4000 Series II

Technical Manual

Issue 2.1
June 2006

4000 Series II

Thank you for purchasing this product; we hope it will provide many years of reliable and rewarding service.

We would be pleased to hear from you if you have any difficulties, comments or suggestions related to this product, the user documentation or the support service which we offer. Please feel free to contact us by e-mail, postal mail or telephone.

Please also visit our website whic is continually being enhanced to offer increased levels of information. You can find us at http://www.vitecgroupcomms.com/

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BS EN 60950:1992	Safety of information technology equipment.

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Revision History

Issue	Date	Notes
2.0	April 2000	Initial Issue
2.1	June 2006	Updates

Warnings and Cautions

GENERAL WARNING

Electrical shock can cause severe personal injury or death. All major units of this equipment are powered by mains voltage. Unless specifically advised otherwise, DISCONNECT mains supply before carrying out any maintenance or repair tasks.

This equipment contains electrostatic sensitive devices. Observe precautions for handling electrostatic sensitive devices when carrying out any maintenance or repair tasks.

Where appropriate, warnings and cautions appear in the text with the following meanings:

WARNING. Given where carrying out an instruction can cause risk of injury or death.

CAUTION. Given where carrying out an instruction can cause risk of damage to the equipment.

WARNING - EARTHING OF EQUIPMENT

This equipment must be properly earthed.

The mains plug must be connected in accordance with the following code:

- BLUE - Neutral (N)
- BROWN - Live (L)
- GREEN/YELLOW - Earth (E)

As the colours of the wires in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or is BLACK.
- The write which is coloured BROWN must be connected to the terminal which is marked with the letter L or is RED.
- The wire which is coloured GREEN and YELLOW must be connected to the terminal which is marked with the letter E or the symbol ⏚

CAUTION - ELECTROSTATIC PROTECTION

When carrying out any maintenance or repair taks on this equipment all personnel should ensure that appropriate grounding equipment is used and checked before commencing work on the equipment. Electrostatic sensitive devices are marked with the symbol 

Glossary of Terms

ADC	Analogue to Digital Converter
ADM	Assignment, Diagnostics and Monitoring
BNC	Standard co-axial video connector
CAT5	Cable standard for high speed data communications (e.g. 100Base-TX)
CODEC	Coder/Decoder
CMAPSi	Configuration and Master Assignment Programming System integrated
CSU	Central Switching Unit
DAC	Digital to Analogue Converter
DAK	Direct Access Key
dB	Decibel
DPDT	Double-Pole-Double-Throw
EPROM	Erasable Programmable Read-Only Memory
FLASH RAM	Low voltage electrically erasable and programmable read-only memory.
GPI	General Purpose Interface
GPSF	General Purpose Special Function
Howlround	Distorted audio - due to feedback of original signal in close proximity.
I/O	Input / Output
I/P	Input
IFB	Interruptible Foldback
Local Programming	Modifying the DAK assignments via the Intelligent Control Panel SOFT Mode
LCD	Liquid Crystal Display
LED	Light Emitting Diode
Listen Route	An audio route to the Control Panel from a source. The audio is normally heard on the Control Panel's Loudspeaker or Headset.
LS	Loudspeaker
Mb	Megabyte
MHz	Megahertz
N/C	Normally Closed
N/O	Normally Open

NID	Non Intrusive Download
NVRAM	Non-Volatile Random Access Memory
O/P	Output
PCB	Printed Circuit Board
Pot.	Potentiometer
PSU	Power Supply Unit
RAM	Random Access Memory
RCU	Rear Connector Unit
RJ45	Standard connector for data communications (used with CAT5 cabling for comms. between the matrix and control panels)
RMS	Root Mean Square
RU	Standard Rack Unit (19 inches wide x 1.75 inches high or 482.6mm x 44.45mm)
Side Tone	Side tone is the audio, which is heard in the Headset's earpiece, which is generated by the headset microphone. This allows the operators to hear themselves when using headsets.
SPDT	Single-Pole-Double-Throw (switch / relay action)
SPST	Single-Pole-Single-Throw (switch / relay action)
TA	Terminal Adaptor
Talkback	A Broadcast term referring to intercom systems in which 4-wire comms. are used.
Talk Route	An audio route from the Control Panel to another destination. The audio is normally generated from the Control Panel's main microphone or Headset microphone.
TBU	Telephone Balance Unit
VOX	Voice Operated Switch
XLR	Audio industry standard connector

Consult the named **Vitec Group Communications** document for further details.

Contact **Vitec Group Communications** for suitable options.

Tips given.

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1 Introduction

1.1 Scope

This manual describes Vitec Group Communications Voice Communications System (VCS) for Broadcast applications and gives details of individual components and sub-assemblies. Specific systems may not contain all the components listed in this manual and the quantities present may vary. Some third party components or equipment may also be used in Broadcast systems. Where this is the case information about the components or equipment will not be covered in this manual and users should refer to the manufacturers manuals for information.

In some cases Broadcast systems may be supplied with customer specific modifications to the standard system; where this is the case additional manuals will be supplied to cover these modifications.

The pictures and figures contained in this document show examples of components. Vitec Group Communications reserves the right to continue with development and to make modifications to the components.

1.2 System Overview

The 4000 Digital Series is a Digital Communications System using a central switching matrix for routing calls between outstations connected in a star format.

The digital central switching matrix uses a microprocessor for control and configuration purposes. A Digital Matrix Card, allowing multiple routes to be made simultaneously achieves all switching and routing. Analogue audio, GPI inputs and outputs, data interfaces and an advanced software package are also provided as part the 4000 system.

A range of Digital Control Panels are available providing a suitable user interface for making and receiving calls over the system. These panels contain push buttons configured to operate specific routes or activate control functions. The push button actions are sent as digital data using a serial link to the central matrix for interpretation by the microprocessor and information is returned to the control panel by the same method. Audio is sent and received digitally, multiplexed with the data via a single co-axial cable. Audio and data can also be connected via standard twisted pair wiring or CAT5.

The standard control panels provide the basic facilities of Direct Access Keys (DAKs) which allow single-button operation for frequent calls, a Reply key for responding to unscheduled calls and where applicable, a dial display for making infrequent calls.

A call is initiated on a control panel by pressing one of the assigned DAKs or, on panels equipped with an electronic dial-pad, by dialling a number and pressing the call button. This activates crosspoints, located in the Matrix, which make the audio route (or routes) to the desired destination(s). Routing can be one-way (e.g. talk only) or two-way (talk and listen simultaneously) and several callers can speak to the same destination at the same time due to the mixing capability of the matrix.

The crosspoints in the matrix are activated or de-activated according to configuration rules held in the system's Matrix map (stored in the microprocessor's memory). The system map for the 4000 Digital Series residing on a Personal Computer is downloaded into the Matrix from the 'Configuration and Master Assignment Programming System integrated' (CMAPSi) and controls every aspect of 4000 Digital Series operation. The Matrix sends part of the system map out to each control panel, programming the actions available on each DAK of each panel. This includes any special function that may also be assigned to a particular pushbutton in addition to initiating the normal dual routing.

Each DAK may be centrally configured and assigned to a destination, source or both at system set-up. On some panels, DAKs that are not assigned at system set-up can be assigned, by local programming of the pushbuttons in Soft mode, to allow different routing options. Local assignments may not be retained if the system is reset, although they are held in non-volatile memory at the panel and thus will be retained after power down.

Destinations and sources can be other panels, beltpacks, 2-wire or 4-wire circuits, either individually or in groups. The destinations and sources could also be in another talkback system. Connection to other

4000 Digital Series systems can also be achieved by use of Ethernet, providing an integrated private intercom network. Up to eight 4000 Digital Series systems can be connected using this facility.

A Conference facility is also available, configured via CMAPSi, which allows people to converse in a conference mode. This is similar in operation to the Conference Ring (Party Line) facilities available in older conventional systems. Users can be allowed access to any conference (up to 64 conferences are allowed) either to listen only or to talk and listen.

*Consult the **Vitec Group Communications** 4000 Series II Installation Guide for further details on Matrices.*

*Consult the **Vitec Group Communications** Network Installation Guide for details on networking.*

CMAPSi operation details are given in the CMAPSi on-line Help facility and user manual.

2 Control Panel Description

2.1 Overview

The 4000 Series II Control Panels comprise of a range of 1RU and 2RU by 19 inch rack mount units.

The standard connection of these panels is via CAT5 (RJ45) cabling to connect analogue audio and RS422 data from the Control Panel to the PDE4628 Serial Communications RCU located in the Matrix.

Other connection methods are possible using twisted pair cable or a bi-directional digital link using 75ohm coaxial cable. This connects to the PDE4617 and PDE4616 Panel Communications RCUs respectively, located in the Matrix.

There are also Extension Panels that are used to increase the number of buttons per panel or to add level control facilities. These Extension Panels connect to the main Control Panel via screened ribbon cable. A Custom Panel Interface is also available to remotely connect keys and displays from the main Control Panel, so that a custom panel can be made to fit various size and shape constraints.

Details of the various panel connection pinouts are given in the section ‘Panel Connections’.

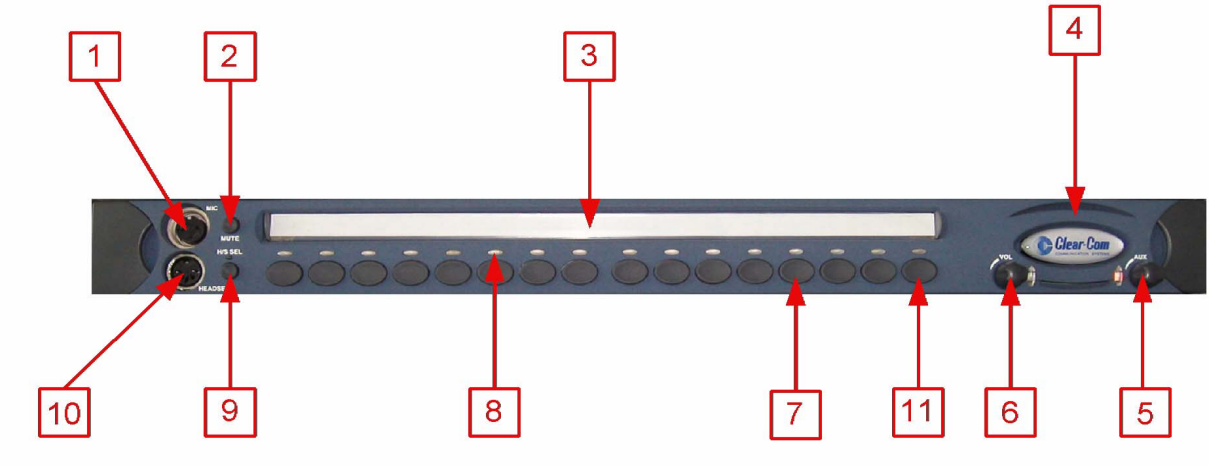
Note: If at any time a panel is removed from the system with its keys still active, the relevant matrix crosspoints will remain in force until the panel is reconnected. Because of this fact, a panel should only be removed after all of its keys have been de-selected.

Panels are DC powered by the 150/UNI and 151/UNI DIN 4 universal 110-240V mains adaptors.

2.2 Standard Control Panels

2.2.1 PD4215R/4215 - 16 Key Control Panel (1RU)

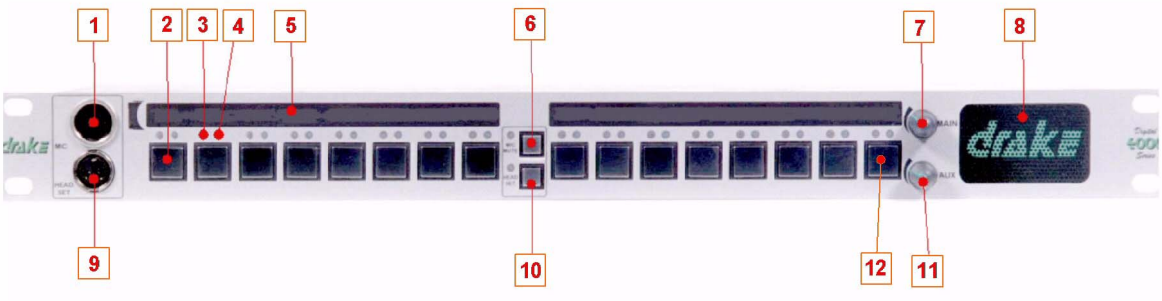
2.2.1.1 PD4215R Front View



1	Microphone Socket	7	Direct Access Key (DAK)
2	Microphone Mute Pushbutton and LED	8	DAK Indicator LED
3	Designation Strip	9	Headset Select Pushbutton and LED
4	Loudspeaker Aperture	10	Headset Socket
5	Auxiliary Volume Control and LED	11	Reply Key
6	Volume Control and LED		

Figure 1 - PD4215R Front View

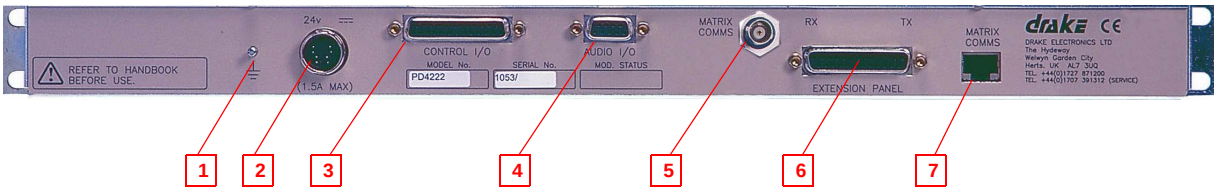
2.2.1.2 PD4215 Front View



1	Microphone Socket	7	Main Volume Control
2	Direct Access Key (DAK)	8	Loudspeaker
3	Talk Tally LED	9	Headset Socket
4	Listen Tally LED	10	Headset Select Pushbutton
5	Designation Strip	11	Auxiliary Volume Control
6	Microphone Mute Pushbutton	12	Reply Key

Figure 2 - PD4215 Front View

2.2.1.3 PD4215R/PD4215 Rear View

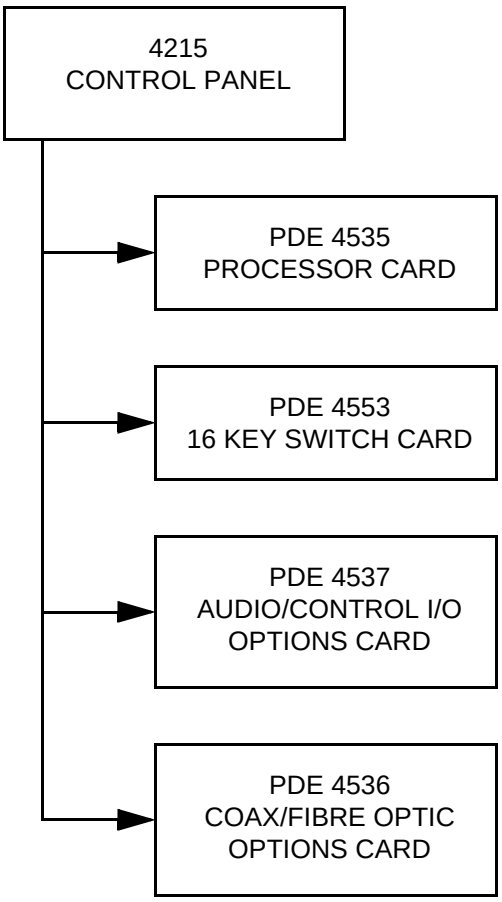


1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 3 - PD4215R/PD4215 Rear View

For further information see the 4000 Digital Series II User and Installation Guides.

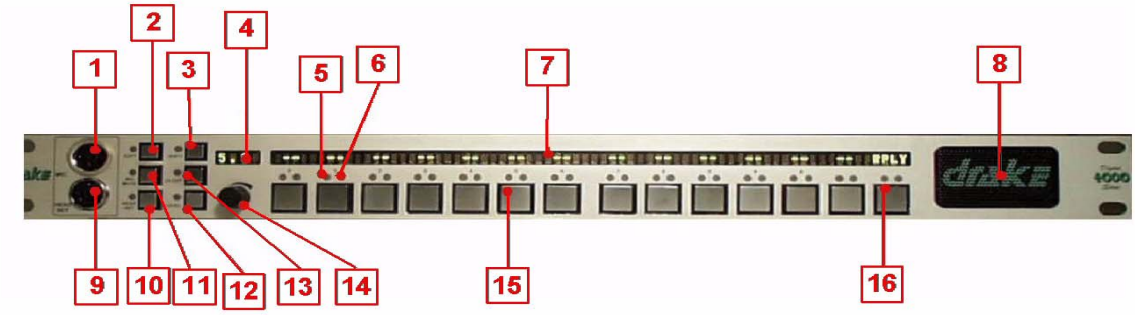
2.2.1.4 PD4215R/PD4215 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.2 PD4217 - Intelligent Control Panel (1RU)

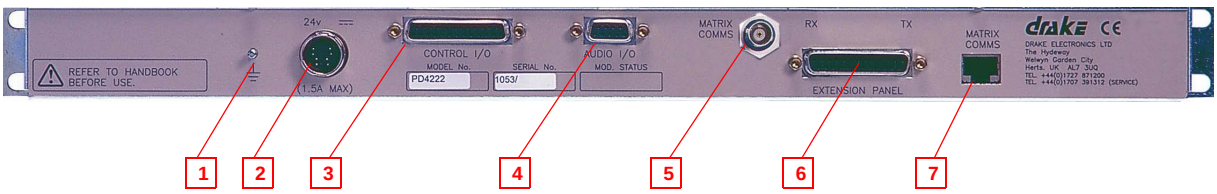
2.2.2.1 PD4217 Front View



1	Microphone Socket	9	Headset Socket
2	Soft Mode Pushbutton	10	Headset Select Pushbutton
3	Shift Pushbutton	11	Microphone Mute Pushbutton
4	Rotary LED Display	12	Level Control Pushbutton
5	Talk Tally LED	13	Loudspeaker Cut Pushbutton
6	Listen Tally LED	14	Rotary Encoder
7	Alphanumeric LED Display	15	Direct Access Key (DAK)
8	Loudspeaker	16	Reply Key

Figure 4 - PD4217 Front View

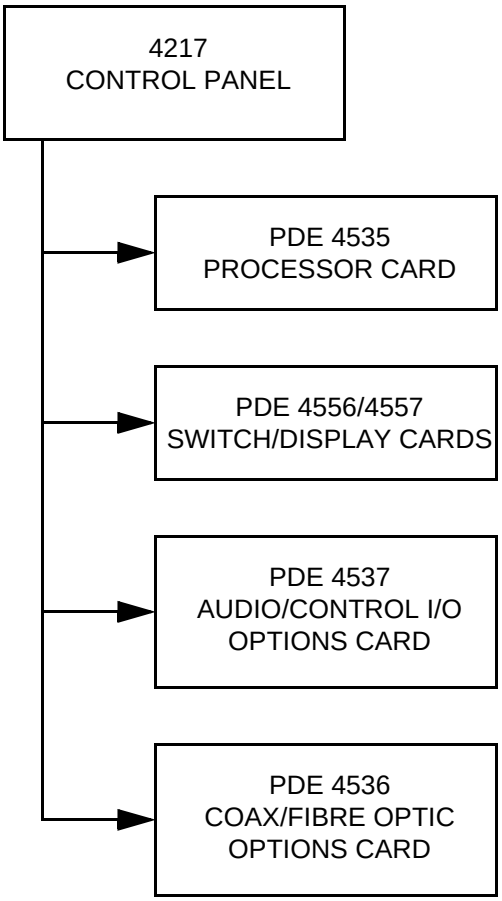
2.2.2.2 PD4217 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 5 - PD4217 Rear View

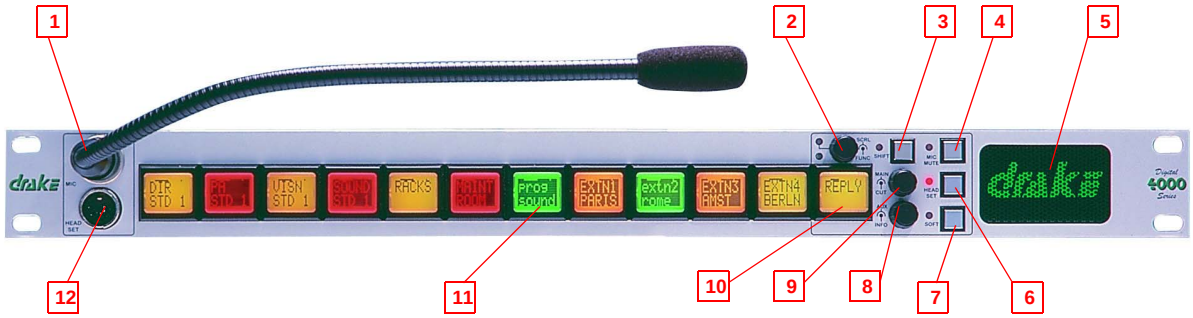
2.2.2.3 PD4217 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.3 PD4211 LCD Key Panel (1RU)

2.2.3.1 PD4211 Front View

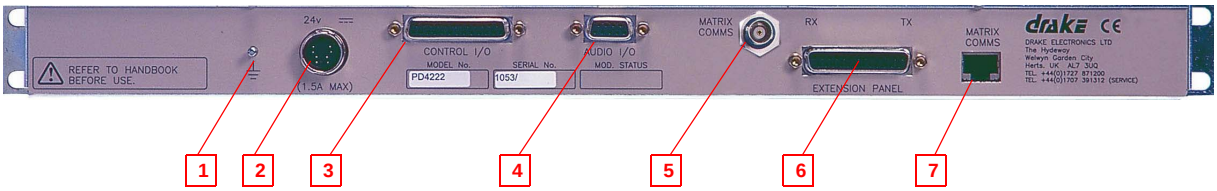


1	Microphone Socket	7	Soft Pushbutton
2	Level Control	8	Auxiliary Volume Control
3	Shift Pushbutton	9	Main Volume Control
4	Microphone Mute Pushbutton	10	Reply Key
5	Loudspeaker	11	Direct Access Key (DAK)
6	Headset Select Pushbutton	12	Headset Socket

Figure 6 - PD4211 Front View

NOTE: Microphone is shown here for illustrative purposes only. Contact Vitec Group Communications for details of suitable products.

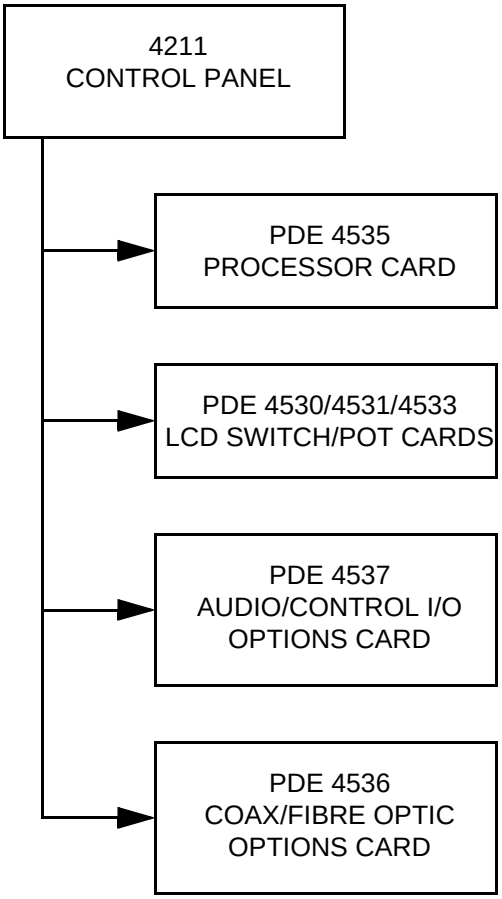
2.2.3.2 PD4211 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 7 - PD4211 Rear View

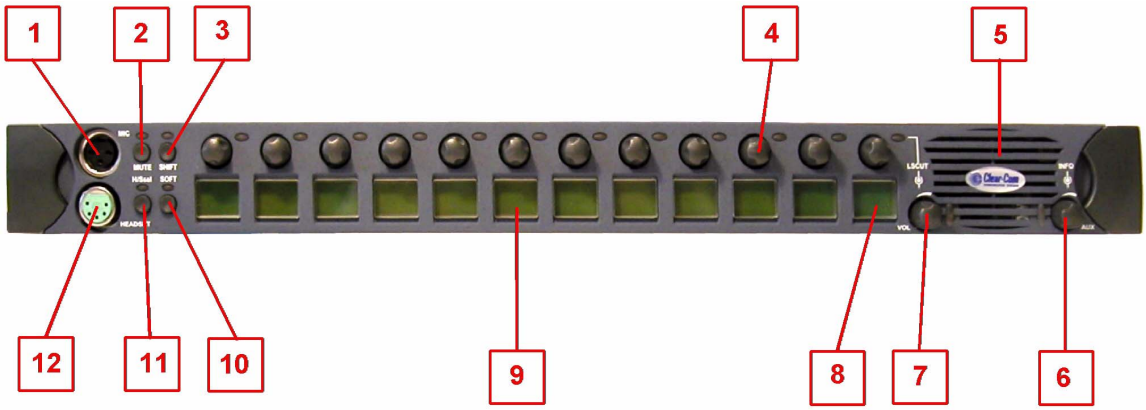
2.2.3.3 PD4211 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.4 PD4212R/PD4212 LCD Key Panel and Rotary Encoder

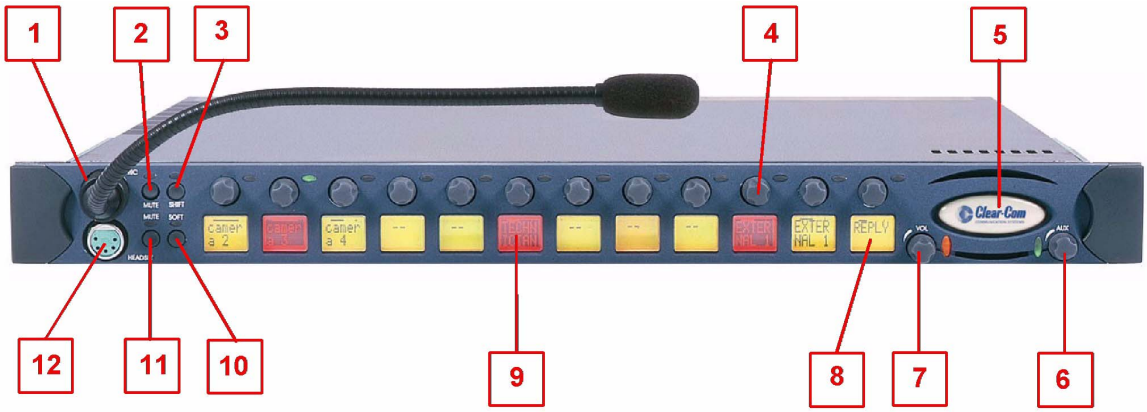
2.2.4.1 PD4212R (revised) Front View



1	Microphone Socket	7	Main Volume Control
2	Microphone Mute Pushbutton	8	Reply Key
3	Shift Pushbutton	9	Direct Access Key (DAK)
4	Crosspoint Level Control	10	Soft Pushbutton
5	Loudspeaker	11	Headset Select Pushbutton
6	Auxiliary Volume Control	12	Headset Socket

Figure 8 - PD4212R (revised) Front View

2.2.4.2 PD4212R Front View

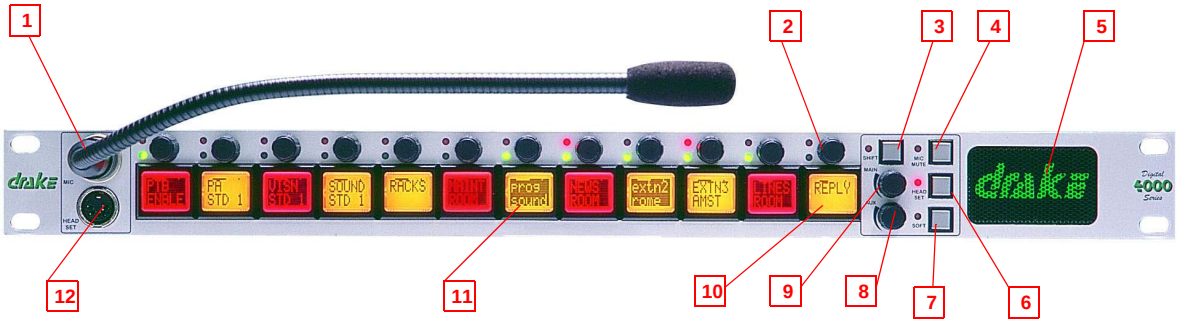


1	Microphone Socket	7	Main Volume Control
2	Microphone Mute Pushbutton	8	Reply Key
3	Shift Pushbutton	9	Direct Access Key (DAK)

4	Crosspoint Level Control	10	Soft Pushbutton
5	Loudspeaker	11	Headset Select Pushbutton
6	Auxiliary Volume Control	12	Headset Socket

Figure 9 - PD4212R Front View

2.2.4.3 PD4212 Front View

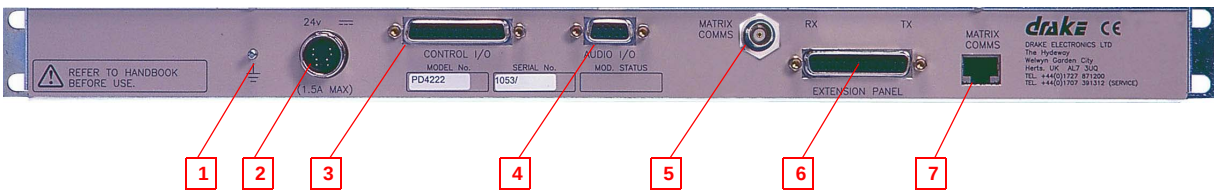


1	Microphone Socket	7	Soft Pushbutton
2	Level Control	8	Auxiliary Volume Control
3	Shift Pushbutton	9	Main Volume Control
4	Microphone Mute Pushbutton	10	Reply Key
5	Loudspeaker	11	Direct Access Key (DAK)
6	Headset Select Pushbutton	12	Headset Socket

Figure 10 - PD4212 Front View

NOTE: Microphone is shown here for illustrative purposes only. Contact Vitec Group Communications for details of suitable products.

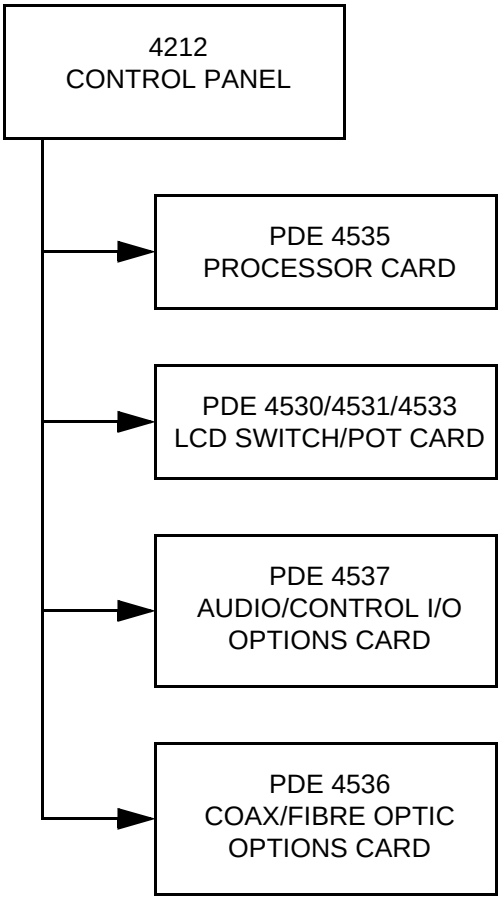
2.2.4.4 PD4212R/PD4212 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 11 - PD4212 Rear View

2.2.4.5 PD4212R/PD4212 Components



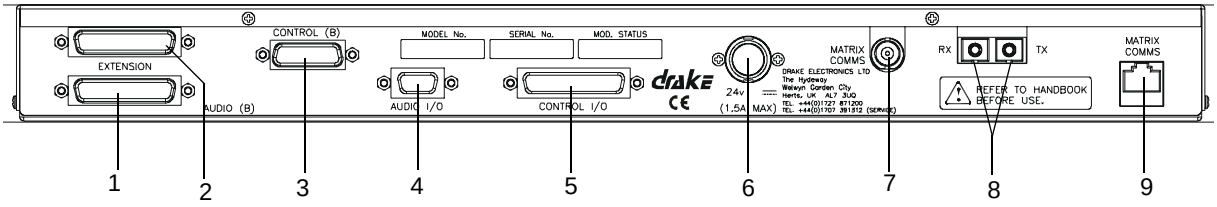
Mechanical construction and wiring are shown in the associated drawings.

2.2.5 PD4216 - Custom Panel Interface (1RU)

2.2.5.1 PD4216 Front View

Figure 12 - PD4216 Front View

2.2.5.2 PD4216 Rear View

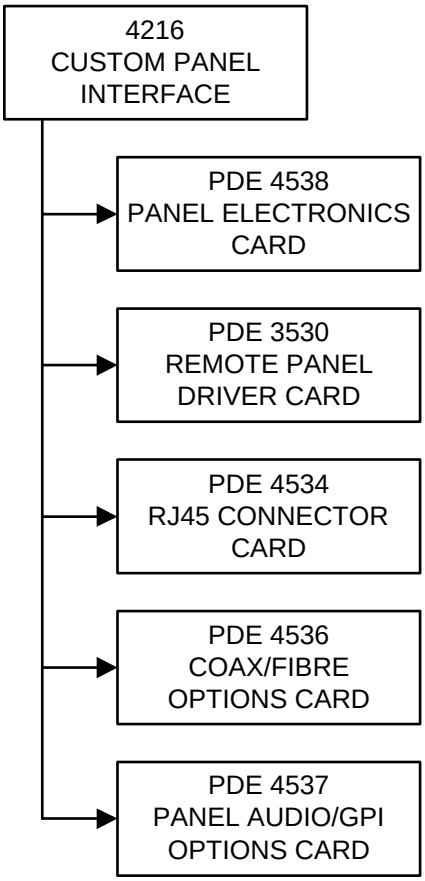


1	Audio (B) Input/Output connector	6	DC input connector
2	Extension Connector	7	Matrix comms connector (optional)
3	Remote Driver Panel connector	8	Coax/Fibre connectors (optional)
4	Audio I/O (optional)	9	RJ45 connector
5	Control I/O (optional)		

Figure 13 - PD4216 Rear View

The 4216 is a 1RU x 19" interface unit, developed to enable Custom Control Panels to be used with the 4000 Matrices. Connection to Custom Control Panels is via serial links and panels must be fitted with a variant of the PDE 3531 Custom Panel PCB to make use of this facility.

2.2.5.3 PD4216 Components



2.2.5.4 PD4216 Operation

At the interface, audio and control signals are separated. Audio facilities such as Mic output, Level control, LS output and Headset control are wired to a 25 way D-type connector.

Control signals are relayed to the custom panel through a serial interface with a 15-way D-type connector. DC power is supplied via this link, giving 15VA of lamp drive (e.g. 24 x 28V lamps/LEDs).

Further auxiliary audio and control inputs and outputs can be fitted to the interface with the installation of an additional PDE4537 options card.

The remote custom panel utilises a number of cascaded PDE 3531/P/SL/D cards to make up the ports for the required number of switches/lamps/displays.

2.2.5.5 PD4216 Controls and Indicators

One green LED indicator on the front panel illuminates when DC power is present.

2.2.5.6 PD4216 Installation Information

The microphone/s and volume pot/s should be wired with good quality 7/0.2 screened cable over a maximum distance of 25m. Drake Technical support should be consulted regarding suitable microphones and headsets.

The control interface can be connected to the remote panel with a cable run of up to 20m using 15-way screened cable or 15-way screened ribbon cable.

Connection to the matrix is made by CAT5 connection, or 75Ω coaxial cable (50Ω BNC connectors) if the PDE4536 options card is used.

2.2.6 PDE3530 - Remote Panel Driver Card

The PDE 3530 card contains the I2C serial I/O circuitry required to drive the remote panel. This provides a bi-directional serial data line for sending LED data and receiving switch data from a remote panel containing the PDE 3531 PCB.

The D-type connector on the PDE 3530 also provides the DC supply for the remote panel.

2.2.7 PDE3531 - Custom Panel Card

The PDE 3531 card provides the necessary interface for display, switch and lamp combinations in a remote control panel. PDE3531 cards have a modular design and may be cascaded as required.

2.2.7.1 PDE3531 Operation

The PDE3531 board is segmented into three parts. These are P(power), SL(switch lamps), and D(display). Two configurations are available:

1. 1.The first PDE3531 card used in a remote panel must be of P/SL/D configuration. The PDE3531/ P/SL/D card contains the I2C line transceivers, psu circuitry and switch/lamp bank selection.
2. 2.Subsequent cards are of SL/D configuration, containing a four-bit comparator to enable the bank and five, eight-bit ports. The ports are divided as follows: one for inputs, two for outputs capable of lamp drive, and two for LED display interface.

Up to seven cards can be cascaded for switches or lamp combinations, including up to four with LED displays.

Remote pots can only be supported by the addition of a version of the 4003 variable level control panel serving as an extension to the 4016 Custom Panel Interface.

2.2.7.2 PDE3531 Installation Information

The remote panel can be connected to the 4016 interface over a maximum distance of 20m using a 15-way screened cable or screened ribbon cable.

On the PDE3531 card:

Switch/lamp cable runs (from CON5-CON7 on the SL section) should be 7/0.2 cable contained within the same panel box as the PCB to maintain EMC compliance.

LED display cable runs (from CON4 on the D section) can be up to 1m long and should be contained within the same panel box as the PCB to maintain EMC compliance.

SL/D to SL/D connections (from CON1 on the SL section) should be a maximum of 150mm using a screened ribbon cable.

Switch settings to configure each card for its panel function i.e. right-hand side of the keypad, Direct Access keys 1-8 etc. are shown in the table below.

S1/S2	0000	1000	0100	1100	0010	1010	0110	1110
Bank	RHS of Keypad	LHS of Keypad	Spare	Spare	DAKs 1-8	DAKs 9-16	DAKs 17-24[1]	DAKs 25-32[1,3]

S1/S2	0001	1001	0101	1101	0011	1011	0111	1111
Bank	DAKs 33-40[2]	DAKs 41-48[2]	Spare	Spare	Spare	Spare	Spare	Spare

NOTES:

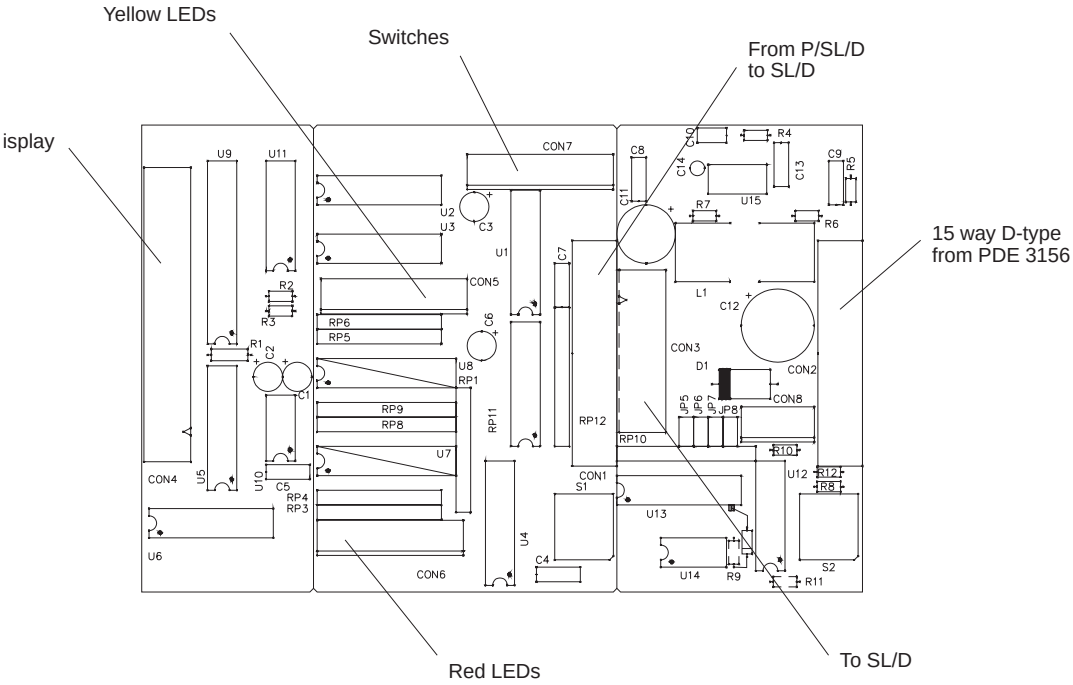
[1]LHS keypad includes soft, shift, call and clr keys. Banks 6 and 7 may be 'shifted' to give DAKs 33-48 if no extension panels are fitted.

[2]Active for extension panel equipment with no display.

[3]DAK 32 is the reply key.

2.2.7.3 PDE3531 Assembly Diagram:

PDE 3531 Connector Assignments

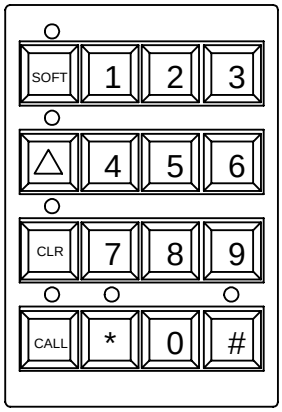


2.2.7.4 PDE3531 Connector Information

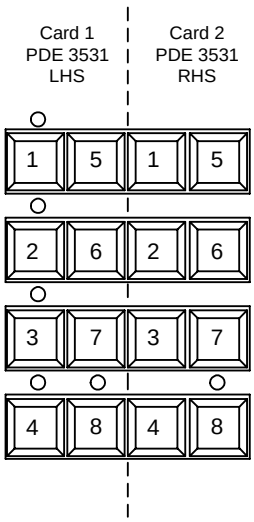
Table 1: PDE 3531 Connector Information

Device	Connector	Pin No.	
	10 Way Molex Plug	1-8	9-10
LED (yel-low/red)	CON 5 (y), CON 6 (r)	LEDs 1-8	+V
Switch	CON 7	Switches 1-8	GND

Drake Keypad Switch Mapping For PDE 3531 Cards



Drake Keypad



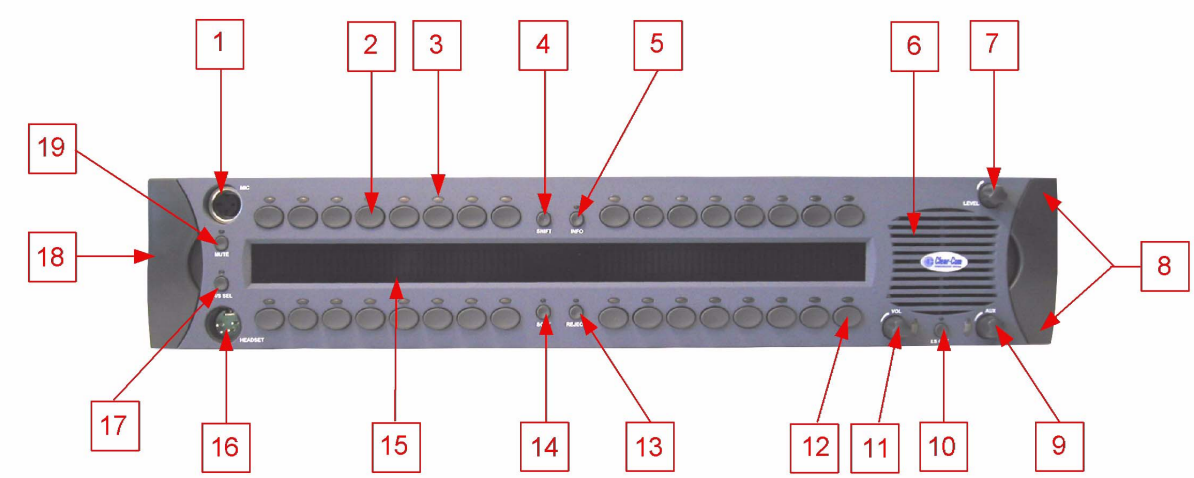
Switch Mapping

Notes:

1. 2 PDE 3531 cards are required for ke operation, with S1 set up as LHS (10 and RHS (0000).
2. LED numbering is the same as the sv it is positioned above.
3. Panel software is configured to accep mapping only (e.g. "Soft" key = switcl

2.2.8 PD4224R/PD4224 - Intelligent Control Panel (2RU)

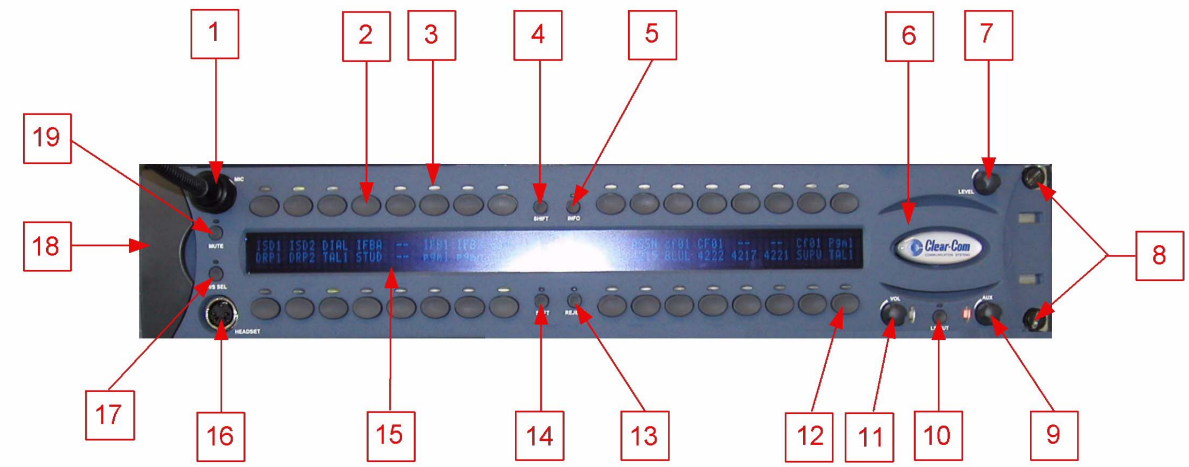
2.2.8.1 PD4224R (revised) Front View



1	Microphone Socket	11	Main Volume Control and Associated LED
2	Direct Access Key (DAK)	12	Reply Key
3	Indicator LED	13	Call Reject Pushbutton and Associated LED
4	Shift Pushbutton and Associated LED	14	Soft Pushbutton and Associated LED
5	Info Pushbuttonand Associated LED	15	Vacuum Fluorescent Display (VFD)
6	Loudspeaker Aperture	16	Headset Socket
7	Crosspoint Level Control	17	Headset Select Pushbutton and Associated LED
8	Rack Mounting Screws (cover removed)	18	Cover Over Rack Mounting Points
9	Auxiliary Volume Control and Associated LED	19	Microphone Mute and Associated LED
10	Loudspeaker Cut Pushbutton and Associated LED		

Figure 14 - PD4224R (revised) Front View

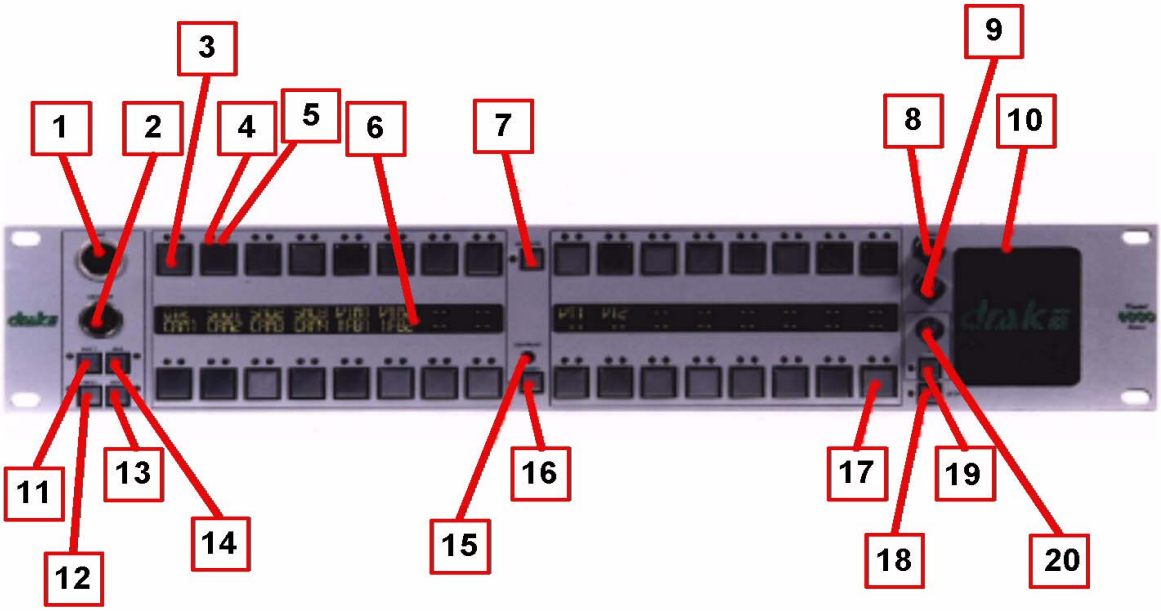
2.2.8.2 PD4224R Front View



1	Microphone Socket	11	Main Volume Control and Associated LED
2	Direct Access Key (DAK)	12	Reply Key
3	Indicator LED	13	Call Reject Pushbutton and Associated LED
4	Shift Pushbutton and Associated LED	14	Soft Pushbutton and Associated LED
5	Info Pushbuttonand Associated LED	15	Vacuum Fluorescent Display (VFD)
6	Loudspeaker Aperture	16	Headset Socket
7	Crosspoint Level Control	17	Headset Select Pushbutton and Associated LED
8	Rack Mounting Screws (cover removed)	18	Cover Over Rack Mounting Points
9	Auxiliary Volume Control and Associated LED	19	Microphone Mute and Associated LED
10	Loudspeaker Cut Pushbutton and Associated LED		

Figure 15 - PD4224R Front View

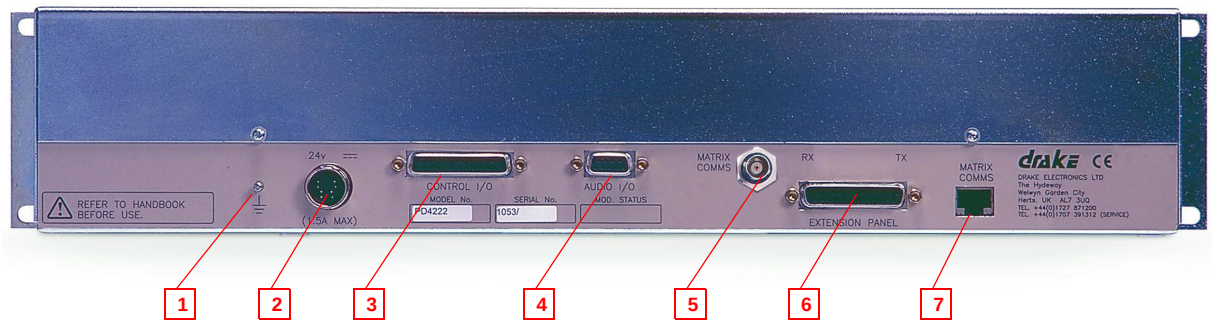
2.2.8.3 PD4224 Front View



1	Microphone Socket	11	Shift Pushbutton
2	Headset Socket	12	Info Pushbutton
3	Direct Access Key (DAK)	13	Soft Pushbutton
4	Talk Tally LED	14	Call Reject Pushbutton
5	Listen Tally LED	15	Contrast Control
6	Alphanumeric LCD Display	16	Headset Select Pushbutton
7	Microphone Mute Pushbutton	17	Reply Key
8	Main Volume Control	18	Loudspeaker Cut Pushbutton
9	Auxiliary Volume Control	19	Level Control Pushbutton
10	Loudspeaker	20	Rotary Level Control

Figure 16 - PD4224 Front View

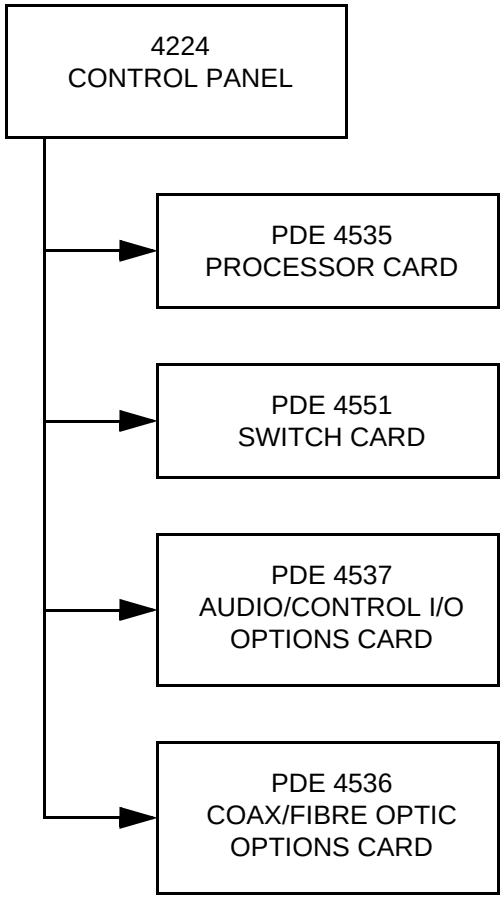
2.2.8.4 PD4224R/PD4224 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 17 - PD4224R/PD4224 Rear View

2.2.8.5 PD4224R/PD4224 Components



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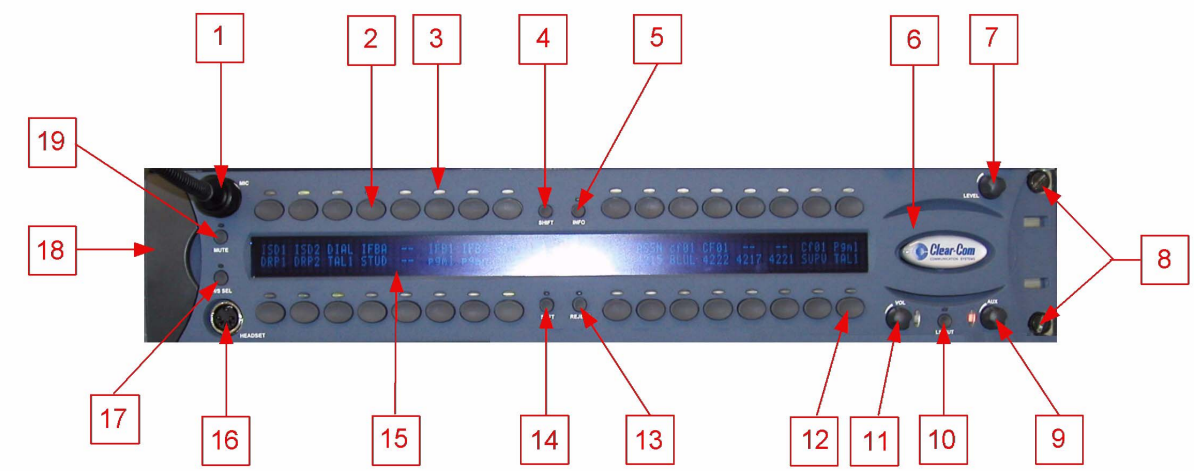
For further information see the 4000 Digital Series User and Installation Guides.

2.2.9 PD4225R/PD4225 Router Control Panel (2RU)

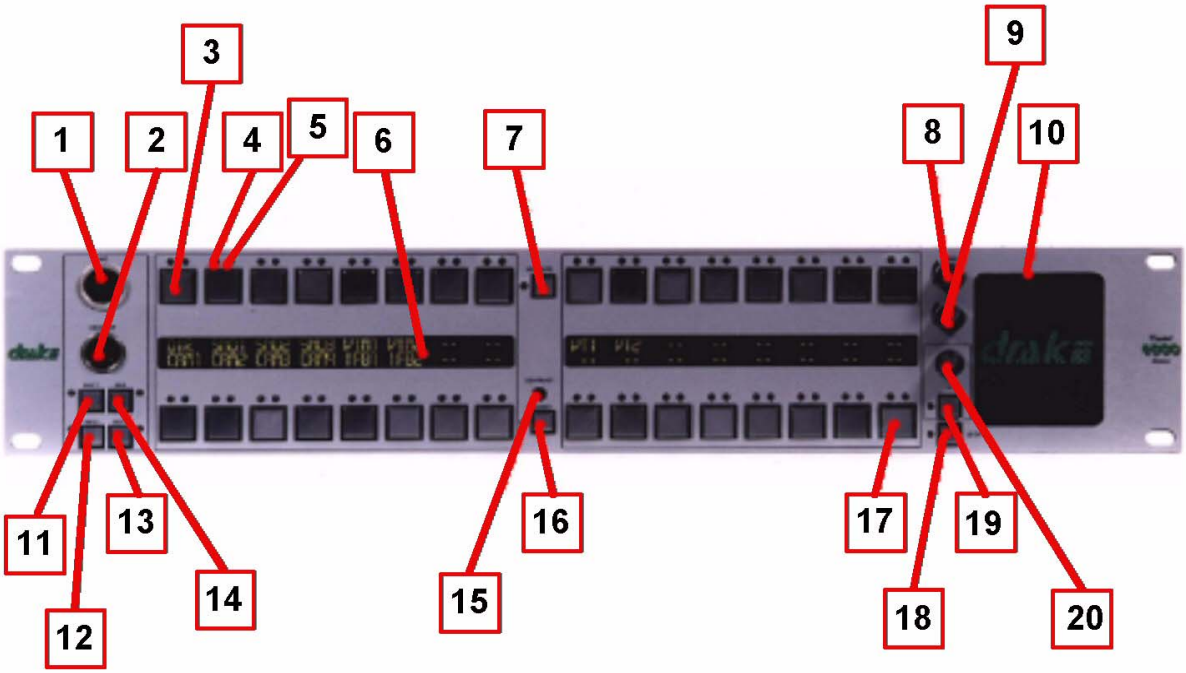
2.2.9.1 PD4225R Front View



1	Microphone Socket	11	Main Volume Control and Associated LED
2	Direct Access Key (DAK)	12	Reply Key
3	Indicator LED	13	Call Reject Pushbutton and Associated LED
4	Shift Pushbutton and Associated LED	14	Soft Pushbutton and Associated LED
5	Info Pushbuttonand Associated LED	15	Vacuum Fluorescent Display (VFD)
6	Loudspeaker Aperture	16	Headset Socket
7	Crosspoint Level Control	17	Headset Select Pushbutton and Associated LED
8	Rack Mounting Screws (cover removed)	18	Cover Over Rack Mounting Points
9	Auxiliary Volume Control and Associated LED	19	Microphone Mute and Associated LED
10	Loudspeaker Cut Pushbutton and Associated LED		

Figure 18 - PD4225R Front View

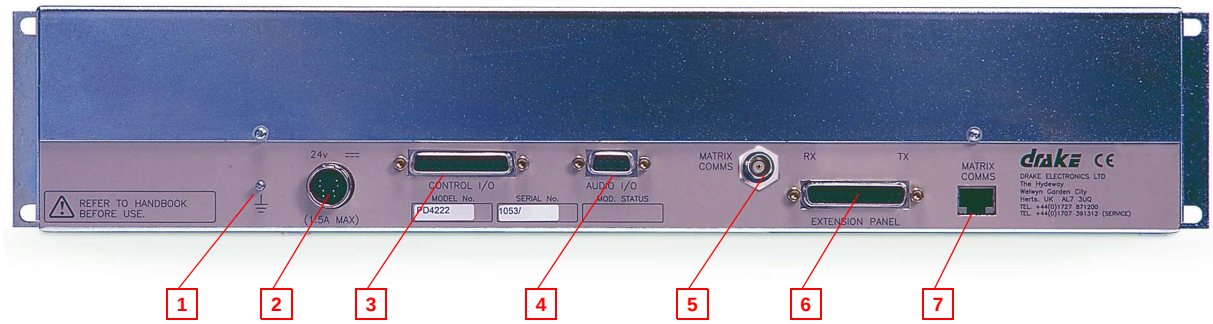
2.2.9.2 PD4225 Front View



1	Microphone Socket	11	Shift Pushbutton
2	Headset Socket	12	Info Pushbutton
3	Direct Access Key (DAK)	13	Soft Pushbutton
4	Talk Tally LED	14	Call Reject Pushbutton
5	Listen Tally LED	15	Contrast Control
6	Alphanumeric LCD Display	16	Headset Select Pushbutton
7	Microphone Mute Pushbutton	17	Reply Key
8	Main Volume Control	18	Loudspeaker Cut Pushbutton
9	Auxiliary Volume Control	19	Level Control Pushbutton
10	Loudspeaker	20	Crosspoint Level Control

Figure 19 - PD4225 Front View

2.2.9.3 PD4225R/PD4225 Rear View

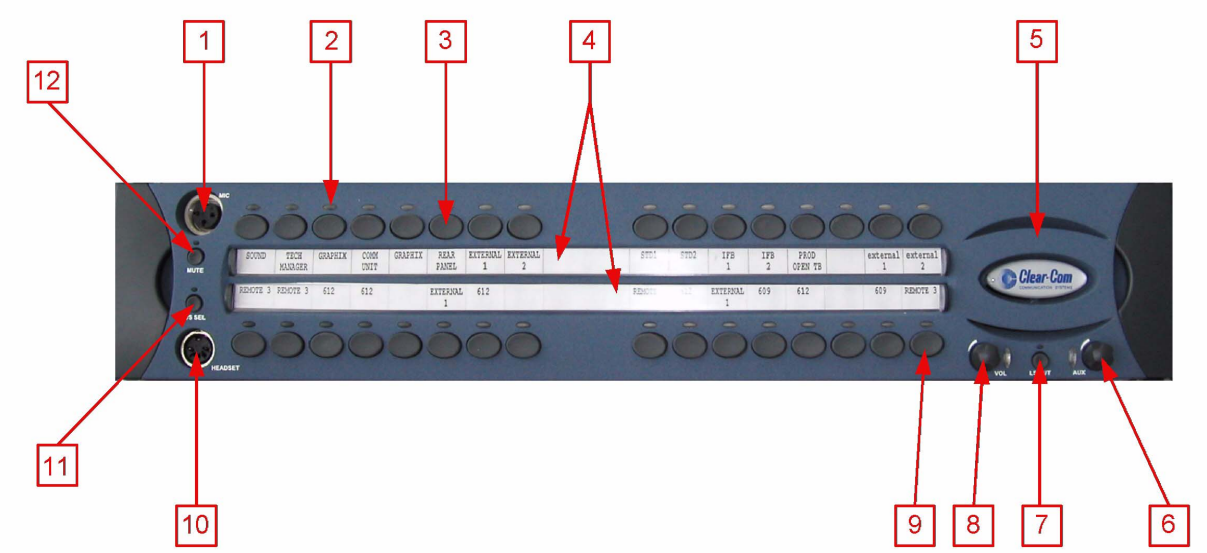


1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 20 - PD4225R/PD4225 Rear view

2.2.10 PD4226R/PD 4226 32-key control panel (2RU)

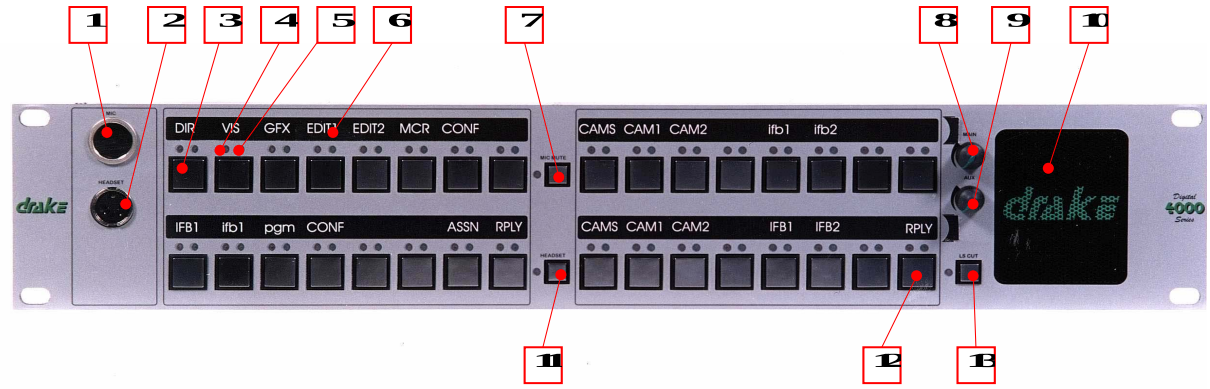
2.2.10.1 PD4226R Front View



1	Microphone Socket	7	Loudspeaker Cut Pushbutton
2	Indicator LED	8	Main Volume Control and Associated LED
3	Direct Access Key (DAK)	9	Reply Key
4	Designation Strips	10	Headset Socket
5	Loudspeaker Aperture	11	Headset Select Button and Associated LED
6	Auxiliary Volume Control and LED	12	Microphone Mute and Associated LED

Figure 21 - PD4226R Front View

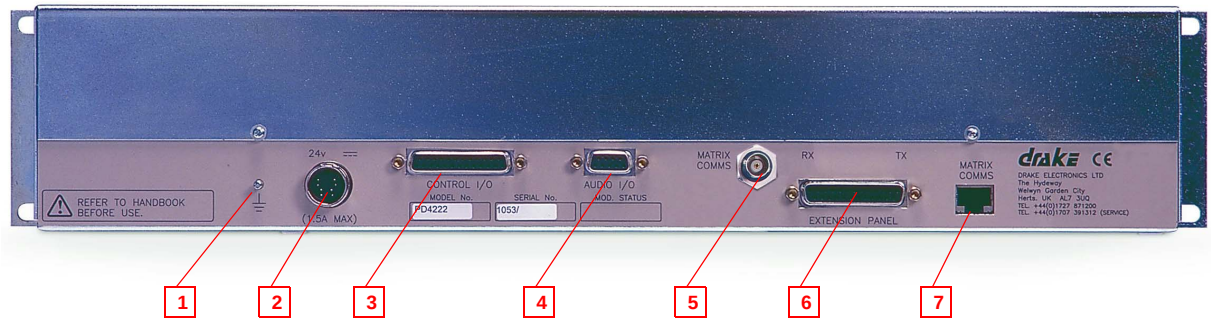
2.2.10.2 PD4226 Front View



1	Microphone Socket	8	Main Volume Control
2	Headset Socket	9	Auxiliary Volume Control
3	Direct Access Key (DAK)	10	Loudspeaker
4	Talk Tally LED	11	Headset Select Pushbutton
5	Listen Tally LED	12	Reply Key
6	Designation Strip	13	Loudspeaker Cut Pushbutton
7	Microphone Mute Pushbutton		

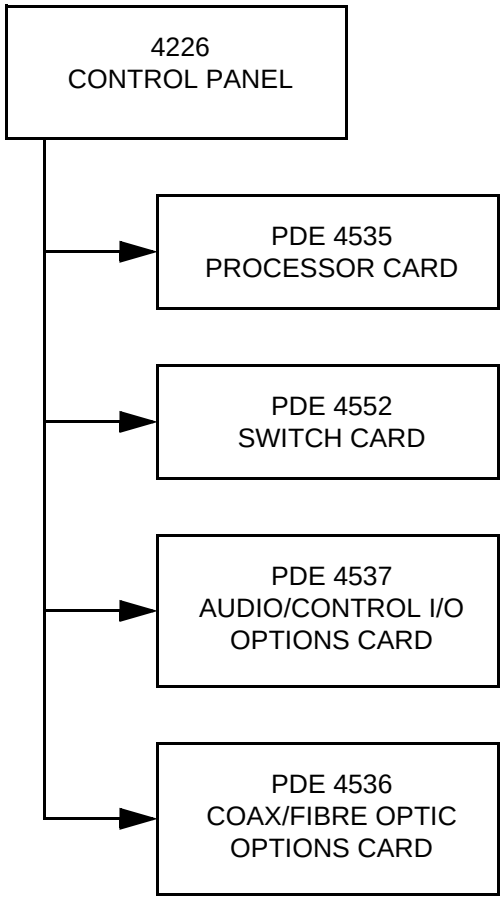
Figure 22 - PD4226 Front View

2.2.10.3 PD4226 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

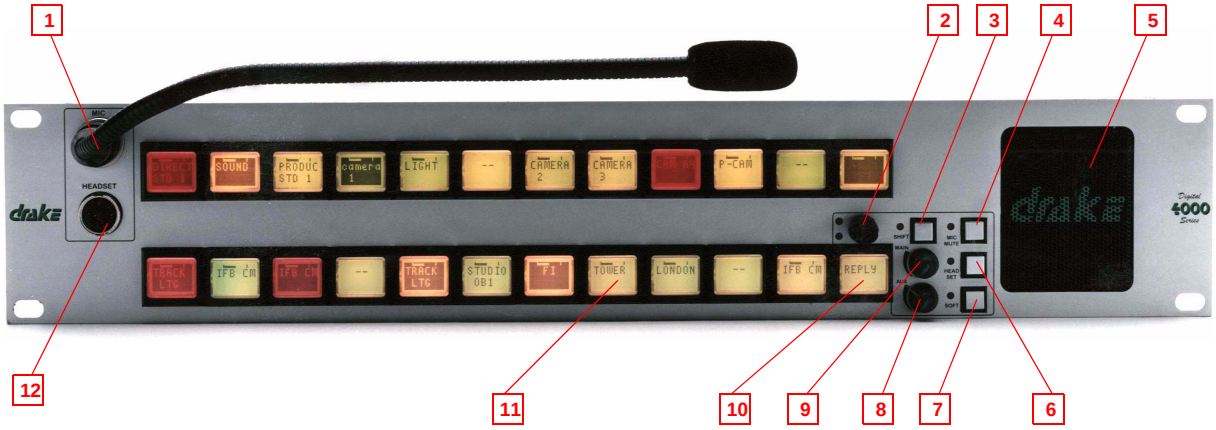
2.2.10.4 PD4226R/PD4226 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.11 PD4221 LCD Key Panel (2RU)

2.2.11.1 PD4221 Front View

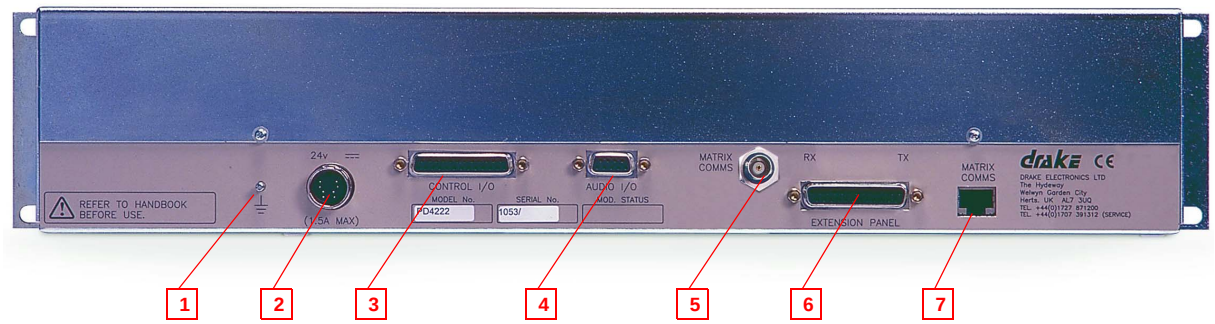


1	Microphone Socket	7	Soft Pushbutton
2	Level Control	8	Auxiliary Volume Control
3	Shift Pushbutton	9	Main Volume Control
4	Microphone Mute Pushbutton	10	Reply Key
5	Loudspeaker	11	Direct Access Key (DAK)
6	Headset Select Pushbutton	12	Headset Socket

Figure 23 - PD4221 Front View

NOTE: Microphone is shown here for illustrative purposes only. Contact Vitec Group Communications for details of suitable products.

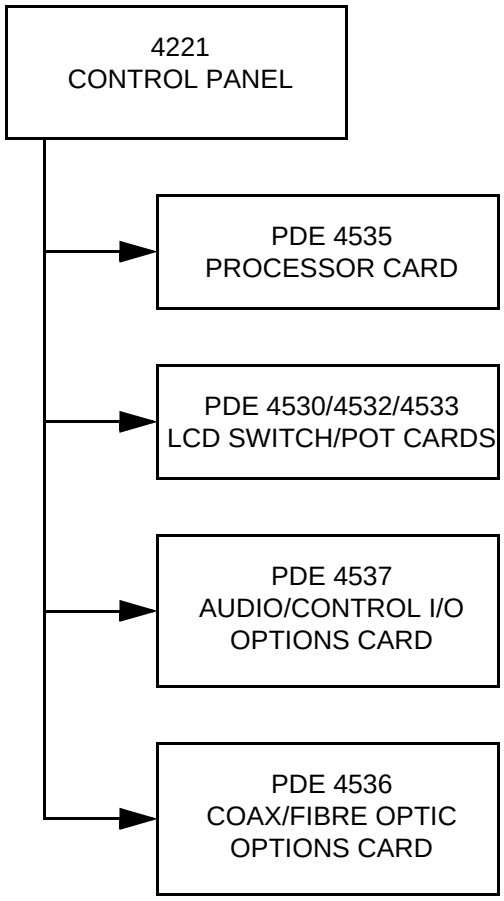
2.2.11.2 PD4221 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 24 - PD4221 Rear View

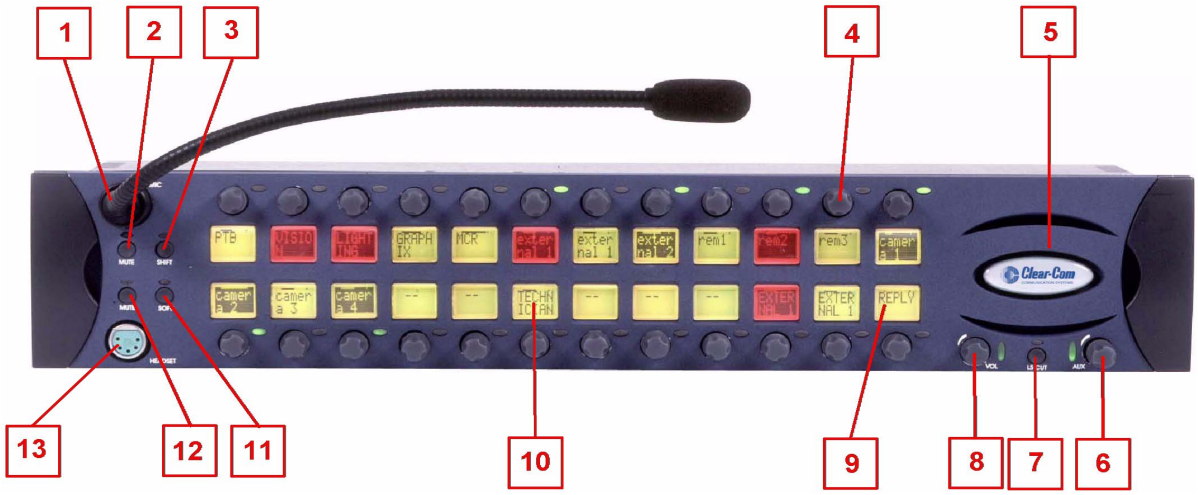
2.2.11.3 PD4221 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.12 PD4222R/PD4222 LCD Key Panel and Rotary Encoder (2RU)

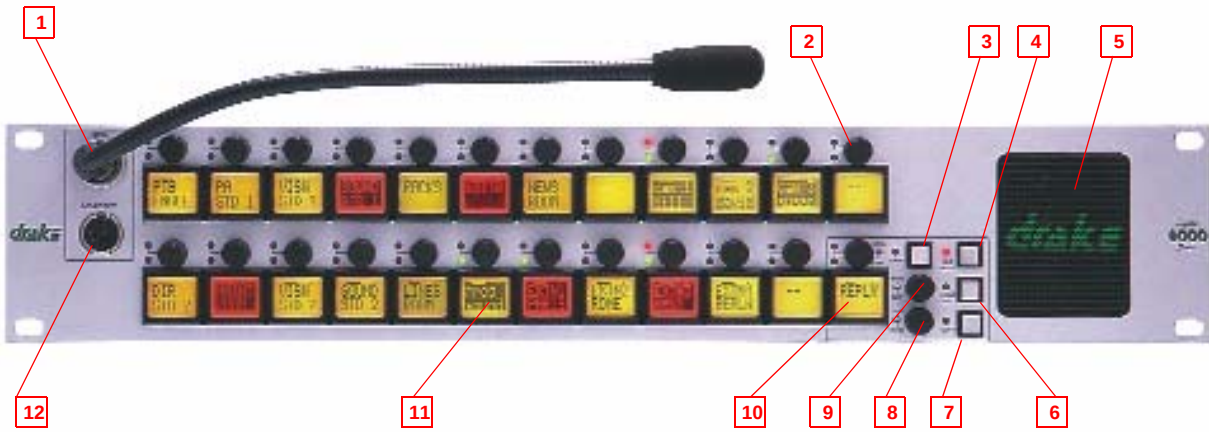
2.2.12.1 PD4222R Front View



1	Microphone Socket	8	Main Volume Control
2	Microphone Mute Pushbutton	9	Reply Key
3	Shift Pushbutton	10	Direct Access Key (DAK)
4	Crosspoint Level Control	11	Soft Pushbutton
5	Loudspeaker	12	Headset Select Pushbutton
6	Auxiliary Volume Control	13	Headset Socket
7	Loudspeaker Cut Pushbutton		

Figure 25 - PD4222R Front View

2.2.12.2 PD4222 Front View

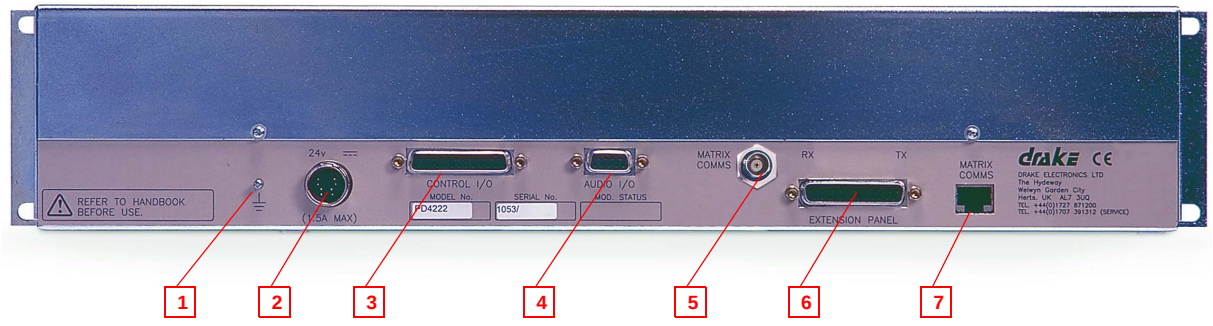


1	Microphone Socket	7	Soft Pushbutton
2	Level Control	8	Auxiliary Volume Control
3	Shift Pushbutton	9	Main Volume Control
4	Microphone Mute Pushbutton	10	Reply Key
5	Loudspeaker	11	Direct Access Key (DAK)
6	Headset Select Pushbutton	12	Headset Socket

Figure 26 - PD4222 Front View

NOTE: Microphone is shown here for illustrative purposes only. Contact Vitec Group Communications for details of suitable products.

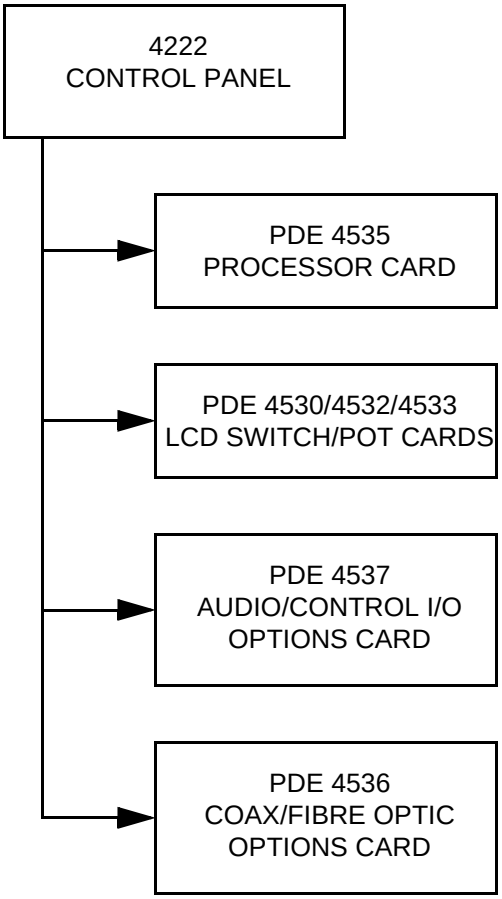
2.2.12.3 PD4222R/PD4222 Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 27 - PD4222R/PD4222 Rear View

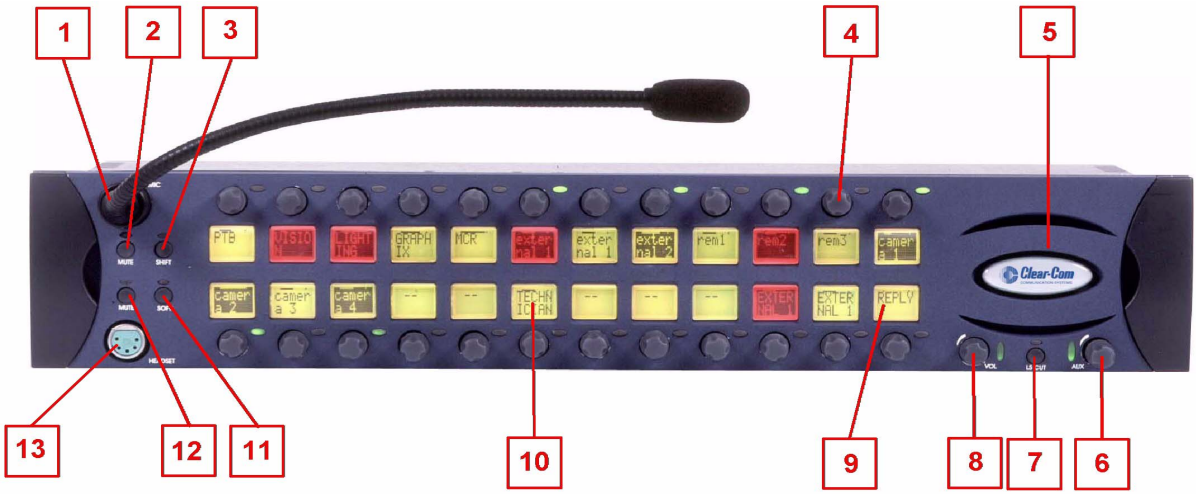
2.2.12.4 PD4222R/PD4222 Components



Mechanical construction and wiring are shown in the associated drawings.

2.2.13 PD4222SR/PD4222S Supervisor Key Panel

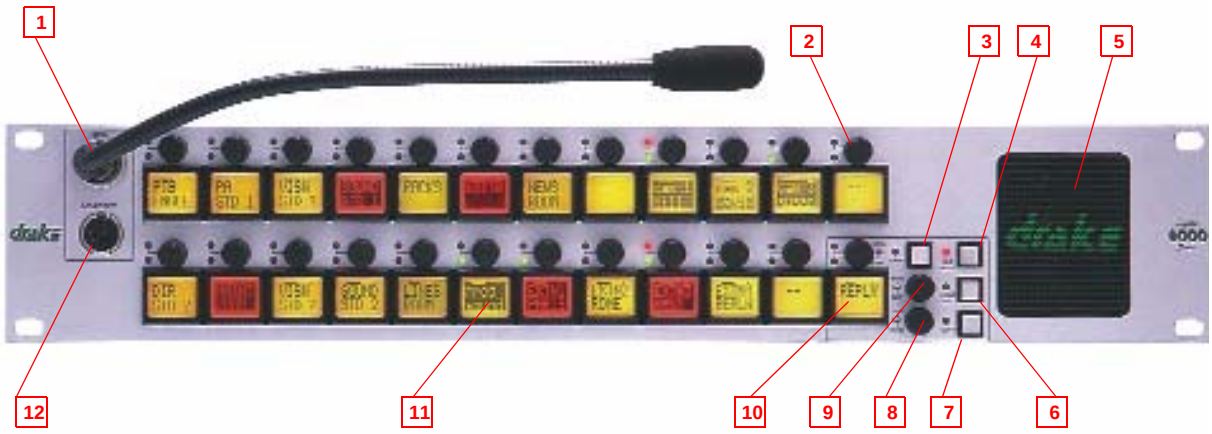
2.2.13.1 PD4222SR Front View



1	Microphone Socket	8	Main Volume Control
2	Microphone Mute Pushbutton	9	Reply Key
3	Shift Pushbutton	10	Direct Access Key (DAK)
4	Level Control	11	Soft Pushbutton
5	Loudspeaker	12	Headset Select Pushbutton
6	Auxiliary Volume Control	13	Headset Socket
7	Loudspeaker Cut Pushbutton		

Figure 28 - PD4222SR Front View

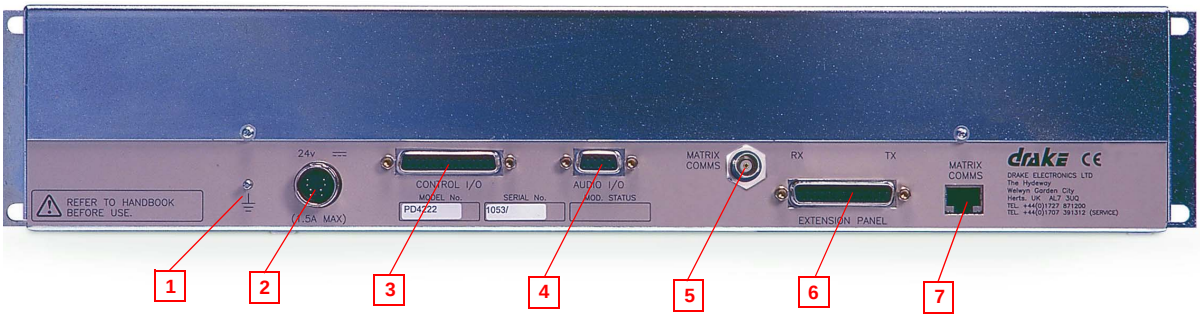
2.2.13.2 PD4222S Front View



1	Microphone Socket	7	Soft Pushbutton
2	Level Control	8	Auxiliary Volume Control
3	Shift Pushbutton	9	Main Volume Control
4	Microphone Mute Pushbutton	10	Reply Key
5	Loudspeaker	11	Direct Access Key (DAK)
6	Headset Select Pushbutton	12	Headset Socket

Figure 29 - PD4222S Front View

2.2.13.3 PD4222SR/PD4222S Rear View



1	Earth Connection	5	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	6	Extension Panel Connector
3	Control I/O (Optional)	7	Matrix Comms Connector (RJ45)
4	Audio I/O (Optional)		

Figure 30 - PD4222SR/PD4222S Rear View

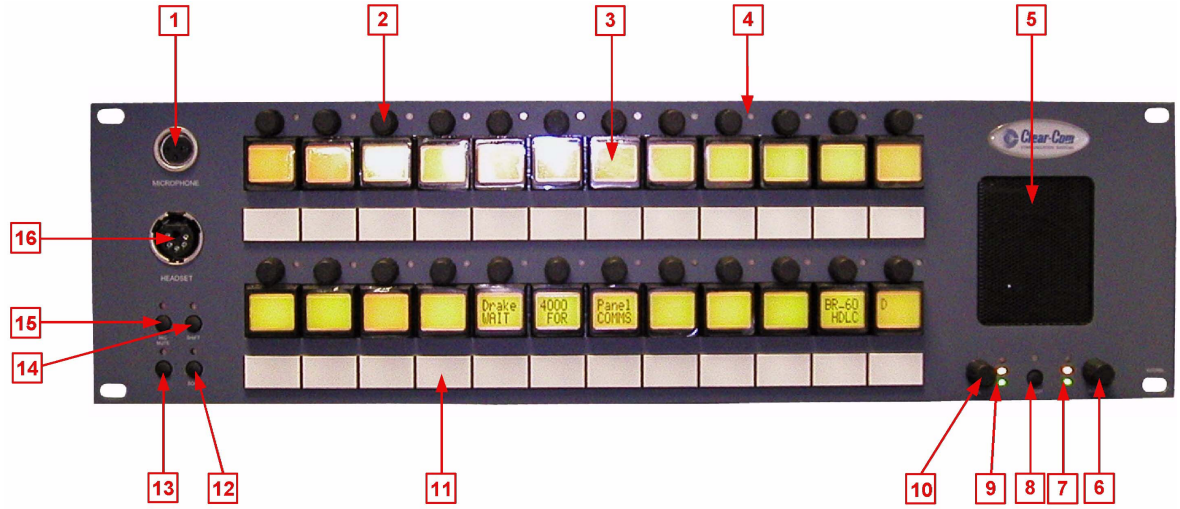
2.2.13.4 PD4222SR/PD4222S Panel Description

A PD4222SR/PD4222S Key Panel, when in Supervisor Mode, can mimic and control any 'target' panel in the local system. This involves remote actioning of key presses and rotary encoder changes, and displaying a mimic of the target panel's display. Whilst in Supervisor Mode all key presses and rotary encoder changes are processed at the target panel.

PD4222R, PD4222, PD4221, PD4212R, PD4212 and PD4211 LCD key panel types can be selected as target panels. When a Supervisor Panel selects any other 3000 or 4000 series panels as a target panel an error message is displayed on the supervisor panel.

2.2.14 PD4232RBL LCD Key Panel and Rotary Encoder (3RU)

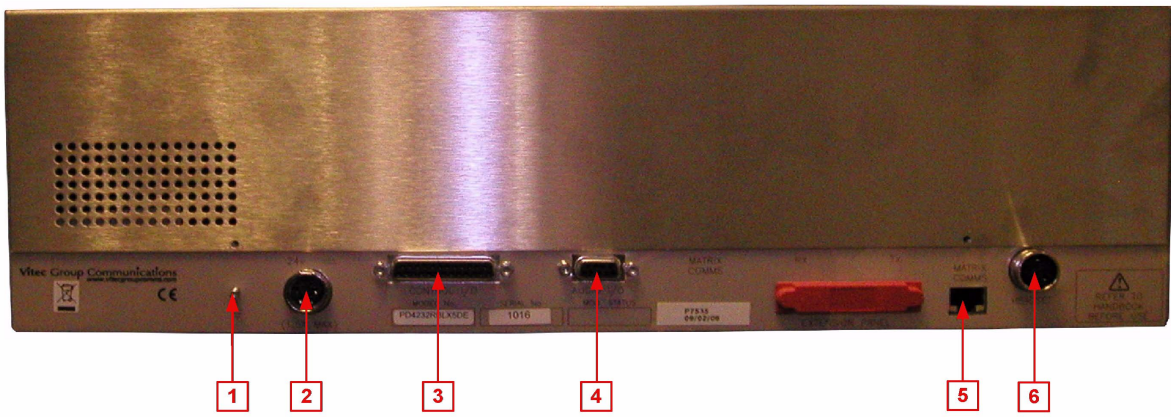
2.2.14.1 PD4232RBL Front View



1	Microphone Socket	9	Main Volume Indicator LEDs
2	Level Control	10	Main Volume Control
3	Direct Access Key (DAK)	11	Scribble Strip
4	Indicator LED	12	Soft Pushbutton
5	Loudspeaker	13	Headset Select Pushbutton
6	Auxiliary Volume Control	14	Shift Pushbutton
7	Auxiliary Volume Indicator LEDs	15	Microphone Mute Pushbutton
8	Loudspeaker Cut Pushbutton	16	Headset Socket

Figure 31 - PD4232RBL Front View

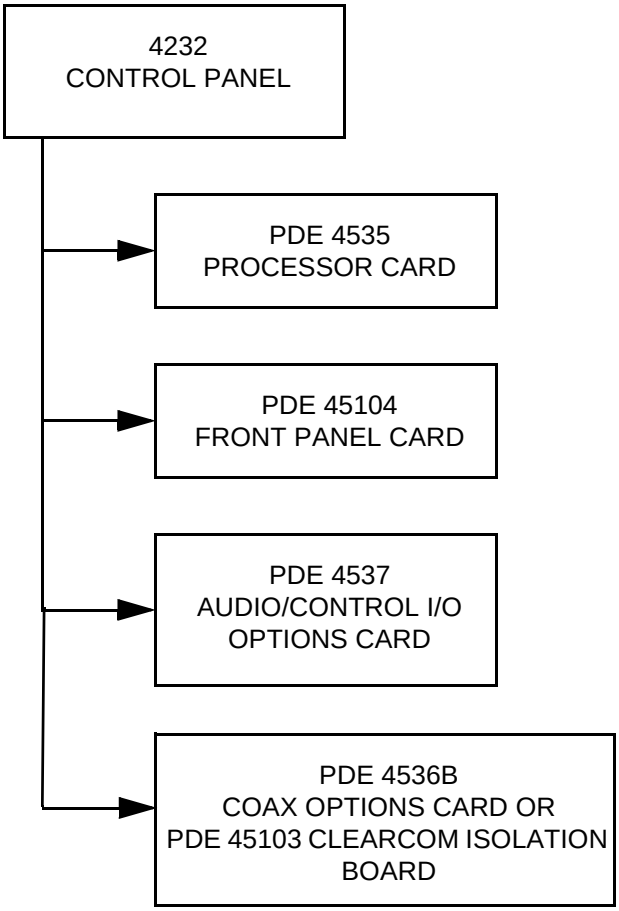
2.2.14.2 PD4232RBL Rear View



1	Earth Connection	4	Matrix Comms Connector (BNC) (Optional)
2	DC Power Connector (DIN)	5	Extension Panel Connector
3	Control I/O (Optional)	6	Matrix Comms Connector (RJ45)

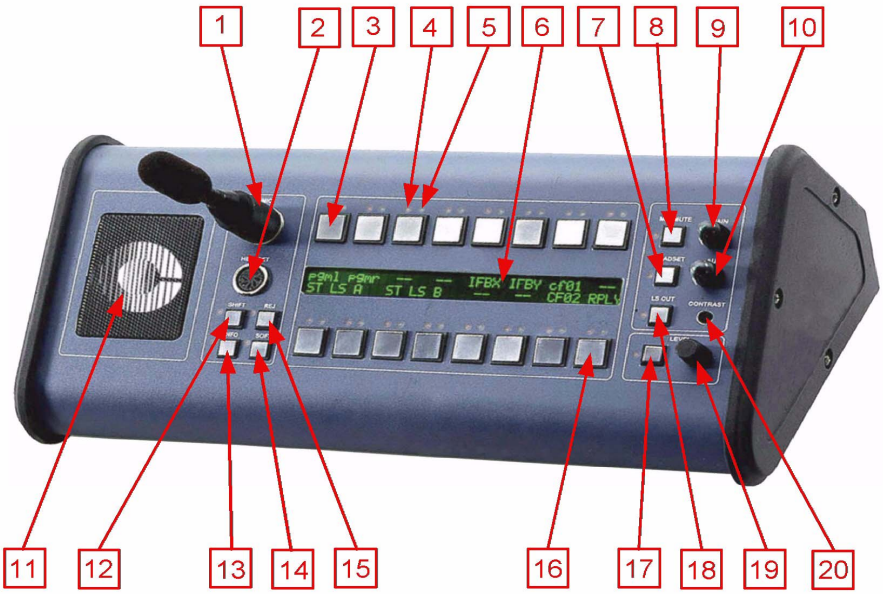
Figure 32 - PD4232RBL Rear View

2.2.14.3 PD4232RBL Components



2.2.15 PD4294R/PD4294 - Desktop Control Panel

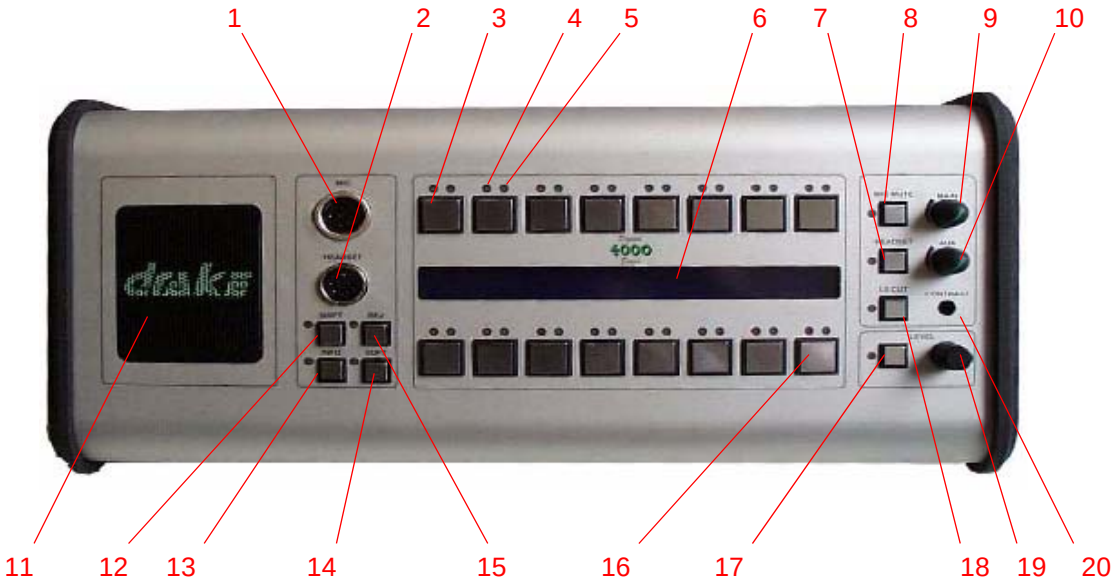
2.2.15.1 PD4294R Front View



1	Microphone Socket	11	Loudspeaker
2	Headset Socket	12	Shift Pushbutton
3	Direct Access Key (DAK)	13	Info Pushbutton
4	Talk Tally LED	14	Soft Pushbutton
5	Listen Tally LED	15	Call Reject Pushbutton
6	Alphanumeric LCD Display	16	Reply Key
7	Headset Select Pushbutton	17	Level Control Pushbutton
8	Microphone Mute Pushbutton	18	Loudspeaker Cut Pushbutton
9	Main Volume Control	19	Rotary Level Control
10	Auxiliary Volume Control	20	Contrast Control

Figure 33 - PD4294R Front View

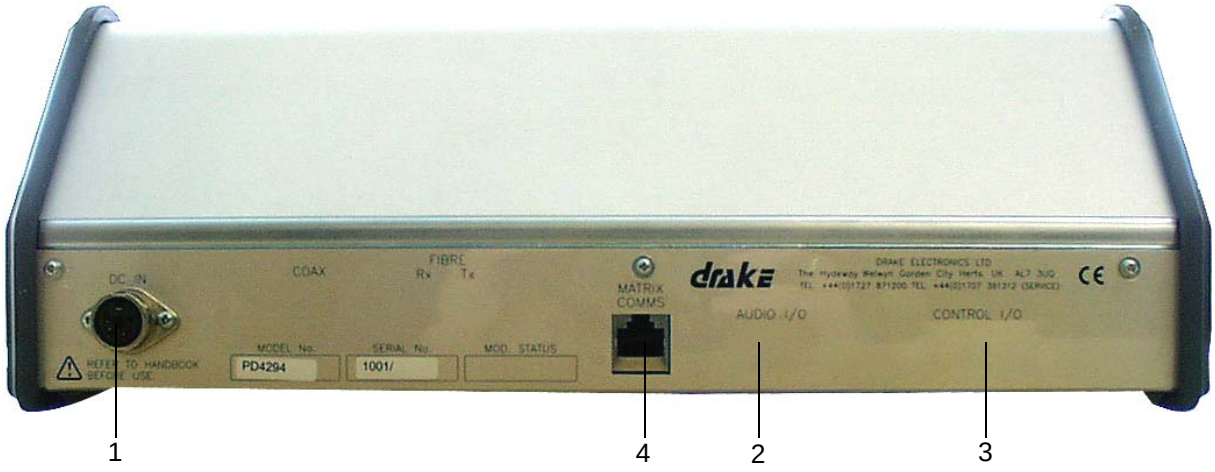
2.2.15.2 PD4294 Front View



1	Microphone Socket	11	Loudspeaker
2	Headset Socket	12	Shift Pushbutton
3	Direct Access Key (DAK)	13	Info Pushbutton
4	Talk Tally LED	14	Soft Pushbutton
5	Listen Tally LED	15	Call Reject Pushbutton
6	Alphanumeric LCD Display	16	Reply Key
7	Headset Select Pushbutton	17	Level Control Pushbutton
8	Microphone Mute Pushbutton	18	Loudspeaker Cut Pushbutton
9	Main Volume Control	19	Rotary Level Control
10	Auxiliary Volume Control	20	Contrast Control

Figure 34 - PD4294 Front View

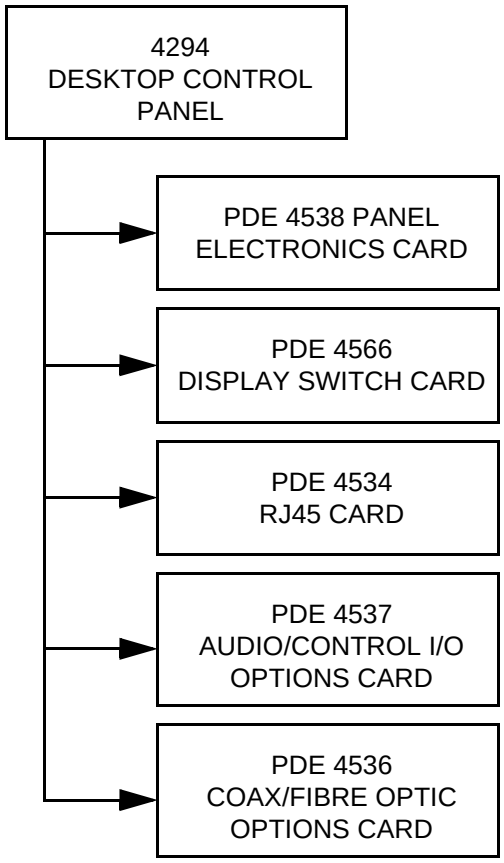
2.2.15.3 PD4294R/PD4294 Rear View



1	DC Connector	3	Control I/O (Optional)
2	Audio I/O (Optional)	4	Matrix Comms Connector

Figure 35 - PD4294R/PD4294 Rear View

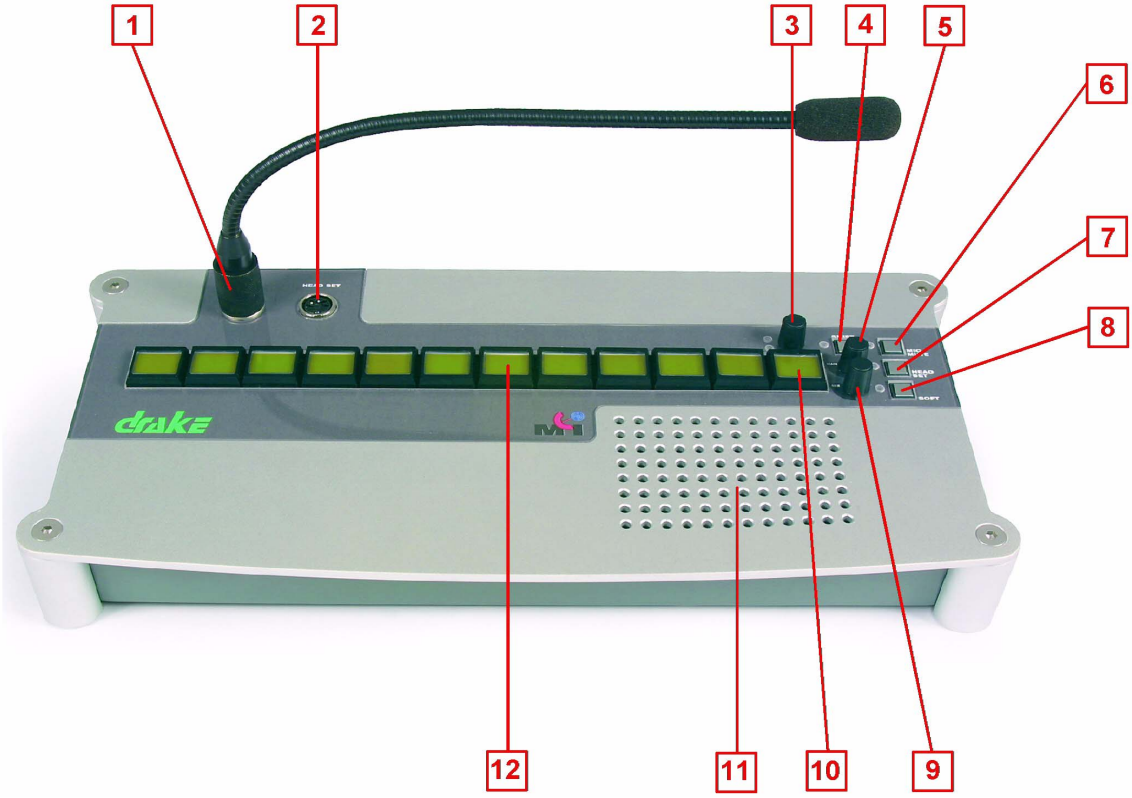
2.2.15.4 PD4294R/PD4294 Components



Positions and wiring of optional cards are shown on the Assembly Drawing

Mechanical construction and wiring are shown in the associated drawings.

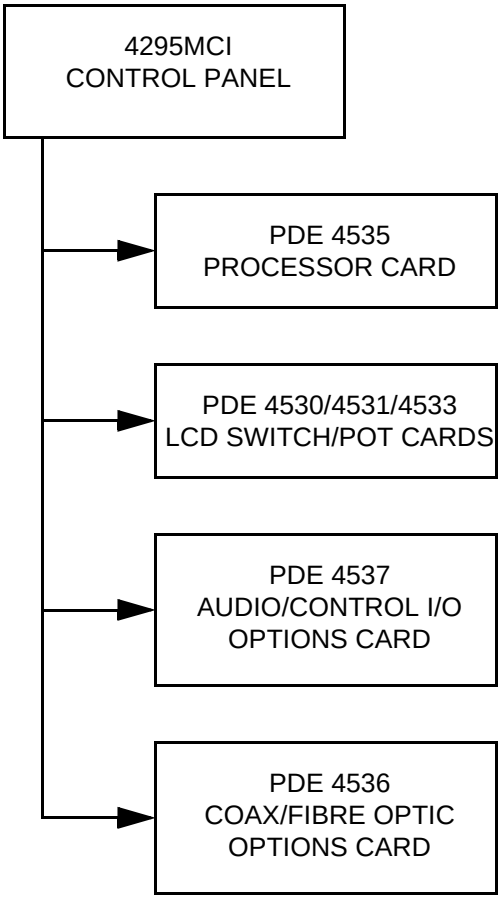
2.2.16 PD4295MCI LCD Desktop Panel



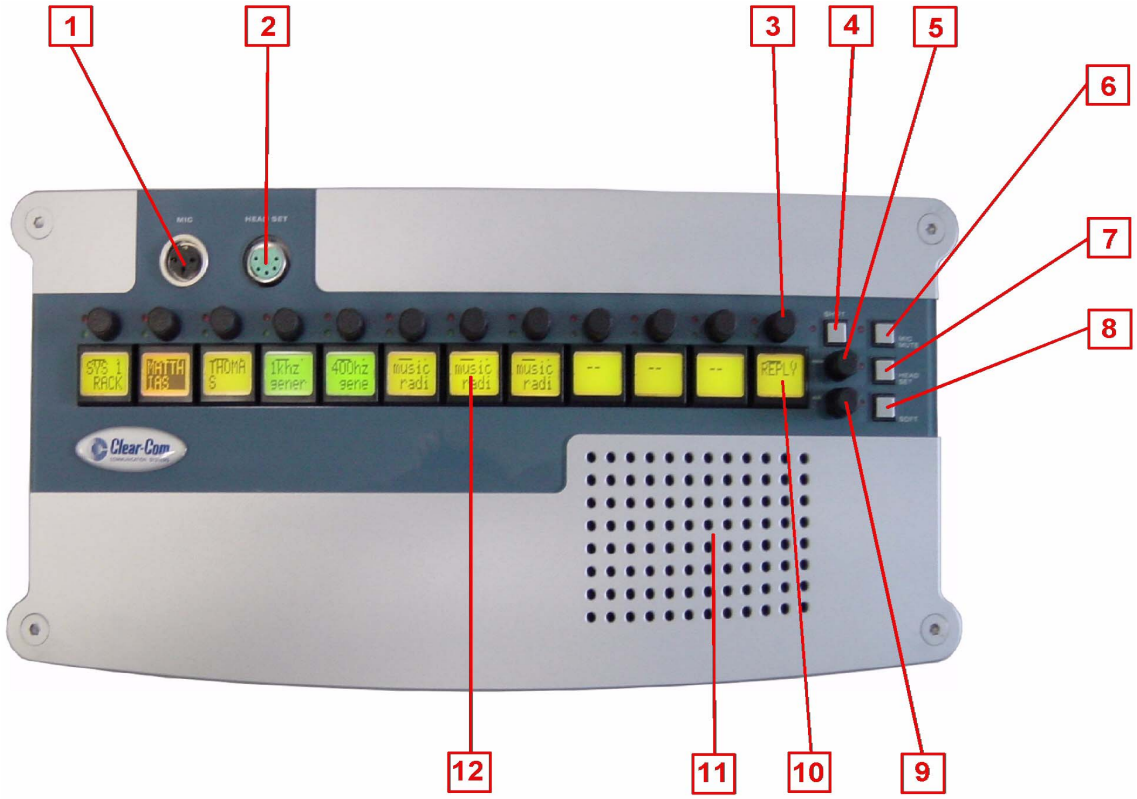
1	Microphone Socket	7	Headset Select Pushbutton
2	Headset Socket	8	Soft Pushbutton
3	Crosspoint Level Control	9	Auxiliary Volume Control
4	Shift Pushbutton	10	Reply Key
5	Main Volume Control	11	Loudspeaker
6	Microphone Mute Pushbutton	12	Direct Access Key (DAK)

Figure 36 - PD4295MCI Front View

2.2.16.1 PD4295MCI Components



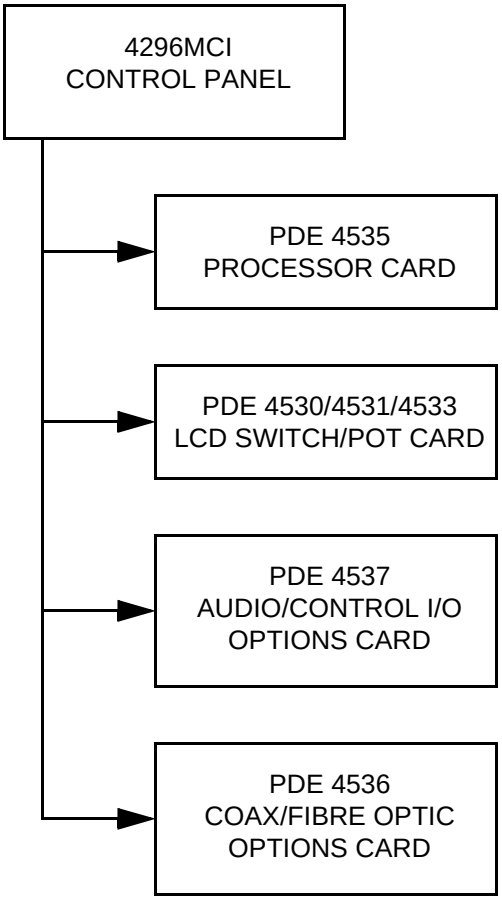
2.2.17 PD4296MCI LCD Desktop Panel



1	Microphone Socket	7	Headset Select Pushbutton
2	XLR5 Headset Socket	8	Soft Pushbutton
3	Crosspoint Level Control	9	Auxiliary Volume Control
4	Shift Pushbutton	10	Reply Key
5	Main Volume Control	11	Loudspeaker
6	Microphone Mute Pushbutton	12	Direct Access Key (DAK)

Figure 37 - PD4296MCI Front View

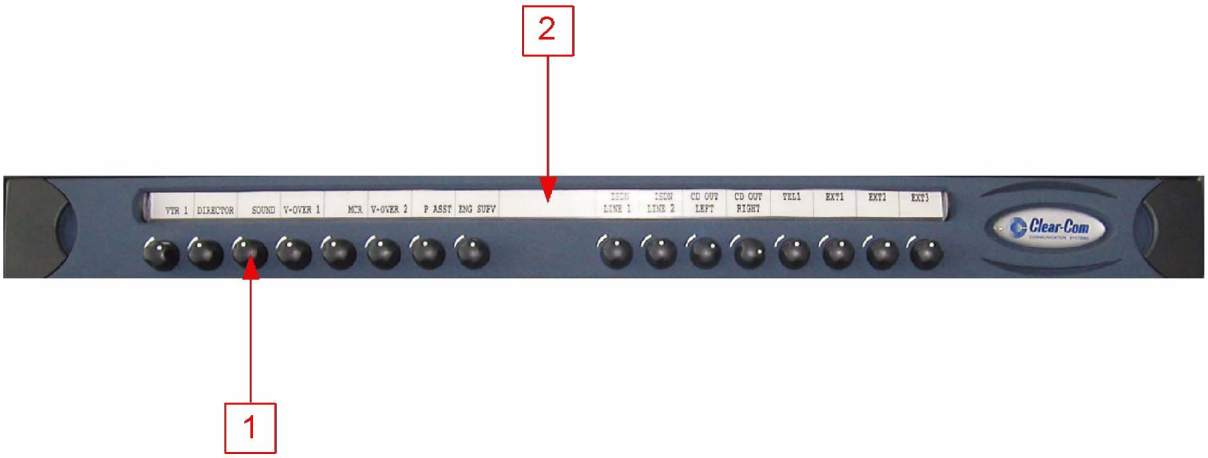
2.2.17.1 PD4296MCI Components



2.3 Extension Panels

2.3.1 PD4203R/PD4203 - Level Control Panel (1RU)

2.3.1.1 PD4203R Front View



1	Level Adjustment Control	2	Designation Strip

Figure 38 - PD4203R Front View

2.3.1.2 PD4203 Front View

1	Level Adjustment Control	2	Designation Strip

Figure 39 - PD4203 Rear View

2.3.1.3 PD4203R/PD4203 Rear View

1	Extension Connector

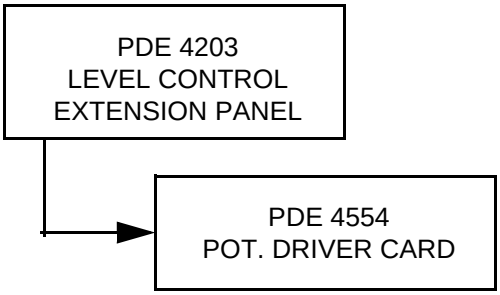
Figure 40 - PD4203R/PD4203 Rear View

2.3.1.4 PD4203R/PD4203 Control Panel Description

The 4203 1RU Level Control Extension Panel has 20 rotary level controls which allow individual crosspoint levels in the Matrix to be varied. The Extension Panel can be connected to either a standard 4000 Control Panel or a 4000 Router Panel. When a single panel is connected with a 4000 Control Panel, the rotary controls can be arranged to correspond to the upper or lower row of DAKs.

To be able to accommodate all combinations of input and output level controls, up to four 4203 Panels can be connected to a 4000 control panel. Only the 4025 panel equipped with Router Panel software can give control of both input and output port gain levels. Standard panel software will accommodate up to four 4203 Panels, which caters for variable crosspoint levels on all of the DAKs available on a 32 DAK Control Panel, Main and Shift Pages, or when 4206 Extension Key Panels are connected to the panel.

2.3.1.5 PD4203R/PD4203 Components



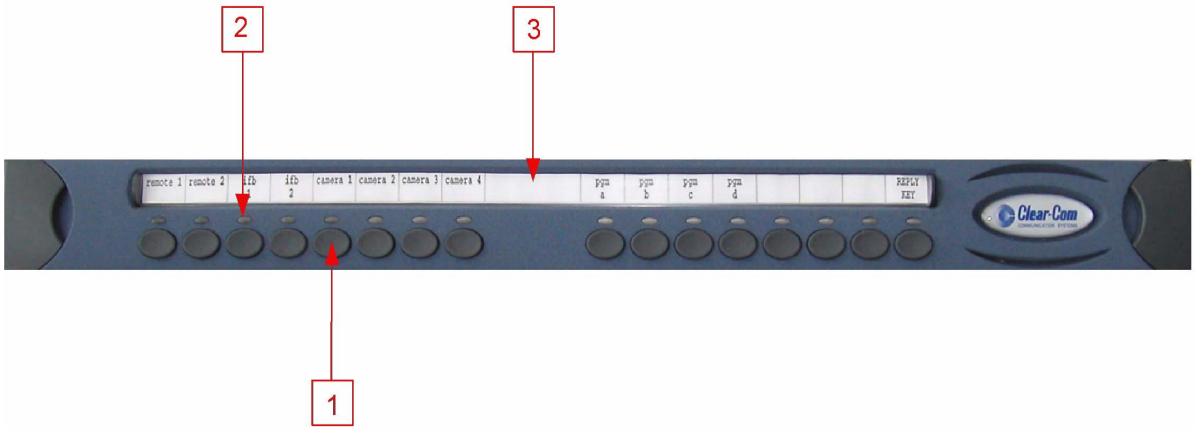
2.3.1.6 Mechanical Construction

The 4003 panel is constructed from folded sheet metal. Access to the interior is given by removing the top panel. 20 rotary controls are mounted on the front panel.

The rotary controls are 100KΩ LIN potentiometers.

2.3.2 PD4206R/PD4206 - 20 Key Extension Panel (1RU)

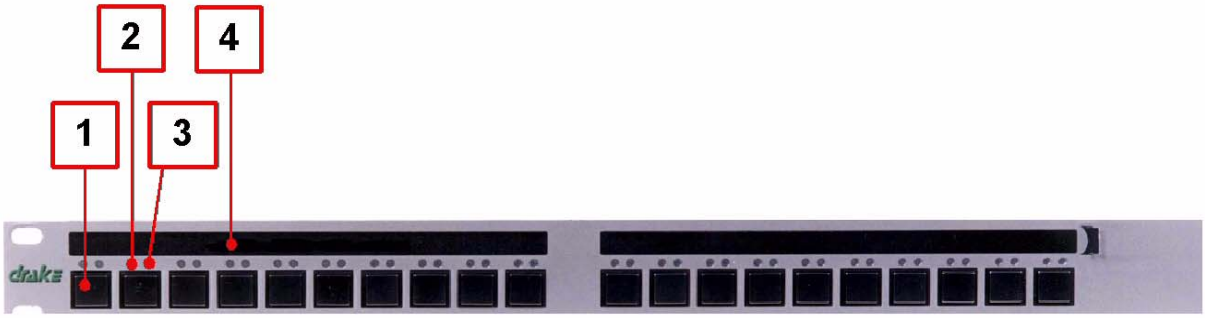
2.3.2.1 PD4206R Front View



1	Indicator LED	3	Designation Strip
2	Direct Access Key (DAK)		

Figure 41 - PD4206R Front View

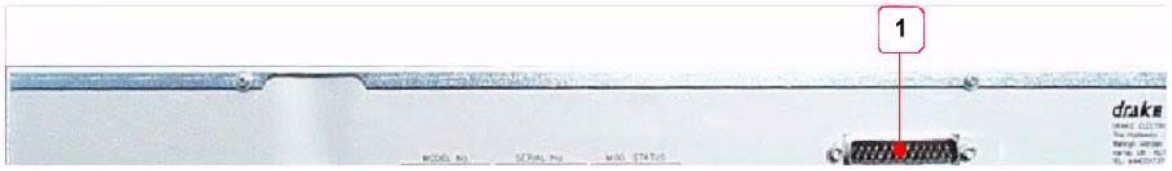
2.3.2.2 PD4206 Front View



1	Direct Access Key (DAK)	3	Listen Tally LED
2	Talk Tally LED	4	Designation Strip

Figure 42 - PD4206 Front View

2.3.2.3 PD4206R/PD4206 Rear View



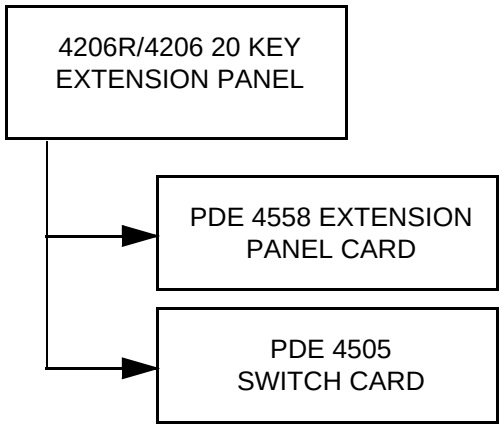
1 Extension Connector

Figure 43 - PD4206R/PD4206 Rear view

2.3.2.4 PD4206R/PD4206 Extension Panel Description

The PD4206R/PD4206 1RU Extension Panels provide 4000 Control Panels with up to 20 additional centrally assigned (via CMAPSi) DAKs.

2.3.2.5 PD4206R/PD4206 Components



2.3.2.6 PD4206R/PD4206 Mechanical Construction

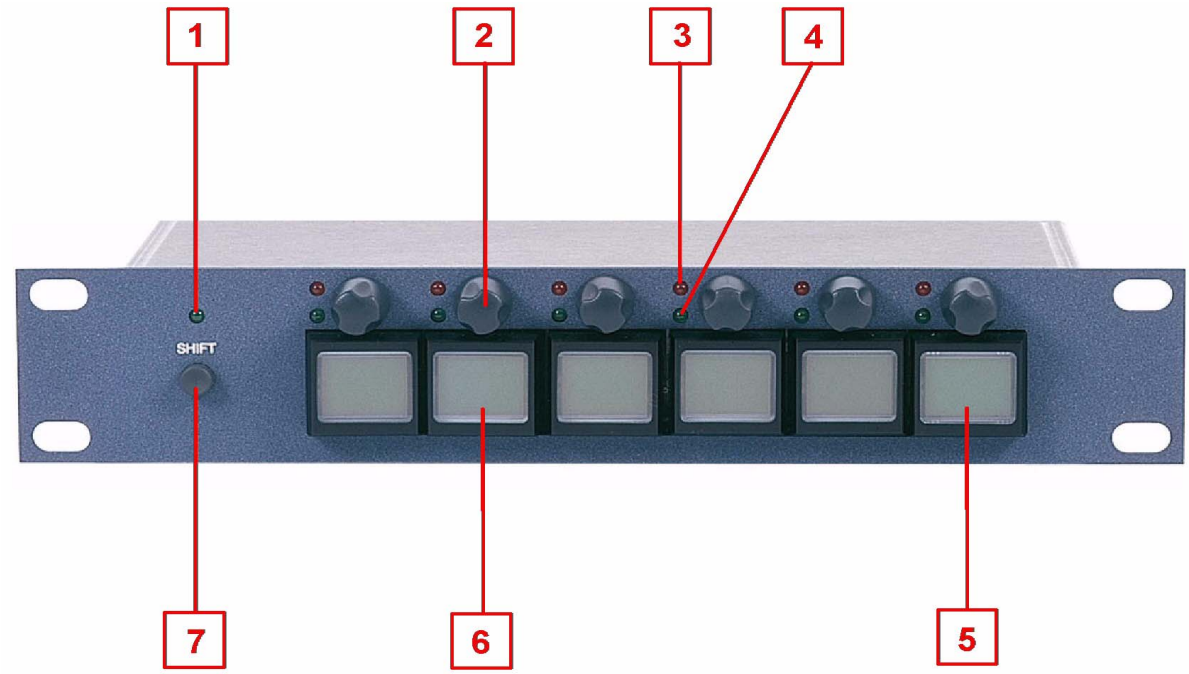
The mechanical structure of the 4006 control panel is similar to that of the 4003.

2.3.2.7 PD4206R/PD4206 Wiring

The two main cards are connected together via ribbon cable. Ribbon cable is also used to connect the PDE 3523 PCB to the 25-way D-type connector mounted on the rear of the unit. The Extension panel is plugged via a 25-way D-type connector to the EXTENSION panel connector at the rear of the associated Control Panel.

The maximum cable length between the 4006, main control panels is 1.5 metres.

2.3.3 PD4230R Half Width LCD Extension Panel (1RU)



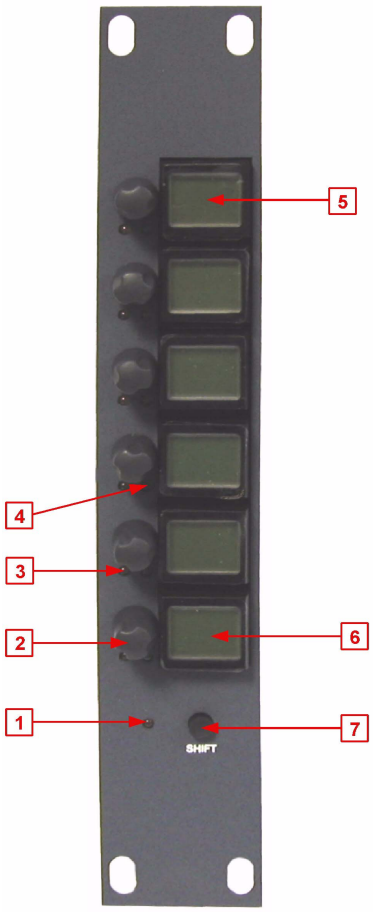
1	Shift mode LED	5	Reply Key
2	Crosspoint Level Control	6	Direct Access Key (DAK)
3	Talk Tally LED	7	Shift Pushbutton
4	Listen Tally LED		

Figure 44 - PD4230R Front View

1	Extension Panel Connector (RJ45)	3	DC Power Connector (DIN)
2	Matrix Comms Connector (RJ45)	4	

Figure 45 - PD4230R Rear View

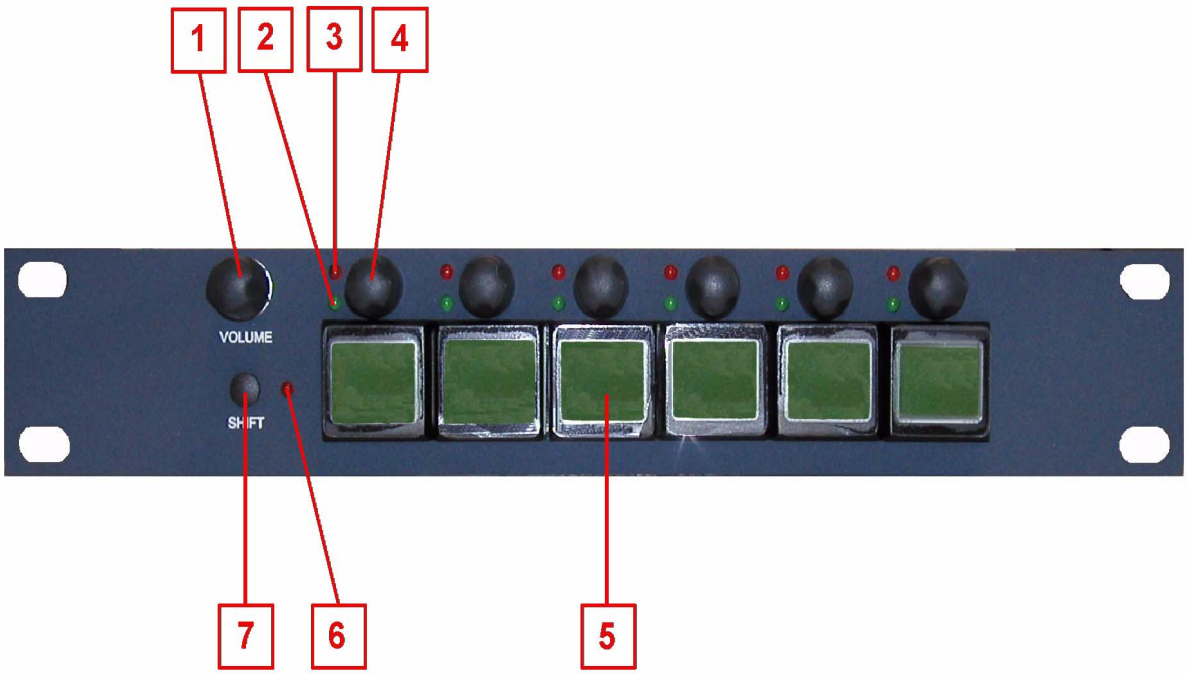
2.3.4 PD4230RV Half Width Vertical LCD Control Panel (1RU)



1	Shift mode LED	5	Reply Key
2	Crosspoint Level Control	6	Direct Access Key (DAK)
3	Talk Tally LED	7	Shift Pushbutton
4	Listen Tally LED		

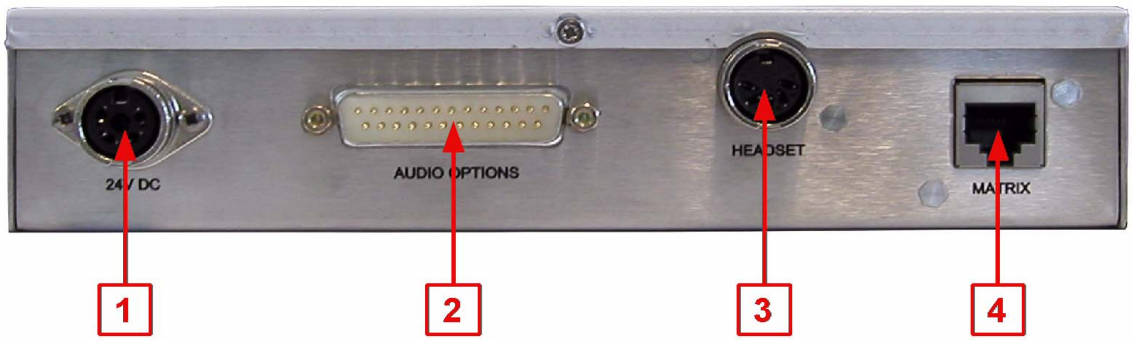
Figure 46 - PD4230R Front View

2.3.5 PD4231R Half Width LCD Control Panel (1RU)



1	Main Volume Control	5	Direct Access Key (DAK)
2	Listen Tally LED	6	Shift LED
3	Talk Tally LED	7	Shift Pushbutton
4	Crosspoint Level Control		

Figure 47 - PD4231R Front View



1	DC Power Connector (DIN)	3	Headset Connector (DIN)
2	Audio I/O (optional)	4	Matrix Comms Connector (RJ45)

Figure 48 - PD4231R Rear View

3 Sub Assembly PCBs

3.1 PDE 4505 Key extension card

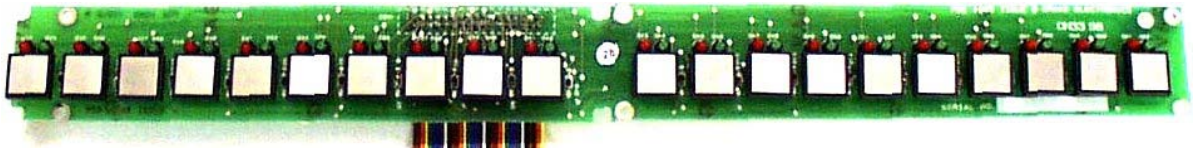


Figure 49 - PDE4505 Key Extension card

This card contains the 20 keys and associated LEDs for the PD4206 key extension panel. The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

3.2 PDE 4530 LCD switch driver card

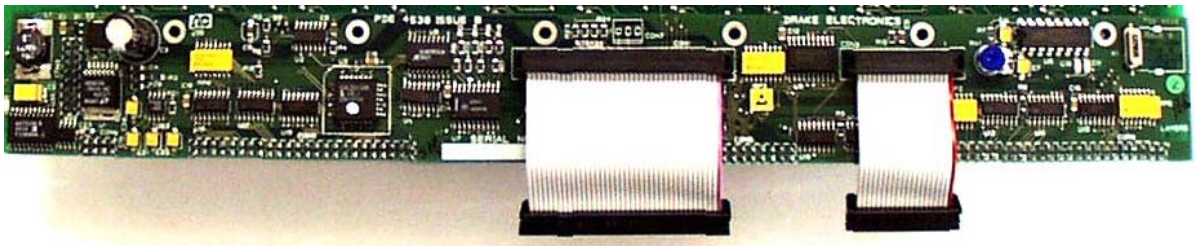


Figure 50 - PDE4530 LCD Switch Driver Card

This card contains the necessary circuitry to interface the PDE4531/4532/4533 cards to the PDE4535 panel processor card.

A buck mode switching regulator ,U1,is used to generate 5Volts for the electronics and switches.

U4,5,7 & 8 form the switch encoding logic which generates the necessary row and column scan lines.

U3 provides DTMF tones decoded from U3 when the main panel processor card writes to LED positions.

RV1 is a preset for adjusting the amount of DTMF to the loudspeaker also controlled by the AUX encoder on the front panel.

DTMF tones sent to the matrix are fixed in level.

U31 is a dual channel multiplying D to A converter which allows the main panel processor card to vary the MAIN and AUX levels fed to the loudspeaker circuit.

The encoders for achieving this are read in by U34.

U9 & 10 provide the decode addresses for writing data to the LCD switches and reading their associated encoder level controls.

The multiplexing circuitry for achieving this is contained on three banks of identical circuitry on sheets 2,3 & 4 of the circuit diagram, each handling eight LCD switches.

3.3 PDE 4531 1U LCD Key Card

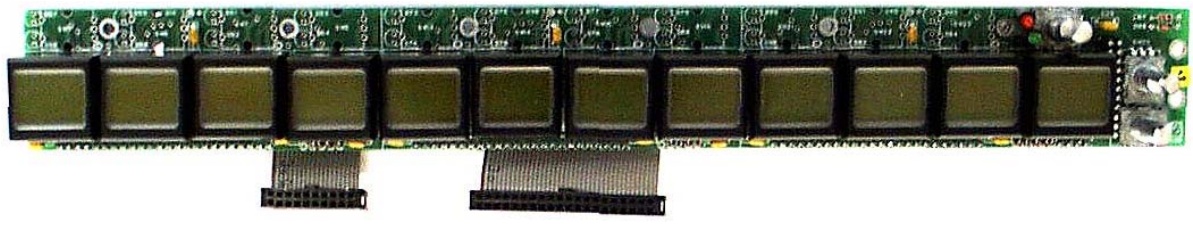


Figure 51 - PDE4531 LCD Key Card

This card contains the 12 LCD keys for the PD4211 panel and In its fully fitted form (/LVL) it also contains the encoders and associated LEDs for the PD4212 panel.

3.4 PDE 4532 2U LCD Key Card

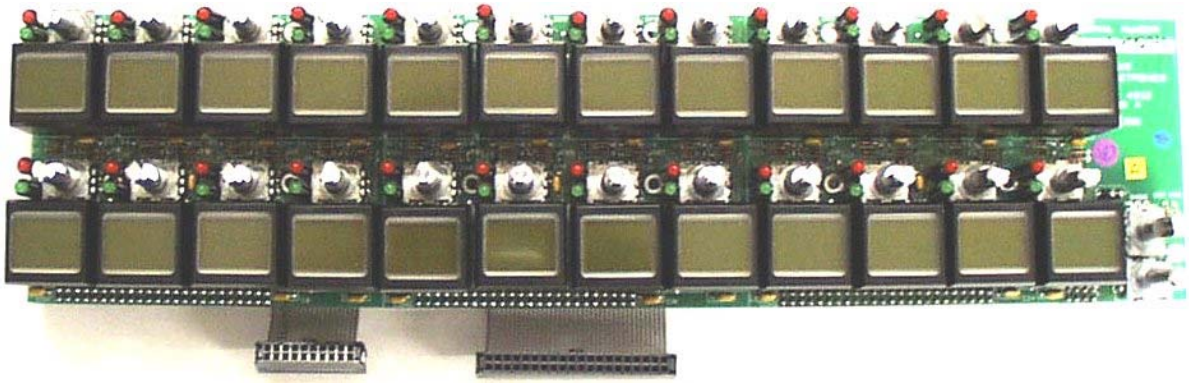


Figure 52 - PDE4532 LCD Key Card

This card contains the 12 LCD keys for the PD4211 panel and In its fully fitted form (/LVL) it also contains the encoders and associated LEDs for the PD4212 panel.

3.5 PDE 4533 Key/Pot. Card

Figure 53 - PDE4533 Key/Pot Card

This card contains the main and auxiliary level control encoders and the four function keys with their associated LEDS for the PD4211/4212/4221/4222 panels.

3.6 PDE 4534 RJ45 Connector Card

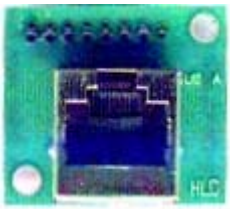


Figure 54 - PDE4534 RJ45 Connector Card

This card contains just a pcb mounted RJ45 connector for serial interconnection of the PD4294 desktop panel.

3.7 PDE 4535 Panel Electronics Card

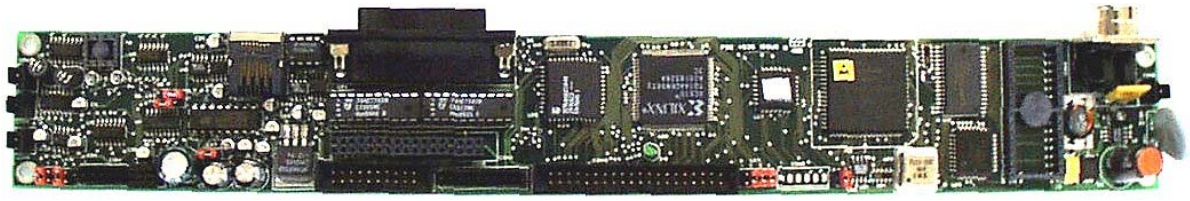


Figure 55 - PDE4535 Panel Electronics Card

The PDE4535 is the panel processor card for non-19" 4000 series II panels.

It provides microphone amplifier/loudspeaker amplifier/power supply/processor/memory and control interfaces.

3.7.1 PDE4535 Circuit description

U8 is the microphone amplifier 30 to 60dBs of gain, which is software selectable by U6. Up to two microphones can be connected to CON3 & 4, one of which is software selectable at any one time via U7.

Note: *Both microphone circuits are factory fitted as unbalanced with 12V phantom power.*

U9 & 10 provide another 20dB gain and a limiting circuit of 8dBu.

U12 provides a balanced output for the matrix

U16 is the loudspeaker amplifier.

U11B provides software selectable loudspeaker mute and TR2 software selectable 12dBs of loudspeaker dim.

U14 is the headphone amplifier, which has a jumper patch (LK10), for selecting left and right audio inputs to left and right earpieces. Sidetone is software selectable via U11A and U11D.

U15D converts balanced audio from the matrix and U15C mixes it with audio from the panel options cards (PDE4536/PDE4537/PDE3561). Analogue level controls (100K linear potentiometers) can be fitted to CON14 and 15.

U2 is the 5V switching regulator. It takes 24Volts in via CON2.

It is synchronised with the main CPU clock and a power fail flag is provided to the CPU to allow emergency data saving.

U3 provides +12V for the analogue electronics and TR1/U4/U29 provide a -7.5V rail.

U17 is the 68000 control CPU, which runs bootstrap code, fitted at U18 and non-volatile downloaded code from the matrix stored in U22.

U19 is a 1Mbit static ram for all volatile data.

U25 is a dual channel UART, one channel for serial communication with the matrix and the other a spare.

U26 is an FPGA, the function of which is programmable and stored as part of the bootstrap Prom.

This board provides all necessary decode logic for the following connectors:

CON7 is for a display interface.

CON8 is for the GPI interface.

CON10 is the extension panel interface.

CON11 is the PDE4536 interface.

CON13 is an RJ45 interface to the matrix.

3.8 PDE 4536 Coax/Fibre Options Card

The PDE4536 is the coax/fibre options board for the 4000 series II panel range. It is plug compatible with both the PDE4535 & PDE4538 panel processor cards.

The PDE 4536 has two build versions depending on the type of interconnection required.

The PDE4536 allows 75W coax interconnection between the control panel and the matrix, whilst the PDE4536MMST allows multi-mode fibre interconnection on ST connectors.

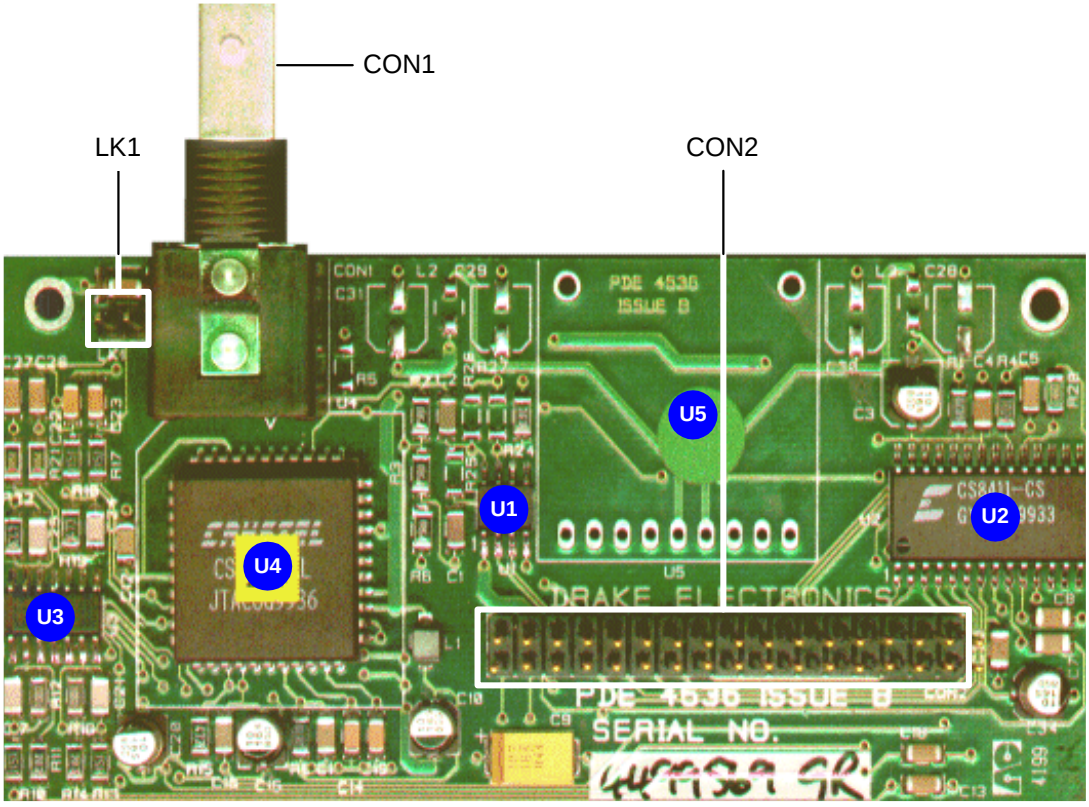


Figure 56 - PDE4536 Coax/Fibre Options Card

3.8.1 PDE4536 Circuit description

U1 is the line transceiver for either the coax or fibre connector.

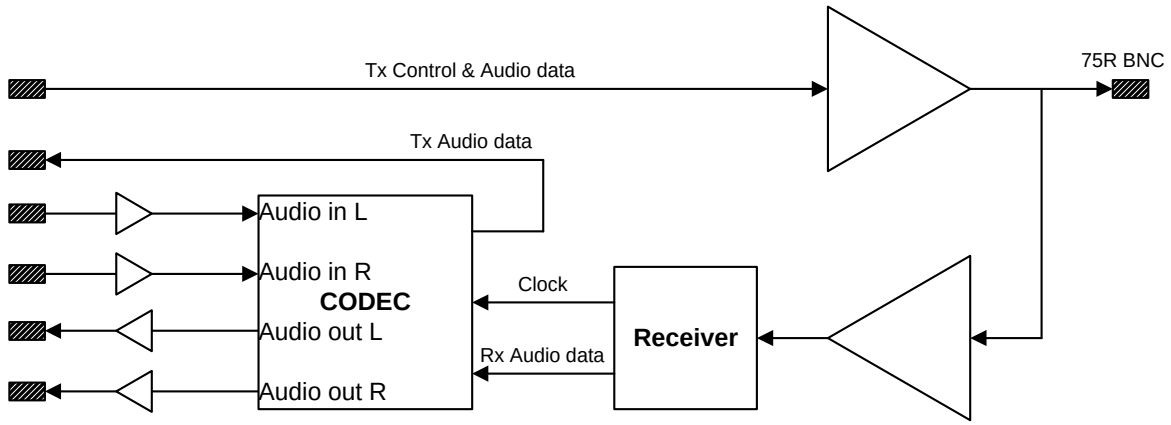
Transmitted data out comes from CON2 since the transmitting device resides on the panel processor card. Received data passes to U2, which extracts the clock & control data from the audio data.

This audio data is passed to U4, the stereo codec IC, which converts it to analogue. The left and right audio signals are buffered by U3 and passed to CON2 for the panel processor card.

Note: *LK1 must be fitted before the right hand audio signal is allowed to pass.*

The left and right audio signals from the panel processor card are converted by U4 to digital signals and passed back to the panel processor card for interlacing with the transmitted control data.

U5 (optional) provides a fibre link.



3.9 PDE 4537 Panel Audio/GPI Options Card

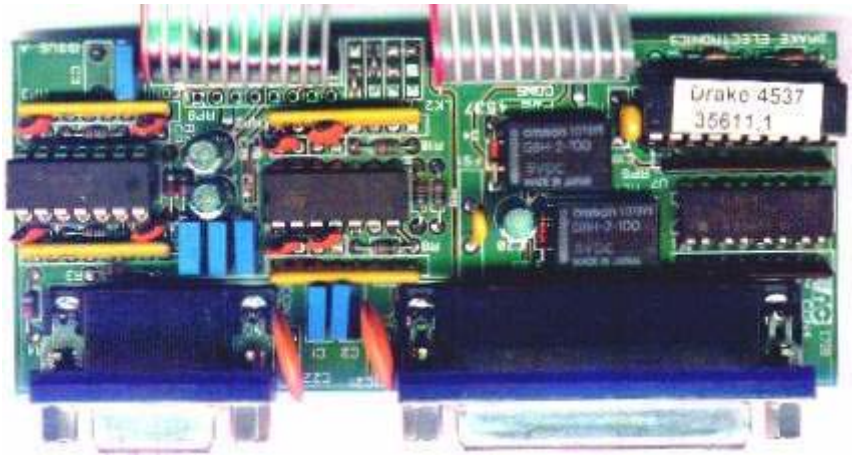


Figure 57 - PDE4537 Panel Audio/GPI Options Card

This card handles two balanced audio mix inputs and two balanced audio send outputs from the panel it is fitted to.

One of the two outputs comes from the microphone output at line level and the other is a mix of MAIN & AUX loudspeaker send signals pre thelevel controls.

The two line level inputs can be patched to either the mix with the microphone signal, mix with the AUX loudspeaker signal ,or mix with the MAIN loudspeaker signal. Additionally there is a patch for routing a second audio signal to be sent to the matrix when using the PDE4536 coax options card.

*Contact **Vitec Group Communications** for suitable options.*

The factory default settings are for microphone input mix and auxiliary loudspeaker mix. In addition there are four opto-isolated general purpose inputs and two DPDT relay outputs which can be programmed with CMAPSi.

3.10 PDE 4538 Panel Electronics Card

The PDE4538 is the panel processor card for non-19" 4000 series II panels.

It provides microphone amplifier/loudspeaker amplifier/power supply/processor/memory and control interfaces.

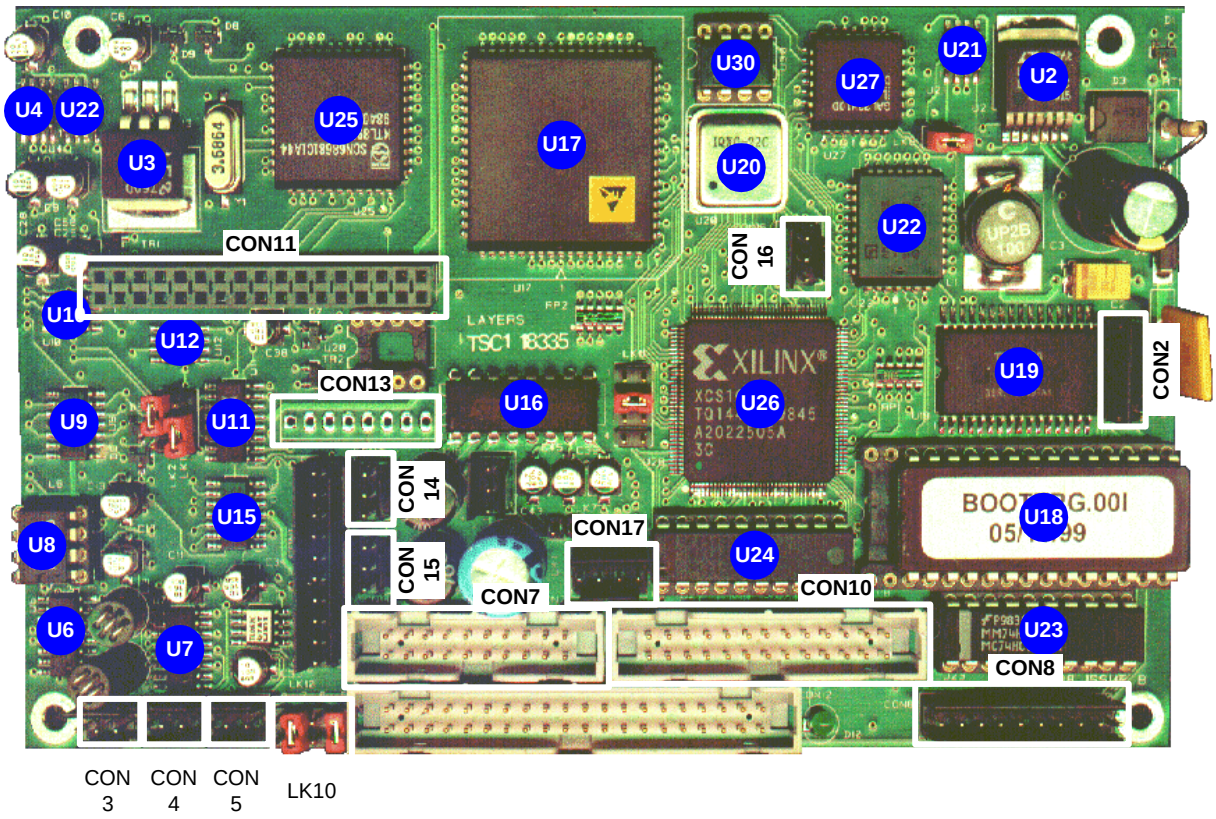


Figure 58 - PDE4538 Panel Electronics Card

3.10.1 PDE4538 Circuit description

U8 is the microphone amplifier 30 to 60dBs of gain, which is software selectable by U6. Up to two microphones can be connected to CON3 & 4, one of which is software selectable at any one time via U7.

Note: *Both microphone circuits are factory fitted as unbalanced with 12V phantom power.*

U9 & 10 provide another 20dB gain and a limiting circuit of 8dBu.

U12 provides a balanced output for the matrix

U16 is the loudspeaker amplifier.

U11B provides software selectable loudspeaker mute and TR2 software selectable 12dBs of loudspeaker dim.

U14 is the headphone amplifier, which has a jumper patch (LK10), for selecting left and right audio inputs to left and right earpieces. Sidetone is software selectable via U11A and U11D.

U15D converts balanced audio from the matrix and U15C mixes it with audio from the panel options cards (PDE4536/PDE4537/PDE3561). Analogue level controls (100K linear potentiometers) can be fitted to CON14 and 15.

U2 is the 5V switching regulator. It takes 24Volts in via CON2.

It is synchronised with the main CPU clock and a power fail flag is provided to the CPU to allow emergency data saving.

U3 provides +12V for the analogue electronics and TR1/U4/U29 provide a -7.5V rail.

U17 is the 68000 control CPU, which runs bootstrap code, fitted at U18 and non-volatile downloaded code from the matrix stored in U22.

U19 is a 1Mbit static ram for all volatile data.

U25 is a dual channel UART, one channel for serial communication with the matrix and the other a spare.

U26 is an FPGA, the function of which is programmable and stored as part of the bootstrap Prom.

This board provides all necessary decode logic for the following connectors:

CON10 is an extension panel interface, which also allows for connection of the PDE3530 I2C card.

CON7 is for a display interface.

CON8 is for the GPI interface.

CON13 is for an RJ45 interface to the matrix.

CON11 is the PDE4536 interface.

CON16 is the spare RS232 interface.

CON17 is for PDE3561 serial interface (NB U28 must be removed if this is used)

3.11 PDE 4551 Key/LCD Display Card

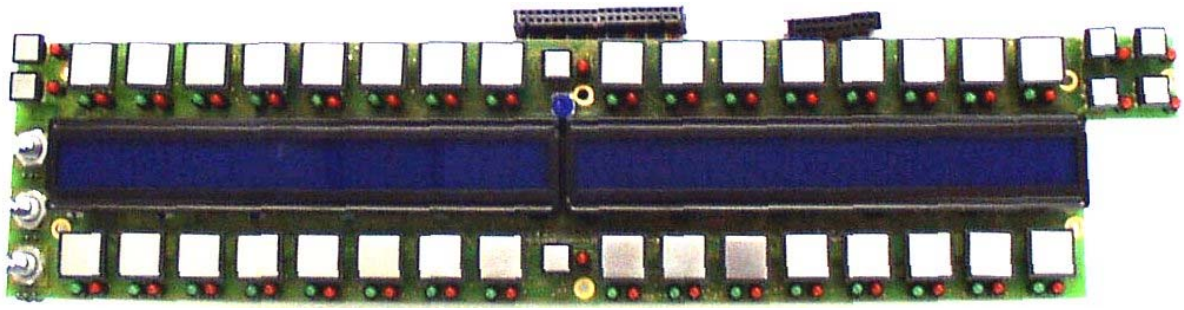


Figure 59 - PDE4551 Key/LCD Display Card

This card contains the 40 keys and associated LEDs for the PD4224 key display panel.

The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

U18-22 perform the decode circuitry necessary to drive these signals.

A buck mode switching regulator ,U1,is used to generate 5Volts for the electronics and switches and displays.

U16 provides DTMF tones decoded from U14 when the main panel processor card writes to LED positions.

VR2 is a preset for adjusting the amount of DTMF to the loudspeaker also controlled by the AUX encoder on the front panel.

DTMF tones sent to the matrix are fixed in level.

The LCD displays are driven by industry standard 80 column LCD driver and LCD controller ics.

VR1 is a preset allowing for viewing angle adjustment of the displays.

3.12 PDE 4552 Key Card

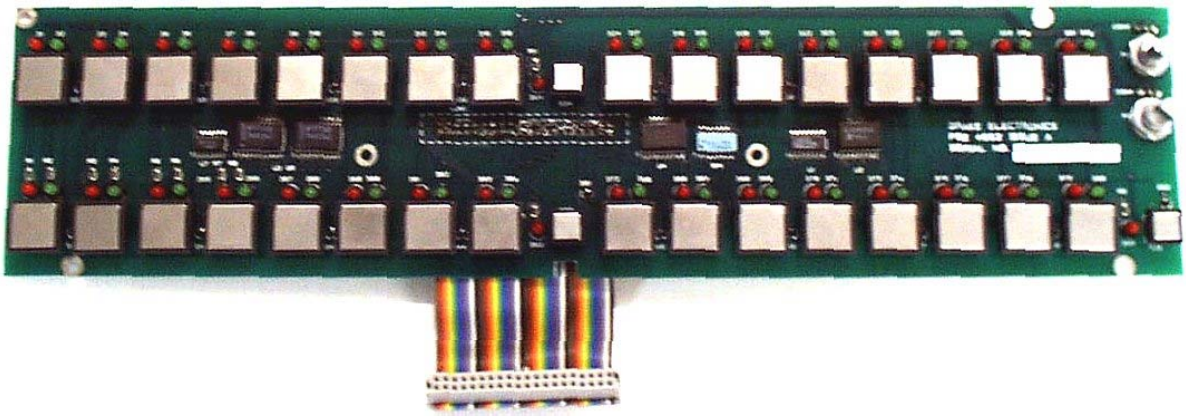


Figure 60 - PDE4552 Key Card

This card contains the 35 keys , and associated LEDs for the PD4226 panel.

The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

U1-5 perform the decode circuitry necessary to drive these signals.

3.13 PDE 4553 Key Card

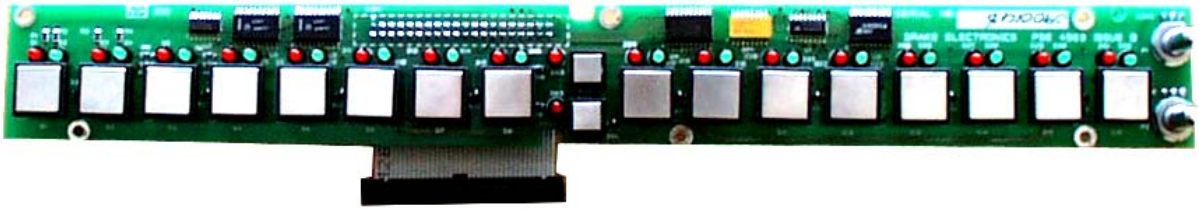


Figure 61 - PDE4553 Key Card

This card contains the 18 keys and associated LEDs for the PD4215 panel.

The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

U1-5 perform the decode circuitry necessary to drive these signals.

3.14 PDE 4554 Pot. Extension Card

This card contains the 20 level controls and driving circutiry for the PD4203 panel.

U18,4 & 6 are buffers for interfacing the circuitry to the main panel.

SW1 is a hex switch used for selecting the function of the PD4203 panel ie for key level control or i/o level control.

(See the installation manual for details)

Each of the 20 level controls is multiplexed onto an A/D converter (U3) for the main processor card to read the position.

3.15 PDE 4556 Key/LED Display Card

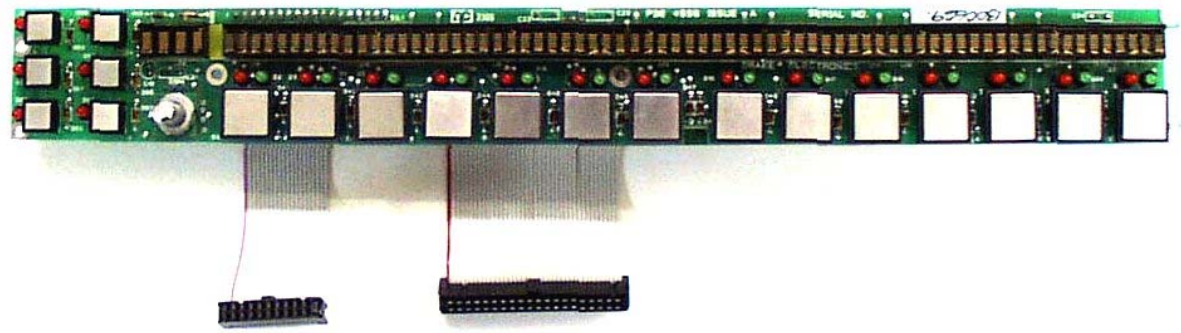


Figure 62 - PDE4556 Key/LED Display card

This card contains the 20 keys and associated LEDs and LED displays for the PD4217 panel.

The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

3.16 PDE 4557 Drive Card

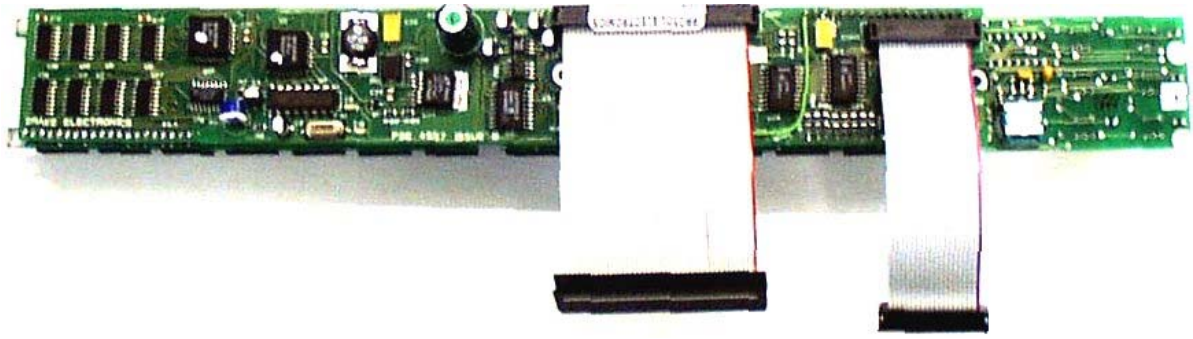


Figure 63 - PDE4557 Drive Card

This card contains the necessary circuitry to interface the PDE4556 card to the PDE4535 panel processor card.

A buck mode switching regulator ,U34,is used to generate 5Volts for the electronics , switches.& displays.

U20,21,22,29 & 30 form the switch encoding logic which generates the necessary row and column scan lines.

U4 provides DTMF tones decoded from U2 when the main panel processor card writes to LED positions.

RV1 is a preset for adjusting the amount of DTMF to the loudspeaker also controlled by the AUX encoder on the front panel.

DTMF tones sent to the matrix are fixed in level.

U31 is a dual channel multiplying D to A converter which allows the main panel processor card to vary the MAIN and AUX levels fed to the loudspeaker circuit.

The encoder for achieving this is read in on CON2.

U17 & 18 provide the decode addresses for writing data to the LED displays.

Each display receives its data from a parallel to serial converter U5,6,7,11,12,15 & 19.

3.17 PDE 4558 Panel Electronics Card

This card contains the driving circutiry inside a PD4206 panel between the PDE4505 extension key card and the main panel.

U6 & 7 are buffers for interfacing the circuitry to the main panel.

U3,4,5 & 26 form the switch encoding logic which generates the necessary row and column scan lines.

SW1 is a hex switch used for selecting the function of the PD4206 panel ie for panel position.

3.18 PDE 4566 Key/LCD Display Card

This card contains the 24 keys and associated LEDs and LCD display for the PD4294 key display panel.

The keys and LEDs are arranged in a matrix of rows and columns to reduce interconnection.

U18-21 perform the decode circuitry necessary to drive these signals.

A buck mode switching regulator ,U1,is used to generate 5Volts for the electronics and switches and display.

The LCD display is driven by industry standard 80 column LCD drivers and LCD controller ic.

VR1 is a preset allowing for viewing angle adjustment of the displays.

3.19 PDE4609 8-channel telephone interface control card

PDE4609 is a 4000 series rear connection unit used for interfacing up to eight Telos units and takes the place of four GPI cards.

Refer to the Series II Installation Guide for details of LEDs and switches.

3.19.1 PDE4609 Circuit description

Sheets 2 - 9 of the circuit diagram show the circuitry for each of the eight Telos interfaces.

The ‘sieze’ output is active low and triggers a momentary low pulse on the ‘drop’ output when released. Dial-in codes are latched and decoded by two PLDs to provide a GPI bit number.

Sheet 10 of the circuit diagram shows the VME bus buffering and decoding necessary to make the card appear as four GPI cards.

4 Digital Routing Matrix

4.1 Racks

4.1.1 4420 4U rack

PDE4629 is the backplane sub-assembly as used in the 4420 4U rack frame.

It contains 7 pairs of 96 way DIN41612 connectors for rack cards and 2 off 15 way DIN41612 connectors for PD4172 power supply units.

Termination for the VME control bus and audio TDM bus is fitted at both ends.

Slot 1 is reserved for the PDE4642 processor card and PDE4643 rear connector unit ,but any other 4000 series II card can be fitted elsewhere.

In the case of processor redundancy , a second PDE4642 card is fitted in slot 2 and CON2 a pin header array , should be fitted with jumpers.

CON19 is a 60 way SIMM connector reserved for the fitting of a PDE4641 dongle sub-assembly , necessary to uniquely identify the rack that the backplane is fitted to for the software on a PDE4642 processor card.

CON18 is a 3 way connector for powering the rack's fan unit.

CON17 is for PSU alarm indication.

2 LEDs are fitted , visible from the front of a rack , to indicate PSU status.

Refer to the 4000 Digital Series II Installation Guide for information on the 4920 and 4420 matrixes.

4.1.2 4920 9U rack

PDE4639 is the backplane sub-assembly as used in the 4920 9U rack frame.

It contains 20 pairs of 96 way DIN41612 connectors for rack cards and 4 off 15 way DIN41612 connectors for PD4173 power supply units.

Termination for the VME control bus and audio TDM bus is fitted at both ends.

Slots 1 & 2 are reserved for the PDE4642 processor cards and a PDE4643 rear connector unit ,but any other 4000 series II card can be fitted elsewhere.

CON48 is a 60 way SIMM connector reserved for the fitting of a PDE4641 dongle sub-assembly , necessary to uniquely identify the rack that the backplane is fitted to for the software on a PDE4642 processor card.

CON49-52 are 3 way connectors for powering the rack's fan units.

CON45 is for PSU alarm indication and is brought out to the rear of a 4920 rack to a 9 way D-type.

4 LEDs are fitted , visible from the front of a rack , to indicate PSU status.

Rack coding , for multi- rack systems , is achieved with LK1-4.

Split output bus operation is achieved by fitting the termination networks RP45-48, removing jumpers fitted at LK5 & 6 and fitting a jumper to LK7.

4.1.3 PDE4641 60-way SIMM card

Figure 64 - PDE4641 60-way SIMM Card

This sub-assembly is a 60 way SIMM card which is uniquely programmed with a PROM(U1) for identification of allowed features by the PDE4642 processor card.

It is fitted to the rear of PDE4629/4639 backplanes.

4.2 Front Cards

The digital and control processing for the system is carried out by a number of electronic cards. A brief description of each of the cards follows. Specific configuration (quantities, etc. is system-dependent).

4.2.1 PDE 3601A - Digital Matrix Card (DMC)

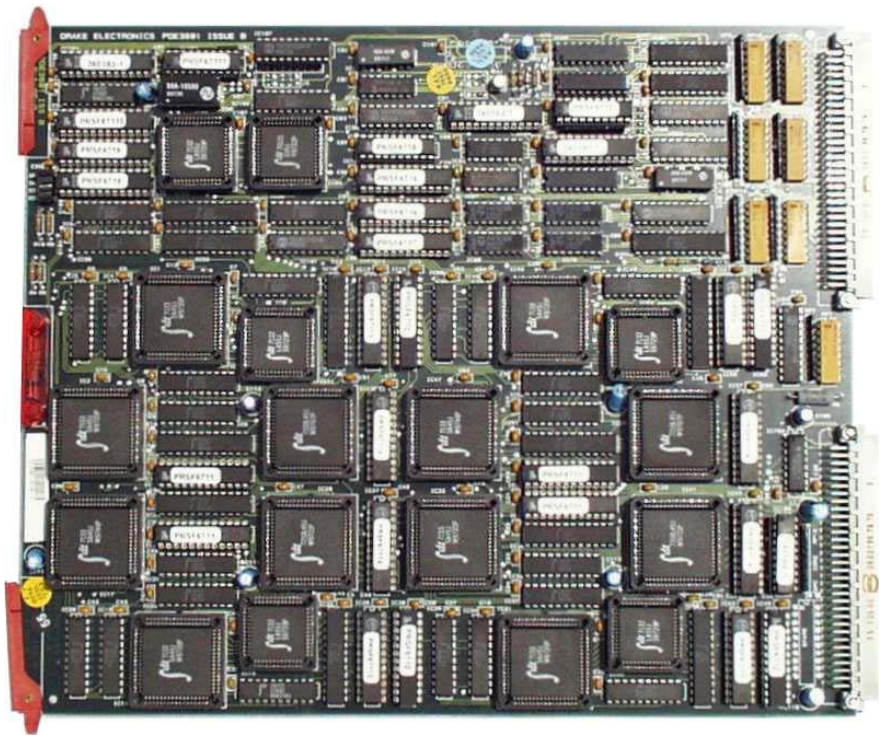


Figure 65 - PDE3601A Digital Matrix Card

The function of the DMC is to route matrix output signals by combining inputs with variable gains applied at each crosspoint. The mapping of inputs to outputs, and the respective crosspoint gains, are controlled via the Control bus.

Each card carries four `routers' which are identical microprogrammable routing and mixing processors. Each has its own Audio Input RAM, Routing (microprogram) RAM, Gain RAM, MAC (Multiplier-ACcumulator) and control circuits; however they all share a Common Output Conditioner (shift-limiter)

circuit and a common Output RAM. A block diagram is shown below. Note that the block diagram only illustrates one router.

A sub-fitted version of this card is used in the smaller 4420 matrices. This card has one quarter of the routing capacity of the fully fitted card.

For a description of the functioning of the LEDs on the card refer to the 4000 Installation Guide.

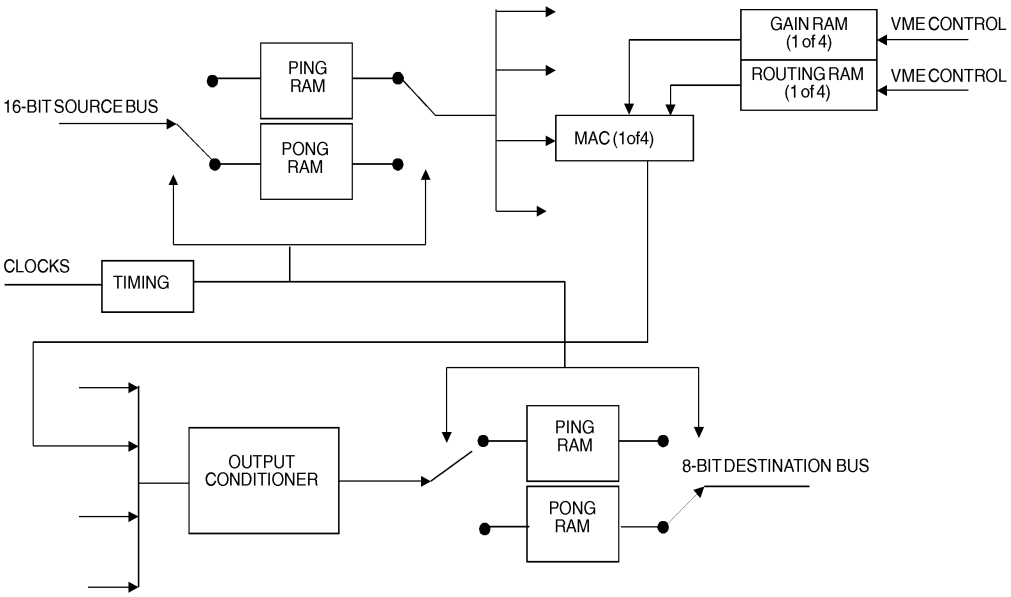


Figure 66 - PDE 3601A - Block Diagram

4.2.2 PDE 4621A - 16 Channel CODEC Card

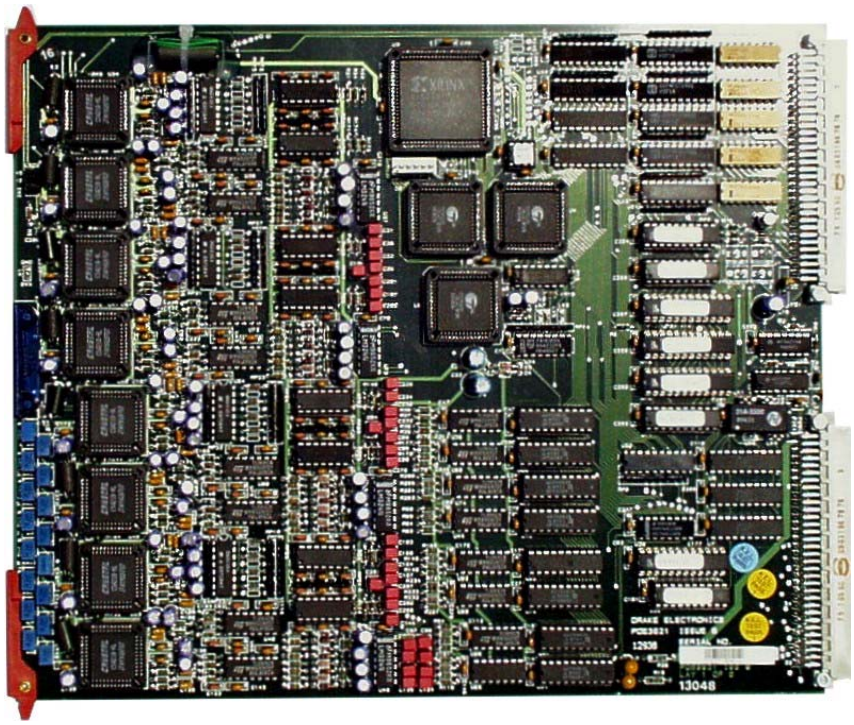


Figure 67 - PDE4621A 16 Channel CODEC Card

The CODEC card is a 16-channel 16-bit analogue to digital and digital to analogue converter. Sampling rate of 42.7kHz give a bandwidth of 17kHz. A control bus provides communication with a central processor. The audio data input and output drive onto a multiplexed digital audio bus.

The card incorporates input gain control and there are voice detectors (VOXs) on each input. These functions are both accessed via the control bus. The audio outputs are provided as differential voltage outputs. Balanced analogue audio inputs and outputs are available via transformers on the PDE3622 CODEC RCU.

This card is fitted with 16 pre-set level controls that set the VOX signal detection threshold for each analogue input. Where VOX operation is in use, these controls will be set up prior to shipping and should need no further adjustment. The nominal threshold setting is -20dB. The level controls (single-turn potentiometers) are mounted in two rows on the leading edge of the board, below the handle. The pots are numbered and correspond to the inputs, but as a guide channel 1 is the top most pot. A standard pot-trimming tool can be used to adjust them. The VOX threshold range is -40dB to 0dB.

Sub-fitted versions of this card are used in the smaller 4400 matrices. The channel capacity is from 2 to16 analogue inputs and outputs, in pairs.

A block diagram of the CODEC card is shown below.

For a description of the functioning of the LEDs on the card refer to the 4000 Installation Guide.

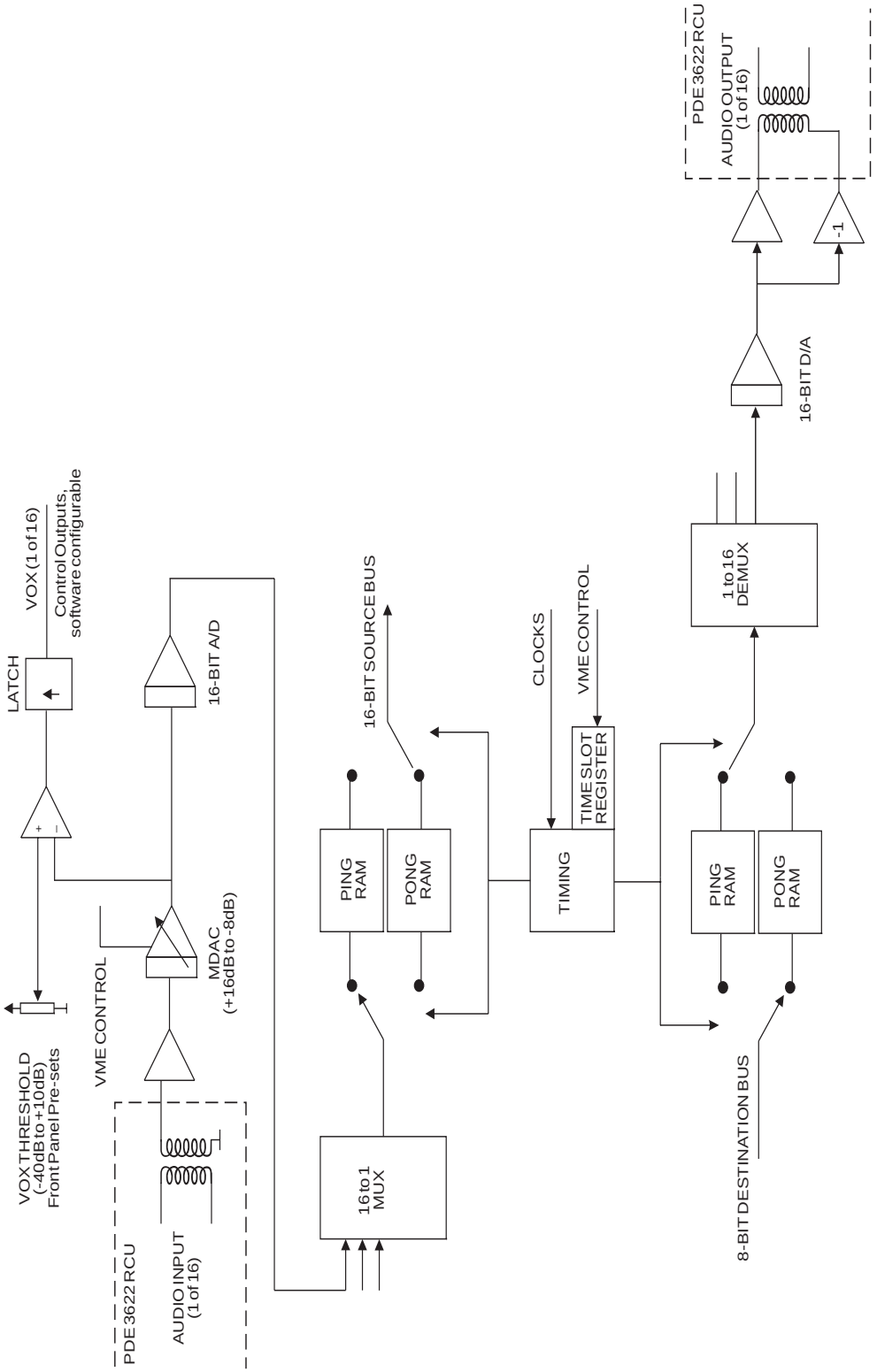


Figure 68 - PDE 4621A - Block Diagram

4.3 PDE4631 - 16 Channel Audio Input / Output CODEC Card

The PDE4631 CODEC Card is a 16-channel analogue-to-digital and digital-to-analogue converter. Either the PDE4622 CODEC RCU or the PDE4628 Serial Communications RCU can be used in conjunction with this card.

Each input to the card incorporates voice detection (VOX) with a threshold which can be adjusted in CMAPSi.

The PDE4631 board is illustrated below:

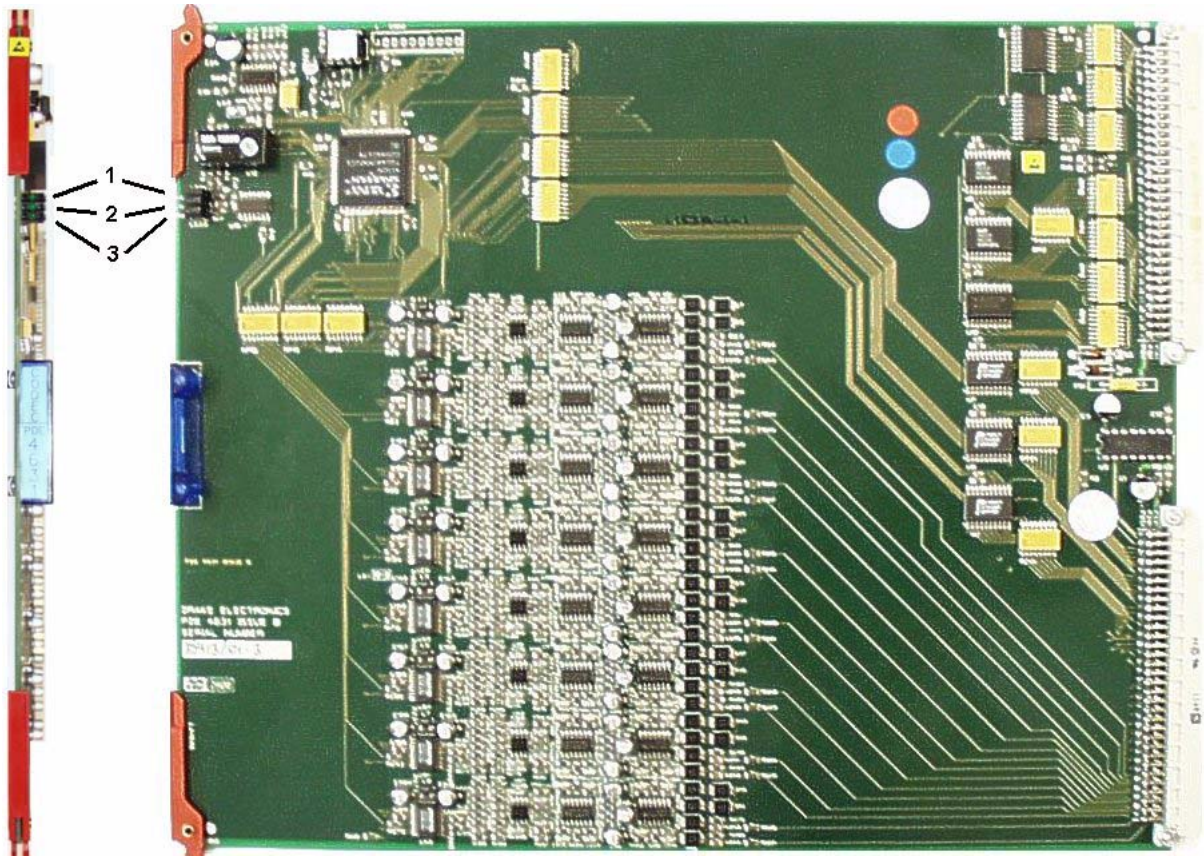


Figure 69 - PDE4631 16 Channel CODEC Card

The following table details the function of the PDE4631 card LEDs:

Table 2: PDE4631 LEDs

Callout	LED Colour	Name	Notes
1	Green	+5 Volts	On if +5 Volts present.
2	Green	-5 Volts	On if -5 Volts present.
3	Green	Configured	On if the card is recognised by the system as valid for this position

4.3.1 Card Location

These cards may be located in any slot from 3 to 20 in the 4920 matrix, or any slot from 2 to 7 in the 4420 matrix.

4.3.2 Controls and Indicators

Three LEDs are mounted on the leading edge of the board; they indicate satisfactory +5V, -5V and initialised status

4.3.3 Description

Sampling rate of 42.7kHz give a bandwidth of 20kHz. A control bus provides communication with a central processor. The audio data input and output drive onto a multiplexed digital audio bus.

The card incorporates digital voice detectors (VOXs) on each input. These functions are both accessed via the control bus and can be adjusted in CMAPSi. The audio outputs are provided as differential voltage outputs. Balanced analogue audio inputs and outputs are available via optional transformers on the PDE4622 CODEC RCU.

A block diagram of the CODEC card is shown below.

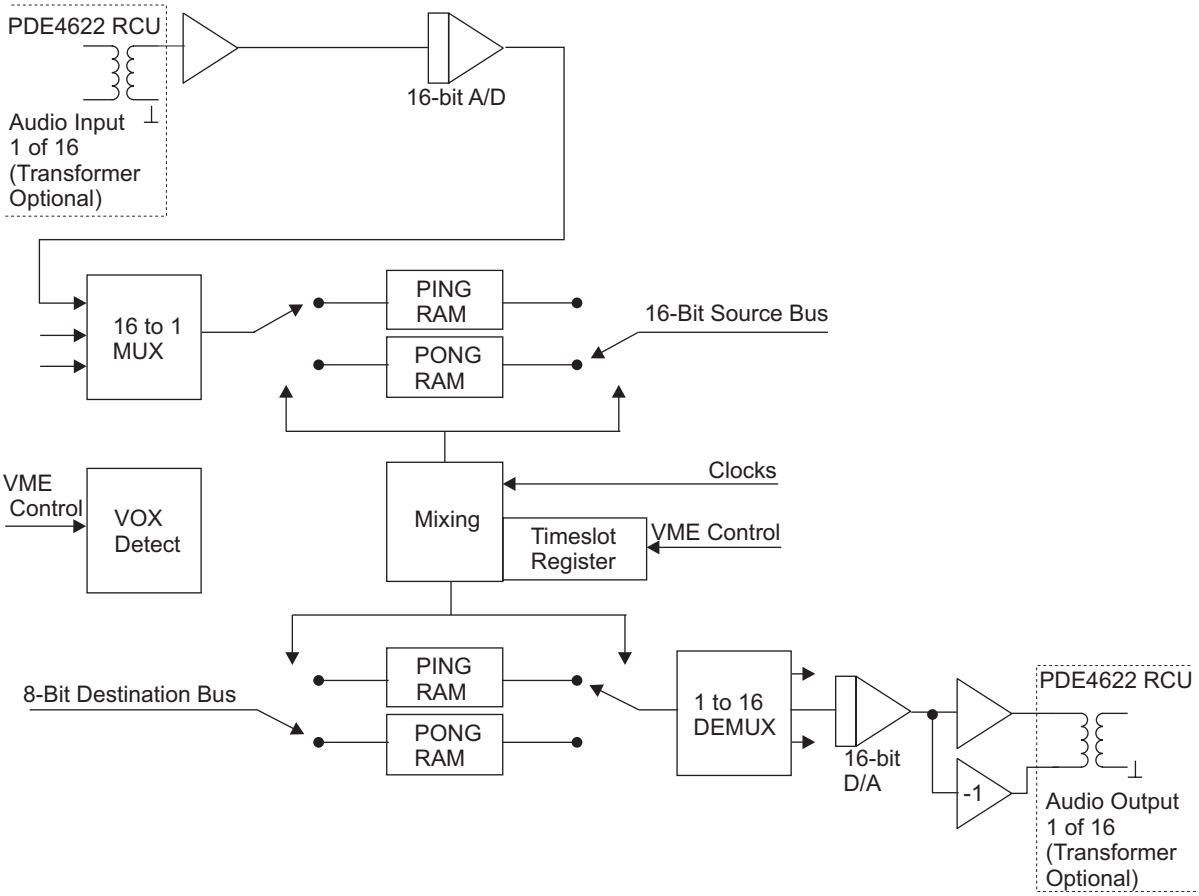


Figure 70 - PDE4631 Card Block Diagram

4.3.4 PDE 4606A - Panel Communications Card (PCC)

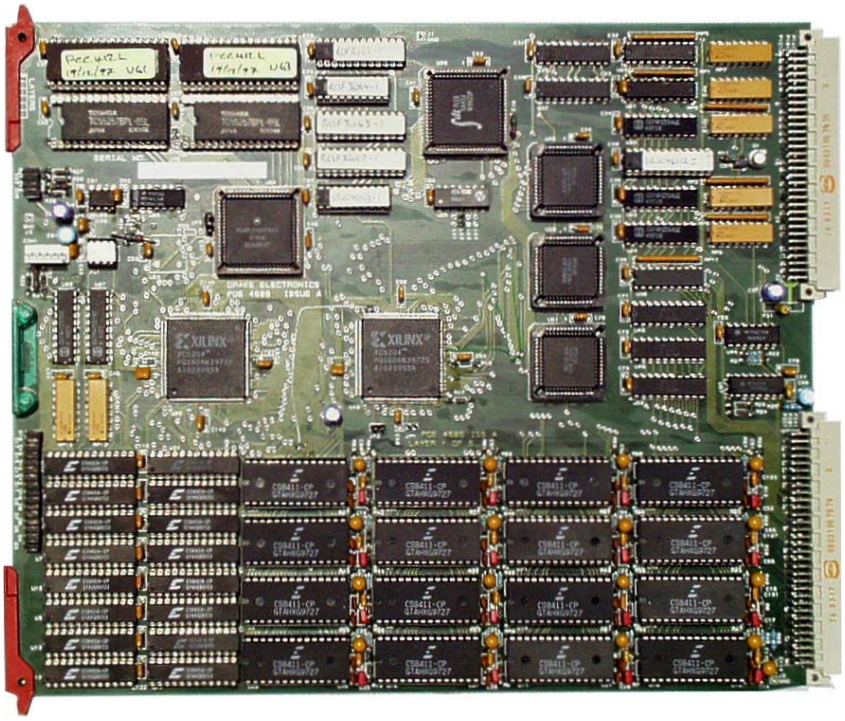


Figure 71 - PDE4604A Panel Communications Card

The PCC sends audio data from each of 16 destination time-slots on the digital audio backplane to a corresponding outstation. Control data sent from the Microprocessor card is multiplexed into the data stream for each outstation.

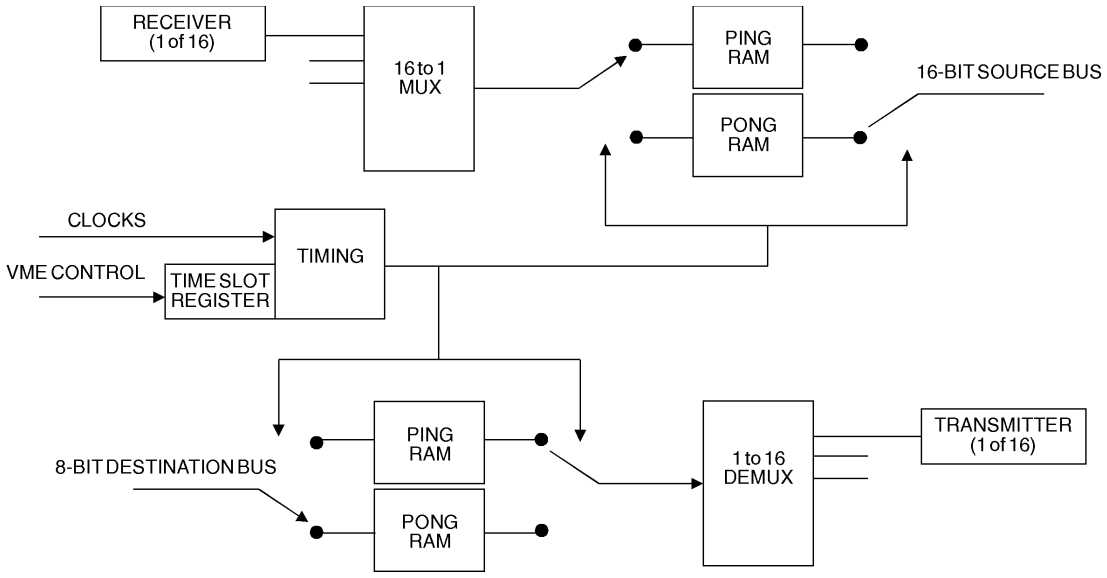
It also performs the reverse operation i.e. it routes audio data from each of the 16 outstations to the corresponding time-slot on the bus.

Control data is extracted from the bitstream from each panel and placed in a dual port buffer ready to be read by the Microprocessor card.

Sub-fitted versions of this card are used in smaller matrices. The panel capacity is from 2-16 panel ports, in pairs.

For a description of the functioning of the LEDs on the card refer to the 4000 Installation Guide.

Two block diagrams are shown for this card; one shows the audio path and the other shows the control path.



PDE 4606A - Block Diagram (Audio)

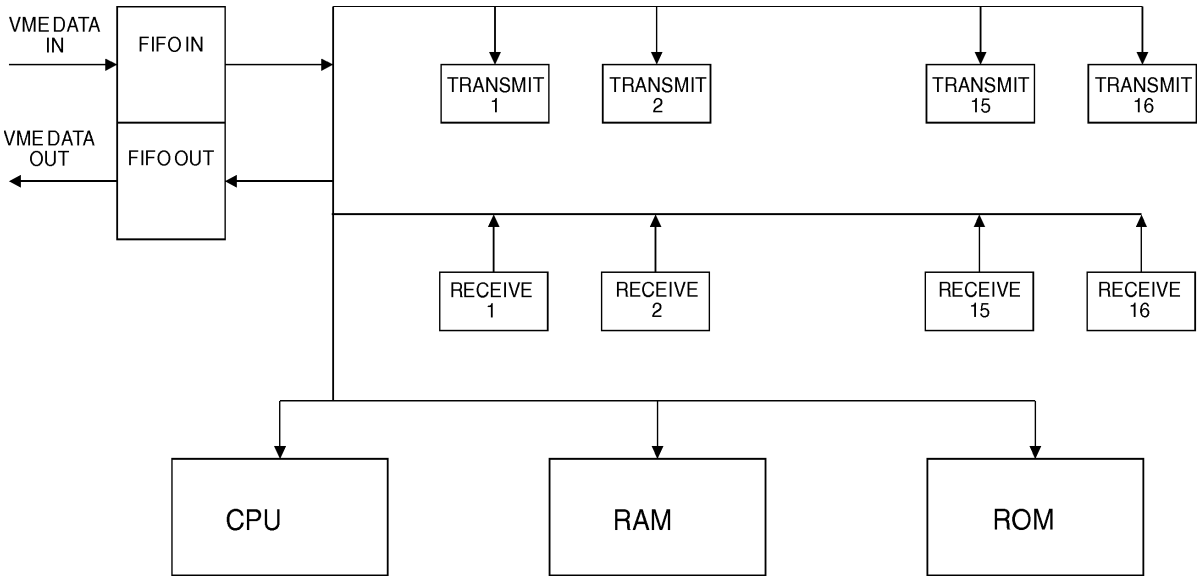


Figure 72 - PDE 4606A - Block Diagram (Control)

4.4 PDE4606B - 16 Channel Panel Communications Card

The PDE4606B Panel Communications Card sends and receives the combined digital audio and control data for each Control Panel.

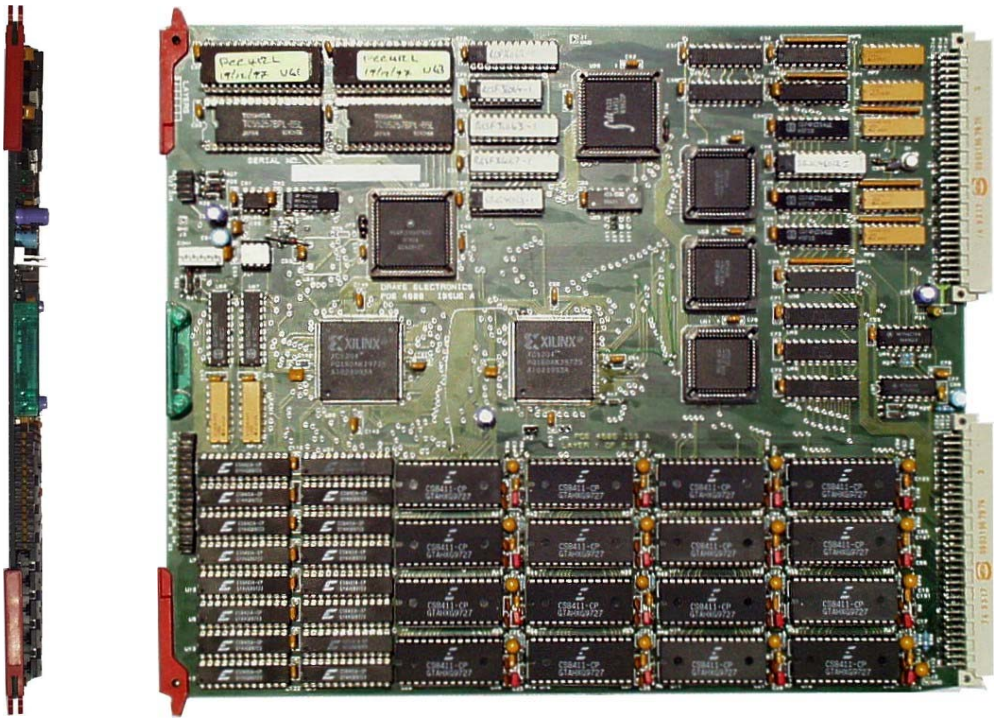


Figure 73 - PDE4606B 16 Channel Communications Card

4.4.1 Card Locations

These cards may be located in any slot from 3 to 20 in the 4920 matrix, or any slot from 2 to 7 in the 4420 matrix.

4.4.2 Controls and Indicators

The following table details the function of the PDE4606B card LEDs:

Table 3: PDE4606B LEDs

Ⓨ	Panel Status	Panel 1 connected and returning valid handshake data.
		Through to:
Ⓨ	Panel Status	Panel 16 connected and returning valid handshake data.
Ⓖ	+5 Volts	LED on if +5V present

Table 3: PDE4606B LEDs

G	-5 Volts	LED on if -5V present
R	Status	Flashes for correct card operation. (A faster rate indicates increased data transfer)
G	Initialized	Matrix has recognised and initialised card.

4.4.3 PDE4644 - Digital matrix card

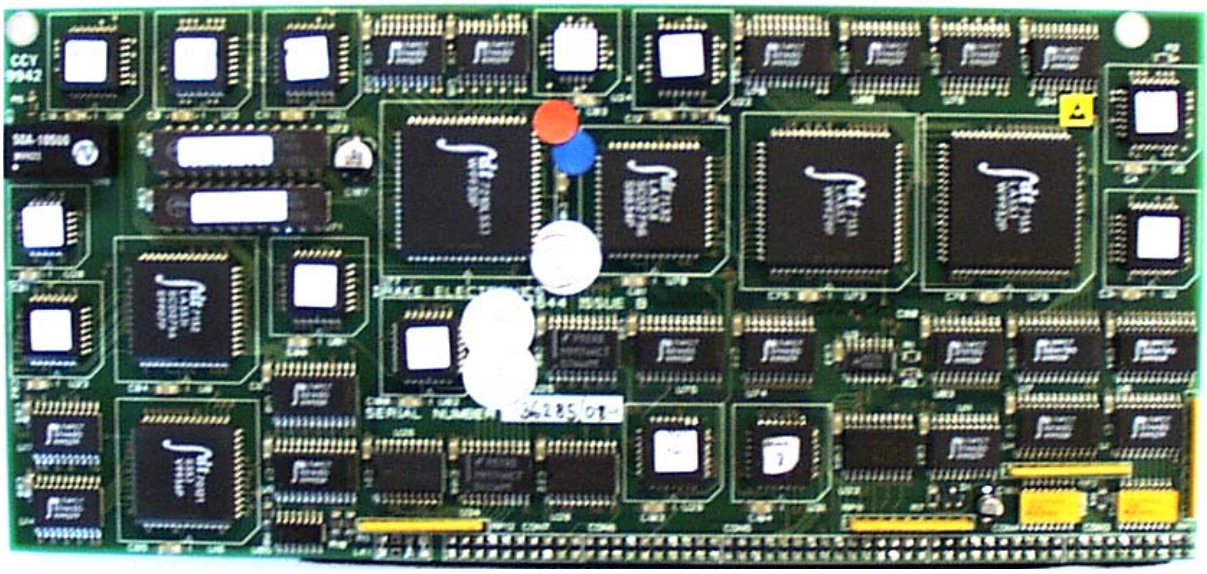


Figure 74 - PDE4644 Digital Matrix Card

PDE4644 is an optional quarter-sized PDE3601A for fitting onto a PDE4642 in the case of small systems.Refer to PDE3601A for further information.

4.4.4 PD 3901 - Beltpack Interface

The PD 3901 is a 1U x 19" mains powered Interface Rack. The Interface can accommodate up to four beltpack rings (for BPS1010 beltpacks) with programme sound, for connection to and from 4000 Digital Series matrices.

The circuitry required to drive each ring and interface to the 4000 analogue I/O is provided by the PDE 1705 IFB Card. This is fully described in the HANDi-COM Handbook. The DC power for the rings and the PDE 1705 cards is provided by the PDE 554 DC regulator card. This card provides ±19V @ 1.0A.

The Unit is supplied equipped for two rings as standard. The components to add additional rings to, a maximum of four, can be added as required. Each ring can have up to 10 beltpacks connected to it.

Access is provided to drive the call lamps on the beltpacks. Similarly the call detect outputs from the beltpacks are available for external switching use etc.

A green LED is provided on the front of the unit to indicate that the unit power supply is operating correctly.

4.4.5 PDE 4642 Microprocessor Card (MPC)

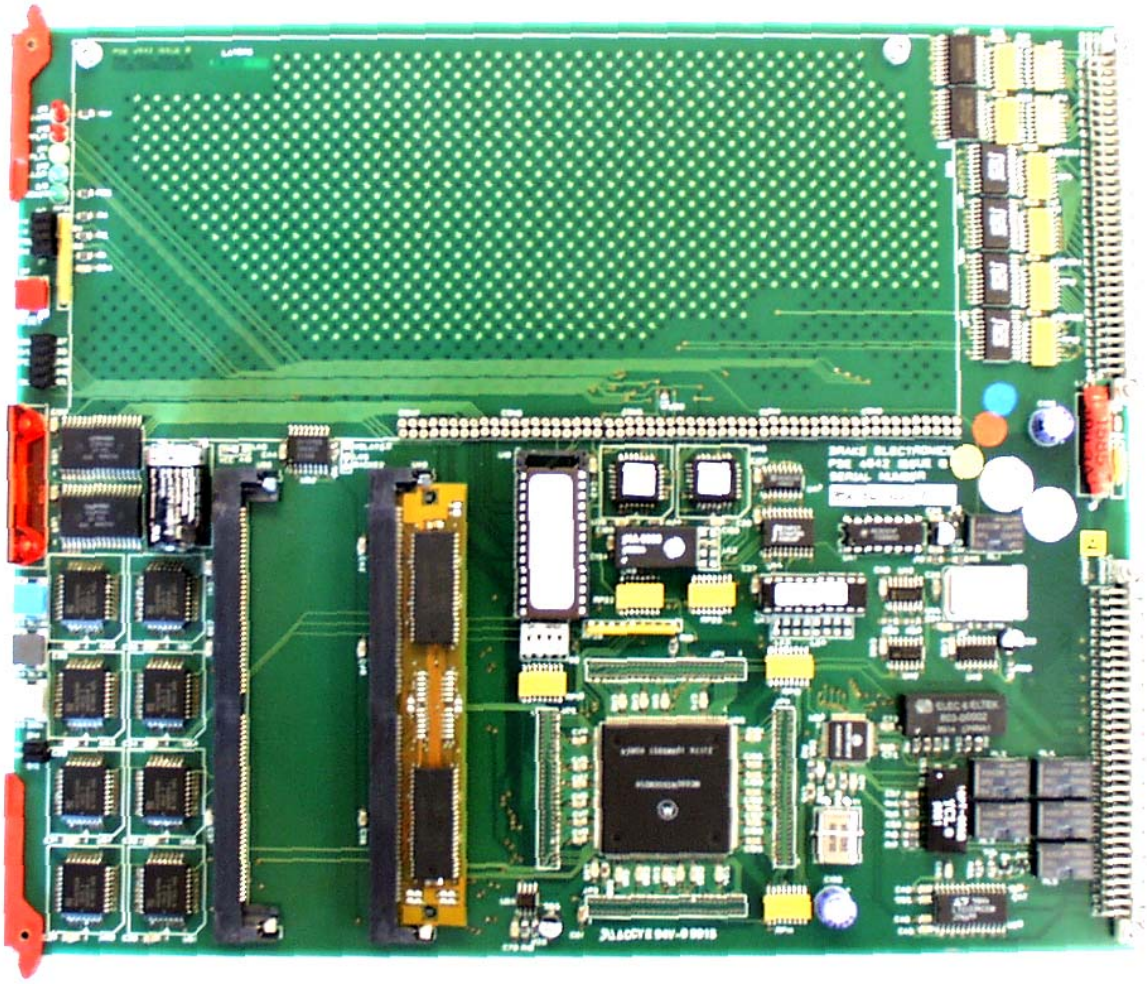


Figure 75 - PDE4642 Microprocessor Card

The PDE4642 is the main processor card for 4000 series II systems.

It runs on a 68360 processor at 25 MHz and contains a 64kbyte/128kbyte boot PROM, one 8Mbyte SIMM DRAM, 256kbyte of battery backed SRAM and 2 Mbytes of flash ROM.

The 68360 contains four serial ports , two are used for RS232/RS422 channels (U63 is the transceiver), one is for ethernet (U68) which will auto-sense AUI or 10BaseT interface, and the other is used for inter-processor communication in the case of redundancy.

The card also drives the main audio clocks for a system: U41 provides a 16MHz balanced ECL signal, a sample rate clock and a x64 sample rate clock are also provided by U42.

U48 is a phase comparator for locking the VCXO(U39) to an external source.

4.4.6 Controls and Indicators

Five LEDs are mounted on the leading edge of the board.; they give indication of the processor status; their operation is detailed in the Installation Guide.

System Reset and 'Bootstrapping' the system are also explained in the 4000 Digital Series Installation Guide.

4.5 PDE4662 Central Processor Card

The PDE 4662 is the main processor card for 4000 Series II systems. It runs on a 68360 processor at 25 MHz and contains a 64kbyte/128kbyte boot PROM, one 8Mbyte SIMM DRAM, 256kbyte of battery backed SRAM and 2 Mbytes of flash ROM. The 68360 contains four serial ports, two are used for RS232/RS422 channels, one is for Ethernet, which will auto-sense AUI or 10BaseT interface, and the other is used for inter-processor communication in the case of redundancy.

The card also drives the main audio clocks for a system: a 16MHz balanced ECL signal, a sample rate clock and a x64 sample rate clock are also provided. It can also be synchronized to an externall source.

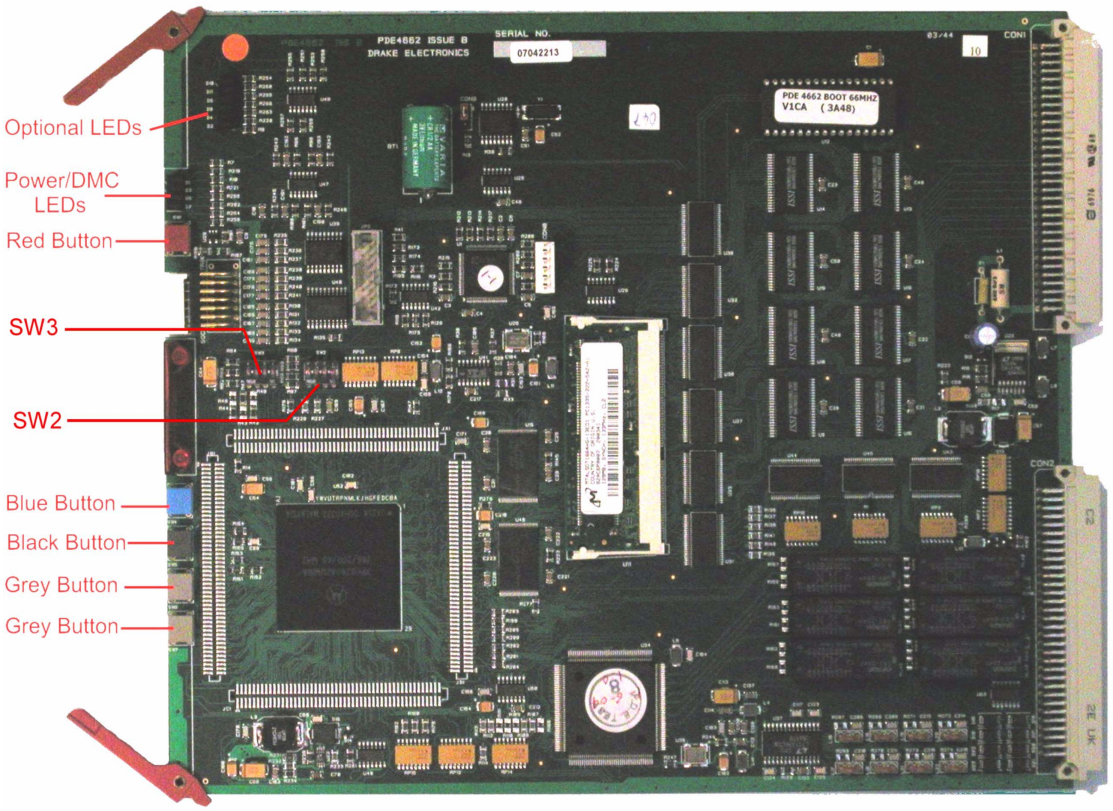


Figure 76 - PDE4662 - Central Processor Card

4.5.1 Card Location

The master processor card is located in slot 2 of the 4920 matrix or slot 1 of the 4420 matrix.

The slave (if fitted) is to be located in slot 1 of the 4920 or slot 2 of the 4420 matrix.

4.6 PDE Rear Connector Units

Rear Connector Units (RCUs) provide a flexible solution to linking the processing and data handling cards mounted in the matrix to control panels and peripheral equipment.

Note that, in general, RCUs are loaded into slots corresponding to their 'front-loading' companion board; actual positions are dictated by the system 'map'.

RCUs are 9U high and 150mm deep. Connection is made to the backplane via 96-way DIN connectors.

4.6.1 PDE 4622TX - 16 Channel CODEC RCU

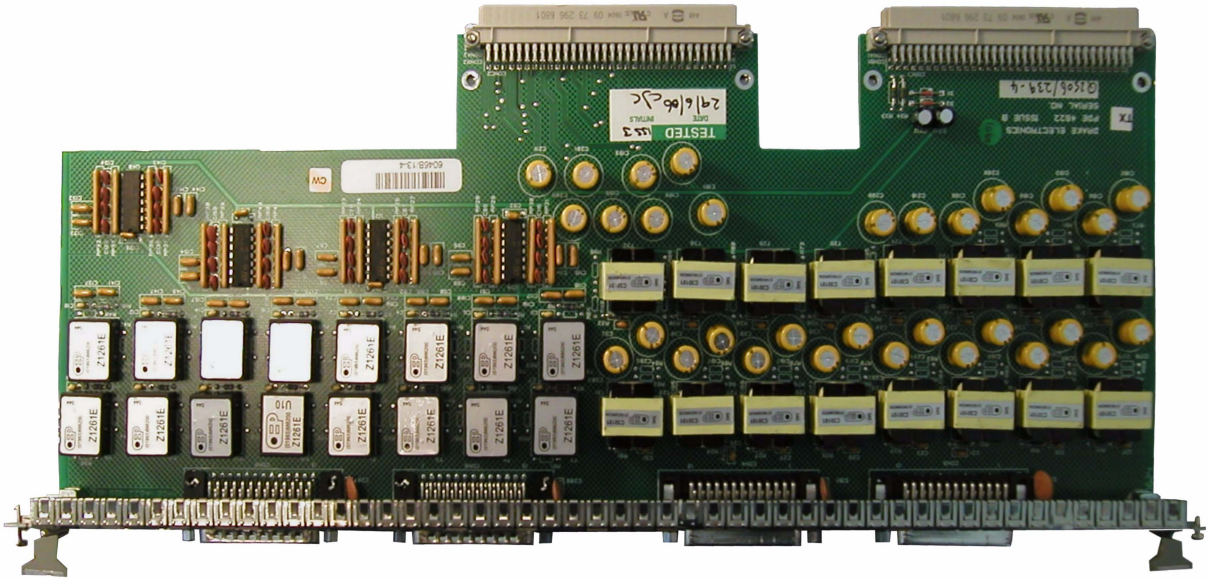


Figure 77 - PDE4622RX 16 Channel CODEC RCU

This RCU performs the same function as the 3622 RCU, transformers being used to balance the audio inputs and outputs.

4.6.2 PDE 4622 - 16 Channel CODEC RCU

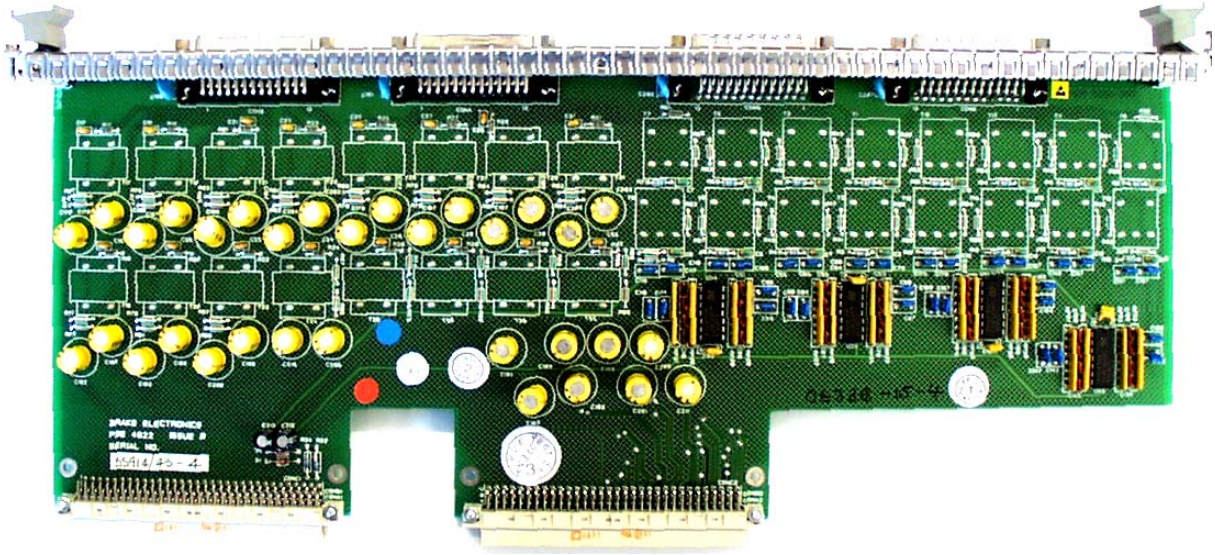


Figure 78 - PDE4622 16 Channel CODEC RCU

This RCU performs the same function as the 3622 RCU, except that the audio inputs and outputs are electronically balanced.

4.6.3 PDE 4643 - Processor I/O RCU (RS232/RS422)

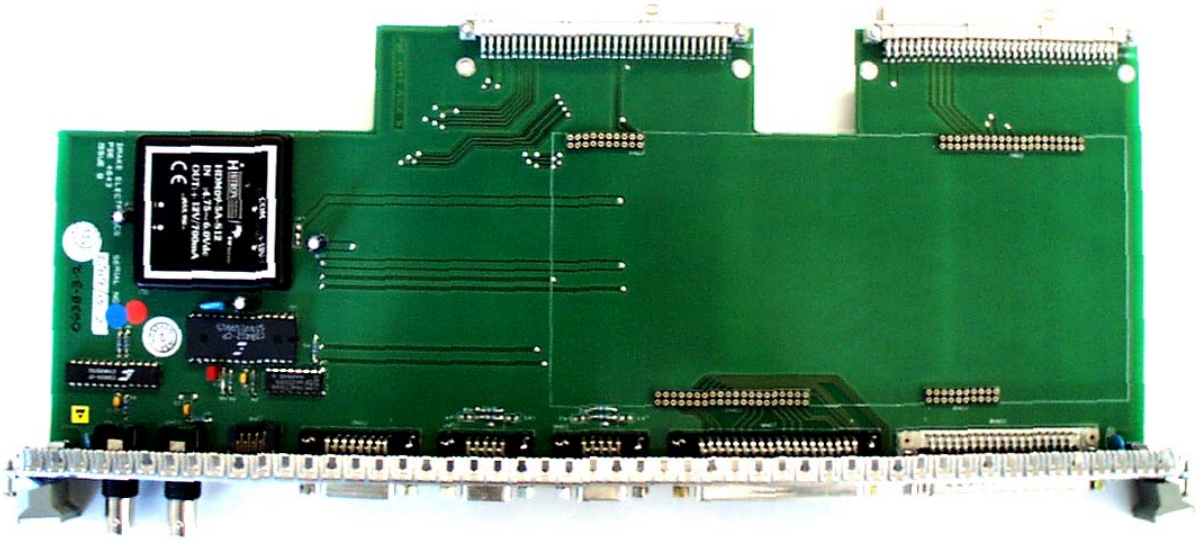


Figure 79 - PDE4643 Processor I/O RCU

The PDE4643 is the processor card rear connector unit and provides connectors for the 2 serial ports, the ethernet AUI , 10BaseT and coax connectors for synchronising the audio clock of different matrices.

LK2,3,4,5 are for termination of the serial ports if RS422 format is adopted.

CON1, 4, 8 & 12 provide for the fitting of an optional PDE4645 GPI card , the inputs & outputs of which, will appear on CON9 & 10.

4.7 PDE4663 - Central processor RCU Card

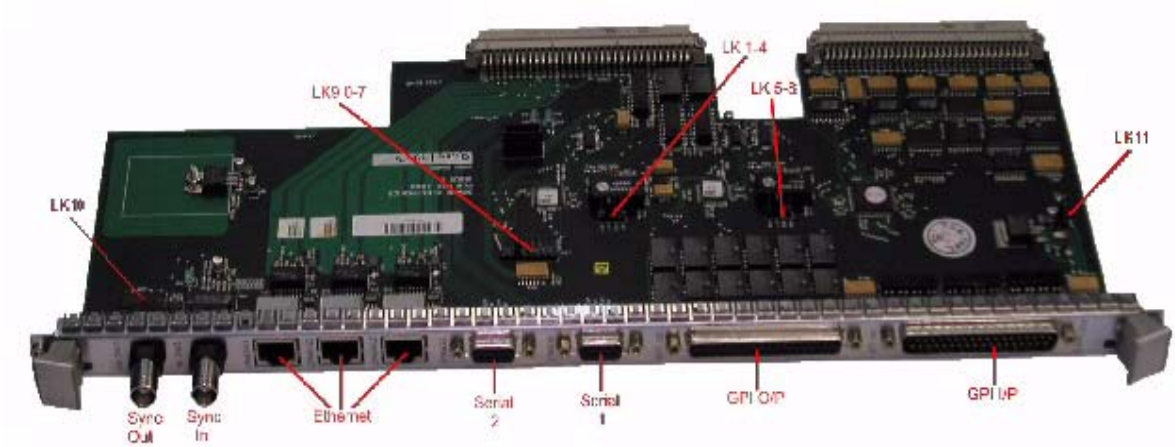


Figure 80 - PDE4663 - Central processor RCU Card

The PDE4663 RCU provides connections to the RS232 (two 9-way socket D-type connector) ports available on the Microprocessor cards (PDE4662). Only one RCU is required per matrix rack.

It provides three RJ45 Ethernet twisted pair connections. The main Ethernet network is normally connected to Ethernet socket 2. If a second Ethernet connection is in use this is normally connected to Ethernet socket 3.

Ethernet socket 1 is not used in normal operation.

Two BNC "sync" connectors provided are for synchronising different matrices together for future digital trunk connections.

Two 37-way D-type connectors provide 12 GPI input and output connections.

The card also provides dual clock circuits with auto-fail detected and changeover if this happens. LEDs D3 and D5 show which clock is the master.

4.7.1 Card location

One of these cards must be located in RCU slot 2 in the 4920 matrix, or RCU slot 1 in the 4420 matrix.

4.7.2 Links

Before fitting this card the links should be checked to ensure that they are correctly set for the application. Details of the link settings are given below.

The links on the circuit card are as follows:

- Links LK 1 - 8 (in two blocks of four, see above). These links are factory set and should not be adjusted.
- Links 3 and 7 are set, the remaining links are unset.
- Link LK9 (see above). These links selects the sample rate, as follows:
- 0 - 42.7 KHz (standard for Broadcast applications)
- 1 - 32 KHz
- 2 - 25.6 KHz
- 3 - 21.3 KHz
- 4 - 18.3 KHz
- 5 - 16 KHz (standard for ATC applications)

- 6 - 14.2 KHz
- 7 - 12.8 KHz
- Link LK10. This link is factory set and should not be changed.
- Link LK11. This link sets the internal/external powering of the GPI opto-isolators as defined below:
- Pins 1-2 linked - opto-isolators powered internally from Vcc (not isolated) (default).
- Pins 2-3 linked - opto-isolators powered externally (fully isolated)
- No links - opto-isolators disconnected

4.7.3 Connector details

Table 4: PDE4663 - GPI Inputs

Description	Pin Number	Description	Pin Number
GPI Input 1	1	GPI Input 2	20
GPI Input 3	2	GPI Input 4	21
GPI Input 5	3	GPI Input 6	22
GPI Input 7	4	GPI Input 8	23
GPI Input 9	5	GPI Input 10	24
GPI Input 11	6	GPI Input 12	25
N.C.	7-16	N.C.	26-35
Isolated Inputs (requires external +7 Volts to +24 Volts applied)	17	Tech 0 Volts	36
Isolated Inputs (requires external +7 Volts to +24 Volts applied)	18	Tech 0 Volts	37
Common 24V Return	19		

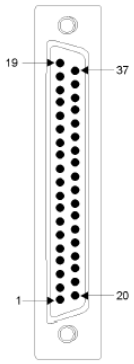


Table 5: PDE4663 - GPI Outputs

Description	Pin Number	Description	Pin Number
Relar Output 1 P	1	Relay Output 7 P	20
Relay Output 1 N/C	2	Relay Output 7 N/C	21
Relay Output 1 N/O	3	Relay Output 7 N/O	22
Relay Output 2 P	4	Relay Output 8 P	23
Relay Output 2 N/C	5	Relay Output 8 N/C	24
Relay Output 2 N/O	6	Relay Output 8 N/O	25
Relay Output 3 P	7	Relay Output 9 P	26
Relay Output 3 N/C	8	Relay Output 9 N/C	27
Relay Output 3 N/O	9	Relay Output 9 N/O	28
Relay Output 4 P	10	Relay Output 10 P	29
Relay Output 4 N/C	11	Relay Output 10 N/C	30
Relay Output 4 N/O	12	Relay Output 10 N/O	31
Relay Output 5 P	13	Relay Output 11 P	32
Relay Output 5 N/C	14	Relay Output 11 N/C	33
Relay Output 5 N/O	15	Relay Output 11 N/O	34
Relay Output 6 P	16	Relay Output 12 P	35
Relay Output 6 N/C	17	Relay Output 12 N/C	36
Relay Output 6 N/O	18	Relay Output 12 N/O	37
Tech 0 Volts	19		

Table 6: PDE4663 - Ethernet RJ45

Description	Pin Number
Data Transmit (TD+)	1
Data Transmit (TD-)	2
Data receive RD+)	3
-	4
-	5
Data Receive (RD-)	6
-	7
-	8

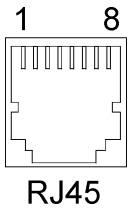
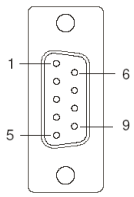


Table 7: PDE4663 - Serial 1 and 2

Description	Pin Number
-	1
Data Receive (Rx)	2
Data Transmit (Tx)	3
-	4
Screen	5
-	6
-	7
-	8
-	9



4.8 PDE4663B - Central Processor RCU Card

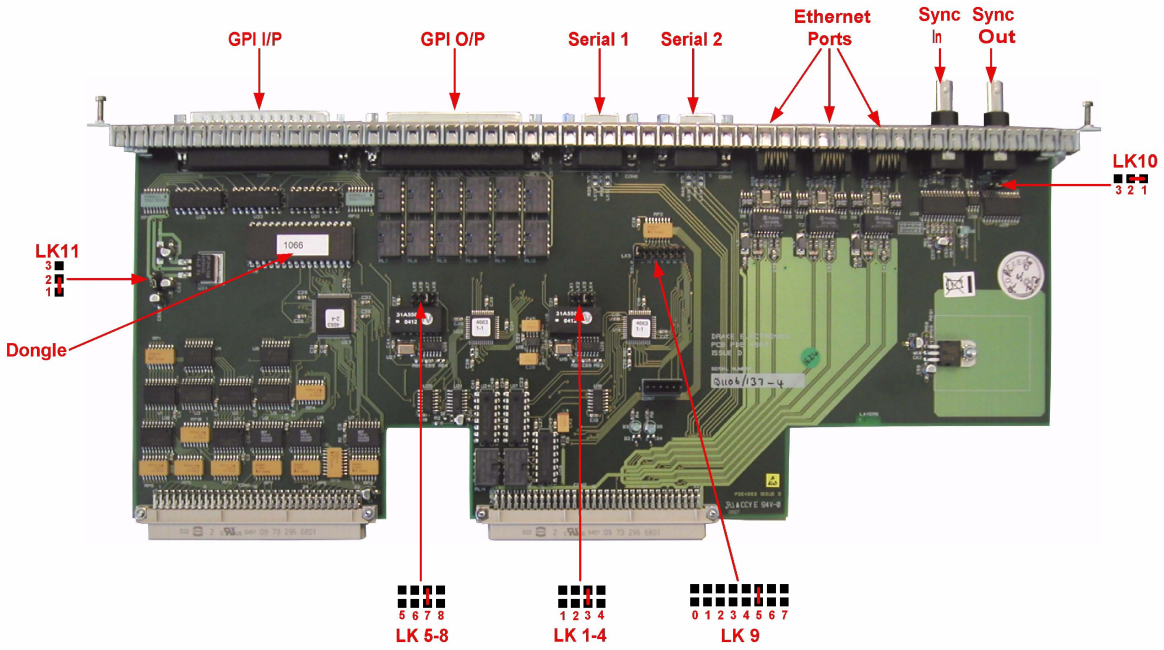


Figure 81 - PDE4663B RCU Card

The PDE4663B RCU card is functionally identical to the PDE4663 RCU card other than it now includes the dongle that was previously fitted externally.

The PDE4663B RCU provides connections to the RS232 (two 9-way socket D-type connector) ports available on the Microprocessor cards (PDE4662). Only one RCU is required per matrix rack.

It provides three RJ45 Ethernet twisted pair connections. The main Ethernet network is normally connected to Ethernet socket 2. If a second Ethernet connection is in use this is normally connected to Ethernet socket 3.

Ethernet socket 1 is not used in normal operation.

Two BNC "sync" connectors provided are for synchronising different matrices together for future digital trunk connections.

Two 37-way D-type connectors provide 12 GPI input and output connections.

The card also provides dual clock circuits with auto-fail detected and changeover if this happens. LEDs D3 and D5 show which clock is the master.

4.8.1 Card location

One of these cards must be located in RCU slot 2 in the 4920 matrix, or RCU slot 1 in the 4420 matrix.

4.8.2 Links

Before fitting this card the links should be checked to ensure that they are correctly set for the application. Details of the link settings are given below.

The links on the circuit card are as follows:

- Links LK 1 - 8 (in two blocks of four, see above). These links are factory set and should not be adjusted.
- Links 3 and 7 are set, the remaining links are unset.
- Link LK9 (see above). These links selects the sample rate, as follows:
- 0 - 42.7 KHz (standard for Broadcast applications)
- 1 - 32 KHz
- 2 - 25.6 KHz
- 3 - 21.3 KHz
- 4 - 18.3 KHz
- 5 - 16 KHz (standard for ATC applications)
- 6 - 14.2 KHz
- 7 - 12.8 KHz
- Link LK10. This link is factory set and should not be changed.
- Link LK11. This link sets the internal/external powering of the GPI opto-isolators as defined below:
- Pins 1-2 linked - opto-isolators powered internally from Vcc (not isolated) (default).
- Pins 2-3 linked - opto-isolators powered externally (fully isolated)
- No links - opto-isolators disconnected

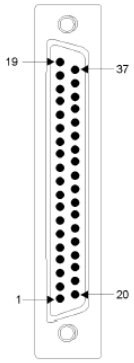
4.8.3 Connector details

Table 8: PDE4663B - GPI Inputs

Description	Pin Number	Description	Pin Number
GPI Input 1	1	GPI Input 2	20
GPI Input 3	2	GPI Input 4	21
GPI Input 5	3	GPI Input 6	22
GPI Input 7	4	GPI Input 8	23
GPI Input 9	5	GPI Input 10	24

Table 8: PDE4663B - GPI Inputs

Description	Pin Number	Description	Pin Number
GPI Input 11	6	GPI Input 12	25
N.C.	7-16	N.C.	26-35
Isolated Inputs (requires external +7 Volts to +24 Volts applied)	17	Tech 0 Volts	36
Isolated Inputs (requires external +7 Volts to +24 Volts applied)	18	Tech 0 Volts	37
Common 24V Return	19		



Plug
(Male)

(View from front)

Table 9: PDE4663B - GPI Outputs

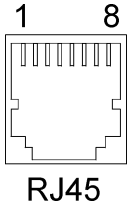
Description	Pin Number	Description	Pin Number
Relar Output 1 P	1	Relay Output 7 P	20
Relay Output 1 N/C	2	Relay Output 7 N/C	21
Relay Output 1 N/O	3	Relay Output 7 N/O	22
Relay Output 2 P	4	Relay Output 8 P	23
Relay Output 2 N/C	5	Relay Output 8 N/C	24
Relay Output 2 N/O	6	Relay Output 8 N/O	25
Relay Output 3 P	7	Relay Output 9 P	26
Relay Output 3 N/C	8	Relay Output 9 N/C	27
Relay Output 3 N/O	9	Relay Output 9 N/O	28

Table 9: PDE4663B - GPI Outputs

Description	Pin Number	Description	Pin Number
Relay Output 4 P	10	Relay Output 10 P	29
Relay Output 4 N/C	11	Relay Output 10 N/C	30
Relay Output 4 N/O	12	Relay Output 10 N/O	31
Relay Output 5 P	13	Relay Output 11 P	32
Relay Output 5 N/C	14	Relay Output 11 N/C	33
Relay Output 5 N/O	15	Relay Output 11 N/O	34
Relay Output 6 P	16	Relay Output 12 P	35
Relay Output 6 N/C	17	Relay Output 12 N/C	36
Relay Output 6 N/O	18	Relay Output 12 N/O	37
Tech 0 Volts	19		

Table 10: PDE4663B - Ethernet RJ45

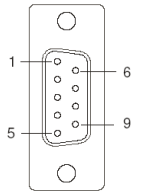
Description	Pin Number
Data Transmit (TD+)	1
Data Transmit (TD-)	2
Data receive RD+)	3
-	4
-	5
Data Receive (RD-)	6
-	7
-	8



RJ45

Table 11: PDE4663B - Serial 1 and 2

Description	Pin Number
-	1
Data Receive (Rx)	2
Data Transmit (Tx)	3
-	4
Screen	5
-	6
-	7
-	8
-	9



SOCKET
(FEMALE)

(VIEW FROM FRONT)

4.8.4 PDE4645 - Optional GPI card

PDE4645 is an optional GPI card for fitting onto a PDE4643 in the case of small systems.

It is in effect a reduced capacity PDE4619 containing 12 opto-isolated inputs and 12 relays.

4.8.5 PDE 4628 - Serial Communications Rear Connector Unit (SCRCU)

The PDE 4628 is a 16-channel serial communications rear connector unit (SCRCU) for use with a CODEC board within the 4000 Series II system. The communications standard is RS422 for each channel.

A 4920 matrix can hold up 12 PDE 4628 board pairs and therefore support 192 serial data link channels. A 4420 matrix can hold up 4 PDE 4628 board pairs and therefore support 64 serial data link connections

The SCRCU is designed to enable the serial connection of 4000 and 3000 series panels to a 4000 matrix.

The SCRCU requires two EPROM devices. Before fitting this card ensure that the EPROMS are present and verify that the version of firmware is correct for the application.

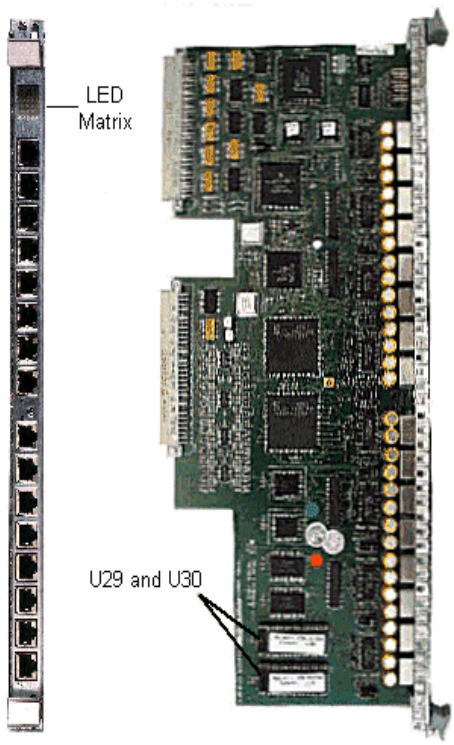


Figure 82 - PDE 4628 - 16 Channel Serial Communications RCU

4.8.5.1 Card Location

These cards may be located in any RCU slot from 3 to 20 in the 4920 matrix, or any RCU slot from 2 to 7 in the 4420 matrix. However, these RCUs must be fitted in a RCU slot directly behind a PDE 4621 CODEC Card.

4.8.5.2 Upgrading Firmware

If firmware needs to be upgraded then U29 and U30 should be replaced.

4.8.5.3 Power On Self Test

On power up, the SCRCU will conduct a series of power on self-tests. While this is taking place, the SCRCUs matrix of 35 LEDs will indicate the current test, as indicated by the following characters:

Table 12: PDE 4628 Self Tests

Action	LED Display	Indication
Display Test		Appears for 1 second

Table 12: PDE 4628 Self Tests

Action	LED Display	Indication
Code Checksum Test		Appears for 0.5 seconds
Workspace RAM Test		Appears for 1 second
Dual Port RAM Test		Appears for 0.25 seconds
Initialisation Test		Appears for 0.25 seconds
Normal Operation		Flashes at 2Hz to indicate processor is running
Message Received		PDE4628 has received a message on a communication channel and is waiting for the Host CPU to read it out
Current Mode of Operation		Indicates the current mode of operation - as shown below

LED 4	LED 5	Mode of Operation
OFF	OFF	Power on self tests
OFF	ON	Waiting for initialisation
ON	OFF	Operational mode
ON	ON	Test mode

Table 12: PDE 4628 Self Tests

Action	LED Display	Indication
Channel Status		Indicates the channel status - as shown below

Channel	LED	Channel	LED
1	16	9	26
2	17	10	27
3	18	11	28
4	19	12	29
5	21	13	31
6	22	14	32
7	23	15	33
8	24	16	34

Each LED is able to indicate the status of the channel that it represents. The various conditions are shown below.

LED (on) - indicates a successful packet exchange, e.g., communication has been successful on that channel.

LED (off) - indicates that the channel is unused.

LED flashing - indicates an error on that channel.

The PDE 4628 provides 16-channel communication with the 4000 Series II matrix via an RS422 interface. The pin-out configuration for the sixteen RJ45 connectors (CON 1-16) is indicated in the following section.

4.8.5.4 Data and Audio Connections

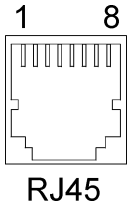


Figure 83 - RS422 Connector (RJ45)

Table 13: PDE 4628 RS422 RJ45 Pinout

RJ45 Connector Description (Matrix End)	Pin Number
Data Receive (Rx+)	1
Data Receive (Rx-)	2
Audio Input (+)	3
Audio Output (+)	4
Audio Output (-)	5
Audio Input (-)	6
Data Transmit (Tx+)	7
Data Transmit (Tx-)	8

4.8.6 PDE 4619 - General Purpose Interface (GPI) RCU

The GPI card provides 32 open-collector outputs and 32 15V CMOS inputs for DC input and output control of external equipment from the 4000 Digital Series.

The card is controlled from the Microprocessor card (PDE 4642); electrical connection is via the main busses. Each GPI card is individually addressable and once selected can be read from or written to by means of the control lines on the busses.

The 32 control inputs are level-detected and multiplexed to the bus data lines D0 to D15 via tristate buffers. The 32 control outputs are demultiplexed and held steady by on-board latches. Card 1, output 1 is designated as CPU Fail.

4.8.6.1 Card Location

These cards may be located in any RCU slot from 3 to 20 in the 4920 matrix, or any RCU slot from 2 to 7 in the 4420 matrix. However, these RCUs can only be fitted in a free RCU slot.

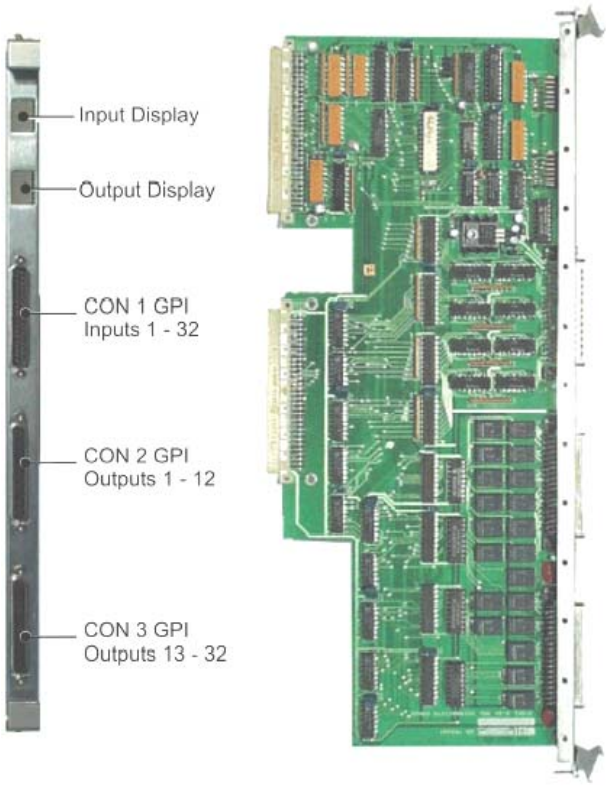


Figure 84 - PDE4619 General Purpose Interface (GPI) RCU

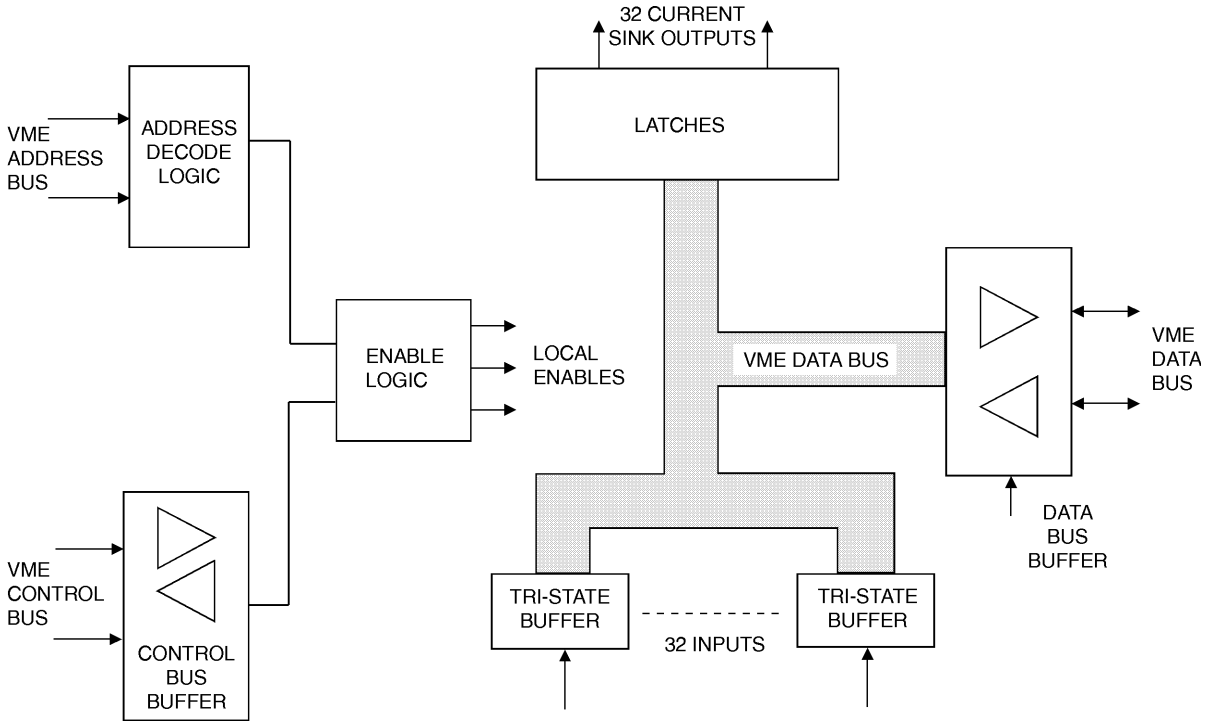


Figure 85 - PDE 4619 - Block Diagram

4.8.7 Mains Panel (4U and 9U Racks)

The Mains Panel on the 9U rack is a fixed panel on the right-hand side at the rear of the unit, and on the left-hand side for the 4U rack.

Details of the connector pin outs are given in the 4000 Digital Series Installation Guide.

4.8.8 AC Supplies

Provision is made for two AC supplies; they are wired to independent PSU slots, so that with the appropriate provision of power supplies, full AC redundancy is available. The power supply redundancy arrangements are discussed in the following section.

4.9 4000 Power Arrangements

4.9.1 4420 (4U) Matrix

The supply requirements of the 4U Matrix are met with 4172 Power Supply Unit (PSU). The supplies can operate over mains AC inputs between 90V and 250V @ 50/60Hz.

Provision is made for two type PD4172 power supplies for AC and DC redundancy. Each PD4171 is a 4 rail power supply rated at 5V @ 20A, +/-12V @ 2A and -5V @ 2A.

2 PSUs fitted for redundancy option.

Information concerning the individual power supplies and fusing is given in the 4000 Digital Series Installation Guide.

4.9.2 4920 (9U) Matrix

The supply requirements of the 4920 9U Matrix are met with a 4173 PSU between 90V and 250V @ 50/60Hz. The maximum power requirement of the Matrix is 300W.

Two switched and fused AC inlets (AC1 and AC2) are provided at the back of the frame via IEC connectors.

Information concerning the individual power supplies and fusing is given in the 4000 Digital Series Installation Guide.

The following Table and diagram allow system power supply redundancy to be understood. In the diagram, a 'small system' is considered to be one that draws less than 20A from the PSU; a `large system' is considered to be one that draws 20A or more from the PSU. The total amperage can be calculated by referring to the Table and calculating the total system load.

The following Table gives details of the matrix card power requirements.

Table 14: Matrix Card Power Requirements

PDE4642	Microprocessor Card	+5V @ 1.2A
PDE3601A	Digital Matrix Card	+5V @ 3.0A; -5V @ 0.1A

Table 14: Matrix Card Power Requirements

PDE4606	Panel Communications Card	+5V @ 2.0A; -5V @ 0.1A
PDE4621	16 Channel CODEC Card	+5V @ 1.0A; -5V @ 0.05A, ±18V @ 0.08A
PDE4609	Telephone Control Interface Card	+5V @ 0.1A
PDE4619	GPI RCU	+5V @ 1.0A
PDE3628	Serial Communications RCU	+5V @ 1.6A

4.9.2.1 Supply Protection

Table 15: 4920 Supply Protection

Main AC supply:	
120V AC supply - 6.3A anti-surge	240V AC supply - 3.15A anti-surge

5 Specifications

Frame Size	
9RU - 4920:	482mm (19 inches) wide 400mm (9RU) high 500mm (20 inches) deep
4U - 4420:	482mm (19 inches) wide 168mm (4RU) high 485mm (19.5 inches) deep
Weight:	20 to 25kg
Power Requirements:	90V to 250V, 50/60Hz, 300W max
Frequency Response:	30Hz - 17kHz ±3dB
Crosstalk (adjacent channel)	<-60dBu
Nominal Level	0dBu
Matrix headroom	+16dBu
Distortion	< 0.1% @ +16dBu, 300Hz - 10kHz; < 0.5% @ +16dBu, 100Hz - 10kHz
Off Noise	<-80dBu, 20Hz - 22kHz, typically
On Noise	<-62dBu, 20Hz - 22kHz, typically
Analogue Inputs:	25 way D-type Balanced, line level, Transformer isolated
Input Impedance	10kΩ
Input Balance	<-60dBu
Input Level (max) Input gain set @ -6dBu	+22dBu
Analogue Outputs:	25 way D-Type, Balanced, line level, Transformer isolated
Output Impedance	120Ω

Output Balance	<-30dBu
Linearity	±1dB
GPI Inputs:	37 way D-type, Opto-isolated
GPI Outputs:	37 way D-type, Isolated relay Open collector driver
Control Inputs/Outputs:	25 way D-type RS232, 9 way D-type RS422, Thinnet / AUI Ethernet®
AC power Inputs/Outputs	
4920:	2x IEC AC input, 9 way D-type Alarm o/p
4420:	2x IEC AC input

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R

S

V

WARRANTY

Vitec Group Communications (VGC) warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

VGC warrants to you that during the warranty period VGC, or any service company authorized by VGC, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should VGC in its discretion deem it necessary, replacing the product in accordance with this limited warranty.

WARRANTY PERIOD

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.
- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.
- UHF wireless IFB products have a limited warranty of one year.
- UHF wireless intercom systems have a limited warranty of three years.
- All other Clear-Com and Drake brand systems and products, including beltpacks, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the date of the Site Acceptance Test (SAT), or three months from purchase, whichever is sooner.

TECHNICAL SUPPORT

To ensure complete and timely support to its customers, VGC's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to VGC's customers during the full course of their warranty period. Telephone support during the warranty period will be offered at no charge between 09:00 and 17:00 according to the customer's local time zone.

In addition, for customers who purchase an Extended Warranty or Service Contract, 24-hour customer support is offered immediately upon purchase of such agreement. For more information, contact your authorized dealer, distributor, or sales representative.

Instructions for reaching our User Support Center are given below.

Telephone for Europe, Middle East and Africa +49 40 6688 4040

Telephone for the Americas and Asia: +1 510 496 6666

Email: vitec.support@AVC.de

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty or Service Contract. In these cases, you will have access to telephone support 24 hours per day, 7 days per week.

WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorisation (RMA). Our representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at our expense.

For out-of-box failures, use the following contact information:

Europe, Middle East and Africa

Tel: +44 1223 815000 Email: customerservicesEMEA@vitecgroup.com

North America, Canada, Mexico, Caribbean & US Military

Tel: +1 510 496 6666 Email: customerservicesUS@vitecgroup.com

Asia Pacific & South America

Tel: +1 510 496 6666 Email: customerservicesAPAC@vitecgroup.com

VGC has the right to inspect the equipment and/or installation or relevant packaging.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain a Return Material Authorisation (RMA) by contacting the User Support Center. Our representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

EXTENDED WARRANTY

If you purchase an Extended Warranty, you are also given access free of charge to the User Support Center 24 hours a day, 7 days a week.

You can purchase an extended warranty at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years. Any purchase of an extended warranty provides 24 x 7 customer support in addition to the warranty immediately upon purchase of the warranty extension.

Note: Clear-Com does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

SERVICE CONTRACT

VGC offers service contracts that provide 24 x 7 telephone support, advance replacements, training, proactive maintenance, on-site visits, and no charge for repair or replacement of equipment. For more information, contact your authorized dealer, distributor, or sales representative.

LIABILITY

The foregoing warranty is VGC's sole and exclusive warranty. There are no other warranties (including without limitation warranties for consumables and other supplies), or guarantees, expressed or implied (including, without limitation, any warranties of merchantability or fitness for a particular purpose), of any nature whatsoever, whether arising in contract, tort, negligence of any degree, strict liability or otherwise, with respect to the products or any part thereof delivered hereunder and/or with respect to any non-conformance or defect in any such product and/or part thereof delivered hereunder and/or with respect to any non-conformance or defect in any such product and/or part thereof delivered hereunder, or any other warranties or guarantees, including but not limited to any liability of VGC for any consequential and/or incidental damages and/or losses (including loss of use, revenue, and/or profits). In any event, the maximum extent of VGC's liability to customer hereunder shall not under any circumstances exceed the cost of repairing or replacing any part(s) found to be defective within the warranty period as aforesaid.

This warranty does not include damage to a product resulting from cause other than part defect and malfunction. The VGC warranty does not cover any defect, malfunction, or failure caused beyond the control of VGC, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by VGC, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by VGC), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures of customer furnished components resulting in damage to VGC provided product.

VGC will be under no liability whatsoever for any loss, injury or damage (whether direct, indirect, or consequential) howsoever arising including, but not by way of limitation, liability arising in negligence that may be suffered in respect of the warranty or service agreement or the subject matter thereof. Indirect or consequential loss or damage shall include any loss or damage in respect to any loss of profits or income or business or use of whatsoever kind.