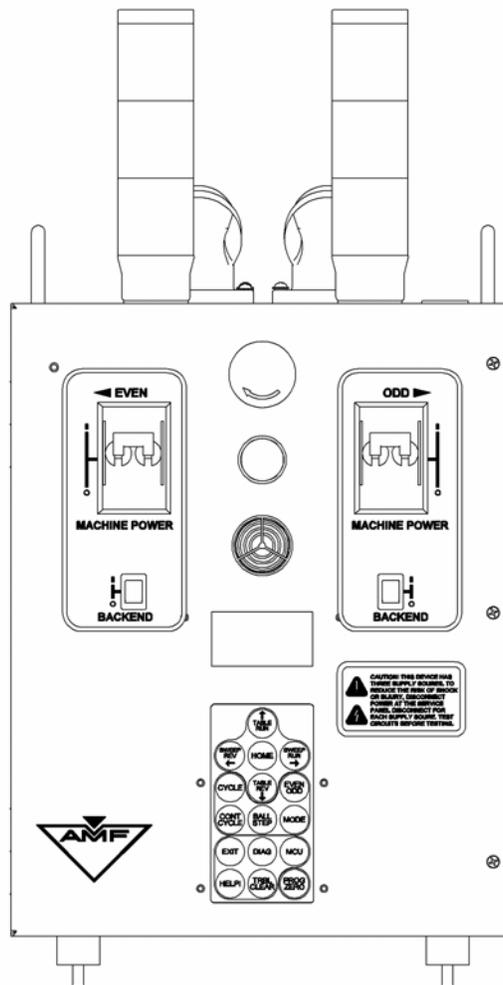




# 90XL*i* PINSPOTTER CONTROL CHASSIS

## Installation & Operating Guide



P/N 400-088-009

Revision B



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# 90XLi Pincotter Control Chassis

## Installation & Operating Guide

Rev. B

### Summary of Changes

<u>Change No.</u>	<u>ECR No.</u>

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## 1.0 INTRODUCTION

### 1.1 How to Use This Manual

The Installation Guide is divided into five sections:

- 1.0 INTRODUCTION
- 2.0 SAFETY PRECAUTIONS
- 3.0 90XLi CHASSIS INSTALLATION
- 4.0 90XLi CONTROL PANEL OPERATING PROCEDURES
- 5.0 WIRING DIAGRAMS AND DRAWINGS

### 1.2 Conventions Used

Whenever a pushbutton or switch on the chassis that can be pushed or operated is mentioned, the name of the pushbutton or switch will appear in brackets [ ] as shown below.

[SWEEP REV]

Items in italics are references to menu items that will be seen on the display or a state that the screen is in. An example is shown below.

*Auto Backend Shutoff*

### 1.3 Abbreviations Used

<b>CONT</b>	Continuous
<b>MCU</b>	Manager's Control Unit
<b>PROG</b>	Program
<b>REV</b>	Reverse
<b>TRBL</b>	Trouble
<b>DIAG</b>	Diagnostic
<b>AC</b>	Alternating Current
<b>E-Stop</b>	Emergency Stop



## 1.4 Chassis Description

The 90XLi pinspotter chassis is a multifunction control system designed to operate a pair of pinspotters as well as communicate with and carry out functions from the Manager's Control Unit and the handheld unit. The unit consists of a steel box with a swing-open front cover. There are no internal components that need to be replaced by the center mechanic. All fuses are now accessed from the top of the chassis.

The front of the chassis contains circuit breakers, switches, and a keypad for performing various functions. A lighted display is used for indicating lane and machine status as described in Section 4.0. The rear of the chassis contains connectors for the various pinspotter power and control cables as well as for cables from supporting equipment, such as the scoring camera and handheld unit extension (which replaces the front end box on older systems). Power supply connections are made at the top of the chassis. Section 5.0 contains chassis drawings and a cable identification and wiring diagram.

## 1.5 Key Features

Some key chassis features are listed below.

---

### KEY FEATURES

- ❖ Circuit breakers and back end motor switches are on the operating panel.
  - ❖ Battery backup allows the chassis controller to maintain key operational data when normal power is removed.
  - ❖ A keypad that allows manual operation of the odd or even lane's pinspotter.
  - ❖ Lighted display that indicates the state of pinspotter and system components.
  - ❖ Links to the pit lights, bumpers, ball detector, camera, mask switch, MCU, foul detector, and ball return.
  - ❖ Audible warning on startup.
  - ❖ Built-in time delay for back end shutdown to allow bowler's ball to be returned.
  - ❖ Access to fuses without opening the chassis.
  - ❖ Handheld unit that can plug into the front side of the pinspotters that replaces the front end box.
  - ❖ Emergency Stop (E-Stop) switch that can be used to rapidly shutdown both pinspotters. A reset switch is also provided.
  - ❖ A pair of light towers that signal the status of the pinspotters as well as functioning as a mechanic call system.
-

## 2.0 SAFETY PRECAUTIONS

- ◆ When you see this symbol



associated with instructions, a possible hazard is indicated. Follow these instructions carefully!

	<b>WARNING!</b> Read this <u>BEFORE</u> Proceeding.
<b>TO AVOID INJURY:</b>  Read these safety precautions before attempting to install or modify any AMF equipment.  Failure to follow these procedures may result in severe personal injury, fire, or permanent damage to equipment or property.	

- ◆ Before installing, removing, or replacing a chassis, be certain that the circuit breakers are turned OFF.
- ◆ Before applying power to a chassis, be sure that all cables have been connected properly – especially the power cables.
- ◆ Disconnect the power plug before working on any pinspotter equipment and before entering any operating portion of a pinspotter.
- ◆ Before operating a chassis or pinspotter, make sure that all GUARDS are in place.
- ◆ Wait a minimum of 60 seconds after the power is disconnected from a chassis before touching or removing any chassis components.



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## 3.0 90XLi CHASSIS INSTALLATION



Before installing the 90XLi Chassis, ensure that all power to the pinspotters is switched off at the main breaker box.

Verify that the power supply matches that required by the chassis. (The 90XLi chassis accepts single phase, 208-250 Volt, 50/60 Hertz power only – DO NOT supply a 90XLi chassis with 115-Volt power!)

Refer to the wiring diagram on Page 28 for cable identification.

### 3.1 Tools Needed

7/16-inch Wrench

Small Flat-Blade Screwdriver

### 3.2 Power Supply Requirements

- Two 13-Amp, 208-250 Volt, 50 or 60 Hertz circuits (1 per pinspotter).
- One 10-Amp 208-250 Volt, 50 or 60 Hertz circuit to serve up to 8 chassis. Must be from the same line (mains) phase as the pinspotter's AC power.

### 3.3 Installation

1. Mount the 90XLi chassis to the chassis mounting bracket (P/N 088-000-112) located between pin elevator wheel covers of the odd and even lane pinspotters.
  - a. Align the four studs of the vibration mounts on the bottom of the chassis with the holes in the mounting bracket, and secure in place using four 1/4 - 20 nuts.

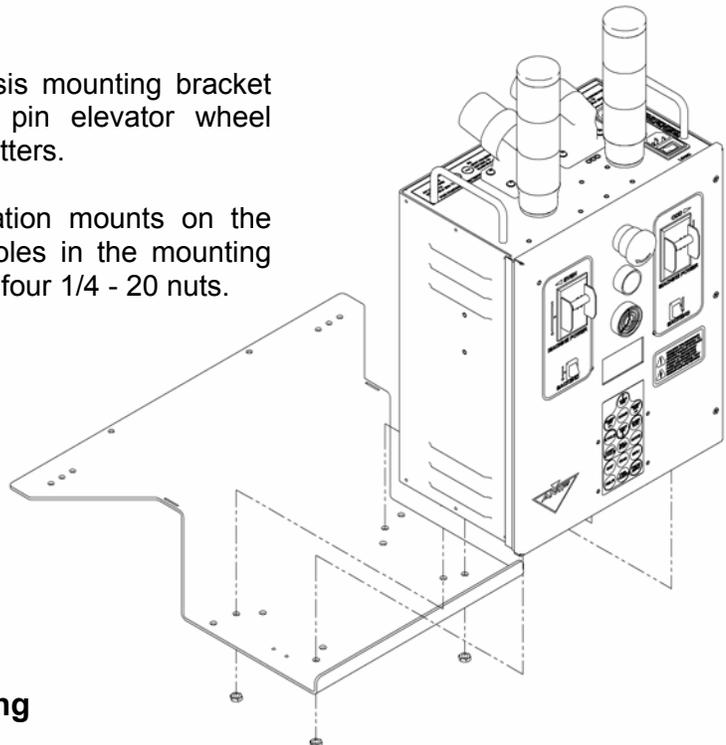
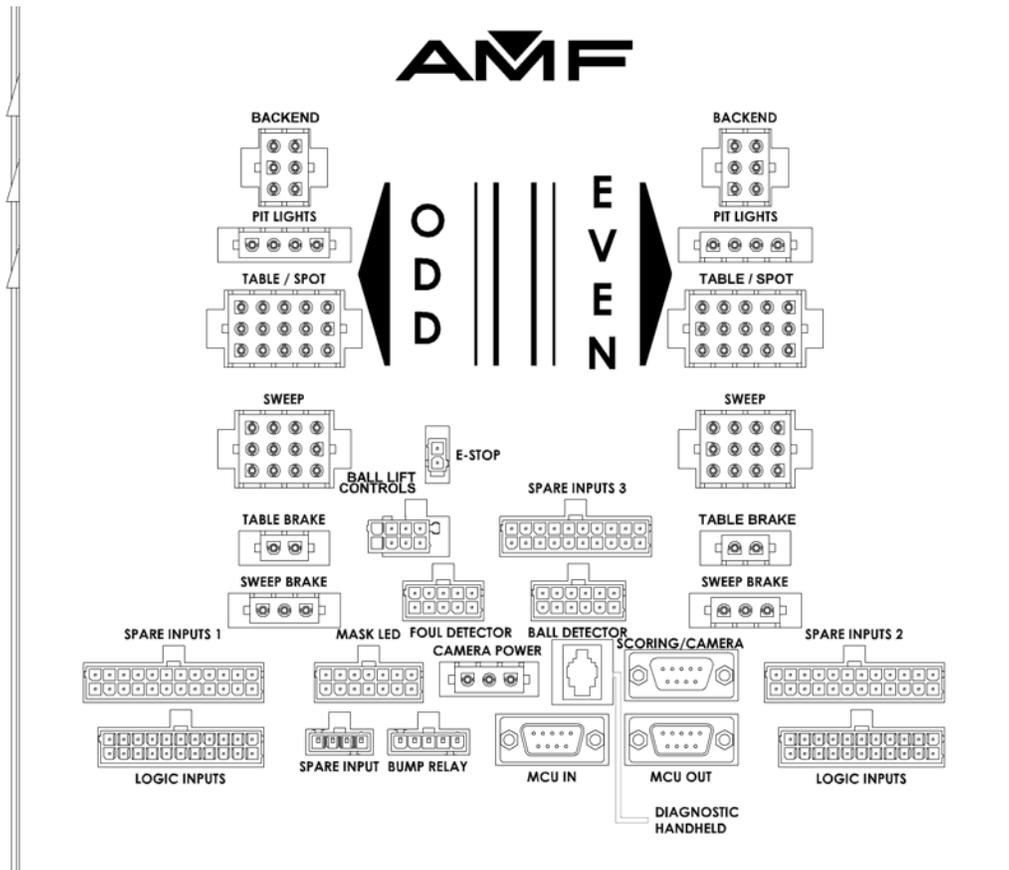


Figure 1, Chassis Mounting

2. Attach the connectors of the odd machine's power cable (088-000-008) and the signal cable (088-000-007) to the corresponding connectors on the back of the 90XLi chassis. Take care to only connect to the Odd side connectors as marked by the back of the chassis.
3. Repeat this process for the even machine's power cable (088-000-006) and the signal cable (088-000-005) for the even side of the chassis connectors.



**Figure 2, 90XLi Chassis, Connection Layout**

4. Install the communication cable between the handheld station and the chassis.
5. For installations with or without AMF scoring:
  - a. Verify that the camera has been installed on the capping between the odd and even lanes.
  - b. Connect the DB-9 scoring cable (286-003-303) between the "SCORING/CAMERA" connector on the back of the 90XLi chassis and the camera.
  - c. If the camera came with a camera power transformer (232-009-116), connect the camera power cable as follows:



1. Verify the transformer's voltage selector switch is selected to the 220-volt position. (The transformer should be located on the top level of the chassis mounting bracket near the rear of the chassis.
  2. Connect the camera power cable (232-008-734) to the three connections on the transformer. The cable's slide-on connector (ground/earth) attaches to the center terminal (terminal 2) and the remaining wires connect to terminals 1 and 3.
  3. Route the camera power cable to the front of the pincspotter, then down under the lane to the camera's location. Attach the cable's connector to the corresponding connector on the camera.
  4. Insert the transformer's three-pronged plug into the "AC OUT" connection on top of the chassis.
- d. If the camera came with camera power cable P/N 090-008-140 only, connect one end of the cable to the "CAMERA POWER" connector on the rear of the 90XLi chassis. Route the other end of the cable to the front of the pincspotter, then down under the lane to the camera's location, and connect it to the camera.
- e. Set the chassis address in accordance with Section 4.4.



### 3.4 Manager's Control Unit (MCU) and Daisy Chain Links

Each MCU has four ports, labeled A, B, C, and Front Desk. Ports A, B, and C can control one chain of chassis. Each chain can link up to 64 lanes through 32 chassis that are connected together using a daisy chain cable. The first chassis in a chain is linked to the MCU via a home run cable, and the last chassis in the chain ends the chain using a termination cable. The Front Desk port is used for communication with the Control System.

1. Connect the home run cable (088-000-104) coming from the MCU to the "MCU IN" connector on the back of the first 90XLi chassis in the chain.
2. Connect one end of the daisy chain cable (090-005-749) to the "MCU OUT" connector on the back of the first 90XLi chassis in the chain.
3. Route the free end of the daisy chain cable along the even machine's wireway and within the crossbeam weldment to the next lane pair in the series. Continue to route the cable in a similar manner within the lane pair's even machine wireway, and connect the free end of the daisy chain cable to the "MCU IN" connector on the back of the next 90XLi chassis in the chain.
4. Repeat Steps 2 and 3 for the remaining chassis in the chain. There can be no more than 32 chassis in a chain.
5. Connect a termination cable (090-005-794) to the "MCU OUT" connector on the back of the last 90XLi chassis in the chain.



6. **Verify that all power switches and breakers on the chassis are in the OFF position.**

7. Connect the AC power cables to the connectors located on the top of the chassis.
  - a. Connect the odd pinspotter's AC power cable (090-005-855) coming from the power source to the chassis' odd machine power connector.
  - b. Connect the even pinspotter's AC power cable (090-005-855) coming from the power source to the chassis' even machine power connector.
  - c. Connect the chassis logic AC power cable (090-005-706) to the chassis logic power connector.
8. Install the wiring hood cover (088-000-004) over the wires at the back of the chassis. The hood has two tabs that fit into slots in the chassis mounting bracket.
9. Reinstall the wireway covers and secure them with the screws provided.

## 4.0 90XLi CHASSIS CONTROL PANEL OPERATING PROCEDURES

### Before Operating This Equipment:



- Be sure that all guards are in place and that there are no loose or frayed wires.
- Keep clear of all moving parts.
- Advise the MCU operator that you are working on the equipment.

The 90XLi chassis has a safety beeper that beeps for 10 seconds when the logic power is turned on and when a pinspotter is placed in any mode except “Stand-by” at the MCU. The pinspotter will not operate while the safety beeper is beeping.

### 4.1 Switches and Circuit Breakers

There are two circuit breakers and three switches on the chassis.

- **Logic Power Switch** Turns control power to the chassis on and off. Switch is located on top of the chassis.
- **Odd Machine Circuit Breaker** Controls all AC power to the odd pinspotter.
- **Even Machine Circuit Breaker** Controls all AC power to the even pinspotter.
- **Odd Machine Back End Switch** Turns the odd pinspotter’s back end motor on or off. **This switch interrupts the control voltage to the back end motor relay, NOT the motor AC power! THIS IS NOT FAIL-SAFE! When working in the back end, disconnect the motor’s AC power cord.**
- **Even Machine Back End Switch** Turns the even pinspotter’s back end motor on or off. **This switch interrupts the control voltage to the back end motor relay, NOT the motor AC power! THIS IS NOT FAIL-SAFE! When working in the back end, disconnect the motor’s AC power cord.**
- **E-Stop** Red button used to stop both pinspotters in an emergency. Once the problem has been solved, twist the E-Stop button to disengage it (the button will pop out). An error will be on the display and to clear it, press the white reset button and then the **[TRBL CLEAR]** button on the keypad.
- **Reset Button** White button directly below the E-Stop that clears the chassis and allows the **[TRBL CLEAR]** to function after an E-Stop error has occurred.

## 4.2 Main Screen

The *Main Screen* is the screen viewed on the display when the chassis is turned on and the state of both of the lanes is displayed. An example of this can be found below in Figure 3.

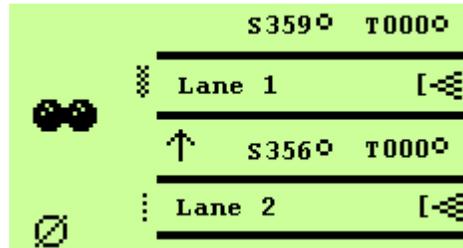


Figure 3, Main Screen

## 4.3 Keypad

The Keypad is located directly below the display and allows the user to change basic attributes about the machine environment such as *Auto Backend Shutoff* time, *Pit Light* color, *Frame Counts*, and many more that will be discussed later. It is identical to the keypad on the Handheld Unit. The Keypad is shown below in Figure 4.



Figure 4, Chassis and Handheld Keypad

The keypad is split up into different colored regions that have specific functions as described in Section 4.3.1.



### 4.3.1 Keypad Description

**Note** - The RUN and REV buttons in the red section of the keypad should be run in mechanic mode with the exception of **[HOME]**. Hold down the RUN and REV buttons to move the table and sweep a significant amount. **[HOME]** will run in any mode except continuous cycle. If the chassis is not in mechanic mode, then the table and sweep buttons function as the arrows.

**[TABLE RUN] [↑]** - Runs the table manually forward through the normal cycle. The up arrow is used to scroll up through a menu list.

**[SWEEP REV] [←]** - Runs the sweep manually backward through the normal cycle. The left arrow is sometimes used to scroll to the left when more than one option setting is available.

**[SWEEP RUN] [→]** - Runs the sweep manually forward through the normal cycle. The right arrow is sometimes used to scroll to the right when more than one option setting is available. It is also used for selection of menu items for the *MCU Functions* menu.

**[TABLE REV] [↓]** - Runs the table manually backward through the normal cycle. The down arrow is used to scroll down through a menu list.

**[HOME]** - Returns the Table and Sweep to the home state.

**[CYCLE]** - Will cause the selected lane to cycle and will not send a signal to the scoring system that a cycle has occurred.

**[CONT CYCLE]** - Causes the selected pinspotter to go into Continuous Cycle (uses a longer than normal time delay).

**[BALL STEP]** - Changes the ball count from first ball to second ball and vice versa. This will be seen on the Main Screen display next to the selected lane as well as on the masking that indicates the ball number.

**[MODE]** - Pressing this button will make the selected lane go into mechanic mode and pressing it a second time will cause the chassis to return to the previous mode it was in. See Mode Indicators (Section 4.6) for more information about modes in general.

**[EVEN ODD]** - Pressing this button changes the focus of the chassis controls from the even lane to the odd lane and vice versa. See Lane Selection (Section 4.5) for more information.

**[EXIT]** - Takes you to the previous menu. If there is no previous menu then the Main Screen will be displayed.

**[DIAG]** - Pressing this button opens up a menu list that allows basic monitoring of the machine and chassis. These items are not present on the Main Screen as icons. See DIAG Button (Section 4.12) for more information.

**[MCU]** - Pressing this button will open a menu list with submenus all related to settings and functions. They also can be selected through the MCU. See MCU Button (Section 4.11) for more information.

**[HELP!]** - Press and hold this button. If there is help available for the item that is being displayed then it will come up on the screen. If no help is available then the display reads, "No help available for this item". Release the button to go back to the last screen displayed.

### 4.3.1 Keypad Description, (cont.)

**[TRBL CLEAR]** - Clears the error from the chassis display. This will only work if the error itself has been corrected. For instance, if the Mask Switch is turned off, the error can only be cleared once the switch is turned back on.

**[PROG ZERO]** - Used to reset software to beginning of cycle. If you are manually moving the table or sweep, press this button, then **[TRBL CLEAR]** to clear the error.

## 4.4 Setting the Chassis Address

The Manager's Control Unit must be able to recognize each individual chassis so that the chassis can be individually controlled. To accomplish this, a different address is input into each chassis.

To set the chassis address:

1. Press the **[MCU]** button on the chassis keypad.
2. The flashing arrow should be next to the *Settings Menu*. Press the **[→]** button to select *Settings Menu*.
3. Press the **[↓]** repeatedly until the flashing arrow is next to *Odd Lane ID:*.
4. Use the **[→]** to make the odd lane number go up and the **[←]** to make it go down. The lane number will display just below the menu option for *Odd Lane ID:*.
5. Once the correct odd lane has been selected, press the **[EXIT]** button a few times until the display is back to the *Main Screen*.

## 4.5 Lane Selection

Pressing the **[EVEN/ODD]** button on the chassis keypad changes the focus of the chassis controls from the even lane to the odd lane and vice versa. The way to tell which lane has the focus is by viewing the Lane Indicator arrow (Figure 5). When the arrow is pointing up, then the odd lane has the focus and when the arrow is pointing down, then the even lane has it. It is important to note that whichever lane the arrow is pointing to, that is the lane that will receive the commands entered from the keypad.

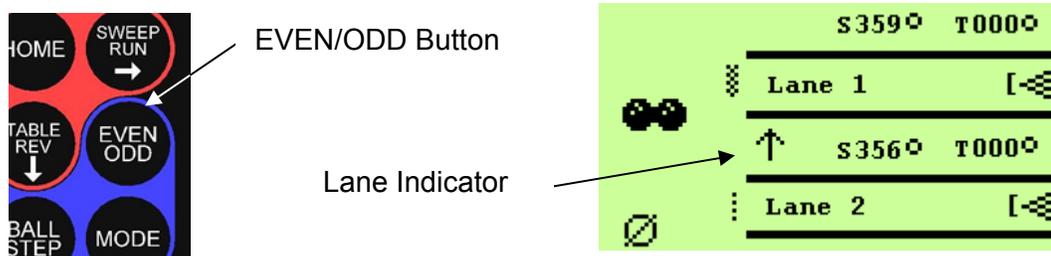


Figure 5, Lane Indication

### 4.6 Mode Indicators

On the chassis Main Screen, several different icons will appear based on what mode the chassis is in. When there is only one icon visible as on Lane 2 (Figure 6), the pinspotter is in the first ball cycle. However, when two icons are visible as on Lane 1, the pinspotter is in the second ball cycle. See Section 4.7 for a complete list of mode indicators.

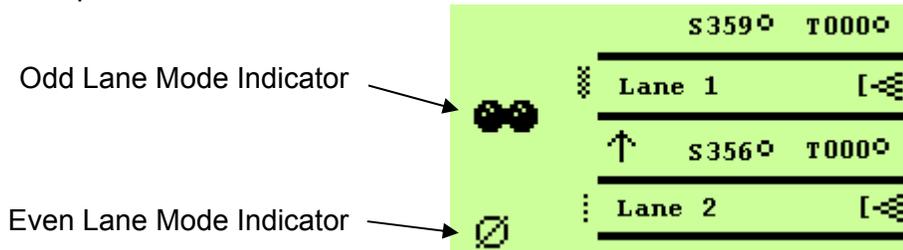


Figure 6, Mode Indication

When the [DIAG] or [MCU] button is pressed on the chassis, the Mode Indicator for the selected lane is still visible but it is in the upper right corner of the display (Figure 7). There will only be one icon displayed on this screen even if the pinspotter is in the second ball cycle.

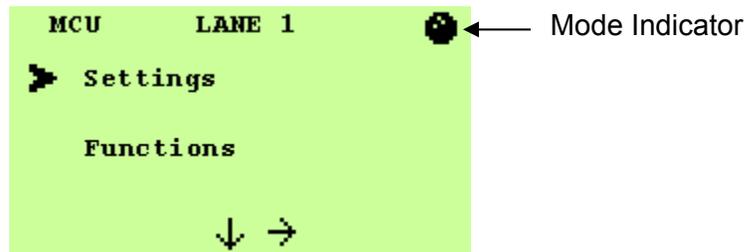
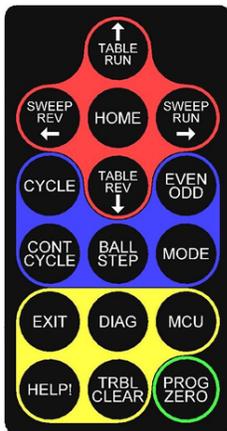


Figure 7, Menu Mode Indication

## 4.7 List of Modes

The icons in the following list represent the different modes that a lane can be in.

 **Bowl Mode** - The selected lane will go into this mode when turned on for open play or when practice is complete for league or tournament. This can be done manually from the MCU or through a scoring system.

 **Mechanic Mode** - Activated by pressing the **[MODE]** button on the chassis keypad, this mode allows the mechanic control of the table, sweep, and home buttons (located in the red section of the keypad). The arrows will not be functional again until the **[MODE]** button is pressed and the previous mode is restored.

 **Continuous Cycle Mode** - This icon lets you know that the selected pinspotter is in continuous cycle (uses a longer than normal time delay). The selected lane will go into this mode when the **[CONT CYCLE]** button is pressed and will exit this mode by pressing it again.

 **Standby Mode** - The Pinspotter is turned off and the chassis is awaiting instruction from the MCU.

 **Practice With Pins** - This mode allows the pinspotter to function in a normal fashion (setting pins and going through normal cycling). The scoring does not reflect frames being bowled nor does the score get marked. The two practice modes are usually only seen when a league or tournament has started warm-up.

 **Practice Without Pins** - In this mode, the pinspotter will not cycle until the chassis is put into **Bowl Mode**. Also, the **[CYCLE]** button and the tenth frame switch on the ball return will not be functional in this mode. Just as with **Practice With Pins**, there is no scoring information being recorded. There will always be two of these icons on the display regardless of whether the bowler is throwing the first or second ball.

## 4.8 Sweep and Table Drive Shaft Positions

The display has two sets of numbers that indicate the position of the sweep and table as measured in degrees (000 - 360). The letter “s” preceding this indicates a sweep measurement and the “t” indicates the table. Figure 8 shows the location of these numbers on the Main Screen display.

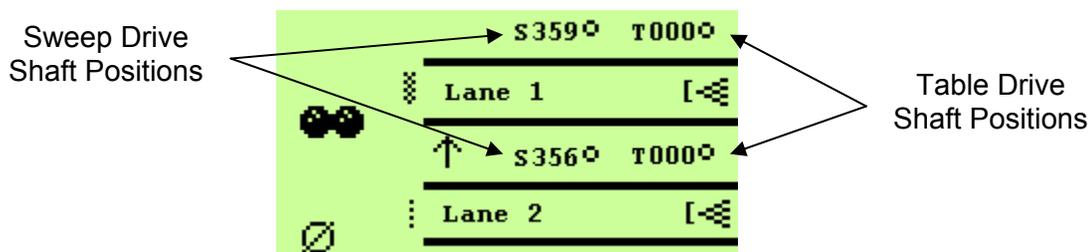


Figure 8, Sweep and Table Drive Shaft Positions

### 4.9 Pin Indication

The two icons pointed out below are a graphic representation of the pins still standing on their respective lanes. After a ball is thrown, the pins that are left will appear on the display as dashes (Figure 9). Looking at a full Pin Indication display, the left most dash of the icon represents the #1 pin, the upper right is the #7 pin, and the lower right is the #10 pin.

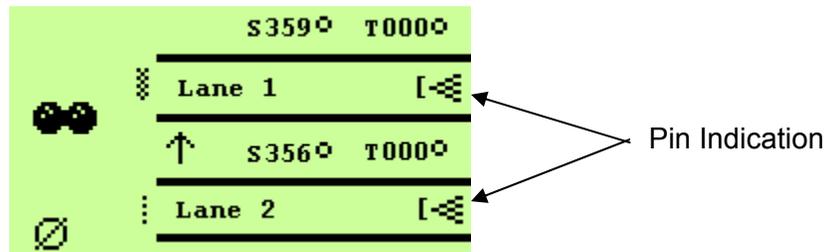


Figure 9, Pin Indication Icons

There is a menu option for the [MCU] button that will also display the numbers for the pins still standing on the selected lane. The numbers are shown in a triangle grid corresponding to the pin numbers they represent (See Figure 10 below). This number grid can be viewed on the chassis display by using the following steps.

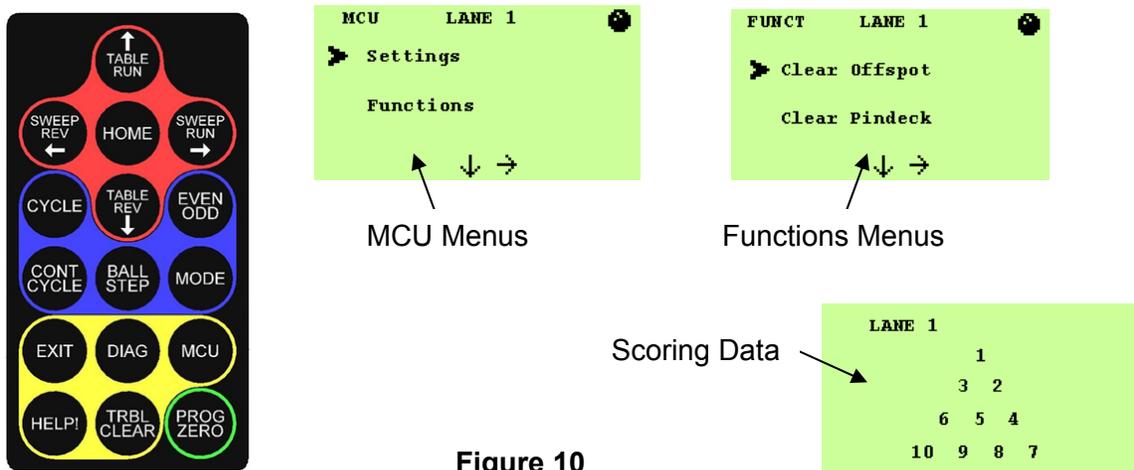


Figure 10

1. Press the [MCU] button to go into the *MCU Menus*.
2. Press the [↓] button to make *Functions* appear next to the flashing arrow.
3. Press the [→] to select the *Functions Menu*.
4. Scroll down by using the [↓] until the flashing arrow is next to *Scoring Data* menu item.
5. Press the [→] and the screen will display the pin indication by number.

Once you have finished viewing the *Scoring Data* screen, press [EXIT] three (3) times to return to the *Main Screen*.

### 4.10 Foul Detectors

The chassis is capable of showing when a lane has the foul detector on or in warning mode. On the Main Screen, you will see symbols just to the left of the lane numbers that tell you what mode the foul detectors are in (shown in Figure 11). If there is not anything there on the display, then the foul detector is off.

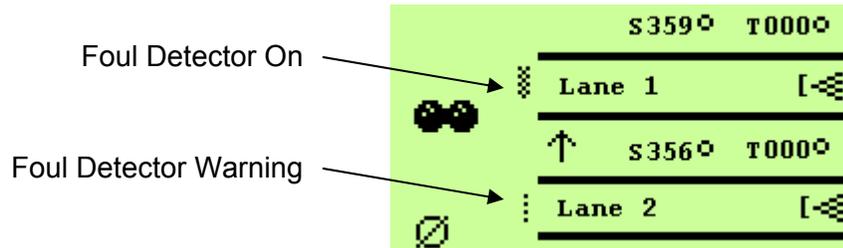


Figure 11, Foul Detector Icons

-  Foul Detector On - Foul lights are turned on and a foul will count on the scoring.
-  Foul Detector Warning - Foul lights are turned on and a foul will not affect the scoring.

As mentioned before, if there is nothing on the display where these two icons can show up, then the foul detectors are off. The foul detector modes can be changed through the [MCU] button on the chassis using the following steps (see Figure 12).

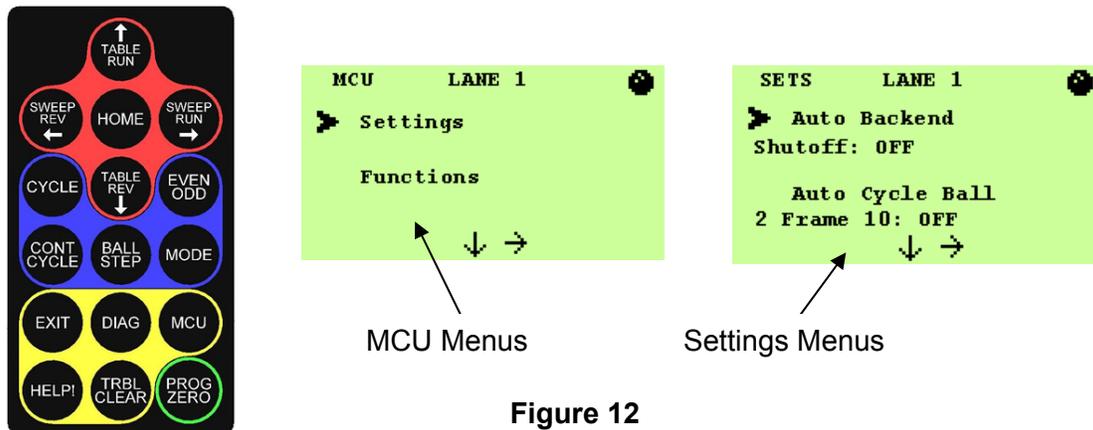


Figure 12

1. Press the [MCU] button to go into the *MCU Menus*.
2. Press the [→] button to select the *Settings Menu*.
3. Scroll down by using the [↓] button until the flashing arrow is next to *Foul Detector*.
4. Pressing the [→] button will cycle through the possible choices for the foul detector.

Once you have finished selecting the appropriate setting for the foul detectors, press the [EXIT] button twice to return to the *Main Screen*.

## 4.11 MCU Button

This section describes the list of menu options and sub-menus available when the **[MCU]** button is pressed. Pressing the **[↓]** will scroll down through this list and the **[→]** will choose the Menu Item for selection. By default, when this menu comes up, *Settings* is the menu item next to the flashing arrow as seen in Figure 13.



Figure 13, MCU Menu

### 4.11.1 Settings Menu

➤ *Settings* menu

The following list contains the options available when the *Settings* menu is selected using the **[→]**. Pressing the **[↓]** after selecting *Settings* will scroll down through this list and the **[→]** will select the menu item for adjustment. In some cases, the **[←]** might be used as well. The options that use the **[←]** are indicated below by an asterisk (\*) to the right of the menu item. The **[Exit]** button should be used once changes have been made in order to return to the previous menu.

- *Auto Backend Shutoff* - On / Off
- *Auto Cycle Ball 2 Frame 10* - On / Off
- *Auto Offspot Cycle* - On / Off
- *Ball Detector* - Front of Sweep / Behind Sweep
- *Bumpers* - Up / Down / Auto
- *Foul Detector* - On / Off / Warning
- *Foul Sweep Reverse* - On / Off
- *Guard Set Menu* - 1<sup>st</sup> Guard / 2<sup>nd</sup> Guard
- *ODD Lane ID* \* - 1-127
- *Pin Data*\* - Camera / Scoring
- *Pin Data Delay* \* - 0 / .75 / 1.25 / 1.75 / 2.25 / 2.75
- *Pit Light* - White / Black
- *Start Signal Delay* \* - Auto / 0.0 to 3.1 Seconds
  - Note - Using the **[→]** allows the user to increase the amount of delay in .1 second increments. The **[←]** can be used when any number is displayed but not when Auto is displayed.
- *Sweep Reverse Mode* - On / Off



## 4.11.2 Functions Menu

➤ *Functions* menu

The following list contains the options available when the *Functions* menu is selected using the [→]. Pressing the [↓] after selecting *Functions* will scroll down through this list and the [→] will select the function to be initiated. The [Exit] button should be used once changes have been made in order to return to the previous menu.

- *Clear Offspot* - Clears any pins that might still be on the deck after an Offspot occurs.
- *Clear Pindeck* - Sweeps whatever is on the pindeck back into the pit.
- *Frame Counters* - Keeps track of the number of frames bowled in Bowling mode as well as Mechanic mode. There are resettable and non-resettable totals. The next two menu items allow the user to take the resettable total back to zero.
- *Reset Bowling Frame Counter*
- *Reset Mechanic Frame Counter*
- *Ball Counters* - Keeps track of the number of balls bowled in Bowling mode as well as Mechanic mode. There are resettable and non-resettable totals. The next two menu items allow the user to take the resettable total back to zero.
- *Reset Bowling Ball Counter*
- *Reset Mechanic Ball Counter*
- *Reset To Factory Settings* - Restores all settings to the way they were when originally manufactured.
- *Scoring Data* - Gives a visual account of the pins that should be standing according to the information sent from the camera or scoring. Section 4.9 has more detailed information about this function.
- *Set New Pins* - A new rack of pins are set and the pinspotter is set back to 1<sup>st</sup> ball.

### 4.11.3 Remote Menu

- *Remote menu*

Section 4.11.3.1 contains the options available when the *Remote* menu is selected. Pressing the [↓] will scroll down through this list. The [Exit] button should be used once changes have been made in order to return to the previous menu.

#### 4.11.3.1 Remote Menu Items and Submenus

- *Change Lane* - The lane being selected is displayed in the upper right hand corner of the screen. Use the [←] and [→] to adjust to the desired lane number. Once the correct lane number is displayed, press the [↓] once to go to the *Settings* or twice for the *Functions* menu for that lane.
- *Remote Settings* - Press the [→] to go to an abbreviated version of the *Settings* menu of the remote chassis. Changes will be done in the same fashion as before for *Settings*. Once changes have been made, press the [EXIT] button. After pressing the [EXIT] button, the screen will display the message in Figure 14 to confirm your changes.

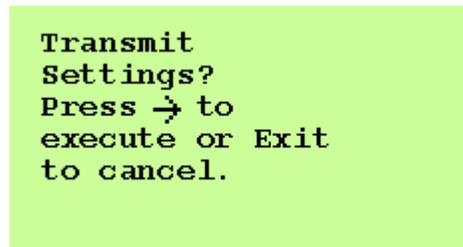


Figure 14, Confirmation Screen

Below is a list of all the menu items from the *Settings* menu that can be changed remotely.

- *Auto Backend Shutoff* - On / Off
- *Auto Cycle Ball 2 Frame 10* - On / Off
- *Auto Offspot Cycle* - On / Off
- *Ball Detector* - Front of Sweep / Behind Sweep
- *Bumpers* - Up / Down / Auto
- *Foul Detector* - On / Off / Warning
- *Foul Sweep Reverse* - On / Off
- *Pin Data* - Camera / Scoring
- *Pin Data Delay* - 0 / .75 / 1.25 / 1.75 / 2.25 / 2.75
- *Pit Light* - White / Black
- *Start Signal Delay* - Auto / 0.0 to 3.1 Seconds
- *Sweep Reverse Mode* - On / Off



### 4.11.3.1 Remote Menu Items and Submenus, (cont.)

- *Remote Functions* - Similar to the *Functions* menu in purpose and selections. Press the [→] to go to the *Functions* menu of the remote chassis. Sending the function is done in the same way as before in *Functions*. To execute the function that is displayed for the remote chassis, press the [→] button. If the remote chassis cannot accept the command, a message will appear saying that the lane is locked. If the command was successfully sent, "OK" will appear near the top of the screen.
- *Clear Offspot* - Clears any pins that might still be on the deck after an Offspot occurs.
  - *Clear Pindeck* - Sweeps whatever is on the pindeck back into the pit.
  - *Cycle Lane* - Functions the same way as the [CYCLE] button on the Keypad.
  - *Frame Counters* - Keeps track of the number of frames bowled in Bowling mode as well as Mechanic mode. There are resettable and non-resettable totals. The next two menu items allow the user to take the resettable total back to zero.
    - *Reset Bowling Frame Counter*
    - *Reset Mechanic Frame Counter*
  - *Ball Counters* - Keeps track of the number of balls bowled in Bowling mode as well as Mechanic mode. There are resettable and non-resettable totals. The next two menu items allow the user to take the resettable total back to zero.
    - *Reset Bowling Ball Counter*
    - *Reset Mechanic Ball Counter*
  - *Home* - This functions the same way as the [HOME] button on the Keypad.
  - *Reset To Factory Settings* - Restores all settings to the way they were when originally manufactured.
  - *Set New Pins* - A new rack of pins are set and the pinspotter is set back to 1<sup>st</sup> ball.

## 4.12 DIAG Button

The **[DIAG]** button is use to open a menu that displays diagnostic states for different parts of the machine and attached components. The 90XLi is constantly being monitored by the chassis for potential problems in performance. The following list details all of the menu items for this button and their potential display.

- *Backend Motor* - On / Off / Overload
- *Backend Switch* - On / Off
- *Ball Detector 1* - Ball / No Ball
- *Ball Detector 2* - Ball / No Ball
- *Ball Lift* - On / Off
- *Bin Switch* - Pin Present / Pin Absent
- *Breaker* - On / Off
- *E-Stop Loop* - Open / Closed
- *Foul Detector* - Foul / No Foul
- *Mask Switch* - On / Off
- *Mechanic Called* - Yes / No
- *Offspot Switch* - On / Off
- *Pinspotter State* - Bowl / Mechanic / Standby / Continuous Cycle / (Errors)
- *Power Frequency* - 50 Hz / 60 Hz
- *Sweep Encoder* - 0 - 360 degrees
- *Sweep Home* - Home / Not Home
- *Table Encoder* - 0 - 360 degrees
- *Table Home* - Home / Not Home
- *Tenth Frame* - On / Off

## 4.13 Shutdown Errors

The 90XLi has the ability to diagnose when problems occur and in many cases will display an error on the chassis screen. For instance, when the mask switch is turned off the main screen will display an error like what is seen in Figure 15.

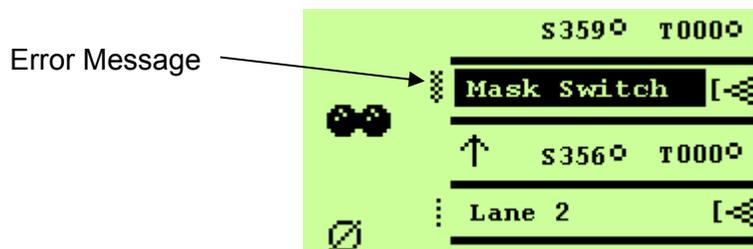


Figure 15, Error Message



### 4.13 Shutdown Errors, (cont.)

The following list shows all of the possible errors and the reason they would be displayed on the chassis screen.

- Breaker** - Circuit breaker is turned off
- Sweep Encoder** - Sweep jam or encoder sensor error
- Table Encoder** - Table jam or encoder sensor error
- Ball Detector** - Ball Detector beam is broken during sweep or table motor operation
- Mask Switch** - Mask Switch is turned off
- Offspot** - Offspot switch is activated and waiting for Clear Offspot command.
- Table Home** - Home switch not found after 3 revolutions of drive shaft
- Sweep Home** - Home switch not found after 3 revolutions of drive shaft
- Overload** - Backend Motor has jammed or overloaded
- E-Stop** - E-Stop switch is opened
- Interlock** - Table and Sweep are interlocked

All of the errors can be handled in different ways. For instance, if the Mask Switch error comes up on the display, just turning on the Mask Switch will clear the error. Other errors might require you to fix the problem and then press the **[TRBL CLEAR]** button on the keypad. An E-Stop error requires you to Twist the E-Stop button until it pops out, press the white RESET button just below that, and then press the **[TRBL CLEAR]** button on the keypad.

**Note** - Be sure that when you are trying to clear an error that the lane indicator is pointing to the appropriate lane. A single lane that has an error will not allow the **[TRBL CLEAR]** button to clear it if the correct lane is not selected.

**Note** - If the error does not clear out and you know everything is corrected for the error, try turning off the logic power to the chassis and turning it back on again.

### 4.14 Warning Errors

There are several errors that show up on the display that can inform you of a potential problem but will not cause the pinspotter to shut down. These errors can be cleared in the same way as the shutdown errors.

- 1st guard adj** - Sweep adjusted out of range for 1<sup>st</sup> guard
- 2nd guard adj** - Sweep adjusted out of range for 2<sup>nd</sup> guard
- Sweep hm adj** - Sweep adjusted out of range for home position
- Sweep rev adj** - Sweep adjusted out of range for sweep reverse home stop position
- Table B1 adj** - Table adjust out of range for ball 1 home stop position
- Table B2 adj** - Table adjust out of range for ball 2 home stop position
- Mechanic's call** - Mechanic's call button pressed

### 4.15 Stack Light Warnings

On top of the 90XLi chassis there are two sets of lights. Each stack of lights consists of a red and a green light. Depending on whether the light is solid or blinking there could be something wrong with the machine or chassis. Below is a list of the light combinations and what they mean if you see them.

**Solid Green** - Machine in bowl mode.

**Solid Red and Solid Green** - Machine in mechanic mode.

**Solid Red** - Machine in shutdown mode.

**Flashing Green** (with or without Solid Red) - Extended period of time for bin switch to see no pins (possible distributor jam).

**Flashing Red** (with or without Solid Green) - Mask switch is turned off.

**Alternating Flashing Red and Green** - Mechanic's call button pressed.

### 4.16 Handheld Unit

The 90XLi is equipped with a handheld unit that is mobile and can be taken from pinspotter to pinspotter manually. It gets plugged in to the front of the pinspotter (this unit has replaced the Front End Box). The unit's keypad is identical to the chassis keypad and once plugged in will have complete control of the chassis. Every function that can be performed from the chassis keypad is available to you with the handheld unit. Figure 16 shows the icon that is displayed on the chassis screen as well as the handheld unit. Seeing this icon lets you know that the unit is plugged in.

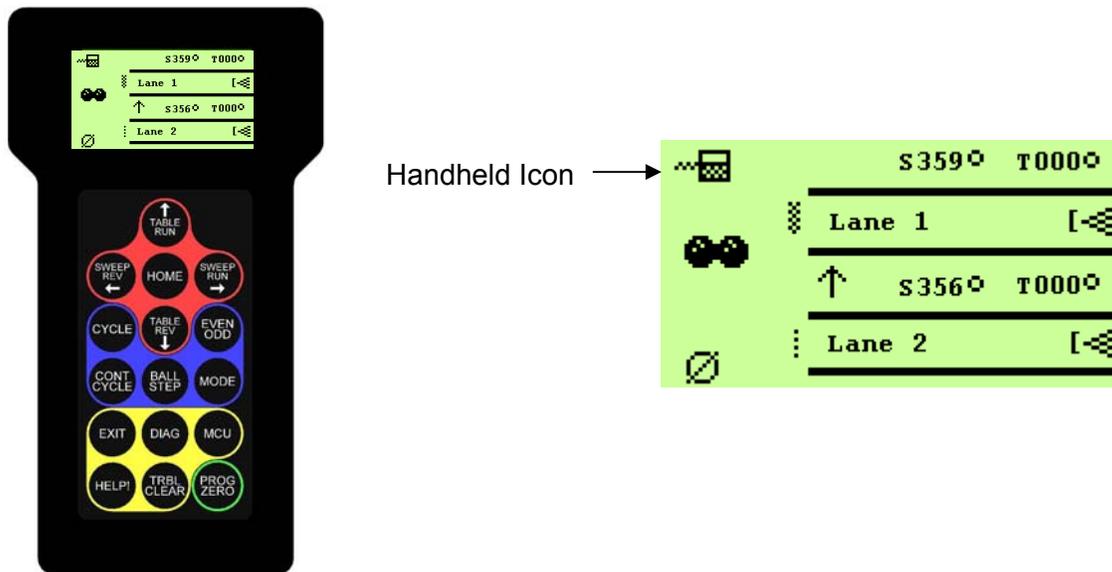


Figure 16, Handheld With Display

**Note** - When the handheld is plugged in, the chassis keypad will not function and the chassis is locked out from remote changes from the MCU or other chassis. At this point, the handheld has complete control. It can also be used to control Remote functions of other machines just like the chassis and MCU.

## 4.17 Fuse Protection

Various chassis and load components are provided with overload protection through the use of fuses. Figure 17 shows the locations of the various fuses. If a fuse requires replacement,

- **Always replace a fuse with one of the same type, voltage, current, and time delay rating only!**



**Dangerous voltages can exist inside the chassis. Remove all three sources of power from the chassis before attempting fuse replacement.**

- **Wait at least 60 seconds after removing power from the chassis before changing fuses to allow voltage stored in the capacitors to dissipate.**

### Logic Power Fuse

Chassis logic circuitry is protected by a 3-Amp, 250-Volt, 5 x 20 mm fuse (088-000-152). This fuse is located inside the removable fuse holder on top of the chassis between the “Logic Power In” and “AC Out” receptacles.

### Spot Solenoid and Pit Light Fuses

The pit lights for the even and odd machines are protected by 1-Amp, 250-Volt, 5 x 20 mm fuse (F1 and F2, P/N 088-000-153) located on top of the chassis. These fuses are identical to the fuses for the spot solenoids.

The spot solenoids for the even and odd machines are also protected by 1-Amp, 250-Volt, 5 x 20 mm fuse (F3 and F4, P/N 088-000-153) located on top of the chassis.

Some of these fuses are designed to be fast acting in order to protect sensitive components. Because of this, switching a pinspotter or a fused component on and off several times in rapid succession could cause a fuse to blow. This does not indicate a problem in the circuitry, and this practice should be avoided.

### 4.17 Fuse Protection, (cont.)

Below is a diagram that shows the locations of all the fuses and the part numbers that they should be replaced with.

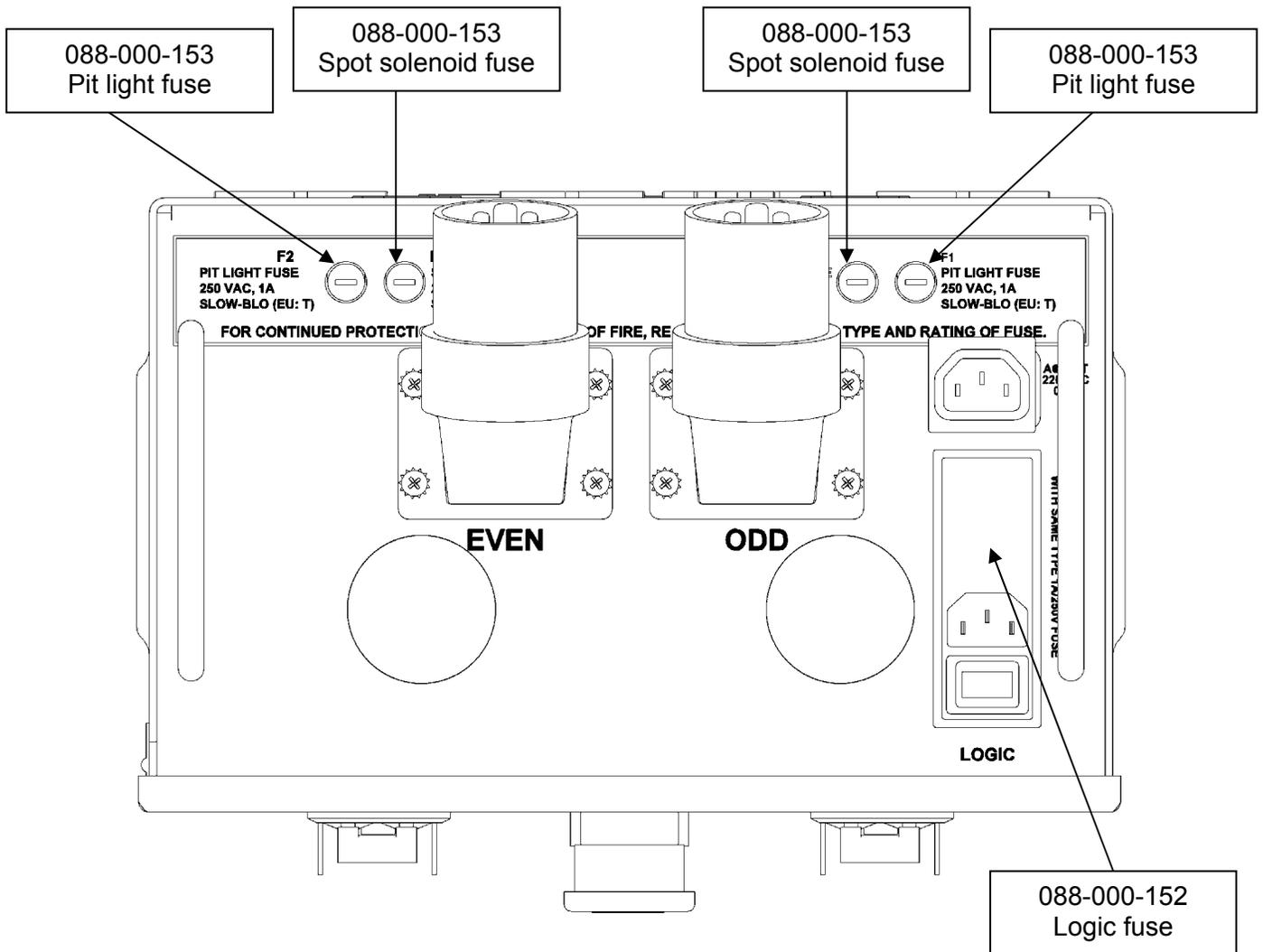


Figure 17, Fuse Locations



## 4.18 Stack Light Bulb Replacement

From time to time a light bulb will blow in the stack lights. Replacement is very easy.

1. There is a screw cap on the very top of the stack that should be removed. This can be done in the same fashion as you would take the top off of a jar or bottle and in the same direction.
2. Once the cap has been removed, the lens tubes can be slid up and over the top of the stack.
3. A plastic piece inside the stack is what holds the bulb in place. This plastic holder is mounted inside the stack and can be removed by pushing it through the bars of the stack (there is only one way that it will slide out of the stack).
4. Once the holder is removed, push the bulb down slightly and twist counterclockwise. It should come out with little effort.
5. Reverse all of these steps to replace the components of the stack light.

**Note** - the lens tubes are grooved on the inside and will need to be aligned to allow proper fit of the cap. When the tube is replaced, twist it around until it slides into the groove and is flush with the lower component. The cap should now fit properly.

**Stack light bulbs** - AMF part number 088-000-151



# **SECTION 5.0**

## **WIRING DIAGRAMS AND DRAWINGS**



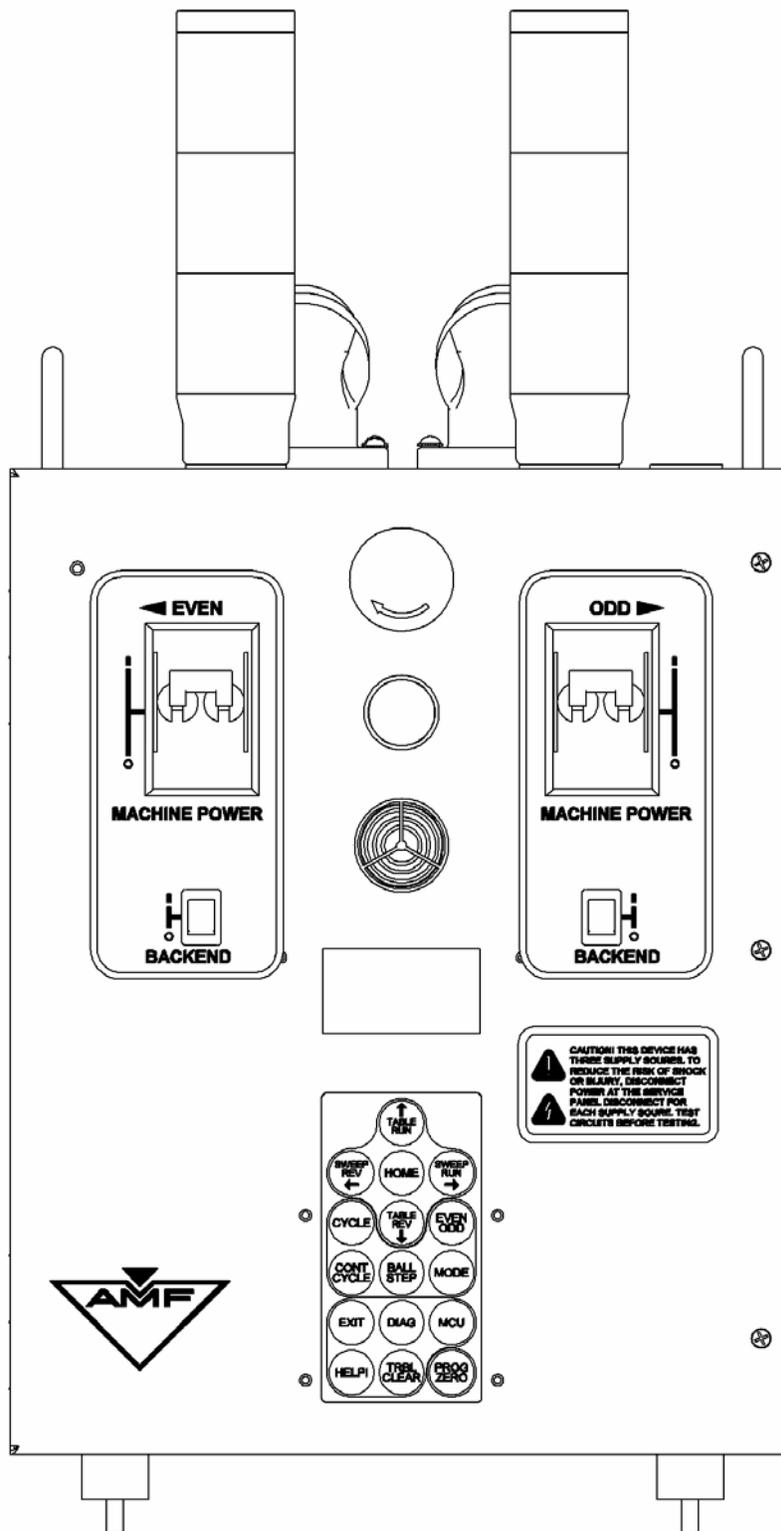


Figure 10, Chassis, Front View

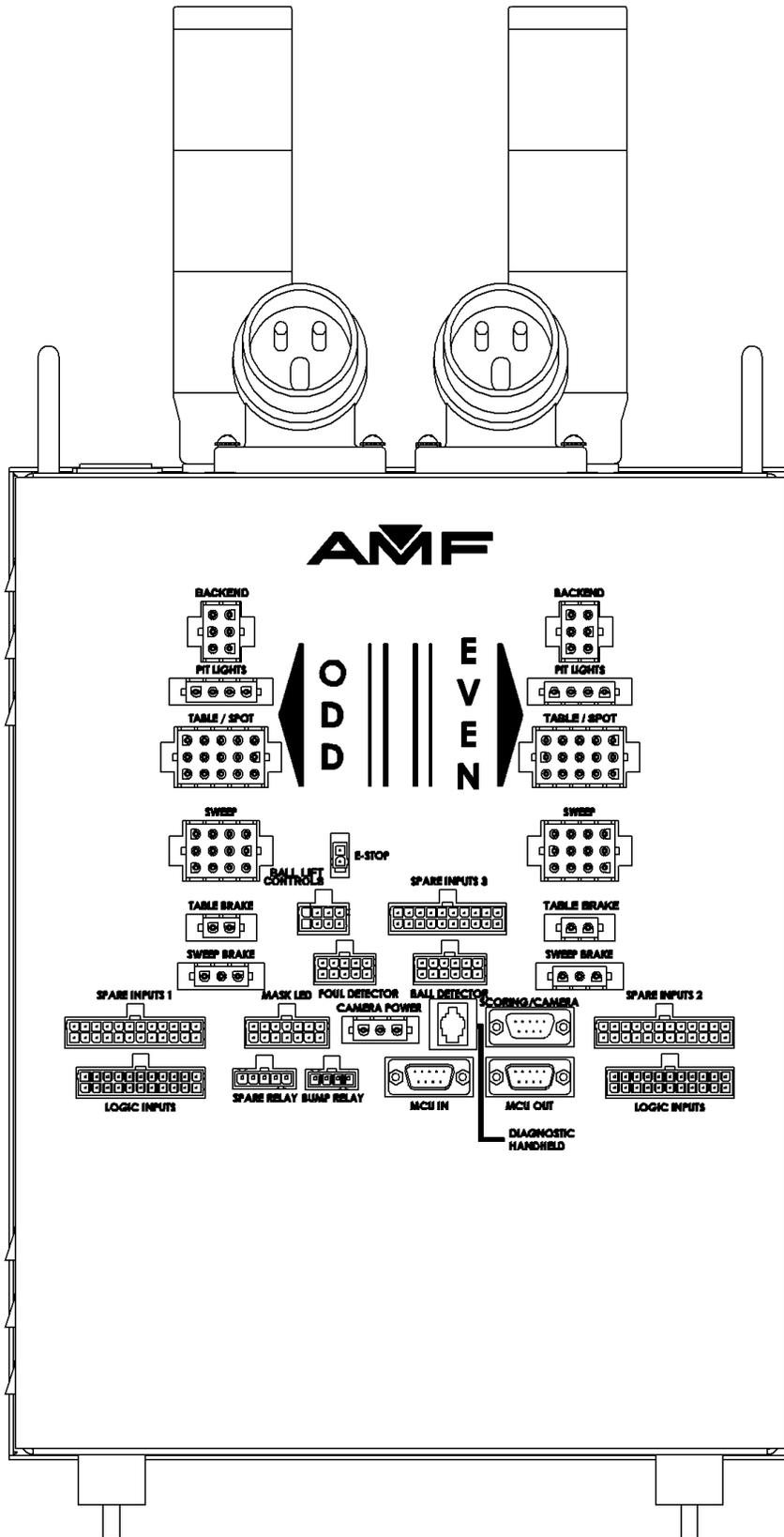


Figure 11, Chassis, Rear View

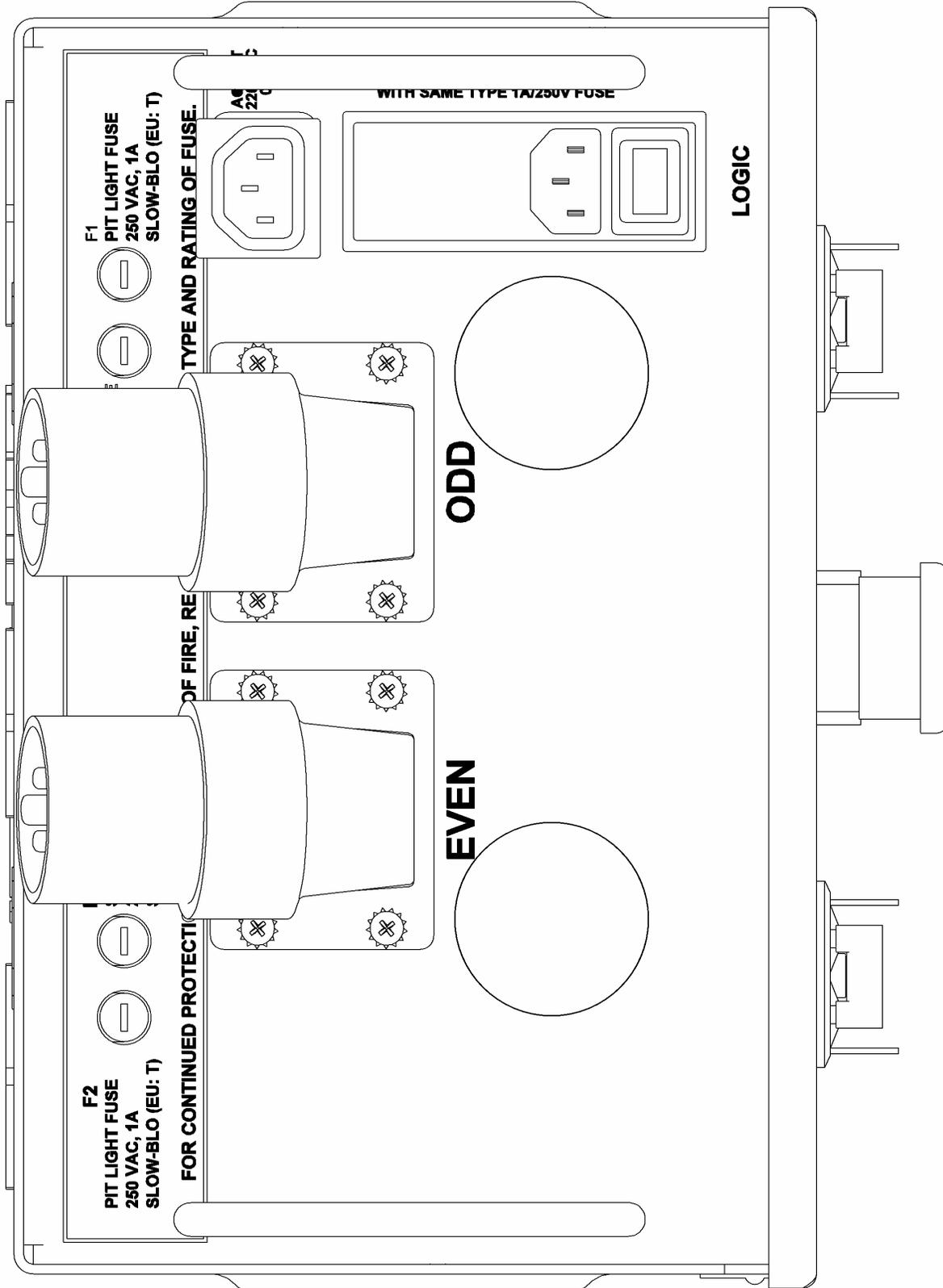


Figure 12, Chassis, Top View



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