ME-90 PINSETTER

User Manual & Certificate of Training

Mendes Electric Pinsetter

LANE CONTROLLER VERSION 3.02

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Mendes Inc.

In our continuing effort to provide the best products possible, we welcome your suggestions and comments on how we can improve the Mendes equipment or its documentation.

This manual was written and produced by the Mendes Customer Service Department. For any further explanation or information on this manual or any other Mendes product, please write to Service Manager, Mendes Inc., 2425 Watt Street, Sainte-Foy, Québec, Canada, G1P 3X2.

MENDES
ME-90
PINSETTER

Contents

SERVICE LETTERS

MENDES
ME-90
PINSETTER

Service Letters

When new versions of the Mendes ME-90™ Pinsetter become available, you will be advised through a service letter of the changes and new items contained in the software along with its expected release date.

You should keep these service letters in this section for future reference.

Also contained in these service letters are new troubleshooting ideas and hints from other bowling proprietors who have been gracious enough to let you in on their discoveries.

If you have any information which you think would benefit other users of the Mendes ME-90™ Pinsetter and would like to share it with them, please write your ideas down along with your consentment allowing Mendes Inc. to use your idea and name in future publications of these same service letters and send it to:

Service Manager
Mendes Inc.
2425 Watt Street (Parc Colbert)
Ste-Foy, Québec
Canada G1P 3X2

Introduction

Welcome to the Mendes ME-90™ Pinsetter, the pinsetter that works the way you want it to. It is understood that pinsetters of any kind require a minimum of maintenance and should operate according to standards. The simplicity of the ME-90 Mendes pinsetter being its main characteristic, it is very easy to understand its concept.

This manual is organized as a comprehensive reference and is arranged by task. It includes information for users who have little experience in addition to advanced topics for those who are more familiar with Mendes Futura™ equipment. It is not necessary to read this manual straight through. Consult the table of contents or index to learn how to use the options you work with most.

This manual is divided into the following parts:

- Part 1: Fundamentals. Explains the essentials of your system.
- Part 2: User's Guide. Explains how to use your system in detail so you may maximize the system's possibilities.
- Part 3: References. Provides an alphabetical reference, with complete descriptions of options and equipment. Intermediate and advanced users can use this reference to learn about the full capabilities of your Mendes equipment and software.
- Part 4: Parts & Plans. Provides detailed plans of all Mendes equipment with corresponding indexed parts lists. Use this section to locate and order parts.
- Part 5: Troubleshooting. Covers possible solutions to problems which may occur with your Mendes equipment.
- Part 6: Preventive Maintenance. Schedules and procedures which must be done in order to keep your Mendes equipment in good operational condition.

MENDES INC
2425 Watt
Sainte-Foy (Québec)
G1P 3X2

Certificate of Training

On this date: _____

The following personnel:

	Name	Signature
(1)	_____	_____
(2)	_____	_____
(3)	_____	_____
(4)	_____	_____
(5)	_____	_____

Have received staff training in the operation and maintenance of the Mendes Electric Pinsetter, model ME-90 on behalf of:

_____ (company / site name)

IMPORTANT: The above named staff are authorized to carry out the operating / maintenance schedule attached and they are also authorized to instruct others in the correct cleaning procedures, and further authorized to instruct others in the correct procedures concerning untangling pins.

AT NO TIME MAY THE ABOVE NAMED TRAIN OTHER PERSONNEL IN THE OPERATION / MAINTENANCE SCHEDULE ATTACHED. Further staff training and re-training may only be carried out by a representative of Mendes Inc., or their appointed agents.

Training given by: _____

Company Name: _____

MENDES INC
2425 Watt
Sainte-Foy (Québec)
G1P 3X2

Certificate of Training

On this date: _____

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Training given by: _____

Company Name: _____

This manual assumes that the Mendes ME-90™ Pinsetter has been installed by an accredited

Fundamentals

This manual assumes that the Mendes ME-90™ Pinsetter has been installed by an accredited Mendes technician and is functional in every aspect. If you have a problem, refer to the Troubleshooting section in this manual.

Basic Functions

The diagram below shows a simplified diagram of a pinsetter. Solid lines indicate the main parts of the pinsetter. When the machine is in the "ready-to-bowl" position, pins are on the pindeck (D1 position).

Never forget your pinsetter is a string machine. Its good operation is related to the proper length of the string. **All the mechanism of the machine is related to the right length of the string.** Any variation in the length of the string caused by humidity or stretching is sufficient to disturb the system.

The Quality Control Department of the manufacturer has taken very good care to ship you a machine that was:

a) completely adjusted;

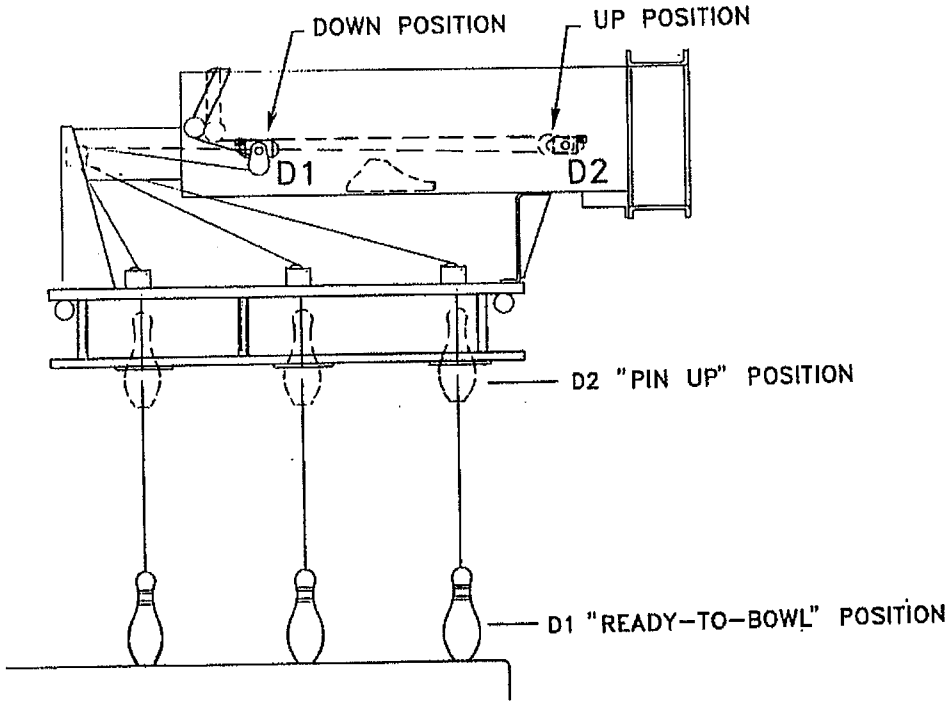
b) field tested;

c) checked before shipment (refer to the control sheet).

When a pin is knocked down, it rotates the pin detection wheel. The wheel sends a signal to the optical switch which is connected to the micro-processor lane controller.

The drawbar will then be activated from the D1 position to the D2 position. Each string has its own corresponding brake module.

When the machine is in the D2 position and starts the cycle back to D1, pins which have been knocked down will be held up due to a brake activated by a solenoid. The remaining pins will return to the pindeck.



String System

Here is the concept of the system. Whether the pinsetter is used for the games of Fivepin, Duckpin or Tenpin, an equal number of strings of fourteen feet (14'), approximately four feet (4') as spare wound on each reel, are attached to the top of the pins. These black nylon strings of the highest quality whiten slightly after a certain period of time. The whitening is therefore, an inherent characteristic of the rope since nylon is basically a white resin braided into string and then dyed black. 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, and the string refastened.

For Duckpin and Tenpin games a plastic bushing (part # P-241-10) is installed in the head of each pin which allows the pin to spin and roll without twisting the string. This greatly extends string life and ensures more accurate spotting of pins.

Pin Detector Wheel

A wheel placed at the front of the machine (one for each pin) allows the detection of knocked down pins. An optical switch receives impulses which are transmitted to the lane controller.

Braking System

The braking system has three main parts, a cam, a solenoid and a brake-shoe. The solenoid activates the cam which in turn secures the string holding the corresponding pin up.

Ball Lift System

The ball lift system is simply a conveyor which takes the ball and places it on a return track. It is a totally automatic operation which is activated as soon as the machine is turned on. It functions with a 20/1 reducer and a ½ h.p. motor on 230 volts.. Chains are guided by plastic slides sturdy to wearing.

An integrated EZ-Lustre ball polisher is optional. The ball lift is identical except for the fact that the motor also activates the ball polisher and a mechanism allows each ball to remain up to four (4) seconds in the polisher.

Traction (Drawbar System)

A 10/1 reducer and a ½ h.p. motor supplies the necessary power to move the pins.

Once the pinsetter is turned on, the motor runs continuously. The raising action is controlled by a magnetic clutch. An adjustable coil allows for the tension adjustment of the strings even if there is a tangle before arriving to the D2 position (pins up). The electronic controller takes care of the time of raising and lowering, stabilizing pause, braking action, untangle routine, etc. All these different delays can be adjusted by the DIP switches located inside the electronic lane control box. The different components used to control the functions of the pinsetter are as follows:

Magnetic Clutch (raising)

This component couples the motor reducer to the main shaft which carries the drawbar to the D2 position.

Magnetic Clutch (lowering)

This magnetic clutch couples the motor reducer to the main shaft which carries the drawbar to the D1 position.

Raising Coil

This adjustable coil is installed between the main shaft and the raising clutch.

Pin Detector Optical Switch

Optical switches (one for each pin) which detect the Pin Detector Wheel action when rotated by a knocked down pin.

L.S. Optical Switch

When pins are in stabilizers and drawbar has completed its cycle, the contact position of this optical switch is activated and sends a positive signal directly to the electronic lane control box.

P.B. Optical Switch

When pins are in stabilizers and L.S. contact has been activated, the drawbar begins to lower. The contact position of this optical switch is activated and sends a positive signal directly to the electronic lane control box which in turn actuates the solenoids to keep knocked down pins up.

P.O. Optical Switch

Once pins have been placed in the D1 position (down), the contact switch of this optical switch is activated and in turn indicates to the electronic lane control box that the cycle is completed and that the lowering magnetic clutch must be inactivated.

Power Box

Refer to drawing # EL-6400-99 in the Parts and Plans Section of this manual. A power supply of 220 V.A.C., 60 HZ, single phase, 20 Amp. is required per pair of lanes. An overload system protects each motor.

Lane Controller

A lane controller system composed of 2 electronic boards, themselves controlled by a micro-processor, controls two pinsetters. Pilot-lights (LEDs) indicating IN and OUT signals are included to facilitate comprehension of the system.

Each pinsetter has a pin detector board which is connected to the pin detector wheels and brake solenoids. This electronic board has 5 buttons which control the pinsetter (during normal operation, the pin detector board is controlled by the lane controller).

An IR (infrared) sensor located on the ball return allows the detection of the ball on its way down the lane. The minimum reaction time is 1.7 milli seconds or 40 MPH. The ball detector allows an automatic operation of the pinsetter which means that it is not necessary to use a reset button during play.

Note

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

Note for AutoScoring Users

A specially designed computer is used to control the display of each pair of lanes. A box including electronic boards needed to control the scoring is connected to the lane controller. The logical functions of the pinsetter are controlled by an electronic system composed of interchangeable boards. This system allows quick servicing. For more details, refer to your AutoScoring Manual.

User's Guide Conventions

The User's Guide includes consistent visual cues and conventions so that you can easily find and use the information you need.

Convention	Indicates
CAUTION	Possible negative consequences of performing an action.
NOTE	Additional information about how the Mendes Electric Pinsetter operates, or an important consideration or instruction
Tip	A hint or information about using the Mendes Electric Pinsetter

Pin Detector Board

Each pinsetter has a pin detector board which is connected to the pin detector wheels and brake solenoids. This electronic board has 5 buttons which control the pinsetter (during normal operation, the pin detector board is controlled by the lane controller). When the LED above the button is lit up, it is on. From left to right these buttons are:

Mode Button — When ON, this means the controller is in slave mode (controlled by the lane controller). This is the only LED which should be lit up when you are in normal operation.

Power Button — Used to manually turn the pinsetter ON and OFF.

Full Set Button — Used to perform a Full Set cycle. This LED will only light up when you depress the button. Once you release the button, the LED will turn OFF.

Part Set Button — Used to perform a Part Set cycle. This LED will only light up when you depress the button. Once you release the button, the LED will turn OFF.

Auxiliary Button — Used to place the pinsetter in an "idle" mode. YOU HAVE TO PUSH THE BUTTON AGAIN to end this "idle" mode. The idle mode is used to untangle strings when the pinsetter is unable to do so itself. This LED will only light up when you depress the button. Once you release the button, the LED will turn OFF.

When combining buttons, you get additional functions...

PS Button with FS Button — 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.

PS Button with AUX Button — When pushing these 2 buttons simultaneously the BRAKES TEST function is activated. The pinsetter performs a cycle and hold all pins up with the brakes. To reestablish normal functions, press the FS button.

Notes

When depressing buttons, hold them down for a few seconds to ensure a good signal to the pinsetter.

When in idle mode, you will see the LEDs on the lane controller board flash 5 at a time in an alternating pattern.

When in string extension mode, the LEDs on the lane controller board perform an inside-out movement.

When in the brakes test mode, the LEDs on the lane controller board all flash at the same time.

Lane Controller

The ME-90 pinsetter is controlled by two electronic boards which are located inside the lane controller (part # SB-6500-90). These boards are the pinsetter's brains and are CPU controlled.

Each lane controller is individually configured through DIP switches on the main (upper) board of the lane controller. The actual configuration process is normally carried out by the technician who installed the pinsetters. If you do change the settings we recommend that you do so only when told to by a qualified technician. It is strongly recommended that you note the settings before changing any switches so you can easily return to the previous settings if a problem occurs.

The different DIP switch settings along with their corresponding descriptions and explanations are located in the References Section of this manual.

NOTE

ANY CHANGES CARRIED OUT ON THE DIP SWITCH SELECTIONS MAY BE DONE WHEN THE ELECTRONICS ARE ON BUT YOU MUST DEPRESS THE RESET BUTTON LOCATED ON THE SAME BOARD IN ORDER FOR THE CHANGES TO TAKE EFFECT. ANOTHER WAY TO PERFORM A RESET IS TO TURN THE POWER OFF AND THEN BACK ON AFTER A FEW SECONDS.

Pinsetter Adjustments

Before making any mechanical adjustments:

- Press the reset button so as to have the machine perform a complete cycle;
- Make sure the strings are all properly aligned;
- If the drawbar cannot reach the D2 position, proceed with the strings adjustment before attempting any other adjustments;
- Ensure that the optical switches (L.S., P.B. and P.O.) as well as the pin detector optical switches are free of dust and well adjusted.

Strings Adjustment

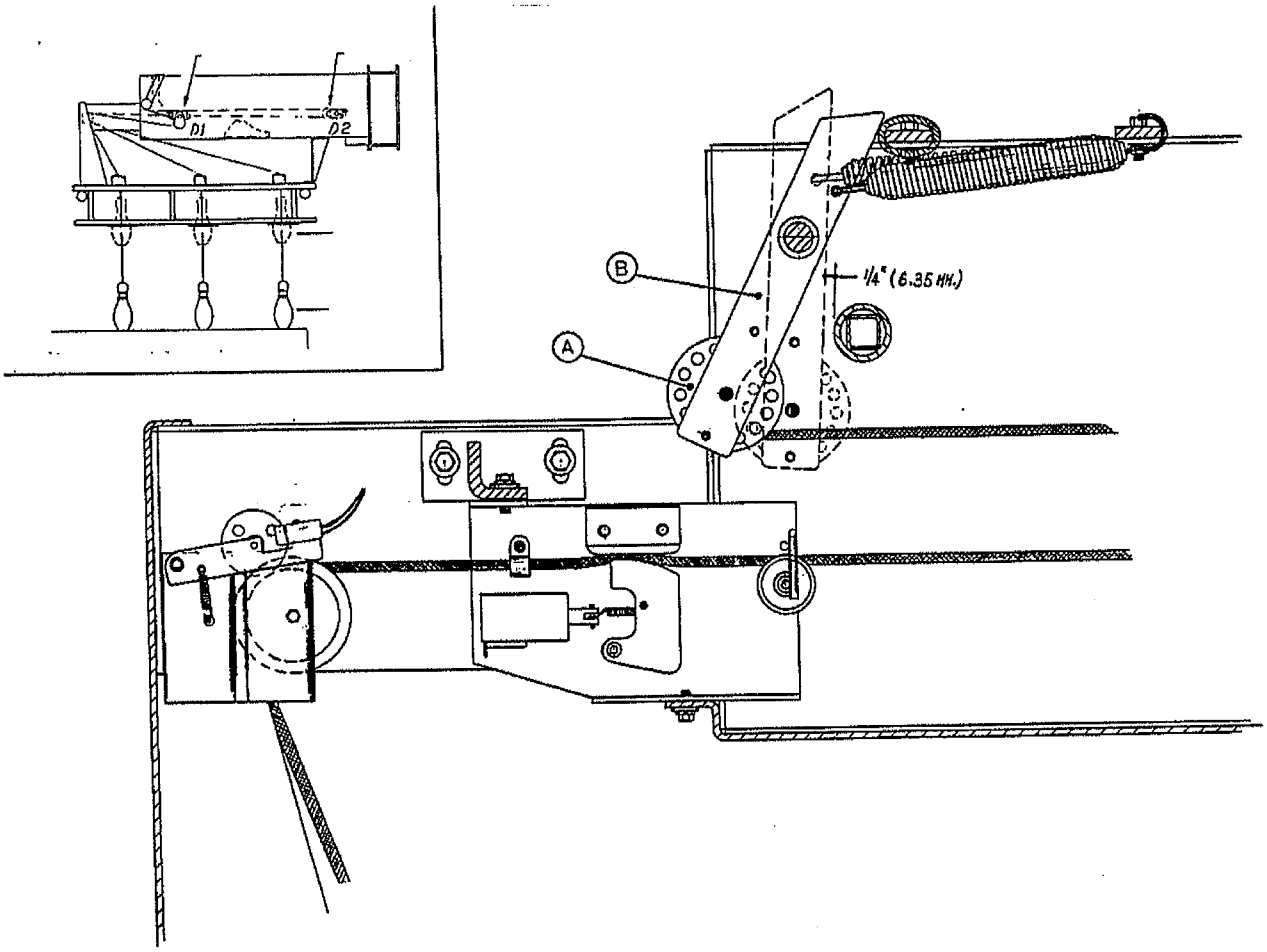
1. Refer to Diagram MEA-90-01 below;

2. Raise the front gray plastic cover of the pinsetter and depress the ON/OFF switch until all pins have dropped onto the lane surface;

3. Depress the FS1 and PS1 buttons together (the drawbar will move to the rear of the pinsetter (position D2). The drawbar should go back to the stop pad and past the L.S. sensor, if it doesn't, the strings are too tight;

4. Adjust strings by loosening and tightening string spools (A) so as to have them all aligned as indicated by the dotted lines (to release spool, pull away from mounting arm). You must ensure that the storage reel arm does not press too hard on the rubber, it only has to lightly touch it.

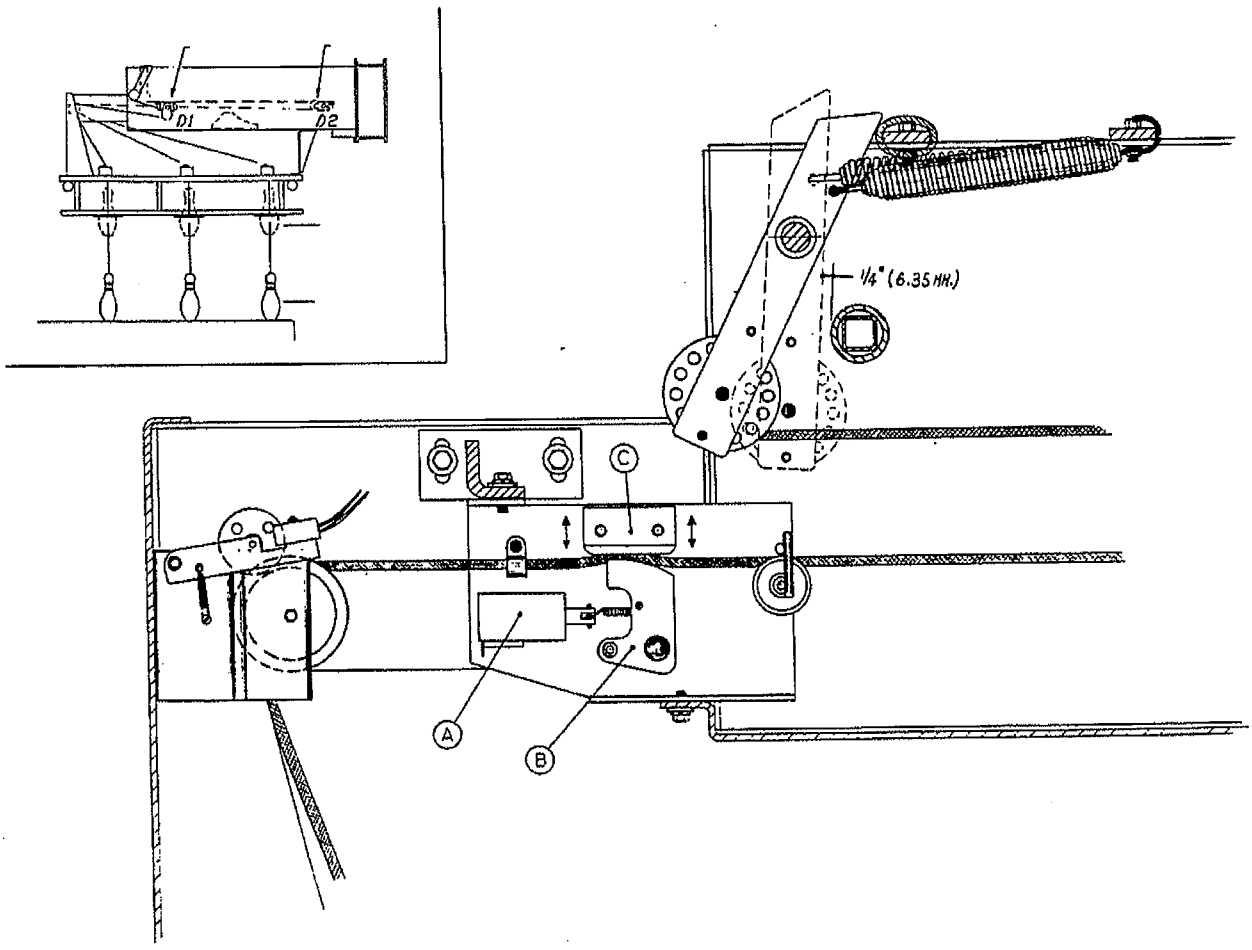
Diagram MEA-90-01



Pin Brakes Adjustment

1. Refer to Diagram MEA-90-02 below;
2. Make sure that the drawbar is in the D2 (UP) position;
3. The solenoid (A) pulls the cam (B) which jams the string. The brake plate (C) may be moved in the direction of the arrows in order to adjust it. Slightly loosen the bolts which hold the brake plate in place;
4. Raise the brake plate to loosen the pin's string or lower the brake plate to tighten the pin's string.

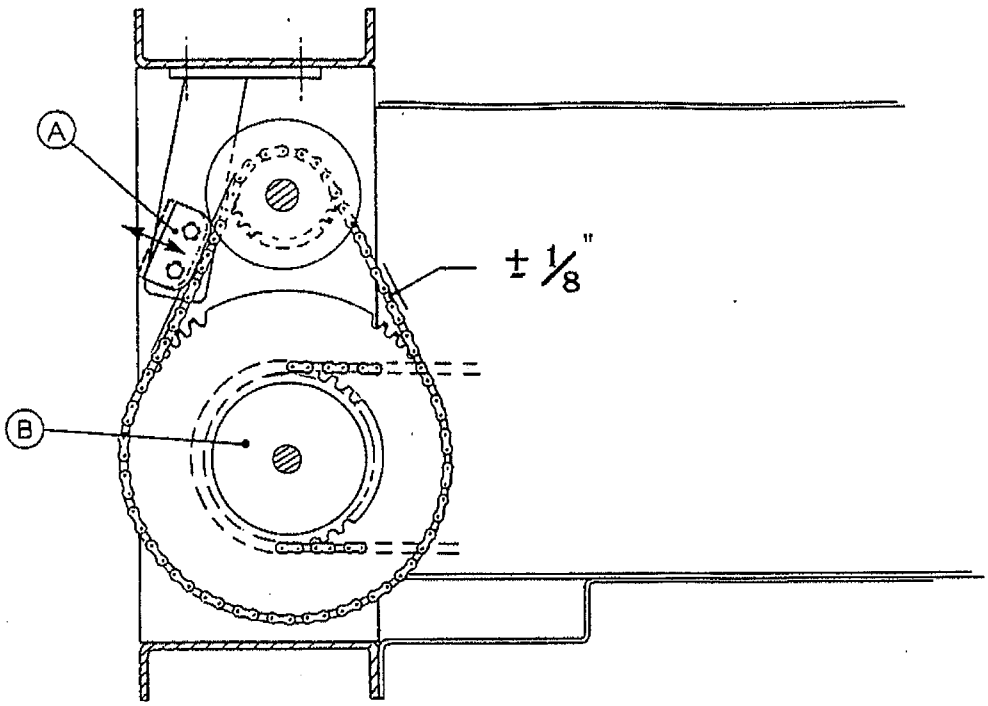
Diagram MEA-90-02



Ascending Drawbar Chain Adjustment

1. Refer to Diagram MEA-90-03 below;
2. Turn power OFF from the gray power box situated between the two pinsetters;
3. Raise back cover of pinsetter;
4. Check chain tension by manually rotating main sprocket (B), there should be a $\frac{1}{8}$ -inch play at the tightest spot of a 360° rotation;
5. If adjustment is necessary, loosen nuts on tensioner plate (A) and slide back or forward until correct tension is achieved;
6. Re-tighten nuts on tensioner plate prior to closing back cover.

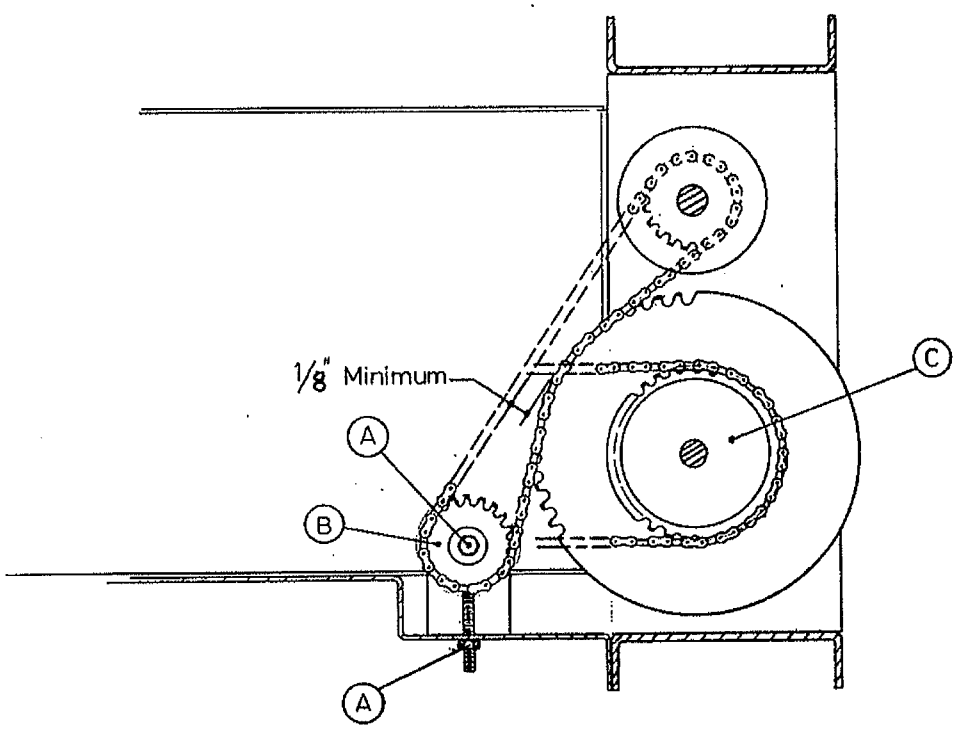
Diagram MEA-90-03



Descending Drawbar Chain Adjustment

1. Refer to Diagram MEA-90-04 below;
2. Turn power OFF from the gray power box situated between the two pinsetters;
3. Raise back cover of pinsetter;
4. Check chain tension by manually rotating main sprocket (C), there should be a ⅛-inch play at the tightest spot of a 360° rotation;
5. If adjustment is necessary, move chain tensioner (B) using the tensioner nuts (A);
6. Re-tighten the tensioner nuts prior to closing back cover.

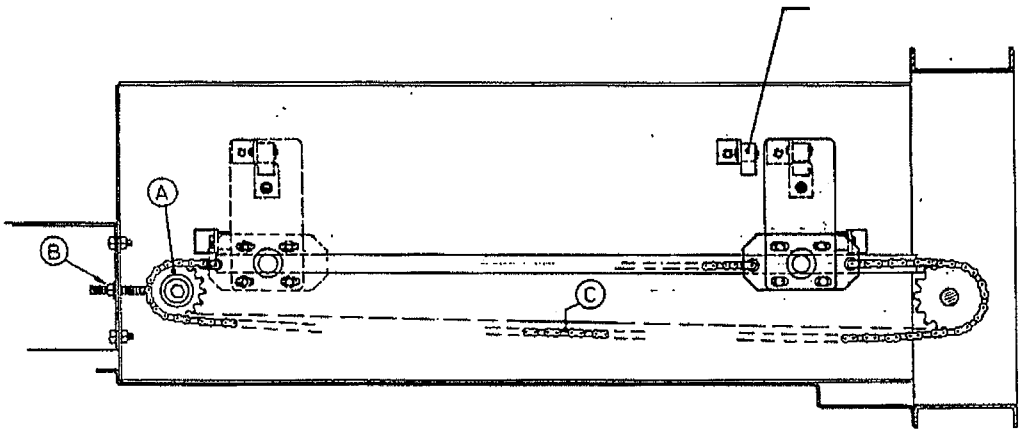
Diagram MEA-90-04



Drawbar Chain Adjustment

1. Refer to Diagram MEA-90-05 below;
2. Make sure that the drawbar is in the D2 (UP) position;
3. Turn power OFF from the gray power box situated between the two pinsetters;
4. Visually check for ¼-inch dip in middle of chain (C);
5. Loosen the nut sprocket (A) and adjust as necessary, using front end tensioner nut (B);
6. Re-tighten the nut sprocket (A).

Diagram MEA-90-05

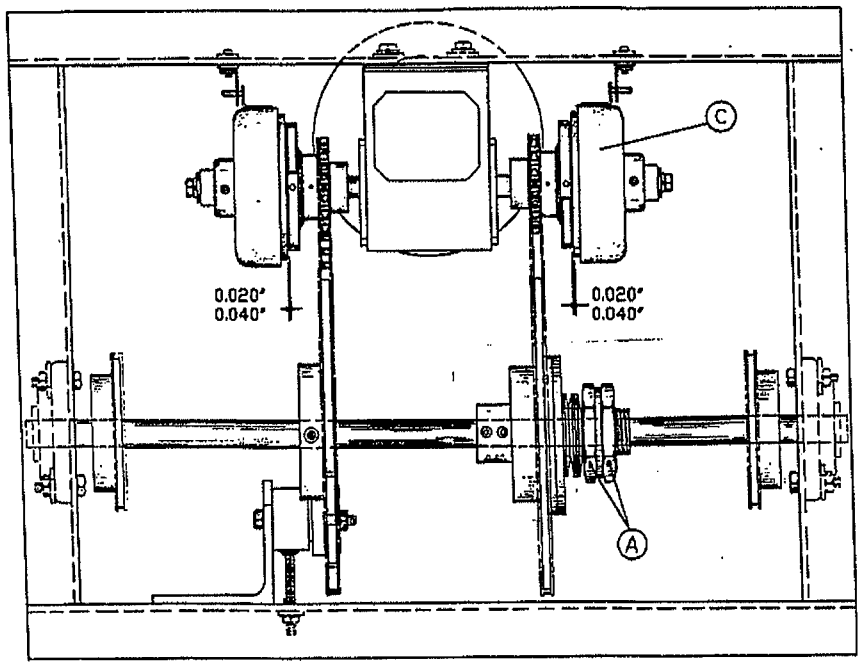


Ascending Torque Verification

1. Turn power OFF from the gray power box situated between the two pinsetters;
2. Place and hold Torque Gauge on the inner left wall of the pinsetter;
3. Power up and press start button situated on power box;
4. When machine is activated, take Torque reading (correct reading between 200-300);

Ascending Torque Adjustment

1. Refer to Diagram MEA-90-06 below;
2. Turn power OFF from the gray power box situated between the two pinsetters in order to completely disengage the magnetic clutch (C);
3. Raise back cover of pinsetter;
4. Release 2-inch outer lock nut (A) situated at right of up-movement cog (Ascending Drawbar Control) when looking from rear of pinsetter.
5. Adjust 2-inch inner nut (A) clockwise (forward) to increase Torque, and counter-clockwise (backward) to decrease Torque.
6. After each adjustment, re-check Torque as previously described before re-tightening the 2-inch outer lock nut;
7. After tightening the 2-inch outer lock nut, check Torque again as previously described.

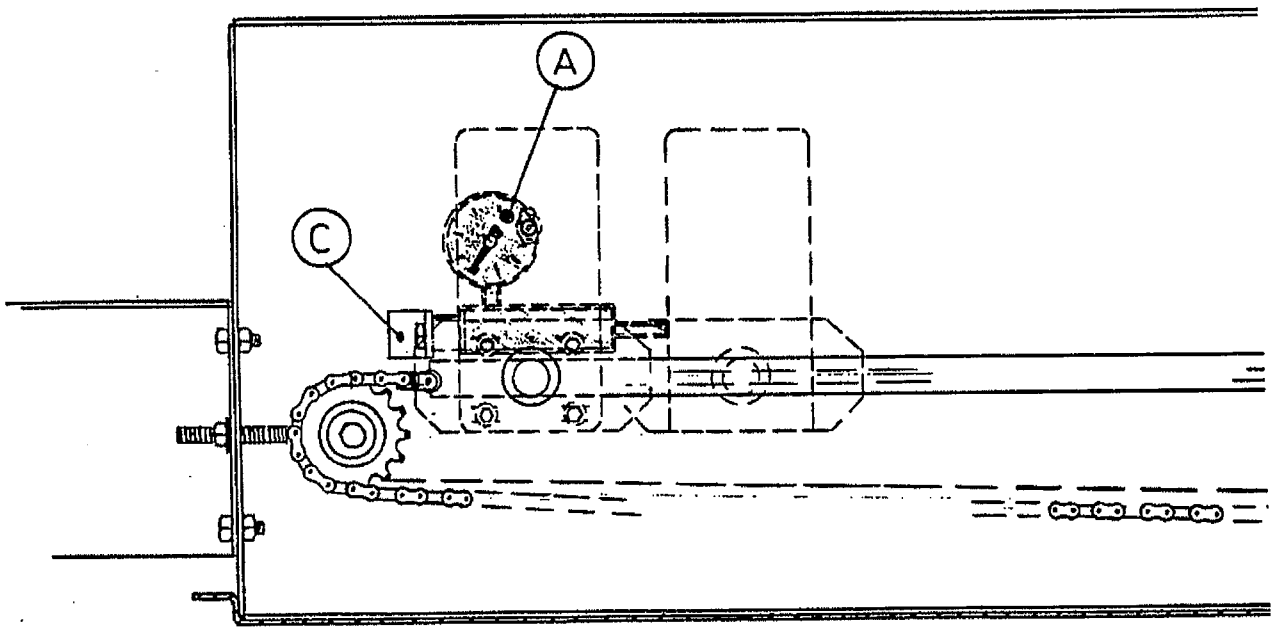


Descending Torque Adjustment

IMPORTANT: The following adjustment is only necessary if the pinsetter's serial number falls into one of the following groups:

- MEB-00001 to MEB-00056;
- MED-00001 to MED-00020;
- MEF-00001 to MEF-00008;
- MET-00001 to MET-00036.

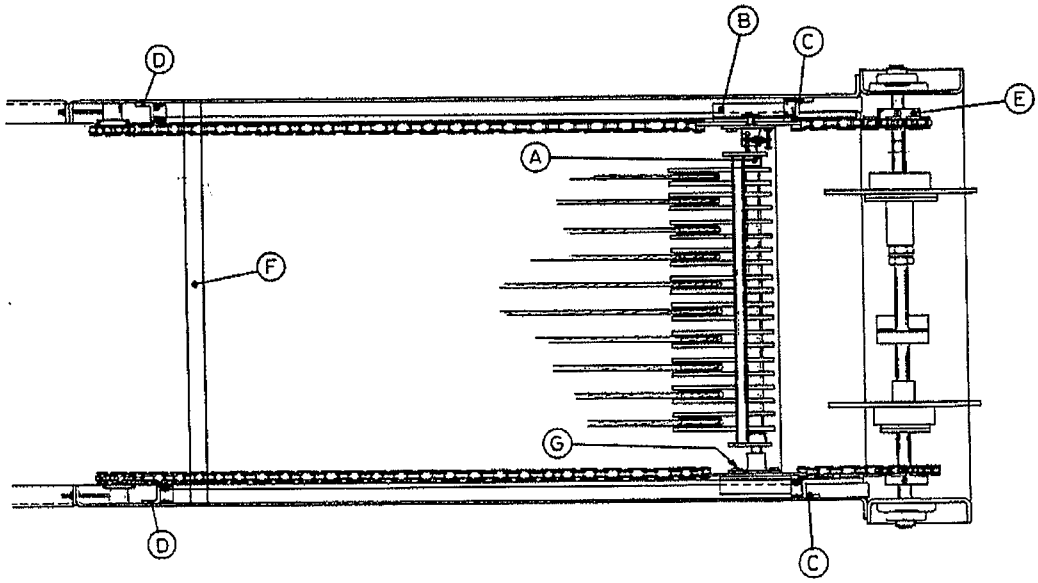
1. Refer to Diagram MEA-90-07 below;
2. When machine is activated, take Torque reading at the front of the pinsetter by positioning the torque gauge (A) on the front stopper (C) (correct reading between 115-135);
3. Turn power OFF from the gray power box situated between the two pinsetters;
4. Raise back cover of pinsetter;
5. Release 2-inch outer lock nut situated at right of up-movement cog (Ascending Drawbar Control) when looking from rear of pinsetter.
6. Adjust 2-inch inner nut clockwise (forward) to increase Torque, and counter-clockwise (backward) to decrease Torque.
7. After each adjustment, re-check Torque as previously described before re-tightening the 2-inch outer lock nut;
8. After tightening the 2-inch outer lock nut, check Torque again as previously described.



Drawbar Alignment Adjustment

1. Refer to Diagram MEA-90-08 below;
2. Make sure that the drawbar is in the D2 (UP) position;
3. Turn power OFF from the gray power box situated between the two pinsetters;
4. Center the drawbar on its carriage (B) using the set screws located on the drawbar (A);
5. Position the drawbar parallel to the crossing bar using the bolts which attach the drawbar to the carriage (G).
6. 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;

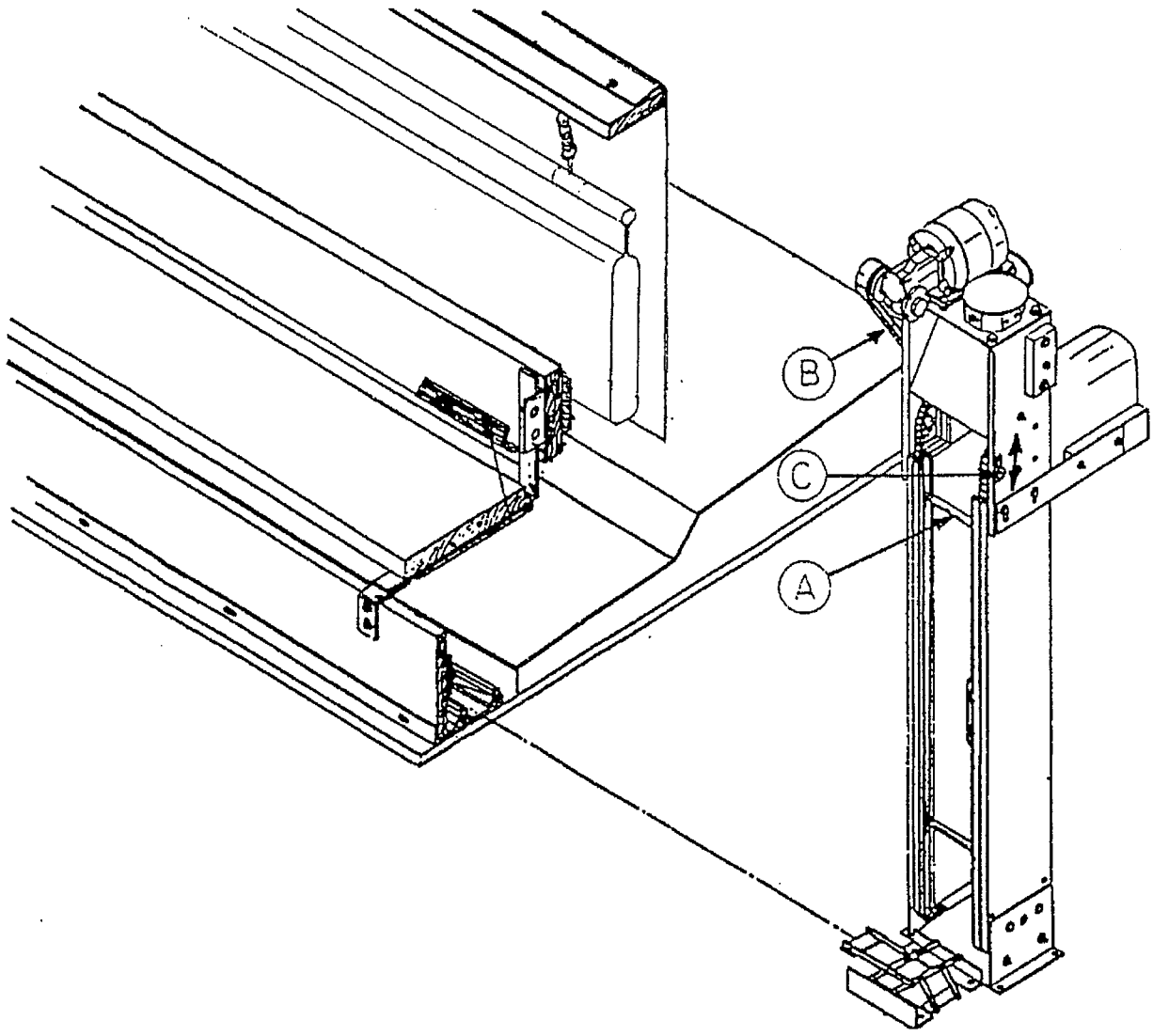
Diagram MEA-90-08



Ball Lift Adjustment

1. Refer to Diagram MEA-90-09 below;
2. The belt tension must be adjusted so that the bars (A) which lift the balls reach 10lbs (4.6kg) of pulling pressure (you must be able to stop the mechanism easily by applying simple hand pressure on any one of the bars);
3. Loosen the sprocket (C);
4. Set the tension with the adjustment bolt (B);
5. Re-tighten the sprocket.

Diagram MEA-90-09



Ball Detector Adjustment

The ball detector is a simple, very reliable stand alone device but may become mis-aligned once in a while due to the constant vibration caused by the balls rolling down the lane. Located on the ball detector mounting plate unit, it communicates with the lane controller through a cable assembly.

Ball Detectors use a very simple principle. An invisible beam of light is constantly emitted from the ball detector. A reflector placed on the opposite side of each lane returns the light beam to the unit. When the signal is cut (ball is detected) the ball detector communicates the information to the lane controller. The lane controller in turn will activate the pinsetter cycle and at the same time send the red light signal to the console if you are equipped with Mendes AutoScoring System.

Each ball detector has two (2) LEDs 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 alignment is borderline (usually requiring you to adjust it until the light becomes green). The simple loosening of the ball detector screws is all that is required in order to adjust the unit until it becomes aligned.

If neither of the two LEDs are visible on a ball detector, one of three things is possible. The ball detector is completely misaligned, it is defective, or the cable which supplies the necessary voltage to the unit has been cut or disconnected.

1. Loosen screws located on the ball detector.
2. Move detector up, down, right or left until the green light appears on the ball detector (a red light is a borderline adjustment and no light is completely unaligned).
3. Slide a sheet of black construction paper across the lane where the ball detector is located. The green light should stay on. If the green light goes out, this means that your signal is bouncing off the lane instead of being just above the lane. If you leave your ball detector like this you will have detection problems.
4. Once the detector is well aligned with the reflector on the opposite side, retighten the screws.

Strings and Pin Bushings Verification

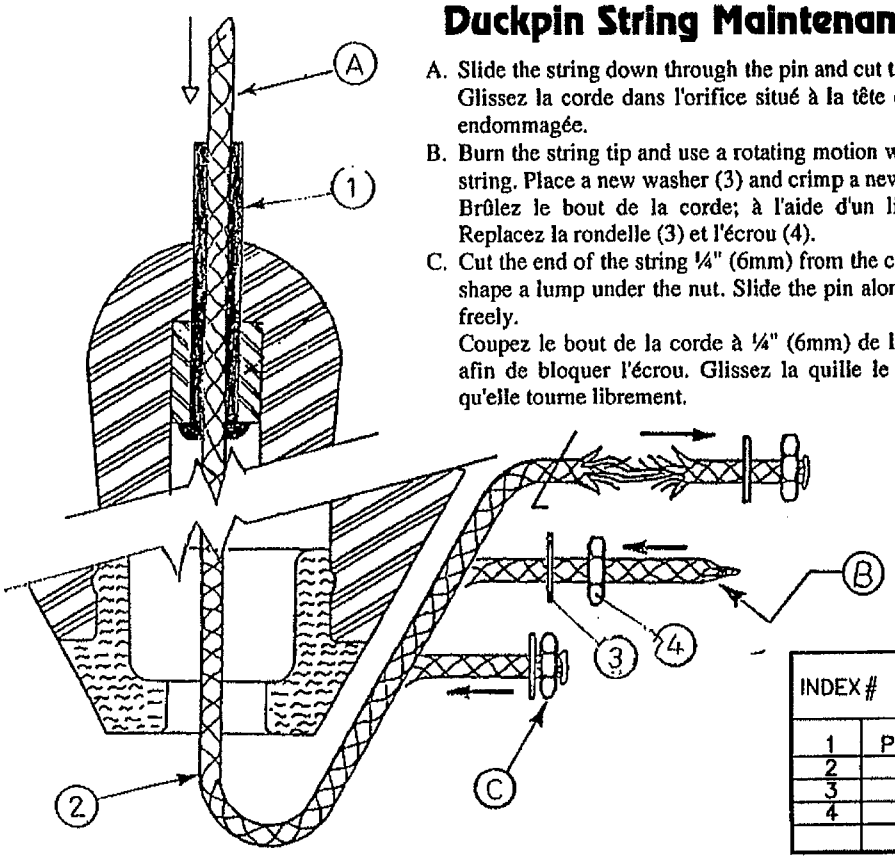
1. Refer to the diagrams on the opposite (notice that there is a difference between duckpin and tenpin);
2. Raise the front gray plastic cover of the pinsetter and depress the ON/OFF switch until all pins have dropped onto the lane surface;
3. Turn power OFF from the gray power box situated between the two pinsetters;
4. Look for visual signs of wear on strings and pin head bushings (clear nylon tube protruding from top of pin).
5. Cut worn string and burn frayed string end (using a match or cigarette lighter). Once frayed end has been sealed, re-thread remainder through pin (replacing pin head bushing if necessary). After re-threading string, secure loose end with washer and crimp nut using crimping tool supplied.

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 explained in this manual's Reference Section. If strings are knotted, pins will have to be untangled manually. Use the following steps to perform such an operation:

1. Raise masking unit and enter beneath it to front of pinsetter;
2. Lift the gray cover at front of pinsetter and depress the AUX button until the pins fall to the pindeck (the pinsetter is now in an idle mode);
3. Untangle strings by hand;
4. Depress the AUX button again until the pinsetter begins its operation of raising the pins;
5. Close the gray cover on front of 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.

Duckpin String Maintenance



A. Slide the string down through the pin and cut the worn out section.
Glissez la corde dans l'orifice situé à la tête de la quille et coupez la section endommagée.

B. Burn the string tip and use a rotating motion with a rag to create a point on the string. Place a new washer (3) and crimp a new nut (4) on the string.
Brûlez le bout de la corde; à l'aide d'un linge, effilez le bout en pointe. Replacez la rondelle (3) et l'écrou (4).

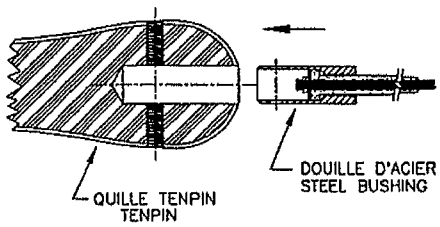
C. Cut the end of the string ¼" (6mm) from the crimped nut. Burn the string tip to shape a lump under the nut. Slide the pin along the string and check if it turns freely.
Coupez le bout de la corde à ¼" (6mm) de l'écrou; brûlez le bout à nouveau afin de bloquer l'écrou. Glissez la quille le long de la corde afin d'assurez qu'elle tourne librement.

INDEX #	PARTS #	DESCRIPTION
1	P-241-10	PLASTIC BUSHING
2	I-011A	STRING
3	H-024	3/16" I.D. WASHER
4	H-085	10/32" HEX NUT
		70026-001a32-000

Tenpin Bushing Maintenance

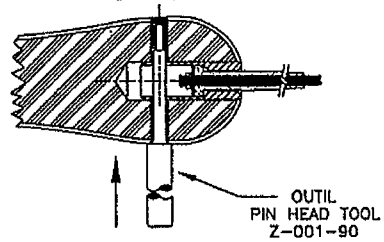
ETAPE #1 Inserer la douille en acier a l'interieur de la quille.

STEP #1 Insert the tenpin steel bushing into the tenpin.



ETAPE #2 Aligner les trous de la douille d'acier avec les trous de la quille en utilisant l'outil tel que demontre.

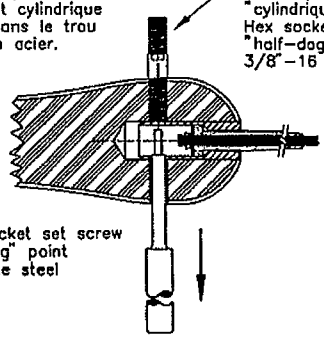
STEP #2 Align the steel bushing holes with the pin holes using the pin head tool.



ETAPE #3

Visser la vis de pression afin que le bout cylindrique court penetre dans le trou de la douille en acier.

Vis de pression avec bout "cylindrique court" Hex socket set screw with "half-dog" point 3/8"-16 x 3/4"

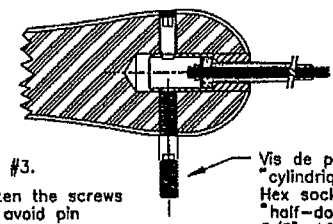


STEP #3

Screw the hex socket set screw until the "half-dog" point penetrates into the steel bushing hole.

ETAPE #4 Repeter l'etape #3.

Serrer les vis legerement afin de ne pas endommager les filets dans la quille.



STEP #4

Repeat step #3.

Slightly tighten the screws in order to avoid pin threads damages.

Vis de pression avec bout "cylindrique court" Hex socket set screw with "half-dog" point 3/8"-16 x 3/4"

References

Lane Controller Dip Switch Bank SW101

All DIP switches in this bank are set at the factory and should never be changed.

VALUES:	SW101-1	Result
	OFF	

All DIP switches in this bank are set at the factory and should never be changed.

VALUES:	SW101-2	Result
	OFF	

All DIP switches in this bank are set at the factory and should never be changed.

VALUES (version 2.40 and higher)	SW101-3	Result
	ON	Jumping ball routine activated
	OFF	Jumping ball routine disactivated

All DIP switches in this bank are set at the factory and should never be changed.

VALUES (version 2.30 and higher)	SW101-4	Result
	ON	60 Hz power supply
	OFF	50 Hz power supply

Lane Controller Dip Switch Bank SW301

Switches 1, 2, 3, and 4 are used to set the pin detector wheels sensitivity. In order for the pinsetter to detect a pin as fell, a certain quantity of holes located on the pin detector wheels must pass through its corresponding optical switch. Fifteen (15) different settings are possible. The more sensitive the setting, the less amount of holes are necessary to count a pin as fell. You usually won't have to change these DIP switches, but if you do, follow the chart below.

The top line of the chart indicates the most sensitive setting possible followed by each lesser sensitive setting in order and finishing on the last line with the least sensitive setting possible.

VALUES	SW301-1	SW301-2	SW301-3	SW301-4
	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

* Default Setting for Fivepin
** Default Setting for Duckpin
*** Default Setting for Tenpin and Bowlingo

Lane Controller Dip Switch Bank SW501

Switches 1 and 2 are used to determine the pause time which the pins will be held in the D2 (UP) position during a normal pinsetter cycle. If this pause time is too short, pins may not be stable when beginning their trip down.

VALUES:	SW501-1	SW501-2	Result
	ON	ON	1.00 second
	OFF	ON	1.25 second
	ON	OFF	1.50 second
*	OFF	OFF	1.75 second

Switches 3, 4 and 5 are used to determine the pause time between ball detection and pinsetter action. The shorter the value, 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). The longer the value, the slower the pinsetter will be to re-spot pins.

VALUES:	SW501-3	SW501-4	SW501-5	Result
	ON	ON	ON	2.00 seconds
	OFF	ON	ON	2.25 seconds
	ON	OFF	ON	2.50 seconds
	OFF	OFF	ON	2.75 seconds
	ON	ON	OFF	3.00 seconds
	OFF	ON	OFF	3.25 seconds
*	ON	OFF	OFF	3.50 seconds
	OFF	OFF	OFF	3.75 seconds

Switches 6 and 7 are used to determine the pull time before activating the tangling routine. Once the pause time between ball detection and pinsetter action has expired, the pull time enters into effect. If the pins are unable to attain the D2 (UP) position after the pull time has expired, the tangling routine is activated. Once the pins are in the D2 (UP) position, the pull time delay ends and the pinsetter pause time delay begins.

VALUES:	SW501-6	SW501-7	Result
	ON	ON	4.00 seconds
	OFF	ON	5.00 seconds
	ON	OFF	6.00 seconds
*	OFF	OFF	7.00 seconds

Switch 8 is used to determine the number of tangle routine sequences which will be attempted by the pinsetter once in the tangle routine.

VALUES:	SW501-8	Result
	ON	5 pulls
	OFF	10 pulls

* Default Settings

Lane Controller Dip Switch Bank SW502

Switches 1 and 2 are used to determine the duration of the pulling time when the pinsetter is in its tangling routine. In other words, the amount of time which the pins will be pulled towards the D2 (UP) position while attempting to untangle the strings.

VALUES:	SW502-1	SW502-2	Result
	ON	ON	2.00 seconds
	OFF	ON	3.00 seconds
	ON	OFF	4.00 seconds
*	OFF	OFF	5.00 seconds

Switches 3 and 4 are used to determine the duration of the down time when the pinsetter is in its tangling routine. In other words, the amount of time which the pins will be left on the pindeck in between each pulling time.

VALUES:	SW502-3	SW502-4	Result
	ON	ON	0.50 second
	OFF	ON	0.75 second
*	ON	OFF	1.00 second
	OFF	OFF	1.25 second

Switch 5 is used to determine the type of tangle routine which will be used by the pinsetters. A constant pattern pulls on all strings with equal force at the same time while the second mode pulls different strings with different forces, varying the sequence on each pull.

VALUES:	SW502-5	Result
*	ON	different patterns
	OFF	constant pattern

Switch 6 (version 1.09 and higher) is used to determine whether or not the pinsetters should cycle after a gutter ball has been thrown (no pins knocked down).

VALUES:	SW502-6	Result
	ON	pinsetter cycles
*	OFF	pinsetter does not cycle

Switch 7 (version 1.09 and higher) is used to determine the number of pins which are installed on the pinsetters.

VALUES:	SW502-7	Result
	ON	10 pins
	OFF	5 pins

Switch 8 (version 2.20 and higher) is used to determine whether or not a Mendes Spot Keyboard is installed (the Spot Keyboard is never installed with the Mendes AutoScoring System, it is replaced by the player's console).

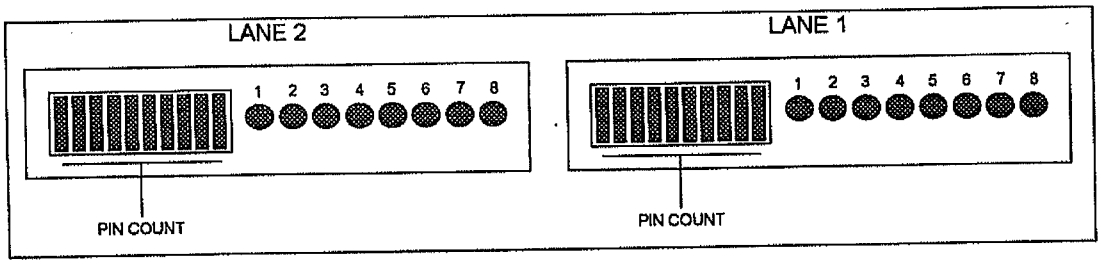
VALUES:	SW502-8	Result
	ON	spot keyboard installed
	OFF	no spot keyboard

* Default Settings

Lane Controller LED Display

The LEDs located on the top board of the Lane Controller are used to read the different in and out signals between the pinsetter and controller. The rectangular LEDs are used to indicate the pins which have been detected as fell. The round LEDs are used to indicate different signals for each pinsetter or globally for the controller itself as indicated below.

SIGNAL :	LEFT GROUP	RIGHT GROUP
	1. Reset Button Feedback	1. Watchdog Feedback
	2. Data Reception	2. Auxiliary Data Reception
	3. Data Transmission	3. Auxiliary Data Transmission
	4. Machine 2 Output Direction	4. Machine 1 Output Direction
	5. Machine 2 Cycling Main Output	5. Machine 1 Cycling Main Output
	6. Machine 2 Brake Trigger Input	6. Machine 1 Brake Trigger Input
	7. Machine 2 Up Position Input	7. Machine 1 Up Position Input
	8. Machine 2 Ball Detection Input	8. Machine 1 Ball Detection Input

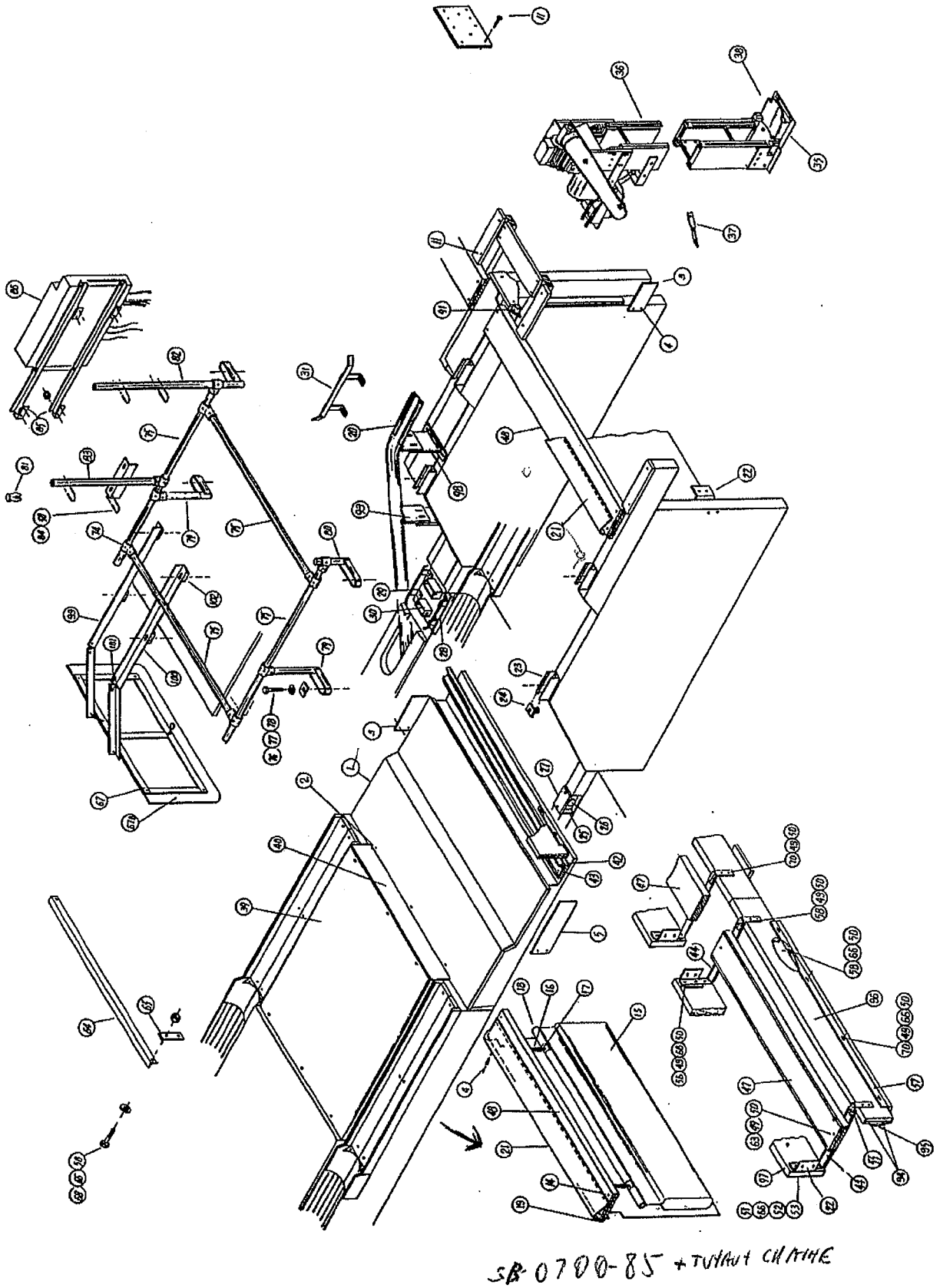


Parts & Plans

All parts and plans in this section are listed in alpha-numerical order. The index numbers on each parts list correspond to the plan which precedes the listing. Mendes parts follow an easy coding system which will help you locate the required plan or sub-assembly plan. Using the Contents located at the front of this manual, you may easily find what you are looking for if you know the part number. If you don't know the part number, use the index located at the back of this manual.

The following abbreviations are used in the description columns in order to save space:

ASSY	= assembly
BD	= ball detector
CB	= carriage bolt
CSS	= cup set screw
FHCS	= flat head cap screw
FHMS	= flat head machine screw
FHWS	= flat head wood screw
FW	= flat washer
HHCS	= hexagon head cap screw
HHTS	= hexagon head tek screw
HKN	= hexagon keep nut
HN	= hexagon nut
HNN	= hexagon nylock nut
HP	= horse power
HSS	= hexagon set screw
HZ	= hertz
ID	= inner dimension
LW	= lock washer
NB	= nylon bushing
NSW	= nylon spacer washer
NW	= nylon washer
OD	= outer dimension
RHMS	= round head machine screw
RHWS	= round head wood screw
SPT	= support
SSW	= special spacer washer
SW	= spacer washer

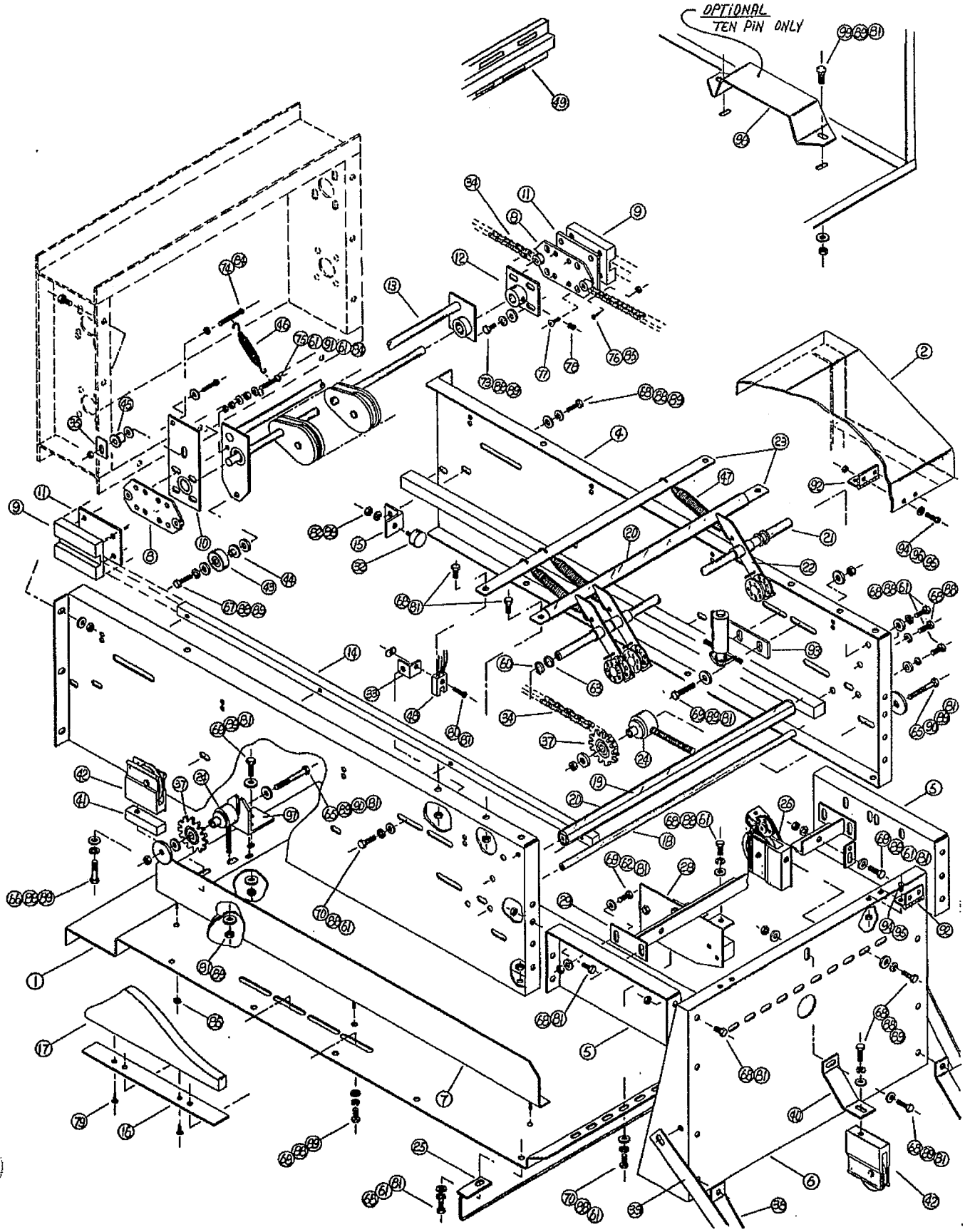

SB-0700-85 + TWIN CHAIN

Pit Assembly - Duckpin/Fivepin

Reference Number: 31-0700

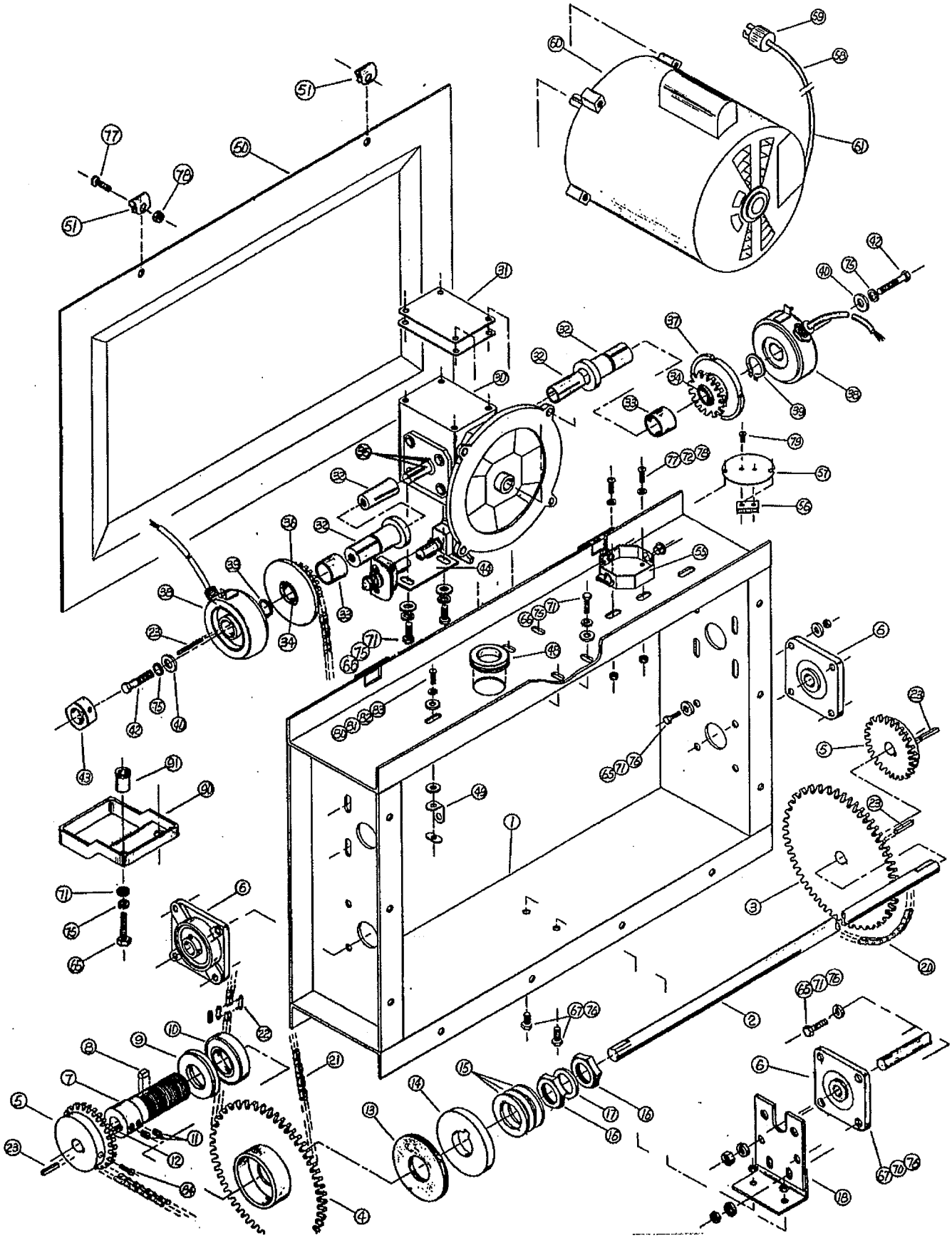
index	part number	description
1	35W-105	PIT FLOOR ASSY
3	P-700-20	10" BALL PROTECTOR
5	P-700-21	15" BALL PROTECTOR
18	M-0452	CUSHION PIPE
19	50W-0700-08	P-250 WOOD FIXATION
20	P-700-27	PLASTIC BALL GUIDE
21	R-0700-02	APRON
22	M-0700-41	CUSHION STOP BRACKET
23	M-0450	UNISTRUFF BAR
25	M-0700-42	REFLECTOR BRACKET
26	P-700-26	1½" REFLECTOR
27	P-700-22	BD BRACKET COVER
28	M-0700-43	BD MOUNTING PLATE
29	M-0700-44	BD GUIDE UNIT
30	M-0700-45	BD BOX
31	M-0700-66	BALL GUIDE PROTECTOR
35	M-0700-20	INSIDE RAILING BASE
37	M-0700-47	CROSS BRACE
38	M-0700-19	INSIDE RAILING
40	P-700-17	PIN DECK PLASTIC PROTECTOR
42	50W-0700-09	1¼" X 59" ANGLED WOOD
43	M-0700-25	BALL RETURN RAILS

index	part number	description
44	P-700-62	PLASTIC HOSE
47	50W-0700-15	HYDRAULIQUE PUMP BASE
48	10W-15	CUSHION PLANK
55	M-0700-26	PUMP SUPPORT BRACKET
57	M-0700-49	BALL STOP BRACKET
64	M-0700-54	CROSSBAR
64	M-0700-54-1	5-PIN CROSSBAR
65	M-0700-46	RETAINING PLATE
74	I-011	10-7 X 1¼" TEE KEEP CLAMP
75	M-0375	52" MAIN SUPPORT PIPE
79	M-0360	11½" SHORT MOUNTING
80	M-0370	8" SHORT MOUNTING
82	M-0362	36" LONG MOUNTING
83	M-0373	25" CONTROL BOX TEE SUPPORT
85	M-0380	POWER BOX BRACKET
88	M-0372	7" CONTROL BOX TEE SUPPORT
94	M-0700-53	3/16" X ¾" X 62" STEEL STRAP
95	P-700-70	RUBBER BALL STOPPER
97	50W-0700-16	BACK CUSHION STOP PLANK
98	M-0700-60	DROP SWEEP SUPPORT
98	M-0700-60-1	DROP SWEEP SUPPORT BASE


OPTIONAL
TEN PIN ONLY

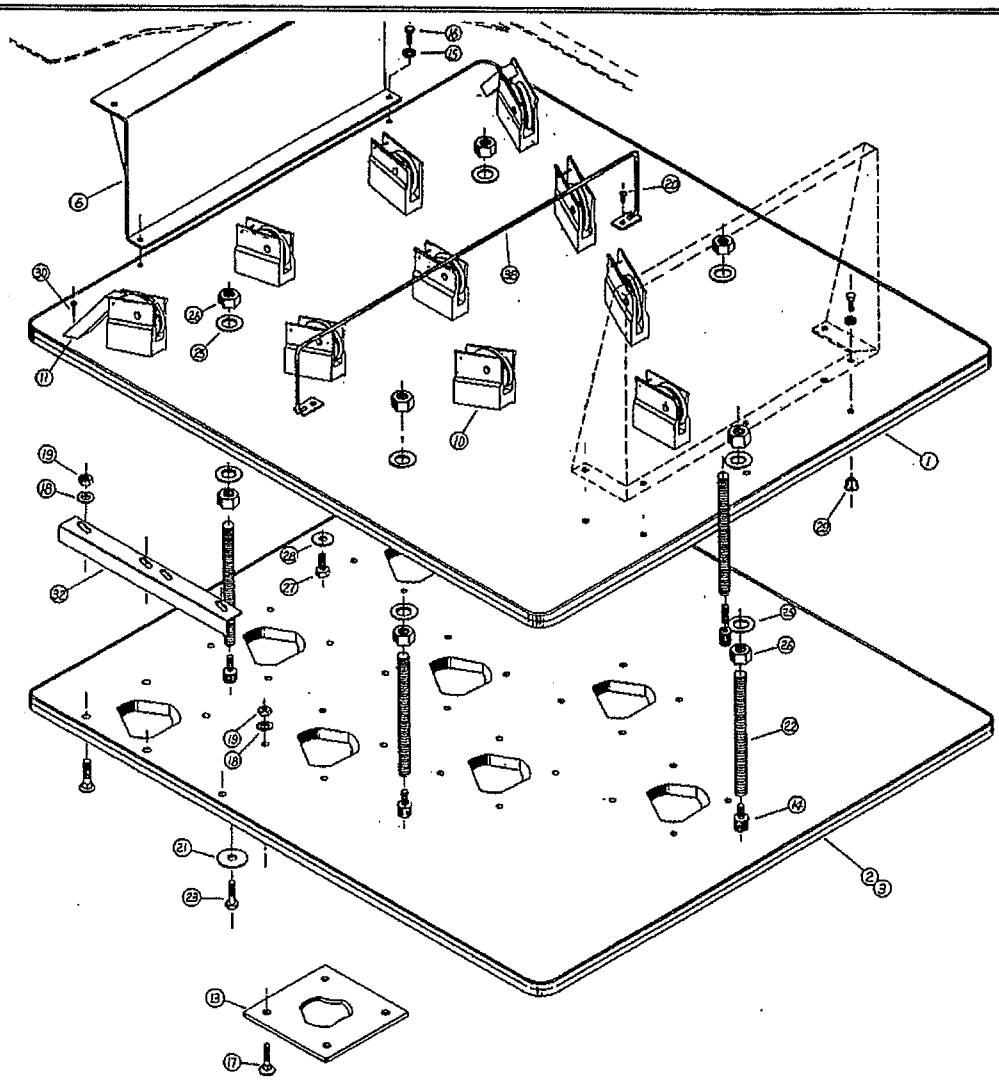
Pièces du Planteur

index	part number	description	index	part number	description
1	9102001	BOTTOM FRAME PLATE	46	S-071	TENSION SPRING
2	9103001	PIN DETECTION COVER REPL. KIT	47	S-080	TENSION SPRING (BIG)
3	9102002	FRAME PLATE, LEFT	48	SB-ECIL-325-FS	OPTICAL SENSOR ASSEMBLY WHITE
4	9102003	FRAME PLATE, RIGHT	49	SB-2131	ELECTRONIC PIN DETECTION ASSY
5	9102004	SENSOR PLATE, SIDE	60	7002-710000-062	5/8" EXTERNAL RETAIN. RING
6	9102005	SENSOR PLATE, FRONT	61	7050-034068-006	11/32" X 11/16" FLAT WASHER
7	9102007	SIDE GUARD	62	7050-028062-006	9/32" X 5/8" FLAT WASHER
8	9102011	DRAWBAR CHAIN PLATE	63	7052-062100-006	5/8" X 1" SPACER WASHER
9	9103011	DRAWBAR GUIDE	64	7652-037062-012	3/8" X 5/8" NYL SPACER WASH
10	9102012	LEFT ADJUSTEMENT PLATE	65	7010-003118-250	5/16-18 X 2 1/2" HEX CAP SCREW
11	9103012	DRAWBAR SPACER GUIDE	66	7010-003118-150	5/16-18 X 1 1/2" HEX CAP SCREW
12	9102013	RIGHT ADJUSTEMENT PLATE	67	7010-003118-125	5/16-18 X 1 1/4" HEX CAP SCREW
13	9122014	DRAWBAR ASSEMBLY	68	7010-003118-075	5/16-18 X 3/4" HEX CAP SCREW
14	9102016	DRAWBAR GUIDE	69	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
15	9102017	DRAWBAR STOPPER	70	7010-003118-050	5/16-18 X 1/2" HEX CAP SCREW
16	9102018	CAM ADJUSTMENT PLATE	71	7036-002520-000	1/4-20 NYLON NUT
17	9103018	PAUSE CAM	73	7010-003118-062	5/16-18 X 5/8" HEX CAP SCREW
18	9102025	SHAFT	74	7016-412520-150	1/4-20 X 1 1/2" MA SC RH SOCK
19	9102026	LOWER REEL ARM STOPPER	75	7016-412520-125	1/4-20 X 1 1/4" MA SC RH SOCK
20	9103026	HOSE	76	7018-001032-087	10-32 X 7/8" HEX SO CA SCW
21	9102027	REEL ARM SHAFT	77	7016-312520-100	1/4-20 X 1" MA SC FH SOCK
22	9122028	REEL ARM ASSEMBLY	78	7014-003118-025	5/16-18 X 1/4" HEX SO SET SC
23	9102030	UPPER REEL ARM STOPPER	79	7022-311200-150	#12 X 1 1/2" WOOD SCW FH SOCK
24	9102036	TENSIONNER	80	7016-410632-075	6-32 X 3/4" MA SC RH SOCK
25	9102037	STRING SUPPORT	81	7036-003118-000	5/16-18 NYLON NUT
26	9122057	PIN DETECTION ASSEMBLY	82	7034-003118-000	5/16-18 HEXAGONE NUT
28	9122070	PIN BRAKE ASSEMBLY	84	7038-002520-000	1/4-20 HEX NUT K-LOCK
29	9102072	BRAKE SUPPORT	85	7034-001032-000	10-32 HEXAGONE NUT
30	9102040	PIVOT BRACKET	86	7038-000632-000	6-32 HEX NUT K-LOCK
32	9104015	DRAWBAR STOPPER	87	7046-000632-006	6-32 X 1/16" WELDED NUT
33	9102054	OPTICAL SENSOR SUPPORT	88	7060-031057-009	5/16" X 37/64" LOCK WASHER
34	9102019	DRAWBAR CHAIN	89	7050-034100-012	11/32" X 1" FLAT WASHER
35	9102055	ACTUATOR	90	7050-034175-012	11/32" X 1 3/4" FLAT WASHER
37	9102094	SPROCKET 40B15	91	7652-026056-006	17/64" X 9/16" NYL SPACER WASH
38	9102061	MOUNTING BRACKET	92	9102044	HINGE
39	9102162	BRACE	93	9122042	DRAWBAR LOCK ASSY
40	9102163	BRACKET SUPPORT PULLEY	94	7016-411032-062	10-32 X 5/8" MA SC RH SOCK
41	9102164	SPACER PULLEY	95	7036-001032-000	10-32 NYLON NUT
42	SB-5017	SENSOR SHEAF	96	7050-021050-006	7/32" X 1/2" FLAT WASHER
43	M-0680-29	BEARING	97	9102113	BRACKET
44	M-0680-31	STEEL BUSHING	98	9102029	ROPE HOLDING
45	P-020	NYLON BUSHING	99	7012-003118-075	5/16-18 X 3/4" CARRIAGE BOLT



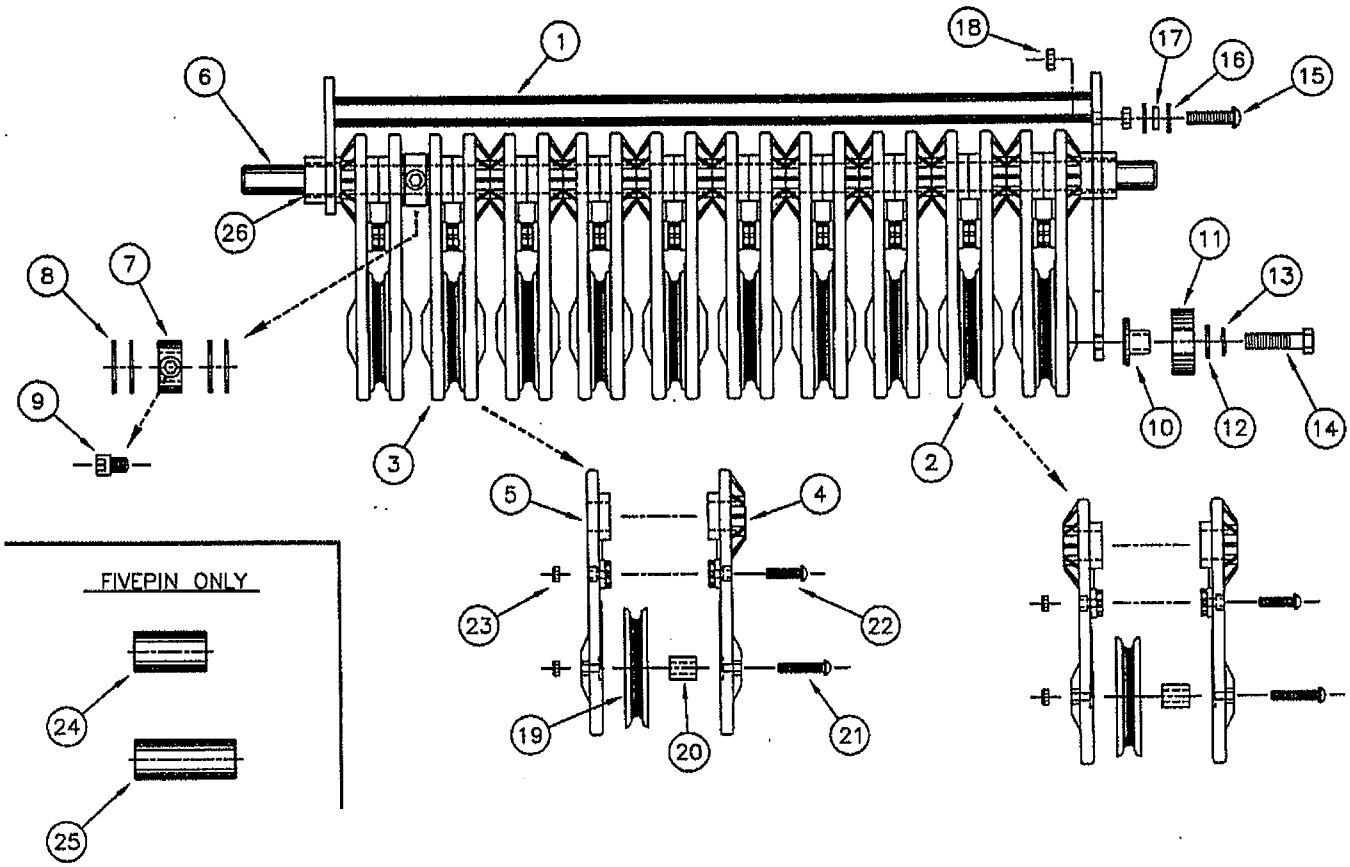
Opérateur Mécanique

index	part number	description	index	part number	description
1	9102080	DRIVE TRAIN FRAME	42	7810-003124-175	5/16-24 X 1 3/4" HEX CAP SC GR8
2	9102120	DRIVE SHAFT	43	9102116	SPECIAL COLLAR 1"
3	9102124	LOWERING DR. SHAFT SPROCKET	44	9122112	CHAIN BINDER ASSEMBLY
4	9102123	RAISING DR. SHAFT SPROCKET	48	RB-249	RUBBER GROMMET 1 3/8"O.D.
5	9102092	SPROCKET	49	7032-001024-200	10-24 X 2" EYE BOLT
6	M-0690-21	PILLOW BLOCK	50	9103002	REAR COVER
7	9102121	DRIVE HUB	51	9102047	"D" RING CLIP .750" 3/4"
8	9102127	MACHINE KEY 3/8'X1/2"	55	E-550	JUNCTION BOX
9	9102126	SEAL 1.375"I.D.	56	E-323HDS12	TERMINAL STRIP
10	9102125	BEARING 1.375" X 2.875"	57	E-551	JUNCTION BOX COVER
11	7014-003118-037	5/16-18 X 3/8" HEX SO SET SC	58	E-020-183-6-110	CORD 110V 6'
12	9102108-4	MACHINE KEY 3/16"X3"	59	E-605-91	TWIST LOCK PLUG
13	9103122	FRICTION DISK 1 3/8" HOLE	60	E-110395	MOTOR 1/2HP 1425 RPM 110/220
14	9102122	DISK SLIPPING PLATE	61	EC-090-220	ME-90-POWER SUPPLY CABLE
15	9105095	DISK SPRING 1 3/8	65	7010-003118-150	5/16-18 X 1 1/2" HEX CAP SCREW
16	9102099	NUT "1 3/8"	66	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
17	9102107	SPECIAL SPACER WASHER 1-3/8"	67	7010-003118-075	5/16-18 X 3/4" HEX CAP SCREW
18	9102110	SUPPORT PLATE	68	7010-003118-200	5/16-18 X 2" HEX CAP SCREW
20	9102081	UP SPROCKET CHAIN #40	69	7010-003118-225	5/16-18 X 2 1/4" HEX CAP SCREW
21	9102082	DOWN SPROCKET CHAIN	70	7050-034068-006	11/32" X 11/16" FLAT WASHER
22	M-0690-01-1	CHAIN COUPLING	71	7050-034100-012	11/32" X 1" FLAT WASHER
23	302-2410-00	MACHINE KEY, 3/16" X 1"	72	7050-028062-006	9/32" X 5/8" FLAT WASHER
24	302-2440-00	MACHINE KEY, 3/16" X 1 3/4"	75	7060-031057-009	5/16" X 37/64" LOCK WASHER
30	M-BMQ1133-1	DOUBLE SHAFT REDUCER	76	7036-003118-000	5/16-18 NYLON NUT
31	9102084	REDUCER SPACER PLATE	77	7016-411032-050	10-32 X 1/2" MA SC RH SOCK
32	9102129	REDUCER COUPLING ASSY.	78	7036-001032-000	10-32 NYLON NUT
33	9102141	INNER RING 1"X1 1/4X1 1/4	79	7016-410832-050	8-32 X 1/2" MA SC RH SOCK
34	9102143	OILITE 1 1/4 X 1 1/2 X 1 1/4	80	7016-411032-062	10-32 X 5/8" MA SC RH SOCK
35	M-BMQ1133-15	DOUBLE OUTPUT SHAFT REPL.	81	7060-018003-006	3/16" X 1/32" LOCK WASHER
35.1	M-BMQ1133-16	BEARING	82	7150-019075-009	.193 X 3/4 ALUM FLAT WASHER
35.2	M-BMQ1133-17	OUTPUT OIL SEAL	83	7046-001032-006	10-32 X 1/16" WELDED NUT
36	9102114	UP CLUTCH SPROCKET	84	7018-002520-075	1/4-20 X 3/4" HEX SO CA SCW
37	9102115	DOWN CLUTCH SPROCKET	85	7010-003716-100	3/8-16 X 1" HEX CAP SCREW
38	301-1400-00	MAGNETIC CLUTCH	86	7060-037067-010	3/8" X 43/64" LOCK WASHER
39	7002-720000-098	63/64" EXTERNAL RETAIN. RING	90	9103036	OIL PAN
40	9102130	SPECIAL COUPLING WASHER	91	P-029	SPACER



Assemblage du Stabilisateur

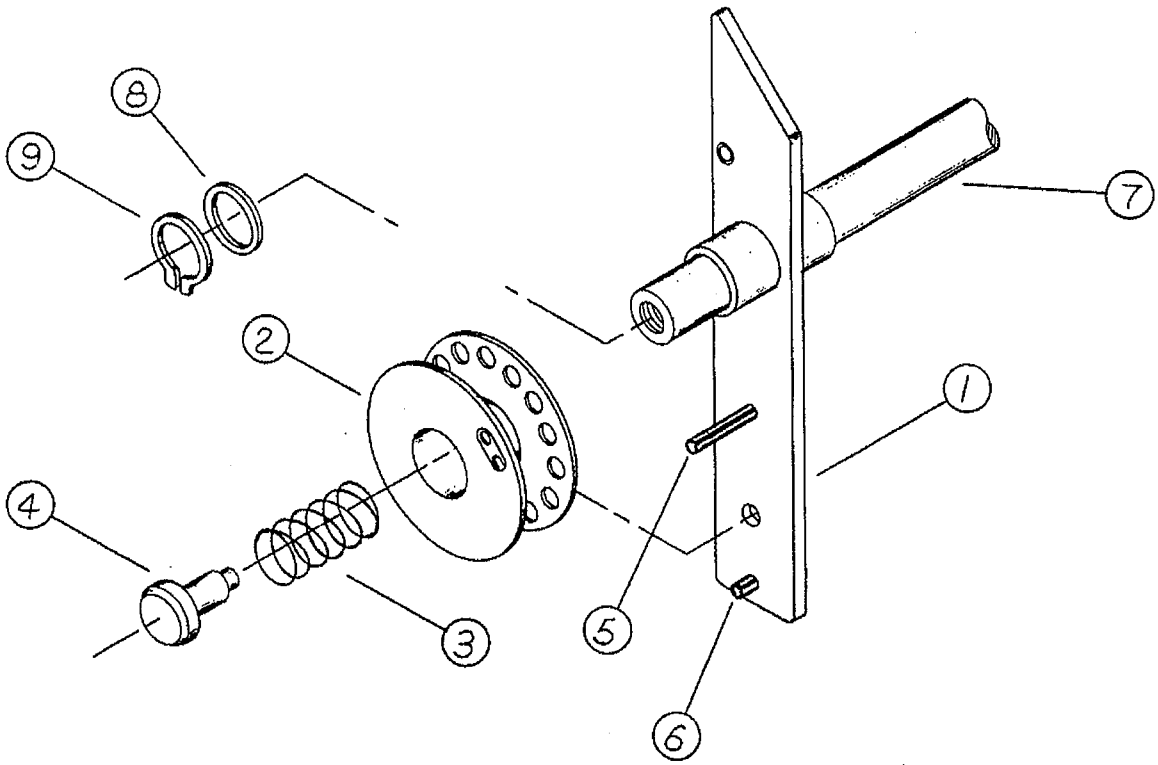
index	part number	description	index	part number	description
1	9106001	TOP BASE PLATE DUCK/FIVE/TEN	17	7012-003118-175	5/16-18 X 1 3/4" CARRIAGE BOLT
2	9106002	BOTTOM BASE PLATE DUCK	18	7050-034068-006	11/32" X 11/16" FLAT WASHER
3	9106003	BOTTOM BASE PLATE FIVE PIN	19	7036-003118-000	5/16-18 NYLON NUT
6	9102006	PINSETTER SUPPORT PLATE	20	7024-710800-050	#8 X 1/2" TAP SCW TRUSS SOCK
10	SB-043-1	PULLEY SHEAF	21	7050-034175-012	11/32" X 1 3/4" FLAT WASHER
11	P-043	PULLEY SHEAVE GUARD	22	9102039	SPACER ROD
13	P-013	PIN CENTERING RING TENPIN	23	7010-003118-175	5/16-18 X 1 3/4" HEX CAP SCREW
13.1	P-013-4	PIN CENTERING RING RIGHT T/F	25	7052-093225-018	15/16" X 2 1/4" SPACER WASHER
13.2	P-013-7	PIN CENTERING RING LEFT T/F	26	7034-008709-000	7/8-9 HEXAGONE NUT
13.3	PD-013	PIN CENTERING RING	27	M-0041	PIN BUMPER BOLT
13.4	PD-013-10	PIN CENTERING RING	28	7050-050106-009	1/2" X 1 1/16" FLAT WASHER
13.5	PD-013-10(4)	PIN CENTERING RING RIGHT	29	7045-003118-037	5/16"-18 X 3/8" TEE NUT
13.6	PD-013-10(7)	PIN CENTERING RING LEFT	30	7022-410600-125	#6 X 1 1/4" WOOD SCW RH SOCK
14	R-014	BUMPER PAD	32	M-0680-32-4	REINFORCEMENT BASE PL. RIGHT
15	7060-031057-009	5/16" X 37/64" LOCK WASHER	32	M-0680-32-7	REINFORCEMENT BASE PL. LEFT
16	7010-003118-125	5/16-18 X 1 1/4" HEX CAP SCREW	38	9102038	STRING SUPPORT



Assemblage de la Barre de Traction

9122014

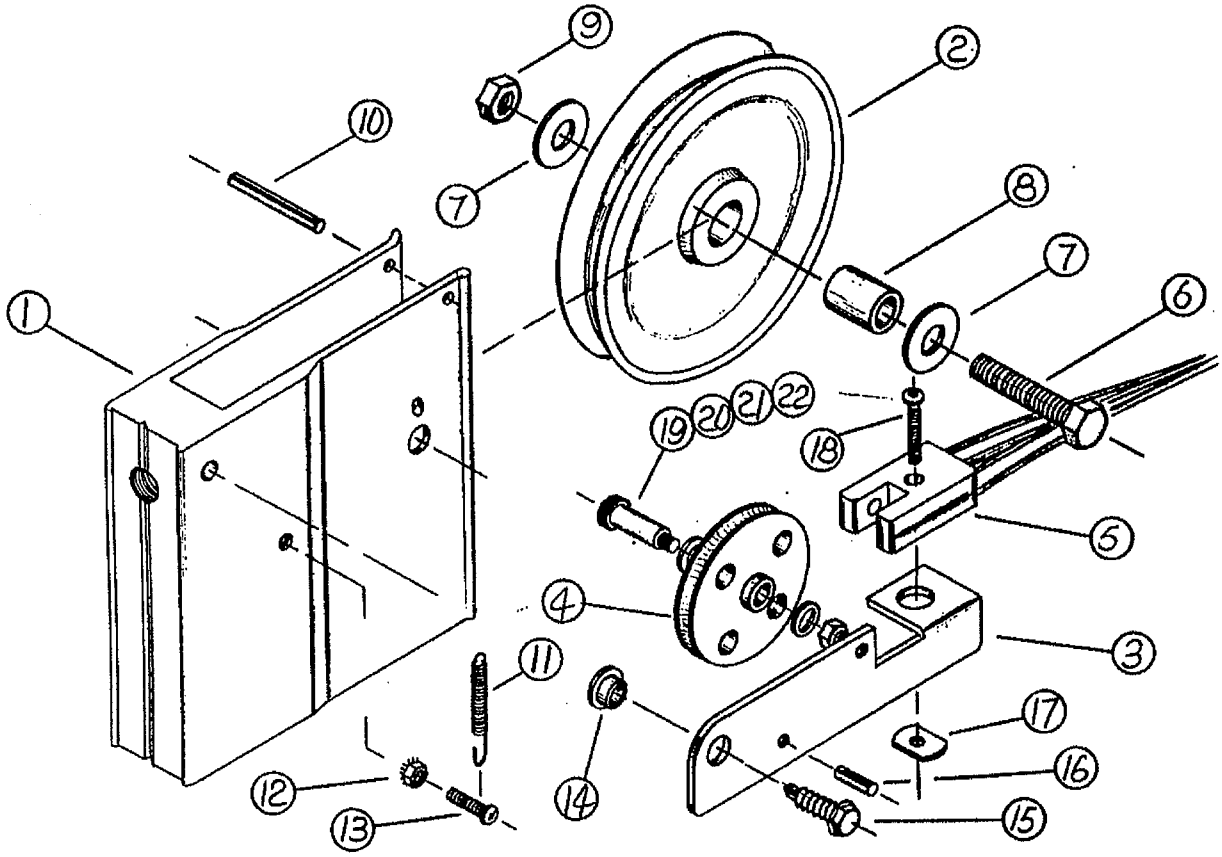
index	part number	description	index	part number	description
1	9102014	DRAWBAR HANDLE	14	7010-005020-250	1/2-20 X 2 1/2" HEX CAP SCREW
2	9133014	SHEAF PLATE ASSEMBLY	15	7016-412520-100	1/4-20 X 1" MA SC RH SOCK
3	9133014-1	SHEAF PLATE ASSEMBLY, FLAT	16	7050-028062-006	9/32" X 5/8" FLAT WASHER
4	9103014	SHEAVE PLATE	17	E-W5007	NYLON SPACER
5	9103014-1	SHEAVE PLATE, FLAT	18	7038-002520-000	1/4-20 HEX NUT K-LOCK
6	9102015	DRAWBAR SHAFT	19	P-016A	PULLEY
7	M-0190	5/8"I.D. COLLAR	20	9102020	BUSHING
8	7052-062100-006	5/8" X 1" SPACER WASHER	21	7016-411032-100	10-32 X 1" MA SC RH SOCK
9	7018-003118-037	5/16-18 X 3/8" HEX SO CA SC	22	7016-411032-075	10-32 X 3/4" MA SC RH SOCK
10	M-0680-31	STEEL BUSHING	23	7036-001032-000	10-32 NYLON NUT
11	M-0680-29	BEARING	24	9103015	NYLON BUSHING FIVE(SHORT)
12	7050-034068-006	11/32" X 11/16" FLAT WASHER	25	9103016	NYLON BUSHING FIVE(LONG)
13	7060-031057-009	5/16" X 37/64" LOCK WASHER	26	9102014-5	OILITE BEARING



Assemblage du Bras du Moulinet

9122028

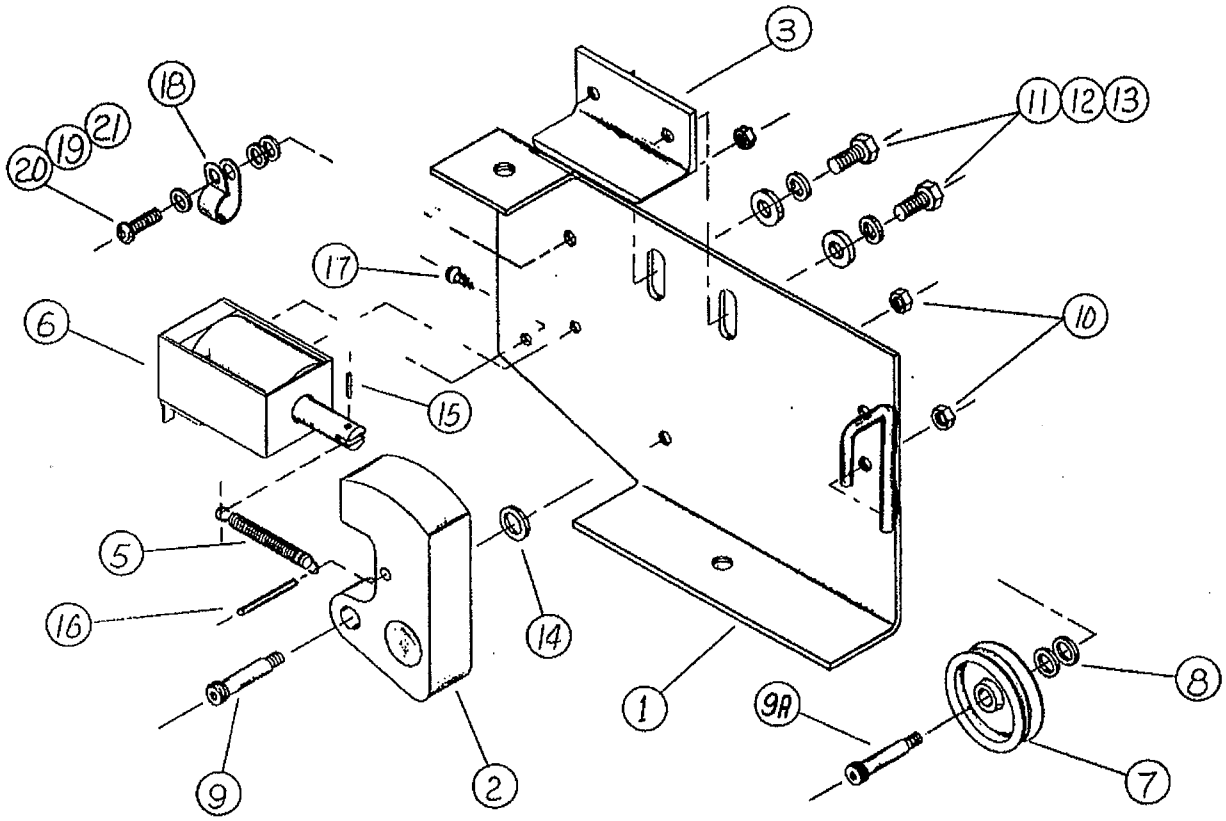
index	part number	description	index	part number	description
1	9102028	REEL ARM	6	7006-001800-037	3/16" X 3/8" SPRING PIN
2	M-0042	STORAGE REEL	7	9102027	REEL ARM SHAFT
3	S-074	STORAGE REEL SPRING	8	7052-062100-006	5/8" X 1" SPACER WASHER
4	M-0011	AXLE PIN	9	7050-056137-012	9/16" X 1 3/8" FLAT WASHER
5	7006-001800-112	3/16" X 1 1/8" SPRING PIN			



Assemblage du Détecteur de Quilles

9122057

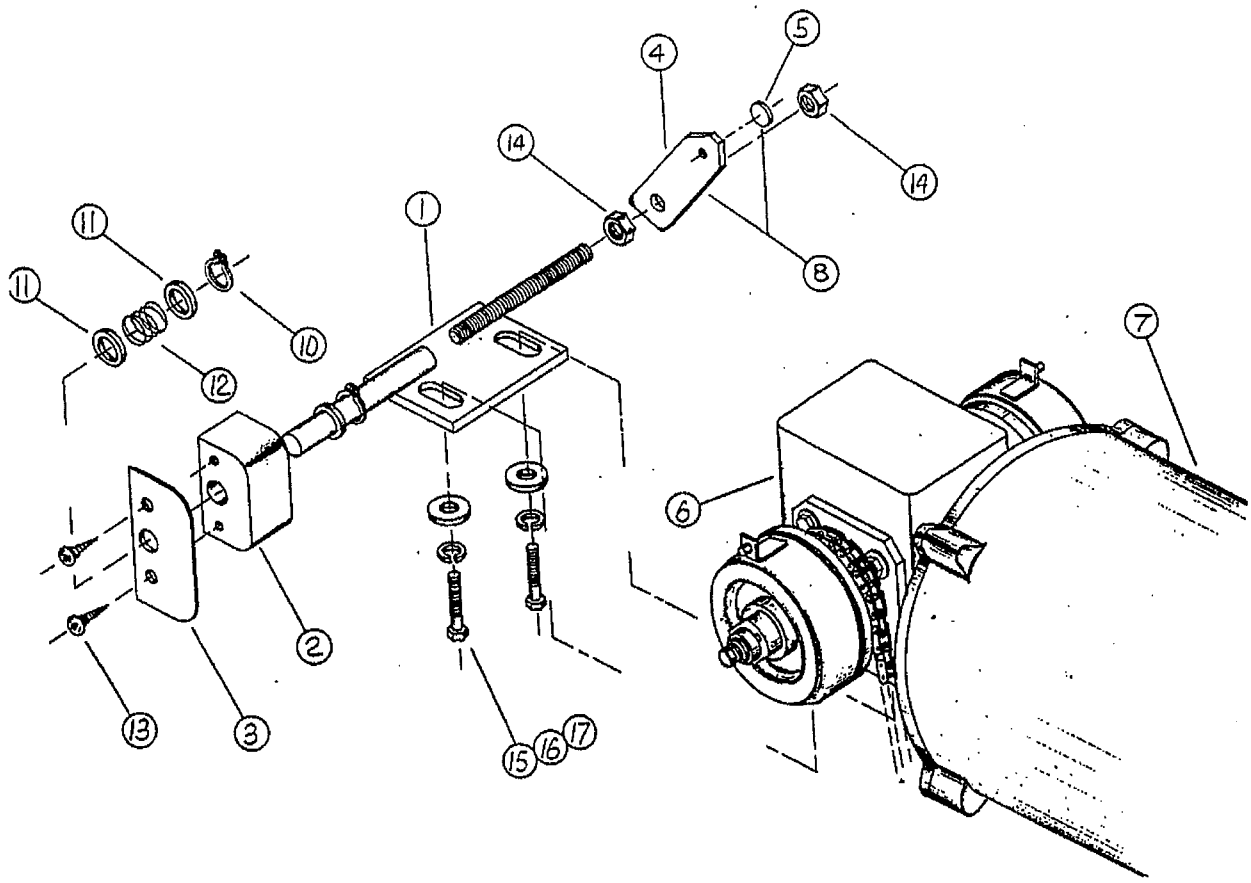
index	part number	description	index	part number	description
1	9102057	SENSOR SHEAF	12	7038-000632-000	6-32 HEX NUT K-LOCK
2	P-016A	PULLEY	13	7016-420632-050	6-32 X 1/2" MA SC RH SLOT
3	9102058	SUPPORT BRACKET	14	9103059	NYLON SHOULDER WASHER
4	9103058	DETECTION WHEEL	15	7027-201016-075	#10-16 X 3/4" TECK SC HEX WASH
5	SB-ECIL-325-PD	OPTICAL SENSOR ASSEMBLY RED	16	7006-000900-050	3/32" X 1/2" SPRING PIN
6	7010-002520-100	1/4-20 X 1" HEX CAP SCREW	17	7046-000632-006	6-32 X 1/16" WELDED NUT
7	7052-050087-003	17/32" X 7/8" X 0.032" SPACER WASHEF	18	7016-410632-075	6-32 X 3/4" MA SC RH SOCK
8	M-0100B	BUSHING	19	7020-002500-050	1/4 X 1/2" SHOULDER SCREW
9	7040-002520-000	1/4-20 TWO WAY LOCK NUT	20	7052-025050-003	1/4" X 1/2" SPACER WASHER
10	7006-001200-100	SPRING PIN	21	7150-019075-009	.193 X 3/4 ALUM FLAT WASHER
11	9105070	SPRING	22	7034-001024-000	10-24 HEXAGONE NUT



Assemblage des Freins

9122070

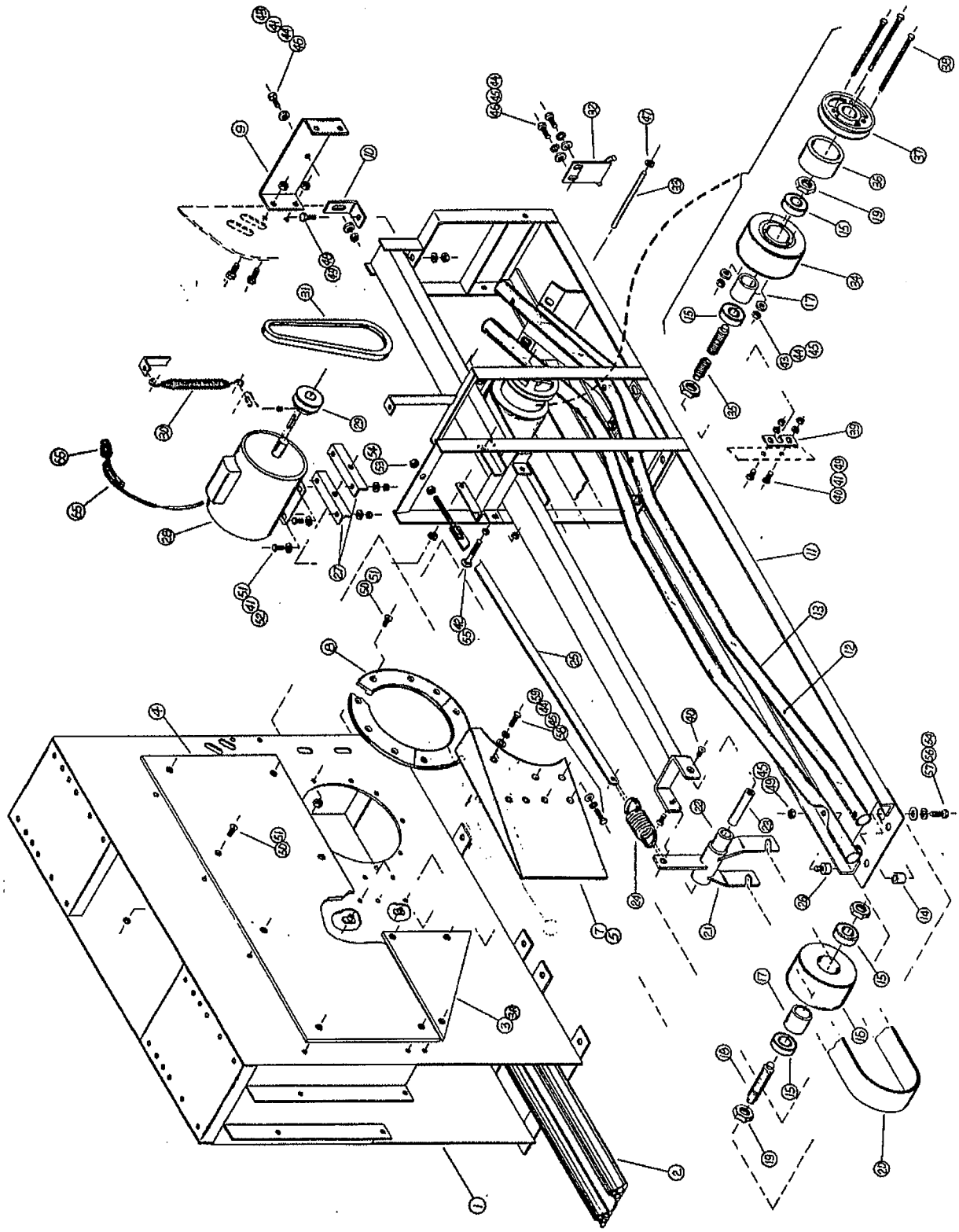
index	part number	description	index	part number	description
1	9102070	BRAKE PLATE	12	7060-025046-006	1/4" X 15/32" LOCK WASHER
2	9103070	BRAKE CAM	13	7050-028062-006	9/32" X 5/8" FLAT WASHER
3	9102071	BRAKE ANGLE PLATE	14	7052-025050-003	1/4" X 1/2" SPACER WASHER
5	9105070	SPRING	15	7006-000900-050	3/32" X 1/2" SPRING PIN
6	399-5170-00	SOLENOID Kit, 24 VAC w/o plunger	16	7006-000900-100	3/32" X 1" SPRING PIN
7	9103072	GUIDE WHEEL	17	7016-410632-025	6-32 X 1/4" MA SC RH SOCK
8	7050-018048-004	3/16" X 31/64" FLAT WASHER	18	E-660-09	CABLE CLAMP 3/8"
9	7020-002500-075	1/4 X 3/4" SHOULDER SCREW	19	7050-021050-006	7/32" X 1/2" FLAT WASHER
9A	7020-002500-050	1/4 X 1/2" SHOULDER SCREW	20	7016-411032-062	10-32 X 5/8" MA SC RH SOCK
10	7034-001024-000	10-24 HEXAGONE NUT	21	7036-001032-000	10-32 NYLON NUT
11	7010-002528-062	1/4-28 X 5/8" HEX CAP SCREW			



Assemblage du Tendeur de Chaîne

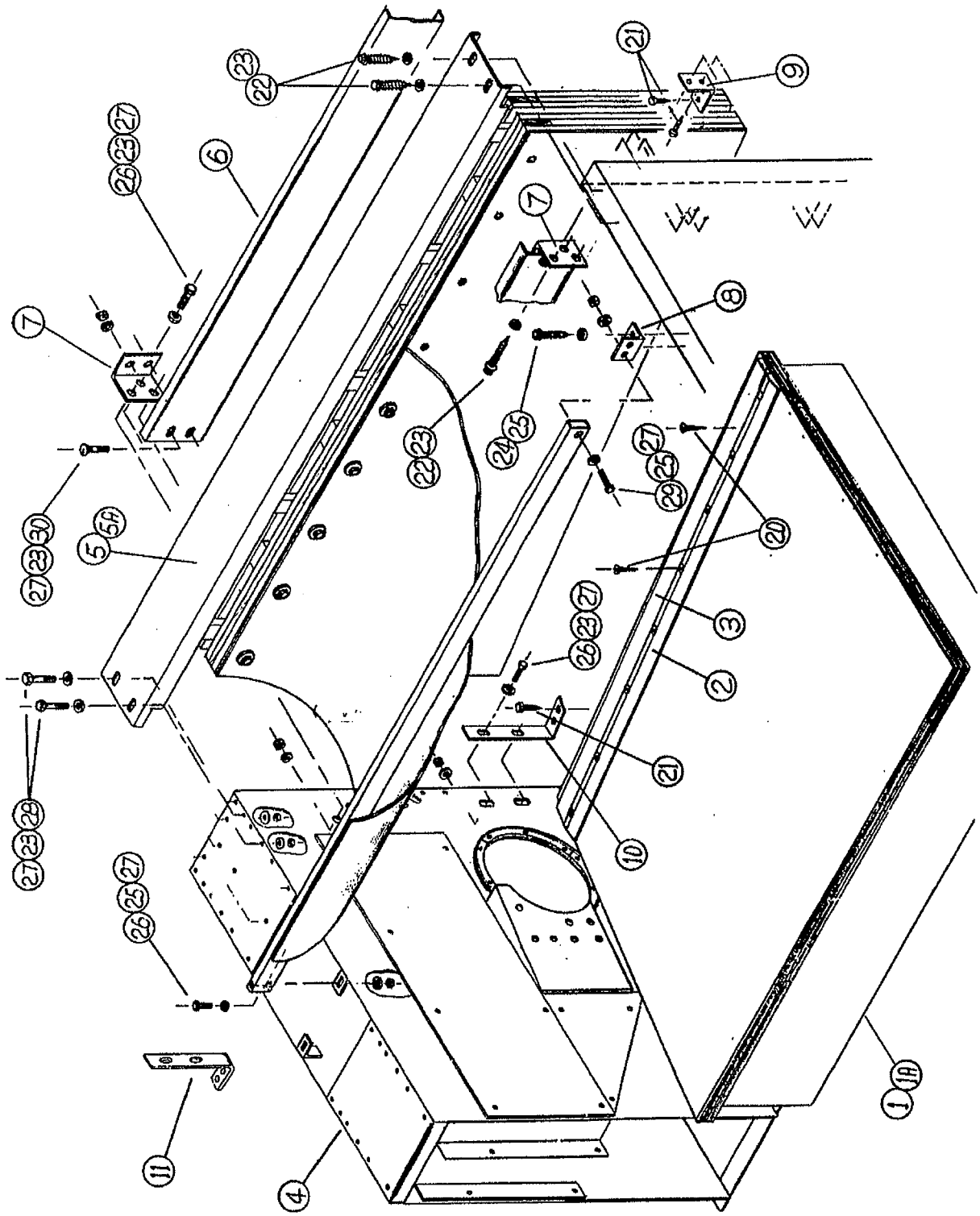
9122112

index	part number	description	index	part number	description
1	9102112	CHAIN BINDER UP	10	7002-710000-050	1/2" EXTERNAL RETAIN. RING
2	9103112	CHAIN BINDER PLASTIC	11	7650-050075-009	1/2" X 3/4" NYLON FLAT WASHER
3	9103112-1	CHAIN BINDER GUIDE	12	9105112	SPRING
4	9102118-1	MAGNET PLATE ASSY.	13	7024-710800-050	#8 X 1/2" TAP SCW TRUSS SOCK
5	9102119	MAGNET	14	7040-003118-000	5/16-18 TWO WAY LOCK NUT
6	M-BMQ1133-1	DOUBLE SHAFT REDUCER	15	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
7	E-110395	MOTOR 1/2HP 1425 RPM 110/220	16	7060-031057-009	5/16" X 37/64" LOCK WASHER
8	9122118-1	MAGNET PLATE ASSY.	17	7050-034100-012	11/32" X 1" FLAT WASHER



Assemblage du Retour de Boules Arrière - Tenpin

index	part number	description	index	part number	description
1	9202001	BALL RETURN CASING	32	303-9030-00	BELT GUARD
2	M-0700-25	BALL RETURN RAILS	33	9202028	MOTOR PIVOT SHAFT
3	9203005	TRIANG. PLASTIC PROTECTOR RIGHT	34	303-9140-01	DRIVE WHEEL
3A	9203007	TRIANG. PLASTIC PROTECTOR LEFT	34	333-9140-01	DRIVE WHEEL ASSY.
4	9203006	RECTANG. PLASTIC PROTECTOR	35	302-9140-00	DRIVE WHEEL SHAFT
5	9266003	DEFLECTOR BLOCK LEFT	36	303-9150-00	N/A SEE 303-9140-01
7	9266004	DEFLECTOR BLOCK RIGHT	37	302-9170-00	DRIVE WHEEL PULLEY
8	303-6550-00	PORT GUARD	38	302-9160-00	PULLEY BOLT
9	9202022	LEVELING PLATE	39	302-9010-00	ADJUSTMENT PLATE
10	9202024	ANGLE ATTACHMENT	40	7016-412520-075	1/4-20 X 3/4" MA SC RH SOCK
11	9202011	BALL RETURN FRAME	41	7050-034100-012	11/32" X 1" FLAT WASHER
12	9202012	ROD TRACK	42	7038-003118-000	5/16-18 HEX NUT K-LOCK
13	9203012	VINYL TRACK	43	7034-003118-000	5/16-18 HEXAGONE NUT
14	9202013	TRACK SPACER	44	7050-034068-006	11/32" X 11/16" FLAT WASHER
15	302-6205-00	BALL BEARING	45	7060-031057-009	5/16" X 37/64" LOCK WASHER
16	303-9110-01	TENSION WHEEL	46	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
16	333-9110-01	TENSION WHEEL ASSY.	48	7010-003118-075	5/16-18 X 3/4" HEX CAP SCREW
17	302-9150-00	N/A SEE 303-9110-01 OR 303-9140-01	49	7036-003118-000	5/16-18 NYLON NUT
18	302-9110-00	TENSION WHEEL SHAFT	50	7016-311032-062	10-32 X 5/8" MA SC FH SOCK
19	302-9130-00	HEXAGON NUT	51	7036-002520-000	1/4-20 NYLON NUT
20	304-9000-00	ACCELERATOR BELT (green)	52	7010-002520-075	1/4-20 X 3/4" HEX CAP SCREW
21	302-9090-00	TENSION BRACKET	53	7034-003716-000	3/8-16 HEXAGONE NUT
22	9203015	TENSION BRACKET BUSHING	54	7060-037067-010	3/8" X 43/64" LOCK WASHER
23	302-9100-00	ACCELERATOR SHAFT	55	7012-003118-250	5/16-18 X 2 1/2" CARRIAGE BOLT
24	9205013	TENSION SPRING	56	7050-040081-006	13/32" X 13/16" FLAT WASHER
25	302-9070-00	TENSION BAR	57	7010-003716-125	3/8-16 X 1 1/4" HEX CAP SCREW
26	9104015	DRAWBAR STOPPER	58	7010-003118-125	5/16-18 X 1 1/4" HEX CAP SCREW
27	9202026	MOTOR ANGLE SUPPORT	59	7046-003118-037	5/16-18 X 3/8" WELDED NUT
28	E-102280	MOTOR 1/3HP 115/230 VAC 50/60HZ	61	7016-311032-050	10-32 X 1/2" MA SC FH SOCK
28	E-110395	MOTOR 1/2HP 1425 RPM 110/220	63	7046-001032-006	10-32 X 1/16" WELDED NUT
29	9202021	PULLEY MA-2.5 X 5/8	64	7036-001032-000	10-32 NYLON NUT
30	S-080	TENSION SPRING (BIG)	65	E-020-183-6-110	CORD 110V 6'
31	304-9010-00	ACCELERATOR BELT	66	E-605-91	TWIST LOCK PLUG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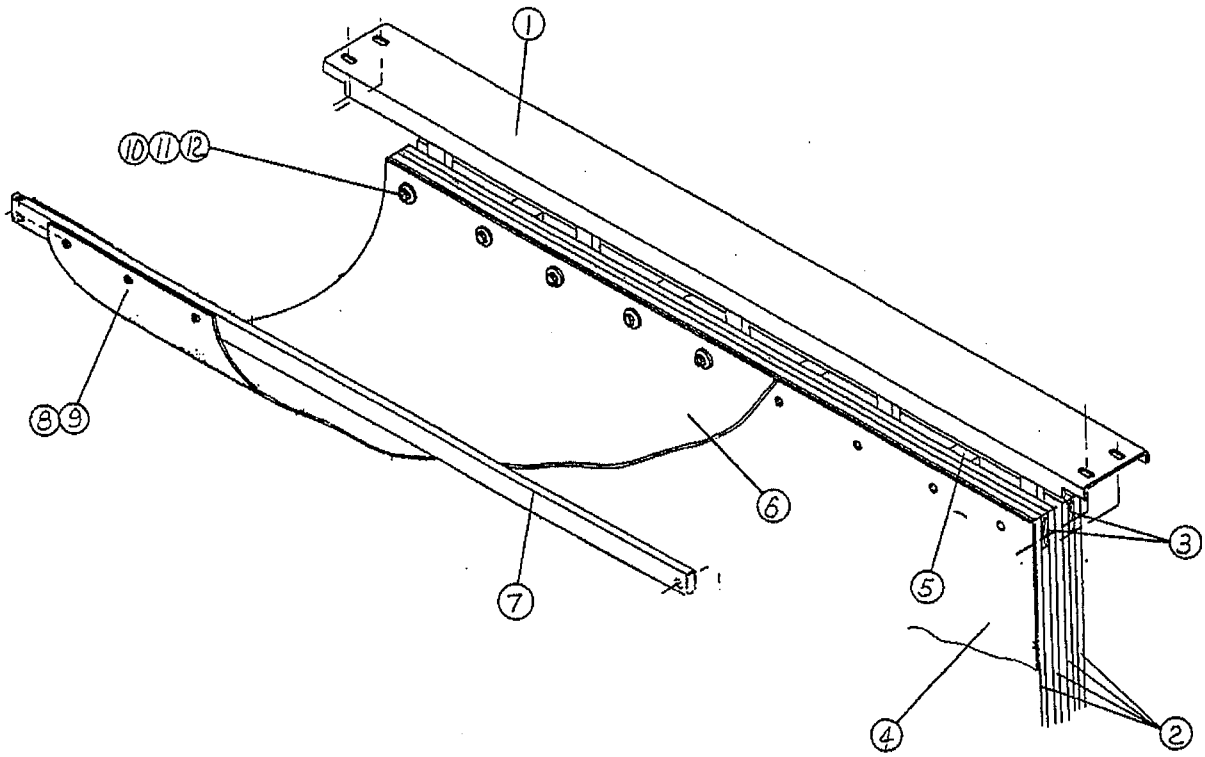
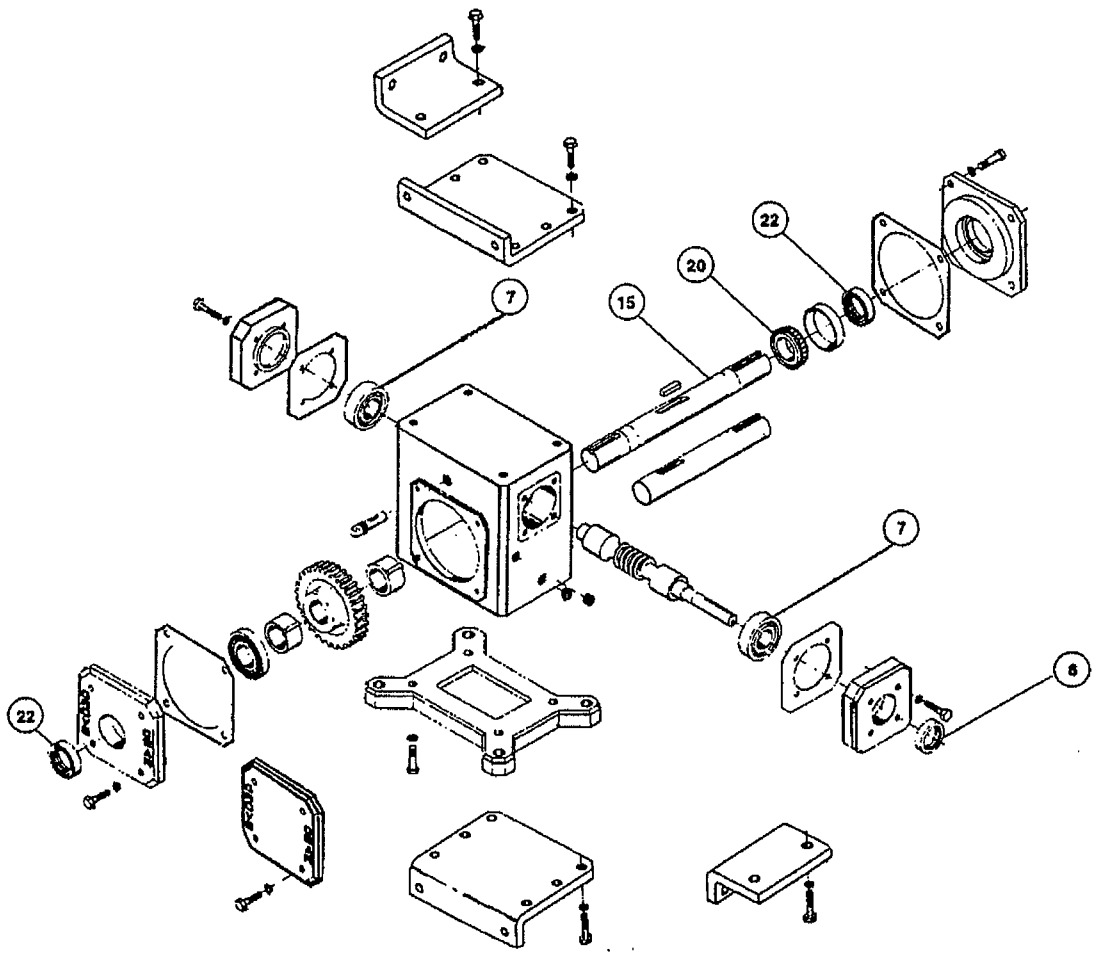
Assemblage du Puits et du Coussin - Tenpin

index	part number	description	index	part number	description
1	9266051	PIT FLOOR ASSY LANE 1	11	9202044	RIGHT PIT HOLDING BRACKET
1A	9266052	PIT FLOOR ASSY LANE 2	20	7026-311000-200	#10 X 2" SELF DR SCW FH SO TYPE 17
2	9203052	BALL GUIDE	21	7028-003100-150	5/16 X 1 1/2" LAG SCREW
3	9206055	BALL GUIDE STOPPER	22	7028-003100-250	5/16 X 2 1/2" LAG SCREW
4	9222001	BALL RETURN CASING ASSY.	23	7050-034100-012	11/32" X 1" FLAT WASHER
5	9222048-4	CUSHION RIGHT ASSY	24	7024-201400-150	#14 X 1 1/2" TAP SCW HEX WASH
5A	9222048-7	CUSHION LEFT ASSY	25	7050-034068-006	11/32" X 11/16" FLAT WASHER
6	9202047	CUSHION STOP CHANNEL	26	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
7	9202049	CUSHION STOP ANGLE	27	7036-003118-000	5/16-18 NYLON NUT
8	9202054	BRACKET APRON TUBING KICK	28	7010-003118-175	5/16-18 X 1 3/4" HEX CAP SCREW
9	9202045	PIT HOLDING BRACKET	29	7010-003118-200	5/16-18 X 2" HEX CAP SCREW
10	9202043	LEFT PIT HOLDING BRACKET	30	7012-003118-100	5/16-18 X 1" CARRIAGE BOLT



Assemblage du Coussin - Tenpin

index	part number	description	index	part number	description
1	9202048	CUSHION SUPPORT CHANNEL	7	9202053	APRON TUBING
2	9204039	CUSHION	8	7027-201016-075	#10-16 X 3/4" TECK SC HEX WASH
3	9206039	CUSHION WOOD SPACER	9	7150-019075-009	.193 X 3/4 ALUM FLAT WASHER
4	9204038	APRON	10	7010-005013-625	1/2-13 X 6 1/4" HEX CAP SCREW
5	9204040	CUSHION SPACER	11	7050-051175-012	33/64" X 1 3/4" FLAT WASHER
6	9204037	APRON PROTECTOR	12	7036-005013-000	1/2-13 NYLON NUT

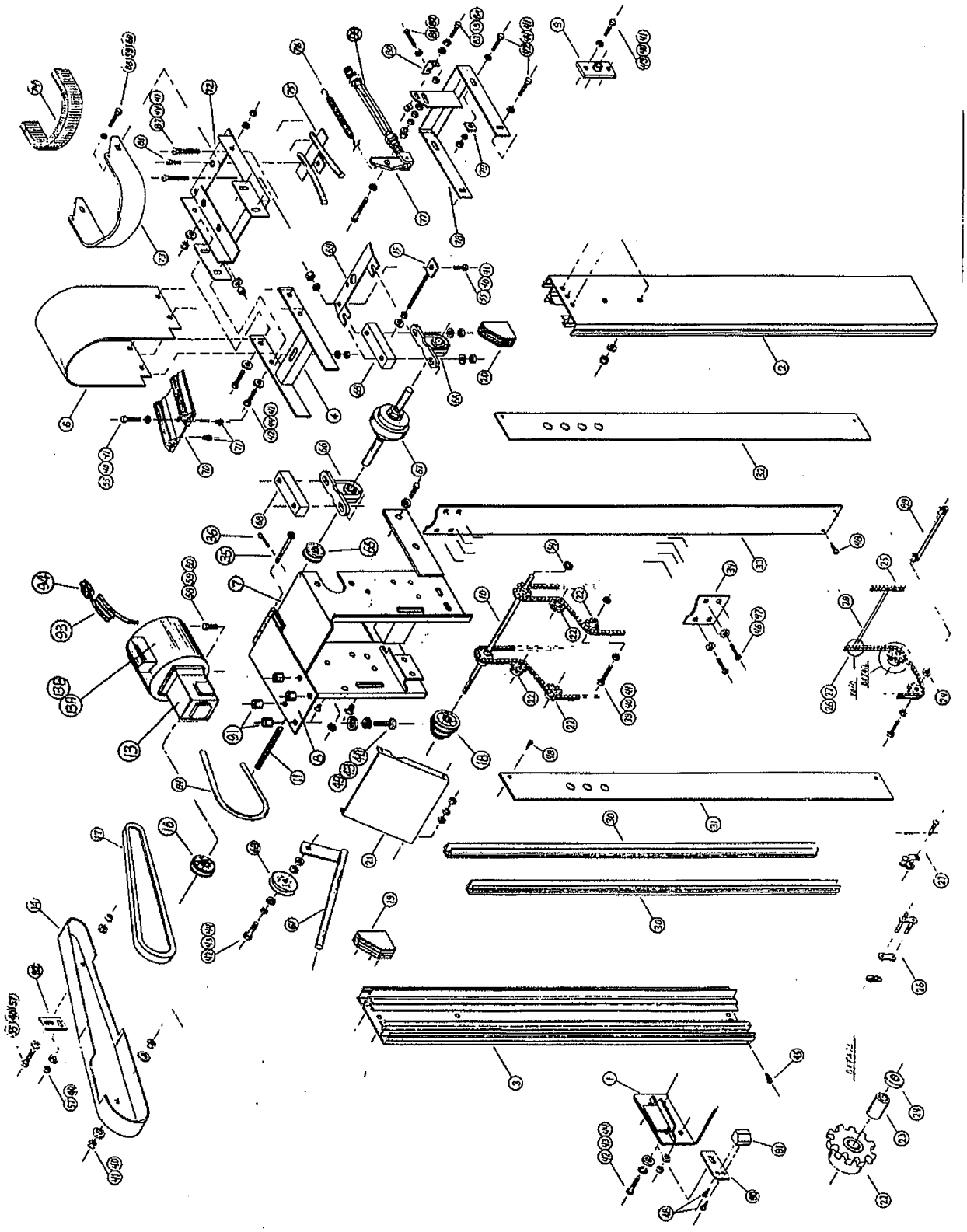


Réducteur du Moteur

Numéro de référence: M-BMQ1133-1

index	part number	description
7	M-BMQ1133-19	INPUT CONE BEARING
8	M-BMQ1133-18	INPUT OIL SEAL
15	M-BMQ1133-15	DOUBLE OUTPUT SHAFT

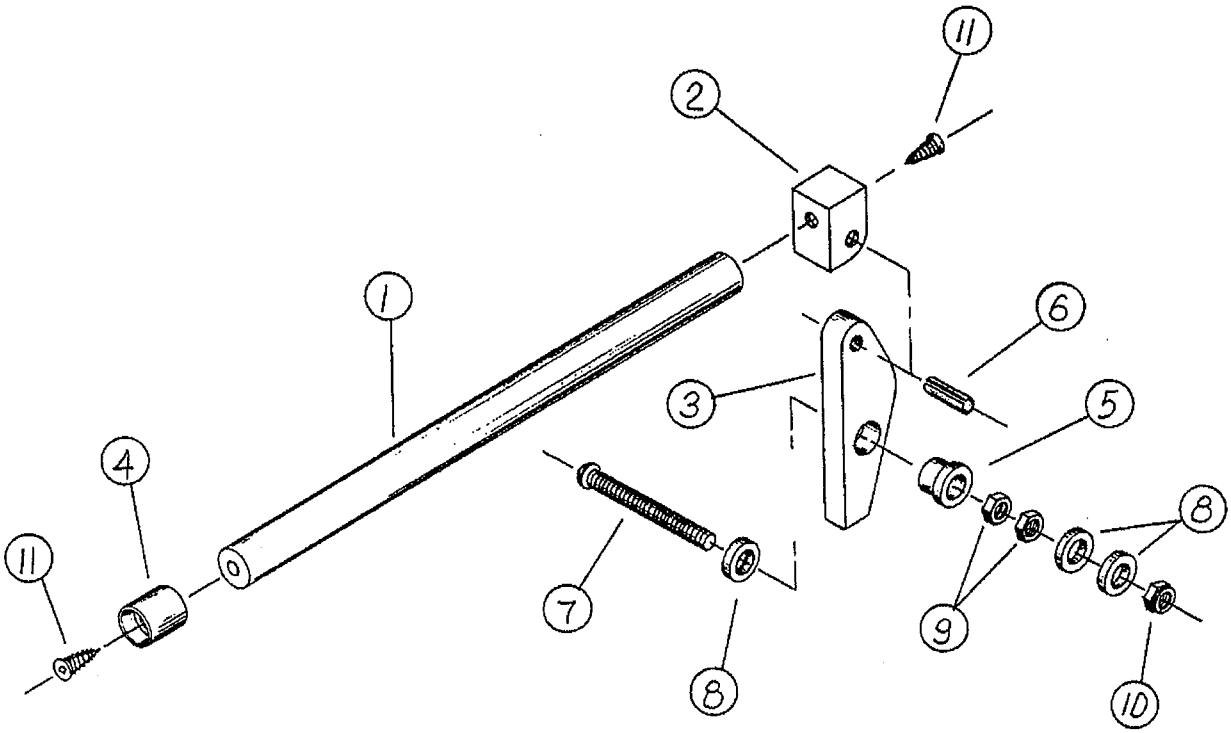
index	part number	description
20	M-BMQ1133-16	OUTPUT CONE BEARING
22	M-BMQ1133-17	OUTPUT OIL SEAL



Assemblage de l'Élévateur de Boules Arrière - Duckpin/FivePin

SB-0700-00

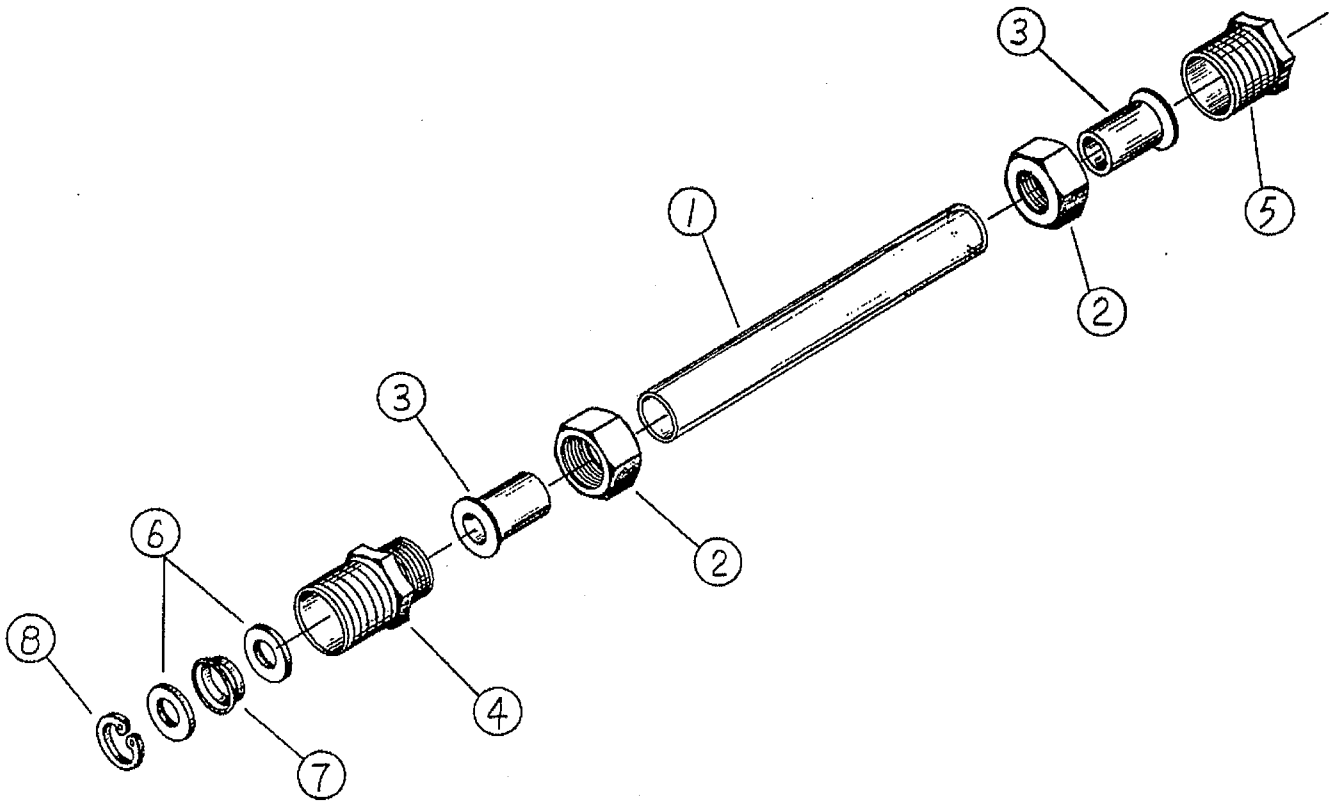
index	part number	description
1	M-0700-11	BALL LIFT BASE
2	M-0700-02-04	MAIN SIDE PLATE RIGHT
3	M-0700-02-07	MAIN SIDE PLATE LEFT
4	M-0700-94	BALL LIFT BRIDGE
6	P-700-13	BALL GUARD OUTSIDE
7	M-0700-00	BALL LIFT HEAD ASSEMBLY
8	M-0700-09	MOTOR DRIVE PLATE
9	M-0700-67	BEARING STEEL BLOCK
10	M-0700-07	DRIVE SHAFT ASSY.
11	M-0700-04-04	RIGHT MAIN SIDE PLATE
12	M-0700-04-07	LEFT MAIN SIDE PLATE
13	M-BMQ1133-3	SINGLE SHAFT MOTOR REDUCER
13A	E-110395	MOTOR 1/2HP 1425 RPM 110/220
14	P-700-63	PULLEY GUARD
15	M-0680-24	IDLER TENSIONER
16	M-0700-21	PULLEY 50X1/2"
17	R-0700-01	V BELT, 4L280
18	M-0700-24	DOUBLE PULLEY
19	50W-0700-07	TOP SPROCKET GUARD LEFT
20	50W-0700-04	TOP SPROCKET GUARD RIGHT
21	M-0700-06	HAND GUARD
22	M-0700-10	IDLER SPROCKET 40 B 10
23	M-0700-10-01	OILITE 3/4OD X 1/2ID X 3/4
24	M-0700-10-02	STEEL BEARING
25	M-0700-13	MAIN CHAIN
26	M-0700-14	CHAIN COUPLING - EXTENDED SHAFT
27	M-0700-15	CHAIN COUPLING HALF-LINK
28	M-0700-27	CROSS CHAIN TRAVEL SHAFT
29	M-0700-12	HEAD & BASE MOUNT PLATE
30	P-700-15	CHAIN GUIDE
31	P-700-11-07	LEFT SIDE PROTECTOR
32	P-700-11-04	RIGHT SIDE PROTECTOR
33	P-700-12	INSIDE REAR PROTECTOR
34	P-700-10	TOP REAR GUIDE
35	7010-002520-350	1/4-20 X 3 1/2" HEX CAP SCREW
36	7080-000900-075	3/32" X 3/4" COTTER PIN
37	M-0700-17	SPROCKET GUARD
38	7108-401200-050	1/8" X 1/2" ALUM POP RIVET DH
39	7010-003118-175	5/16-18 X 1 3/4" HEX CAP SCREW
40	7050-034068-006	11/32" X 11/16" FLAT WASHER
41	7036-003118-000	5/16-18 NYLON NUT
42	7010-003118-100	5/16-18 X 1" HEX CAP SCREW
43	7060-031057-009	5/16" X 37/64" LOCK WASHER
44	7050-034100-012	11/32" X 1" FLAT WASHER
45	7022-410600-037	#6 X 3/8" WOOD SCW RH SOCK
46	7016-410832-075	8-32 X 3/4" MA SC RH SOCK
47	7150-019075-009	.193 X 3/4 ALUM FLAT WASHER
48	7024-710800-050	#8 X 1/2" TAP SCW TRUSS SOCK
49	7010-003118-150	5/16-18 X 1 1/2" HEX CAP SCREW
50	7050-021050-006	7/32" X 1/2" FLAT WASHER
51	7060-018003-006	3/16" X 1/32" LOCK WASHER
52	7034-001032-000	10-32 HEXAGONE NUT
53	M-0700-32	TENSIONNER BASE PLATE
54	7052-050087-003	17/32" X 7/8" X 0.032" SPACER WASHER
55	7010-003118-075	5/16-18 X 3/4" HEX CAP SCREW
56	7016-413118-200	5/16-18 X 2" MA SC RH SOCK
57	7038-001032-000	10-32 HEX NUT K-LOCK
58	7010-002520-100	1/4-20 X 1" HEX CAP SCREW
59	7050-028062-006	9/32" X 5/8" FLAT WASHER
60	7036-002520-000	1/4-20 NYLON NUT
61	M-0700-33	TENSIONNER
62	P-700-16	PLASTIC PROTECTOR
63	M-0700-70	TENSIONNER PULLEY
64	R-0700-03	V BELT 3L460
65	EZP-040	PULLEY
66	EZP-050	PILLOW BLOCK
67	EZP-SB026	SHAFT AND PULLEY ASSY
68	EZP-027	SPACER BLOCK
69	M-0700-38	PUSHER SUPPORT
70	M-0700-39	BALL TRACK
71	7016-411032-025	10-32 X 1/4" MA SC RH SOCK
72	M-0700-35	BALL POLISHER BASE FRAME
73	EZP-010	PAD RETAINER
74	EZP-053	BUFFING PAD
75	EZP-011-1	RAIL BALL EXIT
76	S-071	TENSION SPRING
77	SB-0700-01	PUSHER BALL POLISHER IN
78	M-0700-36	BASE FRAME PUSHER
79	M-0700-34	STOPPER
80	M-0700-37	ADJUSTMENT BRACKET
81	7016-312520-175	1/4-20 X 1 3/4" MA SC FH SOCK
82	7038-002520-000	1/4-20 HEX NUT K-LOCK
83	7010-002520-075	1/4-20 X 3/4" HEX CAP SCREW
84	7046-000832-003	8-32 X 1/32" WELDED NUT
85	7018-302520-075	1/4-20 X 3/4" HEX SO CAP FH
86	7016-312520-100	1/4-20 X 1" MA SC FH SOCK
87	7016-313118-250	5/16-18 X 2 1/2" MA SC FH SOCK
89	M-0700-23	BALL LEVELING ROD
90	M-0880-19	SLEEVE BUSHING



Assemblage du Nettoyeur a Boules - "In Pusher"

SB-0700-01

index	part number	description	index	part number	description
1	P-700-64	INSIDE PUSHER	7	7016-313118-250	5/16-18 X 2 1/2" MA SC FH SOCK
2	P-700-67	PUSHER BLOCK	8	7050-034100-012	11/32" X 1" FLAT WASHER
3	P-700-68	PUSHER CAM (Rev.:1)	9	7040-003118-000	5/16-18 TWO WAY LOCK NUT
4	P-700-66	PUSHER PROTECTOR (7326.90.00)	10	7036-003118-000	5/16-18 NYLON NUT
5	M-0680-31	STEEL BUSHING (Rev.:1)	11	7022-310800-075	#8 X 3/4" WOOD SCW FH SOCK
6	7006-001800-100	3/16" X 1" SPRING PIN			



Assemblage du Nettoyeur a Boules - "Out Pusher"

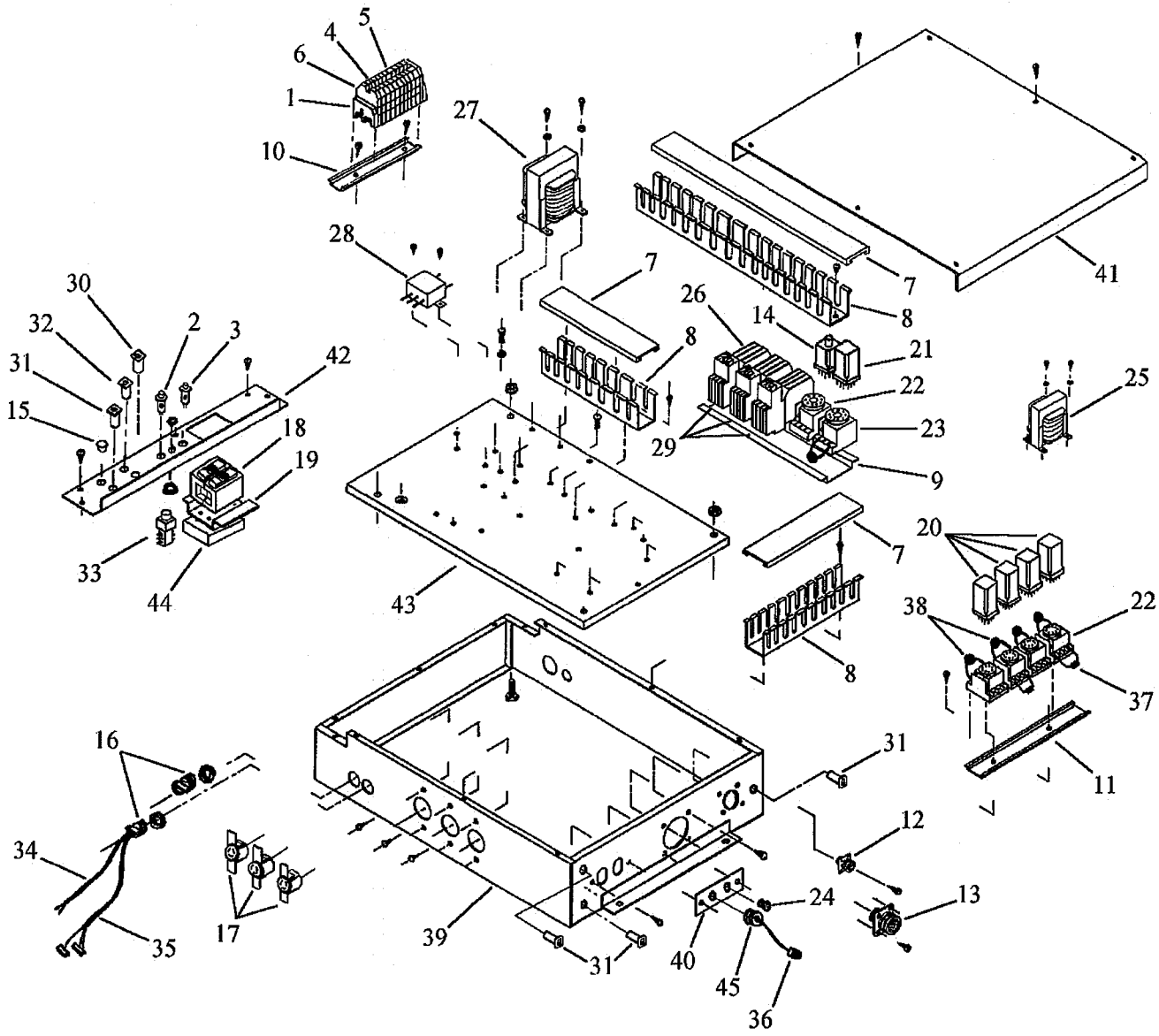
SB-0700-02

index	part number	description	index	part number	description
1	P-700-65	OUTSIDE PUSHER	5	M-0700-78	UPPER BUSHING NUT
2	A-058-31	STANDART 3/4"	6	7350-040061-005	.408 X .61 X .05 CU FW SPEC
3	A-058-18	INSERT 3/4"	7	A-008	3/8" HEAD LIP SEAL MOLYTH
4	M-0700-77	LOWER BUSHING NUT A-58-10	8	7004-300000-062	5/8" INTERNAL RETAIN. RING

Câblages & Composantes du Boîtier d'Alimentation ME-90

Sub assembly number SB-6400-99

INDEX		PART NUMBER	DESCRIPTION	
1	E-103002-26	Stopper		
2	L2	E-1052C5-115	Pilot Lamp, 115VAC Green	
3	L1	E-1090C1-28	Pilot Lamp, 28VAC Red	
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	
9		E-164800-11	Rail, 11	
10		E-164800-5	Rail, 05	
11		E-164800-8	Rail, 08	
12	C4	E-206043-1	Female Connector 14	
13	C5	E-206838-1	Female Connector 24	
14	PS1	E-214215	Power Supply 90VDC	
15		E-315-751	Snap-In Bushing	
16		E-3302M	Power Cord	
17	C1	E-4560	Twist-Lock Receptacle	(Main Motor Pinsetter 1)
17	C2	E-4560	Twist-Lock Receptacle	(Main Motor Pinsetter 2)
17	C3	E-4560	Twist-Lock Receptacle	(Rear Ball Lift Motor)
18	BR1	E-600-20	Circuit Breaker 20AMP	
19		E-600-25-1	Attachment Plate	
20	K2, K3, K4, K5	E-6012	Relay	24VAC-08P
21	K1	E-6013	Relay	24VAC-11P
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	TR3 & TR4	E-B1091	Voltage Transformer	
25	TR3 & TR4	E-90341	Voltage Transformer	
26	CM1	E-B12-10-3	Contact 3-P	(Main Motor Pinsetter 1)
26	CM2	E-B12-10-3	Contact 3-P	(Main Motor Pinsetter 2)
26	CM3	E-B12-10-3	Contact 3-P	(Rear Ball Lift Motor)
27	TR1	E-C0187	Voltage Transformer	
27	TR1	E-70137	Voltage Transformer	
28	F2	E-F2716	Corcom Filter	
29	OL1, OL2, OL3	E-RSA-22K	Circuit Overload	
30	OL5	E-W28XQ1A-15	Circuit Overload 15 AMP	
30	OL5	E-600-46-10	Circuit Overload 10 AMP	
31	OL6,OL7,OL8,OL9	E-W28XQ1A-3	Circuit Overload 3 AMP	
31	OL6,OL7,OL8,OL9	E-600-46-3	Circuit Overload 3 AMP	
32	OL4	E-W28XQ1A-5	Circuit Overload 5 AMP	
32	OL4	E-600-46-5	Circuit Overload 5 AMP	
33	SW1	E-ZF122UEE	Shadow Switch	
34		EC-090-056	Ball Lift Cable Assembly	
35		EC-090-057	One/Two Ball Light Cable Assembly	
36	Assy. Include C6	EC-090-210	ME-90 Lane Controller Power Supply Cable Assy.	
37		EE-IN4007	Diode	
38	VR8-15	EE-V47ZA7	Varistor 38VDC	
39		M-0640-58-1	ME-90 Power Box Cabinet	
40		M-0640-58-2	ME-90 Power Box Wiring Plate	
41		M-0640-58-4	ME-90 Power Box Cover	
42		M-0640-58-6	ME-90 Power Box Small Cover	
43		M-0640-58-15	ME-90 Power Box Pan	
44		P-0640-58-1	Plastic Spacer	
45		RB-39	Rubber Grommet	
	BL	301-0395-00	Rear Ball Lift Motor	
	MM1	301-1200-00	Main Motor Pinsetter 1	
	MM2	301-1200-00	Main Motor Pinsetter 2	
	SW2, SW3	E-519-169	Security Switch	(Pinsetter 1)
	SW4, SW5	E-519-169	Security Switch	(Pinsetter 2)
	SW6	E-519-169	Security Switch	(Rear Ball Lift Motor)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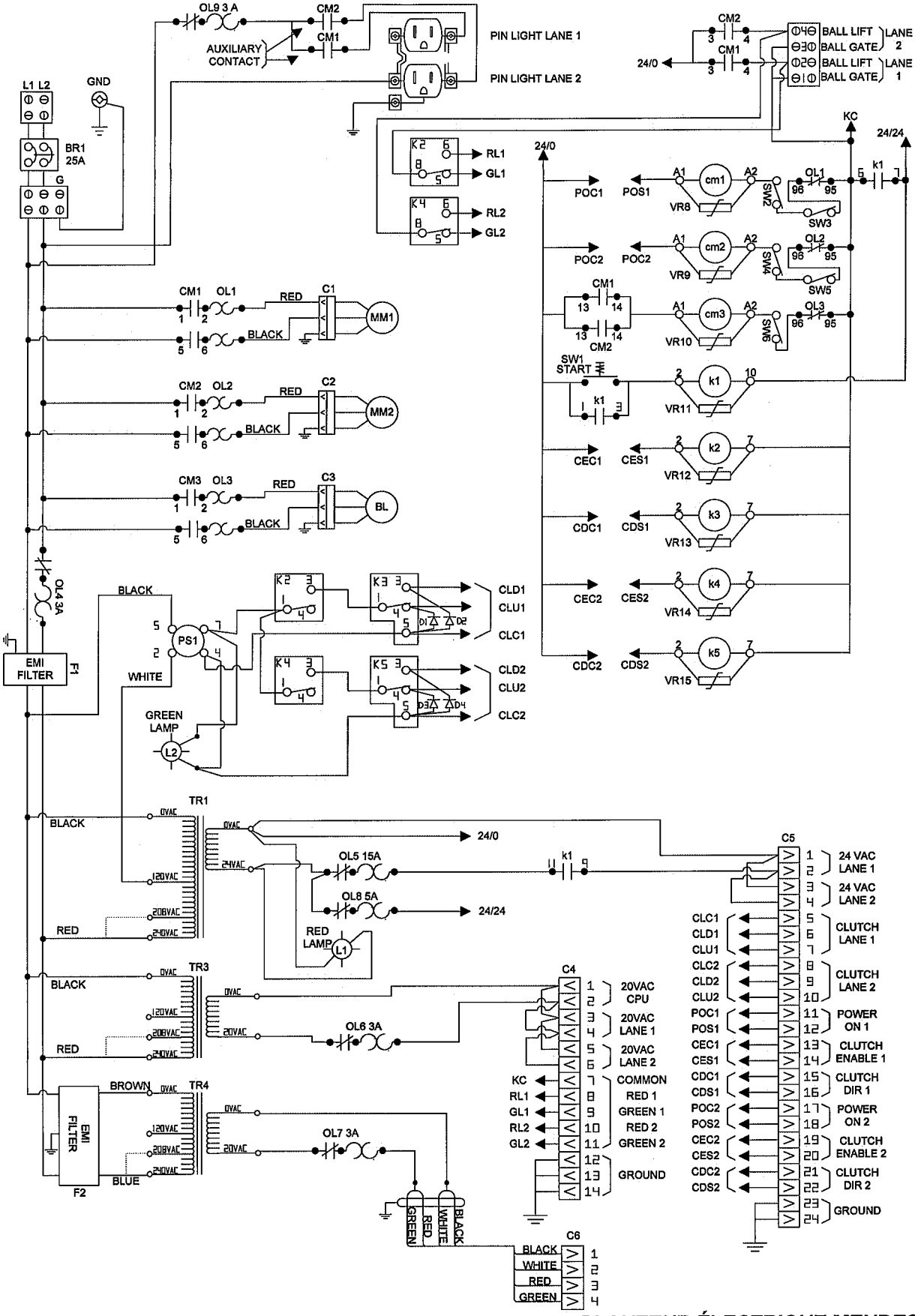
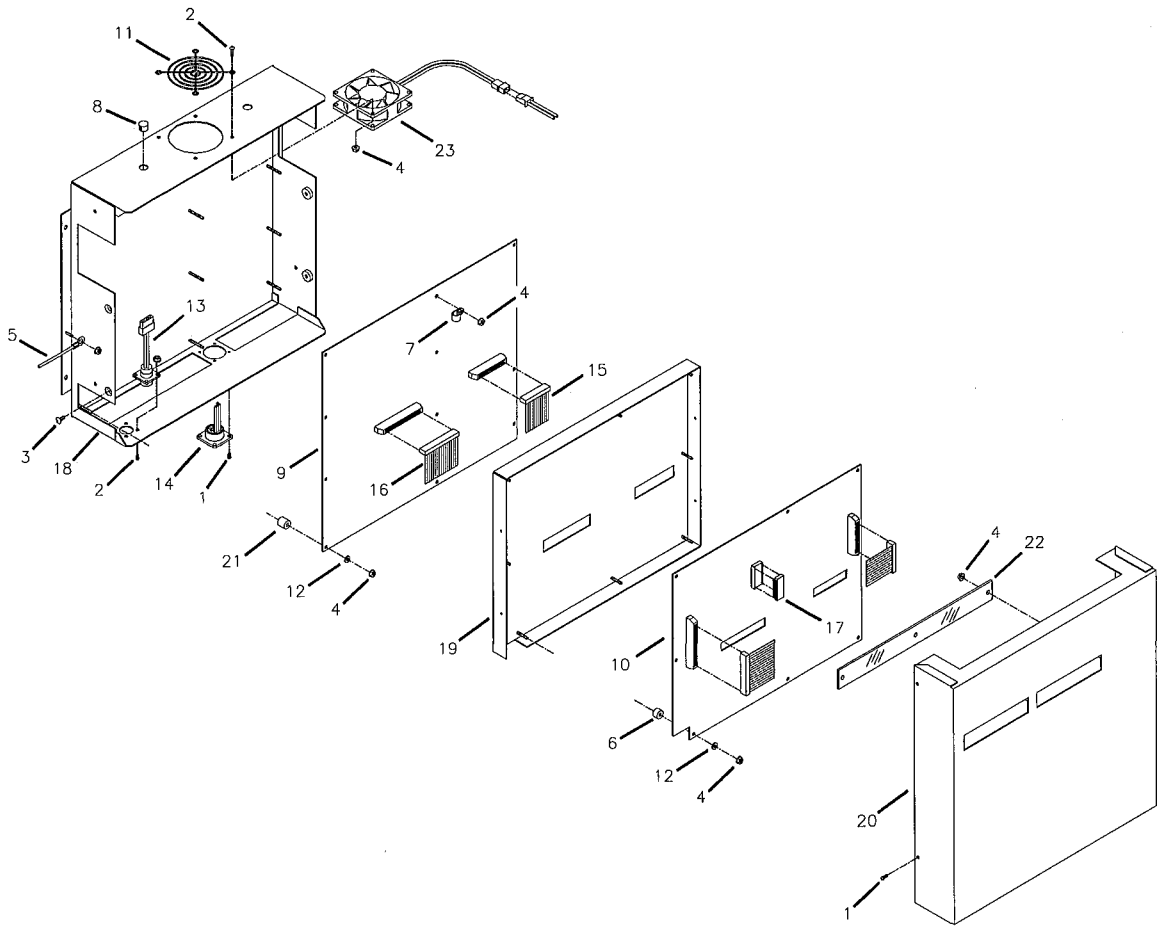

OL9 3 A
CM2
CM1
AUXILIARY CONTACT
PIN LIGHT LANE 1
PIN LIGHT LANE 2
BALL LIFT
BALL GATE
LANE 2
LANE 1
L1 L2
GND
BR1 25A
G
KC
24/24
24/0
RL1
GL1
RL2
GL2
POC1
POS1
POC2
POS2
cm1
cm2
cm3
VR8
VR9
VR10
SW2
SW3
SW4
SW5
SW6
OL1
OL2
OL3
k1
SW1 START
VR11
CEC1
CES1
k2
VR12
CDC1
CDS1
k3
VR13
CEC2
CES2
k4
VR14
CDC2
CDS2
k5
VR15
C1
C2
C3
MM1
MM2
BL
RED
BLACK
OL4 3A
EMI FILTER
F1
PS1
WHITE
GREEN LAMP
L2
CLD1
CLU1
CLC1
CLD2
CLU2
CLC2
TR1
TR3
TR4
0VAC
24VAC
120VAC
208VAC
240VAC
20VAC
OL5 15A
OL8 5A
RED LAMP
L1
OL6 3A
OL7 3A
BROWN
BLUE
F2
C4
C5
C6
20VAC CPU
20VAC LANE 1
20VAC LANE 2
COMMON
RED 1
GREEN 1
RED 2
GREEN 2
GROUND
24 VAC LANE 1
24 VAC LANE 2
CLUTCH LANE 1
CLUTCH LANE 2
POWER ON 1
CLUTCH ENABLE 1
CLUTCH DIR 1
POWER ON 2
CLUTCH ENABLE 2
CLUTCH DIR 2
GROUND
BLACK
WHITE
RED
GREEN

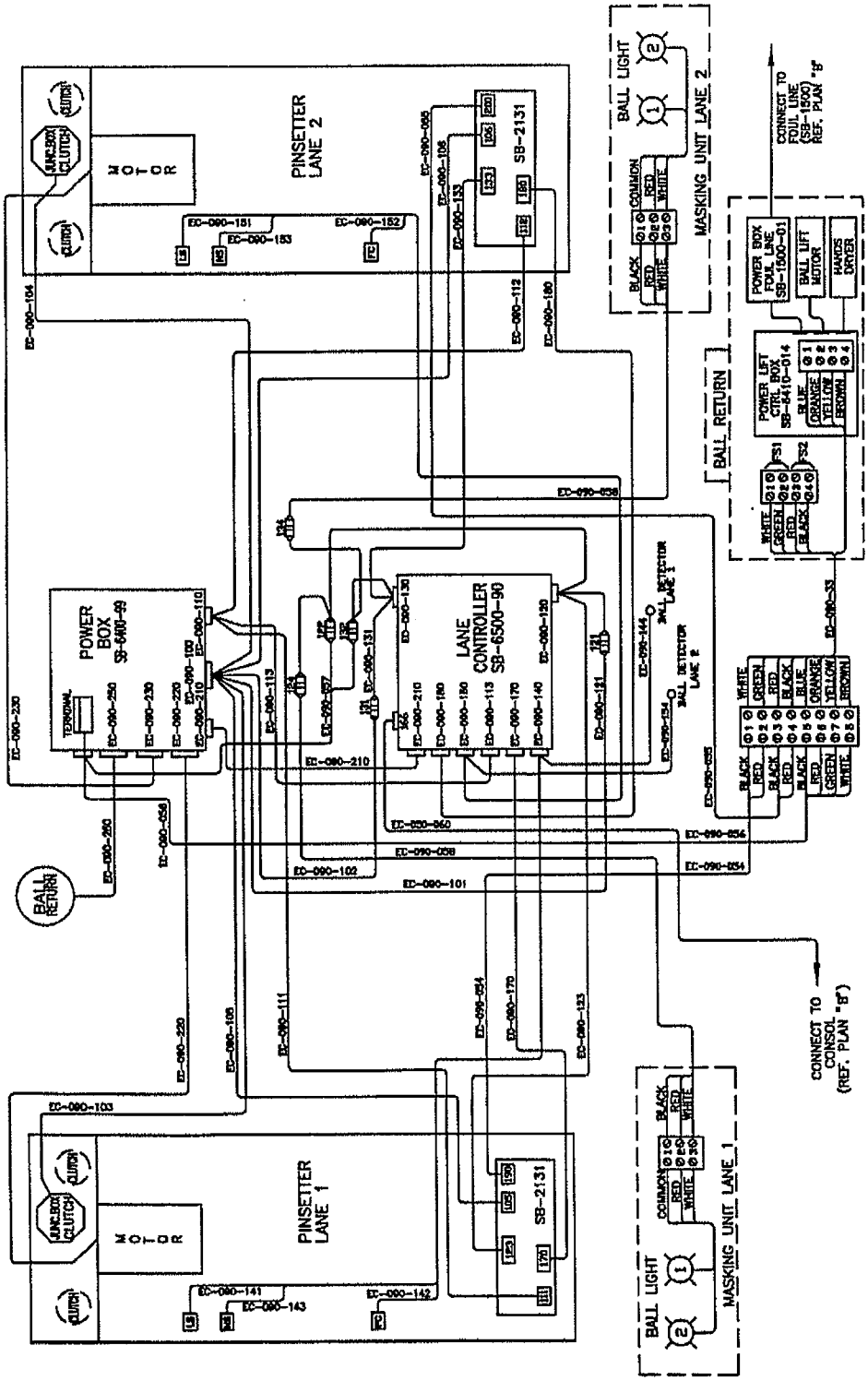
Composantes du Contrôleur d'Allées ME-90

Sub assembly number SB-6500-90

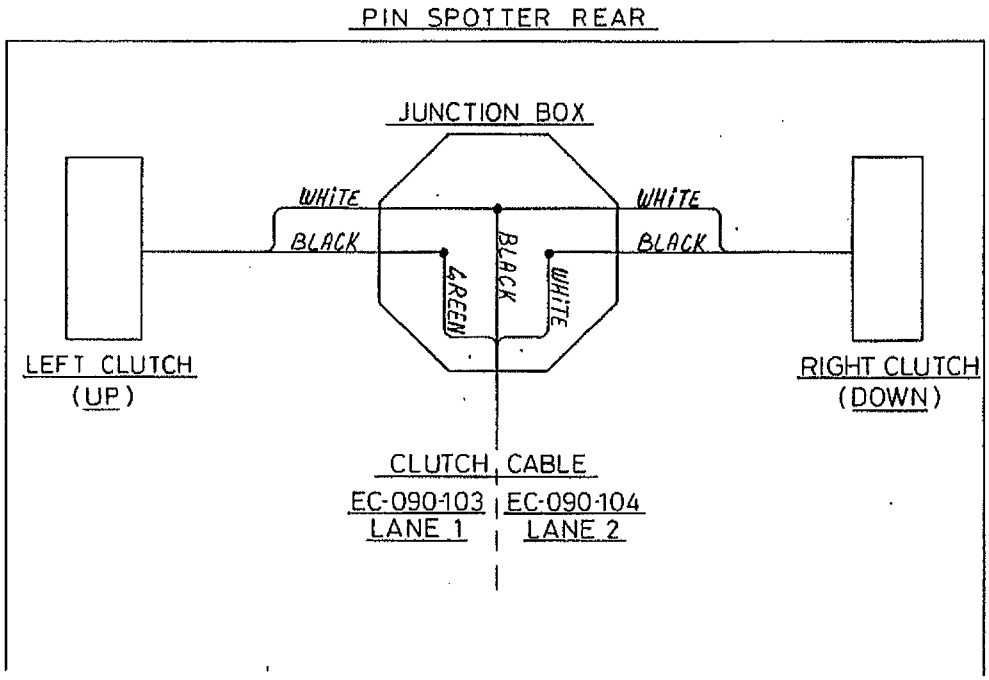
INDEX	PART NUMBER	DESCRIPTION
1	7016-430632-031	Round Combined Machine Screw 6-32 x 5/16"
2	7016-430632-050	Round Combined Machine Screw 6-32 x 1/2"
3	7024-710800-050	Truss Socket Head Metal Screw #8 x 1/2"
4	7038-000632-000	Hexagon K-Lock Nut 6-32
5	E-020-10TEW	Ground Cable
6	E-219	Round Nylon Spacer
7	E-660-09	Cable Clamp
8	E-805	Plastic Snap Plug
9	E-MD3-80	Power Supply PCB
10	E-MD3-85	Central Processor Unit (CPU) PCB
11	E-SC80-W2	Fan Grill
12	E-W3751	Nylon Washer
13	EC-090-280	Power Supply Cable
14	EC-090-290	Power Supply Cable
15	EC-090-98	Flat Cable Assembly 34P
16	EC-090-99	Flat Cable Assembly 50P
17	IF-PGM1	EEPROM
18	M-6590-11	Cabinet
19	M-6590-12	Cover
20	M-6590-13	Pan
21	P-057	Nylon Spacer
22	P-6590-01	Window
23	SB-900-1	Fan Assembly

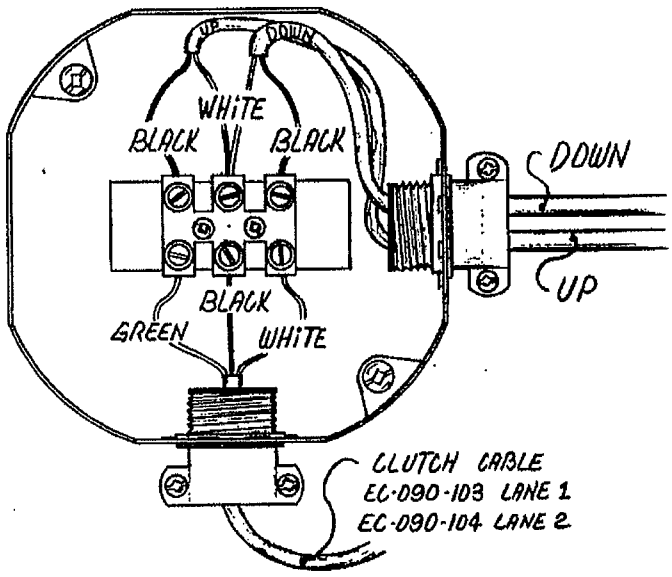


ME-90 Cable Installation Diagram

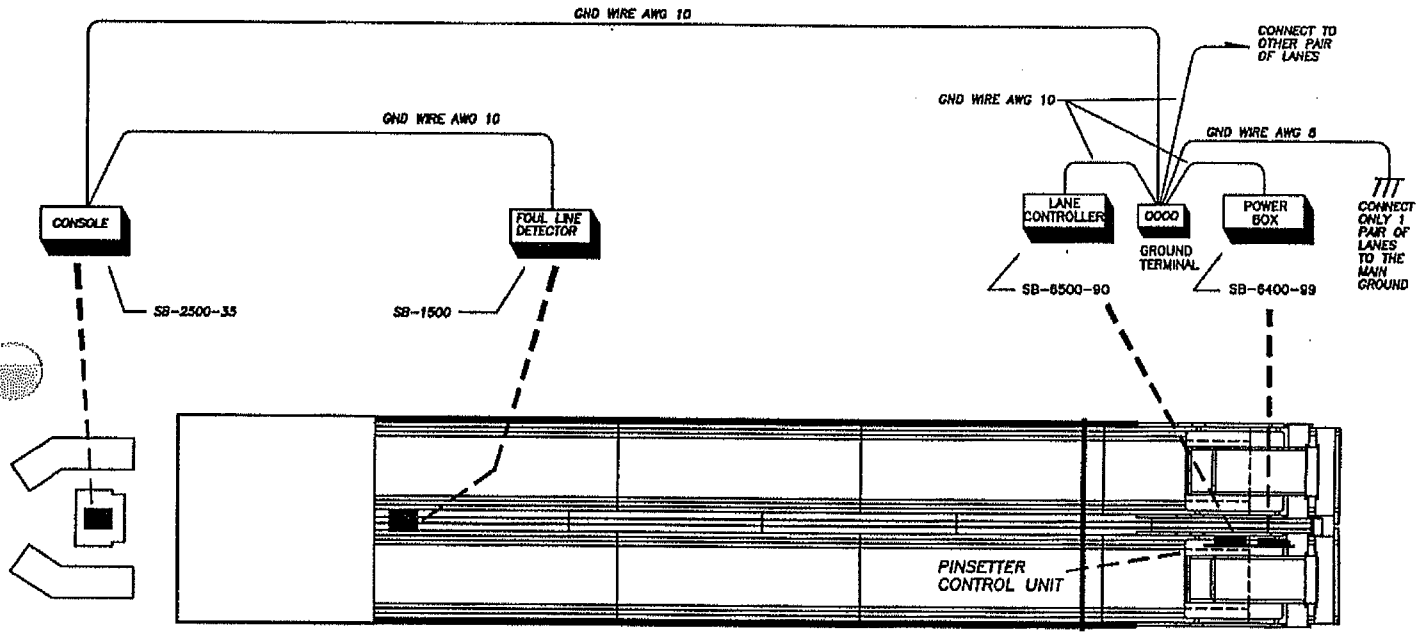


Clutch Junction Box Wiring Diagram





Ground Wiring Diagram



Troubleshooting

Before Making A Service Call

An electronic control is specifically designed to control the two pinsetter's functions. If problems arise, before replacing components the following points must always be verified:

- Check the 115/220 volts power source (main switch on power box is ON);
- Check if the START button is activated;
- Check the fuse or the reset of the transformer on the power box;
- Check if the electronic controller LEDs are on;
- Check if the ball detector LEDs are on;
- Check if all the cables are well connected on the lane controller/pinsetter/electronic control SB-0114-09;
- Check if the motors are properly connected;
- Check if the stop button(s) on the Pin Detector Board are in the "OFF" position.

Drive Mechanism

Problem:	The drawbar does not make it all the way to the back of the pinsetter.
Possible Causes and Solutions:	1. Strings are too tight. Refer to Strings Adjustment in the User's Guide Section of this manual. 2. Torque too low. Refer to Torque Adjustment in the User's Guide of this manual. 3. Foreign matter in the magnetic clutch drive or the UP clutch sprocket (part #9102114) slips. Dismantle the UP clutch sprocket, clean and reassemble (refer to diagram on the opposite page). After reassembly, cycle the pinsetter 3-4 times so as to ensure that the clutch makes good contact with the disk. Adjust the Torque if necessary (refer to Torque Verification and Adjustment in the User's Guide of this manual).

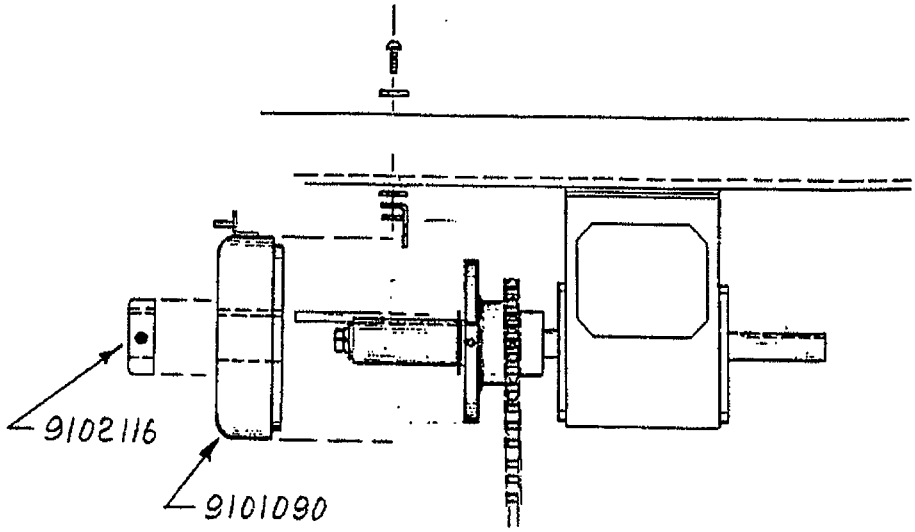
Problem:	The chains emit a loud noise.
Possible Cause and Solution:	Chains need adjusting. Refer to the User's Guide of this manual for Ascending Drawbar Chain Adjustment, Descending Drawbar Chain Adjustment and Drawbar Chain Adjustment.

Problem:	The sweep panel comes back down on its own.
Possible Cause and Solution:	Adjust the drawbar latch assembly (part #9122042). Refer to Plan #9100001-3 in the Parts & Plans section of this manual for its location (index #93).

Dismantling the UP Clutch Sprocket

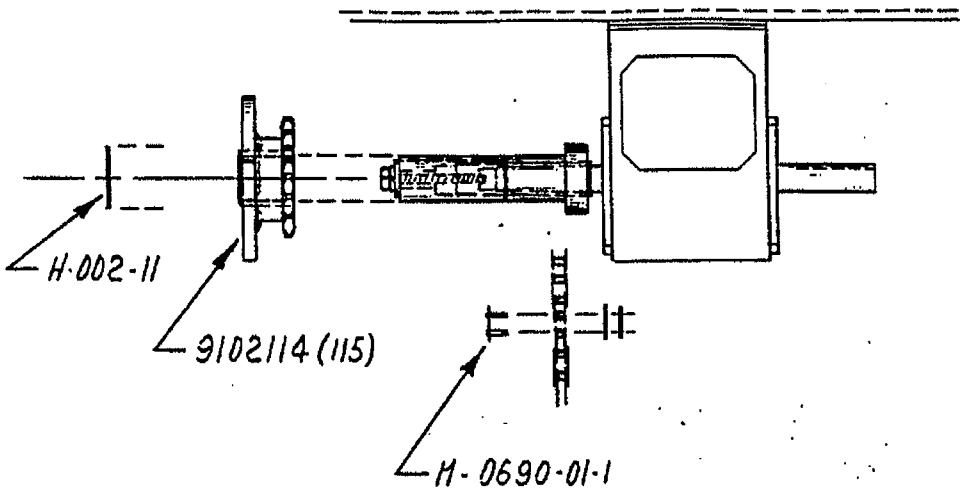
① -DISMANTLE THE COLLAR (9102116)
-DISMANTLE THE MAGNETIC CLUTCH (9101090)

-DÉMONTEZ LE COLLET (9102116)
-DÉMONTEZ L'EMBRAYAGE MAGNÉTIQUE (9101090)



② -DISMANTLE THE RETAINING RING (H-002-11)
-DISMANTLE THE LINK (M-0690-01-1)
-DISMANTLE THE SPROCKET (9102114(115))

-DÉMONTEZ LA BAGUE DE RETENUE (H-002-11)
-DÉMONTEZ LE MAILLON (M-0690-01-1)
-DÉMONTEZ L'ENGRENAGE (9102114(115))



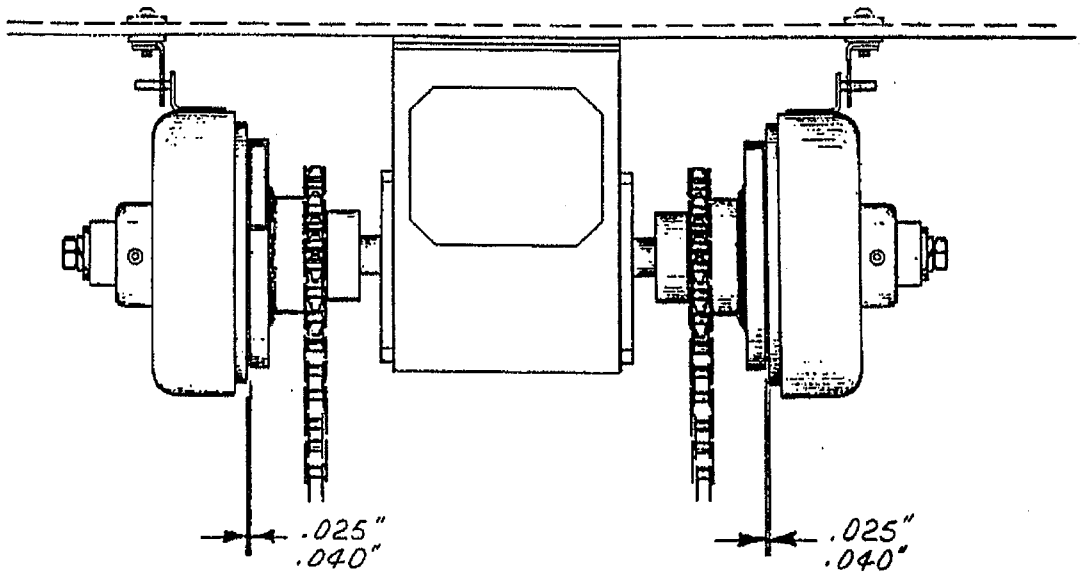
Drive Mechanism (cont.)

Problem:	The drawbar does not move after a ball has been detected and after 7-8 seconds pushes the stoppers in position D1 (DOWN).
Probable Causes and Solutions:	1. The 90-volt Bridge (part #E-214115) 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. 2. Verify that the upward magnetic clutch is working properly. 3. Adjust the magnetic clutch / disk spacing (refer to the diagram on the opposite page).

Problem:	Once the pins are set on the pindeck, the drawbar carriage remains in the middle of the pinsetter.
Probable Causes and Solutions:	1. Verify that the downward magnetic clutch is working properly. 2. Adjust the magnetic clutch / disk spacing (refer to the diagram on the opposite page). 3. Verify the pinsetter's serial number and refer to Torque Adjustment II in the User's Guide section of this manual.

Problem:	There is no reaction from pinsetter after a ball has been rolled down the lane.
Probable Cause and Solution:	Check the ball detector's alignment. The ball detector must indicate a green light at all times, if no green light is visible, adjust the detector according to the procedures indicated in the User's Guide section of this manual.

Adjusting the Clutch Sprocket



LAISSEZ UN ESPACE DE .025" À .040"
LEAVE A SPACE OF .025" TO .040"

Pin Braking System

Problem:	A fallen pin is re-spotted.
Probable Causes and Solutions:	1. The brake solenoid may be defective (part #9101070). Replace the brake solenoid (refer to plan #9122070 in the Parts & Plans Section of this manual). 2. The brake cam spring may be defective (part #9105070). Replace the brake cam spring (refer to plan #9122070 in the Parts & Plans Section of this manual). 3. The string may be misaligned. For correct string alignment, refer to Diagram MEA-90-02 which accompanies the Pin Brakes Adjustment in the User's Guide of this manual. 4. The pin detector optical switch may be disconnected from the Pin Detector Board. Push the connector on the Pin Detector Board to ensure a good contact. 5. Check the pin detection assembly. The pin detector wheel must spin freely when its corresponding pin is hit. Lift the optical assembly with a finger and ensure that the pin detector wheel is free to turn (refer to Plan #9122057 in the Parts & Plans section of this manual or Diagram MEA-90-01 in the User's Guide section.

Problem:	A pin kept up, slowly descends or suddenly falls to the pindeck.
Probable Cause and Solution:	Brake plate needs adjustment. Refer to Pin Brakes Adjustment in the User's Guide Section of this manual.

Problem:	All fallen pins are re-spotted.
Probable Causes and Solutions:	1. The brake solenoids may be disconnected from the Pin Detector Board. Push the connectors on the Pin Detector Board to ensure a good contact. 2. The pinsetter may be in practice mode. Disable the practice mode through the Spot Keyboard (Player's Console if you have automatic scoring).

Pin Setting

Problem:	One or many pins do not descend to their proper location (out of spot).
Probable Cause and Solution:	Strings are too loose. Refer to Strings Adjustment in the User's Guide Section of this manual.

Problem:	When the pins are set on the pindeck, there is no pause causing some or all of the pins to fall over.
Probable Cause and Solution:	Cam needs adjustment. Refer to Plan 9100001-3 in the Parts & Plans Section of this manual. Use the cam adjustment plate (index #16 on plan) to move the cam towards the rear of the pinsetter.

Problem:	When the pins are set on the pindeck, the pause occurs too early causing some or all of the pins to hit the deck with a loud noise.
Probable Cause and Solution:	Cam needs adjustment. Refer to Plan 9100001-3 in the Parts & Plans Section of this manual. Use the cam adjustment plate (index #16 on plan) to move the cam towards the front of the pinsetter.

Problem:	The drawbar continuously moves back and forth.
Probable Causes and Solutions:	1. Strings may be too tight. Refer to Strings Adjustment in the User's Guide Section of this manual. 2. The optical switch may be disconnected. Refer to Plan 9100001-3 in the Parts & Plans Section of this manual. Follow the cable from the optical switch (index #48 on the plan) all the way back to the lane controller, verifying all connections and making sure that the cable has not been cut. 3. The optical switch may be defective or mis-aligned. Refer to Plan 9100001-3 in the Parts & Plans Section of this manual. Make sure that the optical actuator (index #35 on plan) moves completely through the optical switch (index #48 on plan). If it doesn't, adjust the opto support (index #33 on plan) until it does. If it does, replace the optical switch.

Preventive Maintenance

It is understood that machines of any kind require a minimum of maintenance and should operate according to standards.

You are cordially invited to read this simple yet important maintenance program and apply it carefully so as to obtain the best results from your investment.

It is also recommended you instruct your bowling lane superintendent on the functioning of the machines.

The simplicity of the ME-90 Mendes pinsetter being its main characteristic, it is very easy for everyone to understand its concept.

Mechanical Maintenance Schedule

Pin strings

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 string break during normal play. Put very simply, there is no excuse for strings breaking in play other than careless string maintenance.

Refer to the User's Guide section of this manual for proper string verification and adjustment.

Ball lift chains

Check the chains regularly as well as their tensions. For adjustment, refer to Diagram MEA-90-09 in the User's Guide section of this manual.

Vibro insulators and base plate spacer bolts

These are subject to continual violent shock and vibration. They should be checked frequently for tightness. Refer to Plan 9100004 in the Parts & Plans section of this manual for their location.

□	DAILY	WEEKLY	MONTHLY	SEMI-ANNUALLY	YEARLY
1. Check the strings and pin bushings. Change if worn or broken.	X				
2. Adjust the strings.	X				
3. Check the torque (if greater than 300lbs or less than 200 lbs, adjust it).		X			
4. Check and adjust the pin brakes if necessary.		X			
5. Check and adjust the UP movement chains.			X		
6. Check and adjust the DOWN movement chains.			X		
7. Check and adjust the drawbar chains.			X		
8. Check and tighten all loose screws on the pinsetters (especially the set screws) as well as any loose bolts on cushions and ball accelerators or ball lifts.			X		
9. Check the front ball lifts (bolts, pulleys, bearings, etc.)			X		
10. Check and adjust the pin detector pulleys, drawbar pulleys and table pulleys.			X		
11. Check and adjust the pins pause.				X	
12. Check and adjust the ball detectors.				X	

Lubrication Schedule

Proper lubrication is essential to a smooth running trouble free machine and also for preventing its wearing out. It is very important to perform the lubrication according to the following schedule.

	DAILY	WEEKLY	MONTHLY	SEMI-ANNUALLY	YEARLY
1. Check the oil in all reducers and add if required (use 80W-80 oil).			X		
2. Oil all pulleys with very small quantities of oil only if it is judged necessary (don't forget that any excess oil will only drip into undesired places causing headaches for cleaning).			X		
3. Oil all chains with very small quantities of a "3 in 1" or similar proprietary oil.				X	
4. Grease the pillow blocks (bearings).					X

Cleaning Schedule

Machines must be kept free of dirt, dust and excess of oil. A well cared for machine is a clean machine, and will give good service, and trouble free operation.

	DAILY	WEEKLY	MONTHLY	SEMI-ANNUALLY	YEARLY
1. Remove all excess oil and grease from the chains, sides and bottom of pinsetter. Care must be taken to remove all excess oil from the gear and near the friction disk (this disk must never be oiled).		X			
2. Clean all dust deposits which have accumulated on the pin tables and pin stabilizer boards.		X			
3. Clean the ball pits using a vacuum cleaner.		X			
4. Clean the ball detectors and reflectors with a damp cloth.		X			
5. Clean the front and rear ball lifts.			X		
6. Clean the pin detector wheels and the optical sensors (preferably with compressed air).			X		
7. Clean the ball return tracks.					X

MENDES
ME-90
PINSETTER

Index