



DL351 Modular I/O Operator Manual

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In line with the company's policy of continual improvement, specifications and function may be subject to change without notice. This Operator Manual was correct at the time of writing. E&OE.



IMPORTANT SAFETY INSTRUCTIONS



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

- 1 Read these instructions.
- 2 Keep these instructions.
- 3 Heed all warnings.
- 4 Follow all instructions.
- 5 Do not use this apparatus near water.
- 6 Clean only with a dry cloth.
- 7 Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
- 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- 11 Only use attachments/accessories specified by the manufacturer.
- 12 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 13 Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- 14 Use the mains plug to disconnect the apparatus from the mains.
- 15 **Warning: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.**
- 16 **Warning: Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.**
- 17 **Warning: The mains plug of the power supply cord shall remain readily operable.**



EC-Declaration of Conformity

The undersigned, representing the following manufacturer

Manufacturer:

Midas Klark Teknik Ltd.

Address:

Klark Industrial Park, Walter Nash Road,
Kidderminster. Worcestershire. DY11 7HJ.

hereby declares that the following product

Product Type Number	Product Description	Nominal Voltage(s)	Current	Freq.
DL351	Audio System Modular I/O	115V AC 230V AC	0.93A 0.58A	50/60Hz

is in conformity with the regulations of the following marked EC-directives and bears the CE-mark accordingly

reference number	title
2004/108/EC	EMC Directive (EMC)
2006/95/EC	Low-Voltage Directive (LVD)

The conformity of the product with EC Directives for use in environment E4 is provided by compliance with the following standards:

Standards/date:

Applied Electrical Safety test standards:

reference number	title
EN 60065:2002	Audio, video and similar electronic apparatus. Safety requirements.

Applied EMC emission test standards:

ref. no.	title
EN 55103-1:1996 Class A	EN 55103-1 Annex A: Radiated magnetic disturbance, 50Hz-50kHz
	CISPR 22: Radiated disturbance, 30-1000MHz
	CISPR 22: Conducted disturbance, ac & signal ports
	CISPR 16: Discontinuous disturbance
	EN 61000-3-2:2000 Mains harmonics
	EN 61000-3-3:1995 Mains voltage flicker

Applied EMC immunity test standards:

ref. no.	title
EN 55103-2:1996 Class A	EN 61000-4-2:1995 Electrostatic discharge
	EN 61000-4-3:1996: Radiated RF disturbance, 80-1000MHz
	EN 55103-2 Annex A: Magnetic LF disturbance, 50Hz-10kHz
	EN 61000-4-4:1995: Fast transient bursts, ac & signal ports
	EN 61000-4-5:1995: Surge, ac port
	EN 61000-4-6:1996: Conducted RF field, ac & signal ports
	EN 61000-4-11:1994: Mains voltage dips and interruptions

Place, date: Kidderminster, UK
14th June 2010



General Manager
Printed name: John Oakley



AVP, Product Development
Printed name: Alex Cooper

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Precautions

Before installing, setting up or operating this equipment make sure you have read and fully understand all of this section and the “IMPORTANT SAFETY INSTRUCTIONS” at the front of this manual.

This equipment is supplied by a mains voltage that can cause electric shock injury!

The following must be observed in order to maintain safety and electromagnetic compatibility (EMC) performance.

Safety warnings

Signal 0V is connected internally to the chassis.

To electrically isolate this equipment, while observing full safety precautions (see “Power” below), switch off the two isolator switches (above the mains sockets on the rear panel of the unit) *one at a time* and then switch off the mains at the two mains outlets. Isolate the unit by unplugging the two mains leads from rear panel.

To avoid electrical shock do not remove covers.

General precautions

In the event of ground loop problems, disconnect the signal screen at one end of the connecting cables. Note that this can only be done when the equipment is used within a balanced system.

Do not remove, hide or deface any warnings or cautions.

Power

The power supplies contain LETHAL VOLTAGES greatly in excess of the mains voltage and its rails can produce extremely large currents that could burn out equipment and wiring if shorted.

The internal power supplies are of the switch mode type that automatically sense the incoming mains voltage and will work where the nominal voltage is in the range 100VAC to 240VAC.

Each mains inlet is to be sourced from its own separate wall-mounted mains outlet socket. Otherwise, their mains sources must be suitably

distributed so as to meet local safety regulations.

A Volex locking type plug is fitted on each supplied mains cable, which plugs into a mains IEC connector on the unit. When fitted properly the Volex plug locks into place, preventing it from working loose, or being inadvertently knocked loose or pulled out. To fit a Volex plug, insert it into the mains IEC connector and push it in until it locks in place. Then, check to make sure it is locked in place. To remove it, release its locking device and then pull it out. When fitting or removing a Volex plug, always hold the plug itself and never use the cable, as this may damage it.

When removing the equipment’s electric plugs from the outlets, always hold the plug itself and not the cable. Pulling out the plug by the cable can damage it.

Never insert or remove an electric plug with wet hands.

Do not connect/disconnect a mains power connector to/from the unit while power is being applied to it. Switch the power off first.

Switch the mains isolator switches on/off one at a time. Do not switch them both on/off simultaneously.

Handling the equipment

Completely isolate the equipment electrically and disconnect all cables from the equipment before moving it.

When lifting or moving the equipment, always take its size and weight into consideration. If necessary, use suitable lifting equipment or transporting gear, or sufficient additional personnel.

Do not insert your fingers or hands in any gaps or openings on the equipment, for example, vents.

Installation

Before installing the equipment:

- Make sure the equipment is correctly connected to the protective earth conductor of the mains voltage supply of the system installation through the mains leads.
- Power to the equipment must be via a fused spur(s).
- Power plugs must be inserted in socket outlets provided with protective earth contacts. The electrical supply at the socket outlets must provide appropriate over-current protection.
- Both the mains supply and the quality of earthing must be adequate for the equipment.
- Before connecting up the equipment, check that the mains power supply voltage rating corresponds with the local mains power supply. The rating of the mains power supply voltage is printed on the equipment.

Location

Ideally a cool area is preferred, away from power distribution equipment or other potential sources of interference.

Do not install the equipment in places of poor ventilation.

Do not install this equipment in a location subjected to excessive heat, dust or mechanical vibration. Allow for adequate ventilation around the equipment, making sure that its fans and vents are not obstructed. Whenever possible, keep the equipment out of direct sunlight.

Do not place the equipment in an unstable condition where it might accidentally fall over.

Make sure that the mains voltage and fuse rating information of the equipment will be visible after installation.

Audio connections

To ensure the correct and reliable operation of your equipment, only high quality, balanced, screened, twisted pair audio cable should be used.

XLR connector shells should be of metal construction so that they provide a screen when connected to the control centre and, where appropriate, they should have Pin 1 connected to the cable screen.

Radio frequency interference—Class A device

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Electric fields

Caution:

In accordance with Part 15 of the FCC Rules & Regulations, "... changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment."

Should this product be used in an electromagnetic field that is amplitude modulated by an audio frequency signal (20Hz to 20kHz), the signal to noise ratio may be degraded. Degradation of up to 60dB at a frequency corresponding to the modulation signal may be experienced under extreme conditions (3V/m, 90% modulation).

Safety equipment

Never remove, for example, covers, housings or any other safety guards. Do not operate the equipment or any of its parts if safety guards are ineffective or their effectiveness has been reduced.

Optional equipment

Unless advised otherwise, optional equipment must only be installed by service personnel and in accordance with the appropriate assembly and usage regulations.

Special accessories

To comply with part 15 of the FCC Rules, any special accessories (that is, items that cannot be readily obtained from multiple retail outlets) supplied with this equipment must be used with this equipment; do not use any alternatives as they may not fulfil the RF requirement.

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Chapter 1: Introduction

Thank you for purchasing a Midas DL351 Modular I/O. Your DL351 Modular I/O was conceived by Midas to offer audio professionals high-performance audio equipment, designed to provide no-compromise sonic quality with a feature set that offers all essential facilities and functions. It represents the very best of British design and engineering combined with contemporary, efficient manufacturing methods, and will give you many years of reliable service.

So, to obtain the best results with a minimum of effort, please read this operator manual and, finally, enjoy your Midas DL351 Modular I/O!

Overview

The DL351 Modular I/O is a 64-channel I/O unit, which is housed in a 7U, 19" rack mount box. The DL351 Modular I/O can be configured to provide 64 channels of analogue input, analogue output, analogue insert (jack) in and out or 64 AES EBU inputs and outputs. It is of user-configurable¹ sub-modular construction—allowing the mixing of I/O type, selectable from analogue input, analogue output and AES digital—and utilises the same module cards as used for the DL451 Modular I/O 24-channel unit.



Front panel



Rear panel
(standard configuration)

The standard configuration for use with the PRO6 Live Performance System comprises seven 8-channel mic/line analogue input cards and one 8-channel line analogue output card.

1. It is envisaged that new modules will be developed to service market requirements as they continue to evolve.

Features

The DL351 Modular I/O has the following features:

- Up to 64 analogue/digital audio inputs or outputs.
- Sub-modular construction provides user-configurable 8 x 8-channel format.
- The front panel has minimal controls, which are used in conjunction with a standard 16-column x 2-row LCD display.
- Fully isolated GPIO **in** and **out** connections supplied as standard, via 25-pin D-type connectors.
- **in**, **out** and **thru** MIDI sockets supplied as standard, via 5-pin DIN connectors.
- N+1 redundant AES50 connections provided at the digital audio interface.
- USB **host** and **slave** ports provide additional communications interfacing.
- System interconnection is via four AES50 (24 bi-directional digital audio channels) on EtherCon® XLRs (connection is to the router module), which provides N+1 capability.
- All AES EBU connections, analogue inputs and analogue outputs are provided by 3-pin XLR chassis connectors.
- Remote interrogate LEDs are adjacent to the physical XLRs. These are controlled ultimately from the digital console control surface and serve as a visual aid when seeking a particular connector.
- The analogue inputs incorporate remotely controlled, 5dB step analogue gain adjustment from –5dB to +40dB and Phantom power (with LED status).
- The analogue signal maximum incorporates “Clean Clipping” to ensure A/Ds are never clipped.
- The A/D and D/A converters are 24-bit and sampled primarily at 96kHz.
- The A/D inputs take a maximum signal level that represents external +22dBu, that is, 0dBFS (0dB full scale).
- Each of the DC rails is fitted with suitable fusing elements, such that a single board failure will not bring the whole rack down.
- The unit offers the facility of universal input, dual redundant power supplies with two latching mains connectors.
- The unit is force air cooled by means of 80 mm fans. These produce low noise, which is suitable for concert sound. However, racking in separate “amp rooms” is advised for theatre use.

Warranty and registration

Midas has total confidence in the quality and reliability of this product. To back this up, this product comes with the standard Midas and Klark Teknik three year warranty.

Please take the time to register your product by completing and returning the registration card or registering on our website at www.midasconsoles.com.

About this manual

This is the operation manual for the DL351 Modular I/O. It is intended to help get your DL351 Modular I/O installed and in operation as quickly as possible by giving you unpacking, installation, connection, setting up and operating instructions. To help familiarise you with the PRO6 Control Centre there is a description of the front and rear panels, along with easy-to-follow user instructions.

This manual is aimed at professionals, such as front of house (FOH) and monitor (MON) engineers who will be using this equipment in a live performance environment. It is assumed that the reader has prior experience of using professional audio equipment and has, most likely, undergone training on the PRO6 system.

Details in this manual, such as configuration, setting up, connecting up etc., refer only to the unit connected in a standard PRO6 Live Performance System. Should you wish to connect this unit in any other configuration, contact Midas Technical Support for details.

The appendices include a brief overview of the PRO6 Live Performance System. However, if you want to learn more about the PRO6 Live Performance System, please go on to read its owner's manual (part number DOC02-DL3), which provides a full and comprehensive guide.

Unpacking

Carefully unpack your DL351 Modular I/O equipment package.

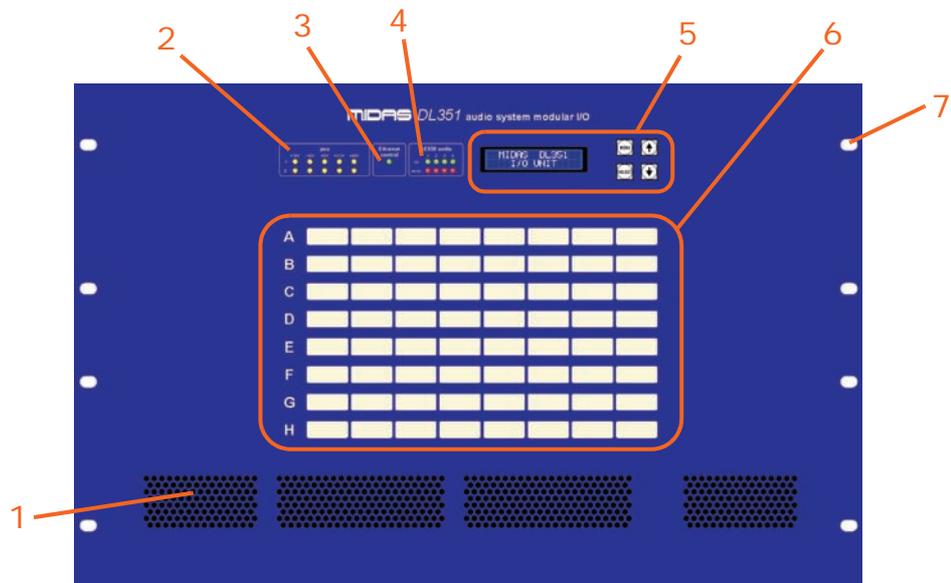
Inspect the DL351 Modular I/O unit carefully for any signs of damage that may have occurred during transit and notify the courier immediately if any is discovered.

Check the contents of your DL351 Modular I/O equipment package and, if there are any parts missing, incorrect or faulty, please contact your local distributor or Midas at the address shown in the front of this manual.

Please retain the original packing in case you should need to return the equipment to the manufacturer or supplier, or transport or ship the unit later.

Chapter 2: Front Panel

The front panel of the DL351 Modular I/O comprises the following:



- 1 Four ventilation panels. **Do not obstruct.**
- 2 Power supply unit monitoring panel; see "psu panel" on page 5.
- 3 Ethernet control panel; see "Ethernet control panel" on page 5.
- 4 AES50 audio panel monitors; see "AES50 audio panel" on page 6.
- 5 Control panel; see "Control panel" on page 6.
- 6 Eight rows of eight write-on strips for manually marking the analogue/digital channel assignments for modules **A** to **H**.
- 7 Cut-outs for rack mounting fixings.

psu panel

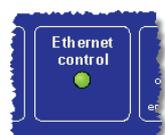
This panel monitors the voltage rails of the two power supplies. The two sets of panel LEDs illuminate to show that the voltage rails are active. There are five yellow LEDs per supply voltage, each representing a specific voltage rail (+18V, -18V, +5V, +3.3V and +48V).



Ethernet control panel

The Ethernet control panel has a green LED, which has three states of illumination to indicate the following:

- **Off** = not connected.
- **On** = connected.
- **Flashing** = active communications.



AES50 audio panel

The AES50 audio panel has four sets of LEDs (one set per AES50 audio connector) to indicate communication status, as follows:

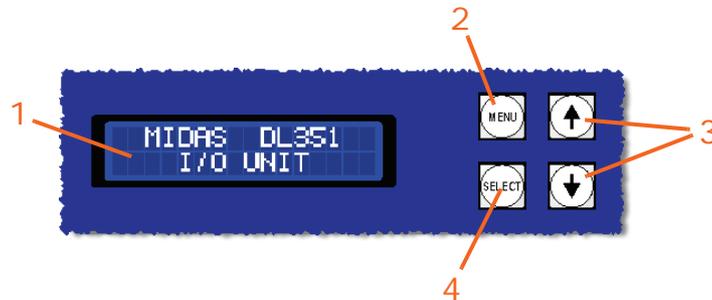
- Green **ok** LED pulsating = good communication.
- Red **error** LED illuminated = communication error.



Control panel

The control panel is used for setting up and monitoring the DL351 Modular I/O. It has an LCD panel and four buttons, each of which illuminates with a blue backlight when pressed.

The LCD display shows the default screen during normal operation and is used in conjunction with the four adjacent buttons to program the DL351 Modular I/O via a main menu (see Chapter 5 "Main Menu").



- 1 LCD display** comprising 32 characters in a 2-row x 16-column configuration.
- 2 MENU** button for entering and exiting menu mode, and navigating the main menu.
- 3** Up and down navigation buttons for scrolling up and down the main menu options.
- 4 SELECT** button, selects the current option.

Chapter 3: Rear Panel

The rear panel of the DL351 Modular I/O has three main sections, as shown below.



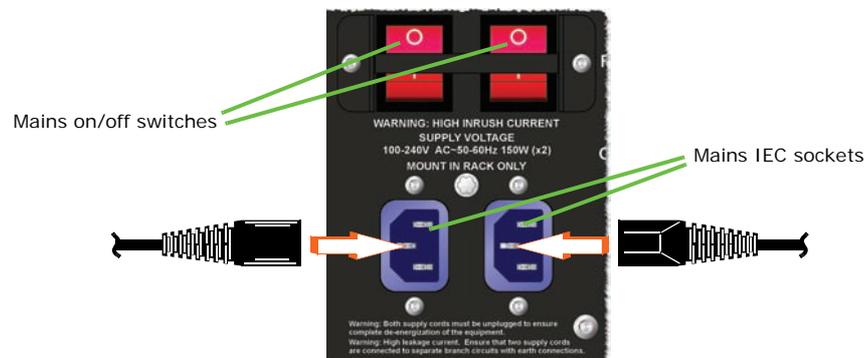
1 Mains power sockets and isolator switches; see “Mains input” on page 7.

2 User-configurable module panel into which any combination of up to eight modules (see Appendix C “I/O Modules”) can be fitted.

3 Connector panel; see “Connector panel” on page 8.

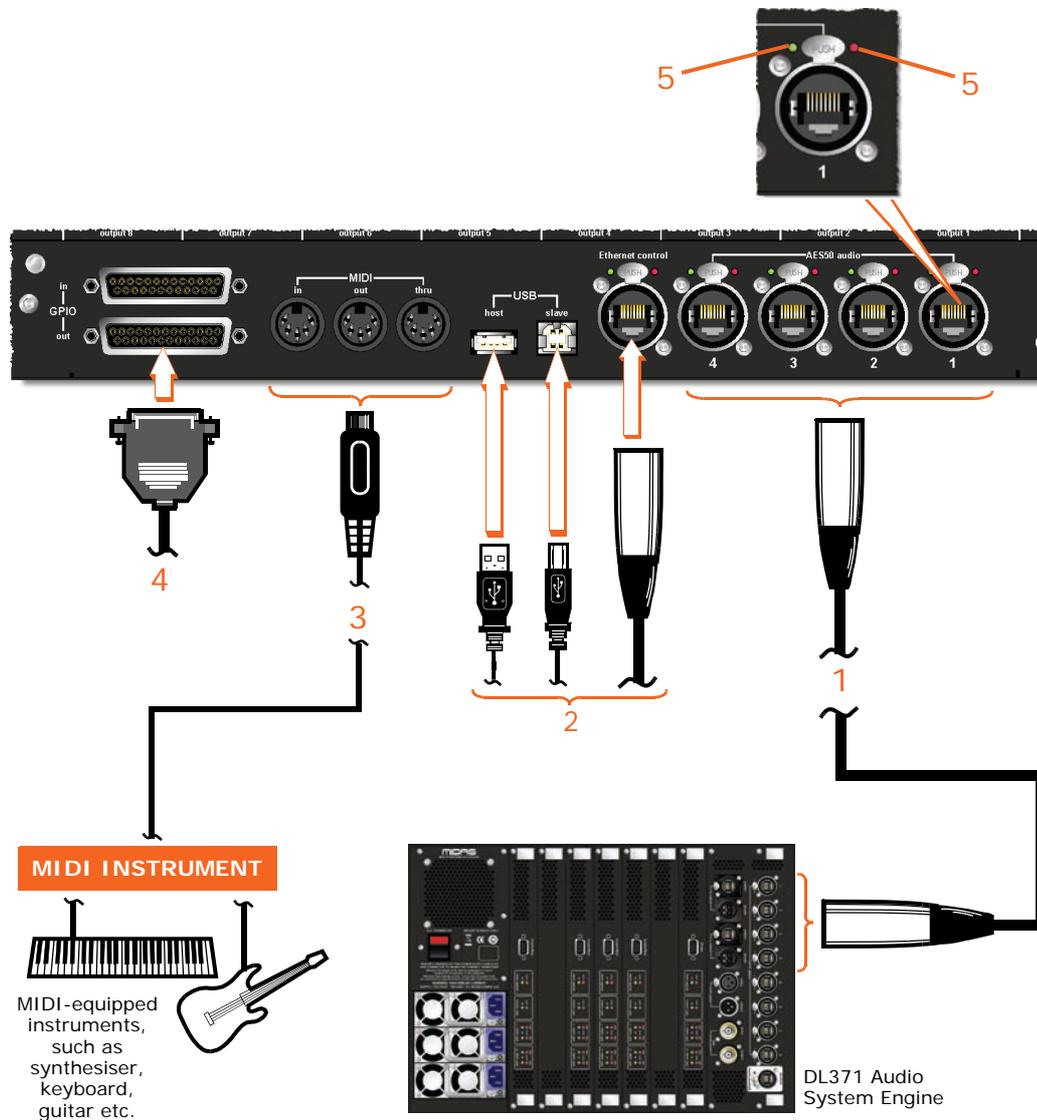
Mains input

Two sets of mains IEC sockets and on/off switches.



Connector panel

The connector panel comprises:



- 1** Four **AES50 audio** Ethernet sockets for passing audio and control data to/from the DL371 Audio System Engine.
- 2** For future use only.
- 3** Three **MIDI** (musical instrument digital interface) sockets, **in**, **out** and **thru** for connection of MIDI-equipped musical instruments. **in** socket receives MIDI data. **thru** socket gives out the same MIDI data that is received by the **in** socket. **out** socket gives out MIDI data generated by the instrument itself.

- 4** Two **GPIO** 25-way connectors, **in** and **out**, for control of external devices, such as CD players, audio processors etc.

- 5** Same as the LEDs in the **AES50 audio** section of the front panel (see "AES50 audio panel" on page 6).

Chapter 4: Getting Started

This chapter shows you how to connect up, switch on, set up and configure the DL351 Modular I/O unit.

Connecting up

Refer to Figure 2 “Standard system configuration” on page 50 and “Connector panel” on page 8.

Connect up the following, as appropriate, to the rear panel of your DL351 Modular I/O unit:

- **Inputs/outputs** — connect the required input/output cabling to the modules fitted in slots **A** to **H** (see Appendix C “I/O Modules”).
- **AES50** — connect the four **AES50 audio** sockets in the connector panel to the appropriate **AES50 audio** sockets (1 to 4) on the DL371 Audio System Engine unit.
- **MIDI** — connect the three MIDI 5-pin DIN connectors to a MIDI-equipment instrument, if required.
- **GPIO** — connect the 25-way D-type connectors to a peripheral device, if required.
- **USB** — connect a laptop/PC, if required.
- **Mains power supply** — insert the IEC connectors of the two mains cables into the rear of the unit and then plug them both into mains power outlets, observing the precautions detailed in “Power” on page xi.

Powering the unit



Caution:

Do not switch the mains on/off switches on or off simultaneously. They must be switched on or off one at a time.

This section shows you how to switch the unit on/off, and also how to completely isolate it electrically.

>> To switch the unit on

Switch on the mains on/off switches (rear of the unit) one at a time. **See the Caution at the beginning of this section.**



>> To switch the unit off

Switch off the mains on/off switches one at a time. **See the Caution at the beginning of this section.**

To electrically isolate the unit completely, disconnect the two mains power connectors from the rear of the unit (just below the mains on/off switches).

Setting up

Initial setting up of the DL351 Modular I/O involves allocating an ID for it within the PRO6 network system environment; see “To set up the ID of the unit” on page 17.

Configuration

Configure the clock source and digital board(s), if fitted, of the DL351 Modular I/O unit to suit your operating requirements; see “Main menu options” on page 17 for details.

Chapter 5: Main Menu

This chapter describes the menu options that allow you to set up your DL351 Modular I/O.

About the main menu

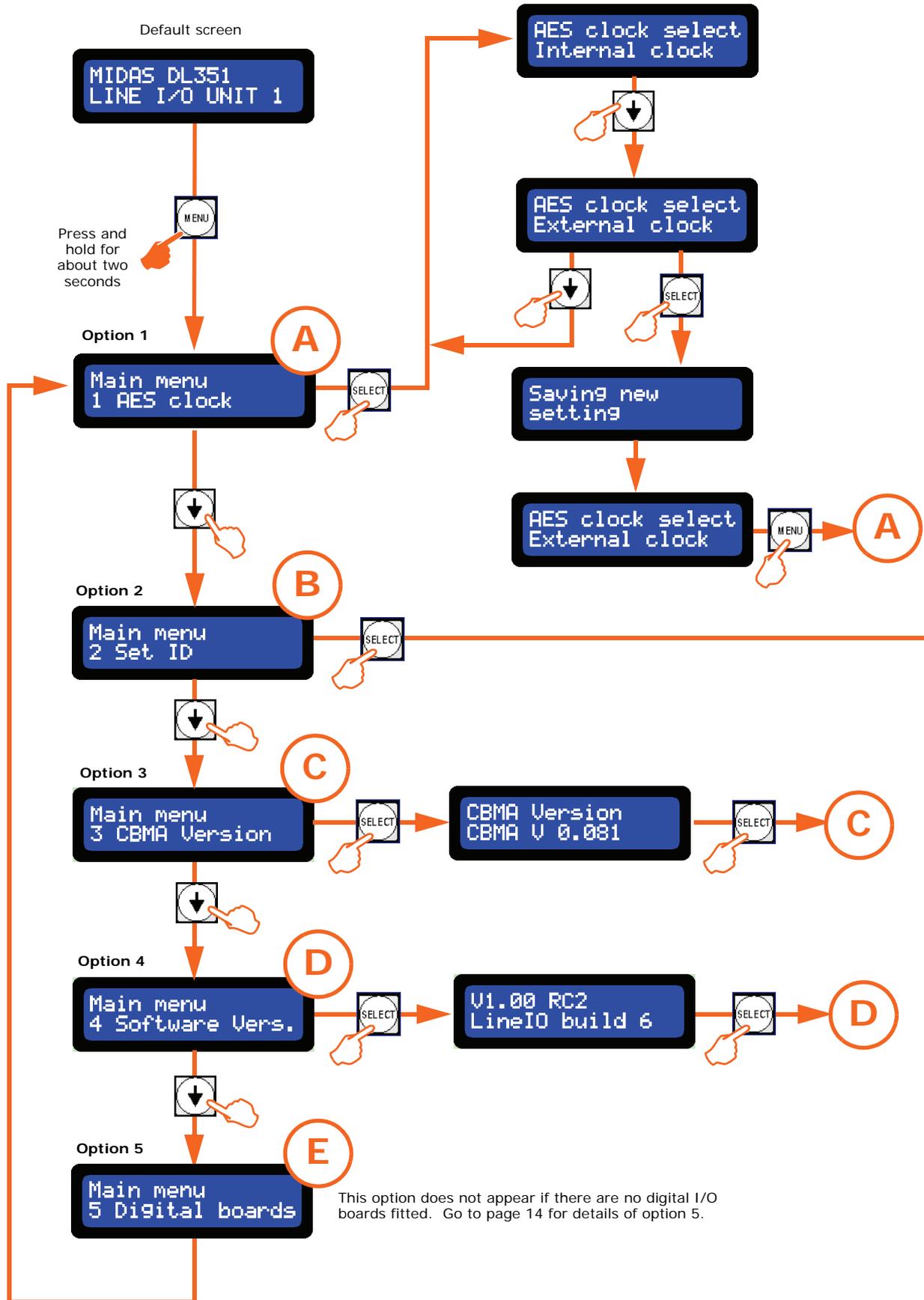
The main menu is accessed via the control panel and provides five options that allow you to carry out the following:

- Select the method of AES50 synchronisation; see “Option 1 — AES clock” on page 17.
- Set up the network unit ID of the DL351 Modular I/O; see “Option 2 — Set ID” on page 17.
- Check the CBMA version number of the DL351 Modular I/O; see “Option 3 — CBMA version” on page 18.
- Check the software version of the DL351 Modular I/O; see “Option 4 — Software version” on page 18.
- Set up the digital I/O board(s) of the DL351 Modular I/O, if fitted; see “Option 5 — Digital boards” on page 19.

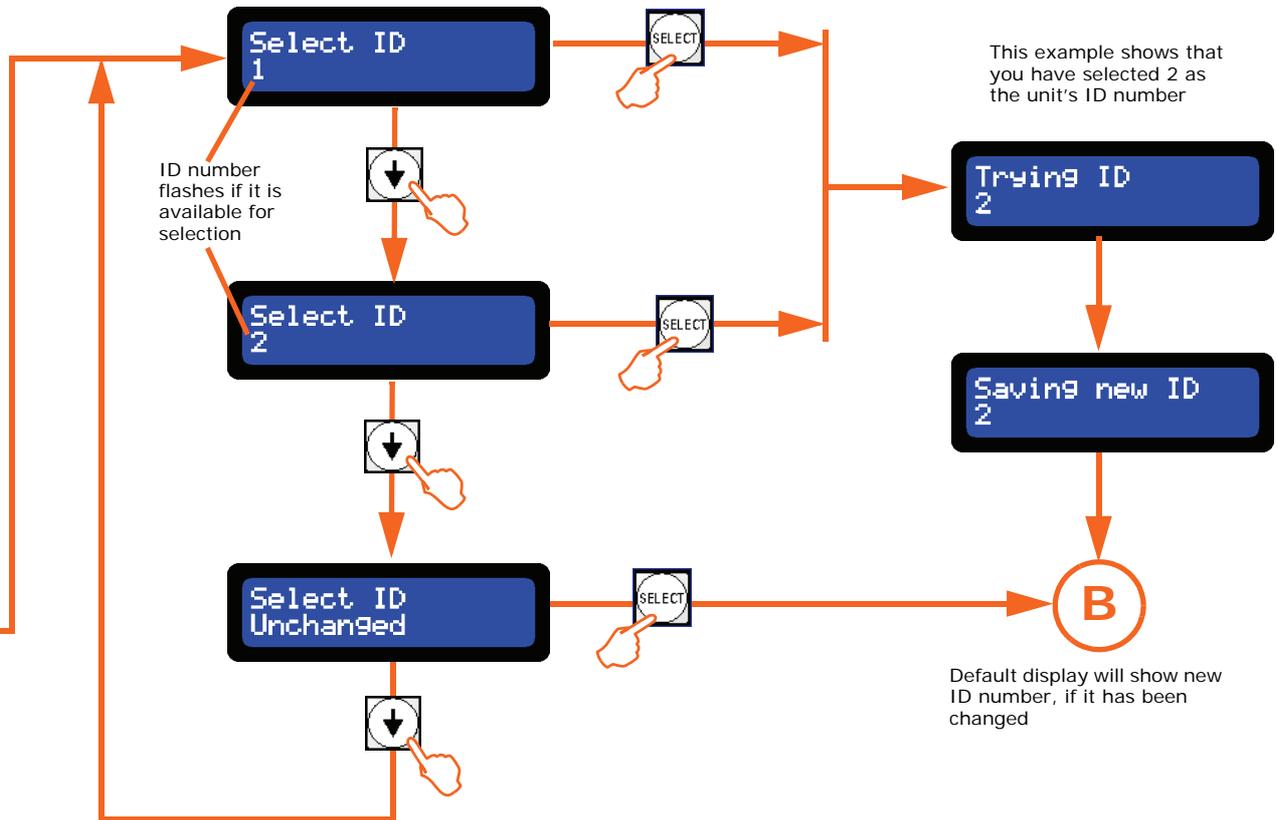
Main menu flowchart

The following pages show the main menu and submenu options.

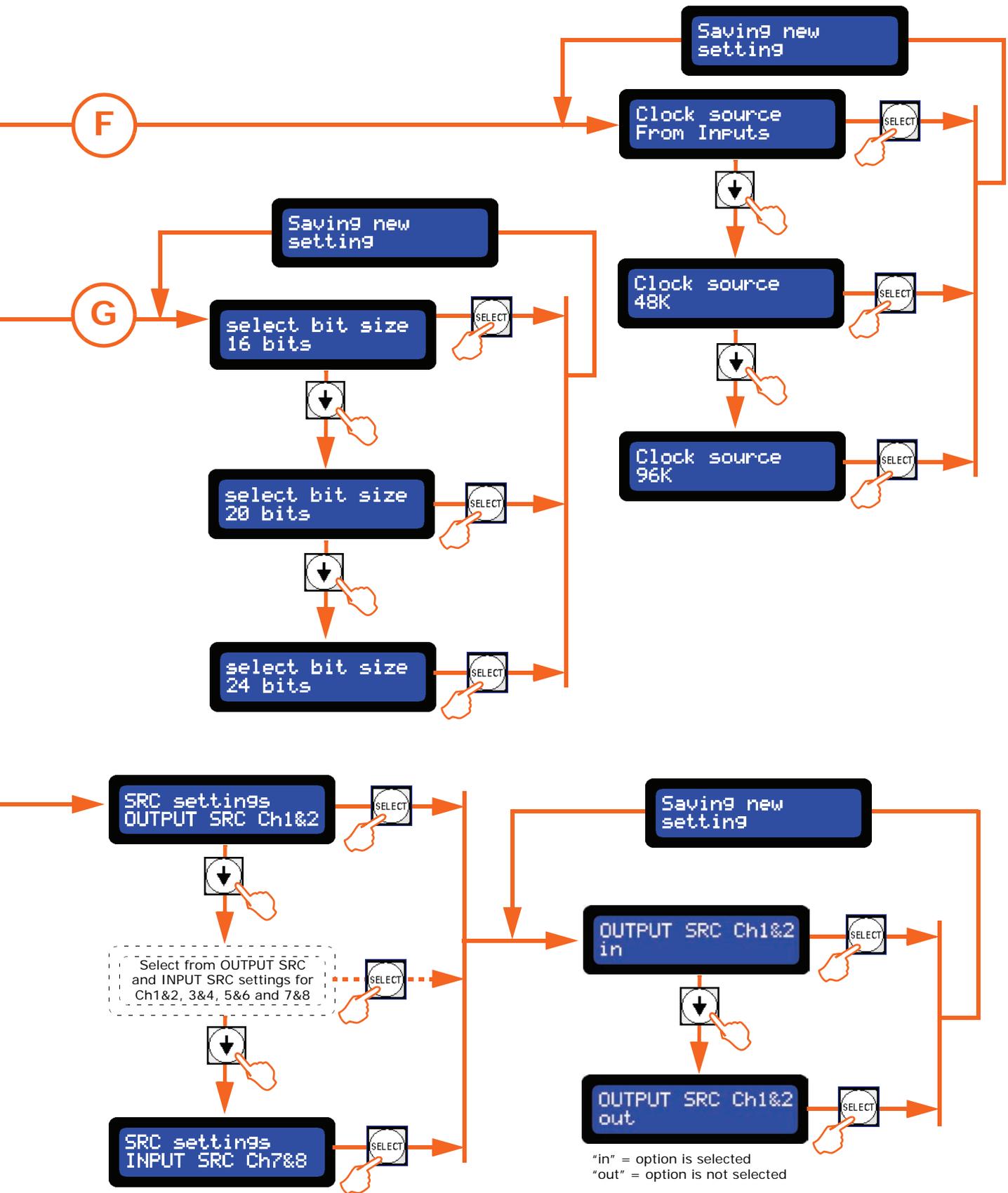
Main menu flowchart (options 1 to 4)



This option does not appear if there are no digital I/O boards fitted. Go to page 14 for details of option 5.



- Notes:**
- 1.  In menu mode, pressing **MENU** takes you up one level without saving any changes.
 - 2.  This flowchart only shows the down arrow presses. Pressing the up arrow takes you in the opposite direction to a down arrow press.
 - 3. Non-flashing options are currently selected, while flashing options are available for selection.



Using the menu

This section shows you how to enter/exit the main menu, navigate your way around the options and how to select an option. The main menu is operated via the four control panel buttons (**MENU**, **SELECT** and the up  and down  arrows).

>> To enter the main menu

Press **MENU** and hold down for approximately two seconds (shown right). You have entered the main menu when the first option is displayed.



>> To navigate the main menu

Use a combination of the following:

- Press the up/down arrow buttons to navigate the options in the current menu level.
- Press **SELECT** to move down to the next submenu level or, if you are at the last submenu level, it selects the current option.
- Press **MENU** to move up a submenu level without saving any changes or, if you are at the top level, it exits the main menu.



>> To select an option

Press **SELECT**.

>> To exit the main menu

Press the **MENU** button as many times as necessary to take you back up the submenu levels until you reach the default screen (see "Default screen" on page 21).

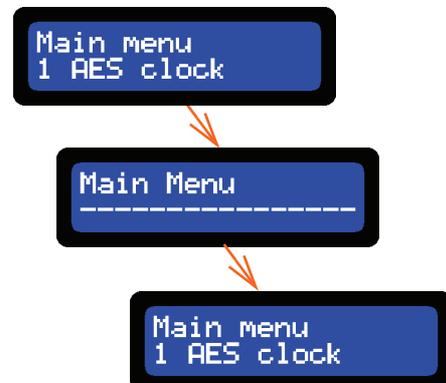
The DL351 Modular I/O will exit the main menu automatically after about 20 seconds of inactivity, that is, if none of the buttons are pressed within that time.

Flashing items

In main menu mode, the bottom line flashes to show that the item is available for selection, such as an option or parameter.

Flashing option: The bottom line of the display alternates between the option name and a full line of dashes (shown right).

Flashing parameter: Only the digits showing the parameter value will flash.



Main menu options

The following subsections describe the function of each main menu and how to use them for setting up, configuration, checking etc.

While carrying out the configuration procedures detailed in this section, refer to the main menu flowchart (see “Main menu flowchart” on page 11).

The selection procedure described for each option assumes that you are initially in normal operation mode.



*To check the current configuration of an option, that is, what parameter is selected, enter the option and navigate to the option you require. You can then change the selection, if required, or exit using the **MENU** button.*

Option 1 — AES clock

You can set up the clock source (as internal or external) of the DL351 Modular I/O for AES synchronisation.

>> To set up the clock source

- 1 Enter the main menu, as described in “To enter the main menu” on page 16. This will take you straight to main menu option 1 (AES clock) screen.
- 2 Press **SELECT** to enter the AES clock option. This will take you to the “Internal clock” option.
- 3 Use the up/down arrow buttons to go to the option you require, that is, “Internal clock” or “External clock”.
- 4 Do one of the following:
 - If the option is already selected (not flashing), go to the next step.
 - If the option is not selected (flashing), press **SELECT** to select this option. The display will briefly show “Saving new setting” and then revert to the option again. However, it will not be flashing, as it is now the current selection.
- 5 Press **MENU** to exit the submenu and go back to the option 1 screen.

Option 2 — Set ID

This option allows you allocate a unique ID to the DL351 Modular I/O unit, which can be either 1 or 2. The PRO6 Live Performance System network will then recognise the unit from its ID number.

>> To set up the ID of the unit

- 1 Enter the main menu, as described in “To enter the main menu” on page 16.
- 2 Use the up/down arrow buttons to go to option 2 (set ID).
- 3 Press **SELECT** to enter the set ID option. This will take you to the “Select ID” screen for ID 1.
- 4 Use the up/down arrow buttons to go to the ID number you require.

- 5 Do one of the following:
 - If the option is already selected (not flashing), use the up and down arrow buttons to go to the “Unchanged” option.
 - If the option is not selected (flashing), go to the next step.
- 6 Press **SELECT**. One of the following will happen, depending on the action in the previous step:
 - If you had selected “Unchanged”, the display will revert to the “Main menu” option 2 screen.
 - If your chosen option was not already selected, the display will show “Trying ID” followed by “Saving new ID”, and will then revert to the “Main menu” option 2 screen.

Note: The default screen (see “Default screen” on page 21) shows the currently selected unit ID number. For example, unit 2.



Option 3 — CBMA version

This view-only option allows you see the console bitmap array (CBMA) version of the DL351 Modular I/O.

>> To view the CBMA version number

- 1 Enter the main menu, as described in “To enter the main menu” on page 16.
- 2 Use the up/down arrow buttons to go to option 3 (CBMA version).
- 3 Press **SELECT**. The CBMA version will be shown on the bottom line of the display.
- 4 Press **SELECT** to exit. This will take you back to the option 3 screen.

Option 4 — Software version

This view-only option allows you to see what host software version the DL351 Modular I/O unit is running.

>> To view the current host software version

- 1 Enter the main menu, as described in “To enter the main menu” on page 16.
- 2 Use the up/down arrow buttons to go to option 4 (software version).
- 3 Press **SELECT**. The host software version will be shown on the bottom line of the display.
- 4 Press **SELECT** to exit. This will take you back to the option 4 screen.

Option 5 — Digital boards

This option allows you to set up the clock source (outputs), SRC and word size for any digital I/O board(s) fitted in the unit. This option has eight boards to choose from — “A” to “H” (printed on the rear panel) — each one representing a module slot position.

Clock source and word size are for digital outputs only, whereas SRC is for inputs and outputs. The channels are configured in pairs.

If there are no digital I/O boards fitted, this option does not appear. However, if one or more digital I/O boards are fitted, all of the board positions (A to H) appear in the menu.

>> To select the digital I/O board (module position)

- 1 Enter the main menu, as described in “To enter the main menu” on page 16.
- 2 Use the up/down arrow buttons to go to option 5 (digital boards).

Note: This option does not appear if there are no digital I/O boards fitted.

- 3 Press **SELECT** to display the screen for module position (board) A.
- 4 Use the up/down arrow buttons to go to the board you require.

>> To set up the clock source for a pair of digital outputs

- 1 After selecting the digital I/O board you wish to configure (see “To select the digital I/O board (module position)” on page 19), press **SELECT** to go to the “Clock Setup(out)” screen.

Note: Pressing **SELECT** has no effect if there is no digital I/O board fitted in this position. Also, pressing **MENU** takes you to the option 5 display, whether a digital I/O board is fitted or not.

- 2 Press **SELECT** to go to the “Select Channels” screen.
- 3 Use the up/down arrow buttons to go to the pair of channels you wish to configure (1 and 2, 3 and 4, 5 and 6 or 7 and 8).
- 4 Press **SELECT** to go to the “Clock source” screen.
- 5 Use the up/down arrow buttons to select the clock source from the following options:
 - “From Inputs” — the digital inputs are used as the clock source.
 - “48K” — 48k clock source.
 - “96K” — 96k clock source.
- 6 Press **SELECT**. The display will briefly display the “Saving new setting” screen and revert to the “Clock source” screen.
- 7 Press **MENU** as many times as necessary to do one of the following:
 - Configure another pair of channels.
 - Exit this option.

>> To set up the SRC option for a pair of digital channels

- 1 After selecting the digital I/O board you wish to configure (see "To select the digital I/O board (module position)" on page 19), press **SELECT** to go to the "Clock Setup(out)" screen.

Note: Pressing **SELECT** has no effect if there is no digital I/O board fitted in this position. Also, pressing **MENU** takes you to the option 5 display, whether a digital I/O board is fitted or not.

- 2 Use the up/down arrow buttons to go to the "SRC options" screen.
- 3 Press **SELECT** to go to the "SRC settings" screen.
- 4 Use the up/down arrow buttons to go to the pair of input or output channels you wish to configure (1 and 2, 3 and 4, 5 and 6 or 7 and 8).
- 5 Press **SELECT** to go to the SRC on/off selection screen.
- 6 Use the up/down arrow buttons to choose "on"/"off", as required.
- 7 Press **SELECT**. The display will briefly display the "Saving new setting" screen and revert to the SRC on/off screen.
- 8 Press **MENU** as many times as necessary to do one of the following:
 - Configure another pair of channels.
 - Exit this option.

>> To set up the word size for a pair of digital output channels

- 1 After selecting the digital I/O board you wish to configure (see "To select the digital I/O board (module position)" on page 19), press **SELECT** to go to the "Clock Setup(out)" screen.

Note: Pressing **SELECT** has no effect if there is no digital I/O board fitted in this position. Also, pressing **MENU** takes you to the option 5 display, whether a digital I/O board is fitted or not.

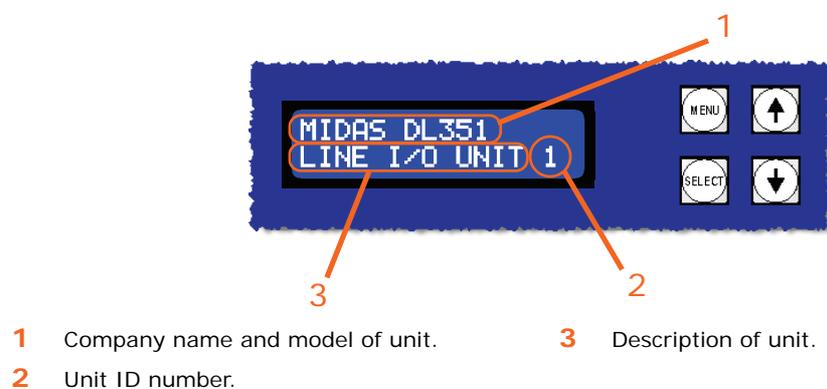
- 2 Use the up/down arrow buttons to go to the "Word Size (out)" screen.
- 3 Press **SELECT** to go to the "Select Channels" screen.
- 4 Use the up/down arrow buttons to go to the pair of channels you wish to configure (1 and 2, 3 and 4, 5 and 6 or 7 and 8).
- 5 Press **SELECT** to go to the "select bit size" screen.
- 6 Use the up/down arrow buttons to choose the word size from the following options: "16 bits", "20 bits" or "24 bits".
- 7 Press **SELECT**. The display will briefly display the "Saving new setting" screen and then revert to the "select bit size" screen.
- 8 Press **MENU** as many times as necessary to do one of the following:
 - Configure another pair of channels.
 - Exit this option.

Chapter 6: Operation

This chapter explains the default screen. There are no operating procedures associated with the DL351 Modular I/O, as it is operated solely from the PRO6 Control Centre. Refer to PRO6 Control Centre operator manual (part number DOC02-DL3) for more details.

Default screen

The default screen appears after the unit has been switched on and has powered up. The following diagram shows a typical default display.



Checking the CBMA/software versions

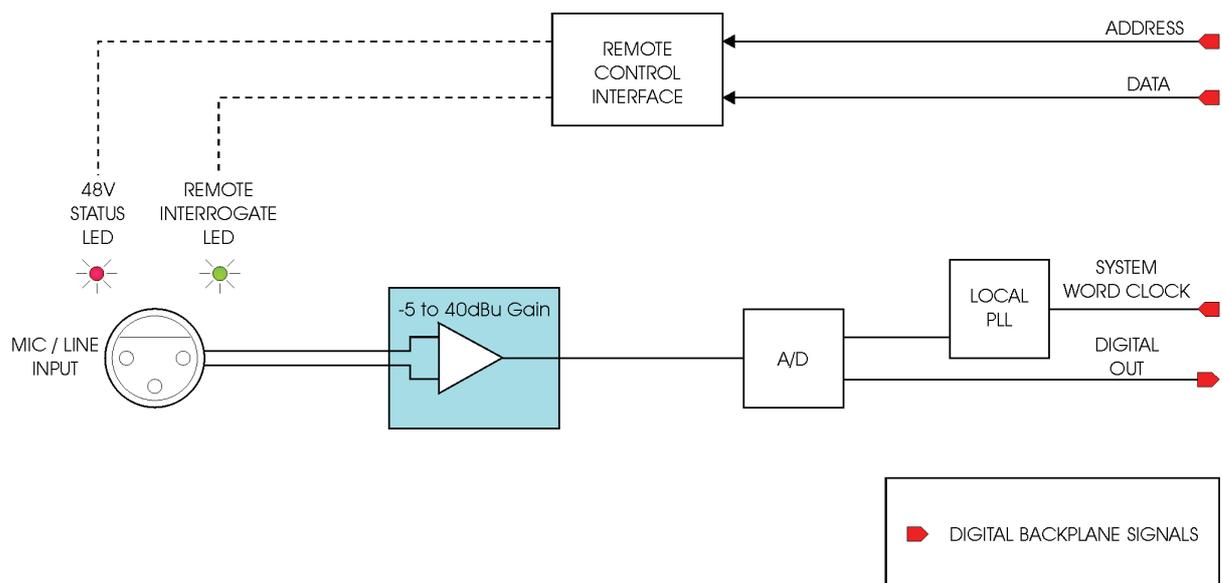
You can check the CBMA and host software versions of the DL351 Modular I/O during normal operation. To do this, see "To view the CBMA version number" on page 18 and "To view the current host software version" on page 18, respectively.

Appendix A: Functional Block Diagrams

This appendix contains a functional block diagram for each module.

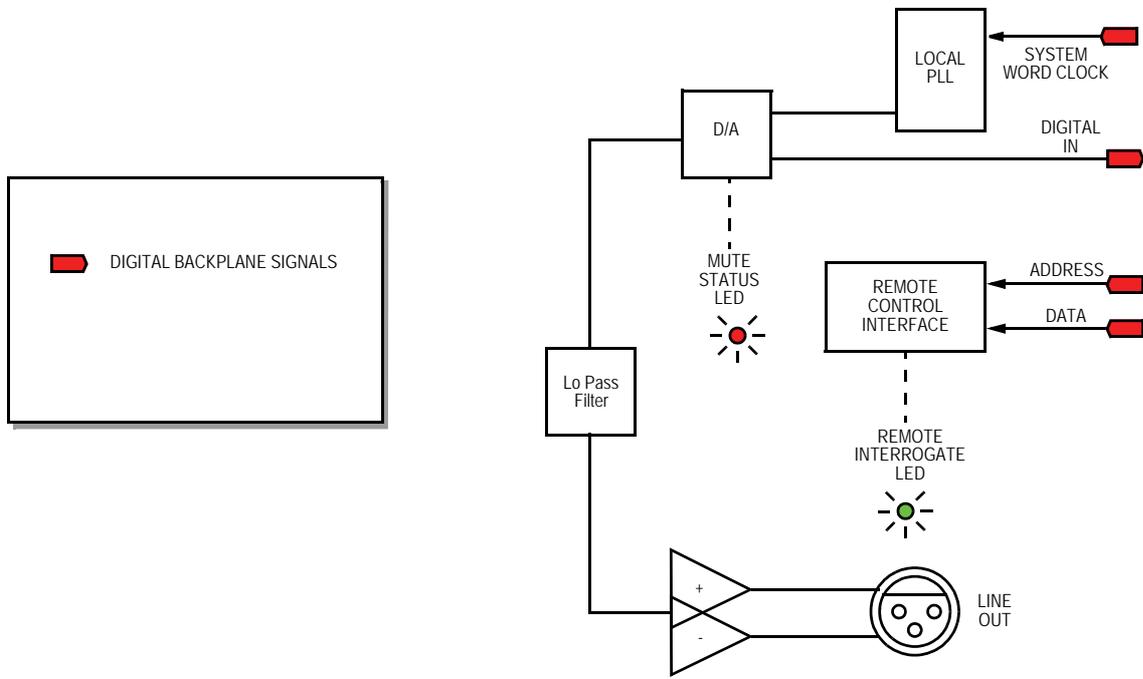
Analogue input module (DL441)

Line/mic board details.



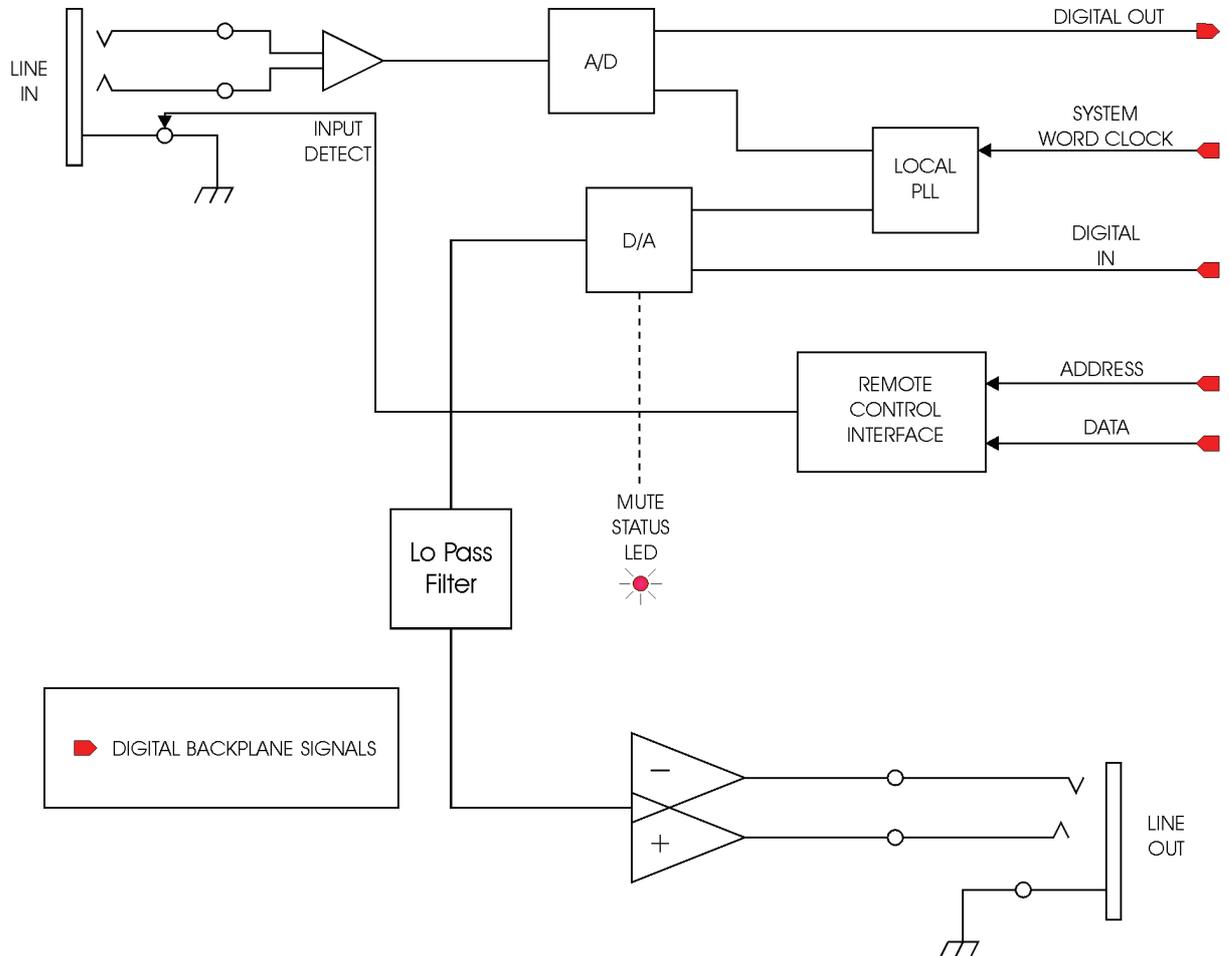
Analogue output module (DL442)

Line out board details.

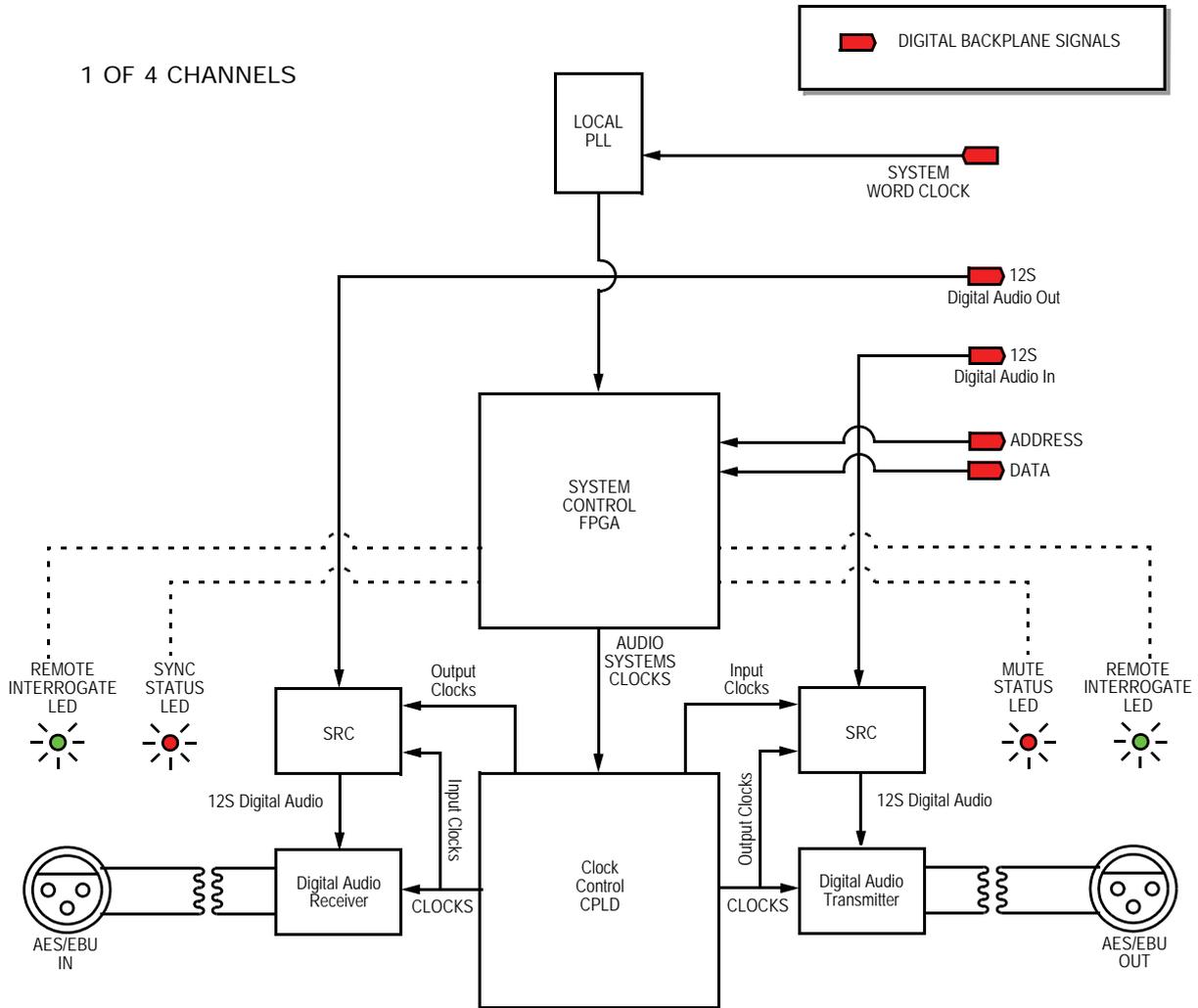


1 OF 8 CHANNEL PATHS

Analogue Jack I/O module (DL443)



AES/EBU digital I/O module (DL452)



Appendix B: Technical Specification

This appendix contains the technical specifications for the DL351 Modular I/O. For system-related DL351 Modular I/O specifications and for full technical specifications for the XL8 Live Performance System, please refer to the Owner's Manual (part number DOC02-DL3).

Due to a policy of continual improvement, Midas reserves the right to alter the function or specification at any time without notice.

General specifications

Dimensions	7U x 410 mm deep
Net weight	50 kg
Power requirements	100V to 240V, 50 to 60Hz
Operating temperature range	+5°C to +40°C
Storage temperature range	-20°C to +60°C

Inputs and outputs

Analogue inputs

Connector	3-pin XLR balanced
A/D converter	24-bit, 96k and 128 times over sampling

Analogue outputs

Connector	3-pin XLR balanced
D/A converter	24-bit, 96k and 128 times over sampling

Digital inputs

Connector	AES3 (two channels of digital audio) on 3-pin XLR
Sample rates	Accepts any frequency between 32k to 96k
Bypass	Sample rate converter can be bypassed

Digital outputs

Connector	AES3 (two channels of digital audio) on 3-pin XLR
Sample rates	48k, 96k or auto tracking to inputs
Bypass	Sample rate converter can be bypassed
Word length	16-, 20- or 24-bit

Analogue Jack inputs and outputs

Connector	16 x 1/4" TRS (8 x inputs (returns) and 8 x outputs (sends))
Miscellaneous	Balanced, normalising and low latency

MIDI and GPIO

MIDI connector	In, out and through on 5-pin DIN
GPIO IN connector	25-pin D-type (opto isolated)
GPIO OUT connector	25-pin D-type (opto isolated)

Digital system inputs and outputs

System connector	3 x AES50 (24 channels of bi-directional digital audio) on EtherCon® XLR
N+1 connector	1 x AES50 (24 channels of bi-directional digital audio) on EtherCon® XLR providing redundant back up

Appendix C: I/O Modules

There are eight module slots (**A** to **H**) into which any combination of the following modules can be fitted:

- DL441 analogue input module; see “DL441 analogue input module” on page 29.
- DL442 analogue output module; see “DL442 analogue output module” on page 30.
- DL443 analogue insert input/output module; see “DL443 analogue Jack I/O module” on page 30.
- DL452 digital in/out (AES/EBU) module; see “DL452 digital I/O module” on page 31.

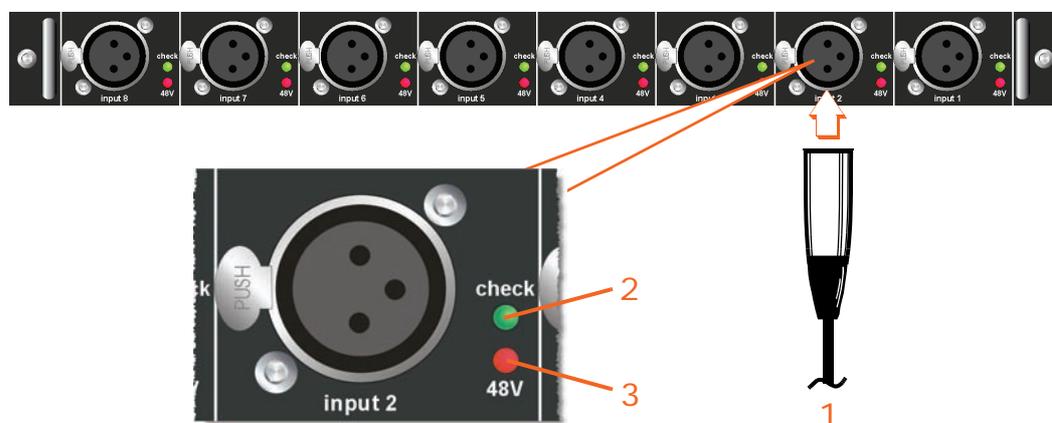
Details of how to replace a module can be found in Appendix D “Replacing An I/O Module”.

DL441 analogue input module

The DL441 analogue input module provides eight balanced line (or mic) inputs. Its rear panel houses eight input XLRs, each with a **check** and a **48V** LED.

The line inputs may be used as simple unity gain inputs to the PRO6, such as insert returns. However, there is also provision for gain adjustment in 5dB steps from -5dB to +40dB. This allows very high signal levels to enter the system and means that the same hardware can be used for mic inputs, if required by the system.

When used for microphones the input can also provide 48-volt phantom power.



1 Eight XLR analogue mic/line inputs.

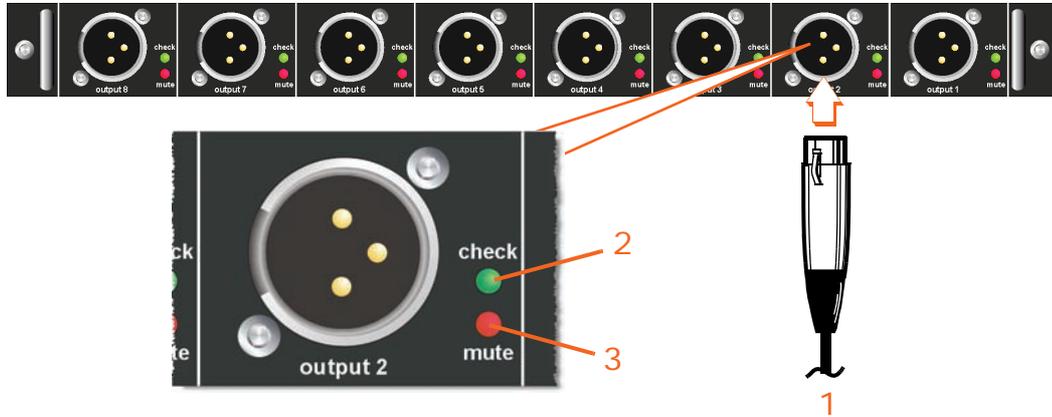
2 Green **check** LED illuminates to show when a channel is selected on a console. These are controlled by the console and are used as a visual aid to locate specific connectors.

3 Red **48V** LED illuminates to show that 48V phantom voltage is on.

DL442 analogue output module

The DL442 analogue output module provides eight balanced line outputs. Its rear panel houses eight output XLRs, each with a **check** and a **mute** LED.

The line outputs have no analogue level adjustment.

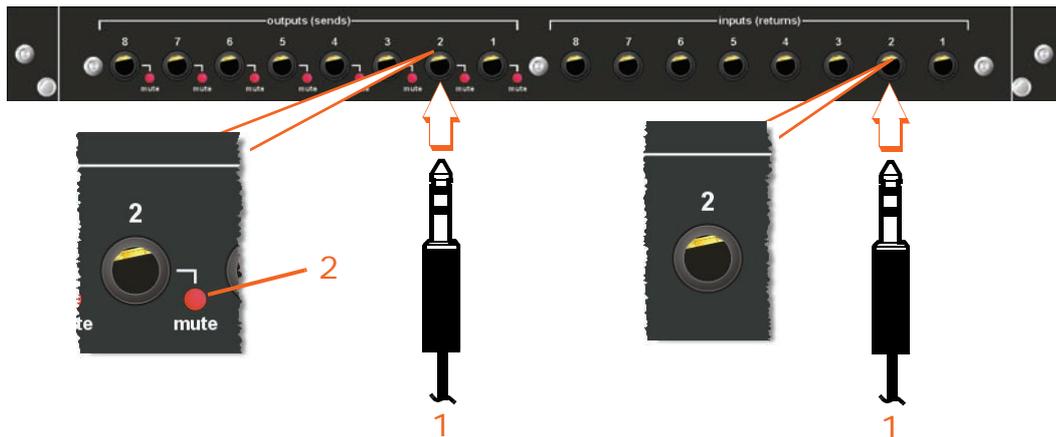


- 1** Eight XLR analogue outputs.
- 2** Green **check** LED illuminates to indicate when a channel is selected on the console. These are controlled by the console and are used as a visual aid to locate specific connectors.
- 3** Red **mute** LED illuminates to show when the channel is muted on the console.

DL443 analogue Jack I/O module

The DL443 Jack I/O module provides a reliable, robust, high quality option where maximum connectivity is required at reduced cost. It has normalising and low latency, and is of robust construction.

The DL443 Jack I/O module has a total of 16 ¼" Jack sockets providing eight outputs (sends) and eight inputs (returns). Each output has a red **mute** status LED.



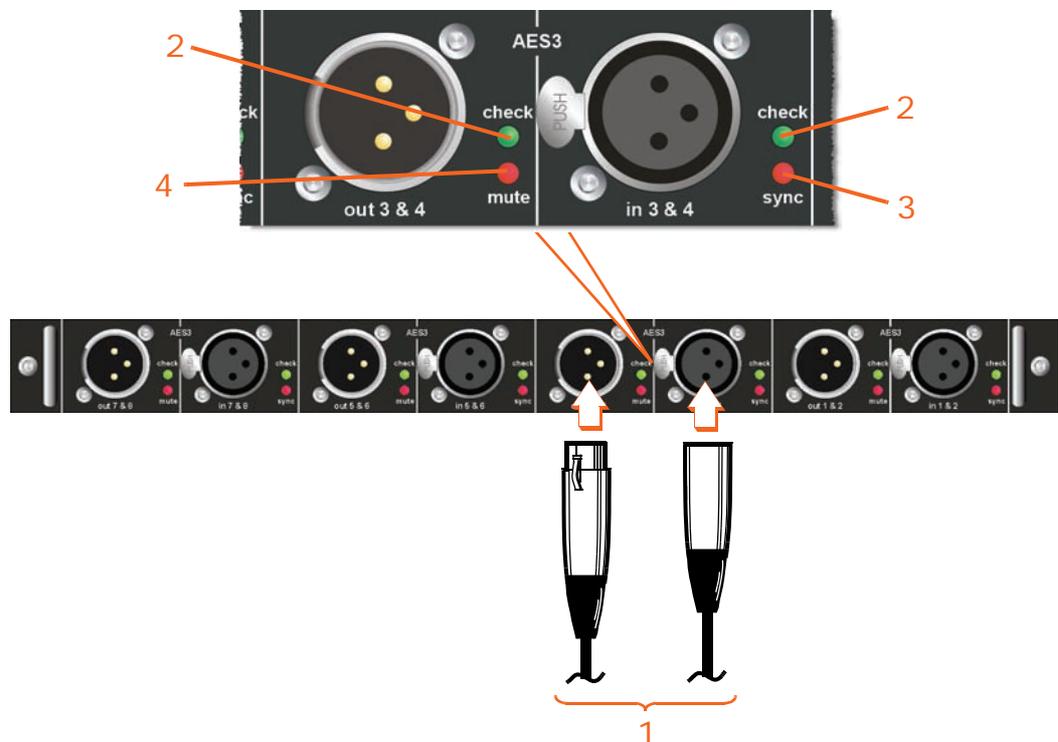
- 1** Eight jack sockets per **inputs (returns)** section and eight jack sockets per **outputs (sends)** section.
- 2** Red **mute** LED on each **outputs (sends)** jack socket illuminates to show when a channel is muted on the console.

DL452 digital I/O module

The DL452 digital I/O module provides four (stereo) AES/EBU inputs and outputs. Its rear panel houses these I/Os in four pairs. Each input has a **check** and a **sync** LED and each output has a **check** and a **mute** LED.

Each AES/EBU input can run at sample rates up to 96kHz (44.1kHz, 48kHz, 88.2kHz and 96kHz) using a sample rate converter (SRC). If the digital input is synchronous with the system clocks, the SRC can be bypassed to remove approximately 1ms of delay, which is inherent in the sample rate conversion process.

Each AES/EBU output can also run at sample rates up to 96kHz by using an (SRC). There are two potential clock sources for the digital outputs: the system and the coinciding digital input. When using the system to drive the digital outputs, the output SRC is bypassed and the sample rate of the output is matched to the system. When the digital input clocks are used to drive the digital outputs, the SRC is enabled and the audio output is converted from the sample rate of the system to the sample rate of the digital input.



1 Four pairs of digital **AES3** (AES/EBU) XLR inputs and outputs.

2 Green **check** LED illuminates to show when a channel is selected on the console. These are controlled by the console and are used as a visual aid to locate specific connectors.

3 Red **sync** LED illuminates to show that a valid AES3 connection is present on the digital input.

4 Red **mute** LED illuminates to show when the channel is muted on the console.

Appendix D: Replacing An I/O Module

This appendix provides instructions on module replacement.

Replacing a module

The design of the DL351 Modular I/O makes module replacement very easy and straightforward. The unit has rack guides in each of the eight module positions so that the modules can slide easily in and out. Each module is held in place by two screws, at the left- and right-hand sides. A short metal post (or stud) adjacent to each screw facilitates removal.

>> To remove a module

- 1 Switch off the unit and isolate it electrically (see "To switch the unit off" on page 10).
- 2 Disconnect all connectors from the rear panel, such as mains, XLRs, USBs etc.
- 3 Remove the two securing screws at either end of the module you wish to remove (see Figure 1).
- 4 Pull out the module using the two circular machined posts (adjacent to the securing screws).

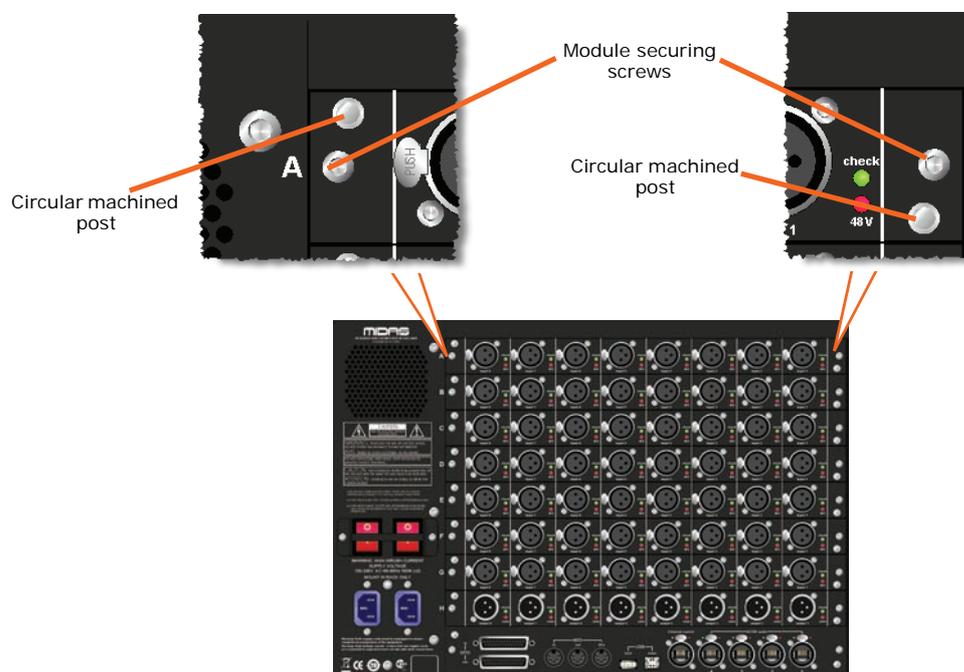


Figure 1: Location of components involved in module removal

>> To fit a module

- 1** Make sure the unit is switched off and electrically isolated; see "To switch the unit off" on page 10.
- 2** At the rear of the unit, offer up the rear of the module to its required module position. Make sure the module is in the correct orientation.
- 3** Insert the module and push it carefully into position.
- 4** Secure using two securing screws (see Figure 1 "Location of components involved in module removal" on page 33).
- 5** Connect up the unit and switch it on (see Chapter 4 "Getting Started").
- 6** Check that the new module is functioning correctly.

Although the unit will recognise the type and position of the new module just fitted, you may need to configure some of its options (see Chapter 5 "Main Menu").

Appendix E: Service Information

This appendix provides instructions on routine servicing and cleaning, and gives details on equipment disposal.

Routine maintenance

To help keep your DL351 Modular I/O unit in good working order and to make sure it gives you optimum performance, we recommend that you carry out the following:

Monthly

- Clean the unit, as detailed in “Cleaning the unit” on page 35.
- Check pushbuttons for freedom of operation.
- Check functionality of all pushbuttons, LEDs and the LCD display. You can quickly carry out a visual check by switching the unit off and then on again, as they are all activated during power-up.
- Check functionality of equipment.

Yearly

- Clean the internal fans, see “Cleaning the internal fans” on page 36.

Cleaning

Switch off the unit and electrically isolate it from the mains *before* cleaning; see “To switch the unit off” on page 10.

Cleaning the unit

Clean the unit using a dry, lint-free cloth. Do not use harsh abrasives or solvents. When cleaning the unit, take great care not to damage the pushbuttons.

Cleaning the LCD display

Carefully wipe the surface of the LCD display with a soft, lint-free cloth using ethanolic liquid, such as a screen cleaner for LCDs, or by using a screen wipe specially designed for the purpose. When cleaning the LCD display, please take the following precautions:

- Avoid putting pressure on the screen.
- Don't use harsh abrasives, for example, paper towels.
- Don't apply liquids directly to the screen.
- Don't use ammonia-based cleaners and solvents, such as acetone.

If you have any queries about cleaning the LCD display, please don't hesitate to contact us.

Cleaning the internal fans

The unit's internal fans need to be cleaned regularly to remove the build of dust, dirt etc. We recommend that they are cleaned at least once a year, provided the unit has been operated under normal conditions. However, if the operating conditions are more adverse or extreme, for example, if the unit is operated in the vicinity of smoke machines, new carpets etc., this frequency should be increased accordingly.

This procedure must be carried out by a fully qualified service engineer. If you have any queries, contact Midas; details can be found at the front of this manual.

Equipment disposal

When this equipment has come to the end of its useful life, its disposal may come under the DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Hazardous substances in WEEE contaminate water, soil and air and ultimately put at risk our environment and health. The directive aims to minimize the impacts of WEEE on the environment during their lifetimes and when they become waste.

The WEEE directive addresses the disposal of products when they have reached the end of their life and contributes to the reduction of wasteful consumption of natural resources. This will help to reduce pollution, and protect the environment and ourselves.



If this equipment carries a 'crossed-out wheellie bin' (shown left), please do not dispose of WEEE as unsorted municipal waste but collect and dispose of in accordance with local WEEE legislation. The horizontal bar underneath indicates that the product was placed on the EU market after 13th August 2005.

For WEEE disposal; see our website at www.midasconsoles.com for information.

Appendix F: PRO6 Live Audio System

This chapter provides a detailed overview of the XL8 Live Performance System.

Standard system configuration

The PRO6 Live Audio System is a very powerful and flexible audio processing system that provides a complete solution for any audio mixing and signal distribution application in a live sound environment.

Despite its compact size the standard PRO6 offers 56 channel inputs, eight auxiliary returns, 41 buses (16 auxes, 16 matrices, three masters and six solos), eight on-board effects processors, PEQs (four-band on inputs and six-band on outputs), eight standard (up to 36 maximum) 31-band GEQs, eight configurable stereo effects¹, 5.1 surround panning and comprehensive, easy-to-use routing. PRO6 automation provides up to 1,000 scenes with snapshot save/recall capability and global edit, and show file archiving.

The PRO6 Control Centre forms the core of the PRO6 Live Audio System, which also includes two 19" rack units — a DL351 Modular I/O (7U) and a DL371 Audio System Engine (7U) — that are interconnected by a networked data system. The network carries both proprietary control data and open architecture AES50 digital audio, and uses readily available standard cabling and connectors. The PRO6 uses a proven stable Linux operating system. All of the control centre's internal and network routing ("patching") is managed via the graphical user interface (GUI).

Operation of the control surface is intuitive, unique and easy. Its layout is based on familiar analogue lines to retain that 'analogue' feel. To manage the numerous channels, the PRO6 Control Centre utilises VCA/POP groups and colours, and additionally there are various navigational controls that aid quick channel/bus access and selection. A daylight-viewable GUI at the top of the control surface assists operation and provides extra functionality.

The PRO6 Live Audio System is tolerant of many types of hardware or software failure. To achieve this the system employs dual redundancy, where a key component has an identical redundant spare that is ready to take over should it fail. Other failure scenarios are managed by the N+1 principle, where redundant components form an acceptable fraction of the system.

The Klark Teknik DN9696 Recorder can be used with the PRO6 Live Audio System for live multi-track recording and 'virtual' sound check. Optional equipment includes the XL8's DL451 I/O and DL431 splitter, and the DN9331 RapidE for remote GEQ operation.

-
1. Each can be configured to generate four additional GEQs, making a total of 36 available on the control centre (plus one stereo effect).

Key features

Please remember, the PRO6 is not just a console, it's a LIVE AUDIO SYSTEM!

- **High channel count** — 56 mixed primary inputs (sourced from up to 112 input locations) and 35 output channels.
- **Control centre** — Small and very compact with an exciting but familiar and ergonomic control surface, enhanced by a two-screen GUI.
- **Performance** — Reduced price, scale and features, but still with XL8 audio performance.
- **Operation** — Easy to use with responsive interpolated controls and fast, intuitive human interfaces that combine to produce that familiar *analogue* feel.
 - **User interface (speed and feel)** — VCA groups (console comes to you!); POP groups (console comes to you!); muscle memory (E-zone and D-zone on channel strips, which have paged controls that do not change function); input and output fast zones; electronic colour coding; and dedicated motorised master output faders.
 - **User interface (status visibility)** — Dual daylight-visible screens and integral surface illumination; metering (23 discrete 20-segment LED meters), discrete metering for dynamics, and *all meters all of the time*; "ST" assign switch; and eight channels of key data plus a single channel strip on both GUI screens.
- **Traditional Midas and Klark Teknik audio quality:**
 - **Headroom** — High headroom, which is well behaved, even when *pushed a little too hard*.
 - **Mic amps** — High quality, overload tolerant microphone amplifier per input.
 - **Dynamics** — High quality dynamic processing with traditional *analogue* artefacts. Midas dynamics has four styles on the inputs and five on the outputs.
 - **EQ** — Fully interpolated phase shifting EQ for that "Midas" sound.
 - **PEQ** — High quality EQ with the "Midas" sound. Each output has six-band parametric EQ, while the inputs have four bands each. Midas sound quality and 'feel' on the EQ's four filters.
 - **GEQ** — Up to 36 (eight if all stereo effects are being used) Klark Teknik quality GEQs with unique on-board fast access controller and control from RapidE.
 - **Effects** — High quality effects processing with traditional artefacts. Up to eight stereo effects units.
- **Patching** — Unique simple-to-use routing system allows you to carry out all your routing needs and also configure any attached devices via the GUI.
- **Navigation** — VCA-based and other advanced intuitive paging/navigation methods.
- **Automation:**
 - **Snapshots** — Flexible *snapshot* style save and recall of control settings and cross-scene global edit capability.
 - **Showfiles** — USB connectors for show archiving. Showfiles are both forward and backward compatible across firmware versions.
- **Metering** — Comprehensive metering. The GUI can show all of the meters all of the time.
- **Dual operation** — Capable of supporting two-man operation, which is ideal for festival situations.
- **Storable preferences** — Storable user operational preferences to suit specific applications, for example, FOH/MON.
- **Broadcasting** — 5.1 surround panning for broadcast markets.

- **Latency** — Low and managed latency through the system. Minimal latency and fully time aligned.
- **Cabling** — Cat 5e or fibre optic snakes. Standard system has reduced cabling as compared to any other available solution.
- **System design and network:**
 - Integrated open-architecture AES50 digital audio distribution.
 - Up to 100 metres (Cat 5e) or up to 500 metres (optical fibre) of dual redundant connectivity between hardware elements.
 - Automatic integral delay management system - audio outputs time and phase coherent.
 - Flexible, expandible hardware system includes analogue and digital I/O options for flexible system integration.
 - Ethernet TCP-IP and USB tunnelling for third parties.
 - KVM (keyboard, video and mouse) switching on control centre.
 - Fast flexible audio and control system architecture.
 - Modular digital and analogue I/O options.
 - Advanced automation and system operating preferences.
 - PRO6 is flexible and the system can be customised with the needs of the install.
 - VGA outputs for additional screens.
- **Reliability** — High reliability with some redundancy and other back up contingencies.
 - Failure-tolerant of any single failure of hardware or software.
 - Proven, stable Linux operating system.
 - Dual redundant control surface master controllers and PSUs.
 - Duplicated (N+1) network for redundancy.
 - Control centre has triple redundant power supplies.
 - DL351 Modular I/O (stage box) has dual redundant power supplies.
 - DL371 Audio System Engine (stage box) has N+1 (optional) modules with three (N+1) power supply units (PSUs).
- **Service and support** — 24/7 global telephone support. Service/support centres in US, UK and Singapore.

Applications

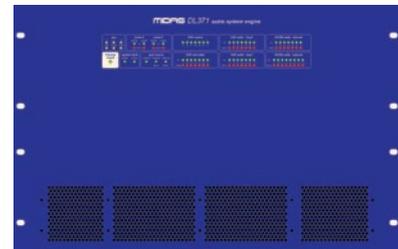
The PRO6 is the 'work horse' mid- to high-end Midas Digital Console System, akin to the 'industry standard' Heritage 3000. Although the PRO6 is designed for the traditional touring live sound environment, it is also ideal for medium-sized theatre, small house of worship installations and broadcast. So, being a truly multi-function console in the Midas tradition, the PRO6 is suitable for many applications, such as:

- Live sound touring MON or FOH duties.
- Live sound small theatre MON or FOH duties.
- Live sound house of worship MON or FOH duties.
- Live sound broadcast mixer with basic 5.1 surround capabilities and monitoring.

System components (standard supply)

The PRO6 Live Audio System is modular, allowing for some variations in physical placement and system size. The standard PRO6 touring system package is configured as a 14U rack (containing two DL3n1 units) in a single, easily portable flight case, with an equally portable, flight-cased control surface and minimal cabling. This package comprises:

- 1-off PRO6 Control Centre (in a flight case). Its user-configurable modular I/O rack (rear panel) will be populated with the following modules (from top to bottom):
 - DL443 analogue Jack I/O module, providing eight Jack line inputs and eight Jack line outputs.
 - DL441 analogue input (mic) module, providing eight balanced mic/line inputs.
 - DL442 analogue output module, providing eight balanced line outputs.
- 1-off main 14U rack (in a flight case), which houses:
 - 1-off DL351 Modular I/O. This is populated with seven DL441 analogue input modules (56 main inputs) and a DL442 analogue output module. There are a total of 56-off XLR mic/line inputs provided on the system.
 - 1-off DL371 Audio System Engine. This is populated with five cards, the two empty slots being blanked off. (If the optional N+1 redundant DSP module card is fitted, there will be six cards and one empty slot.)
 - 4-off interconnecting (N+1) rack Cat 5e copper cables.
 - 2-off interconnecting (dual redundant) gigabit HyperMac Cat 5e copper cables, each 100 m long.
 - 8-off mains cables.



FOH and MON

The PRO6 Live Audio System can be used as a front of house (FOH) or stage monitor (MON) system.

System buses

The PRO6 has comprehensive system buses to suit demanding applications, comprising:

- 6-off solo buses, routable from all locations and allowing for dual operator and 5.1 use.
- 3-off master buses, routable from the 56 inputs and eight aux inputs, and six aux buses.

- 16-off matrix buses, routable from the 56 inputs and eight aux inputs, and 16 aux buses and three master buses.
- 16-off aux buses, routable from the 56 inputs and eight aux inputs.

All the bus routings (above) provide simultaneous and time aligned mixing of all the sources, which will be defeatable for minimum latency requirements.

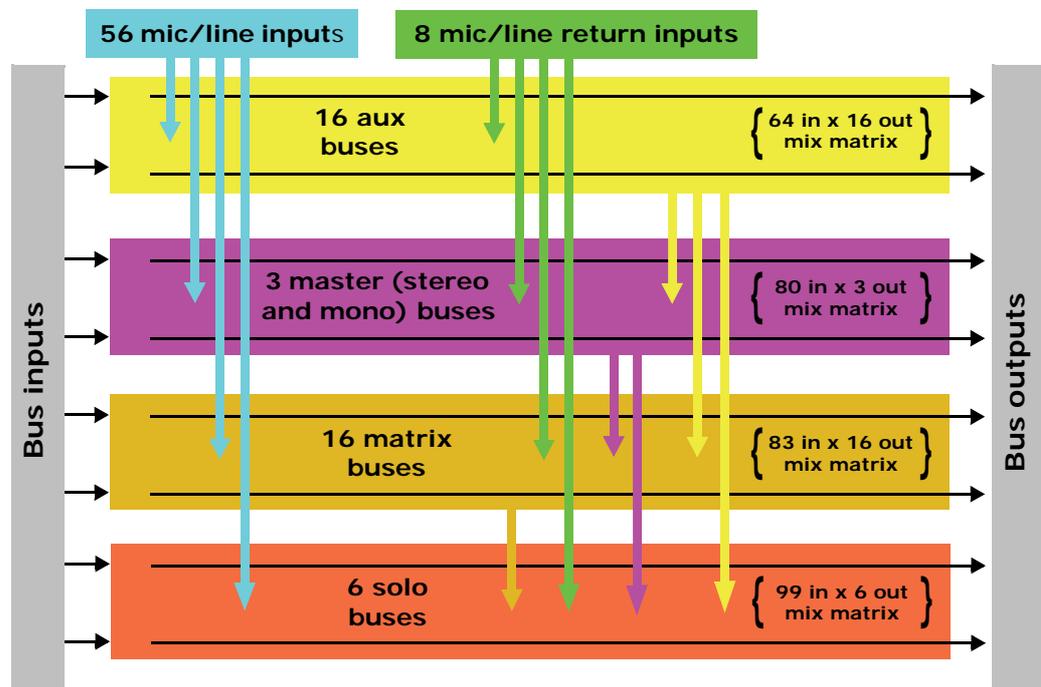
For monitor mixing, the master, matrix and aux buses can all be routed directly from the input channels with independent level controls providing up to 35 monitor mix buses.

For traditional FOH sub group mixing, any (or all) of the aux buses can change to operate post-channel fader and pan (that is, aux gain fixed at unity).

Auxiliary inputs have two modes of operation: effects return and input channel. In input channel mode (default) they will have aux, master and matrix routing, insert points and EQ (like regular inputs channels), but no dynamic capability. They are controlled like regular inputs from the input bay and channel strip, and are time aligned to the stage like regular input channels. In effects return mode the channels have routing to matrix and masters only and no insert or dynamic capability. They are controlled from the aux return area and time aligned to the effects engines.

Mix matrix

Ultimately, the mix matrix defines the capability of the PRO6 Control Centre. Probably the best way to imagine the mix matrix is to think of an analogue console layout, where inputs run vertically and buses run horizontally. A mix matrix is usually defined as the number of buses and the quantity of simultaneously-mixable inputs there are per bus. The following diagram illustrates the capability within the control centre.



Processing

Although the control centre system allows for considerable insertion of external processing it also embodies more than enough internal high quality processing to eliminate the need for this, in the interests of simplicity and reduced overall system size, weight and cost.

Processing components

The processing available is:

- 56 x 12 or 24dB/oct. high pass filters.
- 56 x 6 or 12dB/oct. low pass filters.
- 91 x compressor/limiters with side chain filtering and multiple operating "signatures".
- 56 x gates with side chain filtering.
- 64 x 4-band parametric EQs with multiple shelf "modes".
- 35 x 6-band parametric EQs with hi/lo pass modes.
- 8 assignable 31-band graphic EQs.
- 28 additional 31-band graphic EQs that utilise effects processor digital signal processing (DSP), reducing the available effects quantity stated below.
- 8 stereo effects processors including Reverbs, Delay, Flange, Phase, Dual (stereo) Graphic and Pitch Shifter.

Note: More effects are planned to be added in the future, which may include multi-band compression, dynamic EQ etc.

Input channel processing

Each of the 56 full-function input channels has:

- Analogue and digital gain.
- Phase reverse switch.
- Input delay.
- Swept high pass filter with choice of two filter slopes.
- Swept low pass filter with choice of two filter slopes.
- Frequency-conscious compressor with choice of four compression styles.
- Frequency-conscious noise gate with external side chain.
- Insert point.
- Treble EQ filter with choice of four filter types.
- Parametric hi-mid EQ filter.
- Parametric lo-mid EQ filter.
- Bass EQ filter with choice of four filter types.
- Routing via level controls to 32 mix buses.
- Routing via pan control to left and right master buses.
- Routing to mono master bus.
- Panpot (SIS™).
- Direct output.

Each of the eight auxiliary inputs has:

- Input gain.
- Source from internal FX or external input.
- EQ.
- Fader.
- Panpot (SIS™).
- Routing via level controls to the 16 matrix buses.
- Routing via pan control to the left, right and mono master buses.

Mix channel processing

Each of the 16 auxiliary mix buses has:

- Subgroup, auxiliary or mix minus modes.
- Dual mono or stereo pair modes.
- Six-band PEQ.
- Optional 31-band GEQ (replaces PEQ).
- Frequency-conscious compressor with choice of five compression styles.
- Insert point.
- Routing via level controls to the 16 matrix buses.
- Routing via pan control to the left, right and mono master buses.
- Direct input.

Each of the 16 matrix buses has:

- Six-band PEQ.
- Optional 31-band GEQ (replaces PEQ).
- Five-mode frequency-conscious compressor with soft clip limiter and external side chain.
- Insert point.
- Direct input.

Output channel processing

Each of the 16 matrix buses has:

- Six-band PEQ.
- Optional 31-band GEQ (replaces PEQ).
- Five-mode frequency-conscious compressor with soft clip limiter and external side chain.
- Insert point.
- Direct input.

Each of the three master output buses has:

- Six-band PEQ.
- Optional 31-band GEQ (replaces PEQ).
- Five-mode frequency-conscious compressor with soft clip limiter and external side chain.
- Insert point.

- Direct input.
- Routing via level controls to 16 matrix buses.

Effects processing and GEOs

The PRO6 contains eight mono Klark Teknik (KT) GEOs and seven effects processors as standard.

The seven effects processors can be freely chosen from:

- KT DN780 reverb.
- Delay.
- Flanger.
- Phaser.
- Pitch shifter.
- SQ1 dynamics.
- Stereo 3-band compressor.

The eight mono KT GEOs can be patched into any output. There are many patching options for the effects processors:

- Assign to any insert send/return.
- Assign to any pool, in or out.
- Assign FX out to aux return.
- Assign FX in to aux send (post-fade).
- Assign FX out to bus direct in.
- Assign FX in to channel direct out.

A Klark Teknik DN9331 RapidE motorised fader GEO controller can be used with the PRO6. This unit provides rapid adjustments of the graphics with real hardware, and not a mouse and screen. The graphic channel is selected either by the SOLO button (solo tracking system (STS™)) on the PRO6 Control Centre or by buttons on the RapidE itself.

Audio physical connections

The total number of audio connections, that is, the XLR count, for a standard PRO6 Live Audio System is 96. This includes dedicated and configurable XLR connections. The dedicated XLR connections on the DL351 Modular I/O comprises 56-off mic/line inputs.

All of the configurable connections are on the PRO6 Control Centre, which can be freely located at the FOH or on stage. Three banks of sockets (eight XLRs each) are available for:

- 8-off 1/4" TRS analogue mic/line inputs (returns) and 8-off 1/4" TRS analogue outputs (sends).
- 8-off AES/EBU XLRs providing eight digital inputs and eight digital outputs per module.
- 8-off XLR analogue inputs.
- 8-off XLR analogue outputs.

Surround capabilities

Theatres and broadcast have differing requirements for surround and both are catered for in the PRO6.

Conventional stereo and SIS™ panning is assignable on a channel by channel basis (channel one can be in stereo while channel two can be in SIS™), as follows:

- Stereo left–right routing to master buses.
- SIS™ left–right–centre routing to master buses.

Three additional surround modes operate as follows:

- Quad left – Right – LS – RS routing to Matrix 1, 2, 5 and 6.
- Surround Left – Right – Centre – Surround routing to Matrix 1, 2, 3, and 5 and 6.
- 5.1 Surround Left – Right – Centre – Sub – LS – RS routing to Matrix 1, 2, 3, 4, 5 and 6.

Network

The MidasNET network of the PRO6 utilises the physical connectivity of Ethernet (EtherCon® connectors and Cat 5e/copper cable), but replaces its data protocol with AES50 protocol (implemented as SuperMac) and the HyperMac high capacity system, which are more suited to high quality, low latency audio distribution. The use of the AES standard allows straightforward interfacing with any third party hardware that also utilises this connection.

MidasNET connections carry digital audio, control data and standard Ethernet traffic bi-directionally down a single cable. Cat 5e cable is used for the 'local' connections and the single digital 'snake' (equivalent to a 384-channel analogue multi-core) between control centre and DL371 Audio System Engine. The combination of audio, control, clock and third party Ethernet data in a single network means that the hardware interfaces on a single RJ45 connection.

All system connections are duplicated for full dual redundancy.

Reliability (redundancy)

All critical system connections and most components incorporate integral backup and recovery strategies such as redeployment of resources, N+1 or dual redundancy etc. A modular approach to software, hardware and physical construction also aids reliability and simplifies servicing. The following lists some examples:

- The DL371 Audio System Engine incorporates N+1 redundant power supplies and five modules, with the capability to fit an optional sixth spare module. The standard failure recovery for modules will be redeployment of critical roles typically causing loss of some less important inputs. With the optional sixth module fitted, the system will operate as N+1 and there will be no loss of function after redeployment.
- The router is contained in the same rack and incorporates dual HyperMAC connections in and out.
- The control centre contains dual redundant master controllers, dual GUI screens and N+1 redundant power supplies.
- The I/O is modular in blocks of eight to limit the potential for total audio connection failure and incorporates dual redundant power supplies.

This resilience strategy provides high reliability performance at a reasonable cost because it is designed in from the start and not as an afterthought.

Control software

The operating system of the PRO6 is Linux, which is an open-source, stable, proven operating system (OS). Linux is used in many mission-critical applications worldwide and has allowed Midas' software engineers to write a ground-up system that contains no 'hidden' or unused code. This has resulted in an efficient, compact application, which is quick in operation, quick booting and comparatively easy to debug.

Two copies of the master control software run on separate processors to provide resilience to failure.

GUI

The PRO6 has two, daylight-viewable, TFT screens that provide fast zone and channel strip status indication. Although, any screen can display any information but, in the standard configuration, screen information relates to module location. So, the mix bay screen displays the channel strip and fast zone (12 inputs and 16 outputs), while the master bay screen displays the channel strip input fast zone (four inputs) and all meters. The master bay screen is also generally used for automation, effects, GEOs, third party screens etc., although this is dependent on the current application (concerts will probably be different to theatre) and also operator preference.

The screens are controlled from the primary navigation zone at the bottom of the master bay via two trackballs. A USB keyboard (supplied) is used for text editing.

System card expansion

Additional digital I/O format options will be available later, for example, MADI.

Console linking

You can link two PRO6 Control Centres together. Just connect an AES50 cable from a spare AES50 port on one router to a spare port on another, and then set them up "Generic AES50" connections in the GUI menu's **Patching** screen.

Integration of third party hardware/software

The PRO6 network includes the capability to interface any third party hardware that uses AES/EBU or AES50 digital audio, or standard analogue audio interface.

Each PRO6 AES/EBU input and output has a sample rate converter. Synchronisation to external AES3 interfaces can be:

- Global - via inputs on the routers.
- Local to each input.
- Local to each output (synchronisation to adjacent local output).

Multiple local connections can be at different sample rates.

The use of the AES50 protocol for the transmission of digital audio means that any third party digital audio hardware that features this connection can be connected to the Midas network, and will transfer audio to and from the Midas hardware without any additional interfaces or converters (provided it runs in TDM 96kHz mode). This will be particularly useful as the protocol gains acceptance with recording and playback devices, loudspeaker controllers, audio networking systems, digital amplifiers etc.

PC or MAC computers can use the Ethernet tunnel in the MidasNET system, and can communicate with other computers on the network.

The PRO6 Control Centre features an external video for both screens, and the master bay GUI screen (on the right) also has a three-way KVM switch. Control centre views can be routed to external monitors, and external video sources can be displayed on the control centre.

The KVM switch facilitates the control of three external computers via the screen, trackball and keyboard of the control centre. This is hugely important and means that third party systems can be controlled from within the PRO6 without having to move your head to look at screens placed off to one side. *It also means that there is no need to find somewhere to put multiple keyboards and mice.* Examples are:

- Netmax (AES/EBU audio link initially and CobraNet™ when the 48kHz I/O module is available on PRO6).
- IRIS (for example, for RL amps).
- Wireless mic controllers.
- Your email.
- DVD movies.

Appendix G: Setting Up A PRO6 System

This chapter shows you how to set up a PRO6 Live Audio System to its default configuration.

Note: *If you want to set up the PRO6 Live Audio System using a configuration other than the default, please contact Midas Technical Support for details.*

Initial set-up procedure

Initial system set-up basically comprises:

- Unpacking and checking the equipment — see “Unpacking the equipment” on page 49.
- Making up a rack — see “Making up a rack” on page 49.
- Connecting up the equipment — see “Wiring instructions” on page 49.
- Powering the equipment — see “Powering the PRO6 system” on page 51.
- Initial patching — refer to the XL8 Live Performance System Owner’s Manual or PRO6 Control Centre Quick Reference Guide for details. **It is important to set up the type of snakes connected in the system.**
- Configuring the DL351 unit — see “To set up the ID of the unit” on page 17.

Unpacking the equipment

After carefully unpacking the equipment, check it against the packing list shown in “System components (standard supply)” on page 40 “System components (standard supply)” on page 40.

Save all packing materials, as they will prove useful should it become necessary to transport the equipment later.

Inspect the equipment carefully for any sign of damage incurred during transportation. It has undergone stringent quality control inspection and tests prior to packing and was in perfect condition when it left the factory. However, if the equipment shows any signs of damage, notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for damage during transportation.

Making up a rack

In the standard supply, the rack supplied with the PRO6 Live Audio System is fully fitted with the DL351 Modular I/O and DL371 Audio System Engine units.

Wiring instructions

Connect the snake (Cat 5e or fibre optic) to the DL371 Audio System Engine unit and PRO6 Control Centre (see Figure 2 “Standard system configuration” on page 50).

The DL351 Modular I/O and DL371 Audio System Engine units should already be connected together when you receive them.

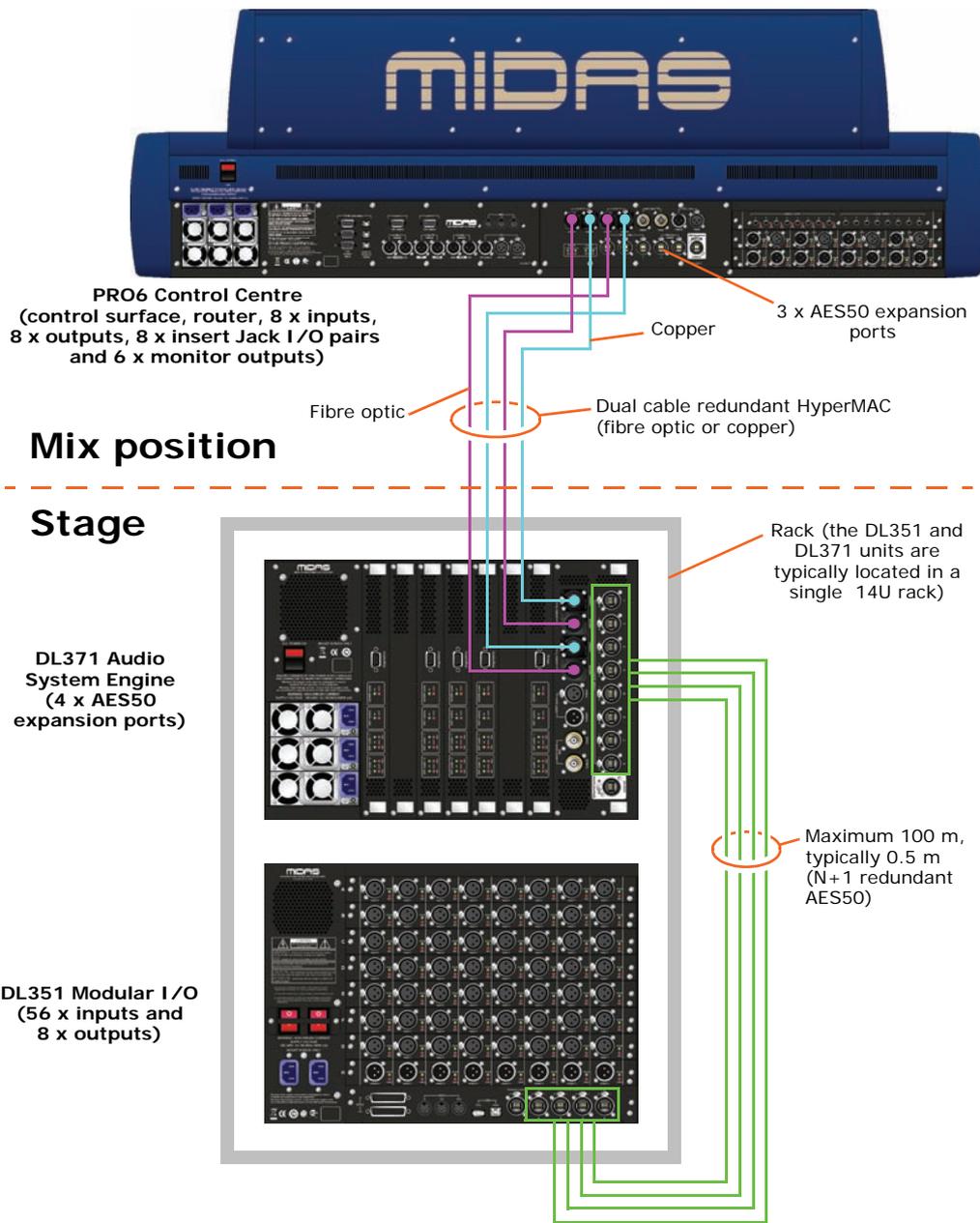


Figure 2: Standard system configuration

Important:

The PRO6 Control Centre, DL351 Modular I/O and DL371 Audio System Engine all have Volex locking type plugs fitted on their supplied mains cables, which plug into their mains IEC connectors. When fitted properly the Volex plug locks into place, preventing it working loose, or being inadvertently knocked loose or pulled out. For details of how to fit/remove a Volex plug, see "Power" on page xi.

Powering the PRO6 system

The following details the recommended power up and power down procedures for the PRO6 system.

Note: If you are in any doubt as to how to switch the DL3n1 units on/off, refer to their operator manuals.

>> To power up the PRO6 system

Important Note:

DO NOT switch on the speaker sub-system until after the start-up of the PRO6 system has been completed.

After all PRO6 system interconnections have been made (refer to Figure 2 “Standard system configuration” on page 50), start up the PRO6 system:

- 1 Make sure that all of the PRO6 system equipment is switched off, such as the PRO6 Control Centre, speaker sub-system, DL351 Modular I/O unit and DL371 Audio System Engine unit.
- 2 Switch on the PRO6 Control Centre (see “To switch on the PRO6 Control Centre” on page 52).
- 3 In the master bay of the PRO6 Control Centre, move all of the monitor and master channel faders to the minimum position and mute all of the master channels.
- 4 Power up the PRO6 components, such as the DL351 Modular I/O unit and the DL371 Audio System Engine unit. This can be done in any order you like.
- 5 After the **status** indicator at the top of each GUI screen has changed to green (as shown right), switch on the speaker sub-system.
- 6 Switch on the audio source and start playing the audio.
- 7 On the PRO6 Control Centre, check that the audio inputs are routed to the master channels. Then, unmute the master channels and gradually increase their faders while listening to the sound levels from the speakers.



If there is no sound at all coming from the speakers when the faders are at maximum, move the faders to below the 0dB level and check if the audio is muted somewhere along the input paths and also check that the individual speakers are switched on. If there is still no sound from the speakers, see “No audio” on page 73.

>> To power down the PRO6 system

Important Note:

BEFORE switching off any of the PRO6 system components, don't forget to mute the audio from the speakers and switch off the speaker sub-system.

- 1 Mute the audio from the speakers and switch off the speaker sub-system.
- 2 Switch off the DL351 Modular I/O unit.
- 3 Switch off the DL371 Audio System Engine unit.
- 4 Switch off the PRO6 Control Centre (see “To switch off the PRO6 Control Centre” on page 52).

Switching the PRO6 Control Centre on/off

Carry out the following to switch the PRO6 Control Centre on or off in a safe manner, observing all **WARNINGS** and **Cautions**.

>> To switch on the PRO6 Control Centre



Caution (1)!

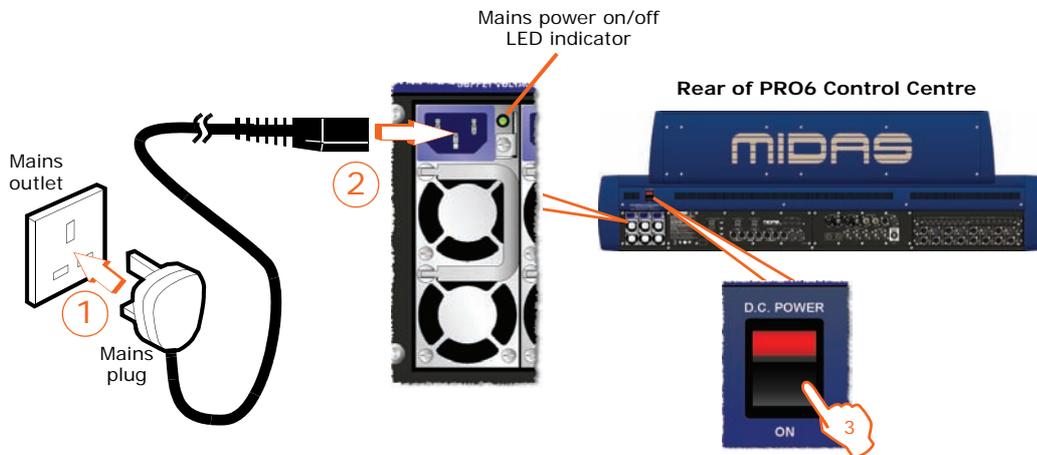
A minimum of two power supply modules must be supplying power to the PRO6 Control Centre for correct operation.



Caution (2)!

Before switching on, check that all monitor loudspeaker power amplifiers are turned off or muted.

After connecting up the audio cables, carry out the following:



- 1 Plug the three mains cables into the mains power outlets.
- 2 Observing **Caution (1)!** above, plug the Volex connectors (see “Wiring instructions” on page 10) of the mains cables into the mains sockets on the rear of the control centre. (The green LED next to each mains socket will illuminate if its mains supply is on.)
- 3 Observing **Caution (2)!** above, apply power to the PRO6 Control Centre by switching the **D.C. POWER** switch on. The PRO6 Control Centre will boot up and, when the default GUI screens are displayed, it is ready for use.

>> To switch off the PRO6 Control Centre

- 1 Make sure you have saved any shows, scenes or settings you require.
- 2 At the GUI, choose **home** ▶ **Preferences** ▶ **Shutdown System**.
- 3 At the **Shutdown ENTIRE system?** prompt, click **OK**.
- 4 After the shutdown sequence has finished, switch off the **D.C. POWER** switch (rear of control centre).
- 5 Disconnect the mains cables from the rear of the PRO6.

Thank you for reading through this Operator Manual.
We hope you found it useful.

Please feel free to send us your comments.
Our contact details and website address can be found
at the front of this manual.



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