Strand Lighting Specification

I. CD80 SUPERVISOR DIMMER RACK RETRO-FIT KIT

A. RETRO-FIT KIT(S), GENERAL

1. The dimmer rack retro-fit electronics assembly shall be fully digital, designed specifically for the control of CD80 and CD80AE series dimmer racks.
2. Rack setup and preset data shall be fully user programmable on a per rack or system wide basis. Racks shall be remotely configurable via a personal computer with appropriate Windows 95 based software.

B. RETRO-FIT KIT(S), MECHANICAL

1. The electronics housing shall be enclosed with 16-gauge, formed steel panels. All rack metal components shall be properly treated, primed and finished in fine texture, scratch resistant, grey powder coat paint.
2. The housing shall not exceed be designed to retro-fit to CD80 Standard series and CD80AE dimmer racks.
3. The housing shall be designed to allow for easy insertion and removal of the processor electronics without the use of tools.
4. A fan module with two low-noise fans shall be provided to allow redundancy in case of fan failure. The fans shall maintain the temperature of all components at proper operating levels with dimmers at any load, providing the ambient temperature of the dimmer room does not exceed 40 degrees C. Air shall flow over the surfaces of the heat generating components using a combination of convection and fan assisted air flow.
5. Fans shall be gradually controlled between off and full speed in order to minimize fan noise under all operating conditions. In the event of a rack over temperature condition, a warning shall be displayed on the rack LCD display or on a remote personal computer or control console. If the temperature rises 5 degrees C over the warning threshold, power to SSR control circuits will be automatically shut off.
6. Signal terminations shall be by plug-in screw terminals to facilitate contracting and servicing and shall be clearly labeled.

C. RACK ELECTRONICS, PHYSICAL

1. The main dimmer control electronics shall be housed in one Rack Processor Module (RPM) plug in module. The dimmer control electronics shall be completely digital without employing any digital to analog demultiplexing schemes or analog ramping circuits.

2. All rack setup and preset data shall be stored in a non-volatile manner and may be transferred to a replacement Rack Processor Module without losing data.
3. Each Rack Processor Module shall have a back-lit LCD display with a six key keypad for rack setup, preset control, testing, rack status, error and diagnostics. Six LED's shall indicate mux inputs A and B OK, electronics power OK, processor OK (Built In Self Test), active processor, and dimmer module error.
4. All rack setup and preset data shall be transferable to and from library storage on a personal computer on a per rack or system wide basis.
5. A permanently mounted Central Interconnection Card (CIC) shall provide signal connections and security features in conjunction with optional rack mounted power supply units. The CIC shall provide the only point for contractor connection of signal cables and PANIC activation. The connections shall be made with two part plug-in screw terminals for ease of contracting.
6. All digital multiplex, RS-485 communication ports and remote contact input connections shall be optically isolated from all processor electronics by 2,500V RMS isolation.
7. The Central Interconnection Card shall have the provision to select any of a maximum of 96 dimmer and 12 analog outputs to be activated by a PANIC function. The PANIC function shall be activated or de-activated by one or more local or remote contact closures. The CIC shall provide a selection device to enable or disable the activation of PANIC when removing the RPM from an active rack. PANIC will not be automatically activated if a RPM is removed from an inactive rack. Racks that employ processor controlled PANIC functions shall not be acceptable.
8. The CIC shall have LED's indicating:
   a. +5V for opto-isolation OK.
   b. Auxiliary power supply OK.
   c. PANIC active.
   d. Rack overheat warning.
   e. Power phases active.

D. RACK ELECTRONICS, CONTROL AND COMMUNICATIONS

1. The control electronics shall provide the following control and communication inputs as standard:
   a. Two optically isolated DMX512 control inputs. The first input can be AMX192 as an alternative to DMX512. The second input is DMX512 only. Each mux input shall have a patch to allow overlapping or separation of any mux control level.
   b. 16 analog 0 to +10V signal inputs. The analog inputs shall be fully patchable to any rack dimmer.

c. Eight optically isolated contact inputs, for external switching of functions.

d. RS-485 optically isolated signal inputs for System Wide Control (SWC), and Outlook control system use. SWC is separate from the mux control signal, allowing sophisticated and independent remote control of circuits and presets through a hand held programmer and/or preset stations. Outlook is a control system comprised of architectural style panels for recording and playback of presets in individual assigned "rooms".

e. One RS-232 signal input for local connection to a personal computer, providing setup, playback, library storage and reporter feature supervision.

2. The control electronics shall provide the following outputs as standard: Up to 48 phase controlled signals to control the dimmer SSRs.

E. RACK ELECTRONICS, FEATURES

1. The dimmer control electronics shall have a dimmer update rate better than 16 ms (60 Hz) or 20 ms (50 Hz). Dimmer outputs shall exhibit no oscillating or hunting for levels. Dimmers set to the same level shall output within +/-1V of each other, regardless of phase or input voltage, providing the desired level is less than the phase input voltage less the dimmer insertion voltage.

2. The dimmer output levels shall be regulated for incoming line voltage variations. The regulation shall adjust for both RMS voltage and frequency changes of the incoming AC wave form. Regulation shall maintain the desired output voltage +/- 1 volt for the entire operation range (90 - 240VAC) with the exception that the maximum output will be no greater than the phase input voltage less the dimmer insertion voltage. The regulation shall compensate for variations of the AC waveform on a dimmer-by-dimmer basis. There shall be no interaction between dimmers in the system or any other equipment. The output shall be regulated to the user programmable maximum voltage level on a dimmer-by-dimmer basis between 50V and 240V. The processor response time to incoming line changes shall take no more than 16 ms (60 Hz) or 20 ms (50 Hz). Dimming systems that do not respond to line voltage and frequency variations shall not be acceptable.

3. The control electronics shall allow the maximum output levels of individual dimmers to be adjusted, e.g. to compensate for load circuit voltage loss. The selected dimmer curve shall regulate so that the curve is proportional to the programmed maximum voltage. Systems with status reporting dimmers shall have full line compensation with adjustment for changes in line and load, systems without this capability shall not be accepted.

4. The RPM shall also have the capability to support dimmers of different types and sizes that may be mixed throughout the rack. Individual dimmers may be dimmed or switched (non-dim). The individual phase control or switching of positive and negative line voltage half cycles shall not be acceptable, as the net resultant DC line current may damage or degrade line supply transformers.

5. The control electronics shall contain diagnostic routines to perform a self test (Built In Self Test). Standard status reporting shall consist of:
   a. Dimmer type in slot (user programmed data).
   b. Input line voltage per phase.
   c. Mux A input fail.
   d. Mux B input fail.
   e. Dimmer output level (%).
   f. Rack overheat warning.
   g. Rack overheat shut-down.
6. The control electronics shall provide the following setup functions that shall be user programmable on a per rack or system wide basis:
   a. Mux A patch.
   b. Mux B patch.
   c. Analog inputs patch.
   d. Architectural patch for Outlook control systems.
   e. Set rack circuit ID.
   f. Record preset and preset crossfade time.
   g. Set SWC preset.
   h. Set SWC backup preset.
   i. Set architectural preset with Outlook control systems.
   j. Set dimmer level (%).
   k. Set dimmer max. voltage (50V - 250V in 1V steps).
   l. Set dimmer min. level (0 to 99%).
   m. Set dimmer curve.
   n. Set dimmer response time.

o. Set control logic.

7. The mux A and B patching shall support a rack start address and individual dimmer patch. It shall be possible to patch the analog outputs to any mux A and B address. The architectural patch shall define the rack circuit / room / room channel relationship for Outlook control systems.
8. Each individual rack circuit shall have a 5-digit alphanumeric ID (Circuit ID) that is addressable by a personal computer connection or by SWC (SWC can access the first 4 digits), enabling continuous numbering over several mux spans or enabling other user programmable groupings or labeling.
9. The control electronics shall provide a facility to disable the output of any individual dimmer by setting the level to 0.
10. The control electronics shall contain 99 System Wide Control (SWC) user programmable presets and a permanent blackout preset (preset 0). It shall be possible to record individual preset crossfade times, including preset 0. The presets shall be simply user programmable as a snapshot of the current dimmer outputs resulting from all dimmer control sources according to selected control logic, on a per rack or system wide basis. Each preset may have an individual crossfade time between 0 seconds and 10 minutes.
11. The control electronics shall support a user assignable backup preset. Each rack shall, in the event of loss of mux control according to selected control logic, maintain the last levels for a user programmable period after which it shall automatically fade in the assigned backup preset. Alternatively it shall be possible to program the rack to indefinitely hold the last dimmer levels. Systems that do not offer this feature shall not be acceptable. It shall be possible to continue control without an active mux signal using any of the SWC or Outlook architectural presets as well as the analog inputs.
12. The control electronics shall provide an architectural Outlook control system preset capability of 8 presets plus full ON and OFF for each of 16 separate rooms with programmable fade times between 0 seconds and 4 minutes.
13. The control electronics shall provide the ability to set one or a group of dimmers to any level.
14. The control electronics shall provide the ability to set a library or user programmable curve to any individual dimmer. Library curves shall be:
    a. Square curve.
    b. S-curve.
    c. Linear power output curve.
15. User selectable curves shall be:
    a. Non-dim (switched) with a programmable trigger level 0 - 99%.

b. Electronic ballast fluorescent curve with a kick-start voltage and user programmable top set and bottom cut-off point.

c. Magnetic ballast fluorescent curve with user programmable top set and bottom cut-off point.

d. Five user defined programmable curves.

16. Each dimmer shall have one of three user programmable response in order to optimize lamp filament life and speed of operation:
    a. Fast (30 ms).
    b. Normal (100 ms).
    c. Slow (300 ms).

17. The control electronics shall provide a number of user programmable control logic schemes, regulating the logical relationship between dimmer control sources:
    a. Mux A highest takes precedence (HTP) with mux B, plus HTP with analog inputs, plus HTP with SWC presets, plus HTP with Outlook presets.
    b. Mux A only HTP with analog inputs, plus HTP with SWC presets, plus HTP with Outlook presets.
    c. Mux B only HTP with analog inputs, plus HTP with SWC presets, plus HTP with Outlook presets.
    d. Mux A or mux B only HTP with analog inputs, plus HTP with SWC presets, plus HTP with Outlook presets (A or B mux selection via external contact closure).
    e. Mux B over mux A HTP with analog inputs, plus HTP with SWC presets, plus HTP with Outlook presets.
    f. Mux A over mux B.
    g. SWC Presets HTP with Outlook presets, HTP with analog inputs over mux A HTP with mux B (on selection of a SWC preset other than 0).

F. PERIPHERAL EQUIPMENT

1. The dimmer system shall support the following specialized peripherals:
    a. Remote SWC backup preset panels.
    b. Remote SWC Stage Manager's auxiliary preset panels.
    c. Remote SWC hand held programmers.

d. Remote personal computer for user programming, library storage of dimmer setup data and remote monitoring of dimmer and load status.

e. Remote Outlook panels for architectural style channel and preset control of separate and independent (rooms).

2. The dimmer system shall support a remote hand held SWC Programmer unit with 40 tactile keys and a 4 line by 16 character backlit LCD offering channel control using standard control system syntax and direct action level keys, preset and preset time recording and control and riggers functions Check+, Check- and Rem Dim. The SWC programmer shall be functional with distributed dimming systems in conjunction with other SWC panels and shall not require the presence of a control system to function. Dimming systems that do not offer this facility shall not be acceptable.
3. The dimmer system shall support 8- and 16-preset SWC wall mounted panels with tactile keys and integral LED indicators per key. The panel shall control 8 or 16 consecutive presets stored in the dimmer racks following a user programmable start address. The panel shall enable the recording of presets, the playback of presets and the turning off of the active playback. It shall be possible to disable the panel recording function. It shall be possible to connect a total of 30 SWC programmers or panels on one SWC system.
4. The dimmer system shall support a range of wall mounted Outlook architectural style panels consisting of preset keys with integral LED's, channel and master faders for setting, recording and playback of architectural style presets in individual assigned zones (rooms). Additional peripherals shall consist of panels allowing the zone (room) channels and presets to be joined and un-joined, infra-red remote control for up to 8 zone (room) presets and Audio-Visual (A/V) interface units enabling 8 dimmer presets, on and off to be controlled by external contact closures

G. PROVIDE THE FOLLOWING:

Qty.	Cat. No.	Disc.
#	76463	Retro-fit rack processor assembly (one per dimmer cabinet), 120V
#	76464	Retro-fit rack processor assembly (one per dimmer cabinet), 220V