and J7
Note: RJ45 connector J1 is connected directly to Ribbon cable header HD1

4.9.6 API connector

The P-APIC board is connected to the P-API board via a 40 way IDC ribbon cable JP4.
The pin allocation of the 40-way ribbon cable header JP4 are indicated in table below

Table 8: JP4 IDC header pin allocation

Pin number	Pin Function	Pin number	
1	LED CLOCK API1	2	LED CLOCK API2
3	LED DATA API1	4	LED DATA API2
5	LED ENABLE API1	6	LED ENABLE API2
7	KEY PAD RESET API1	8	KEY PAD RESET API2
9	KEY PAD CLOCK API1	10	KEY PAD CLOCK API2
11	RELAY CONTROL API1	12	RELAY CONTROL API2
13	KEY PAD RETURN 1 API1	14	KEY PAD RETURN 1 API2
15	KEY PAD RETURN 2 API1	16	KEY PAD RETURN 2 API2
17	VCC	18	VCC
19	VCC	20	VCC
21	0V	22	0V
23	0V	24	0V
25	LED CLOCK API3	26	LED CLOCK API4
27	LED DATA API3	28	LED DATA API4
29	LED ENABLE API3	30	LED ENABLE API4
31	KEY PAD RESET API3	32	KEY PAD RESET API4
33	KEY PAD CLOCK API3	34	KEY PAD CLOCK API4
35	RELAY CONTROL API3	36	RELAY CONTROL API4
37	KEY PAD RETURN 1 API3	38	KEY PAD RETURN 1 API4
39	KEY PAD RETURN 2 API3	40	KEY PAD RETURN 2 API4

4.9.7 RS232

The P-APIC board has a RS232 serial port. This RS232 serial port is not used in the PA/GA application, but is provided for other possible applications yet to be conceived.

To connect to the RS232 Serial port a 9 way male D type connector must be fitted to socket SKT 1.

RS232 SKT 1 pin allocation

Pin number	Pin Function
1	Not connected
2	RS232 Transmitted data
3	RS232 Received data
4	Not connected
5	0V
6	Not connected
7	Not connected
8	Not connected
9	Not connected

4.9.8 RS422

The P-APIC board has a RS422 serial port. This RS422 serial port is not used in the PAGASYS application, but is provided for other possible applications, yet to be conceived.

A 5-way terminal block (TB3) is provided for connection to the RS422.

RS422 terminal block (TB3) pin allocation

Pin number	Pin Function
1	Receive data +
2	Receive data -
3	GND
4	Transmit data +
5	Transmit data -

4.10 Access Panel Interface (P-API) 2005390A

See Technical Installation Guide P_API

The P-API board provides the necessary interface circuitry that lies between the P-APIC board and four remote access panels. This interface circuitry takes the form of opto-isolated input and outputs, Isolated DC power supply generation and control.
The P-API board also provides four terminal blocks through which the access panel's audio signals can be routed.

The P-API interface provides 4 Access panel interface circuits referred to as API 1 to API 4.

4.10.1 P-API board LEDs

The P-API board is fitted with 34 PCB LEDs whose function detailed in Table 1

Table 1: P-APIC PCB LEDs

LED	I/O	On Function	Off Function	Access panel interface circuit
D6		24V DC supply present	24V DC supply fault	N/A
D31		Isolated 12V DC supply present	Isolated 12V DC supply Fault	N/A
D30	O	API LED CLOCK Lo	API LED CLOCK Hi	API 1
D29	O	API LED DATA Lo	API LED DATA Hi	API 1
D28	O	API DC SUPPLY ON	API DC SUPPLY OFF	API 1
D27	O	API LED ENABLE Lo	API LED ENABLE Hi	API 1
D56	I	KEY PAD RETURN 2 switch pressed	KEY PAD RETURN 2 switch not pressed	API 1
D55	I	KEY PAD RETURN 1 switch pressed	KEY PAD RETURN 1 switch not pressed	API 1
D26	O	KEY PAD CLOCK Lo	KEY PAD CLOCK Hi	API 1
D25	O	KEY PAD RESET Lo	LEY PAD RESET Hi	API 1
D24	O	API LED CLOCK Lo	API LED CLOCK Hi	API 2
D23	O	API LED DATA Lo	API LED DATA Hi	API 2
D22	O	API DC SUPPLY ON	API DC SUPPLY OFF	API 2
D21	O	API LED ENABLE Lo	API LED ENABLE Hi	API 2
D49	I	KEY PAD RETURN 2 switch pressed	KEY PAD RETURN 2 switch not pressed	API 2
D48	I	KEY PAD RETURN 1 switch pressed	KEY PAD RETURN 1 switch not pressed	API 2
D20	O	KEY PAD CLOCK Lo	KEY PAD CLOCK Hi	API 2
D19	O	KEY PAD RESET Lo	LEY PAD RESET Hi	API 2
D18	O	API LED CLOCK Lo	API LED CLOCK Hi	API 3
D17	O	API LED DATA Lo	API LED DATA Hi	API 3
D16	O	API DC SUPPLY ON	API DC SUPPLY OFF	API 3

D15	O	API LED ENABLE Lo	API LED ENABLE Hi	API 3
D42	I	KEY PAD RETURN 2 switch pressed	KEY PAD RETURN 2 switch not pressed	API 3
D41	I	KEY PAD RETURN 1 switch pressed	KEY PAD RETURN 1 switch not pressed	API 3
D14	O	KEY PAD CLOCK Lo	KEY PAD CLOCK Hi	API 3
D13	O	KEY PAD RESET Lo	LEY PAD RESET Hi	API 3
D12	O	API LED CLOCK Lo	API LED CLOCK Hi	API 4
D11	O	API LED DATA Lo	API LED DATA Hi	API 4
D10	O	API DC SUPPLY ON	API DC SUPPLY OFF	API 4
D9	O	API LED ENABLE Lo	API LED ENABLE Hi	API 4
D35	I	KEY PAD RETURN 2 switch pressed	KEY PAD RETURN 2 switch not pressed	API 4
D34	I	KEY PAD RETURN 1 switch pressed	KEY PAD RETURN 1 switch not pressed	API 4
D8	O	KEY PAD CLOCK Lo	KEY PAD CLOCK Hi	API 4
D7	O	KEY PAD RESET Lo	LEY PAD RESET Hi	API 4

4.10.2 P-API 24V DC Power supply connection

All of the PAGASYS I/O boards have a standard 24V DC power supply connection interface; this enables multiple I/O boards to be linked together in daisy chain fashion. The 24V DC supply is connected to and from the P-API board via terminal blocks TB1 and TB2.

The Table below shows the pin allocation of 24V DC Supply terminal blocks TB1 and TB2.

DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

The access panel interface circuits and remote access panels are powered from a Isolated +12V DC supply. This Isolated +12V DC supply is derived from the 24V DC supply by an isolated DC/DC converter mounted on the API board.

4.10.3 P-APIC ribbon cable connector

The P-API board is connected to the P-APIC board via 40 way IDC ribbon header JP1.

4.10.4 Remote access panel terminal blocks

The P-API board provides 4 separate access panel interfaces for connection to 4 remote access panels. Connection between an access panel interface and its associated remote access panel is made via a 12-way terminal block.
The 4, 12-way terminal blocks are reference as API 1, API 2, API 3 and API 4

The table below sshows the pin allocation of the Remote access panel interface terminal blocks: API 1, API 2, API 3 and API 4.

Remote access panel interface terminal block

Pin number	Pin Function
1	Audio input +
2	Audio cable screen
3	Audio input -
4	KEY PAD RESET
5	KEY PAD CLOCK
6	KEY PAD RETURN 1
7	KEY PAD RETURN 2
8	ACCESS PANEL 0V
9	ACCESS PANEL 12V
10	LED ENABLE
11	LED DATA

12	LED CLOCK

4.10.5 Audio terminals blocks

The P-API board provides 4 x 3-way audio terminal blocks. Each audio terminal block is associated with one of the remote access panel terminal blocks and is used to connect the audio signals originating at the remote access panels to the system DSP.

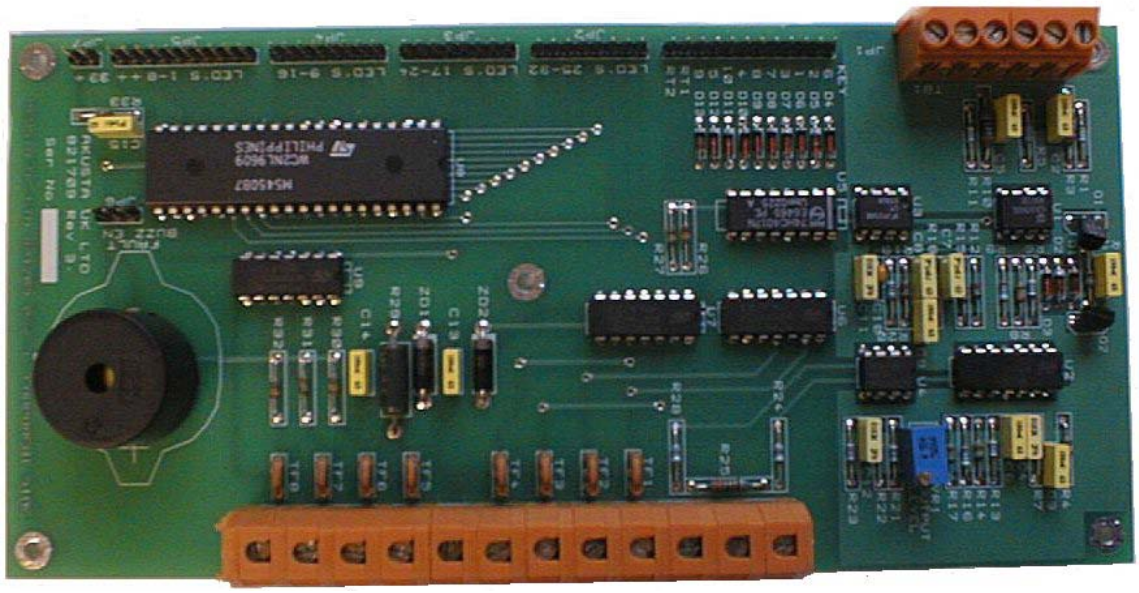
The association between the audio terminal blocks and the remote access panel terminal block are as follows

API 1 ➔ TB4
API 2 ➔ TB3
API 3 ➔ TB2
API 4 ➔ TB1

The Table below shows the pin allocation of Audio terminal blocks TB3, TB, TB5 and TB6

Audio terminal block pin number	Pin Function
1	Audio input +
2	Audio input -
3	Audio cable screen

4.11 ACCESS PANEL DRIVER BOARD 821709



Reference should be made to drawing: 821 709 ACCESS PANEL DRIVER CARD CIRCUIT DIAGRAM
The access panel driver card provides interfacing for signals passing between the control interface and the pushbuttons and LED's.

The board consists of three sections a Pre-amp with 20kHz supervision tone on the right, a LED control circuit and buzzer to the left, and a 10x2 Keyboard matrix decoder in the centre.

The 20kHz is pre-set, but the overall volume output can be adjusted by turning VR1.

TB2 connects to the field cable back to the central system and the Access Panel Interface.
TB1 connects to the microphone.

JP1 is a 12 way header which has 10 outputs and 2 returns for connecting to the pushbuttons in a 10x2 matrix format.

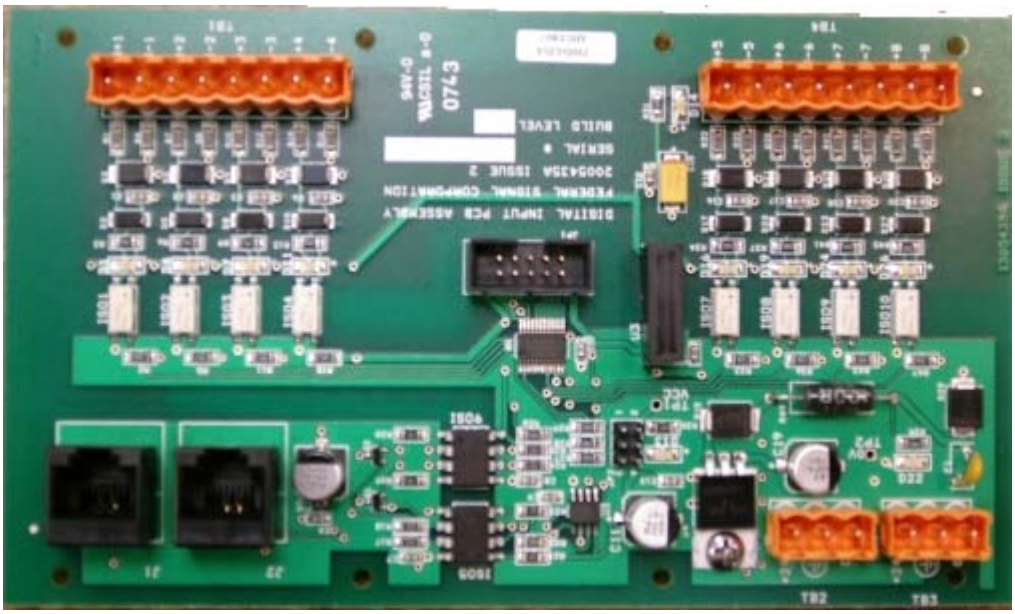
JP5 is a 10 way header which has two +5V pins and 8 control pins to switch Low Current LED indicators.
JP2, 3, 4 are 8 way headers to control up to 24 more LED's.
JP6 should have a jumper fitted onto pins 2 & 3 to enable the fault buzzer.

4.12 8 CHANNEL DIGITAL INPUT PCB P-8DIN 2005435B

See Technical Installation Guide P_8DIN

The P-8DIN board provides the PA/GA system with an 8 channel opto-isolated digital input interface for connection to volt free contacts. Typically examples of equipment utilising volt free contacts could be an oil platform's fire and gas interface or remote microphone station PTT switch.

The P-8DIN PCB is powered from a nominal 24V DC power supply. An onboard Isolated DC/DC converter provides the power for the field termination side of the opto isolated barrier.



4.12.1 PCB LEDs

The P-8DIN board is fitted with LED indicators whose function detailed in Table below

P-8DIN PCB LEDs

LED	On Function	Off Function
D1	Input 1 remote contact closed	Input 1 remote contact open
D4	Input 2 remote contact closed	Input 2 remote contact open
D7	Input 3 remote contact closed	Input 3 remote contact open
D11	Input 4 remote contact closed	Input 4 remote contact open
D16	Input 5 remote contact closed	Input 5 remote contact open
D19	Input 6 remote contact closed	Input 6 remote contact open
D24	Input 7 remote contact closed	Input 7 remote contact open
D26	Input 8 remote contact closed	Input 8 remote contact open
D22	24V supply voltage present	24V fault
D13	5V supply voltage present	5V supply fault
D14	Field-wiring interface Isolated DC supply voltage present	Field-wiring interface Isolated DC supply voltage fault

4.12.2 DC supply connection

The DC power supply is connected into and out of the P-8DIN board via TB2 and TB3.

The Table below shows the pin allocation of DC Supply terminal blocks TB2 and TB3

24V DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.12.3 Field-wiring terminal blocks

The Tables below, shows the pin allocation of Field-wiring terminal blocks

TB1 Terminal block pin allocation

Pin number	Pin Function
1	Digital input 1 +
2	Digital input 1 -
3	Digital input 2 +
4	Digital input 2 -
5	Digital input 3 +
6	Digital input 3 -
7	Digital input 4 +
8	Digital input 4 -

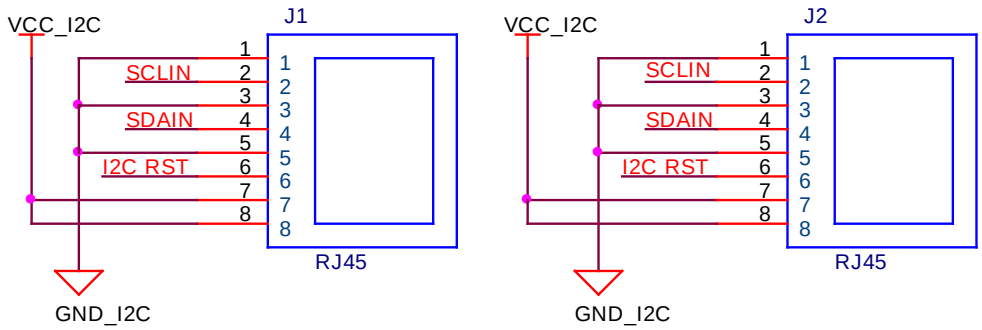
TB4 Terminal block pin allocation

1	Digital input 5 +
2	Digital input 5 -
3	Digital input 6 +
4	Digital input 6 -
5	Digital input 7 +
6	Digital input 7 -
7	Digital input 8 +

4.12.4 P-8DIN I2C interface board connection.

The I2C bus are routed in to and out off the P-8DIN board via RJ45 PCB connectors: J1 and J2.

FIG. 3



4.12.5 P-8DIN I2C base address

The P-8DIN card has one I2C device whose base address range is 0x20H to 0x27H. To set the I2C base address, jumper links must be fitted to configuration header JP2 as per table below

Table 4: P-8DIN I2C Address header JP2

I2C Address	A0 (JP2 1-2)	A1 (JP2 3-4)	A2 (JP2 5-6)
20	Not Fitted	Not Fitted	Not Fitted
21	Fitted	Not Fitted	Not Fitted
22	Not Fitted	Fitted	Not Fitted
23	Fitted	Fitted	Not Fitted
24	Not Fitted	Not Fitted	Fitted
25	Fitted	Not Fitted	Fitted
26	Not Fitted	Fitted	Fitted
27	Fitted	Fitted	Fitted

4.13 8 CHANNEL MONITORED INPUT PCB P-8MIN 2005440B

See Technical Installation Guide P_8mIN

The P-8MIN board provides the PA/GA system with an opto-isolated monitored input interface for connection to remote volt free contact fitted with 2 x 1k biasing resistors. Typically examples of equipment having volt free contacts that require monitoring could be an oil platform's fire and gas interface or remote microphone station PTT switch.

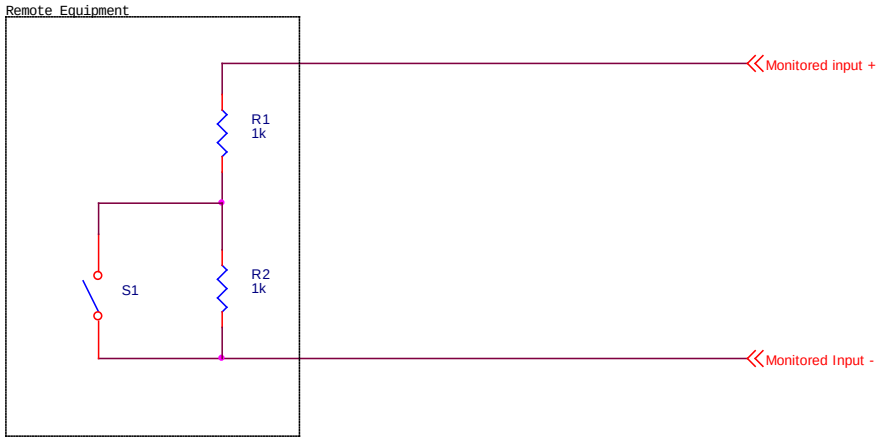
The P-8MIN PCB is powered from a nominal 24V DC power supply. An onboard Isolated DC/DC converter provides the power for the field termination side of the opto isolated barrier.

4.13.1 Monitored input circuit function

The monitored input circuit shall:

Detect closed remote switches	Circuit terminated with 1K
Detect open remote switches	Circuit terminated with 2K
Detect circuit fault: open circuit	Circuit resistance > 4K
Detect circuit fault: shorted circuit	Circuit resistance < 500R

Typical remote monitored switching circuit



4.13.2 P-8MIN PCB LEDs

The P-8MIN board is fitted with LED indicators whose function detailed in the Table below

LED	On Function	Off Function
D3	Input 1 remote switch closed	Input 1 remote switch open
D1	Input 1 external switch circuit Fault	Input 1 external switch circuit OK
D5	Input 2 remote switch closed	Input 2 remote switch open
D7	Input 2 external switch circuit Fault	Input 2 external switch circuit OK
D11	Input 3 remote switch closed	Input 3 remote switch open
D10	Input 3 external switch circuit Fault	Input 3 external switch circuit OK
D15	Input 4 remote switch closed	Input 4 remote switch open
D14	Input 4 external switch circuit Fault	Input 4 external switch circuit OK
D19	Input 5 remote switch closed	Input 5 remote switch open
D18	Input 5 external switch circuit Fault	Input 5 external switch circuit OK
D23	Input 6 remote switch closed	Input 6 remote switch open
D21	Input 6 external switch circuit Fault	Input 6 external switch circuit OK
D27	Input 7 remote switch closed	Input 7 remote switch open
D25	Input 7 external switch circuit Fault	Input 7 external switch circuit OK
D31	Input 8 remote switch closed	Input 8 remote switch open
D29	Input 8 external switch circuit Fault	Input 8 external switch circuit OK

4.13.3 DC power supply connection

The DC power supply is connected into and out of the P-8DIN board via TB2 and TB3.

The Table below shows the pin allocation of DC Supply terminal blocks TB2 and TB3

24V DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.13.4 Field-wiring terminal blocks

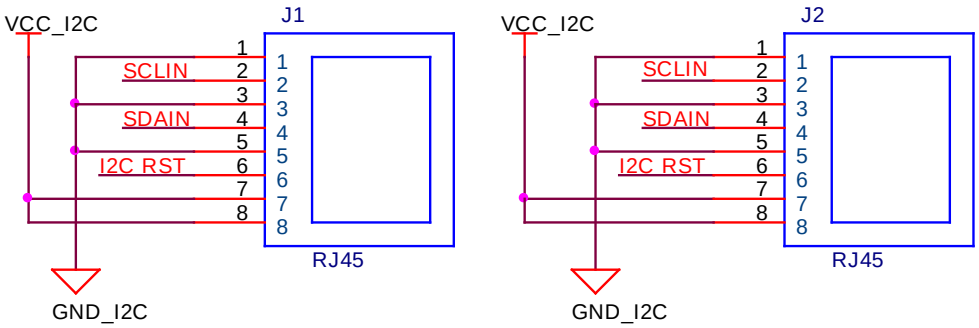
The Table below shows the pin allocation of Field-wiring terminal block

TB1 Terminal block pin allocation

Pin number	Pin Function
1	Monitored input 1 +
2	Monitored input 1 -
3	Monitored input 2 +
4	Monitored input 2 -
5	Monitored input 3 +
6	Monitored input 3 -
7	Monitored input 4 +
8	Monitored input 4 -
9	Monitored input 5 +
10	Monitored input 5 -
11	Monitored input 6 +
12	Monitored input 6 -
13	Monitored input 7 +
14	Monitored input 7 -
15	Monitored input 8 +
16	Monitored input 8 -

4.13.5 P-8MIN I2C interface board connection.

The I2C bus are routed in to and out off the P-8DIN board via RJ45 PCB connectors: J1 and J2.



4.13.6 P-8MIN I2C base address

The P-8MIN card has one I2C device whose base address range is 0x20H to 0x27H. To set the I2C base address, jumper links must be fitted to configuration header JP1 as per table below

P-8MIN I2C Address header JP1

I2C Address	A0 (JP2 1-2)	A1 (JP2 3-4)	A2 (JP2 5-6)
20	Not Fitted	Not Fitted	Not Fitted
21	Fitted	Not Fitted	Not Fitted
22	Not Fitted	Fitted	Not Fitted
23	Fitted	Fitted	Not Fitted
24	Not Fitted	Not Fitted	Fitted
25	Fitted	Not Fitted	Fitted
26	Not Fitted	Fitted	Fitted
27	Fitted	Fitted	Fitted

4.14 5 CHANNEL DPDT RELAY PCB P-5DPDT 2005426B

See Technical Installation Guide TIG P-5DPDT

The P-5DPDT board has been designed to provide the PAGASYS system with the ability to switch or route 100V audio signals with DPDT relays, each relay coil being controlled by a remote microprocessor via an I2C bus.
The audio signal routing on the board can be configured to provide 5 audio outputs from 5 audio inputs or the relays contacts can be linked together to provide other audio signal switching combinations, such as 5 audio outputs from 1 audio input.

4.14.1 PCB LEDs

The P-5DPDT card is fitted with LED indicators whose function detailed in the table below

P-5DPDT PCB LEDs

LED	On Function	Off Function	Comment
D1	Relay 1 energised	Relay 1 de-energised	
D3	Relay 2 energised	Relay 2 de-energised	
D5	Relay 3 energised	Relay 3 de-energised	
D8	Relay 4 energised	Relay 4 de-energised	
D13	Relay 5 energised	Relay 5 de-energised	
D11	24V present	24V fault	
D7	5V present	5V supply fault	

4.14.2 P-5DPDT 24V DC Power supply connection

The DC power supply is routed in to and out of the P-5DPDT board via TB4 and TB6.

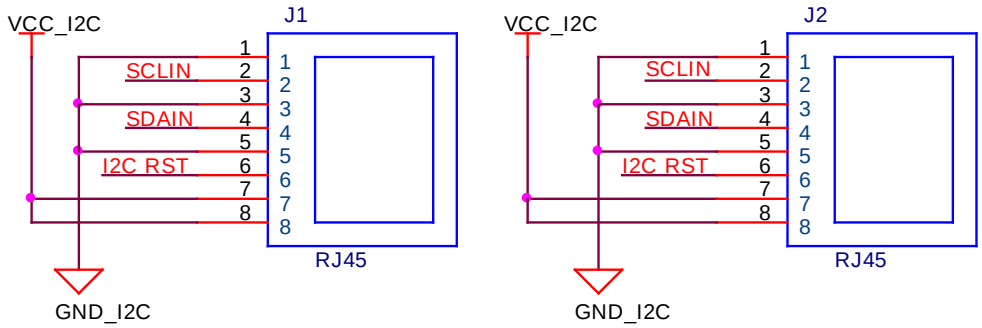
The Table below shows the pin allocation of DC Supply terminal blocks

DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.14.3 P-5DPDT I2C interface board connection.

The I2C bus are routed in to and out off the P-8DIN board via RJ45 PCB connectors: J1 and J2.



4.14.4 Field-wiring terminal blocks

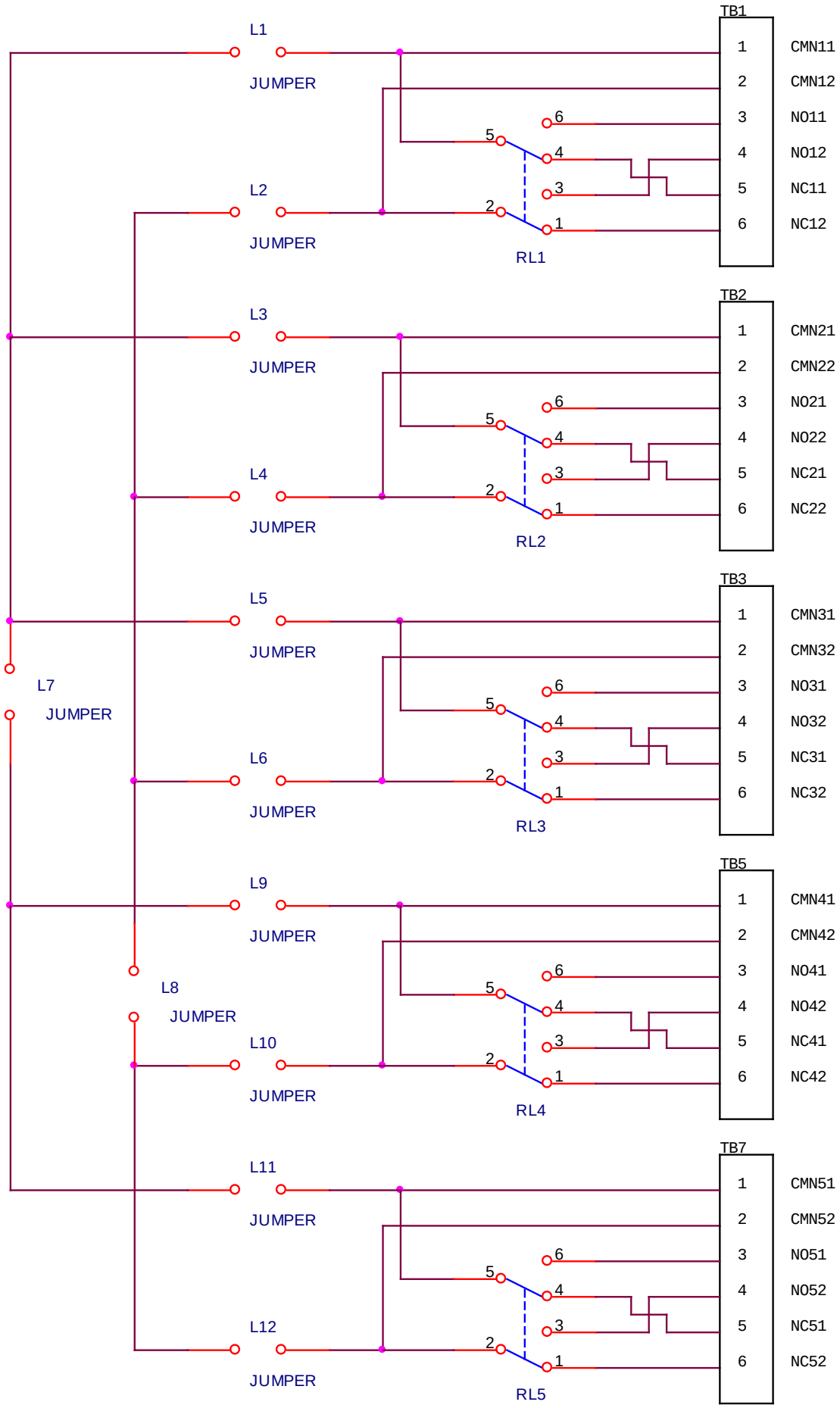
The table below shows the pin allocation of Field-wiring terminal blocks

Field wiring terminal block pin allocation

Pin number	Pin Function
TB1 pin 1	Relay 1 Common 11
TB1 pin 2	Relay 1 Common 12
TB1 pin 3	Relay 1 Normally Open 11
TB1 pin 4	Relay 1 Normally Open 12
TB1 pin 5	Relay 1 Normally Closed 11
TB1 pin 6	Relay 1 Normally Closed 12
TB2 pin 1	Relay 2 Common 11
TB2 pin 2	Relay 2 Common 12
TB2 pin 3	Relay 2 Normally Open 11
TB2 pin 4	Relay 2 Normally Open 12
TB2 pin 5	Relay 2 Normally Closed 11
TB2 pin 6	Relay 2 Normally Closed 12
TB3 pin 1	Relay 3 Common 11
TB3 pin 2	Relay 3 Common 12
TB3 pin 3	Relay 3 Normally Open 11
TB3 pin 4	Relay 3 Normally Open 12
TB3 pin 5	Relay 3 Normally Closed 11
TB3 pin 6	Relay 3 Normally Closed 12
TB5 pin 1	Relay 4 Common 11
TB5 pin 2	Relay 4 Common 12
TB5 pin 3	Relay 4 Normally Open 11
TB5 pin 4	Relay 4 Normally Open 12
TB5 pin 5	Relay 4 Normally Closed 11
TB5 pin 6	Relay 4 Normally Closed 12
TB7 pin 1	Relay 5 Common 11
TB7 pin 2	Relay 5 Common 12
TB7 pin 3	Relay 5 Normally Open 11
TB7 pin 4	Relay 5 Normally Open 12
TB7 pin 5	Relay 5 Normally Closed 11
TB7 pin 6	Relay 5 Normally Closed 12

4.14.5 Audio routing jumpers.

Configuration links L1 to L12 provide a mechanism to link each relay's common terminals to on board audio bus. These links enable many combination audio signal routing through the boards relay contacts. See Diagram below


TB1
L1
JUMPER
L2
JUMPER
RL1
1 CMN11
2 CMN12
3 NO11
4 NO12
5 NC11
6 NC12
TB2
L3
JUMPER
L4
JUMPER
RL2
1 CMN21
2 CMN22
3 NO21
4 NO22
5 NC21
6 NC22
TB3
L5
JUMPER
L7
JUMPER
L6
JUMPER
RL3
1 CMN31
2 CMN32
3 NO31
4 NO32
5 NC31
6 NC32
TB5
L9
JUMPER
L8
JUMPER
L10
JUMPER
RL4
1 CMN41
2 CMN42
3 NO41
4 NO42
5 NC41
6 NC42
TB7
L11
JUMPER
L12
JUMPER
RL5
1 CMN51
2 CMN52
3 NO51
4 NO52
5 NC51
6 NC52

4.14.6 P-5DPDT I2C base address

The P-5DPDT card has one I2C device whose base address range is 0x20H to 0x27H. To set the I2C base address, jumper links must be fitted to configuration header JP2 as per table below:

P-5DPDT I2C address header

I2C Address	A0 (JP2 1-2)	A1 (JP2 3-4)	A2 (JP2 5-6)
20	Not Fitted	Not Fitted	Not Fitted
21	Fitted	Not Fitted	Not Fitted
22	Not Fitted	Fitted	Not Fitted
23	Fitted	Fitted	Not Fitted
24	Not Fitted	Not Fitted	Fitted
25	Fitted	Not Fitted	Fitted
26	Not Fitted	Fitted	Fitted
27	Fitted	Fitted	Fitted

4.15 8 CHANNEL SPDT RELAY PCB P-8SPDT 2005403B

See Technical Installation Guide TIG P-8STDT

The P-8SPDT is a single PCB assembly containing 8 Single Pole Double Throw (SPDT) relays. Each relay coil is individually controlled by a remote microprocessor over a buffered and isolated I2C bus. LED indicators are used to display the status of each relay coil.

The P-8SPDT board has been designed to provide the PAGASYS rack with a Volt free contact interface for connection to external equipment. Typically this external equipment could be an Oil platform fire and Gas interface.

4.15.1 PCB LEDs

The P-8SPDT card is fitted with LED indicators whose function detailed in the table below

P-8SPDT PCB LEDs

LED	On Function	Off Function	Comment
D1	Relay 1 energised	Relay 1 de-energised	
D3	Relay 2 energised	Relay 2 de-energised	
D5	Relay 3 energised	Relay 3 de-energised	
D7	Relay 4 energised	Relay 4 de-energised	
D9	Relay 5 energised	Relay 5 de-energised	
D12	Relay 6 energised	Relay 6 de-energised	
D15	Relay 7 energised	Relay 7 de-energised	
D18	Relay 8 energised	Relay 8 de-energised	
D16	24V present	24V fault	
D10	5V present	5V supply fault	

4.15.2 P-8SPDT DC Power supply connection

The DC power supply is routed in to and out of the P-8SPDT board via TB2 and TB3.

The table below shows the pin allocation of DC Supply terminal blocks

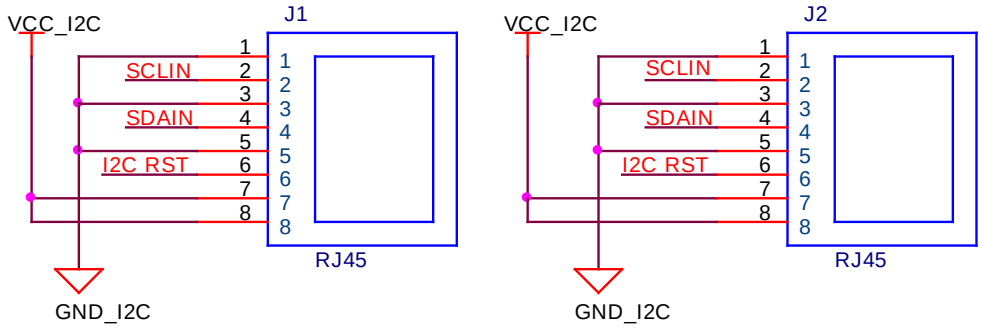
DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.15.3 P-8SPDT I2C interface board connection.

The I2C bus are routed in to and out off the P-8SPDT board via RJ45 PCB connectors: J1 and J2. See Figs. 2 and 3

FIG. 3



4.15.4 Field wiring terminal blocks

The table below shows the pin allocation of Field Wiring terminal blocks.

Field wiring terminal block pin allocation

Pin number	Pin Function
TB1 pin 1	Relay 1 Common
TB1 pin 2	Relay 1 Normally Closed
TB1 pin 3	Relay 1 Normally Open
TB1 pin 4	Relay 2 Common
TB1 pin 5	Relay 2 Normally Closed
TB1 pin 6	Relay 2 Normally Open
TB1 pin 7	Relay 3 Common
TB1 pin 8	Relay 3 Normally Closed
TB1 pin 9	Relay 3 Normally Open
TB1 pin 10	Relay 4 Common
TB1 pin 11	Relay 4 Normally Closed
TB1 pin 12	Relay 4 Normally Open
TB4 pin 1	Relay 5 Common
TB4 pin 2	Relay 5 Normally Closed
TB4 pin 3	Relay 5 Normally Open
TB4 pin 4	Relay 6 Common
TB4 pin 5	Relay 6 Normally Closed
TB4 pin 6	Relay 6 Normally Open
TB4 pin 7	Relay 7 Common
TB4 pin 8	Relay 7 Normally Closed
TB4 pin 9	Relay 7 Normally Open
TB4 pin 10	Relay 8 Common
TB4 pin 11	Relay 8 Normally Closed
TB4 pin 12	Relay 8 Normally Open

4.15.5 P-8SPDT I2C base address

The P-8SPDT card has one I2C device whose base address range is 0x20H to 0x27H. To set the I2C address, jumper links must be fitted to configuration header JP2 as per table below:

P-8SPDT I2C address header JP2

I2C Address	A0 (JP2 1-2)	A1 (JP2 3-4)	A2 (JP2 5-6)
20	Not Fitted	Not Fitted	Not Fitted
21	Fitted	Not Fitted	Not Fitted
22	Not Fitted	Fitted	Not Fitted
23	Fitted	Fitted	Not Fitted
24	Not Fitted	Not Fitted	Fitted
25	Fitted	Not Fitted	Fitted
26	Not Fitted	Fitted	Fitted
27	Fitted	Fitted	Fitted

4.16 4 CHANNEL BEACON MONITORING AND CONTROL PCB 2005407B P-BKMON

See Technical Installation Guide TIG P-BKMON

The Beacon monitoring and control board (P-BKMON) is a single PCB assembly providing control and monitoring of 4 separate AC Zenon beacon circuits. A separate system controller module controls the functions of the P-BKMON board via an opto-isolated I2C bus. The P-BKMON contains 4 separate “Beacon monitoring and control circuits”.

4.16.1 PCB LEDs

The P-BKMON board is fitted with LED indicators whose function detailed in the table below

Table 1: P-BKMON PCB LEDs

LED	On Function	Off Function	Comment
D4	Beacon circuit 1 resistance below lower limit	Beacon circuit 1 resistance above lower limit	D4 off and D5 off Normal D4 off and D5 on ELR O/C D4 on and D5 off ELR S/C
D5	Beacon circuit 1 resistance above upper limit	Beacon circuit 1 resistance below upper limit	
D6	Beacon circuit 1 monitoring active	Beacon circuit 1 monitoring Not active	
D7	AC supply connected to Beacon circuit 1	Constant current generator connected to beacon circuit 1	
D12	Beacon circuit 2 resistance below lower limit	Beacon circuit 2 resistance above lower limit	D12 off and D13 off Normal D12 off and D13 on ELR O/C D12 on and D13 off ELR S/C
D13	Beacon circuit 2 resistance above upper limit	Beacon circuit 2 resistance below upper limit	
D14	Beacon circuit 2 monitoring active	Beacon circuit 2 monitoring Not active	
D15	AC supply connected to Beacon circuit 2	Constant current generator connected to beacon circuit 2	
D32	Beacon circuit 3 resistance below lower limit	Beacon circuit 3 resistance above lower limit	D32 off and D33 off Normal D32 off and D33 on ELR O/C D32 on and D33 off ELR S/C
D33	Beacon circuit 3 resistance above upper limit	Beacon circuit 3 resistance below upper limit	
D34	Beacon circuit 3 monitoring active	Beacon circuit 3 monitoring Not active	
D35	AC supply connected to Beacon circuit 3	Constant current generator connected to beacon circuit 3	
D40	Beacon circuit 4 resistance below lower limit	Beacon circuit 4 resistance above lower limit	D40 off and D41 off Normal D40 off and D41 on ELR O/C D40 on and D41 off ELR S/C
D41	Beacon circuit 4 resistance above upper limit	Beacon circuit 4 resistance below upper limit	
D42	Beacon circuit 4 monitoring	Beacon circuit 4 monitoring	

	active	Not active	
D43	AC supply connected to Beacon circuit 4	Constant current generator connected to beacon circuit 4	
D23	TBD	TBD	
D24	TBD	TBD	
D25	TBD	TBD	
D18	24V DC supply present	24V DC supply fault	
D27	+5V DC supply present	+5V DC supply fault	

4.16.2 P-BKMON DC Power supply connection

The DC power supply is routed in to and out of the P-BKMON board via TB7 and TB8.

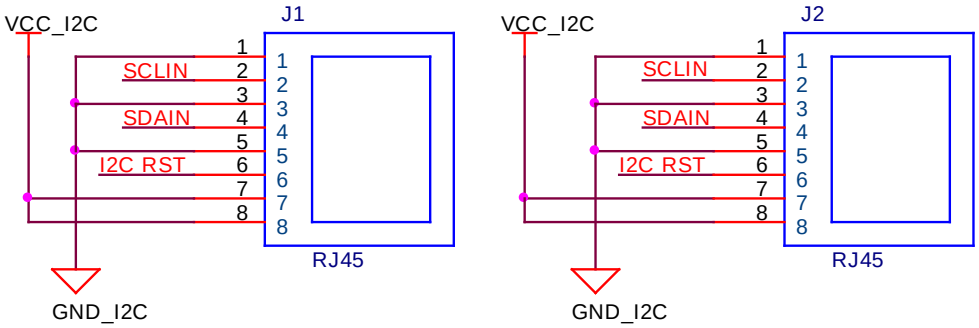
The table below show the pin allocation of DC Supply terminal blocks

TB7 and TB8 DC Power Supply Terminal Block pin allocation

Pin number	Pin Function
1	+24V DC
2	Protective Earth
3	0V

4.16.3 P-BKMON I2C interface board connection.

The I2C bus are routed in to and out off the P-BKMON board via RJ45 PCB connectors: J1 and J2.



4.16.3.1 Field-wiring terminal blocks

The tables below show the pin allocation of Field-wiring terminal blocks

Terminal block TB1: Beacon circuit 1: AC supply

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB2: Beacon circuit 1: AC Load Out

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB3: Beacon circuit 1: AC Load In

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB4: Beacon circuit 2: AC supply

Pin number	Pin Function

1	Live
2	Protective earth
3	Neutral

Terminal block TB5: Beacon circuit 2: AC Load Out

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB6: Beacon circuit 2: AC Load In

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB9: Beacon circuit 3: AC supply

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB10: Beacon circuit 3: AC Load Out

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB11: Beacon circuit 3: AC Load In

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB12: Beacon circuit 4: AC supply

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB13: Beacon circuit 4: AC Load Out

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

Terminal block TB14: Beacon circuit 4: AC Load In

Pin number	Pin Function
1	Live
2	Protective earth
3	Neutral

4.16.4 P-BKMON PCB I2C device configuration

4.16.4.1 U6 PCA9555PW : 16 line I2C I/O device

U6 is used to control the Relays and LED indicators on the board
U6 base address range 0x20H to 0x27H
U6 bases address configuration header JP2

The Table below indicates how to set the base address of U6

U6 (PCA9555PW) configuration header JP2

I2C Address	JP2 1-2	JP2 3-4	JP2 5-6
0x20H	Not Fitted	Not Fitted	Not Fitted
0x21H	Fitted	Not Fitted	Not Fitted
0x22H	Not Fitted	Fitted	Not Fitted
0x23H	Fitted	Fitted	Not Fitted
0x24H	Not Fitted	Not Fitted	Fitted
0x25H	Fitted	Not Fitted	Fitted
0x26H	Not Fitted	Fitted	Fitted
0x27H	Fitted	Fitted	Fitted

Note: Potential I2C address clash indicated in grey

4.16.4.2 U5 (AD5254BRUZ100): I2C controlled 4 Channel potentiometer

U5 is used to program the amplitude of beacon monitoring DC test current.
U5 base address range 0x2CH to 0x2FH
U5 bases address configuration header JP1

The Table below indicates how to set the base address of U5

U5 (AD5254BRUZ100) configuration header JP1

I2C Address	JP1 1-2	JP1 3-4
0x2CH	Not Fitted	Not Fitted
0x2DH	Fitted	Not Fitted
0x2EH	Not Fitted	Fitted
0X2FH	Fitted	Fitted

The Table below indicates how to set the write protect function of U5

Table 18: U5 write protect pin configuration JP1

JP1 9-10	Fitted	Not fitted
Write protect	Active	Not active

4.16.4.3 U2 (AD7993BRUZ-0): I2C controlled 4 Channel ADC

U2 is used to measure the voltage developed across each beacon circuit ELR.
U2 base address range 0x20H to 0x22H
U2 bases address configuration header JP1

The table below indicates how to set the base address of U2

U2 (AD7993BRUZ-0) configuration header JP1

I2C Address	JP1 5-6	JP1 7-8
0x20H	Not Fitted	Not Fitted
0x21H	Fitted	Not Fitted
0x22H	Not Fitted	Fitted
Not valid	Fitted	Fitted

Note: Potential I2C address clash indicated in grey refer

4.17 POWER SUPPLY UNIT (AC - DC) MER12WRB-P27D10

The power supply units are manufactured by TDI.
Mercury Rectifier unit model MER12WRB-P27D10
See manufacturers application data Mercury PSU manual

Electrical Specifications

Input Voltage:	90-300 volts AC, 47-63Hz, single phase (operational)
Input Current:	Less than 16A, 90 VAC, full load.
Peak Inrush Current:	36A peak input current
Power Factor:	0.99 typical
Efficiency:	Greater than 90% with 208VAC input at 50% to full load (including OR'ing diode) (2700W Series)
Input to Output Isolation:	3000 volts AC RMS
Input to Ground Isolation:	1500 volts AC RMS
Output to Ground Isolation:	500 VAC
Line Regulation:	Less than ±0.25%
Load Regulation:	±1.0% from no load to full load (droop load share)
Output Voltage:	27VDC
Output current:	45A
Output Power:	1200W

5. STORAGE/PRESERVATION, INSTALLATION & BASIC COMMISSIONING

Upon receipt of the goods it is the responsibility of the customer to check the delivery against the packing list, and to check for any damage sustained during transport.
Federal Signal Ltd and the carrier must be informed immediately of any discrepancies.

5.1 Preservation

The equipment is designed for indoor environments and preservation requirements are not arduous and comprise the following: -

Whilst in storage the equipment should be kept in its original packing, damaged or disturbed packing should be made good. The storage area should be clean, dry and vermin free, temperature should be within the range of 10 and 40Deg. C. The equipment should be protected from physical damage.

Periodic inspection of the equipment for loss or damage should be carried out.
When the equipment is installed preservation is minimal and would comprise: -

Inspection of the equipment for damage

5.2 Handling and Lifting Requirements.

The supplied P.A. system is pre-assembled into 19” rack cabinets weighing approximately 250kg, Lifting eyes are fitted to allow craning into position, alternatively the racks may be lifted by fork lift truck if mounted on a pallet.
The amplifiers are normally supplied boxed separately; Individual amplifiers should be handled with care so that the rear connector is not damaged.

5.3 Installation

For Rack installation;
Ensure the area is clean and free from debris. Set the plinth in the desired location, and bolt down to the prepared surface using the fixing holes provided. (Note: the depth of the plinth is 50mm less than the rack, see G.A. drawing)
Fit the rack onto the plinth using the M12 bolts and captive nuts provided.
Packing should be kept on the equipment for the maximum time possible. The equipment should be protected against damage once installed.

Some items such as the amplifiers may have been removed from the racks for shipment; these items should be kept packed until after the field cables have been fitted. These items should then be installed in the racks, in accordance with the rack G.A. drawings.

The Access panels are designed to fit onto console fronts (see drawing); the wiring to the terminations on the printed circuit boards must be individually screened pairs.
The Muster stations are designed for either wall or desk mounting, the cable must be suitable for Intrinsically Safe installations.

Field cabling should be connected as shown on the termination diagrams.
Connections to the system should be carried out with power isolated.

5.4 Basic Commissioning

WARNING
Extreme caution must be observed when working on the system, as **High** voltages may be present when the system is energised. When ever possible the system supply should be isolated.

Depending on the contract requirements, it is recommended that a Federal Signal Ltd. engineer carry out commissioning.

Having physically checked the system for damage, correctness, loose wires, etc. ensure that the supply voltage is correct for the system, before proceeding further.

The P.A. system is self-bootable at switch on; therefore the system will be operational.
The AC supply input into the rack is fed through miniature circuit breakers, The DC circuit breakers feed the amplifiers and auxiliary equipment were fitted, when switched on the LED indicators on the power amplifiers will be lit.

Isolation of components connected to the DC + 24V, +12V can be done by lifting the blades in the terminal blocks (these contain fuses), with the blades closed visually check supplies are available at the front panel.

Also, isolation of field equipment can be easily carried out, by lifting the knife switch built into each of the terminal blocks.

Check the fault status of the system by reference to the PC Mimic.

To check the operation of the system: Select various functions from the access panels, and observe the result.

6. MAINTENANCE AND FAULT FINDING/TROUBLESHOOTING

6.1 MAINTENANCE

Routine maintenance is minimal. Fault isolation is largely automatic and is enunciated on the PC mimic display (if fitted), and the individual fault LED's on the Access panels.

6.1.1 General System Maintenance

- Inspect the system visually for any sign of damage to the hardware.
- Check the rack and access panels for any fault indication.
- Check the PC mimics display for any fault indication. (Optional)
- Clean the surface of the equipment with a slightly damp cloth.
- Check the operation of all the speakers by initiating the tick tone at the access panels.
- Check the operation of all the alarm tones at convenient regular intervals.

6.1.2 Adjustment of the Access Panel Audio Levels

The audio levels are pre-set during factory tests and should rarely require adjustment. However, levels can be adjusted to accommodate site conditions where necessary. Audio levels are adjusted by VR1 on the access panel driver board Drawing. No.821709.

6.1.3 System Audio level adjustment

The Audio is all fed through the DSP module; all adjustments are done using the mimic program on a PC connected by a serial lead to the DSP.
See Technical Installation Guide 6000155TIG.

6.2 SERVICE AND MAINTENANCE

The PA/GA System requires little maintenance but for total system integrity the following service schedule, in accordance with BS5839: Part1: 1998, is recommended at the stated intervals.

Daily Checks

- Check the Engineers Test Panel or Set-up PC to see if any faults are shown on the system.

Weekly Checks

- Activate the system using the Engineers Test Panel or using the external inputs and check the alarm tones and messages. If any loudspeaker or zone is reported inoperable or sub-standard, investigate and remedy as required.

Quarterly Checks

- Check the system control racks for damage, ensure any ingress of contaminates is cleaned away
- Check fans are clean and operable
- Operate the Buttons on the Engineers Test Panel in turn, and walk the rig to check the speakers are operating.

Five Year Maintenance check

- All wiring to and from the system control racks should be inspected/checked as part of the buildings overall inspection and test requirement.

6.3 FAULT FINDING AND TROUBLESHOOTING

A separate PAGASYS Fault finding manual is available for use by Service Engineers.

The following section describes remedies to installation and configuration issues. If the fault is not listed or remains active, contact your supplier for further assistance.

No Audio Output from the PA/GA System.

Check the Amplifiers are

No Microphone Audio

- Check using a spare microphone
- Check the power from the control rack to the Pre-Amp is about 12 V DC.
- Ensure the appropriate PTT input is active and changes in this input can be seen with the appropriate PTT LED on the access panel
- Check the microphone volume setting is adequate
- If other audio channels are active check the overall priority structure
- If any amplifier or loudspeaker circuit alarms are present clear them down and review the microphone audio again.

No Alarm Audio

- Ensure the appropriate fire panel input is active and changes in this input can be seen on the LCD display
- Check the DSP volume setting is adequate
- If other audio channels are active check the overall priority structure
- Check the target loudspeaker zone is selected via the audio distribution inputs
- If any amplifier or loudspeaker circuit alarms are present clear them down and review the message audio again.

Alarm Messages

Circuit Fault Monitoring Alarms

- **Amp 'n' Short CCT:** Check its external loudspeaker loop for short circuits between the two signal conductors, breaking the speaker loop down into spurs as necessary to pin point the offending speaker or cable.
- **Amp 'n' Open CCT:** Check its external loudspeaker circuits for open circuits on either of the two signal conductors and check for correct termination to the control rack.
- **Amp 'n' Earth Leak:** Check its external loudspeaker circuits for short circuits between either of the two signal conductors and screen or the earthed building metalwork. Also, check for correct termination to the control rack.

System Fault Monitoring Alarms

- **Audio Input 1-4 Alarms:** Check the audio 1-4 monitoring alarm set points
- **Amp 'n' Power/Signal Fault:** Check circuit breaker is closed and amplifier power lead is plugged into sub-rack motherboard
- **Amp 'n' Audio Fault:** Check the amplifiers monitoring alarm set points

7. Technical Installation Guide FILES

TIG P-A250	250W D CLASS AMPLIFIER
TIG P-M250	SPEAKER LINE MONITOR MODULE
TIG P-AIC	AMP INTERFACE CARD
TIG P-NET	DIGITAL VA/PA NETWORK CARD
TIG P-CIB	CONTROL INTERFACE BACKPLANE
TIG P-DSP	DSP CARD
TIG P-APIC	ACCESS PANEL INTERFACE CONTROLLER
TIG P-API	ACCESS PANEL INTERFACE
TIG P-8DIN	8 CHANNEL DIGITAL INPUT PCB P-8DIN
TIG P-8MIN	8 CHANNEL MONITORED INPUT PCB
TIG P-5DPDT	5 CHANNEL DPDT RELAY PCB
TIG P-8SPDT	8 CHANNEL SPDT RELAY PCB
TIG P-BKMON	4 CHANNEL BEACON MONITORING AND CONTROL PCB
Mercury PSU manual	24V DC power supply manual
PA-TZM8	PABX interface manual