



MANUAL EXECUTIVE 1210



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1 OVERVIEW OF EXECUTIVE DIMMER UNIT

1.1 How to use this information

The IES EXECUTIVE dimmer unit incorporates state-of-the-art lighting power control technology called **itec**[™]. In comparison to the previous dimming technologies (e.g. thyristor), **itec** uses microprocessor-controlled IGBT transistors to reduce or eliminate many of the problems associated with other dimming technologies such as peak currents, noise, heat dissipation and load dependence. The new technology also provides improvements in the safety of the electrical system as each load output is protected against short-circuits, over and under voltage, overload and excessive temperatures.

1.1.1 Main features of the Executive dimmer

Executive dimmer packs incorporate 12 x 2.5kW, 6 x 5kW or 3 x 10kW **itec** modules using IGBT (Insulated Gate Bipolar Transistor) power devices. **itec** technology reduces the problems experienced with conventional dimming, namely the electrical disturbances in the form of radiated interference and conducted interference, peak currents (which are present with thyristor and triac dimmers during switch-on at each half-cycle), heat dissipated by the dimmers, lamp filament 'sing', and the size and weight of traditional dimmers. **itec** dimmers may be cascaded to control larger wattage loads, offering the opportunity to mix dimmer ratings within each dimmer pack if required (factory set option). They can control a wide range of load types between the power factors of 0.5 to unity. In addition to these advantages, IGBT dimmers utilise high power processors running software written in C++, which offers great potential for future development through software upgrades. Harmonic currents can be reduced by configuring dimmers in groups to cancel out the harmonic effects.

The main features of **itec** dimming depend on its ability for reverse-phase switching whereby current switches *ON* using the natural sine wave curve at the beginning of each half cycle. In order to vary the power in the load, current is switched *OFF* in a software-configured manner during each half cycle. The benefit of the reverse-phase, switch-off process is that there is no peak current each half cycle and as the IGBT can be controlled progressively, software switches current off in a way which minimises electrical disturbances and heat dissipation.

1.2 Scope and terminology

This handbook describes the general principles, installation, operation, programming and basic servicing and maintenance elements of the Executive dimmer unit. Note that the Executive dimmer unit forms a central part of a dimming system which also includes supply wiring and protection, output wiring and circuit protection, a control signal network, and a serial link system to a PC for remote control, software maintenance and status reporting. For details of the complete dimming system, please refer to the relevant system manuals.

Some terms used throughout this manual require definition, and they are described here:

Bus-board	The single-phase motherboard which is used to connect itec modules. Three bus-boards are present in each Executive.
Cabinet	Installed and wired housing into which the dimmer packs are installed
Channel	Individually-controlled dimming circuit, comprising a DMX signal, power device (2.5kW, 5kW or 10kW), through to the output.
CPU	Central Processor Unit. The plug-in processor PCB of which four are used in each dimmer pack; one for the front panel processing and one each for the bus-boards.

Device	Transmitter or receiver on the DimSTAT status reporting network. For the purpose of this document, 'device' refers to any Executive dimmer pack.
Dimmer channel	see channel
Dimmer unit	Executive dimmer pack
DMX-1	First of DMX control signal inputs; also includes the DimSTAT data connections.
DMX-2	Second DMX input
DMX line	A single cable system carrying up to 512 multiplexed dimmer control signals. For larger systems, a second or more DMX lines are needed for each subsequent group of 512 dimmers.
<i>itec</i> module	IGBT Dimmer Unit. Available in 2.5kW (single size), 5kW (dual size) and 10kW (quad size).
MCB	Magnetic Circuit Breaker, used for all outgoing load circuits
n/c	not connected
NC	Normally Closed switch contacts
NO	Normally Open switch contacts
Pack	I.E.S "Executive" dimmer unit in a 19" chassis
RCD	Residual current circuit breaker.

1.3 Safety precautions

1.3.1 Importance of electrical safety

It is impossible to over-emphasise the importance of electrical safety procedures, and even though every effort has been made by the dimming equipment manufacturers to ensure the safety of personnel involved with the operation and maintenance of the installation, it is imperative that all relevant steps are taken to eliminate the risk of injury by taking simple precautions and adhering to electrical safety practice. The manufacturers can take no responsibility for safety issues outside their control if the Executive dimmer unit is installed without attention to the recommended installation techniques.

1.3.2 Overview of included and recommended protection devices

All electrical equipment supplied by IES is designed with safety in mind. The output from each Executive dimmer is internally protected against short circuit, overload, overvoltage and the Executive pack is resilient to most cases of mis-wiring and includes internal protection devices and over-rated transformers. Adequately-rated MCBs are recommended as overcurrent devices and isolation switches for each circuit. Personnel may be protected against shock from mis-wired or faulty luminaires through the use of 30mA RCDs fitted to the supply of each pack of dimmers. Individual dimmers have electronic protection circuits

to switch off power and to report faults within a few microseconds of a fault condition developing. Each *itec* module is protected internally by a fuse, and it is recommended that each pack of dimmers has a three phase 50A MCB, or equivalent fuses, to provide overcurrent protection.

1.3.3 Requirements for isolation

When working on load wiring or sockets, it is recommended that the dimmer output is isolated by switching off power to the circuit either by isolating the circuit or by disconnecting power to the Executive dimmer unit.

Similarly, during maintenance and servicing of the system, power should be switched off to isolate an appropriate section of the installation. For the replacement of a single dimmer pack, it is safe to disconnect the dimmer pack after the mains supply to the pack has been switched off, isolating power to that pack only. It is important to isolate the dimmer pack being replaced, for reasons of personal safety, and because multi-pole power connectors are not rated for 'hot' connection and disconnection.

1.4 Dimmer pack overview

Power control

The Executive has capacity for twelve plug-in 2.5kW *itec* IGBT modules arranged in 3 groups of 4 dimmers, one group for each of the three-phase supply. Alternatively, the pack can be fitted with six 5kW dual size modules, three 10kW quadruple sized modules. By a combination of software control and hardware links, one type of dimmer may be used to provide control of a range of load types. Thus, a 2.5kW *itec* module can control 2.5kW, two can control 5kW and four can be used for 10kW loads. A 5kW *itec* module can control 5kW and two can be used for 10kW loads. The choice depends on the layout of the lighting circuits and also the spares holding implications of the total installation.

itec dimmers may also be set to either forward or reverse phase control (reverse is the normal function for IGBT dimmers) to accommodate the widest variation of load types, and to balance harmonics if low levels of harmonics are desired. Most loads can be controlled by reverse (or phase-off) conduction, but phase-on control (as used with thyristor and triac dimmers) should be selected through the software system either for highly inductive loads or for balancing mains harmonics.

The Executive dimmer packs are self-contained in that they each have control processing and memory. There is no centralised processing in the pack so the maximum redundancy in the event of a dimmer processor failure is 12 dimmers at 2.5kW. The dimmer packs are linked by a data network (DimSTAT) which when connected to a PC enables the dimmers to report power, load and signal status and measurements, circuit fault conditions and supply fault conditions. DimSTAT also provides the means to upload new operating software to the dimmers, and to download and upload dimmer characteristics and settings which can be saved as files on the PC.

All programming functions of the 7 presets for the dimmer are available via both the front panel controls and LCD display of the Executive, or via DimSTAT. A full list of the wide range of programming functions available with the dimmers is described in the relevant sections of this handbook.

The Executive's processors monitor many functions of each dimmer channel and provide control of electronic protection against the effects of a short circuit, overload, overvoltage, undervoltage and temperature.

DMX system

The Executive dimmer accepts two independent lines of DMX, and provides a range of choices for the arbitration of levels between the two signals. The second DMX line may be used as a backup, or to group dimmers into zones in a large installation, or to accept two separate control systems, or to accommodate DMX addresses across two consecutive address groups. Each dimmer channel may be programmed with the same or different addresses on each DMX line, and pre-set to respond to one, the other, or a mixture of both DMX signals.

Switched inputs

The Executive includes 7 switched inputs which perform fades to pre-set dimmer levels when a switched input senses a change in dc voltage from zero to 8Vdc- 32Vdc (max.) or vice versa (NO or NC switch operation). This feature may be used for backup switching, or to provide simple houselight or working light systems.



2 INSTALLATION

2.1 Unpacking

Care is taken in the packing and transportation of Executive dimmers. When unpacking, check for any signs of mechanical damage caused during transportation, and inform the transporter and supplier immediately if any damage is found. Keep at least one packing box after installation in case a dimmer has to be returned to I.E.S for any reason.

2.2 Mounting

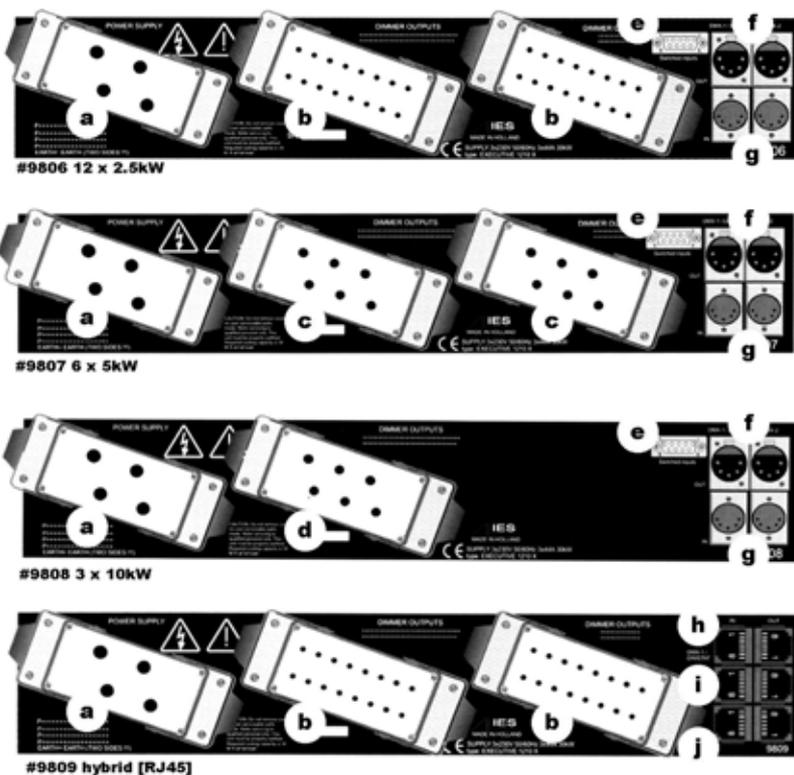
The Executive dimmer pack includes fixings for a standard 19" rack enclosure. The design of the case enables the weight to be supported by the 4 front panel screws.

Note: For reliable operation, pay careful attention to the ventilation system. Executive dimmer packs are fan-blown, with the input at the right side (from the front) and exhaust at the left side. If the dimmers are to be installed in confined enclosures, For advice on suitable ventilation requirements, contact IES.

Access is required to the rear panel to connect the mains input, load outputs and signal connections.

2.3 Plug-in connectors

The Executive dimmer pack is completely self-contained, i.e. it requires no external components to operate other than power, connected load and control signal). All connections to the dimmer pack are made using multi-pin power and signal connectors which when disconnected allow the dimmer pack to be removed from the cabinet for servicing or replacement. Connectors require no tools for connection or disconnection. The connections provided at the rear of the Executive pack are as follows (refer to diagram):



Legend:

- a) 80A 4-pin & earth 3-phase mains input Harting connector
- b) 16-pin Harting connector for 12x2.5k loads or mixture of ratings.
- c) 6-pin Harting connector for 3x5kW loads
- d) 6-pin Harting connector for 3x10kW loads
- e) Switched inputs [7] 9-pin D-type
- f) DMX 1 & 2 out XLR 5-pin (DimSTAT on DMX 1, pins 4 & 5).
- g) DMX 1 & 2 in XLR 5-pin (DimSTAT on DMX 1, pins 4 & 5).
- h) DMX1 in & out & DimSTAT RJ45
- i) DMX2 in & out RJ45
- j) Switched inputs [7] RJ45

2.4 Power input

The mains input is provided on a chassis-mounting Harting 3-phase 80A male connector which is used to provide 41.6A per phase when fully loaded. This 4-pole connector has a leading earth connection at each end, and the four poles are used for three phases and neutral. The Executive may be powered from a three-phase star or delta supply or from a single phase or two phase supply. Wiring connections are as follows:

pin 1: phase 1 (R)
pin 2: phase 2 (S)
pin 3: phase 3 (T)
pin 4: neutral 1
shell: earth

2.5 Load outputs

The load outputs are connected via chassis-mounting Harting multi-pole female connectors which are wired to each *itec* module output. Dedicated pins are used for the fixed 2.5kW, 5kW and 10kW versions, and 16-pin connectors are used for the hybrid 2.5/5/10kW variant. In the case of the hybrid Executive, where dimmer ratings may be mixed, each 2.5kW load connection uses one pole, a 5kW circuit uses two poles and a 10kW load uses 4 poles wired in parallel at the circuit protection MCB/RCBO or termination area. The connectors have a leading earth connection at each end,.

Note that the load neutrals are not connected via the Executive dimmers but are connected directly to the neutral busbar system. Wiring convention is as follows:

16 pole Harting for 12 x 2.5kW and mixed ratings [codes 9806 and 9809]

[see 'b' on diagram above]

load connector #1

pin 1: *itec* module 1 phase output
pin 2: *itec* module 2 phase output
pin 3: *itec* module 3 phase output
pin 4: *itec* module 4 phase output
pin 5: *itec* module 5 phase output
pin 6: *itec* module 6 phase output
pin 7: earth
pin 8: earth
pin 9: module 1 neutral output
pin 10: module 2 neutral output
pin 11: module 3 neutral output
pin 12: module 4 neutral output
pin 13: module 5 neutral output
pin 14: module 6 neutral output
pin 15: earth
pin 16: earth
shell: earth

load connector #2

pin 1: *itec* module 7 phase output
pin 2: *itec* module 8 phase output
pin 3: *itec* module 9 phase output
pin 4: *itec* module 10 phase output
pin 5: *itec* module 11 phase output
pin 6: *itec* module 12 phase output
pin 7: earth
pin 8: earth
pin 9: module 7 neutral output
pin 10: module 8 neutral output
pin 11: module 9 neutral output
pin 12: module 10 neutral output
pin 13: module 11 neutral output
pin 14: module 12 neutral output
pin 15: earth
pin 16: earth
shell: earth

6 pole Harting for 6 x 5kW [codes 9807]

[see 'c' on diagram above]

load connector #1

pin 1: *itec* module 1 phase output

pin 2: *itec* module 2 phase output

pin 3: *itec* module 3 phase output

pin 4: module 1 neutral output

pin 5: module 2 neutral output

pin 6: module 3 neutral output

shell: earth

load connector #2

pin 1: *itec* module 4 phase output

pin 2: *itec* module 5 phase output

pin 3: *itec* module 6 phase output

pin 4: module 4 neutral output

pin 5: module 5 neutral output

pin 6: module 6 neutral output

shell: earth

6 pole Harting for 3 x 10kW [codes 9808]

[see 'd' on diagram above]

pin 1: *itec* module 1 phase output

pin 2: *itec* module 2 phase output

pin 3: *itec* module 3 phase output

pin 4: module 1 neutral output

pin 5: module 2 neutral output

pin 6: module 3 neutral output

shell: earth

2.6 DMX connections

The Executive dimmer pack has provision for two separate DMX signals which are connected either via four 8-pole RJ45 connectors, or four 5-pole XLR connectors, two for DMX in and two for DMX out. The connectors for DMX-1 are also used for DimSTAT status reporting serial communication. The connections are as follows:

RJ45 version

DMX-1 in & out

pin 1: 0V

pin 2: DMX data -

pin 3: DMX data +

pin 4: DimSTAT data -

pin 5: DimSTAT data +

pin 6: n/c

pin 7: n/c

pin 8: n/c

DMX-2 in & out

pin 1: 0V

pin 2: DMX data -

pin 3: DMX data +

pin 4: n/c

pin 5: n/c

pin 6: n/c

pin 7: n/c

pin 8: n/c

XLR version

DMX-1 in & out

pin 1: 0V

pin 2: DMX data -

pin 3: DMX data +

pin 4: DimSTAT data -

pin 5: DimSTAT data +

DMX-2 in & out

pin 1: 0V

pin 2: DMX data -

pin 3: DMX data +

pin 4: n/c

pin 5: n/c

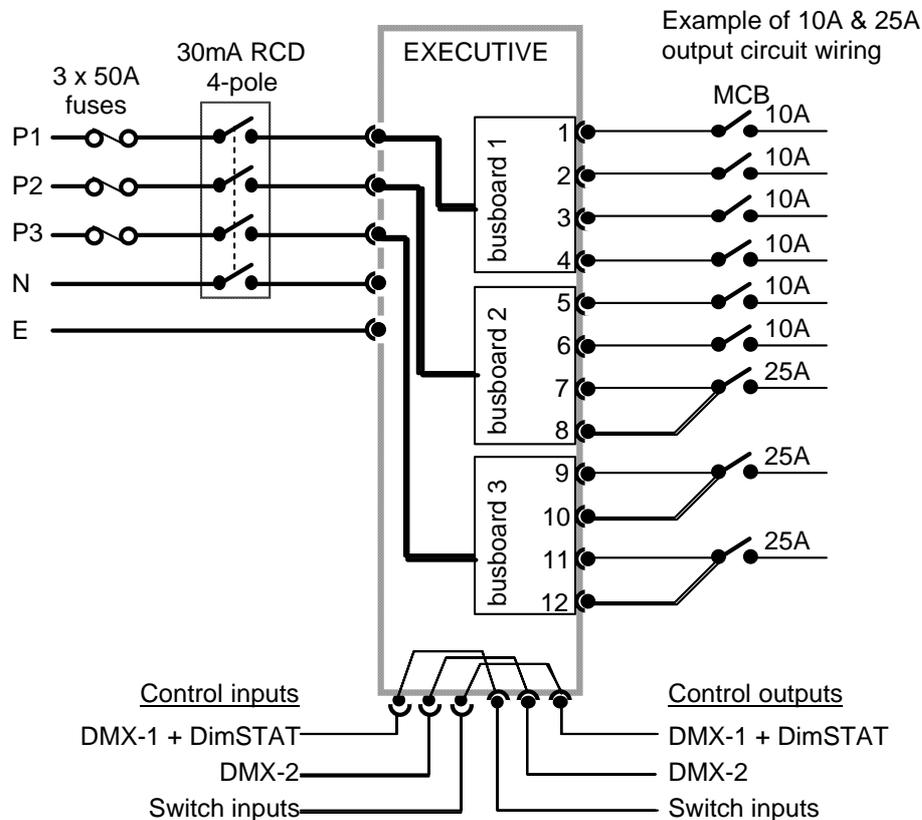
2.7 Direct Control Inputs

A looping in/out connection for 7 direct control signals is provided on a pair of RJ45 connectors or 9-pin Sub-D connectors. This facility accepts a voltage of between 8Vdc and 32Vdc [24Vdc recommended] between the signal input pin and ground to trigger an action within the dimmer pack. The action is programmable and may take the form of a fade to a preset state in a recorded time. The direct input action may also be programmed to respond to a change in either a normally closed or normally open condition. Connections are as follows:

RJ45	9-pin Sub-D
pin 1: direct input 1	pin 1: direct input 1
pin 2: direct input 2	pin 2: direct input 2
pin 3: direct input 3	pin 3: direct input 3
pin 4: direct input 4	pin 4: direct input 4
pin 5: direct input 5	pin 5: direct input 5
pin 6: direct input 6	pin 6: direct input 6
pin 7: direct input 7	pin 7: direct input 7
pin 8: OV	pin 8: OV

2.8 Overview of wiring connections

In schematic form, the connections described previously can be shown in general form for a hybrid executive as follows. Note that the dedicated 5kW and 10kW versions have any paralleling of current capacity within the dimmer pack, and not at the output as shown with the 12 x 2.5kW hybrid #9809 pack :



3 DIMMER PROGRAMMING

Front Panel Controls

It is possible to set and view all of the performance and control characteristics, measurements and status reports created by the dimmer from the front panel LCD screen. The screen is a high-quality 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 light when three phases are present, and a CHECK red led indicator illuminates when the dimmer has identified any error which is unresolved. Self-resetting faults cause the CHECK light to extinguish when the fault has cleared.

The power-up display shows the general setting parameters with the software version:

IES Executive IGBT dimmer	Ver: 1.44
Unom: 230V	L1=4x2.5kW
Imax: 44A	L2=2x5kW
Freq: 50Hz	L3=1x10kW

After a few seconds, this screen changes to the 'home' screen which displays the channel levels (bargraphs at the top right), the measured line voltages and currents, and the status of the dimmers and DMX signals. The number of bargraphs shown relates to the load selection of the dimmers. Thus if some dimmers are selected to operate together as 5kW (2 channels) or 10kW (4 channels) the number of channels shown reduces accordingly. Thus a dimmer pack selected as all 5kW circuits will have only 6 displayed channel levels.

L1: 245V-38A	DMX-1:001 *	L. "==" "=="		
L2: 247V-14A	DMX-2:411 X	CH:123456789012		
L3: 242V-20A	PC-ST:05 X	STATUS: OK		
SET-DMX	PRESETS	CONFIG	INSTALL	INFO

Note: An asterisk () adjacent to the DMX-1 display below shows the DMX signal is valid, and the X adjacent to DMX-2 shows a disconnected or invalid DMX signal. The same applies to the PC-ST address number.*

PASSWORDS *Note: For clarity, the following sections which describe programming activities do not refer to the entry of passwords. Passwords are included to prevent unauthorised 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). 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.*

3.1 Load configuration

The default power setting for the Executive dimmer pack is factory set. Before embarking on any detailed programming of the dimmer characteristics for a hybrid pack (9809), it is important to establish the number of dimmer channels in use, i.e. the number of 2.5kW, 5kW and 10kW channels in use in the pack. If the Executive is to be used in its default mode, then this section can be ignored.

The selection of 5kW or 10kW circuits requires two operations; one is hard-wire links in the output wiring to two or four dimmer outputs, the other is a software option to link the characteristics and DMX address of two sequential dimmers on the same phase.

SAFETY NOTE: Exercise care when creating 5kW and 10kW dimmers by paralleling output connections. It is vital that the paralleled outputs are on the SAME PHASE, that all connections are tight, and adequate protection devices are installed in the circuits.

To establish a 5kW circuit for example, two dimmer pack outputs from two module positions (on the same phase) are hard-wire linked at the MCB or other convenient termination point. On the set-up screen of the dimmer programming facility, it is possible to change each block of 4 dimmers to provide 4 x 2.5kW, 2 x 5kW or 1 x 10kW circuits. The program setting joins two dimmers so they respond exactly to the same DMX channels (from DMX-1 and DMX-2). Factory default setting is 4 x 2.5kW throughout.

3.1.1 To configure the power rating:

1. Select INSTALL from the home menu
2. Press DOWN or UP or use the rotary encoder to choose LOAD SELECTION menu. Press SELECT.
3. The screen shows:

LOAD SELECTION			
LINE 1	LINE 2	LINE 3	
LOAD: 4x 2.5kW	4x 2.5kW	4x 2.5kW	
<<<<		>>>>	
		CANCEL	SAVE

4. Press EDIT and using the <<<< and >>>> buttons, choose a LINE number (LINE-1 is phase A [red], LINE-2 is phase B [yellow], LINE-3 is phase C [blue]), and set the power handling to the required format using the rotary encoder. The options are 4 x 2.5kW, 2 x 5kW or 1 x 10kW.
5. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

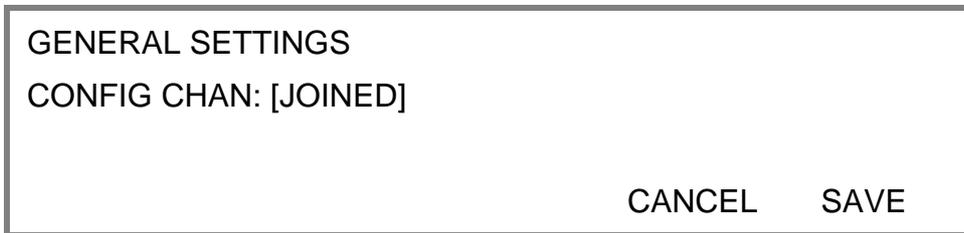
Note: The power settings logically affect some of the other dimmer set-up parameters such as DMX numbering, channel displays and numbers of channel characteristics.

3.2 General controls

Executive 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 pack 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.

3.2.1 To change the dimmer characteristic 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



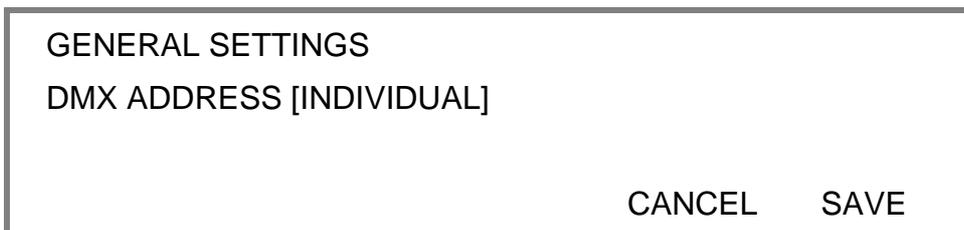
5. Use the rotary encoder to select either INDIVIDUAL (for different individual channel parameters) or JOINED (for all channels in the pack to have the same characteristics).
6. Press SAVE (to record the changes) or HOME (to leave the previous settings unchanged, and return to the home page).

3.3 DMX programming

Each dimmer in the Executive pack 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. When programming a new dimmer pack, IT IS IMPORTANT TO SET THE DMX ADDRESSING SCHEME after the load selection, and before the individual characteristics are set, as a later change can reset previously recorded individual channel characteristic settings.

3.3.1 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:



4. Use the rotary encoder to select either INDIVIDUAL (for individual DMX addresses) or START (one DMX is entered for the first channel in the pack, 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).

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.

3.3.2 To set-up DMX addresses:

1. First set the DMX scheme as described above (either individual or start address).
2. From the home screen, select SET-DMX, and to change a setting, press ENTER
3. If INDIVIDUAL address option is in use, the screen is similar to this:

SELECT DMX ADDRESS							
INPUT	CH1	CH2	CH3	CH4	CH5	CH6	CH7
DMX-1	001	000	049	056	501	296	000
DOWN				UP		<<<<	>>>>
ENTER							

4. 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 <<<< and >>>> 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.
5. If START has been selected, only one number per DMX line is permitted. This is the number for dimmer channel 1 in this pack, and the remaining dimmers are automatically addressed in sequential order.

Note: The total number of dimmers in an Executive dimmer pack depends on the LOAD SELECTION settings within the INSTALL menu. This allocates the twelve 2.5kW dimming channels into three groups of either 4 x 2.5kW, 2 x 5kW or 1 x 10kW. The channel options change in related menus to accommodate the load requirements selected (e.g. if the loads selected are L1=4x2.5kW, L2= 2 x 5kW and L3=4x2.5kW, the channel options will alter to 10 channels maximum.)

6. 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.

3.3.3 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. 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 pack 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%.

3.3.4 To set up a DMX backup condition

The Executive 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 pack.

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.

<p>GENERAL SETTINGS</p> <p>DMX-1 FAIL: [HOLD]</p> <p style="text-align: right;">CANCEL SAVE</p>

4. Press EDIT and use the rotary encoder to select one of the 3 options available.
 - RESET:** sets all dimmers to zero after 5 seconds
 - HOLD:** maintains the last valid DMX levels until DMX is restored
 - BACKUP:** selects dimmer levels set-up through the PRESETS memory facility
 - MASTER:** has executive control until the DMX signal fails, after which control switches to the other DMX line.
5. Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged).
6. Repeat the procedure for DMX-2.

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

3.3.5 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												
CHAN.	1	2	3	4	5	6	7	8	9	10	11	12
DMX-1	00	30	FL	00	56	88	FL	32	50	70	FL	00
	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).

3.3.6 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 switch any preheat levels off 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]
	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).

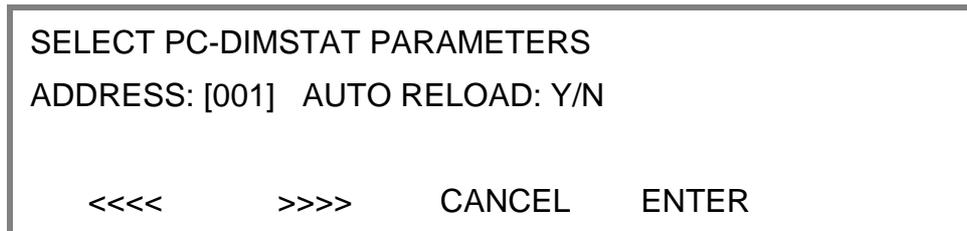
3.4 Serial address

The PC address shown on the home screen as PC-ST: is the unique number which is used by DimSTAT™ to identify each dimmer pack or peripheral for the purpose of reporting status information and for transferring data between the dimmer pack and the PC. If a dimmer pack is removed from the cabinet, and replaced by another pack DimSTAT will prompt for an update of configuration information when power is restored. This is done when the PC number is entered, and DimSTAT identifies the new pack on the network, prompting the operator to download the previous characteristics file from the PC to the dimmer pack. The PC number is associated with a unique factory serial number which is permanently stored in the dimmer. This is because if a different dimmer pack is used with the same PC number as its

predecessor, the DimSTAT program compare serial number and PC-address, notes the difference and thus will prompt the system to download the previous dimmer set-up. An Autoreload function is also provided to reinstate the PC address after a factory reset.

3.4.1 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:



4. Use the rotary encoder to choose the address number (which can be set between 000 and 255).
5. Press >>>> to select Autoreload on or off (Yes or No).
6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

3.5 Maximum & Minimum levels

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. Both the minimum and maximum levels may be set to any level between 0% to 100%, although the minimum must be lower than the maximum by at least 1%. 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. However this should be checked in comparison with other lamps in the rig to ensure uniformity of response.

Note: In the case of high-inrush loads (e.g. Parcans) where flashing on from a cold state is required in a silent auditorium, or for 5kW lamps where the high inrush current could cause the short-circuit protection to report and error, it is recommended to set a 'minimum' preheat level to 5%. See also the section on DMX Minimum Reset.

3.5.1 To set-up max. and min levels:

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 pack) 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
          <<<<      >>>>   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).

3.6 Response time

Each dimmer has two times 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 from thermal damage, 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

3.6.1 To set-up response times:

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 pack) 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
          <<<<      >>>>   CANCEL  SAVE

```

Setting options are from 00.00s to 99.99s.

Note that 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).

3.7 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)

3.7.1 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 pack) 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
			<<<<	>>>>	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).

3.8 Non-Dim operation

The Executive dimmer modules 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.

3.8.1 To select a dimmer to operate as a non-dim switch:

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

- The screen shows the individual channel number (or ALL if the dimmer set-up scheme copies characteristics to all dimmers in the pack) 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
                                     <<<<  >>>>  CANCEL  SAVE

```

- 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
- Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).
- Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

Note: When in solid state (non-dim) mode, the dimmer is operating in Phase-On mode only.

3.9 Maximum current

Each Executive dimmer pack 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.

3.9.1 To set-up maximum current levels:

- Select INSTALL from the home menu
- Press DOWN or UP or use the rotary encoder to choose SELECT LINE PARAMETERS menu. Press SELECT.
- The screen shows:

```

SELECT LINE PARAMETERS
      VOLTAGE CURRENT FREQUENCY
NOMINAL      235   [43]  50 Hz
              <<<<  >>>>  CANCEL  SAVE

```

- Press EDIT and using the <<<< and >>>> buttons, choose CURRENT and enter the maximum current limit per phase using the rotary encoder.
- Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

3.9.2 To set-up priority channels:

- Select CONFIG. from the home menu

- 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

```

- 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 lowering of intensity if the preset maximum current (maximum demand) for the phase in this dimmer pack 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.
- Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).
- Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

3.9.3 To enable current limitation:

- Select INSTALL from the home menu
- Press DOWN or UP or use the rotary encoder to choose GENERAL SETTINGS menu. Press SELECT.
- Press DOWN or UP or use the rotary encoder to choose CURRENT LIMITATION menu. Press SELECT.
- The screen shows:

```

GENERAL SETTINGS
CURRENT LIMITATION: [OFF]
                                     CANCEL  SAVE

```

- Press EDIT and using the encoder wheel, choose ON or OFF to enable or disable the current limitation.
- Press either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

3.10 Voltage regulation

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 the installation option to calibrate the present voltage measured, and secondly activating the voltage regulation software.

3.10.1 To calibrate line voltage

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-ALL	CAL-L1	HOME

4. Press EDIT and >>> or <<<< to select the line to calibrate, shown by square brackets. Calibration can be done either manually, by measuring the incoming main supply voltages and then calibrating the software-measured voltages using the rotary encoder, or alternatively by using the existing measurement if that is correct. With the correct voltage showing in the square brackets, it is then possible to calibrate each line individually, or calibrate all lines to the same voltage shown by the number in the square brackets by using CAL-1 etc. or CAL-ALL.
5. Press SAVE to leave the menu and record the changes or CANCEL (to leave the previous settings unchanged).

3.10.2 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.

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.

3.11 Phase-On and Phase-Off

The *itec* modules can be programmed to control power by switching OFF every half cycle (Phase-off or reverse phase), or to switch ON each half cycle (phase-on or forward phase) in the conventional way of triacs and thyristors. There are several reasons why this feature is included. Firstly, with some highly inductive loads such as transformers, or capacitive loads such as fluorescent tubes, improved level of control can be achieved by using Forward mode (phase ON). Secondly, in situations where harmonic currents have to be minimised to the lowest levels possible, half of the dimmers may be set to reverse phase (phase OFF), and the remainder to forward phase (phase ON) thus cancelling out a high proportion of the harmonics. Obviously the feature cannot completely eliminate harmonic currents as dimmers are used selectively, and therefore cannot be guaranteed to be used in opposing pairs.

3.11.1 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:

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).

3.12 Start Mode

Executive 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 warm and cold filaments where a cold filament will draw up to 20 times its nominal operating current. Although the *itec* modules restrict maximum current to between 5 and 7 times the nominal 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.

3.12.1 To set start mode

1. Select CONFIG. from the home menu

- 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:

```

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

```

- Use the <<<< and >>>> buttons, choose MODE [enabled when square brackets are shown] and set it to:
BASIC, SOFT START, BURST, PROPortional or BLINK
- Using the UP and DOWN buttons to address other channel numbers (unless all dimmers are being set-up together).
- 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.

3.13 Passwords

Passwords are used at 4 levels of the Executive 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.

3.13.1 To set-up passwords:

- Select INSTALL from the home menu
- Press DOWN or UP or use the rotary encoder to choose SELECT NEW PASSWORD menu. Press SELECT.
- 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).

Note: All menu actions, except for INFO, are prefixed with the request to ENTER PASSWORD if passwords are set greater than 0000

3.14 Preset functions (Digital switch inputs 1-7)

The Executive dimmer pack has a total of 8 digital switch functions, 7 of which are available on the RJ45 and optionally 8 on the Sub-D connector at the rear of the dimmer pack. For the RJ45 version, the 8th preset is reserved for DimSTAT control only. The input accepts a switched voltage of between 8Vdc and 32Vdc, and performs a programmed task depending on whether the voltage is present or not. Options include fading or switching to a preset state when responding to a Normally Open [NO] or Normally Closed [NC] contact. The switch function 8 is only available through DimSTAT. There are no factory defaults. The setting up is in two steps; the dimmer levels and the switch functions.

3.14.1 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 INPUTS 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 INPUT CONFIGURATION				
INP.	T-IN	T-OUT	MODE	
IN-1	000.0	000.0	[NO]	
DOWN	UP	EDIT	CANCEL	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).

3.14.2 To reset all presets:

If the presets levels are to be modified only, see paragraph 3.14.3 below. 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

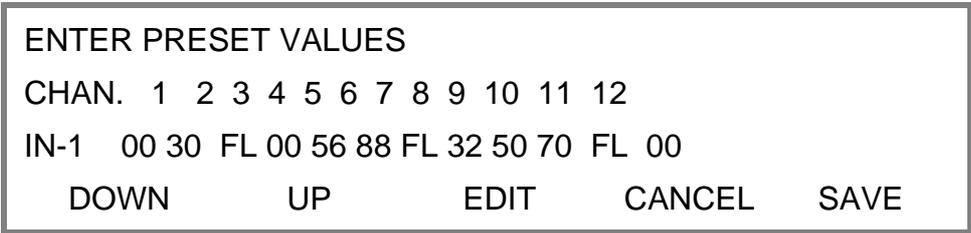
GENERAL SETTINGS	
ERASE ALL PRESETS:	[NO]



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).

3.14.3 To set-up digital switch presets:

1. Select PRESETS. from the home menu
2. Press DOWN or UP or use the rotary encoder to choose INPUTS PRESETS. menu. Press SELECT.
3. The screen provides the following information:



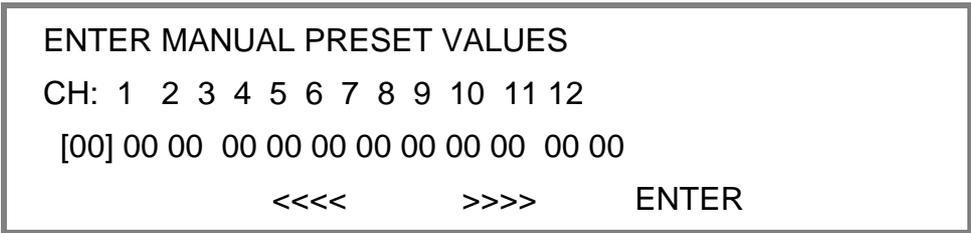
4. Press EDIT and using the <<<< and >>>> buttons, choose the channel level to be adjusted [enabled when square brackets are shown] and set the time and mode by using the rotary encoder.
5. Use the UP and DOWN buttons to address presets 2 - 7 and repeat the above procedure.
6. Press ENTER to leave the menu, then either SAVE (to record the changes) or CANCEL (to leave the previous settings unchanged).

3.15 Manual dimmer control

It is possible to control any dimmer directly from the front panel 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.

3.15.1 To manually control a dimmer level

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.



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).

Note: The channel is under control as soon as it is activated (square brackets) and the rotary encoder used to adjust the channel.

3.16 Fault reporting

If a discrepancy in the normal operating parameters is registered, the Executive will report the potential fault and will take action to minimise the effect of the 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:



- 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.

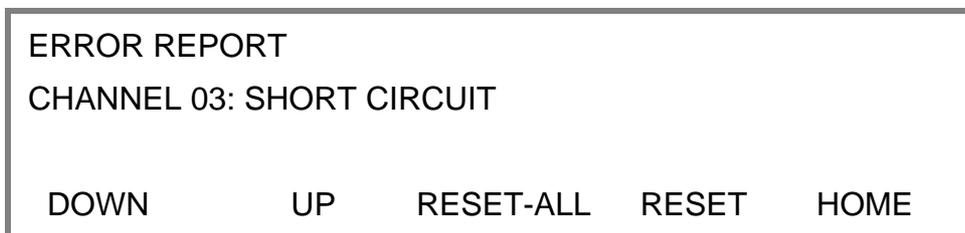
The channel display indicators give the last recorded fault condition. If the fault is a self-resetting fault, or if the dimmer is automatically disabled, the reason for the problem may not be obvious from the channel display. However, a log of the errors is shown in detail through DimSTAT, and a summary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

3.16.1 To check fault history

1. Select INFO from the home screen

Note: This screen never requires a password.

2. Press DOWN or UP or use the rotary encoder to choose VIEW CHANNEL CURRENT/VOLTAGE/TEMPERATURE menu. Press SELECT, and the screen shows:



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

note: Up to 1024 lines of fault error log are available at any time.

4. Press RESET to cancel the message, or RESET-ALL to cancel all error messages.
5. Press HOME to leave the menu and to return to the home menu.

3.16.2 To check dimmer performance

1. Select INSTALL from the home screen
2. Press DOWN or UP or use the rotary encoder to choose VIEW CHANNEL CURRENT/VOLTAGE/TEMPERATURE menu. Press SELECT.
3. The screen shows:

VIEW CHANNEL DATA							
CH	I.	U.	T.	DMX-1	DMX-2	ACTUAL	STAT.
01	4.07	239	043	128	099	128	OK
HOME							

where:

- I = current measured at the output
- U = voltage at the input of the dimmer
- T = *itec* dimmer module temperature
- DMX-1 and -2 = DMX levels received
- ACTUAL = the level the dimmer is responding to
- STAT = error message(s) with letter codes as above

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

3.16.3 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:

LINE L1: Version 01.59	LOAD 4 x 2.5kW
LINE L2: Version 01.59	LOAD 4 x 2.5kW
LINE L3: Version 01.59	LOAD 4 x 2.5kW
Executive version 01.59	HOME

Note: The LINE software versions refer to the software installed on the bus-board processors, and may not be the same as the front panel processor which is indicated as the EXECUTIVE version.

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

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

3.17.1 To set the dimmer pack to 'Sleep' mode

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.

<p>GENERAL SETTINGS SLEEP MODE: [OFF]</p> <p>CANCEL SAVE</p>

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).

3.18 Return to factory settings

The Executive dimmer pack 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 pack is replaced.

3.18.1 To reset the dimmer pack to factory default settings

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.

<p>RETURN TO FACTORY SETTINGS ARE YOU REALLY SURE? [NO]</p> <p>CANCEL SAVE</p>

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
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

4 DIMSTAT™ STATUS REPORTING PROGRAM

4.1 Introduction to DimSTAT™

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, 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.

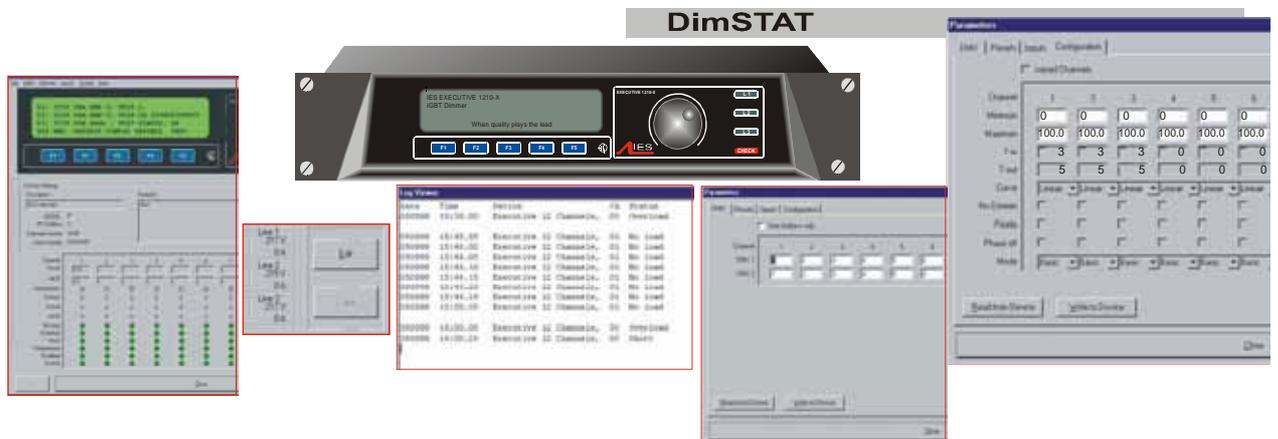
The operation and performance of the Executive dimmer is monitored constantly and comprehensively by the on-board data processors, and this information is available on the LCD screen of the dimmer pack, and through DimSTAT. The parameters measured and reported are:

- a) DMX OK
- b) DMX channel numbers
- c) DMX levels
- d) line voltage
- e) current per dimmer
- f) current per phase per pack
- g) frequency
- h) dimmer curve
- i) temperature per module
- j) temperature per pack

For details of :

- Description of opening screen
- Checking dimmer configurations
- Monitoring status of dimmers
- Changing dimmer configurations
- Fault reports
- Response to fault report
- Fault log
- Clearing fault log
- Printing reports

Please refer to the separate operators' manual for DimSTAT.



5 SERVICING

5.1 Preventative maintenance

5.1.1 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 is in the fan located in each dimmer pack. The fan is mounted on the top panel of the Executive, and the panel should therefore be removed with care to avoid damaging the fan wiring.

The tangential fan is software controlled and its output is varied in proportion to the temperature of the dimmer modules. Air is drawn in from the right of the pack, and directed across the heatsinks to exhaust at the left side. Additional internal ducting directs air to the front and rear areas of the chassis with exhaust grilles to the left side and under the front panel display.

For correct ventilation, the dimmers should be presented with a forced air supply which is provided within the cabinet. This produced the air pressure needed to maintain correct flow of air through the system. Cabinet fans are usually controlled by a temperature thermostat situated at the top of the dimmer compartment.

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 which may result in temperature fault reports and dimmers switching off. The ventilation system is significantly over-rated for the installed dimming load, however, an unexpected increase in the general level of dimmer temperatures may be an early indication of a fan problem.

5.1.2 Annual inspection

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

The effectiveness of all external connections, circuit protection devices, RCDs etc. should also be checked regularly and at the annual inspection time. The RCD can be tested by simply pressing the red test button to trip the circuit. The cabinet fans are usually fitted with test switches which momentarily override the thermostats.

5.2 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 check the system using DimSTAT. This network will give immediate indications of power supply failure or dimmer pack failure, as any fault detected will show the Executive dimmer reference with a red background.

Even if a fault report appears and then disappears, 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 Executive dimmer 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.

5.2.1 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.

5.2.2 Failure of a 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 pack problem or a control problem.

Check the front panel display for the presence of a mains supply. If the mains supply is not present, check any RCDs, fuses or MCBs which power the dimmer rack. 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.

The Executive is fitted with an internal power supply which operates from any of the phases present. Therefore even if one phase fails, the dimming system will continue working with the phases present.

5.2.3 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 switch off the load MCB and 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.

5.2.4 Overtemperature alarm

If modules or dimmer packs 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 modules.

5.2.5 Overvoltage 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 also that the nominal voltage set has not been altered to a lower level, or reverted back to the factory default of 235V for a nominal mains supply of 250V.

5.2.6 Serial data loss

If DimSTAT loses communication to the dimmers, the first step is to check the mechanical connections to the network. If these are 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. Also check that the address settings on the dimmer packs are correct.

5.2.7 DMX data loss

The Executive 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, go to a preset state, or switch to the alternative DMX line.

If there is a partial DMX loss (a section of the system only), it may be caused by a dimmer pack being removed and breaking the link from one pack to the next, or that the DMX cables have been connected incorrectly when a dimmer pack is replaced. Also check outputs from any DMX boosters or buffers in the system.

5.3 Dimmer packs

5.3.1 Fault finding

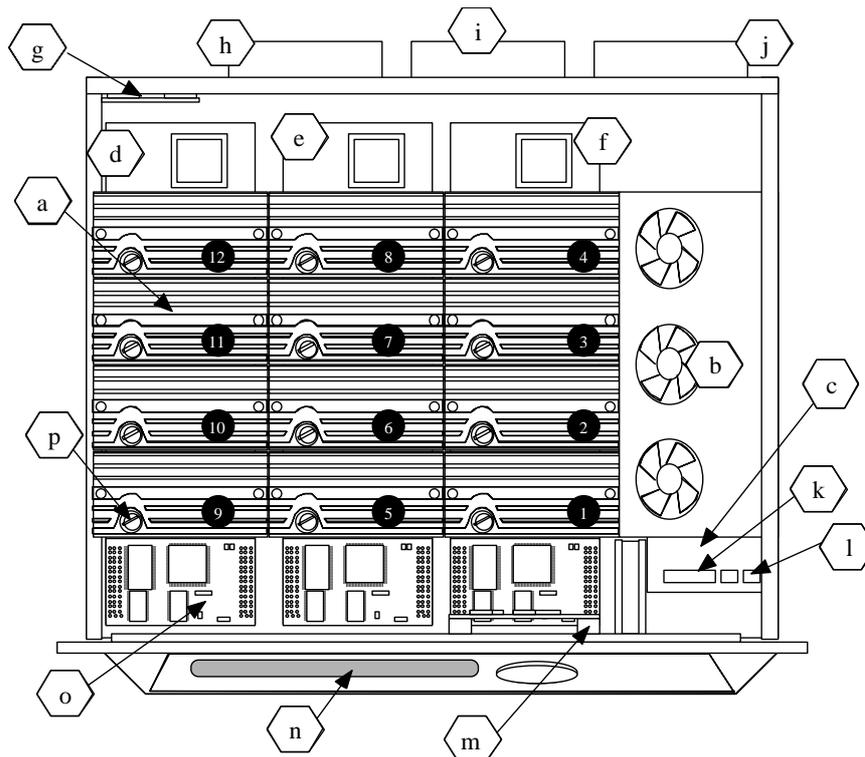
There are no user-serviceable PCBs inside the Executive dimmer, but many of the key component parts are modular and can be replaced easily.

5.3.2 Service access

Access to the main sub-assemblies of the Executive pack is through the top cover plate. This is held in position by 2 self tapping screws around the edge of the cover plate, and 6 machine screws in the centre of the cover plate.

Note: The central screws are vital to maintain correct ventilation within the pack, as they hold the cover plate tight against the heatsinks, creating a sealed air plenum inside the pack.

With the cover plate removed, the main component parts of the dimmer pack can be seen as follows:



(a) *itec* modules

The *itec* dimmer modules are the power handling devices, and incorporate the IGBTs, mains connections, heatsink, temperature sensors and mains fuse. Looking from the front of the pack, the *itec* dimmer module positions are numbered from front to back, and from right to left. Thus channel 1 is in the right front position and 12 is left back position.

Note: 5kW dimmer modules occupies 2 positions and the dedicated 10kW module occupies all 4 positions on one bus board.

(b) fan assembly

Situated on the top cover of the Executive, the fan assembly comprises a low-noise, high volume mains tangential fan which take air from the right side and forces the air through the chamber created by the heatsinks and the top panel. If the top panel is not tightly screwed in place, the cooling effect is significantly reduced. Air ducts are fitted ('q' and 'r') to direct a proportion of air to the electronics at the front and rear of the chassis. The fan is processor controlled and operates at variable speeds depending on the load currents and thus temperature of the modules.

(c) power supply

The switch-mode power supply is positioned beneath the fan assembly. This is powered by all three phases, and the mains inputs are separately fused and diode-bridged to ensure low voltage power is available if one or more phases is present.

(d) Bus-board phase A

This bus board distributes power to modules 1-4, and is on the first phase (A or R, or Red)

(e) Bus-board phase B

This bus board distributes power to modules 5-8, and is on the third phase (B or S, or Yellow)

(f) Bus-board phase C

This bus board distributes power to modules 9-12, and is on the third phase (C or T, or Blue)

(g) Data input

Depending on the model, a PCB with 6 RJ45 connectors, 2 each for DMX-1 (& DimSTAT), DMX-2, and Direct switch inputs, or a combination of XLRs and Sub-D connectors.

(h) Output multipin connector

for modules 7-12.

(i) Output multipin connector

for modules 1-6.

(j) Harting 80A input connector

main supply 3-phase 80A per pole

(k) Data cable connection point from the Power Supply board

(l) Power supply for the fan

(m) Front panel processor

(n) LCD screen displays

(o) Bus-board processor card (1 per bus-board)

(p) fuse

15A 1¹/₄" (32mm) fuse fitted to PCB of module.

5.3.3 Removing a dimmer pack

Even though the task of installing dimmer packs is intrinsically safe (as there are no exposed live terminals), it is good practice to isolate the power, either from the main supply, the cabinet main switch, or by tripping the pack's individual RCD, as the multi-pole connectors are not rated for live connection.

- a) Remove the mains connector (left hand side connector on rear panel) first.
- b) Locate the multi-pole output connector(s) for the loads, release the clamps and remove the connectors.
- c) Locate the DMX/DimSTAT signal cables. Remove the RJ45 or XLR connectors.
- d) Locate the direct control input connections (one or two RJ45 or XLR) and remove them.
- e) Remove the 4 x M10 screws holding the pack into the rack or cabinet, and carefully slide the pack out of the cabinet.

5.3.5 *itec* module exchange

Remove the top cover of the dimmer pack taking care not to damage the cables connecting the fan to the power supply. Locate the appropriate *itec* module, and remove the two hex-head screws. Screw a 6mm bolt into the tapped hole in the centre of the heatsink and carefully remove the module. There is a power connector at each end of the module's lower PCB and a control signal connector in the centre.

To replace an *itec* module, locate the module in position, taking care to line up the control connector with the socket on the bus board. Apply even pressure on the top of the module until it is firmly in place. DO NOT exert excessive pressure, as this might indicate misalignment with the control connector, resulting in damage.

When the module is in position, replace the two hex-head screws but do not over-tighten.

5.3.6 Bus-board PCB exchange

Remove all *itec* modules plugged into the bus-board. Remove all connections, including the mains power connections on fast-on connectors. Unscrew the PCB from the chassis, and replace it with an exchange unit.

5.3.7 Processor PCB exchange

There are 4 CPU processors in the Executive. The bus-board processors are identical (3-off) and the control panel processor is physically similar, but has alternative software. Thus the two types used are not interchangeable. To replace the bus-board CPUs, open the Executive as described above. Unplug the processor card from its sockets, and replace with an exchange unit. The connectors are keyed to fit in one orientation only.

5.3.8 Power supply exchange

Disconnect the mains and low voltage cables from the power supply, and remove the mounting screws to release the unit. Replacement is the reverse of removal.

5.3.9 Front panel processor

Disconnect power. Remove the four hex-head screws in the front panel, and carefully lift the front panel from the dimmer pack, leaving the pack in position. Carefully unplug the flat data cable, and remove the front panel complete with the processor PCB. Replace the complete unit or the PCBs as appropriate.

5.3.10 Replacing fuses

It is unlikely for an internal fuse to blow, but there is a 15A 1¹/₄" 32mm fuse on the lower PCB of each *itec* module, and three 1A 20mm fuses located on the power supply.

6 TECHNICAL DATA

6.1 Specifications

6.1.1 Efficiency

The efficiency of IGBT dimmers is typically 98% at full load.

6.1.2 Risetime

IGBT dimmers have a notional rise time of greater than 830µS for the purpose of minimising electrical disturbance and lamp filament noise. At 90 degree phase angle and phase off mode the rise time should be 3500µS. IGBT dimmers are capable of forward and reverse-phase operation with dynamic control of fall or rise times to minimise electrical disturbance and lamp filament.

6.1.3 Insertion loss

The IGBT circuit presents an insertion loss in the circuit of no more than 4V. This is the maximum difference between the output and input voltages to the dimmer.

6.1.4 Earth leakage protection

This can be included either in the main supply to the Executive to protect the dimmer pack and all 12 modules, or individual RCDs can be fitted on the outputs if preferred. The reverse-phase waveform of the Executive dimmer reduces the risk of nuisance tripping of RCDs as experienced with triac dimmers.

6.1.5 EC specifications

I.E.S. IGBT dimmers have been designed to meet the following European specifications:

Low voltage directive: EN 60204-1, 76/23/EEC
EMC Directive: 89/336/EEC
EMC emission: EN 50081-1, EN 50081-2, prEN 55103-1 E2,
EN 55022, EN 55014
EMC immunity: EN 50082-1, EN 50082-2, prEN 55103-2 E-2,
EN 55024-2 (6kV contact discharge, 8kV air discharge),
EN 55024-3 (3V/m), EN55024-4 (2kV power line, 1kV signal line)

6.1.6 Peak Currents

The peak currents typical of the overshoot at the rising edge of a thyristor or triac dimmer are not present with an IGBT dimmer.

6.1.7 Mains Harmonics

itec dimmers produce a output mains waveform which has been optimised to reduce the mains harmonic disturbances to a level which meets the EN61003.2 standard depending on reverse/forward phase settings, load type and neutral impedance.

6.1.8 Mains power input

The mains input to the Executive dimmer is via a 3-phase Harting 80A (rating per pole) connector.

6.1.9 Load Power Output

The Executive dimmer packs are supplied with Harting multipole connectors for load outputs.

6.1.10 Data signals

The DMX and data signals for DimSTAT and also for the digital switch contacts are either RJ45 or XLR-5 /Sub-D type connectors.

6.1.11 Set-up facilities

For local set-up facilities, each Executive dimmer pack has a 40 x 4 character LCD screen on which is displayed all relevant operational set-up, status and fault reporting information. The control panel utilises a menu-based cursor system for set-up options with an associated encoder wheel for fast access.

The network set-up is based on the IES "DimSTAT" software program. This remote system comprises a PC running DimSTAT under Windows® 95 which links to all dimmers in the installation via 2-cores of the DMX connection system. Features of DimSTAT include the automatic polling of all dimmers and associated monitoring equipment for set-up data, constant monitoring of data for any fault indications, entry of set-up data from the PC keyboard, saving of set-up parameters, and the uploading of data if a dimmer pack is replaced.

6.1.12 Non-dim

Each dimming channel may be selectively set to operate as a full-range dimmer or a non-dim switch.

6.1.13 Min/Max. levels

Each dimming channel may be individually set to have a minimum level of between 0-29.9% or a maximum level of 30-100%.

6.1.14 DMX signals

Each Executive dimmer pack will accept two independent DMX control lines (512 dimmers per line). Two RJ45 or XLR connectors are fitted for DMX in and out per DMX line. Any individual dimmer may be set to any dimmer address on either DMX line, and will respond to line 1, 2 or an HTP combination of both.

6.1.15 DMX selection

The DMX channel number may be accessed via the front panel of each dimmer pack, or by using the serial link via a PC running IES DimSTAT software.

6.1.16 Dimmer laws

A total of 16 dimmer laws are available including:
S-law, linear law, Square law, fluorescent, TV and custom dimmer curves.

6.1.17 Line voltage regulation

The Executive dimmer pack provides line voltage regulation which limits the output voltage variation to 1V for every 10V supply voltage change (with the exception of dimmers set to full).

6.1.18 Serial control

Each dimmer pack has a unique identity number (PC number) with which a PC running DimSTAT may establish bi-directional control for setting levels, for adjusting, recording and uploading set-up parameters and for receiving status information and fault reports. The PC number has to be entered manually from the front panel controls of the pack.

6.1.19 Direct switching facility

Each dimmer pack has an RJ45 (or Sub-D) connector with access to 7 digital on/off inputs to activate pre-stored functions and levels for use as 'panic' or other direct override functions.

6.1.20 Status and fault reporting

The following features are all included in the DimSTAT status and fault reporting system. The system provides a form-filling screen which immediately uploads any changes of the parameters to the relevant dimmer.

6.1.21 DMX address

A DMX address per dimmer, from either of the two DMX lines, may be entered on the PC keyboard. The screen reports the current DMX addresses set, and will immediately respond to any changes made locally on the front panel of the dimmer pack. A set-up function will also be available to set dimmers in the pack to operate together as higher power rating dimmers. Thus if two dimmer positions are required for operation as a 5kW channel, two adjacent dimmers will be set to respond to the same DMX channel.

6.1.22 DMX OK

The DimSTAT screen displays all information relating to the set-up of the dimmer including the presence of a valid DMX signal.

6.1.23 Indication of supply voltage and current

Each Executive dimmer pack reports the line voltage present at the dimmer via the DimSTAT program.

6.1.24 Dimmer curve

It is possible to select any dimmer curve from the DimSTAT program, and to view the selection on screen. If the selection is changed on the front panel of the dimmer pack, DimSTAT will mirror the change instantly.

6.1.25 Response time

The response time setting of between 0s and 9.9s is displayed in DimSTAT, and may be adjusted by entering a new setting on the PC keyboard.

6.1.26 Max. and Min settings

The maximum and minimum level settings are displayed in DimSTAT, and may be adjusted by entering new levels on the PC keyboard.

6.1.27 Overtemperature

Each IGBT power board (of which three are used in each pack) is monitored for temperature, and therefore the overtemperature warning operates on sub-groups of 4 x 2.5kW, 2 x 5kW or 1 x 10kW module depending on the dimmer configuration.

6.1.28 Overload

Each dimmer channel is constantly monitored for a potential overload condition, and if an overload condition is measured the dimmer is switched off within 5 μ S. Warning indications are displayed at the dimmer pack and on the DimSTAT screen if the fault continues for 2 seconds.

In the case where two dimmers are wired for parallel use, but due to operator error the DMX signals are not identical in each dimmer, the one 2.5kW dimmer which has been activated to control the 5kW will shut down as soon as the pre-set overload level is reached, thus protecting the IGBT devices and circuit wiring from any damage caused by an overload.

6.1.29 Overvoltage

The IGBT dimmer design incorporates protection against damage caused through an overvoltage condition. However, the facility has been included to monitor the incoming voltage and display a warning if an overvoltage condition is measured.

6.1.30 Date and time of fault

The date, time and type of fault are recorded on the 'log' page of DimSTAT.

6.1.31 Set and report DMX backup value

Each dimmer has a DMX backup value in case of DMX failure. This level may be viewed and set up through DimSTAT software or from the front panel LCD screen.

6.1.32 Set up parameters

All set-up parameters programmed into a dimmer pack may be recorded and selectively down-loaded and up-loaded to provide a fast and simple replacement process for any dimmer pack in the system. This is automated in the case of a pack being replaced.

6.1.33 Password protection

Each dimmer pack requires up to 4 passwords before full local control of set-up parameters is permitted.

6.1.34 DMX memory

Each dimmer may be set up with a default dimmer level which is evoked if the relevant DMX signal is not present.

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