MATRIX MK. II DIMMING SYSTEM
User Manual

Version: 1.0x

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Introduction

Congratulations...

on the purchase of an ETC Matrix® MkII system. Matrix MkII continues ETC's tradition of providing the highest quality products for the entertainment lighting market.

Using this Manual

This manual describes the general operation and programming information for the Matrix Mk.II dimming system. Installation, maintenance and servicing details are available in separate manuals. Owing to the range of options available, this user manual may describe modules and features which are not directly relevant to a specific installation.

The following symbols are used in this manual to alert you to danger or important information.

Note: *Provides important information about your installation*

CAUTION: *Alerts you to important information relating to equipment performance or reliability.*

WARNING: *RISK OF ELECTRIC SHOCK! warns you when electricity may cause injury.*

WARNING: *warns you where there isd the possibility of other types of injury.*

Chapter 1

Overview

System Components

The Matrix MkII dimming system consists of Matrix Mk.II racks, a Matrix Processor per rack, and various dimmer module types. A module may contain an SCR dimmer or a sine wave dimmer, but in addition, a module may contain only a circuit breaker, a group of relays for switching either conventional lighting or HMI sources, dimmers enhanced for Fluorescent loads, or may contain no electronics at all.

Matrix Mk.II Processor
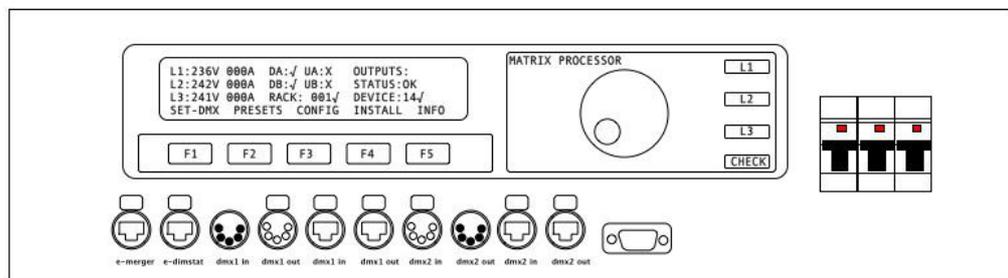
The Matrix modules in each rack are managed by a rack Processor unit. The Matrix Mk.II Processor stores the settings for each module in the rack, manages the data lines into the rack, provides display for and access to the internal settings of each channel in the rack's modules. Although each rack processor is central to the full operation of Matrix Mk.II, each module's own processing capabilities ensure that basic dimming facilities are maintained even if a major fault affects one of the dual processing paths within the rack Processor. The dual processors are:

- Merge Processor: for managing data distribution to the dimmer modules with direct inputs from DMX 1 and 2 (main data lines), Ethernet control data, RS422 touch panels and 48 switched inputs via optional interfaces.

- Screen Processor: for setup, status reports and monitoring, with direct inputs from DMX 1 and 2 (backup lines), Ethernet DimSTAT and RS485 DimSTAT.

The Processor serves as a real-time processor for incoming control signals and transmits that information to the individual modules. It also monitors the system status and reports any errors, both locally, on its own display panel and the affected module's status LEDs, and remotely through the DimSTAT® network.

The Processor can be used to configure its rack within the system. Configuration and error data can be accessed either locally at the Processor keypad, or by using the DimSTAT network PC screen.

Networked Matrix Mk.II systems can be divided into separately configured subsystems called zones. A zone would typically represent one auditorium or one studio in a theatre or TV studio complex. There is no limit to the number of zones, but the maximum number of Processors (i.e. racks in the system) is 255, which is equivalent to 45,900 channels.

The Matrix Processor has capacity to accept Ethernet data and regular DMX, to choose two universes from the Ethernet data (for main and backup control lines A and B), and to output DMX on XLR and RJ45 cat5 connections.

Matrix Mk.II Modules

The range of modules includes a choice of SCR rated at 3kW, 5kW or 12kW per channel with 400µS risetime chokes, Sine wave dimmers rated at 1.25kW, 2.3kW, 3kW, 5kW or 12kW per channel, fluorescent modules rated at 3kW or 5kW per channel, Non-Dim relays rated at 16A or 32A, continuous supply modules rated at 16A, 32A or 63A, Solid-state switches 4kW HMI and 10kW 3-phase HMI non-dim relays with ignition detection.

Matrix Mk.II offers either 1,2,4 or 6 channel module options depending on protection required. Generally, most 6 channel modules include one RCD and 6 individual MCBs, and a 4 channel module has space for individual RCBOs per channel.

Matrix Mk.II dimmer cabinets

The range of Matrix Mk.II dimming cabinets includes 1600 and 2000mm heights, 600 or 800mm widths (800mm incorporates a front access only swing frame), and a choice of wiring to accommodate up to a maximum of 6 channels per module. The 6-channel wiring version provides higher density, and gives more flexibility for future expansion (it is compatible with 4-channel modules as well).

All terminals are high-specification spring loaded terminals for 4mm (3kW), 10mm (5kW) and 16mm (10kW) load terminations.

There are 4 styles of cabinet for either 6-way or 4-way configurations, with or without swing frame (front access only). All are in standard ETC colours except where shown:

1600mm (h) x 800mm (w) x 800mm (d) swing frame, 4- or 6-way for 18 modules

2000mm (h) x 800mm (w) x 800mm (d) swing frame, 4- or 6-way for 18 modules

2000mm (h) x 800mm (w) x 800mm (d) swing frame, 4- or 6-way for 27 modules

1600mm (h) x 600mm (w) x 800mm (d) 6-way for 12 modules (RAL7035 light grey)

1600mm (h) x 600mm (w) x 800mm (d) 6-way for 18 modules (RAL7035 light grey)

2000mm (h) x 600mm (w) x 800mm (d) 6-way for 27 modules (RAL7035 light grey)

Matrix Mk.II Dimmer Monitoring Interface Overview

Each Matrix Mk.II power device in the system may be linked to a PC network using DimSTAT® software for the purpose of remote control, set-up, status monitoring and fault reporting. The system operates through a regular polling of dimmers, and if a fault occurs, the report can be investigated from the PC in the first instance. The network link is also used to upgrade software when appropriate.
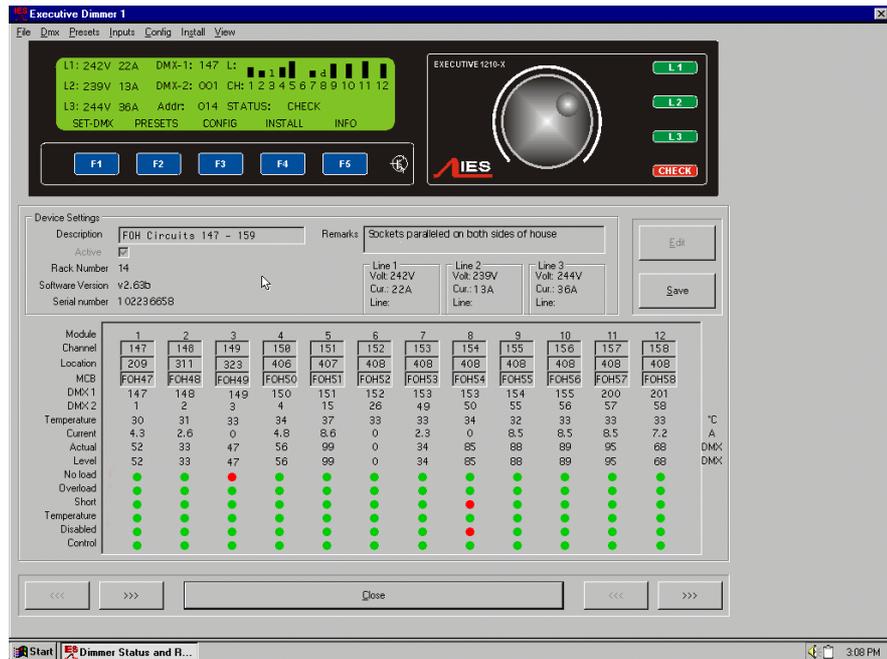
DimSTAT provides a system-wide network, and operates on a host polling protocol where the PC searches for connected dimmers at initiation, and then regularly polls dimmers for data to display. If a fault occurs, the PC's display instantly shows the detail, and if the fault is cleared the system resets accordingly. Information displayed includes: DMX start address per unit, DMX OK, line voltage, current per channel(with most modules), dimmer curve, response time, max. setting, type of fault reported (temperature, overload etc.), date and time of fault. It is possible to set the dimmer curve, start address and pre-heat from DimSTAT software on the PC.

The operation and performance of the Matrix dimmer is monitored constantly and comprehensively by the on-board data processors, and this information is available on the LCD screen of the dimmer rack, and through DimSTAT. The parameters measured and reported are:

a) DMX OK
b) DMX channel numbers
c) DMX levels
d) line voltage
e) current per dimmer (with suitable modules)
f) current per phase per rack
g) set frequency
h) dimmer curve
i) temperature per module
j) Cosine and ignition information for HMI modules

k) MCB / RCBO trip

Normal operation

In normal rehearsal and performance situations, the home screen is displayed with the list of all dimmers in the system. This display normally shows green indications if the dimmers are operating correctly, grey if communication is lost, and red if a reportable fault has been received.

If a dimmer reports a fault, click on the dimmer reference or icon, and DimSTAT will switch to the main screen. The fault reported will be a red warning related to a dimmer channel number in the list of faults.

DimSTAT offers interrogation facilities for each dimmer in the system at any time. To check the mains supply voltage, load current, temperatures etc, simply select a dimmer and view the data in the main screen.

Saving and recalling dimmer system configuration settings

DimSTAT is able to save the settings for all dimmers in the installation as a file. It follows that many settings can be saved for different shows or variable conditions or a change of hook-up. Before saving a configuration, remember to send all changed data to the dimmers and check that the settings are correct. The data in DimSTAT should be considered as a copy of the dimmer settings, and therefore the data should be compared before and after disk transfers.

For details, refer to the DimSTAT operator's handbook.

Matrix Dimming System Features

Modularity

Matrix Mk.II offers a wide range of plug-in power control devices including SCR and Sine wave dimming, relay switch circuits and continuous power modules. Modules can be exchanged safely with power applied, and modules with similar capacity can be exchanged with each other (e.g. sine wave for SCR).

SCR dimmers

A wide choice of SCR dimmer modules are available with 400µS filters; 3kW, 5kW or 10kW capacity per channel; fluorescent versions with associated heater supply; a choice of protection devices including MCB, RCD and RCBO.

Sine wave dimmers

Silent, low harmonic sine wave dimmer modules are available with options for 1250W, 2.3kW, 3kW, 5kW and 10kW capacity per channel; fluorescent versions with associated heater supply; a choice of protection devices including MCB, RCD and RCBO. Key features of Matrix Mk.II sine wave technology are:

Silence: Silent lamp filaments. Sine wave does not eliminate natural filament resonance from a 50Hz mains supply, but it is no more noisy than if the lamp head is connected to a maintained mains supply. There are no distractions for the audience from lamps buzzing during a quiet moment. Radiated interference in audio and video systems is no longer an issue, and signal cables can be safely positioned adjacent to sine wave load cables with no effect on audio or video signal quality. Buzzing cables, trunking, transformers and switchgear are no longer a problem with sine wave dimming.

No reactive power: Creating less that 1% additional harmonic distortion and no 3rd or 5th order harmonics, sine wave dimmers can actually be cheaper to run as the reactive power demand is eliminated from supply bills. Costs are significantly less for rewired venues, or new builds, because the usual requirement to overrate cables, and switchgear by 40% is no longer an issue. That means a lot less copper and

expense. Smaller transformers and backup generators can be purchased, offering great savings.

Environmentally friendly: Providing a pure sinewave, iSine technology avoids the peak currents which stress filaments and also eliminates harmonic currents which can affect other equipment and cause transformers to overheat. Cables and generators also benefit - with a pure sinewave supply, the infrastructure does not have to be overrated (usually 40% excess for normal dimming systems).

Versatile: The sine wave control is the most versatile dimming technology for resistive and inductive loads. Almost any load which can be dimmed is dimmed effortlessly with sinewave.

Non-Dim Switches

Relay switch modules are available for regular loads of either 16A or 32A with options of MCB, RCD and RCBO. HMI switch modules are also available in 4kW and 10kW capacities with cosine measurement to monitor correct lamp ignition.

Distributed processing

Each plug-in dimmer module has integral processing to maintain basic operation even if a processors fails in the Matrix Rack Processor unit.

New to Matrix Mk.II

Higher density

The original Matrix offered a maximum of 162 x 2.5kW, 108 x 5kW or 27 x 10kW (or mixtures of all three dimmer ratings). The new Matrix Mk.II is designed around a 4U high module (44mm taller than previous modules) with space for up to 6 dimming channels per module.

Increased economy

By increasing the dimmer count in each module to a maximum of 6, the per dimmer cost can reduce for high-density installations.

Greater choice of channel ratings

The enlarged module size now allows for a rating upgrade from 2.5kW per channel to 3kW for SCR and sine wave. Sine wave dimmers are also available in 1250W, 2.3kW, 5kW and 12kW ratings.

Improved efficiency

Even though the previous Matrix sine wave dimmers were very efficient for their type (typically 97%), the new design includes a frequency boost to improve efficiency to 98%, better than many traditional SCR dimmers.

Chapter 2

Basic Navigation

This section covers the functions and configuration of the Matrix Mk.II processor. It is possible to password protect areas of the configuration facility, and this is explained later, but for simplicity the details given here do not require password entry.

Processor User Interface

It is possible to set and view all of the performance and control characteristics, measurements and status reports created by the dimmer from the Processor's front panel LCD screen.
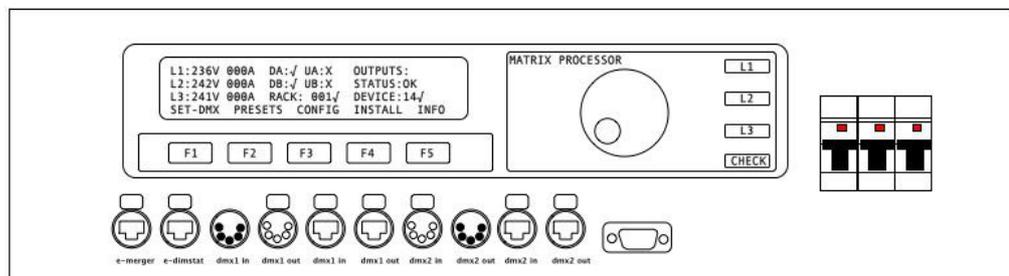
The screen is a 40 x 4 character backlit LCD which provides visual feedback of status and settings, and functional descriptions of the five soft-designated push buttons (F1-F5) beneath the screen.

Additionally, a rotary encoder provides the input interface to adjusting levels and choosing the dimmer's internal characteristics and performance options.

Three green LED bar indicators L1, L2 and L3 light when three phases are present, and a CHECK red led indicator illuminates when the processor has identified any error which is unresolved. Self-resetting faults cause the CHECK light to extinguish when the fault has cleared.

Three MCBs are located to the right of the panel which supply 3-phases to the Processor for internal electronics power supplies. An internal phase selector ensures that power is available to the processor even if two of the three phases fail.

Optional local connections for data are included below buttons F1-F5. These include Ethernet in, DMX in and through, and a RS422 serial connector. The data signals may be accessed at the front panel connection strip, or in the case of rear access only cabinets, via the rear connections. The connections are made to either front or rear by two RJ45 Ethernet jumper cables, which can be clearly seen when the processor is withdrawn from the cabinet.

Note*: All of the following instructions relate to manual operation using the processor's local controls. If specific device has to be interrogated (i.e. for channel-specific features) activate the required device by pressing its front panel access button (the technology logo above the device's column of LEDs).*

The processor's functionality is available with DimSTAT and is generally faster and easier to perform through DimSTAT using a PC using shortcuts to the Matrix's setup features, but for the purpose of this handbook the differences in using DimSTAT are not described in detail and have to be interpreted from the DimSTAT screen. See the DimSTAT handbook for further details.

Basic use of the Processor user interface:

The 'soft' keys F1 – F5 are automatically labelled as the menu context changes. For the home page shown above, the menus refer to:

- Use F1 to access the DMX settings to set the DMX address for each dimmer channel in each module (device). Navigate the menu by rotating the encoder wheel either clockwise or counter-clockwise.

- Use F2 to access the internal preset settings to set and store dimmer presets, preset in/out timings, DMX fail backup presets. Navigate the menu by rotating the encoder wheel either clockwise or counter-clockwise.

- Use F3 to access the dimmer configuration menus to set all the custom channel attributes – min, max levels, fade time T-in, T-out, dimmer curve, non-dim operation I/O, priority, phase control, start mode, tune lamp

- Use F4 to access the basic installation settings to set supply parameters, Ethernet and DimSTAT addresses, no. of devices, change passwords, view channel data live, and provide access to general settings for method of channel and DMX addressing, DMX preferences, voltage regulation, current limitation, lamp saving and lamp tuning and to test the ventilation system and check firmware.

- Use F5 for system reports. If there are no faults indicated by the CHECK indicator, the INFO button shows the software version and nominal voltage and current. If a fault is indicated, the error report is displayed for interrogation and reset.

Details of each menu tree are shown in **Appendix A.**

PASSWORDS <u>*Note*</u>*: For clarity, the following sections which describe programming activities do not refer to the entry of passwords. Passwords are included to prevent accidental or casual access to the SET-DMX, PRESETS, CONFIG and INSTALL menu trees. The passwords are 4-digit numbers with a factory default of 0000 (no password necessary). A service code of 3415 is embedded and may be used if the passwords are forgotten and for service-protected menus. It is possible to have the same password throughout, or separate passwords for each menu tree. If any of the protected menus is selected, the subsequent screen requests a password. This is achieved by pressing the relevant <<<< and >>>> buttons to select the digit, and using the rotary encoder to enter the number.*

The initial power-up display shows the general setting parameters with the software version. After a few seconds, this screen changes to the 'home' screen which displays channel levels (bar graphs at the top right), the measured line voltages and currents, and the status of the dimmers and DMX signals from device 1. The number of bar graphs shown relates to the load selection of the device being monitored.

L1: 245V-38A	DA-X	UA-X	OUTPUTS. _ ||| _ |||
L2: 247V-14A	DB-X	UB-X	STATUS: OK
L3: 242V-20A	RACK : 05 X		DEVICE: 01X
SET-DMX	PRESETS	CONFIG	INSTALL INFO

Dimmer Module User Interface

Local control for each dimmer module is included within the Processor, and no direct access is required with the module to view and adjust settings. However, each module includes slave indicators and an interrogation control button for convenience. When the interrogate button is pressed (the coloured disc in the logo) the Processor LCD panel and controls are routed to the selected module.

Each front panel has an LED per output channel to indicate when there is an output, or if there is a fault with a channel, and when power is applied to the module, the blue 'ON' LED is lit.

Press the coloured disc of the logo for the module's activation button to interrogate this module via the Processor LCD.

Individual status LED per channel.
Green = Output OK
Red = fault
None = no output

Power ON LED (blue)
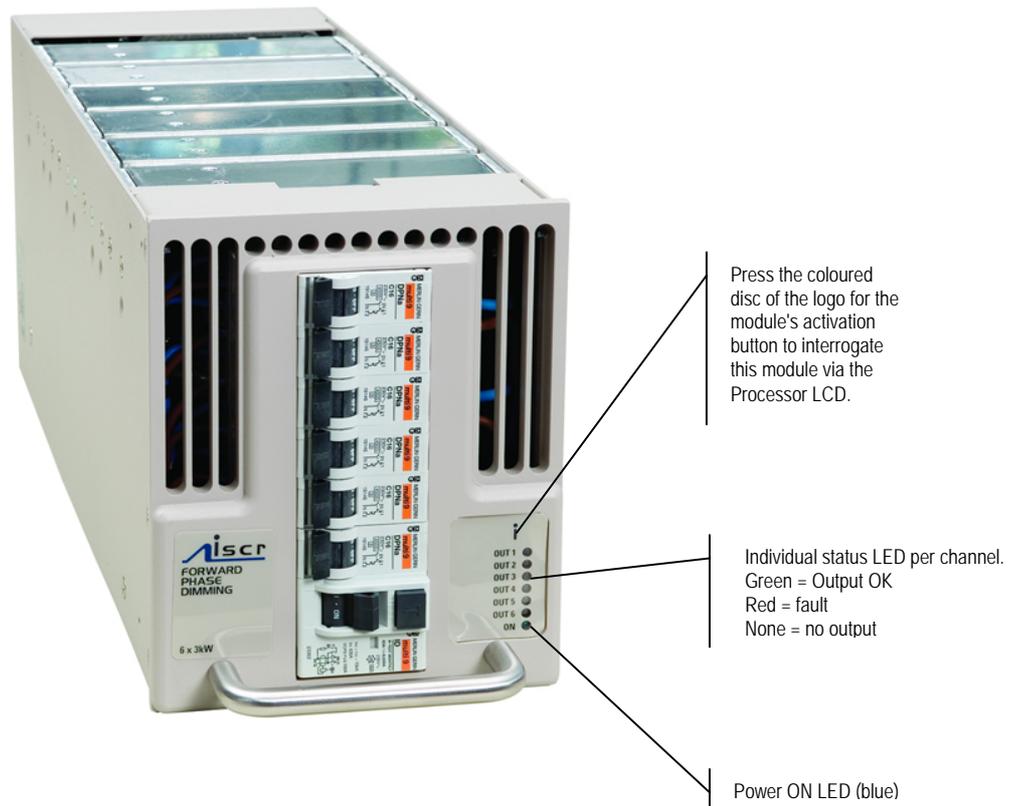
C h a p t e r   3

Configuration Procedures

Initial settings

Some settings for the Matrix rack are made during installation only, and many of the channel configuration settings may only rarely be changed after the commissioning period. Some other settings may be changed regularly on a show-by-show basis (e.g. non-dim operation).

The initial settings required are to program the processor to search for a particular number of Matrix 'devices' in each rack, and to choose the power ratings for each Matrix device.

To check the number of modules (devices) programmed for use in the rack:

This menu defines the number of modules in use in the rack, and is set at the time of installation.

1. Select INSTALL from the home screen

2. Press DOWN or UP or use the rotary encoder to choose SELECT NUMBER OF DEVICES menu. Press SELECT.

3. The screen shows

```
SELECT NUMBER OF DEVICES

DEVICES:  012

                              CANCEL        ENTER
```

4. Use the rotary encoder to select the number of Matrix devices (the plug-in modules) in the rack.

5. Press ENTER (to record the changes and return to the home screen) or CANCEL (to leave the previous settings unchanged, and return to the home screen).

To select the load ratings of devices:

⚠ CAUTION: *This feature sets the configuration of each dimmer module in the rack to define the number of dimmers to be addressed and anticipated load and current measurements. If the setting is incorrect, e.g. a 2 x 5kW dimmer is set up as a 1 x 12kW dimmer, the result will be two adjacent channels operating as one.*

This function is only available for the modules 4x3kW and 2x5kW sine wave

1. Activate a module (e.g. 12) by pressing its front panel access button (the technology logo above the device's column of LEDs). Or select the device with the rotary encoder

2. Press DOWN or UP or use the rotary encoder to choose LOAD SELECTION menu in the . Press SELECT.

3. The screen shows:

```
SELECT LOAD SELECTION DEVICE 12

LOAD:        4 x 2.5KW

                     EDIT      CANCEL       SAVE
```
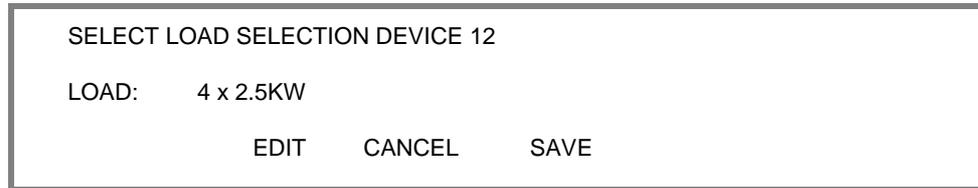
5. Press EDIT.

6. Use the rotary encoder to select the channel configuration of the device:

     4 x 3kW

     2 x 5kW

     1 x 12kW

7. Press SAVE (to record the changes and return to the home screen) or CANCEL (to leave the previous settings unchanged, and return to the home screen).

8. Repeat for other devices by pressing their access buttons in sequence.

Setup schemes for channels and DMX

Matrix Mk.II dimmers have the capacity to store performance characteristics for each dimmer channel individually. However, in some instances this can lead to unnecessary and time-consuming programming, and so the option is included to choose a data entry scheme for all channels in the device together, or for individual data entry as required or as dictated by the system. This feature is independent of the choice of DMX numbering scheme, thus the dimmers may have individual characteristics, but with consecutive DMX addresses. This step, and 2.3 DMX setup, should be performed before other channel-specific programming activities.

To change the dimmer characteristics set-up scheme:

1. Select INSTALL from the home screen

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.

3. Press DOWN or UP or use the rotary encoder to choose CONFIG CHANNEL menu. Press SELECT.

4. The screen shows

```
GENERAL SETTINGS

CONFIG CHAN: [JOINED]

                     CANCEL       SAVE
```
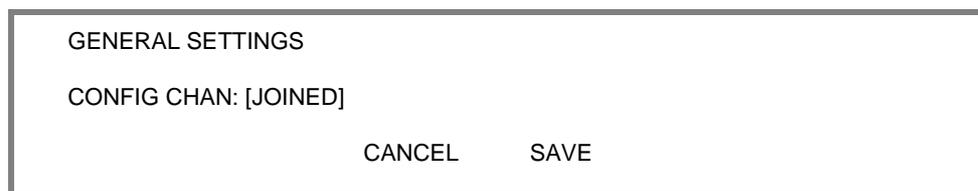
5. Use the rotary encoder to select either INDIVIDUAL (for different individual channel parameters) or JOINED (for all channels in the device to have the same characteristics).

6. Press SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged, and return to the previous page).

Note: *the quickest method of programming the characteristics of a specific device is to use DimSTAT. If local control is preferred, press the logo button to switch the processor directly to the relevant device.*

DMX programming

Each channel in a Matrix device is assigned a DMX channel number from either DMX-1 or DMX-2 signal inputs. The two numbers can be the same or different, as required, and a feature is provided to set sequential number groups ('Start' addressing) instead of individual settings.

Note: *When programming a new dimmer device, IT IS IMPORTANT TO SET THE DMX ADDRESSING SCHEME before the individual characteristics are set, as a later change can reset previously recorded individual channel characteristic settings.*

To set up DMX addressing scheme:

1. Select INSTALL from the home screen

2. Press DOWN or UP or rotate the encoder to choose GENERAL SETTINGS menu. Press SELECT.

3. Press DOWN or UP or rotate the encoder to choose DMX ADDRESS. Press SELECT, and the screen shows:

```
GENERAL SETTINGS

DMX ADDRESS [INDIVIDUAL]

                      CANCEL       SAVE
```

4. Use the rotary encoder to select either INDIVIDUAL (for individual DMX addresses in each device) or START (one DMX address only is entered for the first channel in the device, with other channels following in sequential order).

5. Press SAVE to leave the menu and to record the changes or CANCEL (to leave the previous settings unchanged and return to the previous screen).

Note: *As there are two DMX lines, both DMX-1 and DMX-2 follow the same scheme. It is not possible to have one line using a start address, and the other using individual numbers.*

To set-up DMX addresses:

1. First set the DMX scheme as described above (either individual or start address).

2. Activate the required device (e.g. device 12) by pressing its front panel access button (the technology logo above the device's column of LEDs).

3. From the home screen, select SET-DMX, and to change a setting, press ENTER

4. If INDIVIDUAL address option is in use, the screen is similar to this:

```
SELECT DMX ADDRESS DEVICE 12

CHANNEL       1

DMX 1         ADDRESS       005

   DOWN          UP        EDIT      CANCEL       SAVE
```

5. If INDIVIDUAL has been selected, use the rotary encoder to select the address needed for the first dimmer channel and move to other channels by pressing DOWN or UP repeatedly and adjust DMX addresses accordingly. The rotary

encoder will increment the address number clockwise, and reduce the number anti-clockwise, with a roll-over at the 512-0 point.

6. If START has been selected, only one number per DMX line is permitted. This is the number for dimmer channel 1 in the first device, and the remaining dimmers are automatically addressed in sequential order.

7. Press the DOWN key to activate DMX-2, and repeat for the second DMX line.

Note*: DMX address 000 deselects the channel from operation with the relevant DMX line. Both DMX lines have valid DMX numbers from 001 - 512. If higher dimmer numbers are used by the control desk, the number has to be rationalised to a base of 512.*

DMX A/B arbitration

In the case where a dimmer has two DMX channel numbers selected, and both signals are active, the dimmer will normally respond to the highest level of the two signals (HTP). If one DMX number is set to 000, the dimmer will not respond to channel data from the relevant DMX line.

This feature is used to provide segregation and zoning for two control systems, or for separating channel numbers between 513 and 1024 using a pair of DMX lines. If one DMX line is set to 'Master' it takes exclusive control until the DMX fails, at which time control is transferred to the other DMX line.

Note*: When the channel status is being viewed at the dimmer device or remotely by DimSTAT, the term 'actual' DMX level is used. This is a display of the result of any internal arbitration of levels from either DMX-1, DMX-2, the internal 'manual preset' level, or the level set by a programmable preset memory. Thus if DMX-1 is 56%, DMX-2 is 75% and preset 3 is set to 95%, the Actual DMX level is shown as 95%.*

To set up a DMX backup condition

Matrix is equipped with a choice of responses to the failure of either DMX signals 1 or 2. The dimmers can be set to hold their last DMX level, fade to zero over 5 seconds, or fade to a preset memory setting. This choice is available per DMX line and dimmer device.

1. Select INSTALL from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS.

3. Press DOWN or UP or use the rotary encoder to choose DMX-1 FAIL menu. Press SELECT.

```
GENERAL SETTINGS

DMX-1 FAIL:    [HOLD]

                              CANCEL        SAVE
```
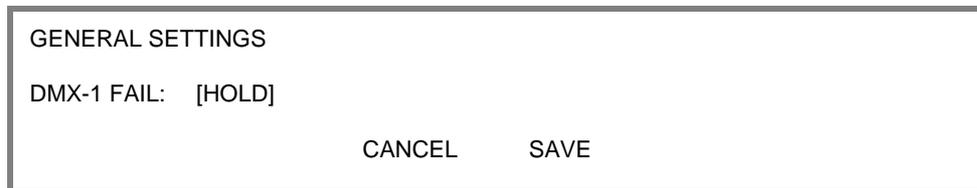
4. Press EDIT and use the rotary encoder to select one of the 3 options available:

    RESET: fades all dimmers to zero after 5 seconds

    HOLD: maintains the last valid DMX levels indefinitely until DMX is restored

BACKUP: fades to dimmer levels set-up through the PRESETS memory facility

5   Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged and to return to the previous screen).

6.   Repeat the procedure for DMX-2.

Note: *If BACKUP has been set, do not forget to pre-set the relevant DMX backup states.*

To set-up DMX Backup preset:

1.   Select PRESETS. from the home menu

2.   Press DOWN or UP or use the rotary encoder to choose DMX BACKUP menu. Press SELECT.

3.   The screen provides the following information:

```
SELECT DMX BACKUP DEVICE 12

    CHANNEL          1

    DMX-1      ADDRESS 005

    DOWN             UP          EDIT        CANCEL        SAVE
```

4.   Press EDIT and using the <<<< and >>>> buttons, choose the channel level to be adjusted [enabled when square brackets are shown] and set the level by using the rotary encoder.

5.   Use the UP or DOWN button to address either DMX-1 or DMX-2 and repeat the above procedure.

6.   Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up a DMX Minimum reset

In order to reduce dynamic filament noise in 120V Par lamps or to increase the rate of response of high wattage filaments, it is sometimes necessary to use a low preheat level. DMX minimum reset is an automatic means to reduce energy consumption by switching off any preheat levels when DMX is not present (i.e. when the control desk is switched off, but the dimmers remain on).

1.   Select INSTALL from the home menu.

2.   Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.

3.   Press DOWN or UP or use the rotary encoder to choose DMX MINIMUM RESET menu. Press SELECT.

```
GENERAL SETTINGS

DMX MINIMUM RESET:   [OFF]

    DOWN       UP              CANCEL        SAVE
```

4.   Use the rotary encoder to choose either ON (active) or OFF (disabled).

5. Press SAVE to record the change or CANCEL (to leave the previous settings unchanged and return to the previous screen).

DMX lamp features

Matrix sine wave technology offers two additional features to enhance lamp performance; Lamp Tuning and Lamp Saver.

Lamp Tuning is a global feature which provides a load learning facility whereby the Matrix dimmer records the current after the lamp has been set to between 90-100% for 3 seconds. This data is then used to 'tune' the dimmer curve to ensure that all lamps respond the same, and there is not an inconsistency in dimming between a 25W lamp and a 5kW lamp on different dimmers.

Lamp Saver is a global feature which only applies preheat if the channel has been used after power up.

To set-up a DMX Lamp Tuning

1. Select INSTALL from the home menu.
2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.
3. Press DOWN or UP or use the rotary encoder to choose DMX LAMP TUNING menu. Press SELECT.

```
GENERAL SETTINGS

DMX LAMP TUNING:      [ON]

                          CANCEL       SAVE
```

4. Use the rotary encoder to choose either ON (active) or OFF (disabled).
5. Press SAVE to record the change or CANCEL (to leave the previous settings unchanged and return to the previous screen).

To set-up a DMX Lamp Saver

1. Select INSTALL from the home menu.
2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.
3. Press DOWN or UP or use the rotary encoder to choose DMX LAMPSAVER menu. Press SELECT.

```
GENERAL SETTINGS

DMX LAMPSAVER:  [ON]
                          CANCEL       SAVE
```

4. Use the rotary encoder to choose either ON (active) or OFF (disabled).
5. Press SAVE to record the change or CANCEL (to leave the previous settings unchanged and return to the previous screen).

Network settings

This section extends the data setup procedure to cover the network setup of Matrix Mk.II dimmers on a DimSTAT and Ethernet network. Control via Ethernet is an option, and if used, DimSTAT is transmitted within the Ethernet network. If Ethernet is not used (i.e. dimmer control is via direct DMX connections) DimSTAT is transmitted using the two spare cores of the DMX-512 cabling system (pins 4 and 5). Note that one of the benefits of using Ethernet is that the data rate of DimSTAT is much faster than if DMX cabling scheme is used. Typical data rates using direct DimSTAT over DMX cables is 56kB/s whereas with Ethernet it can be 10MB/s, 100MB/s or 1GB/s depending on the cabling scheme.

DimSTAT address

The PC address shown on the home screen as RACK: XX is the unique number which is used by DimSTAT™ to identify each dimmer location or peripheral for the purpose of reporting status information and for transferring data between dimmer devices and the PC. If a dimmer device is removed from the rack, and replaced by another device DimSTAT will prompt for an update of configuration information when power is restored.

This is done when the RACK number is entered, and DimSTAT identifies the new device on the network, prompting the operator to download the previous characteristics file from the PC to the dimmer device. The RACK number is associated with a unique factory serial number which is permanently stored in the dimmer. This is because if a different dimmer device is used with the same RACK number as its predecessor, the DimSTAT program compare serial number and RACK address, notes the difference and thus will prompt the system to download the previous dimmer set-up.

To set-up a serial address:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose SELECT PC-DIMSTAT PARAMETERS menu. Press SELECT.

3. The screen shows:

```
SELECT PC-DIMSTAT PARAMETERS

ADDRESS: [004]

                    CANCEL        ENTER
```

4. Use the rotary encoder to choose the address number (which can be set between 000 and 255).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Ethernet

Matrix Mk.II dimmers are prepared for use with Ethernet data distribution for dimmer signals and DimSTAT communications. Protocols included are ETCnet2, AVAB, ArtNet and ACN/RDM. Two sets of addresses need to be set up: IP, subnet and gateway addresses for the dimmers and similar settings for the merger.

To set-up the dimmer IP address:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose ETHERNET SETUP menu. Press SELECT.

3. This accesses the Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose IP ADDRESS menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET ADDRESS

                    AAA     BBB     CCC     DDD

IP ADDRESS          [010]   001     002     002

        <<<<<   >>>>>>  EDIT    CANCEL  SAVE
```

5. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the dimmer subnet mask:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose ETHERNET SETUP menu. Press SELECT.

3. This accesses the Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose SUBNET MASK menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET SUBNET MASK

                    AAA     BBB     CCC     DDD

SUBNET MASK         [255]   255     255     000

        <<<<<   >>>>>>  EDIT    CANCEL  SAVE
```

5. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the dimmer gateway address:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose ETHERNET SETUP menu. Press SELECT.

3. This accesses the Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose GATEWAY ADDRESS menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET GATEWAY ADDRESS

                      AAA      BBB      CCC      DDD

IP ADDRESS            [010]    001      001      001

          <<<<<    >>>>>>   EDIT     CANCEL  SAVE
```

5. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the merger IP address:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose MERGER ETHERNET MENU. Press SELECT.

3. This accesses the Merger's Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose IP ADDRESS menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET ADDRESS

                      AAA      BBB      CCC      DDD

IP ADDRESS            [010]    001      002      002

          <<<<<    >>>>>>   EDIT     CANCEL  SAVE
```

5. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the merger subnet mask:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose MERGER ETHERNET SETUP menu. Press SELECT.

3. This accesses the Merger's Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose SUBNET MASK menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET SUBNET MASK

                      AAA      BBB      CCC      DDD

SUBNET MASK           [255]    255      255      000

          <<<<<    >>>>>>   EDIT     CANCEL  SAVE
```

5. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the merger gateway address:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose MERGER ETHERNET SETUP menu. Press SELECT.

3. This accesses the Merger's Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose GATEWAY ADDRESS menu. Press SELECT.

4. The screen shows:

```
SELECT ETHERNET GATEWAY ADDRESS

                    AAA      BBB      CCC      DDD

IP ADDRESS          [010]    001      001      001

        <<<<<    >>>>>>   EDIT      CANCEL  SAVE
```

7. Use the rotary encoder to choose the address number and press >>>> or <<<< to tab other 3-digit groups.

8. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up the merger universes:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose MERGER ETHERNET SETUP menu. Press SELECT.

3. This accesses the Merger's Ethernet menu tree. Press DOWN or UP or use the rotary encoder to choose NET, UNIVERSE A menu. Press SELECT.

4. The screen shows:

```
MERGER LOGIC NET, UNIVERSE A

            NET UNIVERSE

            0         000

            EDIT      CANCEL       SAVE
```

5. Press EDIT and use the rotary encoder to choose the required logical net and universe.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

7. Repeat for Universe B.

Channel settings

This section describes the individual settings for each channel in the Matrix rack. Individual dimmers may be setup to have specific characteristics for a particular application, such as maximum and minimum level settings, non-dim operation, default fade in and fade out times etc.

<u>Maximum & Minimum levels</u>

It is possible to affect the output range of a dimmer by setting a minimum level and (or) a maximum level. A minimum level is used to provide a pre-heat to warm up lamp filaments, whereas the maximum level is used to limit power and extend lamp life. Minimum levels between 0% to 29.9% may be set, and maximum levels may be set from 100% down to 30%.

Factory default levels are 0% for minimum and 100% for maximum. One common use for a reduced maximum level to control 110V lamps. However, for this situation, the 110V dimmer curve is recommended as it produces a smoother control over the whole range of intensity. If used, this result of using this feature should be checked in comparison with other lamps in the rig to ensure uniformity of response.

<u>To set-up max. and min levels:</u>

1. Select CONFIG. from the home menu, and press EDIT.

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme copies characteristics to all dimmers in the device) as follows:

CONFIGURE CHANNEL PARAMETERS

CH	MIN%	MAX%	T-IN	T-OUT	CURVE	I/O	PRIOR
ALL	[000.0]	100.0	00.02	00.02	LIN	NO	NO

EDIT   CANCEL   SAVE

Setting options are :

MIN: minimum level from 000 to 100%.

MAX: maximum level from 000 to 100%.

3. Press EDIT and using the <<<< and >>>> buttons, choose MIN% or MAX% [enabled when square brackets are shown] and set it to the required number using the rotary encoder.

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

<u>Response time</u>

Each dimmer has two timings associated with it which control the minimum time to fade in and out, and are called T-IN and T-OUT. These times are referred to as 'response times' and are used to protect the lamp filaments and for reducing surges in the system. The default times are currently zero seconds (for the fastest response). Values recommended are 0.00s for a 2kW load, 0.05s for a 5kW load, and 0.1s for a 10kW load

<u>To set-up response times:</u>

1. Select CONFIG. from the home menu, and press EDIT.

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme copies characteristics to all dimmers in the device) as follows:

```
CONFIGURE CHANNEL PARAMETERS

CH          MIN%    MAX%    T-IN      T-OUT     CURVE   I/O   PRIOR

ALL         00      100     [00.05]   00.05     LIN     NO    NO

                    EDIT    CANCEL    SAVE
```

Setting options are from 00.00s to 99.99s.

Note: *0 seconds should not be used with TV-type high wattage lamps, where the minimum recommended is 0.05s. Faster response times should be used with care, and with lower wattage loads.*

3. Press EDIT and using the <<<< and >>>> buttons, choose T-IN or T-OUT [enabled when square brackets are shown] and set it to the required time using the rotary encoder.

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Dimmer curves

Dimmer curves (dimmer laws) are used to adjust the relationship between control level and light output. This enables the dimmer to be fine-tuned to accommodate the preferences of a live audience or a television camera. There are 8 factory standard dimmer laws, and a provision for a further 26 custom selectable curves in later software releases. The factory default law (0) is Linear Law. The list of dimmer curves is as follows:

0 = linear relationship (standard)

1 = BBC specification

2 = S-Law

3 = inverted (control = zero, dimmer = full etc.)

4 = Fluorescent (minimum 50%)

5 = Fluorescent (minimum 30%)

6 = Linear (offset at 50%)

7 = Pulse effect (light switches on and off as the control fades up and down)

8 = Solid state switch

9 = 2kW linear curve

10 - 15 custom programmable via DimSTAT (future expansion)

To select a dimmer curve:

1. Select CONFIG. from the home menu, and press EDIT

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme copies characteristics to all dimmers in the device) as follows:

```
CONFIGURE CHANNEL PARAMETERS

CH           MIN%    MAX%    T-IN      T-OUT    CURVE   I/O   PRIOR

ALL          00      100     00.05     00.05    [LIN]   NO    NO

                     EDIT        CANCEL        SAVE
```

3. Use the <<<< and >>>> buttons, choose CURVE [enabled when square brackets are shown] and set it to the response required.

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Non-Dim operation

Any Matrix dimmer channel may be set to switch on and off rather than dim, and in this way are used for many other functions such as switching power to working lights, non-dim and auxiliary circuits.

To select a channel to operate as a non-dim switch:

1. Select CONFIG. from the home menu, and press EDIT

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme copies characteristics to all dimmers in the device) as follows:

```
CONFIGURE CHANNEL PARAMETERS

CH   MIN%  MAX%  T-IN   T-OUT  CURVE  I/O  PRIOR

ALL   00   100   00.05   00.05   LIN   [NO]  NO

                 EDIT      CANCEL        SAVE
```

3. Use the <<<< and >>>> buttons, choose I/O [enabled when square brackets are shown] and set it to either NO for dimmer operation, or YES for a non-dim

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Maximum current

Each Matrix device has a facility to measure each phase current and to restrict the operation of the dimmers on that phase to ensure the maximum current set is not exceeded. This operates as a maximum demand protection system, and reduces the levels of all dimmers on the phase which is exceeding the preset current.

However, to eliminate a key light from reducing during a performance, it is possible to prioritise the channels which will reduce in intensity to ensure the maximum demand is not exceeded. This is achieved by setting the dimmer channel to "priority", and it will then ignore any instruction to reduce level if the maximum demand is exceeded.

To set-up maximum current levels:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose SELECT LINE PARAMETERS menu. Press SELECT.

3. The screen shows:

```
SELECT LINE PARAMETERS

                 VOLTAGE      CURRENT       FREQUENCY

NOMINAL           235          [43]          50 Hz

            <<<< >>>>      CANCEL      SAVE
```

4. Press EDIT and using the <<<< and >>>> buttons, choose CURRENT and enter the maximum current limit per phase using the rotary encoder.

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To set-up priority channels:

It is possible to prioritise the channels which will reduce in intensity to ensure the maximum demand is not exceeded when maximum current is selected above. This is achieved by setting the dimmer channel to "priority", and it will then ignore any instruction to reduce level if the maximum demand is exceeded.

1. Select CONFIG. from the home menu

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme is all together) with a list of all available channel characteristics including PRIOR (priority) which is to the right of the screen, and is accessible when >>>> is pressed repeatedly:

```
CONFIGURE CHANNEL PARAMETERS

CH          MAX%    T-IN      T-OUT    CURVE  I/O  PRIOR   PHASE

ALL         100     00.05     00.05    LIN     NO  [NO]    OFF

            <<<<      >>>>      CANCEL  SAVE
```

3. Use the <<<< and >>>> buttons, choose PRIOR [enabled when square brackets are shown] and set it to either NO for normal operation, or YES if the dimmer has to maintain its level if the maximum current is exceeded. If set to No, the dimmer will take part in a general lowing of intensity if the preset maximum current (maximum demand) for the phase in this dimmer device is exceeded. If set to Yes, the dimmer will remain at its level, and others will reduce in level to maintain a maximum phase current.

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

To switch on current limitation:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.

3. Press DOWN or UP or use the rotary encoder to choose CURRENT LIMITATION menu. Press SELECT.

4.   The screen shows:

```
GENERAL SETTINGS

CURRENT LIMITATION:  [OFF]

                        CANCEL  SAVE
```

5.   Press EDIT and using the encoder wheel, choose ON or OFF to enable or disable the current limitation.

6.   Press either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Voltage regulation and limitation

Voltage regulation is a software feature which maintains the dimmed level of channels in the event of the mains supply fluctuating (e.g. when power is supplied from a generator source or a high-impedance main). The dimmer's incoming voltage is measured, and if it diverts from the anticipated incoming voltage, the dimmer will adjust the output accordingly to maintain a constant voltage at the output.

This feature does not maintain the voltage of full-on dimmer channels, as the regulation circuit can only work with sufficient voltage headroom. Programming involves two stages, firstly checking the factory-set installation option which calibrates the incoming mains voltage, and secondly activating the voltage regulation software.

Voltage limitation is a feature which limits the maximum voltage reaching the lamp. This allows a global ceiling level to be set to improve lamp life at the expense of colour temperature at maximum output.

To check line voltage calibration

Note: this setting is made during final testing at the factory and does not usually require any adjustment.

1.   Select INSTALL from the home menu.

2.   Press DOWN or UP or use the rotary encoder to choose LINE VOLTAGE CALIBRATION.

3.   Press SELECT, and the screen displays:.

```
LINE VOLTAGE CALIBRATION

ACTUAL:       L1: [235]  L2: 238    L3: 232

  <<<<      >>>>     CAL-L1         HOME
```
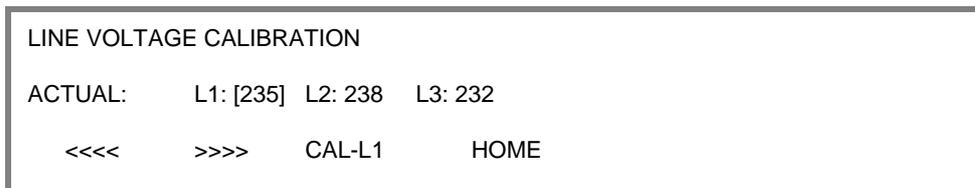
4.   If the voltages shown are different from the line voltages measured at the dimmer supply input socket, press EDIT and >>> or <<<< to select the line to calibrate, shown by square brackets. Calibration is done manually, by measuring the incoming main supply voltages and then calibrating the software-measured voltages using the rotary encoder. With the correct voltage showing in the square brackets, it is then possible to calibrate each line individually.

5.   Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged).

To set voltage regulation

1. Select INSTALL from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS.

3. Press DOWN or UP or use the rotary encoder to choose VOLTAGE REGULATION menu. Press SELECT and the screen shows:

```
GENERAL SETTINGS

VOLTAGE REGULATION:        [OFF]

                           CANCEL        SAVE
```

4. Press EDIT and use the rotary encoder to select either ON (voltage regulation enabled) or OFF (disabled).

5. Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged).

Note: *Factory default is for Voltage Regulation = OFF.*

To set-up maximum output voltage:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose SELECT LINE PARAMETERS menu. Press SELECT.

3. The screen shows:

```
SELECT LINE PARAMETERS

                VOLTAGE      CURRENT      FREQUENCY

NOMINAL          [235]          43          50 Hz

        <<<< >>>>      CANCEL        SAVE
```

4. Press EDIT and using the <<<< and >>>> buttons, choose VOLTAGE and enter the maximum voltage limit per phase using the rotary encoder.

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Phase-On and Phase-Off

Note: *This feature is included in the Processor menu for IGBT reverse-phase Matrix devices which are now discontinued and replaced with sine wave. Details are included here for completeness.*

To set-up forward and reverse phase operation:

1. Select CONFIG. from the home menu

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme is all together) with a list of all available channel characteristics including PHASE which is to the right of the screen, and is accessible when >>>> is pressed repeatedly. The screen shows:

```
┌────────────────────────────────────────────────────────────────┐
│  CONFIGURE CHANNEL PARAMETERS                                    │
│                                                                  │
│  CH          MAX%    T-IN      T-OUT    CURVE   I/O  PRIOR   PHASE│
│                                                                  │
│  ALL         100     00.05     00.05    LIN     NO      NO  [OFF] │
│                                                                  │
│                  <<<<    >>>>      CANCEL  SAVE                   │
│                                                                  │
└────────────────────────────────────────────────────────────────┘
```

3. Use the <<<< and >>>> buttons, choose PHASE [enabled when square brackets are shown] and set it to either OFF for normal operation, or ON if the dimmer being used for other types of loads

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Start Mode

Matrix Mk.II dimmers are equipped with a software feature to alter the criteria for dimming cold filaments. The response of a dimmer depends on the resistance of the filament, which varies according to temperature. A cold filament has a slower response than a warm filament, due to the difference in resistance between warn and cold filaments where a cold filament will draw up to 20 times its nominal operating current.

Although the sine wave modules restrict maximum current, if the complete rig is subject to a sudden loss and resumption of power (a 'brown-out') it is possible for the combined cold switch-on load to be higher than the diversified power supply can withstand, resulting in nuisance tripping of circuit breakers. For this reason, the dimmers are installed with a range of start modes to give added flexibility in the set-up characteristics of the dimmer.

An additional feature is 'Blink mode' which flashes the dimmer channel with a controllable mark-space and flash rate for warning signs in the studio or backstage.

The options are:

BASIC: Normal operating mode

SOFT START: If the circuit has not been used for 5 minutes, the initial response time is automatically set to 500mS

BURST: If the circuit has not been used for 5 minutes, the dimmer burst-fires 20 cycles at full power to heat the filament rapidly and to improve response.

PROP: Proportional burst start mode. The number of cycles is in relation to the speed of rise of DMX signal between 0% and 9%.

BLINK: Flashes the output to full. T-IN sets the fade in time, T-OUT sets the fade out time, and the DMX level sets the period of flash.

To set start mode

1. Select CONFIG. from the home menu

2. The screen shows the individual channel number (or ALL if the dimmer set-up scheme is all together) with a list of all available channel characteristics including MODE which is to the right of the screen, and is accessible when >>>> is pressed repeatedly. The screen shows:

```
CONFIGURE CHANNEL PARAMETERS

CH           T-IN      T-OUT    CURVE   I/O  PRIOR    PHASE    MODE

ALL          00.05     00.05    LIN  NO  NO  OFF      [BASIC]

                  <<<<>>>>CANCEL  SAVE
```

3. Use the <<<< and >>>> buttons, choose MODE [enabled when square brackets are shown] and set it to:

   BASIC, SOFT START, BURST, PROPortional or BLINK

4. Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Note: *If BLINK has been set, be sure to adjust the T-IN and T-OUT times to create the required flash characteristic, and adjust the DMX value when used for the period of flash.*

Passwords

Passwords are used at 4 levels of the Matrix dimmer set-up procedure: SET-DMX, PRESETS, CONFIG. and INSTALL. One password or 4 separate passwords may be used to give a range of access options. Passwords are in the form of 4 digit codes and may be set and used from the front panel of the dimmer and DimSTAT, but passwords may only be read using DimSTAT. Passwords set at 0000 give unlimited access.

Note: *If the password is set to 0000 (factory default) the menus are open, and no prompts to enter a password are seen on the display.*

To set-up passwords:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose SELECT NEW PASSWORD menu. Press SELECT.

3. The screen is similar to this (passwords shown as example only).

```
SELECT NEW PASSWORD

              SET-DMX      PRESETS      CONFIG       INSTALL

PASSWORD      [3589]       1478         9632         8520

              EDIT    CANCEL     SAVE
```

4. Press EDIT and using the <<<< and >>>> buttons, choose the password to be altered or set [enabled when square brackets are shown] and adjust the digits using the rotary encoder.

5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Preset and manual control functions

The Matrix Mk.II system has a total of 7 digital switch functions which can be accessed through RS485 touch-panels. Options include fading or switching to a preset state. The setting up is in two steps; capturing the dimmer levels and setting the switch functions.

To set-up digital switch presets:

1. Set the dimmers to the require preset levels from the control desk.

2. Select PRESETS. from the home menu

3. Press DOWN or UP or use the rotary encoder to choose PRESETS STORE. menu. Press SELECT.

4. The screen display shows:

```
STORE PRESET LEVELS

PRESET NUMBER: 01

   STORE                              HOME
```

5. Press STORE to capture the levels and record them with the preset number displayed, or press HOME to return to the previous screen.

To set-up digital switch functions:

1. Select PRESETS from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose PRESETS CONFIG. menu. Press SELECT.

3. The screen shows the 7 inputs IN-1 to IN-7 in a column with T-IN and T-OUT settings, and a Normally Open (NO) and Normally Closed (NC) input switch option.

```
ENTER PRESET CONFIGURATION

        PRESET  T-IN T-OUT

        PRESET-1     000.0     000.0

        DOWN    UP       EDITCANCEL  SAVE
```

4. Press EDIT and using the <<<< and >>>> buttons, choose the function to be adjusted [enabled when square brackets are shown] and set the time and mode by using the rotary encoder

5. Use the UP and DOWN buttons to address other presets and repeat the above steps.

6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

<u>To reset all presets:</u>

If the presets are being set up for the first time, or significantly altered, it may be appropriate to erase all previous settings to start afresh as follows:

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.

3. Press DOWN or UP or use the rotary encoder to choose ERASE ALL PRESETS menu. Press SELECT.

4. The screen shows

```
GENERAL SETTINGS

ERASE ALL PRESETS:     [NO]

                  CANCEL  SAVE
```

5. Press EDIT and rotary encoder, choose YES or NO. There will be a check message before all presets are cleared down.

6. Press SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

<u>Manual dimmer control</u>

It is possible to control any dimmer directly from the front panel of the Processor using the rotary encoder to set the desired level. This can be used for testing circuits or overriding control signals or other settings. The level is mixed with any other incoming signal on a highest level takes precedence basis.

<u>To manually control a dimmer level</u>

1. Select PRESETS. from the home menu

2. Press DOWN or UP or use the rotary encoder to choose MANUAL PRESETS menu. Press SELECT, and EDIT.

3. The screen shows individual channel numbers with levels.

```
ENTER MANUAL PRESET VALUES DEVICE 1

CHANNELS       1

 PRESET        000

               EDIT     CANCEL     SAVE
```
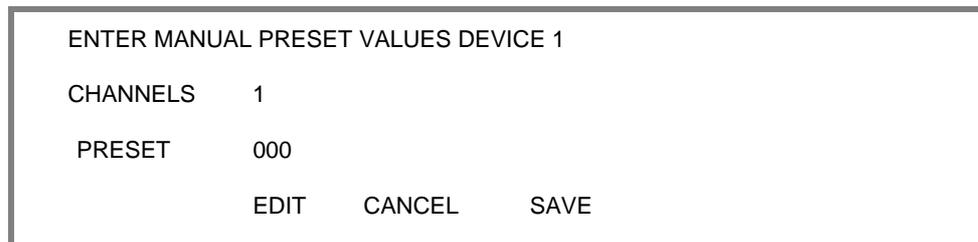
4. Press EDIT and using the <<<< and >>>> buttons, choose the channel to be adjusted [enabled when square brackets are shown] and set the channel level by using the rotary encoder. The channel will be set to the level entered from 00 to FF (full). This level will merge with other control levels on a highest takes precedence basis.

5. Press ENTER to leave the menu, then either SAVE (to record the changes and to create a permanent preset state) or CANCEL (to leave the previous settings unchanged).

Local fault reporting

If a discrepancy in the normal operating parameters is registered, the Matrix device will display a red LED for the faulty channel and the Processor will report the potential fault.

The CHECK light illuminates if a fault is recorded, the STATUS display changes from OK to CHECK, and any circuit errors are reported on the screen above the channel number affected as follows:

L1: 245V-38A	DA-X	UA-X	OUTPUTS. _ o_ |||
L2: 247V-14A	DB-X	UB-X	STATUS: CHECK
L3: 242V-20A	RACK : 05 X		DEVICE: 01X
SET-DMX	PRESETS	CONFIG	INSTALL INFO

code 'l' =	no load (control present but no output)
code 's' =	short circuit
code 't '=	over temperature
code 'o' =	overload (e.g. 4kW plugged into a 2kW dimmer)
code 'c' =	no control (e.g. load current with no control signal)
code 'v' =	voltage out of range (either over or under voltage)
code 'd' =	fault has persisted beyond a default auto-reset time, and the dimmer has been disabled awaiting manual intervention and reset.

The channel display indicators give the last recorded fault condition. If the fault is a self-resetting fault, or if the dimmer is automatically disabled, the reason for the problem may not be obvious from the channel display. However, a log of the errors is shown in detail through DimSTAT, and a summary of the history is shown using the dimmer's LCD screen as follows:

To check fault history

1. Select INFO from the home screen and the screen shows:

```
ERROR REPORT

[DEVICE 01      CHANNEL 03:  SHORT CIRCUIT]




   DOWN       UP  RESET-ALL        RESET      HOME
```

2. Press DOWN or UP to check the status history of each channel.

3. Press RESET to cancel the message, or RESET-ALL to cancel all error messages.

4. Press HOME to leave the menu and to return to the home menu.

To analyse dimmer status and performance

1. Select INSTALL from the home screen

2. Press DOWN or UP or use the rotary encoder to choose VIEW CHANNEL DATA menu. Press SELECT.

3. The screen shows:

```
LIVE CHANNEL DATA DEVICE 12

CH          I.   U.   T.        DMX-1   DMX-2   ACTUAL   STAT.

01          22   232  027       128     099     128      OK

   CH-           CH+           DEV-         DEV+           HOME
```

where:

I = current measured at the output

U = voltage at the input of the dimmer

T = dimmer module temperature

DMX-1 and -2 = DMX levels received

ACTUAL = the level the dimmer is responding to

STAT = either OK, or error message(s) with letter codes as above

4. Press CH+ or CH- to display channels in sequence, and DEV+ and DEV- to display devices in sequence.

5. Press HOME to leave the menu and to return to the home menu.

Matrix OS software

Matrix Mk.II operating system software comprises three sections: processor, Ethernet merger and Matrix devices.

CAUTION: *this section is for the use of service technicians and should only be accessed or updated under instruction from a qualified technician.*

To check dimmer software version

1. Select INSTALL from the home menu

2. Press DOWN or UP or use the rotary encoder to choose SYSTEM INFORMATION menu. Press SELECT.

3. The screen shows:

```
Matrix: Version 01.36   T.          8803uS

Merger: Version 01.06 F/E          39045/    0

Device 01: Version 01.44    F/E          0/    1654

                  RESET FRAMES    DEV-     DEV+              HOME
```

4.   Use DEV- and DEV+ to view device settings in sequence.

5.   Press HOME to leave the menu and to return to the home menu.

Firmware Update

The processor has a feature to update dimmers and the Ethernet merger with firmware.

⚠ CAUTION: *This is only to be attempted by an IES technician or under specific instruction from IES. Incorrect or inappropriate firmware upgrades could result in the loss of communication.*

To update firmware

1.   Select INSTALL from the home menu.

2.   Press DOWN or UP or use the rotary encoder to choose FIRMWARE UPDATE menu. Press SELECT.

3.   The display shows:

```
FIRMWARE UPDATE

UPDATE?        [NO]

                                      HOME
```

4.   Use the rotary encoder to choose from:

   NO (no action)

   ALL DIMMERS

   SELECT DIMMER

   MERGER

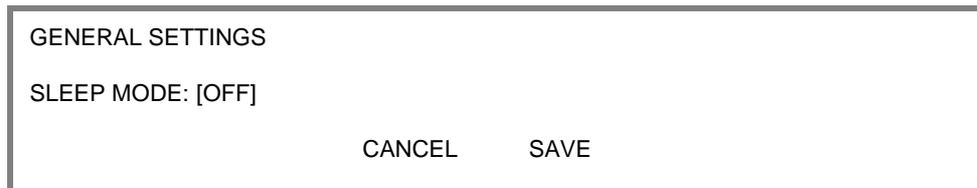5.   Press HOME to leave the menu.

Miscellaneous
Sleep mode

In some venues, the dimmers remain on constantly with the lighting system being switched activated by the control desk only. In order to provide an energy saving regime which switches the dimmers into a lower power mode, the SLEEP function has been included. When enabled, the sleep function will turn off all non-essential

parts of the dimmer devices, including the front panel illumination until such time that the DMX signal is re-established (as soon as the control desk is switched on).

<u>To set the dimmer device to 'Sleep' mode</u>

1. Select INSTALL from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.

3. Press DOWN or UP or use the rotary encoder to choose SLEEP MODE menu. Press SELECT.

```
GENERAL SETTINGS

SLEEP MODE: [OFF]

                          CANCEL        SAVE
```

4. Use the rotary encoder to choose either ON (active) or OFF (disabled).

5. Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged).

Check ventilation

Matrix has an integral test facility to check if the internal ventilation fans are operating correctly using a manual control override.

<u>To check the ventilation</u>

1. Select INSTALL from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose BLOWER TEST menu. Press SELECT.

3. The display shows:

```
BLOWER TEST MENU

SINGLE BLOWER

                UP   DOWN          SELECT        HOME
```
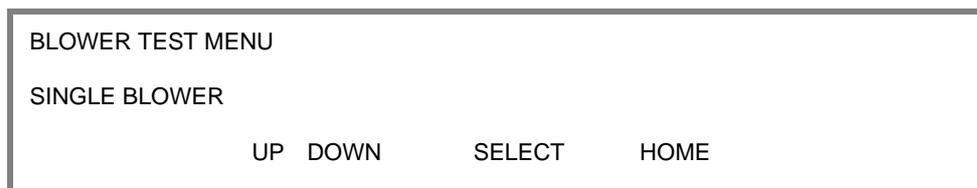
4. Use the rotary encoder to choose either single or all fans (blowers). Single fans can be accessed using UP and DOWN.

5. Press HOME to leave the menu.

Return to factory settings

The Matrix device is supplied with a set of factory default settings and software set-up parameters which configure the internal memory and performance characteristics. It is advisable to reset the dimmer software to the original factory settings in the case of a significant software update, or when a dimmer device is replaced.

<u>To reset the dimmer device to factory default settings</u>

1. Select INSTALL from the home menu.

2. Press DOWN or UP or use the rotary encoder to choose RETURN TO FACTORY SETTINGS menu. Press SELECT.

```
┌─────────────────────────────────────────────────────────────────┐
│  RETURN TO FACTORY SETTINGS                                       │
│                                                                   │
│  ARE YOU REALLY SURE?        [NO]                                 │
│                                                                   │
│                              CANCEL        SAVE                   │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

3. Use the rotary encoder to choose either YES (clears memory) or NO (no action).

4   Press SAVE to leave the menu and reset the dimmer or CANCEL (to leave the previous settings unchanged).

Factory defaults are:

AUTORELOAD: NO

CHANNEL CONFIGURATION:joined

CURRENT: 43A

CURRENT LIMITATION: off

CURVE   LINear

DMX-1 ADDRESS: 001

DMX-1 BACKUP: all 00

DMX-1 FAIL: reset

DMX-2 ADDRESS: 000

DMX-2 BACKUP: all 00

DMX-2 FAIL: reset

DMX SYSTEM: individual

DMX MINIMUM RESET: off

FREQUENCY: 50Hz

LAMP SAVER   ON

LAMP TUNING   ON

LOAD SELECTION: all 2.5kW

MANUAL PRESETS: all 00

MAXIMUM: 100%

MINIMUM: 0%

MODE   basic

NON-DIM (I/O)   no

PASSWORDS: all 0000

PC ADDRESS: 00

PHASE   off

PRESET-1: CH-1 @F only

PRESET-2: CH-2 @F only

PRESET-3: CH-3 @F only

PRESET-4: CH-4 @F only

PRESET-5: CH-5 @F only

PRESET-6: CH-6 @F only

PRESET-7: CH-7 @F only

PRESET MODE: Normally Open

PRIORity   no

SLEEP: off

T-IN   0 secs.

T-OUT   0 secs.

VOLTAGE: 235V

VOLTAGE REGULATION: off

Chapter 4

Service

Contacting ETC

Changing rack modules

Regular inspection

Check ventilation

The only moving parts in the dimming system which will degrade over a period of years, and will affect the operation of the dimmers, are in the ventilation system comprising low-voltage dc axial fans located at the rear of each row of slots in the Matrix Chassis. It is vital that no part of the ventilation system is obstructed from full operation, and is checked at least once a year for correct and full operation. An indication of a fan failure will be a rise in temperature of modules in a dimmer cabinet. The ventilation system is significantly over-rated for the installed dimming load, however, a small increase in the general level of dimmer temperatures may be an early indication of a fan failure. Check regularly using the BLOWER TEST menu.

Annual inspection

Annual inspection should include checking of the operation of all fans, a check on the level of dust inside each dimmer rack, and cleaning if there is a significant build-up of dust in the electronics.

The effectiveness of all external connections, circuit protection devices, RCBOs etc. should also be checked regularly and at the annual inspection time. The RCBO can be tested by simply pressing the red test button to trip the circuit.

Fault finding

In nearly every case of a major failure of the dimming system, the first line of investigation towards a fast solution will be to investigate the system through DimSTAT. This network will give immediate indications of power supply failure or dimmer rack failure, as any fault detected will show the Matrix dimmer address on a red background.

Even if a fault condition appears to disappear, there is always a reason for a failure, and it is vital to identify the cause before resetting MCBs or replacing fuses in case the problem is unresolved and repeats with more damaging results. In the case where DimSTAT is not installed, error messages are available on the front panel LCD with more detailed information available by interrogating data through the display's menu.

Note*: Should any fault occur other than a complete loss of power or a 'no load' situation, the Processor will have a red indicator 'check' light illuminated on the front panel. Only one phase needs to be present to power the internal electronics and fault reporting system. For an immediate guide to the cause of the problem, follow the 'View channel data' section.*

Main power failure

If there is a main power failure where all, or a significant part of the system fails, the first action is to set the control output to all dimmers to a minimum while the source of the problem is located. Total main failure can be experienced by a loss of all lighting levels. Generally, if there is a problem within the dimming system, either part of the system will blackout, or the DMX preset backup into the dimmers will take over.

Failure of group of dimmers

An assessment of the number of dimmers affected is crucial for effective corrective action. This will determine whether the problem is a mains supply problem, a dimmer rack problem or a control problem.

Check the Processor front panel display for the presence of all phases of the mains supply. If the mains supply is not present, check fuses or MCBs which power the processor and Chassis. Before resetting the main supply, investigate and correct the cause of the failure.

If the mains is present, and no control signal bar graphs are showing, check that the control signal input connector is in place.

The dimmer operation can also be checked by using the manual preset control feature in the PRESETS menu.

Check if the failure is restricted to a column or row in the Matrix Chassis. If it is a column, it could be due to a phase failure and if a row, the DMX connection may be missing. DMX is looped from one row to the next, so a group of rows without DMX could indicate a faulty or disconnected DMX cable in the row above the fault.

Failure of single dimmer

The fault reports through DimSTAT will give details of a circuit fault and if the fault cannot be repaired externally, the problem may be a single dimmer failure. In the first instance disconnect all loads and extension cables from the connected sockets and check the dimmer channel again. If the problem still exists, the module concerned should be replaced.

Over temperature alarm

If modules or dimmer racks report high temperatures, this may be due to either a reduction in the efficiency of the ventilation system (caused by a fan failure) or the effect of an unusual load. Check the load in the first instance, and also the temperatures of adjacent devices.

Over voltage alarm

The dimmers affected by either an over or under-voltage condition will report the problem and will then shut down until the voltage returns to the specified range. This is to protect the loads from high voltages which would affect the life of the lamps connected. Check that the default voltage calibration settings are correct. If these are too low, a small variation in nominal voltage may cause nuisance reports and dimmer switch off.

Serial data loss

If DimSTAT loses communication to the dimmers, the first step is to check the mechanical connections to the network. If this is intact, reboot the PC and check communications and the comms port settings, in case the settings have been corrupted by additional software loaded on the hard disk .

DMX data loss

The Matrix dimmer has a backup scheme for DMX whereby the response to a failure of DMX can be set to hold the last valid DMX state, fade to blackout, or go to a preset state.

If there is a partial DMX loss, it may be caused by a dimmer rack being removed and breaking the link from one rack to the next, or that the DMX cables have been connected incorrectly when a dimmer rack is replaced.

Appendix A

Processor menus

F1 SET DMX

Set DMX

This menu sets the DMX address for each channel or a start address for the channels in each module.

F2 PRESETS

Manual Preset Levels

Sets a level for each channel in each preset.

Preset Configuration

Sets the fade time in and out (T-in and T-out) associated with each preset.

Presets store

Records the settings of the presets. The presets do not need to be stored to operate as a manual override control.

DMX Backup

If a DMX line fails, the system may be set up to use this backup preset as an alternative to holding the level or fading out. This menu is used to set the backup levels in case of a DMX failure.

F3 CONFIG

Config channel parameters

This menu provides direct set up access to the main performance features of the channel, including: min and max levels, default fade times, dimmer curve, non-dim operation, priority setting, phase control, start mode.

F4 INSTALL

Select number of devices in the rack

This sets the number of modules present in the rack.

Select PC DimSTAT parameters

This is where the DimSTAT address is set.

Select Line Parameters

Where the nominal Voltage, maximum current and frequency anticipated for each module is set.

Select New password

4-digit passwords may be set individually for the following menus: Set DMX, Presets, Config, Install.

General settings

This is the main system menu for general operating features:

- DMX address settings [individual or joined]
- Channel configuration settings [individual or joined]
- DMX 1 fail [reset, hold or backup]
- DMX 2 fail [reset, hold or backup]
- Sleep mode [on/off]
- Voltage regulation [on/off]
- Current limitation [on/off]
- DMX Minimum reset [on/off]
- Erase all presets [yes/no]
- DMX lamp saver [on/off]
- DMX lamp tuning [on/off]

Load selection

This sets the number of dimmers and their rating per module.

Line voltage calibration

This sets the nominal voltage for L1, L2, L3.

Return to factory settings

Resets the channel parameters to the default levels.

View channel data

This gives a summary of present operating conditions of each channel. Channel number, current, voltage, temperature, DMX A level, DMX B level, actual DMX level used, status of channel (OK or fault).

System info

Gives a list of software versions in use, and provides technicians with data frame counts to facilitate fault finding.

Firmware update

Allows a suitably trained technician to update the firmware for all dimmers, selected dimmers or the merger.

Ethernet set up

This menu is to set the IP address, subnet mask and gateway address for the rack.

Merger Ethernet set up

This menu is to set the IP address, subnet mask, gateway address and Net universe A and B for the processor's merger.
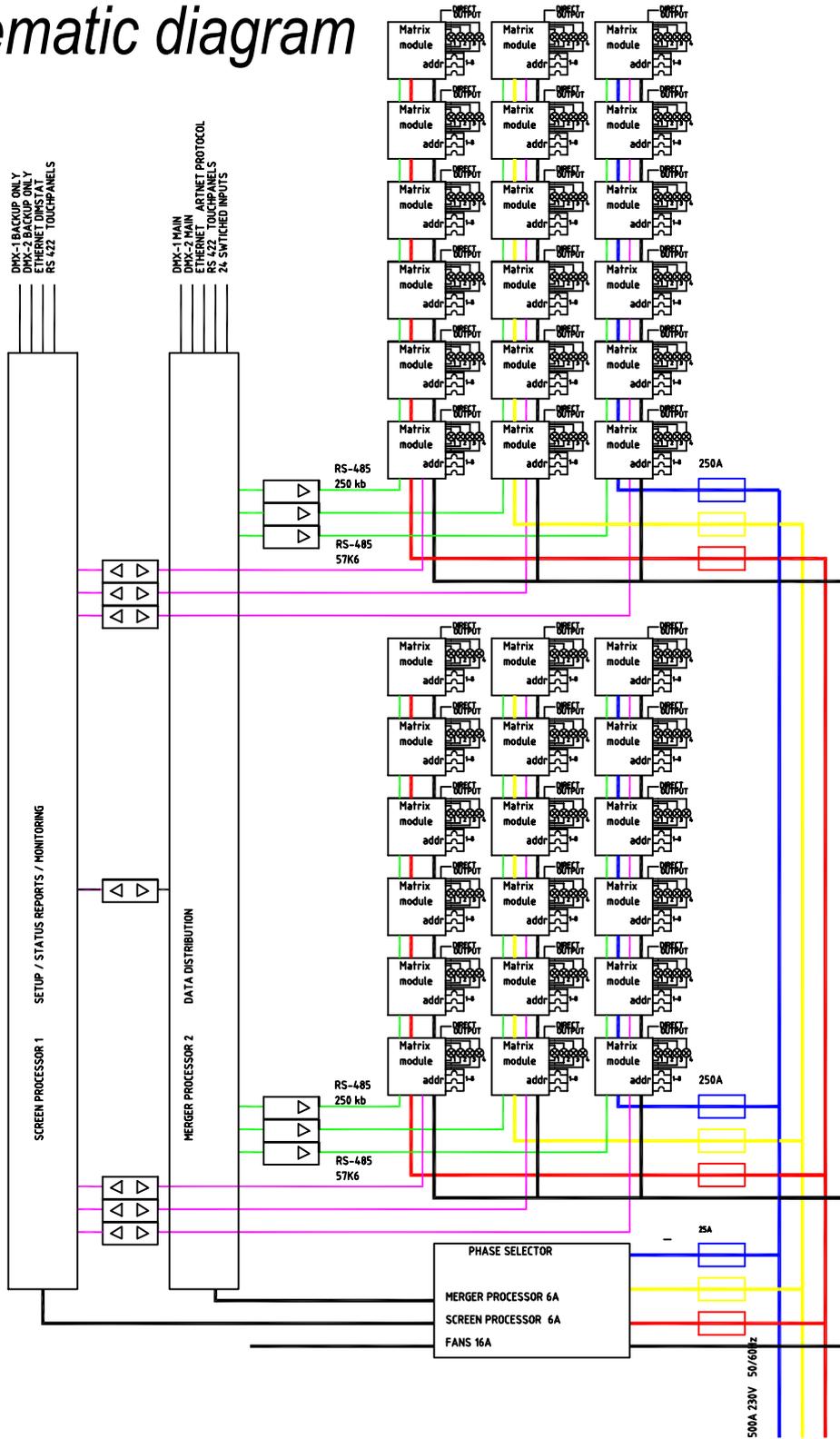
Blower test

The facility for checking ventilation within the rack. Either all fans or selected fans can be controlled to test efficiency.
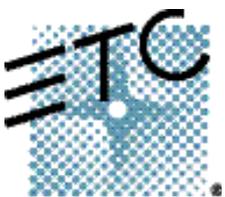
F5 INFO

This menu provides the software settings of the processor, or if a fault is reported, it provides details and reset options.

Appendix B

Schematic diagram