Installation, Operation & Service Manual

Lightworx System

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Lightworx System Installation, Operation & Service manual

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Table of Contents

SAFETY	4
SAFETY NOTICE TO USERS OF THIS MANUAL	5
Brunswick Lightworx System Packaging	6
Warranty and Service Policy	8
Replacement Parts Under the Warranty	8
Introduction	9
Primary Components of Lightworx	9
System Overview	11
Section 1: System Installation	12
Electrical Power Requirements	12
Transformers	13
Address Decoder Module	14
DIP Switch Settings	14
Cable Routing and Termination	17
Light Modules	23
Installation	23
Cable Routing and Termination	24
Cosmetic Covers	25
Installation	25
Section 2: System Operation	
Initial System Setup and Self-Diagnostic Test	
Selecting Lighting Patterns	
Customizing Lighting Patterns	
System Control Adjustments	29
Adjusting LCD Display	
Adjusting Audio Input Level	
Section 3: Maintenance and Troubleshooting	31
Maintenance	
Light Module PCB Replacement	
Troubleshooting	
Appendix A	
Cables	33

SAFETY

Throughout this publication, "Warnings", and "Cautions" (accompanied by one of the International HAZARD Symbols) are used to alert the mechanic to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. They are defined below. **OBSERVE AND READ THEM CAREFULLY!**

These "Safety Alerts" alone cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the service, plus training and "Common Sense" operation are major accident prevention measures.



NOTE or IMPORTANT !:

Will designate significant informational notes.



WARNING!

Will designate a mechanical or nonelectrical alert which could potentially cause personal injury or death.



WARNING!

Will designate electrical alerts which could potentially cause personal injury or death.



CAUTION!

Will designate an alert which could potentially cause product damage.



Will designate grounding alerts.

SAFETY NOTICE TO USERS OF THIS MANUAL

This manual has been written and published by the Service Department of Brunswick Bowling and Billiards to aid the reader when servicing or installing the products described.

It is assumed that these personnel are familiar with, and have been trained in, the servicing or installation procedures of these products, which includes the use of common mechanic's hand tools and any special Brunswick or recommended tools from other suppliers.

We could not possibly know of and advise the reader of all conceivable procedures by which a service might be performed and of the possible hazards and/or results of each method. We have not attempted any such wide evaluation. Therefore, anyone who uses a service procedure and/or tool, which is not recommended by Brunswick, must first completely satisfy himself that neither his nor the products safety will be endangered by the service procedure selected.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication.

It should be kept in mind, while working on the product, that the electrical system is capable of violent and damaging short circuits or severe electrical shocks. When performing any work where electrical terminals could possibly be grounded or touched by the mechanic, the power to the product should be disconnected prior to servicing and remain disconnected until servicing is complete.

Brunswick Lightworx System Packaging

1	L2-60	0070-xxx Lightwo	orx Kit with existing capping		
1	84-860	605-xxx Package	, Lightworx Controller		
	Qty.	Part Number	Description		
	1	84-200330-4XX	Lightworx Controller		
	1	84-200289-000	Cable Assembly, Lightworx Controller to Address Decoder Module		
	1	84-200331-000	Cable Assembly, Power Adapter		
	1	84-900027-000	Manual, Lightworx Installation		
	6	84-200295-000	Module, Lightworx		
	1	84-200341-000	Terminator Assembly, Address Decoder Module Line		
	1	11-680180-000	Plug, Power, Miniature		
1	84-860	608-000 Package	- Light Kit with Accessories		
	Qty.	Part Number	Description		
	20	84-200295-000	Module Assembly, Lightworx		
	20	84-200299-000	Cosmetic Cover, Clear, Division Capping		
	1	84-200292-000	Address Decoder Module, Assembly		
	19	84-200287-000	Cable Assembly, Light Module to Light Module		
	1	84-200298-000	Cable Assembly, Address Decoder Module to Light Module		
	1	84-200288-000	Cable Assembly, Address Decoder Module to Address Decoder Module		
	1	84-200332-000	Cable Assembly, Address Module Power Adapter		
	1	11-680180-000	Plug, Power, Miniature		
	2	11-081201-000	Screw, Robertson, #10 x 1-1/2"		
1	84-860	609-301 Package	, Color Strip, Division (Clear)		
	Qty.	Part Number	Description		
	6	84-200242-301	Color Strip, Division Capping (clear)		
1	*53-860326-230 F		Package, Transformer Kit, 230VAC		
	Qty.	Part Number	Description		
	1	53-600180-230	Transformer, Lightworx Controller/Address Decoder Module 230VAC, 50Hz		
	1	53-860326-001	Connector, IEC Power		
	1	53-860326-002	Bracket, Mounting, Transformer		
	4	53-860326-003	Screw, Self Tapping, #8 x 3/4"		

1 *53-860326-100 Package, Transformer Kit, 100VAC

Qty.	Part Number	Description
1	53-600180-100	Transformer, Lightworx Controller/Address Decoder Module, 100VAC, 50Hz
1	53-860326-001	Power Connector, IEC
1	53-860326-002	Bracket, Mounting, Transformer
4	53-860326-003	Screw, Self Tapping, #8 x 3/4"

1 *53-860327-115 Package, Transformer Kit, 115VAC

Qty.	Part Number	Description
1	53-600180-115	Transformer, Lightworx Controller/Address
		Decoder Module, 115VAC, 60Hz
1	53-860327-001	Cord, Power, 7.5' Long
1	53-860326-002	Bracket, Mounting, Transformer
4	53-860327-003	Screw, Self Tapping, #8 x 3/4"

* NOTE:

Transformer dependent upon country of installation.

Warranty and Service Policy

If any defects in material or workmanship appear during the first three months after installation, the defective part will be repaired or replaced, at Brunswick's option, with no charge to the Customer.

If any defects in material appear during the nine months following the initial three month warranty period, the defective part will be repaired or replaced, at Brunswick's option, with no charge to the Customer for parts. The Customer must assume all other costs in making the repair or replacement.

All service calls during the first three months of the warranty period, resulting from the inability of the Customer's mechanics to perform required adjustments or maintenance, will be billed directly to the Customer.

Brunswick reserves the right to change the design of any product, but assumes no responsibility to incorporate such design changes on products already sold.

The warranty applies only to new products installed by Brunswick and extends only to the original purchaser. Repairs or replacements made by anyone not approved by Brunswick void the warranty.

Under no circumstances shall the Seller or Manufacturer be liable for loss of profits or other direct or indirect costs, expenses, losses, or damages arising out of defects in or failure of parts.

Replacement Parts Under the Warranty

All service parts are F.O.B. the installation site both during and after the warranty period. The price of parts includes delivery by standard means, such as United Parcel Service (UPS). Any expense resulting from expedited delivery, such as air freight, will be billed to the Customer.

During the one year period, parts which are faulty due to material or workmanship will be replaced or repaired free of charge only if the old part is properly identified and turned in for credit. Identify the defective part by attaching a tag containing the part name and part number. Light bulbs are not covered by the warranty.

Service parts are ordered through the Brunswick Bowling and Billiards Corporation toll free number: 1-800-323-1812 or in Michigan,

1-800-626-5963. Refer to the "General Information" section of the *Bowling Service Parts Catalog* for address and order information. When ordering service parts, specify part numbers and descriptions to simplify handling. *Use only Genuine Brunswick Replacement Parts.*

Introduction

Lightworx is a computer controlled show designed for use with Cosmic bowling. Bowling centers can now present a colorful, coordinated, computerized light show to bowlers during the Cosmic experience. A music interface feature included with the system, allows an external audio signal to dictate what the lighting pattern will be.

Basic additions to PVC style division capping along with required cabling and a control unit make the installation of Lightworx easy.



IMPORTANT!:

Lightworx can only be installed on Brunswick PVC division capping. Installation of the PVC division capping is addressed in the Frameworx Gutter and Capping Installation Manual part number 84-900026-000.

Primary Components of Lightworx

Light Modules

Twenty modules are installed within the PVC division capping. Each light module contains a green, a blue, and a red LED. Seven different light combinations are possible; red, green, blue, red-blue, blue-green, red-green, and redgreen-blue.

Lightworx Controller

This unit is placed at the front desk and contains the on/off control of the system. A computerized chip within the unit initiates and synchronizes the lighting patterns and color combinations. The proprietor can choose from multiple predesigned lighting patterns and set the time that each pattern repeats.

Address Decoder Modules

The modules are placed near the ball lifts, and provide address (location) input/ output signals of each division to the Lightworx controller. The electrical power supply is also provided to the individual light modules via the address decoder modules.

Step-Down Transformers

The step-down transformers adapt the 100, 115, or 230 VAC center power to the required 12 VAC power necessary to operate the system components. Each address decoder module requires its own transformer and a separate transformer is required for the Lightworx controller. An IEC connector is included with 100VAC and 230VAC transformers. For 115VAC a power cord will be supplied with the transformer.

Required Cabling

There are five basic cable assemblies provided with the Lightworx system.

- *Control Module Interface Cable* used for signal input/output (I/O) between the Lightworx controller and the first address decoder module on either end of the center.
- Address Decoder Module to Address Decoder Module Cable connects the individual address decoder modules together.
- *Light Module to Light Module Cable* connects the light modules within a division to each other.
- Address Decoder Module to Light Module Interface Cable used for signal I/O and power from the division address decoder module to the light module nearest the foul line.
- *Power Supply Adapter Cables* adapts transformer output power to the Lightworx controller and address decoder modules.

System Overview

The following *System Overview* shows the basic layout and components of the Lightworx system. It is intended for general purposes only and is not meant to replace the step-by-step instructions contained in this manual.



System Overview

(1) LIGHTMODULE

- (2) TRANSFORMER
- (4) ADDRESS DECODER MODULE
- (5) LIGHTWORXCONTROLLER
- (3) IEC CONNECTOR FOR 100V AND
- 230V AND POWER CORD FOR 115V(6) ALTERNATE LOCATION FOR
- ADDRESS DECODER MODULE

Electrical Power Requirements

For 100VAC and 230 VAC the transformer power cables are to be provided and installed by the customer's electrician. For 115VAC a power cord is provided with the transformer. The cord is terminated with a NEMA standard North American 115VAC plug. This plug may need to be cut off and discarded to allow wiring into junction box. Refer to *Figure 1-1* and *1-2*. On new installations, this should be done after the lane foundation is completed. Junction box locations and power cable routings for both new and modernizations installations are shown in *Figures 1-2* and *1-3*.

Electrical Power Supply Responsibility			
Customer to furnish 1 of the power supplies listed below as required by country of installation site.	Current Per Division	Brunswick	
115VAC Single Phase 60Hz	.35 Amp	1 each Power Cord, Transformer	
100VAC Single Phase 50Hz	.3 Amp	1 each IEC 320 Connector 1 each Transformer	
230VAC Single Phase 50 Hz	.15 Amp.	1 each IEC 320 Connector 1 each Transformer	

Figure 1-1. Electrical Power Supply Responsibility Chart

- (1) TEL-E-FOULPOWERCABLE
- FURNISHED BY CUSTOMER
 (2) INCOMING ELECTRICAL SERVICE
- (2) INCOMINGELEC (3) JUNCTIONBOX



Figure 2-2. Junction Box

NOTE:

Use the following load requirements to ensure the ball lift circuit is not overloaded; each transformer pulls 0.35 amps at 100VAC, 0.3 amps at 115VAC, and 0.15 amps at 230VAC.

Transformers

1. For 100VAC and 230VAC, hardwire the IEC connector (provided with transformer) to a cord from the ball lift junction box or other suitable power source. Refer to *Figure 1-3*. For 115VAC, cut plug from power cord and hardwire into ball lift junction box.



Figure 1-3. Supply Power to Transformer

- (1) BRUNSWICKSUPPLIEDTRANSFORMER AND IEC 320 CONNECTOR
- (4) MOUNTING SCREW

- (2) CUSTOMER SUPPLIED POWER SOURCE (CORD INCLUDED ON 115VAC ONLY)
- (3) TRANSFORMER MOUNTING BRACKET
- 2. Attach the transformer to the ball lift underlayment or other suitable location using hardware provided. Refer to *Figure 1-4*.

- (1) TRANSFORMER
- (2) MOUNTING BRACKET
- (3) SCREW
- (4) BALL LIFT ANCHOR PLATE



Figure 1-4. Attach Transformer

3. Repeat steps 1 and 2 above to install all of the power supply transformers for the address decoder modules.

Address Decoder Module

DIP Switch Settings



NOTE:

Prior to mounting the address decoder modules, the DIP switches must be set to a designated address as shown in Figures 1-6a and 1-6b.



IMPORTANT!:

The maximum number of unique addresses for the address decoder modules is 41. If more than 41 divisions exist, the center should be divided into two sections so that some address decoder modules share the same DIP switch setting. Example: 100 lane center (51 divisions), divisions 1-26 =addresses 1-26. At division 27, set addresses to 25, 24, 23, etc.

 Starting with the address decoder module being installed at the left-most division, set the DIP switches on the address decoder PCB. Refer to *Figure 1-5*. Refer to *Figures 1-6a* and *1-6b* for DIP switch settings. The address decoder module being installed at the left-most division is assigned as address #1.



Figure 1-5. DIP Switch Location

- 2. After properly setting the DIP switches as listed in *Figures 1-6a* and *1-6b*, install the address decoder module cover using two #6-32 x 1-1/4" pan head C.R. screws. Reference *Figure 1-5*.
- 3. Label the cover of the module enclosure with the address setting of internal DIP switches. This will aid in easy identification of the unit.
- 4. Repeat steps 1 through 3 above to set DIP switches for all of the address decoder modules.



IMPORTANT !:

The address decoder modules are attached to the return I-joist after the cables are routed and terminated at the ports of the address decoder module. If address decoder modules are attached at this time, cable connections become difficult.

- (1) ADDRESSDECODERMODULE
- (2) DIPSWITCHES
- (3) #6-32 X 1-1/4" PAN HEAD SCREW



Figure 1-6a. DIP Switch Settings

(1)	STRING ADDRESS = 1
(4)	STRING ADDRESS = 4
(7)	STRING ADDRESS = 7
(10)	STRING ADDRESS = 10
(13)	STRING ADDRESS = 13
(16)	STRING ADDRESS = 16
(19)	STRING ADDRESS = 19
(22)	STRING ADDRESS = 22
(25)	STRING ADDRESS = 25
(28)	STRING ADDRESS = 28

(2) STRING ADDRESS = 2 STRING ADDRESS = 5 (5) (8) STRING ADDRESS = 8 (11) STRING ADDRESS = 11 (14) STRING ADDRESS = 14 (17) STRING ADDRESS = 17 STRING ADDRESS = 20 (20) STRING ADDRESS = 23 (23) (26) STRING ADDRESS = 26

(3) STRING ADDRESS = 3 STRING ADDRESS = 6 (6) (9) STRING ADDRESS = 9 STRING ADDRESS = 12 (12)(15) STRING ADDRESS = 15 (18) STRING ADDRESS = 18 STRING ADDRESS = 21 (21) STRING ADDRESS = 24 (24) (27) STRING ADDRESS = 27



Figure 1-6b. DIP Switch Settings

- (29) STRING ADDRESS = 29
- (32) STRING ADDRESS = 32
- (35) STRING ADDRESS = 35
- (38) STRING ADDRESS = 38
- (41) STRING ADDRESS=41
- (30) STRING ADDRESS = 30
 (33) STRING ADDRESS = 33
 (36) STRING ADDRESS = 36

(39) STRING ADDRESS = 39

- (31) STRING ADDRESS = 31(34) STRING ADDRESS = 34
 - (37) STRING ADDRESS = 37
 - (40) STRING ADDRESS = 40

Cable Routing and Termination



NOTE:

Appendix A in the rear of this manual contains cable and component prints for reference purposes.

1. Drill a 3/4" (19 mm) access hole in division capping approximately 3" (76 mm) behind the division reflector cover. Refer to Figure 1-7.



Figure 1-7. Drill Cable Access

2. Route address decoder module to light module cables beneath the approach from the selected location of the address decoder modules to the first light modules located on each division capping. Refer to Figure 1-8 for a view of cable routing /termination. Route connector end of cable through 3/4" (19 mm) access hole on division capping (step 1 above).)

CAUTION!

Only plug cable into the front of first module (Refer to Figure 1-8) or damage to system will occur!

> 3. Route address decoder module to address decoder module cables. Refer to Figure 1-8.



For the first pair of lanes and lane breaks, two sets of address decoder modules and transformers will be installed under one ball return trap door. Lane breaks will make it necessary to place address decoder modules in such a way as to keep them within reach of each other using the 16' address decoder module cable.

- 4. Route power supply adapter cables from transformers to address decoder modules.
- 5. Route a control module interface cable assembly from the Lightworx controller to the address decoder module located on either of the outside lanes. Refer to Figure 1-8 for cable/termination view.



- DRILL 3/4" THROUGH HOLE (2)
- SUPPORTSTRIP (3)
- **END VIEW** (4)
- (5) TOP VIEW
- (6) DIVISION REFLECTOR COVER

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- 6. With cables routed to address decoder modules, perform steps 6a through 6f:
 - a. Insert the connector end of the address decoder module to light module cable (5-pin), into the J2 port. Insert the miniature RCA plug of power supply adapter cable into J4 port of address decoder module.



Figure 1-9. Address Decoder Module Location/Cable Terminations

- b. Using extreme caution not to bend or damage pins of module. Attach address decoder module to a I-joist within ball lift trap door using a #10 x 1-1/2" Robertson screw. Refer to *Figure 1-9* for suggested mount location.
- c. Insert the connector end of one of the address module to address module cables (11-pin) into the visible J1 or J3 port of the address decoder module.
- d. Install second #10 x 1-1/2" Robertson screw through tab of module enclosure.
- e. Terminate remaining address decoder module to address decoder module cable at either J1 or J3 port of module.

(1) INSTALL ADDRESS DECODER MODULE TO LIGHT MODULE CABLE

- (2) INSTALL TRANSFORMER PLUG
- (3) INSTALL A #10 X 1-1/2" ROBERTSON SCREW
- (4) INSTALL FIRST ADDRESS DECODER MODULE TO ADDRESS DECODER MODULE CABLE
- (5) ROTATE MODULE 180°
- (6) INSTALL SECOND #10 X 1-1/2" ROBERTSONSCREW
- (7) INSTALL SECOND ADDRESS DECODER MODULE TO ADDRESS DECODER MODULE CABLE
- (8) I-JOIST

- f. Repeat steps 6a through 6e for each of the address decoder modules.
- 7. Insert 11-pin connector end of control module interface cable assembly into last unused J1 or J3 port of the address decoder module located on either of the outside lanes.
- 8. Insert the two terminal ends of the power supply adapter cable assembly into the corresponding receptacles attached to transformer leads.
- 9. Insert the 15-pin connector end of control module interface cable assembly into the J4 port on rear of Lightworx controller.
- 10. Install a line terminator into the last address decoder module. Refer to Figure 1-8.

NOTE:

Line terminators may cause occasional interference with light module operation. If this occurs, remove line terminator and check system again.

Light Modules

Installation

division capping is installed.



Installation of the Lightworx light modules requires the new PVC division capping with the clear strips. The Light modules CANNOT be installed in UOS/VOS capping. Do not proceed with the following steps unless PVC

- 1. If installed, remove the clear strips on top of PVC division capping.
- 2. From the foul line, measure 24" (610 mm) along the center line of division capping and place a mark on capping for light module location. Refer to *Figure 1-10* for view of light module placement.



Figure 1-10. Light Module Location

- (1) DIVISION REFLECTOR COVER
- (4) LIGHT MODULE/ADDRESS MODULE CABLE PREVIOUSLY ROUTED.
- (2) FOULLINE(5) N

- (3) LIGHTMODULE(6) OUT
- From the original marked location, continue to measure and mark in 35-1/4" (895 mm) increments all the way down the division capping. These will be the locations for leading edge placement of the light modules.

NOTE:

If screws attaching the division capping interfere with placement of light modules, remove screws and reinstall in alternate location on capping.

- 4. Peel off adhesive backing on bottom of module. Carefully position light module into the alignment groove of capping making sure that the foul line edge of module is on mark made in step 3 above. Align the scoop to face evenly forward and press down firmly on module housing to secure.
- 5. Repeat step 4 to install all of the light modules in the division capping.

Cable Routing and Termination

- 1. Route light module to light module cables between the light modules on a division. See *Figure 1-8* for routing/termination points.
- 2. Starting at the light module closest to foul line, insert the connector end of the address decoder module to light module cable into the J2 port of light module.
- 3. Insert the connector ends of light module to light module cable into the light modules. Refer to *Figure 1-11*. Move any excess slack toward the light module nearest the foul line and apply a length of PVC electrical tape to secure cable. This is necessary to keep cable centered in division capping. Refer to *Figure 1-11*.



Figure 1-11. Route Light Module Cables

4. Insert connector ends of light module to light module cables into the light modules while straightening and taping cables to remove excess slack (step 3).

- (1) APPROACH(2) LIGHTMODULE
- (3) PVCELECTRICAL TAPE

Cosmetic Covers

Installation

1. Install cosmetic covers between all light modules as shown in *Figure 1-12*.

- (1) LIGHTMODULE
- (2) CLEAR STRIP
- (3) COSMETICCOVER
- (4) LIGHT MODULE TO LIGHT MODULE CABLE





2. Smooth edges of cover down to fit snugly within the bottom corners of capping to conceal light module cabling.

NOTE:

If cosmetic covers are too long between modules, place overlapping end on module nearest the foul line.

3. Reinstall clear strips on top of division capping. Refer to *Figure 1-12*.

Initial System Setup and Self-Diagnostic Test



IMPORTANT !:

After installation of the Lightworx system, it is necessary to perform the following steps to identify the number of divisions (light strings) installed and to verify proper system operation.

At the Lightworx controller, perform the following:

1. Place toggle switch on rear of Lightworx controller to ON (up) position, the word "READY" appears when the self-diagnostic test is complete. Refer to *Figure 2-1*.



Figure 2-1. Lightworx Controller Face Plate

- (1) LCDSCREEN(4) RUN/STOPKEY
- (7) CUSTOMKEY

- (2) SCROLL UP KEY
- (5) TOGGLE "ON/OFF" SWITCH
- (3) SCROLL DOWN KEY
- (6) SETUPKEY

- 2. Press and hold the SETUP key for ten seconds.
- 3. At the prompt, "No. of divisions", use the s and t keys to indicate the number of divisions with Lightworx.
- 4. Press SETUP key when the correct number of divisions is displayed.
- 5. Use the s and t keys to select diagnostic pattern(s) to be activated.

NOTE:

Diagnostic patterns are currently designed to verify that light strings/ modules have consistent flashing of colors and color combinations and that address decoder modules are properly sequenced. Diagnostics may also be done to assist in troubleshooting the system.

- 6. To exit SETUP mode, place toggle switch to OFF (down) position.
- 7. Place toggle switch to the ON (up) position and press the RUN/STOP key for normal system operation. The default lighting will begin with name of lighting pattern listed on the LCD display.

Selecting Lighting Patterns

- 1. With system power on (step 1 above), press the s key to scroll up through patterns or press the t key to scroll down through patterns. Refer to *Figure 2-1*.
- 2. When desired pattern is listed on LCD display, press RUN/STOP key to activate new pattern.

Customizing Lighting Patterns

- 1. Press CUSTOM key on front desk control center. Refer to Figure 2-1.
- 2. Press SETUP key and use the s and t keys to select program designator; A, B, or, C.
- 3. Press SETUP again and use the s and t keys to choose the desired lighting pattern.
- 4. Press SETUP and use the s and t keys to select pattern running time.
- 5. Press SETUP and use the s and t keys to set the time delay between programs.
- 6. Now press SETUP to enter data for program "B" and repeat steps 3, 4, and 5.
- 7. Press CUSTOM key when finished selecting customized lighting patterns.

System Control Adjustments

There are two basic adjustments that can be made to the system; changing the LCD display contrast and trimming the external audio input level. Both of these adjustments are made on the rear of the Lightworx controller.

Adjusting LCD Display

To adjust the contrast of the LCD display on Lightworx controller;

1. Locate the adjustment potentiometer screw on the rear of the Lightworx controller. Refer to *Figure 2-2* for location of screw.



Figure 2-2. Lightworx controller Rear View

- (1) POWER INPUT (TRANSFORMER JACK)
- (2) POWERON/OFF

- (4) SERIALPORT
- (7) AUDIORIGHT
- (10) INCREASE

(5) DISPLAY CONTRAST (LCD)

(8) AUDIO INPUT LEVEL

- (3) CONTROLMODULE INTERFACE
- CABLE PORT
- (6) AUDIOLEFT
- (9) DECREASE
- 2. Rotate adjustment screw clockwise to increase contrast; counterclockwise to decrease contrast.

Adjusting Audio Input Level

If an external music interface (i.e., CD player, FM tuner) is being used, the audio input signal may be too weak to adequately drive the lighting pattern. To compensate for a weak audio input signal:

- 1. Locate the adjustment potentiometer screw on the rear of the Lightworx controller. Refer to *Figure 2-2* for location of screw.
- 2. Rotate adjustment screw clockwise to increase (amplify) the audio input signal. Continue to increase signal strength until lighting patterns operate as desired.

Maintenance

Light Module PCB Replacement



NOTE: The individual LEDs within the light modules are not replaceable.

- 1. Remove the clear strip from division capping to gain access to module needing replacement.
- 2. As needed, lift end and slide adjacent cosmetic covers away from light module being replaced.
- 3. Unplug the light module to light module cables from both ends of the module.
- Using a small, straight tip screwdriver, gently push on two tabs of lower light module enclosure while lifting up on front edge of enclosure. When both front hooks are free, slide back top enclosure until cover is free. Refer to *Figure 3-1*.



Figure 3-1. Replace LED PCB

- (1) UNLOCK TAB WITH SCREWDRIVER
- (4) REPLACE PCB AND REINSTALL COVER
- (2) LIGHTMODULE

(3) SLIDE COVER BACK

- 5. Remove defective PCB and place new PCB into lower housing.
- 6. Install top enclosure of light module.
- 7. Reverse procedures in steps 1, 2, and 3 to complete module replacement.

Troubleshooting

Problem	Corrective Action		
Light modules not lit or no display on Lightworx controller.	 Check output voltage of transformer supplying power to the address decoder module or Lightworx controller. Reading should be 13 VAC ± .05. Replace transformer as needed. 		
	 At address decoder module, check light string output with output cable disconnected. Reading should be 15 VDC ± .05. Replace address decoder modules as needed. 		
	Check for loose cable connections to and from address decoder modules and light modules. Replace cables as needed.		
	 Check light module connector J1 or J2, pins 1 (+) and 5 (-). Reading should be 15 VDC ± .05. Replace light module PCB as needed. 		
Intermittent or no lighting patterns.	1. Make sure toggle switch on Lightworx controller is ON (up) position.		
	 Check transformer output power to Lightworx controller (see step 1 above). 		
	3. Remove terminator on last address decoder module.		
	4. Check for loose cable connections to address decoder modules.		
If above corrective actions do not solve problem, contact Brunswick Customer Response Center at 1-800-323-8141.			

Appendix A

Cables



Light Module to Light Module Cable 35.5" (902 mm) - 84-200287-000

(1) TO "J1" OR "J2" ON LIGHT MODULE(4) BROWN



Address Decoder Module to Address Decoder Module Cable 16' (4.8 m) - 84-200288-000

- (1) TO "J1" OR "J3" ON ADDRESS DECODER MODULE
 (1) ODANCE
- (4) ORANGE
- (7) WHITE/YELLOW
- (10) BLACK

(2) RED

(2) BLACK

(5) YELLOW

- (5) WHITE/ORANGE
- (8) BROWN
- (11) WHITE/BLACK

- (3) WHITE/RED
- (6) YELLOW
- (9) WHITE/BROWN
- (12) DRAIN

(3) RED

(6)

ORANGE



(2) TO "J1" ON ADDRESS DECODER

Control Module Interface Cable 300' (91.4 m) - 84-200289-000

- (1) TOLIGHTWORXCONTROLLER
- (4) WHITE/RED(7) YELLOW

(13) DRAIN

(10) WHITE/BROWN

- MODULE (5) ORANGE
 - (8) WHITE/YELLOW
 - (11) BLACK
 - (14) NOCONNECTION

- (3) RED
- (6) WHITE/ORANGE
- (9) BROWN
- (12) WHITE/BLACK
- Lightworx System Installation, Operation, and Service Manual 3



Address Decoder Module to Light Module Cable 22' (6.7 m) - 84-200298-000

(1)	TO "J2" ON LIGHT MODULE OR "J2"	(2)	BLACK	(3)	RED
	ADDRESS DECODER MODULE				
(4)	BROWN	(5)	YELLOW	(6)	ORANGE



Lightworx Controller Power Adapter Cable 10' (3 m) 84-200331-000

(1) TOTRANSFORMER

(2) TOLIGHTWORXCONTROLLER



Address Decoder Module Power Adapter Cable 1' (305 mm) 84-200332-000)

(1) TOTRANSFORMER

(2) TO ADDRESS MODULE