

Digital Environ

User's Manual

Strand Lighting

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Introduction and Assistance

This manual provides information on the installation and operating procedures for Digital Environ cabinets.

Manual Organization

This manual contains the chapters shown below, plus an Index.

Introduction (chapter 1) - tells you about the organization of this manual, plus definitions and conventions used. Also tells you how to get technical help if necessary.

Operational Features (chapter 2) - gives an overview of the operational features of this product.

Hardware Description (chapter 3) - gives an overview of the hardware and how it works together.

Installation (chapter 4) - tells you about the installation requirements for the dimmer cabinet. This chapter shows pinouts for externally accessible connectors, cable types and lengths, and (where applicable) setup information.

Basic Trouble-shooting (chapter 5) - tells you how to begin trouble-shooting if you have problems with dimmers or the cabinet.

Periodic Maintenance (chapter 6) - lists the steps which should be taken to keep the equipment running at its best.

Reference (chapter 7) - provides a reference for setting up the programmable processor module.

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Definitions

This manual uses the following definitions throughout:

20A dimmer = 2.4Kw dimmer at 120VAC.

50A dimmer = 6Kw dimmer at 120VAC.

100A dimmer = 12Kw dimmer at 120VAC.

Channel Device controlling a dimmer or group of dimmers. Historically, there is a physical controller (such as a slider) for each channel. On most current control systems, channels are numbers accessed by a numeric keypad. Each channel can control multiple dimmers.

Circuit Connection device and wiring for powering a lighting fixture from a dimmer.

Circuit Identifier See "Name."

Crossfade A fade which contains both an up-fade and a down-fade. Also may refer to any fade where the levels of one cue are replaced by the levels of another cue.

Cue The process of recalling a preset from its memory location and putting the result on stage.

Preset, Memory, and Cue are often used interchangeably.

Curve The relationship between a control level and the actual dimmer output. Also known as "Dimmer Law."

Dimmer Law See "Curve."

Dimmer Device controlling power to a lighting fixture. Two lights on the same dimmer cannot be separately controlled.

Default The original factory settings.

Fade A gradual change in stage levels from one set of intensities ("look") to another.

Fade Time **The time it takes for dimmer levels to go from their current levels to the levels in the selected preset.** Each preset has its own fade time.

Level A numerical value used to express the "brightness" of a dimmer. Usually shown as %.

Memory Storage location for preset information.

Mux Abbreviation of the word "Multiplex." Multiplex systems transmit data (usually dimmer information) from a lighting controller to a dimmer cabinet via a single external cable rather than via a pair of wires for each dimmer.

- Name** A unique identification string containing up to five upper case letters or numbers which you can assign to each dimmer. The name may be the same as the dimmer number, or may be a string used to indicate circuit location, phase, etc. This feature is useful for SWC or SV90.
- Patch** Historically, the process of physically connecting circuits to dimmers. Now usually refers to electronic assignment of dimmers to channels.
- Phase** The three phases of the mains supply to which the dimmers are connected are identified as phase 1, phase 2, and phase 3 in Europe and phase A, Phase B, and Phase C in the US.
- Preset** A pre-defined setup of intensities for a set of channels, stored in memory for later replay. For Outlook stations, the Digital Environ processor module stores 8 programmable presets per room for up to 16 rooms. For SWC controllers, the Digital Environ processor module stores 99 programmable presets. Preset 0 (ZERO) is always a blackout.

Preset Fade Time See "Fade Time."

Rack Number A number used to uniquely identify each dimmer cabinet in a multiple cabinet system. Rack numbers are set from the front panel of the processor module, and are usually set by the installation engineer.

Room An area separately defined for purposes of lighting control. This is usually either a room in the traditional sense (an indoor enclosed area) or a portion of a room which can be partitioned off from the remainder if required. Each room is separately controlled by the system.

SSR (Solid State Relay) A power control device used in Strand dimmers that contains two silicon control rectifiers (SCRs), control circuitry, and optical isolation circuitry.

SWC (System Wide Control) A method of programming and controlling more than one Digital Environ cabinet simultaneously. A hand held controller lets you program and recall all 99 presets, and control individual dimmers. 8 and 16 channel pushbutton stations let you recall any 8 or 16 of the 99 presets at each station. Please contact Strand Lighting or see the System Wide Control User's Manual for details on how SWC works.

SV90 Software that runs under MS-DOS or PC-DOS and lets you set up certain Strand Lighting dimming cabinets and racks (including Digital Environ). Please contact Strand Lighting or see the SV90 User's Manual for more details on how this software works.

Conventions

The following additional conventions are used in this manual.



Shows the actual push-button labelled "LEVEL." This is used wherever possible without requiring special text formatting.

ON (all capital text) shows the status of a function or switch, as in "Turn the switch ON."

Input (text with first letter capitalized) shows the name of a function or menu, or mode of operation (e.g., Input menu).

Technical Assistance

Digital Environ cabinets require a minimum of maintenance and servicing.

Problems If equipment fails to operate properly upon installation, or under normal load and temperature conditions, and basic trouble-shooting procedures are not effective, please contact Strand Lighting Field Service at the office serving your area. Strand Lighting will issue a Return Goods Authorization before the return of any defective materials. This allows tracking of returned equipment, and speeds its return to you.

Technical Questions For technical questions regarding setup, operation, or maintenance of this equipment, please contact the Strand Lighting Field Service office serving your area.

Parts Purchases For purchase of spare parts or documentation, please contact the Strand Lighting office serving your area.

Comments and Suggestions For comments regarding equipment functions and/or possible improvements, or for comments on this manual, please call or write to the Marketing Manager at the Strand Lighting office serving your area.

Addresses Addresses for all of the Strand Lighting offices are shown on the reverse side of the manual title sheet.

Operational Features

This chapter presents the basic operational features of the Digital Environ cabinet.

Configuration

Each cabinet has provision for up to 24 dimmers or non-dims. The small cabinet can be fitted with up to 6 power modules, each with 1, 2, or 4 circuits. The large cabinet can be fitted with up to 12 power modules, but can only accommodate 1 and 2 circuit power modules.

The processor module supports 24 digital outputs to drive single, dual and quad power modules. In addition, two 0 to +10 volt analog outputs (at 1mA maximum) are provided for auxiliary control capability (e.g. the Electronic Fluorescent Ballast Controller).

The following configuration items are usually programmed in the factory or at the time of commissioning, but can easily be reprogrammed by the user if required.

- Language: English, French, German
- Dimmer assignments: The arrangement of Single, Dual or Quad power modules for each module position is programmed. From this information, dimmers and analog outputs are given sequential dimmer numbers to simplify programming of other features.
- Cabinet number: 1 - 99. Used for System Wide Control

Input & Output Protocol

The following control protocols are supported by Digital Environ

- Outlook control stations
- Multiplex Input - DMX512
- Optional 2nd Multiplex Input - DMX512
- 26 Analog inputs - 24 for internal dimmers, 2 for external equipment.
- 2 Analog outputs for external equipment.
- System Wide Control

Signals can appear at all inputs at the same time, and are processed on a highest takes precedence basis (see figure 14 on page 40). All control terminations are via screw terminal connectors.

Programming

Several additional functions are generally accessed or programmed in the field by the user as required:

- Maximum output voltage (per dimmer): 50-250 volts e.g. Set to 105V for extended lamp life.
- Minimum level (per dimmer): 0% - 25% e.g. Set to 10% for safety purposes.
- Room and channel Patching (for Outlook control stations).
- Each dimmer and analog output can be patched to any valid DMX or D54 address number for both the standard multiplex input A (Mux A) and optional multiplex input B (Mux B).
- Each dimmer and analog output is automatically assigned in sequence to one of 26 analog inputs.
- Circuit ID--used for SWC or SV90.
- Individual assignment of dimmers as non-dims with threshold levels programmable between 1%-99%.
- Response curve assignment per dimmer: Linear Power, Square, S-Curve, Fluo Elec (for electronic fluorescent balasts) and Fluo Mag (for magnetic fluorescent balasts). The two fluorescent settings also let you set the top end voltage and the bottom end cutoff voltage.
- Dimmer response: fast (30ms), normal (100ms) or slow (300ms). This determines a dimmer's rate of response to a change in control level. Slow is usually set for large tungsten loads to reduce filament inrush, medium or fast for small loads.
- Record and recall presets (1-8, ON and OFF per room for Outlook, and 0-99 per cabinet for System Wide Control).
- Define Preset Number or "Hold" condition on Mux failure.
- Define power-up preset per cabinet for Digital Network Control.
- Dimmer control assignment to "Input" (Outlook preset, SWC preset, Mux A, Mux B, or Analog) or to a fixed level (0% - 99% or "Full").
- Calibrate top set between 7 and 13 volts for analog inputs.
- Calibrate top set between 5 and 10 volts for analog outputs.
- Set LCD contrast.
- Cabinet self tests.
- Viewable error log.

System Wide Control (SWC)

A method of programming and controlling more than one Digital Environ cabinet simultaneously. A hand held controller lets you program and recall all 99 presets, and control individual dimmers. 8 and 16 channel pushbutton stations let you recall any 8 or 16 of the 99 presets at each station. Please contact Strand Lighting or see the System Wide Control User's Manual for details on how SWC works.

Dimming Characteristics

Regulation Each dimmer, with circuitry in the Digital Environ processor module, regulates output voltage with changes in the AC line from 85 to 250 volts RMS. The maximum output voltage is limited to the input voltage.

Output

- The output response curve can be set to Linear Power, Square, S-Curve, Fluo Elec (for electronic fluorescent balasts) and Fluo Mag (for magnetic fluorescent balasts). The two fluorescent settings also let you set the top end voltage and the bottom end cutoff voltage.
- The output waveform is a variable conduction angle 120VAC sine wave.
- The output waveform risetime is at least 350 microseconds.
- Dimmer response can be adjusted to fast (30ms), normal (100ms) or slow (300ms). This determines a dimmers rate of response to a change in control level. Slow is usually set for large tungsten loads to reduce filament inrush, medium or fast for small loads.

Efficiency The power efficiency of the dimmer is a minimum of 95% at full load.

Dimmer Level Retention

The microprocessor can be set to maintain current dimmer levels ("Status Quo" memory) if there is a loss of control signal (i.e., when you turn the control console OFF). It can also be set to go to a specific preset 10 seconds after loss of the control signal with a user specified fade time. This feature can be turned OFF if required.

Servicing

The Digital Environ dimming cabinet is designed to be easily serviced in the field. It incorporates:

- Replaceable processor module.
- Rapidly replaceable SSR modules.

Hardware Description

The Digital Environ cabinet is a wall mounted steel enclosure 6" (152mm) deep and 30" (762mm) wide. It is available as a "small" cabinet 36" (914mm) high or "large" cabinet 72" (1829mm) high. The small cabinet includes 2" (51mm) mounting flanges at the top and bottom of the cabinet. The large cabinet includes a mounting flange on top and support legs on the bottom of the cabinet. The Digital Environ cabinet is finished in thermally set powdercoat gray paint.

Each dimmer cabinet includes all of the necessary internal wiring for 6 (small cabinet) or 12 (large cabinet) power modules and the processor module. Power feed connections, load wiring, and control wiring are provided by the contractor.

Cabinets

Each cabinet has provision for up to 24 dimmers or non-dims. The small cabinet can be fitted with up to 6 power modules. Power modules can be single (one circuit per module), dual (two circuits per module) or quad (four circuits per module) modules. The large cabinet can be fitted with up to 12 power modules, but can only accommodate single and dual power modules.

All internal power and signal connections are factory wired. Power feed connections are in the upper left of the corner of the cabinet. Load connections are at the right edge of the cabinet. Connections to the power feed block are wired for three phase use, and need to be modified for use with single phase feeds. Control connections are on the distribution board in the lower left corner of the cabinet.

One (small cabinet) or two (large cabinet) fans are provided in the lower right corner of the cabinet to maintain the temperature of all components at proper operating levels with all dimmers under full load, as long as ambient room temperature does not exceed 35°C. Fans are ON whenever a dimmer signal is present on any input and are automatically turned OFF 5 minutes after control to all dimmers is turned OFF.

The space in which this equipment is located must be maintained at temperatures not exceeding 40°C while the equipment is in operation.

The front of the cabinet includes the following controls and inputs:

- An "XLR" style connector for connecting the SWC Hand Held Controller.
- A "Panic" switch - to turn selected dimmers ON full. The switch is illuminated when panic is active.
- A "Normal" switch - to turn the panic function OFF.

Processor Module

The processor module, accessible on the front panel of the cabinet, is made of a face plate and control card. The processor module has a membrane keypad and LCD display to let you program many advanced features. For a complete list of commands, please see Chapter 9.

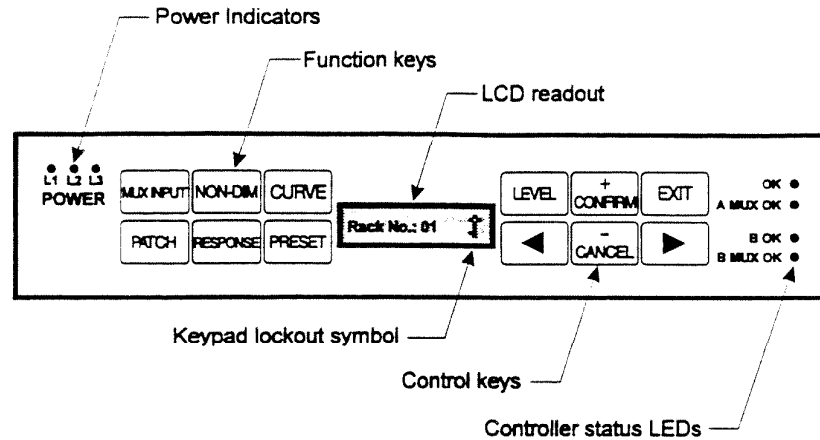


Figure 1. Processor Module

Processor Module Front Panel

The following functions and indicators are on the processor module face plate:

- Phase Indicators: A (L1), B (L2), C (L3).
- OK LED (processor OK).
- A MUX OK LED (Mux A signal exists).
- B OK LED (Mux B fitted and OK).
- B MUX OK LED (Mux B signal exists).
- Keypad for programming the available functions.
- Liquid Crystal Display for programming and viewing processor module functions and status.

Processor Module Electronics

The Digital Environ processor module can accept Digital Network Control (Outlook), DMX512 or D54 multiplexed signals, SWC control, and up to 26 analog inputs.

The processor module electronics contains all circuitry required to decode the incoming signals and produce 24 phase-synchronized, pulse width modulated control signals to drive the SSRs and 2 analog output signals to drive external equipment. Incoming signals are combined on a "highest takes precedence" basis.

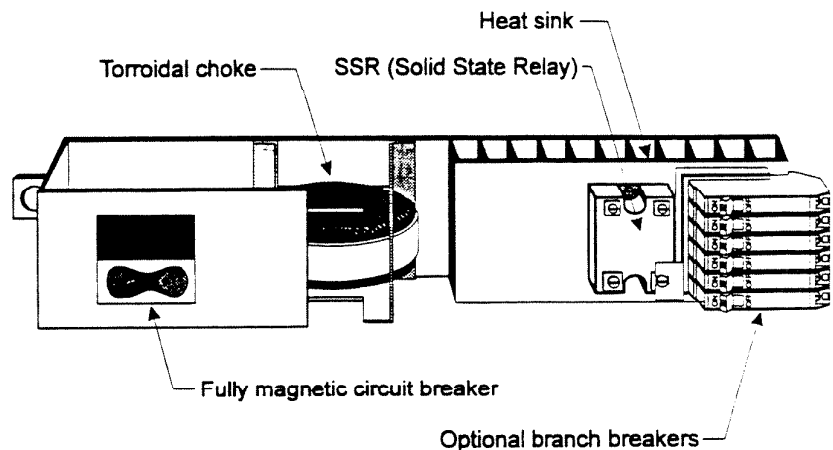
The electronics are powered from all three phases. The processor will continue to work even if any two phases fail.

Power Modules

Power modules are the rugged, high power switching section of the Digital Environ dimming system, and contain one, two, or four dimmers, 1 or two non-dims, or one constant circuit. Each dimmer consists of a circuit breaker, solid state relay (SSR), and choke. Non-dims do not contain a choke, but have a non-dim controller mounted to the SSR.

The SSR for each dimmer contains optical isolation circuitry, control circuitry, and two silicon controlled rectifiers (SCRs) encapsulated in epoxy. It uses low level signals (10mA, 3-24V) from the processor module to switch the incoming power (up to 50A, 120/220VAC) ON and OFF at high speed. The amount of time per cycle that the dimmer is ON determines the output power level.

The dimmer choke slows down the time it takes the dimmer to switch ON during each cycle and helps to minimize radio frequency interference.



**Figure 2. Typical Digital Environ Power Module
(6.0Kw power module shown)**

Efficiency The power efficiency of Digital Environ dimmers is at least 95% at full load.

Power Module Types Power modules are available in the following configurations for 110/120VAC.

- 1.8Kw quad power module w/terminal block (S.L. #72004)
- 2.4Kw single power module w/terminal block (S.L. #72001)
- 20A single non-dim w/terminal block (S.L. #72009)
- 2.4Kw single fluorescent power module w/terminal block (S.L. #72006)
- 2.4Kw dual power module w/terminal block (S.L. #72002)
- 2.4Kw dual power module w/CB mounting (S.L. #72003)
- 20A dual non-dim w/terminal block (S.L. #72010)
- 2.4Kw dual non-dim w/CB mounting (S.L. #72011)
- 2.4Kw dual fluorescent power module w/terminal block (S.L. #72007)
- 6.0Kw single power module w/CB mounting (S.L. #72005)
- 6.0Kw single fluorescent power module w/CB mounting (S.L. #72008)
- 50A single non-dim w/CB mounting (S.L. #72012)
- 50A single constant circuit w/CB mounting (S.L. #72013)

Output circuit breakers must be purchased separately.

Power modules are available in the following configurations for 220VAC.

- 2.2Kw single power module w/terminal block (S.L. #72021)
- 2.2Kw single non-dim w/terminal block (S.L. #72029)
- 2.2Kw single fluorescent power module w/terminal block (S.L. #72026)
- 2.2Kw dual power module w/terminal block (S.L. #72022)
- 2.2Kw dual power module w/CB mounting (S.L. #72023)
- 2.2Kw dual non-dim w/terminal block (S.L. #72030)
- 2.2Kw dual non-dim w/CB mounting (S.L. #72031)
- 2.2Kw dual fluorescent power module w/terminal block (S.L. #72027)
- 5.5Kw single power module w/CB mounting (S.L. #72025)
- 5.5Kw single fluorescent power module w/CB mounting (S.L. #72028)
- 5.5Kw single non-dim w/CB mounting (S.L. #72032)

Output circuit breakers must be purchased separately.

Power module Accessories Accessory kits are available to convert selected power modules from their standard output configuration if required.

- Terminal strip mounting kit for 6.0Kw power modules (S.L. #76800)
- Circuit breaker mounting kit for six 1-pole breakers (S.L. #76801)
- Circuit breaker mounting kit for three 2-pole breakers (S.L. #76802)
- 15A 1-pole Circuit breaker kit w/six 1-pole breakers (S.L. #76803)
- 15A 2-pole Circuit breaker kit w/three 2-pole breakers (S.L. #76804)
- 20A 1-pole Circuit breaker kit w/six 1-pole breakers (S.L. #76805)
- 20A 2-pole Circuit breaker kit w/three 2-pole breakers (S.L. #76806)
- Quad Power module Harness (S.L. #76807)