Lightronics

RA - 122

RACK MOUNT
ARCHITECTURAL DIMMER

OWNERS MANUAL

Version 0.1
03/03/2005

TABLE OF CONTENTS

RA-122 UNIT DESCRIPTION

The RA-122 consists of a processor and 12 dimmer channels of 2.4KW each. Each dimmer channel is protected by a 20 Amp circuit breaker. Heavy duty filtering chokes are used to reduce noise. Dimmer channel semiconductors exceed a 200% load carrying capacity overhead allowance. All components and sub systems are UL recognized components. All internal wiring conforms to UL standards as they apply to industrial controls. Dimensions and weight information is given at the end of this manual.

EXTERNAL CONTROLS

The unit can communicate with remotely located control equipment in several ways.

A USITT DMX-512 protocol bus is provided so the unit may be used with any DMX lighting console. The RA-122 is fully patchable with respect to the DMX bus.

The RA-122 may also be controlled by several types of wall mounted smart remote stations. Smart remotes communicate with the RA-122 by way of a low voltage RS-485 bus. This bus is completely separate from the DMX bus. Smart remotes are used to activate scenes which have been prestored in the RA-122. There are several types of smart remote stations. Multiple smart remotes of the same or different types may be chained together on the RS-485 bus. The same RS-485 bus may be chained to multiple RA-122 dimmer packs.

The RA-122 may additionally be controlled by an arrangement of one or more momentary switches (simple remotes). The switches may be used to control a specific set of scenes prestored in the RA-122.

POWER REQUIREMENTS

The RA-122 may be operated from 50/60 Hz, 120/208 VAC, three phase power or from 50/60 Hz, 120/240 VAC, single phase power. Input power to the unit must be capable of delivering 80 Amps per line if using three phase or 120 Amps per line if using single phase power.

The RA-122 will not operate correctly using only 2 phases of a 3 phase power service. This holds true regardless of whether the unit is set up for single or three phase power.

INSTALLATION

PHYSICAL LOCATION

The unit is intended for INDOOR OPERATION ONLY and should not be subjected to excessive moisture or heat. The unit should be installed where a supply of circulating air is available. The RA-122 is designed to be installed in a standard 19 inch equipment rack. If rack installed it is recommended that supports be provided at the rear of the unit.

The RA-122 is fan cooled. Air is drawn in from the vent slots at each side and exits the unit from the bottom of the front panel. Be sure that these areas are not restricted.

POWER INPUT CONNECTIONS

⚠ WARNING ⚠
MAKE CERTAIN POWER IS REMOVED
FROM THE FEED CIRCUITS
BEFORE YOU BEGIN INSTALLATION.

Consult applicable electrical codes to determine the proper wire type and methods.

The RA-122 operates using either three phase 120/208 VAC or single phase 120/240 VAC power. The unit is shipped from the factory as a THREE PHASE unit. It can be field converted to single phase unit.

THREE PHASE POWER CONNECTIONS

⚠ **WARNING** ⚠
**MAKE CERTAIN POWER IS REMOVED
FROM THE FEED CIRCUITS
BEFORE YOU BEGIN INSTALLATION.**

REQUIREMENTS

True 120/208VAC three phase power must be supplied to operate the RA-122 in the 3 phase configuration. This means that the voltage across any two lines must be 208 VAC. The feed circuit must be able to supply 80 Amps for each hot line.

The feed circuit must be able to supply 120 Amps for each line.

THE UNIT WILL NOT OPERATE IN A THREE PHASE CONFIGURATION FROM 2 LINES OF A 3 PHASE SUPPLY CIRCUIT.

CONNECTIONS

Connect the 3 in hot feed lines to the 3 terminals on the input power terminal block (L1, L2, L3). When operating on three phase power, the unit expects a particular phase sequence for these 3 input power connections. NO damage will occur if the order is reversed but dimming will not occur correctly and some channels will appear to be in a on/off mode. This condition can be corrected at the RA-122 front panel without rewiring anything. See the section POWER SETUP for specific information.

Connect the feed neutral to the NEUTRAL bus bar.
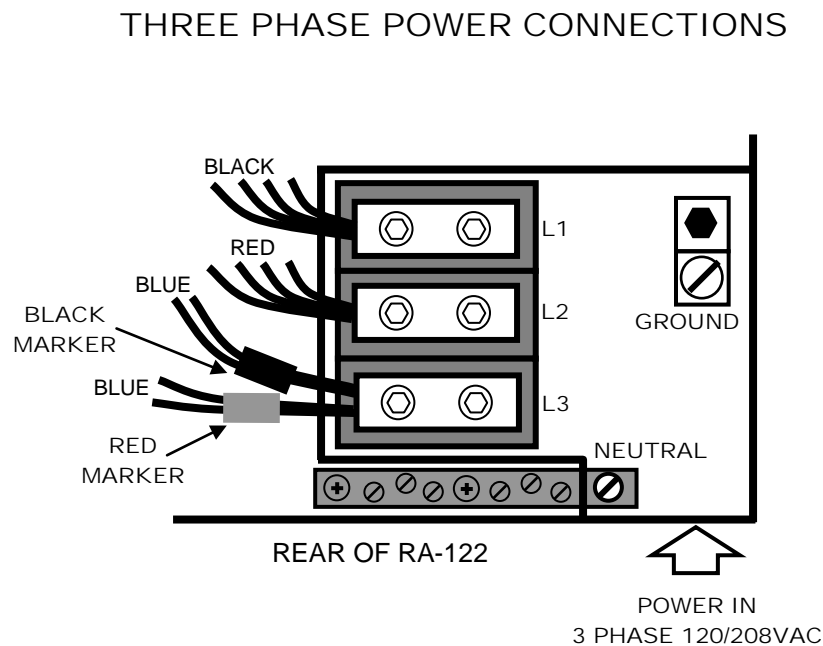
Connect the feed ground to the GROUND lug.

THREE PHASE POWER CONNECTIONS

SINGLE PHASE POWER CONNECTIONS

⚠ **WARNING** ⚠
**MAKE CERTAIN POWER IS REMOVED
FROM THE FEED CIRCUITS
BEFORE YOU BEGIN INSTALLATION.**

REQUIREMENTS

Actual 120/240VAC single phase power must be supplied to operate the RA-122 in the single phase configuration. The unit should be connected to two hot lines which are NOT the same phase. The 2 hot lines must be actual single phase power. This means that the voltage across the two lines must be 240 VAC.

The feed circuit must be able to supply 120 Amps for each line.

THE RA-122 WILL NOT OPERATE AS A SINGLE PHASE UNIT USING 2 LINES OF A 3 PHASE SUPPLY CIRCUIT.

CONNECTIONS

There are three terminals on the input terminal power block (L1, L2, L3). When operating the RA-122 on single phase power, the bottom (L3) terminal is not used. The wires connected to the left side of the L3 terminal contain color coded sleeves (RED and BLUE). These wires must be moved and distributed to the L1 and L2 terminals. Remove the wires from the L3 terminal and connect them to L1 and L2 such that the sleeve color matches the wire colors on L1 and L2.

Connect the feed neutral to the NEUTRAL bus bar.

Connect the feed ground to the GROUND lug.

SINGLE PHASE POWER CONNECTIONS
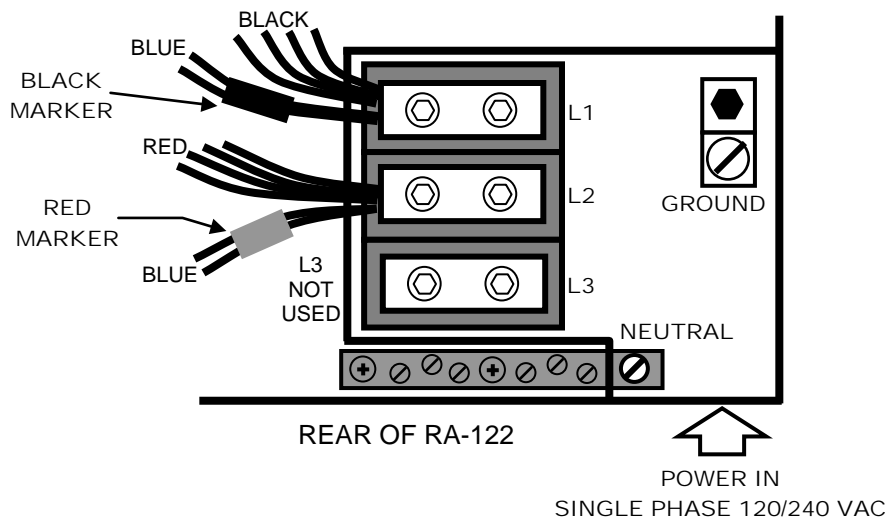
LOAD CONNECTIONS

The RA-122 is supplied with one of several different rear load connection panels. In all cases the lowest number dimmer channel output connection is on the left when the unit is viewed from the rear panel.

CONTROL SIGNAL CONNECTIONS

Two male DB25 connectors are provided at the rear of the RA-122 to accommodate all external control signals. Specific pins on the DB25 connector are used to connect each different type of control device. Control devices include a DMX console, multi-scene remotes, and simple remote stations.

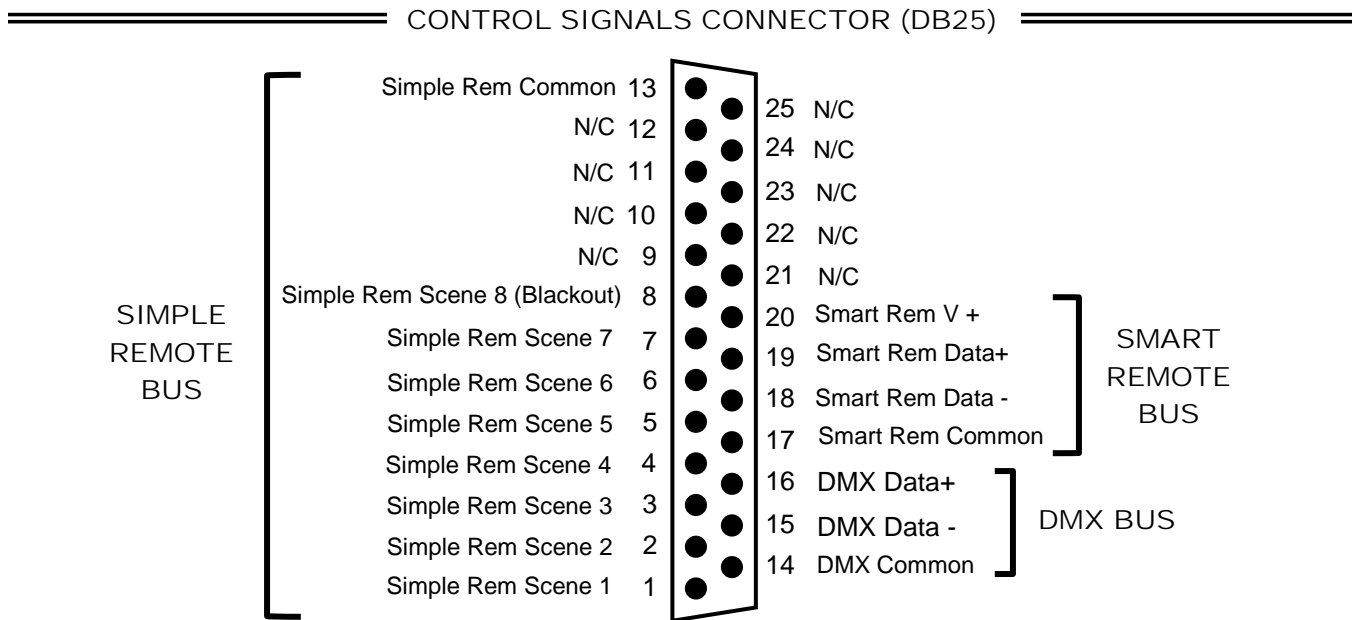One of the connectors is used for control signal input, the other is to pass the control signals to another RA-122. The connectors are "hardwired" together so either one can be used for "in" or "out".

The RA-122 is supplied with a ribbon cable which can be used to chain multiple RA-122 dimmers together in a rack.

A cable mount, female, DB25 connector is also provided to accommodate all external control signals.

Wiring pin-out for the DB25 connectors is shown below.

CONTROL SIGNALS CONNECTOR (DB25)

SIMPLE REMOTE BUS

Simple Rem Common	13
N/C	12
N/C	11
N/C	10
N/C	9
Simple Rem Scene 8 (Blackout)	8
Simple Rem Scene 7	7
Simple Rem Scene 6	6
Simple Rem Scene 5	5
Simple Rem Scene 4	4
Simple Rem Scene 3	3
Simple Rem Scene 2	2
Simple Rem Scene 1	1

25	N/C
24	N/C
23	N/C
22	N/C
21	N/C
20	Smart Rem V +
19	Smart Rem Data+
18	Smart Rem Data -
17	Smart Rem Common
16	DMX Data+
15	DMX Data -
14	DMX Common

SMART REMOTE BUS (pins 17–20)

DMX BUS (pins 14–16)

DMX CONSOLE CONNECTIONS

DMX console signals to the RA-122 should be transmitted over a twisted pair, shielded, low capacitance cable. Wiring data for DMX cabling is shown below. A DMX console transmits from a female, 5 Pin XLR Connector.

DMX CABLE
CONDUCTOR ARRANGEMENT FOR
TWISTED PAIR, SHIELDED CABLE

Common — Shield
DMX Data -
DMX Data +
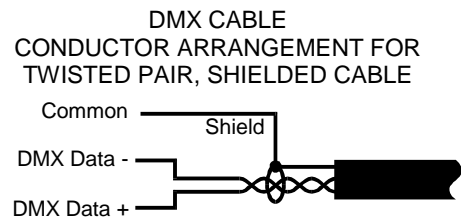
DMX XLR CONNECTOR SIGNALS

PIN #	FUNCTION
1	DMX COMMON
2	DMX DATA -
3	DMX DATA +
4	NOT USED
5	NOT USED

5 PIN FEMALE
XLR CONNECTOR
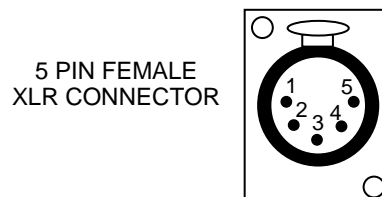
DMX TERMINATION

A DMX bus should be terminated (only) at the last receiving device on the chain. This is done by connecting a 120 ohm, 1/4 watt resistor across the DMX DATA - and DMX DATA + lines.

A DMX bus should be daisy chained to all its receiving units. It should NOT be connected in a star arrangement with multiple "home runs".

SMART REMOTE CONNECTIONS

> **CAUTION**
> REMOVE ALL POWER FROM THE RA-122 BEFORE MAKING OR CHANGING SMART REMOTE CONNECTIONS.

There are two types of smart remotes (push button and fader) which can be used with the RA-122. There are multiple models of each type. They all connect to a common RS-485 bus which is controlled by a RA-122. Additional RA-122 dimmers may also be connected on the same bus. One of them will be set as a master bus controller by the UNIT ADDRESS ASSIGNMENT.

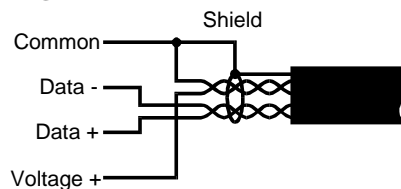Smart remote signals to the RA-122 are transmitted over a two twisted pair, shielded, low capacitance cable. One pair carries the RS-485 signal and the other provides a low voltage power and common to the remotes.

A smart remote bus should be daisy chained to all its receiving units. It should NOT be connected in a star arrangement with multiple "home runs".

Each smart remote has a 4 pin connector with screw down terminals to connect to the RS-485 bus. You must get the exact wiring pinout information for the remote unit from its owners manual. The connection at the RA-122 end is made through the rear panel DB25 connector. Refer to the CONTROL SIGNAL CONNECTIONS section in this manual for exact pinout information.

An example of smart remote connections is shown below.

SMART REMOTES CABLE ARRANGEMENT

SMART REMOTES CONNECTIONS EXAMPLE

1 Remote Common (Pair 1)
2 Remote Data -   (Pair 2)
3 Remote Data +   (Pair 2)
4 Remote Voltage + (Pair 1)
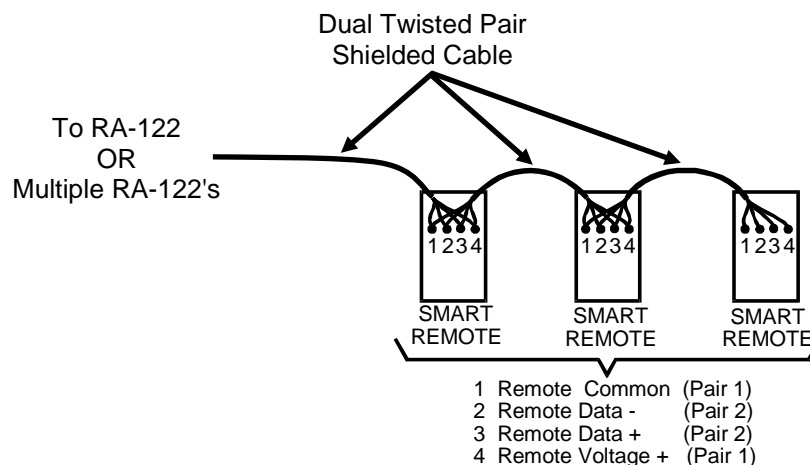
SIMPLE REMOTES CONNECTIONS

CAUTION
REMOVE ALL POWER FROM THE RA-122
BEFORE MAKING OR CHANGING SIMPLE
REMOTE CONNECTIONS.

Scenes 1 - 7 (stored in the RA-122) may be accessed by simple remotes. A BLACKOUT FUNCTION may also be accessed. A simple remote is any switch which can provide a momentary contact closure that can be applied to a specific pin on a RA-122 CONTROL SIGNALS CONNECTOR (DB25 connector).

The SIMPLE REMOTE COMMON is routed to the remote. When the remote is operated the closure brings the signal back to the applicable simple scene number connection point at the RA-122 CONTROL SIGNALS
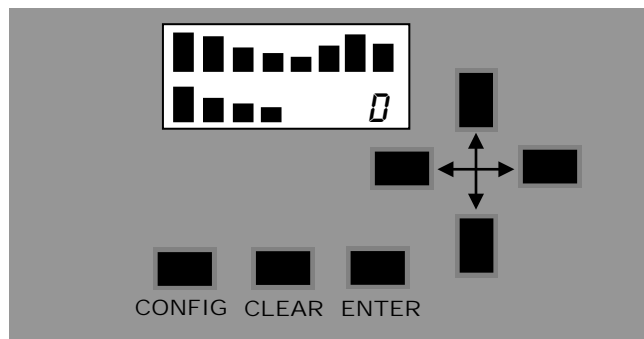
CONNECTOR (DB25 connector).
Since these are contact closures almost any available low voltage wire may be used.

An example of a simple remote connection using a Lightronics APP01 is shown below.
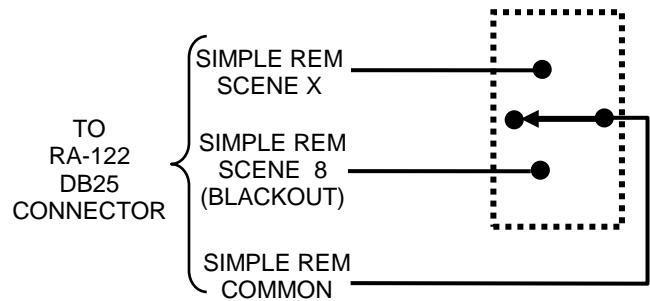
RA-122 UNIT SETUP

FRONT PANEL (PARTIAL VIEW)

The RA-122 must be set up (configured) as part of the installation process in any application. This set up process is done from the front panel of the unit. Unit setup should be done in the following order.

The Power Setup must be done first.

The unit address must be correctly set if smart remote wall stations will be used .

The units output channels should be assigned (or patched) to the desired console control channels if a DMX console will be used.

The last setup step creates prestored scenes to be activated from the remote control stations.

USING THE MENU SYSTEM

The **CONFIG** button steps through the display menus. There are currently four menus available. They are: "SCENE SETUP", "DIMMER SETUP", "SET UNIT ADDRESS", and "POWER SETUP". When one of these messages is displayed you can push the **ENTER** button to access that function. The **CLEAR** button will return the unit to its normal operating mode and cause the MENU/STATUS display to show the channel level bar graph. The **CLEAR** button DOES NOT clear entered values. The arrow buttons are used to set values for various menu selections.

INPUT POWER SETUP

```
                    CAUTION
    TURN OFF ALL CHANNELS AND OPEN ALL
    CHANNEL CIRCUIT BREAKERS BEFORE
    CHANGING THE INPUT POWER SETUP.
```

In addition to making the correct power connections for the power source available at your installation the RA-122 must be set up to correctly respond to the power type.

At the RA-122 front panel - push **CONFIG** until "POWER SET UP" appears on the Menu/Status display.

```
            POWER
            SETUP
```

Push **ENTER**. The display shows the current power setup. For example:

```
            POWER In
            60Hz 1PN
```

Use the ↑ and ↓ buttons to select the configuration corresponding to the power supplied to the RA-122. The available choices are shown below.

60Hz 1PN   60Hz 1 Phase, Normal Phase Rotation
60Hz 3PN   60Hz 3 Phase, Normal Phase Rotation
60Hz 3PR   60Hz 3 Phase, Reverse Phase Rotation
50Hz 1PN   50Hz 1 Phase, Normal Phase Rotation
50Hz 3PN   50Hz 3 Phase, Normal Phase Rotation
50Hz 3PR   50Hz 3 Phase, Reverse Phase Rotation

You may not know in advance if you should use the Normal or Reverse rotation choice for 3 phase power. If this is the case then use Normal Phase Rotation.

NO damage will occur if the rotation is actually reverse but dimming will not occur correctly and some channels will appear to be in a on/off mode. This will be readily apparent when the unit is operated. You can then change the setting.

UNIT ADDRESS ASSIGNMENT

At the RA-122 front panel - push **CONFIG** until "SET UNIT ADDRESS" appears on the Menu/Status display.

```
            SET UNIT
            ADDRESS
```

Push **ENTER**. The display shows the unit address.

```
            SET UNIT
            ID   ↕  00
```

Set the desired address by pushing the ↑ and ↓ buttons.

Push **ENTER**. Then push **CLEAR** to return to the normal operating mode.

NOTE: When using a single RA-122 unit system, the unit address MUST BE SET TO 00. One of the units in a multiple unit system must be set to address 00. Other units should be assigned in a consecutive order.

DIMMER CHANNEL ASSIGNMENT

Dimmer channel assignment is used to assign or patch individual RA-122 channels (circuits) to a DMX control channel. Each dimmer channel (1 - 12) is fully patchable to any of 512 DMX control channels.

At the RA-122 front panel - push **CONFIG** until "DIMMER SETUP" appears on the Menu/Status display.

```
            DIMMER
            SETUP
```

Push **ENTER.** The display shows the dimmer output on the top line prefixed by "OUT" and a "D" or "R" which indicates that the channel is in the either relay or dimming mode. The currently assigned console channel is shown on the lower line prefixed by "DMX".

```
        OUT ←—→ D01
        DMX  ↕  001
```

Set each dimmer channel to the desired DMX channel using the → ← ↓ ↑ buttons. Push **ENTER** after each channel assignment. Push **CLEAR** to return the RA-122 to its normal operating mode. It will not clear your settings.

Pushing **CONFIG** while assigning a channel will switch the channel between dimming and relay operation. The upper right corner of the display will be prefixed with "**D**" or "**R**" accordingly. Remember to push **ENTER** after each change.

CONSOLE LOCKOUT: You can set any dimmer channel output to ignore DMX signal inputs from a control console by assigning it to DMX channel 0. This feature is used where "house lights" or other special lighting is used. The channel will still respond to the wall remote stations but is "locked out" from the DMX control console.

CREATING AND EDITING SCENES

At the RA-122 front panel - push **CONFIG** until "SCENE SETUP" appears on the Menu/Status display.
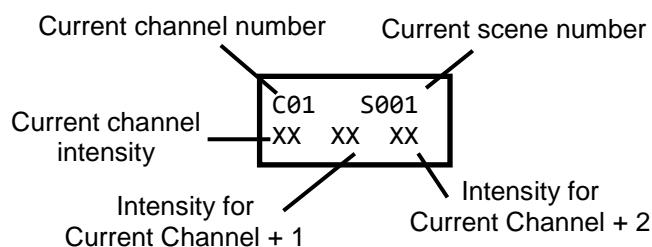
```
┌─────────────┐
│    SCENE    │
│    SETUP    │
└─────────────┘
```

Push **ENTER**. The display shows the current scene number.

```
┌─────────────┐
│    SCENE    │
│   ←000 →    │
└─────────────┘
```
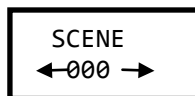
Use the ← and → buttons to select the scene you want to set up. Scene 00 controls blackout fade time. Scene 01 is the first actual scene.

Push **ENTER**. The display shows the scene setup menu.

Current channel number   Current scene number

```
┌─────────────┐
│  C01   S001 │
│  XX   XX  XX│
└─────────────┘
```

Current channel intensity

Intensity for Current Channel + 1   Intensity for Current Channel + 2

The current channel number is shown on the display upper left. The current scene number (which was selected in the previous step) is shown on the display upper right. The settings for three channels are shown on the lower display row. The LEFT channel is the current channel (the channel which you will set the output level for).

Use the ↓ and ↑ buttons to set the channel output intensity. The display shows the intensity setting as a number between 0% and 100%. A 100% setting is indicated by "FL". A "XX" setting means that the channel will be ignored for the current scene.

Push **ENTER** after the channel level is set.

Use the ← and → buttons to proceed to the next channel to be set up. The lower row of the display will shift to the left. Repeat the channel intensity selection for that channel.

Push **CLEAR** when all the channels for the selected scene are set. This will not clear you scene settings.

To setup another scene - repeat the process above using a different scene selection.

SCENE FADE TIME

A fade time may be set individually for each scene. This is the time elapsed between a scene fully active and the next scene fully active. The factory default fade time is 3 seconds. Fade time may be set between .5 and 99.5 seconds and is set from the SCENE SETUP menu (normally as you set channel intensities for the scene).

1   To access the SCENE SETUP Menu - push the **CONFIG** button once. Then push **ENTER**.

2   Use the ↓ and ↑ buttons to select the desired scene. Then push the **ENTER** button. The display will show the current settings for the scene.

3   Use the → and ← buttons to proceed BEYOND the last channel (channel 16) for the scene. The display will indicate the current fade time for the scene.

4   Use the ↓ and ↑ buttons to set the desired fade time. Then push the **ENTER** button.

5   Push The **CLEAR** button to return the RA-122 to its normal status display.

SCENE BLACKOUT FADE TIME

Fade time for the remote stations blackout function is set as an independent function. The procedure is similar to that for other scenes except the BLACKOUT function is accessed by selecting SCENE 0 from the SCENE SETUP menu. Factory default fade time is 3 seconds. Blackout fade time may be set between .5 and 99.5 seconds. The current fade time is displayed when you activate the SCENE SETUP menu and select SCENE 0. Use the   and buttons to set the fade time. Push **ENTER** after the fade time is set.

OPERATION

OVER TEMPERATURE CONDITION

The RA-122 has a temperature sensing element which will shut down all operating channels if the temperature rises above 175 deg F. A message "OVERTEMP SHUTDOWN" will be shown on the front panel display in this case. This shutdown cannot be reset except by allowing the unit to cool down.

COOLING FAN

The RA-122 is cooled by a fan which is controlled by the dimmer internal circuitry. It will begin running when the unit is powered up. After a short initialization period the fan will run if any dimmer channels are at a non zero intensity and will time out and turn off after aprox. 15 minutes of a "all channels off" condition.

MANUAL OPERATION

Individual dimmer channels may be operated from the RA-122 front panel. This is useful during testing and setup operations. Use the → and ← buttons to select a channel. The associated channel on the bar graph display will begin flashing. Use the ↓ and ↑ buttons to raise/lower the lighting intensity for the selected channel.

Manual operation combines with DMX and remote stations settings but does not lock them out.

The **CLEAR** button will turn off all channels when operating manually.

MX CONSOLE OPERATION

If a DMX signal is present when the RA-122 is turned on it will automatically respond to it. A "D" will be shown in the lower right corner of the LCD display if a valid DMX signal is present. Channel intensity levels will be shown on the bar graph display.

Channel Intensity Bar Graph
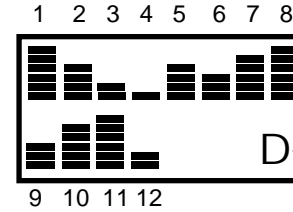
Valid DMX indication

SMART REMOTES OPERATION

The RA-122 can store 64 scenes which may be activated by smart remotes. See the section "Creating and Editing Scenes" for info about programming the scenes. These scenes are grouped according to which type of smart remote can access them. Scenes 1 - 48 are reserved for push button and IR remotes. Scenes 51 - 64 are used with fader remotes. If multiple RA-122 units are connected to a smart remote then each RA-122 will activate its own corresponding scene.

Both push button and fader remotes may be connected on the same smart remote bus.

BUTTON AND IR SMART REMOTES OPERATION

These remotes activate individual scenes within a block of scenes which have been stored in the RA-122 on an "exclusive" basis. In other words only one scene may be on at a time. Currently available remotes are the AC-1009, AC-2016 and AI-1001.

You can select which block of scenes will be activated by the remote. This is done by DIP switches on the back of the remote. For instance, an AC-1009 can be set to control scenes 1 - 8 , scenes 9-16 or other blocks of 8 consecutive scenes. Refer to the smart remote owner manual for specific info on setting scene addressing. Multiple smart remotes may be but are not required to be set to the same block of scenes.

FADER SMART REMOTES OPERATION

These remotes specific individual scenes which have been stored in the RA-122 on a "pile on" basis. In other words multiple scenes will merge together in a "greatest of " fashion. This means that the intensity of any given channel will go to the highest level of all the scenes which use it. Currently available fader remotes are the AF-2004, AF-3007 and AF-5013.

You CANNOT select which block of scenes will be activated by the remote. Fader smart remotes are NOT scene block addressable. These remotes always use scene 51 for the lowest numbered fader on the remote. The remaining faders will use the next consecutively numbered scenes (52, 53, 54, etc). If multiple fader remotes are connected to one or more RA-122's then they will all activate scenes beginning at scene 51 in each RA-122.

SIMPLE REMOTES OPERATION

Scenes 1 - 7 (stored in the RA-122) may be accessed by simple remotes. A BLACKOUT FUNCTION may also be accessed. A simple remote is any switch which can provide a momentary contact closure that can be applied to a specific pin on a RA-122 CONTROL SIGNALS CONNECTOR (DB25 connector). Lightronics currently offers a APP01 simple remote. This is a "center off , single pole, double throw, momentary toggle switch". It can be used as a simple entrance switch to activate a scene when someone enters an area.

Alternative devices such as relays, timers, and motion sensors can be connected to RA-122 dimmers as simple remotes. These are available from a variety of manufacturers.

Operation of a simple remote is dependent upon the device used. In the case of the Lightronics APP01 it is a simple matter of pushing the switch.

MAINTENANCE AND REPAIR

WARNING

⚠ **MAKE CERTAIN POWER IS REMOVED FROM THE FEED CIRCUITS BEFORE HANDLING THE UNIT.** ⚠
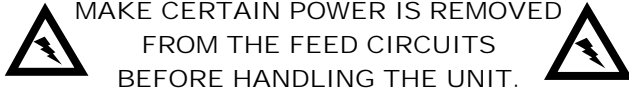
TROUBLESHOOTING

- To simplify troubleshooting - reset the unit or provide a known simple set of conditions.
- Check that the console is powered and that console channels are correctly patched or set.
- Check the control cable between the dimmer(s) and console.
- Verify the loads and their connections.

OWNER MAINTENANCE

FRONT PANEL FUSES: The RA-122 has two 1/2 amp, 250V, Type ABC, fast acting fuses on the front panel. These fuses provide protection for the internal electronic control circuitry and the fan. They may be replaced ONLY by fuses of identical type and size.

There are no user serviceable parts inside the unit.

The best way to prolong the life of your unit is to keep is cool, clean, and dry. It is important that the cooling intake and exit vent holes are clean and unobstructed.

Service by other than Lightronics authorized agents may void your warranty.

OPERATING AND MAINTENANCE ASSISTANCE

If service is required, contact the dealer from whom you purchased the equipment or contact Lightronics, Service Department, 509 Central Drive, Virginia Beach, VA 23454   TEL 757 486 3588.

Lightronics recommends that you record the serial number of your unit for future reference.

SERIAL NUMBER _____

RA-122 UNIT SPECIFICATIONS

CHANNELS/CAPACITY:	12 @ 2400 Watts each
POWER REQUIREMENTS:	120/208VAC three phase,80 Amps each line OR 120/240VAC single phase, 120 Amps each line
POWER DEVICES:	Dual 65 Amp SCRs
POWER CONNECTOR:	Terminal strip
CHANNEL OUTPUT:	Edison Plug External Terminal Strip Patch Panel Socapex
CIRCUIT BREAKERS:	20 Amp fast acting
MINIMUM LOAD:	15 Watts
CURVE:	Modified square law
FILTER RISE TIME:	600 usec. minimum
OUTPUT FUNCTION: selectable	DIMMER or RELAY
CONTROL INPUT:	DMX-512 U.S.I.T.T. standard
FRONT PANEL:	8 char. x 2 line LCD display
REMOTE NETWORK:	RS-485, 62.5 Kbaud, bidirectional 9 bit network
LOCAL PRESETS:	64 scenes standard, expandable to 255 scenes
CLOSURE INPUT:	8 inputs for single, dual button, or combine stations
REMOTE STATIONS:	Total of 32 remote stations with unique system addresses
SLAVE UNITS:	Up to 31 additional units may be added
SIZE :	3.5"H x 19"W x 16"D
WEIGHT:	40 pounds

WARRANTY

All Lightronics products are warranted for a period of TWO/FIVE YEARS from the date of purchase against defects in materials and workmanship.

This warranty is subject to the following restrictions and conditions:

A) If service is required, you may be asked to provide proof of purchase from an authorized Lightronics dealer.

B) The FIVE YEAR WARRANTY is only valid if the warranty card is returned to Lightronics accompanied with a copy of the original receipt of purchase within 30 DAYS of the purchase date, if not then the TWO YEAR WARRANTY applies.   Warranty is valid only for the original purchaser of the unit.

C) This warranty does not apply to damage resulting from abuse, misuse, accidents, shipping, and repairs or modifications by anyone other than an authorized Lightronics service representative.

D) This warranty is void if the serial number is removed, altered or defaced.

E) This warranty does not cover loss or damage, direct or indirect arising from the use or inability to use this product.

F) Lightronics reserves the right to make any changes, modifications, or updates as deemed appropriate by Lightronics to products returned for service. Such changes may be made without prior notification to the user and without incurring any responsibility or liability for modifications or changes to equipment previously supplied. Lightronics is not responsible for supplying new equipment in accordance with any earlier specifications.

G) This warranty is the only warranty either expressed, implied, or statutory, upon which the equipment is purchased. No representatives, dealers or any of their agents are authorized to make any warranties, guarantees, or representations other than expressly stated herein.

H) This warranty does not cover the cost of shipping products to or from Lightronics for service.

I) Lightronics Inc. reserves the right to make changes as deemed necessary to this warranty without prior notification.