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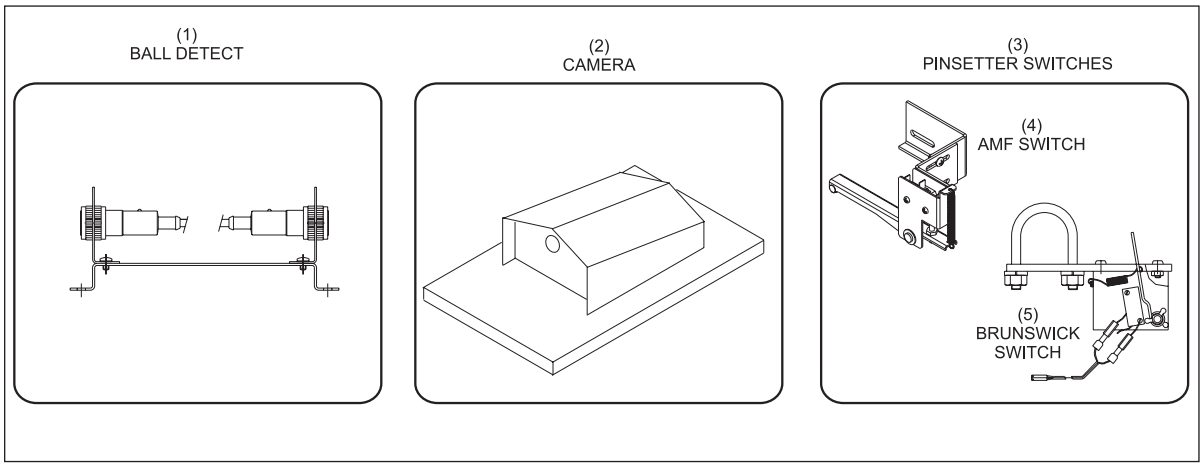
GENERAL DESCRIPTION

The Vector camera assembly is an electrical/optical device used with non-GS series pinsetters to count standing pins, control on/off and machine reset for a pair of pinsetters, and interface the foul units to the scoring system. The system uses a camera, ball detect assemblies, a distribution PCB, and special pinsetter modifications to accomplish this. Refer to figure titled *Vector Components.*

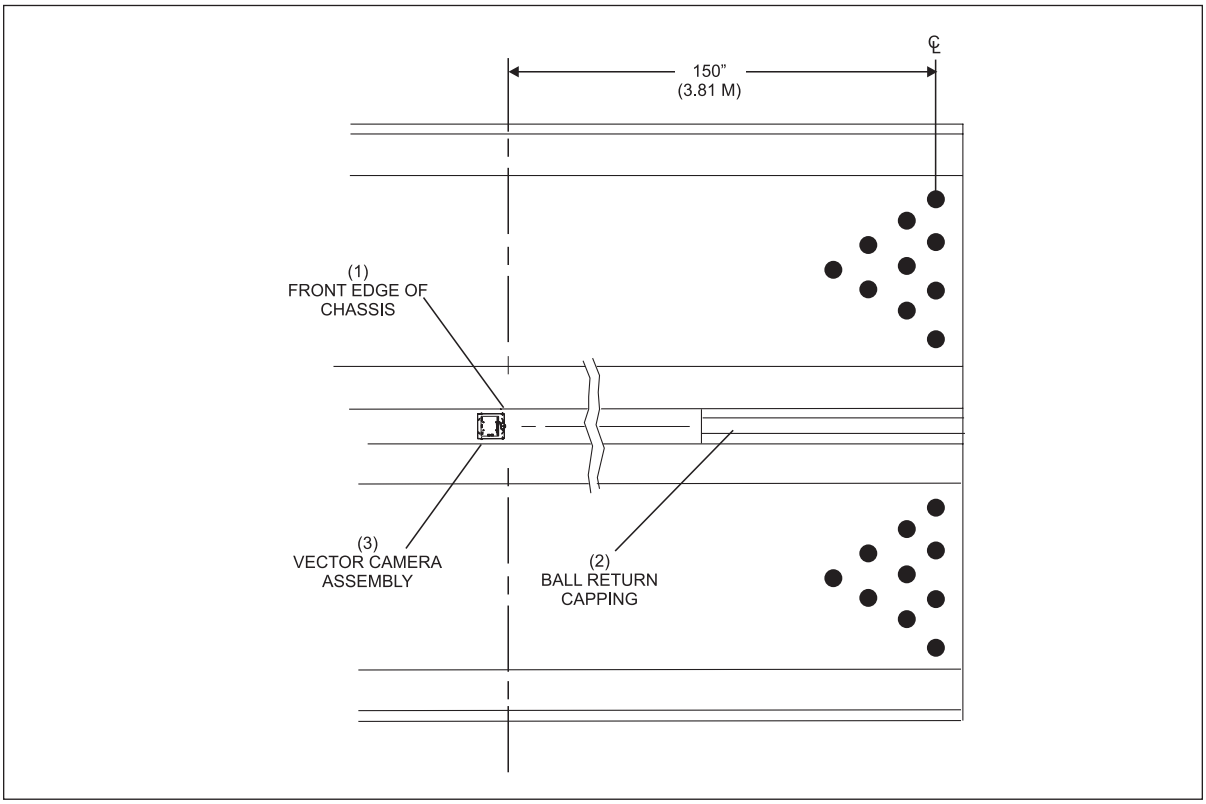


Vector Components

(1) BALL DETECT (2) VECTOR CAMERA CHASSIS (3) PINSETTER SWITCHES
(4) AMF SWITCH (5) BRUNSWICK SWITCH

The Vector camera chassis is mounted on the ball return capping of a lane pair so that the front edge of the unit is approximately 150" (3.81 m) from the center of the last row of pins. Refer to figure titled *Camera Position*. The assembly uses a single camera to take a picture of the pit area of both pinsetters. The picture is sent to the scoring computer where it is analyzed by the Video3 PCB. During the analysis, a portion of the picture is searched for bright reflections and shapes resembling pins. This is compared to a stored calibration to determine if the reflection level for the pins is above a reference brightness level set by the user through the control desk. Any reflection level that is above the set level is counted as a standing pin.

An infrared ball detect is mounted near the pinsetter and a switch is mounted on the pinsetter to monitor the rake (sweep) drop are used to ensure that the unit scores only after a ball has been thrown and the pinsetter has triggered. (A ball detect signal will not be accepted unless the switch is actuated.) Scoring occurs after a the rake (sweep) switch contacts have closed and a user determined time delay has passed. In the event that the pinsetter does not cycle on its own, the system will score then cycle the pinsetter using the machines reset circuit.



Vector Camera Position

(1) FRONT EDGE OF CHASSIS (2) BALL RETURN CAPPING (3) VECTOR CAMERA ASSEMBLY

The Vector camera consists of the following components:

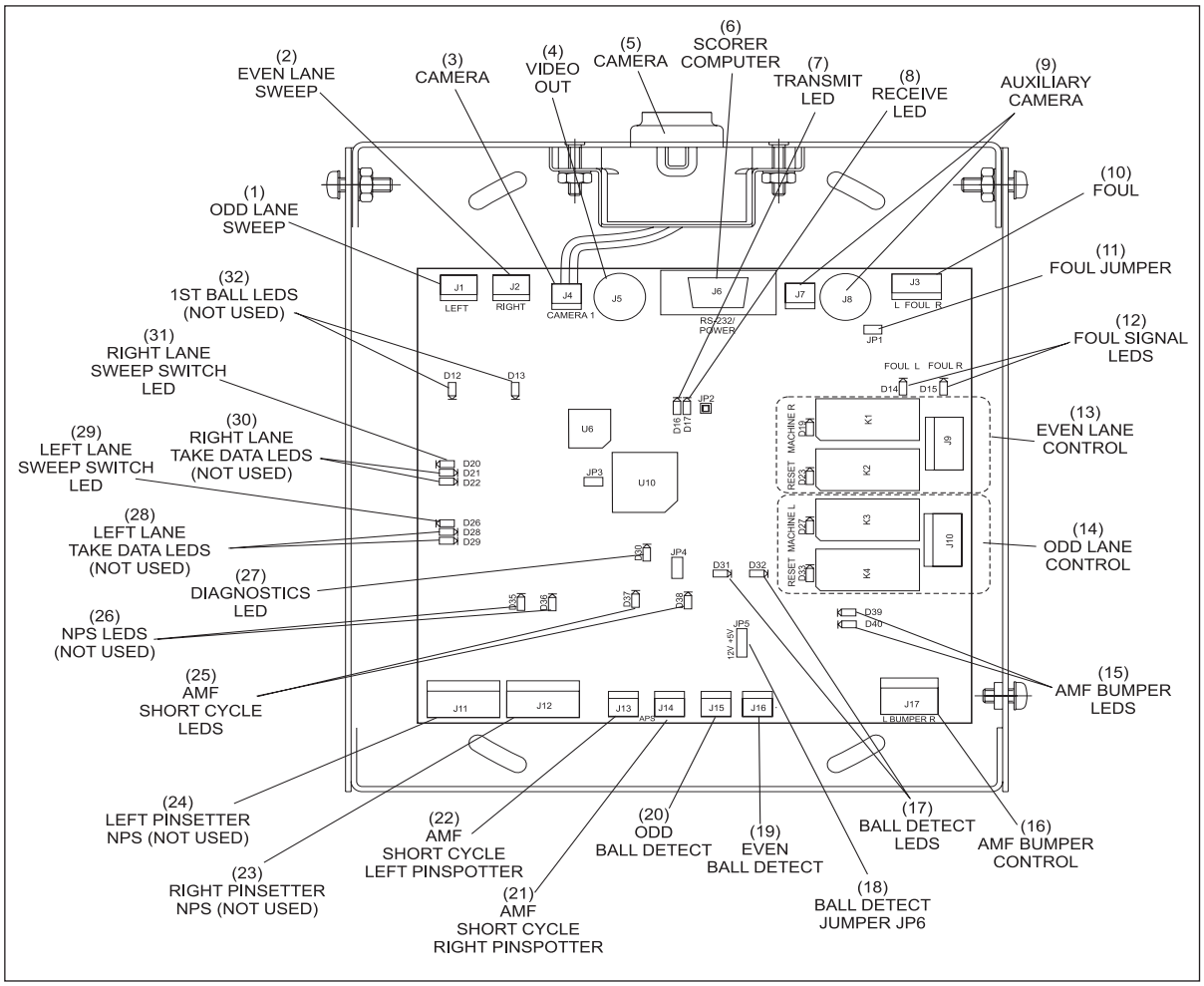
Ball Detect - The ball detect is an infrared device that senses when a ball has been thrown. The signal from the ball detect tells the Vector system when to begin the scoring cycle for a lane.

Pinsetter Modifications - A sweep (rake) switch is added to the pinsetter to make sure the camera takes the picture at the proper time during the pinsetter cycle. Also connections into the pinsetters circuits allows auto triggering of the pinsetter, special pinsetter cycles for No Tap or 3rd ball-10th frame situations, and AMF short cycle.

Vector Camera Chassis - The Vector Camera Chassis contains a camera and the Distribution PCB. The Distribution board powers the camera, interfaces the foul unit and ball detectors, controls the pinsetter on/off and triggering, and allows communication to the scorer computer.

VECTOR CAMERA CHASSIS - VERSION 6.0

The Vector Camera Chassis version 6.0 contains a camera and a Distribution PCB. The distribution board in camera chassis supplies power to the camera and routes the camera video to the scorer computer, turns the pinsetters on/off, cycles the pinsetters as needed, controls AMF automated bumpers, interfaces the ball detectors and foul unit to the scoring system, and controls the AMF pinspotter for short cycle situations. Version 6.0 also contains circuitry and connectors on the circuit board to expand functionality in the future. Refer to figure titled *Vector Camera Chassis 6.0.*



Vector Camera Chassis Version 6.0

The function of the components in the Vector Camera Chassis version 5.0 are:

(1) Odd Lane Sweep (J1) - Signal from the odd lane pinsetter's sweep/rake switch.

(2) Even Lane Sweep (J2) - Signal from the even lane pinsetter's sweep/rake switch.

(3) Camera (J4) - Connection for the camera's power and video.

(4) Video (J5) - Connection to Scorer Computer for the camera video.

(5) **Camera Lens -** The camera used to take pictures of the pins.

(6) **Scorer Computer (J6) -** Connection used to communicate to the scorer computer. This connection also transfers the camera's video to the scorer computer.

(7) **Transmit LED (D16) -** LED D16 flashes when the board is transmitting information to the scorer computer.

(8) **Receive LED (D17) -** LED D17 flashes when the board is receiving information to the scorer computer.

(9) **Auxiliary Camera (J7,J8) -** Connection to an additional camera for lane pairs that have a large distance between lanes.

(10) **Foul (J3) -** Input for the signals from the foul units for both the left and right lanes. Also refer to *(9) Foul Jumper (JP1).*

(11) **Foul Jumper (JP1) -** Jumper used to configure the distribution so that is can properly handle the foul input signal. When using Brunswick foul units or foul units that uses a relay type (switch) output, install a jumper to short the pins. If using a foul unit that supplies +12VDC as an output (AMF) remove the jumper.

(12) **Foul Signal LEDs (D14,D15) -** LED D14 (green) turns "ON" when the board is receiving a foul signal for the left lane. LED D15 (red) turns "ON" when the board is receiving a foul signal for the right lane.

(13) **Even Lane Pinsetter Control -** Connection to the even (right) lane pinsetter. The distribution PCB turns the even lane pinsetter on/off by energizing relay K1 and resets (cycle) the pinsetter by energizing relay K2. LED D19 turns "on" when the pinsetter power relay (K1) energizes. LED D23 turns "on" when the pinsetter reset relay (K2) energizes.

(14) **Odd Lane Pinsetter Control -** Connection to the odd (left) lane pinsetter. The distribution PCB turns the even lane pinsetter on/off by energizing relay K3 and resets (cycle) the pinsetter by energizing relay K4. LED D27 turns "on" when the pinsetter power relay (K3) energizes. LED D33 turns "on" when the pinsetter reset relay (K4) energizes.

(15) **AMF Bumper LEDs -** LED D39 turns "On" when a signal is sent to the AMF automated bumpers on the right lane. LED D40 turns "On" when a signal is sent to the AMF automated bumpers on the left lane.

(16) **AMF Bumper Control (J17) -** Connection to AMF automated bumpers.

(17) **Ball Detect LEDs -** LEDs D31 (left lane) and D32 (right lane) turn "On" when a ball detect signal occurs.

(18) **Ball Detect Jumper (JP6) -** Jumper used to configure the distribution PCB to power the ball detectors with 5VDC or a 12VDC. For Vector type ball detectors, set the jumper to 12VDC.

(19) **Even Ball Detect (J14) -** Connection for the signal and power for the even lane ball detector.

(20) **Odd Ball Detect (J13) -** Connection for the signal and power for the odd lane ball detector.

(21) **AMF Short Cycle Right Pinspotter (J14)** - Connection to the AMF 8270MP pinspotter to allow the even lane machine to perform a short cycle when needed.

(22) **AMF Short Cycle Left Pinspotter (J13)** - Connection to the AMF 8270MP pinspotter to allow the odd lane machine to perform a short cycle when needed.

(23) **Right Pinsetter NPS -** Not Used

(24) **Left Pinsetter NPS -** Not Used

(25) **AMF Short Cycle LEDs -** Leds D37 (left lane) and D38 (right lane) turn "On" when the short cycle signal sent AMF pinspotter.

(26) **NPS LEDs -** Not Used

(27) **Diagnostics LED -** Led D30 flashes when the Distribution PCB is working properly.

(28) **Left Lane Take Data LEDs -** Not Used

(29) **Left Lane Sweep Switch LED (D26) -** "On" when the sweep switch for the left (odd) lane is actuated.

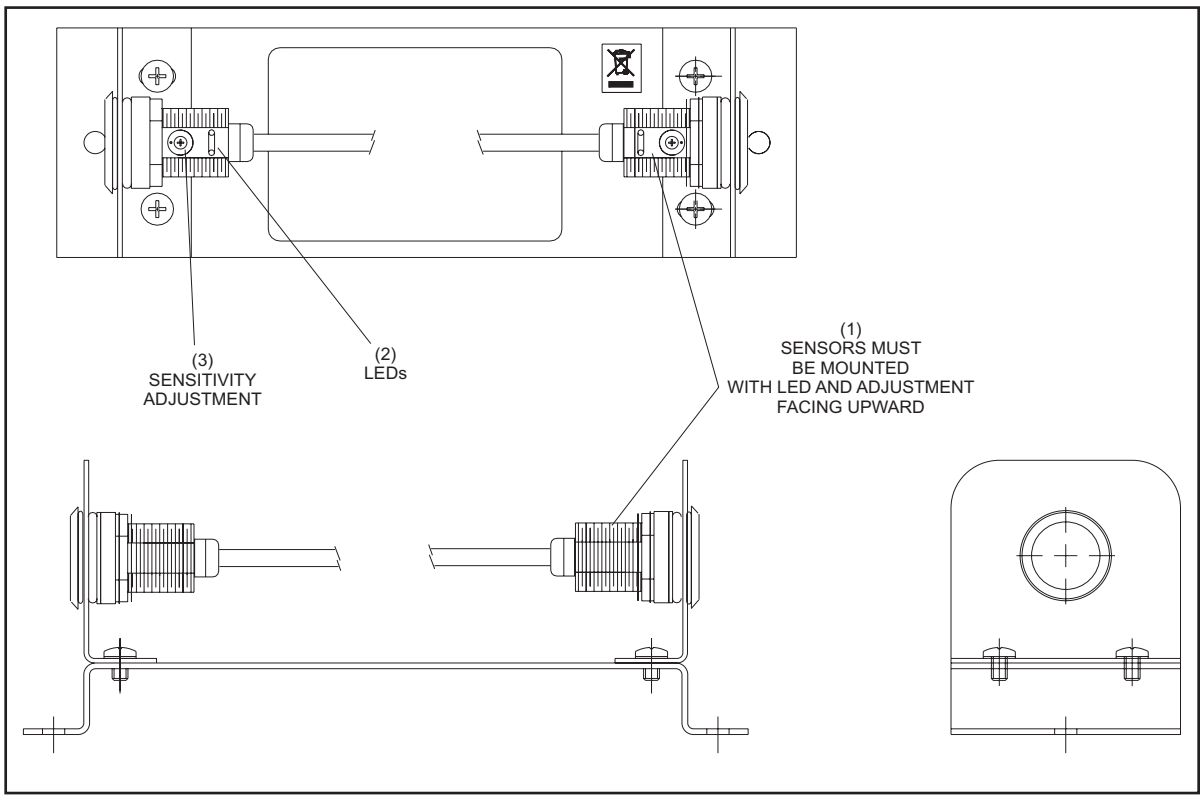
(30) **Right Lane Take Data LEDs -** Not Used

(31) **Right Lane Sweep Switch LED (D20) -** "On" when the sweep switch for the left (odd) lane is actuated.

(32) **1st Ball LEDs -** Not Used

BALL DETECTOR

The Vector uses a ball detector that is an infrared sensing device. The ball detector unit is made up of two infrared transmitters and receivers, one for each lane. Within each lane unit there are two lenses, one to focus the transmitted infrared beam toward the reflector on the opposite side of the lane, and one to focus the return light from the reflector onto the infrared receiver. LEDs on the unit indicate power, signal stability and level. The provided adjustment allow the user to adjust the ball detection sensitivity. Refer to figure titled *Vector Ball Detector.*



Vector Ball Detector

(1) SENSORS MUST BE MOUNTED WITH LED AND ADJUSTMENT FACING UPWARD

(2) LEDS

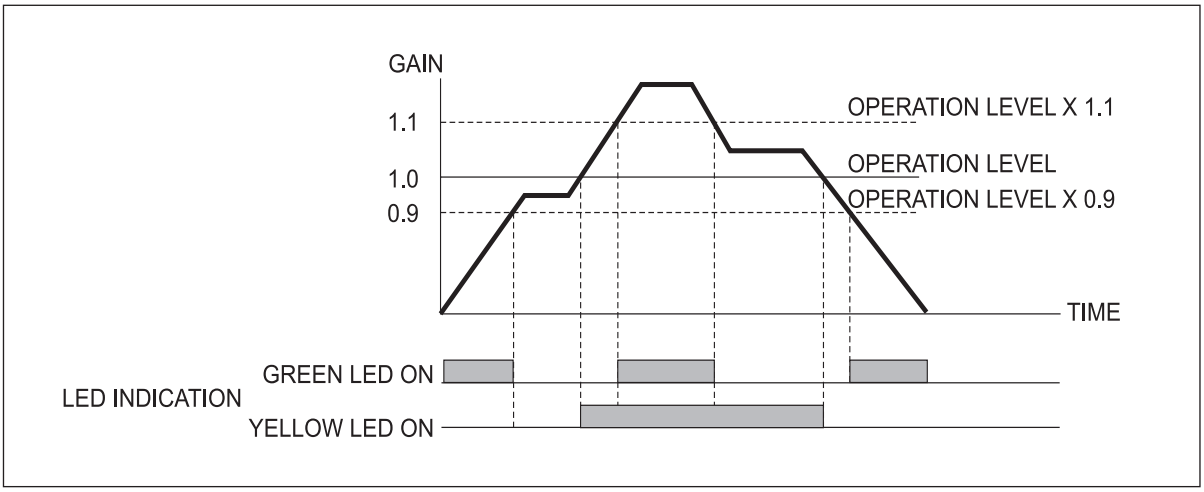
(3) SENSITIVITY ADJUSTMENT

BALL DETECT LED OPERATION

Green LED (Power and Stability) - The green LED has a dual purpose. During normal operation it is used to indicate power. During calibration it indicates the signal stability. The LED will turn off when the signal level (light level) is between 90% (10% below) and 110% (10% above) of the level needed for detection. Refer to figure titled *Vector Ball Detector.- LED Sensitivity Chart*

NOTE: *When adjusting the ball detector, the green LED will turn "Off " when the light returning from the reflector is between 90% and 110% of trigger threshold. This is normal operation.*

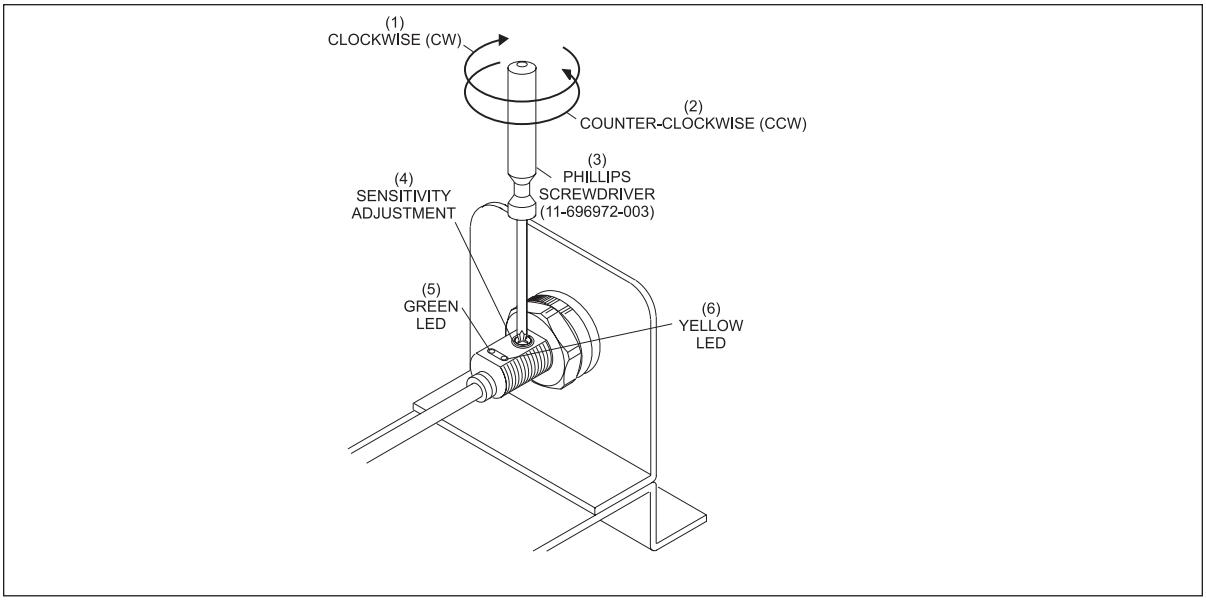
Yellow LED (Output) - The yellow LED indicates whether the Ball Detect output has been triggered. When the detector is receiving sufficient light, the LED will be "On" to indicate that the output is not enabled (0V). When the beam is blocked the LED turns "Off" to indicate the output is enabled (+V).



Vector Ball Detect - LED Sensitivity Chart

BALL DETECT CALIBRATION INSTRUCTIONS

1. Turn the sensitivity adjustment fully CCW. The yellow LED will be “Off” and the Green LED will be “On”. Refer to figure titled *Sensitivity Adjustment 1.*



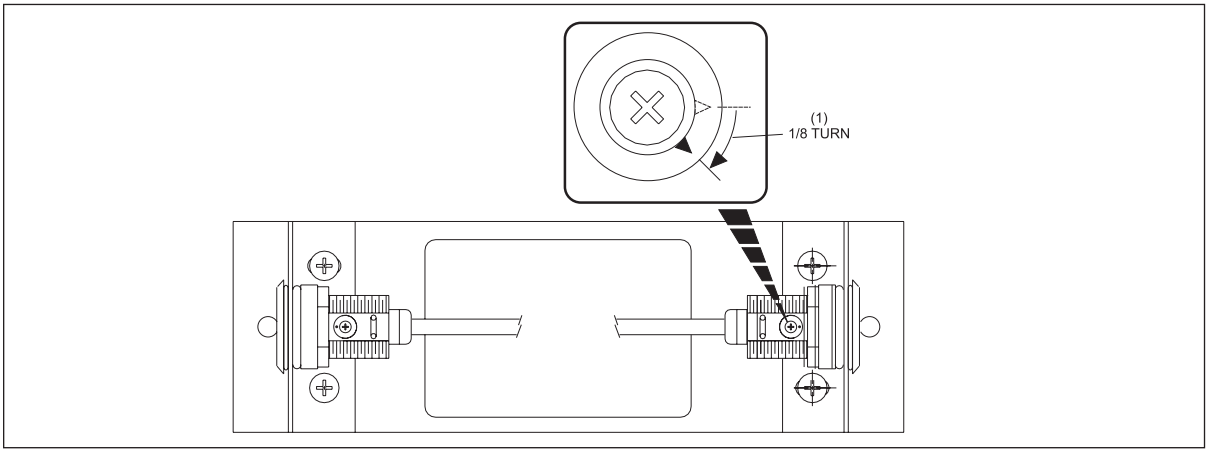
Sensitivity Adjustment 1

(1) CLOCKWISE (CW)	(2) COUNTER-CLOCKWISE (CCW)	(3) PHILLIPS SCREWDRIVER (11-696972-003)
(4) SENSITIVITY ADJUSTMENT	(5) GREEN LED	(6) YELLOW LED

2. Turn the sensitivity adjustment CW, very slowly until both LEDs turn “On”. Refer to figure *titled Sensitivity Adjustment 1.*

NOTE: *When adjusting the ball detector, the green LED will turn “Off”, the Yellow LED will turn “On”, then the Green LED will turn back “On”. This is normal operation.*

3. Once both the green and yellow LEDs are “On”, turn the sensitivity adjustment CW an additional 1/8 turn. Refer to figure titled *Sensitivity Adjustment.*2



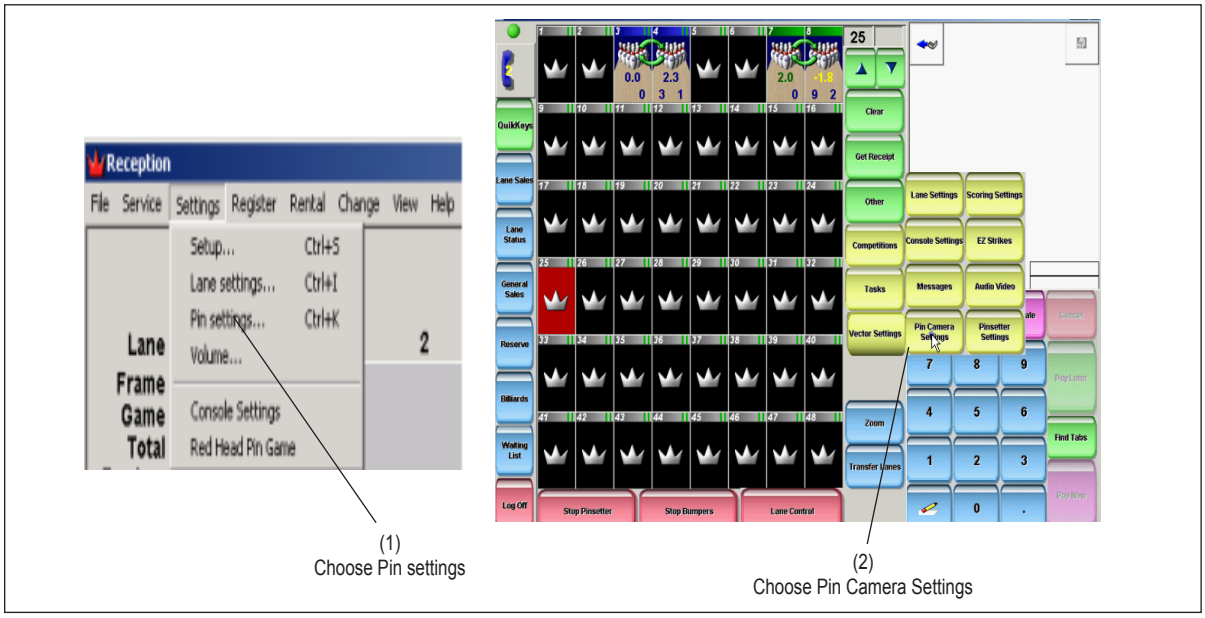
Sensitivity Adjustment 2

Ball Speed Adjustment

Use the following steps to adjust how the ballspeed is calculated:

1. For Vector desk systems select the “Settings” menu then the “Pin settings” menu item from the drop down menu.

   For Vector Plus systems go to the Lane Status screen, select the lane desired lane, Vector Settings, then Pin Camera Settings. Refer to the figures titled *Accessing Pin Camera Settings*



Accessing Pin Camera Settings

(1) CHOOSE PIN SETTINGS (2) CHOOSE PIN CAMERA SETTINGS

2. On the pinsettings page verify that the desired lane is being shown on the pin camera page. Change the lane number as needed. Refer to figure titled *Pin Camera Settings.*

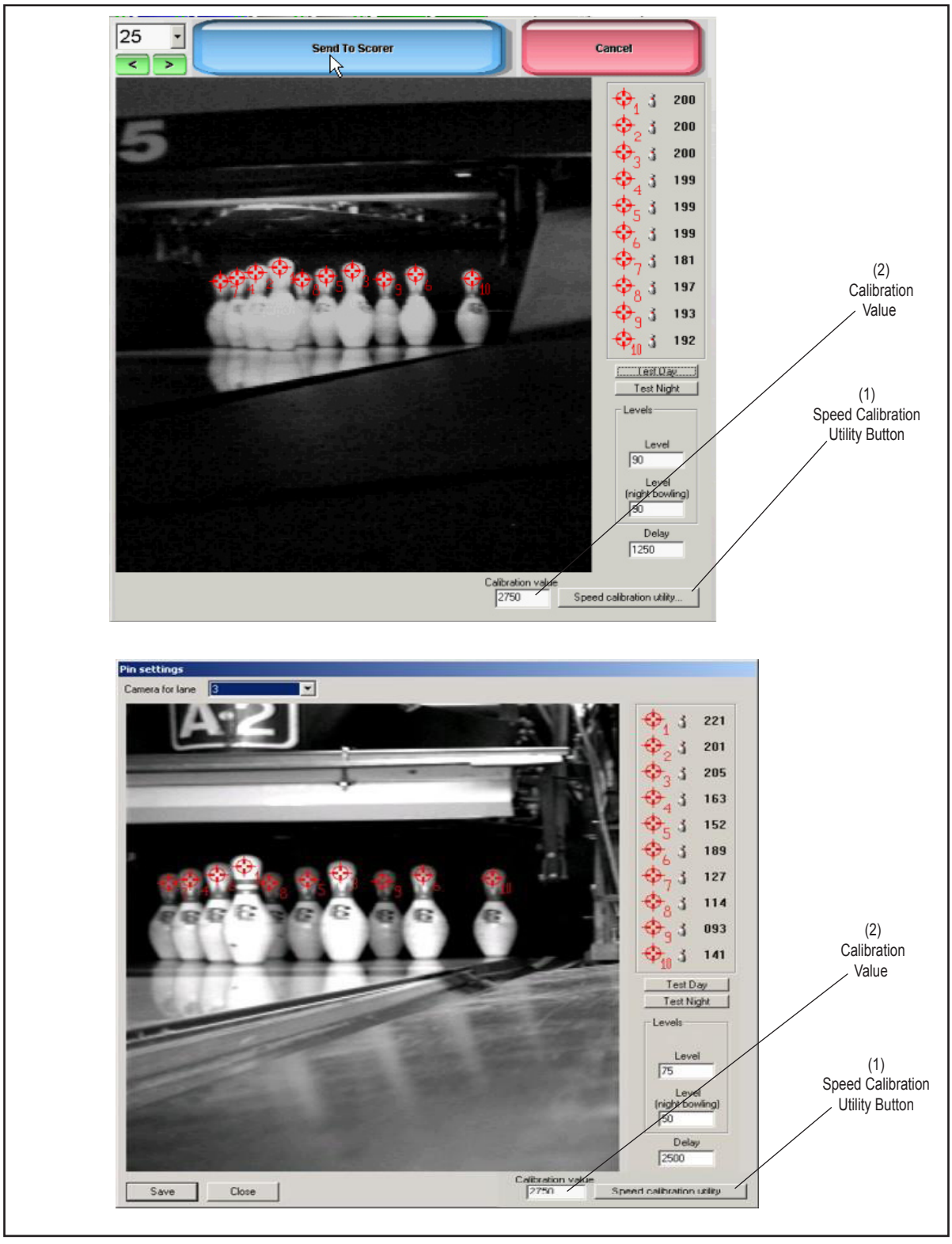
3. Change the ball speed calculation the value using either of the following methods.

   a. Change the number in the Calibration Value box as needed. To decrease the speed shown at the scorer enter a value lower than the number stored. To increase the speed shown to the scorer enter a number greater than the one stored.

NOTE: *A typical starting value is approximately 2700.*

   b. Run the speed calibration utility

4. Re-boot the scoring computer to activate the changes.



Pin Camera Settings

(1) SPEED CALIBRATION UTILITY BUTTON (2) CALIBRATION VALUE

PINSETTER MODIFICATIONS

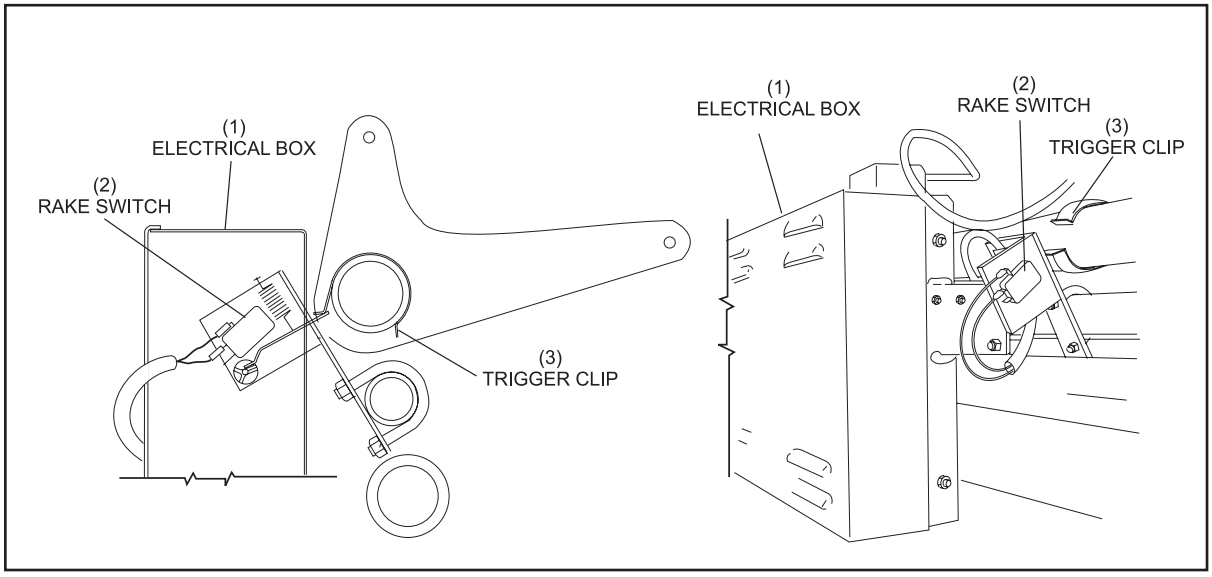
Sweep (Rake) Switch

The sweep (rake) switch ensures that the camera takes the picture only after the pinsetter triggers. If a ball detection has occurred, the opening of sweep switch, causes the camera to take a picture after a preset delay. Additional ball detect signals will be ignored when the switch is opened. The wiring of the switches is dependant on the EPROM version of the distribution PCB. Refer to figures titled *Switch Wiring Chart, Brunswick Rake Switch* and *AMF Sweep Switch*.

Sweep (Rake) Switch Wiring

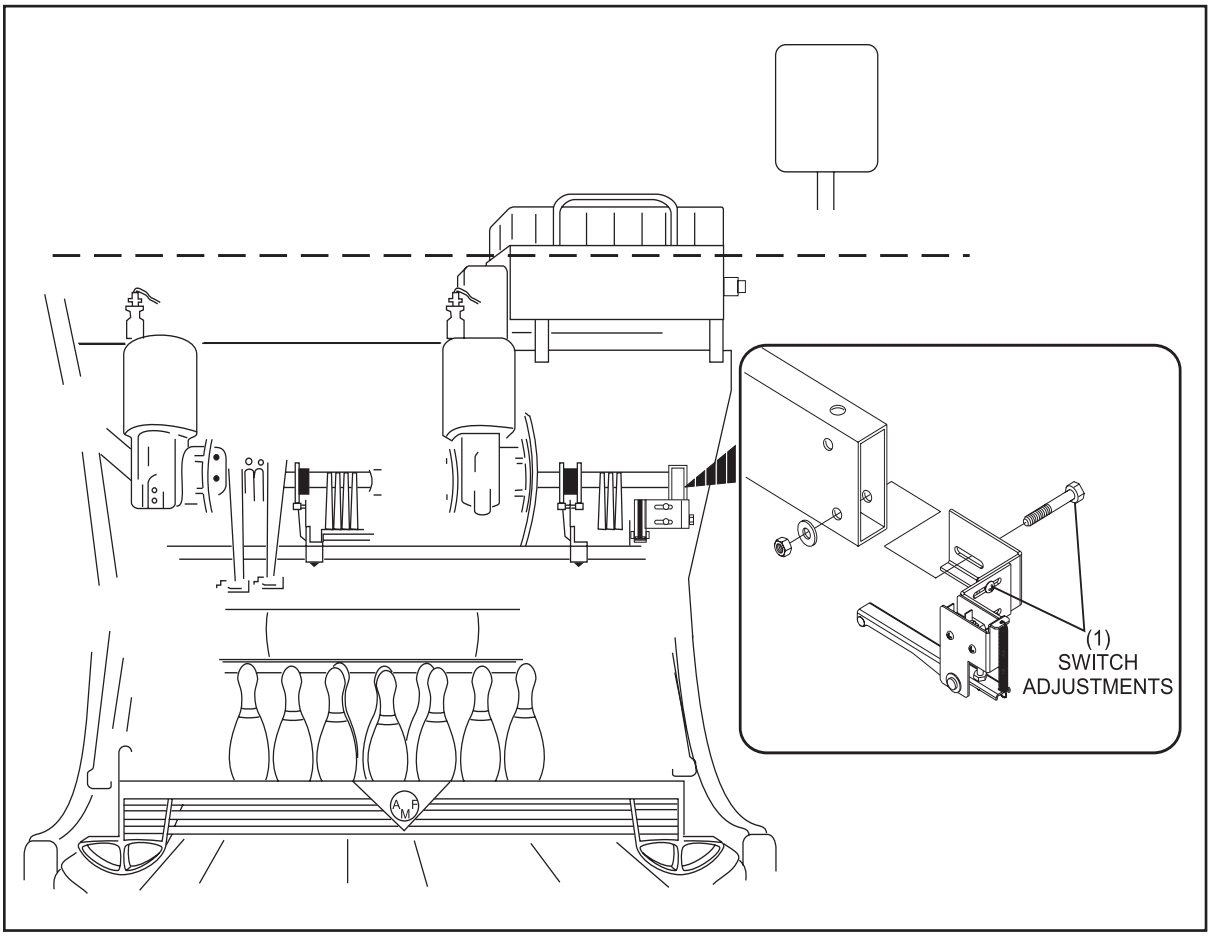
INSTALLATION	WIRING
Brunswick Pinsetters with Distribution PCB V1.3 or later	Common (COM), Normally Closed (NC)
AMF Pinspotter Sweep Connections	Common (COM), Normally Closed (NC)

Switch Wiring Chart



Brunswick Rake Switch

(1) ELECTRICAL BOX (2) RAKE SWITCH (3) TRIGGER CLIP



AMF Sweep Switch

(1) SWITCH ADJUSTMENTS

SCORING SEQUENCE OF EVENTS

First Ball, Second Ball

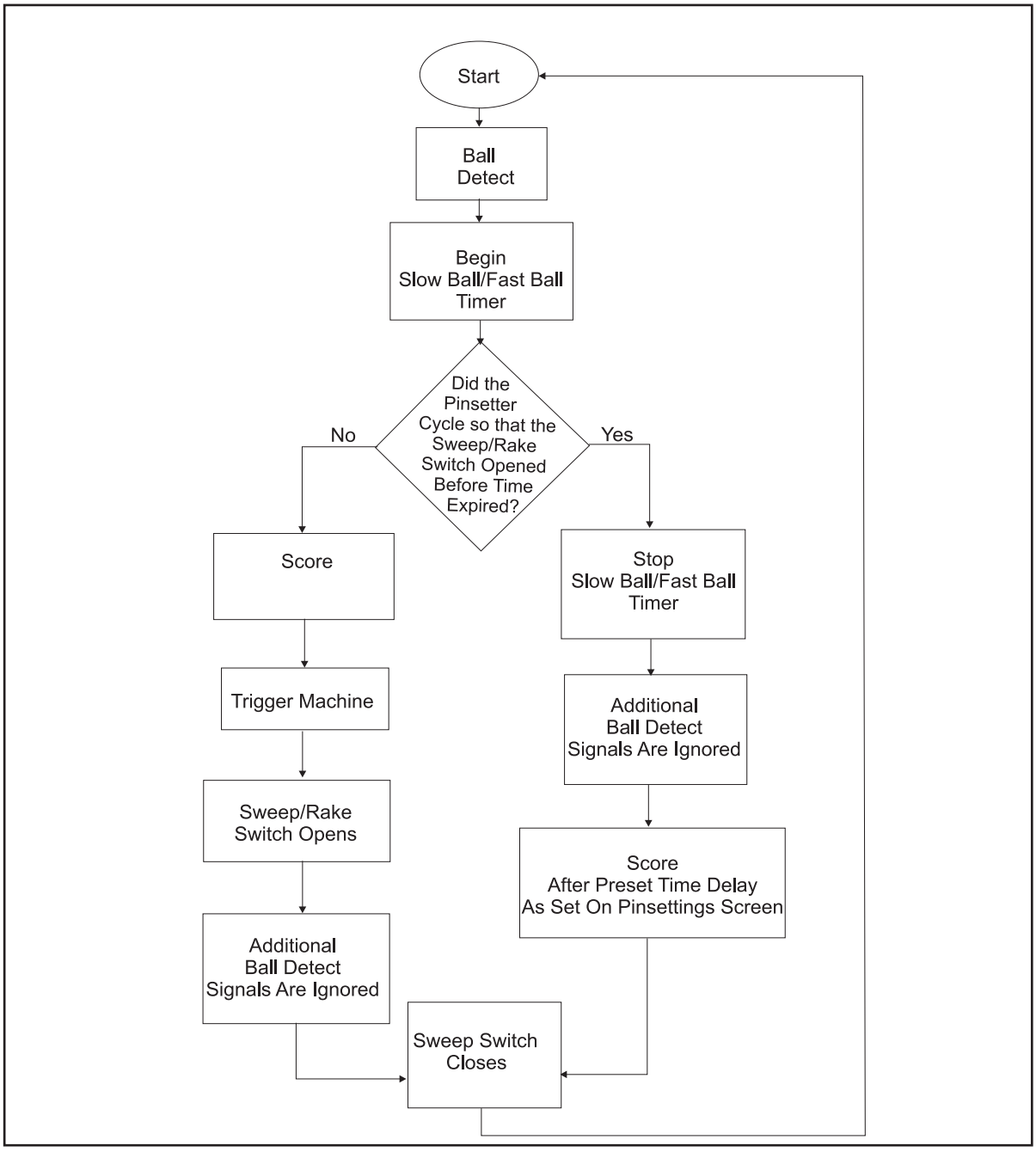
The following describes the events necessary for the first and second ball scoring sequences.

***NOTE**: The scorer console must be turned on, and a bowler's name entered.*

1. The bowler delivers the first ball. The ball breaks the ball detect's light path and sends a signal to the distribution PCB.
2. The scoring process starts.
3. The pinsetter is triggered by the ball.

***NOTE:** If the pinsetter does not trigger on its own, the distribution board will automatically take a picture and trigger the machine after a time delay that is calculated based on the fast ball/slow ball settings as set on the scorer settings screen and continues from step 6.*

4. The sweep falls downward causing the sweep switch to open - sending signal to the Distribution PCB.
5. After the time delay entered on the pinsettings screen at the control desk, the camera takes a picture and sends it to the Video3 PCB.
6. The Video3 PCB analyzes the picture.
7. Score is displayed.
8. The sweep switch closes to reset scoring cycle.



First Ball, Second Ball Scoring Sequence

No Tap

The following describes the events for the no tap scoring sequence.

This cycle occurs when a bowler throws a no tap strike and the scorer is set to No Tap scoring. At the end of the regular cycle, the pinsetter will automatically cycle a second time so the next bowler does not have to press the reset button to get a full rack of pins.

1. The bowler delivers the first ball. The ball breaks the ball detect's light path and sends a signal to the distribution PCB.

2. The scoring process starts.

3. The pinsetter is triggered by the ball or if the pinsetter does not trigger on its own, the a reset signal is sent from the Distribution PCB to trigger the machine.

NOTE: *If the pinsetter does not trigger on its own, the distribution board will automatically take a picture and trigger the machine after a time delay that is calculated based on the fast ball/slow ball settings as set on the scorer settings screen and continues from step 6.*

4. The sweep falls downward causing the sweep switch to open - sending signal to the Distribution PCB.

5. After the time delay entered on the pinsettings screen at the control desk, the camera takes a picture and sends it to the Video3 PCB.

6. The Video3 PCB analyzes the picture.

7. $^{N}_{T}X$ is displayed on CRT's.

8. The sweep switch closes to reset scoring cycle.

9. The Distribution PCB sends a reset signal to the machine causing it to cycle a second time.

3rd Ball 10th Frame

The following describes the events necessary for the third ball tenth frame scoring sequence.

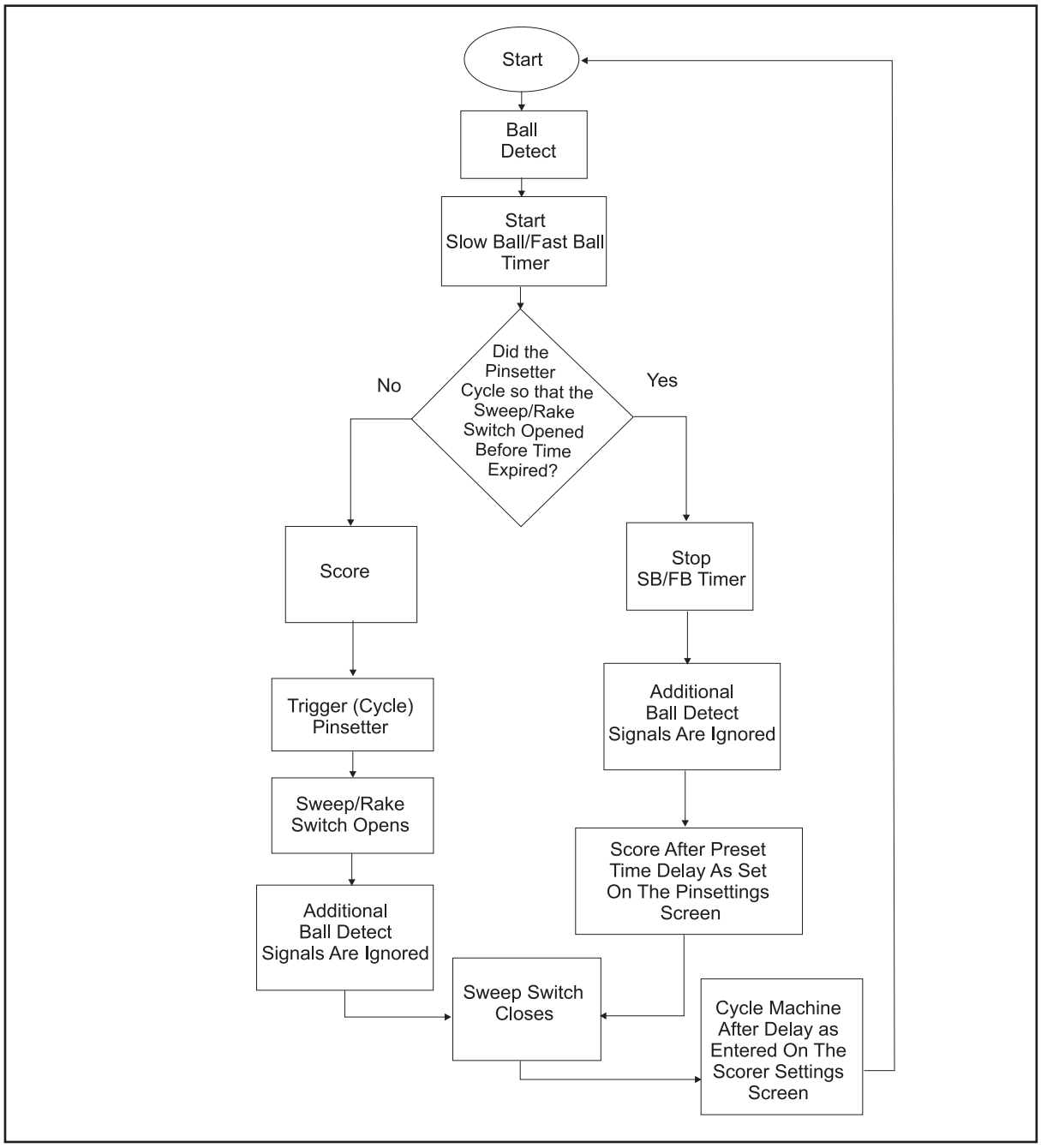
This cycle occurs at the end of the tenth frame for a bowler that received a “bonus” ball after a spare or a double. If the bowler does not strike on the “bonus” ball, the pinspotter will cycle a second time so the next bowler is not required to push the Reset button to get a full rack, first ball.

NOTE: *The scorer console must be turned on, a bowler’s name entered, and the sequencing arrows on a bowler’s name.*

1. The bowler delivers the first ball. The ball breaks the ball detect’s light path and sends a signal to the Distribution PCB.
2. The scoring process starts.
3. The pinsetter is triggered by the ball or if the pinsetter does not trigger on its own, the a reset signal is sent from the Distribution PCB to trigger the machine.

NOTE: *If the pinsetter does not trigger on its own, the distribution board will automatically take a picture and trigger the machine after a time delay that is calculated based on the fast ball/slow ball settings as set on the scorer settings screen and continues from step 6.*

4. The sweep falls downward causing the sweep switch to open - sending signal to the Distribution PCB.
5. After the time delay entered on the pinsettings screen at the control desk, the camera takes a picture and sends it to the Video3 PCB.
6. The Video3 PCB analyzes the picture and determines a strike has not occurred.
7. The score is displayed on CRT’s.
8. The sweep switch closes to reset scoring cycle.
9. The Distribution PCB sends a reset signal to the machine causing it to cycle a second time.



No Tap, Third Ball 10th Frame Scoring Sequence

Pinsettings

The “Pinsetting” (Vector) and Pin Camera Setting (Vector Plus) functions are used to control the operation of the Pinfall Camera. The Pinfall Camera takes a picture of the standing pins that is used to calculate the score. The camera settings are very important for proper operation of the scoring system. The score for each ball is determined by comparing the light level within a target with a threshold value. If the light level inside the target is higher than the threshold value, the scorer will determine the pin is standing. If the light level inside the target is lower than the threshold value, the scorer will determine the pin has fallen and score it as pinfall. The system has two light thresholds. One that is set up for normal operation and one that is set up for operation in low light conditions such as black lights, or times when lights over the bowling lanes are turned off. Refer to the figures titled *Accessing Pin Camera Settings, Pin Setting Window-Vector Control Desk* and *Pin Camera Settings Window-Vector Plus Control Desk.*

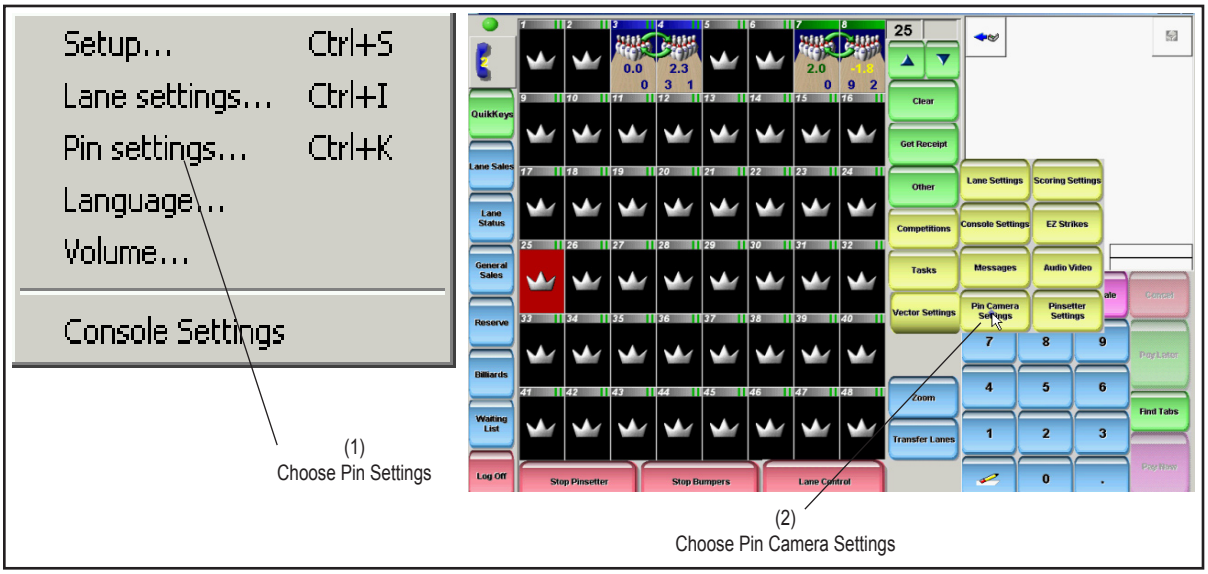
Use the following sequence to access the pin camera settings screen:

Vector Control Desk

1. Select the “Settings” menu.
2. Select the “Pin settings” menu item.
3. Enter a password, if required.
4. Make desired changes.
5. Select the “OK” button.

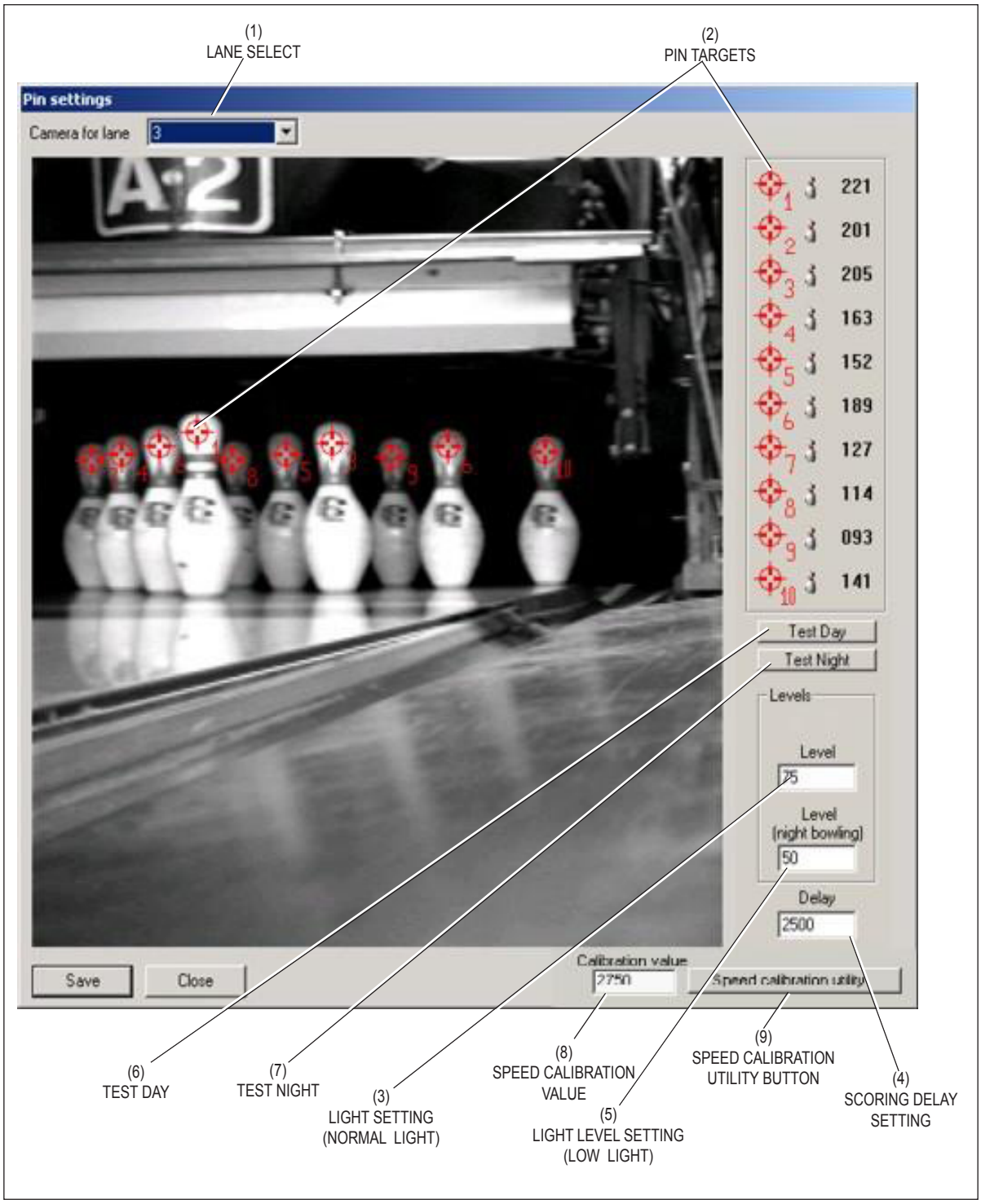
Vector Plus

1. Select the “Vector Settings” button while on the lane status screen.
2. Select “Pin Camera Settings”.

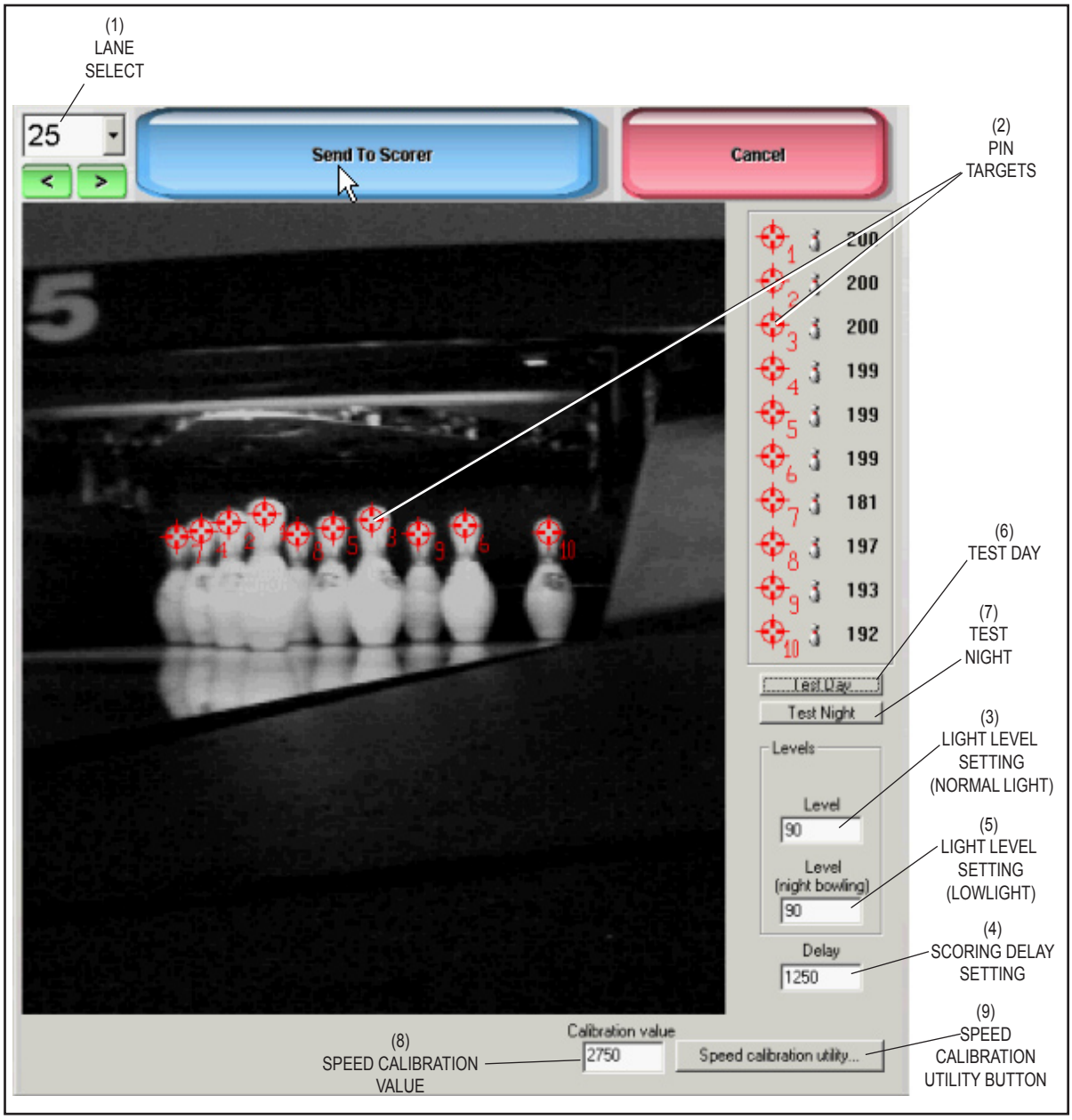


Accessing Pin Camera Settings

(1) CHOOSE PIN SETTINGS (2) CHOOSE PINCAMERA SETTINGS



Pin Setting Window-Vector Control Desk



Pin Camera Settings Window-Vector Plus Control Desk

(1) Lane Select - Drop down box used to select the lane for calibration.

(2) Pin Targets - The spots where the camera is looking to determine whether or not that pin is standing. The target are set by dragging them from the target area at the left and placing them over the proper pins in the display. Once in position the light level (0 - 255) coming from the pin will appear to the left of the target.

(3) Light Level Setting (Normal Light) - Setting used to determine the minimum light level needed to detect a pin as standing during normal bowling conditions. *A good rule of thumb is to select a value midpoint between the level of light shown for the darkest pin and the level displayed when a target is positioned on the background.* Normally the preset level will be in the 80 to 100 range, but if the lighting is dimmer or brighter than normal, it may fall outside these values.

The **Level** should be set to a substantially lower value than the light level for all pins, particularly pins in the back rows, where there is less lighting. For example, two camera pictures of the same lane, taken immediately after each other, can have different light levels. For this reason it is a good idea to take several pictures, in order to see how much the light can vary. Also remember that, during bowling, the camera pictures are taken when the sweep is down. This results in pictures that are somewhat darker than the pictures used during setup. It is important to allow for this when setting the levels.

(4) **Scoring Delay -** The "Delay" time, in milliseconds, controls when the scoring picture is taken. The time starts once the rake/sweep has left the home position and the sweep switch has opened. This value should be set to allow the rake/sweep to drop to the guard position before the picture is taken. The delay should end before the rack/table can make contact with the top of the pins. If the interval is too short it may include pins just about to fall or the sweep board may block the camera from seeing the pins. If the delay is too long, the pinsetter deck or table may block the pins.

NOTE: *1500-3000 milliseconds is a typical setting for most pinsetters.*

(5) **Light Level Setting (Low Light) -** An alternative light level setting to the that can be used to determine the minimum light level needed to detect a pin as standing. This is usually used to set a lower threshold for use during Cosmic or other low light situations.

(6) **Test Day -** Click this button to simulate how the camera will score when using the light level value entered in the Level box.

(7) **Test Night -** Click this button to simulate how the camera will score when using the light level value entered in the Level (Night Bowling) box.

(8) **Speed Calibration Value -** Enter a new value in this box to change the ball speed calculation. Increasing the value cause an increase in the ball speed shown on the overhead. Lower this value decreased the speed shown.

(9) **Speed Calibration Utility Button** - Click this button to run the ball speed calibration wizard.

Camera Calibration

In order to calibrate the camera, the pinsetter associated with the camera must be on with 10 pins standing on the pindeck. Perform the following steps to calibrate the camera to the pins:

1. Select the lane to be calibrated.

2. Using the mouse, drag the target for the Pin 1 from the column at the right side of the dialog box to the head of the pin 1. The number in the column on the right indicates the light level for that pin.

3. Repeat the previous step for all pins.

NOTE: *It is important to place the correct pin target on its corresponding pin; if not, incorrect scoring will occur.*

4. Set the *initial* Light Threshold:

    a. Record the light value for all ten pins.
    b. Knock all ten pins over and record the light value for each pin.
    c. Select the "Level" field and enter a value midway between the lowest light level value recorded in *step a* and the light highest level recorded in *step b*.

NOTE: *The initial light level setting described is a good starting point for camera calibration. The actual light level used may be varied from this setting to accommodate different lighting and pin conditions, such as colored pins.*

5. Set the *initial* Night Light Threshold:

    a. Set the bowling center's lighting up as it would be used during night bowling events such as cosmic bowling, black light bowling or other reduced lighting conditions.
    b. Record the light value for all ten pins.
    c. Knock all ten pins over and record the light value for each pin.
    d. Select the "Level" field and enter a value midway between the lowest light level value recorded in *step b* and the light highest level recorded in *step c*.

6. Set the Delay value:

    a. Select the delay field.

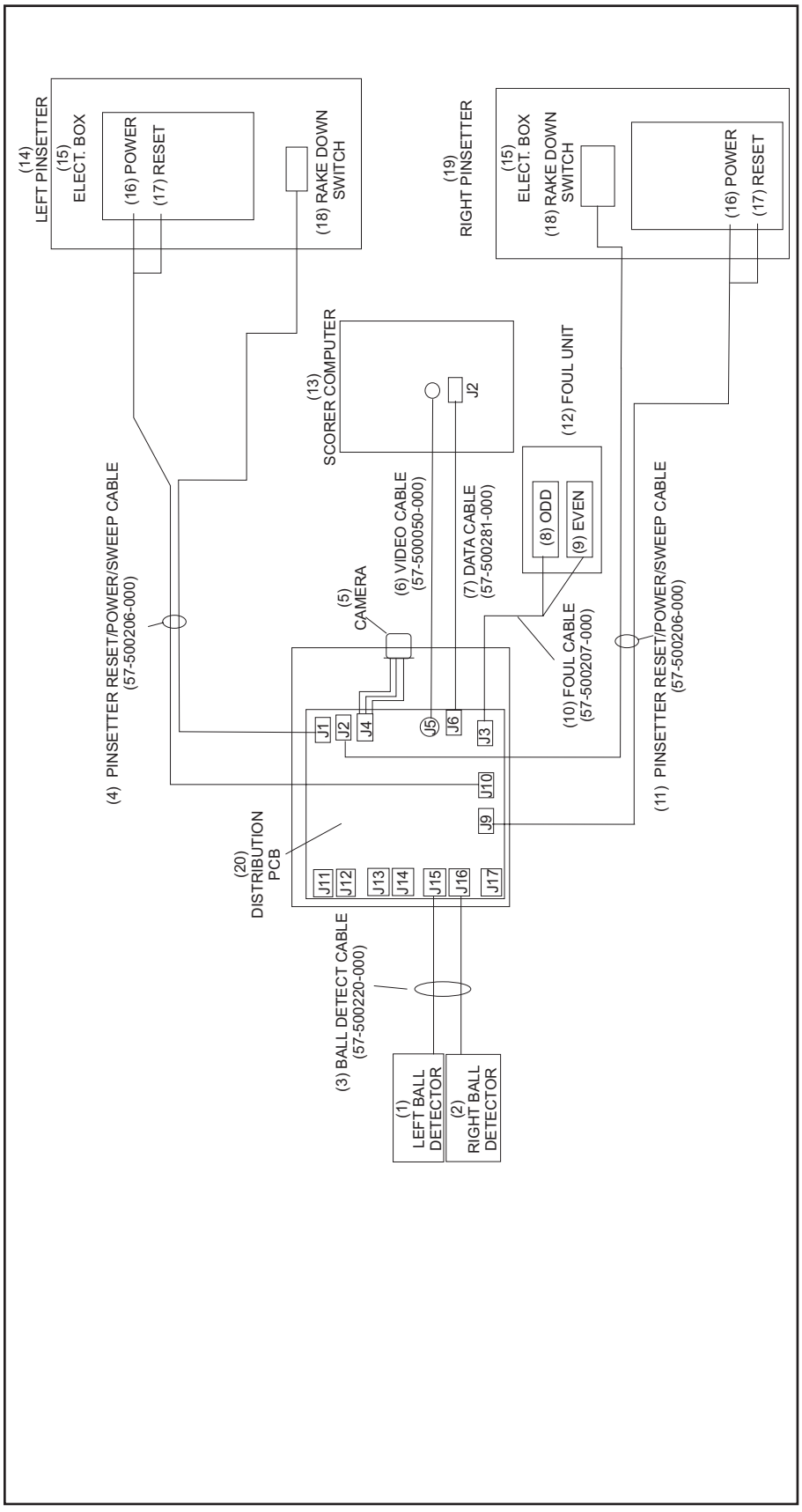
    b. Enter the amount of delay between the time that the rake or sweep is triggered and when the camera should take the picture for scoring. This value should be set to allow the rake/sweep to drop to the guard position before the picture is taken. The delay should end before the rack/table begins to move.

NOTE: *1500-3000 milliseconds is a typical setting for most pinsetters.*

7. When all camera settings have been made for this lane, select the "Save" button, or "Send to Scorer" as appropriate

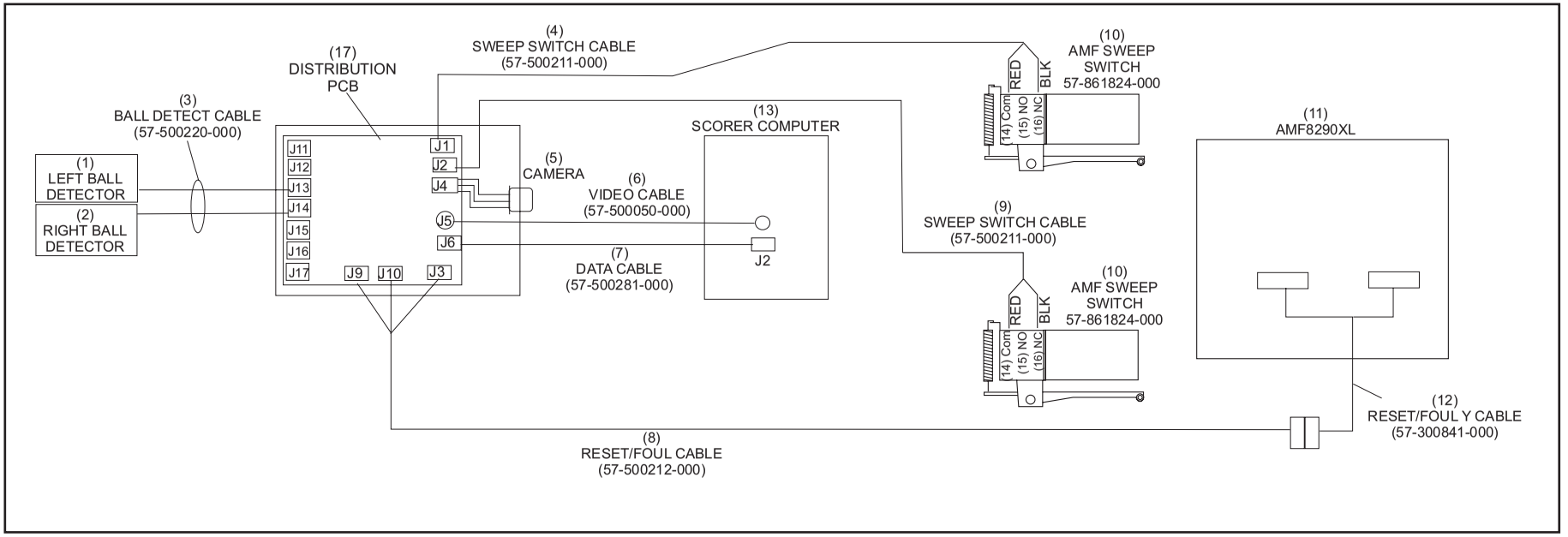
NOTE: *The Vector program will automatically exit and restart when settings have been changed.*

CABLE DIAGRAMS



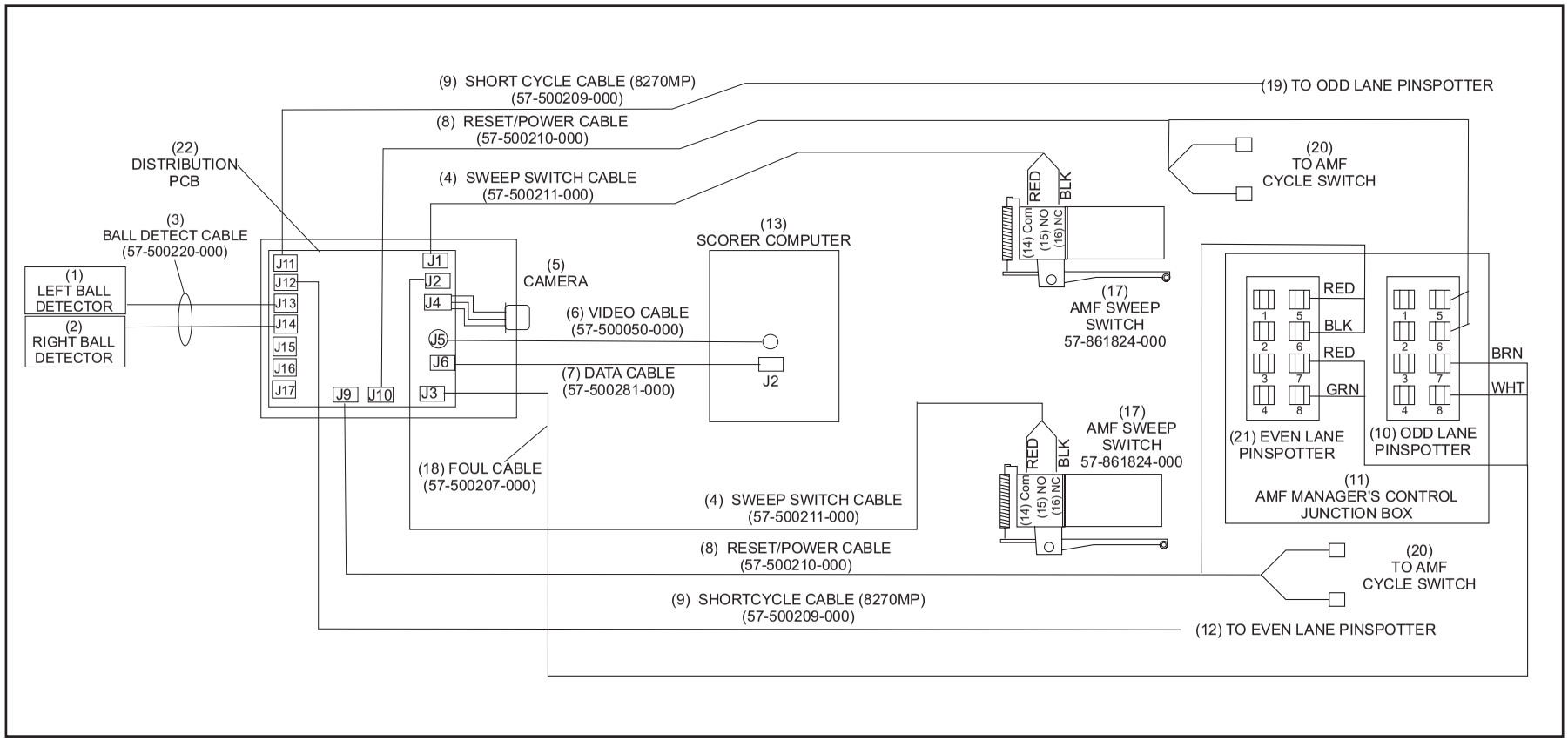
A, A2 Pinsetter Vector wiring

(1) LEFT BALL DETECTOR
(2) RIGHT BALL DETECTOR
(3) BALL DETECT CABLE (57-500220-000)
(4) PINSETTER RESET/POWER/SWEEP CABLE (57-500206-000)
(5) CAMERA
(6) VIDEO CABLE (57-500050-000)
(7) DATA CABLE (57-500281-000)
(8) ODD
(9) EVEN
(10) FOUL CABLE (57-500207-000)
(11) PINSETTER RESET/POWER/SWEEP CABLE (57-500206-000)
(12) FOUL UNIT
(13) SCORER COMPUTER
(14) LEFT PINSETTER
(15) ELECT. BOX
(16) POWER
(17) RESET
(18) RAKE DOWN SWITCH
(19) RIGHT PINSETTER
(20) DISTRIBUTOR PCB



AMF 8290 Wiring

(1) LEFT BALL DETECTOR
(2) RIGHT BALL DETECTOR
(3) BALL DETECT CABLE (57-500220-000)
(4) SWEEP SWITCH CABLE (57-500211-000)
(5) CAMERA
(6) VIDEO CABLE (57-500050-000)
(7) DATA CABLE (57-500281-000)
(8) RESET FOUL CABLE (57-500212-000)
(9) SWEEP SWITCH CABLE (57-500211-000)
(10) AMF SWEEP SWITCH (57-861824-000)
(11) AMF 8290XL
(12) RESET/FOUL “Y” CABLE (57-300841-000)
(13) SCORER COMPUTER
(14) COM
(15) NORMALLY OPEN
(16) NORMALLY CLOSED
(17) DISTRIBUTOR PCB



AMF 8270 Wiring

(1) LEFT BALL DETECTOR
(2) RIGHT BALL DETECTOR
(3) BALL DETECT CABLE (57-500220-000)
(4) SWEEP SWITCH CABLE (57-500211-000)
(5) CAMERA
(6) VIDEO CABLE (57-500050-000)
(7) DATA CABLE (57-500281-000)
(8) RESET/POWER CABLE (57-500210-000)
(9) SHORT CYCLE CABLE (57-500209-000)
(10) ODD LANE PINSPOTTER
(11) AMF MANAGER'S CONTROL JUNCTION BOX
(12) TO EVEN LANE PINSPOTTER
(13) SCORER COMPUTER
(14) COM
(15) NORMALLY OPEN
(16) NORMALLY CLOSED
(17) AMF SWEEP SWITCH (57-861824-000)
(18) FOUL CABLE (57-500207-000)
(19) TO ODD LANE PINSPOTTER
(20) TO AMF CYCLE SWITCH
(21) EVEN LANE PINSPOTTER
(22) DISTRIBUTION PCB

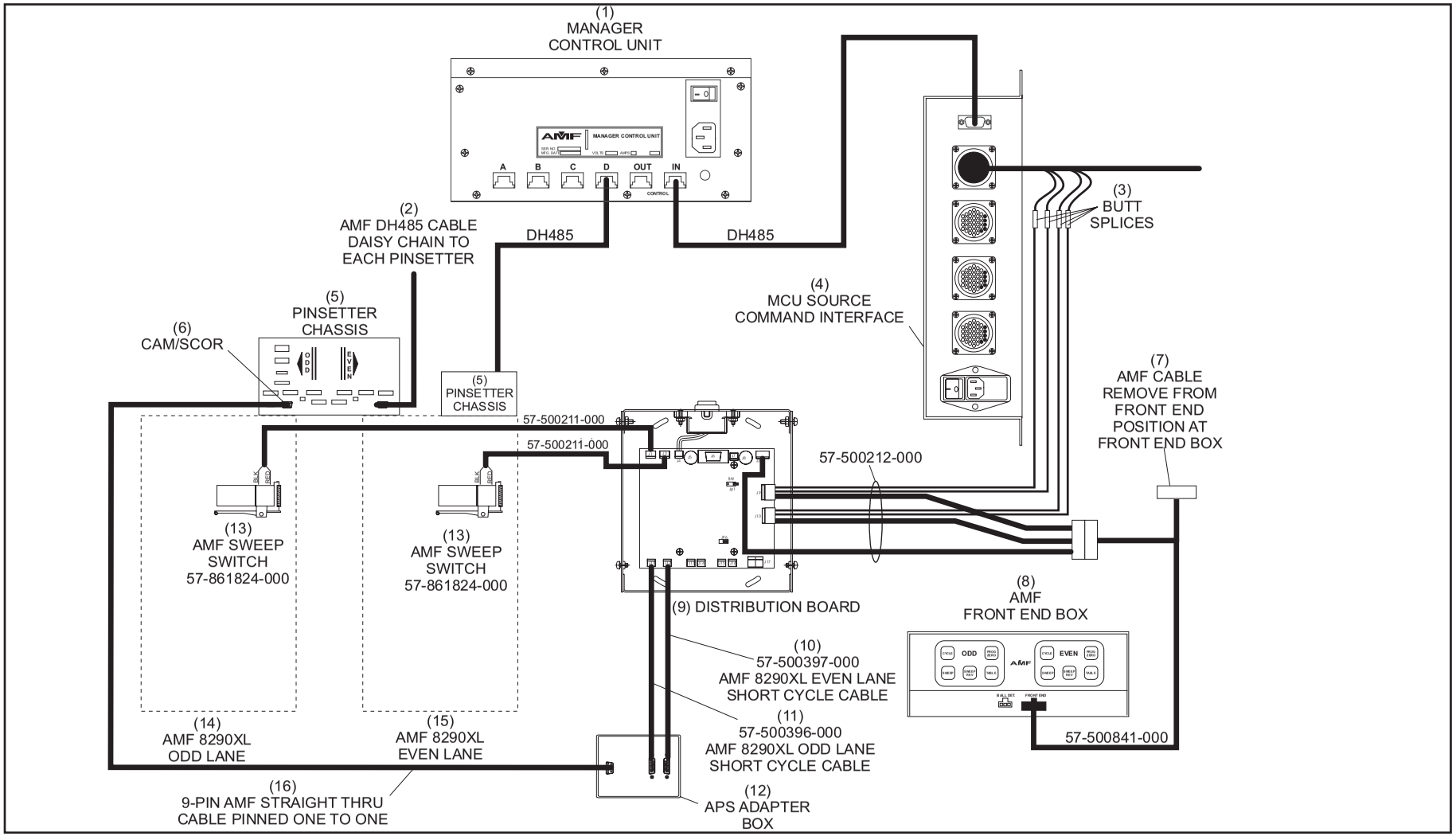
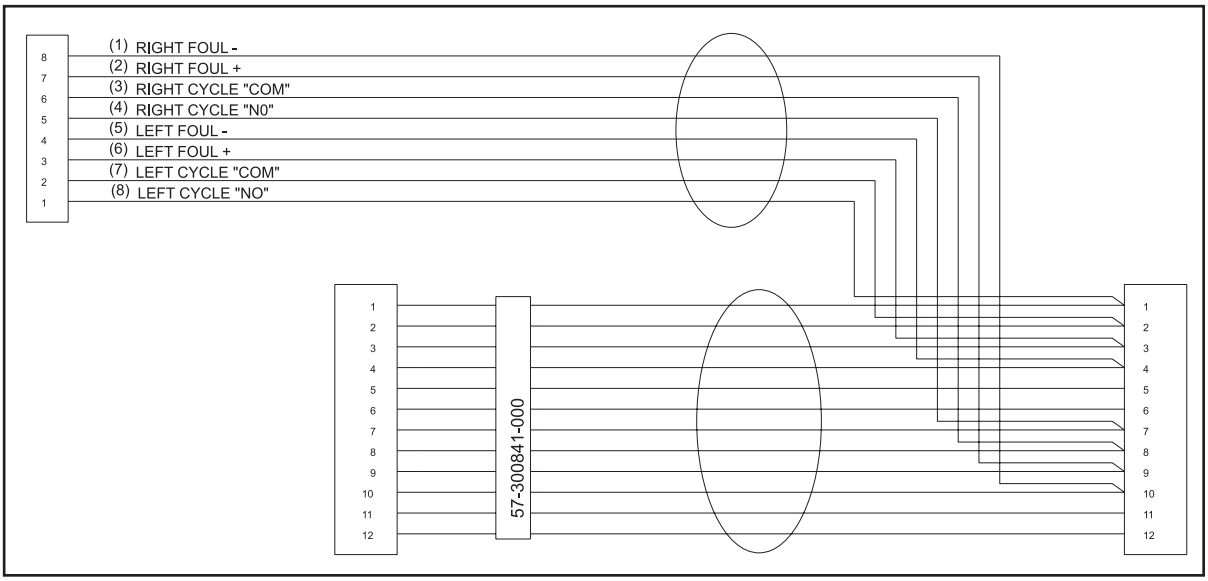


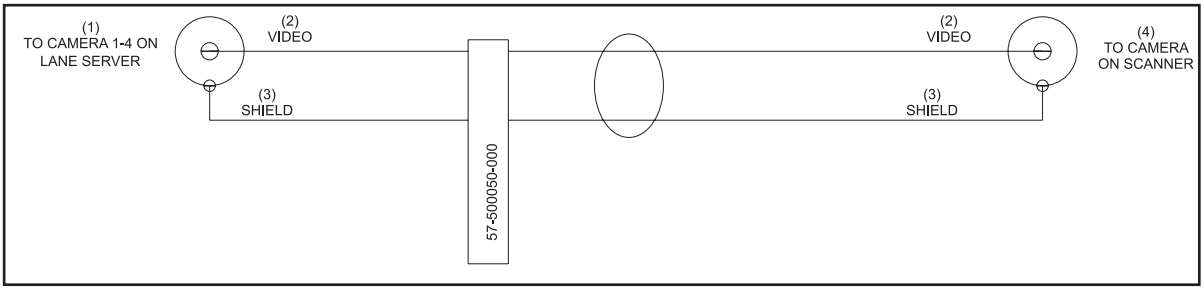
Figure 102. AMF 8290XL Interface Overview

(1) MANAGER CONTROL UNIT
(2) AMF DH485 CABLE DAISY CHAIN TO EACH PINSETTER
(3) BUTT SPLICES
(4) MCU SOURCE COMMAND INTERFACE
(5) PINSETTER CHASSIS
(6) CAM/SCOR
(7) AMF CABLE REMOVE FROM “FRONT END” POSITION AT FRONT END BOX
(8) AMF FRONT END BOX
(9) DISTRIBUTION BOARD
(10) 57-500397-000 AMF 8290XL EVEN LANE SHORT CYCLE CABLE
(11) 57-500396-000 AMF 8290XL ODD LANE SHORT CYCLE CABLE
(12) APS ADAPTER BOX
(13) AMF SWITCH 57-861824-000
(14) AMF 8290XL ODD LANE
(15) AMF 8290XL EVEN LANE
(16) 9-PIN AMF STRAIGHT THRU CABLE PINNED ONE TO ONE



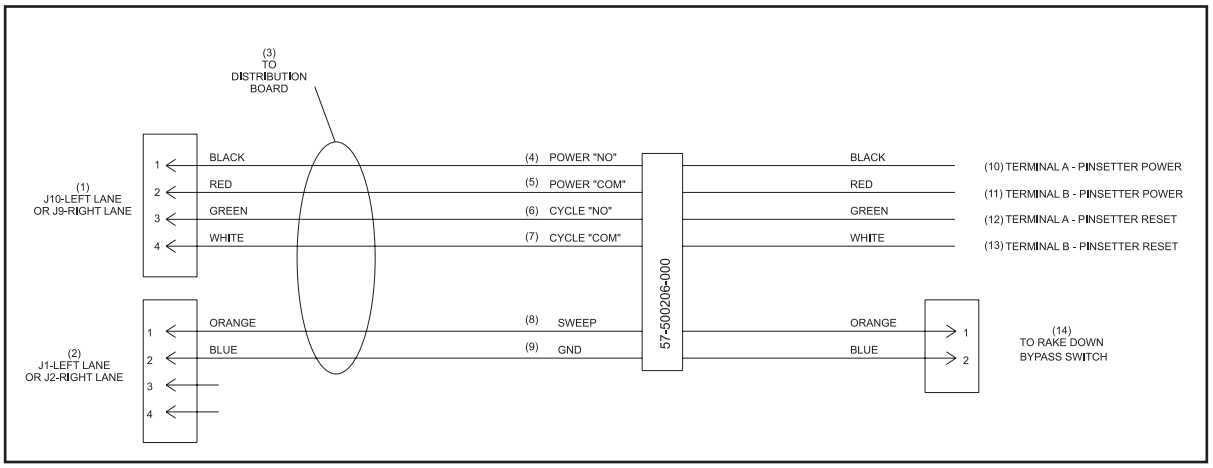
AMF 8290XL Foul/Reset "Y" Cable (Part No. 57-300841-000)

(1) RIGHT FOUL -
(2) RIGHT FOUL +
(3) RIGHT CYCLE "COM"
(4) RIGHT CYCLE "NO"
(5) LEFT FOUL-
(6) LEFT FOUL+
(7) LEFT CYCLE "COM"
(8) LEFT CYCLE "NO"



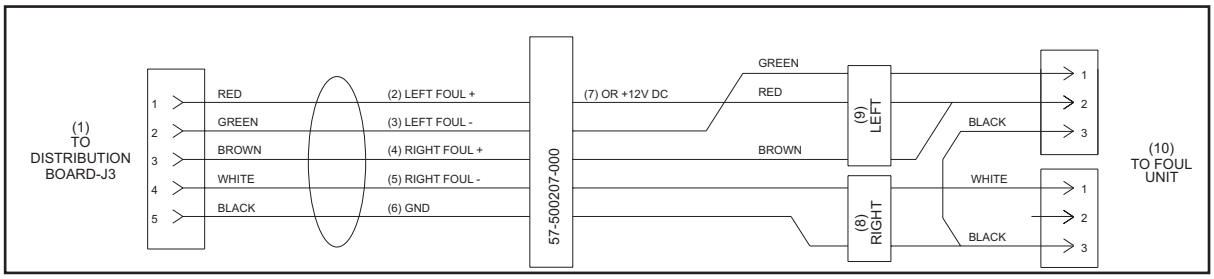
Camera Video Cable (Part No. 57-500050-000)

(1) TO CAMERA 1-4 ON LANE SERVER
(2) VIDEO
(3) SHIELD
(4) TO CAMERA ON SCANNER



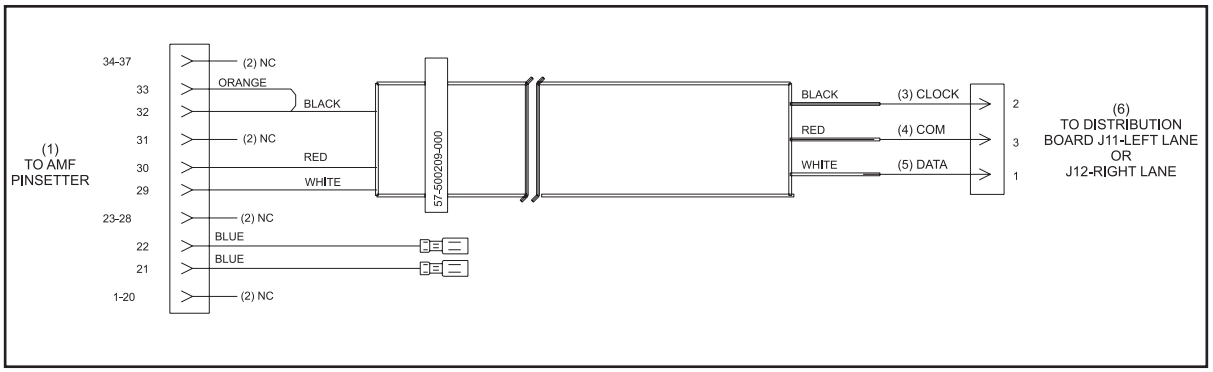
A, A-2 Reset/Power/Sweep Cable (Part No. 57-500206-000)

(1) J10 LEFT LANE OR J9 RIGHT LANE
(2) J1-LEFT LANE OR J2-RIGHT LANE
(3) TO DISTRIBUTION BOARD
(4) POWER "NO"
(5) POWER "COM"
(6) CYCLE "NO"
(7) CYCLE "COM"
(8) SWEEP
(9) GROUND
(10) TERMINAL A - PINSETTER POWER
(11) TERMINAL B - PINSETTER POWER
(12) TERMINAL A - PINSETTER RESET
(13) TERMINAL B - PINSETTER RESET



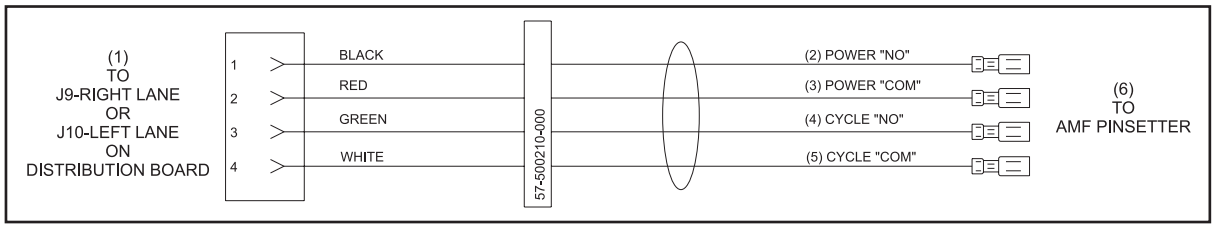
Foul Cable (Part No. 57-500207-000)

(1) TO DISTRIBUTION BOARD-J3
(2) LEFT FOUL +
(3) LEFT FOUL -
(4) RIGHT FOUL +
(5) RIGHT FOUL-
(6) GROUND
(7) OR +12VDC
(8) RIGHT
(9) LEFT
(10) TO FOUL UNIT



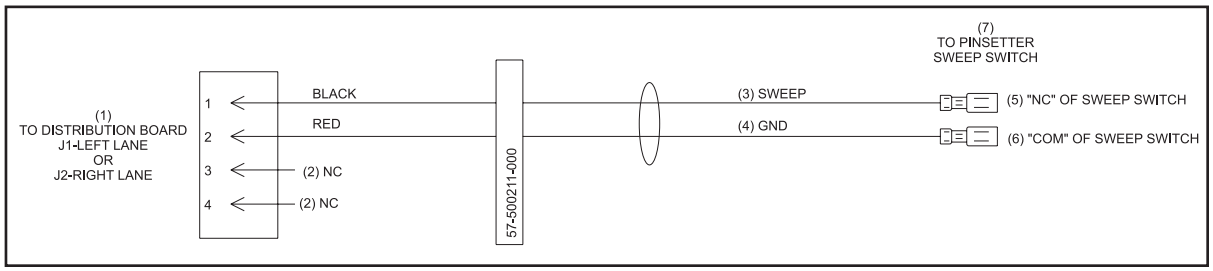
AMF 8270MP Short Cycle Cable (Part No. 57-500209-000)

(1) TO AMF PINSETTER
(2) NO CONNECTION
(3) CLOCK
(4) COM
(5) DATA
(6) TO DISTRIBUTION BOARD J11-LEFT LANE OR J12-RIGHT LANE



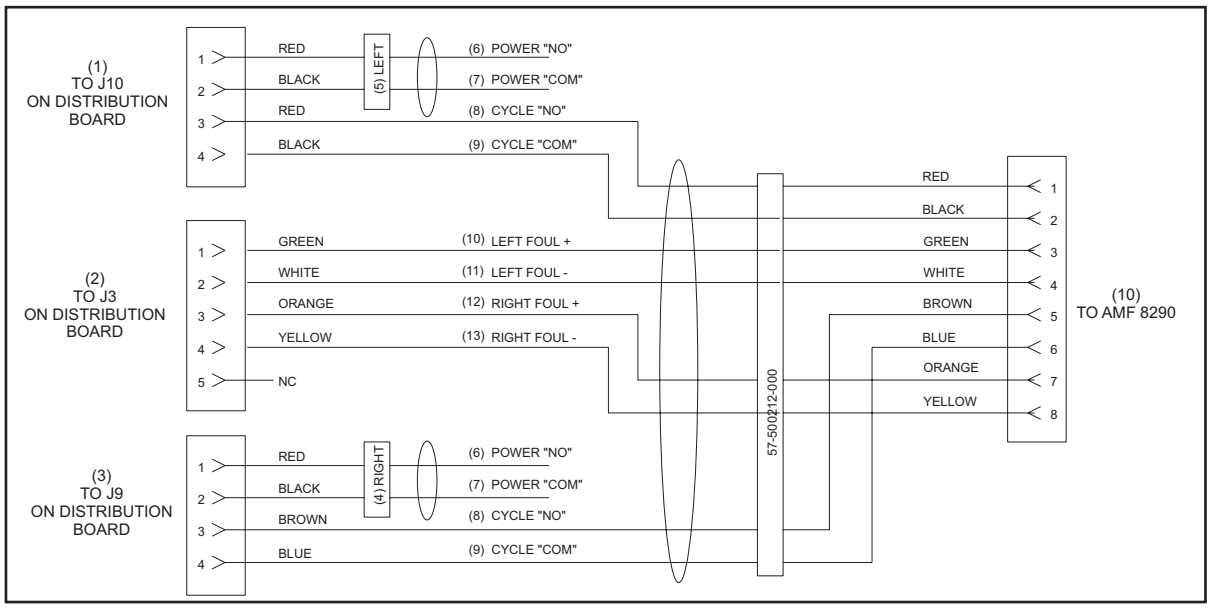
AMF 8230 /8270 Power/Reset Cable (Part No. 57-500210-000)

(1) TO J9-RIGHT LANE OR J10 ON DISTRIBUTION BOARD
(2) POWER “NO”
(3) POWER “COM”
(4) CYCLE “NO”
(5) CYCLE “COM”
(6) TO AMF PINSETTER



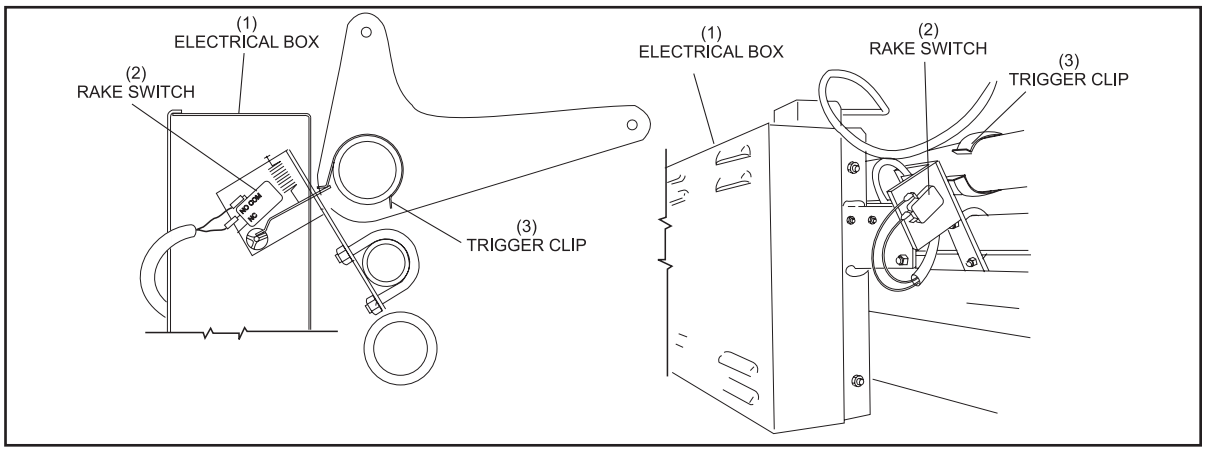
AMF Sweep Switch Cable (Part No. 57-500211-000)

(1) TO DISTRIBUTION BOARD J1-LEFT LANE OR J2-RIGHT LANE
(2) NO CONNECTION
(3) SWEEP
(4) GROUND
(5) NORMALLY CLOSED OF SWEEP
(6) COMMON OF SWEEP SWITCH
(7) TO PINSETTER SWEEP SWITCH



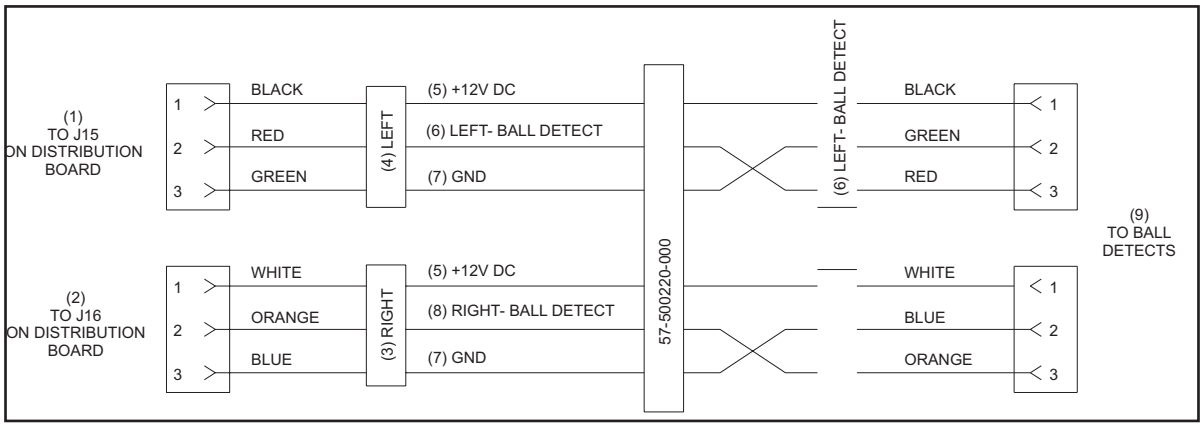
AMF 8290XL Foul/Reset Cable (Part No. 57-500212-000)

(1) TO J10 ON DISTRIBUTION BOARD
(2) TO J3 ON DISTRIBUTION BOARD
(3) TO J9 ON DISTRIBUTION BOARD
(4) RIGHT
(5) LEFT
(6) POWER “NO”
(7) POWER “COM”
(8) CYCLE “NO”
(9) CYCLE “COM”
(10) TO AMF 8290



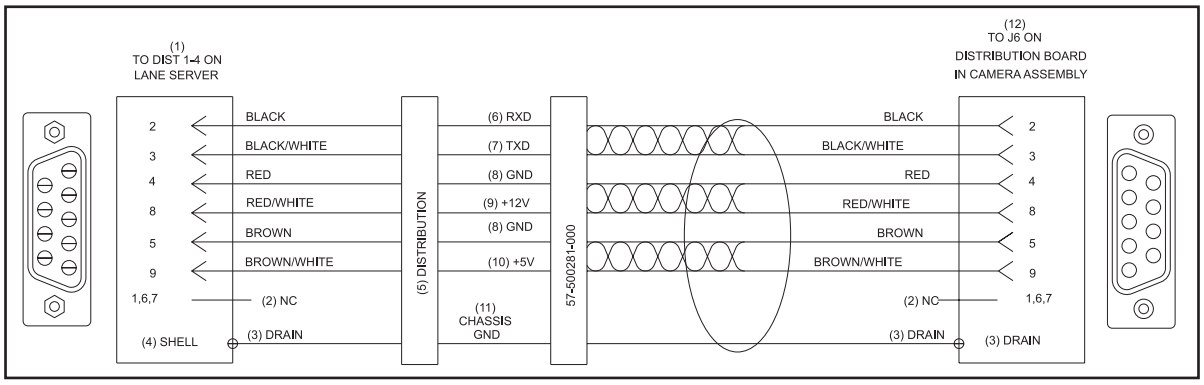
Brunswick A Pinsetter Sweep Switch Cable (Part No. 57-500213-000)

(1) ELECTRICAL BOX (2) RAKE SWITCH (3) TRIGGER CLIP



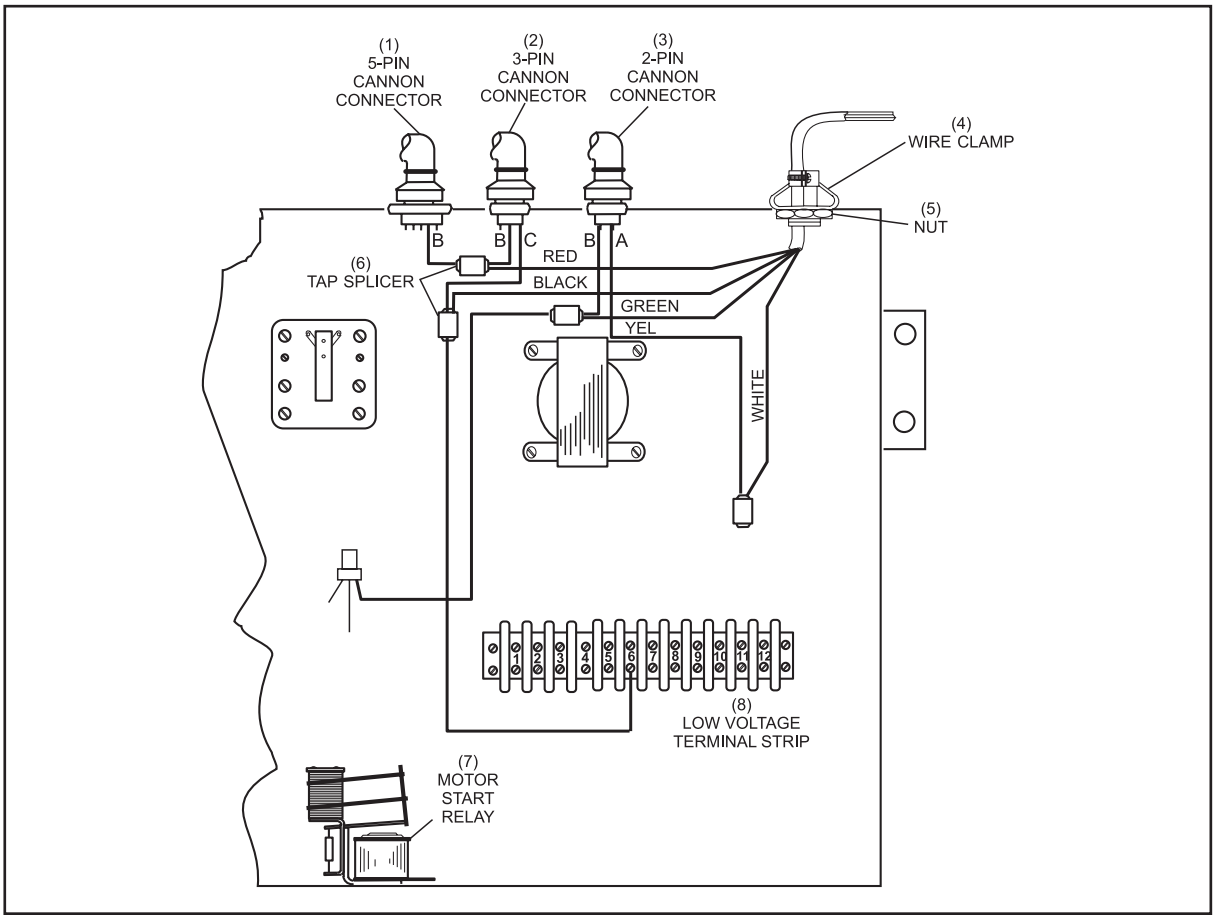
Ball Detect Cable (Part No. 57-500220-000)

(1) TO J15 ON DISTRIBUTION BOARD (2) TO J16 ON DISTRIBUTION BOARD (3) RIGHT
(4) LEFT (5) +12 VOLTS DIRECT CURRENT (6) LEFT BALL DETECT
(7) GROUND (8) RIGHT BALL DETECT (9) TO BALL DETECTS



Distributor PCB to Scorer Computer Data Cable (Part No. 57-500281-000)

(1) TO DIST 1-4 ON LANE SERVER (2) NO CONNECTION (3) DRAIN
(4) SHELL (5) DISTRIBUTION (6) RXD
(7) TXD (8) GROUND (9) +12V
(10) +5V (11) CHASSIS GROUND (12) TO J6 ON DISTRIBUTION BOARD IN CAMERA ASSEMBLY



A-2 Pinsetter Wiring

(1) 5-PIN CANNON CONNECTOR
(2) 3-PIN CANNON CONNECTOR
(3) 2-PIN CANNON CONNECTOR
(4) WIRE CLAMP
(5) NUT
(6) TAP SPLICER
(7) MOTOR START RELAY
(8) LOW VOLTAGE TERMINAL STRIP

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