

Owner's Manual

GENESIS COMSTAR DIMMER

Models 1224 and 660



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TEATRONICS LIGHTING CONTROLS, INC.

INTRODUCTION

Thank you for buying a Genesis Comstar 1224 or 660 dimmer pack from Teatronics Lighting Controls, Inc.. Before you read this owner's manual, examine your equipment carefully for damage or discrepancies in the packing list. If shipping damage is evident, contact your carrier immediately to file a claim. Contact our sales department for mysteries concerning your order or packing slip at (805) 528-6900 (8:30 - 4:30 Pacific Time).

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SETUP AND CONNECTION

MECHANICAL INSTALLATION

For portable use, set the Genesis on a level, cool surface where the ambient air temperature does not exceed 105 degrees Fahrenheit (40 degrees Celsius). An area free of falling truss, stage props, and misplaced feet is ideal. Having your unit exposed to rain or customers is also discouraged. Up to four units may be stacked vertically as long as the stack is not used as a stepladder. Realize that any dust stirred up will eventually find its way to the internal surfaces of the unit, reducing its cooling efficiency and shortening the life of the fan. As a general rule, think clean and cool for safe, reliable, long term performance.

RACK MOUNTING

Genesis dimmers may be rack mounted on standard EIA 24" equipment rail under the following conditions:

- 1) Remove the unit's plastic feet to allow them to mount next to each other.
- 2) Do not support each unit only by the front rack ears; its weight must be supported by side rails.
- 3) An enclosed rack system needs adequate exhaust ventilation at the top of the cabinet. Louvered vents may be adequate but an exhaust fan is preferred. The front of the units must have access to cool intake air.
- 4) Genesis front panels are 5 1/4 inches high. This is 3 standard (1 3/4") rack spaces.
- 5) Input power wiring should allow enough slack that a unit may be removed from the rack individually for service without disconnecting it. Alternately, a quick disconnect, high current, power connector may be used on input feeds and loads so the unit may be removed and bench tested if needed. Teatronics Lighting Controls, Inc. uses 30, 80, and 120 Amp ANDERSON power pole connectors for this application. AMP Industries makes a similar power connector set.

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SETUP AND CONNECTION (continued)

ELECTRICAL INSTALLATION

Power Hookup

Four or five terminals must be connected to provide input power for a Genesis dimmer, depending on the AC source available (see diagram on the next page). The lugs are pressure type, accepting copper or aluminum conductors. Rotating 4 quarter turn fasteners counterclockwise on the rear access cover will expose these input terminals. The five terminals are Phase A (Single Phase-Line 1), Phase B, Phase C (Single Phase-Line 2), Neutral and Ground. The Greek letter phi, ϕ , is used to abbreviate Phase.

Phase A, B, and C are the 'hot' supply inputs. These terminals may be connected to a three phase wye source of 120 Volt (referenced to neutral) power. Each phase terminal will draw 80 Amps (Genesis 1224 or 100 Amps (Genesis 660) when the dimmer is under full load. Common wiring practice calls for hot legs to be black, blue, and red.

Lines 1 and 2 are the 'hot' supply lines when using a single phase source of 120 Volt (referenced to neutral) power. Each line terminal will draw 120 Amps (Genesis 1224) or 150 Amps (Genesis 660) when the dimmer is under full load. Common wiring practice calls for hot legs to be black, blue, or red.

Neutral is the return path for load current. It is required in all installations. Although the National Electrical Code Currently does not require the neutral conductor to be oversized, it is good practice to size the neutral 20% larger than the hot feeds. This is because the neutral current can exceed the hot current in a phase controlled dimming system that is operated from a multi-phase feed.

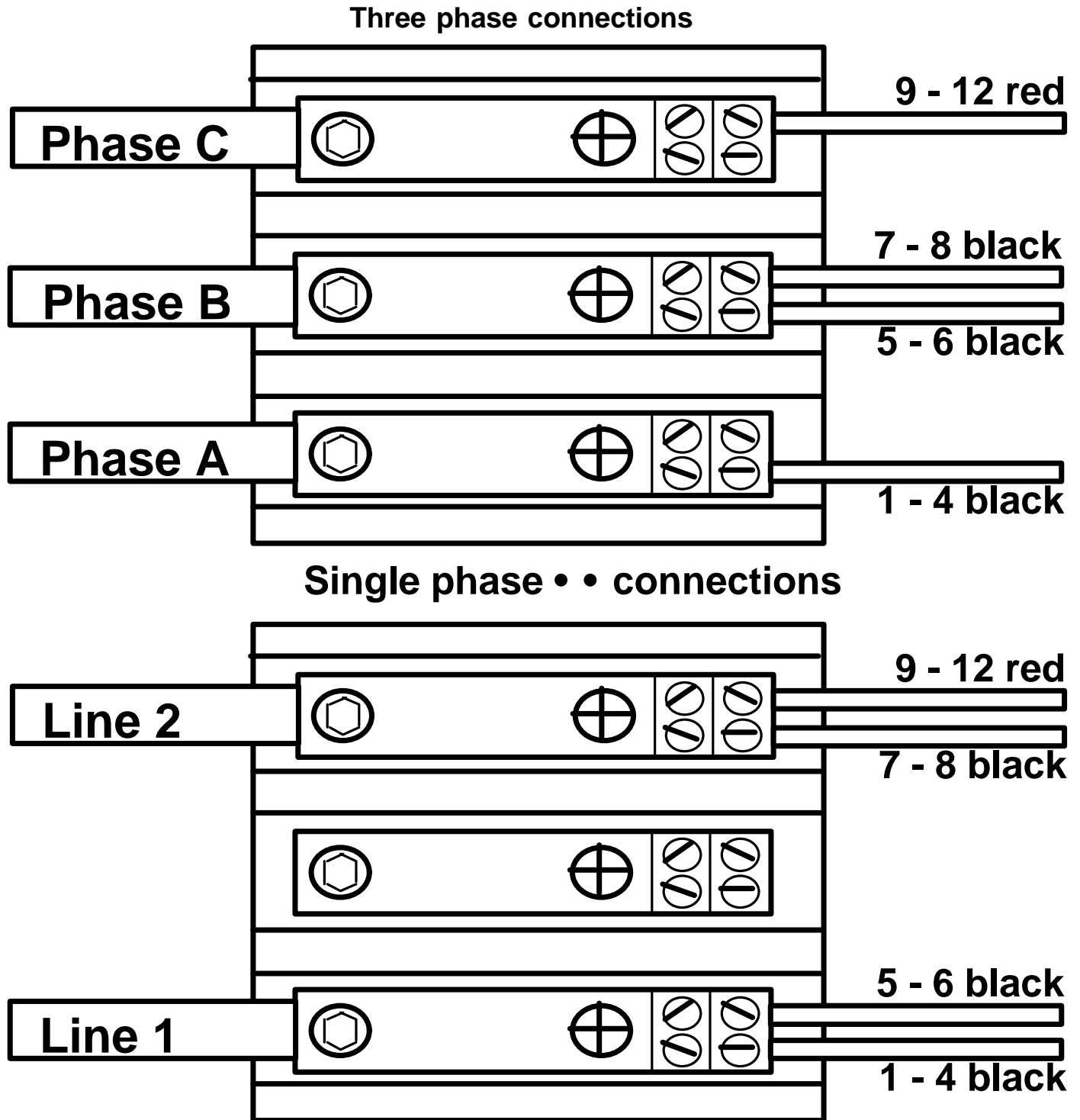
Ground is not a current carrying terminal but must be capable of handling significant current in case of a short in any of the loads, load wiring, or the dimmer. Common wiring practice calls for the ground wire to be green with a yellow stripe.

Teatronics Lighting Controls, Inc. recommends that dimmers requiring 'hard wired' input power be installed by a licensed electrical contractor due to the complexity of local and national electrical codes.

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Figure 1

GENESIS 1224 AND 660 INPUT WIRING Three Phase Connections



Ground and neutral connections are required for either mode of connection in addition to the hot connections shown above.

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SETUP AND CONNECTION (continued)

ELECTRICAL INSTALLATION (continued)

The two common supply connections are reiterated here:

Note: The wire sizes suggested here are based on tables found in the National Electrical Code {Tables 310-16 and 250-95}. The complexity of the Code, and the requirements of other local, and state agencies, may render these suggestions inaccurate. Teatronics Lighting Controls, Inc. assumes no responsibility for the safety or appropriateness of customer installed wiring.

- 1) Single Phase, 120/240 Volt AC, 120 Amps (Genesis 1224) or 150 Amps (Genesis 660). Lines 1 and 2 are connected to the two ‘hot’ legs of this type service. When connected this way, the neutral current will not exceed either line current. Use #1 AWG wire rated for 90 degrees Celsius (type THHN) or #00 AWG wire rated for 60 degree Celsius (type TW) for all supply connections. Ground may be made through solid conduit if it is bonded to the dimmer (a #6 copper ground wire is required if ground is not made through solid conduit). The two black wires on the dimmer side of the input terminal block are split between Line 1 and Line 2 for single phase operation.
- 2) Three Phase Wye, 120/208 Volt AC, 80 Amps (Genesis 1224) or 100 Amps (Genesis 660). Phase A, B, and C inputs are connected to the three ‘hot’ legs of this type service. When connected this way, the neutral current can exceed the line current by approximately 20%. Use #2 AWG wire rated for 90 degrees Celsius (type THHN) or #0 AWG wire rated for 60 degree Celsius (type TW) for all supply connections. Ground may be made through solid conduit if it is bonded to the dimmer (a #8 copper ground wire is required if ground is not made through solid conduit). The two black wires on the dimmer side of the input terminal block are connected to the B phase.

A less common supply connection is the:

- 3) Three Phase Delta with Derived Neutral, 120/240 Volt AC, 120 Amps (Genesis 1224) or 150 Amps (Genesis 660). Lines 1 and 2 are connected to the two hot legs whose voltage with respect to the derived neutral is 120 Volts. The third hot leg in a three phase delta supply is 208 Volts with respect to the derived neutral. Do not use this high voltage (stinger) leg. When connected this way, the neutral current can exceed the line current by approximately 20%. Use #0 AWG wire rated for 90 degrees Celsius (type THHN) or #000 AWG wire rated for 60 degree Celsius (type TW) for all supply connections. Ground may be made through solid conduit if it is bonded to the dimmer (a #6 copper ground wire is required if ground is not made through solid conduit). The two black wires on the dimmer side of the input terminal block are split between Line 1 and Line 2 for this type of connection. Note that this supply connection is similar to single phase operation except that a third 208 volt leg is present at the main disconnect.

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SETUP AND CONNECTION (continued)

ELECTRICAL INSTALLATION (continued)

Supply circuit protection and disconnect (i.e., main breaker) is the responsibility of the user and should be adequate for the loading indicated above. Regardless of the mode of connection, a neutral line must be connected. It is also highly recommended that all supply voltages be checked with a meter before connection to the pack, especially in unfamiliar venues. Reversing a hot leg and earth ground creates unforgiving and embarrassing situations, not to mention voiding the warranty.

240 Volt Operation

A switch on the main board next to the transformer allows a Genesis pack to operate on power grids where the line to neutral potential is 220 - 240 Volts A.C. Use a small screwdriver to slide the actuator from 115V to the 230V position. Remember that the cooling system of your Genesis is designed for a specific load (either 2400, or 6000 Watts per channel). Operating from a 240 Volt grid will allow this load capacity to be exceeded without tripping the circuit breaker. Exceeding the cooling capacity of the dimmer will cause the unit to overheat and shut down.

The dimmer does not convert a 240 Volt feed to 120 Volt outputs. Be sure to use 240 Volt lamps when using the Genesis on 240 volt power grids.

Grounding

The term 'grounding' refers to a separate conductor which is connected from the equipment case to earth ground (often through a properly constructed conduit system). This is not the same as neutral or common. For safe operation, the Genesis dimmer case must be grounded. If flexible conduit is used, a separate conductor is required for the ground.

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SETUP AND CONNECTION (continued)

CONTROL CONNECTIONS

Analog Input

Analog control requires one control input per channel, referenced to a signal common. The signal common is isolated from the supply neutral and also from earth ground. The low voltage control signal is zero to ten volts D.C. The input impedance is 20K Ohms. With the control voltage at zero, the output of the dimmer is at idle (about 6 volts). With the control voltage at ten volts the output of the dimmer is at maximum (about 4 volts less than the supply voltage).

Analog control wiring color codes are given in figure 2. Pin 12 of the SRC, or pin 13 of the DB 15 connector, provide power from the dimmer when using 'passive' control consoles. Power from the dimmer is not needed for consoles having AC line cords.

The connectors are keyed for proper orientation. Once seated, you may gently tighten the SRC locking ring (be careful not to cross-thread the ring). Hand tighten only, and only tight enough to prevent the connector from falling out. The locking ring may be left free if there is no danger of the cable being pulled out.

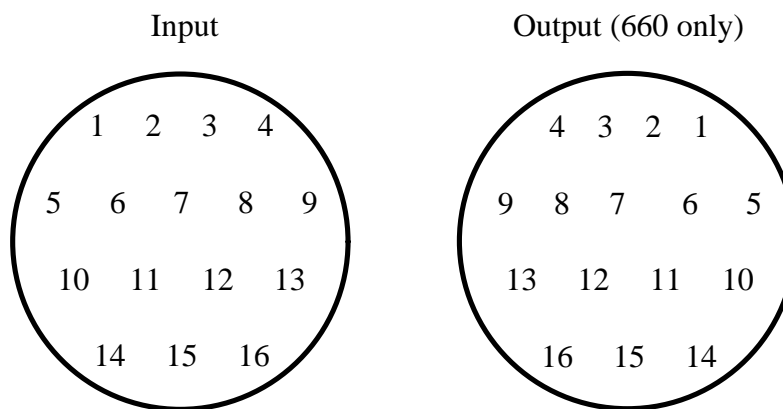
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Figure 2

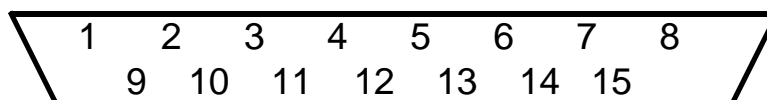
GENESIS ANALOG CONTROL WIRING Three Phase Connections

SRC PIN #	DB 15 PIN #	FUNCTION	INTERNAL WIRING		BELDEN
			1224	660	
1	1	Channel 1	Brown	Brown	Black
2	2	Channel 2	Red	Red	Red
3	3	Channel 3	Orange	Orange	White
4	4	Channel 4	Yellow	Yellow	Green
5	5	Channel 5	Green	Green	Orange
6	6	Channel 6	Blue	Blue	Blue
7	7	Channel 7	Violet	Channels 7 thru 12 are looped through channels 1 thru 6	White/Black
8	8	Channel 8	Gray		Red/Black
9	9	Channel 9	White		Green/Black
10	10	Channel 10	Black		Orange/Black
11	11	Channel 11	Brown	Blue/Black	
12	13	+15 Volts	Orange	Orange	Black/White
13		Reserved	Yellow	Yellow	Red/White
14	14	Spare	No Connection	No Connection	No Connection
15	15	Common	Green	Green	Blue/White
16	12	Channel 12	Red	loop through	Green/White

SRC Pin numbers facing back of dimmer



DB 15 CONNECTOR



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SETUP AND CONNECTION (continued)

CONTROL CONNECTIONS (continued)

Multiplex Input

The United States Institute for Theatre Technology (USITT) has published two control standards for lighting dimmers. AMX-192 is an analog multiplex signal, DMX-512 is a digital multiplex signal. The Genesis Comstar receives either signal as well as the traditional “zero to ten Volt” DC control signal. A switch on the front right hand corner of the main card determines which control standard will be accepted.

DMX-512

Genesis Comstar dimmers utilize a 5 pin XLR-type control connector. This connector is wired according to the USITT standard for DMX-512 dimmers.

AMX-192

The AMX-192 standard calls for a 4 pin connector; the Genesis Comstar does not use the standard connector for AMX-192. Several dimmer manufacturers, including Teatronics Lighting Controls Inc., have adopted the practice of placing the AMX-192 signals on the 5 pin XLR-type connector. A scramble cable will be required to convert from the AMX-192 standard 4 pin connector to the Genesis Comstar 5 pin connector.

AMX-192 Scramble Cable

Female 4 pin <u>XLR-type</u>	Female 5 pin <u>XLR-type</u>
1	1
2	3
3	4
4	2

Although the DMX-512 standard calls for the male connector to be the input, the input/output functions may be reversed since the connectors are simply wired in parallel. The signal is normally daisy chained from dimmer to dimmer, however a ‘wye’ adaptor may be used to split the control line to two or more dimmers or dimmer racks.

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SETUP AND CONNECTION (continued)

CONTROL CONNECTIONS (continued)

GENESIS MULTIPLEX CONTROL WIRING

PIN #	FUNCTION		INTERNAL WIRING 1224 and 660	CONTROL CABLE WIRING	
	DMX	AMX		Belden 8723	Canare L-4E6S
1	Common	Common	White	Black & Shield	Shield
2	-Data	-Clock	Violet	Green	Blue
3	+Data	+Clock	Grey	White	Blue
4	Unused	Analog data	Black	Red	White
5	No Connection			No Connection	White

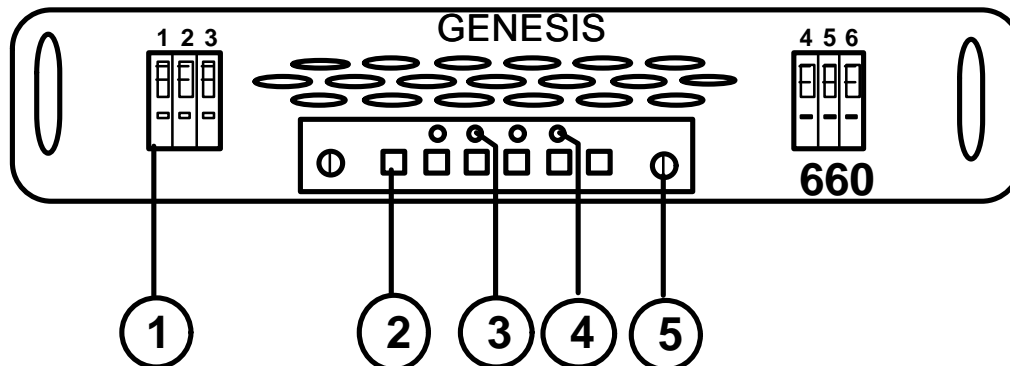
Note: Wiring on control cables must be one-to-one. Since the Canare cable has two white and two blue wires, continuity checks must be made to be sure the signals are not crossed.

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OPERATION

CONTROLS AND INDICATORS

- 1) 20 (Genesis 1224) OR 50 (Genesis 660) AMP CHANNEL BREAKER: Square-D type QO, 10,000 Amps Interrupting Capacity.
- 2) LIGHT EMITTING DIODE (LED) MIMIC/CONTROL OVERRIDE: Mechanically latching switch keeps channel at full regardless of incoming control level. LED inside the switch indicates level of control channel.
- 3) PHASE INDICATOR: Three indicators indicate presence of phase A, phase B, and phase C.
- 4) OVERTEMP INDICATOR: Indicates when internal temperature exceeds 55 degrees Celsius (130 degrees Fahrenheit). When in overtemp, the outputs turn off but the fan is kept running until the temperature returns to safe limits.
- 5) THUMBSCREW: Unscrew to allow access to control electronics drawer.



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OPERATION (continued)

CONTROL FUNCTIONS

Centered on the front panel is a horizontal row of push-on/push-off switches. These 'override' switches override any control signal coming to the dimmer and force the associated channel to full. These switches are useful for testing, checking channel to load assignments, and focusing. They may also be used as a last ditch effort to get light on stage if the console fails or the control cable gets damaged. These switches should be left in the 'out' position for normal operation.

Inside the override switches are status LED's. These indicators mimic the control level for each channel. Pressing the override switch will also bring the control status LED to full. When a system fails to operate properly, these indicators can help isolate the fault to the control or load side of the dimmer. The status indicators will also mimic the effect of the idle level pots on the outputs. Thus any channel that has a pre-heat or idle level above zero will indicate a slight voltage even when the control is at zero.

Each channel has an associated circuit breaker. The circuit breakers are provided for safety and to protect the load wiring. The breakers are not capable of protecting the internal dimmer components against short circuits, or extreme overloads. If the breaker trips after the load has been up for a short period of time, it probably means that a slight overload exists. Bumping to full with low idle levels or hot patching may also trip a breaker due to excessive inrush currents to cold filaments. Hot patching, although it will not harm the dimmer, is not recommended by industry safety standards. If the breaker trips immediately, it probably indicates an extreme overload or a shorted output. Miswired fixtures, worn cables, loose connections or sloppy workmanship are all situations that can cause catastrophic failure. If, after the fault is cleared, the channel will not come up, will not go off, or stays part way on all the time, then the output device in the dimmer has failed.

NOTE: Since Teatronics Lighting Controls, Inc. has no control over customer installed wiring and fixtures, the solid-state relays are not covered under warranty. Genesis dimmers are not short circuit proof.

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OPERATION (continued)

CHANNEL LOADING

Any incandescent load from 40 Watts up to rated load capacity (2400 Watts for Genesis 1224 and 6000 Watts for Genesis 660) may be connected to each dimmer channel. Although not U.L. listed for other than incandescent loads, the Genesis dimmer will not be harmed by most loads such as motors, neons, pin-beam spots, fog machines, etc. 'Dimming' of these loads can sometimes cause damage to the load however. Check with the manufacturer of the lighting instrument as to whether dimming is advisable on these loads. Teatronics Lighting Controls, Inc. recommends de-rating the dimmer's capacity by 30% when driving other than incandescent loads (1700 Watts max. for Genesis 1224 and 4200 Watts max. for Genesis 660).

NON-DIM OPERATION

Some electrical loads can be damaged if connected to a phase controlled dimmer. The constant idle (pre-heat) voltage can cause heating in some (particularly inexpensive) transformers and applying less than full voltage to some motors can cause them to burn out. To allow control of these loads, the Genesis Comstar provides a non-dim mode.

Channels may be placed in a non-dim mode in successive order starting with channel 1. That is, there is no way to put channel 3 in non-dim mode without channels 1 and 2 also being non-dims.

On the front right hand corner of the Comstar board is a multi turn rotary trim pot. In its fully counterclockwise position all channels function as incandescent light dimmers. As the pot is rotated clockwise, additional dimmers are placed in non-dim mode. Set the rotary pot as follows:

- 1) Bring all channels in the pack to 30%.
- 2) Rotate the non-dim pot clockwise until the desired number of dimmers are in non-dim mode as verified by the fact that the status LED will extinguish when a channel is in non-dim mode.
- 3) Note the point where the desired number of channels have gone to non-dim mode.
- 4) Continue to rotate the non-dim pot until the next channel goes to non-dim.
- 5) Back the pot off to half way between the point noted in step 3 and the point at which the next channel goes to non-dim.

TEATRONICS LIGHTING CONTROLS, INC.

OPERATION (continued)

FILTERING

Each dimmer channel has an associated filter choke inside the pack. These chokes help to filter out the electrical noise that often causes hum to be picked up in sound systems and musical instrument pick-ups. The chokes also help to eliminate 'lamp sing' that can cause audible noise to come from the lighting fixtures. In providing these filtering functions, the chokes themselves generate a slight buzz. It is recommended that the dimmer pack be placed in an area where this buzz will not be heard by the audience or picked up by recording equipment.

OVERVOLTAGE PROTECTION

Phase C (Line 2 in single phase operation), nominally at 120 Volts AC, provides power to the fan and power supply transformer. Should a miswiring condition occur such that the voltage between phase C and neutral exceeds 140 Volts AC, a sensing relay will disconnect the input to the fan and power supply thus protecting the control circuitry from overvoltage. Some phase indicators may be off or excessively bright, depending on the abnormal voltages detected. Make sure the channel breakers remain off until the connections are returned to normal.

FAN OPERATION

The fan is turned on when a control signal is present. In the absence of a multiplex control signal or an analog control signal, the fan will turn off after approximately five minutes. A switch on the Comstar board bypasses the delay feature and forces the fan to run continuously.

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USER ADJUSTABLE FEATURES

IDLE ADJUSTMENT

Three idle adjustment trimmers are located on the right side of the main control board (see figure 3). The trimmers adjust the idle voltage on groups of channels. The first control on the left adjusts channels 1 - 4 on a 1224, channels 1 & 2 on a 660. The second control adjusts channels 5 - 6 on a 1224, channels 3 & 4 on a 660. The rightmost control adjusts channels 9 - 12 on 1224, channels 5 & 6 on a 660.

The ideal idle setting varies with the intended use. For maximum lamp life and fastest off-to-on response, the idle should be set high. To prevent ghosting, after glow, and for fastest on-to-off response, the idle should be set low.

To adjust the idle, remove the control drawer far enough to allow access to the idle trimmers. With the intended loads connected to the outputs and the console in blackout, turn the trimmer clockwise to increase the idle until the load begins to glow. Back off the trim until the load goes out. Take the console out of blackout and check the channel for response time and after glow. If "after glow" is present, turn the idle down some more. If response is too slow turn the idle higher.

NON-DIM ADJUSTMENT

Behind the idle trimmers is the non-dim select pot. In its fully counterclockwise position, all channels function as dimmers. As the pot is rotated clockwise, dimmers are placed in non-dim mode starting with channel one. In non-dim mode the channel turns on with a control setting above 5 and off at a setting below 5. Adjust the non-dim pot as follows:

- 1) Bring all channels in the pack to 30%.
- 2) Rotate the non-dim pot clockwise until the desired number of dimmers are in non-dim mode as verified by the fact that the status LED will extinguish when a channel is in non-dim mode.
- 3) Note the point where the desired number of channels have gone to non-dim mode.
- 4) Continue to rotate the non-dim pot until the next channel goes to non-dim.
- 5) Back the pot off to half way between the point noted in step 3 and the point at which the next channel goes to non-dim.

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USER ADJUSTABLE FEATURES (continued)

MULTIPLEX TYPE

A two position switch labeled MUX TYPE is located on the right side of the Comstar Board. This switch sets the Comstar to receive either AMX-192 or DMX-512 multiplex signals.

MULTIPLEX PACK SELECT SWITCH

The multiplex pack select switches set the starting channel number when using the multiplex input. The two switches represent the tens (SW 16) and ones (SW 15) digits of a two digit number. The first pack (pack 01) will start at channel 1 and decode either 6 or 12 channels. The second pack (pack 02) will start at channel 7. Pack 03 will start at channel 13, etc. The table on the following page shows the switch settings for channels 1 through 512.

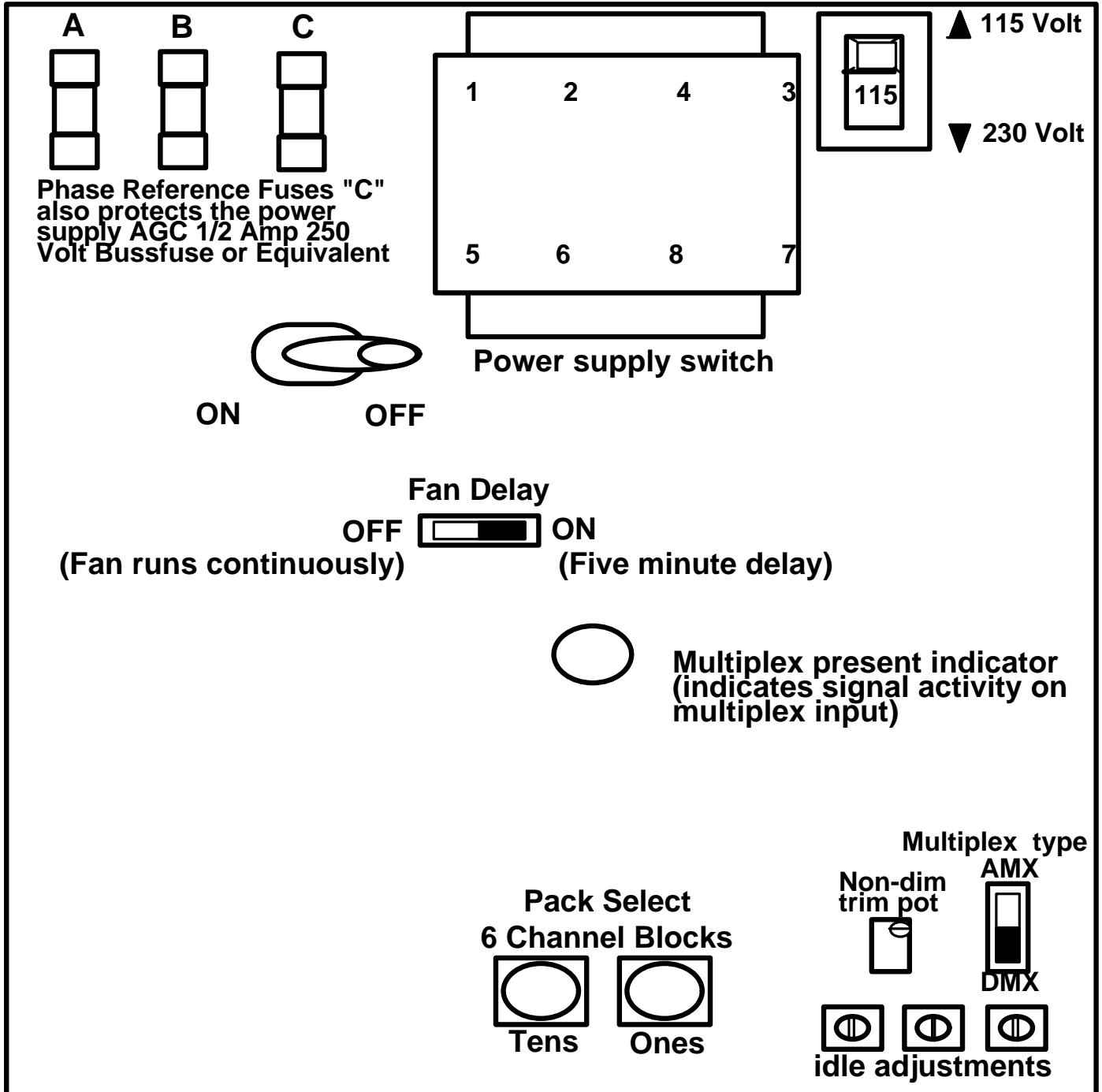
MULTIPLEX CHANNEL ASSIGNMENTS

Pack #	Starts At:	Pack #	Starts At:	Pack #	Starts At:	Pack #	Starts At:	Pack #	Starts At:
01	1	21	121	41	241	61	361	81	481
02	7	22	127	42	247	62	362	82	487
03	13	23	133	43	253	63	363	83	493
04	19	24	139	44	259	64	369	84	499
05	25	25	145	45	265	65	375	85	505
06	31	26	151	46	271	66	381	86	511
07	37	27	157	47	277	67	387		
08	43	28	163	48	283	68	393		
09	49	29	169	49	289	69	399		
10	55	30	175	50	295	70	405		
11	61	31	181	51	301	71	411		
12	67	32	187	52	307	72	417		
13	73	33	193	53	313	73	423		
14	79	34	199	54	319	74	429		
15	85	35	205	55	325	75	435		
16	91	36	211	56	331	76	441		
17	97	37	217	57	337	77	447		
18	103	38	223	58	343	78	453		
19	109	39	229	59	349	79	459		
20	115	40	235	60	355	80	465		

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USER ADJUSTABLE FEATURES (continued)

CONTROL BOARD LAYOUT



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IN CASE OF TROUBLE

TROUBLESHOOTING

This section serves two purposes. For the experienced user, it gives details that will help locate most problems that are field serviceable. For the user who is not comfortable with live high voltage circuits inches from their fingertips, this section will help locate suspected problems with the dimmer and may save you a long distance phone call or shipping costs to a service center (as well as down time). Even if the user is not able to solve the problem, performing these diagnostics will help the user explain the malfunction to a service technician.

Please bear with us if we seem to state the obvious. Some of our customers are not as familiar with dimming equipment and controls as others. Many apparent failures result from not being familiar with the operating characteristics of the dimmer, so read the sections on operation carefully. The more experienced user may find the troubleshooting chart at the end of this manual more useful than this section.

There are two forms of malfunction common to solid-state dimmers: “Failed Off” in which the lights do not come on, and “Failed On” in which the light cannot be turned off.

If your system has “failed off”, check that a lamp load is connected and that the lamp is not burned out. Verify that the primary power is live and that all our LED’s on the front panel are on. Check that all channel breakers are on (in up position). A tripped breaker is reset by first turning the breaker to the fully off (down) position and then restoring it to its on (up) position. NOTE: Breakers often ‘trip’ when subjected to impact; check all breakers after shipping or moving the dimmer pack. Make sure the loads are plugged in and that all extension cords are continuous. Check load circuits by plugging them into a known live ‘non-dim’ circuit not on the dimmer pack. Check that the control cable is intact, and plugged in at both ends.

Some consoles derive their operating power from the dimmer pack. If more than one dimmer pack is used with this type of console, the pack connected to the first channels supplies the power. If the first pack is not powered up or is disconnected from the console none of the channels will work.

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING (continued)

The loads on “failed on” dimmers will stay on until the channel breaker is turned off. First check that the channel override switches are turned off (out position). Try unplugging the control cable from the dimmer. If the failure goes away, the cable or console is at fault, If the output stays on, then the problem is probably in the dimmer. For those who wish to attempt the repair themselves, consult the troubleshooting chart for more information. Be advised that unauthorized repairs on units will void any remaining warranties.

OBTAINING SERVICE

If, after performing these tests, you still cannot get proper operation, you may send your unit to an Authorized Service Center near you. You may also send your unit to the factory, freight prepaid, with a note describing the specific complaint and the results of the checks you have made. Before shipping your equipment, please call the Sales Department to obtain a Return Materials Authorization number (RMA number). Our phone number is (805) 528-6900 Please call during working hours, 8:30 to 4:30 Pacific time. Send your unit, well packed and insured, to:

TEATRONICS LIGHTING CONTROLS, INC.
Service Department
1236 LOS OSOS VALLEY RD., STE. G
LOS OSOS, CA 93402
RMA #XXX

IN CASE OF TROUBLE (continued)

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TROUBLESHOOTING CHART

The troubleshooting chart is organized as follows:

- 1) This top line contains a description of the symptoms.
 - a) The possible causes are listed under the symptoms. Tests to verify that the cause listed to the left are given here along with likely solutions.
 - b) A second possible cause. Tests for second possible cause.

- 1) No channels work, Fan is off, front panel indicators may be off.
 - a) No power to unit. Locate and activate main breaker.
 - b) Neutral disconnected. Neutral line is required for all modes of connection. Neutral bar is located on back panel, isolated from case ground.
 - c) Input is miswired resulting in the over-voltage protection circuit being activated. Correct overvoltage on phase C (three phase) or line 2 (single phase).
 - d) Phase C protection fuse is blown. TURN OFF MAIN POWER. Replace with 1/2 Amp "normal blow" glass fuse.
 - e) Transformer primary is shorted. Resistance should be approximately 125 Ohms between pins 1 and 2, or 3 and 4. Replace transformer and 1/2 Amp fuse. Transformer is Signal part # LP16-700.
 - f) Overvoltage relay is activated at normal voltage. Check 22K, 2 Watt resistor and overvoltage relay (circuit may be disabled by removing resistor). Relay is Aromat part # HA 1E-AC115.

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING CHART (continued)

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| g) | Broken or disconnected wire between the circuit breaker buss bar and the main board. | Check continuity between input block and phase fuses on board.
Check that connector is making good contact with the pins on the pc board. |
| h) | Power supply switch on main board is off. | Switch handle toward left side of board. |
| 2) | No channels work, Fan is on, Phase and mimic indicators are off. | |
| a) | Flex jumper between main board and mimic/override board is disconnected. | Reseat jumper. |
| 3) | No channels work, fan is on, all phase indicators on. | |
| a) | Ribbon cable to power cubes disconnected. | Check control out (J2) on main board. Check interface board on top of power cubes. Reseat if necessary. |
| b) | Control cable to board is disconnected. | See if LED mimics follow control console. |
| c) | Channel breakers are off. | Move handles up to on position. If breaker has tripped it must be reset by moving to off (down) position before turning on. |
| d) | Voltage select switch on power supply board is in 230V position. | Switch to 115V position for domestic power grids. |
| e) | Ribbon cable from back panel to main board disconnected (override switches will still work). | Reseat connector on main board. Line brown wire (pin 1) up with arrow on socket. |

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING CHART (continued)

- 4) No channels work, red overtemp indicator is on.
- a) Ambient internal air temperature exceeds 55 degrees Celsius. Allow unit to cool to reset thermostat. Check for air flow restriction. Thermostat may be defective. Airpax part # 66L055.
- 5) Adjacent groups of channels are out.
- a) No power to one line. Check for a blown fuse. Check incoming feed voltages with respect to neutral.
 - b) Defective phase reference circuit. Open or shorted phase transformer or defective LM339.
 - c) Line fuse blown. Replace with 1/2 Amp, 250V normal blow fuse.
- 6) Channel breakers keep tripping.
- a) Channel overloaded. Reduce loads to proper rating.
 - b) Inductive (transformer) loads cause over current kick. Derate channel capacity by 30%.
 - c) Breaker worn out. Remove power. Replace breaker. Square D part # QO120 (20 Amp) or QO150 (50 Amp) as appropriate.
- 7) Channels do not dim, but turn on full above a certain control level.
- a) Non-dim trimmer on main board is defective or has been rotated to the non-dim position. Rotate non-dim trimmer fully counter-clockwise.
 - b) Solid-state relay is bad (if switch point is arbitrary and problem affects only one channel). Swap power cube (solid-state relay) with another in pack to isolate fault. Replace if appropriate.

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING CHART (continued)

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| 8) | Most channels work, one or more stay off. | |
| a) | No load connected or lamp burned out. | Check load using known good utility circuit. |
| b) | Bad channel on control console.
Bad control cable (override switch will still work). | If console is more than 12 channels, swap control cables, and control channels to isolate fault. |
| c) | Broken wire on 16 pin input connector on back panel of dimmer. | Check continuity with ohmmeter. |
| d) | Blown solid-state relay. | Verify defective cube by swapping cube with another channel. Replace if appropriate. |
| e) | Defective component on mimic board. | Check yellow LED inside switch. |
| f) | Defective component on main board. | Comstar main board is micro-processor based. Send main board to T.L.C., Inc. for repair. |

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING CHART (continued)

- 9) Most channels work, one or more stay on.
- a) Override switch on or shorted. Switch should be out for normal operation.
 - b) Short to +15 volts in control cable or console. Unplug control cable from dimmer. If channel turns off, then dimmer is not at fault. Check cable with ohmmeter.
 - c) Solid-state relay shorted. Lift control connection on power cube. If channel stays on, then cube is shorted. This is the single most common failure in solid-state dimmers. It is usually caused by overloads and short circuits. Be sure to clear the cause of failure before replacing cube.
 - d) Defective component on main board. Comstar main board is micro-processor based. Send main board to T.L.C., Inc. for repair.
- 10) All channels stay on, but go off if disconnected.
- a) Signal common open between console and dimmer. Check cable with an ohmmeter.
 - b) Console is defective. Refer to console owners manual.
- 11) Most channels work, one or more channels will not go to full.
- a) "Soft patch" of a computerized console is at a proportional level below full (override will still take channel to full). Become familiar with the operation of your computerized console.
 - b) Half of the solid-state relay is open. Swap cubes with a good channel to verify failure. Replace if appropriate.

IN CASE OF TROUBLE (continued)

TEATRONICS LIGHTING CONTROLS, INC.

TROUBLESHOOTING CHART (continued)

- 12) Most channels work, one or more channels will not go out.
- a) Idle set too high (will affect several dimmer channels). Adjust idle setting to prevent ghosting.
 - b) Half of the solid-state relay is shorted. See 9c.
- 13) Output always reads 120 volts when measured with a meter.
- a) No load on channel. Channel must have a load to yield an accurate reading.
- 14) Output does not read 60 volts when control is set at half.
- a) The "square law" dimming curve is not linear. It's not supposed to read 60 volts.
 - b) Most AC meters will not give accurate readings on "dimmed" outputs. Use only a true RMS meter to get accurate readings.

TEATRONICS LIGHTING CONTROLS, INC.

SELECTED PARTS

MAIN COMPONENTS

*6019	COMSTAR 12 CHANNEL CONTROLLER
*6069	COMSTAR 6 CHANNEL CONTROLLER
+*6014	TERMINAL CONTROL INPUT 12 CHANNEL
+*6015	TERMINAL CONTROL INPUT 6 CHANNEL
+*6028	WALL MOUNT KIT
+*6030	RACK EAR KIT
+6090	SRC OPTION 12 CHANNEL
+6091	SRC OPTION 6 CHANNEL

REPAIR PARTS

806000000	PRE GREASED PAD, POWER CUBE
3806242000	POWER CUBE, 40 AMP DUAL
3806247500	POWER CUBE, 80 AMP SINGLE
4201500000	BREAKER, 15 AMP
4202000120	BREAKER, 20 AMP
4205000150	BREAKER, 50 AMP
+6028	CHOKE, 20 AMP
+6030	CHOKE, 50 AMP
5106328250	CAPTIVE PANEL SCREW, COMSTAR
5110326107	RACK SCREW, 10-32X.75 TRUSS HEAD
3910320000	STAGEPIN, 20 AMP CHASSIS RECEPTACLE
3910320100	STAGEPIN, 60 AMP CHASSIS RECEPTACLE
3910323100	TWISTLOCK, L5-20, CHASSIS RECEPTACLE
3910358000	DUPLEX EDISON UGROUND, 20 AMP CHASSIS RECEPTACLE
3951900007	SOCAPEX, 6 CHANNEL, 20 AMP CHASSIS RECEPTACLE
3910113300	POWERPOLE CONNECTOR, 30 AMP
3910113330	POWERPOLE CONNECTOR, 120 AMP

MATING CONNECTORS

3950500011	5 PIN XLR FEMALE CABLE MOUNT, A5F
3950500012	5 PIN XLR MALE CABLE MOUNT, A5M
3951612116	16 PIN SRC MALE CABLE MOUNT, PINS
3951662116	16 PIN SRC FEMALE CABLE MOUNT, SOCKETS
3971500001	15 PIN DB-15 MALE CABLE MOUNT, PINS
3971500000	15 PIN DB-15 FEMALE CABLE MOUNT, SOCKETS
3971500010	15 PIN DB-15 CABLE BACK SHELL

TEATRONICS LIGHTING CONTROLS, INC.

LIMITED WARRANTY

Teatronics Lighting controls, Inc. (TLC) agrees that its products shall be free from defects in material or workmanship for a period of one year from date of delivery. Said warranty will not apply if equipment is used in conditions of service for which it is not specifically intended. The manufacturer is not responsible for damage to its apparatus through improper installation, physical damage, or poor operating practice.

TLC's sole responsibility under this warranty shall be to repair or replace, at TLC's discretion, such parts as shall be determined to be defective upon inspection by TLC or their authorized agent. Such equipment shall be replaced or put in operating condition, free of all charges except transportation, and the correction of any defects by repair or replacement by TLC shall constitute fulfillment of all obligations to the original purchaser or retail customer. **FREIGHT TERMS ON WARRANTY REPAIRS ARE FOB TLC FACTORY OR DESIGNATED REPAIR FACILITY.** Collect shipments or freight allowances shall not be acceptable. TLC does not assume responsibility for unauthorized repairs to its goods, even when determined to be defective.

TLC shall not be liable for any incidental, general, or consequential damages in case of any failure to meet the conditions of any warranty or shipping schedule. Nor will any claim be allowed for labor costs, loss of profits or income, repair costs, or any other expenses incidental to replacement or repair of the item under said warranty.

The owner's obligations during the warranty period described herein are to notify TLC in writing within ONE WEEK (7 calendar days) of any suspected defect, and with TLC's authorization (RMA), to return the item or apparatus prepaid to the TLC factory.

No other representations, guarantees, or warranties, expressed or implied, are made by the manufacturer in connection with the manufacture and sale of its equipment. This warranty is nontransferable and applies only to the original purchaser or retail customer.

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