



*Building a Connected World*

# TOPAZ 12 PORTABLE PACK AND ASSOCIATED CONTROL MODULES USER GUIDE

(Part # LIT-29433-1A)



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## CHAPTER 1: USING THIS MANUAL

The TOPAZ 12 Pack is an extremely versatile piece of equipment which can be tailored to meet the needs of any small to medium-sized dimming application. This manual is designed to assist you in identifying each of the parts of your system and to correctly connect each of those parts.

The model number of the pack shell may be found on the back of the pack and the control module model number will be found on the bottom of the module. Consult your packing list for individual component identification. The information shown below is in generic terms. For details on 100V or 220V operation, see Chapter VI, Section 2.

**TABLE 1**

### **120 VOLT MODELS**

MODEL#	DESCRIPTION
600-021	TOPAZ 12 Portable Pack: 12 x 1.8kW Dimmers, 2 x 15A U-Ground (NEMA 5-15) outlets per dimmer
600-001	TOPAZ 12 Portable Pack: 12 x 2.4kW Dimmers, 2 x 20A Pin Plug outlets per dimmer
600-002	TOPAZ 12 Portable Pack: 12 x 2.4kW Dimmers, 2 x 20A U-Ground (NEMA 5-20) outlets per dimmer
600-004	TOPAZ 12 Portable Pack: 12 x 2.4kW Dimmers, 1 x 20A Locking Blade (NEMA L5-20) outlet per dimmer
LEC2102	TOPAZ 12 Remote Control Module
600-902	TOPAZ 12 Universal Control Module

### **240 VOLT MODELS**

(Foreign Electrical Service Only)

MODEL#	DESCRIPTION
600-011	TOPAZ 12 Portable Pack: 12 x 2.5kW Dimmers, 2 x 15A Pin Plug outlets per dimmer.
600-014	TOPAZ 12 Portable Pack: 12 x 2.5kW Dimmers, 1 x 15A Locking Blade outlet per dimmer
LEC2105	TOPAZ 12 Remote Control Module
600-904	TOPAZ 12 Universal Control Module

## CHAPTER II: PORTABLE PACK INSTALLATION

### A. PACK LOCATION

The TOPAZ 12 Pack should be located in a dust-free space with an ambient temperature between 32 - 104°F (0-40°C) and a relative humidity of 10 - 90% without condensation. It should be located on a stable surface suitable for supporting the weight indicated in Appendix A, Specifications. If packs are stacked on top of each other using the interlocking feature, make sure that the stack is stable both before and after all cables are terminated. There must be at least 18 inches (457.2 mm) of clearance at the front and back of the pack to allow for cooling and wire routing. Consideration should be given to the fact that this equipment will produce a slight noise due to dimmer hum and fan operation. Also, no sound equipment should be placed in the vicinity of the dimmer pack or its wiring. Failure to observe this practice could result in excessive buzzing in the sound equipment.

### B. LINE WIRING

The feeder cable should enter the pack through the strain relief located in the back of the pack. See Figure 1. This cable clamp will accept 1.15" to 1.98" diameter (29.21 to 50.292 mm) cable. Suggested cables to U.S.A. standards can be found in Appendix B. The input power (feeder) requirements are indicated on the back of the pack along with the shell model number.

Locate the line wire lugs, found inside the rear of the pack. Phases A, B, C, the Neutral and the Ground lug are designed to accept 14-1/0 AWG (2-50mm<sup>2</sup>) CU. wire operating at the 90°C ampacity rating. Upon termination, the contact screws should be tightened to the following torque values:

14-10AWG	35in.lbs.
8 AWG	40in.lbs.
6-4 AWG	45in.lbs.
2-1/0 AWG	50in.lbs.

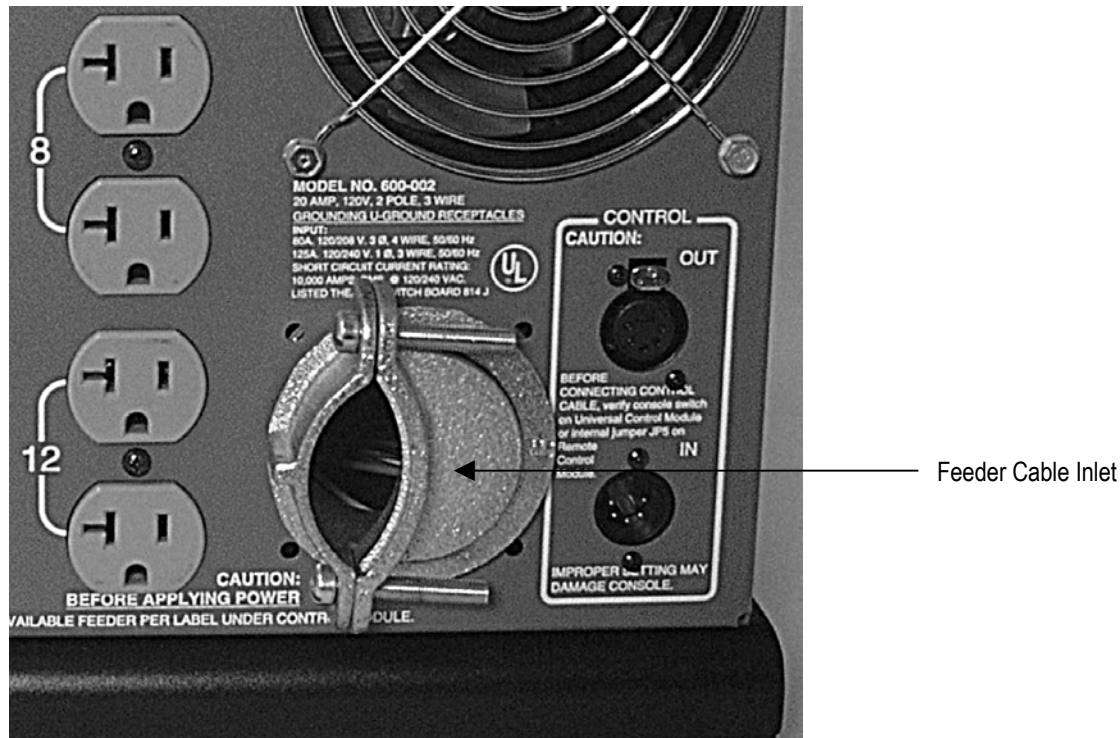


Figure 1 - Feeder Cable Inlet

The TOPAZ 12 Pack comes wired from the factory to accept a 3 phase, 4 wire, wye service with equipment ground. If this is the type of service which will be used for your particular installation, connect the line wiring to the A, B, C, Neutral and Ground Lugs, See Figure 2; then skip down to Part C of this chapter.

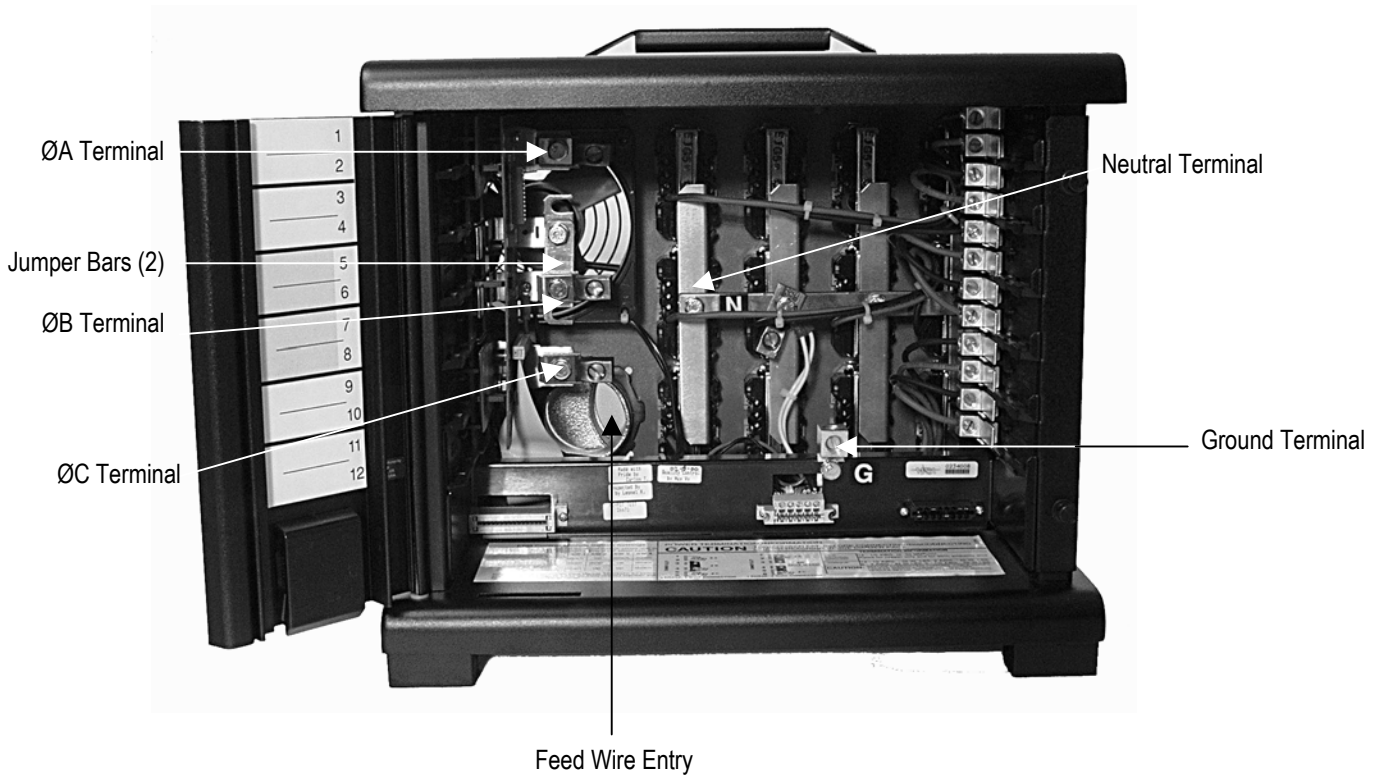


Figure 2 - 3 Ø Power Hookup

If the service you have available is a single phase, 3 wire (split phase) service, convert the pack using the following directions:

### Phase Conversion

1. Loosen the four bolts on the dimmer power feed busses using a 7/16" socket wrench. See figure 3.
2. Rotate the Phase B1 jumper bar up so that it connects to the Phase A bus. Be sure that the terminal lug on the Phase A bus is pointing to the right side of the pack and hand-tighten the Phase A bolt.
3. On the Phase B2 bus, rotate the jumper bar down so that it connects to the Phase C bus. Be sure that the terminal lugs on the Phase B and C busses are pointing to the right side of the pack and hand-tighten both bolts.
4. Using a 7/16" socket wrench, tighten all four bolts.

Connect the wiring to the ØA, ØC, Neutral and Ground Lugs. This configuration is also suitable for connection to two phases of a 3 phase, 4 wire system.

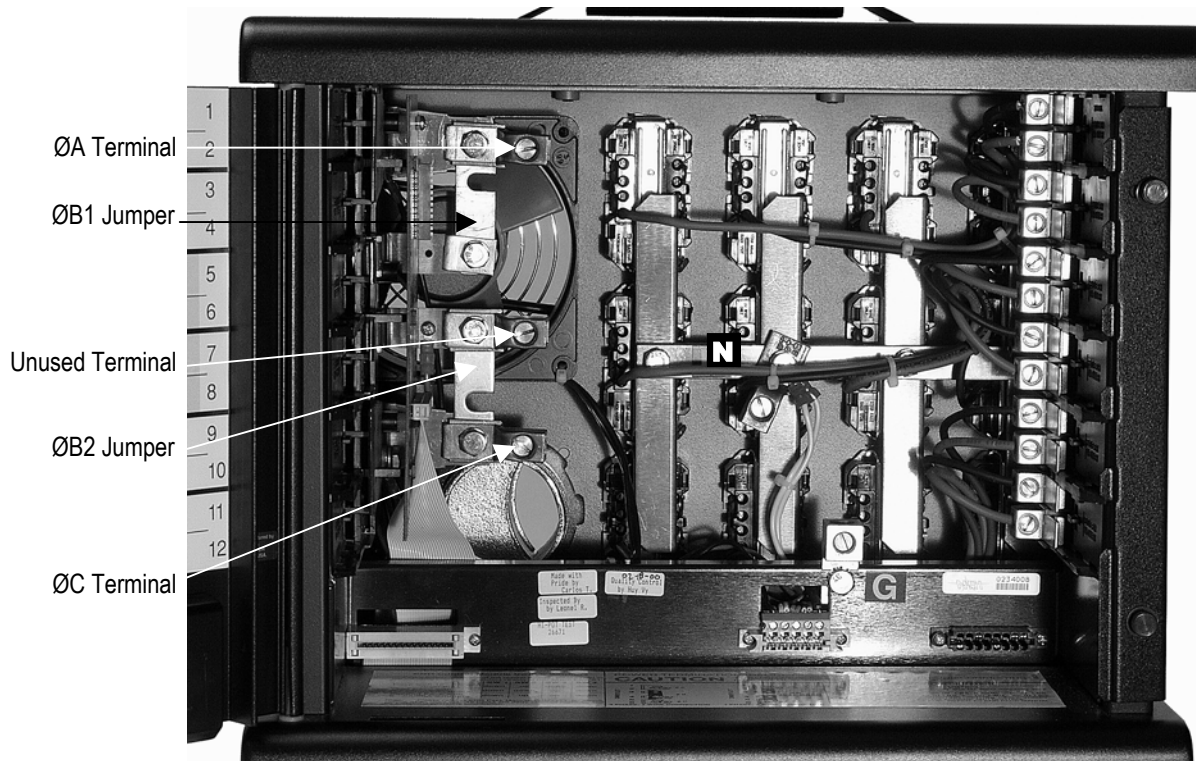


Figure 3 - Phase Conversion

### C. DIMMER INSTALLATION

The dimmers may now be installed in the pack. The door on the front of the pack must be open to allow for insertion of the dimmer modules. Also, the module retaining bracket on the right must be moved to the right by loosening the two thumb screws. Insert the dimmers in the six slots of the pack. Slide the modules in firmly until they stop. The breakers should be in the off position while inserting the modules. All slots must have a dimmer or airflow module inserted in order to maintain proper cooling of the pack.

The TOPAZ 12 PACK dimmer module is available in 1.8kW or 2.4kW sizes for 120V operation, and 2.5kW for 240V operation. The 1.8/2.4/2.5kW modules are dual dimmers. The model number may be found on the bottom of each dimmer module.

**TABLE 2**

<b>Model No.</b>	<b>Description</b>	<b>Voltage</b>	<b>Max. Load</b>	<b>Circuit Breaker</b>
166-361	Dual Dimmer Module	120V	1.8kW	15A
166-362	Dual Dimmer Module	120V	2.4kW	20A
166-364	Dual Dimmer Module	240V	2.5kW	15A

### D. LOAD WIRING

Loads are connected to the portable pack by means of plug-in receptacles on the rear panel of the pack. Dimmer and load receptacle types and receptacle ampere ratings for the type of pack being used can be found in Table 1 of Chapter I. Maximum load capacity and branch circuit ratings of the dimmers can be found in Table 2, above. The dimmers are rated for both incandescent and inductive loads, the latter having a kVA rating equal to the kW rating shown. These dimmers employ phase-control switching techniques, so inductive loads must be suitable for use with the steep wave front which this technique produces. The loads should be sized appropriately and mating connectors utilized for proper connections. Information on load wiring and mating connectors can be found in Appendix C.

### E. CONTROL MODULE CONFIGURATION AND INSTALLATION

The electronic control module may now be installed in the pack. There are two types of control modules available which are designed to work under different conditions. The model number of the control module may be found on the bottom of its case. Go to the appropriate chapter (Chapter III or IV) for instructions on how to configure the module for your application.

**IMPORTANT.** The module must be configured before it is installed to conform to your application. Please read carefully and make all necessary settings to your control module.

## CHAPTER III: REMOTE CONTROL MODULE MODEL NO. LEC2102 - 120V and LEC2105 - 240V

The purpose of the Remote Control Module is to control the TOPAZ 12 Pack when only a digital multiplexed control signal is used. The remote control module automatically detects whether the control signal is DMX512 or CMX (Colortran's version of DMX) protocol upon power-up, reset or first appearance of a valid control signal.

There are numerous switches and jumpers on or in the control module which provide a large range of configurations in which the module can operate. The operation of each item will be explained. It should be noted that the functions of all items may be combined as desired in order to tailor the equipment for the desired application. Refer to Figures 4 and 5 for the physical location of each item.

**IMPORTANT. The module must be configured before it is installed to conform to your application. Please read carefully and make necessary switch settings to your control module.**

### 1. THUMBWHEEL SWITCH (Front Panel, Figure 4)

This switch selects which dimmers the module will control. In this 12 dimmer pack, position "0" represents dimmers 1 thru 12, position "1" represents dimmers 13 thru 24, etc. As the digital cable is routed from pack to pack ("daisy chained"), the packs do not need to be sequentially assigned. Dimmer numbering is determined only by the "Thumbwheel" setting and not by the sequence of the control cable daisy chain. It is also possible to set two thumbwheels to the same number if it is desired to have two dimmers (one per pack) respond to the same control channel.

### 2. RESET SWITCH (Front Panel, Figure 4)

If a control module becomes inoperative or "freezes", the Reset Switch should be pressed. This will cause a "warm boot" of the system and it should resume normal operations.

### 3. TEST SWITCH (Front Panel, Figure 4)

This switch is used to test the individual outputs of each dimmer without the use of a digital signal from the lighting console. This switch, when in the up position, causes all the dimmers to lock on at full. By shutting off all the breakers and turning each breaker on individually, you can check the output of each dimmer. This switch overrides any signal coming into the pack and must be turned off (down) to restore dimmer control to the lighting console.

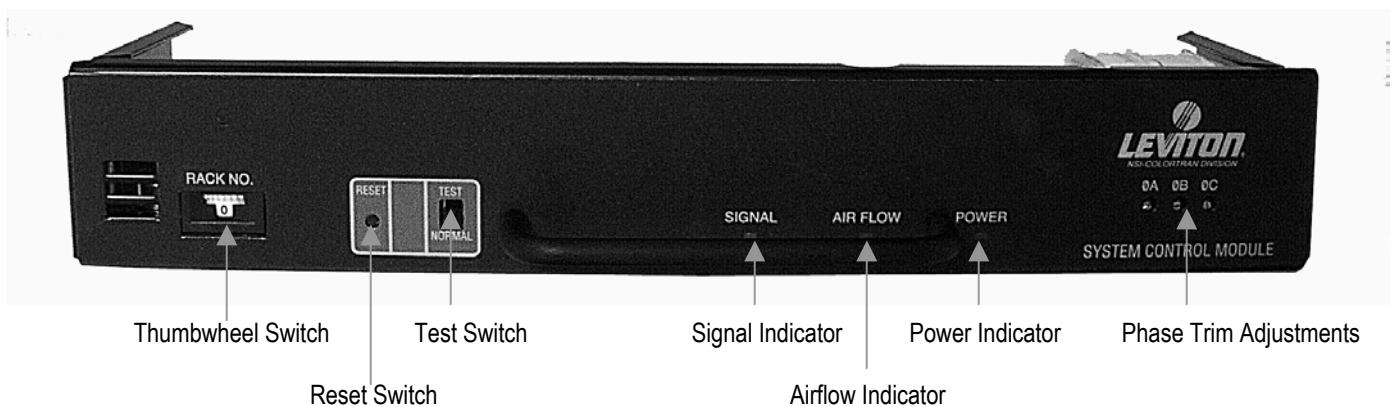


Figure 4 - Remote Control Module Front Panel



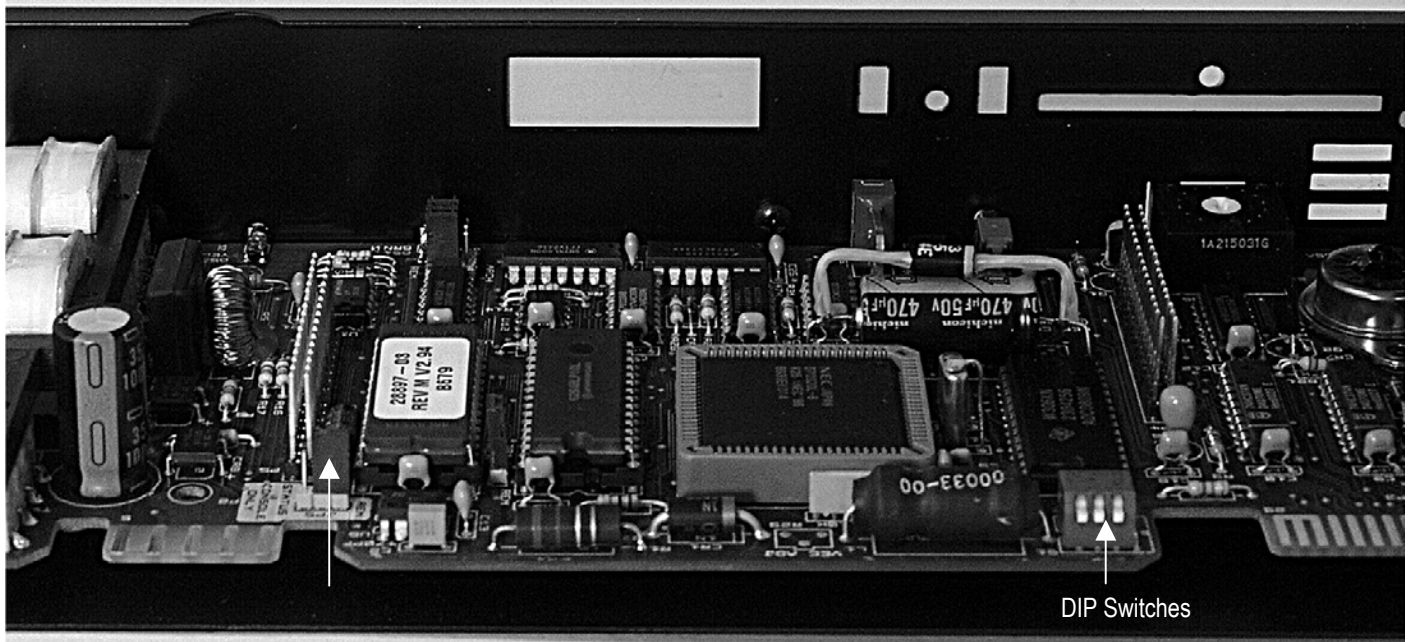


Figure 5 – Internal Switches/Jumpers

#### 4. STATUS CONTROL CONSOLE JUMPER (JP 5, internal, Figure 5)

**IMPORTANT:** This jumper should **ONLY** be moved when using a Status control console, moving the jumper and using any other control console may damage the control console.

By placing the jumper in the "Status" position you are placing 12 volts on pin #4 of the data cable. For all other types of digital control consoles the "JP5" must be in the "remote" position. The jumper should be checked before a lighting console is connected.

#### 5. DIP SWITCHES (Red Switches Numbered 1 thru 3, internal, Figure 5)

These switches offer a large range of configurations in which the module can operate. The operation of each switch is explained below.

##### SWITCH NO. 1: Thumbwheel "+ 16" Switch

In a very large system, dimmers with numbers higher than 192 might be required. There are only 16 positions on the front panel thumbwheel switch. In these situations, the + 16 switch, number 1 on the dip switch, makes it possible to have higher numbered packs on the same control line.

The first 16 packs are assigned as normal, with their "+16" switch in the "OFF", or down, position. The next group of 16 packs should have their thumbwheel switches set from "0" to "15" and the "+16" switch in the "On" (up) position. In other words the thumbwheel switch on the seventeenth pack should be set to "0" and the "+16" switch (numbered 1 on the dip switches) in the "ON" (up) position. This will cause the first dimmer in the seventeenth pack to be addressed as dimmer 193 and so on up to a maximum of 384.

## SWITCH NOS. 2 and 3: Pack Configuration Switches

These switches tell the control module that it will be controlling a 12 x 1.8 / 2.4 / 2.5kW pack. The table below explains the setting.

**TABLE 3**

Pack Description	Switch No.	
	2	3
Pack with 12 – 1.8 / 2.4 / 2.5kW dimmers	UP	DOWN

### 6. FRONT PANEL LED'S (Figure 4, page 6)

#### SIGNAL INDICATOR (Green):

This LED senses the presence of a digital signal from the lighting console. If a digital signal is correctly applied, the LED will glow solid green. If a signal is not present or incorrectly applied, the LED will either not turn on or will flicker.

#### AIRFLOW INDICATOR (Amber):

This LED, when on, indicates the lack of airflow over the dimmer modules. The Airflow indicator will turn on and shut down all dimmer output within the pack for several reasons, such as: a fan failure, missing dimmer modules, or an obstruction in the airflow. To reset a module in Airflow mode, remove any obstruction or replace any missing modules, and the control module will automatically reset itself. In the event that these actions do not restore the system, you may need to have the fan circuitry repaired. A failure in any one pack will light its LED, but not the LED in any other pack.

#### POWER INDICATOR (Red):

The Power Indicator will blink if any phase is missing or incorrectly wired. The Power Indicator will glow steadily if all wiring and phasing is correct.

### 7. PHASE TRIM ADJUSTMENT (Front Panel, Figure 4, page 6)

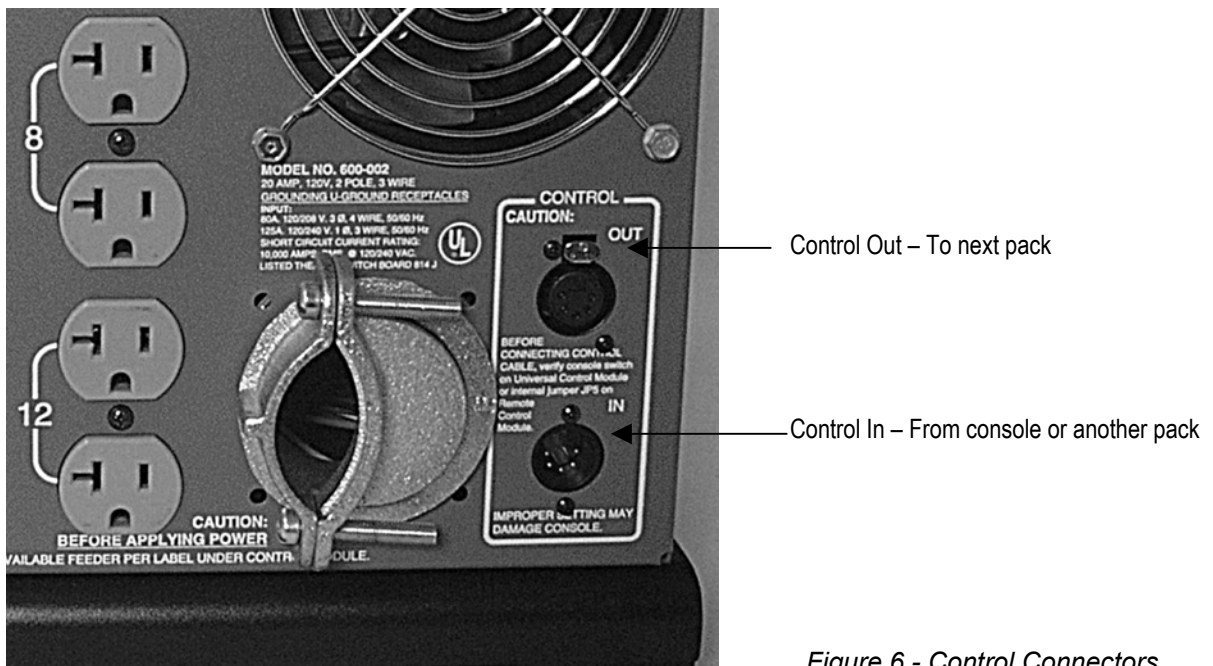
The control module is preset at the factory for 120 or 240 volts and should not require further phase trim adjusting; but if you are using the TOPAZ 12 Pack in an environment that has unusually high or low voltage, including 100V or 220V, the phase trim will need to be adjusted. Refer to Chapter VI, Maintenance and Adjustments.

After you have made all necessary settings on the Remote Control Module, you can install it into the TOPAZ 12 pack. Push the module in firmly making sure that the edge connectors are making full contact.

Control wiring to this module is via the 5-pin XLR connectors on the back of the pack. See Figure 6. If LEVITON control cables are not available, cables must be made using Neutrik NC5MX-B (male) and NC5FX-B (female), or equivalent connectors, and Belden 9829 or equivalent cable. Connector wiring is per the USITT DMX512 standard.

**TABLE 4**  
**Control Connector Wiring**

Pin No.	Function	Wiring
1	Common	Shield
2	Data –	Pair 1
3	Data +	Pair 1
4	Not Used	Pair 2
5	Not Used	Pair 2



*Figure 6 - Control Connectors*

Plug the control console into the male connector marked "IN" for the first pack. Plug the male connector of a jumper cable into the pack connector marked "OUT" and the other end of the cable into the next pack. Packs can be connected in any order without regard to the thumbwheel switch-selected numbers. The complete installation must adhere to the EIA 422A standard which, in general, limits the total cable length from console to last pack to 1000' (304.8m) and the number of control modules to 16.

Now go on to the final assembly section of this manual, Chapter V.

## CHAPTER IV: UNIVERSAL CONTROL MODULE, MODEL NO. 600-902 - 120V 600-904 - 240V

The purpose of the Universal Control Module is to control the TOPAZ 12 Pack when a digital or analog multiplexed control signal and/or standard analog control signals are used. When in the digital multiplex mode, the Universal control module automatically detects whether the control signal is DMX512 or CMX (Colortran's version of DMX) protocol upon power-up, reset or first appearance of a valid control signal. If multiplex and analog signals are both present, the signals will be "piled onto" each other in a highest takes precedence action.

There are numerous switches on or in the Universal Control Module that provide a large range of configurations in which the module can operate. The operation of each switch will be explained. It should be noted that the functions of all switches may be combined as desired in order to tailor the equipment for the desired application. Refer to Fig. # 7, 8 and 9 for the physical location of each switch.

**IMPORTANT: The module must be configured before it is installed to conform to your application. Please read carefully and make all necessary switch settings to your control module.**

### 1. THUMBWHEEL SWITCH (Front Panel, Figure 7)

This switch selects which dimmers the module will control from the incoming control signal. In this 12 dimmer pack, position "0" represents dimmers 1 thru 12, position "1" represents dimmers 13 thru 24, etc. As the digital cable is routed from pack to pack ("daisy chained"), the packs do not need to be sequentially assigned. Dimmer numbering is determined only by the "Thumbwheel" setting and not by the sequence of the control cable daisy chain. It is also possible to set two thumbwheels to the same number if it is desired to have two dimmers (one per pack) respond to the same control channel.

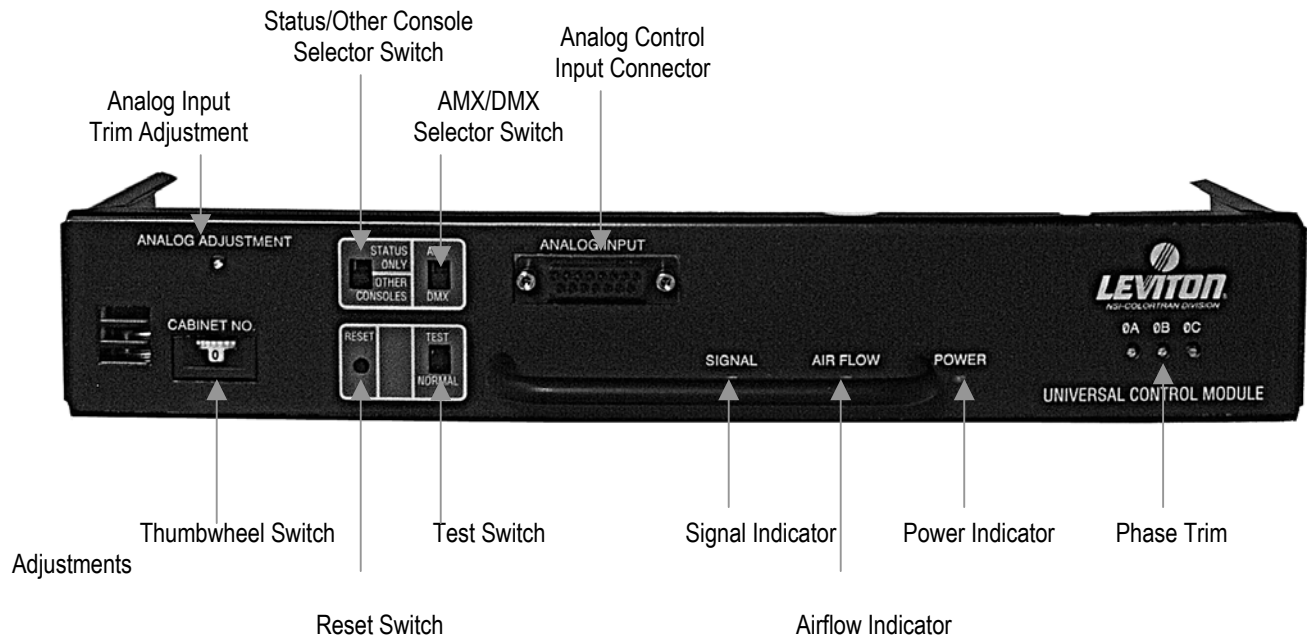


Figure 7 - Universal Control Module Front Panel

## 2. RESET SWITCH (Front Panel, Figure 7)

If a control module becomes inoperative or "freezes", the Reset Switch should be pressed. This will cause a "warm boot" of the system and it should resume normal operations.

## 3. TEST SWITCH (Front Panel, Figure 7)

This switch is used to test the individual outputs of each dimmer without the use of a signal from a lighting console. This switch, when in the up position, causes all the dimmers to lock on at full. By shutting off all the breakers and turning each breaker on individually, you can check the output of each dimmer. This switch overrides any signal coming into the pack and must be turned off (down) to restore dimmer control to the lighting console.

## 4. STATUS ONLY / OTHER CONSOLE SWITCH (Front Panel, Figure 7)

**IMPORTANT: This switch should be used ONLY when using a Status control console; moving the switch and using any other control console may damage that control console.**

By placing the switch in the "Status Only" position, you are placing 12 volts on pin #4 of the data cable. For all other types of digital control consoles, the switch must be in the "Other Console" position (down) only. The switch should be checked before a lighting console is connected.

## 5. AMX / DMX SWITCH (Front Panel, Figure 7)

This switch is used to switch between DMX512 and AMX192 protocols.

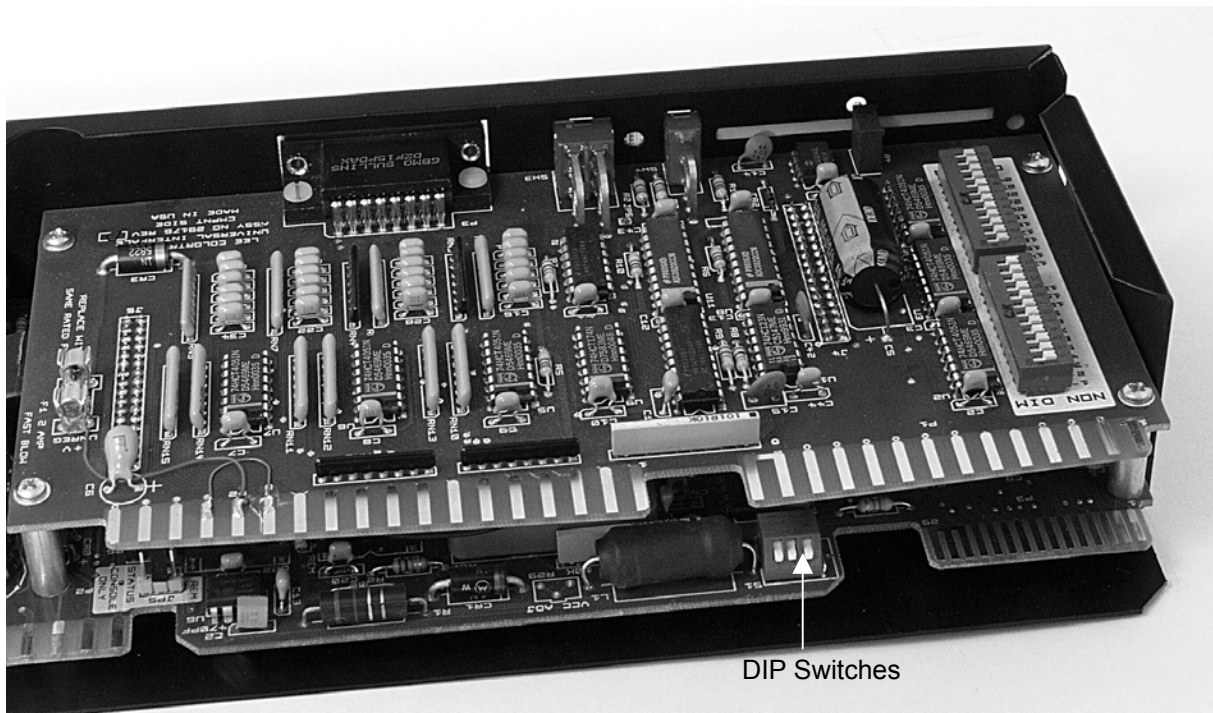
### DMX POSITION

In this position, the control module will receive USITT standard DMX512 and will automatically switch between CMX and DMX512 protocol.

### AMX POSITION

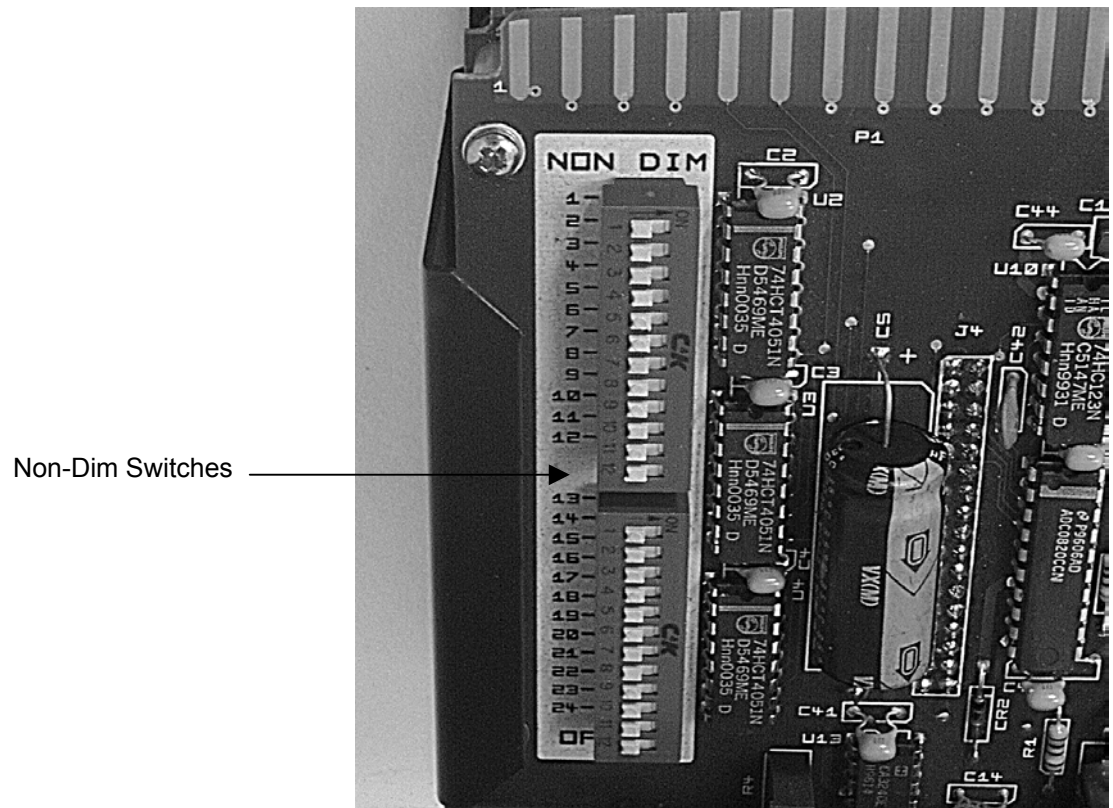
In this position, the control module will receive USITT standard AMX192 protocol.

**IMPORTANT: This switch extensively changes the function of the control connector on the rear of the pack. Refer to the end of the chapter for details.**



DIP Switches

Figure 8 - Universal Control Module Internal Switches



Non-Dim Switches

Figure 9 - Universal Control Module Non-Dim Switches

## 6. DIP SWITCHES (Red Switches Numbered 1 thru 3, Internal, Figure 8)

These switches offer a large range of configurations in which the module can operate. The operation of each switch is explained below. Note that switches 1 thru 3 offset only the multiplexed control and not the analog control.

### SWITCH NO. 1: Thumbwheel "+16" Switch

In a very large system, dimmers with numbers higher than 192 might be required. There are only 16 positions on the front panel thumbwheel switch. In these situations, the +16 switch, number 1 on the dip switch, makes it possible to have higher numbered packs on the same control line.

The first 16 packs are assigned as normal, with their "+16" switch in the "OFF" (down) position. The next group of 16 packs should have their thumb wheel switches set from "0" to "15" and the "+16" switch in the "On" (up) position. In other words the thumbwheel switch on the seventeenth pack should be set to "0" and the "+16" switch (numbered 1 on the dip switch) in the "ON" (up) position. This will cause the first dimmer in the seventeenth pack to be addressed as dimmer 193 and on up to a maximum of 384. Since the AMX-192 protocol stops at 192, a second console cable will be used in lieu of this switch.

### SWITCH NOS. 2 and 3: Pack Configuration Switches

These switches tell the control module that it will be controlling a 12 x 1.8 / 2.4 / 2.5kW pack. The table below explains the setting.

**TABLE 5**

Pack Description	Switch No.	
	2	3
Pack with 12 – 1.8 / 2.4 / 2.5kW dimmers	UP	DOWN

## 7. NON-DIM SWITCHES (24 DIP Switches on Top Card, Figure 9)

The Universal Control Module is also equipped to handle non-dims on a per circuit basis. The DIP switches can individually select which channel is a non-dim. This is done by moving the appropriate dip switch to the "On" position. The channel then becomes a non-dim and will become active (to Full) only when the control level exceeds 50% on the control console.

## 8. FRONT PANEL LED'S (Front Panel, Figure 7, Page 10)

### SIGNAL INDICATOR (Green)

This LED senses the presence of a digital signal from the lighting console. If a digital signal is correctly applied, the LED will glow solid green. If signal is not present or incorrectly applied, the LED will either not turn on or will flicker.

### AIRFLOW INDICATOR (Amber)

This LED when on indicates the lack of airflow over the dimmer modules. The Airflow indicator will turn on and shut down all dimmer outputs within the pack for several reasons, such as: a fan failure, missing dimmer modules, or an obstruction in the airflow. To reset a module in Airflow mode, remove any obstruction or replace any missing modules, and the control module will automatically reset itself. In the event that these actions do not restore the system, you may need to have the fan circuitry repaired. A failure in any one Pack will light its LED, but not the LED in any other Pack.

### POWER INDICATOR (Red)

The Power Indicator will blink if any phase is missing or incorrectly wired. The Power Indicator will glow steadily if all wiring and phasing is correct.

## 9. ANALOG INPUT CONNECTOR (Front Panel, Figure 7, Page 10)

Connecting your analog control input into the 15 pin "D" connector on the front panel will allow control from a non-multiplexed analog console to drive dimmers. If both analog and a multiplexed protocol are used at the same time, the analog levels will pile-on to the multiplexed levels. Cables must be terminated on the pack end with a Cannon DA-15P or equivalent "D" connector.

## 10. ANALOG INPUT TRIM ADJUSTMENT SCREW (Front Panel, Figure 7, Page 10)

Your non-multiplexed analog input voltage can be adjusted using the trim adjustment screw on the front panel. The control module is factory set for 0 to 10V but can be adjusted to accept 0 to 4.5, 0 to 15, or any voltage in between those values using the trim adjustment screw. Table 6 is a listing of connector pin numbers and their functions in the control module.

The Control Module will respond to a filtered full wave DC linear voltage or to a linear transition of a pulse-width modulated DC voltage within the frequency range of 900 Hz to 11 kHz. The input impedance of each dimmer is 21.3 k $\Omega$ .



**TABLE 6**  
**Analog Input Connector**

<b>Connector Pin No.</b>	<b>Function 1.8/2.4/2.5kW Pack</b>
1	DIMMER 1 CONTROL
2	DIMMER 2 CONTROL
3	DIMMER 3 CONTROL
4	DIMMER 4 CONTROL
5	DIMMER 5 CONTROL
6	DIMMER 6 CONTROL
7	DIMMER 7 CONTROL
8	DIMMER 8 CONTROL
9	DIMMER 9 CONTROL
10	DIMMER 10 CONTROL
11	DIMMER 11 CONTROL
12	DIMMER 12 CONTROL
13	NOT USED
14	NOT USED
15	COMMON

11. PHASE TRIM ADJUSTMENT (Front Panel, Figure 7, Page 10)

The control module is preset at the factory for 120 or 240 volts and should not require further phase trim adjusting; but if you are using the TOPAZ 12 Pack in an environment that has unusually high or low voltage, including 100V or 220V, the phase trim will need to be adjusted.

Refer to Chapter VI, Maintenance & Adjustment.

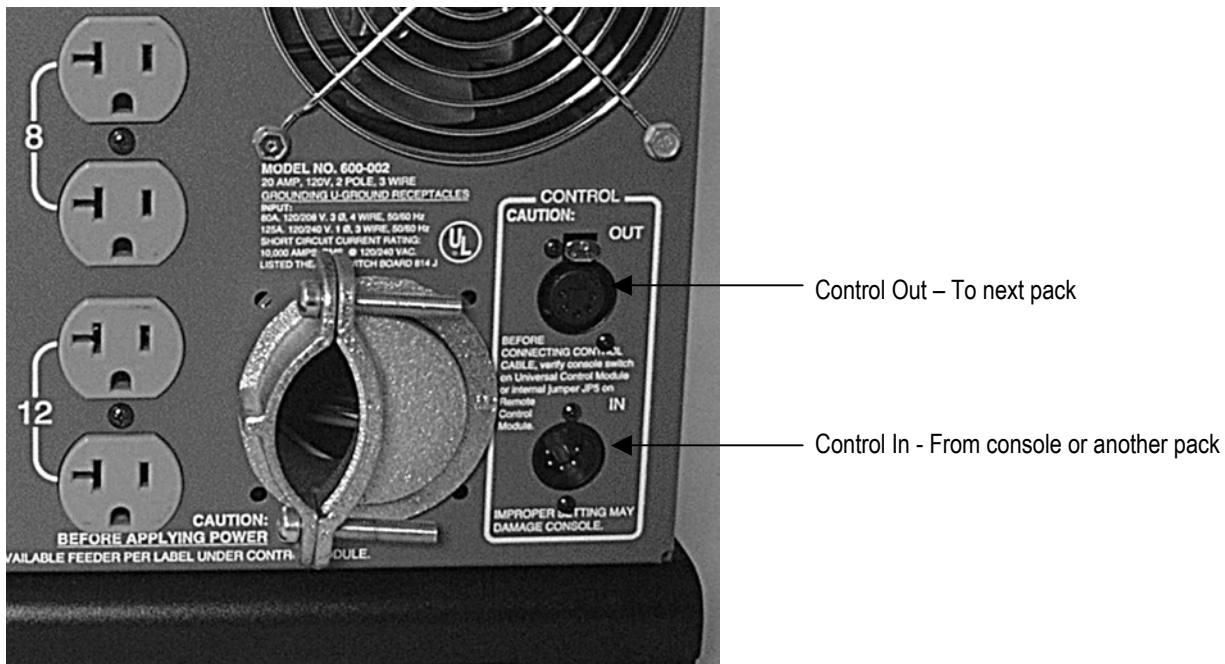
After you have made all necessary settings on the Universal Control Module, you can install it into the TOPAZ 12 pack. Push the module in firmly making sure that the edge connectors are making full contact.

Multiplex control wiring to this module is via the 5-pin XLR connectors on the back of the Pack. See Figure 10. If LEVITON control cables are not available, cables can be made using Neutrik NC5MX-B (male) and NC5FX-B (female), or equivalent connectors and Belden 9829, or equivalent cable. Connector wiring is as shown in Table 7, depending on the position of the AMX/DMX Switch discussed in Setup Step 5, above.

**TABLE 7**  
**Multiplex Control Connector Wiring**

Wiring	Pin	FUNCTION	
		AMUX	DMX512/CMX
Shield	1	C-ND	GND
Pair 1	2	CLOCK-	DATA-
Pair 1	3	CLOCK+	DATA+
Pair 2	4	ANALOG MUX.	NOT USED
Pair 2	5	NOT USED	NOT USED

\*Depends on the setting of the Status/Other Switch - see control module setup, Step 4.



Plug the control console into the male connector marked "In" for the first pack. Plug the male end of a jumper cable into the pack connector marked "Out" and the other end of the cable into the next pack. Packs can be connected in any order without regard to the thumbwheel switch-selected dimmer numbers. If operating in the DMX mode, the complete installation must adhere to the EIA 422A standard, which, in general, limits the total cable length to 1000' (304.8m) and the number of Control Modules to 16. Systems operating in the AMX mode must comply with the USITT AMX-192 standard.

Now you can go on to the Final Assembly section of this manual, Chapter V.

## CHAPTER V: FINAL ASSEMBLY

1. Make sure all breakers are in the "OFF" position on the dimmer pack.
2. Apply power to the pack. The power indicator should be on. If control console is hooked up and running, the signal indicator will also be on.
3. Turn on the Test Switch.
4. Confirm that the fan is running. If you are using a Universal Control Module, the fan should turn on when power is applied.
5. Turn on each dimmer breaker individually (one at a time) and confirm that each of the dimmers is working.
6. Turn off the Test Switch.
7. Turn on all dimmer breakers.
8. Close the front door of the pack. The door should latch closed. Move the retaining bracket on the right edge of the pack to the left and secure with the two thumb screws.

*(Note to Canadian users: CSA requires screwdriver-installed screws in lieu of thumb screws. Two 8-32 x 1/2 screws are provided for this purpose.)*

9. Test the dimmers using control console.

THIS COMPLETES THE INSTALLATION OF THE TOPAZ 12 PACK DIMMING SYSTEM. IF THERE ARE ANY TECHNICAL QUESTIONS OR DIFFICULTIES, SEE CHAPTER VIII: TROUBLESHOOTING.

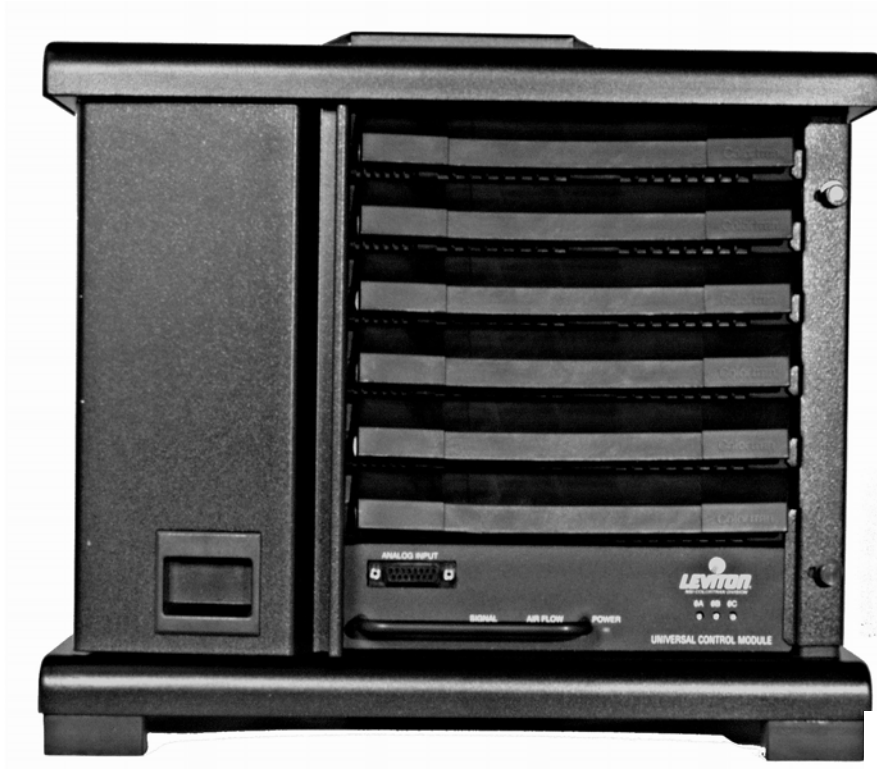


Figure 11 - Assembled Pack

## CHAPTER VI: MAINTENANCE AND ADJUSTMENT

**IMPORTANT:** Disconnect Pack from power source before performing any maintenance.

### 1. MAINTENANCE

The only maintenance which should be required on the TOPAZ 12 Pack is the occasional cleaning of the dimmer modules and the tightening of the feeder bus bar lugs.

The cleaning of the modules is simply done by removing the module from the pack and blowing the dust out of the module with compressed air. The modules should be cleaned every six months or sooner when the pack is used in an environment that is particularly dusty. The control module should also be cleaned in the same manner as the dimmer module.

The Bus Bar lugs should also be checked at the same time that the modules are cleaned. Using a 7/16" socket, check the torque of all three phases lugs and the neutral lug.

### 2. ADJUSTMENT

**IMPORTANT:** This operation should only be attempted by a qualified electrical technician.

There are three phase trim adjustment screws on the front of the control module. Each of these phase adjustment screws corresponds with a phase of the incoming feeder. Refer to Appendix D on Dimmer Phasing to find the corresponding dimmer numbers. The simplest method of adjustment is through the use of an oscilloscope. If split phase, 3 wire, power is being used, only phases A and C need to be accurately adjusted.

Note: If any phase is considerably out of adjustment with respect to the others, the microprocessor will not run. Take care that the adjustment process does not render the module temporarily inoperable.

Phase Trim Adjustment Procedure:

1. Connect the scope probe to a Phase A dimmer output. This is best accomplished by using a load receptacle plug. Note: Be sure to isolate the ground of your scope.
2. Apply power to the dimmer pack.
3. Turn on the Test Switch.
4. Look at dimmer output on scope. The wave should be sinusoidal.
5. While looking at the dimmer output wave form, turn the Phase A trim adjustment screw counter clockwise until the wave starts to become chopped. Then slowly turn the adjustment screw clockwise until the wave form becomes sinusoidal again. At this point the adjustment is complete. Continue in this manner to calibrate the remaining phases.

Control modules are usually adjusted for 120V or 240V operation. For 100V or 220V operation it may be necessary to readjust your modules. If you operate this Pack at 100V, the dimmer modules are derated to 2KW and 5KW. The ratings of dimmer modules operating at 220V remain at 2.5KW and 5.0KW.

## CHAPTER VII: TROUBLESHOOTING

Before requesting service for this unit, check the charts below for a possible cause of the problem you are experiencing. Some simple checks or a minor adjustment on your part may eliminate the problem and restore proper operation.

If you are in doubt about some of the checkpoints, or if the remedies indicated in the chart do not solve the problem, consult your local dealer or call the NSI Technical Support line for assistance. 1-800-864-2502 M-F 8 AM – 5 PM PST.

**TABLE 8  
CONTROL MODULE INDICATOR LEDS**

SIGNAL	AIRFLOW	POWER	STATUS
ON	OFF	ON	NORMAL
OFF	ON	ON	Console not on, not connected, or control line is miswired.
OFF	OFF	OFF	Power not on, not connected, or control module fuses are blown.
ON	ON	ON	Airflow obstructed or dimmers are missing.
ON	OFF	FLASHING	Missing a phase of power, control module fuse blown.
FLASHING	OFF	ON	Protocol is wrong, not selected, control line is miswired.

**TABLE 9  
OUTPUT AND OPERATION**

PROBLEM	SUGGESTED CAUSE/REMEDY	REFER TO CHAPTER, SECTION
Lights stuck at full.	Test switch is ON, turn off	III, 3 and IV, 3
Dimmer numbering is wrong	Check thumbwheel setting. Check control module configuration DIP switches	III, 1 and IV, 1 III, 5 and IV, 6
Lights don't come on with Test Switch	Circuit breakers off. Loads not connected properly. Power not on, not connected. Dimmer modules not inserted. Airflow obstructed, missing dimmer modules.	II, C and V II, D II, B II, C II, C
Lights don't come on with console control	Console not connected properly. Control cable wired improperly. Protocol selected improperly. Thumbwheel setting is wrong. Pack configuration DIP switches set improperly.	III and IV III and IV IV, 5 III, 1 and IV, 1 III, 5 and IV, 5
Improper dimmer curve	Phase trim adjustment is wrong.	VI
Light bumps to FULL	Non-Dim switch is ON.	IV, 7
Dimmer modules 3 + 4 don't turn on.	Bussing configured wrong.	II, B

## APPENDIX A: SPECIFICATIONS

PACK CAPACITY:	12 CIRCUITS, 20AMP MAX PER CIRCUIT
DIMENSIONS:	13.00"H x 14.65"W x 9.63"D (33.0cm) x (37.2cm) x (24.4cm)
WEIGHT: EMPTY: LOADED:	24.8 LBS. (11.16 Kg) 45.1 LBS. (20.3 Kg)
NOMINAL INPUT: 120V CIRCUITS	120/208V, 50/60HZ, 3Ø, 4 WIRE OR 120/240V, 50/60HZ, 1Ø, 3 WIRE
240V CIRCUITS (FOREIGN ELECTRICAL SERVICE ONLY)	240/415V, 50/60HZ, 3Ø, 4 WIRE OR 240/480V, 50/60HZ, 1Ø, 3 WIRE
POWER FEEDER ENTRY:	2" STRAIN RELIEF - RANGE 1.15" (29.21 mm) to 1.98" (50.292mm)
MAXIMUM FAN NOISE RATING:	NC33
MAXIMUM AMBIENT OPERATING TEMPERATURE:	40°C (104°F)
MAXIMUM OPERATING HUMIDITY	90% W/O CONDENSATION
PHASE-TO-NEUTRAL OPERATING VOLTAGE:	120V ± 10% OR 220/240V ± 10%
OPERATING FREQUENCY:	50 ± .5HZ OR 60 ± .5HZ
ENCLOSURE TYPE:	NEMA TYPE 1 FOR INDOOR USE ONLY (UTILIZER DANS UN ENDROIT A L'ABRI).

## APPENDIX B: DIMMER PACK FEEDER CABLES

The 2002 National Electrical Code allows for smaller, lighter, less expensive cables, providing the terminations on each end are capable of dealing with the elevated temperatures. All Pack terminations are rated to operate at the elevated temperatures at which 90°C rated cables operate. Proper selection is dependent on the rating of the terminations on the opposite end of the cable. All other terminations are rated for 60°C cable unless specifically marked for the higher rating.

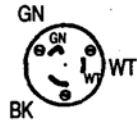
Below are suggested feeder cables based on the 2002 NEC. They all fit the 1.15" to 1.98" range of the Pack cable clamp and the 1/0 AWG (0 AWG) maximum size of the terminations.

Dimmer Pack Rating	Termination Temperature Rating	Cable Size and Type	Cable Diameter
2.4Kw	60°C	1/4G	1.68
2.4kW	60°C	1/5W	1.88
2.4kW	75°C	2/4G	1.48
2.4kW	75°C	2/5W	1.61
2.4kW	90°C	3/4G	1.34
2.4kW	90°C	3/5W	1.51

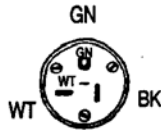
It is also possible to use single-conductor type W feeder cable. The NEC requires a minimum of 1 AWG for use in theatres. Since this cable is over-sized for this application, 1 AWG is good for all three temperature ratings. The five cables can be bundled or unbundled. It is necessary to use a 6 AWG ground conductor as five 1 AWG conductors will not fit the cable clamp.

## APPENDIX C: LOAD CONNECTORS

20A, 120V TWIST LOCK  
(NEMA L5-20)

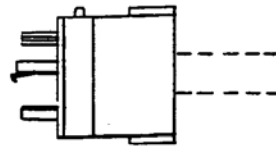
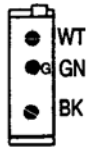


20A, 120V U-GROUND  
(NEMA 5-20)



{15A, 120V U-GROUND  
(NEMA 5-15)  
SIMILAR}

20A, 120V STAGE PIN



## APPENDIX D: DIMMER PHASING

For the **Topaz 12 portable pack**, the dimmers are on the following phases:

DIMMER	3 PHASE	SINGLE PHASE
1	A	A(L1)
2	A	A(L1)
3	A	A(L1)
4	A	A(L1)
5	B	A(L1)
6	B	A(L1)
7	B	C(L2)
8	B	C(L2)
9	C	C(L2)
10	C	C(L2)
11	C	C(L2)
12	C	C(L2)

## INTERLOCK STACKING CAPABILITIES

The TOPAZ 12 Pack is designed so that several units can be stacked on top of each other. The channel on the bottom of the packs is designed to fit over the handle on the top and the rubber feet minimize slipping. Numerous packs can be stacked on top of each other as stability permits. Stability must be verified after all power cables are connected.



## **LEVITON-NSI DIVISION TWO-YEAR LIMITED WARRANTY**

Leviton-NSI warrants new Leviton-NSI electronic control and dimmer products to be free from defective materials and workmanship for a period of two years from the date of purchase to the original owner when purchased from an authorized Leviton-NSI dealer.

Fixtures, lamps and gel material are not covered under this warranty.

The purchaser is encouraged to complete and mail to Leviton-NSI the product registration card enclosed with each product. Leviton-NSI products that have been subjected to accident, alteration, abuse or defacing of the serial number are not covered by this warranty. The normal wear and tear of items such as knobs, jacks and switches are not covered under this warranty.

If your Leviton-NSI product requires service during the warranty period, Leviton-NSI will repair, at its option, defective materials provided you have identified yourself as the original owner of the product to Leviton-NSI or any authorized Leviton-NSI dealer. Transportation charges to and from an authorized dealer or the Leviton-NSI factory for repair shall be the responsibility of the owner. All products returned to Leviton-NSI must have a factory return authorization number issued prior to shipping.

Leviton-NSI is not liable for any incidental or consequential damages resulting from defect or failure other than repairs of the Leviton-NSI product subject to the terms of this warranty. This warranty gives you specific legal rights, and you may have other rights which vary from state to state. This warranty is expressly in lieu of all other agreements and warranties expressed or implied except as may be otherwise required by law.



20497 SW Teton Avenue  
Tualatin, OR 97062  
503-404-5500  
fax: 503-404-5600