

Operation Manual

GS-X Pinsetter with Advanced (CE) Guarding

August 2019 / 47-902005-GBR

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GS-X Pinsetter with Advanced (CE) Guarding Operation Manual

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Reorder Part No. 47-902005-GBR

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SAFETY ALERTS

Notes & Warnings

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

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

 **NOTE or IMPORTANT!** Will designate significant informational notes.

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

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

 **CAUTION!** Will designate an alert which could potentially cause product damage.

 Will designate grounding alerts.

SAFETY NOTICE TO USERS OF THIS MANUAL

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

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

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

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

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

PINSETTERS EQUIPPED WITH SAFETY POWER CONTROLLERS

The GS-X Pinsetter Safety Controller system must be commissioned and serviced only by specialist personnel.

Specialist Personnel

Specialist personnel (Center Mechanics) are defined as persons who:

- have undergone the appropriate technical training and
- who have been instructed by the responsible pinsetter operator in the operation of the pinsetter and the current valid safety guidelines and
- who have access to the “Safety Photoelectric Switch System L 4000” operating instructions.

General Safety Information and Protective Measures

Safety Notes

Please observe the following procedures in order to ensure the correct and safe use of the GS-X Pinsetter Power Controller system.

- The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the GS-X Pinsetter Safety Controller system, in particular:
 - Machine Directive 98/37/EEC
 - Equipment Usage Directive 89/655/EEC
 - the work safety regulations/safety rules
 - other relevant health and safety regulations
- Users of the pinsetter equipped with the GS-X Pinsetter Safety Controller system are responsible for obtaining and observing all applicable safety regulations and rules.
- It is imperative that all notes created during the *Tests Performed Before the First Commissioning* and *Functional Checks of the Protective Device* sections of this manual are observed.
- The tests must be carried out by the center mechanic and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the user of the pinsetters equipped with the GS-X Pinsetter Safety Controller system. The pinsetter operator is to be instructed in the use of the device by center mechanic and must be instructed to read the operating instructions.

Tests Performed Before the First Commissioning

The purpose of the tests before the first commissioning is to confirm the safety requirements specified in the national/international rules and regulations, especially in the Machine and Equipment Usage Directive (EU Conformity).

- To ensure correct function, test as defined in the Functional checks of the protective device section.
- The distance between the sender and receiver must not exceed the maximum distance of 7 meters.
- Access to the hazardous point of the pinsetter must only be possible through the protective fields.
- It must not be possible to climb over, creep underneath or pass around the protective devices.
- Make sure that the operating personnel of the pinsetters protected by the GS-X Pinsetter Power Controller system are correctly instructed by specialist personnel before being allowed to operate the pinsetters. Instructing the operating personnel is the responsibility of the machine owner.

Functional Checks of the Protective Devices

The effectiveness of the protective devices must be checked daily, or before work is commenced, by a specialist or by authorized personnel.

Prior to each test verify on the safety evaluation device UE 401 that the green LED illuminates. If this is not the case, make sure that this condition is reached. The tests are otherwise meaningless.

1. Completely cover each light beam with a test piece that is not transparent (at least 30 mm diameter) at the following positions:
 - Directly in front of the sender.
 - In the middle between sender and receiver.
 - Directly in front of the receiver.
2. Open the rear pinsetter access door with the interlock switch.
3. Open the masking unit interlock switch.
4. Press the emergency stop switch.

Each of these individual tests must produce the following result:

- During the light beam test, the receiver for the related safety photoelectric safety switch must have no LED illuminated.
- On the safety evaluation device UE 401, only the red LED must illuminate.
- As long as the light beam, interlock or emergency stop switch is interrupted, it must not be possible to initiate the dangerous state of the machine.

No further operation of the pinsetter is allowed if the green or yellow LED on the safety evaluation device UE 401 illuminates during the test, even if the green or yellow LED illuminates only for a short period. In this case, the installation of the GS-X Pinsetter Power Controller system must be checked by specialized personnel.

The proper functioning of the interlock devices must be checked weekly, by a specialist or by authorized personnel.

Prior to the tests, turn off and lockout the main power switch on the GS-X Pinsetter Power Controller system.

- a. Unplug the rear door interlock cable from the GS-X Pinsetter Power Controller box and verify that when the interlock switch is closed (rear door closed) there is continuity from pin 1 to 2 and from pin 3 to 4 of the connector. Then verify that when the interlock switch is opened (rear door opened) there is no continuity from pin 1 to 2 and from pin 3 to 4 of the connector. This should be done with a multi-meter.
- b. Unplug the masking unit interlock cable from the GS-X Pinsetter Power Controller box and verify that when the interlock switch is actuated (masking unit down) there is continuity from pin 1 to 2 and from pin 3 to 4 of the connector. Then verify that when the interlock switch is opened (masking unit up) there is no continuity from pin 1 to 2 and from pin 3 to 4 of the connector. This should be done with a multi-meter.
- c. With the emergency stop switch on the GS-X Pinsetter Power Controller box in the non-pressed position, verify that there is continuity between the two orange wires on the switch and continuity between the two brown wires on the switch. Then with the emergency stop switch on the GS-X Pinsetter Power Controller box in the pressed position, verify that there is no continuity between the two orange wires on the switch and no continuity between the two brown wires on the switch. This should be done with a multi-meter.

Care and Maintenance

The lenses for the sensors must be cleaned regularly or if dirty. Avoid scratching the lenses and the formation of droplets on the lenses as these could change the optical properties.

- Do not use aggressive cleaning agents.
- Do not use abrasive cleaning agents.

Static charges cause dust particles to be attracted to the lens. You can prevent this effect by using the antistatic plastic cleaner.

How to clean the lens:

- Use a clean and soft brush to remove dust from the lens.
- Then wipe the lens with a clean and damp cloth.

After cleaning, check the position of sender and receiver to make sure that it is not possible to climb over, creep below or stand behind the protective device.

SAFETY GUIDELINES FOR GS-SERIES PINSETTERS

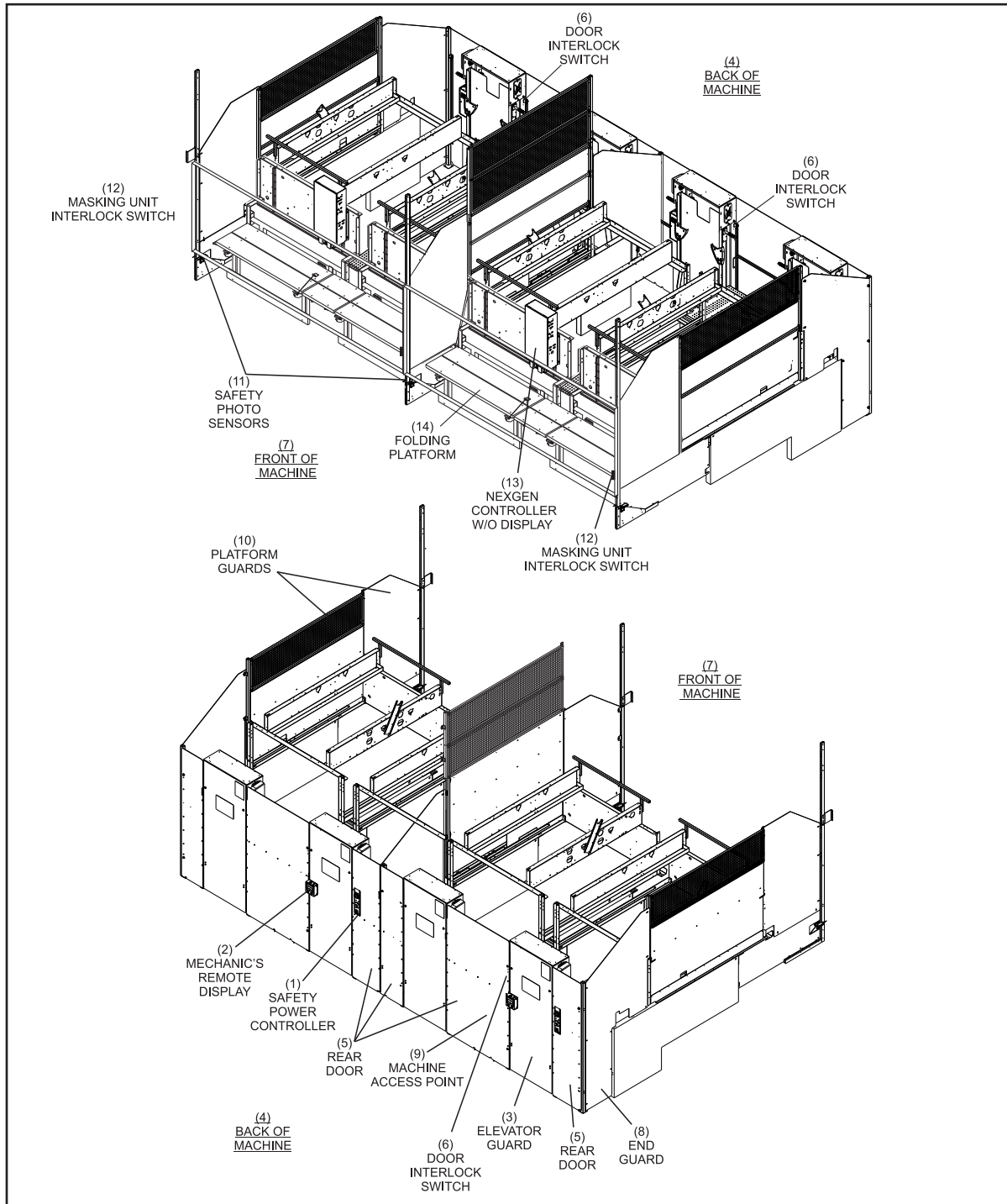
As with all machinery, a certain amount of risk is involved in working on the GS-Series Pinsetter. However, if the necessary care, knowledge and responsibility are exercised, damage to the pinsetter and accidents involving people can be avoided. The following steps should be taken:

1. ONLY PROPERLY TRAINED PEOPLE ARE QUALIFIED TO WORK ON OR OPERATE THE PINSETTER.
2. Never operate the pinsetter without ALL factory supplied guarding in place.
3. Never operate the pinsetter if a guard or safety device is damaged or improperly fitted to the machine.
4. Never bypass, disable, or tamper with the safety interlocks or pinsetter function switches.
5. Never attempt to climb over or around any mechanical barrier or machine guard.
6. Reinstall all the machine guards and the ladder after any troubleshooting or maintenance work has been done on the pinsetter(s) or ball accelerator.
7. Always face toward the machine when using the ladder to climb onto or off the machine. Only one person should be on the ladder at any time.
8. Suitable clothing must be worn (for example: rubber-soled shoes). Do not wear loose clothing such as neckties or smocks that could get caught in moving parts. Remove rings, watches, earrings, bracelets and other jewelry to avoid injury.
9. Care should be taken while near the front of the machine. Accidentally blocking the photocell beam will cause the pinsetter to cycle.
10. Always turn the pinsetter off before working on the machine. Use the rear mechanic's switch mounted on the pin elevator or toggle the stop/run switch on the Nexgen box to the stop position.
11. If more than one person is working on a machine or if a stop/run switch will be out of reach while working on the machine, turn off both stop/run switches to prevent a person from turning on the pinsetter before the other person says he/she is clear of the pinsetter.
12. When working on both machines of a lane pair or components that are common to both machines (for example: an electronic control box or ball accelerator) power must be turned off at the Nexgen box or Power Safety Controller and the input power cable must be removed from the box. In addition the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.
13. The sweep boards for the lane pair must be dropped to the guarding position when working on the pinsetter or the ball accelerator to prevent a bowling ball from entering the pinsetter.
14. Prior to performing service work underneath the setting table, place a jack stand or other suitable support under the center of the table.

15. Fire extinguishers must be on hand and maintained properly. Keep oily rags and other combustibles in approved fire proof containers.
16. If more than one person is working on a machine, be sure the other person is CLEAR before restarting the machine.
17. When working in the pinsetter area while machines are in operation, ear protection should be worn. Sound levels greater than 83db can be experienced within 1.6 meters of operating machines.
18. Never remove the V-belt from the setting table motor without first lowering the table to the new pin setting position (pindeck).
19. Never work on or around the pinsetter while under the influence of alcohol, drugs, or any other substance that can impair your physical abilities or mental judgment.
20. Always use the correct tools for the job.
21. The GS-Series pinsetter is designed for use as a 10 pin bowling machine. Do not use the machine or any of its subassemblies for any other purpose.
22. Poisonous or toxic cleaners must not be used. Always check the material safety data sheets before using new cleaners.
23. Always use factory approved parts when repairing the pinsetter. Using substandard parts may pose a safety risk.
24. Always make sure that a bowler is not positioned to throw a ball before putting yourself between the bowler and the machine. It is good practice to have another employee positioned near any bowler to ensure they cannot throw a ball and/or place a sign on the approach to indicate the lane is not available for bowling.

MACHINE GUARDS

The GS Pinsetter is equipped with guards and safety interlocks to prevent injury and to limit access to moving parts of the pinsetter. A Safety Controller disconnects power to the pinsetters on a lane pair whenever an interlock is activated. Refer to figure titled *Advanced (CE) Guard Packages*.

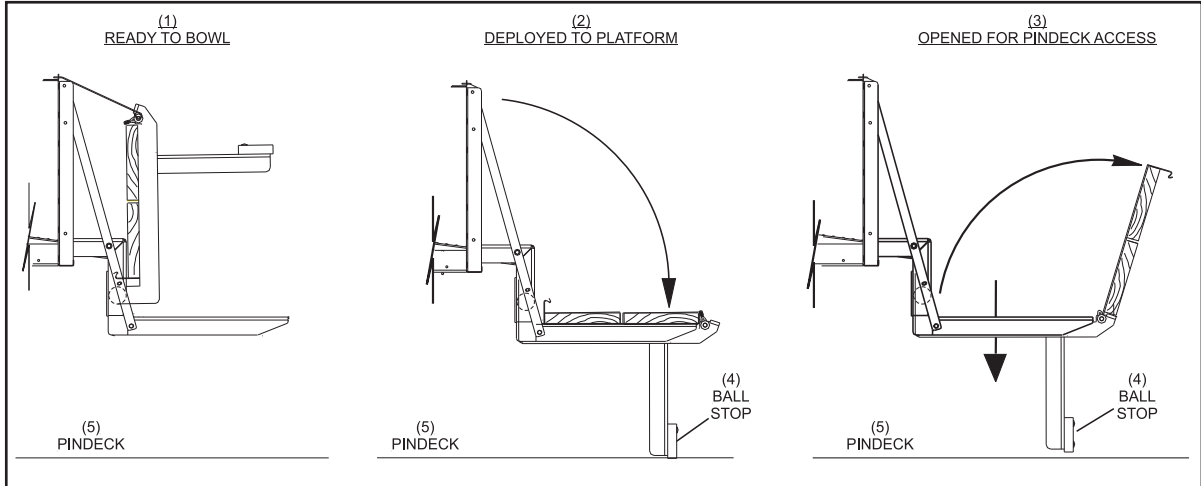


Advanced (CE) Guard Packages

- | | | |
|------------------------------------|-------------------------------|------------------------------------|
| (1) SAFETY POWER CONTROLLER | (2) MECHANIC'S REMOTE DISPLAY | (3) ELEVATOR GUARD |
| (4) BACK OF MACHINE | (5) REAR DOOR | (6) DOOR INTERLOCK SWITCH |
| (7) FRONT OF MACHINE | (8) END GUARD | (9) MACHINE ACCESS POINT |
| (10) DIVISION GUARDS | (11) SAFETY PHOTO SENSORS | (12) MASKING UNIT INTERLOCK SWITCH |
| (13) NEXGEN CONTROLLER W/O DISPLAY | (14) FOLDING PLATFORM | |

Folding Platform

The front of each pinsetter is equipped with a folding platform. When deployed, the platform provides access to the front part of the pinsetter. From the deployment position, the platform can open to allow safe entry to the pindeck area of the machine. An integrated ball stop prevent balls from entering the pinsetter when the platform is deployed. Refer to figure titled *Folding Platform*.



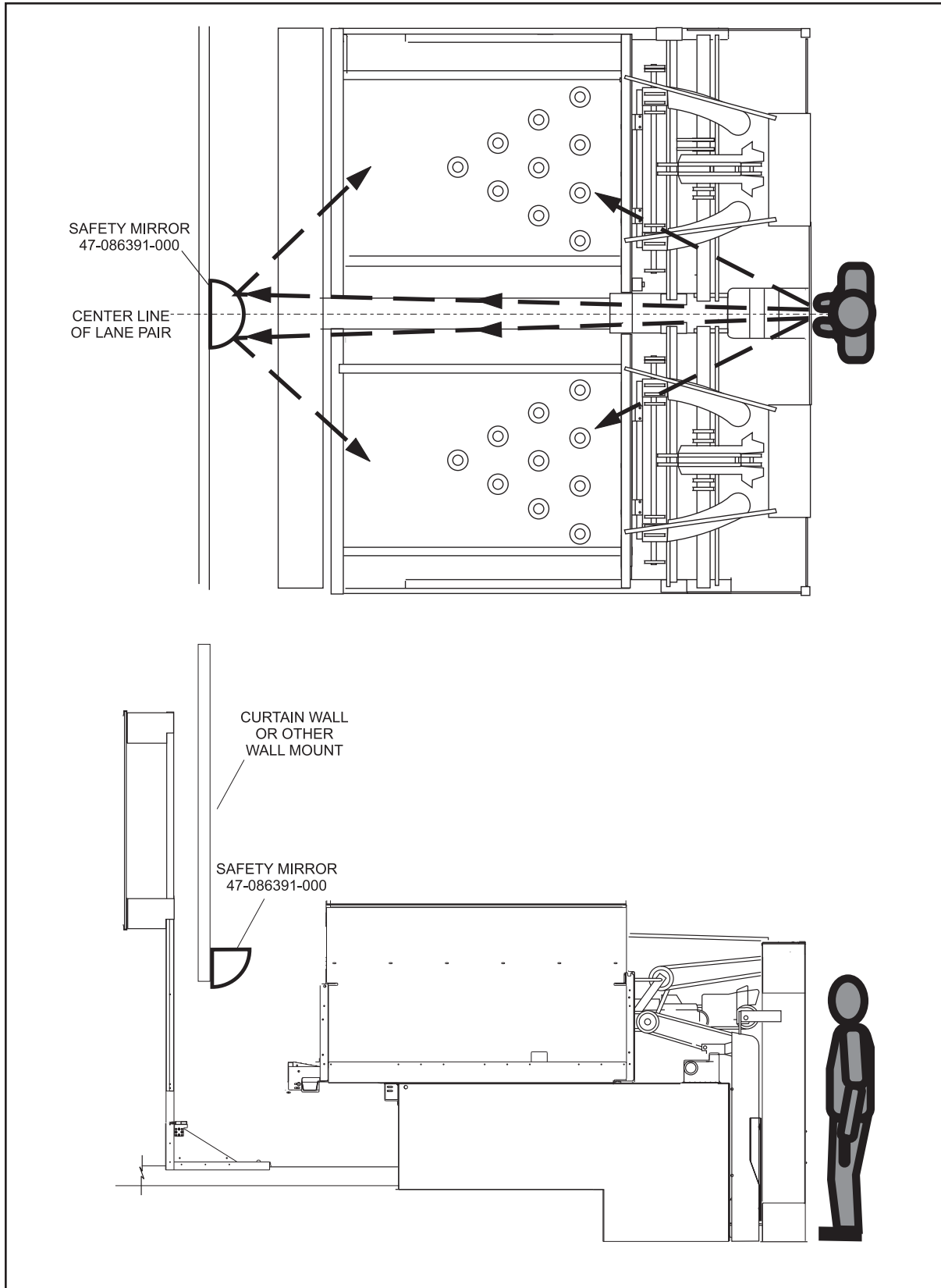
Folding Platform

(1) READY TO BOWL
(4) BALL STOP

(2) DEPLOYED PLATFORM
(5) PINDECK

(3) OPENED FOR PINDECK ACCESS

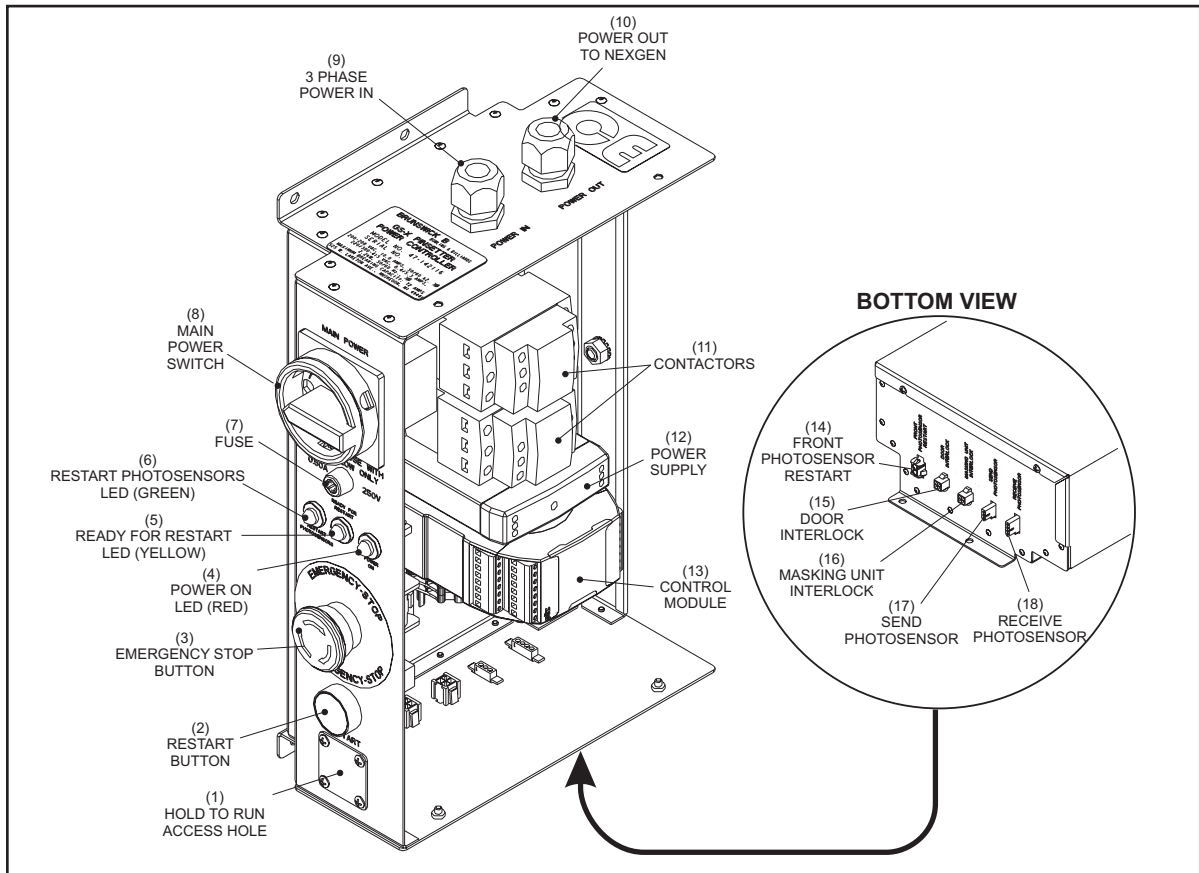
GS Safety Mirror



Safety Mirror

Safety Power Controller

The Safety Power Controller is installed with pinsetters equipped with the advanced guarding package. The controller interfaces the masking unit and rear door interlock switches and the safety photo sensor and in turn controls the 3 phase power to the Nexgen box.



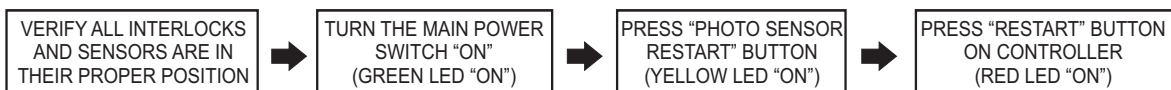
Safety Power Controller

- (1) **Hold To Run Access Hole** - Location to mount the optional Hold-To-Run Switch.
- (2) **Restart Switch** - Button used to restart the Safety Controller, as indicated by the yellow restart LED, after a power failure or interruption of power caused by activating an interlock sensor.
- (3) **Emergency Stop Switch** - Push this button to immediately remove power from the Nexgen box and shut down power to both pinsetters of the lane pair.
- (4) **Power On LED (Red)** - This LED Turns “On” when the Safety Controller power contactors are energized to provide power to the Nexgen.
- (5) **Ready For Restart LED (Yellow)** - This LED Turns “On” when all interlock switches and sensors are in the ready to operate position and the Safety Controller is ready for a restart. Refer to (2) *Restart Switch*.
- (6) **Restart Photo Sensors LED (Green)** - This LED Turns “On” when the photosensor beam at the masking unit has been interrupted. Once the cause of the interruption has been determined, press the Photosensor Restart button to reset the photosensor circuit

- (7) **Fuse** - .25A slow blow fuse used to protect power going to the power supply module.
- (8) **Main Power Switch** - Controls the 3-phase power Nexgen. In the off position, this switch will disconnect power to the Nexgen box and disable both pinsetters and the ball accelerator.
- (9) **3 Phase Power In** - Input power connection for the 3-phase power. This voltage can be 208, 230 or 380 - 415 VAC.
- (10) **Power Out to Nexgen** - Power connection for 3-phase power to the Nexgen box.
- (11) **Contactors** - Power contactors used to disconnect 3-phase power whenever the emergency off switch is pressed or an interlock switch/sensor is tripped
- (12) **Power Supply** - DC power supply for the photo sensor controller and the photo sensor receiver and transmitter.
- (13) **Controller** - The module that monitors the photo sensor receiver and transmitter and the interlock switches. The display on the controller provides information as to the status of the module and the interlock switches and photo sensors.
- (14) **Front Photosensor Restart** - Connection for the photosensor restart button. The button is typically located on the back of the odd lane pinsetter, under the Nexgen display, but may be mounted at the front of the pinsetters on the making unit frame.
- (15) **Door Interlock** - Connection rear door interlock switches.
- (16) **Masking Unit Interlock** - Connection for the masking unit interlock switch.
- (17) **Send Photo Sensor** - Connection for the safety photo sensor transmitter unit located at the front of the pinsetters.
- (18) **Receive Photo Sensor** - Connection for the photosensor receiving unit located at the front of the pinsetters.

Pinsetter Power-up Procedure - Safety Controller

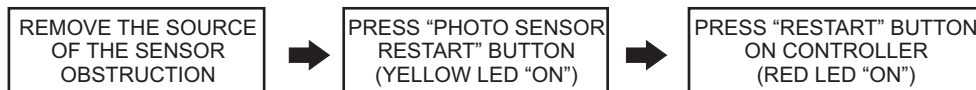
1. Verify that the photo sensors are aligned with no obstructions, the masking unit and ball return door interlocks switches are closed and the emergency stop switch on the safety controller is not activated (Twist the E-stop button to deactivate). Turn main power switch to the “On” position.
 - The safety controller will start an initial power up diagnostics to verify conditions.
 - The green “Restart Photosensor” LED will illuminate.
2. Press the photosensor restart button to activate the photosensor located on the masking unit.
 - The green LED will go off and the yellow “Ready for Restart” LED will illuminate.
3. Press the blue “Restart” button located on the GS-X Safety Controller box to activate the interlock switches.
 - The yellow LED will go off and the red “Power On” LED will illuminate.
 - Power will be supplied to the GS-X Nexgen.



Pinsetter Restart Procedure - Safety Controller

The photo sensor has been obstructed (Green, “Restart Photosensor” LED, “ON”)

1. Remove obstruction from photo sensors.
2. Press the photosensor restart button to re-activate the photo sensors.
3. Press the blue “Restart” button located on the GS-X Safety Controller box.



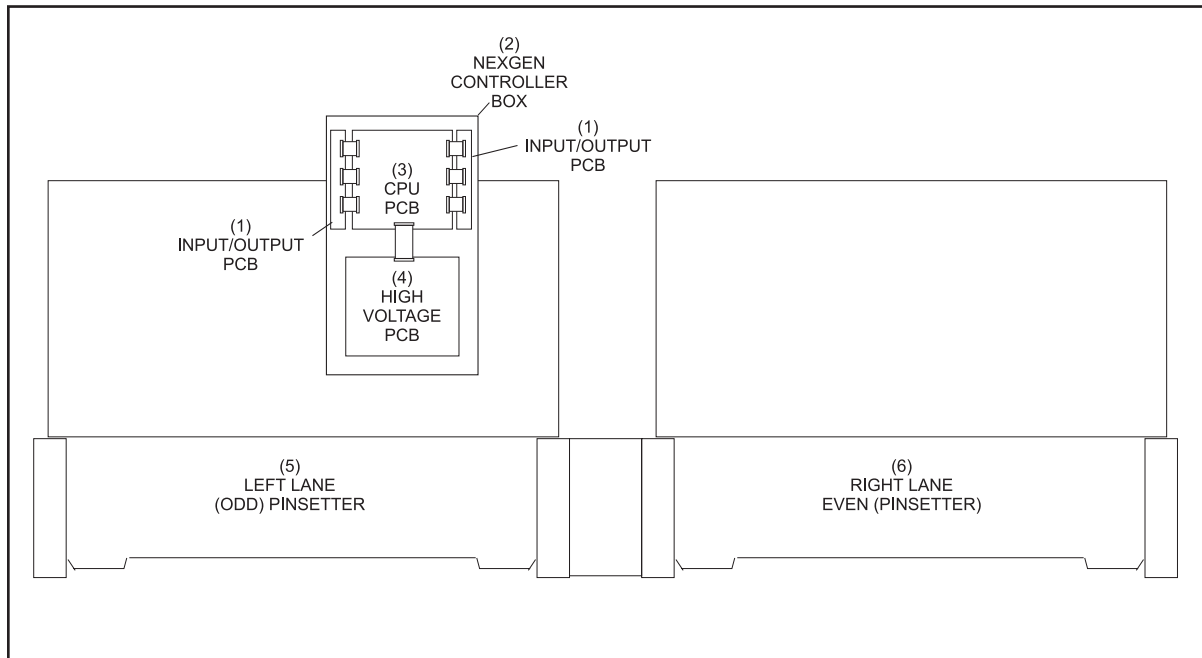
The Ball Return Interlock or Masking Unit Interlock is triggered.

1. Return the masking unit and/or the ball return access door to the “closed” position.
2. Press the blue “Restart” button located on the GS-X Safety Controller box to re-activate the interlock switches.



NEXGEN ELECTRONICS

The Nexgen electronic system consists of one control box mounted on the front of the left pinsetter and several other items that monitor and help the pinsetter operate. Refer to the figure titled *Nexgen Controller Box Layout*.



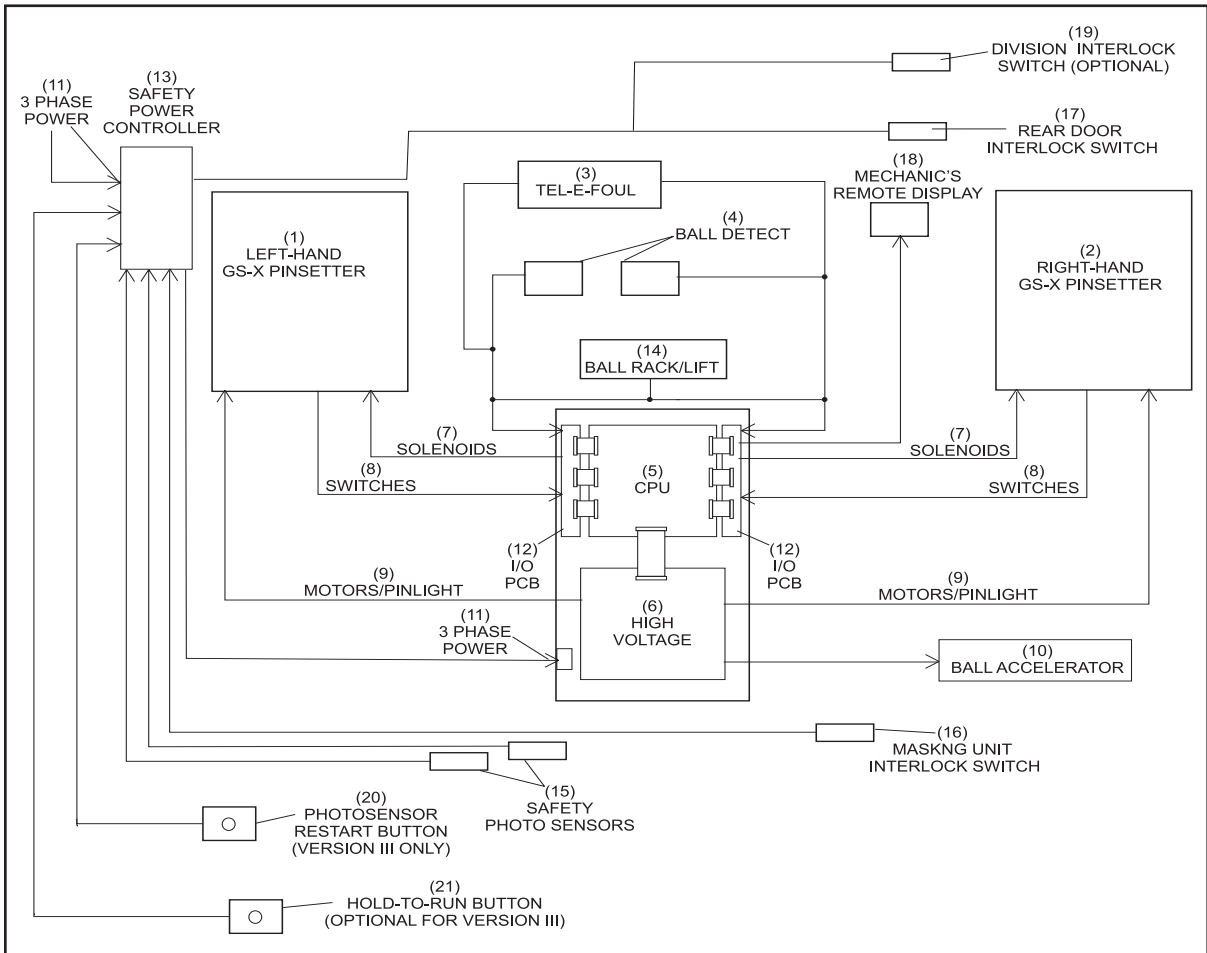
Nexgen Controller Box Layout.

- | | | |
|------------------------|-------------------------------|---------------------------------|
| (1) INPUT / OUTPUT PCB | (2) NEXGEN CONTROLLER BOX | (3) CPU PCB |
| (4) HIGH VOLTAGE PCB | (5) LEFT LANE (ODD) PINSETTER | (6) RIGHT LANE (EVEN) PINSETTER |

The CPU Board gathers switch information and sends out solenoid voltage to each pinsetter through the I/O PCBs. Communication to the scoring system is also handled by the CPU.

The High Voltage board is the entry point for the 3-phase power needed to run the pinsetters. The High Voltage board supplies the power for the motors and pin lights for both pinsetters.

The figure titled *Pinsetter Block Diagram - Advanced (CE) Guard Packages*, shows the flow of information and power paths between the pinsetters, several external devices and the electronic boxes.

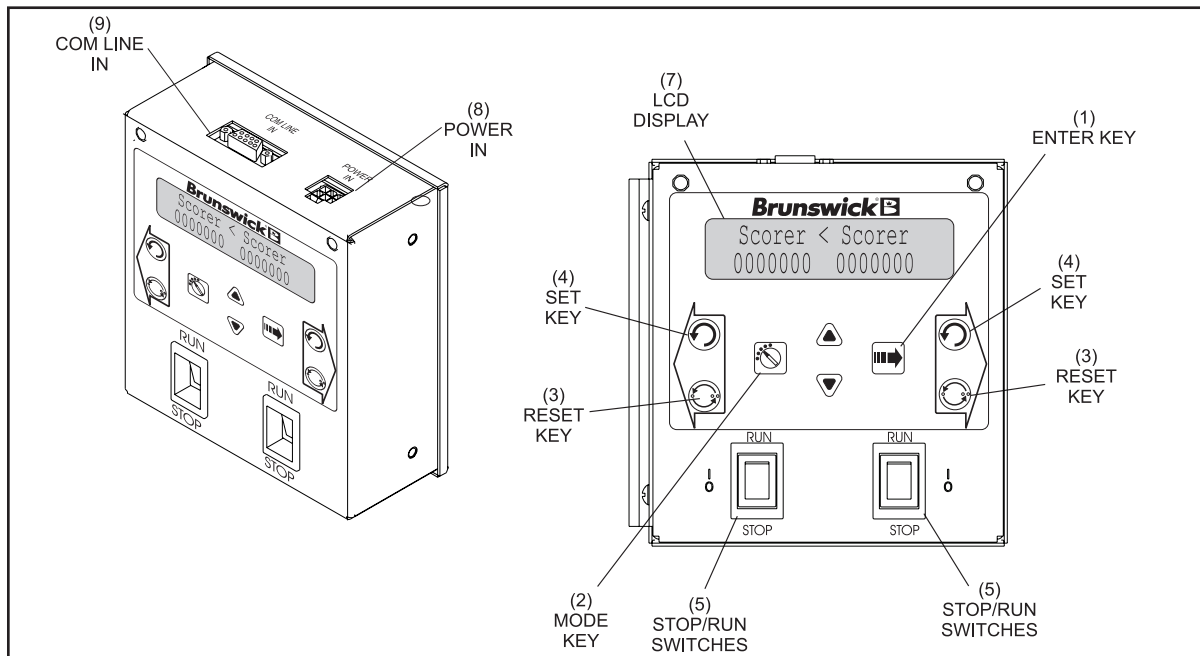


Pinsetter Block Diagram - Advanced (CE) Guard Packages

- | | | |
|---|--|--|
| (1) LEFT -HAND GS-X PINSETTER | (2) RIGHT -HAND GS-X PINSETTER | (3) TEL-E-FOUL |
| (4) BALL DETECT | (5) CENTRAL PROCESSING UNIT PCB | (6) HIGH VOLTAGE PCB |
| (7) SOLENOIDS | (8) SWITCHES | (9) MOTORS / PINLIGHT |
| (10) BALL ACCELERATOR | (11) 3 PHASE POWER | (12) INPUT/OUTPUT PCB |
| (13) SAFETY POWER CONTROLLER | (14) BALL RACK/LIFT | (15) SAFETY PHOTO SENSORS |
| (16) MASKING UNIT INTERLOCK SWITCH | (17) REAR DOOR INTERLOCK SWITCH | (18) MECHANIC'S REMOTE DISPLAY |
| (19) DIVISION INTERLOCK SWITCH (OPTIONAL) | (20) PHOTOSENSOR RESTART BUTTON (VERSION III ONLY) | (21) HOLD-TO-RUN BUTTON (OPTIONAL VERSION III) |

LCD Display/User Interface

Setup and diagnostics for the both pinsetters is performed using the mechanic's remote display. Refer to figure titled, *Nexgen Remote Display*.



Nexgen Remote Display

- (1) **Enter Key** – This push button key has two functions. During pinsetter setup it is used to select the left or right lane. Once a configuration mode has been selected using the Mode key, it is used to display the different options available for the mode.
- (2) **Mode Key** – This push button key allows the mechanic to select the different pinsetter setup modes used to configure how the machine should operate.
- (3) **Reset Key** – These push button keys cause the pinsetter to cycle to the next ball. Push button switches with the same function are mounted on the ball rack for the bowler's use and on the rear control box located on the elevator for the mechanics' use .
- (4) **Set Key** – These push button keys causes the last combination of pins to be set. Push button switches with the same function are located on the rear control box mounted on the elevator.
- (5) **Stop/Run Switches** – This toggle switch is used to manually stop or start the pinsetter.
- (6) **Up / Down Arrows** – These push button keys allow the mechanic to select the desired parameter for the option being displayed.
- (7) **LCD-Display** – This display shows the frame count, error codes and setup information for both pinsetters
- (8) **Power In** - This connection provide power for the display and connects the stop/run switches to the Nexgen Controller.
- (9) **Comline In** - Connection for communication coming from the auxiliary comline connection of the Nexgen Controller.

During power up of the Nexgen Controller, the unit it goes through a boot up sequence. The Controller's LCD display will first display "Brunswick GS-X" and then display "Software V 4.xx.xx EPROM OK". (xx.xx represents the software version such as 4.97.11). Once the controller successfully boots up, the mode selection menu is displayed.

The Mode selection menu has the following choices:

Scorer - Use this mode when the GS-X is connected to Frameworkx or Vector scoring systems. This selection does not have a submenu. For firmware versions prior to 4.94 this mode is labeled Frmwrx.

Tenpin - Use this setting when the GS-X is NOT connected to a scoring system or is operating in a stand-alone mode. This selection does not have a submenu.

AS-90 - This setting appears only if software version 4.08.03 or higher is installed in the Nexgen box. Use this setting when a GS-X is connected to an AS-80, or AS-90 scorer. This selection does not have a submenu.

Diag - This selection allows the mechanic to put the selected pinsetter into cycle diagnostics mode. This selection does not have a submenu.

Motor - This selection allows the mechanic to manually run the pinsetter motors on the selected machine by pressing and holding the "Up" arrow key. A submenu that appears when the stop/run switch is set to the run position has the following choices:

Table CW - This selection runs the table motor of the selected lane in a clockwise rotation.

Table CCW - This selection runs the table motor of the selected lane in a counterclockwise rotation.

Distrib - This selection turns the distributor motor of the selected lane "On".

Sweep - This selection turns the sweep motor of the selected lane "On".

Pinlight - This selection caused the pinlight of the selected pinsetter to turn on.

Clean - This menu selection causes the sweep to drop when the Stop/Run switch is turned "On". It also allows the mechanic to run the distributor motor by pressing and holding the up arrow key.



NOTE: The following selections are available only when the STOP/RUN switches for both pinsetters are in the STOP position.

Setup - This selection allows the user to configure the pinsetter's operating characteristic. A submenu for this selection has the following choices:



NOTE: Use the enter button to select the desired choice then arrow buttons to choose yes or no.

Firmware Version: The firmware version is displayed in the setup menu for firmware versions 4.95.21 and later.

ENGLISH / SVENSKA / NEDERL / MAGYAR / DANSK / POLSKI

- The selection is available on machines with firmware version 4.97.02 and higher. The option allows the mechanic to choose display prompts in different languages. Press the arrow buttons to choose the desired language. English and Swedish languages are available starting with firmware version 4.97.02. Dutch, Hungarian, Danish and Polish languages were added beginning with firmware version 4.97.11.

Left Lane ## - Sets the lane ID for the lane pair. Currently, this selection is not used.

Double Detect: (Y or N) - Gives the pinsetter the choice of detecting pin activity on second ball. If a scoring system is present that has the capability of interfacing with the CPU, it can use the pin holder switch information to determine the bowler's pinfall. If no scoring system is available, or the scoring system uses a scanner or camera for determining pinfall, turning this switch on disables the detection stroke of the setting table during the second ball.

Y - Double Detect - Set if a scanner or CCD Camera are not used. (Frameworkx, Vector, Sync scoring system) (default)

N - Single Detect - Set if a scanner, CCD Camera or VPS are used or if no scoring system is used.

Enable OOR: (Y or N) - Enable or disables the out-of-range cycle. Most bowling organizations require that the pinsetter stop and any deadwood (pins that have been knocked over but are still in the field of play) must be removed before the next ball can be rolled. If your center has sanctioned leagues that require deadwood be removed before choose "Y" otherwise choose "No".

Y - Pinsetter stops for an out-of-range pin. (default)

N - Ignores an out-of-range pin.

Table Delay: (Y or N) - This option controls the delay of the setting table operation after the sweep drops to a guarded position.

Y - Delayed setting table - USBC, FIQ..., compliant delay. (Default)

N - Quick setting table - No delay after sweep drop.

Distrib Stop: (Y or N) - This option determines if the distributor will stop after all 10 pins have been delivered to the pin holders while waiting for a 2nd ball cycle. The suggested setting for this option is "N".

Y - Stop enable - Distributor stops after ten pins have loaded while waiting for a 2nd ball.

N - Stop disabled - Continuous distributor operation while loading pin. (default)

Enable 50 ERR (Y or N) - This option allows pinfall detection to be monitored or ignored during machine cycle diagnostics.

Y - Enable Codes (default)

N - Disable Codes

Enable Foul: (Y or N) - This option allows you to accept or ignore the foul signal coming from the foul unit.

Y - The pinsetter will accept the foul signal (default)

N - Foul Signals are ignored.

Dist Slow Start: (Y or N) - *This option is available on machines beginning with firmware version 4.08.02. It was removed in software versions 4.95.21 and later.* The option determines whether the distributor will start slowly and gradually increase speed or start at full speed. The suggested setting for this option is "N".

Y - Slow start enabled

N - Slow start is disabled (default)

Enable PF Err: (Y or N) - *This option is available on machines with firmware version 4.95.21 and higher.* The option allows the mechanic to enable (or disable) an error code that would occur in the event that the pinsetter loses power.

Y - Enable the code (default)

N - Disable the code

Long Err Codes: (Y or N) - *This option is available on machines with firmware version 4.08.02 and higher.* The option determines whether the display will show error code using the standard 2 digit code or extended code.

Y - Display error codes using extended format

N - Display error codes using 2 digit format

Pinlight: (Y or N) - *This option is available on machines with firmware version 4.08.02 and higher.* This option turns on the pinlight so that the pins are illuminated even when the machine is unassigned.

Y - Pinlight on

N - Pinlight off (default)

Off Sweep Dwn: (Y, N, 45) - *This option is available on machines with firmware version 4.95.21 and higher.* The option causes the sweep to drop when the lane is turned off from the scorer. The sweep will not drop when the pinsetter is turned off via a local mechanic's Stop/Run switch.

Y - Enable sweep drop

N - Disable sweep drop (default)

45 - *This option is available on machines with firmware version 4.97.11 and higher.* The option enables a delayed sweep drop. 45 seconds after the machine is turned off, the machine will cycle and set 10 pins, but the sweep will stay down.

Auto Ball Ret: (Y or N) - *This option is available on machines with firmware version 4.97.11 and higher.* This option determines how the machine reacts to a ball detection when the machine is not in use.

Y - When a ball detection occurs on a pinsetter that is not in use (unassigned), the distributor, ball accelerator, and ball lift motors will turn on. The distributor motor will run for 60 seconds to clear pins out of the pit. The ball lift and ball accelerator motors will run for 90 seconds to return the ball. The pinsetter's table and sweep motors remain off.

N - Disabled (default)

Trouble Blink: (Y or N) - *This option is available on machines with firmware version 4.95.21 and higher.* The option determines whether the light on the elevator will perform as a traditional trouble light and be "off" during machine operation or as a status light and remain "On" during machine operation.

Y - Normally "Off", "flashing" for errors.

N - "Off" when machine is turned off, "On" when the machine is operating, flashing for errors. (default)

ST Timing: (Y or N) - *The option is available on machines with software version 4.97.02 and higher.* The option allows the mechanic to choose which switch signal causes the spotting tong solenoid to de-energize as the tongs return to their open position.

Y - ST solenoid de-energize at the ST switch (default)

N - ST solenoid de-energize at the B switch



NOTE: *Firmware versions prior to version 4.95.26 use the B switch timing.*

Distrib Time: (45, 50, 55, 60) - *This selection is available on machines with firmware version 4.95.21 and higher.* Distributor time out. This selection determines how long the distributor runs at the end of a pinsetter cycle if an addition ball detection does not occur.

45 - 45 seconds (default)

50 - 50 seconds

55 - 55 seconds

60 - 60 seconds

Shdw Bwl Time: (0, 1, 2, 3): *This selection was first available on machines with firmware version 4.95.21. It was removed in firmware versions 4.97.11 and later. It determines the amount of time the ball accelerator will continue running after the pinsetter has been turned off in order to allow the ball to return to the bowler. The pin light is off during this time and the pinsetter will not cycle.*

00 - Disabled (default)

01 - 1 minute

02 - 2 minutes

03 - 3 minutes



NOTE: *For centers that have either Vector Desk version 3.3.0.863 (or higher), Vector Plus version 2.8.23 (or higher), or Sync scoring, this feature can also be implemented through the scorer. It is recommended that the 0 be used as the NexGen setting when the scorer is controlling this feature.*

Coast Past A : (00,06,07,08,09,10) - This selection is available on machines with software version 4.95.21 and higher. This selection allows the table to continue past the ‘A’ switch after a 1st ball non strike cycles so the pinstation retaining bows can clear pins that may be loaded in the pin holders. This causes the ejector flaps to return to their up position allowing the stations to resume collecting pins, thus reducing overflow. *With firmware versions 4.97.11 and higher, if Coast Past A is enabled, the table motor will stop after coasting, wait 500 milliseconds, then reverse back to the ‘A’ switch in order to return the table and sweep to their up position.*

00 - Disabled (available with firmware version 4.95.26 and later)

06 - 10 - Select the lowest number possible that allows the table to drop just far enough to cause all the ejector flaps to return to their up position. Default = 08



NOTE 1: *Be aware that when the table continues past ‘A’ the sweep will also lower. As a result you may begin to see a little bit of the sweep board below the masking unit on 2nd ball. With firmware versions 4.97.11 and higher, if Coast Past A is enabled, the table motor will stop after coasting, wait 500 milliseconds, then reverse back to the ‘A’ switch in order to return the table and sweep to their up position. With firmware versions prior to 4.97.11, it is important to always select the lowest number possible that allows the table to drop just far enough to cause the pin station ejector flaps to return to their up position. A minor adjustment to the sweep board height will typically correct issues with a visible sweep board.*



NOTE 2: *When the table continues past ‘A’ the sweep will also lower. With firmware versions prior to 4.97.11, this may result in insufficient clearance for some lane machines to pass under the sweep. Always verify there is sufficient clearance for your lane machine after changing this setting. (A minor adjustment to the sweep board height will typically correct this.) It is suggested that the pinsetter be on 1st ball prior to running your lane machine so that the sweep will always be at its highest position.*

SW Diag - This selection allows the user to check the switches and switch wiring on the pinsetters. The display will list the switches that are actuated (closed) are used during the time the check is being made. A submenu for this selection has the following choices:

Pin SW (Left) - This selection checks the pinholder switches and displays the ones that are actuated on the left pinsetter.

Table SW (Left) - This selection checks the Table switches A, B, C , D, TS1, and TS2 and displays the ones that are actuated on the left pinsetter.

Mach SW (Left) - This selection checks the machine switches EC,(E),G, SM, OOR, ST, Pincount Switch (SS), and displays the ones that are actuated on the left pinsetter.

EXT SW (Left) - This selection checks the external inputs Ball Detect, Foul, Set And Reset and displays the ones that are actuated on the left pinsetter.

Pin SW (Right) - This selection checks the pinholder switches and displays the ones that are actuated on the left pinsetter.

Table SW (Right) - This selection checks the Table switches A, B, C , D, TS1, and TS2 and displays the ones that are actuated on the right pinsetter.

Mach SW (Right) - This selection checks the machine switches EC (E),G, SM, OOR, ST, Pincount Switch (SS), and displays the ones that are actuated on the right pinsetter.


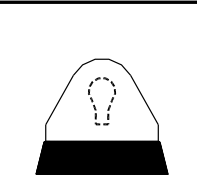
EXT SW (Right) - This selection checks the external inputs Ball Detect, Foul, Set And Reset and displays the ones that are actuated on the right pinsetter.

PINSETTER STATUS LIGHT / MACHINE POWER ON SEQUENCE

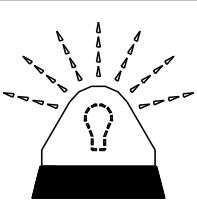

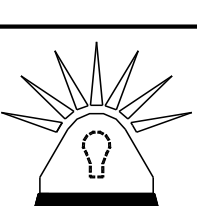
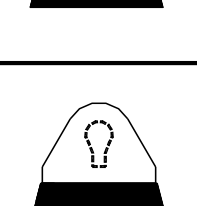
The light located on top of the elevator provides the operator with valuable information concerning the state of the machine. The meaning of the light depends on what software version is installed on the Nexgen box's CPU PCB.

i NOTE: The light's function is selectable in Nexgen boxes with firmware version 4.95.21 or higher.

Software Version 4.9.08 and prior

	Slow-flashing red light indicates an error has occurred. The pinsetter needs attention. Turn machine off and lock out power before servicing.
	No light indicates the pinsetter may be READY TO RUN. A signal from a remote location will cause the pinsetter to start WITHOUT WARNING. Stay clear of machine. Turn off the Stop/Run switch before servicing.

Software Version 4.9.09 and later

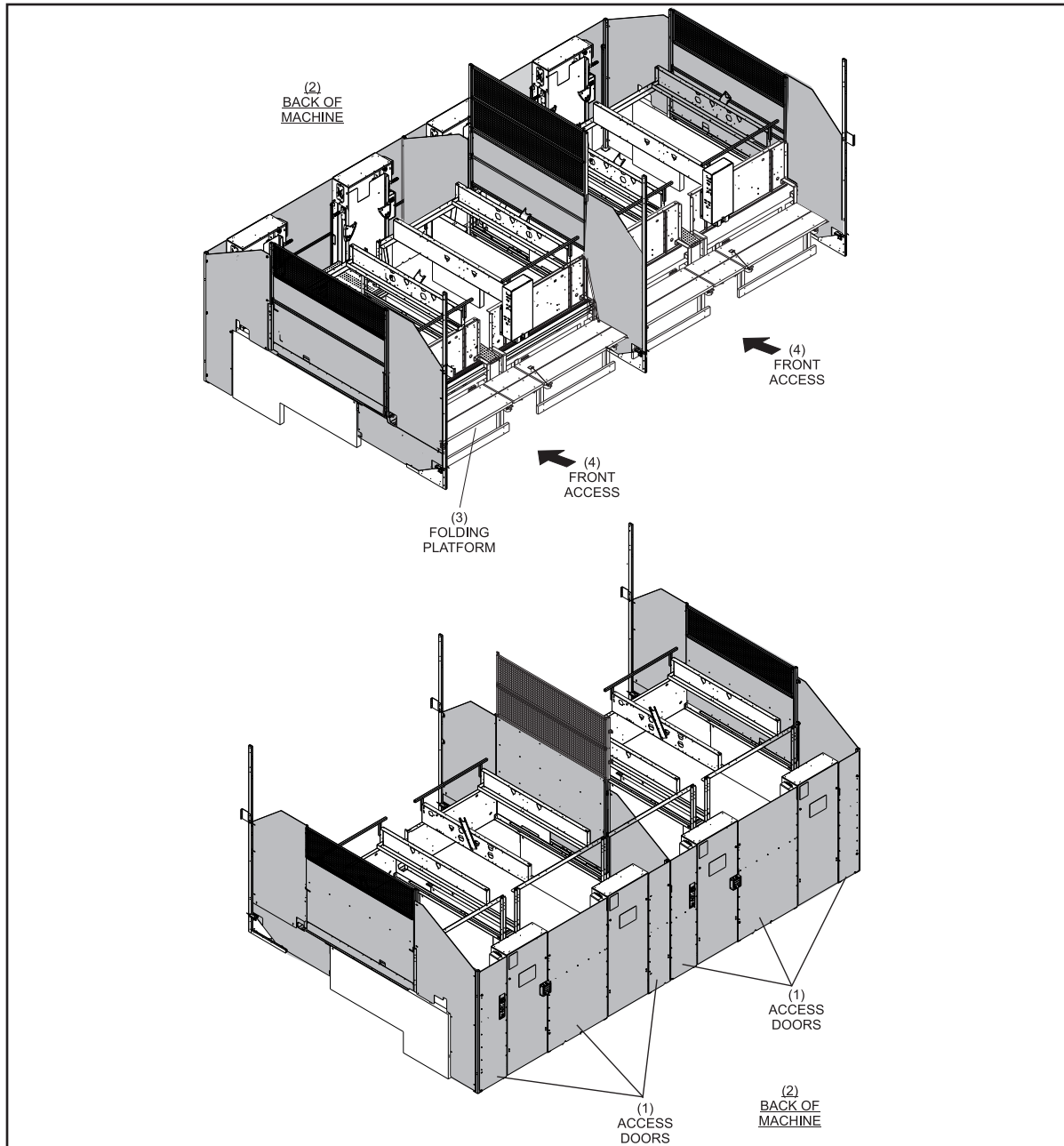
	Rapid-flashing red light indicates the pinsetter is GETTING READY TO RUN. Stay clear of machine & keep guards in place.
	Slow-flashing red light indicates an error has occurred. The pinsetter needs attention. Turn machine off and lock out power before servicing.
	Solid red light indicates the pinsetter is READY TO RUN. A signal from a remote location will cause the pinsetter to start WITHOUT WARNING. Stay clear of machine. Keep guards in place.
	No light indicates the pinsetter is off. Safe to Service. Lock out power before servicing.

PINSETTER ACCESS POINTS

It may become necessary to enter the pinsetter to perform maintenance tasks or correct a problem with the machine. If entering the pinsetter is needed, only enter using the locations as shown in the figure titled *Pinsetter Access Points*.



CAUTION: Only use the access points as recommended. With pinsetters equipped with Safety Controllers, these access points are protected with interlock switches and/or photo sensors that will automatically disconnect power to both pinsetters on the lane pair. Do not attempt to bypass, disable or tamper with these interlocks.



Pinsetter Access Points

- (1) ACCESS DOORS
- (4) FRONT ACCESS

- (2) BACK OF MACHINE

- (3) FOLDING PLATFORM

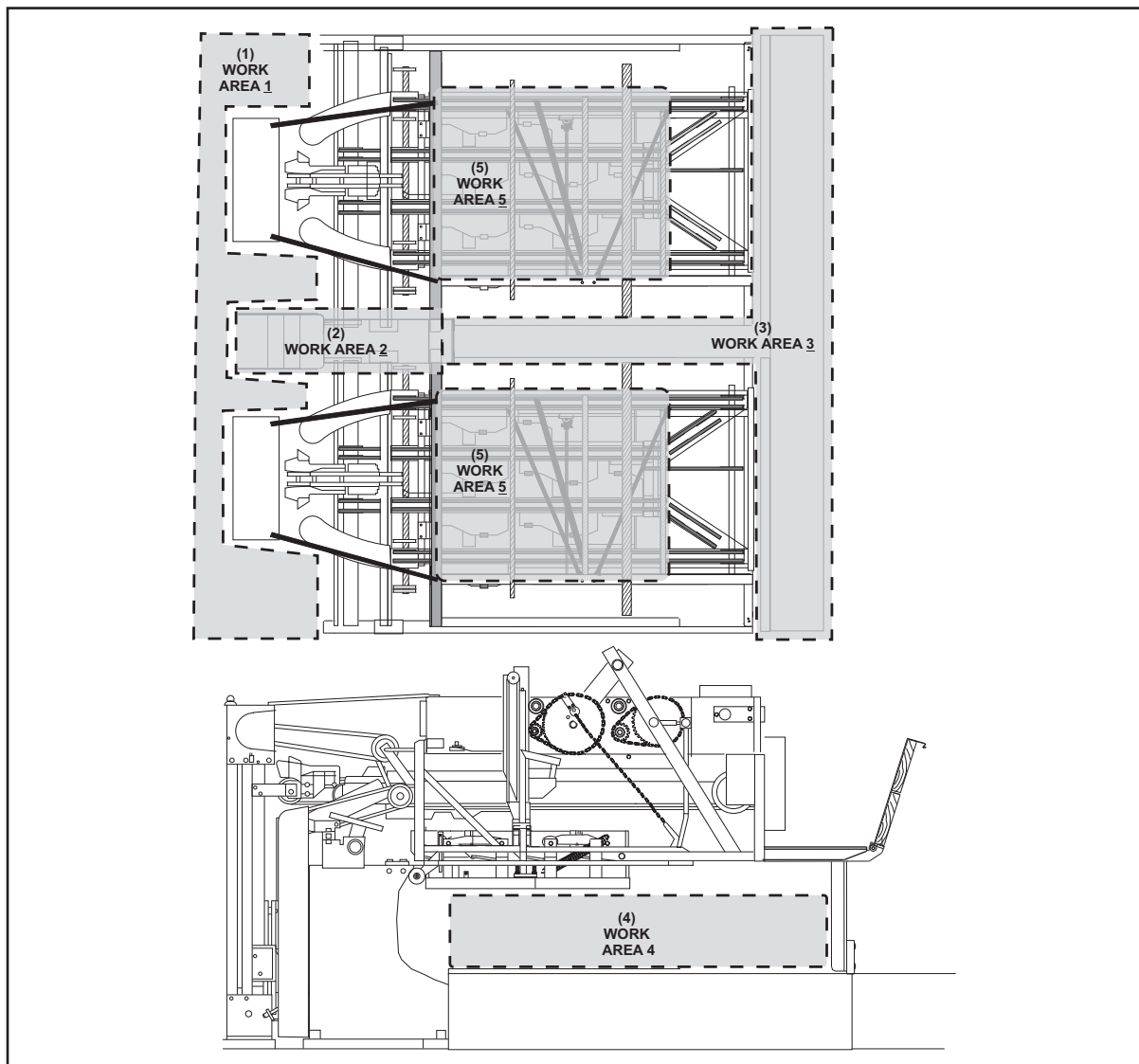
WORK AREAS

The operation, maintenance and repair of the GS pinsetter can be accomplished using five defined work areas or locations. Refer to figure titled *Work Areas*. As defined from the most to least frequently used, the areas include:

- Area 1 - Floor
- Area 2 - Ball accelerator platform
- Area 3 - Standing platforms between or at the front of the pinsetter
- Area 4 - On the pindeck
- Area 5 - On top of the distributor



CAUTION: When accessing the machine for work areas 3 -5, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.



Working Areas

(1) WORK AREA 1
(5) WORK AREA 5

(2) WORK AREA 2

(3) WORK AREA 3

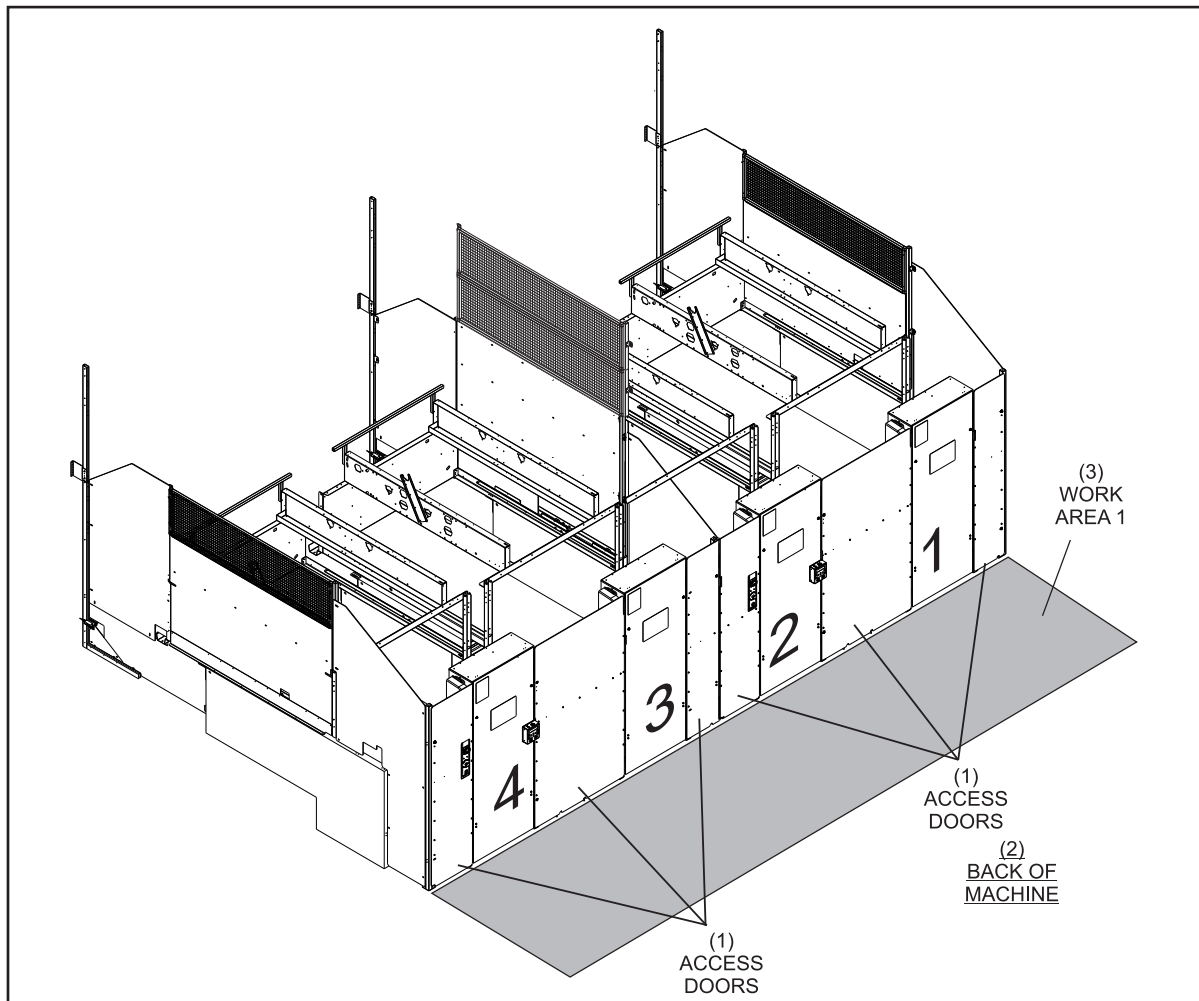
(4) WORK AREA 4

Area 1 - Floor

The most frequent area used for operating and maintaining the pinsetter is the floor area behind the pinsetters. During operation, all machine activity can be observed from this location. Additionally, interlocked doors provide access to the ball accelerator, elevator, shark assembly, ball cushion, transport band and the back portion of the distributor allowing the mechanic to easily correct a machine stop or perform maintenance. Refer to the figure titled *Pinsetter Work Area 1 - Floor*.

This area may be used for such activities as:

1. Cleaning the transport band
2. Correcting ball return stops
3. Correcting pin elevator jams



Pinsetter Work Area 1 - Floor

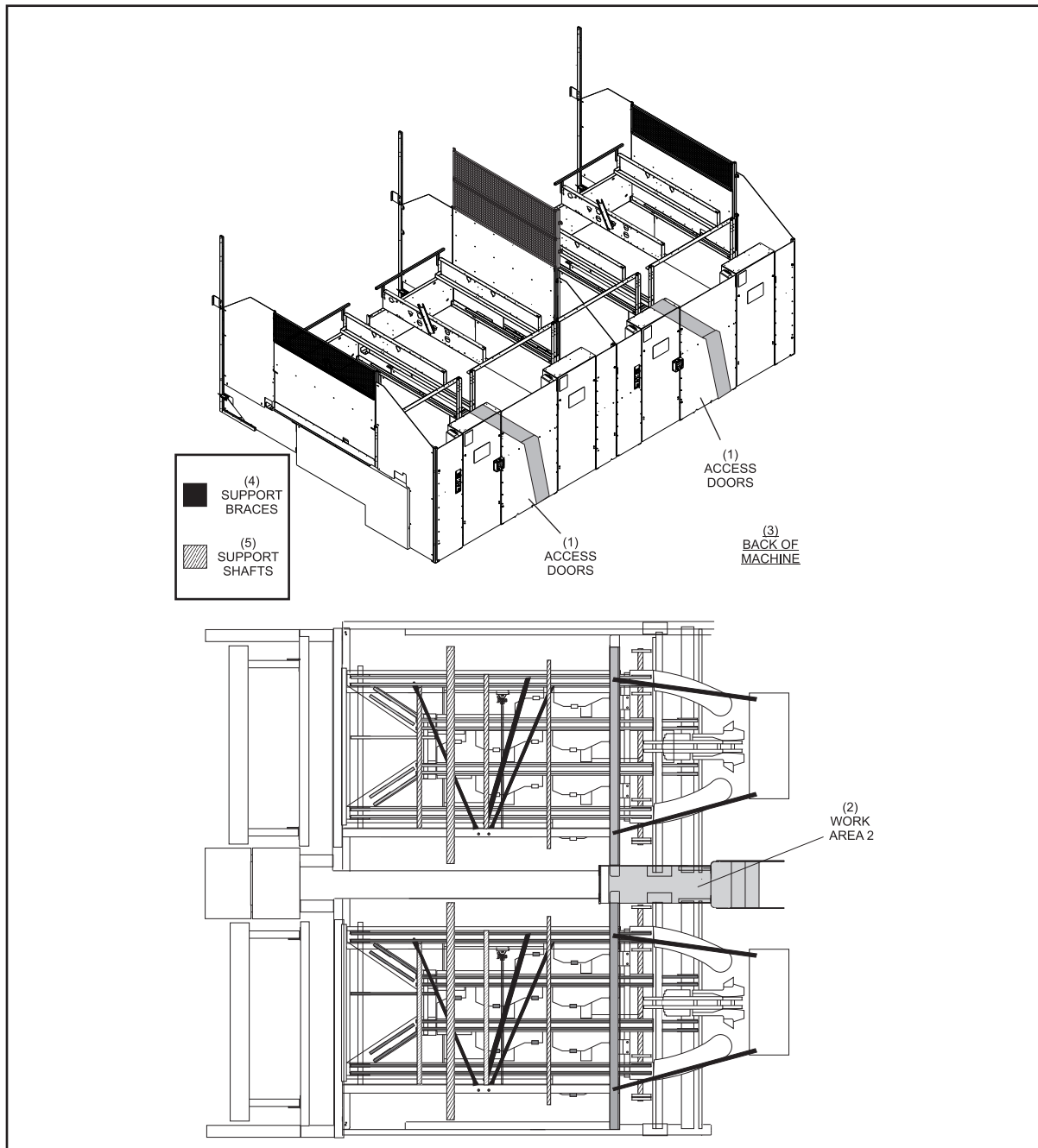
- (1) ACCESS DOORS (2) BACK OF MACHINE (3) WORK AREA 1

Area 2 - Ball Accelerator Platform

On occasion there may be a pinsetter stop or maintenance that cannot be done from work area 1. The areas involved may include the top of the elevator or the back to mid position of the distributor. Access to these locations can be obtained standing on the ladder or the platform on top of the ball accelerator's ball box. Refer to the figure titled *Pinsetter Work Area 2 - Ball Accelerator Platform*.

This area may be used for such activities as:

1. Cleaning distributor belts
2. Correcting pin handling issue on the shark assembly or at the back of the distributor.
3. Correcting issues at the back of the pinsetter main frame



Pinsetter Work Area 2 - Ball Accelerator Platform

- (1) ACCESS DOORS (2) WORK AREA 2 (3) BACK OF MACHINE (4) SUPPORT BRACES
(5) SUPPORT SHAFTS

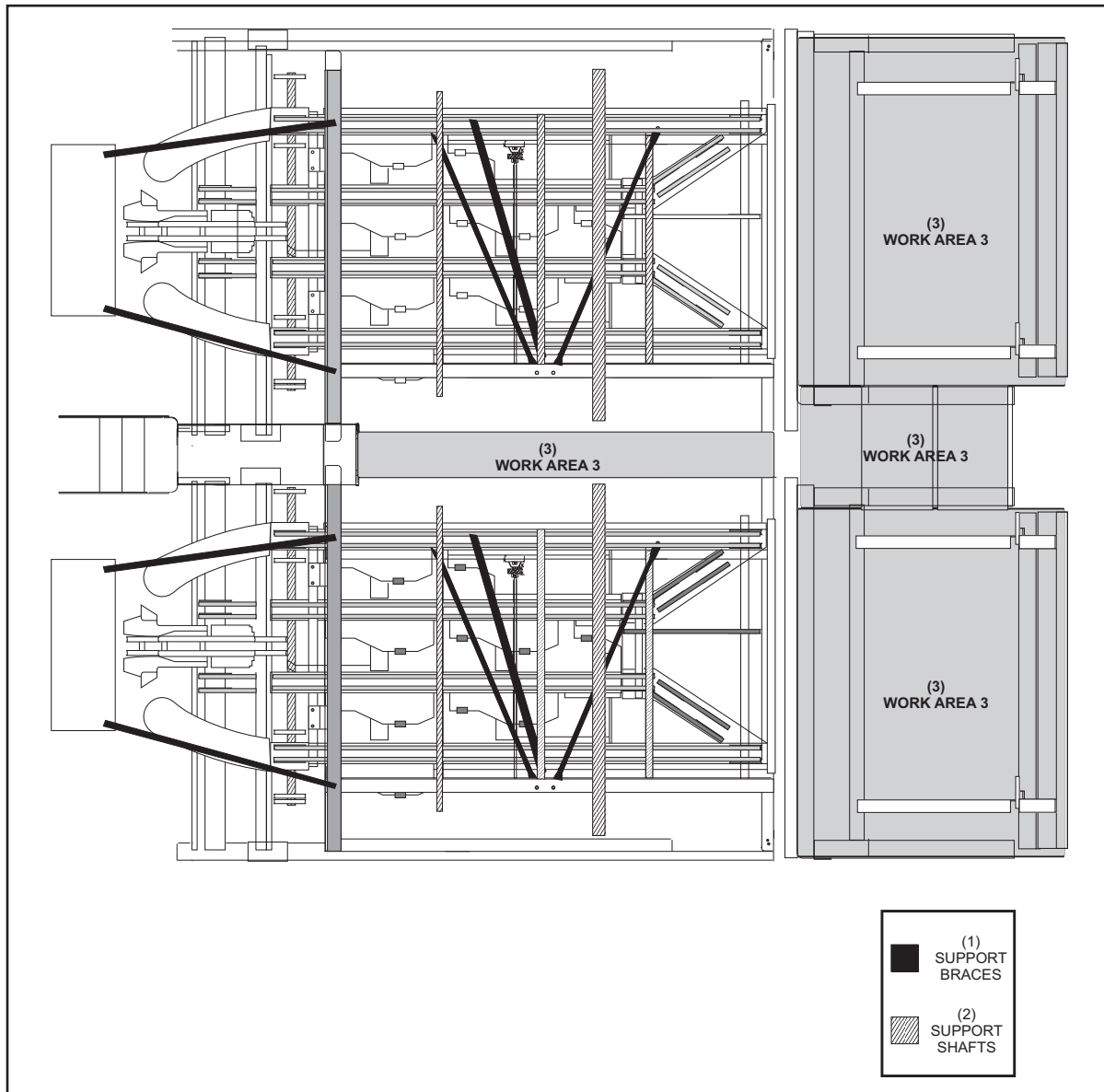
Area 3 - Standing Platforms

Infrequently, a pinsetter stop or maintenance requires access further into the machine. For situations that cannot be performed from work areas 1 or 2, Area 3 - Standing Platforms can be used. Refer to the figure titled *Pinsetter Work Area 3 - Standing Platforms*. This area may be used for such activities as:

1. Cleaning distributor belts
2. Correcting pin handling issue at the front of the machine.
3. Accessing the pinsetter's electronics



CAUTION: When accessing the machine for work area 3, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.



Pinsetter Work Area 3 - Standing Platforms

(1) SUPPORT BRACES (2) SUPPORT SHAFTS (3) WORK AREA 3

Area 4 - Pindeck

Infrequently, a pinsetter stop or maintenance requires access further into the machine. For situations that cannot be performed from work areas 1,2, or 3, Area 4 - Pindeck can be used. Refer to the figure titled *Pinsetter Work Area 4 - Pindeck*. This area may be used for such activities as:

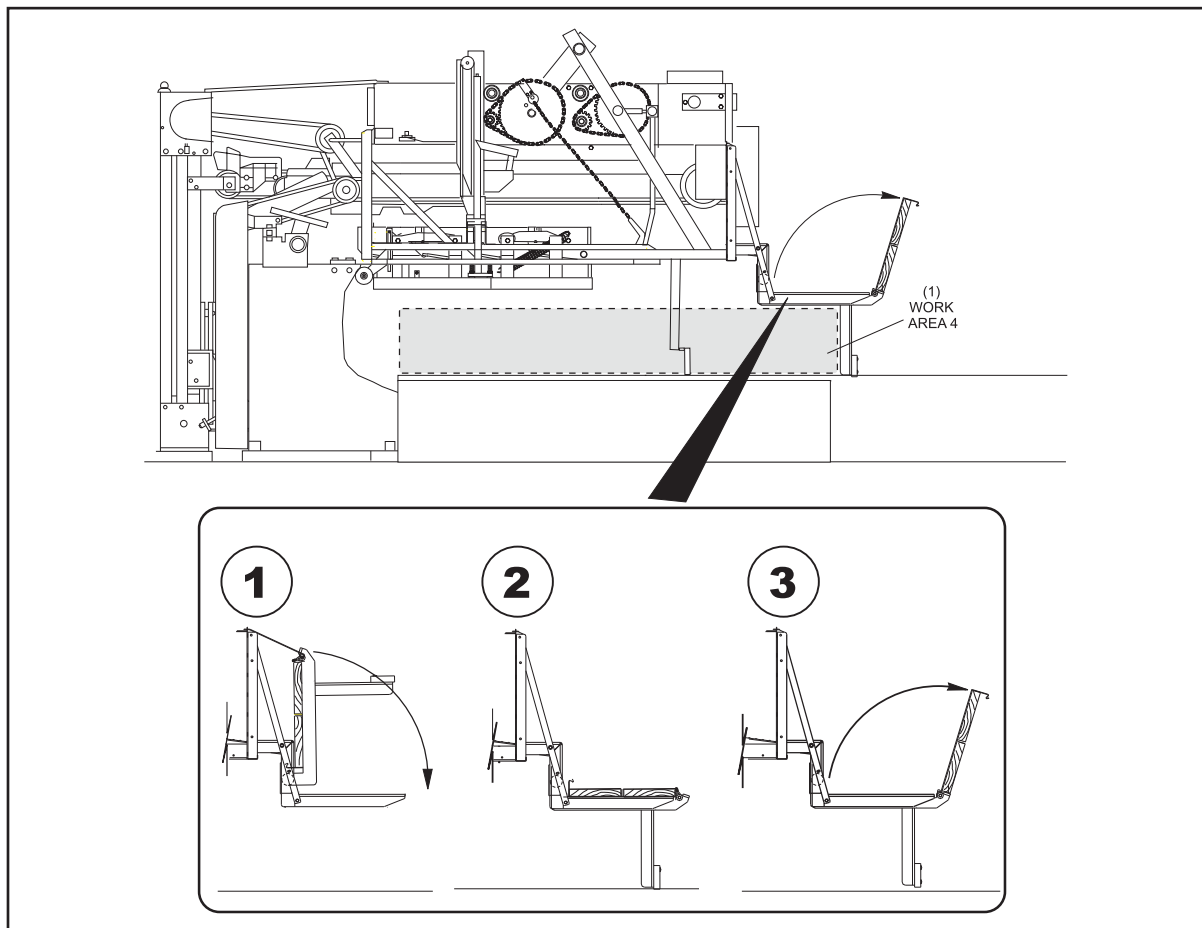
1. Removing a pin from under the Sweep
2. Replacing pin light bulbs
3. Accessing the underside of the distributor
4. Working on the setting table



CAUTION: Even though the pivoting walkway has an integrated ball stop which prevents a ball from entering the pinsetter, always make sure that a bowler is not positioned to a throw ball before accessing work area 4. It is good practice to have another employee positioned near any bowler to ensure they cannot throw a ball.



CAUTION: When accessing the machine for work area 4, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.



Pinsetter Work Area 4 - Pindeck

(1) WORK AREA 4

Area 5 - Distributor

Rarely, a mechanic must perform work at the division kickback side of the pinsetter. Although many division side procedures can be accomplished from work areas 1-4, some require climbing into the pinsetter. For these situations, Area 5 - Distributor should be used. The space defined in area 5 will provide adequate support for the mechanic's weight, provide stability for the mechanic, and prevent damage to the machine. Refer to the figure titled *Pinsetter Work Area 5 - Distributor*. This area may be used for such activities as:

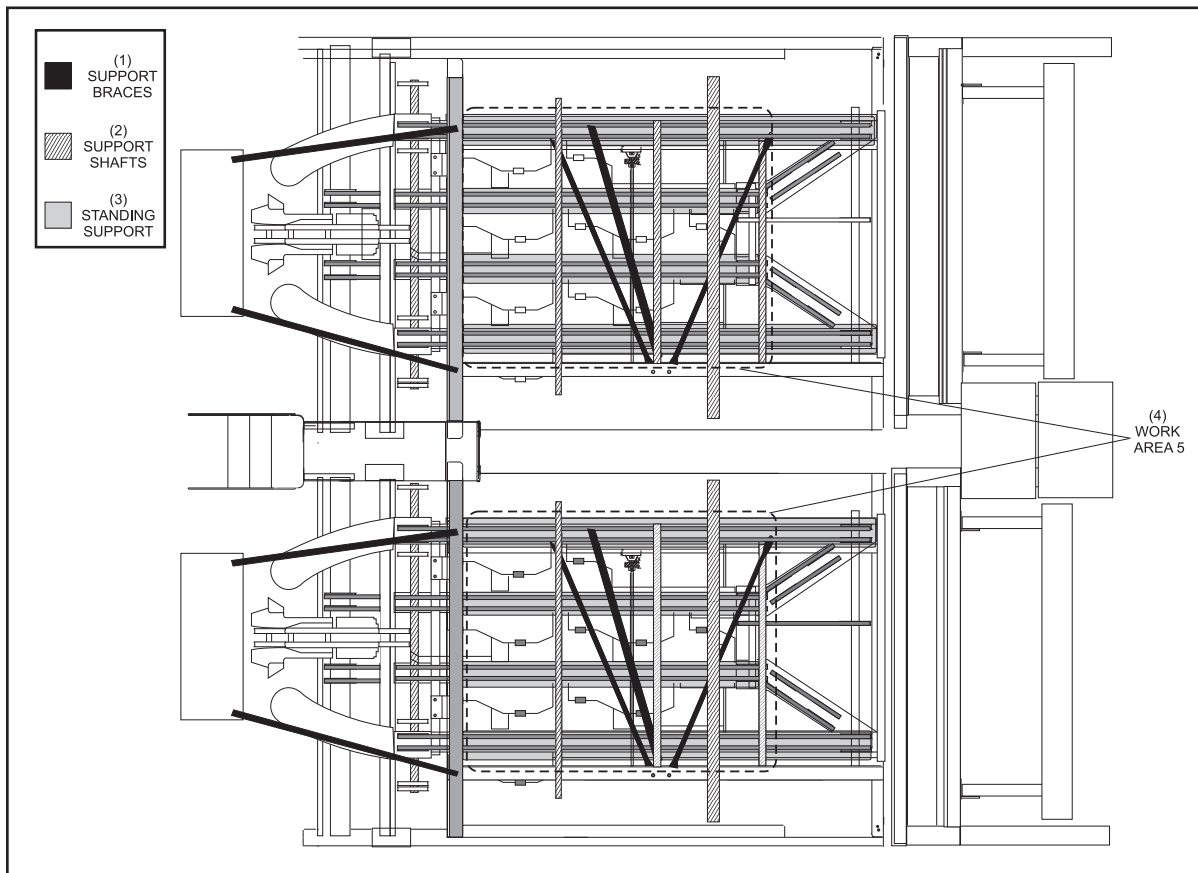
1. Replacing a division side table or sweep motor
2. Replacing the table or sweep drive assemblies
3. Replacing Pin Stations
4. Replacing distributor belts



CAUTION! Before using the distributor frame to support your weight, place a pin in each pinstation to power the ejector flaps to prevent damage to the pinstations and to eliminate trip hazards.



CAUTION: When accessing the machine for work area 5, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.



Pinsetter Work Area 5 - Distributor Working Positions and Support Locations

(1) SUPPORT BRACES (2) SUPPORT SHAFTS (3) STANDING SUPPORT (4) WORK AREA 5

STOPPING MACHINE IN MID-CYCLE

Suggested Work Location: Work Area 1

A machine may be stopped in mid-cycle by turning the stop/run switch on the Nexgen Controller or mechanic's remote display to the stop position. Once power is restored to the pinsetter it will automatically return to home or ready to bowl position.

If internal service work is to be performed, turn off the main power switch on the Power Safety Controller and lock the switch in the off position using an approved lockout device to prohibit the machine from being turned on.

i ***NOTE:** Removing the incoming 3 phase power will disable both pinsetters. Upon completion of work, remove any installed lockout devices and turn the main power switch on. Restore power to the Nexgen box by pressing the restart button on the Safety Controller.*

Once the machine has initialized, clear the power failure (PF) error code by toggling both stop/run switches off then on.

CLEARING ERROR CODES AND CORRECTING PINSETTER STOPS

Although pinsetter stops that require a mechanic intervention occur infrequently, circumstances will occur that make them inevitable.

When a pinsetter does experience a stop, the Nexgen CPU, will shut down the machine and flash the red status light located on top of the elevator assembly. A code indicating the problem encountered will be shown on the display of the Nexgen box or the remote display terminal.

i ***NOTE:** Some errors or problems with the pinsetter may not be detected by the Pinsetter CPU. Examples are ball accelerator problems or scoring errors. In these situations the status light will not flash to indicate a problem.*

The following procedure should be used for correcting pinsetter stops or malfunctions.

1. When approaching the pinsetter from the rear, turn the stop/run switch located on the mechanic's remote display terminal to the stop position. When approaching the pinsetter from the front, power to the Nexgen box will automatically be disconnected when the masking unit is lifted or the safety photo sensor in front of the machines is blocked, or the rear access door is opened.
2. Determine the reason for the stop. Look for pins on shark switch assembly, distributor, or on top of the setting table. If the status light is flashing look at the display located on the top of the remote display terminal for an associated error code.
3. Clear the jam, repair or replace the failed part, or make the adjustment as appropriate. If making the correction requires work to be done on the pindeck, ball accelerator, or pit area, lower the sweep wagon to prevent a ball from entering the machine.
4. Re-install all guards and verify all interlock and sensors are in their proper position.
5. Restart the Safety Controller:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.

6. Once the machine has initialized, toggle the STOP/RUN switches for each machine off/on to clear the power failure (PF) code.
7. If the machine will not restart, recheck the error code diagnostic display. If an invalid state is displayed, you must return the table (up) or sweep (forward) to its home position.

CLEARING PINS JAMMED IN DISTRIBUTOR

Suggested Work Location: Work Area 2, Work Area 3



CAUTION: *When accessing the machine for work area 3, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.*

1. Turn the stop/run on the mechanic's remote display or the Nexgen box to the stop position. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
2. Check for pins jammed at track ejector points. Check for pins jammed at belt turning points. Remove the jammed pins and place them on the outside return belt track.
3. Check the pin ejector assemblies for proper positions.
4. Continuous jams require checking the pin station assemblies for broken parts or missing pin release levers.
5. Re-install all guards and restart the safety controller restore power to the pinsetter:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED in "On" press the restart button.
6. Once the machine has initialized, toggle the stop/run switches on the mechanic's remote display to clear the power failure (PF) codes.
7. Check pinsetter operation.

CLEARING AN ELEVATOR JAM

Suggested Work Location: Work Area 1

1. Turn the stop/run on the mechanic's remote display or the Nexgen box to the stop position. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
2. Remove the guard from the back of the elevator assembly.
3. Check for the cause of the elevator jam.
 - a. Check for pins jammed in the elevator.
 - b. Check for pins jammed between the pinfeed deflector and the transport band.
 - c. Check at the bottom of the elevator for a shovel that has flipped over.
 - d. Observe the elevator assembly for any other obstruction that may prohibit movement of the shovels.
4. Remove the cause of the jam. In the event of a flipped shovel, manually rotate the elevator in the reverse direction to positioning the flipped shovel in a location that allows it to be rotated to its proper position.
5. Re-install all guards and restart the safety controller restore power to the pinsetter:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.
6. Once the machine has initialized, toggle the stop/run switches on the mechanic's remote display to clear the power failure (PF) codes.
7. Check pinsetter operation.

REMOVING PIN(S) FROM UNDER THE SWEEP

Suggested Work Location: Work Area 4



CAUTION: *Removing a pin from under the sweep places the mechanic between the bowler and the machine. Always make sure that a bowler is not positioned to throw a ball before putting yourself between the bowler and the machine. It is good practices to have another employee positioned near any bowler to ensure they cannot throw a ball and/or place a sign on the approach to indicate the lane is not available for bowling.*



CAUTION: *When accessing the machine for work area 4, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.*

1. Turn the stop/run on the mechanic's remote display or the Nexgen box to the stop position. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
2. Verify that all bowlers on the lane pair are off the approach and are not in a position to throw a ball.
3. Manually pivot the sweep board upward and remove the pin(s) from under the sweep.
4. Restart the safety controller restore power to the pinsetter::

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.

5. Once the machine has initialized, toggle the stop/run switches on the mechanic's remote display to clear the power failure (PF) codes.
6. Check pinsetter operation.

CORRECTING BALL RETURN STOPS

Suggested Work Location: Work Area 1



CAUTION: *Since the ball return system is common to a lane pair, the sweep on both lanes must be placed in the guarding position (down) to prohibit a ball from entering either pinsetter.*

1. Verify that a bowler is not in a position to throw a ball, then press the set button on the mechanic's remote display to lower the sweep board. Turn the stop/run switch on the mechanic's remote display to the stop position.
2. Repeat step 1 for the other lane of the lane pair.
3. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
4. Open the ball return rear door to gain access to the ball return area.
5. Check for the cause of the ball return issue.
 - a. Check for pins blocking the ball door opening.
 - b. Check for pins inside the ball accelerator.
 - c. Verify the operation of the ball door locking assembly.
 - d. Observe the ball return area for any other obstruction that may prohibit the ball from passing through the ball accelerator.
6. Correct the issue identified in step 5.
7. Close the rear door opened in step 4.
8. Restart the safety controller to restore power to the pinsetter:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.
9. Once the machines have initialized, toggle the stop/run switches on the mechanic's remote display to clear the power failure (PF) codes.
10. Check pinsetter operation.

MACHINE CLEANING

The frequency for cleaning the pinsetter depends on the type and quantity of lane conditioner (oil) used, the environment that the pinsetter is operating, and the amount of bowling activity for the pinsetter.

In general the pinsetter should be kept as clean as possible using a vacuum, general purpose cleaner, warm water (with detergent as needed), and 12:1 diluted lane cleaner such as Invincible.



CAUTION: Power to the pinsetter must be off when performing any machine maintenance. Additionally the sweep board must be in the guarding position to ensure that ensure a bowling ball cannot enter the pinsetter.

Cleaning the Transport Band

Suggested Work Location: Work Area 1

The following procedure should be used when cleaning the transport band.

1. Press the pinsetter reset button to lower the sweep board to its guarding position. Immediately turn the stop/run on the mechanic's remote display or the Nexgen box, to the stop position. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
2. Verify that all bowlers on the lane pair are off the approach and are not in a position to throw a ball.
3. Lower the sweep board to prohibit a ball from entering the pinsetter.
4. Remove guards as needed to gain access to the transport band.
5. Wipe the top of the transport band using a solution of 12 parts water to 1 part lane cleaner (lane cleaner diluted 12:1 with water).
6. Manually rotate the transport band to gain access to other side of the band.
7. Clean the remaining portion of the transport band.
8. Re-install all guards removed in step 4 and verify all interlock and sensors are in their proper position.
9. Restart the Safety Controller:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.
10. Once the machine has initialized, toggle the STOP/RUN switches for each machine off/on to clear the power failure (PF) code.

Cleaning the Distributor Belts

Suggested Work Location: Work Areas 1,2,3



CAUTION: When accessing the machine for work area 3, the main power switch on the Nexgen or Safety Controller must be locked into the off position using a suitable locking mechanism.

The following procedure should be used when cleaning the distributor belts.

1. Press the pinsetter reset button to lower the sweep board to its guarding position. Immediately turn the stop/run on the mechanic's remote display or the Nexgen box, to the stop position. Turn off the main power switch on the Power Safety Controller box and lock the switch into the off position using an approved lockout device.
2. Verify that all bowlers on the lane pair are off the approach and are not in a position to throw a ball.
3. Remove guards as needed to gain access to the distributor area.
4. From work area 1, 2 or 3, clean all accessible distributor belts using a solution of 12 parts water to 1 part lane cleaner (lane cleaner diluted 12:1 with water).
5. Manually rotate the distributor belts to gain access to the unwashed portion of the belts.
6. Clean the remaining portion of the distributor belts.
7. Re-install all guards removed in step 3 and verify all interlock and sensors are in their proper position.
8. Restart the Safety Controller:

If the Green "Restart Photocell" LED is "On" press the photo sensor restart button to illuminate the yellow "Ready for Restart" LED, then press the restart button. If only the yellow "Ready for Restart" LED is "On" press the restart button.

9. Once the machine has initialized, toggle the STOP/RUN switches for each machine off/on to clear the power failure (PF) code.

TROUBLESHOOTING

Trouble Diagnostics

The GS-X pinsetter monitors its function switches for proper operation and will shut down a pinsetter if a fault is detected. When a problem occurs, the pinsetter will shut down and the status light on the top of the elevator will start to flash. The error code displayed on the LCD Display of the mechanic's remote display can be used to diagnose the problem.

Contact Closure Diagnostics (Switch Diagnostics)

In addition to trouble diagnostics, the GS-X is capable of performing two diagnostic modes for testing pinsetter operations; one mode, contact closure diagnostics, checks the switches on the pinsetter and displays which switches are closed during the time the check is being made. This mode can be used to verify that switches are working properly and the wiring between the Nexgen Controller box and the individual switches is correct.

Machine Cycle Diagnostics

The machine cycle diagnostics, puts the pinsetter into a continuous operating cycle in which the pinsetter operates as if it was in a ten pin bowling mode, with the following exceptions. Instead of waiting for a ball detect, a five second time signal from the CPU starts the pinsetter cycle. The pinsetter will continue to set, reset, sweep and reload pins as long as it is switched into the diagnostic mode. Fouls will be ignored during the diagnostics. Diagnostic faults (failures) are active during diagnostics and can stop the pinsetter if a jam or some form of failure is detected.

Using the Diagnostics

Contact Closure Diagnostics (Switch Diagnostics)

1. The contact closure diagnostics can only be performed when both pinsetters are off (stop/run switches in the stop positions) The pinsetter is selected by having the following conditions available.
 - a. The pinsetter cannot be in an error condition.
 - b. For pinsetters equipped with base or fixed guards, the Stop/Run switch on the rear mechanic box must be set to Run.
 - c. Both the left and the right stop/run switches on the Mechanics Remote Display must be switched to the “stop” position.
 - d. To activate Contact Closure diagnostics, press the [Mode] key on the control panel until the mode “SW Diag” appears on the display.
 - e. Press the [Enter] key to step through the display options.

Pin SW (Left) - Displays the pinholder switches that are actuated on the left pinsetter. A “-” indicates the switch is open.

Table SW (Left) - Display switches A, B, C, D, TS1, and TS2 of the left pinsetter if actuated. A “-” indicates the switch is open.

Mach SW (Left) - Displays switches E(EC), G, SM, OOR, ST, and SS (Pincount Switch) of the left pinsetter if actuated. A “-” indicates the switch is open.

EXT SW (Left) - Displays the Ball Detect, Foul, Set And Reset Switches if actuated for the left pinsetter. A “-” indicates the switch is open.

Pin SW (Right) - Displays the pinholder switches that are actuated on the right pinsetter. A “-” indicates the switch is open.

Table SW (Right) - Display switches A, B, C, D, TS1, and TS2 of the right pinsetter if actuated. A “-” indicates the switch is open.

Mach SW (Right) - Displays switches E(EC), G, SM, OOR, ST, and SS (Pincount Switch) of the right pinsetter if actuated. A “-” indicates the switch is open.

EXT SW (Right) - Displays the Ball Detect, Foul, Set And Reset Switches if actuated for the right pinsetter. A “-” indicates the switch is open.

Machine Cycle Diagnostics

1. To enter into this mode, the following conditions are necessary.
 - a. The pinsetter cannot be in an error condition.
 - b. The stop/run switch for the pinsetter is being tested must be switched to the “stop” position.
 - c. All other interlock switches or other stop/run switches must be on.
2. To activate cycle diagnostics, press the [Mode] key on the control panel until the mode “Diag” appears on the display.
3. Turn the stop/run switch for the pinsetter is being tested to the “run” position.
4. If a pinsetter stops during diagnostics and the status light is flashing, check the error code displayed on the mechanic’s remote display. Refer to *Table 1*.

i **NOTE:** *In order to see error codes 50-59 (Detect 1 - Detect 9, Detect 10) in Machine Diagnostics, the Enable 50 ERR must be set to Y.*

Tables 1 and 2 list possible error codes and describe the most likely cause for the error. The displayed code may not pinpoint the problem in all cases. For further explanation of the codes, refer to the “Troubleshooting” section of this manual.

Error Codes

Std. Code	Extended Code		Std. Code	Extended Code	
PO	Pin OOR	Out -of-Range	64	SM Found	Switch SM Not Expected But Found
01	Pin1 Ld	Pin Loading Time Out Pin 1	65	G Found	Switch G Not Expected But Found
02	Pin2 Ld	Pin Loading Time Out Pin 2	66	STFound	Switch ST Not Expected But Found
03	Pin3 Ld	Pin Loading Time Out Pin 3	67	OORFound	SW. OOR Not Expected But Found
04	Pin4 Ld	Pin Loading Time Out Pin 4	70	A Nftnd	Switch A Expected But Not Found
05	Pin5 Ld	Pin Loading Time Out Pin 5	71	B Nftnd	Switch B Expected But Not Found
06	Pin6 Ld	Pin Loading Time Out Pin 6	72	C Nftnd	Switch C Expected But Not Found
07	Pin7 Ld	Pin Loading Time Out Pin 7	73	D Nftnd	Switch D Expected But Not Found
08	Pin8 Ld	Pin Loading Time Out Pin 8	74	SM Nftnd	Switch SM Expected But Not Found
09	Pin9 Ld	Pin Loading Time Out Pin 9	75	G Nftnd	Switch G Expected But Not Found
10	Pin10 Ld	Pin Loading Time Out Pin 10	76	ST Nftnd	Switch ST Expected But Not Found
50	Detect10	#10 Pin Not Detected in Diagnostics	90	Invld 0	Invalid Machine State 0
51	Detect1	#1 Pin Not Detected in Diagnostics	91	Invld 1	Invalid Machine State1
52	Detect2	#2 Pin Not Detected in Diagnostics	92	Invld 2	Invalid Machine State 2
53	Detect3	#3 Pin Not Detected in Diagnostics	93	Invld 3	Invalid Machine State 3
54	Detect4	#4 Pin Not Detected in Diagnostics	94	Invld 4	Invalid Machine State 4
55	Detect5	#5 Pin Not Detected in Diagnostics	95	Invld 5	Invalid Machine State 5
56	Detect6	#6 Pin Not Detected in Diagnostics	EJ	ElevJam	Elevator Jam
57	Detect7	#7 Pin Not Detected in Diagnostics	EL	Pin Cnt	Pin Count Switch Shorted for 5 Seconds
58	Detect8	#8 Pin Not Detected in Diagnostics	J1	TS1 Jam	Jam Switch TS1
59	Detect9	#9 Pin Not Detected in Diagnostics	J2	TS2 Jam	Jam Switch TS2 (Tower)
60	A Found	Switch A is Not Expected But Found	BA	AcelOff	Accelerator Motor (overload)
61	B Found	Switch B is Not Expected But Found	IL	IL	Interlock Switch Open
62	C Found	Switch C is Not Expected But Found	PF	PwrFail	Power Failure has Occured
63	D Found	Switch D is Not Expected But Found			

Table 1. Error Display

Error Code	Switch Status				Problem
	Table	Sweep		Spotting Tongs	
	“A”	“G”	“SM”	“ST”	
90 (Invl 0)	Actuated	Un-Actuated	Un-Actuated	Actuated	Sweep is up but it is not forward.
91 (Invl 1)	Un-Actuated	Un-Actuated	Un-Actuated	Actuated	Sweep is up but it is not forward and the Table is not at home position.
92 (Invl 2)	Un-Actuated	Actuated	Un-Actuated	Actuated	Sweep not forward, Table is not at home position
93 (Invl 3)	Actuated	Un-Actuated	Un-Actuated	Un-Actuated	Sweep is up but it is not forward and the Spotting Tongs are closed.
94 (Invl 4)	Un-Actuated	Un-Actuated	Un-Actuated	Un-Actuated	Sweep is up but it is not forward, the Table is not at home position and the Spotting Tongs are closed.
95 (Invl 5)	Un-Actuated	Actuated	Un-Actuated	Un-Actuated	Sweep is not forward, the Table is not at home position, and the Spotting Tongs are closed.

Table 2. Invalid Machine States

i **NOTE:** Some errors or problems with the pinsetter may not be detected by the Pinsetter CPU. Examples are ball accelerator problems or scoring errors.

Error Codes Description and Causes

STD. CODE	EXTENDED CODE *	FAILURE DESCRIPTION	POSSIBLE CAUSES
PO	Pin OOR	TABLE CAN'T PICK UP PINS, OUT-OF-RANGE - The Table was unable to lower to it's normal detecting height.	<ol style="list-style-type: none"> 1. A bowling pin has been moved off its normal spot when the bowler rolled the ball. The table came down and it was resting on top of the pin. Turn off the power, clear any fallen pins still on the playing surface of the lane, and turn power back on. 2. The OOR switch mounted on the tower is not being actuated. Check the switch and actuating cam for proper adjustment. Check the wiring and connections between the switch and P-1/P-23 on the Nexgen Controller. 3. Switch cluster timing cam out of adjustment. 4. Table is not lowering properly. Check for binds in the table racks or the chain lowering mechanism.
01 02 03 04 05 06 07 08 09 10	Pin1 Ld Pin2 Ld Pin3 Ld Pin4 Ld Pin5 Ld Pin6 Ld Pin7 Ld Pin8 Ld Pin9 Ld Pin10 Ld	PIN LOADING TIME OUT A pin was not loaded into the pinholder within 90 seconds.	<ol style="list-style-type: none"> 1. Pins jammed in one of the distributor lanes preventing the pin station from receiving a pin. 2. Pin holder switch not working properly. Check for broken switch or wiring. 3. Pin Holder solenoid not energizing. Check the solenoid, the wiring and the Nexgen Controller. 4. Table height too high, preventing the pin from dropping properly into the pin holder to make the switch. 5. Table height too low preventing the pin holder's open gripper from pushing up on the pin release lever to drop the pin. Also check individual pin release lever for proper positioning. 6. Pin count switch not functioning properly. 7. For Nexgen Electronics, swap the CPU PCB. Also, swap the interconnecting cables to help isolate the problem.

CODE	EXTENDED CODE*	FAILURE DESCRIPTION	POSSIBLE CAUSES
50 51 52 53 54 55 56 57 58 59	Detect10 Detect1 Detect2 Detect3 Detect4 Detect5 Detect6 Detect7 Detect8 Detect9	PIN NOT DETECTED IN DIAGNOSTICS - These ten codes are used during Machine Cycling diagnostics only. If a standing pin is not detected when the pinsetter is operating in this mode, the pinsetter will stop and display the code for the pin not detected. To activate this option set the Enable 50 Err setup option to "Y"	<ol style="list-style-type: none"> 1. Check the pin detector plate for proper positioning. Is it level from left to right. 2. Check the Stroke Limiter height adjustment. 3. Check the setting table levelness. 4. Check the angle "1" and "2" adjustment.(Pinsetter Timing) 5. Check stroke limiter shock.
60	A Found	SWITCH A NOT EXPECTED BUT FOUND - Pinsetter CPU has requested that the table be lowered but the "A" switch is still being held closed.	<ol style="list-style-type: none"> 1. Table Motor or brake defective preventing table from being lowered. 2. The wiring between the switch and P-1/P-23 on the Nexgen Controller is defective. 3. Bad Connection on the H.V. PCB or Bad H.V. PCB (Nexgen) 4. Faulty A-Switch
61	B Found	SWITCH B NOT EXPECTED BUT FOUND - This switch was actuated at the wrong time or continuously.	<ol style="list-style-type: none"> 1. Switch "B" on the switch cluster is shorted. Check the wiring and the switch. 2. Table motor or brake defective
62	C Found	SWITCH C NOT EXPECTED BUT FOUND - This switch was actuated at the wrong time or continuously.	<ol style="list-style-type: none"> 1. Switch "C" on the switch cluster is shorted. Check the wiring and the switch. Nexgen CPU defective. Check the wiring and swap the PCBs with a working lane pair. 2. Table motor or brake defective.
63	D Found	SWITCH D NOT EXPECTED BUT FOUND - This switch was actuated at the wrong time or continuously.	<ol style="list-style-type: none"> 1. Switch "D" on the switch cluster is shorted. Check the wiring and the switch. 2. Table motor or brake defective 3. Nexgen CPU defective. Check the wiring and swap the PCBs with a working lane pair.
64	SMFound	SWITCH SM NOT EXPECTED BUT FOUND - This sweep motor switch is actuated when it should not have been.	<ol style="list-style-type: none"> 1. Sweep motor defective. 2. Sweep motor brake defective or stuck on the motor shaft. 3. No power to the sweep motor and/or brake. Check wiring for damage and proper hookup. 4. "SM" switch shorted. Wiring between the Nexgen Controller and the switch is shorted. 5. Sweep wagon or sweep arms binding or roller out of adjustment.

CODE	EXTENDED CODE *	FAILURE DESCRIPTION	POSSIBLE CAUSES
65	G Found	SWITCH G NOT EXPECTED BUT WAS FOUND - This error is detected when the sweep is down when it should be up in the raised "waiting for a ball" position.	<ol style="list-style-type: none"> 1. Replacement table motor is wired so so the table is running backwards. 2. Sweep release assembly defective. Check for broken parts, missing spring or a sticky solenoid plunger. 3. Sweep release assembly out of alignment causing it to miss the sweep during the clockwise rotation of the table shaft. 4. Sweep wagon's forward position out of adjustment. Check both sweep arms and make sure both sweep crANK links on the sweep shaft are tight. <p>"G" Switch shorted. Wiring between the Nexgen Controller and the switch is shorted.</p>
66	STFound	SWITCH ST NOT EXPECTED BUT WAS FOUND - Spotting tong switch is actuated when it should not have been. This means that the tongs are in their open position when they should have closed.	<ol style="list-style-type: none"> 1. Spotting tong solenoid not energizing. Check fuses on Nexgen CPU PCB. 2. Spotting tong clutch slipping. Clean, reset tension and readjust. 3. One or more set of spotting tongs damaged or binding. 4. Drive gears on the square shaft or out of adjustment. 5. "ST" shorted or wiring on the table damaged.
67	OORFound	SWITCH OOR NOT EXPECTED BUT FOUND - The Out-of-Range switch, located on the tower, is actuated when it should not have been.	<ol style="list-style-type: none"> 1. The "OOR" switch is shorted or damaged. 2. The wiring from the switch to the Nexgen Controller is faulty. 3. The Nexgen Controller CPU may be defective.
70	A Ntfrd	SWITCH A EXPECTED BUT NOT FOUND - Table is not at the fully raised to "home" position.	<ol style="list-style-type: none"> 1. "A" switch is defective or out of adjustment. 2. Table motor or brake defective. 3. Check wiring connections and motor and brake connections. 4. Reversing fuses on Nexgen High Voltage PCB that are blown.
71	BNtfrd	SWITCH B EXPECTED BUT NOT FOUND - "B" switch was not made when table lowered to detect or set pins.	<ol style="list-style-type: none"> 1. Switch "B" defective or out of adjustment. 2. The wiring from the switch to the Nexgen Controller is faulty 3. The Nexgen Controller CPU PCB may be defective. 4. Reversing fuses on Nexgen High Voltage PCB that are blown 5. Table motor or brake is defective

CODE	EXTENDED CODE *	FAILURE DESCRIPTION	POSSIBLE CAUSES
72	C Ntfnd	SWITCH C EXPECTED BUT NOT FOUND - Switch "C" is not actuated as expected during a pinsetter cycle.	<ol style="list-style-type: none"> 1. Table motor or brake defective. 2. Check wiring from Nexgen Controller H.V. PCB to table motor and brake. 3. Table motor wired to run backward. Reverse any two of the "hot" leads coming into the motor terminal block. 4. Switch "C" defective or adjusted too far away from the magnetic switch activator. 5. The Nexgen Controller CPU PCB may be defective. 6. Reversing fuses on Nexgen High Voltage PCB that are blown. 7. Table motor or brake is defective.
73	D Ntfnd	SWITCH D EXPECTED BUT NOT FOUND - "D" switch was not made when table lowered to detect or set pins.	<ol style="list-style-type: none"> 1. Switch "D" defective or out of adjustment. 2. The wiring from the switch to the Nexgen box is shorted. The Nexgen Controller CPU PCB may be defective. 3. CPU PCB may be defective. 4. Reversing fuses on Nexgen High Voltage PCB that are blown 5. Table motor or brake is defective
74	SM Ntfnd	SWITCH SM EXPECTED BUT NOT FOUND - This error indicates that the sweep is not forward or is unable to stop at the forward position.	<ol style="list-style-type: none"> 1. Sweep motor brake not preventing the motor from coasting. 2. "SM" switch not being actuated. 3. The Nexgen Controller CPU PCB may be defective. 4. Defective Nexgen High Voltage PCB.
75	G Ntfnd	SWITCH G EXPECTED BUT NOT FOUND - Indicates that the sweep did not lower all the way down to the guarding "ready to sweep" position.	<ol style="list-style-type: none"> 1. Sweep down on top of a pin or ball. 2. Sweep release solenoid defective. 3. Sweep release mechanism damaged or defective. 4. Switch "G" out of adjustment. 5. The wiring between the Nexgen Controller and the sweep release solenoid or "G" switch is defective. 6. The Nexgen Controller CPU PCB may be defective.
76	STNfnd	SWITCH ST EXPECTED BUT NOT FOUND - Indicates that the spotting tongs are not all the way open.	<ol style="list-style-type: none"> 1. Spotting tong clutch - clean and adjust. 2. Spotting tong switch damaged or out of adjustment. 3. Spotting tong solenoid not working properly. 4. The wiring between the Nexgen Controller and the switch is loose or damaged. 5. Spotting tongs not working properly - damaged or binding. A replacement set of tongs could have been installed out of time with the other tongs.

CODE	EXTENDED CODE *	FAILURE DESCRIPTION	POSSIBLE CAUSES
90 91 92 93 94 95	Invld 0 Invld 1 Invld 2 Invld 3 Invld 4 Invld 5	INVALID MACHINE STATES 0-5 These states are situations which the Pinsetter CPU is not able to determine where the table, sweep and spotting tongs are. Most times this is caused by an incomplete clearing of a table or sweep jam by the mechanic.	<ol style="list-style-type: none"> 1. Check the position of the table, sweep and spotting tongs. Moving the sweep to the fully forward position will normally allow the pinsetter to restart itself. 2. The sweep is not making the "SM" switch in order for the table motor to run. 3. The table is not "up" making the "A" switch in order for the sweep motor to run. 4. Check the "SM" switch with the sweep forward. 5. Check the "G" switch the sweep up. 6. Check the "A" switch with the table up. 7. Check the "ST" switch with the tongs fully open. 8. Check the Nexgen Controller CPU PCB cables for proper connections, both internally and externally.
EL	Pin Cnt	Pin count switch closed continuously.	<ol style="list-style-type: none"> 1. Pin jam at the Shark assembly pin guides. 2. Switch is stuck in the closed position. 3. The wiring between the Nexgen Controller and the switch is shorted. 4. The Nexgen Controller CPU PCB is defective.
EJ	Elev Jam	ELEVATOR JAM - Elevator shovels not rotating properly. "EC" switch on elevator not being pulsed by a pin shovel at least once every 6 seconds.	<ol style="list-style-type: none"> 1. Elevator pin shovel flipped and wedged in the elevator. 2. Pin caught in the elevator preventing rotation of the shovels. 3. Transport drive has a bind which prevents the rear distributor shaft from rotating elevator fast enough to keep pulsing "EC" switch. 4. Distributor motor defective. 5. Belt drive from the motor to the distributor shafts is too loose.
J1	TS1 Jam	JAM SWITCH TS1 - The switch is made when the rear pin holder swing shaft is unable to return to the horizontal position after setting pins.	<ol style="list-style-type: none"> 1. A pin, broken part or tool is stuck in the table preventing rotation of the swing shafts. 2. The TS1 jam mechanism is out of adjustment and allows the switch to be made during proper rotation of the swing shafts. 3. The TS1 switch or its wiring to the Nexgen Controller is shorted.
J2	TS2 Jam	JAM SWITCH TS2 (TOWER) - This switch is made when the table is prevented from raising to its home position.	<ol style="list-style-type: none"> 1. A pin, broken part or tool is wedged between the table and distributor. 2. The table height adjustment is wrong allowing the table to be pulled up against the distributor. Check the Angle "1" & "2" adjustment of the table and the table height in the raised position adjustments. 3. Check the TS2 adjustment to make sure the spring tension is adjusted properly. 4. The wiring to the Nexgen Controller is possibly shorted.
*	BA	BALL ACCELERATOR- Thermal protection activated or accelerator cable not connected.	<ol style="list-style-type: none"> 1. Ball or pin stuck in accelerator clear obstruction. 2. Accelerator(AS) cable broken or disconnected. Check accelerator cable.



NOTE: Nexgen Electronics displays either Standard Code or Extended Code

* = Nexgen Electronics only

Problem/Cause /Corrective Action

PROBLEM	CAUSE	CORRECTIVE ACTION
1. Ball does not return.	1. Pins in accelerator. 2. Adjoining machine transport band binding ball door. 3. Ball doors do not move freely. 4. Pin stuck between transport band and ball cushion board. 5. Transport band drive belt broken, or slipping. 6. Broken transport band. 7. Faulty ball door solenoid. 8. Accelerator flat belt. 9. Ball fell off transition track.	1. Remove pins. 2. Adjust transport band. 3. Adjust or lubricate ball door. 4. Adjust ball cushion. 5. Replace or weld belt. See Servicing section. 6. Replace transport band. 7. Replace or adjust solenoid. 8. Tighten or replace belt as required. 9. Remove capping, retrieve ball and clear any obstruction on or near the track.
2. Ball door blocked by pins.	1. Ball cushion not adjusted properly. 2. Loose transport band. 3. Loose transport band drive belt. 4. Worn transport band. 5. Ball door not adjusted properly.	1. Adjust ball cushion. 2. Tighten transport band. 3. Cut off a piece and weld back together. 4. Replace transport band. 5. Adjust ball door.

PROBLEM	CAUSE	CORRECTIVE ACTION
<p>3. Pinsetter does not turn on properly.</p>	<ol style="list-style-type: none"> 1. TS1 or TS2 safety switch actuated. 2. Photocell not adjusted properly. 3. Faulty switch "A" or "SM". 4. Nexgen Controller main switch is off. The main power cable is unplugged, the mechanic's rear stop switch is not on. 5. Main house breaker box (if two pinsetters are down.) 6. Incorrect line voltage. 7. Pinsetter set to wrong mode. 	<ol style="list-style-type: none"> 1. Determine cause of trouble, repair, and restart machine. 2. Adjust ball detector. 3. Replace or adjust switch. 4. Turn on all switches. Check plugs and connectors. 5. Reset breakers. 6. Have line voltage corrected. 7. Set machine to proper mode
<p>4. Pinsetter cycles independently. (One cycle only.)</p> <p>CAUTION: Camera flash may cause pinsetter to cycle independantly.</p>	<ol style="list-style-type: none"> 1. Photocell not adjusted properly. 2. Loose reflector mounting. 3. Faulty power supply connections. 4. Nexgen mode setting is wrong. 5. Incoming 3 phase power surge, or is out of balance 	<ol style="list-style-type: none"> 1. Check for proper hardware and adjust. 2. Remount with proper hardware and adjust. 3. Tighten connections. 4. Place pinsetter mode in 10-pin mode (stand alone pinsetters) or in (Frmwrx) mode if attached to the Frameworx scorer. 5. As a last resort, consult a qualified electrician to help identify the surge and correct the problem.

PROBLEM	CAUSE	CORRECTIVE ACTION
5. Pinsetter cycles continuously.	<ol style="list-style-type: none"> 1. "SET" switch on mechanic's rear control box stuck or faulty. 2. Bowler's reset button stuck or cable is shorted. 	<ol style="list-style-type: none"> 1. Replace or repair as needed. 2. Check reset button, check cable, repair or replace.
6a. No pinsetter motor will operate.	<ol style="list-style-type: none"> 1. Safety switches TS1 or TS2 actuated. 2. Manager's remote control unit not turned on. (Stand Alone pinsetters only) 3. Faulty Nexgen H.V. PCB 	<ol style="list-style-type: none"> 1. Determine cause of trouble, repair, and restart machine. 2. Turn on switch. 3. Relplace Nexgen H.V. PCB.
6b. Individual motor does not operate.	<ol style="list-style-type: none"> 1. Main house breaker box or faulty power supply connections. 2. Faulty cables. 3. Damaged motor. 4. All above checked faulty Nexgen CPU or H.V. PCB. 	<ol style="list-style-type: none"> 1. Check breaker box and tighten power connections. 2. Check for shorted or loose pins, continuity, faulty connectors. Repair or replace. 3. Replace motor. 4. Power down and exchange faulty box.
7. Pinsetter fails to sweep.	<ol style="list-style-type: none"> 1. Pin under or on top of sweep. 2. Faulty switch G, OOR or SM. 3. Sweep wagon guide rollers not adjusted properly. 4. Broken or worn sweep drive belt. 	<ol style="list-style-type: none"> 1. Remove pin. 2. Adjust or replace switch. 3. Adjust guide rollers. 4. Replace belt.

PROBLEM	CAUSE	CORRECTIVE ACTION
8. Sweep motor runs continuously.	<ol style="list-style-type: none"> 1. Sweep motor brake defective. 2. Faulty switch SM. 3. All above checked. Faulty electronic assemblies or Nexgen CPU or H.V. PCB. 	<ol style="list-style-type: none"> 1. Adjust motor. 2. Adjust or replace switch. 3. Power down and exchange faulty box. or PCBs.
9. Pins jammed in distributor.	<ol style="list-style-type: none"> 1. Oil/grease on pins or belts. 2. Belts not tensioned properly, dragging in rails. 3. Distributor belts off or broken. 4. Broken pin slider in pin station. 5. Front distributor and idler gears do not have proper tooth gap or belts are not tensioned properly. 6. Belts not level on distributor or riding in top of belt rail. 	<ol style="list-style-type: none"> 1. Clean with all-purpose cleaner. 2. Remove section of belt and weld back together, lubricate belt 3. Replace or weld belt. 4. Replace as required. 5. Adjust for proper tooth gap. Replace or weld belt for proper tension. 6. Adjust pulleys so the belts ride properly in rail
10. Shark switch not flipping to load pins on the right pin side.	<ol style="list-style-type: none"> 1. Shark solenoid. 2. Pin count switch not closing. 	<ol style="list-style-type: none"> 1. Change solenoid or make sure solenoid is plugged in. 2. Check wiring to Nexgen Controller. Adjust switch, replace or repair switch or wiring.
11. Incorrect score.	<ol style="list-style-type: none"> 1. Pin detect switch. 2. Pin detection height is not correct. 3. Angle "1" or "2" not adjusted 4. Broken pin detector plate. 	<ol style="list-style-type: none"> 1. Switch actuator or switch is sticking. 2. Adjust stroke limiter. 3. Adjust angle "1" or "2". 4. Replace pin detector plate.

PROBLEM	CAUSE	CORRECTIVE ACTION
12. Pins jammed in overflow chute.	1. Dirty pins and/or dirt built up in pin overflow chute.	1. Clean pins with pin cleaner and/or clean chute with all purpose cleaner.
13. Pin elevator turns continuously.	1. Faulty Nexgen CPU or H.V. PCB .	1. Replace Nexgen CPU or H.V. PCB.
14. Pinsetter runs for six seconds then turns off.	1. Elevator switch defective. 2. Pin jam in elevator. 3. Faulty Nexgen CPU PCB .	1. Replace or adjust switch. 2. Remove pins. 3. Replace faulty electronic assembly.
15. Table motor runs continuously.	1. Faulty switch A, or cam misadjusted. 2. Missing screw on switch actuator. 3. Faulty Nexgen CPU or H.V. PCB .	1. Adjust or replace actuator. 2. Replace screw or switch actuator. cam as required. 3. Replace faulty electronic assembly.
16. Table sets pins but sweep stays down.	1. Sweep not fully forward. 2. Sweep attenuator stop screw not adjusted properly. 3. Sweep pick up chain not adjusted to proper length. 4. Sweep contacting gutter adapter blocks. 5. Sweep release assembly bound. 6. Table motor running backwards. 7. Nexgen controller set table delay set to "N"	1. Move sweep manually by turning middle pulley. 2. Adjust stop screw. 3. Adjust to proper length using screw on end of chain. 4. Adjust sweep board. 5. Free bind in sweep release assembly. 6. Re-wire motor for correct rotaion. 7. Set table delay to "Y".

PROBLEM	CAUSE	CORRECTIVE ACTION
17. Full table lowers but does not release all pins.	<ol style="list-style-type: none"> 1. Setting table not adjusted for proper height. 2. Faulty pin holder solenoids or pin holder microswitches. 3. Faulty electrical connections. 	<ol style="list-style-type: none"> 1. Adjust setting table. 2. Repair or replace faulty solenoid or microswitch. 3. Repair connections.
18. Table does not set full rack of pins.	<ol style="list-style-type: none"> 1. Faulty pin holder switches or switch finger. 2. Pin detectors not allowed free movement. 3. Faulty pin holder solenoid(s), or cable harness's. 4. Faulty stroke limiter solenoid. 	<ol style="list-style-type: none"> 1. Replace switch or switch finger. 2. Determine cause and adjust as required. 3. Replace solenoid(s). Check harness cable and connectors. 4. Check stroke limiter solenoid and wiring.
19. Table makes long stroke only.	<ol style="list-style-type: none"> 1. Stroke limiter not adjusted properly. 2. Faulty solenoid. 3. Faulty cable. 	<ol style="list-style-type: none"> 1. Adjust stroke limiter. 2. Replace or adjust solenoid as required. 3. Repair or replace cable.
20. Table makes short stroke only.	<ol style="list-style-type: none"> 1. Faulty pin holder switch. 2. Faulty stroke limiter solenoid. 3. Pin holder shaft latch not adjusted properly. 4. Faulty cable. 	<ol style="list-style-type: none"> 1. Replace switch or adjust . 2. Replace solenoid as required. 3. Adjust pin holder shaft latch. 4. Repair or replace cable.

PROBLEM	CAUSE	CORRECTIVE ACTION
<p>21. Table does not set pins after second ball or table is not full.</p>	<ol style="list-style-type: none"> 1. Pin jam in distributor. 2. Bent pin distributor guide tabs. 3. Faulty pin holder solenoid. 4. Table not adjusted to proper height. 5. Broken pin station on distributor. 6. Not enough pins in machine. 7. Broken pin holder electrical connections. 8. Faulty electronics. 9. Faulty pin holder switch or switch actuator. 	<ol style="list-style-type: none"> 1. Remove jam. 2. Adjust as required. 3. Replace solenoid as required. 4. Adjust table. 5. Replace as required. 6. Be certain 22 pins are in machine. 7. Repair connections. 8. Change the Nexgen CPU PCB. 9. Repair pin holder switch or switch actuator.
<p>22. Table is full but does not lower.</p>	<ol style="list-style-type: none"> 1. Faulty pinholder microswitches. 2. CPU fuse is blown (Nexgen). 3. Faulty Nexgen CPU or H.V. PCB . 4. Pin holder switch actuator sticking. 5. Pin detector plate stuck up. 6. Pin holder out of position detector plate hangs up. 	<ol style="list-style-type: none"> 1. Adjust or replace microswitches. 2. Replace fuse 3. Replace faulty box or PCB. 4. Repair 5. Check clearance between plate and pin holders. 6. Adjust pin holder assembly.
<p>23. Pins wobble or fall over while being set.</p>	<ol style="list-style-type: none"> 1. Pin holders not plumb. 2. Table not adjusted for proper height. 3. Table is not completely level. 4. Faulty table spring. 5. Pin bottoms are worn. 	<ol style="list-style-type: none"> 1. Make sure pin holders are vertical. 2. Adjust table height. 3. Level table. 4. Replace spring. 5. Scrap or repair worn pins.

PROBLEM	CAUSE	CORRECTIVE ACTION
24. Pin holder double loads.	<ol style="list-style-type: none"> 1. Pin holder switch sticks. 2. Switch actuator sticks. 3. Pin detector plate stuck up. 4. Pin not seated in pin holder. 5. Pin holder switch finger cracked. 6. Broken wires or loose pin holder switch connectors. 7. Bad Nexgen PCB or loose connection 	<ol style="list-style-type: none"> 1. Replace Switch 2. Lube, check switch actuator. 3. Check detector plate pins, pin holder location in relation to other pin holders. 4. Check pin holder position and table height. 5. Replace switch finger. 6. Check table harness and switch wires. 7. Check connections and replace Nexgen PCB as needed.
25. Spotting tongs do not close - table does not pick up standing pins.	<ol style="list-style-type: none"> 1. Tong drive clutch dirty or lubricated. 2. Tong drive shaft clutch not adjusted to proper tension. 3. Faulty spotting tong solenoid. 4. Faulty spotting tong switch or out-of-range switch. 5. Spotting tongs are obstructed. 6. Faulty Nexgen CPU. 7. Stroke limiter Assembly set too high (score strike) 	<ol style="list-style-type: none"> 1. Remove all lubricants and dirt from clutch face. 2. Adjust tension. 3. Change solenoid, check cable. 4. Adjust or replace switches as required. 5. Clear obstruction. 6. Change the Nexgen CPU PCB. 7. Adjust stroke limiter.
26. Pins drop from tongs.	<ol style="list-style-type: none"> 1. Missing or worn tong insert. 2. Broken tong. 3. Tong out of time with other tongs 4. Spotting tong drive shaft clutch not adjusted to proper tension. 5. Table gears obstructed. 6. Faulty cables. 7. Switches B or D are faulty or not adjusted properly. 	<ol style="list-style-type: none"> 1. Replace tong insert. 2. Replace broken tong. 3. Check for proper movement of tongs. Realign tong an drive gear. 4. Adjust for proper tension. 5. Clear obstruction. 6. Repair or replace cables. 7. Adjust switch for gap. Replace if switch is faulty.
27. Ball accelerator belt not centering.	<ol style="list-style-type: none"> 1. Front pulley not bolted correctly or front yoke is loose (parts incorrectly installed.) 	<ol style="list-style-type: none"> 1. Loosen bolts on yoke and operate accelerator. Align both yoke halves until the belt runs true. Tighten bolts.

PROBLEM	CAUSE	CORRECTIVE ACTION
28. Pinsetter operates erratically.	<ol style="list-style-type: none"> 1. Faulty switch A. 2. Loose or faulty cables and connections. 3. Switches B, C, or D, (on switch cluster) or switch OOR (on setting table guide tower) not adjusted properly. 4. Setting table height not adjusted properly. 5. Belts not tensioned properly. 6. Damaged pinsetter parts. 7. Pin holder latch not adjusted properly. 8. Release levers damaged or not adjusted properly. 9. Switch adjustment faulty or faulty assembly. 10. Photocell adjustment not correct. 11. Faulty motor rotation. 12. Main power supply on too low a voltage. 13. Faulty switch cluster cable, trouble light, and ball door cable. 14. Faulty, ball lift cable, foul & optical trigger cable. 15. After above checked, electronics. 	<ol style="list-style-type: none"> 1. Replace switch. 2. Use solenoid and cable checker. 3. Adjust switches or cam for B, C, or D and OOR. 4. Adjust table height. 5. Check all belts for proper tension. Replace or weld belts as required. 6. Repair or replace parts. 7. Adjust latch. 8. Replace levers or adjust as required. 9. Check switch mountings. Check adjustments. 10. Adjust ball detect. 11. Determine proper rotation and adjust to proper phase status. 12. Use proper line voltage. 13. Substitute spare cable (to check). 14. Check cables and repair or exchange. 15. Change the Nexgen CPU or H.V. PCB

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