SECTION 1

Introduction

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1.0 Introduction

1.1 How To Use This Manual

This manual set is provided for use by trained and authorized bowling center mechanics in conjunction with the adjustment and maintenance of AMF 90XL pinspotters containing the Steel Table, the 90XL Chassis, the new-style front end gearmotors, and the AccuCam 3000 Camera. The pinspotter manual does not cover the installation of the pinspotter or associated equipment. Several other manuals are included in this manual set. These manuals may provide instructions for the installation of the associated equipment. Refer to the attachments at the back of the manual for information specific to this equipment.

Refer to the Safety Section of this manual before proceeding with machine maintenance.

1.2 Manual Layout

The 90XL Pinspotter Operation, Service, and Parts Manual is divided into individual sections by the section tabs. Each section contains its own Table of Contents to help the user find a topic within that section. Several sections include subsection tabs for quick reference. The complete Table of Contents of all sections is provided at the beginning of this manual, a Parts Section Table of Contents is located at the beginning of Section 5.0, and a replacement parts index can be found at the end of Section 5.0.

Section Tab	Subsection Tab
Section 1 - Introduction	1.1 How To Use This Manual 1.2 Manual Layout 1.3 AMF Bowling, Inc. 1.4 AMF Bowling's Commitment to Quality
Section 2 - Safety	2.1 General Safety Guidelines 2.2 Safety Procedures & Precautions 2.3 Safety Guards & Labels
Section 3 - Operation	3.1 Pinspotter Mechanical Operation 3.2 Pinspotter Electrical Operation
Section 4 - Service & Maintenance	4.1 Service Tools 4.2 Adjustments 4.3 Lubrication 4.4 Preventive Maintenance 4.5 Troubleshooting
Section 5 - Parts	5.1 Part Numbers & Drawings 5.2 Parts Index

Attachment A - Pinspotter Motor & Gearbox Manual

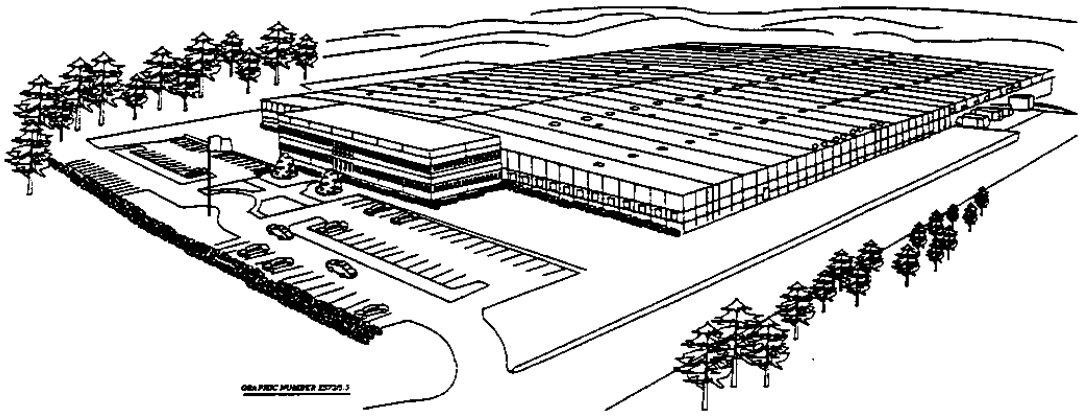
Attachment B - 90XL Chassis Manual

Attachment C - AccuCam 3000 Camera Manual

Attachment D - Manager's Control Unit (MCU) Manual

1.3 AMF Bowling, Inc.

- AMF was founded in New York in 1900 as American Machine and Foundry Company, Inc. AMF's first product was automated machinery for the tobacco industry.
- In 1936, the pinspotter was invented by Fred Schmidt in his garage in Pear River, New York. AMF was intrigued by his invention, hiring him in 1938 and assigning him to perfect his invention. The war delayed production, but in 1946 the pinspotter made its first public debut at the World's Fair. In 1951, the pinspotter went into production and revolutionized tenpin bowling, touching off a boom in the sport.
- In 1946, AMF introduces "pindilator", the first automatic pinspotting machine, at the ABC Tournament in Buffalo, New York, and the first automated pinspotter to be installed and used by bowlers in an ABC Championship in Fort Worth, Texas.
- In 1986, AMF Bowling was acquired from AMF Incorporated by a group of Richmond, Virginia, investors.
- IN 1988, AMF relocated their Corporate Headquarters, engineering offices, R&D lab, and manufacturing facilities to their current location, a new 375,000 square foot, 70 acre facility in Richmond, Virginia.



AMF Bowling, Inc Corporate Headquarters Richmond, Virginia

The company also has manufacturing facilities in Lowville, New York, which manufactures bowling pins and lanes; and in Bland, Missouri, which manufactures billiards tables under the Renaissance, Highland, and PlayMaster brand names. Additionally, AMF owns the Michael Jordan Golf Company, whose Michael Jordan Golf Centers provide the most complete facilities in the nation for learning, practicing, and enjoying the game of golf.

AMF is the largest owner and operator of bowling centers in the world. On September 30, 2000, AMF owned and operated 527 bowling centers throughout the world, with 408 centers in the United States and 119 centers in 9 other countries. AMF is also a world leader in the manufacture and sale of bowling products, with a global market presence more than 50 countries.

1.4 AMF's Commitment to Quality

When you make a commitment to AMF, AMF makes a commitment to you. A commitment to see that you get the best. The best equipment, the best engineering, the best technology, and the best customer service and technical support in the industry. By having all of these disciplines under one roof, AMF is uniquely positioned to provide the finest in products and services to the bowling industry.

AMF's commitment to their customers doesn't stop after the sale. AMF strives to provide their customers with pinspotters that, with proper maintenance, will provide you with years of trouble-free operation. In the event that help is needed, AMF is ready to serve you. For customer service or technical support from within the United States call **1-800-DIAL AMF (1-800-342-5263)**, or from outside of the U.S. call **1-804-730-4000**.

SECTION 2

Safety

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2.1 GENERAL SAFETY GUIDELINES AND SYMBOLS

AMF feels strongly about its commitment to safety. Proper service and repair are important to the safety of the mechanic as well as the safe, reliable operation of the pinspotters.

Please read, understand, and follow all of the recommended safety procedures presented in this manual.

The service procedures recommended and described in this technical manual are effective methods of performing service and repair. Some of these procedures require the use of tools specially designed for this purpose.

- **Properly trained personnel should be present whenever maintenance is being performed on a pinspotter.**
- **No unauthorized personnel should be allowed in the pit area.**
- **Keep in mind that the 90XL pinspotter performs a series of mechanical motions and electrical actions during each cycle, and that bodily injury could result should personnel enter the machine when power is on. When working in a pinspotter, it is recommended that power also be turned off on adjacent machines.**
- **Remember that safety must remain your first priority at all times.**
- **Safety goggles, ear protection, and steel-toed shoes are recommended whenever any work is being performed on a pinspotter.**
- **Wearing loose clothing or jewelry is <u>NOT RECOMMENDED</u> when operating or maintaining the machinery.**

It is important to note that this manual contains various symbols

that indicate information that must be carefully observed in order to reduce the risk of personal injury during service or repair, or that warn of the possibility that improper service or repair may damage the pinspotter or render it unsafe.

The

symbol indicates a life-threatening possibility or the risk of significant personal injury.

The

symbol indicates that damage to the machine or personal injury may occur.

The

symbol represents the possibility that improper service or repair may damage the pinspotter.

It is also important to understand that the use of these symbols is not all-inclusive because it is impossible to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

2.2 SAFETY PROCEDURES AND PRECAUTIONS

1. **DISCONNECT THE POWER PLUG** before working on any pinspotter equipment and before entering an operating portion of a pinspotter (Figure 2-1).
2. Be sure all safety guards are securely in place before operating a pinspotter.
3. Wait a minimum of 60 seconds after disconnecting the power plug before opening the chassis or contacting any electrically charged pinspotter components.
4. NEVER alter pinspotter safety mechanisms or wiring.

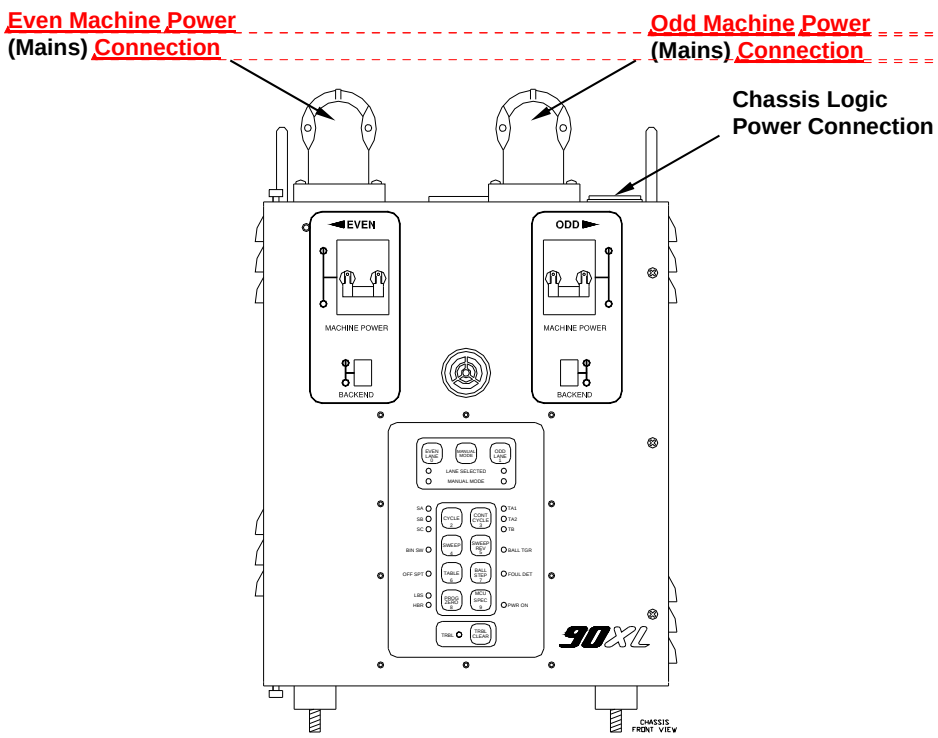

Figure 2-1

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2.3 SAFETY GUARDS AND LABELS

2.3.1 SAFETY GUARDS

All safety guards must be in place before operating the machine. When maintenance is required, the following steps must be followed:

1. Disconnect the power plug before working on the pinspotter.
2. Remove guards only as required to perform the maintenance.
3. Once maintenance is complete, replace all guards.
4. Reconnect the power plug.

There are seven different types of safety guards on a pair of AMF Pinspotters (refer to Figure 2-2):

- Front End Box Cover Guard
- End Machine Guard Assembly
- Center Guard (LBS or PBS)
- Pinspotter Wheel Guard
- Ball Lift Guard Weldment
- Rear Ball Lift Guard
- Hand Rail

2.3.2 SAFETY LABELS

A pair of AMF Pinspotters displays eight

labels.

Each pair of pinspotters displays one

label on the rear ball lift guard.

Each end machine displays two

labels located on the machine end guard: one on the inside and one on the outside.

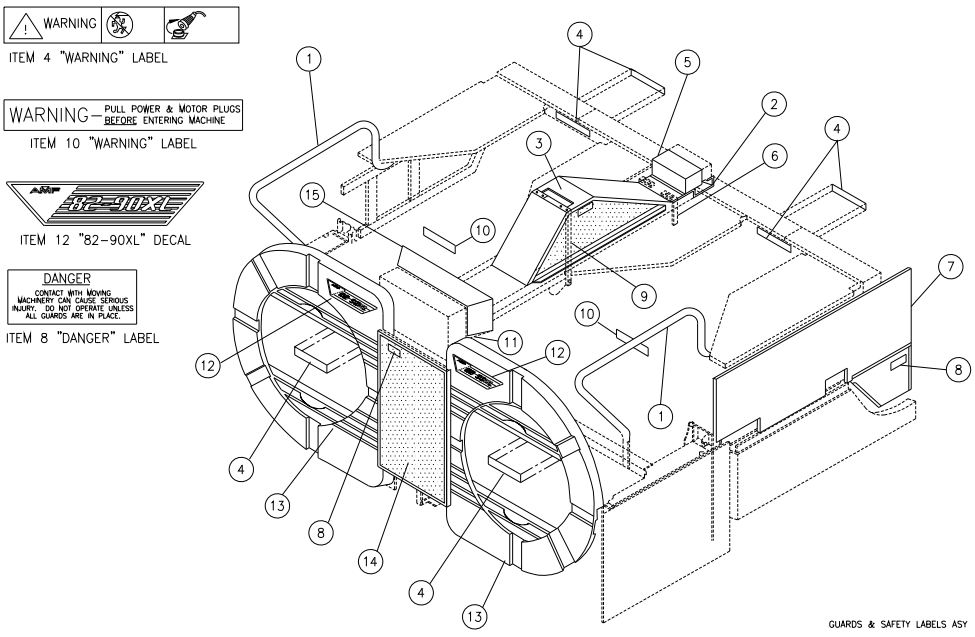

Figure 2-2

ITEM	QTY	PART #	DESCRIPTION
1	2	090-005-118	HANDRAIL
2	1	090-004-709	FRONT END COVER GUARD
3	1	070-011-401	BALL LIFT GUARD WELDMENT
4	6	090-004-028	WARNING LABEL
5	1	090-004-708	FRONT END BOX COVER
6	4	070-004-691	REAR GUARD BRACKET
7	2	070-005-585	END MACHINE GUARD ASSEMBLY
8	3	070-011-211	DANGER DECAL
9	2	070-010-238	FRONT GUARD ASSEMBLY BRACKET
10	2	090-005-642	WARNING DECAL (ON YOKE)
11	1	090-004-706	CHASSIS MOUNTING BRACKET
12	2	090-008-895	82-90XL WHEEL GUARD DECAL
13	2	090-007-145	PINSPOTTER WHEEL GUARD
14	1	090-004-420	BALL LIFT GUARD, REAR
15	1	090-004-707	CHASSIS COVER

SECTION 3

Basic Pinspotter Operation

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3.1 PINSPOTTER MECHANICAL OPERATION

3.1.1 FOUR BASIC PINSPOTTER FUNCTIONS

The 90XL Pinspotter has four basic functions:

1. Stops balls
2. Returns balls
3. Sets pins
4. Resets pins

3.1.2 EIGHT BASIC PINSPOTTER COMPONENTS

1. Cushion

The cushion stops the ball and deflects it into the pit area.

2. Sweep

The sweep removes fallen pins from the pin deck and adjacent gutters. It also is a guard preventing balls from striking the table while spotting or respotting pins (Figure 3-1).

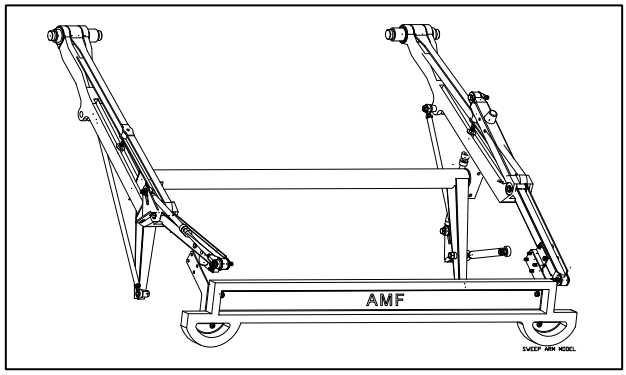


Figure 3-1, Sweep

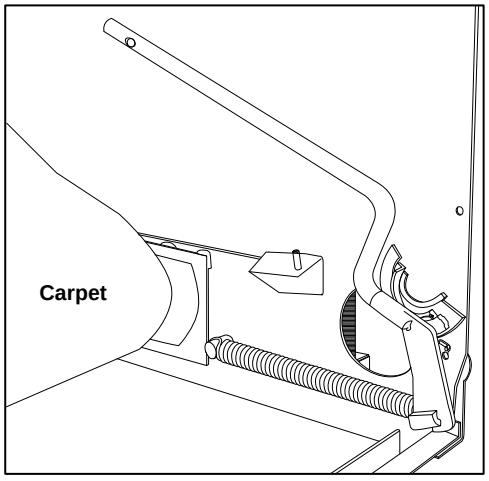


Figure 3-2, Carpet

3. Carpet

The carpet (Figure 3-2) is a belt that carries fallen pins to the pin elevator wheel, where they are carried up to the distributor. The underlying bounce board provides support for the pins and guides the ball to the opening to the ball return.

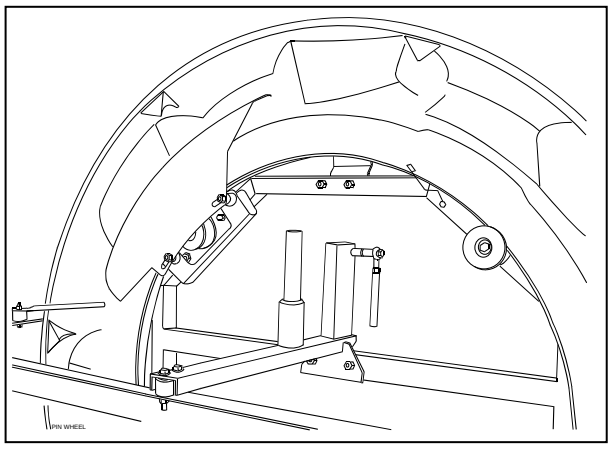


Figure 3-3, Pin Elevator Wheel

4. Pin Elevator Wheel

The pin elevator wheel carries the pins from the pit area and delivers them to the distributor. (Figure 3-3)

5. Distributor

The distributor (Figure 3-4) delivers the pins from the pin elevator to the bin assembly. The distributor runs continuously and is driven by the back-end motor.

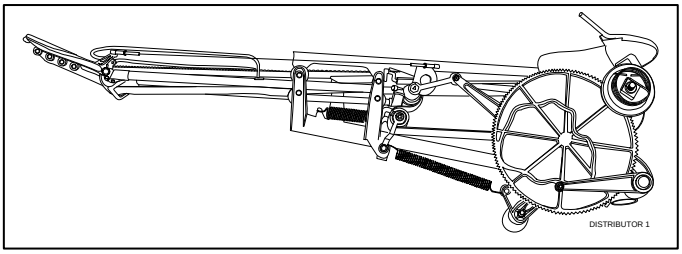


Figure 3-4, Distributor

6. Ball Lift

The ball lift (Figure 3-5) lifts the ball high enough to permit gravity to return the ball to the bowler. The ball lift is mounted in the middle of a pair of pinspotters.

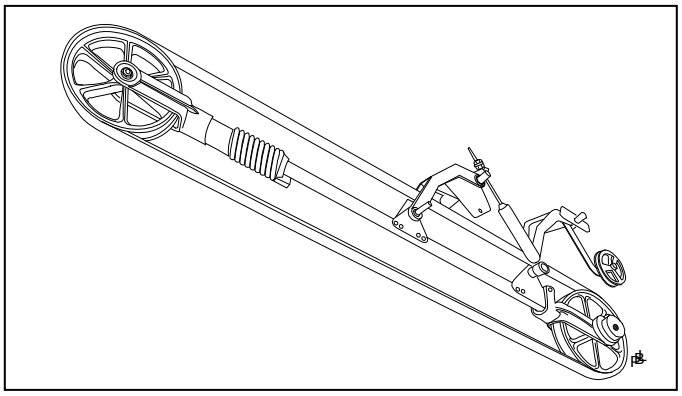


Figure 3-5, Ball Lift

7. Bin and Shuttle Assembly

The bin (Figure 3-6) stores pins received from the distributor until ready for spotting. The shuttle drops pins into the spotting cups. Two sets of pins can be stored in the bin assembly until required.

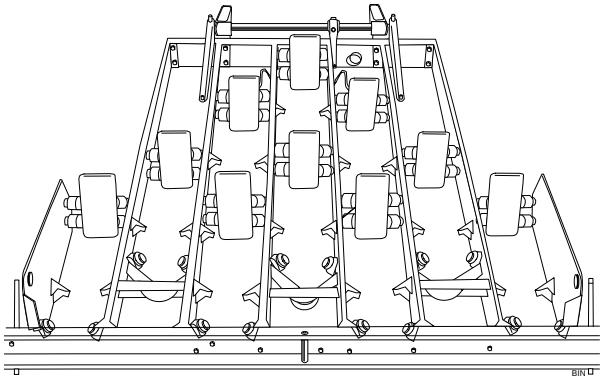


Figure 3-6, Bin Assembly

8. Table

The table performs its spotting and respotting functions by employing two major subassemblies:

The **yoke assembly** supports the ten spotting cups (Figure 3-7).

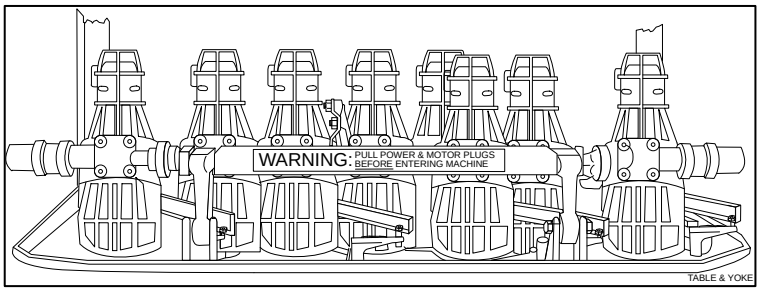


Figure 3-7, Yoke and Spotting Cups

The **table assembly** houses the ten respot cell assemblies (Figures 3-8a & 3-8b).

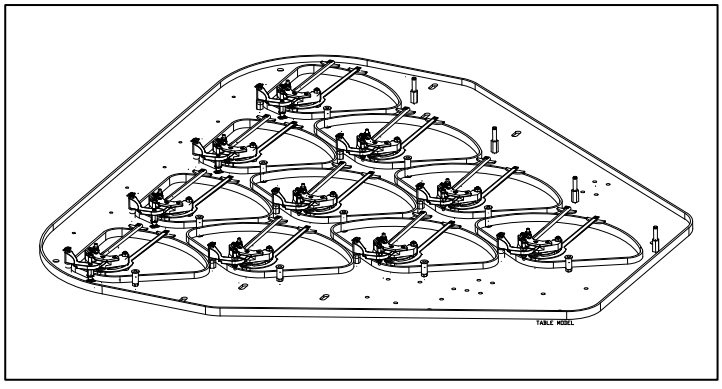


Figure 3-8a, Table

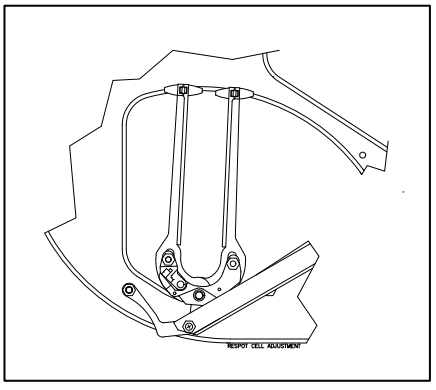


Figure 3-8b, Respot Cell

3.1.3 FIVE BASIC PINSPOTTER CYCLES

The 90XL Pinspotter employs five basic cycles:

1. First Ball Cycle
2. Second Ball Cycle
3. Strike Cycle
4. First Ball Foul Cycle
5. Second Ball Foul Cycle

1. FIRST BALL CYCLE

- The machine is ready for the first ball with first ball light on.
- After the bowler rolls the ball, the photoeye ball trigger detects the ball passing, signals the chassis, and starts the machine cycle.
- The sweep runs to its down or 1st guard position. It remains here until called upon to sweep the pins into the pit.
- A time delay begins, and at its conclusion the camera detects the pins that remain standing, relays this information to the chassis, and then the table starts its first descent.
- Standing pins are mechanically gripped and raised to a height sufficient for the sweep to pass under them and clear the lane of fallen pins.
- The sweep begins its run-through, pushes fallen pins into the pit, and returns to the guard position where it stops.
- The table respots the pins, and the table and sweep return to the home position.
- The second ball light comes on.

2. SECOND BALL CYCLE

- When the second ball is rolled, the photoeye ball trigger senses the ball and starts the machine cycle.
- The sweep drops to the 1st guard position. It remains here until called upon to sweep the pins into the pit.
- A time delay begins, and at its conclusion the camera detects the pins that remain standing and relays this information to the chassis.

- The sweep then performs it sweeping operation and returns to the guard position.
- At this time, the table receives its spotting signal and the spotting cups swing downward to set up a complete set of pins.
- The table and sweep return to the home position.
- The second ball light goes off, and first ball light stays on.

3. STRIKE CYCLE

- In the strike cycle, the machine components are in the same condition as for the first ball.
- The ball is rolled and the photoeye ball trigger senses the ball and starts the machine cycle.
- The sweep drops to the 1st guard position and the time delay starts as in the first ball cycle.
- At the end of the time delay, the camera attempts to detect any pins that remain standing. Since there are none, it feed this information to the chassis which interprets this as a strike.
- The first ball light goes off and the strike light comes on.
- The sweep clears all of the fallen pins from the lane.
- The mask flashes the strike lights, the table begins a spotting operation, descends, and the cups swing down and deposit a full set of pins.
- The table and sweep return to the home position, and the first ball light comes on.

4. FIRST BALL FOUL CYCLE

- When the ball is rolled and the bowler commits a foul, the foul detector unit operates and prepares the machine for a foul cycle.
- The foul detector unit energizes the foul light on the mask and rings a bell or buzzer.
- The ball passes the photoeye ball trigger which senses the ball and starts the machine cycle.
- The sweep drops to the 1st guard position and then completes its sweeping operation of the pin deck.

- The table, when full of pins, begins its spotting operation. The table cups swing down and deposit a full set of pins.
- The table and sweep return to the home position. A score of zero pins has been registered.
- The machine is ready for a second ball with the second ball light on.

5. SECOND BALL FOUL CYCLE

- Should the bowler commit a foul when delivering the second ball, the machine performs a second ball operation without a scoring time delay.
- The foul detector unit operates the foul light and bell or buzzer.
- A score of zero pins is registered for the second ball.

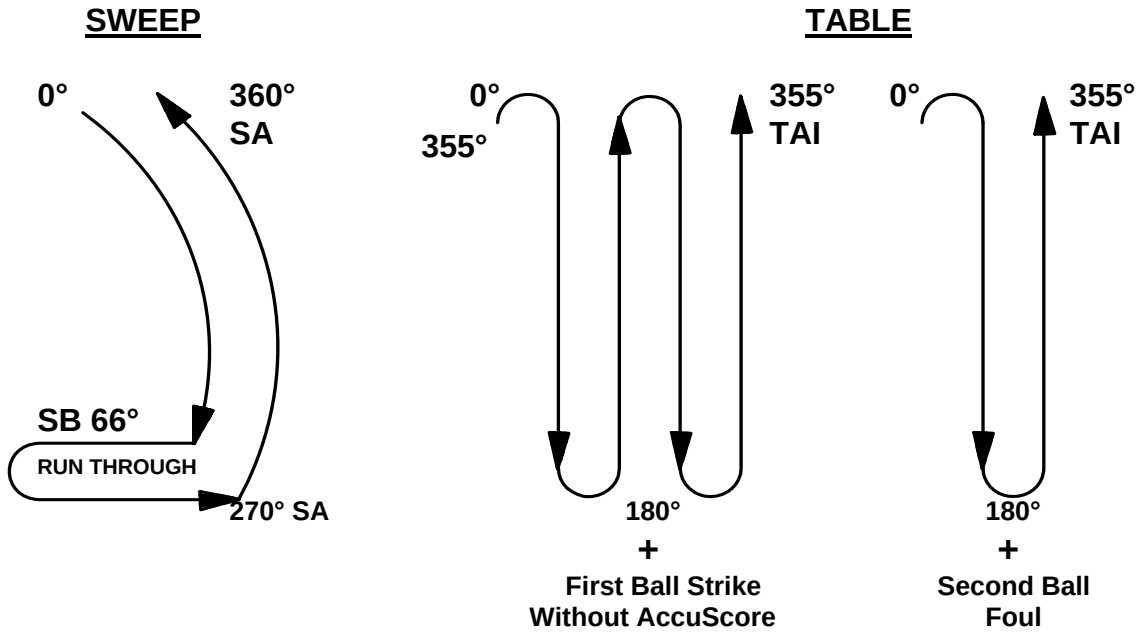


Figure 3-9

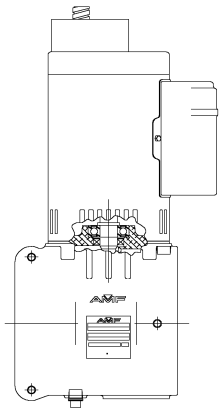
3.2 PINSPOTTER ELECTRICAL OPERATION

3.2.1. MOTORS

The machine employs three capacitor-start induction motors. All three motors are fractional horsepower units. These motors can be configured to operate on either 120VAC or 240VAC and are available in 50 Hz or 60 Hz, to match the electrical power in your area. All motors have gear reducer units attached.

Two of the three motors (Figure 3-10) are mounted on the front end and operate the table and sweep. These motors operate intermittently as required. **Table and sweep motors are interchangeable.**

The third motor is mounted on the back end and supplies power to drive the pin elevator wheel, the carpet, the ball lift, and the distributor. This motor runs continuously.



DRAWING 3-10

3.2.2 SWITCHES

Sweep Cam Switches

The sweep is controlled by three cams and switches (Figure 3-11). They are:

1. The SA cam and switch determine the second guard and home positions of the sweep.

2. The SB cam and switch determine the first guard position of the sweep.

3. The SC cam and switch provide one half of the table and sweep interlock for the interference zone of the sweep and table.

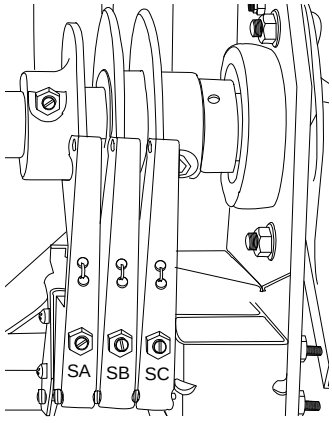


Figure 3-11

These switches turn the sweep motor on and off. The motor stays on or off until the SA, SB, or SC cam moves to a peak or valley, actuating the switch and turning the motor on or off.

Table Cam Switches

The table is also controlled by cams and switches (Figure 3-12). They are:

1. The TA1 cam and switch determines the home position of the table.
2. The TA2 cam and switch initiates a sweep run-through.
3. The TB cam and switch determines the interference zone of the table with the sweep.

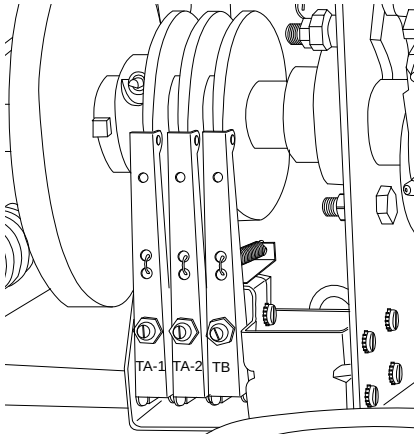


Figure 3-12

These switches turn the table motor on and off. The motor stays on or off until the TA1, TA2, or TB cam moves to a peak or valley, actuating the switch and turning the motor on or off.

The Off Spot Switch

The off spot switch is an electro-mechanical switch that actuates when the table contacts a pin that is standing but has moved off its spot beyond the normal respot range of the table. Its purpose is to prevent damaging the machine if an off-spot condition occurs.

The Ball Trigger (or Ball Detector)

The ball detector is a photoelectric switch that actuates when it detects the ball passing. Its purpose is to signal the chassis to initiate the machine cycle. See Section 3.2.8 for information on the Ball Detector.

The Bin Switch (BS)

The bin switch is an electromechanical switch that actuates when the #9 pin (the last pin delivered by the distributor) is deposited in the bin. Its purpose is to allow the machine to spot pins only when the bin is full.

3.2.3 PROTECTION DEVICES

In addition to the circuit breakers on the power supply panels and chassis, as well as the fuses contained in the chassis (see Chassis Manual), the back end motor and the table and sweep motors are protected by thermal overload devices. These devices, identified by a red reset button, are located on each motor and are sometimes referred to as a "Klixon". They shutdown the motor when it exceeds a predetermined temperature caused by an overload or an electrical fault.

3.2.4 MACHINE PIT TIME DELAY

When the "OFF" button is pushed on the Manager's Control Unit (MCU), Advantage Front Desk, and BOSS Front Desk, all functions and motors, **except the pinspotter back end motor**, become inoperative. A time delay allows the back end motor to continue operate for approximately 60 seconds to enable all of the pins in the pit to be delivered to the bin and for the bowler's ball to be returned to the ball rack. (The machine pit time delay is built into the chassis).

3.2.5 FRAME COUNTERS

A frame count is provided for the manager's convenience so that the number of frames bowled can be determined. This count is kept in the Chassis (total) and Manager's Control Unit (MCU). This unit is located at the manger's control desk.

3.2.6 BOWLER'S PIT SIGNAL SYSTEM (Optional)

A low voltage signal system is provided for the center's convenience so that the bowler has a method of notifying the maintenance man that a machine needs attention. This system is both audible and visual through the use of a bell and lamp arrangement.

The bowler's push button, also known as the mechanic call button, is located on the ball return. The control box is mounted between the machines near the pin elevator. This box contains one low voltage control relay to momentarily operate an audible signal and to turn on the signal light. The light remains on until turned off by the mechanic.

3.2.7 TENTH FRAME BUTTON

The tenth frame button, located on end of the ball return, is provided as a means of cycling the machine when required. Whenever pins are left standing after a game has been completed, the tenth frame button can be operated to signal the machine to set up for the next bowler.

NOTE: Please refer to the Options and Profile Ball Return Manuals (P/N 612-860-032 & 612-860-010) for more Information on functions of the mechanic call and tenth frame buttons.

3.2.8 BALL DETECTOR

3.2.8.1 Ball Detector Location

The ball detector head and the reflector assemblies must be properly aligned in order to function correctly. It is also very important that the detector's location on each lane pair be identical so that crosstalk between adjacent lanes is not encountered. Crosstalk refers to the light from one detector head shining directly into another detector head because the reflectors between them do not block the line of sight properly.

Detector Head

The detector head should be mounted on the center of the ball return capping in front of the pin deck. Slotted mounting holes are provided for fine-tuning the alignment. The system is designed to accommodate mounting locations ranging from approximately 60 inches to 120 inches from the rear of the pin deck (tail plank). The two modes of operation should be considered before placement of the detector heads.

MODE 1

This mode is used when the path of the sweep interrupts the optical beam between the detector head and the reflector during a machine cycle. The system is designed to allow mounting locations forward of the head pin, but where the sweep breaks the beam.

MODE 2

This mode is used when the path of the sweep does NOT interrupt the optical beam between the detector head and the reflector during a machine cycle.

Reflectors

The reflectors should be mounted on the opposite, smaller capping at exactly the same distance from the rear of the pin deck as the detector head (see Figures 3-13 and 3-14).

LEDs

Inside each detector there are two light emitting diodes, one for with each detector head, that signal when detector alignment is correct. If the LEDs are on constantly, the detector is NOT in alignment. Correct alignment is indicated when each LED blinks from 4 to 10 times per second.

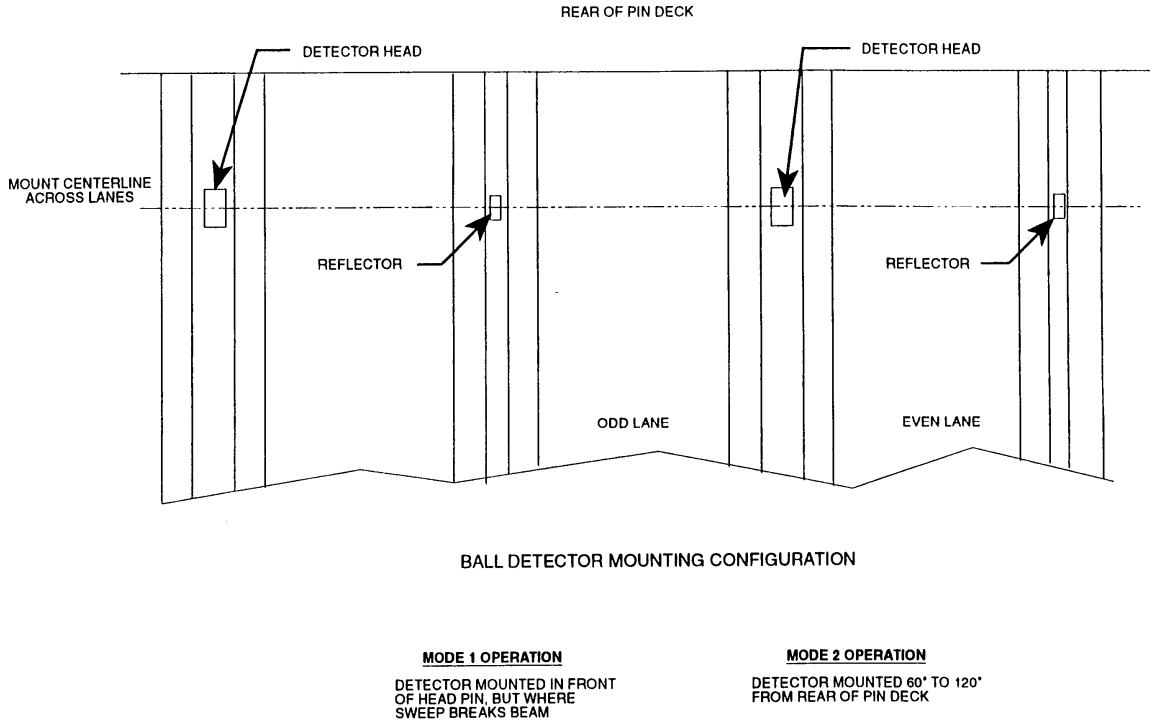


Figure 3-13

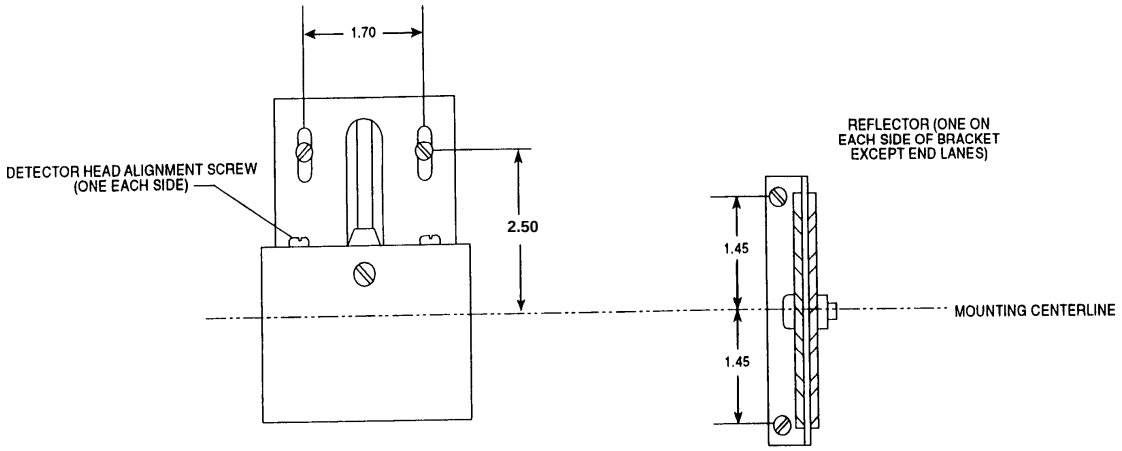


Figure 3-14

3.2.8.2 Ball Detector Operation

The ball detector is designed to detect and signal the passage of a bowling ball. The detector head contains two optics systems, one monitoring the odd lane and one monitoring the even lane. The unit interfaces with the chassis via the front end box. It also provides ball speed information to the scoring system.

Detector Switches

The detector circuit board contains a group of four control switches that are common to both optical systems. Switch order from left to right with the foul line at your back is 4, 3, 2, 1. Only switches 1 through 3 provide mode selection and delay-time adjustment (see Table 3-1 for information on switch setting). The time delay provides a waiting period between the time a ball is detected and the time the detector sends a signal to the chassis to cycle the machine allowing the ball to clear the pin deck. There are eight delay settings (0 through 7) with 0 being no time delay, or Mode 1. Mode 2 provides proportional time delays ranging from a minimum of 1/4 second to a maximum of 3 seconds. The nominal setting is setting #4.

The detector is designed to measure the duration of the beam's interruption, and to delay the signal for a time that is proportional to the duration of the interruption. In other words, the faster the ball is rolled, the shorter the time delay within the maximum and minimum time delays discussed above.

For example, for every switch setting the minimum time delay is 1/4 second, and the maximum time delay is 3 seconds. Depending on the speed of the ball, a slowly rolled ball may result in a time delay of as much as 3 seconds, while a rapidly rolled ball may result in a delay of as little as 1/4 second. For any specific ball speed between 1 and 30 mph, the lower the Mode 2 setting, the shorter the delay. Increasing the setting increases the time delay for that specific ball speed.

TABLE 3-1, Ball Detector Settings

SETTING	SWITCH POSITIONS			COMMENTS
	SWITCH 3	SWITCH 2	SWITCH 1	
7	OFF	OFF	OFF	MAXIMUM DELAY
6	OFF	OFF	ON	
5	OFF	ON	OFF	
4	OFF	ON	ON	
3	ON	OFF	OFF	
2	ON	OFF	ON	
1	ON	ON	OFF	MINIMUM DELAY
0	ON	ON	ON	MODE 1

NOTE: Switch settings 1 through 7 are all MODE 2.

3.2.8.3 Ball Detector System Test

WARNING

MAKE CERTAIN THAT ALL PERSONNEL, TOOLS, AND EQUIPMENT ARE CLEAR OF THE MACHINE BEFORE RESTORING POWER!

1. Turn the chassis power ON.

2. Verify that the optical path of the ball detector is not blocked.

3. Remove the cover of the ball detector head to access the switches.

4. **For Mode 1 operation**:

   a. Set switches 1, 2, & 3 to the ON position to select Mode 1(down is ON and up is OFF).

   b. Momentarily break the beam. This should cause the machine to cycle with less than a 1/4-second delay. Verify this for both lanes.

      The chassis will not accept a detection signal until 1/4 second after the sweep has left the 2nd guard position. If the sweep breaks the ball detector beam as it starts up, the detector senses it as if it was a ball and sends a detection signal to the chassis without any delay (in Mode 1). Since the chassis receives this signal within the .25-second time period discussed above, it ignores the signal and does not cycle the machine. Without this feature, the sweep could cause a continuous cycling of the machine.

   c. Skip to Step 7.

5. **For Mode 2 operation**:

   a. Set switches 1, 2, & 3 to setting #4 (see Table 3-1).

   b. Rapidly pass a screwdriver handle or other small tool across the face of the detector causing a short duration of interruption. This should initiate a machine cycle very quickly.

   c. Again break the optical path, this time with your hand so that the blockage lasts approximately 1 second. This should cause the machine to cycle approximately 3 seconds after the blockage is removed.

   d. Next, block the optical path for more than 2 seconds. This should NOT cause the machine to cycle at all.

e. Repeat Steps b. through d. for the other lane.

6. If the machine cycle operation delay appears too fast or too slow for any machine, the three small switches on the detector head can be adjusted to provide the desired time delay.

7. After the switches have been set, reinstall the cover.

3.2.8.4 Ball Detector Maintenance & Cleaning Recommendations

The system is designed to operate properly with a significant amount of dust and dirt accumulation on the optics. Periodic cleaning of the reflector surfaces and detector head cover will help ensure proper operation.

NOTE: It is recommended that the units be covered during any lane maintenance that generates large amounts of dust and dirt.

1. Use a clean, soft cloth to gently wipe the face of the reflectors on the reflector units and the cover of the detector head.

2. If gentle wiping does not remove the dirt, it may be due to grease or oil accumulation. A mild soap (such as dishwashing liquid soap) and water solution may be used. First wash and then gently wipe dry.

DO NOT USE ABRASIVE CLEANERS OR STRONG SOLVENTS AS THEY MAY PERMANENTLY DAMAGE THE SURFACES.

3.3 CHASSIS

For information pertaining to the operation of the pinspotter chassis, refer to Attachment A, *90XL Pinspotter Control Chassis Manual*, P/N 400-090-005.

3.4 MOTORS & GEARBOXES

For information pertaining to the front end and back end gear-motor assemblies, refer to Attachment B, *Pinspotter Motor and Gearbox Manual*, P/N 400-090-002.

3.5 SCORING CAMERA

For information pertaining to the scoring camera, refer to Attachment C, *AccuCam 3000 Camera Manual*, P/N 400-286-002.

3.6 MANAGER'S CONTROL UNIT

For information pertaining to the Manager's Control Unit (MCU), refer to Attachment D, *Manager's Control Unit Operations and Maintenance Manual*, P/N 610-005-700.

SECTION 4.1

Service Tools

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4.1 SERVICE TOOLS

4.1.1 SERVICE TOOL KITS

There are several tool kits available for servicing the 90XL pinspotter: the Standard Tool Kit, P/N 784-528-052, and the Deluxe Tool Kit, P/N 784-528-013, and the Steel Table Special Tool Kit P/N 784-528-011. Figure 4-1a shows the tools that are included in the Deluxe Tool Kit and Figure 4-1b shows the tools that are included in the Steel Table Special Tool Kit. The corresponding parts lists follow the drawings.

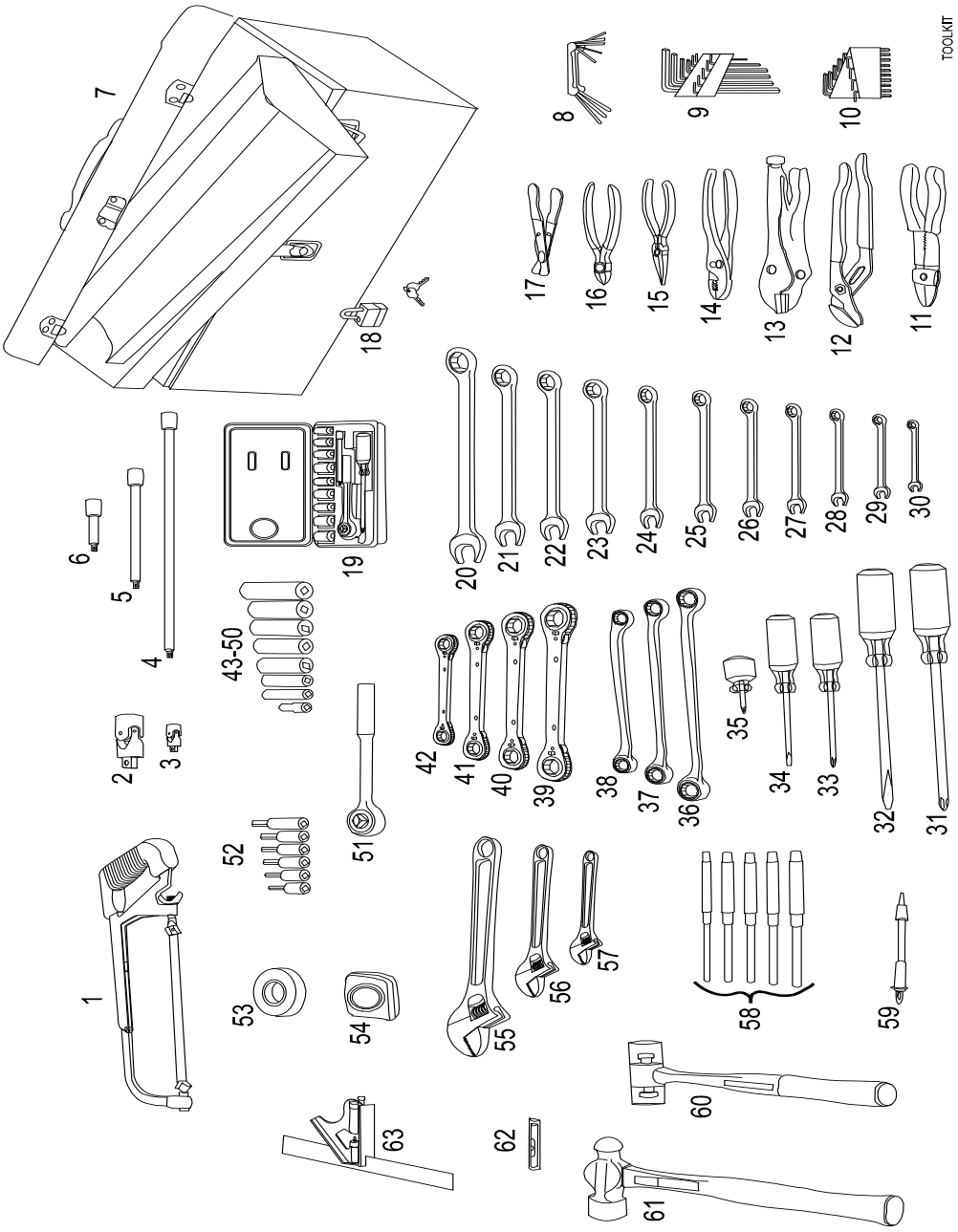

Figure 4-1a, Deluxe Tool Kit - P/N 784-528-013

Table 4-1a, Deluxe Tool Kit Parts List

ITEM	PART#	DESCRIPTION	ITEM	PART#	DESCRIPTION
1	788-504-004	12" Hacksaw	34	789-006-008	4” Flat Blade Screwdriver
2	789-512-029	Universal 3/8" Drive	35	789-001-001	2” #2 Phillips Screwdriver
3	789-512-028	Universal 1/4" Drive	36	793-507-030	11/16 X 3/4" Offset Box Wrench
4	782-501-001	12" Extension 3/8" Drive	37	793-507-029	9/16" X 5/8" Offset Box Wrench
5	789-502-004	6" Extension 3/8" Drive	38	793-507-028	7/16" X 1/2" Offset Box Wrench
6	789-502-003	3" Extension 3/8" Drive	39	793-510-044	3/4" X 7/8" Ratching Box Wrench
7	792-005-005	Tool Box	40	793-510-043	5/8" X 11/16" Ratching Box
8	793-503-017	Hex Key Set	41	793-510-042	1/2" X 9/16" Ratching Box
9	789-024-034	Metric Hex Key Set	42	793-510-041	3/8" X 7/16" Ratching Box
10	793-503-051	Hex Key Set (14 Pieces)	43	789-510-055	10mm Socket, 3/8" Drive
11	792-512-019	Crimping Tool	44	789-509-030	1/2" Deep Socket, 3/8" Dr
12	786-501-001	10" Channelock® Pliers	45	789-509-023	13/16" Deep Socket, 3/8" Dr
13	793-514-048	10" Vise Grip® Pliers	46	789-509-022	3/4" Deep Socket, 3/8" Dr
14	786-503-003	6" Slip Joint Pliers	47	789-509-021	11/16" Deep Socket, 3/8" Dr
15	786-502-002	6" Needle Nose Pliers	48	789-509-020	5/8" Deep Socket, 3/8" Dr
16	786-504-004	6" Diagonal Cutters	49	789-509-019	9/16" Deep Socket, 3/8" Dr
17	792-029-031	Wire Strippers	50	789-509-018	7/16" Deep Socket, 3/8" Dr
18	714-501-001	Padlock	51	789-505-008	3/8" Drive Rachet
19	789-511-027	1/4" Drive Socket Set (13 Pieces)	52	780-503-014	3/8" Drive Hex Bit Set (6 Pieces)
20	793-506-050	3/4" Combination Wrench	53	724-001-011	Electrical Tape 3/4" X 66'
21	793-506-027	11/16" Combination Wrench	54	792-026-028	1/2" X 8' Steel Tape Measure
22	793-506-026	5/8" Combination Wrench	55	793-501-003	10" Adjustable Wrench
23	793-506-025	9/16" Combination Wrench	56	793-501-002	8" Adjustable Wrench
24	793-506-024	1/2" Combination Wrench	57	793-501-001	6" Adjustable Wrench
25	793-506-023	7/16" Combination Wrench	58	787-001-006	Punch Set (6 Pieces)
26	793-506-022	3/8" Combination Wrench	59	791-004-004	Testlight - 80V - 600V
27	793-506-021	5/16" Combination Wrench	60	783-502-002	Mallet - 16 oz. Plastic
28	793-505-020	15/16" Combination Wrench	61	783-501-001	Hammer - 16 oz. Ball Peen
29	793-505-019	13/16" Combination Wrench	62	792-016-018	Line Level
30	789-510-056	10mm Combination Wrench	63	792-020-044	12" Combination Square
31	789-001-003	8" #4 Phillips Screwdriver			
32	789-006-009	8" Flat Blade Screwdriver			
33	789-001-002	4" # 2 Phillips Screwdriver			

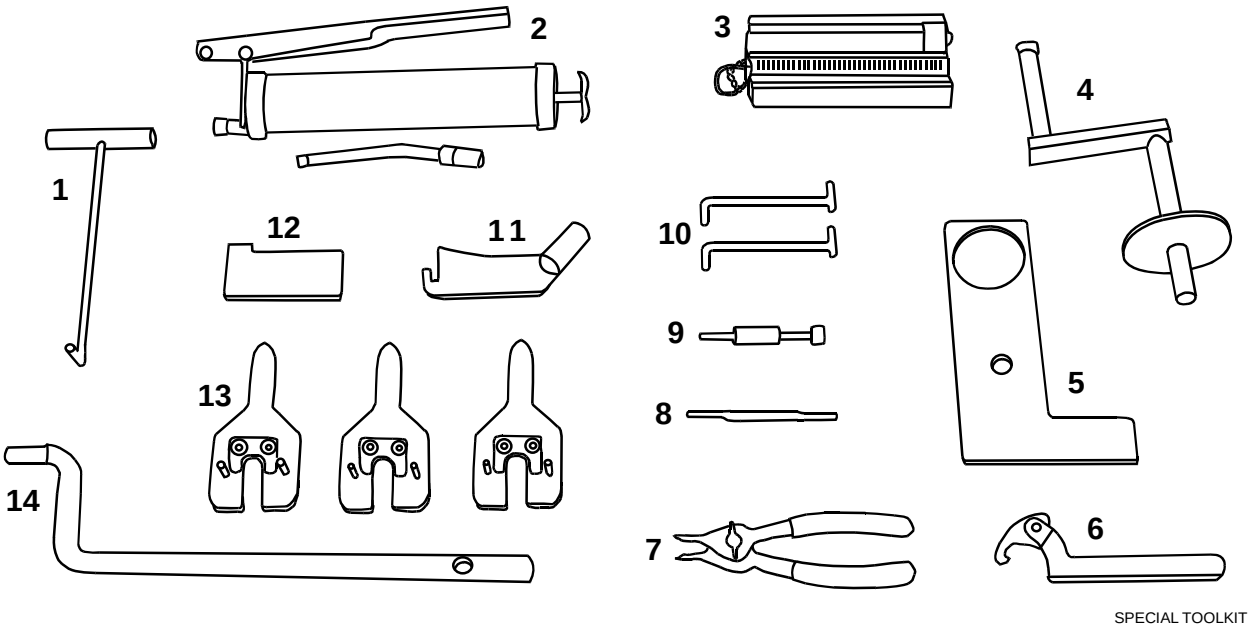

Figure 4-1b, Steel Table Special Tool Kit - P/N 784-528-011

Table 4-1b, Steel Table Special Tool Kit Parts List

ITEM	QTY	PART#	DESCRIPTION
1	1	792-505-005	Spring Puller
2	1	785-005-005	Grease Gun w/Extension
3	1	030-003-542	Belt Lacer
4	1	090-002-021	Motor Crank
5	1	090-005-661	Yoke Front Adjustment Fixture
6	1	793-511-045	Spanner Wrench
7	1	793-002-007	Retaining Ring Pliers
8	1	030-002-748	Sweep Cam Gauge
9	1	030-004-031	Pin Extracting Tool
10	2	792-501-001	Carpet Removal Pins
11	1	792-502-002	Carpet Tool Flag
12	1	070-006-519	Respot Gauge
13	3	090-005-525	Steel Table Locating Tool
14	1	784-003-000	Carpet installation Tool Handle

4.1.2 CARPET INSTALLING TOOL

The carpet installing tool is used to remove spring tension from the carpet roller for replacement of the carpet, carpet roller, bounce board, and other related parts. With the pinspotter shutdown, insert the tool between the tail plank and the carpet near one end of the roller, and using the tool as a lever, apply pressure towards the rear of the machine until you can insert a carpet removing pin (P/N 792-501-001) into the hole provided in the side plate. Repeat this procedure for the other end of the roller. The front roller can now be removed.

Because of the danger involved should the carpet removing pins be accidentally knocked out while working in the pit, the carpet installing tool can be used in conjunction with the flag (P/N 792-502-002) to remove spring tension from the front roller bearing supports. Attach the flag to the bearing support as shown in Figure 4-2, apply rearward pressure, remove the carpet removing pin, and carefully let off pressure until the bearing support is resting against the tail plank. Repeat for the other side. **Perform this procedure with caution as the bearing supports are under considerable spring tension.**

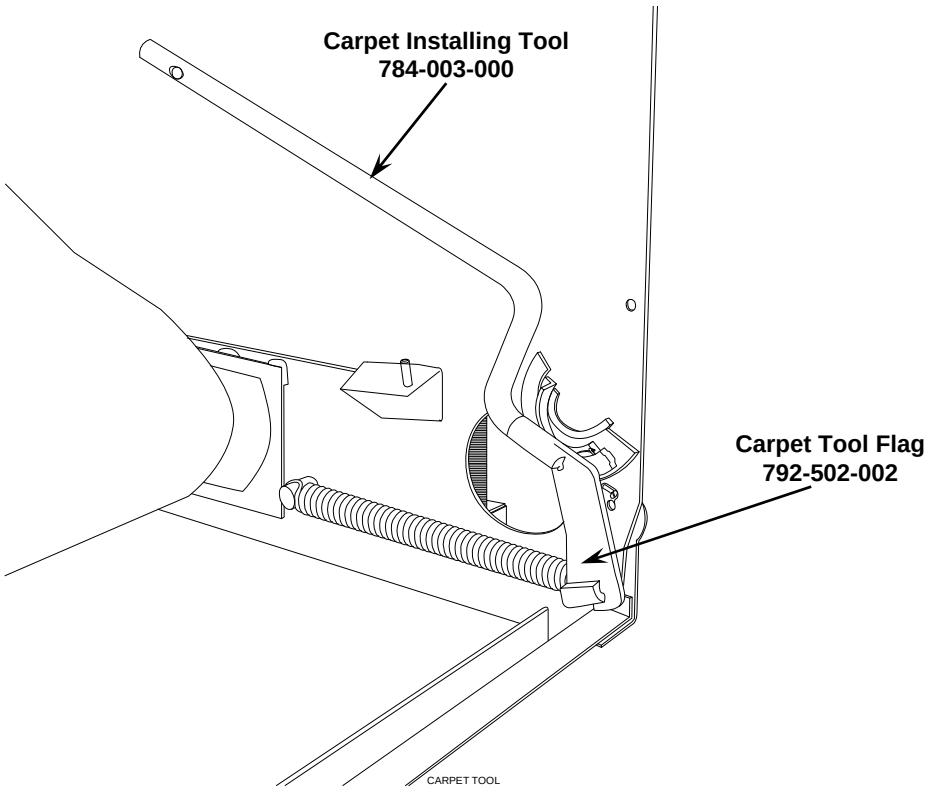

Figure 4-2, Carpet Installing Tool in Use

4.1.3 CLIPPER BELT LACER INSTRUCTIONS (DISTRIBUTOR BELT)

The clipper belt lacer is provided to help the mechanic manufacture replacement distributor belts. The optimum belt length can vary slightly from distributor to distributor. If possible, match the existing belt length. The belt lacing will add approximately 1/4 inch to the overall, installed belt length. To make a belt, proceed as follows:

1. Cut a section of belt material to the appropriate length (approximately 116¾").
2. Place the open clipper belt lacer (see Figure 4-3) between the jaws of a vise. Remove the guide pin from the hole in the end of the lacer, if installed.
3. Position a new set of clips into the lacer ensuring that the bends pass through the slots in the lacer.
4. Insert the guide pin into the hole in the end of the slotted section of the lacer so that the pin captures the clips, and then remove the paper backing from the clips.
5. Insert one end of the cut-off section of the belt between the points of the clips, and tighten the vise so that the clips are forced evenly into the belt.
6. Open the vice, remove the guide pin, remove the belt from the lacer, and repeat the applicable steps for the other end of the belt.

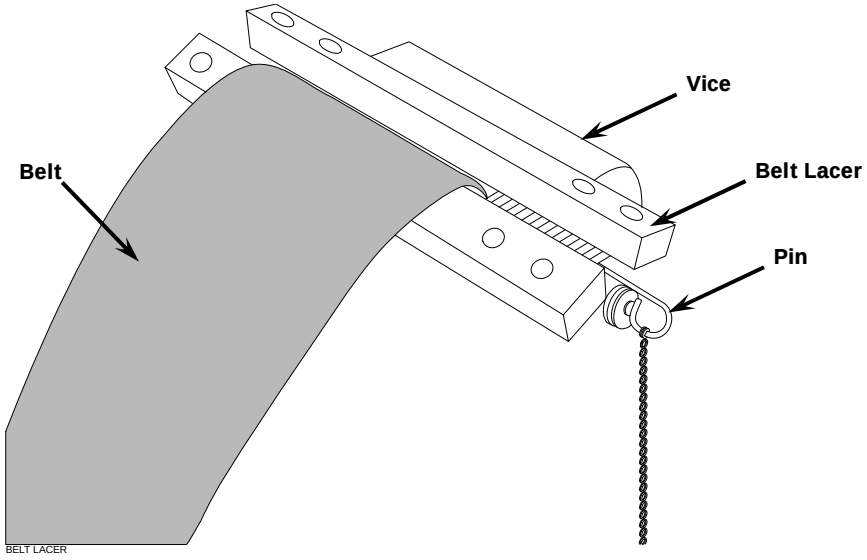

Figure 4-3, Belt Lacer Operation

4.1.4 CRIMPING TOOL (typical)

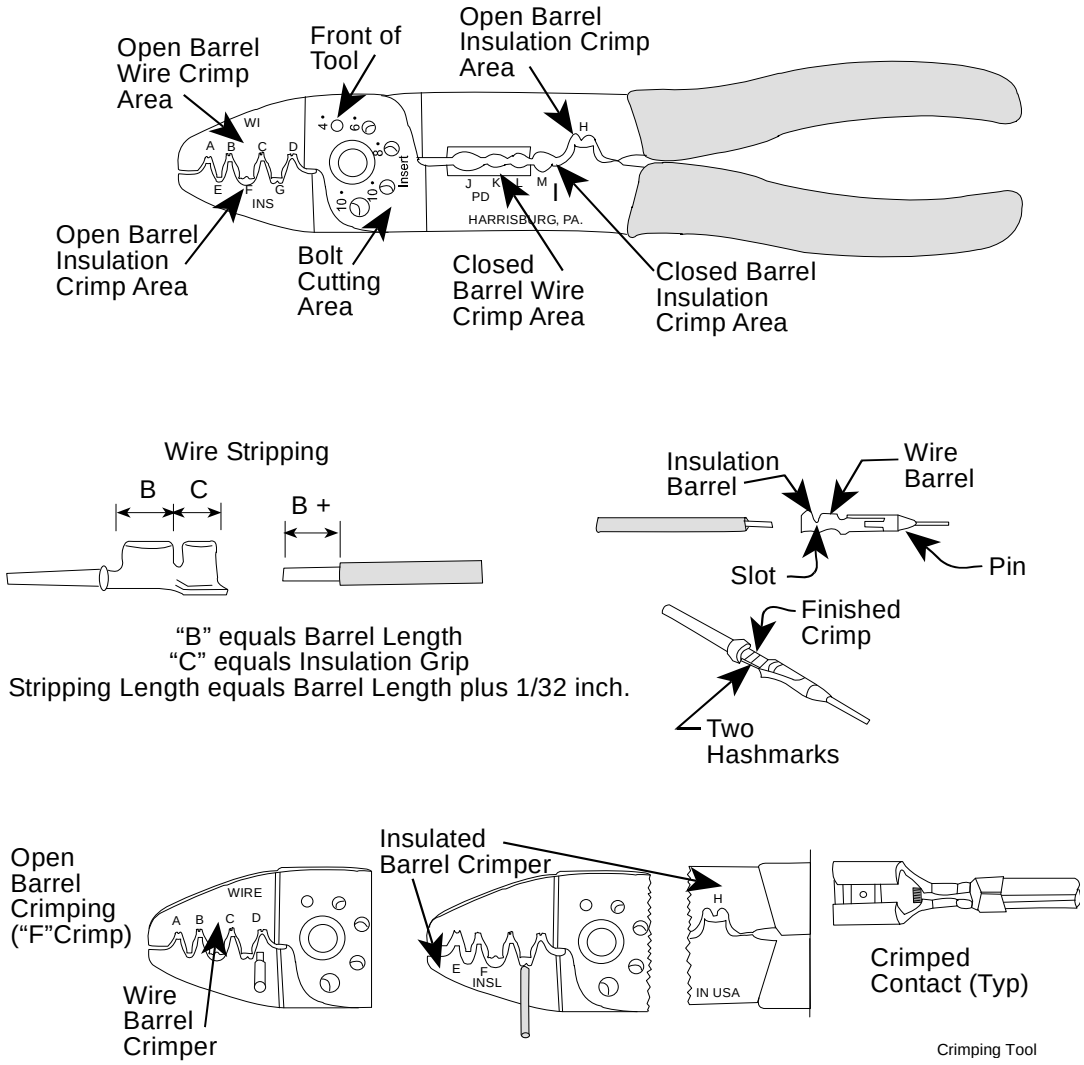

Figure 4-4

Wire Barrel - Position the contact in the appropriate crimp area (A, B, C, or D) with the wire barrel opening facing the letter. Squeeze the tool handles just enough for the jaws to hold the contact in place. Insert a properly stripped wire into the wire barrel. Hold the wire in place and squeeze the tool handles to finish the crimp.

Insulation Barrel - Position the contact and wire in the appropriate insulation crimp area (E, F, G, or H) with the insulation barrel opening facing the letter. Hold the contact and wire in place and squeeze the tool handles to finish the crimp.

4.1.5 SOCKET AND PIN EXTRACTION TOOL

The socket and pin extraction tool is designed to allow removal of pins and sockets from various connectors for repair or replacement. This tool is available from AMF by ordering P/N 030-004-031. Use the tool as shown in Figure 4-5 below.

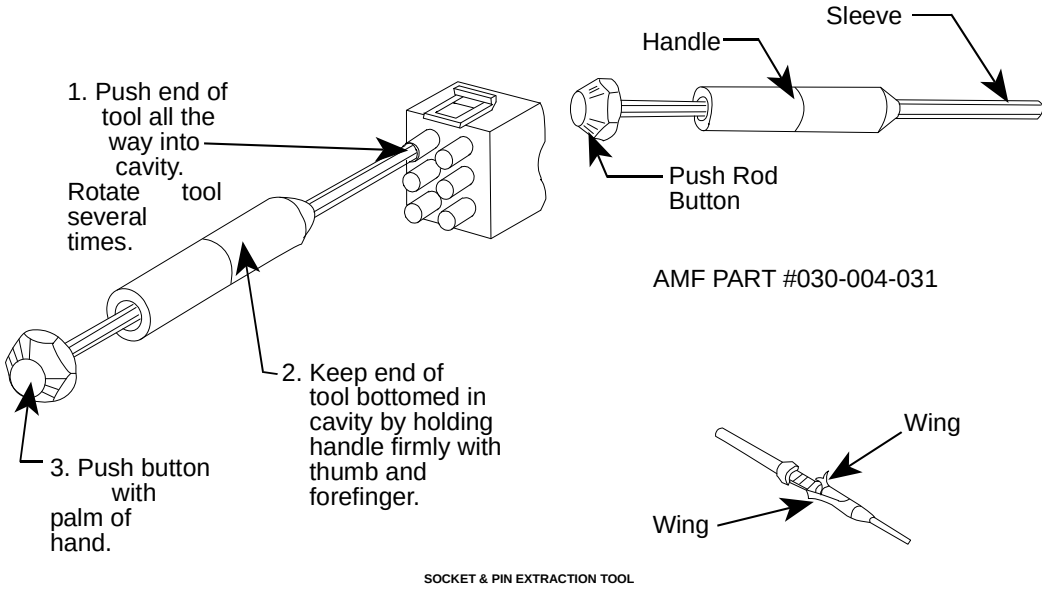

Figure 4-5, Pin Extracting Tool

NOTE: **When a pin or socket is removed from an "M" type plug, it will be necessary to flare out the two wings (Figure 4-5) which have been flattened by the extraction tool. This action is necessary so that the terminal seats properly and will not back out of the plug when reinstalled. Care should also be exercised to prevent damage to the ring at the rear of the terminal. This area must remain circular to promote correct alignment within the plug.**

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4.2 MACHINE ADJUSTMENTS

4.2.1 MACHINE HEIGHT AND POSITION ADJUSTMENTS

Before making any table adjustments you must check the machine height and position relative to the pin deck.

1. Verify that the vertical distance from the pin deck to the underside of the frame is 18-7/8 ± 1/8 inches at all four corners. This measurement should be as nearly the same as possible at each corner, i.e. not 18-3/4 inches at one corner and 19 inches at another, although both numbers are within limits. A level or straight edge can be used to help make this measurement (see Figure 4-6). Any necessary adjustments may also require adjustment of the back end's large leveling jack screws.

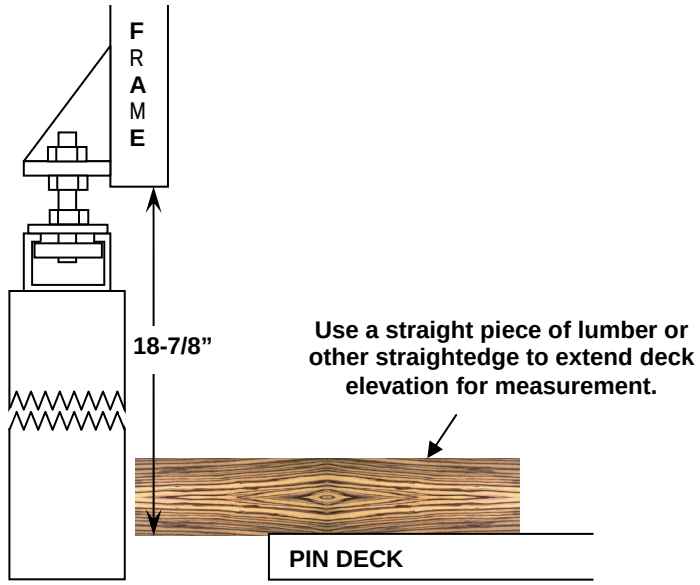


Figure 4-6

2. From a line running through the center of the 7 and 10 spots (known as the 7-10 line), it should measure 13-5/8 inches to the front of the front vertical member of the front-end frame (see **A** in Figure 4-7). Adjust by loosening the unistrut jam nuts and sliding the entire unit forward or backward, as necessary, and then retighten the jam nuts.

3. From the 7-10 line it should measure 6-1/2 ± 1/8 inches to the front edge of the kickback plates (see **B** in Figure 4-7). This distance can be adjusted by adding or removing washers from the junction of the front-end and back-end units.

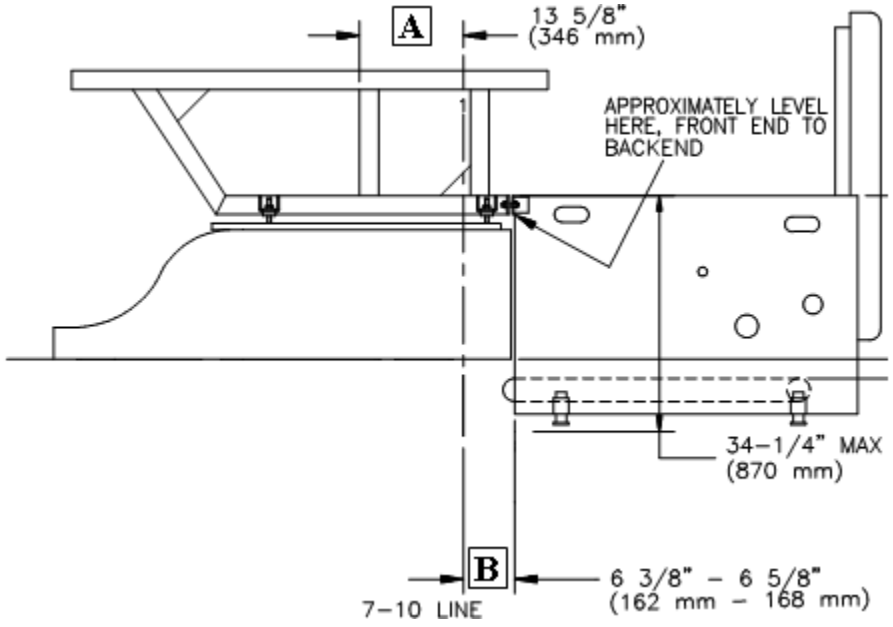
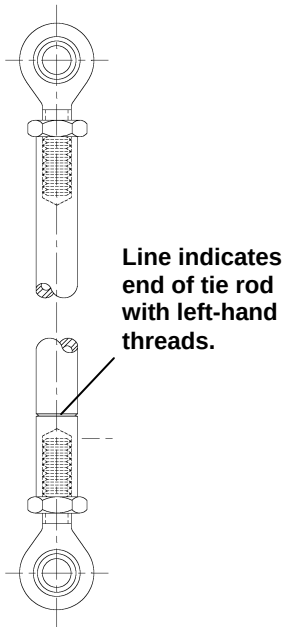


Figure 4-7

4.2.2 TABLE ADJUSTMENTS

4.2.2.1 Tie Rod Adjustment

Throughout this section, references to adjusting the various tie rods are made. A tie rod is a device that consists of two threaded sections and a center section into which the threaded sections fit. On most tie rods, one threaded section has standard right-hand threads, and the other threaded section has left-hand threads. Turning the center section increases or decreases the tie rod's overall length. The end with the left-hand threads can be identified by a line scribed around the circumference of the center section near the end. It is helpful to know which end is left threaded because there is a jam nut on each of the threaded sections, and the left-threaded nut must be turned opposite the normal direction to loosen. A few tie rods have right-hand threads on both ends and at least one end must be removed for it to be adjusted. This prevents the tie rod from going out of adjustment during operation. Loosen the jam nuts before making any tie rod adjustments, and tighten them after adjustments have been made.



Tie Rod

4.2.2.2 Table Leg Screw Adjustment

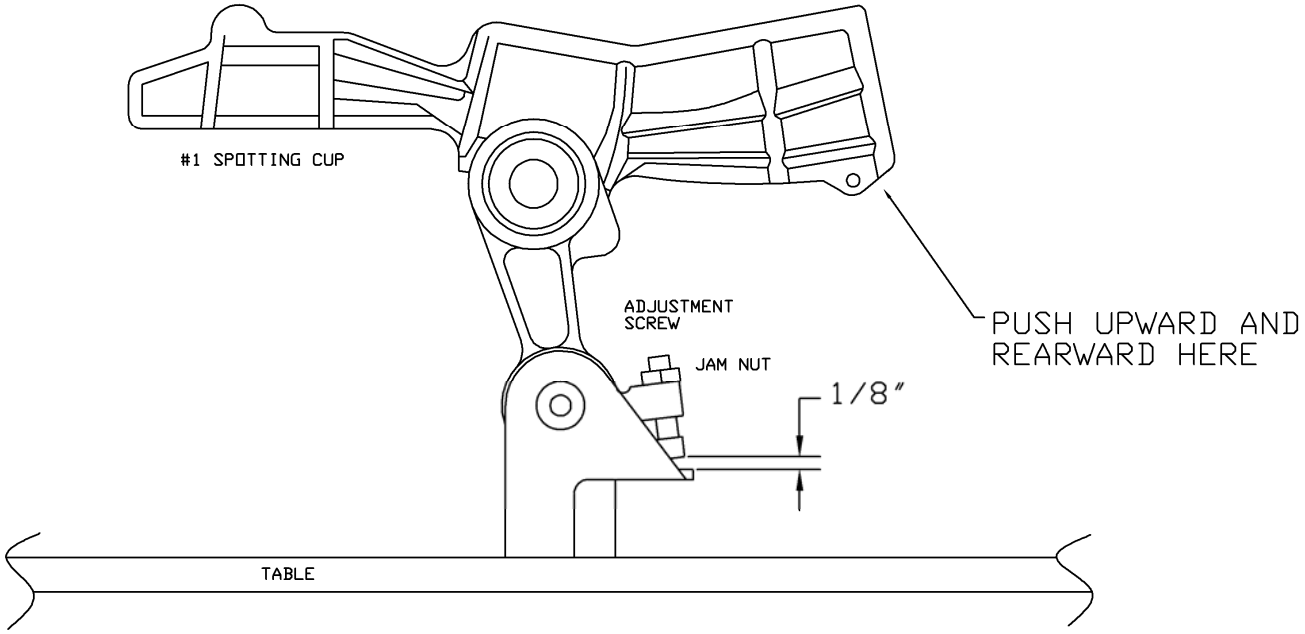


Figure 4-8

1. Run the Table to low point on a respot cycle.
2. Unplug both the Table and Sweep Motors.
3. Loosen the Jam Nuts on both Table Leg adjustment screws.
4. Grasp #1 Spotting Cup and push rearward and upward until it stops.
5. While holding the #1 Cup in this position, obtain a 1/8” gap under the square head of the Table Leg adjustment screw on the 7 pin side (nearest the Yoke Link).
6. Without losing the adjustment or allowing the cups to tilt forward, tighten the jam nut.
7. Release the #1 Spotting Cup and allow the cups to return to a resting state.
8. Turn the adjustment screw on the 10 pin side until the head of the screw touches the Table Leg Bracket. Continue turning the screw until it is finger tight. Do not use a wrench.
9. Tighten the jam nut for the adjustment screw on the 10 pin side.
10. Push the #1 Cup upward and rearward again to double-check the 1/8” gap.

4.2.2.3 Positioning the Table

1. With the Table and Sweep at zero and both motor plugs disconnected, install 3 flags on the Wing Brackets at the 1, 7 and 10 positions of the Table as seen in Figure 4-9.

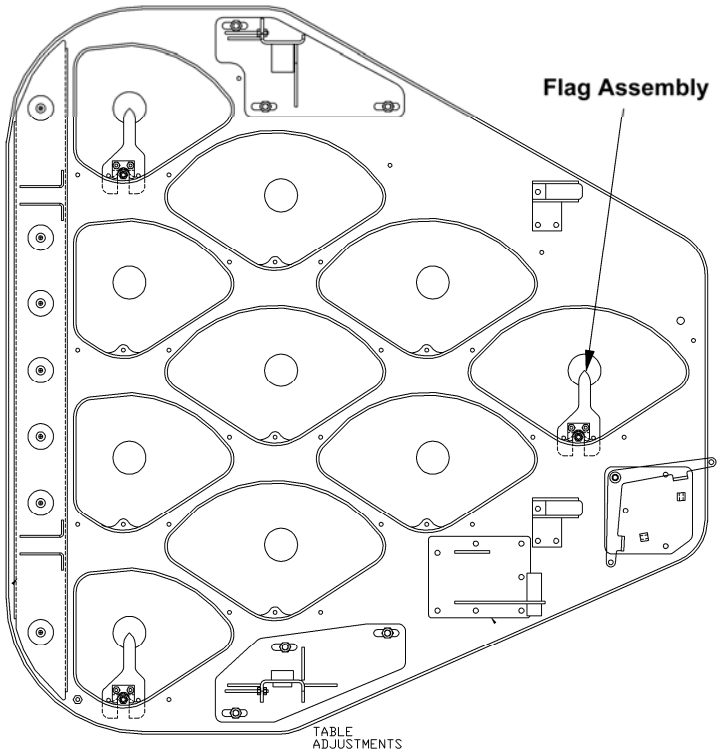


Figure 4-9

2. Remove the Spot Rod from the crab leg Spot Cam Follower.

3. Remove the two Tension Springs from the 7-10 Yoke Shaft to the Table Uprights.

4. Plug in the Table Motor.

5. While pushing down on the white nylon roller on the Table Drive Eccentric, pull on the TA1 cam switch lever to run the Table. This will make the Table take the long stroke to the Pin Deck without shuttling pins. Release the TA1 lever before the lobe of the TA1 cam would hold the TA1 switch open.

6. The Table should be near Bottom Dead Center (its lowest point). Unplug the Table Motor and use a hand crank to get the Table exactly at Bottom Dead Center (Table Drive Shaft, Eccentric stud, and Clevis bolt through Torque Tube all in line as seen in Figure 4-10).

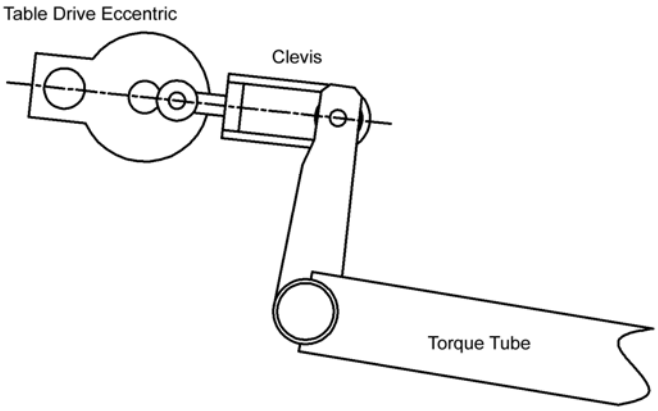


Figure 4-10

7. Loosen the 6 nuts on the carriage bolts that hold the Table to the Table Uprights.

8. If there is any tension on the Table Uprights, loosen the jam nuts on the Table Leveling Rods and adjust the Rods to relieve all pressure. Table Uprights should be perpendicular to the pindeck.

9. Move the Table so that the points of the Flags are exactly over the center spots of the 1, 7 and 10 pinspots.

10. Tighten all six carriage bolt nuts.

11. Plug the Table Motor back in.

12. Run the Table home by pulling on the TA1 cam switch lever momentarily.

13. Reconnect the Table Spot Rod.

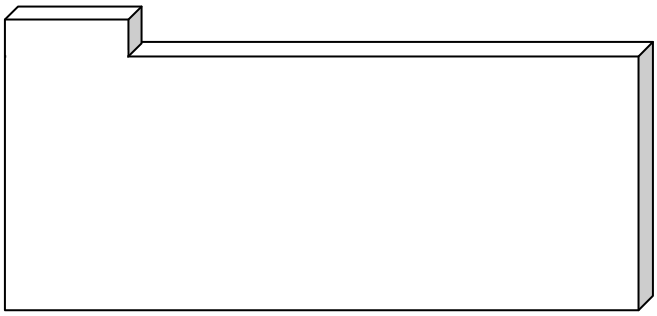
4.2.2.4 Table Level and Height Adjustments

1. Run the Table to near Bottom Dead Center

2. Unplug the Table Motor

3. Use the Hand crank to align the Table Drive Shaft, Eccentric Stud, and Clevis Bolt to get the Table exactly at Bottom Dead Center.

4. Slide the Pinspotter Gauge Tool (Figure 4-11) under the Table to check Table height above pindeck. The gauge should be laid flat on the pindeck and be placed under the head of the Button Head Screw in the center of each wing bracket at the 1, 8 and 10 positions.



Pinspotter Gauge Tool
Figure 4-11

5. Break the jam nuts loose on the Table Leveling Rods.

6. Adjust the Leveling Rods to obtain an equal amount of clearance at all 3 locations (1, 8 and 10).

7. Adjust the Table Clevis so that the Pinspotter Gauge Tool just fits between the pindeck and Button Head Screw of the Wing Brackets (Figure 4-12).

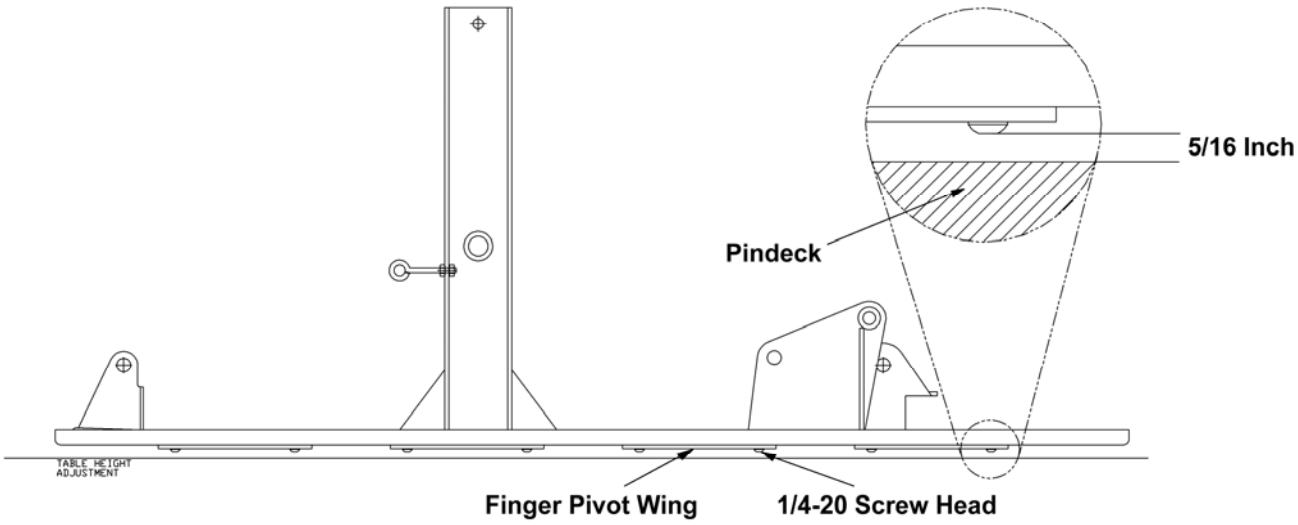


Figure 4-12

8. Repeat steps 6-7 as necessary to attain a 5/16” gap (thickness of Tool) between the pindeck and the head of the Button Head Screws at the 1, 8 and 10 positions.

9. If it is not possible to obtain 5/16” all the way around the table, it may be necessary to shim under one of the Table Uprights with C-washers.

10. Once the Table is level and 5/16” above the pindeck, hold the Leveling Rods secure and tighten the jam nuts.
11. Tighten the Clevis Bolt.
12. Plug in the Table Motor
13. Run the Table home.

4.2.2.5 Spotting Cup Width Adjustment

1. Run Table to low point on a Respot Cycle.
2. Unplug Table and Sweep motors
3. Check all 10 Cup widths at the points using the Pinspotter Gauge Tool.
4. The tool should have a small clearance (1/16”) between the points.
5. Use a steel hammer to bend the points inward or outward to obtain the proper width. Use care not to break the Spotting Cup. Adjust both sides evenly.
6. Once all 10 are at the same width, plug the Table motor in and run Table home.

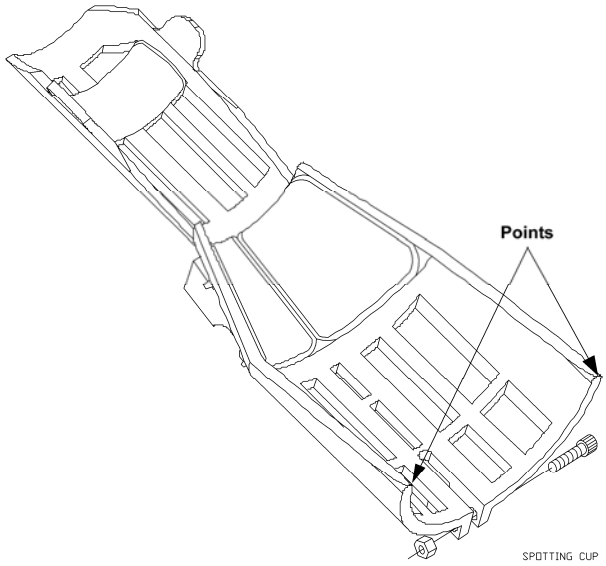


Figure 4-13

4.2.2.6 Spot Rod Adjustment

1. With the Bin full of pins, hold down on the Cam Link to manually actuate the Spot Linkage.
2. Pull on TA1 Cam Switch Lever to run the Table and Spot pins.
3. Release the TA1 Lever before the pins touch the pindeck.
4. Unplug Table and Sweep Motors.
5. Use hand crank to lower the Table to the point where the pins (if not all, then most) first touch the pindeck.
6. Break loose the jam nuts on the Spot Rod.

7. Adjust the Spot Rod so that the Head of the Table Leg Screw just begins to lift off of the Table Leg Bracket. There should be no more than a 1/16” gap.

8. Gently push up and down on the front of the Table to be sure this adjustment is true.

9. Once in adjustment, tighten the Spot Rod jam nuts.

10. Plug the Table motor in.

11. Run the Table home.

4.2.2.7 Individual Spotting Cup Adjustments

1. Repeat Steps 1-5 from the previous section (4.2.2.6 Spot Rod Adjustment).

2. Adjust all 10 Spotting Cups to place pins exactly on spot.

3. To adjust the spotting cups in order to place pins on spot, proceed as follows:

    a. When pins are being set too far forward, loosen the two top cup nuts and tighten the bottom two nuts.

    b. When pins are being set too far back, loosen the bottom two nuts and tighten the top two nuts.

    c. When pins are being set too far left or right, loosen all four cup nuts and slide the cup on the shaft accordingly. Tighten the nuts.

4. Clear pindeck and set several racks to be sure pins are on spot.

4.2.2.8 Individual Pin Height Adjustments

1. Plug Sweep Motor in.

2. Pull on SA Cam Switch Lever to run Sweep through 1 cycle (clear pindeck).

3. Unplug the Sweep Motor.

4. Repeat Steps 1-5 from 4.2.2.6 Spot Rod Adjustment.

5. Look under the Table and notice which pins are touching the pindeck and which are not. Make note of which pins are sitting too low and which are sitting too high. All 10 pins must touch the pindeck simultaneously to obtain a proper spotting action.

6. Plug in the Table Motor and run the Table to the low point in the Respot cycle.
7. Unplug the Table Motor.
8. Using a steel hammer, open the cup width on Spotting Cups where pins were too high. Conversely, close the cup width on Spotting Cups where pins were too low.
9. Plug the Table Motor back in.
10. Repeat Steps 4-9 until all 10 pins touch the pindeck simultaneously.

4.2.2.9 Recheck Spot Adjustments

1. Run through several racks of pins making sure pins are on spot
2. If pins are off spot, repeat steps in 4.2.2.7.

4.2.2.10 Spotting Cup Toe-in

1. Repeat Steps 1-5 of 4.2.2.6 above.
2. Look under Table and note gap between the heels (back) of all the pins and the pindeck. This gap should be roughly 1/8".
3. If gap is too large (greater than 1/8"), Table must be moved rearward and 4.2.2.6 - 4.2.2.9 must be repeated.
4. If gap is too small (less than 1/8") or there is no gap at all, Table must be moved forward and 4.2.2.6 - 4.2.2.9 must be repeated.

4.2.2.11 Final Observations

1. Run through a dozen or more Spot cycles.
2. Check that Table motion is smooth with fluid cup rotation and no bounce. Loose Torsion Springs on the Yoke Assembly can cause jerky cup rotation. If Table has a bounce on its way down to the pindeck or if the pins seem to hit the pindeck somewhat hard, be sure the Torsion Springs are adjusted so that the Spring Clips are in line with the Spotting Cups (parallel). If the Table still has a bounce, try wiping some lane oil on the Spotting Cup Liners and see if the problem goes away. The last thing to check would be the 1/8" gap under the head of the Table Leg Screw. Readjust if necessary.

3. Be sure that pins do not wobble or fall over when spotting. If pins wobble or fall over, check Table height adjustment (5/16") and Toe adjustment.

4. If height and Toe are correct, check the Spot Rod adjustment.

5. If Spot Rod is correct, remove one of the smaller counterbalance springs from the Torque Tube. If pins spot well now, the Table will have to run for some time without this spring, until the pivot points wear in some and loosen up.

6. Be sure that the Table does not "deck" at Bottom Dead Center while spotting pins. This is easy to observe as the pins will touch the pindeck and immediately after you will feel or hear the Table hit the pindeck. If this happens, readjust the Clevis. Keep in mind this may require you to make other adjustments as well.

7. Check the respot cells to be sure they open and close smoothly. If they don't, adjust the Respot Rod accordingly.

8. Once pins spot well, go back and check all jam nuts to be sure they are tight.

4.2.2.12 Table Off-Spot Switch Operation and Adjustment

When the table contacts an off-spot pin during a respot cycle, the table stops its downward movement, but clevis movement continues causing it to contact the off-spot lever actuating the off-spot switch. This action places the machine in a 2nd ball cycle, causes the table to return to the home position, and holds the sweep at the 1st guard position.

As necessary, adjust the off-spot switch as follows:

1. With the table at the home position, loosen the off-spot adjusting screw jam nut located on the table arm just below the clevis (see Figure 4-14).

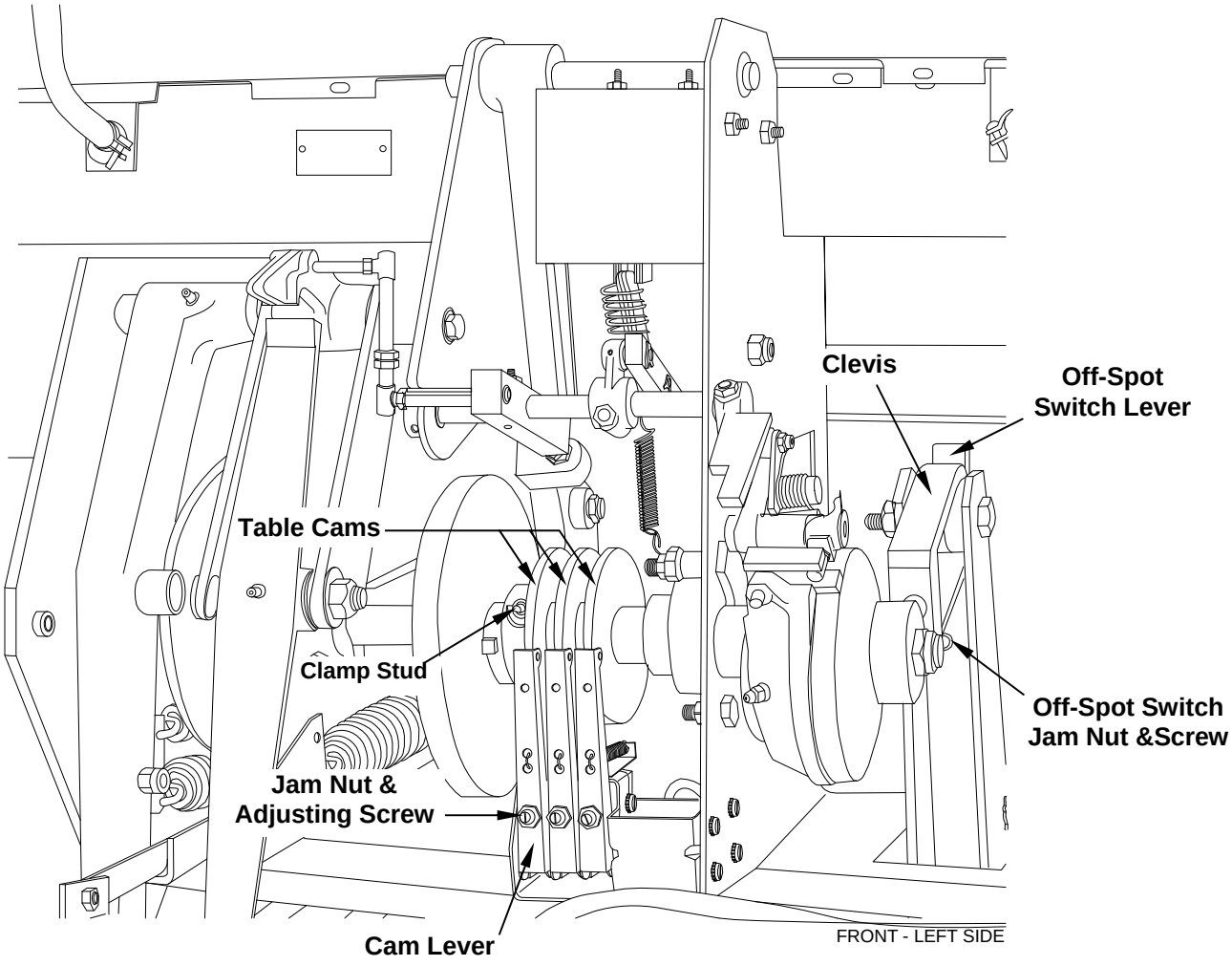


Figure 4-14

2. Using gauge 030-002-748, insert the thicker end of gauge between the off-spot switch lever and the clevis. Adjust the screw counterclockwise to the point of switch operation.

3. Remove the gauge. When the thinner end of the gauge is inserted, the switch should not actuate.

4. Hold the screw in position and tighten the jam nut.

5. To check above adjustment:

   a. Cycle the machine through the 1st ball cycle with a pin placed out of range.

   b. The sweep should drop to the 66° (1st guard) position.

   c. The table should contact the pin and return to the zero (home) position.

   d. The 2nd ball light should turn on.

6. Remove any fallen pins, open the respot cell fingers, and operate the sweep reverse switch to bring the sweep to the home position and continue play.

⚠CAUTION **Some of the table adjustments require that the table be operated under power. When this is the case, the respot cells should be actuated manually to open the fingers and prevent damage.**

4.2.2.13 Table Cam Lever Adjustment

Much of the table's operation is controlled by cams, levers, and switches. The table cam operating logic is as follows:

A. The TA1 cam and switch runs the table from 185° to 355° and initiates the sweep's return to home from the 2nd guard position.

B. The TA2 cam and switch initiates the sweep run-through.

C. The TB cam and switch provides half the table/sweep interference interlock.

Note: For proper operation, the lever rollers must ride fully on the table cams.

1. Manually crank or run the table to put the TA1 cam lever at the lowest position on the first table cam. (See Figure 4-14 for the location of the table cams.)

2. Insert gauge 030-002-748 between the lever roller and the lowest portion of the cam. The thicker end (.176 inch) of the gauge should actuate the switch and the thinner end (.136 inch) should not actuate the switch.

3. If adjustment is necessary, loosen the cam lever jam nut and adjust the screw as follows:
   a. If the thicker end of the gauge does not cause the switch to actuate, turn the adjusting screw in the counterclockwise direction to obtain the correct setting.
   b. If the thinner end of the gauge causes the switch to actuate, turn the adjusting screw in the clockwise direction to obtain the correct setting.
   c. Hold the screw in position and retighten the jam nut.

4. Repeat steps 1 through 3 for the remaining two table cams/switches.

4.2.2.14 Table Cam Adjustment

Note: The table cam switch levers must first be adjusted as described in the previous section.

1. Manually crank the table to its highest position.

2. Loosen the clamp stud (see Figure 4-14) and position the cams so that the clamp stud is parallel to the pin deck. This is the starting (approximate) cam setting position. Retighten the clamp stud.

3. Cycle the machine and note the table's stopping position at the end of a 2nd ball cycle. The table should stop just before the zero (home) position. This is typically 355 degrees, or 5 degrees before top dead center (TDC). If it does not, move the table cam as follows:
   a. If the table overruns, move the top of the cam towards you.
   b. If the table stops short, move the top of the cam away from you.

Note: Table zero (home) position is the point at which the table has reached its highest operating position.

4.2.2.15 Table Drive Eccentric Operation

The low points of table travel during the spot and respot cycles are controlled by the table drive eccentric. During a respot cycle, the eccentric's latch is engaged locking the eccentric's input and output sides together, which only allows the table to lower to the respot height. When the spotting solenoid is energized at the start of a spotting cycle, the eccentric's latch is disengaged allowing the two sides of the eccentric to operate independently. This permits the table to descend close to the pin deck for spotting a set of pins.

4.2.2.16 Spotting Linkage Adjustments

1. With the table at the home position, the distance between the end of the shuttle stop lever assembly and the adjusting bolt (see Figure 4-15) should be .015 inches. Adjust the bolt to provide this spacing and then tighten the jam nut.

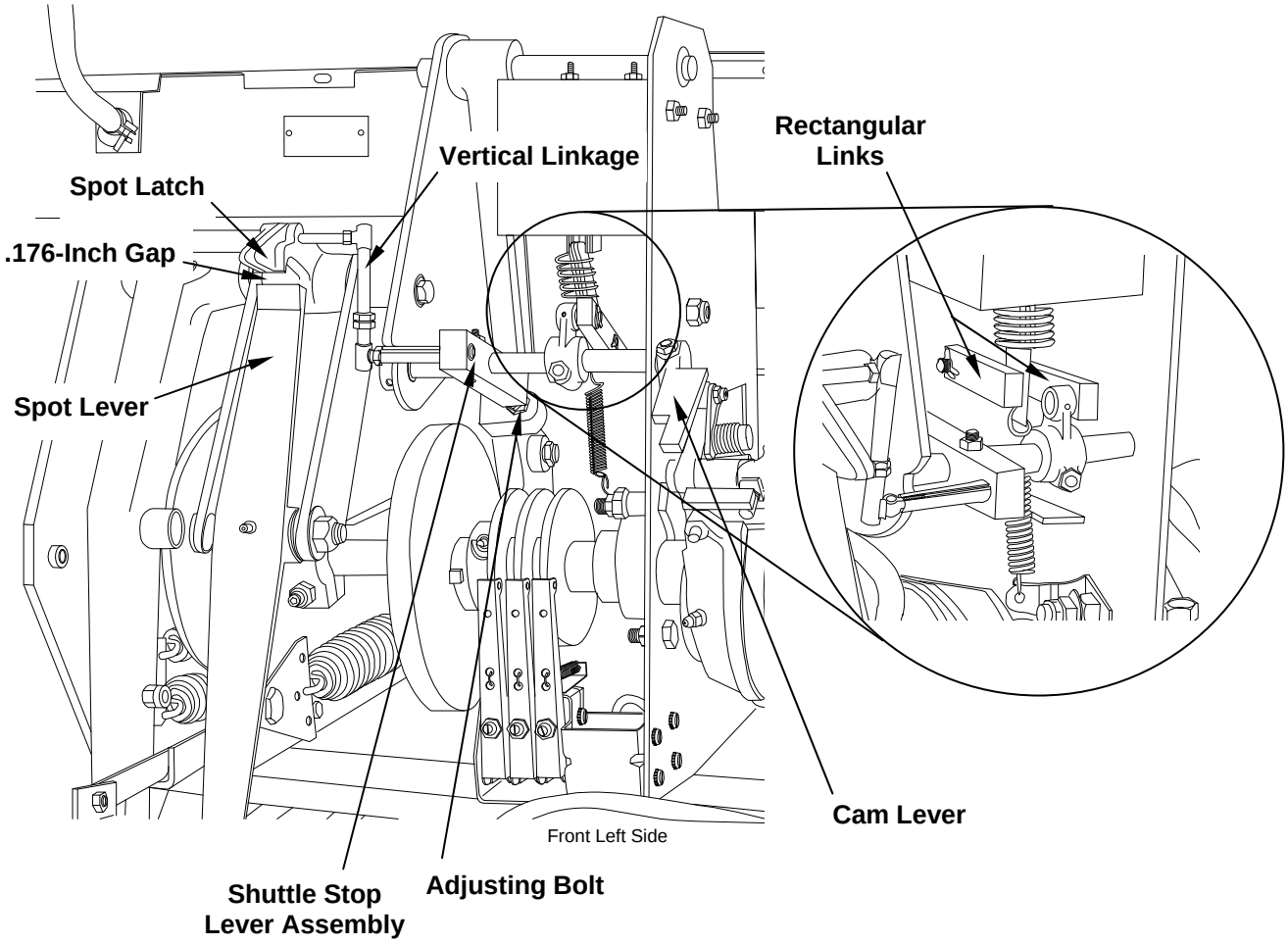


Figure 4-15

2. When the spotting solenoid is actuated, the cam lever should be locked in the down position. This locked condition is established when solenoid engagement causes the two rectangular links (see Figure 4-15) to align horizontally. Test for locking by manually engaging the solenoid and then pulling up on the cam lever. The lever must remain in the down position. This rigidity is necessary to disengage the eccentric's latching mechanism during a spotting cycle. If the lever moves, some part of the linkage is worn or broken and must be replaced.

3. With the table at the home position, insert the thicker end of gauge (030-002-748) between the top of the spot lever and the bottom edge of the spot latch. Adjust the vertical linkage to obtain a .176- inch clearance and then tighten the jam nuts against each other.

4.2.2.17 Yoke Spring Adjustment

The yoke springs, located on #3 and #4 yoke shafts, are used to stabilize cup movement during a spotting operation. They also serve to hold the spotting cups horizontal during a respot cycle.

1. With the table in the home position, loosen the spring retainer's locking nut and rotate the spring retainer on the yoke shaft so that the spring end is in line with the slot between the cup and cup cap (see Figure 4-16). This is the initial (approximate) setting.

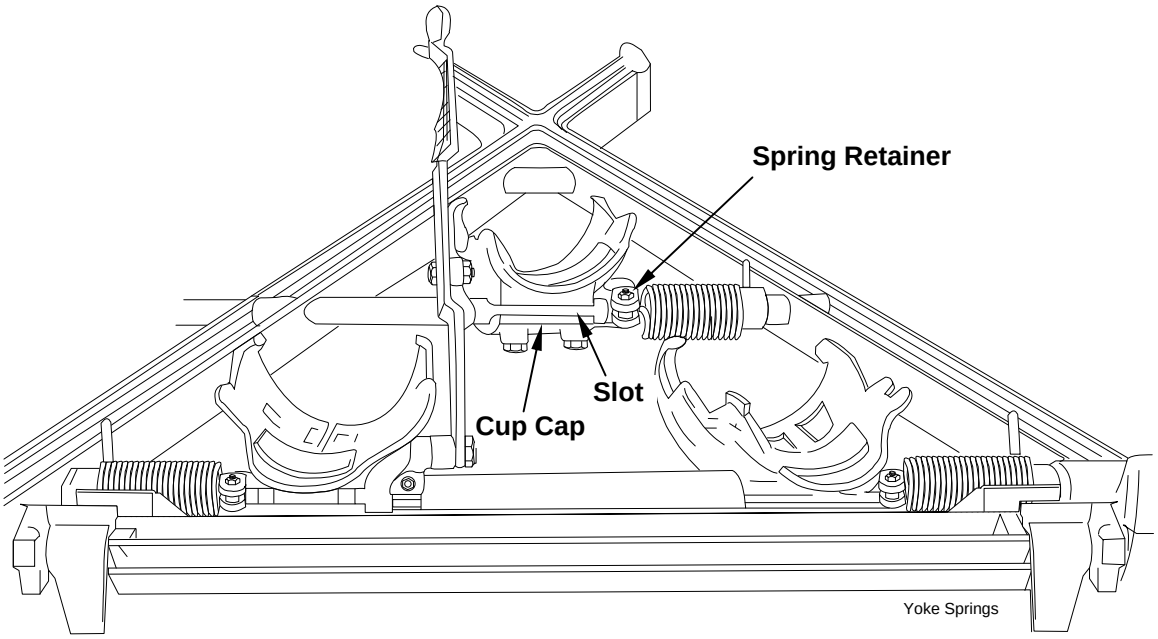


Figure 4-16

Cycle the machine through several spotting operations and observe cup movement. Insufficient spring tension will cause unstable cup movement causing the pins to wobble or fall when spotted. Too much spring tension will cause the cups to slam back after the pins have been spotted. Adjust accordingly.

Note: If the springs need to be replaced, the yoke must be removed from the machine. See Section 4.2.2.14 for yoke assembly removal instructions.

4.2.2.18 Spot and Respot Lever Spring Removal or Replacement

1. Hold the cam lever down on the table drive eccentric while holding the spot latch up (see Figure 4-17) and have a second person manually crank the table down.

   a. To remove the single spot lever spring, stop the table when the lower end of the spot lever is in toward the table as far as it will go (minimum spring tension).

   b. To remove the two respot lever springs, stop the table when the lower end of the respot lever is in toward the table as far as it will go.

2. Loosen the nut on the spring hanger bolt (see Figure 4-17) so that it is being held by just one or two threads.

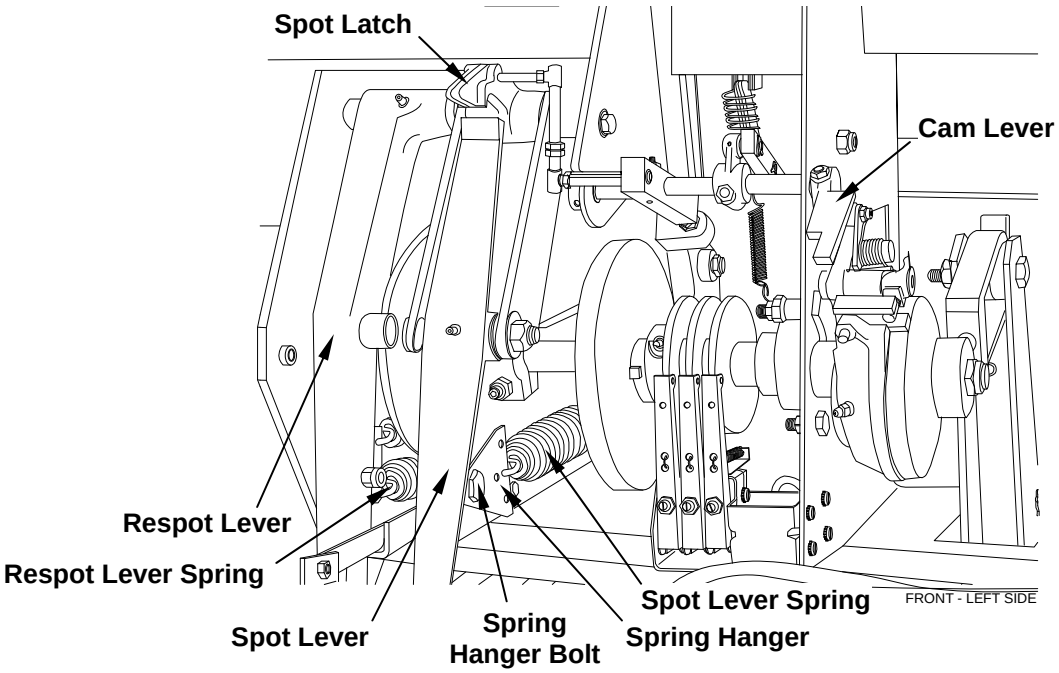


Figure 4-17

3. Insert the spring puller (792-505-005) in the center hole in the spring hanger. Free the hanger from the bolt by pulling on the hanger and passing the larger part of the slotted opening in the spring hanger over the bolt head.

4. Complete the removal of the hanger bolt and nut. Inspect the hanger and bolt, and replace if needed.

5. To replace spring(s), reverse the actions in steps 2 through 4 above.

6. Return the table to the home position.

4.2.2.19 Yoke Assembly (X-Frame) Removal

Note: If the yoke is broken, it can be repaired with Yoke Repair Kit #610-704-011. It is not necessary to remove the yoke from the table in order to make the repair.

1. With the table at the home position, disconnect the spot and respot rods from the lower end of the spot and respot levers.

2. Hold the cam lever down on the table drive eccentric and manually crank the table to the 180 degree position, which is the lowest position of the table.

3. Remove the pins from the spotting cups.

4. Disconnect the extension springs (one on each side) which attach yoke shaft #4 to the table uprights. (See Figure 4-18.)

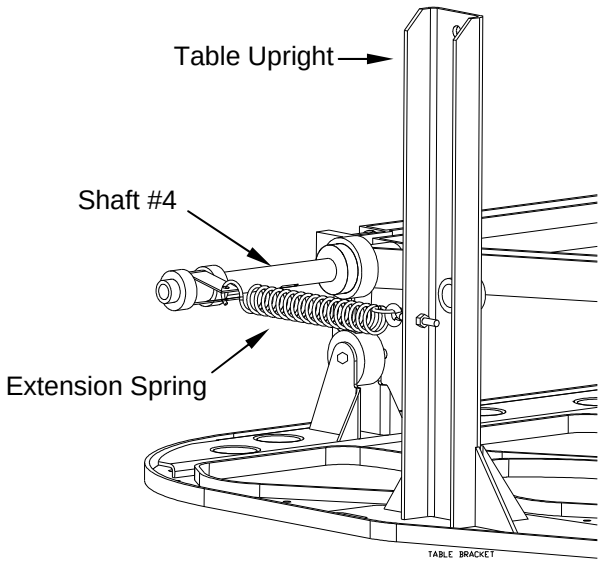


Figure 4-18

5. Remove the bolts that attach the front and rear X-frame legs to the front and rear table brackets. The yoke can now be removed.

6. To reinstall the yoke assembly, reverse the actions of steps 1, 2, 4, & 5.

4.2.2.20 Respot Cell Operation & Adjustments

When the table lowers to pick up pins as in a first ball cycle, the respot cell fingers close on the standing pins, lock, and then the table raises the pins high enough for the sweep to clear the lane of fallen pins. The table then respots the pins.

4.2.2.20.1 Finger Adjustment

1. Move the respot cell linkage to close the cell fingers.

2. Using a 1/8-inch hex wrench and the widest part of the respot cell gauge (070-006-519), adjust each of the respot cells for a 2-inch opening between fingers approximately mid way along the fingers (see Figure 4-19). This adjustment can be made with the respot cell either in or out of the table.

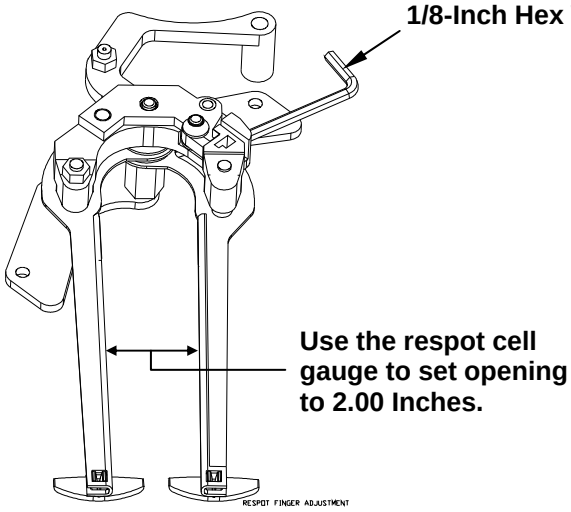


Figure 4-19

4.2.2.20.2 Respot Cell Adjustment

1. Manually crank the table to the spotting position.

2. Disconnect the 6 body links that connect the respot cells to the #7, #8 & #9 connecting links (see Figure 4-20).

3. Loosen the bolts that connect cells #8, #9 & #10 to the slotted ends of the connecting links. **Do <u>not</u> loosen the bolt at the #7 cell connecting link.**

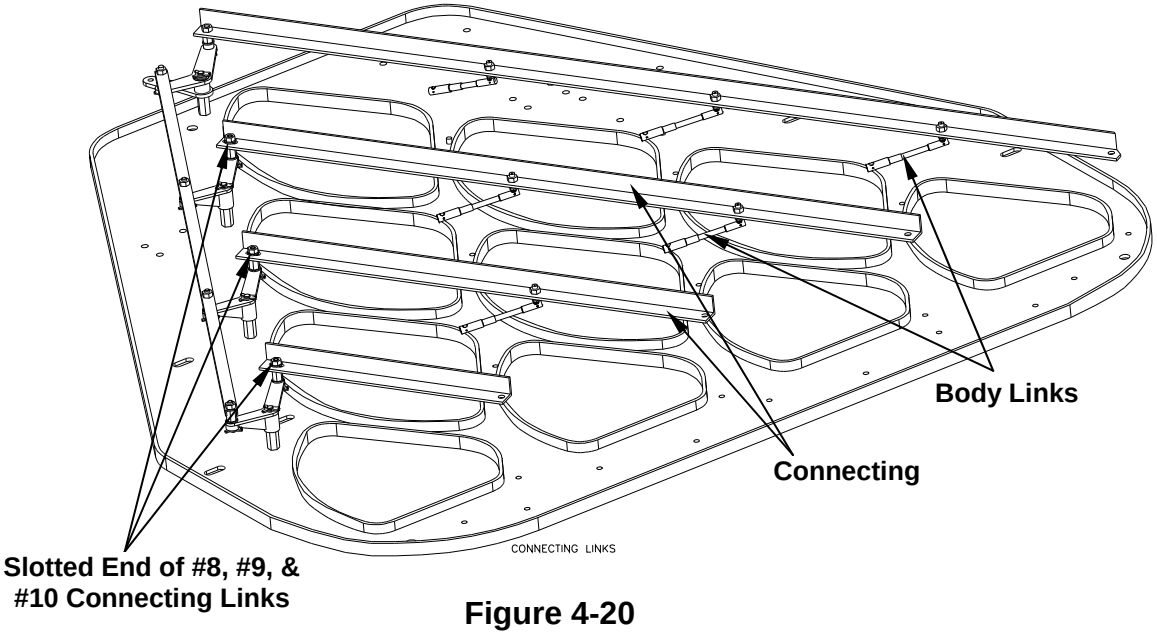


Figure 4-20

4. Loosen the two actuator stop screws (see Figure 4-21).

5. Set the length of the long rod on the front actuator assembly to 8-3/8 inches (213 mm) from center to center between the openings at each end.

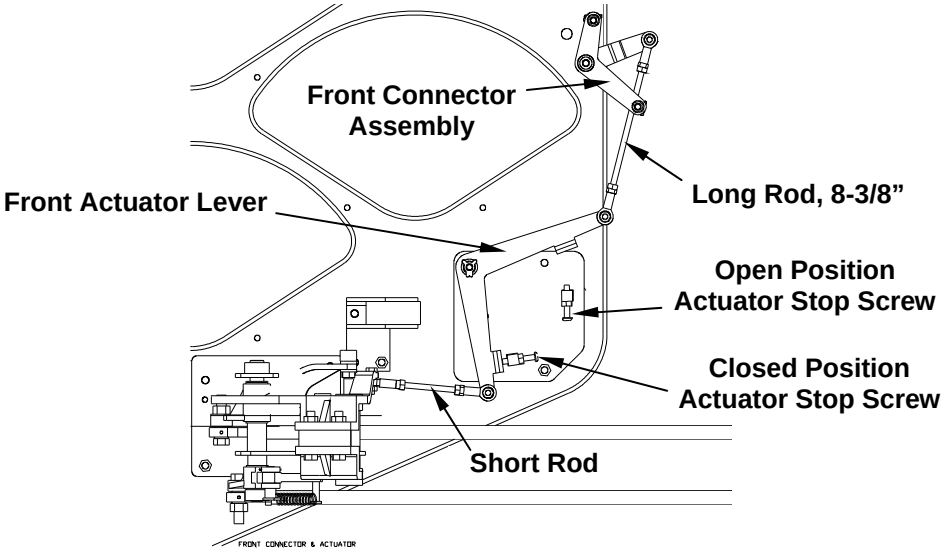


Figure 4-21

6. Open cell #7 fully.

7. While keeping cell #7 fully open, adjust the slot in the #8 cell connecting link so that the #8 cell is fully open. Keeping the #8 cell fully open, tighten the bolt in the #8 connecting link slot.

8. Repeat Step 7 for the #9 and #10 cells.

9. With the rear cells (#7, #8, #9, & #10) fully open, turn the open position actuator stop screw until it is against the actuator lever. Turn the screw an additional 1/2 turn. Tighten the jam nut on the stop screw.

10. With all cells fully open, adjust and connect the respot cell body links for the remaining 6 cells so that when connected, the cells are fully open. Set the length of the body links so that the excess movement (play) in cells 1 through 6 matches the excess movement in cells 7 through 10.

NOTE: When all of the respot cells have been adjusted, and with the front actuator lever in the open position against the stop, there should be approximately 1/4-inch of play in each cell's fingers.

11. Loosen the jam nuts on the short rod (see Figure 4-21).

12. Move the spotting lever to the spotting position, which is done by placing the spotting lever in a "fingers open" position (see Figure 4-22).

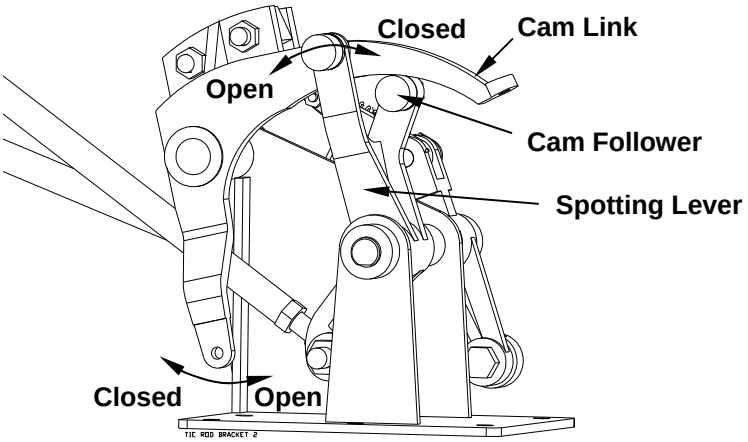


Figure 4-22

13. Open the respot cells fully (actuator lever against the open position stop screw).

14. With the spotting lever in the fingers open position, adjust the length of the short rod (Figure 4-22) so that the cam link (Figure 4-22) just makes contact with the cam follower. THE CAM FOLLOWER MUST STILL BE ABLE TO TURN FREELY. Tighten the jam nuts on the short rod.

15. Recheck the adjustment of the long rod, and adjust as necessary to ensure that all cells are fully open and have the correct amount of play in the respot cell fingers.

16. Crank the table to the home position.

17. With the pin deck clear, crank the table down to the respot position.

18. Rotate the front actuator lever to close the cells completely. Adjust the closed position actuator stop screw until it is against the actuator lever. Turn the screw an additional 2 turns. There should be approximately 1/8 inch between the cam studs and the end of the slot on each finger (see Figure 4-23). Turning the stop screw in increases the gap. Tighten the jam nut on the closed position stop screw.

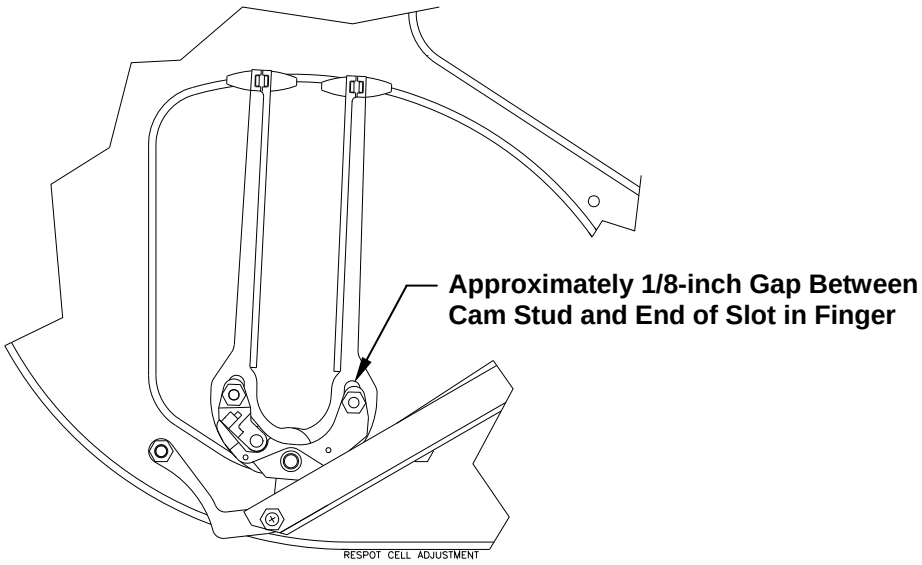


Figure 4-23

19. Crank the table to the home position.

20. Close the respot cells slightly so that the center highest point of the shifter link is directly opposite the pawl (see Figure 4-24). Adjust the length of the respot rod so that the pawl clears the center highest point by 1/4 inch.

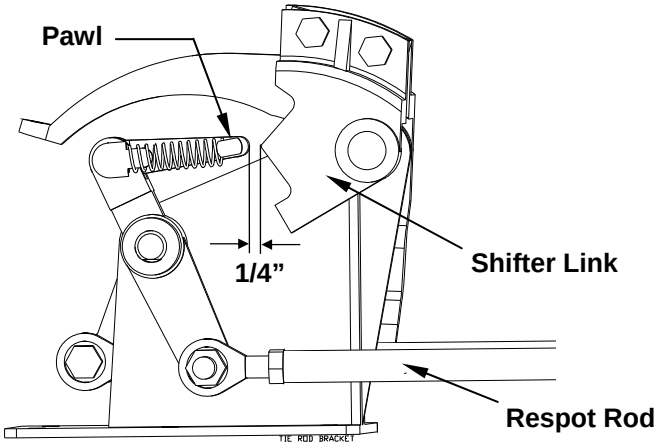


Figure 4-24

21. Run the table though a respot cycle. The cell fingers should open and close at the lowest point of the stroke. If the fingers appear to open and close too early, shorten the respot rod to increase the clearance between the pawl and shifter link. If the fingers appear to open and close too late, lengthen the respot rod accordingly.

Note: When the fingers are adjusted properly, all of the pins should be held at the same point (near the top ring) on the neck. This will cause all of the pins to contact the pin deck at the same time minimizing respotting problems. If one or more pins are not being picked up in this manner, readjust those cells in accordance with Section 4.2.2.15.1.

4.2.2.21 Table Motor and Gearbox Removal

For table drive motor and gearbox removal, refer to the *Pinspotter Motor and Gearbox Manual*, P/N 400-090-002.

4.2.3 SWEEP OPERATION & ADJUSTMENTS

4.2.3.1 Sweep Cams and Cam Levers

The sweep should operate smoothly in all locations and should not rub the machine or the pin deck.

The purpose of the sweep cams and levers is to:

- Control the sweep operation during the run-through from the 66° (1st guard) position to the 270° (2nd guard) position and up to the zero (home) position (SA & SB).
- Operate switches that control the timing of table movement and provide one of two inputs for interlock protection between the sweep and the table (SC).

4.2.3.2 Sweep Cam Lever Adjustment

1. Manually crank or run the sweep to put the SA cam lever roller at the lowest portion of the sweep cam (see Figure 4-25).

2. Insert gauge 030-002-748 between the cam lever roller and the lowest portion of the cam. The thicker end (.176 inch) of the gauge should actuate the switch and the thinner end (.136 inch) should not actuate the switch.

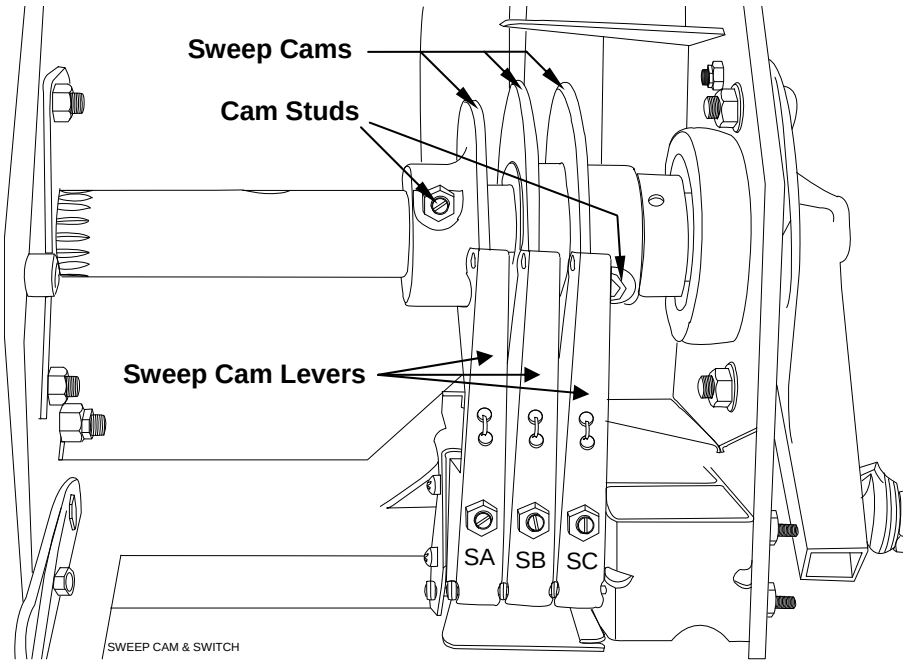


Figure 4-25

3. If adjustment is necessary, loosen the cam lever jam nut and adjust the screw as follows:
   a. If the thicker end of the gauge does not cause the switch to actuate, turn the adjusting screw in the counterclockwise direction to obtain the correct setting.
   b. If the thinner end of the gauge causes the switch to actuate, turn the adjusting screw in the clockwise direction to obtain the correct setting.
   c. Hold the screw in position and retighten the jam nut.
4. Repeat steps 1 through 3 for the remaining two sweep cams/switches

4.2.3.3 Sweep Cam Adjustment

Before making these adjustments, check the cam lever settings in accordance with the previous section.

1. Manually crank the sweep to its highest position (zero position).
2. Loosen the cam studs and position the cams so that the studs are parallel with the pin deck. Tighten the cam studs. This is the initial or approximate setting.
3. Cycle the machine in 1st ball and note the sweep down (1st guard), sweep run to 2nd guard, and sweep up (home) positions. If the sweep operates smoothly and stops at the correct points, no further adjustment is necessary.
4. If adjustment is necessary, proceed as follows:
   a. Adjust the middle (SB) cam so that the sweep stops just before the bottommost position (66°).
   b. Adjust the left (SA) cam for sweep run-through so that the sweep stops at the 270° (2nd guard) position.
   c. If the sweep overruns at stopping positions, adjustment is made by turning the top of the cam(s) toward you.
   d. If the sweep stops short, adjustment is made by turning the top of the cam(s) away from you.

4.2.3.4 Sweep Adjustments

Note: Sweep adjustments should be made on both sides of the machine.

1. With the sweep at the home position:
   a. Adjust the short connecting rod (see Figure 4-26) to obtain a starting length of 10-1/8 inches center to center between the rod end openings. Tighten the jam nuts.

Note: Sweep travel is determined by the length of the short connecting rod. If this rod is too long, the sweep will collapse into the pit. If too short, the sweep will hit the frame of the machine at the home position.

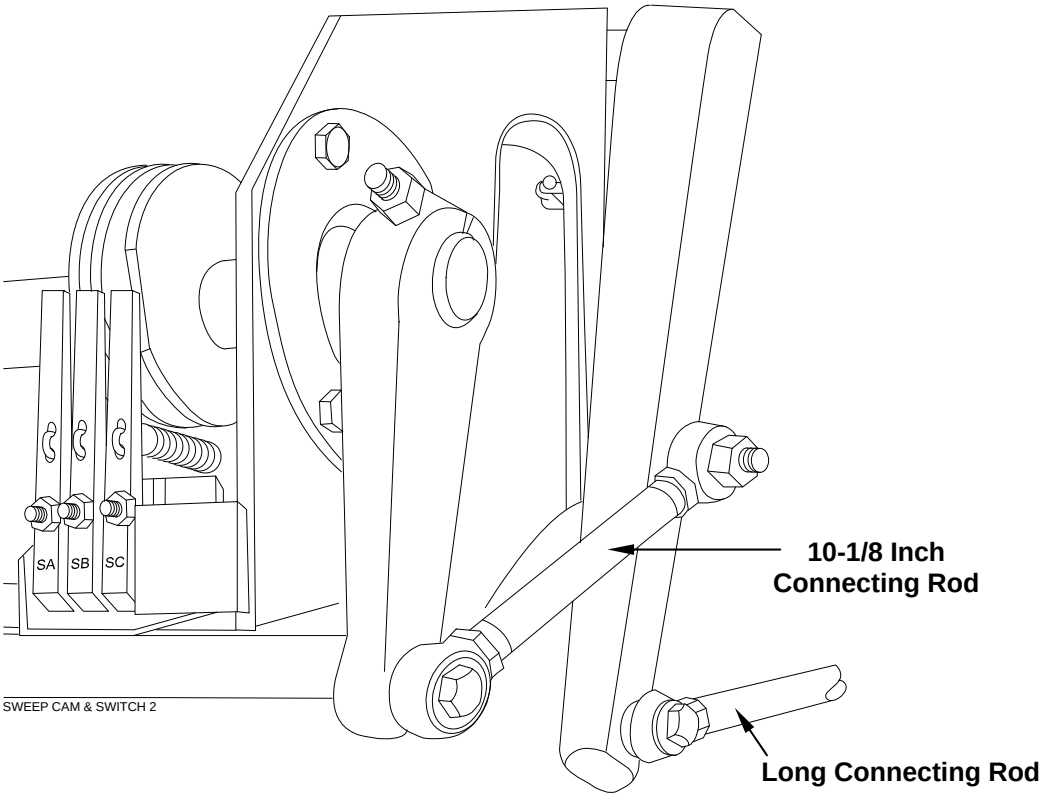


Figure 4-26

2. Adjust the long connecting rod (see above) to obtain approximately 1/2-inch of clearance between the stabilizing link and the frame (see Figure 4-27) when the sweep is in the home position. The clearance must be sufficient to keep the sweep from contacting the frame during sweep operation.

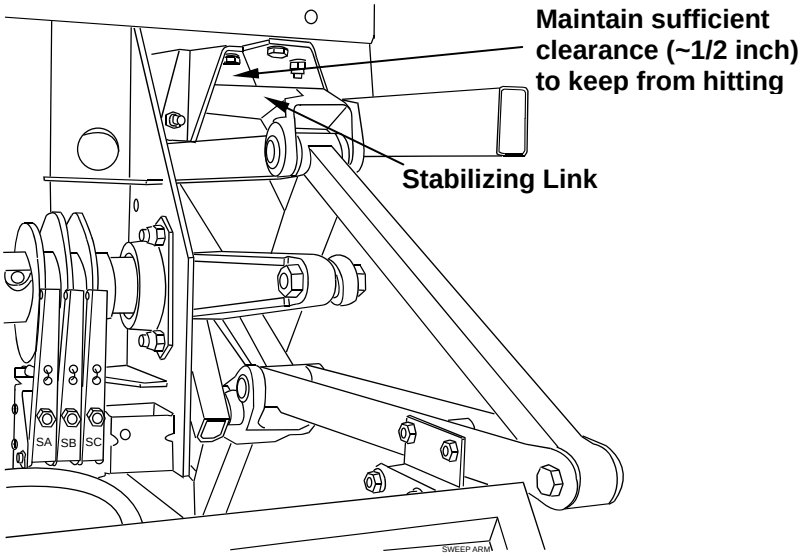


Figure 4-27

3. Manually crank the sweep to its lowest point at the 1st guard position. The sweep shield should clear the channel by approximately 3/4 inch.

   a. To increase the clearance between the sweep shield and the channel, loosen the nut where the telescoping link connects to the slotted pivot bracket on the vertical frame member (see Figure 4-28), and move the end of the telescoping link toward the front of the pinspotter. Retighten the nut.

   b. To decrease clearance between the sweep shield and the channel, move the end of the telescoping link toward the rear of the pinspotter.

   c. Repeat this adjustment on the other side of the machine to maintain both ends of the sweep at the same height above the lane.

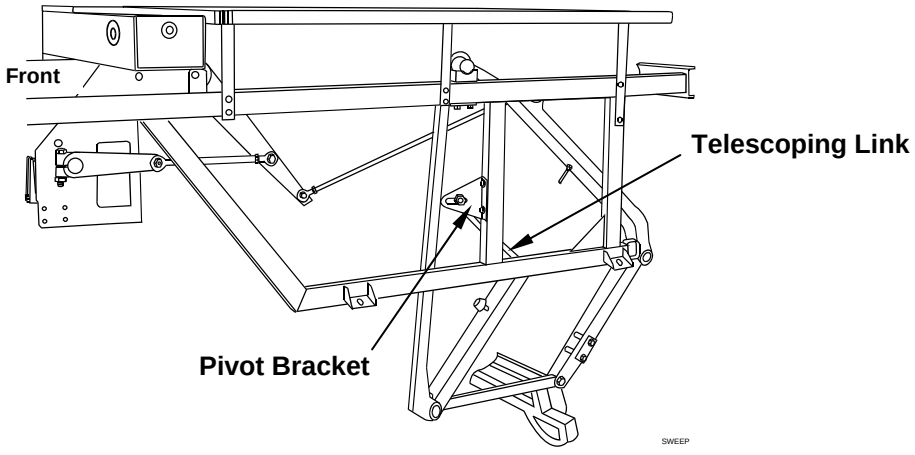


Figure 4-28

4. Manually crank the sweep to the #5 pin position. The sweep bar should just clear the pin deck without dragging and should be no more than 1/4 inch above the deck.
   a. To lower the sweep, loosen the pivot bracket's mounting screws on the vertical frame member and move the bracket up. To raise the sweep, move pivot bracket down.
   b. Retighten the bracket's mounting screws.
   c. As necessary, repeat this adjustment on the other side of the pinspotter.
5. Set a pin on each side of the pin deck as far back as possible.
6. Continue cranking the sweep to its extreme back position. The sweep should just touch the pins so that under power, the sweep should knock the pins into the pit. If the sweep does not go back far enough, increase the length of the 10-1/8-inch long connecting rod. Do not lengthen it more than is necessary. Under power, the sweep may collapse into the pit area.
7. Manually crank sweep to the home position. Recheck the stabilizing link for the correct clearance. The long connecting rod may have to be readjusted in order to have sufficient clearance and for the sweep to hang parallel to the pin deck.
8. Operate the machine under power and note sweep operation. If necessary, repeat the sweep cam adjustments.

4.2.3.5 Sweep Motor and Gearbox Removal

For Sweep motor and gearbox removal, refer to the *Motor and Gearbox Repair and Maintenance Manual*, 400-090-002.

4.2.4 POSITIVE BALL LIFT OPERATION & ADJUSTMENTS

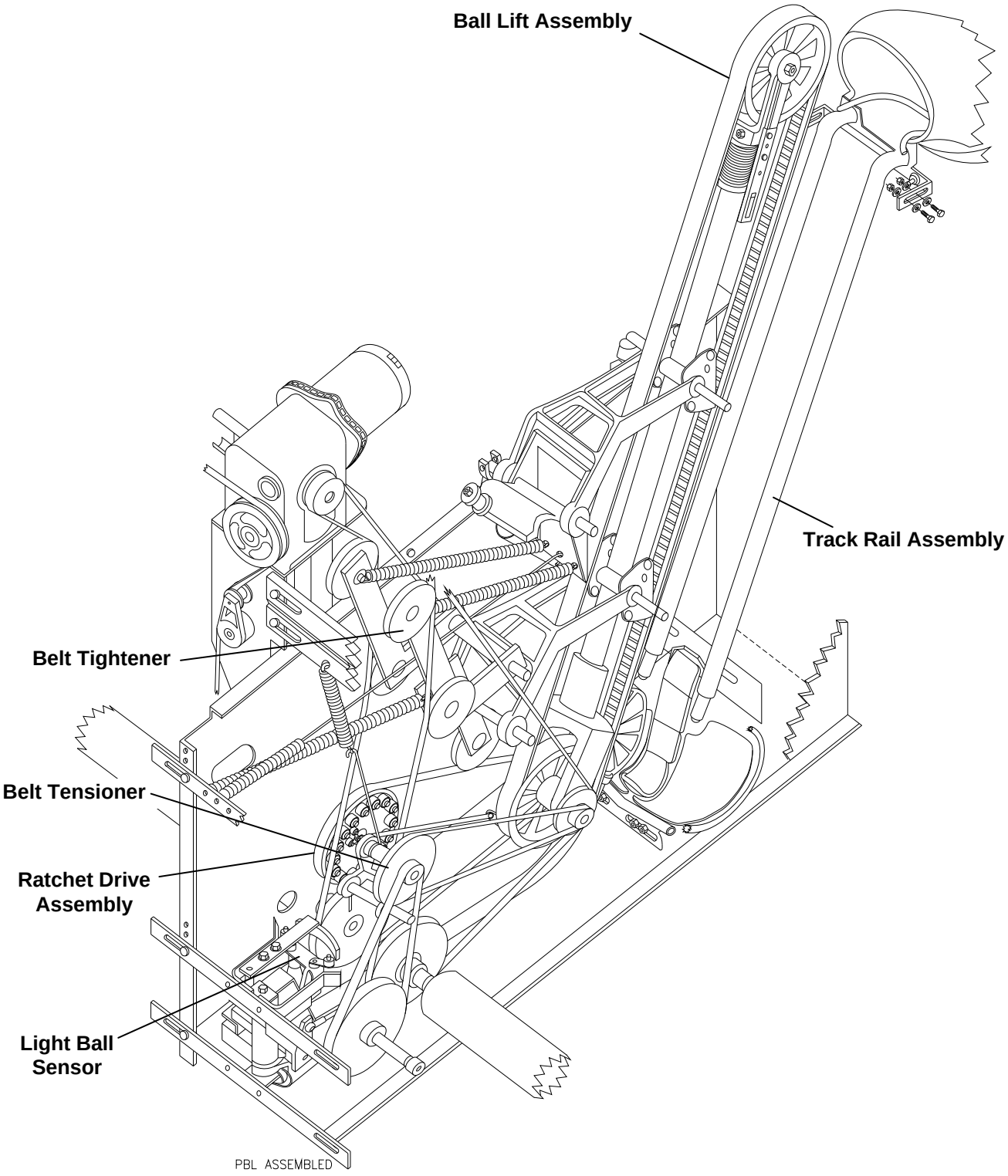


Figure 4-29

4.2.4.1 Positive Ball Lift Operation

The purpose of the ball lift is to raise the ball high enough to permit a gravity return to the bowler. The ball lift consists of a number of separate assemblies that work together to achieve the desired result. These assemblies are (refer to Figure 4-29):

- Positive Ball Lift Assembly
- Light Ball Sensor Assembly
- Ratchet Drive Assembly
- Track Rail Assembly
- Belt Tensioner Assembly
- Belt Tightener Assembly

4.2.4.2 Positive Ball Lift Removal

1. Turn off power to both pinspotters.
2. Remove the upper and rear ball lift guards.
3. Remove the two springs and extension rods, the two belt tightener springs, and the ratchet drive belt tensioner spring.
4. Remove the carpet drive belts, the ratchet drive belt, and the upper paddle drive belt from the PBL pulleys.
5. Remove the clamp studs from the upper and lower ball lift shaft mounting brackets, and lift the ball lift out of pinspotter.

4.2.4.3 Positive Ball Lift Installation

1. Place the upper ball lift shaft in the upper support brackets on the kickback plates.
2. Place all V-belts in position on the lift pulleys.
3. Put the lower ball lift shaft in the lower support brackets.
4. Install the clamp studs keeping the nuts loose.
5. Adjust the upper and lower shafts to center the lift with the track rails in accordance with Section 4.2.4.11.
6. Verify that the ball lift is aligned with the track rails. Adjustment is required when the ball lift shaft support brackets on the kickback plates are not aligned directly across from each other or are not at the same height.

7. If the ball lift is not aligned with the track rails:
   a. Rotate the ball lift support shafts so that the slots in the adjustable plates are in line with the direction of offset between the support brackets on the kickback plates (see Figure 4-30).

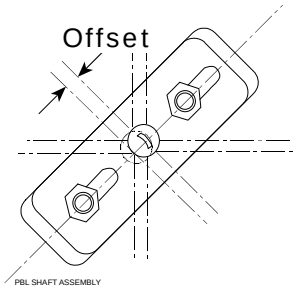


Figure 4-30

   b. Tighten the nuts on the clamp studs.
   c. Loosen the nuts on the upper and lower adjustable shaft assemblies, and adjust the ball lift support shafts within the slots of the adjustable plates until the ball lift and track rails are in alignment.
   d. Tighten the nuts on the upper and lower adjustable support shaft plates.

8. If an offset adjustment was made, or if a different ball lift is being installed, verify correct bumper height adjustment in accordance with Section 4.2.4.13.

9. Install all drive belts, springs, and spring extensions.

10. Reinstall the upper and rear guards.

11. Test the ball lift by running several balls through it to verify smooth operation, that the belt does not slip, and that the unit remains properly aligned.

4.2.4.4 Positive Ball Lift Belt Adjustment

1. If the lift belt rubs against the tube assembly when a ball is being elevated, adjustment is necessary. Use a spanner wrench and rotate the upper spring retainer until the length of the spring between the lower retainer and the upper washer is 4-1/8 inches (see Figure 4-31).

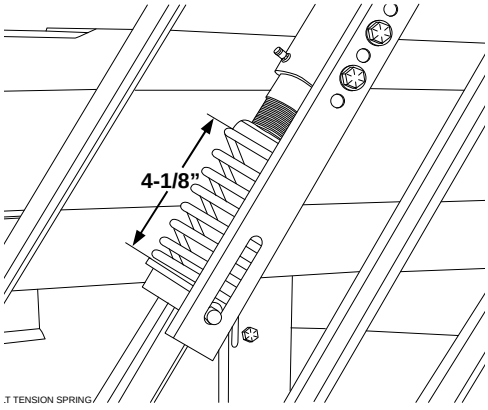


Figure 4-31

4.2.4.5 Sensor Assembly Operation

The cam follower roller must be low enough so that it will slide under the rudder cams when paddle movement is blocked, but high enough so that the rudder cams will lock behind it in the power drive position (see Figure 4-32). Washers are included in the assembly for fine tuning the height of the cam follower roller.

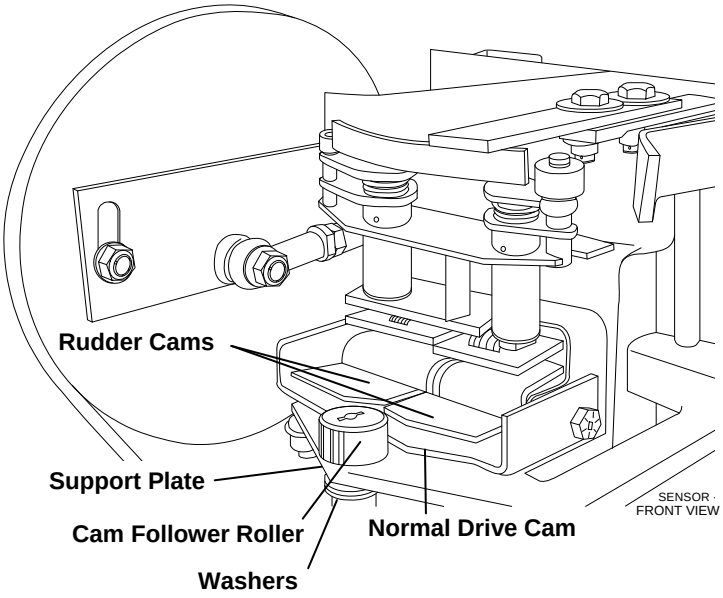


Figure 4-32

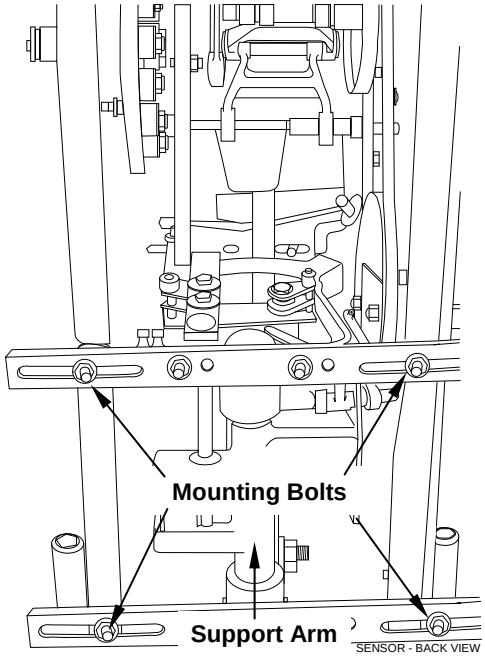


Figure 4-33

4.2.4.6 Sensor Adjustments

1. If the height of the cam follower must be adjusted:
   a. Remove the light ball sensor from the machine.
   b. Disconnect the support plate tension spring.
   c. Add or remove washers, as needed, between the cam follower and the support plate.
   d. Reconnect the support plate tension spring.
   e. Reinstall the light ball sensor in the pinspotter.
2. The ball lift sensor support arm should be centered between the side plates. Measure with a ruler. Loosen the mounting bolts and adjust if necessary (see Figure 4-33).

4.2.4.7 Rudder and Sensor Adjustments

1. Remove the retaining nut from the crank pin and save (see Figure 4-34).

2. Remove the rod assembly from the crank pin and swing it out of the way so that the sensor assembly can be moved manually.

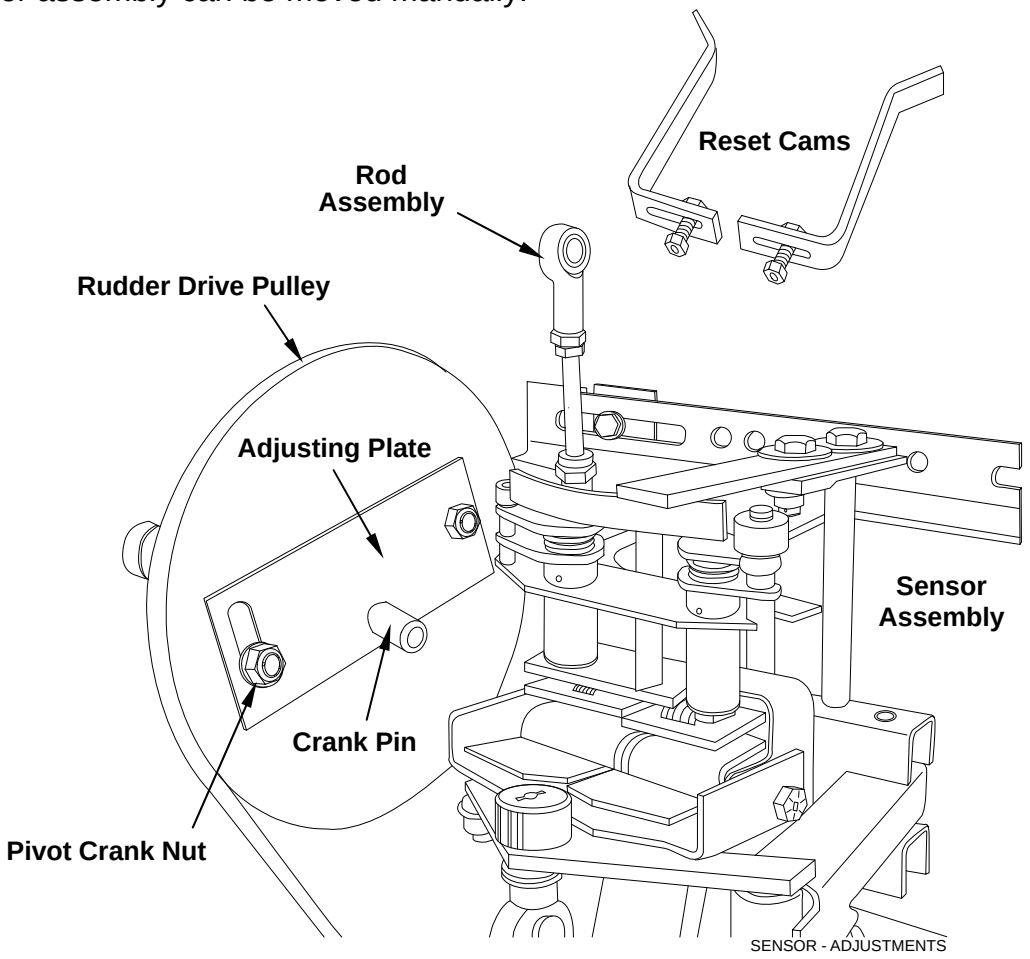


Figure 4-34

3. Remove both reset cams.

4. Loosen the pivot crank nut and turn the adjusting plate to the full clockwise position, then tighten the pivot crank nut to prevent the adjusting plate from moving.

5. Move the rudder arm back and forth so that it touches the rubber bumper on each side plate. The arm should move freely with no interference. If the paddle is not centered in the door opening, it may be necessary to adjust the length of the rudder arm for front-to-back alignment and/or shim the rudder arm support bracket for vertical alignment as shown in Figure 4-35.

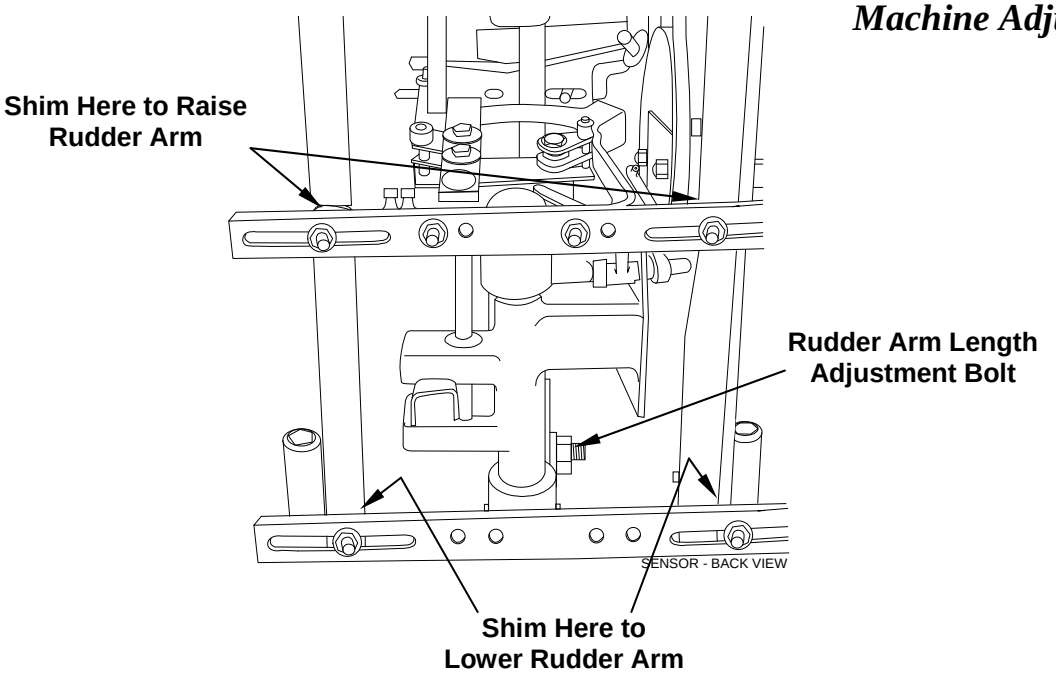


Figure 4-35

6. If not done previously, disconnect the spring from the belt tensioner and remove the belt from the rudder drive pulley.

7. Reattach the rod assembly to the crank pin and pivot the sensor assembly by manually rotating the rudder drive pulley to observe the travel of the rudder arm.

8. Adjust the length of the rod assembly so that the rudder arm swings equally to the left and right of the center position. Tighten the rod's jam nuts.

NOTE: Lengthening the rod provides more travel towards the odd machine while shortening the rod provides more travel towards the even machine. The rod assembly has right hand threads on both ends, so the rod end must be removed from the crank pin to make adjustments.

8. Loosen the pivot crank nut on the crank plate and rotate the plate in a counterclockwise manner to increase the overall stroke of the rudder arm. The correct adjustment is achieved when the rudder arm touches each rubber bumper on the left and right side plates with equal force without actuating the trip cam follower when the drive pulley is rotated. There should be a little overtravel (1/8 inch) on each side. Tighten the pivot crank nut.

9. Rotate the rudder drive pulley to recheck travel. If the rudder hits one bumper and not the other, repeat Steps 7 & 8.

4.2.4.8 Trip Cam Adjustments

1. Turn the drive pulley to place the rudder in the center of its travel (center of ball lift).

2. Push the trip cam followers forward as far as they will go. There should be a 1/8-inch gap on each side between the trip cam and rollers (see Figure 4-36).

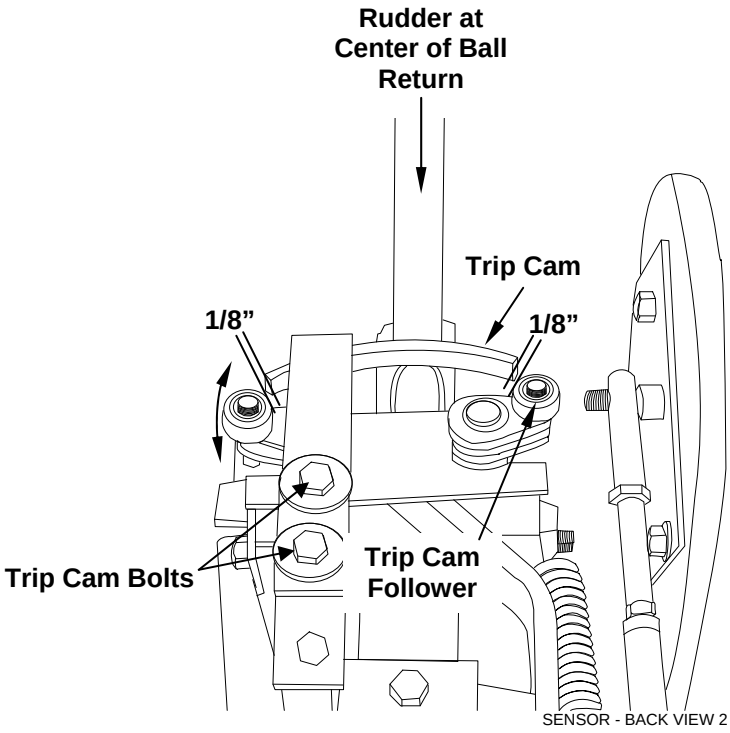


Figure 4-36

3. To adjust, loosen the trip cam bolts, reposition the cam, and retighten the bolts.

4. Recheck the clearance after tightening.

4.2.4.9 Reset Cam Adjustments

1. Rotate the drive pulley to place the rudder arm as far left as it will go, striking the bumper. Hold this position.

2. Install the left reset cam and move its angled surface to touch the trip cam follower. Tighten the cam’s mounting bolt.

3. Repeat Steps 1 and 2 for the right side reset cam.

4.2.4.10 Checking the Reset Cam

1. Manually rotate the rudder drive pulley. While the sensor is moving back and forth, move one of the trip cam follower rollers towards the rear of the machine. Continue rotating the drive pulley until the roller contacts the reset cam, returning the trip cam follower roller to its normal (forward) position.

2. Manually push the trip cam follower roller forward to check that it has fully returned to its forward position.

3. If the trip cam follower roller has fully returned to its forward position, the reset cam is properly adjusted. If the roller has not fully returned to its forward position, adjust the reset cam inward a small amount and repeat Steps 1 and 2.

4. Check and, as necessary, adjust the other trip cam follower roller in the same manner.

5. Install the belt on the rudder drive pulley.

6. Replace the spring on belt tensioner.

7. On the chassis, turn the Back End switch ON.

8. Apply power to the machine.

⚠ CAUTION **Keep your hands away from belts, pulleys, and other rotating equipment! Failure to do so can result in severe personal injury to the hands and arms.**

9. Retest the operation of the trip cam follower rollers. Use a screwdriver or wooden stick in the open end of the rudder arm to cause the rudder to actuate each roller. If the roller does not return to its forward position properly during the subsequent sweep of the assembly, turn power to the machine OFF and readjust the reset cam.

10. Retest under power until both reset cam settings are correct.

4.2.4.11 Positive Ball Lift Assembly Adjustment

1. Positive Ball lift assembly must be centered between the return rails (Figure 4-37). To adjust, loosen the nuts on the four clamp studs in the upper and lower mounting brackets, adjust the lift from side to side as needed, and retighten the nuts.

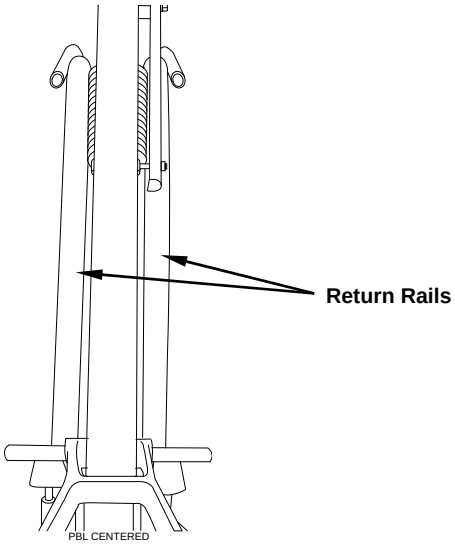


Figure 4-37

2. The Positive Ball Lift belt tension spring should be compressed to 4-1/8 ±1/8" for proper tension on the lift belt (see Figure 4-38). Take this measurement between the top edge of the spring and the upper edge of the lower spring retainer. Adjust by tightening or loosening the upper retaining ring using a spanner wrench.

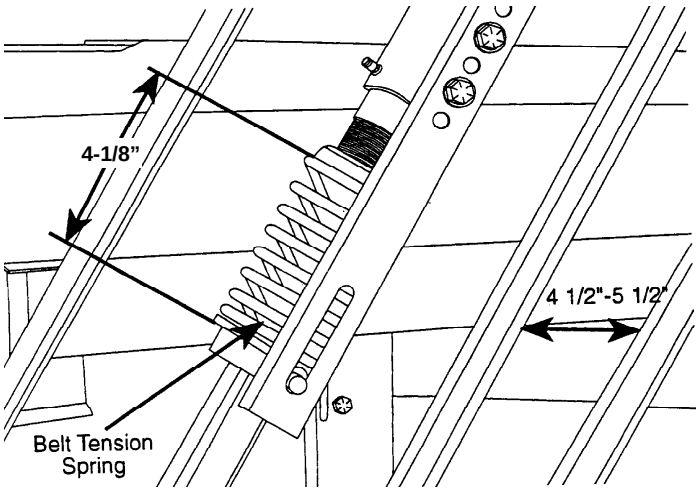


Figure 4-38

4.2.4.12 Lift Arm Adjustment

1. Measure the height of the lift arm above the door weldment (see Figure 4-39). This distance should be between 1/8 and 3/16 inches. Adjust this gap by adjusting the length of the rod that connects between the lift arm and the ratchet drive assembly (see Figure 4-40). The rod has right hand threads on both ends, so one end of the rod must be disconnected in order to make the adjustment. Shortening the rod raises the lift arm, lengthening the rod lowers the lift arm. Tighten the jam nuts after completing the adjustment.

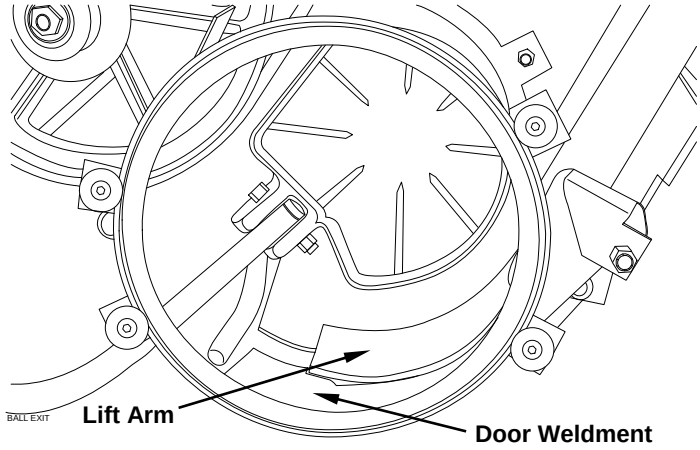


Figure 4-39

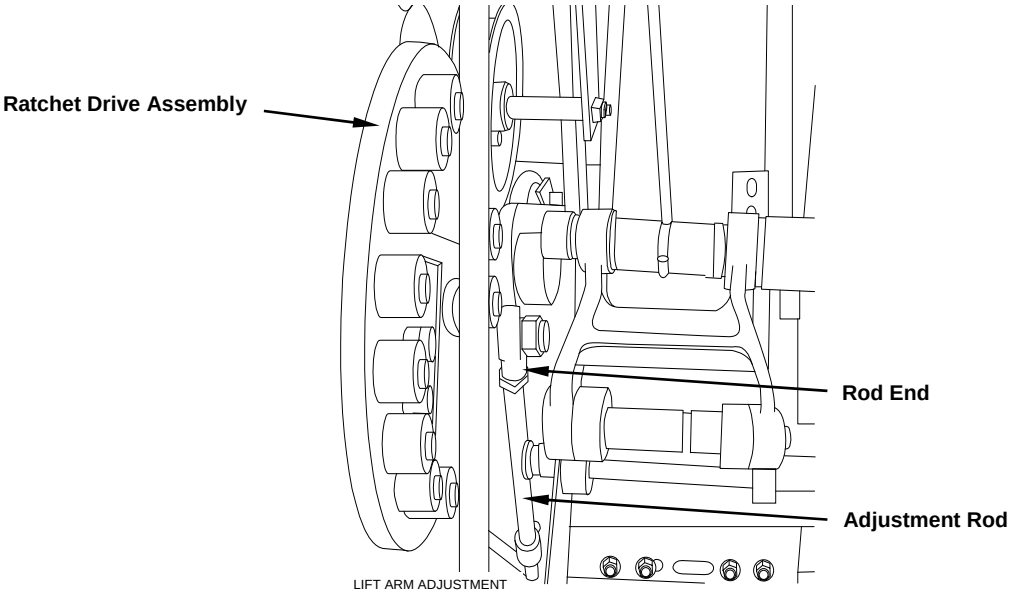


Figure 4-40

4.2.4.13 Rubber Bumper Adjustments

1. Place a bowling ball on the lift arm assembly (see Figure 4-41).

2. Measure the clearance between the ball and the ball lift belt. This clearance should be no more than 1/4 inch.

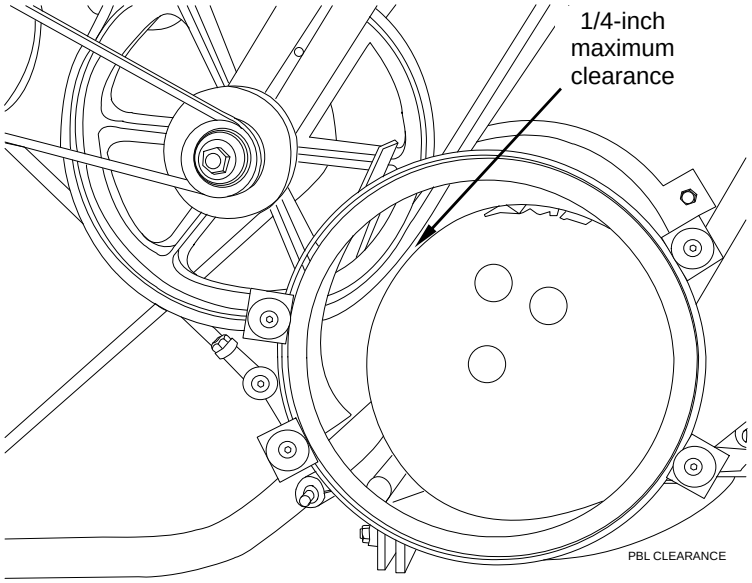


Figure 4-41

3. Adjust this clearance by adjusting the height of the rubber bumpers (see Figure 4-42). Following adjustment, tighten the jam nuts.

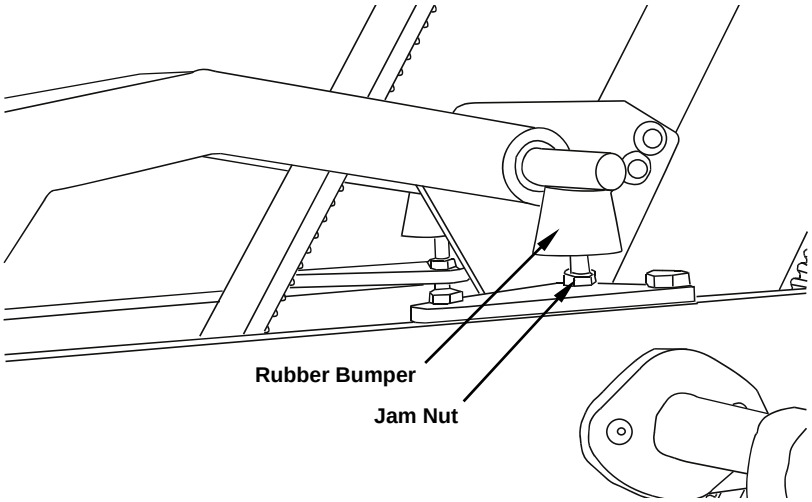


Figure 4-42

4.2.5 DISTRIBUTOR OPERATION & ADJUSTMENTS

4.2.5.1 Distributor Operation

The distributor transfers pins from the elevator wheel to the bin assembly. The distributor is driven by an adjustable clutch through its various positions. A large nylon gear serves a dual purpose:

- The outside of the gear contains a cam that moves the distributor left and right to the various bin locations.
- The inside of the gear has a cam that controls the telescoping action of the front portion of the distributor. Springs keep the cam followers against the cams.

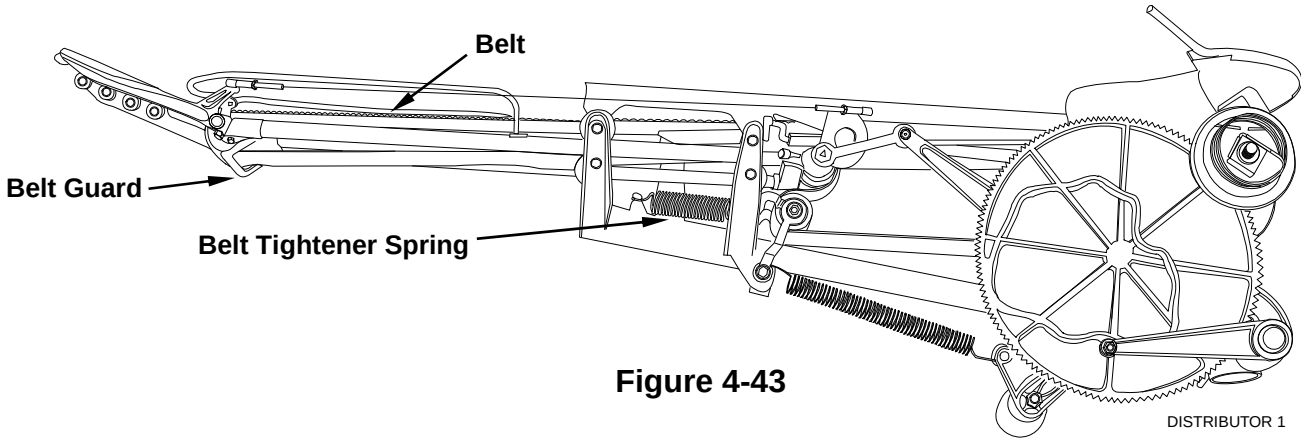


Figure 4-43

4.2.5.2 Distributor Belt Replacement

1. Remove the belt tightener spring.
2. Locate the belt lacing and remove the belt pin. The distributor belt can now be removed from the distributor. The approximate finished belt length is from 117 to 117-1/4 inches.
3. To increase the belt tension, cut off a little from one end of the belt. Belt tightener spring length will increase one-half of the amount cut off of the belt. (If .50 inches is cut off, the spring length will increase by .25 inches.) A belt that is a little too long or short can cause pin feeding problems, and the ideal length can vary a little from machine to machine.
4. Use the clipper belt lacer ST #030-003-542 to install new clips on the belt in accordance with Section 4.1.3.
5. Thread the belt onto the distributor keeping one end on the belt runner about a foot behind the trip arm making sure to thread the belt through the belt guard. If

necessary, use another distributor as a guide to belt layout. When threaded, bring the two ends together, interlock the lacing, and install the belt pin. The end of the pin can be bent over to keep the pin from working loose.

6. Reinstall the belt tightener spring.

7. Turn the machine on and verify proper operation. If the belt tracks excessively off to one side, turn the machine off, disconnect the belt tightener spring from the distributor casting, and move the end of the spring that is attached to the tracking bracket one notch toward the side to which the belt was tacking. Reattach the other end of the spring.

8. Run the machine and make any necessary adjustments.

4.2.5.3 Distributor Removal

1. Disconnect the drive shaft and universal joint from the distributor drive unit.

2. Remove the lateral drive spring and safety link spring from the base of the distributor (see Figure 4-44).

3. Make sure that the elevator wheel is turned so that a pin bracket is not directly above the orientor pan of the distributor.

4. Lift the distributor assembly upward off the support post. Save the spacer between the support post and the distributor for reuse during distributor installation.

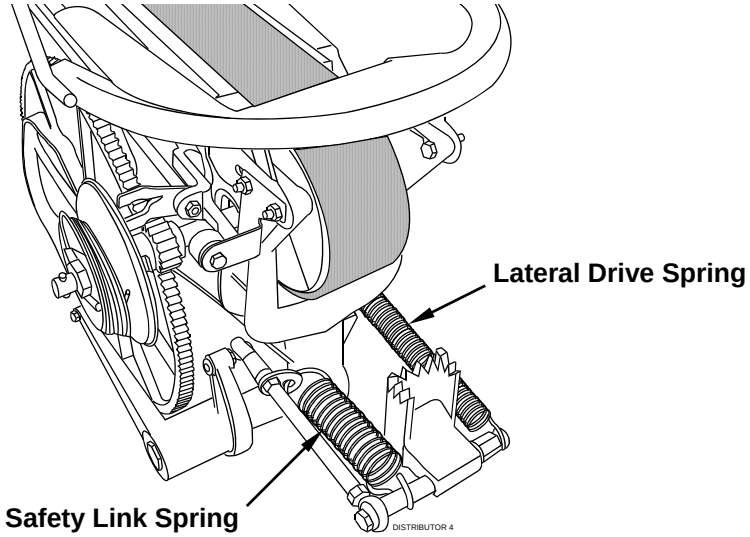


Figure 4-44

4.2.5.4 Distributor Replacement

1. To replace the distributor drive assembly, follow the removal procedure in reverse order. Ensure that only one spacer is installed between the support post and the distributor.

2. Check the timing marks for correct alignment. The distributor must be at the #1 bin position when checking or adjusting. There is a raised bump on the large nylon gear at the base of one of the valleys between the teeth and a notched tooth on the pinion gear that must be opposite one another for correct timing. The nylon gear is flexible and can be disengaged from the pinion by applying pressure towards the distributor where the gears mesh to allow realignment of the marks.

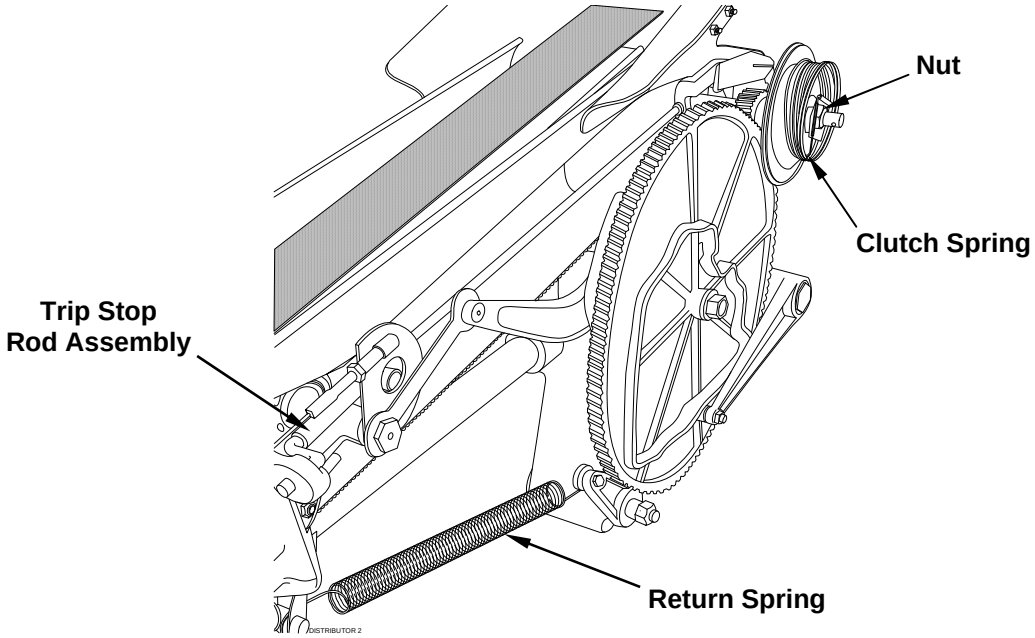


Figure 4-45

3. Set the clutch spring tension (Figure 4-45). With the clutch nut finger tight on the shaft, rotate the spring's adjusting clip in the counterclockwise direction until you just start to feel some spring tension. Continue rotating the clip an additional 3/4 turn, and then slide the clip onto the clutch nut. Power up the machine and feed pins.

   a. If the spring is not compressed enough, the distributor will stall between the #6 and #10 positions. Add more tension to correct this condition.

   b. If the distributor hesitates or fails to index, other than mentioned in the previous step, tension must be removed by reducing the spring tension.

   c. Adjust the spring tension one notch at a time, and use the minimum tension that produces acceptable results.

4. When the distributor is at the #1 bin position, the distance between the distributor orientor pan and the elevator wheel should be as close as possible without touching (¼ inch or less) and should not touch during pin wheel and distributor operation. If adjustment is necessary, loosen the orientor pan's mounting bolts and position accordingly.

4.2.5.5 Distributor Cam Operation

The cam has a timing mark along its outer edge at the base of a valley between two teeth. This bump and a notched tooth on the pinion gear must be aligned for proper timing. See the previous section for instructions on how to realign the cam and pinion gear. The outer face of the large cam is marked for the feed positions of the pins, which are attained as the outer cam follower traces the path laid out by the cam sections. **The pin feed sequence is 1, 3, 2, 4, 7, 8, 5, 6, 10, 9.**

The inside of the cam controls the telescoping of the distributor using cam sections and a cam follower in a manner similar to the operation described in the previous paragraph. During operation, the distributor is forced inward by the action of the inner cam follower, and telescopes outward because of a combination of return spring tension and a moving belt's tendency to straighten out whenever the cam follower's linkage allows it to do so.

4.2.5.6 Distributor Adjustments

1. Index the distributor trip stop rod (Figure 4-45) to position the distributor at the #1 bin position.

2. Inspect the nylon cam gear and pinion gear to verify that the timing marks are aligned.

3. The distributor should be in line with the #1 and #5 bins. To adjust, loosen the jam nut on the hoop weldment end of the safety link rod (see Figure 4-46) and rotate the safety link rod to either increase or decrease the length of the rod to obtain the correct alignment. Tighten the jam nut.

4. Operate machine and note the pin feed operation at the individual bin pockets. The rod length may have to be readjusted slightly to obtain accurate pin feed.

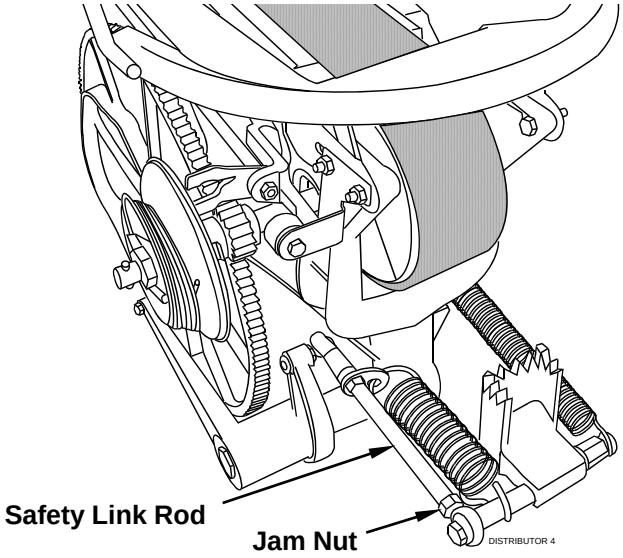


Figure 4-46

4.2.5.7 Distributor Roller Adjustments

1. Starting with the distributor at the #1 bin position and the back end drive motor turned off, telescope the distributor inward so that it is at its minimum length.

2. Position the front lower adjustable roller in its lowest position so that the distance between the roller and the carriage tube is at its maximum. (See Figure 4-47.)

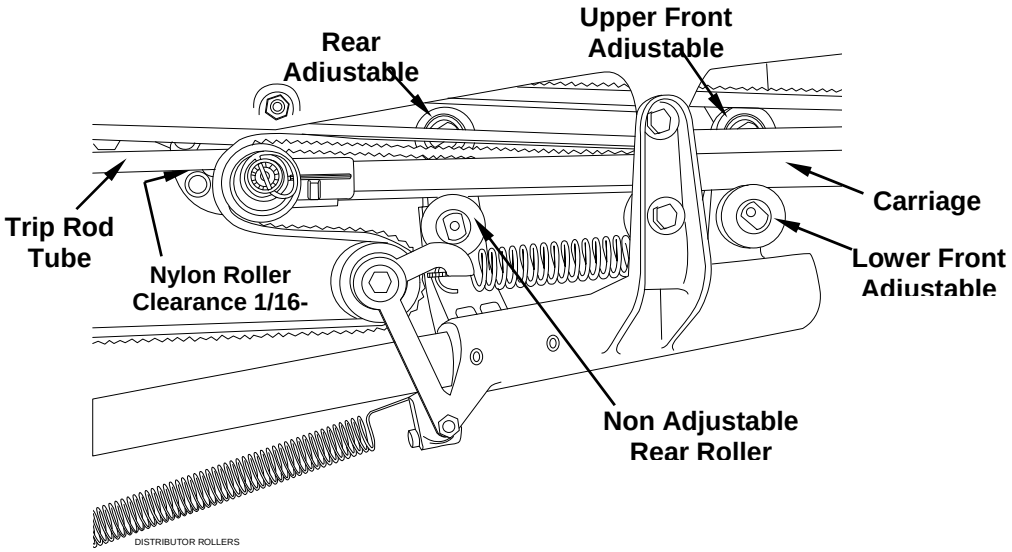


Figure 4-47

3. Bring the rear adjustable roller down until there is a noticeable drag against the carriage tube when you turn the roller. (Too much drag could prevent the distributor from extending.)

4. Adjust the upper front adjustable roller until the trip rod tube and carriage tubes are parallel to each other.

5. Position the front lower adjustable roller up until it just makes contact with the carriage tube.

6. Recheck the rear adjustable roller to ensure that it is not exerting too much pressure against the carriage tube. Adjust if necessary.

7. Adjust the length of the cable assembly (Figure 4-48) so that the clearance between the nylon rollers and the trip rod tube is approximately 1/16 inch (Figure 4-47) and is the same in all positions of the distributor.

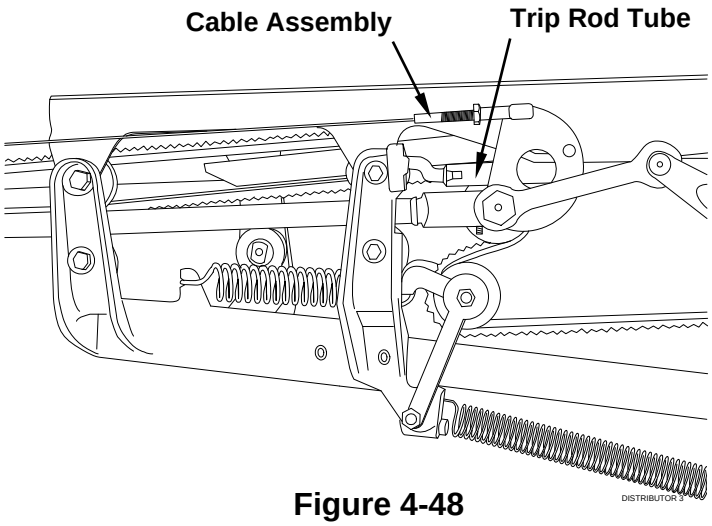


Figure 4-48

8. Operate the distributor under power and observe. As necessary, fine-tune the rollers and trip cable.

4.2.5.8 Distributor Trip Lever

1. Operate the distributor trip lever. Inspect for mechanical binds in the lever and associated linkage. Check that the rollers turn freely.

2. As a pin transfers from the distributor belt onto the trip lever, the weight of the pin causes the lever to pivot downward as it is deposited in the bin. After depositing the pin the trip lever is returned to the up position by a spring located at the rear of the carriage tube (see Figure 4-49). This tripping and resetting action actuates the trip rod allowing the distributor to index to the next bin position. The spring tension is factory set for 1/2 turn. Too much spring tension would prevent the trip lever from deflecting causing the distributor to fail to index.

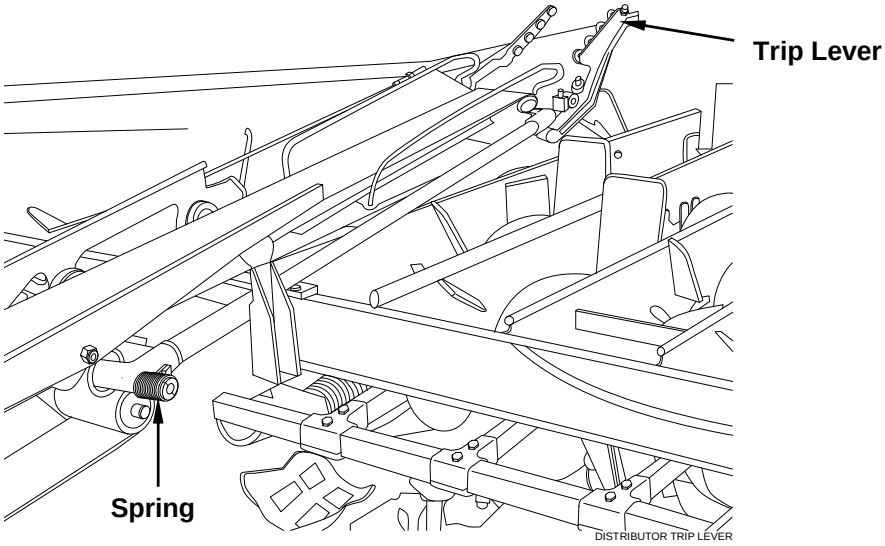


Figure 4-49

4.2.6 SHUTTLE AND BIN OPERATION & ADJUSTMENT

4.2.6.1 Shuttle and Bin Operation

The shuttle, located below the bin, holds the pins in the bin until a new setup is required. When the shuttle cam follower travels into the low point of the shuttle cam, the shuttle momentarily moves forward allowing a set of pins to drop through from the bin to the spotting cups.

The bin assembly will store two sets of pins.

4.2.6.2 Shuttle and Bin Adjustments

Note: Adjustments must be made with no pins in the bins.

1. There should be approximately 1.719 inches between the back edge of the bin's back channel and the leading edge of the shuttle assembly measured at the center of the bin using gauge ST #070-006-519 (see Figure 4-50). To adjust, disconnect one end of the shuttle connecting rod at the front of the shuttle, loosen the jam nut, and adjust the length of the rod accordingly. Tighten the jam nut and reconnect the rod.

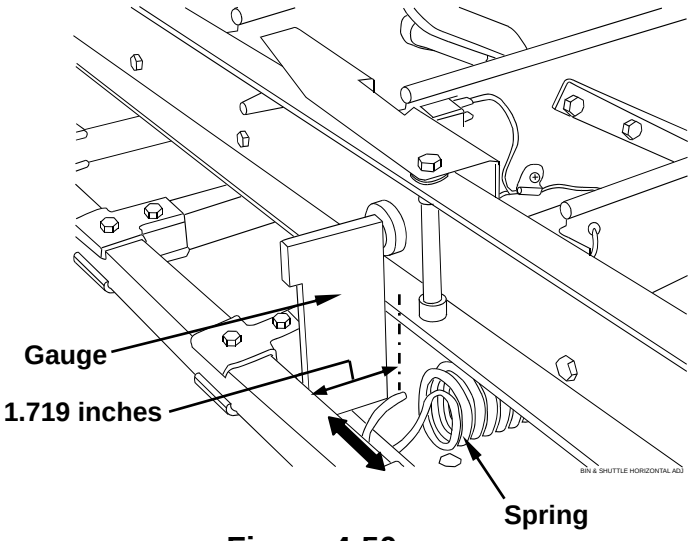


Figure 4-50

2. The shuttle assembly should be centered directly under the bins. Adjustment is made by repositioning spring (see Figure 4-50) to another location on the spring strap.

3. The vertical distance from the bin's rear channel to the shuttle assembly should be 7/8 inch measured at the rear corners of the shuttle. Adjust the length of the adjusting rods (see Figure 4-51) to obtain this dimension on each side.

Note: The threads on both ends of the adjusting rods are right handed. One end of each rod must be removed to lengthen or shorten.

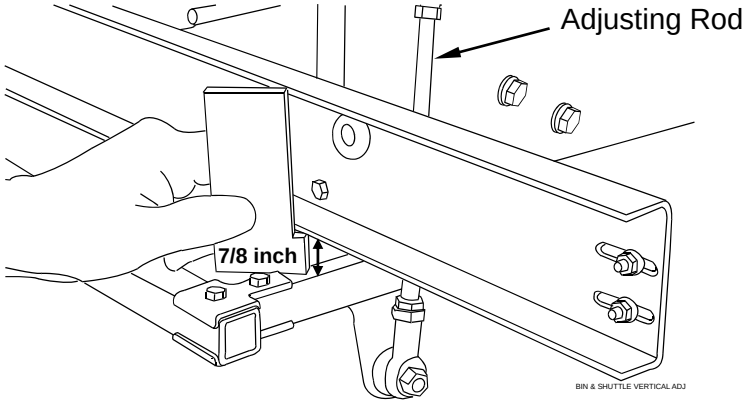


Figure 4-51

4.2.6.3 Bin Switch Operation

The bin switch (BS) is located in the bin framework between the #8 and #9 pin locations. The #9 bin position is the last one filled when preparing the bin for the next set up of pins. When the 10th pin is delivered to the #9 bin position, it actuates the bin switch (see Figure 4-52), which sends a signal to the chassis indicating that 10 pins are ready for a spotting cycle.

To test the switch, operate the lever several times. If the switch does not actuate, loosen the switch mounting screws and reposition the switch accordingly. Tighten the screws.

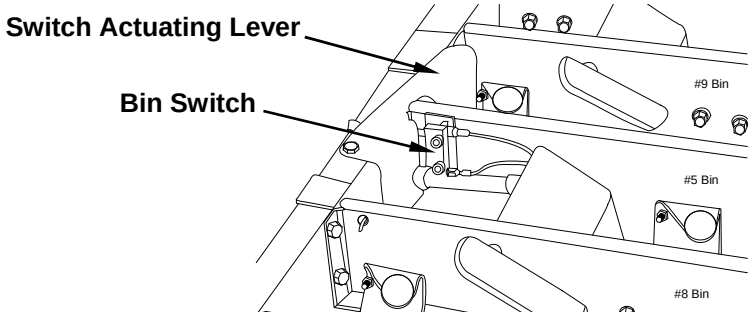


Figure 4-52

4.2.7 CUSHION OPERATION & ADJUSTMENTS

4.2.7.1 Cushion Shock Absorber Adjustment

Note: This adjustment can be made either with the shock absorber mounted in the machine or held in a vise.

⚠CAUTION If the shock absorber is held in a vise, clamp the shock on its end only. DO NOT PLACE THE PISTON IN A VISE.

1. Loosen the collar's lock screw.
2. Insert a 1/2-inch open-end wrench between the coils of the spring at the point where the piston rod exits the piston so that the open end of the wrench straddles the piston rod.
3. Hold the wrench against the piston while turning the spring. When the length of the spring is 6¼ inches, slide the collar against the spring, tighten the collar's lock screw, and remove the wrench.

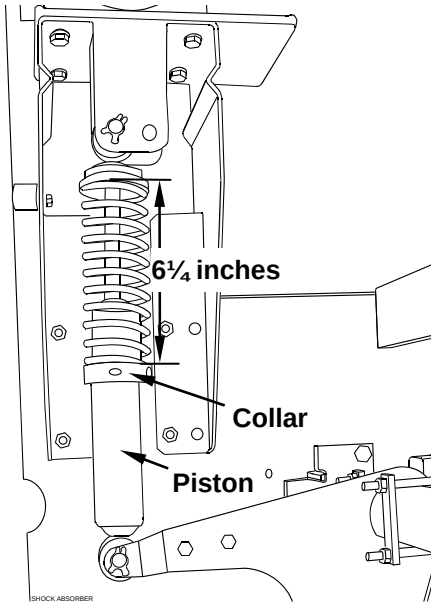


Figure 4-53

4.2.7.2 Cushion Removal

1. Unlatch the pin curtain.
2. Remove one X-washer from the shock absorber mounting pin and remove the pin to release the shock absorber from the cushion assembly.
3. Remove the three screws that mount the support box to the kickback plate (See Figure 4-54) ***on the shock absorber end of the cushion only***!
4. Slide the free end of the cushion forward until the other end comes free from its mount block. Remove the cushion assembly from the machine.
5. To replace, reverse the above procedure.

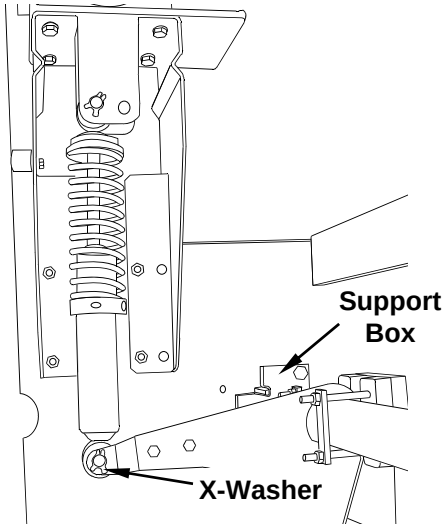


Figure 4-54

4.2.7.3 Replacing Rubber Rivets

1. Remove any remaining sections of the broken rivet.
2. Lubricate the raised portion of the rivet stem with liquid soap.
3. Push the rivet through the cushion assembly until about 1 inch protrudes through the back of the wooden plank.
4. Insert the end of the rubber rivet protruding through the wooden plank through the hole near the end of the carpet installing tool (784-003-000).
5. Use the tool as a crank to pull on the rivet until the raised portion of the stem is pulled through the back of the wooden plank.

4.2.8 CARPET ADJUSTMENTS

4.2.8.1 Carpet Removal Procedure

⚠CAUTION **Turn OFF the machine being worked on as well as the machines on each side of the machine being worked on while replacing the carpet.**

1. Disconnect the carpet drive belt from the carpet pulley on the rear roller, and remove the pulley from the roller.
2. Remove the paddle from the rudder arm.
3. Release the front roller from its bearing supports as follows:
   a. Insert the carpet installing tool between the front roller and the tail plank.
   b. Apply pressure toward the rear of the machine. When the bearing support bracket clears the hole in the kickback plate, insert a carpet pin (792-501-001) into the hole.
   c. Repeat steps 3a and 3b for the other side of the machine.
4. Remove the front roller by rolling it over the bounce plate and out the ball exit opening into the adjacent machine.

⚠CAUTION **Spring tension on the roller bearing support brackets should be removed while working in the pit. Personnel can be injured if a carpet pin is accidentally knocked out.**

a. Place the flag (792-502-002) of the carpet installing tool onto the bearing support assembly (see Figure 4-55).

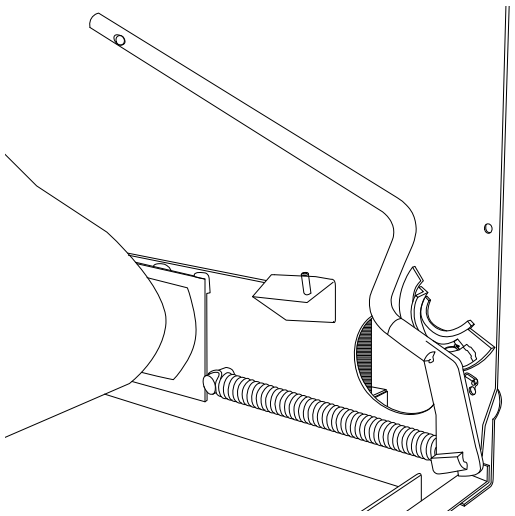


Figure 4-55

b. Apply pressure toward the rear of the machine and remove the carpet pin from the hole in the kickback plate.

c. Slowly release the tension on the bearing support assembly until it rests on the tail plank. **DO THIS PROCEDURE WITH CAUTION.**

d. Repeat steps 4a through 4c for the other side of the machine.

5. Unhook the rear roller support from its bracket and tip the rear roller from its bearing support.

6. Remove the rear roller passing it into the adjacent machine through the access hole in the kickback plate on the side opposite the ball exit side of the machine.

7. Remove the four 5/16-inch nuts and washers that secure the vibration dampeners to the studs on the pit support brackets at each corner of the bounce board assembly.

8. Lift the carpet and bounce board assembly onto the pin deck and slide out onto the lane.

4.2.8.2 Carpet Replacement Procedure

⚠ CAUTION **Turn OFF the machine being worked on as well as the machines on each side of the machine being worked on while replacing the carpet.**

1. Note the direction of the arrow on the carpet. This may be located either on the inside or outside of the carpet.
   a. Place the bounce board assembly inside the carpet with the V-shaped cutout toward the ball exit. The arrow on the carpet must point in the direction the carpet turns during operation.
   b. Wrap the carpet around the bounce plate assembly and place it in the pit slightly forward on the pit support brackets.
   c. Do not fasten the bounce plate down at this time.
2. Install the rear roller by passing it from the adjacent machine on the side opposite the ball exit side of the machine, through the opening in the rear of the kickback plates and through the carpet. The axle of the roller should protrude through the hole in the kickback plate and into the space occupied by the PBL.
3. Place the rear roller bearings in the bearing supports and hook the handle of the rear roller support bracket under the retaining tab on the kickback plate.
4. Install the carpet drive pulley and belt.
5. Place the bounce plate in position inserting the studs on the pit support brackets through the mounting holes in the vibration dampers.
6. Place the free end of the grounding strap over the stud at the right rear vibration dampener and install the washers and 5/16-inch lock nuts onto the studs at each corner of the bounce plate assembly. Tighten securely. Make sure that the carpet is free and not pinched between the bounce board and brackets.
7. Install the front roller by passing it through the ball exit opening of the adjacent machine and into the carpet on top of the bounce board, but do not position in the bearing supports yet.
8. Before the front roller can be replaced, spring tension must be applied to the bearing support assemblies.

⚠ CAUTION **Keep your fingers clear of any moveable parts while applying spring tension. A severe pinching hazard exists.**

a. Place the flag on the carpet installing tool, and hook the tool on the bearing support assembly as shown in Figure 4-55.

b. Apply pressure toward the rear of the machine until the bearing support bracket clears the hole in the kickback plate, and insert the carpet pin into the hole. The carpet installing tool can be rotated in the flag while applying pressure in order to provide additional clearance.

c. Repeat steps 8a and 8b for the other side of the machine.

d. Install the front roller in the bearing supports.

e. Grasp the end of the roller assembly on the top only and roll it into the support assembly. Repeat for the other end of the roller. Make sure that the roller bearings are fully seated in the bearing supports.

f. Apply pressure at one end of the front roller with the carpet installing tool and remove the carpet pin. Carefully ease off on the roller. Repeat for the other end of the roller.

9. Reinstall the paddle on the rudder arm.

NOTE: Some break-in may be required for certain styles of carpet belts.

4.2.9 PIN WHEEL ADJUSTMENTS

4.2.9.1 Pin Guide Rail Adjustments

1. Remove the pin guide rail and adjust the rubber mounts so that they are in the center of their mounting slots on the rail standoff bracket. Tighten the nuts securely.

2. Position the pin guide rail on the studs of the rubber mounts so that the guide rail is as far as possible from the orientor pan. (The studs will be against one end of the guide rail's slots as shown in Figure 4-56.)

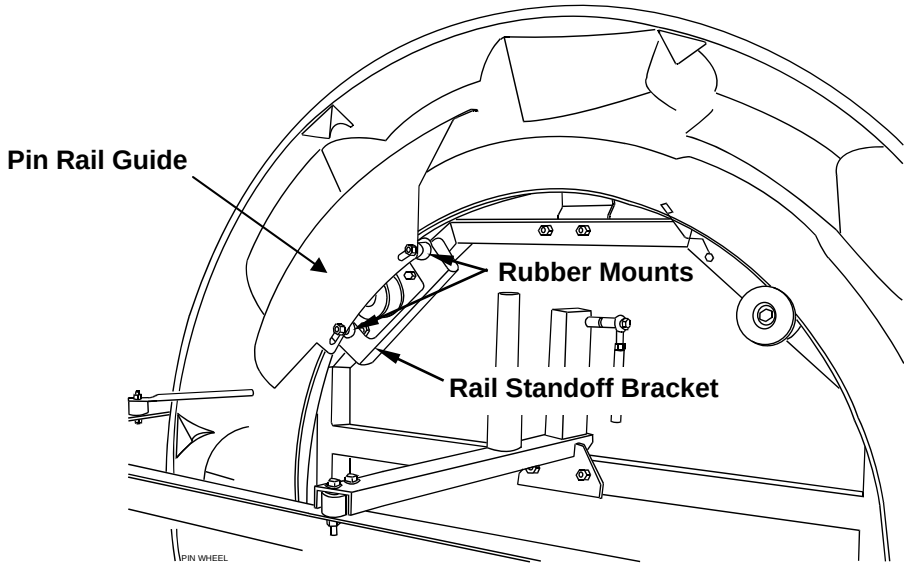


Figure 4-56

3. Run the machine and observe the guide rail as pins pass over it and observe the pins as they fall from the pin wheel onto the orientor pan. The pins should not cause the guide rail to deflect significantly and should fall onto the center of the orientor pan.

   a. If the guide rail deflects significantly as a pin passes over it, this indicates that the guide rail is too high. Repeat the procedure from step 1 lowering the rubber mounts instead of centering them.

   b. If the pins are not deposited in the center of the orientor pan, adjust the pin guide rail closer to the orientor pan until the pins fall onto the center of the pan.

NOTE: Either adjustment affects the other. Whenever an adjustment is made, check to see if readjustment of the other setting is needed.

4. Run the machine and observe the pins orienting to the distributor as they approach the orientor pan both butt first and head first. Pins should drop onto the center of the pan, and roll free of the pin wheel. The pins should not shift or bind as they pass over the guide rail and should release cleanly at the drop-off point.

4.2.9.2 Pin Seating Rod Adjustment

1. Loosen the lock nut and position the pin seating rod (Figure 4-57) so that it clears the pin bracket by approximately 1/4 inch. Tighten the lock nut.

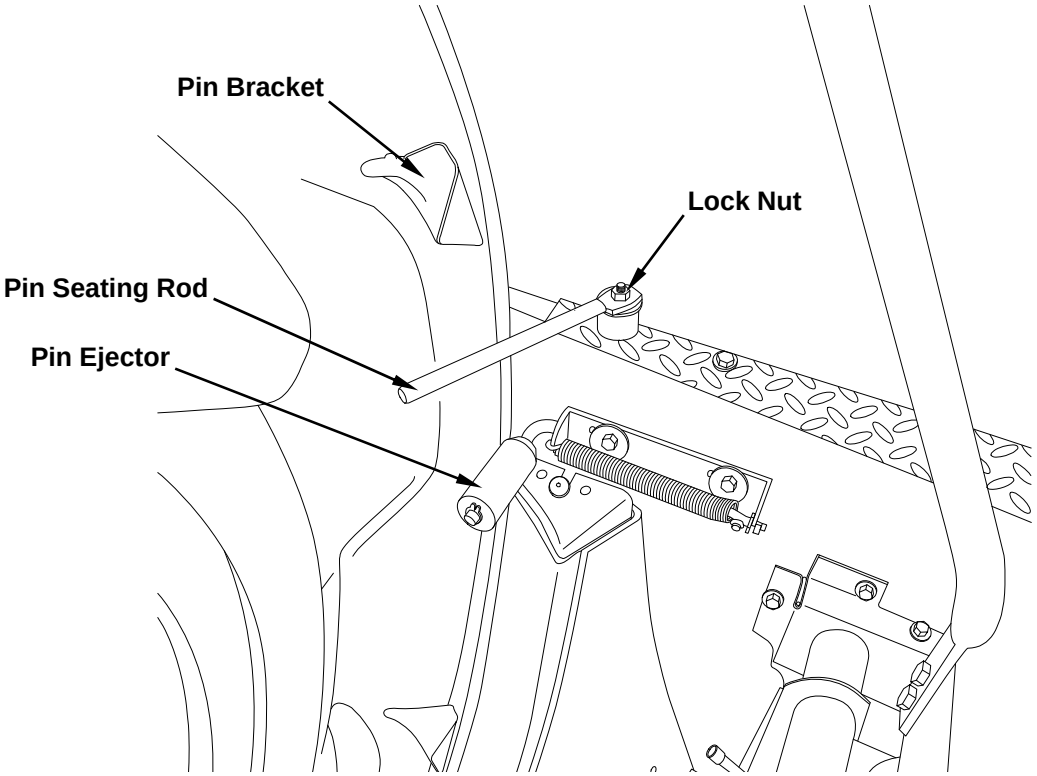


Figure 4-57

4.2.9.3 Pin Ejector Adjustment

1. Loosen the pin ejector mounting bolts using a 1/2-inch wrench.

2. Position the pin ejector assembly in the machine so that the beveled edge of the roller assembly is approximately 1/4 inch from the pin wheel. Tighten the bolts.

3. Observe pins as they pass by the pin ejector. A properly seated pin should not touch the pin ejector.

4.2.9.4 Pin Wheel Drive Belt Tensioner Adjustment

The pin wheel belt tensioner assembly (Figure 4-58) consists of an inner section and an outer section. The inner section has one indicator mark cast into its perimeter. The outer section contains a pulley as well as ten indicator marks (in two groups of five to accommodate left hand and right hand installations) on the casting. Adjustment requires the use of 9/16-inch and 15/16-inch wrenches.

1. Loosen the tensioner's through-bolt just enough to allow free movement of tensioner assembly.

2. Using a 15/16-inch wrench, turn the large central nut on the outside of the tensioner assembly so that the pulley rotates just beyond the 12:00 o'clock position and contacts the pin wheel drive belt. Continue rotating the central nut to apply tension to the belt until the mark on the inner perimeter of the tensioner aligns with the middle (third) mark on the outer section. Hold this setting and tighten the through-bolt.

   This setting should provide the correct tension, but slightly more or less tension may be applied, as needed, to provide smooth operation.

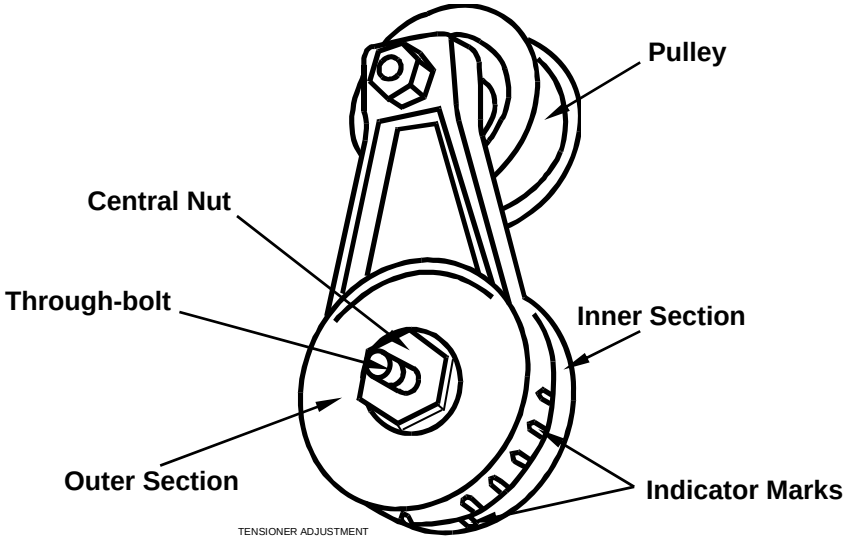


Figure 4-58

CHASSIS REPLACEMENT

(Refer to Attachment A, the *90XL Chassis Manual*)

MOTORS AND GEARBOXES

(Refer to Attachment B, the *AMF Pinspotter Motor and Gearbox Manual*

SCORING CAMERA

(Refer to Attachment C, the *AccuCam 3000 Camera Manual*

MANAGER'S CONTROL UNIT (MCU)

(Refer to Attachment D, the *Manager's Control Unit (MCU) Operations and Maintenance Manual*

SECTION 4.3

Lubrication

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4.3. LUBRICATION INSTRUCTIONS

4.3.1 LUBRICATION

Lubrication is one of the most important items in the proper operation and maintenance of the 90XL Pinspotter. Care must be taken to insure that lubricants are applied correctly. Avoid excessive lubrication to minimize the possibility of transmitting lubricants to the bowler. Before lubrication of exposed parts or surfaces, it is important that the old lubricant first be removed. It is also very important to clean the pinspotter as you lubricate.

This section of the manual shows the points of lubrication, the correct lubricants to use, and the frequency of lubrication for each part of the machine.

4.3.2 LUBRICANT SYMBOLS

[1] **OILING:** Items indicated by a number within a square require oiling. Use SAE #10 oil as the lubricant.

(1) **GREASING:** Items indicated by a number within a circle require greasing. Use a multi-purpose grease (Bearing Guard #2) as the lubricant.

NOTES: Refer to Attachment B, the *Pinspotter Motor and Gearbox Manual*, of this manual for proper lubrication instructions for these items. Use only AMF Gear Lube in the gearbox!

There are 52 uniball rod ends on each pair of 90XL Pinspotters. Although they are considered greaseless and maintenance free, an occasional drop of oil on a rod end may be desired to prevent squeaking.

4.3.3 TABLE DRIVE ASSEMBLY

1. Table cam lever rollers (3 places): 1 drop of oil every 3 months.
2. Table cam lever pivots (6 places): 1 drop of oil every 3 months.

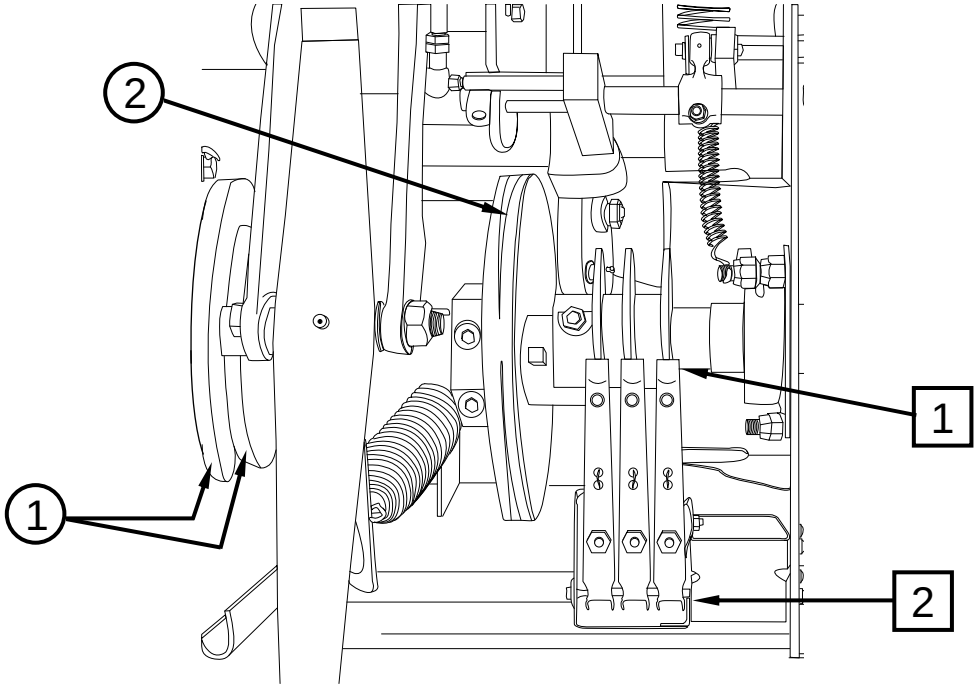


Figure 4-60

(1) 3. Apply light coating of grease once a month on the table spot and respot cams.

(2) 4. Apply light coating of grease once a month on the shuttle cam.

4.3.3 TABLE DRIVE ASSEMBLY - continued

[1] 1. Spotting hook pivot bushings (2 places): 1 drop of oil every 2 months.

[2] 2. Upper spotting link assembly bushings (2 places): 1 drop of oil every 2 months.

[3] 3. Solenoid linkages (6 places): 1 drop of oil every 2 months.

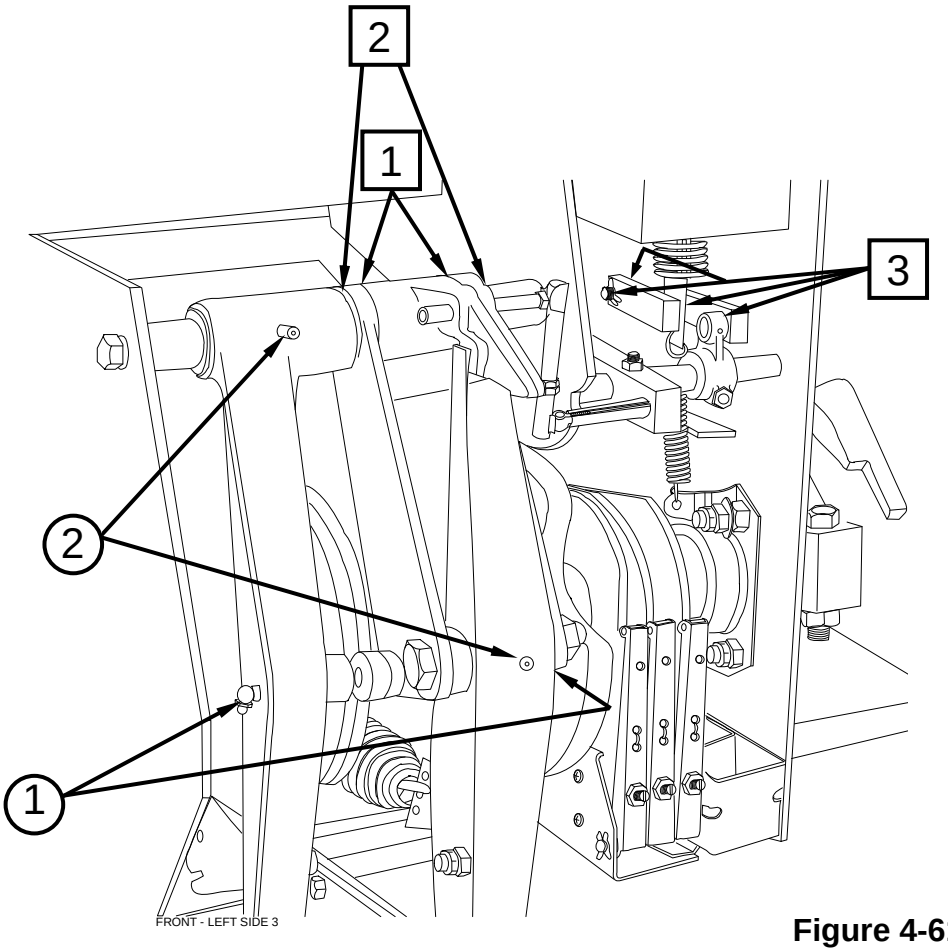


Figure 4-61

(1) 4. Grease the spot and respot cam follower bearing once a month.

(2) 5. Grease the spot and respot levers every 3 months.

4.3.3 TABLE DRIVE ASSEMBLY - continued

1. Cam lever shaft (4 places): 1 drop of oil every 2 months.
2. Roller arm assembly (3 places): 1 drop of oil every 2 months.
3. Crank housing (2 places): 1 drop of oil every 2 months.
4. Latch pivot (2 places): 1 drop of oil every 2 months.
5. Off-spot lever pivot (2 places): 1 drop of oil every 6 months.
6. Spring hanger pivot bolts (2 places): 1 drop of oil every 2 months.

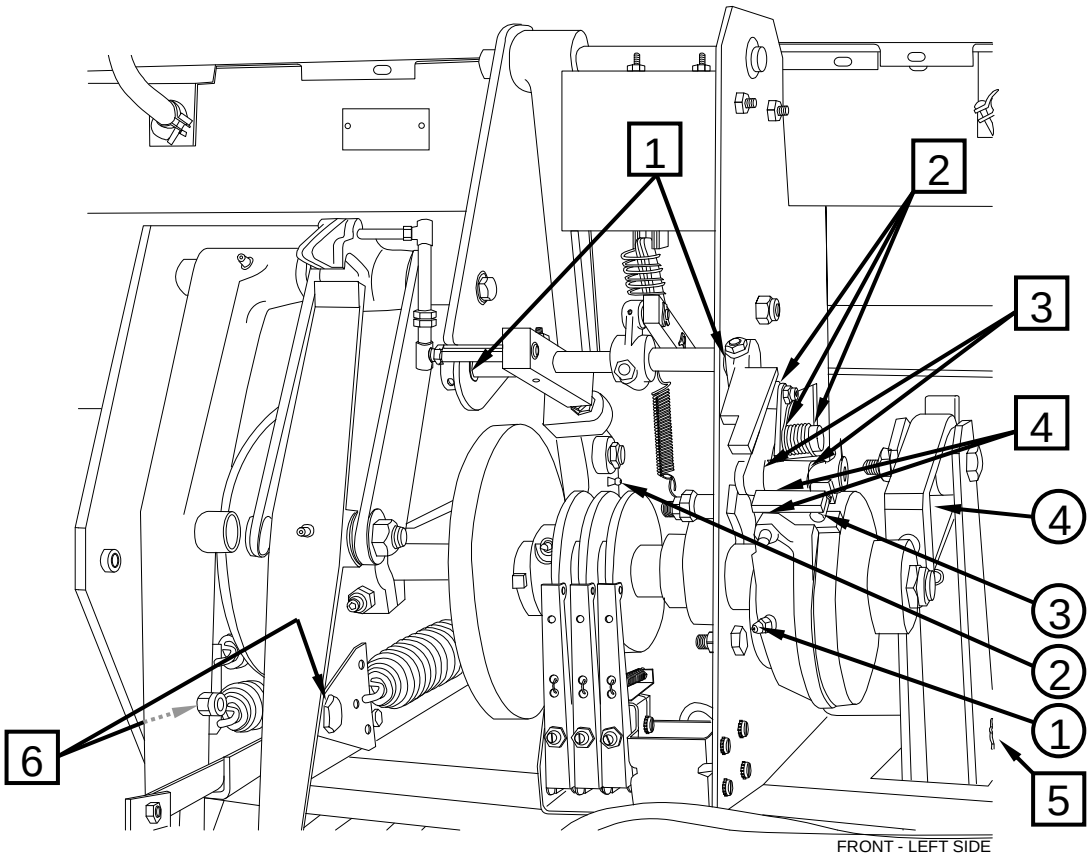


Figure 4-62

1. Apply grease to the table drive eccentric assembly once per year.
2. Apply grease to the shuttle cam follower once a month.
3. Apply a light coating of grease to the cam ball every 6 months.
4. Apply a light coating of grease to the inside of the clevis every 6 months.

4.3.3 TABLE DRIVE ASSEMBLY - continued

(1) 1. Grease the table support weldment sleeve bearings (2 places) every 3 months.

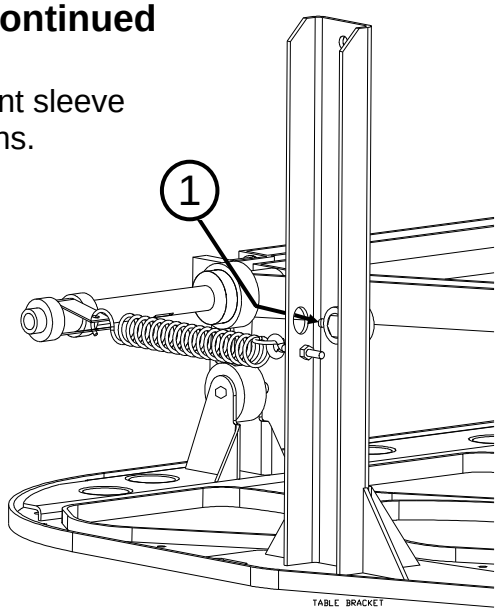


Figure 4-63

4.3.4 SWEEP DRIVE AND LINKAGES

[1] 1. Sweep cam lever rollers (3 places): 1 drop of oil every 3 months.

[2] 2. Sweep cam lever pivots (6 places): 1 drop every 3 months.

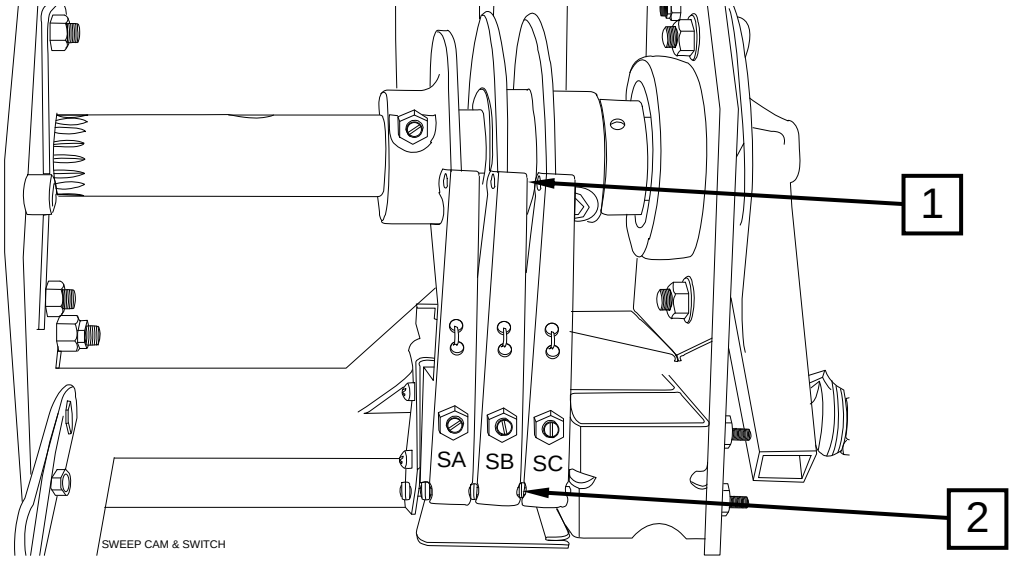


Figure 4-64

4.3.4 SWEEP DRIVE AND LINKAGES - continued

NOTE: Only one side of the sweep linkage is shown. Totals reflect both sides.

1. Linkage knuckles (2 places): 4 drops of oil at each knuckle every 3 months.

2. Linkage joints (8 places): 2 drops of oil on each joint once a month.

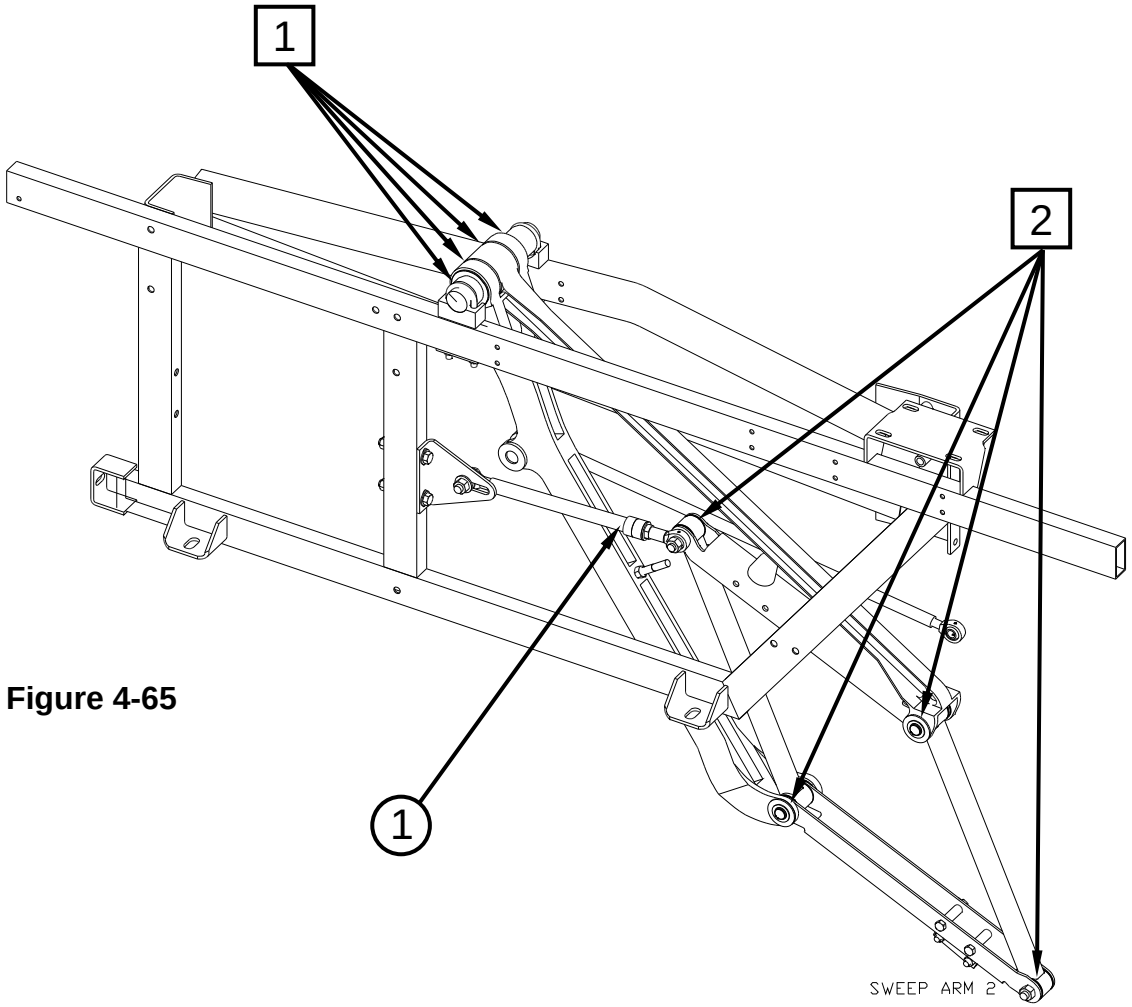


Figure 4-65

3. Inside guide tube: clean and grease every 3 months.

4.3.5 RESPOT CELLS

1. Respot cell lever (10 per machine): 1 drop of oil on each lever every 3 months.
2. Pivot points (10 cells per machine): 1 drop of oil on each pivot point every 3 months.
3. Carburetor links (6 links per machine): 1 drop of oil at each end every 3 months.

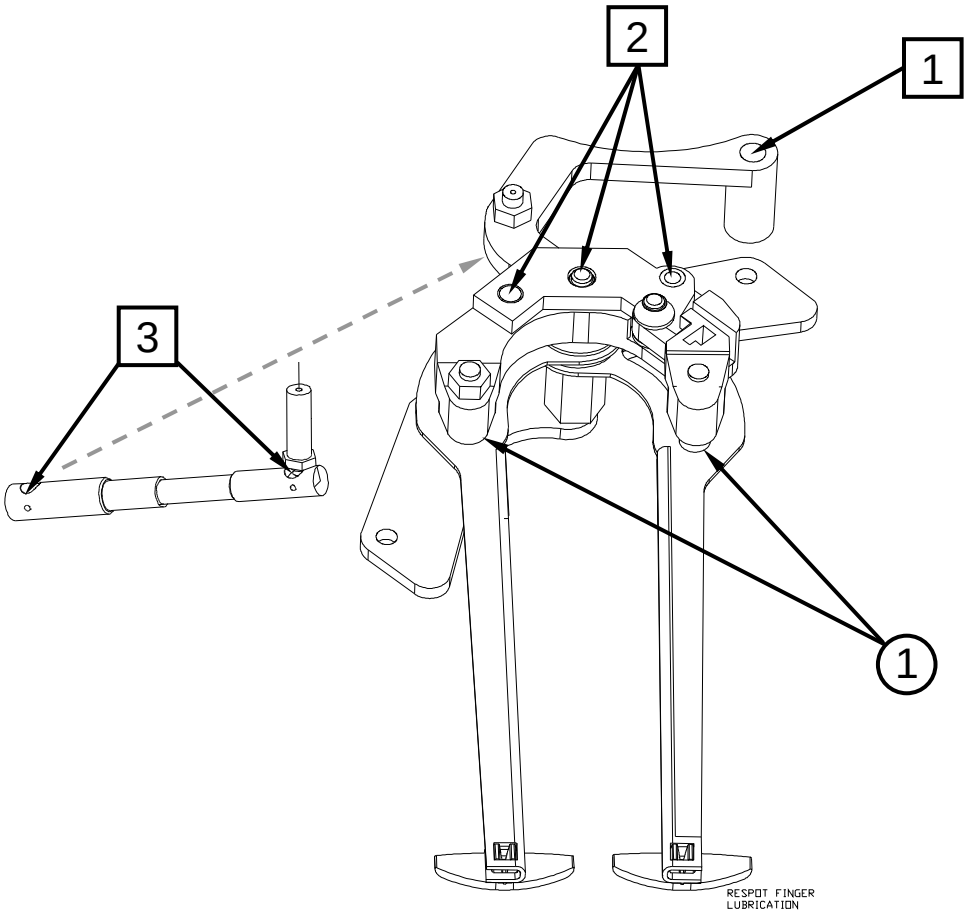


Figure 4-66

(1) 1. Respot cell finger slots (20 places): apply a light film of grease along the perimeter of each slot once a month.

4.3.6 YOKE ASSEMBLY

1. Rear leg bushings (8 places) 2 drops of oil on each side every 3 months.
2. Linkage rod pivot points (4 places): 1 drop of oil every 3 months.
3. Front leg lower bushings (4 places): 2 drops of oil each side every 3 months.

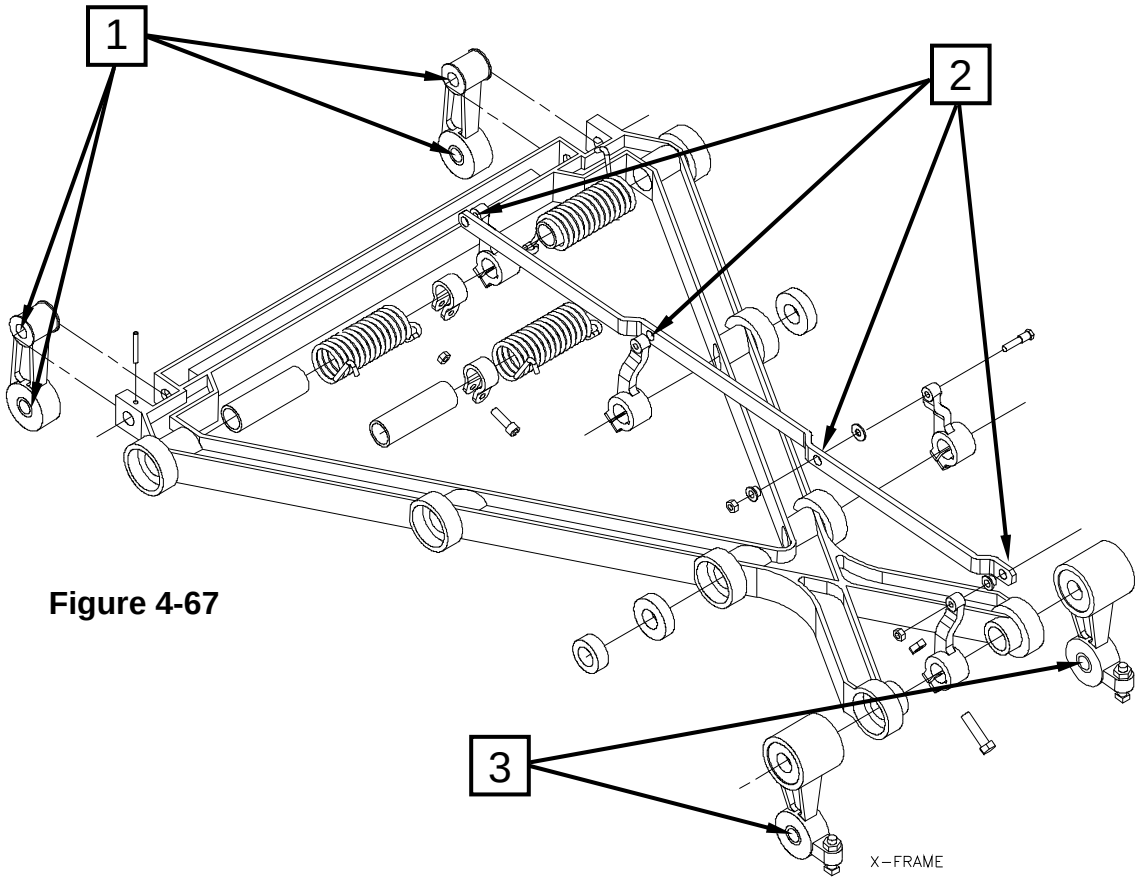


Figure 4-67

4.3.7 TABLE SHIFTER MECHANISM

1. Finger lever bushings (2 places): 1 drop of oil every 3 months.
2. Finger link (2 places): 1 drop of oil every 3 months.
3. Respot lever (2 places): 1 drop of oil every 3 months.

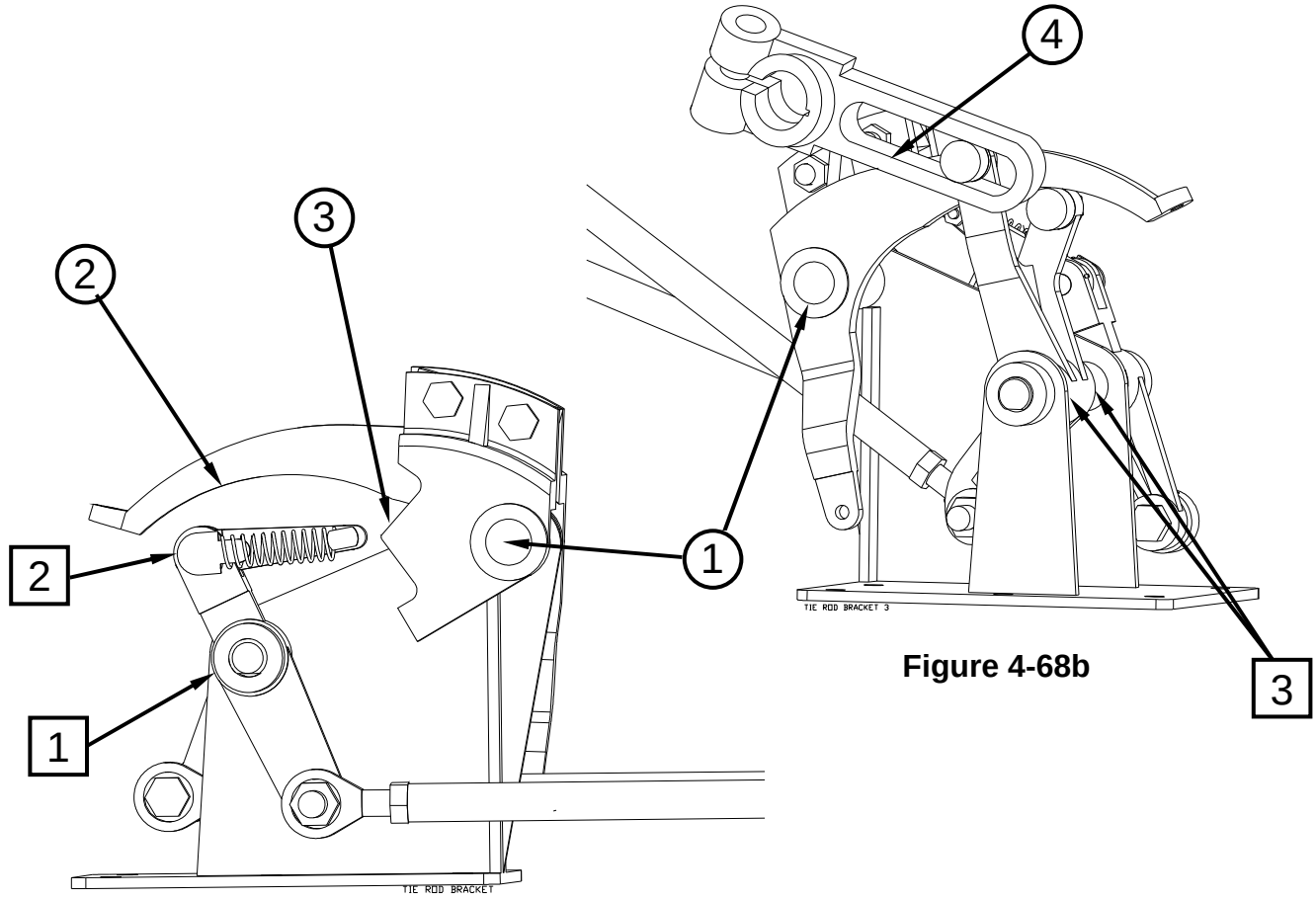


Figure 4-68b

Figure 4-68a

1. Shifter Link and cam link (2 places): repack needle bearings in once a year.
2. Cam Link (1 place): apply a light coat of grease to the underside every 3 months.
3. Shifter Link (1 place): apply a light coat of grease every 3 months.
4. Actuator Arm (1 place): apply a light coat of grease to the inside surface every 3 months.

4.3.8 DISTRIBUTOR DRIVE

1. Trip support casting bearings (2 places): apply 2 drops of oil every 3 months.

2. Pinion gear access holes (2 places): apply 1 drop of oil in each hole every 3 months.

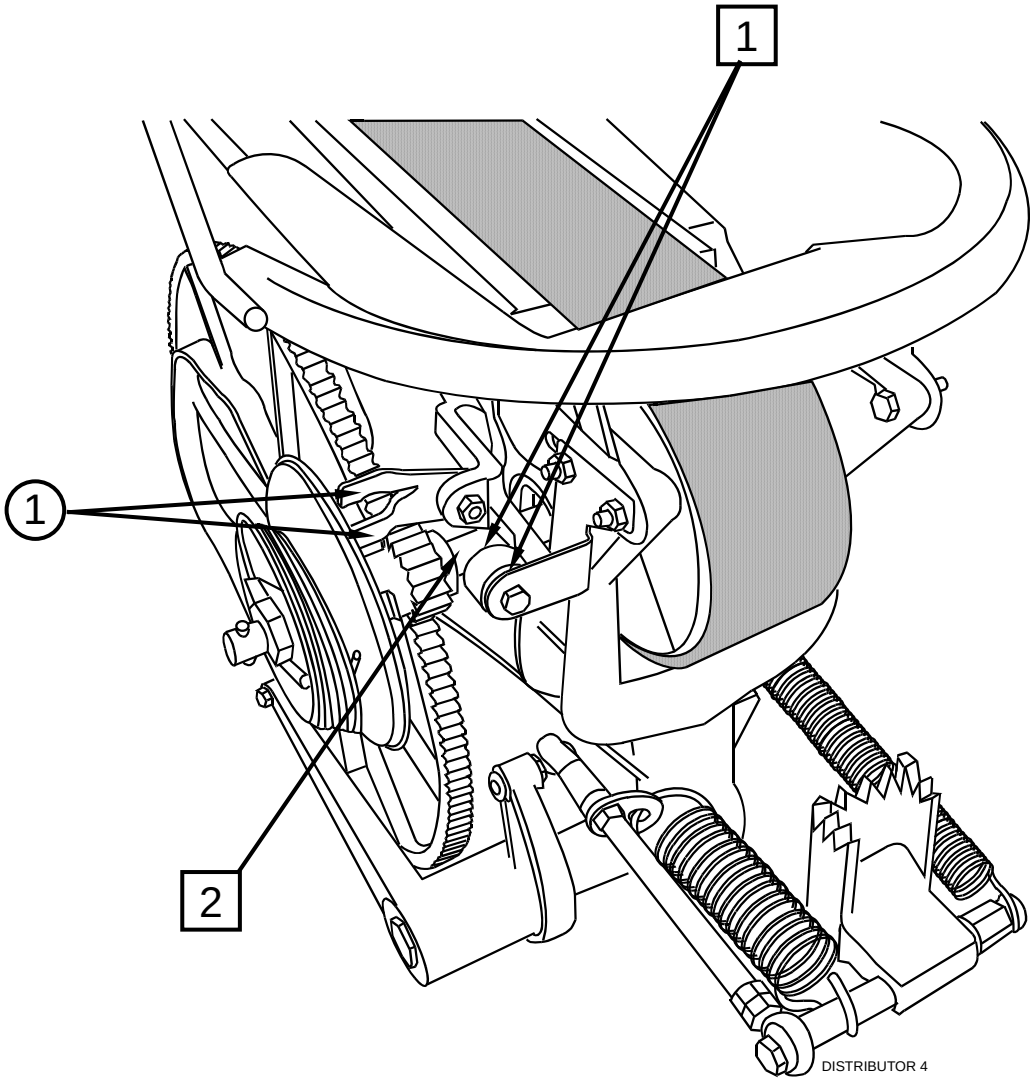


Figure 4-69

(1) 1. Stop blades (2 places): apply grease to the back surfaces every 3 months.

4.3.9 DISTRIBUTOR

1. Trip lever rollers (8 places): apply 1 drop of oil every 3 months.
2. Trip lever bushings (2 places): apply 1 drop of oil every 3 months.
3. Carriage tubes (4 places): apply a light film of oil every 3 months along the top and bottom of each tube.
4. Distributor clutch assembly (1 place): disassemble, clean, lubricate, and adjust every 3 months.

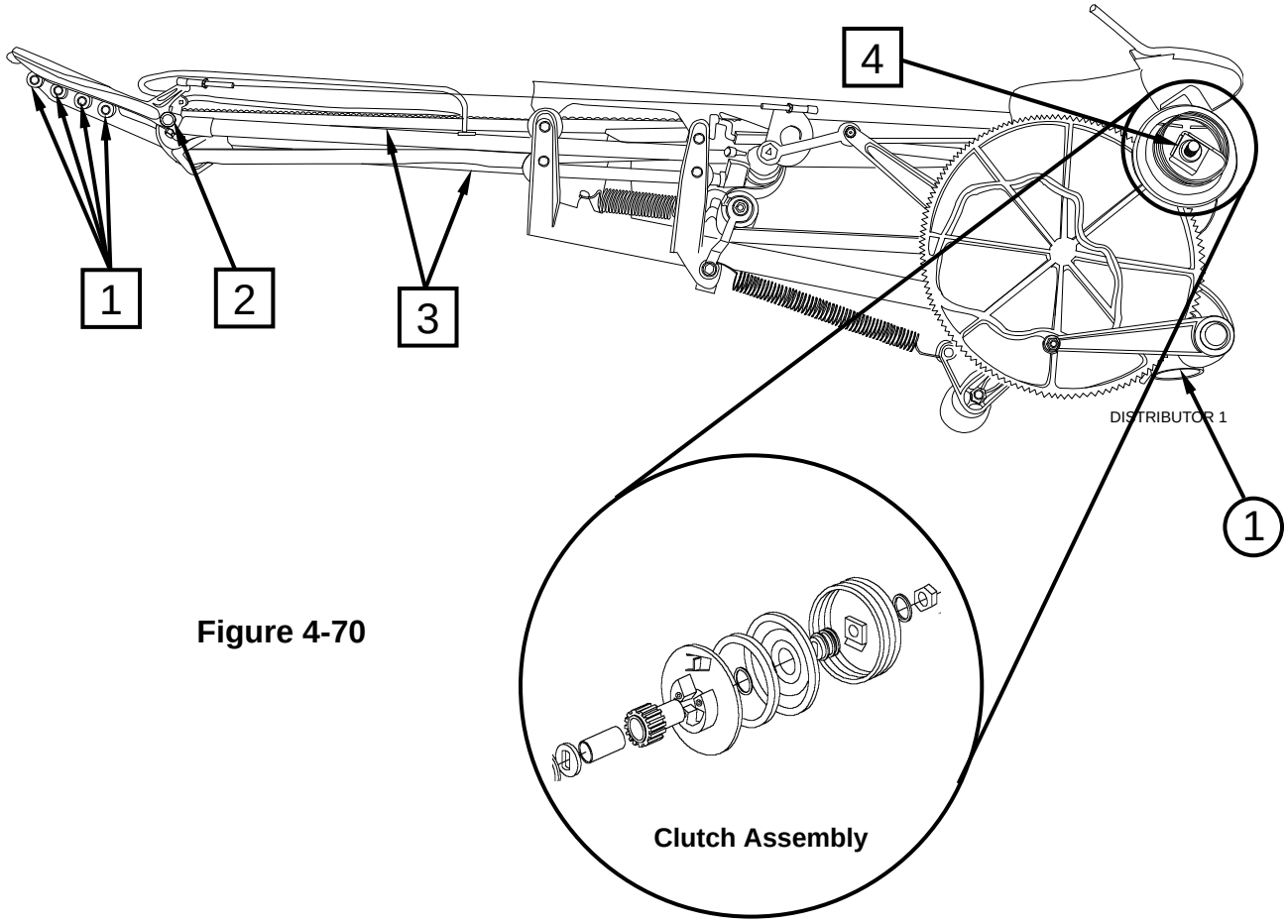


Figure 4-70

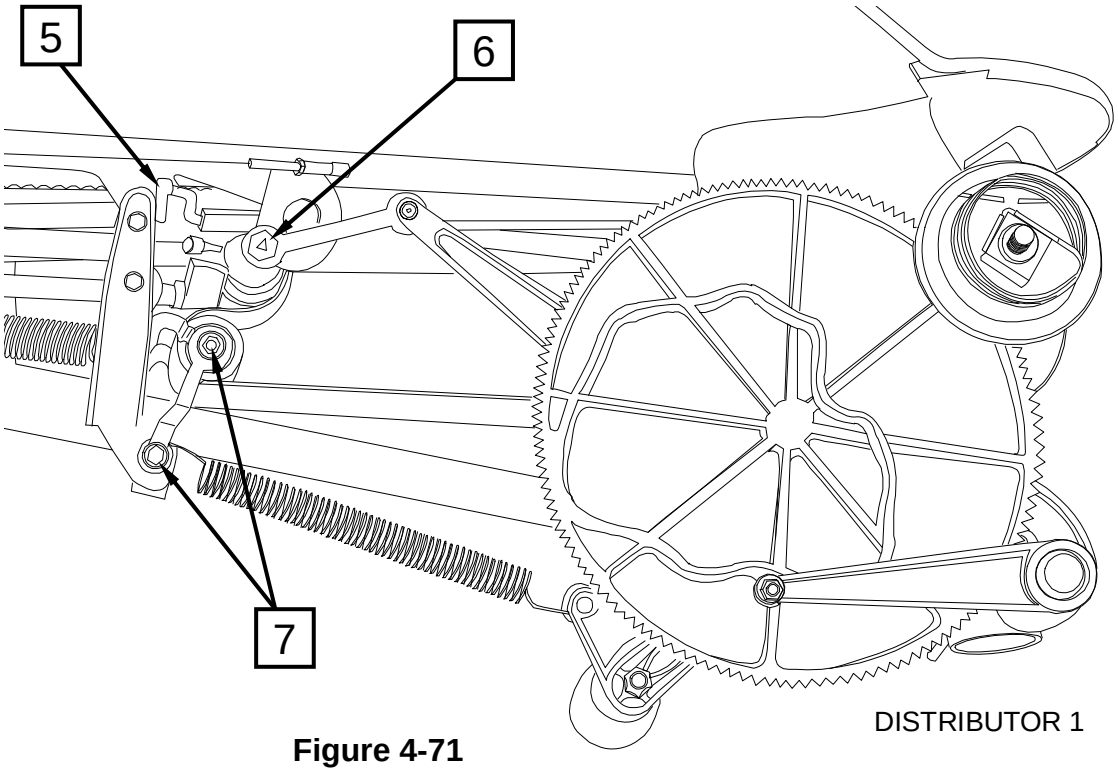
(1) 5. Distributor support bearings (2 places): remove distributor and grease bearings once a year.

4.3.9 DISTRIBUTOR - continued

5 1. Trip rod (front) (6 places): 1 drop of oil every 2 months.

6 2. Trip rocker arm (2 places): apply 1 drop of oil to each side every 3 months.

7 3. Roller tracking bracket (3 places): 1 drop of oil every 2 months.



DISTRIBUTOR 1

Figure 4-71

4.3.10 SHUTTLE & BIN ASSEMBLY

1. Bin switch bracket (2 places): apply 2 drops of oil every 3 months.
2. Roller bearings (10 places): apply 1 drop of oil every 3 months.

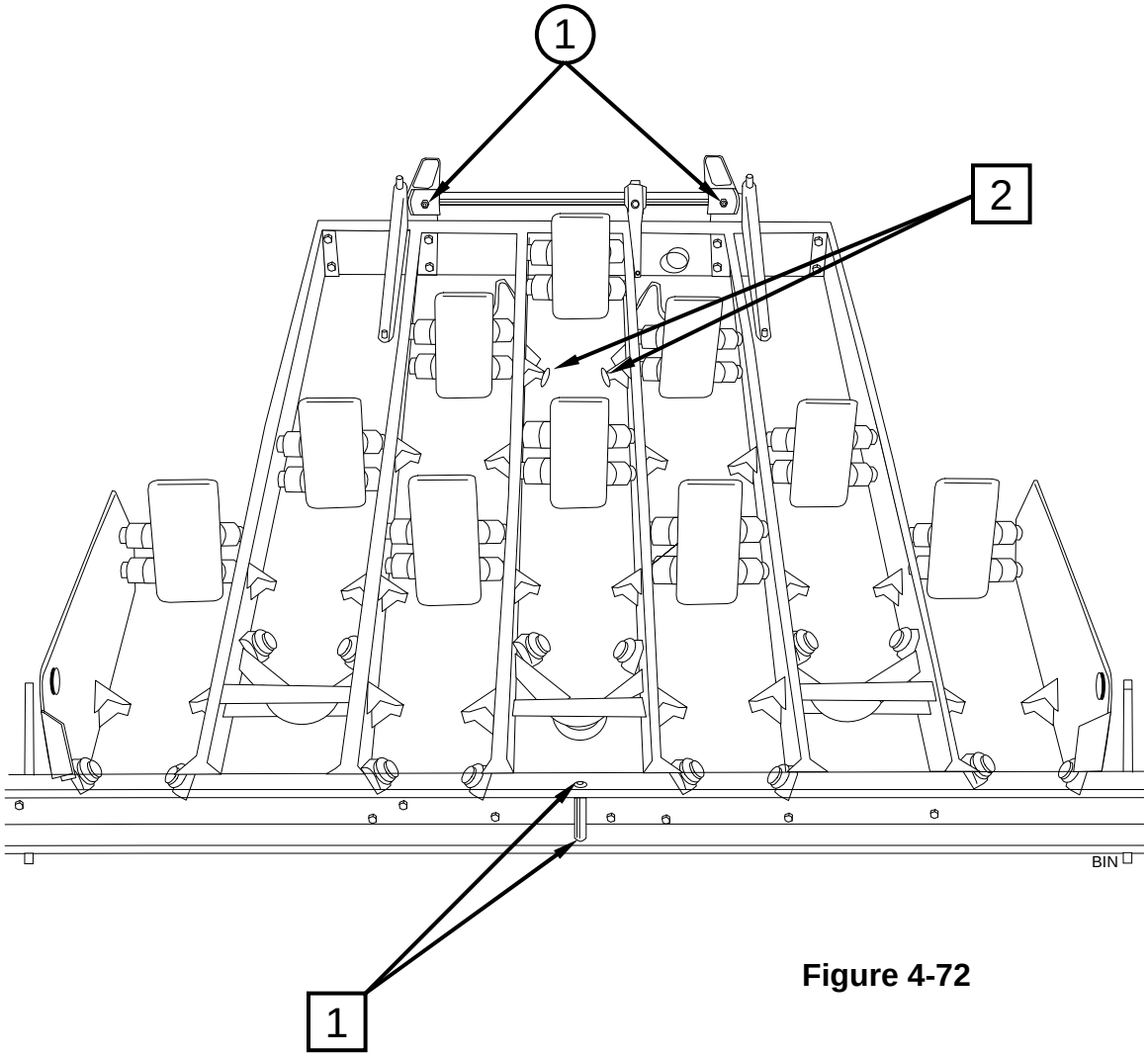


Figure 4-72

1. Bin shaft sleeve bearings (2 places): grease every 6 months.

4.3.11 POSITIVE BALL LIFT (PBL)

1. Rudder arm pivot points (2 places): apply 2 drops of oil every 3 months.
2. Paddle drive pulley shaft (2 places): apply 2 drops of oil every 3 months.
3. Pin wheel belt tensioner (2 places): apply 2 drops of oil every 3 months.
4. PBL lift arm flange bearing (2 places): apply 2 drops of oil every 3 months.
5. Carpet belt tensioner assembly (6 places): apply 2 drops of oil every 2 months.

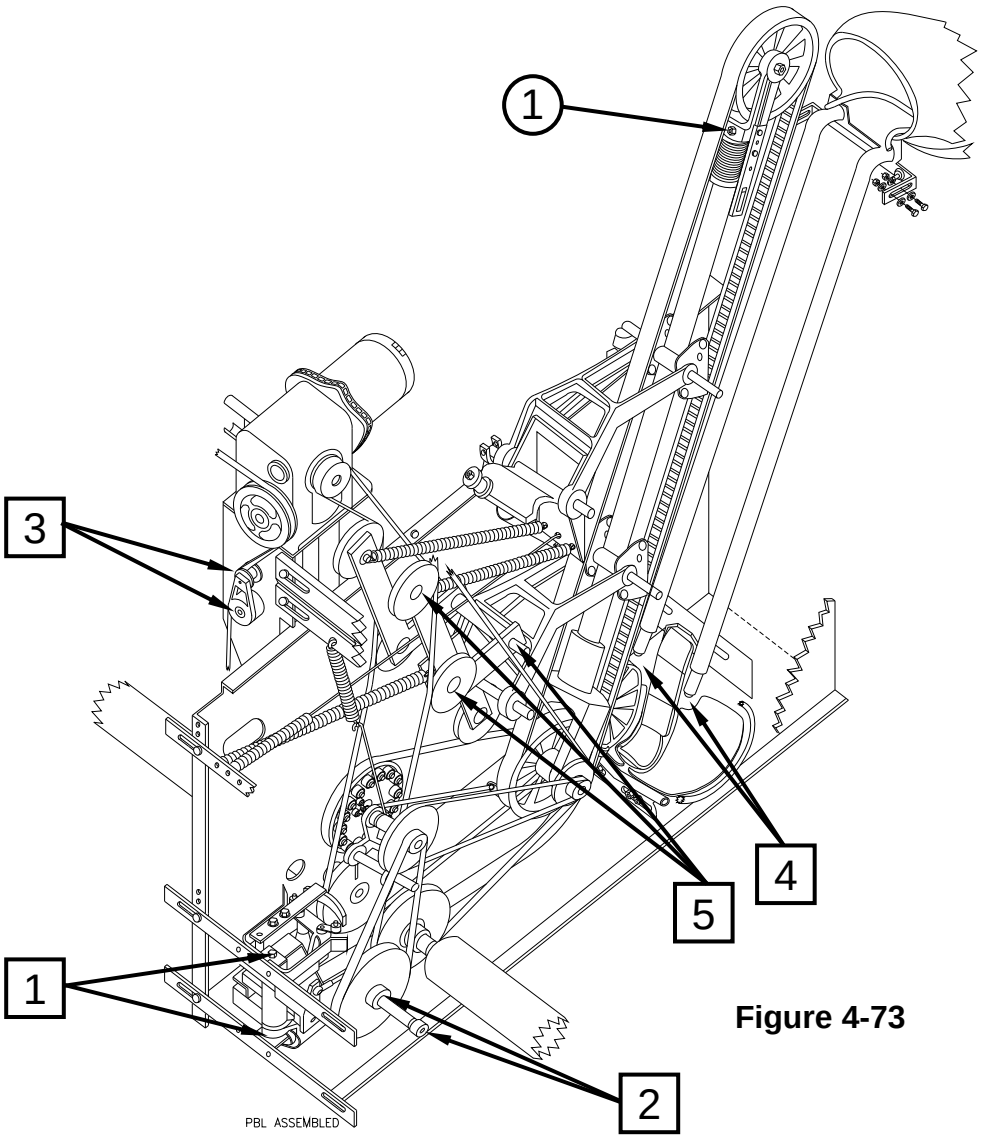


Figure 4-73

(1) 1. Apply grease (with Grease Gun) every 6 months.

4.3.11 POSITIVE BALL LIFT - continued

1. Idler pulley (2 places): apply 2 drops of oil to each side every 3 months.
2. Lower yoke pivot points (4 places): apply 2 drops of oil every 3 months.
3. Upper yoke pivot points (4 places): apply 2 drops of oil every 3 months.
4. Upper yoke upper shaft (2 places): apply 2 drops of oil every 3 months.
5. Lower yoke upper shaft (2 places): apply 2 drops of oil every 3 months.

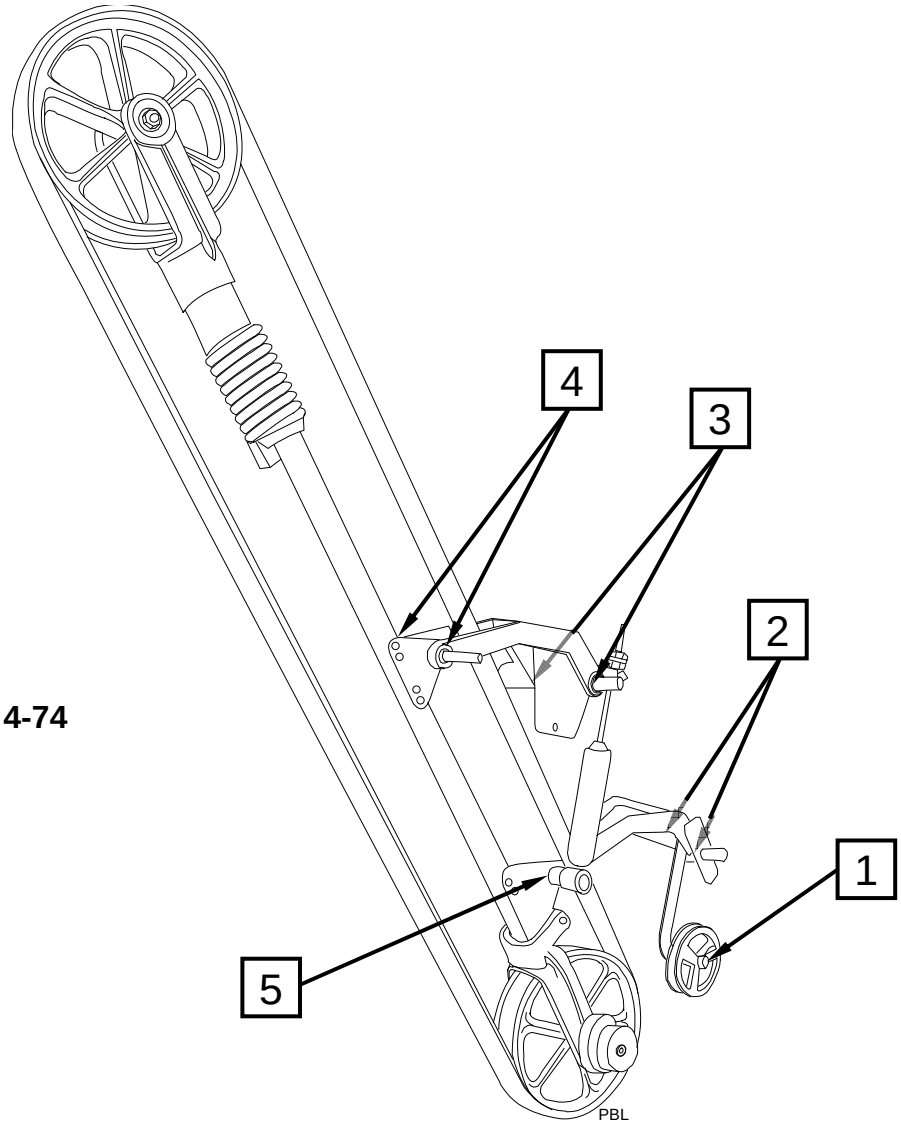


Figure 4-74

4.3.12 BELT TENSIONER

1. Pulley (2 places): apply 1 drop of oil to each side every 3 months.
2. Hanger arm center pivot points (6 places): apply 1 drop of oil every 3 months.
3. Lower shaft sleeve bearings (4 places): apply 1 drop of oil every 3 months.

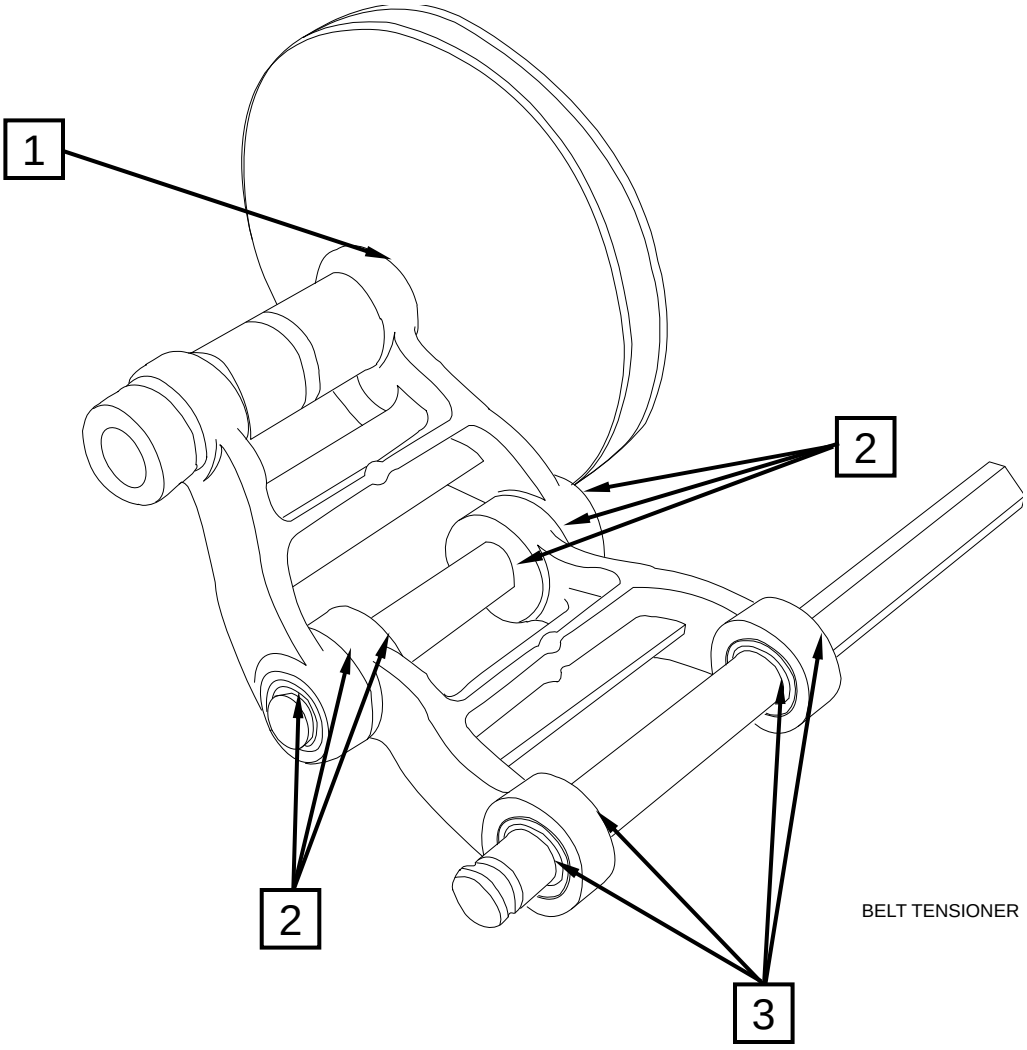


Figure 4-75

4.3.13 LIGHT BALL SENSOR

DO NOT LUBRICATE component parts of the trip cam and rudder cam assembly, outlined within the square below. Friction is required in this area to allow the sensor to operate properly.

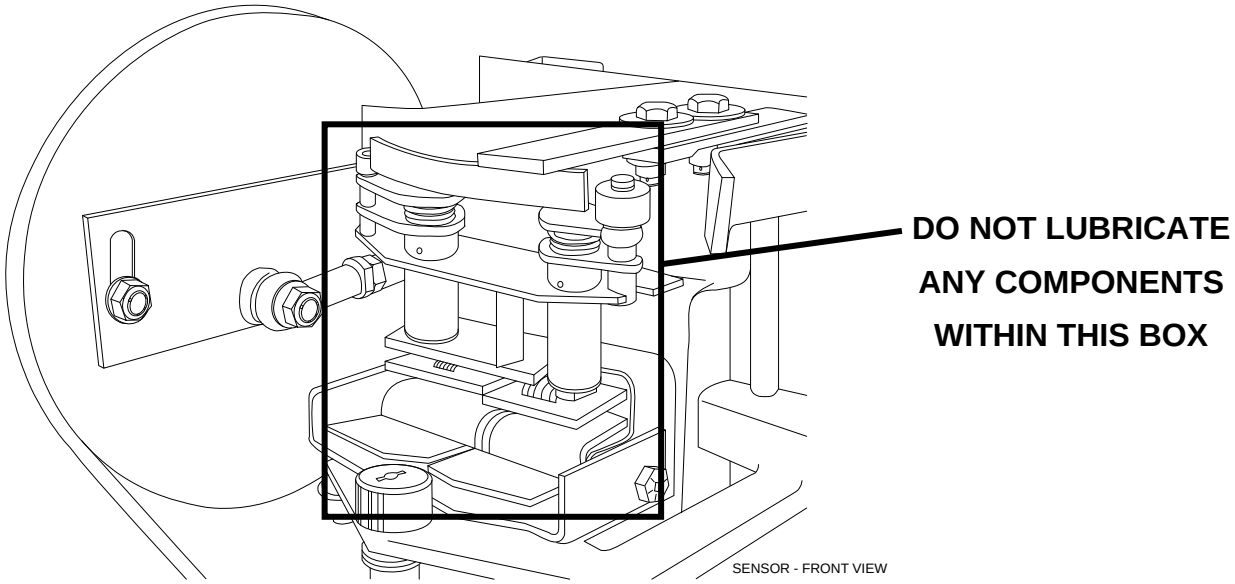


Figure 4-76

4.3.14 RATCHET WHEEL

1

1. Ratchet wheel shaft flange bearings (2 places): apply 2 drops of oil every 3 months.

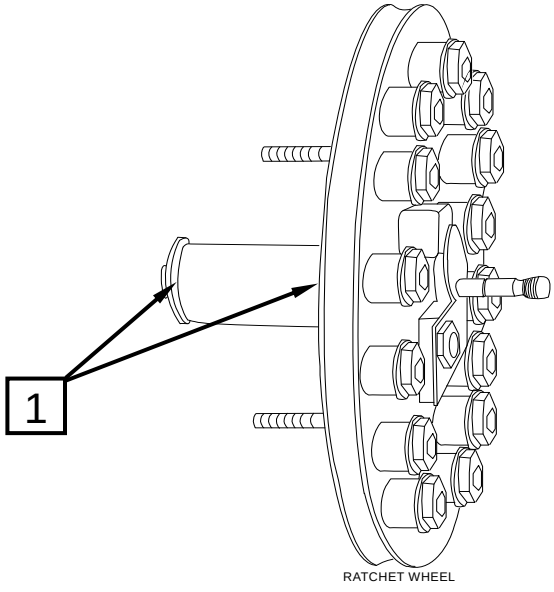


Figure 4-77

4.3.15 SHOCK ABSORBER

1

1. Pivot pins (2 places): apply 2 drops of oil every 3 months.

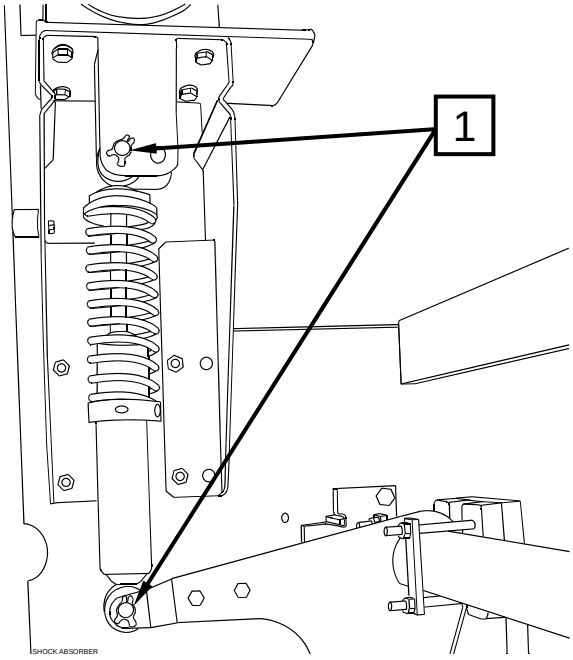


Figure 4-78

4.3.16 PIN EJECTOR

1

1. Apply 2 drops of oil at the bushings (2 places) every 3 months.

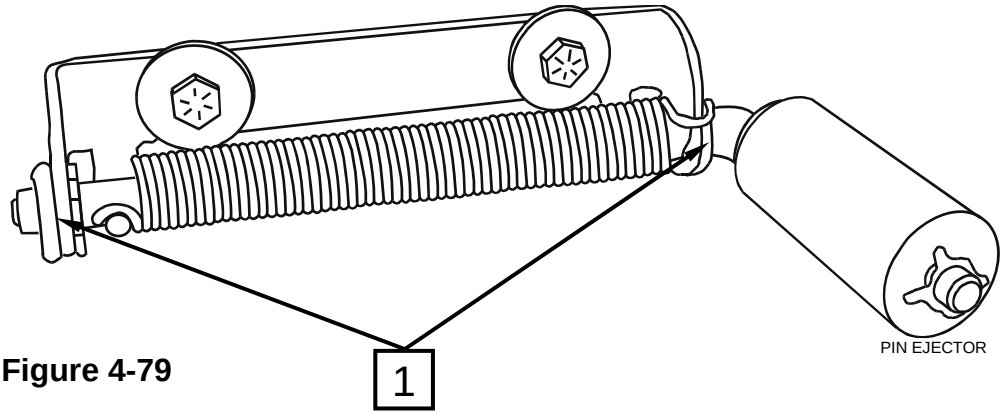


Figure 4-79

4.3.17 BACK END SIDE PLATE ASSEMBLY

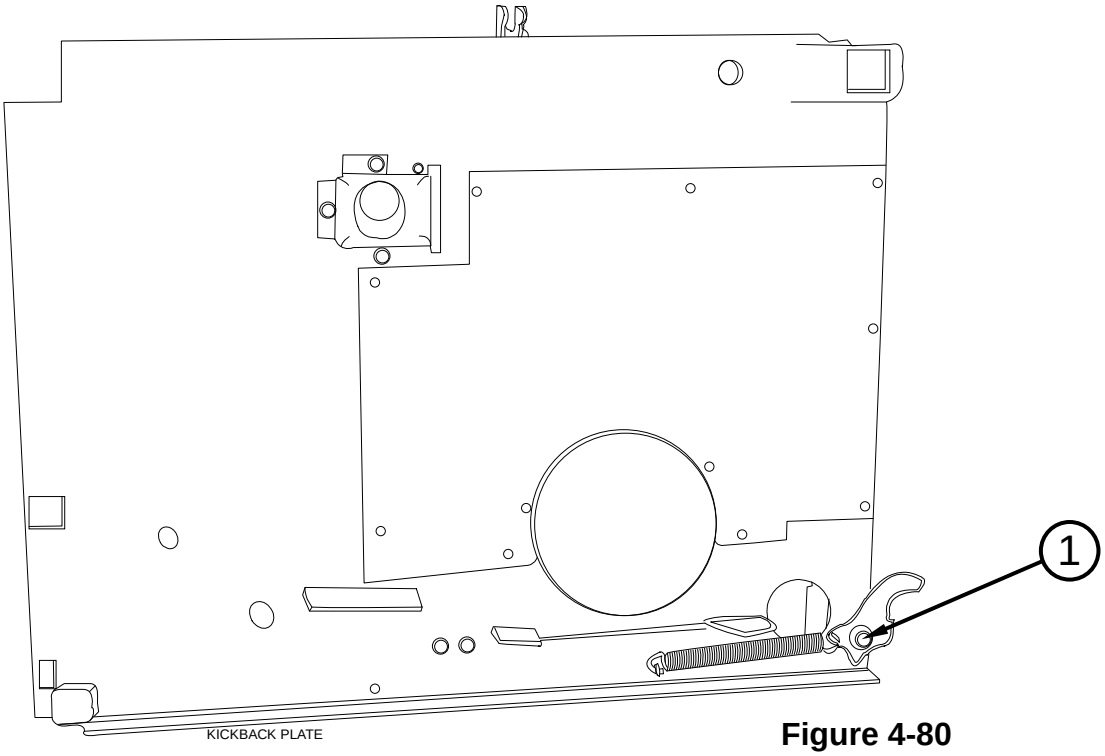


Figure 4-80

(1) 1. Front roller bearing bracket assembly R.H. and L.H. (2 places): grease every 6 months.

4.3.18 FRONT ROLLER HINGE AND ROLLER ASSEMBLY

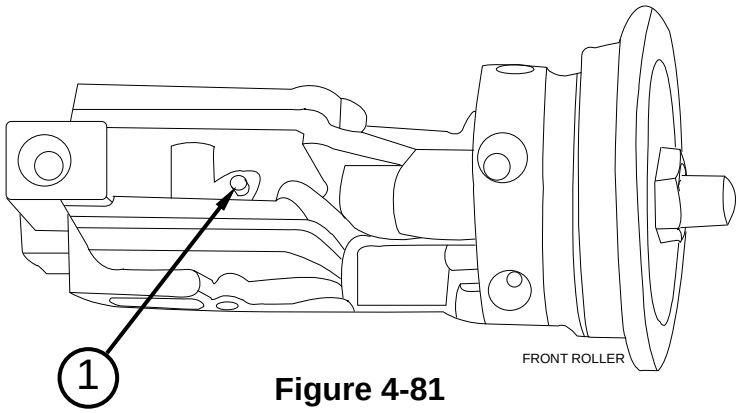


Figure 4-81

(1) 1. Front hinge and roller assembly grease fitting (2 places): Apply grease through the access at each end every 6 months.

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SECTION 4.4

Preventive Maintenance

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4.4 PREVENTIVE MAINTENANCE

4.4.1 AMF WEEKLY PREVENTIVE MAINTENANCE CHART

Preventive maintenance is performed by the proprietor's maintenance man using the form shown on Page 85. Each machine is given this check once each week. Table 4-4 provides a quick and easy method of dividing the workload throughout the week. For example, the maintenance man of a 16-lane house would do four pinspotters a day for four days each week.

Table 4-4

TYPICAL PINSPOTTER INSPECTION SCHEDULE														
	Number of Pinspotters													
DAY	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**
MON.	2	2	2	4	4	4	4	4	5	5	6	6	6	8
TUES.	2	2	2	4	4	4	4	4	5	5	5	6	6	6
WED.	2	2	2	4	4	4	4	4	4	5	5	6	6	6
THURS.		2	2		2	4	4	4	4	5	5	5	6	6
FRI.			2				2	4	4	4	5	5	6	6

If your bowling center has more lanes than shown in the table, you can determine your schedule by adding the totals from two columns. For example, if your center has 36 lanes, add the numbers from the **30** column to the numbers from the **6** column for each day of the week. In this case, your schedule would be: **8, 8, 8, 6, 6 = 36**. If the number of lanes in your center is an exact multiple of one of the numbers shown in the table, simply multiply the number of lanes for that day by the multiple. For example, if your center has 48 lanes, multiply the numbers in the **24** column by **2**, which result in **10, 10, 10, 10, 8 = 48**. Alternately, you could have added the numbers in the **28** and **20** columns to get **10, 10, 10, 9, 9 = 48**, which is also acceptable.

4.4.2 MAINTENANCE CHECK OF PINSPOTTER ASSEMBLIES

The *AMF Pinspotter Preventive Maintenance Checklist* shown on Pages 85 and 86 should be used as a reference when performing pinspotter maintenance. The front of the form lists the major pinspotter assemblies and provides spaces for checking off the completion of specific maintenance items, which are listed on the back of the form. The legend at the top of the front page provides a simplified method of recording the type of action completed or required. If parts are replaced, the part numbers should be entered in the *Parts Replaced* column. This information will facilitate ordering replacement parts and restocking.

The checklist can also be used to help in scheduling maintenance by using the items that have been marked with a **C**, **L**, **A**, or **X** during the weekly check to create a list of tasks that may require special parts or machine downtime.

AMF Pinspotter Preventive Maintenance Checklist

4- Satisfactory
C - Requires Cleaning
L - Requires Lubrication
A - Requires Adjustment
R - Parts Replaced
X - Repair or Replace

Date _____

Center Name _____

Center Address _____

Lane Number	Pin Elevator	Distributor	Bin & Shuttle	Cushion	Carpet & Pit Area	Ball Exit & Ball Lift	Sweep	Table	Motors & Gearboxes	Pindication & Scoring	MCU Functions	Parts Replaced	Summary

Mechanic's Signature

Proprietor's Signature

1. **Pin Elevator**
   - A. Plastic Rollers
   - B. Wear Strip
   - C. Pulley
   - D. Pockets & Cleats
   - E. Drive Belt
   - F. Belt Tensioner

2. **Distributor**
   - A. Pinion Gear, Bushing, & Sleeve
   - B. Pin Delivery Position
   - C. Shafts & Bearings
   - D. Cable Assembly
   - E. Drive Shaft & Universal
   - F. Distributor Belt
   - G. Clutch Assembly

3. **Bin & Shuttle**
   - A. Bin Switch
   - B. Rollers
   - C. Broken or Loose Parts
   - D. Smooth Operation

4. **Cushion**
   - A. Ball Impact Pad
   - B. Screws and Fasteners
   - C. Rubber Rivets
   - D. Shock Absorber
   - E. Hanger Weldment & Support Blocks
   - F. Curtain & Facing

5. **Carpet & Pit Area**
   - A. Front Roller
   - B. Rear Roller & Drive Belt
   - C. Bearings, & Supports
   - D. Plows and Bounce Plate
   - E. Condition of Carpet Belt

6. **Ball Exit & Ball Lift**
   - A. Ball Exit Weldment
   - B. Drive Belts
   - C. Track Rail
   - D. Light Ball Sensor
   - E. Ratchet Assembly
   - F. Lift Belt
   - G. Pulley Assemblies & Bearings
   - H. Clutches & Shafts
   - I. Wiper Cloth

7. **Sweep**
   - A. Cams & Cam Followers
   - B. Sweep Drive Linkage
   - C. Stopping Positions
   - D. Condition & Operation

8. **Table**
   - A. Cams & Cam Followers
   - B. Drive, Supports, & Linkages
   - C. Respot Cells & Mechanisms
   - D. Pin Cups
   - E. Spotting Pattern

9. **Motors & Gearboxes**
   - A. Seals, Plugs, & Covers
   - B. Oil Level
   - C. Observe Operation
   - D. Excessive Noise

10. **Pindication & Scoring**
    - A. 1st & 2nd Ball
    - B. Strike & Foul
    - C. Camera
    - D. Scoring

11. **MCU Functions**
    - A. Communication
    - B. Proper Spec Codes

4.4.3 PINSPOTTER PROTECTION DURING LANE REFINISHING (Wood Lanes Only)

During the resurfacing or refinishing of wood lanes, dust particles and aerosols from the refinishing agents can settle on operating parts of the pinspotter and cause serious problems when operations are resumed. To prevent problems, the following precautionary measures must be observed:

4.4.3.1 Refinishing Wood Lanes

The purpose of this protection is to prevent aerosols from epoxies, urethanes, and varnishes from depositing on exposed electrical contacts. When cured, these substances act as electrical insulators making the unit inoperative.

1. Seal all motor ventilating openings using masking tape or plastic wrap.
2. Cover and seal the chassis.

4.4.3.2 Resurfacing Wood Lanes

1. Cover all open gearing, delicate assemblies, and operating surfaces with rags, newspaper, or plastic. This prevents dust particles from clinging to the mechanisms, which can cause mechanical binds.
2. Cover any exposed part that has an oily or greasy surface.
3. After resurfacing is complete, all protection except on motors and chassis can be removed.
4. Wipe down the entire pinspotter with a damp cloth.
5. After the refinishing process is completed **AND THE BUILDING IS FREE OF ALL VAPORS FROM THE REFINISHING AGENTS**, motor and chassis protection may be removed.

NOTE: The sweep assembly may be removed, if necessary, in order to permit the resurfacing machinery to reach the back of the pin deck area.

4.4.4 LANE AND PINSPOTTER CLEANING

4.4.4.1 Lane Cleaning

CAUTION **Turn off the power to the pinspotters and remove the power plug before cleaning the lanes.**

1. For daily lane cleaning, TURN OFF POWER TO THE PINSPOTTER either at the mask, the chassis, or at the Manager's Control Unit.

2. Knock the pins into the pit with a mop of broom.

3. After all the lanes have been cleaned, turn on the pinspotters and press the cycle buttons or tenth frame switches to make the pinspotter ready for the first ball.

4.4.4.2 Pinspotter Cleaning

CAUTION **Turn off the power to the pinspotters and remove the power plug before cleaning the pinspotter.**

The pinspotter must be kept clean to provide satisfactory service to the bowler. It is important to maintain the cleaning schedule given below:

1. Every Two Weeks

A. Dust the entire machine.

2. Twice Each Week

A. Wipe the following assemblies with a cloth dampened with a pin cleaner such as "Topshot".

- Inside the pin elevator wheel
- Inside the bins and spotting cups
- Pit carpet
- Pin curtain face
- Distributor belt and orientor pan
- Pulleys and V-belt drives

B. Check the gearbox drip pans and clean as required.

C. Vacuum between the kickback plates of adjacent machines as well as under the light ball sensor and rudder arm assembly.

D. Vacuum under the pin elevator wheel and carpet.

E. Clean the PBL belt.

3. Once Each Week

A. Remove, launder, and replace the ball wiper cloth.

4. Once Each Month

A. Remove, launder, and replace the dust trap cloth.

4.4.5 PIN CHANGING PROCEDURE

1. Cycle the pinspotter to spot a full set of pins on the pin deck and to store a full set in the bin pockets.
2. Push the *Sweep Run* button to sweep all of the pins into the pit.
3. **Turn power to the pinspotter OFF.**
4. Remove the old pins from the pit area, and replace with a new set.
5. Turn the pinspotter on and press the cycle button. This will place the second old set of pins on the lane and start loading the bin with new pins.
6. When the new set of pins has been loaded into the bin, repeat steps 2, 3, and 4.
7. Press the cycle button to complete the pin changing procedure.

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SECTION 4.5

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4.5 TROUBLESHOOTING

4.5.1 TROUBLESHOOTING TOOLS

4.5.1.1 CONTINUITY TESTER

CAUTION **Using the continuity tester on live circuits can damage the tester.**

1. Open Circuits

A. To check the continuity of any wire, disconnect one end of the wire.

B. Connect one side of the tester to one end of the wire suspected, and the other side of the tester to the end of the disconnected wire.

C. If the wire is good, the tester should read zero and/or beep. If the wire is open, the tester will not react.

2. Shorts

A. To check for a short between two wires, disconnect both ends of the suspect wires.

B. Connect the tester to one end of each wire. If tester lights, the wires are shorted. If tester does not light, the wires are not shorted.

3. Grounds

A. To check for a ground, disconnect both ends of the suspect wire.

B. Connect one side of the tester to the machine's frame (bare metal) or to a conduit and the other side of the tester to one end of the wire being tested.

C. If the wire is grounded, the tester should light. If the wire is not grounded, the tester will not light.

4.5.1.2 VOLTAGE TESTER

CAUTION **For use on alternating or direct current (AC or DC) between 80 and 600 volts. All power to the component to be tested should be turned on. Caution should be used when testing live circuits.**

A. To check for voltage, connect the tester across the hot leads (line) on the device to be tested. The neon bulb will glow if voltage is present. When checking across 220 volts, the neon bulb will be twice as bright as when checking 110 volts. The tester cannot be used on circuits below 80 volts.

4.5.2 TABLE TROUBLESHOOTING

4.5.2.1 PROBLEM: Respot cells will not pick up or place pins.

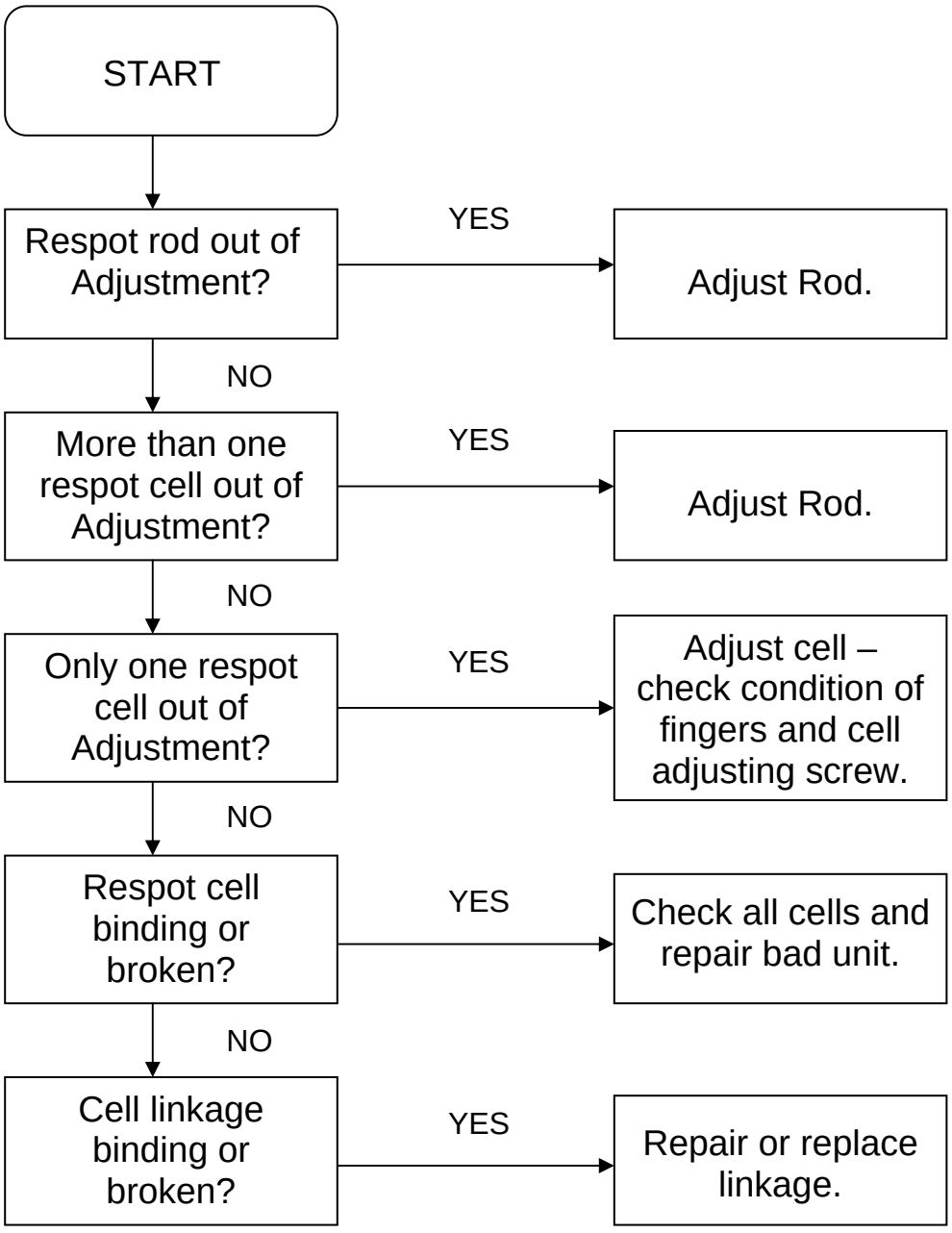

Figure 4-82

4.5.2.2 PROBLEM: Scoring or Pindication Problems (miscounts, no strike cycle, etc.)

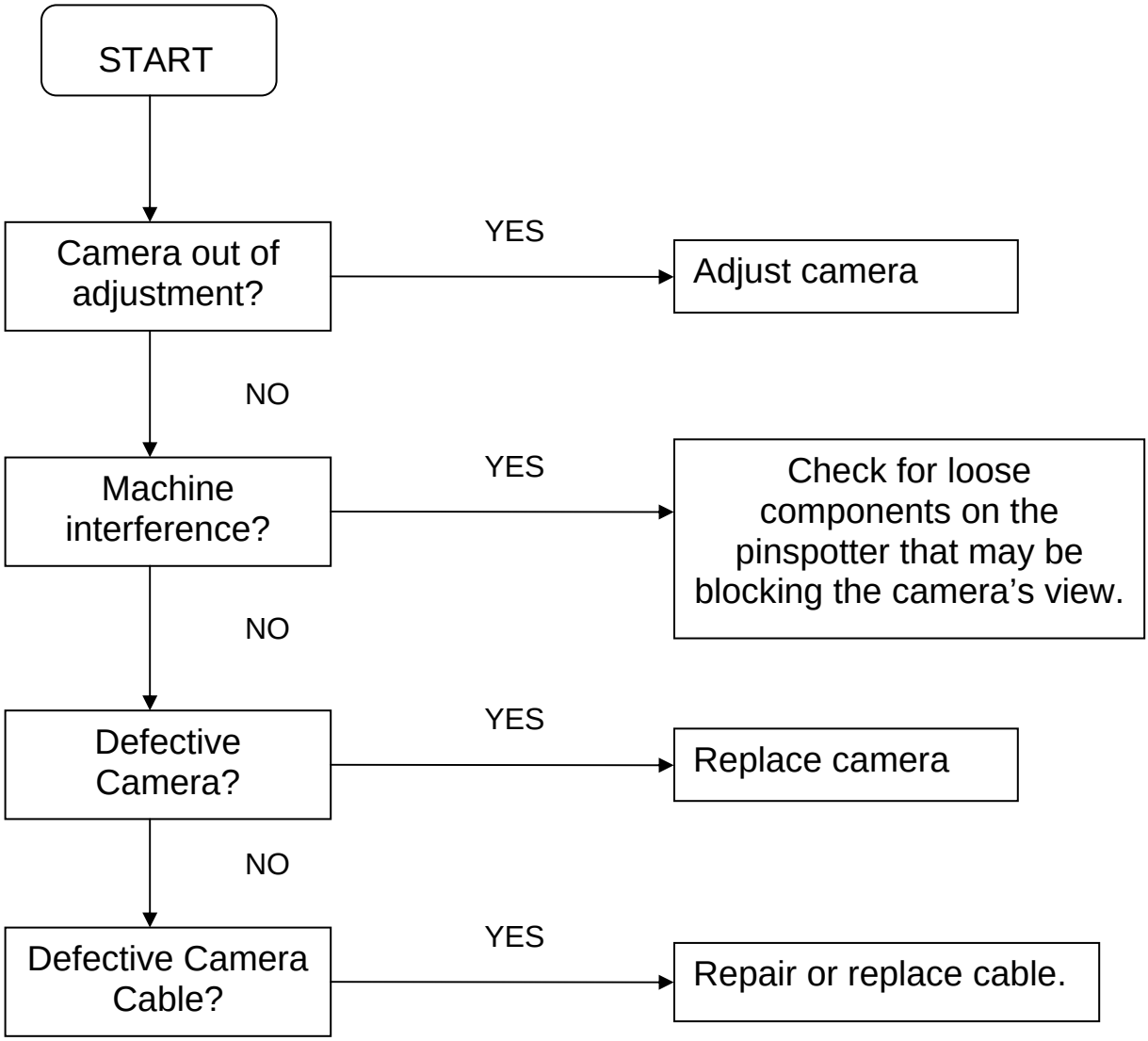

Figure 4-83

4.5.2.3 PROBLEM: Table runs continuously.

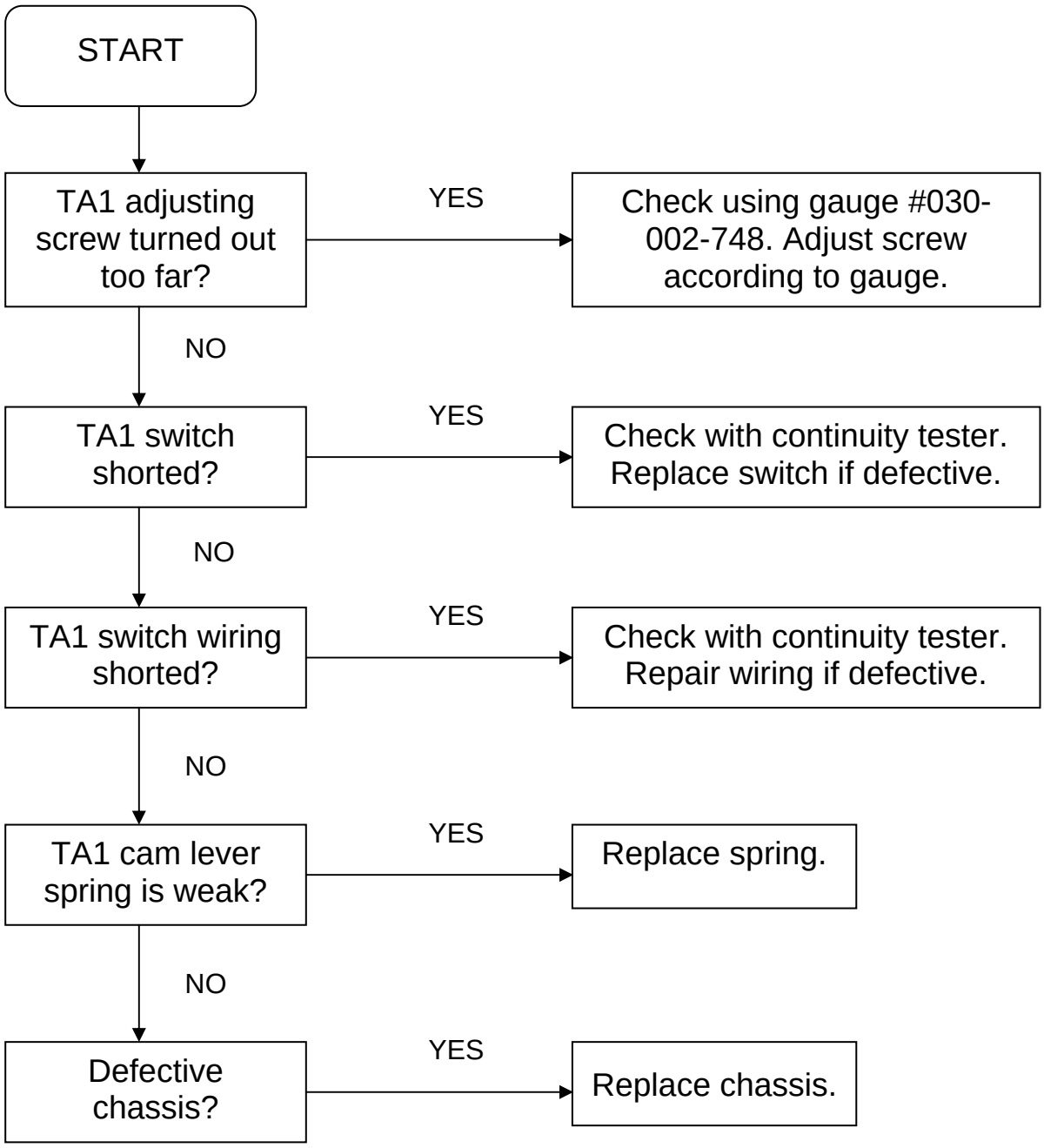

Figure 4-84

4.5.2.4 PROBLEM: Table stops before zero position.

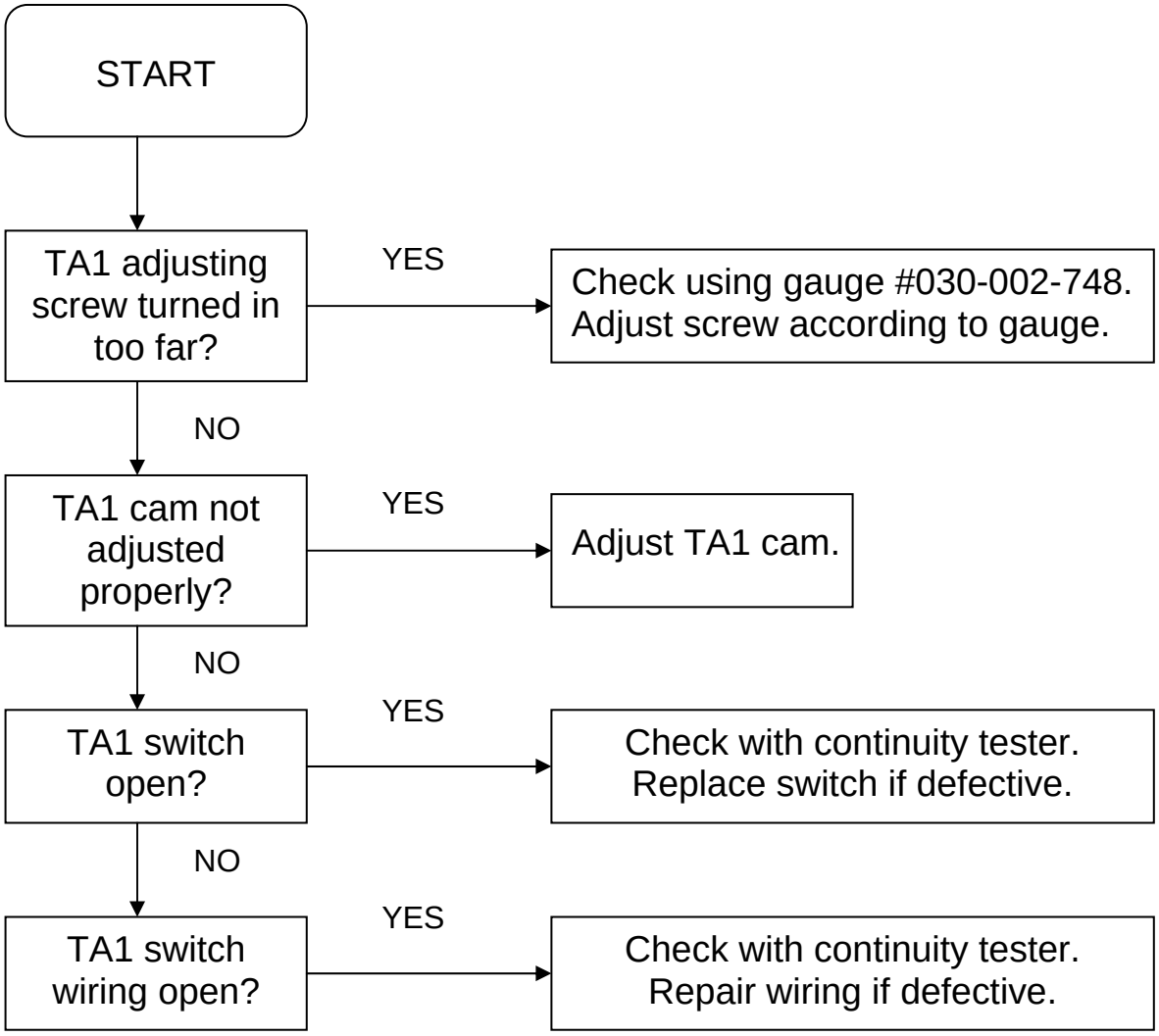

Figure 4-85

4.5.2.5 PROBLEM: 1st ball - sweep goes down and after a time delay the sweep runs and cleans off all the pins and comes back to the guard position. The table does not come down.

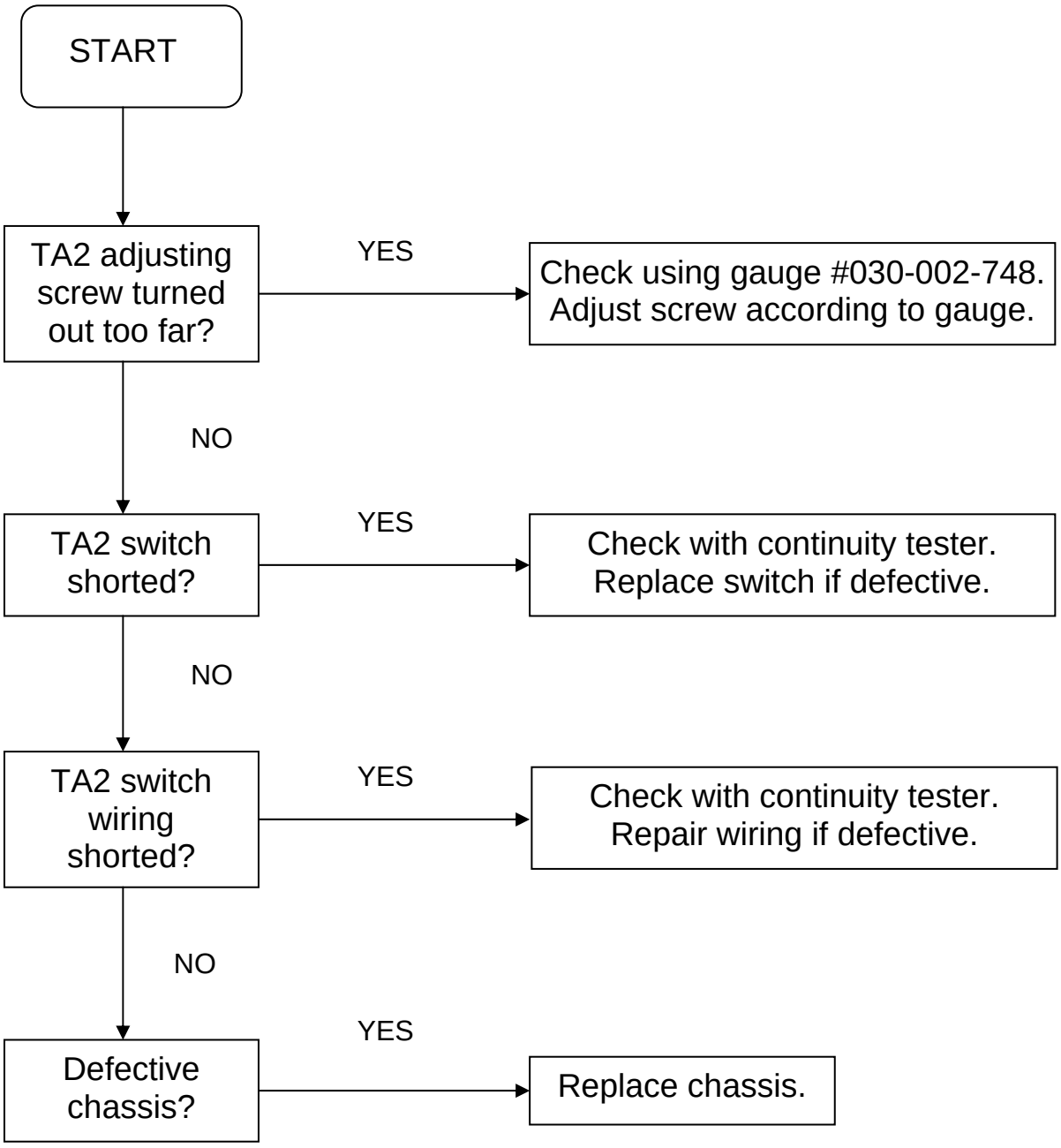

Figure 4-86

4.5.2.6 PROBLEM: 1st ball - sweep moves down to the guard position, and the table continues to run.

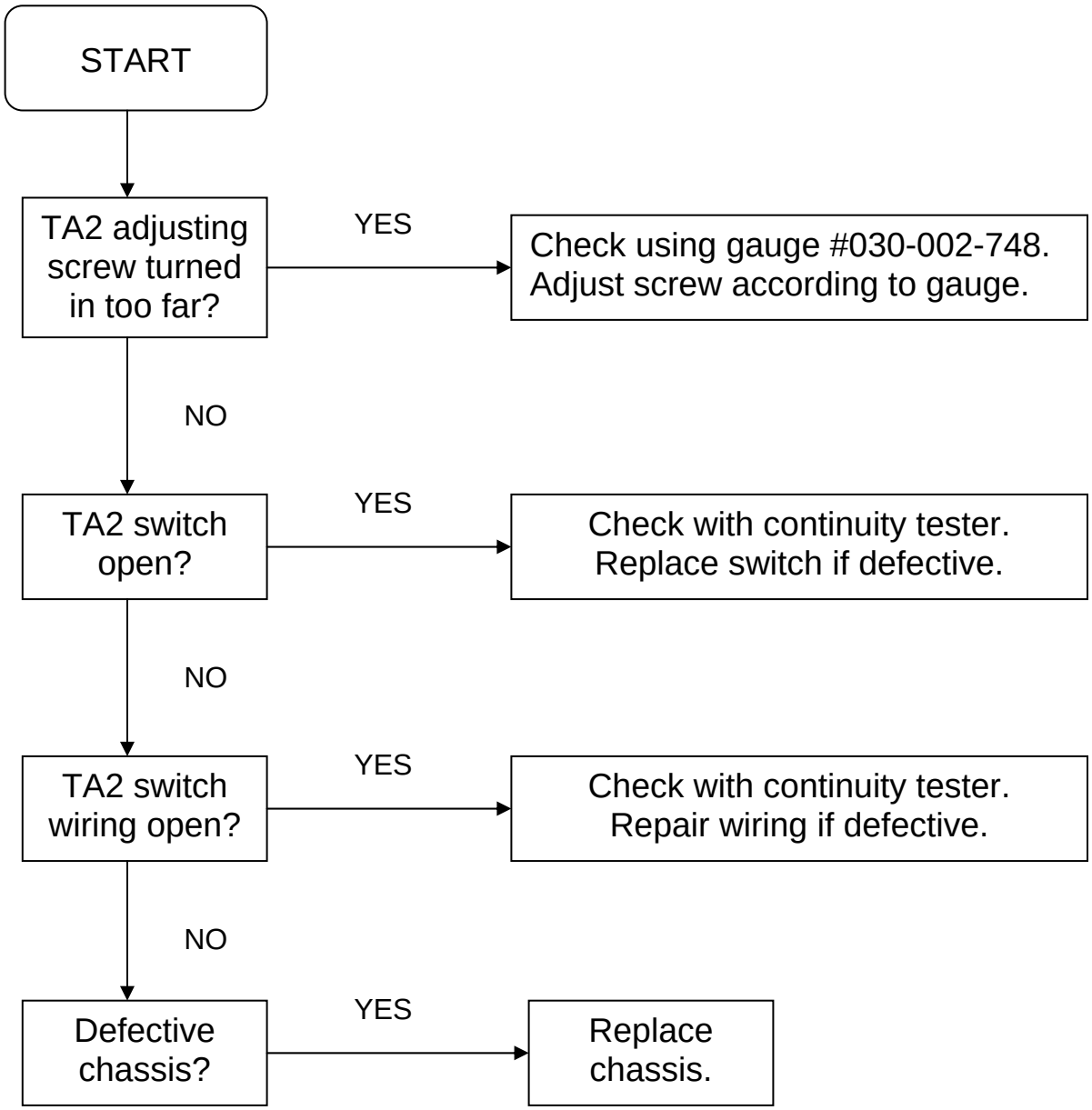

Figure 4-87

4.5.2.7 PROBLEM: 1st ball - sweep starts toward pit, table starts up with pins in fingers, both stop, neither will run with SA or TA1 closed (Interlock).

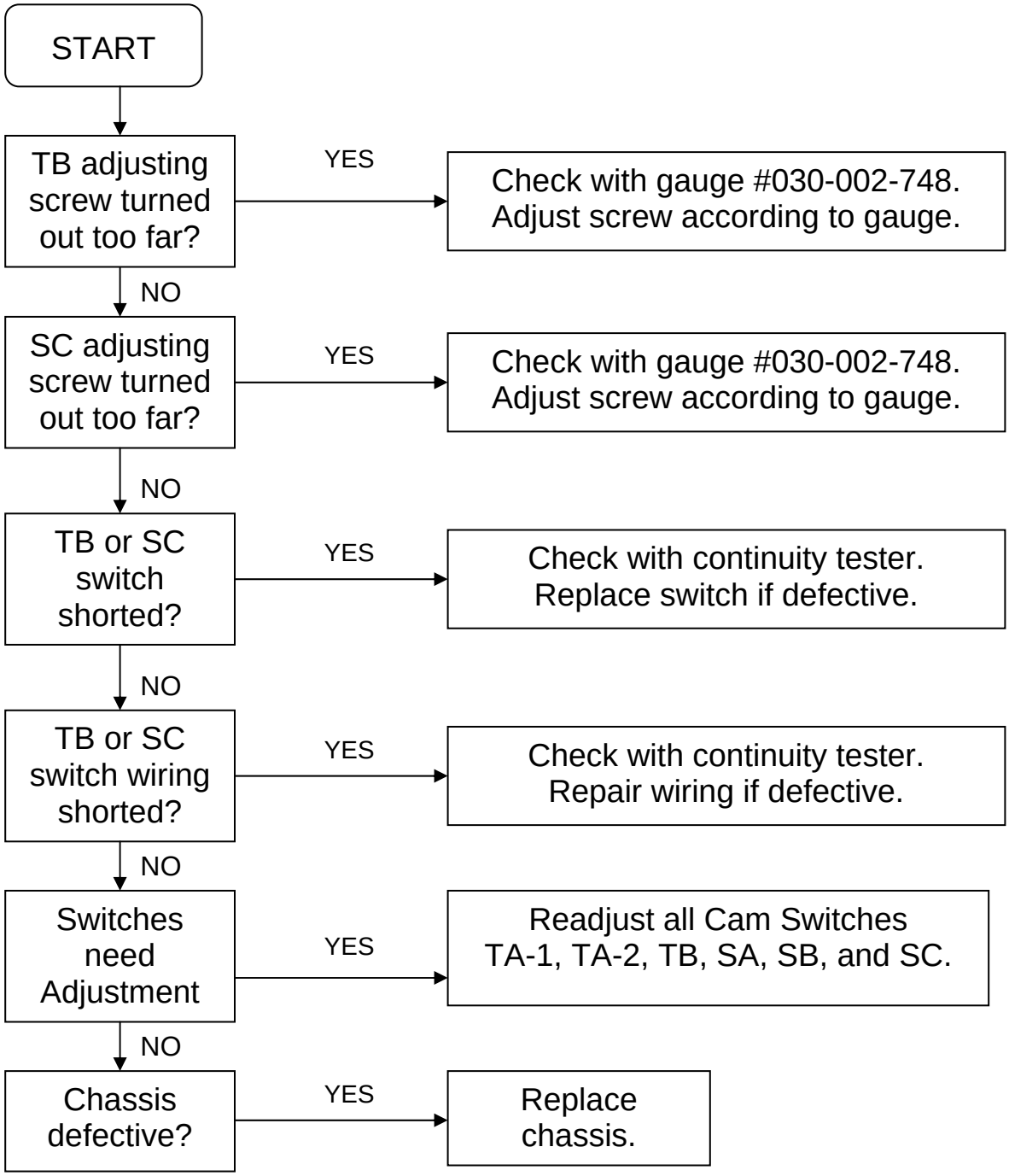

Figure 4-88

4.5.2.8 PROBLEM: Pin fell over during spotting.

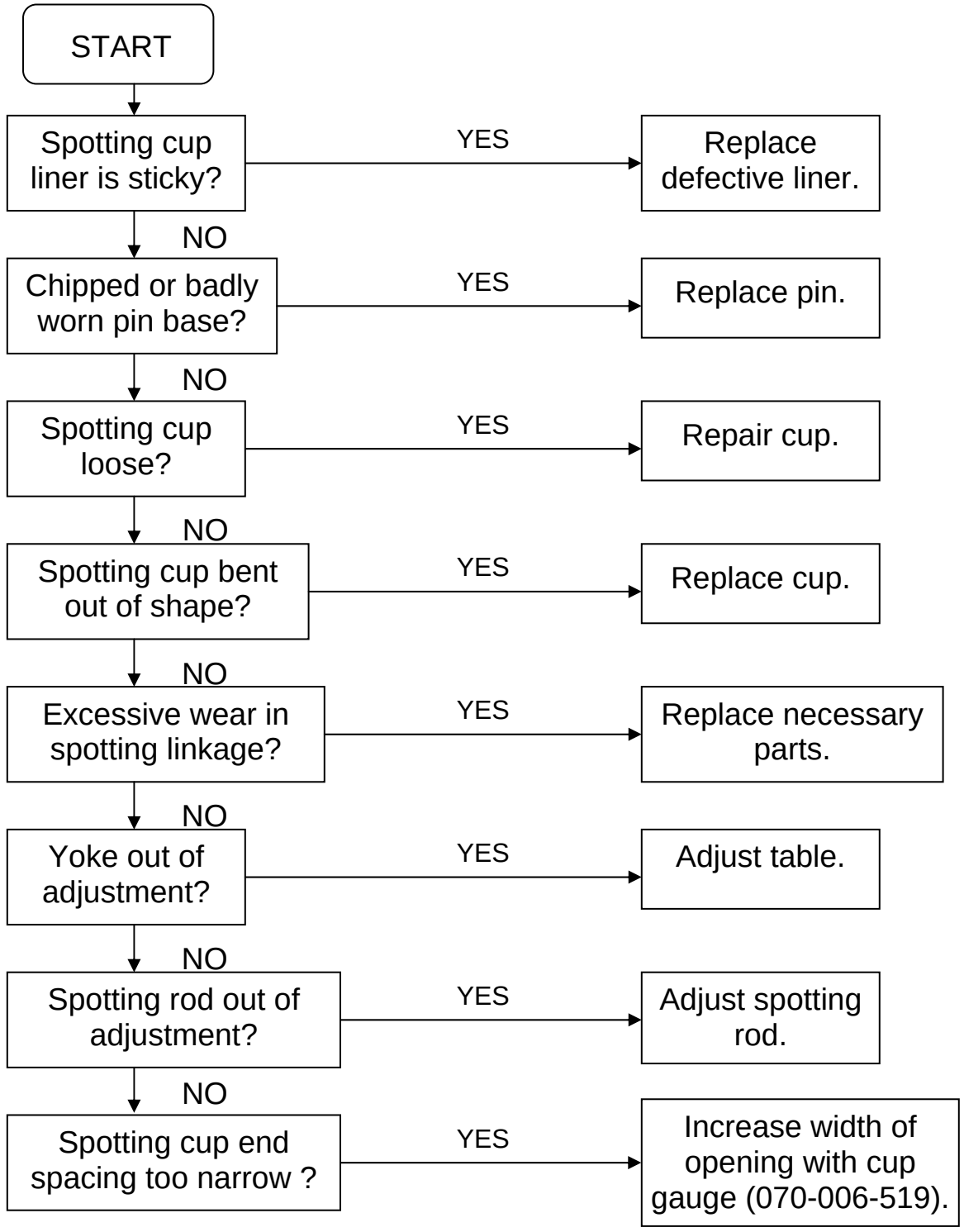

Figure 4-89

4.5.3 SWEEP TROUBLESHOOTING

4.5.3.1 PROBLEM: Sweep runs up, down, and starts through to clean off the deck a second time as the table spots pins. Table and sweep stop because of interlock.

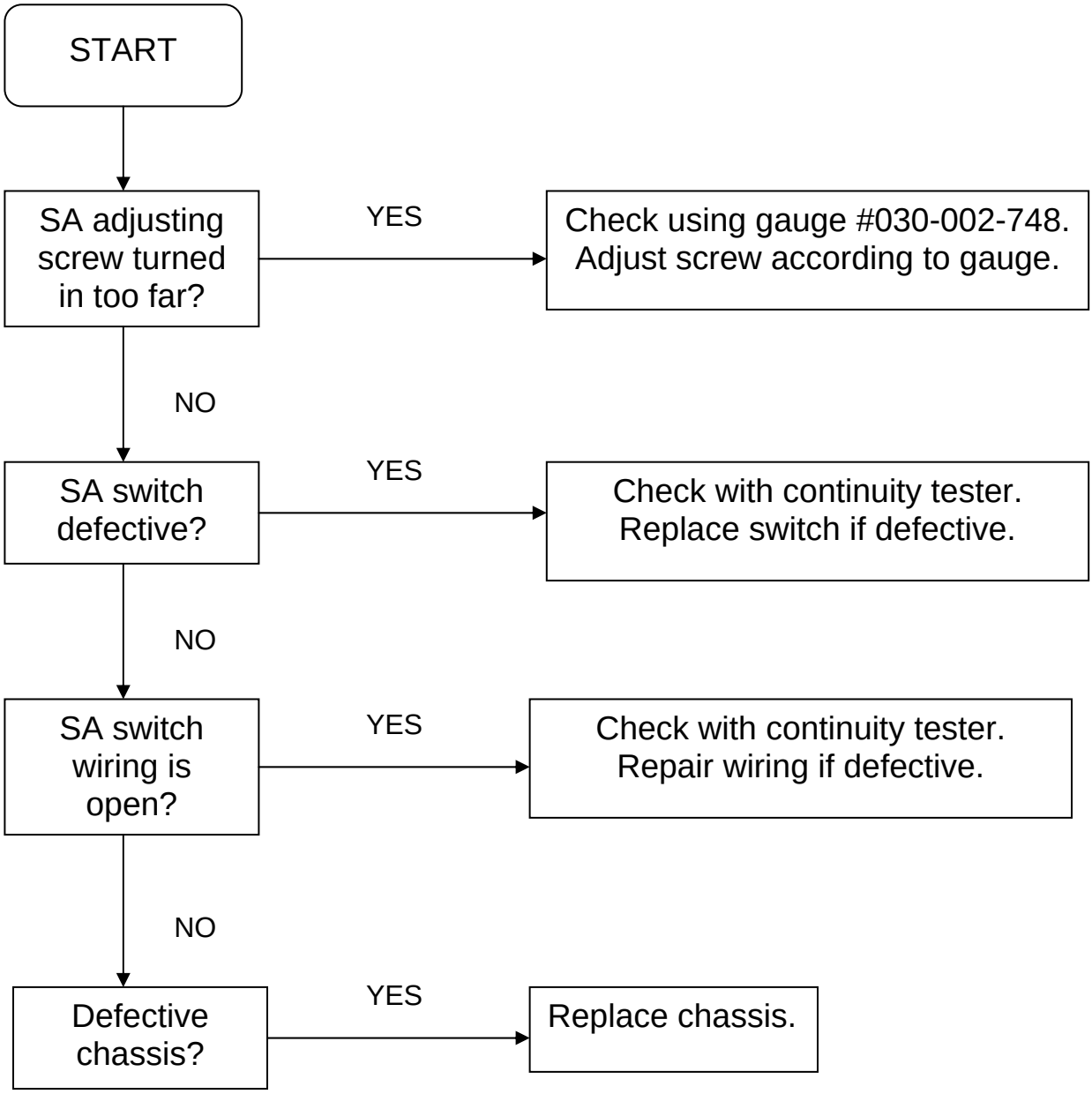

Figure 4-90

4.5.3.2 PROBLEM: Sweep overruns all stopping positions. Motor coasts.

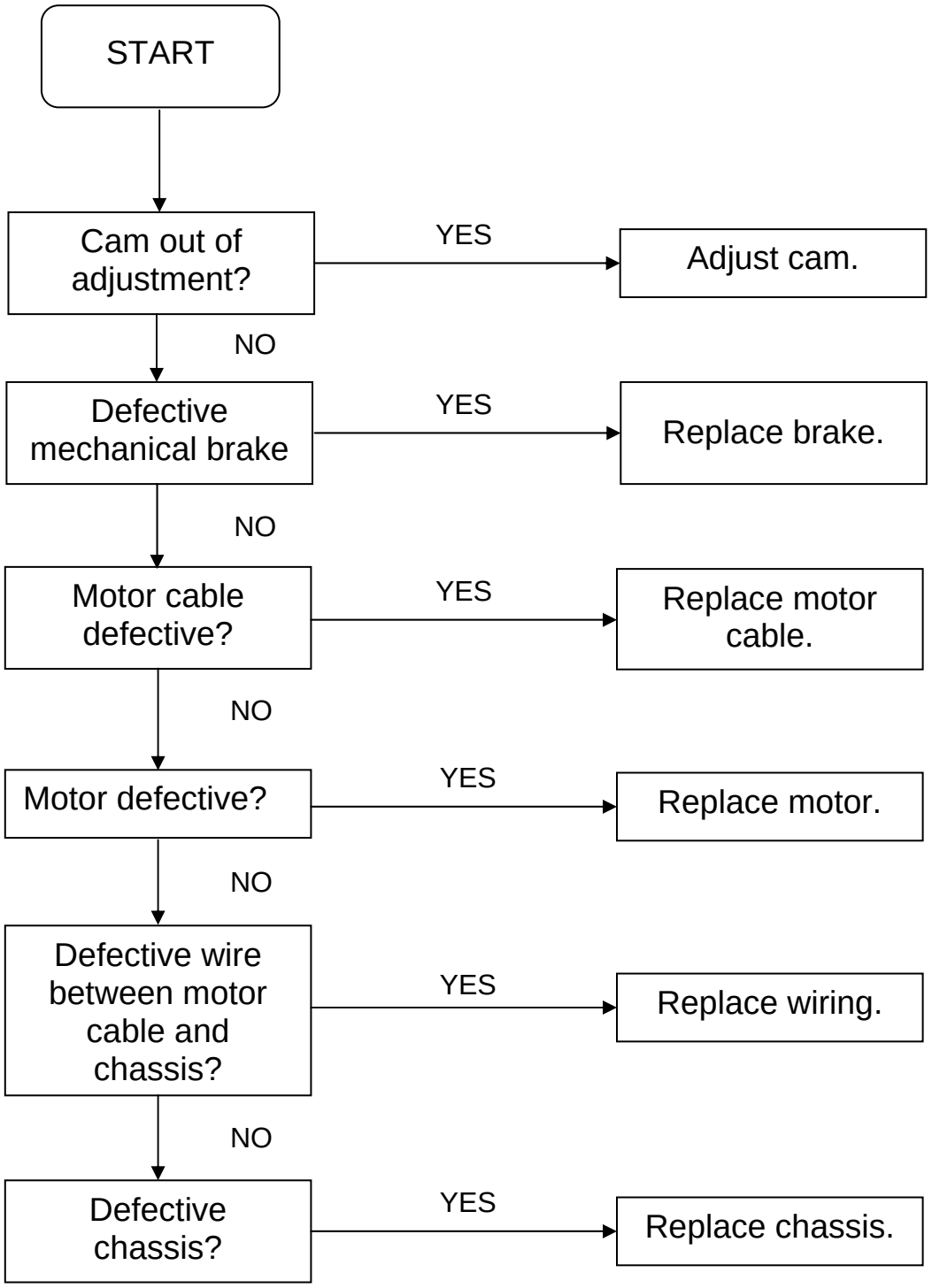

Figure 4-91

4.5.3.3 PROBLEM: Sweep motor trips overload.

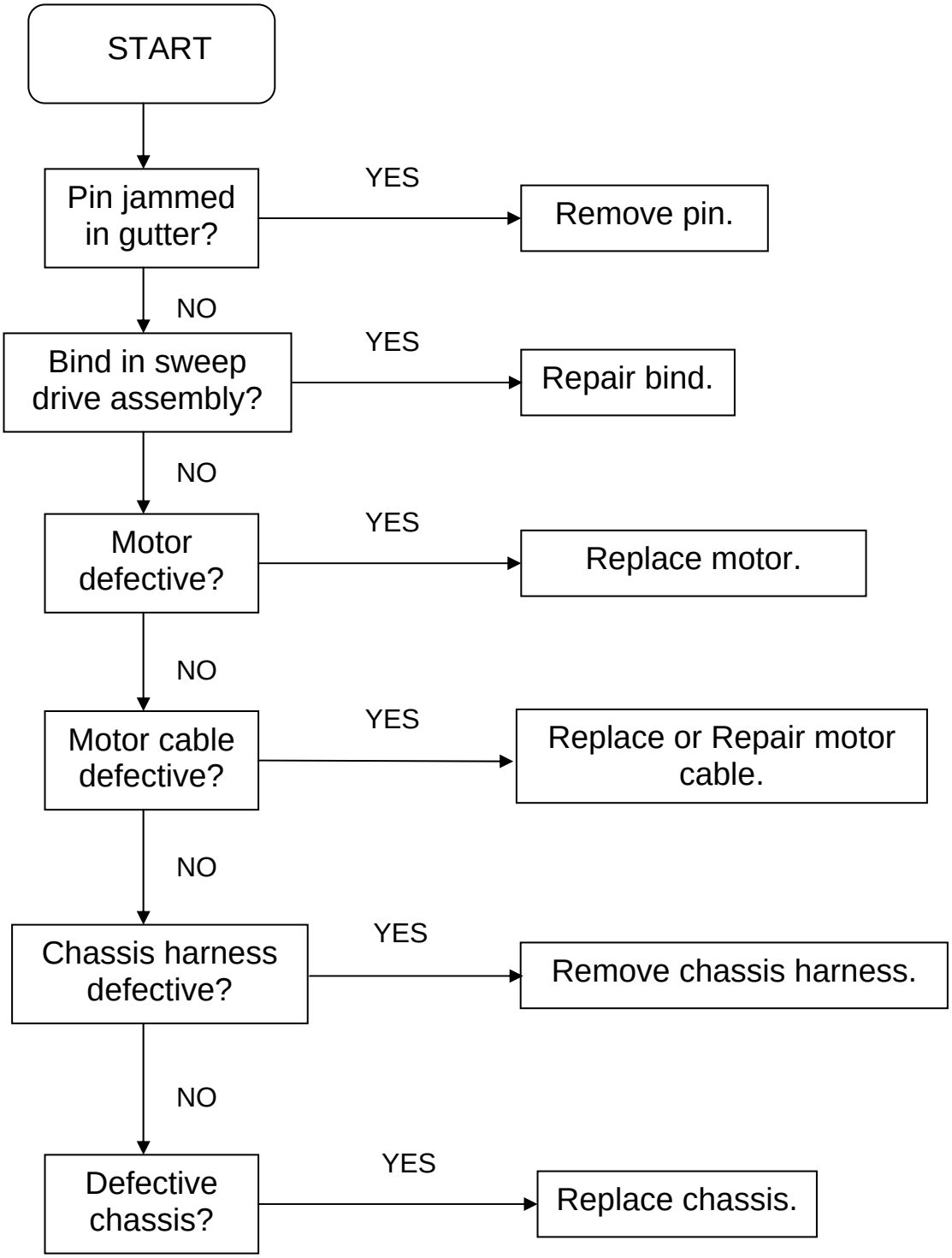

Figure 4-92

4.5.3.4 PROBLEM: Sweep hits gutter at 66° guard position.

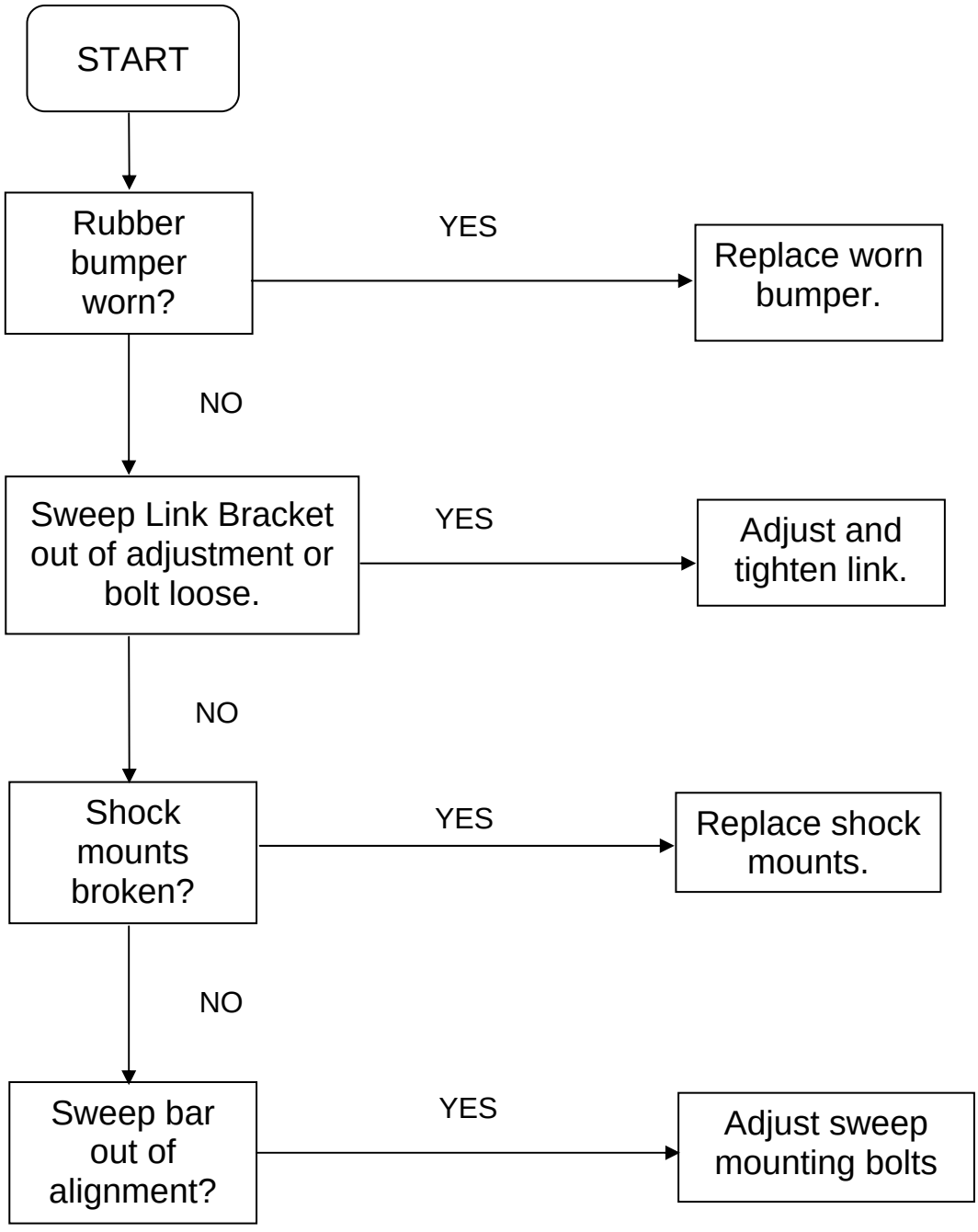

Figure 4-93

4.5.3.5 PROBLEM: Sweep runs continuously.

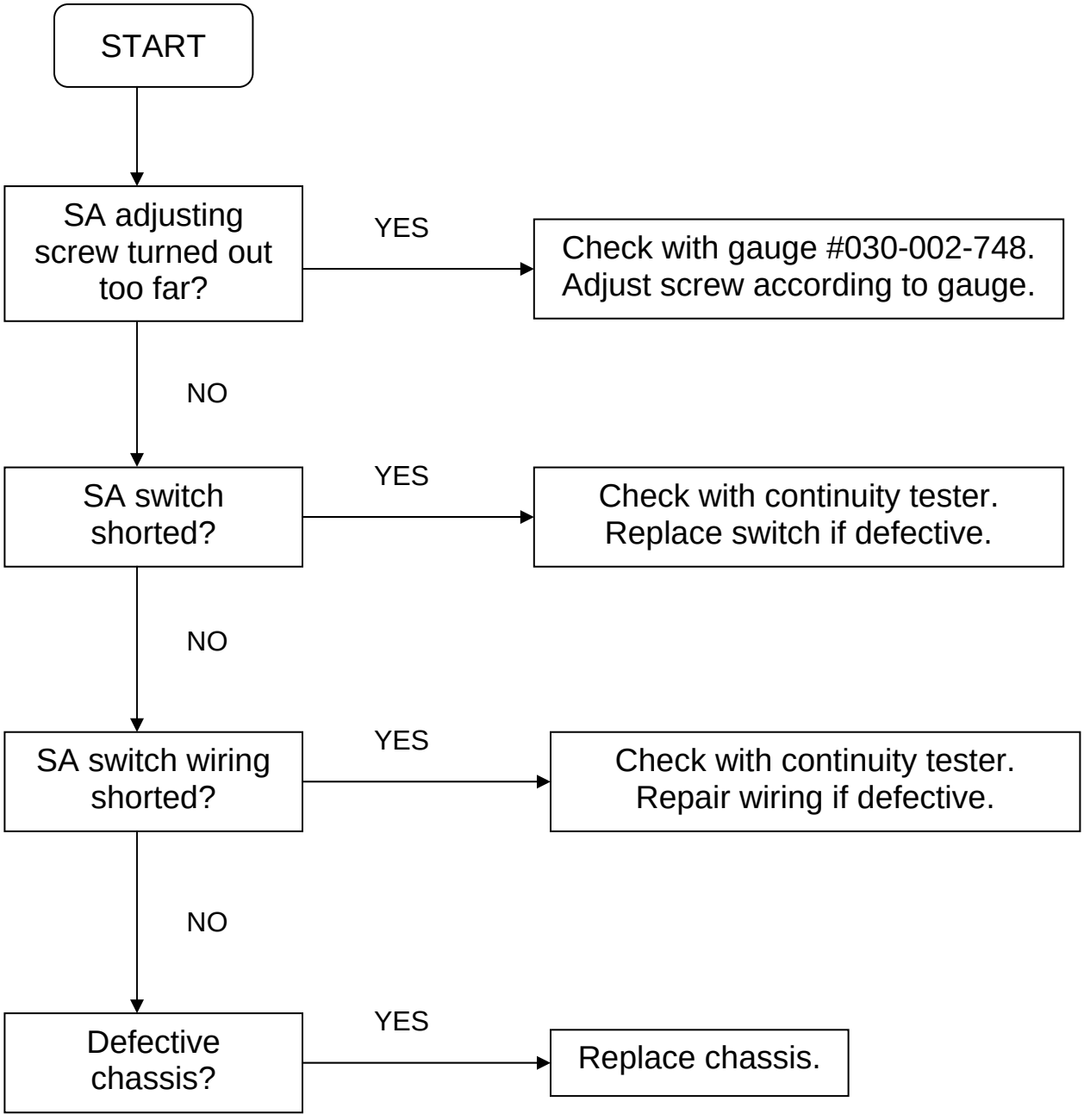

Figure 4-94

4.5.3.6 PROBLEM: After cycle starts, sweep runs continuously.

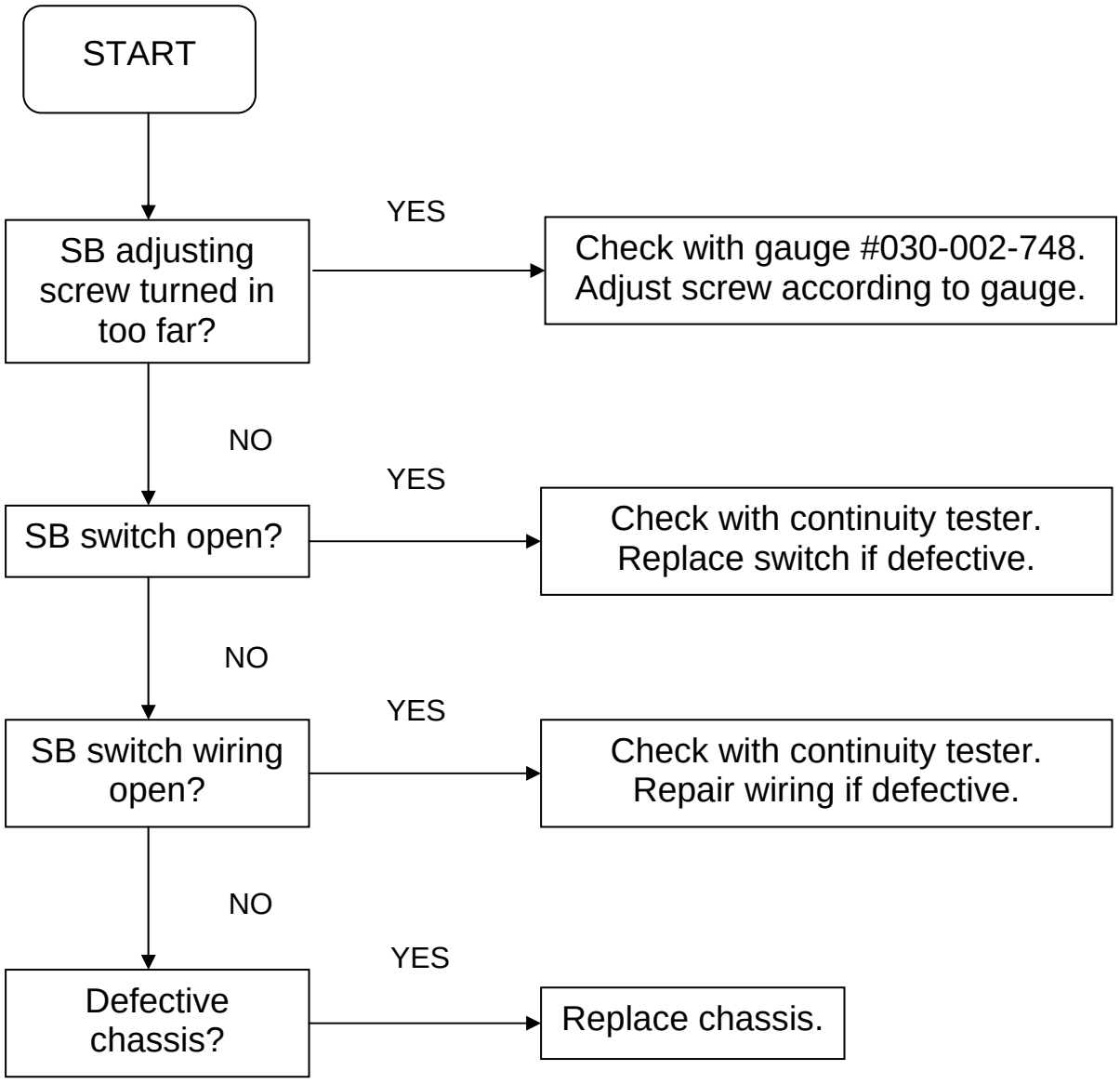

Figure 4-95

4.5.3.7 PROBLEM: 1st ball – sweep goes down, table comes down about half way and stops. Table and sweep will not move by lifting TA or SA.

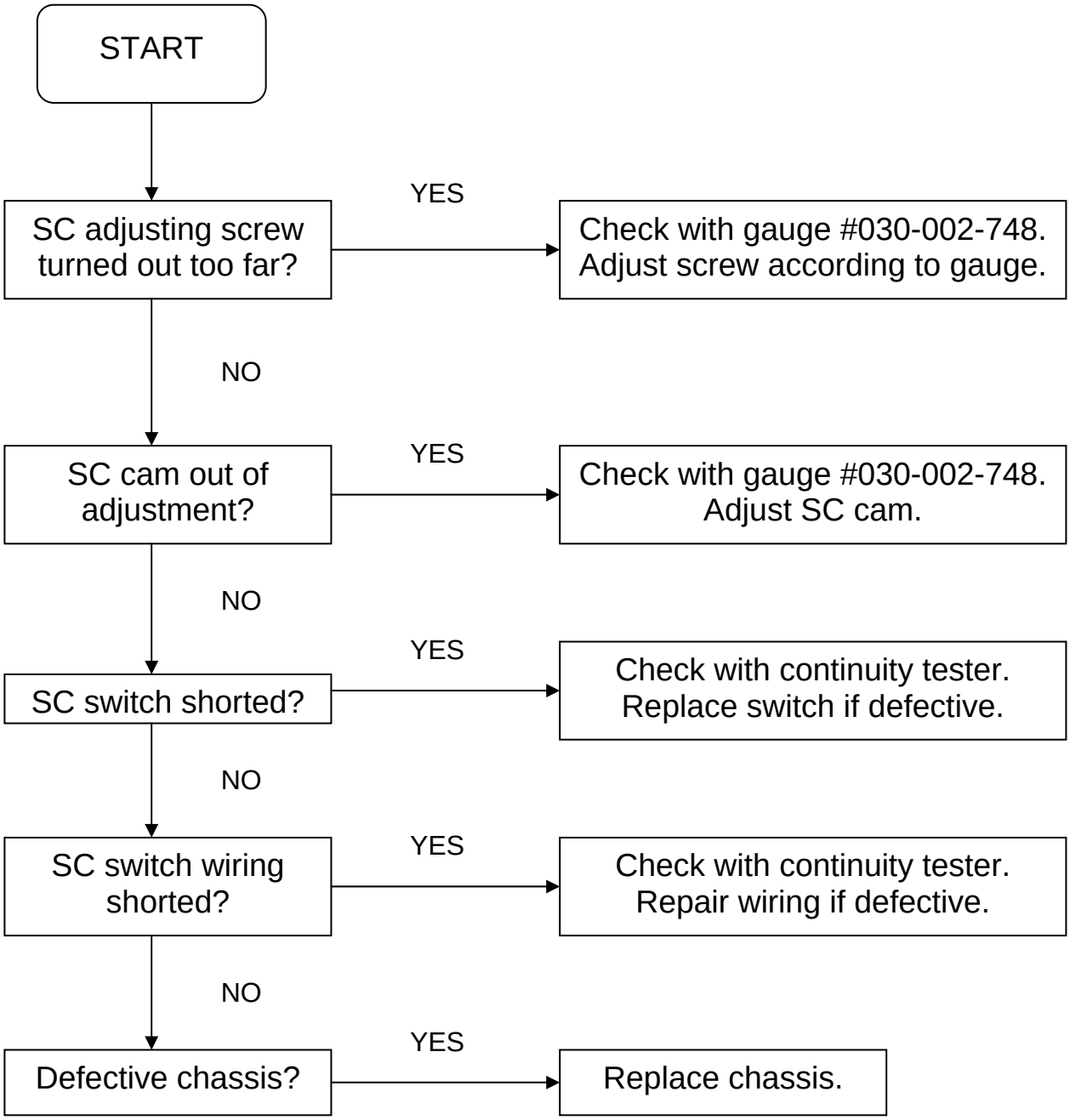

Figure 4-96

4.5.3.8 PROBLEM: Sweep arm hits frame of machine at zero. position.

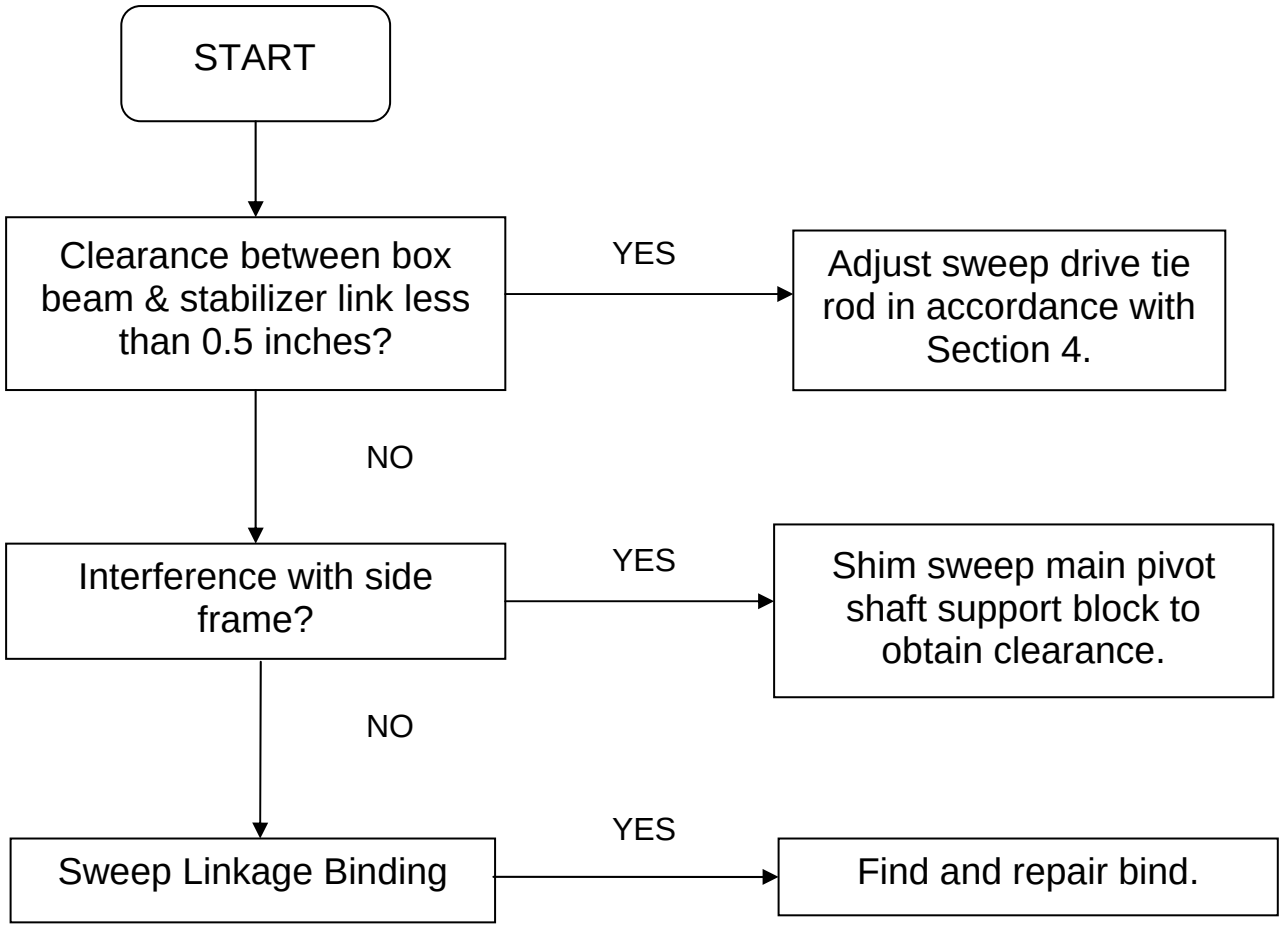

Figure 4-97

4.5.3.9 PROBLEM: 1st ball – table comes down and picks up standing pins, but does not respot them. Sweep remains at guard position.

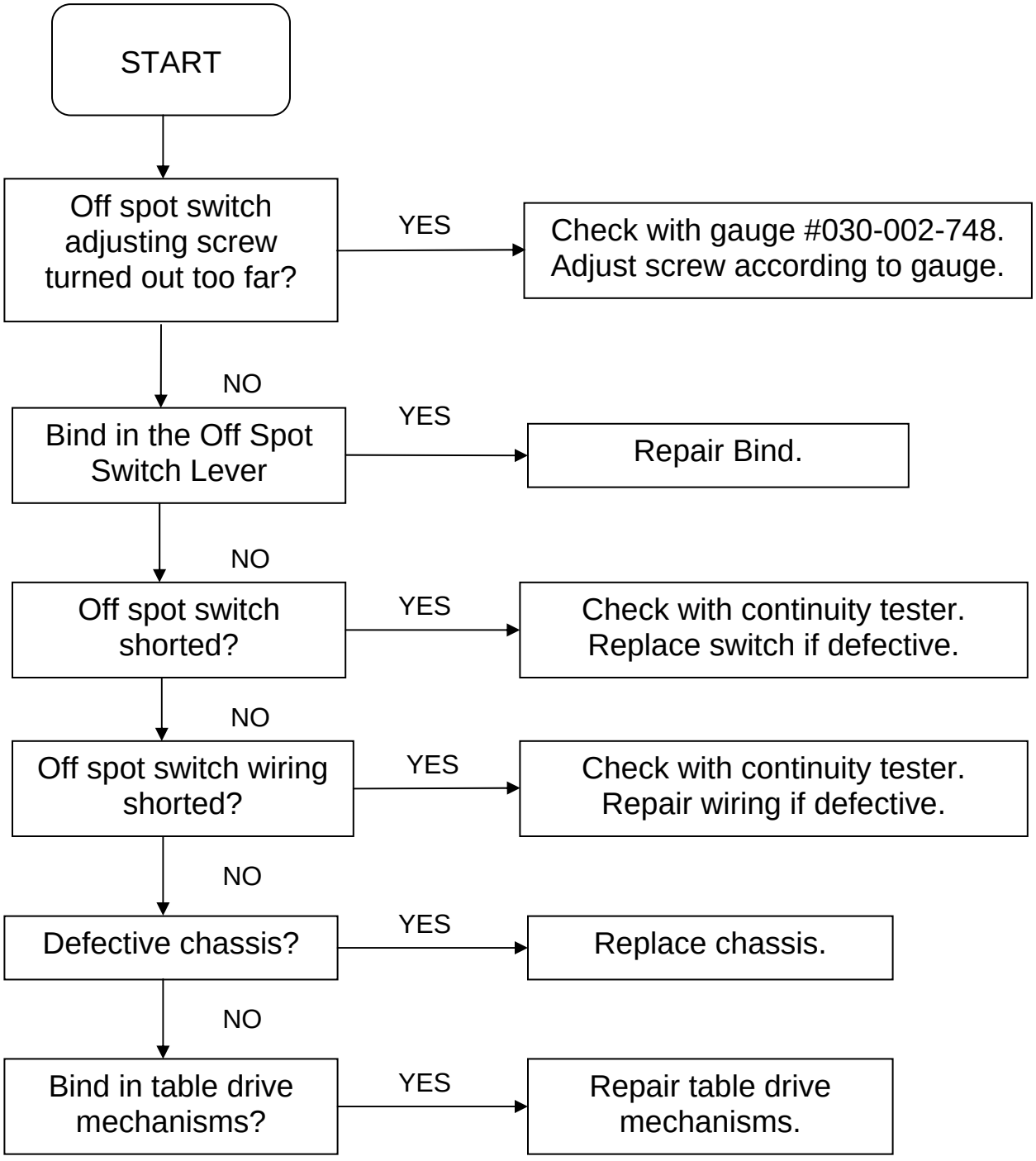

Figure 4-98

4.5.3.10 PROBLEM: 1st ball - table comes down on top of an off spot pin, thus not picking up the pins. Then the sweep cleans off all of the pins both standing and down. Table comes down, spots pins, then goes up, sweep goes up, and the strike light goes on.

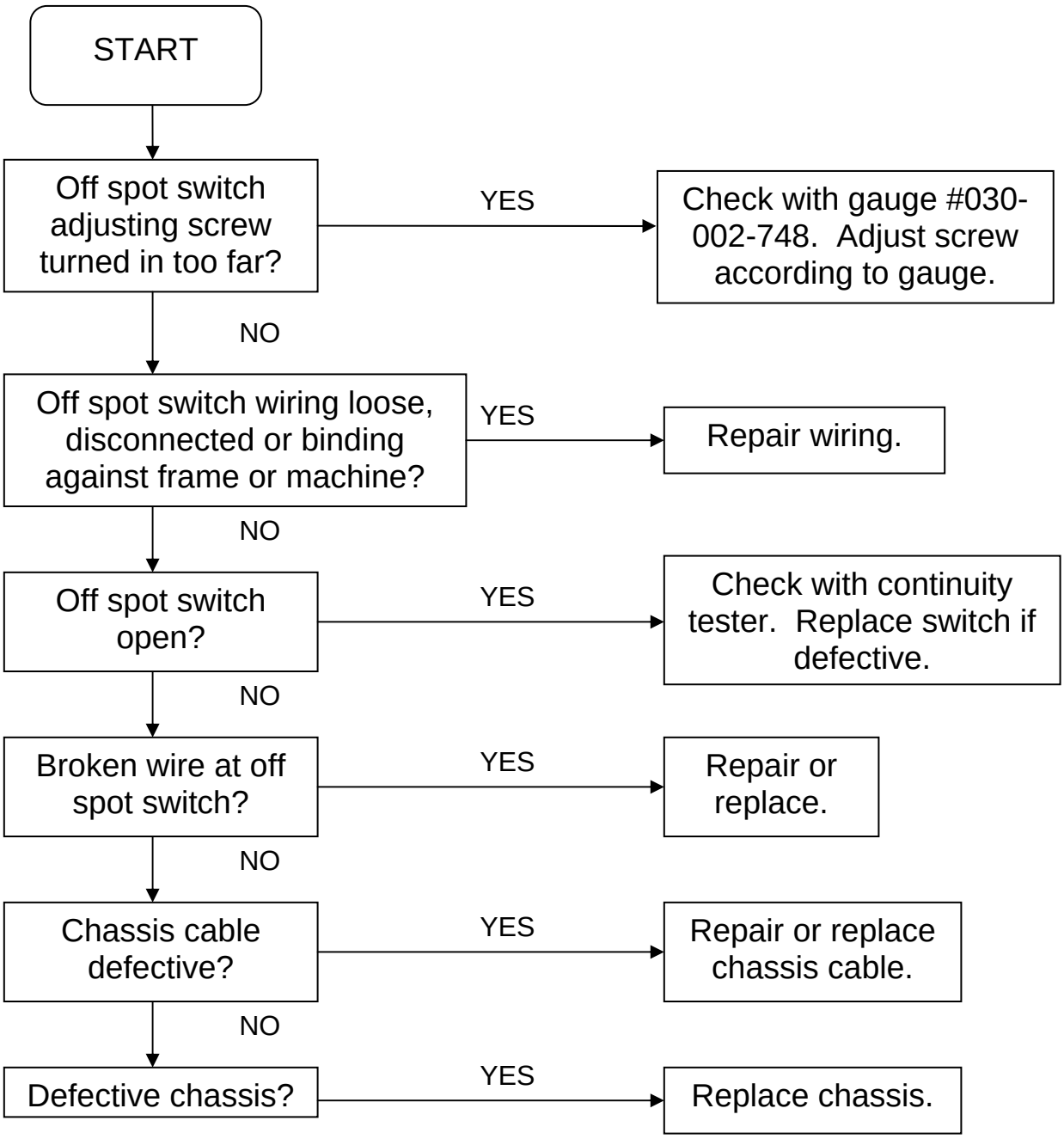

Figure 4-99

4.5.3.11 PROBLEM: 2nd ball or strike – table does not run, bins loaded with pins but will not drop the pins into the spotting cups.

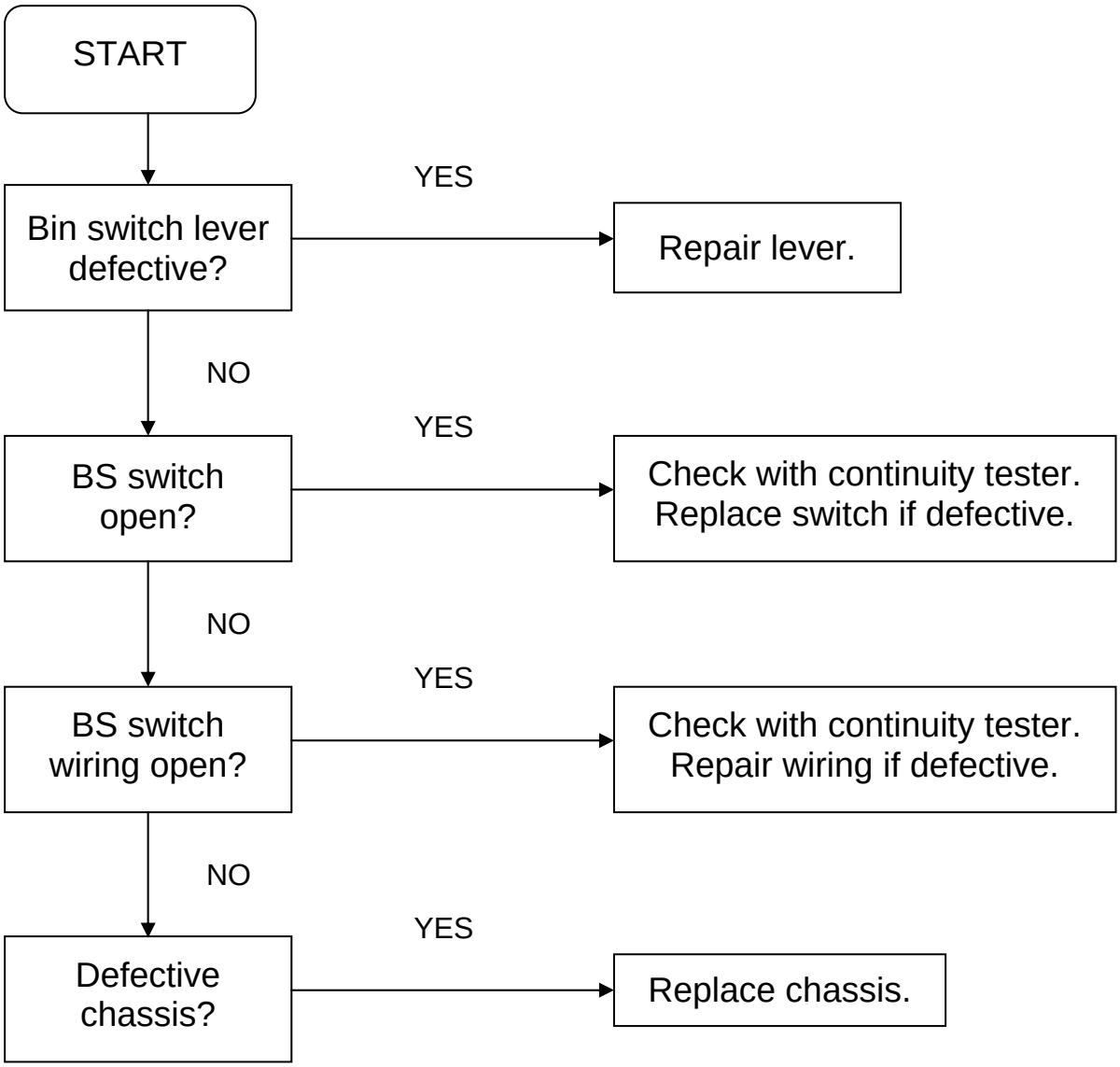

Figure 4-100

4.5.3.12 PROBLEM: Sweep runs too far into pit area.

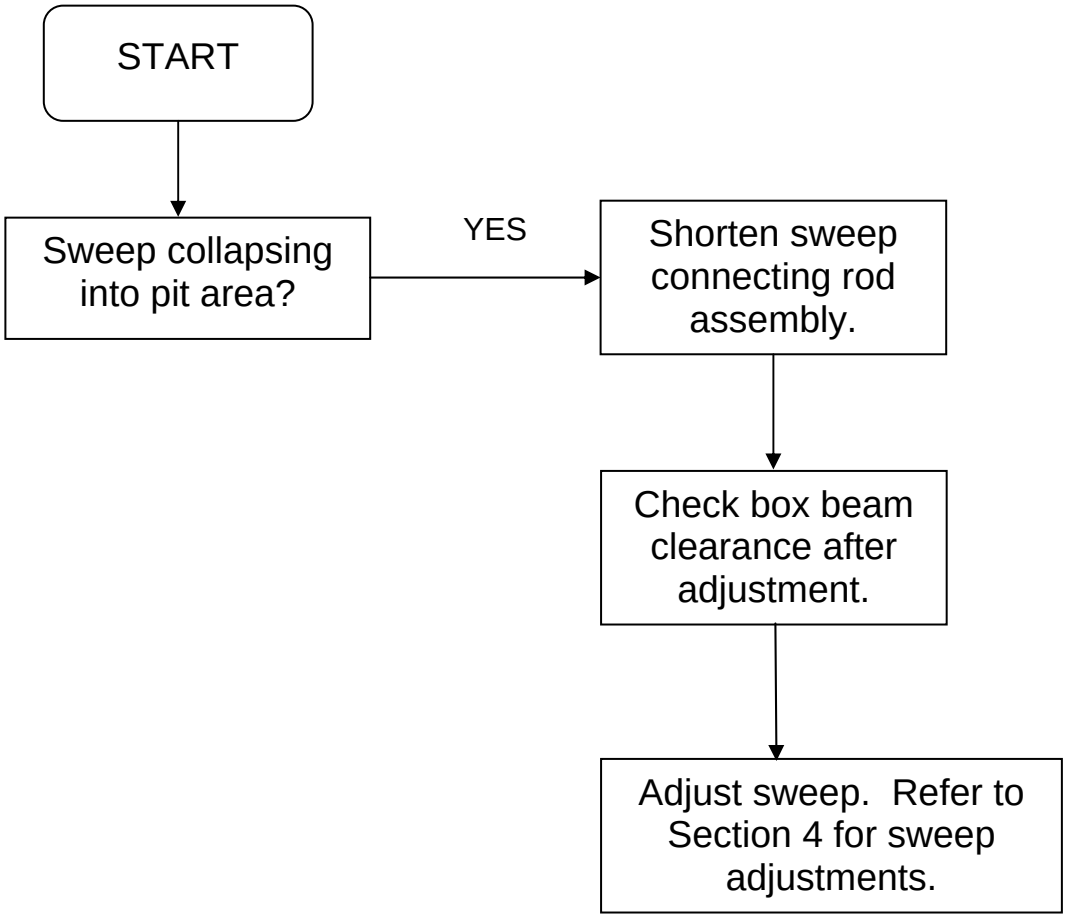

Figure 4-101

4.5.3.13 PROBLEM: Sweep does not knock all pins into pit.

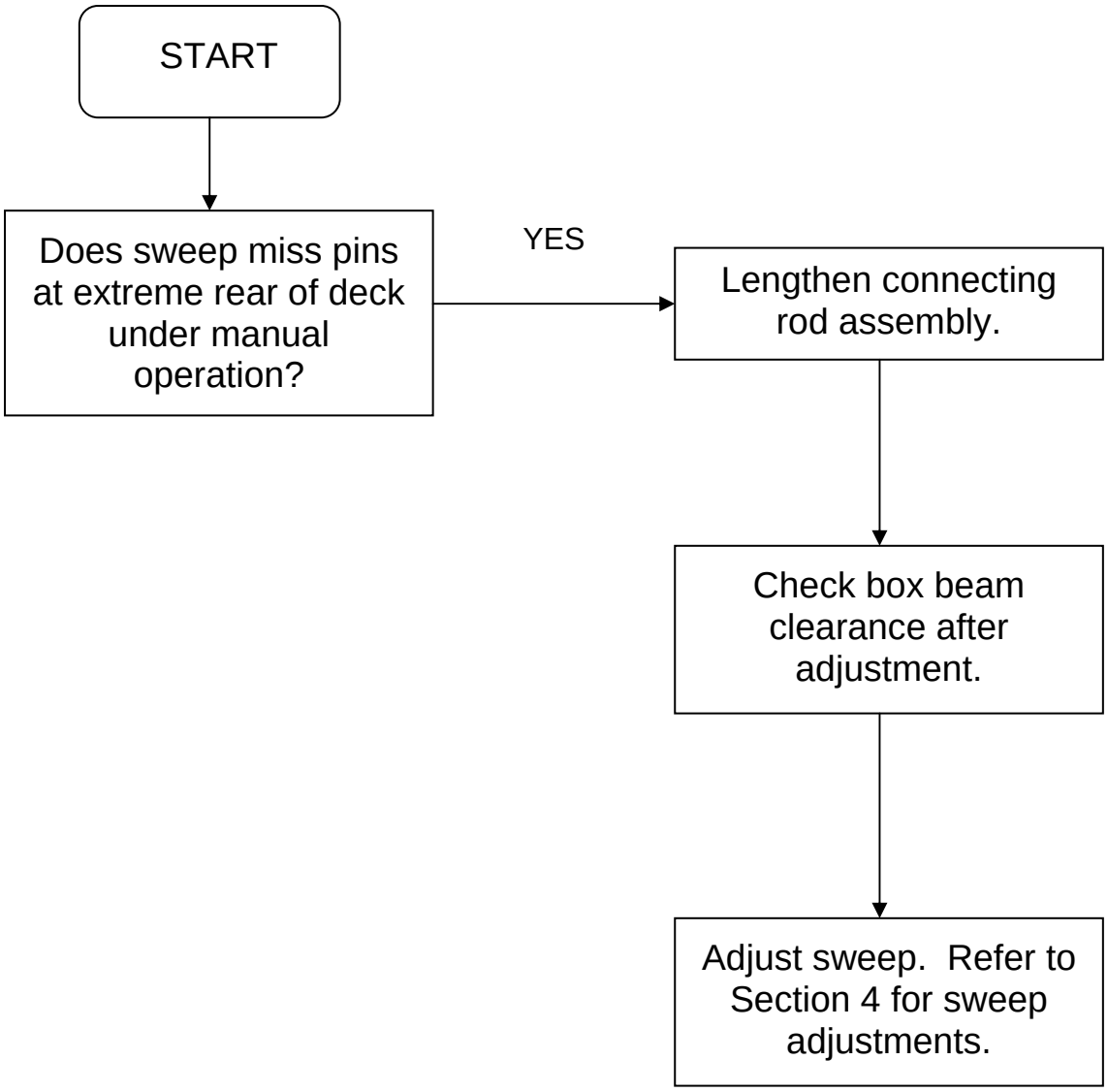

Figure 4-102

4.5.3.14 PROBLEM: 2nd Ball or Strike – Table runs but does not shuttle pins or go all the way down to the spotting position.

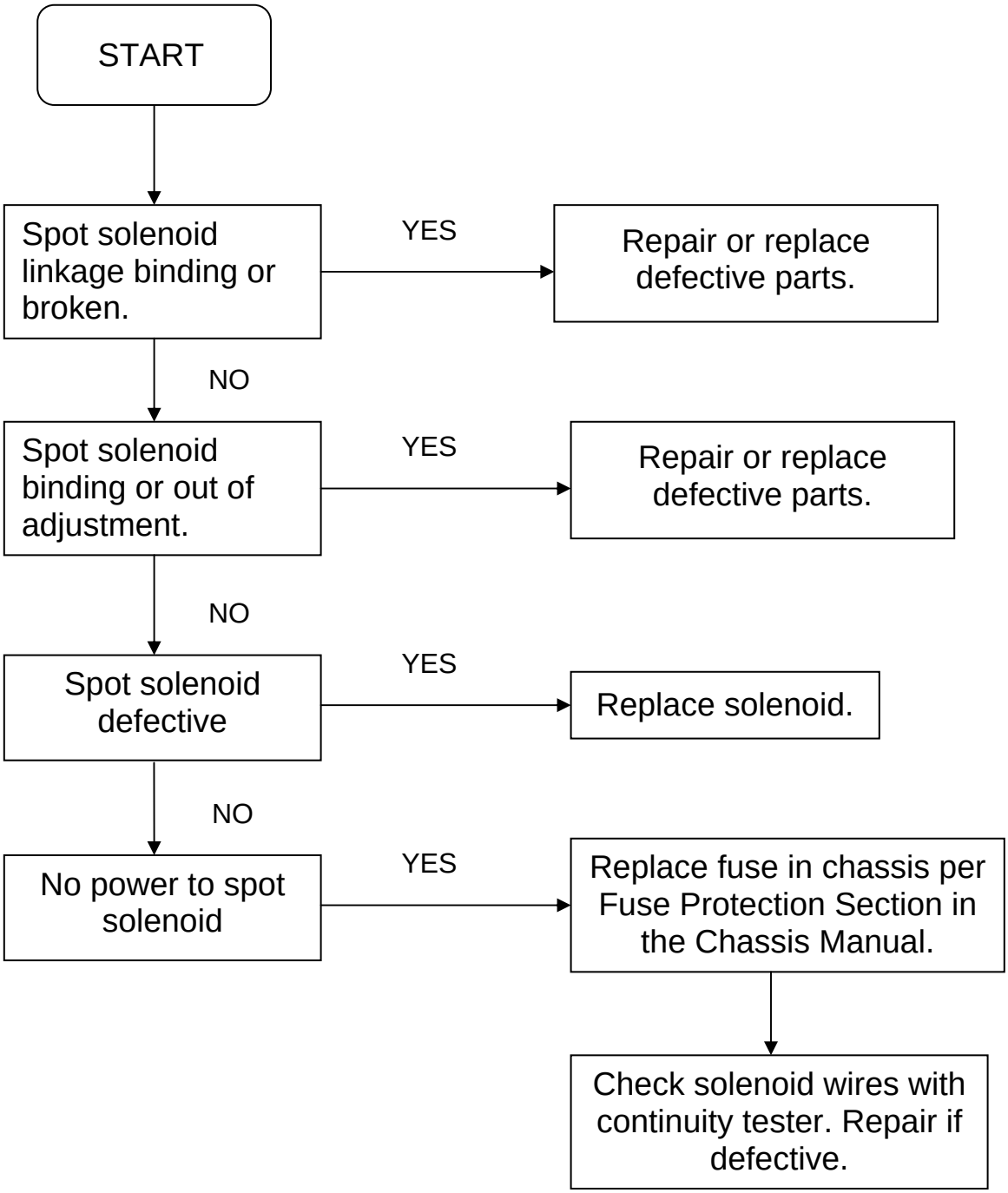

Figure 4-103

4.5.4 DISTRIBUTOR AND BIN TROUBLESHOOTING

4.5.4.1 PROBLEM: Distributor does not feed pins at correct position.

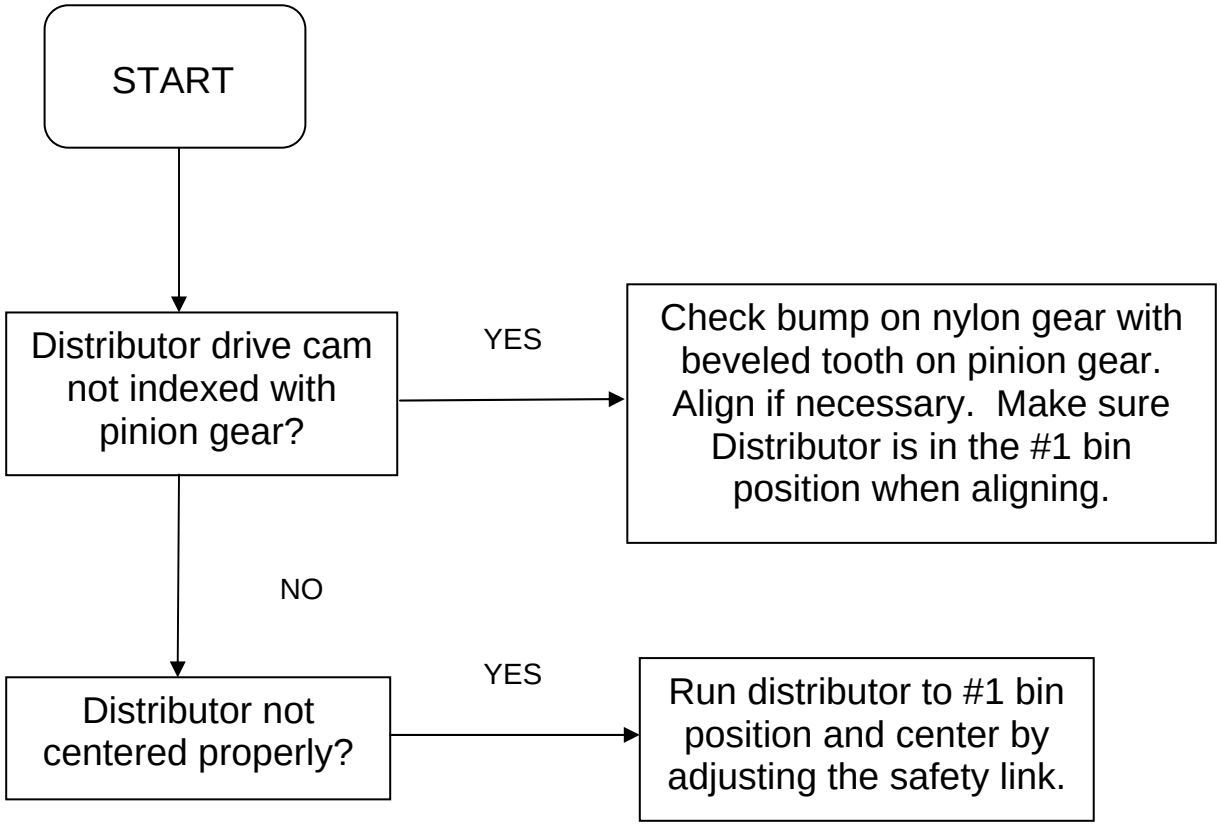

Figure 4-104

4.5.4.2 PROBLEM: Pins feed into bin continuously at one bin position or too many pins in one bin location.

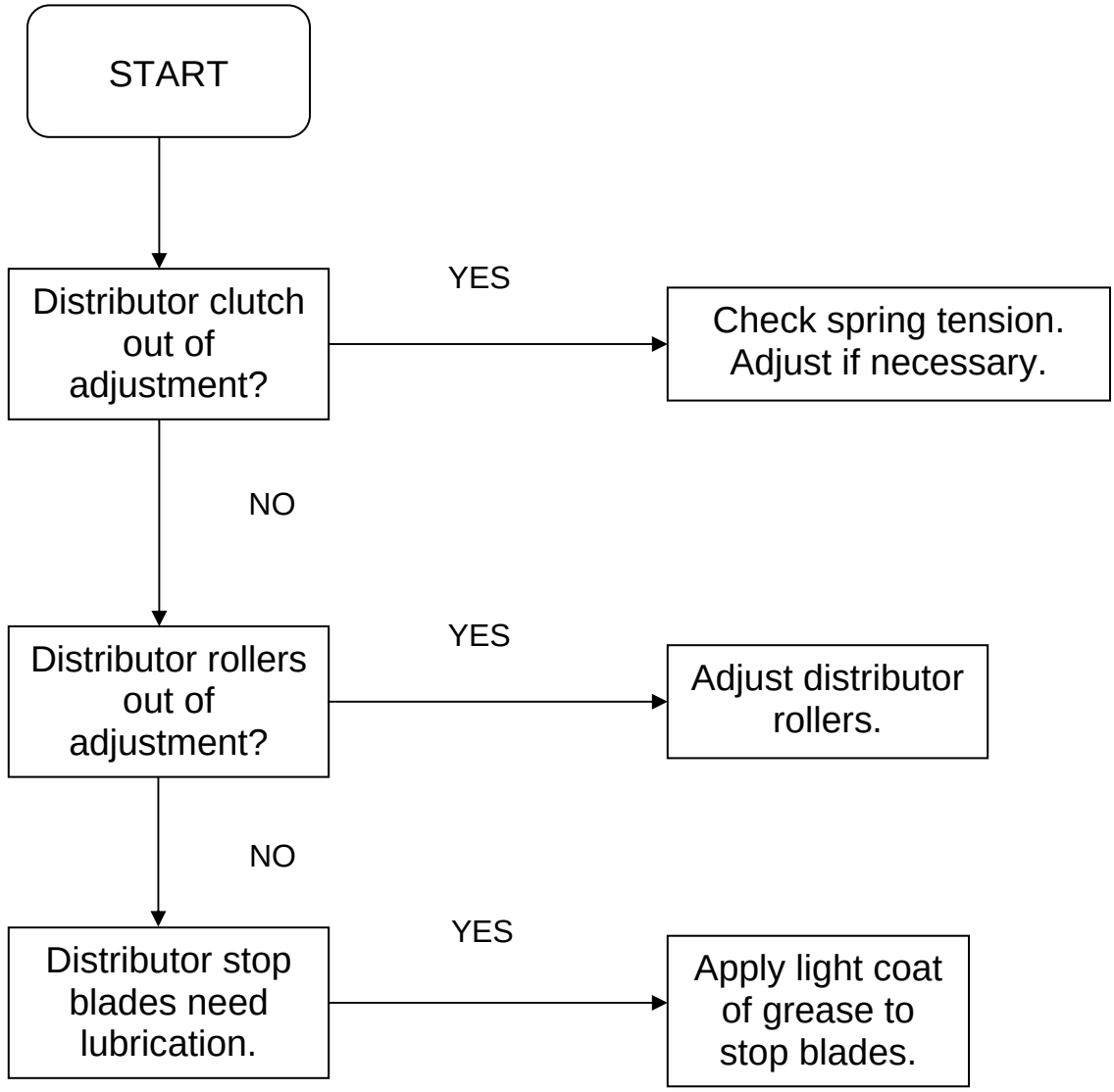

Figure 4-105

4.5.4.3 PROBLEM: Pin delivered head end first to bin pockets.

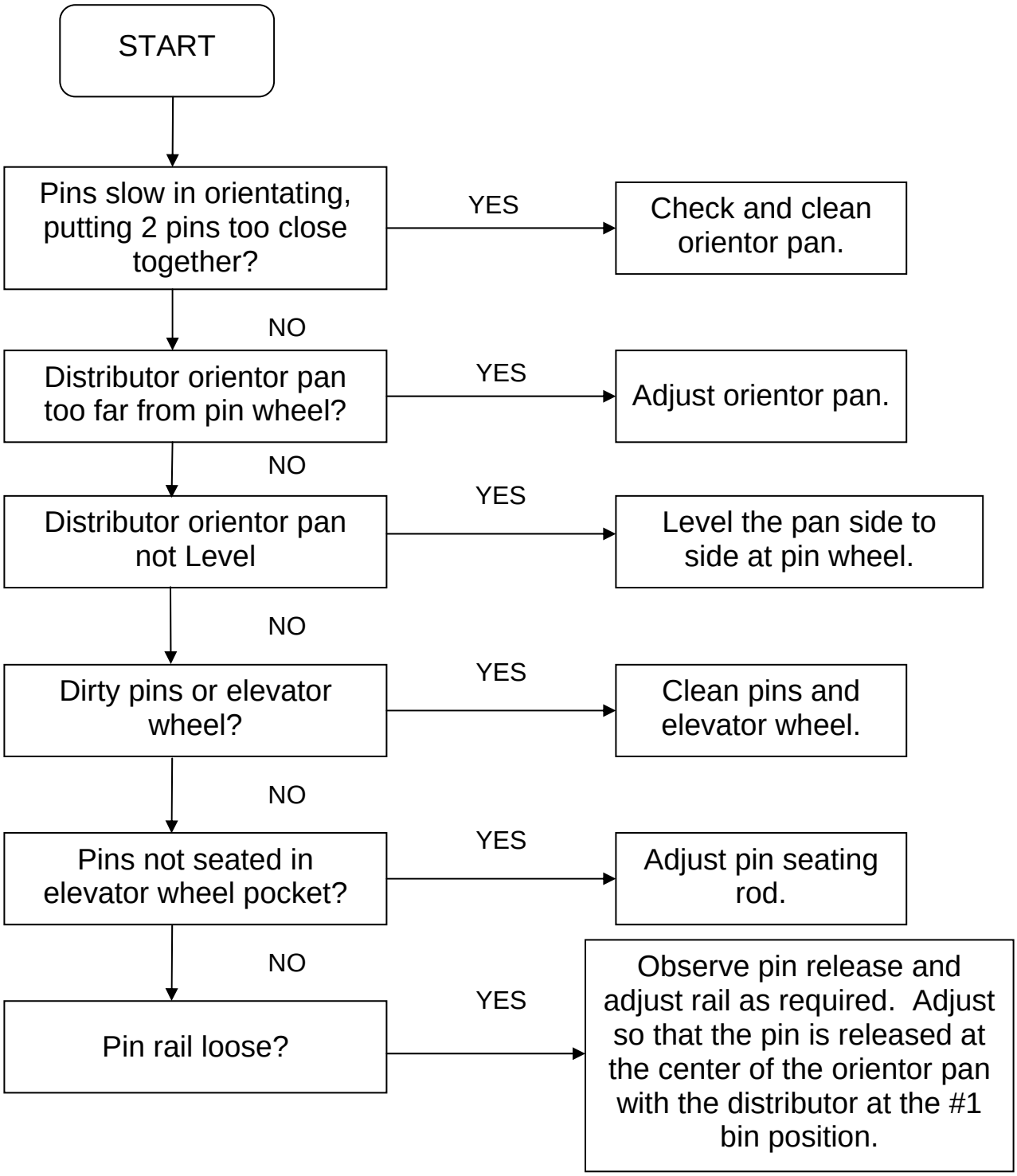

Figure 4-106

4.5.4.4 PROBLEM: Distributor front end hits bin during pin feed.

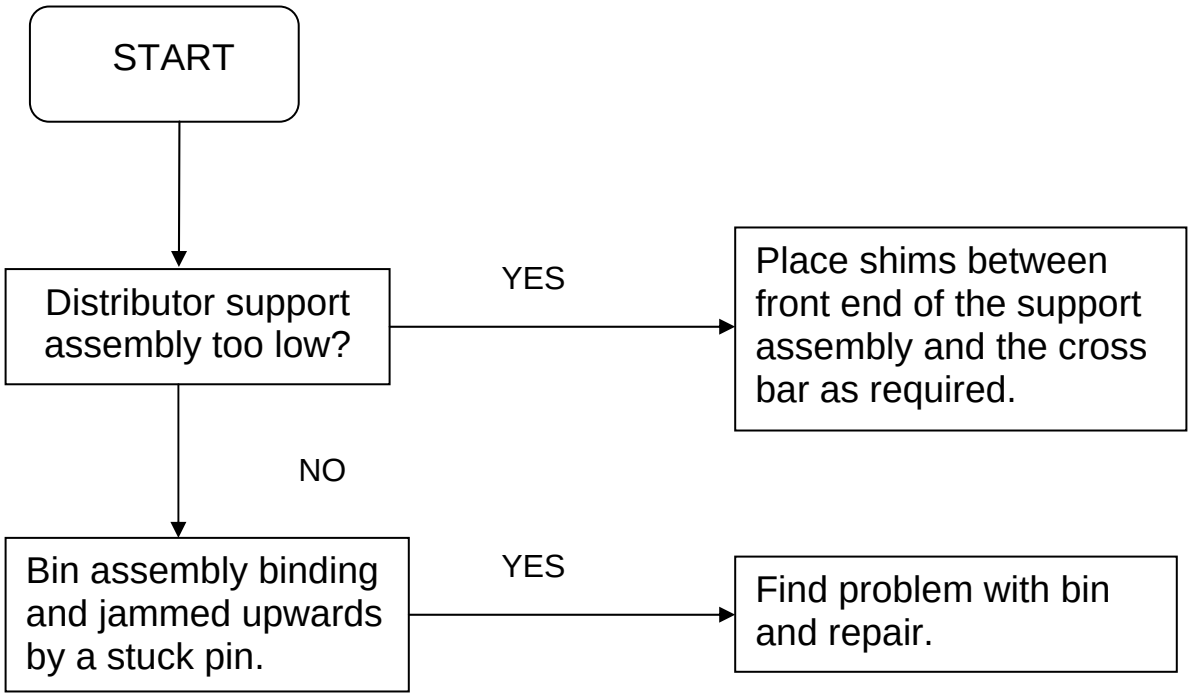

Figure 4-107

4.5.5 CUSHION AND PIT TROUBLESHOOTING

4.5.5.1 PROBLEM: Ball idles at cushion.

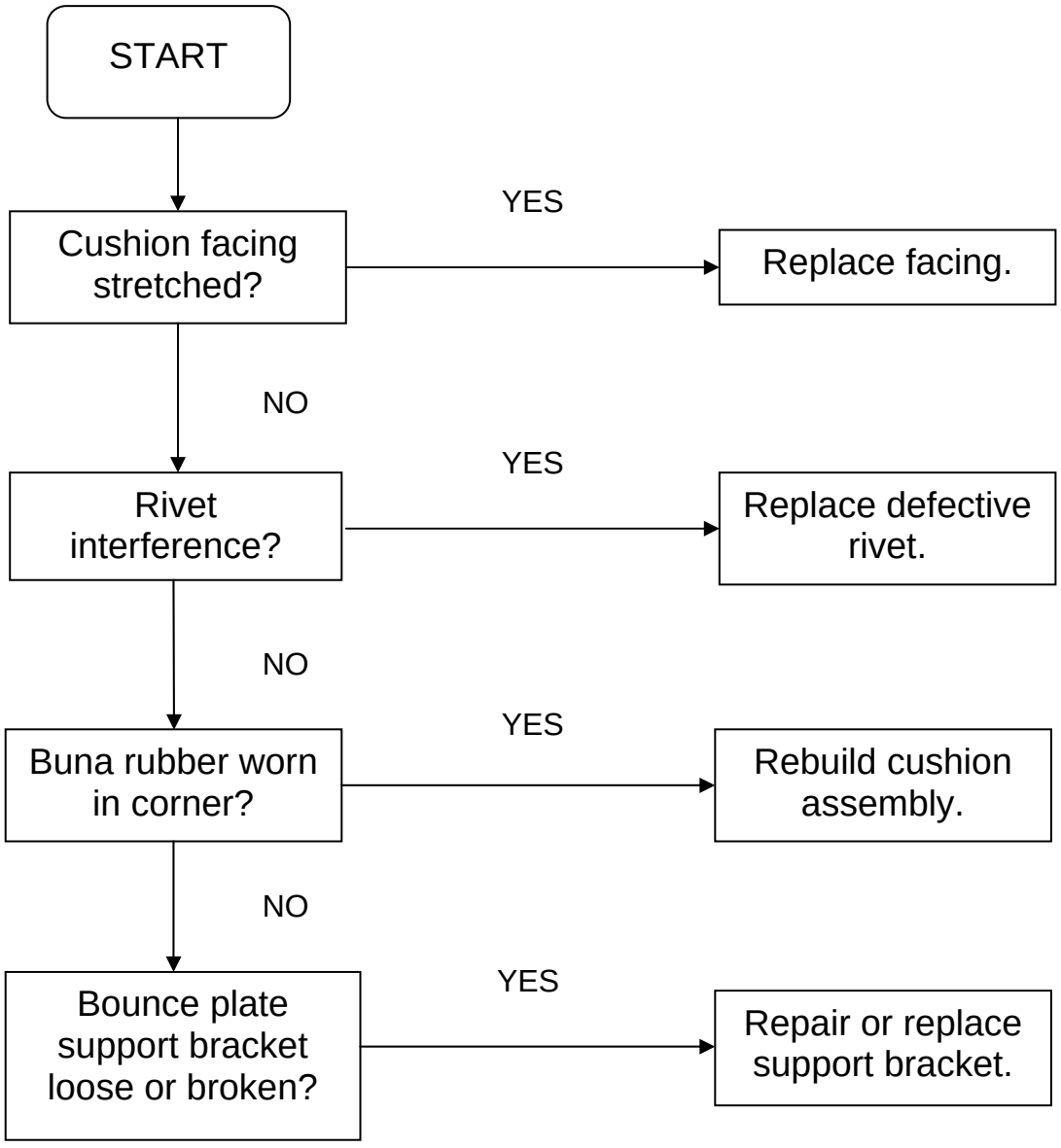

Figure 4-108

4.5.5.2 PROBLEM: Ball idles at exit – will not enter lift.

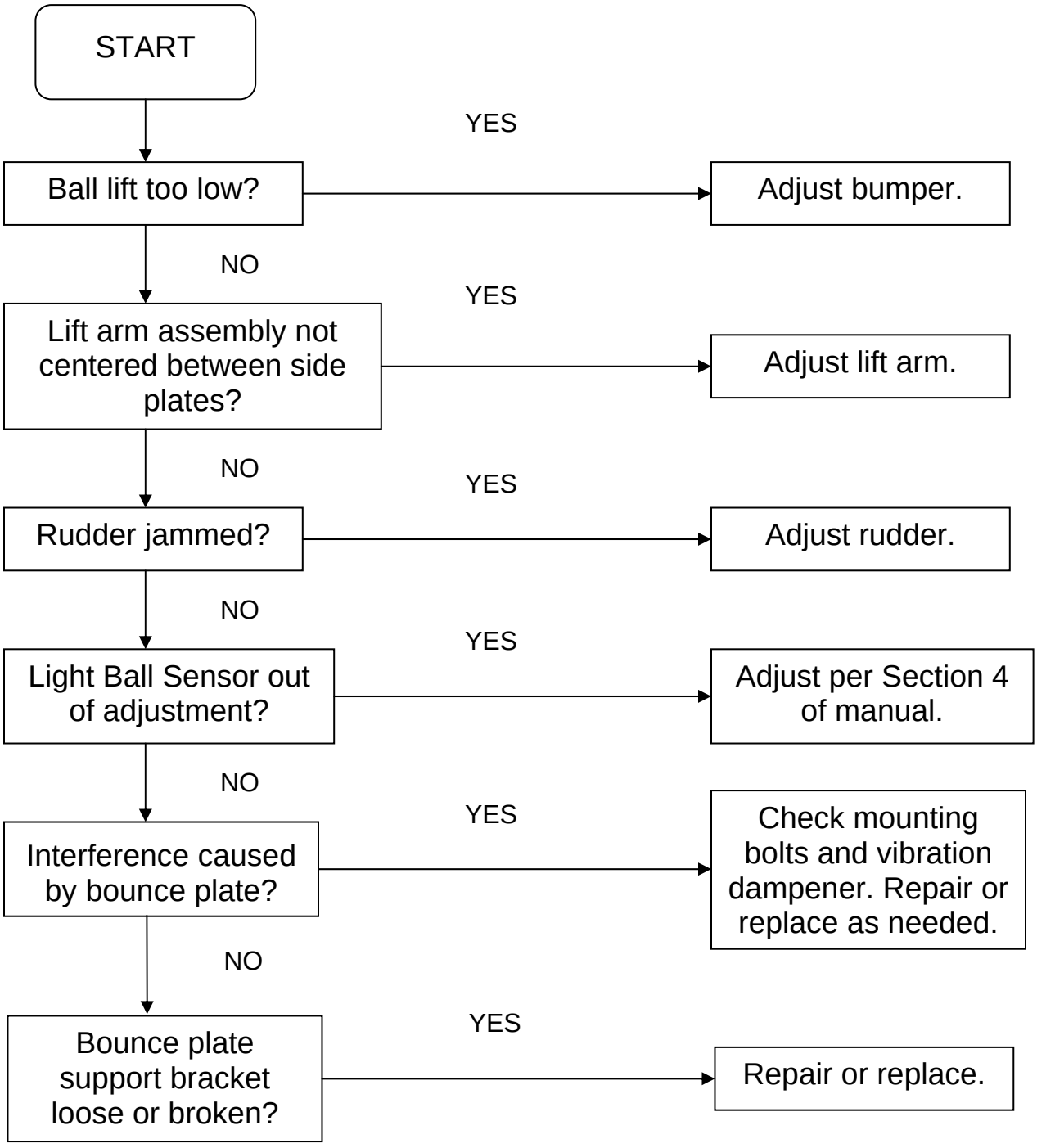

Figure 4-109

4.5.5.3 PROBLEM: Ball failed to cycle machine.

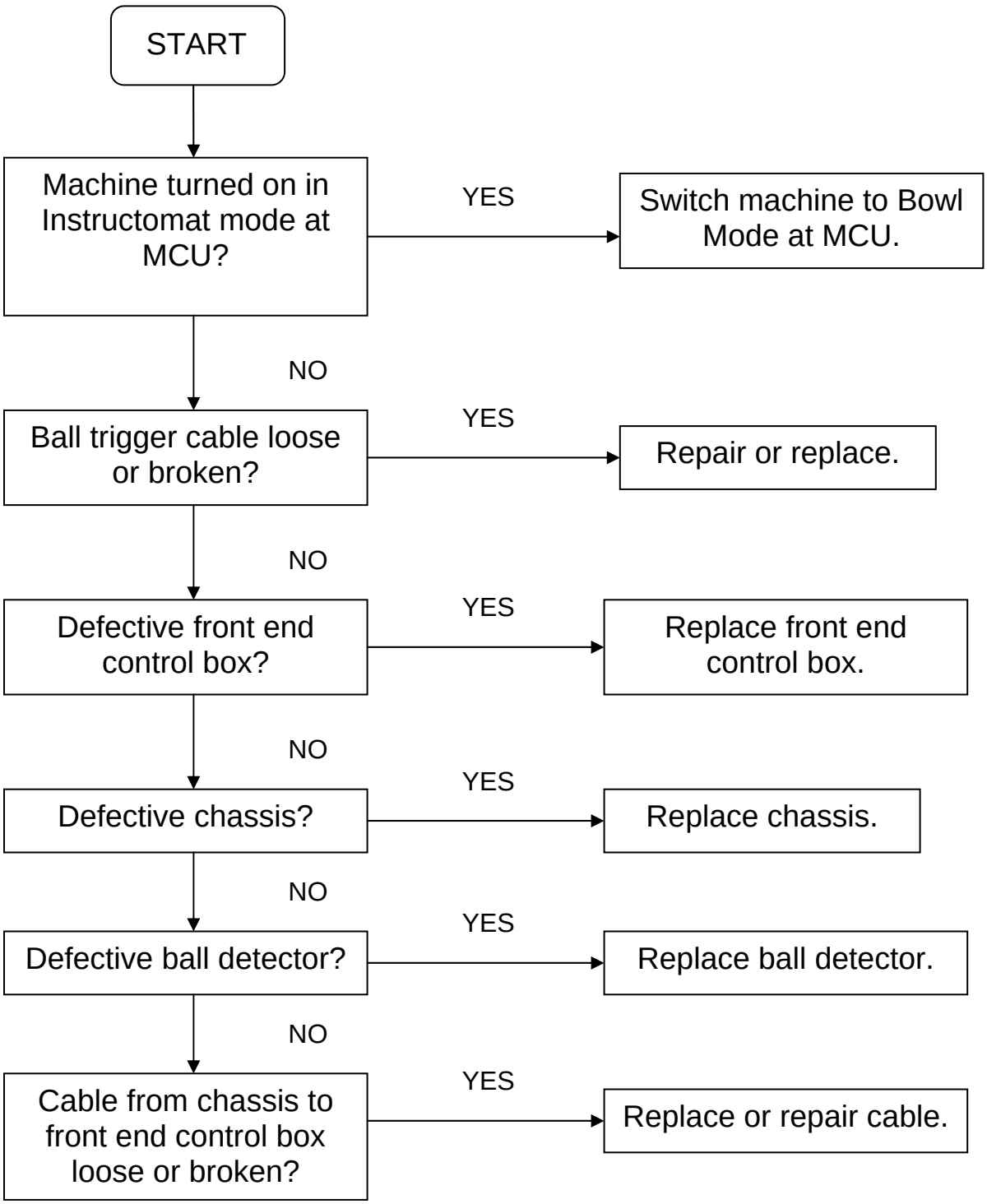

Figure 4-110

4.5.5.4 PROBLEM: Machine continues to cycle or cycles randomly.

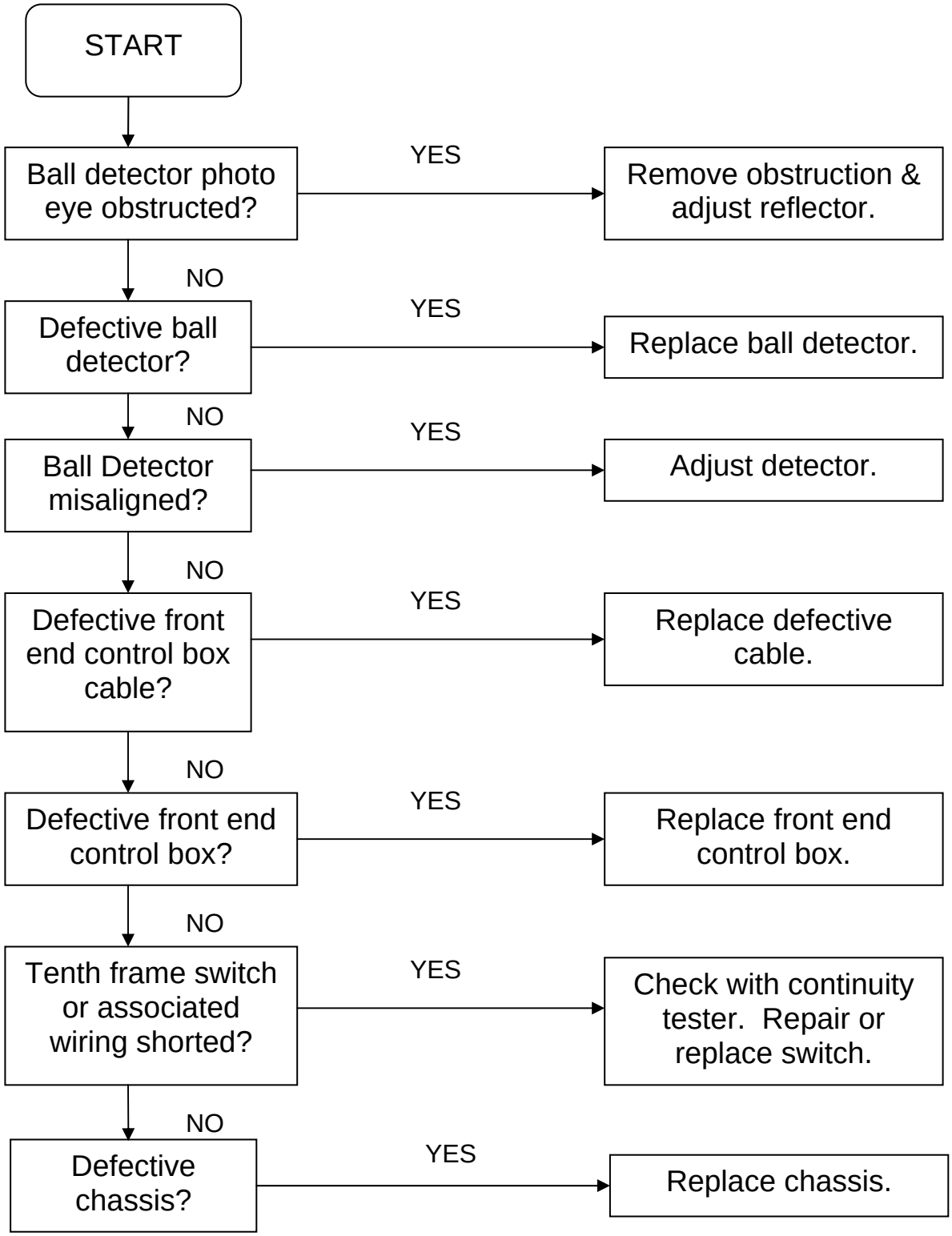

Figure 4-111

4.5.5.5 PROBLEM: Ball lift fails to elevate ball.

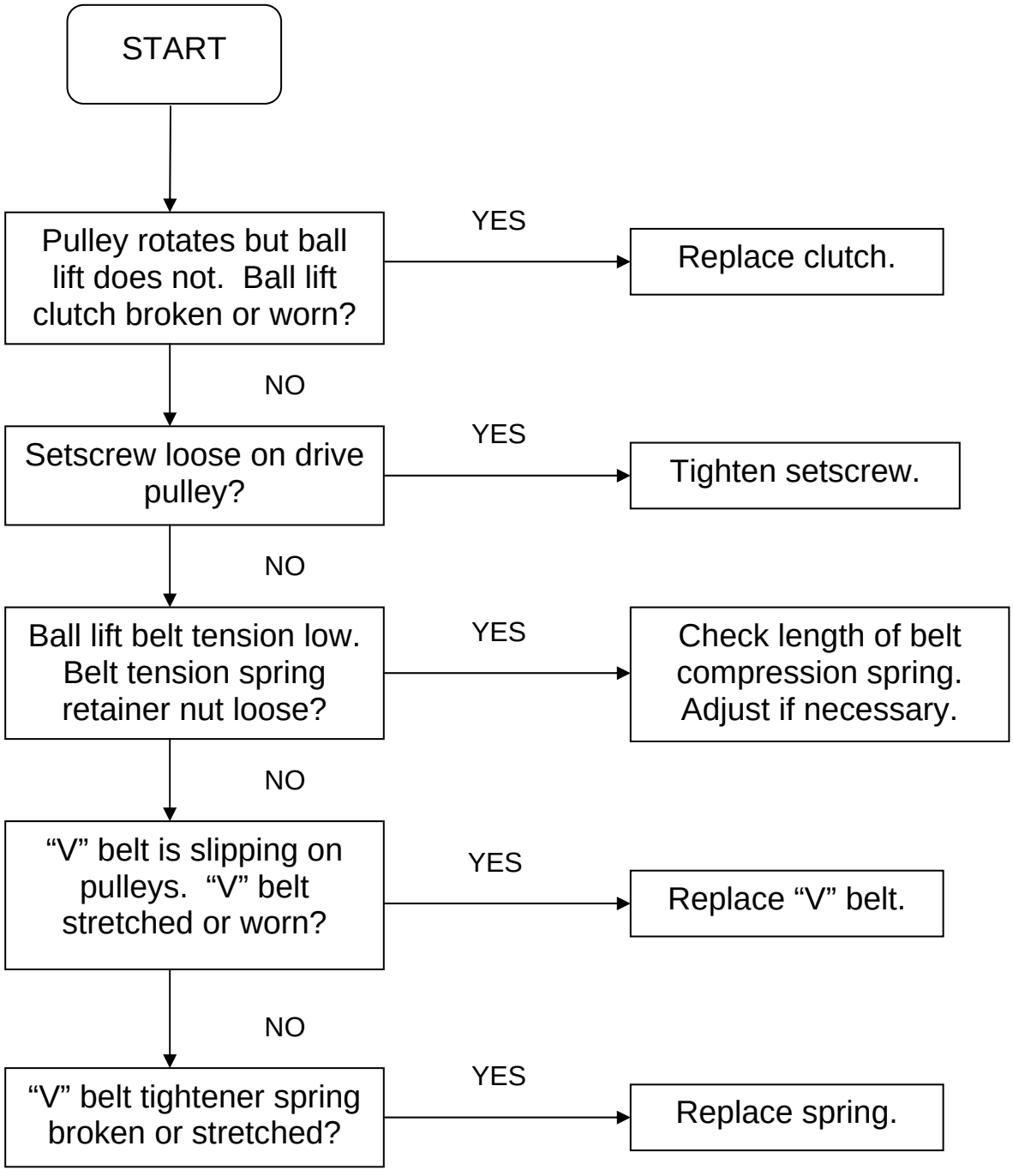

Figure 4-112

4.5.5.6 PROBLEM: Ball fails to roll up track rails.

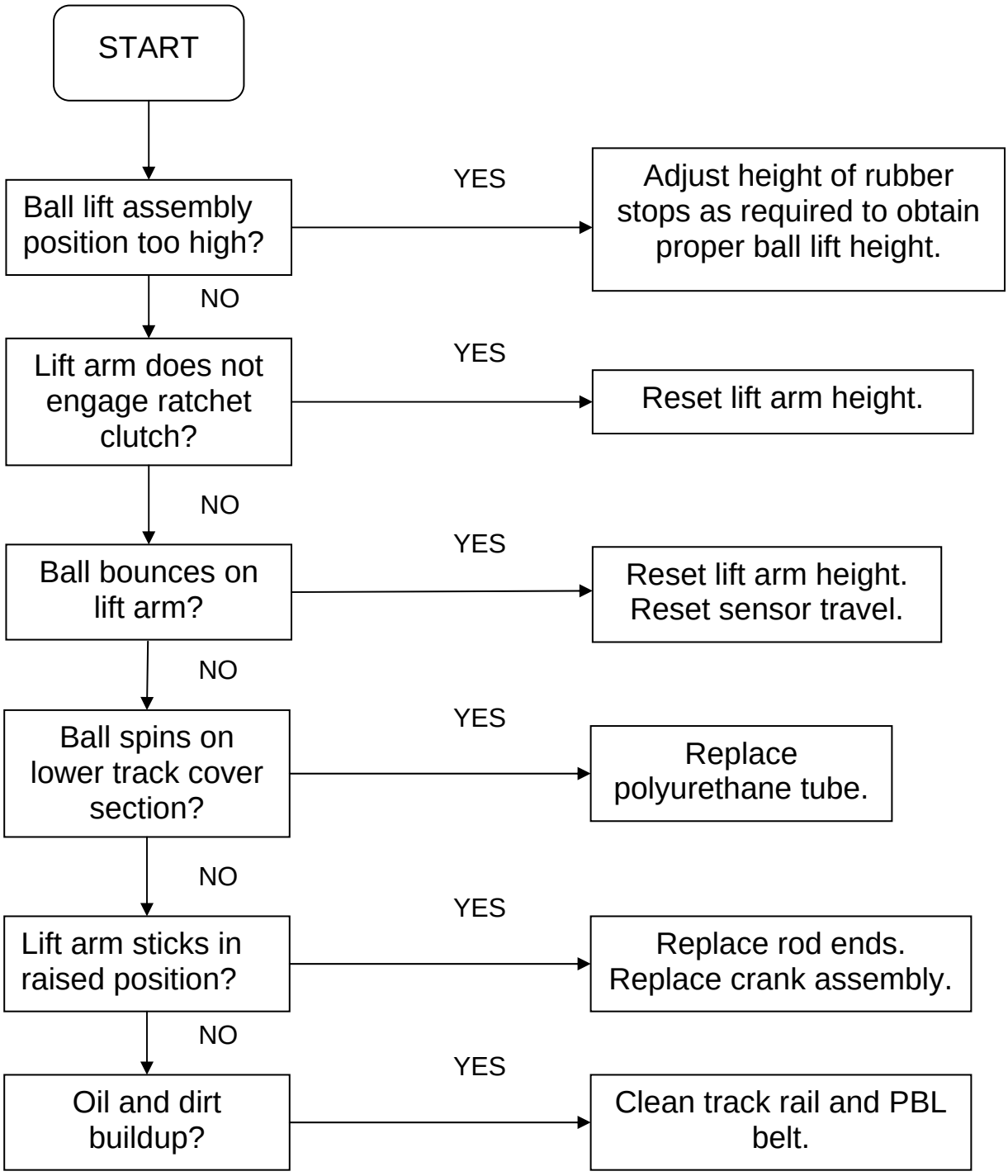

Figure 4-113

4.5.5.7 PROBLEM: Back end motor trips on overload.

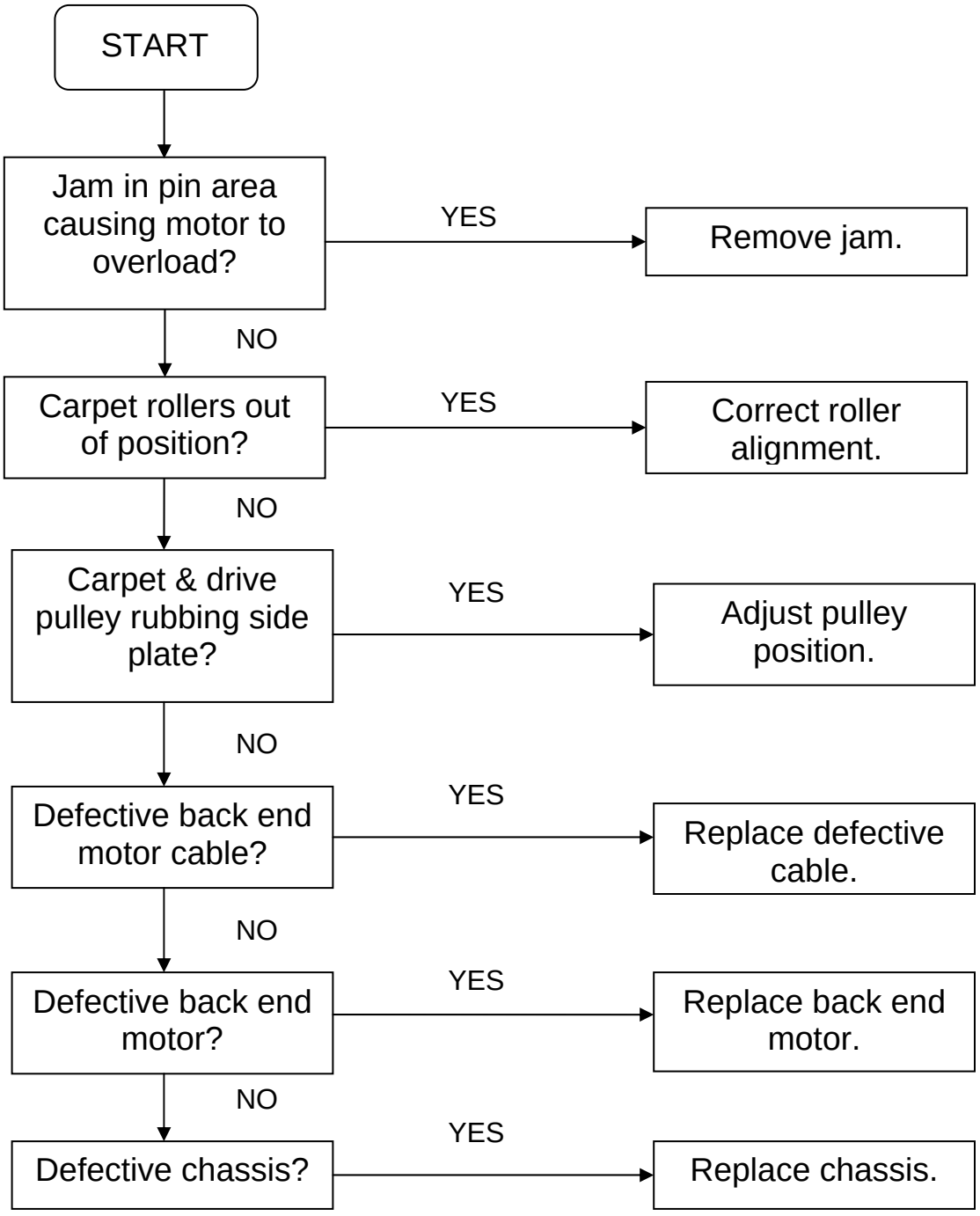

Figure 4-114

4.5.5.8 PROBLEM: Ball fails to continue to top of lift assembly and stops or slides back to the lift arm.

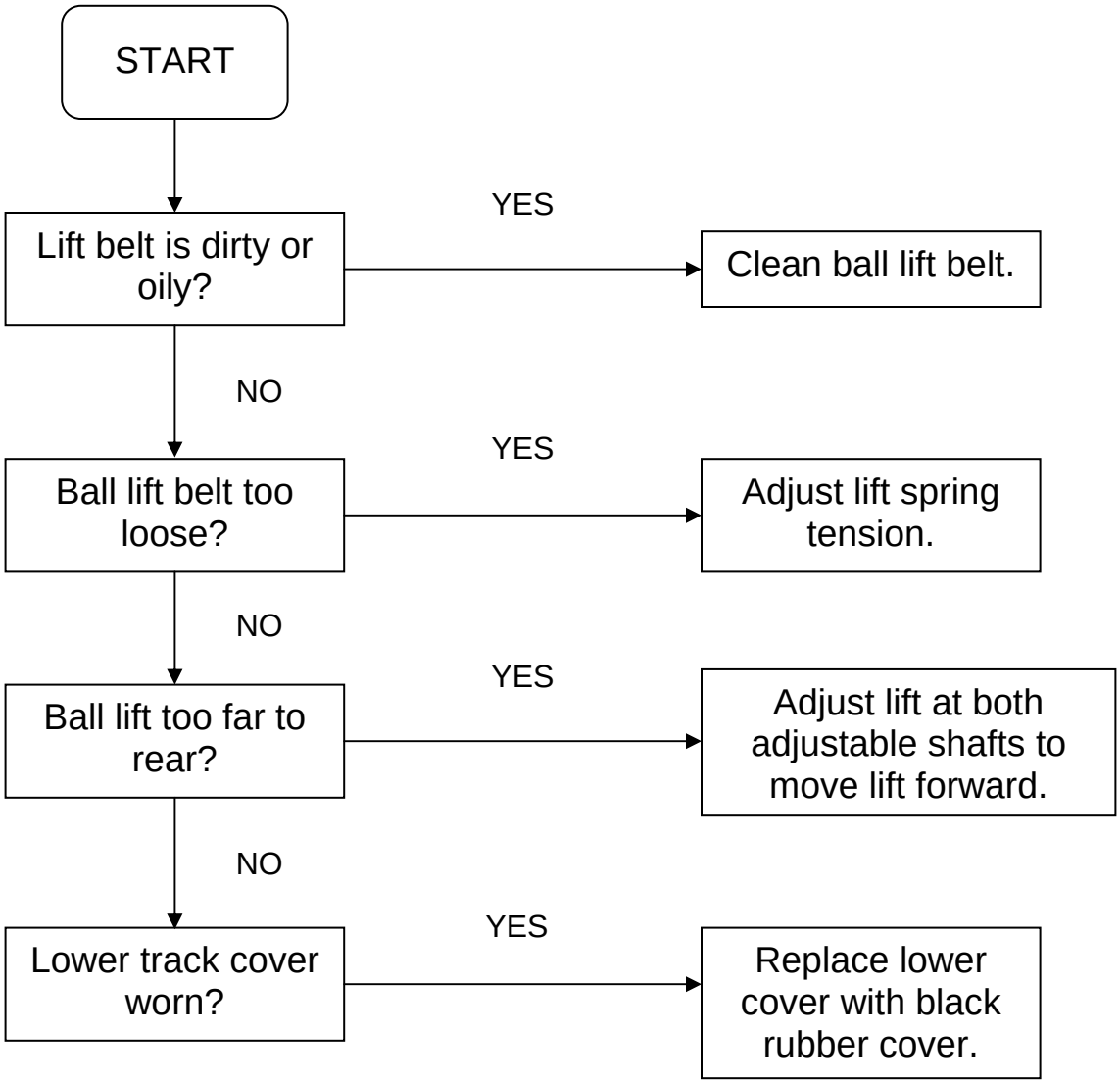

Figure 4-115

4.5.5.9 PROBLEM: Ball becomes airborne at top of track rail assembly.

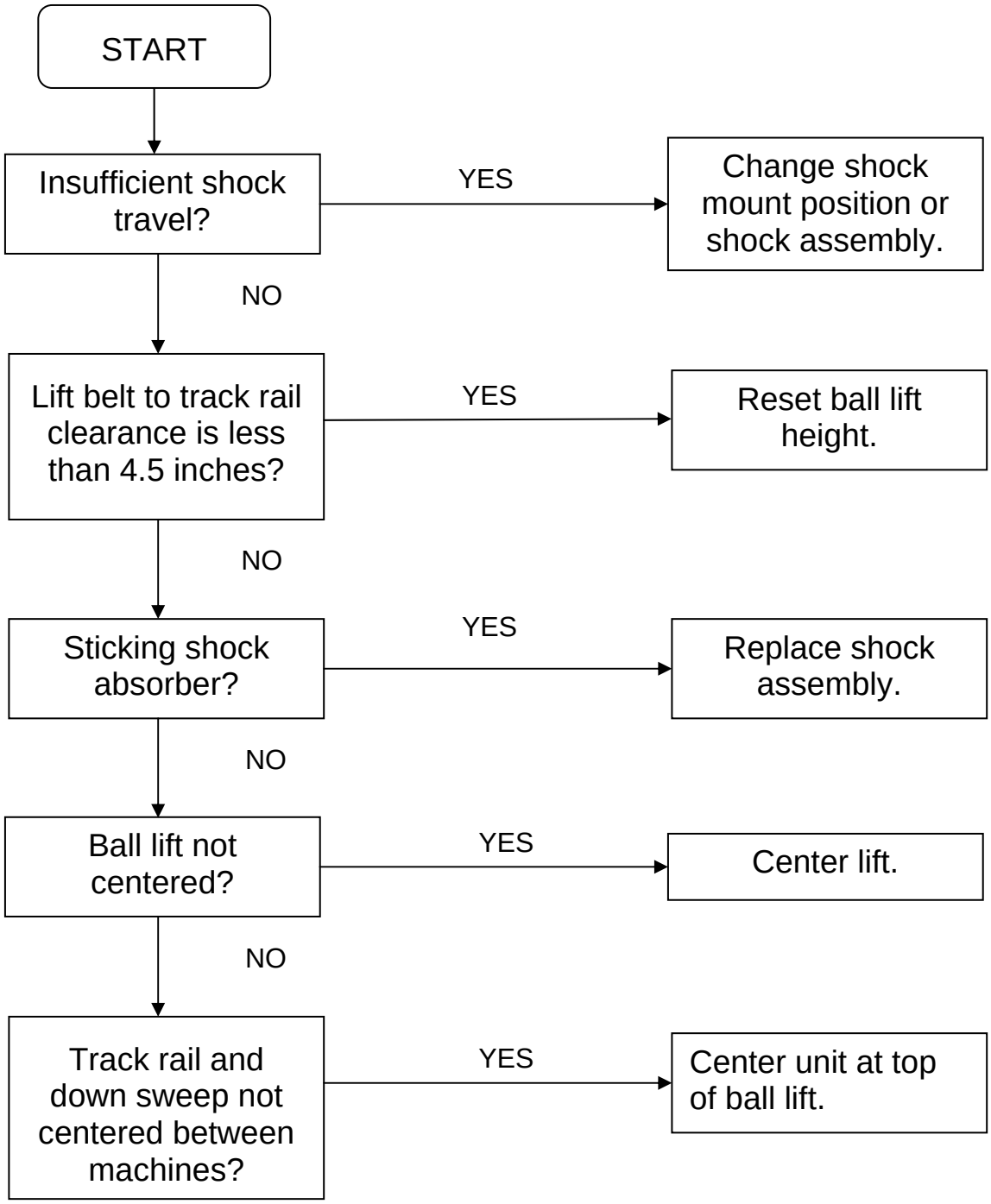

Figure 4-116

4.5.5.10 PROBLEM: Ball wobbles on track rail assembly.

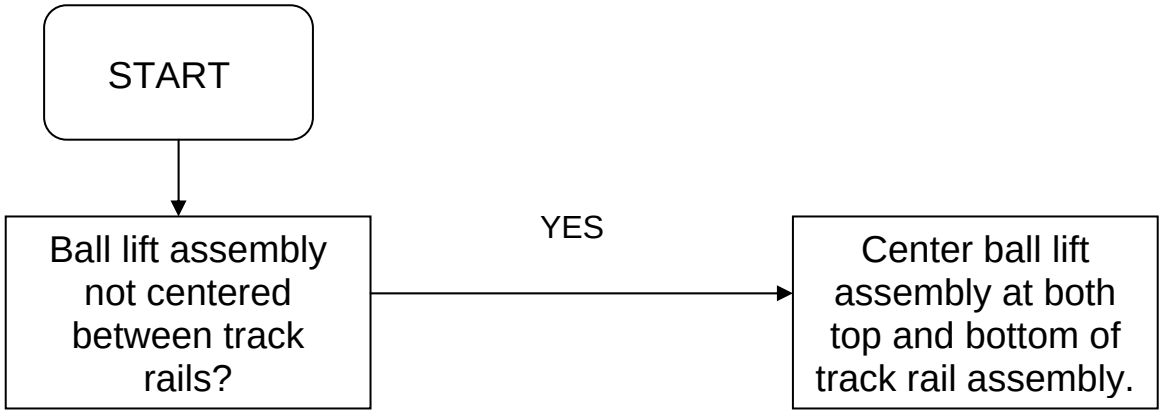

Figure 4-117

4.5.5.11 PROBLEM: Ball lift belt leaves V-groove of sheaves.

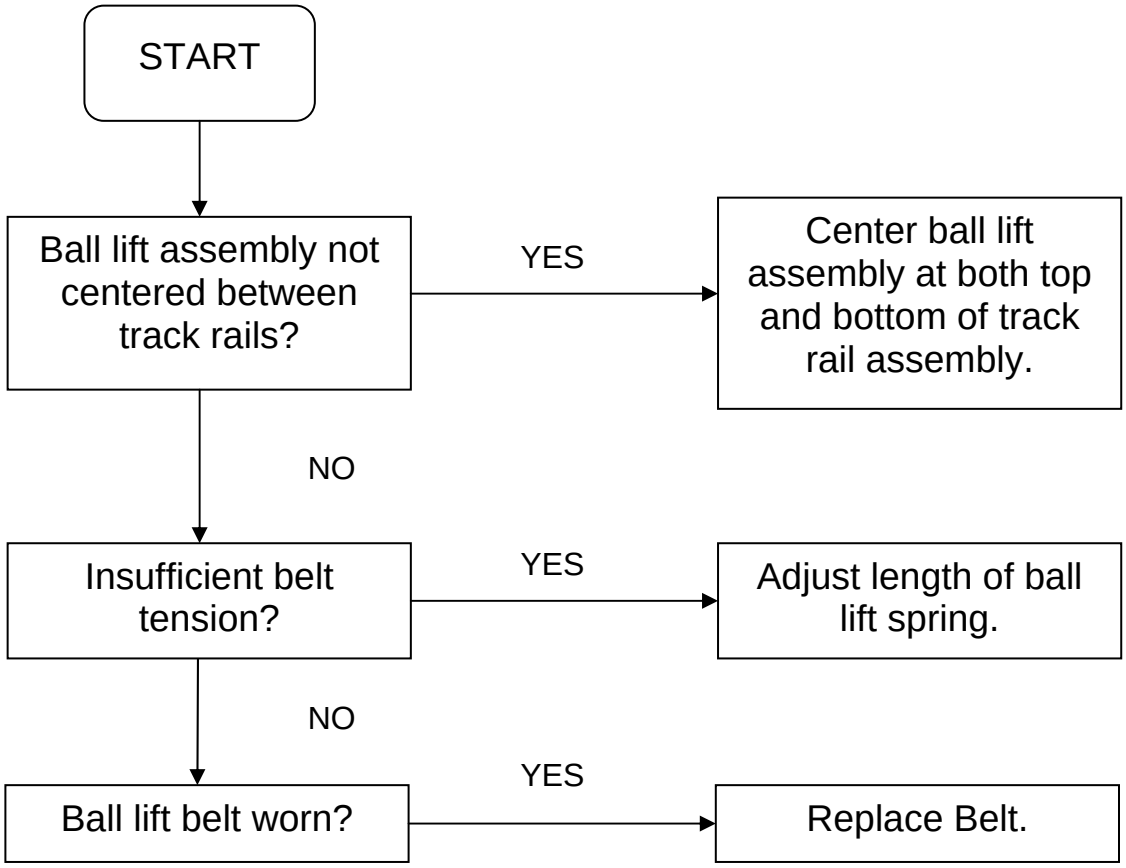

Figure 4-118

4.5.6 POSITIVE BALL SENSOR TROUBLESHOOTING

4.5.6.1 PROBLEM: Sensor slaps ball back onto carpet.

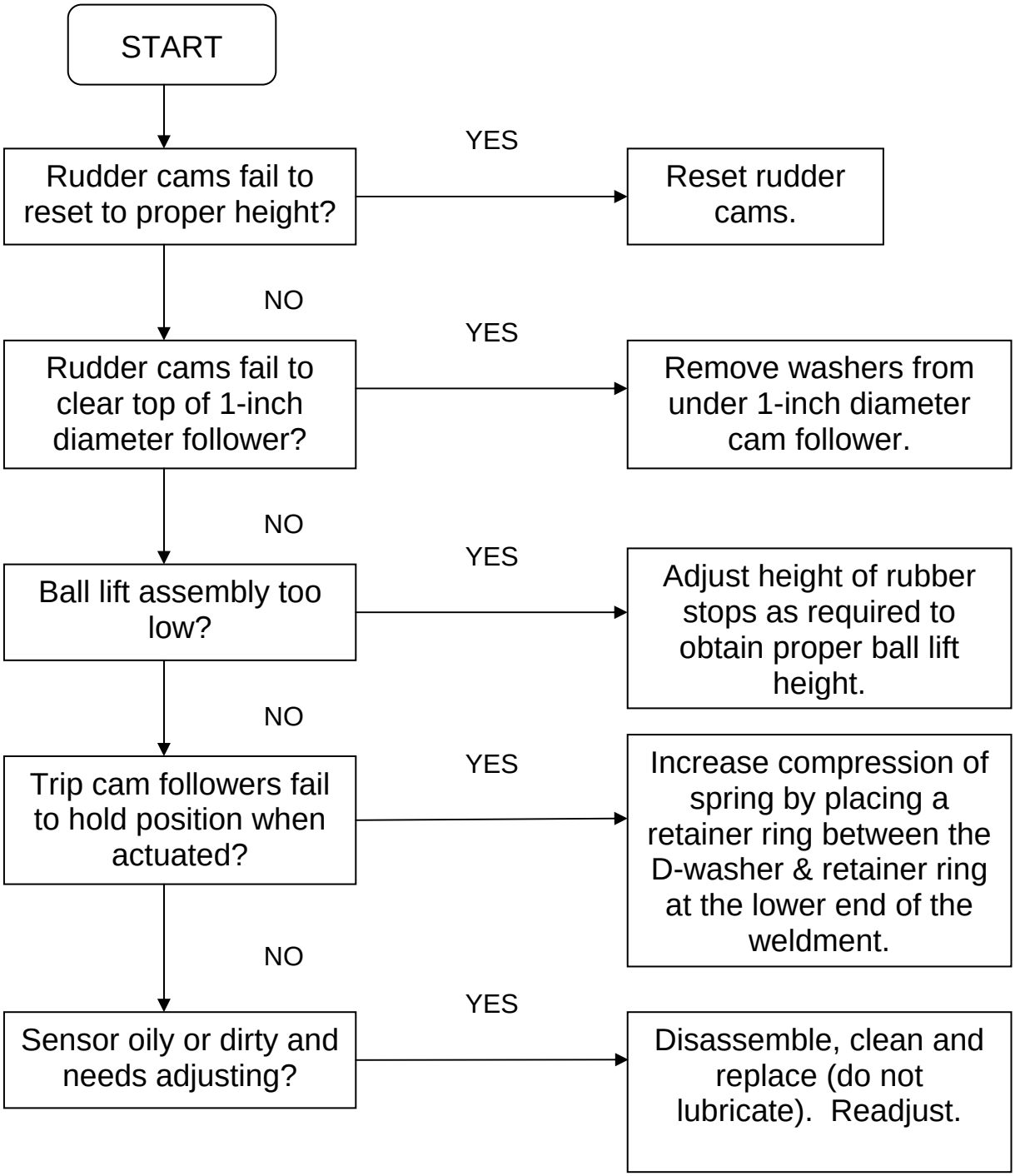

Figure 4-119

4.5.6.2 PROBLEM: Sensor fails to clear pin jams.

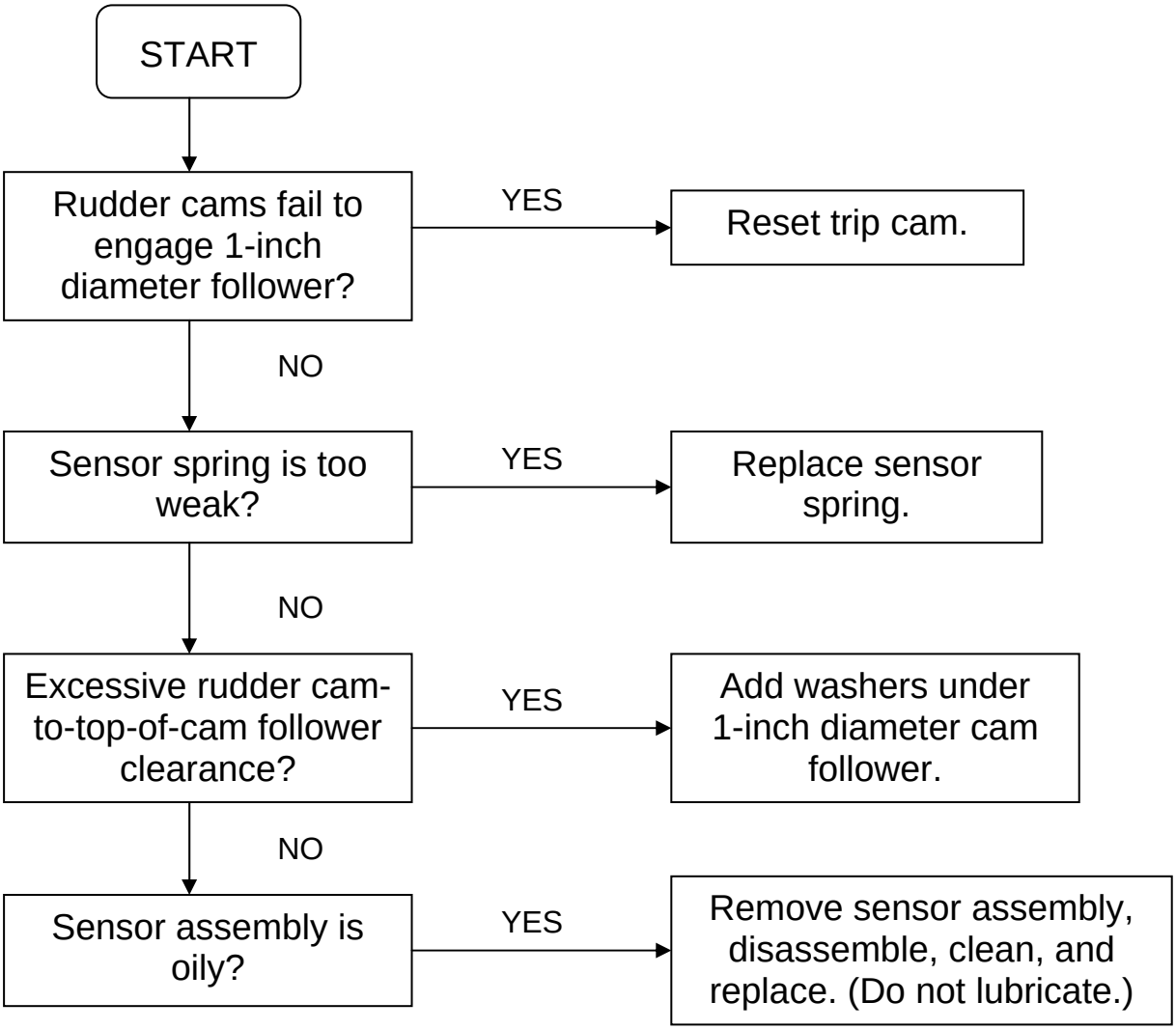

Figure 4-120

4.5.7 CHASSIS TROUBLESHOOTING

4.5.7.1 PROBLEM: Table time delay too long or too short.

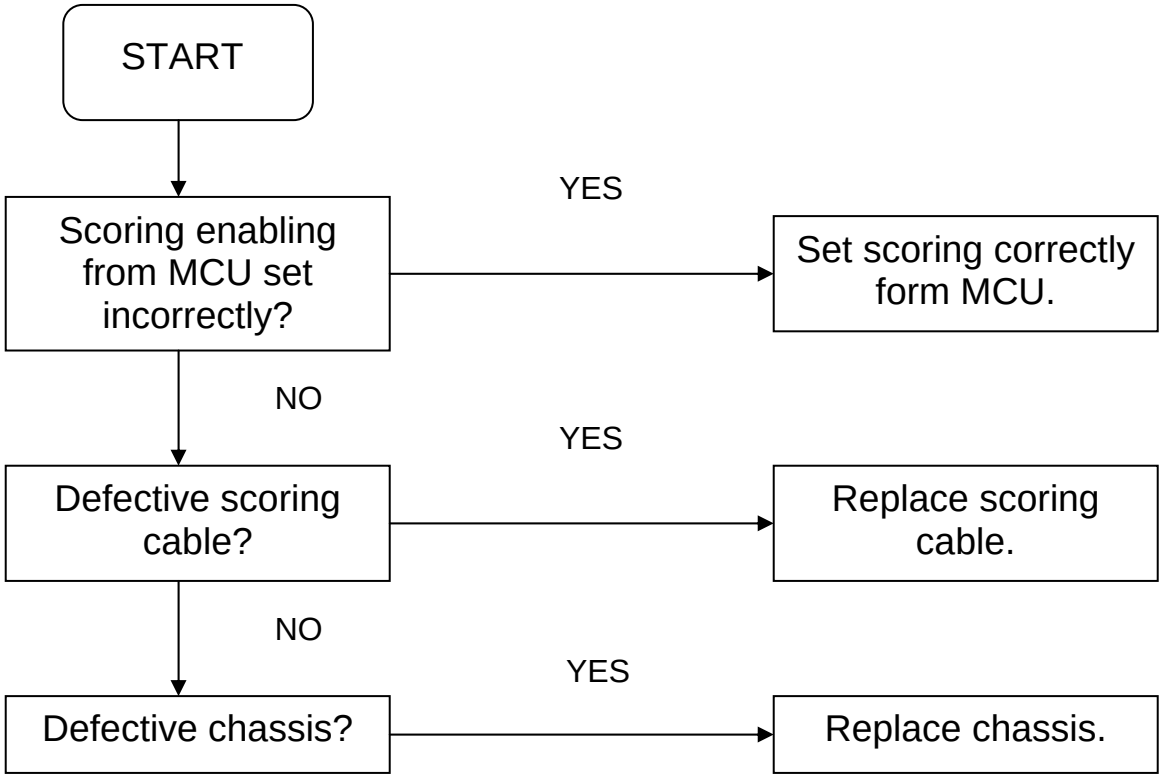

Figure 4-121

4.5.7.2 PROBLEM: Sweep time delay too long or too short.

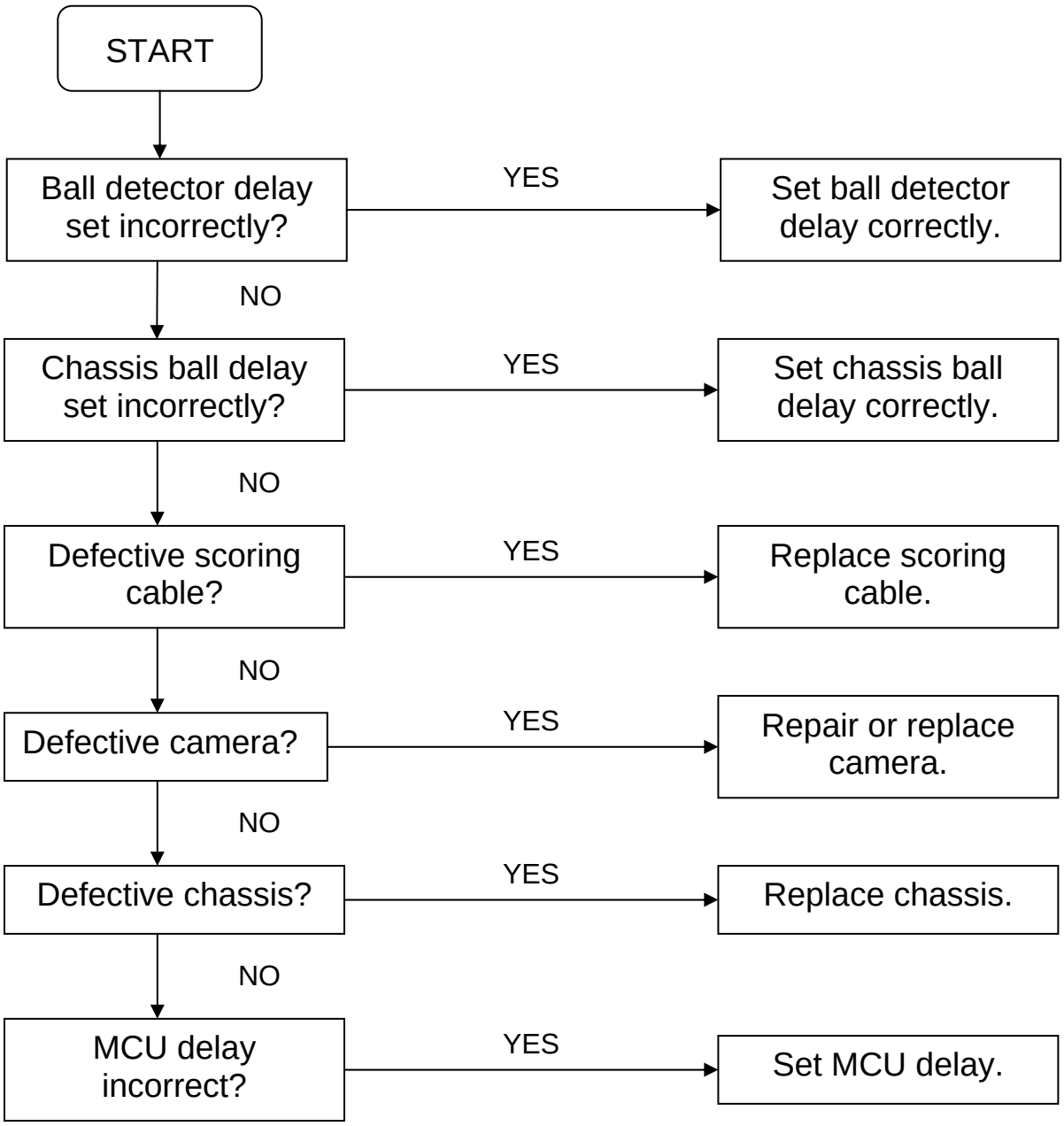

Figure 4-122

4.5.7.3 PROBLEM: Cannot turn machine on from the MCU.

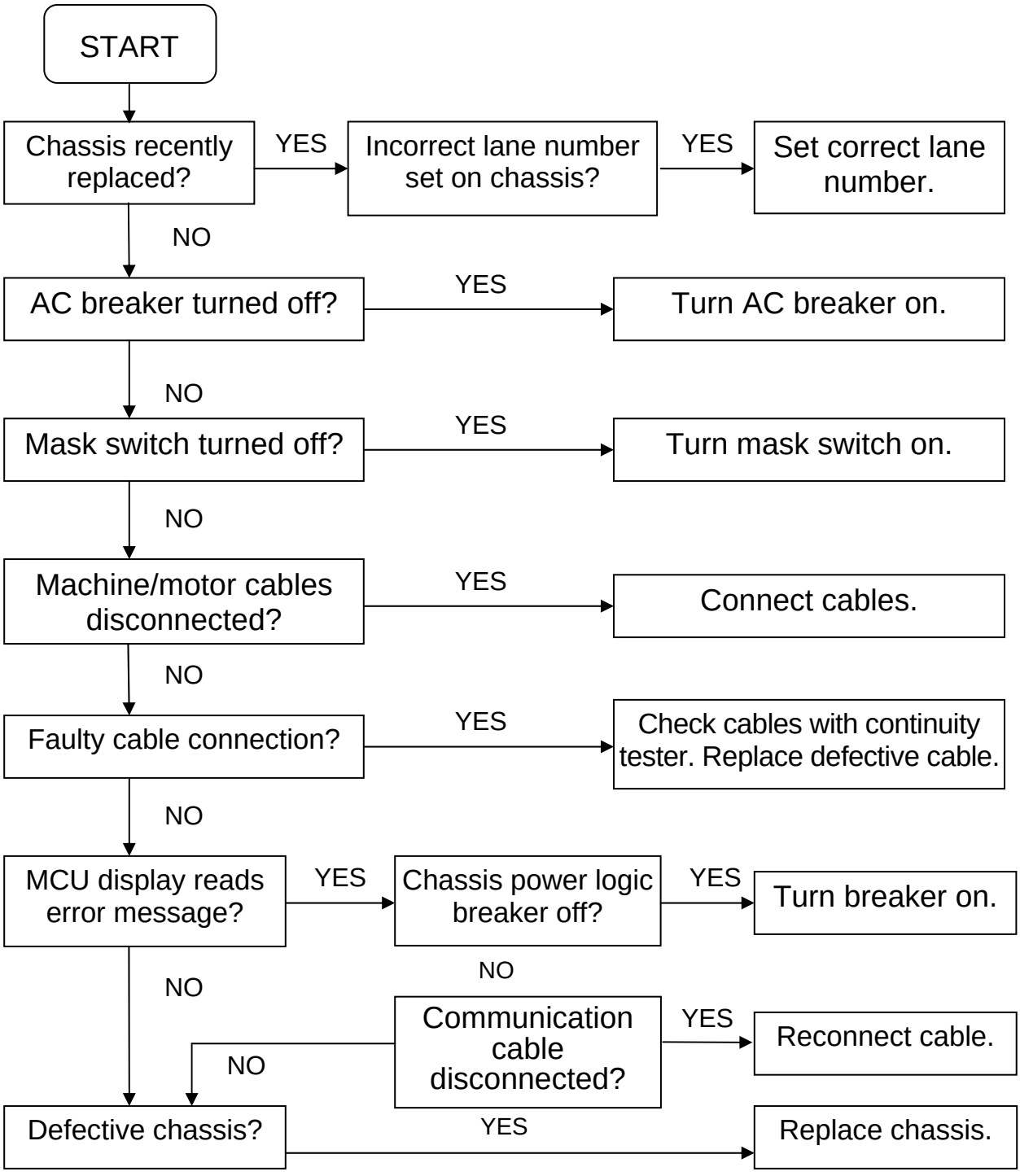

Figure 4-123

4.5.7.4 PROBLEM: Scoring chassis scores correctly on first ball, but does not score on second ball. Second ball signal is not getting to chassis.

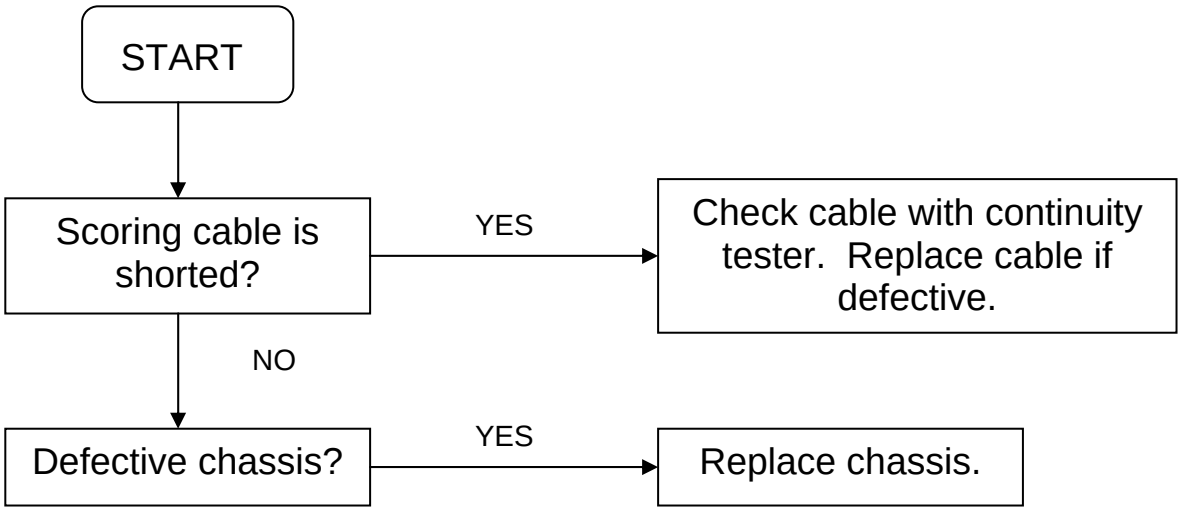

Figure 4-124

4.5.7.5 PROBLEM: Scoring chassis is not scoring the first ball, but scores correctly on the second ball. Receiving second ball signal continuously.

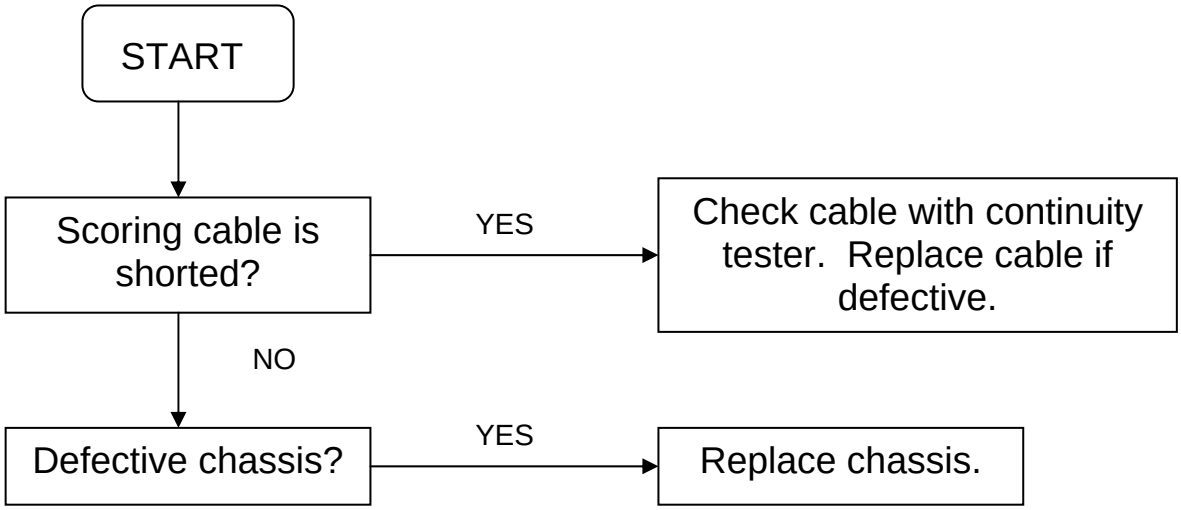

Figure 4-125

4.5.8 MOTOR TROUBLESHOOTING

4.5.8.1 PROBLEM: Table motor runs continuously.

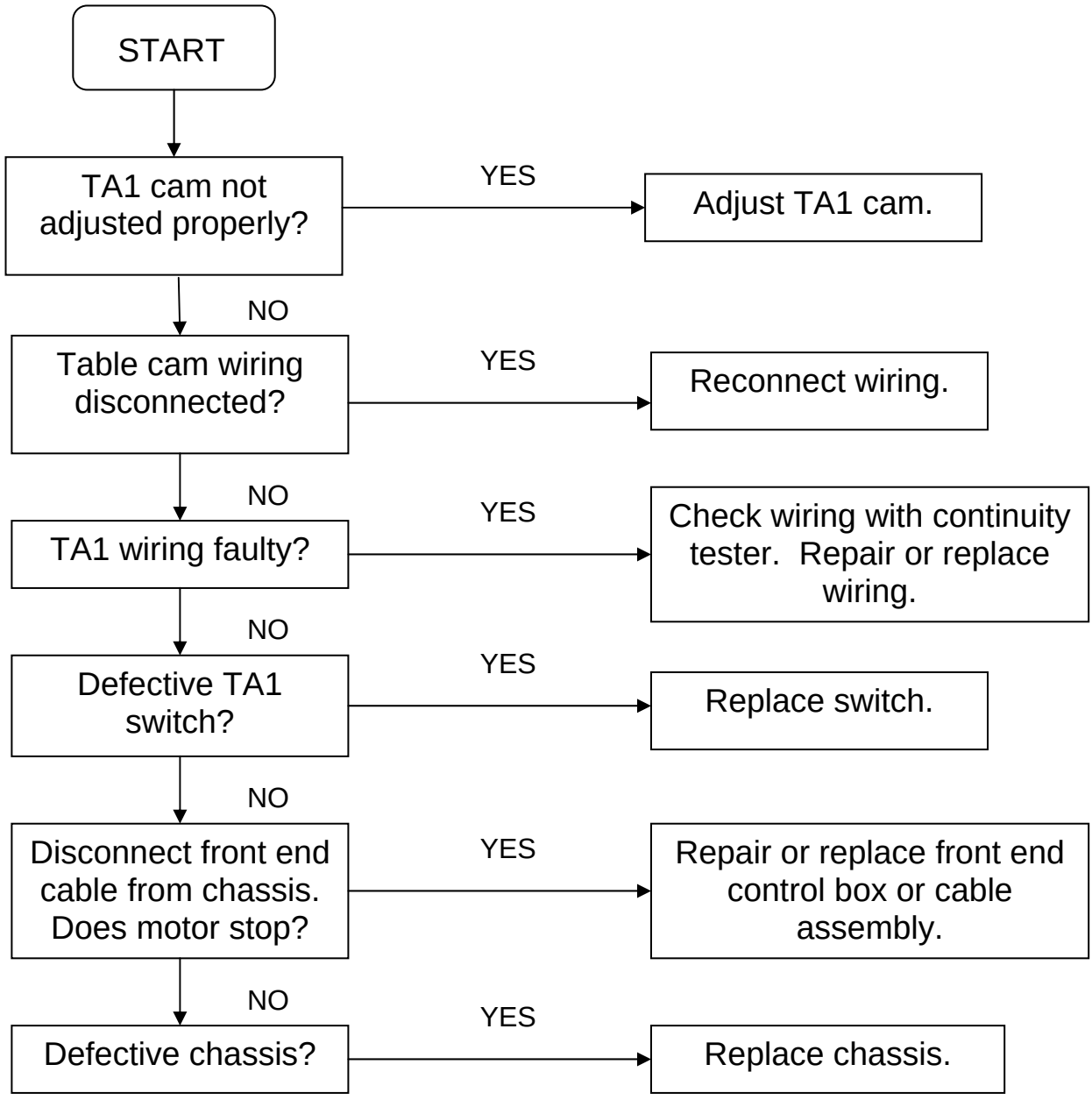

Figure 4-126

4.5.8.2 PROBLEM: Sweep motor runs continuously.

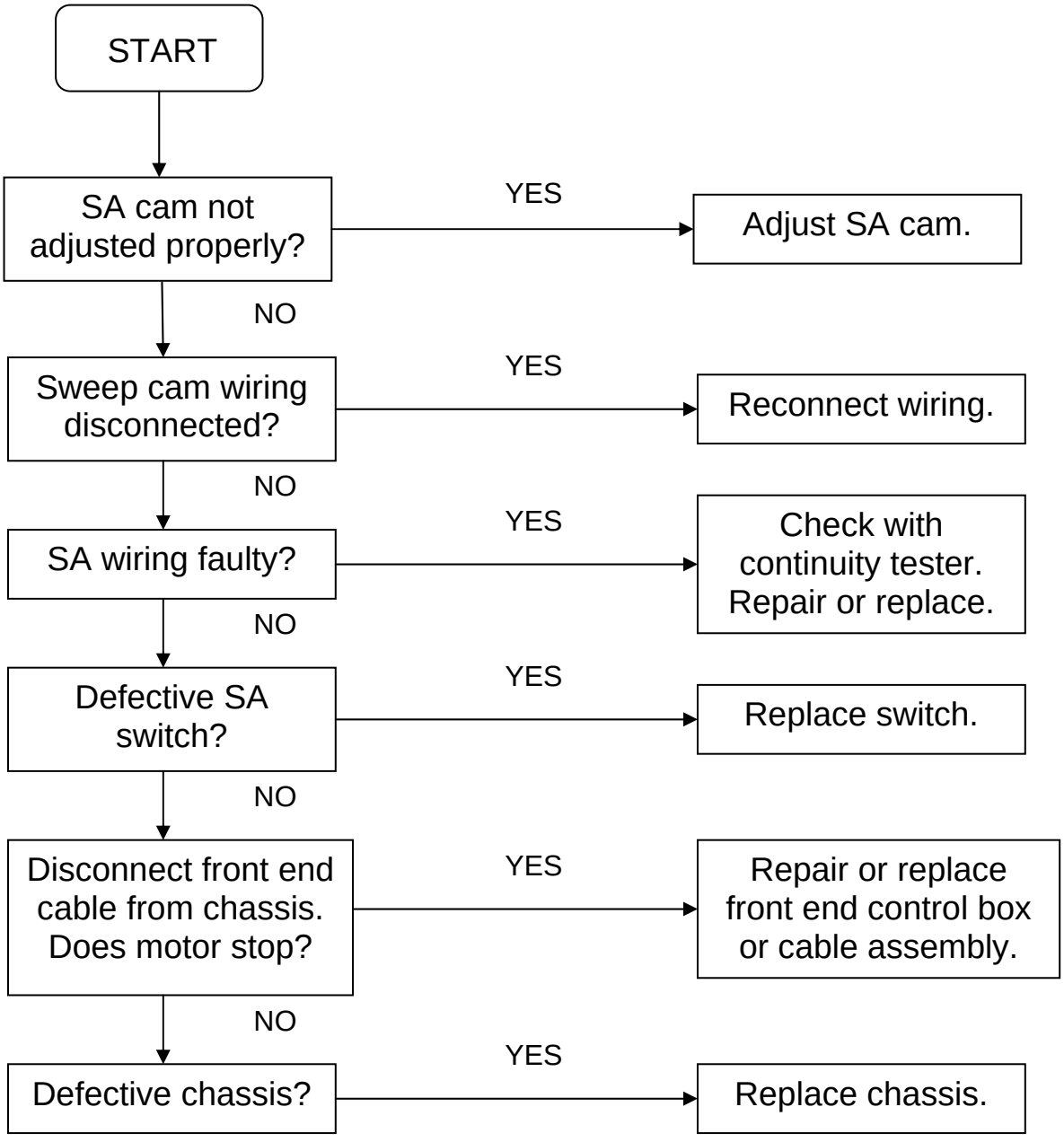

Figure 4-127

4.5.8.3 PROBLEM: Front end motor will not run.

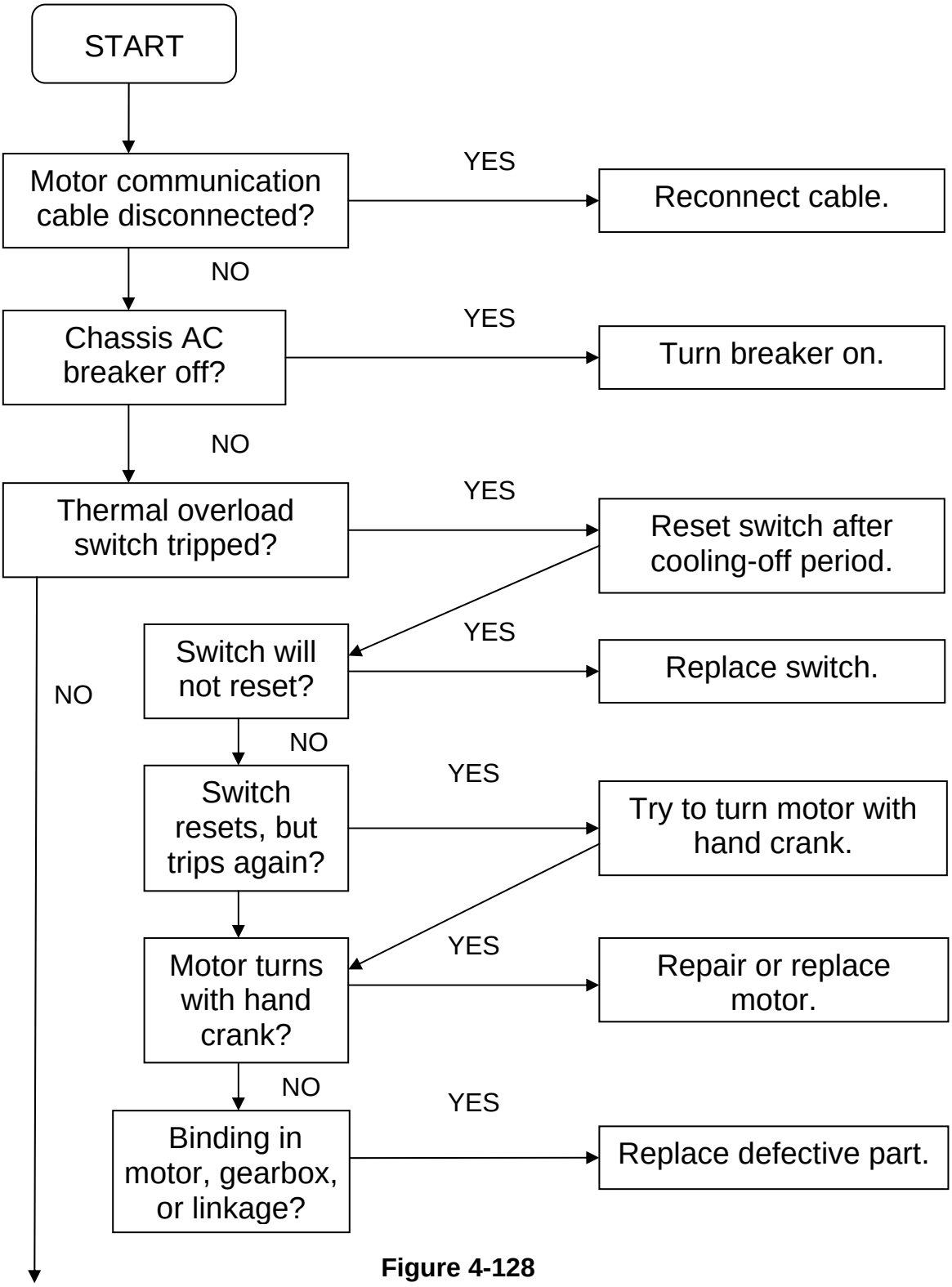

Figure 4-128

4.5.8.3 PROBLEM: Front end motor will not run. (Continued from previous page.)

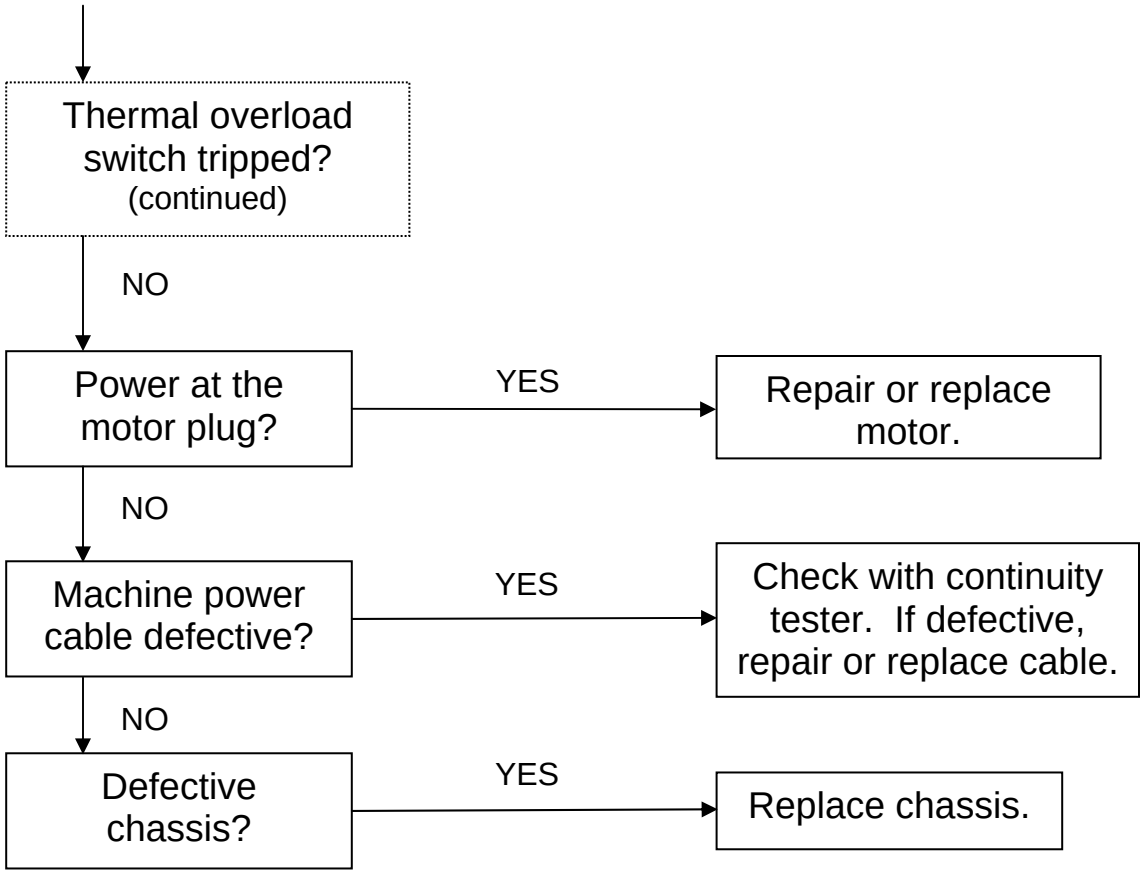

Figure 4-129

4.5.9 PIT LIGHT TROUBLESHOOTING

4.5.9.1 PROBLEM: Pit Light will not turn on.

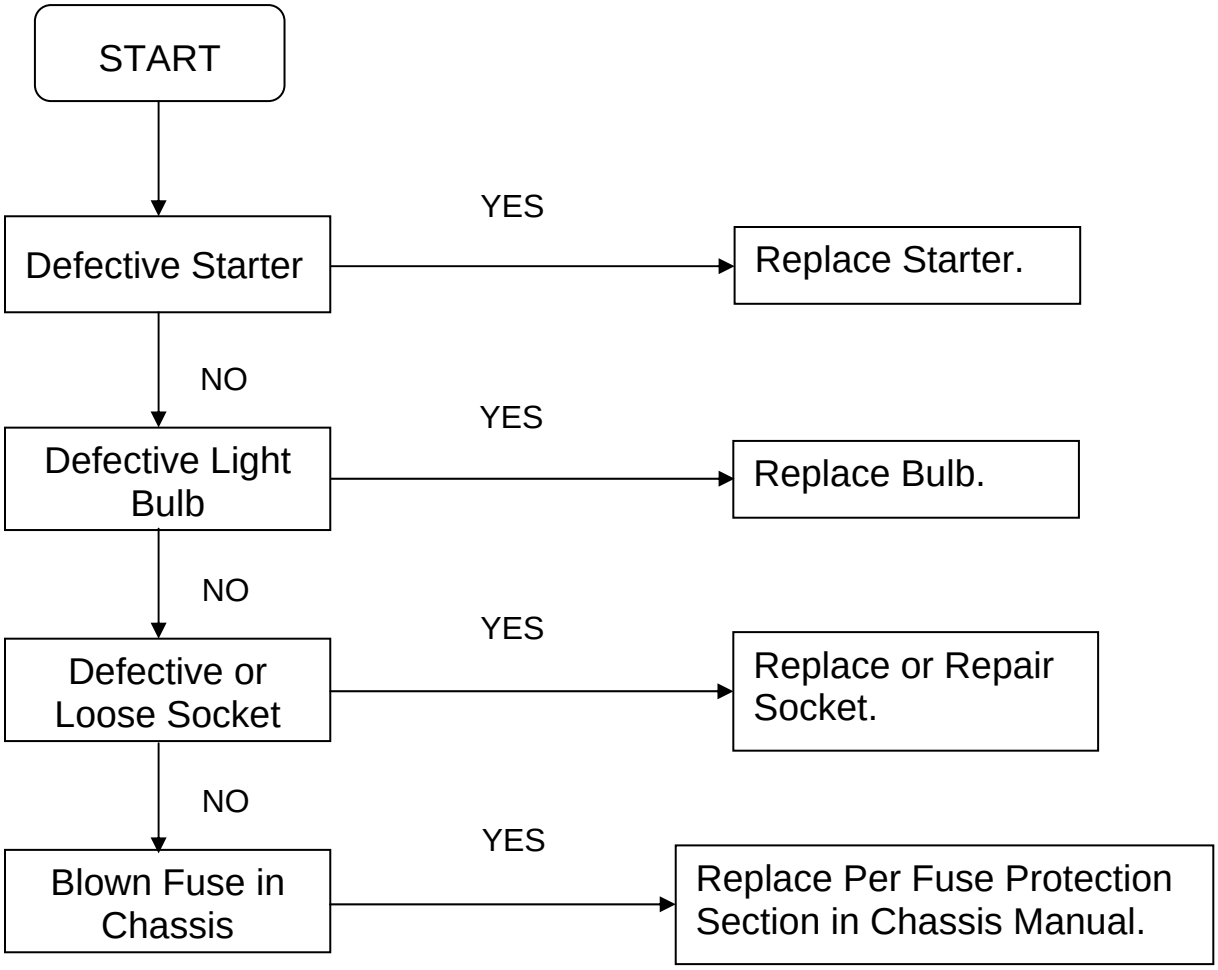

Figure 4-130

Drawings and Part Numbers

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Section 5.1
Drawings and Part Numbers

The drawings and parts lists in this section contain the following attributes:

- The use of the letters L.H. or R.H. in the description refers to a part that is specific to the left hand or right hand side of a machine. Left hand and right hand components may look similar, but are not interchangeable within the same machine. The phrases L.H. MACHINE and R.H. MACHINE in the description refer to parts that are specific to either a left hand or right hand machine. It is possible for a part to carry both designations. For example, a part's description may include the phrase: R.H./L.H. MACHINE. This would indicate a part that is used on the right hand side of a left hand machine. **It is important to note that when referring to a left hand or right hand machine, the point of reference is from the back of the machine. (Lane 1 is a right hand machine, Lane 2 is a left hand machine, etc.) When referring to L.H. or R.H. parts, the point of reference is from the front of the machine.**

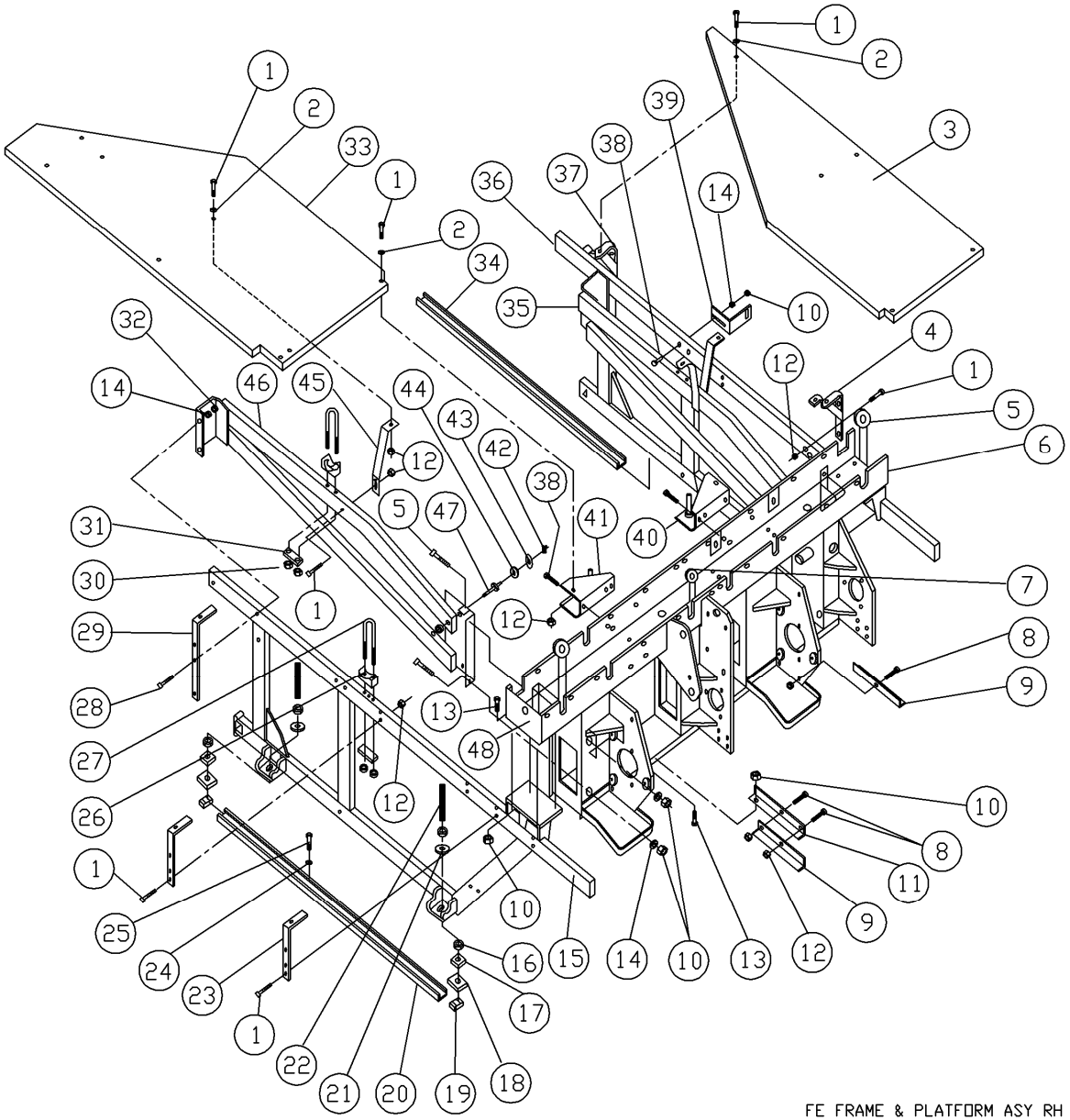
- 110V & 220V indicate components that are to be used in machines connected to electrical circuits that correspond to the indicated voltage only. 220V components can also be used on 240-volt circuits.

- Two or more item numbers may be shown associated with a single part. When adjacent item numbers refer to the same part, the item number closest to the line pointing to the part is the one that is actually depicted. For example, items 20 and 21 refer to the same part. Item 20 also carries a R.H. designation while item 21 carries a L.H. designation. A pointer (line) connects item 20 and the illustration. The illustrated part is the R.H. part. The L.H. part is not shown and may be a mirror image of item 20 or may have other physical differences. Both part numbers are included in the parts list.

- Components with a number followed by the letter 'A', such as (8A), indicate an assembly. Assemblies contain two or more parts (see the assembly's part description for the parts that are included in the assembly) and may be the more efficient means of replacing the main component. The number assigned to an assembly (in this example the number 8) indicates the major component of the assembly.

  Occasionally there are two different assemblies with the same major component. In this case, the first assembly will be as described in the previous paragraph, and the second assembly will have a number after the letter 'A', as in (8A1).

FRONT END FRAME & PLATFORM ASSEMBLY – RIGHT HAND MACHINE



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FRONT END FRAME & PLATFORM ASSEMBLY – RIGHT HAND MACHINE

ITEM	QTY	PART #	DESCRIPTION
1	20	809-849-285	SCREW, HEX, 1/4 -20 X 1-3/4
2	5	948-753-102	WASHER, FLAT, 5/8 X 9/32 X 1/16
3	1	070-006-425	PLATFORM, R.H.
4	1	070-001-819	PLATFORM SUPPORT WELDMENT
5	2	250-001-046	GROMMET, LARGE
6	1	090-004-001	CROSS BEAM WELDMENT
7	8	711-520-017	GROMMET, SMALL
8	4	809-849-125	SCREW, HEX, 1/4 -20 X 3/4
9	2	070-001-698	PIT LIGHT BRACKET
10	24	839-665-002	NUT, HEX LOCK 3/8 -16
11	1	070-001-596	ANGLE BRACKET
12	14	844-049-002	NUT, STOVER LOCK, 1/4 -20
13	18	809-865-165	SCREW, HEX, 3/8 -16 X 1
14	25	948-767-132	WASHER, FLAT, 13/16 X 13/32 X 1/16
15	1	090-004-006	SIDE FRAME, L.H.
16	8	835-573-002	NUT, HEX JAM, 1/2 -13
17	4	070-007-509	ELEVATING NUT
18	4	000-021-786	FRAME ADJUSTMENT PLATE
19	4	853-500-001	UNISTRUT NUT
20	1	070-007-843	UNISTRUT, LONG
21	4	000-021-787	WASHER, 9/16 X 1-5/8 X 1/4, BLACK
22	4	070-007-510	ELEVATING SETSCREW
23	2	070-001-817	PLATFORM ANGLE WELDMENT
24	8	948-761-112	WASHER, FLAT, 11/16 X 11/32 X 1/16
25	8	810-556-320	SCREW, HEX LAG, 5/16 X 2
26	4	000-021-528	SADDLE

ITEM	QTY	PART #	DESCRIPTION
27	4	804-557-731	U-BOLT, SWEEP MOUNTING
28	4	809-865-325	SCREW, HEX, 3/8 -16 X 2
29	1	070-006-405	ANGLE WELDMENT
30	8	844-057-002	NUT, HEX LOCK, 5/16 -18
31	4	070-008-126	CLAMP BAR
32	1	840-065-002	NUT, FLEX LOCK, THIN, 3/8 - 16
33	1	070-006-426	PLATFORM, L.H.
34	1	070-007-844	UNISTRUT, SHORT
35	1	090-005-647	INNER SIDE BRACE R.H.
36	1	090-004-002	SIDE FRAME, R.H.
37	1	070-006-414	PLATFORM SUPPORT BRACKET
38	4	809-865-285	SCREW, HEX, 3/8 -16 X 1-3/4
39	2	070-004-654	TRACK SUPPORT BRACKET
40	1	070-006-411	BRACKET WELDMENT (BIN ASSEMBLY, R.H.)
41	1	070-006-413	BRACKET WELDMENT (BIN ASSEMBLY, L.H.)
42	1	963-400-002	X-WASHER
43	1	945-867-242	WASHER, 13/32 X 1-1/2
44	4	090-003-795	COUNTERBALANCE SPRING ROLLER
45	3	070-006-490	PLATFORM SUPPORT BRACKET
46	1	090-005-646	INNER SIDE BRACE L.H.
47	4	090-002-028	PIN SPRING ROLLER
48	1	090-005-034	END PLATE

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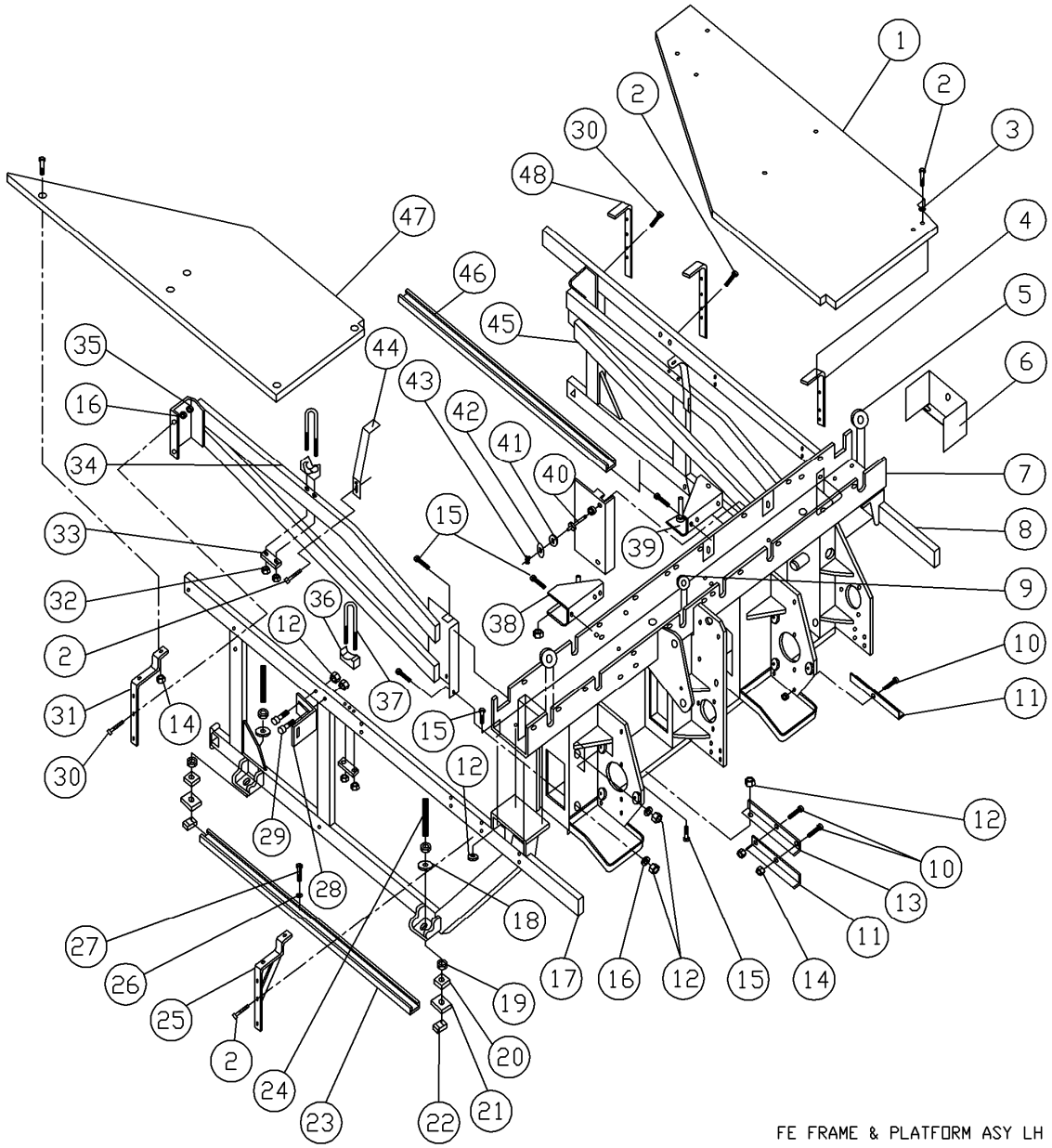
FRONT END FRAME & PLATFORM ASSEMBLY – LEFT HAND MACHINE



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FRONT END FRAME & PLATFORM ASSEMBLY – LEFT HAND MACHINE

ITEM	QTY	PART #	DESCRIPTION
1	1	070-006-426	PLATFORM, R.H.
2	20	809-849-285	SCREW, HEX, 1/4 -20 X 1-3/4
3	10	948-753-102	WASHER, FLAT, 5/8 X 9/32 X 1/16
4	2	070-001-817	PLATFORM ANGLE WELDMENT
5	2	250-001-046	GROMMET, LARGE
6	1	090-005-034	END PLATE
7	1	090-004-001	CROSSBEAM WELDMENT
8	1	090-004-003	SIDE FRAME, R.H.
9	8	711-520-017	GROMMET, SMALL
10	4	809-849-125	SCREW, HEX, 1/4 -20 X 3/4
11	2	070-001-698	PIT LIGHT BRACKET
12	24	839-665-002	NUT, STOVER LOCK, 3/8 -16
13	1	070-001-596	ANGLE BRACKET
14	14	844-049-002	NUT, STOVER LOCK, 1/4 - 20
15	18	809-865-165	SCREW, HEX, 3/8 - 16 X 1
16	25	948-767-132	WASHER, FLAT, 13/16 X 13/32 X 1/16
17	1	090-004-006	SIDE FRAME, L.H
18	4	000-021-787	WASHER, 9/16 X 1-5/8 X 1/4
19	8	835-573-002	NUT, HEX JAM, 1/2 - 13
20	4	070-007-509	ELEVATING NUT
21	4	000-021-786	FRAME ADJUSTMENT PLATE
22	4	853-500-001	UNISTRUT NUT
23	1	070-007-844	UNISTRUT, SHORT
24	4	070-007-510	ELEVATING SETSCREW
25	1	070-001-819	PLATFORM SUPPORT WELDMENT
26	8	948-761-112	WASHER, FLAT, 11/16 X 11/32 X 1/16

ITEM	QTY	PART #	DESCRIPTION
27	8	810-556-320	SCREW, HEX LAG, 5/16 X 2
28	2	070-004-654	TRACK SUPPORT BRACKET
29	4	809-865-285	SCREW, HEX, 3/8 - 16 X 1-3/4
30	6	809-865-325	SCREW, HEX, 3/8 - 16 X 2
31	1	070-006-414	PLATFORM SUPPORT BRACKET
32	8	844-057-002	NUT, STOVER LOCK, 5/16 - 18
33	4	070-008-126	CLAMP BAR
34	1	090-005-646	INNER SIDE BRACE, L.H.
35	4	840-065-002	NUT, FLEX LOCK, THIN, 3/8 - 16
36	4	000-021-528	SADDLE
37	4	804-557-731	U-BOLT, SWEEP MOUNTING
38	1	070-006-413	BRACKET WELDMENT, BIN ASSEMBLY, L.H.
39	1	070-006-411	BRACKET WELDMENT, BIN ASSEMBLY, R.H.
40	4	090-002-028	PIN SPRING ROLLER
41	4	090-003-795	COUNTERBALANCE SPRING ROLLER
42	4	945-867-242	WASHER, 13/32 X 1-1/2
43	4	963-400-002	X-WASHER
44	3	070-006-490	PLATFORM SUPPORT BRACKET
45	1	090-005-647	INNER SIDE BRACE, R.H.
46	1	070-007-843	UNISTRUT, LONG
47	1	070-006-425	PLATFORM, L.H.
48	1	070-006-405	ANGLE WELDMENT

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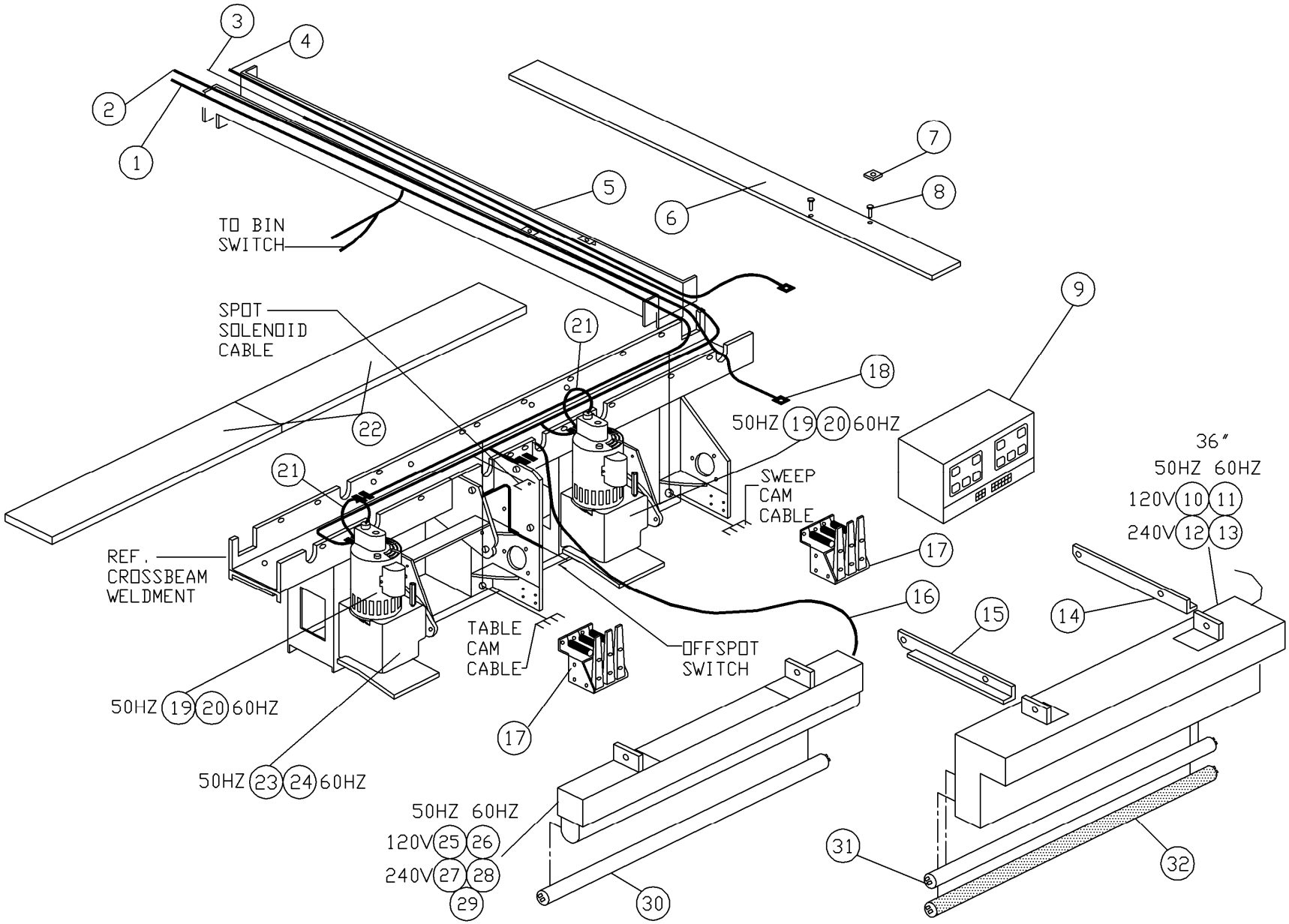
FRONT END ELECTRICAL INSTALLATION - RIGHT HAND MACHINE



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FRONT END ELECTRICAL INSTALLATION - RIGHT HAND MACHINE

ITEM	QTY	PART #	DESCRIPTION
1	1	090-005-759	ODD LOGIC CABLE
2	1	090-005-739	PINDICATION CABLE
3	1	090-005-763	ODD POWER CABLE
4	1	090-005-733	FRONT END CABLE
5	1	070-007-748	FRONT WIREWAY
6	1	070-007-747	WIREWAY COVER
7	5	724-511-074	U-NUT, 10 - 32
8	5	812-840-082	SCREW, ROUND HEAD, 10 - 32 X ½
9	1	090-005-827	FRONT END CONTROL BOX (UNIVERSAL)
10	1	090-008-034	DUAL PIT LIGHT ASSEMBLY 36”, 120V, 50HZ
11	1	090-008-017	DUAL PIT LIGHT ASSEMBLY 36”, 120V, 60HZ
12	1	090-008-033	DUAL PIT LIGHT ASSEMBLY 36”, 240V, 50HZ
13	1	090-008-032	DUAL PIT LIGHT ASSEMBLY 36”, 240V, 60HZ
14	1	070-001-907	PIT LIGHT SUPPORT BRACKET, R.H.
15	1	070-001-908	PIT LIGHT SUPPORT BRACKET, L.H.
*16	1	090-003-703	PIT LIGHT CABLE (only used on items 25 - 29)
17	2	070-002-841	TABLE & SWEEP CAM SWITCH ASSEMBLY
18	1	090-005-734	STRIKE/FOUL CABLE
19	2	090-004-060	FRONT END MOTOR, 50HZ
20	2	090-004-061	FRONT END MOTOR, 60HZ
21	2	090-005-876	MOTOR CABLE
22	2	090-005-053	CROSSBEAM COVER
23	2	090-004-499	FRONT END GEARBOX, 50HZ
24	2	090-004-500	FRONT END GEARBOX, 60HZ
25	1	090-003-802	PIT LIGHT ASSEMBLY, 120V, 50 HZ
26	1	090-003-800	PIT LIGHT ASSEMBLY, 120V, 60 HZ

ITEM	QTY	PART #	DESCRIPTION
27	1	090-003-801	PIT LIGHT ASSEMBLY, 240V, 50 HZ
28	1	090-003-803	PIT LIGHT ASSEMBLY, 240V, 60 HZ
29	1	090-003-805	PIT LIGHT, NO BALLAST, JAPAN
30	1	751-001-254	LAMP, DAYLIGHT, F30T 12/DIRS
31	1	751-001-466	LAMP, DAY LIGHT T8 36”, 30W
32	1	751-001-460	LAMP, BLACK LIGHT T8 36”, 30W

*Note: Items 25 - 29 (single pit light assemblies) come with item 16 (pit light cable).
Items 10 - 13 (dual pit light assemblies) come with a different cable that is attached but not sold separately.

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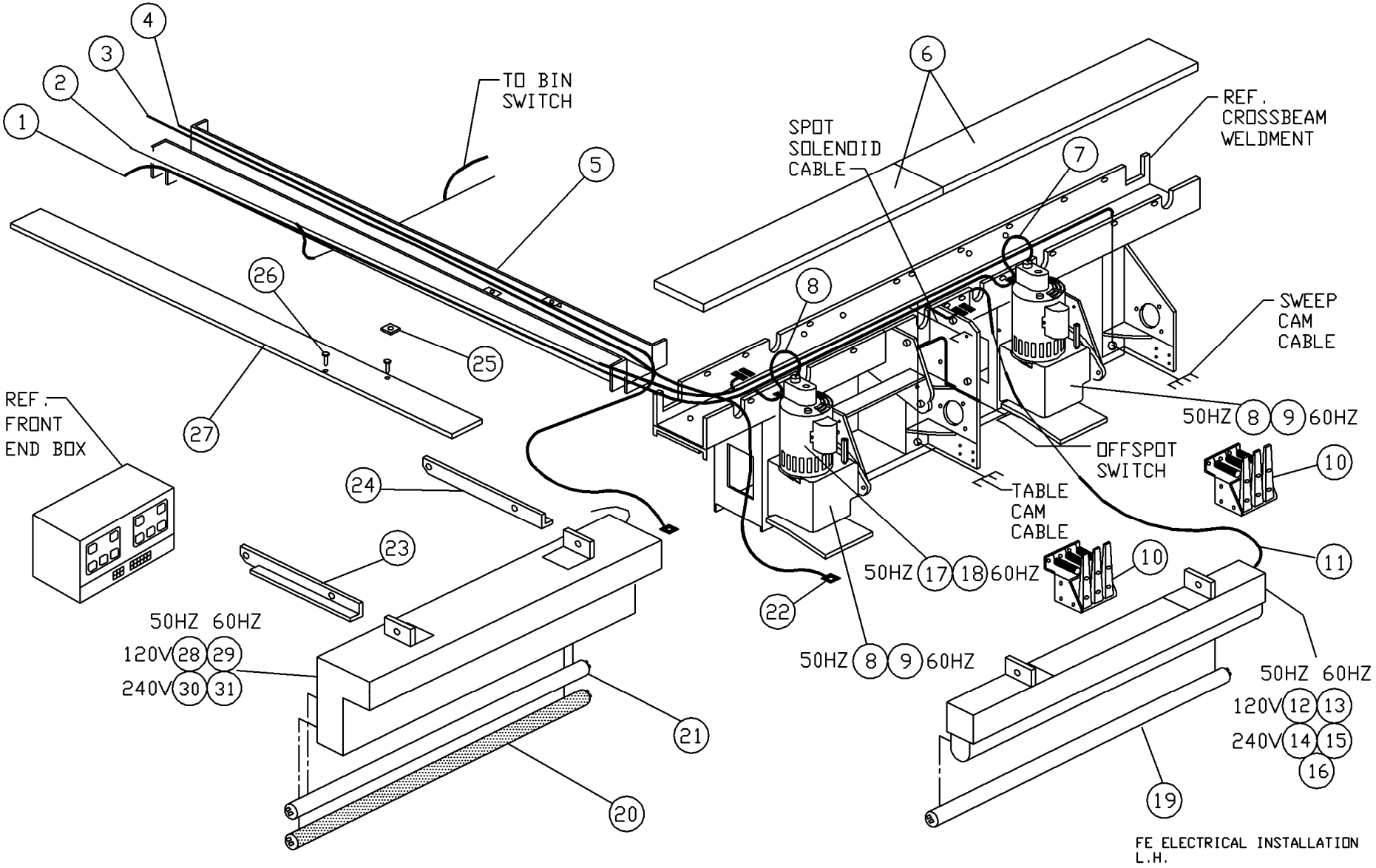
FRONT END ELECTRICAL INSTALLATION - LEFT HAND MACHINE



FE ELECTRICAL INSTALLATION L.H.

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FRONT END ELECTRICAL INSTALLATION - LEFT HAND MACHINE

ITEM	QTY	PART #	DESCRIPTION
1	1	090-005-762	EVEN POWER CABLE
2	1	090-005-758	EVEN LOGIC CABLE
3	1	090-005-739	PINDICATION CABLE
4	1	090-005-733	FRONT END CABLE
5	1	070-007-748	FRONT WIREWAY
6	2	090-005-053	CROSSBEAM COVER
7	2	090-005-876	MOTOR CABLE
8	2	090-004-499	FRONT END GEARBOX, 50HZ
9	2	090-004-500	FRONT END GEARBOX, 60HZ
10	2	070-002-841	TABLE & SWEEP CAM SWITCH
*11	1	090-003-703	PIT LIGHT CABLE (only used on items 12-16)
12	1	090-003-802	PIT LIGHT ASSEMBLY, 120V, 50 HZ
13	1	090-003-800	PIT LIGHT ASSEMBLY, 120V, 60 HZ
14	1	090-003-801	PIT LIGHT ASSEMBLY, 240V, 50 HZ
15	1	090-003-803	PIT LIGHT ASSEMBLY, 240V, 60 HZ
16	1	090-003-805	PIT LIGHT, NO BALLAST, JAPAN
17	2	090-004-060	FRONT END MOTOR, 50HZ
18	2	090-004-061	FRONT END MOTOR, 60HZ
19	1	751-001-254	LAMP, DAYLIGHT F30T 12/DIRS
20	1	751-001-460	LAMP, BLACK LIGHT T8 36”, 30W
21	1	751-001-466	LAMP, DAY LIGHT T8 36”, 30W
22	1	090-005-734	STRIKE/FOUL CABLE
23	1	070-001-908	PIT LIGHT SUPPORT BRACKET, L.H.
24	1	070-001-907	PIT LIGHT SUPPORT BRACKET, R.H.
25	5	724-511-074	U-NUT, 10 - 32
26	5	812-840-082	SCREW, ROUND HEAD, 10 - 32 X ½

ITEM	QTY	PART #	DESCRIPTION
27	1	070-007-747	WIREWAY COVER
28	1	090-008-034	DUAL PIT LIGHT ASSEMBLY 36”, 120V, 50HZ
29	1	090-008-017	DUAL PIT LIGHT ASSEMBLY 36”, 120V, 60HZ
30	1	090-008-033	DUAL PIT LIGHT ASSEMBLY 36”, 240V, 50HZ
31	1	090-008-032	DUAL PIT LIGHT ASSEMBLY 36”, 240V, 60HZ

*NOTE: Items 12 - 16 (single pit light assemblies) come with item 11 (pit light cable).
Items 28 - 31 (dual pit light assemblies come with a different cable that is attached but not sold separately.

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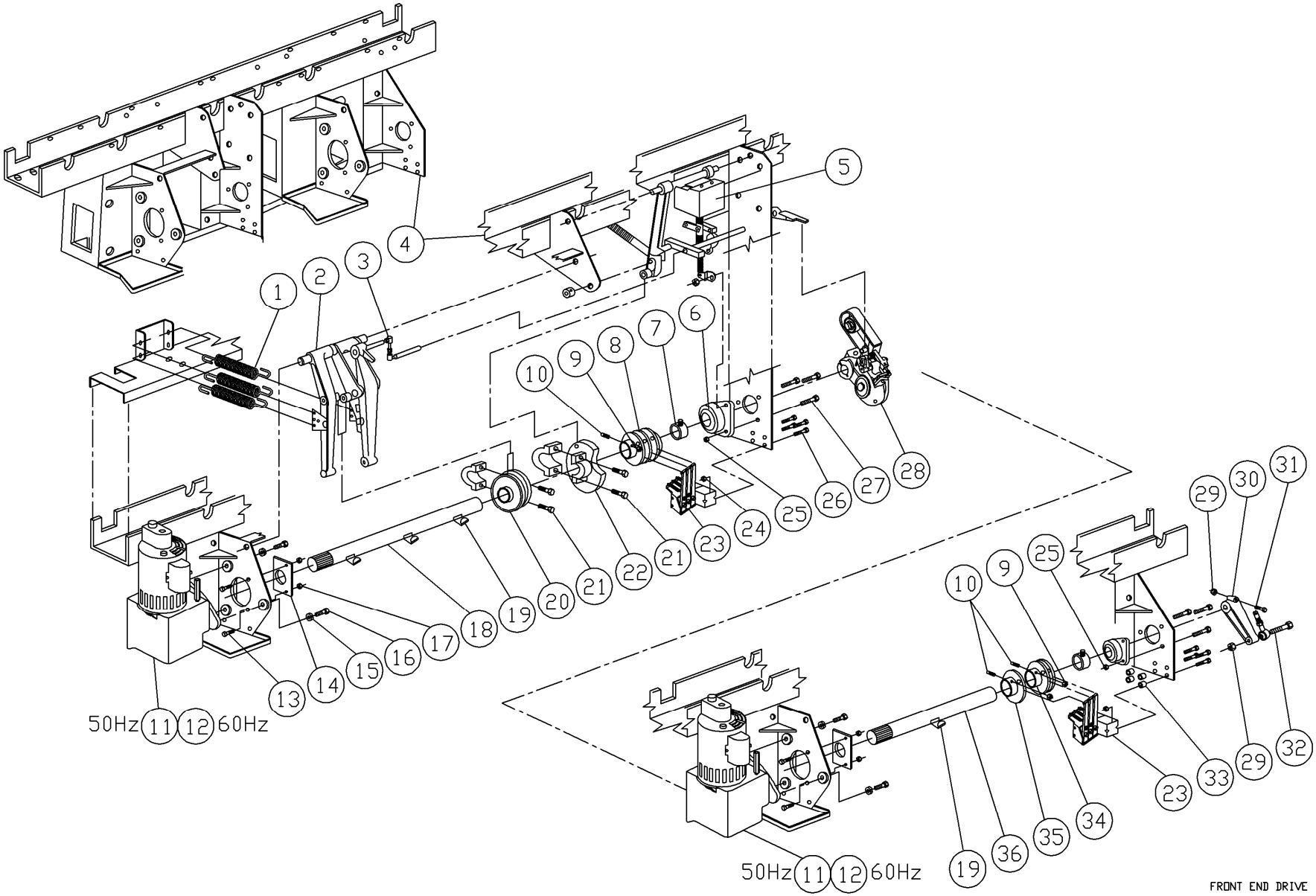
FRONT END DRIVE



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ITEM	QTY	PART #	DESCRIPTION
1	3	070-001-707	EXTENSION SPRING
2	1	070-006-492	RESPOT ARM LINK ASSEMBLY
3	1	070-006-493	BALL JOINT ASSEMBLY
4	1	090-004-001	CROSSBEAM WELDMENT
5	1	090-003-655	SOLENOID OPERATED SHUTTLE ASSY
6	2	701-420-034	BEARING, 1-1/4 BORE, 3-BOLT FLANGE
7	2	902-900-110	BEARING COLLAR, 1-1/4, LOCKING
8	1	070-006-417	TABLE CAM WELDMENT
9	3	834-549-002	NUT, HEX, 1/4 - 20
10	3	070-001-664	CLAMP STUD
11	2	090-003-516	50HZ GEARMOTOR ASSEMBLY
12	2	090-003-517	60HZ GEARMOTOR ASSEMBLY
13	4	809-857-125	SCREW, HEX, 5/16 - 18 X ¾
14	2	070-006-765	SHAFT PLATE
15	6	951-164-002	WASHER, SPLIT LOCK, 3/8
16	10	809-865-245	SCREW, SOCKET HEAD, 3/8 -16 X 1-1/2
17	4	844-057-002	NUT, STOVER LOCK, 5/16 - 18
18	1	090-005-565	TABLE DRIVE SHAFT
19	4	907-000-900	KEY
20	1	070-001-910	SPOT & RESPOT CAM
21	4	810-265-280	SCREW, SOCKET HEAD, 3/8 - 16 X 1¾
22	1	070-006-427	SHUTTLE CAM
23	2	070-006-420	TABLE CAM SWITCH & LEVER ASSEMBLY
24	8	843-139-002	NUT, HEX LOCK, 10 - 24
25	12	839-665-002	NUT, FLEX LOCK, 3/8 - 16
26	8	818-239-122	SCREW, ROUND HD, 10 - 24 X 3/4, SEMS

ITEM	QTY	PART #	DESCRIPTION
27	6	809-865-165	SCREW, HEX, 3/8 - 16 X 1
28	1	090-005-550	TABLE DRIVE ASSEMBLY
29	3	844-073-002	NUT, STOVER LOCK, ½ - 13
30	1	000-023-139	CRANK ARM
31	2	809-873-405	SCREW, HEX, 1/2 - 13 X 2-1/2
32	1	070-003-243	CRANK ARM SCREW
33	4	250-001-544	OUTLET COVER SPACERS
34	1	070-006-449	SB & SC SWEEP CAM WELDMENT
35	1	070-006-450	SA SWEEP CAM WELDMENT
36	1	070-001-699	SWEEP SHAFT

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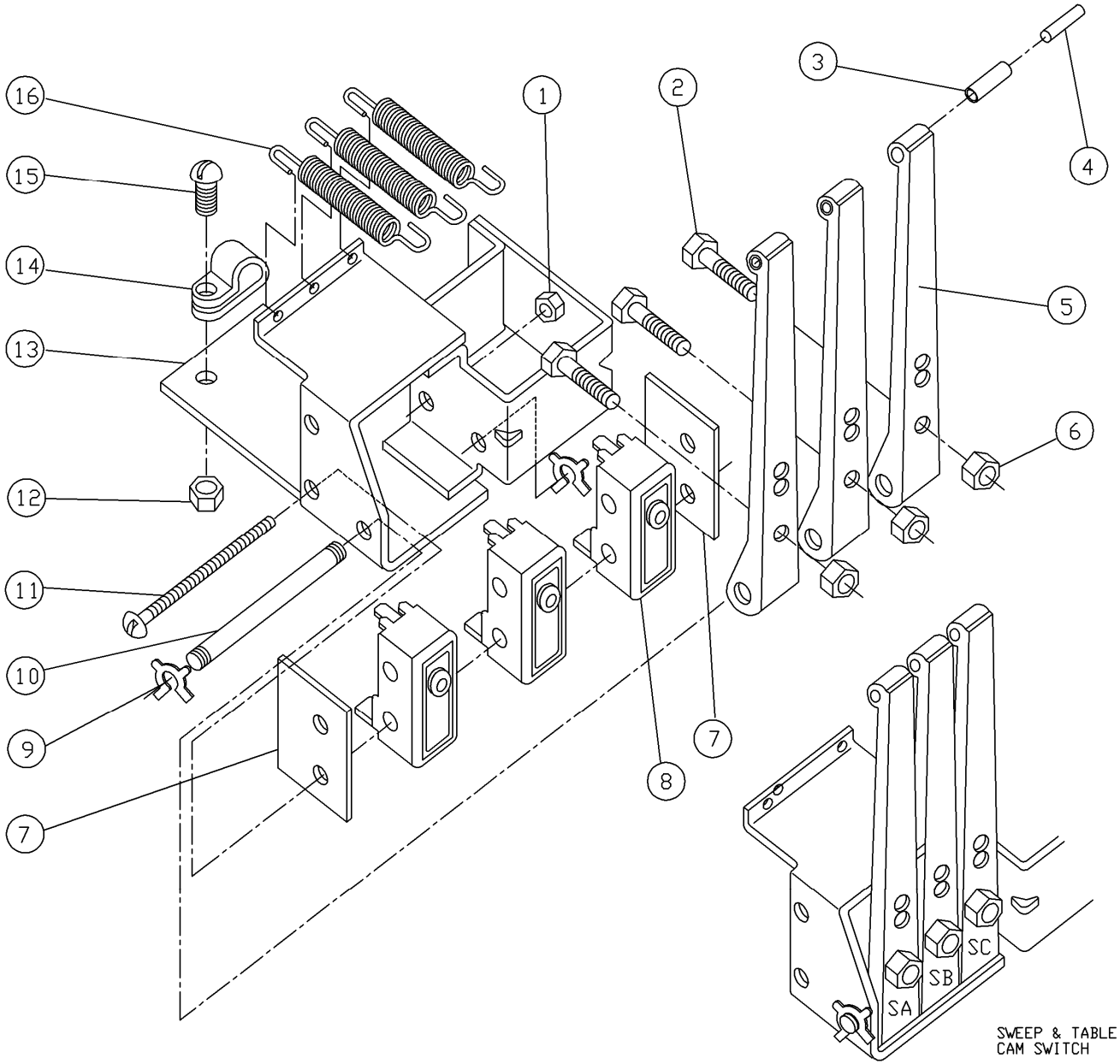
SWEEP & TABLE CAM SWITCH



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SWEEP & TABLE CAM SWITCH

ITEM	QTY	PART #	DESCRIPTION
1	2	843-127-002	NUT, HEX LOCK, 6 - 32
2	3	000-021-714	ADJUSTING SCREW
3	3	000-027-016	ROLLER
4	3	922-323-090	RIVET, SEMI-TUBULAR RD HD, .125 X 9/16
5	3	070-001-644	LEVER
6	3	835-550-002	NUT, HEX JAM, ¼ - 28
7	2	000-021-575	INSULATOR
8	3	000-026-042	MICROSWITCH
9	2	963-200-002	X-WASHER, 1/8
10	1	000-026-401	SHAFT
11	2	818-227-402	SCREW, RD HD, 6 - 32 X 2-1/2, SEMS
12	1	843-133-002	NUT, HEX LOCK, 8 - 32
13	1	000-026-419	HOUSING WELDMENT
14	1	744-107-013	NYLON CLAMP, 1/8
15	1	818-233-082	SCREW, ROUND HEAD, 8 - 32 X 1/2, SEMS
16	3	000-024-657	SPRING

ITEM	QTY	PART #	DESCRIPTION

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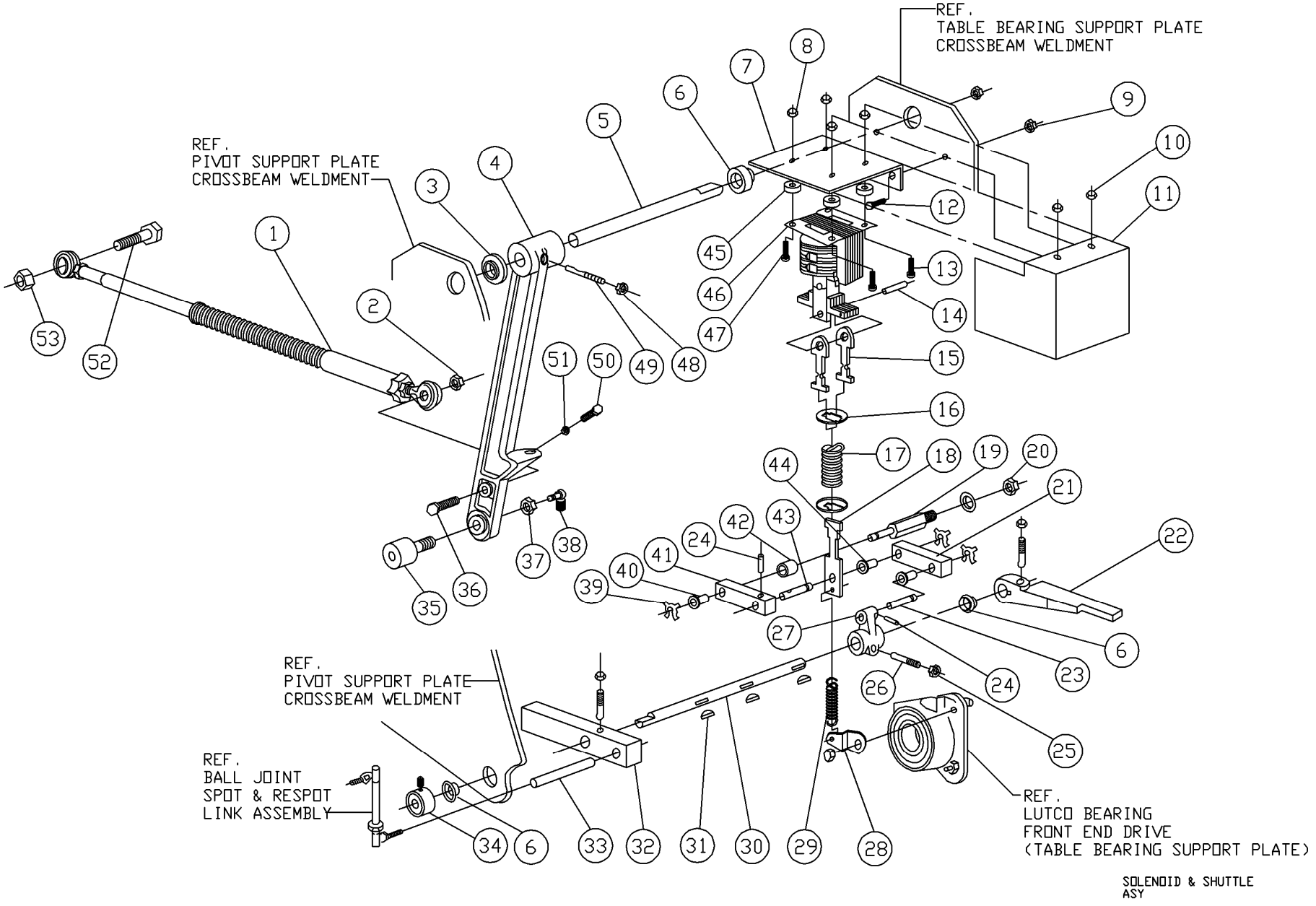
SOLENOID & SHUTTLE OPERATING ASSEMBLY



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SOLENOID & SHUTTLE OPERATING ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	090-005-263	SHUTTLE CONNECTING ROD
2	1	840-065-002	NUT, FLEX LOCK, 3/8 - 16
3	1	900-210-251	FLANGED BEARING
4	1	070-006-295	SHUTTLE OPERATING ROD LEVER
5	1	090-004-017	RESPOT LEVER SHAFT
6	3	900-208-041	FLANGED BEARING, .503 X .753 X 5/16
7	1	090-005-018	SOLENOID BRACKET
8	4	839-533-002	NUT, FLEX LOCK, 8 - 32
9	2	844-049-002	NUT, STOVER LOCK, 1/4 - 20
10	2	843-133-002	NUT, HEX LOCK, 8 - 32
11	1	090-005-029	SOLENOID GUARD
12	2	809-849-125	SCREW, HEX, 1/4 - 20 X 3/4
13	2	813-933-162	SCREW, HEX, 8 - 32 X 1
14	1	913-448-120	SPRING PIN, 1/4 X 3/4
15	2	070-006-724	LINK, SHUTTLE SPRING, UPPER
16	2	070-006-277	SPRING WASHER
17	1	070-006-276	SHUTTLE DRIVE SPRING
18	1	070-006-282	LINK, SHUTTLE SPRING, LOWER
19	1	090-005-028	SOLENOID PIVOT STUD
20	1	839-665-002	NUT, FLEX LOCK, 3/8 - 16
21	1	070-008-132	LINK ASSEMBLY
22	1	070-006-278	CAM LINK
23	1	070-001-777	LINK PIN
24	2	913-415-100	SPRING PIN, 3/32 X 5/8
25	3	835-549-002	NUT, HEX JAM, 1/4 - 20
26	3	070-006-116	CLAMP STUD, 1/4 X 1-1/8
27	1	070-006-292	LINK

ITEM	QTY	PART #	DESCRIPTION
28	1	070-006-280	SPRING CLIP
29	1	070-006-283	SHUTTLE DRIVE LINK SPRING
30	1	090-005-017	SOLENOID PIVOT SHAFT
31	3	907-000-200	KEY
32	1	070-006-456	STOP LEVER
33	1	913-464-480	SPRING PIN, 3/8 X 3
34	1	901-100-110	SET COLLAR
35	1	070-006-728	CAM FOLLOWER
36	1	809-865-205	SCREW, HEX, 3/8 - 16 X 1-1/4
37	1	835-570-002	NUT, HEX JAM, 7/16 - 20
38	1	710-501-012	GREASE FITTING
39	3	963-200-002	X - WASHER
40	1	900-204-121	FLANGED BEARING, .25 X .378 X 3/4
41	1	070-008-134	LINK ASSEMBLY
42	1	070-008-133	LINK ASSEMBLY SPACER
43	1	070-006-287	PIN, LONG
44	2	070-002-630	FLANGED BEARING, .252 X .315 X .218
45	4	948-041-100	RUBBER WASHER
46	1	090-005-723	SOLENOID, 50/60 HZ, 115V / 230V
47	2	814-333-122	SCREW, HEX, 8 - 32 X 3/4
48	1	844-057-002	NUT, HEX, 5/16 - 18
49	1	070-006-284	CLAMP STUD 5/16 X 1-3/4
50	1	809-865-205	SCREW, HEX, 3/8 - 16 X 1
51	1	835-566-002	NUT, HEX JAM, 3/8 - 16
52	1	809-865-245	SCREW, HEX, 3/8 - 16 X 1½
53	1	844-065-002	NUT, STOVER LOCK, 3/8 - 16

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TABLE DRIVE ASSEMBLY

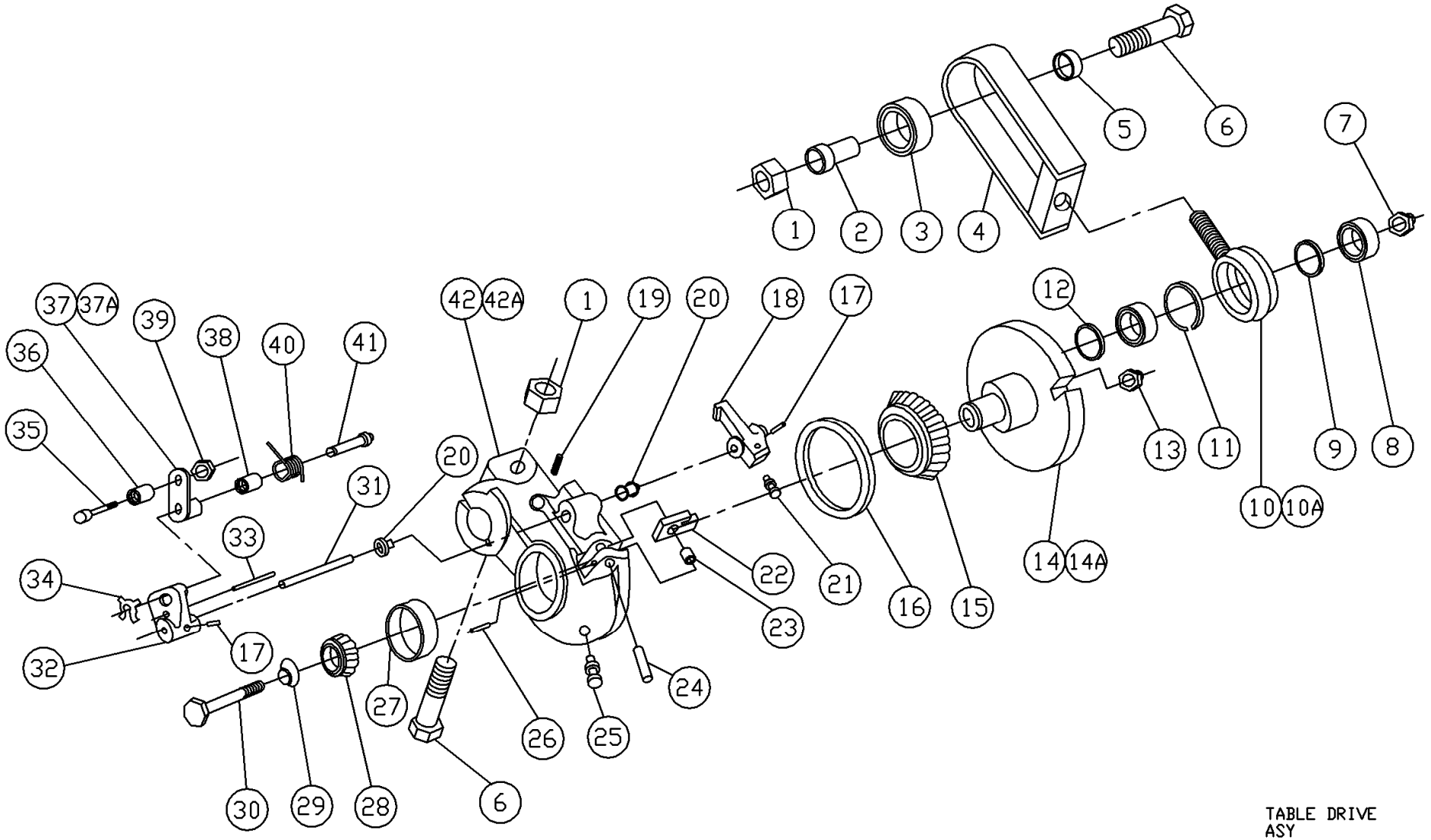

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TABLE DRIVE ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	844-073-002	NUT, STOVER LOCK, 1/2 - 13
2	1	070-007-310	FLANGED BEARING, .502 X .871 X 1.20
3	1	190-001-490	BALL BEARING
4	1	070-007-755	YOKE WELDMENT
5	1	070-007-311	SLEEVE, TABLE DRIVE ASSEMBLY
6	2	809-873-405	SCREW, HEX, 1/2 - 13 X 2-1/2
7	1	840-182-002	NUT, FLEX LOCK
8	2	000-021-881	BALL BEARING, .625 X 1.375
9	1	000-021-878	SPACER ROD ASSEMBLY
10	1	000-021-879	ROD END
10A	1	000-021-880	ROD END ASSEMBLY (includes 8, 10 & 11)
11	1	919-000-600	RETAINING RING
12	1	070-001-849	WASHER, 1 X 5/8 X 1/8
13	1	840-070-002	NUT, FLEX LOCK, 7/16 - 20
14	1	090-005-549	TABLE DRIVE ECCENTRIC
14A	1	070-002-799	ECCENTRIC & CONE ASSY (includes 14 & 15)
15	1	070-002-776	CONE-STYLE ROLLER BEARING
16	1	070-002-777	BEARING CUP
17	2	913-423-120	SPRING PIN, .125 X ¾
18	1	070-008-321	LATCH ARM ASSY (1/8" SPRING PIN HOLE)
19	1	070-001-917	COMPRESSION SPRING
20	2	900-205-053	FLANGED BEARING .315 X .44 X 5/16
21	1	070-001-893	CAM BALL ASSEMBLY
22	1	070-001-918	LATCH ASSEMBLY
23	1	900-104-071	SLEEVE BEARING, .253 X 7/16
24	1	070-001-894	PIVOT PIN

ITEM	QTY	PART #	DESCRIPTION
25	1	710-501-004	GREASE FITTING
26	1	913-415-120	SPRING PIN, .094 X ¾
27	1	070-002-780	ROLLER BEARING CUP
28	1	070-002-824	CONE & SEAL BEARING ASSEMBLY
29	1	070-006-729	SPRING DISC
30	1	809-870-325	SCREW, HEX, 7/16 - 20 X 2
31	1	070-008-325	PIN ACTUATOR ASSEMBLY
32	1	070-008-322	LINK ACTUATOR ASSEMBLY
33	1	912-137-200	GROOVE PIN, 1/16 X 1-1/4
34	1	963-300-002	X-WASHER
35	1	880-139-120	SHOULDER SCREW, 10 - 24 X 1/4 X 3/8
36	1	070-001-857	NYLON ROLLER
37	1	070-001-861	LINK & HUB ASSEMBLY
37A	1	070-007-250	LINK ASSEMBLY (includes items 37 & 38)
38	1	070-002-652	BUSHING .252 X .315 X .5
39	1	839-539-002	NUT, FLEX LOCK, 10 - 24
40	1	070-001-931	SPRING
41	1	070-001-932	PIN
42	1	070-001-889	TABLE DRIVE CRANK HOUSING
42A	1	070-002-778	CRANK HOUSING & CUP ASSEMBLY (includes items 16, 20, 25, 27, & 42)

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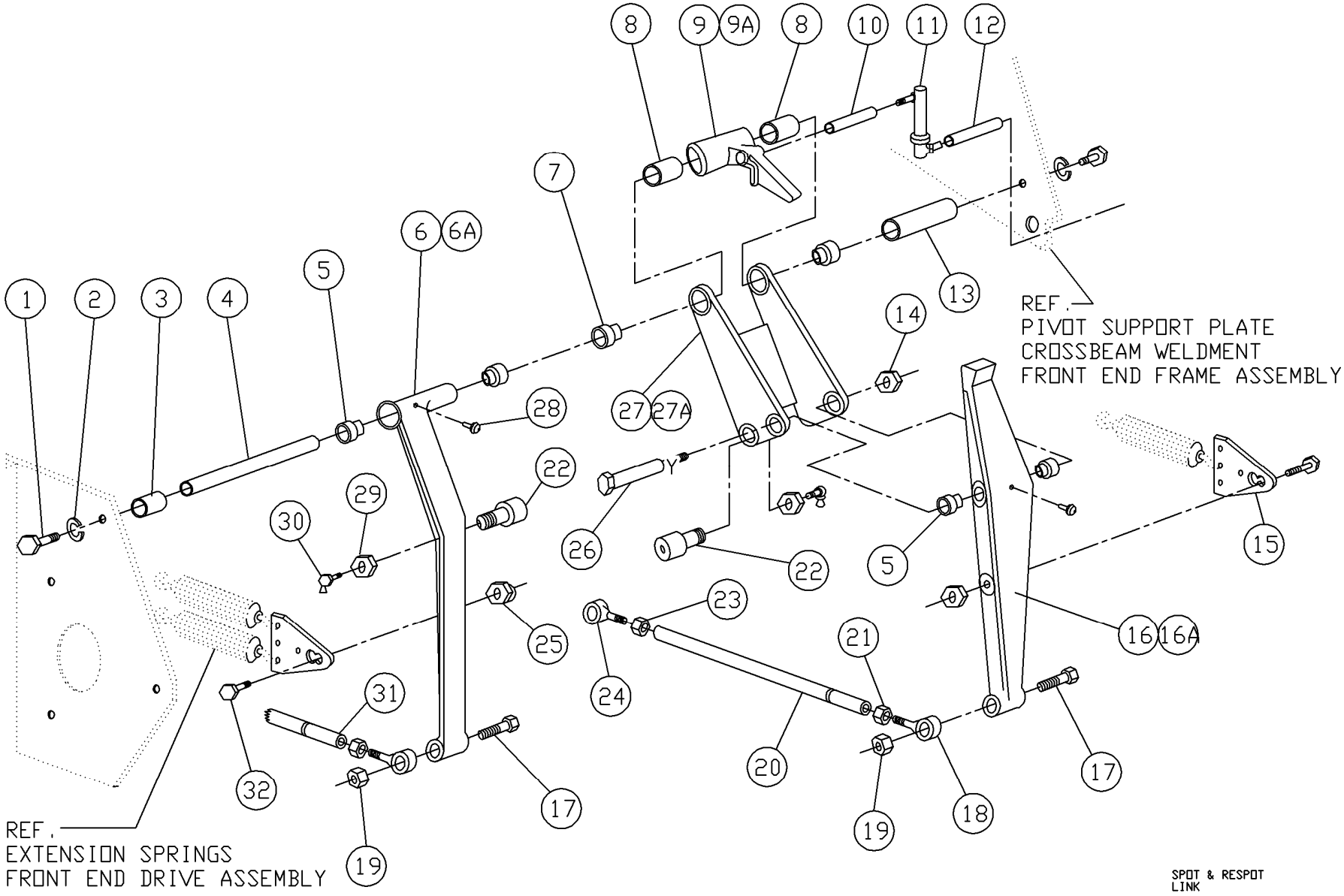
SPOT & RESPOT LINKAGES



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ITEM	QTY	PART #	DESCRIPTION
1	2	809-865-125	SCREW, HEX, 3/8 - 16 X 3/4
2	2	951-164-002	WASHER, SPLIT LOCK, 3/8
3	1	090-005-534	SPACER
4	1	090-005-025	PIVOT SHAFT, 5/8 X 8-5/8
5	4	070-001-919	FLANGED BEARING, .627 X .814 X .870
6	1	070-006-459	RESPOT ARM LINK
6A	1	070-006-492	RESPOT ARM LINK ASSY. (incl. 5, 6, & 28)
7	2	070-002-691	FLANGED BEARING, .627 X .752 X 1/2
8	2	900-110-141	SLEEVE BEARING, .628 X .878 X 7/8
9	1	070-001-996	SPOTTING ARM LATCH
9A	1	090-005-552	SPOTTING ARM LATCH ASSY. (incl. 8 & 9)
10	1	913-464-400	SPRING PIN
11	1	070-006-493	BALL JOINT ASSEMBLY
12	1	913-464-480	SPRING PIN, 3/8
13	1	090-005-564	SPACER, LONG
14	1	844-073-002	NUT, STOVER LOCK, 1/2 - 13
15	2	090-005-576	SPRING HANGER
16	1	070-006-479	RESPOT ARM LINK
16A	1	070-006-481	SPOTTING ARM LINK ASSY. (incl. 5, 16, & 28)
17	2	809-869-365	SCREW, HEX, 7/16 - 14 X 2¼
18	2	090-005-264	END FITTING, 7/16-20, L.H. THREADS
19	2	844-069-002	NUT, STOVER LOCK, 7/16 - 14
20	1	090-005-660	SPOT TIE ROD (ROD ONLY)
21	2	835-670-002	NUT, JAM, 7/16-20, L.H. THREADS
22	2	070-006-728	CAM FOLLOWER BEARING ASSEMBLY
23	2	835-570-002	NUT, JAM, 7/16-20, R.H. THREADS

ITEM	QTY	PART #	DESCRIPTION
24	2	090-005-265	END FITTING, 7/16-20, R.H. THREADS
25	2	839-665-002	NUT, FLEX LOCK, 3/8 - 16
26	1	070-001-585	SPOT LINK PIN
27	1	070-001-565	UPPER SPOTTING LINK
27A	1	070-001-605	UPPER SPOTTING LINK ASSY. (incl. 7 & 27)
28	2	710-501-009	GREASE FITTING
29	2	844-070-002	NUT, STOVER LOCK, 7/16 - 20
30	2	710-501-012	GREASE FITTING
31	1	070-001-606	RESPOT TIE ROD (ROD ONLY)
32	2	070-001-587	SPRING HANGER PIN

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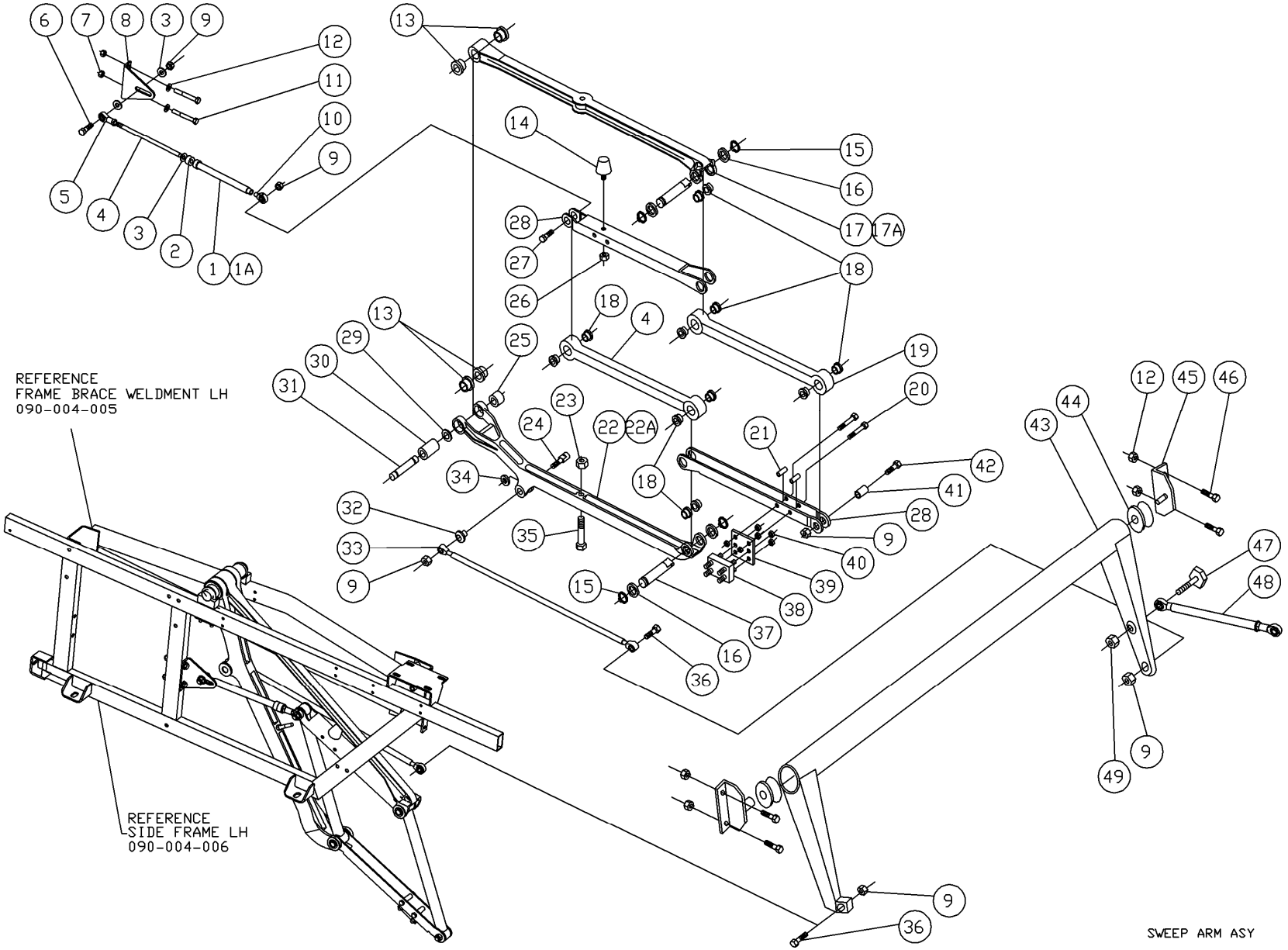
SWEEP ARM ASSEMBLY



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SWEEP ARM ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	070-007-278	TUBE WELDMENT
1A	1	090-006-145	SWEEP LINK SLIDE ASSY (incl. 1, 2, 3, 4, 5, & 11)
2	1	070-007-283	BUMPER
3	3	949-100-002	WASHER, 59/64 X 15/32
4	1	070-007-276	ROD
5	1	090-005-257	ROD END
6	1	809-869-245	BOLT, 7/16-14 X 1½
7	2	844-065-002	NUT, STOVER LOCK, 3/8 - 16
8	1	090-006-128	SWEEP LINK BRACKET
9	5	838-369-002	NUT, CENTER PUNCH LOCK, 7/16 - 14
10	1	090-006-138	ROD END, 7/16 - 20 X .5
11	2	809-865-445	SCREW, HEX, 3/8 - 16 X 2.75
12	2	948-767-132	WASHER, 13/32 X 13/16 X 1/16
13	4	000-023-104	FLANGED BEARING, 1.25 X 1.5 X .953
14	1	090-006-137	BUMPER
15	4	919-005-600	RETAINING RING
16	4	070-006-121	WASHER
17	1	070-003-239	SWEEP LINK
17A	1	090-006-139	STABLIZER LINK ASSY (incl. 13, 17 & 18)
18	12	000-023-114	FLANGED BEARING, .628 X .81 X .06
19	2	090-006-133	MIDDLE LINK, STEEL
20	2	809-857-365	SCREW, HEX, 5/16 - 18 X 2¼
21	2	090-006-125	LOWER STEEL SWEEP SPACER
22	1	070-003-157	DRIVE LINK CASTING
22A	1	090-006-140	DRIVE LINK ASSY (incl. 13, 18, 22, 23 & 35)
23	1	839-665-002	NUT, FLEX LOCK, 3/8 - 16

ITEM	QTY	PART #	DESCRIPTION
24	1	090-006-134	DRIVE LINK PIN
25	1	070-003-233	MAIN PIVOT SPACER, SHORT
26	1	839-057-002	NUT, HEX LOCK NYLON, 5/16 - 18
27	1	809-869-405	BOLT, HEX, 7/16 - 14 X 2-1/2
28	1	090-006-132	STEEL SWEEP LINK, UPPER & LOWER
29	1	070-011-819	SHIM, TABLE & SWEEP
30	1	070-003-232	MAIN PIVOT SPACER, LONG
31	1	070-003-106	MAIN PIVOT SHAFT
32	1	090-006-135	DRIVE LINK BUSHING/SPACER
33	1	090-005-254	DRIVE LINK CONNECTING ROD
34	1	070-003-117	DRIVE LINK SPACER
35	1	070-003-221	SCREW, SWEEP LINK ASSEMBLY
36	2	809-869-365	SCREW, HEX, 7/16 - 14 X 2-1/4
37	2	090-006-126	PIN, STEEL SWEEP LINKAGE
38	1	090-006-136	SHOCK MOUNT
39	1	090-006-131	SWEEP SHOCK MOUNT PLATE
40	2	844-057-002	NUT, STOVER LOCK, 5/16 - 18
41	2	090-006-127	STEEL SWEEP LINK SLEEVE
42	1	809-869-325	BOLT, HEX, 7/16 - 14 X 2
43	1	090-004-010	SWEEP ROCKER ARM
44	2	090-005-015	TORQUE TUBE BEARING
45	2	090-004-007	TORQUE TUBE HANGER
46	4	809-865-205	SCREW, HEX, 3/8 - 16 X 1-1/4
47	1	070-003-243	SCREW, HEX, ½ - 13 X 2½
48	1	090-005-255	CONNECTING ROD ASSEMBLY
49	1	844-073-002	NUT, STOVER LOCK, ½ - 13

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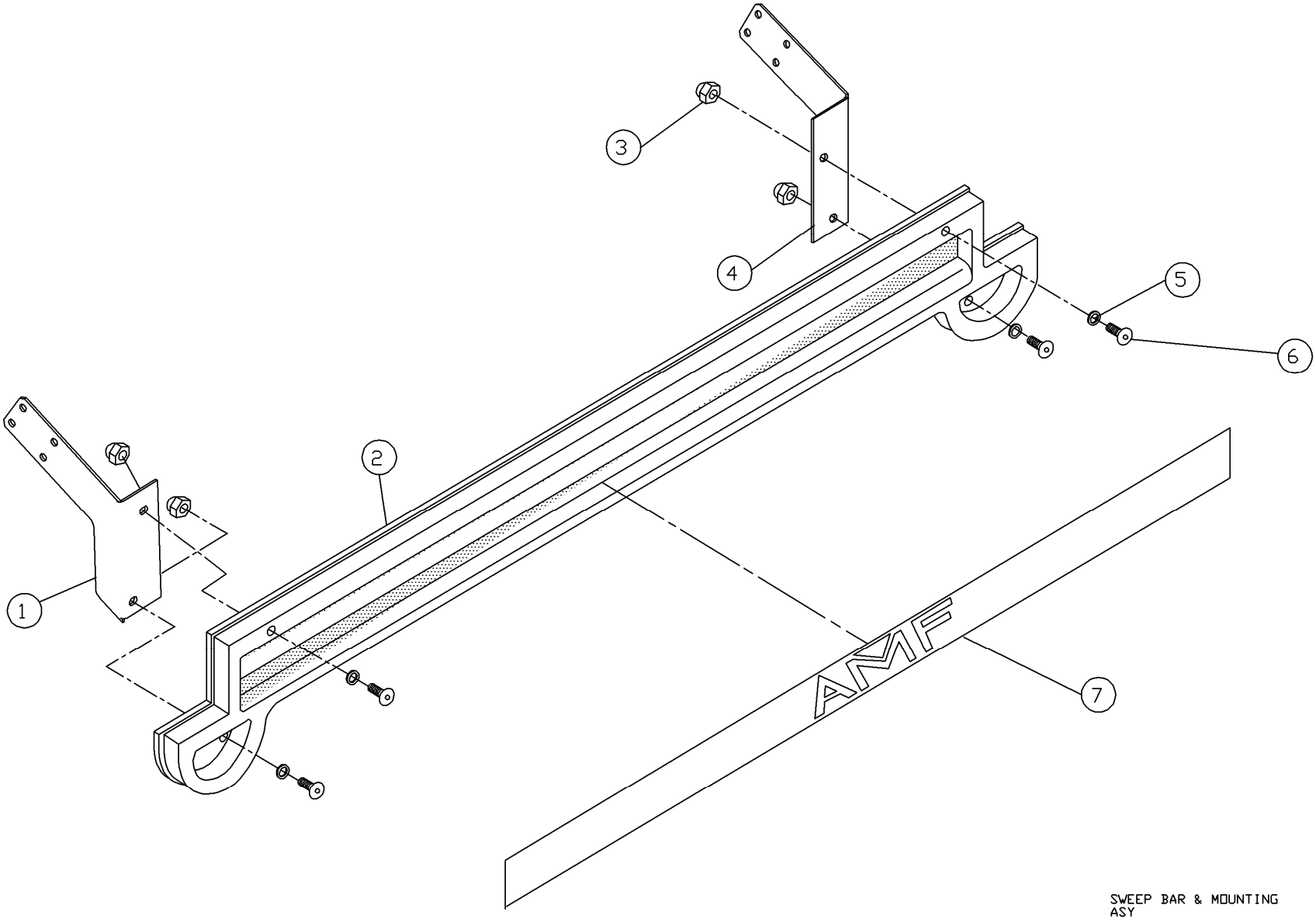
SWEEP BAR & MOUNTING ASSEMBLY



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SWEEP BAR & MOUNTING ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	090-006-129	SWEEP MOUNTING BRACKET, L.H.
2	1	300-000-165	SWEEP BAR
3	4	830-057-002	NUT, ACORN, 5/16 - 18
4	1	090-006-130	SWEEP MOUNTING BRACKET, R.H.
5	4	948-722-111	WASHER, FLAT, 11/16 X 11/32 X 1/16
6	4	808-557-140	SCREW, BUTTON HEAD, 5/16 - 18 X 7/8
7	1	090-006-166	SWEEP DECAL, 8290XL, GLOW

ITEM	QTY	PART #	DESCRIPTION

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TABLE & CROSSBEAM ASSEMBLY

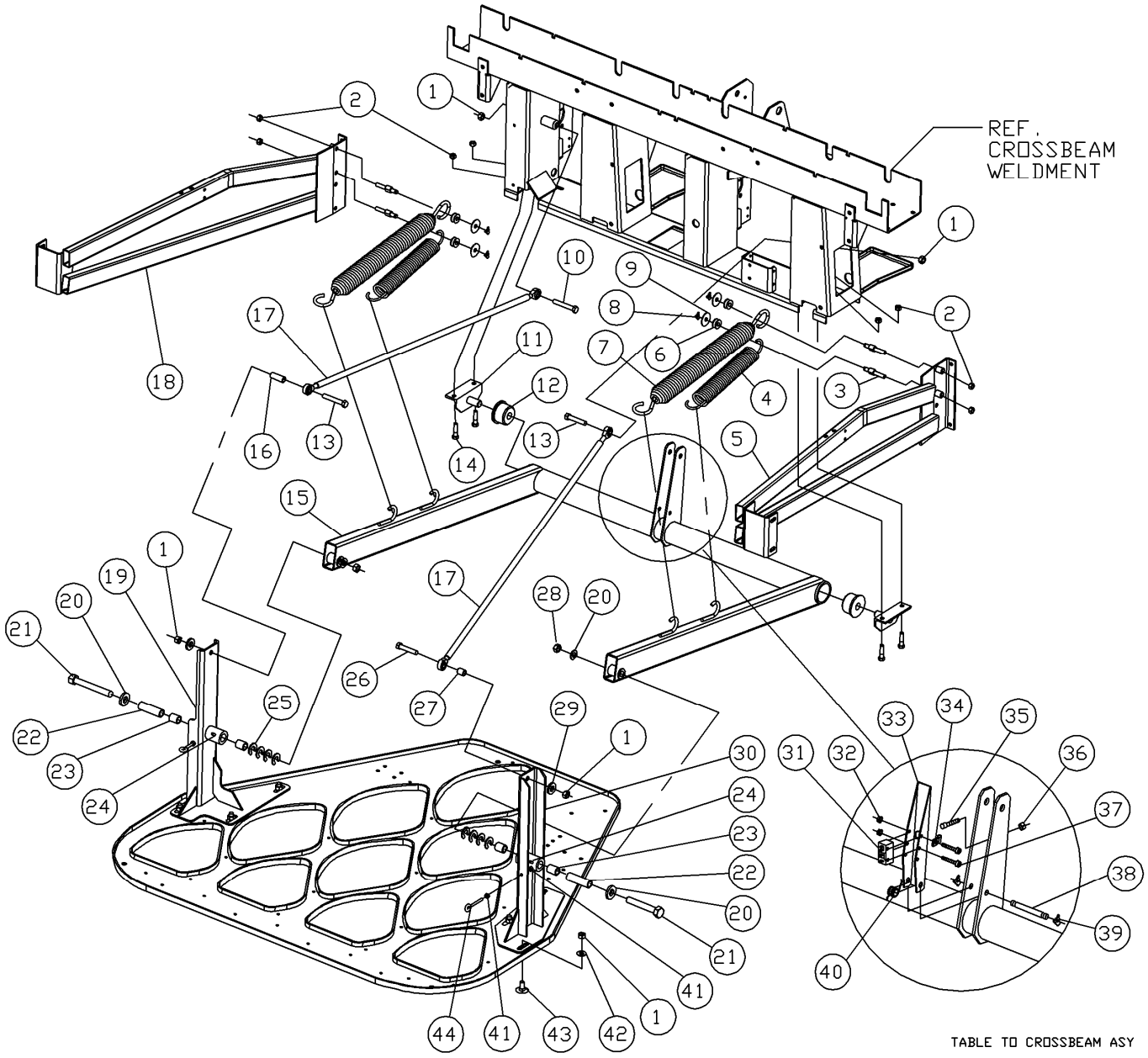

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TABLE & CROSSBEAM ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	10	838-369-002	NUT, CENTER PUNCH LOCK, 7/16 - 14
2	8	839-665-002	NUT, STOVER LOCK, 3/8 - 16
3	4	090-002-028	SPRING ROLLER PIN
4	2	090-005-662	COUNTERBALANCE SPRING, SMALL
5	1	090-005-646	SIDE BRACE, L.H.
6	4	090-003-795	COUNTERBALANCE SPRING ROLLER
7	2	000-022-782	COUNTERBALANCE SPRING
8	4	963-400-002	X-WASHER, 3/16
9	4	945-867-242	WASHER, FLAT, .406 X 1-1/2 X .05
10	1	809-869-365	SCREW, HEX, 7/16 - 14 X 2.25
11	2	090-004-007	TUBE HANGER BRACKET
12	2	090-005-015	TORQUE TUBE BEARING
13	1	809-869-520	SCREW, HEX, 7/16 - 14 X 3.25
14	4	809-865-245	SCREW, HEX, 3/8 - 16 X 1-1/2
15	1	090-005-645	TORQUE TUBE WELDMENT
16	1	090-005-597	LEVELING SPACER
17	2	090-005-253	TIE ROD ASSEMBLY
18	1	090-005-647	SIDE BRACE, R.H.
19	1	090-005-514	TABLE SUPPORT WELDMENT, R.H.
20	4	948-983-212	WASHER, 21/32 X 1-5/16
21	2	070-006-048	BOLT, SPECIAL
22	2	090-005-654	SLEEVE, UPRIGHT
23	4	900-114-101	SLEEVE BEARING .877 X 1.128 X 5/8
24	2	710-501-009	GREASE FITTING
25	6	070-007-752	SPACER
26	1	809-869-325	SCREW, HEX, 7/16 - 14 X 2

ITEM	QTY	PART #	DESCRIPTION
27	1	070-007-303	LEVELING ROD SPACER
28	2	844-081-002	NUT, STOVER LOCK, 5/8 - 11
29	2	949-100-002	WASHER, 59/64 X 15/32 X 1/16
30	1	090-005-509	TABLE SUPPORT WELDMENT, L.H.
31	1	000-026-042	MICROSWITCH
32	2	843-127-002	NUT, HEX LOCK, 6-32
33	1	070-001-852	OFF-SPOT LEVER
34	1	744-203-013	CABLE CLAMP
35	1	070-001-854	ADJUSTMENT SCREW
36	1	835-549-002	NUT, HEX JAM, 1/4-20
37	2	818-227-202	SCREW, ROUND HEAD, 6-32 X 1-1/4
38	1	070-001-591	PIN
39	2	963-400-002	X-WASHER
40	1	070-001-853	SPRING
41	4	835-549-002	NUT, HEX JAM, 1/4 - 20
42	6	947-271-967	WASHER, FLAT, 7/16
43	6	801-369-161	CARRIAGE BOLT, 7/16 - 14 X 1
44	2	879-849-487	EYEBOLT, ¼ - 20 X 3

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TABLE & BRACKET ASSEMBLY

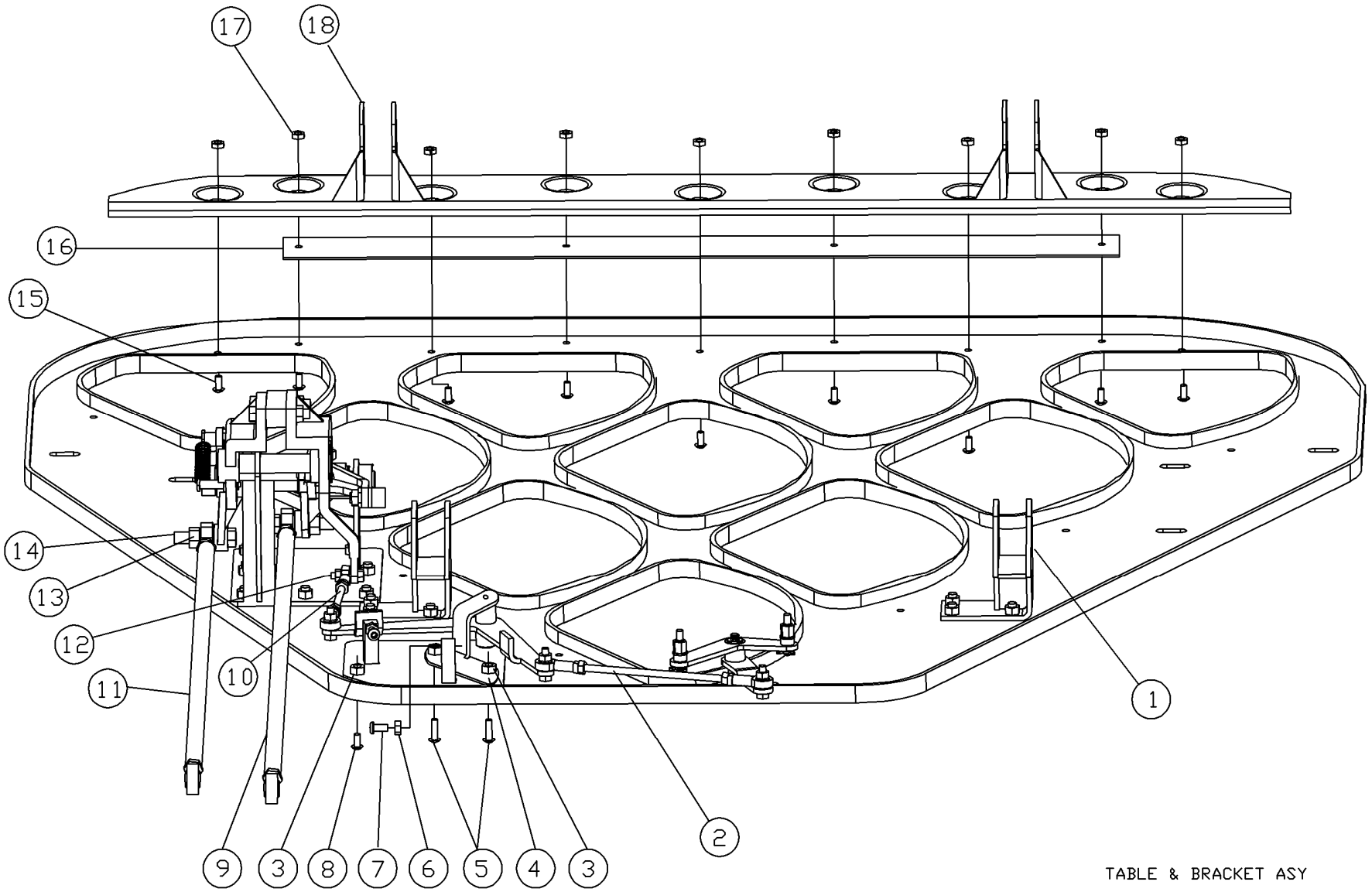

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TABLE & BRACKET ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	090-005-505	FRONT BRACKET WELDMENT
2	1	090-005-613	ROD ASSEMBLY, LONG
3	19	844-057-002	NUT, STOVER LOCK, 5/16 - 18
4	1	090-005-637	PIVOT SUPPORT BRACKET
5	2	808-557-140	SCREW, BUTTON HEAD CAP, 5/16 - 18 X 7/8
6	2	835-549-002	NUT, HEX JAM, ¼ - 20
7	1	808-549-200	SCREW, BUTTON HEAD CAP, ¼ - 20 X 1¼
8	17	808-557-120	SCREW, BUTTON HEAD CAP, 5/16 - 18 X 3/4
9	1	088-005-501	SPOT TIE ROD ASSEMBLY
10	1	090-005-615	ROD ASSEMBLY, SHORT
11	1	088-005-500	RESPOT TIE ROD ASSEMBLY
12	4	809-849-165	SCREW, HEX, 1/4 - 20 X 1
13	2	844-069-002	NUT, STOVER LOCK, 7/16 - 14
14	2	809-869-285	SCREW, HEX, 7/16 - 14 X 1-1/2
15	9	808-549-120	SCREW, BUTTON HEAD CAP, 1/4 - 20 X 3/4
16	1	090-005-656	REAR BRACKET SHIM
17	13	844-049-002	NUT, STOVER LOCK, 1/4 - 20
18	1	090-005-536	MOUNTING BRACKET

ITEM	QTY	PART #	DESCRIPTION

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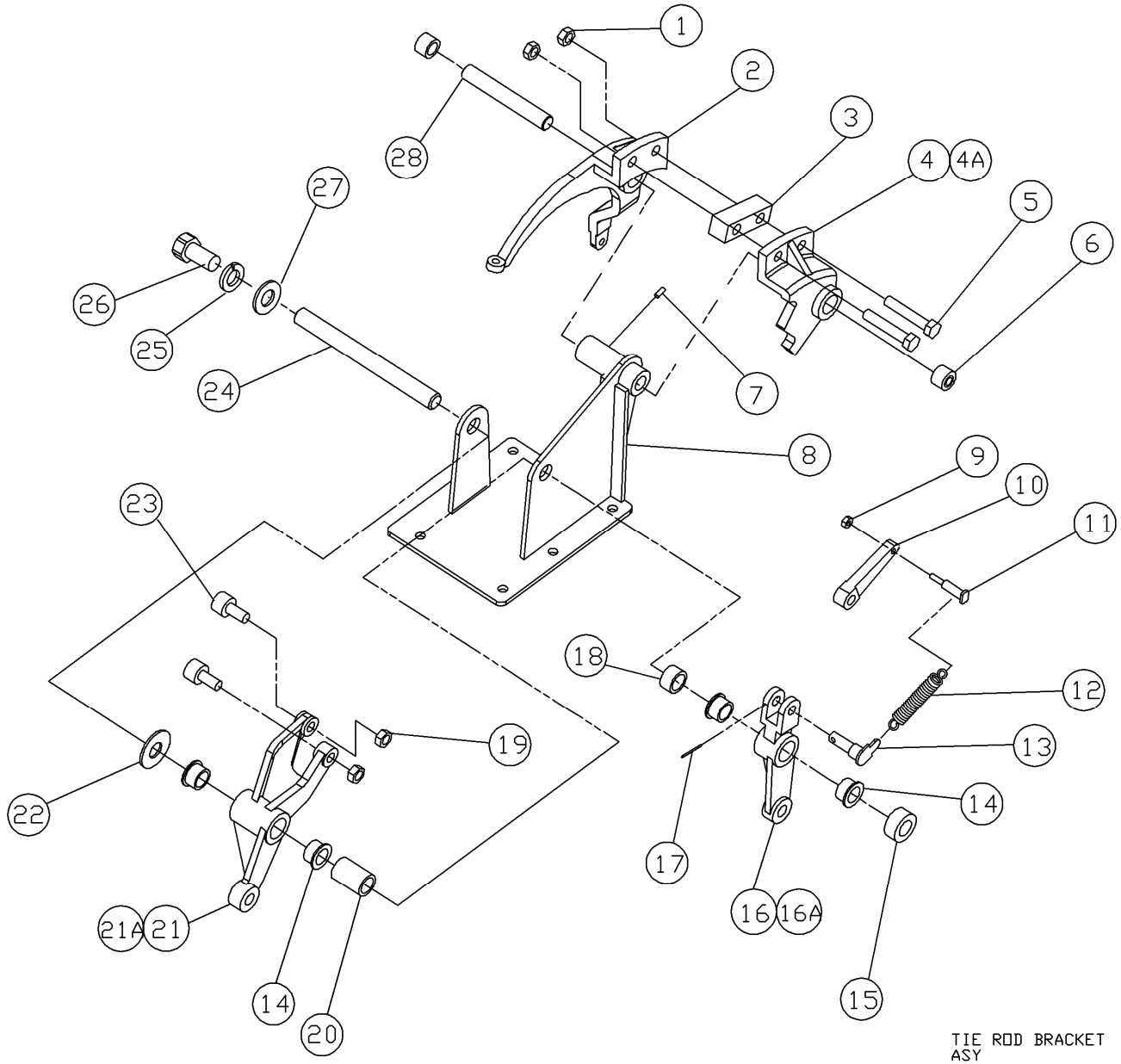
TIE ROD BRACKET ASSEMBLY



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TIE ROD BRACKET ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	844-065-002	NUT, STOVER LOCK, 3/8 - 16
2	1	070-002-725	CAM LINK
3	1	090-005-520	SPACER
4	1	070-002-724	SHIFTER LINK
4A	1	070-002-727	SHIFTER LINK & BEARING ASSY (incl. 4 & 6)
5	2	809-865-325	SCREW, HEX, 3/8 - 16 X 2
6	2	070-002-781	NEEDLE BEARING
7	1	807-249-060	SETSCREW, 1/4 - 20 X 3/8
8	1	088-005-503	TIE ROD BRACKET
9	1	843-140-002	NUT, HEX LOCK, 10 - 32
10	1	070-002-590	FINGER LINK
11	1	090-005-629	PIN
12	1	070-001-807	RESPOT LEVER SPRING
13	1	090-005-631	PIVOT WELDMENT
14	4	070-002-745	FLANGED BEARING, .6265 X .814 X ½
15	1	000-021-423	SHAFT COLLAR
16	1	070-002-589	FINGER LEVER
16A	1	070-002-579	FINGER LEVER ASSY (includes 14 & 16)
17	1	913-423-120	SPRING PIN
18	1	090-005-533	SPACER
19	2	840-066-002	NUT, FLEX LOCK, THIN, 3/8 - 24
20	1	090-005-532	SPACER
21	1	070-002-599	SPOT LEVER
21A	1	070-002-578	SPOT LEVER ASSEMBLY (incl. 14 & 21)
22	1	948-983-212	WASHER, FLAT, 21/32 X 1-5/16
23	2	070-002-816	CAM FOLLOWER

ITEM	QTY	PART #	DESCRIPTION
24	1	090-005-655	SHAFT
25	1	951-164-002	WASHER, SPLIT LOCK, 3/8
26	1	809-865-125	SCREW, HEX, 3/8 - 16 X ¾
27	1	948-767-132	WASHER, FLAT, 13/32 X 13/16 X 1/16
28	1	090-005-521	SHAFT, SHORT SIDE

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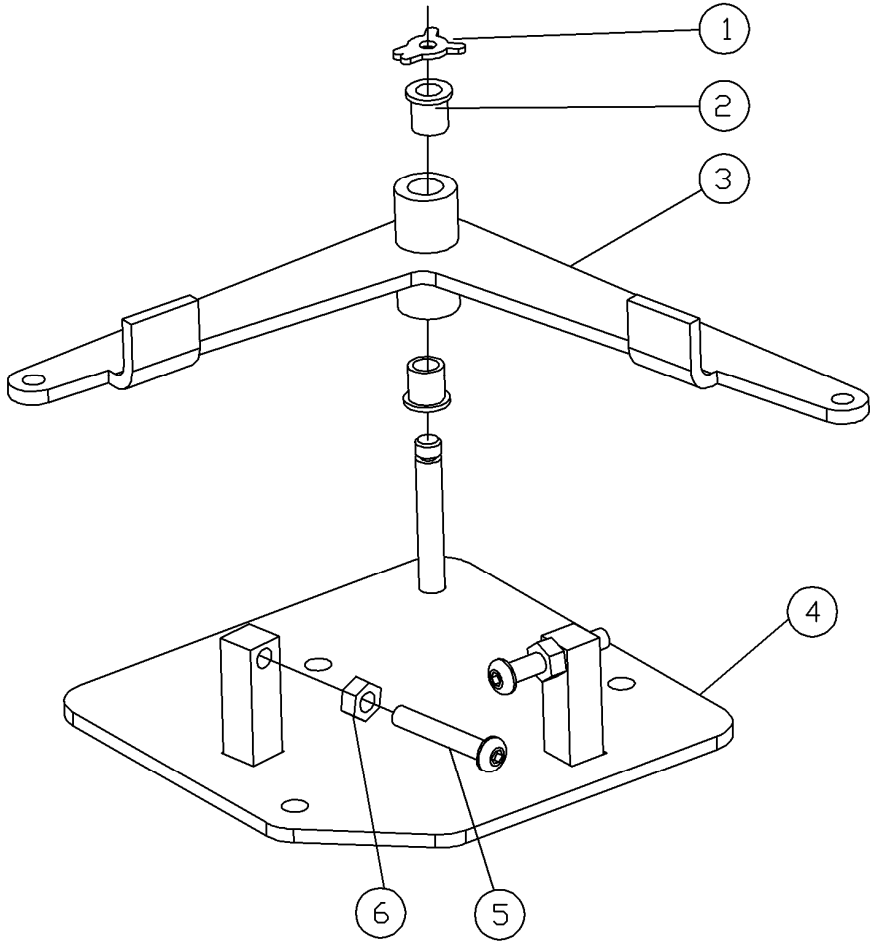
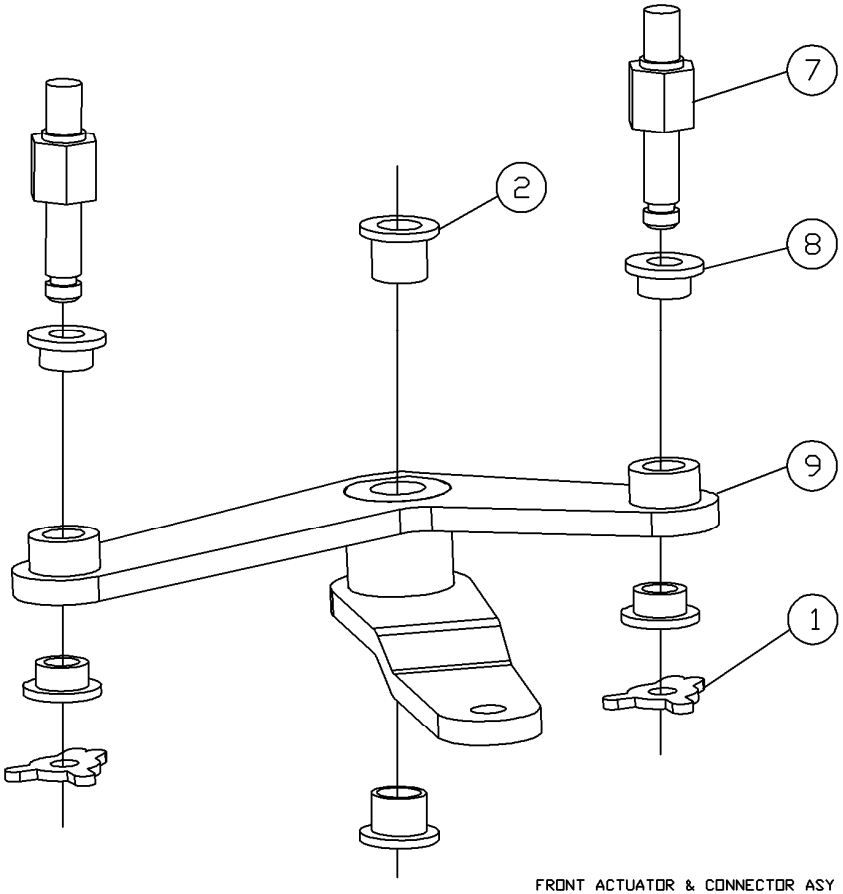
FRONT ACTUATOR & CONNECTOR ASSEMBLIES





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ITEM	QTY	PART #	DESCRIPTION
1	3	963-400-002	X-WASHER
2	4	900-205-081	FLANGED BEARING, .315 X .44 X .5
3	1	090-005-600	ACTUATOR LEVER WELDMENT
4	1	090-005-603	ACTUATOR BASE WELDMENT
5	2	808-549-200	SCREW, BUTTON HEAD CAP, ¼ - 20 X 1-1/4
6	2	835-549-002	NUT, HEX JAM, ¼ - 20
7	2	090-005-612	FRONT CONNECTING LINK PIN, 7 PIN
8	4	070-002-630	FLANGED BEARING, .252 X .315 X .218
9	1	090-005-607	FRONT CONNECTING LINK

ITEM	QTY	PART #	DESCRIPTION

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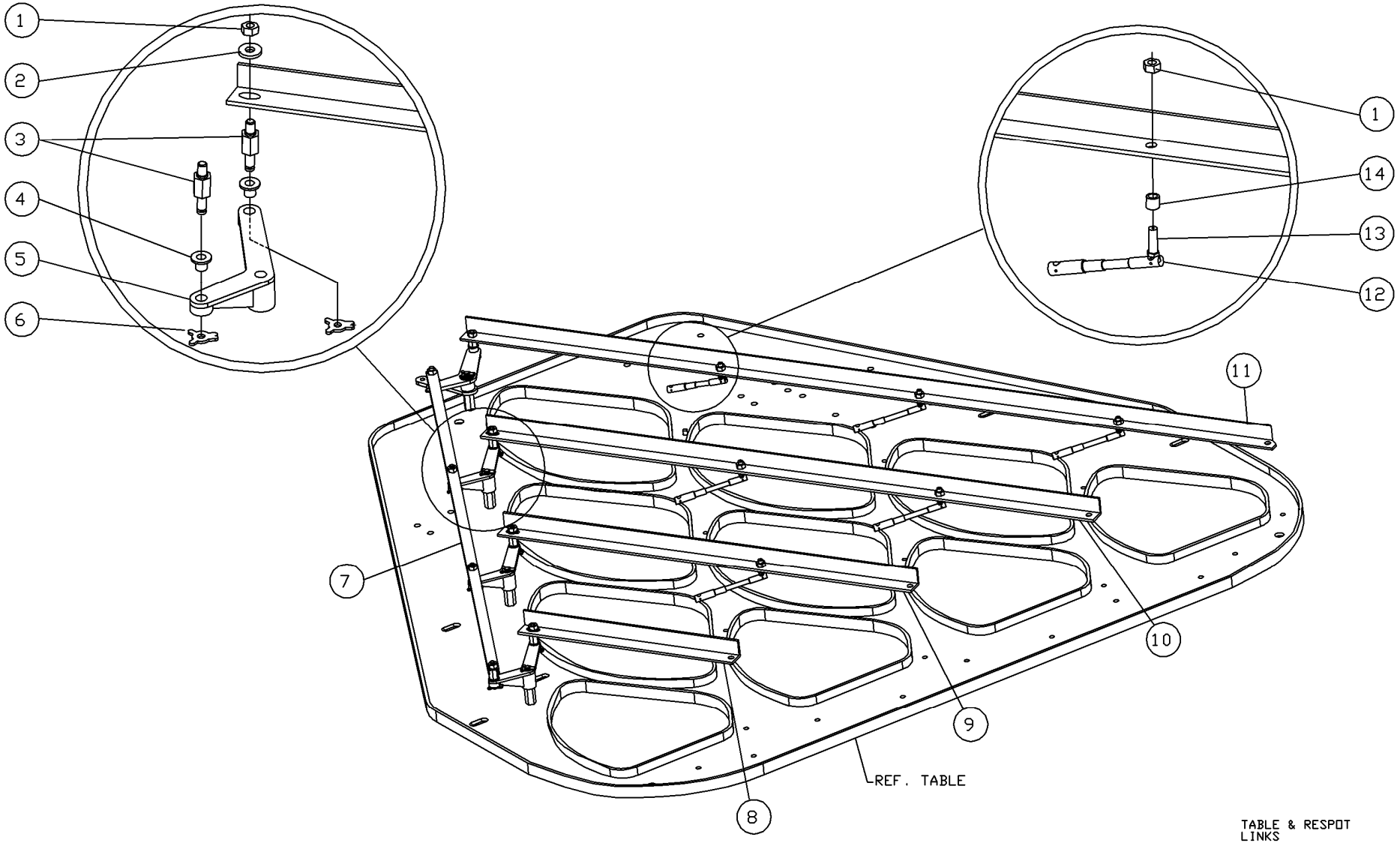
TABLE & RESPOT LINKS



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ITEM	QTY	PART #	DESCRIPTION
1	14	844-049-002	NUT, STOVER LOCK, 1/4 - 20
2	3	948-753-102	WASHER, FLAT, 9/32 X 5/8 X 1/16
3	6	090-005-571	PIN, 8, 9, & 10 LINKS
4	6	070-002-653	FLANGED BEARING, .252 X .315 X .38
5	3	070-002-677	LEVER CASTING
6	12	963-400-002	X-WASHER
7	1	070-002-671	RESPOT LINK
8	1	090-005-558	10-PIN LINK
9	1	090-005-557	9-PIN LINK
10	1	090-005-556	8-PIN LINK
11	1	090-005-555	7-PIN LINK
12	6	090-002-020	LINK BODY
13	6	730-027-019	STUD, BALL HEAD
14	6	070-002-815	SPACER BUSHING

ITEM	QTY	PART #	DESCRIPTION

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TABLE & RESPOT CELLS

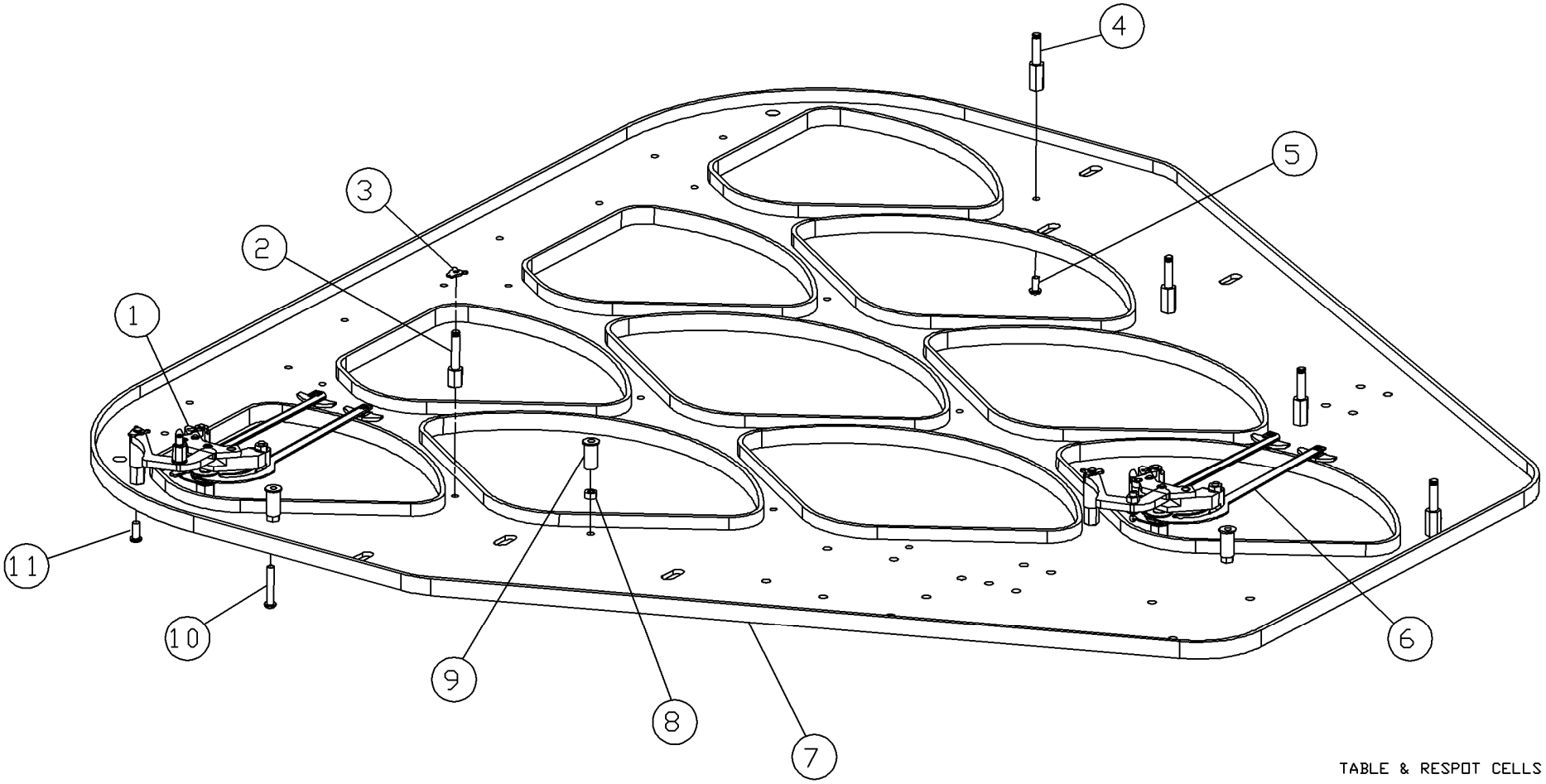

TABLE & RESPOT CELLS

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ITEM	QTY	PART #	DESCRIPTION
1	4	090-005-540	RESPOT CELL ASSY (pins 7 through 10)
2	10	090-005-504	RESPOT PIVOT
3	10	963-400-002	X-WASHER
4	4	090-005-503	LINK CONNECTOR PIVOT
5	4	809-149-100	SCREW, BUTTON HEAD CAP, 1/4 - 20 X 5/8
6	6	090-005-544	RESPOT CELL ASSY (pins 1 through 6)
7	1	088-005-502	TABLE
8	10	844-049-002	NUT, STOVER LOCK, 1/4 - 20
9	10	855-349-010	WELL NUT, 1/4 - 20 x 1
10	10	801-149-247	CARRIAGE BOLT, 1/4 - 20 X 1-1/2
11	10	801-149-100	CARRIAGE BOLT, 1/4 - 20 X 5/8

ITEM	QTY	PART #	DESCRIPTION

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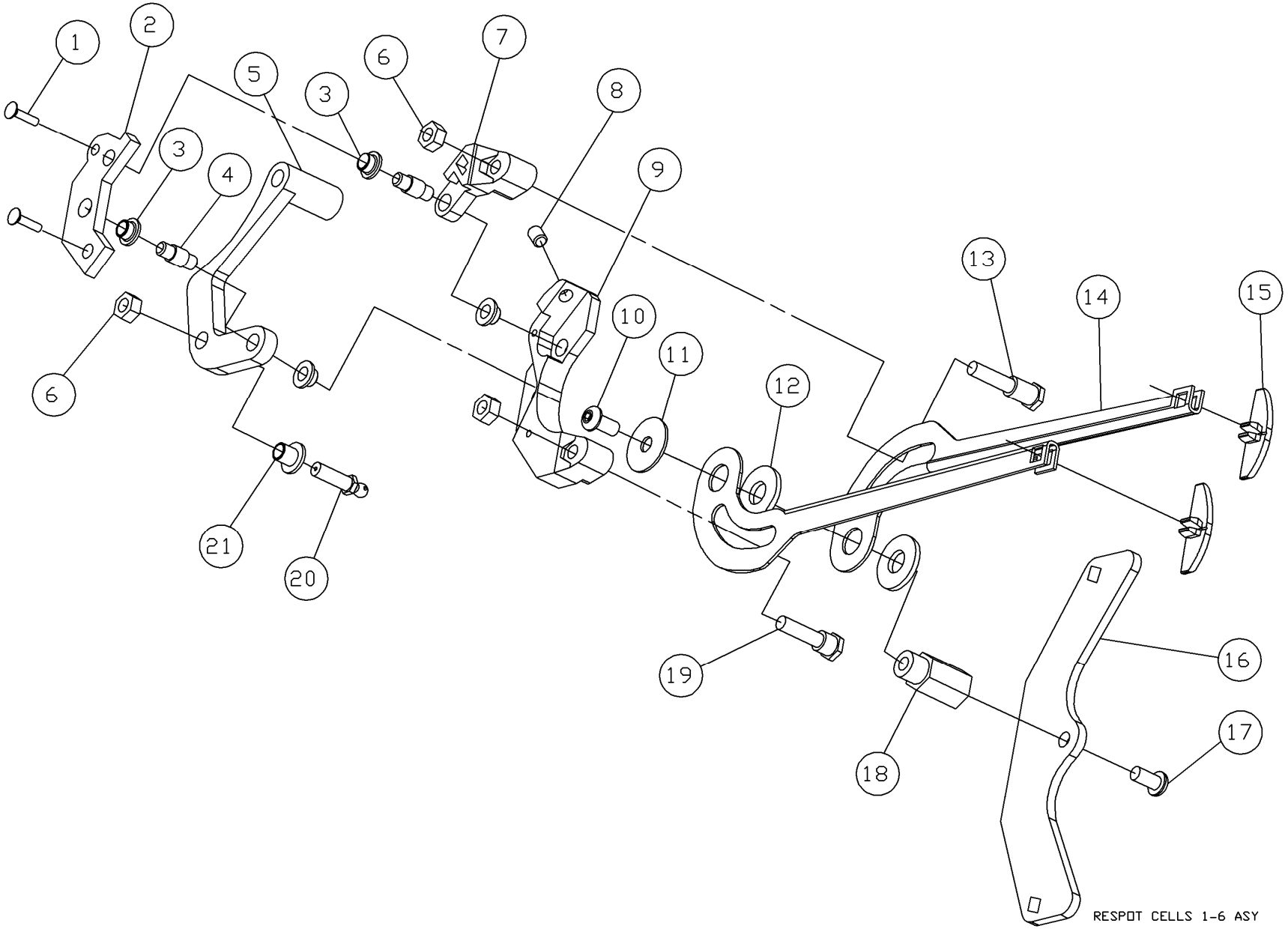
RESPOT CELL ASSEMBLY, CELLS 1 THROUGH 6



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RESPOT CELL ASSEMBLY, CELLS 1 THROUGH 6

ITEM	QTY	PART #	DESCRIPTION
1	2	070-002-750	SCREW, FLAT HEAD
2	1	070-002-695	YOKE PLATE
3	4	070-002-630	FLANGED BEARING, .252 X .315 X .218
4	2	070-002-645	LEVER ASSEMBLY SHAFT
5	1	070-002-651	RESPOT LEVER
6	2	844-049-002	NUT, STOVER LOCK, 1/4 - 20
7	1	090-004-113	RESPOT YOKE ARM
8	1	807-650-050	SETSCREW, 1/4 - 28 X 5/16
9	1	090-004-118	RESPOT YOKE
10	1	808-549-080	SCREW, BUTTON HEAD CAP, 1/4 - 20 X 1/2
11	1	070-007-192	WASHER
12	2	070-007-193	RESPOT CELL SPACER
13	1	090-005-640	STUD, LONG
14	2	090-004-119	RESPOT FINGER
15	2	090-005-617	FINGER INSERT
16	1	090-005-632	FINGER PIVOT WING
17	1	809-149-100	SCREW, BUTTON HD w/PATCH, 1/4 - 20 X 5/8
18	1	090-005-522	RESPOT FINGER BUSHING
19	1	070-007-195	STUD, SHORT
20	1	730-027-019	STUD, BALL HEAD
21	1	070-002-653	FLANGED BEARING, .252 X .315 X .38

ITEM	QTY	PART #	DESCRIPTION

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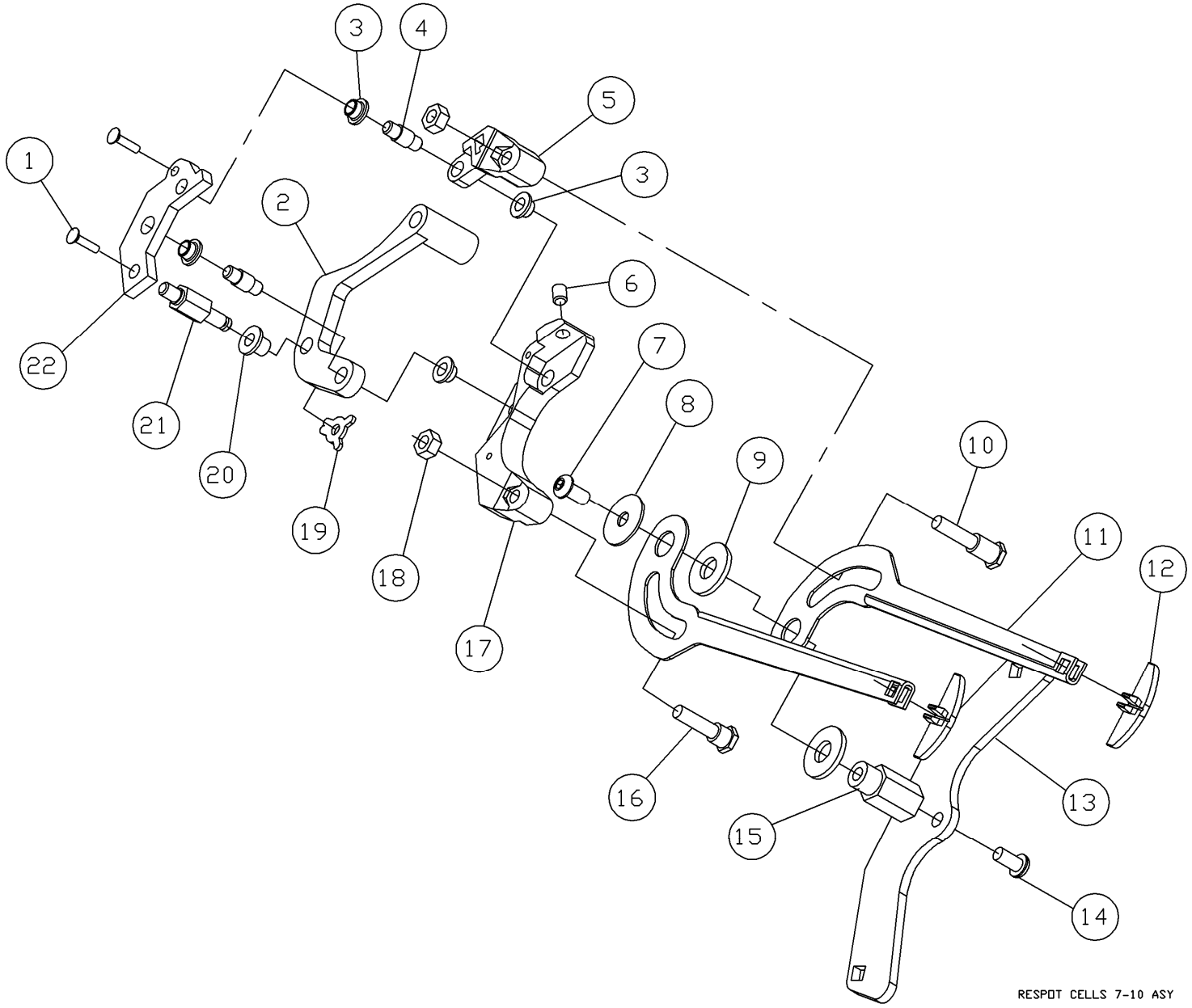
RESPOT CELL ASSEMBLY, CELLS 7 THROUGH 10



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ITEM	QTY	PART #	DESCRIPTION
1	2	070-002-750	SCREW, FLAT HEAD
2	1	070-002-651	RESPOT LEVER
3	4	070-002-630	FLANGED BEARING, .252 X .315 X .218
4	2	070-002-645	LEVER ASSEMBLY SHAFT
5	1	090-004-113	RESPOT YOKE ARM
6	1	807-650-050	SETSCREW, 1/4 - 28 X 5/16
7	1	808-549-080	SCREW, BUTTON HEAD CAP, 1/4 - 20 X ½
8	1	070-007-192	WASHER
9	2	070-007-193	RESPOT CELL SPACER
10	1	090-005-640	STUD, LONG
11	2	090-004-119	RESPOT FINGER
12	2	090-005-617	FINGER INSERT
13	1	090-005-632	FINGER PIVOT WING
14	1	809-149-100	SCREW, BUTTON HD w/PATCH, 1/ 4 - 20 X 5/8
15	1	090-005-522	RESPOT FINGER BUSHING
16	1	070-007-195	STUD, SHORT
17	1	090-004-118	RESPOT YOKE
18	2	844-049-002	NUT, STOVER LOCK, 1/4 - 20
19	1	963-200-002	X-WASHER
20	1	070-002-653	FLANGED BEARING, .252 X .315 X .38
21	1	090-005-571	PIN, 8-9-10 LINKS
22	1	070-002-695	YOKE PLATE

ITEM	QTY	PART #	DESCRIPTION

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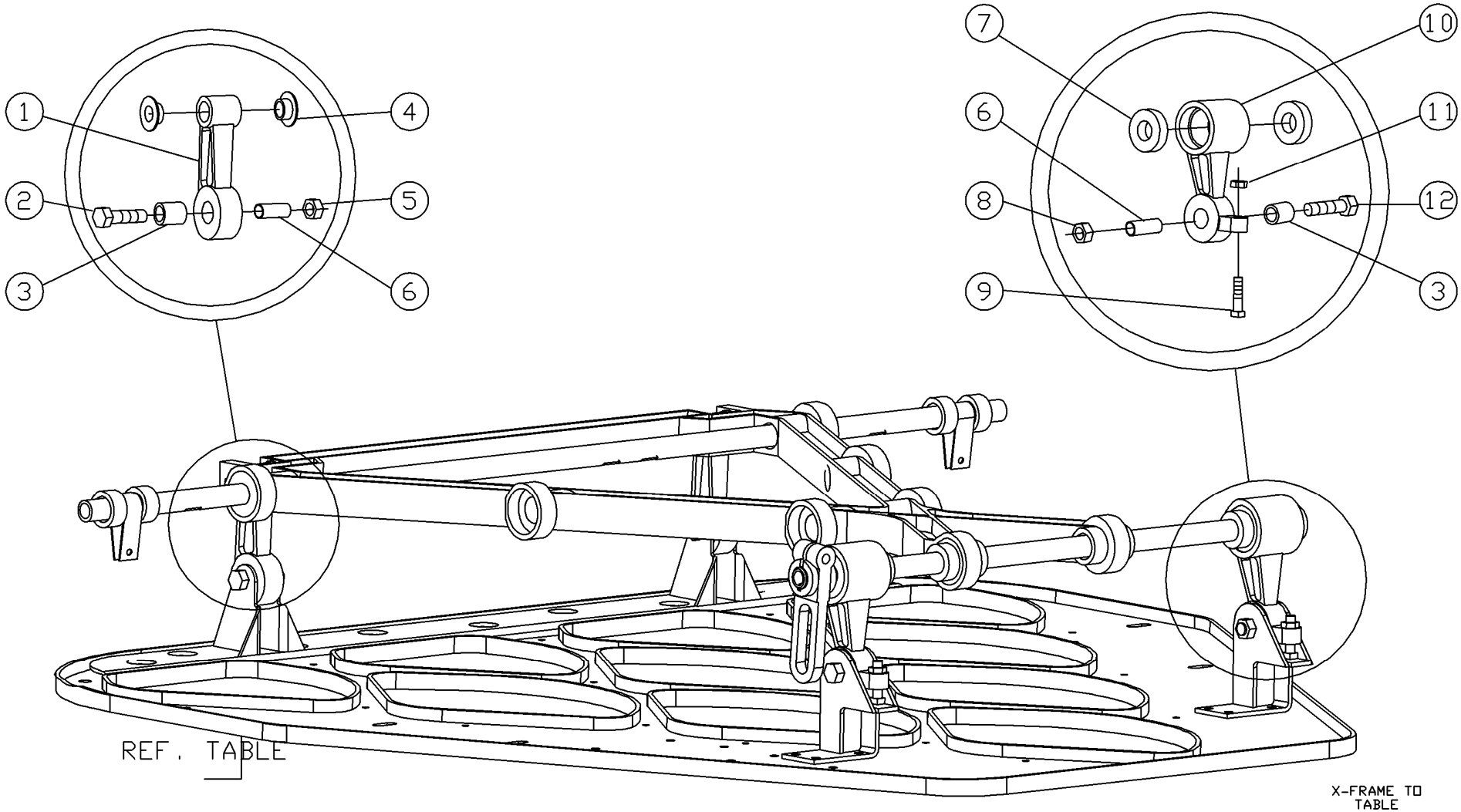
X-FRAME TO TABLE CONNECTIONS



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X-FRAME TO TABLE CONNECTIONS

ITEM	QTY	PART #	DESCRIPTION
1	2	090-005-547	REAR LEG
2	2	809-865-325	SCREW, HEX, 3/8 - 16 X 2
3	4	090-005-593	AXLE TUBE (SLEEVE)
4	4	000-023-114	FLANGED BEARING, .628 X .815 X .06
5	2	844-065-002	NUT, STOVER LOCK, 3/8 - 16
6	4	900-110-161	BUSHING
7	4	190-001-490	BALL BEARING, .875 X 1.875 X .5
8	2	844-069-002	NUT, STOVER LOCK, 7/16 - 14
9	1	806-265-240	SETSCREW, 3/8 - 16 X 1.5
10	2	090-005-564	FRONT LEG
11	2	835-565-002	NUT, HEX JAM, 3/8 - 16
12	2	809-869-365	SCREW, HEX, 3/8 - 16 X 2¼

ITEM	QTY	PART #	DESCRIPTION

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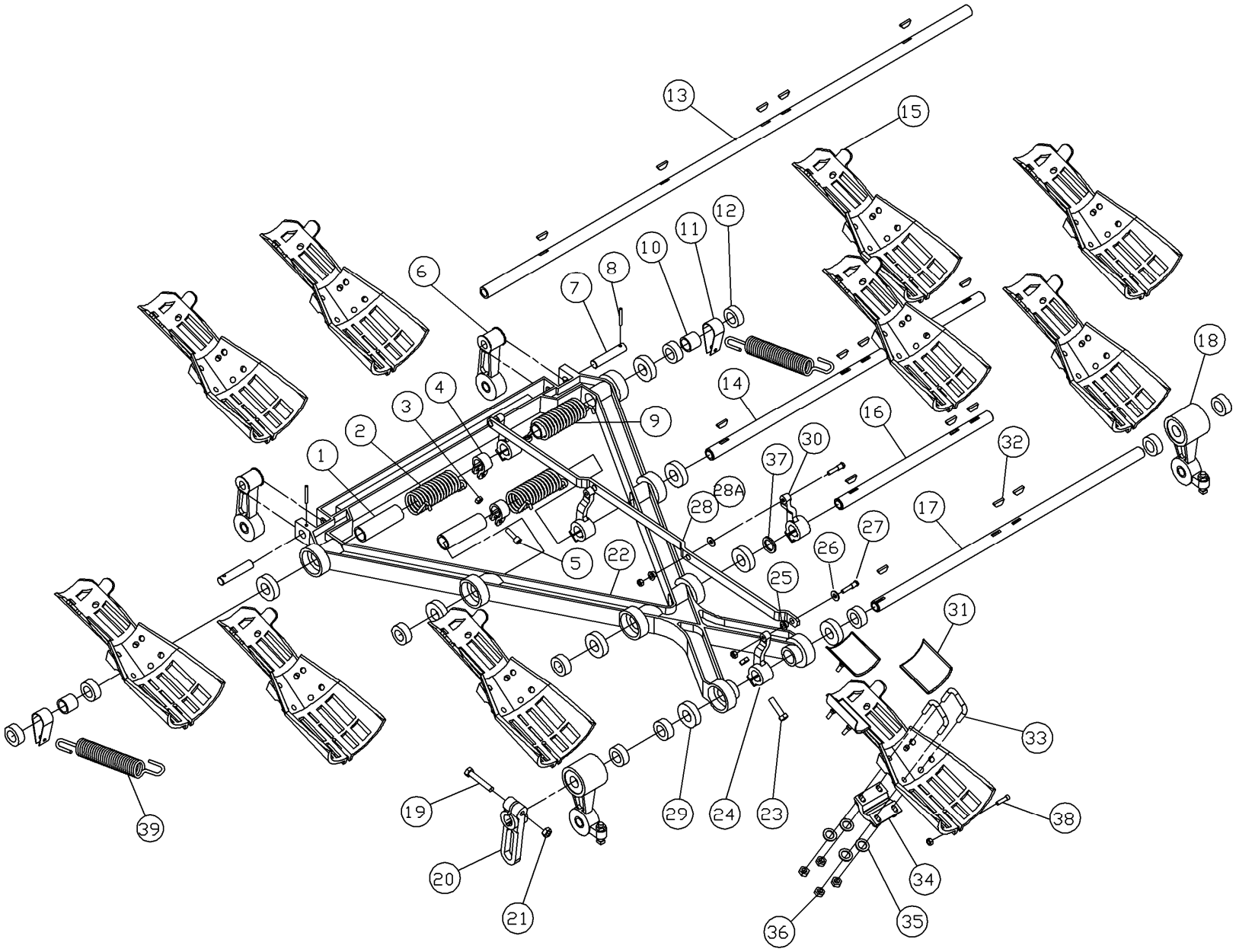
YOKE & SPOTTING CUP ASSEMBLY



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YOKE & SPOTTING CUP ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	3	070-002-719	SPRING SLEEVE
2	2	070-002-688	SPRING, R.H. WOUND, L.H. SIDE
3	17	844-049-002	NUT, STOVER LOCK, 1/4 - 20
4	3	090-004-033	CLAMP
5	3	809-849-165	SCREW, HEX, 1/4 - 20 X 1
6	2	090-005-548	REAR LEG ASSEMBLY
7	2	070-002-609	PIN
8	2	913-437-240	SPRING PIN, 3/16 X 1-1/2
9	1	070-002-689	SPRING, L.H. WOUND, R.H. SIDE
10	2	900-114-161	BEARING, 7/8 X 1-1/8 X 1
11	2	090-005-577	SPRING HOOK
12	12	000-025-549	LOCK COLLAR WITH SETSCREW
13	1	090-005-578	SHAFT #4
14	1	070-002-617	SHAFT #3
15	10	070-002-809	SPOTTING CUP
16	1	070-002-616	SHAFT #2
17	1	090-005-553	SHAFT #1
18	2	090-005-545	FRONT LEG ASSEMBLY
19	1	809-865-365	SCREW, HEX, 3/8 - 16 X 1-1/2
20	1	090-005-554	ARM ACTUATOR
21	5	839-665-002	NUT, FLEX LOCK, 3/8 - 16
22	1	070-002-683	YOKE
23	4	809-865-245	SCREW, HEX, 3/8 - 16 X 1-1/2
24	2	070-002-602	INNER LEVER
25	4	900-205-053	FLANGED BEARING, .315 x .44 x 5/16
26	4	701-310-036	THRUST BEARING

ITEM	QTY	PART #	DESCRIPTION
27	4	070-002-723	PIN
28	1	070-002-611	LINK
28A	1	070-002-612	LINK ASSEMBLY (includes: 25 & 28)
29	8	190-001-490	BALL BEARING, .875 X 1.875 X .5
30	2	070-002-603	OUTER LEVER
31	30	070-002-784	SPOTTING CUP LINER
32	15	907-000-600	KEY
33	20	070-002-787	U-BOLT
34	10	070-002-788	CAP
35	40	948-761-112	WASHER, FLAT, 11/32 X 1-1/16 X 1/16
36	40	844-057-002	NUT, STOVER LOCK, 5/16 - 18
37	1	070-002-620	SPACER
38	10	810-249-200	SCREW, SOCKET HEAD CAP, 1/4 - 20
39	2	000-026-032	SPRING

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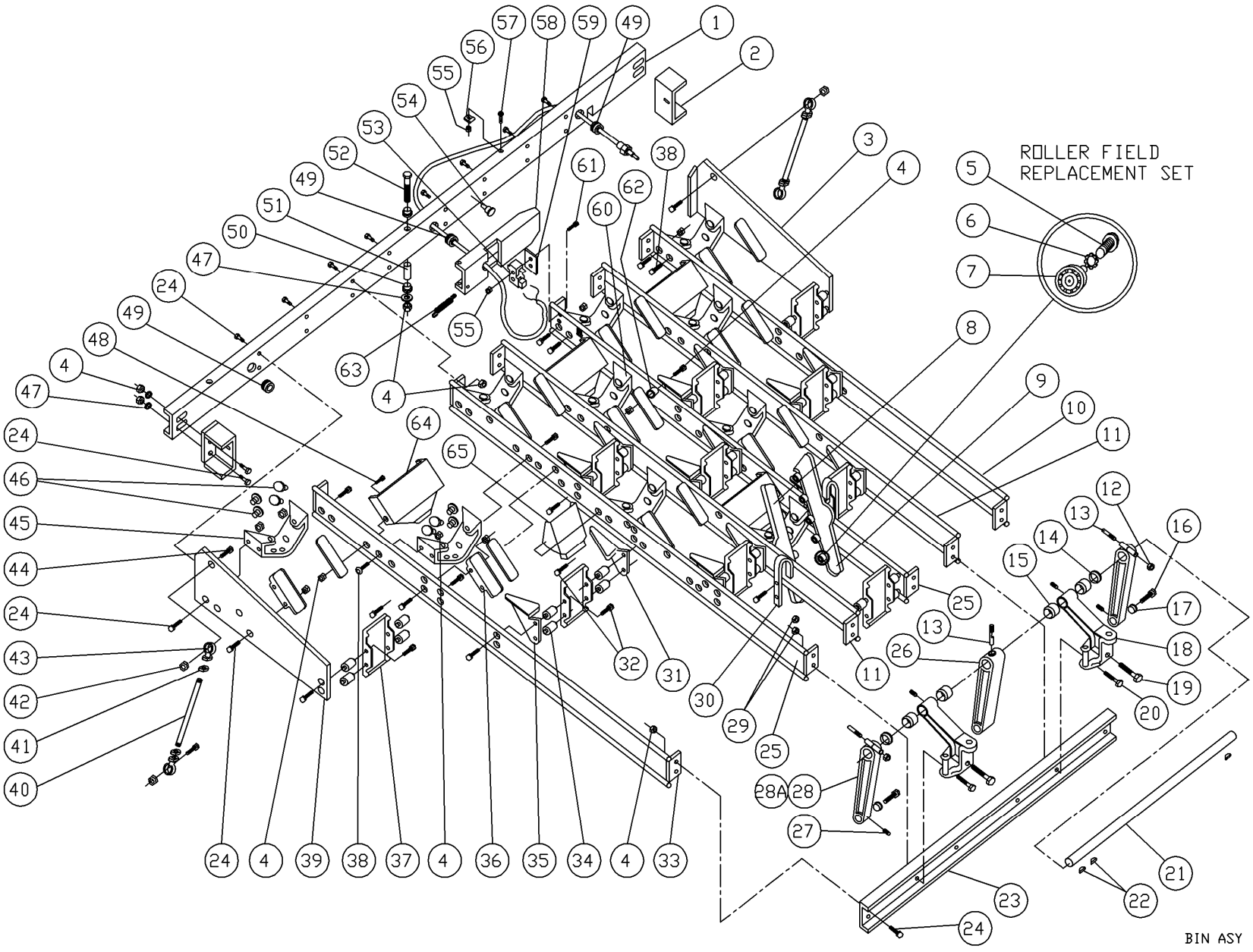
BIN ASSEMBLY



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BIN ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	070-006-360	CHANNEL WELDMENT, LONG
2	2	070-006-371	BIN ASSEMBLY SUPPORT BRACKET
3	1	070-006-369	PIN GUIDE, R.H.,
4	101	838-670-006	NUT, HEX, M6
5	10	813-540-082	SCREW, TRUSS HEAD, 10 - 32 X ½
6	10	957-100-002	WASHER, EXTERNAL TOOTH, #10
7	10	000-026-251	BEARING ROLLER, THREADED (field use only)
8	1	070-006-386	TRACK ASSEMBLY, L.H.
9	1	070-006-388	TRACK ASSEMBLY, R.H.
10	1	070-006-376	STRINGER, OUTSIDE, R.H.
11	2	070-006-373	STRINGER, CENTER, L.H.
12	3	831-565-002	NUT, HEX, 3/8 - 16
13	3	070-006-403	CLAMP STUD
14	2	701-329-050	THRUST BEARING, .8905 X 1.5 X 1/8
15	4	900-114-101	SLEEVE BEARING, .877 X 5/8
16	2	809-865-205	SCREW, HEX, 3/8 - 16 X 1¼
17	2	000-029-614	UNIBALL BEARING
18	2	070-006-358	BRACKET ASSEMBLY
19	2	809-849-485	SCREW, HEX, ¼ - 20 X 3
20	2	809-849-285	SCREW, HEX, ¼ - 20 X 1-3/4
21	1	070-006-402	SHAFT, BIN ASSEMBLY
22	3	907-000-600	KEY
23	1	070-006-363	CHANNEL, SHORT
24	64	709-013-063	SCREW, HEX, M6 X 12 mm
25	2	070-006-372	STRINGER, CENTER, R.H.
26	1	070-006-408	LEVER
27	4	710-501-007	GREASE FITTING
28	2	070-006-445	ARM CASTING
28A	2	070-006-429	ARM ASSEMBLY (includes 17, 27 & 28)
29	4	844-049-002	NUT, STOVER LOCK, ¼ - 20
30	2	070-006-389	PIN GUIDE, #1 PIN
31	7	070-006-380	PIN GUIDE EAR, R.H.
32	80	809-849-085	SCREW, HEX, ¼ -20 X ½

ITEM	QTY	PART #	DESCRIPTION
33	1	070-006-377	STRINGER, OUTSIDE, L.H.
34	40	070-006-354	SHOCK MOUNT, BIN ASSEMBLY
35	7	070-006-381	PIN GUIDE EAR, L.H.
36	18	070-006-353	PIN GUIDE
37	10	070-006-364	SPACER, PIN BUTT GUIDE
38	24	709-013-066	SCREW, BUTTON HEAD, M6 X 12 mm
39	1	070-006-370	PIN GUIDE, L.H.
40	2	070-006-351	ROD, BIN ASSEMBLY
41	4	835-566-002	NUT, HEX JAM, 3/8 - 24
42	7	844-065-002	NUT, HEX LOCK, 3/8 - 16
43	2	090-005-250	ROD END
44	4	809-865-165	SCREW, HEX, 3/8 - 16 X 1
45	9	070-006-359	BRACKET, BIN ASSEMBLY
46	41	070-006-142	BUMPER
47	5	785-502-207	FLAT WASHER, M6
48	12	709-013-064	SCREW, HEX, M6 X 16 mm
49	3	711-516-020	GROMMET
50	2	900-206-091	FLANGED BEARING, .378 X .503 X 9/16
51	1	070-006-108	SPACER
52	1	709-013-067	SCREW, HEX, M6 X 100 mm
53	1	000-026-043	MICROSWITCH
54	1	070-006-142	BUMPER
55	4	843-127-002	NUT, HEX LOCK, 6 -32
56	2	744-107-013	CLAMP, NYLON, 1/8”
57	2	818-227-082	SCREW, ROUND HEAD, 8 - 32 X ½, SEMS
58	1	070-006-356	SWITCH ACTUATOR
59	1	000-021-575	INSULATOR
60	1	070-006-384	BRACKET, #5 PIN ONLY
61	2	818-227-162	SCREW, ROUND HEAD, 6 - 32 X 1, SEMS
62	2	070-006-390	SPACER
63	1	090-002-029	SPRING
64	4	070-006-366	SPACER/HEAD GUIDE
65	3	070-006-365	SPACER/HEAD GUIDE, PINS 4 & 6

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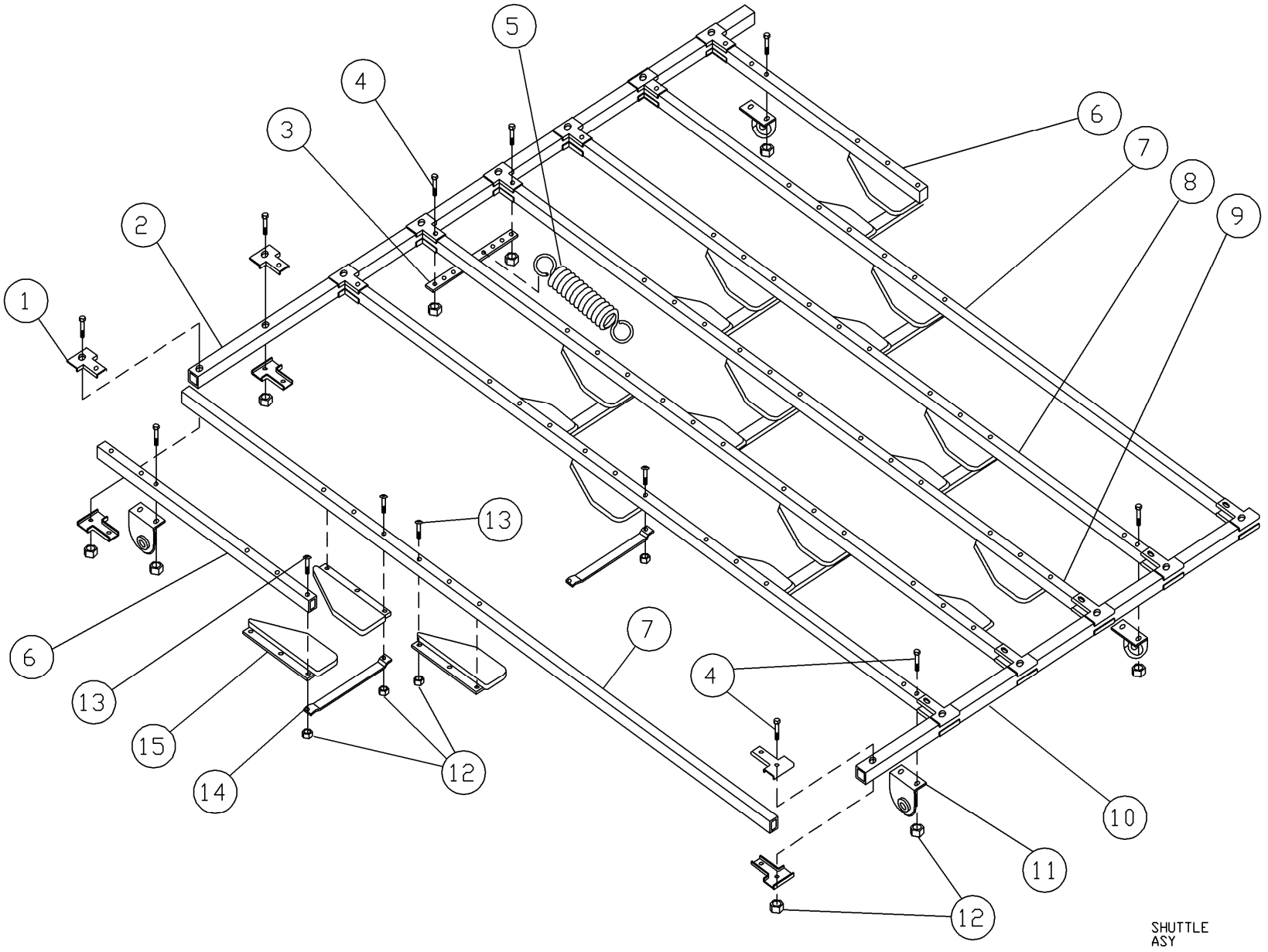
SHUTTLE ASSEMBLY



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SHUTTLE ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	28	070-006-261	END CLAMP
2	1	070-006-253	CROSS TUBE, LONG
3	1	070-006-266	BIN SPRING STRAP
4	36	709-013-069	SCREW, HEX, M6 X 40 mm
5	1	070-006-447	SPRING, SHUTTLE ASSEMBLY
6	2	070-006-254	SIDE TUBE, SHORT
7	2	070-006-256	OUTSIDE TUBE
8	2	070-006-255	SIDE TUBE, LONG
9	2	070-006-257	CENTER TUBE
10	1	070-006-258	CROSS TUBE, SHORT
11	4	070-006-259	SHUTTLE ARM BRACKET
12	96	838-670-006	NUT, HEX, M6
13	60	709-013-068	SCREW, BUTTON HEAD M6 X 20 mm
14	9	070-006-268	STRAP
15	20	070-006-265	PIN HOLDER

ITEM	QTY	PART #	DESCRIPTION

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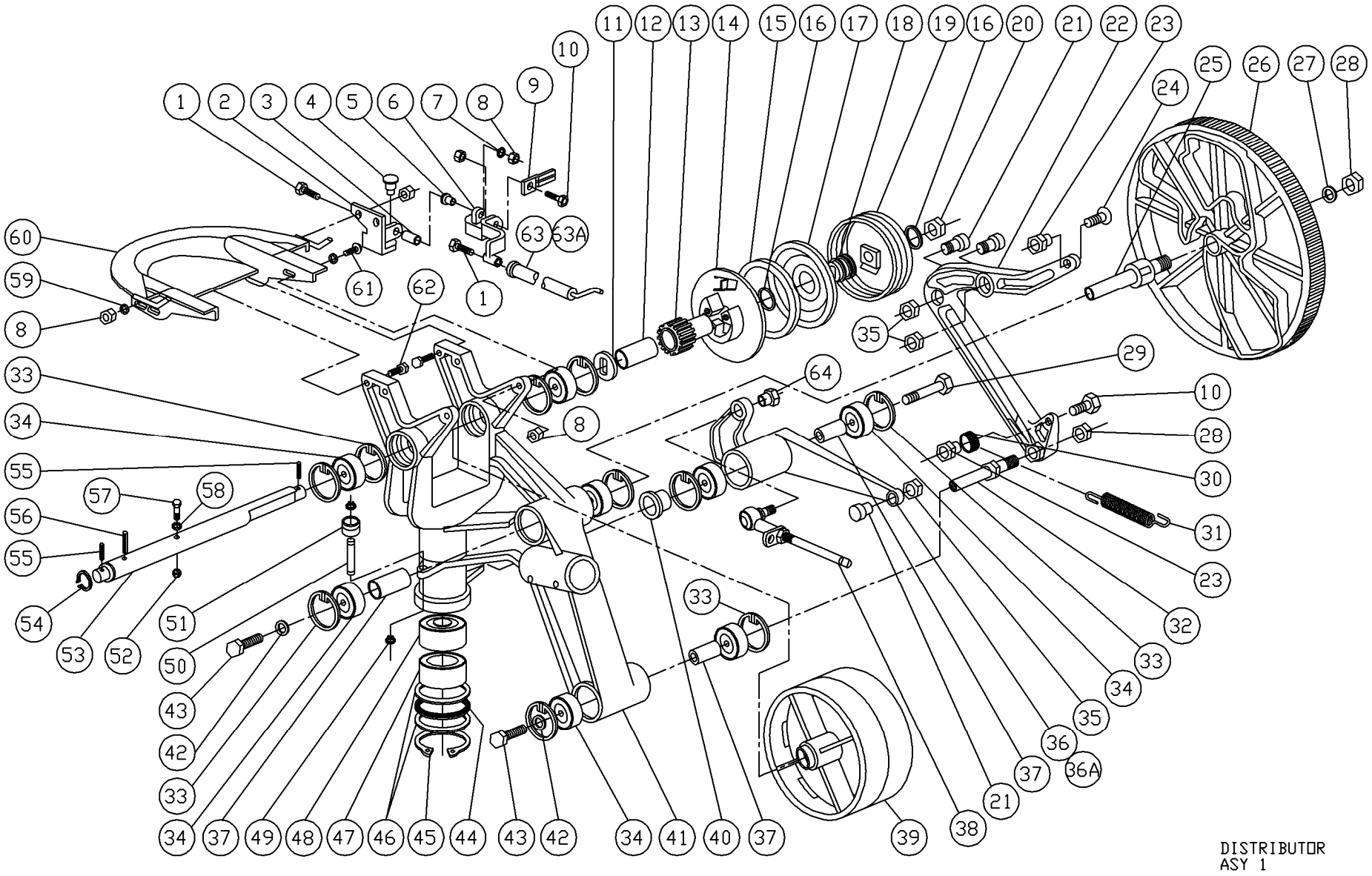
DISTRIBUTOR ASSEMBLY 1



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DISTRIBUTOR ASSEMBLY 1

ITEM	QTY	PART #	DESCRIPTION
1	2	809-849-165	SCREW, HEX, ¼ - 20 X 1
2	1	070-006-084	TRIP STOP SUPPORT BRACKET
3	1	070-006-685	PIVOT
4	1	070-006-142	BUMPER
5	1	701-712-097	BEARING, .375 BORE
6	1	090-006-665	TRIP SUPPORT CASTING ASSEMBLY
7	1	000-026-865	WASHER
8	7	844-049-002	NUT, STOVER LOCK, ¼ - 20
9	1	070-006-691	STOP BLADE
10	2	809-849-125	SCREW, HEX, ¼ - 20 X ¾
11	1	070-007-376	THRUST WASHER
12	1	070-006-676	SLEEVE
13	1	070-006-686	PINION GEAR ASSEMBLY
14	1	070-006-692	CLUTCH PLATE ASSEMBLY
15	1	070-006-126	FRICTION DISC
16	2	070-006-121	WASHER, DISTRIBUTOR CLUTCH
17	1	070-006-130	CLUTCH PLATE
18	1	070-006-125	WORM
19	1	070-006-128	SPRING ASSEMBLY
20	1	835-582-002	NUT, HEX JAM, 5/8 - 18
21	3	070-006-071	CAM FOLLOWER
22	1	070-006-051	ARM
23	3	000-022-173	NUT, SPECIAL
24	1	808-849-100	SCREW, FLAT HD HEX SOCKET ¼ - 20 X 5/8
25	1	070-006-061	CAM SUPPORT SHAFT
26	1	070-006-149	INDEXING CAM
27	1	070-006-121	WASHER
28	2	844-073-002	NUT, STOVER LOCK, 1/2 - 13
29	1	070-006-048	BOLT, SPECIAL
30	2	070-006-111	SLEEVE
31	1	070-006-034	SPRING, LINEAR
32	1	070-006-049	SHAFT ARM
33	10	919-000-600	RETAINING RING
34	8	000-024-679	BEARING

ITEM	QTY	PART #	DESCRIPTION
35	3	844-049-002	NUT, STOVER LOCK, ¼ - 20
36	1	070-006-052	DRIVE ARM
36A	1	070-007-119	DRIVE ARM ASSY (includes: 33, 34, 36 & 37)
37	3	070-006-064	BEARING SPACER
38	1	090-005-262	ROD LINK ASSEMBLY
39	1	070-006-666	PULLEY, DISTRIBUTOR DRIVE BELT
40	1	070-006-065	RACE CLAMP
41	1	070-006-053	CASTING
42	2	948-761-112	WASHER, 11/16 X 11/32 X 1/16
43	2	809-857-080	SCREW, HEX, 5/16 – 18 X ½
44	1	070-006-074	BEARING, NEEDLE THRUST, 1.252 X 1.917
45	1	919-004-200	RETAINING RING
46	2	070-006-073	THRUST WASHER
47	1	070-006-076	NEEDLE BEARING, OPEN END
48	1	070-006-075	NEEDLE BEARING, CLOSED END
49	2	919-005-300	RETAINING RING
50	1	070-006-082	SPRING POST PIN
51	1	000-026-081	SPRING POST SLEEVE
52	1	840-039-002	NUT, FLEX LOCK, 10 – 24
53	1	070-006-077	SHAFT
54	2	919-005-600	RETAINING RING
55	2	913-437-140	SPRING PIN, 3/16 X 7/8
56	1	914-037-206	SPRING PIN, 3/16 X 1-1/4
57	1	810-239-240	SCREW, SOCKET HEAD CAP, 10-24 X 1½
58	1	948-745-082	WASHER, 7/32 X ½ X 1/16
59	6	948-753-102	WASHER, 5/8 X 9/32 X 1/16
60	1	090-003-077	ORIENTOR PAN
61	2	808-549-200	SCREW, BUTTON HEAD, 1/4 - 20 X 1-1/2
62	4	809-849-205	SCREW, HEX, ¼ - 20 X 1¼
63	1	090-006-663	TRIP STOP ROD ASSEMBLY
63A	1	090-006-668	TRIP STOP ROD & SUPPORT CASTING ASSEMBLY (includes 5, 6, 62, & 63)
64	1	070-006-069	NUT, SPECIAL

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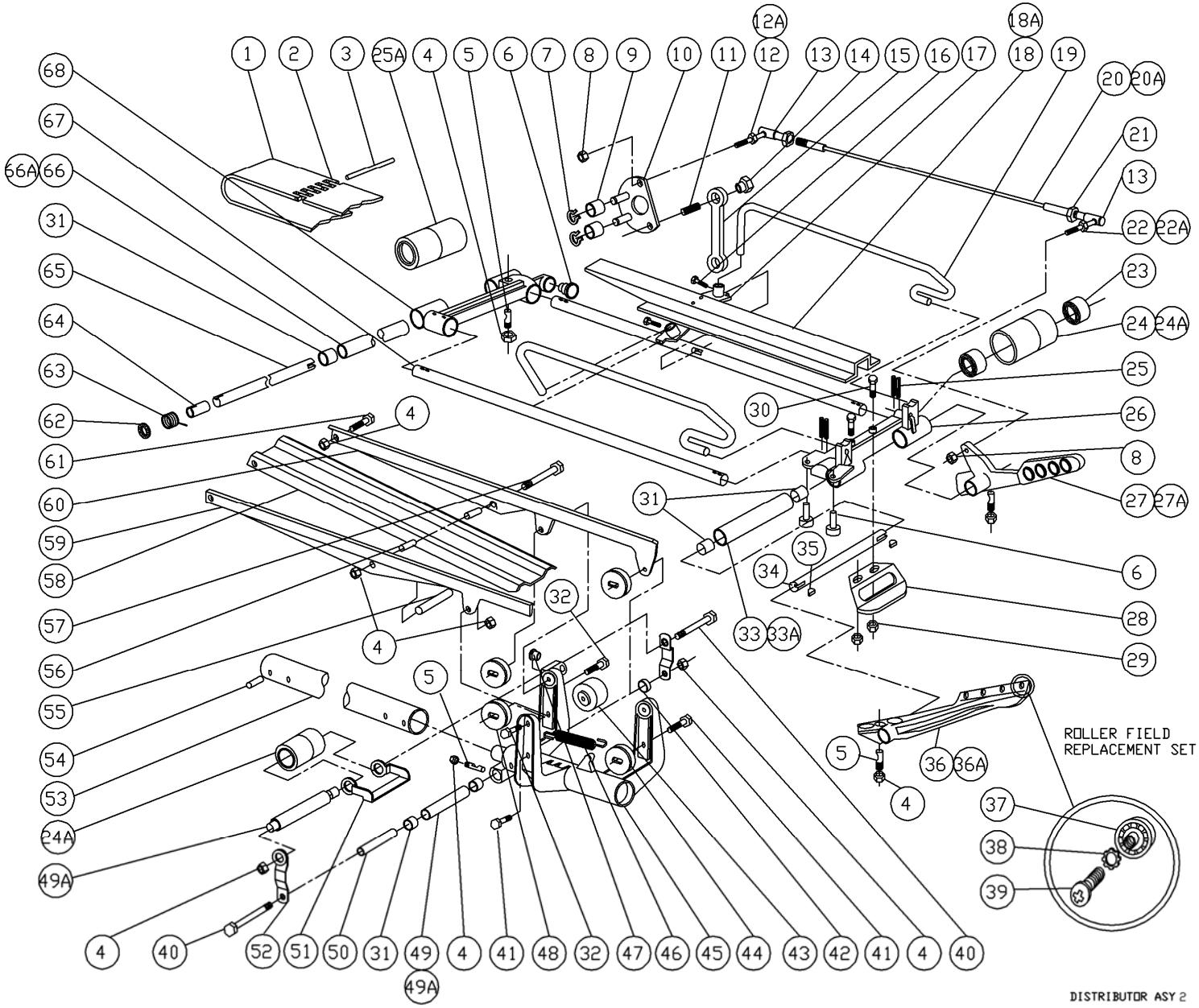
DISTRIBUTOR ASSEMBLY 2



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DISTRIBUTOR ASSEMBLY 2

ITEM	QTY	PART #	DESCRIPTION
1	1	702-508-025	BELT
2	2	070-006-036	BELT LACING
3	1	070-006-037	BELT PIN
4	17	844-049-002	NUT, STOVER LOCK, ¼ - 20
5	5	070-006-116	CLAMP STUD
6	3	070-006-142	BUMPER
7	2	919-005-600	RETAINING RING
8	1	840-040-002	NUT, FLEX LOCK, THIN, 10 - 32
9	2	070-001-857	NYLON ROLLER
10	1	070-006-661	TRIP ROCKER ARM WELDMENT
11	1	807-249-160	SETSCREW, SOCKET HEAD, ¼ - 20 X 1
12	1	090-004-110	BALL HEAD STUD
12A	1	070-011-172	BALL JOINT ASSEMBLY (includes 12 & 13)
13	2	090-004-112	SHELL & CLIP ASSEMBLY
14	1	000-022-173	NUT, SPECIAL
15	1	070-006-029	CONNECTING LINK
16	2	806-249-060	SETSCREW, SQUARE HEAD, ¼-20 X 3/8
17	1	070-006-007	SUPPORT WELDMENT
18	1	070-006-008	BELT RUNNER, FRONT
18A	1	070-006-009	BELT RUNNER SUPPORT ASSY (incl. 17 & 18)
19	2	070-006-013	PIN GUIDE
20	1	070-011-171	CABLE
20A	1	070-011-170	DISTRIBUTOR CABLE ASSEMBLY, (incl. 12, 13, 19, 21, & 22)
21	2	835-550-002	NUT, HEX JAM, ¼ - 28
22	1	090-004-111	BALL HEAD STUD
22A	1	070-011-173	BALL JOINT ASSEMBLY (includes 13 & 22)

ITEM	QTY	PART #	DESCRIPTION
23	6	000-024-679	BEARING
24	3	070-006-010	IDLER CARRIAGE PULLEY
24A	3	070-006-011	PULLEY ASSEMBLY (includes 23 & 24)
25	8	913-437-140	SPRING PIN, .187 X 7/8
26	1	070-006-055	CARRIAGE, FRONT
27	1	070-006-057	TRIP ARM, R.H.
27A	1	070-006-015	TRIP ARM ASSY (R.H.) (#27 & factory rollers)
28	1	070-006-137	BELT GUARD
29	2	840-039-002	NUT, FLEX LOCK, 10 - 24
30	2	810-239-160	SCREW, SOCKET HEAD CAP, 10-24 X 1
31	8	900-106-081	SLEEVE BEARING, .378 X 1/2
32	5	809-849-125	SCREW, HEX, ¼ - 20 X ¾
33	1	070-006-023	TUBE
33A	1	070-006-021	TUBE ASSEMBLY, FRONT (includes 31 & 33)
34	1	070-006-014	SHAFT
35	2	907-000-100	KEY
36	1	070-006-056	TRIP ARM, L.H.
36A	1	070-006-016	TRIP ARM ASSY (L.H.) (#36 & factory rollers)
37	10	000-026-251	ROLLER BEARING, THREADED (field replacement)
38	10	957-100-002	WASHER, EXTERNAL LOCK, # 10
39	10	813-540-082	SCREW, TRUSS HEAD, 10 - 32 X ½
40	2	809-849-605	SCREW, HEX, ¼ - 20 X 3¾
41	6	809-849-165	SCREW, HEX, ¼ - 20 X 1
42	1	070-006-111	SPRING POST SLEEVE
43	1	701-849-124	BALL BEARING, ¼ - 20 THREADED BORE
44	3	070-006-118	BEARING, GROOVED, ECCENTRIC

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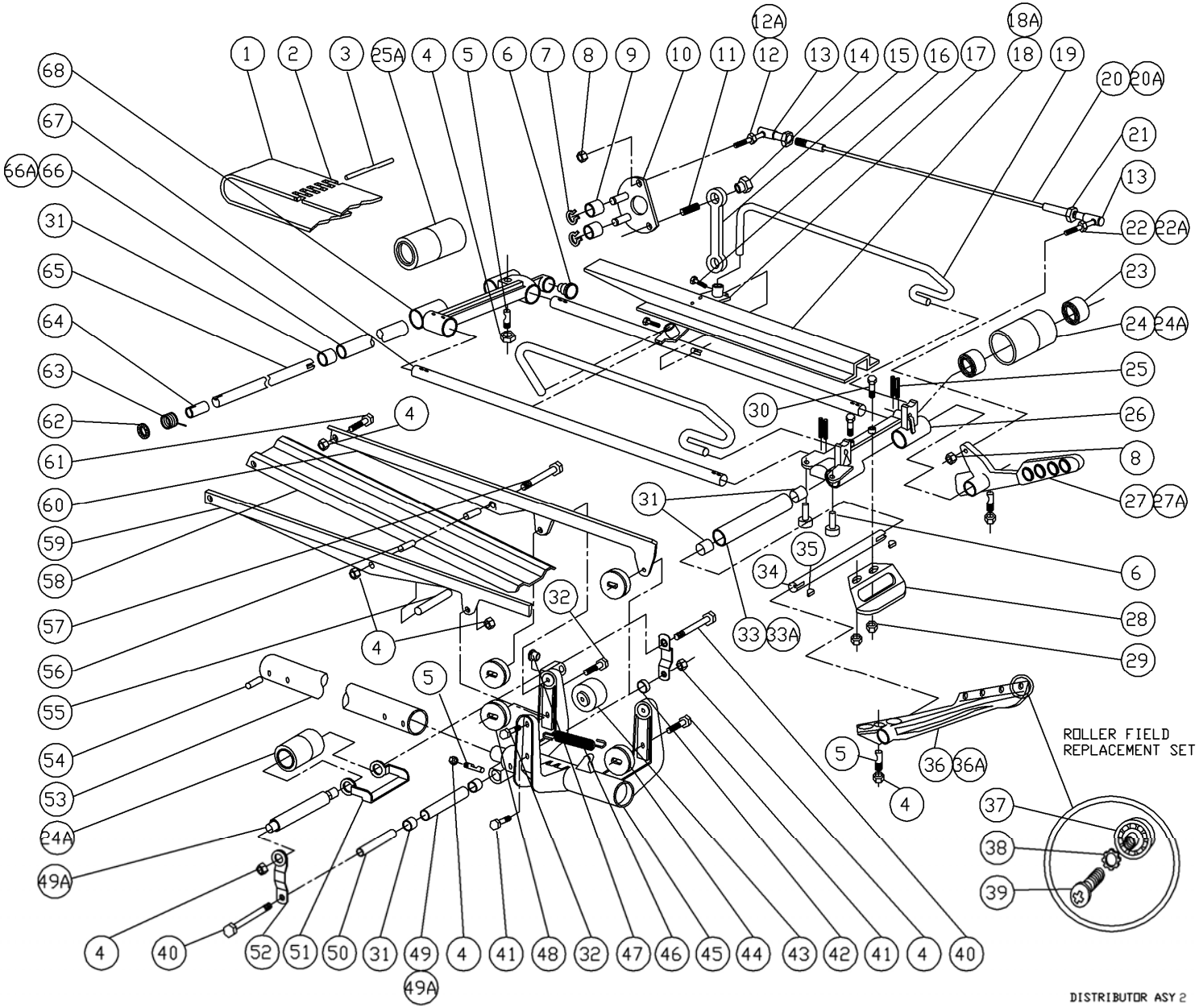
DISTRIBUTOR ASSEMBLY 2 - continued



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ITEM	QTY	PART #	DESCRIPTION
45	1	070-006-687	CARRIAGE SUPPORT CASTING
46	1	000-026-031	BELT TIGHTENER SPRING
47	1	701-710-098	BEARING, UNIBALL
48	1	070-006-117	BEARING, GROOVED, CONCENTRIC
49	2	070-006-107	BELT TIGHTENER TUBE
49A	2	070-006-105	TUBE ASSEMBLY (includes 31, 49 & 50)
50	2	070-006-108	SPACER
51	1	070-006-106	TRACKING BRACKET
52	2	070-006-109	ROLLER ASSEMBLY LINK
53	1	070-006-120	CARRIAGE SUPPORT TUBE
54	4	913-464-280	SPRING PIN, 3/8 X 1¾
55	1	070-006-139	INNER SPACER
56	2	070-006-140	OUTER SPACER
57	1	809-849-885	SCREW, HEX, ¼ - 20 X 5½
58	1	070-006-042	BELT RUNNER, REAR
59	1	070-006-103	SUPPORT GUIDE, L.H.
60	1	070-006-104	SUPPORT GUIDE R.H.
61	2	808-549-200	SCREW, BUTTON HEAD, ¼ - 20 X 1-1/4
62	1	919-006-800	RETAINING RING
63	1	070-006-035	SPRING
64	1	070-006-019	SPRING COLLAR
65	1	070-006-659	SHAFT
66	1	070-006-671	TUBE, MIDDLE
66A	1	070-006-683	TUBE ASSEMBLY, MIDDLE (items 31 & 66)
67	2	070-006-004	TUBE
68	1	070-006-672	CARRIAGE CASTING, REAR

ITEM	QTY	PART #	DESCRIPTION

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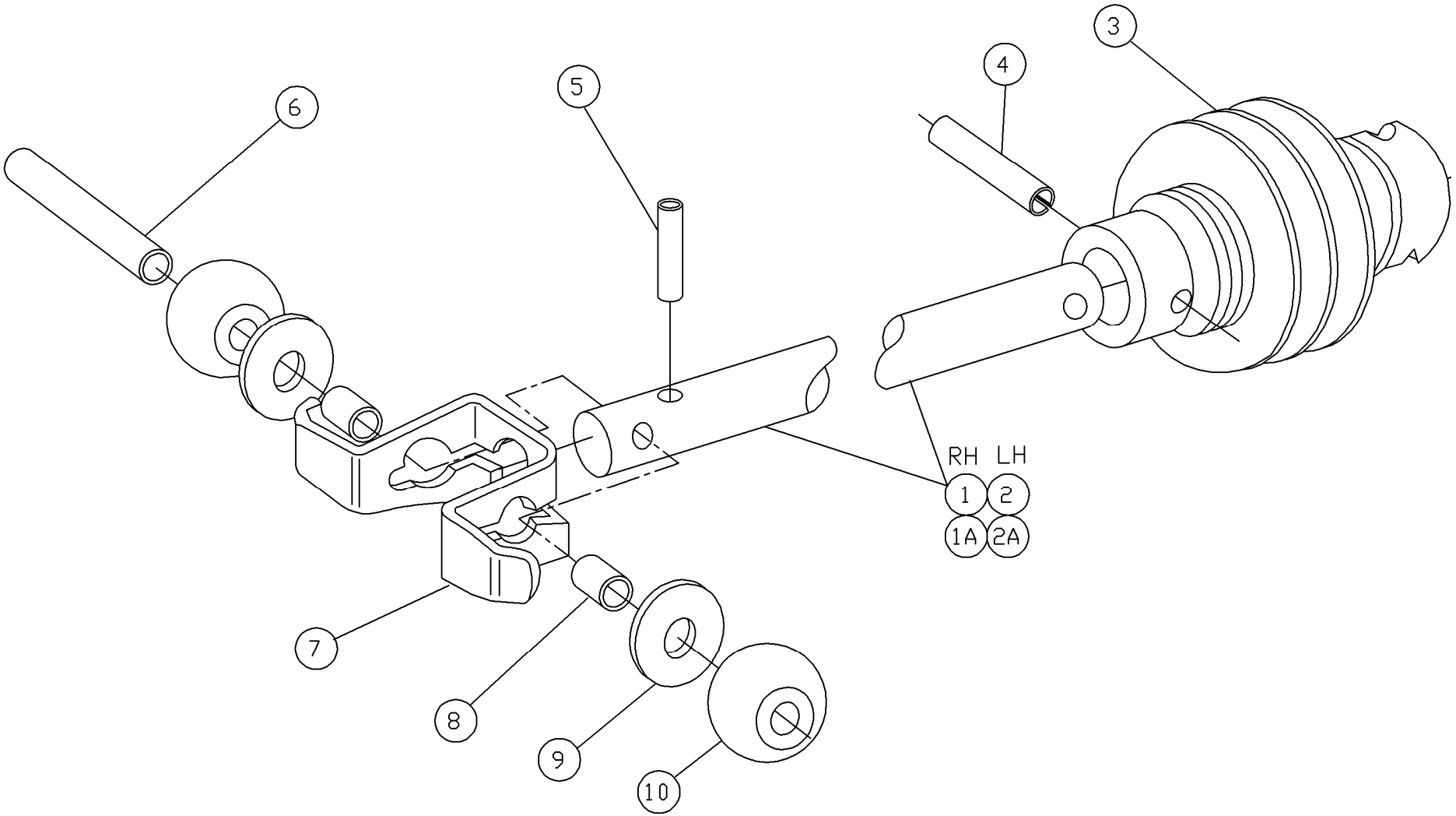
DISTRIBUTOR DRIVE SHAFT ASSEMBLY



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DISTRIBUTOR DRIVE SHAFT ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	090-002-018	SHAFT, R.H. MACHINE
1A	1	090-006-102	DISTRIBUTOR DRIVE SHAFT ASSY – R.H. (Includes items 1 & 3 through 10)
2	1	090-002-017	SHAFT L.H. MACHINE
2A	1	090-006-103	DISTRIBUTOR DRIVE SHAFT ASSY – L.H. (Includes items 2 through 10)
3	1	070-007-586	UNIVERSAL JOINT
4	1	913-437-160	SPRING PIN, .187 X 1
5	1	913-423-120	SPRING PIN, .125 X ¾
6	1	908-048-480	DOWEL PIN, 1/4 X 3
7	1	090-002-034	BALL BEARING RETAINER
8	2	722-501-070	SPACER
9	2	000-029-073	WASHER
10	2	090-002-019	BALL

ITEM	QTY	PART #	DESCRIPTION

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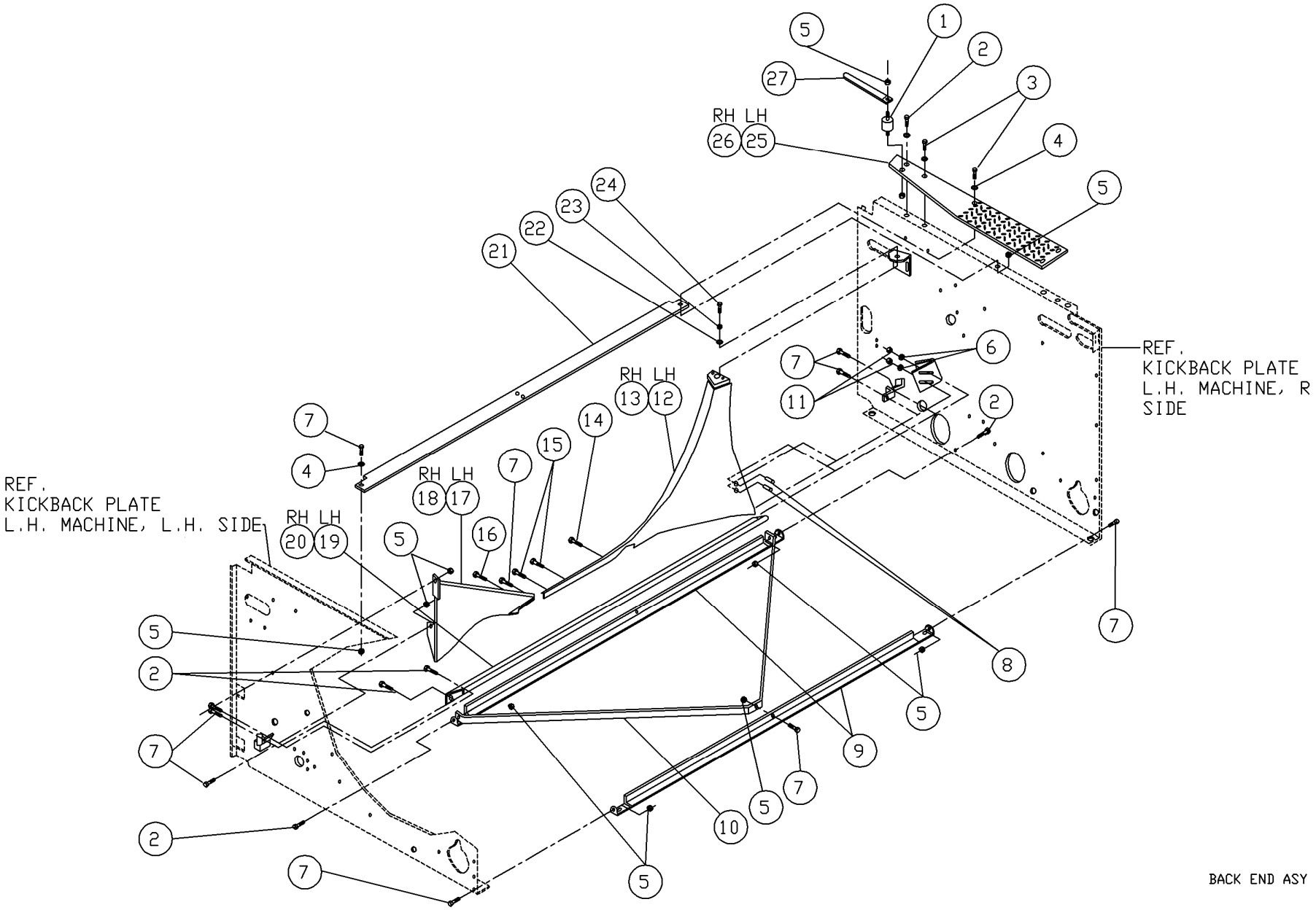
BACK END ASSEMBLY



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ITEM	QTY	PART #	DESCRIPTION
1	1	000-029-068	RUBBER MOUNTING
2	6	809-857-165	SCREW, HEX, 5/16 - 18 X 1
3	3	809-857-205	SCREW, HEX, 5/16 - 18 X 1-1/4
4	6	948-761-112	WASHER, FLAT, 11/16 X 11/32 X 1/16
5	12	844-057-002	NUT, STOVER LOCK, 5/16 - 18
6	2	948-753-102	WASHER, FLAT, 5/8 X 9/32 X 1/16
7	6	809-857-125	SCREW, HEX, 5/16 - 18 X 3/4
8	1	808-849-120	SCREW, FLAT HEAD, ¼ - 20 X ¾
9	2	070-001-184	STRAP WELDMENT
10	1	070-001-185	BRACE
11	2	844-049-002	NUT, STOVER LOCK, 1/4 - 20
12	1	000-027-380	PLOW ASSY, R.H. SIDE, L.H. MACHINE
13	1	000-027-381	PLOW ASSY, L.H. SIDE, R.H. MACHINE
14	1	808-858-240	SCREW, FLAT HEAD, 5/16 - 24 X 1½
15	2	808-858-120	SCREW, FLAT HEAD, 5/16 - 24 X ¾
16	1	809-858-125	SCREW, HEX, 5/16 - 24 X ¾
17	1	070-002-168	PLOW ASSY, L.H. SIDE, L.H. MACHINE
18	1	070-001-404	PLOW ASSY, R.H. SIDE. R.H. MACHINE
19	1	030-006-964	APRON ASSEMBLY, L.H. MACHINE
20	1	030-006-963	APRON ASSEMBLY, R.H. MACHINE
21	1	070-007-359	SUPPORT BRACKET
22	1	948-767-132	WASHER, FLAT, 13/32 X 13/16 X 1/16
23	1	951-164-002	WASHER, SPLIT LOCK, 3/8
24	1	808-566-160	SCREW, BUTTON HEAD, 3/8 - 24 X 1
25	1	090-004-210	TREAD WELDMENT, R.H. SIDE, L.H. MACHINE
26	1	090-004-211	TREAD WELDMENT, L.H. SIDE, R.H. MACHINE
27	1	070-001-195	PIN SEATING ROD

ITEM	QTY	PART #	DESCRIPTION

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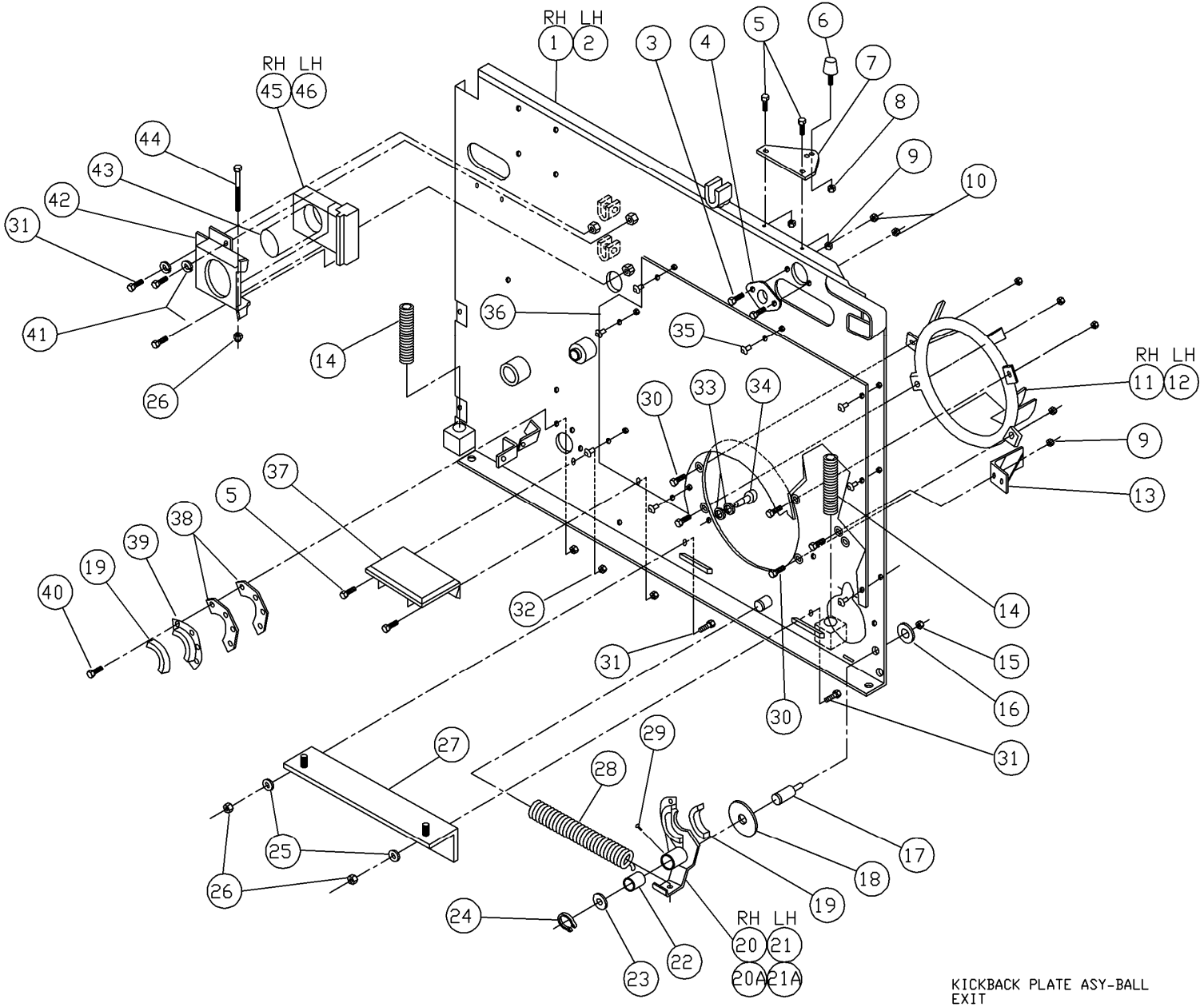
KICKBACK PLATE ASSEMBLY– BALL EXIT SIDE



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KICKBACK PLATE ASSEMBLY– BALL EXIT SIDE

ITEM	QTY	PART #	DESCRIPTION
1	1	090-004-126	KICKPLATE, R.H. SIDE, R.H. MACHINE
2	1	090-004-129	KICKPLATE, L.H. SIDE, L.H. MACHINE
3	2	808-549-160	SCREW, BUTTON HEAD, 1/4 - 20 X 1
4	1	070-011-286	CURTAIN ROD BUSHING
5	2	809-857-125	SCREW, HEX, 5/16 - 18 X 3/4
6	1	000-024-641	STOP BUMPER
7	1	070-004-642	BALL LIFT STOP BRACKET
8	1	835-558-002	NUT, HEX JAM, 5/16 - 24
9	8	844-057-002	NUT, STOVER LOCK, 5/16 - 18
10	2	844-049-002	NUT, STOVER LOCK, 1/4 - 20
11	1	070-011-006	DOOR WELDMENT, R.H. MACHINE
12	1	070-011-005	DOOR WELDMENT, L.H. MACHINE
13	1	000-024-668	TRACK SUPPORT BRACKET
14	2	000-024-890	SETSCREW
15	1	844-074-002	NUT, STOVER LOCK, 1/2 - 20
16	1	948-975-172	WASHER, FLAT, 1-1/4 X 1/2 X 1/16
17	1	000-029-015	PIVOT STUD
18	1	000-027-641	THRUST BEARING
19	2	000-022-924	SUPPORT BEARING
20	1	000-029-602	BRACKET WELDMENT, R.H. SIDE, R.H. MACHINE
20A	1	000-029-672	BEARING BRACKET ASSEMBLY, R.H. SIDE, R.H. MACHINE (Includes 19, 20, 22, & 29)
21	1	000-022-248	BRACKET WELDMENT L.H. SIDE, L.H. MACHINE
21A	1	000-022-249	BEARING BRACKET ASSEMBLY, L.H. SIDE, L.H. MACHINE (Includes 19, 21, 22, & 29)
22	1	900-112-203	SLEEVE BEARING, .753 X 1-1/4

ITEM	QTY	PART #	DESCRIPTION
23	1	000-027-642	FRONT ROLLER SUPPORT WASHER
24	1	919-005-800	RETAINING RING
25	2	948-767-132	WASHER, 13/32 X 13/16 X 1/16
26	3	839-665-002	NUT, FLEX LOCK, 3/8 - 16
27	1	090-004-131	PIT SUPPORT BRACKET
28	1	000-021-204	SPRING
29	1	710-501-009	GREASE FITTING
30	6	808-857-120	SCREW, FLAT HEAD, 5/16 - 18 X 3/4
31	5	809-865-165	SCREW, HEX, 3/8 - 16 X 1
32	8	844-057-002	NUT, FLEX LOCK, 5/16 - 24
33	1-2*	070-011-050	WASHER, SPECIAL
34	1	000-028-362	BUMPER, URETHANE
35	9	937-000-000	DRIVE RIVET (field replacement)
36	1	000-029-640	KICKBACK PANEL
37	1	000-022-878	ANGLE
38	2	090-004-136	SPACER
39	1	000-022-926	RETAINER SUPPORT
40	4	808-557-120	SCREW, BUTTON HEAD, 5/16 - 18 X 3/4
41	3	951-164-002	WASHER, SPLIT LOCK, 3/8
42	1	000-022-788	BOX SUPPORT
43	1	000-022-300	SHIELD
44	1	809-865-645	SCREW, HEX, 3/8 - 16 X 4
45	1	000-022-794	BLOCK SUPPORT, R.H. SIDE
46	1	000-022-795	BLOCK SUPPORT, L.H. SIDE
n/a	1	008-100-413	LOCTITE ADHESIVE #404 (apply between items 43 & 45 or 43 & 46, as applicable)

* Either 1 or two washers depending on the distance between the two machines' kickback plates.

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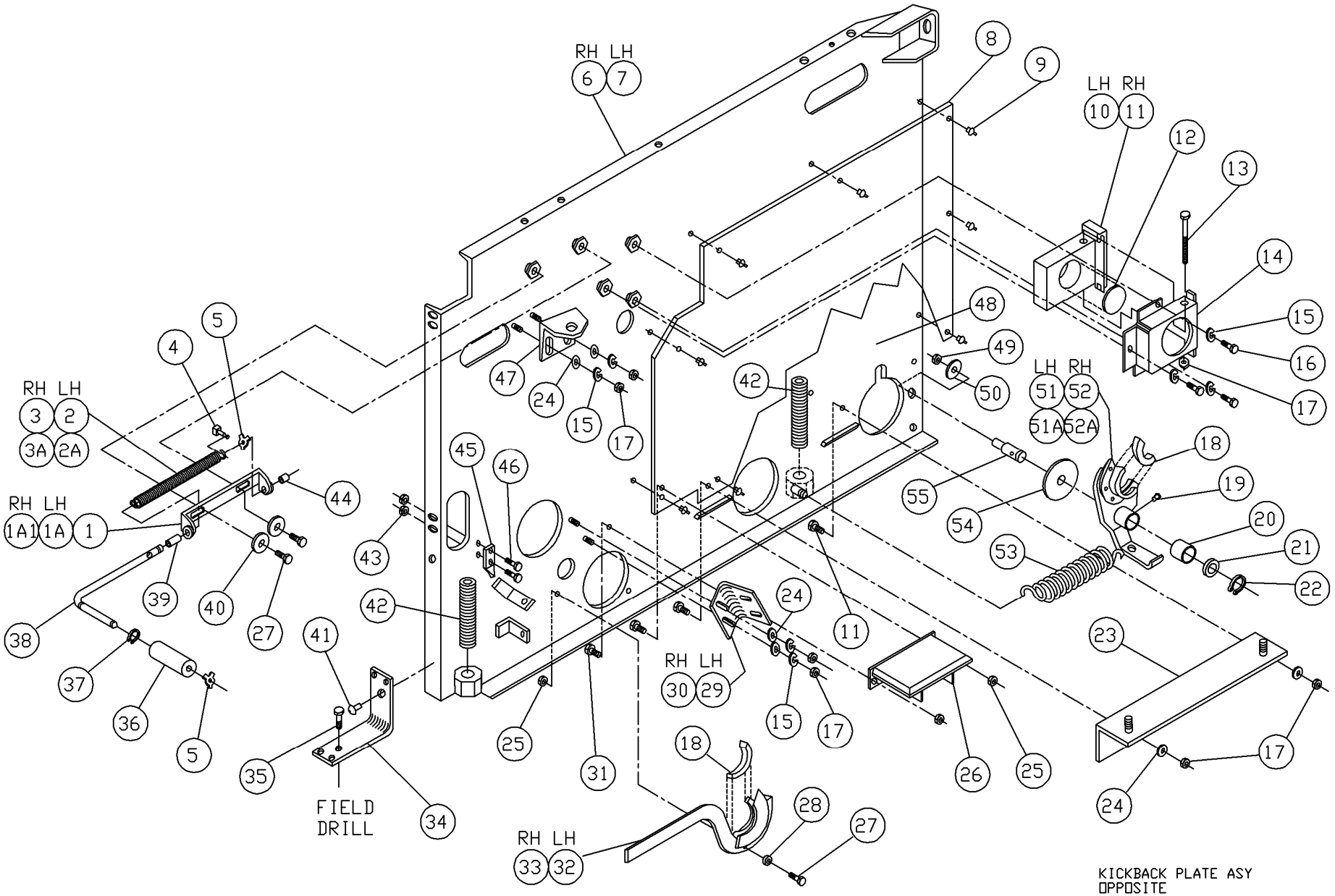
KICKBACK PLATE ASSEMBLY– SIDE OPPOSITE BALL EXIT



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KICKBACK PLATE ASSEMBLY– SIDE OPPOSITE BALL EXIT

ITEM	QTY	PART #	DESCRIPTION
1	1	000-024-509	PIN EJECTOR BRACKET
1A	1	000-024-510	BRACKET ASSEMBLY, L.H. MACHINE (includes 1, 39 & 44)
1A1	1	000-024-511	BRACKET ASSEMBLY, R.H. MACHINE (includes 1, 39 & 44)
2	1	000-024-512	PIN EJECTOR SPRING, L.H. MACHINE
2A	1	000-024-507	PIN EJECTOR ASSEMBLY, L.H. MACHINE (includes 1, 2, 4, 5, 36, 37, 38, 39, & 44)
3	1	000-024-513	PIN EJECTOR SPRING, R.H. MACHINE
3A	1	000-024-508	PIN EJECTOR ASSEMBLY, R.H. MACHINE (includes 1, 3, 4, 5, 36, 37, 38, 39, & 44)
4	1	000-029-317	STOP PIN
5	1	963-600-002	X-WASHER, ¼
6	1	090-004-128	KICKBACK WELDMENT R.H. SIDE, L.H. MACHINE
7	1	090-004-127	KICKBACK WELDMENT L.H. SIDE, R.H. MACHINE
8	1	070-002-027	KICKBACK PANEL
9	9	937-000-000	DRIVE RIVET (field replacement)
10	1	000-002-794	BLOCK SUPPORT, R.H. SIDE
11	1	000-022-795	BLOCK SUPPORT, L.H. SIDE
12	1	000-022-300	SHIELD
13	1	809-865-645	SCREW, HEX, 3/8 - 16 X 4
14	1	000-022-788	BOX SUPPORT
15	7	951-164-002	WASHER, SPLIT LOCK, 3/8
16	5	809-865-165	SCREW, HEX, 3/8 - 16 X 1
17	7	839-665-002	NUT, FLEX LOCK, 3/8 - 16
18	2	000-022-924	SUPPORT BEARING
19	1	710-501-009	GREASE FITTING
20	1	900-112-203	SLEEVE BEARING, .753 X 1-1/4
21	1	000-027-642	WASHER
22	1	919-005-800	RETAINING RING
23	1	090-004-131	PIT SUPPORT BRACKET
24	6	948-767-132	WASHER
25	3	844-057-002	NUT, STOVER LOCK, 5/16 - 18
26	1	000-022-878	ANGLE
27	3	809-857-165	SCREW HEX, 5/16 - 18 X 1
28	1	000-023-467	FLANGED BEARING, .314 X .434 X .310
29	1	000-023-432	CLIP, BOTTOM, L.H. MACHINE
30	1	000-023-431	CLIP, BOTTOM, R.H. MACHINE
31	2	809-857-125	SCREW, HEX, 5/16 - 18 X ¾
32	1	000-023-465	SUPPORT WELDMENT, L.H. MACHINE
33	1	000-023-464	SUPPORT WELDMENT, R.H. MACHINE
34	1	000-026-464	KICKBACK BRACKET
35	1	709-013-059	SCREWBOLT, HEX, 8 mm X 75 mm
36	1	000-025-803	ROLLER, PIN EJECTOR ASSEMBLY
37	1	919-005-400	RETAINING RING
38	1	000-025-804	SHAFT, PIN EJECTOR ASSEMBLY
39	1	000-024-515	SLEEVE BEARING, .44 X .56 X ¾
40	1	000-028-334	WASHER
41	1	937-738-003	RIVET, STEEL
42	2	000-024-890	SETSCREW
43	2	844-049-002	NUT, STOVER LOCK, ¼ - 20
44	1	000-024-516	SLEEVE BEARING,.44 X .56 X 3/8
45	1	000-023-468	BRACKET
46	2	809-849-125	SCREW, HEX,¼ - 20 X ¾
47	1	000-023-821	SIDE CLIP WELDMENT
48	1	070-002-027	KICKBACK PANEL
49	1	844-074-002	NUT, STOVER LOCK, 1/2 - 20
50	1	941-070-200	WASHER, FLAT, 1.25 X .5 X .083
51	1	000-021-043	BRACKET WELDMENT, L.H. SIDE, R.H. MACHINE
51A	1	000-027-645	BEARING ASSY., L.H. SIDE, R.H. MACHINE (includes: 18, 19, 20 & 51)
52	1	000-021-044	BRACKET WELDMENT, R.H. SIDE, L.H. MACHINE
52A	1	000-027-646	BEARING ASSY., R.H. SIDE, L.H. MACHINE (includes: 18, 19, 20 & 52)
53	1	000-021-204	SPRING
54	1	000-027-641	THRUST BEARING
55	1	000-029-015	PIVOT STUD

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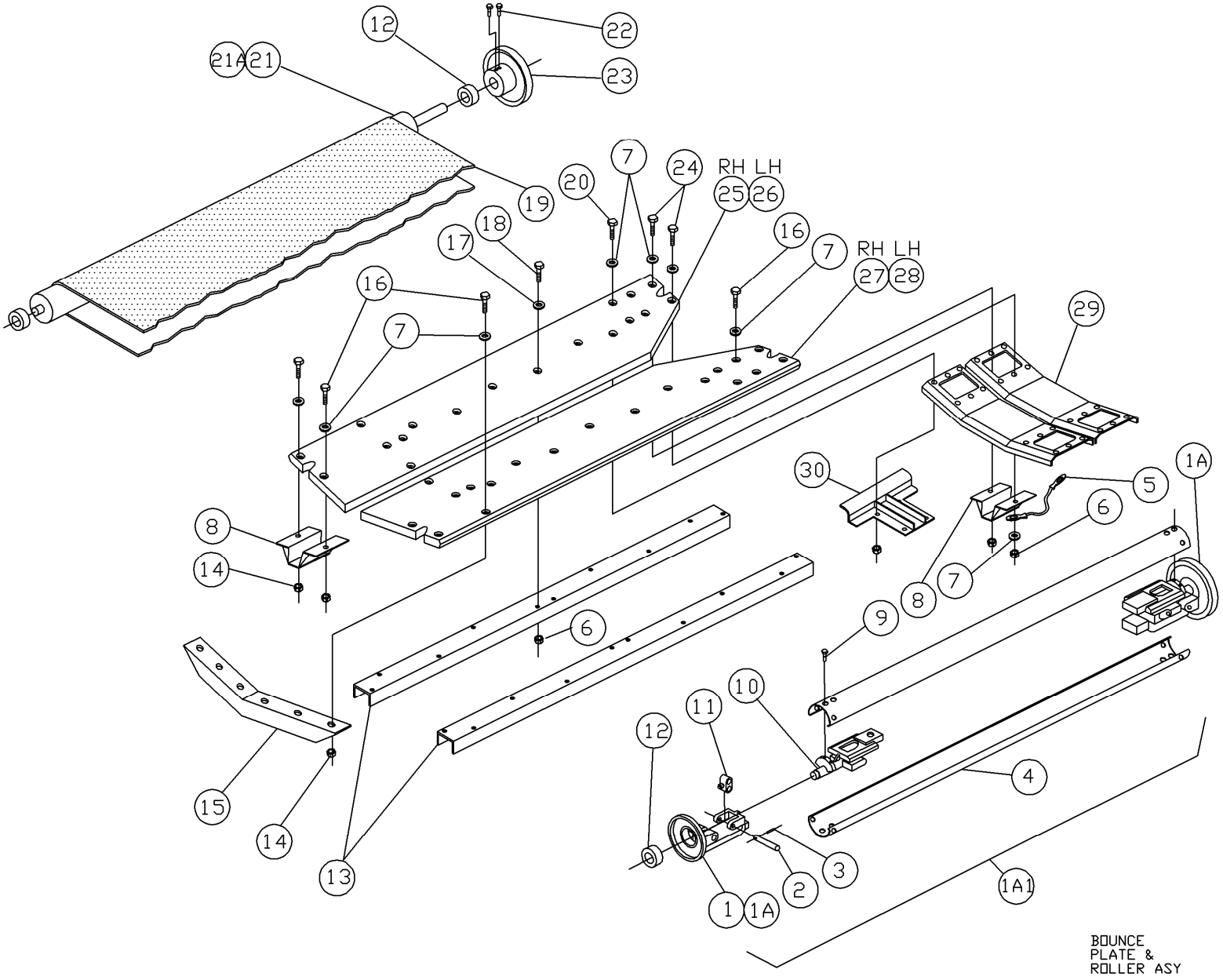
BOUNCE PLATE & ROLLER ASSEMBLY



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BOUNCE PLATE & ROLLER ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	000-024-579	ROLLER HINGE
1A	2	000-024-592	HINGE ASSY (includes 1, 2, 3, 10, 11 & 12)
1A1	1	000-024-576	FRONT ROLLER ASSY (includes 1A, 4 & 9)
2	4	000-024-582	PIN
3	8	913-411-100	SPRING PIN, .078 X 5/8
4	2	000-024-578	ROLLER BODY
5	1	000-025-622	BONDING STRAP
6	18	844-057-002	NUT, STOVER LOCK, 5/16 - 18
7	23	948-753-102	WASHER, FLAT, .281 X .625 X .06
8	4	000-021-224	VIBRATION DAMPENER
9	16	000-025-662	SCREW, NYLON LOCKING
10	2	000-024-580	SHAFT HINGE
11	2	000-024-597	LINK ASSEMBLY
12	4	000-024-590	BEARING
13	2	090-005-274	SUPPORT CHANNEL
14	22	844-049-002	NUT, STOVER LOCK, 1/4 - 20
15	1	000-029-626	ANGLE SUPPORT
16	14	809-849-165	SCREW, HEX, 1/4 - 20 X 1
17	18	948-761-112	WASHER, FLAT, .343 X .625 X .06
18	18	809-857-205	SCREW, HEX, 5/16 - 18 X 1-1/4
19	1	090-006-124	CARPET BELT, PUMPKIN/TAN
20	4	809-849-325	SCREW, HEX, 1/4 - 20 X 2
21	1	070-002-033	REAR ROLLER
21A	1	070-002-034	REAR ROLLER ASSY (includes 12 & 21)
22	2	806-265-160	SETSCREW, SQUARE HEAD, 3/8 - 16 X 1
23	1	090-004-203	82-90 CARPET DRIVE SHEAVE

ITEM	QTY	PART #	DESCRIPTION
24	4	809-849-205	SCREW, HEX, ¼ - 20 X 1-1/4
25	1	090-005-272	BOUNCE BOARD, REAR, R.H. MACHINE
26	1	090-005-273	BOUNCE BOARD, REAR, L.H. MACHINE
27	1	090-005-270	BOUNCE BOARD, FRONT, R.H. MACHINE
28	1	090-005-271	BOUNCE BOARD, FRONT, L.H. MACHINE
29	2	000-021-914	BOUNCE BOARD CHANNEL
30	1	070-007-769	BRACKET WELDMENT

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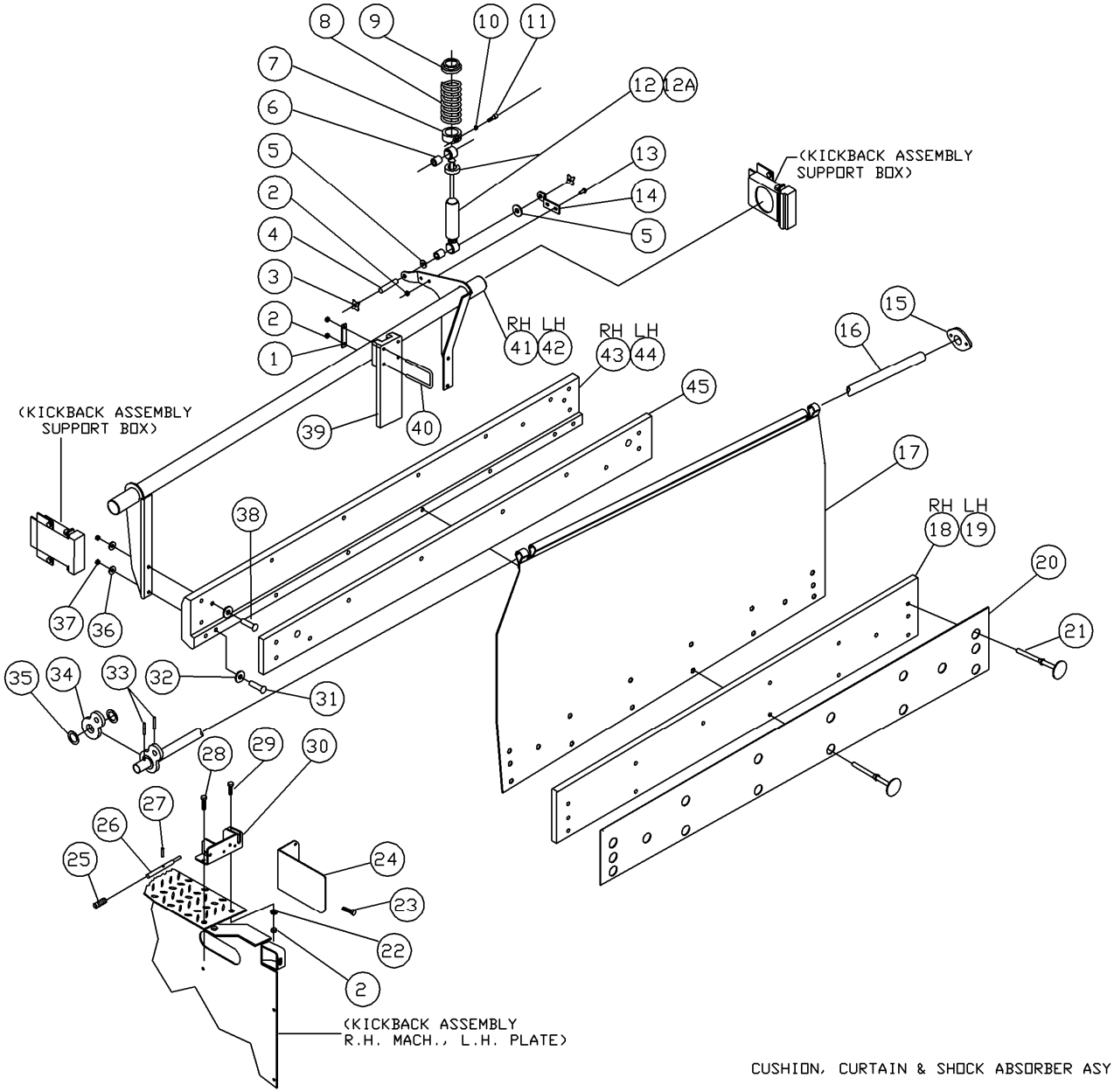
CUSHION, CURTAIN, & SHOCK ABSORBER ASSEMBLY



CUSHION, CURTAIN & SHOCK ABSORBER ASY

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CUSHION, CURTAIN, & SHOCK ABSORBER ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	070-001-421	STRAP
2	7	844-057-002	NUT, STOVER LOCK, 5/16 - 18
3	4	963-600-002	X-WASHER
4	2	000-022-821	PIN
5	4	948-975-172	WASHER, FLAT, 1-1/16 X 17/32 X 3/32
6	2	000-022-822	SLEEVE
7	1	000-022-286	CUSHION STRUT COLLAR
8	1	000-022-288	SPRING
9	1	000-022-287	SPRING SEATING WASHER
10	1	951-148-002	WASHER, SPLIT LOCK, ¼
11	1	810-250-200	SCREW, SOCKET HEAD CAP, ¼ - 28 X 1-1/4
12	1	000-022-823	SHOCK ABSORBER w/UPPER COLLAR
12A	1	000-022-824	SHOCK ASSY (Includes 6, 7, 8, 9, 10, 11 & 12)
13	2	809-857-125	SCREW, HEX, 5/16 - 18 X ¾
14	1	000-024-534	HANGER EAR
15	1	070-011-286	CURTAIN ROD BUSHING
16	1	070-011-288	CURTAIN ROD
17	1	000-026-450	CURTAIN ASSEMBLY
18	1	000-024-807	RUBBER CUSHION, R.H. MACHINE
19	1	000-024-808	RUBBER CUSHION, L.H. MACHINE
20	1	090-005-230	CUSHION COVER
21	16	000-028-519	RIVET, CUSHION ASSEMBLY
22	1	948-761-112	WASHER, 11/32 X 11/16 X 1/16
23	2	809-849-125	SCREW, HEX, 1/4 - 20 X ¾
24	1	070-004-738	GUARD
25	1	070-001-389	CURTAIN LATCH SPRING

ITEM	QTY	PART #	DESCRIPTION
26	1	070-001-396	CURTAIN LATCH PIN
27	1	913-431-160	SPRING PIN, .156 X 1
28	1	809-857-205	SCREW, HEX, 5/16 - 18 X 1-1/4
29	1	809-857-165	SCREW, HEX, 5/16 - 18 X 1
30	1	070-007-360	SUPPORT BRACKET WELDMENT
31	2	808-865-400	SCREW, FLAT HEAD, 3/8 - 16 X 2-1/2
32	4	000-024-801	WASHER
33	2	913-437-240	SPRING PIN, .187 X 1-1/2
34	1	070-005-610	CURTAIN LINK
35	2	945-091-242	WASHER, 1-1/2 X 1 X .046
36	4	951-164-002	WASHER, SPLIT LOCK, 3/8
37	4	844-065-002	NUT-STOVER LOCK, 3/8 - 16
38	2	808-865-320	SCREW, FLAT HEAD, 3/8 - 16 X 2
39	1	070-001-432	PAD
40	2	070-001-422	U-BOLT
41	1	070-002-050	TUBE WELDMENT, R.H. MACHINE
42	1	070-002-252	TUBE WELDMENT, L.H. MACHINE
43	1	000-024-796	PLANK, R.H. MACHINE
44	1	000-024-795	PLANK, L.H. MACHINE
45	1	000-022-770	SPONGE RUBBER CUSHION PAD

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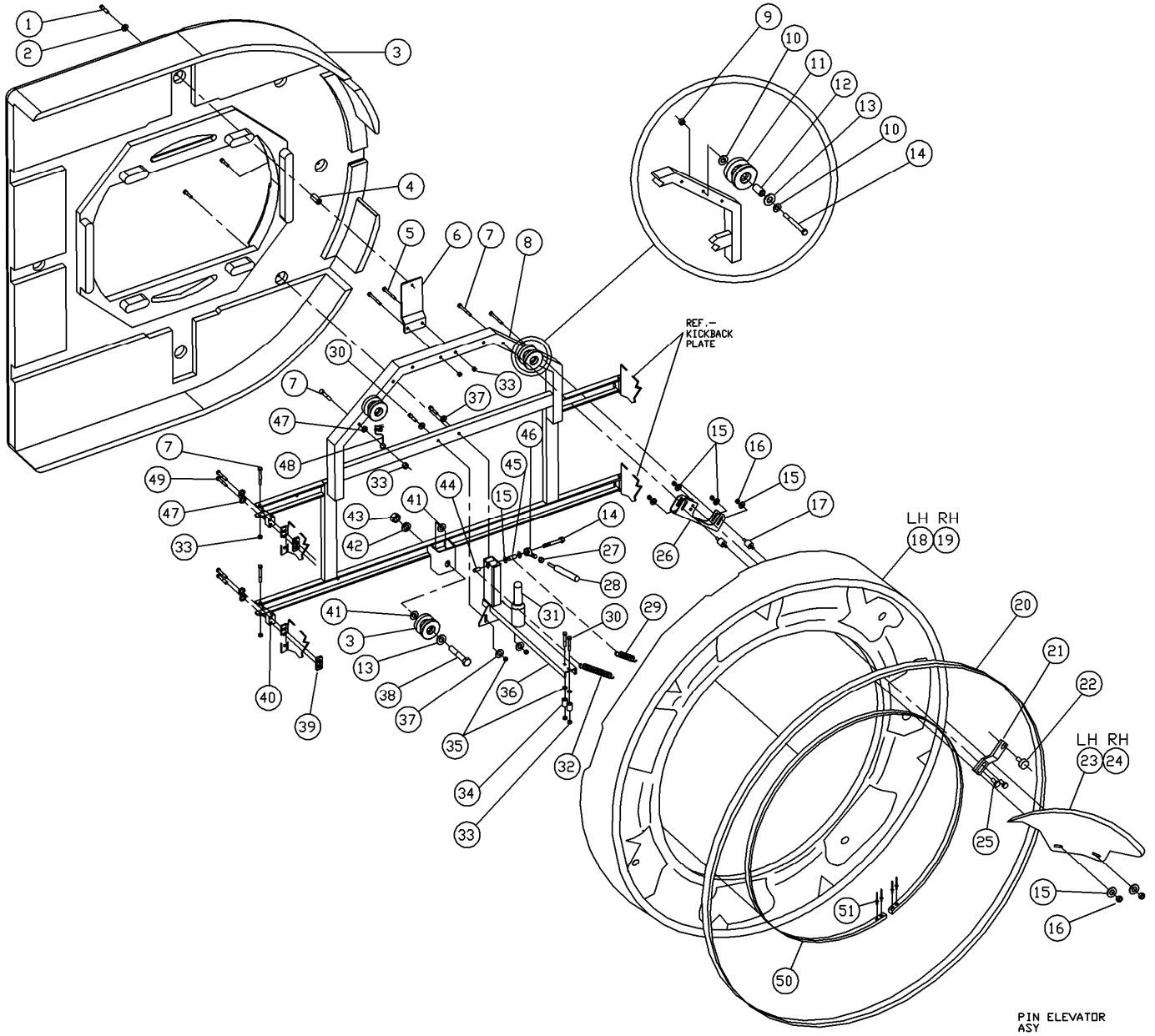
PIN ELEVATOR & HOOP ASSEMBLY



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PIN ELEVATOR & HOOP ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	4	826-057-242	SCREW, THREAD FORMING, 5/16 - 18 X 1-1/2
2	4	090-004-055	WASHER
3	1	090-007-145	WHEEL GUARD, REVERSIBLE
4	4	090-007-241	SPACER
5	2	809-857-445	SCREW, HEX, 5/16 - 18 X 2-3/4
6	1	090-003-111	UPPER GUARD SUPPORT
7	7	809-857-405	SCREW, HEX, 5/16 - 18 X 2-1/2
8	1	090-003-102	HOOP WELDMENT
9	2	844-065-002	NUT, STOVER LOCK, 3/8 - 16
10	4	947-367-141	WASHER, 7/8 X 13/32 X 1/8
11	3	090-007-327	PIN ELEVATOR ROLLER
12	2	090-003-116	SPACER
13	3	950-001-008	WASHER, NYLON, .750 X 1.25 X .08
14	2	809-865-725	SCREW, HEX, 3/8 - 16 X 4-1/2
15	6	948-767-132	WASHER, 13/16 X 13/32 X 1/16
16	4	834-557-002	NUT, HEX, 5/16 - 18
17	2	000-029-068	RUBBER MOUNTING
18	1	090-004-117	PIN WHEEL WELDMENT, L.H. MACHINE
19	1	090-004-116	PIN WHEEL WELDMENT, R.H. MACHINE
20	1	090-002-065	PIN WHEEL BELT
21	1	070-001-415	RAIL STOP BRACKET
22	1	000-021-992	BUMPER
23	1	070-006-099	RAIL, L.H. MACHINE
24	1	070-006-098	RAIL, R.H. MACHINE
25	2	824-757-102	SCREW, WASHER HEAD, 5/16 - 18 X 5/8
26	1	090-005-120	RAIL STANDOFF BRACKET

ITEM	QTY	PART #	DESCRIPTION
27	1	831-566-002	NUT, HEX, 3/8 - 24
28	1	070-006-047	SAFETY LINK TUBE
29	1	000-026-032	DISTRIBUTOR LATERAL DRIVE SPRING
30	6	809-857-365	SCREW, HEX, 5/16 - 18 X 2-1/4
31	1	070-006-045	DISTRIBUTOR SUPPORT POST
32	1	070-006-030	SAFETY LINK SPRING
33	12	844-057-002	NUT, STOVER LOCK, 5/16 - 18
34	2	070-008-449	SPACER
35	10	948-761-112	WASHER, FLAT, 11/16 X 11/32 X 1/16
36	1	090-003-112	DISTRIBUTOR MOUNT
37	4	947-356-617	WASHER, FLAT, 11/32 X 5/16
38	1	880-781-240	SHOULDER BOLT, SOCKET HEAD, 3/4 X 1-1/2
39	4	090-005-123	NUT PLATE
40	4	090-005-106	HINGE/SPACER
41	1	948-809-210	WASHER, FLAT, 1-5/16 X 5/8 X .09
42	1	951-181-002	WASHER, SPLIT LOCK, 5/8
43	1	840-381-002	NUT, FLEX LOCK, 5/8-11
44	1	070-006-044	SPRING POST NUT, 3/8 - 16
45	1	070-006-043	SPACER
46	1	090-005-256	ROD END
47	9	951-156-002	WASHER, SPLIT LOCK, 5/16
48	1	090-005-144	STATIC BRUSH
49	8	809-857-325	SCREW, HEX, 5/16-18 X 2
50	1	090-005-108	PIN WHEEL STRIP
51	4	938-523-050	POP RIVET, 1/8 X .251 X .31

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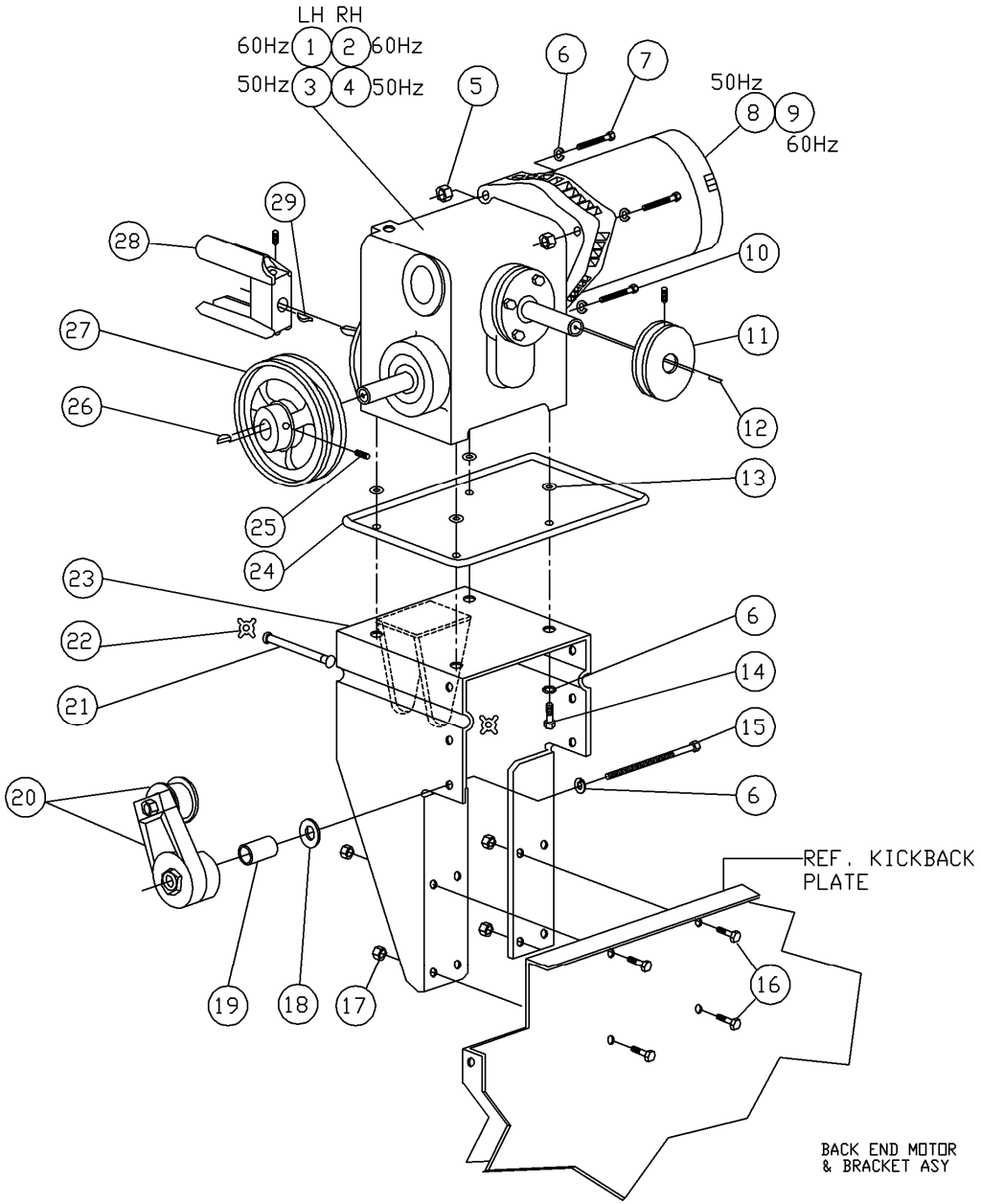
BACK END DRIVE MOTOR & BRACKET ASSEMBLY



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BACK END DRIVE MOTOR & BRACKET ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	090-004-502	GEARBOX, L.H. MACHINE, 60 Hz
2	1	090-004-501	GEARBOX, R.H. MACHINE, 60 Hz
3	1	090-004-507	GEARBOX, L.H. MACHINE, 50 Hz
4	1	090-004-506	GEARBOX, R.H. MACHINE, 50 Hz
5	2	839-665-002	NUT, FLEX LOCK, 3/8 - 16
6	8	951-164-002	WASHER, SPLIT LOCK, 3/8
7	2	809-865-325	SCREW, HEX, 3/8 - 16 X 2
8	1	090-007-310	MOTOR, 50 Hz
9	1	090-003-766	MOTOR, 60 Hz
10	1	809-865-245	SCREW, HEX, 3/8 - 16 X 1-1/2
11	1	000-022-172	DRIVE SHEAVE
12	1	907-202-600	KEY, SQUARE, 3/16 X 1-7/8
13	4	000-023-758	GASKET WASHER, 7/8 X 3/8 X 1/32
14	4	809-865-165	SCREW, HEX, 3/8 - 16 X 1
15	1	070-003-221	SCREW, HEX, 3/8 - 16 X 3-1/2
16	4	809-857-125	SCREW, HEX, 5/16 - 18 X 3/4
17	4	844-057-002	NUT, STOVER LOCK, 5/16 - 18
18	1	000-021-792	WASHER, FLAT, 7/8 X 13/32 X 1/8
19	1	090-004-519	SPACER
20	1	090-003-508	TENSIONER ASSEMBLY
21	1	000-022-821	PIN
22	2	963-600-002	X-WASHER
23	1	090-003-509	MOTOR MOUNT WELDMENT
24	1	090-004-517	BACK END MOTOR DRIP PAN
25	3	807-358-060	SETSCREW, 5/16 - 24 X 3/8
26	1	907-201-000	KEY, SQUARE, 3/16 X 1-1/4

ITEM	QTY	PART #	DESCRIPTION
27	1	000-023-673	PIN ELEVATOR DRIVE SHEAVE
28	1	090-001-130	DISTRIBUTOR DRIVE HOUSING
29	1	907-000-300	KEY

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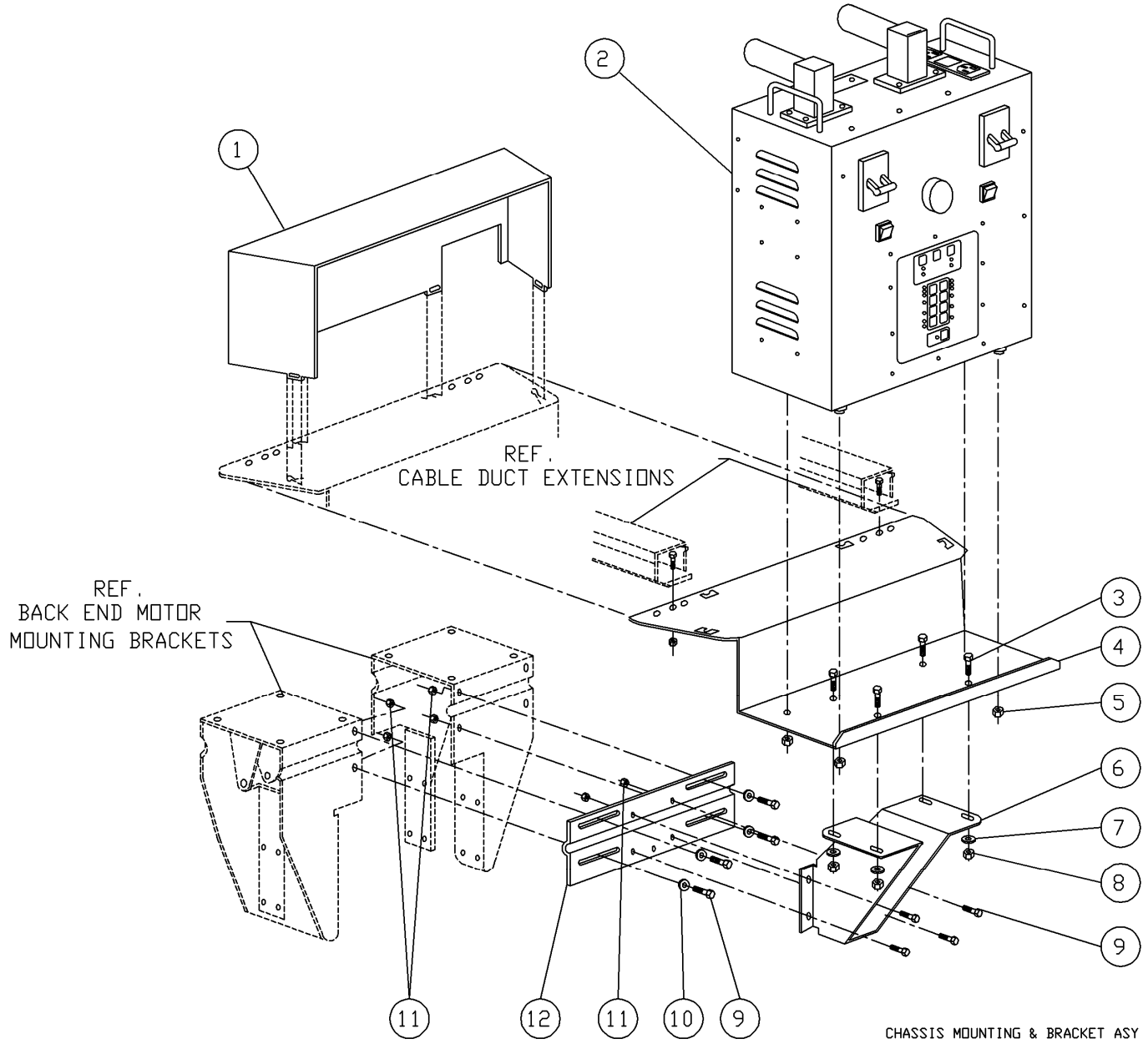
CHASSIS & MOUNTING BRACKET ASSEMBLY



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CHASSIS & MOUNTING BRACKET ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	090-004-707	CHASSIS COVER
2	1	090-008-965	90XL PINSPOTTER CONTROL CHASSIS (220V 50/60Hz)
3	4	809-849-125	SCREW, HEX, ¼ - 20 X ¾
4	1	090-004-706	CHASSIS MOUNTING BRACKET
5	4	835-549-002	NUT, HEX JAM, ¼ - 20
6	1	090-004-514	CHASSIS MOUNTING BRACKET SUPPORT
7	4	948-753-102	WASHER, FLAT, 9/32 X 5/8 X 1/16
8	4	844-049-002	NUT, STOVER LOCK, ¼ - 20
9	8	809-857-125	SCREW, HEX, 5/16 - 18 X ¾
10	4	948-761-112	WASHER, FLAT, 11/32 X 11/16 X 1/16
11	8	844-057-002	NUT, STOVER LOCK, 5/16 - 18
12	1	090-004-513	TIE PLATE

ITEM	QTY	PART #	DESCRIPTION

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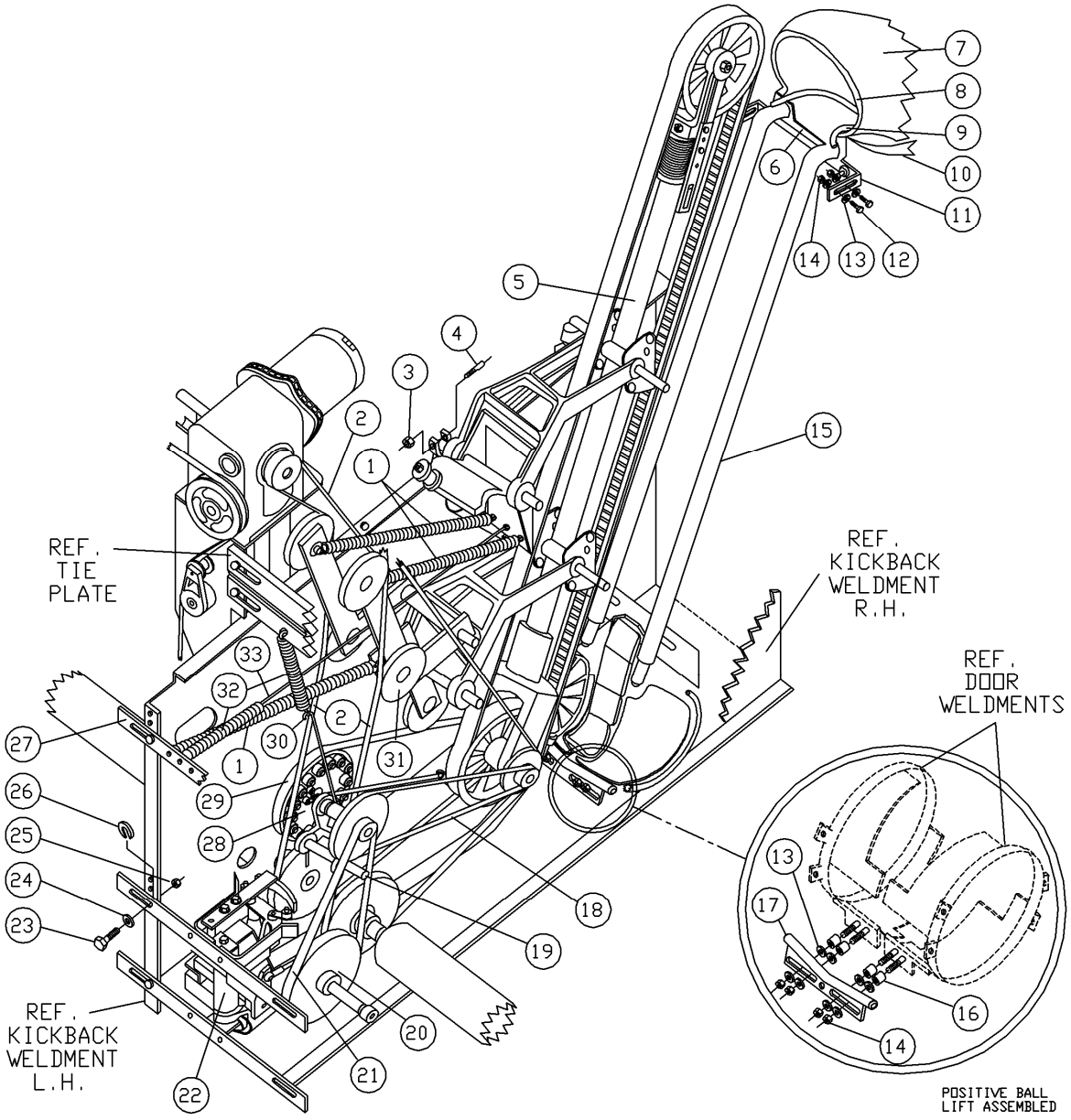
POSITIVE BALL LIFT (PBL) - ASSEMBLED



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POSITIVE BALL LIFT (PBL) - ASSEMBLED

ITEM	QTY	PART #	DESCRIPTION
1	3	000-024-673	SPRING
2	2	090-004-520	V- BELT, CARPET DRIVE
3	6	831-565-002	NUT, HEX, 3/8 - 16
4	6	000-024-610	CLAMP STUD
5	1	070-011-052	BALL LIFT ASSEMBLY (see next illustration)
6	1	000-021-813	WIPER SUPPORT
7	1	070-004-669	BALL WIPER CLOTH
8	2	000-021-814	WIPER CLOTH RING
9	1	000-029-629	DOWN SWEEP WELDMENT
10	1	070-004-670	DUST TRAP
11	4	070-004-654	TRACK SUPPORT BRACKET
12	8	809-865-285	SCREW, HEX, 3/8 - 16 X 1-3/4
13	74	948-767-132	WASHER, 13/32 X 13/16 X 1/16
14	20	844-065-002	NUT, STOVER LOCK, 3/8 - 16
15	1	070-011-414	TRACK RAIL ASSEMBLY
16	4	070-008-212	SPACER
17	1	070-008-207	RAIL WELDMENT
18	1	070-011-148	V- BELT, PADDLE DRIVE, UPPER
19	1	090-002-015	BELT TENSIONER ASSEMBLY
20	1	070-011-178	CRANK ASSEMBLY
21	1	070-011-147	V- BELT, PADDLE DRIVE, LOWER
22	1	070-011-120	LIGHT BALL SENSOR ASSEMBLY
23	12	809-857-165	SCREW, HEX, 5/16 - 18 X 1
24	8	948-761-112	WASHER, 11/32 X 11/16 X 1/16
25	12	844-057-002	NUT, STOVER LOCK, 5/16 - 18
26	14	000-029-910	SHIM

ITEM	QTY	PART #	DESCRIPTION
27	1	070-011-035	STRAP
28	1	070-011-039	RATCHET ASSEMBLY
29	1	070-011-064	V- BELT, RATCHET DRIVE
30	1	090-002-016	SPRING EXTENSION
31	1	070-011-810	BELT TIGHTENER
32	2	000-026-031	SPRING
33	1	070-011-034	EXTENSION ROD

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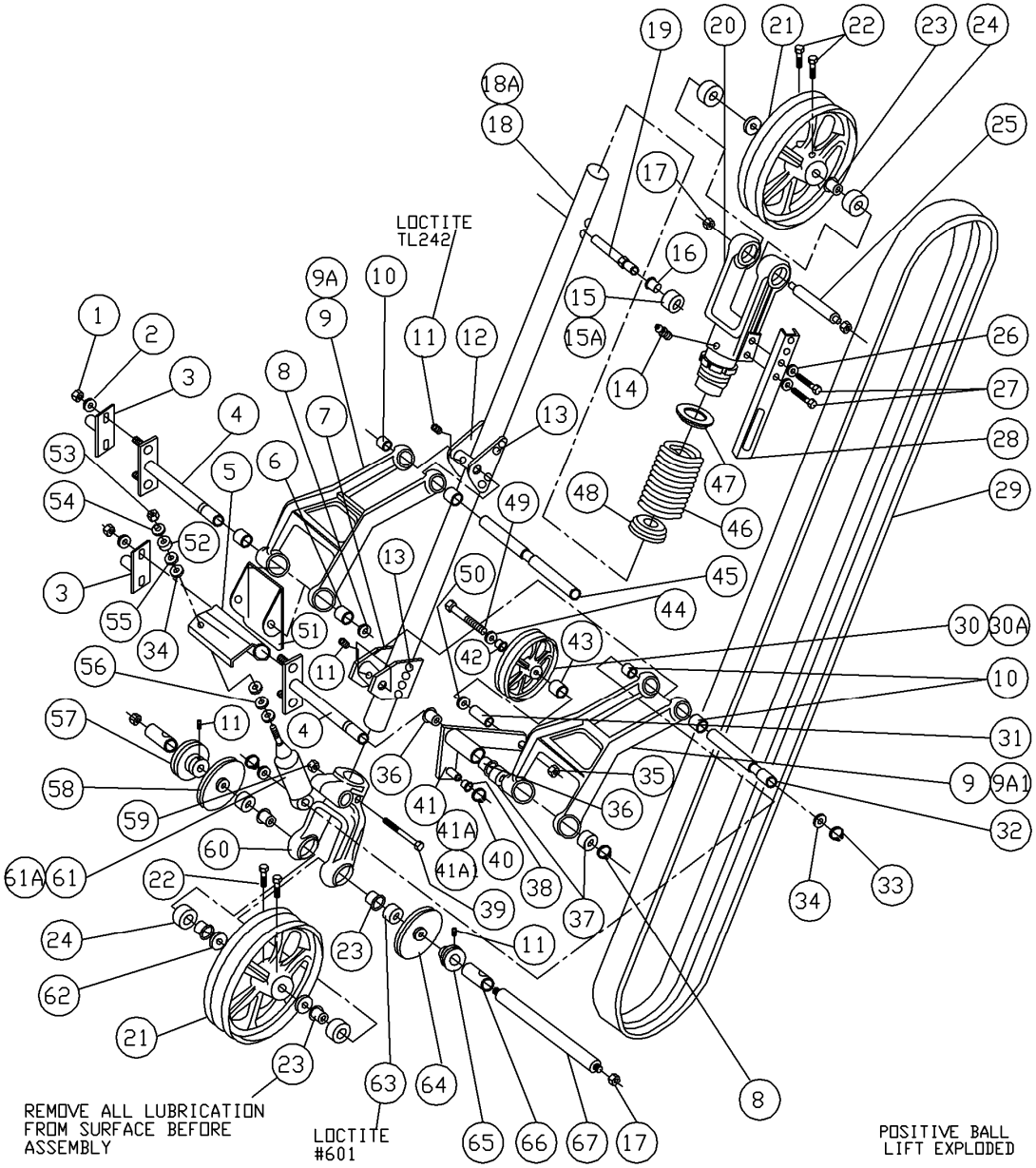
POSITIVE BALL LIFT (PBL) – EXPLODED VIEW



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POSITIVE BALL LIFT (PBL) – EXPLODED VIEW

ITEM	QTY	PART #	DESCRIPTION
1	4	840-057-002	NUT, STOVER LOCK, 5/16
2	4	948-761-112	WASHER, FLAT, 11/32 X 11/16 X 1/16
*3	2	070-006-320	SHAFT ASSY. ADJ. 9 ½ " - 11 " SPACING
	2	070-006-329	SHAFT ASSY ADJ. 11" - "12-5/8" SPACING
	2	070-006-333	SHAFT ASSY. ADJ. 12-5/8" - 14" SPACING
*4	2	070-005-325	SHAFT ASSY. FXD. 9 ½ " - 11" SPACING
	2	070-006-328	SHAFT ASSY. FXD. 11" - "12-5/8" SPACING
	2	070-006-330	SHAFT ASSY. FXD. 12-5/8" - 14" SPACING
5	1	070-011-289	SHOCK ABSORBER BRACKET
6	2	900-112-203	SLEEVE BEARING, .753 X 1-1/4
7	1	070-011-002	LOWER SUPPORT
8	2	919-005-800	RETAINING RING
9	2	000-024-653	LINK
9A	1	000-024-720	LINK ASSY, UPPER (includes 6, 9, 10, & 51)
9A1	1	000-024-651	LINK ASSY, LOWER (includes: 9, 10 & 37)
10	4	900-110-121	SLEEVE BEARING, .628 X 3/4
11	4	807-265-060	SETSCREW, 3/8 - 16 X 3/8
12	1	000-024-606	UPPER SUPPORT
13	16	937-000-000	RIVET, STEEL, 1/4 X 11/32
14	1	710-501-007	GREASE FITTING
15	1	000-024-647	ROLLER
15A	1	000-024-650	ROLLER ASSEMBLY (includes 15 & 16)
16	1	900-206-081	FLANGED BEARING, .378 X .688 X 1/2
17	4	856-070-002	NUT, FLANGED, 7/16 - 20
18	1	000-024-607	TUBE
18A	1	070-011-004	TUBE & SUPPORT ASSY (incl. 7, 12, 13, & 18)
19	1	000-024-648	PIVOT PIN

ITEM	QTY	PART #	DESCRIPTION
20	1	070-001-995	UPPER YOKE w/NUT
21	2	000-024-661	PULLEY
22	4	806-265-160	SETSCREW, 3/8 - 16 X 1
23	4	070-006-748	SPACER
24	4	070-006-699	BALL BEARING
25	1	070-006-747	UPPER SHAFT
26	4	951-164-002	WASHER, SPLIT LOCK, 3/8
27	2	809-865-165	SCREW, HEX, 3/8 -16 X 1
28	1	000-029-613	RAIL
29	1	090-002-450	BELT, V-GUIDE FLAT, 2 INCHES WIDE
30	1	000-022-071	IDLER PULLEY
30A	1	000-021-408	IDLER PULLEY ASSY (includes 30 & 43)
31	1	070-008-218	SPACER, LONG
32	1	000-029-660	SHAFT
33	2	919-005-600	RETAINING RING
34	2	948-983-212	WASHER, FLAT, 1-5/16 X 21/32 X .093
35	1	839-549-002	NUT, FLEX LOCK, ¼ - 20
36	2	900-212-161	FLANGED BEARING, .753 X 1.003 X 1
37	2	900-112-161	SLEEVE BEARING, .753 X 1
38	1	070-011-040	RATCHET ROLLER
39	1	809-865-445	SCREW, HEX, 3/8 - 16 X 2¾
40	1	919-005-200	RETAINING RING
41	1	070-008-215	BELT TIGHTENER WELDMENT
41A	1	070-011-041	BELT TIGHTENER WELDMENT ASSEMBLY (includes 36 & 41)
41A1	1	070-011-042	BELT TIGHTENER ASSEMBLY (includes 30A, 31, 35, 38, 40, 41A, 42, 44, 49, & 50)

* Items 3 & 4 vary in length according to the space between the right and left pinspotters.

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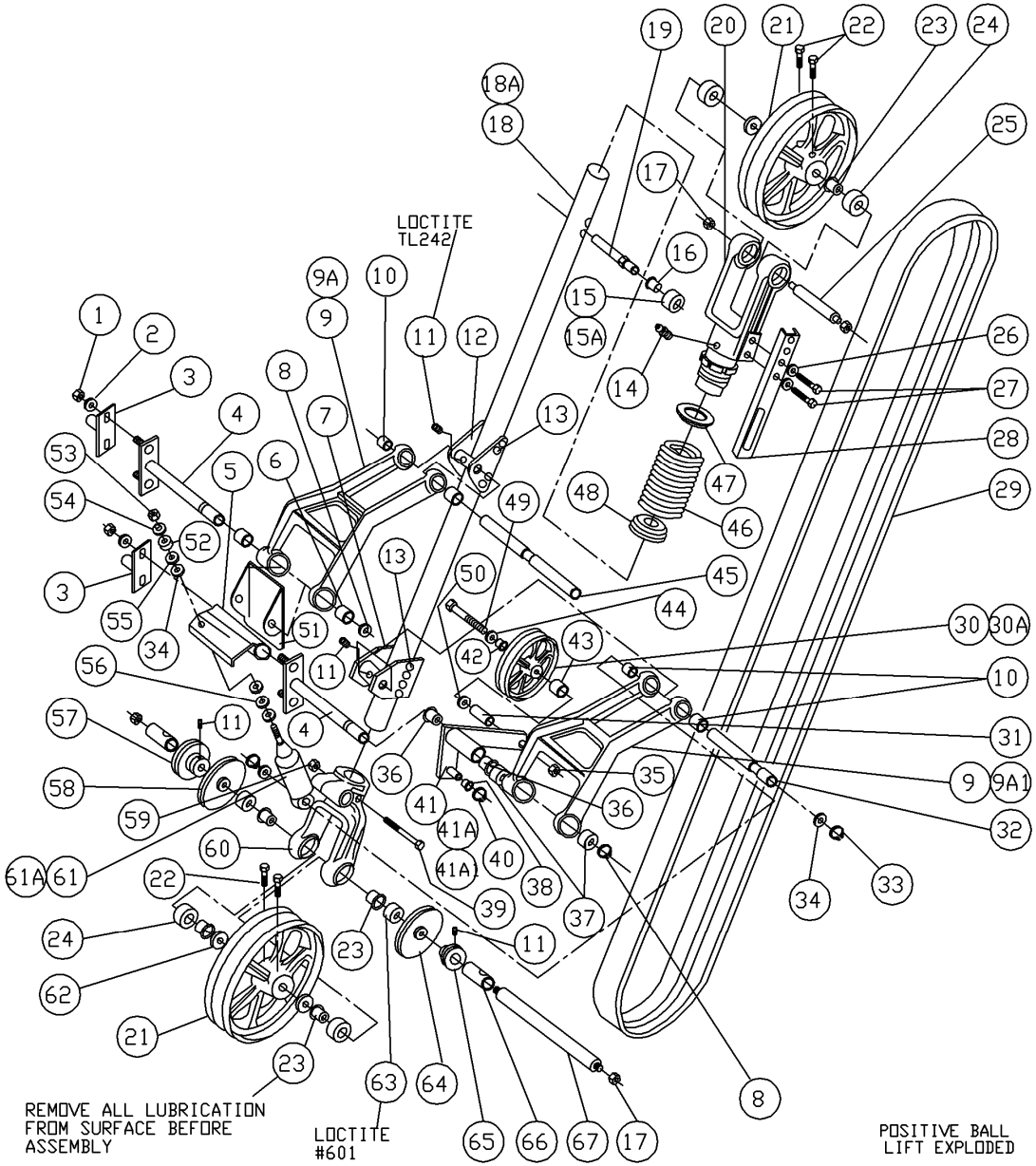
POSITIVE BALL LIFT (PBL) – EXPLODED VIEW (continued)



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ITEM	QTY	PART #	DESCRIPTION
42	1	070-008-217	SHORT SPACER
43	1	900-208-161	FLANGED BEARING, .503 x .875 x 1
44	1	146-005-277	WASHER, COUNTERSUNK, 9/32 x 7/8 x 1/8
45	1	000-028-737	SHAFT
46	1	000-024-603	SPRING
47	1	000-024-608	UPPER RETAINER
48	1	000-024-605	LOWER RETAINER
49	1	808-849-565	SCREW, FLAT HEAD, ¼ - 20 X 3-1/2
50	1	070-007-192	WASHER
51	1	000-024-716	SPRING HOLDER
52	2	000-027-996	RUBBER CUSHION
53	1	831-566-002	NUT, HEX, 3/8 - 24
54	2	000-027-998	RETAINER
55	2	000-028-057	RETAINER
56	2	070-008-212	SPACER
57	1	070-008-211	SHEAVE
58	1	000-024-811	PULLEY ASSEMBLY, R.H.
59	1	839-665-002	NUT, FLEX LOCK, 3/8 - 16
60	1	000-024-659	LOWER YOKE
61	1	000-029-661	SHOCK ABSORBER
61A	1	070-011-323	SHOCK ABSORBER ASSEMBLY (includes 5, 32, 33, 34, 52, 53, 54, 55, 56, & 61)
62	6	000-027-642	WASHER
63	2	070-007-291	CLUTCH BEARING
64	1	000-024-812	PULLEY ASSEMBLY, L.H.
65	1	070-008-210	SHEAVE

ITEM	QTY	PART #	DESCRIPTION
66	2	090-003-401	CLUTCH RACE, LONG
67	1	070-011-796	LOWER SHAFT
N/A		700-107-170	LOCTITE #601 (applied to item 63)
N/A		700-107-146	ADHESIVE, LOCTITE TL242 (apply to item 11)

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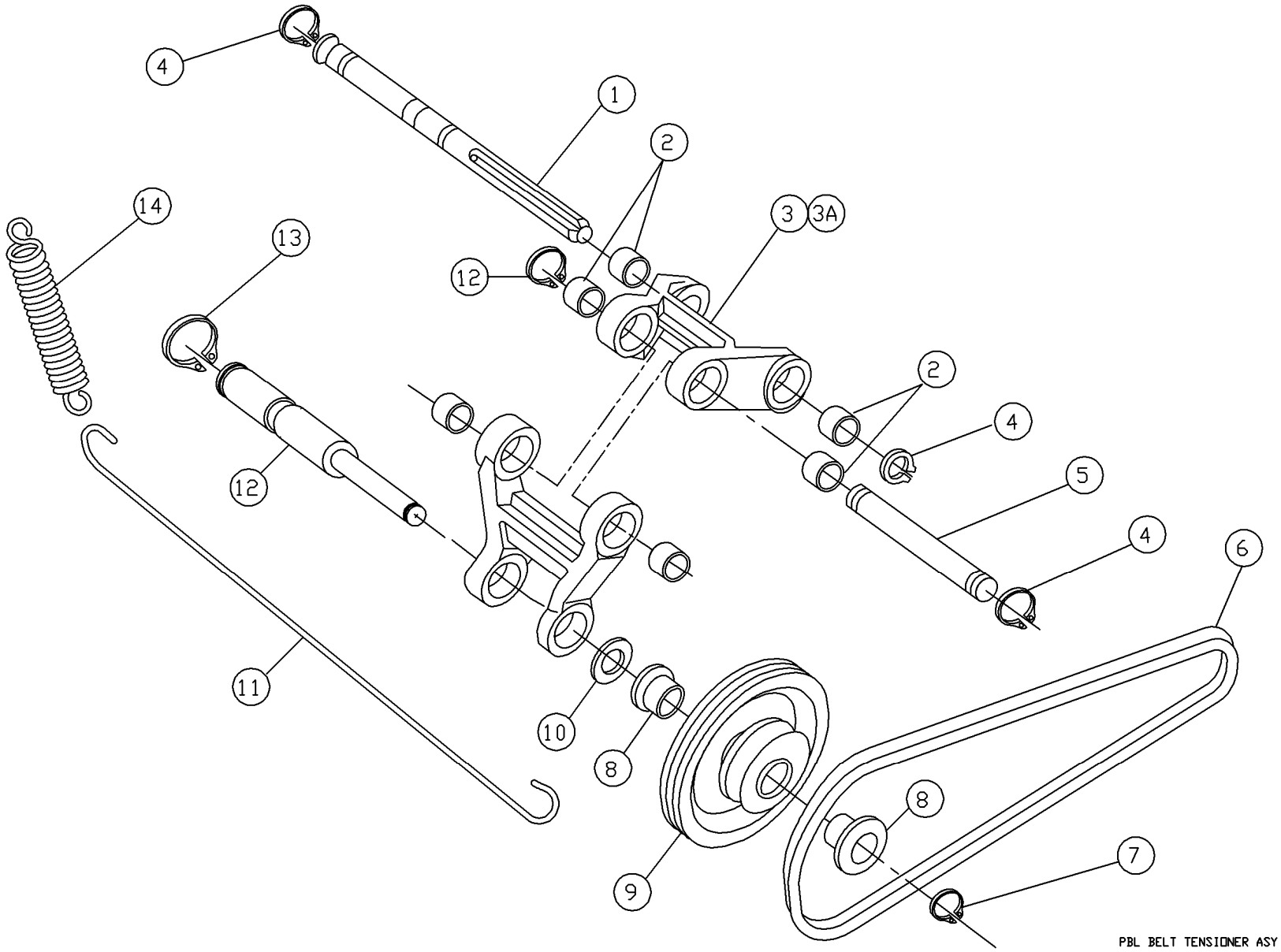
PBL BELT TENSIONER ASSEMBLY



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PBL BELT TENSIONER ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	000-029-605	PIVOT SHAFT
2	6	900-110-081	SLEEVE BEARING, .628 X .878 X .5
3	2	000-029-625	HANGER ARM
3A	1	000-029-659	HANGER ARM ASSY (includes items 2 & 3)
4	4	919-005-600	RETAINING RING
5	1	000-029-606	PIVOT SHAFT, SHORT
6	1	070-011-147	V-BELT, PADDLE DRIVE, LOWER
7	1	919-005-500	RETAINING RING
8	2	900-208-120	BEARING
9	1	070-011-131	PULLEY WELDMENT
10	1	000-027-264	SPACER
11	1	090-002-016	SPRING EXTENSION
12	1	090-002-014	SHAFT
13	1	919-005-900	RETAINING RING
14	1	000-026-031	SPRING

ITEM	QTY	PART #	DESCRIPTION

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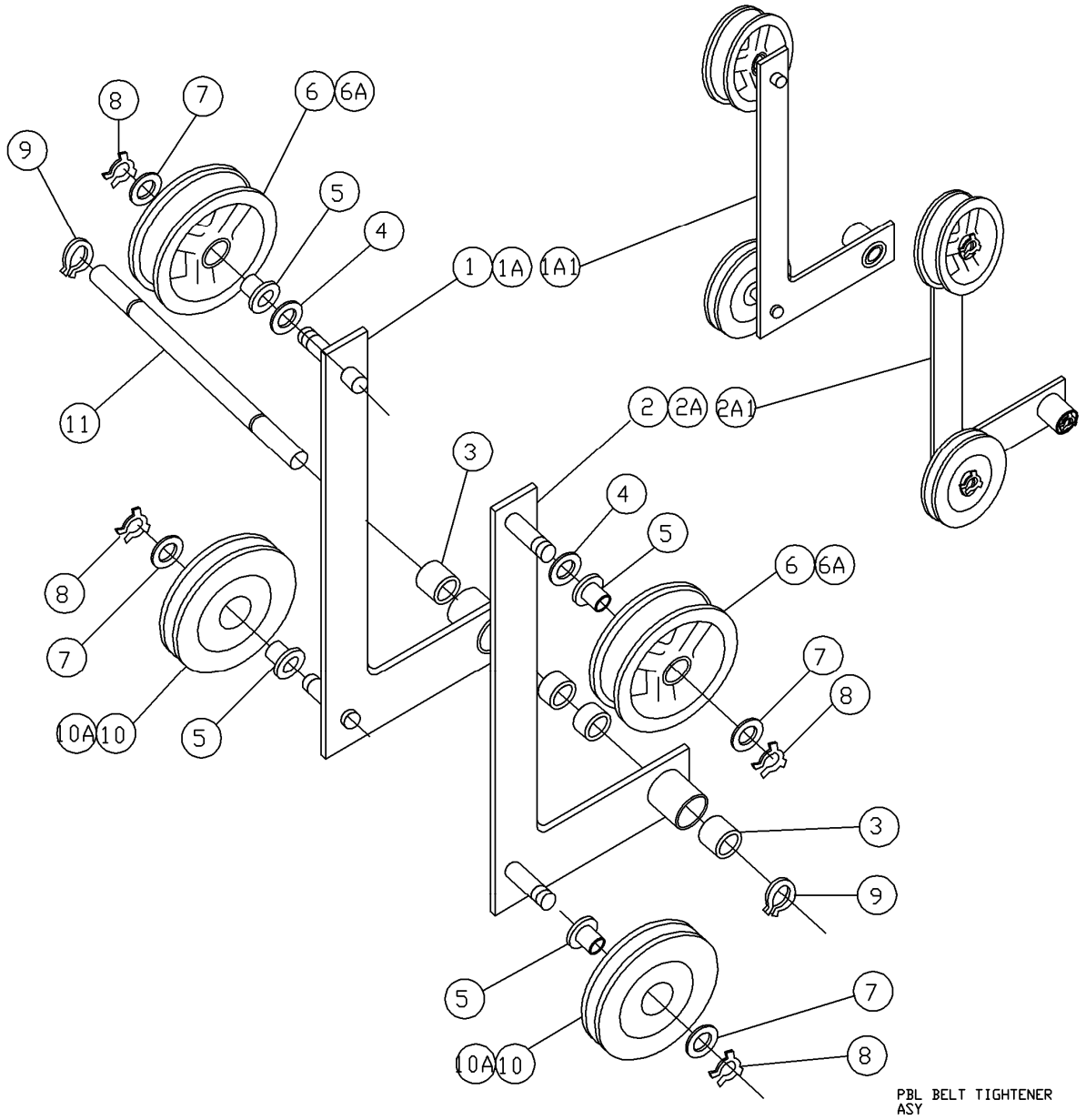
PBL BELT TIGHTENER ASSEMBLY



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PBL BELT TIGHTENER ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	070-011-531	ARM ASSY WELDMENT, L.H. MACHINE
1A	1	070-011-530	ARM ASSY, L.H. MACHINE (includes 1 & 3)
1A1	1	070-011-524	BELT TIGHTENER, L.H. MACHINE (includes 1, 3, 4, 5, 6, 7, 8, & 10)
2	1	070-011-528	ARM ASSY WELDMENT, R.H. MACHINE
2A	1	070-011-527	ARM ASSY, R.H. MACHINE (includes 2 & 3)
2A1	1	070-011-523	BELT TIGHTENER, R.H. MACHINE (includes 2, 3, 4, 5, 6, 7, 8, & 10)
3	4	900-112-121	SLEEVE BEARING, .753 X .75
4	2	701-316-041	THRUST BEARING, .51 X 1 X 1/16
5	4	900-208-161	FLANGED BEARING, .503 X .875
6	2	000-002-071	IDLER PULLEY
6A	2	000-021-408	IDLER PULLEY ASSY, (includes 5 & 6)
7	4	948-975-172	WASHER, FLAT, 1-1/16 X 17/32 X 3/32
8	4	963-600-002	X-WASHER, 1/4
9	2	919-005-800	RETAINING RING
10	2	070-011-526	IDLER SHEAVE
10A	2	070-011-525	IDLER SHEAVE ASSY (includes 5 & 10)
11	1	000-029-603	SHAFT

ITEM	QTY	PART #	DESCRIPTION

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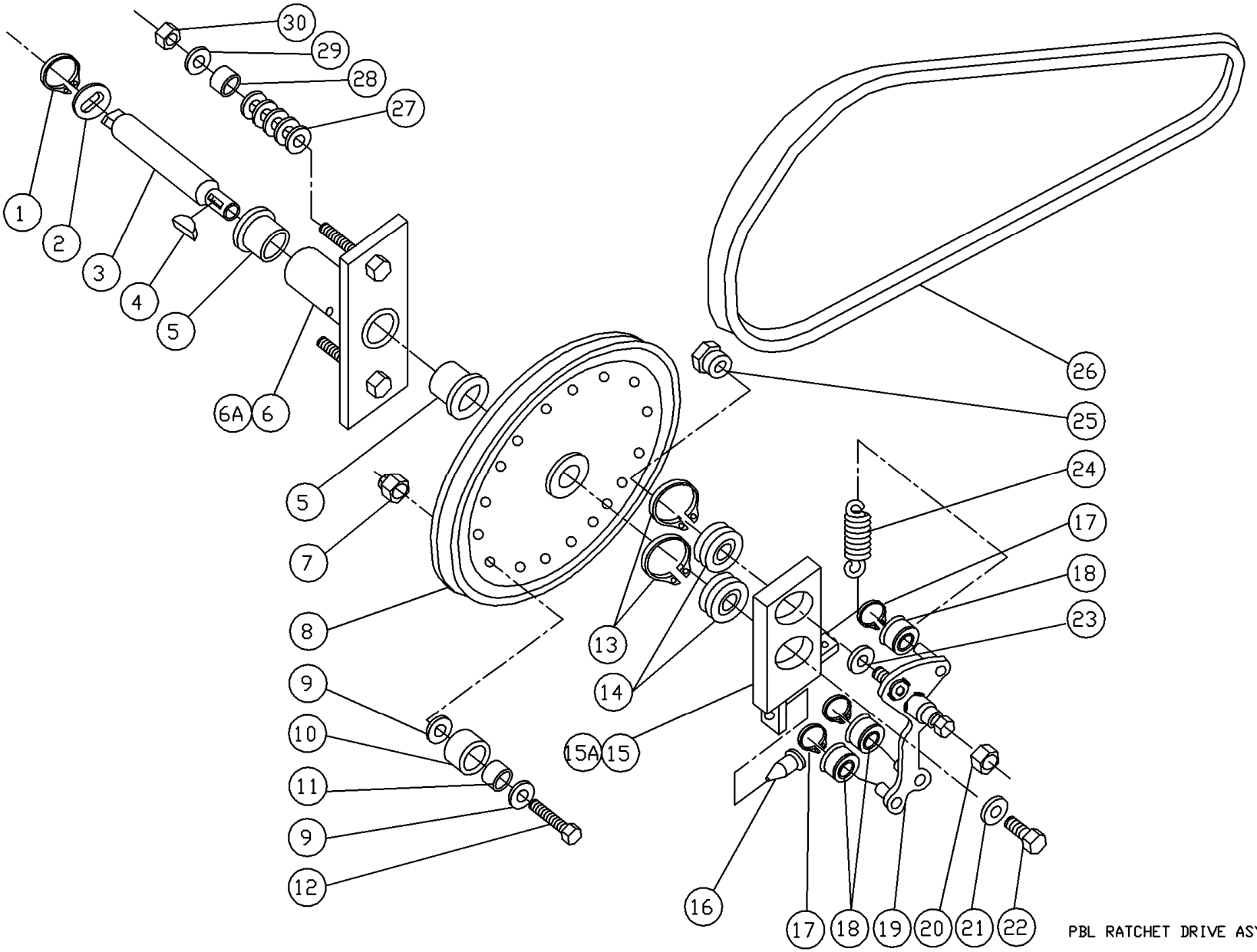
PBL RATCHET DRIVE ASSEMBLY



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PBL RATCHET DRIVE ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	1	919-005-600	RETAINING RING
2	1	070-011-028	WASHER
3	1	070-011-027	SHAFT
4	1	907-000-200	KEY
5	2	900-212-161	FLANGED BEARING, .753 X 1.003 X 1
6	1	070-011-009	BEARING HOUSING WELDMENT
6A	1	070-011-036	BEARING & HOUSING ASSY (includes 5 & 6)
7	16	839-549-002	NUT, FLEX LOCK, ¼ - 20
8	1	070-011-033	PULLEY
9	32	000-026-865	WASHER
10	16	070-011-030	ROLLER
11	16	070-011-031	ROLLER SPACER
12	16	809-849-205	SCREW, HEX, ¼ - 20 X 1¼
13	2	919-000-600	RETAINING RING
14	2	000-024-679	BALL BEARING, .625 X 1.375
15	1	070-011-013	CRANK WELDMENT
15A	1	070-011-037	CRANK ASSY (includes 13, 14, 15, & 16)
16	1	070-006-142	BUMPER
17	3	919-005-200	RETAINING RING
18	3	070-011-040	RATCHET ROLLER
19	1	070-011-217	RATCHET ARM WELDMENT
20	1	838-866-002	NUT, HEX LOCK, 3/8 - 24, THIN
21	1	947-356-617	WASHER, 5/16
22	1	809-965-125	SCREW, HEX, 3/8 - 16 X ¾
23	1	948-964-142	WASHER, FLAT, .375 X .875 X .094
24	1	070-011-032	SPRING

ITEM	QTY	PART #	DESCRIPTION
25	1	070-011-029	NUT
26	1	070-011-064	V-BELT, RATCHET DRIVE
27	0-26*	948-767-132	WASHER, FLAT, 13/32 X 13/16 X 1/16
28	2	070-008-212	SPACER
29	2	948-761-112	WASHER, FLAT, 11/32 X 11/16 X 1/16
30	2	844-057-002	NUT, STOVER LOCK, 5/16 - 18

* The number of washers used depends on the spacing between the left and right machines' kickplates. See installation drawing 610-007-043.

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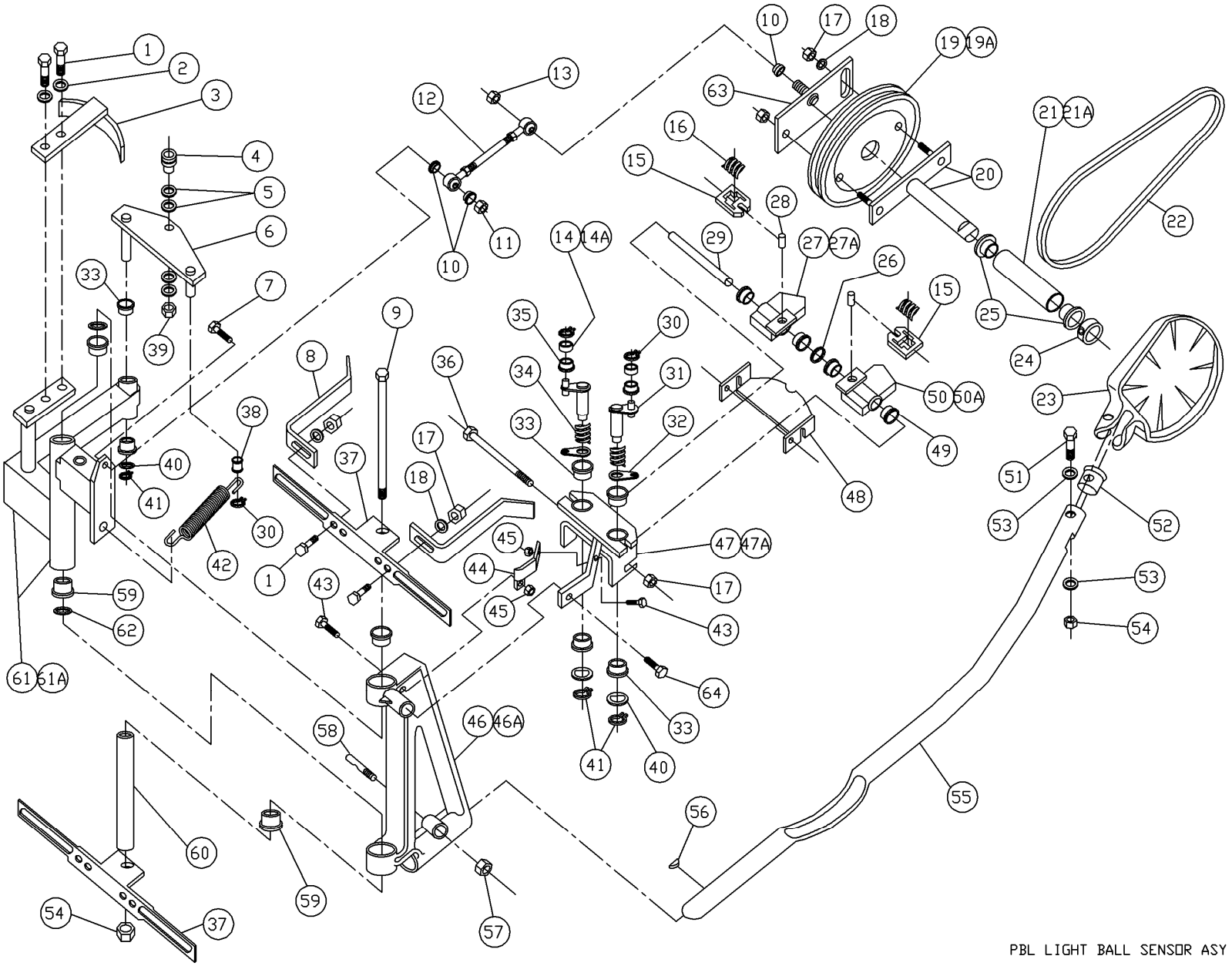
PBL LIGHT BALL SENSOR ASSEMBLY



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PBL LIGHT BALL SENSOR ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	4	809-857-165	SCREW, HEX, 5/16 - 18 X 1
2	2	000-022-869	WASHER
3	1	070-011-418	TRIP CAM
4	1	070-006-728	CAM FOLLOWER
5	4	949-100-002	WASHER, FLAT, 59/64 X 13/32 X 1/16
6	1	070-011-068	LINK WELDMENT
7	1	809-865-205	SCREW, HEX, 3/8 - 16 X 1¼
8	2	070-011-107	TRIP ARM (RESET CAM)
9	1	802-865-996	SCREW, HEX, 3/8 - 16 X 9½
10	3	000-029-611	WASHER, UNIBALL BEARING
11	1	840-065-002	NUT, FLEX LOCK, 3/8 -16, THIN
12	1	090-005-258	ROD ASSEMBLY
13	1	838-866-002	NUT, HEX LOCK, 3/8 - 24
14	2	070-011-096	ROLLER
14A	2	070-011-105	ROLLER ASSEMBLY (includes 14 & 35)
15	2	070-011-077	TRIP FINGER
16	2	722-971-522	COMPRESSION SPRING
17	4	844-057-002	NUT, STOVER LOCK, 5/16 - 18
18	3	948-761-112	WASHER, 11/16 X11/32 X 1/16
19	1	070-011-097	CRANK PULLEY
19A	1	070-011-178	RUDDER DRIVE CRANK ASSY (includes 13, 17, 18, 19, 20 & 63)
20	1	070-011-092	CRANK SHAFT WELDMENT
21	1	000-029-697	ADJUSTMENT TUBE
21A	1	000-029-696	ADJUSTMENT TUBE ASSY (includes 21 & 25)
22	1	070-011-148	V-BELT, PADDLE DRIVE, UPPER

ITEM	QTY	PART #	DESCRIPTION
23	1	070-011-146	PADDLE
24	2	000-021-423	COLLAR WITH SETSCREW
25	2	000-021-427	FLANGED BEARING, .629 X .878 X 1/8
26	1	000-027-264	SPACER
27	1	070-011-404	RUDDER CAM, R.H.
27A	1	070-011-406	RUDDER CAM ASSY, R.H. (incl. 27, 28 & 49)
28	2	913-448-120	SPRING PIN, ¼ X ¾
29	1	070-011-098	SLEEVE
30	3	919-005-200	RETAINING RING
31	2	070-011-626	TRIP ARM ASSEMBLY
32	2	070-011-273	TAB
33	6	900-208-091	FLANGED BEARING, .503 X .690 X 9/16
34	2	722-985-512	COMPRESSION SPRING
35	2	900-205-081	FLANGED BEARING, .315 X .44 X 1/2
36	1	809-857-880	SCREW, HEX, 5/16 - 18 X 5-1/2
37	2	090-007-276	BRACKET
38	1	070-011-040	RATCHET ROLLER
39	1	844-070-002	NUT, STOVER LOCK, 7/16 - 20
40	3	070-011-108	WASHER
41	3	919-005-500	RETAINING RING
42	1	000-026-031	SPRING
43	2	809-849-125	SCREW, HEX, ¼ - 20 x ¾
44	1	070-011-299	SENSOR BRACE
45	2	844-049-002	NUT, STOVER LOCK, ¼ - 20
46	1	070-011-067	RUDDER ARM SUPPORT
46A	1	070-011-066	RUDDER ARM SUPPORT ASSY (incl. 46 & 59)

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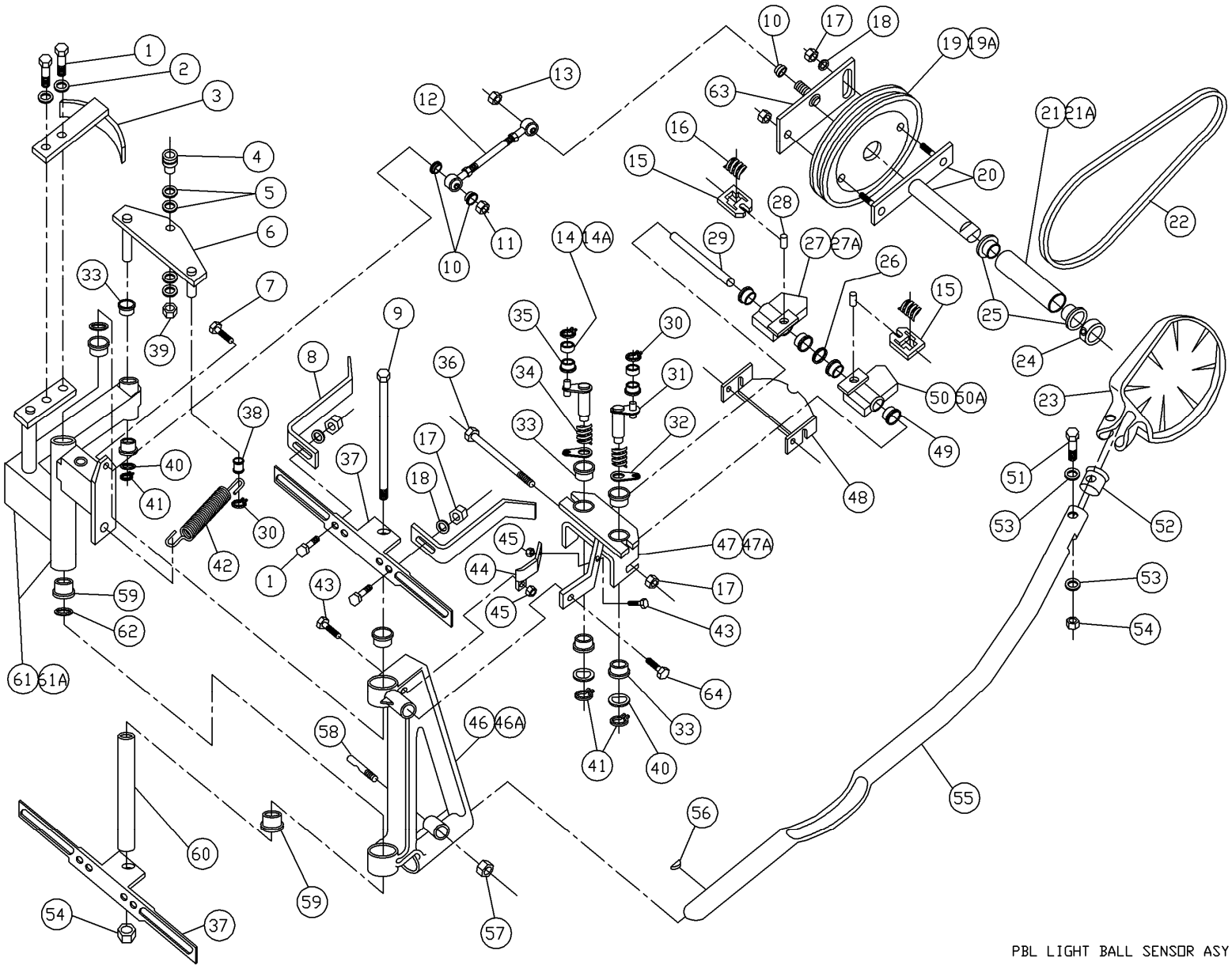
PBL LIGHT BALL SENSOR ASSEMBLY (continued)



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ITEM	QTY	PART #	DESCRIPTION
47	1	070-011-100	CAM SENSOR WELDMENT
47A	1	070-011-110	CAM SENSOR ASSY (includes 33 & 47)
48	1	070-011-099	CAM
49	4	900-208-161	FLANGED BEARING, .503 X .875
50	1	070-011-405	RUDDER CAM, L.H.
50A	1	070-011-407	RUDDER CAM ASSY, L.H. (incl. 28, 49 & 50)
51	1	809-865-405	SCREW, HEX, 3/8 - 16 X 2½
52	1	070-011-121	PLUG
53	2	948-767-132	WASHER, FLAT, 13/16 X 13/32 X 1/16
54	1	844-065-002	NUT, FLEX LOCK, 3/8 - 16
55	1	070-011-122	RUDDER ARM
56	1	907-000-900	KEY
57	1	831-573-002	NUT, HEX, 1/2 - 13
58	1	000-024-616	CLAMP STUD
59	4	900-212-201	FLANGED BEARING, .753 X 1 X 1.25
60	1	000-024-615	SHAFT
61	1	070-011-079	RUDDER DRIVE WELDMENT
61A	1	070-011-080	RUDDER DRIVE ASSY (incl. 33, 59 & 61)
62	2	070-011-151	SPACER
63	1	070-011-225	CRANK ADJUSTMENT PLATE WELDMENT
64	1	809-865-165	SCREW, HEX, 3/8 - 16 X 1

ITEM	QTY	PART #	DESCRIPTION

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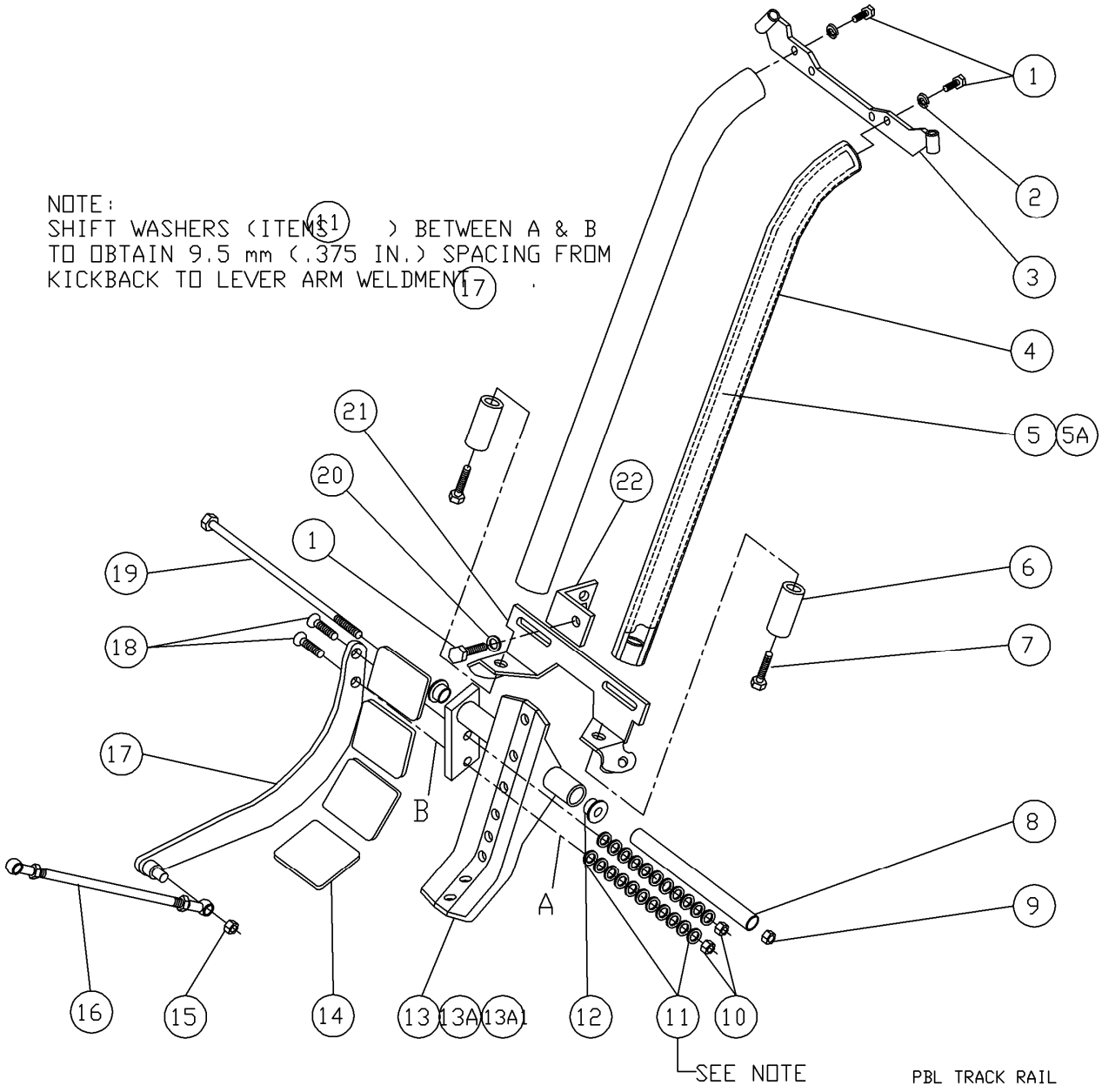
PBL TRACK RAIL ASSEMBLY



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PBL TRACK RAIL ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
1	2	809-865-165	SCREW, HEX, 3/8 - 16 X 1
2	2	951-164-002	WASHER, SPLIT LOCK, 3/8
3	1	000-021-813	WIPER SUPPORT
4	2	000-024-663	TRACK COVER
5	2	000-024-666	TRACK RAIL WELDMENT
5A	2	070-011-279	TRACK ASSEMBLY (includes 4 & 5)
6	2	070-011-018	BALL GUIDE
7	2	810-365-401	SCREW, SOCKET HEAD CAP, 3/8 - 16 X 2-1/2
8	1	070-011-063	SHAFT
9	2	844-065-002	NUT, STOVER LOCK, 3/8 - 16
10	2	844-057-002	NUT, STOVER LOCK, 5/16 - 18
11	0-22***	948-767-132	WASHER, FLAT, 13/32 X 13/16 X 1/16
12	2	900-210-161	FLANGED BEARING, .628 x 1
13	1	070-011-411	LIFT ARM WELDMENT
13A	1	070-011-412	LIFT ARM ASSEMBLY (includes 12 & 13)
13A1	1	070-011-413	LIFT ASSEMBLY (incl. 8, 9, 13A, 14, 19 & 21)
14	4	090-002-024	CRADLE LINER
15	1	838-866-002	NUT, HEX, 3/8 - 24
16	1	090-005-259	ROD ASSEMBLY
17	1	070-011-218	LEVER ARM WELDMENT
18	2	808-857-280	SCREW, FLAT HEAD, 5/16 - 18 x 1-3/4
19	1	809-865-992	SCREW, HEX, 3/8 - 16 X 9
20	1	958-584-002	WASHER, LOCK, 3/8
21	1	070-008-191	BALL LIFT BRACKET
22	1	000-024-668	TRACK SUPPORT BRACKET WELDMENT

ITEM	QTY	PART #	DESCRIPTION

***From 0 to 22 washers may be needed for spacing. See installation drawing 610-007-043.

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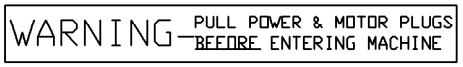
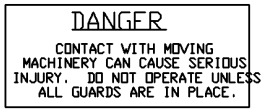
GUARDS & SAFETY LABELS

ITEM 4 "WARNING" LABEL

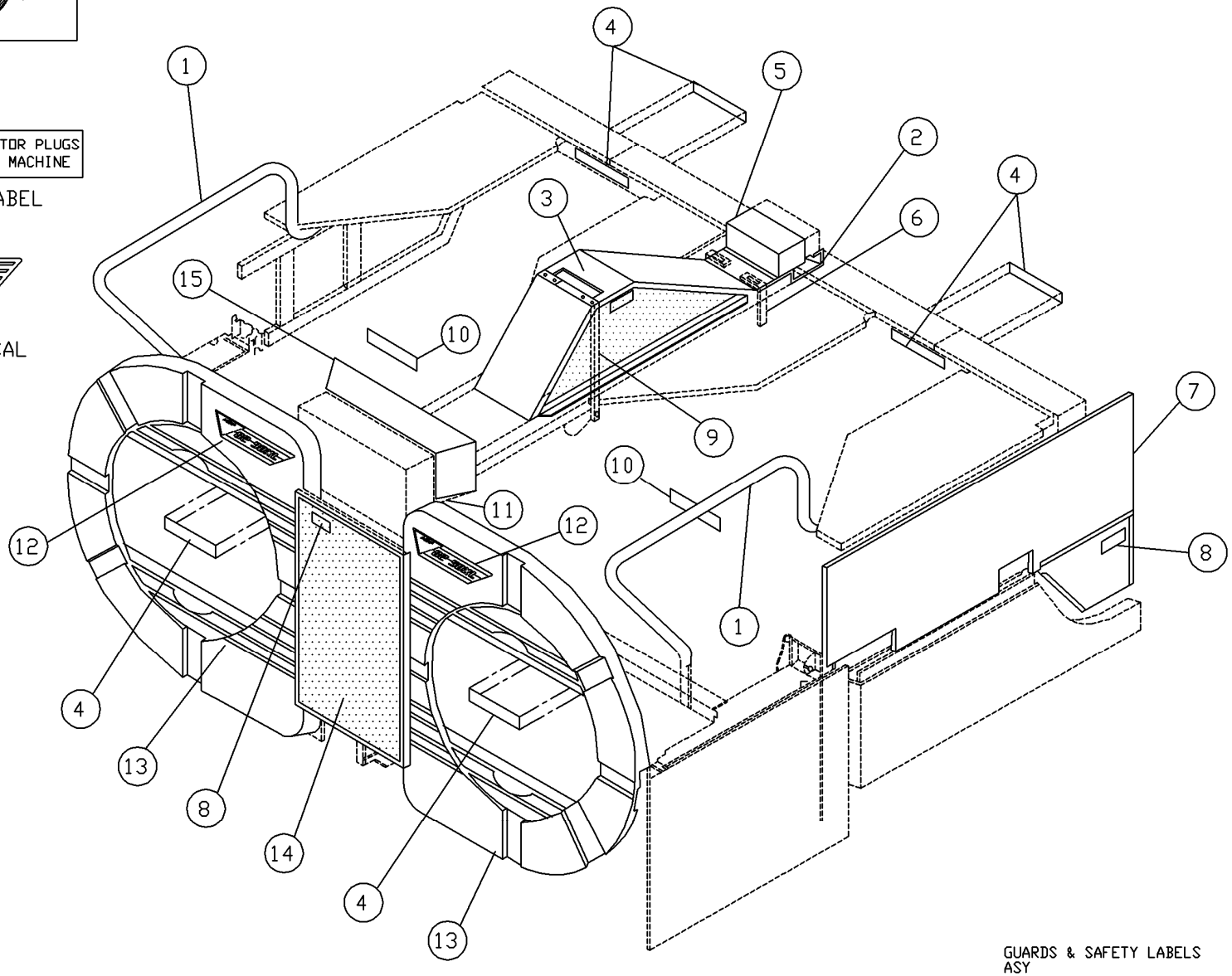


ITEM 10 "WARNING" LABEL

ITEM 12 "82-90XL" DECAL



ITEM 8 "DANGER" LABEL



GUARDS & SAFETY LABELS ASY

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ITEM	QTY	PART #	DESCRIPTION
1	2	090-005-118	HANDRAIL
2	1	090-004-709	FRONT END COVER GUARD
3	1	070-011-401	BALL LIFT GUARD WELDMENT
4	6	090-004-028	WARNING LABEL
5	1	090-004-708	FRONT END BOX COVER
6	4	070-004-691	REAR GUARD BRACKET
7	2	070-005-585	END MACHINE GUARD ASSEMBLY
8	3	070-011-211	DANGER DECAL
9	2	070-010-238	FRONT GUARD ASSEMBLY BRACKET
10	2	090-005-642	WARNING DECAL (ON YOKE)
11	1	090-004-706	CHASSIS MOUNTING BRACKET
12	2	090-008-895	82-90XL WHEEL GUARD DECAL
13	2	090-007-145	PINSPOTTER WHEEL GUARD
14	1	090-004-420	BALL LIFT GUARD, REAR
15	1	090-004-707	CHASSIS COVER

ITEM	QTY	PART #	DESCRIPTION

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SECTION 7

Attachments

CONTENTS

Attachment A - 90XL Chassis Manual

Attachment B - Pinspotter Motor & Gearbox Manual

Attachment C - AccuCam 3000 Camera Manual

Attachment D - Manager's Control Unit (MCU) Manual