Operations and Service Manual

Pinball Wizard

March 2000 / 84-900029-000

Brunswick®

CUSTOMER SERVICE

A tradition in excellence.

Statement of Intent

This manual is provided to be used by qualified bowling center personnel. Customer accepts responsibility for safety training of all personnel who service and maintain this product.

Pinball Wizard System Operations and Service Manual

Past Revisions: September 1999

Reorder Part No. 84-900029-000

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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.

Contact the Warranty Department at 1-231-725-3433.

Federal Communications Commission Class B Equipment

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on , the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Product Information Sheet

Laboratory tests have been conducted to develop a list of cleaning materials which are approved for use in the maintenance of your Pinball Wizard gutters**.** Also developed was a list of products commonly used in bowling center maintenance ***that must NOT be used on your Pinball Wizard gutters.***

IMPORTANT: The use of any unapproved material on your *PinBall Wizard gutters* ***will void the warranty.***

Products *Not Harmful* to Pinball Wizard Gutters

Brunswick Products

30/30 Lane Conditioner	62-860025-000	Golden Lane Conditioner	62-860082-000
Approach Spot Cleaner	62-860034-000	TLC Lane Conditioner	62-860077-000
Armor Slide	62-860024-000	LVC Lane Conditioner	62-860079-000
Approach Restorer	62-860033-000	TLC Lane Cleaner	62-860075-000
Condensation Barrier	62-860028-000	Viscon LC Additive	62-860080-000
Golden Lane Cleaner	62-860043-000		

DBA Products

Lane Walker Conditioner #311
Dura-Slide Conditioner #5625
Aquarius Cleaner #2601
Lane Conditioner #911
Lane Conditioner #511

Perry-Austen Products

Guardian H.V. Conditioner #2D 1897
Respond Lane Conditioner #2D 0890
Old Style Lane Conditioner #2D 1880
Guardian H.V. Conditioner #2D 1895
U-300 Lane Conditioner #2D 1830

Products *Harmful* to Pinball Wizard Gutters

Brunswick Products

Pinsetter Cleaner	62-860032-000	Approach Treatment	62-860078-000
Zip Cleaner	62-860085-000	All Purpose Cleaner (APC)	62-860085-000

DBA Products

Solvent Lane Stripper #007
Lane Cleaner & Polish #80014P
N/C Machine Cleaner #6040
Chlorinite Solvent #008
Pin Cleaner #522
Pin Deck Treatment #7585
Detergent Lane Cleaner #7583
Detergent Pin Cleaner #555
Kwik Kleen Cleaner #7579
Formula "C" Approach Conditioner
Lane Stripper #7555
G/P Machine Cleaner #088
White Glove Cleaner

Perry-Austen Products

Approach Spot Cleaner #2D 4013
Guardian Lane Cleaner #2D 0880
Solvent Lane Cleaner #4096
CV88 All Purpose Cleaner #2D 0850

IMPORTANT: Toulene, Methyl Ethyl Ketone and Chlorinated Solvents will also cause damage to Pinball Wizard gutters.

Safety Precautions

Certain procedures in this manual may require operational checks of the system. All non-operational electrical work should be done with the power turned off (power cord unplugged to automatic bumper controller). When operational checks require electrical power to be turned on, extreme care must be exercised to avoid contacting electrical components or power sources. Simple steps such as reinstalling covers, proper static grounding, etc. should be performed to prevent injury to personnel and/or equipment damage.

Operational checks using the Diagnostic screen for Frameworx scorers should only be performed if :

- The center personnel are aware the installation or service of equipment is in process.
- The lane(s) being worked on are placed in an out of service or hold status. This prevents personnel from inadvertently activating the pinsetter and issuing a lane.

Recommended Guidelines for Safe Automated Bumper Bowling

Automated Bumper Bowling presents a risk of injury to young children who attempt to walk on the lane surface and could slip and fall while the automated bumpers are closing. The following "Operating Guidelines" are provided for bowling center proprietors, managers and their employees in an effort to minimize this risk to the greatest extent possible while providing an enjoyable bowling experience for young bowlers.

Supervision

Always make sure that parents, youth group sponsors, and/or bowling center instructors supervise children bowlers.

Advise

1. Advise children's supervisors and children, of the risk of slipping and falling if the bowler crosses the foul line and walks on the lane surface.

2. Advise parents of children's desires to chase balls that have stopped on the lane.

3. Advise supervisor and children to call a center employee to retrieve a ball.

4. "Bumper Up Switch" - Advise parents, supervisors and employees of its location and its use.

Use Foul lights and Buzzers

Keep them on. Advise children and parents of the presence and significance of the foul line and foul lights. Children are wary of the sound of the buzzers. They are also sensitive to the loss of score should they create a foul.

Prevent Unnecessary Closings of the Bumpers

1. Leave the bumpers permanently in the up position when only young children are bowling.

2. Assign a younger children lineup (bowling) order when parents and older siblings are also bowling.

Purpose of This Manual

This manual is designed to provide instructions and guidelines to qualified bowling center operators and maintenance personnel regarding the automated Pinball Wizard system. Operations, servicing, scheduled maintenance and basic trouble-shooting procedures are listed to provide center personnel with the necessary instructions for maintaining the automated Pinball Wizard system in the best possible operating condition.

Equipment problems or issues that are not directly addressed within this manual should be brought to the attention of the Customer Response Center at 1-800-323-8141.

Section 1: General Information

System Overview

The automated bumper system is an electromechanical system that allows the user to conveniently raise and lower the gutters on a lane pair from a remote location. When used with the Frameworx scoring system, the gutters can be controlled automatically for each bowler from the individual scorers consoles.

The system consists of a drive and driven pivot assembly and an automated bumper controller mounted approximately 30' from the foul line in the ball return area. An emergency up switch, mounted on the ball return capping next to the foul line, provides a means of raising the gutters in the event of an emergency.

When installed as a Stand-Alone system (no Frameworx scorers), a system controller is placed at the Control Desk and allows the user to raise and lower selected lanes with automated bumpers. Refer to *Figure 1*.

(1) AUTOMATED BUMPER CONTROLLER
(2) RECEPTACLE
(3) DRIVE & DRIVEN PIVOT ASSEMBLY
(4) EMERGENCY UP SWITCH
(5) CONTROL DESK
(6) FOUL LINE
(7) SYSTEM CONTROLLER

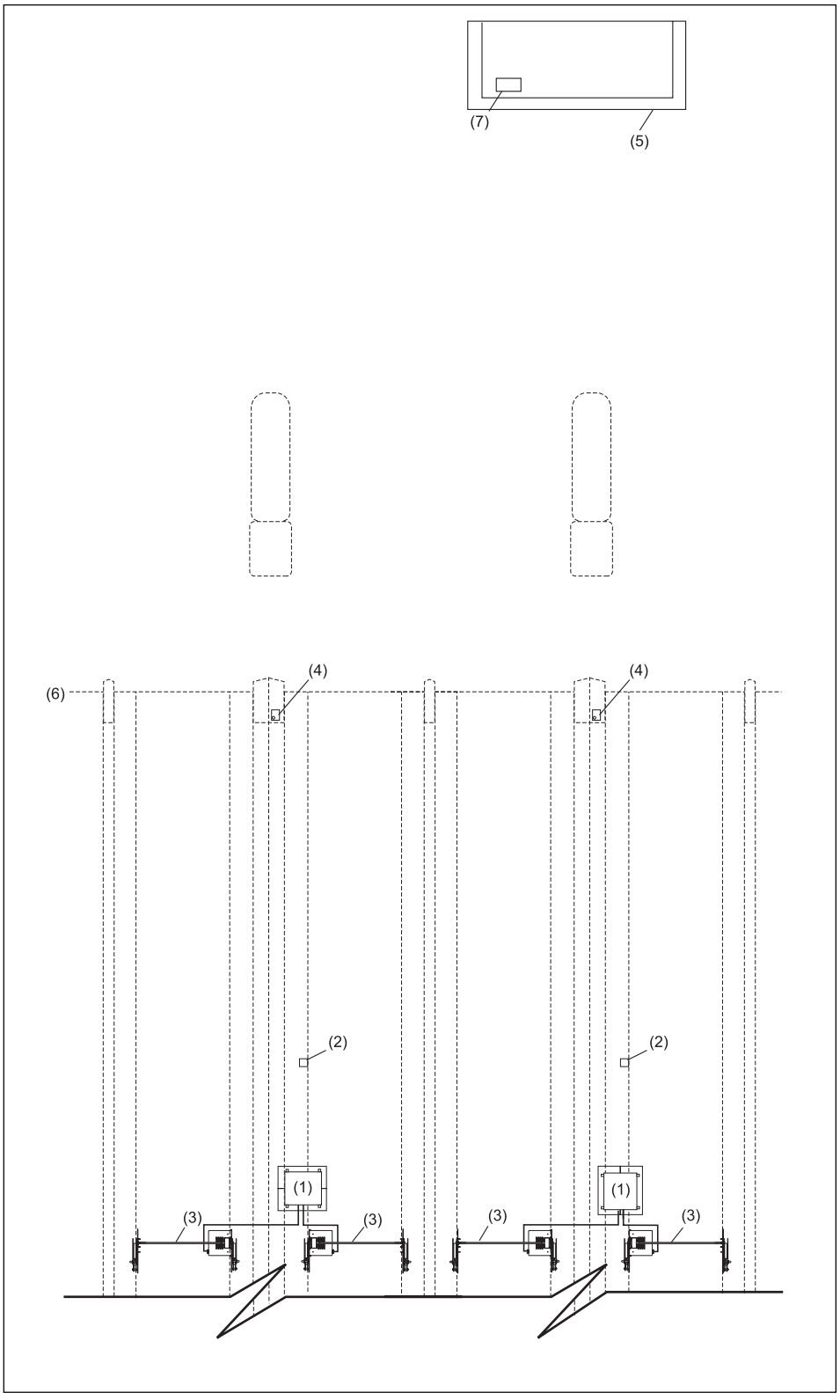


Figure 1. Overview - Stand Alone Configuration

Automated Bumper Controller

Commonly referred to as the control “Box”, the automated bumper controller consists of a single printed circuit board (PCB). The main function of this PCB is to supply and control power to the actuator motors of the lane pair.

The PCB determines when to raise or lower the gutters based on information it receives from the control desk's System Controller (Stand-Alone installations) or I/O PCB (Frameworx scorer installations).

The emergency up switch mounted on the ball return capping, overrides any information received from the System Controller or I/O PCB causing the automated bumper controller to raise the gutters. Refer to *Figure 2*.

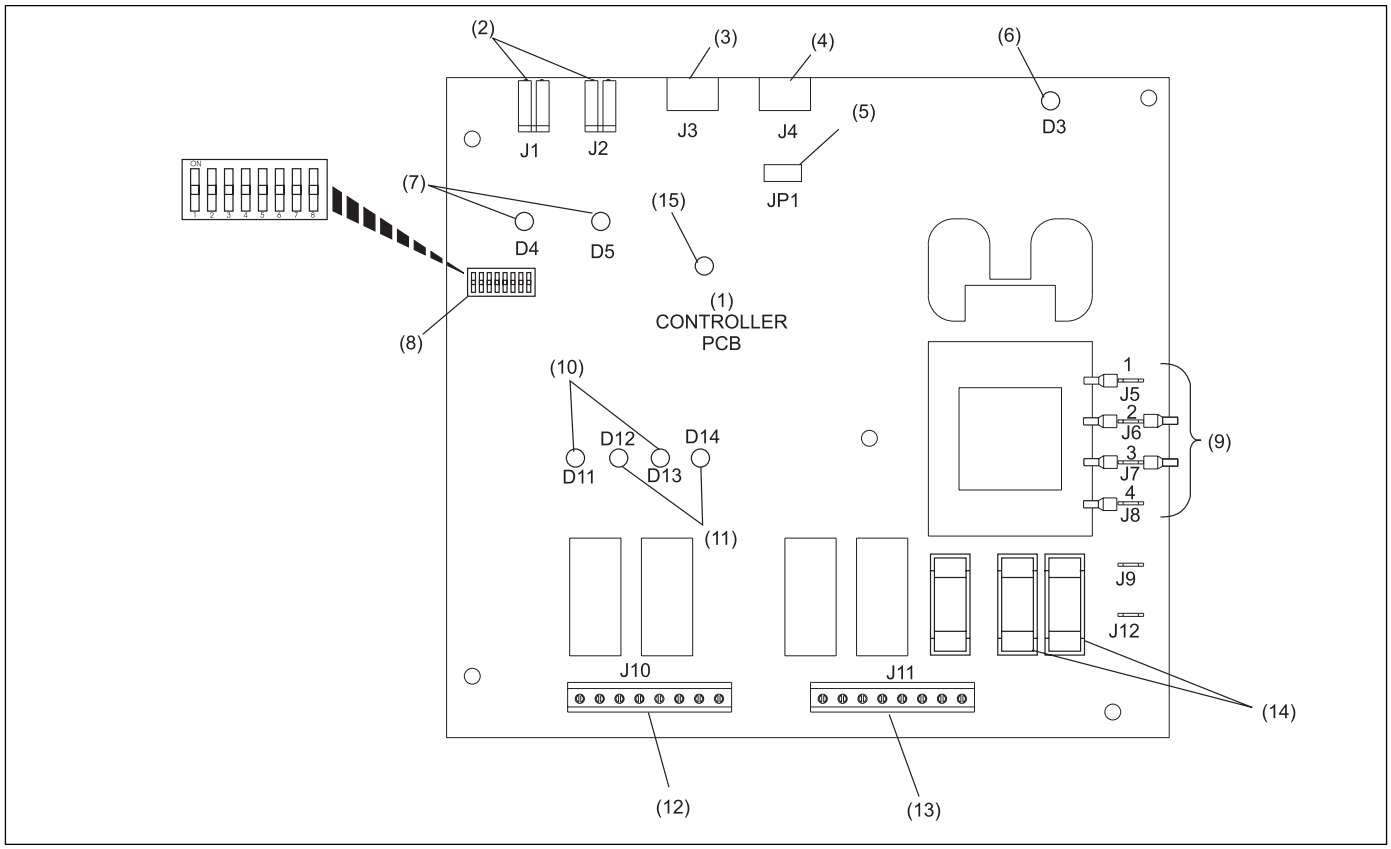


Figure 2. Automated Bumper Controller PCB

(1) CONTROLLER PCB
(2) EMERGENCY UP SWITCH INPUT
(3) COMMUNICATIONS IN
(4) COMMUNICATIONS OUT
(5) TERMINATION JUMPER
(6) POWER LED
(7) EMERGENCY UP LED
(8) CONFIGURATION DIP SWITCHES
(9) POWER TRANSFORMER JUMPERS
(10) GUTTER UP LEDS
(11) GUTTER DOWN LEDS
(12) ACTUATOR MOTOR OUTPUT LEFT LANE
(13) ACTUATOR MOTOR OUTPUT RIGHT LANE
(14) MOTOR FUSES
(15) HEARTBEAT LED

The functions of the automated bumper controller PCB are:

- *Actuator Motor Output - Left Lane (J10*) - Terminal block used to output voltage to the left lane actuator motor. The motor should be wired according to the color-coded label located next to the terminal block.

- *Actuator Motor Output - Right Lane (J11*) - Terminal block used to output voltage to the right lane actuator motor. The motor should be wired according to the color-coded label located next to the terminal block.

- *Communication In (J3)* - Input for communication entering the PCB. On the first lane pair for Stand-Alone configurations, this information comes from the system controller located at the control desk. Refer to *Figure 2*. For additional lane pairs in a Stand-Alone system the cable comes from the prior lane pair bumper controller. Refer to *Communications Out (J4).* For installations with Frameworx scorers, the input data to J3 is sent from the I/O PCB - J2.

NOTE: *A LLAN Breakout PCB is mounted in either the lane group processor, or Frameworx scorer console, and allows easy cabling to the existing Frameworx local LAN.*

- *Communication Out (J4)* - This connection allows the information entering the PCB at J3 to continue out of the PCB to other devices. For stand alone systems, the J4 port attaches to the next lane pair's automated bumper controller. If automated bumper controller is for the last lane pair with automated bumpers, a jumper (terminator) must be installed on pins 2 and 3 of JP1. Refer to *Figure 3.*

- *Emergency Up Switch Connectors (J1 and J2)* - When activated, the emergency up switch for that specific lane pair, triggers the controller PCB and overrides any current command or condition to immediately raise the gutters on both lanes. J1 port is for left lane gutters and J2 is for right lane gutters.

- *Termination Jumper (JP1*) - The termination jumper is used to terminate the communications line for the last lane pair in a Stand-Alone system. Set the jumpers as shown in *Figure 3.*

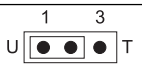
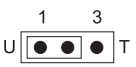
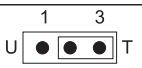
INSTALLATION LOCATION	*SETTINGS*
Frameworx Scorers	
Stand-Alone (all but last lane pair)	
Stand-Alone (last lane pair only)	

Figure 3. Termination Jumper (JP1).

- *DIP Switch Configuration* - These two-position ON-OFF switches provide lane address identification to the controller PCB. When Frameworx scorers are installed, ALL DIP switches must be set to OFF. For Stand-Alone systems, the DIP switches MUST be set as listed in *Figure 4*.

Lane No.	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
1-2	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
3-4	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
5-6	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
7-8	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
9-10	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
11-12	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
13-14	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
15-16	ON	ON	ON	ON	OFF	OFF	OFF	OFF
17-18	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
19-20	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
21-22	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
23-24	ON	ON	ON	OFF	ON	OFF	OFF	OFF
25-26	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
27-28	ON	ON	OFF	ON	ON	OFF	OFF	OFF
29-30	ON	OFF	ON	ON	ON	OFF	OFF	OFF
31-32	ON	ON	ON	ON	ON	OFF	OFF	OFF
33-34	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
35-36	ON	ON	OFF	OFF	OFF	ON	OFF	OFF
37-38	ON	OFF	ON	OFF	OFF	ON	OFF	OFF
39-40	ON	ON	ON	OFF	OFF	ON	OFF	OFF
41-42	ON	OFF	OFF	ON	OFF	ON	OFF	OFF
43-44	ON	ON	OFF	ON	OFF	ON	OFF	OFF
45-46	ON	OFF	ON	ON	OFF	ON	OFF	OFF
47-48	ON	ON	ON	ON	OFF	ON	OFF	OFF
49-50	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
51-52	ON	ON	OFF	OFF	ON	ON	OFF	OFF
53-54	ON	OFF	ON	OFF	ON	ON	OFF	OFF
55-56	ON	ON	ON	OFF	ON	ON	OFF	OFF
57-58	ON	OFF	OFF	ON	ON	ON	OFF	OFF
59-60	ON	ON	OFF	ON	ON	ON	OFF	OFF
61-62	ON	OFF	ON	ON	ON	ON	OFF	OFF
63-64	ON	ON	ON	ON	ON	ON	OFF	OFF
65-66	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
67-68	ON	ON	OFF	OFF	OFF	OFF	ON	OFF
69-70	ON	OFF	ON	OFF	OFF	OFF	ON	OFF
71-72	ON	ON	ON	OFF	OFF	OFF	ON	OFF
73-74	ON	OFF	OFF	ON	OFF	OFF	ON	OFF
75-76	ON	ON	OFF	ON	OFF	OFF	ON	OFF
77-78	ON	OFF	ON	ON	OFF	OFF	ON	OFF
79-80	ON	ON	ON	ON	OFF	OFF	ON	OFF

NOTE: *For installations with Frameworx scorers all switches must be "OFF".*

Figure 4. DIP Switch Settings (Stand - Alone)

LEDs

Several LEDs are located on the controller PCB to indicate various operating functions/conditions. Refer to *Figure 2* for LED locations on the controller PCB. The LED functions are:

- *Gutter Up LEDs (D11, D13)* - These LEDs light to indicate that the gutters are in the UP position. LED D11 is for left lane and D13 is for right lane gutters.

- *Gutter Down LEDs (D12, D14)* - These LEDs light to indicate that the gutters are in the DOWN position. LED D12 is for left lane and D14 is for right lane gutters.

- *Emergency UP LEDs (D4, D5)* - These LEDs light whenever the emergency up switch is used to raise the gutters.

- *Power LED (D3)* - This LED lights to indicate the presence of DC 12V power.

- *Heartbeat LED (D10)* - This LED flashes to indicate the presence of communication to the Frameworx scorer or the system controller in a stand alone system. When communication is present, the LED will light in a FLASH, FLASH, PAUSE sequence.

Fuses

There are three fuses located on the controller PCB. Refer to *Figure 2.*

- *Power Fuse* - A .25 amp main power fuse.

- *Motor Fuses* - Fuses for the actuator motors. Fuses are field installed during installation based on input voltage. 115VAC = 1.6 amp, 230VAC= .8 amp

NOTE: *Fuse F2 is for right lane actuator motor and F3 is for left lane actuator motor.*

Power Transformer Jumpers (J5 through J8)

These jumper terminals allow the user to setup the controller for 115VAC or 230 VAC input. Refer to *Figure 5* for jumper locations for 115VAC power source and *Figure 6* for 230VAC power source.

(1) CONTROLLER PCB
(2) 115V JUMPER CONFIGURATION
(3) ATTACH TO ENCLOSURE
(4) RECEPTACLE

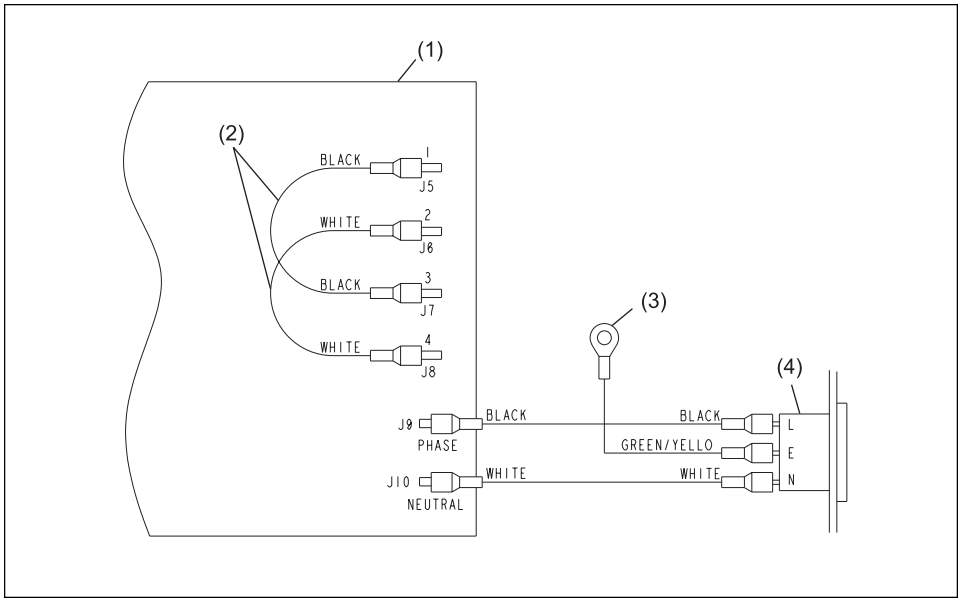


Figure 5. Power Jumper Settings - 115VAC

(1) CONTROLLER PCB
(2) 230V JUMPER CONFIGURATION
(3) ATTACH TO ENCLOSURE
(4) RECEPTACLE

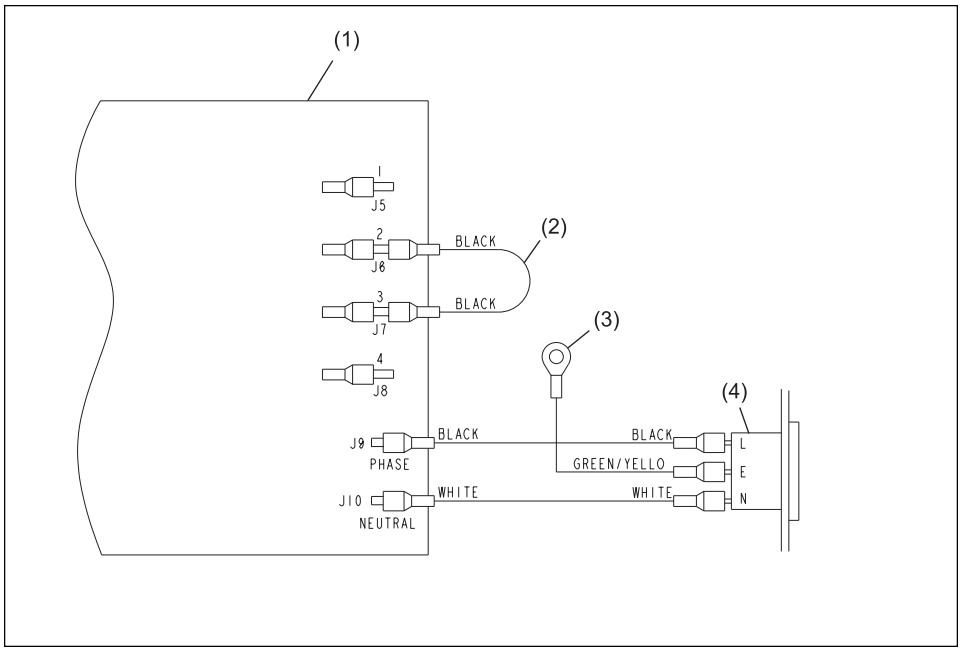


Figure 6. Power Jumper Settings - 230 VAC

System Controller for Stand - Alone Systems

A System Controller is located at the Control Desk in centers not equipped with Frameworx scoring systems. The controller allows the desk operator to raise or lower the gutters on a lane(s). Refer to *Figure 7*.

(1) POWER IN
(2) POWER SWITCH
(3) SHIFT DATA PORT
(4) SERIAL PORT
(5) CONTRAST
(6) AUDIO IN (NOT USED)
(7) AUDIO OUT (NOT USED)

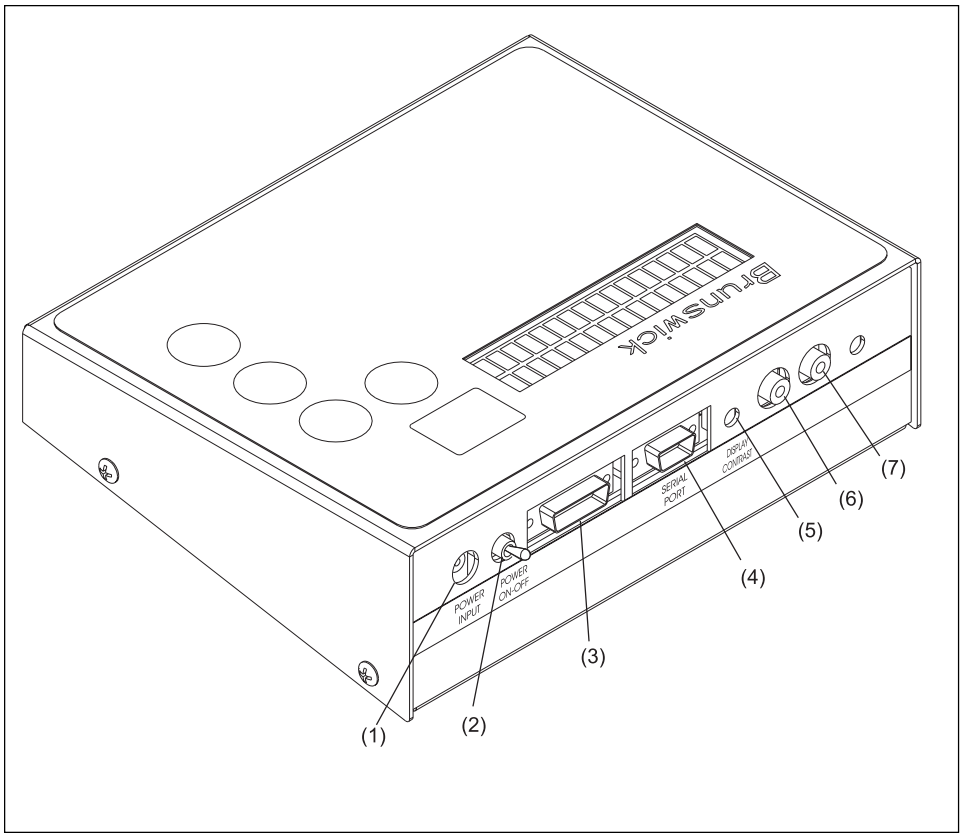


Figure 7. System Controller - Rear Connector Ports and Controls

The controller functions/features are:

- *Power In* - Connection for the main power for the controller.
- *Power Switch* - Main Power, On/Off toggle switch.
- *Shift Data Port* - Not used.
- *Serial Port* - Connection for communication cable going to the automated bumper controller (first lane pair).
- *Display Contrast* - Rotate this control to adjust the LCD screen for best visibility.
- *Audio* - Not used.

Operational Check of System

NOTE: *The following steps are performed at the Frameworx scorer and require Frameworx Scorer software version 4.0 or higher. They are basic commands and/or status messages used to verify system operation after installation or during system troubleshooting. General bumper system operation is listed under the* "Automated Bumper - Control Desk".

1. Choose the *"Select Diagnostics Function"* menu, enter password and press OK.

2. Select *"Bumpers Configuration"* and press OK.

3. Choose *"Left Lane or Right Lane Configuration"* and press OK.

4. Select *"Enable Bumpers"* and press OK.

5. Scroll down to the *"Close Channels"* option and press OK. The gutters should close.

NOTE: *Reset switch status before each check.*

6. Scroll down to *"Open Channels"* and press OK. The gutters should open.

7. Repeat steps 3-6 for other lane pair.

8. Press CANCEL to return to Frameworx scorer screen.

Automated Bumper System Operation with Frameworx Scorers - Control Desk

Turn On Automated Bumpers While Issuing a Lane

NOTE: *Perform the following steps at the Control Desk CMS terminal:*

1. Select LANE NUMBER(S) for automated bumper system.

2. Press **LANE ON** key.

3. While "check in" screen is displayed, press the ↑ key. The automated bumper system is now available to the bowlers on that lane. Press the ↑ a second time to disable automated bumpers.

NOTE: *The status of the automated bumpers is displayed by a "W" in the RATE box while the "check in" screen is displayed. When the letter "W" is present, automated bumpers are available to the bowlers on the selected lane or lane range. Automated bumpers will need to be enabled for the appropriate bowlers as names are entered at the automatic scorer. Names that were previously entered, entered via the Waiting List, entered via "Download Open Party" or entered via "View/Correct Scores" will have to be edited at the automatic scorer to activate for the appropriate bowler(s).*

Enable Automated Bumpers from the Waiting List

At the Waiting List Screen

1. Press "A" to add a party to the waiting list.

2. Type the party name and press **ENTER**.

3. Type the number of bowlers in the party and press **ENTER**.

4. Use the arrow keys to highlight the scoring unit available and press **ENTER**.

5. Use the arrow keys to highlight "Bumpers" on the on the Centers Services List. Press **ENTER** to select bumpers. (An asterisk will display when bumpers are selected.) Pressing **ENTER** a second time deselects bumpers. Press **ENTER SCREEN** when all of the desired Center Services have been selected.

6. Proceed with step 6 as listed in the *Control Desk Operations Guide 57-900355-000,* pages 3-2 through 3-3.

Turn On Automated Bumpers After Lane Has Been Issued

NOTE: *Operators can choose one of two methods to turn on the automated bumpers after a lane has been issued.*

Method One

1. Press **SCORER STATUS** key.
2. Enter the lane number and/or lane range and press the ↑ key.
3. The prompt “Lift bumpers for everyone? Y/N” will appear.
4. If **Y** (yes) is selected, ALL bowler names for that lane number/lane range will have automated bumpers activated.
5. If **N** (no) is selected, the appropriate bowler name(s) will have to be edited at the scorer.

Method Two

1. Enter lane number(s) and press **ADJUST** key.
2. With "ADJUST" screen displayed, press ↑ key. Bumpers are now available for bowler(s) on this lane.
3. Press **ADJUST** key again to exit.

Turn Off Automated Bumpers While a Lane is in Use

NOTE: *Operators can choose one of two methods to turn off the automated bumpers while a lane is in use.*

Method One

1. To disable the automated bumper system:
   a. Enter the lane number or lane range.
   b. Press **U** key and then the ↑ key. Automated bumpers are no longer available for that lane/lane range.

Method Two

1. Enter lane number(s) and press "ADJUST" key.
2. With adjust screen displayed, press the ↑ key. Bumpers are no longer available for bowler(s) on this lane.
3. Press adjust key again to exit.

Raising/Resetting Bumpers During an Emergency - Control Desk

1. EMERGENCY UP - Enter lane number or lane range and press ↑ key.

2. To reset bumpers after an Emergency UP command has been given OR the Emergency UP switch has been pressed:

   a. Enter lane number or lane range and press ↑ key.

   b. At the prompt, “Bumpers are in emergency up. Do you want to turn off emergency up? Y/N". Enter **Y** to lower bumpers and return to normal operation. If **N** is entered, bumpers will remain in the emergency UP position.

Automated Bumper System Operation - Frameworx Scorer

Edit Existing Bowler Names at the Scorer

1. Press **BOWLER** and then **EDIT.**
2. Use the ↑ and ↓ keys to highlight bowler name to be edited and press OK.
3. Press the ↑ or ↓ key to highlight AUTOMATED BUMPERS mode.
4. Use ← or → key to turn bumper on or off for that bowler. Press OK when finished.

Adding New Bowler Names with Automated Bumpers

1. Press **BOWLER** and then **ADD.**
2. Enter bowler name and press ↓ key.
3. Use ← or → to select left or right-handed coach display and then press ↓ key.
4. Use ← or → key to select (turn on) automated bumpers for specified bowler name.
5. Press **DONE** or **NEXT** to add another bowler with automated bumpers.

System Controller - Initial System Setup - Stand Alone Configuration

After completing the installation of automated bumper system components, the system controller at the control desk must be programmed to specify which and how many lanes within the center have automated bumpers installed.

Perform the following steps:

1. Place toggle switch on rear of unit up (ON) position. Refer to *Figure 8* for switch/button locations.

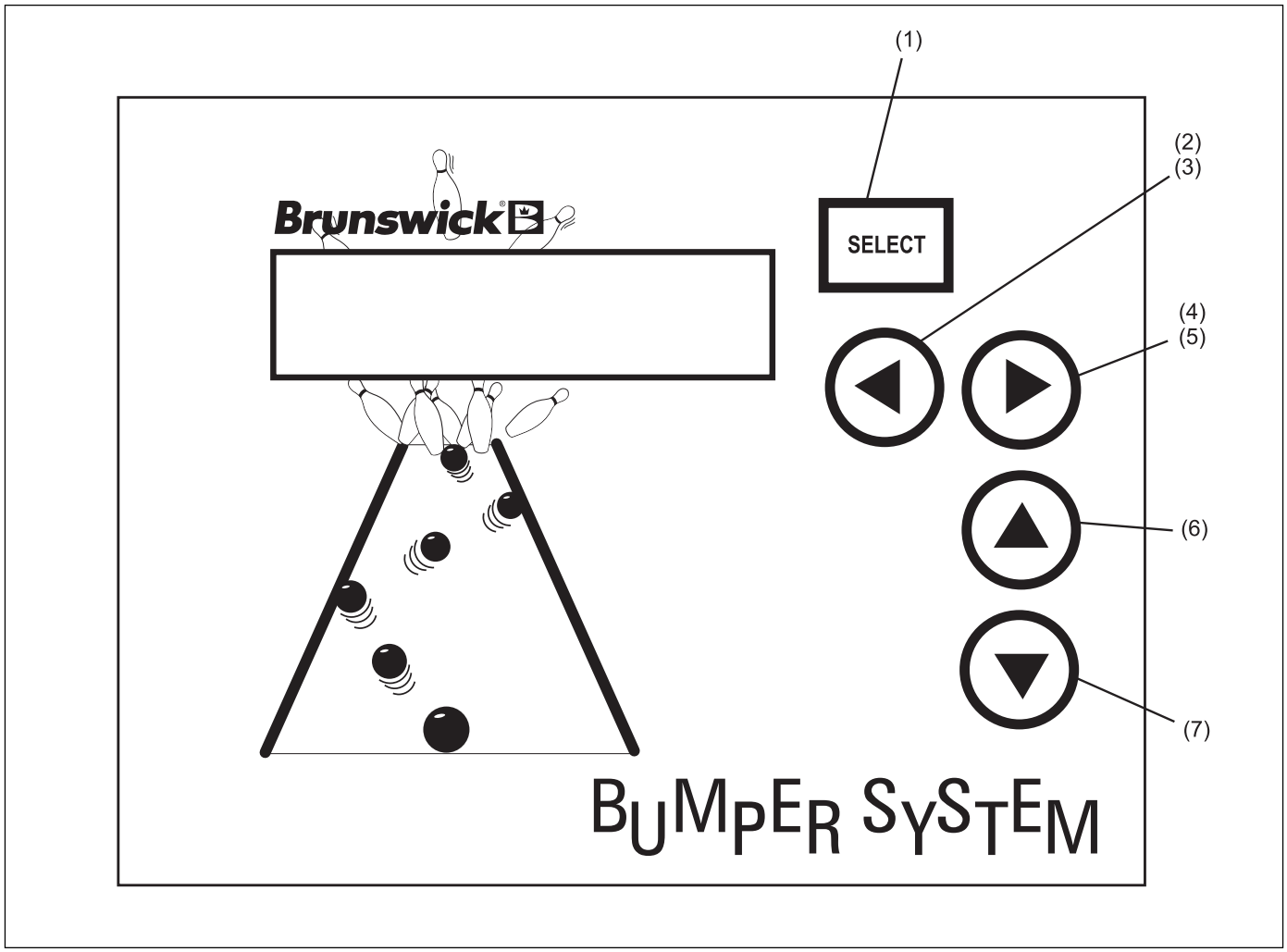


Figure 8. System Controller - Stand Alone Configuration

(1) SELECT "ENTER" KEY

(2) LANE NUMBER SCROLL DOWN KEY

(3) "NO" KEY (AUTOMATED BUMPERS INSTALLED?)

(4) LANE NUMBER SCROLL UP KEY

(5) "YES" KEY (AUTOMATED BUMPERS INSTALLED?)

(6) RAISE CHANNEL KEY

(7) LOWER CHANNEL KEY

2. On the LCD display, the prompt, "*ENTER FIRST LANE WITH AUTOMATED BUMPERS: 01"* will appear.

3. Use the ▸ (up) arrow key to identify the first lane number with automated bumpers installed.

4. Press **SELECT** key. The last lane prompt is now displayed.

5. Use the ▸ (up) and ◂ (down) arrow keys to identify the *last* lane number with automated bumpers installed.

6. Press **SELECT** to accept the lane number data.

Lane Configuration Mode - Stand - Alone

NOTE: *It is initially assumed that all lanes from the start to the end lane will have the automated bumpers installed - all lanes will be set to "Y" (YES - automated bumpers installed). If this is the case, pressing SELECT will end the lane configuration mode immediately.*

Those lanes that do NOT have automated bumpers must be identified as follows:

7. With the prompt " AUTOMATED BUMPERS LN 00? -Y PRESS SELECT TO END" displayed,

   a. Use the ▸ (up) and ◂ (down) arrow keys to scroll through the lane numbers.

   b. Press **SELECT** when desired lane appears.

   c. Press ▸ (yes) or ◂ (no) key to identify each specific lane.

   d. To change from a no automated bumpers installed status back to yes (automated bumpers installed), press the ▸ key.

   e. Press **SELECT** to end the lane configuration mode.

Confirm Lane Configuration - Stand - Alone

To verify that the lane configuration data has been entered correctly, the following prompt will appear:

"*SETUP COMPLETE? UP = YES DOWN=NO*"

1. Press ▶ (YES) key to confirm that the setup is complete; the normal (default) mode is then displayed on the LCD.

2. If ◀ (NO) is pressed, ALL setup data is cleared, and the setup will start over again with the prompt *'ENTER FIRST LANE WITH AUTOMATED BUMPERS: 01*."

NOTE: *If the setup data is corrupted or lost, it will be cleared and the initial setup prompts will be displayed again. The operator MUST perform the steps listed under "System Controller - Initial System Setup" again. In addition, the operator may change current configuration of lane (i.e. add/remove bumper mode) using same steps.*

Diagnostics Mode - Stand - Alone Controller

The diagnostics mode is designed to allow automated bumpers system installers and/or field service personnel to make adjustments and check status of switch on the drive pivot assembly. Only one lane at a time is affected under the diagnostics mode.

1. Press and hold **SELECT** key for five seconds to access the diagnostics mode.

2. The currently selected lane is displayed:

   "DIAG LN01 COARSE
   *OPEN = 0 CLOSE = 1"

3. Press ▶ key to scroll lane number up or ◀ key to scroll lane number down. Lane numbers without automated bumpers installed are automatically skipped.

4. Press **SELECT** key to toggle between full open/close, coarse and fine adjustment modes.

5. Press ▲ arrow key and continue to press and release to move channel UP in the selected increments.

6. Press ▼ key and press repeatedly to move channel DOWN in the selected increments.

NOTE: *While in diagnostics mode, the opening and closing status messages are not displayed*.

7. Press and hold the **SELECT** key for five seconds to disable and exit the diagnostics mode.

Initially, the default lane will be the first lane in the center that has automated bumpers installed and the following prompt is displayed:

"AUTOMATED BUMPERS LANE O1"

Individual Lane Selection

1. Press ▸ key to scroll up or ◂ to scroll down until desired lane number is displayed.

2. Press ▲ arrow key to raise channels (bumpers) for specified lane. Press ▼ key to lower channels for specified lane.

Selecting Lane Range

1. With prompt *"AUTOMATED BUMPERS O1"* displayed, press **SELECT** key. Two up arrows are shown on LCD display beneath starting lane number.

2. Use ▸ key to scroll up until desired starting lane is displayed.

3. Press **SELECT** key again to specify the ending lane number. Two arrows are displayed beneath the current (ending) lane number.

4. Press ▸ or ◂ keys to scroll up or down until desired ending lane is displayed.

5. Press ▲ key to raise channels for selected lane range. Press ▼ key to lower channels for selected lane range.

NOTE: *Starting lane range may never be less than the first lane in the center that has automated bumpers installed and ending lane range not greater than last lane with automated bumpers. Pressing and holding either the ▲ ▼ keys for more than 0.5 seconds will scroll the starting lane lumber at a rate of 1 lane every 0.5 seconds until the maximum or minimum lane has been reached. Pressing the* ***SELECT*** *key a third time will return to the default prompt allowing the operator to select one lane at a time.*

Lanes that do ***NOT*** *have automated bumpers installed are automatically skipped over when selecting lane range.*

If a selected range of lanes includes lanes that are not all in the same state (opened or closed), pressing the ▲ key will raise all channels that are not currently raised. Pressing the ▼ key will lower all channels that are not currently lowered.

Error Messages

There are five error messages that may appear on the LCD display;

- Could not open channel
- Could not close channel
- Communication error
- Invalid Switch State
- COM LINE DOWN - (All communication with ALL automated bumper controllers has been lost)

These messages appear to alert the operator of the displayed condition. Refer to *"Troubleshooting"* section at the rear of this manual for error descriptions and corrective action.

Resetting Emergency UP Switch Conditions

When the emergency UP switch is pressed on any of the lanes, it overrides any commands from the system controller and immediately opens the channels on the affected lane. The following prompt appears on the controller LCD display:

"EMERGENCY UP 01
PRESS SEL TO CLR"

1. Press **SELECT** key to reset an emergency UP condition. Normal automated bumper operation is restored on the affected lane.

Replacing the LLAN PCB (Part Number 57-300790-000)

If it becomes necessary, replace the LAN breakout PCB within the Frameworx scorer or lane group processor (LGP) following instructions below. Refer to *Figure 9.*

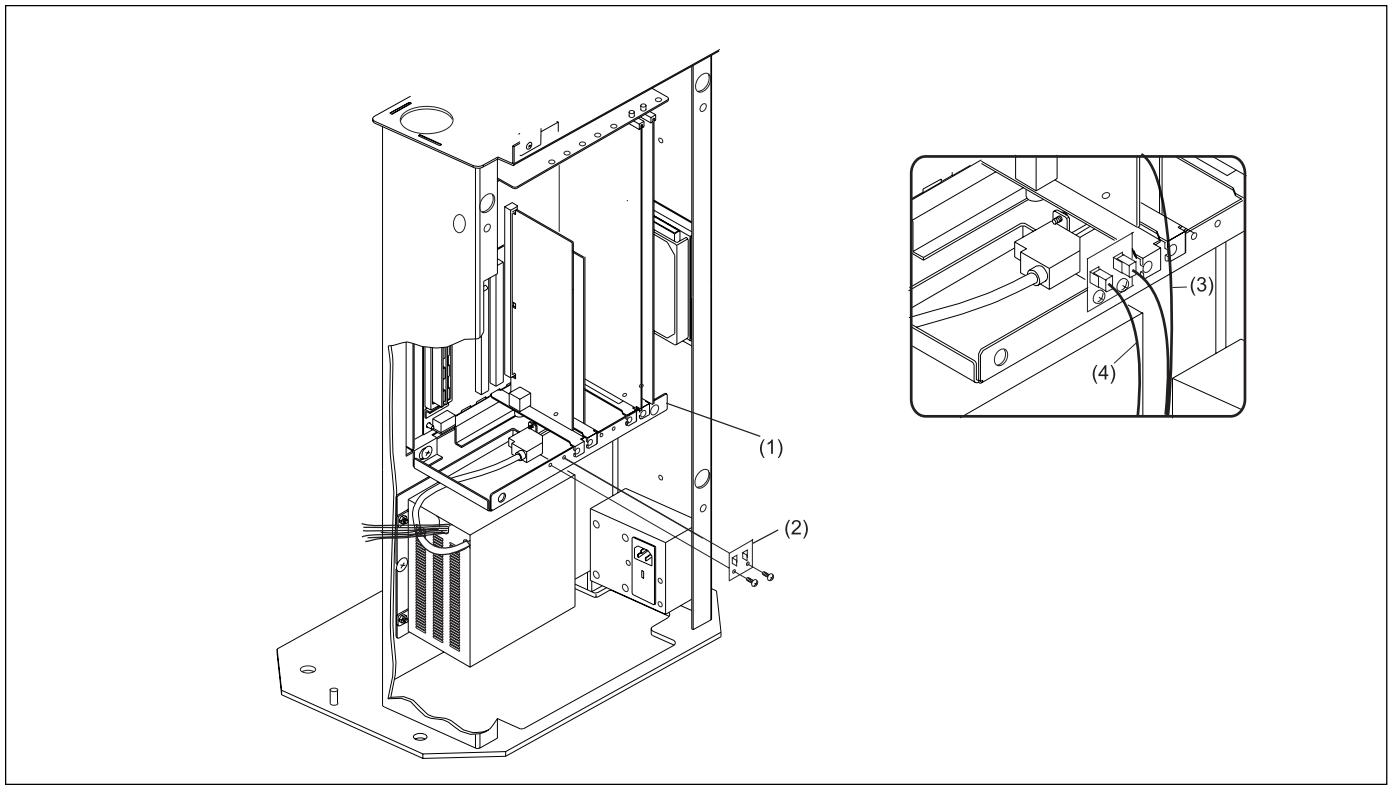


Figure 9. Replacing Breakout Local LAN PCB

(1) POWER CHASSIS
(2) LLAN BREAKOUT PCB
(3) RECONNECT LANE CABLE
(4) RECONNECT LLAN CABLE

1. Unplug the two cable connections to the LLAN breakout PCB.
2. Loosen two screws securing LLAN breakout PCB to scorer or LGP chassis and remove PCB.
3. Install new breakout LLAN PCB (part number 57-300790-000, package number 17-860787-000).
4. Reinstall two screws to secure PCB.
5. Plug existing LAN cable connection into J2 port of LLAN breakout PCB and the lane cable connector into J1 port of the LLAN breakout PCB. Refer to *Figure 9.*

Cable Replacement

It may become necessary to replace a cable in the automated bumper system. Refer to *Figures 10, 11, and 12* for the basic cable routing and connections.

NOTE: *It is critical that cable routing beneath the lanes does NOT interfere with the ball return path or moving automation components.*

(1) SYSTEM CONTROLLER
(2) POWER
(3) SERIAL PORT
(4) 17-300235-000 FRONT DESK CONTROLLER TO CONTROLLER CABLE ASSEMBLY
(5) AUTOMATED BUMPER CONTROLLER PCB
(6) 17-300234-000 AUTOMATED BUMPER CONTROLLER TO AUTOMATED BUMPER CONTROLLER (DAISY CHAIN) CABLE ASSEMBLY
(7) TO J3 OF NEXT LANE PAIR AUTOMATED BUMPER CONTROLLER OR TERMINAL J4
(8) TO MOTOR
(9) 17-300284-000 AUTOMATED BUMPERS EMERGENCY SWITCH CABLE ASSEMBLY
(10) POWER RECEPTACLE
(11) EMERGENCY UP SWITCH

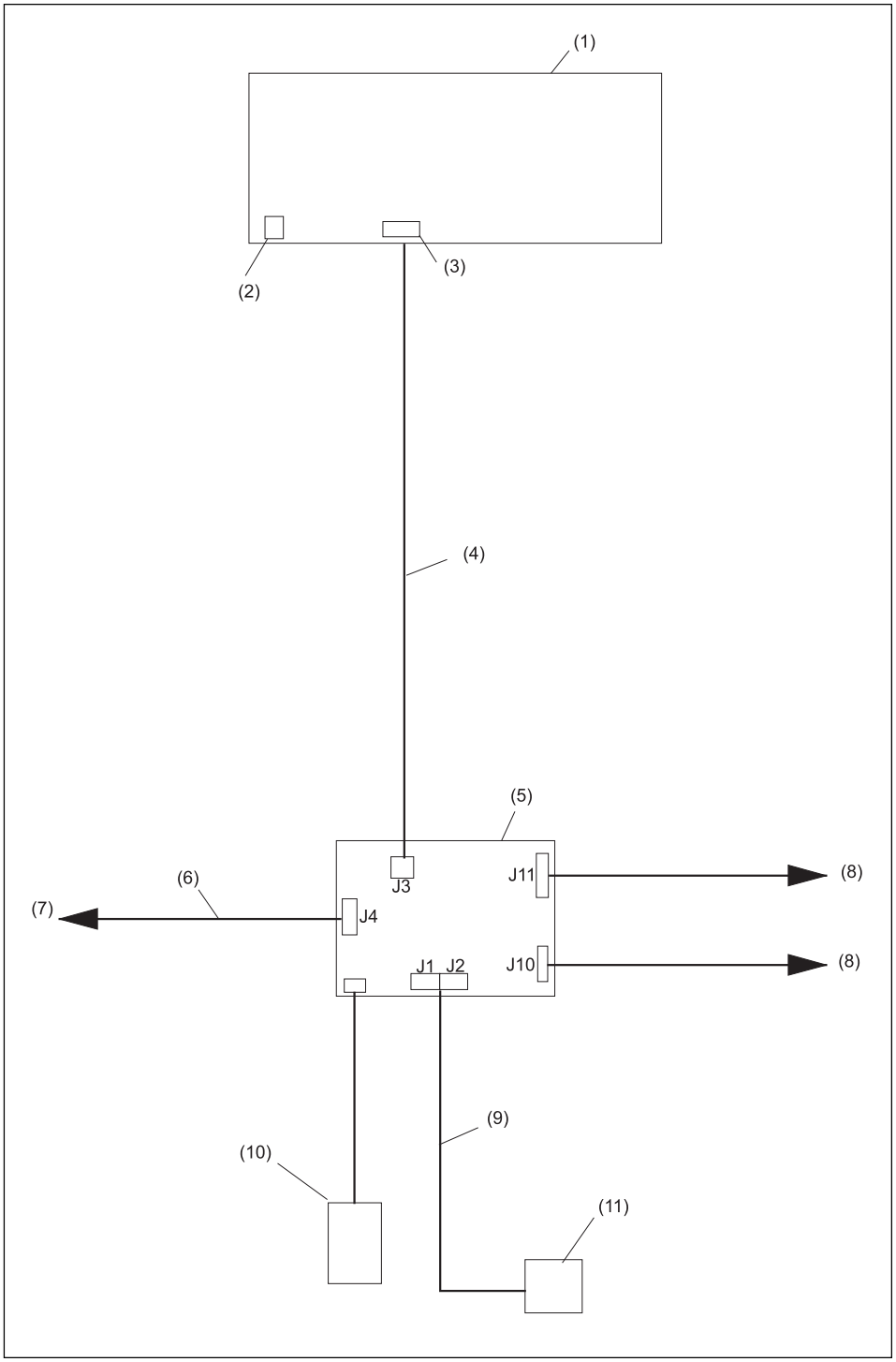
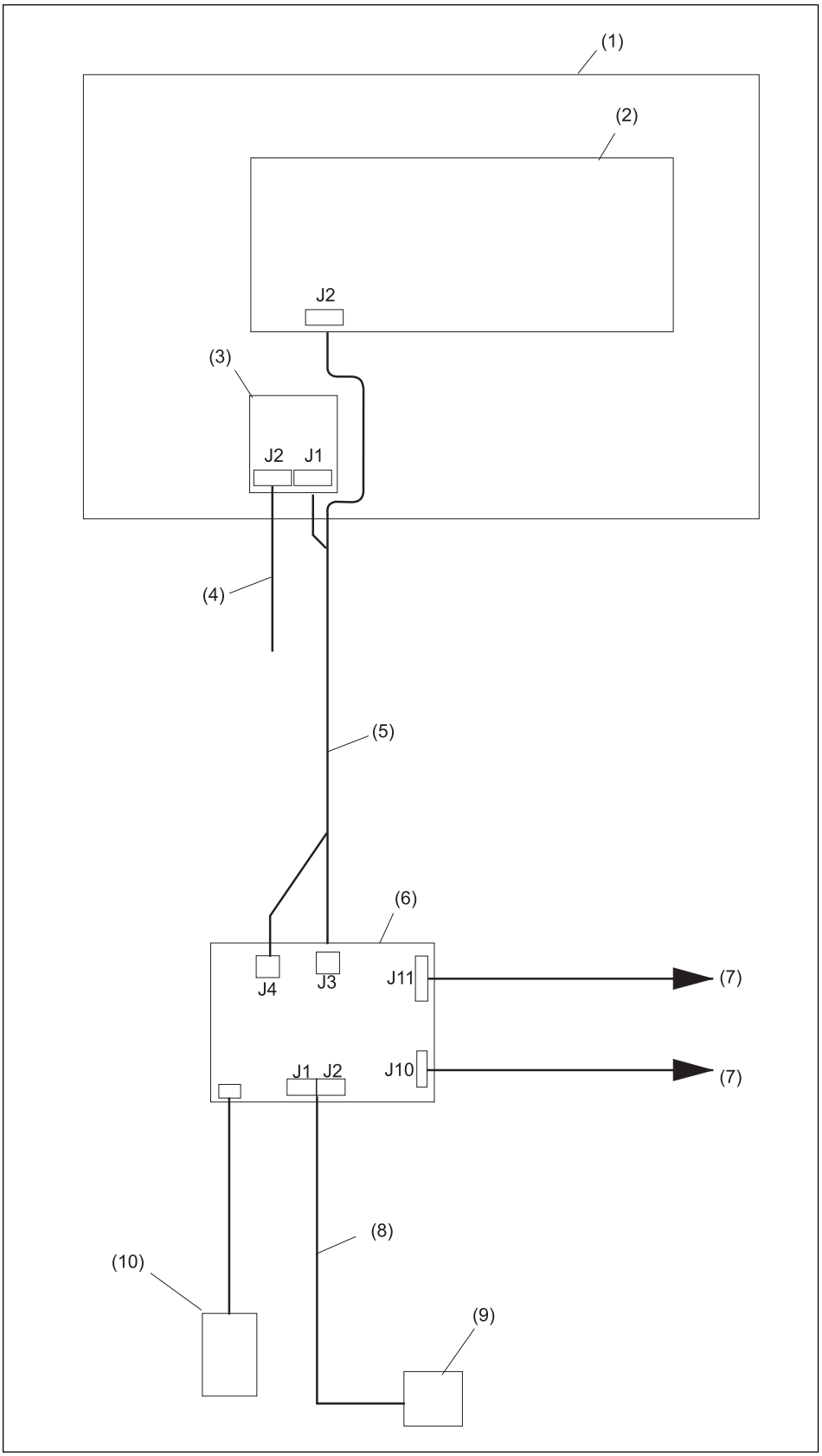


Figure 10. Stand-Alone Cable Routing and Connections



(1) FRAMEWORX LGP OR SCORER
(2) I/O PCB
(3) LLAN BREAKOUT PCB
(4) EXISTING LAN CABLE
(5) 17-300256-000 AUTOMATED BUMPER LANE CABLE ASSEMBLY
(6) AUTOMATED BUMPER CONTROLLER
(7) TO MOTOR
(8) 17-300284-000 AUTOMATED BUMPERS EMERGENCY SWITCH CABLE ASSEMBLY
(9) EMERGENCY UP SWITCH
(10) POWER RECEPTACLE

Figure 11. Frameworx Cable Routing and Connections

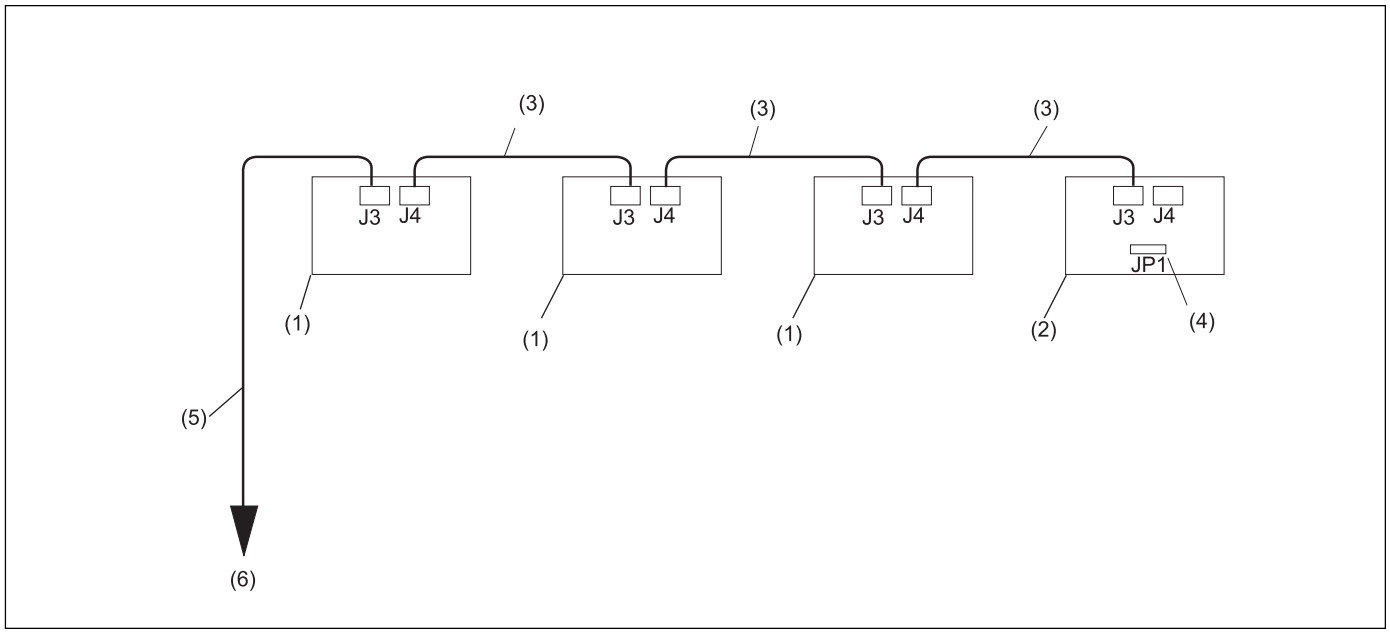


Figure 12. Stand - Alone Daisy Chain Cabling

(1) AUTOMATED BUMPER CONTROLLER PCB
(2) LAST AUTOMATED BUMPER CONTROLLER PCB
(3) 17-300234-000 AUTOMATION CONTROL BOX CABLE ASSEMBLY
(4) JUMPER ON PINS 2 AND 3 OF JP1
(5) 17-300235-000 FRONT DESK CONTROLLER TO CONTROLLER CABLE ASSEMBLY
(6) TO SYSTEM CONTROLLER

Bumper Rail Position Check

IMPORTANT! It is absolutely critical that the bumper rail positions (Opened & Closed) be verified after replacement of drive/driven pivot assemblies. Failure to verify proper rail position may result in damage to mechanical or electrical components of the system!

NOTE: *If using remote box instead of stand-alone controller, make sure lane address settings (DIP switches) inside automated bumper controller are set after bumper rail position check.*

Without Frameworx scorers installed, raising/lowering of the rails is possible through the use of an "automated bumper remote control box" (part number 17-300271-000) hereafter referred to as the "remote box". The remote box plugs into the automated bumper controller and through visual checks of actual rail physical position and the LED indicators on the automated bumper controller PCB, the rail positions and motor cycling can be tested. Only one lane at a time can be operated using remote box.

NOTE: *To use remote box, firmware version (V.13) must be installed within automated bumper controller.*

Perform the following to verify that the drive assembly operates correctly and rails open and close properly.

1. Turn off power to automated bumper controller.
2. Set DIP switches inside automated bumper controller as listed in *Figure 13*.

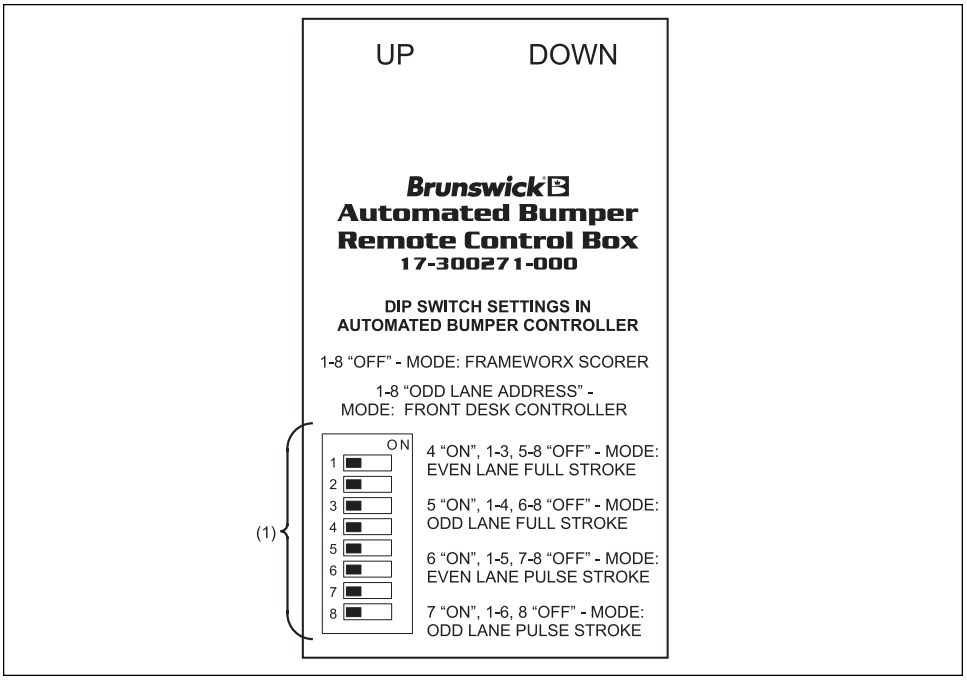


Figure 13. Automated Bumper Remote Control Box

NOTE: *DIP switch settings as listed in* Figure 13 *are for raising/lowering rails for visual check and/or performing adjustments to the system only! All DIP switch settings within automated bumper controller MUST be set to OFF before using Frameworx scorers or set to proper lane address with stand-alone controller configuration.*

3. Plug the remote box connector marked “UP” into the J1 port of the automated bumper controller (left lane). Plug the connector marked “DOWN” into the J2 port of the automated bumper controller (right lane).

NOTE: *Gutter (rail) UP and DOWN LEDs shown in* Figure 14 *are primarily intended for the automated BallWall system. LED indications are not critical to system operation but merely indicate motor position.*

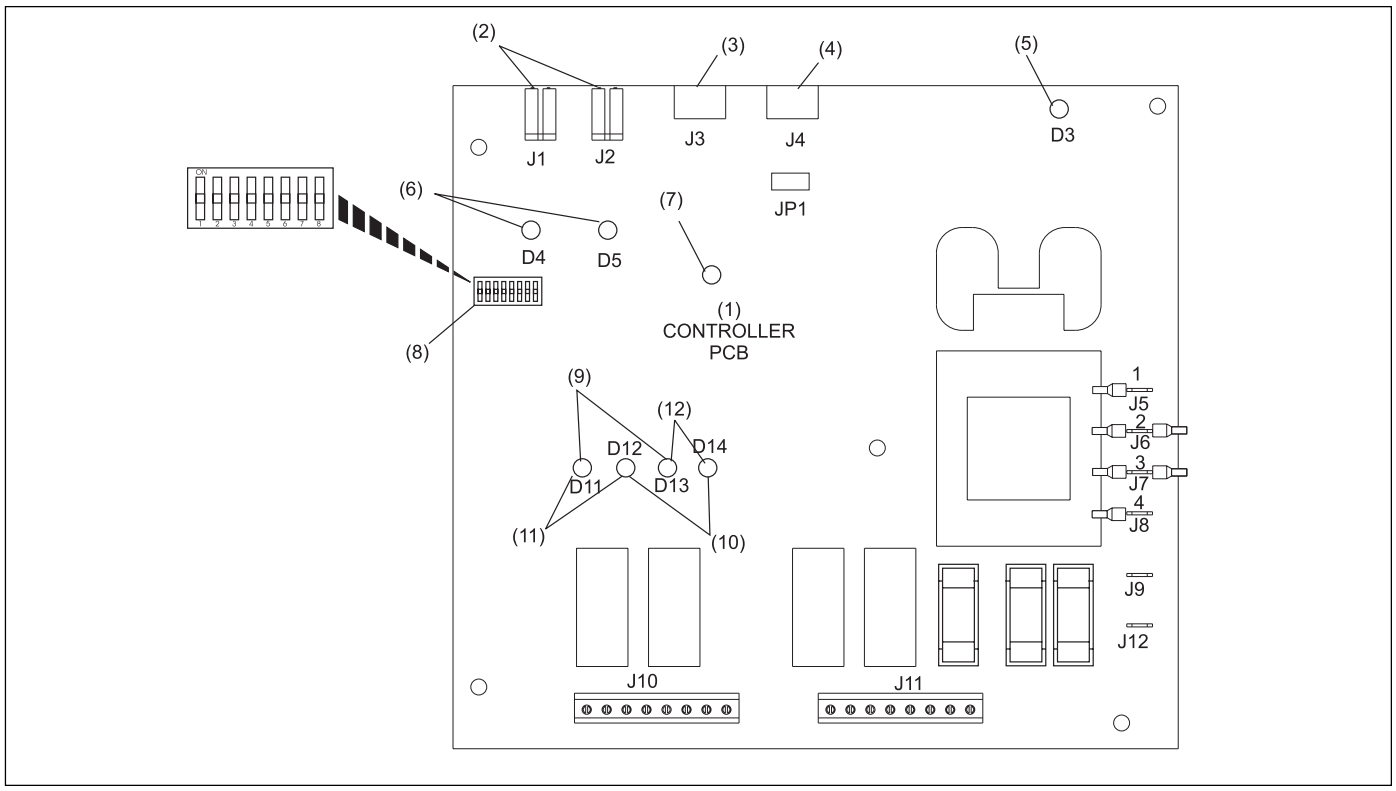


Figure 14. Gutter Position LEDs

(1) CONTROLLER PCB
(2) EMERGENCY UP SWITCH INPUT
(3) COMMUNICATIONS IN
(4) COMMUNICATIONS OUT
(5) POWER LED
(6) EMERGENCY UP LED
(7) HEARTBEAT LED
(8) CONFIGURATION DIP SWITCHES
(9) GUTTER UP LEDS
(10) GUTTER DOWN LEDS
(11) LEFT LANE
(12) RIGHT LANE

4. Turn on the automated bumper controller and press "UP" button on front of remote box. Listen for cycling of drive pivot motor assembly and visually verify that rails raise fully. If motor cycles but fails to reach "full up" position:

   a. Visually inspect the rails for evidence of binding, obstructions, etc.

b. If no obstructions/binding condition is apparent, contact Brunswick at 1-800-323-8141.

5. Press "DOWN" button on front of remote box. Listen for cycling of drive pivot motor assembly and visually verify that rails lower fully. If motor cycles but fails to reach "full down" position:

   a. Visually inspect the rails for evidence of binding, obstructions, etc.

   b. If no obstructions/binding condition is apparent, contact Brunswick at 1-800-323-8141.

Service and Maintenance

The Pinball Wizard system was designed to simplify the required scheduled maintenance or servicing done by the customer. There are no required lubrication instructions to perform and at the time of print of this manual, center personnel are responsible for performing the following maintenance inspections.

NOTE: *The* Troubleshooting *section at the rear of this manual contains corrective actions for system faults. The items listed here are NOT recommended procedures for troubleshooting the system.*

Periodic Inspections

WARNING: The lane(s) being serviced should be placed out of service at the control desk until servicing/inspections are finished. Failure to deactivate lane(s) may cause injury to personnel!

1. At the control desk with "Lane Status" screen displayed:

    a. Press lane number and "HOLD" keys at the same time. Lane is now out of service.

    b. Press lane number and "HOLD" keys at the same time again to make lane available for use.

2. At recommended intervals of 20,000 cycles or six months of operation, visually inspect the set screws on the drive and driven pivot assembly crank arms for security. Tighten set screws as needed.

3. Visually inspect the jam nuts on the connecting link turnbuckles for evidence of wear, looseness, or damage; correct turnbuckles as needed. The required length of assembled turnbuckles is 4.31 to 4.38 “.

4. Inspect the bushings on the rail upright and correct any conditions that may exist.

5. Visually inspect ALL mechanical linkages (i.e. cross lane links, crank arms, rail couplers) for evidence of excessive wear. Replace worn components as needed.

NOTE: *If replacement of drive/driven pivot assemblies is required, a bumper rail position check MUST be performed afterward. Refer to "Bumper Rail Position Check" paragraph in this manual.*

IMPORTANT: All non- operational checks should be done with lane placed in "out of Service" status. Operational checks must be performed by trained, experienced personnel.

1. Rails Don't Raise or Lower.

MECHANICAL SOLUTION		FRAMEWORX ELECTRONICS SOLUTION		STAND ALONE ELECTRONICS SOLUTION	
CHECK	*CORRECTION*	*CHECK*	*CORRECTION*	*CHECK*	*CORRECTION*
Are motors being turned on?	Yes. But no motion results.	Controller Plugged in?	No. Plug it in.	Controller plugged in?	Plug it in.
Are the gutters stuck or bound?	Yes. Correct and retry.	Power LED (D3) lit?	No. Is circuit getting power? If no power flowing to the circuit then correct. Otherwise board failure - replace order 17-860613-400 retain enclosure, hardware and jumpers.	Power LED (D3) lit?	No. Is circuit getting power? If no powerflowing to the circuit then correct. Otherwise board failure - replace order 17-860613-4000 retain enclosure, hardware and jumpers.
Visually inspect using mirror if necessary.	Problem? Note abnormality and refer to installation manual for affected parts. If no problem noted, continue.	Heartbeat LED blinking?	No. LAN connection proceed.	Heartbeat LED blinking?	No. suspect LAN connection proceed.
Motors are being turned on and there is no sticking, binding or abnormality.	Replace drive assembly as needed.	Fuses Blown?	Yes. Replace with appropriate fuse.	Fuses Blown	Yes. Correct
No motor response.	Is motor wired to controller correctly ?If not rewire.	All DIP switches set to off?	No. Set all to off.	DIP switches set to proper lane address?	No. Set per installation manual.
Do controller relays close when commands are issued?	No. Refer to "Electrronics Cause" section	Emergency up cable leads plugged in, and LEDs (D4) and (D5) lit?	No. Reseat connections check all connections at controller and also at switch . Replace switch (17-860799-000) if necessary.	Emergency up cable leads plugged in, and LEDs (D4) and (D5) lit?	No reseat connections check all connections at controller and also at switch . Replace switch 17-860799-000 if necessary.
		LAN cable plugged in and installed correctly?	Yes. Check for defects like loose wire connections, continuity. If necessary order 17-860788-000 to diagnose problem.	Cable connection between front desk and first addressable lane sound?	Check for loose connections . Check continuity, visually inspect if necessary. Order as replacement 17-860791-000 to diagnose problem.
		Breakout PCB OK?	Check Continuity and check for defects		
		Still problems?	Contact Brunswick at 1800-323-8141.	If not first addressable lane is daisey chain cable plugged in and working?	Check continuity inspect for defects. Try a known "good" lane cable on this pair. If necessary order 17-860790-000 to diagnose.
				Still problems?	Contact Brunswick at 1-800-323-8141.

2. Rails keep going into emergency up.

MECHANICAL SOLUTION		FRAMEWORX ELECTRONICS SOLUTION		STAND ALONE ELECTRONICS SOLUTION	
CHECK	*CORRECTION*	*CHECK*	*CORRECTION*	*CHECK*	*CORRECTION*
Check all connections to emergency up cable assembly. Does the front desk show an emergency up status for this lane?	Check connections at switch and controller. Check continuity between both. If necessary order a replacement emergency up cable assembly 17-860799-000. Make sure nobody is in harms way on lane and clear emergency up condition at front desk.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

3. Rails stuck in open/closed position.

MECHANICAL SOLUTION		FRAMEWORX ELECTRONICS SOLUTION		STAND ALONE ELECTRONICS SOLUTION	
CHECK	*CORRECTION*	*CHECK*	*CORRECTION*	*CHECK*	*CORRECTION*
See "Gutters Going Into Emergency Up" in troubelshooting.		Are motor relays contacts stuck closed?	Board failure - replace board P/N 17-860613-400 retain enclosure, hardware, and jumpers.	Are motor relay contacts stuck closed?	Board failure - replace board P/N 17-860613-400 retain enclosure, hardware, and jumpers.

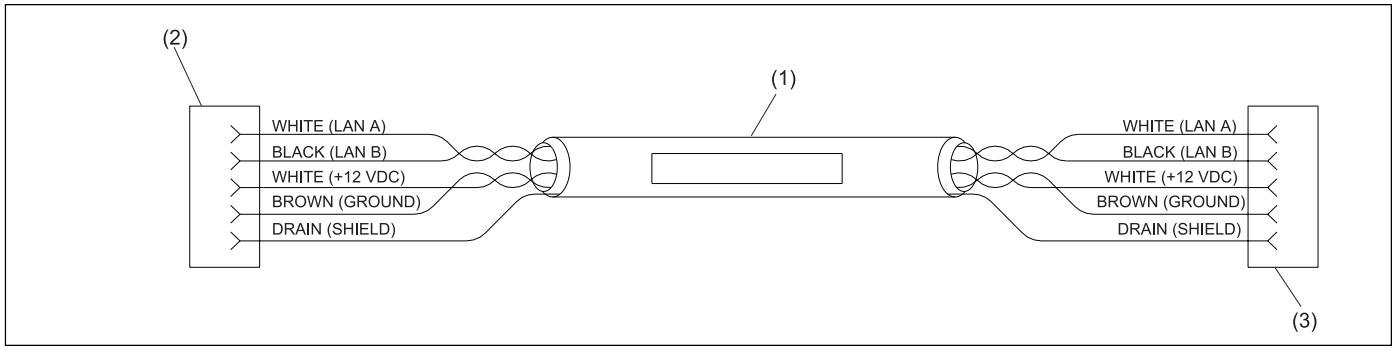
4. Only one rail opens or closes.

MECHANICAL SOLUTION		FRAMEWORX ELECTRONICS SOLUTION		STAND ALONE ELECTRONICS SOLUTION	
CHECK	*CORRECTION*	*CHECK*	*CORRECTION*	*CHECK*	*CORRECTION*
Inspect drive/driven pivot assemblies for broken or dissassembled linkages.	Note failures and order replacements as needed.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

5. Both rails in up/down position, actuator controller fails to open gutter. COM line\ down error message.

MECHANICAL SOLUTION		FRAMEWORX ELECTRONICS SOLUTION		STAND ALONE ELECTRONICS SOLUTION	
CHECK	*CORRECTION*	*CHECK*	*CORRECTION*	*CHECK*	*CORRECTION*
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Cable connection between front desk and first addressable lane sound?	Check for loose connections. Check continuity visually inspect. If necessary order as replacement 17-860791-000 to diagnose problem.
				If not first addressable lane, is daisey chain cable plugged in and working?	Check continuity inspect for defects. Try a working lane cable on this pair. If necessary order 17-860790-000 to diagnose.
				Controller?	Switch bumper controller power on and off. Check lane setup press and hold down the arrow up key for 7 seconds. Until setup screen disappears. Verify settings, see manual.
				Is lane address correct?	No. Set DIP switches inside controller.
				Still problems?	Contact Brunswick at 1-800-323-8141.

Appendix A - Cables

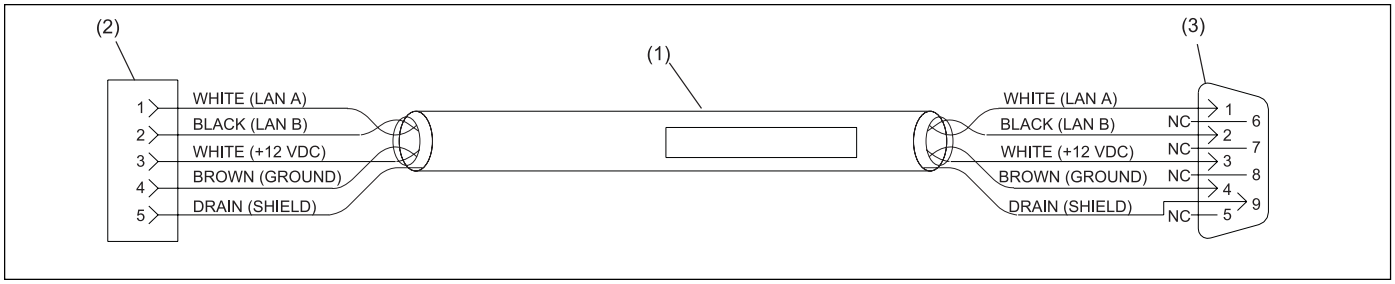


Automation Control Box Cable Assembly (Stand Alone)

(1) 17-300234-000 AUTOMATION CONTROL BOX CABLE ASSEMBLY

(2) TO LLAN IN J3 ON AUTOMATED CONTROLLER PCB

(3) TO OUT J4 ON AUTOMATED CONTROLLER PCB

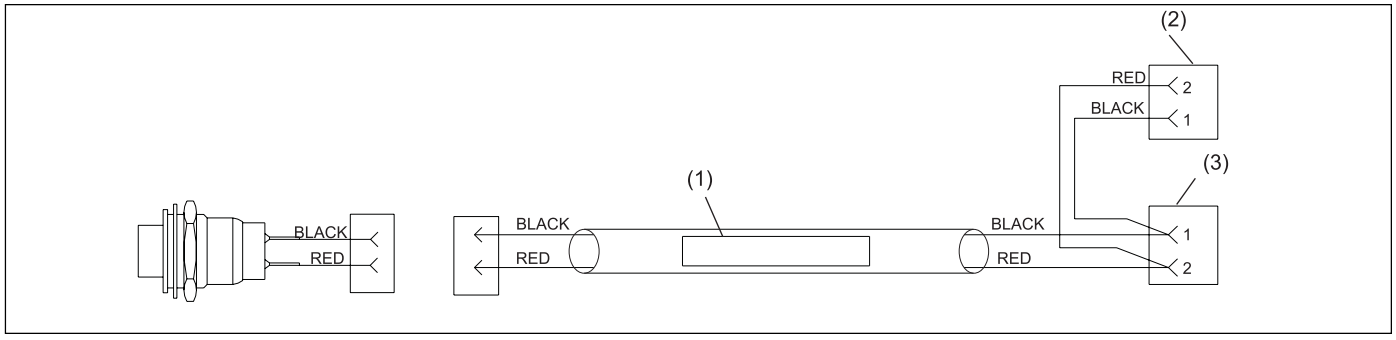


Front Desk Controller to Controller Cable Assembly

(1) 17-300235-000 FRONT DESK CONTROLLER TO CONTROLLER CABLE ASSEMBLY

(2) TO LLAN IN J3 ON AUTOMATED CONTROLLER PCB

(3) TO SERIAL PORT STAND ALONE FRONT DESK CONTROLLER

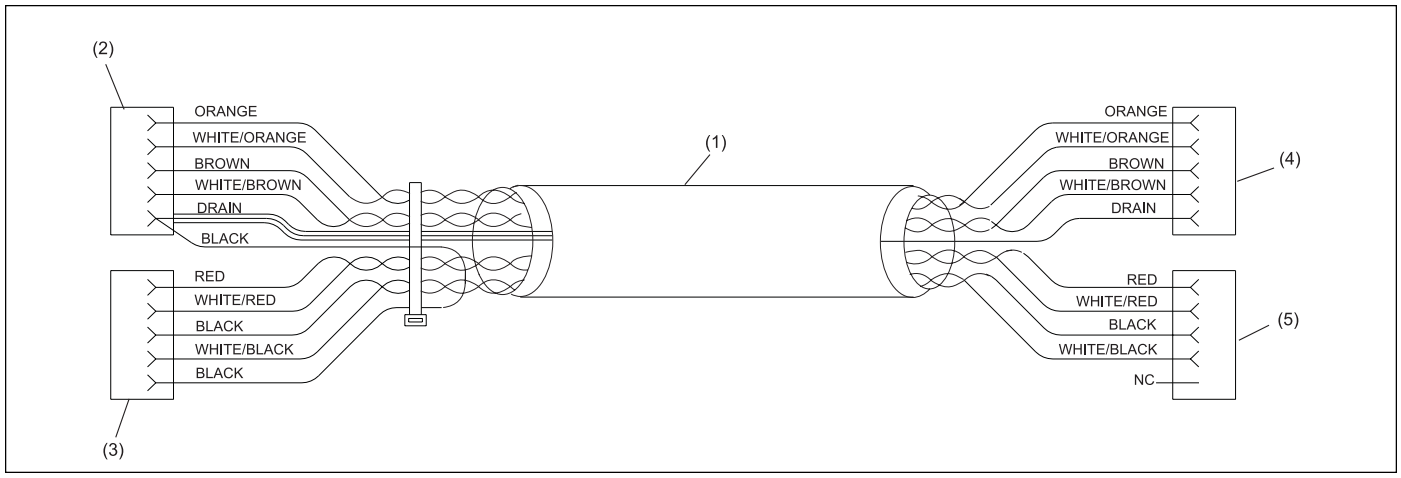


Automated Bumpers Emergency Switch Cable Assembly

(1) 17-300284-000 AUTOMATED BALLWALL EMERGENCY SWITCH CABLE ASSEMBLY

(2) TO J2 ON AUTOMATED BUMPER CONTROLLER PCB

(3) TO J1 ON AUTOMATED BUMPER CONTROLLER PCB



Automated Bumper System Lane Cable

(1) 17-300256-000 AUTOMATED BUMPER SYSTEM LANE CABLE

(2) TO J1 BREAKOUT BOX

(3) TO J2 I/O PCB

(4) TO J3 AUTOMATED BUMPER CONTROLLER

(5) TO J4 AUTOMATED BUMPER CONTROLLER