

Price: \$20.00

# **CD80 1.2Kw Pack**

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*Operator's Reference*



**Strand Lighting**

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By: D. Lammers  
Date: 08/29/89

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# Maintenance

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This section provides trouble-shooting and maintenance information for the CD80 1.2Kw Pack. For electronic repair information, see "CD80 1.2Kw Pack Electronics Repair Procedures" (Strand part #8-700193-000).

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# **Introduction**

*CD80 1.2Kw Pack Operator's Reference*

This section provides information on manual organization. It also details procedures for getting your suggestions to Strand Lighting, and receiving help if necessary.

## ***1. About this Manual***

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This manual provides information on the operating and maintenance procedures for CD80 1.2Kw Packs. Circuit descriptions are included in the CD80 1.2Kw Pack Repair Procedures Manual for those who wish to do their own circuit level maintenance of this equipment.

### ***1.1 Manual Organization***

This manual contains 5 major sections as shown below.

#### **INTRODUCTION**

Manual organization (chapter 1)  
How to get help (chapter 2)

#### **SYSTEM INFORMATION**

Specifications (chapter 3)  
Basic Description (chapter 4)

#### **OPERATION**

Installation (chapter 5)  
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#### **MAINTENANCE**

CD80 1.2Kw Pack trouble-shooting (chapter 7)  
Periodic maintenance procedures (chapter 8)

#### **APPENDICES**

Appendix A

## **2. *Technical Assistance***

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CD80 1.2Kw Packs are designed to require a minimum of maintenance and servicing. Circuit descriptions are included in the CD80 1.2Kw Pack Repair Procedures Manual for those who wish to do all of their own repair and maintenance work. Other documentation may be purchased through Strand Lighting Customer Service.

### **2.1 *In Case of 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 an RGA (Return Goods Authorization) before the return of any defective materials. This allows tracking of returned equipment, and speeds its return to you.

### **2.2 *Technical Questions***

For technical questions regarding setup, operation, or maintenance of this equipment, please contact the Strand Lighting Field Service office serving your area (see reverse side of manual title sheet for addresses and phone numbers).

### **2.3 *Parts Purchases***

For purchase of spare parts or documentation, Please contact Strand Lighting Customer Service in the Rancho Dominguez office.

### **2.4 *Comments and Suggestions***

For comments regarding equipment functions and/or suggested enhancements, please call or write to the Control and Dimming Product Manager at the Rancho Dominguez office.

For comments on this manual, please write to the Technical Publications Manager at the Rancho Dominguez office.



# **System Information**

*CD80 1.2Kw Pack Operator's Reference*

This section provides specifications and basic layout information for CD80 1.2Kw Packs.

### ***3. Dimmer Pack Description***

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The CD80 1.2Kw Pack is a lightweight portable performance dimming pack containing 24 1.2Kw dimmers.

#### ***3.1 General***

- Size - 23.25" x 20.00" x 7.75"
- Weight - 65 pounds
- .125" (3mm) aluminum alloy housing.
- Baked enamel finish, black semi-gloss, with off-white silkscreened graphics.
- Integral carrying handles for transporting.
- Optional wall mounting.

#### ***3.2 Environmental***

- Operating Temperature - 40 degree maximum ambient.
- Low noise fan for efficient cooling.

#### ***3.3 Servicing***

- Rapidly replaceable electronics.
- Rapidly replaceable SSR modules.

#### ***3.4 A.C. Power***

- 100-140VAC, 50/60Hz.
- Three phase power requirements:
  - 1.2Kw Pack - 120V/208 VAC, 80 Amps, 4-wire plus ground.
- Single phase power requirements:
  - 2.4Kw - 120V/240 VAC, 120 Amps, 3-wire plus ground.
- Internally field changeable between three phase and single phase power input configurations.

### 3.5 *Control Signal*

- Compatible with USITT AMX 192 control signals.
- Input Control Voltage - Multiplexed 0 to 5.0V DC level
- Input Control Current - Less than 1 ma
- Signal Input Impedance - Line terminated by 1.8K in series with .001 uF
- Optional 0-10VDC input electronics module (switchable between AMX192 and analog).

### 3.6 *Dimming Characteristics*

- Input vs. output - IES square law characteristics.
- Output Response Time - Better than 0.1 seconds
- Line Regulation -  $\pm 2\%$  with changes in line from 108V to 132 VAC.
- Load Regulation - Better than  $\pm 2\%$  with changes in load from 10 watts to full load any point in the dimming curve.

### 3.7 *Dimmer Output*

- Output Waveform - Variable conduction angle 120 VAC Sine Wave.
- Rise Time - Greater than 320 micro-seconds.
- Efficiency - Better than 95% at full load.
- Load Range - 10W to 1.2Kw.
- Output Capacity - Twenty four 1.2Kw channels.
- Available with Grounded Twist Lock, Pin Plug, U-Ground, or terminal strip outputs.

### 3.8 *Protection*

- Overvoltage Protection - fuses on Motherboard and Power Supply.
- Front panel overtemperature and power indication.
- Solid State Relay Peak Surge Rating: - 600 AMPS.
- Short Circuit Protection - fully magnetic circuit breakers.

## 4. *Basic Component Layout*

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### 4.1 *Chassis*

The CD80 1.2Kw Pack chassis consists of a main structural chassis (bottom housing and front panel), a removable top, and an interchangeable rear connector panel. The heavy gauge structural panels create a rugged container even though assembled with only four pieces.

The main structural chassis consists of the bottom housing and front panel fastened rigidly together. The front panel is recessed to protect the circuit breakers and panel components.

The front panel, constructed of .090 thick aluminum alloy, contains cutouts for the U.L. listed circuit breakers and a removable panel which hides the plug-in printed circuit boards.

The bottom housing, constructed of .125 thick aluminum alloy, supports a heat sink subassembly (mounting the solid state relays and an overheat thermostat), a fan, a fan guard, a circuit breaker/toroidal choke subassembly (with chokes solidly mounted in a "clamshell" Lexan retaining channel), and a power-in knock-out, for input power wiring. The rear panel is attached to the bottom housing and recessed to protect the connectors. Four large diameter feet, approximately 3/4" high, are attached to the underside of the bottom housing and existing feet mount holes are accessible for easy wall mounting.

The rear connector panel, constructed of .090 thick aluminum alloy, is manufactured in four customer options:

- 1) Pin connectors
- 2) Twist lock GTL connectors
- 3) Straight blade (Duplex) connectors
- 4) A terminal block for hard wiring of outputs plus control

The top cover, constructed of .125 aluminum alloy, fastens to the main chassis by four screws, and allows easy access for servicing. Recessed handles are integrated into the top housing for easy one man carry capability. Instruction labels are affixed to the underside of the top cover and a warning label... "Disconnect power before removing top"...attached to the top of the cover.

## 4.2 *Control Electronics (Multiplexed Analog Input)*

The control electronics for the 1.2Kw Pack consists of a Motherboard, four CD80 Rack Ramp Cards, one CD80 Rack Power Supply Card, and a Control Panel assembly which is screwed on in front of the other control components, and hides them.

### A. **Motherboard**

The Motherboard serves to connect the control components together. It also contains the phase references for phases B and C, and a clock circuit which allows testing the pack by bringing all dimmers in the pack to FULL.

### B. **Ramp Card**

Ramp Cards provide control signal demultiplexing and analog to pulse width conversion.

Up to 192 dimmer levels are time multiplexed on the ANA (analog) line of the control cable (control terminal 4). Levels vary from 0-5VDC, representing dimmer output levels of 0-100%. A differential clock on the CLK- (minus clock) and CLK+ (plus clock) lines (control terminals 1 and 3) synchronizes the dimmer rack with the control console. The multiplexing scheme conforms to the USITT AMX192 Dimmer Signal Specification. 6KW and 12KW dimmers require 2 clock cycles or dimmer positions.

Each Ramp Card contains the following circuitry:

- 1) clock receiver and reset detector
- 2) counter/decoder circuit
- 3) analog buffer
- 4) analog demultiplexer
- 5) A.C. zero crossover detector
- 6) square law curve generator
- 7) output solid state relay driver
- 8) power supply

### C. **Power Supply Card**

The Power Supply Card conditions AC power from power phase A, and supplies the AC line reference source for the phase A Ramp Card.

The Power Supply Card also has an SSR for fan power, which is energized from the Ramp Card when system clock signals are present. A fuse on the Power Supply Card provides overload and short circuit protection for this SSR.

D. Control Panel

The contains input plugs for the AMX192 signal, the thumbwheel switch for pack number selection, a slider controller for testing the dimmers, a "NORMAL/TEST" switch to activate the slider control, and "POWER" and "OVERTEMP" indicators.

#### 4.3 *Control Module (Discreet Analog Input)*

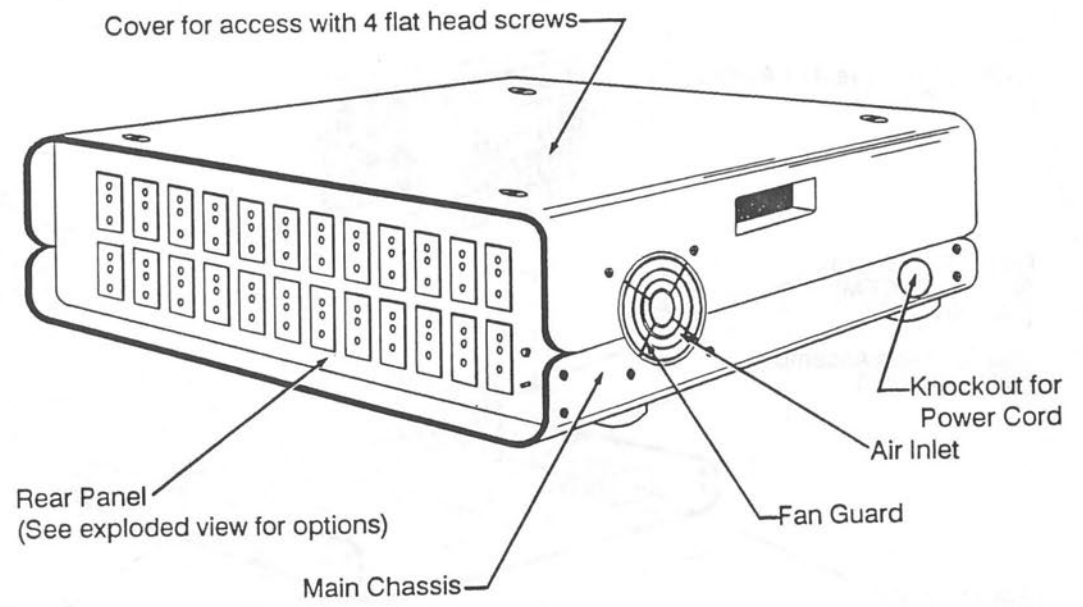
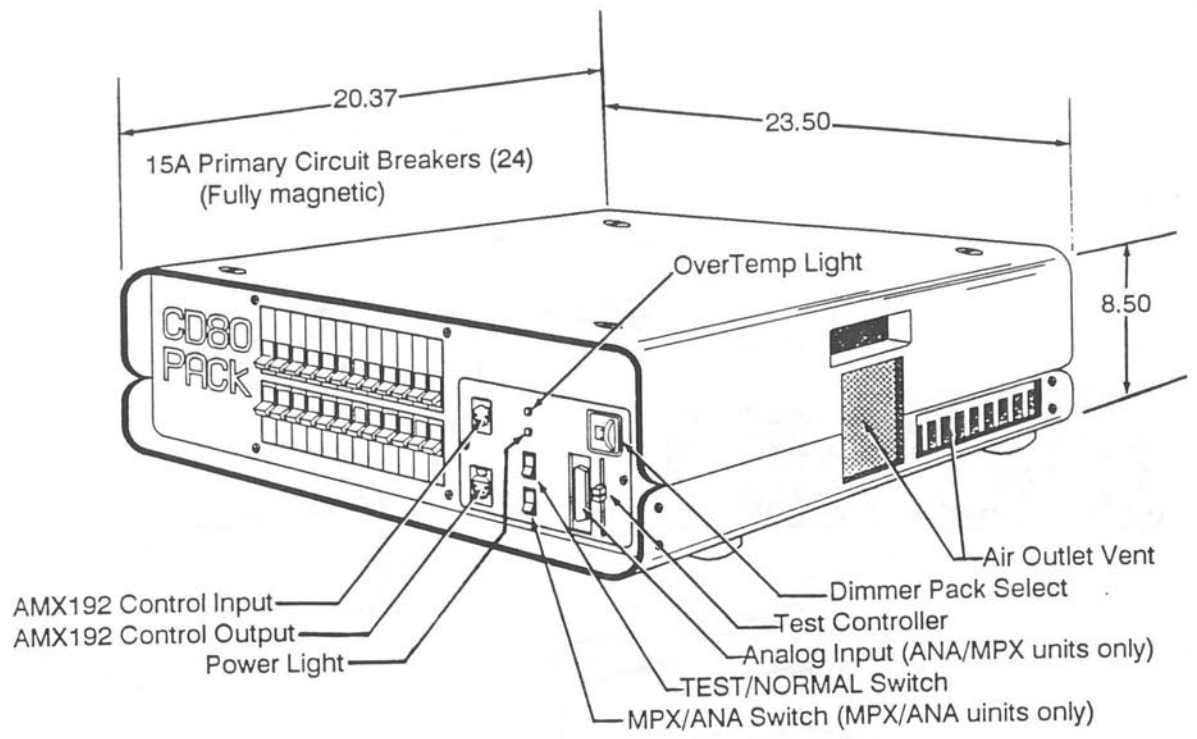
A discreet analog input version of the pack is available. This pack contains an analog to multiplex converter in addition to the other control circuitry.

This converter plugs into the Motherboard, and requires a different removable control panel from the "Multiplex Only" version. The "Multiplex/Analog" version of the control panel allows selection of AMX192 or analog signals from a front panel switch.

#### 4.4 *Power Control and Cooling Assemblies*

The following circuit and thermal elements in the bottom housing serve to control and dissipate power in the CD80 1.2Kw Pack:

- A. 12 SSRs (1 for each 2 dimmers), rated appropriately for the dimmer power rating, and mounted on a common 18" long heat sink anchored to the bottom housing. Each dual SSR is field replaceable.
- B. One torroidal choke for each dimmer is mounted in a common assembly adjacent to the heat sink.
- C. One primary, fully magnetic circuit breaker for each dimmer is mounted in front of the torroidal chokes.
- D. A fan mounted on the positive pressure side of the heat sink provides approximately 70 CFM (derated) of cooling air through the enclosure.
- E. A phase changing/terminal block assembly on the bottom housing provides termination of either 3 phase 4-wire plus ground 120/208 VAC 80 AMPS, or single phase 3-wire plug ground 120/240 VAC 120 AMPS.



**Figure 1. CD80 1.2Kw Pack**

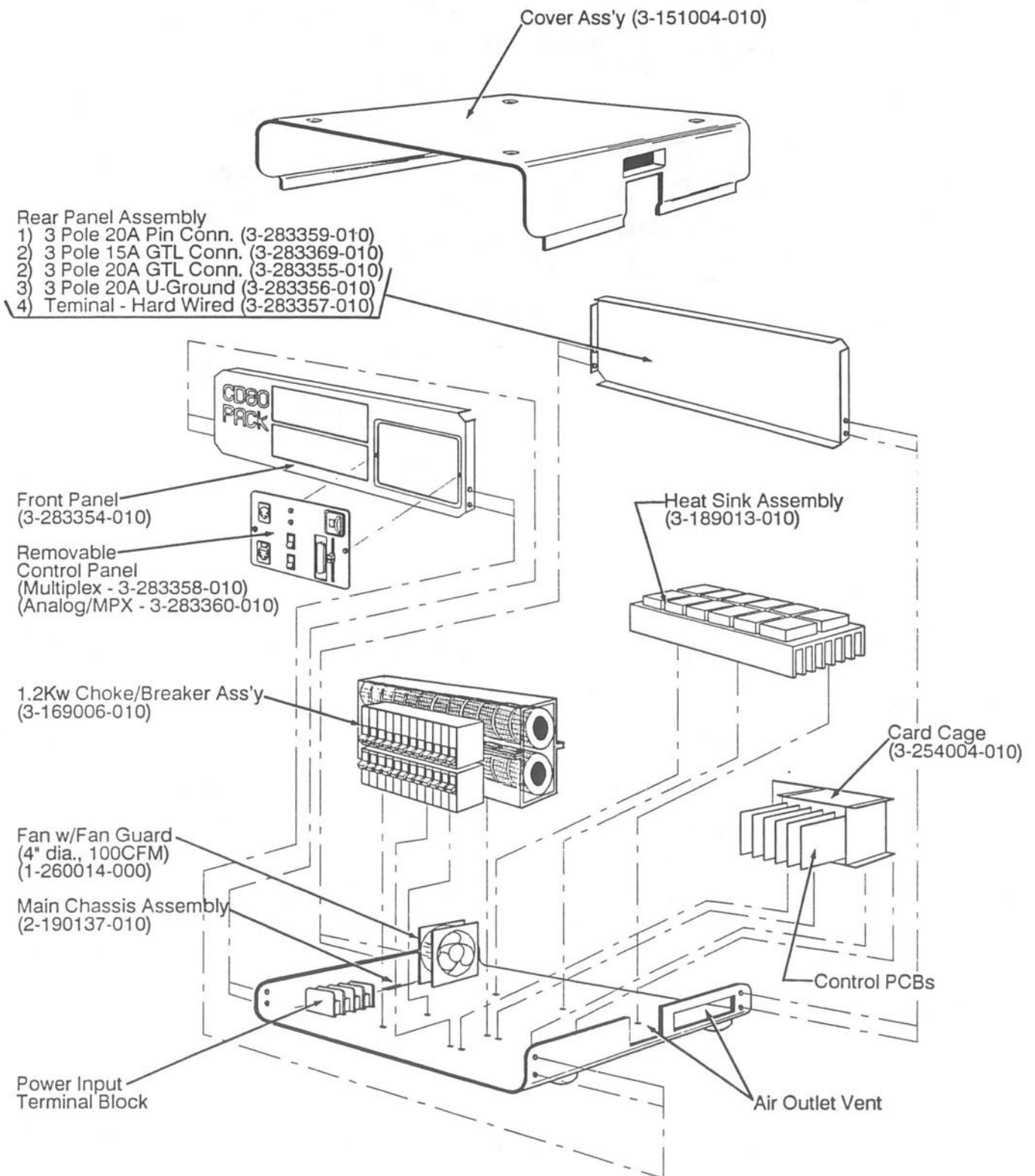


Figure 2. CD80 1.2Kw Pack Exploded View



# **Operation**

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## *CD80 1.2Kw Pack Operator's Reference*

This section provides information on installation and operation of CD80 1.2Kw Packs.

## **5. *Installation***

---

The location of wiring runs may affect dimmer performance and should be planned before laying out the control and dimming equipment.

**DO NOT run power feed or load wires in the same cable bundle, conduit or wireway as control wiring.** Where control and power wiring must cross, they should cross at as close to a right angle as possible.

**DO NOT run wiring from other manufacturers' equipment in the same cable bundle, conduit, or wireway with CD80 1.2Kw Pack wiring.**

**DO NOT run wiring from unrelated Strand Lighting or Strand Electro Controls equipment in the same cable bundle, conduit, or wireway with CD80 1.2Kw Pack wiring.**

**DO NOT run wiring in ways other than shown on system riser diagram in permanent installations.**

**DO NOT substitute plastic conduit for metal** where conduit is called for in permanent installation. Metal conduit acts as a ground and shield.

Since this is portable equipment, and installed under many circumstances, following all of the above constraints in all installations may not be possible. However, following these constraints where possible will help insure consistent and stable system operation.

### **5.1 *Install Packs - Portable CD80 1.2Kw Pack***

The CD80 1.2Kw Pack may be placed on any flat surface for normal operation. Up to 8 units may be stacked vertically if required. No more than 2 units should be placed side to side unless at least 24 inches is provided between packs. Otherwise, the hot air exhaust from each unit will simply feed into the next. In permanent or semi-permanent installations, build shelves to hold two packs separated by at least 24 inches horizontally. Vertical shelf spacing should allow removal of the CD80 1.2Kw Pack top covers for access to SSR modules if required.

## 5.2 Install Packs - Wall Mounted CD80 1.2Kw Pack

The wall mounted CD80 1.2Kw Pack (Terminal Strip 1.2Kw Pack) provides load and control terminal strips on the rear panel of the pack, and provides a termination for remote overtemp indication.

- A. Set mounting hardware in wall according to the figure.
- B. Remove top of pack and mount on wall. Make certain that the fan is at the bottom of the unit as mounted.
- C. Attach conduit as indicated for power, load, and control wires, and pull wiring. Bring wires into pack as shown. This configuration is designed for minimum crosstalk between the AC line and the control wiring.

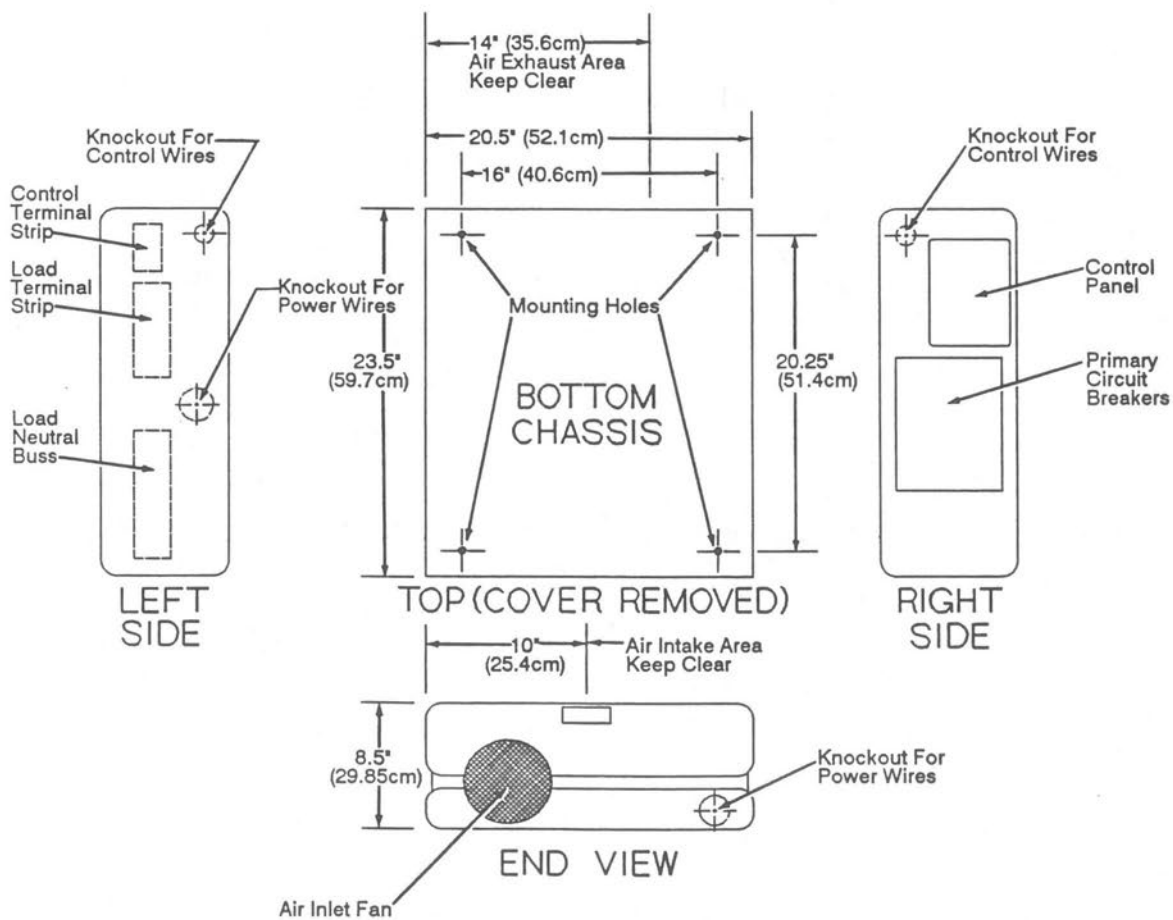


Figure 3. CD80 1.2Kw Pack Wall Mounting

### 5.3 Connect Control Signal

CD80 Dimmer Racks accept control signals conforming to the USITT AMX192 Dimmer Signal Specification.

Short extensions of the multiplex signal, where TA4/TY4 connectors are used, are made with Belden cable #8723 (2 pairs of shielded 24 gauge wire). All other runs (in or out of conduit) are made with Belden #9156 (2 pairs of unshielded 18 gauge wire). Maximum allowable distance from control console to last dimmer cabinet is 1000 feet.

The three types of connections provided in Strand Lighting equipment for the AMX192 signal are the XLR style connector, the TA4/TY4 Series Mini-SwitchCraft connector, and terminal blocks. CD80 1.2Kw Packs use XLR connectors for control signal connection. Pin assignments are shown below.

Function	XLR Pin #	TA4/TY4 Pin #	CD80 Term. Block Pin #
- CLOCK	4	1	1
+ CLOCK	2	3	3
COMMON	1	2	2
ANALOG	3	4	4

Interconnection between equipment with different plug types requires an adapter cable. **The plugs on this adapter are not connected pin to pin.** See figure below for proper adapter wiring.

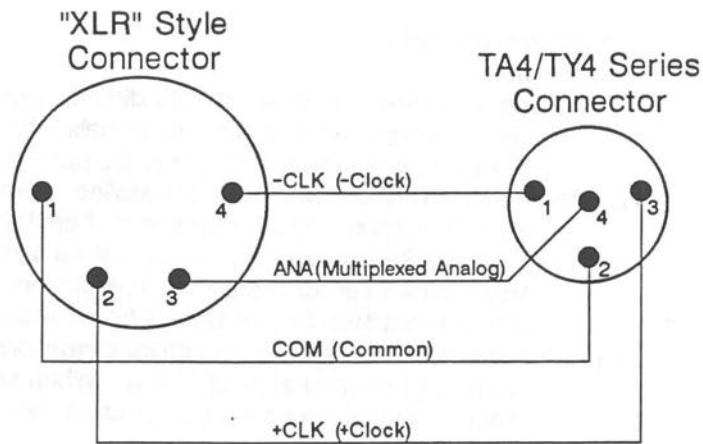


Figure 4. XLR To mini-SwitchCraft Adapter

## 5.4 *Set Thumbwheel Switches*

Set the dimmer numbers for each pack by setting the thumbwheel switch and expansion switch on the front of the control module to the appropriate group of dimmers on the control cable. Switch settings are as follows:

<u>Thumbwheel Switch Setting</u>	<u>Dimmer Numbers</u>
1	1-24
2	25-48
3	49-72
4	73-96
5	97-120
6	121-144
7	145-168
8	169-192

## 5.5 *Systems with Multiple Control Cables*

When there is more than one control cable, dimmer numbers on cable 2 will be offset by 96 or 192, depending on the console, and cables after cable #2 will have dimmer numbers offset from cable #2 by 192.

The following Strand Lighting control consoles output only 96 dimmer signals from Dimmer Output #1, and 192 dimmer signals from all other outputs. Remember that each dimmer patched as a 6Kw dimmer in the console takes up two dimmer signals.

- All versions of Mantrix
- Mantrix Memory
- miniPalette consoles, when set for 288 dimmer signals or less. When set for more than 288 dimmer signals, these consoles output 192 dimmer signals from Dimmer Output #1.
- Lightboard M with AMX select jumper installed. Without this jumper, the console outputs 192 dimmer signals from Dimmer Output #1.
- miniLight Palette Series consoles, when set for 288 dimmer signals or less. When set for more than 288 dimmer signals, these consoles output 192 dimmer signals from Dimmer Output #1.
- Light Palette Series consoles with software revisions above V6E, when set for 288 dimmer signals or less. When set for more than 288 dimmer signals, these consoles output 192 dimmer signals from Dimmer Output #1.

Strand Lighting Light Palette Series consoles with software revisions V5A, V5B, V6A and V6B output 96 dimmer signals from all Dimmer Outputs when set for 384 dimmer signals or less. When set for more than 384 dimmer signals, these consoles output 192 dimmer signals from each output.

## 5.6 *Mixing CD80 Packs*

Combinations of 1.2Kw, 2.4Kw, 6Kw, and 12Kw packs may be used in the same installation. Care must be taken to properly set the thumbwheel group switches, and identify 6Kw/12Kw dimmers in the patching operation when setting up the control console.

## 5.7 *Analog Control Module Hookup*

For use with discreet analog output control consoles, the Analog Control Module inputs twelve 0 to +10VDC signals through a standard male DB25 connector. The thumbwheel switch has no effect on signals input through this connector. Control consoles with outputs which are not pure D.C. (i.e., Manual Micro-Q), will require a filter choke box (part #3-069017-010 or 3-069018-010) between the console and any splitter arrangement for proper operation. The connector pinout for the DB25 connector is shown below.

PIN	FUNCTION
1	COM
2	Analog signal #23
3	Analog Signal #21
4	Analog Signal #19
5	Analog Signal #17
6	Analog Signal #15
7	Analog Signal #13
8	Analog Signal #11
9	Analog Signal #9
10	Analog Signal #7
11	Analog Signal #5
12	Analog Signal #3
13	Analog Signal #1
14	Analog Signal #24
15	Analog Signal #22
16	Analog Signal #20
17	Analog Signal #18
18	Analog Signal #16
19	Analog Signal #14
20	Analog Signal #12
21	Analog Signal #10
22	Analog Signal #8
23	Analog Signal #6
24	Analog Signal #4
25	Analog Signal #2

## 5.8 *Set Phase Changer*

For maximum flexibility, a phase changing terminal assembly (consisting of a terminal block and a connector pair assembly) provides termination for a 3-phase 4-wire 240/208 VAC 80 AMP power source, or a single phase 3-wire 120/240 VAC 120 AMP power source.

For 3 phase operation, place the connection plug in the 3 phase (3 $\phi$ ) position. For single phase operation, place connector plug in the 1 phase (1 $\phi$ ) position.

Changing from three phase to single phase operation also requires changing the position of the reference source switch (3 $\phi$ /1 $\phi$ ) on the Motherboard. This re-routes the ramp generators to the proper SSR drive.

## 5.9 *Connect Power*

Connect power to the CD80 1.2Kw Pack by attaching the appropriate customer supplied connector to the manufacturer supplied power cable. If no cable is supplied, install customer cable by removing the top of the unit, connecting the phase connector for split single phase or three phase operation, and attaching cable to the power terminal block. In the event of an improper power connection, the overvoltage circuit disables the power supply regulator and flashes the power supply indicator, protecting the electronics.

## 5.10 *Fault Protection*

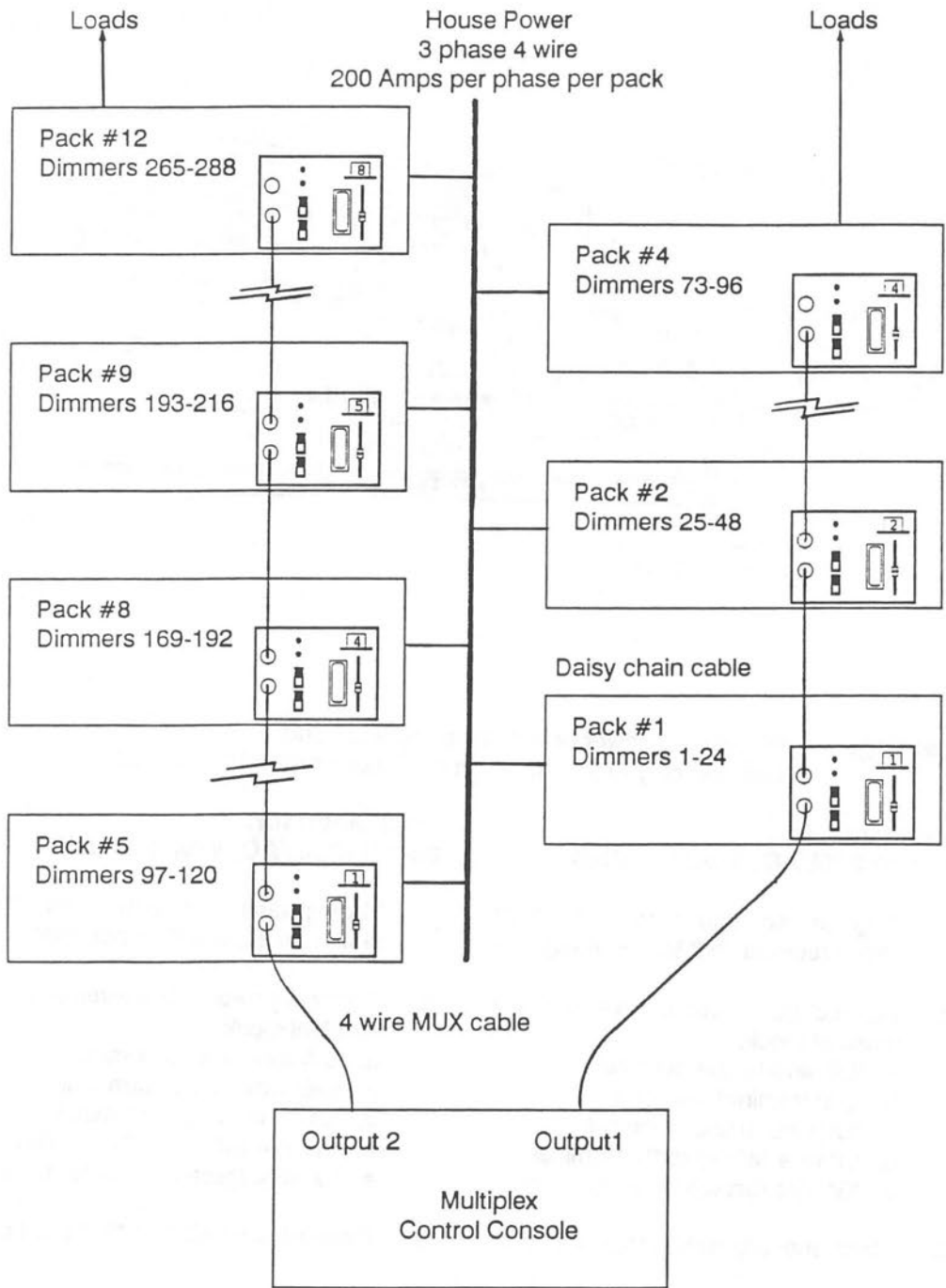
If the SSR heat sink overheats, the OverTemp Indicator will turn ON. This shows that air flow has been blocked or the fan has failed.

Electromagnetic circuit breakers protect the SSRs if there is a short circuit. A short on any dimmer in the pack will trip the circuit breaker for the dimmer OFF. Restore circuit operation by clearing the short and turning the circuit breaker back ON.

## 5.11 *Test Controller*

Use the Test Controller on the Control Panel to test loads without using a control console. Set the \*NORMAL/TEST\* switch on the Control Panel to \*TEST\* and raise the Test Controller to the required level. All 24 dimmers will be active at the set level. To turn individual dimmers OFF while using this feature, turn their circuit breaker OFF.

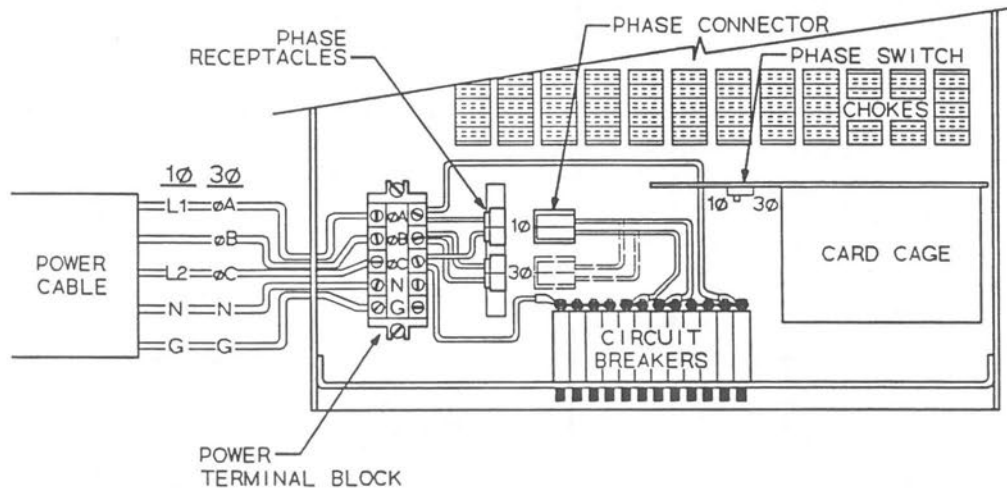
To activate all dimmers at full, push the PANIC switch on the rear panel next to the dimmer 24 output.



NOTE: Figure shows console with 96 dimmer signals from Output #1. For consoles with 192 signals from Output #1, packs 1-8 are on Output #1 and Output #2 drives packs #9-16.

**Figure 6. Multiplexed 1.2Kw Pack Control Hookup**





**Warning:** Disconnect power before removing any parts.  
Connect only to a system that is properly grounded/earthed.

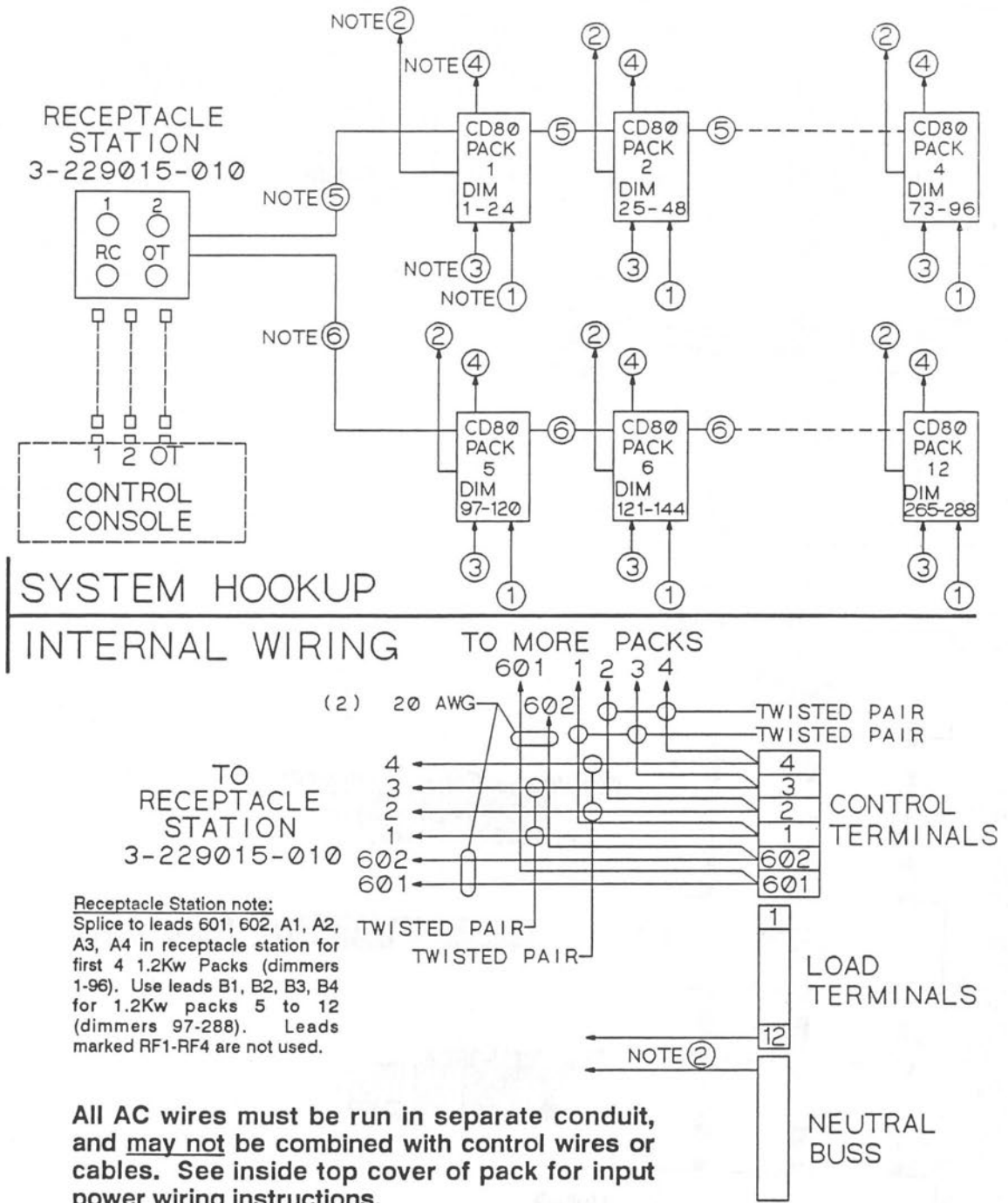
**Installation for:**  
**1φ 120/240VAC, 3 wire + GND.**

1. Plug phase connector into "1φ" phase receptacle ("3φ" not used).
2. Connect power cable wires to power terminal block:
  - a. "L1" wire to "φA" terminal
  - b. "φB" terminal not used
  - c. "L2" wire to "φC" terminal
  - d. "N" wire (white) to "N" terminal
  - e. "G" wire (green) to "G" terminal
3. Place phase switch in "1φ" position

**Installation for:**  
**3φ 120/208VAC, 4 wire + GND.**

1. Plug phase connector into "3φ" phase receptacle ("1φ" not used).
2. Connect power cable wires to power terminal block:
  - a. "φA" wire to "φA" terminal
  - b. "φB" wire to "φB" terminal
  - c. "φC" wire to "φC" terminal
  - d. "N" wire (white) to "N" terminal
  - e. "G" wire (green) to "G" terminal
3. Place phase switch in "3φ" position

**Figure 5. 1.2Kw Pack Power Connection**



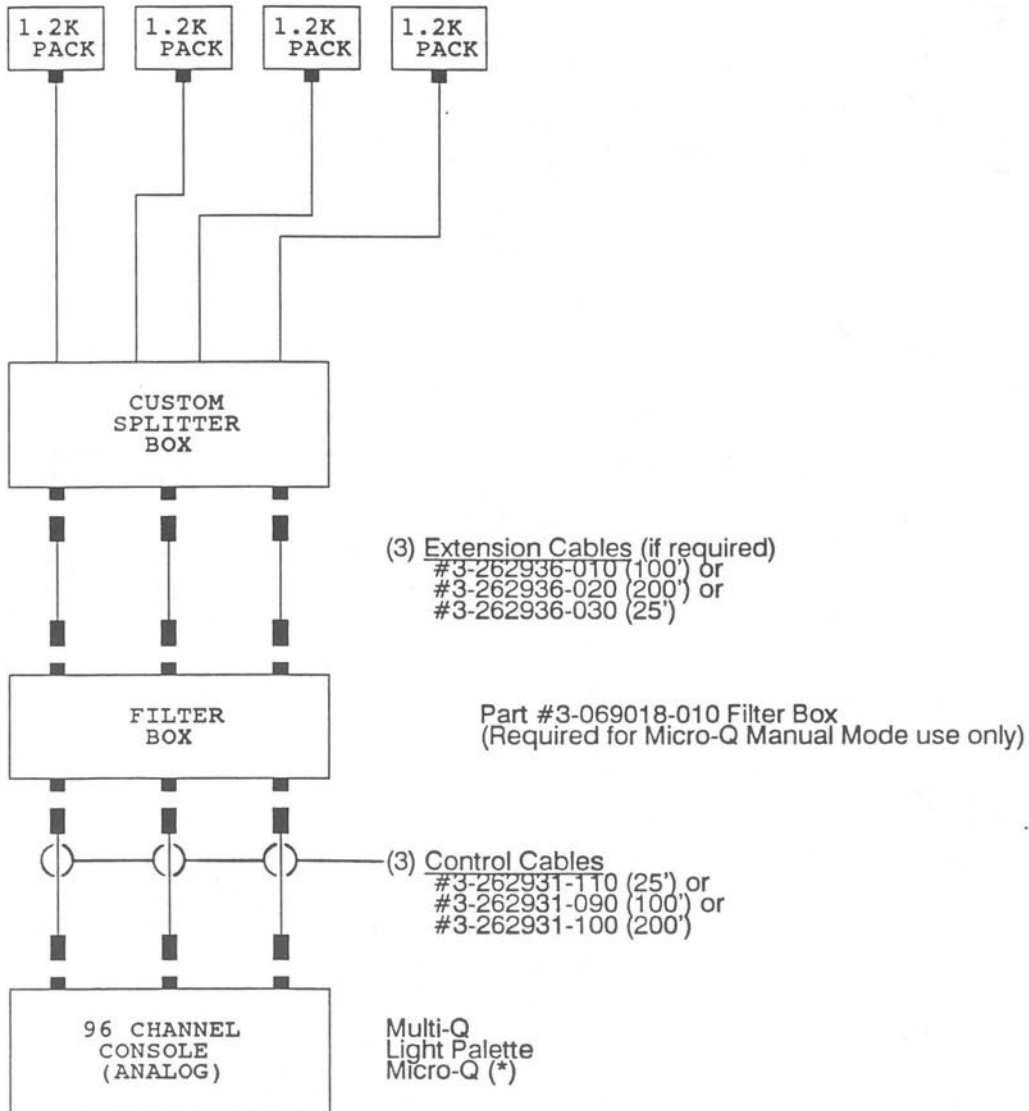
**Receptacle Station note:**  
 Splice to leads 601, 602, A1, A2, A3, A4 in receptacle station for first 4 1.2Kw Packs (dimmers 1-96). Use leads B1, B2, B3, B4 for 1.2Kw packs 5 to 12 (dimmers 97-288). Leads marked RF1-RF4 are not used.

**All AC wires must be run in separate conduit, and may not be combined with control wires or cables. See inside top cover of pack for input power wiring instructions.**

- Note:**
1. 3 $\phi$  4 wire 120/208VAC or 1 $\phi$  3 wire 120/240VAC main feed (bottom entry only).
  2. To loads as required (left side conduit entry only). 2 wire circuits.
  3. Air entry
  4. Warm air exhaust - keep clear.
  - # 5. Two (2) twisted pair BELDEN #9744 or #9156 (A1, A2, A3, A4) and two (2) #20 AWG (601,602) in conduit (for CD80 1.2Kw Packs #1-4).
  - # 6. Two (2) twisted pair BELDEN #9744 or #9156 (B1, B2, B3, B4) and two (2) #20 AWG (601,602) in conduit for CD80 1.2Kw Packs #5-12).
- (#) Use BELDEN #9744 cable up to 1000 feet, and BELDEN #9156 cable up to 2000 feet.

**Figure 7. CD80 1.2Kw Pack (Hardwired Control) Installation**

4 - CD80 1.2Kw Packs with Analog Option  
(96 dimmer system)



\* When used in **Manual Mode**, use the filter box in addition to the splitter box.

Figure 8. Analog 1.2Kw Pack Hookup to Strand Analog Console

4 - CD80 1.2Kw Packs with Analog Option  
(96 dimmer system)

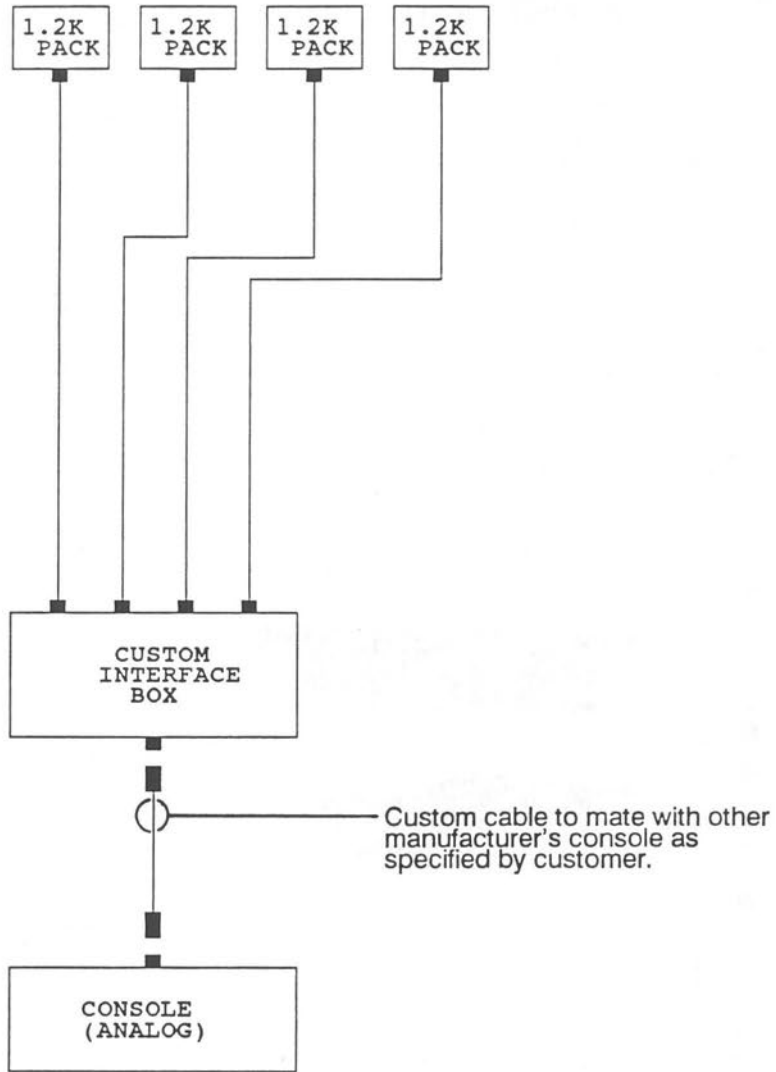


Figure 9. Analog 1.2Kw Pack Hookup to Non-Strand Analog Console

8 - CD80 2.4Kw Packs with Analog Option  
(96 dimmer system)

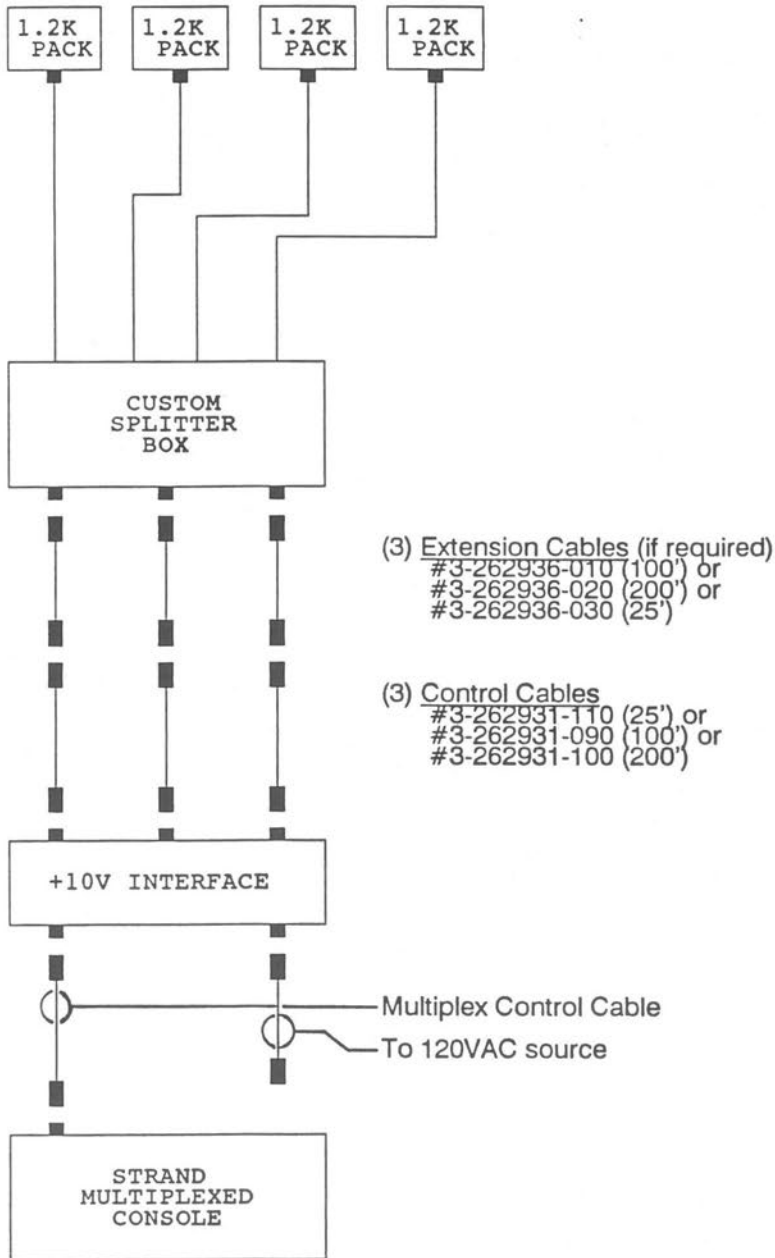


Figure 10. Analog 1.2Kw Pack Hookup to Strand Multiplexed Console

## 6. *Dimmer Pack Calibration*

---

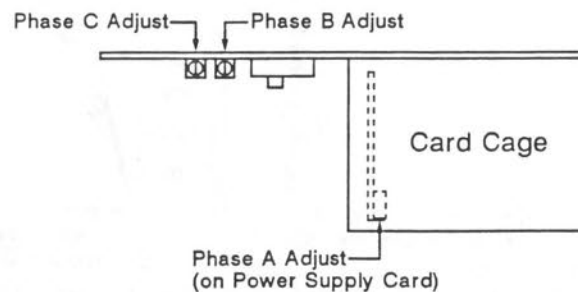
### 6.1 *Ramp Card Calibration*

Calibration of CD80 Ramp Cards is beyond the scope of this chapter. Calibration is done in the factory before shipment of the CD80 1.2Kw Pack and should not be necessary in the field. All field adjustments relating to curve or to maximum output level should be accomplished with the Power Supply adjustment.

### 6.2 *Power Supply Card Calibration*

CD80 Ramp Cards require a specific reference voltage from the Power Supply to generate their 5 Volt reference ramp (5V "S" curve). The Power Supply is then used to make any required adjustments in dimmer output curve using a true RMS (AC+DC) meter. Adjustment is made with the Power Supply Card installed in the 1.2Kw Pack.

60Hz systems require a 10.96VAC RMS reference and 50Hz systems require a 9.13VAC RMS reference from the power supply. For the phase A reference in 1.2Kw Packs, measure this voltage between J2 (Common) and J3 (Ref.) on the Power Supply Card. For phase B and C, measure this voltage between J2 on the Power Supply Card and the center tap of the adjustment potentiometer. Compensation for different line voltages frequencies is by adjusting the Power Supply, not the Ramp Card.



**Figure 11. Reference Adjustment Locations**

CD80 1.2Kw Pack electronics virtually eliminates the need for on-site calibration. The "CD80 Dimmer Output" drawing below shows the effects of line voltage shifts in a system calibrated for 120VAC, and typical output curves of CD80 1.2Kw Packs when power supplies are calibrated to the actual incoming line voltage. Once calibrated, the output is held to the ideal output curve for the calibrated voltage until it reaches incoming line voltage level, at which time it flattens out. Systems with greater than calibrated voltage as power line voltage will maintain a square law curve to the calibrated voltage. Systems with lower than calibrated voltage as incoming line voltage should be recalibrated in the field. Recalibration for this purpose is on the Power Supply Cards, not on the Ramp Cards.

Where line voltages vary significantly from calibration voltage, a standard square law output can be obtained by adjusting the Power Supply reference voltage to 10.96VAC RMS (for 60Hz systems) or 9.13VAC RMS (for 50Hz systems) on-site. This results in a square law output curve with a maximum output voltage 3-5VAC below the incoming line voltage. Though adjustment to boost output voltage slightly (or limit output to a specific level) is possible, it is not recommended, as it will change the output curve.

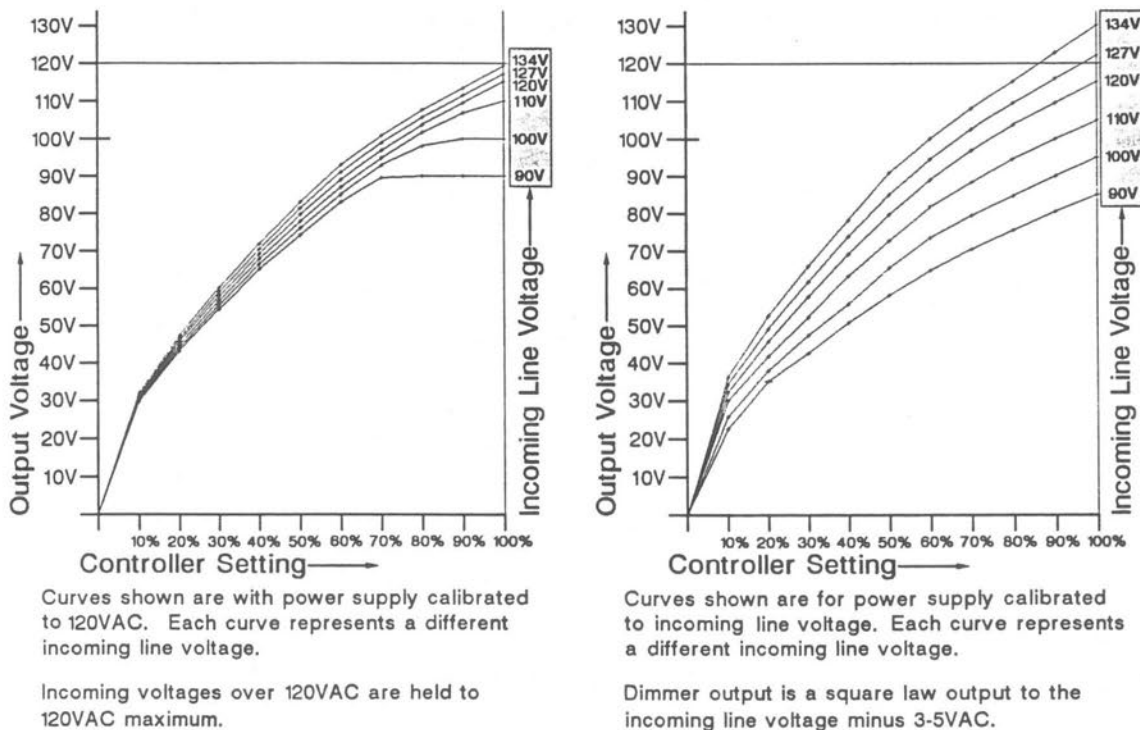


Figure 12. CD80 Dimmer Output Curves

# **Maintenance**

---

*CD80 1.2Kw Pack Operator's Reference*

This section provides trouble-shooting and maintenance information for CD80 1.2Kw Packs. For electronic repair information, see "CD80 1.2Kw Pack Electronics Repair Procedures" (8-700193-000).



## 7. *Basic Trouble-Shooting*

---

### 7.1 *Component Removal*

The CD80 1.2Kw Pack has been designed to be serviced easily and quickly by the customer.

The plug-in electronics are designed to be removed by first removing the Control Panel (4 screws), and then removing the suspect printed circuit board.

The Motherboard is removed as a part of the card cage. Remove the top cover, then unplug all cards and cables from the Motherboard, making sure to note where they go back, remove the screws holding the Card Cage to the Bottom Housing, and remove the Card Cage.

The electrical and mechanical components, relays, chokes, breakers, connectors, fan and phase changer are accessible by simply removing the top cover. The relays are fastened from above into the heat sink by two screws and are easily replaced by the customer by removing the two screws and disconnecting the electrical connections.

For best operation, do a routine check and cleaning about once each year unless the operating environment is unusually harsh or dirty. Service and maintenance other than this cleaning are seldom required. In case of problems, and in order to save time and aggravation, follow the procedures outlined here before calling Strand Lighting. Observe what happens at each step. These steps represent the questions you will first be asked by Strand Lighting Service Representatives. **The person actually doing the tests should contact Strand Lighting to minimize errors in translation and other misunderstandings.**

In case of failures in the system, fault isolation is expedited by considering the system subject to the following categories of possible malfunctions:

- A. Major system malfunctions common either to all dimmers or to a single phase.
- B. Dimmer problems common to a single Ramp Card.
- C. Dimmer problems not related by phase or Ramp Card.

Establish fault location by interchanging Ramp Cards, or SSRs as required. Correct the problem by card or SSR replacement. Always turn dimmer rack power OFF when removing or replacing a PCB from the Motherboard.

## 7.2 *System Malfunctions Common to One or More Power Phases*

### A) **POWER SUPPLY INDICATOR IS OFF.**

#### POSSIBLE CAUSE

- 1) Main power feed off.

#### SOLUTION

Check main power feed.

#### POSSIBLE CAUSE

- 1) Blown fuse in power supply.

#### SOLUTION

Replace fuse.

### B) **POWER SUPPLY INDICATOR ON, FANS OFF.**

#### POSSIBLE CAUSE

- 1) Control cable disconnected, or broken.

#### SOLUTION

Repair, connect, or replace control cable.

#### POSSIBLE CAUSE

- 2) Incorrect patch in console.

#### SOLUTION

Check console patch to make certain it is correct.

#### POSSIBLE CAUSE

- 3) Clock leads reversed.

#### SOLUTION

Reverse clock leads to CD80 Pack at control signal input terminal block (TB1) or control input connector.

**C) INDICATOR ON, FAN ON. LIGHTS FLOAT TO FULL.**

POSSIBLE CAUSE

- 1) Analog line broken or no analog output from console.

SOLUTION

Try control cable for defective pack in a different console output. Remember that this changes the dimmer numbers, and repatching may be necessary, as well as resetting the number of dimmers. If problem persists, check analog line for breaks. Otherwise, problem is probably in console.

**D) INDICATOR ON. FAN ON. ALL LIGHTS OFF.**

POSSIBLE CAUSE

- 1) Analog line shorted or reversed.

SOLUTION

Repair or clear shorts on analog line, or replace defective control cable.

**E) INDICATOR ON, FAN ON, CONSOLE NOT ADDRESSING DIMMERS CORRECTLY (I.E. DIMMER NUMBERS ARE CONSISTENTLY OFF BY A CERTAIN NUMBER).**

POSSIBLE CAUSE

- 1) Patch problem in console.

SOLUTION

Check 6kW/12kW assignments in patch.

**F) ALL DIMMERS IN ONE PACK WILL ONLY GO TO 90%.**

POSSIBLE CAUSE

- 1) Control wiring error.

SOLUTION

+ Clock and common probably reversed in control wiring.

**G) ALL DIMMERS IN ONE PACK WILL NOT GO TO ZERO.**

POSSIBLE CAUSE

- 1) Control wiring error.

SOLUTION

- Clock and common probably reversed in control wiring.

### 7.3 *Dimmer Problems Common to a Single Ramp Card*

The dimmer pack must be powered down before removing or inserting Ramp Cards

- A) **FOUR OR EIGHT CONSECUTIVE DIMMERS DO NOT RESPOND TO COMMANDS.**

POSSIBLE CAUSE

- 1) Ramp Card failure.

SOLUTION

Replace Ramp Card and return faulty card to factory for repair.

- B) **A PAIR OF CONSECUTIVELY NUMBER DIMMERS DO NOT RESPOND TO CONTROLS.**

POSSIBLE CAUSE

- 1) Ramp Card driver output failure.

SOLUTION

Replace Ramp Card and return faulty card to factory for repair.

- C) **FOUR OR EIGHT CONSECUTIVELY NUMBERED DIMMERS DO NOT COME UP TO FULL BRIGHTNESS OR DO NOT TRACK SYSTEM.**

POSSIBLE CAUSE

- 1) Motherboard phase switch (1 $\phi$ /3 $\phi$ ) not in correct position for 3 phase operation.

SOLUTION

Place phase switch in 3 $\phi$  position.

POSSIBLE CAUSE

- 2) Ramp Card improperly calibrated.

SOLUTION

Replace Ramp Card and return faulty card to factory for recalibration.

- D) **ONE OR MORE LIGHTS COME ON WHEN CONSOLE IS TURNED OFF OVERNIGHT.**

POSSIBLE CAUSE

- 1) Output driver or sample and hold malfunction.

SOLUTION

Replace Ramp Card and return faulty card to factory for repair.

#### 7.4 *Dimmer Problems Not Related by Phase or a Common Ramp Card*

The dimmer pack must be powered down before removing or inserting Ramp Cards.

##### A) DIMMER FLICKERS AS SYSTEM IS BROUGHT UP.

###### POSSIBLE CAUSE

- 1) Defective Ramp Card or SSR.

###### SOLUTION

Swap Ramp Card with a known good unit. If problem moves, Ramp Card is defective. Replace Ramp Card and return defective unit to factory for repair.

Swap SSR with a known good unit. If problem moves, SSR is defective. Replace SSR.

##### B) DIMMER DOES NOT FOLLOW COMMANDS.

###### POSSIBLE CAUSE

- 1) Defective Ramp Card or SSR.

###### SOLUTION

Swap Ramp Card with a known good unit. If problem moves, Ramp Card is defective. Replace Ramp Card and return defective unit to factory for repair.

Swap SSR with a known good unit. If problem moves, SSR is defective. Replace SSR.

###### POSSIBLE CAUSE

- 2) Control circuitry open.

###### SOLUTION

Check and repair control circuitry, motherboard connectors.

## 8. *Periodic System Maintenance*

---

Perform Periodic Maintenance every six (6) to twelve (12) months, depending on the environmental conditions.

- A. Turn power to the dimmer pack OFF.
- B. Remove Ramp Cards and Power Supply Card from the Motherboard, dust them off with a soft natural bristle brush, and clean their edge connectors with a mixture of 70% denatured alcohol and 30% distilled water (or other cleaning compound intended for gold edge connectors).
- C. Inspect the dimmer pack for loose connections, build-up of dust, and (for permanent or semi-permanent installations) placement of obstructions around it which may impede air flow. Tighten any loose connections found at this time.
- D. Vacuum out any excessive dust build-up in the dimmer pack while power to the pack is shut down.
- D. Exercise all circuit breakers by turning them ON and OFF several times.
- E. Replace Power Supply Cards and Ramp Cards.
- F. Turn power to the system ON and verify Power Supply reference voltages and adjust as required.

*Appendix A*

## **Spare Parts**

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*CD80 1.2Kw Pack Operator's Reference*

## CD80 1.2Kw Pack Spare Parts List

---

<u>DESCRIPTION</u>	<u>PART #</u>
CD80 Ramp Card	3-722776-010
CD80 Power Supply Card	3-722777-010
CD80 1.2Kw Pack Motherboard	3-723041-010
Analog Interface PCB	3-723045-010
Analog Splitter Box	3-060008-010
Analog Filter Box (32 dimmer)	3-069017-010
Analog Filter Box (96 dimmer)	3-069018-010
Torroidal Choke	2-169032-010
Circuit Breaker (15A)	1-132247-000
Heat Sink Assembly with SSR (1.2Kw)	3-189013-010
Solid State Relay (dual 1.2Kw)	1-377161-000
Fan for 1.2Kw Pack	1-260014-000



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