bowlingo
Owner's Manual

bowlingo Wood Lanes
Package types BP-2971 and BP-2972

bowlingo Glow-in-the-Dark Lanes
Package types BP-2981 and BP-2982

May 2000
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A MENDES DIVISION

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Introduction to bowlingo

Mendes is proud to introduce you to your bowlingo machine. This equipment was designed and manufactured by Mendes Corporation of Sainte-Foy, Quebec, Canada and was sold to you through an authorised Mendes representative. Mendes is a leading manufacturer in bowling and entertainment products. We are proud to provide you with the finest products and equipment in the industry.

The Quality Control Department at Mendes has taken very good care to ship you a product that was completely adjusted, tested and checked before shipment. Your bowlingo machines are to be custom installed by a trained Mendes authorised technician. He/she will provide you with recommended products for use with your bowlingo and instruct you in the proper operating and maintenance techniques.

What makes up the bowlingo system

The structure of the bowlingo system is based on a wooden truss foundation with prefabricated lanes. The lane surface is of a hard-wearing synthetic material, designed to withstand the most extreme operating conditions and providing the operator with the minimum amount of maintenance.

Suspended above the bowlingo lanes are the scoring display modules which control the display on each lane.

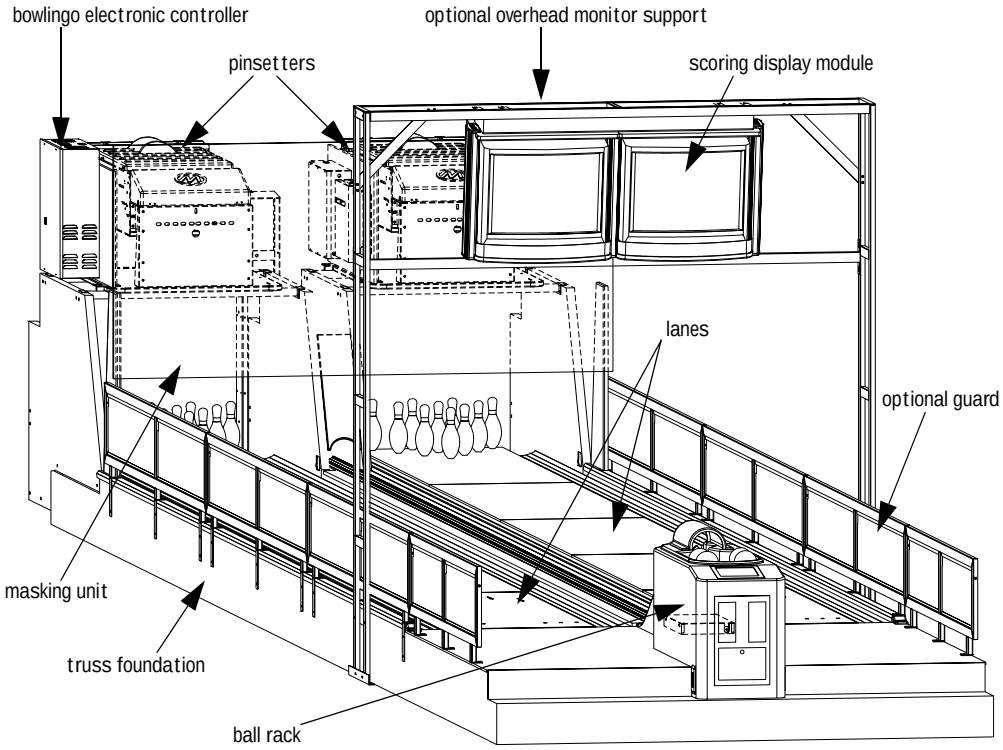
Located at the furthest end of the playing surface is the masking unit used to hide the machines. The graphic panels inserted into these units may vary from installation to installation and even lane to lane. With a multitude of graphic panels available, every decor has its match.

Located at the rear of the unit, behind the masking units, are the pinsetters which function in conjunction with the coin mechanism; activated by the introduction of the correct amount of money.

Note *The pinsetters are supplied to operate on 240 volts, 50/60 cycles, single phase. The electrical supply lines must conform to all electrical codes and it is the responsibility of the proprietor to supply power to all the electrical components necessary for the normal function of the pinsetters.*

Warning *High voltage is present in the pinsetter power box. The main circuit breakers must always be shut off or the twist lock plug disconnected prior to removing the power box cover.*

Identifying Your bowlingo System's Components



Understanding how the game is played

bowlingo is a coin-operated tenpin bowling system. Smaller than conventional tenpin bowling, bowlingo was developed to appeal to families, novices and experienced players alike. Special footwear is not required and the coin operation ensures a steady flow of players.

A game of bowlingo is made up of ten frames. At the beginning of each frame, ten pins are set in a triangular form at the far end of the bowlingo lane, and the bowler rolls a maximum of two balls per frame at the pins trying to knock down as many as possible. If all the pins are knocked down with the first ball it is called a strike. The ball is returned to the bowler and ten pins are then set up for the next frame.

If the first ball does not knock down all the pins, the ball is returned to the bowler and the standing pins are left for the bowler's second roll of the frame. The deadwood is removed from the playing area so as not to interfere with the game. The bowler then rolls the ball a second time in order to attempt to knock down the remaining pins. Regardless of the number of pins left standing after the delivery of the second ball, the ball is returned to the bowler and ten pins are set up for the next frame.

Understanding how bowlingo keeps score

bowlingo uses the same scoring method as regular bowling. A game of bowlingo consists of 10 frames. A maximum of 2 deliveries is made in each frame except the 10th. In the 10th frame, if a strike is rolled, two bonus balls are awarded. So it is possible to roll 3 strikes in the 10th frame. If a spare is rolled in the 10th frame, one bonus ball is awarded.

Strike. If a bowler knocks down all 10 pins with his first ball, it is a strike and is marked with an X. The next ball delivered begins a new frame. When a bowler rolls a strike, he is credited with a count of 10 in that frame plus the total pinfall on his next two deliveries.

Spare. If a bowler knocks down all the pins with 2 deliveries in a frame, he has a spare. A spare is marked with a /. When a bowler makes a spare he is credited with a count of 10 in that frame plus the total pinfall on his next delivery.

About this Book

Thank you for selecting bowlingo for your fun and entertainment. Your bowlingo incorporates many of the latest advances in technology and is very easy to maintain for many years of enjoyment and profit.

This publication helps you become familiar with your bowlingo equipment and its many features. It describes how to install, configure, operate, and maintain your machine. In the unlikely event you experience problems, you can also find helpful troubleshooting information as well as instructions for obtaining service and parts.

This book is organized as follows:

- Chapter 1, "bowlingo Fundamentals," provides an overview of your bowlingo machine. After reading this chapter you should be able to identify the major components of your bowlingo and understand the basic principles of the machine's operation.
- Chapter 2, "Setting Up/Operating Your bowlingo," provides step-by-step instructions for setting up and configuring your equipment in order to meet your needs and requirements along with instructions for the day-to-day use and management of your equipment.
- Chapter 3, "Taking Care of Your bowlingo," contains information about the proper handling and care of your equipment.
- Chapter 4, "Solving Problems," contains information that will help you identify and correct problems that might arise as you use your equipment. A description of the wide variety of resources available from Mendes to assist you in the use of your equipment is also included along with instructions on how to obtain additional information about Mendes products.
- Chapter 5, "Wiring Diagrams," provides you with all necessary wiring and electronic information in easy to comprehend diagrams for your reordering and servicing convenience.
- Chapter 6, "bowlingo Parts Catalog," provides you with a complete breakdown of all your equipment's parts in exploded views for your reordering and servicing convenience.
- Equipment warranty information, trademark acknowledgements, electronic emission notices, and other legal and general notices for your equipment may be found in Appendix A.
- Finally, Appendix B contains a form for recording information about your equipment, which can be helpful if you decide to install any additional options, or if you ever need to have your equipment serviced.

Safety Information

Use of common sense and industry experience are key factors which one should utilize whenever operating electromechanical equipment. As with all machinery, there is an element of risk if the rules of safety are disregarded. Training in the operation of this equipment is available. Schools in the equipment's use and operation are held on a regular basis. It is the responsibility of the attendant to provide his or her own travel, lodging and school expenses. Anyone interested in attending a factory training school should contact their local Mendes sales or service representative.

1. **Always open the circuit breaker or disconnect the power plug from the electrical box before looking for, and clearing, any problem.**
2. **Always reach over and around the equipment assemblies, never through or between the components.**
3. **Avoid the use of cleaners that are toxic.**
4. **Immediately wipe up any oil or liquids that have spilled to prevent slipping.**
5. **Store oily rags and any other combustibles in a fireproof container.**
6. **The mechanic / maintenance person must teach all personnel who will work on the equipment enough about the equipment to prevent accidents through ignorance.**
7. **Under no circumstances allow an unqualified person to work on the equipment.**
8. **Use the right tool for each job to prevent injury to yourself and to the equipment. Remove all tools from the equipment before turning it on.**
9. **Wear the proper clothing when working on the equipment. Do not wear neckties or loose clothing that may be caught by the equipment. Wear trousers without cuffs to prevent tripping. Wear shoes with safety, non-slip soles.**
10. **When more than one person is working on the equipment, never turn on the equipment without checking to see if everyone is clear of the equipment.**
11. **When the safety guards are removed from the equipment, be extra cautious when the equipment is turned on. Replace the guards immediately when the work is completed.**

Chapter 1
bowlingo Fundamentals

Chapter Overview

This chapter provides an overview of your bowlingo machine. After reading this chapter you should be able to identify the major components of your bowlingo and understand the basic principles of the machine's operation.

Major Components and Assemblies

There are a number of different assemblies which make up your bowlingo machine, and each performs its own function.

When the unit is turned on, the pins are set on the lane and the pinsetter is placed in a ball one situation. Let's begin by taking a look at operation of your bowlingo as it goes through a game. With ten pins set on the lane, the bowler rolls the first ball.

Ball detector

As the ball rolls down the lane, it will cross (cut) the ball detector's infrared light beam. The ball detector's transmitter is placed at the bottom of the kickbacks. On the opposite side of the lane, facing the transmitter, is a reflector which returns the infra red light beam to the ball detector's transmitter. Basically the ball detector has only one function, it triggers or starts the bowlingo's various operations when its signal is cut by a passing ball. It is important, then, that the ball detector be sensitive enough so that regardless of the speed of the passing ball it is able to detect it.

Pit

Located at the rear of each lane's pin deck is the pit which is slanted to the inside of the pair of lanes in order to direct the ball to the ball elevator. Above the pit, the cushion absorbs the impact of the bowling ball.

As the ball leaves the playing area of the lane, its forward momentum carries it across the pit until it strikes the pit cushion, which is suspended across the rear of the pit. Both the ball and the knocked down pins come to rest in the pit.

From the pit, the ball needs to be returned to the bowler. So far its forward motion has been stopped by the pit cushion and it has rolled into the trough located behind the pit.

Ball elevator

To return the ball to the bowler, the ball moves through the ball elevator. The ball elevator is fastened to the floor between each pair of pinsetters. Using a simple conveyor system, the ball is raised to a level above the pinsetters and then propelled by shear gravity to the front ball return rack located at the bowler's end of the lane.

The ball lift's conveyor is powered by a ½ hp, capacitor start electric motor that is mounted on the motor support bracket at the top of the ball lift's frame. The power generated by the motor is relayed to the conveyor's chains through the pulley on the motor shaft, the drive belt, the drive pulley, and the drive wheel. The motor support bracket is adjustable to obtain constant pressure on the drive belt.

Ball flow

We have just seen the normal route a ball travels from the time it leaves the bowler's hand until it is returned to him. This is called the ball flow.

Pinsetter

Contrary to the ball being removed from the pit area and returned to the bowler, the pins remain at the rear and are re-spotted for the next delivery. The equipment used to control the flow of pins is called a pinsetter.

Each time a bowler rolls a ball, the pinsetter goes through a specific sequence of operations. This sequence of operations is called the pinsetter cycle.

The various operations of the pinsetter are guided by the pinsetter electronics. The pinsetter electronics distribute the electrical power to the various motors and components as needed. Specifically, the pinsetter electronics activate the magnetic clutches which transmit power to the drawbar in order to raise or lower the pins to the playing surface. The pinsetter electronics can be considered the brains of the pinsetter. From the time a bowler has rolled the first ball, the electronics must be able to direct the pinsetter through its different combinations of operations.

Each pair of pinsetters has an electric power box and a pinsetter control box which are used in conjunction with the coin mechanism activated by the introduction of the correct amount of money.

Note *The ME-90 pinsetter is supplied to operate on 240 volts, 50/60 cycles, single phase. The electrical supply lines must conform to all electrical codes and it is the responsibility of the proprietor to supply power to all the electrical components necessary for the normal function of the pinsetters.*

ME-90 Power Box. A power supply line is run from the main service circuit breaker distribution panel to a junction box mounted above each pair of pinsetters. From each junction box, a three conductor drop cord (2-wires plus an insulated ground), terminating in a twist lock connector, is plugged into the power box of each pair of pinsetters to supply the necessary electrical power.

Attached to a panel which is mounted between each pair of pinsetters is the electric power box used to supply the necessary electrical power to all components on a pair of pinsetters. Unlike conventional electrical circuits, which are controlled through a multitude of microswitches, all opening and closing of electrical circuits on the ME-90 pinsetter and its accessories is done through the pinsetter control box using software and optical reading devices (sensors and transmitters/receivers).

An on-off switch is located on the power box and is used to manually open and close the thermal overload circuit breaker.

Any time the electrical power is cut (power failure, opening of circuit breaker, etc.) to the power box, a relay is opened which ensures that all pinsetters do not start when the electrical power is restored. The START button located below the circuit breaker on the power box must be depressed in order to close the relay and restore all electrical components on the pair of lanes.

Warning *High voltage is present in the pinsetter power box. The main circuit breakers must always be shut off or the twist lock plug disconnected prior to removing the power box cover.*

Pinsetter Control Box. Mounted to the right of the power box is the pinsetter control box which receives software commands from the solenoid/opto control box and/or the master device which controls the pair of lanes. Input signals originate from the different optical devices located on the pinsetter. The pinsetter control box, through its different circuit boards, analyzes the input signals and sends the appropriate output signals to the pinsetter's components. The pinsetter control box keeps both pinsetters under constant surveillance, turning on and off components as necessary.

The pinsetter control box (SB-6500-90) controls both ME-90 pinsetters and their functions. Inside the pinsetter control box are two printed circuit boards, the central processing unit (E-MD3-85) and the input/output circuit board (E-MD3-80).

Located on the central processing circuit board (E-MD3-85) are the EPROM's and DIP switch banks used to control the board's functions. Each and every electronic component communicates in one way or another with the central processing unit, it is the brains behind the brawn of the ME-90 Pinsetter.

Pin Stabilizer. Mounted below the pinsetter is the stabilizer assembly which absorbs most of the vibration and then stabilizes each pin before its descent to the lane. The stabilizer assembly is a very important part of the pinsetter. Without it, the pins would have to be picked up much gentler than they are and the untangling mode would lose its powerful effect. Another important factor is the speed and accuracy which is obtained through the stabilizer. Each pin is spotted according to its position in the stabilizer, thus allowing for consistent pin spotting cycle after cycle.

Main Motor. Located at the rear of each pinsetter is a ½hp main motor. A 10/1 double shaft reducer reduces the speed of the main motor which uses two magnetic clutches to perform the raising and lowering actions. Once the pinsetter is turned on, the main motor runs continuously.

The two magnetic clutches, one for raising and one for lowering, actually couple the motor reducer to the main shaft which carries the drawbar to its desired position.

The pinsetter control box takes care of the time of raising and lowering, stabilizing pause, braking action, untangle routine, and all other pinsetter movements by activating and disengaging the magnetic clutches as needed. All of the different delays are controlled by the user through DIP switches located inside the pinsetter control box.

Drawbar. Attached to both chains on the sides of the pinsetter is the drawbar. The drawbar is made up of sheaf assemblies (one for each pin) mounted on a shaft. Each sheaf pulls its corresponding pin's string when the drawbar is pulled to the rear of the machine by the chains.

The shield is powered by the drawbar's forward and backward movements. When the drawbar is pulled to the rear of the pinsetter, the shield is lowered. When the drawbar returns to the front of the pinsetter, the shield is raised.

The strings themselves are the concept of the machine. Each pin has a fourteen-foot length of string attached to its head. A four-foot length of this same string is wound on each reel and storage assembly to be used as spare string. In other words, the pinsetter needs ten feet of string to operate normally.

With a well adjusted pinsetter, the only point of wear on the string is immediately above the top of the pin. When it wears, it may be merely pulled through the pin, the worn out part cut (six inches), and the string refastened. Keeping in mind the four-foot length of spare string and the fact that six inches of string is cut. Each string may be repaired eight times before having to replace the complete length of string (fourteen feet).

Note *The ME-90 Pinsetter's good operation is directly related to the proper length of the strings. Any variation in the length of the strings caused by humidity or stretching is sufficient to disturb the system.*

Solenoid/Opto Control Box. Mounted at the front of each pinsetter is the solenoid/opto control box (SB-2131) and the pin detection wheels (one for each pin). These wheels are activated (rotated) by their corresponding strings when a pin is knocked down. Each wheel has holes in it and the wheel itself rotates through an optical sensor (SB-ECIL-325-PD). As the wheel turns, its optical sensor counts the number of holes which pass through it. This information is transmitted to the pinsetter control box. The pinsetter control box then determines which pins, if any, have been knocked down.

The solenoid/opto control box is connected to the pinsetter control box along with the individual pin detectors and brake solenoids. The sensitivity of the pin detection optical sensors is determined through a dip switch setting inside the pinsetter control box itself.

Pin Brakes. Mounted behind the pin detectors and below the reel and storage assemblies are the pin brakes. There is one brake assembly for each pin. The brake assembly has three main parts, a cam, a solenoid and a brake-shoe. When a pin is determined as fell by the pinsetter control box, its solenoid activates the cam which in turn secures the string holding the pin up while the drawbar descends the remaining pins to the lane.

Optical Reading Devices. Each ME-90 pinsetter uses a total of fourteen (14) different optical reading devices in order to send signals directly to the pinsetter control box. These devices come in the form of optical sensors and transmitters with each one equipped with a partner device such as an actuator or reflector.

- **Ball detector:** With the pinsetter in a ready to bowl position, the ball detector allows for the detection of the ball on its way down the lane. Once a ball is detected, the reading pause commences.

The ball detector must be operational in order for the pinsetter to function. All commands to and from the pinsetter start with the detection of a ball.

- **Pin detectors:** There is one PD optical sensor (SB-ECIL-325-PD) for each bowling pin. When a pin is knocked down, its string rotates the wheel (9103058) through the PD, indicating to the pinsetter control box that the pin has been knocked down. Once the reading pause expires, the PD optical sensors are placed in an idle mode until the next ball detection and the magnetic clutch used to raise the drawbar is activated.
- **Landing signal:** When pins are in the stabilizers and the drawbar has completed its cycle, the drawbar's left adjustment plate (9102012) passes through the LS optical sensor (SB-ECIL-325-FS) sending a positive signal to the pinsetter control box. The magnetic clutch used to raise the drawbar is disengaged and the stabilizing pause commences.
- **Pin brakes:** Once the stabilizing pause has expired, the magnetic clutch used to lower the drawbar is activated. The drawbar's left adjustment plate passes through the PB optical sensor (SB-ECIL-325-FS) sending a positive signal to the pinsetter control box. The necessary pin brakes are activated.
- **Position 0:** Once the pins have been deposited on the lane, the drawbar's left adjustment plate passes through the PO optical sensor (SB-ECIL-325-FS) sending a positive signal to the pinsetter control box. The magnetic clutch used to lower the drawbar is disengaged and the pinsetter is now ready to bowl.

Ball rack

Located at the player's end of your bowlingo is the ball rack which, besides acting as a storage unit for the bowlingo balls, contains important components which control the functioning of your bowlingo. These components are:

- bowlingo control box (SB-0114-09)
- power box (SB-0114-08)
- audio speakers
- coin-op mechanisms
- ticket dispensers
- meters

The main component is, of course, the bowlingo control box. Made up principally of two printed circuit boards, the bowlingo control box may be called the "brains" of your bowlingo system.

The main component in the bowlingo control box is the E-MD3-93 PCB. It contains the central processing unit (CPU) and DIP switches which actually run the pair of lanes. Also found on this board are 6 push buttons which are used for various functions.

The second board located in the bowlingo control box is the power supply circuit board (E-MD3-94). This board is used to distribute the necessary electrical power to the various electronic components including the E-MD3-93 PCB.

Refer to Chapter 2, "Setting Up/Operating Your bowlingo," for more details on the ball rack's components.

Overhead scoring display unit

Suspended above the bowlingo lanes are the scoring display modules which are controlled by the scoring control box located at the rear with the pinsetters. Located inside the scoring control box are the printed circuit boards used to control the display of each pair of lanes.

Understanding how the System Works

When the pinsetter is turned on, the pins are set on the lane and the pinsetter is placed in a ball one situation. The bowler rolls the ball which passes through the ball detector's infrared beam of light thus sending a signal to the pinsetter control box. The ball knocks down some pins which fall into the pit. The floor of the pit is angled so that the ball moves toward the rear ball lift.

Each pin has a string attached to its head which activates its pin detection wheel when the pin is knocked down. The pin detection wheel in turn, advises the pinsetter control box that the pin has been knocked down.

After a pre-determined delay, the pinsetter control box activates a magnetic clutch which couples the motor reducer to the main shaft and pulls the drawbar to the rear of the pinsetter. The shield is lowered as the drawbar picks up the pins from the pit and secures them in the stabilizer. The drawbar then activates the optical sensor at the rear of the machine, which indicates to the pinsetter control box that the drawbar is at the end of its cycle and that no strings are tangled. At this point, the pinsetter control box will disengage the magnetic clutch.

Note *If the strings are tangled, the optical sensor at the rear of the machine will not be activated. This will order the pinsetter control box to activate the pinsetter's untangling routine, which will cause the pinsetter to lower and raise the pins in different manners until the strings are untangled. The number of attempts made by the pinsetter is controlled through a DIP switch setting inside the pinsetter control box itself.*

Pinsetter cycles

After a slight pause, the drawbar will commence its downward cycle aided by a second magnetic clutch which is activated once again through the pinsetter control box. The ME-90 Pinsetter will then perform one of two different types of cycles:

- **Part set:** the pinsetter sets on the lane only the pins which weren't knocked down, the shield raises and the lane is ready for the next ball. If a part set is necessary, the pinsetter control box activates each individual brake for each pin which was detected as knocked down.
- **Full set:** the pinsetter spots a full set of pins on the lane, the shield raises and the lane is ready for the next frame. If a full set is necessary, none of the brakes are activated.

The pinsetter must be able to determine the different pinsetter reactions based on the rules of bowling and set up by delivery of the ball. After the bowler delivers the ball, the ball detector sends a signal to the pinsetter control box. The pinsetter control box will determine whether there are pins standing and what type of cycle to perform. This process is called reading and according to all the information which the pinsetter control box analyzes, the pinsetter will cycle in one of the two possible manners.

- If the bowler rolls the first ball down the lane and knocks down all the pins (strike), the pin detection wheels all rotate through their corresponding optical sensors and when the pinsetter control box takes its reading it will find no pins standing. At this point, the pinsetter control box has the pinsetter perform a full set.
- If the bowler rolls the first ball down the lane and knocks down some pins but not all, the pin detection wheels again rotate through their corresponding optical sensors and the pinsetter control box takes its reading to find some pins still standing. At this point, the pinsetter control box has the pinsetter perform a part set.
- Whenever the bowler delivers a second ball, regardless of the number of pins knocked down, the pinsetter control box has the pinsetter perform a full set.

Chapter 2
Setting Up/Operating Your bowlingo

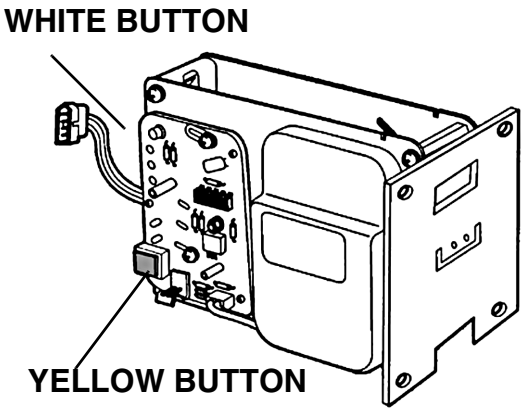
Chapter Overview

This chapter provides step-by-step instructions for setting up and configuring your equipment in order to meet your needs and requirements along with instructions for the day-to-day use and management of your equipment.

Procedure 2.1 Ticket Dispenser Setup

	Do this	*Comments*
1.	Install your redemption tickets in the storage bin.	
2.	Insert your tickets in the automatic feeder mechanism and push the YELLOW button to ease ticket loading.	

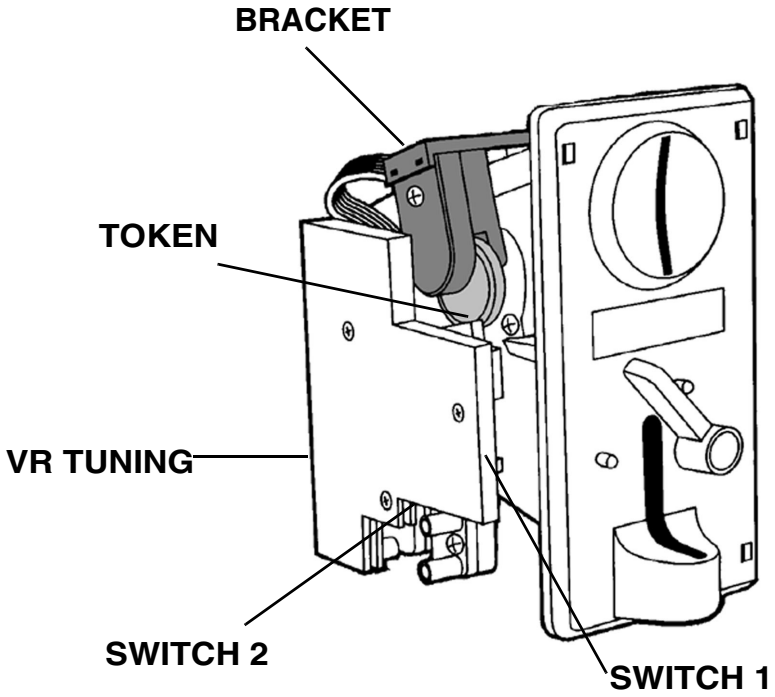
Figure 2.1 Redemption ticket dispenser



Procedure 2.2 Coin-op Mechanism Setup

	Do this	*Comments*
1.	Remove the factory installed plastic token from the coin sampling clamp.	Refer to Figure 2.2 on page 31.
2.	Slide the coin clamp backward and insert a right coin into the clamp slot then pinch the coin.	The mechanism will accept only that coin.
3.	Adjust the insert opening size to fit your coin's diameter. Do this by loosening the screw in the back side of the front panel.	This will prevent bigger, invalid coins from being inserted.
4.	Close and lock the cash drawer.	You may want to install a padlock on cash box for extra security.

Figure 2.2 Coin Mechanism



Coin Mechanism Specifications

- Voltage: DC 12V ± 20%
- Coin Diameter: 18mm - 31mm
- Coin thickness: 1.2mm - 3.0mm
- Temperature: -15°C - +75°C
- Pulse width – 100ms (SW2) – preset at factory
- Pulse mode – N.O. (SW1) – preset at factory
- Sensitivity – adjustable (VR tuning) – Turn clockwise (+) for slack coin selection and turn counter-clockwise (-) for strict coin selection.

bowlingo Control Box Button Functions

As mentioned in Chapter 1, the main component in the bowlingo control box is the E-MD3-93 PCB. It contains the central processing unit (CPU) and DIP switches which actually run the pair of lanes. Also found on this board are 6 push buttons which are used for various functions.

- **PB101** has only one function, that of resetting the control box, although there exist two different reset levels. Pressing PB101 by itself resets the CPU but restores the scores and game results just prior to the reset. This is called a partial reset. The second type of reset is done by pressing the same button, PB101, and pressing PB601 while the L601 LED is flashing. This results in the erasing of all game results and turning the pinsetters off. This is called a complete reset.

The remaining buttons react as follows:

- **PB601** - Used in conjunction with PB101 as explained above.

With old LED scoring display models of bowlingo, PB601 may be pressed during play to refresh the overhead display.

- **PB602** - Runs the board through an auto-test sequence. This function is only available when the system is not in play. The auto-test is usually used only under the guidance of a qualified Bowlingo technician.
- **PB603** - After having pressed PB101 and while the L601 LED is flashing, pressing PB603 will place the odd numbered pinsetter in its auto mode. The auto mode has the pinsetter spot pins in 100 various combinations. This function is useful during installation and after having changed the pinsetter's strings.
- **PB604** - Same function as PB603 for the even numbered pinsetter.
- **PB605** - When in play, pressing this button will send a full set (cycle the machine command) to the pinsetters. If both machines are in play it will send the command to the presently active pinsetter (active for the CPU), therefore you may have to press it a few times before it cycles the pinsetter you actually want to cycle.

DIP switch settings

The tables which follow describe the various DIP switch functions. The version in which the setting was introduced or changed is indicated in brackets following the description. The shaded areas indicate the preset factory settings.

Pinsetter control box DIP switches

Printed Circuit Board E-MD3-85

DS-101	Comprised of 4 different switches, this bank is used to configure general items. **DESCRIPTION**	**ON**	**OFF**
1.	These switches are not used and must be set to OFF. (version 1.00)		
2.			
3.	Used to determine whether or not the jumping ball routine is activated. When the jumping ball routine is activated, the pinsetter's electronics verify if any pins have been knocked down at regular intervals instead of waiting for a signal from the ball detector. This option is used to counter a ball which bounces over the ball detector. (version 2.40)	Active	Not Active
4.	Used to determine the electrical phase which the pinsetters are running on. This switch is set at the factory and verified during the installation and should never be changed. (version 2.30)	60Hz	50Hz

Pinsetter Control Box DIP Switches

Printed Circuit Board E-MD3-85

Pin Detection Sensitivity

These dip switches are used to set the pin detector wheels' sensitivity. In order for the pinsetter to detect a pin as fell a specific quantity of holes located on the pin detector wheels must pass through its corresponding optical sensor. Fifteen (15) different settings are possible. The more sensitive the setting, the less number of holes are necessary to count a pin as fell. You usually won't have to change these dip switches, but if you do, refer to the settings below. The first setting indicates the most sensitive reading possible while the last setting indicates the least sensitive reading possible.

(version 1.00)

DS301-1	DS301-2	DS301-3	DS301-4
OFF	ON	ON	ON
ON	OFF	ON	ON
OFF	OFF	ON	ON
ON	ON	OFF	ON
OFF	ON	OFF	ON
ON	OFF	OFF	ON
OFF	OFF	OFF	ON
ON	ON	ON	OFF
OFF	ON	ON	OFF
ON	OFF	ON	OFF
OFF	OFF	ON	OFF
ON	ON	OFF	OFF
OFF	ON	OFF	OFF
ON	OFF	OFF	OFF
OFF	OFF	OFF	OFF

Pinsetter Control Box DIP Switches

Printed Circuit Board E-MD3-85

Stabilizing Pause Time

Used to determine the pause time which the pins will be held in the UP position during a normal pinsetter cycle. If this stabilizing pause time is too short, pins may not be stable when beginning their trip down.

(version 1.00)

DS501-1	DS501-2	SETTING
OFF	OFF	1.75 seconds
ON	OFF	1.50 seconds
OFF	ON	1.25 seconds
ON	ON	1.00 second

Pin Reading Pause Time

Used to determine the reading pause time between the ball detection and pinsetter action. The shorter the pause, the quicker the pinsetter will be to re-spot pins (less time will be allotted for pins to fall which may cause erroneous pin fall detection).

(version 1.00)

DS501-3	DS501-4	DS501-5	SETTING
OFF	OFF	OFF	3.75 seconds
ON	OFF	OFF	3.50 seconds
OFF	ON	OFF	3.25 seconds
ON	ON	OFF	3.00 seconds
OFF	OFF	ON	2.75 seconds
ON	OFF	ON	2.50 seconds
OFF	ON	ON	2.25 seconds
ON	ON	ON	2.00 seconds

Drawbar Pull Time

Used to determine the drawbar pull time before activating the tangle routine. Once the Reading Pause Time has expired, the Pull Time enters into effect. If the pins are unable to attain the UP position after the Pull Time has expired, the untangle routine is activated. Once the pins are in the UP position, the Pull Time ends and the UP Pause Time begins.

(version 1.00)

DS501-6	DS501-7	SETTING
OFF	OFF	7.00 seconds
ON	OFF	6.00 seconds
OFF	ON	5.00 seconds
ON	ON	4.00 second

Maximum Untangle Attempts
DS501-8

Used to determine the maximum number of times the pinsetter will attempt to untangle strings once the pull time has expired. After the maximum number of attempts has expired, the pinsetter will place itself in idle mode and wait for manual assistance.

(version 3.00)

ON	OFF
5 attempts	10 attempts

Untangle Routine Pulling Time

Used to determine the duration of the pulling time for each attempt at untangling the strings when the pinsetter is in its tangle routine.

(version 1.00)

DS502-1	DS502-2	SETTING
OFF	OFF	5.00 seconds
ON	OFF	4.00 seconds
OFF	ON	3.00 seconds
ON	ON	2.00 second

Untangle Routine Pause Delay

Used to determine the duration of each pause between each attempt to untangle strings when the pinsetter is in its tangle mode.

(version 1.00)

DS502-3	DS502-4	SETTING
OFF	OFF	1.25 seconds
ON	OFF	1.00 second
OFF	ON	0.75 second
ON	ON	0.50 second

DS-502	DESCRIPTION	ON	OFF
5.	Used to determine whether the untangle routine will use constant patterns and force at each attempt to untangle strings or will use different patterns and pull different strings with different strength at each attempt to untangle strings. (version 1.00)	Different	Constant
6.	Used to determine the pinsetter's reaction when a gutter ball is thrown. (version 1.09)	Cycles	Does not cycle
7.	Used to determine the number of pins which are installed on the pinsetter. (version 1.09)	5	10
8.	Used to determine the master device which controls the pinsetters. (version 2.20)	Pin selector	Scoring or bowlingo

bowlingo control box DIP switches

Printed Circuit Board E-MD3-93

Strike Definition (no-tap)

Used to determine the minimum number of pins which must be knocked down with the player's first ball in order for the electronics to attribute a strike.

(version 1.00)

DS401-1	DS401-2	SETTING
OFF	OFF	10 pins
ON	OFF	9 pins
OFF	ON	8 pins
ON	ON	7 pins

Time Delay Between Games

Used to determine the time delay between games, meaning that the next game will not start until the selected time period has expired.

(version 1.00)

DS401-3	DS401-4	SETTING
OFF	OFF	5 seconds
ON	OFF	10 seconds
OFF	ON	15 seconds
ON	ON	20 seconds

Penalty Setting

Used to determine penalties, if any, to be attributed on either balls thrown before the STOP display has disappeared or too many balls thrown (more than one) on the same throw. The penalty results in the loss of the score obtained with the throw.

(version 1.03)

DS401-5	DS401-6	SETTING
OFF	OFF	None
ON	OFF	Early ball
OFF	ON	Too many balls
ON	ON	Both

bowlingo Control Box DIP Switches

Printed Circuit Board E-MD3-93

Interface Setting

Used to determine different pre-configured player interface options.

(version 1.00)

DS401-7	DS401-8	SETTING
OFF	OFF	None
ON	OFF	Keyboard
OFF	ON	Start button
ON	ON	CAPCOM

Ticket Dispenser Setting
DS402-1

Used to determine how DS-403-7 and 8 will dispense coupons.

(version 1.09)

ON	OFF
Tickets on Strikes	Tickets on Spares

Number of Frames

Used to determine the number of frames bowled by each player when it is his or her turn to bowl. These switches are also used to determine whether players take turns beginning with an even or odd numbered frame.

(version 1.00)

DS402-2	DS402-3	SETTING
OFF	OFF	1 frame
ON	OFF	2 frames even
OFF	ON	2 frames odd
ON	ON	not in use

bowlingo Control Box DIP Switches

Printed Circuit Board E-MD3-93

Game Control Settings

Depending on the Game Control that is in effect (Game or Time determined with DS-404-7) these switches have different uses. In Game mode, the settings determine the time that is used to close the lane after a period of inactivity (no ball thrown or detected). In Time mode the settings determine the actual time that is allotted for each credit. (refer to DS-405-1, 2, 3 and 4 for credit values) All values are specified in seconds.

(version 1.00)

DS402-4	DS402-5	DS402-6	DS402-7	DS402-8	GAME	TIME
OFF	OFF	OFF	OFF	OFF	120	180
ON	OFF	OFF	OFF	OFF	150	210
OFF	ON	OFF	OFF	OFF	180	240
ON	ON	OFF	OFF	OFF	210	270
OFF	OFF	ON	OFF	OFF	240	300
ON	OFF	ON	OFF	OFF	270	330
OFF	ON	ON	OFF	OFF	300	360
ON	ON	ON	OFF	OFF	330	390
OFF	OFF	OFF	ON	OFF	360	420
ON	OFF	OFF	ON	OFF	390	450
OFF	ON	OFF	ON	OFF	420	480
ON	ON	OFF	ON	OFF	450	510
OFF	OFF	ON	ON	OFF	480	540
ON	OFF	ON	ON	OFF	510	570
OFF	ON	ON	ON	OFF	540	600
ON	ON	ON	ON	OFF	570	630
OFF	OFF	OFF	OFF	ON	600	660
ON	OFF	OFF	OFF	ON	630	690
OFF	ON	OFF	OFF	ON	660	720
ON	ON	OFF	OFF	ON	690	750
OFF	OFF	ON	OFF	ON	720	780
ON	OFF	ON	OFF	ON	750	810
OFF	ON	ON	OFF	ON	780	840
ON	ON	ON	OFF	ON	810	870
OFF	OFF	OFF	ON	ON	840	900

Game Control Settings

Depending on the Game Control that is in effect (Game or Time determined with DS-404-7) these switches have different uses. In Game mode, the settings determine the time that is used to close the lane after a period of inactivity (no ball thrown or detected). In Time mode the settings determine the actual time that is allotted for each credit. (refer to DS-405-1, 2, 3 and 4 for credit values) All values are specified in seconds.

(version 1.00)

DS402-4	DS402-5	DS402-6	DS402-7	DS402-8	GAME	TIME
ON	OFF	OFF	ON	ON	870	930
OFF	ON	OFF	ON	ON	900	960
ON	ON	OFF	ON	ON	930	990
OFF	OFF	ON	ON	ON	960	1020
ON	OFF	ON	ON	ON	990	1050
OFF	ON	ON	ON	ON	1020	1080
ON	ON	ON	ON	ON	1050	2010

Ticket Dispenser Score Setting

Used to determine the score(s) at which a coupon is dispensed for each individual game (if you have the ticket dispenser installed). If no ticket dispenser is installed set all of these switches to OFF. If a ticket dispenser is installed, first set DS-404-5 accordingly.

(version 1.10)

Settings with DS-404-5 set to OFF

1 coupon is dispensed only once and only if the player attains the score indicated.

DS403-1	DS403-2	DS403-3	SETTING
OFF	OFF	OFF	Never
ON	OFF	OFF	50
OFF	ON	OFF	75
ON	ON	OFF	100
OFF	OFF	ON	125
ON	OFF	ON	150
OFF	ON	ON	175
ON	ON	ON	200

Settings with DS-404-5 set to ON

1 coupon is dispensed each time the player's score increments by the value indicated.

DS403-1	DS403-2	DS403-3	SETTING
OFF	OFF	OFF	Never
ON	OFF	OFF	10
OFF	ON	OFF	15
ON	ON	OFF	20
OFF	OFF	ON	25
ON	OFF	ON	30
OFF	ON	ON	40
ON	ON	ON	50

Strike Coupons

Used to determine the number of coupons that are dispensed for strikes during each individual game. Again this feature is only available if you have a coupon dispenser installed. If no coupon dispenser is installed set all of these switches to OFF.

(version 1.00)

DS403-4	DS403-5	DS403-6	SETTING
OFF	OFF	OFF	Never
ON	OFF	OFF	1 coupon for every 3 strikes
OFF	ON	OFF	1 coupon for every 2 strikes
ON	ON	OFF	1 coupon for each strike
OFF	OFF	ON	2 coupons for each strike
ON	OFF	ON	3 coupons for each strike
OFF	ON	ON	4 coupons for each strike
ON	ON	ON	1 coupon for the first strike, 2 coupons for the second strike, ... 12 coupons for the twelfth strike

Consecutive Strikes and Spares Coupon Settings

Used to determine the number of coupons that are dispensed for spares or consecutive strikes during each individual game (depending on how DS-402-1 is set). Again this feature is only available if you have a coupon dispenser installed. If no coupon dispenser is installed set both of these switches to OFF.

(version 1.09)

Settings with DS-402-1 set to OFF

Coupons dispensed on Spares

DS403-7	DS403-8	SETTING
OFF	OFF	Never
ON	OFF	1 coupon for every 3 spares.
OFF	ON	1 coupon for every 2 spares.
ON	ON	1 coupon for each spare.

Settings with DS-402-1 set to ON

Coupons dispensed on consecutive Strikes

DS403-7	DS403-8	SETTING
OFF	OFF	Never
ON	OFF	1 coupon for 8 and 9 consecutive strikes.
OFF	ON	1 coupon for 10, 11, and 12 consecutive strikes.
ON	ON	1 coupon for 8, 9 10, 11, and 12 consecutive strikes.

bowlingo Control Box DIP Switches
Printed Circuit Board E-MD3-93

DS-404	Comprised of 8 different switches, this bank is used to configure general items.		
	DESCRIPTION	**ON**	**OFF**
1.	This switch is no longer used and must be set to OFF. (North American Market version 1.09) **or** Used to determine whether a coupon dispenser or a rate selector is connected to CN703 (lane 1) and CN704 (lane 2). (World Market version 1.13)	Rate selector	Coupon dispenser
2.	This switch is no longer used and must be set to OFF. (version 1.09)		
3.	Used to determine whether or not coin mechanism B will count coins. This switch is commonly called the service switch since it is possible to verify the machine's functions without having the counter increment. (version 1.09)	Does not count coins	Counts coins
4.	Used to determine whether or not the pair of lanes is equipped with the High Score Module display option. (version 1.09)	Best Score	None
5.	Used to determine the method used by DS-403-1, 2 and 3 to dispense coupons for high scores. (version 1.09)	Increment	Fixed score
6.	Used to determine which of the 2 types of play to be used. The Bowling type follows exactly the same rules as conventional bowling, that is 2 balls per frame. The second type of play, Arcade type, allows only one ball per frame, its main advantage is that it makes the games much shorter. (version 1.00)	Arcade	Bowling
7.	Used to determine the value of credits. This switch is used in conjunction with DS-405-1, 2, 3, 4, 5, 6, 7 and 8 if set to OFF and in conjunction with DS-402-4, 5, 6, 7 and 8 if set to ON. (version 1.00)	Time	Game
8.	Used to determine how credits are used in conjunction with play and players. Regardless of how this switch is set, once the maximum number of player's is attained (4), credits will simply accumulate until the end of the current game. System 1: If 2 frames or less have been played, a new credit will add a new bowler. If more than 2 frames have been played, credits will accumulate until the end of the game. System 2: A new credit will always add a new player. (version 1.09)	System 1	System 2

Coin Mechanism A Settings
North American Market

Used to determine the relationship of coins and credits through coin mechanism A. Refer to DS-404-7 to establish the value of a credit (Game or Time).

(version 1.13)

DS405-1	DS405-2	DS405-3	DS405-4	SETTING
OFF	OFF	OFF	OFF	1 coin = 4 credits
ON	OFF	OFF	OFF	1 coin = 3 credits
OFF	ON	OFF	OFF	1 coin = 2 credits
ON	ON	OFF	OFF	1 coin = 1 credit
OFF	OFF	ON	OFF	2 coins = 1 credit
ON	OFF	ON	OFF	3 coins = 1 credit
OFF	ON	ON	OFF	4 coins = 1 credit
ON	ON	ON	OFF	5 coins = 1 credit
OFF	OFF	OFF	ON	6 coins = 1 credit
ON	OFF	OFF	ON	8 coins = 1 credit
OFF	ON	OFF	ON	10 coins = 1 credit
ON	ON	OFF	ON	12 coins = 1 credit
OFF	OFF	ON	ON	14 coins = 1 credit
ON	OFF	ON	ON	16 coins = 1 credit
OFF	ON	ON	ON	20 coins = 1 credit
ON	ON	ON	ON	24 coins = 1 credit

Coin Mechanism B Settings
North American Market

Used to determine the relationship of coins and credits through coin mechanism B. Refer to DS-404-7 to establish the value of a credit (Game or Time).

(version 1.13)

DS405-5	DS405-6	DS405-7	DS405-8	SETTING
OFF	OFF	OFF	OFF	1 coin = 4 credits
ON	OFF	OFF	OFF	1 coin = 3 credits
OFF	ON	OFF	OFF	1 coin = 2 credits
ON	ON	OFF	OFF	1 coin = 1 credit
OFF	OFF	ON	OFF	2 coins = 1 credit
ON	OFF	ON	OFF	3 coins = 1 credit
OFF	ON	ON	OFF	4 coins = 1 credit
ON	ON	ON	OFF	5 coins = 1 credit
OFF	OFF	OFF	ON	6 coins = 1 credit
ON	OFF	OFF	ON	8 coins = 1 credit
OFF	ON	OFF	ON	10 coins = 1 credit
ON	ON	OFF	ON	12 coins = 1 credit
OFF	OFF	ON	ON	14 coins = 1 credit
ON	OFF	ON	ON	16 coins = 1 credit
OFF	ON	ON	ON	20 coins = 1 credit
ON	ON	ON	ON	24 coins = 1 credit

Coin Mechanism A and B Settings
World Market

Used to determine the relationship of coins, units and credits through coin mechanisms A and B. Refer to DS-404-7 to establish the value of a credit (Game or Time). Refer to DS405-8 to establish coin and unit values.

(version 1.13)

DS405-1	DS405-2	DS405-3	DS405-4	SETTING
OFF	OFF	OFF	OFF	1 coin = 4 credits
ON	OFF	OFF	OFF	2 coins = 1 credit
OFF	ON	OFF	OFF	50 units = 1 credit
ON	ON	OFF	OFF	75 units = 1 credit
OFF	OFF	ON	OFF	100 units = 1 credit
ON	OFF	ON	OFF	125 units = 1 credit
OFF	ON	ON	OFF	150 units = 1 credit
ON	ON	ON	OFF	175 units = 1 credit
OFF	OFF	OFF	ON	200 units = 1 credit
ON	OFF	OFF	ON	225 units = 1 credit
OFF	ON	OFF	ON	250 units = 1 credit
ON	ON	OFF	ON	275 units = 1 credit
OFF	OFF	ON	ON	300 units = 1 credit
ON	OFF	ON	ON	325 units = 1 credit
OFF	ON	ON	ON	350 units = 1 credit
ON	ON	ON	ON	375 units = 1 credit

World Market only

DS-405	DESCRIPTION	ON	OFF
5. 6. 7.	These switches are no longer used and must be set to OFF. (version 1.13)		
8.	Used to determine the value of units attributed by the coin mechanisms. (version 1.13)	A = 100 B = 25	A = 100 B = 50

Pinsetter function buttons

Located on the front of the pinsetter and accessible by the front panel is the solenoid/opto control box. This box has five buttons, each one with a corresponding LED. Each button will send different commands to the pinsetter control box when pressed. When the LED above the button is lit up, this indicates that the button is ON. From left to right, the buttons and their functions are:

- **Manual/Auto** Button; when ON, this means that the pinsetter is in slave mode (controlled by the pinsetter control box). This is the only LED which should be lit up when the pinsetter is in normal operation.
- **ON/OFF** Button: Used to manually turn the pinsetter ON and OFF in order to perform adjustments and maintenance on the pinsetter.
- **FS1** Button: Used to perform a full set cycle, the LED will only light up when you press the button. Once the button is released, its LED will turn OFF.
- **PS1** Button: Used to perform a part set cycle, the LED will only light up when you press the button. Once the button is released, its LED will turn OFF.
- **AUX** Button: Used to place the pinsetter in an idle mode in order to untangle strings when the pinsetter is unable to do so itself. THE BUTTON MUST BE PRESSED A SECOND TIME IN ORDER TO RETURN TO NORMAL OPERATION. As with the full set and part set buttons, the LED will only light up when you press the button. Once the button is released, its LED will turn OFF.

When combining buttons, the following adjustment functions are available:

- **FS1** & **PS1** Buttons: When pushing these 2 buttons simultaneously, the string extension function is activated. The pinsetter pulls the strings for 20 seconds allowing you to adjust the strings correctly.
- **PS1** & **AUX** Buttons: When pushing these two buttons simultaneously, the brakes test function is activated. The pinsetter performs a cycle and holds all pins up with the brakes. To re-establish normal functions, simply press the FS button.

Note *When depressing buttons, hold them down for a few seconds to ensure a good signal to the pinsetter control box. When in Idle Mode, the LED's on the pinsetter control box flash 5 at a time in an alternating pattern. When in String Extension Mode, the same LED's perform an inside-out movement. Finally, when in Brakes Test Mode, the LED's all flash at the same time.*

Chapter 3
Taking Care of Your bowlingo

Chapter Overview

This chapter contains information about the proper handling and care of your equipment.

Preventive Maintenance Basics

Here are some basic points about keeping your equipment functioning properly.

- Machines must be kept free of dirt, dust and excess of oil. A well cared for machine is a clean machine. A clean machine performs much better and reduces the chance of electronic problems.
- Do not place items on top of electronic components or cover any of their vents. These vents provide airflow to keep your electronics from overheating.
- Keep food and drinks away from electronic components. Food particles and spills might make the electronics sticky and unusable.
- Do not get the power switches or other components wet. Moisture can damage these parts and cause an electrical hazard.
- Always disconnect a power cord by grasping the plug, not the cord.
- Machines are subject to constant vibration and must be checked frequently for loose nuts and bolts. All bolts on the machines and accessories must be tightened with a torque wrench. Over tightening bolts will simply cause them to break and depending on the function of the bolt, may cause operating headaches. Also, check and tighten any loose screws on the pinsetters ,especially the setscrews, as well as any loose bolts on the pit cushions and ball elevators at regular intervals.
- Setup and maintain a preventive maintenance program as outlined in this chapter.

Manufacturer's recommendations

- Always use original Mendes parts with your equipment.
- The detailed part listings in this publication make it easy to locate parts for reordering purposes. Always order parts by the part number and its description, not by index and/or page numbers because this information is subject to change.
- Always supply your equipment serial number when placing an order.

Important note for European installations Mendes ground wires may be colored green instead of the standard European green and yellow.

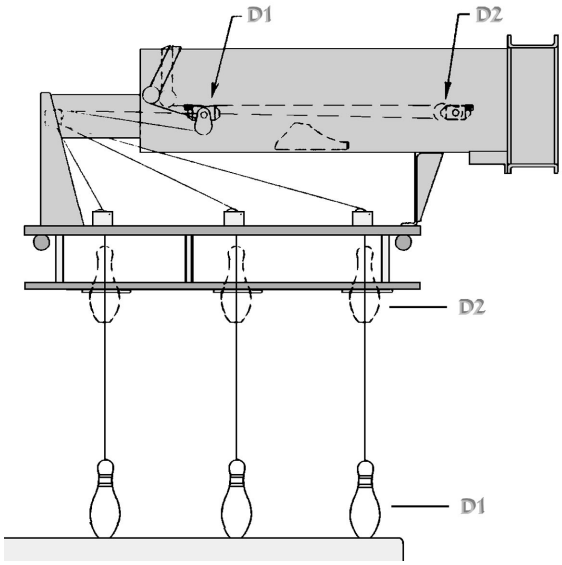
Setting Up A Preventive Maintenance Program

The simplicity of Mendes equipment being its main characteristic, it is very easy to understand its concept. At the same time, it must be understood that equipment of any kind requires a minimum of maintenance and should operate according to standards. Regular, scheduled maintenance is very important in order to keep your equipment in excellent condition.

ME-90 pinsetter positions

Illustrated in Figure 3.1 are the two (2) pinsetter positions which are referred to in this chapter as D1 and D2.

Figure 3.1 Pinsetter Positions



Before making any mechanical adjustments, the following steps must be carried out.

1. **Press the FS1 button on the pin detection assembly so as to have the pinsetter perform a complete cycle;**
2. **Make sure the strings are all properly aligned in their sheaves;**
3. **If the drawbar cannot reach the D2 position, proceed with the strings adjustment before attempting any other adjustments;**
4. **Ensure that the optical sensors (LS, PB, PO and PD) are free of dust and well aligned with their partners. The actuators must pass freely inside the optical sensors in order for them to function normally.**

Getting organized

The Preventive Maintenance Work Schedule is an organized schedule of routine preventive maintenance that must be performed on all machines over a four-week period.

First, the machines must be divided into four groups as evenly as possible. For example, if your center has sixteen lanes of equipment that are divided into four groups, each group would have four machines. Maintenance is performed on each group during different days of the week.

Let's briefly look at how the Preventive Maintenance Work Schedule is organized.

At the top of the work schedule are the four different colored boxes. This color-coding prevents confusion between the groups of machines. For example, if machines 1-4 are color-coded in green, once the scheduled preventive maintenance has been performed on machines 1-4, it is recorded in green on the work schedule.

Looking down the rest of the work schedule we see that the maintenance is divided into five areas. The headers on the right side of the page indicate these.

They show that the preventive maintenance is divided into five areas, according to time. There are services that must be performed daily, weekly, monthly, and quarterly.

Mendes strongly suggests that you make copies of the Preventive Maintenance Work Schedule and set up your own maintenance program as detailed on the pages in this section.

Preventive Maintenance Work Schedule

Machine # _____ thru # _____ Machine # _____ thru # _____

Machine # _____ thru # _____ Machine # _____ thru # _____

4-week period ending : _____

Daily Service	Assign	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Check stop sheets																													
Check and repair strings																													
Wipe ball detectors and reflectors																													
Clean all lane surfaces																													
Weekly Service	Assign	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Clean all optical sensors																													
Verify all pin brakes																													
Verify the ascending torque																													
Wipe all stabilizers																													
Vacuum pit area																													
Wipe bowlingo balls																													
Monthly Service	Assign	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Ball detector alignment																													
Clean all pin detector wheels																													
Verify all chains																													
Verify drawbar																													
Verify ball elevator																													
Quarterly Service	Assign	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Tighten bolts & screws																													
Verify pin pause																													
Verify magnetic clutches																													
Annual Service	Assign	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
Check oil level in motor reducers																													

Remarks :

Daily maintenance schedule

Let's look at the daily maintenance required of all machines each and every day.

- Everyday, all the machines must be checked for stop sheets. These are pieces of paper that are put on the back of the machine to indicate if something went wrong with it the night before. A qualified maintenance technician should immediately correct the malfunction;
- Pin strings should be inspected daily and if showing evidence of wear, they should be shortened and refastened and the string tension readjusted to compensate for the shortened string. If a proper program of string maintenance and inspection is set up, you will never experience a broken string during normal play. Put very simply, there is no excuse for strings breaking in play other than careless string maintenance;
- Wipe the ball detectors and reflectors with a damp cloth;
- Clean all lane surfaces and surrounding areas with a phosphate-free lane cleaner (Mendes part number Q82-0070) or similar. Regardless of the product you choose, it must be used in accordance with the manufacturers instructions. Always use a hand spray applicator.
- Condition all lane surfaces using bowling lane conditioner, but sparingly; excess conditioner will make lanes appear to be dirty, it will also cause balls to be slippery - making them difficult to handle and also impeding their return. Too much conditioner will also cover the bowling balls causing them to spin at the base of the ball elevator and block the ball pit. Do not apply conditioner to the approach sections, any conditioner in this area will cause players to slip.

Once the daily maintenance is finished for all the machines, it is color-coded in the appropriate places on the work schedule.

Weekly maintenance schedule

Following the daily maintenance of the machines there is also scheduled maintenance that needs to be performed weekly. Most of the weekly maintenance is simply cleaning which requires wiping off the major assemblies. All assemblies should be wiped clean with a dry cloth. Sometimes oil or grease may accumulate on these surfaces and a dry cloth will not remove them. When this happens, it makes sense to moisten the cloth with machine cleaner.

The weekly work schedule does not require that all the machines be serviced together. Rather, only one quarter of the machines must be serviced every two days. For a sixteen lane center, machine numbers one to four would be serviced on Monday, machine numbers five to eight would be serviced on Wednesday, machine numbers nine to twelve would be serviced on Friday, and machines thirteen to sixteen would be serviced on Sunday. This process repeats itself so that by the end of the month each machine will have been serviced four times.

Weekly cleaning The cleaning simply involves wiping the various components indicated with a dry cloth. The pit area is best cleaned by vacuuming the dust that accumulates. Dust also accumulates inside the various optical reading devices located on the machine. This dust is best removed by using compressed air prior to vacuuming.

- Clean all optical sensors and pin detector wheels with compressed air;
- Remove all excess oil and grease from the chains and surrounding area. Care must be taken to remove all excess oil from the gear and near the friction disk (this disk must never be oiled);
- Remove all dust deposits which have accumulated on the pin tables and pin stabilizer boards;
- Vacuum the pit area;
- Vacuum the ball elevator area;
- Wipe the ball detectors and reflectors with a damp cloth;
- Wipe the ball return track;
- Wipe the front ball rack and the bowling balls;
- Wipe work area (bench, room, aisle).

Weekly adjustments There are two adjustments which must be verified on a weekly basis, the pin brakes, and the pinsetter's torque.

Once the weekly items are finished for one quarter of all the machines, it is color-coded in the appropriate places on the work schedule.

Monthly maintenance schedule

Moving on to items performed monthly, we see that the first area is to inspect and correct is the ball detector alignment. Although the ball detector is not a mechanical part of the drive train, it is a critical component to the machine's mechanics since all commands to and from the machine start with the detection of a ball.

The remaining monthly procedures are just as important as the rest of the preventive maintenance program. Although most of the adjustments listed below will not need adjusting, you must verify each one of them correctly in order to ensure yourself of their perfection thus allowing yourself to rest easy for another month.

- Check the ascending chain;
- Check the descending chain;
- Check the drawbar chain and alignment;
- Check the ball elevators.

Once the monthly items are finished for one quarter of all the machines, it is color-coded in the appropriate places on the work schedule.

Quarterly and annual maintenance schedule

Although the quarterly and annual servicing of machines is not done as frequently as the other services, they are just as important. Much of the quarterly service involves tightening the bolts and screws of the various assemblies. Loose bolts and screws may result in premature failure of the machine and may even result in serious damage to the machine or an operator.

Nuts and bolts Machines are subject to constant vibration and must be checked for loose nuts and bolts. All bolts on the machines and accessories must be tightened with a torque wrench as indicated in the table below. Over tightening bolts will simply cause them to break and depending on the function of the bolt, may cause operating headaches.

The vibro-insulators and base plate spacer bolts located on the stabilizers are subject to continual violent shock and extreme vibration. They should be checked frequently for tightness

BOLT SIZE	AMERICAN	NEWTON
1/4"	15 FT. LB.	67 N/M
5/16"	19 FT. LB.	85 N/M
3/8"	25 FT. LB.	112 N/M
1/2"	29 FT. LB.	130 N/M

Tightening loose bolts and screws should not be limited to quarterly service however. Any time you come across a loose bolt or screw, it should be corrected immediately.

The following items must also be performed quarterly:

- Check the pin pause.
- Clean and lubricate the magnetic clutches;
- Oil all chains if necessary;
- Oil all pulleys if necessary.

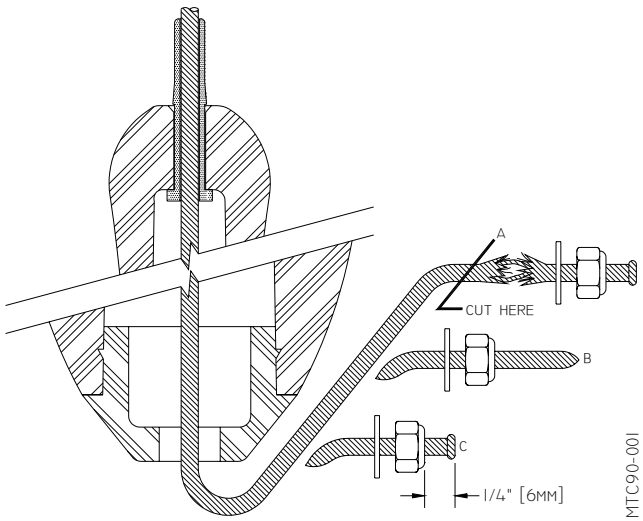
Note *Oil all pulleys and chains with very small quantities of SW10 motor oil only if judged necessary. Don't forget that any excess oil will only drip into undesired places causing headaches for cleaning.*

Annual inspection

An annual inspection of the machine is best done by a qualified mechanic. He has the experience to determine the wear of parts and their need for replacement. The oil in all motor reducers must also be checked and added if required (use 80W-80 oil).

Procedure 3.1 Repairing Strings and Bushings

	Do this	*Comments and illustrations*
1.	Raise the front cover of the pinsetter and press the Power On button.	The pinsetter will start up and set the pins on the lane.
2.	Open the circuit breaker located on the power box between the two pinsetters.	*Figure 3.2 String Repair*
3.	Look for visual signs of wear on strings and pin head bushings.	
4.	Any strings which are frayed or worn should be repaired or replaced as illustrated in Figure 3.2.	



A) Slide the string down through the pin and cut the worn out section.

B) Burn the string tip using a match or cigarette lighter. Use a rotating motion with a rag to create a point on the string. Replace the pin head bushing if necessary. Place a new washer and crimp a new nylock nut on the string. Use the swaging tool (Z-001) supplied with your spare parts kit to crimp the nut on the string.

C) Cut the end of the string ¼-inch (6mm) from the crimped nut. Burn the string tip to shape a lump under the nut. Slide the pin along the string and check that it turns freely.

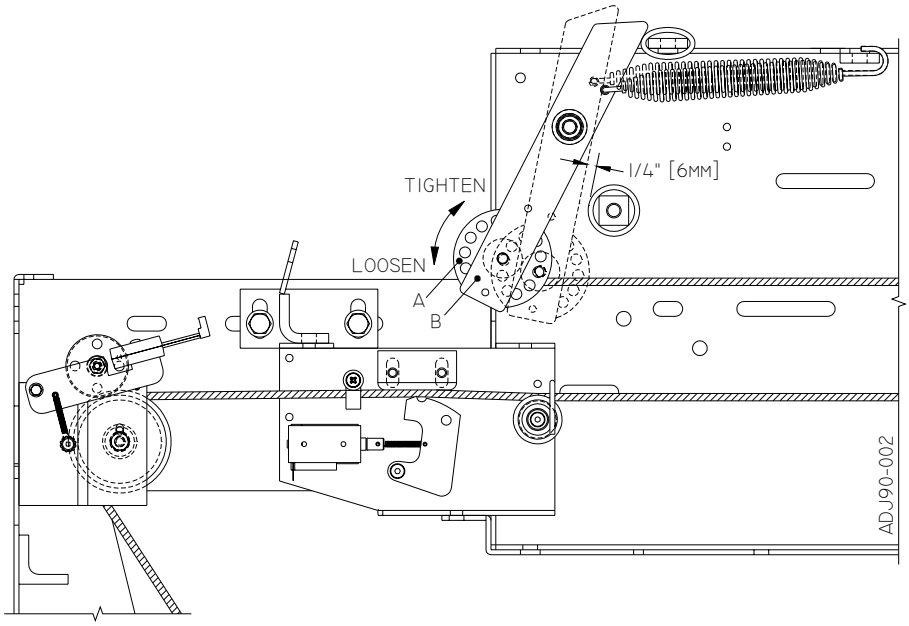
5. Once the repairs have been finished, close the circuit breaker on the power box and press the start button.

6. Proceed with the strings adjustment procedure.

Procedure 3.2 Adjusting the Strings

	Do this
1.	Raise the front cover of the pinsetter and press the Power On button. The pinsetter will start up and set the pins on the lane.
2.	Press the FS1 and PS1 buttons together. The drawbar will move to the rear of the pinsetter (position D2 as illustrated in Figure 3.1 on page 53). The drawbar should go back to the stop pad and past the LS optical sensor. If it doesn't, the strings are too taut.
3.	Adjust the strings by loosening and/or tightening the reel and storage assemblies (A) so as to have them all aligned 1/4" from the bar as indicated by the dotted line in Figure 3.3. To release the spool in order to loosen or tighten the strings, pull the spool away from its corresponding mounting arm (B).

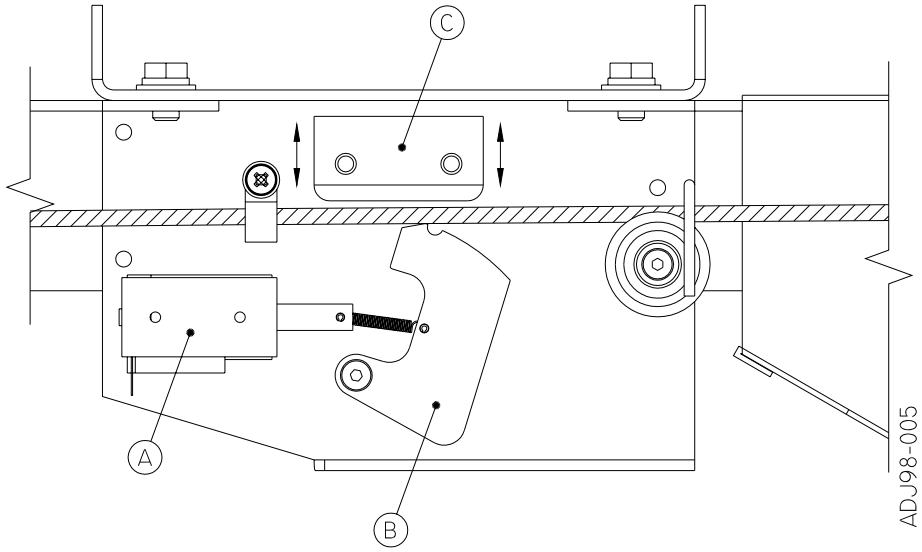
Figure 3.3 String Adjustment



Procedure 3.3 Adjusting the Pin Brakes

	Do this
1.	Raise the front cover of the pinsetter and press the Power On button. The pinsetter will start up and set the pins on the lane.
2.	Press the PS1 and AUX buttons together. The drawbar will move to the rear of the pinsetter (position D2) and each pin brake will be activated.
3.	The brake plate may be moved in the direction shown by the arrows in Figure 3.4. Slightly loosen the bolts which hold the brake plate in place and then raise the brake plate to loosen the pin's string or lower the brake plate to tighten the pin's string.
4.	Press the FS1 button to reestablish normal functions.

Figure 3.4 Pin Brakes Adjustment

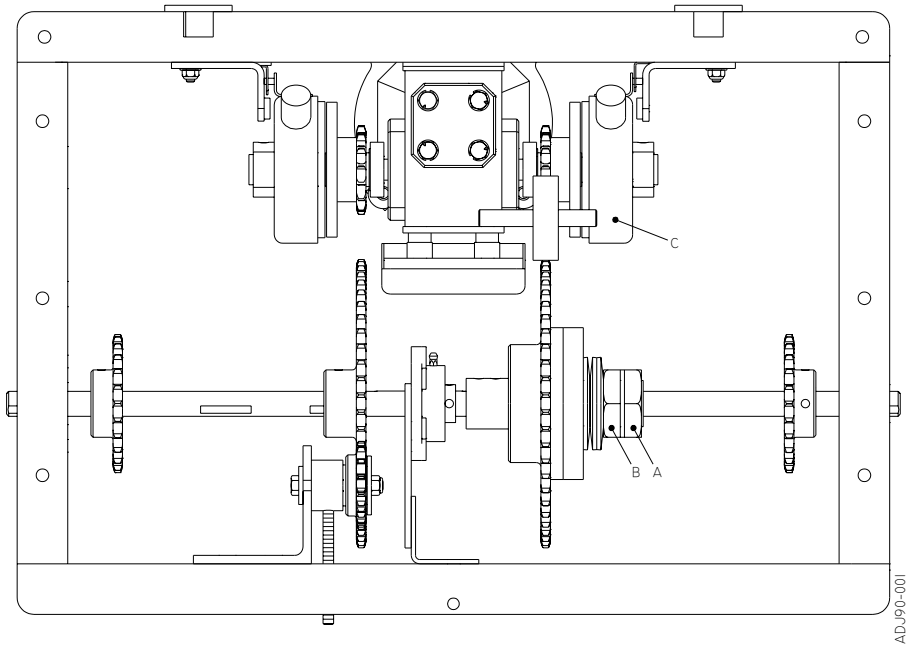


Pin brakes should be inspected weekly and if necessary, adjusted. The solenoid (A) pulls the cam (B) which jams the string on the brake plate (C). If a pin is lowered to the lane when it should stay up or if a pin stays up when it should be lowered to the lane, the pin brakes need adjusting. Follow the procedure above to adjust your pin brakes.

Procedure 3.4 Ascending Torque Adjustment

	Do this
1.	Open the main circuit breaker located on the power box situated between the two pinsetters.
2.	Place and hold the torque gauge (Z-ME90) on the inner left wall at the rear of the pinsetter.
3.	Close the main circuit breaker and press the start button on the power box.
4.	Raise the front cover of the pinsetter and press the Power On button. Once the pinsetter is activated and exerts pressure on the torque gauge, take your reading. The torque reading should be between 200 and 300. If it is, proceed to step 11. If the torque needs adjusting, continue.
5.	Open the main circuit breaker located on the power box situated between the two pinsetters in order to completely disengage the magnetic clutch (C).
6.	Raise the pinsetter's back cover. Check the clutch's empty space as indicated in Figure 3.12 on page 71. The clutch must be completely disengaged in order to work efficiently.
7.	Place a block of wood under the drive cog in order to prevent slipping and then loosen the 2-inch outer lock nut (A).
8.	Using a 2-inch open face key (Z-ME90-10), turn the 2-inch inner adjustment nut (B) clockwise (forward) to increase the torque, or counter-clockwise (backward) to decrease the torque.
9.	After each adjustment, re-check the torque as previously described before re-tightening the 2-inch outer lock nut.
10.	After tightening the 2-inch outer lock nut, check the torque again.
11.	Power OFF the pinsetter.

Figure 3.5 Rear view of Pinsetter



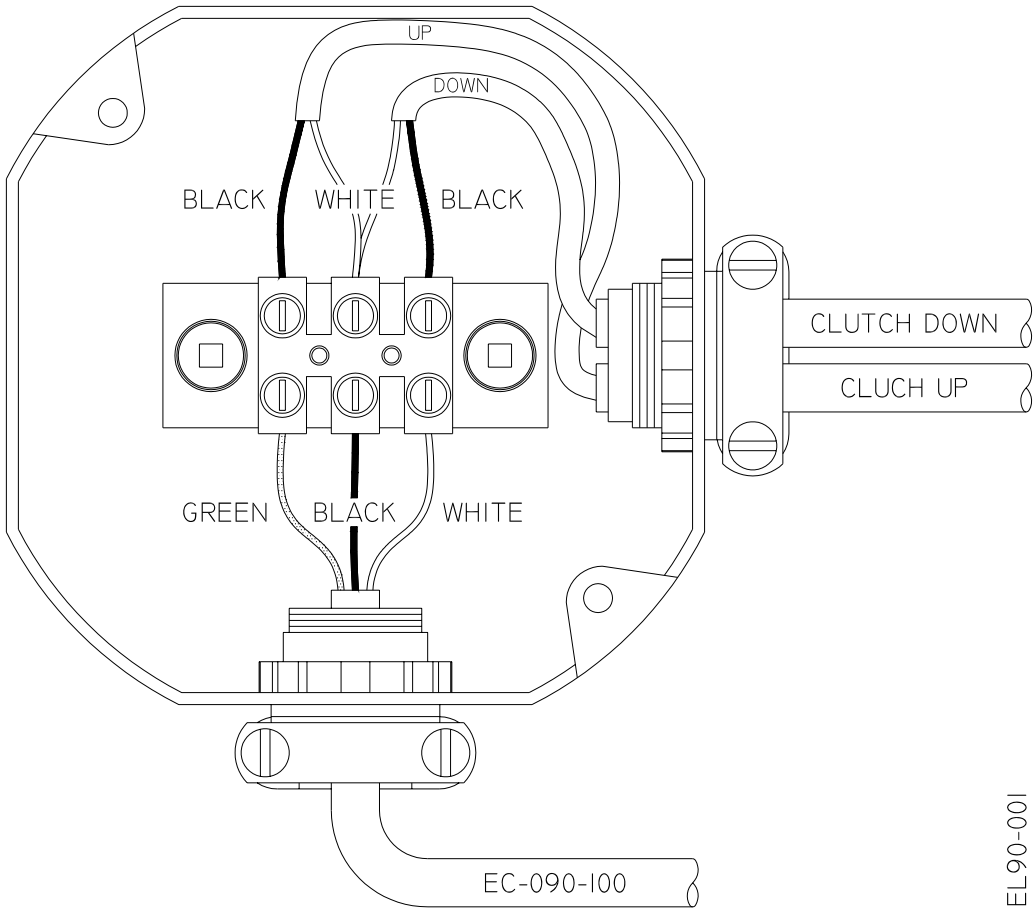
Procedure 3.5 Descending Torque Adjustment

This adjustment need only be performed as required. If you replace a clutch or a contact plate, you must follow this procedure prior to using the pinsetter for normal play.

On the descending torque, the friction between the clutch and the clutch sprocket is calibrated so the drawbar has sufficient torque to return to the D-1 position. To increase the lowering torque, the friction between the clutch and the contact plate must be increased. To increase the friction for the descending torque, follow these steps:

	Do this
1.	Open the main circuit breaker located on the power box situated between the two pinsetters.
2.	Remove the clutch. Clean it using the procedure explained in “Cleaning and Lubricating the Magnetic Clutches” on page 71.
3.	Open the clutch electrical junction box which is located above the reducer and invert the white and green cable connections of the right clutch and the left clutch as shown in Figure 3.6.
4.	Close the main circuit breaker and press the start button on the power box.
5.	Press the FS1 and PS1 buttons together in order to activate the string extension function. Since the two clutches have been inverted, the drawbar will stay in its D1 position and the lowering clutch will slide on its contact plate.
6.	Repeat the string extension function 8 to 10 times.
7.	Open the main circuit breaker located on the power box situated between the two pinsetters.
8.	Replace the white and green wires to their original position.
9.	Clean the descending clutch once again.
10.	Place and hold the torque gauge (Z-ME90) on the inner left wall at the front of the pinsetter.
11.	Close the main circuit breaker and press the start button on the power box.
12.	Raise the front cover of the pinsetter and press the Power On button. Once the pinsetter is activated and exerts pressure on the torque gauge, take your reading. The torque reading should be between 115 and 135.
13.	Open the main circuit breaker located on the power box situated between the two pinsetters in order to completely disengage the magnetic clutch.
14.	If the torque's reading coincides with step 12, all is well. If the torque's reading doesn't coincide with step 12, repeat this complete procedure until it does.

Figure 3.6 Clutch Electrical Junction Box



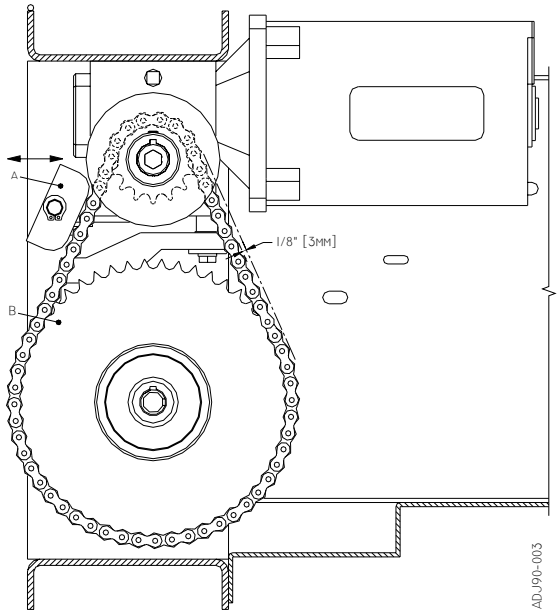
Procedure 3.6 Adjusting the Ball Detector

	Do this	*Comments*
1.	Loosen the screws which hold the ball detector transmitter assembly (SB-1500-31-BW) in place.	The ball detector is a simple, very reliable stand alone device but may become misaligned once in a while due to the constant vibration caused by the balls rolling down the lane. Each ball detector has two LED's that simplify the adjustment of the unit. The green LED signifies that the unit is perfectly aligned with the reflector while the red LED indicates that the signal has been cut. If both LEDs flash simultaneously, the adjustment is borderline (usually requiring you to adjust it until only the green LED is visible). If neither of the two LED's are visible on a ball detector, one of four things is possible. The ball detector is completely misaligned, it is defective, the reflector on the opposite side of the lane is soiled or has fallen, or the cable which supplies the necessary voltage to the unit has been cut or disconnected.
2.	Move the detector assembly up, down, right or left until the green LED appears on the ball detector.	
3.	Re-tighten the screws.	

Refer to Figure 6.10 on page 109 for location and identification of the different components pertaining to the ball detector.

Procedure 3.7 Adjusting the Ascending Chain

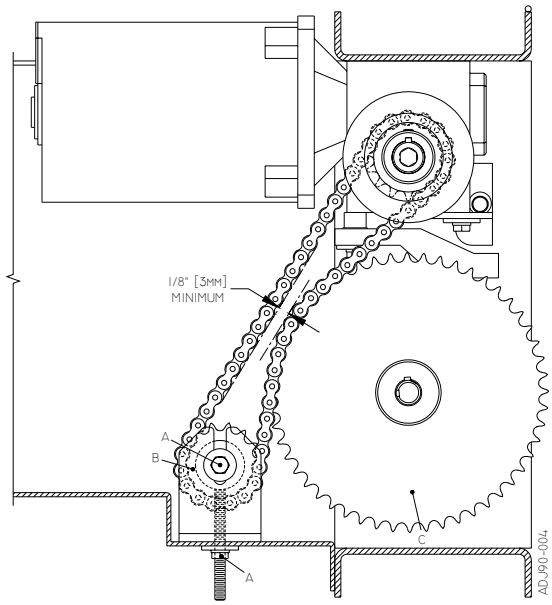
	Do this	*Comments and illustrations*
1.	Open the main circuit breaker located on the power box situated between the two pinsetters.	*Figure 3.7 Ascending Chain Adjustment*
2.	Raise the back cover of the pinsetter.	
3.	Check the chain tension by manually rotating the main sprocket (B). There should be a 1/8-inch (3mm) play at the tightest spot of a 360° rotation.	
4.	If adjustment is necessary, loosen the nuts on the tension plate (A) and slide back or forward until correct tension is obtained.	
5.	Re-tighten the nuts on the tension plate prior to closing the back cover.	



The ascending chain must not be tightened to extreme. The mechanism must have some slack to it in order to extend the life of the pinsetter. Oil the chain with a very small quantity of SW10 motor oil only when absolutely needed. Remove all excess oil and grease from the chain and surrounding area on a weekly basis. Care must be taken to remove all excess oil from the gear and near the friction disk (this disk must never be oiled). The chain's tension should be verified and adjusted on a monthly basis.

Procedure 3.8 Adjusting the Descending Chain

	Do this	*Comments and illustrations*
1.	Open the main circuit breaker located on the power box situated between the two pinsetters.	*Figure 3.8 Descending Chain Adjustment*
2.	Raise the back cover of the pinsetter.	
3.	Check the chain tension by manually rotating the main sprocket (C). There should be a 1/8-inch (3mm) play at the tightest spot of a 360° rotation.	
4.	If adjustment is necessary, move the chain binder sprocket (B) using the adjustment nuts (A).	
5.	Re-tighten the binder nuts prior to closing the back cover.	

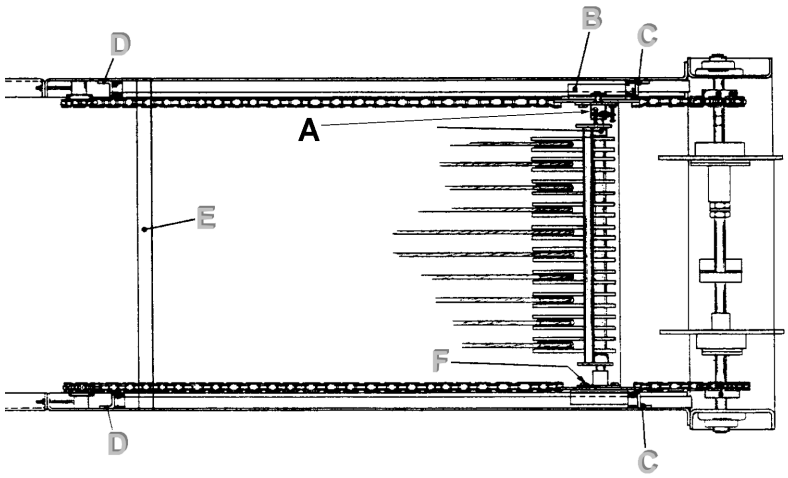


The descending chain, as the ascending chain, must not be tightened to extreme. The mechanism must have some slack to it in order to extend the life of the pinsetter. Oil the chain with a very small quantity of SW10 motor oil only when absolutely needed. Remove all excess oil and grease from the chain and surrounding area on a weekly basis. Care must be taken to remove all excess oil from the gear and near the friction disk (this disk must never be oiled). The chain's tension should be verified and adjusted on a monthly basis.

Procedure 3.9 Aligning the Drawbar

	Do this
1.	Make sure that the drawbar is in its D2 (UP) position.
2.	Open the main circuit breaker located on the power box situated between the two pinsetters.
3.	Center the drawbar on its carriage (B) using the set screws located on the drawbar (A).
4.	Position the drawbar parallel to the crossing bar (E) using the bolts which attach the drawbar to the carriage (F).
5.	Adjust the front (D) and rear (C) stoppers on both sides of the pinsetter so they come into contact at the same time with the carriage. Manually pull the drawbar back and forth to perform this adjustment.

Figure 3.9 Drawbar Alignment

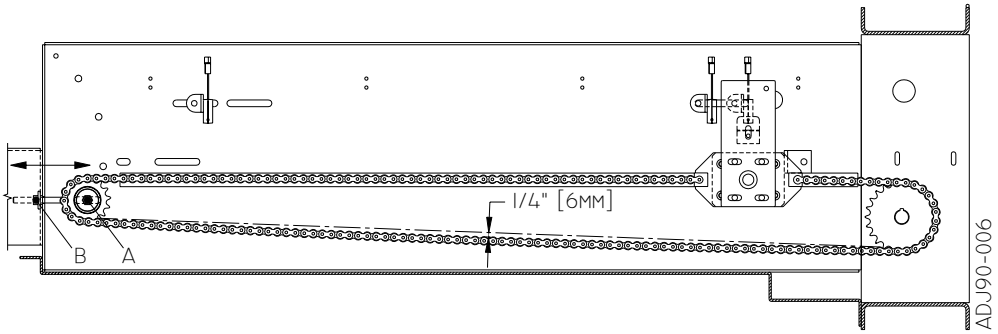


The drawbar must be kept perpendicular to the frame and parallel to the crossing bar and drive train in order to pull and set the pins evenly. The drawbar's alignment should be verified and adjusted on a monthly basis.

Procedure 3.10 Adjusting the Drawbar's Chain

	Do this
1.	Make sure that the drawbar is in the D2 (UP) position.
2.	Open the main circuit breaker located on the power box situated between the two pinsetters.
3.	Visually check for a 1/4-inch (6mm) dip in the middle of the chain.
4.	If adjustment is necessary, loosen the sprocket's nut (A) and adjust as necessary using the front end adjustment nut (B).
5.	Re-tighten the sprocket's nut (A).

Figure 3.10 Drawbar Chain Adjustment



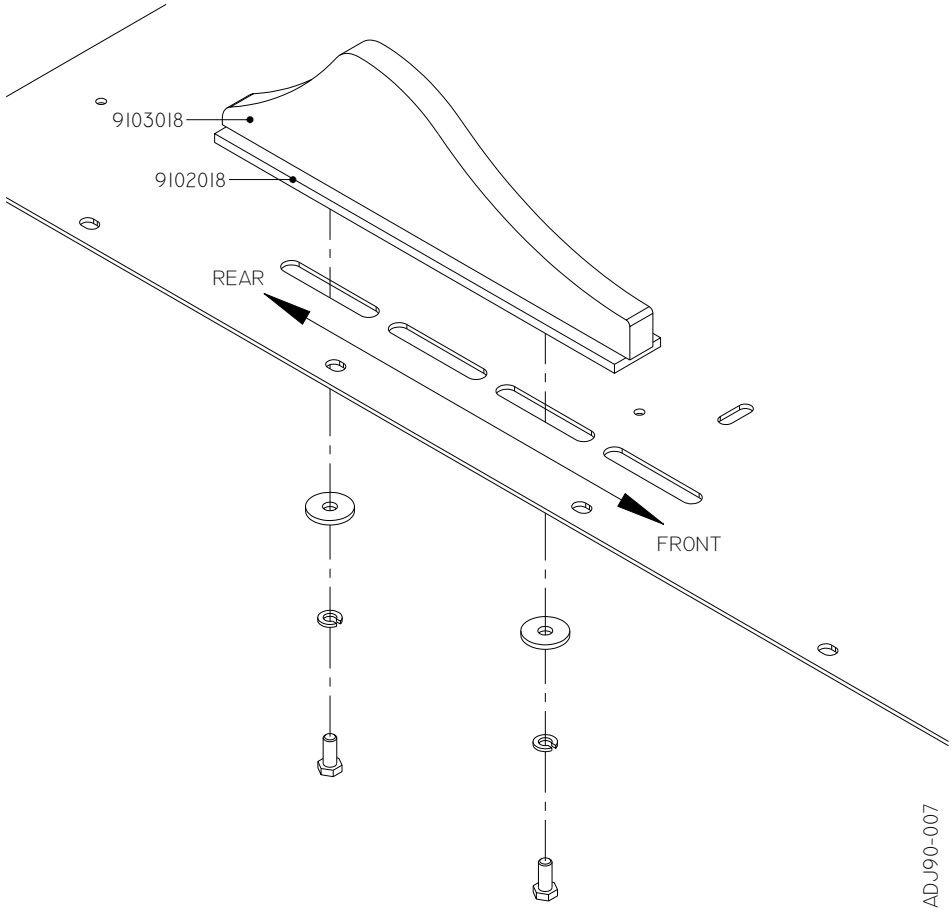
The drawbar chain must not be tightened to extreme. The mechanism must have some slack to it in order to extend the life of the pinsetter. Oil the chain with a very small quantity of SW10 motor oil only when absolutely needed. Remove all excess oil and grease from the chain and surrounding area on a weekly basis. The chain's tension should be verified and adjusted on a monthly basis.

Procedure 3.11 Adjusting the Pin Pause

The pin pause is controlled through the cam (9103018) which is located on the main frame bottom plate. This cam slows the drawbar down on its way to the front of the pinsetter, allowing a pause which ensures that the pins are spotted gently onto the lane. If the pause occurs too early or too late, the pins will not be spotted correctly. To adjust the pause action, simply loosen the screws which hold the cam adjustment plate (9102018) in place and then proceed with the required movement of the cam as indicated below.

- Slide the cam to the rear if there is little or no pause;
- Slide the cam to the front if the pause occurs too early.

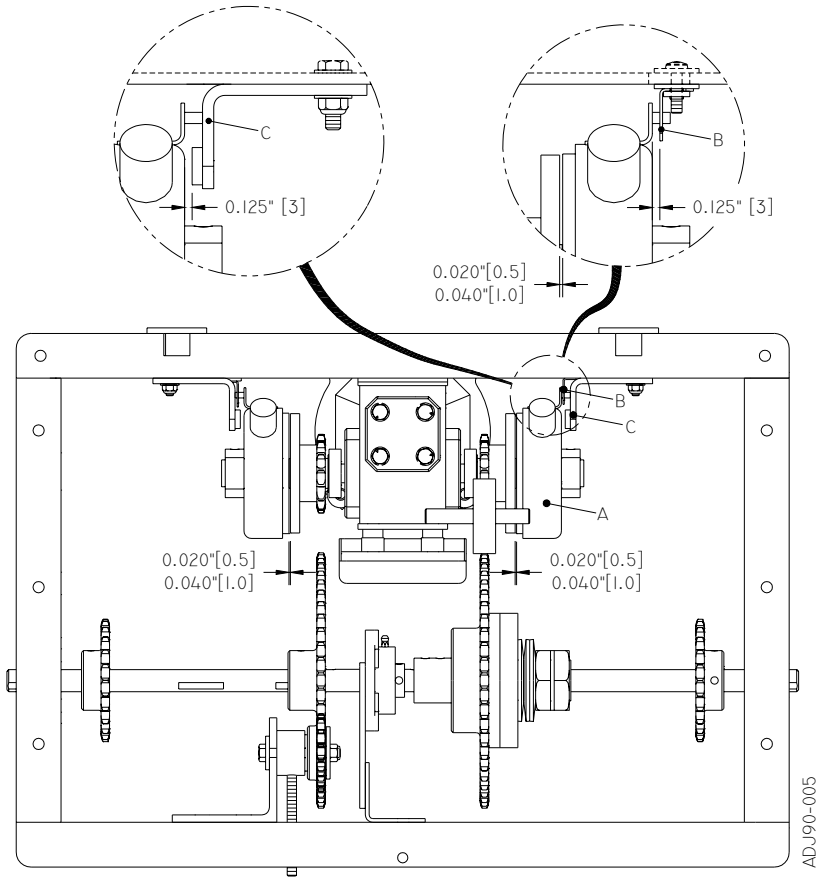
Figure 3.11 Pin pause adjustment



Procedure 3.12 Cleaning and Lubricating the Magnetic Clutches

Cleaning and lubrication of the magnetic clutches must be performed on a quarterly basis (every three months). To do this, the assembly should be removed from the pinsetter and cleaned. (Open the main circuit breaker located on the power box situated between the two pinsetters prior to working on the pinsetter.) The components should be cleaned with a solvent such as a paint thinner. The components should then be dried using a towel. The shaft of the machine where the clutch assembly is normally inserted should also be cleaned with a clean rag while the clutch assembly is out being cleaned as per the above.

Figure 3.12 Dismantling and Reassembling the Magnetic Clutches



Prior to re-assembly, lightly lubricate the shaft with an anti-seize lubricant such as Loctite Anti-Seize Brush Type No. 76764, and make sure that the clutch components travel freely on the shaft. Do not apply too much lubricant so as to have it overflow from the shaft to the components' outer surfaces. The clutch's facing must never be lubricated. A lubricant is available from Mendes and its affiliated distributors under part number Z-76764.

Following re-assembly of the clutch assembly, close the main circuit breaker located on the gray power box situated between the two pinsetters and then cycle the pinsetter 3-4 times so as to ensure that the clutch makes good contact with the disk. Verify and adjust the torque if necessary.

Chapter 4
Solving Problems

Chapter Overview

This chapter contains information that will help you identify and correct problems that might arise as you use your equipment. A description of the wide variety of resources available from Mendes to assist you in the use of your equipment is also included along with instructions on how to obtain additional information about Mendes products.

Services available and telephone numbers listed are subject to change without notice.

If you have a problem with your bowlingo unit, always verify the following points before replacing system components as indicated in this chapter.

- Check that you have electrical power to the system; a glance at the fuse box could save you a lot of precious time.
- Make sure that the LED on the ball detector is green.
- Simulate a power failure.
- Check that all cabling assemblies are well connected.

Hint on cabling problems

There are only two possible solutions to cabling problems. First, any one of the connectors used with the cable assembly may have become loose due to the constant vibration generated from play. Secondly, a cable may be cut or have been pinched by a foreign object. The solutions are simple, ensure that all connectors are well positioned and push down on each one to ensure its proper contact. If this fails to resolve your problem, use a multi-meter to verify the cable assembly's continuity.

- Verify the relative humidity in your center. When humidity levels get too low, static electricity transported by people can build up to enormous levels. These levels can be so large that even good grounds will not stop the destruction of these static discharges. Be advised that the recommended relative humidity level for a bowling center is between 40 and 50 percent.
- Retrace the ground wire installed with your equipment all the way to the building's main ground. Never depend upon the ground installed with your outlets, since many electricians do not reliably install these grounds. If your equipment is not properly grounded the CPU's can literally blow their electronic chips when they receive a static electricity discharge, be it from the players or a defective part.
- Check that the START button on the power box is activated.
- Check the fuse or the transformer's reset in the power box.

Overhead monitor problems

The system does not start-up when coins are inserted and the coin mechanism has been confirmed to work properly and is powered.

1. **Reset the E-MD3-93 PCB located inside the Bowlingo Electronic Controller.**
2. **Check the coin mechanism cabling to the E-MD3-93 PCB.**
3. **Replace the ULN2804A chip on the E-MD3-93 PCB.**
4. **Replace the E-MD3-93 PCB.**

No sound (audio) is emitted through the ball return speaker(s).

1. **Reset the E-MD3-93 P.C.B located inside the Bowlingo Electronic Controller.**
2. **Check the speaker cabling.**
3. **Check the speaker's volume controls located on the E-MD3-93 PCB inside the Bowlingo Electronic Controller. P901 controls the volume for the speaker on lane #1 while P902 controls the volume for the speaker on lane #2.**
4. **Replace the E-MD3-93 PCB.**
5. **Replace the speaker(s).**

Pinsetter problems

Procedure 4.1 Untangling Pin Strings

If pin strings tangle, the pinsetter will attempt to untangle them according to the settings established through the lane controller's DIP switch banks. If strings are knotted, they will have to be untangled manually. Use the following steps to perform such an operation.

	Do this
1.	Raise the masking unit and enter beneath it to the front of the pinsetter.
2.	Lift the cover at the front of the pinsetter and press the AUX button until the pins fall to the lane. The pinsetter is now in its idle mode.
3.	Untangle the strings by hand.
4.	Press the AUX button again until the pinsetter begins its raising operation.
5.	Close the cover on front of the pinsetter. The pins which were still in play will be re-spotted.
6.	Leave the pinsetter area and lower the masking unit to its normal position.

The pinsetter doesn't react to a ball rolled down the lane.

1 **Check the ball detector's adjustment and cabling**

2 **Reset the main circuit board (E-MD3-80), if this does not rectify the problem, replace the lane controller.**

The pinsetter cycles when it shouldn't.

1 **Check the ball detector's adjustmen**

2 **Reset the pinsetter’s main circuit board (E-MD3-80), if this does not rectify the problem, replace the lane controller.**

The pinsetter does not shut off when it is supposed to.

1 **Check the ON/OFF button located on the Pin Detection Assembly. Its LED should be OFF, if not, press the button to turn the pinsetter OFF.**

The drawbar continuously moves back and forth.

1. **Strings may be too tight, check their adjustment.**
2. **The LS optical sensor may be misaligned, disconnected or defective. Make sure that the actuator moves completely through the optical sensor. If it doesn't, adjust the bracket until it does. Follow the cable from the optical sensor all the way back to the lane controller, verifying all connections and making sure that the cable has not been cut or crimped.**

The drawbar does not attain the rear of the pinsetter.

1. **Check the strings adjustment, they are probably too tight.**
2. **Check the torque adjustment, it may be too low.**
3. **There may be foreign matter in the magnetic clutch drive, or the UP clutch sprocket (part #9102114) may be slipping. Dismantle the UP clutch sprocket, clean and reassemble. After re-assembly, cycle the pinsetter 3-4 times so as to ensure that the clutch makes good contact with the disk. Adjust the torque if necessary.**

Once the pins are set on the lane, the drawbar carriage remains in the middle of the pinsetter.

1. **Check that the magnetic clutch used to lower the pins is functioning properly and that it has the correct clutch/disk spacing.**

The drawbar does not move after a ball has been detected and after 7-8 seconds, the drawbar pushes the stoppers in position D1 (DOWN).

1. **The 90-volt bridge (part #E-214115) located in the power box may be defective. The green light on the power box must be ON, if it isn't, replace the 90-volt bridge.**

Note *If the 90-volt bridge is defective, there is a good chance that its Varistor is also defective.*

2. **Check that the magnetic clutch used to raise the pins is functioning properly and that it has the correct clutch/disk spacing.**
3. **If only one of the magnetic clutches does not engage, chances are that the problem may be its corresponding relay located inside the power box.**

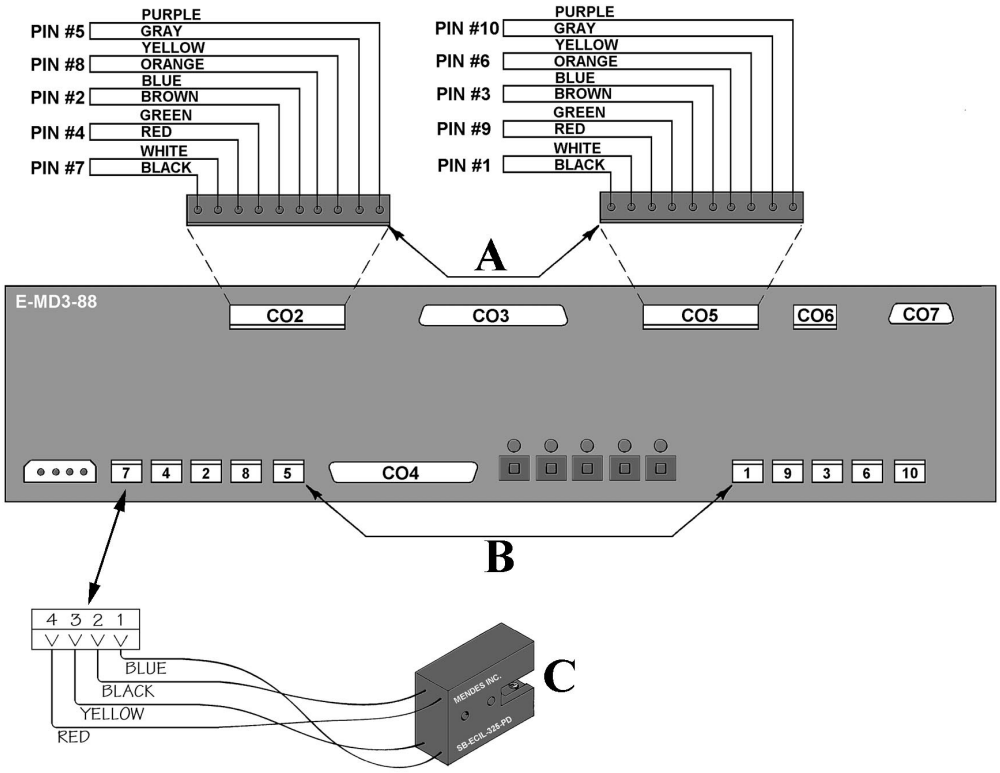
The chains emit a loud noise.

1. **Chains need to be adjusted.**

All fallen pins are re-spotted.

1 **The brake solenoids may be disconnected from the pin detector board (E-MD3-88). Push the connectors on the pin detector board to ensure a good contact.**

Figure 4.1 Pin Brake Connections



(A) pin brake solenoids

(B) pin detection optical sensors

(C) optical sensor

A fallen pin is re-spotted.

1 **Check the pin's brake adjustment and make sure that the pin's string follows its proper route.**

2 **The brake solenoid (part #9101070) or the brake cam spring (part #9105070) may be defective.**

3 **The pin detector optical sensor may be disconnected from the pin detector board. Push the connector on the pin detector board to ensure a good contact.**

4 **Check the pin detection assembly. The pin detection wheel must spin freely when its corresponding pin is hit. Lift the optical assembly with a finger and make sure that the pin detection wheel is free to turn.**

5 **The optical sensor may be defective or obstructed with dust. Clean the optical sensor with pressurized air or replace it.**

A pin kept up, slowly descends or suddenly falls to the lane.

1 **Check the pin's brake adjustment and make sure that the pin's string follows its proper route.**

One or more pins do not descend to their proper location (out of spot).

1 **Strings are too loose and should be adjusted correctly.**

The pins fall over when set on the lane.

1 **Check the pin pause adjustment.**

The pins hit the lane with a loud noise.

1 **Check the pin pause adjustment.**

Ball 1 and/or ball 2 signal lights do not turn on.

1 **Replace the ball 1/2 light bulb(s).**
2 **Check the ball 1/2 cable assembly.**

Service support

With the original purchase of a Mendes product, you have access to extensive support coverage. During the Mendes product warranty period, you may call the Mendes Help Center for product assistance covered under the terms of the"Mendes Statement of Limited Warranty". For telephone numbers to call, See "Getting help by telephone" on page 81.

The following services are available during the warranty period:

- Problem determination : Trained personnel are available to assist you with determining what type of problem you have and deciding what action is necessary to fix the problem.
- Mendes equipment repair : If the problem is determined to be caused by Mendes equipment under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management : Occasionally, there might be changes that are required after a product has been sold. Mendes or your distributor, if authorized by Mendes, will make engineering changes (EC's) available that apply to your equipment.

Please have the following information ready when you call:

- Equipment type and model
- Serial numbers of your Mendes equipment
- Description of the problem
- Exact wording of any error messages

Refer to the "Mendes Statement of Limited Warranty" on page 156 *for a full explanation of the Mendes warranty terms.*

Before you call for service

Many problems can be solved without outside assistance, by using the on-line or printed documentation that comes with your equipment. Also, if applicable, be sure to read the information in any README files that come with your software.

Most Mendes equipment comes with documentation that contains troubleshooting procedures and explanations of error messages.

Getting customer support and service

Purchasing a Mendes product entitles you to standard help and support during the warranty period. If you need additional support and services, a wide variety of extended services are available for purchase that address almost any need.

Getting help on-line On-line help is a remote communication service that allows a Mendes technical-support representative to access your PC by modem. Many problems can be remotely diagnosed and corrected quickly and easily. In addition to a modem, a remote-access application program is required. There might be a charge for this service depending on the request.

For more information about configuring your PC for on-line help, contact the Mendes Help Center.

Getting help by telephone During the warranty period, you can get help and information by telephone through the Mendes Help Center. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your equipment and configuring it to your needs;
- Installing and setting up Mendes options purchased from Mendes or a Mendes distributor;
- Arranging for service (on-site or ship-in);
- Arranging for overnight shipment of customer-replaceable parts.

It is important to remember that response time will vary depending on the number and complexity of incoming calls.

USA: 1-800-462-1022

CANADA: 1-800-561-0644

WORLDWIDE: 1-418-650-6022

Telephone numbers listed are subject to change without notice.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for computer hardware, Mendes application programs, upgraded or extended product repair services, and custom installations. Service availability and name might vary by country. For more information or to purchase these services, contact the Mendes Help Center.

Warranty and repair services

You can extend your standard product warranty service beyond the warranty period. Warranty and repair services offer a variety of post-warranty maintenance options. Availability of the services varies by product. For more information about warranty extensions, contact the Mendes Help Center.

Ordering publications

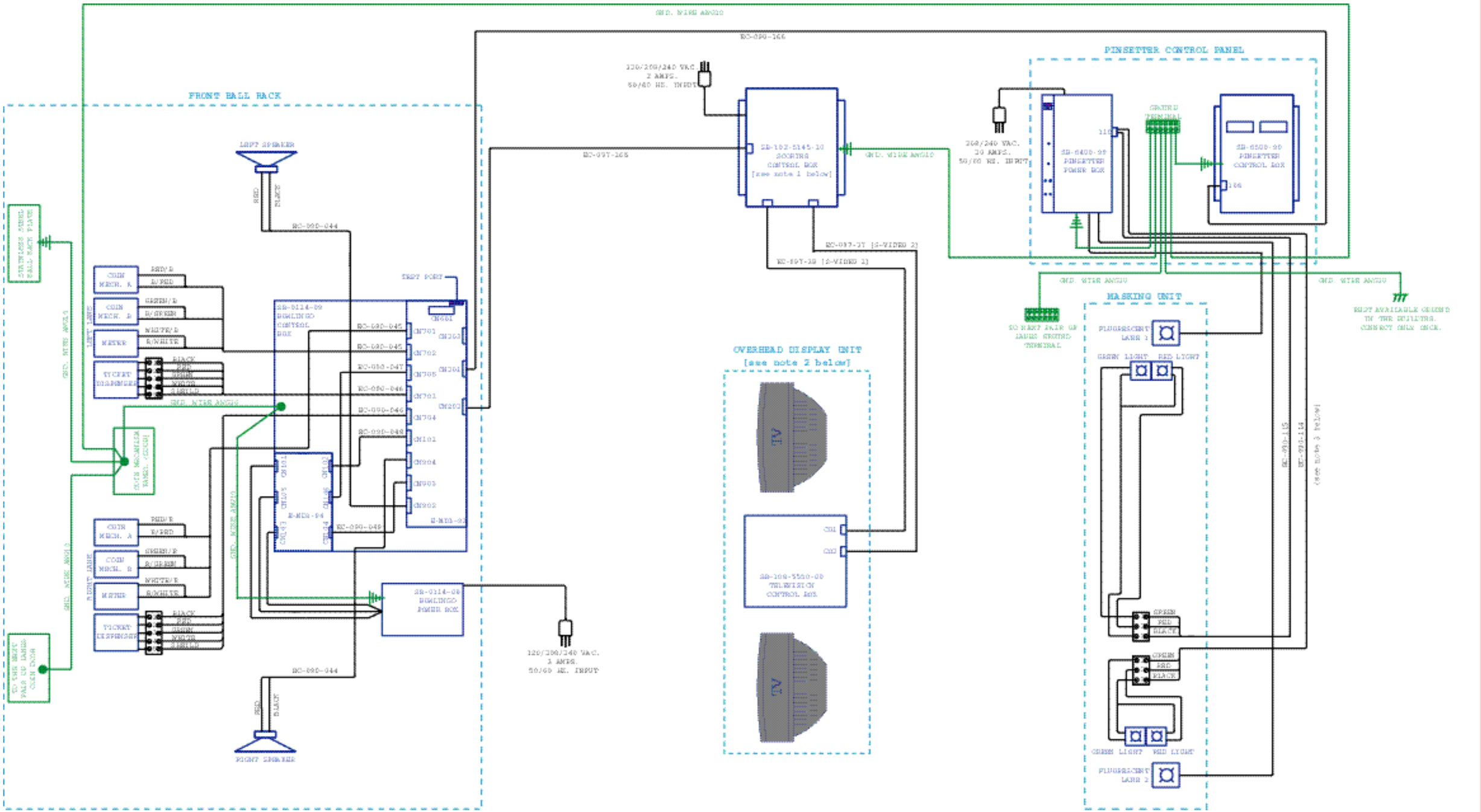
Additional publications are available for purchase from Mendes. For a list of publications available in your country, contact the Mendes Help Center.

Chapter 5
Wiring Diagrams

Chapter Overview

This chapter provides you with all necessary wiring and electronic information in easy to comprehend diagrams for your reordering and servicing convenience.

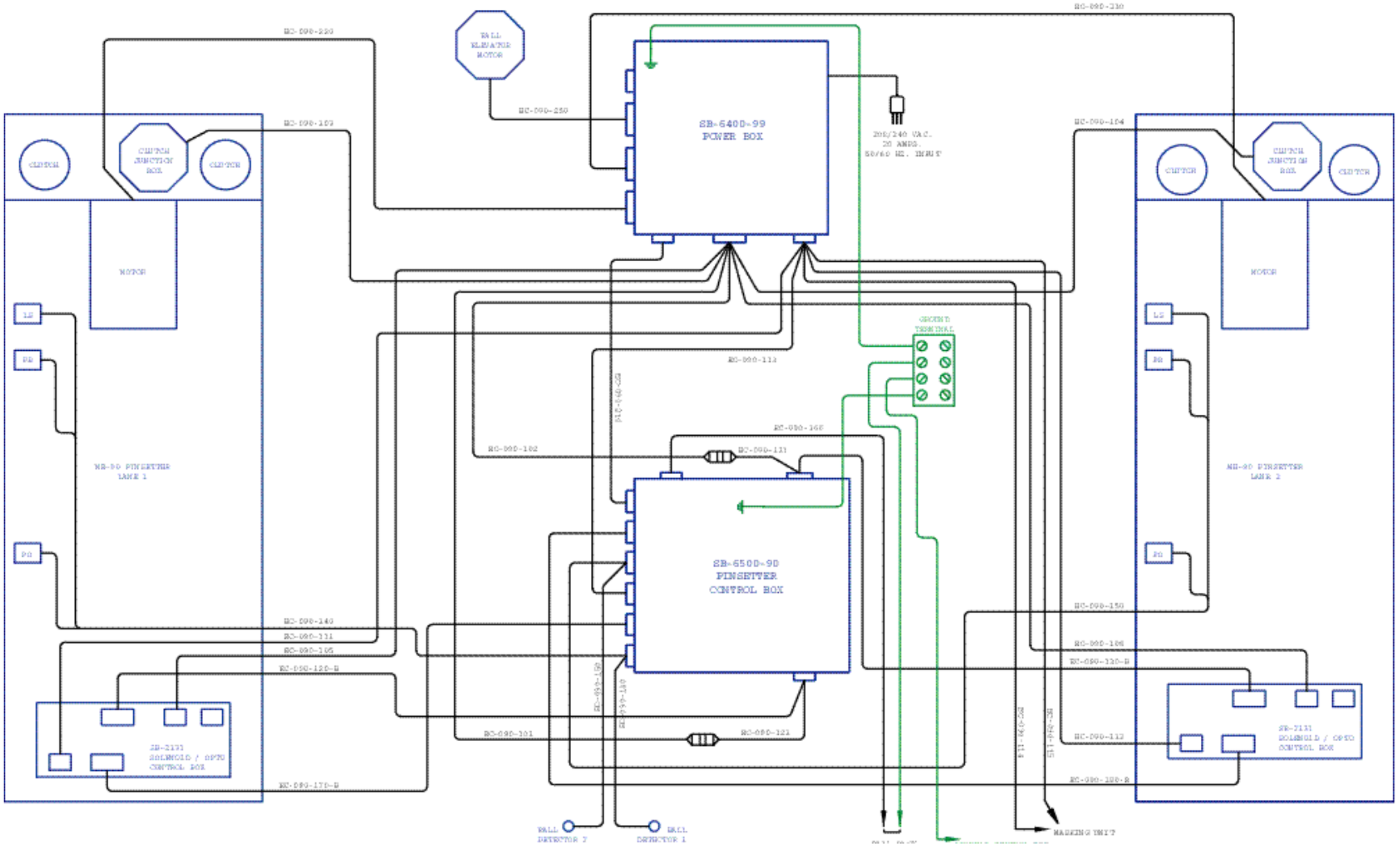
Figure 5.1 bowlingo Component Interconnections



NOTE 1: Refer to Figure 5.3 on page 89 for additional details.
NOTE 3: EC-090-114 and EC-090-115 are part of the major cable harness EC-090-110-B.

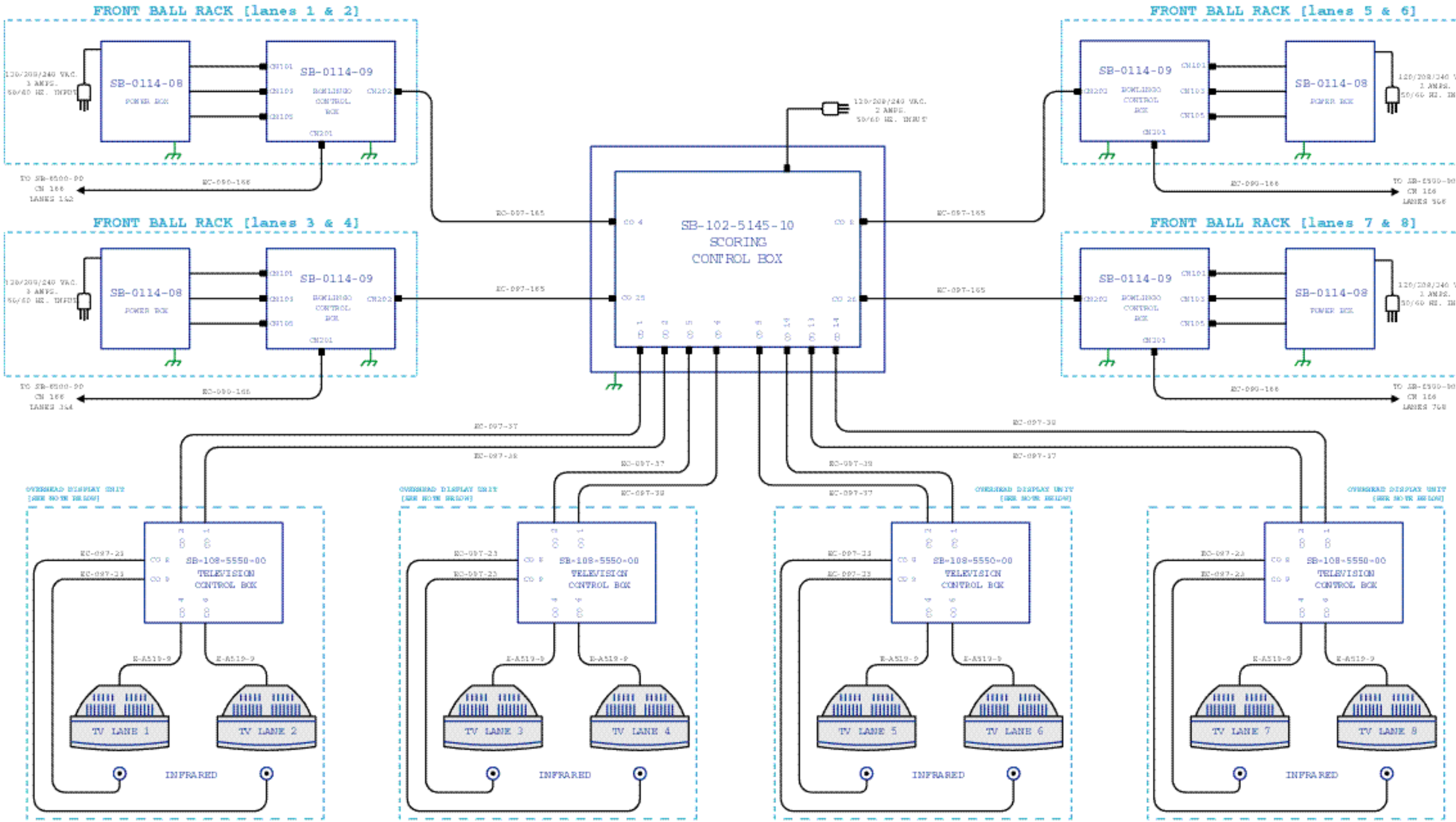
NOTE 2: Refer to Figure 5.4 on page 91 for additional details.

Figure 5.2 MEB-90 Pinsetter Component Interconnections



NOTES: *EC-090-101, 102, 103, 104, 105 and 106 are part of the major cable harness EC-090-100-B.*
EC-090-111, 112, 113, 114, and 115 are part of the major cable harness EC-110-B

Figure 5.3 Scoring Control Box Component Interconnections



NOTE: Refer to Figure 5.4 on page 91 for additional details.

Figure 5.4 Television Power Supply

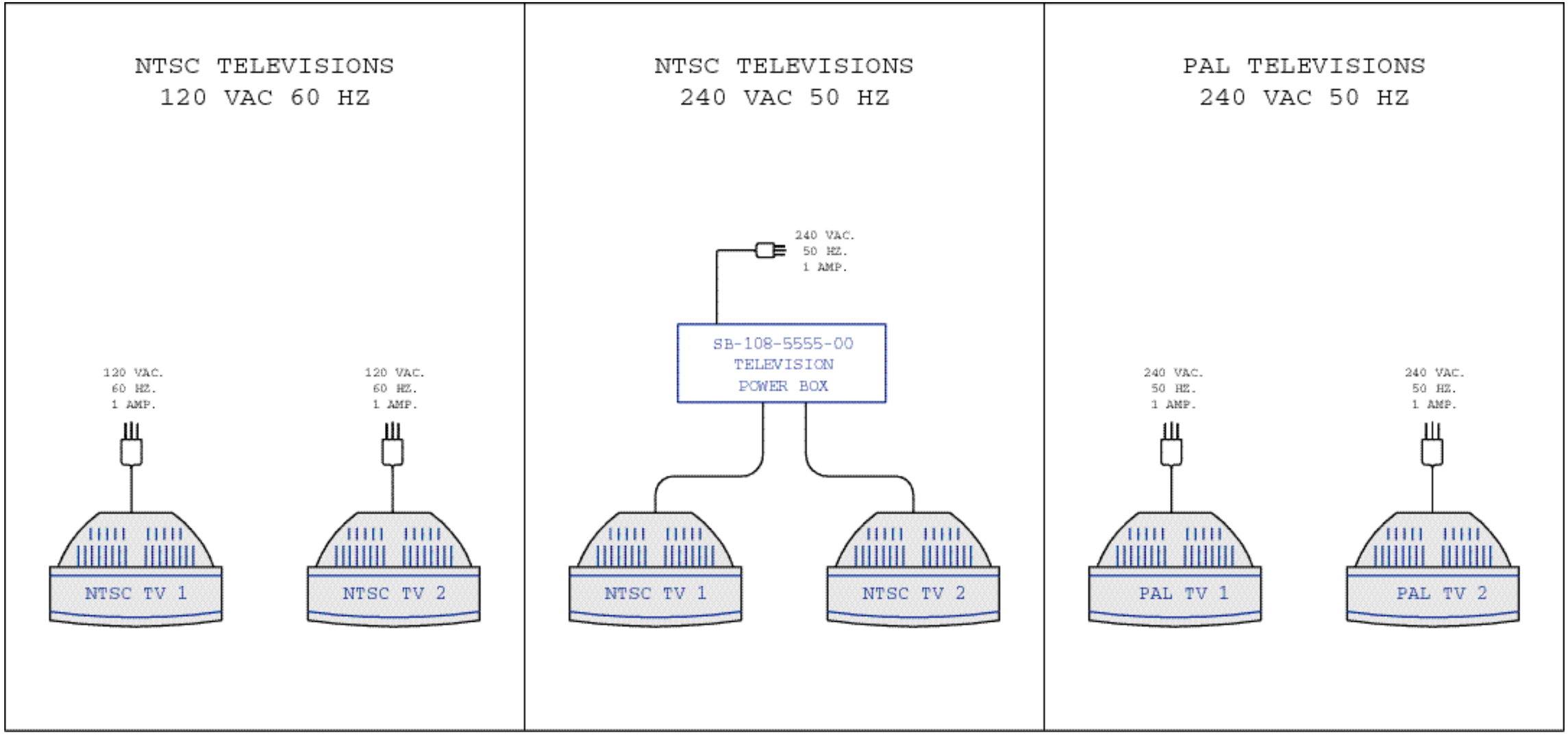
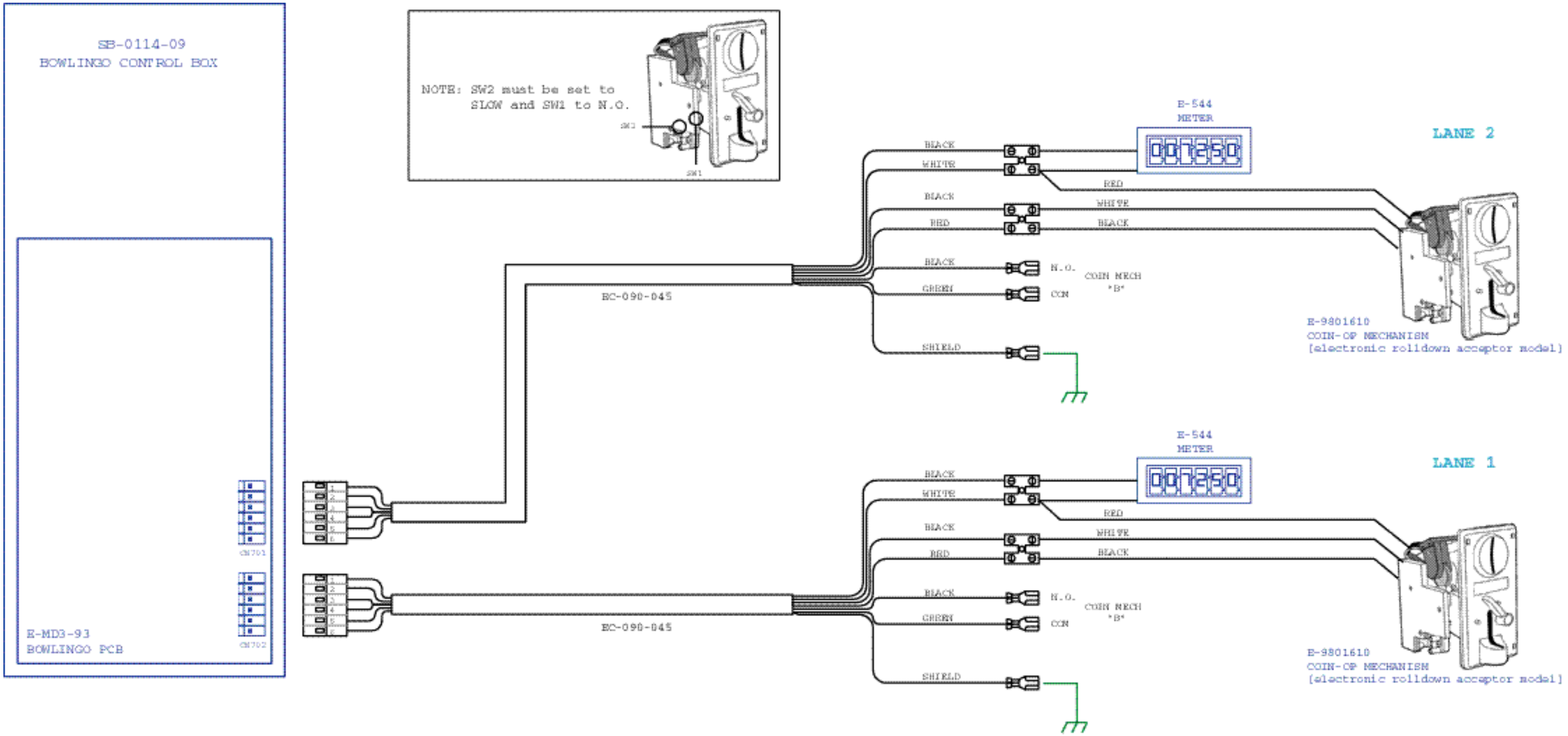


Figure 5.5 Coin-op Mechanism Connections
Electronic Rolldown Acceptor Model



NOTE: Remove the terminal on the Black and Red wire (EC-090-045) and use a terminal strip to connect the coin-op mechanism.

Chapter 6
bowlingo Parts Catalog

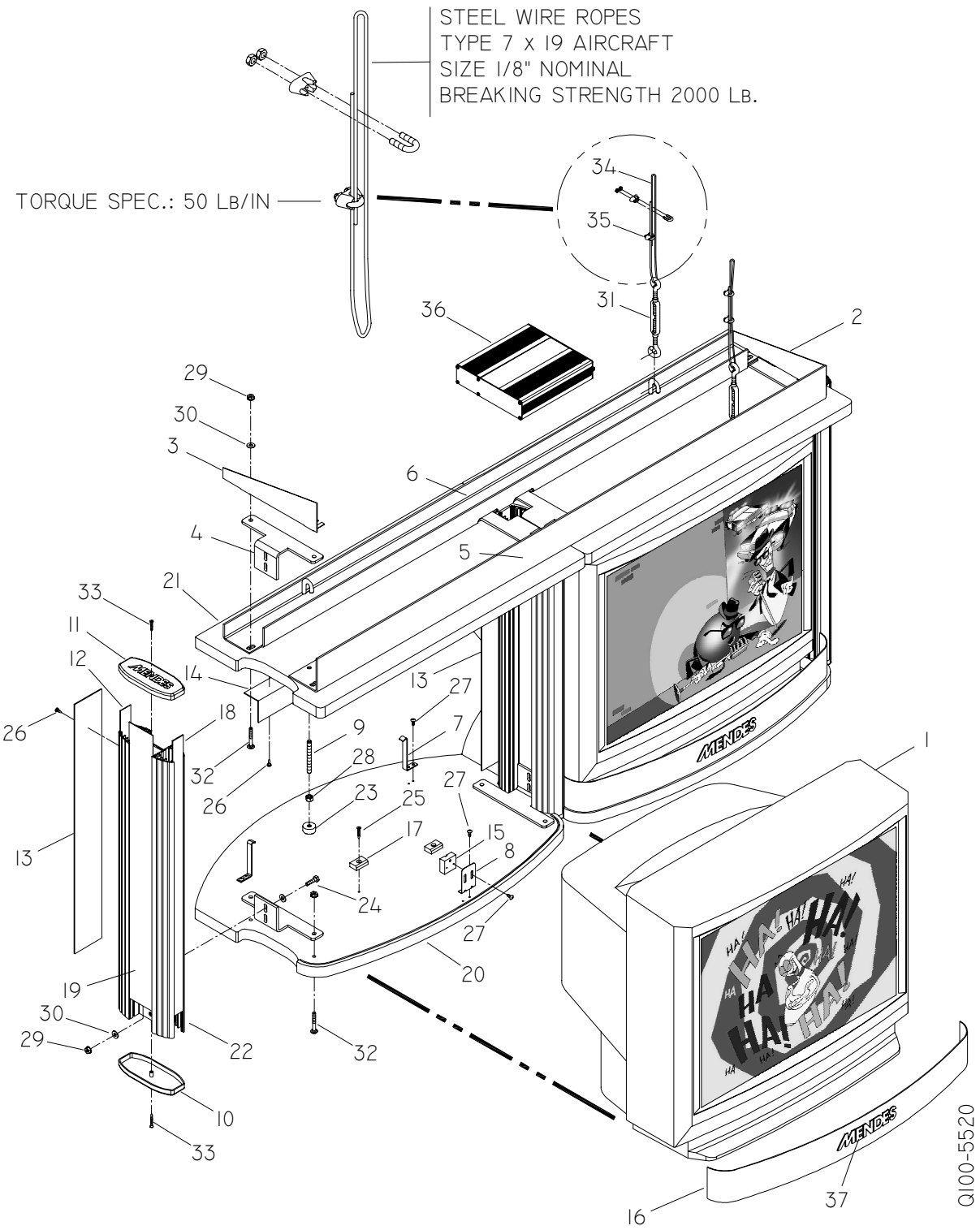
Chapter Overview

This chapter provides you with a complete breakdown of all your equipment's parts in exploded views for your reordering and servicing convenience.

Overhead Display Unit

	Part No.	Description	Qty
1	101-1027-03	27" TELEVISION	2
2	102-5500-00	OVERHEAD SUPPORT CAP {RIGHT}	1
3	102-5505-00	OVERHEAD SUPPORT CAP {LEFT}	1
4	102-5510-00	SUPPORT BRACKET	8
5	102-5520-00	OVERHEAD SUPPORT FRONT {2 T.V.}	1
6	102-5525-00	OVERHEAD SUPPORT REAR {2 T.V.}	1
7	102-5550-00	T.V. RETAINING BRACKET	4
8	102-5560-00	LED SUPPORT BRACKET	2
9	102-5620-00	THREAD ROD	4
10	103-5500-00	COLUMN CAP {BOTTOM}	3
11	103-5505-00	COLUMN CAP {TOP}	2
12	103-5520-00	27" T.V. COLUMN MOULDING, REAR	3
13	103-5530-00	27" T.V. REAR SIDE PANEL	4
14	103-5550-00	27" T.V. REAR TOP PANEL	2
15	103-5560-00	LED BLOCK	2
16	103-5570-00	27" T.V. FRONT PANEL	2
17	103-5580-00	T.V. STOPPER	4
18	103-5590-00	27" T.V. COLUMN MOULDING, FRONT	3
19	103-5595-04	27" T.V. COLUMN MOULDING, SIDE {GRAY}	6
	103-5595-36	27" T.V. COLUMN MOULDING, SIDE {YELLOW}	6
	103-5595-41	27" T.V. COLUMN MOULDING, SIDE {MAGENTA}	6
	103-5595-85	27" T.V. COLUMN MOULDING, SIDE {BLUE}	6
20	106-5500-00	27" T.V. BASE PLATE	2
21	106-5510-00	27" T.V. TOP PLATE	2
22	108-5500-01	OVERHEAD COLUMN	3
23	304-1560-00	BUMPER PAD	4
24	7010-002520-100	HEXAGON CAP SCREW {1/4"-20 x 1"}	12
25	7022-310800-100	FLAT SOCKET HEAD WOOD SCREW {#8 x 1"}	4
26	7024-640600-043	PAN SOCKET HEAD METAL SCREW {#6 x 7/16"}	24
27	7024-710800-050	TRUSS SOCKET HEAD METAL SCREW {#8 x 1/2"}	16
28	7034-003118-000	HEXAGON NUT {5/16"-18}	4
29	7038-002520-000	HEXAGON LOCKNUT {1/4"-20}	28
30	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	28
31	7080-800000-030	TURNBUCKLE {5/16"-18}	4
32	7412-002520-175	CARRIAGE BOLT BLACK {1/4"-20 x 1 3/4"}	16
33	7422-310600-075	BLACK FLAT SOCKET HEAD WOOD SCREW {#6 x 3/4"}	5
34	C-061	STEEL CABLE	12
35	C-084	CABLE CLIP	16
36	SB-108-5550-00	“Television control box”	1
37	Z-466	MENDES STICKER	2

Figure 6.1 Overhead Display Unit



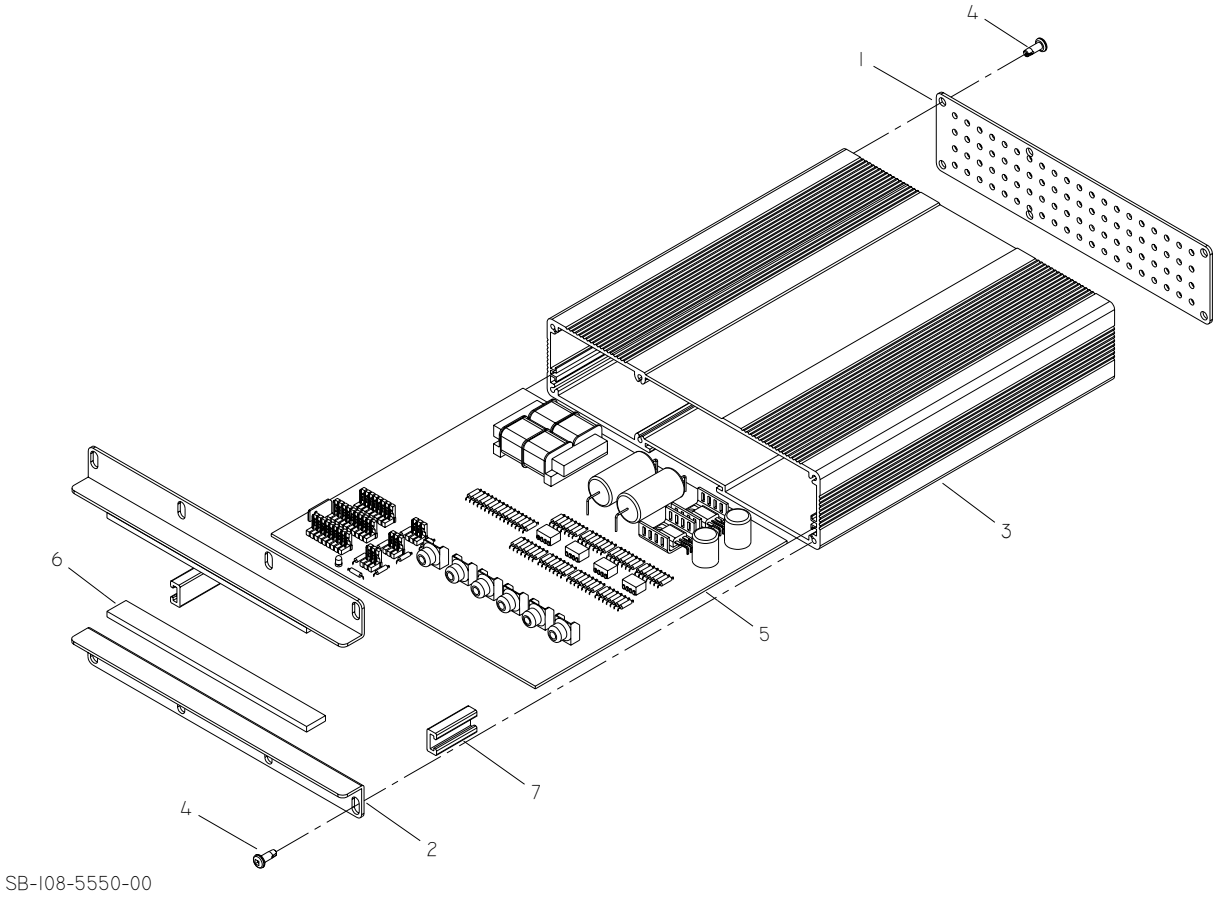
Television control box

	Part No.	Description	Qty
1	102-5220-00	CONTROL BOX COVER	1
2	102-5230-00	CABLE COVER	2
3	108-5550-00	OVERHEAD CONTROL BOX CHASSIS	1
4	7025-610600-037	PAN SOCKET HEAD TAP SCREW {#6 x 3/8"}	12
5	E-MD97-07	TELEVISION CONTROL PCB	1
6	MPD-098	NEOPRENE TAPE	2
7	P-6420-25	PCB STOPPER	2

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

8	E-A519-9	S-VIDEO CABLE ASSEMBLY
9	EC-097-23	INFRARED TRANSMITTER CABLE ASSEMBLY
10	EC-097-37	S-VIDEO CABLE ASSEMBLY
11	EC-097-38	S-VIDEO CABLE ASSEMBLY

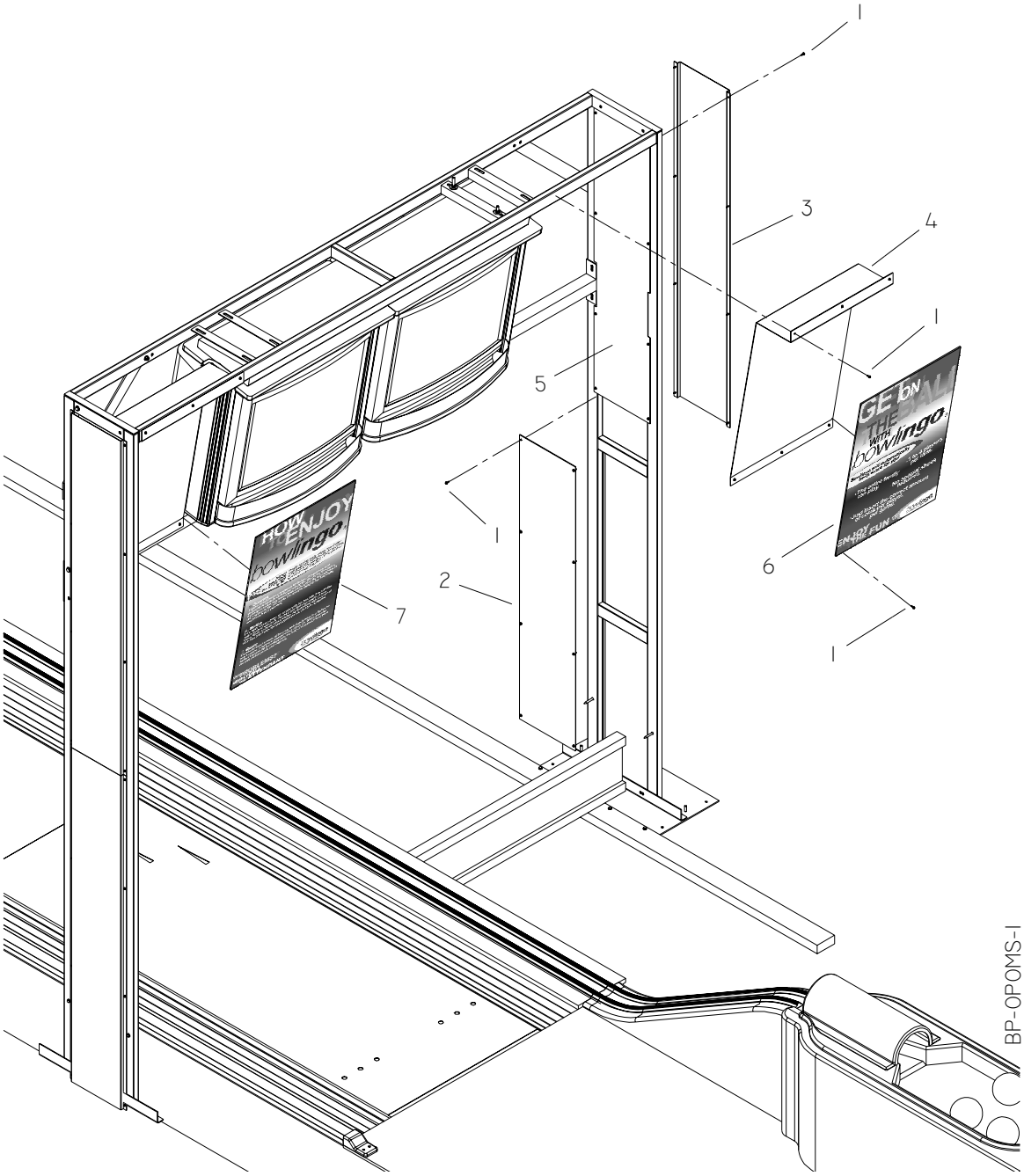
Figure 6.2 Television Control Box



Support unit panels (optional)

	Part No.	Description	Qty
1	7027-200818-050	HEXAGON FLANGE SOCKET HEAD TAP SCREW {#8 x 1/2"}	84
2	M-0540-87	SIDE PLATE IN {BOTTOM}	2
3	M-0540-88	SIDE PANEL OUT	4
4	M-0540-89	OVERHEAD SIDE PANEL	2
5	M-0540-90	SIDE PLATE IN {TOP}	2
6	Z-546	GET ON THE BALL WITH BOWLINGO PANEL	1
7	Z-547	HOW TO ENJOY BOWLINGO PANEL	1

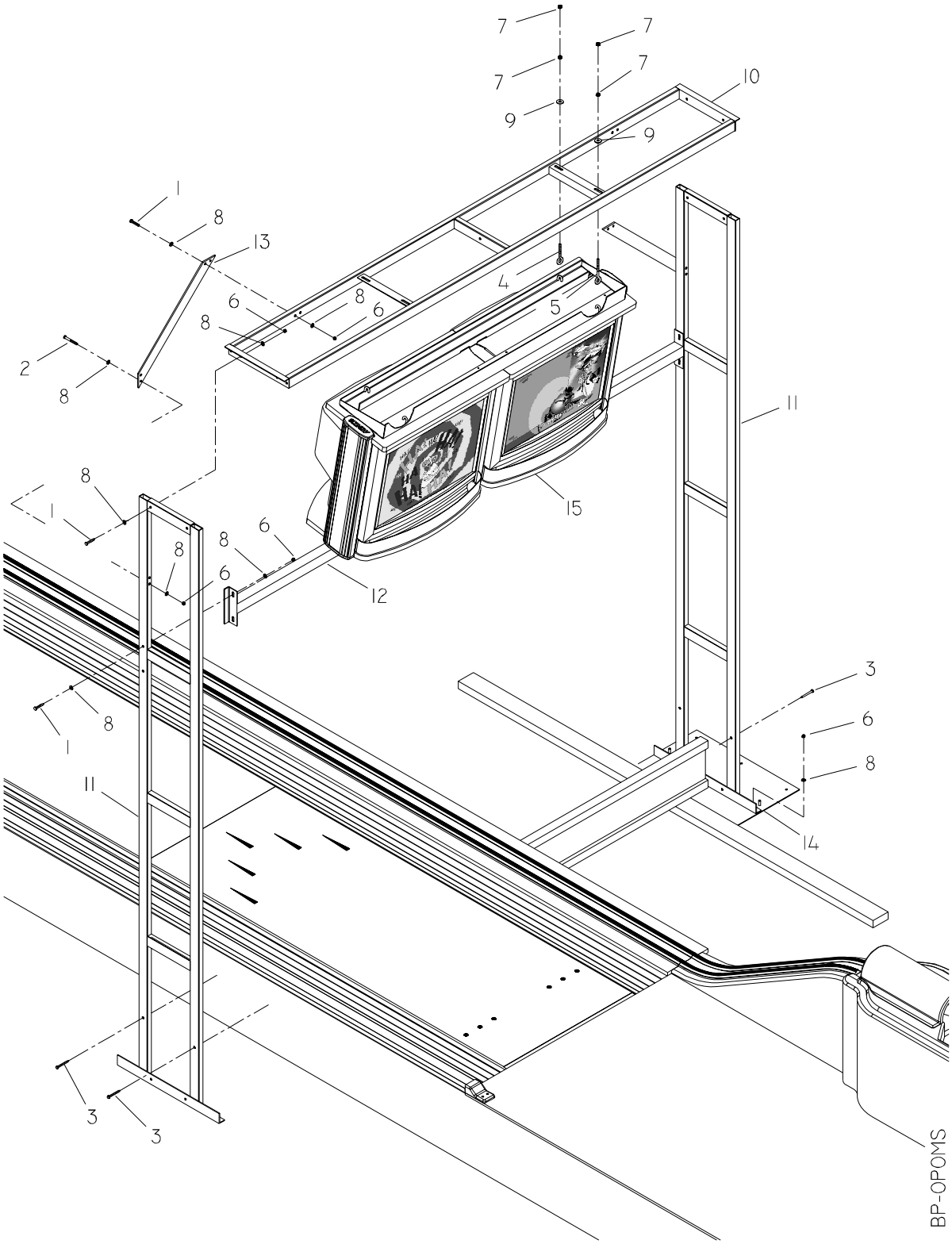
Figure 6.3 Overhead Monitor Support Unit



Support unit frame (optional)

	Part No.	Description	Qty
1	7010-003118-175	HEXAGON CAP SCREW {5/16"-18 x 1 3/4"}	12
2	7010-003118-275	HEXAGON CAP SCREW {5/16"-18 x 2 3/4"}	4
3	7024-201400275	HEXAGON FLANGE SOCKET HEAD METAL SCREW {#14 x 2 3/4"}	3
4	7032-003118-400	EYE BOLT {5/16"-18 x 4"}	2
5	7032-003118-500	EYE BOLT {5/16"-18 x 5"}	2
6	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	18
7	7038-003118-000	HEXAGON LOCKNUT {5/16"-18}	8
8	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	24
9	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	4
10	M-0540-80	TOP FRAME	1
11	M-0540-81	SIDE FRAME	2
12	M-0540-82	CENTER BRACE	1
13	M-0540-83	CORNER BRACE	2
14	M-0540-84	UNION BASE PLATE	1
15	Q100-5520	“Overhead Display Unit”	1

Figure 6.4 Overhead Monitor Support Frame



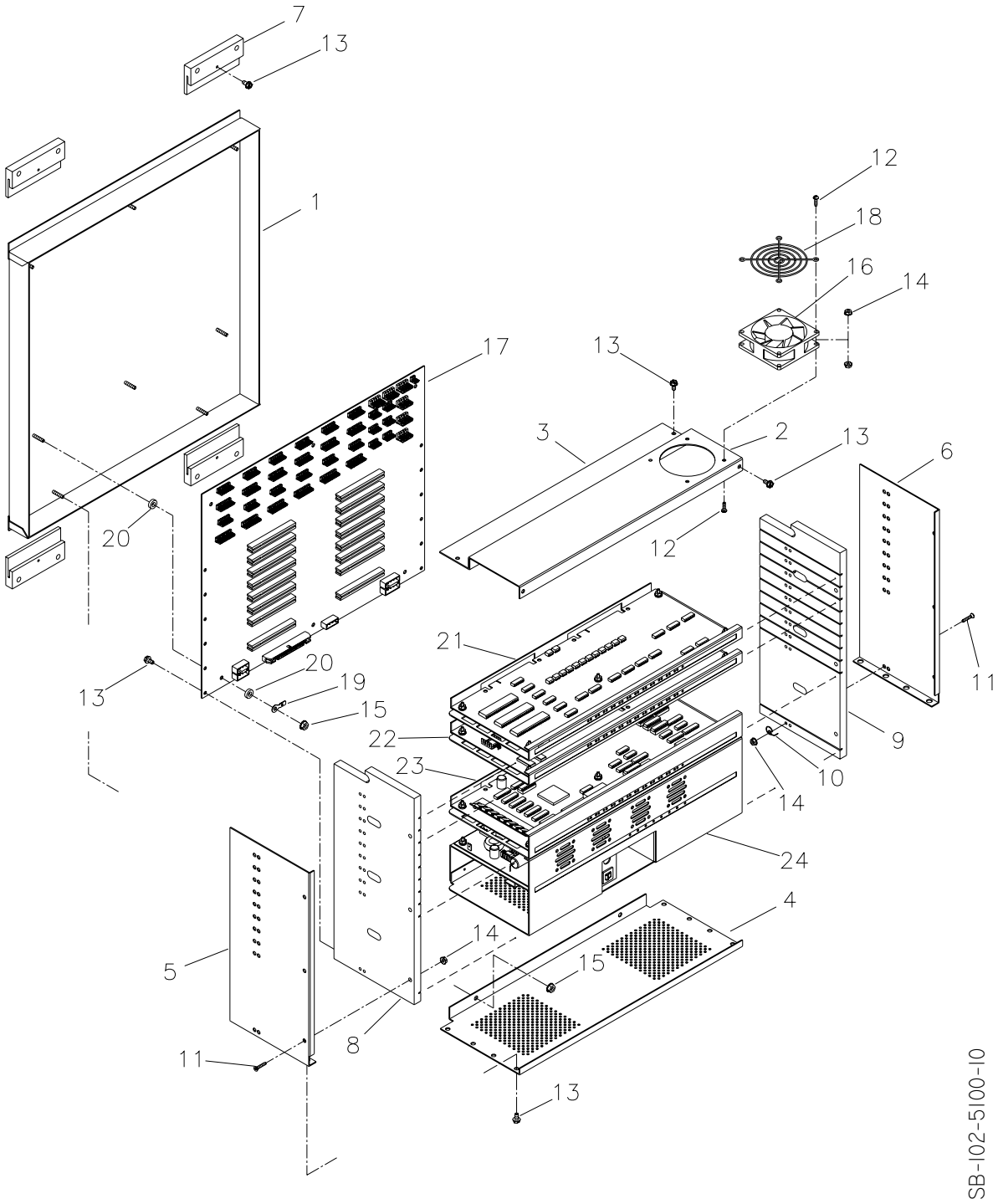
Scoring Control Box

	Part No.	Description	Qty
1	102-5100-01	MOUNTING PLATE	1
2	102-5110-00	TOP COVER {LARGE}	1
3	102-5120-00	TOP COVER {SMALL}	1
4	102-5130-00	BOTTOM COVER	1
5	102-5180-00	SIDE PLATE {RIGHT}	1
6	102-5185-00	SIDE PLATE {LEFT}	1
7	103-5030-00	CHASSIS BLOCK	4
8	103-5100-00	TRAY GUIDE PLATE {RIGHT}	1
9	103-5105-00	TRAY GUIDE PLATE {LEFT}	1
10	105-5100-00	GROUND SPRING	12
11	7016-310632-075	FLAT HEAD MACHINE SCREW {#6-32 x 3/4"}	18
12	7016-430632-050	ROUND HEAD MACHINE SCREW {#6-32 x 1/2"}	8
13	7024-221000-037	HEXAGON FLANGE SOCKET HEAD METAL SCREW {#10 x 3/8"}	5
14	7038-000632-000	HEXAGON LOCKNUT {#6-32}	26
15	7038-000832-000	HEXAGON LOCKNUT {#8-32}	17
16	E-903	FAN 12 VDC	1
17	E-MD97-04CE	SCORING CONTROL BOX PCB	1
18	E-SC80-W2	FAN GRILL	1
19	E-TG	GROUND TERMINAL	1
20	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	12
21	SB-102-5150-00	“Input / output tray assembly”	1
22	SB-102-5155-00	“MPEG tray assembly”	1
23	SB-102-5160-00	“CPU tray assembly”	1
24	SB-102-5170-00	“Power supply tray assembly”	1

associated cables (not illustrated – refer to Chapter 5 of the Owner’s Manual)

25	EC-097-165	BOWLINGO CONTROL TO SCORING CONTROL CABLE ASSEMBLY
26	EC-097-37	S-VIDEO CABLE ASSEMBLY
27	EC-097-38	S-VIDEO CABLE ASSEMBLY

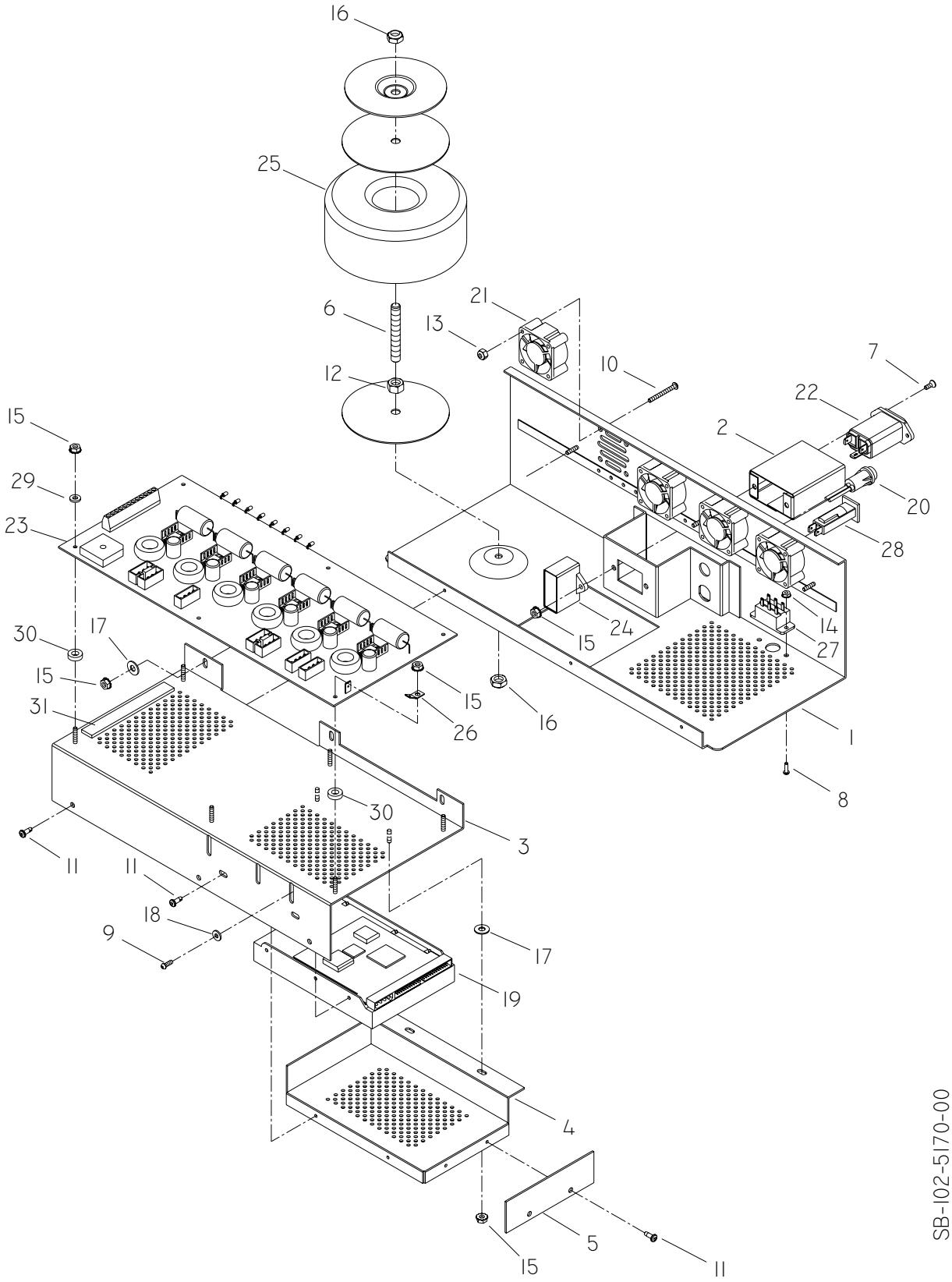
Figure 6.5 Scoring Control Box



Power supply tray assembly

	Part No.	Description	Qty
1	102-5170-00	TRAY CHASSIS	1
2	102-5175-00	WIRE TUNNEL	1
3	102-5190-00	TRAY COVER	1
4	102-5290-00	HARD DISK BRACKET	1
5	102-5295-00	HARD DISK BRACKET COVER	1
6	103-5190-00	NYLON THREAD ROD	1
7	7016-310632-075	FLAT HEAD MACHINE SCREW {#6-32 x 3/4"}	2
8	7016-410440-037	ROUND HEAD MACHINE SCREW {#4-40 x 3/8"}	2
9	7016-410632-031	ROUND HEAD MACHINE SCREW {#6-32 x 5/16"}	3
10	7016-410632-125	ROUND HEAD MACHINE SCREW {#6-32 x 1 1/4"}	16
11	7025-610600-037	PAN SOCKET HEAD TAP SCREW {#6 x 3/8"}	5
12	7034-003118-00	HEXAGON NUT {5/16"-18}	1
13	7036-000632-000	HEXAGON NYLON INSERT LOCKNUT {#6-32}	16
14	7038-000440-037	HEXAGON LOCKNUT {#4-40}	2
15	7038-000632-000	HEXAGON LOCKNUT {#6-32}	11
16	7044-003118-000	HEXAGON THIN NYLON INSERT LOCKNUT {5/16"-18}	2
17	7050-021050-006	FLAT WASHER {7/32" x 1/2" x 1/16"}	3
18	7052-015037-004	FLAT WASHER {5/32" x 3/8" x 3/64"}	3
19	E-102-5170-00	HARD DISK DRIVE {SCSI}	1
20	E-1052C5-115	GREEN PILOT LAMP, 115 VAC	1
21	E-902	FAN 12 VDC	4
22	E-F15756	FILTER	1
23	E-MD97-05	POWER SUPPLY PCB	1
24	E-RAM362BWZ	SURGE PROTECTOR	1
25	E-TC144S	TRANSFO TOROIDAL 250VAC	1
26	E-TG-1	TERMINAL GROUND	1
27	E-V80212	LINE VOLTAGE SWITCH	1
28	E-W28XQ1A-2	CIRCUIT OVERLOAD, 2 AMP	1
29	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	5
30	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	8
31	MPD-098	NEOPRENE TAPE {4"}	1

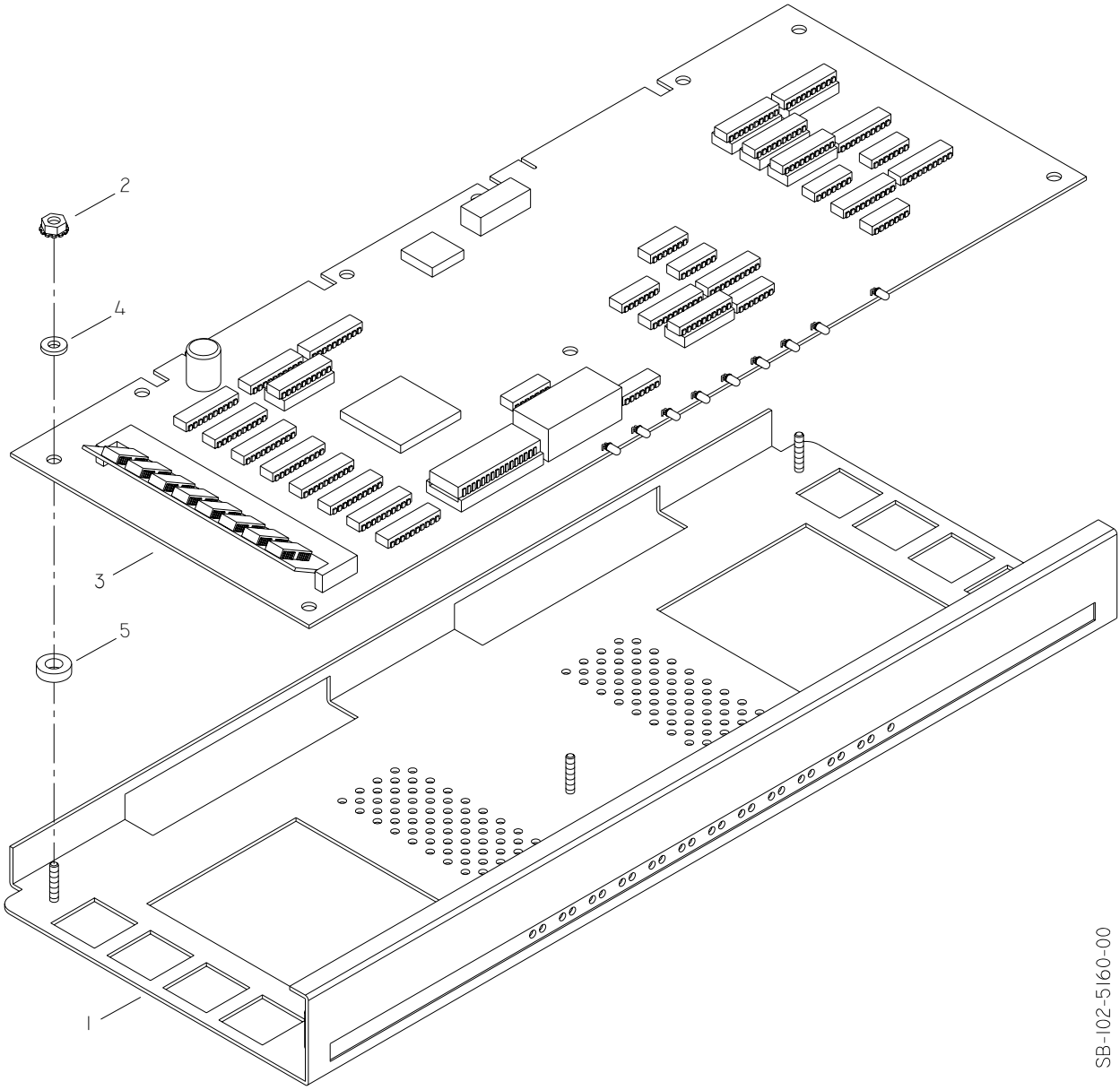
Figure 6.6 Power Supply Tray Assembly



CPU tray assembly

	Part No.	Description	Qty
1	102-5160-00	PCB DRAWER	1
2	7038-000632-000	HEXAGON LOCKNUT {#6-32}	5
3	E-MD97-01	CPU CONTROLLER PCB	1
4	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	5
5	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	5

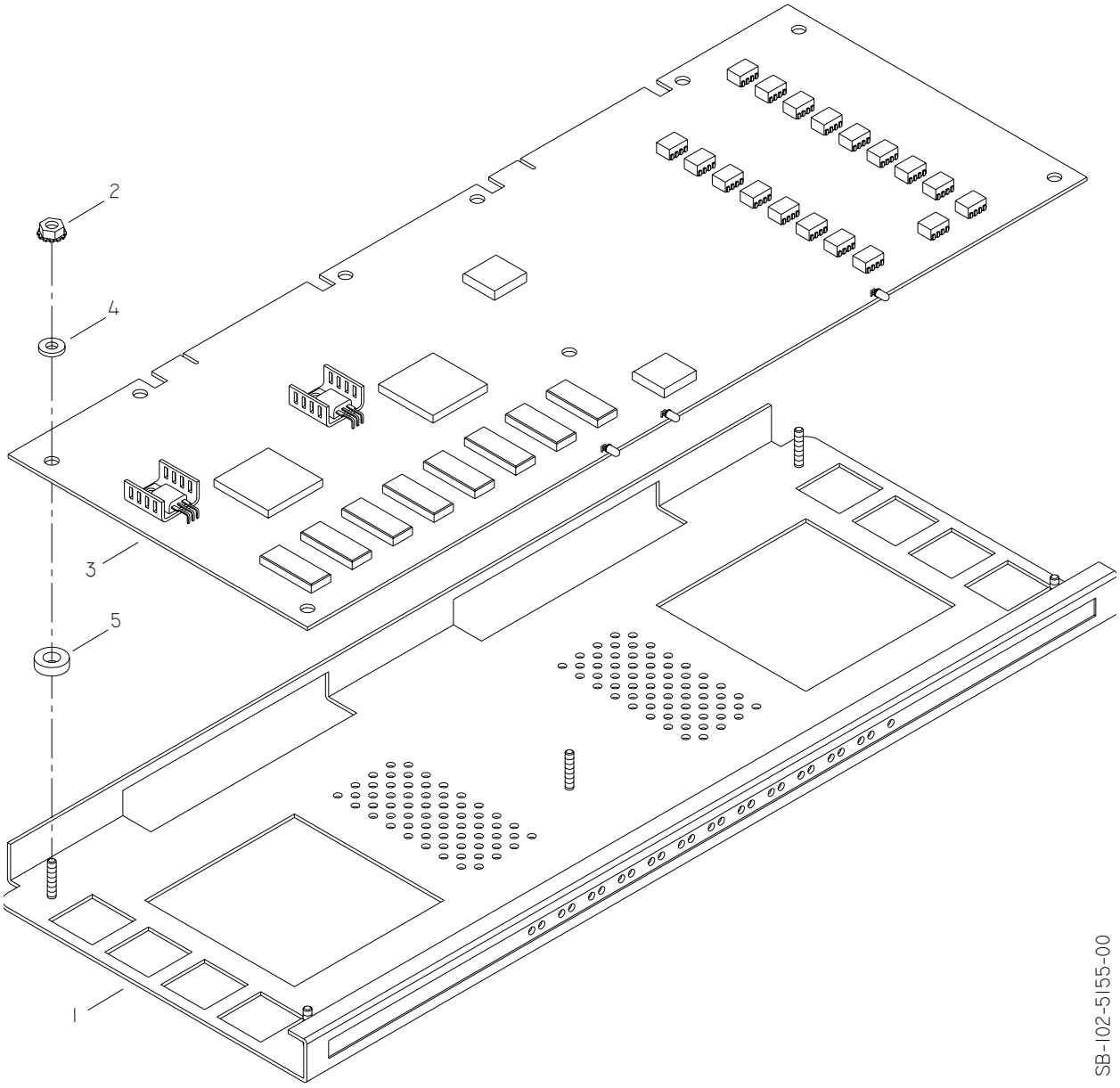
Figure 6.7 CPU Tray Assembly



MPEG tray assembly

	Part No.	Description	Qty
1	102-5150-00	PCB DRAWER	1
2	7038-000632-000	HEXAGON LOCKNUT {#6-32}	5
3	E-MD97-02-1	S-VIDEO PCB	1
4	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	5
5	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	5

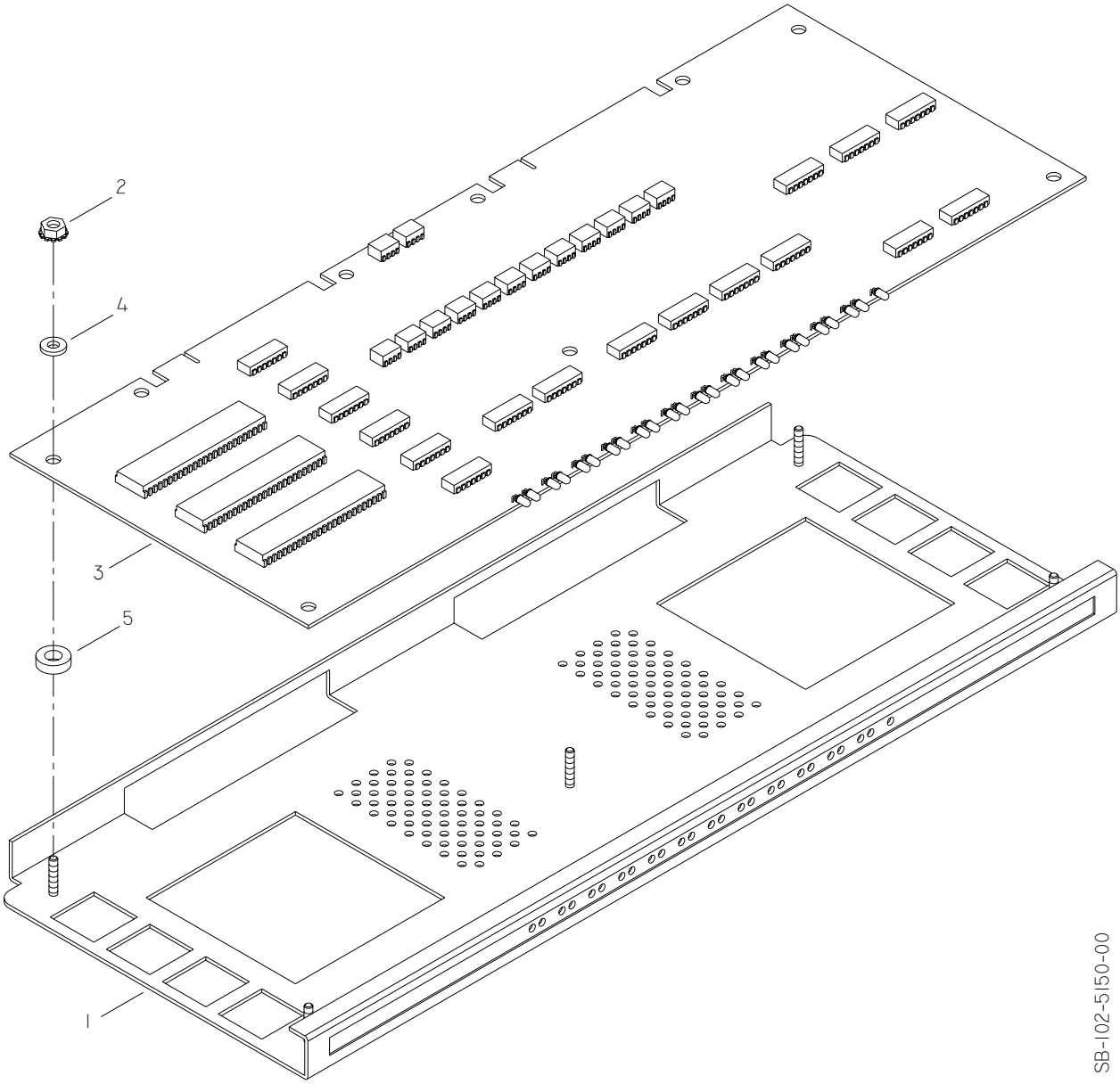
Figure 6.8 MPEG Tray Assembly



Input / output tray assembly

	Part No.	Description	Qty
1	102-5150-00	PCB DRAWER	1
2	7038-000632-000	HEXAGON LOCKNUT {#6-32}	5
3	E-MD97-03	INPUT/OUTPUT PCB	1
4	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	5
5	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	5

Figure 6.9 Input / Output Tray Assembly



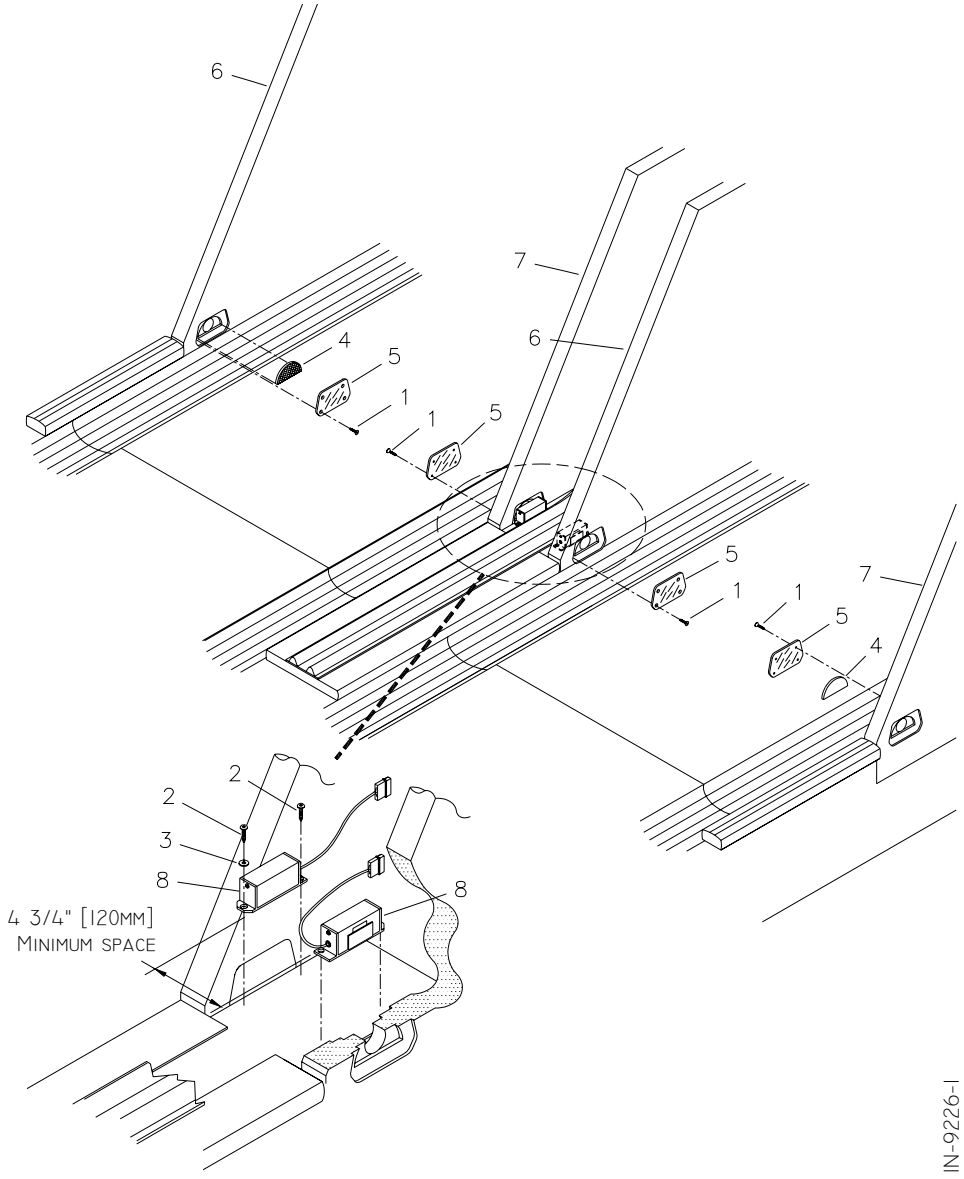
Ball Detector

	Part No.	Description	Qty
1	7022-310800-075	FLAT SOCKET HEAD WOOD SCREW {#8 x 3/4"}	16
2	7024-710800-075	TRUSS SOCKET HEAD METAL SCREW {#8 x 3/4"}	4
3	7050-018043-004	FLAT WASHER {3/16" x 7/16" x 3/64"}	2
4	E-FE-RR1	REFLECTOR	2
5	P-0540-07	REFLECTOR PROTECTOR	4
6	Q88-0171-175L	KICKBACK, LEFT	2
7	Q88-0171-175R	KICKBACK, RIGHT	2
8	SB-1500-31-BW	BALL DETECTOR TRANSMITTER	2

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

9	EC-090-140	MACHINE 1 OPTICAL SENSORS CABLE ASSEMBLY
10	EC-090-150	MACHINE 2 OPTICAL SENSORS CABLE ASSEMBLY

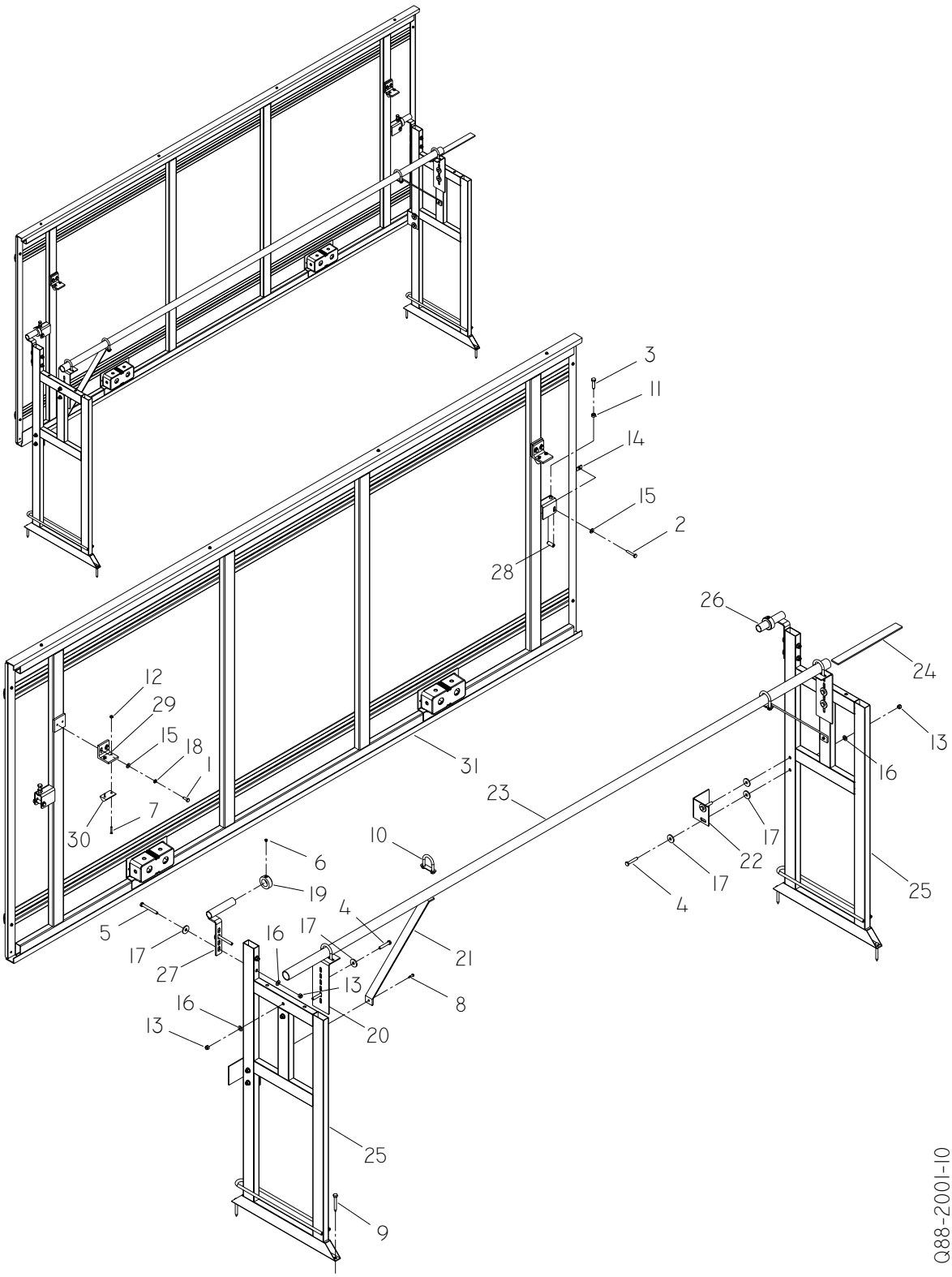
Figure 6.10 Ball Detector



Masking Unit Frame

	Part No.	Description	Qty
1	7010-002520-075	HEXAGON CAP SCREW {1/4"-20 x 3/4"}	4
2	7010-002520-150	HEXAGON CAP SCREW {1/4"-20 x 1 1/2"}	2
3	7010-003118-125	HEXAGON CAP SCREW {5/16"-18 x 1 1/4"}	2
4	7010-003118-175	HEXAGON CAP SCREW {5/16"-18 x 1 3/4"}	8
5	7010-003118-275	HEXAGON CAP SCREW {5/16"-18 x 2 3/4"}	4
6	7014-003118-025	HEXAGON SOCKET SET SCREW - CUP POINT {5/16"-18 x 1/4"}	2
7	7016-310632-100	FLAT HEAD MACHINE SCREW {#6-32 x 1"}	4
8	7027-201016-075	HEXAGON FLANGE SOCKET HEAD TAP SCREW {#10 x 3/4"}	2
9	7028-003100-250	HEXAGON SOCKET HEAD LAG SCREW {5/16" x 2 1/2"}	4
10	7030-003118-137	U BOLT {5/16"-18 x 1 3/8"}	4
11	7034-003118-000	HEXAGON NUT {5/16"-18}	2
12	7036-000632-000	HEXAGON NYLON INSERT LOCKNUT {#6-32}	4
13	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	12
14	7046-002520-006	WELD NUT {1/4"-20}	2
15	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	6
16	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	12
17	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	16
18	7060-025046-006	LOCK WASHER {1/4"}	4
19	M-0193	STEEL COLLAR {1 1/16" I.D.}	2
20	M-2000-13	PIPE SUPPORT BRACKET	2
21	M-2000-15	SUPPORT ARCH BRACE	2
22	M-2000-35	STOPPER BRACKET	2
23	M-2001-20	HORIZONTAL SUPPORT	1
24	M-2001-31	SUPPORT ARCH UNION	1
25	M-2100-10	MASKING SUPPORT FRAME	2
26	M-2100-15	PIVOT BRACKET {LEFT}	1
27	M-2100-16	PIVOT BRACKET {RIGHT}	1
28	M-2100-29	PIVOT BRACKET SPACER	2
29	M-2100-37	LOCK BRACKET	2
30	P-2100-37	PLASTIC LOCK	2
31	Q88-2001	“Masking unit panel assembly”	1

Figure 6.11 Masking Unit Frame



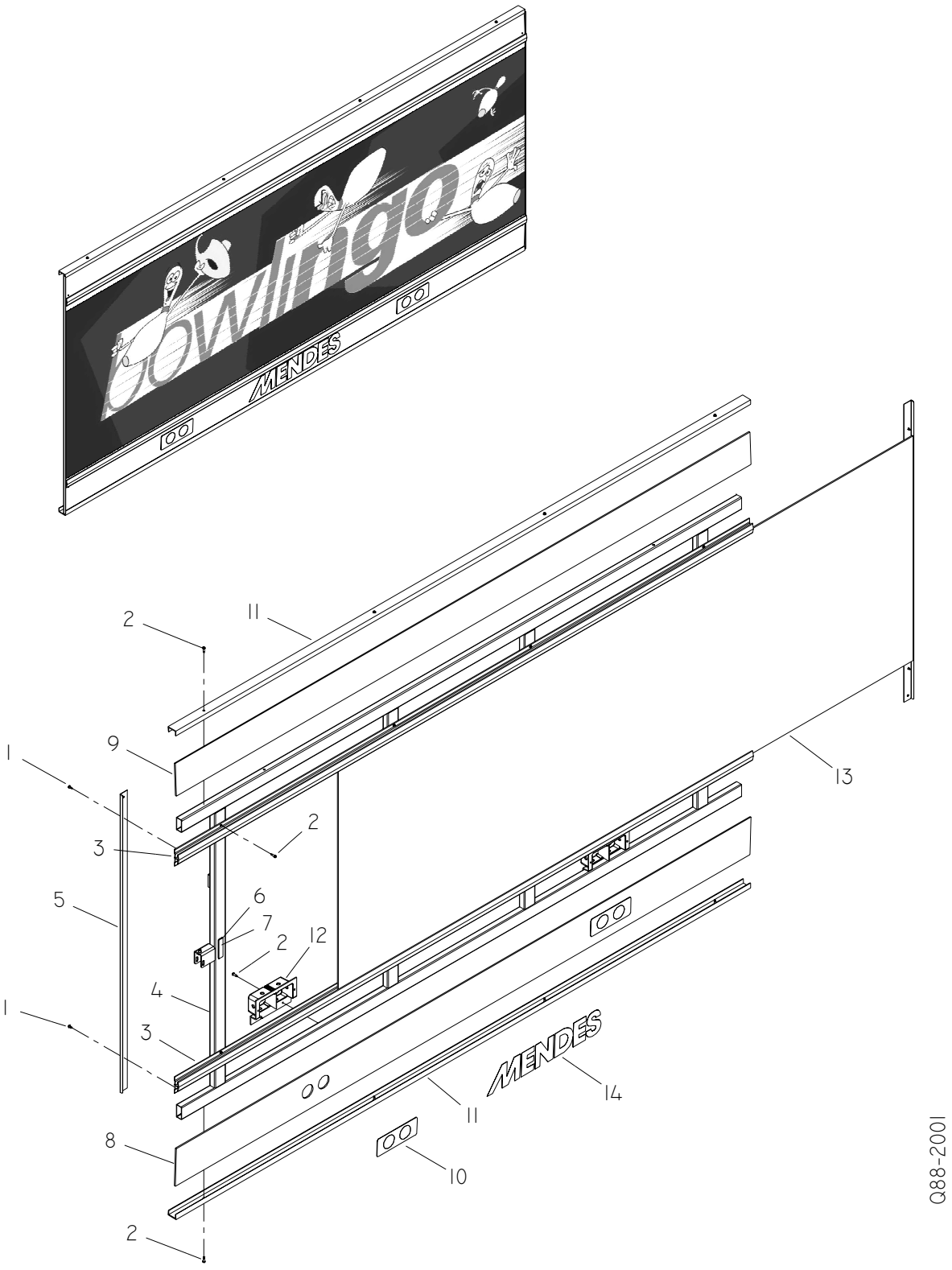
Masking unit panel assembly

	Part No.	Description	Qty
1	7027-201016-050	HEXAGON FLANGE SOCKET HEAD TAP SCREW {#10 x 1/2"}	4
2	7027-201016-075	HEXAGON FLANGE SOCKET HEAD TAP SCREW {#10 x 3/4"}	28
3	M-2001-35	ALUMINIUM MOULDING 106 1/4"	2
4	M-2001-38	MASKING UNIT FRAME 103 1/4"	1
5	M-2100-06	SIDE GUIDE	2
6	MPD-250	VELCRO, HOOK SHAPE	4
7	MPD-260	VELCRO, LOOP SHAPE	4
8	P-2001-01	BOTTOM PANEL	1
9	P-2001-02	TOP PANEL	1
10	P-2001-26	ONE/TWO BALL LIGHT COVER	2
11	P-2001-38	MOULDING	2
12	P-2100-26	ONE/TWO BALL LIGHT BOX	2
13		GRAPHIC PANEL	1
	P-2100-50	GRAPHIC PANEL, BOWLINGO I	
	P-2100-52	GRAPHIC PANEL, BOWLINGO II	
	P-2000-14	GRAPHIC PANEL, BOWLING CITY, RIGHT	
	P-2000-15	GRAPHIC PANEL, BOWLING CITY, LEFT	
14	Z-462	MENDES STICKER, BLACK	1
15		NUMBER DECALS (NOT SHOWN)	
	Z-470-00	NUMBER 0 DECAL	
	Z-470-01	NUMBER 1 DECAL	
	Z-470-02	NUMBER 2 DECAL	
	Z-470-03	NUMBER 3 DECAL	
	Z-470-04	NUMBER 4 DECAL	
	Z-470-05	NUMBER 5 DECAL	
	Z-470-06	NUMBER 6 OR 9 DECAL	
	Z-470-07	NUMBER 7 DECAL	
	Z-470-08	NUMBER 8 DECAL	

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

16	EC-2100-02	ONE/TWO BALL LIGHT POWER CABLE	

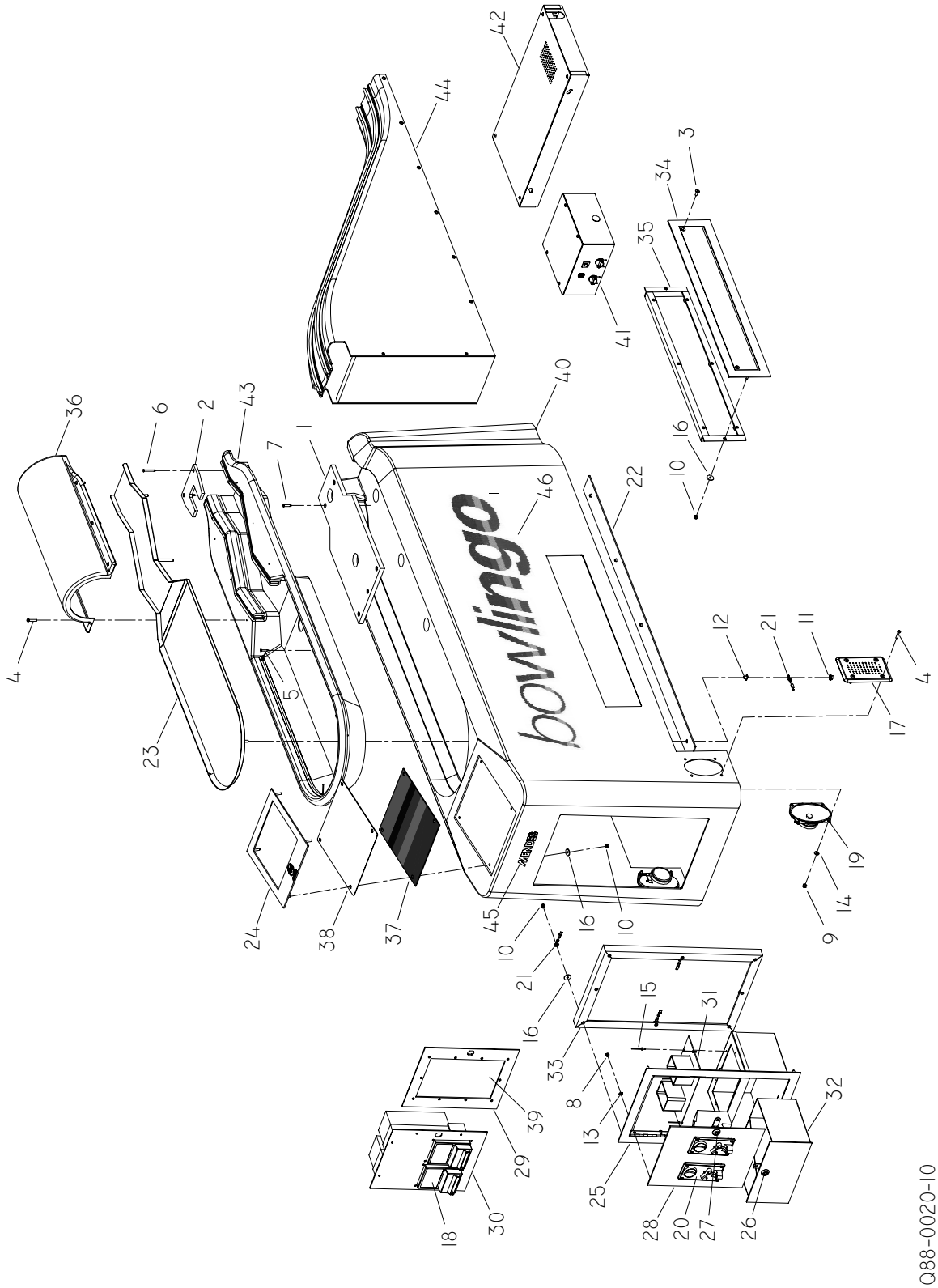
Figure 6.12 Masking Unit



Front Ball Rack

	Part No.	Description	Qty
1	30W-0540-20	BALL RACK SHIM	1
2	50W-0540-23	BALL TRAY SHIM	1
3	7016-311032-050	FLAT HEAD MACHINE SCREW {#10-32 x 1/2"}	2
4	7018-501024-100	HEAXAGON SOCKET BUTTON HEAD CAP SCREW {#10-24 x 1"}	14
5	7022-3108000-100	FLAT SOCKET HEAD WOOD SCREW {#8 X 1"}	2
6	7022-3108000-150	FLAT SOCKET HEAD WOOD SCREW {#8 X 1 1/2"}	2
7	7022-3110000-100	FLAT SOCKET HEAD WOOD SCREW {#10 X 1"}	2
8	7036-000632-000	HEXAGON NYLON INSERT LOCKNUT {#6-32}	4
9	7036-001024-000	HEXAGON NYLON INSERT LOCKNUT {#10-24}	8
10	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	20
11	7038-002520-000	HEXAGON LOCKNUT {1/4"-20}	1
12	7045-002520-031	TEE NUT {1/4"-20 x 5/16"}	4
13	7050-018043-004	FLAT WASHER {3/16" x 7/16" x 3/64"}	4
14	7050-021050-006	FLAT WASHER {7/32" x 1/2" x 1/16"}	8
15	7108-401200-037	ALUMINUM ROUND HEAD POP RIVET {1/8" x 3/8"}	6
16	7150-019075-009	ALUMINUM FLAT WASHER {3/16" x 3/4" x 3/32"}	20
17	E-40-1291	SPEAKER GUARD	2
18	E-42-2055-00	BILL ACCEPTOR	2
19	E-8LS3506-23	AUDIO SPEAKER	2
20	E-9801610	COIN-OP MECHANISM	2
21	E-TG	GROUND TERMINAL	5
22	M-0540-10	BALL RACK ATTACHMENT	1
23	M-0540-210	BALL TRAY	1
24	M-114-0002	CONSOLE RING TOP	1
25	M-114-05	COIN MECHANISM FRAME ASSEMBLY	1
26	M-114-05-10	COIN DRAWER 8601 ACE KEY	1
27	M-114-05-12	COIN DOOR 8603 ACE KEY	1
28	M-114-05-2A	COIN MECANISM DOOR	1
29	M-114-05-2B	UNIVERSAL DOOR	1
30	M-114-05-2C	BILL ACCEPTOR DOOR	1
31	M-114-05-4A	TOKEN TUNNEL PLATE	1
32	M-114-05-5	COIN MECHANISM DRAWER	1
33	M-114-05-6	COIN RING	1
34	M-114-15	ACCESS PANEL	1
35	M-114-16	ACCESS PANEL RING	1
36	P-0540-13	BOWLINGO INSERT GUARD	1
37	P-1140003-1	DECORATIVE STICKER	1
38	P-114-0003-1	STICKER WINDOW	1
39	P-114-05-2B	BLANK DOOR	1
40	P-114-1	BALL RACK	1
41	SB-0114-08	“bowlingo power box”	1
42	SB-0114-09	“bowlingo control box”	1
43	SB-0540-10	“Ball rack insert”	1
44	SB-30W-0020	“Raiser assembly”	1
45	Z-465	MENDES STICKER, BLACK	1
46	Z-540	BOWLINGO STICKER	2
		associated cables (not illustrated – refer to Chapter 5 of the Owner’s Manual)	
47	EC-090-044	SPEAKER CABLE ASSEMBLY	

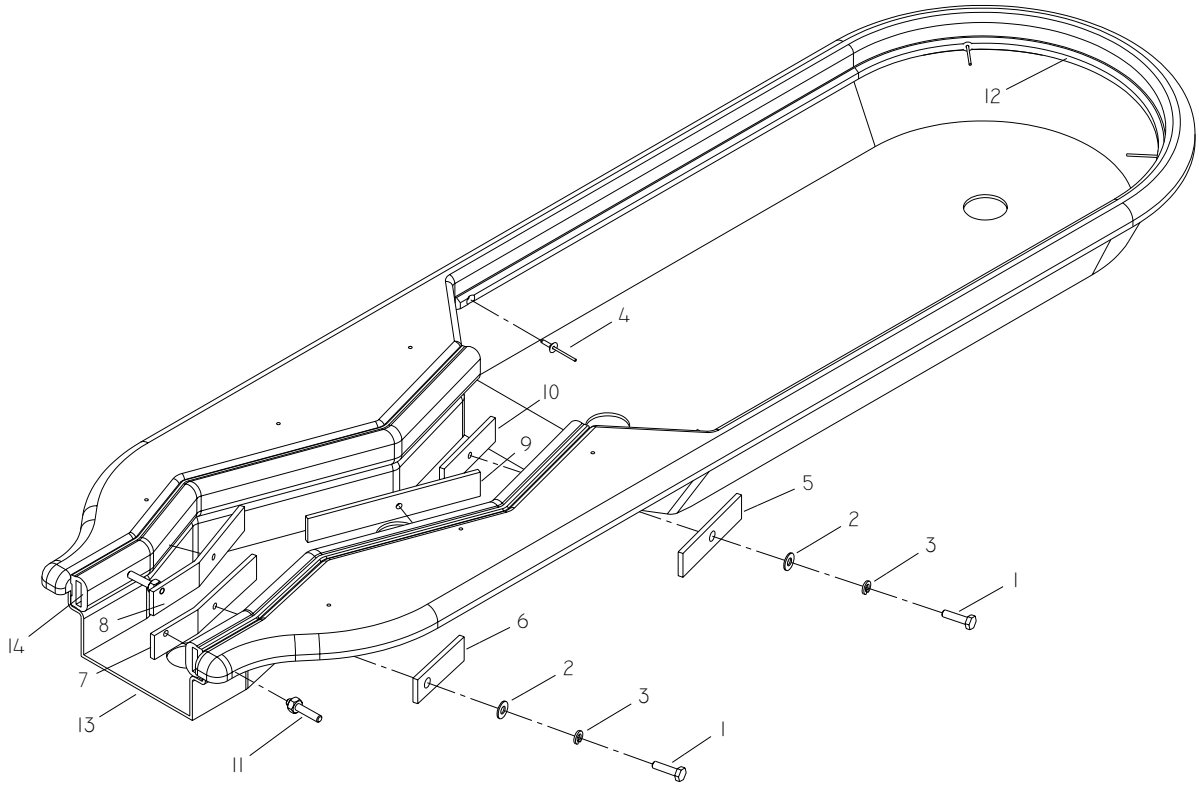
Figure 6.13 Front Ball Rack



Ball rack insert

	Part No.	Description	Qty
1	7010-002520-100	HEXAGON CAP SCREW {1/4"-20 x 1"}	6
2	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	6
3	7060-025046-006	LOCK WASHER {1/4"}	6
4	7108-301200-050	ALUMINUM COUNTERSUNK HEAD POP RIVET {1/8" x 1/2"}	4
5	M-0540-11-1	WASHER PLATE	4
6	M-0540-11-2	WASHER PLATE	2
7	M-0540-11-3	FIXATION PLATE	1
8	M-0540-11-4	FIXATION PLATE	1
9	M-0540-11-5	FIXATION PLATE	2
10	M-0540-11-6	FIXATION PLATE	2
11	M-0540-13	SPECIAL BOLT	2
12	MBP-0540-12	BLACK MOULDING	1
13	P-0540-10	BALL RACK PLASTIC PAN	1
14	Q89-064-1	BALL GUIDE PROTECTOR	2

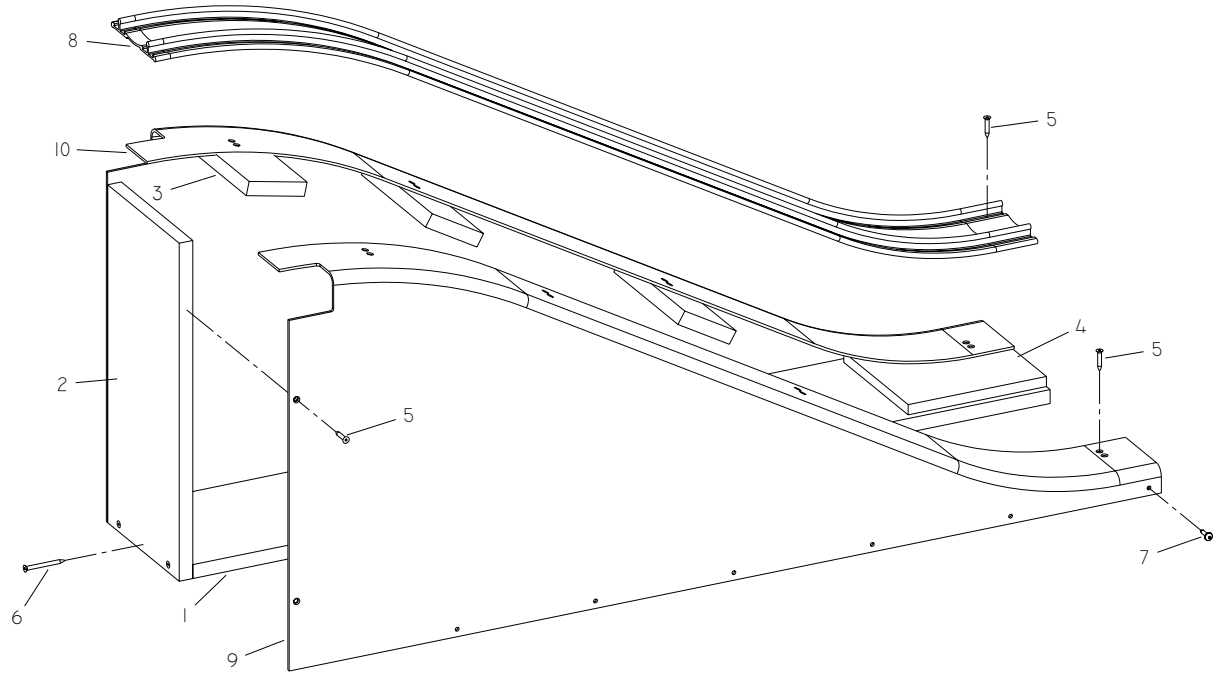
Figure 6.14 Ball Rack Insert



Raiser assembly

	Part No.	Description	Qty
1	30W-0020-1	RAISER BOTTOM SUPPORT	1
2	30W-0020-3	RAISER REAR SUPPORT	1
3	30W-0020-5	RAISER TRACK SUPPORT	3
4	30W-0020-7	RAISER FRONT SUPPORT	1
5	7022-310800-100	FLAT SOCKET HEAD WOOD SCREW {#8 x 1"}	28
6	7022-310800-200	FLAT SOCKET HEAD WOOD SCREW {#8 x 2"}	3
7	7424-710800-075	BLACK ROUND HEAD SOCKET METAL SCREW {#8 x 3/4"}	12
8	M-114-1	BALL TRACK	1
9	P-114-2	RAISER SIDE LEFT	1
10	P-114-3	RAISER SIDE RIGHT	1

Figure 6.15 Ball Rack Raiser Assembly



SB-30W-0020

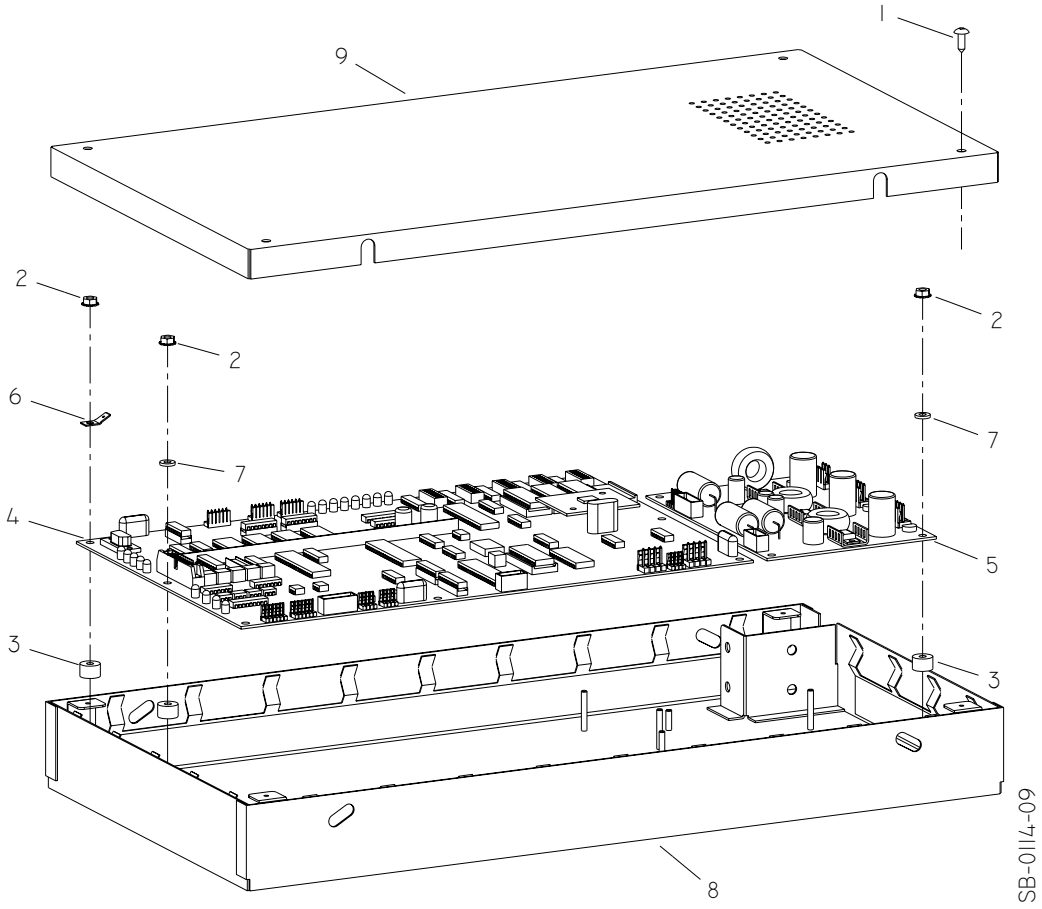
bowlingo control box

	Part No.	Description	Qty
1	7024-710800-050	TRUSS SOCKET HEAD METAL SCREW {#8 x 1/2"}	4
2	7038-000632-000	HEXAGON LOCKNUT {#6-32}	12
3	E-219	NYLON SPACER {11/64" x 1/2" x 5/16"}	11
4	E-MD3-93	BOWLINGO PCB	1
5	E-MD3-94	POWER DISTRIBUTION PCB	1
6	E-TG-1	TERMINAL GROUND	6
7	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	7
8	M-114-0009	CONTROL BOX CHASSIS	1
9	M-114-0009-5	CONTROL BOX COVER	1

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

10	EC-090-044	SPEAKER CABLE ASSEMBLY	2
11	EC-090-045	COIN-OP CABLE ASSEMBLY	2
12	EC-090-046	TICKET DISPENSER CABLE ASSEMBLY	2
13	EC-090-047	I/O POWER SUPPLY CABLE ASSEMBLY	1
14	EC-090-048	CPU POWER SUPPLY CABLE ASSEMBLY	1
15	EC-090-049	AUDIO POWER SUPPLY CABLE ASSEMBLY	1
16	EC-097-165	BOWLINGO CONTROL TO SCORING CONTROL CABLE ASSEMBLY	1
17	EC-090-166	COMMUNICATION CABLE ASSEMBLY	1

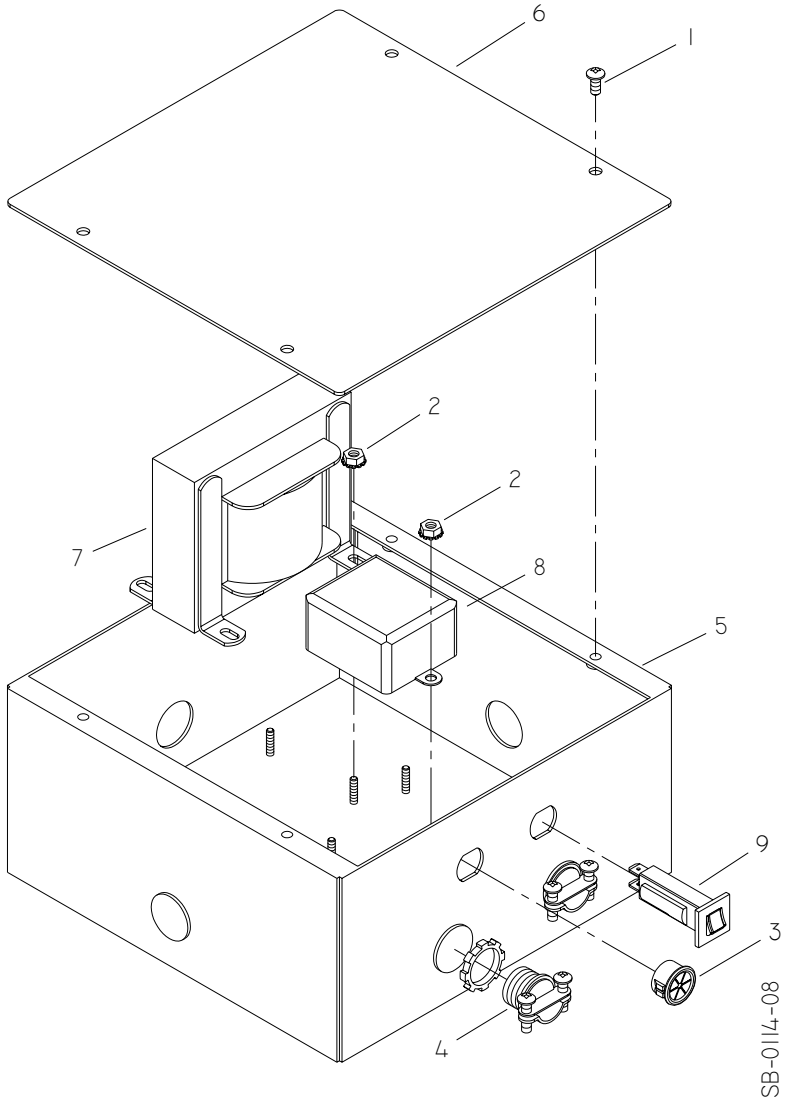
Figure 6.16 bowlingo Control Box



bowlingo power box

	Part No.	Description	Qty
1	7016-410832-037	ROUND HEAD MACHINE SCREW {#8-32 x 3/8"}	4
2	7038-000632-000	HEXAGON LOCKNUT {#6-32}	7
3	E-315-751	SNAP-IN PLUG	1
4	E-3302M	INSULATED BX CONNECTOR	2
5	E-568	JUNCTION BOX	1
6	E-568-1	JUNCTION BOX COVER	1
7	E-B1090	TRANSFORMER	1
8	E-F2716	FILTER	1
9	E-W28XQ1A-2	CIRCUIT OVERLOAD, 2 AMP	1

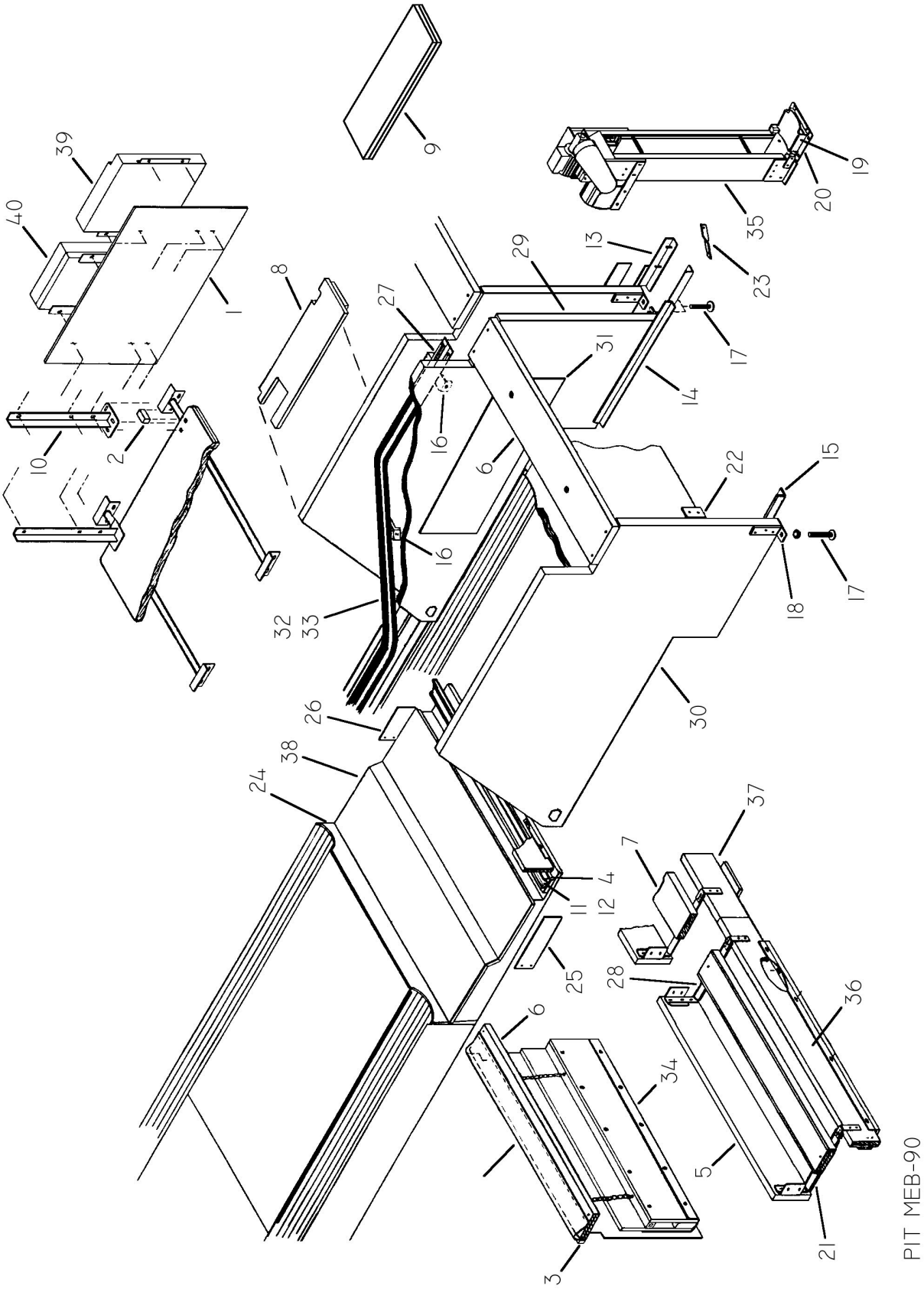
Figure 6.17 bowlingo Power Box



Pit

	Part No.	Description	Qty
1	9106134	MOUNTING PANEL	1
2	15W-0374-1	SPACER BLOCK 1" x 1" x 2"	2
3	50W-0540-01	APRON FIXATION	2
4	50W-0540-04	WOOD ANGLE 1"1/4 X 43"	2
5	50W-0540-05	PIT CUSHION STOP PLANK	2
6	50W-0540-11	PIT CUSHION PLANK	2
7	50W-0540-12	BALL TROUGH COVER	2
8	50W-0540-13-1	KICKBACKER SPACER, TOP	1
9	50W-0540-13-2	CATWALK	1
10	M-0374	POWER BOX MOUNTING FOOT	2
11	M-0540-06-4	BALL TROUGH, RIGHT	1
12	M-0540-06-7	BALL TROUGH, LEFT	1
13	M-0540-20	BALL ELEVATOR SUPPORT BRACKET LEFT	1
14	M-0540-21	BALL ELEVATOR SUPPORT BRACKET RIGH	1
15	M-0540-22	SUPPORT	2
16	M-0540-23	KICKBACK SPACER	2
17	M-0540-29	KICKBACK LEVELING ROD	4
18	M-0540-30	BRACKET	4
19	M-0700-19-1	INSIDE RAILING	1
20	M-0700-20-1	INSIDE RAILING BASE	1
21	M-0700-26	REAR PLANK SUPPORT	4
22	M-0700-41	BRACKET	4
23	M-0700-47	CROSS BRACE	2
24	P-0540-01	PIN DECK REAR GUARD	2
25	P-700-20	BALL GUIDE	2
26	P-700-21	BALL GUIDE	2
27	P-700-27	BALL TRACK	2
28	P-700-62	HOSE	4
29	Q88-0170-175L	KICKBACK, LEFT	2
30	Q88-0170-175R	KICKBACK, RIGHT	2
31	Q88-0171	KICKBACK PLATE	4
32	Q89-0303	DROPSWEEP TRACK	1
33	Q89-0310	VINYL TRACK	2
34	SB-0540-70	“Pit cushion assembly”	2
35	SB-0701-25	“Ball elevator assembly”	1
36	SB-50W-0540-02-4	BALL TROUGH WALL, RIGHT	1
37	SB-50W-0540-02-7	BALL TROUGH WALL, LEFT	1
38	SB-50W-0540-07	“Pit floor assembly”	2
39	SB-6400-99	“Pinsetter power box”	1
40	SB-6500-90	“Pinsetter control box”	1

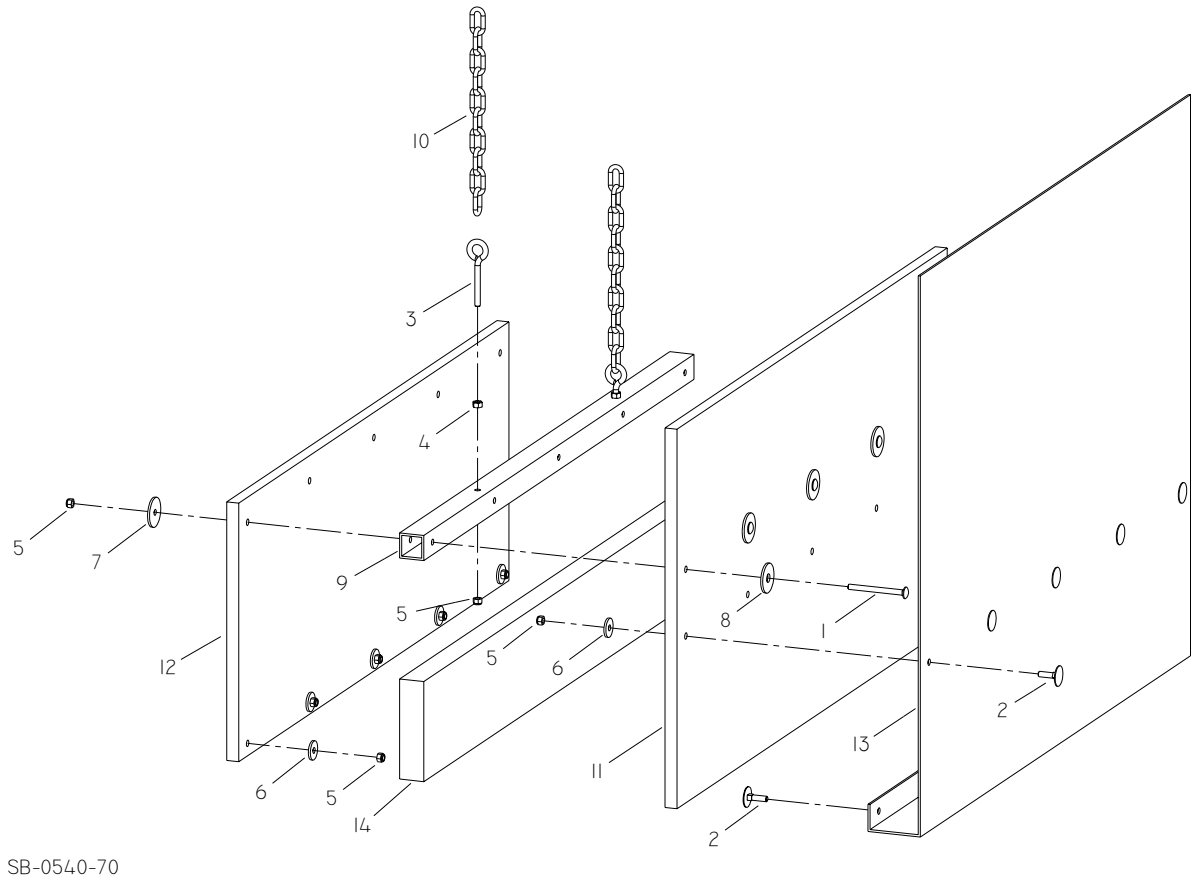
Figure 6.18 Pit



Pit cushion assembly

	Part No.	Description	Qty
1	7012-003118-350	CARRIAGE BOLT {5/16"-18 x 3 1/2"}	5
2	7013-003118-125	ELEVATOR BOLT {5/16"-18 x 1 1/4"}	10
3	7032-003118-400	EYE BOLT {5/16"-18 x 4"}	2
4	7034-003118-000	HEXAGON NUT {5/16"-18}	2
5	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	17
6	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	10
7	7050-034175-012	FLAT WASHER {11/32" x 1 3/4" x 1/8"}	5
8	7050-051175-012	FLAT WASHER {33/64" x 1 3/4" x 1/8"}	5
9	M-0540-70	CUSHION SUPPORT	1
10	M-0540-71	CUSHION CHAIN	2
11	R-0540-70	CUSHION, FRONT	1
12	R-0540-71	CUSHION, REAR	1
13	R-0540-72	PIT APRON	1
14	R-0540-73	CUSHION ABSORBER	1

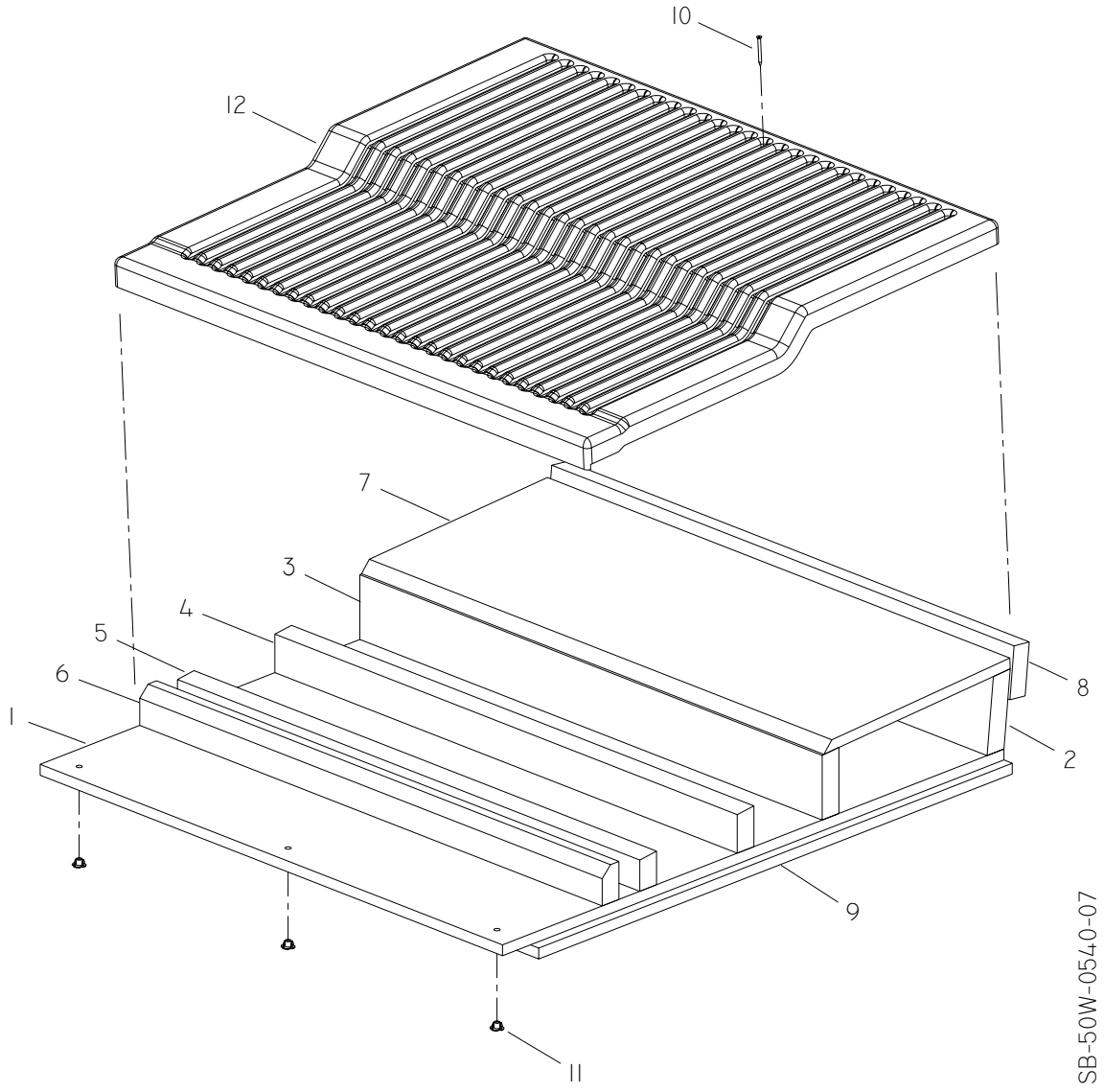
Figure 6.19 Pit Cushion



Pit floor assembly

	Part No.	Description	Qty
1	50W-0540-07-1	BASE PLANK	1
2	50W-0540-07-2	CROSS MEMBER	1
3	50W-0540-07-3	CROSS MEMBER	1
4	50W-0540-07-4	CROSS MEMBER	1
5	50W-0540-07-5	CROSS MEMBER	1
6	50W-0540-07-6	CROSS MEMBER	1
7	50W-0540-07-7	TOP PLANK	1
8	50W-0540-07-8	PIT SPACER	1
9	50W-0540-07-9	SIDE SUPPORT	2
10	7022-310800-200	FLAT SOCKET HEAD WOOD SCREW {#8 x 2"}	65
11	7045-003118-037	TEE NUT {5/16"-18 x 3/8"}	3
12	MBP-1000-105-2	PIT PROTECTOR {BOWLINGO}	1

Figure 6.20 Pit Floor Assembly



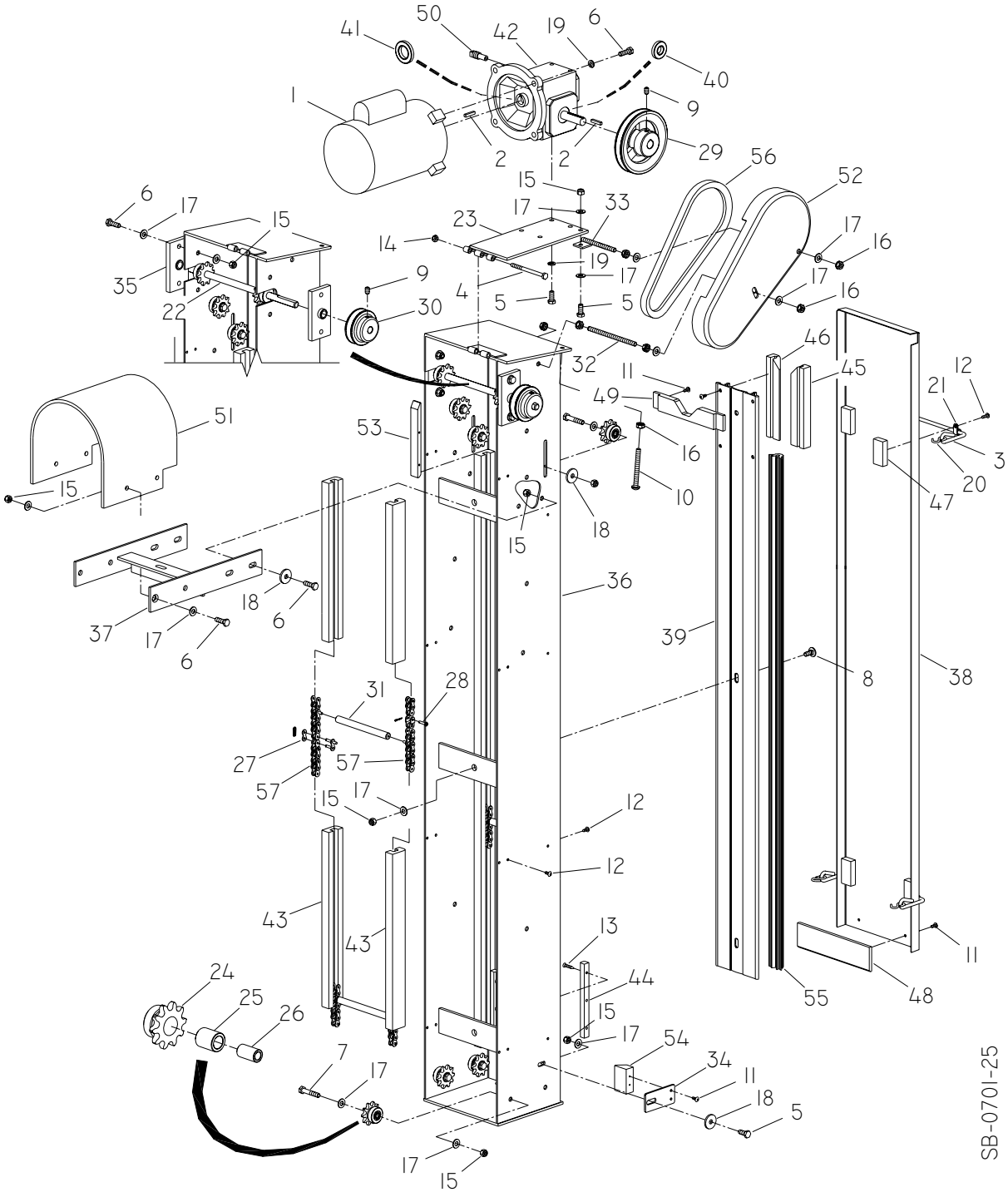
Ball elevator assembly

	Part No.	Description	Qty
1	301-1200-00	MOTOR {208/230 VAC, 1/2 HP}	1
2	302-2410-00	MACHINE KEY {3/16" x 1"}	2
3	394-8100-00	BUNGEE CORD	1
4	7010-002520-350	HEXAGON CAP SCREW {1/4"-20 x 3 1/2"}	1
5	7010-003118-075	HEXAGON CAP SCREW {5/16"-18 x 3/4"}	7
6	7010-003118-100	HEXAGON CAP SCREW {5/16"-18 x 1"}	12
7	7010-003118-175	HEXAGON CAP SCREW {5/16"-18 x 1 3/4"}	8
8	7012-003118-075	CARRIAGE BOLT {5/16"-18 x 3/4"}	3
9	7014-003118-050	HEXAGON SOCKET SET SCREW - CUP POINT {5/16"-18 x 1/2"}	2
10	7016-413118-300	ROUND HEAD MACHINE SCREW {5/16"-18 x 3"}	1
11	7024-710800-050	TRUSS SOCKET HEAD METAL SCREW {#8 x 1/2"}	12
12	7024-710800-075	TRUSS SOCKET HEAD METAL SCREW {#8 x 3/4"}	34
13	7026-310800-100	FLAT SOCKET HEAD SELF DRILLING SCREW {#8 x 1"}	6
14	7036-002520-000	HEXAGON NYLON INSERT LOCKNUT {1/4"-20}	1
15	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	26
16	7038-003118-000	HEXAGON LOCKNUT {5/16"-18}	7
17	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	37
18	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	8
19	7060-031057-009	LOCK WASHER {5/16"}	8
20	7080-800000-050	"S" HOOK	4
21	E-660-09	CABLE CLAMP	4
22	M-0700-07	DRIVE SHAFT	1
23	M-0700-09	MOTOR DRIVE PLATE	1
24	M-0700-10	SPROCKET 40B10	8
25	M-0700-10-01	SLEEVE BEARING	8
26	M-0700-10-02	BUSHING	8
27	M-0700-14	CONNECTING LINK {D1 TYPE}	8
28	M-0700-15	HALF COUPLING LINK	2
29	M-0700-21-2	PULLEY {MA5 x 5/8"}	1
30	M-0700-22	PULLEY {MA2.8 x 5/8"}	1
31	M-0700-27	CROSS CHAIN TRAVEL SHAFT	4
32	M-0700-29	GUARD THREAD ROD	1
33	M-0700-29-1	PULLEY RETAINING GUARD	1
34	M-0700-55	GUARD PLATE	2
35	M-0700-67	STEEL BEARING BLOCK	2
36	M-0700-90	BALL ELEVATOR CHASSIS	1
37	M-0700-94	BALL ELEVATOR BRIDGE	1
38	M-0700-96	BALL ELEVATOR COVER	1
39	M-0700-97	BALL TRACK	1
40	M-BMQ1133-17	OUTPUT SEAL	1
41	M-BMQ1133-18	INPUT OIL SEAL	1
42	M-BMQ1133-3	MOTOR REDUCER	1
43	P-0700-69	CHAIN GUIDE	4
44	P-0700-71	BOTTOM BALL GUIDE	2
45	P-0700-72-4	BALL GUIDE RIGHT	1
46	P-0700-72-7	BALL GUIDE LEFT	1
47	P-0700-73	SPACER BLOCK	4
48	P-0700-74	COVER GUARD	1
49	P-0700-75	BALL GUIDE, TOP	1
50	P-1133-3	REDUCER VENT	1
51	P-700-13	BALL GUARD, OUTSIDE	1
52	P-700-14	PULLEY GUARD	1
53	P-700-16	CHAIN GUIDE	1
54	P-700-55	GUARD	2
55	Q89-0310	VINYL TRACK	1
56	R-0700-01	V BELT 4L280	1
57	SB-0700-13	CHAIN	2

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

58	EC-090-250	BALL ELEVATOR POWER SUPPLY CABLE ASSEMBLY	1

Figure 6.21 Ball Elevator



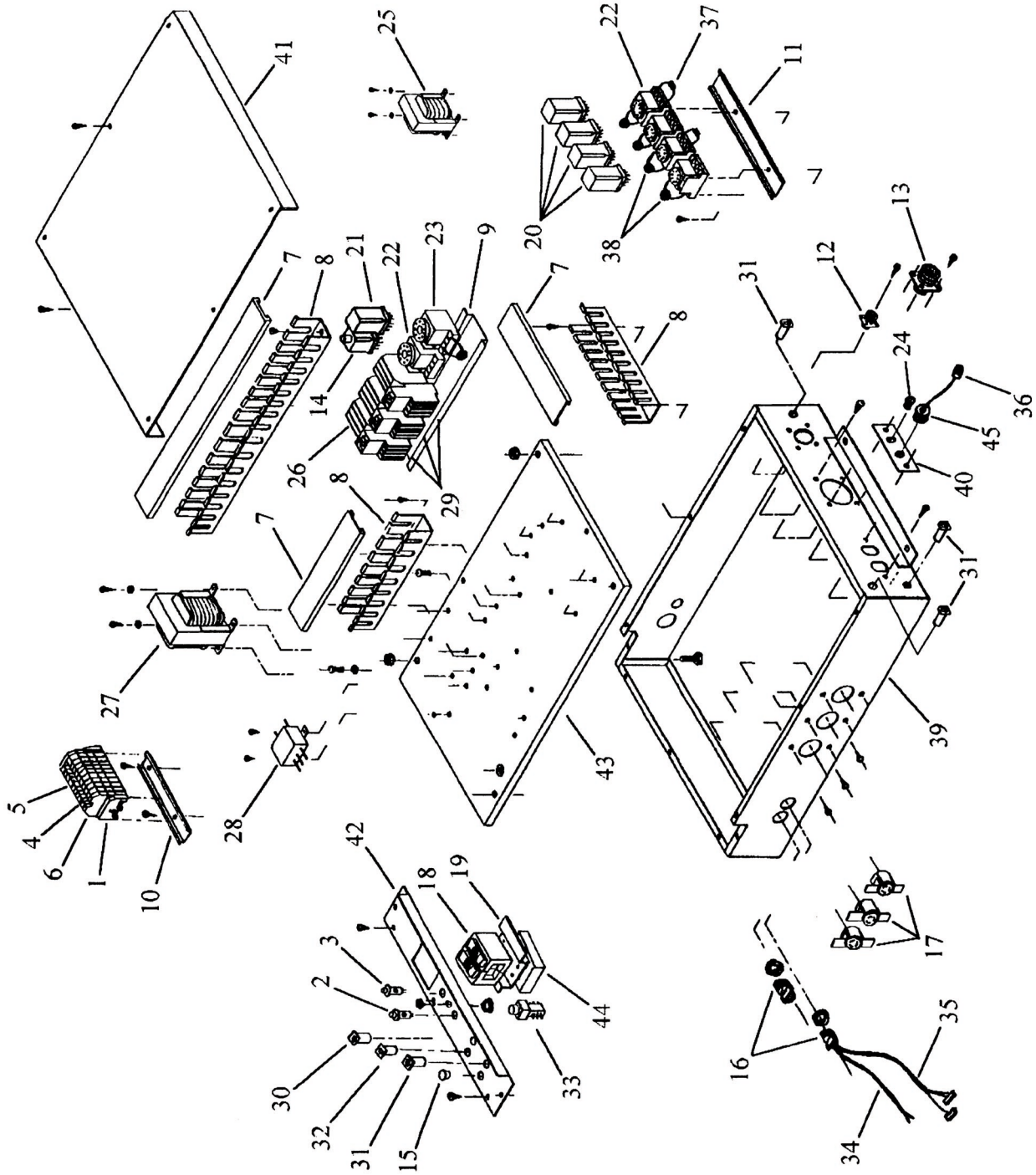
Pinsetter power box

	Part No.	Description	Qty
1	E-103002-26	TERMINAL STRIP STOPPER	
2	E-1052C5-115	GREEN PILOT LAMP, 115 VAC	
3	E-1090C1-28	RED PILOT LAMP, 28 VAC	
4	E-115116	ELECTRIC TERMINAL,SMALL	
5	E-115118	ELECTRIC TERMINAL, LARGE	
6	E-118368	ELECTRIC TERMINAL SEPARATOR	
7	E-1631	WIRING DUCT COVER	
8	E-1635	WIRING DUCT 1.5" X 2"	
9	E-164800-11	ELECTRIC TERMINAL RAIL, 11"	
10	E-164800-5	ELECTRIC TERMINAL RAIL, 5"	
11	E-164800-8	ELECTRIC TERMINAL RAIL, 8"	
12	E-206043-1	FEMALE CONNECTOR, CPC-14	
13	E-206838-1	MALE CONNECTOR, CPC-24	
14	E-214215	90VDC POWER SUPPLY	
15	E-315-751	SNAP-IN PLUG	
16	E-3302M	INSULATED BX CONNECTOR	
17	E-4560	220VAC TWIST-LOCK RECEPTACLE	
18	E-600-20	20AMP CIRCUIT BREAKER	
19	E-600-25-1	ATTACHEMENT PLATE	
20	E-6012	8-POSITION 24VAC 2FC RELAY	
21	E-6013	11-POSITION 24VAC 3FC RELAY	
22	E-620-12	RELAY BASE FOR E-6012	
23	E-620-13	RELAY BASE FOR E-6013	
24	E-805	PLASTIC SNAP PLUG	
25	E-B1091	TRANSFORMER	
26	E-B12-10-3	3-P MOTOR CONTACTOR	
27	E-C0187	TRANSFORMER	
28	E-F2716	FILTER	
29	E-RSA-22K	MOTOR OVERLOAD	
30	E-W28XQ1A-15	CIRCUIT OVERLOAD, 15 AMP	
31	E-W28XQ1A-3	CIRCUIT OVERLOAD, 3 AMP	
32	E-W28XQ1A-5	CIRCUIT OVERLOAD, 5 AMP	
33	E-ZF122UEE	SHADOW SWITCH	
34	EC-090-056	BALL ELEVATOR CABLE ASSEMBLY	
35	EC-090-057	ONE/TWO BALL LIGHT CABLE ASSEMBLY	
36	EC-090-210	PINSETTER CONTROL BOX POWER SUPPLY CABLE ASSEMBLY	
37	EE-IN4007	DIODE	
38	EE-V47ZA7	38VDC VARISTOR	
39	M-0640-58-01	POWER BOX CHASSIS	
40	M-0640-58-02	WIRING PLATE	
41	M-0640-58-04	POWER BOX COVER	
42	M-0640-58-06	POWER BOX COVER, SMALL	
43	M-0640-58-15	POWER BOX PAN	
44	P-0640-58-1	PLASTIC SPACER 2" x 1/2"	
45	RB-39	RUBBER GROMMET	

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

46	EC-090-100-B	PINSETTER COMPONENT POWER SUPPLY CABLE ASSEMBLY	
47	EC-090-110-B	PERIPHERAL POWER SUPPLY CABLE ASSEMBLY	
48	EC-090-210	PINSETTER CONTROL BOX POWER SUPPLY CABLE ASSEMBLY	
49	EC-090-220	PINSETTER 1 POWER SUPPLY CABLE ASSEMBLY	
50	EC-090-230	PINSETTER 2 POWER SUPPLY CABLE ASSEMBLY	
51	EC-090-250	BALL ELEVATOR POWER SUPPLY CABLE ASSEMBLY	

Figure 6.22 Pinsetter Power Box



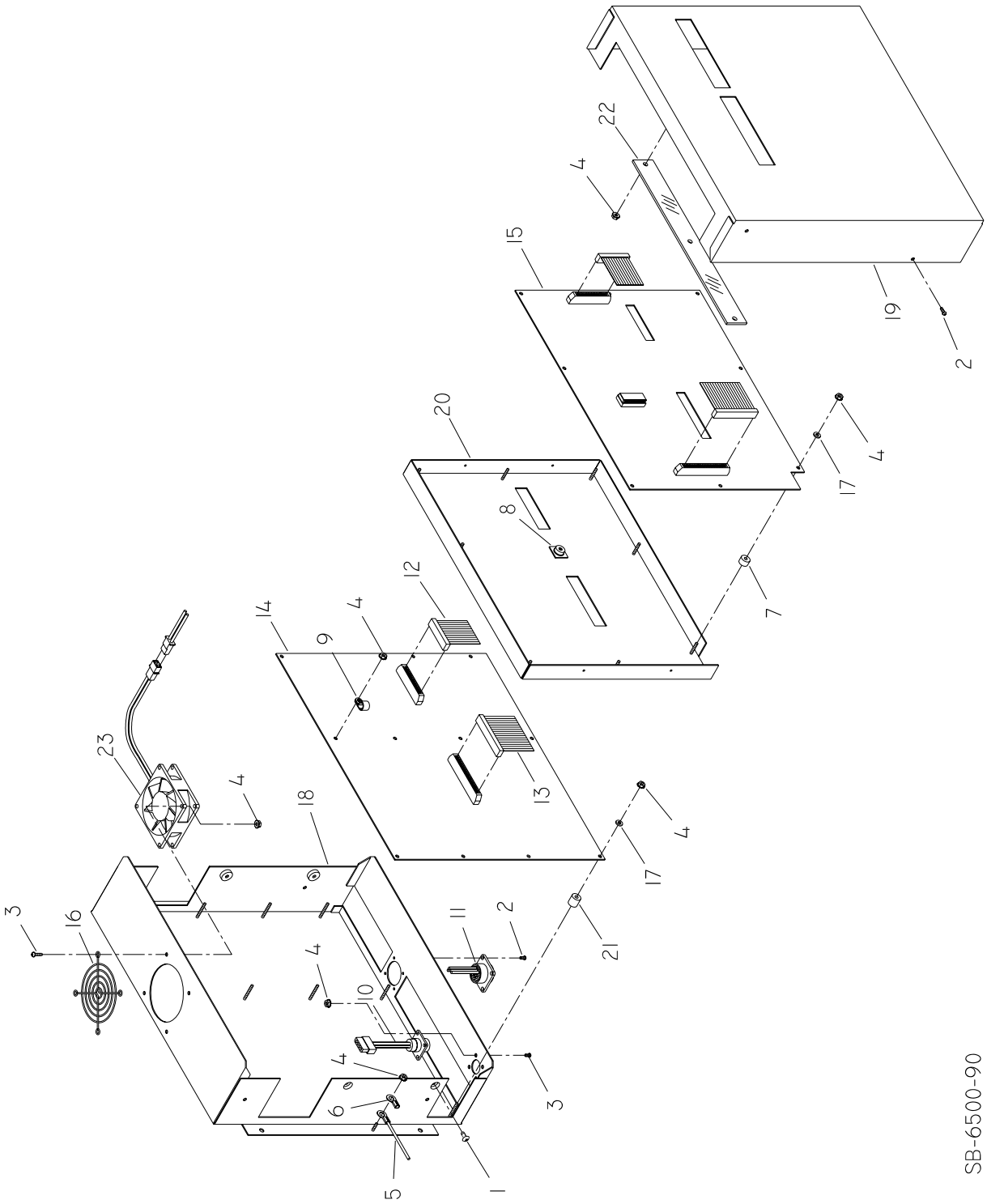
Pinsetter control box

	Part No.	Description	Qty
1	7016-410832-037	ROUND HEAD MACHINE SCREW {#8-32 x 3/8"}	4
2	7016-430632-050	ROUND COMBINED HEAD MACHINE SCREW {#6-32 x 1/2"}	12
3	7016-430632-050	ROUND COMBINED HEAD MACHINE SCREW {#6-32 x 1/2"}	4
4	7038-000632-000	HEXAGON LOCKNUT {#6-32}	28
5		GROUND WIRE 10AWG	1
6	E-16-30-4310	TERMINAL	1
7	E-219	NYLON SPACER {11/64" x 1/2" x 5/16"}	8
8	E-3683	PUSH MOUNT ADAPTER	1
9	E-660-09	CABLE CLAMP	3
10	EC-090-280	20VAC POWER SUPPLY CABLE ASSEMBLY	1
11	EC-090-290	24VAC POWER SUPPLY CABLE ASSEMBLY	1
12	EC-090-98	34-POSITION FLAT CABLE ASSEMBLYY	1
13	EC-090-99	50-POSITION FLAT CABLE ASSEMBLY	1
14	E-MD3-80-R3	POWER DISTRIBUTION PCB	1
15	E-MD3-85-R3	CPU CONTROLLER PCB	1
16	E-SC80-W2	FAN GRILL	1
17	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	16
18	M-6590-11	PINSETTER CONTROL BOX CHASSIS	1
19	M-6590-12	PINSETTER CONTROL BOX COVER	1
20	M-6590-13	PINSETTER CONTROL BOX PAN	1
21	P-057	NYLON SPACER	12
22	P-6590-01	PINSETTER CONTROL BOX WINDOW	1
23	SB-900-1	FAN ASSEMBLY	1

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

24	EC-090-100-B	PINSETTER COMPONENT POWER SUPPLY CABLE ASSEMBLY
25	EC-090-110-B	PERIPHERAL POWER SUPPLY CABLE ASSEMBLY
26	EC-090-120-B	MACHINE 1 PIN DETECTORS CABLE ASSEMBLY
27	EC-090-130-B	MACHINE 2 PIN DETECTORS CABLE ASSEMBLY
28	EC-090-140	MACHINE 1 OPTICAL SENSORS CABLE ASSEMBLY
29	EC-090-150	MACHINE 2 OPTICAL SENSORS CABLE ASSEMBLY
30	EC-090-166	COMMUNICATION CABLE ASSEMBLY
31	EC-090-170-B	MACHINE 1 SOLENOIDS CABLE ASSEMBLY
32	EC-090-180-B	MACHINE 2 SOLENOIDS CABLE ASSEMBLY
33	EC-090-210	PINSETTER CONTROL BOX POWER SUPPLY CABLE ASSEMBLY

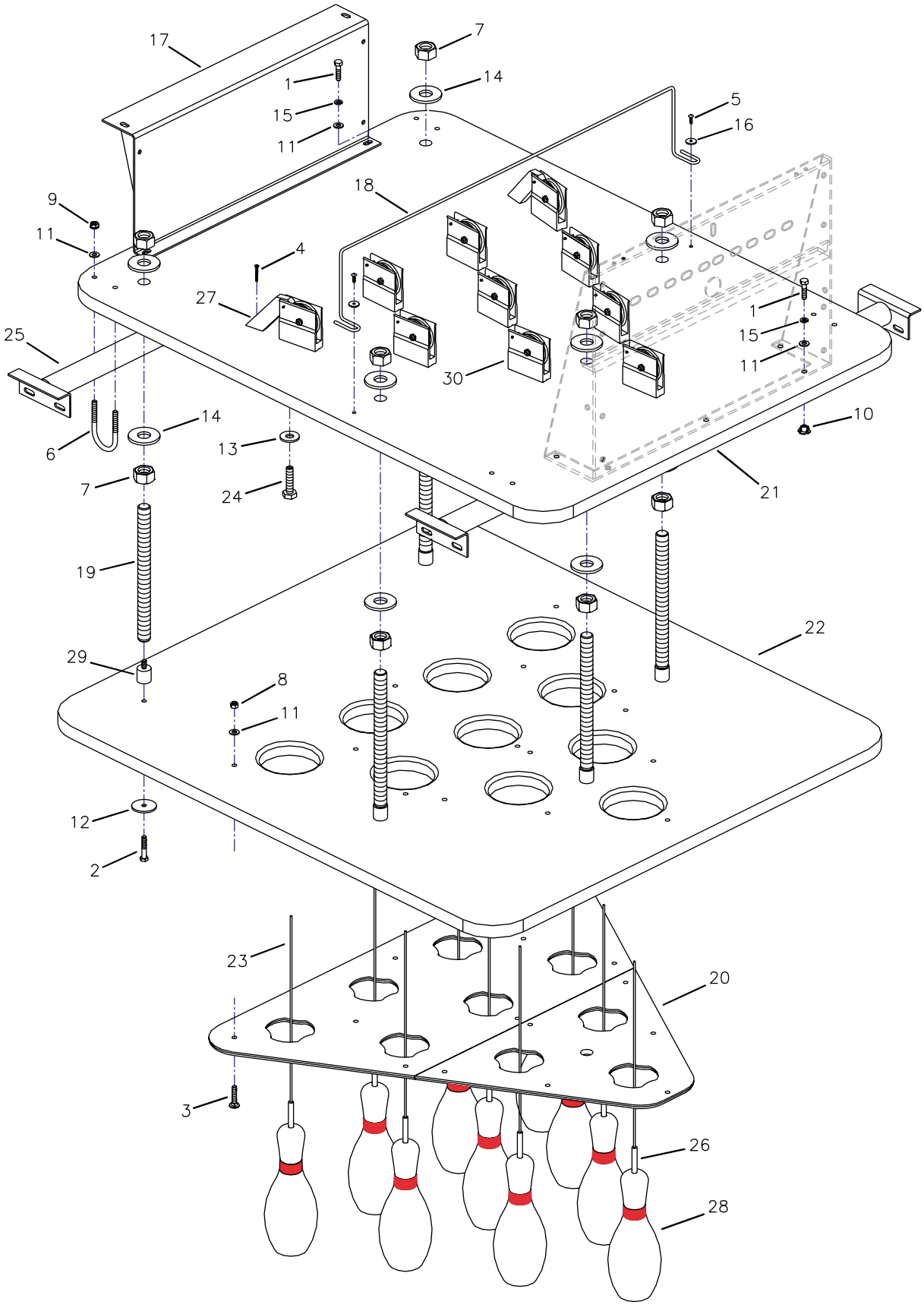
Figure 6.23 Pinsetter Control Box



Pin stabilizer

	Part No.	Description	Qty
1	7010-003118-125	HEXAGON CAP SCREW {5/16"-18 x 1 1/4"}	
2	7010-003118-175	HEXAGON CAP SCREW {5/16"-18 x 1 3/4"}	
3	7012-003118-150	CARRIAGE BOLT {5/16"-18 x 1 1/2"}	
4	7022-410600-125	ROUND SOCKET HEAD METAL SCREW {#6 x 1 1/4"}	
5	7024-710800-075	TRUSS SOCKET HEAD METAL SCREW {#8 x 3/4"}	
6	7030-003118-325	U-BOLT {5/16" x 3 1/4"}	
7	7034-008709-000	HEXAGON NUT {7/8"-9}	
8	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	
9	7038-003118-000	HEXAGON LOCKNUT {5/16"-18}	
10	7045-003118-037	TEE NUT {5/16"-18 x 3/8"}	
11	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	
12	7050-034175-012	FLAT WASHER {11/32" x 1 3/4" x 1/8"}	
13	7050-056137-012	FLAT WASHER {9/16" x 1 3/8" x 1/8"}	
14	7052-093225-018	SPACER WASHER {15/16" x 2 1/4" x 3/16"}	
15	7060-031057-009	LOCK WASHER {5/16"}	
16	7150-019075-009	ALUMINUM FLAT WASHER {3/16" x 3/4" x 3/32"}	
17	9102006	PINSETTER SUPPORT PLATE	
18	9102038	STRING SUPPORT	
19	9102039	SPACER ROD	
20	9103005	PIN CENTERING PLATE	
21	9106004	PINSETTER SUPPORT TABLE	
22	9106005	STABILIZER BASE PLATE	
23	I-022A	PIN STRING	
24	M-0041	PIN BUMPER BOLT	
25	M-0540-08	MAIN CROSS SUPPORT	
26	P-241-10	PIN HEAD BUSHING	
27	P-043	PULLEY SHEAF GUARD	
28	Q72-0241	BOWLINGO PIN	
29	R-014	BUMPER PAD	
30	SB-043-1	“Sheave pulley assembly”	

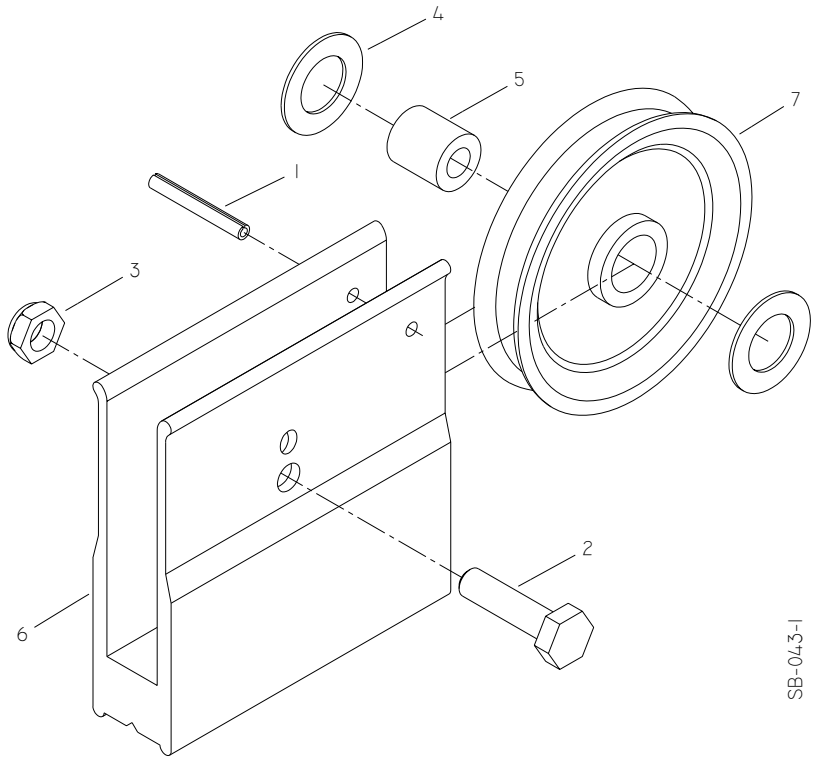
Figure 6.24 Pin Stabilizer



Sheave pulley assembly

	Part No.	Description	Qty
1	7006-001200-100	SPRING PIN {1/8"x1"}	1
2	7010-002520-100	HEXAGON CAP SCREW {1/4"-20 x 1"}	1
3	7044-002520-000	HEXAGON THIN NYLON INSERT LOCKNUT {1/4"-20}	1
4	7052-050087-003	SPACER WASHER {1/2" x 7/8" x 1/32"}	2
5	M-0100B	BUSHING	1
6	M-043-1	SHEAVE	1
7	P-016A	PULLEY	1

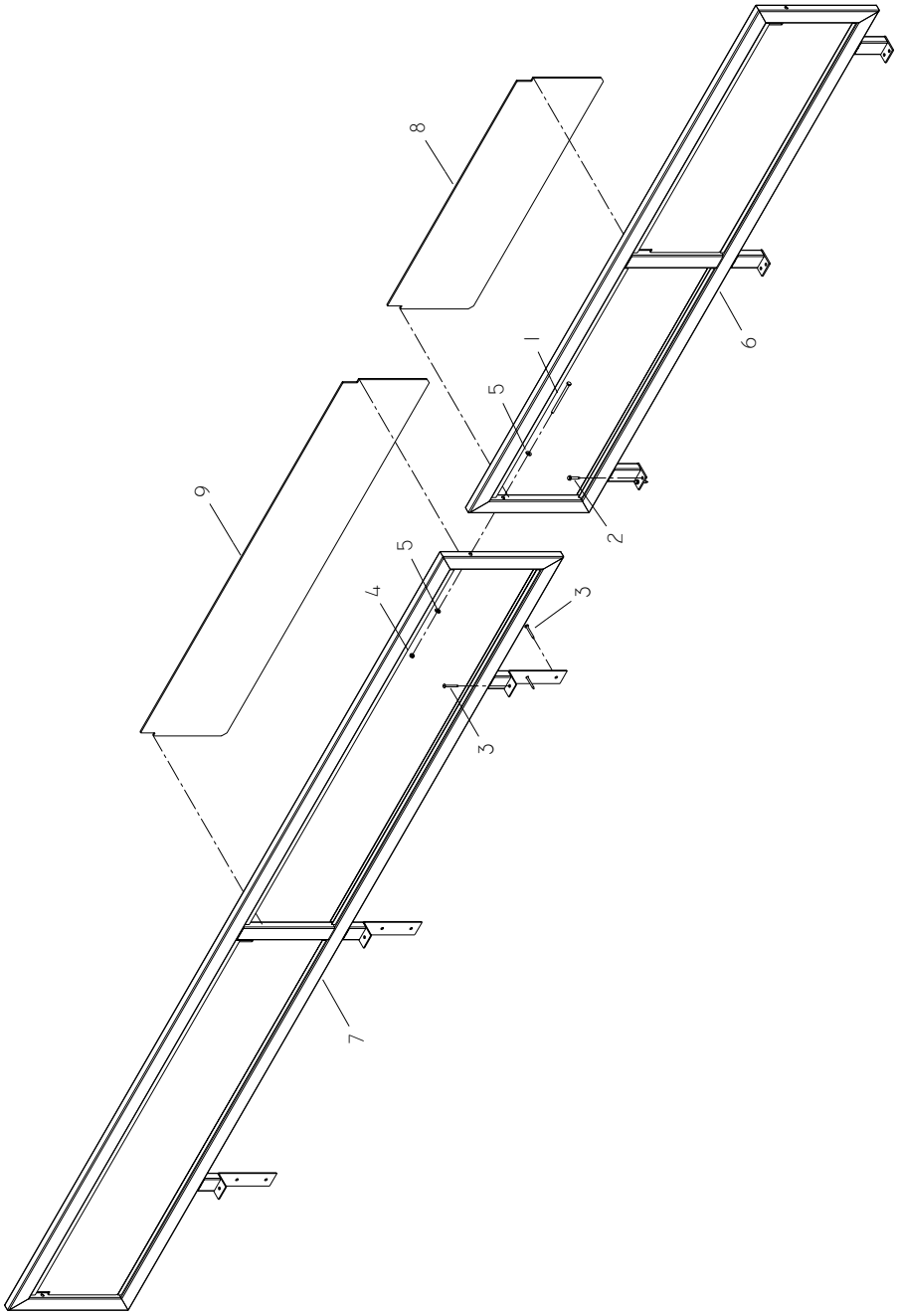
Figure 6.25 Sheave Pulley Assembly



Lateral Side Guard (optional)

	Part No.	Description	Qty
1	7010-002520-450	HEXAGON CAP SCREW {1/4"-20 x 4 1/2"}	3
2	7024-201400-150	HEXAGON FLANGE SOCKET HEAD METAL SCREW {#14 x 1 1/2"}	6
3	7024-711000-200	TRUSS SOCKET HEAD METAL SCREW {#10 x 2"}	27
4	7036-002520-000	HEXAGON NYLON INSERT LOCKNUT {1/4"-20}	3
5	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	6
6	M-0540-85	SIDE GUARD, APPROACH	1
7	M-0540-86	SIDE GUARD, LANE	3
8	P-0540-85	SIDE GUARD GLASS, APPROACH	2
9	P-0540-86	SIDE GUARD GLASS, LANE	6

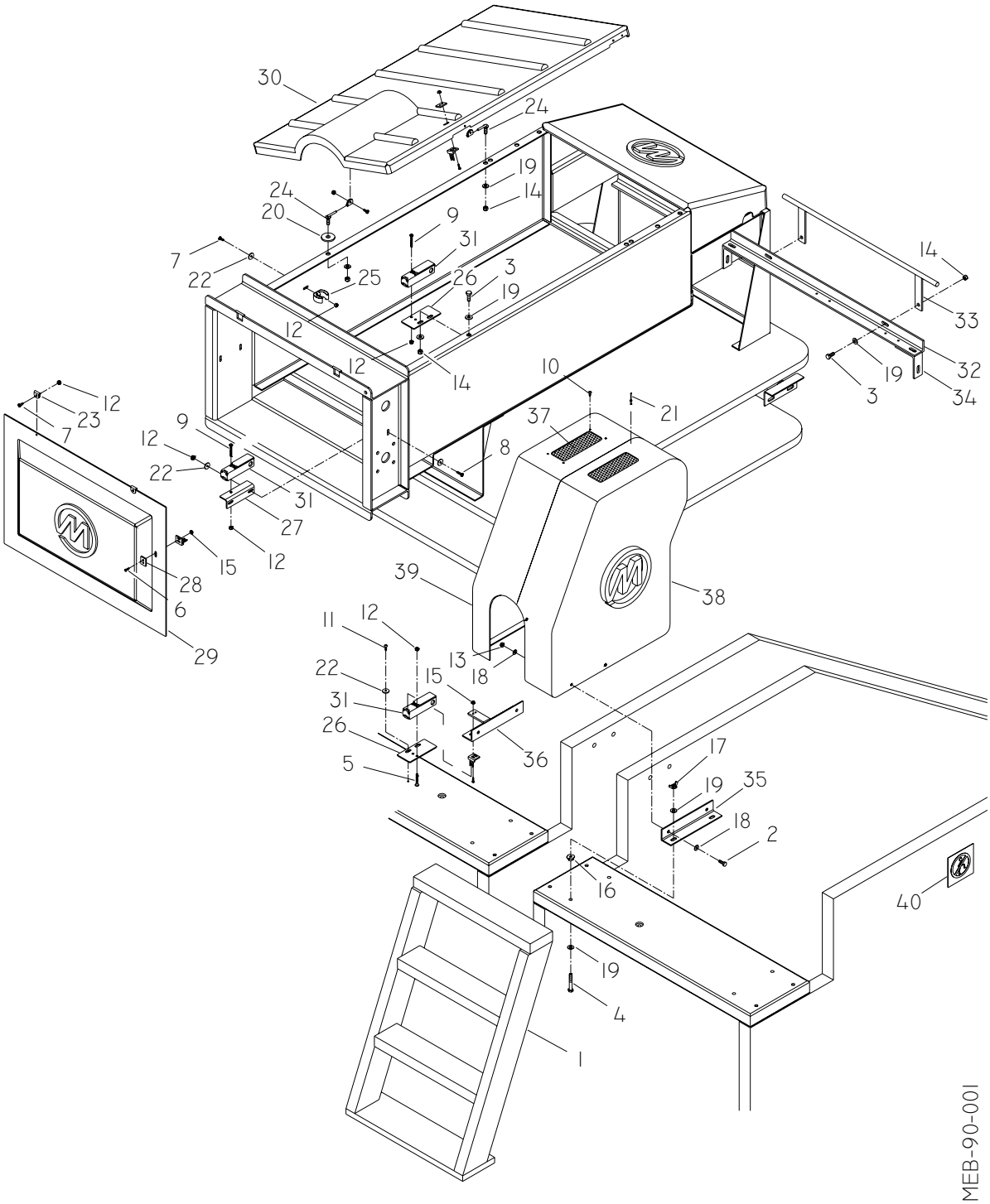
Figure 6.26 Lateral Side Guard Unit



Guards and CE Accessories (optional)

	Part No.	Description	Qty
1	50W-0540-30	STEPS ASSEMBLY	1
2	7010-002520-075	HEXAGON CAP SCREW {1/4"-20 x 3/4"}	4
3	7010-003118-075	HEXAGON CAP SCREW {5/16"-18 x 3/4"}	3
4	7010-003118-200	HEXAGON CAP SCREW {5/16"-18 x 2"}	4
5	7016-311032-150	FLAT HEAD MACHINE SCREW {#10-32 x 1 1/2"}	1
6	7016-410632-050	ROUND HEAD MACHINE SCREW {#6-32 x 1/2"}	8
7	7016-411032-050	ROUND HEAD MACHINE SCREW {#10-32 x 1/2"}	3
8	7016-411032-075	ROUND HEAD MACHINE SCREW {#10-32 x 3/4"}	2
9	7016-411032-150	ROUND HEAD MACHINE SCREW {#10-32 x 1 1/2"}	4
10	7024-710800-050	TRUSS SOCKET HEAD METAL SCREW {#8 x 1/2"}	8
11	7024-710800-075	TRUSS SOCKET HEAD METAL SCREW {#8 x 3/4"}	2
12	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	12
13	7036-002520-000	HEXAGON NYLON INSERT LOCKNUT {1/4"-20}	4
14	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	5
15	7038-000632-000	HEXAGON LOCKNUT {#6-32}	6
16	7045-003118-037	TEE NUT {5/16"-18 x 3/8"}	4
17	7047-003118-000	WING NUT {5/16"-18}	4
18	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	8
19	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	14
20	7050-043100-009	FLAT WASHER {7/16" x 1" x 3/32"}	1
21	7108-401200-050	ALUMINUM DOME HEAD POP RIVET {1/8" x 1/2"}	15
22	7150-019075-009	ALUMINUM FLAT WASHER {3/16" x 3/4" x 3/32"}	6
23	9102047	D RING CLIP .750" 3/4"	4
24	9102048	TOP COVER PIVOT	2
25	9102049	PRESSSURE GUAGE CLIP	1
26	9102060	MOUNTING PLATE	2
27	9102061	MOUNTING BRACKET	1
28	9102062	WASHER PLATE	2
29	9103002	REAR COVER	1
30	9103003	TOP COVER	1
31	E-519-169	SECURITY SWITCH GUARD MASTER	3
32	M-0391-01	CROSS BAR	1
33	M-0391-02	FRONT GUARD	1
34	M-0392	CROSS BAR SUPPORT	2
35	M-0700-81	HEAD GUARD BRACKET	1
36	M-0700-81-1	HEAD GUARD BRACKET	1
37	M-0700-82	VENTILATION PLATE	2
38	P-0700-61-4	BALL LIFT GUARD RIGHT	1
39	P-0700-61-7	BALL LIFT GUARD LEFT	1
40	Z-611	DON'T WALK DECAL	2

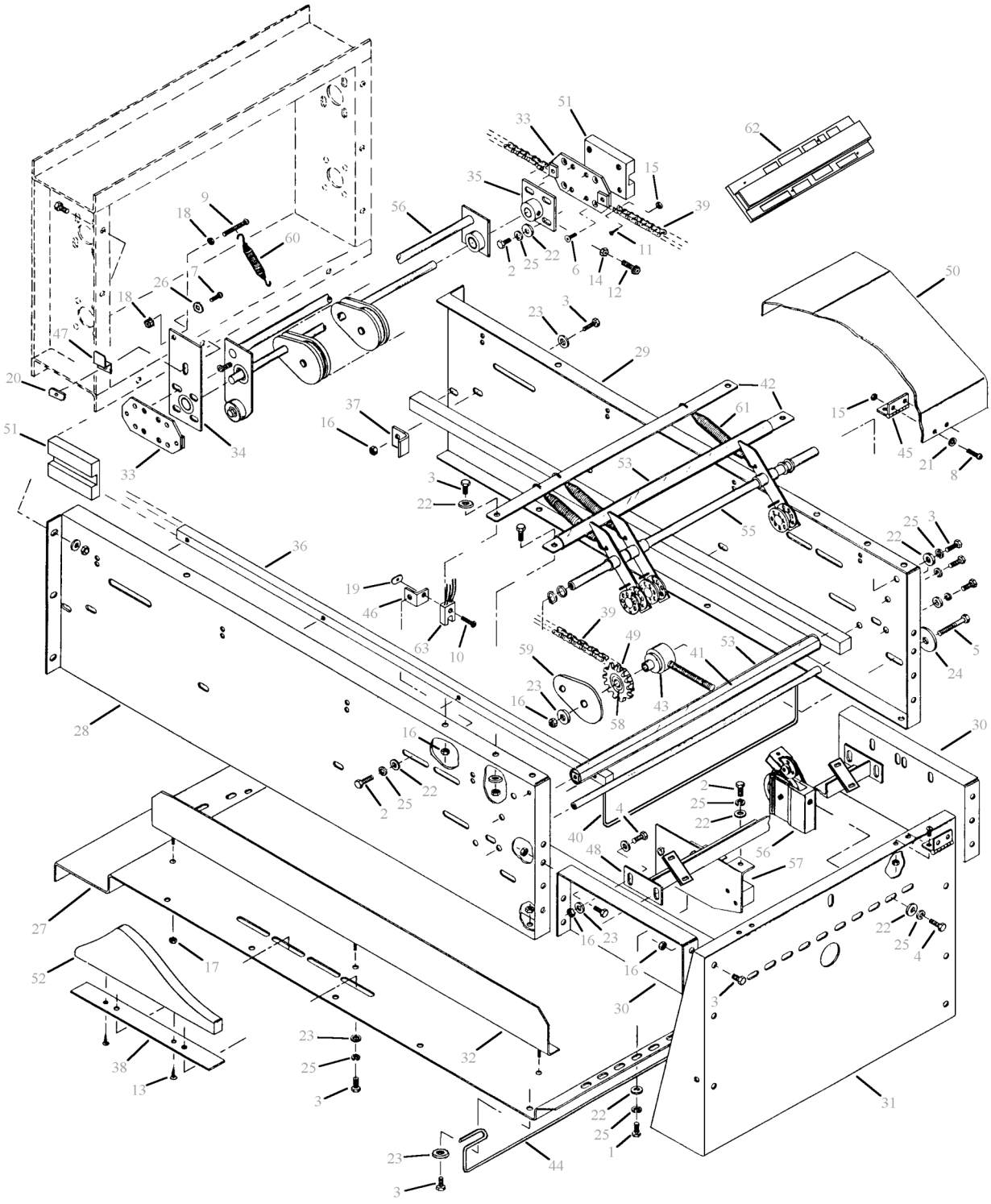
Figure 6.27 Guards and CE Accessories



ME-90 Pinsetter Frame and Main Components

	Part No.	Description	Qty
1	7010-003118-050	HEXAGON CAP SCREW {5/16"-18 x 1/2"}	
2	7010-003118-062	HEXAGON CAP SCREW {5/16"-18 x 5/8"}	
3	7010-003118-075	HEXAGON CAP SCREW {5/16"-18 x 3/4"}	
4	7010-003118-100	HEXAGON CAP SCREW {5/16"-18 x 1"}	
5	7010-003118-275	HEXAGON CAP SCREW {5/16"-18 x 2 3/4"}	
6	7016-312520-100	FLAT HEAD MACHINE SREW {1/4"-20 x 1"}	
7	7016-411032-050	ROUND HEAD MACHINE SCREW {#10-32 x 1/2"}	
8	7016-411032-062	ROUND HEAD MACHINE SCREW {#10-32 x 5/8"}	
9	7016-412520-150	ROUND HEAD MACHINE SCREW {1/4"-20 x 1 1/2"}	
10	7016-410632-075	ROUND HEAD MACHINE SCREW {#6-32 x 3/4"}	
11	7018-001032-087	HEXAGON SOCKET HEAD CAP SCREW {#10-32 x 7/8"}	
12	7018-003118-062	HEXAGON SOCKET HEAD CAP SCREW {5/16"-18 x 5/8"}	
13	7022-311200-150	FLAT SOCKET HEAD WOOD SCREW {#12 x 1 1/2"}	
14	7034-003118-000	HEXAGON NUT {5/16"-18}	
15	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	
16	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	
17	7038-000632-000	HEXAGON LOCKNUT {#6-32}	
18	7038-002520-000	HEXAGON LOCKNUT {1/4"-20}	
19	7046-000632-006	WELD NUT {#6-32}	
20	7046-001032-006	WELD NUT {#10-32}	
21	7050-021050-006	FLAT WASHER {7/32" x 1/2" x 1/16"}	
22	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	
23	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	
24	7050-034175-012	FLAT WASHER {11/32" x 1 3/4" x 1/8"}	
25	7060-031057-009	LOCK WASHER {5/16"}	
26	7150-019075-009	ALUMINUM FLAT WASHER {3/16" x 3/4" x 3/32"}	
27	9102001	BOTTOM FRAME PLATE	
28	9102002	FRAME PLATE, LEFT	
29	9102003	FRAME PLATE, RIGHT	
30	9102004	SENSOR PLATE, SIDE	
31	9102005	SENSOR PLATE, FRONT	
32	9102007	SIDE GUARD	
33	9102011	DRAWBAR CHAIN PLATE	
34	9102012	LEFT ADJUSTEMENT PLATE	
35	9102013	RIGHT ADJUSTEMENT PLATE	
36	9102016	DRAWBAR GUIDE	
37	9102017	DRAWBAR STOPPER	
38	9102018	CAM ADJUSTEMENT PLATE	
39	9102019	DRAWBAR CHAIN	
40	9102025	SHAFT	
41	9102026	LOWER REEL ARM STOPPER	
42	9102030	UPPER REEL ARM STOPPER	
43	9102036	TENSIONNER	
44	9102037	STRING SUPPORT	
45	9102044	HINGE	
46	9102054	OPTICAL SENSOR SUPPORT	
47	9102055	ACTUATOR	
48	9102072	BRAKE SUPPORT	
49	9102094	SPROCKET 40B15	
50	9103001	PIN DETECTION COVER	
51	9103011	DRAWBAR GUIDE	
52	9103018	PAUSE CAM	
53	9103026	HOSE	
54	9122014	“Drawbar assembly”	
55	9122027	“Reel arm complete assembly”	
56	9122057	“Pin detection assembly”	
57	9122070	“Pin brake assembly”	
58	M-0680-29	BEARING	
59	P-001A	DRAWBAR SHEAF PLATE	
60	S-071	TENSION SPRING	
61	S-080	TENSION SPRING	
62	SB-2131	“Solenoid/Opto control box”	
63	SB-ECIL-325-FS	OPTICAL SENSOR ASSEMBLY	

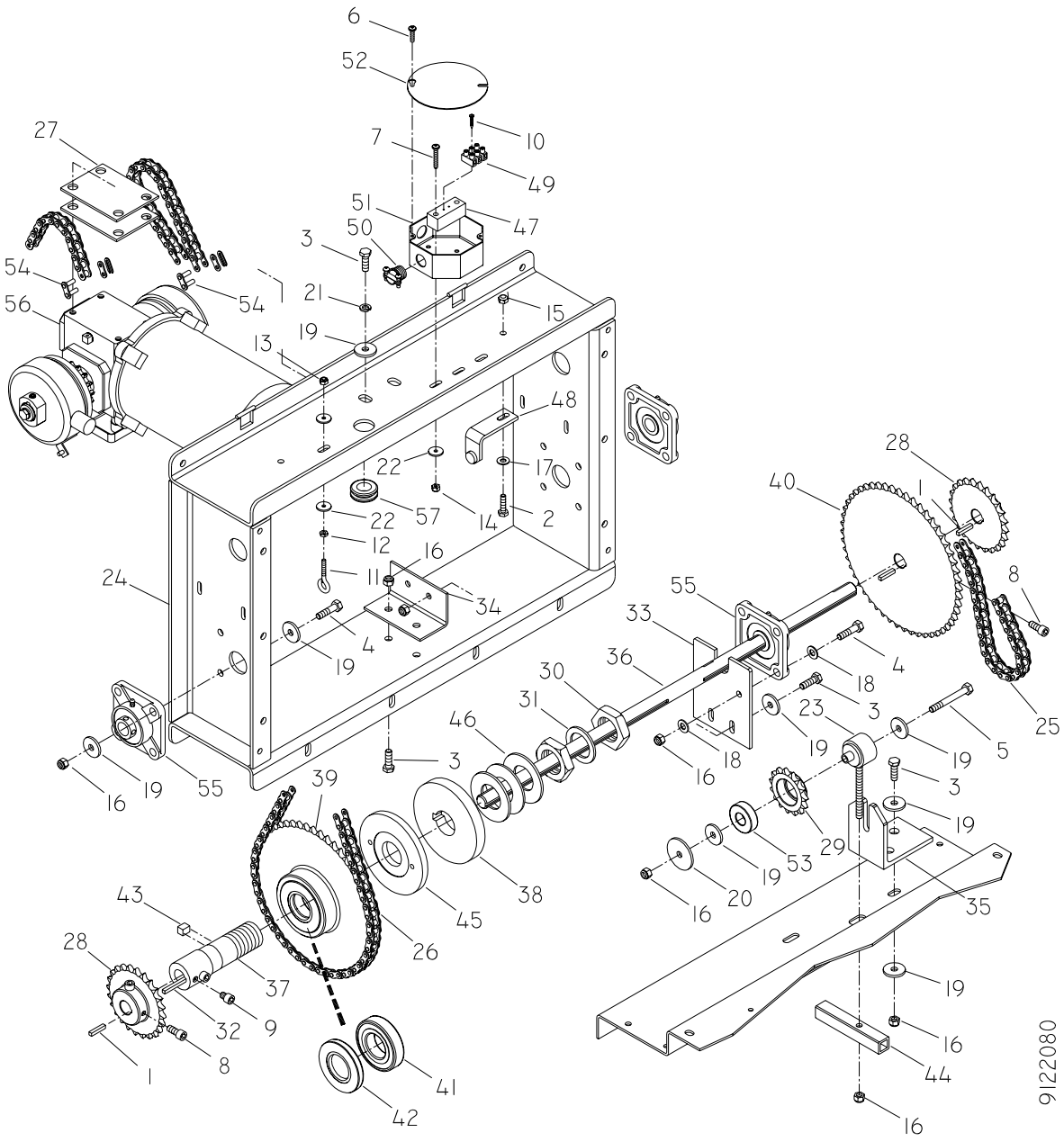
Figure 6.28 ME-90 Pinsetter Frame and Main Components



Drive train components

	Part No.	Description	Qty
1	302-2410-00	MACHINE KEY {3/16" X 1"}	3
2	7010-002520-100	HEXAGON CAP SCREW {1/4"-20 x 1"}	2
3	7010-003118-100	HEXAGON CAP SCREW {5/16"-18 x 1"}	10
4	7010-003118-125	HEXAGON CAP SCREW {5/16"-18 x 1 1/4"}	10
5	7010-003118-250	HEXAGON CAP SCREW {5/16"-18 x 2 1/2"}	1
6	7016-411032-075	ROUND HEAD MACHINE SCREW {#10-32 x 3/4"}	4
7	7016-411032-125	ROUND HEAD MACHINE SCREW {#10-32 x 1 1/4"}	2
8	7018-002520-075	HEXAGON SOCKET HEAD CAP SCREW {1/4"-20 x 3/4"}	6
9	7018-003118-037	HEXAGON SOCKET HEAD CAP SCREW {5/16"-18 x 3/8"}	2
10	7024-610400-075	PAN SOCKET HEAD METAL SCREW {#4 x 3/4"}	2
11	7032-001024-200	EYE BOLT {#10-24 x 2"}	2
12	7034-001024-000	HEXAGON NUT {#10-24}	2
13	7036-001024-000	HEXAGON NYLON INSERT LOCKNUT {#10-24}	1
14	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	2
15	7036-002520-000	HEXAGON NYLON INSERT LOCKNUT {1/4"-20}	2
16	7036-003118-000	HEXAGON NYLON INSERT LOCKNUT {5/16"-18}	18
17	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	2
18	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	4
19	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	28
20	7050-034175-012	FLAT WASHER {11/32" x 1 3/4" x 1/8"}	1
21	7060-031057-009	LOCK WASHER {5/16"}	4
22	7150-019075-009	ALUMINUM FLAT WASHER {3/16" x 3/4" x 3/32"}	6
23	9102036	CHAIN TENSIONNER	1
24	9102080	DRIVE TRAIN FRAME	1
25	9102081	UP SPROCKET CHAIN	1
26	9102082	DOWN SPROCKET CHAIN	1
27	9102084	REDUCER SPACER PLATE	2
28	9102092	SPROCKET 40B24	2
29	9102094	SPROCKET 40B15	1
30	9102099	THIN HEXAGON NUT {1 3/8"-12}	2
31	9102107	SPECIAL SPACER WASHER 1 3/8"	1
32	9102108-4	MACHINE KEY 3/16" x 3"	1
33	9102110	SUPPORT PLATE	1
34	9102110-1	DRIVE SHAFT CENTER SUPPORT BASE	1
35	9102113	BRACKET	1
36	9102120	DRIVE SHAFT	1
37	9102121	DRIVE HUB	1
38	9102122	DISK SLIPPING PLATE	1
39	9102123	RAISING DRIVE SHAFT SPROCKET	1
40	9102124	LOWERING DRIVE SHAFT SPROCKET	1
41	9102125	BEARING	1
42	9102126	SEAL	1
43	9102127	MACHINE KEY 3/8" x 1/2"	1
44	9102145	CHAIN BINDER DOWN REINFORCEMENT	1
45	9103122	FRICTION DISK 1 3/8" HOLE	1
46	9105095	DISC SPRING 1 3/8"	3
47	9106045	SPACER BLOCK	1
48	9122118-1	MAGNET BRACKET	2
49	E-323HDS12	TERMINAL STRIP	1
50	E-3302M	INSULATED BX CONNECTOR	1
51	E-550	JUNCTION BOX	1
52	E-551	JUNCTION BOX COVER	1
53	M-0680-29	BEARING	1
54	M-0690-01-1	CHAIN COUPLING	2
55	M-0690-21	FLANGED BEARING	3
56	M-BMQ1133-10	“Motor assembly”	1
57	RB-249	RUBBER GROMMET	1

Figure 6.29 Drive Train Components



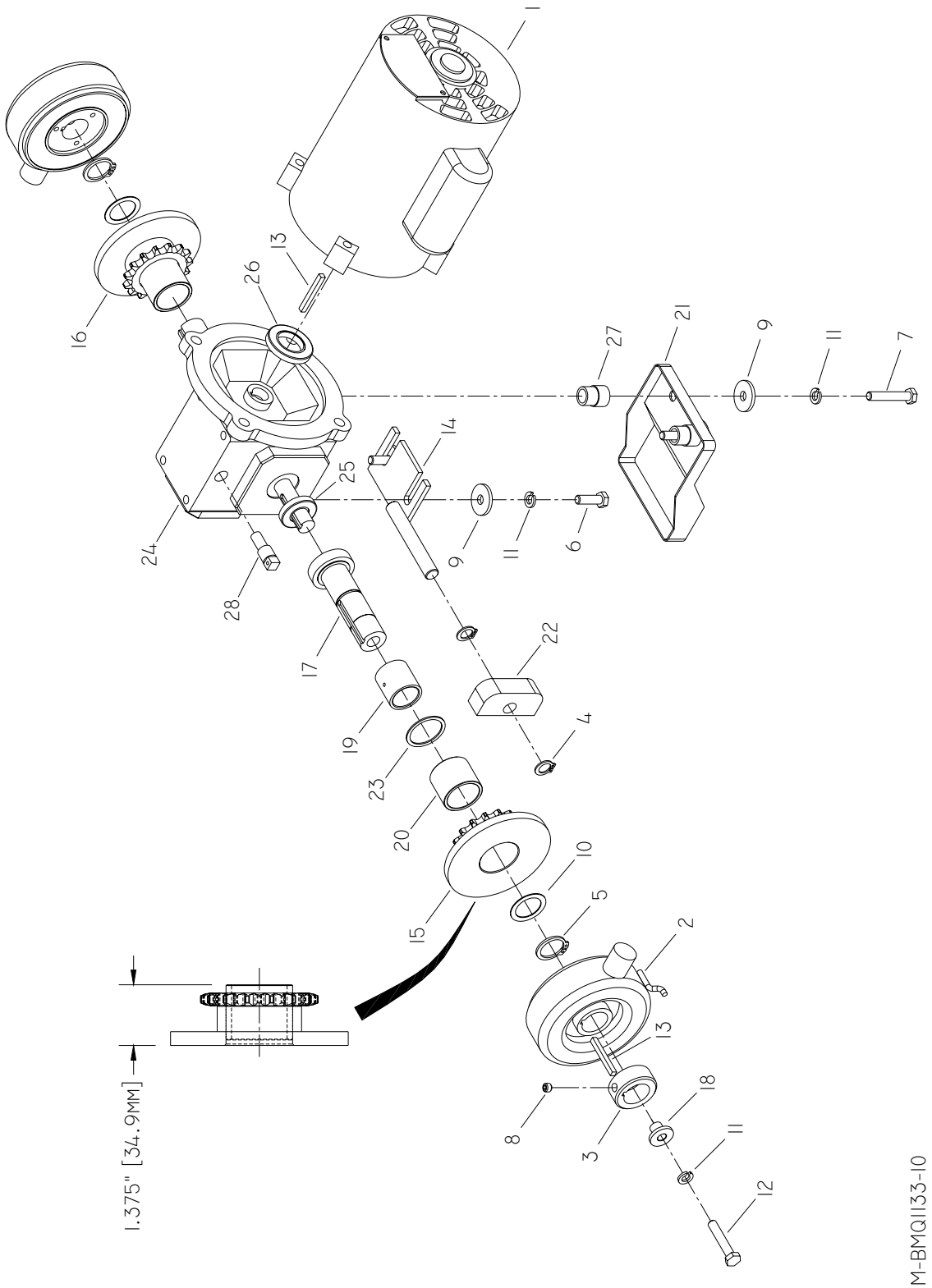
Motor assembly

	Part No.	Description	Qty
1	301-1200-00	MOTOR {208/230 VAC, 1/2 HP}	1
2	301-1400-00	MAGNETIC CLUTCH	2
3	302-2030-00	STEEL COLLAR {1"}	2
4	7002-710000-050	EXTERNAL RETAINING RING {1/2"}	2
5	7002-720000-098	EXTERNAL RETAINING RING {63/64"}	2
6	7010-003118-100	HEXAGON CAP SCREW {5/16"-18 x 1"}	2
7	7010-003118-175	HEXAGON CAP SCREW {5/16"-18 x 1 3/4"}	2
8	7014-003118-025	HEXAGON SOCKET SET SCREW - CUP POINT {5/16"-18 x 1/4"}	2
9	7050-034100-012	FLAT WASHER {11/32" x 1" x 1/8"}	4
10	7052-100137-003	SPACER WASHER {1" x 1 3/8" x 1/32"}	2
11	7060-031057-009	LOCK WASHER {5/16"}	6
12	7810-003124-175	HEXAGON CAP SCREW GRADE 8 {5/16"-24 x 1 3/4"}	2
13	9102108-2	MACHINE KEY {3/16" x 1 3/4"}	3
14	9102112-1	BINDER PLATE	1
15	9102114	UP CLUTCH SPROCKET	1
16	9102115	DOWN CLUTCH SPROCKET	1
17	9102129	REDUCER COUPLING {2 PCS.}	2
18	9102130	FLANGED BUSHING	2
19	9102141	INNER RING	2
20	9102143	SLEEVE BEARING	2
21	9103036	OIL PAN	1
22	9103112	CHAIN BINDER	1
23	9103143	SPACER WASHER	2
24	M-BMQ1133-1	DOUBLE SHAFT REDUCER	1
25	M-BMQ1133-17	OUTPUT OIL SEAL	2
26	M-BMQ1133-18	INPUT OIL SEAL	1
27	P-029	SPACER	2
28	P-1133-3	REDUCER VENT	1

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

29	EC-090-220	PINSETTER 1 POWER SUPPLY CABLE ASSEMBLY	1
30	EC-090-230	PINSETTER 2 POWER SUPPLY CABLE ASSEMBLY	1

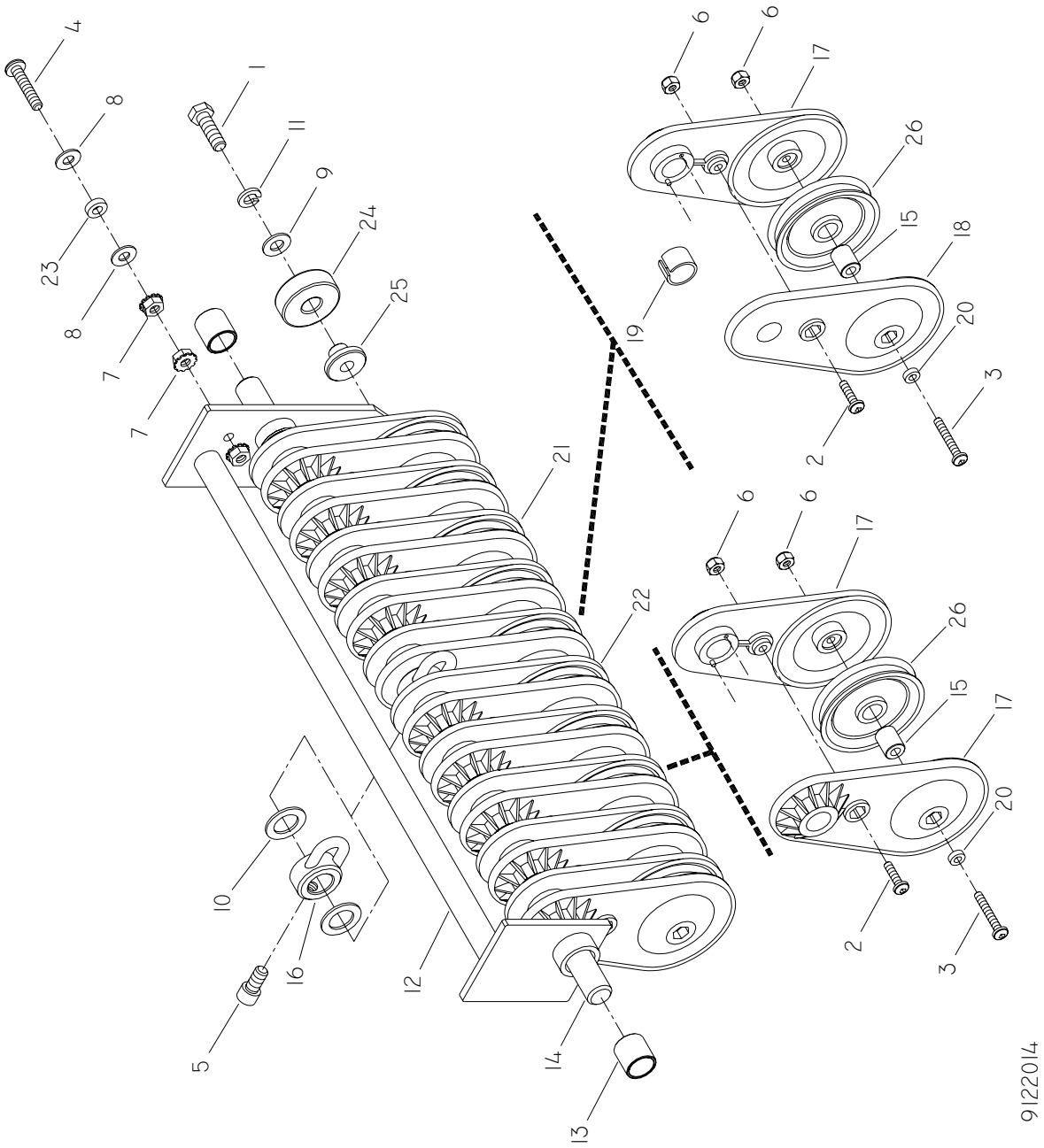
Figure 6.30 Motor Assembly



Drawbar assembly

	Part No.	Description	Qty
1	7010-003118-100	HEXAGON CAP SCREW {5/16"-18 x 1"}	1
2	7016-411032-075	ROUND HEAD MACHINE SCREW {#10-32 x 3/4"}	10
3	7016-411032-125	ROUND HEAD MACHINE SCREW {#10-32 x 1 1/4"}	10
4	7016-412520-125	ROUND HEAD MACHINE SCREW {1/4"-20 x 1 1/4"}	1
5	7018-003118-037	HEXAGON SOCKET HEAD CAP SCREW {5/16"-18 x 3/8"}	1
6	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	20
7	7038-002520-000	HEXAGON LOCKNUT {1/4"-20}	2
8	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	2
9	7050-034068-006	FLAT WASHER {11/32" x 11/16" x 1/16"}	1
10	7052-062100-006	SPACER WASHER {5/8" x 1" x 1/16"}	2
11	7060-031057-009	LOCK WASHER {5/16"}	1
12	9102014	DRAWBAR HANDLE	1
13	9102014-5	OILITE BEARING	2
14	9102015	DRAWBAR SHAFT	1
15	9102020	BUSHING	10
16	9102181	SHIELD COLLAR ATTACHMENT	1
17	9103014	SHEAF PLATE	18
18	9103014-1	SHEAF PLATE, FLAT	2
19	9103014-2	SHEAF PLATE SPACER	10
20	9103071	NYLON SPACER	10
21	9133014	SHEAF PLATE ASSEMBLY	8
22	9133014-1	SHEAF PLATE ASSEMBLY, FLAT	2
23	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	1
24	M-0680-29	BEARING	1
25	M-0680-31	STEEL BUSHING	1
26	P-016A	PULLEY	10

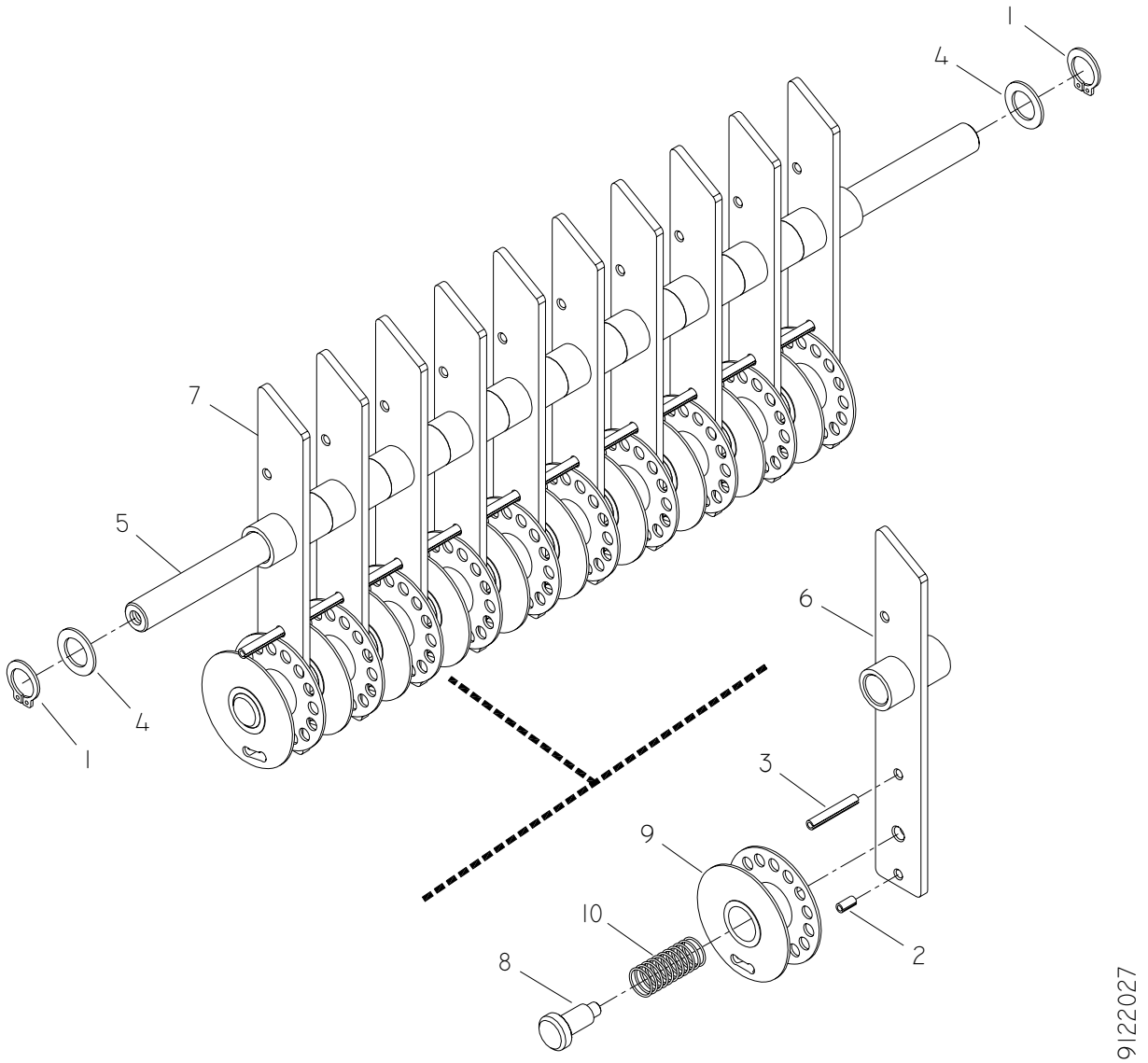
Figure 6.31 Drawbar Assembly



Reel arm complete assembly

	Part No.	Description	Qty
1	7002-710000-062	EXTERNAL RETAINING RING {5/8"}	2
2	7006-001800-037	SPRING PIN {3/16"x3/8"}	10
3	7006-001800-125	SPRING PIN {3/16"x1 1/4"}	10
4	7052-062100-006	SPACER WASHER {5/8" x 1" x 1/16"}	2
5	9102027	REEL ARM SHAFT	1
6	9102028	REEL ARM	10
7	9122028	REEL ARM ASSEMBLY	10
8	M-0011	AXLE PIN	10
9	M-0042	STORAGE REEL	10
10	S-074	STORAGE REEL SPRING	10

Figure 6.32 Reel Arm Complete Assembly



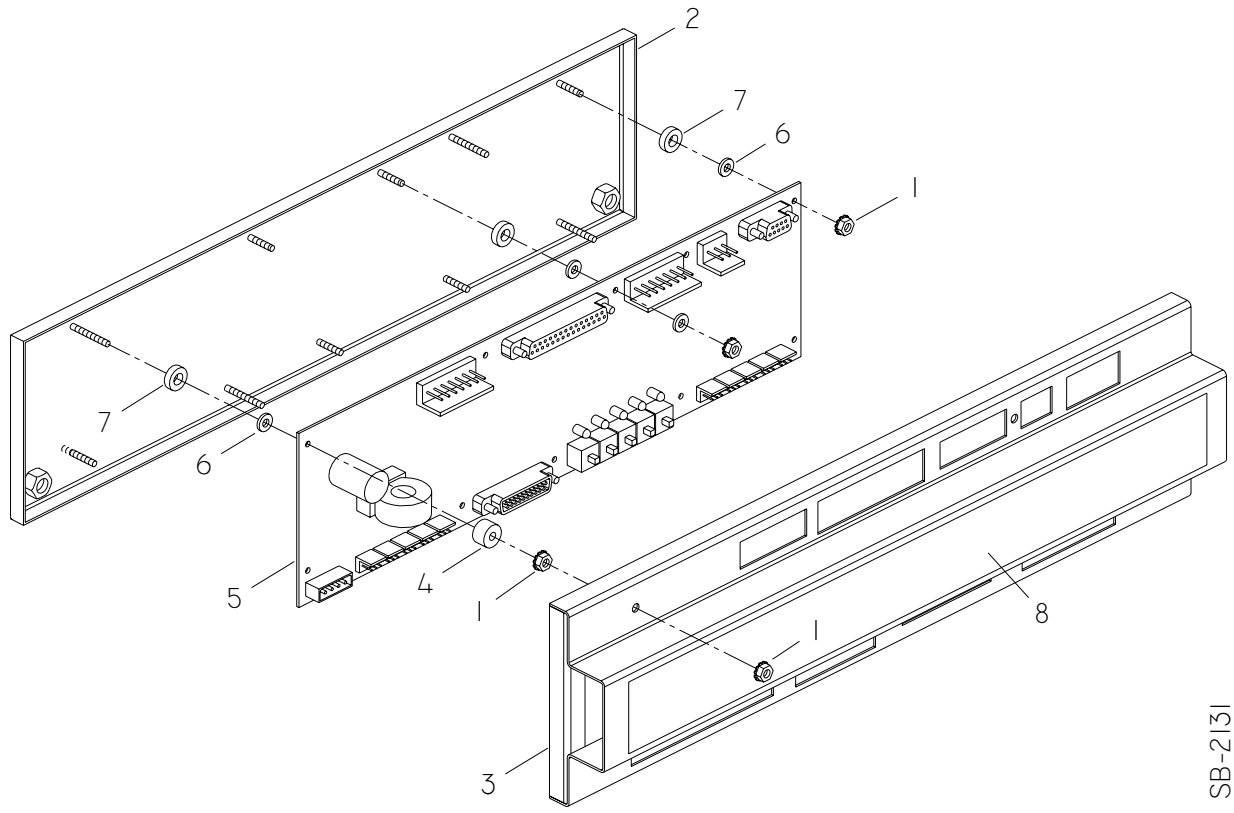
Solenoid/Opto control box

	Part No.	Description	Qty
1	7038-000632-000	HEXAGON LOCKNUT {#6-32}	14
2	9102131	PCB BASE	1
3	9102132	PCB COVER	1
4	E-219	NYLON SPACER {11/64" x 1/2" x 5/16"}	4
5	E-MD3-88	PIN DETECTOR CONTROLLER PCB	1
6	E-W3751	NYLON SPACER {3/16" x 3/8" x 1/16"}	14
7	E-W5007	NYLON SPACER {1/4" x 1/2" x 5/32"}	10
8	Z-2131	STICKER	1

associated cables (not illustrated – refer to Chapter 5 of the Owner's Manual)

9	EC-090-100-B	PINSETTER COMPONENT POWER SUPPLY CABLE ASSEMBLY
10	EC-090-110-B	PERIPHERAL POWER SUPPLY CABLE ASSEMBLY
11	EC-090-120-B	MACHINE 1 PIN DETECTORS CABLE ASSEMBLY
12	EC-090-130-B	MACHINE 2 PIN DETECTORS CABLE ASSEMBLY
13	EC-090-170-B	MACHINE 1 SOLENOIDS CABLE ASSEMBLY
14	EC-090-180-B	MACHINE 2 SOLENOIDS CABLE ASSEMBLY

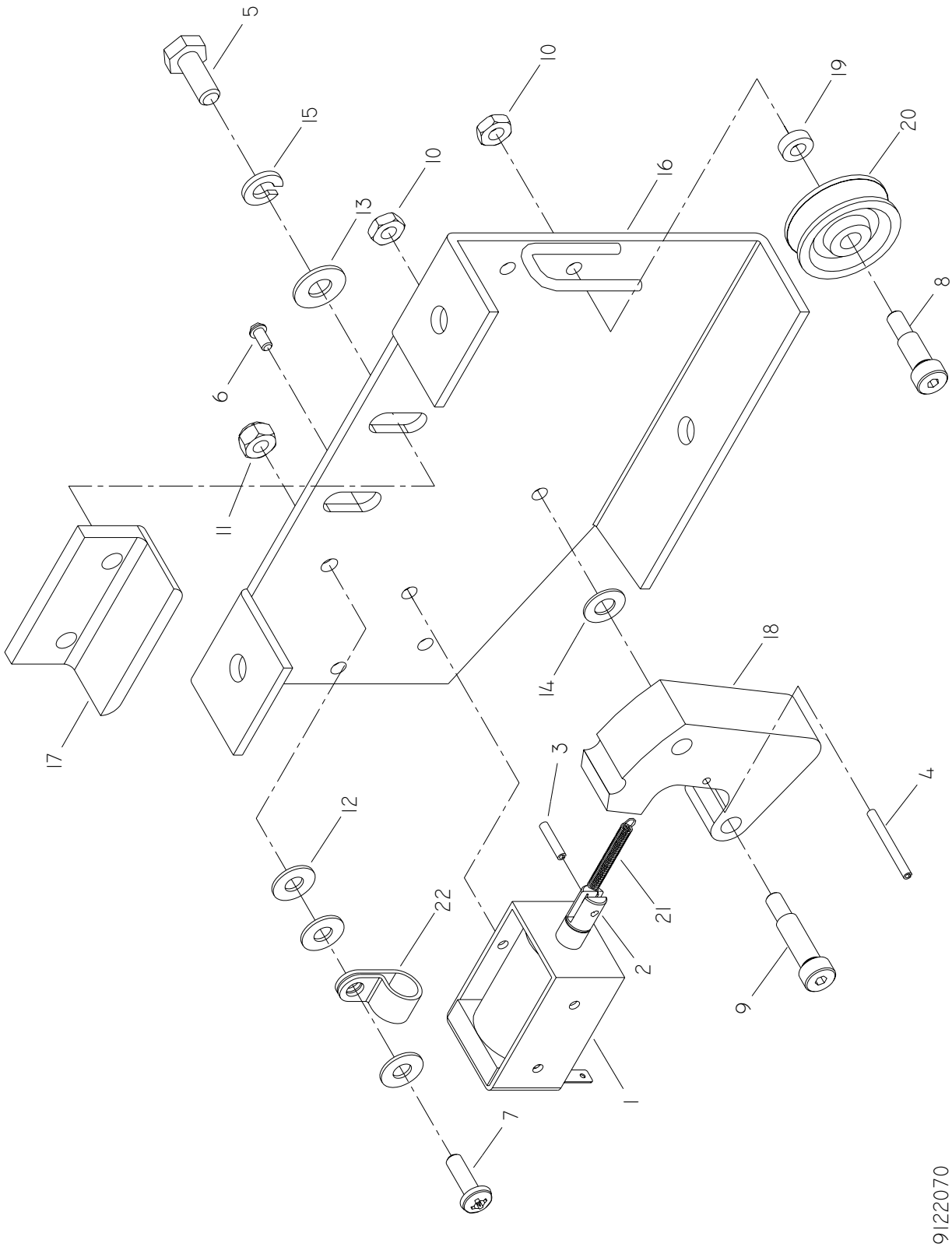
Figure 6.33 Solenoid/Opto Control Box



Pin brake assembly

	Part No.	Description	Qty
1	301-5170-00	SOLENOID {24VAC}	1
2	302-5270-00	SOLENOID SHAFT	1
3	7006-000900-050	SPRING PIN {3/32"x1/2"}	1
4	7006-000900-100	SPRING PIN {3/32"x1"}	1
5	7010-002528-062	HEXAGON CAP SCREW {1/4"-28 x 5/8"}	2
6	7016-410632-025	ROUND HEAD MACHINE SCREW {#6-32 x 1/4"}	2
7	7016-411032-062	ROUND HEAD MACHINE SCREW {#10-32 x 5/8"}	1
8	7020-002500-050	HEXAGON SOCKET HEAD SHOULDER SCREW {1/4" x 1/2"}	1
9	7020-002500-075	HEXAGON SOCKET HEAD SHOULDER SCREW {1/4" x 3/4"}	1
10	7034-001024-000	HEXAGON NUT {#10-24}	2
11	7036-001032-000	HEXAGON NYLON INSERT LOCKNUT {#10-32}	1
12	7050-021050-006	FLAT WASHER {7/32" x 1/2" x 1/16"}	3
13	7050-028062-006	FLAT WASHER {9/32" x 5/8" x 1/16"}	2
14	7052-025050-003	SPACER WASHER {1/4" x 1/2" x 1/32"}	1
15	7060-025046-006	LOCK WASHER {1/4"}	2
16	9102070	BRAKE PLATE	1
17	9102071	BRAKE ANGLE PLATE	1
18	9103070	BRAKE CAM	1
19	9103071	NYLON SPACER	1
20	9103072	GUIDE WHEEL	1
21	9105070	SPRING	1
22	E-660-09	CABLE CLAMP	1

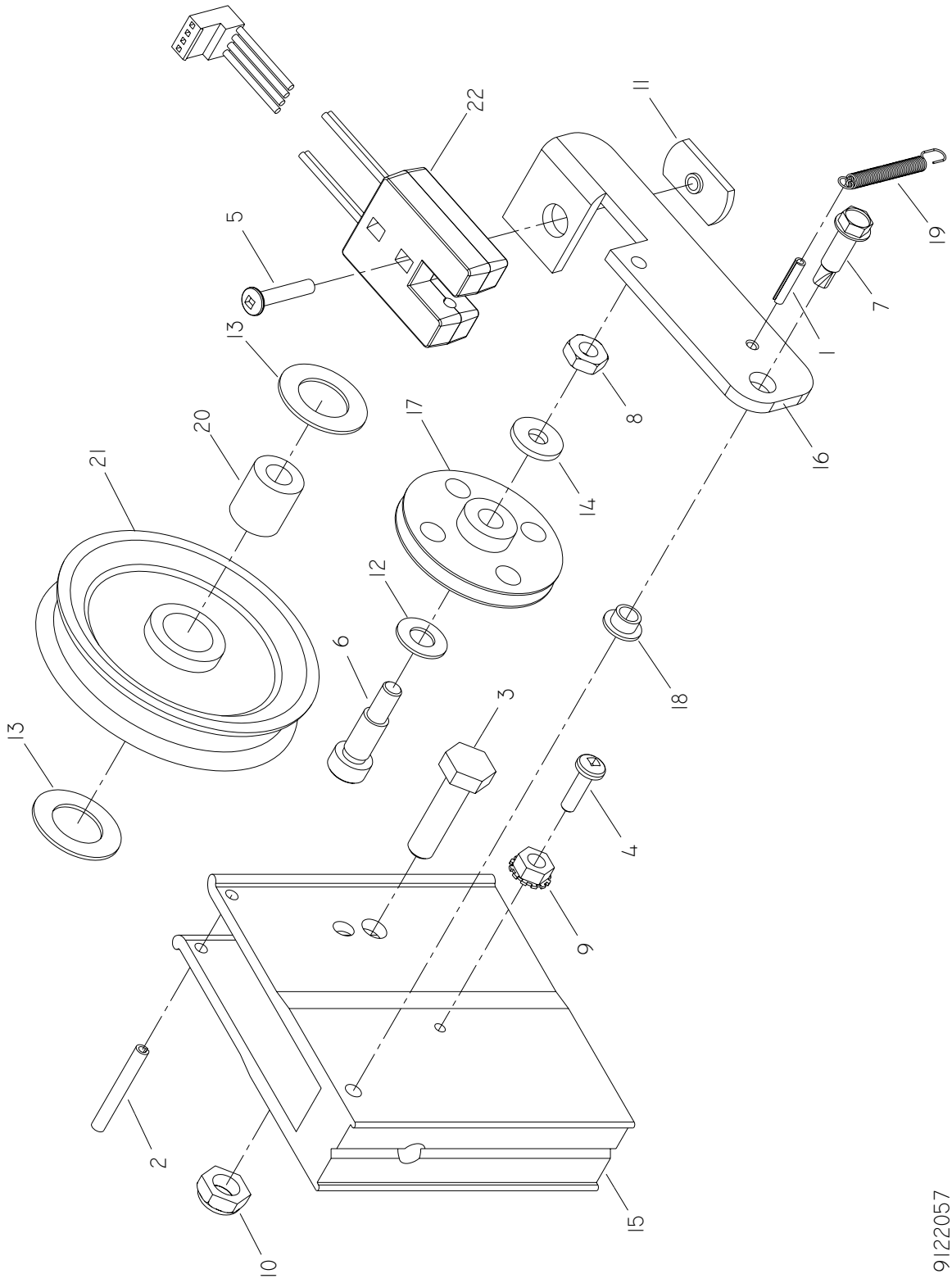
Figure 6.34 Pin Brake Assembly



Pin detection assembly

	Part No.	Description	Qty
1	7006-000900-050	SPRING PIN {3/32"x1/2"}	1
2	7006-001200-100	SPRING PIN {1/8"x1"}	1
3	7010-002520-100	HEXAGON CAP SCREW {1/4"-20 x 1"}	1
4	7016-410632-050	ROUND HEAD MACHINE SCREW {#6-32 x 1/2"}	1
5	7016-410632-075	ROUND HEAD MACHINE SCREW {#6-32 x 3/4"}	1
6	7020-002500-050	HEXAGON SOCKET HEAD SHOULDER SCREW {1/4" x 1/2"}	1
7	7027-201016-075	HEXAGON FLANGE SOCKET HEAD TAP SCREW {#10 x 3/4"}	1
8	7034-001024-000	HEXAGON NUT {#10-24}	1
9	7038-000632-000	HEXAGON LOCKNUT {#6-32}	1
10	7044-002520-000	HEXAGON THIN NYLON INSERT LOCKNUT {1/4"-20}	1
11	7046-000632-006	WELD NUT {#6-32}	1
12	7052-025050-003	SPACER WASHER {1/4" x 1/2" x 1/32"}	1
13	7052-050087-003	SPACER WASHER {1/2" x 7/8" x 1/32"}	2
14	7150-019050-004	ALUMINUM FLAT WASHER {3/16" x 1/2" x 3/64"}	1
15	9102057	SENSOR SHEAVE	1
16	9102058	SUPPORT BRACKET	1
17	9103058	DETECTION WHEEL	1
18	9103059	NYLON SHOULDER WASHER	1
19	9105070	SPRING	1
20	M-0100B	BUSHING	1
21	P-016A	PULLEY	1
22	SB-ECIL-325-PD	OPTICAL SENSOR ASSEMBLY	1

Figure 6.35 Pin Detection Assembly



Non-Illustrated Components, Options and Accessories

Electronic accessories

Refer to Chapter 5 “Wiring Diagrams” of the Owner’s Manual for more information on these parts.

	Part No.	Description
1	E-544	6-DIGIT METER W/BRACKET, 24VAC
2	E-9801600	TICKET DISPENSER

Game accessories

	Part No.	Description
1	Q01-0450	BOWLINGO BALL, BROWN/RUST
2	Q01-0460	BOWLINGO BALL, GLOW-IN-THE-DARK WHITE
3	Q01-0475	BOWLINGO BALL, GLOW-IN-THE-DARK PINK
4	Q01-0480	BOWLINGO BALL, GLOW-IN-THE-DARK BLUE
5	Q01-0485	BOWLINGO BALL, GLOW-IN-THE-DARK GREEN

Maintenance products and accessories

	Part No.	Description
1	Q82-0055	GENERAL PURPOSE MACHINE CLEANER
2	Q82-0060	CLEAR 100% SOLID LANE COND
3	Q82-0070	PHOSPHATE-FREE LANE CLEANER
4	Q83-0014-36	BED BRUSH 36"
5	Q83-0016-1	APPROACH MOP COMPLETE 24"
6	Q83-0020	DUSTER CLOTH 43" 100Y. #8430
7	Q83-0022	LANE SPRAYER
8	Z-001	SWAGING TOOL
9	Z-76764	ANTI-SEIZE LOCKTITE
10	Z-BJ0001	STRING ADJUSTMENT TOOL
11	Z-ME90	TENSION ADJUSTMENT TOOL
12	Z-ME90-10	2” OPEN WRENCH
13	Z-MEB90-10	BOWLINGO OWNER’S MANUAL

BP-OPCE CE CONVERSION KIT Complete conversion kit for one pair of lanes. Obligatory for installations in Europe, this kit ensures conformity to CE codes. The kit is made up of the following items:

	Part No.	Description	Qty.
1	BP-OPCE-1	KIT BOWLINGO CE (ELECTRONIQUE)	1
2	7010-002520-075	1/4-20 X 3/4" HEX CAP SCREW	4
3	7010-002520-100	1/4-20 X 1" HEX CAP SCREW	2
4	7010-003118-100	5/16-18 X 1" HEX CAP SCREW	2
5	7010-003118-200	5/16-18 X 2" HEX CAP SCREW	4
6	7016-311032-150	10-32 X 1 1/2" MA SC FH SOCK	2
7	7016-411032-050	10-32 X 1/2" MA SC RH SOCK	6
8	7016-411032-075	10-32 X 3/4" MA SC RH SOCK	4
9	7016-411032-150	10-32 X 1 1/2" MA SC RH SOCK	8
10	7016-430632-050	6-32 X 1/2" MA SC RH COMB	8
11	7024-710800-050	#8 X 1/2" TAPP SCW TH SOCK	8
12	7024-710800-075	#8 X 3/4" TAPP SCW TH SOCK	2
13	7036-001032-000	10-32 NYLON NUT	18
14	7036-002520-000	1/4-20 NYLON NUT	6
15	7036-003118-000	5/16-18 NYLON NUT	6
16	7038-000632-000	6-32 HEX NUT K-LOCK	8
17	7038-002520-000	1/4-20 HEX NUT K-LOCK	4
18	7045-003118-037	5/16"-18 X 3/8" TEE NUT	4
19	7047-003118-000	5/16-18 WING NUT	4
20	7050-018048-004	3/16" X 31/64" FLAT WASHER	4
21	7050-028062-006	9/32" X 5/8" FLAT WASHER	12
22	7050-034068-006	11/32" X 11/16" FLAT WASHER	8
23	7050-034100-012	11/32" X 1" FLAT WASHER	2
24	7050-040081-006	13/32" X 13/16" FLAT WASHER	2
25	7050-043100-009	7/16" X 1" FLAT WASHER	2
26	7108-401200-050	1/8" X 1/2" ALUM POP RIVET DH	14
27	7150-019075-009	.193 X 3/4 ALUM FLAT WASHER	2
28	9102047	"D" RING CLIP .750" 3/4	"4
29	9102048	TOP COVER PIVOT	4
30	9102049	PRESSSURE GUAGE CLIP	2
31	9102060	MOUNTING PLATE	3
32	9102061	MOUNTING BRACKET	2
33	9102062	WASHER PLATE	4
34	9103003	TOP COVER	2
35	M-0391-02	PROTECTION BRACKET	1
36	M-0700-81	HEAD GUARD BRACKET	1
37	M-0700-81-1	HEAD GUARD BRACKET	1
38	M-0700-82	VENTILLATION PLATE	2
39	P-0700-61-4	BALL LIFT GUARD RIGHT	1
40	P-0700-61-7	BALL LIFT GUARD LEFT	1

KIT-MEB97M MEDIUM SPARE PARTS KIT Recommended for installations with more than 6 lanes; the kit is comprised of the following parts:

	Part No.	Description	Qty.
1	301-1200-00	ELECTRIC MOTOR 208/230 VAC 1/2	1
2	301-1400-00	MAGNETIC CLUTCH	1
3	301-5170-00	24VAC INTERMITTANT SOLENOID	2
4	7036-001032-000	NYLOCK NUT	50
5	9102015	DRAWBAR SHAFT	1
6	9103058	DETECTION WHEEL	2
7	9103070	BRAKE CAM	2
8	9103112	CHAIN BINDER	2
9	9105070	SPRING	10
10	9122028	REEL ARM ASSEMBLY	1
11	9122057	PIN DETECTION ASSEMBLY	1
12	9122070	PIN BRAKE ASSEMBLY	2
13	E-214215	90VDC POWER SUPPLY	2
14	E-902	FAN 12 VDC 1.1W	1
15	E-903	FAN 12 VDC 2W	1
16	E-W28XQ1A-10	CIRCUIT OVERLOAD, 10 AMP	1
17	E-W28XQ1A-3	CIRCUIT OVERLOAD, 3 AMP	2
18	E-W28XQ1A-5	CIRCUIT OVERLOAD, 5 AMP	1
19	EC-097-03	HARD DRIVE CABLE ASSEMBLY	1
20	M-BMQ1133-3	MOTOR REDUCER	1
21	OU-001	ROBERTSON #1 SCREWDRIVER	2
22	OU-002	ROBERTSON #2 SCREWDRIVER	2
23	OU-003	ROBERTSON #3 SCREWDRIVER	2
24	P-241-10	PIN HEAD BUSHING	50
25	Q70-0030	NYLON PIN BASE	1
26	Q72-0241	BOWLINGO PIN	2
27	Q81-1050	STRING, 50 METER ROLL	2
28	Q82-0060	CLEAR 100% SOLID LANE COND	1
29	Q82-0070	PHOSPHATE FREE LANE CLEANER GA	1
30	Q83-0014-36	BED BRUSH 36	"1
31	Q83-0016-1	APPROACH MOP COMPLETE 24	"1
32	Q83-0020	DUSTER CLOTH 43" 100Y. #8430	1
33	Q83-0022	LANE SPRAYER	1
34	S-071	TENSION SPRING	5
35	SB-102-5150-00	INPUT/OUTPUT TRAY ASSEMBLY	1
36	SB-102-5155-00	MPEG TRAY ASSEMBLY	1
37	SB-102-5160-00	CPU TRAY ASSEMBLY	1
38	SB-102-5170-00	POWER SUPPLY TRAY ASSEMBLY	1
39	SB-ECIL-325-FS	OPTICAL SENSOR ASSEMBLY	3
40	SB-ECIL-325-PD	OPTICAL SENSOR ASSEMBLY	3
41	Z-001	SWAGING TOOL	1
42	Z-ME90	TENSION ADJUSTMENT TOOL	1
43	Z-ME90-10	2" OPEN WRENCH	2

KIT-MEB97S SMALL SPARE PARTS KIT Recommended for installations with less than 6 lanes; the kit is comprised of the following parts:

	Part No.	Description	Qty.
1	301-1400-00	MAGNETIC CLUTCH	1
2	301-5170-00	24VAC INTERMITTANT SOLENOID	2
3	7036-001032-000	NYLOCK NUT	50
4	9102015	DRAWBAR SHAFT	1
5	9103058	DETECTION WHEEL	2
6	9103070	BRAKE CAM	2
7	9103112	CHAIN BINDER	2
8	9105070	SPRING	10
9	9122028	REEL ARM ASSEMBLY	1
10	9122057	PIN DETECTION ASSEMBLY	1
11	9122070	PIN BRAKE ASSEMBLY	2
12	E-214215	90VDC POWER SUPPLY	2
13	E-902	FAN 12 VDC 1.1W	1
14	E-903	FAN 12 VDC 2W	1
15	E-W28XQ1A-10	CIRCUIT OVERLOAD, 10 AMP	1
16	E-W28XQ1A-3	CIRCUIT OVERLOAD, 3 AMP	2
17	E-W28XQ1A-5	CIRCUIT OVERLOAD, 5 AMP	1
18	EC-097-03	HARD DRIVE CABLE ASSEMBLY	1
19	OU-001	ROBERTSON #1 SCREWDRIVER	2
20	OU-002	ROBERTSON #2 SCREWDRIVER	2
21	OU-003	ROBERTSON #3 SCREWDRIVER	2
22	P-241-10	PIN HEAD BUSHING	50
23	Q70-0030	NYLON PIN BASE	1
24	Q72-0241	BOWLINGO PIN	2
25	Q81-1050	STRING, 50 METER ROLL	2
26	Q82-0060	CLEAR 100% SOLID LANE COND	1
27	Q82-0070	PHOSPHATE FREE LANE CLEANER GA	1
28	Q83-0014-36	BED BRUSH 36"	1
29	Q83-0016-1	APPROACH MOP COMPLETE 24"	1
30	Q83-0020	DUSTER CLOTH 43" 100Y. #8430	1
31	Q83-0022	LANE SPRAYER	1
32	S-071	TENSION SPRING	5
33	SB-102-5150-00	INPUT/OUTPUT TRAY ASSEMBLY	1
34	SB-102-5155-00	MPEG TRAY ASSEMBLY	1
35	SB-102-5160-00	CPU TRAY ASSEMBLY	1
36	SB-102-5170-00	POWER SUPPLY TRAY ASSEMBLY	1
37	SB-ECIL-325-FS	OPTICAL SENSOR ASSEMBLY	3
38	SB-ECIL-325-PD	OPTICAL SENSOR ASSEMBLY	3
39	Z-001	SWAGING TOOL	1
40	Z-ME90	TENSION ADJUSTMENT TOOL	1
41	Z-ME90-10	2" OPEN WRENCH	2

Appendix A
Product Warranties and Notices

Mendes Statement of Limited Warranty

Warranties covering the construction and equipment order

NEW ITEMS. Mendes warrants that all new Mendes equipment will be free from defects in material and workmanship for one year. The warranty period shall commence upon completion of installation. Should any defect appear during the first three-months of the warranty period, the defect will be repaired or replaced at Mendes' option without charge to the Customer. Any defect, which occurs thereafter during the warranty period, will be repaired or replaced at Mendes' option, without charge to the Customer for parts, provided Customer immediately pays all other costs involved in making such repair or replacement.

Normal maintenance procedures and adjustments are the responsibility of the Customer and are not covered under the terms of this warranty.

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

The above warranties are in lieu of all other warranties, express or implied. Repair or replacement as provided above shall be the Customer's sole remedy under this limited warranty. Under no circumstances shall Mendes be liable for loss of profits or other direct or indirect costs, expenses, losses or damages arising out of defects in or failures of pinsetters, parts or other goods purchased hereunder. Mendes' warranties apply only to items installed by Mendes or a Mendes authorized representative. If repairs, replacements, or modifications are made by anyone not approved in advance by Mendes, Mendes shall have no liability whatever under this limited warranty. The costs of any service calls made by Mendes during the initial 90 day warranty period for new equipment and reconditioned pinsetters which result from the inability of the Customer's mechanic to perform required adjustments, maintenance, or replacement of parts, shall be charged to the Customer and be payable to Mendes immediately. The limited warranty contained herein does not cover any damage to the electronic components resulting from Customer's failure to fulfill the electrical requirements as specified in the Mendes pre-installation specifications. Further, the relative humidity must be maintained between 35% and 45% to allow the electronic components to perform adequately. Mendes shall not be responsible for any changes that may take place after the delivery or installation due to atmospheric conditions or moisture in the premises or developing from causes over which it has no control. Mendes makes no assurances, representation or warranties to the Customer that Mendes supplied pinsetters or bowling lanes will operate without noise or vibration. Nor does Mendes agree to eliminate or reduce any noise or vibration, which may result from the operation of the pinsetters or bowling lanes. Any verbal or written statement made by any agent or sales representative of Mendes contrary to the provision of this warranty is wholly unauthorized and of no force and effect.

OBTAINING WARRANTY SERVICE. In order to obtain warranty service for defective parts, Customer must return the defective part to Mendes, freight prepaid. Upon determination that the returned part is defective, Mendes will repair or replace the part and then return it to the Customer. You may REQUEST INFORMATION

on how to obtain service under this warranty by contacting the Mendes subsidiary office in your country, or by contacting Mendes Incorporated at the address printed below.

DO NOT SEND PRODUCTS TO THIS ADDRESS WITHOUT PRIOR AUTHORIZATION. TO RETURN PRODUCTS, CONTACT THE MENDES HELP CENTER FOR AN R.MA. NUMBER AND SHIPPING INSTRUCTIONS.

Mendes Inc., 2425 Watt Street • Sainte-Foy, Quebec • Canada G1P 3X2

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Class A Electronic Emission Notices

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Mendes is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A Emission Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Appendix B
Equipment Records

Use the form on the next page to record and retain the following information:

- Product names
- Models and types
- Serial numbers
- Any other information which might be useful such as the lane number or location where the equipment/component is installed

Product Serial Numbers

Product/component	*Model/type*	*Serial number*	*Notes*

bowlingo Parts Index

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