

AMF

**8290XL
AUTOMATIC PINSPOTTER**

82 - 90 XL

**SERVICE & PARTS
MANUAL**

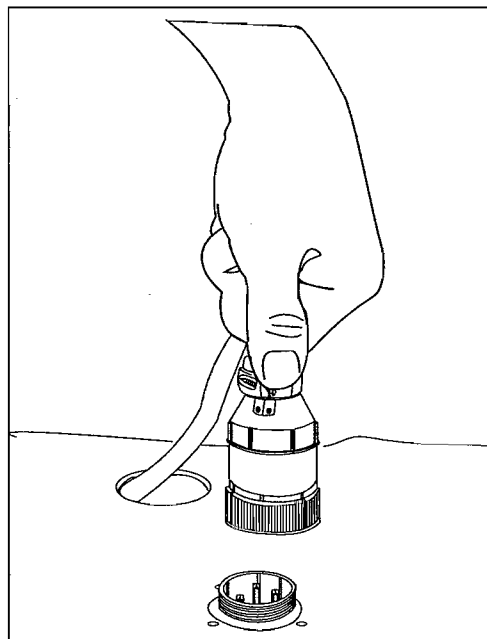
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IMPORTANT

These safety alert symbols indicate important safety messages in this manual. When you see these symbols, be alert to the possibility of personal injury and carefully read the message that follows.



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



Always DISCONNECT POWER PLUG before working on a machine.

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SECTION 1

INTRODUCTION



SECTION 1

Introduction

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1.1 HOW TO USE THIS MANUAL

The 82-90XL Pinspotter Service & Parts Manual is divided into individual sections by the section tabs. Each section includes its own Table of Contents to help the user find a topic within that section. Several sections include sub-section tabs for quick references. See illustration below.

<u>Section Tab</u>	<u>Sub-Section Tab</u>
Section 1 - Introduction	1.1 Introduction
Section 2 - Safety	2.1 Safety
Section 3 - General Operations	3.1 Pinspotter Mechanical Operation 3.2 Pinspotter Electrical Operation
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A complete Table of Contents of all sections is provided at the beginning of this manual and a Main Index can be found at the end.

1.2 THE AMF FAMILY OF COMPANIES

The AMF Family of Companies is a world-wide manufacturing and operating company with over 7,500 employees in the United States and overseas. The company is comprised of six separate operating companies.

1. **AMF Bowling Products, Inc.** manufactures equipment for the bowling industry. Products include automatic scorers, pinspotters, ball returns, seats, pins, lanes, balls, bags and other consumer products. Organizationally it has divisions: Advanced Technology and Scoring, Performance Equipment Division, and Consumer and Support Products, which are located in Richmond, Virginia while Pins and Lanes located in Lowville, New York. There are ten international branches: Australia, Canada, France, Germany, Hong Kong, Japan, Mexico, Spain, Sweden and the United Kingdom. Over 50% of sales are international. AMF Bowling Worldwide, Inc., the parent company, is headquartered in Richmond, Virginia. The headquarters for international operations is in Hemel Hempstead, England.
2. **AMF Bowling Centers, Inc.** owns and operates bowling centers worldwide. Its overseas operations are in Australia, France, Hong Kong, Japan, Mexico, Spain, Switzerland, and the United Kingdom. It is the world's largest operator of bowling centers and is headquartered in Richmond, Virginia.



DRAWING #1.1



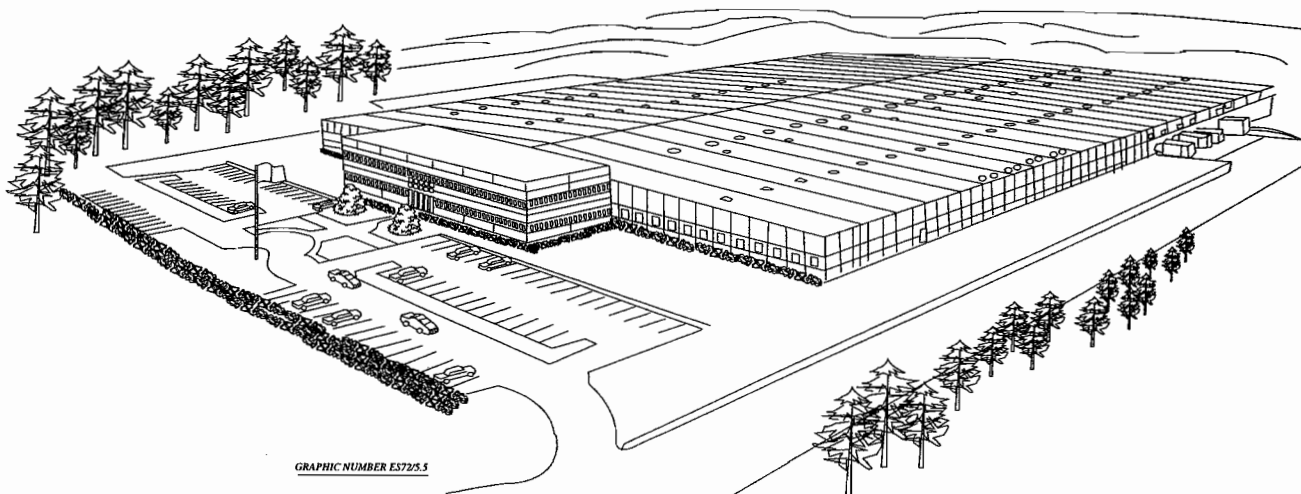
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1.3 AMF BOWLING, INC.

- In 1936 the pinspotter was invented by Fred Schmidt, an inventor from New York.
- In 1957 the AMF Pinspotter became the first automated pinspotter machine to be installed and used by bowlers at the ABC Championship in Forth 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, and manufacturing facilities to their current location, a new 375,000 square foot, 70 acre facility in Richmond, Virginia.

The company also has a manufacturing facility in Lowville, New York which manufactures bowling pins and lanes, along with sales and installation offices throughout the world.

- Today AMF Bowling is a world-wide bowling manufacturing and operating company with over 600 employees in the United States and overseas.



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DRAWING #1.2

1.3.1 AMF BOWLING'S COMMITMENT TO QUALITY

When you make a commitment to AMF, you get a commitment from AMF. A commitment to see that you get the best. The best equipment, the best engineering, the best technology and the best service in the industry today.

By having manufacturing, engineering, distribution and operations all under one roof, AMF is uniquely positioned to provide the finest in products and services for the bowling industry.

1.3.2 AMF BOWLING'S COMMITMENT TO CUSTOMER SERVICE

AMF's commitment to our customer doesn't stop after the sale. AMF's Worldwide Customer Service Operation is the best in the industry! If you have a question or concern, call us at one of the following numbers:

1.	<u>82-90XL Pinspotter & Concept 90 Products:</u>	<u>In the U.S.</u>	<u>Outside the U.S.</u>
	Technical Support	1-800-342-5263	804-730-4000
	Worldwide Customer Service Operations	1-800-342-5263	804-730-4000
2.	<u>Automatic Scoring Products:</u>		
	Technical Support	1-800-342-5263	804-730-4000
3.	<u>82-30 and 82-70 Pinspotters:</u>		
	Technical Support	1-800-342-5263	804-730-4000
4.	<u>Consumer Products:</u>		
	Parts Replacement	1-800-342-5263	804-730-4000

Whenever you call AMF, our support staff is committed to serving you. We promise to listen to your problem and do it with a **SMILE**.

SECTION 2

SAFETY



SECTION 2

Safety

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2.1 GENERAL SAFETY GUIDELINES AND SYMBOLS



AMF feels strongly about their 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.

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 the purpose.

It is important to note that this manual contains various symbols



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

The  **DANGER** symbol indicates a life threatening possibility or the risk of personal injury. The  **WARNING** symbol indicates

that damage to the machine or personal injury may occur. The

 **CAUTION** symbol represents the possibility that improper

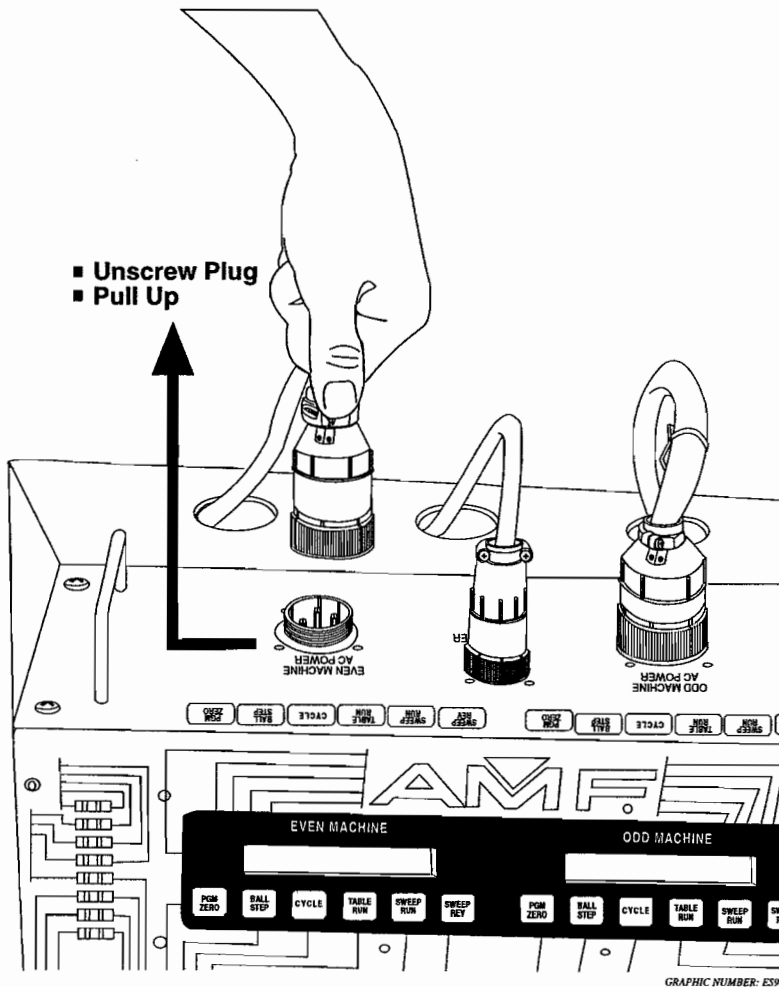
service or repair may damage the pinspotter.

It is also important to understand that these symbols are not exhaustive, 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 POWER PLUG** before working on any pinspotter equipment and before entering an operating portion of a pinspotter. See Drawing #2.1
2. Be sure all safety guards are securely in place before operating a pinspotter.
3. Wait a minimum of 60 seconds after removing power plug before removing any PC boards or contacting any electrically charged pinspotter components.
4. Never alter pinspotter safety mechanisms or wiring.



DRAWING #2.1

2.3 SAFETY GUARDS & 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 power plug before working on pinspotter.**
- 2. Remove all guards.**
- 3. Once maintenance is complete, replace all guards.**
- 4. Reconnect power plug.**

There are eleven safety guards on a pair of 82-90XL Pinspotters:

1. Front End Box Cover Guard
2. Front End Cover Guard
3. Rear Bracket Guard
4. Front Bracket Guard
5. End Machine Side Guard
6. Back End Screen Guard
7. Pin Elevator Wheel Guard
8. Back End Motor Chassis Mounting Bracket Cover Guard
9. Ball Lift Guard Weldment
10. Hand Rail
11. Wing Guard

See Drawing #2.2 for location of these important safety guards.

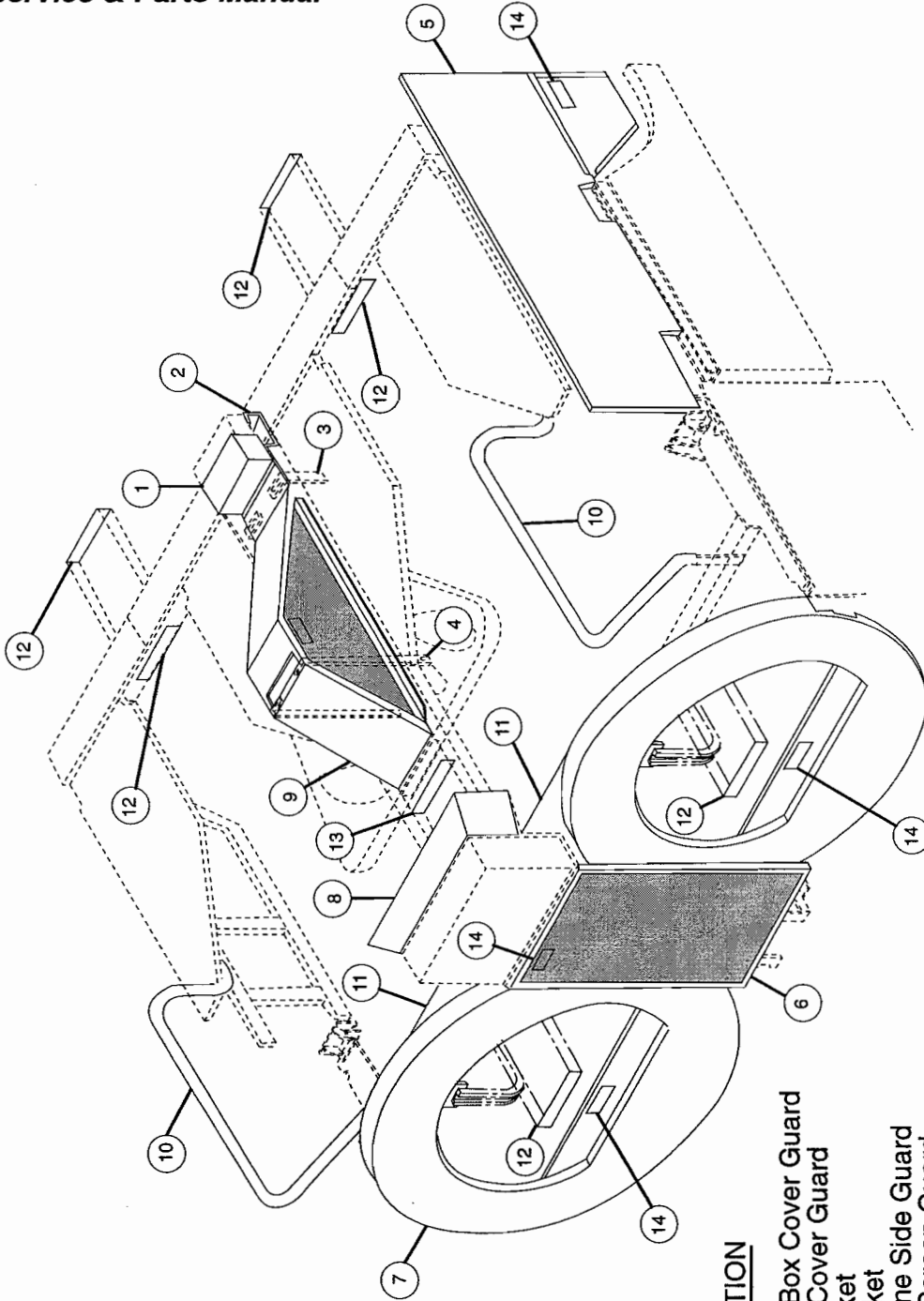
2.3.2 SAFETY LABELS

A pair of 82-90XL Pinspotters displays five  **DANGER** labels

and seven  **WARNING** labels. See Drawing #2.2 for

placement of these labels.





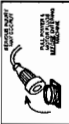
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DANGER
 MAINTENANCE AND REPAIR WORK
 SHOULD BE DONE BY A QUALIFIED
 PERSON. ALL GUARDS ARE IN PLACE.

ITEM 14 "DANGER" LABEL

WARNING - FULL POWER & MOTOR PLUGS
 BEFORE ENTERING MACHINE

ITEM 13 "WARNING" LABEL



ITEM 12 "WARNING" LABEL

ITEM	QTY	DESCRIPTION
1	1	Front End Box Cover Guard
2	1	Front End Cover Guard
3	2	Rear Bracket
4	1	Front Bracket
5	2	End Machine Side Guard
6	1	Back End Screen Guard
7	2	Pin Elevator Wheel Guard Assembly
8	1	Back End Motor Chassis Mounting Bracket Cover Guard
9	1	Ball Lift Guard Weldment
10	2	Hand Rail
11	2	Wing Guard
12	7	"WARNING" Label #1
13	1	"WARNING" Label #2
14	5	"DANGER" Label

DRAWING #2.2

SECTION 3

GENERAL OPERATIONS



SECTION 3

General Operations

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3.1 PINSPOTTER MECHANICAL OPERATIONS



3.1 PINSPOTTER MECHANICAL OPERATIONS

3.1.1 FOUR BASIC PINSPOTTER FUNCTIONS

The 82-90XL Pinspotter has four basic functions:

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

3.1.2 FIVE BASIC PINSPOTTER CYCLES

The 82-90XL 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

For further detail on the five basic pinspotter cycles, see Appendix C.

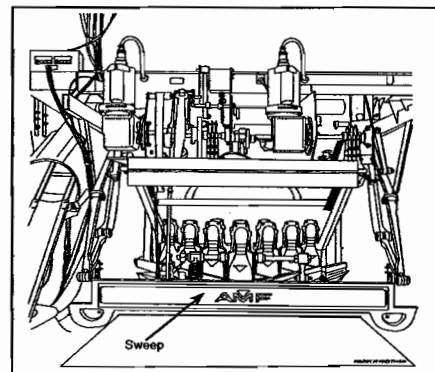
3.1.3 EIGHT BASIC PINSPOTTER COMPONENTS

1. Cushion

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

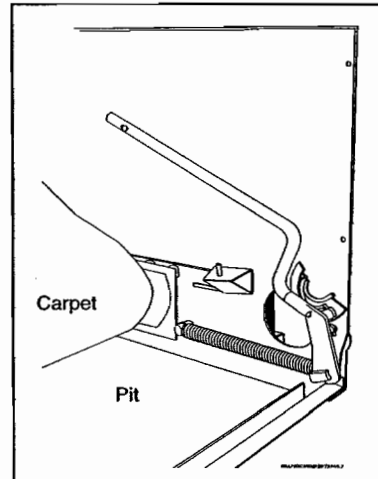
2. Sweep

The primary function of the sweep is to remove fallen pins from the lane. It also is a guard and prevents balls from striking the table while spotting or respotting pins.



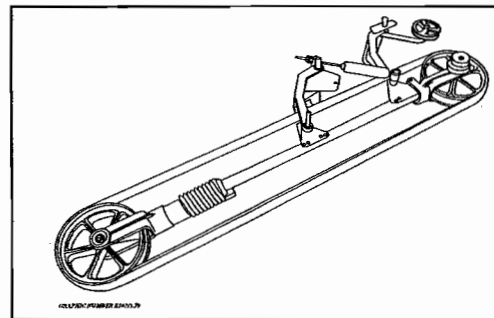
3. Carpet and Pit

The carpet is a belt which carries fallen pins to the pin elevator wheel, where they are elevated to the distributor. The underlying pit provides support for the pins and guides the ball to the opening of the ball return.



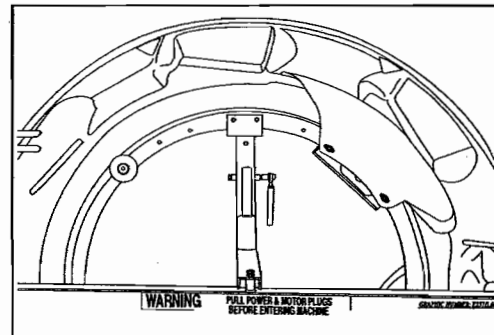
4. Ball Lift

The ball lift carries the ball from the machine high enough to permit a gravity return. The ball lift is mounted in the middle of a pair of machines.



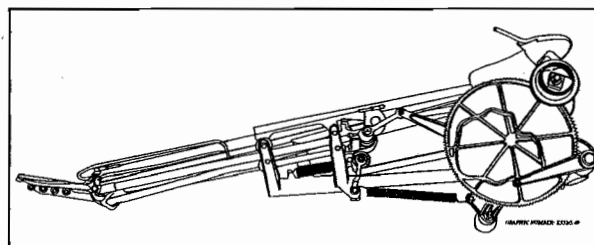
5. Pin Elevator Wheel

The pin elevator wheel carries the pins from the pit area and delivers them to the distributor.



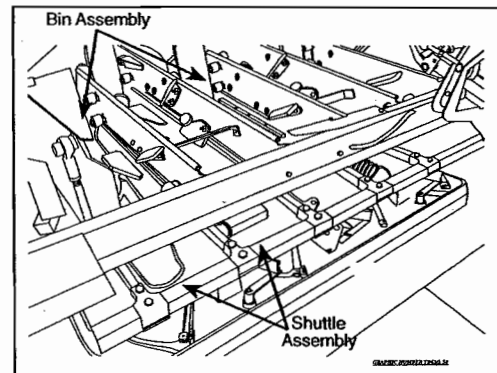
6. Distributor

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



7. Bin and Shuttle Assembly

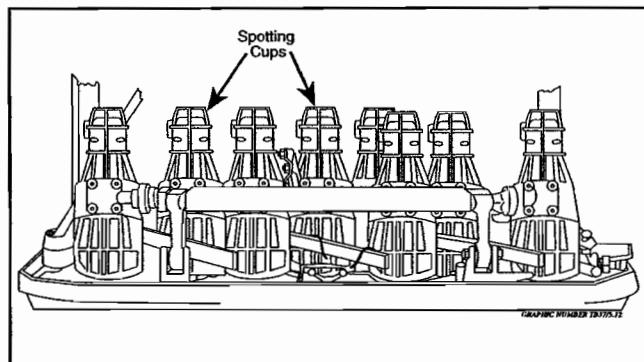
The bin stores pins received from the distributor until ready for spotting. The shuttle drops pins onto the table. Two sets of pins can be stored in the bin assembly until required.



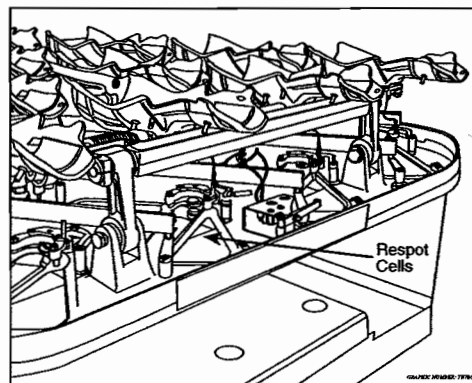
8. Table

The table performs its spotting and respotting functions by employing two component assemblies:

- A. The **yoke assembly** supports the ten spotting cups.



- B. The **table assembly** houses the ten respot cell assemblies.



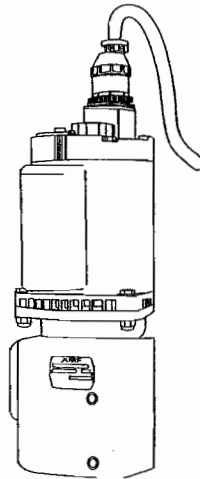
**3.2 PINSPOTTER ELECTRICAL
OPERATIONS**



3.2.1 PINSPOTTER ELECTRICAL FUNCTIONS**3.2.1.1 MOTORS**

The machine employs three capacitor start induction motors. All three motors are fractional horsepower units. These motors operate on either 120v or 240v and are available in 50 hz or 60 hz depending on the electrical supply in the area. All motors have gear reducer units attached.

1. Two of the three motors are mounted in the front end and operate the table and sweep. These motors operate intermittently as required. Table and sweep motors are interchangeable



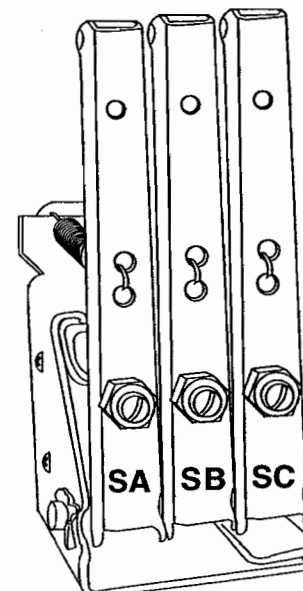
2. The third motor is mounted on the back end and supplies power to drive the pin elevator, the carpet, ball lift and distributor. It runs continuously.

3.2.1.2 SWITCHES**1. SWEEP CAMS**

The sweep is controlled by three cams & switches:

1. The SA cam & switch determines the second guard & home position of the sweep.
2. The SB cam & switch determines the first guard position of the sweep.
3. The SC cam & switch determines the interference zone of the sweep with the table.

These switches turn the motor on and off. The motor stays on until the SA, SB or SC cam moves to the end position, releasing the switch and turning the motor off.

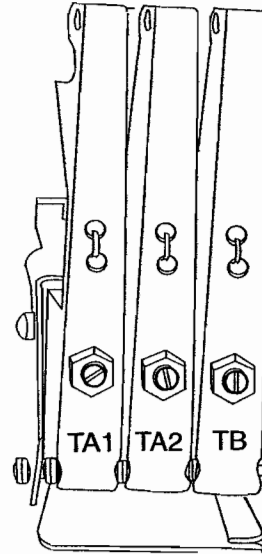


2. TABLE CAMS

The table is also controlled by cams & switches:

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

These switches turn the motor on and off. The motor stays on until the TA1, TA2 or TB cam moves to the end position, releasing the switch and turning the motor off.



3.2.1.3 OTHER SWITCHES

1. The Gripper Protection (GP) Switch (Part #000-026-042)
An electro-mechanical switch that actuates when all of the grippers are completely opened. Its purpose is to prevent the table assembly from being damaged during malfunction. See Section 5, Drawing #5.12 for location.
2. The Off Spot (OP) Switch (Part #000-026-042)
An electro-mechanical switch that actuates when the table engages a pin that's moved beyond the normal respot range of the table. Its purpose is to prevent the machine from damage if an off spot condition occurs. See Section 5, Drawing #5.17 for location.
3. The Ball Trigger
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 3.2.5 for information on the Ball Detector.
4. GS 1 through GS 10 (Part #070-002-570)
Electro-mechanical switches that actuate when the grippers close on a pin which is left standing. Its purpose is to operate circuits that indicate which pins are left standing for machine cycle and for pindication reasons. See Section 5, Drawing #5.14 for location.

5. **The Bin Switch (BS) (Part #000-026-043)**
An electro-mechanical switch which actuates when the #9 pin (the last pin delivered by the bin) is delivered into the bin. Its purpose is to allow the machine to spot pins only when the bin is full. See Section 5, Drawing #5.20 for location.

3.2.1.4 PROTECTION DEVICES

In addition to the circuit breakers used on the machine, the back end motor, table motor and sweep motors are all protected by thermal overload switches. This switch, indicated by a red button, is located on each motor and is referred to as a Klixon.

3.2.1.5 MACHINE PIT TIME DELAY

On the Manager's Control Unit (MCU) or Advantage Front Desk, when the "OFF" button is pushed, all functions and motors, except the back end motor, become inoperative. A time delay allows these units to operate approximately another 60 seconds to enable all of the pins in the pit to be delivered to the bin cups. (Machine pit time delay is built into the chassis).

3.2.1.6 FRAME COUNTERS

A frame count is provided for the manager's convenience so that he or she can determine the number of frames bowled. This count is kept in the Manager's Control Unit (MCU). This unit is located at the manger's control desk. See Section 3.2.4 for MCU instructions.

3.2.1.7 BOWLER'S PIT SIGNAL SYSTEM

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 bowlers' push button is located on the ball return. The control box is mounted in between the machines near the pin elevator. This box contains one low voltage control relay, a momentarily operated light switch.

3.2.1.8 TENTH FRAME BUTTON

The tenth frame button, located on the ball return, is provided to cycle the machine when required. In the event that scoring is not available and pins are left standing after the bowler has completed his/her game, the tenth frame button must be operated to signal the machine to set up the next bowler.



3.2.2 82-90XL PINSPOTTER CHASSIS

3.2.2.1 CHASSIS OPERATION

The 82-90XL Pinspotter Chassis is designed to operate a pair of 82-90XL pinspotters. Throughout this manual, all descriptions of machine operation pertain equally to either lane. Some key features of the chassis are listed below:

1. The chassis is located at the rear of the Pinspotter with the main power input connected to the chassis. (One chassis controls one pair of pinspotters).
2. A single high performance microcontroller controls both lanes simultaneously. Software updates are provided by an externally accessible EPROM circuit board.
3. A battery back-up allows the controller to maintain key operational data when power is removed. This includes frame count, programmed lane number, machine state, etc.
4. Alphanumeric displays for each lane provide monitoring of the pinspotter operation and allow programmable data to be entered.
5. Manual operation of key machine functions are provided via a switch panel or keypad.
6. Circuit breakers and power switches are provided on the operator panel.
7. The chassis communicates with the Manager's Control Unit via a serial communication link. Communications with the Accuscore Curtain Wall Chassis are also supported.
8. The chassis is linked to the Front End Box and allows manual operations of key machine functions.



NOTE: Refer to Appendix C for the chassis and machine cabling schematic.

Please refer to the Pinspotter Chassis Manual for further information.

3.2.2.2 82-90XL PINSPOTTER CHASSIS INSTALLATION**BEFORE INSTALLING THE UNIT:**

*** Make certain that all power cables to the unit are switched OFF at the main breaker box.**

*** Be sure to follow ALL installation directions carefully.**

1. Mount the chassis on the shelf provided at the rear of the unit with the screws and shock mounts provided by AMF.
2. **BE SURE** the ground strap between the chassis and the machine frame is attached and well-grounded.
3. Make certain that all power switches on the chassis are in the OFF position.
4. Connect the input power cables to the connectors located on the top of the chassis as follows: See Drawing #3.1 for location.
 - a) Odd machine AC power cable to the ODD MACHINE AC POWER connector.
 - b) Even machine AC power cable to the EVEN MACHINE AC POWER connector.
 - c) AC logic power cable to LOGIC AC POWER connector.
5. Install the machine cables onto the connectors on the rear of the chassis as described below: See Drawing #3.2 for location.
 - a) Odd machine power cable at the ODD MACHINE POWER connector.
 - b) Even machine power cable to the EVEN MACHINE POWER connector.
 - c) Odd machine signal cable to the ODD MACHINE connector.
 - d) Even machine signal cable to the EVEN MACHINE connector.
 - e) Front End Box cable to the FRONT END connector.
 - f) Odd Machine Back End cable to the ODD BACKEND MOTOR connector.
 - g) Even Machine Back End cable to the EVEN BACKEND MOTOR connector.



6. Connect the Mask Cables to the connectors on the rear of the chassis as follows: See Drawing #3.2 for location.
 - h) For Pindication Masks, connect the Odd Mask cable to the ODD MASK connector.
 - i) For Pindication Masks, connect the Even Mask cable to the EVEN MASK connector.
 - j) For Strike/Foul Masks, connect the single Mask cable to the ODD MASK connector.

7. Connect the cable from the AccuScore Curtain Wall Chassis to the rear of the chassis as follows: See Drawing #3.2 for location.
 - k) Connect the AccuScore Plus CWC cable to the APS connector.

8. Connect the serial communications cables to the connectors on the rear of the chassis as follows: See Drawing #3.3 for location.

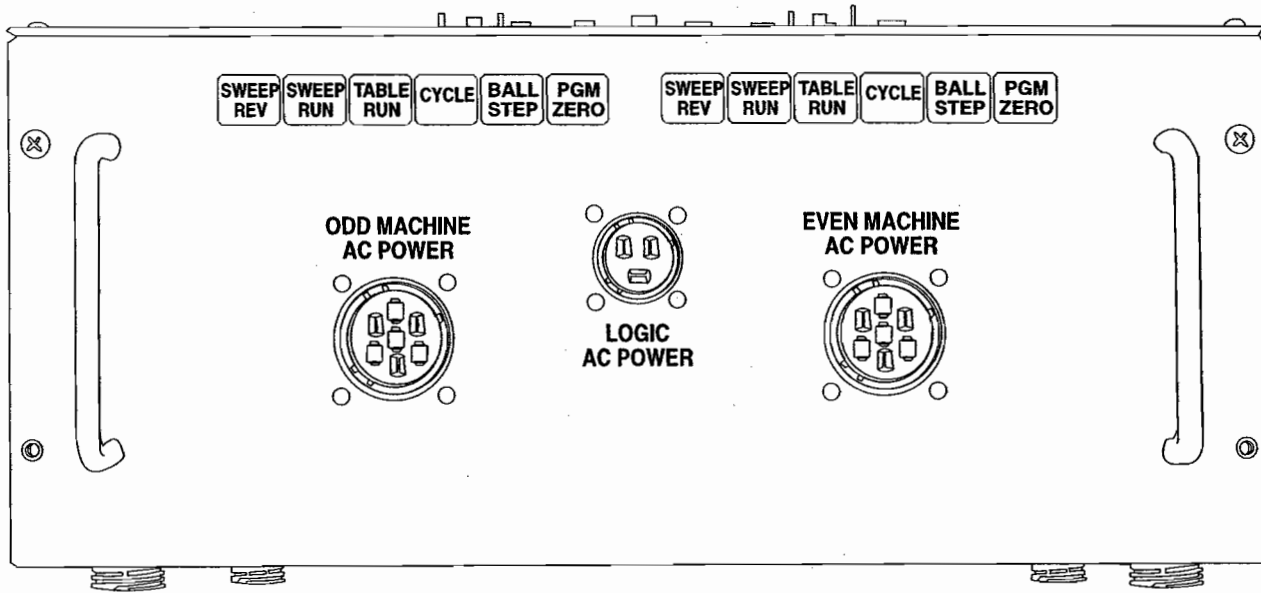


Note: The capacity of a single communication line is 25 pairs (50 lanes). Centers with more than 25 pairs requires an additional communication line.

- 1) If the lane pair is the first of a group of 25 pairs (50 lanes):
 - a) Connect the serial cable from the Manager's Control Unit to one of the chassis connectors labeled RS485.
 - b) Connect one end of the serial jumper cable to the other remaining chassis connector labeled RS485.
 - c) Connect the other end of the serial jumper cable that goes to the next chassis to the next pair's rear chassis connector labeled RS485.

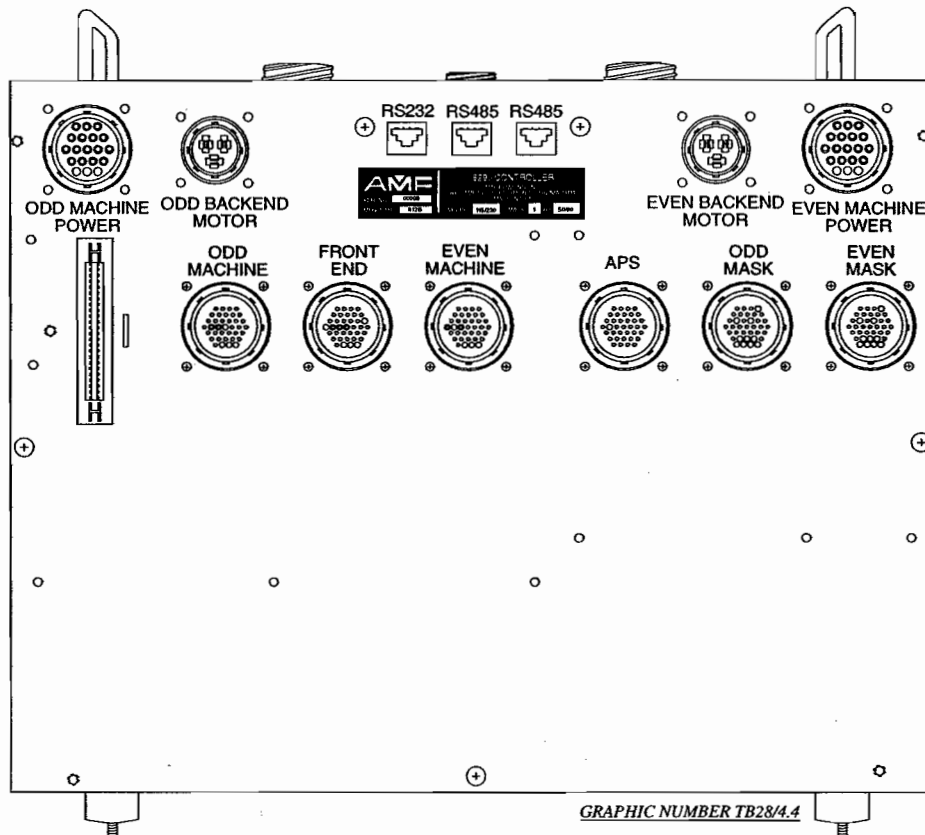
- 2) If the lane pair is neither the first or last of a group of 25 pairs:
 - a) Connect the serial cable from the previous chassis to one of the next chassis connectors labeled RS485.
 - b) Connect the serial jumper cable to the other remaining chassis connector labeled RS485.

- 3) If the lane pair is the last of a group of 25 pairs or if it is the last lane pair in the house:
 - a) Connect the serial cable from the previous chassis to one of the next chassis connectors labeled RS485.
 - b) Install the termination cable into the other remaining chassis connector labeled RS485.



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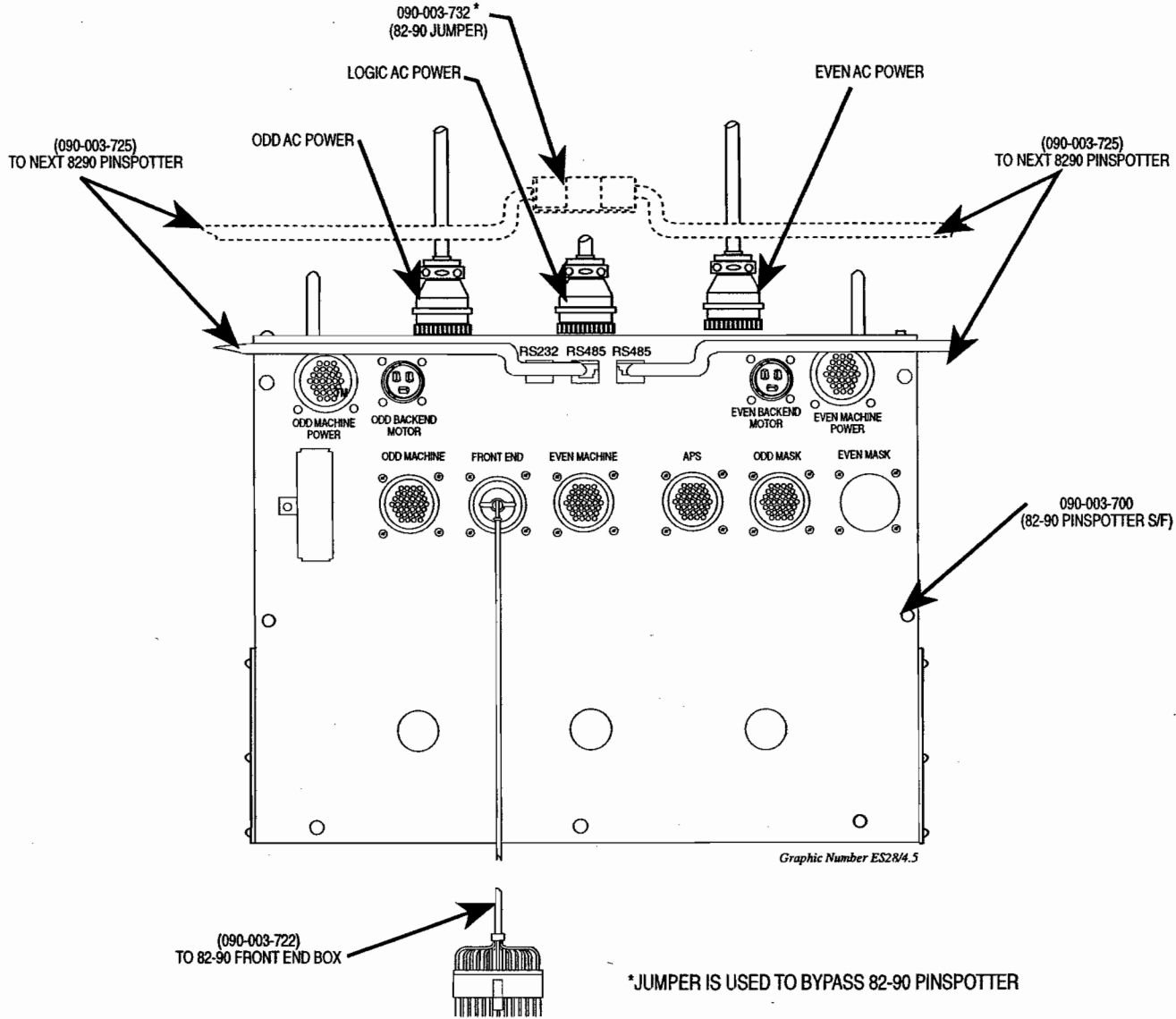
DRAWING #3.1



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DRAWING #3.2





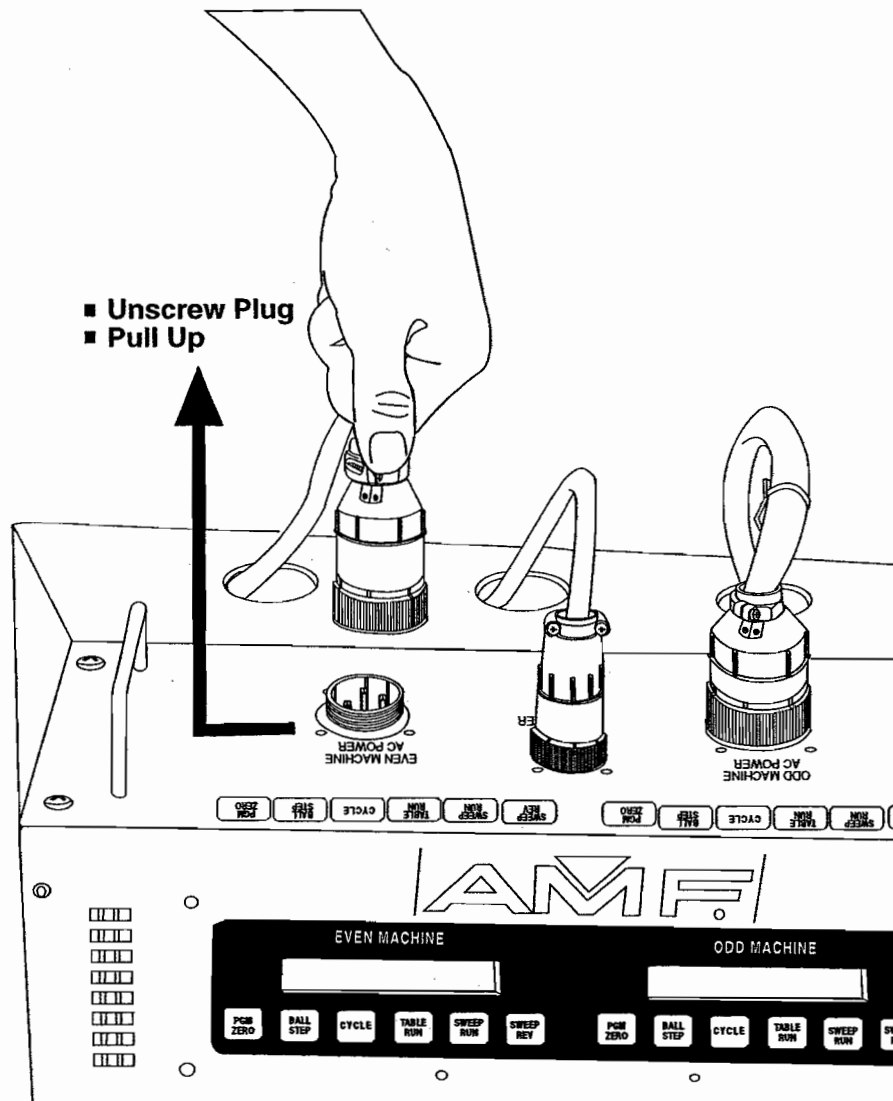
DRAWING #3.3

**3.2.2.3 82-90XL PINSPOTTER CHASSIS
CONTROL PANEL OPERATIONS**



WARNING

ALWAYS REMOVE THE POWER PLUG WHEN WORKING ON THE PINSPOTTER OR BEFORE ENTERING ANY OPERATING PORTION OF THE PINSPOTTER.



GRAPHIC NUMBER: ES9

DRAWING #3.4



1. POWER SWITCHES/CIRCUIT BREAKERS

A. EVEN / ODD POWER

These switches are the AC power input circuit breakers for the even and odd machines. These switches interrupt AC power to the machine but do not turn off logic (chassis) power.

These switches should be switched to the "OFF" position anytime the lanes are being serviced. The safety pin should be used to prevent inadvertent resetting of these switches.

This breaker can also be switched OFF via the Emergency Power Off switch located on the Front End Box.



NOTE: Anytime this breaker trips, the machine should be carefully checked to determine the cause of any problems and to guarantee proper corrective action has been taken before power is re-applied.

B. EVEN / ODD MASK

This circuit breaker interrupts all power to the Even / Odd machines' mask lights.

C. CHASSIS POWER

This breaker interrupts the AC power to the logic supply that powers the electronics within the chassis.

2. MOTOR CONTROL SWITCHES

D. SWEEP

This switch disables the sweep motor when in the "OFF" position. In the "ON" position the motor operates normally.

E. TABLE

This switch disables the table motor when in the "OFF" position. In the "ON" position the motor operates normally.

F. BACK END (BE)

This switch disables the back end motor when in the "OFF" position. In the "ON" position the motor operates normally.

3. MODE SWITCH (3 positions)**G. MANUAL**

In this position, the machine is manually switched on and cannot be operated from the Manager's Control Unit (MCU).

H. NORMAL

In this position, the machine can be turned on / off by the Manager's Control Unit.

I. DIAG

In this position, special diagnostic capabilities are accessible. The unit cannot be operated from the Manager's Control Unit in this setting.

4. KEYPAD SWITCHES**NOTE:**

When the "lock out" signal from the cam switch on the machine is detected, the table and sweep motors will not operate manually.

These keypad switches have alternate functions as described under Special Programming (Section 3.2.2.4).

J. PGM ZERO

This switch returns the machine to the state where it is awaiting a ball.

K. BALL STEP

This switch toggles the cycle state between ball 1 and ball 2.

L. CYCLE

This switch causes the machine to execute a ball cycle.

M. TABLE RUN

This switch causes the table to operate as long as it is depressed.

N. SWEEP RUN

This switch causes the sweep to operate as long as it is depressed.

O. SWEEP REV

This switch causes the sweep to operate in reverse as long as it is depressed.



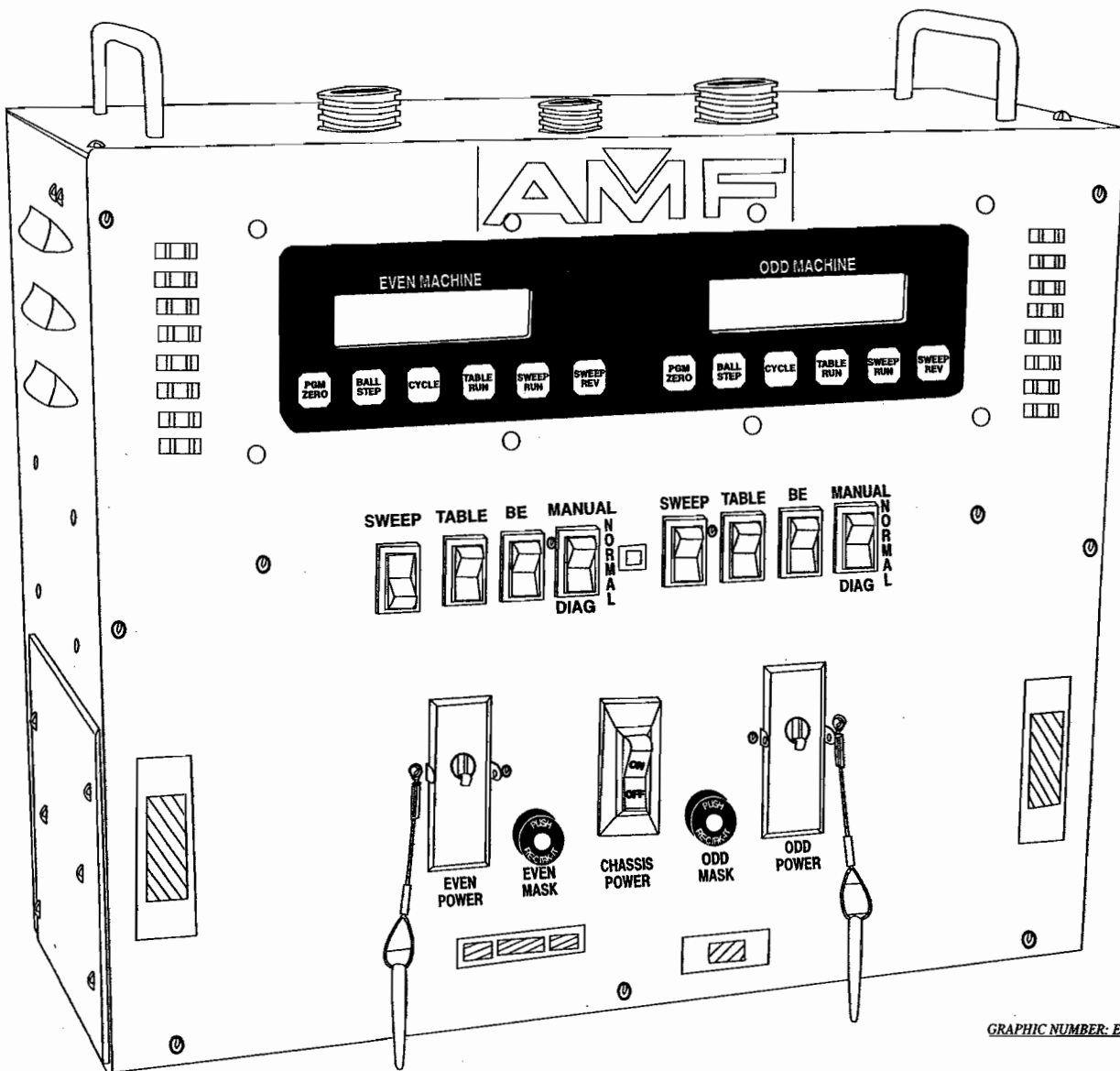
5. DISPLAY

P. EVEN MACHINE / ODD MACHINE

The liquid crystal display (LCD) allows the mechanic to monitor the machine. The display provides prompting to and displaying of programmable parameters including lane number and programmable ball detector delays.



NOTE: All control panel switches are located on Drawing #3.5.



GRAPHIC NUMBER: ES10

DRAWING #3.5

**3.2.2.4 82-90XL PINSPOTTER CHASSIS
SPECIAL PROGRAMMING****1. SETTING THE LANE NUMBER**

The lane numbers for both the odd and even machines must be entered before the chassis will communicate properly with the Manager's Control Unit (MCU). All lanes connected to a single MCU must have unique numbers.

- A. Press both PGM ZERO keys on the chassis keypad for 5 to 10 seconds until the display changes to the Lane Number Setup screen. The screen shows the proper buttons to press to set the lane numbers:
 - a) Press the SWEEP REV key to increment the "ones" digit on the lane number.
 - b) Press the SWEEP RUN key to increment the "tens" digit on the lane number.
 - c) Press the TABLE RUN key to increment the "hundreds" digit on the lane number.
- B. After setting the lane numbers, press the BALL STEP key to get out of the Lane Number Setup screen or the chassis will automatically exit if no key is pressed within 20 seconds.

2. RESETTING THE INTERNAL FRAME COUNTER

The internal frame counter for each lane counts the number of times the machine has cycled since the frame counter was last reset. It is intended for maintenance purposes only.

- A. In order to reset this counter, press both PGM ZERO keys on the chassis for 5 to 10 seconds.
 - a) Press the CYCLE key to reset the frame counter for the respective lane.

3. SETTING THE BALL DETECTOR DELAY

The ball detector delay should be programmed into each lane when the ball detector head is set in Mode 1 and the ball detector head is mounted in front of the sweep down position.



NOTE: Only ball detector heads marked Version 2 or higher are capable of Mode 1 operation.



- A. Press both BALL STEP keys on the chassis keypad for 5 to 10 seconds until the display changes to the Program Ball Delay Mode.
 - a) Press the SWEEP REV key to increment the delay count (range is 0 to 20).
 - b) Press either BALL STEP key to exit.

The default setting is set to zero delay, which should be used when the sweep operation interrupts the ball detector beam or when Mode 1 of the Ball Detector is selected. However, anytime a chassis is installed, the delay setting should be set.

3.2.2.5 82-90XL PINSPOTTER CHASSIS SYSTEM MESSAGE

The display provides a series of messages indicating machine operations. It is intended to allow monitoring of the unit during normal operation, as well as assist the operator when a problem occurs.

1. SOFTWARE VERSION IDENTIFICATION

When the logic (chassis) power is first turned on, the display will provide the date and version number of the software contained in the EPROM board. The message will appear for approximately 4 seconds.

2. FIRST LINE DISPLAY MESSAGES

The following messages appear on the first line of the display, depending on the state of the machine.

- A. **Crash** - Sweep and table in interference position, motors will not run.
Table motor off - Table motor switch in "OFF" position, or mask switch in "OFF" position.
Sweep motor off - Sweep motor switch in "OFF" position.
Test switch on - Mode Select Switch in diagnostic position.
Waiting for ball 1 - Machine awaiting detected ball.
Waiting for ball 2 - Machine awaiting detected ball.
Run sweep down - Sweep cycle active and conditions normal.
Gripper protect - Gripper protect error condition detected.
Sweep Down - Sweep going to first guard

Ball 1 - In Ball 1 cycle.
Ball 1 Timed delay - ball detected, sweep dropped and pausing.
Ball 1 foul - Foul detected in Ball 1 cycle.

General Operations

Strike - Strike detected.

Ball 1 pick - 7 or 10 pin down or gutter ball, short cycling machine.

Ball 1 wait table - Normal Ball 1 cycle, cycling table.

Ball 2 - In Ball 2 cycle.

Ball 2 timed delay - Ball detected, sweep dropped and pausing.

Ball 2 foul - Foul detected in Ball 2 state.

Offspot table up - Offspot condition detected, table going up.

Offspot table home - Offspot condition detected, table at home.

Offspot complete - Offspot cycle complete.

3. Second Line Display Messages

The following messages appear on the second line of the display. They appear with line one messages in all appropriate combinations.

- A. **Sweep to spot position** - Sweep going to or in 2nd guard position.
Sweep to guard position - Sweep going to or in guard position.

Wait for bin full - Sweep in 2nd guard position, but no bin full.

Wait for table up - Waiting for table up cam signal.

Wait for table home - Waiting for table home signal.

On-line no mode sent - Chassis in normal mode, but no mode signal received from MCU.

On-line mode is off - Lane turned off by MCU.

On-line mode is INST - Lane in Instructomat mode by MCU.

On-line mode is test - Reserved for future use.

3.2.2.6 82-90XL PINSPOTTER CHASSIS SOFTWARE UPDATE

The entire program for the chassis is contained in a single EPROM circuit board accessible from the rear of the chassis. This board inserts into the logic board via an edge connector. The procedure to replace this board is as follows:

1. Remove all power in the chassis.
2. Remove the small cover on the rear of the chassis that is held in place by a single screw.
3. Install the new EPROM board by carefully aligning it in the card guide and firmly pressing it into the edge connector visible through the access hole.
4. Replace the cover panel and re-apply power.



3.2.3 FRONT END CONTROL BOX

3.2.3.1 FRONT END CONTROL BOX OPERATIONS

The 82-90XL Pinspotter provides the mechanic with a means to access machine functions from the front of the pinspotter. The Front End Control Box provides the mechanic with a safer means to control the pinspotter.

The Front End Control Box serves two purposes:

1. It provides an interface between the 82-90XL Chassis and the Ball Detector, Foul Detectors, Ball Return Control box and the 10th Frame Switches.
2. It provides a remote key pad for manual operation of the motors and Emergency Power Off Switches for each lane.

3.2.3.2 FRONT END CONTROL BOX INSTALLATION



Before installing Front End Control Box, make certain that ALL power switches on the 82-90XL Chassis are in the "OFF" position.

1. Mount the Front End Control Box on the shelf provided at the front center of the pinspotter pair with the hardware provided by AMF. Note: There is one Front End Control Box per pinspotter pair.
2. Connect the Ball Return Control Box cable into the 10 position connector on the front of the Front End Control Box.
3. Connect the Ball Detector cable into the 6 pin connector on the rear of the Front End Control Box.
4. Connect the cable from the 82-90XL Chassis to the 24 pin connector on the rear of the Front End Control Box.
5. Connect the Odd and Even machine Emergency Power Off (EPO) connectors to their respective 2 pin connectors on the rear of the Front End Control Box.

3.2.3.3 FRONT END CONTROL BOX CONTROL PANEL OPERATIONS

The Front End Control Box for each pinspotter has four keys on the front and one power switch on the top of the unit. These keys provide the same functions as the keys on the 82-90XL Chassis and have the same labeling.

1. KEYPAD SWITCHES

- A. PGM ZERO
This switch returns the machine to the state where it is awaiting a ball.
- B. CYCLE
This switch causes the machine to execute a ball cycle.
- C. TABLE RUN
This switch causes the table to operate as long as it is depressed.
- D. SWEEP RUN
This switch causes the sweep to operated as long as it is depressed.

2. POWER SWITCHES

- E. The Emergency Power Off (EPO)
These switches are the two large red buttons on top of the Front End Control Box. Pressing either the EVEN or ODD EPO switch trips the EVEN or ODD power breaker respectively.



3.2.4 MANAGER'S CONTROL UNIT

3.2.4.1 MANAGER'S CONTROL UNIT OPERATION

The 82-90XL Manager's Control Unit (MCU) allows primary control of up to 256 lanes that are using the new 82-90XL Pinspotter Chassis. This unit replaces the older mechanical "frame counters", while providing other extended capabilities. Lane commands can be initiated on an individual lane basis, or commands can be directed to a block of contiguous lanes.

The MCU provides the following basic functions:

1. Sets each lane in either "BOWL", "INST" (Instructo) or "OFF" mode.
2. Sets diagnostic functions.
3. Sets chassis parameters such as whether or not scoring is connected and type of scoring present.
4. Displays the frame count of each lane since last reset.
5. Interface to AMF's Automatic Scoring System by responding to LIU commands. The Advantage Front Desk system will only support up to 80 lanes per MCU.



NOTE: When the MCU is communicating or responding to commands via the LIU, any response to keypad commands will be delayed.

3.2.4.2 MANAGER'S CONTROL UNIT INSTALLATION

1. Determine the exact location of the MCU. The MCU is designed to be mounted on a vertical surface in an area convenient to the operator at the front control counter. All wiring enters the unit through connectors on the bottom.
2. Install the two mounting screws (1" x #10 slotted hex head) on a horizontal line 4 inches apart. Leave the screw head extended enough to allow the two mounting holes in the back of the unit to slip over the screw heads. Adjust the screws as required so that the unit fits snugly.
3. Connect the communications wiring to the appropriate connectors via the sockets in the bottom of the unit. See Drawing #3.7.

4. If the unit is to be operated in conjunction with an automatic scoring system, connect its LIU communications cable into the CONTROL IN connector on the MCU.
5. Install the power cord (not furnished) into the unit and apply the AC power by connecting the other end to a convenient outlet. The unit power receptacle is a standard IEC receptacle.

3.2.4.3 MANAGER'S CONTROL UNIT CONTROL PANEL OPERATIONS

The Manager's Control Unit control panel has seven keys on the front of the unit and a numeric keypad. See Drawing #3.6 for location of switches.

1. KEYPAD SWITCHES

- A. BOWL
This switch places the selected lane into normal bowl mode.
- B. INST
This switch places the selected lane into "instructo" mode.
- C. OFF
This switch turns the lane off.
- D. SPEC
This switch allows the operator to use special functions.
- E. BLOCK
This switch allows the control of a group of consecutive lanes.
- F. RESET
This switch resets the frame count. Note this switch does not reset the frame count internal to the 82-90XL Pinspotter, but allows the MCU to count the number of frames that has been bowled since the last time it was reset from the MCU.
- G. ENTER
This switch allows the operator to view the current status of the lane.



3.2.4.4 MANAGER'S CONTROL UNIT CONTROL PANEL OPERATOR COMMANDS

When a keyboard entry is made from the control panel of the Manager's Control Unit this information is displayed in the following manner:

- A. The appropriate key name(s) appear in square brackets [].
- B. Specific commands or numeric keys appear in upper case.
- C. General numeric entries representing lane numbers appear in lower case (valid range is from 1 to 199).
- D. Display responses appear in italic brackets { }, with specific messages in upper case.
- E. Generalized messages appear in lower case.
- F. When numeric responses are entered, the normal key sequence is to enter the number desired, followed by pressing the ENTER key.

1. SINGLE LANE OPERATIONS

To turn on a single pinspotter through the Manger's Control Box, follow the instructions below:

- a) Enter the lane number from the control panel's numeric keypad.
- b) Enter the next command by pressing one of the keypad switches.
- c) If the selected pinspotter is able to respond correctly, the display will list the lane number, frame count, and present state of the pinspotter.
- d) If the selected pinspotter is unable to respond correctly, the following messages appear on the display:
 - 1. The status message {BOWL SW} indicates that the pinspotter is manually turned on at its control panel.
 - 2. The status message {TEST SW} indicates that it is in test mode as selected by the control panel.
- e) If the selected lane cannot be found, the display will report {ERROR 3} on the second line of the display. This indicates that the lane is inoperative (it is powered off or cannot communicate).



NOTE: While the MCU is searching for a lane, the message {BUSY} will temporarily appear.

2. MULTIPLE LANE OPERATIONS

Block commands allow a group of consecutive lanes to be controlled as a group. Other than the initiation sequence described below, all commands and responses are identical to the single lane functions.

- a) Enter the command BLOCK from the control panel keypad.
- b) The display will report: LANE ___ to ___
- c) Enter the lowest lane number in the group selected and then press the ENTER key. This lane number will now appear in the display.
- d) Next enter the highest lane number in the group and press the ENTER key.

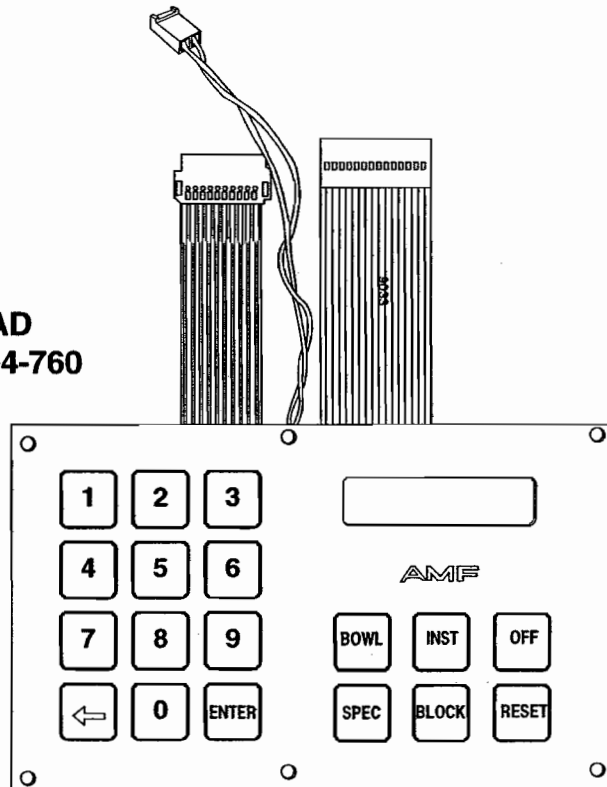
3. SOFTWARE VERSION IDENTIFICATION

The unit briefly displays the software version # and release date on the display immediately after power is applied. This allows the user to easily identify the level of software in the MCU.



NOTE: Please refer to the MCU Manual for further information.

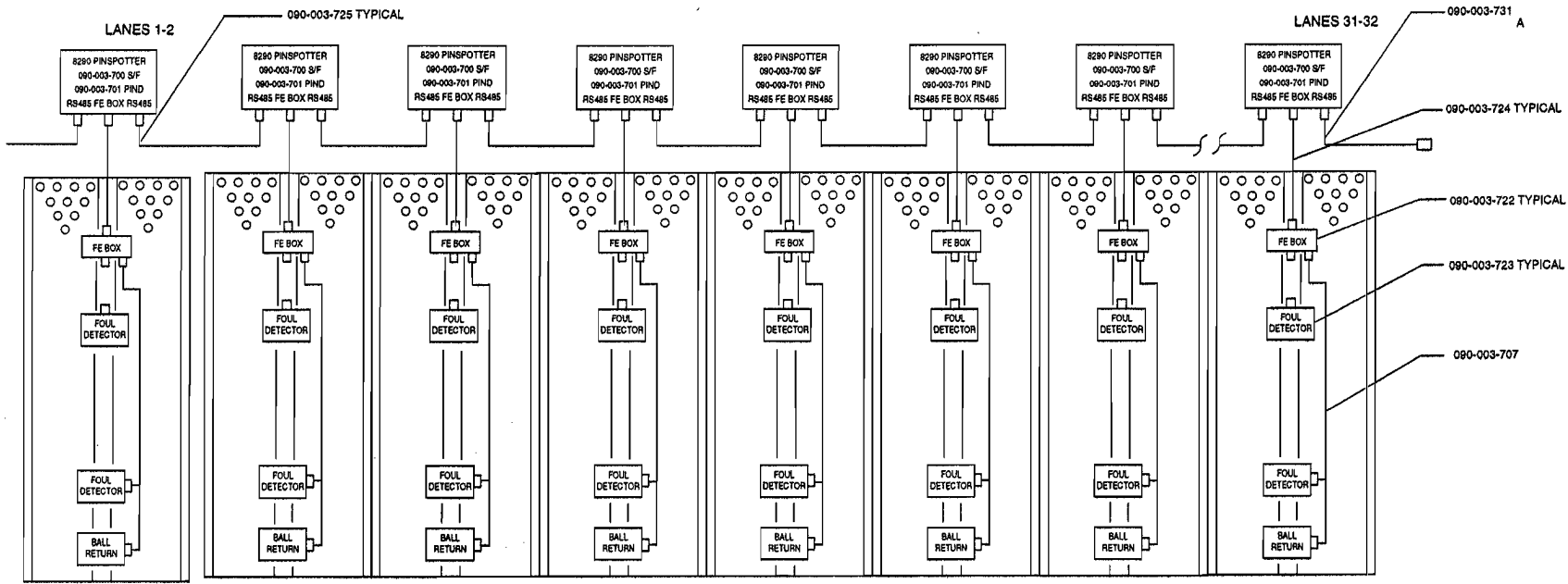
**MCU KEYPAD
Part #090-004-760**



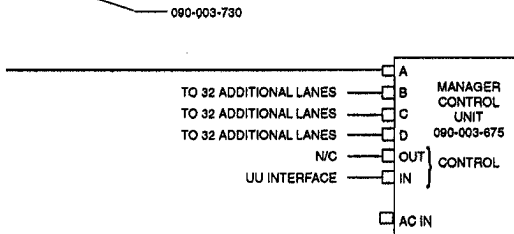
DRAWING #3.6

Graphic Number ES32/4.15





Graphic Number E31/4.13



DRAWING #3.7

3.2.5 BALL DETECTOR

3.2.5.1 BALL DETECTOR OPERATION

The ball detector, designed to detect and signal the passage of a bowling ball, consists of a detector head and reflectors. The detector head is designed to be mounted on the ball return capping in front of the pin deck. It contains two optics systems, one monitoring the odd lane and one monitoring the even lane. The unit interfaces to the 82-90XL Pinspotter chassis via the front end boxes.

3.2.5.2 BALL DETECTOR LOCATION

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

1. Detector Head

The detector head should be mounted on the center of the ball return capping in front of the pin deck. The two modes of operation should be considered before placement of the detector heads.

A. MODE 1

This mode is used when the drop of the sweep interrupts the optical path between the detector head and the reflector during a machine cycle.

The system is designed to accommodate mounting locations in front of the head pin, but where the sweep breaks the beam.

B. MODE 2

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

The system is designed to accommodate mounting locations ranging from approximately 60" to 120" from the rear of the pin deck.

2. Reflectors

The reflectors can be mounted on the opposite smaller capping at exactly the same distance from the rear of the pin deck.



3.2.5.3 BALL DETECTOR INSTALLATION



DISCONNECT ALL MACHINE POWER DURING THE INITIAL INSTALLATION

1. Determine proper location of the reflector mounts. Refer to Section 3.2.5.1 on Ball Detector Location.
2. Install the reflector mounts on the center of the small cappings using the #10 x 1/2" self tapping screws provided by AMF. Because the reflector assemblies are designed to support two lanes, all but the first lane pair require only one reflector mount. The first pair however, requires two, one for each machine.
3. Using a string drawn between the first two reflectors as a guide, position the detector head so that the center of the plastic housing from front to back is directly between the reflector center holes. See Drawing #3.9.
4. Mount the detector head bracket on the center of the ball return capping using the two #10 x 1" self tapping screws provided by AMF.



NOTE: The vertical height of the detector head can be adjusted by slightly loosening the alignment screws; the front to back position can be accomplished by slightly loosening the mounting screws and sliding the entire mount forward or backward slightly.

5. Install the reflectors on the reflector bracket using the 1/4" - 20 screw and nut provided by AMF.
6. Route the detector head cable to the Pinspotter Front End Control Box and plug it into the appropriate connector. Be sure that the cable is routed and secured so that it does not interfere with the ball path or pinspotter mechanism.
7. Remove the screw holding the plastic cover on the detector head and slide the cover forward. Set the switches on the detector head to either Mode 1 or Mode 2. See Section 3.2.5.4, Ball Detector System Test for Mode settings.
8. Apply power to the ball detector unit by connecting the logic power to the 82-90XL Chassis. The two alignment LED's on the detector head should either blink or stay on steadily.



MAKE CERTAIN THAT THE MOTOR POWER IS NOT APPLIED AT THIS TIME.



NOTE: These two alignment LED's on the head are used to indicate proper alignment. When either stay on, it is an indication that the system is out of alignment. The more rapidly they blink, the better the alignment. When both blink rapidly (from 4 to 10 times a second), the system is aligned properly.

8. If alignment needs adjustment:

1. Slightly loosen the two mounting screws on the rear of the detector head to allow movement without excessive force. See Drawing #3.10.
2. Rotate the head until both alignment LED's blink rapidly. It may be necessary to adjust the height if the rotation alone does not result in proper alignment.

9. When the head is aligned, tighten the rear screws, but do not use excessive force.

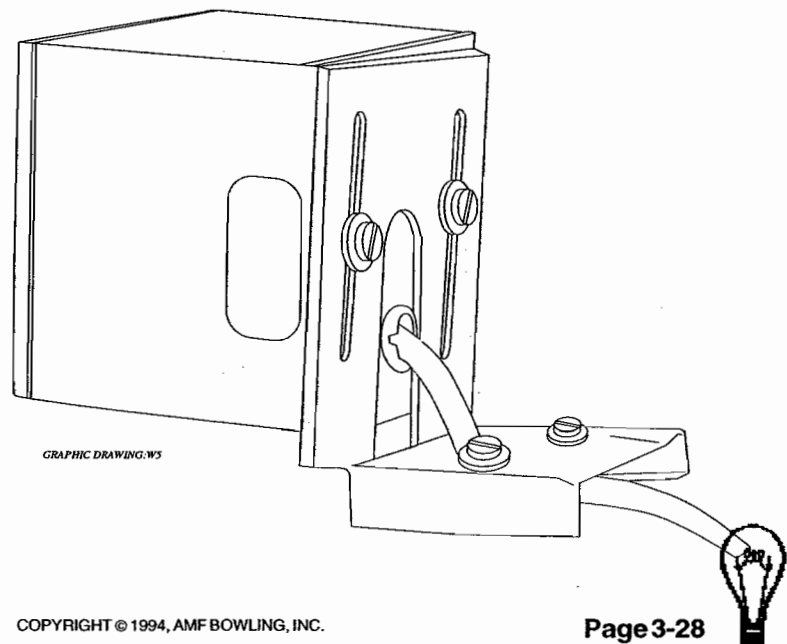


NOTE: If alignment is difficult or impossible to achieve, it is most likely the result of not carefully following the procedure in this section. The heads are pre-adjusted and should not require field adjustment. If problems occur, first verify that the alignment procedure has been carefully done. **DO NOT** attempt to adjust the optics or electronics.

10. When the beam is momentarily interrupted, the appropriate alignment LED should stay on for a brief period of time. This indicates proper operation of the detector head.

11. Reinstall the plastic cover.

DRAWING #3.8



3.2.5.4 BALL DETECTOR SYSTEM TEST



WARNING

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

1. Turn the 82-90XL Chassis power on.
2. Make certain the optical path of the ball detector is not blocked.
3. For Mode 1 operation:
 - A. Break the beam momentarily. This should cause the machine to cycle with less than a 1/4 second delay. Verify this for both lanes. Skip to Step 5.
4. For Mode 2 operation:
 - A. Rapidly pass a screw driver handle or other small tool across the face of the detector, causing a very short duration of interruption. This should initiate a machine cycle very quickly.
 - B. 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.
 - C. Next block the optical path for more than 2 seconds. This should NOT cause the machine to cycle at all.
 - D. Repeat the steps for the other lane.
5. If the machine cycle operation delay appears too fast or too slow for any machine, the small switches on the detector head can be adjusted. See Drawing #3.10 for location of these switches.

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

The three switches at the top of the detector head allow mode selection and the delay times to be adjusted. The delay settings range from 1 to 7; 1 being the minimum delay and 7 being the maximum. The nominal setting is 4.

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



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

6. After switch settings are in place, reinstall the cover.

3.2.5.5 ROUTINE MAINTENANCE

The system is designed to operate properly with a significant amount of dust and dirt accumulation on the optics. However, it is advisable to perform periodic cleaning of the reflector surfaces and detector head cover.



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

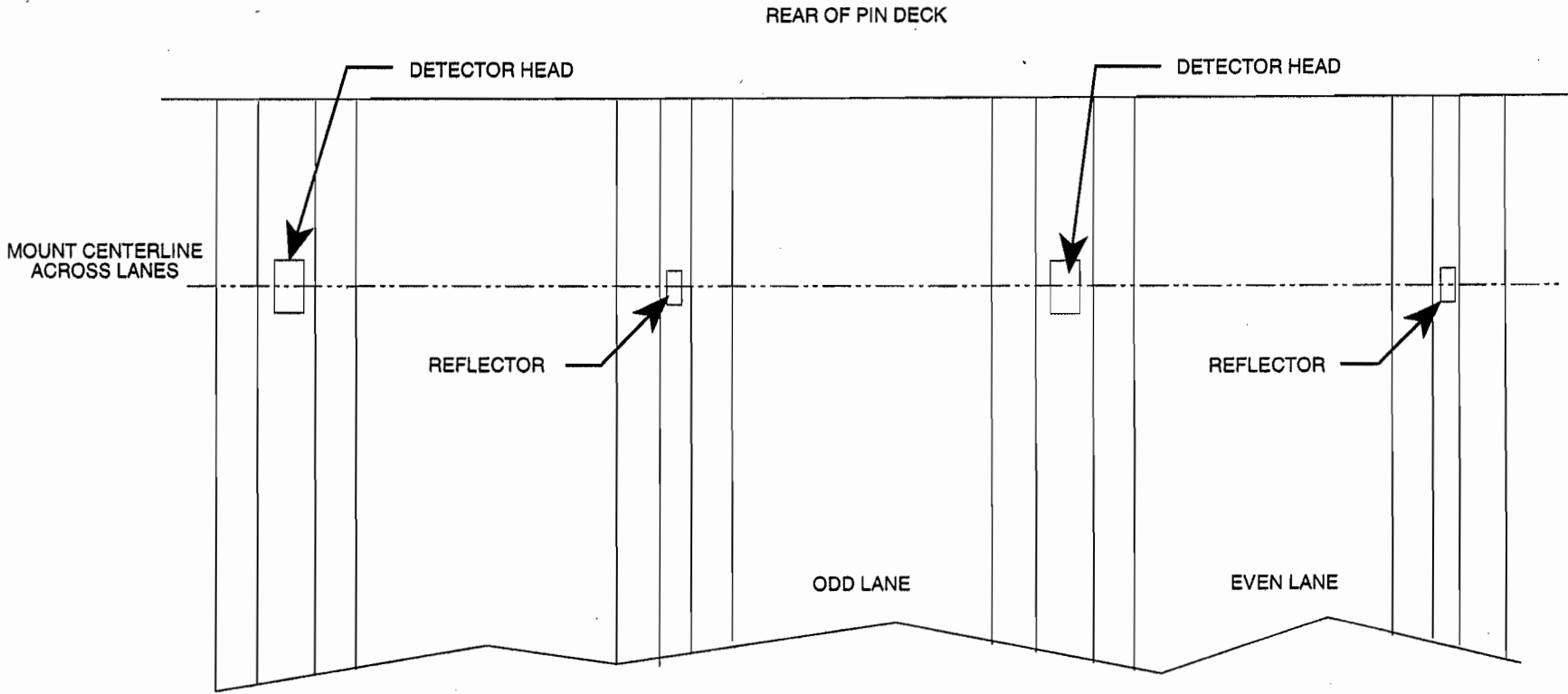
3.2.5.6 CLEANING RECOMMENDATIONS

1. Use a clean non-abrasive cloth to gently wipe the face of the reflectors on the reflector unit and the cover of the detector head.
2. If gentle wiping does not remove the dirt, it may be due to grease or wax 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.





BALL DETECTOR MOUNTING CONFIGURATION

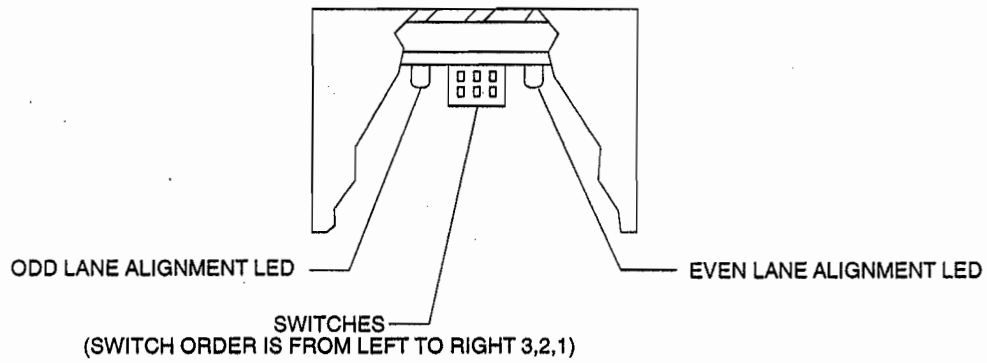
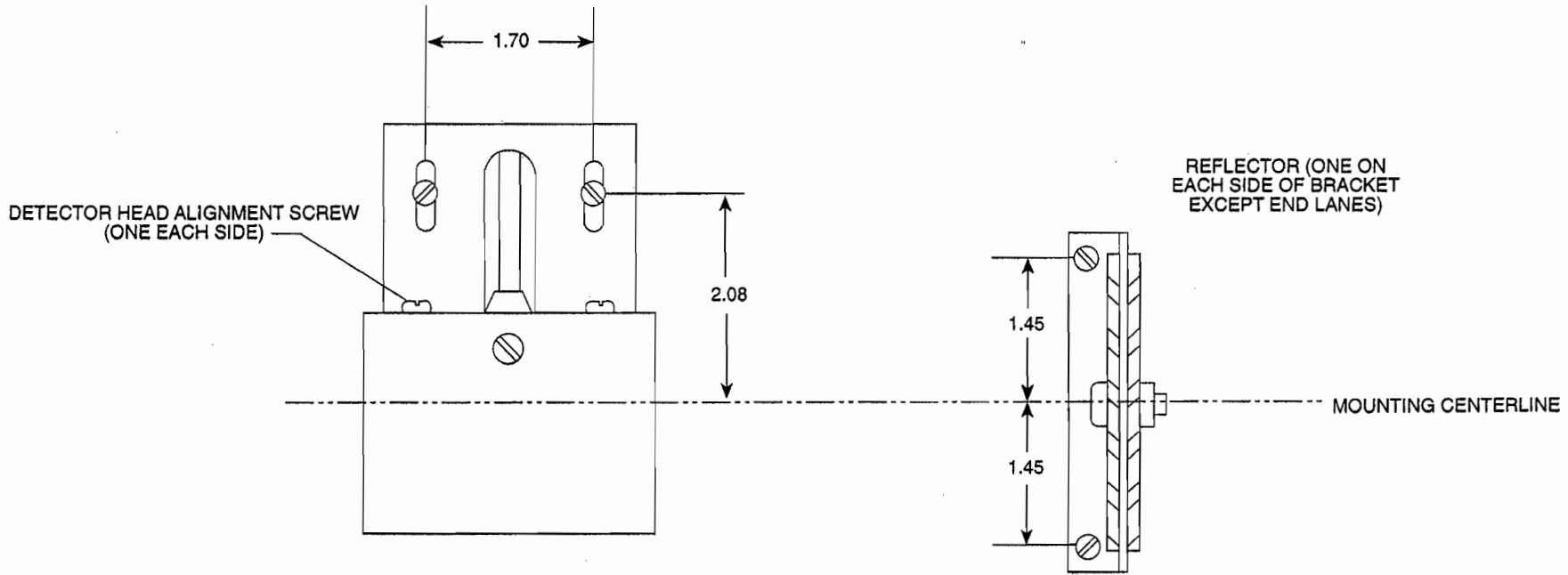
MODE 1 OPERATION

DETECTOR MOUNTED IN FRONT OF HEAD PIN, BUT WHERE SWEEP BREAKS BEAM

MODE 2 OPERATION

DETECTOR MOUNTED 60° TO 120° FROM REAR OF PIN DECK

DRAWING #3.9



DRAWING #3.10

3.2.6 MOTOR & GEARBOX

3.2.6.1 MOTOR & GEARBOX OPERATION

The motor and the gearbox are separate assemblies. The electric motor can be removed while leaving the gearbox in place. The electric motors have solid state switches for more reliable operation.

The motors are dual voltage - capable of operating at 115v and 230v. When the motors leave the factory, they are wired for 230v operation. For 115v operation, see Drawing #3.11 for the proper connections.



NOTE: Refer to Section 5.1 for Motor & Gearbox part numbers and drawings.

3.2.6.2 MOTOR & GEARBOX MAINTENANCE

1. When the electric motor is removed from the gearbox, or the gearbox is removed from the sweep or table drive shaft, Molykote G-N paste should be applied to the shafts before re-assembly. This lubricant will provide years of trouble free operation without fretting corrosion.

Molykote G-N paste, manufactured by Dow Corning, is available as AMF part #715-011-803.

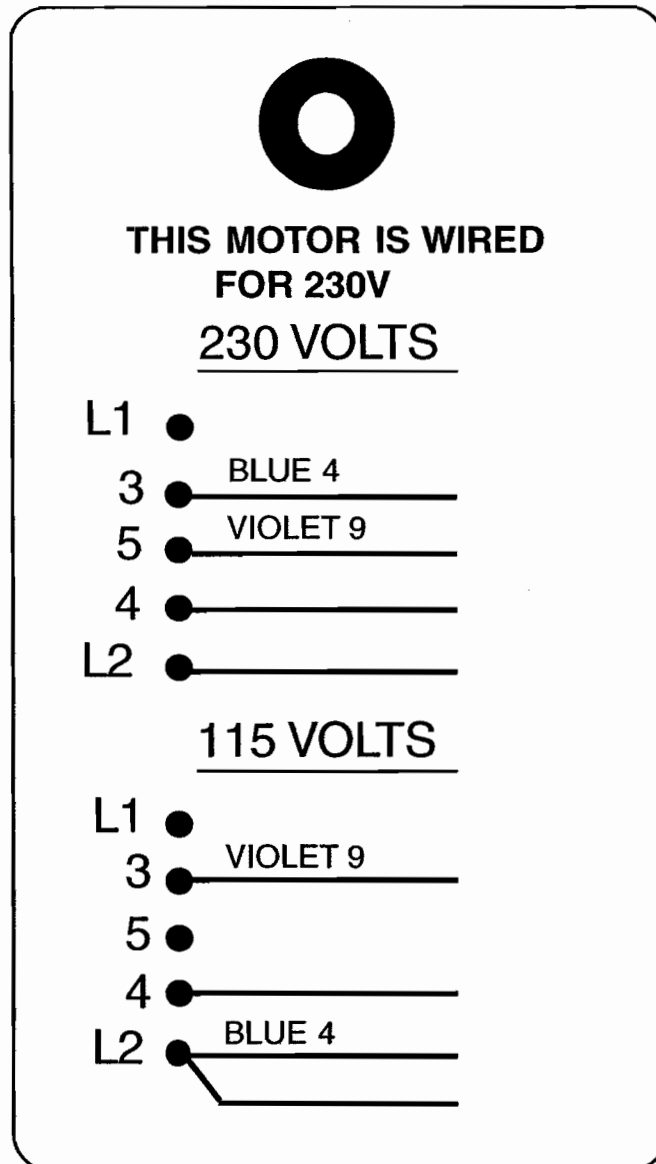
2. To maximize the life of the gearboxes, the gear oil should be changed after the first 100 hours of operation. Thereafter, gear oil should be changed every 2,500 operating hours or every six (6) months.
3. The gear oil used is Mobil 600 cylinder oil. It is available in quarts as AMF part #715-021-706.
4. Any capscrews removed from the gearbox should be reinstalled with Loctite #242.



NOTE: Please refer to the Motor & Gearbox Manual for further information.

3.2.6.3 MOTOR WIRING

The tag in Drawing #3.11 is placed on all electric motors leaving the factory. To operate on 115v, follow the connection diagram as shown. In addition to the electric motors, the spot solenoid wiring must be changed to 115v.



DRAWING #3.11



SECTION 4

SERVICE & MAINTENANCE



SECTION 4

Service & Maintenance

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4.1 SERVICE TOOLS

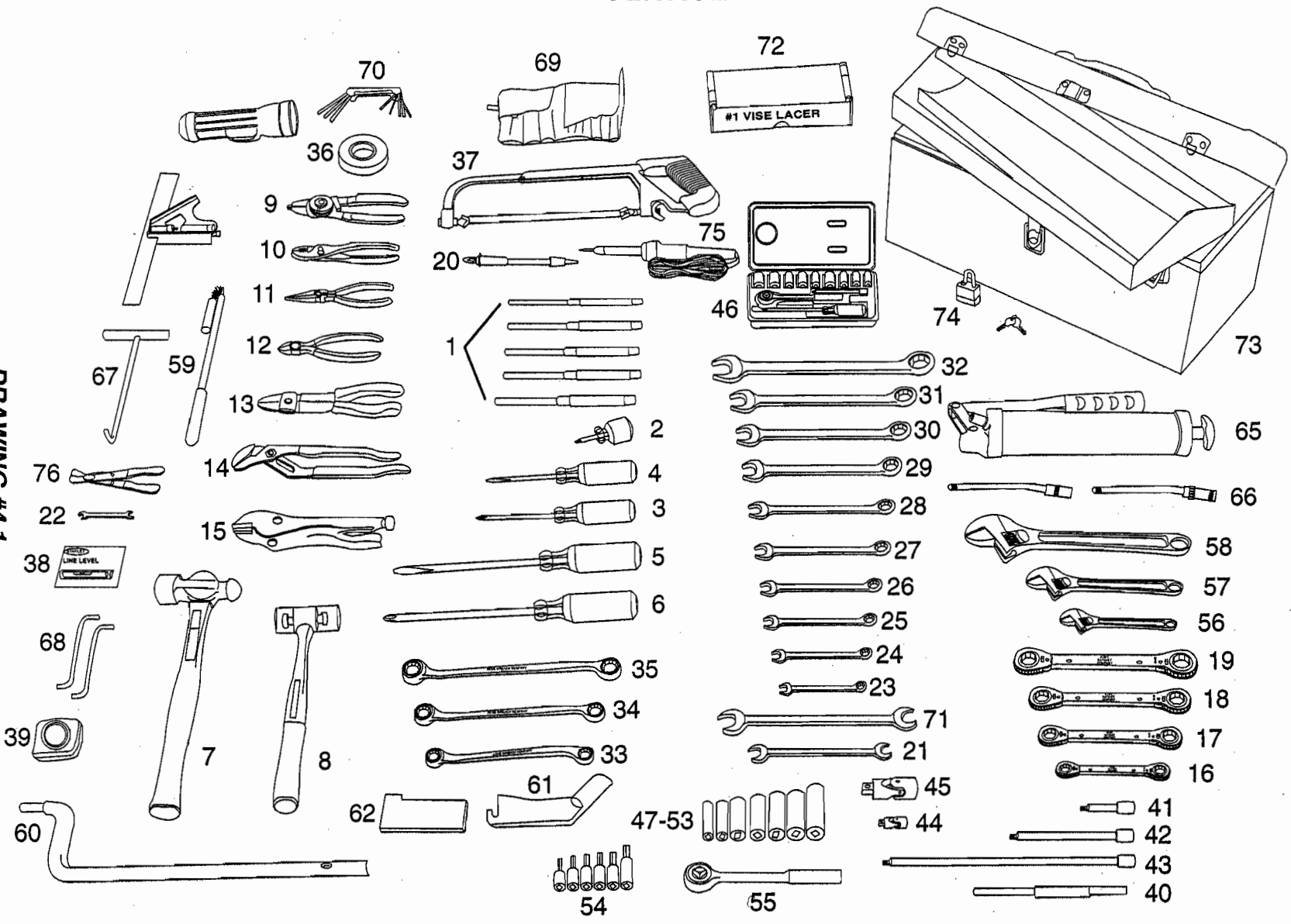


SECTION 4

Service & Maintenance

4.1.1 SERVICE TOOL KIT #784-528-052

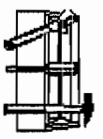
SERVICE TOOL KIT



DRAWING #4.1

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Revised: 31 Dec 1993

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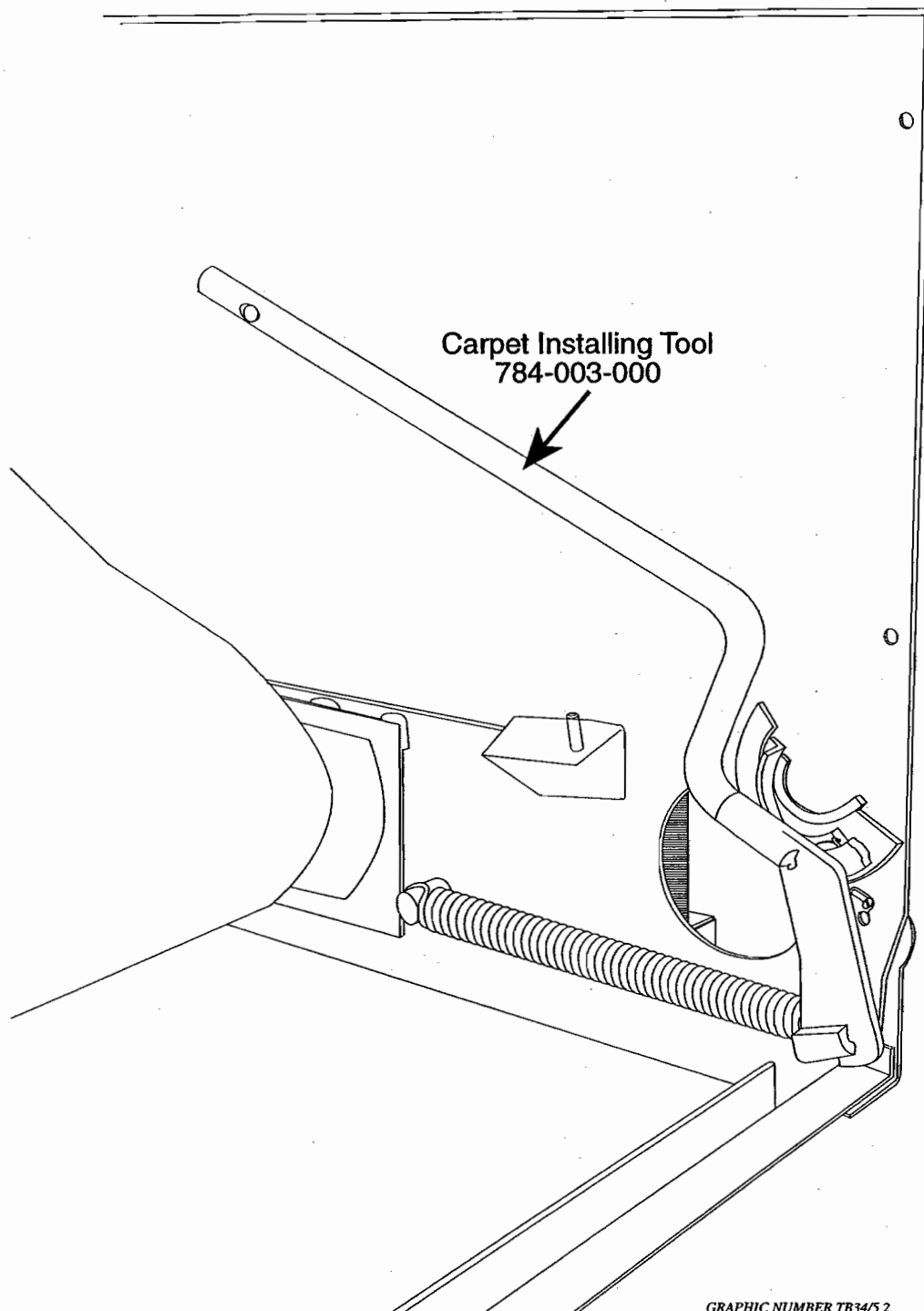


Service & Parts Manual

SERVICE TOOL KIT - Continued

Item	Part No.	Description	Item	Part No.	Description
1	787-001-006	Drive Punch Set	34	793-507-029	Offset Box Wrench
2	789-001-001	Screwdriver CR #2 x 1-1/4"			9/16" x 5/8"
3	789-001-002	Screwdriver CR #2 x 4"	35	793-507-030	Offset Box Wrench
4	789-006-008	Screwdriver SL x 4"			11/16" x 3/4"
5	789-001-003	Screwdriver CR #4 X 8"	36	724-001-011	Scotch Electric Tape
6	789-006-009	Screwdriver SL x 8"			3/4" x 36 yds.
7	783-501-001	Hammer - 16 Oz. Ballpeen	37	788-504-004	Hack Saw
8	783-502-002	Hammer - 16 oz. Plastic	38	792-016-018	Level
9	793-002-007	Snap Ring Pliers	39	792-026-028	6' Steel Tape
10	786-503-003	6" Gripping Pliers	40	030-002-748	Sweep Cam Gauge
11	786-502-002	5" Needle Nose Pliers	41	789-502-003	Extension 3"
12	786-504-004	6" Diagonal Cutters	42	789-502-004	Extension 5"
13	792-009-010	Crimping Tool	43	782-501-001	Extension 11"
14	786-501-001	ChannelLock Pliers	44	789-512-028	Universal 1/4" Drive
15	793-514-048	10" Vise Grip Wrench	45	789-512-029	Universal 3/8" Drive
16	793-510-041	3/8" x 7/16" Ratcheting Box Wrench	46	789-511-027	Socket Set 1/4" Drive
17	793-510-042	1/2" x 9/16" Ratcheting Box Wrench	47	789-509-023	Deep Socket 13/16"
18	793-510-043	5/8" x 11/16" Ratcheting Box Wrench	48	789-509-022	Deep Socket 3/4"
19	793-510-044	3/4" x 7/8" Ratcheting Box Wrench	49	789-509-021	Deep Socket 11/16"
20	791-004-004	Testlight - High Voltage	50	789-509-020	Deep Socket 5/8"
21	070-006-974	1/2" x 9/16" Open End Wrench - Thin	51	789-509-019	Deep Socket 9/16"
22	793-509-036	1/4" Thin Wrench	52	789-509-030	Deep Socket 1/2"
23	793-506-021	Comb. Open End & Box Wrench 5/16"	53	789-509-018	Deep Socket 7/16"
24	793-506-022	Comb. Open End & Box Wrench 3/8"	54	780-503-014	Allen Wrench Socket Set
25	793-506-023	Comb. Open End & Box Wrench 7/16"	55	789-505-008	Drive Ratchet 3/8"
26	793-506-024	Comb. Open End & Box Wrench 1/2"	56	793-501-001	6" Adj. Wrench
27	793-506-025	Comb. Open End & Box Wrench 9/16"	57	793-501-002	8" Adj. Wrench
28	793-506-026	Comb. Open End & Box Wrench 5/8"	58	793-501-003	12" Adj. Wrench
29	793-506-027	Comb. Open End & Box Wrench 11/16"	59	792-018-020	Magnetic Pick-up Tool
30	793-506-050	Comb. Open End & Box Wrench 3/4"	60	784-003-000	Handle, Carpet Tool
31	793-505-019	Comb. Open End & Box Wrench 13/16"	61	792-502-002	Flag, Carpet Tool
32	793-505-020	Comb. Open End & Box Wrench 15/16"	62	070-006-519	Gauge, Respot Cell
33	793-507-028	Offset Box Wrench 7/16" x 1/2"	63	793-511-045	Spanner Wrench
			64	791-003-003	HD Continuity Tester
			65	785-005-005	Lube Gun - Alemite
			66	785-003-008	Extension - Lube Gun
			67	792-505-005	Spring Puller
			68	792-501-001	Carpet Removal Pins (2)
			69	793-503-017	SPS #2 Allen Wrench Set
			70	793-503-051	#91S Uni-Key Set
			71	793-509-037	9/16" x 5/8" Open End Wrench
			72	030-003-542	Belt Lacer
			73	792-005-005	Tool Box
			74	714-501-001	Padlock
			75	790-006-009	Solder Iron - Ungar
			76	792-029-031	42 Watt Wire Stripper

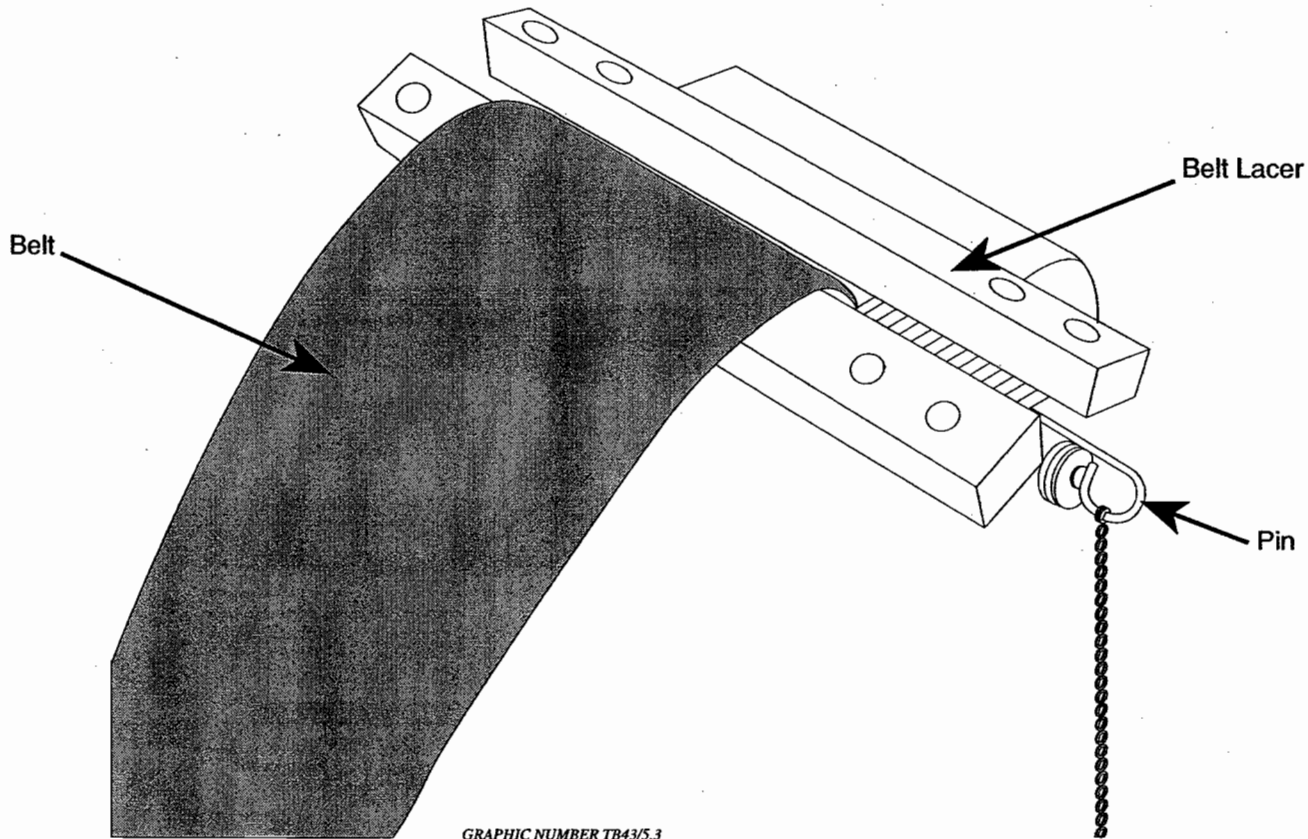
4.1.2 CARPET INSTALLING TOOL



GRAPHIC NUMBER TB34/5.2

DRAWING #4.2



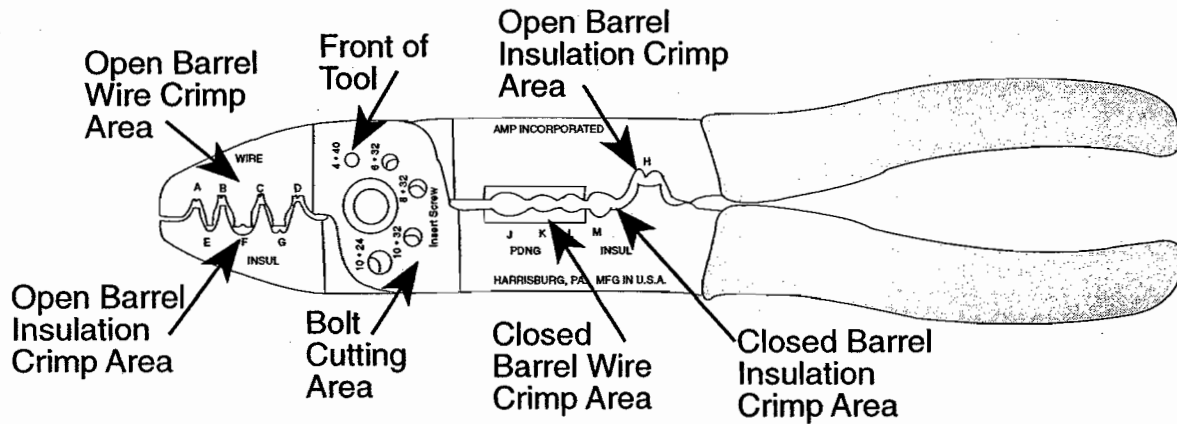


DRAWING #4.3

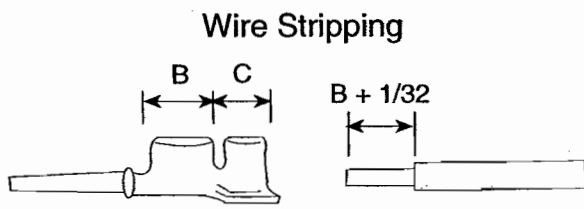
4.1.3 CLIPPER BELT LACER INSTRUCTIONS (DISTRIBUTOR BELT)

Insert clipper belt lacer #030-003-542 into vise as shown in Drawing #4.4 above. Position new clips into lacer, insert guide pin and remove the paper holder from the clips. Place the cut-off section of the belt into the lacer and tighten vise so that the clips are forced evenly into the belt. Remove from vise and install belt on distributor.

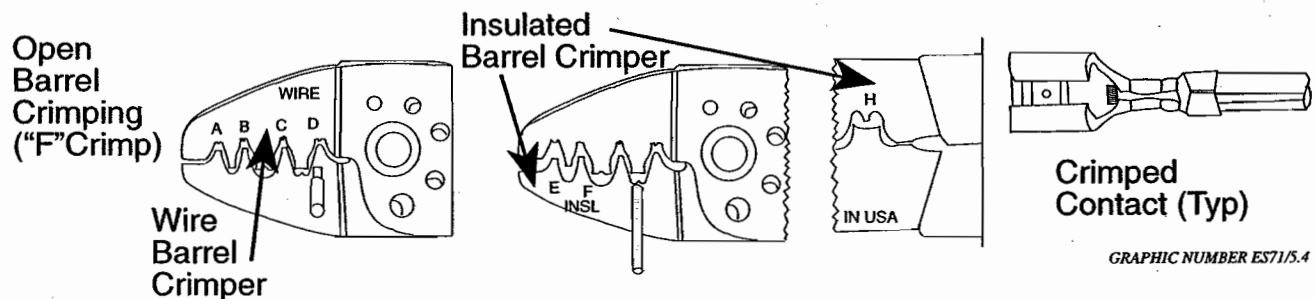
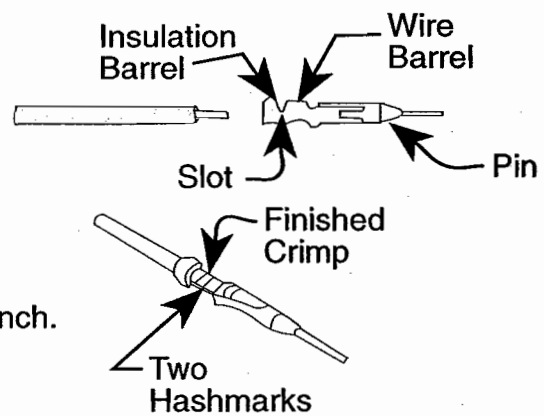
4.1.4 AMP CRIMPING TOOL



AMF PART #792-009-010



"B" equals Barrel Length
 "C" equals Insulation Grip
 Stripping Length equals Barrel Length plus 1/32 inch.



GRAPHIC NUMBER ES71/5.4

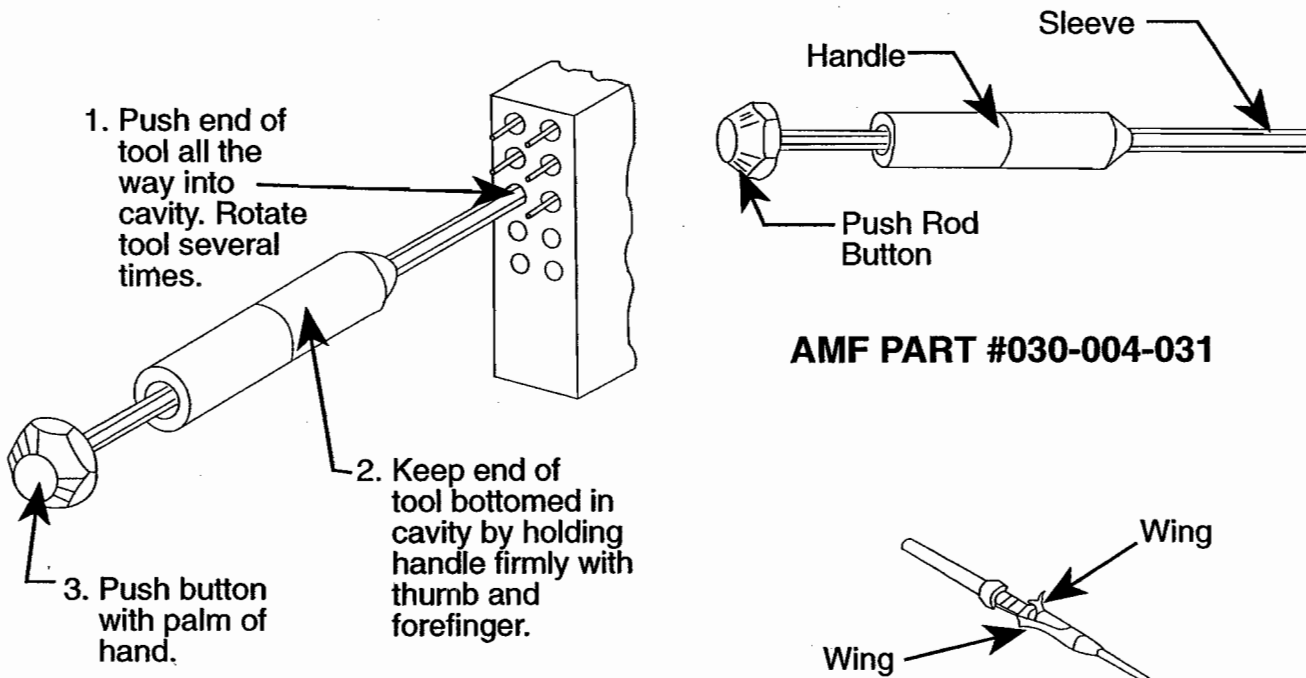
Wire Barrel -- Position the contact in the best crimp area ("A, B, C, or D") with the wire barrel opening facing the letter as shown. Squeeze the tool handles just enough for the jaws to hold the contact in place. Insert a properly stripped wire into the wire barrel. Hold the wire in place and squeeze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

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

DRAWING #4.4



4.1.5 AMP SOCKET AND PIN EXTRACTION TOOL



DRAWING #4.5



NOTE:

When a pin or socket is removed from a "M" type plug, it will be necessary to flare out the two wings (see Drawing #4.5) with a fingernail. This action is necessary so the terminal seats properly and will not back out of the plug. Care should also be exercised so as not to damage the ring at the rear of the terminal. This must remain circular to allow correct alignment within the plug.

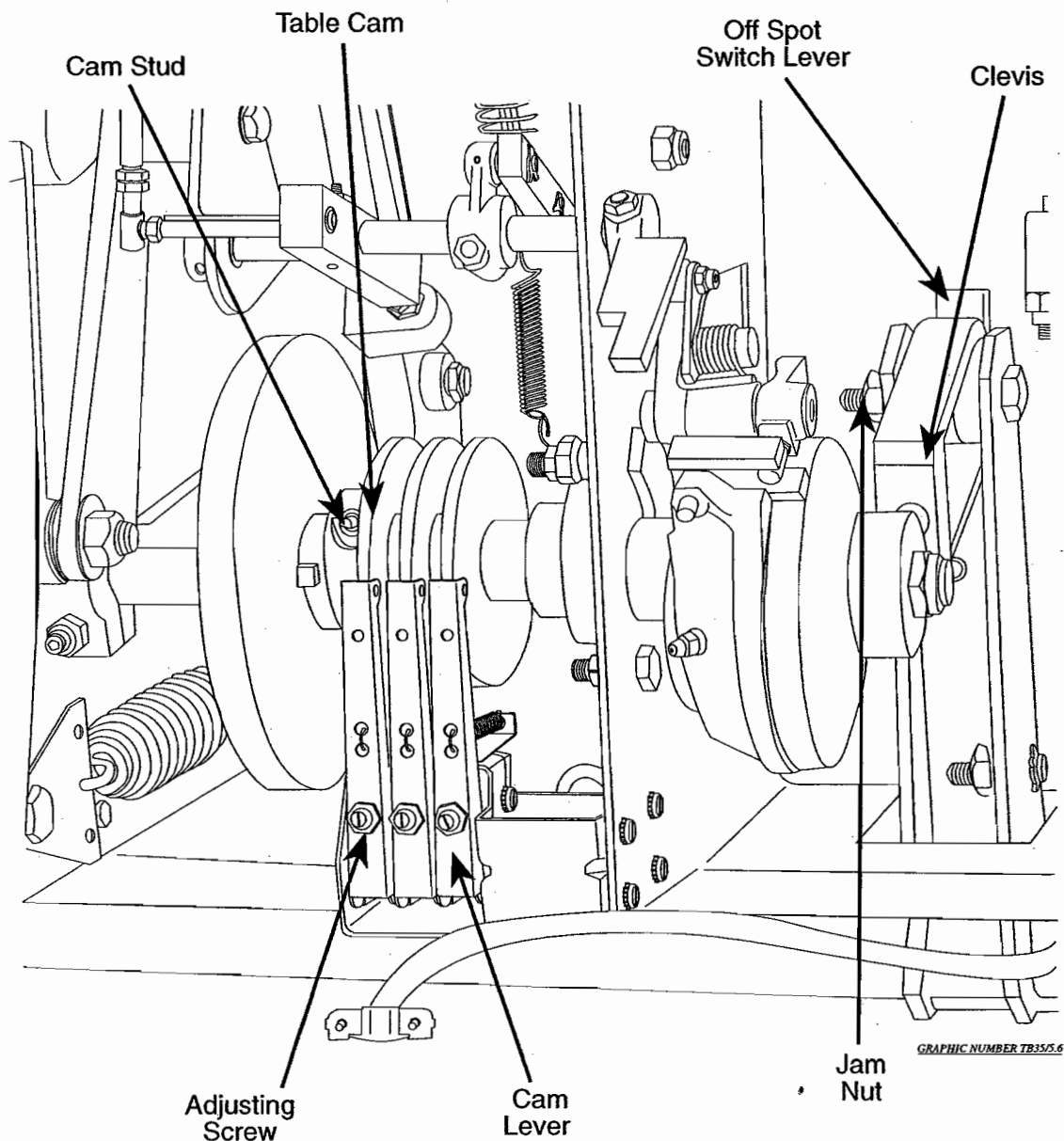
4.2 TECHNICAL ADJUSTMENTS



4.2.1 TABLE OPERATIONS & ADJUSTMENTS**4.2.1.1 TABLE OFF SPOT SWITCH OPERATION**

When the table contacts an off-spot pin during a respot cycle:

1. The clevis moves the off-spot switch lever which closes the off-spot switch. This action converts the machine into 2nd ball cycle.
2. Remove the fallen pins (if any).
3. Open the respot cell fingers and operate the sweep reverse.
4. Operate the sweep reverse switch to bring the sweep to zero (home) position.

**DRAWING #4.6**

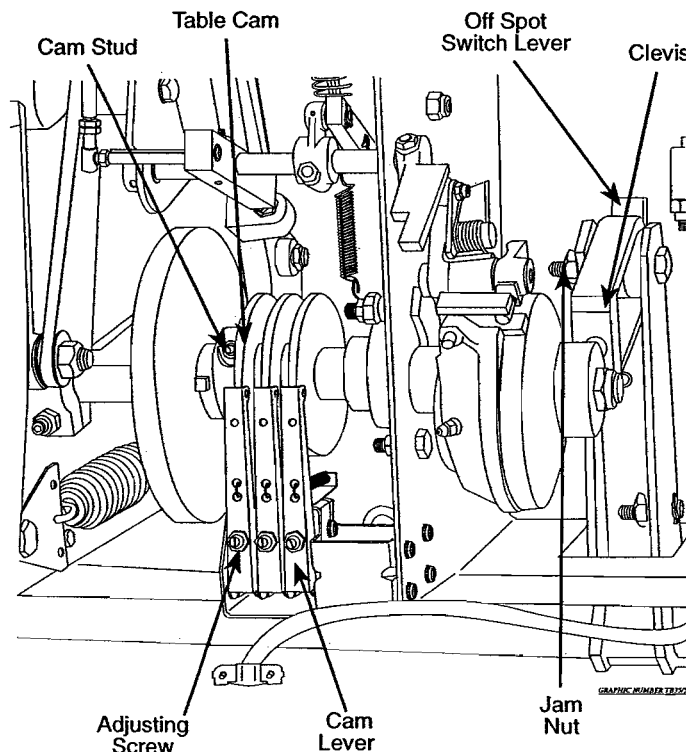
4.2.1.2 TABLE OFF SPOT SWITCH ADJUSTMENTS

1. Loosen jam nut.
2. Using gauge ST #030-002-748, insert the large end of gauge between the off spot switch lever and the clevis. Adjust the screw for switch operation. When the small end of gauge is inserted, the switch should not actuate.
3. Hold screw and tighten jam nut.
4. To check above adjustment:
 - a) Cycle machine through 1st ball with pin placed out of respot cell range.
 - b) Sweep should drop to the 66° (guard) position.
 - c) Table should contact pin and return to zero (home) position.
 - d) The 1st ball light should turn off and the 2nd ball light should turn on.
5. Open the respot cell fingers and operate the Sweep Reverse switch to bring the sweep to zero (home) position.

4.2.1.3 TABLE LEVER AND CAM OPERATION

The table is controlled by cams, levers and switches:

- A. The TA1, normally a closed contact, runs the table from 185° to 355°.
- B. The TA2 turns on the pin indicator lights and initiates the sweep run-through.
- C. The TB is the interlock cam.



DRAWING #4.7

4.2.1.4 TABLE CAM LEVER ADJUSTMENT

NOTE: Some of the adjustments of the table require that the table be operated under power. When this is the case, the respot cells should be actuated manually to open grippers, preventing damage to the fingers.

1. Manually crank or run the table to put the switch cam lever at the lowest portion of table cam. See Drawing #4.7 for location.
2. Insert gauge ST #030-002-748 between lever and lowest portion of cam.
3. The large end (.176") of the gauge should actuate switch not the small (.136") end.
4. Loosen the switch lever jam nut and adjust the screw to obtain the above setting.
5. For proper operation, the levers must ride fully on the table cams.

4.2.1.5 TABLE CAM ADJUSTMENT

NOTE: The table cam switch levers must first be adjusted as described above.

1. Manually crank the table to its highest position.
2. Loosen cam stud and position cams so that the stud is parallel with the pin deck. This is the approximate or starting cam setting position. See Drawing #4.7 for location.
3. Run table and note the table stopping position at the end of a second ball cycle. Table should stop just before the zero (home) position. If it does not, move the table cam accordingly. If the table overruns, move the cam in the direction of the rotation. If it runs short, move it in the opposite direction.

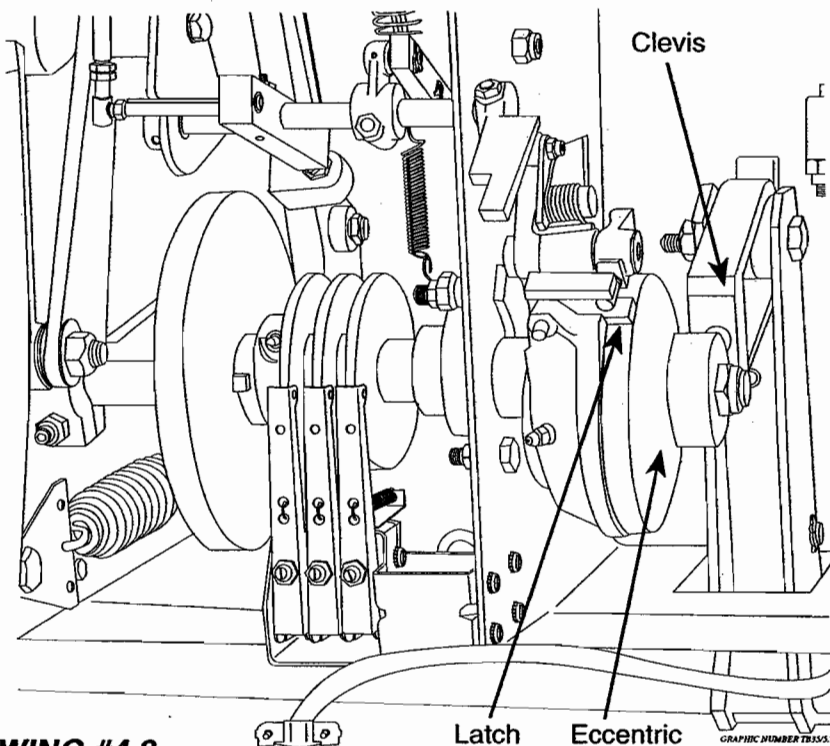


NOTE: "Table zero" (home) position is the point at which the table has reached its highest operating position.



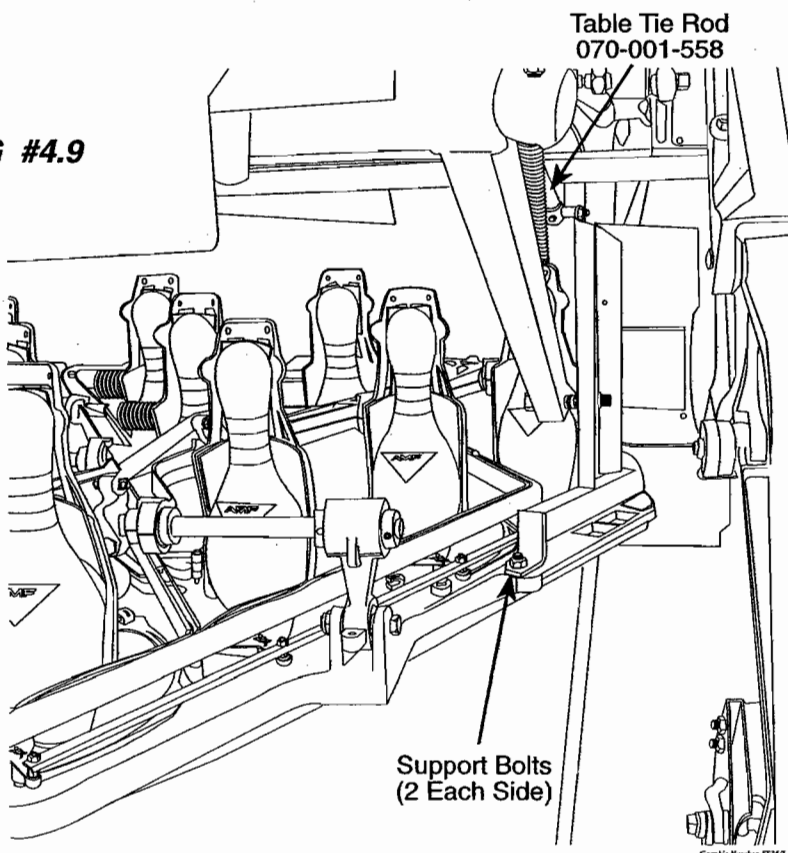
4.2.1.6 TABLE DRIVE ECCENTRIC OPERATION

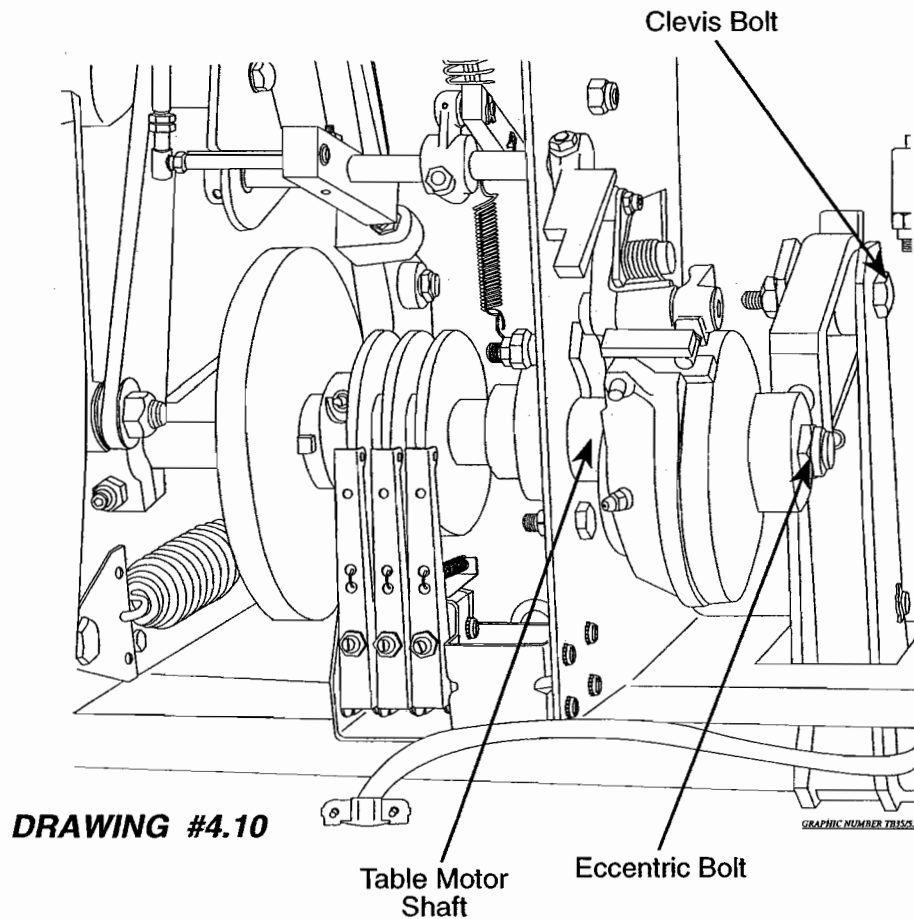
The height of the table travel during spotting and respotting is controlled by the table drive eccentric. During a respot cycle, the latch is engaged in the eccentric and the table lowers to respot height. When the spotting solenoid is energized, as in a spotting cycle, the latch is disengaged allowing the eccentric to operate. This permits the table to descend to the deck and spot a set of pins.



DRAWING #4.8

DRAWING #4.9





4.2.1.7 TABLE ADJUSTMENT TO CORRECT PINS WOBBLING OR FALLING DURING SPOTTING



NOTE: Adjustments must be made in the order given.

1. Manually crank the table clockwise so that the table will go into a spotting position. Stop when the bolt in the table drive eccentric, the clevis bolt, and the table motor drive shaft are in line.
2. Adjust the table height for 5/16" clearance between the bottom of the table and the pin deck by lengthening or shortening the clevis. (A half turn of the clevis causes approximately 1/8" of table movement). Shortening the clevis raises the table, lengthening the clevis lowers the table. Use ST #070-006-519 gauge or a 5/16" allen wrench as a gauge. The clearance between the table and pin deck should not exceed 3/8" or less than 1/4".

**** Continue with Table Adjustments on next page ****



TABLE ADJUSTMENTS - Continued

3. Place a block of wood in between the table and pin deck in order to remove the clevis bolt to make the previous adjustment.



NOTE:

Table cross level may be corrected by using slotted washers as required between the table and support post. When front to rear level is not correct, change the length of the tie rods. These two rods must be turned uniformly. Lengthening the rods raises the front of the table and lowers rear of table. Shortening the rods does the opposite. All levels are taken with respect to the pin deck. See Drawing #4.9 for location of tie rods (#070-001-558).

4.2.1.8 TABLE ADJUSTMENT FOR SPOTTING CUP TOE ADJUSTMENT

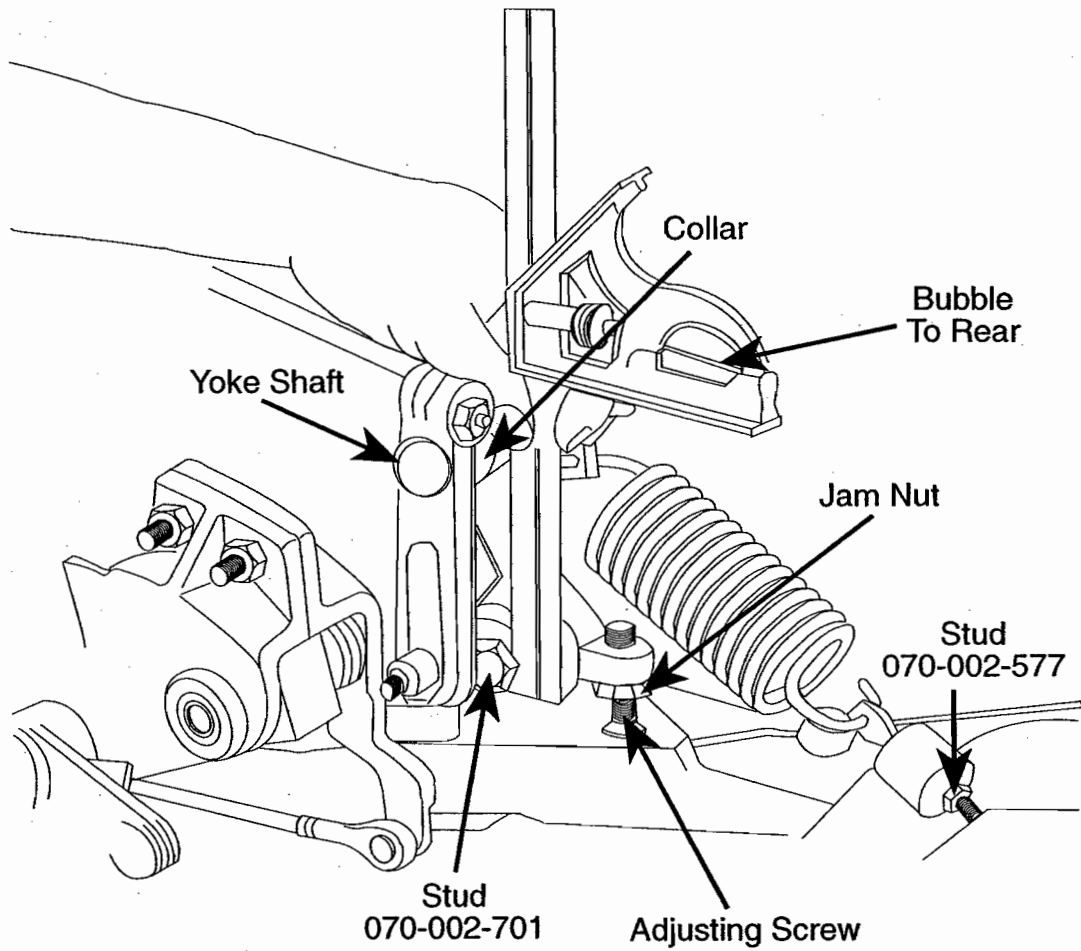
1. Manually crank table motor counterclockwise until the table is approximately 6" off the pin deck.
2. Loosen the collar on the front yoke shaft and slide collar away from yoke. See Drawing #4.11 for location.
3. Using a combination level and square, hold square against front yoke shaft and stud #070-002-701. Loosen jam nut and adjust screw stop until combination square reads 1/2 bubble (with bubble toward rear of the machine).
4. Tighten jam nut and reposition. Tighten collar.
5. The nut on stud #070-002-577 is to be tightened all the way down to provide maximum spring tension.



NOTE:

This adjustment provides the correct amount of toe-in required for good spotting action. The cup assembly is positioned for spotting by means of the large spring attached to the yoke. Too little toe-in will cause the pins to be spotted flat on the deck; too much toe-in could cause pins to fall over.

**** Continue with Table Adjustments on next page ****



GRAPHIC DRAWING ES37/5.10

DRAWING #4.11

**** Continue with Table Adjustments on next page ****



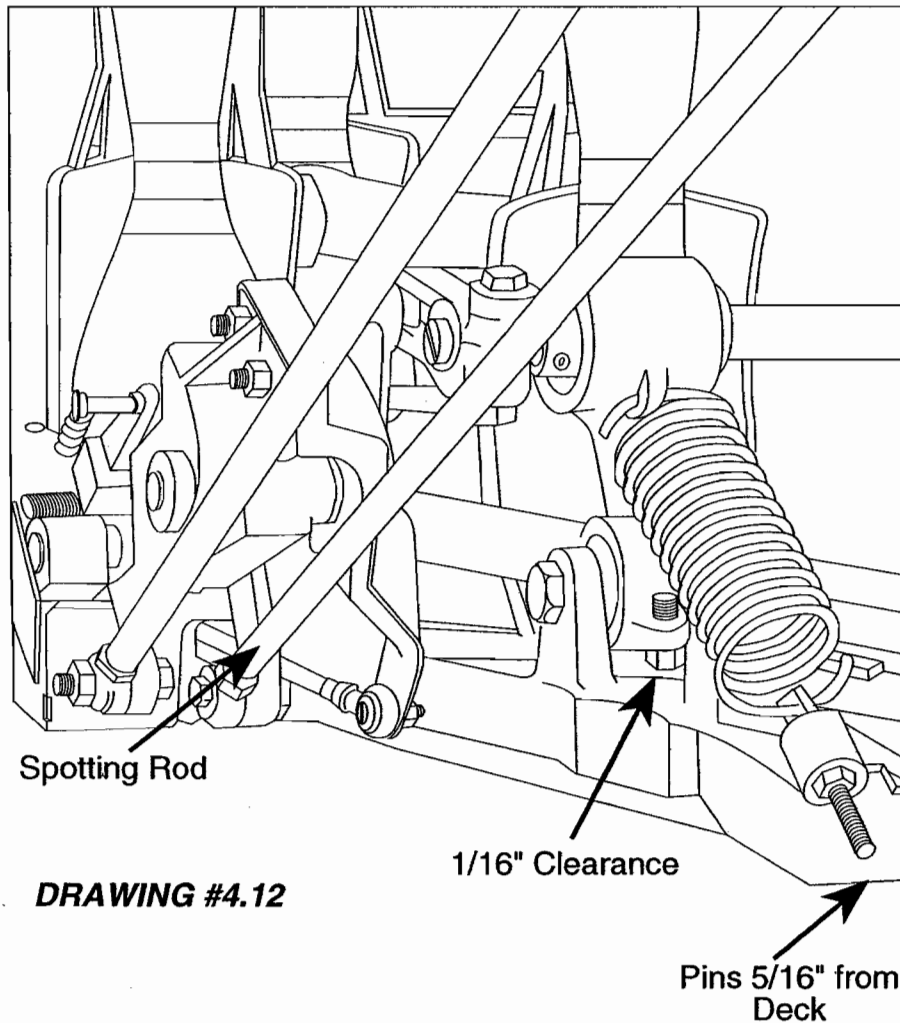


TABLE ADJUSTMENTS - Continued

4.2.1.9 TABLE ADJUSTMENT FOR SPOTTING ROD

1. Manually crank the table motor clockwise so that the pin bottoms are $5/16$ " from pin deck and are perpendicular to the deck. Adjust the spotting rod until $1/16$ " clearance is obtained between the screw stop and adjusting screw. This starts the yoke assembly to move away from the pins as they come in contact with the pin deck.



NOTE:

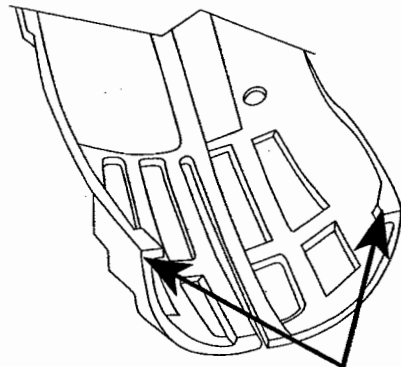
The table spotting rod transmits the motion from the spotting cam to the clevis. This permits the table spotting cups to travel in an arc down to the deck to spot pins. As the low portion of table spotting cam is reached, the spotting rod moves the yoke and cup assembly away from the pins, spotting them on the deck.

**** Continue with Table Adjustments on next page ****

TABLE ADJUSTMENTS - Continued

4.2.1.10 TABLE ADJUSTMENT FOR SETTING SPOTTING CUP WIDTH

1. Lower the table to the respot position.
2. Check the inside measurement at the forward tip of the spotting cup. The dimension should be 4-1/8" to 4-1/4".



DRAWING #4.13 4-1/8" to 4-1/4"

4.2.1.11 TABLE ADJUSTMENT FOR SPOTTING CUPS

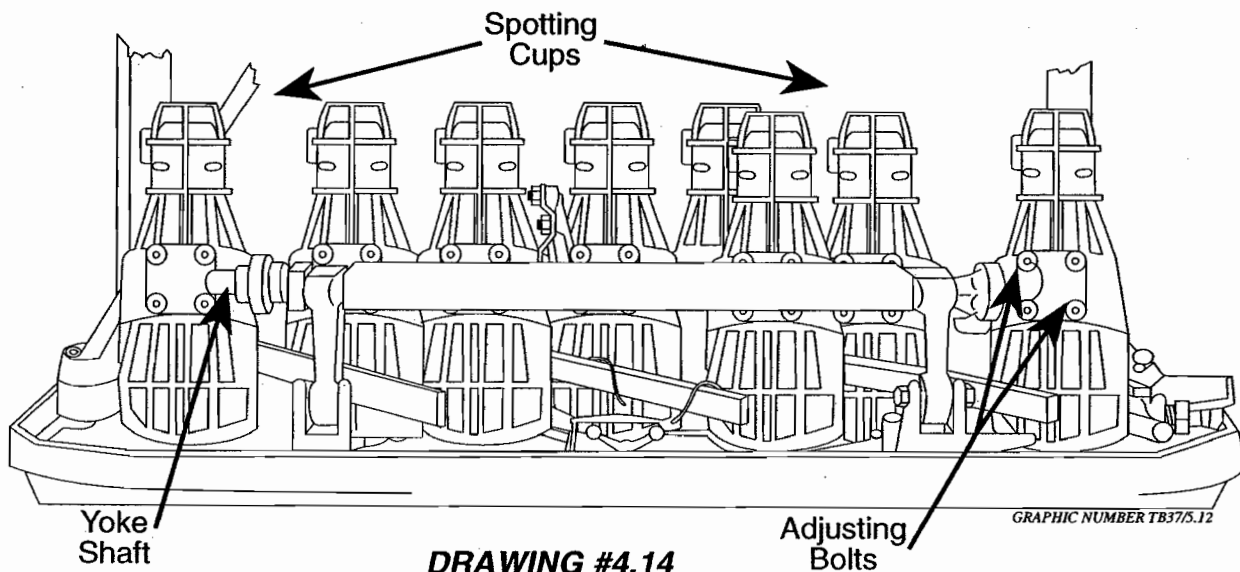


An extreme adjustment of the cup must permit free movement of the cup.

1. To adjust the spotting cups in order to place pins on spot:
 - a) When pins are too far forward, loosen the two top cup bolts and tighten the two top bolts.
 - b) When pins are too far back, loosen the two bottom cup bolts and tighten the two bottom bolts.
 - c) When pins are too far left or right, loosen through bolts and slide cup on shaft accordingly.
2. Run table to check for proper spotting of pins.



NOTE: If there is insufficient lateral movement to place pins on spot, the table should be repositioned.

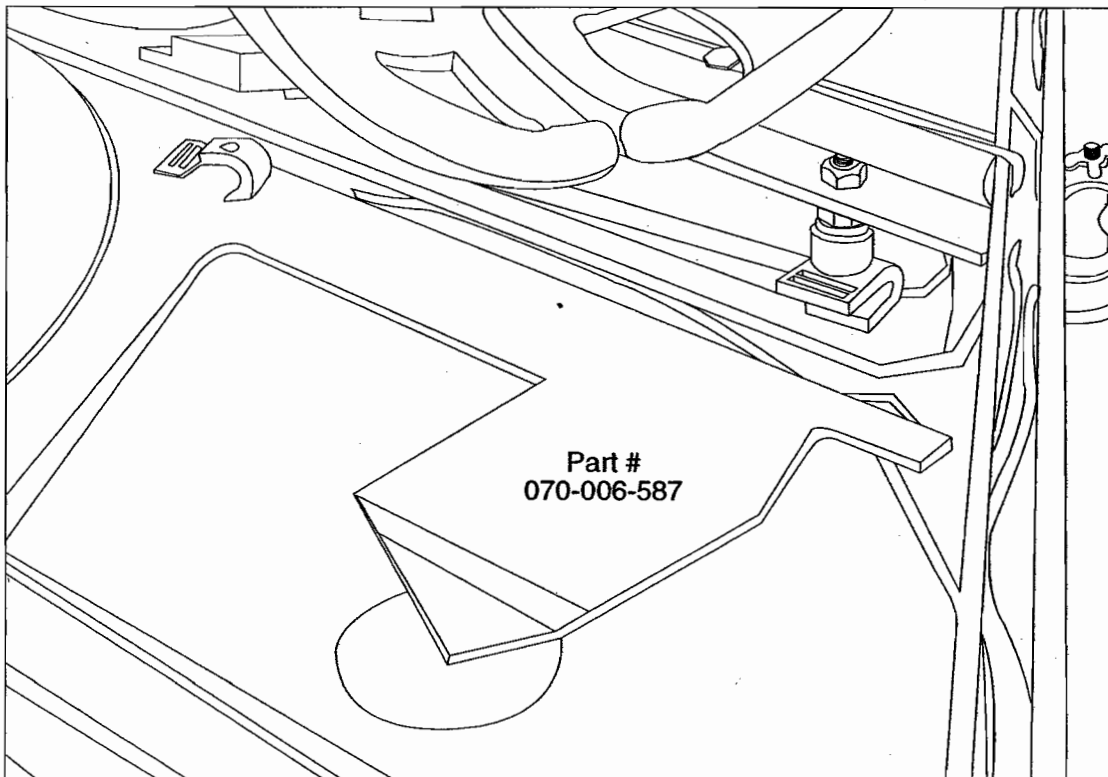


DRAWING #4.14



4.2.1.12 TABLE REPOSITIONING

1. Manually crank the table to zero position.
2. Remove spot and respot rods. See Drawing #4.12 for location. Manually crank table down to lowest point.
3. Place three 5/16" flat plates between table and deck.
4. Remove clevis bolt. See Drawing #4.10 for location.
5. Mount locating tools ST #070-006-587 in the 1, 7, & 10 cell brackets. If the table is 5/16" from the pin deck, these tools should rest flat on the spots. Two locating tools may be used alternating between the 1-7 and 1-10 spots. See Drawing #4.15 for location.
6. Loosen the four bolts holding the table support assembly #070-007-296 to the table #070-002-684. See Drawing #4.9 for location. Shift the table until locating tools point to the center of the 1, 7, 10 spots.
7. Secure table bolts, spot and respot rods, and clevis pin. Remove the 5/16" plates.



GRAPHIC NUMBER ES38/5.13

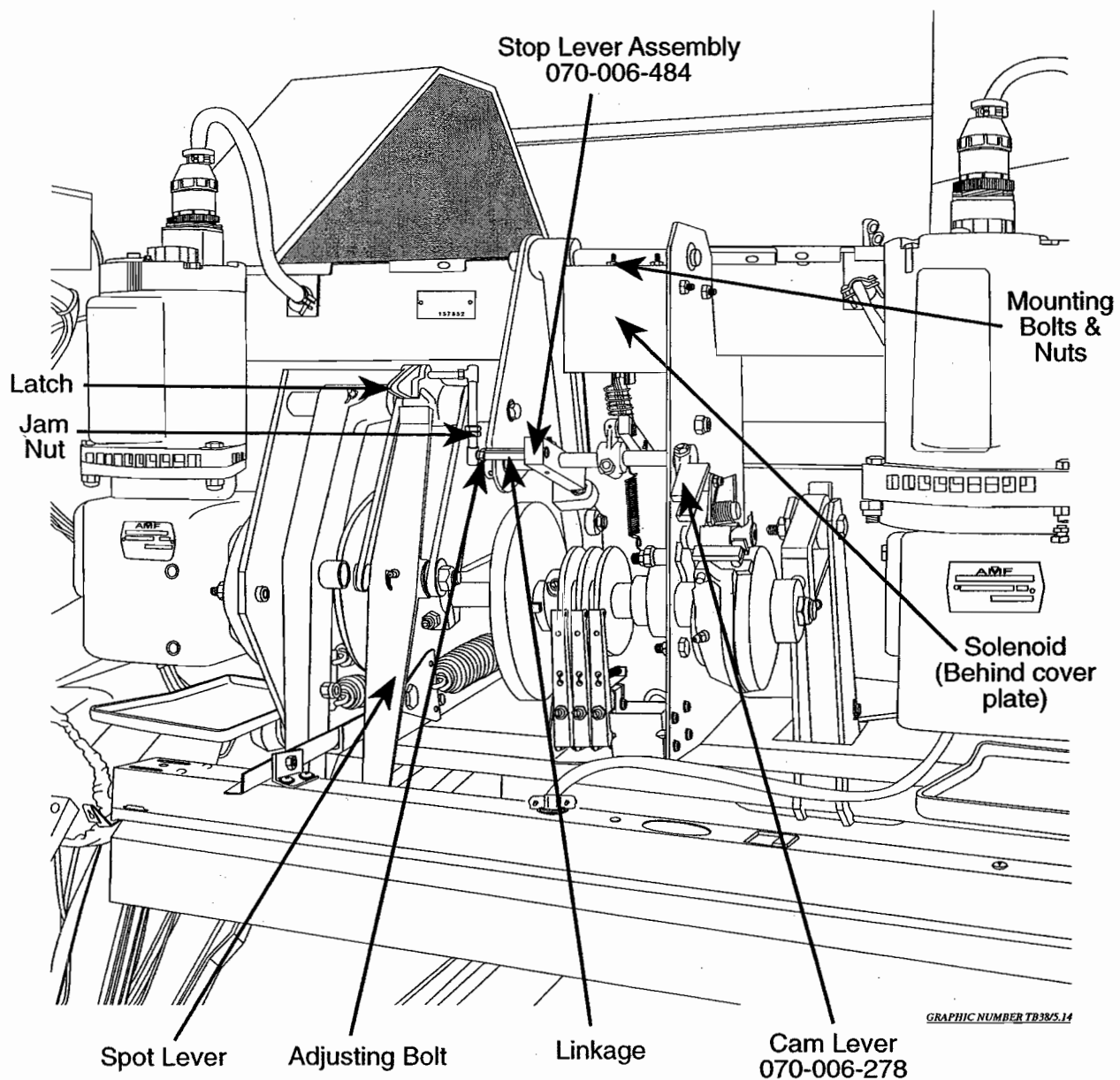
DRAWING #4.15

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4.2.1.13 SPOTTING SOLENOID OPERATION

The spotting solenoid controls the operation of the table for the spotting and respotting functions:

1. For the spotting function, the solenoid is energized, unlocking the table drive mechanism and disengaging the shuttle stop. This allows the shuttle assembly to follow the cams and release pins from the bin into the spotting cups.
2. For the respotting function, the solenoid is de-energized, releasing the spot lever which fixes the spotting cups into horizontal position and prevents the table from full descent.



GRAPHIC NUMBER TB38/5.14

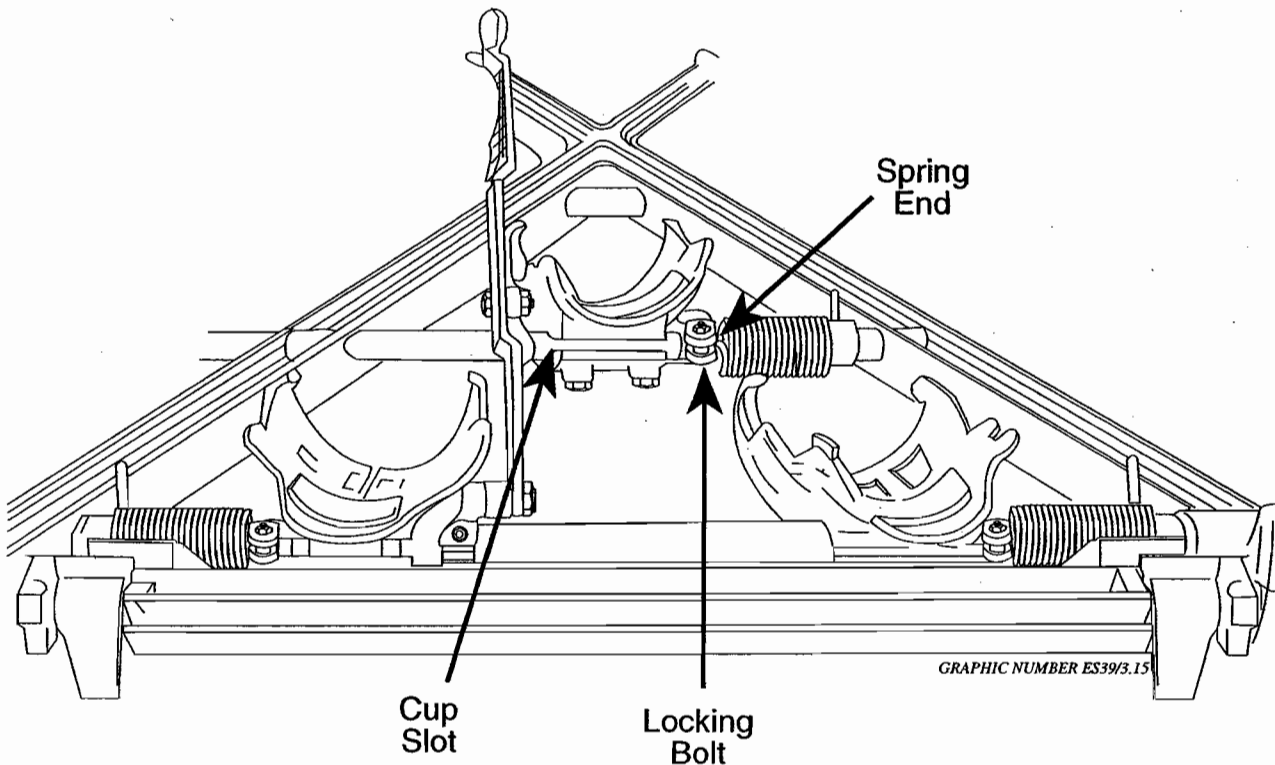
DRAWING #4.16

4.2.1.14 SPOTTING SOLENOID ADJUSTMENTS

1. With the table at zero (home) position, the distance between the end of the stop lever assembly #070-006-484 and the adjusting bolt should be .015". Adjust the bolt to meet these conditions. See Drawing #4.16 for location.
2. If the spotting solenoid is replaced, it should be positioned so when manually operated (as if it were energized) the cam lever #070-006-278 should be in a locked position. This rigidity is necessary to trip the spotting mechanism during a spotting cycle. Tighten the solenoid mounting bolts uniformly to obtain the above conditions.
3. With the table at zero (home) position, insert the large end of ST #030-002-748 gauge between the spot lever and latch. Adjust linkage to obtain .176" clearance.

4.2.1.15 TABLE SPRINGS OPERATION

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



DRAWING #4.17

4.2.1.16 TABLE SPRINGS ADJUSTMENTS

1. With the table in zero (home) position, loosen the locking bolt and rotate the spring retainer on the table shaft so that the spring ends are in line with the slot between the cup and cup cap. This is the initial or approximate setting.
See Drawing #4.17 for location.
2. Run machine through several spotting operations and observe cup movement. Insufficient spring tension will cause unstable cup movement allowing 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.

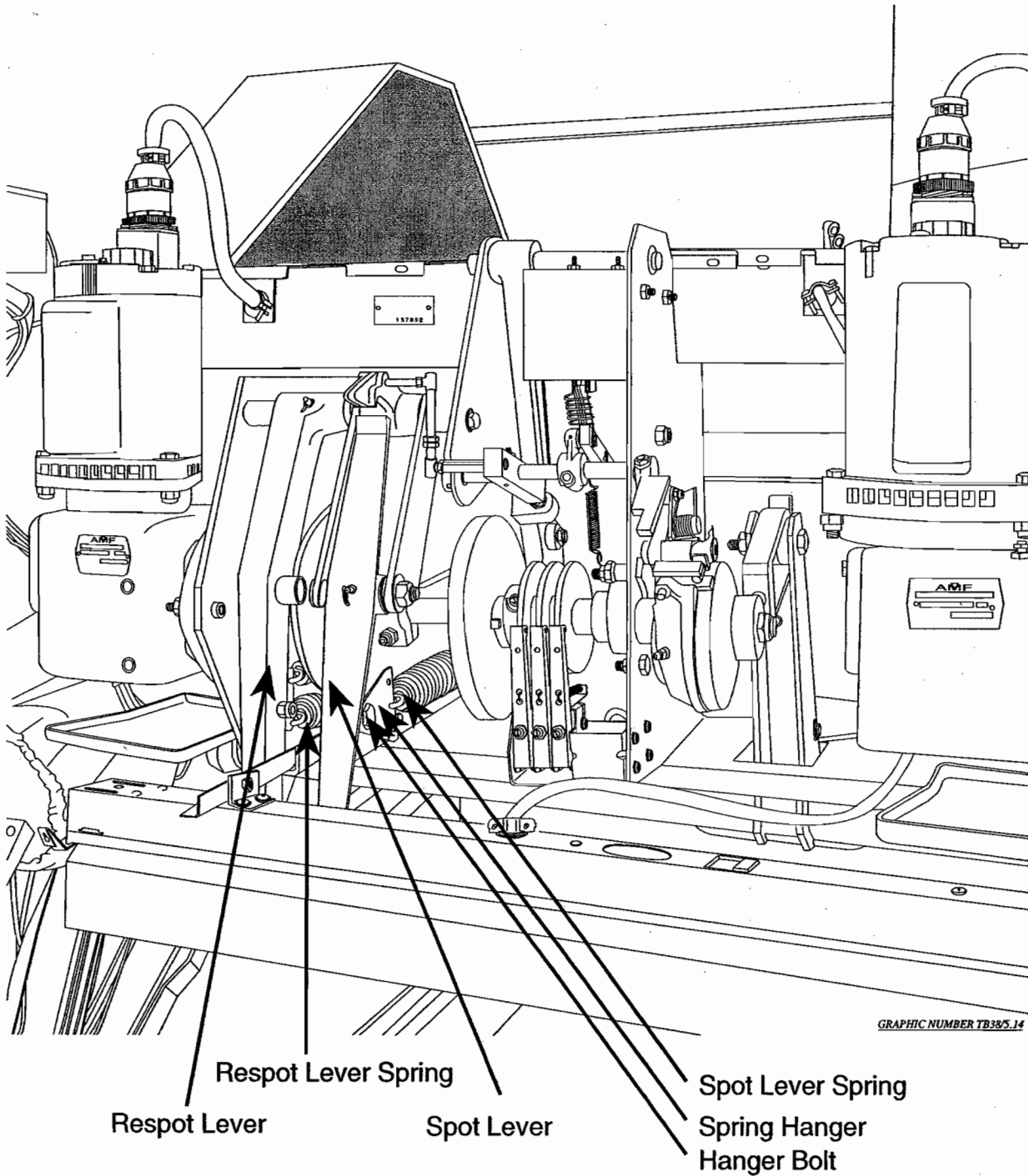


NOTE: If springs have to be replaced, first remove yoke. See Section 4.2.1.18 for Yoke Assembly Removal instructions.

4.2.1.17 SPOT AND RESPOT LEVER SPRING REMOVAL OR REPLACEMENT

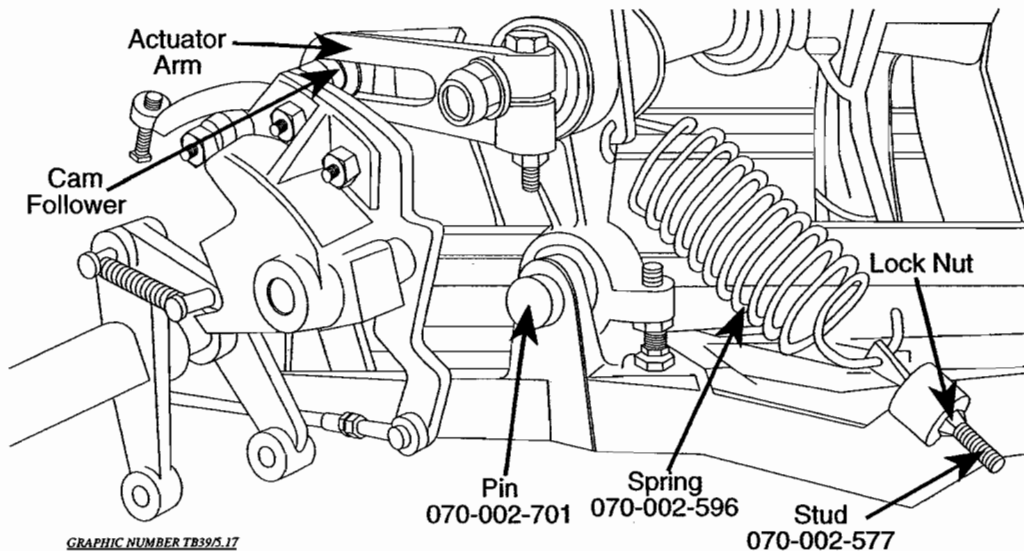
1. Hold the trip latch down on the table drive eccentric while holding the spot lever latch up and manually crank the table down. See Drawing #4.18 for location.
 - a) To remove the one spot lever spring, stop the table when minimum clearance is reached between the spot lever and spot lever stop.
 - b) To remove the two respot lever springs, stop the table when minimum clearance is reached between the respot lever stop. This removes a lot of the spring tension.
2. Remove the nut from the spring hanger bolt.
3. Insert the spring puller through the center hole in the spring hanger. Pull to remove tension from the hanger bolt. While pulling, move bolt and hanger away from the lever until free from the hole.
4. To replace spring(s), reverse procedure in steps 2 and 3 above.





DRAWING #4.18

4.2.1.18 YOKE ASSEMBLY REMOVAL



DRAWING #4.19

**NOTE:**

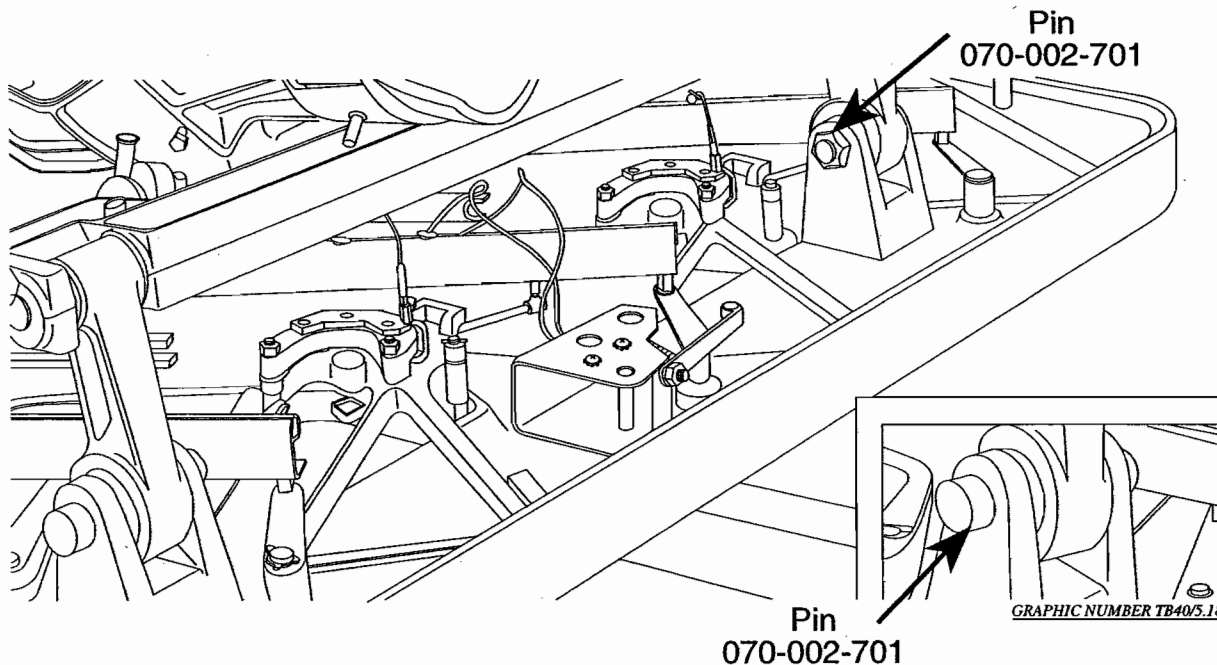
If the yoke is broken, it can be repaired with Yoke Repair Kit #610-704-011. It is not necessary to remove the yoke from the table in order to make the repair.

1. With the table at zero (home) position, disconnect the spot and respot rods from the spot and respot levers. See Drawings #4.12 & #4.18 respectively for locations.
2. Hold trip latch down on the table drive eccentric and manually crank the table down to the 180° position. Remove pins from the spotting cups. See Drawing #4.8 for location.
3. With the table in this position and the spotting cups horizontal to the deck, some of the tension is removed from spring #070-002-596. Loosen the lock nut on stud #070-002-577. This will remove more tension from spring #070-002-596. Before removing lock nut completely, hold tension on spring #070-002-596 with spring puller. This will ease the removal of the lock nut and prevent from stripping the threads of the stud.



YOKE ASSEMBLY REMOVAL - CONTINUED

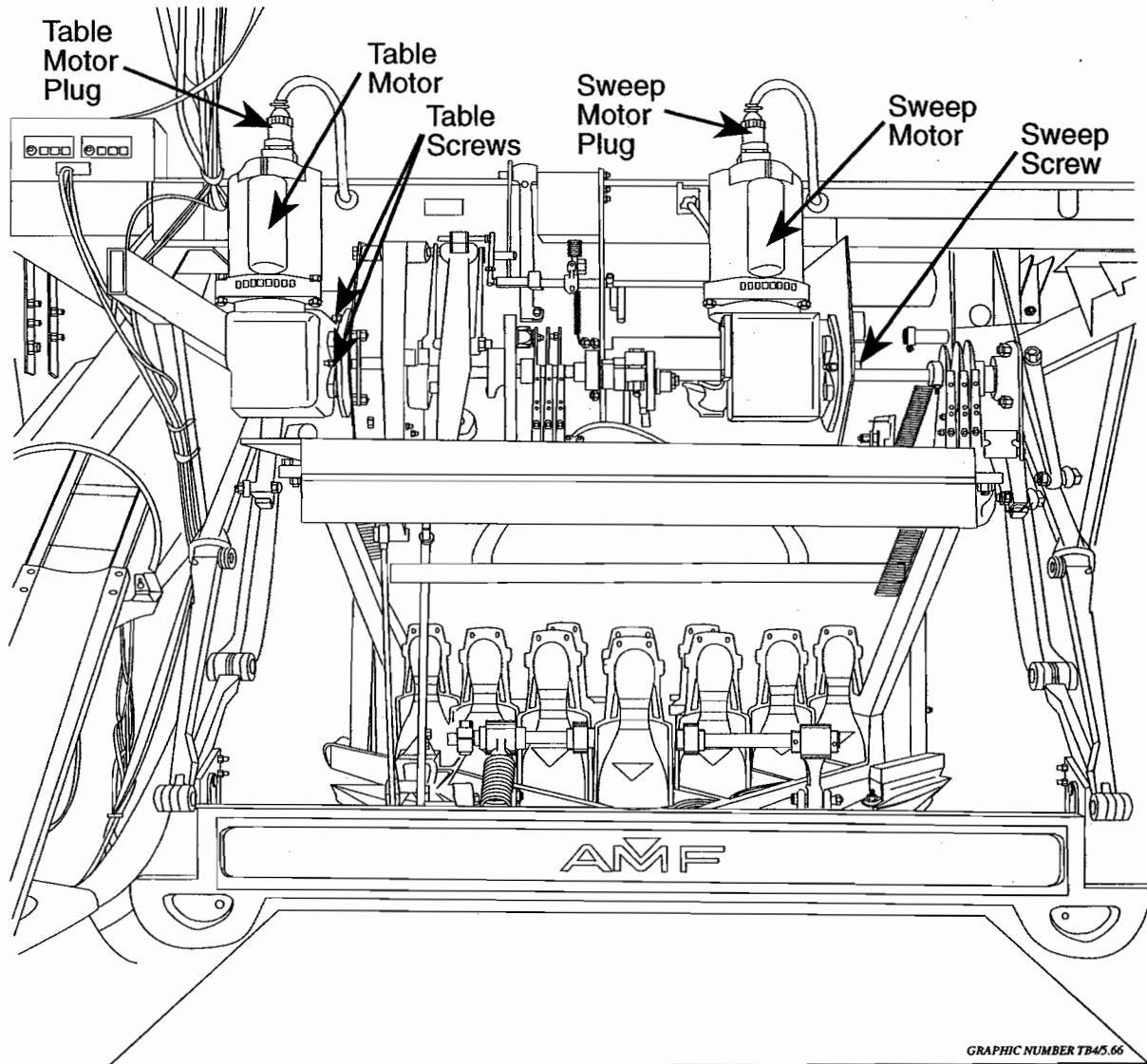
4. Remove the lock nuts from pins #070-002-701 which join the yoke to the table in 4 places; 2 in front and 2 in back. See Drawings #4.19 and #4.20 for location.
5. Slide yoke to the right to free actuator arm from cam follower. The yoke can now be removed from the table.



DRAWING #4.20

4.2.1.19 TABLE MOTOR ASSEMBLY REMOVAL

1. Disconnect table motor plug. See Drawing #4.21 for location.
2. Manually crank table down in spotting position. Place a wooden block between the table and the pin deck.
3. Manually crank the sweep down to the guard position.
4. Remove the three lock nuts #844-065-002 and screws #810-265-280 holding the motor on to the drive shaft.
5. Slide motor off splined shaft.



DRAWING #4.21

4.2.1.20 TABLE MOTOR ASSEMBLY REPLACEMENT

1. Spread a light coating of molykote grease on splined motor drive shaft.
2. Slide motor onto shaft and install the three screws and lock nuts.
3. Connect table motor plug.
4. Run table and sweep to zero (home) position.

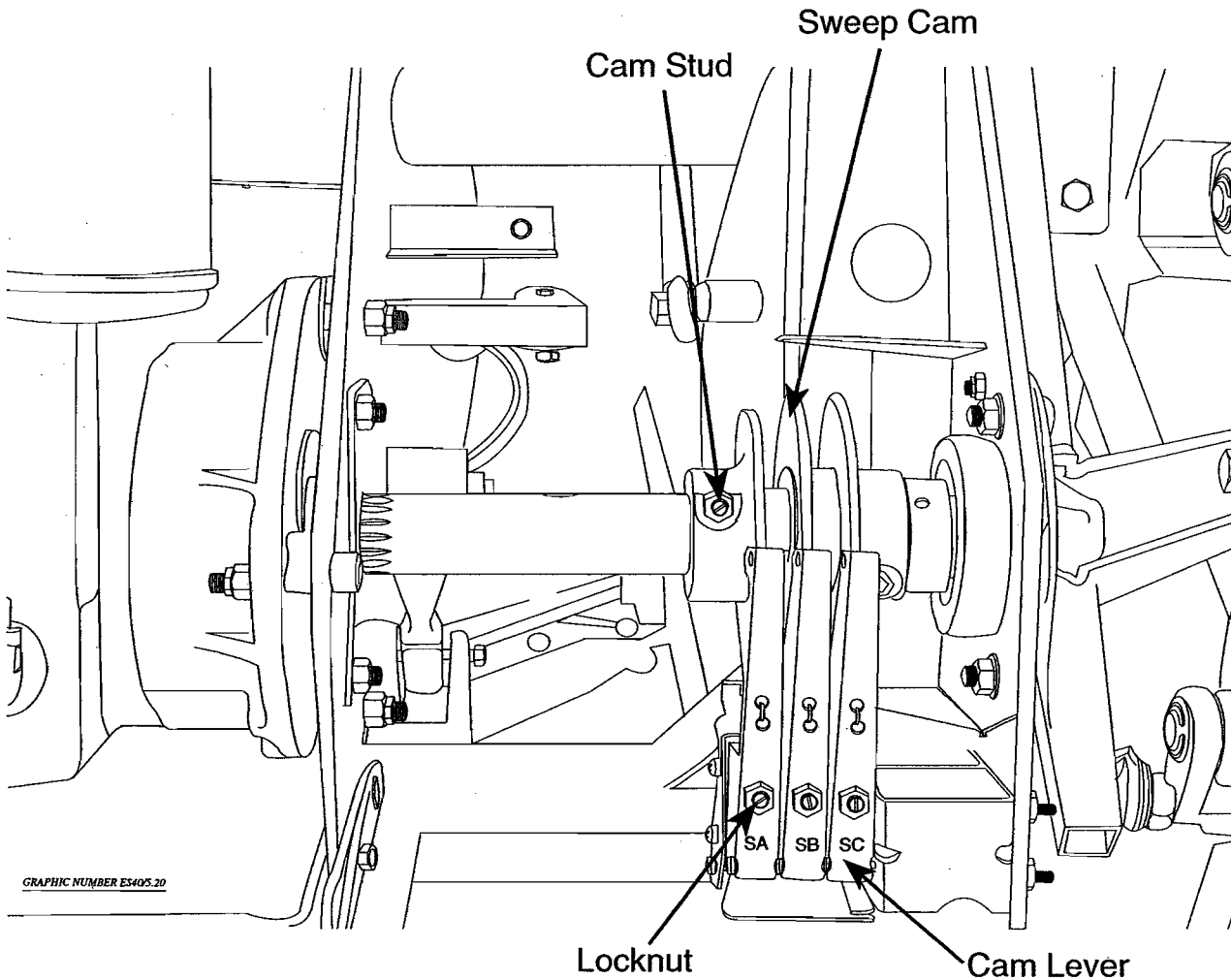


4.2.2 SWEEP OPERATIONS & ADJUSTMENTS

4.2.2.1 SWEEP CAM LEVERS AND CAMS OPERATION

The purpose of the sweep cams and levers:

- 1) To control the sweep operation during the 66° (guard) position run through to 270° position, and up to zero (home) position.
- 2) Sweep should operate smoothly in all locations and should not rub the machine or lane bed.
- 3) The cams and switches control the timing of the table movement and interlock protection (SC).



GRAPHIC NUMBER ES405.20

DRAWING #4.22

4.2.2.2 SWEEP CAM LEVERS ADJUSTMENT

1. Manually crank or run sweep to put the lever at the lowest portion of the sweep cam. See Drawing #4.22 for location.
2. Insert gauge ST #030-002-748 between the lever and the lowest portion of the sweep cam.
3. Actuate switch with the large end of the gauge.
4. Loosen lock nut and adjust to obtain above conditions. Tighten lock nut.

4.2.2.3 SWEEP CAM ADJUSTMENT

NOTE: After adjusting the sweep cam levers as described above, proceed with the following:

1. Manually crank the sweep to its highest position (zero position).
2. Loosen the cam studs and position the cams so the stud is parallel with the pin deck. Tighten cam studs. This is the initial or approximate setting. See Drawing #4.22 for location.
3. Run machine and note sweep down, sweep run and sweep up positions. If sweep operates smoothly, no further adjustment is necessary.
4. If adjustment is necessary:
 - a) Adjust SB cam so the sweep stops just before its' bottom most position (66°).
 - b) Adjust SA cam for sweep run through so the sweep stops at the 270° position.
5. Run machine and note operation of sweep. It may be necessary to readjust the lever of the table, sweep interlock cam SC, to obtain proper interlock operation. Correct sweep interlock is when the sweep sufficiently clears the #1 pin on run through when the table is picking up and respotting pins.

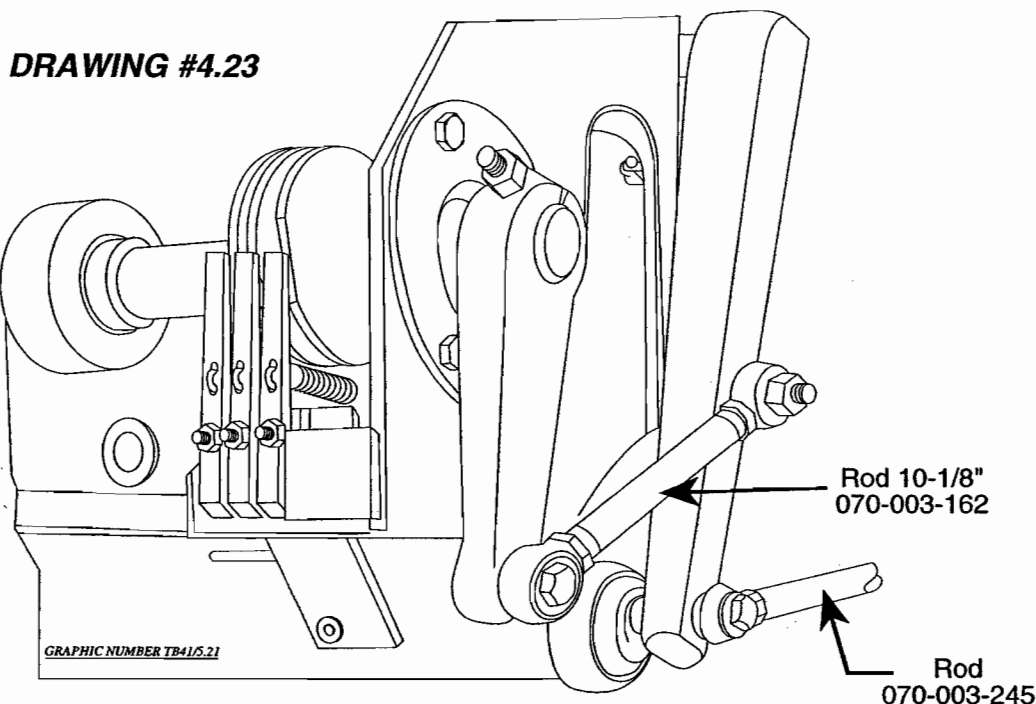


NOTE: If sweep over runs at stopping positions, adjustment is made by turning the cams towards you. If sweep stops short, turn the cams away from you.



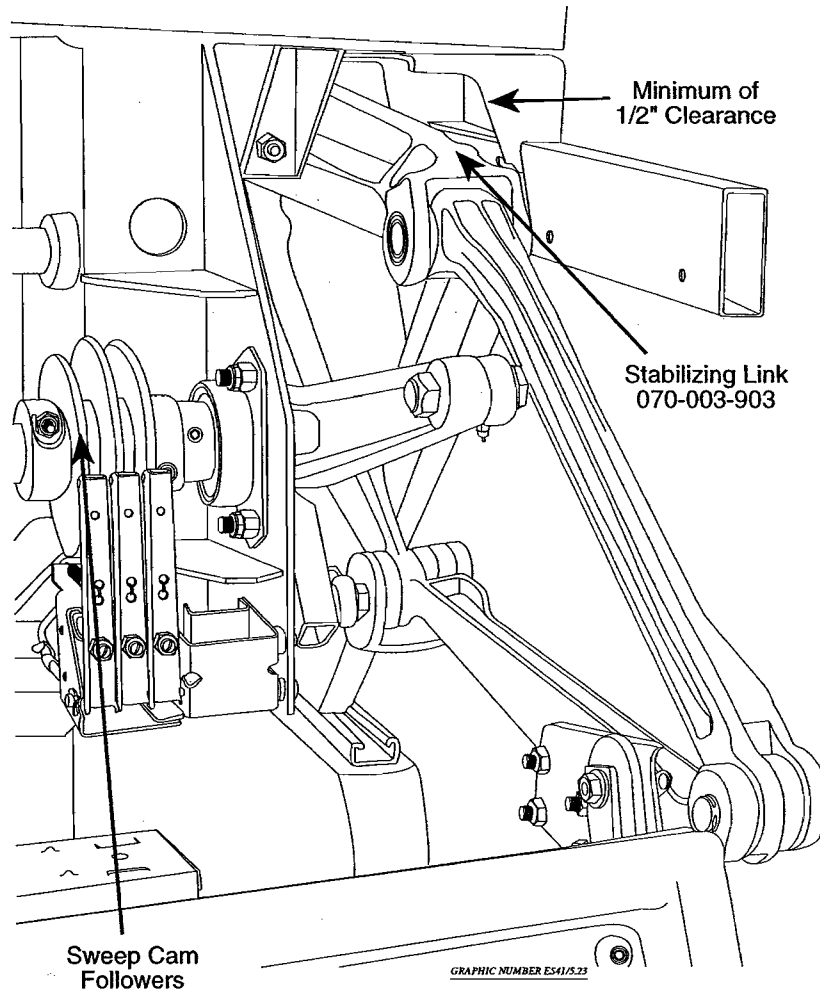
4.2.2.4 SWEEP ADJUSTMENTS

1. With the sweep at zero (home) position:
 - a) Adjust the short rod #070-003-162 to obtain 10-1/8" center to center for a starting length. See Drawing #4.23 for location.
 - b) Tighten lock nuts.
 - c) The sweep travel is determined by the length of rod #070-003-162. If this rod is too long, the sweep will collapse into the pit; if rod is too short, it will hit the framework of the machine at zero (home) position.



2. Adjust rod #070-003-245 to obtain a minimum of 1/2" clearance between the stabilizing link #070-003-903 and the frame of the machine. See Drawings #4.23 & #4.24 respectively, for location.
3. Manually crank sweep to guard position. Sweep shield should clear channel by approximately 3/4".
 - a) To increase clearance between sweep shield and channel, lengthen #070-003-223 link.
 - b) To decrease clearance, shorten #070-003-223 link.

The #070-003-223 links should be at right angles to the side frame of the machine. See Drawing #4.25 for location.



DRAWING #4.24

SWEEP ADJUSTMENTS - Continued

4. Manually crank sweep to #5 pin position. The sweep bar should clear the pin deck by approximately 1/4".
 - a) To lower sweep, move bracket #070-003-222 up.
 - b) To raise sweep, move bracket #070-003-222 down.

5. Set a pin on each side of the pin deck as far back as possible. 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 length of connection rod #070-003-162. Do not lengthen to maximum position. Under power, the sweep may collapse into the pit area.

6. Manually crank sweep to zero (home) position. Re-check Step 2 for clearance. Rod #070-003-245 may have to be readjusted in order to have sufficient clearance and for the sweep to hang parallel to the pin deck.



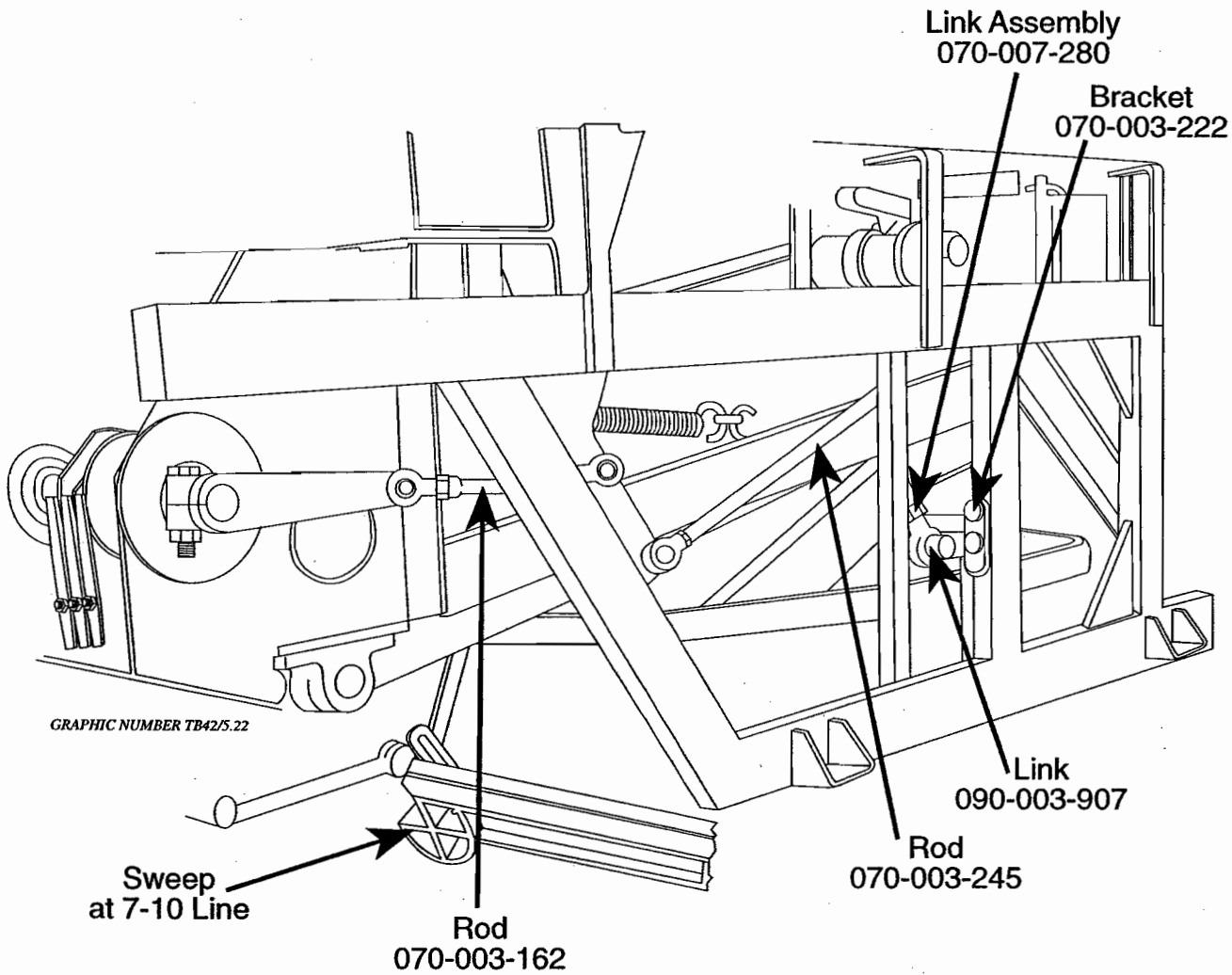
SWEEP ADJUSTMENTS - Continued

7. Operate machine under power and note sweep operation. It may be necessary to repeat the sweep cam adjustments.



Note:

Adjustments described in steps 2, 3 and 4 are made on both sides of the machine.



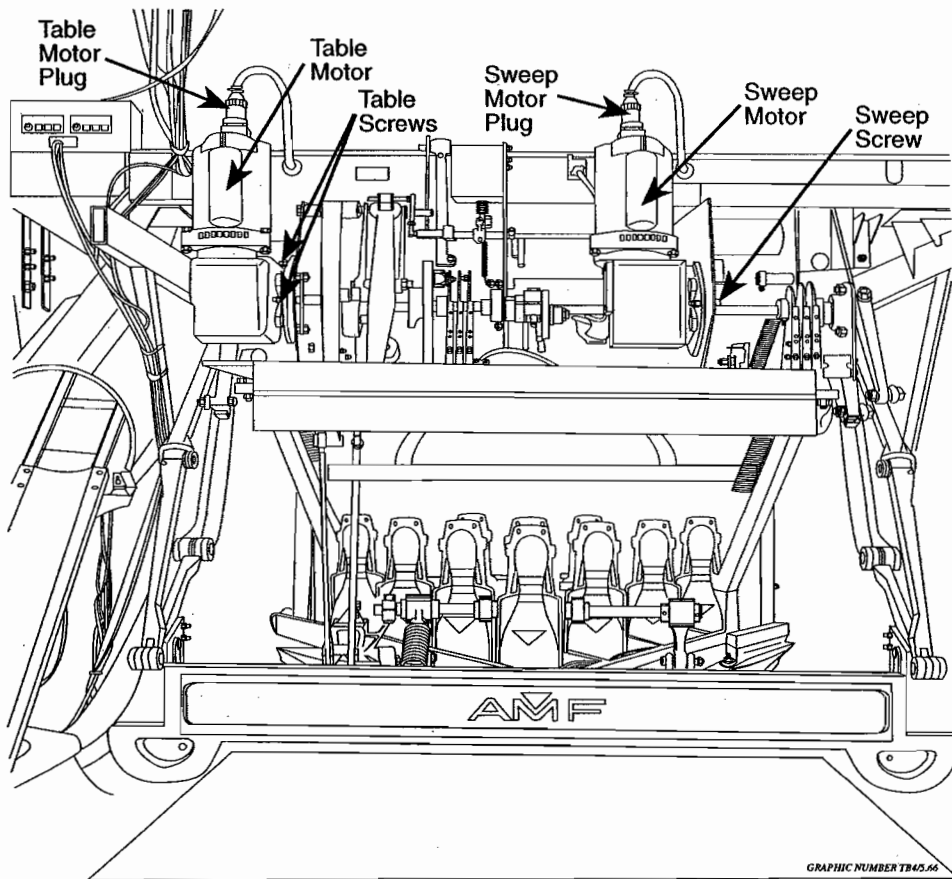
DRAWING #4.25

4.2.2.5 SWEEP MOTOR ASSEMBLY REMOVAL

1. Disconnect sweep motor plug.
2. Crank the sweep down to the guard position.
3. Remove the three lock nuts #810-265-280 and screws holding the motor onto the drive shaft.
4. Slide motor off splined shaft.



NOTE: Table, sweep motors and gearboxes are interchangeable.



GRAPHIC NUMBER TB45.66

4.2.2.6 SWEEP MOTOR ASSEMBLY REPLACEMENT

DRAWING #4.26

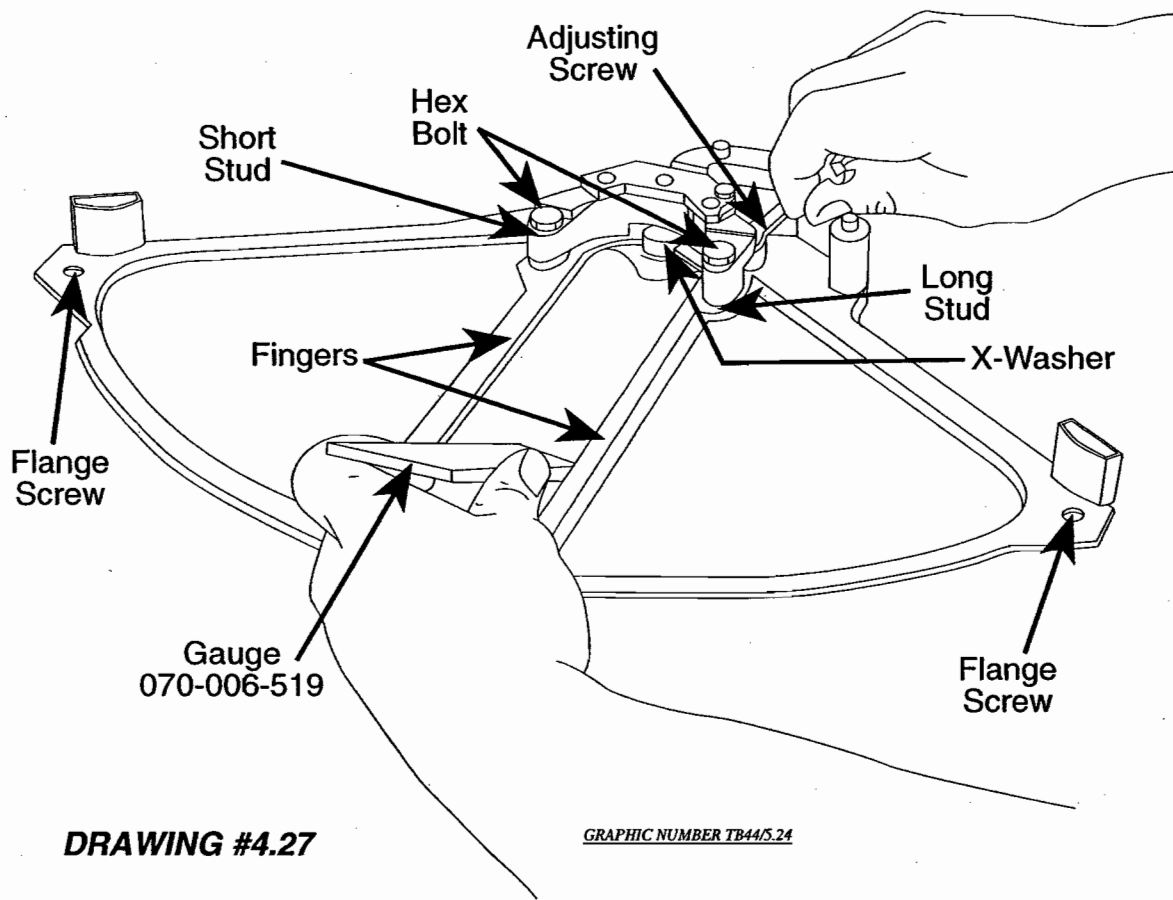
1. Spread a light coating of molykote grease on splined motor drive shaft.
2. Slide motor onto shaft and install the three screws and lock nuts.
3. Connect sweep motor plug.
4. Run sweep to zero (home) position.



4.2.3 RESPOT CELLS OPERATION & ADJUSTMENTS

4.2.3.1 RESPOT CELLS OPERATION

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



4.2.3.2 RESPOT CELLS REMOVAL

1. The respot cell assembly may be removed from the table by removing the four flange screws, the carburetor type linkage, and the wire from the gripper switch. See Drawings #4.27 & #4.28 for locations.
2. Each finger can be replaced by removing the hex bolt and X-washer located at the pivot point. The finger can be replaced when respot cell is mounted in the table. When replacing fingers, the rear finger should be put over the pivot point bushing first.

4.2.3.3 STEEL FINGERS ADJUSTMENT

Adjustment of fingers must be 2", if the adjustment is less than this dimension, the finger assembly will not lock. If this dimension is greater than specified, the pin may slip through the fingers causing a malfunction.

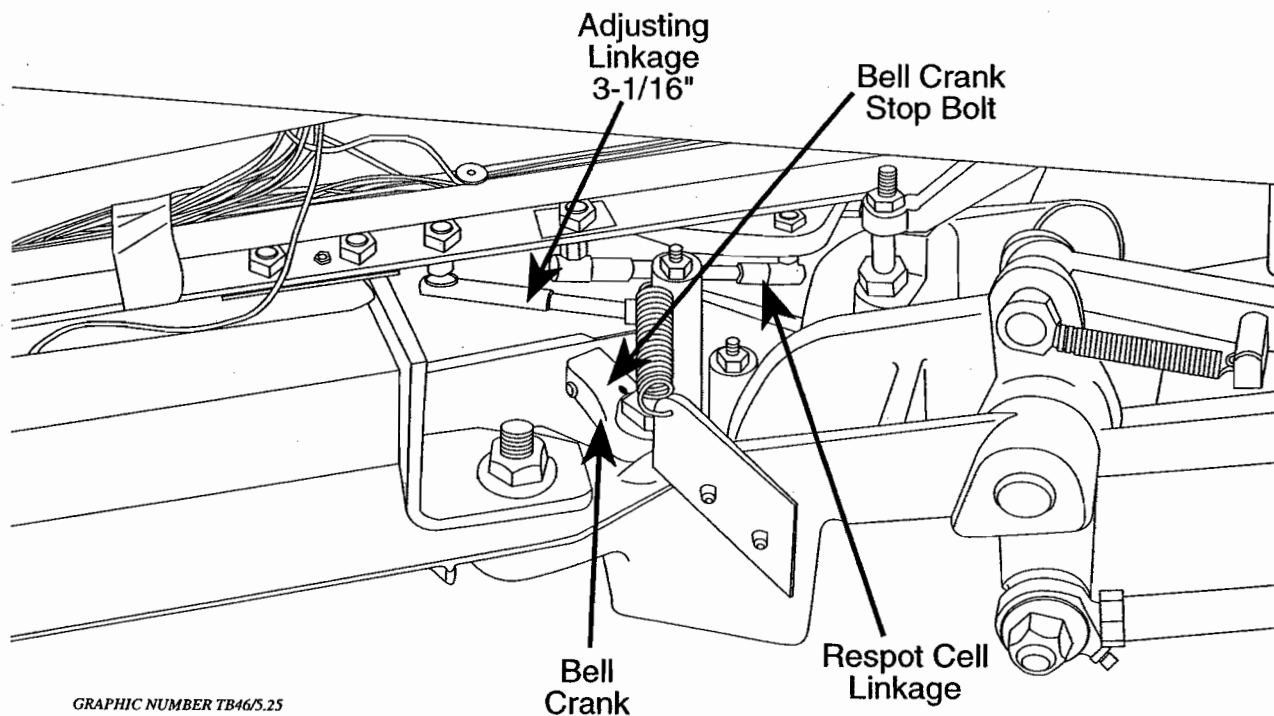
1. Move respot cell linkage to close cells as in respot condition. Using 1/4" open end wrench and ST #070-006-519 gauge, adjust for 2" width between fingers with the spring at the gripper switch compressed.



NOTE: This adjustment can be made with the respot cell in or out of the table.

4.2.3.4 RESPOT CELL BELL CRANK OPERATION

To prevent binding and breakage of the respot cells upon opening, the bell crank stop bolt is provided. This bolt takes the load from the fingers.

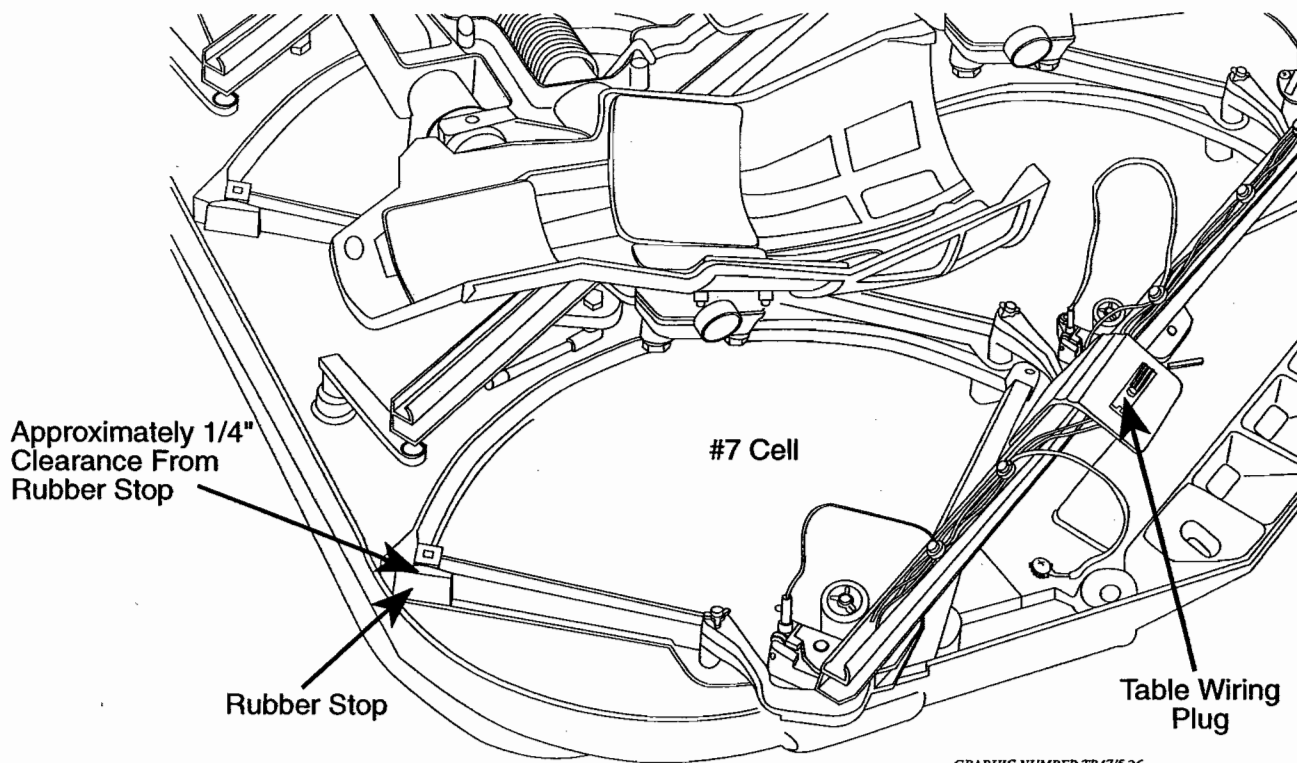
**DRAWING #4.28**

4.2.3.5 RESPOT CELL ADJUSTMENTS



NOTE: Adjustments must be made in the order given.

1. Move the respot linkage to close the cells. Disconnect the carburetor type linkage from all the cells (#7 cell is fixed). Make steel fingers adjustment as described in Section 4.2.3.3. Do not reconnect.
2. Adjust the carburetor type drive linkage at the bell crank to 3-1/16". See Drawing #4.28 for location.
3. Open #7 cell and adjust bell crank stop to obtain approximately 1/4" clearance from the rear finger to the rubber stop while holding the front finger against the stop. See Drawing #4.29 for location.



GRAPHIC NUMBER TB47/5.26

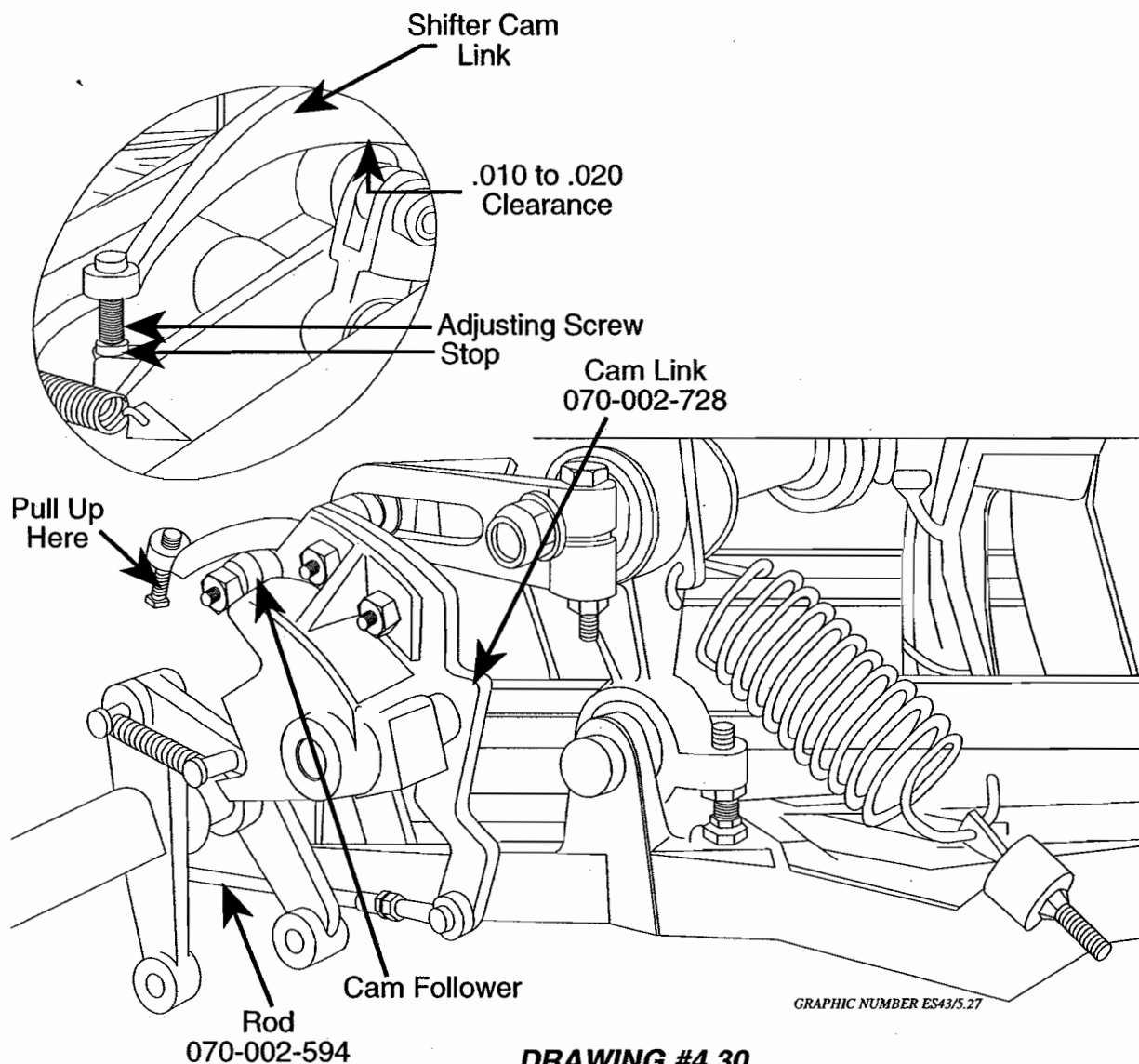
DRAWING #4.29

**** Continue with Respot Cell Adjustments on next page ****

RESPOT CELL ADJUSTMENTS - Continued

4. Adjust and reconnect the connecting linkage of the remaining nine cells, one at a time, to obtain the approximate 1/4" clearance from the rear finger to the rubber stop.

The shifter cam link should be pulled up and held, as indicated in Drawing #4.30, while making and checking this adjustment. Open and close the respot cells after each cell is adjusted to check for proper adjustment.



DRAWING #4.30

**** Continue with Respot Cell Adjustments on next page ****



RESPOT CELL ADJUSTMENTS - Continued

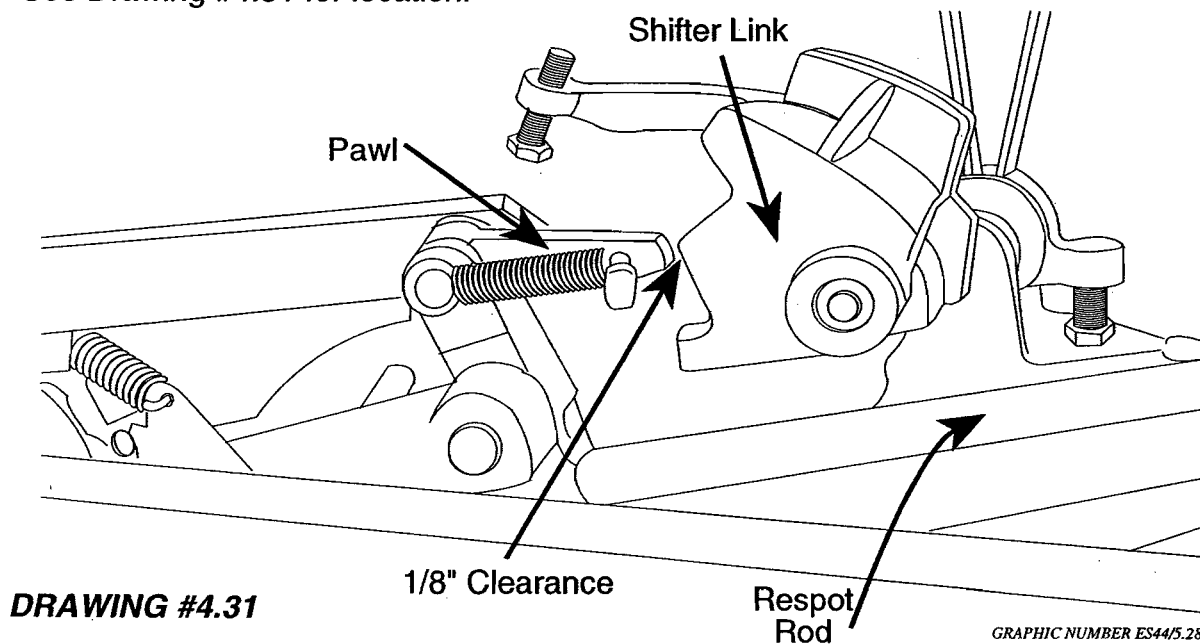
5. Slowly crank the table into spotting action while checking the clearance between the cam follower and the surface of the #070-002-728 cam link. See Drawing #4.30 for location.

If the clearance is such that the cam follower is difficult to turn, shorten the #070-002-594 control rod before cranking the table any further down. Failure to do so will cause the #070-002-594 control rod to bend as the table is cranked down. Stop the table at the 180° position. See Drawing #4.30 for location.

6. Adjust the #070-002-594 control rod assembly so there is a .010" to .020" clearance between the cam follower and the surface of the #070-002-728 cam link. Pull up at the end of the cam link when checking clearance.

7. Manually crank the table to the 355° position.
 - a) Close the respot cells and adjust the stop screw on the end of the shifter cam link to clear the stop.
 - b) Lengthen the screw stop about 4 turns to prevent force from being applied to the ten respot cell fingers, allowing the respot cells to lock on pins.

8. Close the respot cells slightly so that the center high point of the #070-002-728 shifter cam link is directly opposite the #070-002-590 pawl. Adjust the respot rod so that the pawl clears the center high point of the shifter cam link by 1/8". See Drawing #4.31 for location.



**** Continue with Respot Cell Adjustments on next page ****

RESPOT CELL ADJUSTMENTS - Continued

- Run table through several respot operations. Fingers should open and close smoothly without binds. If fingers do not lock on pins, a tight cell is indicated. Inspect all cells and adjust accordingly.



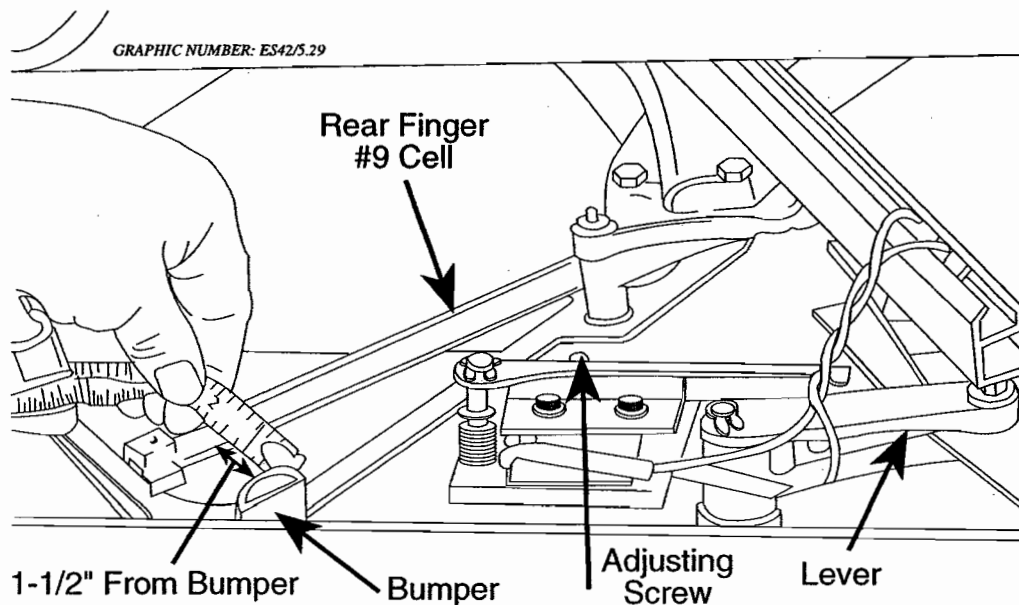
NOTE: To avoid damage to the ten fingers on the initial running of the table, use only one pin until smooth operation is achieved, then test with a complete set of pins.

4.2.3.6 RESPOT CELL PROTECTION SWITCH OPERATION

The respot cell protection switch prevents the table from operating (feeling for pins) when the cells are not fully open.

4.2.3.7 RESPOT CELL PROTECTION SWITCH ADJUSTMENT

- With the respot cells in the open position, hold the front finger of #9 cell to the extreme forward position. See Drawing #4.32 for location.
- Move rear respot cell finger forward to a maximum of 1½" from the #070-002-752 bumper. Use cell linkage for movement. **DO NOT PUSH FINGER.**
- Loosen locknut on the switch lever and adjust the screw until the switch is turned on. Tighten locknut.

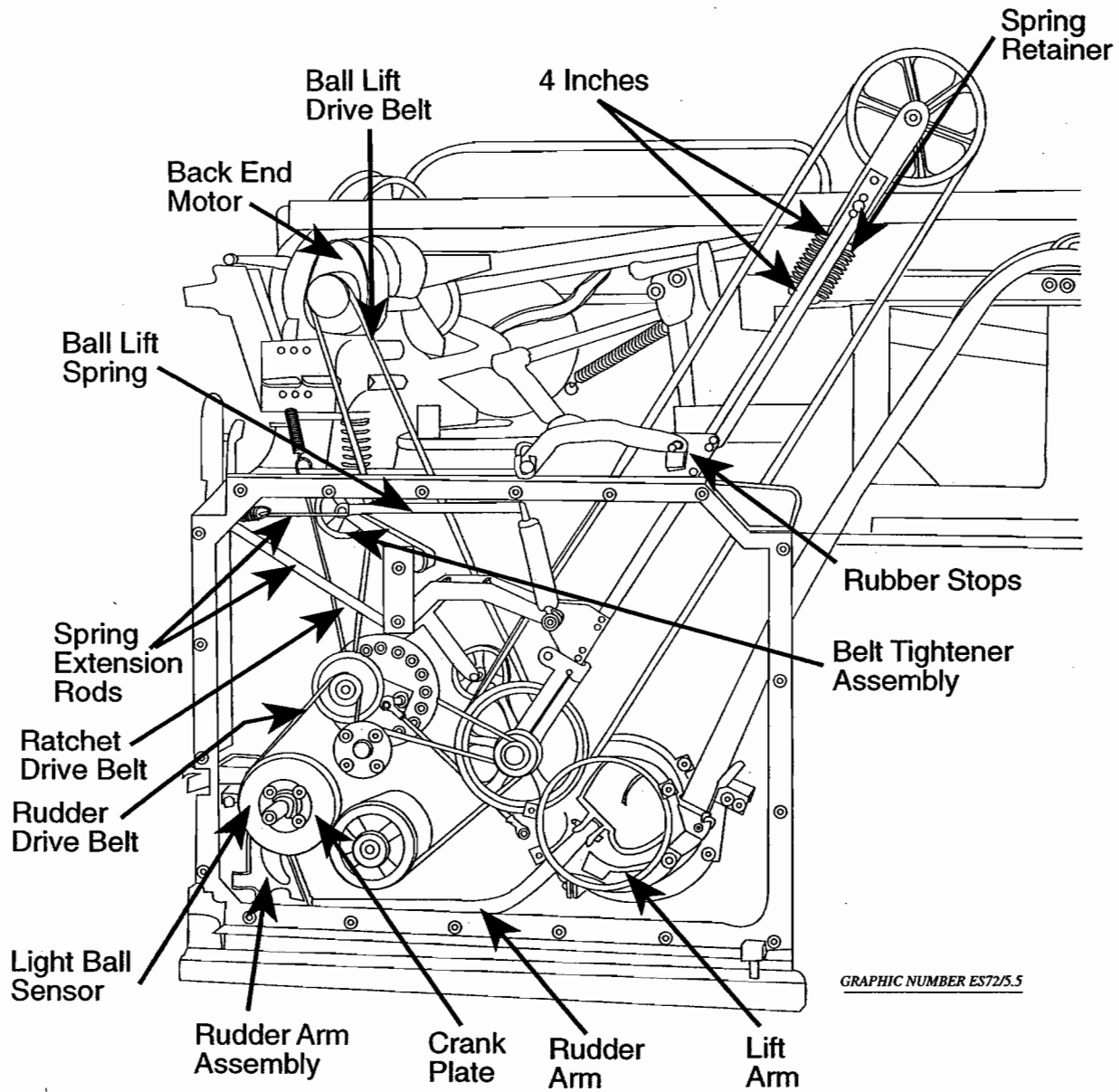


DRAWING #4.32

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4.2.4 BALL LIFT OPERATIONS & ADJUSTMENTS



DRAWING #4.33

4.2.4.1 BALL LIFT OPERATION

The purpose of the ball lift is to raise the ball high enough to permit a gravity return to the bowler.

4.2.4.2 BALL LIFT REMOVAL

1. Remove the springs from both spring extension rods, the belt tightener and the ball lift springs. See Drawing #4.33 for location.
2. Remove ball lift drive belt, ratchet drive belt and rudder drive belt.
3. Remove the studs from the upper and lower ball lift shaft mounting brackets. Lift ball lift out of pinspotter.

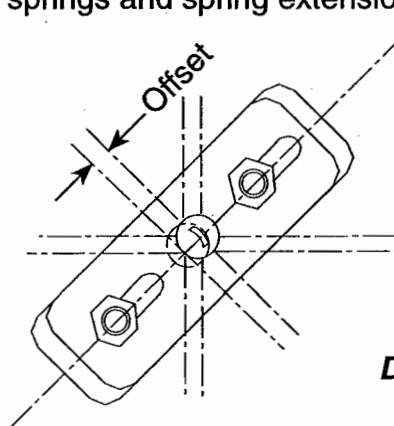
4.2.4.3 BALL LIFT REPLACEMENT

1. Place upper ball lift shaft in brackets. Place all V belts in position on the lift. Then put the lower shaft in brackets.
2. Replace the clamp studs with nuts loose. Then adjust upper and lower shafts accordingly. Center lift and tighten nuts.



NOTE: Adjustable ball lift support shafts are provided to allow alignment of the ball lift to the track rails. Adjustment is required when the shaft supports on the metal Kickback Assemblies are not aligned. Alignment is achieved by turning the plates on the Support Shaft Assemblies until the plates are parallel to the direction of offset. Make this adjustment so that the ball lift moves in the direction of the track rails, not away from the track rails. See Drawing #4.34.

3. Replace all drive belts, springs and spring extensions.

**DRAWING #4.34**

GRAPHIC NUMBER: ES115.43

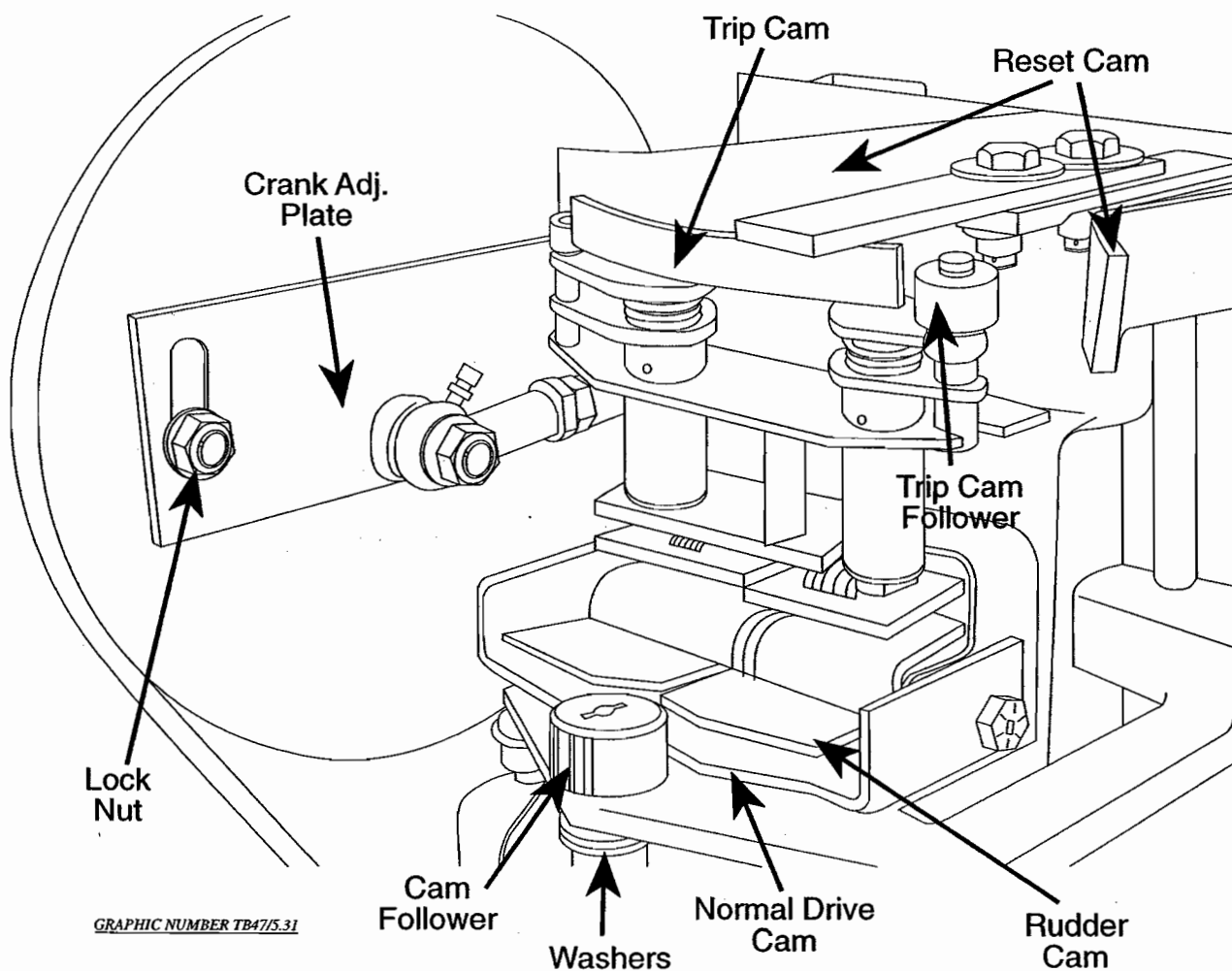


4.2.4.4 BALL LIFT BELT ADJUSTMENT

1. If the belt rubs against the tube assembly when the ball is elevated, adjustment is necessary. Use a spanner wrench and rotate the spring retainer until the overall dimension of the spring is 4 inches. See Drawing #4.33 for location.

4.2.4.5 SENSOR ASSEMBLY OPERATION

Cam follower roller must be low enough so it will slide under the rudder cams when paddle movement is blocked, also high enough so rudder cams will lock behind it in the power drive position. Washers are provided so the height of the cam roller can be adjusted.

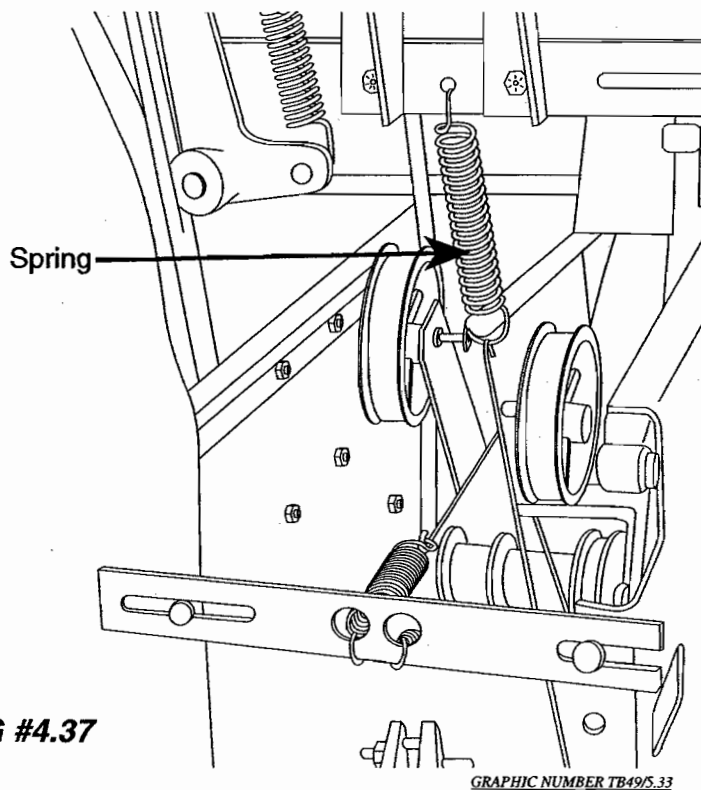
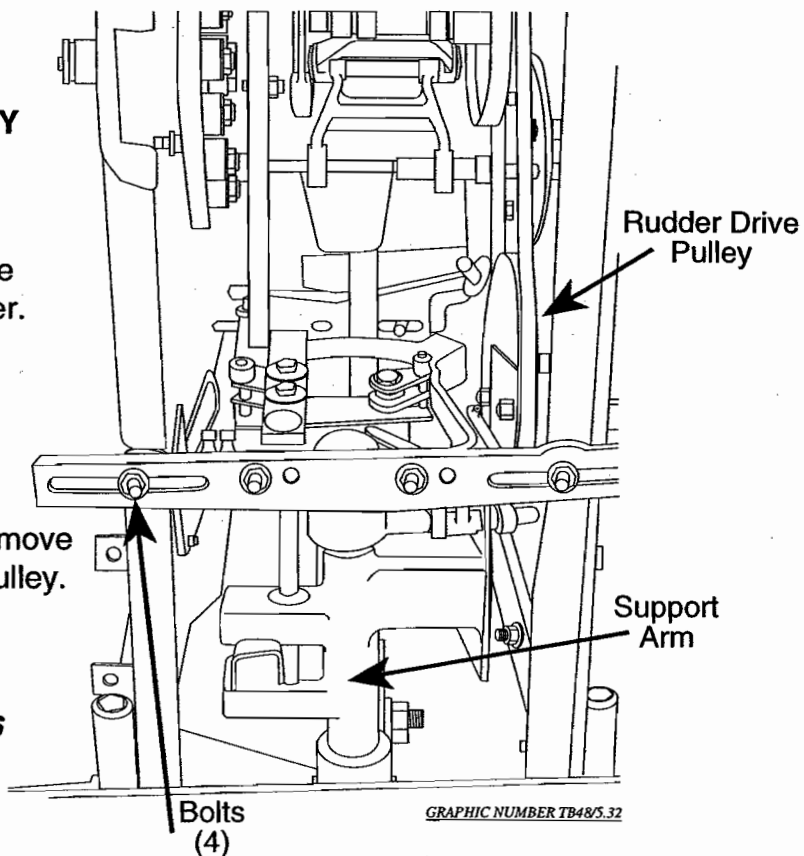


GRAPHIC NUMBER TB47/5.31

DRAWING #4.35

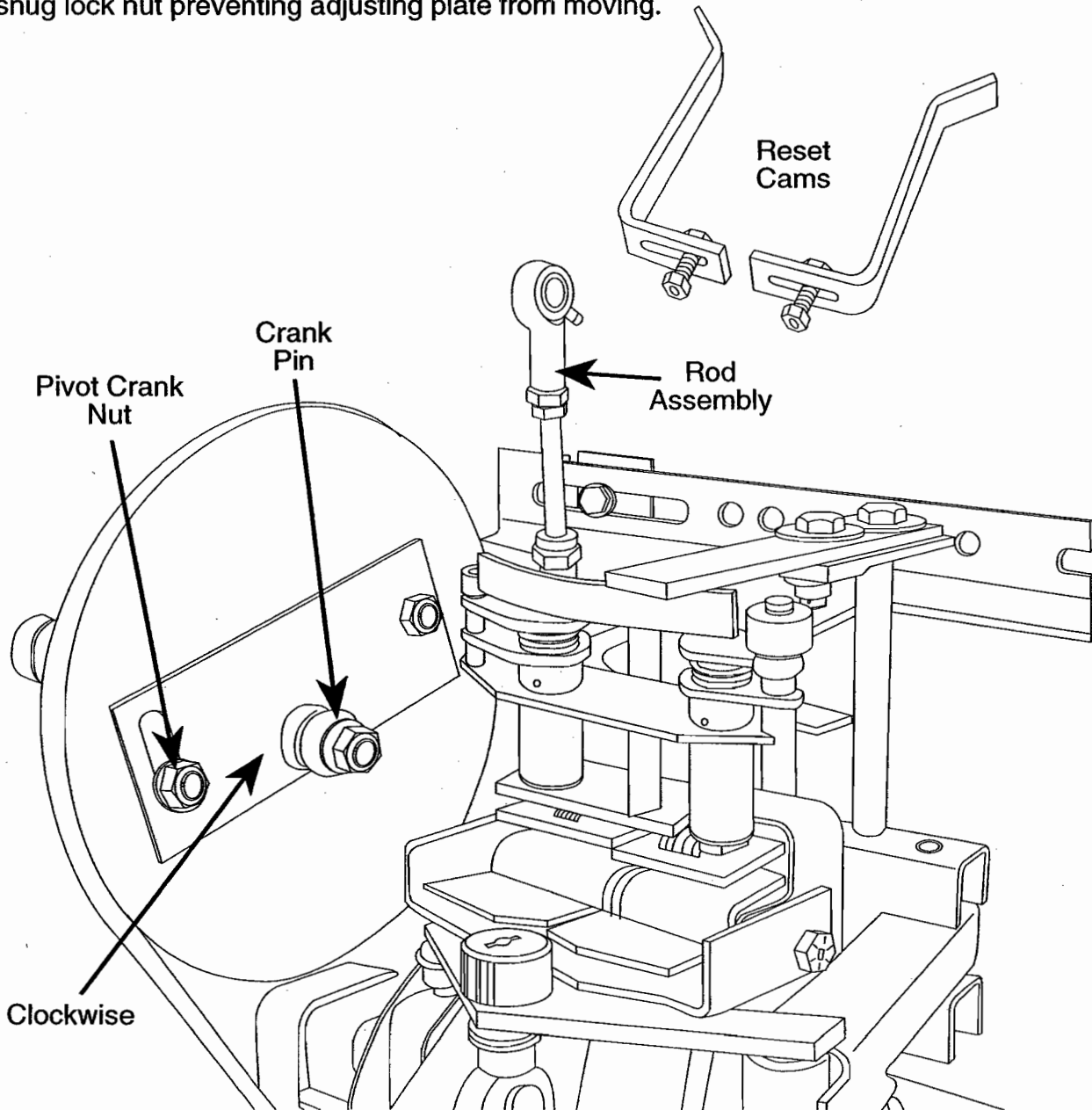
4.2.4.6 SENSOR ASSEMBLY ADJUSTMENTS

1. The ball lift sensor support arm should be centered between the side plates. Measure with a ruler.
2. Loosen bolts and adjust if necessary.
3. Remove the spring from the belt tensioner assembly and remove the belt from the rudder drive pulley.

DRAWING #4.36**DRAWING #4.37**

4.2.4.7 RUDDER AND SENSOR ADJUSTMENTS

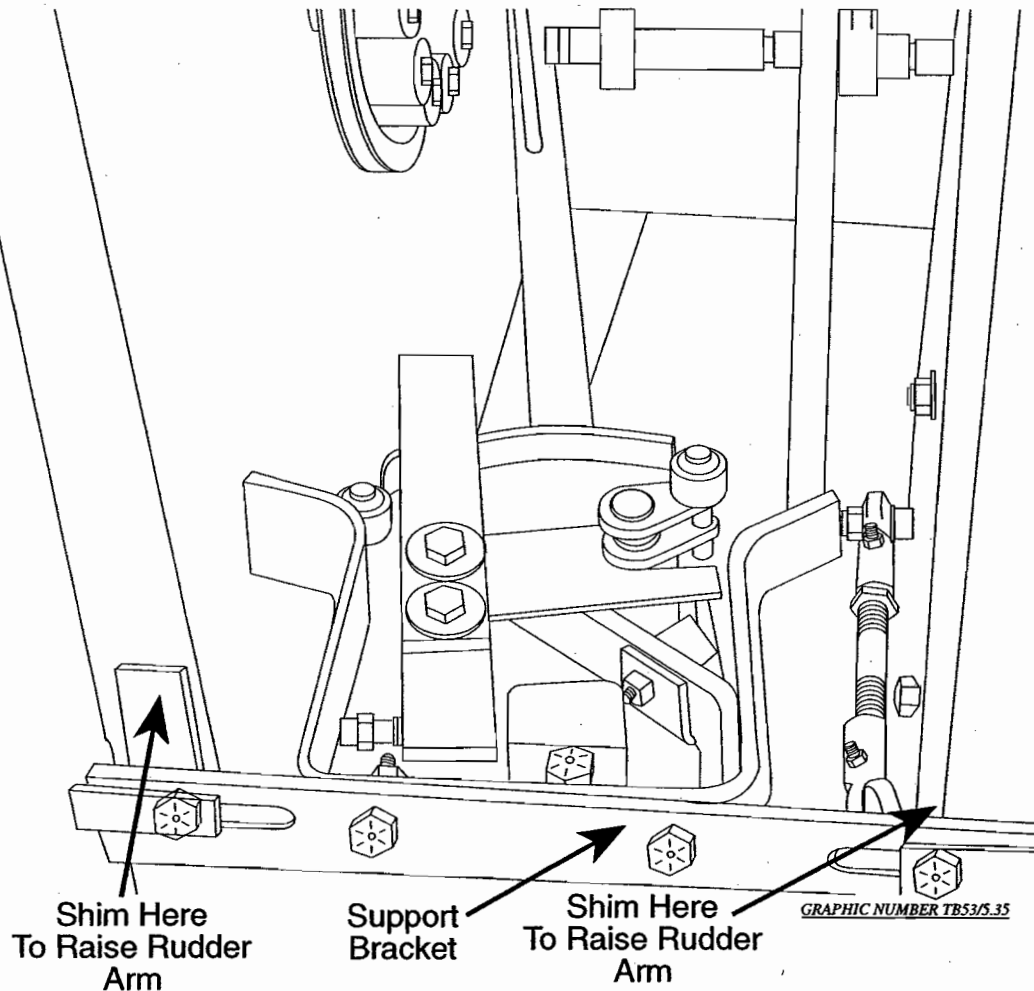
1. Remove retaining nut from the crank pin and save.
2. Remove the rod assembly from the crank pin and swing out of the way so the sensor assembly can be moved manually.
3. Remove both reset cams.
4. Loosen the pivot crank nut and turn the adjusting plate to full clockwise position, then snug lock nut preventing adjusting plate from moving.



GRAPHIC NUMBER TB50/5.34

DRAWING #4.38

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RUDDER AND SENSOR ADJUSTMENTS - Continued**DRAWING #4.39****4.2.4.8 RUDDER AND SENSOR ADJUSTMENTS FOR RUDDER ARM CLEARANCE**

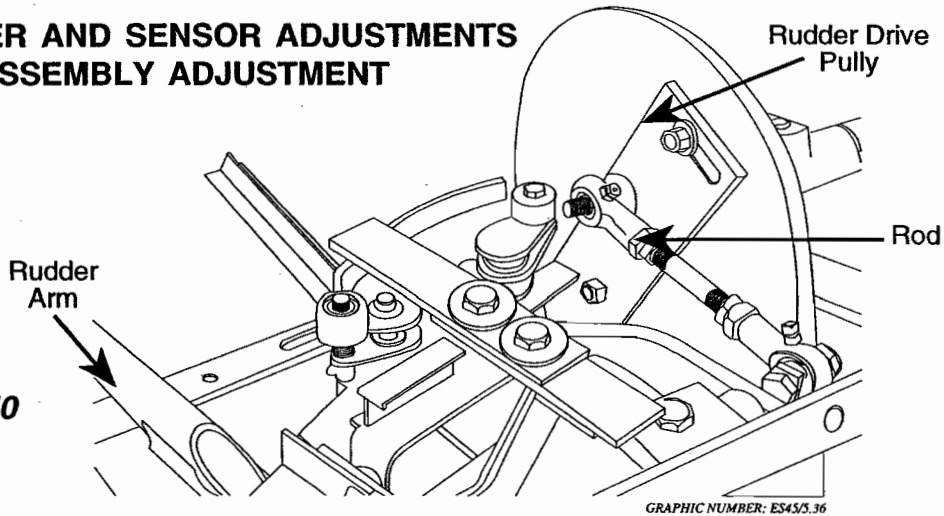
1. Move sensor assembly back and forth so rudder arm touches rubber bumpers on each side of the plate. It should move freely with no interference.
2. If there is any interference with the ball door weldments, it may be necessary to shim the rudder arm support bracket.



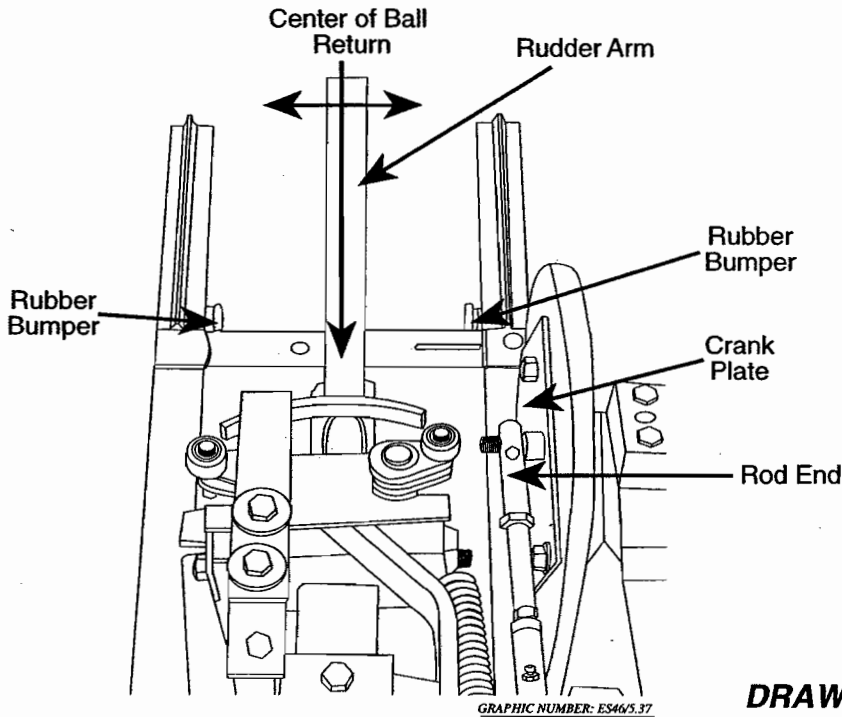
RUDDER AND SENSOR ADJUSTMENTS - Continued

4.2.4.9 RUDDER AND SENSOR ADJUSTMENTS ROD ASSEMBLY ADJUSTMENT

DRAWING #4.40



1. Place free end of rod assembly on crank pin and pivot sensor assembly by manually rotating the rudder drive pulley to observe travel of rudder arm.



DRAWING #4.41

2. Adjust rod so rudder arm swings equally to the left and right of the center line position, then install lock nut.



NOTE:

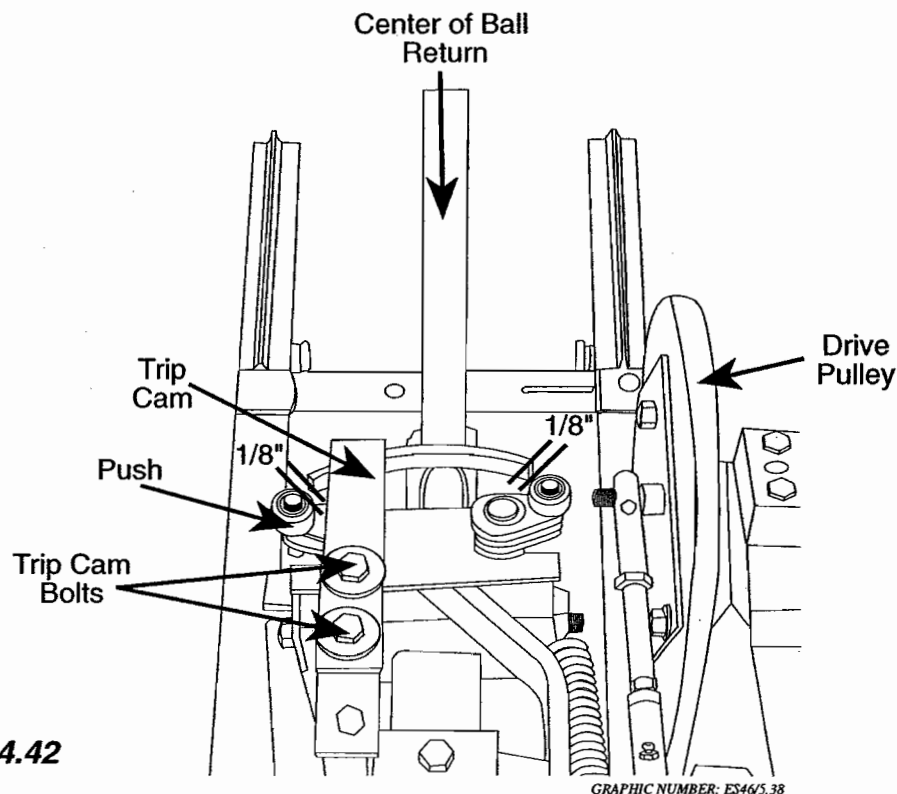
Lengthen rod to obtain more travel to the left and shorten rod to obtain more travel to the right. Rod assembly has right hand thread on both ends, so rod end must be removed to make adjustment.

RUDDER AND SENSOR ADJUSTMENTS - Continued

3. Loosen lock nut on crank plate and move plate in a counterclockwise manner until the rudder arm touches each bumper on the left and right side of the side plate with equal force and, without actuating the trip cam follower. Tighten lock nut.
See Drawing #4.41 for location.
4. Rotate rudder drive pulley to recheck travel. If rudder hits one bumper and not the other, repeat Step 2.

4.2.4.10 TRIP CAM ADJUSTMENTS

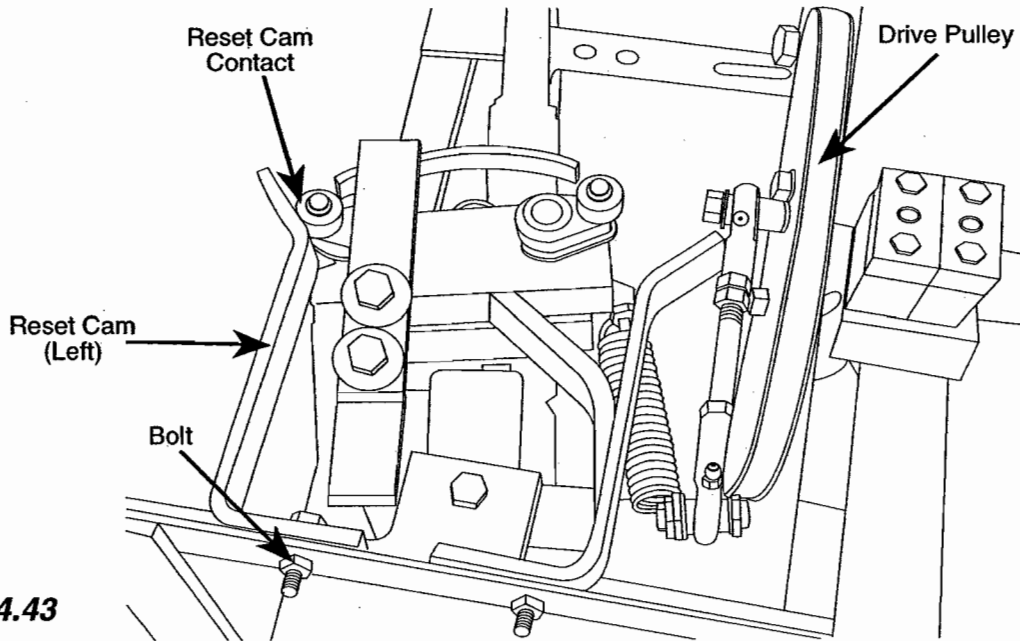
1. Turn drive pulley to place rudder in the center of its' travel (center of ball lift).
2. Push trip cam followers forward to the maximum position.
3. There should be a 1/8" gap on each side between the trip cam and rollers.
4. To adjust, loosen trip cam bolts, reposition cam, then tighten bolts.
5. Recheck clearance after tightening.

**DRAWING #4.42**

GRAPHIC NUMBER: ES46/5.38



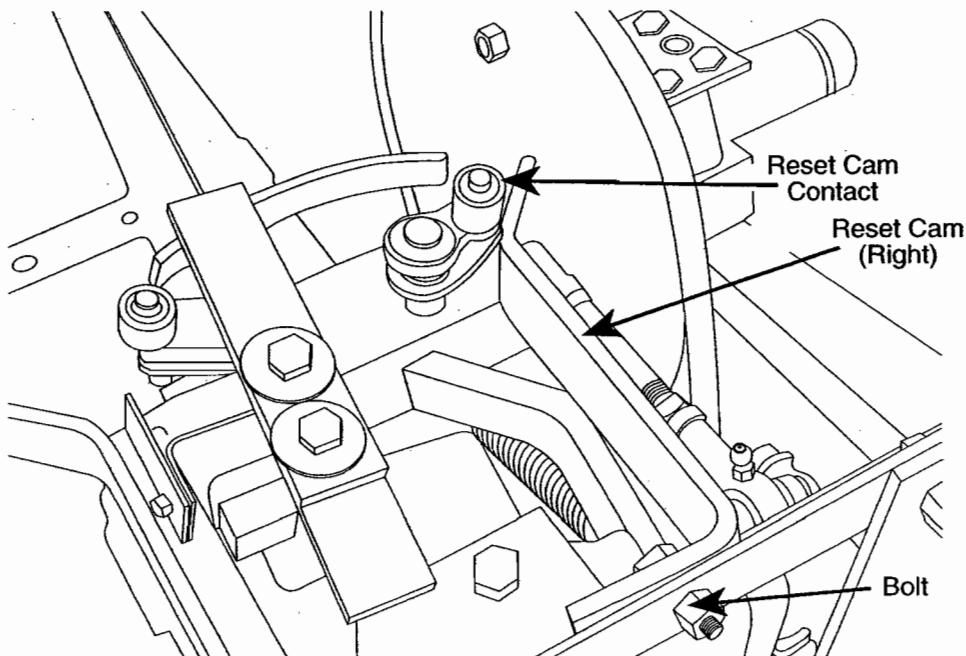
4.2.4.11 RESET CAM ADJUSTMENTS



DRAWING #4.43

GRAPHIC NUMBER TB51/5.39

1. Turn drive pulley to place rudder arm in its' furthest travel, striking the bumper (left side). Hold this position.
2. Install reset cam and move angled surface to touch trip cam follower. Tighten bolt.
3. Repeat above Steps 1 and 2 with the other reset cam (right side).



DRAWING #4.44

GRAPHIC NUMBER TB52/5.40

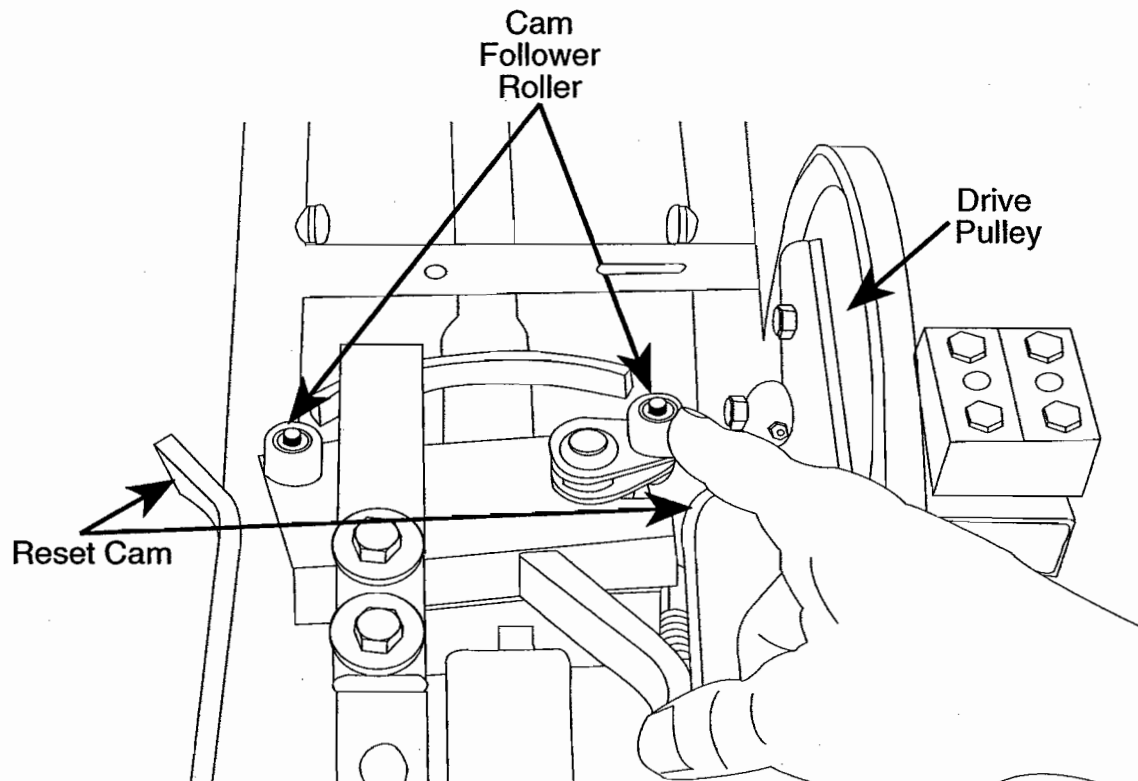
4.2.4.12 CHECKING RESET CAM

1. Manually rotate the rudder drive pulley.
2. While sensor is moving back and forth, move cam follower roller towards the rear of the machine.
3. Wait for the roller to strike the reset cam, returning it to its normal position (forward).
4. Manually push the roller forward to check that the reset cam returned to its forward position, if so, reset cam is properly adjusted. Check the other roller in the same manner.
5. Install the belt on the rudder drive pulley. Replace the spring on belt tensioner.



Apply power to the machine, turn the back end switch on and the table & sweep switches off.

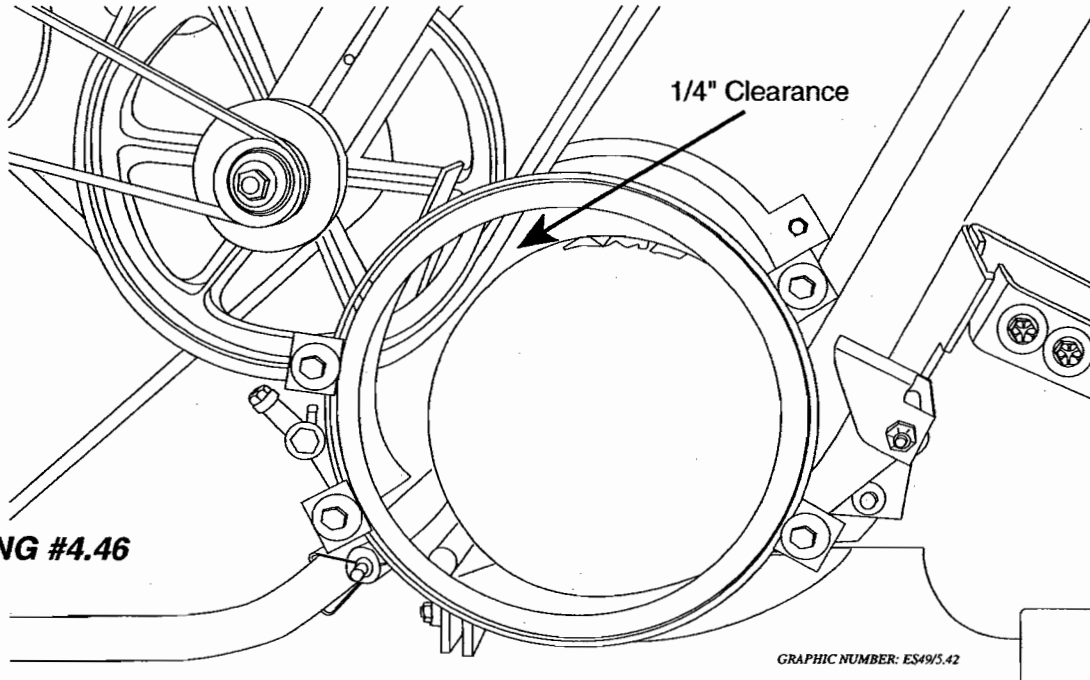
6. Retest operation of the rollers again. Use a screwdriver or wood stick to actuate the roller; if the roller does not return to its forward position properly, re-adjust the reset cam again.



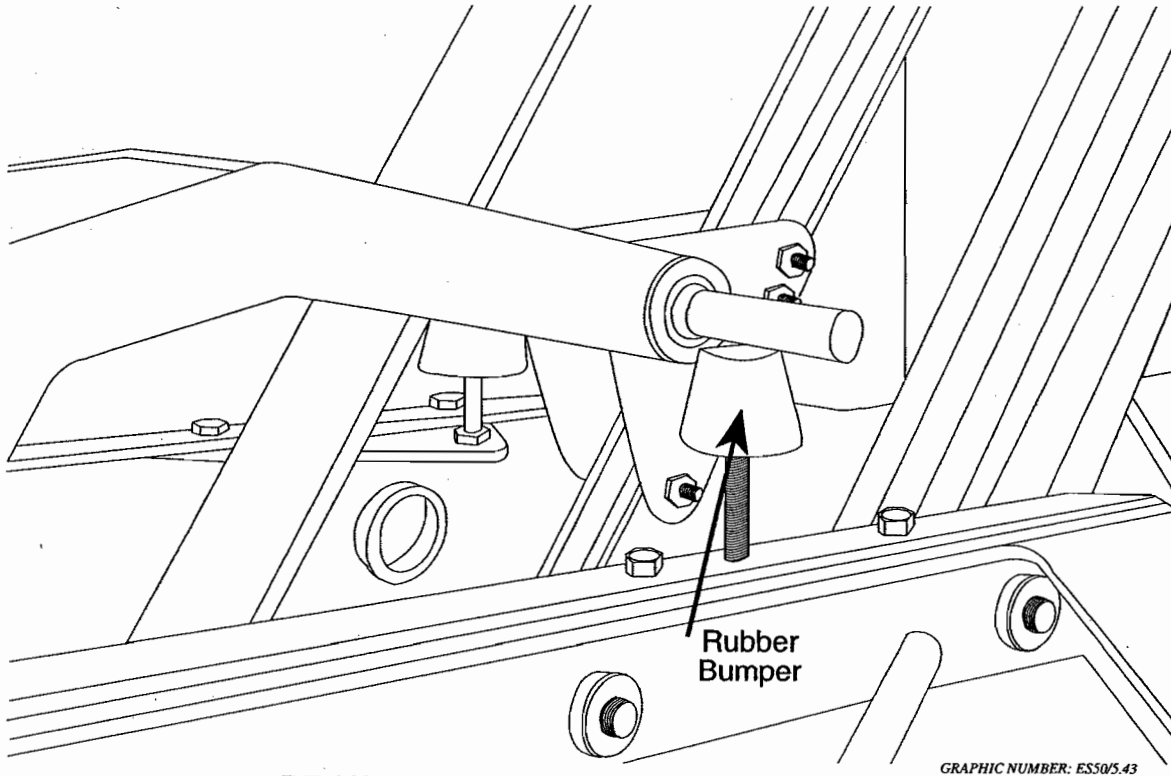
GRAPHIC NUMBER: ES47/5.41

DRAWING #4.45

4.2.4.13 RUBBER BUMPER ADJUSTMENTS

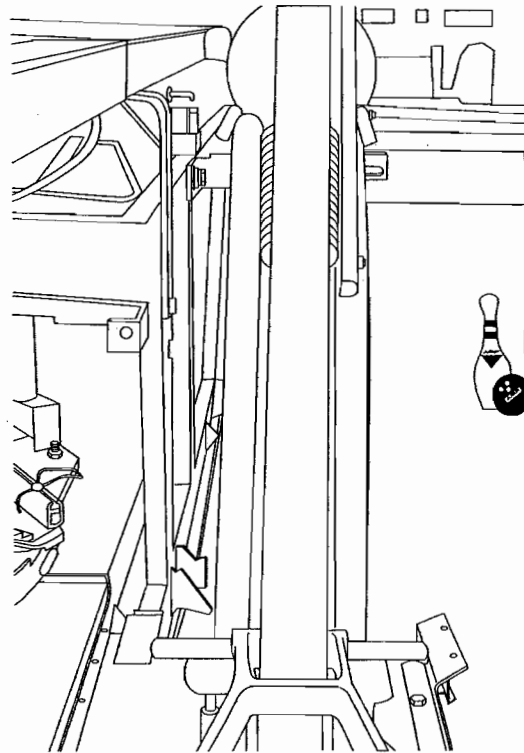


1. Place a ball on the lift arm assembly. Adjust rubber bumper to have less than 1/4" between the ball and the ball lift.



4.2.4.14 BALL LIFT ASSEMBLY ADJUSTMENT

- 1. Ball lift assembly must be centered with return rails.

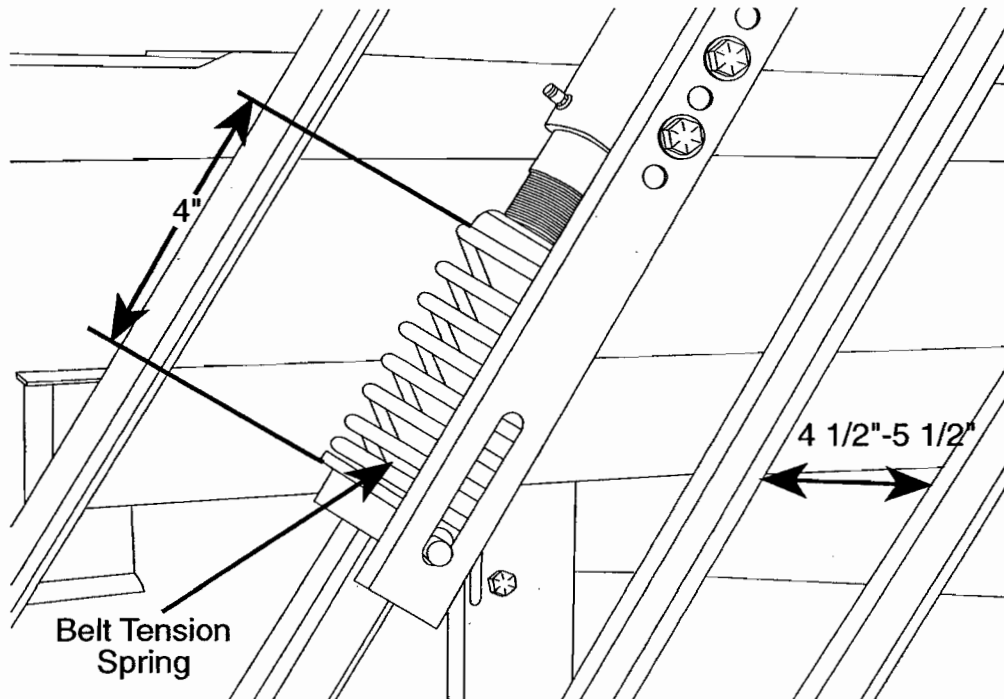


NOTE: Reference Sections 4.2.4.3 and 4.2.4.4

DRAWING #4.48

GRAPHIC NUMBER TB54/5.44

- 2. Ball lift belt tension spring should be compressed to 4" for proper tension on lift belt.

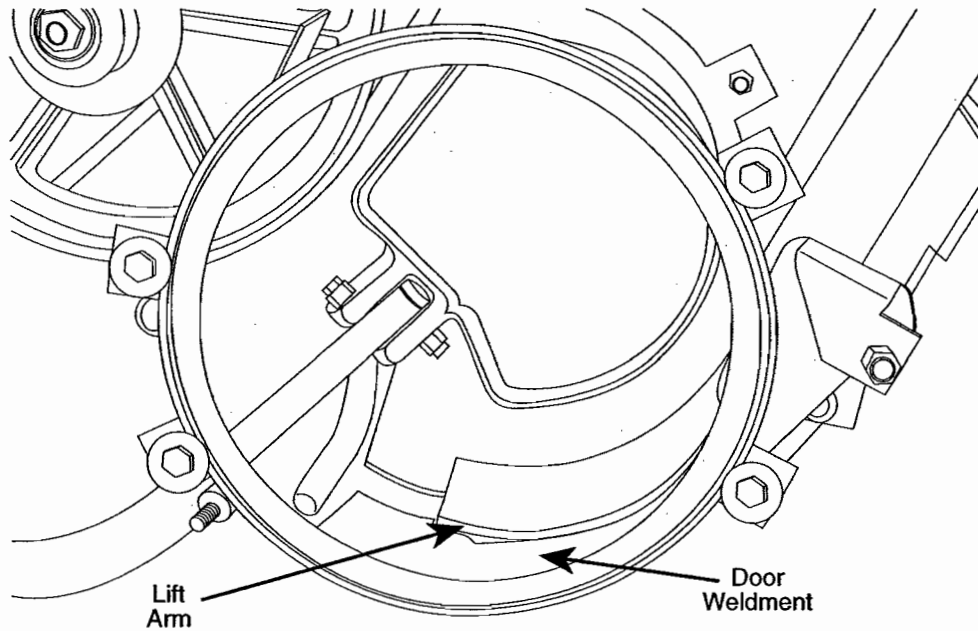


GRAPHIC NUMBER TB55/5.46

DRAWING #4.49

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GRAPHIC NUMBER TB565.47

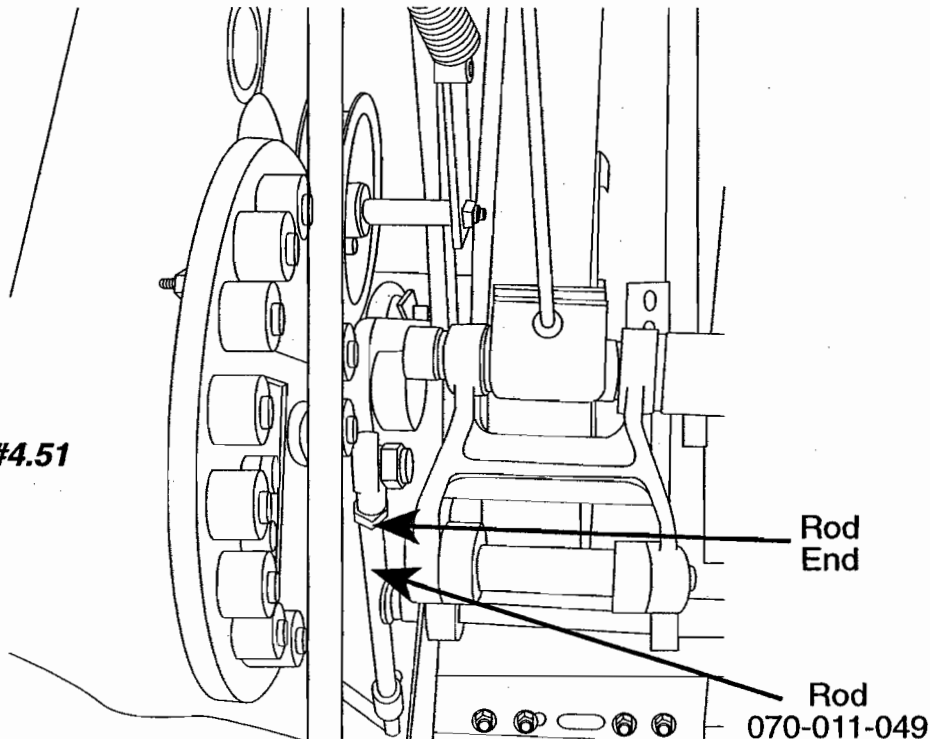
DRAWING #4.50

4.2.4.15 LIFT ARM ADJUSTMENT

Lift arm should be 1/8" to 3/16" above the door weldment. The #070-011-049 rod assembly controls this. Rod length should be approximately 15 1/2". The rod has right hand thread on both ends. It must be disconnected at one end to make adjustments.



NOTE: To raise lift arm, shorten rod. To lower lift arm, lengthen rod.



DRAWING #4.51

GRAPHIC NUMBER TB575.48

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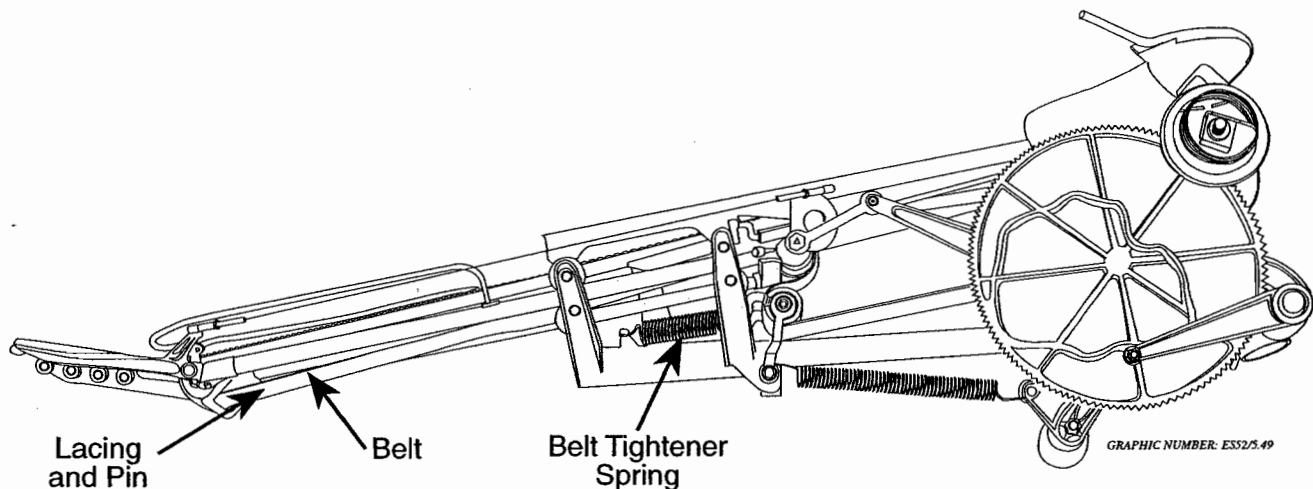
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Revised: 31 Dec 1993

4.2.5 DISTRIBUTOR OPERATIONS & 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. The large nylon gear serves a dual purpose:

1. The outside of the gear contains a cam which moves the distributor to the various cup locations.
2. The other side of the cam controls the telescoping action of the front portion of the distributor. Springs keep the cam followers against the cams.



DRAWING #4.52

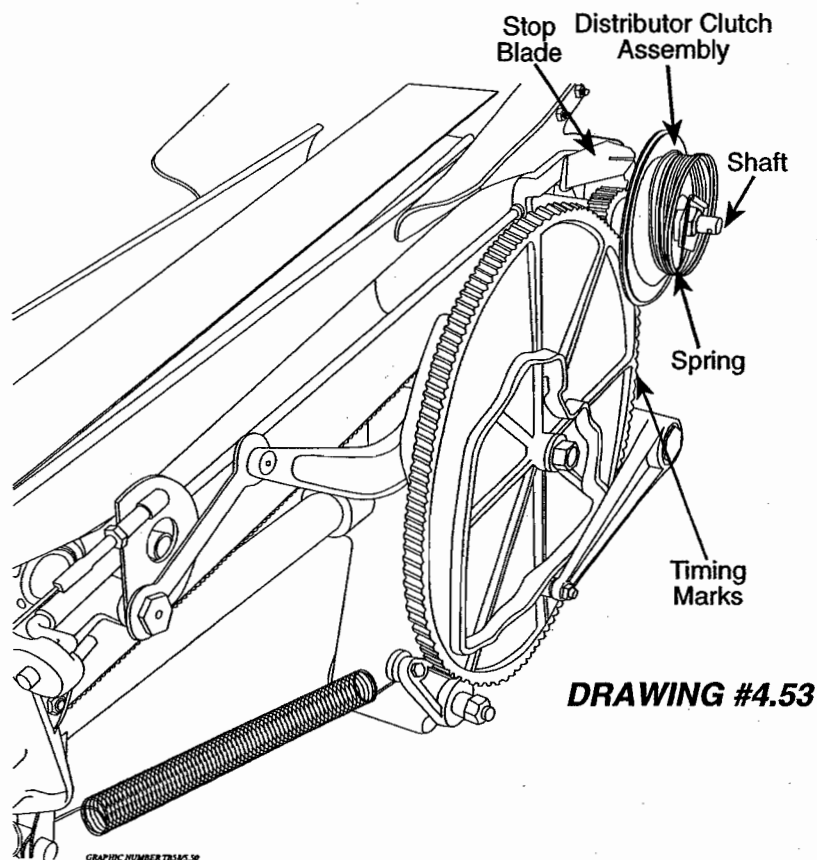
4.2.5.2 DISTRIBUTOR BELT REMOVAL

1. Remove the belt tightener spring.
2. Locate the belt lacing and remove the belt pin. The distributor belt can now be pulled from the distributor. The approximate belt length is $116\frac{1}{4} \pm \frac{1}{4}$ ".
3. To increase the belt tension, cut off one end of the belt. The spring length will increase one-half of the amount cut off of the belt. (If one inch is cut off, the spring length will increase one-half inch).
4. Use clipper belt lacer ST #030-003-542 to install new clips on the belt.



4.2.5.3 DISTRIBUTOR REMOVAL

1. Disconnect the shaft and universal from the distributor drive unit.
2. Remove springs from the base of the distributor.
3. Make sure that the elevator wheel is turned so that the pin bracket is not directly above the orientor pan of the distributor.
4. Lift the distributor assembly upward out of the support casting.



4.2.5.4 DISTRIBUTOR REPLACEMENT

1. Check level of the distributor mounting bearing. This should be level in both directions. If adjustment is needed, loosen the distributor bracket mounting bolts and position accordingly. Spacers are used between the distributor bracket and machine weldment to insure the distributor will clear the bin assembly by at least 3/8".

DISTRIBUTOR REPLACEMENT - Continued

2. To replace the distributor drive assembly, do the removal procedure in reverse order.
3. Check timing marks.
4. The clutch spring is to be set at one complete turn of the spring. The most difficult drive position is between the 6 and 10 pin feed positions:
 - a) If the spring tension is not strong enough, the distributor will stall between the 6 and 10 pin feed positions.
 - b) If too much tension is applied, it will cause stalling of the distributor or failure to index.
5. When the distributor is at the #1 bin position, the distance between the distributor orientor pan and the elevator wheel should be $\frac{1}{4}$ " or less. If adjustment is necessary, loosen orientor pan attaching bolts and position accordingly. See Drawing #4.54 for location.

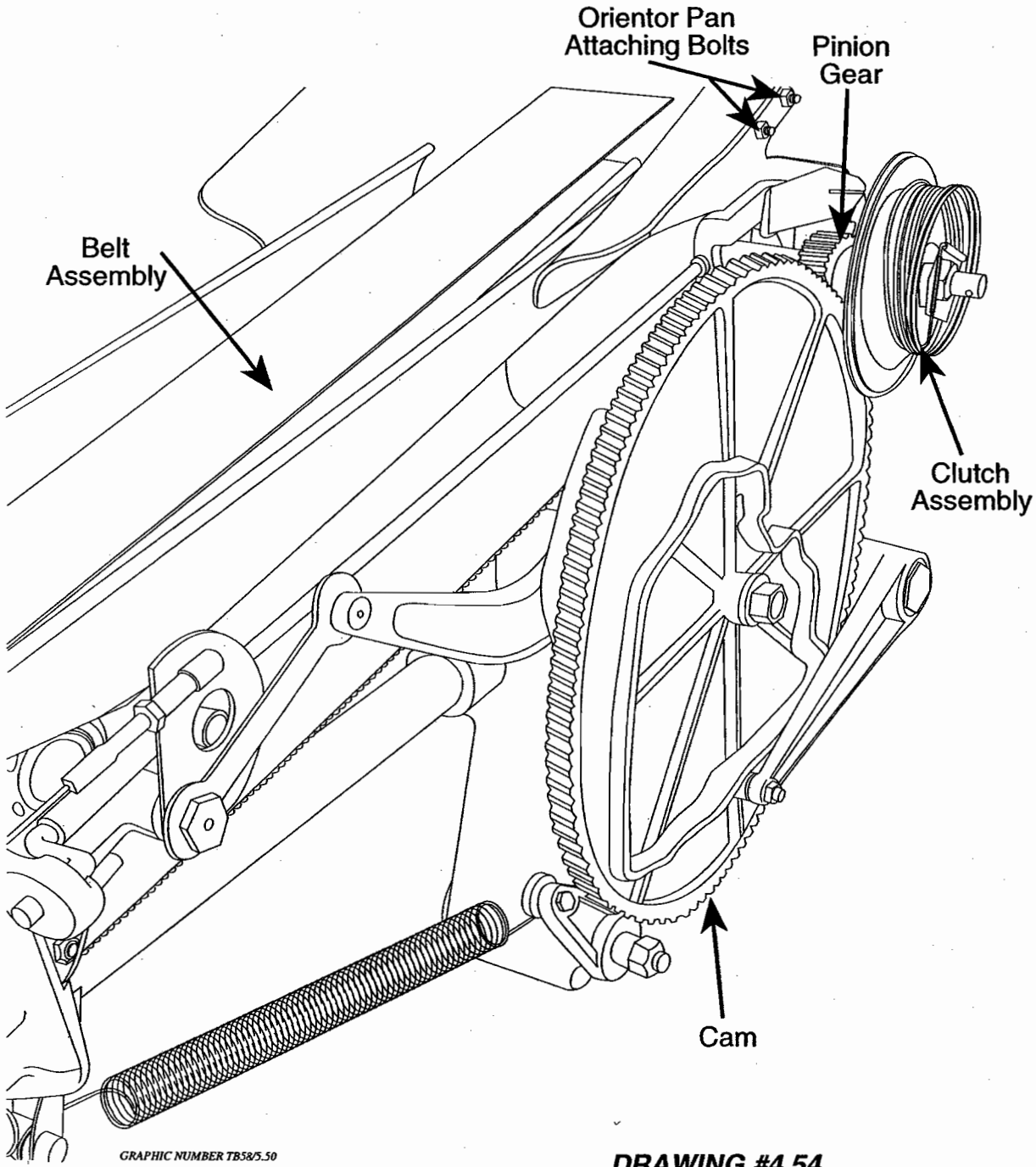
4.2.5.5 DISTRIBUTOR CAM OPERATION

The cam has a bump on each side of its outer edge at the base of the valley between the teeth. This locating mark and marked tooth of the pinion gear are to be matched for proper timing. The nylon cam is flexible and can be disengaged from the pinion gear by applying pressure towards the distributor where the gears mesh. The outer face of the large cam is marked for the feed position for each pin. The timing marks are in line only when the distributor is at the #1 bin position.

**NOTE:**

If these conditions are not met, improper pin feed will result. The inside of the cam controls the telescoping of the distributor. The outside of the cam controls the movement to various bin locations. The pin feed sequence is 1, 3, 2, 4, 7, 8, 5, 6, 10, 9.



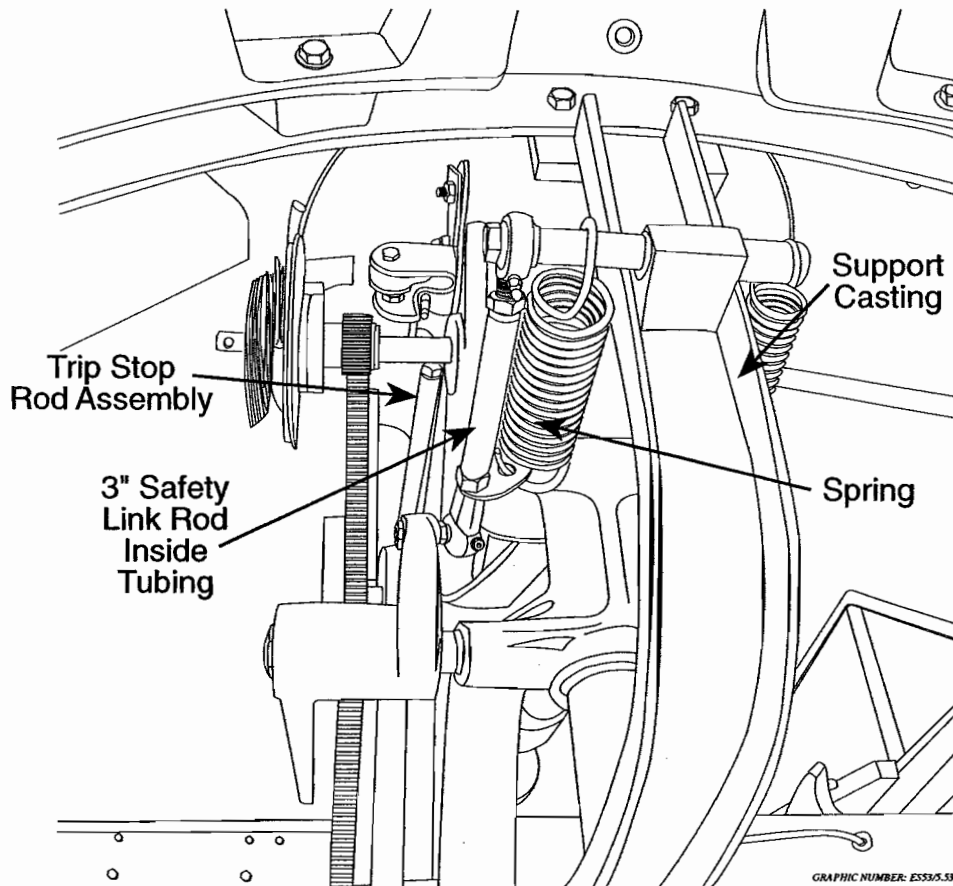


GRAPHIC NUMBER TB58/5.50

DRAWING #4.54

4.2.5.6 DISTRIBUTOR ADJUSTMENTS

1. Index the distributor trip stop rod assembly to position the distributor at the #1 bin pocket.
2. Inspect the nylon cam gear to assure that the timing marks match with the pinion gear. See Section 4.2.5.5 for distributor cam operation and Drawing #4.54 for location.
3. Distributor should be in line with the #1 and #5 bins. If distributor is not in line, loosen the rod end and adjust the tubing accordingly.
4. Operate machine and note the pin feed operation at the individual bin pockets. The tubing may have to be readjusted to obtain accurate feeding of pins.



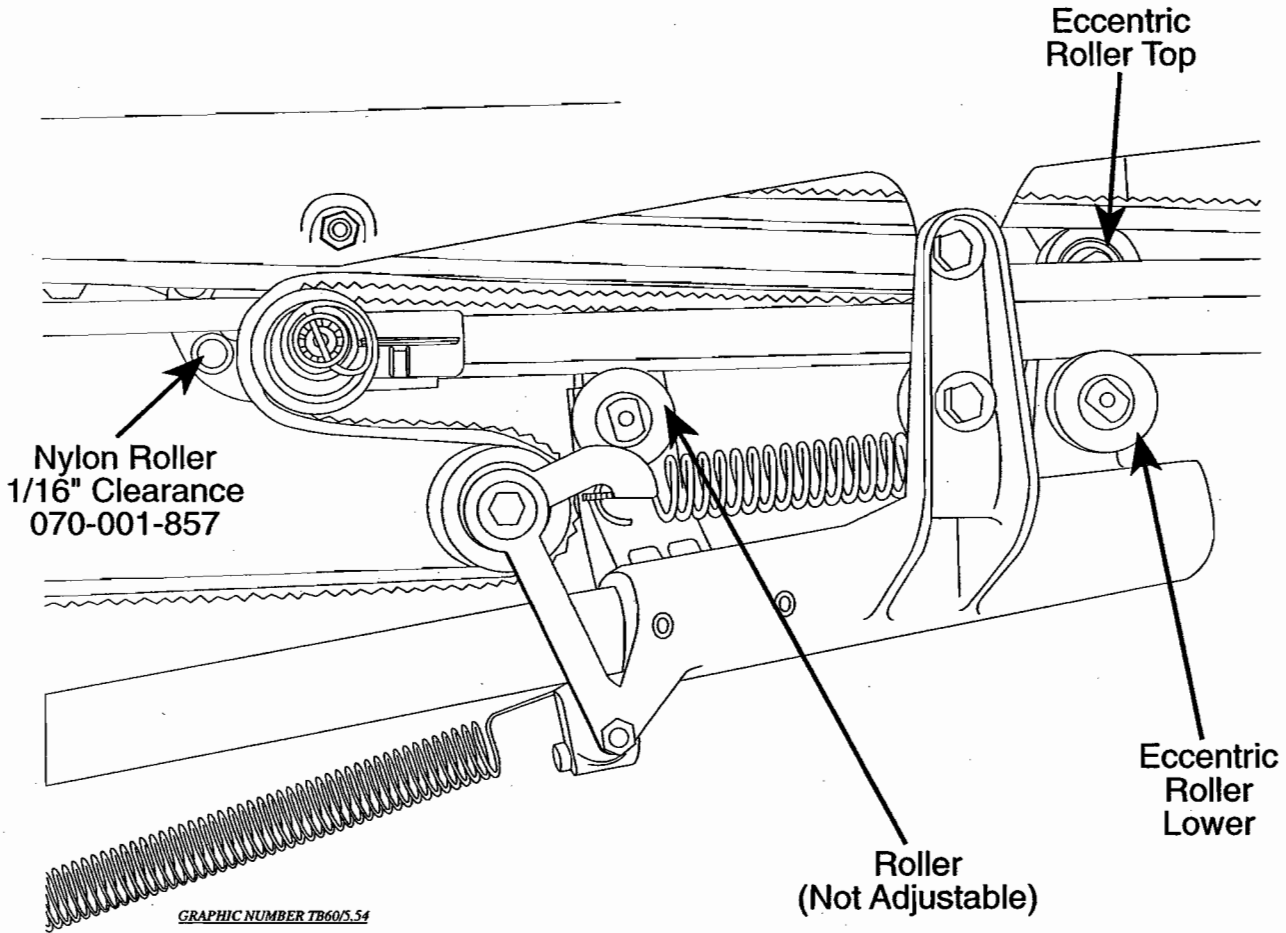
DRAWING #4.55



NOTE:

A safety link is provided to act as a distributor stop should the distributor be jarred out of position. The length of the safety link should not exceed 3" from the lock nut to the rod end to avoid bottoming in the mating tube. This dimension is set at the factory and need only be checked when replacing the link.

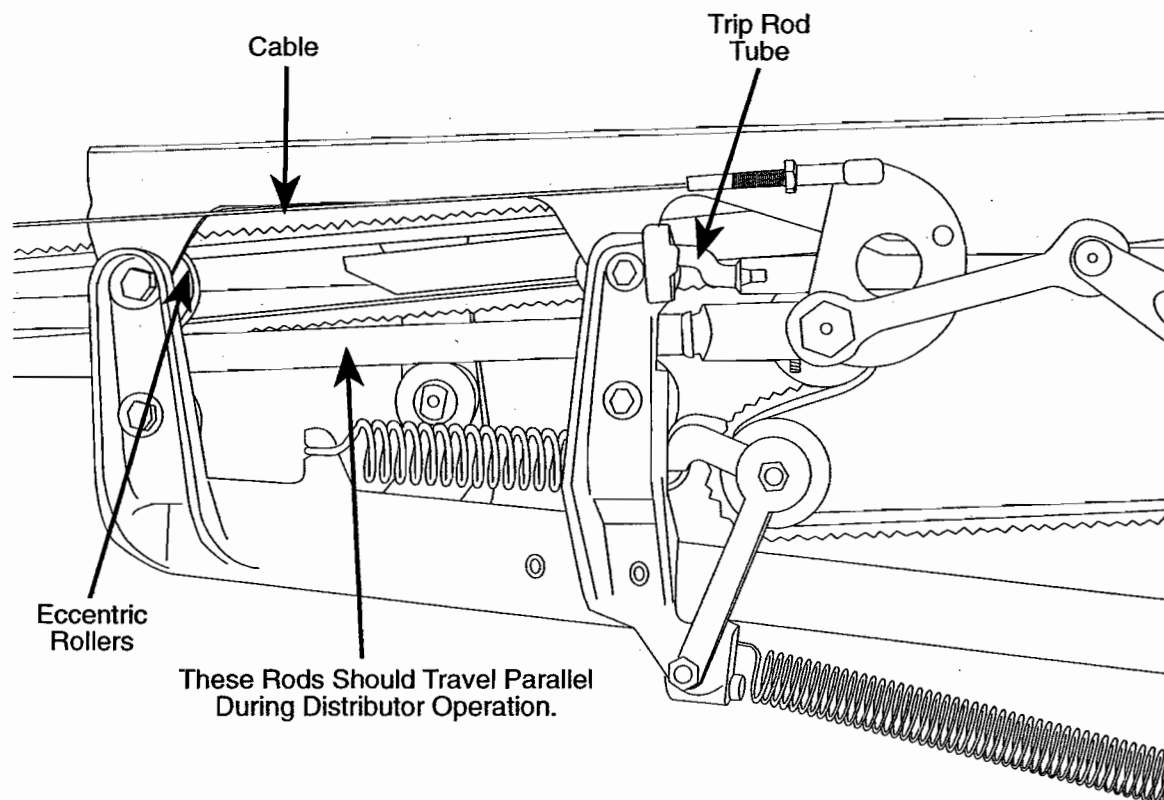




DRAWING #4.56

4.2.5.7 DISTRIBUTOR ROLLER ADJUSTMENTS

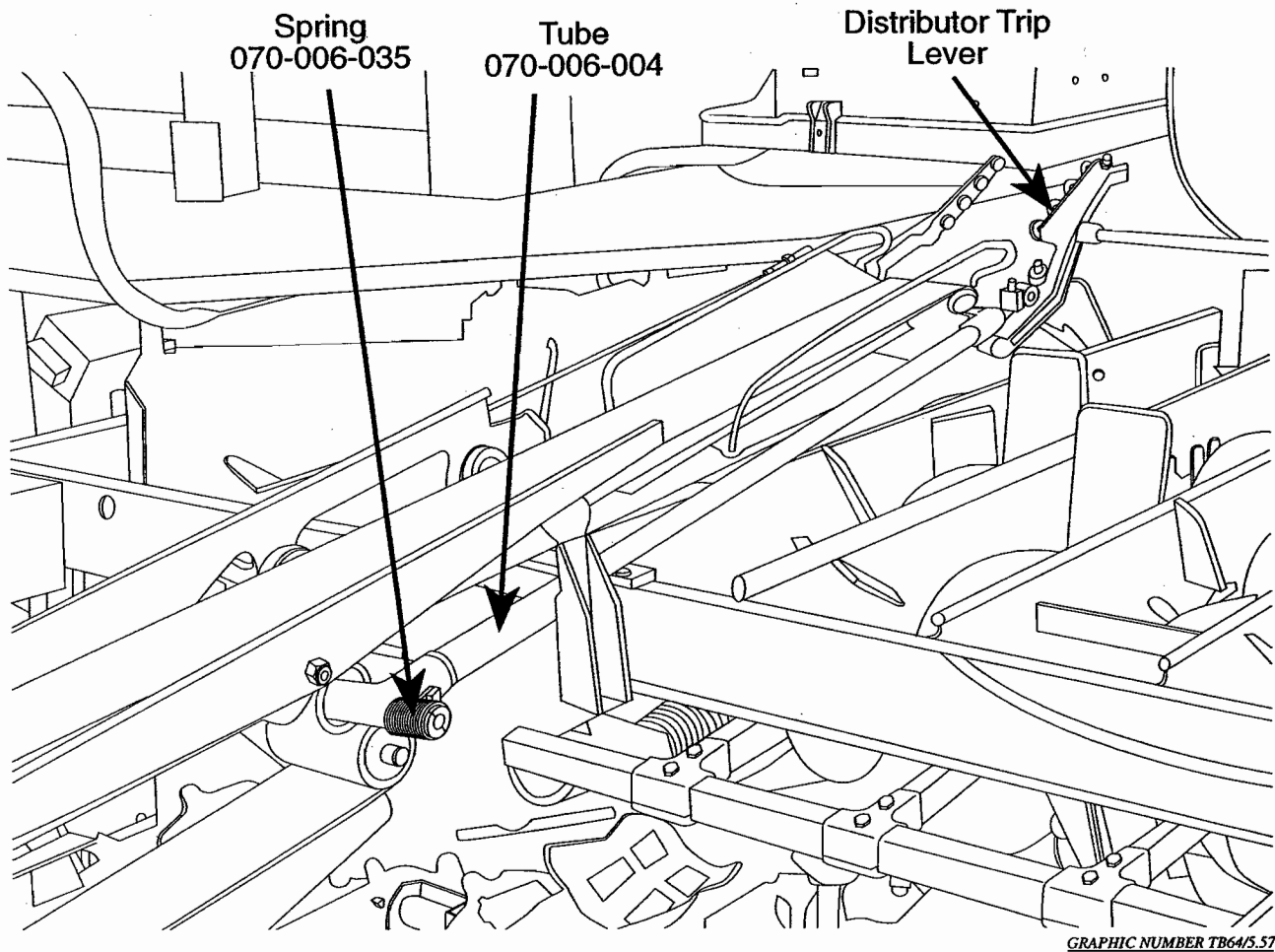
1. Starting with the distributor at the #1 bin position, telescope the distributor so that it is at its' minimum length.
2. Position the front lower eccentric roller in its' lowest position, so the distance between the roller and the carriage tube is at its maximum. See Drawing #4.56 for location.
3. Bring the top rear eccentric 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 eccentric roller until the trip rod tube and carriage tube are parallel to each other. See Drawing #4.57 for location.
5. Position the front lower eccentric roller up until it just makes contact with the carriage tube and are parallel to each other.
6. Adjust the cable so that the clearance between the nylon rollers and the trip rod tube is equal. This clearance is about 1/16" in all positions of the distributor. See Drawings #4.56 & #4.57 for locations.



DRAWING #4.57

GRAPHIC NUMBER TB61/5.55





DRAWING #4.58

4.2.5.8 DISTRIBUTOR TRIP LEVER ADJUSTMENT

1. Operate the distributor trip lever, inspect for mechanical binds in the lever and its associated linkage.
2. The distributor trip lever assembly is spring loaded by means of a spring, part #070-006-035, located at the rear of tube #070-006-004. This spring is factory set for $\frac{1}{2}$ turn.

4.2.6 SHUTTLE AND BIN OPERATIONS & ADJUSTMENTS

4.2.6.1 SHUTTLE AND BIN OPERATION

The shuttle holds the pins in the storage bin and drops them into the table spotting cups when required. The bin assembly stores two sets of pins.

4.2.6.2 SHUTTLE AND BIN ADJUSTMENTS

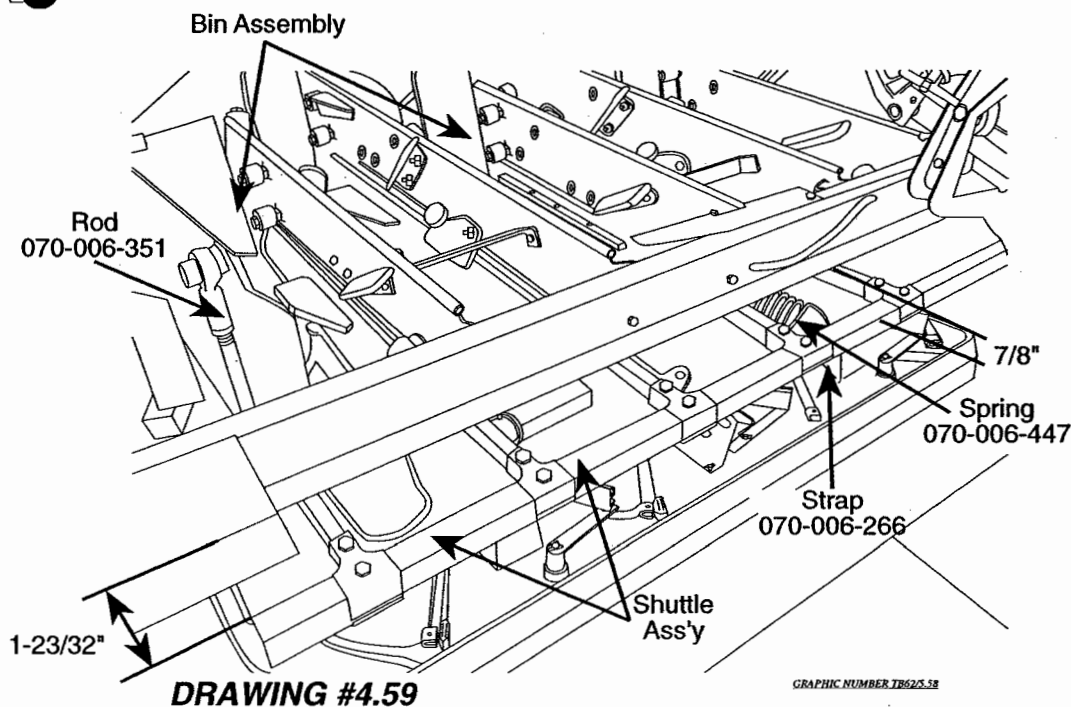


NOTE: Adjustments must be made with no pins in the bins.

1. There should be approximately 1-23/32" between the back channel to the leading edge of the shuttle assembly measured at the center. To make this adjustment, loosen lock nut on connecting rod #070-006-293 and adjust accordingly, use gauge ST#070-006-519.
2. The shuttle assembly should be centered directly under the bins. Adjustment is made by repositioning spring #070-006-447 to another location on the spring strap #070-006-266.
3. The distance from the rear frame of the bins to the shuttle assembly should be 7/8". Adjust rod #070-006-351 to obtain this dimension on each side.



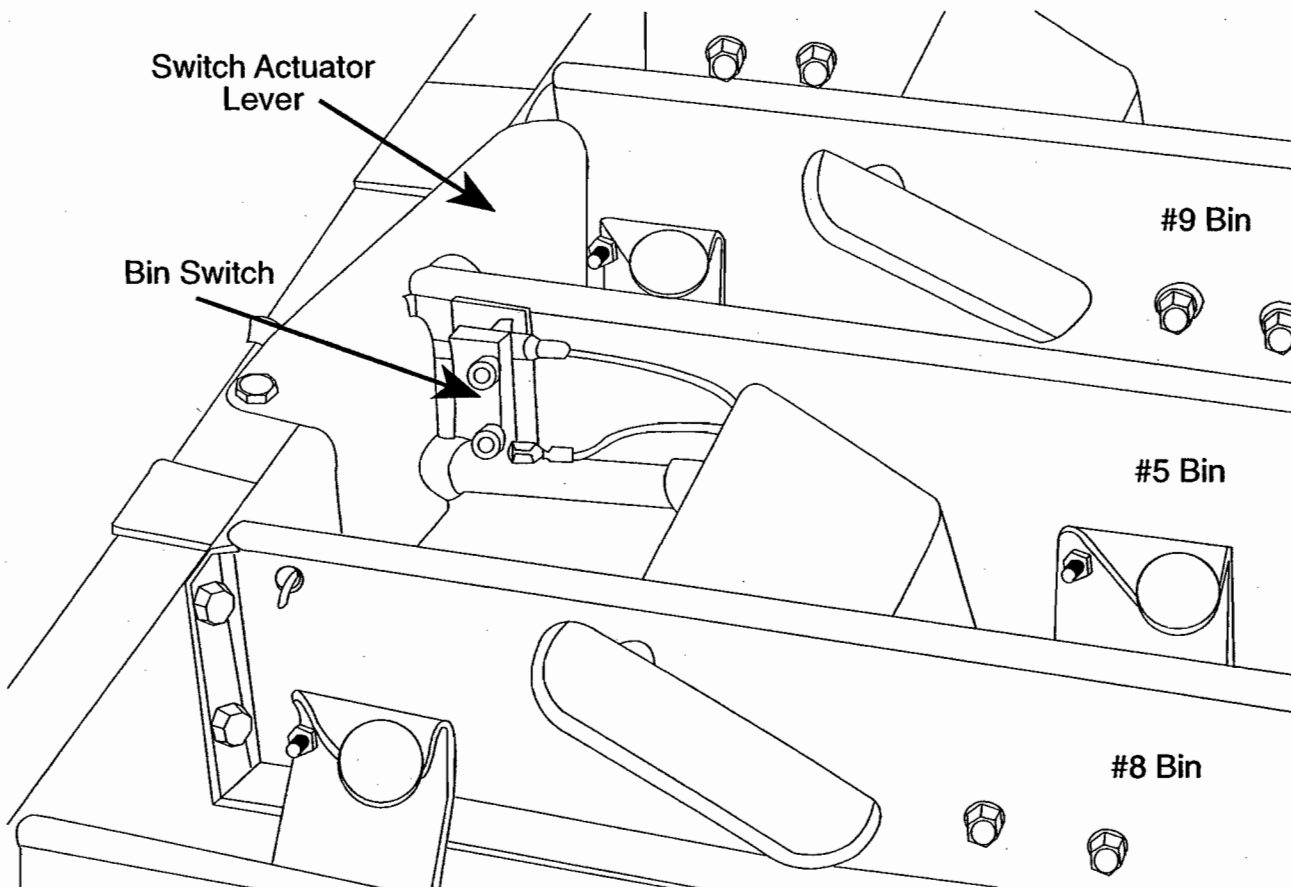
NOTE: The threads on rods #070-006-293 and #070-006-351 are right handed. One end must be removed to lengthen or shorten.



4.2.6.3 BIN SWITCH OPERATION

The bin switch (BS) is located in the bin framework between the #8 and #9 bin locations. When the 10th pin, #9 bin, is delivered to the bin assembly, it actuates the bin switch 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, reposition the switch accordingly.



GRAPHIC NUMBER: ES55/5.59

DRAWING #4.60

4.2.7 CUSHION OPERATIONS & ADJUSTMENTS

4.2.7.1 CUSHION SHOCK ABSORBER ASSEMBLY ADJUSTMENTS

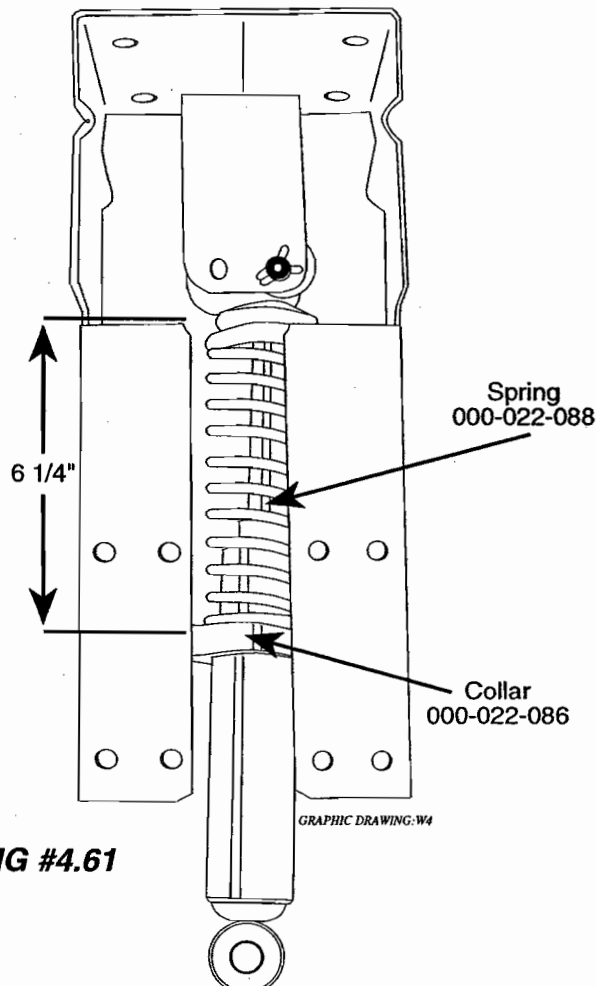


NOTE: This adjustment can be made either with the shock absorber mounted in the machine or held in a vise.



If the shock absorber is held in a vise, clamp shock on end only. **DO NOT PLACE PISTON IN VISE.**

1. Loosen collar lock screw.
2. Insert a 1/2" open end wrench between the coils.
3. Hold wrench against the piston while turning the spring. When the dimension of 6 1/4" is obtained, slide the collar against the spring, tighten the lock nut, then remove the wrench.



DRAWING #4.61



4.2.7.2 CUSHION REMOVAL

1. Unhook pin curtain.
2. Remove "X" washer #963-600-002 from pin #000-022-821 and remove pin #000-022-821 to release shock absorber from cushion assembly.
3. Remove the three screws #809-865-165 from the support box #000-022-788 holding the mounting block. Remove from ball door side of machine only.
4. Wrap curtain around the cushion and slide box and cushion assembly until cushion is free from mounting block on opposite side. Remove from machine.
5. To replace, reverse the above procedure.

4.2.7.3 REPLACING RUBBER RIVETS

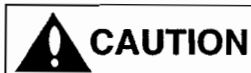
1. Lubricate the raised portion of the rivet stem with liquid soap.
2. Push rivet through the cushion assembly until about 1" protrudes through the wooden plank.
3. Use Carpet Installing Tool #784-003-000 and place the hole which is drilled in the tool over the end of the rubber rivet protruding through the wooden plank.
See Drawing #4.62 for Carpet Installing Tool.
4. Use a cranking motion, pull the rivet through the cushion.

4.2.8 CARPET ADJUSTMENTS**4.2.8.1 CARPET REMOVAL PROCEDURE**

NOTE: The adjacent machine must be turned off and not used while the carpet is being removed. The cushion may be removed to provide more working room.

1. Disconnect carpet and ball lift drive belts from the carpet pulley drive assembly.
2. Remove paddle from rudder arm.
3. Release the front roller from its bearing supports. In order to remove the front roller, release the tension on the carpet first:
 - a) Insert ST #784-003-000 between the roller and tail plank.
 - b) Apply pressure towards the rear of the machine and insert the carpet pin #792-501-001 into the hole provided in the side plate.
 - c) Repeat the same procedure for the other side of the machine.
4. Remove the front roller by rolling it over the bounce plate and out the ball opening into the adjacent machine.

Note that in some instances, it may be necessary to position the roller flange as far as possible towards the opposite side of the machine in order to clear the bearing support assembly.



Because of the danger involved, if the carpet removing pins were accidentally knocked out, it is advisable to remove the tension from the roller bearing support while working in the pit:

- a) Place flag #792-502-002 on the carpet installing tool #784-003-000 onto the bearing support assembly as shown in Drawing #4.62.
 - b) Apply pressure toward the rear of the machine and remove the carpet pin #792-501-001 from the hole in the side 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 the same procedure for the other side of the machine.
5. Unhook the rear roller support from its' bracket and tip rear roller from its' bearing support.



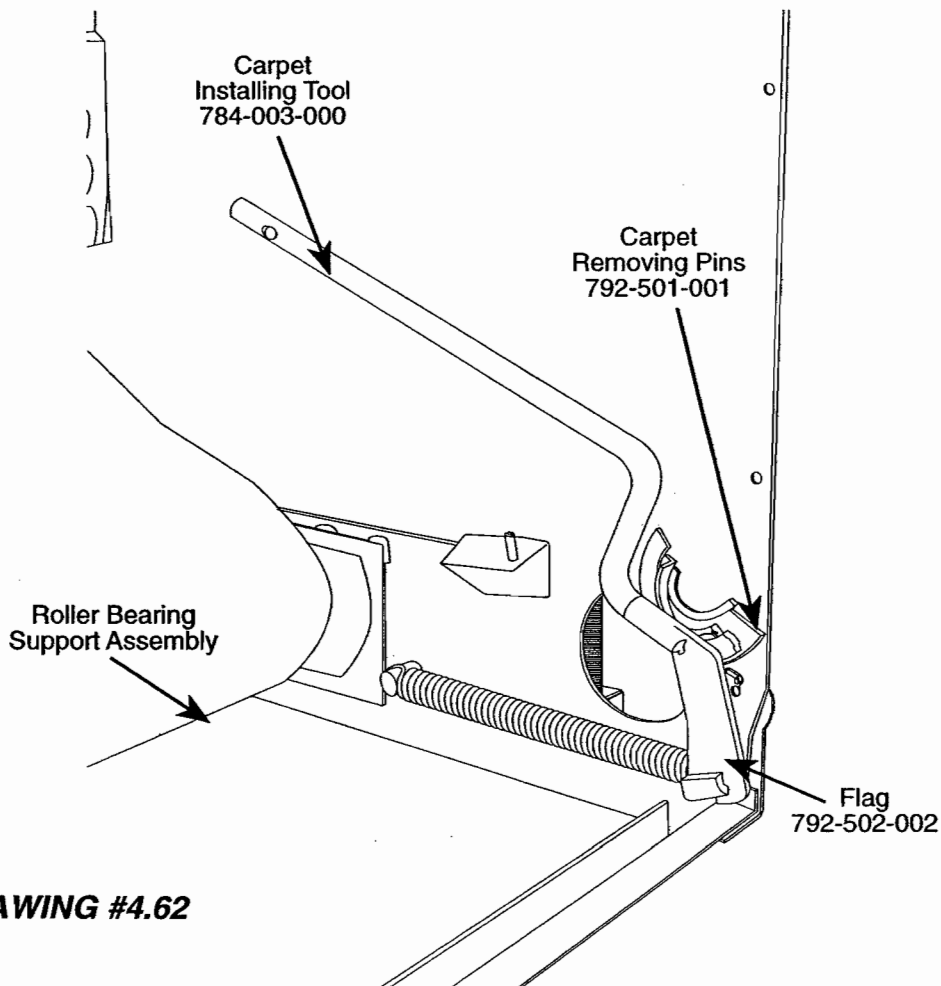
CARPET REMOVAL PROCEDURE - Continued

6. Remove the carpet drive pulley. It may be necessary to slide rear roller out several inches to provide enough clearance to remove pulley.
7. Remove the four lock nuts holding the bounce plate assembly to the pit support brackets. Lift and slide the bounce plate several inches toward the front of the pit.
8. Remove the rear roller by first freeing the roller drive shaft from the side plate, then roll it over the bounce plate and out the ball opening in the side plate.
9. Wrap the carpet around the bounce plate and remove the carpet and bounce plate together from the machine.



NOTE:

The carpet runs in the direction of the arrow stamped on the carpet. If no arrow is visible, mark the direction of rotation before removing the carpet from the machine.



DRAWING #4.62

GRAPHIC NUMBER TB345.61

4.2.8.2 CARPET REPLACEMENT PROCEDURE

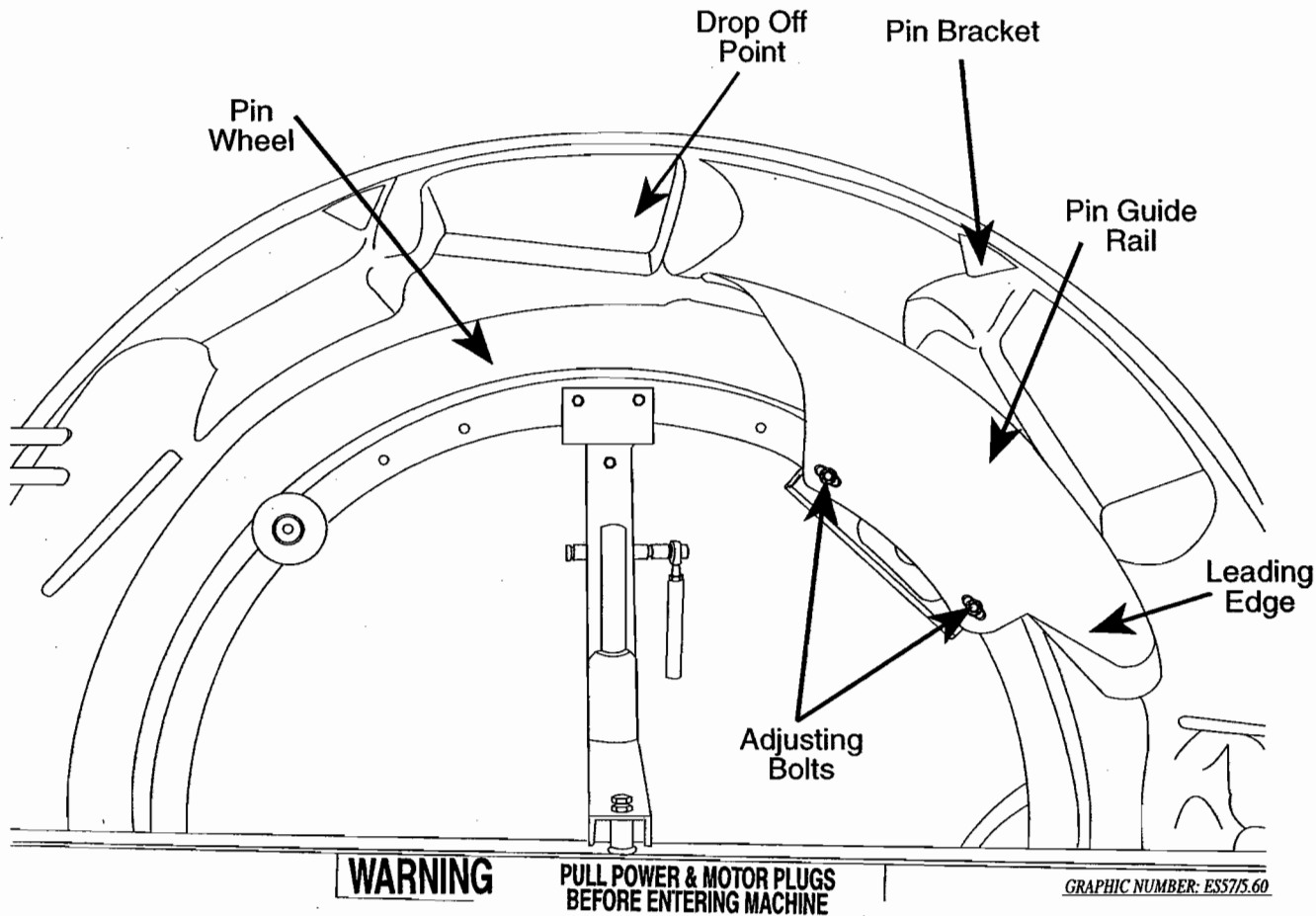
1. Note the arrow on the carpet:
 - a) Place the bounce plate between the carpet with the "V" shape cut-out toward the ball exit.
 - b) Wrap the carpet around the bounce plate and place it in the pit slightly forward on the pit support brackets.
 - c) Do not fasten the bounce plate down at this time.
2. Replace the rear roller using the opposite procedure from the removal.
3. Place the rear roller bearings in the bearing supports. Hook up the rear roller support bracket, drive pulley and belts.
4. Place bounce plate in proper position on the pit brackets and tighten the four lock nuts. Make sure that the carpet is free and not pinched between the bounce board and brackets.
5. Replace the front roller in the pit, but do not position in the bearing supports yet.
6. Before the front roller can be replaced, the tension on the bearing support assembly must be engaged:
 - a) Place flag on the carpet installing tool onto the bearing support assembly as shown in Drawing #4.62.
 - b) Apply pressure towards the rear of the machine and insert the carpet pin into the hole provided in the side plate.
 - c) **KEEP FINGERS CLEAR.**
 - d) Carpet installing tool can be turned in flag while applying pressure in order to provide additional clearance.
 - e) Repeat the same procedure for the other side of the machine.
 - f) Replace the front roller.
 - g) Grasp the roller flange on the top only and roll into the support assembly.
 - h) Apply pressure on the front roller with the carpet installing tool to remove pins.
7. Replace the paddle on the rudder arm.



4.2.9 PIN WHEEL ADJUSTMENTS

4.2.9.1 PIN GUIDE RAIL ADJUSTMENTS

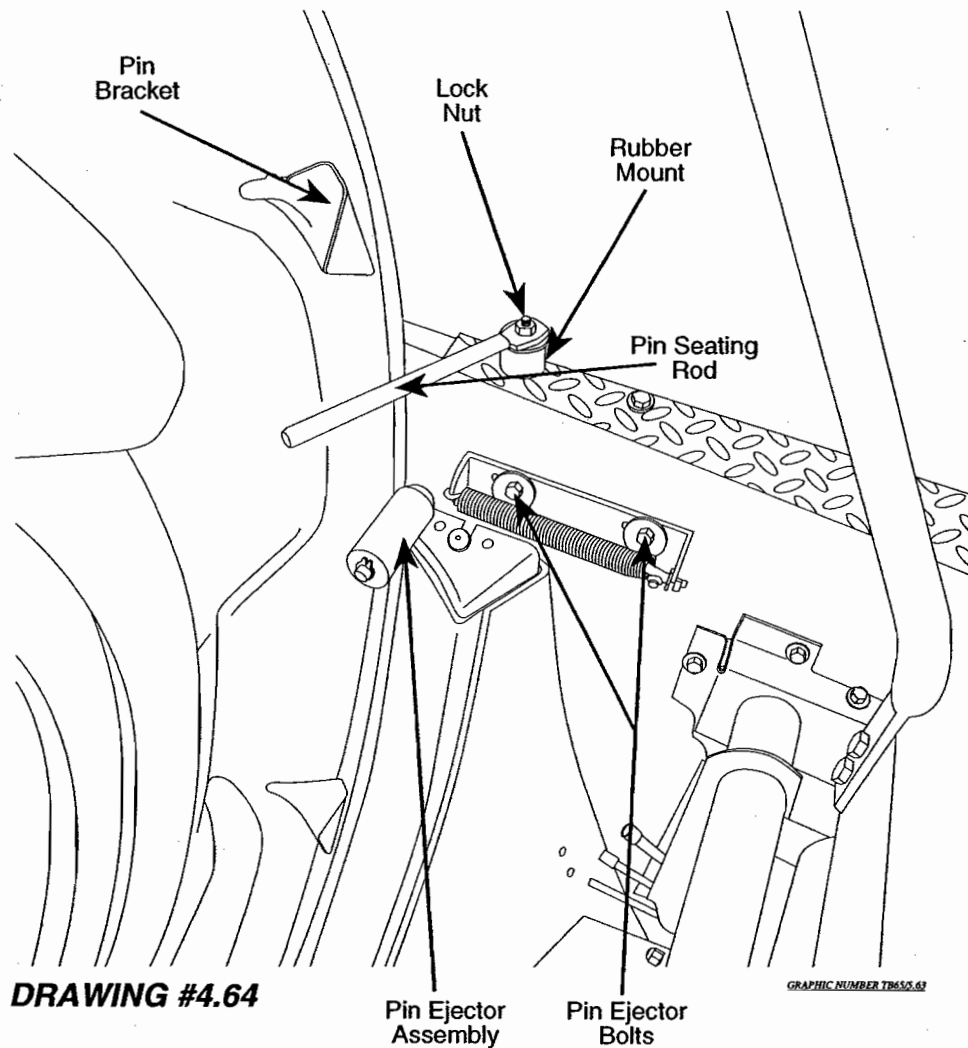
1. Position the pin guide rail so adjusting bolts are centered in the slotted holes as shown in Drawing #4.63.
2. Run machine and observe the pins entering between the pin wheel and leading edge of the guide rail. Pins at this point should be held loosely so as not to jam the pin wheel.
3. Run machine and observe the pins orienting to the distributor (butt and head first). Pins should drop onto the center of the distributor pan, and roll free of the pin wheel. Adjust the pin guide rail so the pins are held securely but not tightly in the pin wheel at the drop off point.



DRAWING #4.63

4.2.9.2 PIN SEATING ROD ADJUSTMENT

1. Loosen the lock nut and position the rod so that it clears the pin bracket by approximately 1/2". Tighten the lock nut.

**4.2.9.3 PIN EJECTOR REMOVAL**

1. Loosen the bolts and remove the pin ejector assembly, from side plate of the machine.

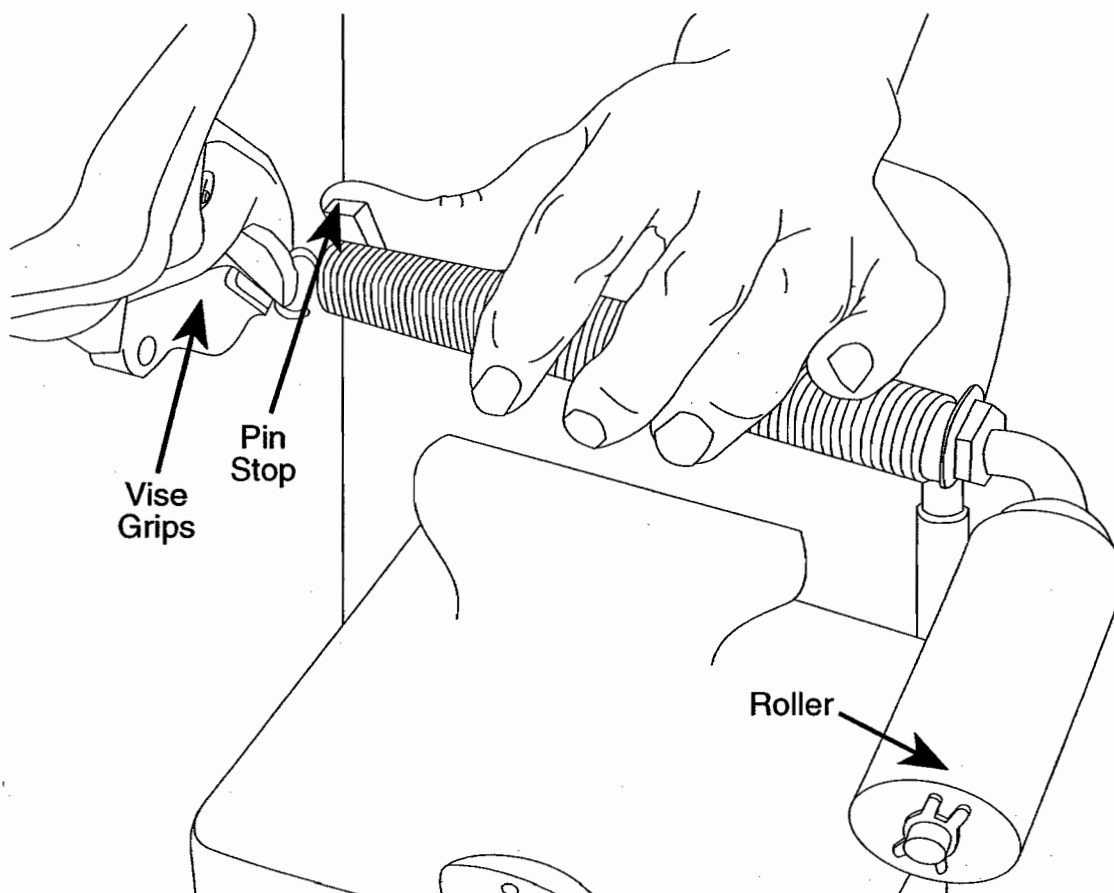
4.2.9.4 PIN EJECTOR REPLACEMENT

1. Position the pin ejector assembly in the machine so that the leading edge of the roller assembly is in line with the machine plow.
2. Tighten bolts.



4.2.9.5 PIN EJECTOR ADJUSTMENTS

1. Insert the pin ejector assembly, L.H. #000-024-507 or R.H. #000-024-508, in vise as shown in Drawing #4.65.
2. Remove the "X" washer and slide the shaft out of the bearing end.
3. Grasp the end of the spring with vise grip pliers and wind spring 1½ turns.
4. While maintaining tension on the spring, position the roller and shaft, then install the pin stop.
5. Release vise grip pliers and the spring will fall into position.
6. Install the "X" washer in the groove provided on the shaft.

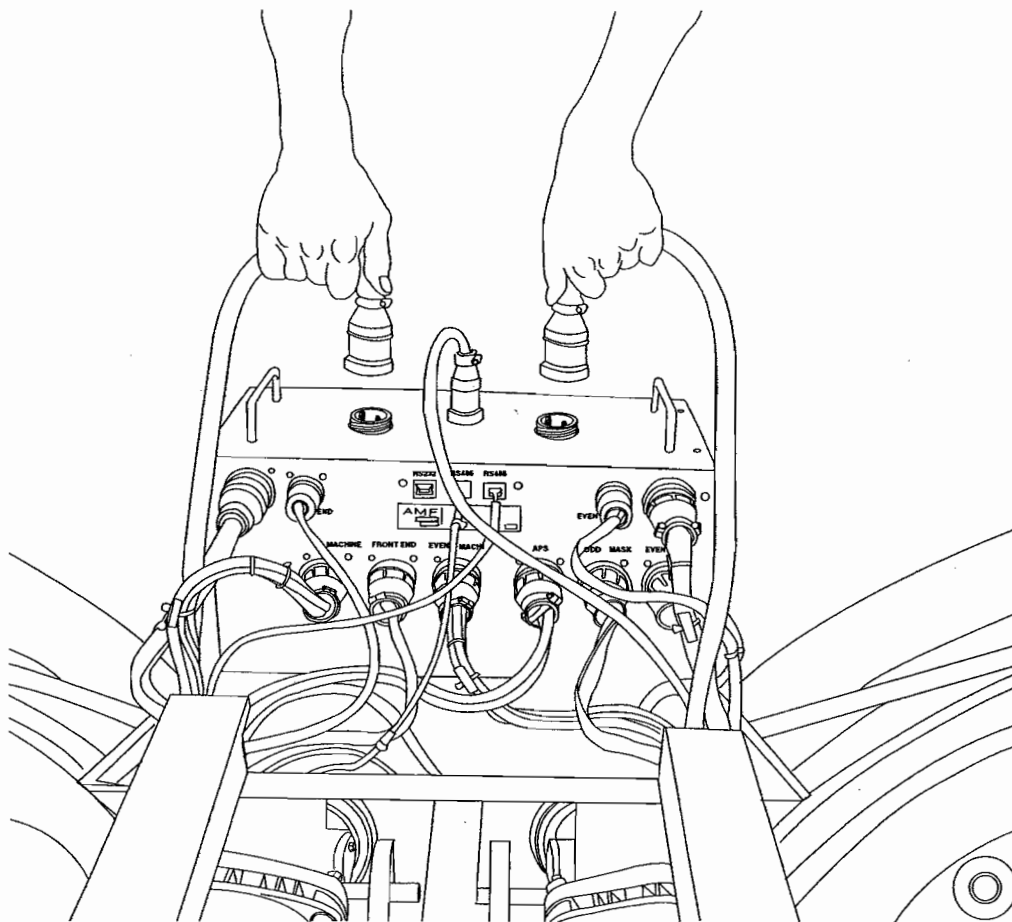


GRAPHIC NUMBER TB66/5.64

DRAWING #4.65

4.2.10 CHASSIS REPLACEMENT**4.2.10.1 CHASSIS REPLACEMENT**

1. Remove power from the chassis by flipping the odd, even and chassis power switches located on the front of the chassis.
2. Remove power to the machine by pulling the odd, even and chassis power plugs located on the top of the chassis.
3. Disconnect ALL of the interface cables from the rear of the chassis.
4. Remove the four (4) nuts and ground screw on the bottom of the chassis mounting bracket.
5. Lift chassis out of position and replace with new one following the reverse order.
6. Apply power to the pinspotter and check operation for first ball, second ball, strike and foul cycles.

**DRAWING #4.66**

4.3 LUBRICATION



4.3.1 LUBRICATION INSTRUCTIONS

4.3.1.1 LUBRICATION

Lubrication is one of the most important items in the proper operation and maintenance of the 82-90XL Pinspotter. Care must be taken to insure correct lubrication. Avoid excessive use of lubricants to prevent the possibility of transmitting it to the bowler. Before lubrication of exposed parts or surfaces, it is important that the old lubricant first be removed.

This section of the manual indicates the points of lubrication, the correct lubricant and the frequency of lubrication for each part of the machine.

4.3.1.2 LUBRICANT SYMBOLS



OILING: Items marked with this symbol pertain to oiling. Use lubricant SAE #10 oil.



GREASING: Items marked with this symbol pertain to greasing. Use a multi-purpose grease (Bearing Guard #2) as the lubricant.



GEAR HEAD MOTORS: Items marked with this symbol pertain to the lubrication of the gear head motors used on table, sweep, and back end.

To ensure trouble free operation of both the motors and gearboxes, the following procedures should be adhered to:

1. Motors

When the electric motor is removed from the gearbox, or the gearbox is removed from the sweep or table drive shaft, apply Molykote G-N paste to the shafts before re-assembly.

This lubricant provides years of trouble free operation without corrosion. Molykote G-N paste is manufactured by Dow Corning, and is available as AMF Part #715-011-803.

2. Gearboxes

To maximize the life of the gearboxes, change the gear oil after the first 100 hours of operation. Thereafter, change the gear oil every 2,500 operating hours or every 6 months. Mobil 600 gear oil is available in pints as AMF Part #715-020-906.



4.3.2 FRONT END ASSEMBLY

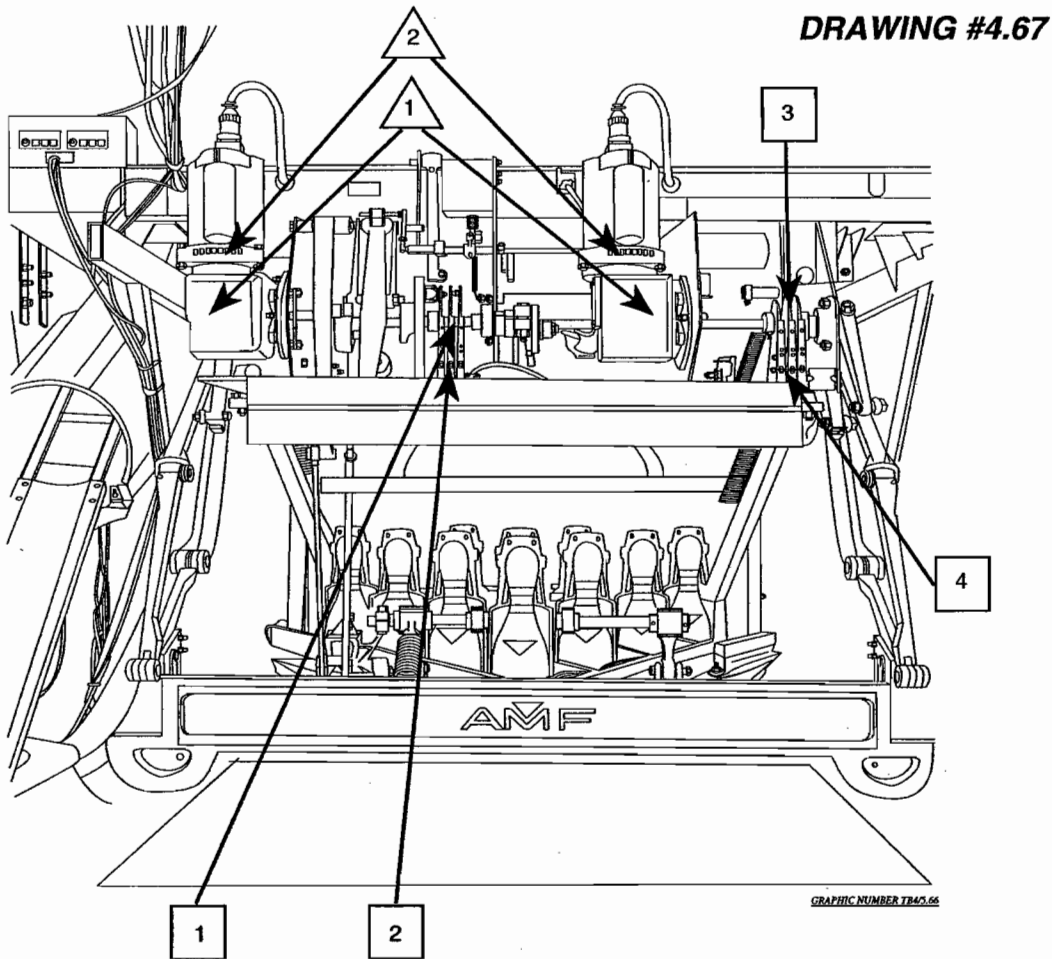
4.3.2.1 FRONT END ASSEMBLY



1. Check oil level of table and sweep motors once every six months by removing the oil level plug. If oil has sludge or contamination; drain, flush with kerosene, rinse and refill to level plug. Fill as required with Mobil 600 - AMF #715-020-906.



2. Spread a light coat of Molykote to the motor shaft.



DRAWING #4.67



1. Table cam lever rollers (3 places): 1 drop #10 oil every 3 months.



2. Table cam lever pivots (6 places): 1 drop #10 oil every 3 months.



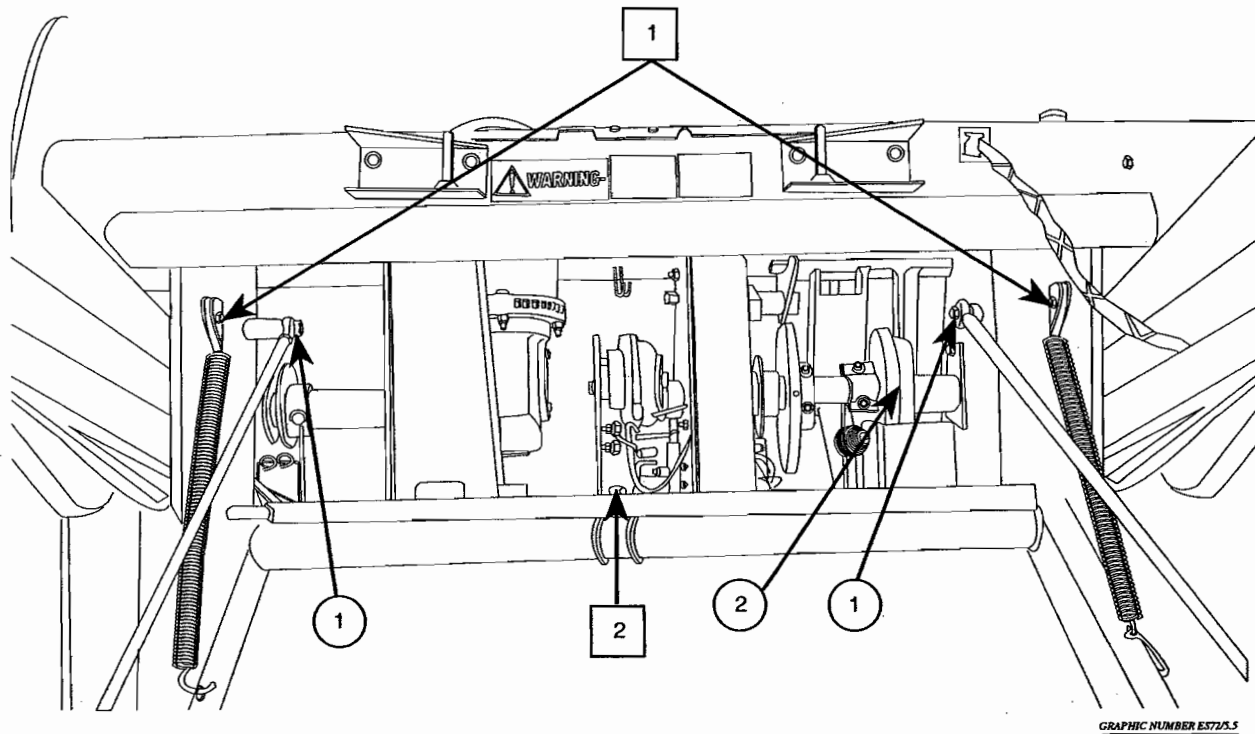
3. Sweep cam lever (3 places): 1 drop #10 oil every 3 months.



4. Sweep cam lever pivots (6 places): 1 drop #10 oil every 3 months.

4.3.2.2 FRONT END ASSEMBLY

- 1** 1. Spring roller bearing (2 places): 2 drops #10 oil every 3 months.
- 2** 2. Over travel lever pivot (2 places): 1 drop #10 oil every 6 months.



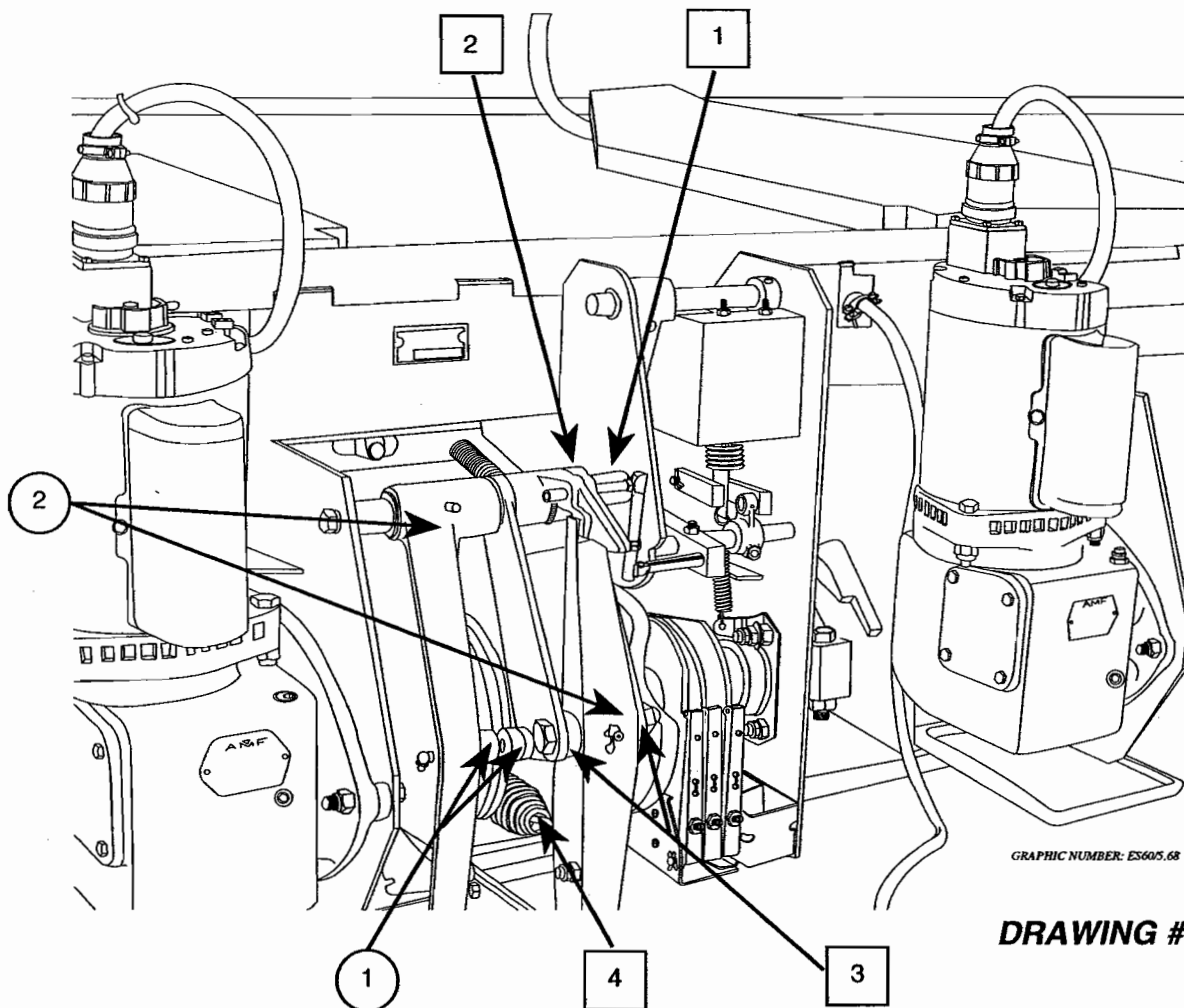
DRAWING #4.68

- 1** 1. Table connecting rod ends (2 places): Grease every 3 months.
- 2** 2. Table spot and respot cams (2 places): Apply a light coating of grease every month.
- 3. Spherical bushing in table support weldment (2 places): Grease every 6 months. (Not Shown).



4.3.2.3 FRONT END ASSEMBLY TABLE TRAVEL CAM LEVERS

- 1. Oilite bearing on pin (1 place): 2 drops #10 oil every month.
- 2. Oilite bearings at hook pivot (2 places): 1 drop #10 oil every month.
- 3. Oilite bearings at spot link arm (2 places): 2 drops #10 oil every month.
- 4. Spring mounting plate pivot bolt (2 places): 1 drop #10 oil every month.

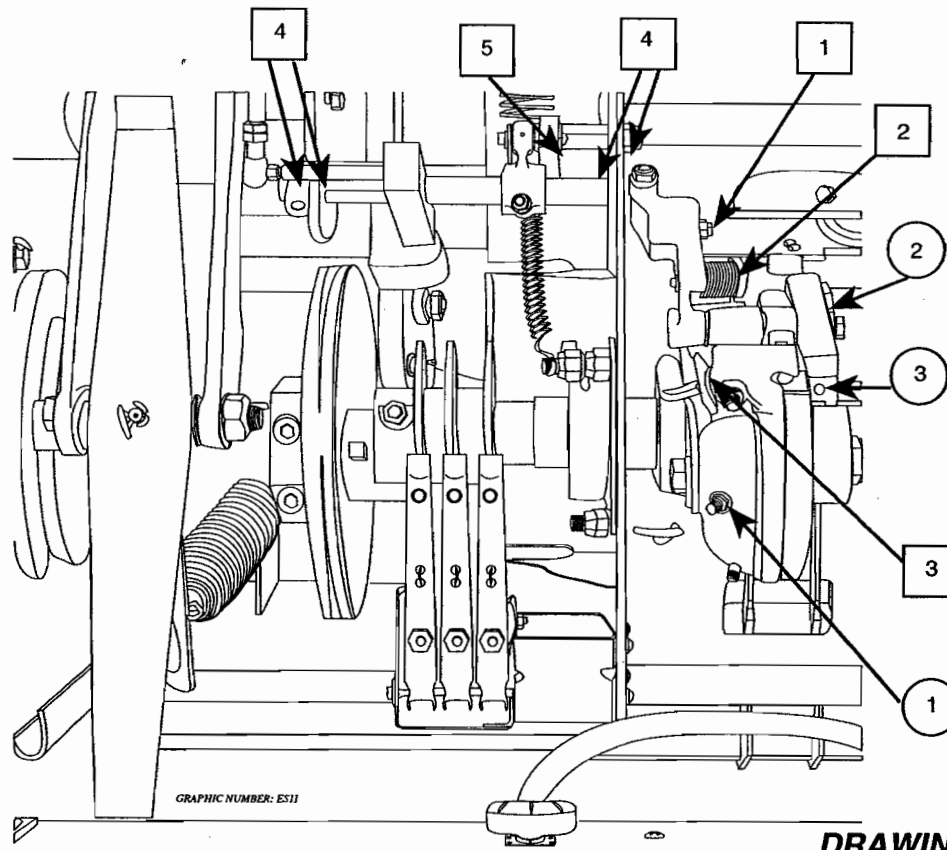


DRAWING #4.69

- 1. Grease fitting at cam follower bearings (2 places): Grease once a month.
- 2. Grease fittings at spot and respot arm (2 places): Grease every 3 months.

4.3.2.4 FRONT END ASSEMBLY TABLE DRIVE ASSEMBLY

- | | |
|---|--------------------------------------------------------------------------------|
| 1 | 1. Oilite bearing in link at roller arm (3 places): 1 drop #10 oil every month |
| 2 | 2. Oilite bearings in crank housing (2 places): 1 drop #10 oil every month. |
| 3 | 3. Oilite bearing in latch pivot (2 places): 1 drop #10 oil every month. |
| 4 | 4. Oilite bearing in link assembly (4 places): 1 drop #10 oil every month. |
| 5 | 5. Solenoid linkage (6 places): 1 drop #10 oil every month. |



DRAWING #4.70

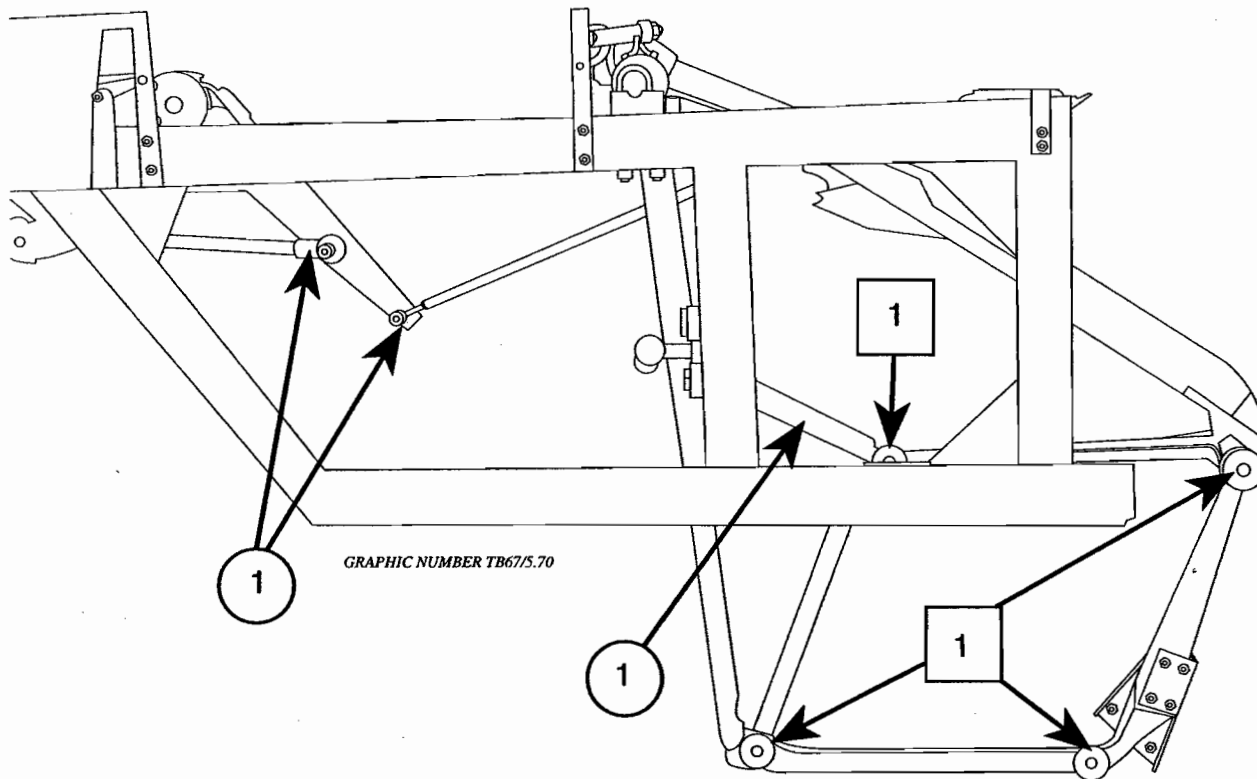
- | | |
|---|-----------------------------------------------------------------------------------------------|
| 1 | 1. Apply grease at crank housing fitting for roller bearings once each year. |
| 2 | 2. Apply a light film of grease to inner surfaces of elongated link slot once every 6 months. |
| 3 | 3. Apply a light film of grease at the cam ball every 6 months. |



4.3.2.5 FRONT END ASSEMBLY SWEEP DRIVE LINKAGES

1

1. Oilite bearing in sweep pantograph joints (10 joints): 4 drops #10 oil
each place every month.



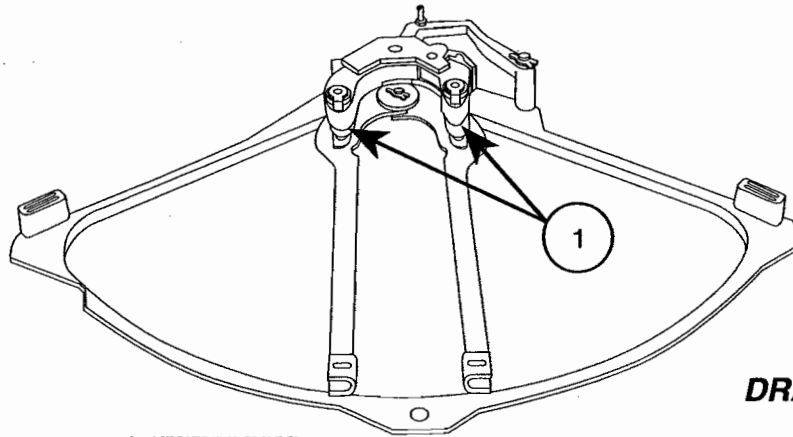
DRAWING #4.71

1

1. Grease in guide tube and rod ends every 3 months.

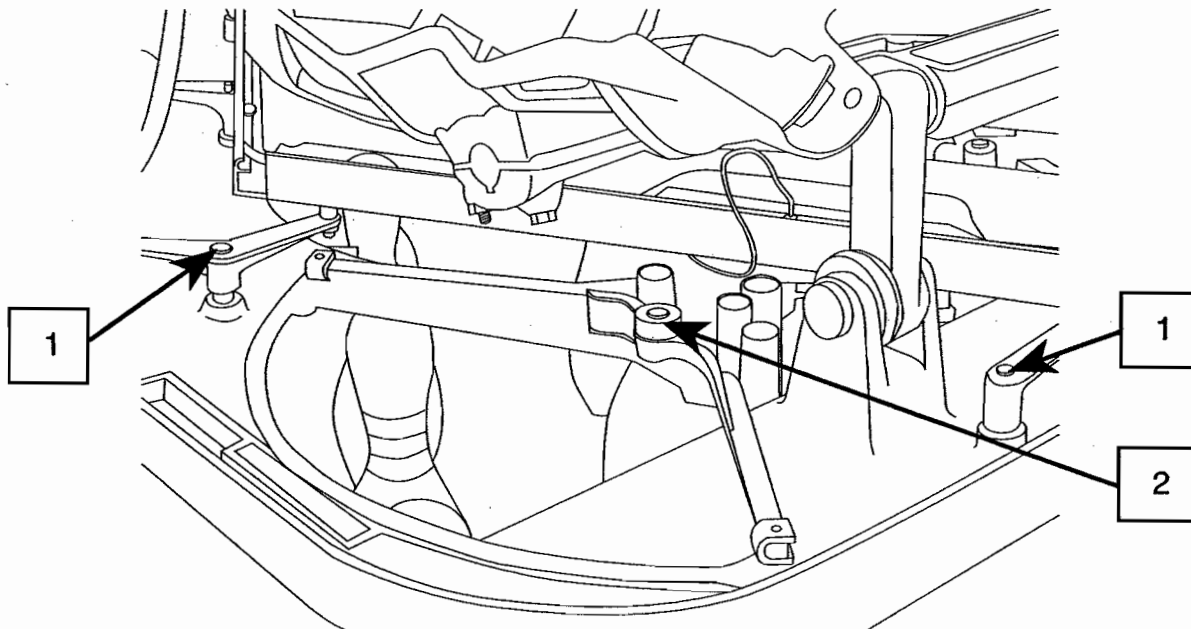
4.3.2.6 FRONT END ASSEMBLY TABLE RESPOT LINKAGES

- 1** 1. Bearings in (4) respot levers (4 places each lever): 2 drops #10 oil every 3 months.
- 2** 2. Bearings in respot cell fingers and connecting links (10) cells (7 places each cell): 2 drops #10 oil every 3 months.



DRAWING #4.72

GRAPHIC NUMBER TB685.71



DRAWING #4.73

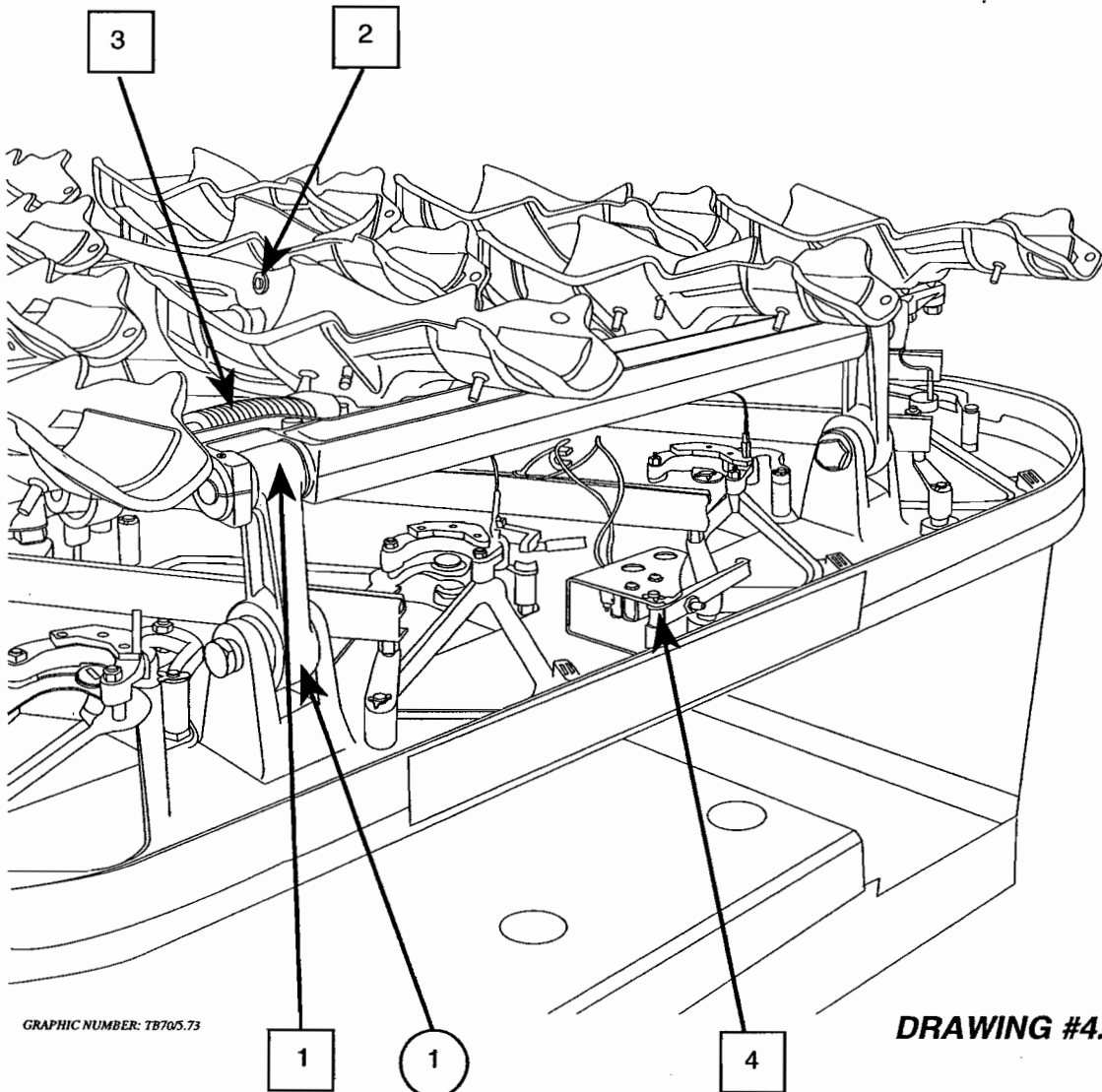
GRAPHIC NUMBER TB695.72

- 1** 1. Stud long, stud short (10) cells (2 places): Light film of grease every month.



4.3.2.7 FRONT END ASSEMBLY YOKE ASSEMBLY

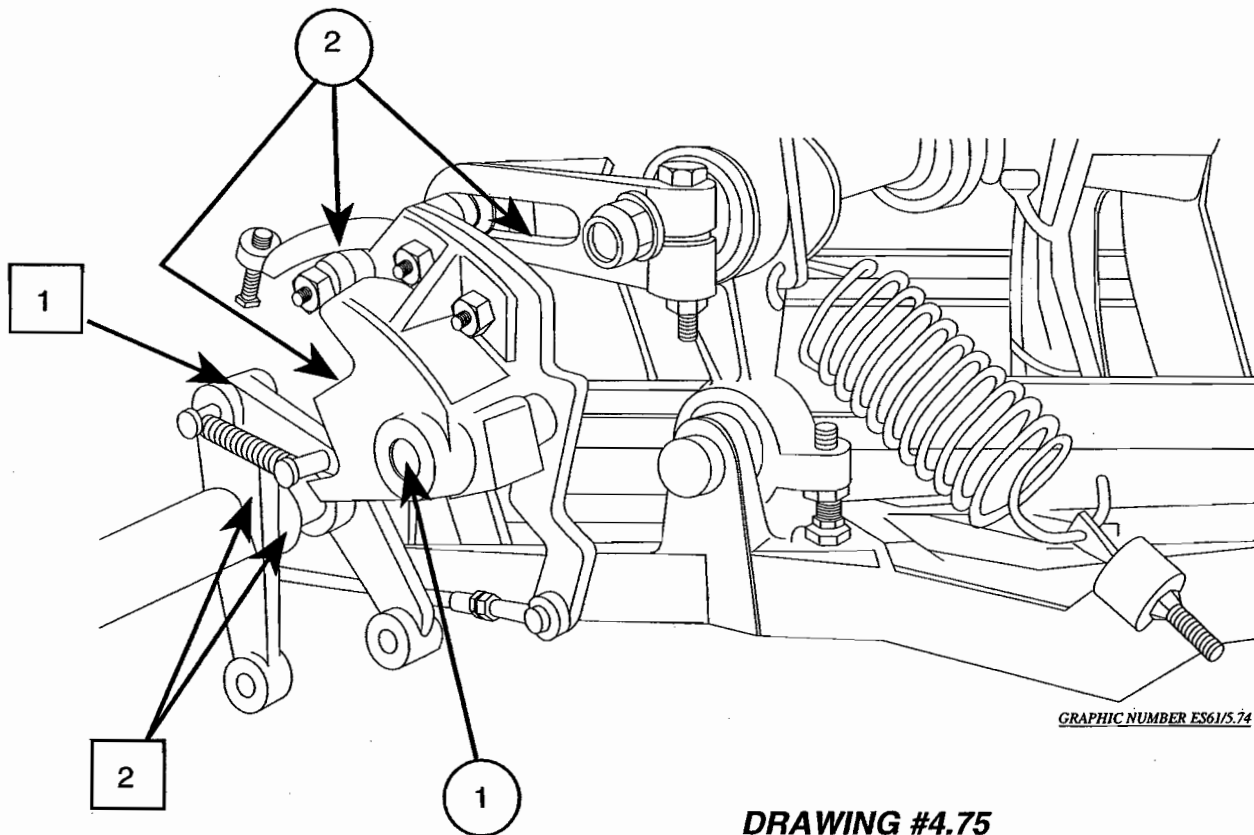
- 1** 1. Oilite bearings in upper table leg, rear legs (4 places): 4 drops of #10 oil every 3 months.
- 2** 2. Oilite bearings in spotting cup link (4 places): 2 drops #10 oil every 3 months.
- 3** 3. On springs of yoke shaft (3 places): 5 drops #10 oil between spring coils every 3 months.
- 4** 4. Respot cell protection switch pivot and roller (4 places): 2 drops #10 oil every 3 months.



- 1** 1. Spherical bearing, front and rear legs (4 places): re-pack with grease once every year.

4.3.2.8 FRONT END ASSEMBLY TABLE SHIFTER MECHANISM

- 1** 1. Oilite bearing in finger link (2 places): 2 drops #10 oil every 3 months.
- 2** 2. Oilite bearings in shifter link and finger assemblies (4 places): 2 drops #10 oil each place every 3 months.



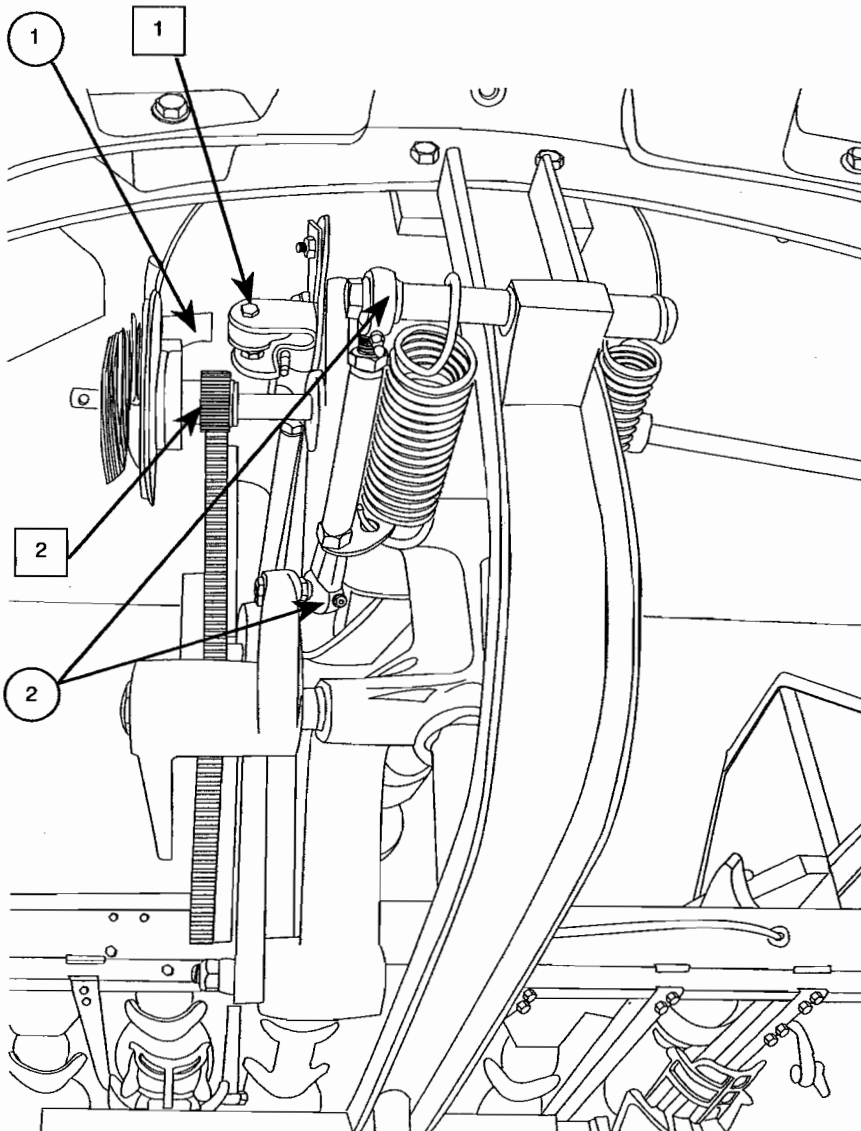
- 1** 1. Re-pack shifter link needle bearings (2 places): Grease once each year.
- 2** 2. Apply light film of grease to the surfaces of shifter link and actuator arm (3 places): Grease every 3 months.



4.3.3 DISTRIBUTOR DRIVE

4.3.3.1 DISTRIBUTOR DRIVE

- 1** 1. Bearings in trip support castings (2 places): 2 drops #10 oil every 3 months.
- 2** 2. Bearing in drive pinion (1 place): 2 drops #10 oil every month.



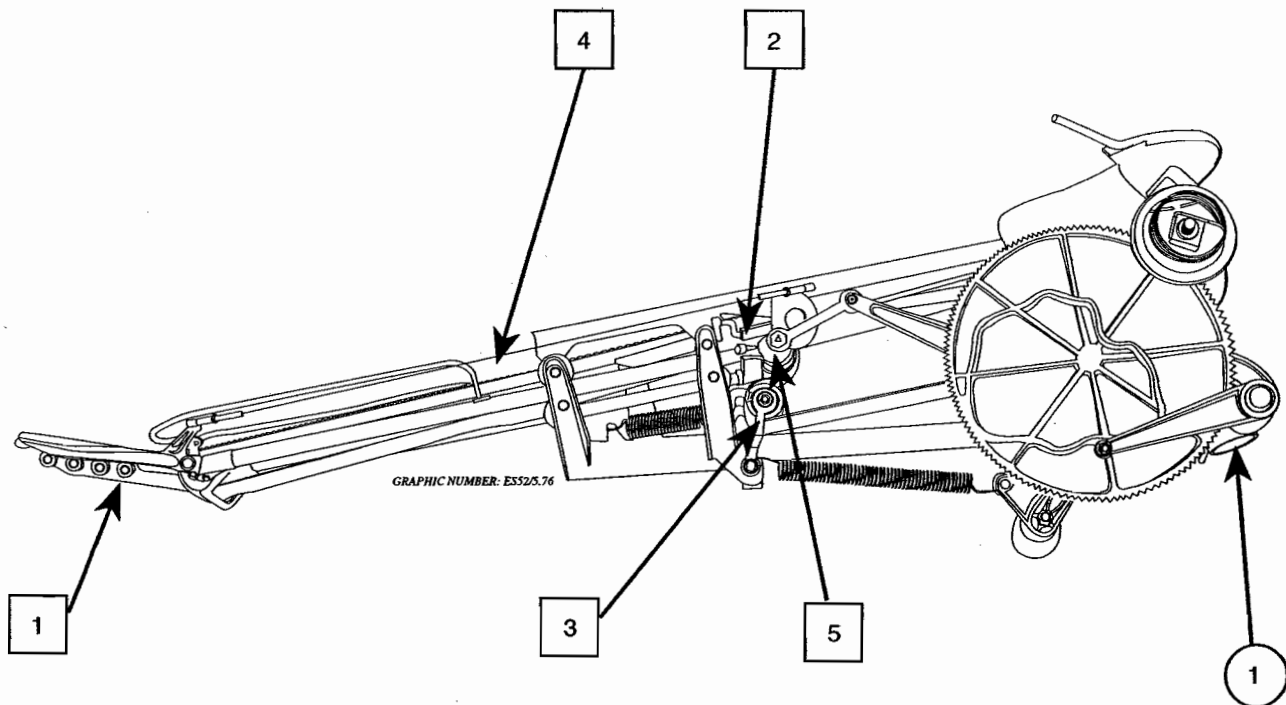
DRAWING #4.76

GRAPHIC NUMBER: ES325.52

- 1** 1. Surface of distributor stop blade (2 places): Grease every month.
- 2** 2. Tubing rod ends (2 places): Grease every 3 months.

4.3.3.2 DISTRIBUTOR

- | | |
|---|--------------------------------------------------------------------------------------------------------|
| 1 | 1. Trip lever bearings (16 places): 2 drops #10 oil every 3 months. |
| 2 | 2. Tube housing (2 places): 2 drops #10 oil every 3 months. |
| 3 | 3. Roller tracking bracket (4 places): 2 drops #10 oil every 3 months. |
| 4 | 4. Carriage tubes where it contacts nylon bearings (4 places):
a light film #10 oil every 3 months. |
| 5 | 5. Trip rocker arm shaft (2 places): 2 drops #10 oil every 3 months. |

**DRAWING #4.77**

- | | |
|---|----------------------------------------------------------------|
| 1 | 1. Bearings in support casting (2 places): Grease once a year. |
|---|----------------------------------------------------------------|

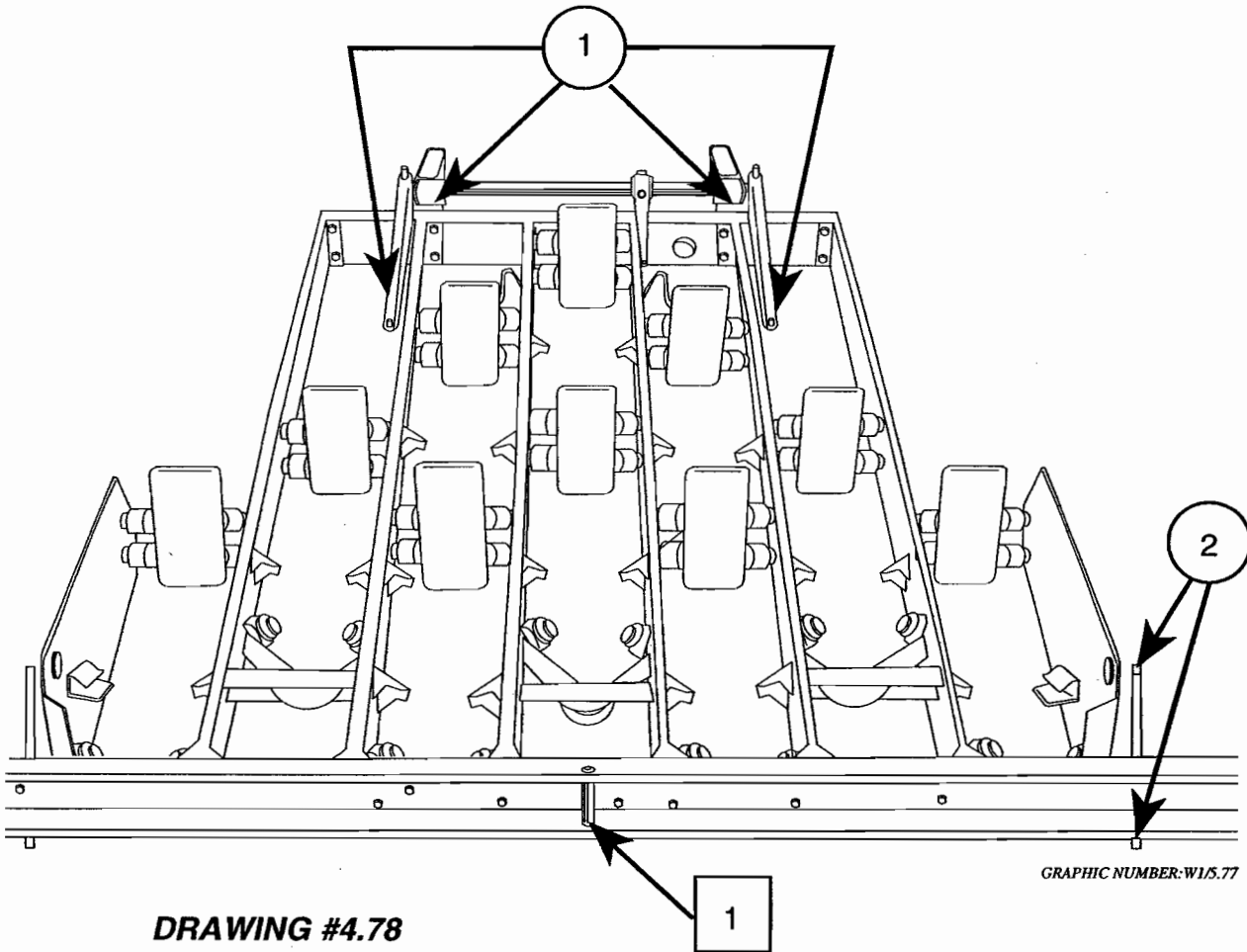


4.3.4 SHUTTLE & BIN ASSEMBLY

4.3.4.1 SHUTTLE & BIN ASSEMBLY

1

1. Oilite in bin switch bracket (2 places): 2 drops #10 oil every 6 months.



1

1. Grease fitting in front levers and shuttle connecting rods (4 places):
Every 6 months.

2

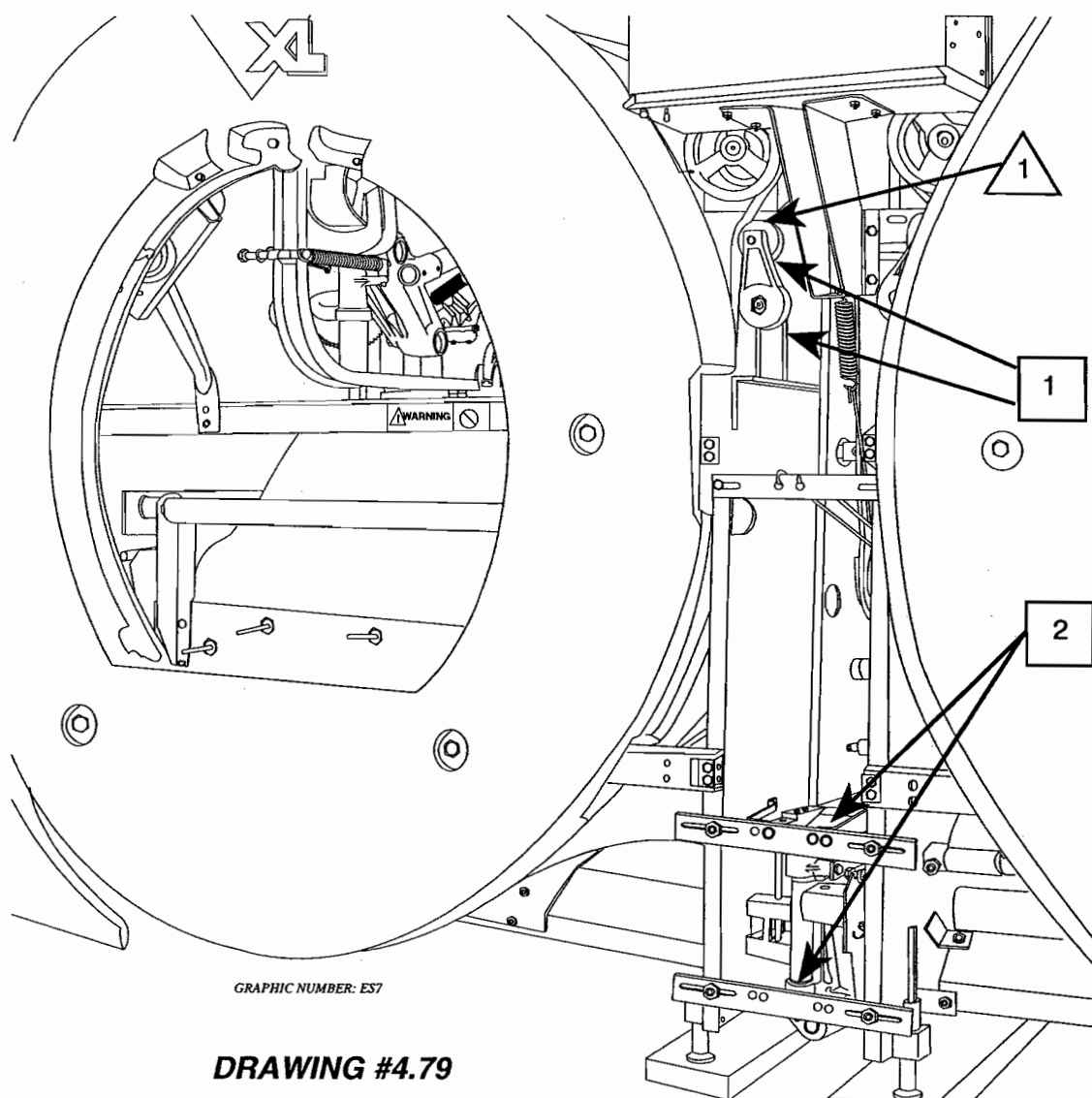
2. Grease fittings in rear shuttle connecting rods (4 places):
Every 6 months.

4.3.5 BACK END ASSEMBLY**4.3.5.1 BACK END ASSEMBLY****1**

1. Oilite bearings in belt tensioner arms (4 places): 4 drops #10 oil every 3 months.

2

2. Oilite bearings in rudder arm pivots (2 places): 4 drops #10 oil every 3 months.

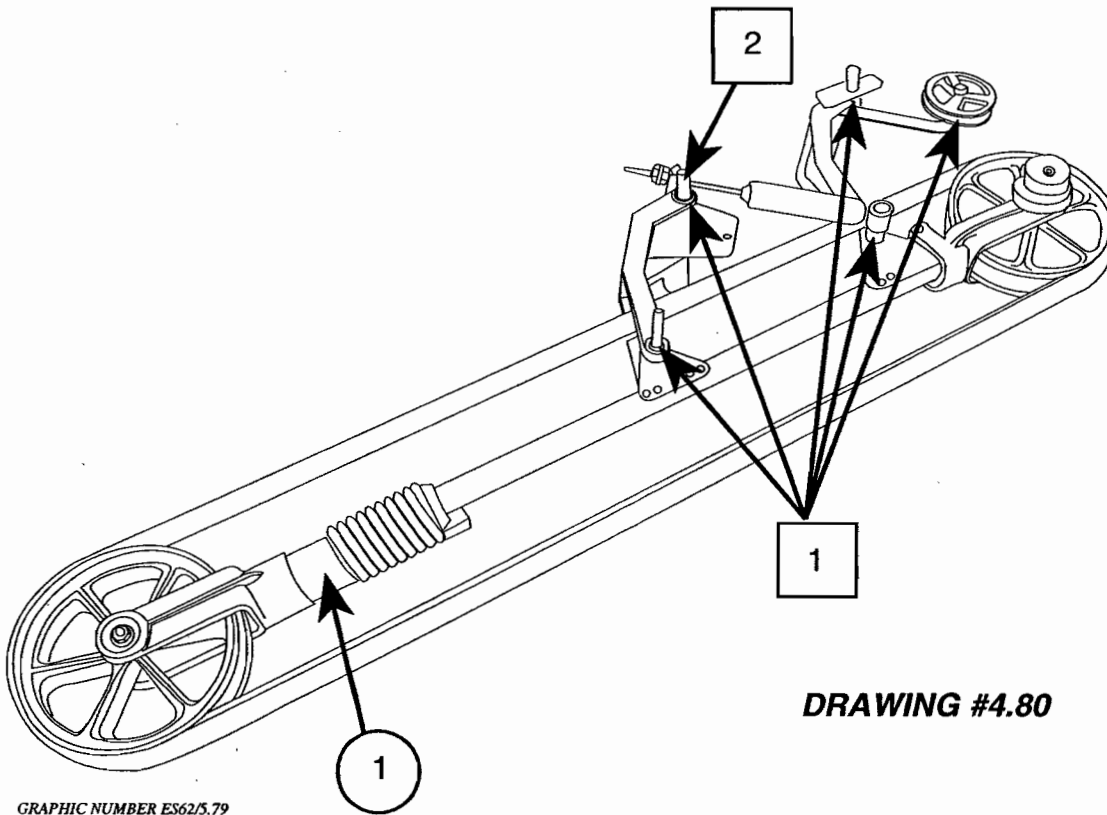
**1**

1. Check oil level of gear motor at level plug once per year. Fill as required with Mobil 600 #715-020-906.



4.3.5.2 BACK END ASSEMBLY BALL ELEVATOR

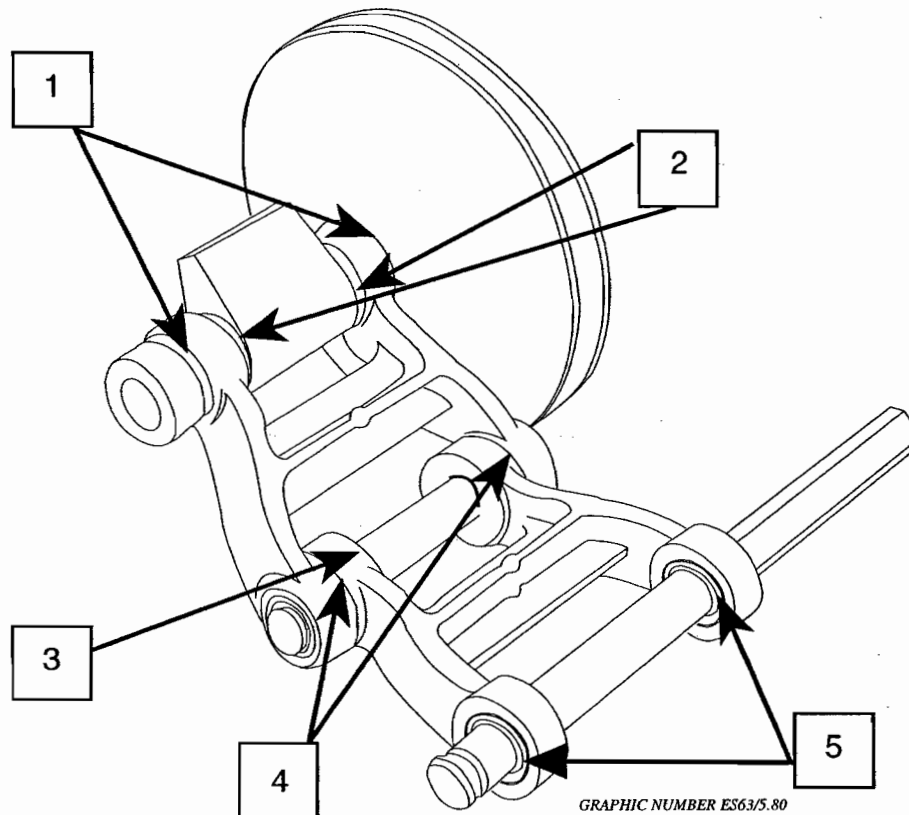
- 1** 1. Oilite bearings in links (8 places): 2 drops #10 oil every 3 months.
- 2** 2. Shock absorber bracket (2 places): 2 drops #10 oil every 3 months.



DRAWING #4.80

GRAPHIC NUMBER ES62/5.79

- 1** 1. Grease fitting in upper yoke (1 place): Grease every 3 months.

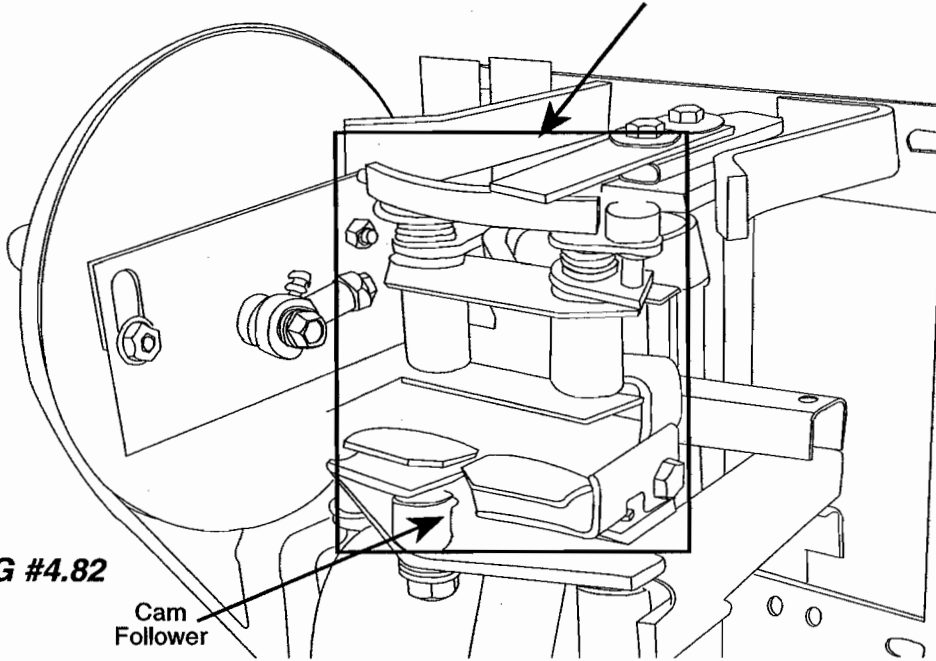
**4.3.5.3 BACK END ASSEMBLY
BELT TENSIONER****DRAWING #4.81**

- | | |
|----------|-------------------------------------------------------------------------------------------|
| 1 | 1. Oilite thrust bearings at pulley shaft (2 places): 2 drops #10 oil every 3 months. |
| 2 | 2. Oilite bearings at hanger arm pulley shaft (2 places): 4 drops #10 oil every 3 months. |
| 3 | 3. Oilite bearings spring guide (1 place): 2 drops #10 oil every 3 months. |
| 4 | 4. Oilite bearings at hanger arm spring shaft (2 places): 2 drops #10 oil every 3 months. |
| 5 | 5. Oilite bearings at pivot shaft (2 places): 2 drops #10 oil every 3 months. |

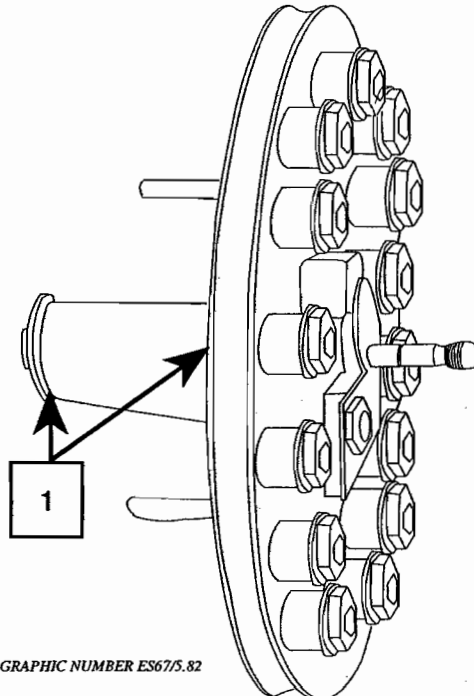


4.3.5.4 BACK END ASSEMBLY LIGHT BALL SENSOR

Do Not Lubricate Any
Components Within This Box



Do not lubricate component parts of the trip cam and rudder cam assembly, outlined within square (see Drawing #4.82). Friction is required in this area to allow the sensor to operate properly.



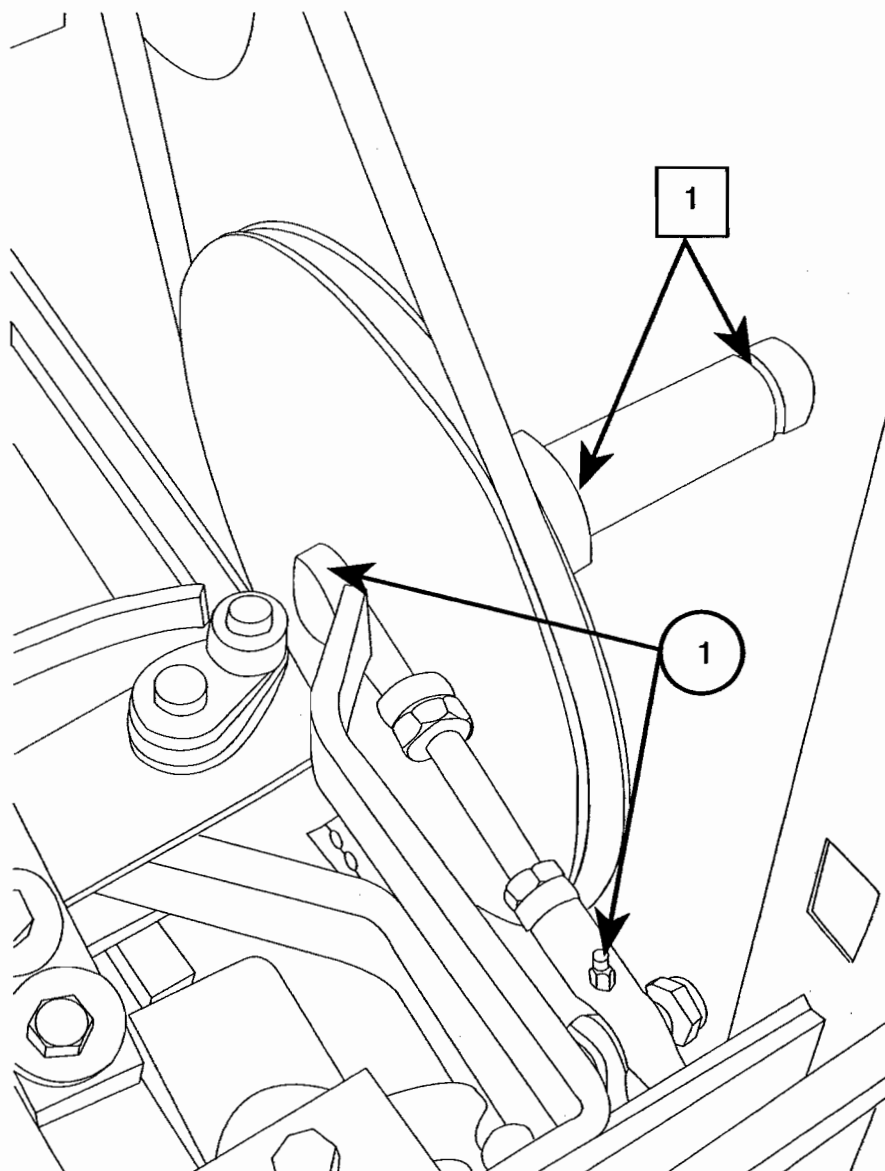
1

1. Flange bearings on ratchet wheel shaft (2 places): 2 drops #10 oil every 3 months.

**4.3.5.5 BACK END ASSEMBLY
RUDDER DRIVE ASSEMBLY**

1

- 1. Oilite bearings in shaft tube (2 places): 2 drops #10 oil every 3 months.



GRAPHIC NUMBER ES64/5.83

DRAWING #4.84

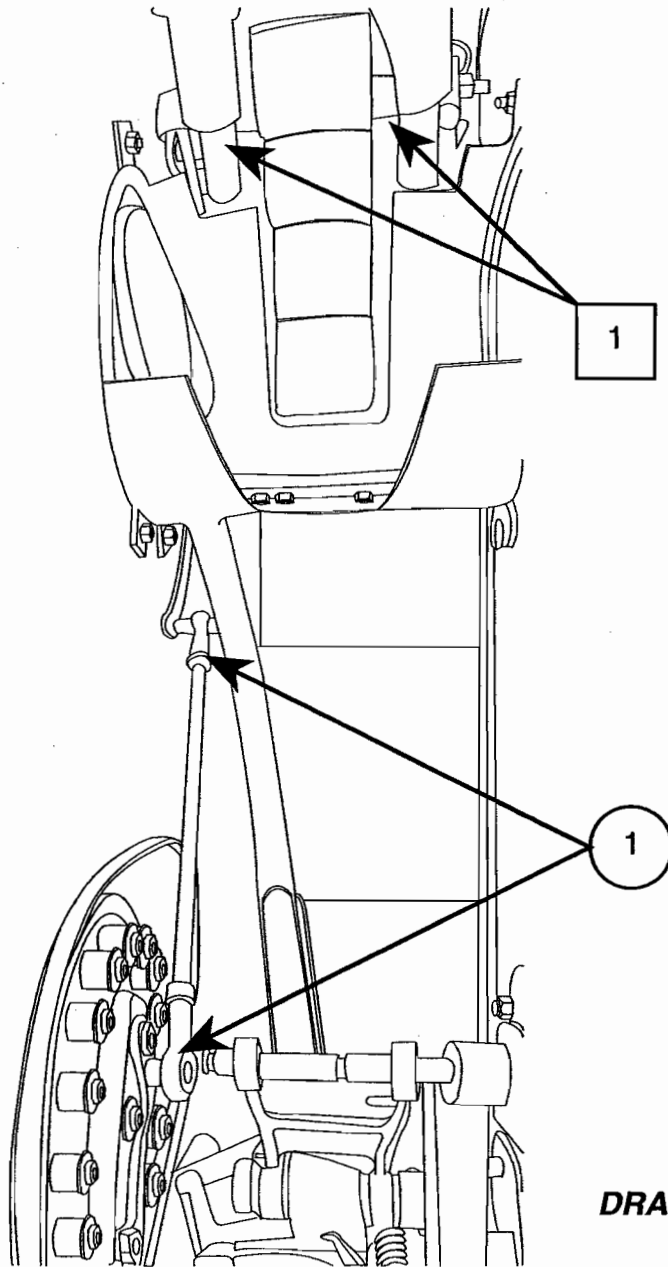
1

- 1. Apply grease at both ends every 3 months.



4.3.5.6 BACK END ASSEMBLY TRACK RAIL ASSEMBLY

- 1** 1. Flange bearings on lift arm (2 places): #10 oil every 3 months.



DRAWING #4.85

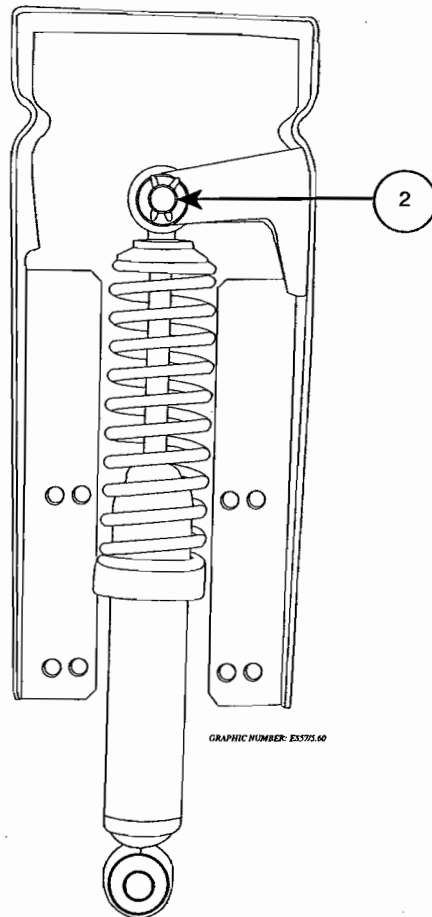
GRAPHIC NUMBER ES70/5.84

- 1** 1. Apply grease at fittings (2 places): Grease every 3 months.

4.3.5.7 BACK END ASSEMBLY PIN EJECTOR

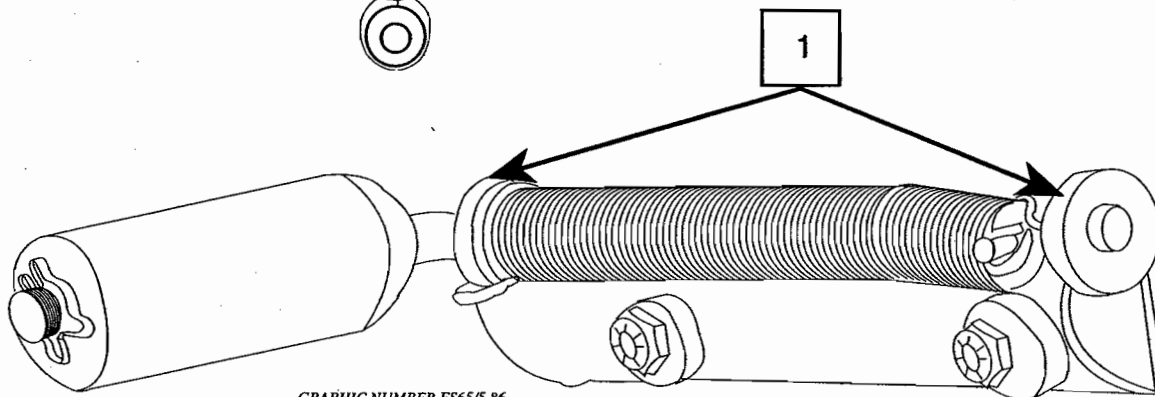
1

1. Oilite bearings in pin ejector assembly (2 places): 2 drops #10 oil every 3 months.



DRAWING #4.86

GRAPHIC NUMBER: ES775.60



GRAPHIC NUMBER ES65/5.86

DRAWING #4.87

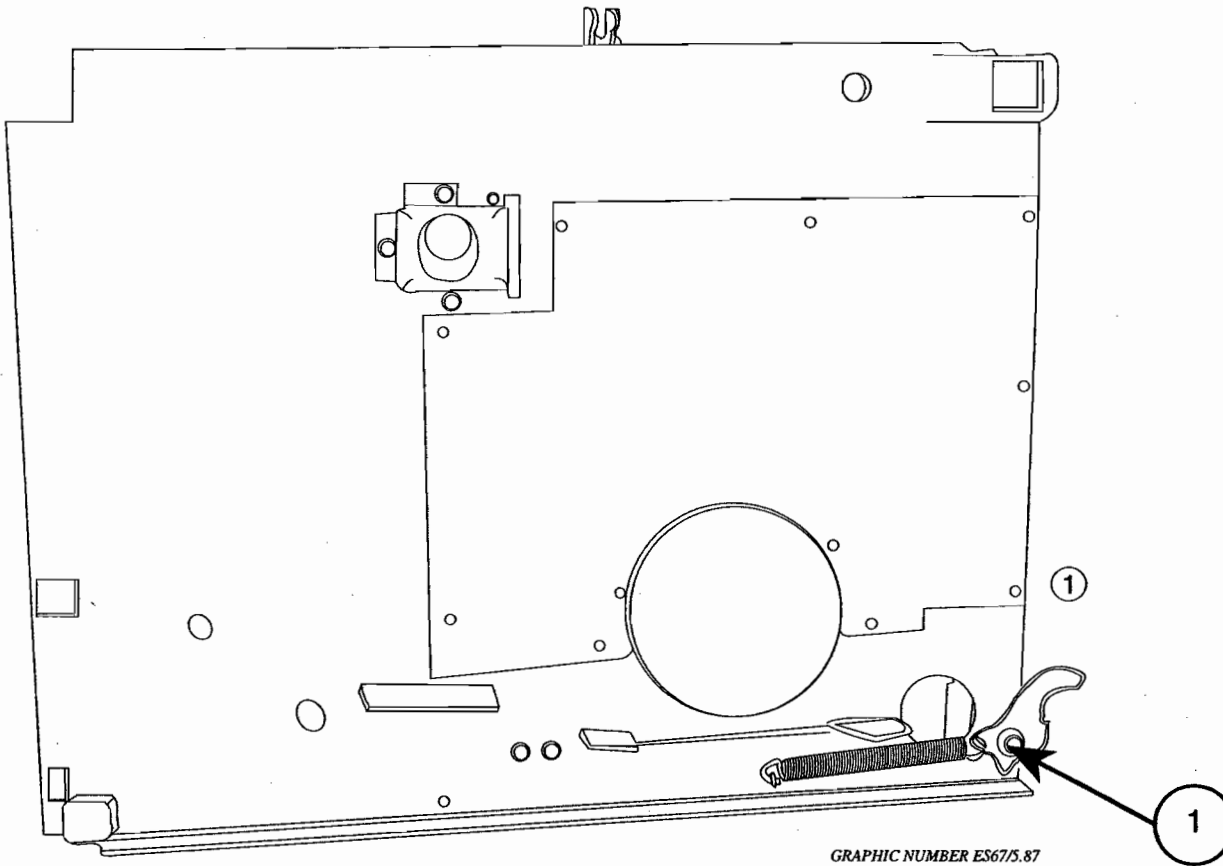
2

2. Pivot pin of shock absorber (2 places): 2 drops #10 oil every 3 months.

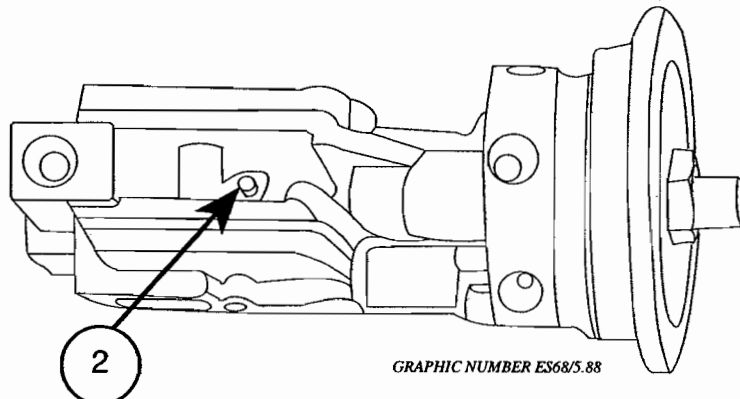


4.3.5.8 BACK END ASSEMBLY SIDE PLATE ASSEMBLY

1. Grease fitting in front roller support brackets (2 places): Grease every 6 months both left and right sides.
2. Remove the front roller (2 places): Apply grease through access hole to grease fitting every 6 months.



DRAWING #4.88



DRAWING #4.89

4.4 PREVENTIVE MAINTENANCE



4.4.1 AMF WEEKLY PREVENTIVE MAINTENANCE CHART

A weekly preventive maintenance is performed by the proprietor's maintenance man using the form shown in Drawing #4.90. Each machine is given this check once a week. For example, the maintenance man of a 16 lane house would do 4 pinspotters per day for 4 days a week. See Drawing #4.90.

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
THUR.		2	2		2	4	4	4	4	5	5	5	6	6
FRI.			2				2	4	4	4	5	5	6	6

DRAWING #4.90

4.4.2 MAINTENANCE CHECK OF PINSPOTTER ASSEMBLIES

The following major pinspotter assemblies should be checked for performance and condition of components using the form printed in Drawing #4.91.

**** Continue with Maintenance Check of Pinspotter Assemblies on next page ****



MAINTENANCE CHECK OF PINSPOTTER ASSEMBLIES - Continued

1. **Sweep**
 - A. Sweep Drive Linkage
 - B. Sweep Stopping Positions
 - C. Condition and Operation of Sweep
2. **Distributor**
 - A. Driving Gears
 - B. Pin Delivery Position
 - C. Shafts and Bearings
 - D. Drive Shaft and Universal
 - E. Conveyor Belts
3. **Carpet and Pit Area**
 - A. Front Roller Actuating Linkage
 - B. Rear Roller and Drive Belt
 - C. Rollers, Bearings and Supports
 - D. Plows and Bounce Plate
 - E. Condition of Carpet Belt
4. **Ball Exit**
 - A. Ball Exit Weldment Assembly
 - B. Drive Belts
 - C. Lift Tube Assembly
5. **Ball Lift**
 - A. Belt
 - B. Pulley Assemblies and Bearings
 - C. Elevator Track
 - D. Drive Belts—Clutches
6. **Pin Elevator**
 - A. Belt
7. **Cushion**
 - A. Ball Impact Pad
 - B. Screws and Fasteners
 - C. Shock Absorber
 - D. Cushion Curtain—Facing
 - E. Hangers—Supports
8. **Table**
 - A. Spotting Pattern
 - B. Pin Cups
 - C. Respot Cells & Mechanisms
 - D. Drive—Supports—Linkage
 - E. Electrical Wiring
9. **Motors—Drive**
 - A. Lubrication Level
10. **Pit Signal—Pindicator**
 - A. Pin Lights
 - B. 1st and 2nd Ball
 - C. Strike and Foul
 - D. Signal Light—Bell—Reset
11. **Counters—Frameter**
 - A. Mechanical Counter and Seals
 - B. Remote Counters at Managers Desk

4.4.3 AMF PINSPOTTERS PREVENTIVE MAINTENANCE CHECK

Using the form in Drawing #4.91, the maintenance man can check the various assemblies listed and perform the details for each assembly as listed above. The legend provides an easy, simplified method of recording the type of action completed if necessary. If parts are replaced, part numbers should be entered into the "Parts Replaced" column. This information will supply the bowling center with a perpetual inventory and facilitate the ordering of spare parts.

4.4.4 PINSPOTTER PROTECTION DURING LANE REFINISHING

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

4.4.4.1 REFINISHING

1. Using masking tape or plastic wrap, seal all motor ventilating openings and cover and seal the chassis.

The purpose of this protection is to prevent the fumes from the refinishing agent from settling on exposed electrical contacts. The fumes will act as an insulator, making the unit inoperative.

4.4.4.2 RESURFACING

1. Cover all open gearing, delicate assemblies and operating surfaces with rags, newspapers or plastic. This prevents dust particles from clinging to the mechanisms which cause mechanical binds.

Cover any exposed parts that may have an oily or greasy surface.

2. After the resurfacing is complete, all protection except on the motors and chassis, can be removed.
3. The entire pinspotter must be wiped down with a damp cloth.
4. After the refinishing process is completed and **THE BUILDING IS FREE FROM ALL FUMES FROM THE REFINISHING AGENT**, the motor and chassis protection may be removed.



NOTE:

In order to permit the resurfacing machinery to extend further back into the pit area, the sweep assembly may be removed.

4.4.5 LANE AND PINSPOTTER CLEANING

4.4.5.1 LANE CLEANING



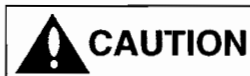
CAUTION Turn off the power and remove the power plug before cleaning the lanes.

1. For daily lane cleaning, TURN OFF THE POWER TO THE PINSPOTTER either at the machine safety switch on the masking unit or at the Manager's Control Unit.
2. Knock the pins into the pit with a mop or broom. The lane is now ready for cleaning.
3. After ALL the lanes are cleaned, turn on the pinspotters and press the cycle buttons, or tenth frame switches, to bring the pinspotter ready for first ball.



NOTE: If buffer or rotary brush is used, the hinged pindicator can be raised and propped in the "UP" position.

4.4.5.2 PINSPOTTER CLEANING



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

The Pinspotter must be kept clean at all times to give satisfactory service to the bowler. It is important to maintain the cleaning schedule given below:

1. Every Two Weeks
 - A. Dust the complete machine.
2. Twice a Week
 - A. Wipe the following assemblies with a cloth dampened with a pin cleaner such as "Topshot":
 - a) Inside of pin elevator wheel.
 - b) Inside of spotting cups and bins.
 - c) Pit carpet.
 - d) Pin curtain face.
 - e) Distributor belts and orientor.
 - f) Ball lift track.
 - g) Sheaves and V-Belt drives.



PINSPOTTER CLEANING - Continued

- B. Check the motor drip pans and clean as required.
- C. Reverse or change ball wipe cloths.
- D. Vacuum between kickback plates and the bottom section of the ball lift.
- E. Vacuum under the pin elevator wheel and carpet.
- F. Clean the ball lift belt.

4.4.6 PIN CHANGING PROCEDURES

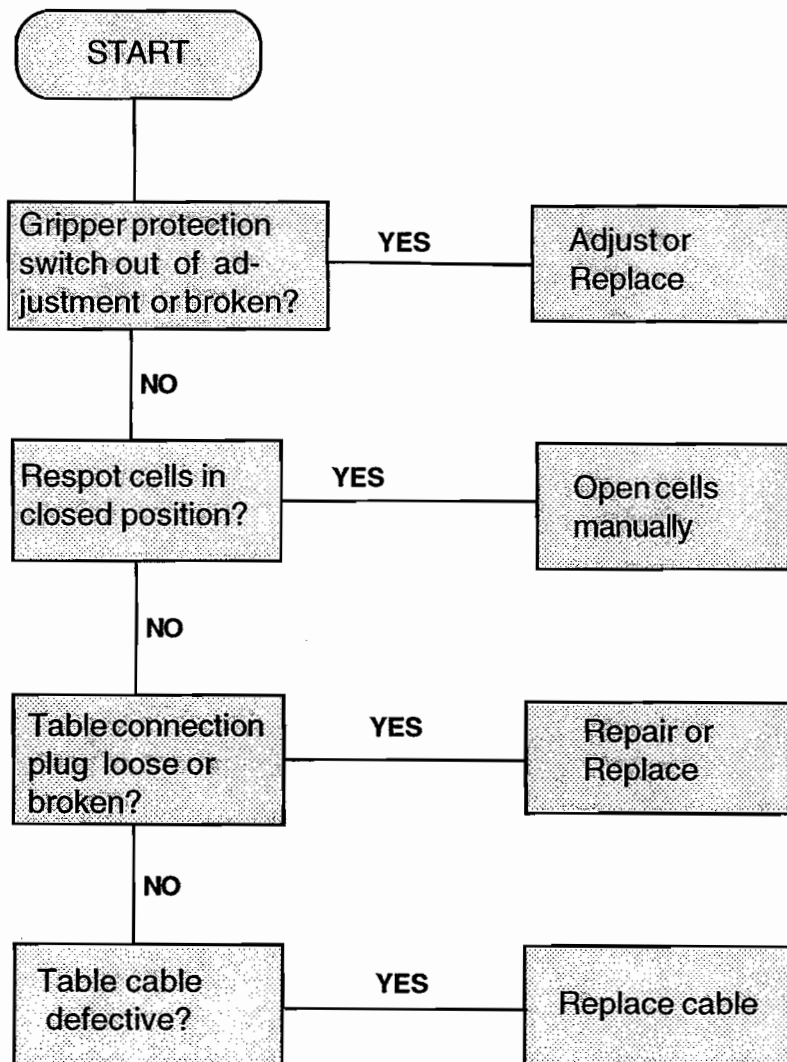
1. Cycle the pinspotter to spot a full set of pins on the pin deck and store a full set in the bin pockets.
2. Push the Sweep Run Switch to sweep all pins into the pit.
3. **Turn the power to the pinspotter off.**
4. Remove the old pins from the pit area and replace with a new set.
5. Turn the pinspotter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

4.5 TROUBLESHOOTING GUIDE



4.5.1 TABLE TROUBLESHOOTING

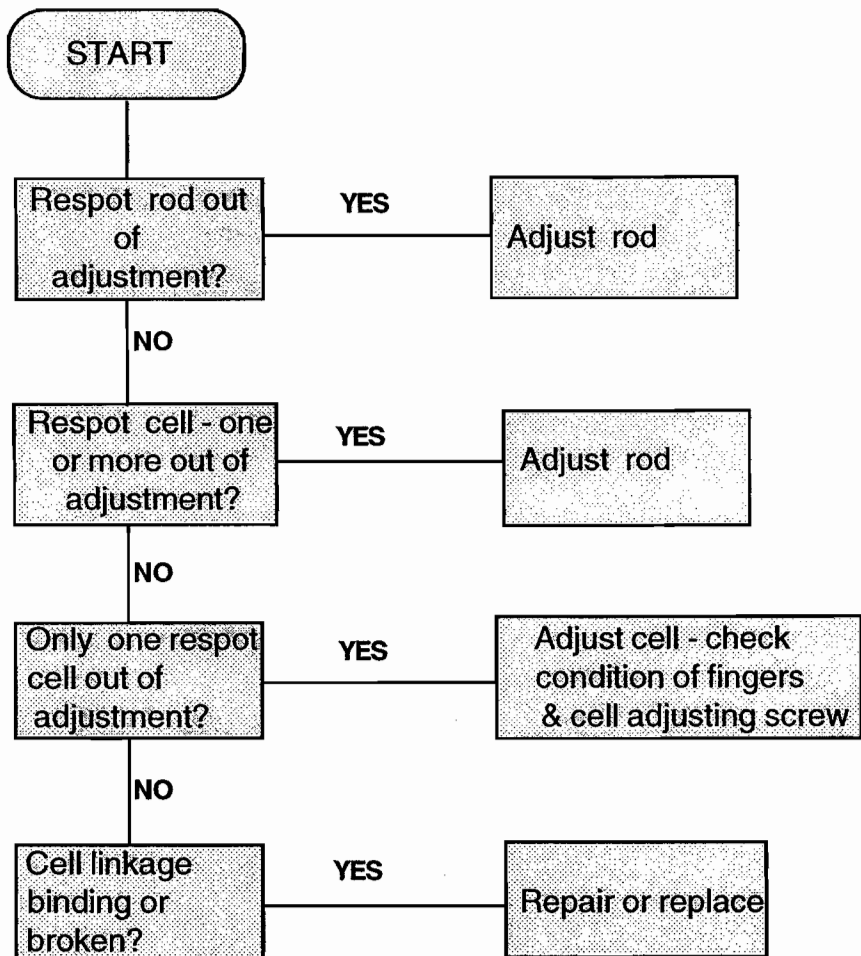
4.5.1.1 PROBLEM: Table will not feel for pins (1st ball light on).



DRAWING #4.92

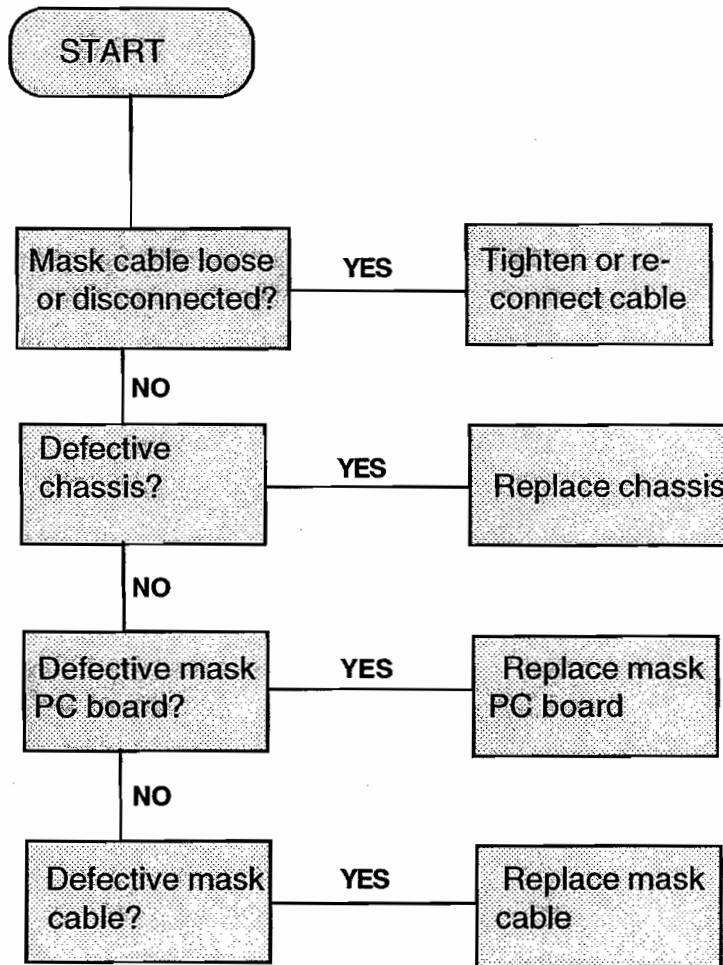


4.5.1.2 PROBLEM: Respot cells will not pick up pins or drop pins.



DRAWING #4.93

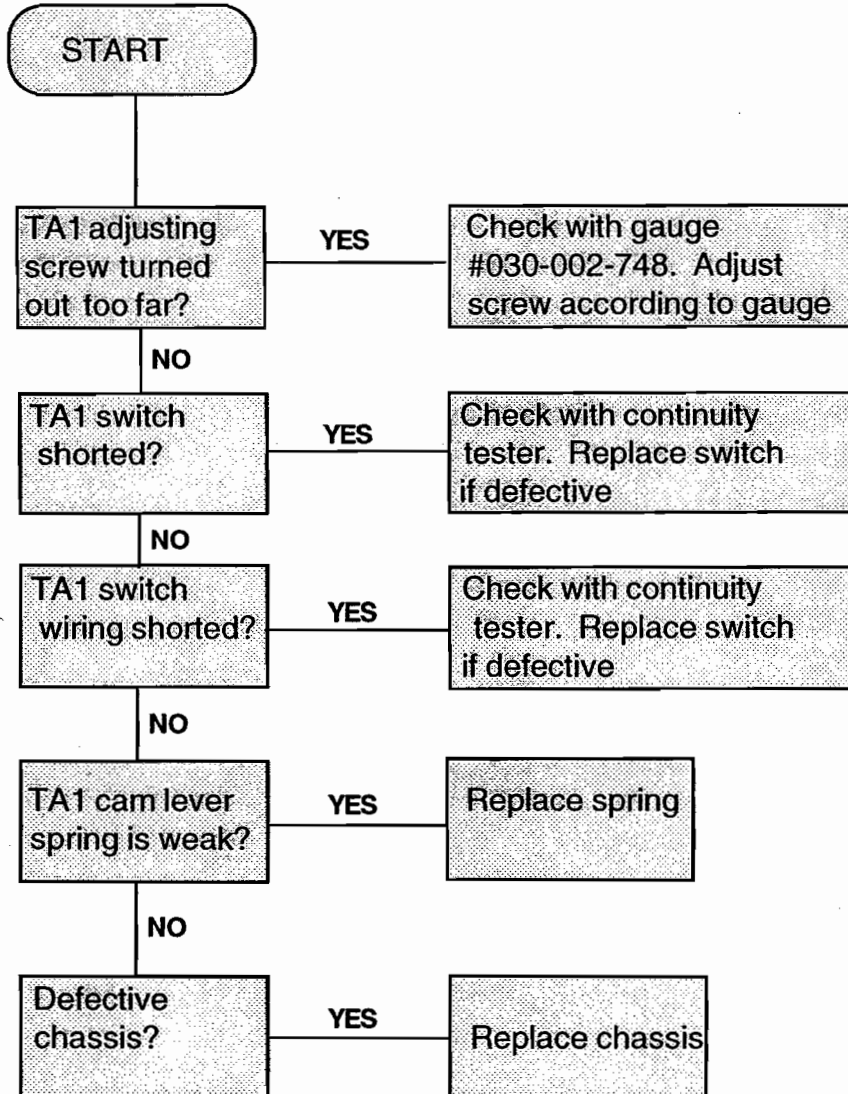
4.5.1.3 **PROBLEM:** No pindicator lights. 10 pins originally picked up by table and indicated on masking unit.



DRAWING #4.94

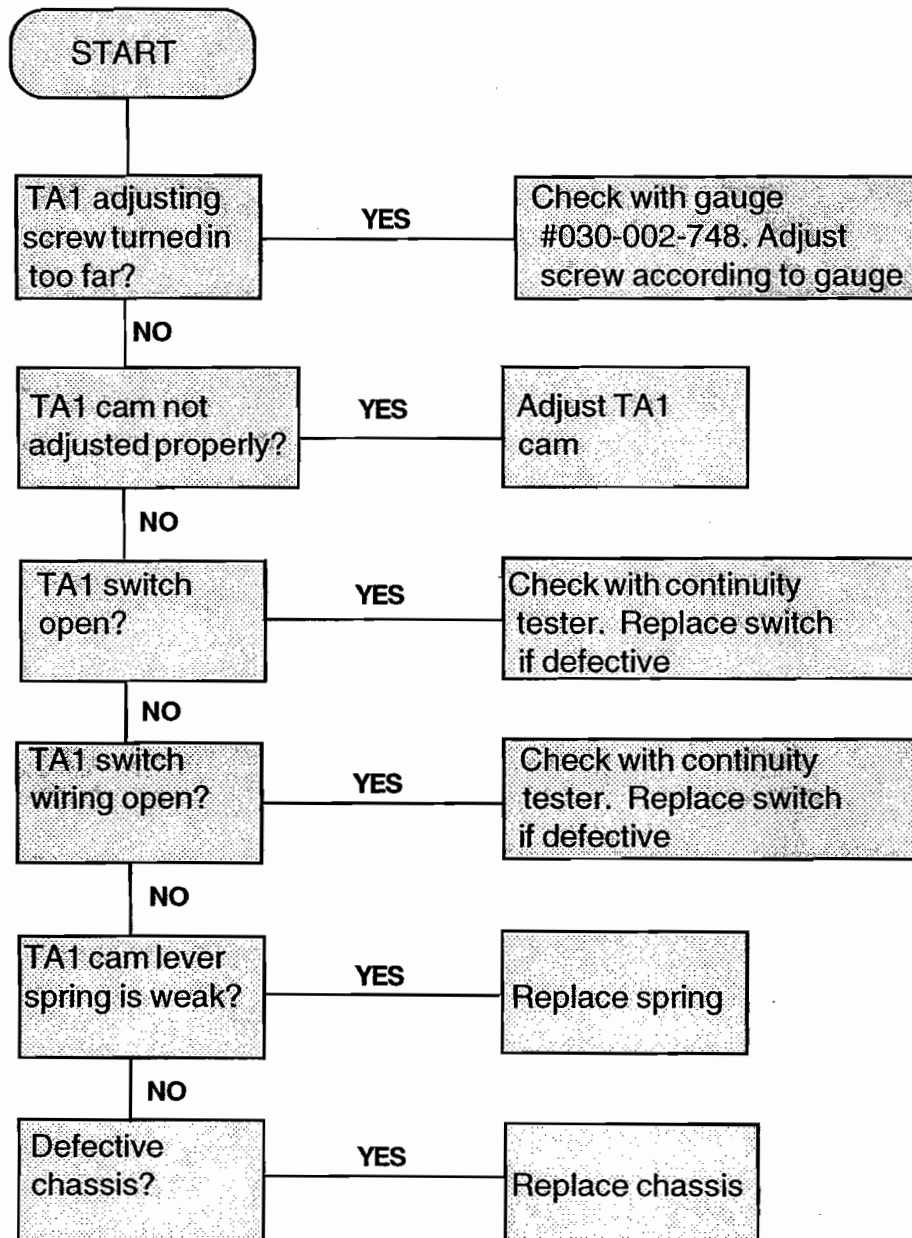


4.5.1.4 PROBLEM: Table runs continuously.



DRAWING #4.95

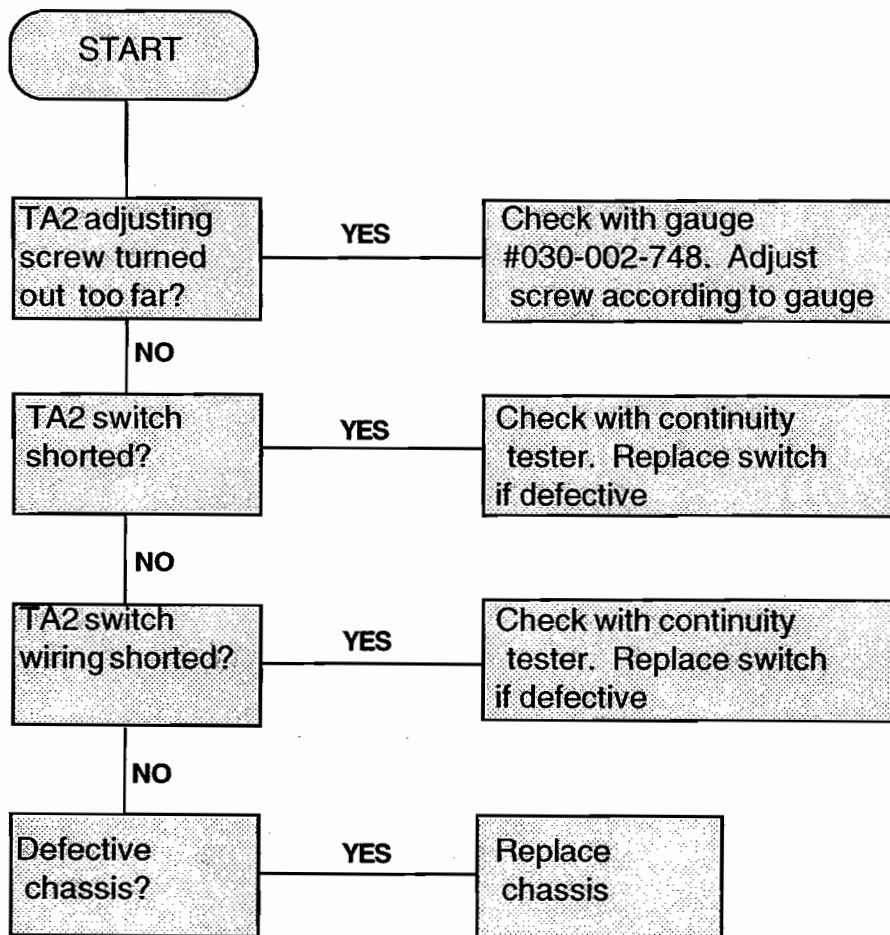
4.5.1.5 PROBLEM: Table stops before zero position.



DRAWING #4.96

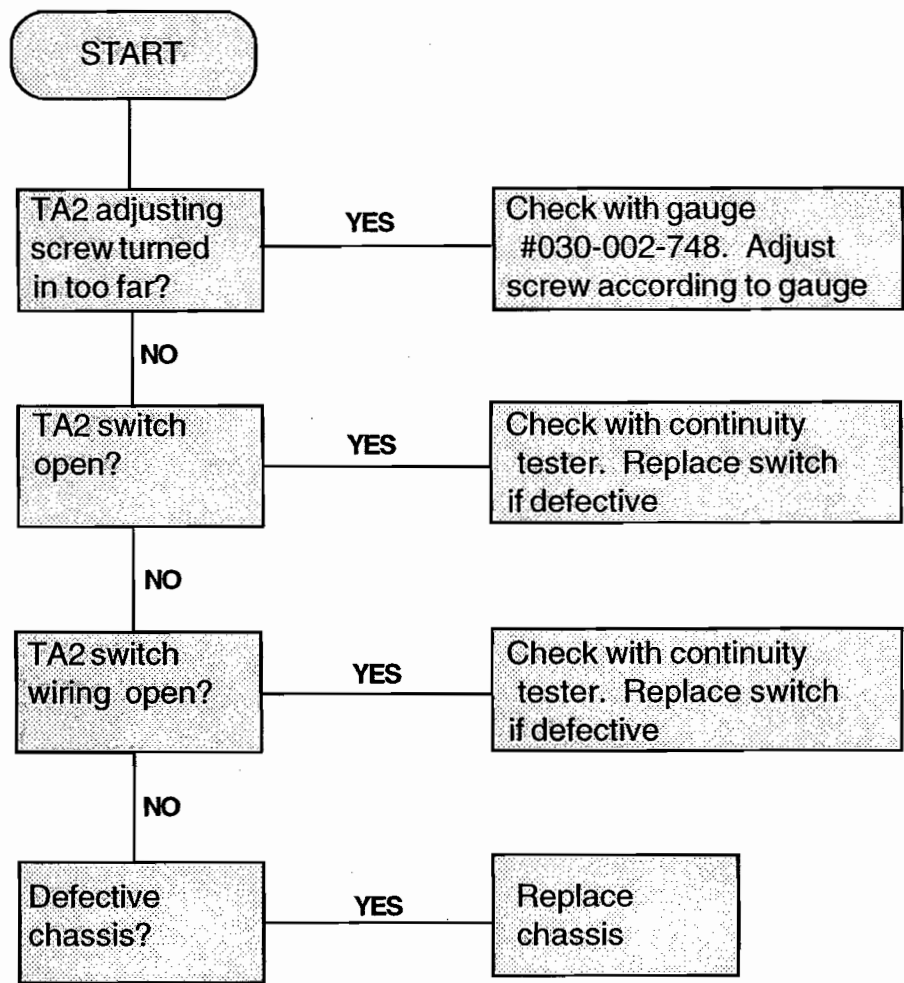


4.5.1.6 **PROBLEM:** 1st ball-sweep down, time delay, sweep runs and cleans off all pins and comes into guard position. Table does not come down.



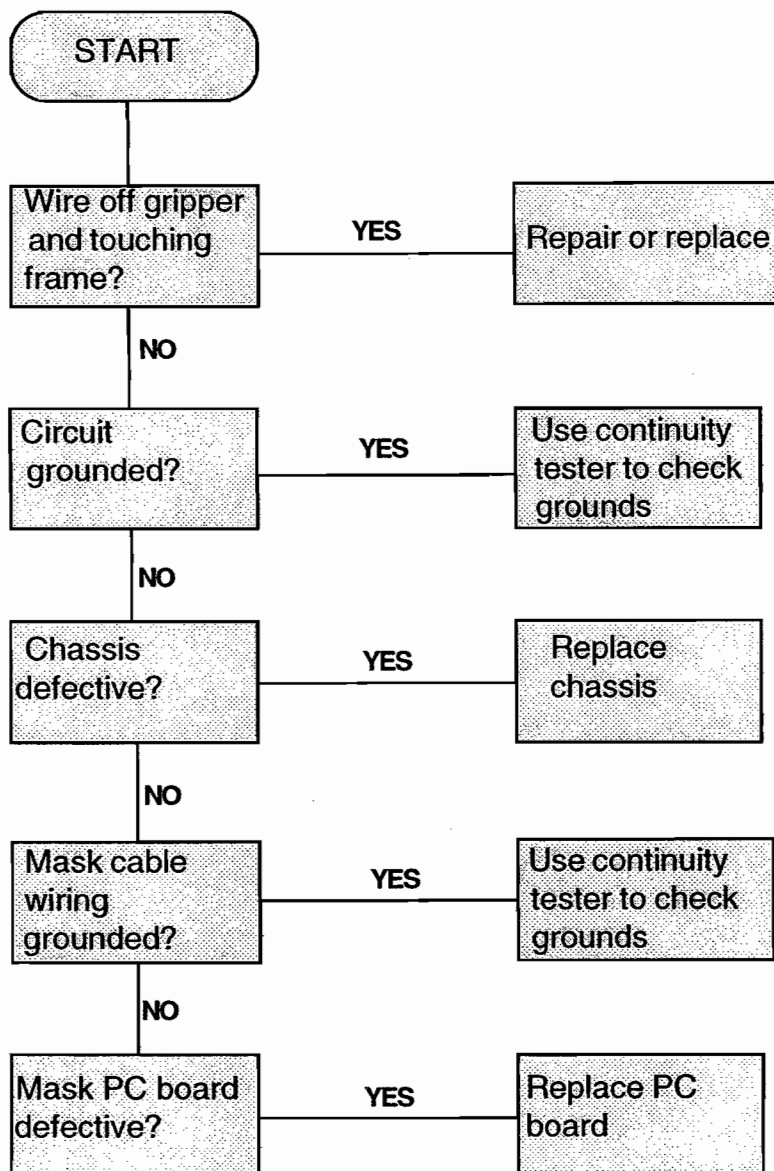
DRAWING #4.97

4.5.1.7 PROBLEM: 1st ball-sweep down to guard position, table continues to run.



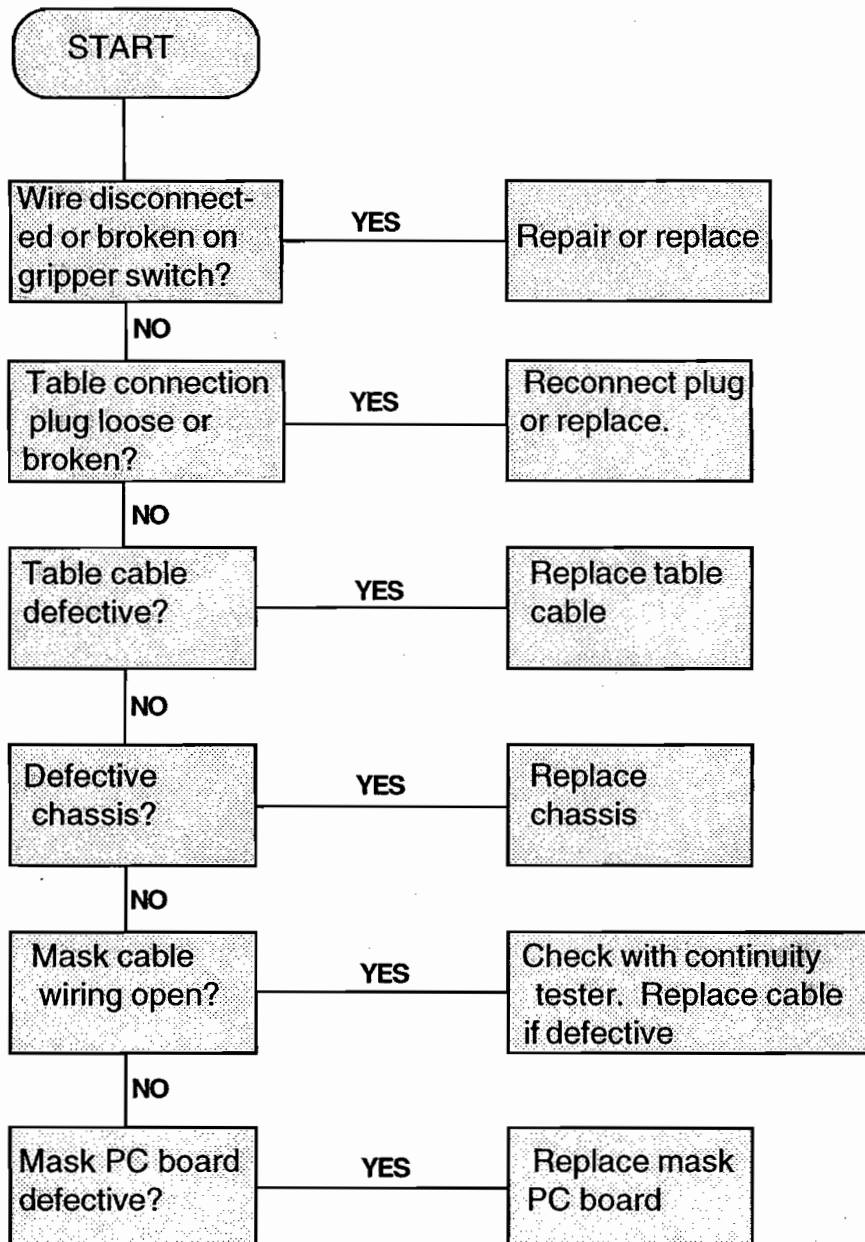
DRAWING #4.98

4.5.1.8 PROBLEM: Pin light on, no pin in gripper.



DRAWING #4.99

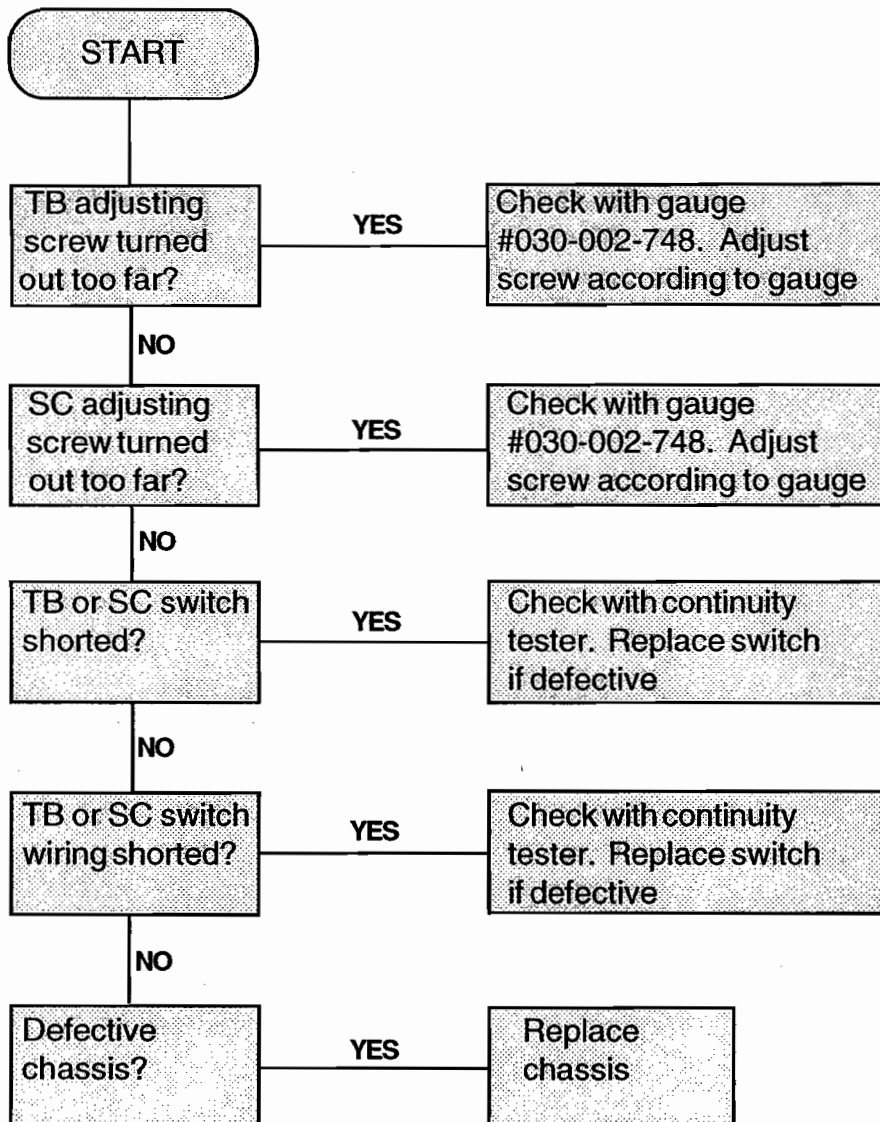
4.5.1.9 PROBLEM: Pin in gripper, no pindicator light on.



DRAWING #4.100

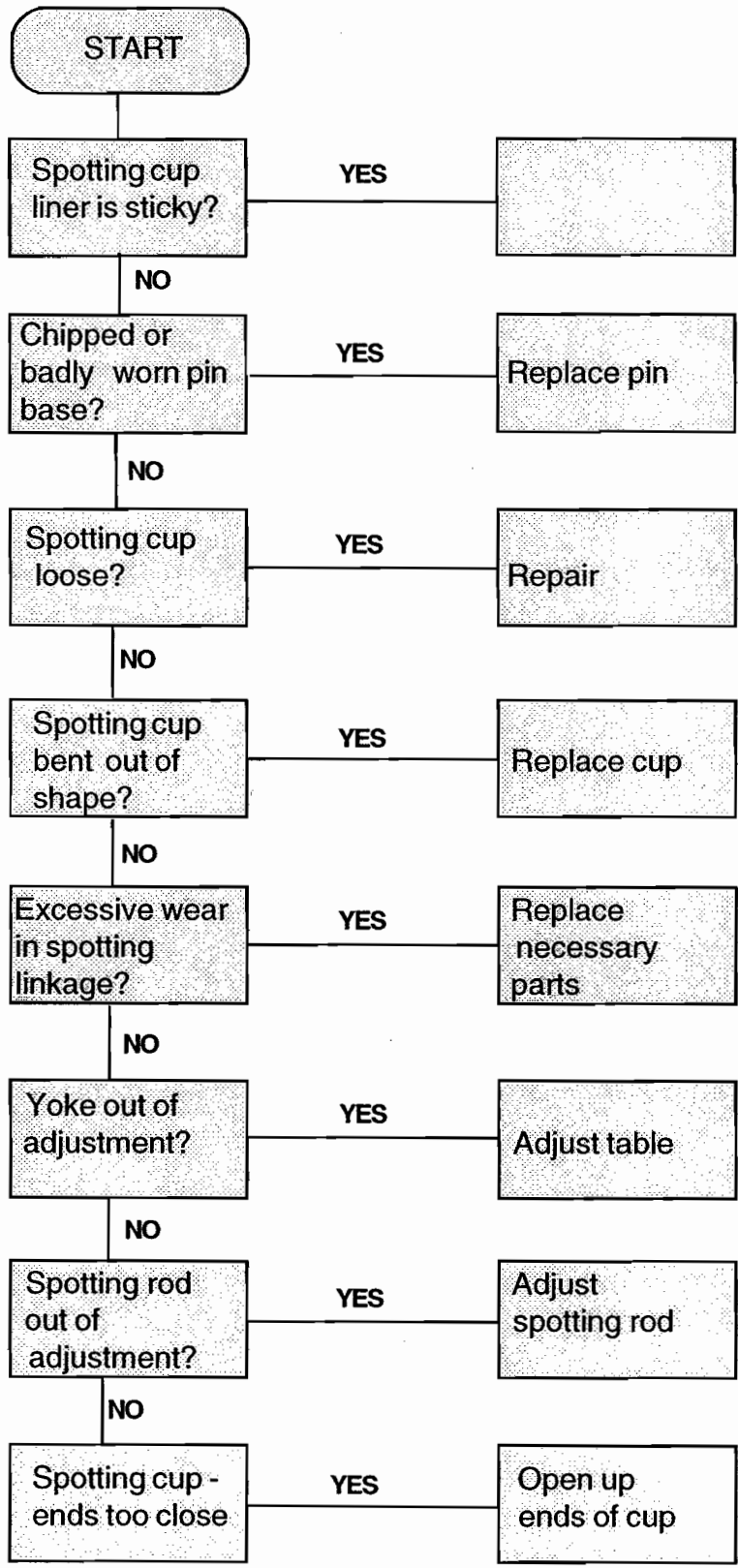


4.5.1.10 PROBLEM: First ball, sweep starts toward pit, table starts up with pins in gripper, both stop, neither will run with SA or TA1.



DRAWING #4.101

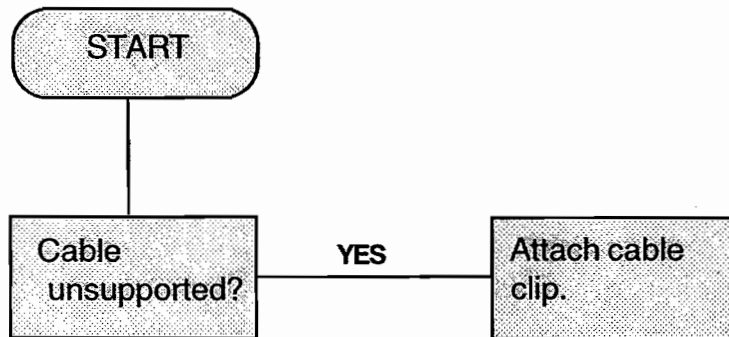
4.5.1.11 PROBLEM: Pin fell over during spotting.



DRAWING #4.102

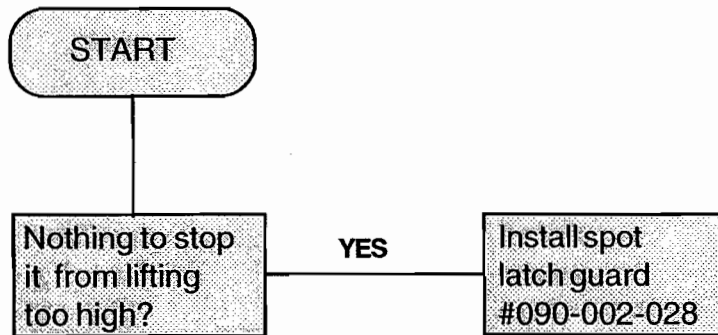


4.5.1.12 PROBLEM: Off spot switch cable breaks.



DRAWING #4.103

4.5.1.13 PROBLEM: Spot latch staying open.

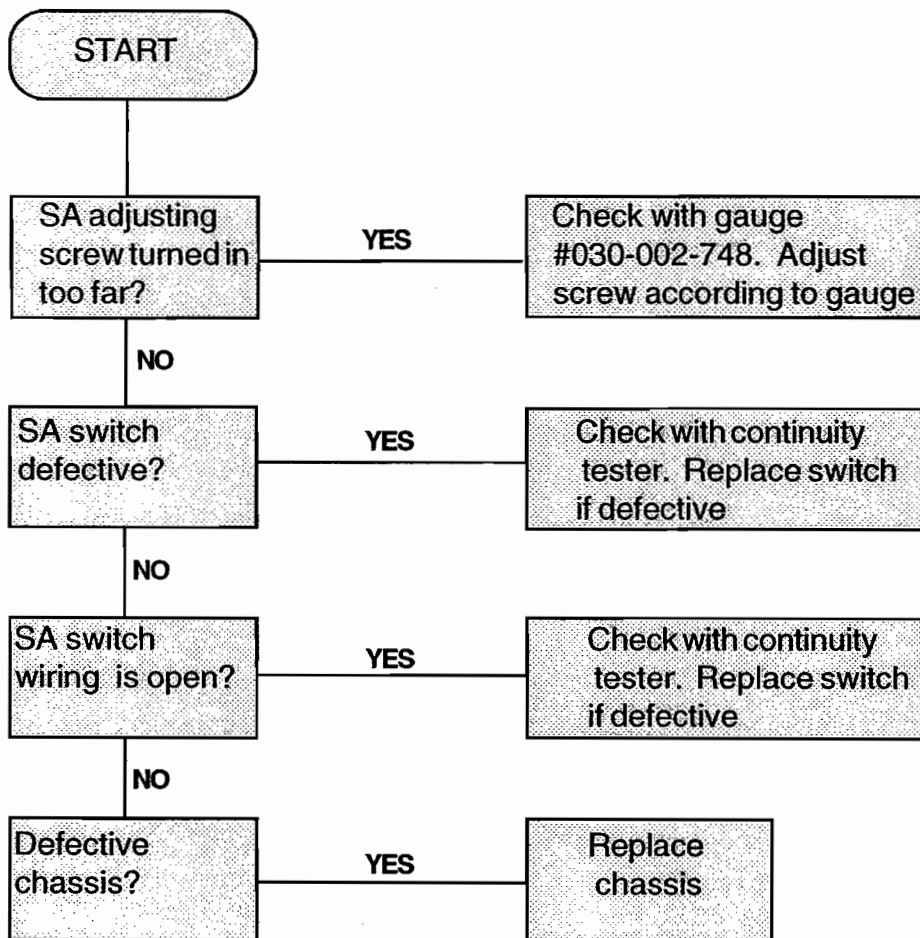


DRAWING #4.104



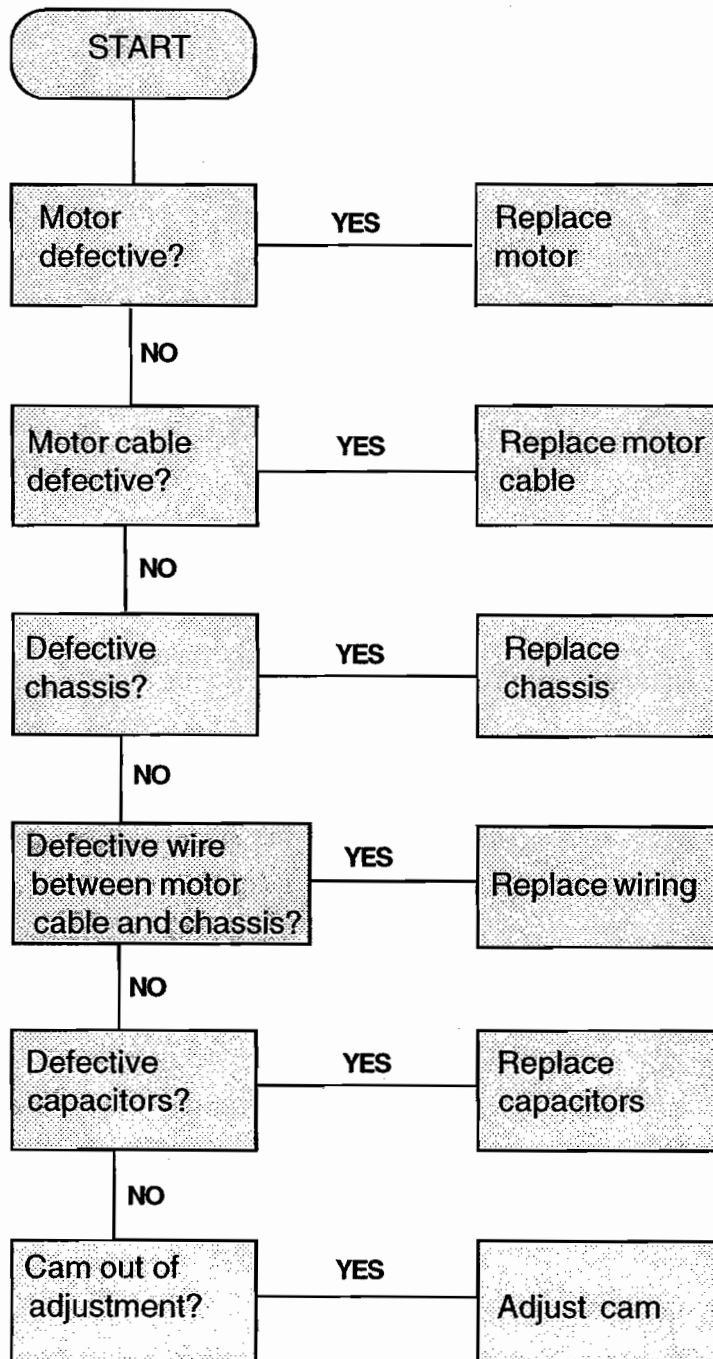
4.5.2 SWEEP TROUBLESHOOTING

4.5.2.1 **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.



DRAWING #4.105

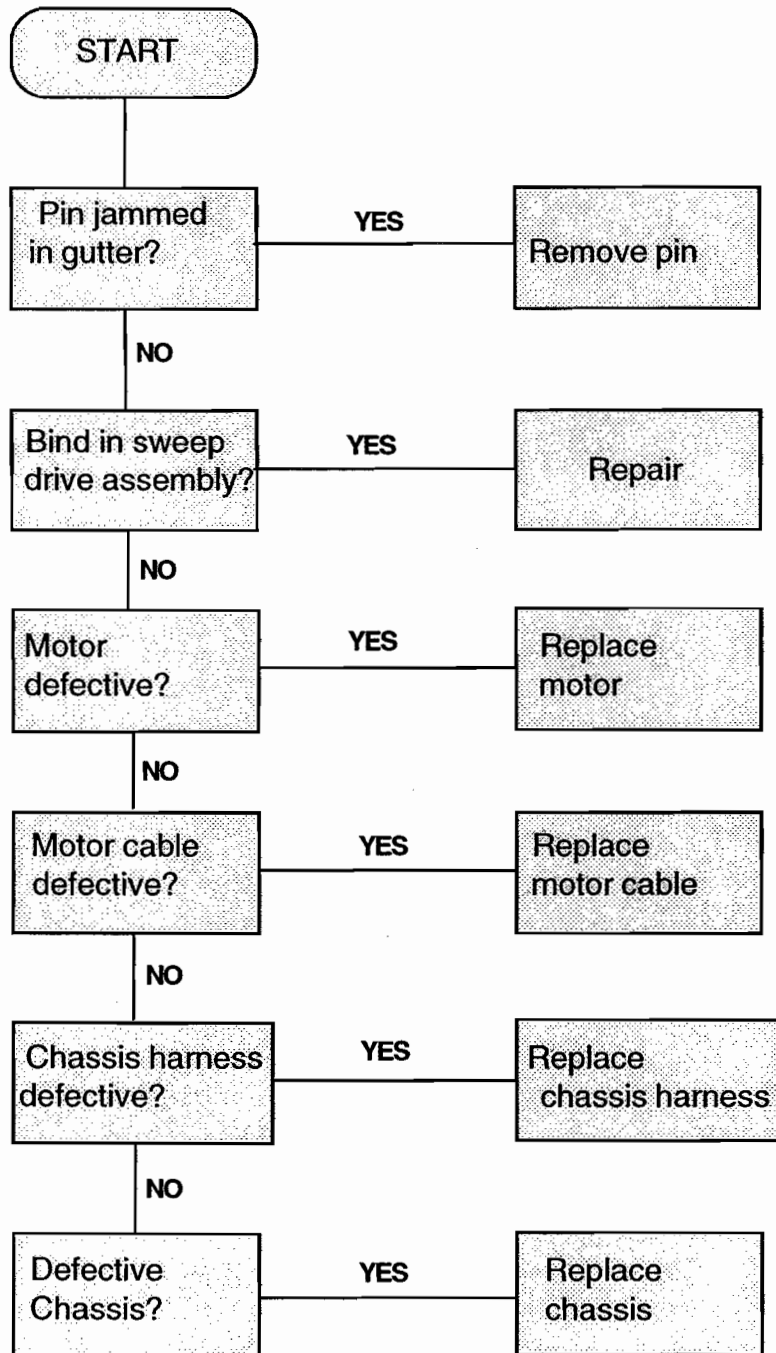
4.5.2.2 PROBLEM: Sweep overruns all stopping positions. Motor coasts.



DRAWING #4.106

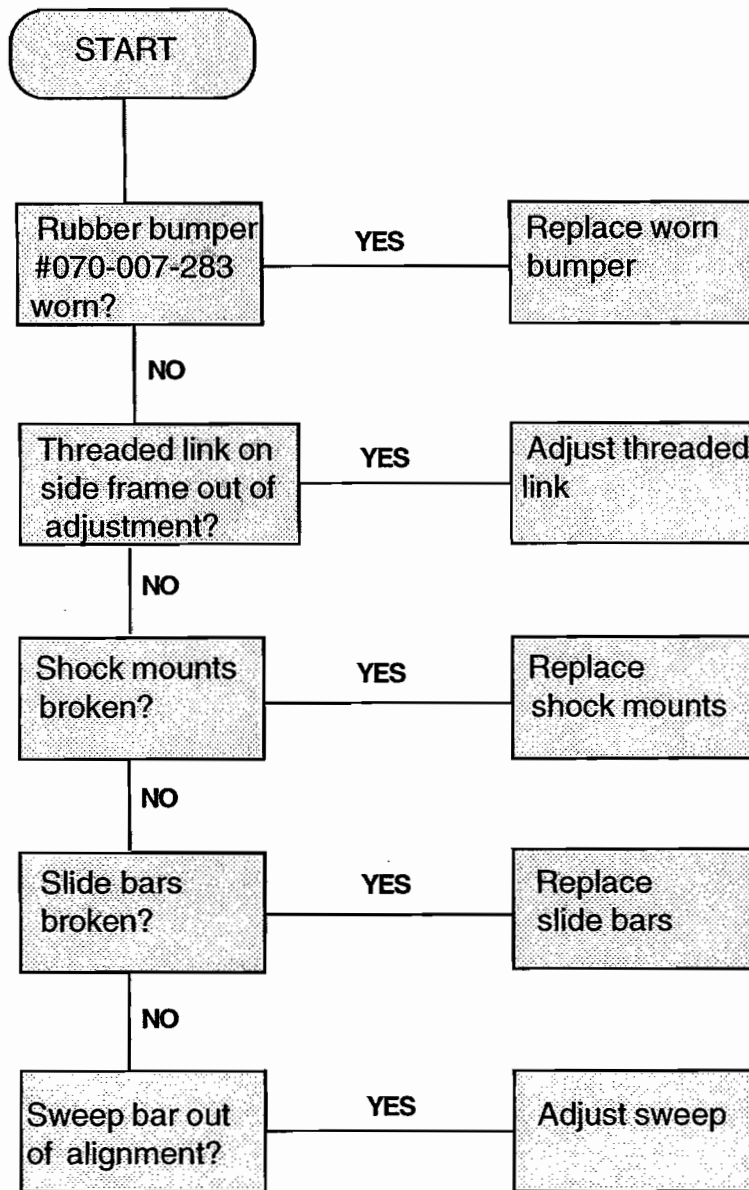


4.5.2.3 **PROBLEM: Sweep motor overloads trip to off position.**



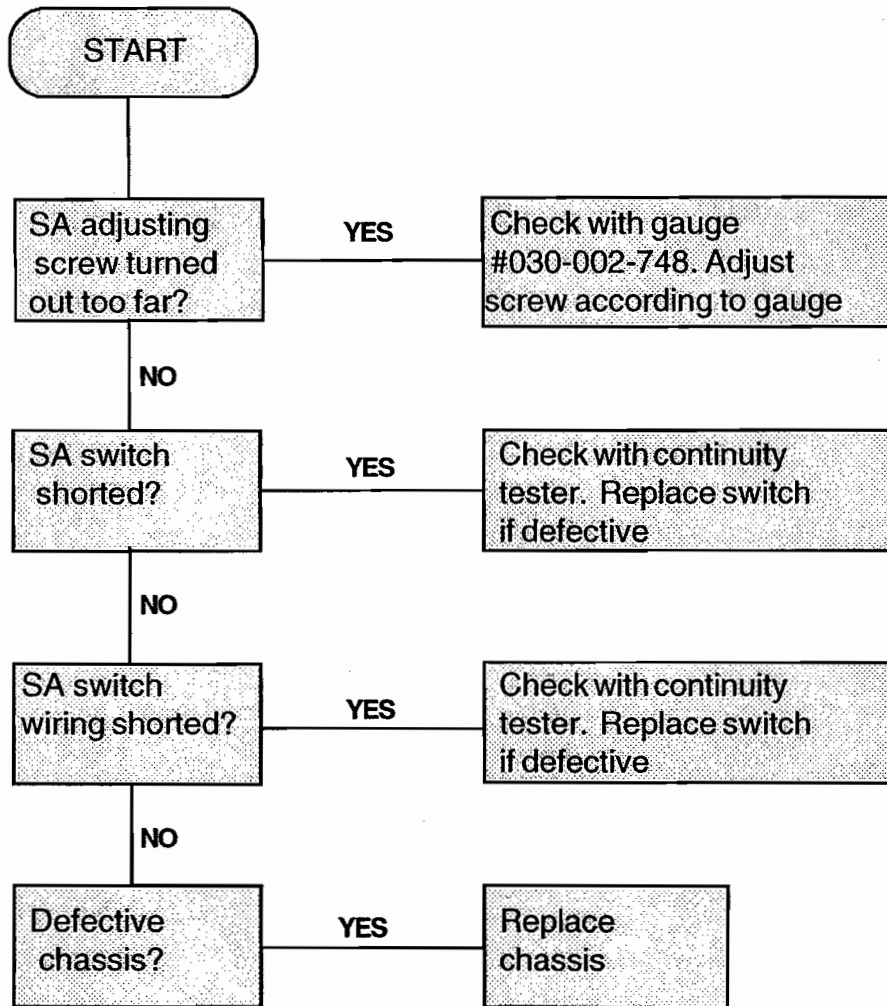
DRAWING #4.107

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



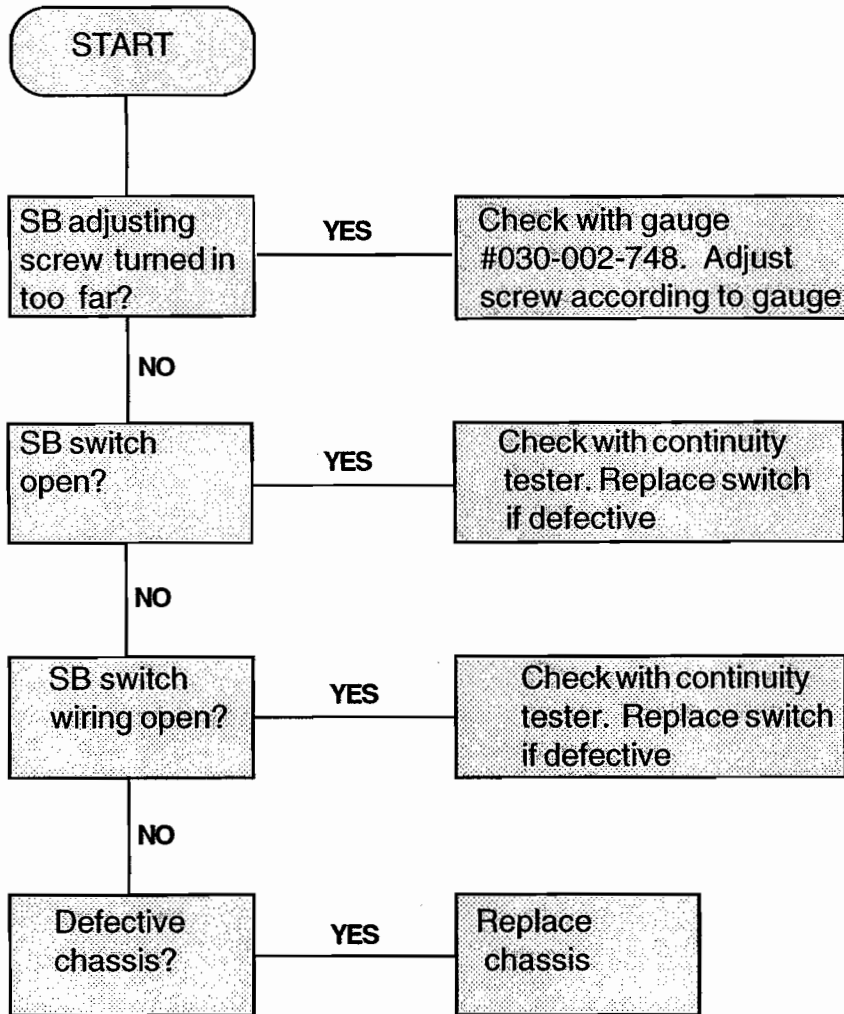
DRAWING #4.108

4.5.2.5 PROBLEM: Continuous sweep run.



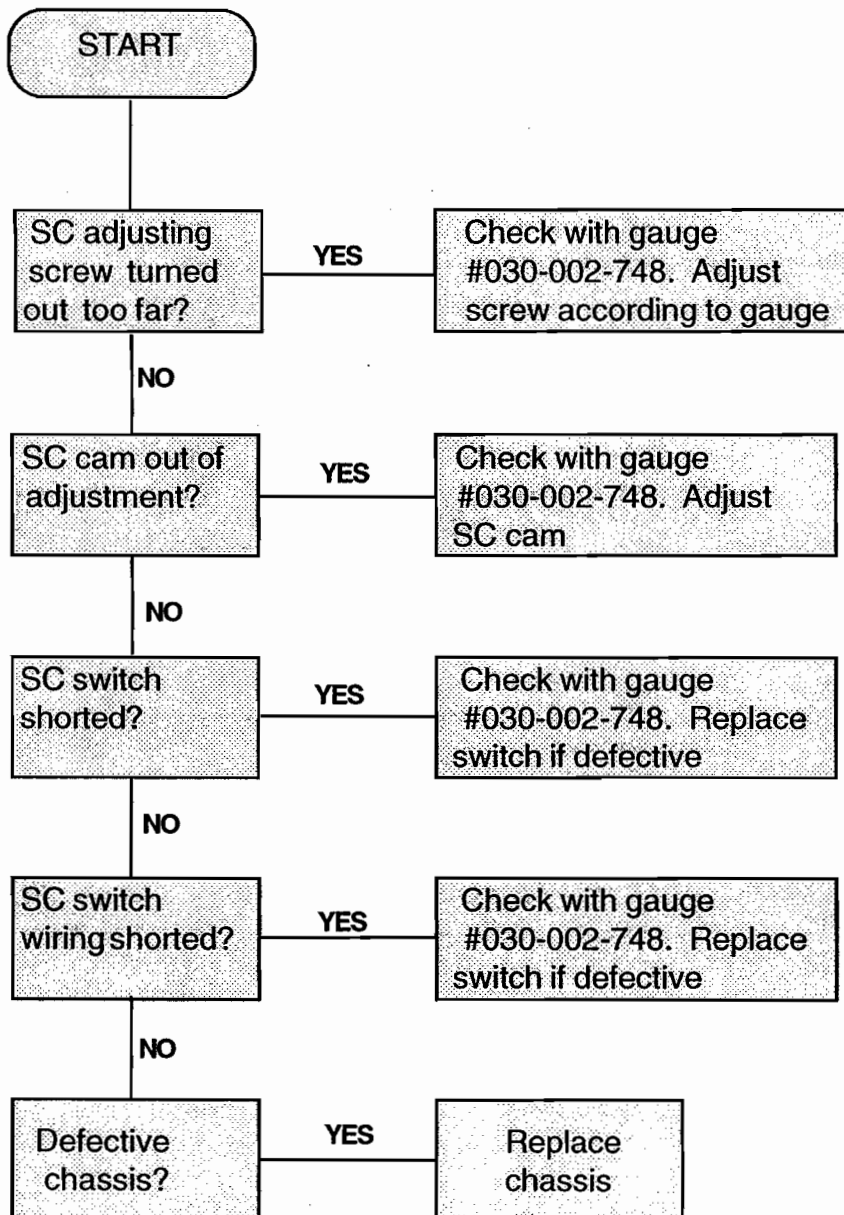
DRAWING #4.109

4.5.2.6 PROBLEM: After cycle starts, sweep runs continuously.



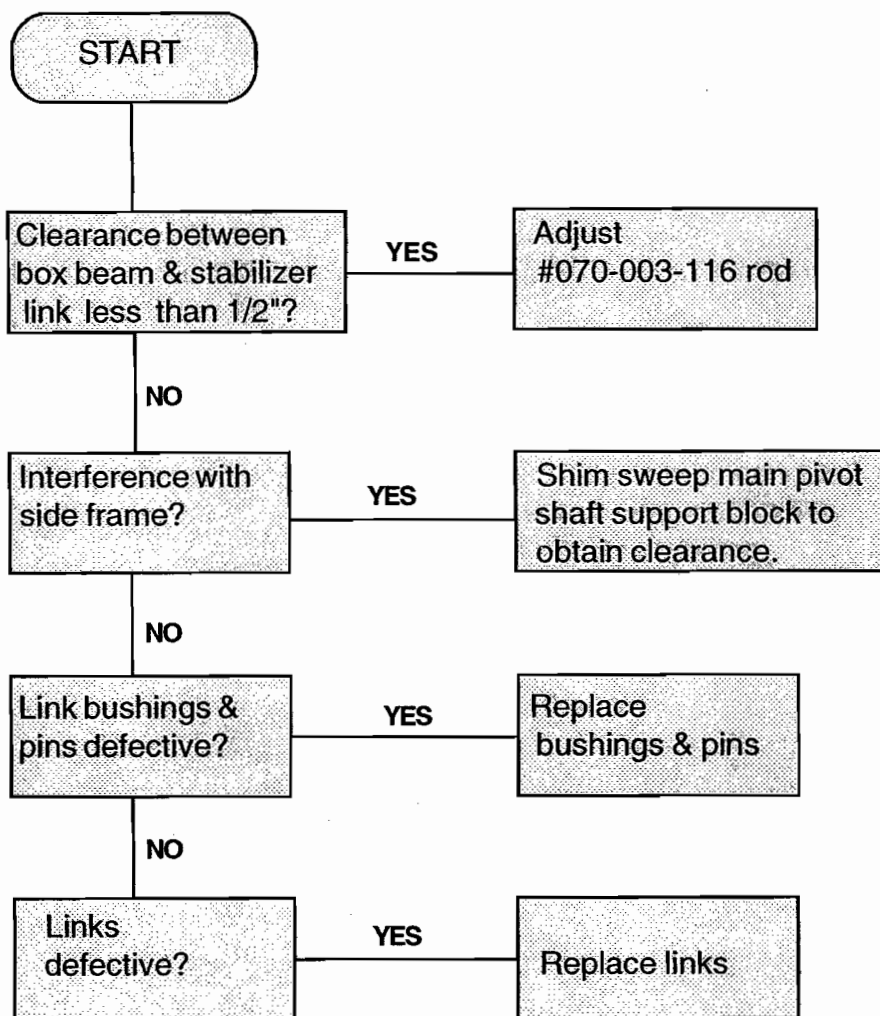
DRAWING #4.110

4.5.2.7 PROBLEM: 1st ball - sweep down, table down about halfway and stops. Table and sweep will not move by lifting TA or SA.



DRAWING #4.111

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

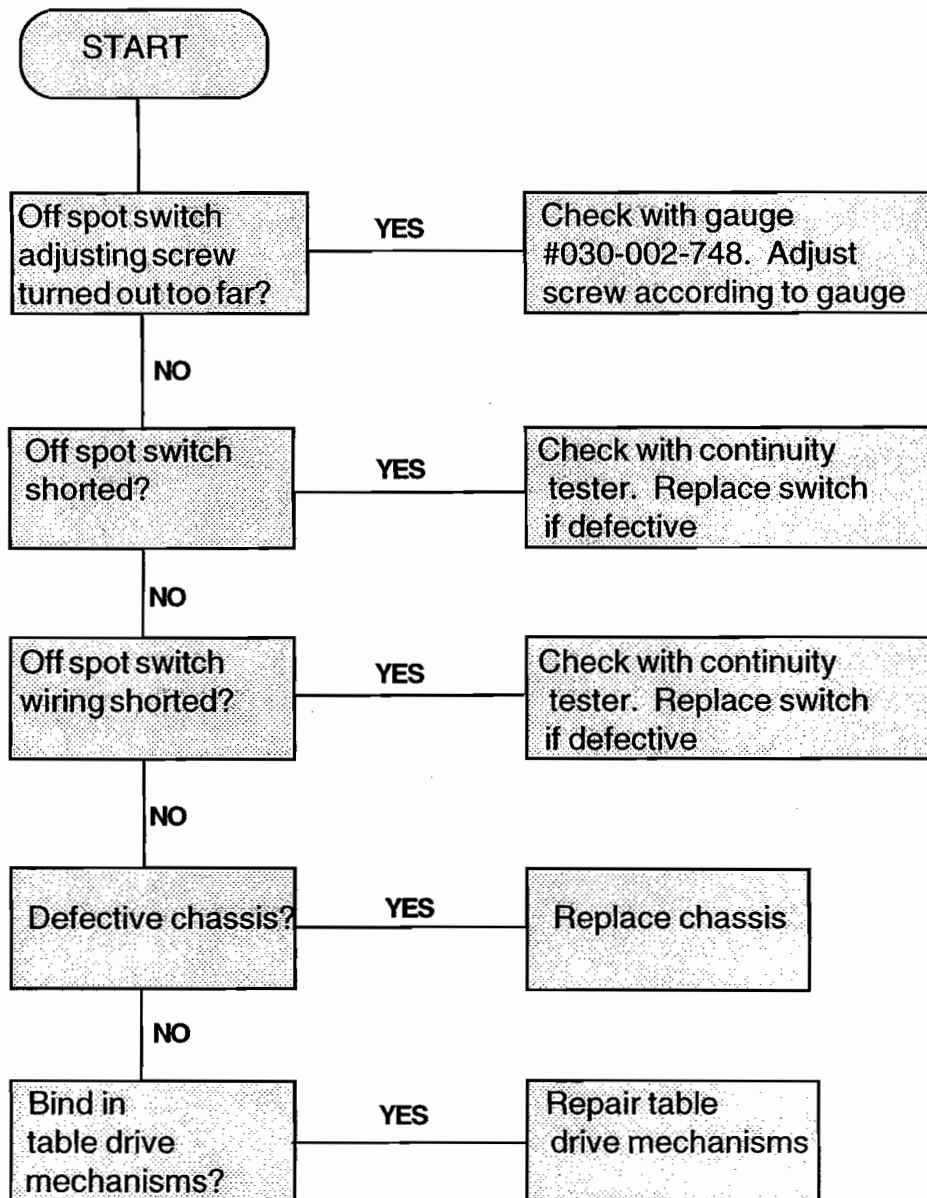


DRAWING #4.112



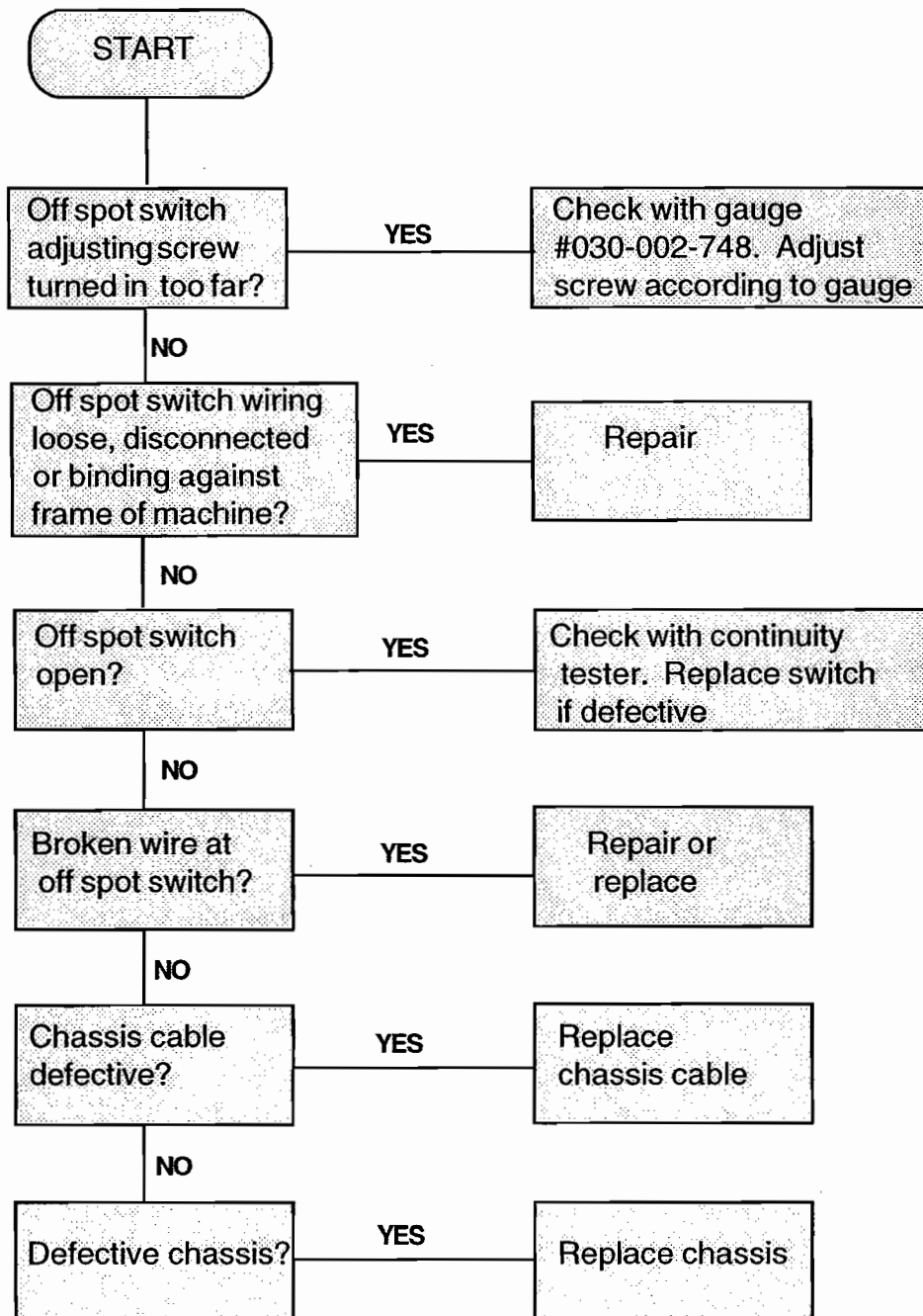
4.5.2.9

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



DRAWING #4.113

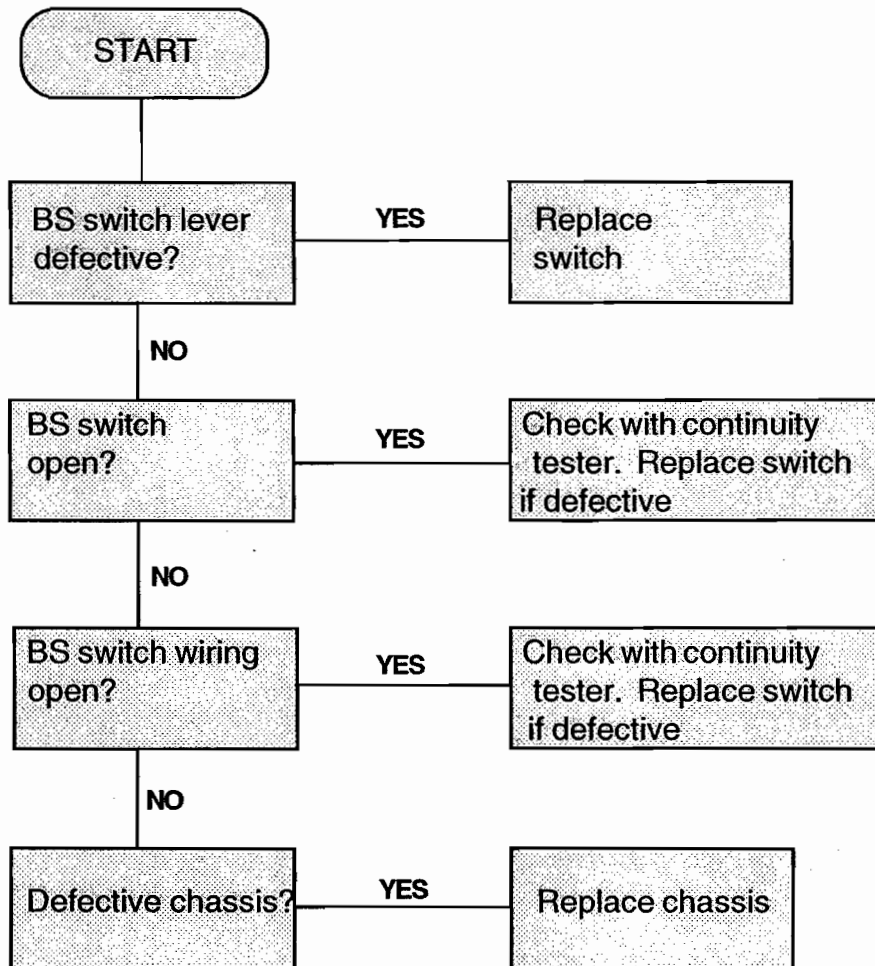
4.5.2.10 PROBLEM: 1st ball - table comes down on top of an off spot pin, thus not picking up the pins. Then the sweep cleans off all the pins both standing and down, table comes down, spots pins, table goes up, sweep up, and strike light on.



DRAWING #4.114

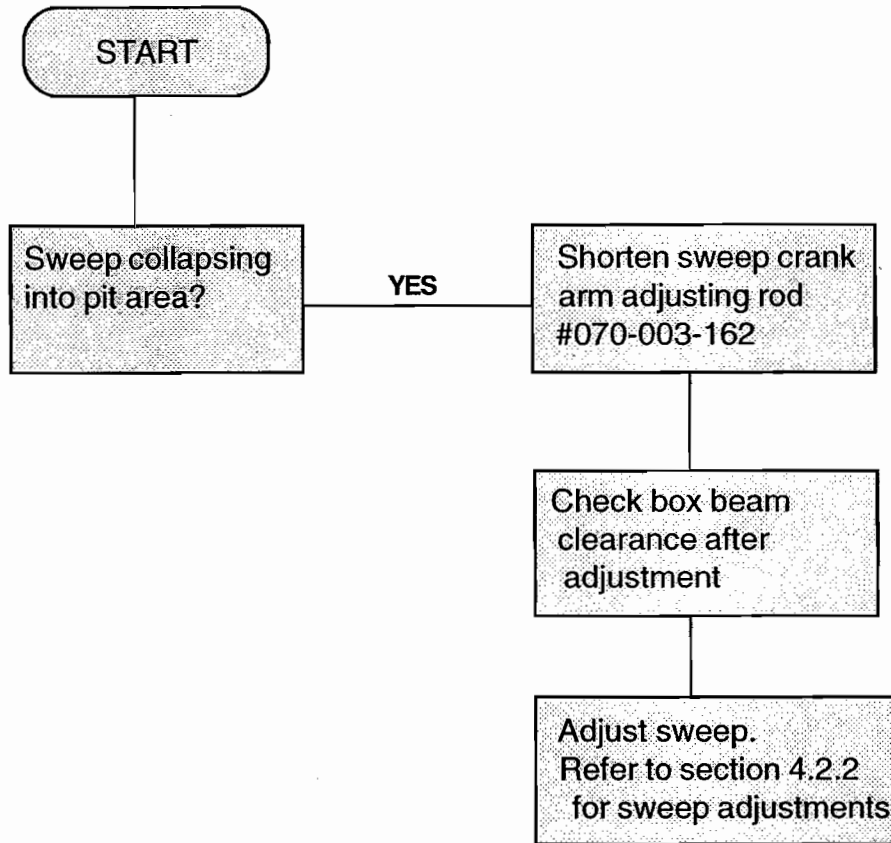


4.5.2.11 **PROBLEM:** 2nd ball or strike - table will not spot pins, bins loaded with pins but will not drop the pins into the spotting cups.



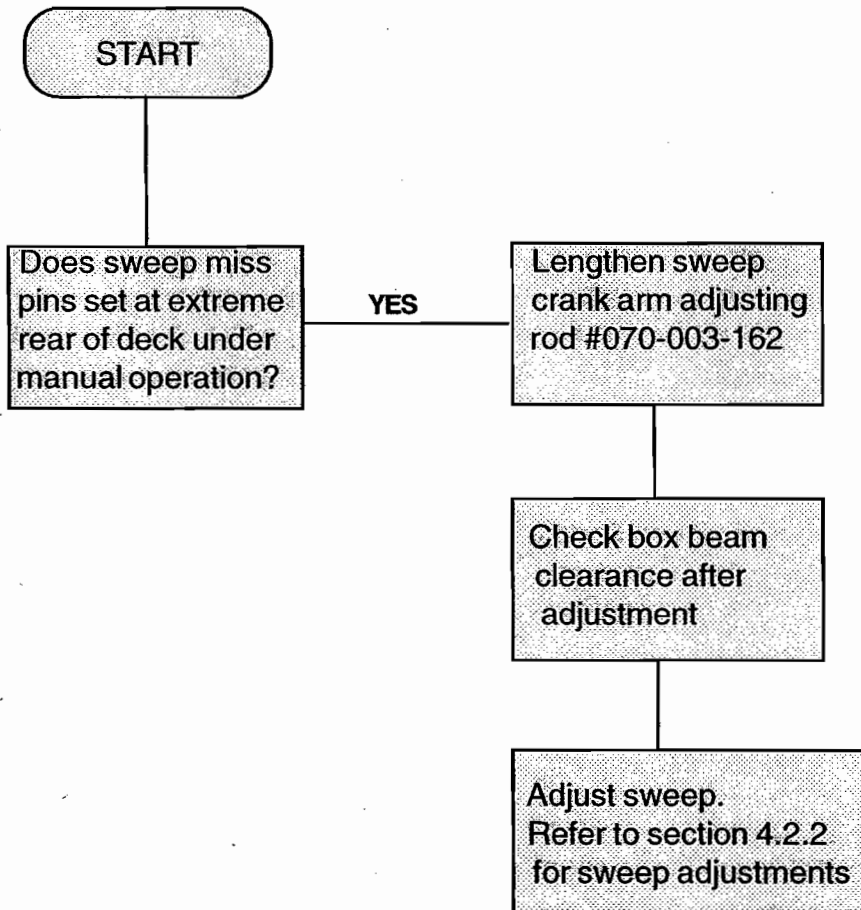
DRAWING #4.115

4.5.2.12 PROBLEM: Sweep runs too far into pit area.



DRAWING #4.116

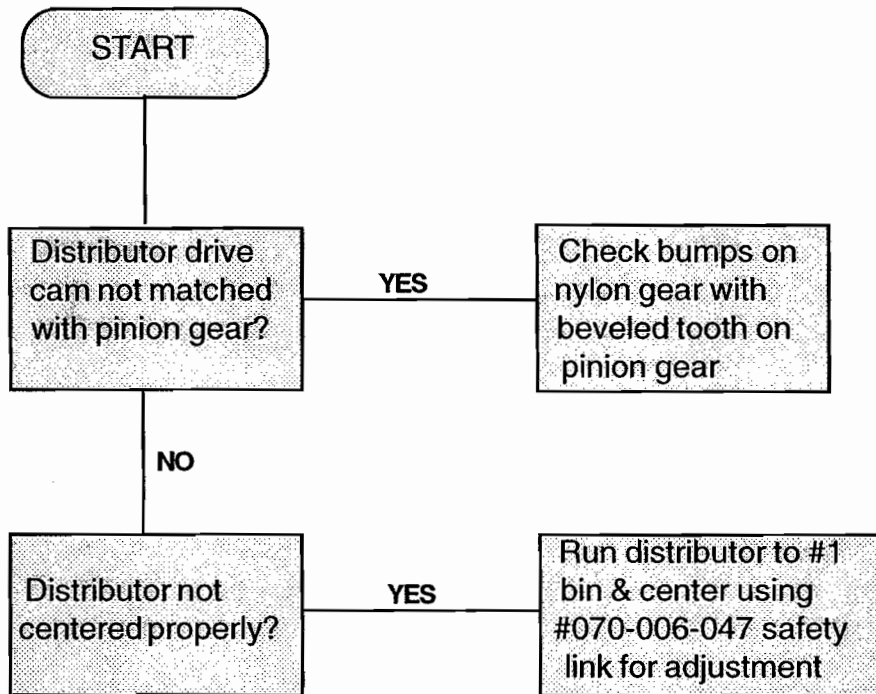
4.5.2.13 **PROBLEM: Sweep does not knock all pins into pit.**



DRAWING #4.117

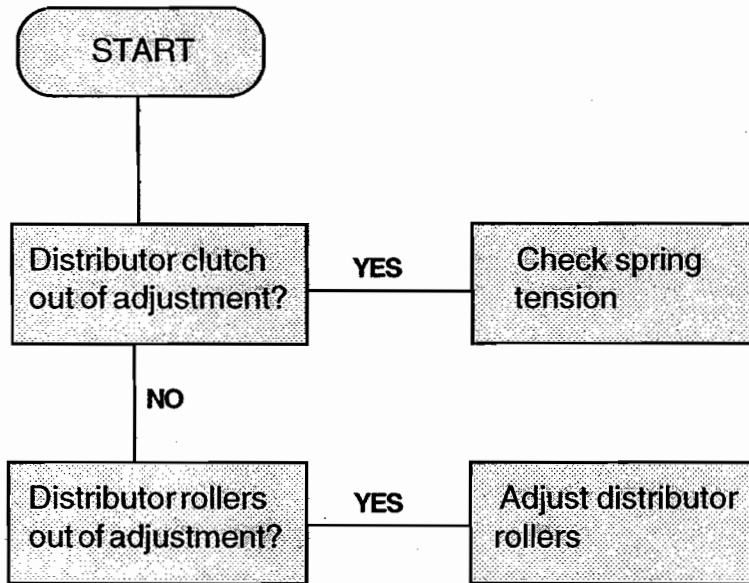
4.5.3 DISTRIBUTOR & BIN TROUBLESHOOTING

4.5.3.1 PROBLEM: Distributor will not feed pins at correct position.



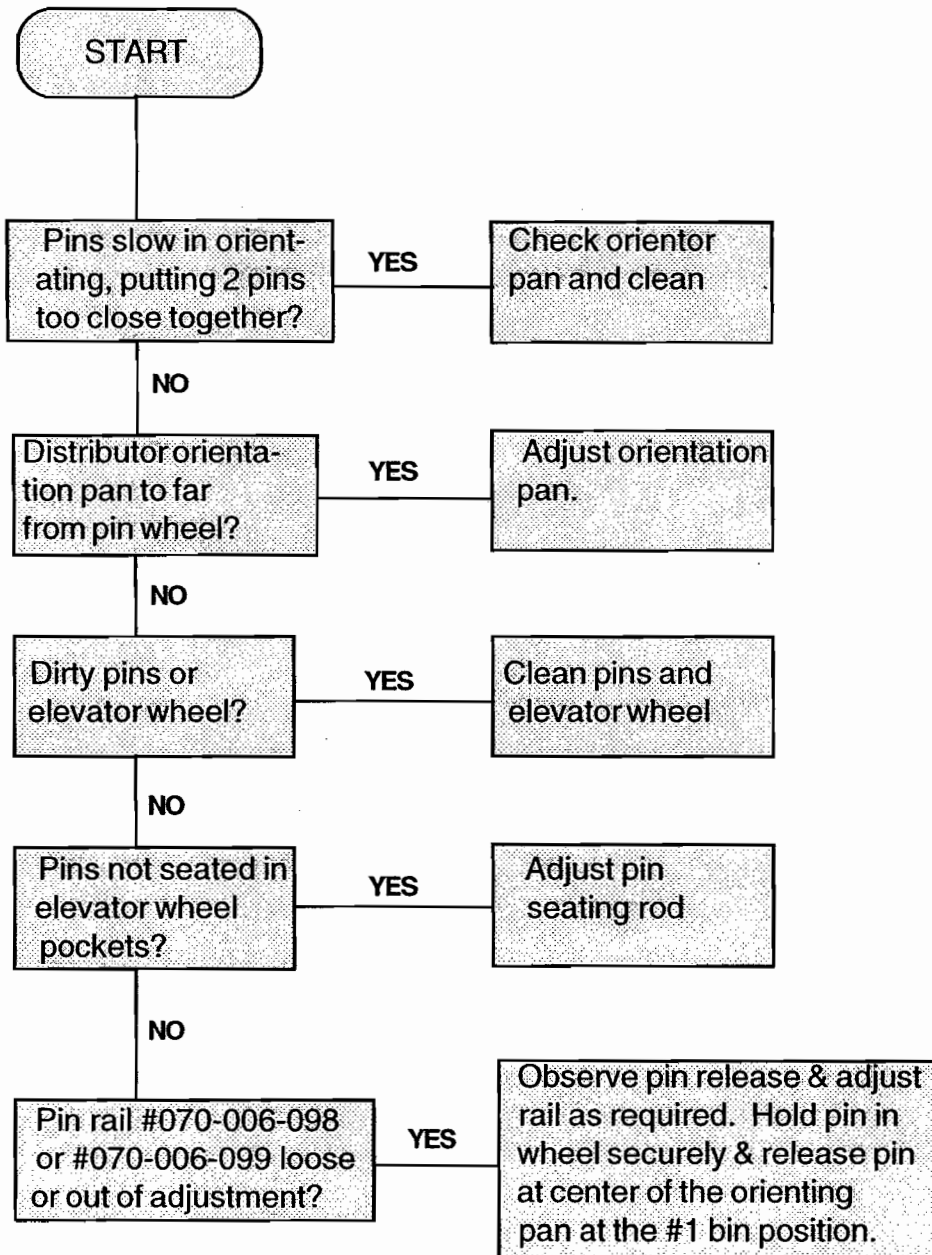
DRAWING #4.118

4.5.3.2 **PROBLEM: Pins feed continuously at one distributor location.**



DRAWING #4.119

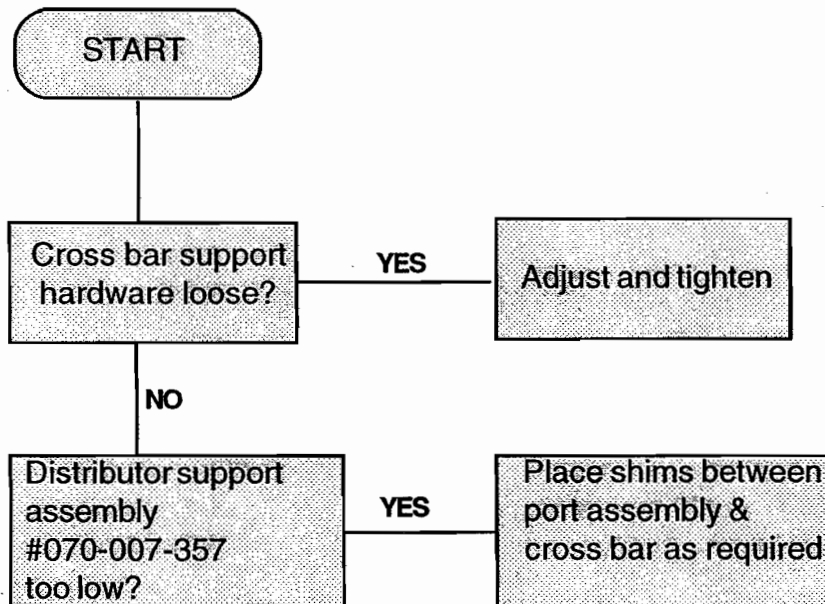
4.5.3.3 PROBLEM: Pin head first delivered to bin pockets.



DRAWING #4.120



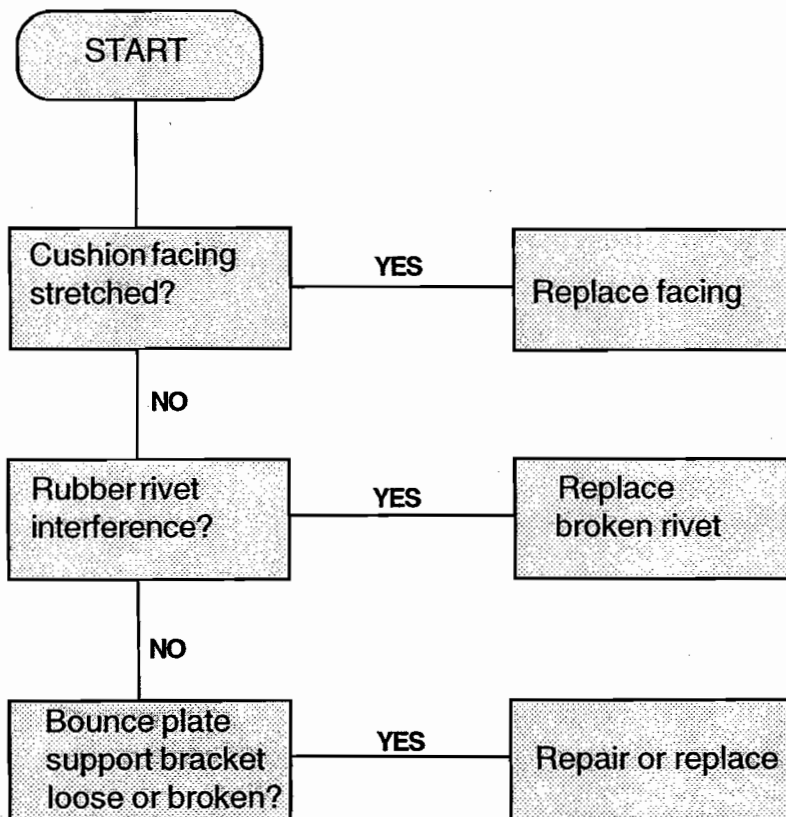
4.5.3.4 **PROBLEM: Distributor front-end hits bin during pin feed.**



DRAWING #4.121

4.5.4 CUSHION & PIT TROUBLESHOOTING

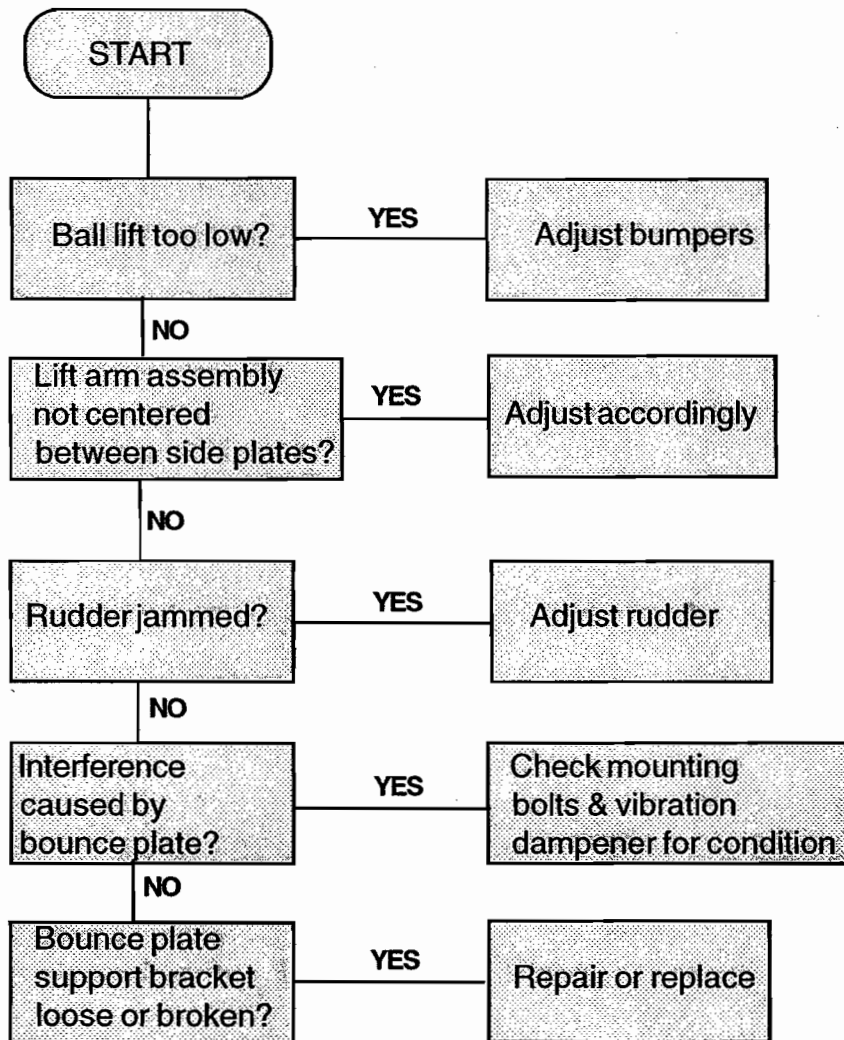
4.5.4.1 PROBLEM: Ball idles at cushion.



DRAWING #4.122

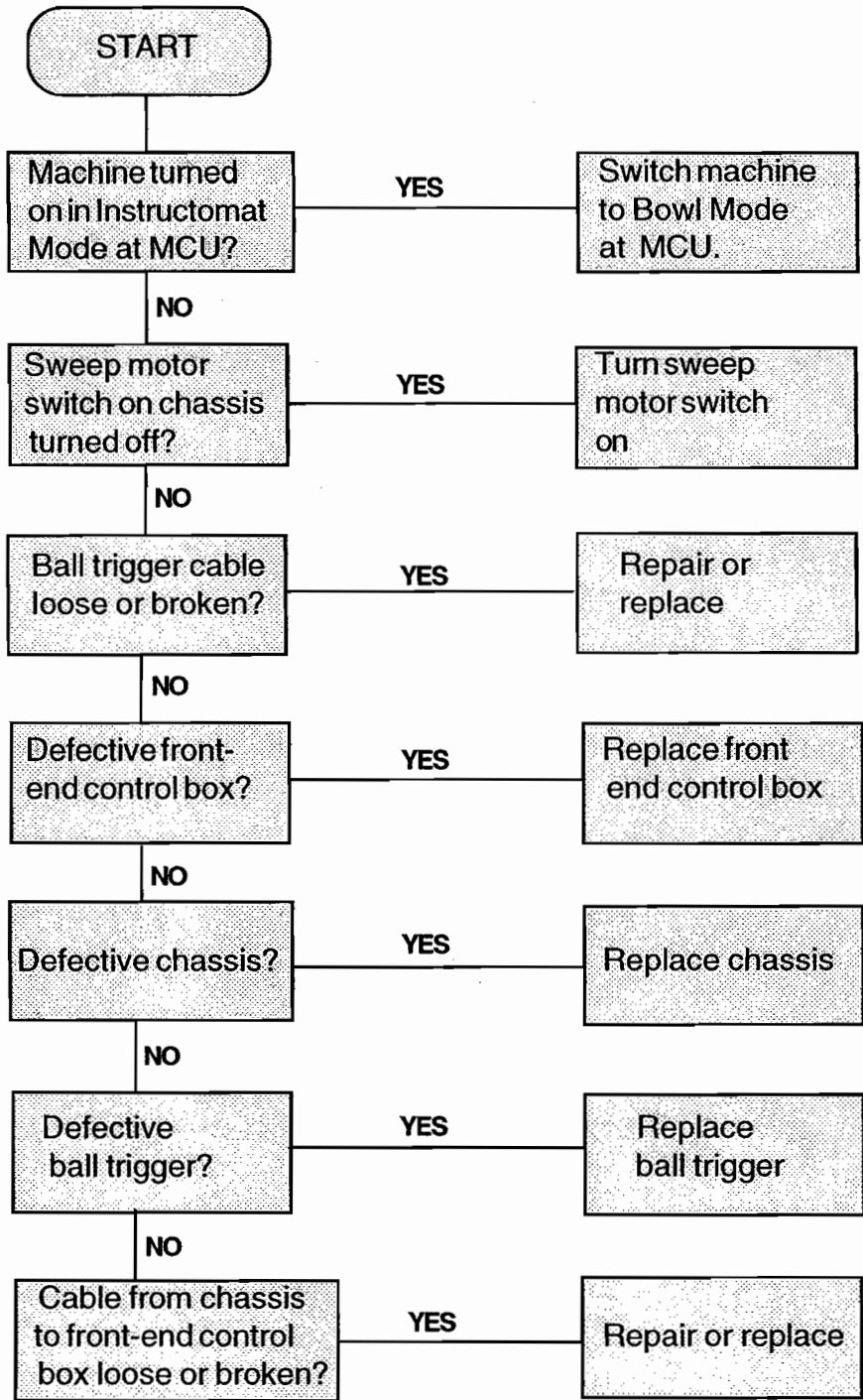


4.5.4.2 PROBLEM: Ball idles at exit - will not enter lift.



DRAWING #4.123

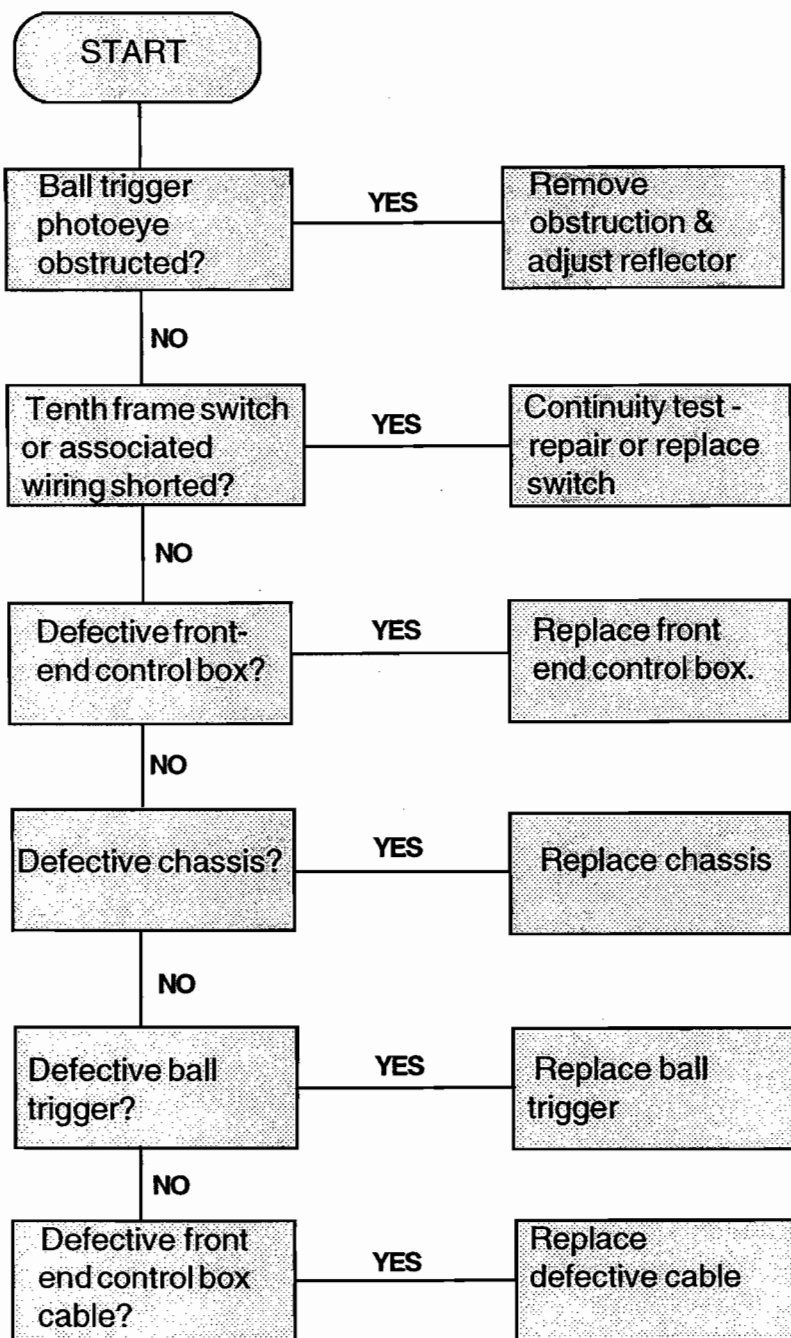
4.5.4.3 PROBLEM: Ball failed to start machine.



DRAWING #4.124

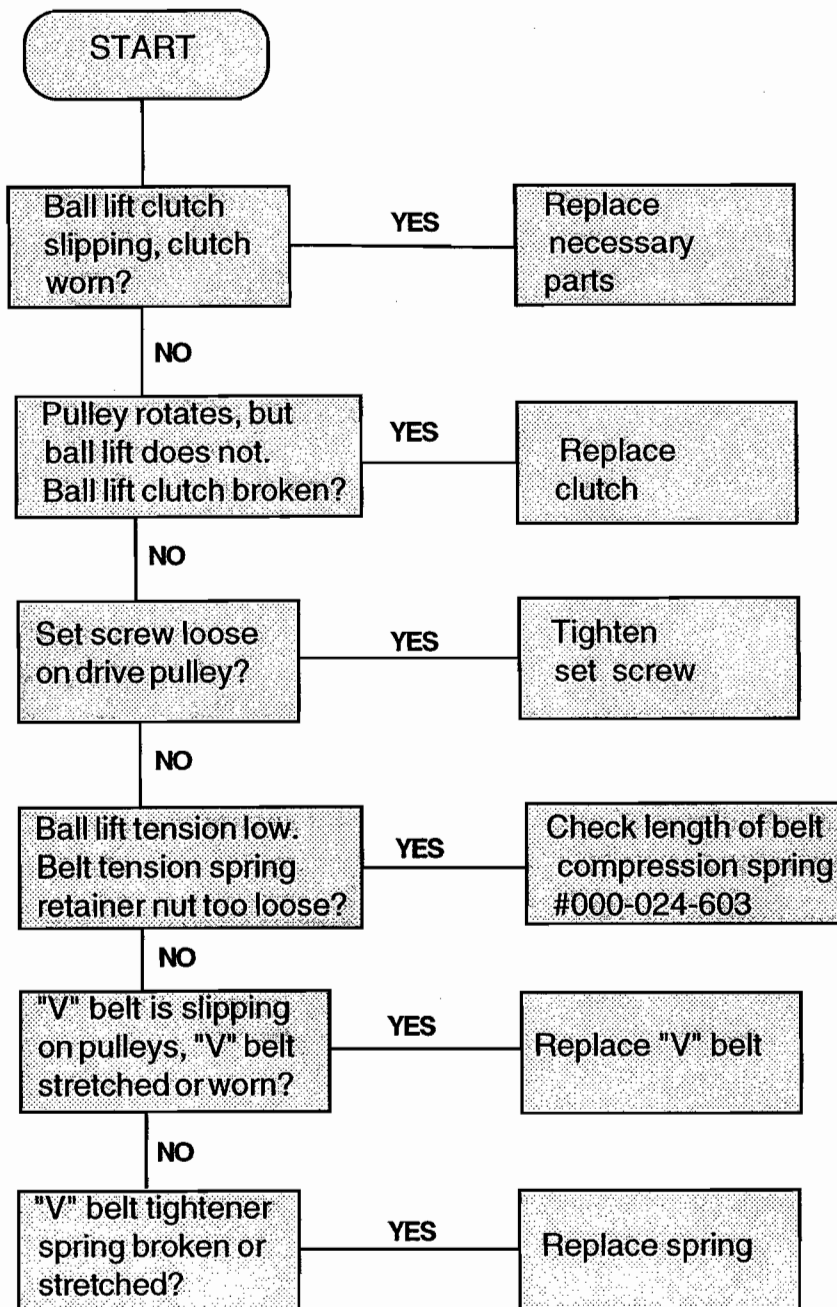


4.5.4.4 PROBLEM: Machine continues to cycle.



DRAWING #4.125

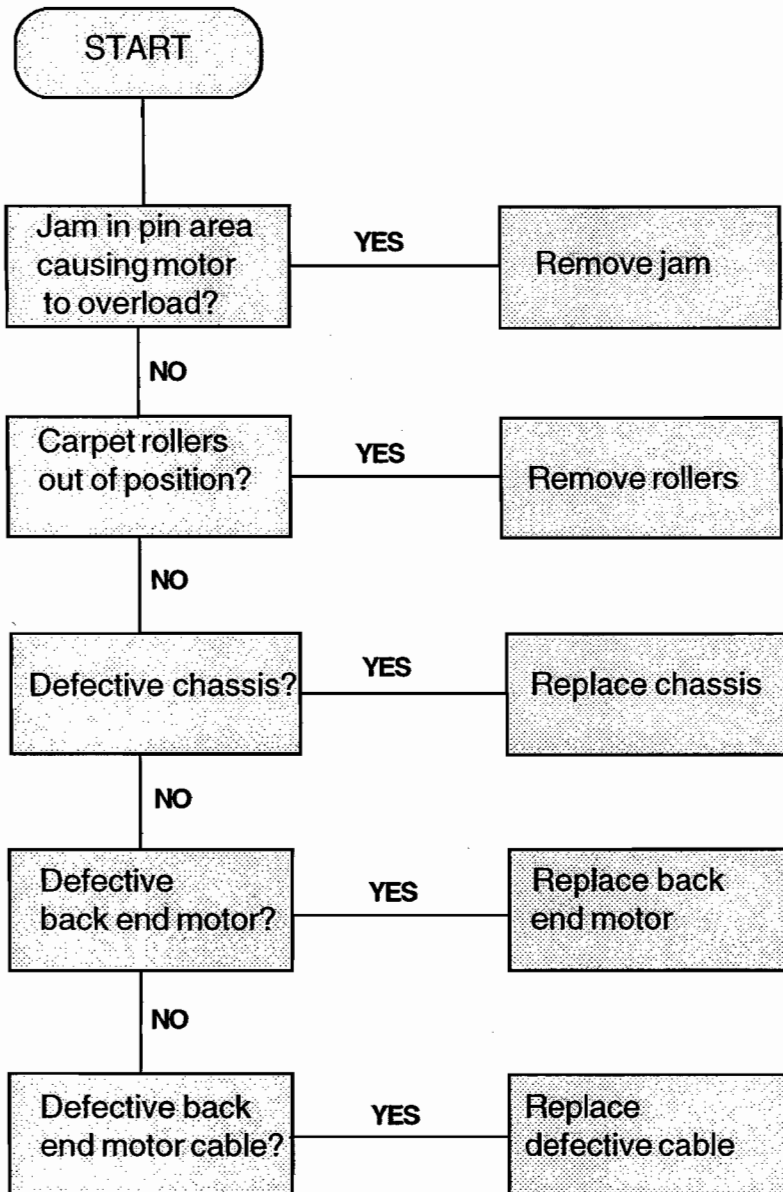
4.5.4.5 PROBLEM: Ball lift fails to elevate ball.



DRAWING #4.126



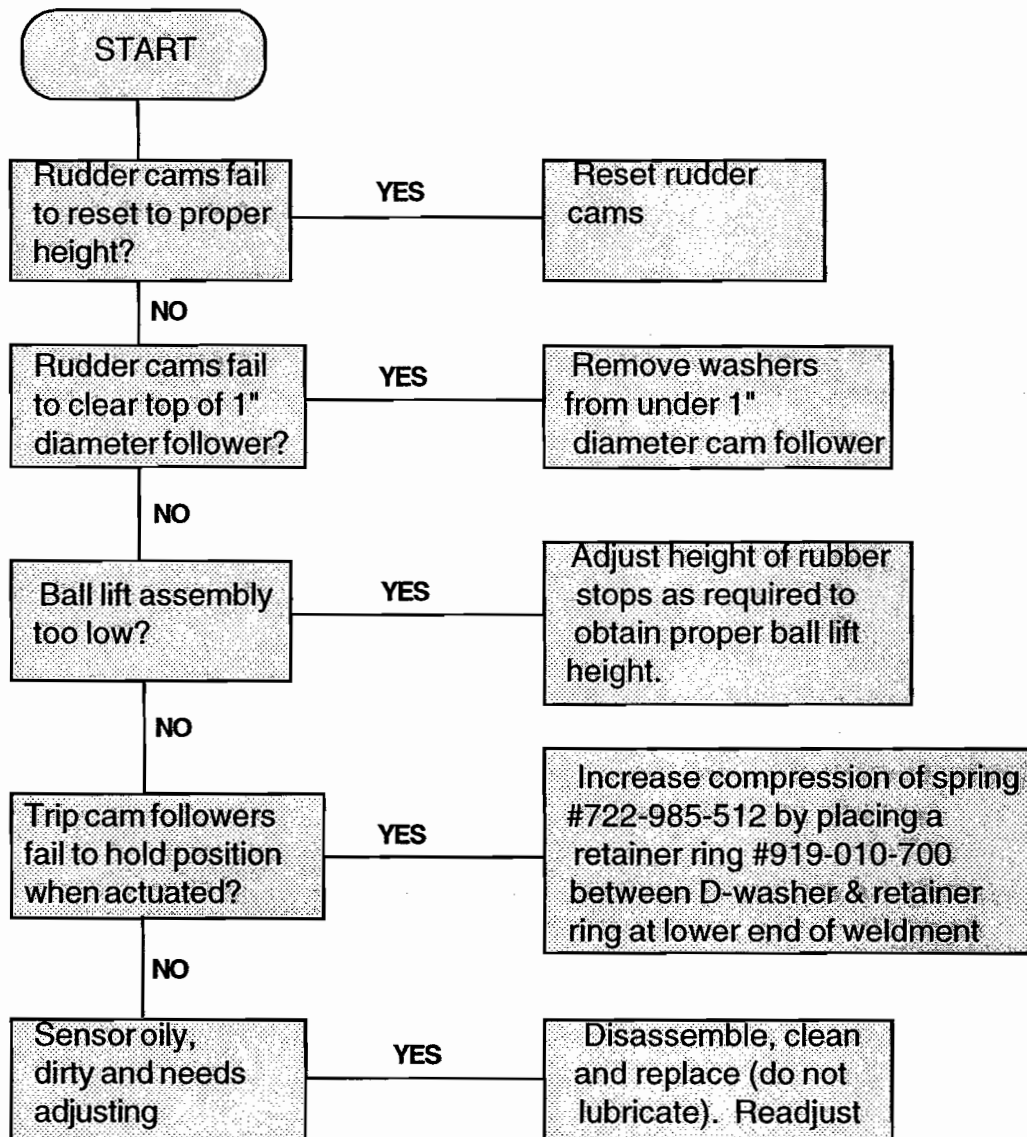
4.5.4.6 PROBLEM: Back-end motor overload, trips to off position.



DRAWING #4.127

4.5.5 POSITIVE BALL LIFT TROUBLESHOOTING

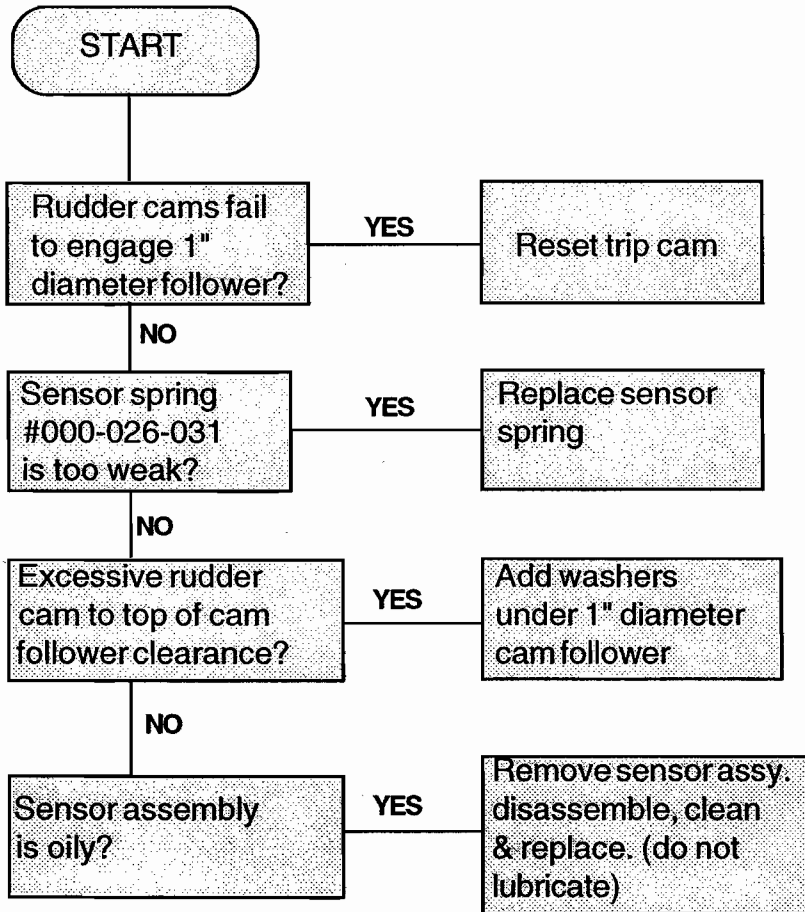
4.5.5.1 PROBLEM: Sensor slaps ball onto carpet.



DRAWING #4.128

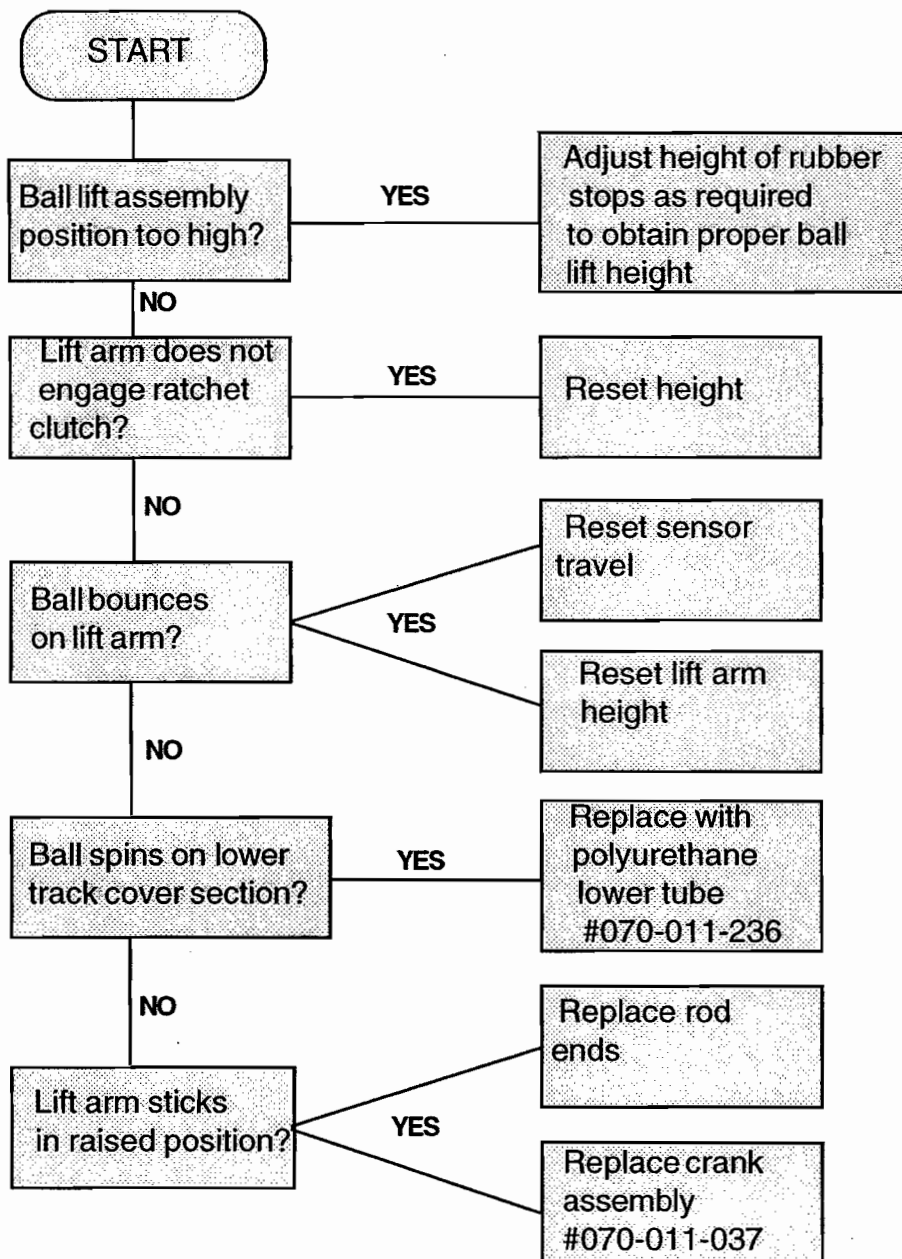


4.5.5.2 PROBLEM: Sensor fails to clear pin jams.



DRAWING #4.129

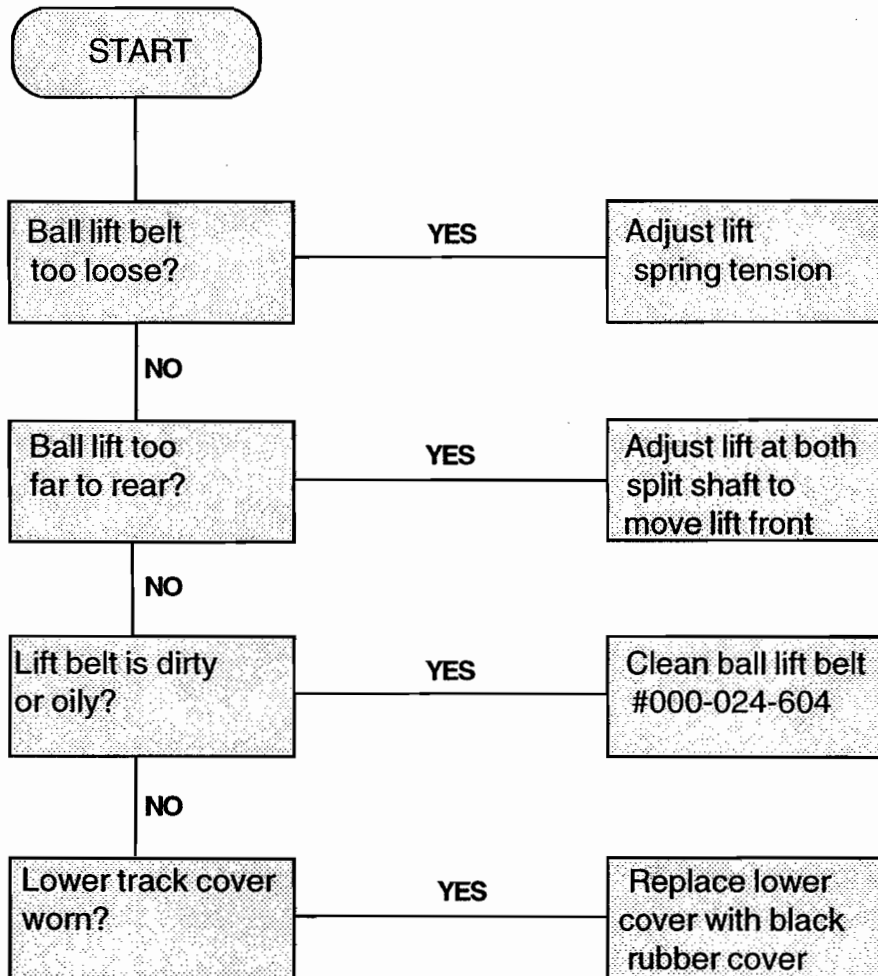
4.5.5.3 PROBLEM: Ball fails to roll up track rails.



DRAWING #4.130

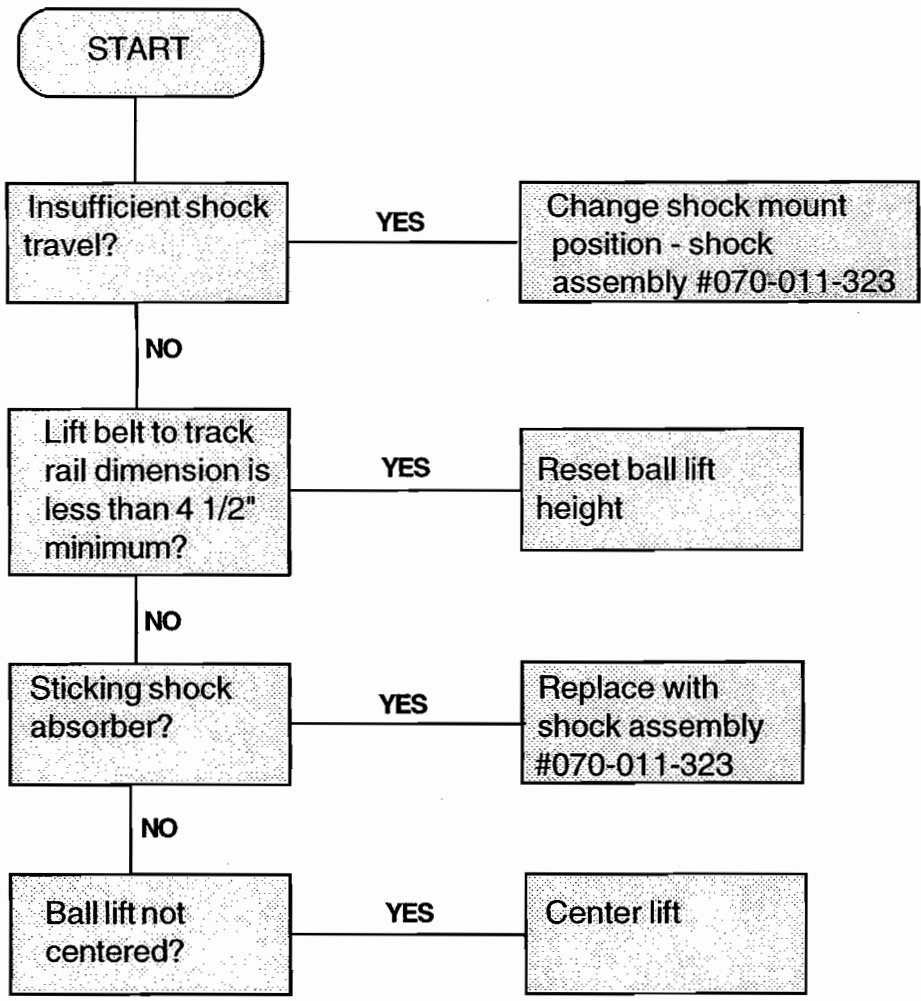


4.5.5.4 PROBLEM: Ball fails to continue to top of left assembly and stops or slides back to lift arm.



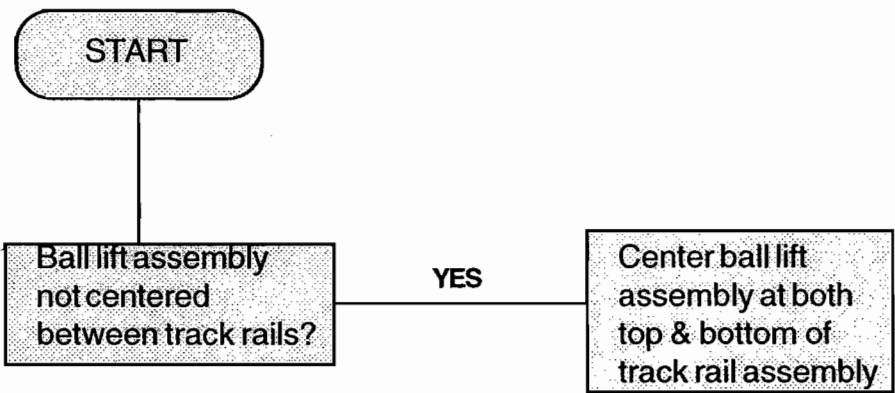
DRAWING #4.131

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



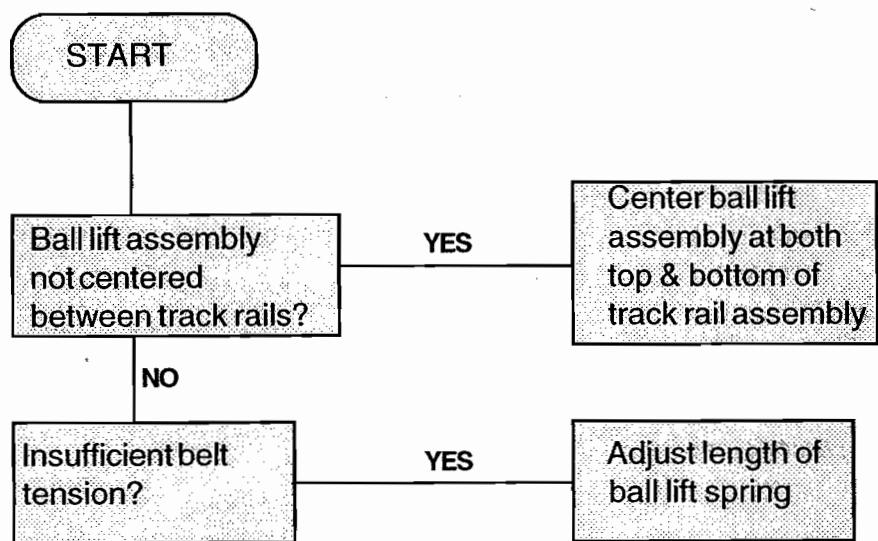
DRAWING #4.132

4.5.5.6 PROBLEM: Ball wobbles on track rail assembly.



DRAWING #4.133

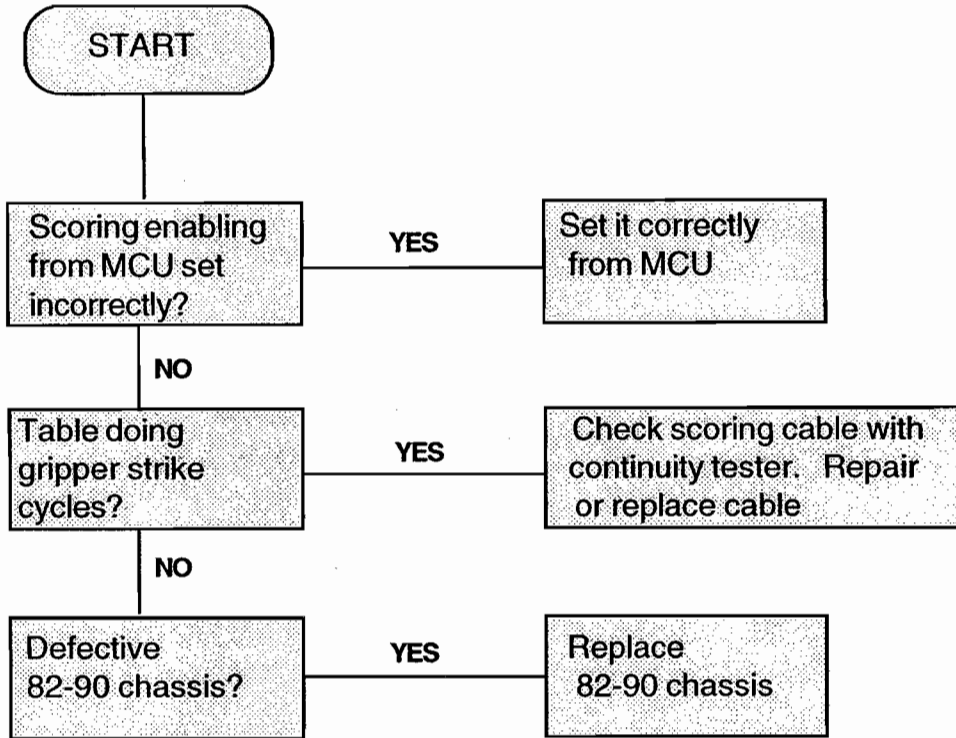
4.5.5.7 PROBLEM: Ball lift belt leaves V-groove of sheaves.



DRAWING #4.134

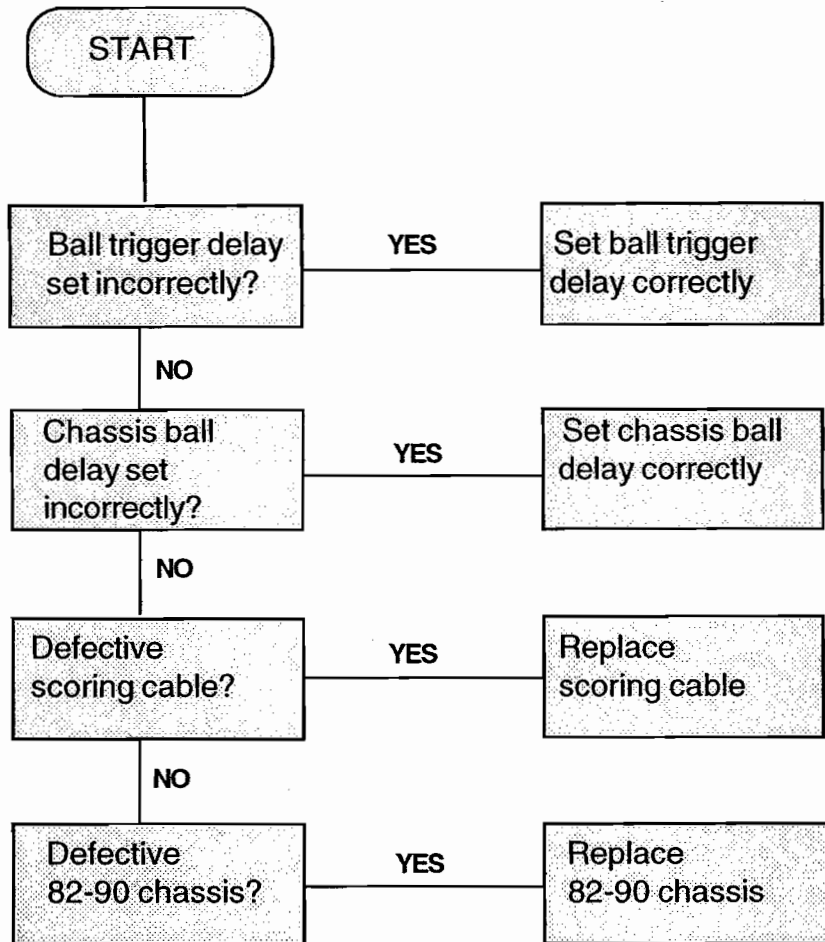
4.5.6 CHASSIS TROUBLESHOOTING

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



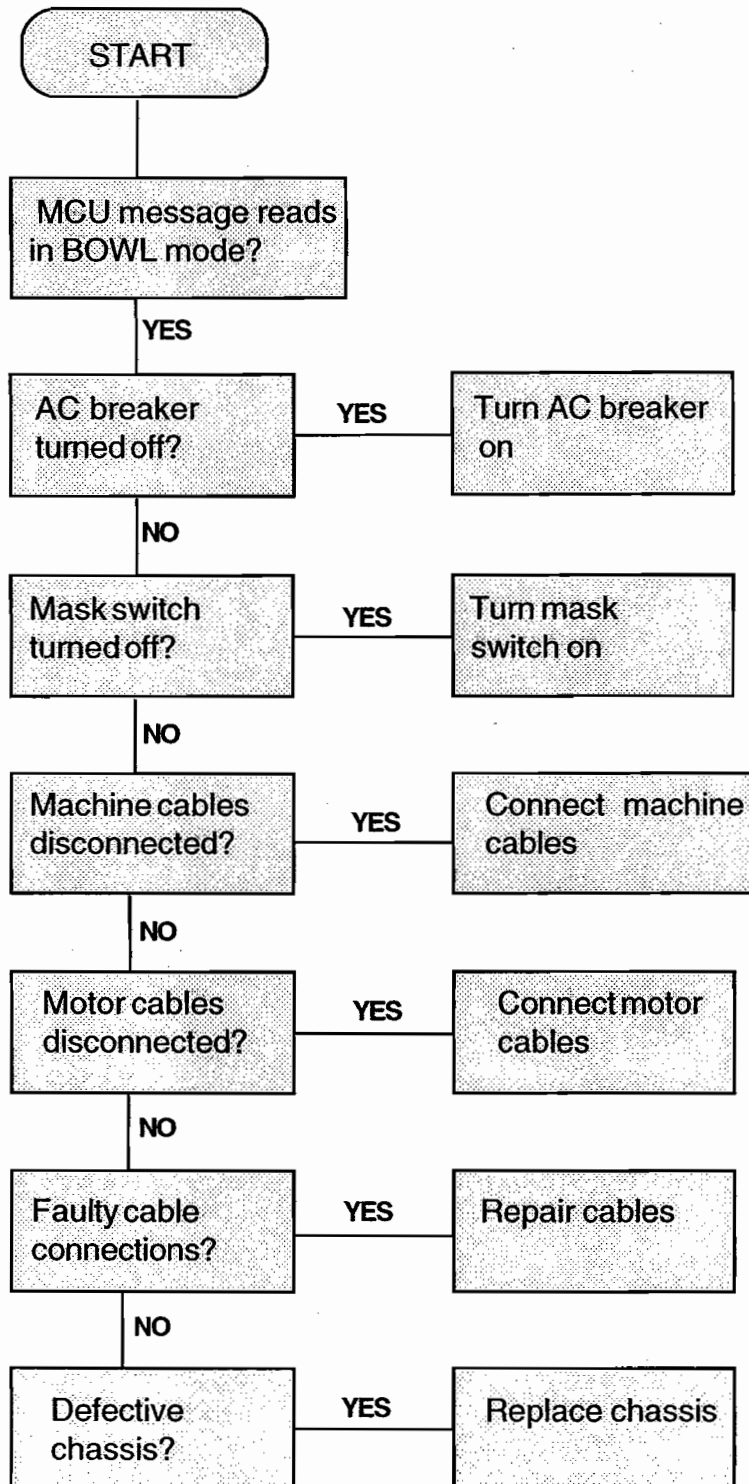
DRAWING #4.135

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

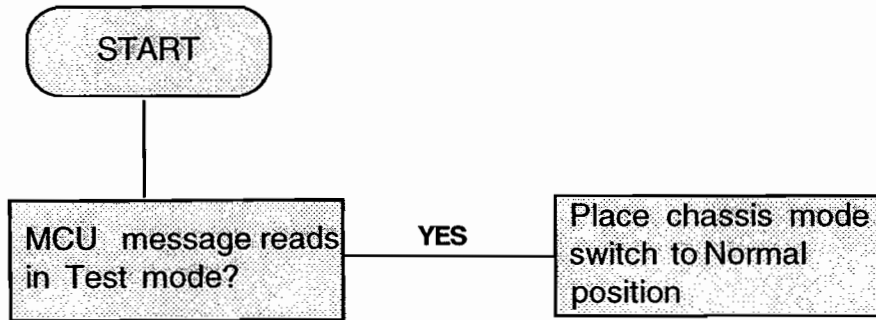


DRAWING #4.136

4.5.6.3 PROBLEM: Cannot turn machine on from the MCU. (Continued on next page)

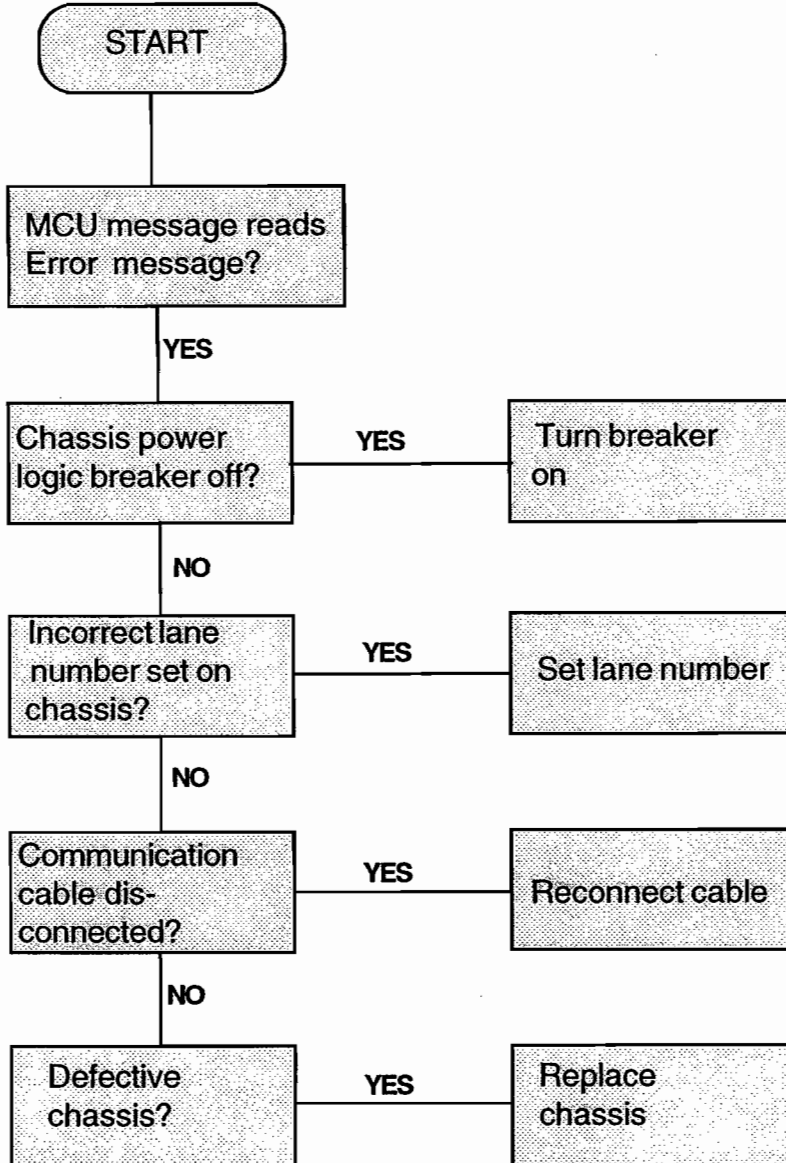


**PROBLEM: Cannot turn machine on from the MCU.
(Continued on next page)**



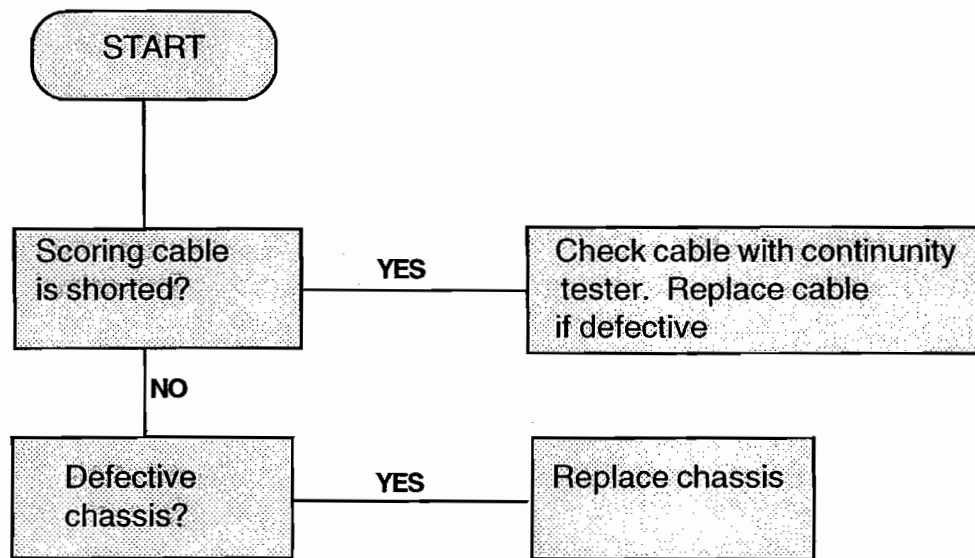
DRAWING #4.138

PROBLEM: Cannot turn machine on from the MCU.



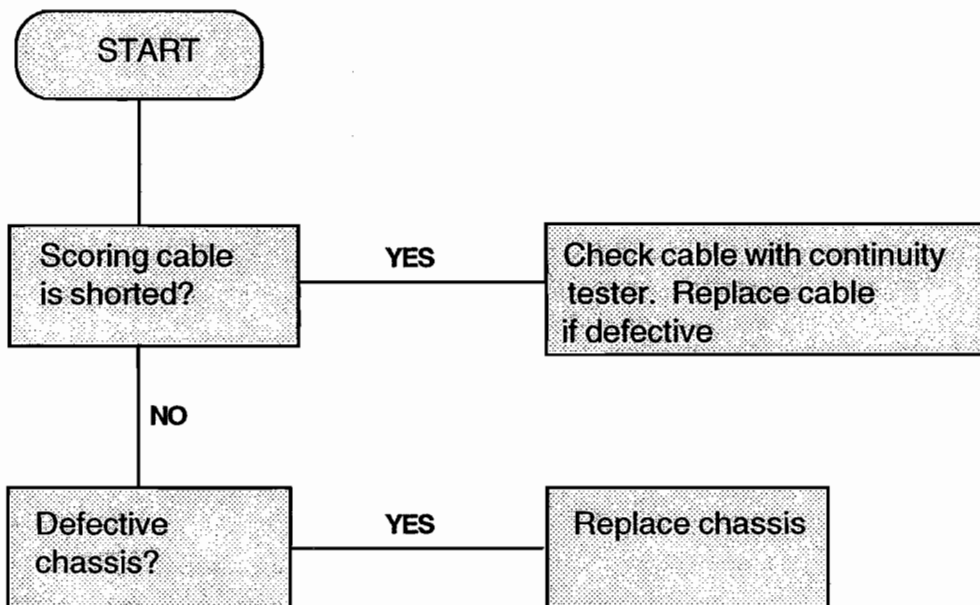
DRAWING #4.139

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



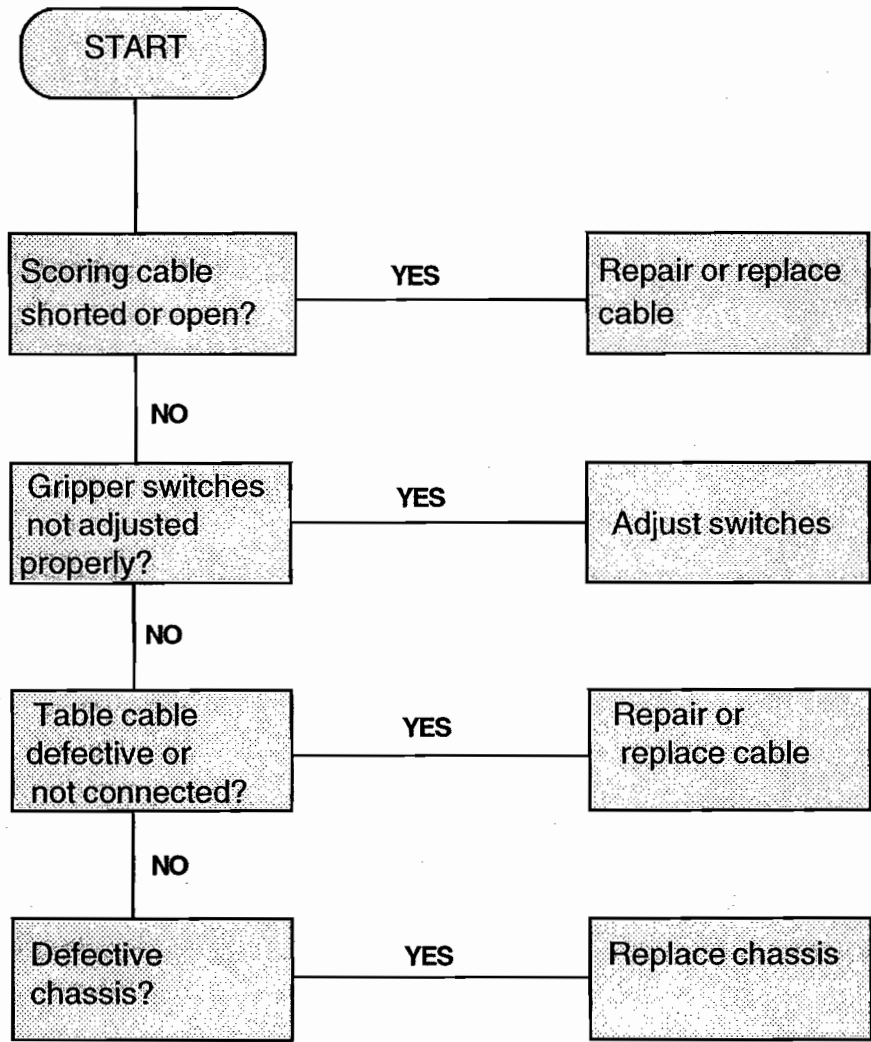
DRAWING #4.140

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



DRAWING #4.141

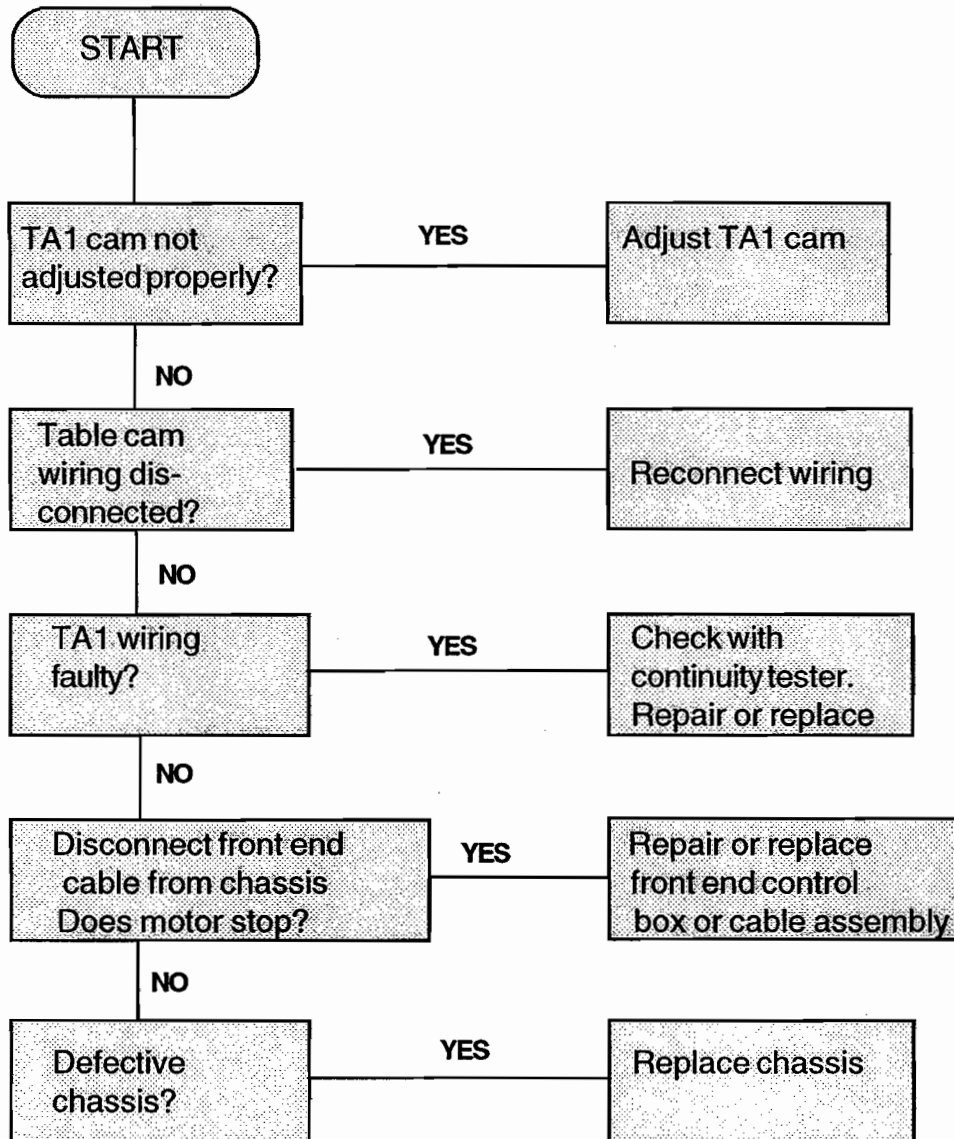
4.5.6.6 PROBLEM: Scoring chassis scores correctly, but mask shows pins incorrectly.



DRAWING #4.142

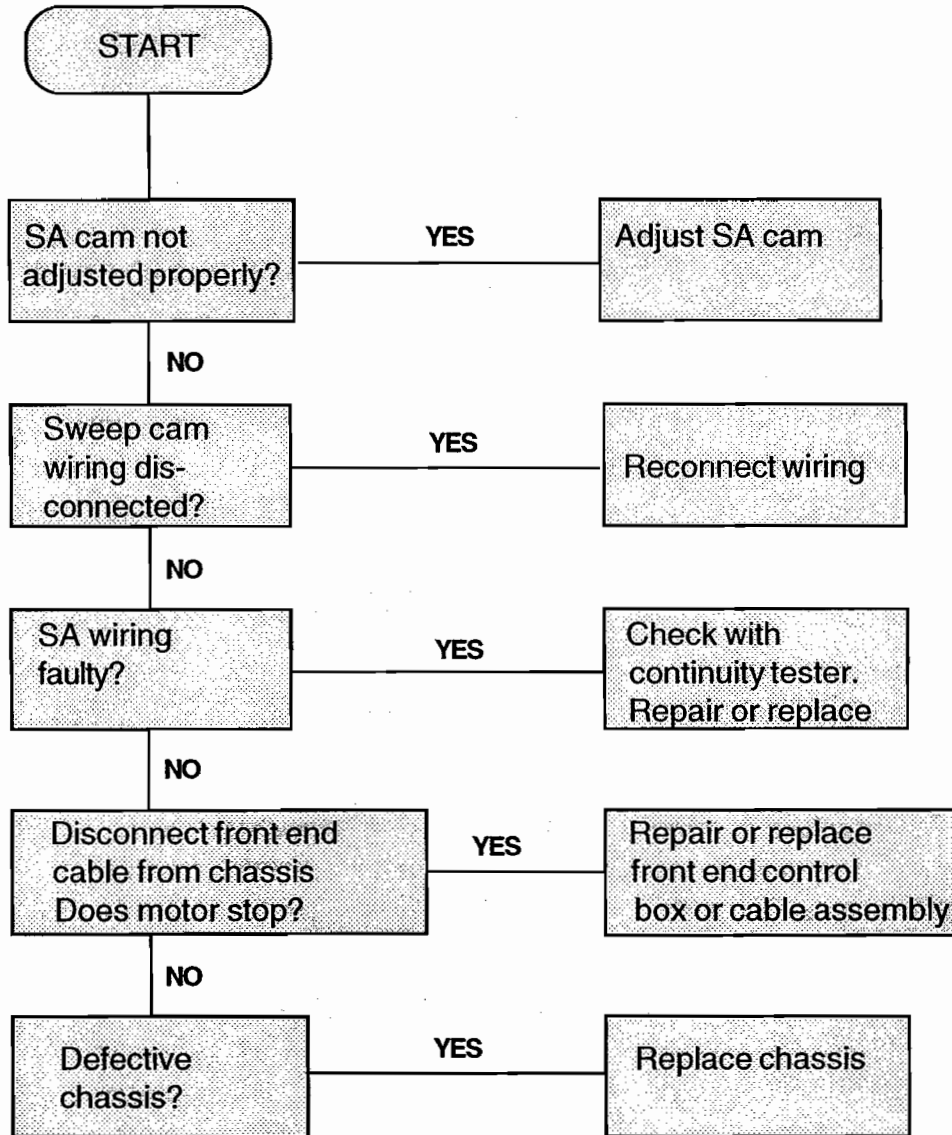
4.5.7 MOTOR TROUBLESHOOTING

4.5.7.1 PROBLEM: Table motor runs continuously.



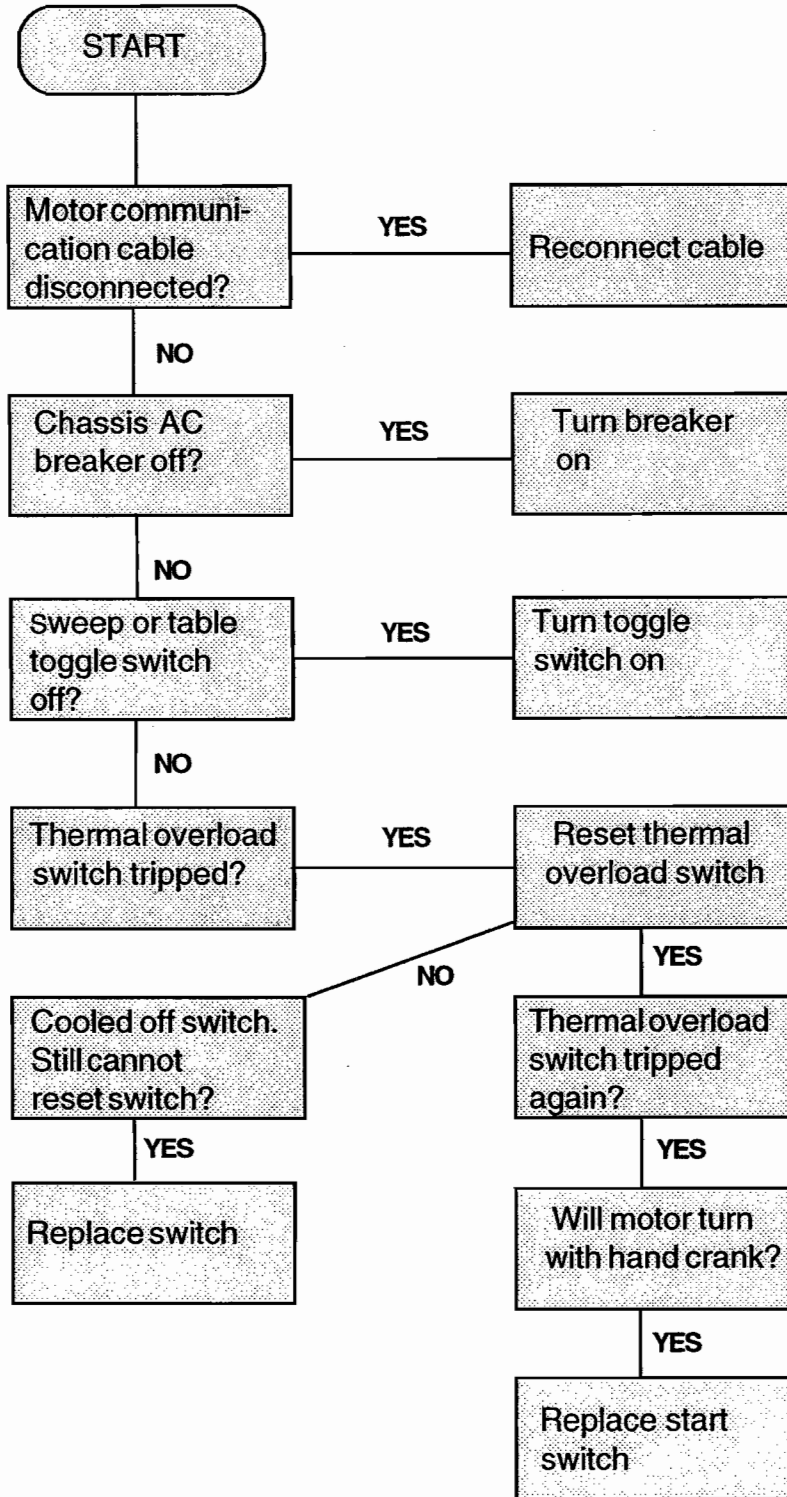
DRAWING #4.143

4.5.7.2 PROBLEM: Sweep motor runs continuously.



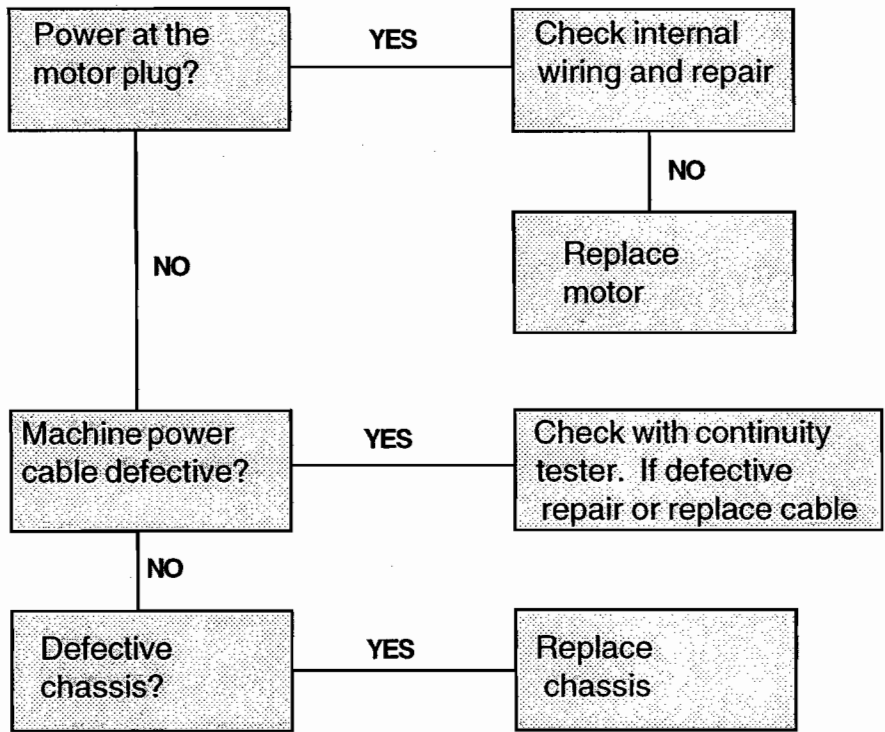
DRAWING #4.144

4.5.7.3 **PROBLEM: Front-end motor will not run.**
(Continued on next page)



DRAWING #4.145

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



DRAWING #4.146

4.5.8 TROUBLESHOOTING TOOLS

4.5.8.1 CONTINUITY TESTER

1. Open Circuits



NOTE: Do not use on live circuits. Disconnect all power on device to be tested.

- a) To check the continuity of any wire, disconnect one end.
- 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 light. If the wire is open, the tester will not light.

2. Shorts

- a) To check for a short between two wires, disconnect both ends of the wires suspected.
- b) Connect the tester across the two wires. If tester lights, the wires are shorted. If tester does not light, the wires are good.

3. Grounds

- a) To check for possible ground, disconnect both ends of the wire suspected.
- b) Connect one side of the tester to the conduit or frame of the machine and the other side of the tester to one end of the wire being tested.
- c) If wire is grounded, tester should light. If wire is not grounded, tester will not light.

4.5.8.2 VOLTAGE TESTER



NOTE: For use on alternating or direct current (AC or DC) 80 to 600 volts. All power to the machine or device to be tested should be turned on. Caution should be used when testing live circuits.

1. To check for voltage, connect tester in parallel or across line on device to be tested. Neon bulb will glow if voltage is present. When checking across 220 volts, neon bulb will be twice as bright as when checking 110 volts. Tester cannot be used on circuits below 80 volts.

SECTION 5

PARTS



SECTION 5

Parts

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5.1 PART NUMBERS & DRAWINGS



5.1 PART NUMBERS & DRAWINGS





FRONT END FRAME & PLATFORM ASSEMBLY R.H. MACHINE

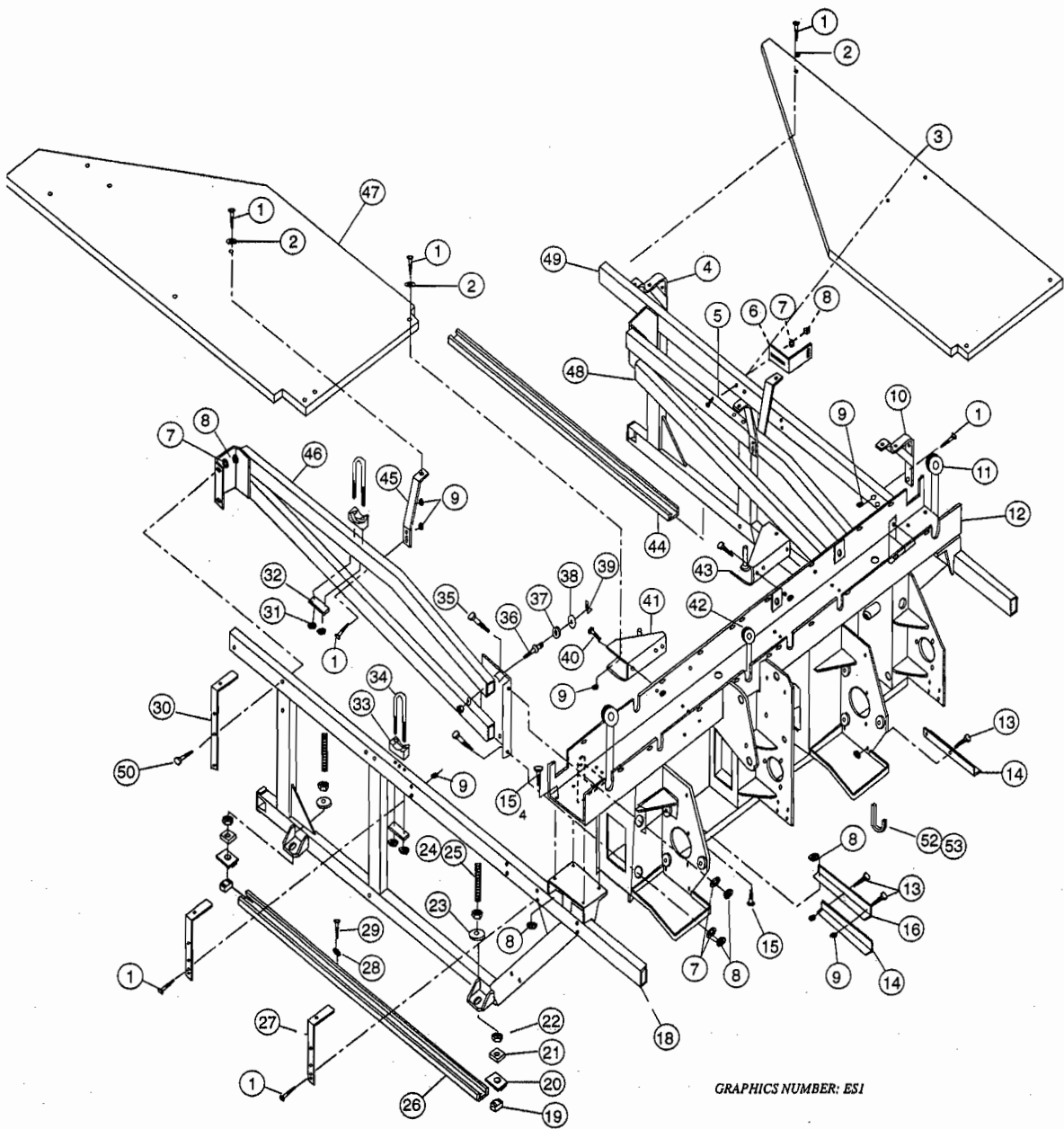
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ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	15	809-849-285	HEX HD. SCREW, 1/4 - 20 x 1-3/4 LG.	28	8	948-761-112	FLAT WASHER,
2	5	948-753-102	FLAT WASHER,				11/16 O.D. x 11/32 I.D. x 1/16 THK.
			5/8 O.D. x 9/32 I.D. x 1/16	29	8	810-556-320	HEX HD. LAG SCREW, 5/16 x 2 LG.
3	1	070-006-425	R.H. PLATFORM (R.H. MACHINE)	30	1	070-006-405	PLATFORM ANGLE SUPPORT
4	1	070-006-414	REAR PLATFORM SUPPORT WELDMENT (BALL RETURN SIDE)	31	8	844-057-002	HEX LOCK NUT, 5/16 - 18
5	4	809-865-285	HEX HD. SCREW, 3/8 - 16 x 1-3/4 LG.	32	4	070-008-126	CLAMP BAR
6	1	070-004-654	SUPPORT ANGLE	33	4	000-021-528	SADDLE
7	25	948-767-132	FLAT WASHER,	34	4	804-557-737	U-BOLT SWEEP MTGN.
			13/16 x O.D. 13/32 I.D. x 1/16 THK.	35	2	809-865-245	HEX HD. SCREW,
8	24	839-665-002	NUT, HEXLOCK 3/8 - 16				3/8 - 16 x 3-1/4 LG.
9	10	844-049-002	NUT, HEXLOCK 1/4 - 20	36	1	070-011-165	PIN SPRING ROLLER
10	1	070-001-819	FRONT PLATFORM SUPPORT WELDMENT (BALL RETURN SIDE)	37	1	070-001-668	ROLLER, SPRING
11	2	250-001-046	LARGE GROMMET	38	1	945-867-242	WASHER,
12	1	090-004-001	CROSS BEAM WELDMENT				1-1/2 O.D. x .406 O.D. x .048 THK.
13	4	809-849-125	HEX HD. SCREW, 1/4 - 20 x 3/4 LG.	39	1	963-400-002	X-WASHER, 9000-12
14	2	070-001-596	ANGLE BRACKET	40	4	809-865-165	HEX HD. SCREW, 3/8 - 16 x 3/4 LG.
15	6	809-865-165	HEX HD. SCREW, 3/8 - 16 x 1 LG.	41	1	070-006-413	BRACKET WELDMENT (BIN SUPPORT - L.H.)
16	1	070-001-698	PIT ANGLE BRACKET	42	1	711-520-017	SMALL GROMMET
17	3	000-025-183	S/O CLIP (NOT USED)	43	1	070-006-411	BRACKET WELDMENT (BIN SUPPORT - R.H.)
18	1	090-004-006	SIDE FRAME, L.H.	44	1	070-007-844	SHORT UNISTRUT BALL RETURN SIDE
19	4	853-500-001	UNISTRUT NUT, P3010, 1/2 - 13	45	3	070-006-490	FRAME SUPPORT WELDMENT
20	4	000-021-786	BEARING PLATE - FRAME ADJ.	46	1	090-004-005	FRAME BRACE WELDMENT L.H.
21	4	070-007-509	NUT, ELEVATING	47	1	070-006-426	PLATFORM
22	8	835-573-002	NUT, HEX JAM 1/2 - 13	48	1	090-004-004	FRAME BRACE WELDMENT R.H.
23	4	000-021-787	THICK WASHER	49	1	090-004-002	SIDE FRAME R.H.
24	4	070-007-510	SCREW, ELEVATING	50	4	809-865-325	HEX HD. SCREW, 3/8 - 16 x 2 LG.
25	4	700-107-076	LOCTITE - THREAD - LOC	51	1	090-004-028	DECAL (NOT SHOWN)
26	1	070-007-843	LONG UNISTRUT	52	1	070-006-308	GROMMET
27	2	070-001-817	PLATFORM ANGLE SUPPORT	53	1	008-100-413	ADHESIVE

FRONT END FRAME & PLATFORM ASSEMBLY R.H. MACHINE



GRAPHICS NUMBER: ESI

DRAWING #5.1





FRONT END FRAME & PLATFORM ASSEMBLY L.H. MACHINE

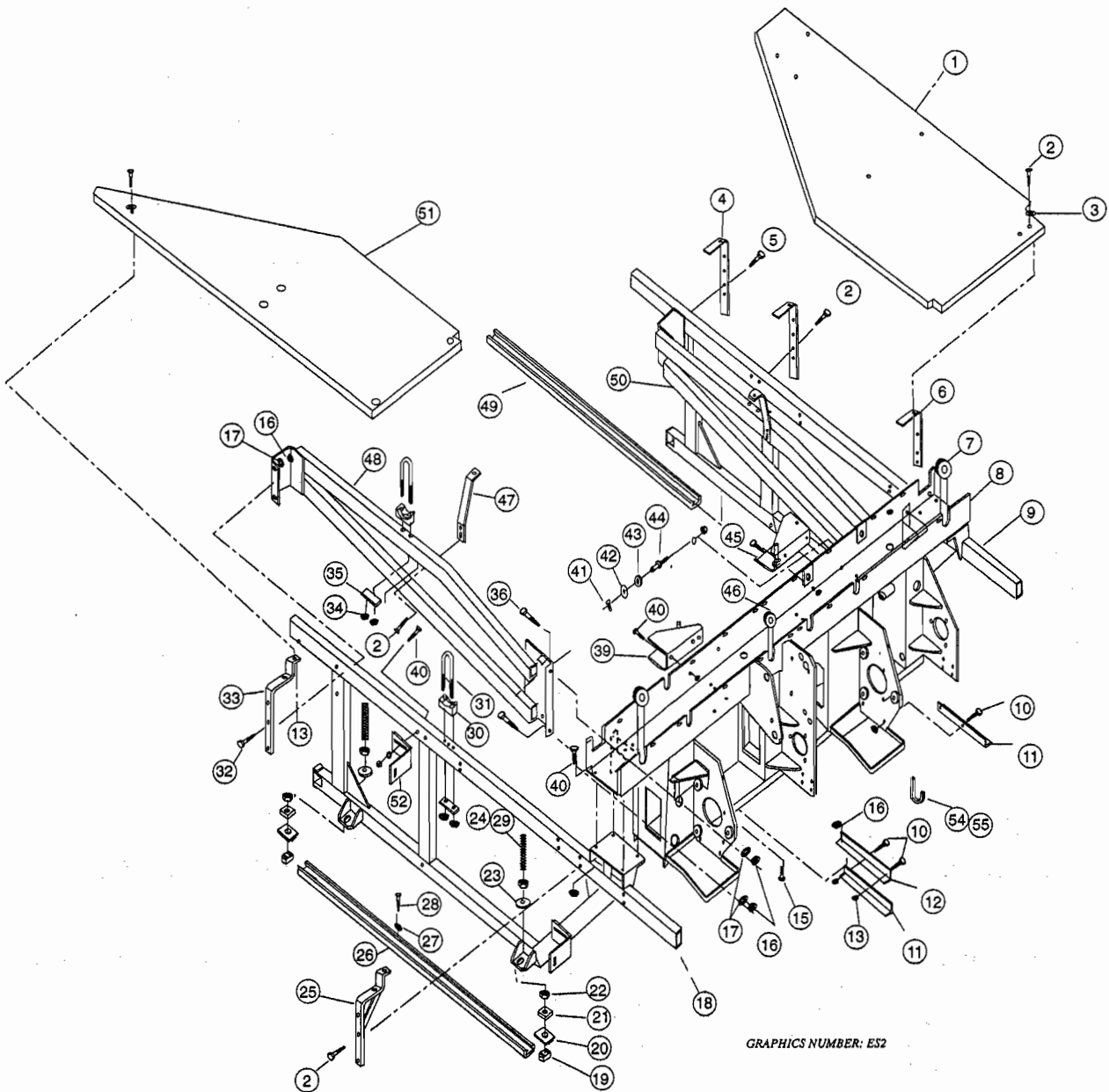
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Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-006-426	PLATFORM	30	4	000-021-528	SADDLE
2	15	809-849-285	HEX HD. SCREW, 1/4 - 20 x 1-3/4 LG.	31	4	804-557-737	U-BOLT SWEEP MTGN.
3	5	948-753-102	FLAT WASHER 5/8 O.D. x 9/32 I.D. x 1/16 THK.	32	1	809-849-285	HEX HD. SCREW, 1/4 - 20 x 1-3/4 LG.
4	2	070-006-405	PLATFORM ANGLE SUPPORT	33	1	070-006-414	REAR PLATFORM SUPPORT WELDMENT (BALL RETURN SIDE)
5	4	809-865-325	HEX HD. SCREW, 3/8 - 16 x 2 LG.	34	8	844-057-002	HEX LOCK NUT, 5/16 - 18
6	2	070-001-817	PLATFORM ANGLE SUPPORT	35	4	070-008-126	CLAMP BAR
7	2	205-001-046	LARGE GROMMET	36	4	809-865-245	HEX HD. SCREW, 3/8 - 16 x 3-1/4 LG.
8	1	090-004-001	CROSS BEAM WELDMENT	37	3	000-025-183	S/O CLIP (NOT USED)
9	1	090-004-003	SIDE FRAME, R.H.	38			
10	4	809-849-125	HEX HD. SCREW, 1/4 - 20 x 3/4 LG.	39	1	070-006-413	BRACKET WELDMENT (BIN SUPPORT - L.H.)
11	2	070-001-596	ANGLE BRACKET	40	4	809-865-165	HEX HD. SCREW, 3/8 - 16 x 3/4 LG.
12	1	070-001-698	PIT ANGLE BRACKET	41	1	963-400-002	X-WASHER, #9000 - 12
13	14	844-049-285	NUT, HEX LOCK, 1/4 - 20	42	1	945-867-242	WASHER, 1-1/2 O.D. x .406 I.D. x .048 THK.
14				43	1	070-001-668	ROLLER, SPRING
15	10	809-865-165	HEX HD. SCREW, 3/8 - 16 x 1 LG.	44	1	070-011-165	PIN SPRING ROLLER
16	24	844-665-002	NUT, HEX LOCK, 3/8 - 16	45	1	070-006-411	BRACKET WELDMENT (BIN SUPPORT - R.H.)
17	25	948-767-132	FLAT WASHER 13/16 O.D. x 13/32 I.D. x 1/16 THK.	46	1	711-520-017	SMALL GROMMET
18	1	090-004-006	SIDE FRAME, L.H.	47	3	070-006-490	FRAME SUPPORT WELDMENT
19	4	853-500-001	UNISTRUT NUT, P3010, 1/2 - 13	48	1	090-004-005	FRAME BRACE WELDMENT, L.H.
20	4	000-021-786	BEARING PLATE - FRAME ADJ.	49	1	070-007-844	SHORT UNISTRUT, BALL RETURN SIDE
21	4	070-007-509	NUT, ELEVATING	50	1	090-004-004	FRAME BRACE WELDMENT, R.H.
22	8	835-573-002	NUT, HEX JAM 1/2 - 13	51	1	070-006-425	R.H. PLATFORM, L.H. MACHINE
23	4	000-021-787	THICK WASHER	52	1	070-004-654	SUPPORT ANGLE
24	4	070-007-510	SCREW, ELEVATING	53	1	090-004-028	DECAL (NOT SHOWN)
25	1	070-001-819	FRONT PLATFORM SUPPORT WELDMENT (BALL RETURN SIDE)	54	1	070-006-308	GROMMET
26	1	070-007-843	LONG UNISTRUT	55	1	008-100-413	ADHESIVE
27	8	948-761-112	FLAT WASHER, 11/16 O.D. x 11/32 I.D. x 1/16 THK.				
28	8	810-556-320	HEX HD. LAG SCREW, 5/16 x 2 LG.				
29	4	700-107-076	LOCTITE, THREAD LOC				

FRONT END FRAME & PLATFORM ASSEMBLY L.H. MACHINE



GRAPHICS NUMBER: ES2

DRAWING #5.2





FRONT END DRIVE ASSEMBLY

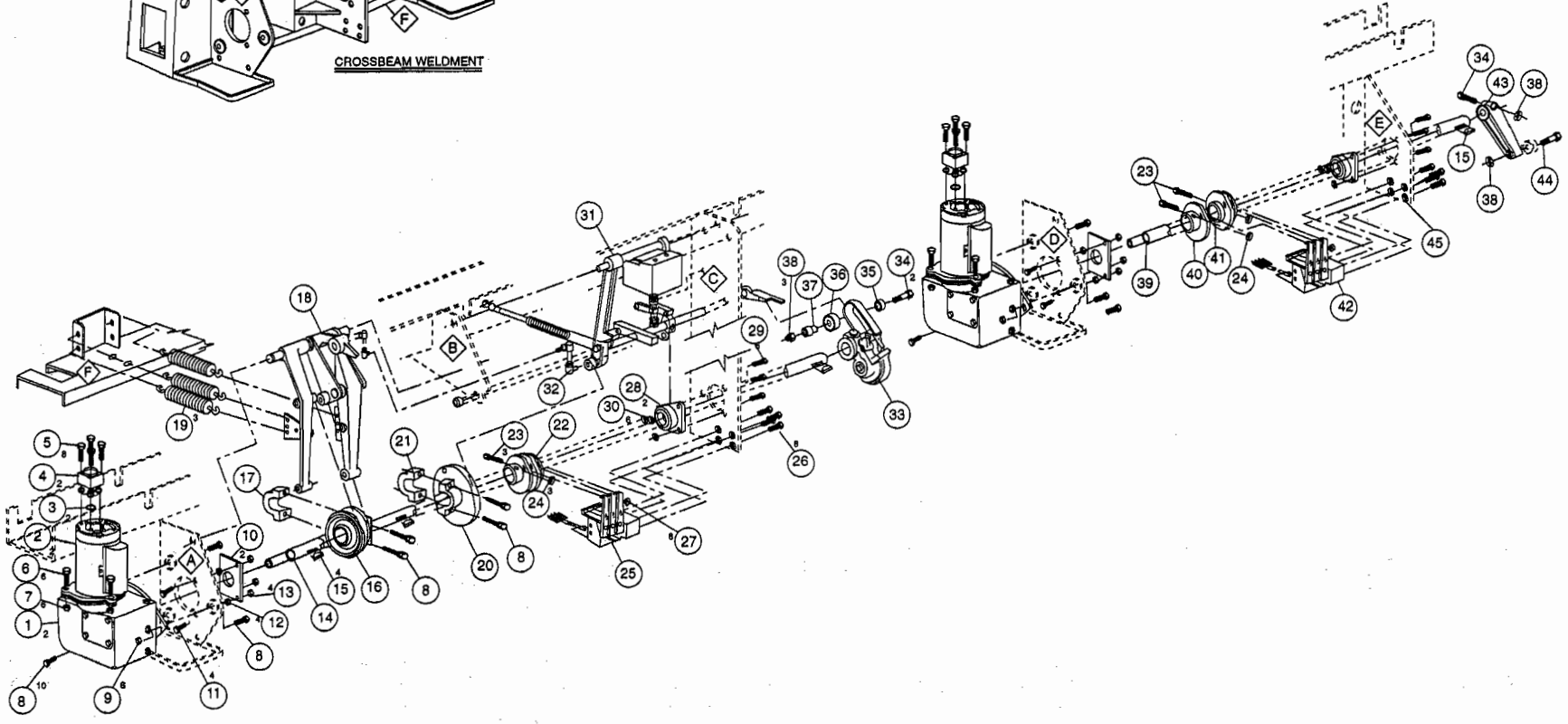
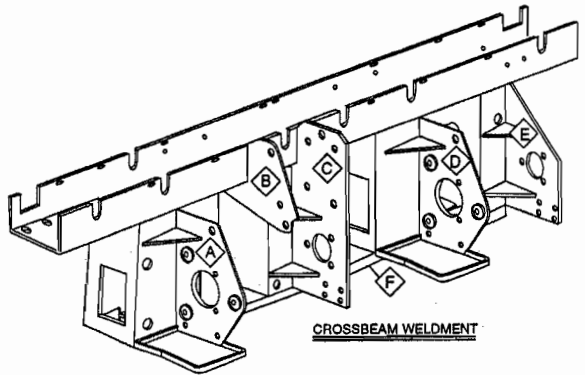
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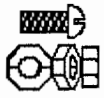
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	090-004-509	GEARBOX, 50Hz	22	1	070-006-417	TABLE CAM WELDMENT
		090-004-504	GEARBOX, 60Hz	23	3	070-001-664	CLAMP STUD
2	2	090-004-508	MOTOR, 50Hz	24	3	835-549-002	HEX NUT, 1/4 - 20
		090-004-503	MOTOR, 60Hz	25	1	070-006-420	TABLE CAM
3	2	090-004-526	BUSHING				SWITCH & LEVER ASSY.
4	2	090-004-524	RECEPTACLE ASSEMBLY	26	8	818-239-122	SEMS ROUND HD SCREW,
5	8	828-127-062	THREADED SCREW, 6-32 x 1/2	27	8	843-139-002	SEMS KEP NUT, 10 - 24
6	6	809-865-285	HEX HD. SCREW, 3/8 - 16 x 1-3/4 LG.	28	2	090-004-020	LUTCO 3-BOLT TRIANGULAR
7	6	839-665-002	FLEX NUT, 3/8 - 16				BALL BEARING.
8	10	810-265-280	SOCKET HD CAP SCREW, 3/8 - 1 x 1-3/4 LG.	29	5	809-865-165	HEX HD CAP SCREW, 3/8 - 16 x 1 LG.
9	6	839-665-002	STOVER LOCK NUT, 3/8-16	30	7	839-665-002	FLEX LOCK NUT, 3/8 - 16
		090-003-510	50Hz ASSEMBLY	31	1	090-003-655	SOLENOID OPERATED
			(INCLUDES ITEMS 1-9 WITH 50Hz				SHUTTLE ASSY.
			MOTOR & GEARBOX)	32	1	070-006-493	BALL JOINT ASSEMBLY
		090-003-511	60Hz ASSEMBLY	33	1	090-003-606	TABLE DRIVE ASSEMBLY
			(INCLUDE ITEMS 1-9 WITH 60Hz	34	2	809-873-405	HEX HD. CAP SCREW, 1/2 - 13 x 2-1/2 LG.
			MOTOR & GEARBOX)	35	1	070-007-311	SLEEVE
10	2	070-006-765	SHAFT PLATE	36	1	190-001-490	BEARING
11	4	809-857-125	HEX HD. CAP SCREW, 5/16-18 x 3/4 LG.	37	1	070-007-310	BUSHING
12	4	948-761-112	WASHER 11/32 I.D. x 11/16 O.D. x 1/16 THK. (NOT USED)	38	3	844-073-002	STOVER LOCK NUT, 1/2 - 13
13	4	844-057-002	STOVER LOCK NUT, 5/16 - 18	39	1	070-001-699	SWEEP SHAFT
14	1	070-001-700	TABLE DRIVE SHAFT	40	1	070-006-450	SWEEP CAM WELDMENT
15	4	907-000-900	HI-PRO KEY #910	41	1	070-006-449	SWEEP CAM WELDMENT
16	1	070-001-910	SPOT & RESPOT CAM	42	1	070-006-452	SWEEP CAM
17	1	070-001-562	SPOT & REPSOT CAM HUB CAP				SWITCH & LEVER ASSY.
18	1	090-003-605	SPOT & RESPOT LINK ASSEMBLY	43	1	000-023-139	CRANK ARM
19	3	070-001-707	EXTENSION SPRING	44	1	070-003-243	SWEEP DRIVE SCREW
20	1	070-006-427	SHUTTLE CAM	45	4	250-001-544	SPACERS .025 x .597 x .072
21	1	070-006-407	SHUTTLE CAM HUB CAP		1	809-865-245	SCR. HX. 3/8 - 16 x 1-1/2

FRONT END DRIVE ASSEMBLY



GRAPHIC NUMBER TB8

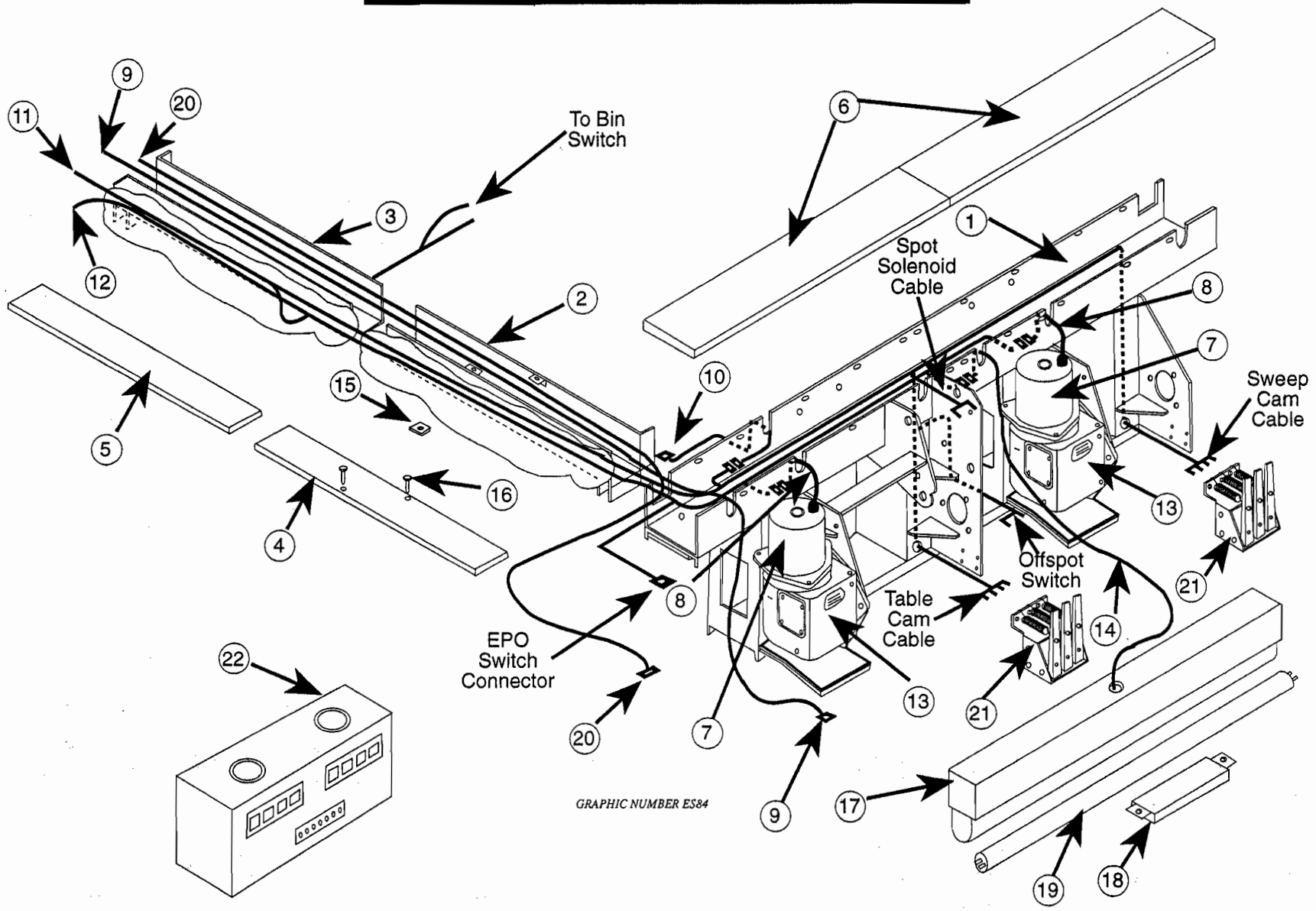
DRAWING #5.3




**FRONT END ELECTRICAL INSTALLATION
R.H. MACHINE**
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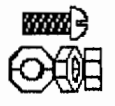
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-001	CROSSBEAM WELDMENT	17	1	090-003-800	PITLIGHT ASSEMBLY, 115V 60 HZ
2	1	070-007-747	FRONT WIREWAY			812-633-322	8-32 x RD M/S
3	1	090-005-031	REAR WIREWAY			843-133-002	NUT KEEP
4	1	070-007-747	FRONT WIREWAY COVER			828-133-062	SCREW 8-32 x 8
5	1	090-005-032	REAR WIREWAY COVER			938-523-020	RIVET
6	2	090-005-027	CROSSBEAM COVER			742-502-002	CAP NYLON
7	2	090-004-503	60 HZ FRONT END MOTOR			742-503-004	SPLICE CAP
	2	090-004-508	50 HZ FRONT END MOTOR			070-007-370	ANGLE PITLIGHT MNT.
8	2	090-003-714	MOTOR CABLE			818-233-100	SCREW 8-32 x 5/8
9	1	090-003-720	STRIKE FOUL CABLE			070-009-847	REFLECTOR
	1	090-003-721	PINDICATION CABLE			814-740-068	SCREW 10-32 x 3/8
10	1	090-003-745	TABLE CABLE			751-001-524	BALLAST, 115V 60 HZ
11	1	090-003-711	ODD LOGIC CABLE	17A	1	090-003-801	PITLIGHT ASSEMBLY, 230V 50 HZ
12	1	090-003-713	ODD POWER CABLE	17B	1	090-003-802	PITLIGHT ASSEMBLY, 115V 50 HZ
13	2	090-004-504	60 HZ FRONT END GEARBOX	18	1	751-001-533	BALLAST, 230V 50 HZ
	2	090-004-509	50 HZ FRONT END GEARBOX	18A	1	751-001-526	BALLAST, 115 V 50 HZ
14	1	090-003-703	PIT LIGHT CABLE	19	1	751-001-423	LIGHT BULB
15		724-511-074	TIN.NUT	20	1	090-003-724	FRONT END CABLE
16		812-840-082	SCREW - COVER				

FRONT END ELECTRICAL INSTALLATION R.H. MACHINE



DRAWING #5.4

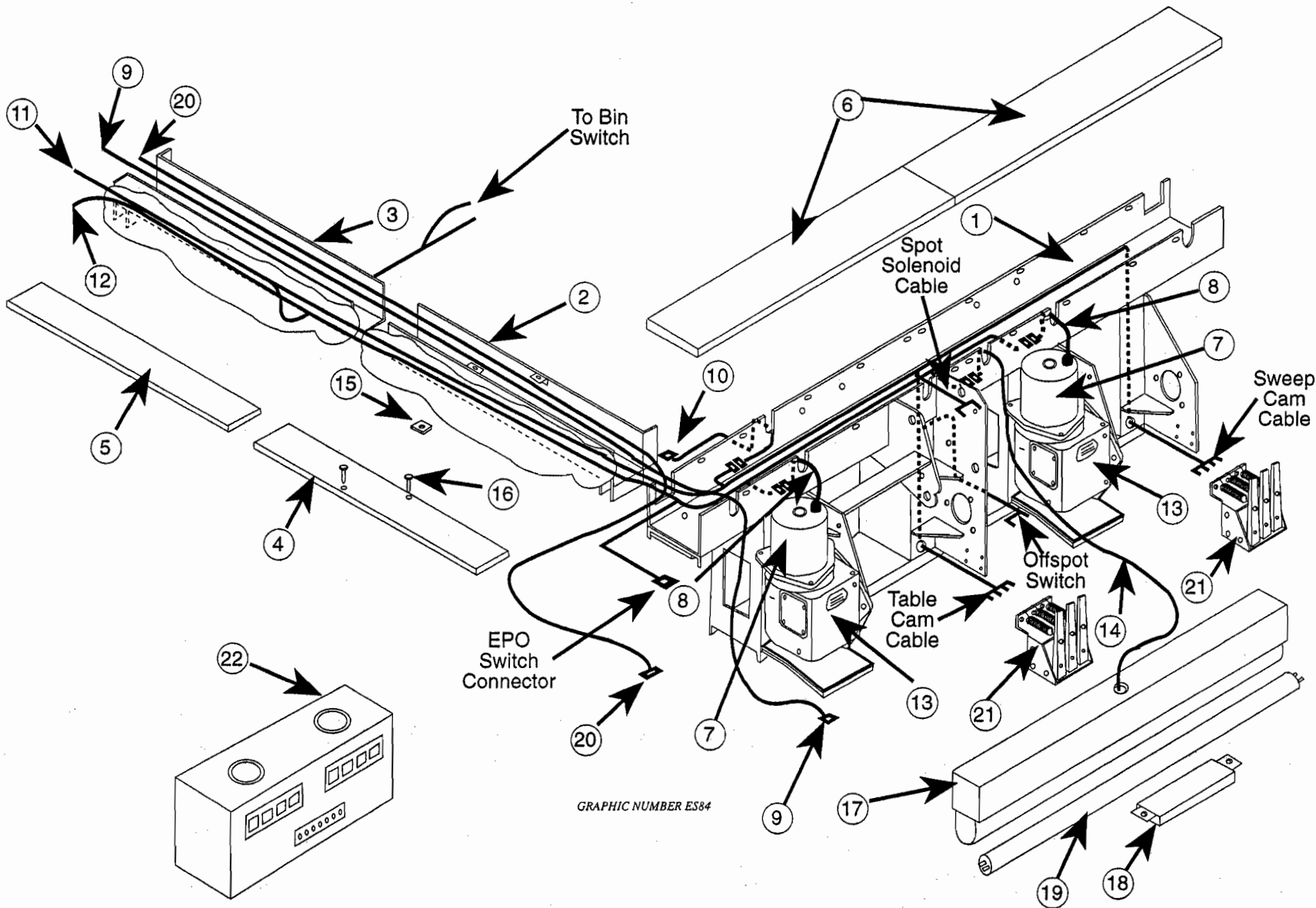
GRAPHIC NUMBER ES84




**FRONT END ELECTRICAL INSTALLATION
R.H. MACHINE**
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
21		090-003-645	TABLE AND SWEEP CAM SWITCH ASSEMBLY				
		000-021-575	INSULATOR				
		000-021-644	SWITCH LEVER				
		000-021-714	ADJUSTING SCREW				
		000-024-657	SPRING				
		000-026-042	SWITCH				
		000-026-401	SHAFT				
		000-026-419	HOUSING WELDMENT				
		744-107-015	NYLOCLIP - BURNDY HP6N				
		818-227-402	SCREW, SEMS RD. HD., #6 - 32 x 2-1/2 LG.				
		818-233-082	SCREW, SEMS RD. HD., #8 - 32 x 1/2 LG.				
		835-550-002	NUT, HEX JAM (1/4 - 28)				
		843-127-002	NUT, KEPS (#6 - 32)				
		843-133-002	NUT, KEPS (#8 - 32)				
		963-200-002	X-WASHER, #9000 - 8				
22	1	090-003-722	FRONT END CONTROL BOX				

FRONT END ELECTRICAL INSTALLATION R.H. MACHINE



DRAWING #5.5

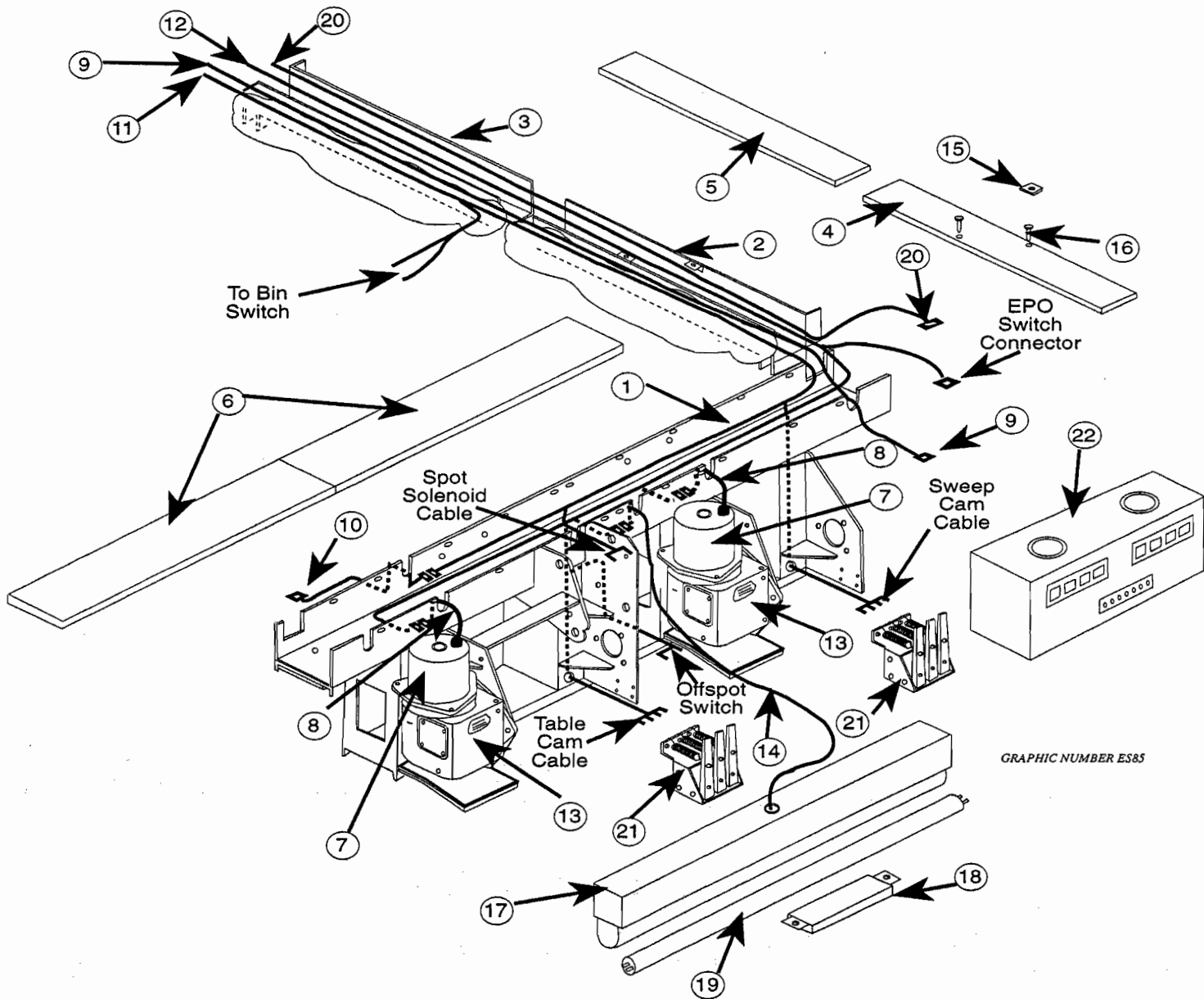
GRAPHIC NUMBER ES84




**FRONT END ELECTRICAL INSTALLATION
L.H. MACHINE**
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-001	CROSSBEAM WELDMENT	17	1	090-003-800	PITLIGHT ASSEMBLY, 115V 60 HZ
2	1	070-007-747	FRONT WIREWAY			812-633-322	8-32 x RD M/S
3	1	090-005-031	REAR WIREWAY			843-133-002	NUT KEEP
4	1	070-007-747	FRONT WIREWAY COVER			828-133-062	SCREW 8-32 x 8
5	1	090-005-032	REAR WIREWAY COVER			938-523-020	RIVET
6	2	090-005-027	CROSSBEAM COVER			742-502-002	CAP NYLON
7	2	090-004-503	60 HZ FRONT END MOTOR			742-503-004	SPLICE CAP
	2	090-004-508	50 HZ FRONT END MOTOR			070-007-370	ANGLE PITLIGHT MNT.
8	2	090-003-714	MOTOR CABLE			818-233-100	SCREW 8-32 x 5/8
9	1	090-003-720	STRIKE FOUL CABLE			070-009-847	REFLECTOR
	1	090-003-721	PINDICATION CABLE			814-740-068	SCREW 10-32 x 3/8
10	1	090-003-745	TABLE CABLE			751-001-524	BALLAST, 115V 60 HZ
11	1	090-003-710	EVEN LOGIC CABLE	17A	1	090-003-801	PITLIGHT ASSEMBLY, 230V 50 HZ
12	1	090-003-712	EVEN POWER CABLE	17B	1	090-003-802	PITLIGHT ASSEMBLY, 115V 50 HZ
13	2	090-004-504	60 HZ FRONT END GEARBOX	18	1	751-001-533	BALLAST, 230V 50 HZ
	2	090-004-509	50 HZ FRONT END GEARBOX	18A	1	751-001-526	BALLAST, 115 V 50 HZ
14	1	090-003-703	PITLIGHT CABLE	19	1	751-001-423	LIGHT BULB
15		724-511-074	TIN. NUT	20	1	090-003-724	FRONT END CABLE
16		812-840-082	SCREW - COVER				

FRONT END ELECTRICAL INSTALLATION L.H. MACHINE



GRAPHIC NUMBER ES85

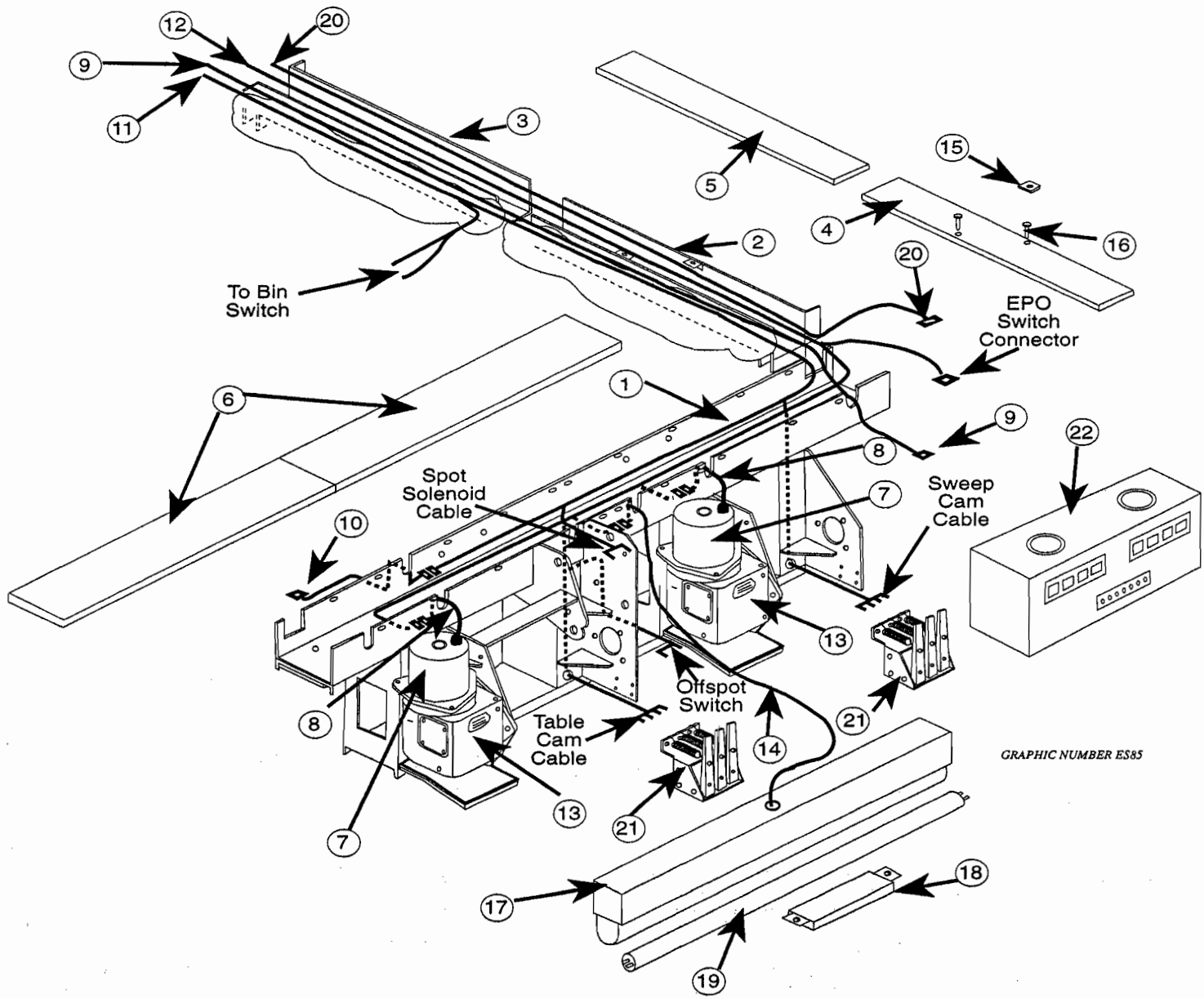
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**FRONT END ELECTRICAL INSTALLATION
L.H. MACHINE**
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
21		090-003-645	TABLE AND SWEEP CAM SWITCH ASSEMBLY				
		000-021-575	INSULATOR				
		000-021-644	SWITCH LEVER				
		000-021-714	ADJUSTING SCREW				
		000-024-657	SPRING				
		000-026-042	SWITCH				
		000-026-401	SHAFT				
		000-026-419	HOUSING WELDMENT				
		744-107-015	NYLOCLIP - BURNDY HP6N				
		818-227-402	SCREW, SEMS RD. HD., #6 - 32 x 2-1/2 LG.				
		818-233-082	SCREW, SEMS RD. HD., #8 - 32 x 1/2 LG.				
		835-550-002	NUT, HEX JAM (1/4 - 28)				
		843-127-002	NUT, KEPS (#6 - 32)				
		843-133-002	NUT, KEPS (#8 - 32)				
		963-200-002	X-WASHER, #9000 - 8				
22	1	090-003-722	FRONT END CONTROL BOX				

FRONT END ELECTRICAL INSTALLATION L.H. MACHINE



DRAWING #5.7

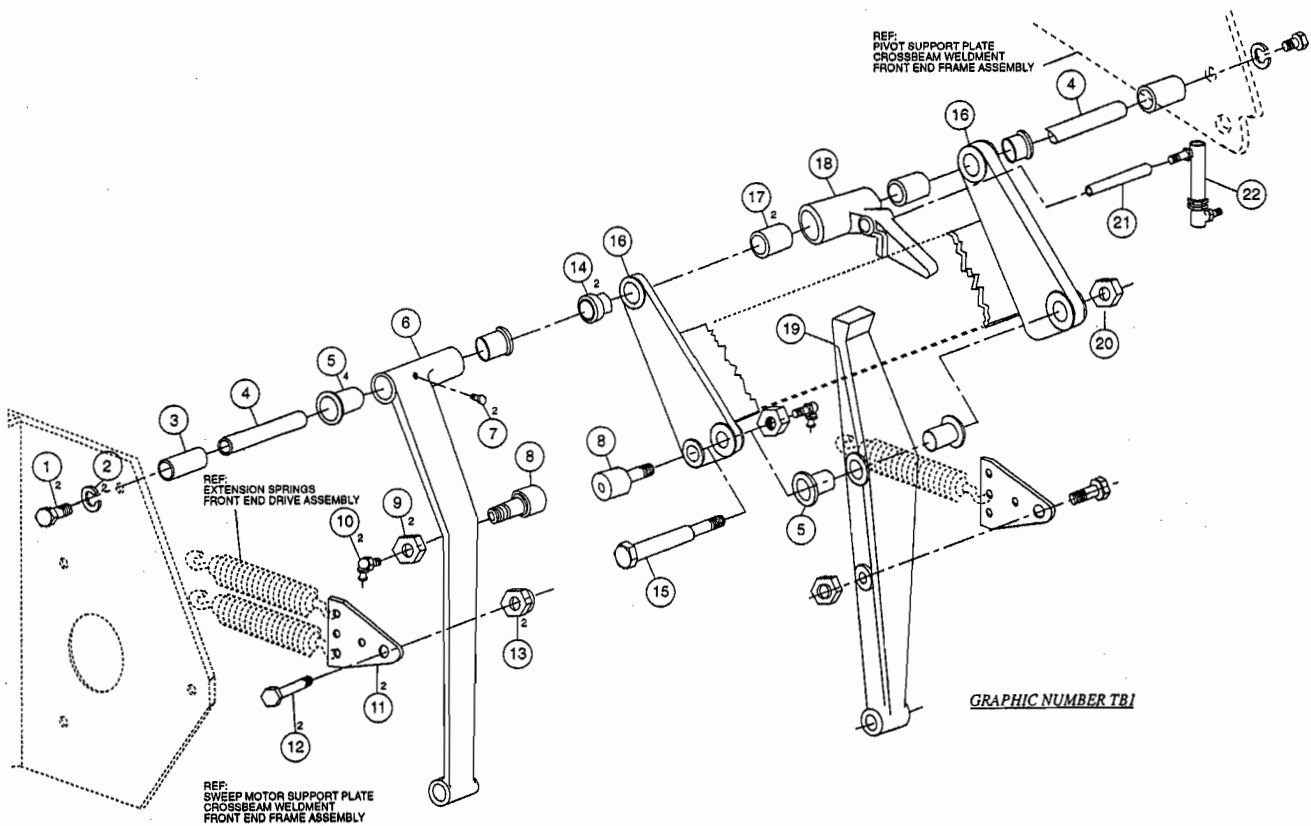
GRAPHIC NUMBER ES85




SPOT AND RESPOT LINK ASSEMBLY
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	809-857-125	SCR. HX 5/16 - 18 x 3/4				
2	2	951-164-002	LOCKWASHER, 3/8				
3	2	090-005-026	SPACER, 7/8 x 1-1/4 LG.				
4	1	090-005-025	PIVOT SHAFT, 5/8 O.D. x 8-5/8 LG.				
5	4	070-001-919	FLANGED BEARING				
6	1	070-006-492	RESPOT ARM LINK ASSEMBLY				
7	2	710-501-009	GREASE FITTING, ALEMITE #3006				
8	2	610-704-002	CAM FOLLOWER BEARING ASSEMBLY				
9	2	844-070-002	STOVER LOCK NUT, 7/16 - 20				
10	2	710-501-012	GREASE FITTING, ALEMITE #B911				
11	2	070-001-751	SPRING HANGER				
12	2	070-001-587	SPRING HANGER PIN				
13	2	839-665-002	FLEX LOC NUT, 3/8 - 16				
14	2	070-002-691	FLANGED BEARING				
15	1	070-001-585	SPOT LINK PIN				
16	1	070-001-605	UPPER SPOTTING LINK ASSEMBLY				
17	2	900-110-141	BRONZE SLEEVE BEARING				
18	1	070-001-997	SPOTTING ARM LATCH ASSEMBLY				
19	1	070-006-481	SPOTTING ARM LINK ASSEMBLY				
20	1	844-073-002	STOVER LOCK NUT, 1/2 - 13				
21	1	913-464-360	ROLL PIN, 3/8 O.D x 2-1/4 LG.				
22	1	070-006-493	BALL JOINT ASSEMBLY				

SPOT AND RESPOT LINK ASSEMBLY



DRAWING #5.8





SOLENOID OPERATED SHUTTLE ASSEMBLY

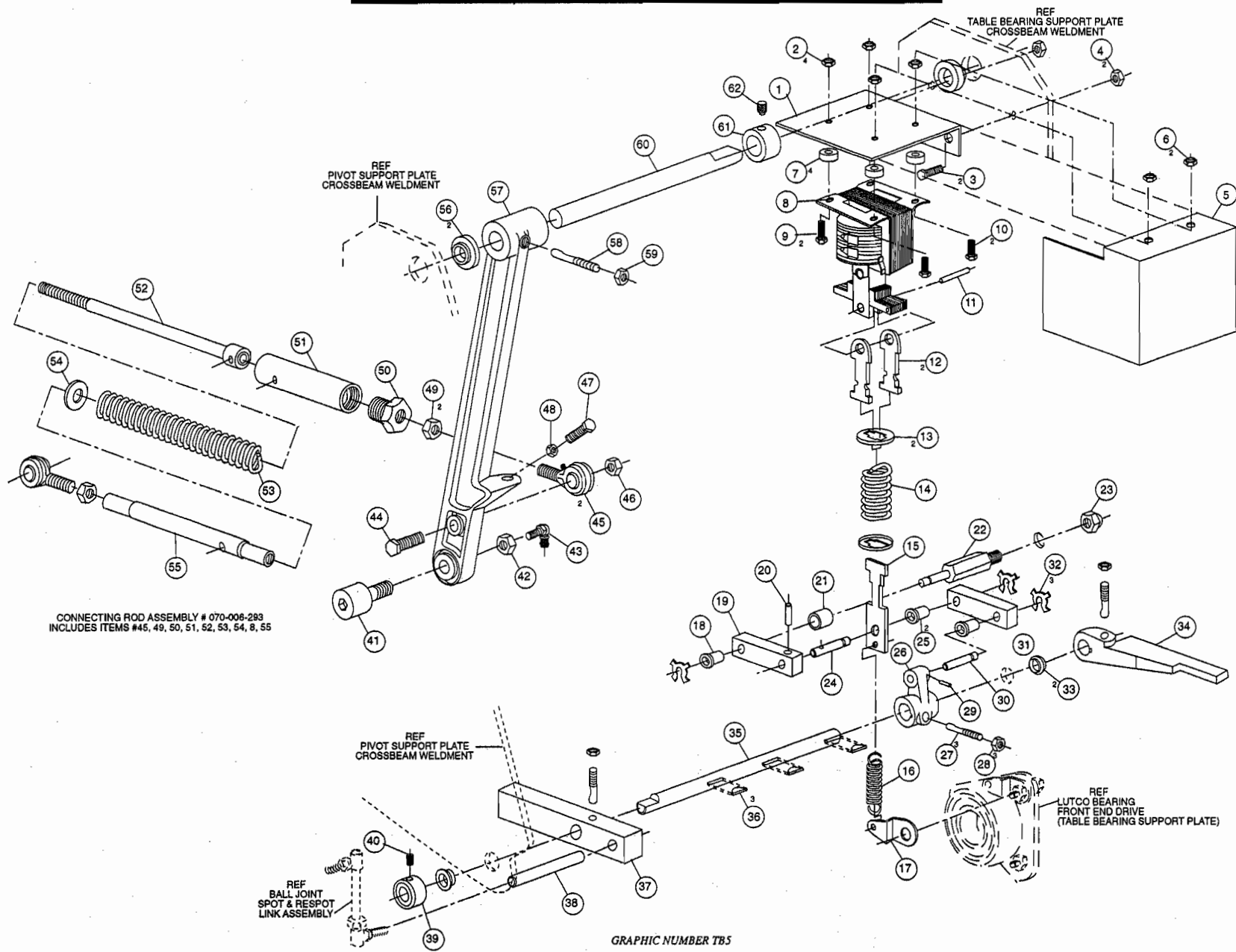
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-005-018	SOLENOID HANGER BASKET	34	1	070-006-278	CAM LINK
2	4	839-533-002	FLEX NUT, 8-32	35	1	090-005-017	KEY SHAFT, 1/2 - 7
3	2	809-849-125	HEX HD. SCREW, 1/4 - 20 x 3/4 LG.	36	3	907-000-200	KEY, HI-PRO #404
4	2	844-049-002	STOVER LOCK NUT, 1/4 - 20	37	1	070-006-484	STOP LEVER ASSEMBLY
5	1	090-005-029	SOLENOID GUARD	38	1	913-464-400	ROLL PIN, 3/8 O.D. x 2-1/2 LG.
6	2	843-133-022	KEPS NUT, 8-32	39	1	901-100-110	SET COLLAR
7	4	000-021-442	RUBBER WASHER	40	1	807-249-040	SOC. SET SCREW, 1/4 - 20 x 1/4 LG.
8	1	070-006-727	SOLENOID, 50/60 Hz 115V - 230V	41	1	610-704-002	CAM FOLLOWER ASSEMBLY
9	2	814-333-122	HEX HD. SCREW, 8 - 32 x 3/4 LG.	42	1	835-570-002	HEX JAM NUT, 7/16 - 20
10	2	813-933-162	HEX HD. SCREW, 8 - 32 x 1 LG.	43	1	710-501-012	GREASE FITTING, ALEMITE #1911-B
11	1	913-448-120	ROLL PIN, 1/4 O.D. x 3/4 LG. 250 x 3/4	44	1	809-865-205	HEX HD SCREW, 3/8 - 16 x 1-1/4 LG.
12	2	070-006-724	OUTSIDE SPRING LINK, 1/4" HOLE	45	2	070-006-046	ROD END
13	1	070-006-277	SPRING WASHER	46	1	840-065-002	FLEX LOC NUT, 3/8 - 16
14	1	070-006-276	SPRING	47	1	809-865-165	HEX HD SCREW, 3/8 - 16 x 1 LG.
15	1	070-006-282	CENTER SPRING LINK	48	1	835-565-002	HEX JAM NUT, 3/8 - 16
16	1	070-006-283	SPRING	49	2	835-566-002	HEX JAM NUT, 3/8 - 24
17	1	070-006-280	SPRING CUP	50	1	070-006-302	TUBE PLUG
18	1	900-204-121	FLANGED BEARING 25 x .378 x 3/4 LG.	51	1	070-006-299	TUBE ASSEMBLY
19	1	070-008-135	LINK ASSEMBLY	52	1	070-006-304	ROD ASSEMBLY
20	1	913-415-100	ROLL PIN, 3/32 O.D. x 5/8 LG.	53	1	070-006-306	SPRING
21	1	070-008-133	SPACER	54	1	070-006-296	SPRING WASHER
22	1	090-005-028	SOLENOID PIVOT STUD	55	1	070-006-297	LONG TUBE
23	1	839-655-002	FLEX LOC NUT, 3/8 - 16	56	2	900-210-251	FLANGED BEARING
24	1	070-006-287	PIN	57	1	070-006-295	LEVER
25	2	070-002-630	BUSHING	58	1	070-006-284	CLAMP STUD, 5/16 x 1-3/4 LG.
26	1	070-006-307	1" C - C LINK ASSEMBLY	59	1	834-557-002	HEX NUT, 5/16 x 18
27	3	070-006-116	CLAMP STUD, 1/4 O.D. x 1-1/8 LG.	60	1	070-006-286	CAM LEVER SHAFT, 5/8 x 6-1/2 LG.
28	3	835-549-002	HEX JAM NUT, 1/4 - 20	61	1	000-021-423	SET COLLAR
29	1	913-415-100	ROLL PIN, 3/32 O.D. x 5/8 LG.	62	1	807-357-040	SOC. SET SCREW, 5/16 - 18 x 1/4 LG.
30	1	070-001-777	LINK PIN				
31	1	070-001-744	LINK ASSEMBLY				
32	3	963-200-002	X-WASHER, #9000-8				
33	2	900-208-041	FLANGED BEARING .503 x .753 X 5/16				

SOLENOID OPERATED SHUTTLE ASSEMBLY



DRAWING #5.9

GRAPHIC NUMBER T85





TABLE DRIVE ASSEMBLY

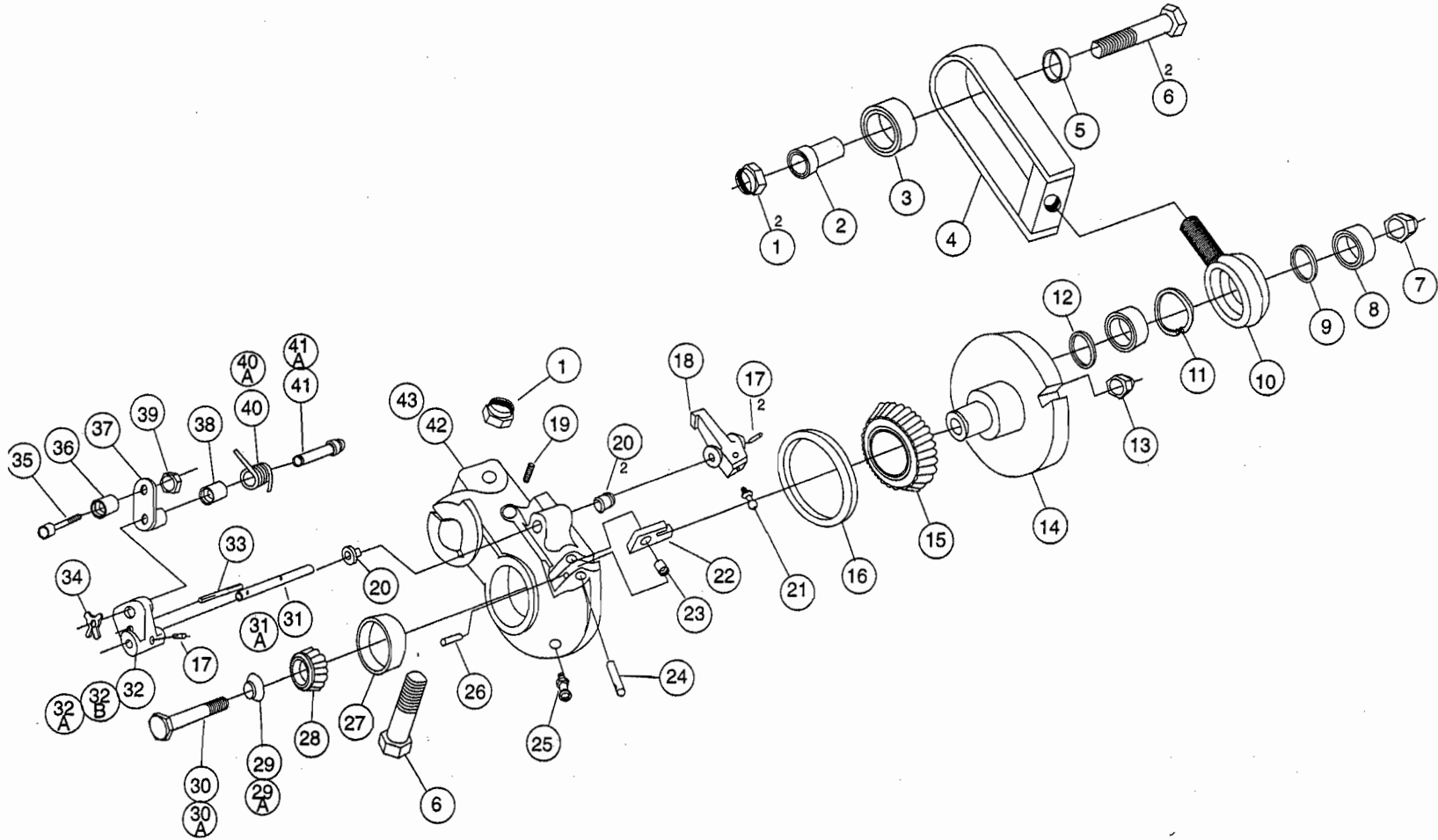
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	844-073-002	STOVER LOCK NUT, 1/2 - 13	26	1	913-415-120	ESNA ROLL PIN, 3/32 O.D x 3/4 LG.
2	1	070-007-310	BUSHING	27	1	070-002-780	ROLLER BEARING CUP #07196
3	1	109-001-490	BALL BEARING	28	1	070-002-824	CONE & SEAL
4	1	070-007-755	YOKE WELDMENT ASSEMBLY	29	1	070-006-729	SPRING DISC
5	1	070-007-311	SLEEVE	29a	1	070-002-835	WASHER (NOT SHOWN)
6	2	809-873-405	HEX HD CAP SCREW, 1/2-13 x 2-1/2 LG.	30	1	809-870-285	HEX HD CAP SCREW, 7/16 - 20 x 1-3/4 LG.
7	1	840-070-002	FLEX LOC NUT, 7/16 - 20	30a	1	809-870-325	HEX HD CAP SCREW, 7/16 - 20 x 2 LG.
8	2	000-021-881	BALL BEARING	31	1	070-008-325	PIN, 1/8" ROLL PIN HOLE
9	1	000-021-878	SPACER	31a	1	070-001-866	PIN, 3/32" ROLL PIN HOLE
10	1	000-021-879	ROD END	32	1	070-008-322	LINK, 1/8" ROLL PIN HOLE
11	1	919-000-600	RETAINING RING, #N5000-137	32a	1	070-001-933	LINK, 3/32" ROLL PIN HOLE
		000-021-880	ROD END ASSEMBLY (INCLUDES ITEMS 8 - 11)	32b	1	070-001-922	LINK, HEX HOLE FOR #1863 PIN, (ITEM 41a)
12	1	070-001-849	ECCENTRIC WASHER, 1 O.D. x 5/8 I.D. x 1/8 THK.	33	1	912-137-200	GROOVE PIN, 1/16 O.D. x 1-1/4 LG. TYPE 2
13	1	840-070-002	FLEX LOC NUT, 7/16 - 20	34	1	963-300-002	X-WASHER #9000-10
14	1	070-001-877	ECCENTRIC	35	1	880-139-120	SHOULDER SCREW, 1/4 x 3/8
15	1	070-002-776	ROLLER BEARING CONE # 18685	36	1	070-001-857	ROLLER
		070-002-799	ECCENTRIC & CONE ASSEMBLY (INCLUDES ITEMS 14 & 15)	37	1	070-001-861	LINK & HUB ASSEMBLY
16	1	070-002-777	ROLLER BEARING CUP # 18620	38	1	070-002-652	BUSHING
17	2	913-423-120	ESNA ROLL PIN, 1/8 O.D. x 3/4 LG.			070-007-250	LINK ASSEMBLY (INCLUDES ITEMS 37 & 38)
18	1	070-008-324	LATCH ARM ASSEMBLY (1/8" ROLL PIN HOLE)	39	1	839-539-002	FLEXLOC NUT, # 10-24
19	1	070-001-917	COMPRESSION SPRING	40	1	070-001-931	SPRING
20	2	900-205-053	FLANGE BEARING	40a	1	070-001-844	SPRING (USED WITH ITEM 41a)
21	1	070-001-893	CAM BALL ASSEMBLY	41	1	070-001-932	PIN
22	1	070-001-898	LATCH ASSEMBLY	41a	1	070-001-863	PIN (HEX SHOULDER)
23	1	900-104-071	SLEEVE BEARING	42	1	070-001-889	TABLE DRIVE CRANK HOUSING
24	1	070-001-894	PIVOT PIN	43	1	070-002-778	CRANK HOUSING & CUP ASSEMBLY (INCLUDES ITEMS 16, 20, 27 & 42)
25	1	710-501-004	GREASE FITTING, ALEMITE # 1641				

TABLE DRIVE ASSEMBLY



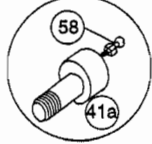
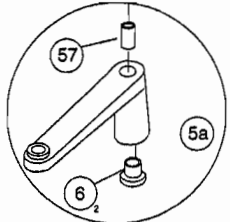
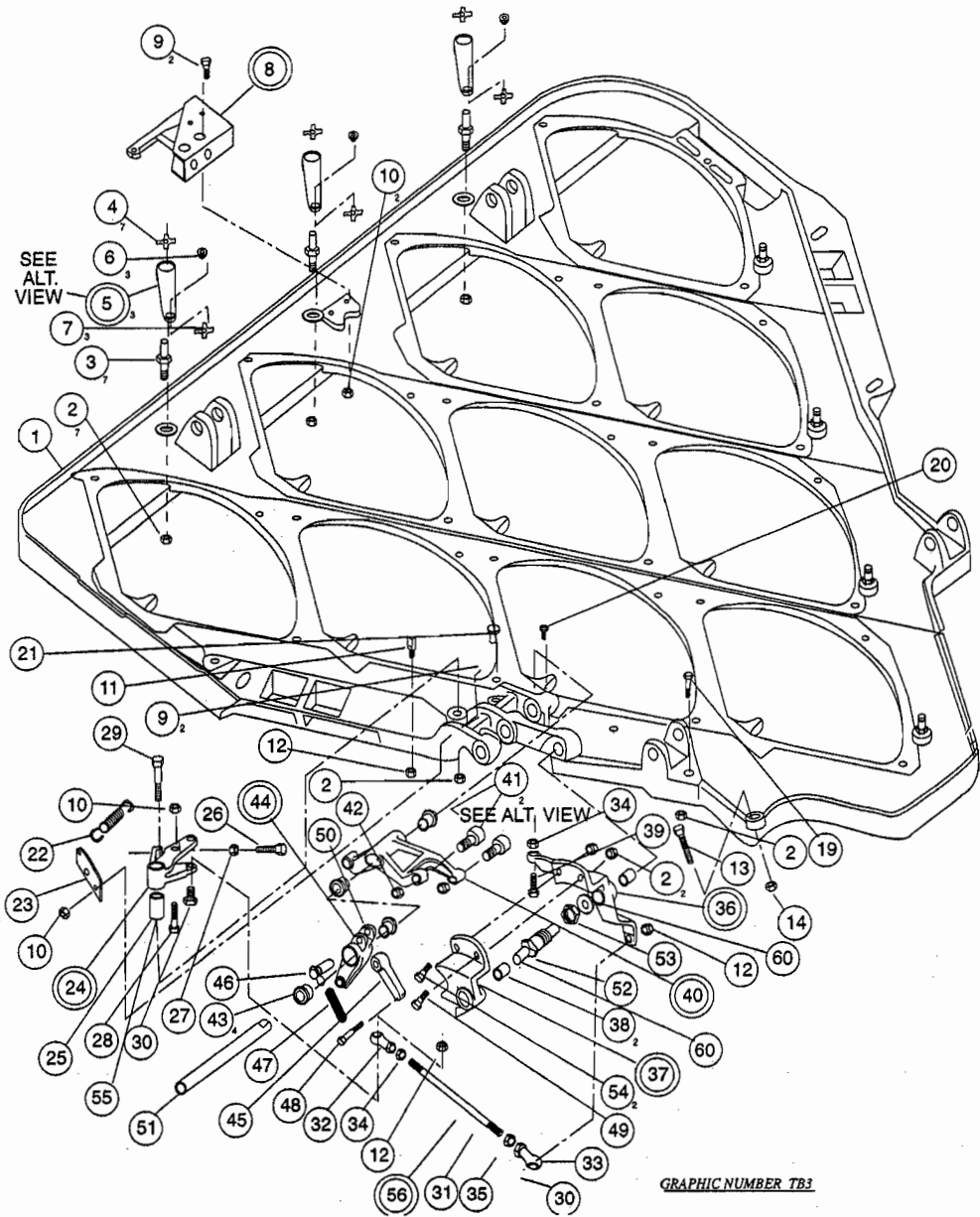
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DRAWING #5.10



ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-002-684	TABLE CASTING	30	2	809-849-165	HEX HD. CAP SCREW, 1/4 - 20 x 1 LG.
2	11	839-665-002	FLEXLOC NUT, 3/8 - 16	31	1	070-002-581	TIE ROD
3	7	070-007-616	PIN (5/16 DIA.)	32	1	000-022-738	1/4 ROD END BRG. (R.H. THD)
3A		070-002-681	PIN (1/4 DIA.)	33	1	000-022-737	1/4 ROD END BRG. (L.H. THD)
4	17	963-400-002	X-WASHER, #9000-8	34	1	835-550-002	HEX JAM NUT, 1/4 - 28
5	3	070-007-622	LEVER RESPOT ASS'Y. (LEVER WITH FLANGE BUSHING)	35	1	835-650-002	HEX JAM NUT, 1/4 - 28 L.H.
5A		070-002-680	LEVER RESPOT ASS'Y. (LEVER WITH FLANGE AND SLEEVE BUSHINGS)	36	1	070-002-728	CAM LINK BRG. ASS'Y.
6	3	070-002-653	BUSHING	37	1	070-002-727	LINK AND BEARING ASS'Y.
7	17	963-200-002	X-WASHER, #9000-8	38	2	070-002-698	NEEDLE BEARING .625 x 1 .562 x 7/8
8	1	070-006-697	SWITCH ASS'Y.	39	1	070-001-871	HEX HD. CAP SCREW
8A		070-007-111	SWITCH ASS'Y.	40	1	070-002-578	LEVER ASS'Y. SPOT (LEVER WITH BUSHING, ITEM 43)
9	2	810-239-120	SOC. HD. CAP. SCREW, 10-24 x 3/4 LG.	41	2	070-002-816	CAM FOLLOWER AND GREASE FITTING
10	4	839-539-002	FLEXLOC NUT, 10-24	42	2	840-066-002	FLEX NUT, 3/8 - 24, THIN
11	1	070-002-702	STOP. RESPOT	43	2	070-002-745	BUSHING
12	47	844-049-002	STOVER LOCK NUT, 1/4 - 20	44	1	070-002-579	FINGER - LEVER ASS'Y.
13	1	070-002-577	STUD	45	1	070-002-590	FINGER LINK
14	1	844-057-002	STOVER LOCKNUT, 5/16 - 18	46	1	070-001-804	PIVOT WELDMENT
15				47	1	070-001-807	SPRING
16				48	1	070-002-592	PIN
16A				49	1	839-539-002	KEP NUT, 10-32
16B				50	1	913-423-160	ROLL PIN - ESNA, 1/8 DIA. x 1 LG.
17				51	1	070-002-585	SHAFT
18				52	1	070-002-726	SHAFT
19	1	809-865-125	HEX HD BOLT, 3/8 - 16 x 1 LG.	53	1	840-600-002	FLEXLOC NUT, 7/8 - 14
20	1	807-357-060	SOC. SET SCREW K.N. CUP PT. 5/16 - 18 x 3/8 LG.	54	2	809-865-205	HEX HD. CAP SCREW, 3/8 - 16 x 1-1/4 LG.
21	1	000-022-580	PIN STOP	55	1	701-320-046	THRUST BEARING OILITE
22	1	070-002-732	SPRING	56		070-002-594	TIE ROD ASS'Y. (ROD WITH ROD ENDS)
23	1	070-002-734	BRACKET	57		070-002-652	BUSHING - SLEEVE
24	1	070-002-583	LINK ASS'Y. ACTUATING (LINK, BUSHING, SET SCREW NUT)	58		710-501-009	ALEMITE FITTING (#3006)
25	1	070-002-715	BUSHING .502 x .689 x 1.5	59		070-002-596	SPRING (NOT SHOWN) USED WITH ITEM 13
26	1	806-249-160	SET SCREW SQ. HD. CUP PT.		1	948-753-102	WASHER 9/32 x 5/8 x 1/16
27	1	835-549-002	JAM NUT, 1/4 - 20		1	948-745-082	WASHER 7/32 x 1/2 x 7/16
28	1	070-002-733	SCREW	60	2	720-320-046	THRUST BEARING OILITE
29	1	070-002-584	PIN, BELL CRANK				

TABLE ASSEMBLY



GRAPHIC NUMBER TB3

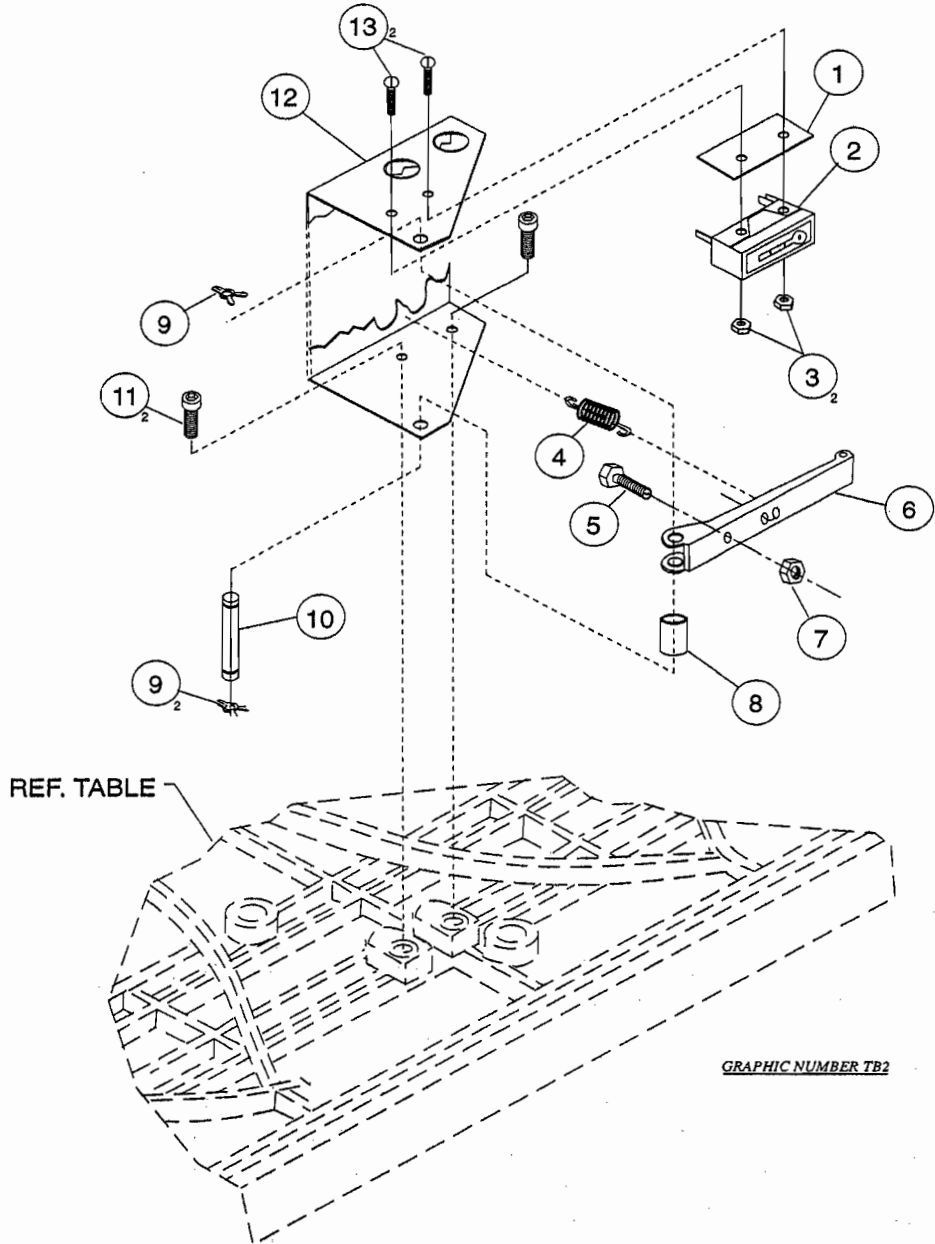
DRAWING #5.11




TABLE SWITCH ASSEMBLY
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	000-022-296	INSULATOR				
2	1	000-026-042	MICROSWITCH				
3	2	839-527-002	FLEXLOC NUT, #6-32				
4	1	000-024-657	SPRING				
5	1	000-021-714	ADJUSTING SCREW				
6	1	000-021-645	SWITCH LEVER ASSEMBLY				
7	1	835-550-002	HEX JAM NUT, 1/4 - 28				
8	1	070-006-694	SPACER				
9	2	963-200-002	X-WASHER, #9000 - 8				
10	1	070-006-693	SHAFT				
11	2	810-239-120	SOC. SCREW, 10 - 24 x 3/4 LG.				
12	1	070-006-695	TABLE SWITCH BRACKET				
13	2	818-227-162	RD. HD. SEMS SCREW, 6 - 32 x 1 LG.				

TABLE SWITCH ASSEMBLY



DRAWING #5.12





TABLE WIREWAY ASSEMBLY

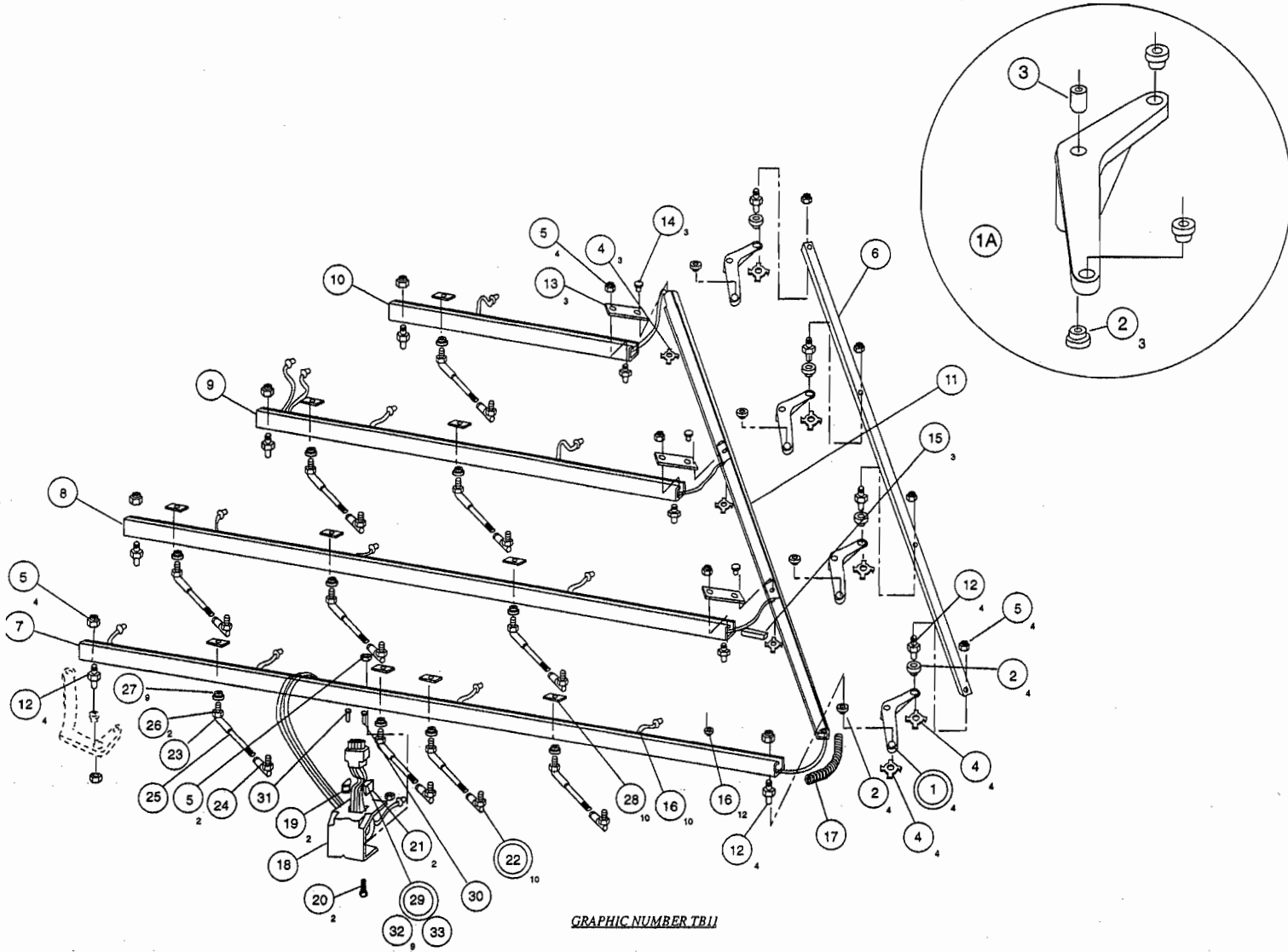
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	070-007-623	LEVER RESPOT ASS'Y. (LEVER, W / ITEMS 2)	28	10	724-507-002	TINNERMANNUT
1A		070-002-678	EVER RESPOT ASS'Y. (LEVER, WITH ITEMS 2 AND 3)	29	1	070-005-602	TABLE CABLE ASS'Y.
2	4	070-002-653	BUSHING FLANGED RESPOT LEVER	30	1	000-028-442	GUIDE PIN
3		070-002-652	BUSHING SLEEVE (USED IN ITEMS 1A)	31	1	000-028-441	GUIDE SOCKET
4	26	963-200-002	X-WASHER, #9000 - 8	32		000-025-079	BLOCK - MALE 14 PIN
5	47	844-049-002	STOVER NUT 1/4 - 20	33		760-011-197	PIN - WIRE TERMINAL
6	1	070-002-671	LINK RESPOT CONN.				
7	1	070-006-669	LINK				
7A		070-002-767	LINK				
8	1	070-002-768	LINK				
9	1	070-002-769	LINK				
10	1	070-002-770	LINK				
11	1	070-002-766	LINK - WIREWAY				
12	12	070-002-774	PIN				
13	3	070-002-771	PLATE				
14	3	070-002-772	PIN				
15	3	070-006-308	GROMMET, 2" LONG SECTION				
16	25	070-002-773	GROMMET				
17	1	770-008-009	POLY SPIRAP 5"				
18	1	070-002-538	BRACKET				
19	2	000-025-556	LOCKING SPRING CATCH				
20	2	813-949-082	HEX HD. SCREW, 1/4 - 20 x 1/2 LG.				
21	2	843-821-000	4 - 40 HEX BRASS NUT				
22	10	070-002-814	LINK ASS'Y.				
23		730-036-025	CLIP (SILVER)				
23A		730-035-025	CLIP (BROWN)				
24		730-023-015	SHELL - CUP ASS'Y.				
25		730-020-012	ROD - CLIP ASS'Y.				
26		730-027-019	STUD				
27	10	070-002-815	SPACER BUSHING				

TABLE WIREWAY ASSEMBLY



GRAPHIC NUMBER TBJJ

DRAWING #5.13





RESPOT CELL ASSEMBLY

SECTION 5

Service & Parts Manual

Parts

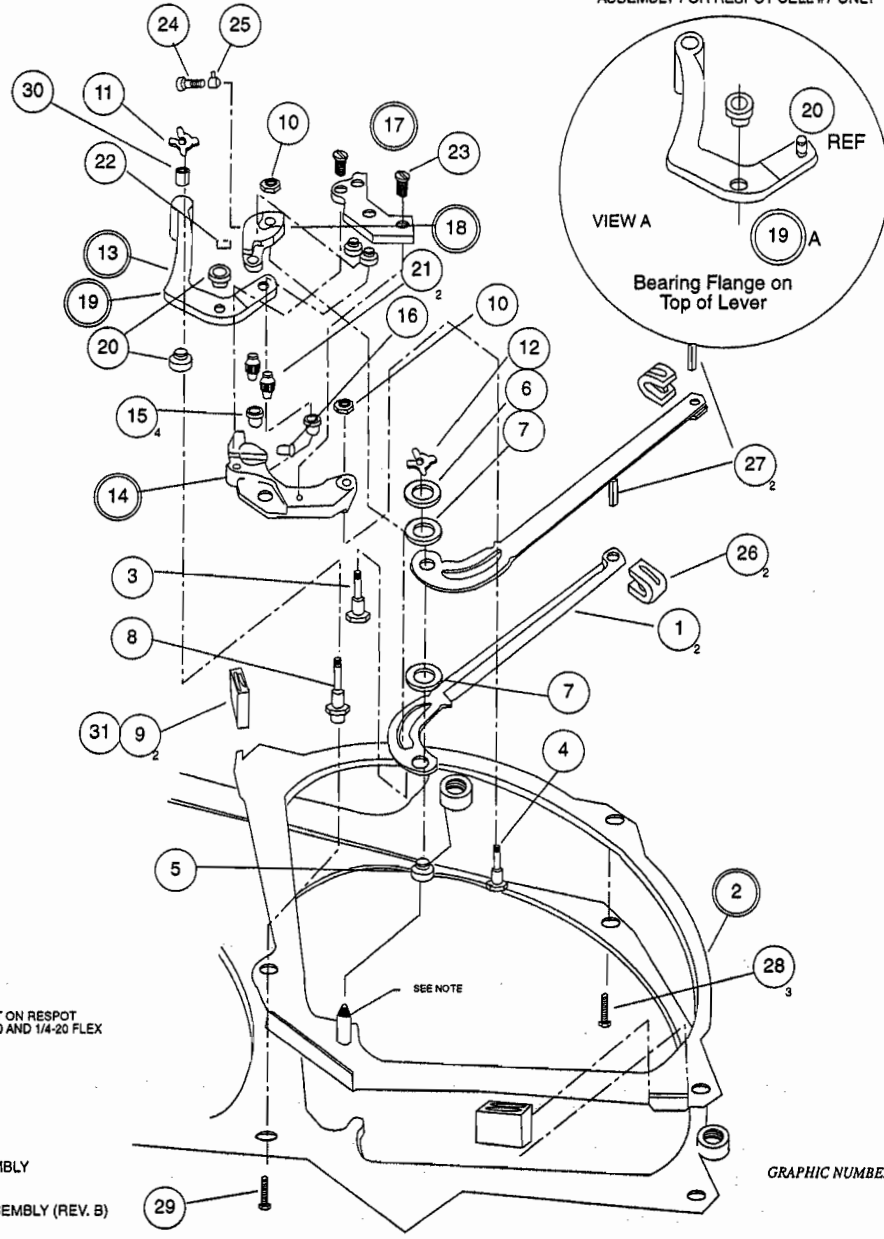
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	20	070-007-261	FINGER ASS'Y. (FINGER WITH ITEMS 26 AND 27)	21	20	070-002-645	SHAFT
2	20	070-002-792	FRAME RESPOT WELD	22	10	070-002-649	SPRING YOKE ARM
3	10	070-007-194	STUD - LONG	23	20	070-002-750	SCREW
4	10	070-007-195	STUD - SHORT	24	10	070-002-632	STOP SCREW
5	10	070-007-196	BUSHING	25	10	070-002-570	INSERT, ASS'Y.
6	10	070-007-192	WASHER	26	20	070-007-197	INSERT
7	20	070-007-193	SPACER	27	20	913-437-100	SPRING PIN 3/16 DIA. x 5/8 LG.
8*	10	070-007-617	STUD - PIVOT (5/16 DIA. SHAFT)	28	30	808-640-141	SCREW, SOC. HD. CAP #10 - 32 x 7/8 LG.
8A		070-002-654	STUD - PIVOT (1/4 DIA. SHAFT)	29	10	808-640-121	SCREW, SOC. HD. CAP #10 - 32 x 3/4 LG.
9**	20	070-002-752	BUMPER EXTRUSION	30		070-002-652	BUSHING - SLEEVE
10	29	844-049-002	STOVER LOCKNUT 1/4 - 20 AUTO GR. C.	31		008-100-413	ADHESIVE (E C 1300)
11	10	963-400-002	X-WASHER, #9000 - 12	32		070-008-154	PIN
12	10	963-200-002	X-WASHER, #9000 - 8	33		070-007-200	RESPOT CELL ASS'Y. (FOR CELLS 1 THRU 6 AND 8 THRU 10)
13	1	070-007-619	RESPOT YOKE ASS'Y. (WITH ITEMS 14, 17, 18, 19, 22 AND 23)	34		070-006-674	RESPOT CELL ASS'Y. (FOR #7 CELL ONLY)
13A		070-007-621	RESPOT YOKE ASS'Y. FOR RESPOT CELL 7 ONLY (WITH ITEMS 19A, 22 AND 23)				
14	10	070-002-629	YOKE, ARM ASS'Y (WITH ITEM 16)				
15	40	070-002-630	BUSHING YOKE				
16	10	933-623-050	RIVET - YOKE				
17	10	070-002-644	PLATE - ASS'Y (WITH ITEM 15)				
18	10	070-002-646	ARM ASS'Y. RESPOT YOKE (WITH ITEMS 21, 24, AND 25)				
19	1	070-007-618	LEVER ASS'Y. (9 CELLS) (WITH ITEM 20 UNDERSIDE AND 21)				
19A	1	070-007-620	LEVER ASS'Y. #7 CELL (WITH ITEM 20 ABOVE AND 21)				
20	10	070-002-653	BUSHING (FLANGE)				

* **NOTE:** With Item #8 No Bushings Used in Boss of Item 19.
With Item #8A Bushings are used in Boss of Item 19.

** **NOTE:** Cement item #9 to Item #2 with Item 31.

RESPOT CELL ASSEMBLY

ASSEMBLY FOR RESPOT CELL #7 ONLY

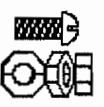


NOTE:
FOR THE WELD STUD REPLACEMENT ON RESPOT
CELL FRAME USE STUD # 070-002-650 AND 1/4-20 FLEX
LOC NUT # 840-049-002

- 33 070-007-200 RESPOT CELL ASSEMBLY
- 34 070-006-674 RESPOT CELL #7 ASSEMBLY (REV. B)

GRAPHIC NUMBER: ES4

DRAWING #5.14





#7 - REV A - RESPOT CELL ASSEMBLY

SECTION 5

Service & Parts Manual

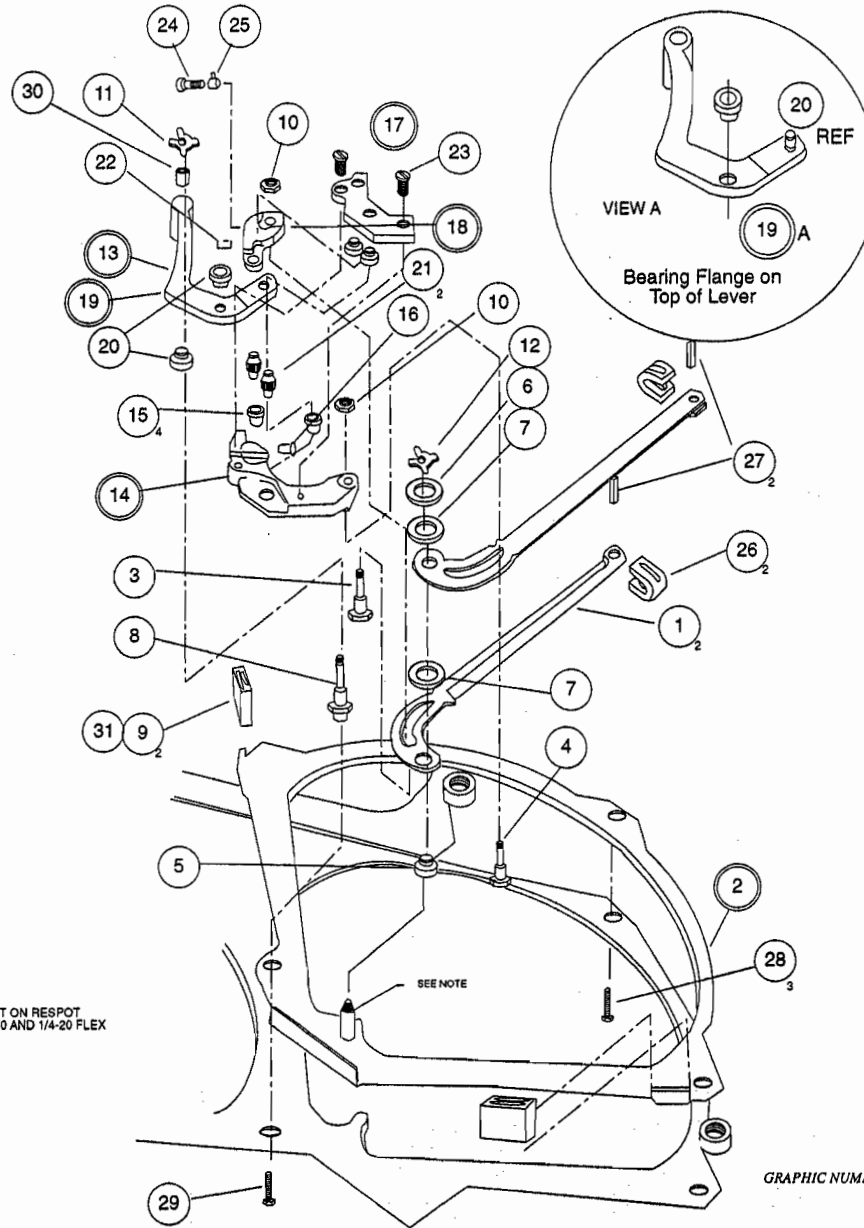
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1		070-007-261	FINGER ASSEMBLY	19A		610-704-026	KIT LEVER RESPOT ARM (VIEW A)
2		070-002-655	FRAME ASSEMBLY (WITH ITEMS 8A, 9 AND 31)	20		070-002-653	BUSHING
2A		070-002-686	FRAME ASSEMBLY (WITH ITEMS 8, 9, AND 31)	21		070-002-645	SHAFT
3		070-007-194	STUD - LONG	22		070-002-649	SPRING
4		070-007-195	STUD - SHORT	23		070-002-750	SCREW
5		070-007-196	BUSHING	24		070-002-632	STOP SCREW
6		070-007-192	WASHER	25		070-002-570	INSERT, ASSEMBLY
7		070-007-193	SPACER	26		070-007-197	INSERT
8		070-002-685	STUD - PIVOT (1/4" DIA. WITH SHOULDER)	27		913-437-100	SPRING PIN, 3/16 DIA x 5/8 LG.
8A		070-002-654	STUD - PIVOT (1/4" DIA.)	28		808-640-141	SOC. HD. CAP SCREW, #10 - 32 x 7/8 LG.
9*		070-002-752	BUMPER EXTRUSION	29		808-640-121	SOC. HD. CAP SCREW, #10 - 32 x 3/4 LG.
10		844-049-002	STOVER LOCKNUT 1/4 - 20	30		070-002-652	BUSHING - SLEEVE
11		963-100-002	X-WASHER, #9000 - 6	31		008-100-413	ADHESIVE (E C 1300)
12		963-200-002	X-WASHER, #9000 - 8	32		070-008-154	PIN
13		070-006-677	RESPOT YOKE ASSEMBLY (WITH ITEMS 14, 17, 18, 19, 22, AND 23)				
13A		070-002-642	YOKE ASSEMBLY (WITH ITEMS 14, 17, 18, 19A, 22 AND 23)				
14		070-002-629	YOKE ASSEMBLY (WITH ITEMS 15 AND 16)				
15		070-002-630	BUSHING				
16		933-623-050	RIVET				
17		070-002-644	PLATE - YOKE (WITH ITEM 15)				
18		070-002-646	ARM RESPOT YOKE (WITH ITEMS 21, 24, AND 25)				
19		070-006-673	LEVER RESPOT ARM (WITH ITEMS 20, 21, AND 30)				

* NOTE: CEMENT ITEM #9 TO ITEM #2 WITH ITEM #31

#7 - REV A - RESPOT CELL ASSEMBLY

ASSEMBLY FOR RESPOT CELL #7 ONLY



NOTE:
FOR THE WELD STUD REPLACEMENT ON RESPOT
CELL FRAME USE STUD # 070-002-650 AND 1/4-20 FLEX
LOC NUT # 840-049-002

GRAPHIC NUMBER: ES3

DRAWING #5.15





YOKE AND SPOTTING CUP ASSEMBLY

SECTION 5

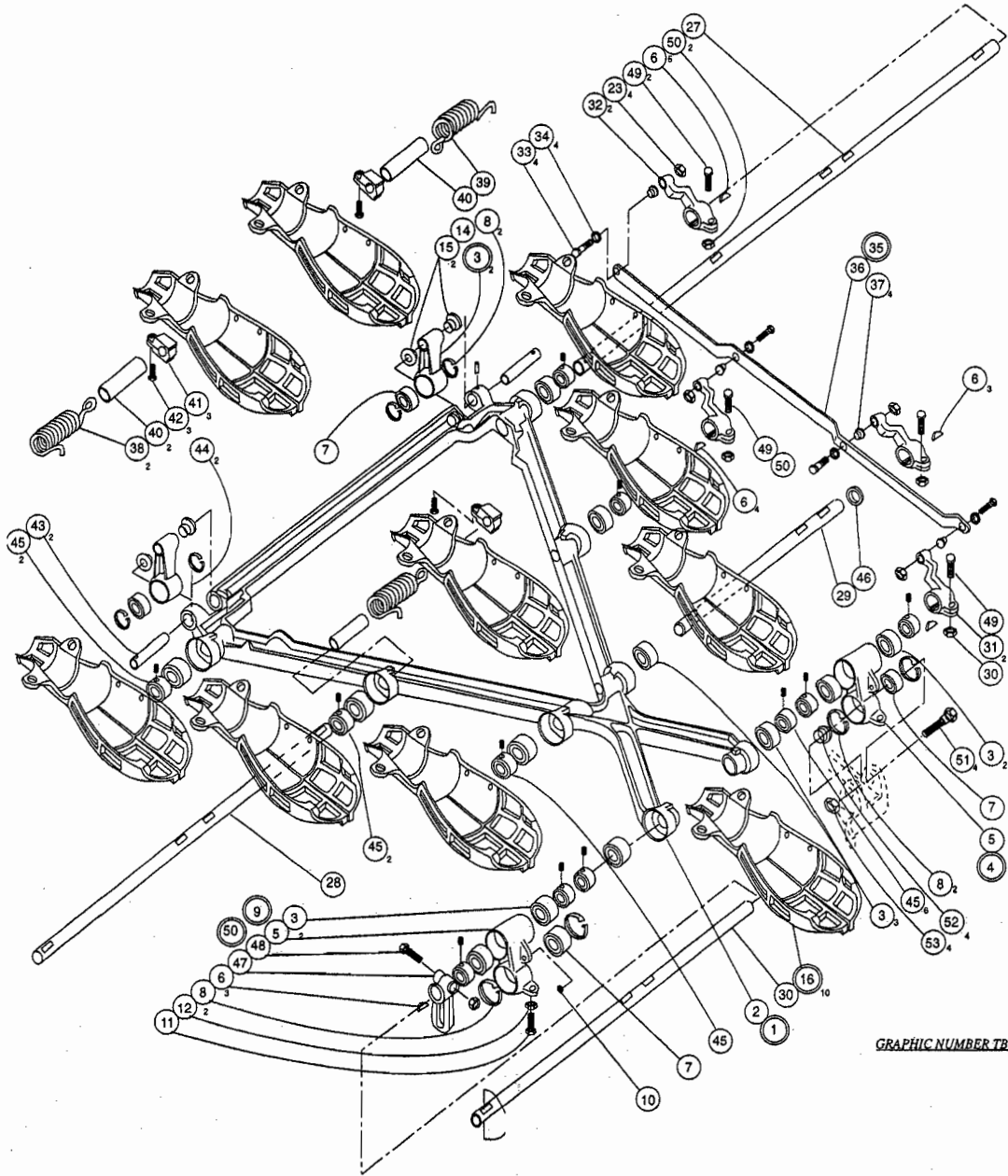
Service & Parts Manual

Parts

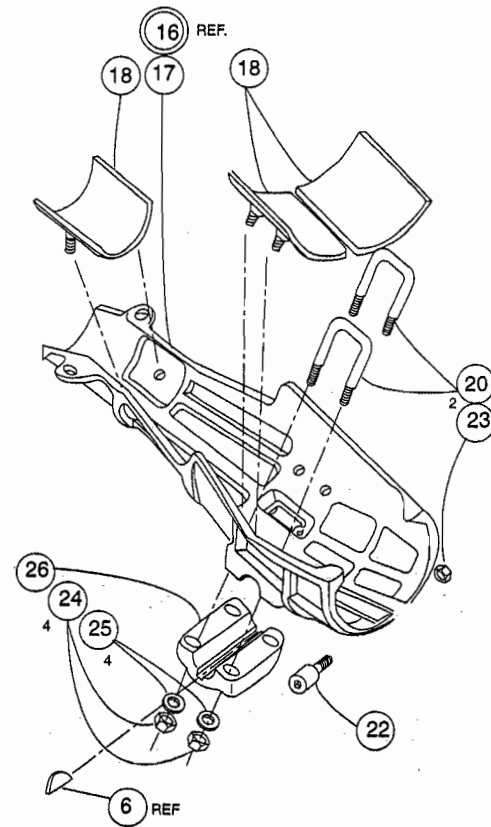
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1		070-002-623	YOKE AND BEARING ASSEMBLY	26	10	070-002-788	CAP
2*	2	070-002-683	YOKE	27	1	070-002-618	SHAFT #4
3	8	190-001-490	BEARING	28	1	070-002-617	SHAFT #3
4		070-002-663	FRONT LEG ASS'Y., R.H. (WITH ITEMS 3, 5, 7 AND 8)	29	1	070-002-616	SHAFT #2
5	2	070-002-667	LEG	30	1	070-002-615	SHAFT #1
6	15	907-000-600	KEY, HI - PRO #706	31	2	070-002-602	LEVER - INNER
7	4	070-002-698	BUSHING - SPHERICAL	32	2	070-002-603	LEVER - OUTER
8	8	919-000-700	RETAINING RING (N-5000-156)	33	4	070-002-723	PIN
9		070-002-664	FRONT LEG ASS'Y., L.H. (WITH ITEMS 3, 5, 7, 8, 10, 11 AND 12)	34	4	701-310-036	THRUST BEARING
10	1	724-517-107	RING COMPRESSION (TINN. C 2122 - 025)	35		070-002-612	TIE LINK ASS'Y
11	1	806-265-240	SET SCREW SQ. HD. CUP POINT 3/8 - 16 x 1-1/2 LG.	36	1	070-002-611	LINK
12	1	835-565-002	JAM NUT CAD. PL., 3/8 - 16	37	4	900-205-053	FLANGE BEARING
13		070-002-665	REAR LEG ASS'Y. (WITH ITEMS 7, 8, 14 AND 15)	38	1	070-002-688	SPRING R.H.
14	2	070-002-666	LEG - REAR	39	1	070-002-689	SPRING L.H.
15	4	000-023-114	FLANGED BUSHING	40	3	070-002-719	SPRING SLEEVE
16		070-002-808	SPOTTING CUP ASSEMBLY	41	3	070-002-608	COLLAR SPRING
17	10	070-002-809	SPOTTING CUP	42	3	810-258-160	SOC. HD. CAP SCREW, 5/16 - 24 x 1 LG.
18	30	070-002-784	LINER	43	2	070-002-609	PIN
19				44	2	913-437-240	ROLL PIN, .187 O.D. x 1-1/2 LG.
20	10	070-002-787	"U" BOLT	45	11	000-025-549	COLLAR WITH SET SCREW
21		070-002-818	WASHER (NOT USED)	46	1	070-002-620	SPACER
22	10	810-249-200	SOC. HD. CAP. SCREW, 1/4 - 20 X 1-1/4 LG.	47	1	070-002-624	ARM - ACTUATOR
23	14	844-049-002	STOVER LOCK NUT 1/4 - 20	48	1	809-865-365	HEX HD. CAP SCREW, 3/8 - 16 x 2-1/4 LG.
24	40	844-057-002	NUT ESNA 5/16 - 18	49	4	809-865-245	HEX HD. CAP SCREW, 3/8 - 16 x 1-1/2 LG.
25	40	948-761-112	WASHER, PIN 1-1/16 O.D. x 11/32 I.D. x 1/16 THK.	50	5	839-665-002	STOVER LOCKNUT 3/8 - 16
				51	4	070-002-701	STUD
				52	4	070-002-573	SPACER
				53	4	840-381-002	NUT 5/8 - 11 FLEX LOCK

*NOTE: FOR YOKE (CRACKED) REPAIR KIT ORDER 610-704-011

YOKE AND SPOTTING CUP ASSEMBLY



SPOTTING CUP ASSEMBLY
070 002 808



GRAPHIC NUMBER TB7

DRAWING #5.16





TABLE TORQUE TUBE ASSEMBLY

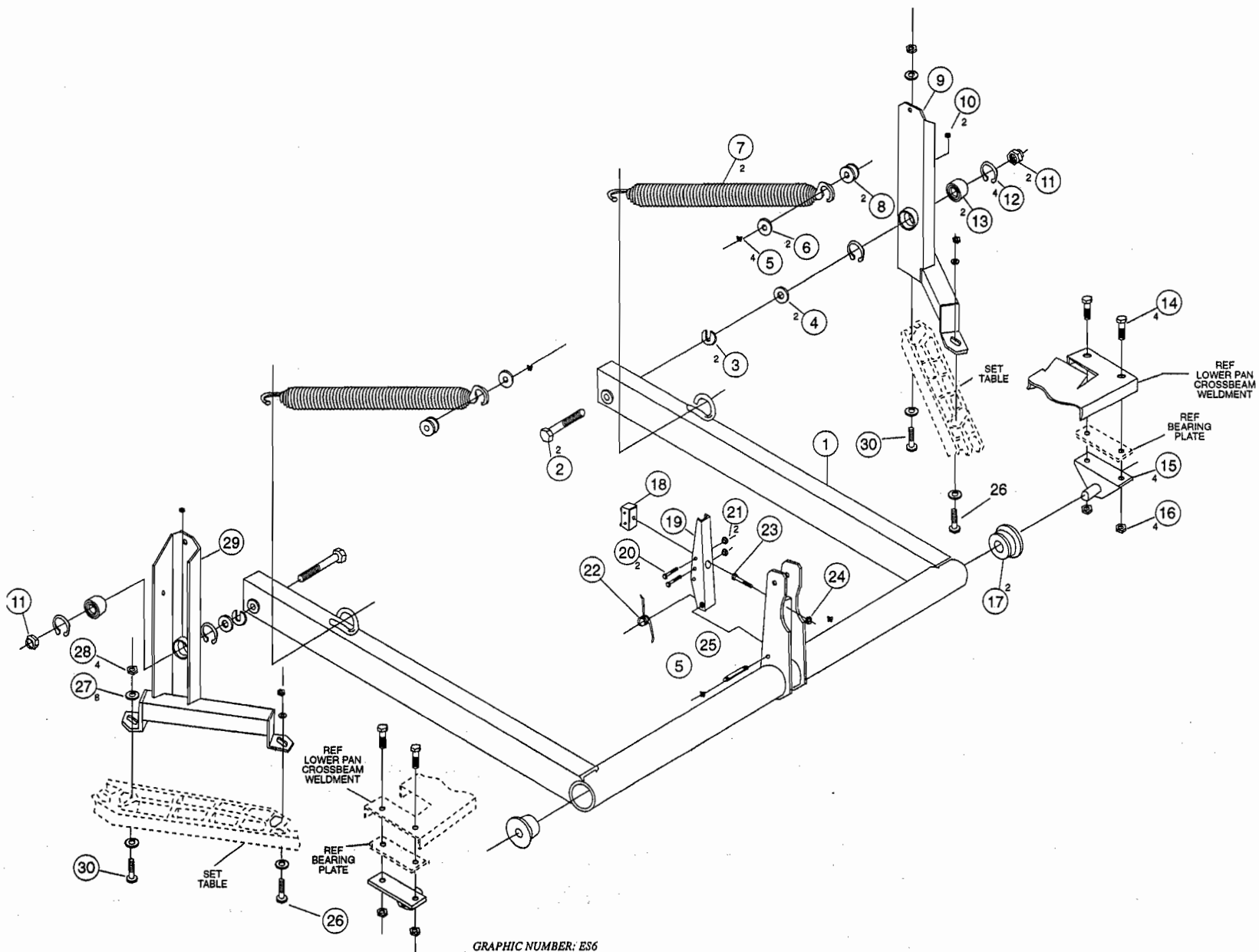
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-008	TABLE TORQUE TUBE WELDMENT	25	1	070-001-591	PIN
2	2	809-881-640	HEX HD. CAP SCREW, 5/8 - 11 x 4 LG.				TABLE ARM OVER-TRAVEL LEVER ASSEMBLY (INCLUDES ITEMS: 5 & 18 THRU 25)
3	6	070-007-752	SPACER	26	2	809-869-245	HEX HD. CAP SCREW, 7/16 - 14 x 2-1/2 LG.
4	2	070-007-302	SPACER	27	4	949-100-002	PLAIN WASHER, .922 O.D. x .468 I.D. x .06 THK.
5	4	963-400-002	X-WASHER, #9000-12	28	4	844-069-002	STOVER LOCK NUT, 7/16 - 14
6	2	945-867-242	PLAIN WASHER, 1.50 O.D. x .406 I.D. x 0.5 THK.	29	1	070-007-296	TABLE SUPPORT WELDMENT, L.H.
7	2	000-022-782	SPRING	30	2	809-869-325	HEX HD. CAP SCR. 7/16 - 14 x 2-1/2 LG.
8	2	070-001-668	SPRING ROLLER				
9	1	070-007-295	TABLE SUPPORT WELDMENT, R.H.				
10	2	710-501-009	GREASE FITTING, ALEMITE # 3006				
11	2	844-081-002	STOVER LOCK NUT, 5/8 - 11				
12	4	919-000-700	RETAINING RING, # 5000-156				
13	2	070-002-698	SPHERICAL BUSHING				
14	4	809-865-245	HEX HD. CAP SCREW 3/8 - 16 x 1-1/2 LG.				
15	2	090-004-007	TORQUE TUBE HANGER ASSEMBLY				
16	4	840-065-002	FLEX LOC NUT, 3/8 - 16				
17	2	090-005-015	TORQUE TUBE BEARING				
18	1	000-026-042	MICROSWITCH				
19	1	070-001-852	TABLE ARM OVER-TRAVEL LEVER				
20	2	818-227-202	SEMS ROUND HD. SCREW, 6 - 32 x 1-1/4 LG.				
21	1	843-127-002	KEPS HEX LOCK NUT, 6 - 32				
22	1	070-001-853	TABLE ARM OVER-TRAVEL LEVER ARM				
23	1	070-001-854	TABLE ARM OVER-TRAVEL LEVER SPECIAL SCREW				
24	1	835-549-002	FLEX LOC NUT, 1/4 - 20				

TABLE TORQUE TUBE ASSEMBLY



GRAPHIC NUMBER: ES6

DRAWING #5.17





TIE ROD ASSEMBLIES

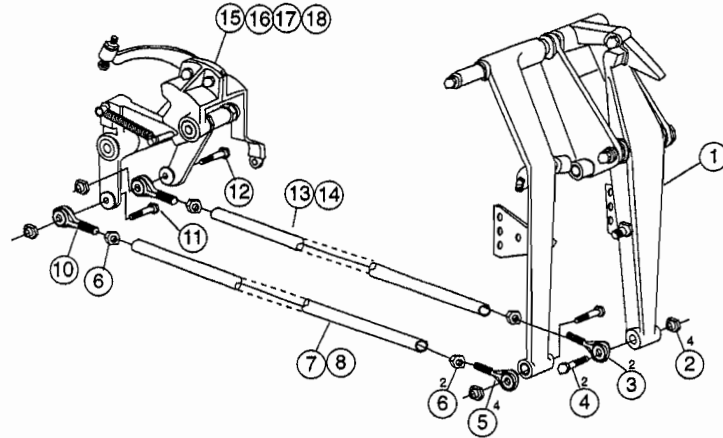
SECTION 5

Service & Parts Manual

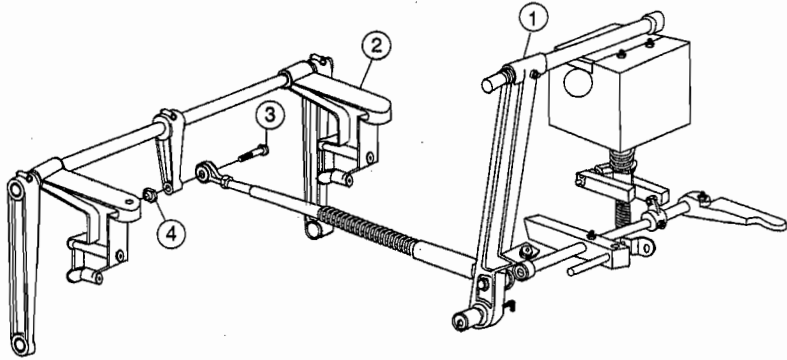
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
SPOT & RESPOT TIE ROD ASSEMBLY				TABLE TIE ROD ASSEMBLY			
1	1	070-006-481	SPOT & RESPOT LINK ASSEMBLY	1	1	090-004-001	CROSSBEAM WELDMENT
2	4	844-069-002	STOVER LOCK NUT, 7/16 - 14	2	4	844-069-002	STOVER LOCK NUT, 7/16 - 14
3	2	000-025-004	END FITTING, R.H.	3	1	949-100-002	PLAIN WASHER, 15/32 I.D. x 59/64 O.D. x 1/16 THK.
4	2	809-869-365	HEX HD. CAP SCREW, 7/16 - 14 x 2-1/4 LG.	4	2	710-501-013	GREASE FITTING, ALEMITE #3019
5	4	710-501-013	GREASE FITTING, ALEMITE #3019	5	1	809-865-405	HEX HD. CAP SCREW, R.H. 7/16 - 14 x 2-1/2 LG.
6	2	835-570-002	HEX JAM NUT, 7/16 -20, R.H.			809-869-365	HEX HD. CAP SCREW, L.H. 7/16 - 14 x 2-1/4 LG.
7	1	070-001-601	RESPOT TIE ROD ASSEMBLY	6	1	000-025-004	END FITTING, R.H.
8	1	070-001-606	RESPOT TIE ROD	7	1	835-570-002	HEX JAM NUT, 7/16 - 20, R.H.
9	2	835-670-002	HEX JAM NUT, 7/16 - 20, L.H.	8	1	070-001-557	TABLE TIE ROD
10	2	000-025-005	END FITTING, L.H.	9	1	070-001-558	TABLE TIE ROD ASSEMBLY
11	1	809-869-245	HEX HD. CAP SCREW, 7/16 - 14 x 1-1/4 LG.	10	1	835-670-002	HEX JAM NUT, 7/16 - 20, L.H.
12	1	809-869-285	HEX HD. CAP SCREW, 7/16 - 14 x 1-3/4 LG.	11	1	000-025-005	END FITTING, L.H.
13	1	070-001-607	SPOT TIE ROD	12	1	070-007-303	SPACER, 7/16 I.D.
14	1	070-001-602	SPOT TIE ROD ASSEMBLY	13	1	070-007-295	TABLE SUPPORT WELDMENT, R.H.
15	1	070-002-578	SPOT LEVY ASSEMBLY			070-007-276	TABLE SUPPORT WELDMENT, L.H.
16	1	070-002-727	SHIFTER LINK ASSEMBLY	14	2	809-869-325	HEX HD. CAP SCREW, 7/16 - 14 x 2 LG.
17	1	070-002-728	CAM LINK ASSEMBLY			949-100-002	WASHER
18	1	070-002-595	RESPOT LINK ASSEMBLY				
SHUTTLE TIE ROD ASSEMBLY							
1	1	090-003-655	SOLENOID OPERATED SHUTTLE ASSEMBLY				
2	1	070-006-350	BIN ASSEMBLY				
3	1	809-865-245	HEX HD. CAP SCREW, 3/8 - 16 x 1-1/2 LG.				
4	1	844-065-002	FLEX LOC NUT, 3/8 - 16				

TIE ROD ASSEMBLIES



SPOT & RESPOT TIE ROD ASSEMBLY



SHUTTLE TIE ROD ASSEMBLY

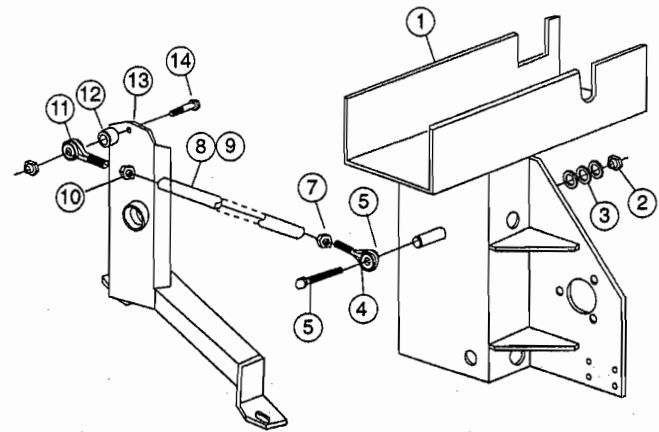


TABLE ROD ASSEMBLY

DRAWING #5.18

GRAPHIC NUMBER: ESS





SHUTTLE ASSEMBLY

SECTION 5

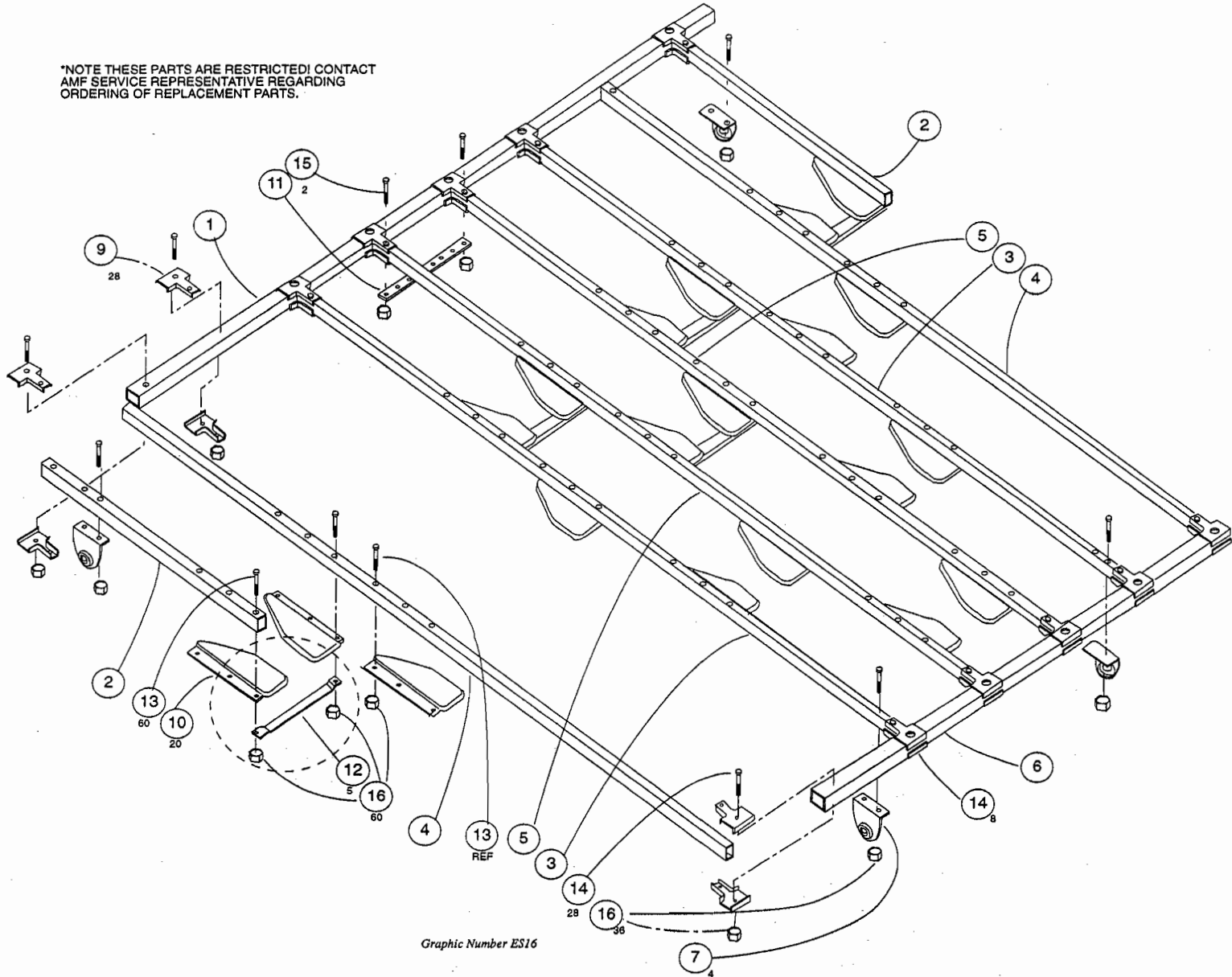
Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-006-253	TUBE, CROSS (LONG)	13	60	808-549-240	SCREW, SOC. BUTTON HD. (1/4 - 20 x 1-1/2 LG.)
2	2	070-006-254	TUBE, SIDE (SHORT)	14	38	809-849-245	SCREW, HEX HD. CAP (1/4 - 20 x 1-1/2 LG.)
3	2	070-006-255	TUBE, SIDE (LONG)	15	2	809-849-285	SCREW, HEX. HD. CAP (1/4 - 20 x 1-3/4 LG.)
4	2	070-006-256	TUBE, OUTSIDE	16	96	844-049-002	NUT, HEXLOCK (STOVER 1/4 - 20)
5	2	070-006-257	TUBE, CENTER				
6	1	070-006-258	TUBE, CROSS (SHORT)				
7	4	070-006-259	BRACKET, ARM				
8		070-006-260	BUMPER, COUNTER (NOT USED)				
9	28	070-006-261	CLAMP, END				
10	20	070-006-265	PIN HOLDER ASSEMBLY				
11	1	070-006-266	STRAP, (7) HOLE				
12	5	070-006-268	STRAP, (REV A) (USED 5-7-8-9-10 PIN)				

SHUTTLE ASSEMBLY

*NOTE THESE PARTS ARE RESTRICTED! CONTACT
AMF SERVICE REPRESENTATIVE REGARDING
ORDERING OF REPLACEMENT PARTS.



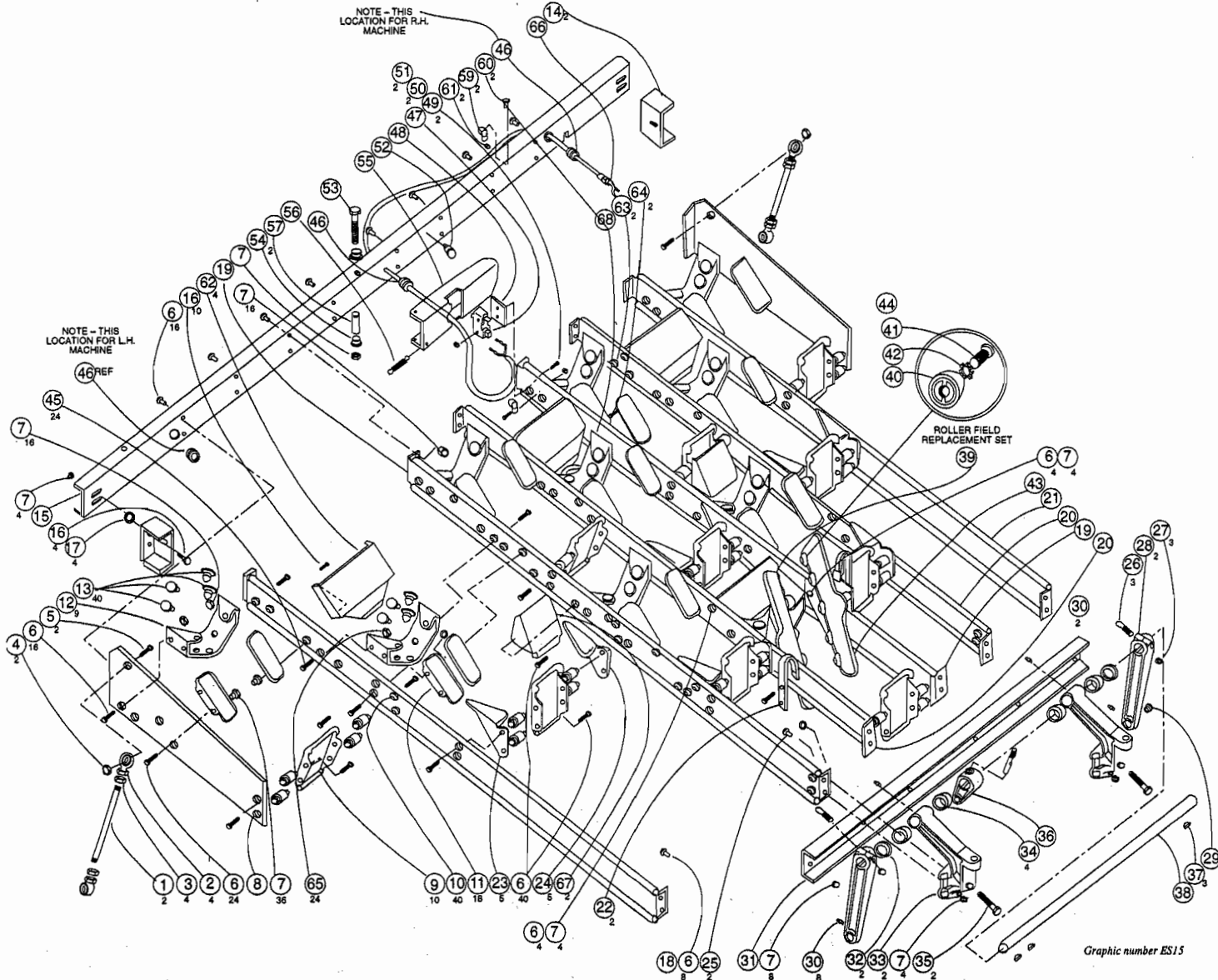
DRAWING #5.19

Graphic Number ES16



ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1		070-006-351	ROD	37		907-000-600	HI - PRO KEY (HP 706)
2		000-026-446	ROD END WITH 710-502-010 LUBE FITTING	38		070-006-402	SHAFT
3		835-566-002	HEX JAM NUT, 3/8 - 24	39		070-006-386	TRACK ASSEMBLY, L.H.
4		844-065-002	HEX LOCK NUT, 3/8 - 16	40		000-026-251	BEARING (ROLLER) (THREADED FOR FIELD USE ONLY)
5		809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1 LG.	41		813-540-082	SCREW, PHILLIPS TRUSS HEAD 10 - 32 x 1/2 LG.
6		809-849-085	HEX HD. CAP SCREW, 1/4 - 20 x 1/2 LG	42		957-100-002	WASHER SHAKE PROOF EXT. #10
7		844-049-002	HEX STOVER LOC NUT, 1/4 - 20	43		070-006-388	TRACK ASSEMBLY R.H.
8		070-006-370	PIN GUIDE L.H.	44		070-006-369	PIN GUIDE R.H.
9		070-006-364	SPACER - PIN BUTT GUIDE	45		808-549-080	BUTTON SOC. HD. CAP SCREW 1/4 - 20 x 1/2 LG.
10		070-006-354	SHOCK MOUNT	46		711-516-020	GROMMET - ATLANTIC # 2861
11		070-006-353	PIN GUIDE	47		000-026-043	SWITCH (BZ - 2RD - D2)
12		070-006-359	PIN HEAD BRACKET	48		000-021-575	INSULATOR
13		000-021-992	BUMPER	49		818-227-162	SCREW - SEMS ROUND HEAD 6 - 32 x 1 LG.
14		070-006-371	SUPPORT BRACKET	50		843-127-002	KEP NUT, 6 - 32
15		070-006-360	CHANNEL WELDMENT	51		948-631-062	FLAT WASHER, 3/8 O.D. x 5/32 I.D. x .046 THK
16		809-849-125	HEX HD. CAP SCREW, 1/4 - 20 x 3/4 LG	52		070-006-142	BUMPER
17		948-753-102	FLAT WASHER, 5/8 O.D. x 9/32 I.D. x .062 THK.	53		809-849-605	HEX HD. CAP SCREW, 1/4 - 20 x 3-3/4 LG.
18		070-006-377	STRINGER OUTSIDE L.H. (6)	54		900-206-091	FLANGE BEARING
19		070-006-372	STRINGER CENTER R.H. & L.H. (3+5)	55		070-006-356	SWITCH ACTUATOR
20		070-006-373	STRINGER CENTER R.H. & L.H. (2+4)	56		000-022-168	SPRING
21		070-006-376	STRINGER OUTSIDE R.H. (1)	57		070-006-108	SPACER
22		070-006-389	GUIDE NO. 1 PIN	58			
23		070-006-381	PIN GUIDE NO. 6 PIN	59		744-203-014	NYLOCLIP BRUNDY HP6N
24		070-006-380	PIN GUIDE NO. 4 PIN	60		818-233-082	SCREW - SEMS RD. HD., 8 - 32 x 1/2 LG.
25		809-849-285	HEX HD. CAP SCREW 1/4 - 20 x 1-3/4 LG	61		843-133-002	KEP NUT, 8 - 32
26		070-006-403	STUD CLAMP	62		070-006-366	SPACER PIN HEAD GUIDE
27		831-565-002	HEX NUT STD. , 3/8 - 16	63		070-006-390	SPACER
28		070-006-429	SHUTTLE OPERATING ARM ASS'Y.	64		809-849-165	HX. HD. CAP SCREW, 1/4 - 20 x 1 LG.
29		000-029-614	HEIM - UNIBAL.	65		840-049-002	FLEXLOC NUT, 1/4 - 20 N.C.
30		710-501-007	GREASE FITTING, ALEMITE (1792 - B)	66		746-001-016	CONNECTOR, STRAIGHT
31		070-006-363	SHORT CHANNEL	67		070-006-365	SPACER PIN GUIDE (4 & 6)
32		701-329-050	WASHER - THRUST OILITE (TT 1503)	68		070-006-384	BRACKET WELDMENT. PIN HEAD
33		070-006-358	BRACKET ASS'Y. - BIN ASS'Y.				
34		900-114-101	BEARING - SLEEVE				
35		809-849-485	HEX HD. CAP SCREW, 1/4 - 20 x 3 LG.				
36		070-006-408	LEVER BIN ASSEMBLY				

BIN ASSEMBLY



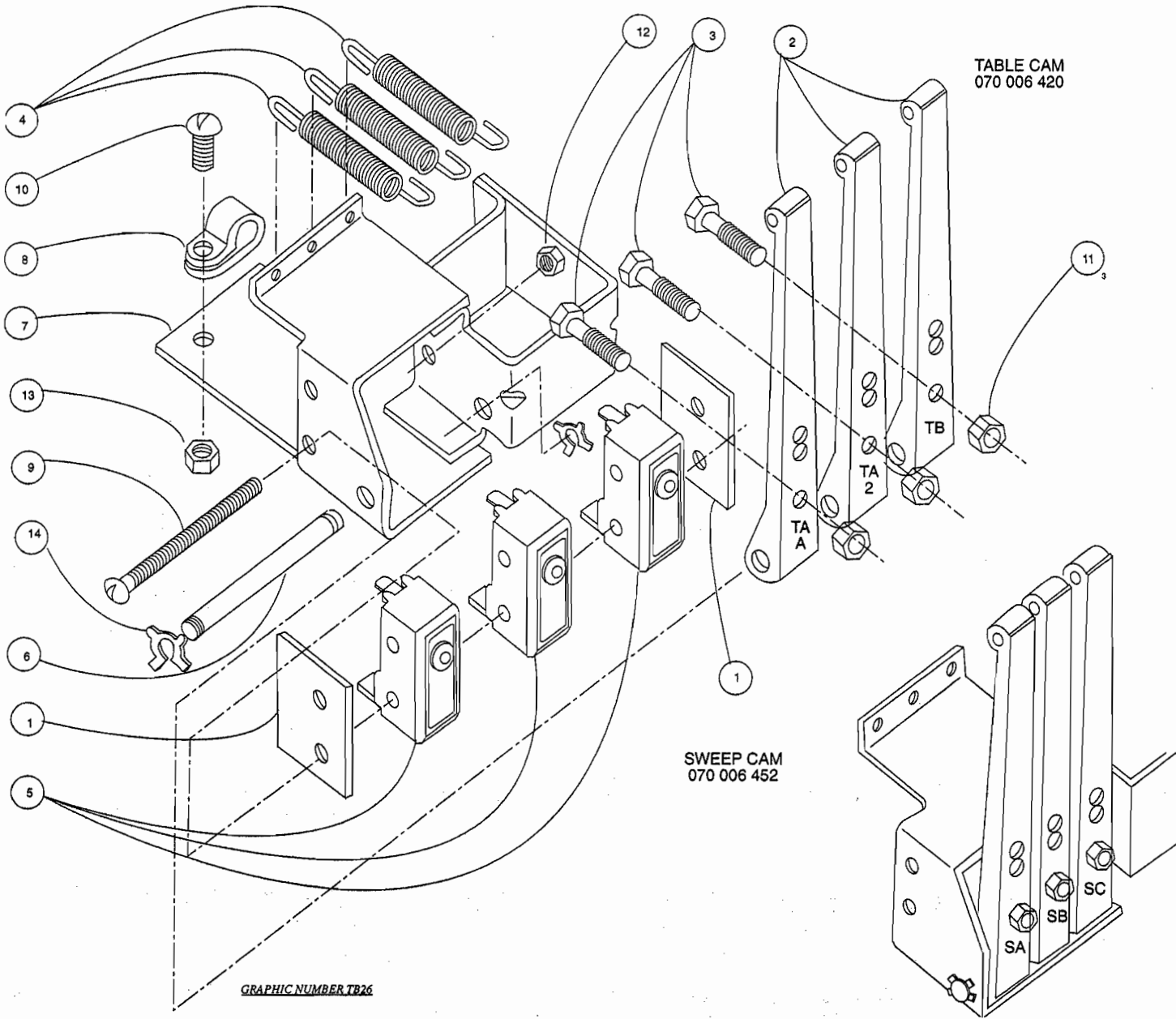
DRAWING #5.20




**SWEEP AND TABLE CAM
SWITCH ASSEMBLY**
SECTION 5
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Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1		000-021-575	INSULATOR				
2		000-021-644	SWITCH LEVER				
3		000-021-714	ADJUSTING SCREW				
4		000-024-657	SPRING				
5		000-026-042	SWITCH				
6		000-026-401	SHAFT				
7		000-026-419	HOUSING WELDMENT				
8		744-107-015	NYLOCLIP - BURNDY HP6N				
9		818-227-402	SCREW, SEMS RD. HD., #6 - 32 x 2-1/2 LG.				
10		818-233-082	SCREW, SEMS RD. HD., #8 - 32 x 1/2 LG.				
11		835-550-002	NUT, HEX JAM (1/4 - 28)				
12		843-127-002	NUT, KEPS (#6 - 32)				
13		843-133-002	NUT, KEPS (#8 - 32)				
14		963-200-002	X-WASHER, #9000 - 8				

SWEEP AND TABLE CAM SWITCH ASSEMBLY



DRAWING #5.21





SWEEP BAR MOUNTING ASSEMBLY

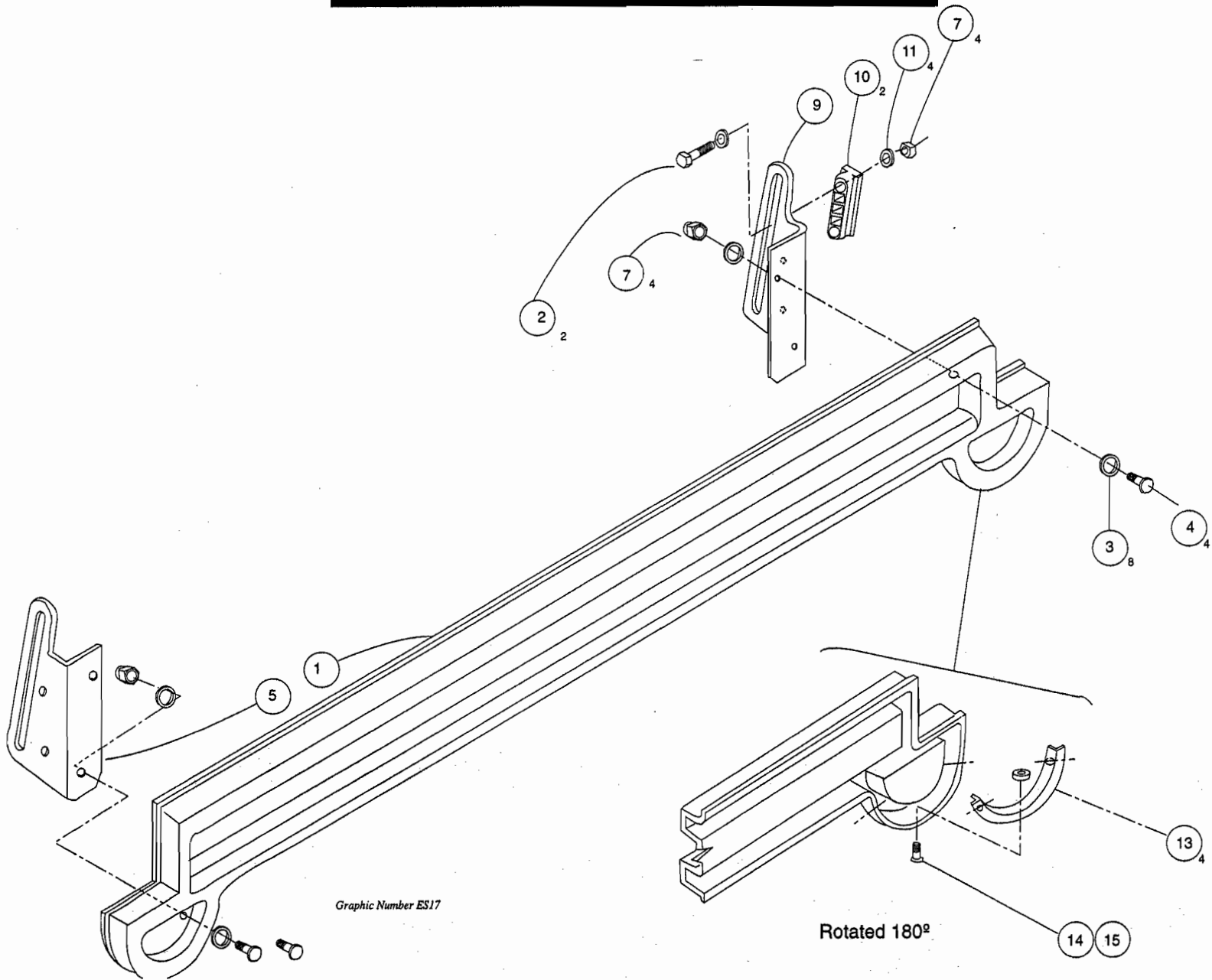
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	300-000-167	SWEEP BAR ASSEMBLY	10	2	000-023-182	SLIDE BAR
2				11	4	948-761-112	WASHER, 11/16 O.D. x 11/32 I.D. x 1/16 THK.
3	4	948-722-111	WASHER - BLACK OXIDE, 11/16 O.D. x 11/32 I.D. x 1/16 THK.	12			
4	4	808-557-140	SCREW, SOC. BUTT HD. 5/16 - 18 x 7/8 LG.	13	2	300-000-175	CAP - SWEEP BAR
5	1	300-000-171	BRACKET - SWEEP MOUNTING, L.H.	14	6	938-637-100	RIVET - POP 3/16 DIAMETER ALUMINUM
6	4	809-857-245	SCREW - HEX HD. CAP, 5/16 - 18 x 1-1/2 LG. (GR - 8)	15	6	749-537-068	WASHER - BACKUP 3/16 POP RIVET
7	4	844-057-002	NUT STOVER LOCK 5/16 - 18				
8	4	830-057-002	NUT - ACORN 5/16 - 18 (PLATED)				
9	1	300-000-170	BRACKET - SWEEP MOUNTING, R.H.				

SWEEP BAR MOUNTING ASSEMBLY

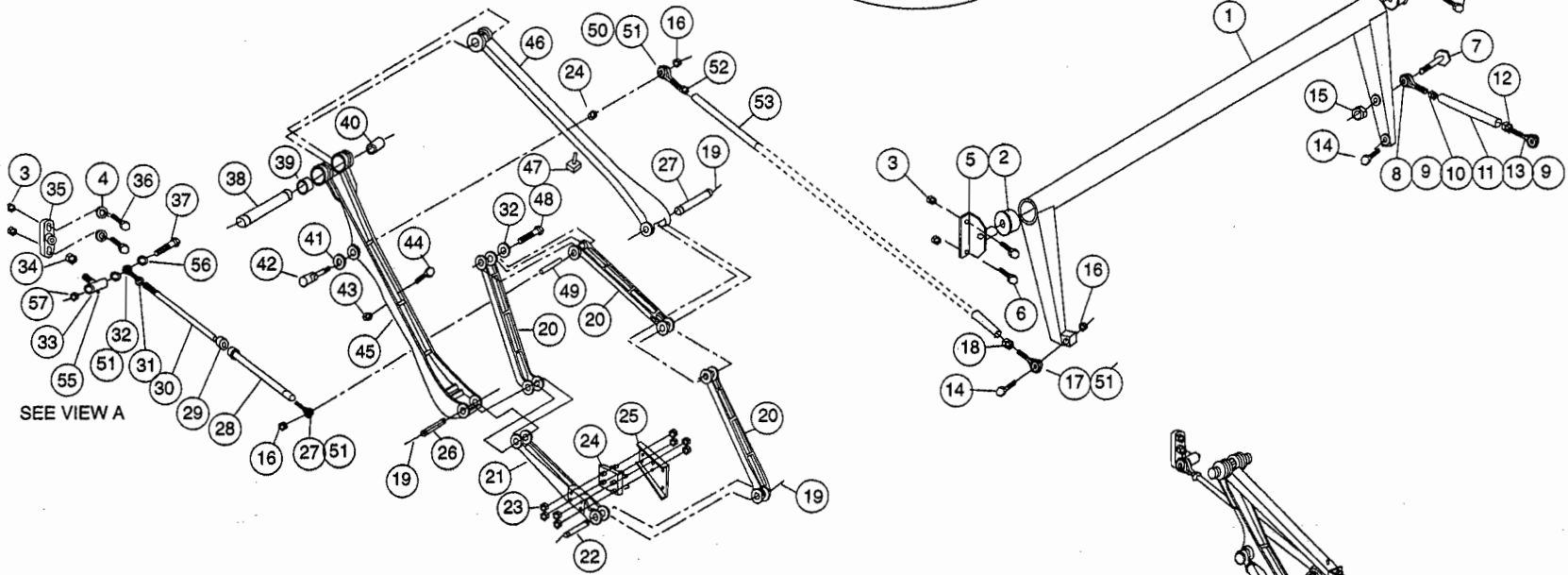
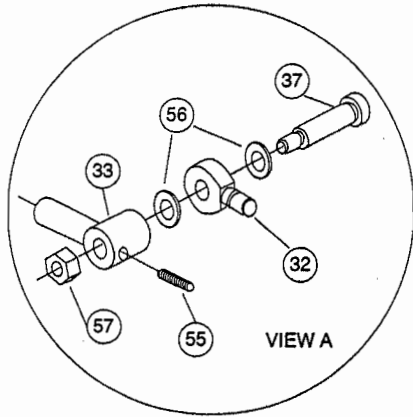


DRAWING #5.22



ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-009	SWEEP ROCKER ARM ASSEMBLY	35	1	070-003-222	BRACKET, SHOCK MOUNT
2	2	090-005-015	BEARING	36	2	809-865-565	HEX HD. CAP SCREW, 3/8 - 16 x 3-1/2 LG.
3	4	839-665-002	FLEXLOC NUT, 3/8 - 16	37	1	808-465-080	.5" SOCKET HD. SHOULDER SCR.
4	4	948-761-112	WASHER, 13/16 O.D. x 13/32 I.D. x .06 THK	38	1	070-003-106	SHAFT MAIN PIVOT
5	2	090-004-007	PILLOW BRACKET	39	1	070-003-233	SPACER - MAIN PIVOT - SHORT
6	4	809-865-285	HEX HD. CAP SCREW, 7/16 - 14 x 2-1/2 LG.	40	1	070-003-232	SPACER - MAIN PIVOT - LONG
7	1	070-003-243	SCREW	41	1	070-003-117	SPACER
8	1	000-023-161	END FITTING, L.H.	42	1	070-003-231	PIN BEARING
9	1	710-502-011	GREASE FITTING (NOT SHOWN)	43	1	839-665-002	FLEXLOC NUT, 3/8 - 16
10	1	835-674-002	HEX JAM NUT, 1/2 - 20 L.H. THREAD	44	1	070-003-221	SCREW
11	1	070-003-159	TUBE	45	1	070-003-158	DRIVE LINK ASSEMBLY
12	1	835-574-002	HEX JAM NUT, 1/2 - 20 R.H. THREAD	46	1	090-003-903	STABILIZING LINK ASSEMBLY
13	1	000-023-160	END FITTING, R.H.	47	1	000-023-216	BUMPER
14	2	809-869-365	HEX HD. CAP SCREW, 7/16 - 14 x 2-1/4 LG.	48	1	070-003-235	SCREW BEARING
15	1	844-073-002	STOVER LOCK NUT, 7/16 - 14	49	1	070-003-173	SLEEVE BEARING
16	3	844-070-002	STOVER LOCK NUT, 7/16 - 20	50	1	000-025-005	END FITTING
17	1	000-025-004	END FITTING, R.H.	51	4	710-501-013	GREASE FITTING
18	1	835-570-002	HEX JAM NUT, 7/16 - 20 R.H. THREAD	52	1	835-670-002	HEX JAM NUT, 7/16 - 20 L.H.
19	6	919-010-700	RETAINER "E" RING, #5133 - 62	53	1	070-003-116	TUBE
20	3	090-003-901	LINK ASSEMBLY	54	1	000-023-646	PLAIN WASHER, .81 O.D. x .40 I.D. x .06 THK.
21	1	090-003-902	SUPPORT LINK ASSEMBLY	1	070-003-162	MOTOR CONNECTING ROD ASSY. (ITEMS 8 THRU 13)	
22	1	070-003-189	PIN BEARING	1	070-003-245	DRIVE LINK - CONNECTING ROD ASSY. (ITEMS 17, 18, 50, 51, 52, 53)	
23	4	844-057-002	STOVER NUT, 5/16 - 18	1	070-007-280	TELESCOPING LINK ASSY. (ITEMS 27 THRU 32, & 51)	
24	1	070-003-195	SHOCK MOUNT ASSEMBLY	1	070-003-190	SHOCK BRACKET R.H. (NOT SHOWN)	
25	1	070-003-191	SHOCK BRACKET, L.H.	1	809-869-520	HEX HD. CAP SCR. R.H. (NOT SHOWN)	
26	1	002-025-004	PIN BEARING	55	1	807-358-060	5/16-24 UNF 3/8" L SET SCREW
27	1	070-007-281	ROD END, MALE	56	2	701-316-041	OILITE THRUST WASHER
28	1	070-007-278	TUBE WELDMENT	57	1	840-065-002	3/8-16 UNC FLEX NUT
29	1	070-007-283	BUMPER				
30	1	070-007-276	ROD				
31	4	949-100-002	FLAT WASHER, 59/64 x 15/32 x 1/16				
32	1	090-003-906	FIXED JOINT				
33	1	090-003-907	MODIFIED LINK CASTING				
34	1	835-582-002	HEX JAM NUT, 5/8 - 18				

SWEEP ARM ASSEMBLY



Graphic Number ES18

R.H. AND L.H. SWEEP ARM ASSEMBLED USING SAME LINKAGE AND COMPONENTS SHOWN.

DRAWING #5.23





KICKBACK PLATE ASSEMBLY SIDE OPPOSITE BALL EXIT

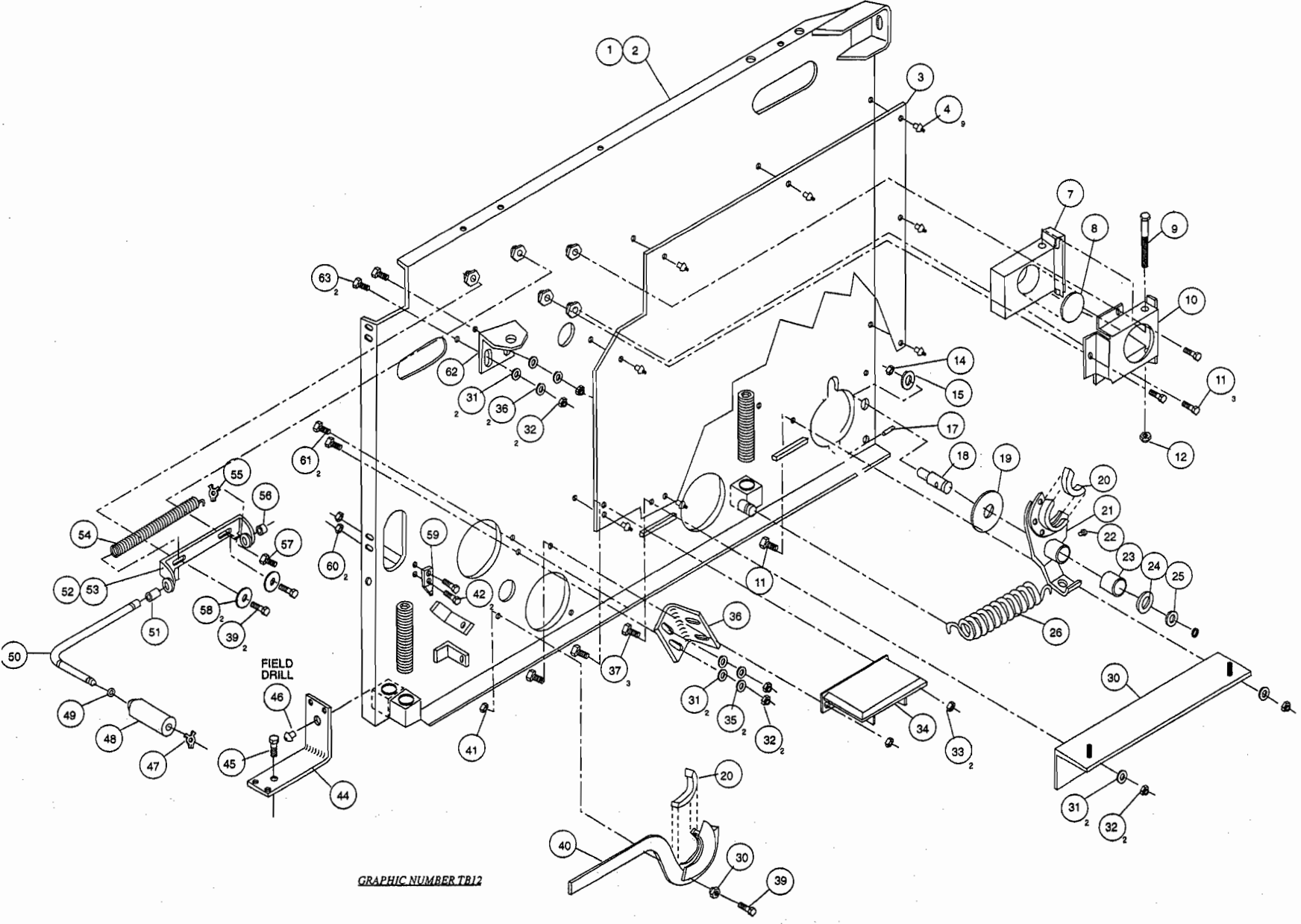
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-127	KICKBACK WELDMENT L.H. SIDE, R.H. MACHINE (NOT SHOWN)	21	1	000-027-645	BEARING ASSY., L.H. FOR R.H. MACHINE
2	1	090-004-128	KICKBACK WELDMENT R.H. SIDE, L.H. MACHINE	21A	1	000-027-646	BEARING ASSY., R.H. FOR L.H. MACHINE
3	1	070-002-027	PANEL	22	1	710-501-009	ALEMITE FITTING, #3006-1
4	9	937-000-000	STEEL DRIVE RIVET	23	1	900-112-203	PLAIN SLEEVE BEARING
5				24	1	000-027-642	WASHER, FRONT ROLLER
6				25	1	919-005-800	TRUARC RETAINING RING
7	1	000-022-795	BLOCK, L.H.	26	1	000-021-204	SPRING
7A	1	000-022-794	BLOCK, R.H. (NOT SHOWN)	27			
8	1	000-022-300	SHIELD	28			
9	1	809-865-645	HEX HD. CAP SCREW, 3/8 - 16 x 4 LG., GR. 8	29			
10	1	000-022-788	SUPPORT BOX	30	1	090-004-131	PIT SUPPORT WELDMENT L.H. FOR R.H. MACHINE
11	6	809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1 LG.	31	4	948-767-132	PLAIN WASHER
12	1	839-665-002	FLEXLOC NUT, 3/8 - 16	32	4	839-665-002	FLEXLOC NUT, 3/8 - 16
13				33	2	844-057-002	LOCKNUT, 3/8 - 16
14	1	844-074-002	STOVER LOCKNUT	34	1	000-022-878	ANGLE
15	1	941-072-200	FLAT WASHER, 1.25 O.D. x .5 I.D. x .083 THK.	35	4	951-164-002	LOCKWASHER
16				36	1	000-023-431	CLIP, BOTTOM R.H.
17				36A	1	000-023-432	CLIP, BOTTOM L.H.
18	1	000-029-015	PIVOT STUD	37	1	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.
19	1	000-027-641	THRUST BEARING	38	3	809-857-165	HEX HD. CAP SCREW, 5/16 - 18 x 1 LG.
20	2	000-022-924	SUPPORT BEARING	39	1	000-023-467	BUSHING
				40	1	000-023-464	SUPPORT WELDMENT, R.H. REAR ROLLER

KICKBACK PLATE ASSEMBLY SIDE OPPOSITE BALL EXIT



DRAWING #5.24

GRAPHIC NUMBER TB12





KICKBACK PLATE ASSEMBLY SIDE OPPOSITE BALL EXIT

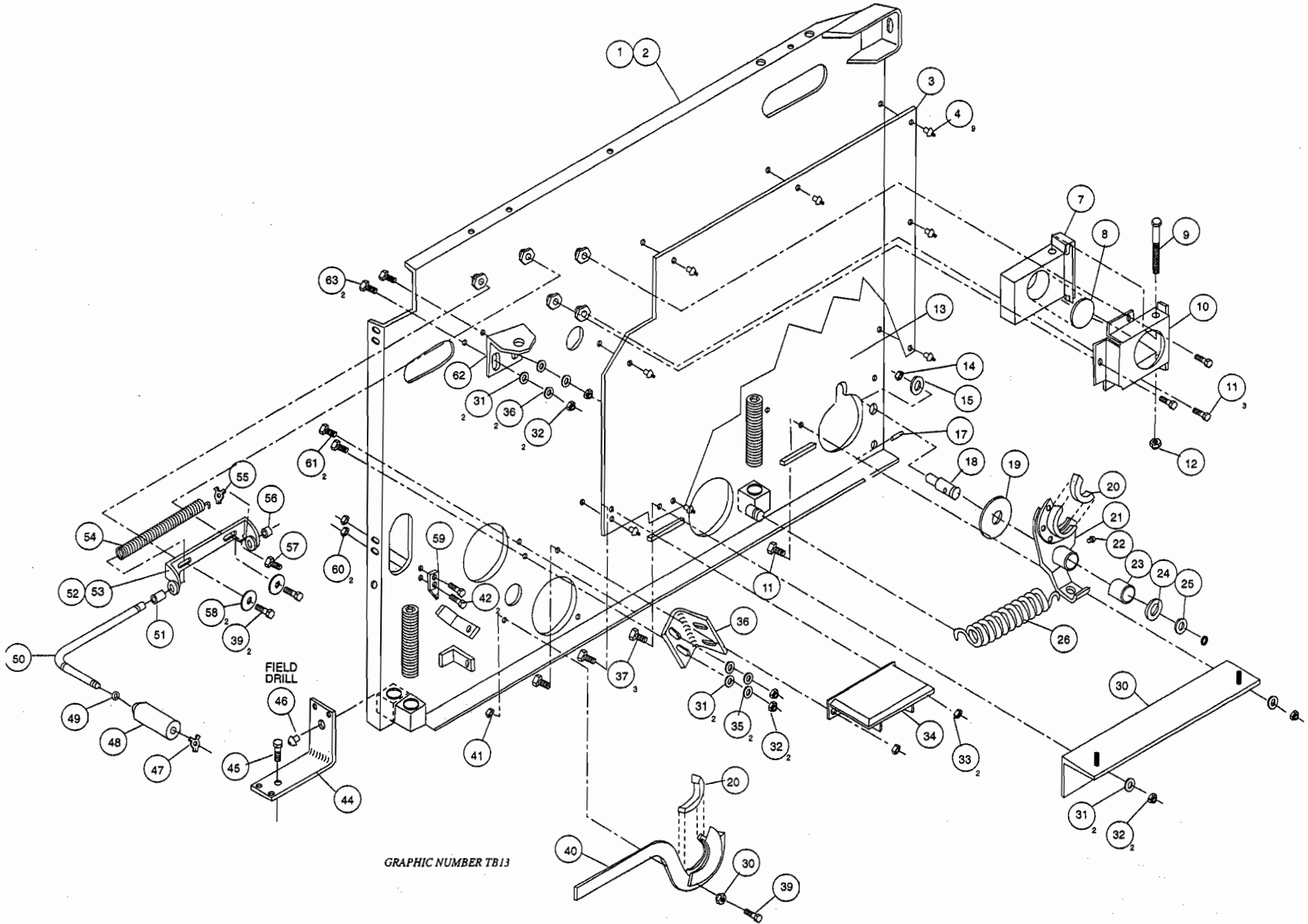
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Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
40A	1	000-023-465	SUPPORT WELDMENT, L.H. REAR ROLLER (NOT SHOWN)	53	1	000-024-508	PIN EJECTOR ASSY., R.H.
41	2	844-057-002	LOCKNUT, 5/16 - 18	53A	1	000-024-507	PIN EJECTOR ASSY., L.H. (NOT SHOWN)
42	2	809-849-125	HEX HD. CAP SCREW, 1/4 - 20 x 3/4 LG., GRADE 8	54	1	000-024-513	SPRING, R.H.
43	3	000-024-890	SET SCREW	54A	1	000-024-512	SPRING, L.H. (NOT SHOWN)
44	1	000-026-464	KICKBACK PIT BRACKET	55	1	963-600-002	X-WASHER
45	1	709-007-037	TAPER BOLT	56	1	000-024-516	BUSHING, SHORT
46	1	937-738-003	STEEL RIVET	57	1	000-029-317	PIN STOP
47	1	963-600-002	X-WASHER	58	1	000-028-334	WASHER
48	1	000-025-803	ROLLER	59	1	000-023-468	BRACKET
49	1	919-005-400	TRUARC RETAINING RING	60	2	844-049-002	STOVER LOCKNUT, 1/4 - 20
50	1	000-025-804	SHAFT	61	2	809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1 LG.
51	1	000-024-515	BUSHING - LONG	62	1	000-023-821	CLIP WELDMENT
52	1	000-024-511	BRACKET ASSY., R.H.	63	2	809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1 LG.
52A	1	000-024-510	BRACKET ASSY., L.H. (NOT SHOWN)				

KICKBACK PLATE ASSEMBLY SIDE OPPOSITE BALL EXIT



DRAWING #5.25

GRAPHIC NUMBER TB13





KICKBACK PLATE ASSEMBLY

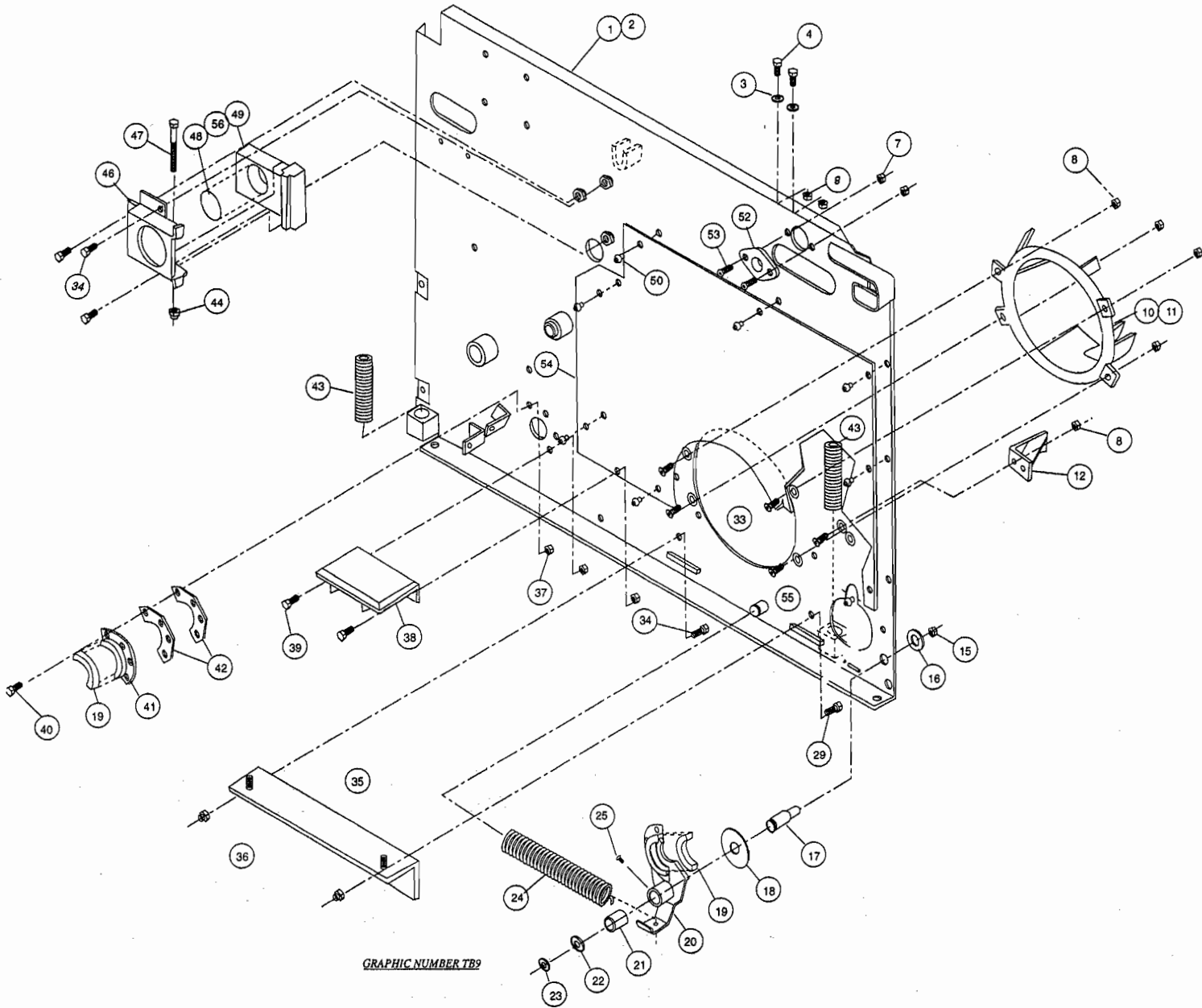
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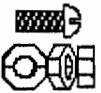
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-004-126	KICKBACK WELDMENT R.H. SIDE, R.H. MACHINE	32	1	090-004-212	PINCH ROLLER GUIDE
2	1	090-004-129	KICKBACK WELDMENT L.H. SIDE, L.H. MACHINE (NOT SHOWN)	33	4	808-857-120	FLAT HD. SOCKET SCREW, 5/16 - 18 x 3/4 LG.
3	4	948-761-112	FLAT WASHER, .68 O.D. x .34 O.D. x .06 THK.	34	2	809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1
4	2	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.	35	1	090-004-131	PIT SUPPORT WELDMENT R.H./R.H.
5				36	2	839-665-002	FLEXLOC NUT, 3/8 - 16
6				37	4	844-057-002	FLEXLOC NUT, 5/16 - 24
7	2	844-049-002	STOVER LOCKNUT, 1/4 - 20	38	1	000-022-878	ANGLE
8	4	844-057-002	STOVER LOCKNUT, 5/16 - 18	39	2	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.
9				40	4	810-257-120	SOCKET HD. CAP SCREW, 5/16 - 18 x 3/4 LG.
10	1	090-003-412	DOOR WELDMENT - R.H.	41	1	000-022-926	RETAINER
11	1	090-003-411	DOOR WELDMENT - L.H.	42	1	090-004-136	SPACER
12	1	000-024-668	TRACK SUPPORT BRKT. WELDMENT	43	1	000-024-890	SET SCREW
13				44	1	840-065-002	FLEXLOC NUT, 3/8 - 16
14				45			
15	1	844-074-002	STOVER LOCKNUT, 1/2 - 20	46	1	000-022-788	SUPPORT BOX
16	1	941-072-200	FLAT WASHER, 1.25 O.D. x .5 I.D. x .08 THK.	47	1	809-865-645	HEX HD. CAP SCREW, 3/8 - 16 x 4 LG., GRADE 8
17	1	000-029-015	PIVOT STUD	48	1	000-022-300	SHIELD
18	1	000-027-641	THRUST BEARING	49	1	000-022-794	BLOCK, R.H.
19	2	000-022-924	SUPPORT	49A	1	000-022-795	BLOCK, L.H. (NOT SHOWN)
20	1	000-029-672	BEARING ASSY. BRACKET - R.H.	50	9	937-000-000	STEEL DRIVE RIVET
20A	1	000-022-249	BEARING ASSY. BRACKET - L.H. (NOT SHOWN)	51			
21	1	900-112-203	PLAIN SLEEVE BEARING	52	2	808-549-160	SOCKET BUTTON HD. SCREW, 1/4 - 20 x 1 LG.
22	1	000-027-642	WASHER - FRONT ROLLER SUPPORT	53	1	070-011-286	BUSHING - CURTAIN ROD
23	1	919-005-800	RETAINING RING	54	1	000-029-640	PANEL
24	1	000-021-204	SPRING	55	4	808-857-160	FLAT SOCKET HD. CAP SCREW, 5/16 - 18 x 1 LG.
25	1	710-501-009	ALEMITE GREASE FITTING	56	1	008-100-413	LOCTITE ADHESIVE #404
26							
27							
28							
29	1	809-865-205	HEX HD. CAP SCREW, 3/8 - 16 x 1-1/4 LG.				
30	1	913-437-160	ESNA ROLL PIN, .187 O.D. x 1 LG.				
31	1	009-004-206	PINCH ROLLER WELDMENT				

KICKBACK PLATE ASSEMBLY



GRAPHIC NUMBER TB9

DRAWING #5.26





PIN ELEVATOR WHEEL ASSEMBLY

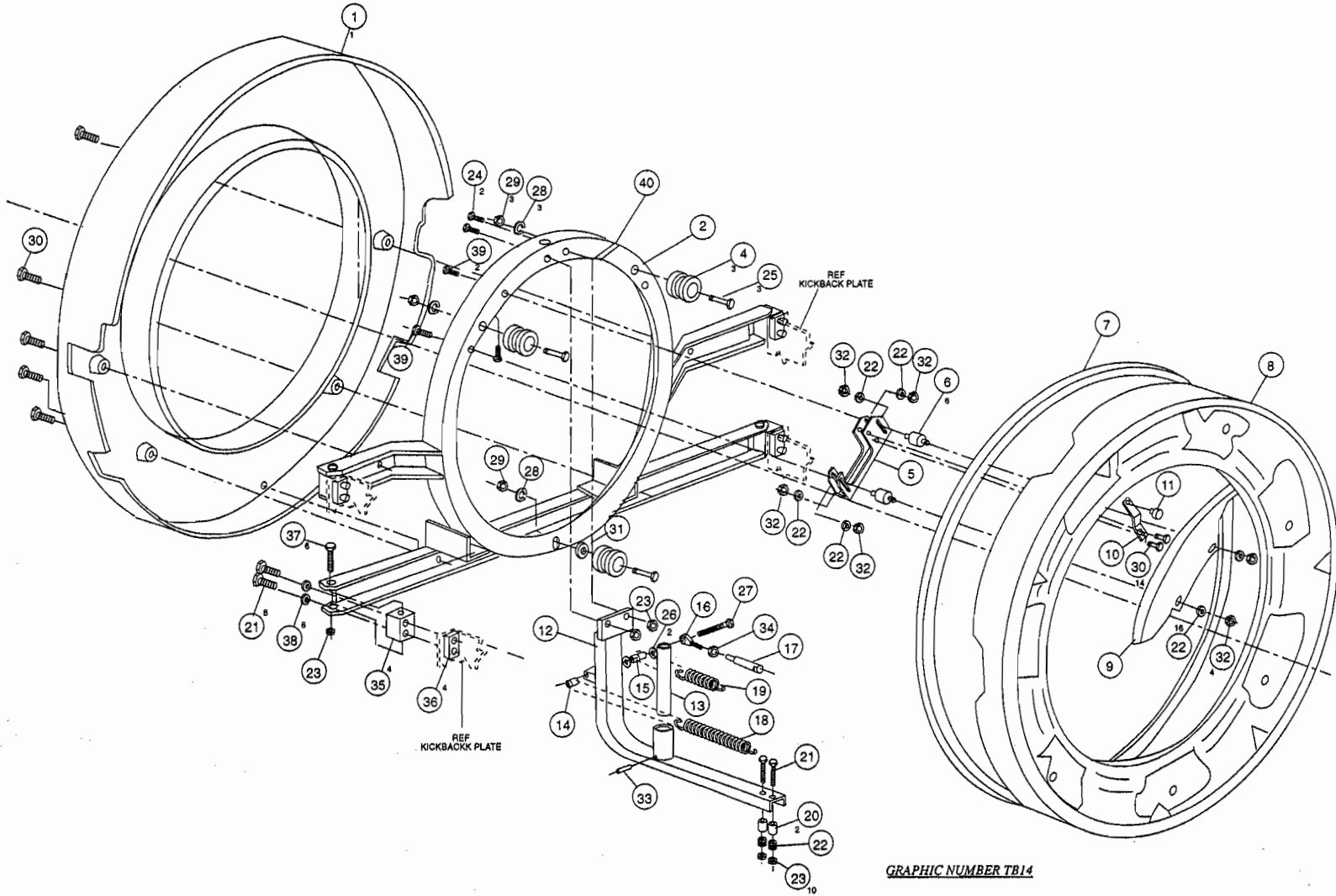
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Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-005-140	WHEEL GUARD	23	11	844-057-002	STOVER NUT, 5/16 - 18
2	1	090-004-109	ELEVATOR SUPPORT FRAME WELDMENT	24	2	809-857-165	HEX HD. CAP SCREW, 5/16 - 18 x 1 LG.
3				25	3	880-781-240	SHOULDER BOLT
4	3	090-005-109	PIN ELEVATOR ROLLER	26	2	948-767-132	FLAT WASHER, 13/16 O.D. x 13/32 I.D. x 1/16 THK.
5	1	090-005-120	PIN HOLDER BRACKET MOUNT	27	1	809-865-725	HEX HD. CAP SCREW, 3/8 - 16 x 4-1/2 LG.
6	2	000-029-068	RUBBER SPACER MOUNT	28	3	951-181-002	LOCK WASHER
7	1	070-002-005	V-BELT	29	3	840-381-002	FLEXLOC NUT, 5/8 - 11
8	1	090-004-116	ELEVATOR WHEEL WELDMENT, R.H.	30	8	824-757-102	HEX HD. SWAGEFORM SCREW, 5/16 - 18 x 5/8 LG.
8a	1	090-004-117	ELEVATOR WHEEL WELDMENT, L.H. (NOT SHOWN)	31	1	948-980-212	FLAT WASHER, 21/32 I.D. x 1-5/16 O.D.
9	1	090-006-098	RAIL, R.H.	32	4	834-557-002	HEX NUT, 5/16 - 18
9a	1	070-006-099	RAIL, L.H. (NOT SHOWN)	33	1	913-437-280	ROLL PIN, .187 O.D. x 1-3/4 LG.
10	1	070-001-415	BRACKET	34	1	831-566-002	HEX NUT, 3/8 - 24
11	1	000-021-992	BUMPER	35	4	090-005-106	HINGE BLOCK
12	1	090-004-101	DISTRIBUTOR MOUNT WELDMENT	36	4	090-005-123	HINGE BLOCK NUT
13	1	070-006-045	DISTRIBUTOR SUPPORT	37	6	809-857-405	HEX HD. SCREW, 5/16 - 18 x 2-1/2 LG.
14	1	070-006-044	SPRING POST NUT	38	8	951-156-002	LOCK WASHER, 5/16 SPLIT
15	1	070-006-043	SPACER CLAMP	39	3	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.
16	1	070-006-046	ROD END	40	1	090-005-144	STATIC BRUSH
17	1	070-006-047	SAFETY LINK TUBE				
18	1	000-026-032	LATERAL DRIVE SPRING				
19	1	070-006-030	SAFETY LINK SPRING				
20	2	070-008-449	SHIM				
21	8	809-857-325	HEX HD. CAP SCREW, 5/16 - 18 x 2 LG.				
22	17	948-761-112	PLAIN WASHER, 11/16 O.D. x 11/32 I.D. x 1/16 THK.				

PIN ELEVATOR WHEEL ASSEMBLY



DRAWING #5.27

GRAPHIC NUMBER TB14





BOUNCE PLATE & ROLLER ASSEMBLY

SECTION 5

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Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-005-142	BOUNCE BOARD				
2	1	090-005-147	BOUNCE BOARD STIFFENER				
3	4	000-021-224	VIBRATION DAMPENER				
4	12	844-049-002	1/4-20 STVR LK NUT				
5	8	809-849-165	1/4-20 X 1 SCREW				
6	8	948-753-102	5/8 X 1/16 WASHER				
7	4	808-549-240	SCREW 1/4-20 X 1 1/2				
8	4	948-753-101	WASHER 1/4 NOM.				
9	4	000-024-590	BEARING				
10	2	000-024-579	HINGE ROLLER				
11	2	000-024-580	HINGE SHAFT				
12	2	000-024-597	LINK ASSEMBLY				
13	4	000-024-582	ROLLER PIN				
14	8	913-411-100	ESNA ROLL PIN				
15	16	000-025-662	NYLOC SCREW				
16	2	000-024-578	ROLLER BODY				
17	1	070-002-033	REAR ROLLER				
18	1	000-024-753	CARPET BELT				
19	1	090-004-203	CARPET DRIVE SHEAVE				
20	2	806-265-160	SQ. HD. SCREW CUP PT. 3/16-16 X 1 LG.				
21	1	070-002-034	REAR ROLLER ASSEMBLY				
22	1	000-024-576	FRONT ROLLER ASSEMBLY				
23	2	710-501-002	ALEMITE FITTING				



BACK END ASSEMBLY

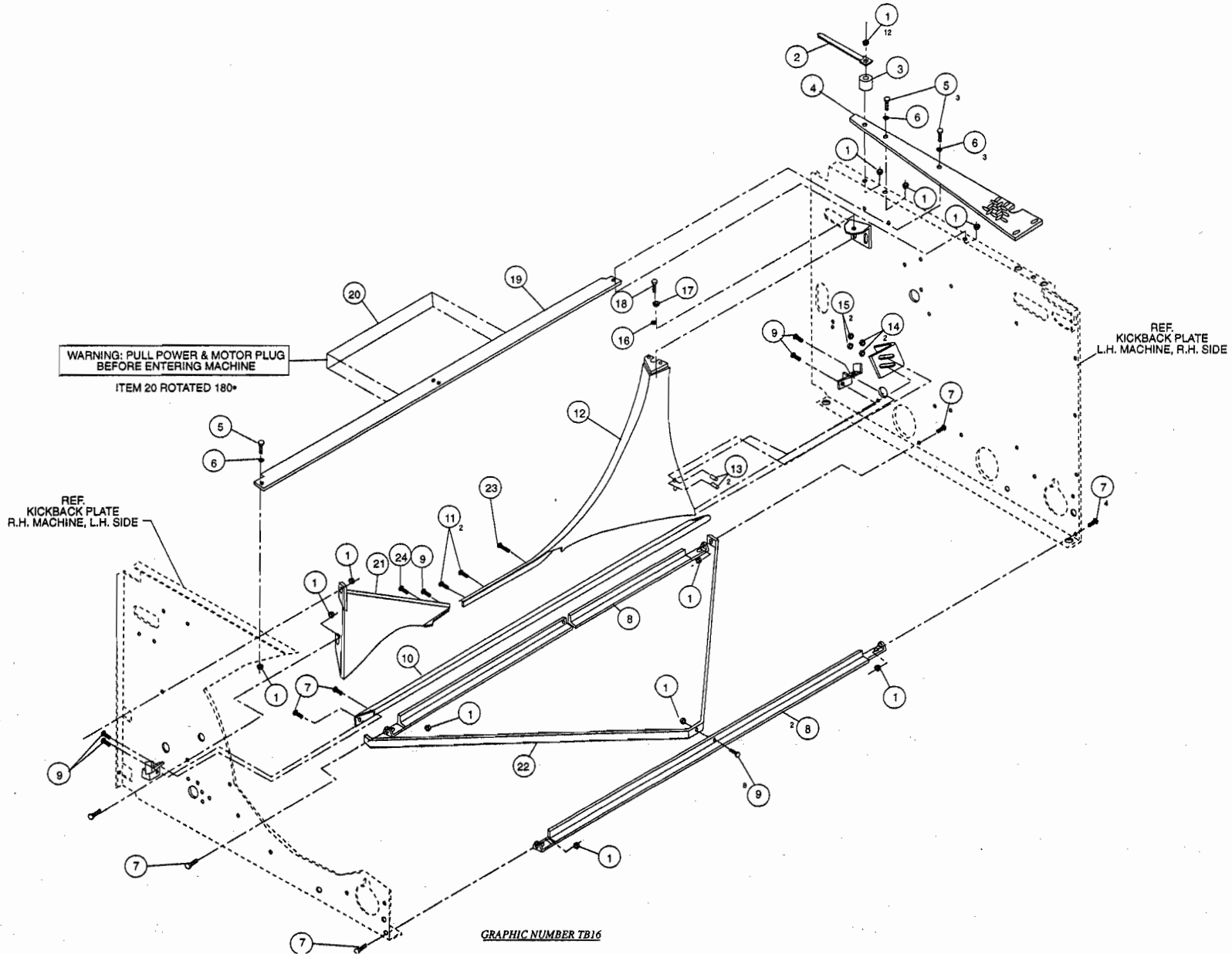
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	12	844-057-002	STOVER LOCKNUT, 5/16 - 18	13	2	808-849-120	FL. HD. SOC. CAP SCREW, 1/4 - 20 x 3/4 LG.
2	1	070-001-195	PINEJECTOR	14	2	948-753-102	WASHER, 5/8 O.D. x 9/32 I.D. x 1/16 THK.
3	1	000-029-068	RUBBER SHOCK MOUNTING	15	2	844-049-002	STOVER LOCKNUT, 1/4 - 20
4	1	090-004-211	L.H. TREAD WELDMENT (SHOWN)	16	1	948-767-132	PLAIN WASHER, 47/64 O.D. x 13/32 I.D. x 1/16 THK.
4A	1	090-004-210	R.H. TREAD WELDMENT (NOT SHOWN)	17	1	951-164-002	SPLIT LOCK WASHER, 3/8
5	3	809-857-205	HEX HD. CAP SCREW, 5/16 - 18 x 1-1/4 LG.	18	1	808-566-160	BUTTON HD. SOC. CAP SCREW, 3/8 - 24 x 1 LG.
6	3	948-761-112	WASHER, 11/16 O.D. x 11/32 I.D. x 1/16 THK.	19	1	070-007-359	SUPPORT BRACKET
7	4	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 1 LG.	20	1	090-004-028	WARNING DECAL
8	2	070-001-184	STRAP WELDMENT	21	1	070-002-169	L.H. PLOW & MAT ASS'Y. SMALL (NOT SHOWN)
9	8	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.	21A	1	070-001-412	R.H. PLOW & MAT ASS'Y. SMALL
10	1	000-027-100	L.H. APRON ASS'Y.	22	1	070-001-185	BRACE
10A	1	000-027-099	R.H. APRON ASS'Y. (NOT SHOWN)	23	1	808-858-240	FL. HD. SOC. CAP SCREW, 5/16 - 24 x 1-1/2 LG.
11	2	808-858-120	FL. HD. SOC. CAP SCREW, 5/16 - 24 x 3/4 LG.	24	1	809-858-125	HEX HD. CAP SCREW, 5/16 - 24 x 3/4 LG.
12	1	000-027-380	L.H. PLOW & MAT ASS'Y. LARGE (SHOWN)				
12A	1	000-027-372	R.H. PLOW & MAT ASS'Y. LARGE (NOT SHOWN)				

BACK END ASSEMBLY



DRAWING #5.29





CUSHION, SHOCK ABSORBER & CURTAIN ASSEMBLY

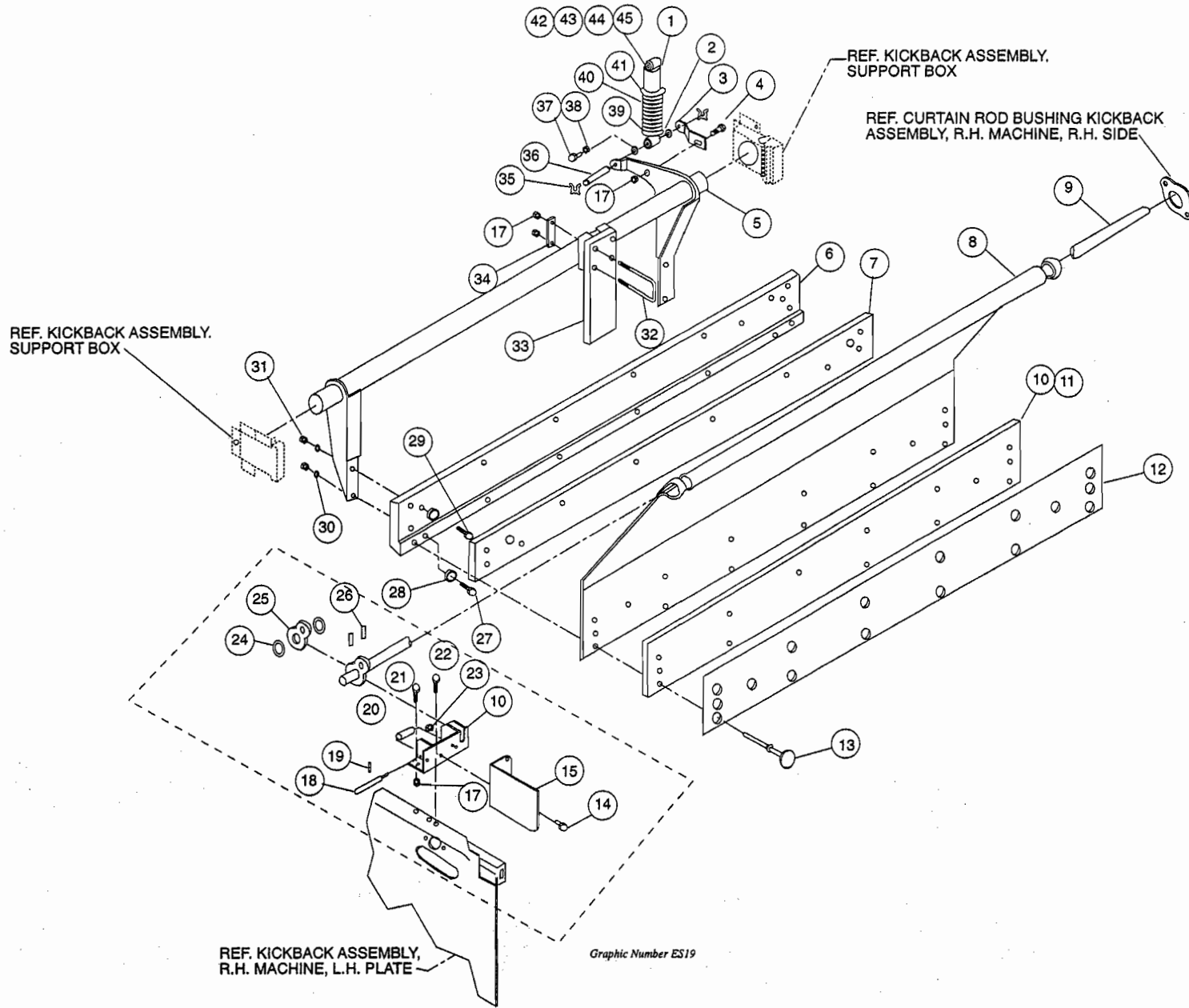
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	000-022-824	SHOCK ABSORBER ASSY.	22	1	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 1 LG., GRADE 8
2	2	948-975-172	PLAIN WASHER	23	2	844-049-002	STOVER LOCKNUT, 1/4 - 20, GR. C
3	1	000-024-534	EAR	24	2	945-091-242	WASHER, 1-1/2 O.D. x 1 I.D. x .046 THK.
4	1	809-857-125	HEX HD. CAP SCREW, 5/8 - 18 x 3/4 LG.	25	1	070-005-610	LINK
5	1	070-002-050	HANGER WELDMENT R.H.	26	2	913-437-240	ESNA ROLL PIN, .1875 O.D. x 1-1/2 LG.
5A	1	070-002-252	HANGER WELDMENT L.H. (NOT SHOWN)	27	2	808-865-400	FL. HD. SOCKET SCREW, 3/8 - 16 x 2-1/2 LG.
6	1	000-024-796	PLANK, R.H.	28	4	000-024-801	WASHER
6A	1	000-024-795	PLANK, L.H. (NOT SHOWN)	29	2	808-865-320	FL. HD. SOCKET SCREW, 3/8 - 16 x 2 LG.
7	1	000-022-770	PAD - SPONGE RUBBER	30	4	951-164-002	LOCK WASHER
8	1	000-026-450	PIN CURTAIN	31	4	839-665-002	FLEX LOC NUT, 3/8 - 16
9	1	070-011-288	CURTAIN ROD	32	2	070-001-422	U-BOLT
10	1	000-024-807	RUBBER CUSHION, R.H.	33	1	070-001-432	PAD
10A	1	000-024-808	RUBBER CUSHION, L.H. (NOT SHOWN)	34	2	070-001-421	STRAP
11	1	070-002-060	CUSHION ASSY. - R.H.	35	4	963-600-002	X-WASHER
11A	1	070-002-260	CUSHION ASSY. - L.H. (NOT SHOWN)	36	2	000-022-821	PIN
12	1	070-006-761	CUSHION COVER	37	1	810-250-200	SOC. HD. CAP SCREW, 1/4 x 28 - 1 LG.
13	16	000-028-519	RIVET	38	1	951-148-002	LOCK WASHER - 1/4 SAE
14	2	809-849-125	HEX HD. CAP SCREW, 1/4 - 20 x 3/4 LG., GRADE 8	39	1	000-022-286	COLLAR
15	1	070-004-125	GUARD	40	1	000-022-288	SPRING
16	1	070-007-360	SUPPORT BRKT. WELDMENT	41	1	000-022-287	WASHER - SPRING SEAT
17	2	844-057-002	STOVER LOCKNUT, 5/16 - 18 x 3/4 LG.	42	1	721-502-005	RUBBER BUSHING (OLD STYLE)
18	1	070-001-396	CURTAIN LATCH PIN	43	1	721-502-022	RUBBER BUSHING (NEW STYLE)
19	1	913-431-160	ESNA ROLL PIN, 5/32 O.D. x 1 LG.	44	2	000-022-822	SLEEVE
20	1	070-001-389	CURTAIN LATCH SPRING	45	1	000-022-823	SHOCK ABSORBER
21	1	809-857-205	HEX HD. CAP SCREW, 5/16 - 18 x 1-1/4 LG., GRADE 8				

CUSHION, SHOCK ABSORBER & CURTAIN ASSEMBLY



DRAWING #5.30





BACK END MOTOR MOUNT BRACKET ASSEMBLY

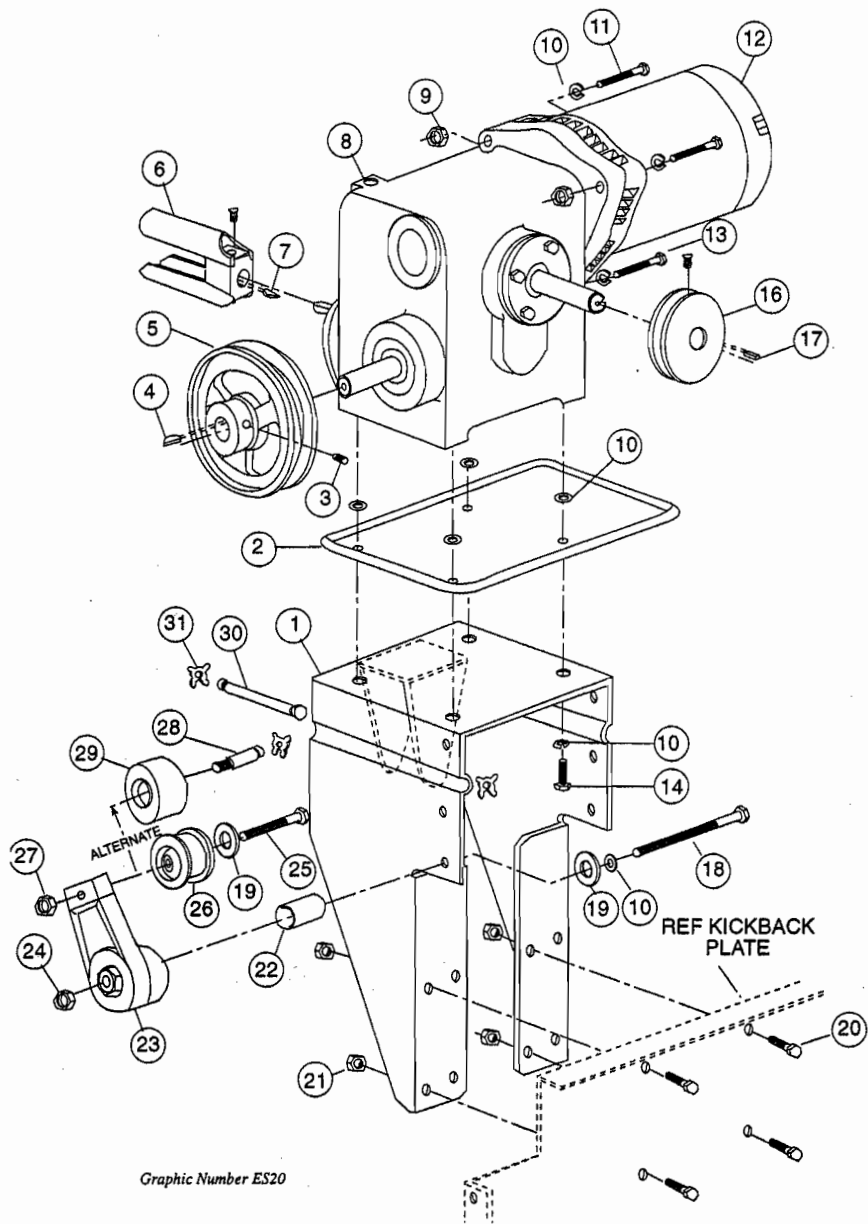
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-003-509	MOTOR MOUNT WELDMENT ASSY.	19	2	948-767-132	FLAT WASHER, 13/32 I.D. x 13/16 O.D. x 1/16 THK.
2	1	090-004-517	BACK END MOTOR DRIP PAN	20	4	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.
3	3	807-358-060	SOCKET SET SCREW, 5/16 - 24 x 3/8 LG.	21	4	844-057-002	STOVER LOCK NUT, 5/16 - 18
4	1	907-000-500	KEY, HI-PRO #HP-606	22	1	090-004-519	SPACER
5	1	000-023-673	PIN ELEVATOR SHEAVE	23	1	090-003-508	TENSIONER ASSEMBLY
6	1	000-027-390	DISTRIBUTOR DRIVE SHAFT	24	1	831-565-002	HEX NUT, 3/8 - 16
7	1	907-000-300	KEY, HI-PRO #HP-504	25	1	809-865-325	HEX HD. CAP SCREW, 3/8 - 16 x 2 LG.
8	1	090-004-501	GEARBOX, R.H. 60Hz	26	1	090-004-444	IDLER PULLEY
		090-004-502	GEARBOX, L.H. 60Hz	27	1	835-565-002	HEX JAM NUT, 3/8 - 16
		090-004-506	GEARBOX, R.H. 50Hz	28	1	090-004-120	STUB SHAFT
		090-004-507	GEARBOX, L.H. 60Hz	29	1	070-002-007	BELT TIGHTENER PULLEY ASSEMBLY
9	2	839-665-002	FLEX LOC NUT, 3/8 - 16	30	1	000-022-821	SHOCK PIN
10	8	951-164-002	SPLIT LOCK WASHER, 3/8	31	3	963-600-002	X-WASHER, #9000-6
11	2	809-865-325	HEX HD. CAP SCREW, 3/8 - 16 x 2 LG.	32		700-107-146	LOCTITE
12	1	090-004-505	MOTOR, 50Hz			090-003-514	GEARBOX, R.H. 60Hz ASSEMBLY (INCLUDES ITEMS 8-15 WITH 60Hz MOTOR & GEARBOX)
		090-004-510	MOTOR, 60Hz			090-003-515	GEARBOX, L.H. 60Hz ASSEMBLY (INCLUDES ITEMS 8-15 WITH 60Hz MOTOR & GEARBOX)
13	1	809-865-245	HEX HD. CAP SCREW, 3/8 - 16 x 1-1/2 LG.			090-003-512	GEARBOX, L.H. 50Hz ASSEMBLY (INCLUDES ITEMS 8-15 WITH 50Hz MOTOR & GEARBOX)
14	4	809-865-165	HEX HD. CAP SCREW, 3/8 - 16 x 1 LG.			090-003-513	GEARBOX, R.H. 50Hz ASSEMBLY (INCLUDES ITEMS 8-15 WITH 50Hz MOTOR & GEARBOX)
15	4	000-023-758	PAPER WASHER, 3/8 I.D. x 7/8 O.D.				
16	1	000-022-172	DRIVE SHEAVE				
17	1	907-201-100	SQUARE 3/16 x 3/16 x 2 LG.				
18	1	070-003-221	HEX HD. CAP SCREW, 3/8 - 16 x 3-1/2 LG.				

BACK END MOTOR MOUNT BRACKET ASSEMBLY



Graphic Number ES20

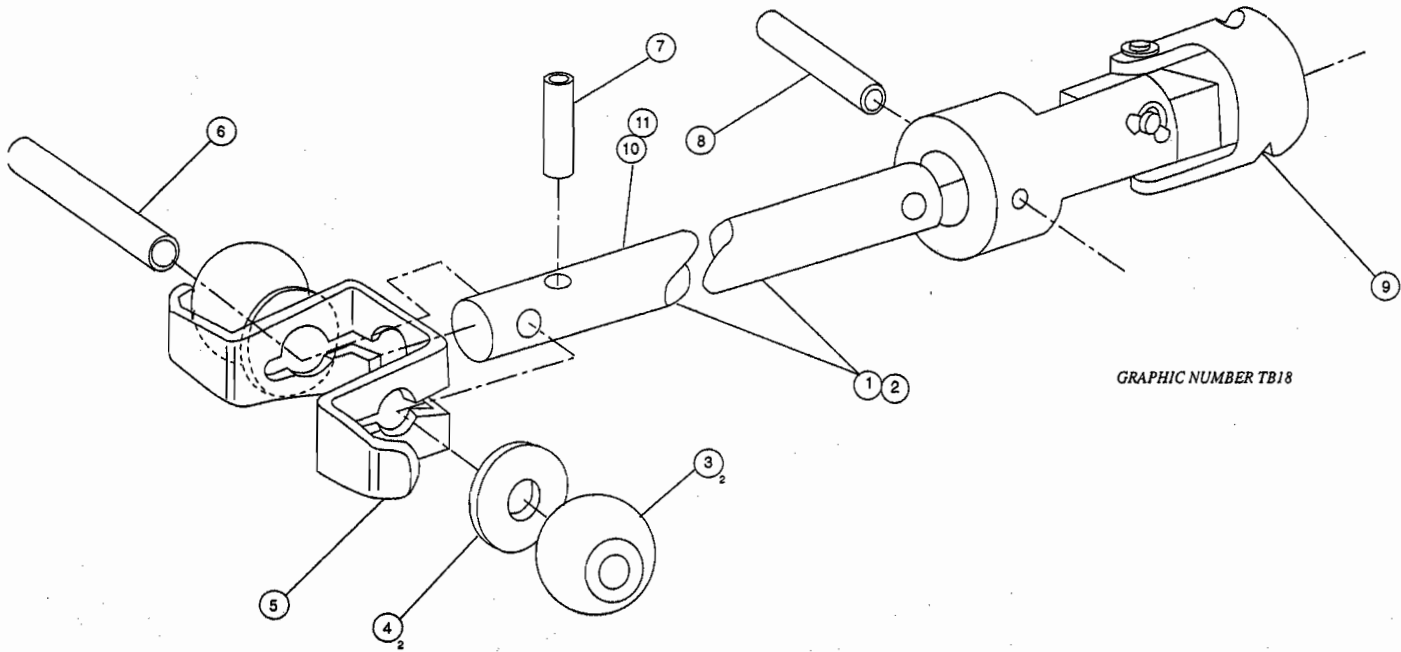
DRAWING #5.31




DISTRIBUTOR DRIVE SHAFT ASSEMBLY
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-006-101	SHAFT, R.H. MACHINE				
2	1	000-022-369	SHAFT, L.H. MACHINE				
3	2	000-026-461	BALL BEARING				
4	2	000-029-073	WASHER				
5	1	000-024-892	BALL BEARING RETAINER				
6	1	000-022-717	PIN				
7	1	913-423-120	ROLL PIN, ESNA, .125 DIA. x 3/4 LG.				
8	1	913-437-160	ROLL PIN, ESNA, .187 DIA. x 1 LG.				
9	1	070-008-004	UNIVERSAL JOINT				
10	1	070-006-102	DIST. DRIVE SHAFT ASSEMBLY - R.H.				
11	1	000-024-893	DIST. DRIVE SHAFT ASSEMBLY - L.H.				

DISTRIBUTOR DRIVE SHAFT ASSEMBLY



GRAPHIC NUMBER TB18

DRAWING #5.32



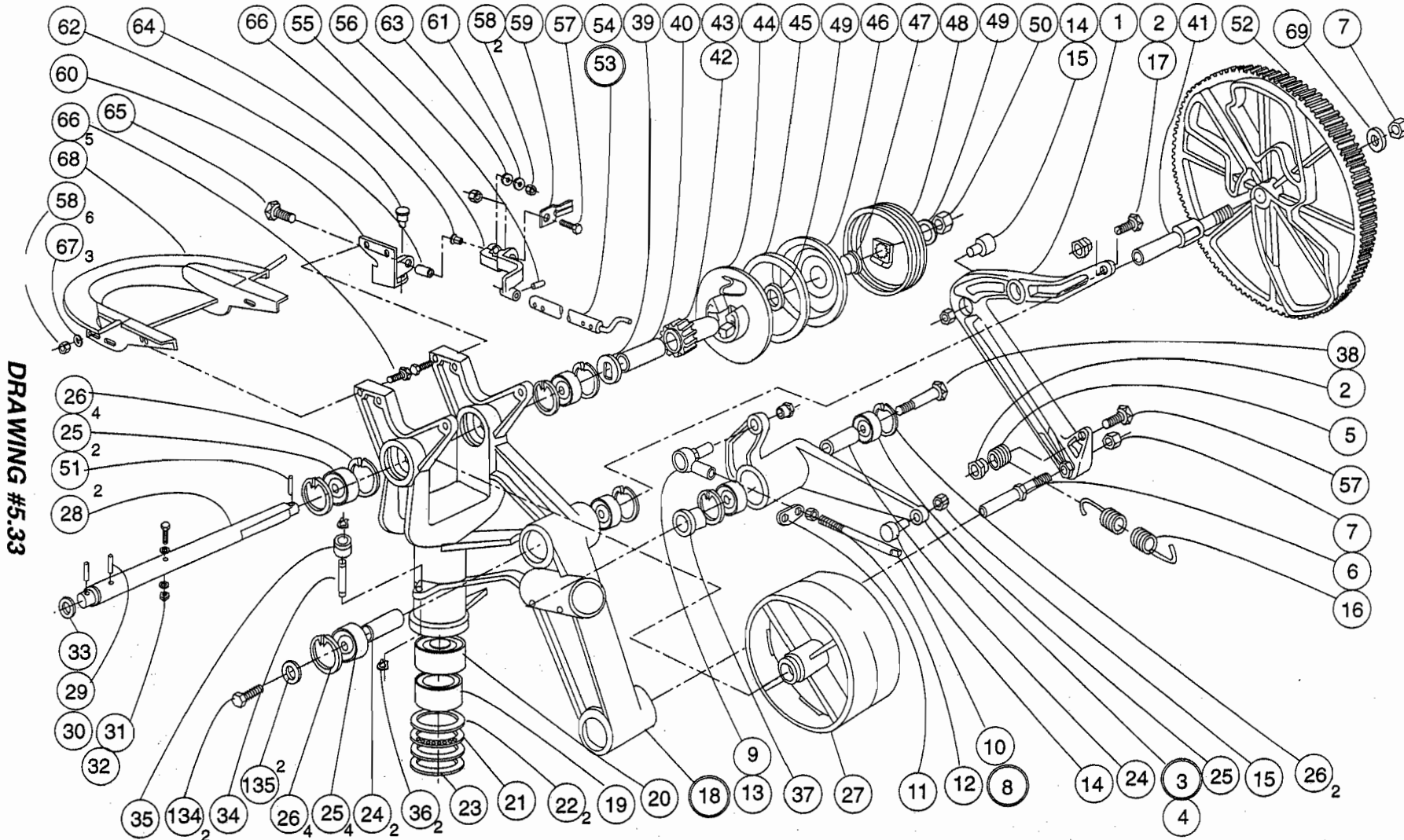
Service & Parts Manual

Parts

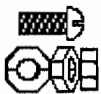
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-006-051	ARM	39		070-007-376	WASHER, THRUST
2	3	000-022-173	NUT, SPECIAL	40	1	070-006-676	SLEEVE
3	1	070-007-119	DRIVE ARM ASSEMBLY (LATERAL)	41	1	070-006-061	SHAFT, CAM SUPPORT
4	1	070-006-052	DRIVE ARM	42	1	070-006-678	BUSHING, PINION
5	2	070-006-111	SPRING POST SLEEVE	43		610-704-005	PINION & GEAR SLEEVE ASSEMBLY
6	1	070-006-049	SHAFT ARM	44		610-704-006	KIT, CLUTCH PLATE ASSEMBLY
7	2	844-073-002	NUT LOCK, STOVER 1/2 - 13	45	1	070-006-126	FRICTION DISC
8		070-007-137	ROD LINK ASSEMBLY	46	1	070-006-130	CLUTCH PLATE, DRIVE
9	1	070-006-066	ROD END, FEMALE	47	1	070-006-125	WORM
10	1	070-006-067	ROD, SAFETY LINK	48	1	070-006-128	SPRING ASSEMBLY
11	1	070-006-068	SPRING SUPPORT	49	1	070-006-121	WASHER
12	1	831-566-022	NUT, HEX 3/8 - 24	50		835-582-002	NUT 5/8 - 18, SPECIAL
13	1	070-006-069	NUT, SPECIAL	51	2	913-437-140	ROLL PIN (ESNA) 3/16 DIA. x 7/8 LG.
14	3	070-006-071	CAM FOLLOWER	52	1	070-006-149	CAM INDEX
15	3	844-050-002	NUT, LOCK STOVER 1/4 - 28	53		070-006-668	TRIP STOP ROD & SUPPORT CASTING ASSEMBLY
16	1	070-006-034	SPRING, LINEAR	54	1	070-006-663	TRIP STOP ROD ASSEMBLY
17	1	808-849-100	SCREW, SOFL. 1/4 - 20 x 5/8 LG.	55	1	070-006-665	TRIP SUPPORT CASTING ASSEMBLY
18	1	070-006-053	MAIN CASTING & BEARING ASSEMBLY	56	1	913-415-090	ROLL PIN (.94 O.D. x 9/16 LG.) AC3
19	1	070-006-076	NEEDLE BEARING, OPEN END	57	1	809-849-125	SCREW, HEX HD. CAP 1/4 - 20 x 3/4 LG.
20	1	070-006-075	NEEDLE BEARING, CLOSED END	58	5	844-049-002	LOCK NUT, STOVER 1/4 - 20
21	1	070-006-074	NEEDLE THRUST BEARING	59	1	070-006-691	STOP BLADE
22	1	070-006-073	THRUST WASHER	59A		070-006-083	STOP BLADE (USED WITH OLD CLUTCH PLATE ASSEMBLY- 070-006-062 ONLY)
23	1	919-004-200	RING, TRU - ARC (INTERNAL)	60	1	070-006-084	TRIP STOP SUPPORT BRKT.
24	1	070-006-064	SPACER BEARING	61	1	000-026-865	WASHER
25	6	000-024-679	BEARING	62		070-006-685	PIVOT - (19/32 LG.)
26	6	919-000-600	RING, TRU - ARC (INTERNAL)	62A		070-006-087	PIVOT - (31/32 LG.)
27	1	070-006-666	PULLEY, DRIVE	63		070-007-651	WASHER, NYLON
28	1	070-006-077	SHAFT	64	1	070-006-142	BUMPER
29	1	914-037-206	SPIRAL PIN (187 - 1250L - B - R)	65	4	809-849-205	SCREW, HEX HD. CAP 1/4 - 20 x 1-1/4 LG
30	1	810-239-240	SCREW, SOC. HD. CAP, 10 - 24 x 1-1/2 LG	66	1	701-712-097	PRESS BRG. - SPYRALIGN (FSB 375)
31	1	840-039-002	NUT, FLEXLOC 10 - 24	67	4	948-753-102	WASHER, 5/8 O.D. x 9/32 I.D. x .62 THK
32	2	948-745-082	WASHER 7/32 I.D. x 1/2 O.D. x 3/64 THK.	68	1	070-006-144	ORIENTOR PAN ASSEMBLY
33	1	919-005-600	RING, TRU - ARC (EXTERNAL)	69		070-006-121	WASHER, 1-1/16 O.D. x 17/32 I.D. x 3/32 THK.
34	1	070-006-082	PIN, SPRING POST	134	2	809-857-080	SCREW, HEX HEAD CAP, 5/16 - 18 x 1/2 LG. AC3
35	1	000-026-081	SPRING POST SLEEVE	135	2	948-761-112	WASHER, PLAIN 11/16 O.D. x 11/32 I.D. x 1/16 THK.
36	2	919-005-300	RING, TRU - ARC (EXTERNAL)				
37	1	070-006-065	CLAMP RACE				
38	1	070-006-048	BOLT, SPECIAL				

DISTRIBUTOR ASSEMBLY SHEET 1

- NOTES:
1. ADJUST TORQUE NUT (IT. 50) TO 250 LBS. IN.
2. ASSEMBLE MARKED TOOTH OF PINION (IT. 52)
INTO PROPER MARKED TOOTH SPACE OF CAM GEAR FOR
PROPER TIMING.



DRAWING #5.33





DISTRIBUTOR ASSEMBLY SHEET 2

SECTION 5

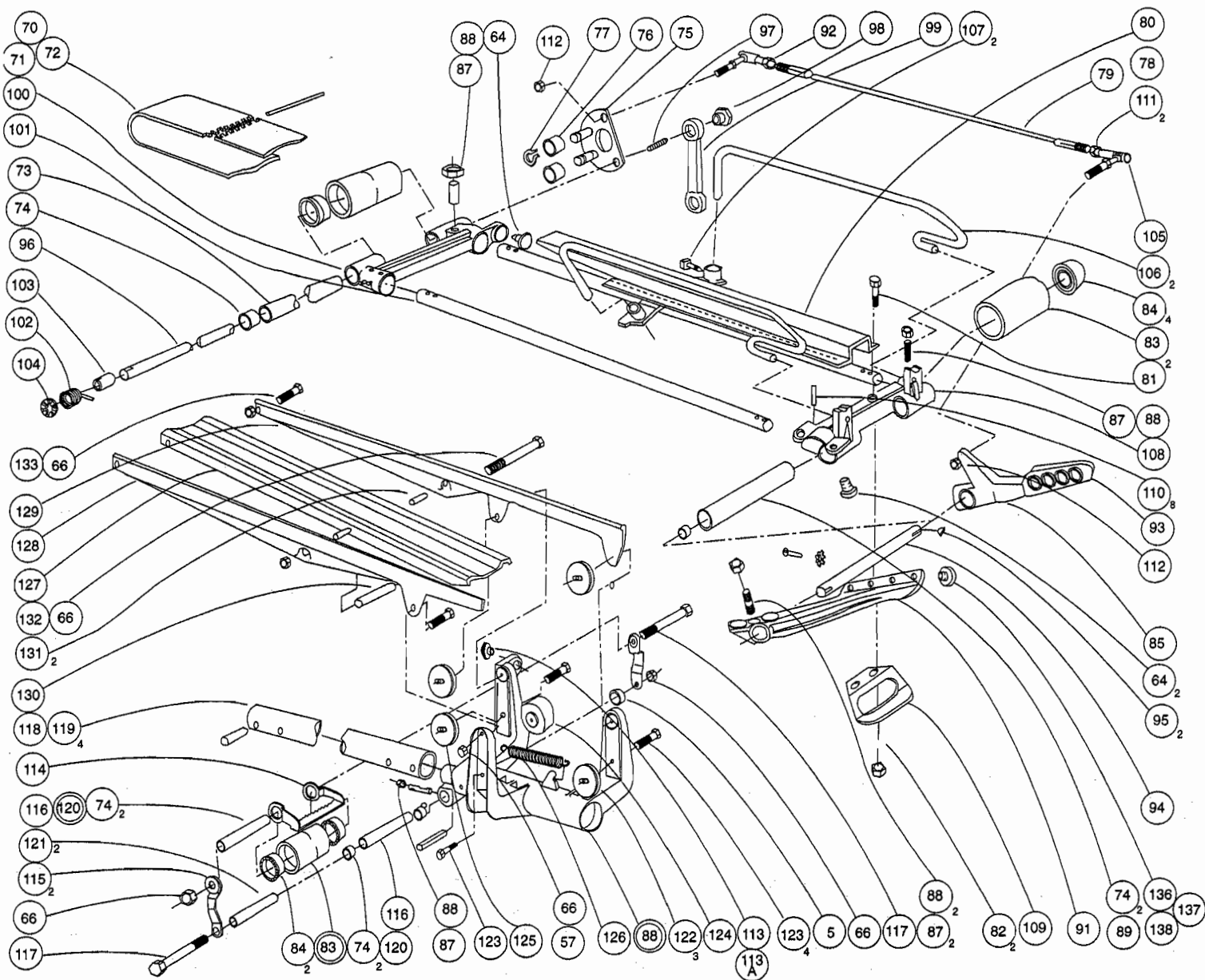
Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
5	1	070-006-111	SPRING POST SLEEVE	106	2	070-006-013	PIN GUIDE
57	5	809-849-125	SCREW, HEX HD. CAP. 1/4 - 20 x 3/4 LG	107	2	806-249-060	SET SCREW, SQ. HEAD CUP PT. 1/4 - 20 x 3/8 LG.
64	3	070-006-142	BUMPER	108	1	070-006-055	CARRIAGE - FRONT
66	6	844-049-002	LOCKNUT, STOVER 1/4 - 20	109	1	070-006-137	BELT GIARD
70		702-508-003	BELT	110	8	913-437-140	PIN (ESNA) 3/16 O.D. x 7/8 LG.
71	1	070-006-036	BELT LACING	111	2	835-550-002	NUT, HEX, JAM - 1/2 - 28
72	1	070-006-037	BELT PIN	112	1	840-039-002	NUT, FLEXLOC THIN #10 - 32
73	1	070-006-683	TUBE MIDDLE - ASSEMBLY (7-7/64" LG.)	113	1	701-710-098	SPYRALIGN - PRESS BEARING
73A		070-006-022	TUBE ASSEMBLY MIDDLE (7-1/2" LG.)	113A		900-206-091	OILITE BEARING (USED ON OLD CARRIAGE SUPPORT ASSEMBLY)
74	4	070-009-067	BEARING	114	1	070-006-106	TRACKING BRACKET
75	1	070-006-661	TRIP ROCKER ARM WELDMENT	115	2	070-006-109	LINK
75A		070-006-028	TRIP ROCKER ARM WELDMENT	116	1	070-006-107	TUBE
76	2	070-001-857	ROLLER	117	2	809-849-605	SCREW HEX HEAD CAP. 1/4 - 20 x 3-3/4 LG.
77	2	919-055-600	RETAINING RING	118	1	070-006-120	CARRIAGE SUPPORT TUBE
78	1	070-011-170	TRIP CABLE ASSEMBLY	119	4	913-464-280	ROLL PIN (ESNA) 3/8 x 1-3/4 LG.
79	1	070-011-171	CABLE	120		070-006-105	TUBE ASSEMBLY
80	1	070-006-009	BELT RUNNER SUPPORT ASSEMBLY	121	1	070-006-108	SPACER
81	2	810-239-160	SCREW, SOC. HD. CAP., 10-24 x 1 LG.	122	3	070-006-118	BEARING, GROOVED - EXCENTRIC
82	2	840-039-002	NUT, FLEXLOC 21 FK, 10 - 24	123		809-849-165	SCREW, HEX HEAD CAP. 1/4 - 20 x 1 LG.
83	3	070-006-011	PULLEY ASSEMBLY	124*	1	701-849-124	BEARING THREADED BORE CONCENTRIC
84		000-024-679	BEARING	125		070-006-117	BEARING, GROOVED - CONCENTRIC
85	1	070-006-015	TRIP ARM ASSEMBLY (R.H.)	126	1	000-026-031	SPRING, BELT TIGHTENER
86		070-006-688	CARRIAGE SUPPORT, CASTING ASSEMBLY	127	1	070-006-042	BELT RUNNER, REAR
87		070-006-116	CLAMP STUD	128	1	070-006-103	SUPPORT GUIDE L.H.
88		834-549-002	NUT, HEX (REG.) 1/4 - 20	129	1	070-006-104	SUPPORT GUIDE R.H.
89	1	070-006-021	TUBE ASSEMBLY - FRONT	130	1	070-006-139	SPACER, INNER
91	1	070-006-016	TRIP ARM ASSEMBLY (L.H.)	131	2	070-006-140	SPACER, OUTER
92	1	070-011-172	BALL JOINT ASSEMBLY (7/16")	132	1	809-849-885	SCREW, HEX HD. CAP. 1/4 - 20 x 5-1/2 LG.
93	8	070-004-176	BEARING (SEE ITEMS 136, 137 AND 138 FOR REPLACEMENT)	133	2	808-549-200	SCREW, SOC. HEAD BUTTON 1/4 - 20 x 1-1/4 LG.
94	1	070-006-014	SHAFT	136		813-540-082	SCREW, PHIL. HEAD TRUSS 10 - 32 X 1/2 LG. (USE W/IT 138)
95	2	907-000-100	KEY, HI-PRO #HP403	137		957-100-002	WASHER, STAR #1110-00 (USE W/IT 138)
96	1	070-006-659	SHAFT	138		000-026-251	BEARING, FIELD RPL. FOR ITEM 93
97	1	807-249-160	SET SCREW, SOC. HD. CUP PT., 1/4 - 20x1 LG.				
98	1	000-022-173	NUT, SPECIAL				
99	1	070-006-029	CONNECTING LINK				
100		070-006-672	CARRIAGE, REAR				
101	2	070-006-004	TUBE				
102	1	070-006-035	SPRING				
103	1	070-006-019	COLLAR				
104	1	919-006-800	RING, RETAINING				
105	1	070-011-173	BALL JOINT ASSEMBLY				

***NOTE: ROLLER MUST BE ALL STEEL BEARING ON INSTALLATIONS WITH
"MAGICSCORE".**

DISTRIBUTOR ASSEMBLY SHEET 2



Graphic Number ES21

DRAWING #5.34





DISTRIBUTOR TRIP & DRIVE PULLEY ASSEMBLIES

SECTION 5

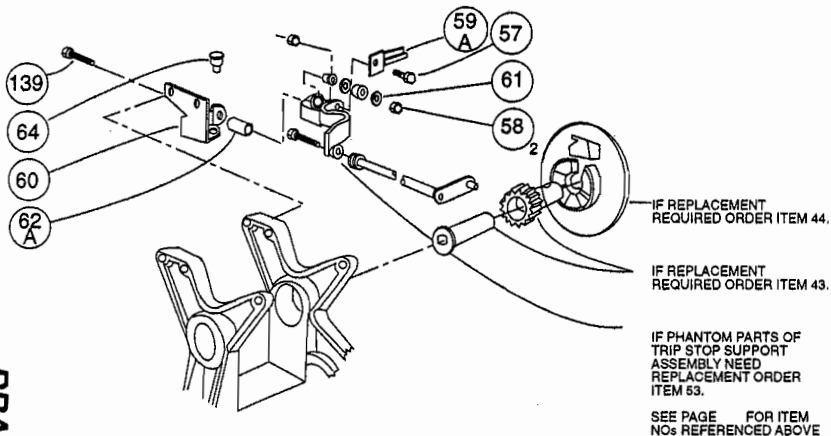
Service & Parts Manual

Parts

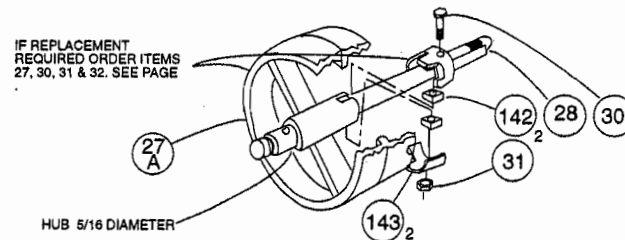
ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
TRIP STOP SUPPORT & CLUTCH PLATE ASSEMBLY				TRIP ROCKER ARM AND TRIP ROD ASSEMBLY			
57		809-849-125	SCREW HEX HD. CAP. 1/4 - 20 x 3/4 LG.	31		840-039-002	NUT, FLEXLOC 10 - 24
58		844-049-002	LOCK NUT STOVER 1/4 - 20	73A		070-006-022	TUBE ASSEMBLY MIDDLE (7-1/2 LG.)
59A		070-006-083	STOP BLADE USED WITH 070-006-062 CLUTCH PLATE ASSEMBLY	75A		070-006-028	TRIP ROCKER ARM WELDMENT
60		070-006-084	TRIP STOP SUPPORT BRACKET	81		810-239-160	SCREW, SOC. HEAD CAP., 10 - 24 x 1 LG.
61		000-026-865	WASHER	102		070-006-035	SPRING
62A		070-006-087	PIVOT - 31/32 LG.	103		070-006-019	COLLAR (SPRING)
64		070-006-142	BUMPER	140		810-239-120	SCREW, SOC. HEAD CAP., 10 - 24 x 3/4 LG.
139		809-849-245	SCREW, HEX HEAD CAP. 1/4 - 20 x 1-1/2 LG.	141		070-007-304	ROD END
DRIVE PULLEY ASSEMBLY				*NOTE: ITEM 143 WAS NOT USED WITH 070-006-666 DRIVE PULLEY (HUB 1-1/8 " DIA.)			
27A		070-006-078	DRIVE PULLEY (HUB 15/16" DIA.)				
28		070-006-077	SHAFT				
30		810-239-240	SCREW, SOC. HEX HD. CAP., 10 - 24 x 1-1/2 LG.				
31		840-039-002	NUT, FLEXLOC 10 - 24				
142		070-006-079	DRIVE BLOCK				
143*		610-704-027	DRIVE LUG KIT (INCLUDES ITEM 142 DRIVE BLOCKS)				

DISTRIBUTOR TRIP & DRIVE PULLEY ASSEMBLIES

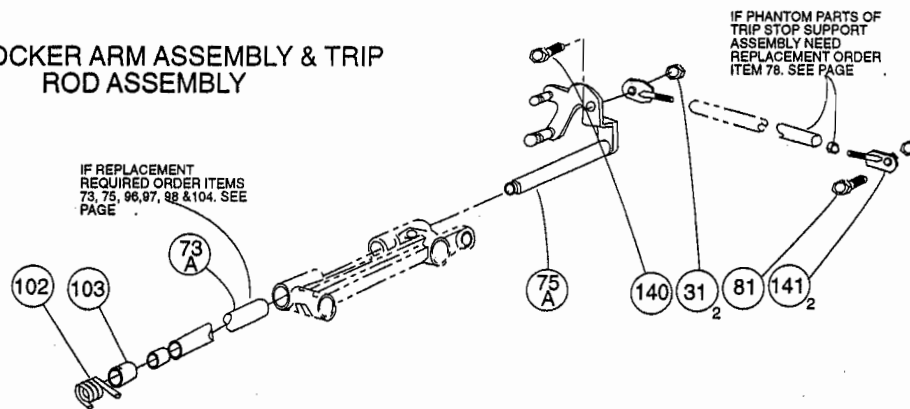
TRIP STOP SUPPORT ASSEMBLY & CLUTCH PLATE ASSEMBLY



DRIVE PULLEY ASSEMBLY



TRIP ROCKER ARM ASSEMBLY & TRIP ROD ASSEMBLY

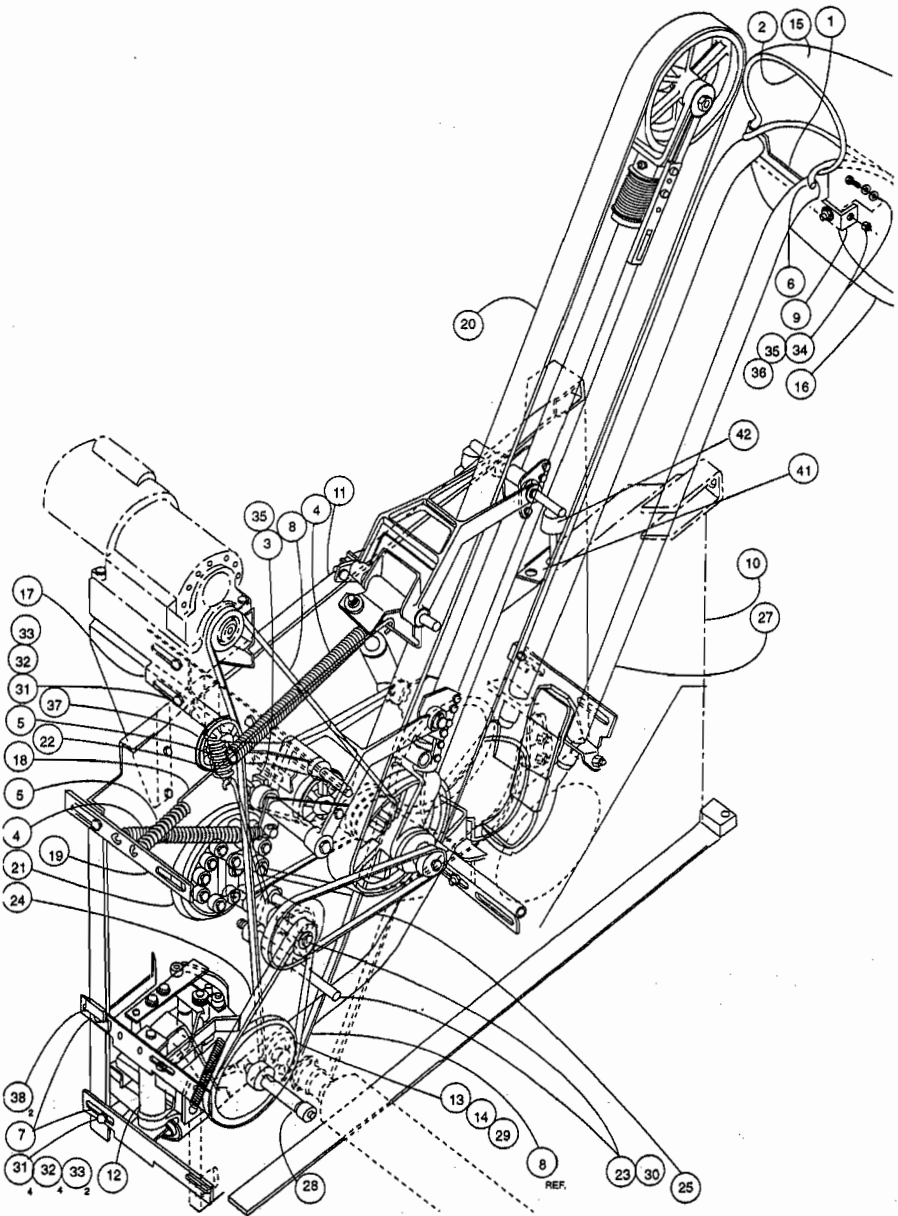


Graphic Number ES22



ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	000-021-813	SUPPORT, WIPER	26		070-011-178	CRANK ASSEMBLY, RUDDER DRIVE
2	2	000-021-814	RING, WIPER CLOTH	27		070-011-414	TRACK RAIL ASSEMBLY
3		000-024-610	STUD, CLAMP (3/8 DIAMETER)	28		700-107-146	LOCTITE - NOT SHOWN
4	3	000-024-673	SPRING	29		806-265-160	SCREW, SQ. HD. SET 3/8 - 16 x 1 LG.
5		000-026-031	SPRING	30		807-265-060	SCREW, SOC. HEAD SET 3/8 - 16 x 3/8 LG.
6		000-029-629	DOWN SWEEP WELDMENT	31		809-857-165	SCREW, HEX HEAD CAP. 5/16 - 18 x 1 LG.
7		000-029-910	SHIM	32		844-057-002	NUT, HEX 5/16 - 18
8		000-022-099	"V" BELT, CARPET DRIVE (113.75/2890.1)	33		948-761-112	WASHER, 11/32 I.D. x 11/16 O.D. x 1/16 THK.
9	4	070-004-654	BRACKET, DOWN TRACK	34		809-865-285	SCREW, HEX HEAD CAP. 3/8 - 16 x 1-3/4 LG.
10		070-011-202	KICKBACK ASSEMBLY, R.H. - FOR R.H. MACHINE	35		844-065-002	NUT, HEX STOVER 3/8-16
11		070-011-201	KICKBACK ASSEMBLY, L.H. - FOR L.H. MACHINE	36		948-767-132	WASHER, 13/32 I.D. x 13/16 O.D. x 1/16 THK.
12		070-011-120	LIGHT BALL SENSOR ASSEMBLY	37		070-007-124	BELT TIGHTENER PACKAGE
13		070-002-034	ROLLER ASSEMBLY (REAR)	38	2	070-011-310	SUPPORT - B.E. MOTOR GUARD
14		070-002-097	SHEAVE, CARPET DRIVE	39		000-024-699	B.E. MOTOR GUARD ASSEMBLY
15	1	070-004-669	WIPER CLOTH	40		070-004-730	BALL LIFT GUARD (NOT SHOWN)
16	1	070-004-670	DUST TRAP	41		070-004-642	STOP BRACKET
17		070-007-129	TIE PLATE ASSEMBLY (COMPLETE) - NOT SHOWN	42		000-024-641	STOP BUMPER
18		070-011-034	EXTENSION ROD				
19		070-011-035	STRAP				
20		070-011-052	BALL LIFT ASSEMBLY				
21		070-011-064	"V" BELT, RATCHET DRIVE, (GATES #1450 45"/1143 MM)				
22		070-011-106	SPRING, EXTENSION				
23		070-011-132	BELT TENSIONER ASSEMBLY				
24		070-011-147	"V" BELT, (GATES #1380 38"/965.2 MM)				
25		070-011-148	"V" BELT, (GATES #1400 40"/1016 MM)				

(PBL) POSITIVE BALL LIFT



GRAPHIC NUMBER TB20

DRAWING #5.36





PBL RATCHET DRIVE ASSEMBLY

SECTION 5

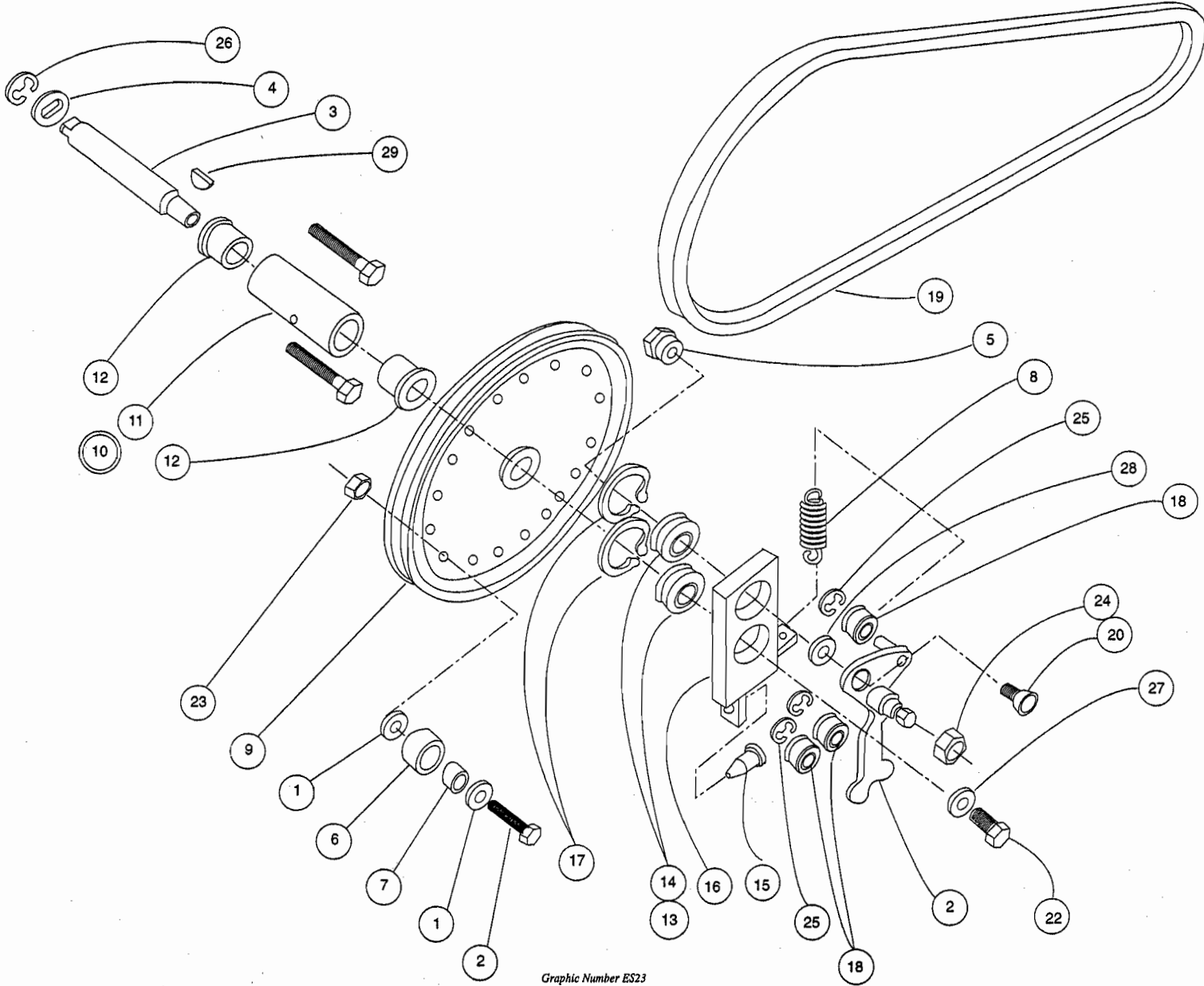
Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	32	000-026-865	WASHER	21	16	809-849-205	HEX HEAD CAP SCREW 1/4 - 20 x 1-1/4 LG.
2	1	070-011-217	RATCHET ARM WELDMENT	22	1	809-965-125	HEX HD. CAP SCREW, (LONG-LOK) 6/8-16 x 3/4 LG.
3	1	070-011-027	SHAFT - RATCHET ASSEMBLY	23	16	839-549-002	FLEXLOC NUT 1/4-20
4	1	070-011-028	WASHER	24	1	838-066-002	NUT HEX ESNA THN 3/8-24
5	1	070-011-029	NUT - RATCHET	25	3	919-005-200	TRU-ARCRING #5100-31
6	16	070-011-030	ROLLER	26	1	919-005-600	TRU-ARCRING #5100-75
7	16	070-011-031	SPACER - ROLLER	27	1	948-767-132	FLAT WASHER, 13/32 I.D. x 13/16 O.D. x 1/16 THK.
8	1	070-011-032	SPRING - RATCHET ASSEMBLY	28	1	948-964-142	FLAT WASHER, .375 I.D. x .875 O.D. x .094 THK.
9	1	070-011-033	PULLEY - RATCHET	29	1	907-000-200	KEY, HI-PRO #HP404
10		070-011-036	BEARING AND HOUSING ASSEMBLY	30*		070-008-212	SPACER
11	1	070-011-009	HOUSING	31*		844-057-002	NUT HEX STOVER 5/16-18
12	2	900-212-161	BEARING - FLANGE	32*		948-767-132	PLAIN WASHER, 13/32 I.D. x 13/16 O.D. x 1/16 THK.
13		070-011-037	CRANK ASSEMBLY				
14	2	000-024-679	BEARING				
15	1	070-006-142	BUMPER				
16	1	070-011-013	CRANK WELDMENT				
17	2	919-000-600	TRU - ARCRING 5000-137				
18	3	070-011-040	ROLLER - RATCHET ARM				
19	1	070-011-064	BELT (GATES #1450 45"/1143 MM)				
20	1	808-865-140	FLAT HEAD SOC. CAP SCREW, 3/8 - 16 x 7/8 LG.				

*** NOTE: ITEMS 30, 31 AND 32 ARE USED TO MOUNT RATCHET DRIVE ASSEMBLY TO SIDE PLATE BUT ARE NOT SHOWN**

PBL RATCHET DRIVE ASSEMBLY



DRAWING #5.37

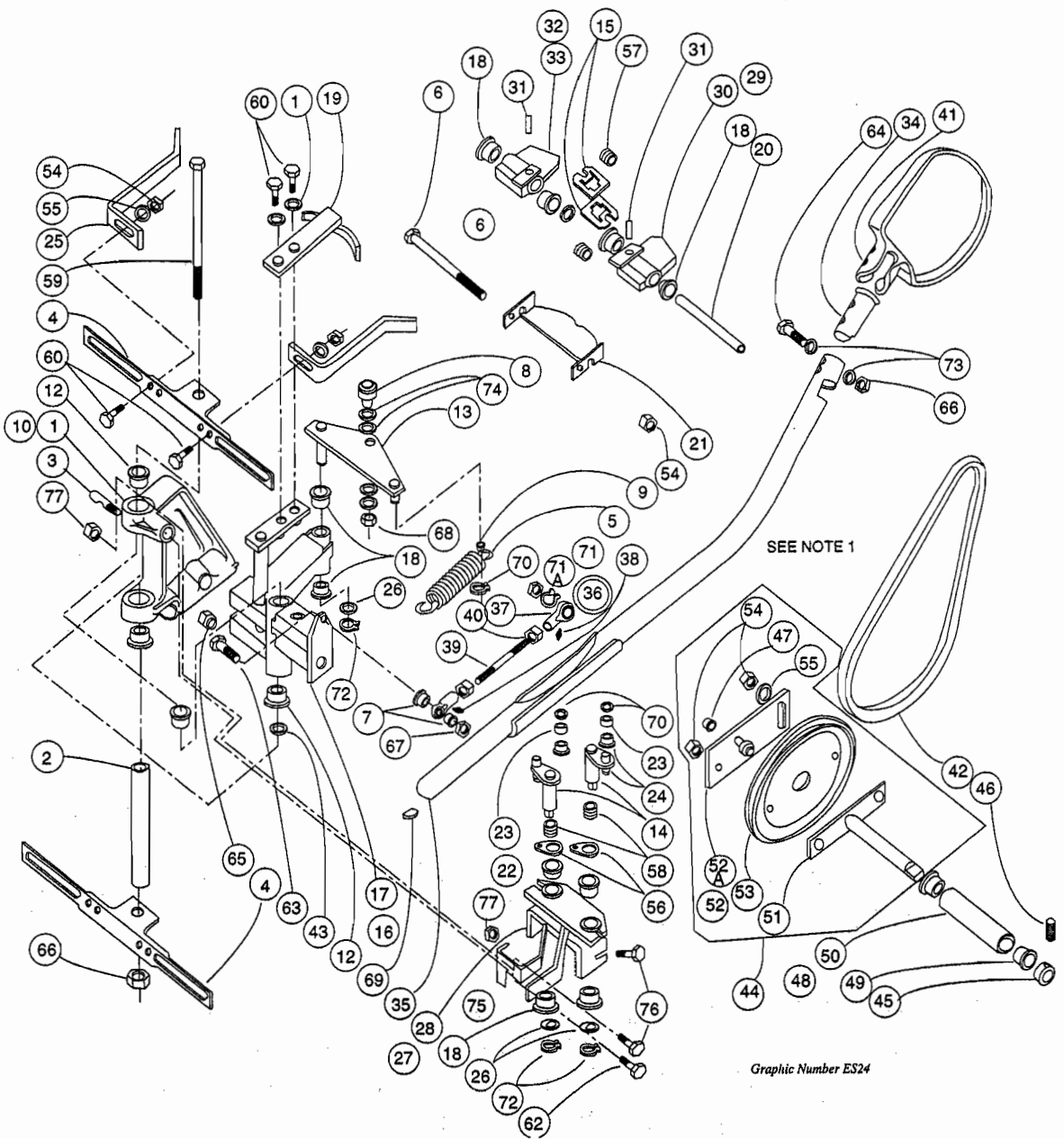
Graphic Number ES23





ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	000-022-869	FLAT WASHER	44		070-011-178	RUDDER DRIVE CRANK ASSEMBLY
2	1	000-024-615	SHAFT RUDDER	45	2	000-021-423	COLLAR (WITH SET SCREW)
3	1	000-024-616	CLAMP STUD	46		807-357-040	SOC. SET SCREW KN. CUP PT. 5/16 - 18 x 1/4 LG.
4	2	070-011-319	RUDDER ARM SUPPORT	47		000-029-611	WASHER - UNIBALL BRG. EFFT. TO 1 - 78
5	1	000-026-031	SPRING	48	1	000-029-696	TUBE ADJUSTMENT ASSEMBLY
6	1	000-027-264	WASHER - SPACER	49	2	000-021-427	FLANGE BEARING
7	2	000-029-611	WASHER - UNIBALL BEARING	50	1	000-029-697	TUBE
8	1	070-006-728	CAM FOLLOWER	51	1	070-011-092	CRANK SHAFT WELDMENT
9	1	070-011-040	ROLLER	52	1	070-011-225	CRANK ADJUSTMENT PLATE WELD EFFT. 1 - 78
10	1	070-011-066	RUDDER ARM SUPPORT ASSEMBLY	52A	1	070-011-225	CRANK ADJ. PLATE WELD EFFT. 1 - 78
11	1	070-011-067	RUDDER ARM SUPPORT	53	1	070-011-097	CRANK PULLEY
12	4	900-212-201	FLANGE BEARING	54	2	844-057-002	NUT STOVER 5/16 - 18
13	1	070-011-068	LINK WELDMENT	55	3	948-761-112	WASHER, 11/16 O.D. x 11/32 I.D. x 1/16 THK.
14	2	070-011-626	TRIP ARM ASSEMBLY	56	2	070-011-273	TAB
15	2	070-011-077	TRIP FINGER	57	2	722-971-522	SPRING
16	1	070-011-080	RUDDER DRIVE ASSEMBLY	58	2	722-985-512	SPRING
17	1	070-011-079	RUDDER DRIVE WELDMENT	59	1	802-865-996	BOLT, HEX HD. 3/8 - 16 x 9-1/2 LG.
18	6	900-208-091	FLANGE BEARING	60	4	809-857-165	SCREW, HEX HD. 5/16 - 18 x 1 LG.
19	1	070-011-418	CAM WELDMENT	61	1	809-857-880	SCREW, HEX HD. 5/16 - 18 x 5-1/2 LG.
20	1	070-011-098	SLEEVE	62	1	809-865-165	SCREW, HEX HD. 3/8 - 16 x 1 LG.
21	1	070-011-099	CAM	63	1	809-865-205	SCREW, HEX HD. 3/8 - 16 x 1/4 LG.
22		070-011-105	ROLLER ASSEMBLY	64	1	809-865-405	SCREW, HEX HD. 3/8 - 16 x 2-1/2 LG.
23	2	070-011-096	ROLLER	65	1	831-573-002	NUT, HEX 1/2 - 13
24	2	900-205-081	FLANGE BEARING	66	1	844-065-002	NUT, HEX FLEXLOC 3/8 - 16
25	2	070-011-107	TRIP ARM	67	1	840-065-002	NUT, HEX THIN FLEXLOCK 3/8 - 16
26	3	070-011-108	WASHER	68	1	844-070-002	NUT, HEX STOVER 7/16 - 20
27	1	070-011-110	CAM SENSOR ASSEMBLY	69	1	907-000-900	KEY HI PRO #910
28	1	070-011-100	CAM SENSOR WELDMENT	70	3	919-005-200	RETAINING RING 5100 - 31
29	1	070-011-407	RUDDER CAM ASSEMBLY L.H.	71	1	838-866-002	NUT HEX ESNA 3/8 - 24
30	1	070-011-405	RUDDER CAM WELDMENT L.H.	72	3	919-005-500	RETAINING RING 5100 - 50
31	2	913-448-120	ROLL PIN, 1/4 O.D. x 3/4 LG.	73	2	948-767-132	WASHER PLAIN, 13/16 O.D. x 13/32 I.D. x 1/16 THK.
32	1	070-011-406	RUDDER CAM ASSEMBLY R.H.	74	4	949-100-002	WASHER PLAIN, 59/64 O.D. x 13/32 I.D. x 1/16 THK.
33	1	070-011-404	RUDDER CAM WELDMENT R.H.	75	1	070-011-299	BRACE SENSOR
34	1	070-011-121	PLUG	76	2	809-849-145	SCREW HEX HEAD 1/4 - 20 x 7/8 LG.
35	1	070-011-122	RUDDER ARM	77	2	844-049-002	NUT HEX STOVER 1/4 - 20
36	1	070-011-123	ROD ASSEMBLY				
37	2	000-026-446	ROD END				
38		710-502-010	LUBRICATOR FITTINGS LU - E40				
39	1	070-011-124	ROD				
40	2	835-566-002	HEX JAM NUT 3/8 - 24				
41	1	070-011-146	PADDLE				
42	1	070-011-147	V - BELT (GATES #1380 - 38"/965.2 MM)				
43	2	070-011-151	SPACER RUDDER DRIVE				

PBL LIGHT BALL SENSOR ASSEMBLY



Graphic Number ES24

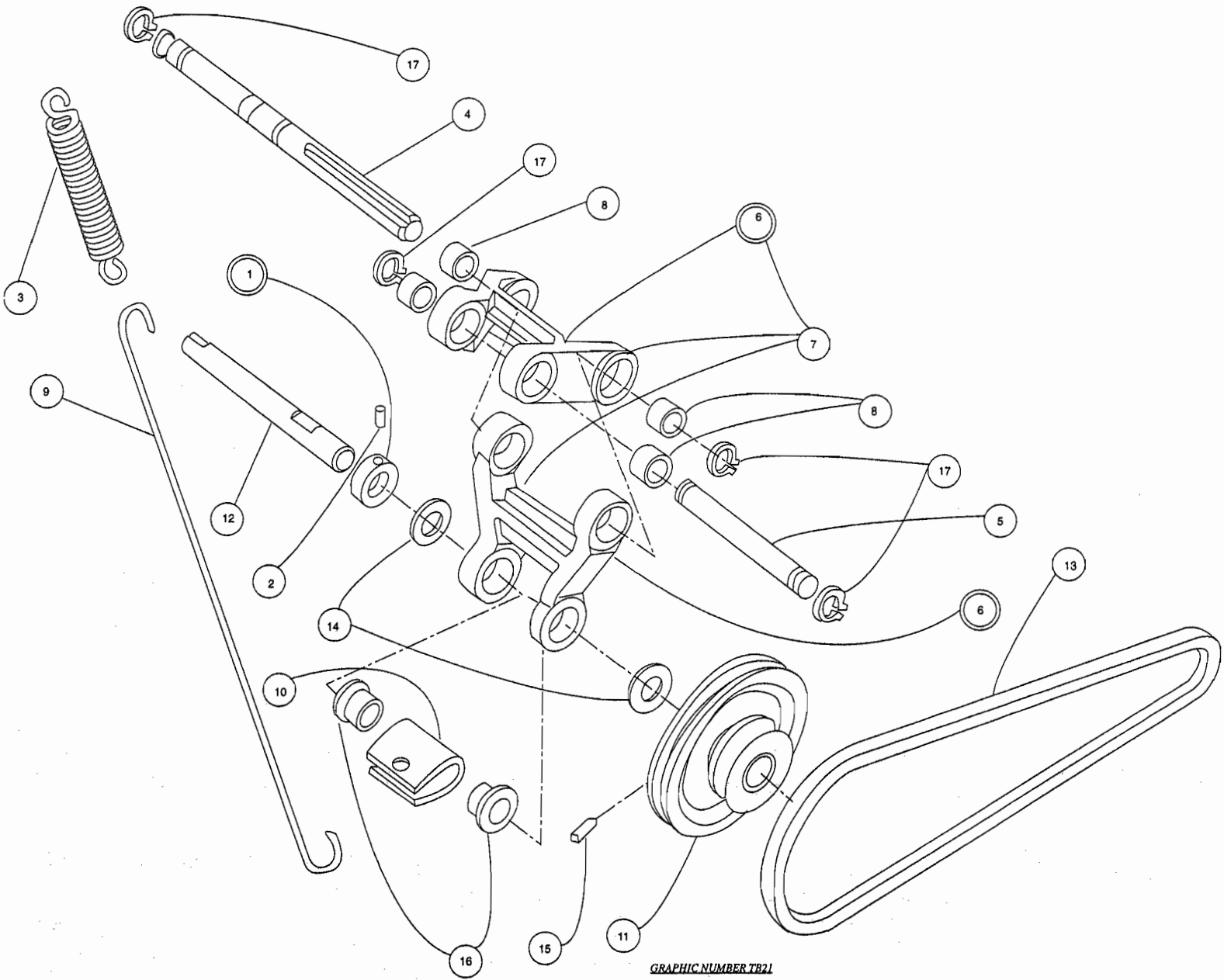
DRAWING #5.38




PBL BELT TENSIONER ASSEMBLY
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	000-021-423	COLLAR				
2	1	807-357-040	SOC. SET SCREW KNURLED CUP PT. 5/16 - 18 x 1/4 LG.				
3	1	000-026-031	SPRING				
4	1	000-029-605	SHAFT				
5	1	000-029-606	SHAFT				
6	1	000-029-659	HANGER ARM ASSEMBLY				
7	2	000-029-625	HANGER ARM				
8	8	900-110-081	BEARING - SLEEVE				
9	1	070-011-106	SPRING EXTENSION				
10	1	070-011-109	SPRING CLIP				
11	1	070-011-131	PULLEY - WELDMENT				
12	1	070-011-133	SHAFT				
13	1	070-011-148	V - BELT (GATES #1400 40"/1016 MM)				
14	2	701-320-045	THRUST WASHER				
15	1	807-257-060	SET SCREW - SOCKET CUP PT. 5/16 - 18 x 3/8 LG.				
16	2	900-210-101	FLANGE BEARING				
17	4	919-005-600	TRUARC RING, #5100-62				

PBL BELT TENSIONER ASSEMBLY



GRAPHIC NUMBER TB21

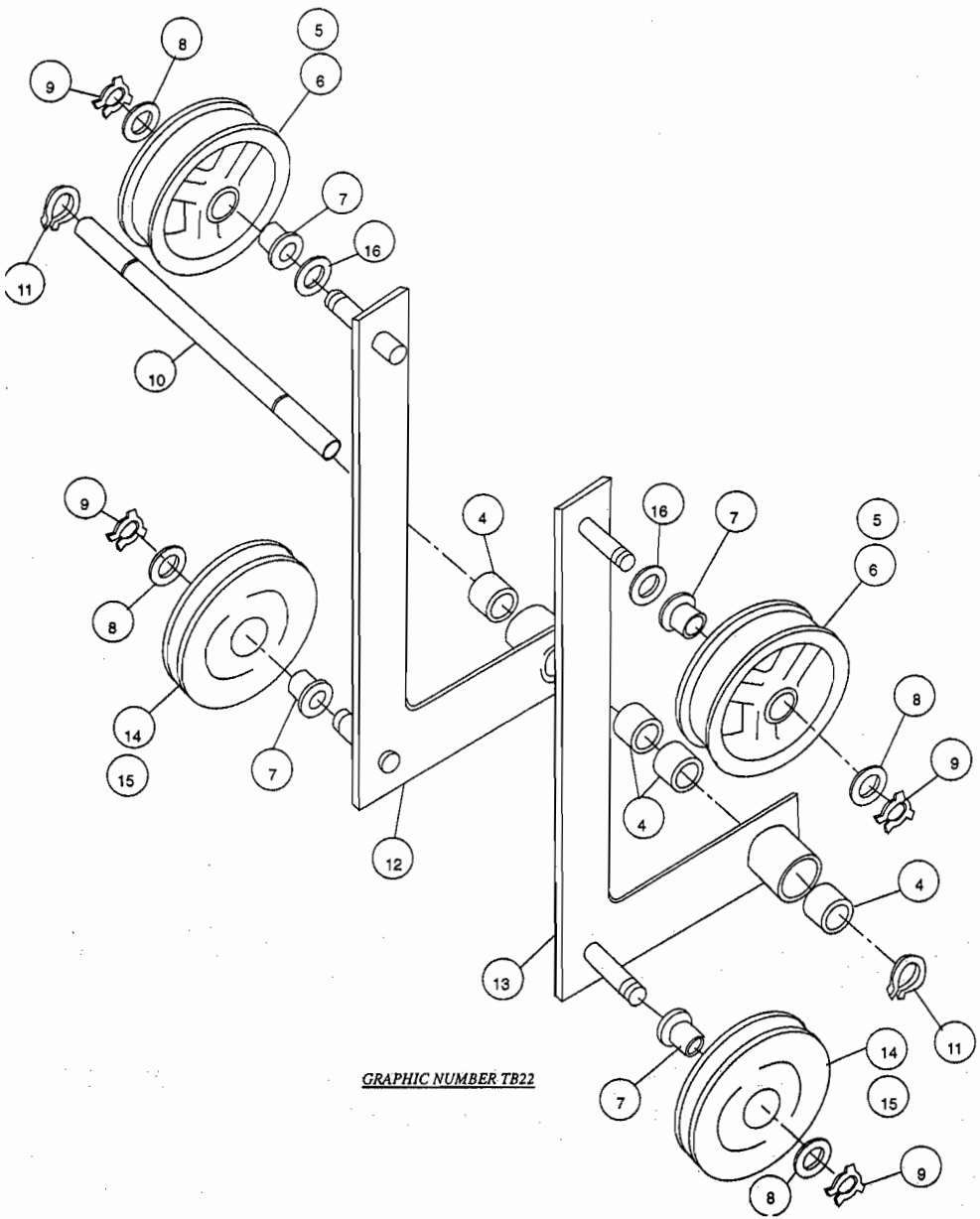
DRAWING #5.39




PBL BELT TIGHTENER ASSEMBLY
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-001-411	ARM ASSEMBLY				
2							
3							
4	4	900-112-121	BEARING SLEEVE				
5	2	000-021-408	IDLER PULLEY ASSEMBLY				
6	2	000-022-071	IDLER PULLEY				
7	4	900-208-161	BEARING, FLANGE				
8	4	948-975-172	WASHER, PLAIN 1-1/16 O.D. x 17/32 I.D. x 3/32 THK.				
9	4	963-600-002	X-WASHER, #9000-16				
10	1	000-029-603	SHAFT				
11	2	919-005-800	RETAINING RING				
12	1	070-011-524	BELT TIGHTNER, L.H.				
13	1	070-011-523	BELT TIGHTNER, R.H.				
14	2	070-011-525	IDLER SHEAVE ASSEMBLY (STL.)				
15	2	070-011-526	IDLER SHEAVE				
16	2	701-316-041	THRUST BEARING				

PBL BELT TIGHTENER ASSEMBLY



GRAPHIC NUMBER TB22

DRAWING #5.40





ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	070-011-323	SHOCK ABSORBER ASSEMBLY	35*	2	070-006-330	SHAFT ASS'Y. ADJ. 12-5/8" TO 14" SPACING
2	2	000-027-996	CUSHION	36	4	070-011-797	BALL BEARING ("D" SHAFT)
3	2	000-027-998	RETAINER	37	1	070-011-795	SHAFT - UPPER ("D" STYLE)
4	2	000-028-057	RETAINER	38	6	070-006-748	SPACER
5	1	000-029-660	SHAFT	39	1	070-011-004	TUBE AND SUPPORT ASSEMBLY
6	1	000-029-661	SHOCK ABSORBER	40	1	000-024-606	SUPPORT ASSEMBLY - UPPER
7	1	070-011-289	BRACKET	41	1	000-024-607	TUBE
8	1	831-566-002	NUT 3/8 - 24	42	1	070-011-002	SUPPORT LOWER
9	2	919-005-600	RETAINING RING #5100-62	43	4	809-849-365	SCREW HEX HD. CAP. 1/4 - 20 x 2-1/4 LG.
10	2	948-983-212	WASHER, PLAIN 1-5/16 O.D x 21/32 I.D. x .093 THK.	44	1	070-011-042	BELT TIGHTENER ASSEMBLY
11	1	000-024-603	SPRING	45	1	000-021-408	IDLER PULLEY ASSEMBLY
12	1	000-024-604	BELT-V-GUIDE RED	46	1	000-022-071	IDLER PULLEY
13	1	000-024-605	RETAINER - LOWER	47	1	900-208-161	BEARING - FLANGED
14	1	000-024-608	RETAINER - UPPER	48	1	070-007-192	WASHER
15	1	000-024-648	PIN PIVOT	49	1	070-008-217	SHORT SPACER
16	1	000-024-650	ROLLER ASSEMBLY	50	1	070-008-218	LONG SPACER
17	1	000-024-647	ROLLER	51	1	070-011-040	ROLLER
18	1	900-206-081	FLANGE BEARING	52		070-011-041	BELT TIGHTENER WELDMENT ASS'Y.
19	1	000-024-651	LINK ASSEMBLY - LOWER	53	1	070-008-215	BELT TIGHTENER WELDMENT
20	2	000-024-653	LINK	54	2	900-212-161	BEARING FLANGE
21	4	900-110-121	BEARING - SLEEVE	55	1	146-005-277	COUNTERSUNK WASHER
22	2	900-112-161	BEARING - SLEEVE	56	1	808-849-565	SCREW FL. SOC. HD. 1/4 - 20 x 3-1/2 LG.
23	1	070-001-995	YOKE - UPPER	57	1	839-549-002	NUT, FLEXLOC, 1/4 - 20, 21FA420
24	2	000-024-661	BELT PULLEY	58	1	919-005-200	TRUARC RING #5100-35
25	1	000-024-720	LINK ASSEMBLY - UPPER	59		070-011-047	YOKE ASSEMBLY LOWER
26	1	000-024-716	SPRING HOLDER	60	1	000-024-659	YOKE LOWER
27	2	900-112-203	BEARING - SLEEVE	61A	1	070-011-796	SHAFT LOWER ("D" SHAFT)
28	1	000-028-737	PIVOT SHAFT	61B		070-006-746	SHAFT LOWER (OLD STYLE)
29	1	000-029-613	RAIL	62	2	070-006-749	CLUTCH RACE
30	1	070-006-320	SHAFT ASS'Y. ADJ. 9-1/2" TO 11" SPACING	63**		000-024-811	PULLEY ASSEMBLY B.L. ROLLER CLUTCH
31	1	070-006-325	SHAFT ASS'Y. FIXED 9-1/2" TO 11" SPACING	64**	2	070-007-291	CLUTCH AND BEARING ASSEMBLY
32*	2	070-006-328	SHAFT ASS'Y. FIXED 11" TO 12-5/8" SPACING	65**		000-024-812	PULLEY ASSEMBLY B.L. ROLLER CLUTCH
33*	2	070-006-329	SHAFT ASS'Y. ADJ. 11" TO 12-5/8" SPACING	66		700-107-170	LOCTITE #601
34*	2	070-006-330	SHAFT ASS'Y. FIXED 12-5/8" TO 14" SPACING	67	1	070-008-210	SHEAVE - PADDLE DRIVE



(PBL) POSITIVE BALL LIFT ASSEMBLY

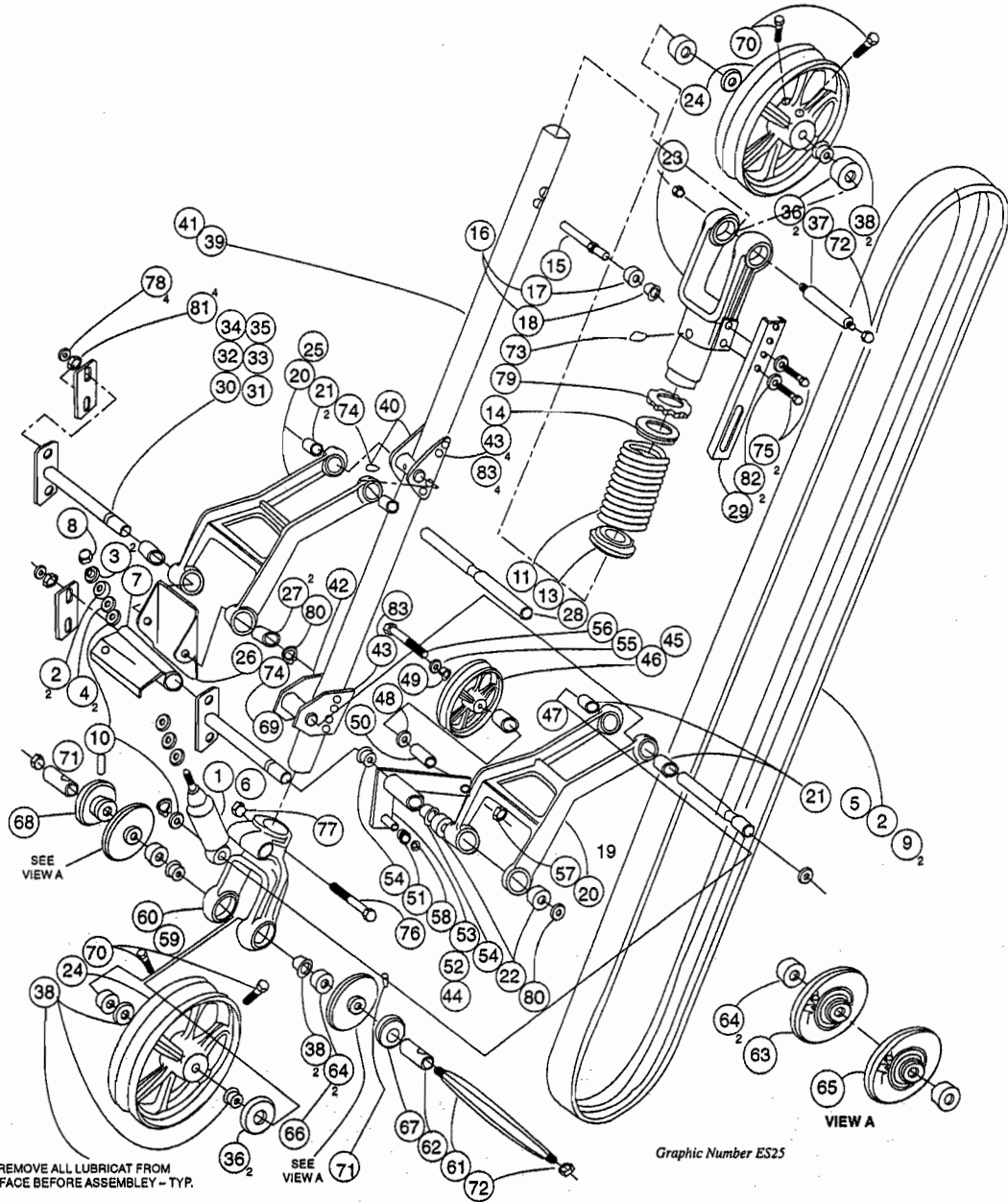
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
68	1	070-008-211	SHEAVE - FIRST STAGE LIFT				
69							
70	4	807-265-080	SOC. SET SCREW CUP PT. 3/8-16 x 1 LG.				
71	2	856-070-002	FLANGE NUT 7/16-20				
72	4	710-501-007	LUBRICATOR FITTING #1792B				
73	1	807-265-060	SOC. SET SCREW CUP PT. 3/8 - 16 x 3/8 LG.				
74	2	809-865-165	SCREW, HEX HD. 3/8 - 16 x 1 LG.				
75	2	809-865-445	SCREW, HEX HD. 3/8 - 16 x 2-3/4 LG.				
76	1	839-665-002	NUT, FLEXLOC 3/8 - 16				
77	1	840-057-002	NUT, STOVER 5/16 - 18				
78	4	845-100-000	BEARING LOCKNUT				
79	1	919-005-800	TRU - ARC RING #5100-75				
80	2	948-761-112	WASHER, PLAIN 11/32 I.D. x 11/16 O.D. x 1/16 THK.				
81	4	951-164-002	LOCKWASHER, MEDIUM 3/8				
82	2	839-549-002	NUT, FLEXLOC 1/4 - 20				
83	2	070-008-212	SPACER				
<p>* NOTE: 9-1/2" = 241.30 MM, 11" = 279.40MM, 12-5/8" = 320.68 MM, 14" = 355.60 MM, 3-1/2" = 88.9 MM, 4-1/4" = 107.95 MM</p> <p>ITEMS 32, 33, 34 & 35 ARE USED WITH MACHINES THAT MAY NEED A LONGER SHAFT BECAUSE OF AN EXTRA WIDE BACKEND</p>				<p>** NOTE: REFER TO VIEW WHICH MATCHES YOUR BALL LIFT ASSEMBLY FOR ITEM NUMBERS</p> <p>*** NOTE: ADJUSTABLE BALL LIFT SUPPORT SHAFTS (ITEMS 30 THROUGH 35) ARE PROVIDED TO ALLOW ALIGNMENT OF THE BALL LIFT TO THE TRACK RAILS. ADJUSTMENT IS REQUIRED WHEN THE SHAFT SUPPORTS ON THE METAL KICKBACK ASSEMBLIES ARE NOT ALIGNED. ALIGNMENT IS ACHIEVED BY TURNING PLATES ON THE SUPPORT SHAFT ASSEMBLIES UNTIL THE PLATES ARE PARALLEL TO THE DIRECTION OF OFFSET. (SEE VIEW A)</p>			

(PBL) POSITIVE BALL BEARING LIFT ASSEMBLY



REMOVE ALL LUBRICAT FROM SURFACE BEFORE ASSEMBLY - TYP.

Graphic Number ES25

DRAWING #5.42





PBL TRACK RAIL ASSEMBLY

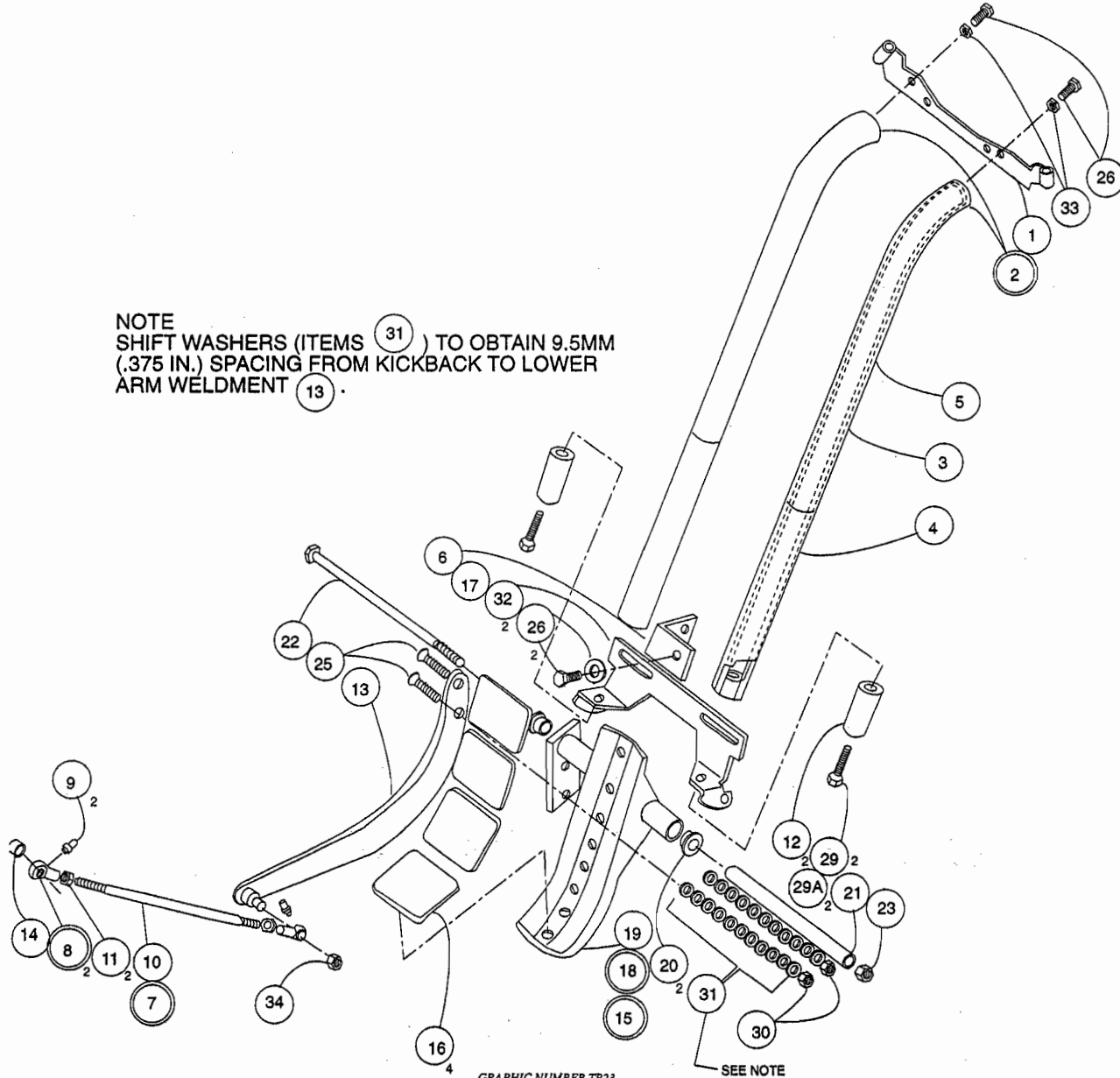
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	000-021-813	SUPPORT WIPER	22	1	809-865-992	SCREW, HEX HD. CAP 3/8 - 16 x 9 LG.
2		070-011-279	TRACK ASSEMBLY	23	1	844-065-002	NUT STOVER 3/8 - 16
3	2	000-024-663	TRACK COVER UPPER	25		808-857-280	SCREW, FLAT SOC. HEAD 5/16 - 18 x 1-3/4 LG.
4	2	070-011-440	TRACK COVER LOWER	26	2	809-865-165	SCREW, HEX HD. 3/8 - 16 x 1 LG.
5	2	000-024-666	TRACK RAIL WELDMENT	29		810-265-400	SCREW, SOC. HD. CAP 3/8 - 16 x 2-1/2 LG.
6		000-024-668	TRACK SUPPORT ASSEMBLY	29A		810-365-401	SCREW SOC HEAD CAP LONG LOC 3/8 - 16 x 2-1/2 LG.
7	1	070-011-049	ROD ASSEMBLY	30		844-057-002	NUT, STOVER 5/16 - 18
8	2	000-026-446	ROD END WITH LUBE FITTING	31		948-767-132	WASHER, PLAIN 13/32 I.D. x 13/16 O.D. x 1/16 THK.
9		710-502-010	LUBRICATOR FITTING	32		958-584-002	SHAKEPROOF WASHER
10	1	070-011-048	ROD	33	2	951-164-002	LOCKWASHER SPRING 3/8 MEDIUM
11	2	835-566-002	HEX JAM NUT	34		838-866-002	ESNA HEX NUT 3/8 - 24
12	2	070-011-018	BALL GUIDE				
13		070-011-375	LEVER ARM WELD.				
14		070-011-053	SPACER EFFECTIVE TO 1 - 78				
15		070-011-413	LIFT ASSEMBLY				
16	4	090-002-024	LINER				
17	1	070-008-191	BRACKET				
18		070-011-412	LIFT ARM ASSEMBLY				
19	1	070-011-411	LIFT ARM WELDMENT				
20	2	900-210-161	FLANGE BEARING				
21	1	070-011-063	SHAFT				

PBL TRACK RAIL ASSEMBLY



NOTE
 SHIFT WASHERS (ITEMS 31) TO OBTAIN 9.5MM
 (.375 IN.) SPACING FROM KICKBACK TO LOWER
 ARM WELDMENT 13 .

DRAWING #5.43





PIT SIGNAL SYSTEM ASSEMBLY

SECTION 5

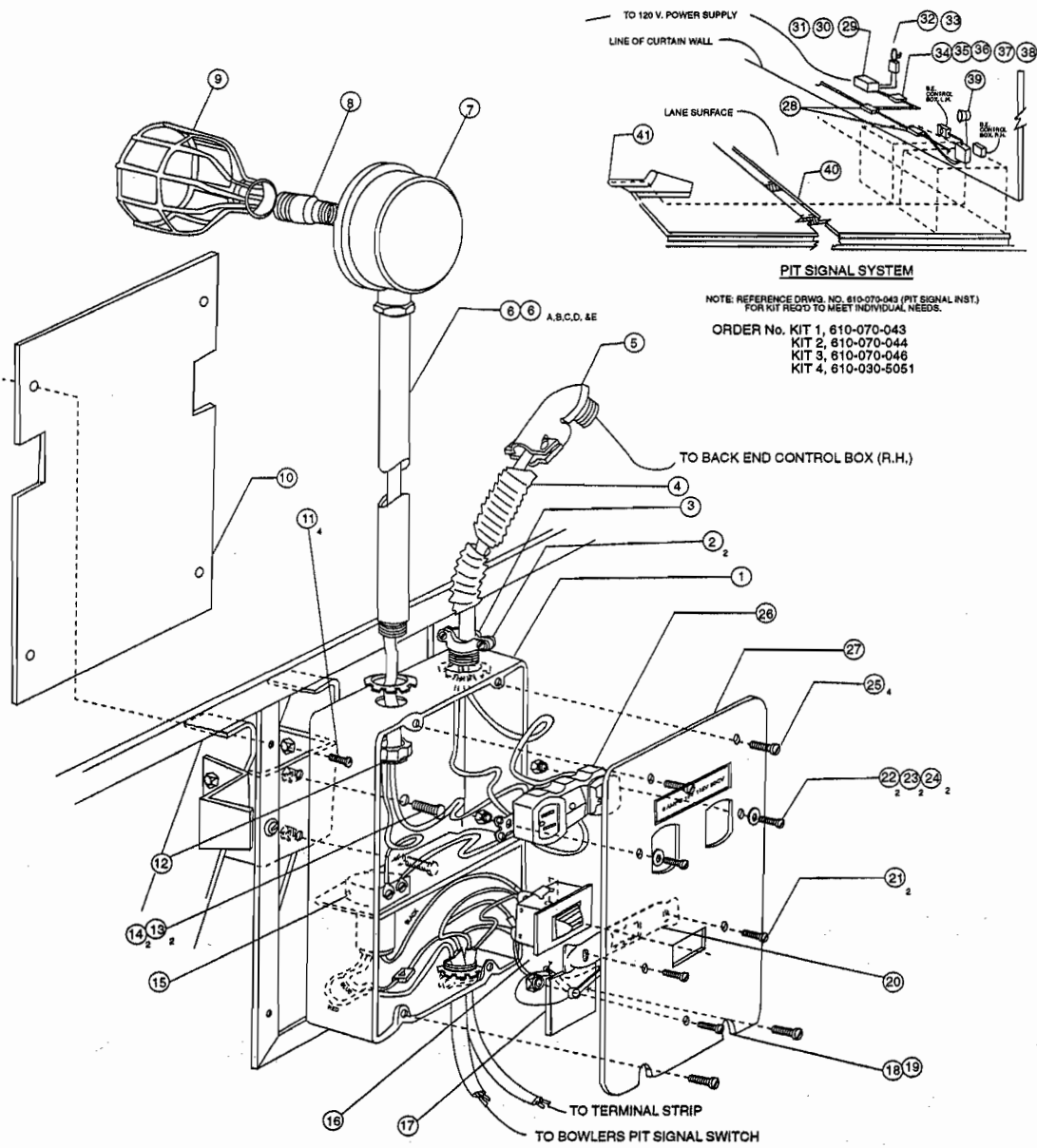
Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1		741-008-008	ELECTRICAL BOX	19		843-133-002	KEPS NUT, 8 - 32
2		746-001-015	CONNECTOR, STR. LOCKNUT INCL.	20		744-104-005	STRAP
3		741-510-200	BUSHING, ANTI-SHORT - 3/8 DIA.	21		818-227-042	SEMS SCREW, 6 - 32 x 1/4 LG.
4		905-064-000	CONDUIT, FLEX - 3/8 DIA. (70 & 3000 MACHINES ONLY)	22		812-827-062	RD. HD. SCREW, 6 - 32 x 3/8 LG.
5		746-003-008	CONNECTOR, 90 DEG. - 3/8 DIA. (70 & 3000 MACHINES ONLY)	23		948-631-062	PLAIN WASHER, 5/32 I.D. x 3/8 O.D. x .046 THK.
6		070-005-498	LAMP MAST CONDUIT, 1/2 DIA. (70 & 3000 MACHINES ONLY)	24		840-027-002	LOCK NUT, 6 - 32
6A		030-004-845	LAMP MAST CONDUIT, 1/2 DIA. (30 MACHINE ONLY)	25		813-240-082	PAN HD. MACHINE SCREW, 10 - 32 x 1/2 LG.
6B		744-101-020	CLAMP (30 MACHINE ONLY) NOT SHOWN	26		000-024-822	DUPLEX OUTLET
6C		744-101-021	CLAMP BACK (30 MACHINE ONLY)	27		000-024-803	ELECTRICAL BOX COVER
6D		810-250-200	SOC. HEAD CAP. SCREW, 1/4 - 28 x 1-1/4 LG. (30 MACHINE ONLY) NOT SHOWN	28		000-026-512	TERMINAL BLOCK
6E		844-050-002	NUT, 1/4 - 28 (30 MACHINE ONLY) NOT SHOWN	29		000-026-514	TRANSFORMER
7		770-012-012	UNILET	30		000-026-509	RELAY
8		000-024-695	LAMP SOCKET	31		000-026-837	CAPACITOR
9		770-006-006	LAMP GUARD	32		000-023-700	BELL, 4"
10*		000-024-694	SAFETY COVER	33		000-026-515	BELL RELAY
11*		828-133-082	RD. HD. TAP SCREW, #8 x 1/2 LG.	34		000-028-024	BOX, FUSTAT
12		741-520-301	BUSHING, CONDUIT - 1/2 DIA. T & B	35		000-026-709	COVER AND SWITCH (FUSTAT BOX)
13		809-849-125	HEX HD. SCREW, GR. 8, 1/4 - 20 x 3/4 LG.	36		000-026-710	FUSTAT
14		844-049-002	STOVER HEX NUT, 1/4 - 20	37		000-026-711	ADAPTOR
15		000-026-509	RELAY	38		208-111-296	DECAL (FUSE RATING)
16		000-024-823	MOMENTARY SWITCH	39		070-005-360	BACKEND CONTROL BOX, R.H. (REF.)
17		000-026-508	RECTIFIER	40		000-029-962	MAST LAMP ASSEMBLY
18		808-533-120	BUTTON HD. SOC. SCREW, 8 - 32 x 3/4 LG.	41		000-024-946	TWO (2) CONDUCTOR CABLE

*** NOTE: Asterisk (*) indicates items required when the P.S.S. is not used.**

PIT SIGNAL SYSTEM ASSEMBLY



GRAPHIC NUMBER TB25

DRAWING #5.44





82-70 TO 82-90 PIT SIGNAL SYSTEM CONVERSION KIT

SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	746-001-016	CONNECTOR, #3302 1/2				
2	8	809-849-100	SCREW, HEX 1/4 - 20 x 5/8 LG.				
3	8	839-549-002	NUT, FLEXLOCK 1/4 - 20				
4	3	760-015-038	TERMINAL, AMP - 41473 REEL				
5	2	090-004-716	82-90 PIT SIGNAL MOUNTING BRACKET				
6	2	090-003-709	PIT SIGNAL CHASSIS LOGIC POWER				
7	1	610-700-924	UTILITY BOX				

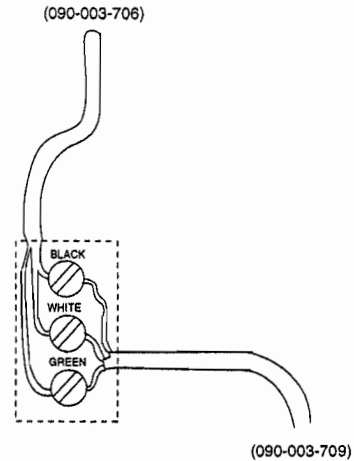
82-70 TO 82-90 PIT SIGNAL SYSTEM CONVERSION KIT

1. MOUNTING PIT SIGNAL SUPPORT BRACKET (090-004-716)

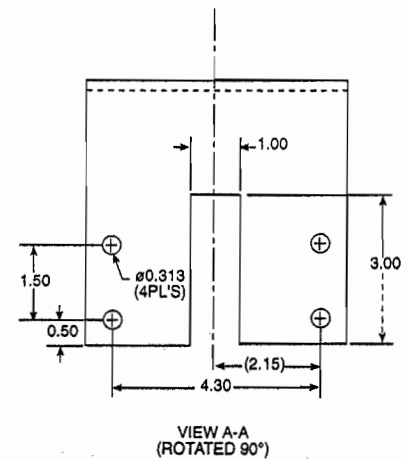
- A) REMOVE THE BACK WIRE COVER (090-004-703) FROM THE CHASSIS MOUNTING BRACKET (090-004-705)
- B) LOCATE THE FOUR (4) HOLES THAT MATCH HOLE PATTERN OF PIT SIGNAL SUPPORT BRACKET (090-004-705) REFER TO VIEW A-A; IF HOLES DO NOT EXIST IN CHASSIS MOUNTING BRACKET, USE HOLE PATTERN OF PIT SIGNAL BRACKET AS TEMPLATE, MAINTAINING THE 1.75 INCH DIMENSION SHOWN IN DIAGRAM BELOW AND DRILL FOUR (4) 0.313 DIAMETER HOLES.
- C) SECURE PIT SIGNAL KIT (610-700-046) WITH HARDWARE ALSO PROVIDED.

2. PIT SIGNAL KIT #3 WIRING UPGRADE INSTRUCTIONS

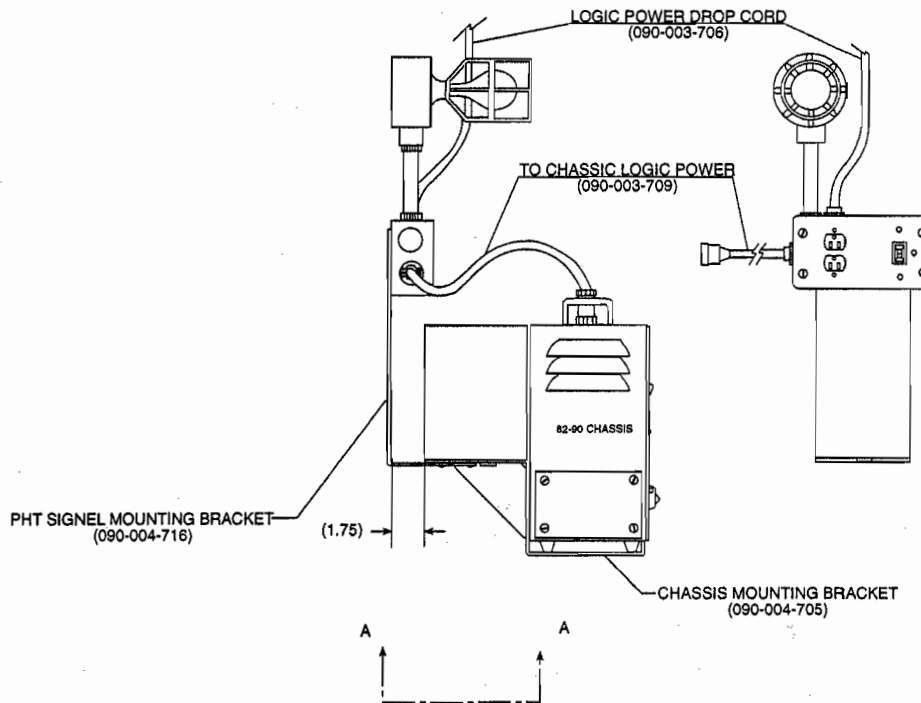
- A) REMOVE FRONT COVER FROM PIT SIGNAL KIT #3 (610-700-046)
- B) REMOVE FLEXIBLE CONDUIT, STRAIN RELIEF AND WIRING THAT IS CONNECTED TO RECEPTACLE OUTLET (000-024-822)
- C) TURN OFF CHASSIS LOGIC POWER "CIRCUIT BREAKER" AND SECURE IT FROM BEING SWITCHED ON ACCIDENTALLY.
- D) STRIP AND TERMINATE WITH SPADE TERMINALS (760-015-038) THE PIT SIGNAL/CHASSIS LOGIC CABLE (090-003-709)
- E) ATTACH CONNECTOR (746-001-016) TO HOLE WHERE FLEXIBLE CONDUIT WAS CONNECTED.
- F) INSERT PIT SIGNAL/CHASSIS LOGIC CABLE THRU CONNECTOR (746-001-016) TO RECEPTACLE OUTLET. SEE WIRING SCHEMATIC BELOW.
- G) CUT PLUG END OFF OF CHASSIS LOGIC POWER CABLE (090-003-706) AND STRIP CABLE JACKET OFF IN ORDER TO MOUNT CABLE TO RECEPTACLE OUTLET. SEE BELOW



RECEPTACLE WIRING SCHEMATIC
FOR 610-700-046 KIT #3



DRAWING #5.45



GRAPHIC NUMBER TB24



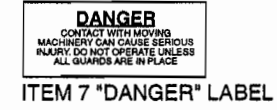


ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	6	090-004-028	"WARNING" LABEL				
2	1	090-005-132	FRONT END BOX COVER GUARD				
3	1	090-005-133	FRONT END COVER GUARD				
4	2	070-004-691	REAR BRACKET				
5	2	070-010-238	FRONT BRACKET				
6	2	070-005-585	END MACHINE SIDE GUARD				
7	5	070-011-211	"DANGER" DECAL				
8	1	090-004-420	BACK END SCREEN GUARD				
9	2	090-003-651	PIN ELEVATOR WHEEL GUARD				
			ASSEMBLY (BLACK)				
10	1	090-004-703	BACK END MOTOR CHASSIS MOUNTING BRACKET COVER GUARD				
11	1	070-005-614	"WARNING" DECAL				
12	1	070-011-401	BALL LIFT GUARD WELDMENT				
13		090-005-118	HAND RAIL				
14		090-005-135	WING GUARD				

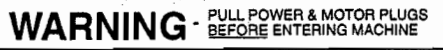
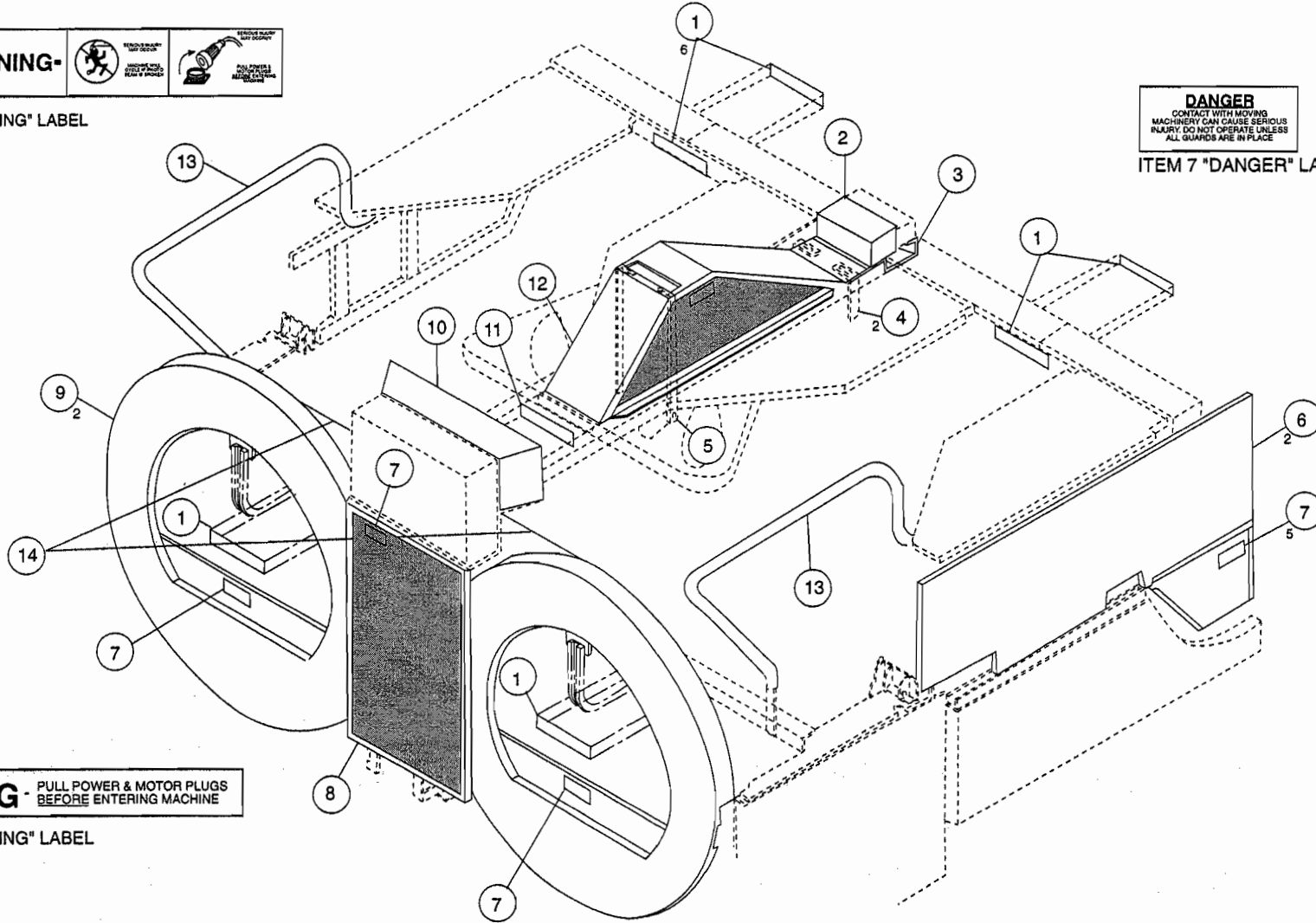
GUARDS & SAFETY LABELS ASSEMBLY



ITEM 1 "WARNING" LABEL



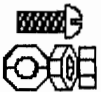
ITEM 7 "DANGER" LABEL



ITEM 11 "WARNING" LABEL

GRAPHIC NUMBER TB27

DRAWING #5.46





CHASSIS MOUNTING BRACKET ASSEMBLY

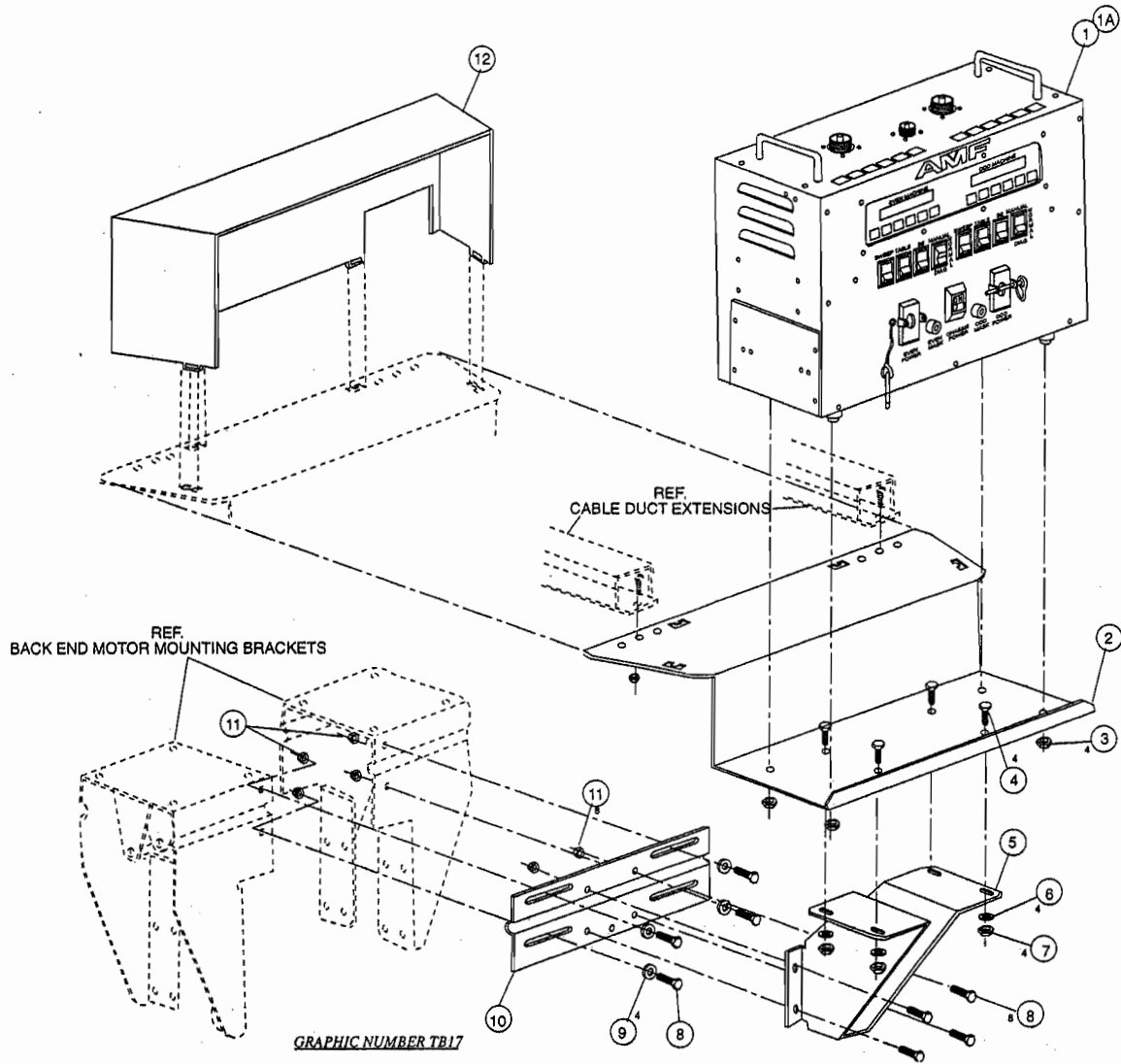
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	090-003-700	CHASSIS ASSEMBLY- STRIKE FOUL XL				
1A	1	090-003-701	CHASSIS ASSEMBLY - PINDICATION				
2	1	090-004-705	BACK END MOTOR CHASSIS MOUNTING BRACKET				
3	4	835-549-002	HEX JAM NUT, 1/4 - 20				
4	4	809-849-125	HEX HD. CAP SCREW, 1/4 - 20 x 3/4 LG				
5	1	090-004-514	BACK END MOTOR CHASSIS MOUNTING BRACKET SUPPORT				
6	4	948-753-102	FLAT WASHER, 9/32 I.D. x 5/8 O.D. x 1/16 THK.				
7	4	844-049-002	STOVER LOCK NUT, 1/4 - 20				
8	8	809-857-125	HEX HD. CAP SCREW, 5/16 - 18 x 3/4 LG.				
9	4	948-761-112	FLAT WASHER, 11/32 I.D. x 11/16 O.D. x 1/16 THK.				
10	1	090-004-513	BACK END MOTOR MOUNTING BRACKET TIE PLATE				
11	8	844-057-002	STOVER LOCK NUT, 5/16 - 18				
12	1	090-004-703	BACK END MOTOR CHASSIS MOUNTING BRACKET COVER				

CHASSIS MOUNTING BRACKET ASSEMBLY



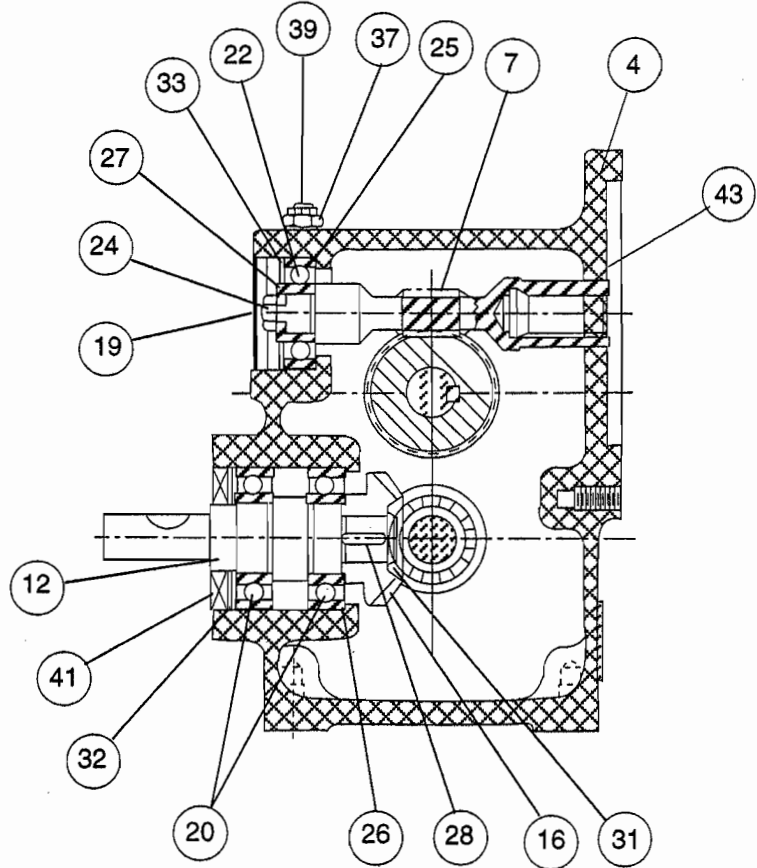
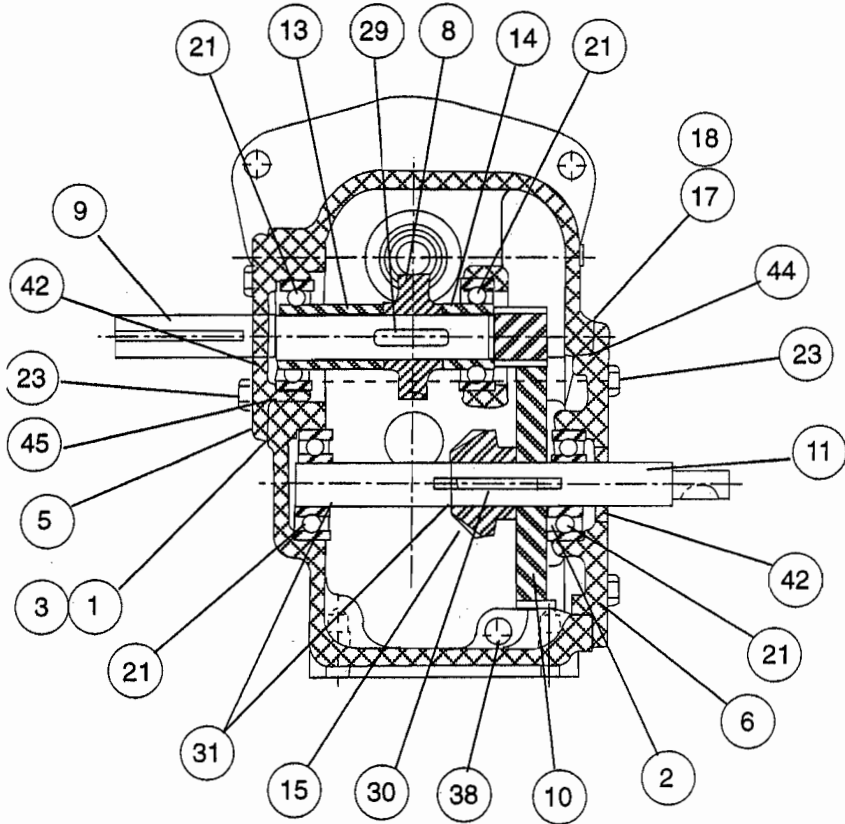
DRAWING #5.47




BACK GEAR DRIVE R.H. (50 HZ)
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	785-503-035	SHIM, .002 RED	34	.363	715-021-711	OIL, MOBIL 600W
2	1	785-503-059	SPACER	35	.20oz	715-011-801	GREASE, MOLY-XL
3	2	785-503-036	SHIM, .005 BLUE	36	1	785-503-076	RED TAG NAME PLATE
4	1	785-503-010	HOUSING, R.H.	37	1	718-803-003	BUSHING, PIPE 1/8 NPT
5	1	785-503-045	CAP, OPEN	38	2	718-507-023	PLG, PIPE SCKT 1/4 X 1/8NPT
6	1	785-503-046	CAP, OPEN	39	1	730-063-088	PLUG, VENTED 1/4 NPT H.T.
7	1	785-503-024	WORM, INTG 5/1	40	1	785-503-081	CAPLUG, PROT CLOS 7
8	1	785-503-018	GEAR, WORM 5/1	41	1	785-503-071	SEAL, 11392 OR EQ
9	1	785-503-019	GEAR, INTG SPUR 18T	42	2	785-503-072	SEAL, 7443 OR EQ
10	1	785-503-020	GEAR, SPUR 82T	43	1	785-503-074	SEAL, 11124 OR EQ
11	1	785-503-055	SHAFT, INTERMEDIATE	44	1	785-503-075	O-RING, -046 OR EQ
12	1	785-503-056	SHAFT, OUTPUT	45	1	785-503-076	O-RING, -034 OR EQ
13	1	785-503-060	SPACER				
14	1	785-503-061	SPACER				
15	1	785-503-021	GEAR, ST BEV 20T				
16	1	785-503-022	GEAR, ST BEV 26T				
17	1	785-503-037	SHIM, .002 RED				
18	2	785-503-039	SHIM, .005 BLUE				
19	1	785-503-043	PLUG, EXP 1-27/32				
20	2	701-000-033	BEARING, BALL 206K OR EQ				
21	4	701-000-032	BEARING, BALL 204K OR EQ				
22	1	701-000-034	BEARING, BALL 303 OR EQ				
23	8	809-849-120	SCRW, HEX GR5 1/4NC X 3/4				
24	1	809-857-120	SCRW, HEX GR5 5/16NC X 3/4				
25	6	785-503-040	SHIM 1 1/2X1 13/16 X .002				
26	4	785-503-039	SHIM, 2 1/4X2 7/16 X .002				
27	1	946-264-160	WSHR 3/8 X 1 X 1/8				
28	1	907-200-800	KEY, P&W 3/16 SQ X 3/4				
29	1	907-202-200	KEY, P&W 3/16 SQ X 1				
30	1	907-202-300	KEY, SQ END 3/16 SQ X 1 1/2				
31	3	919-005-800	RING, RET 5100-75 OR EQ				
32	1	919-001-400	RING, RET 5000-244 OR EQ				
33	1	919-001-100	RING, RET N5000-185 OR EQ				

BACK GEAR DRIVE R.H. (50 HZ)



AMF

90004506
ASSEMBLY NUMBER

BACK END RH 50
MODEL HERTZ

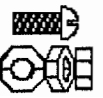
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DATE CODE

AMF BOWLING, INC.
RICHMOND, VA 23227

LUBRICATION
MOBIL 600 W CYLINDER OIL OR EQUIV
RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES77

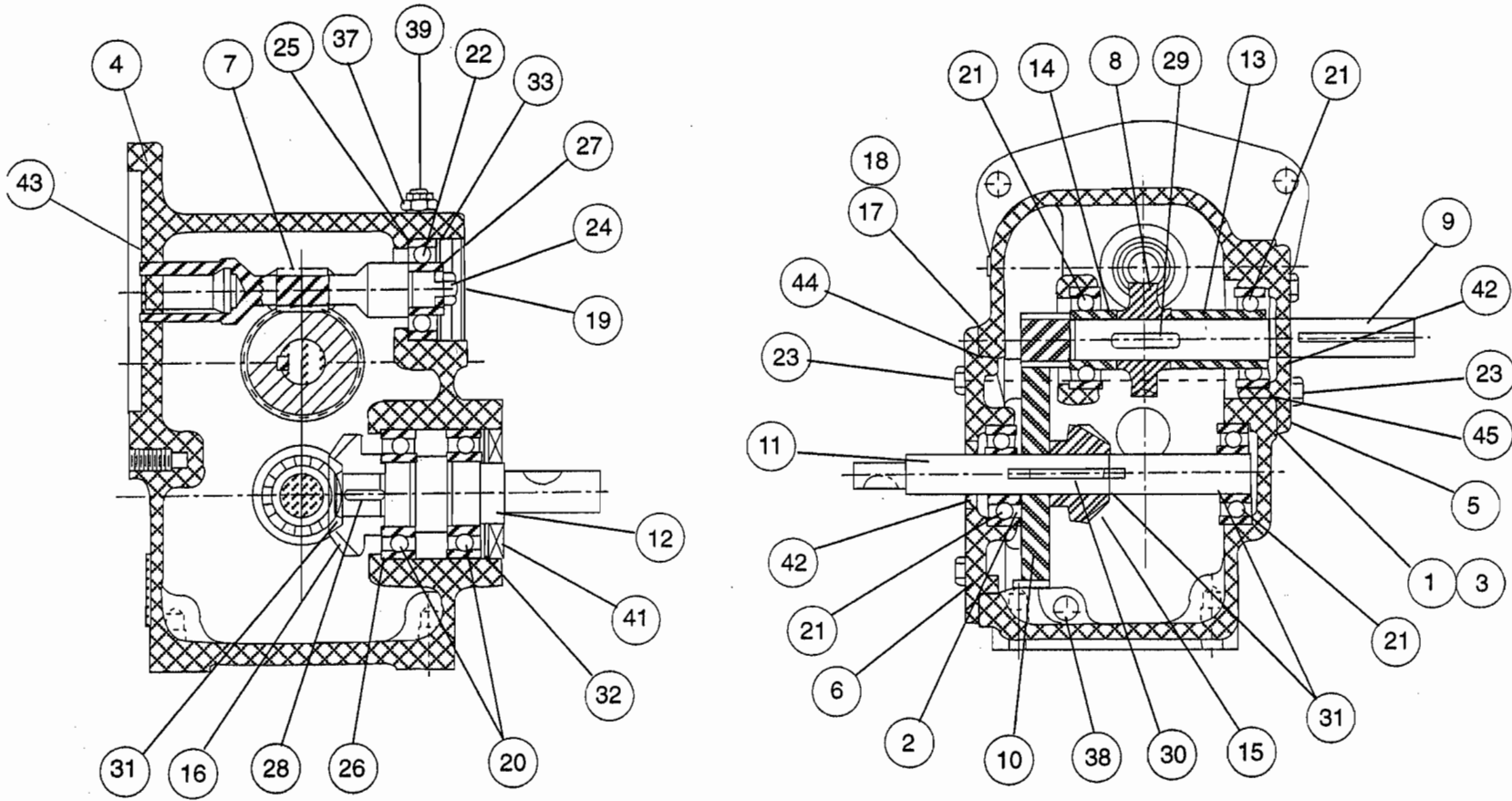
DRAWING #5.48




BACK GEAR DRIVE L.H. (50 HZ)
SECTION 5
Service & Parts Manual
Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	785-503-035	SHIM, .002 RED	34	.363	715-021-711	OIL, MOBIL 600W
2	1	785-503-059	SPACER	35	.20oz	715-011-801	GREASE, MOLY-XL
3	2	785-503-036	SHIM, .005 BLUE	36	1	785-503-076	RED TAG NAME PLATE
4	1	785-503-010	HOUSING, R.H.	37	1	718-803-003	BUSHING, PIPE 1/8 NPT
5	1	785-503-045	CAP, OPEN	38	2	718-507-023	PLG, PIPE SCKT 1/4 X 1/8NPT
6	1	785-503-046	CAP, OPEN	39	1	730-063-088	PLUG, VENTED 1/4 NPT H.T.
7	1	785-503-024	WORM, INTG 5/1	40	1	785-503-081	CAPLUG, PROT CLOS 7
8	1	785-503-018	GEAR, WORM 5/1	41	1	785-503-071	SEAL, 11392 OR EQ
9	1	785-503-019	GEAR, INTG SPUR 18T	42	2	785-503-072	SEAL, 7443 OR EQ
10	1	785-503-020	GEAR, SPUR 82T	43	1	785-503-074	SEAL, 11124 OR EQ
11	1	785-503-055	SHAFT, INTERMEDIATE	44	1	785-503-075	O-RING, -046 OR EQ
12	1	785-503-056	SHAFT, OUTPUT	45	1	785-503-076	O-RING, -034 OR EQ
13	1	785-503-060	SPACER				
14	1	785-503-061	SPACER				
15	1	785-503-021	GEAR, ST BEV 20T				
16	1	785-503-022	GEAR ST BEV 26T				
17	1	785-503-037	SHIM, .002 RED				
18	2	785-503-039	SHIM, .005 BLUE				
19	1	785-503-043	PLUG, EXP 1-27/32				
20	2	701-000-033	BEARING, BALL 206K OR EQ				
21	4	701-000-032	BEARING, BALL 204K OR EQ				
22	1	701-000-034	BEARING, BALL 303 OR EQ				
23	8	809-849-120	SCRW, HEX GR5 1/4NC X 3/4				
24	1	809-857-120	SCRW, HEX GR5 5/16NC X 3/4				
25	6	785-503-040	SHIM 1 1/2X1 13/16 X .002				
26	4	785-503-039	SHIM, 2 1/4X2 7/16 X .002				
27	1	946-264-160	WSHR 3/8 X 1 X 1/8				
28	1	907-200-800	KEY, P&W 3/16 SQ X 3/4				
29	1	907-202-200	KEY, P&W 3/16 SQ X 1				
30	1	907-202-300	KEY, SQ END 3/16 SQ X 1 1/2				
31	3	919-005-800	RING, RET 5100-75 OR EQ				
32	1	919-001-400	RING, RET 5000-244 OR EQ				
33	1	919-001-100	RING, RET N5000-185 OR EQ				

BACK GEAR DRIVE L.H. (50 HZ)



DRAWING #5.49

AMF

90004507
ASSEMBLY NUMBER

BACK END LH 50
MODEL HERTZ

(YYMM)
DATE CODE

AMF BOWLING, INC.
RICHMOND, VA 23227
LUBRICATION
MOBIL 600 W CYLINDER OIL OR EQUIV
RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES78





BACK GEAR DRIVE R.H. (60 HZ)

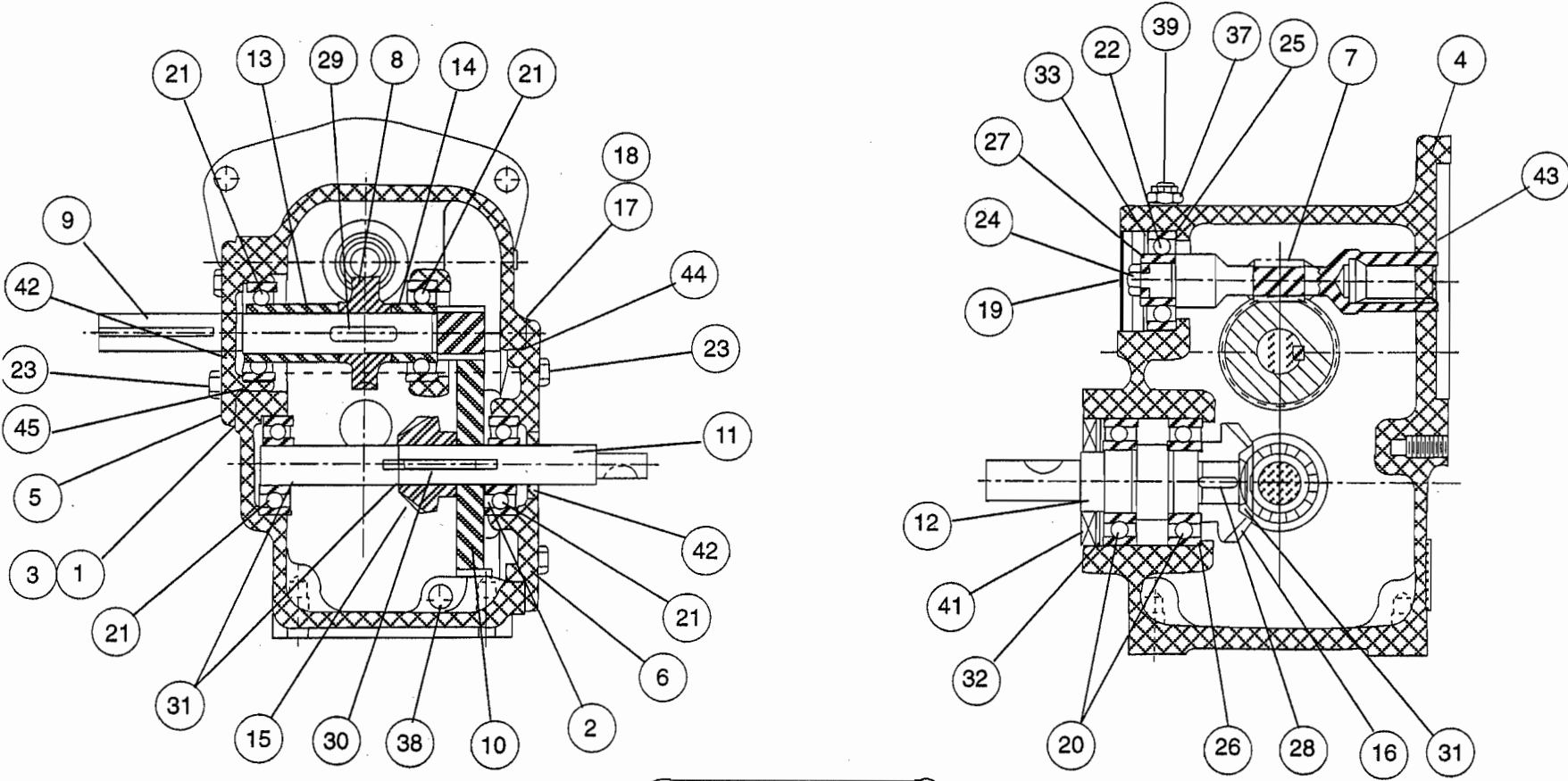
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	785-503-035	SHIM, .002 RED	34	.363	715-021-711	OIL, MOBIL 600W
2	1	785-503-059	SPACER	35	.20oz	715-011-801	GREASE, MOLY-XL
3	2	785-503-036	SHIM, .005 BLUE	36	1	785-503-075	NAME PLATE
4	1	785-503-010	HOUSING, R.H.	37	1	718-803-003	BUSHING, PIPE 1/8 NPT
5	1	785-503-045	CAP, OPEN	38	2	718-507-023	PLG, PIPE SCKT 1/4 X 1/8NPT
6	1	785-503-046	CAP, OPEN	39	1	730-063-088	PLUG, VENTED 1/4 NPT H.T.
7	1	785-503-024	WORM, INTG 5/1	40	1	785-503-081	CAPLUG, PROT CLOS 7
8	1	785-503-018	GEAR, WORM 5/1	41	1	785-503-071	SEAL, 11392 OR EQ
9	1	785-503-019	GEAR, INTG SPUR 18T	42	2	785-503-072	SEAL, 7443 OR EQ
10	1	785-503-020	GEAR, SPUR 82T	43	1	785-503-074	SEAL, 11124 OR EQ
11	1	785-503-055	SHAFT, INTERMEDIATE	44	1	785-503-075	O-RING, -046 OR EQ
12	1	785-503-056	SHAFT, OUTPUT	45	1	785-503-076	O-RING, -034 OR EQ
13	1	785-503-060	SPACER				
14	1	785-503-061	SPACER				
15	1	785-503-021	GEAR, ST BEV 20T				
16	1	785-503-022	GEAR ST BEV 26T				
17	1	785-503-037	SHIM, .002 RED				
18	2	785-503-039	SHIM, .005 BLUE				
19	1	785-503-043	PLUG, EXP 1-27/32				
20	2	701-000-033	BEARING, BALL 206K OR EQ				
21	4	701-000-032	BEARING, BALL 204K OR EQ				
22	1	701-000-034	BEARING, BALL 303 OR EQ				
23	8	809-849-120	SCRW, HEX GR5 1/4NC X 3/4				
24	1	809-857-120	SCRW, HEX GR5 5/16NC X 3/4				
25	6	785-503-040	SHIM 1 1/2X1 13/16 X .002				
26	4	785-503-039	SHIM, 2 1/4X2 7/16 X .002				
27	1	946-264-160	WSHR 3/8 X 1 X 1/8				
28	1	907-200-800	KEY, P&W 3/16 SQ X 3/4				
29	1	907-202-200	KEY, P&W 3/16 SQ X 1				
30	1	907-202-300	KEY, SQ END 3/16 SQ X 1 1/2				
31	3	919-005-800	RING, RET 5100-75 OR EQ				
32	1	919-001-400	RING, RET 5000-244 OR EQ				
33	1	919-001-100	RING, RET N5000-185 OR EQ				

BACK GEAR DRIVE R.H. (60 HZ)



DRAWING #5.50

AMF

90004501
ASSEMBLY NUMBER

BACK END RH 60
MODEL HERTZ

(YYMM)
DATE CODE

AMF BOWLING, INC.
RICHMOND, VA 23227

LUBRICATION
MOBIL 600 W CYLINDER OIL OR EQUIV
RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES76





BACK GEAR DRIVE L.H. (60 HZ)

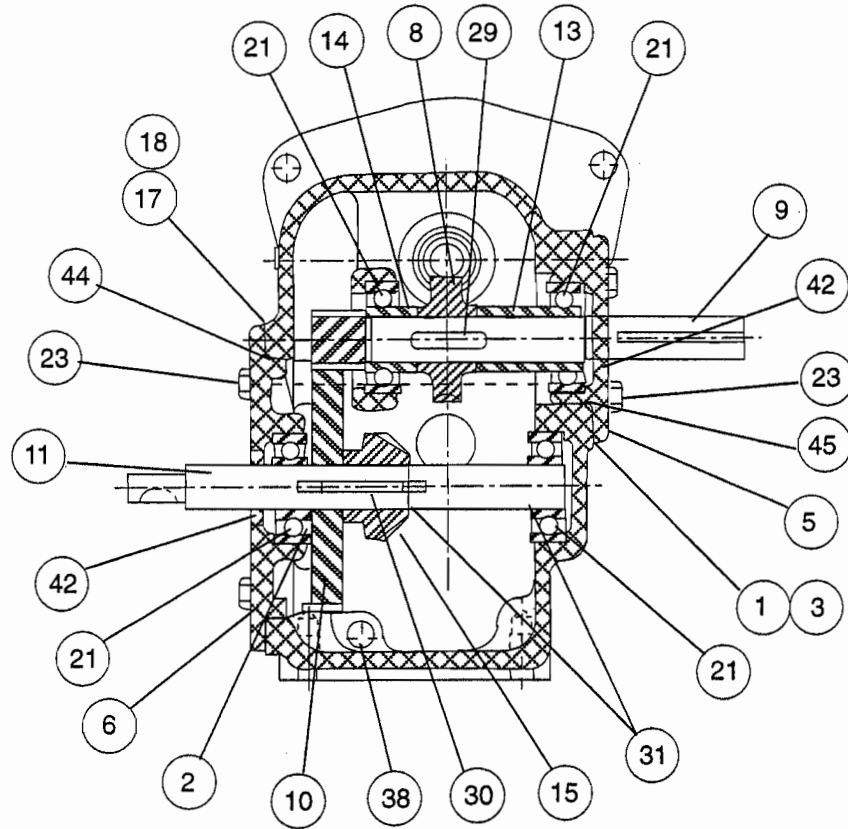
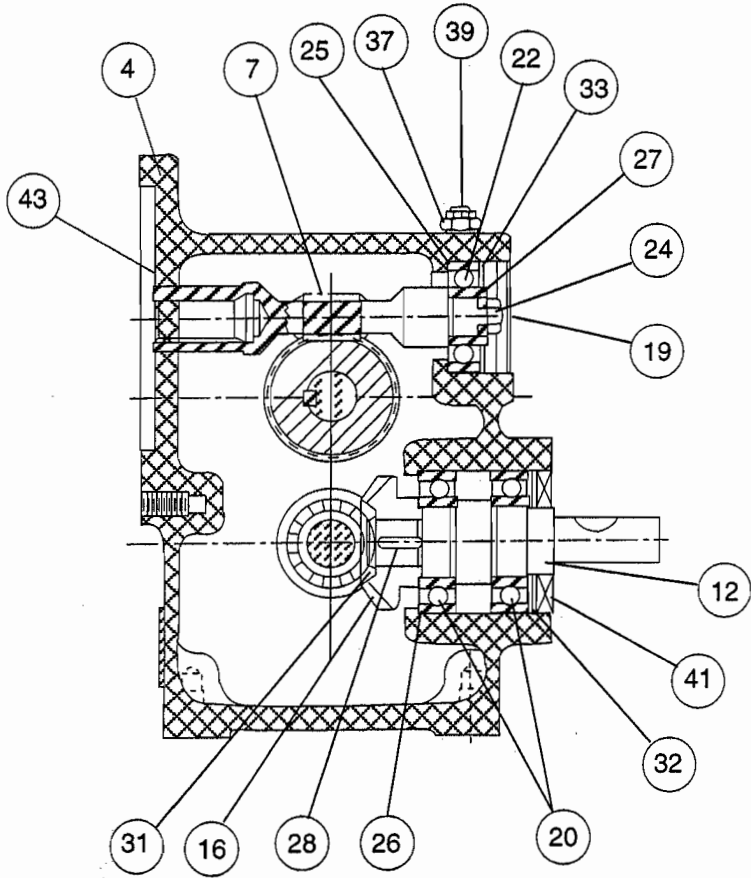
SECTION 5

Service & Parts Manual

Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	785-503-035	SHIM, .002 RED	34	.363	715-021-711	OIL, MOBIL 600W
2	1	785-503-059	SPACER	35	.20oz	715-011-801	GREASE, MOLY-XL
3	2	785-503-036	SHIM, .005 BLUE	36	1	785-503-075	NAME PLATE
4	1	785-503-010	HOUSING, R.H.	37	1	718-803-003	BUSHING, PIPE 1/8 NPT
5	1	785-503-045	CAP, OPEN	38	2	718-507-023	PLG, PIPE SCKT 1/4 X 1/8NPT
6	1	785-503-046	CAP, OPEN	39	1	730-063-088	PLUG, VENTED 1/4 NPT H.T.
7	1	785-503-024	WORM, INTG 5/1	40	1	785-503-081	CAPLUG, PROT CLOS 7
8	1	785-503-018	GEAR, WORM 5/1	41	1	785-503-071	SEAL, 11392 OR EQ
9	1	785-503-019	GEAR, INTG SPUR 18T	42	2	785-503-072	SEAL, 7443 OR EQ
10	1	785-503-020	GEAR, SPUR 82T	43	1	785-503-074	SEAL, 11124 OR EQ
11	1	785-503-055	SHAFT, INTERMEDIATE	44	1	785-503-075	O-RING, -046 OR EQ
12	1	785-503-056	SHAFT, OUTPUT	45	1	785-503-076	O-RING, -034 OR EQ
13	1	785-503-060	SPACER				
14	1	785-503-061	SPACER				
15	1	785-503-021	GEAR, ST BEV 20T				
16	1	785-503-022	GEAR, ST BEV 26T				
17	1	785-503-037	SHIM, .002 RED				
18	2	785-503-039	SHIM, .005 BLUE				
19	1	785-503-043	PLUG, EXP 1-27/32				
20	2	701-000-033	BEARING, BALL 206K OR EQ				
21	4	701-000-032	BEARING, BALL 204K OR EQ				
22	1	701-000-034	BEARING, BALL 303 OR EQ				
23	8	809-849-120	SCRW, HEX GR5 1/4NC X 3/4				
24	1	809-857-120	SCRW, HEX GR5 5/16NC X 3/4				
25	6	785-503-040	SHIM 1 1/2X1 13/16 X .002				
26	4	785-503-039	SHIM, 2 1/4X2 7/16 X .002				
27	1	946-264-160	WSHR 3/8 X 1 X 1/8				
28	1	907-200-800	KEY, P&W 3/16 SQ X 3/4				
29	1	907-202-200	KEY, P&W 3/16 SQ X 1				
30	1	907-202-300	KEY, SQ END 3/16 SQ X 1 1/2				
31	3	919-005-800	RING, RET 5100-75 OR EQ				
32	1	919-001-400	RING, RET 5000-244 OR EQ				
33	1	919-001-100	RING, RET N5000-185 OR EQ				

BACK GEAR DRIVE L.H. (60 HZ)



DRAWING #5.51

AMF

90004502
ASSEMBLY NUMBER

BACK END LH 60
MODEL HERTZ

(YYMM)
DATE CODE

AMF BOWLING, INC.
RICHMOND, VA 23227

LUBRICATION
MOBIL 600 W CYLINDER OIL OR EQUIV
RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES79





FRONT GEAR DRIVE (50 HZ)

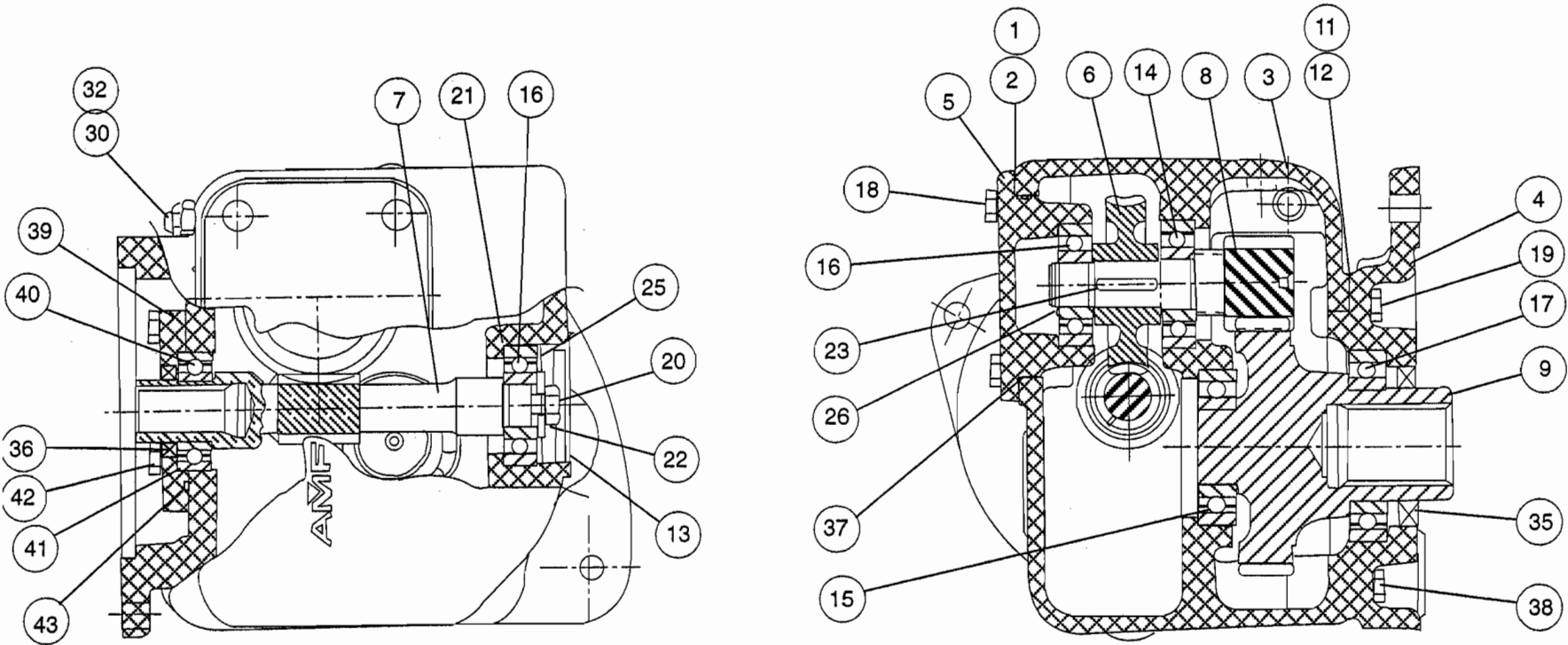
SECTION 5

Service & Parts Manual


Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	785-503-031	SHIM, .002 RED	34	1	785-503-080	CAPLUG
2	2	785-503-031	SHIM, .005 BLUE	35	1	785-503-073	SEAL
3	1	785-503-011	HOUSIN	36	1	785-503-074	SEAL
4	1	785-503-050	FLANGE, MOUNTING	37	1	919-102-100	O-RING
5	1	785-503-047	CAP, CLOSED	38	1	919-102-200	O-RING
6	1	785-503-015	GEAR, WORM 38/1	39	1	785-503-044	CAP, OPEN
7	1	785-503-028	WORM, INTG 38/1	40	1	701-032-037	BEARING, BALL SEALED
8	1	785-503-016	GEAR, INTG HEL RH 12T	41	1	962-800-600	SPRING, WAVE
9	1	785-503-017	GEAR, INT HEL LH 46T	42	3	809-849-160	SCREW, HSCP GR5 1/4 NCX1
11	1	785-503-033	SHIM, .002 RED	43	1	919-102-300	O-RING
12	2	785-503-034	SHIM, .005 BLUE				
13	1	785-503-043	PLUG, EXPANSION				
14	1	701-000-035	BEARING, BALL				
15	1	701-000-033	BEARING, BALL				
16	2	701-000-034	BEARING, BALL				
17	1	701-000-036	BEARING, BALL				
18	4	809-849-120	SCRW, HX CP GR5 1/4NC X 3/4				
19	6	809-857-160	SCRW, HX CP GR5 5/16NC X 1				
20	1	809-857-120	SCRW, HX CP GR5 5/16NCZ X 3/4				
21	4	785-503-040	SHIM, .002				
22	1	946-264-160	WASHER 3/8 X 1 X 1/8				
23	1	907-202-200	KEY, P&W 3/16 SQ X 1				
25	1	919-001-400	RING, RETAINING				
26	1	919-001-100	RING, RETAINING				
27	.35gal	715-021-711	OIL, MOBIL 600W CYL				
28	.20oz	715-011-801	GREASE, MOLY-XL				
29	1	785-503-076	RED TAG NAME PLATE				
30	1	718-803-003	BUSHING, PIPE 1/4 X 1/8				
31	3	718-507-023	PLUG, PIPT SOCKET				
32	1	730-003-088	PLUB, VENTED 1/8NPT				
33	1	785-503-081	CAPLUG				

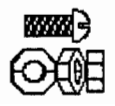
FRONT GEAR DRIVE (50 HZ)



DRAWING #5.52


 90004509
 ASSEMBLY NUMBER
 BACK END RH 50
 MODEL HERTZ
 (YYMM)
 DATE CODE
 AMF BOWLING, INC.
 RICHMOND, VA 23227
 LUBRICATION
 MOBIL 600 W CYLINDER OIL OR EQUIV
 RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES81





FRONT GEAR DRIVE (60 HZ)

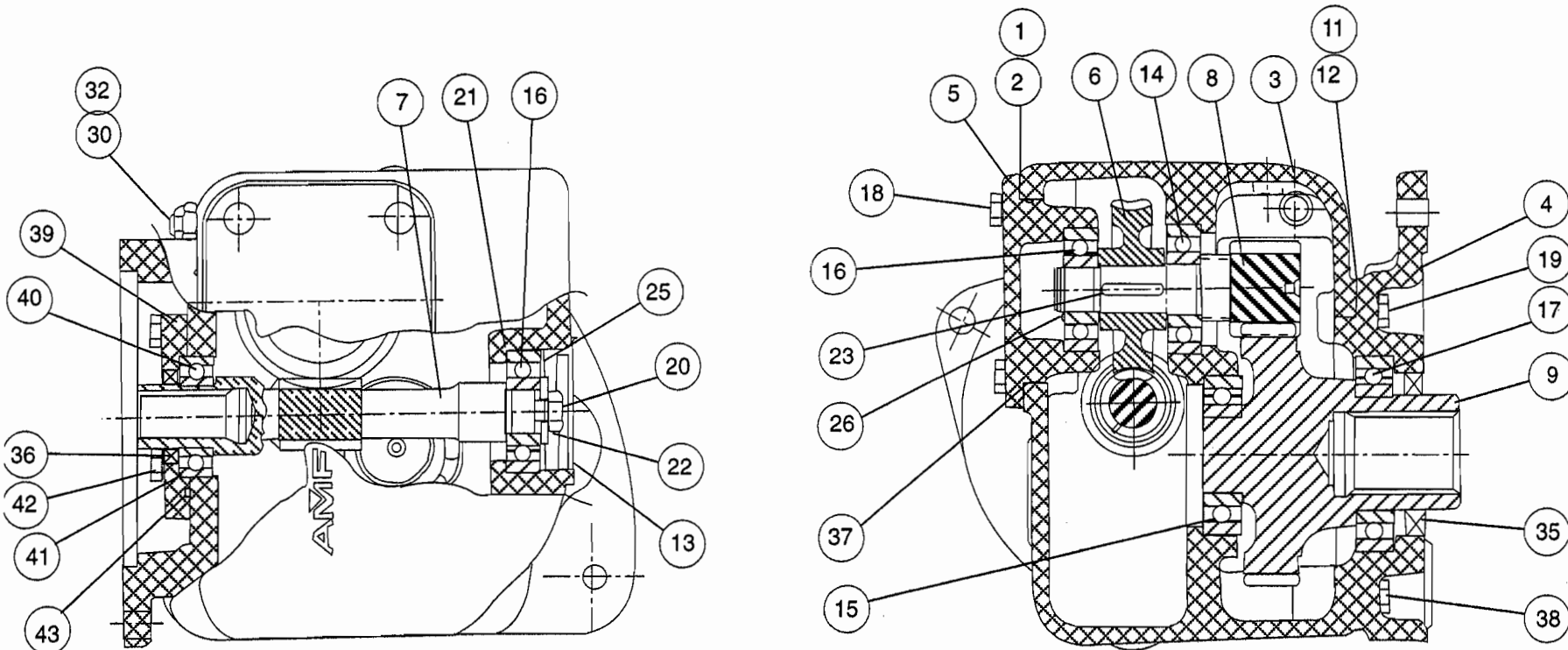
SECTION 5

Service & Parts Manual


Parts

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	785-503-031	SHIM, .002 RED	34	1	785-503-080	CAPLUG
2	2	785-503-031	SHIM, .005 BLUE	35	1	785-503-073	SEAL
3	1	785-503-011	HOUSING	36	1	785-503-074	SEAL
4	1	785-503-050	FLANGE, MOUNTING	37	1	919-102-100	O-RING
5	1	785-503-047	CAP, CLOSED	38	1	919-102-200	O-RING
6	1	785-503-015	GEAR, WORM 38/1	39	1	785-503-044	CAP, OPEN
7	1	785-503-028	WORM, INTG 38/1	40	1	701-032-037	BEARING, BALL SEALED
8	1	785-503-016	GEAR, INTG HEL RH 12T	41	1	962-800-600	SPRING, WAVE
9	1	785-503-017	GEAR, INT HEL LH 46T	42	3	809-849-160	SCREW, HSCP GR5 1/4 NCX1
11	1	785-503-033	SHIM, .002 RED	43	1	919-102-300	O-RING
12	2	785-503-034	SHIM, .005 BLUE				
13	1	785-503-043	PLUG, EXPANSION				
14	1	701-000-035	BEARING, BALL				
15	1	701-000-033	BEARING, BALL				
16	2	701-000-034	BEARING, BALL				
17	1	701-000-036	BEARING, BALL				
18	4	809-849-120	SCRW, HX CP GR5 1/4NC X 3/4				
19	6	809-857-160	SCRW, HX CP GR5 5/16NC X 1				
20	1	809-857-120	SCRW, HX CP GR5 5/16NCZ X 3/4				
21	4	785-503-040	SHIM, .002				
22	1	946-264-160	WASHER 3/8 X 1 X 1/8				
23	1	907-202-200	KEY, P&W 3/16 SQ X 1				
25	1	919-001-400	RING, RETAINING				
26	1	919-001-100	RING, RETAINING				
27	.35gal	715-021-711	OIL, MOBIL 600W CYL				
28	.20oz	715-011-801	GREASE, MOLY-XL				
29	1	785-503-075	NAME PLATE				
30	1	718-803-003	BUSHING, PIPE 1/4 X 1/8				
31	3	718-507-023	PLUG, PIPT SOCKET				
32	1	730-003-088	PLUB, VENTED 1/8NPT				
33	1	785-503-081	CAPLUG				

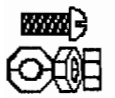
FRONT GEAR DRIVE (60 HZ)



DRAWING #5.53


 90004504
 ASSEMBLY NUMBER
 BACK END LH 60
 MODEL HERTZ
 AMF BOWLING, INC.
 RICHMOND, VA 23227
 LUBRICATION (YYMM) DATE CODE
 MOBIL 600 W CYLINDER OIL OR EQUIV
 RELUBRICATE PER SERVICE MANUAL

GRAPHIC NUMBER ES80



5.2 PARTS INDEX



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APPENDIX B

REVISION LOG

Appendix B

To provide the customer with the most accurate and up to date manual available, AMF Bowling will update the 82-90XL Pinspotter manual regularly. When revisions are made, the revised pages will be available for replacement. Just remove the old pages and replace with the updated pages. See example below.

Revision Page Title	Revision Page Num.	Revision Date	Manual Page Replaced
<i>EXAMPLE:</i> Motor & Gearbox	pgs. 3-33 to 3-38	3/1/94	pgs. 3-33 to 3-34

APPENDIX C

C.1 PINSPOTTER MECHANICAL CYCLES**C.1.1 FIVE BASIC PINSPOTTER CYCLES**

The 82-90XL 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

C.1.2 FIRST BALL CYCLE

1. The machine is ready for the first ball with first ball light on.
2. The bowler rolls the ball and the photoeye ball trigger will detect the ball passing, signal the chassis, and start the machine cycle.
3. The sweep will run to its down or guard position. Here it will rest until called upon to sweep pins.
4. A time delay is set in motion and, at its conclusion, the table will start (if AccuScore is not present) its' first descent to detect pins.
5. If pins remain, they are mechanically gripped and raised to a height sufficient for the sweep to pass under them and clear the lane of fallen pins.
6. The pindicator (optional) registers the pins left standing.
7. The table respots the pins.
8. The first ball light is out and the second ball light is on.

C.1.3 SECOND BALL CYCLE

1. For the start of the second ball, the ball is rolled and the photoeye ball trigger will start the machine cycle.
2. The sweep drops to guard position and a time delay is set in motion.

3. The sweep then performs its sweeping operation and returns to its forward guard position.
4. At this time, the table receives its spotting signal and the spotting cups will swing downward to set up a complete set of pins.
5. The second ball light is off and first ball light is on.

C.1.4 STRIKE CYCLE

1. In the strike cycle, the machine components are in the same condition as for first ball.
2. The ball is rolled and the ball trigger will start the machine cycle.
3. The sweep will drop to the guard position and the time delay is started as in the first ball cycle.
4. The table will descend to feel for pins. When the table finds that there are no pins to be picked up, the ten respot cell switches will not operate and the machine will override the normal cycle functions.
5. The first ball light goes off and the strike light comes on.
6. The sweep will clear all of the fallen pins from the lane.
7. The mask will flash the strike lights and at the end of the cycle, it will display a first ball cycle.

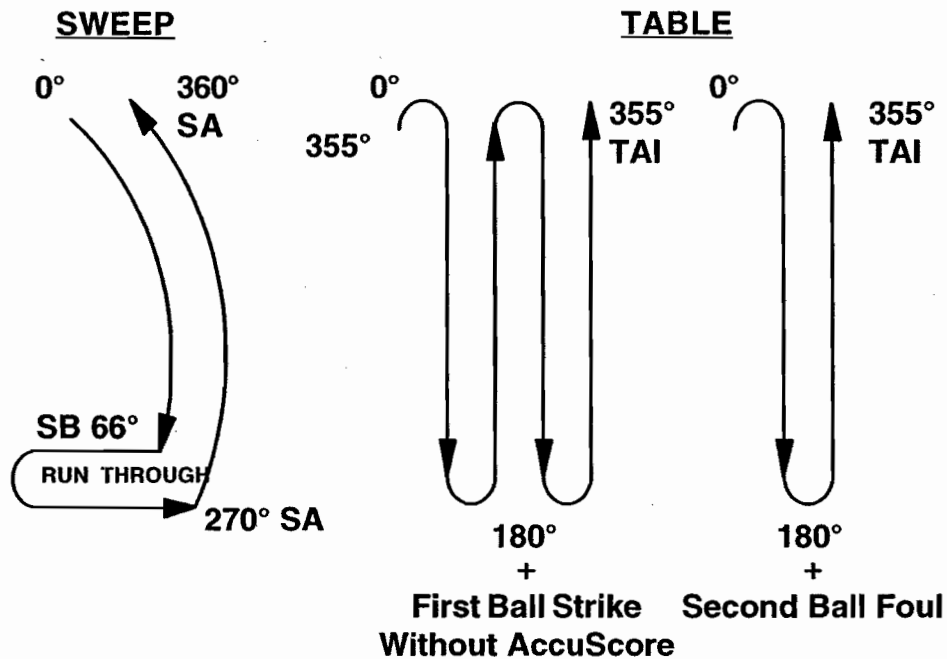
C.1.5 FIRST BALL FOUL CYCLE

1. When the ball is rolled and the bowler commits a foul, the foul detector unit operates and prepares the machine for a foul cycle.
2. The ball passing the photoeye trigger will start the machine cycle and the ball is returned as mentioned in a first ball cycle.
3. The sweep drops to the guard position and then completes its sweeping operation of the pin deck.

4. The table, when full of pins, will begin its spotting operation. The table cups will swing down and deposit a full set of pins.
5. The machine will remain ready for second ball with the second ball light on.
6. The foul detector unit energizes the foul light on the mask and rings a bell or buzzer.

C.1.6 SECOND BALL FOUL CYCLE

1. Should the bowler commit a foul when delivering his second ball, the machine will perform a normal second ball operation.
2. The foul detector unit will operate the foul light and bell or buzzer.

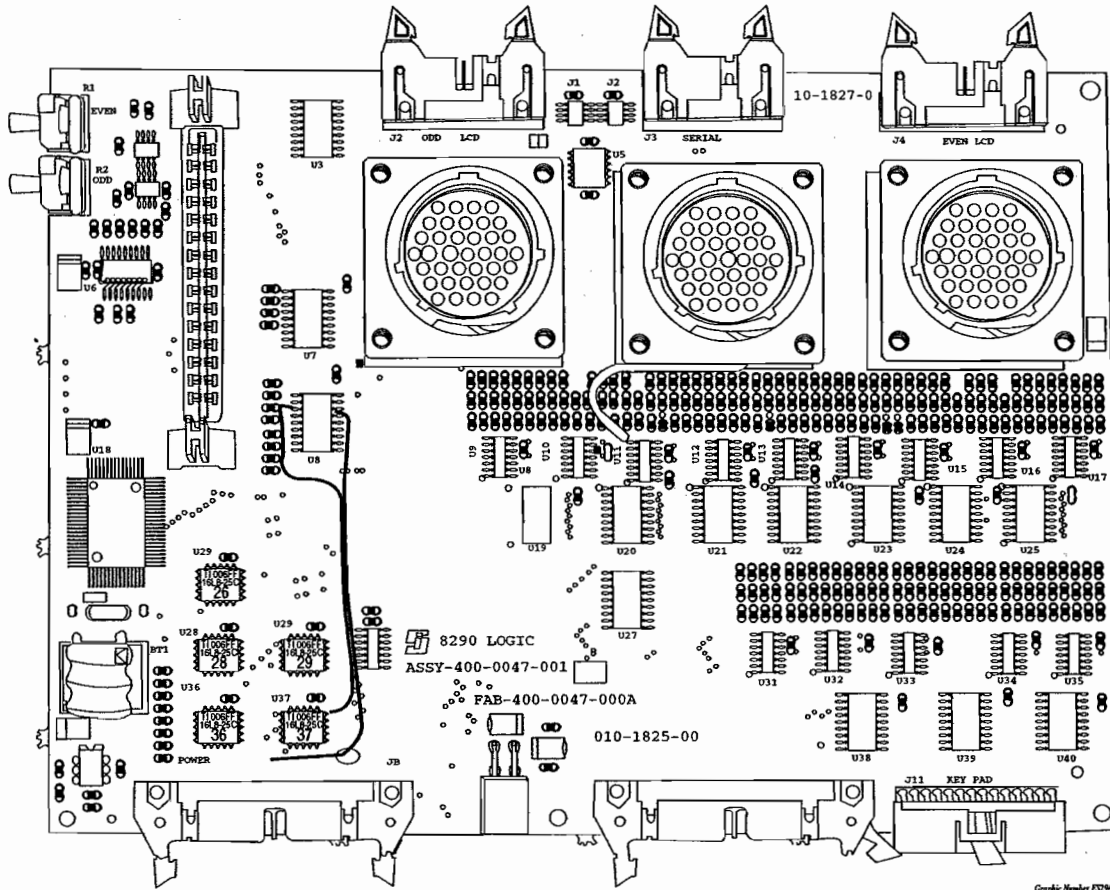


DRAWING #C.1

C.2 CHASSIS AND MACHINE COMPONENTS

<u>Circuit Symbol</u>	<u>Function</u>
CB1	Chassis Power
CB2	Odd Power
CB3	Even Power
BE	Back End Motor Switch
Sweep	Sweep Motor Switch
Table	Table Motor Switch
SWSR	Switch, Sweep Reverse
SWS	Switch, Sweep Run
SWT	Switch, Table Run
GS1-10	Gripper Switches (10)
OS	Off Spot
BS	Bin Switch
GPSW	Gripper Protection Switch
Zero	Program Zero Switch
Step	Ball Step Switch
Cycle	Cycle Switch
SA, SB, SC	Sweep Cam Switches
TA1, TA2, TB	Table Cam Switches

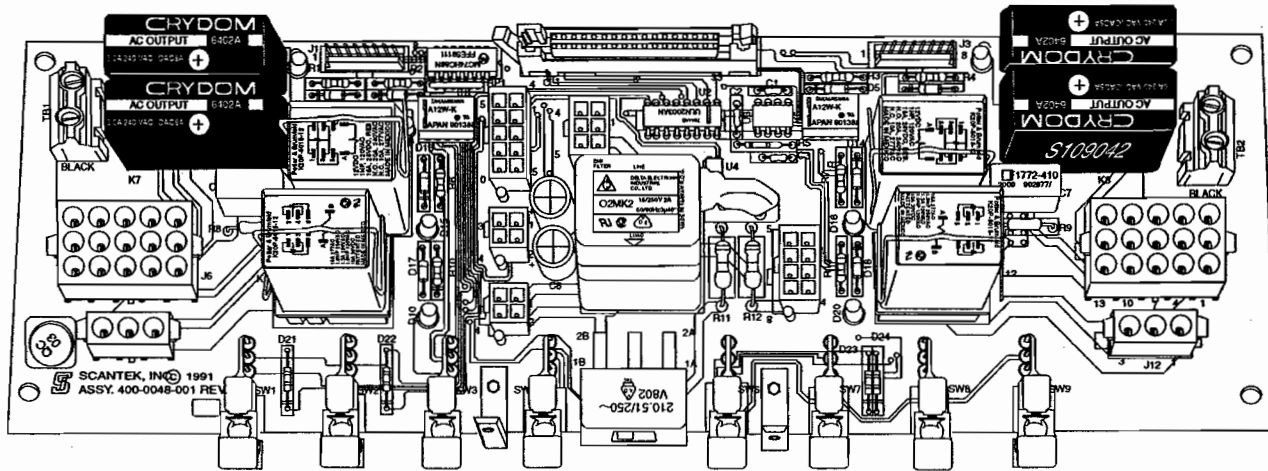
C.3 ELECTRICAL COMPONENT BOARDS



Graphic Number E2298.1

**82-90XL LOGIC BOARD
Part #090-004-735**

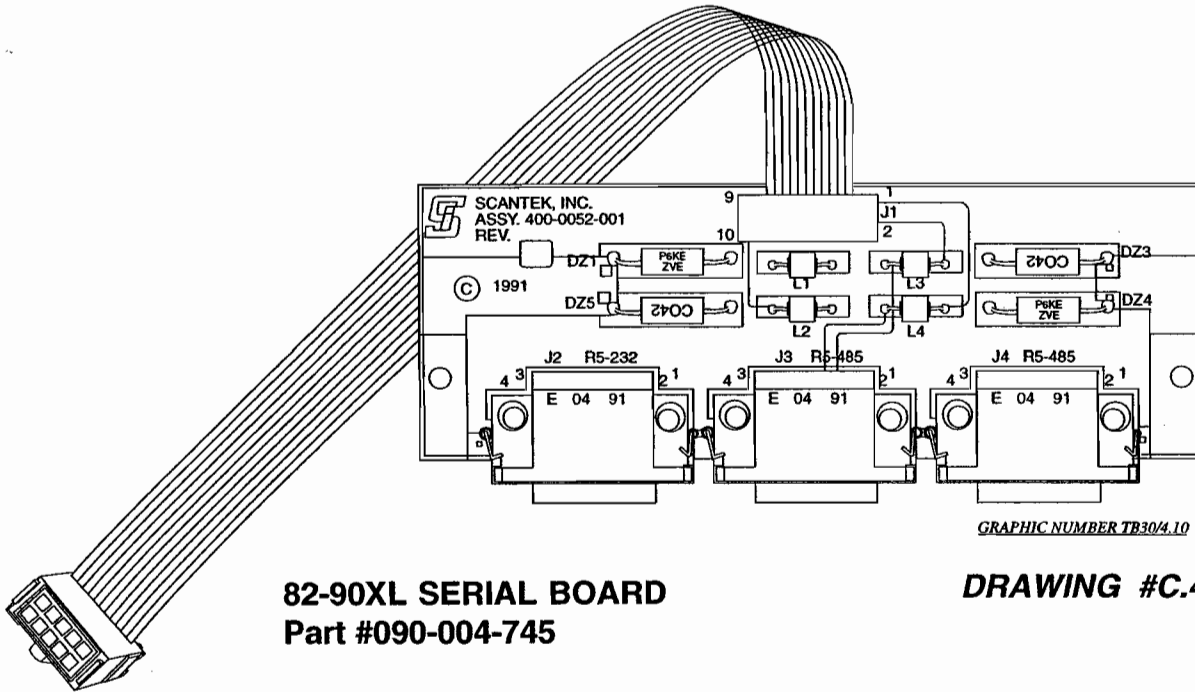
DRAWING #C.2



GRAPHIC NUMBER TB294.9

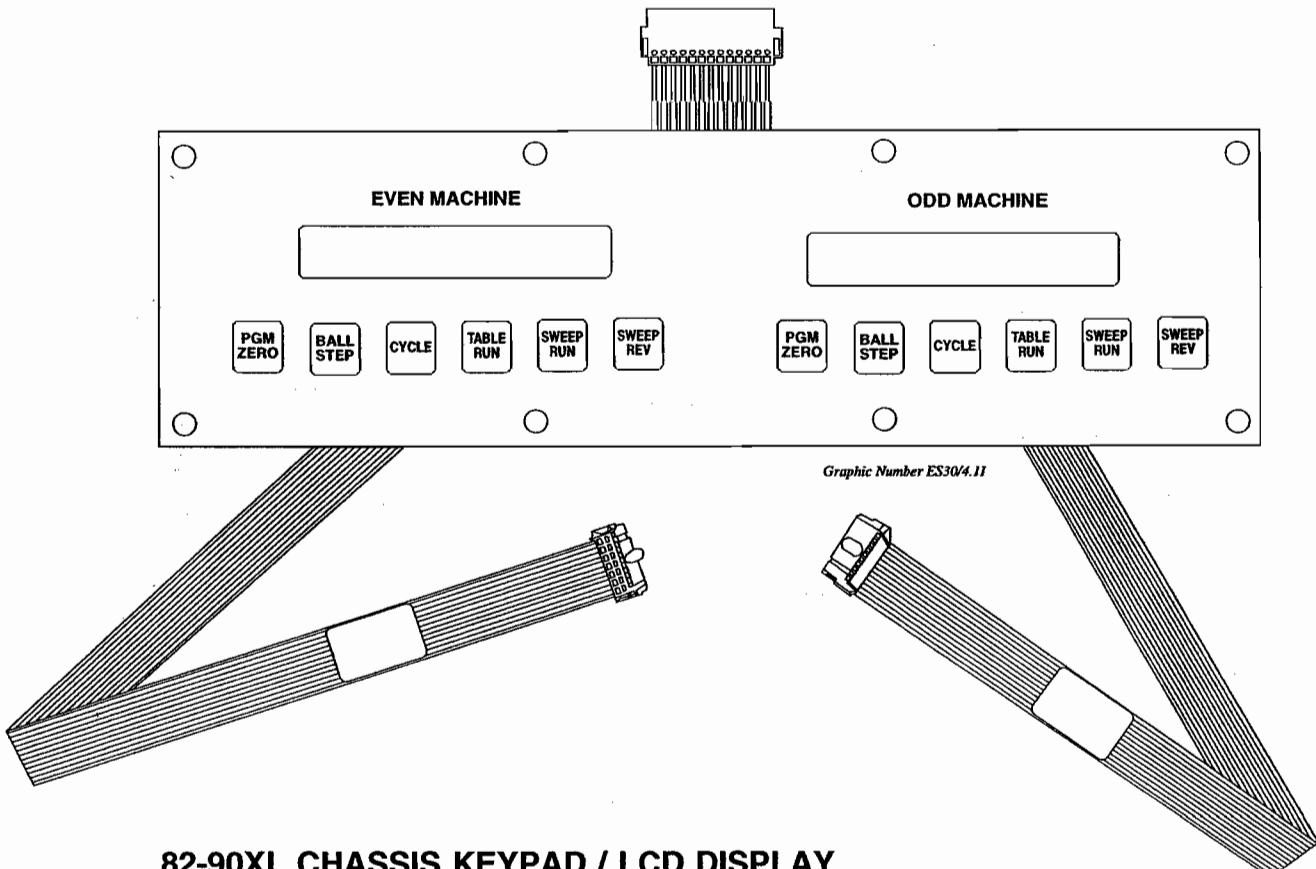
**82-90XL POWER BOARD
Part #090-004-730**

DRAWING #C.3



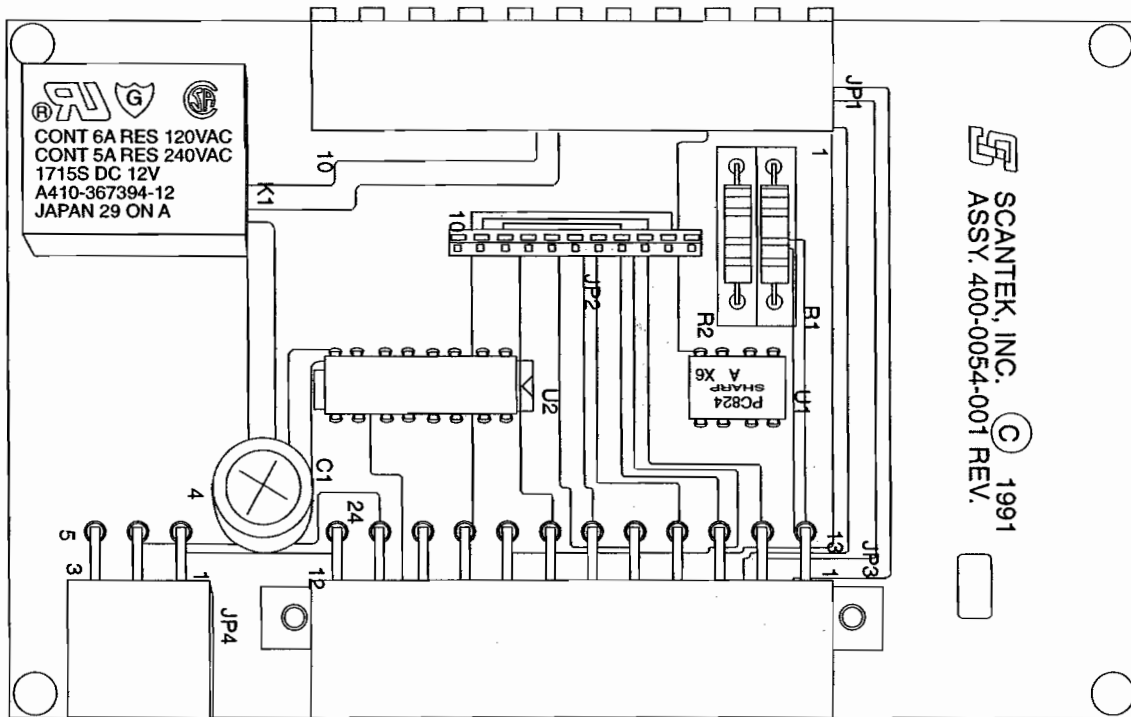
82-90XL SERIAL BOARD
Part #090-004-745

DRAWING #C.4



82-90XL CHASSIS KEYPAD / LCD DISPLAY
Part #090-004-735

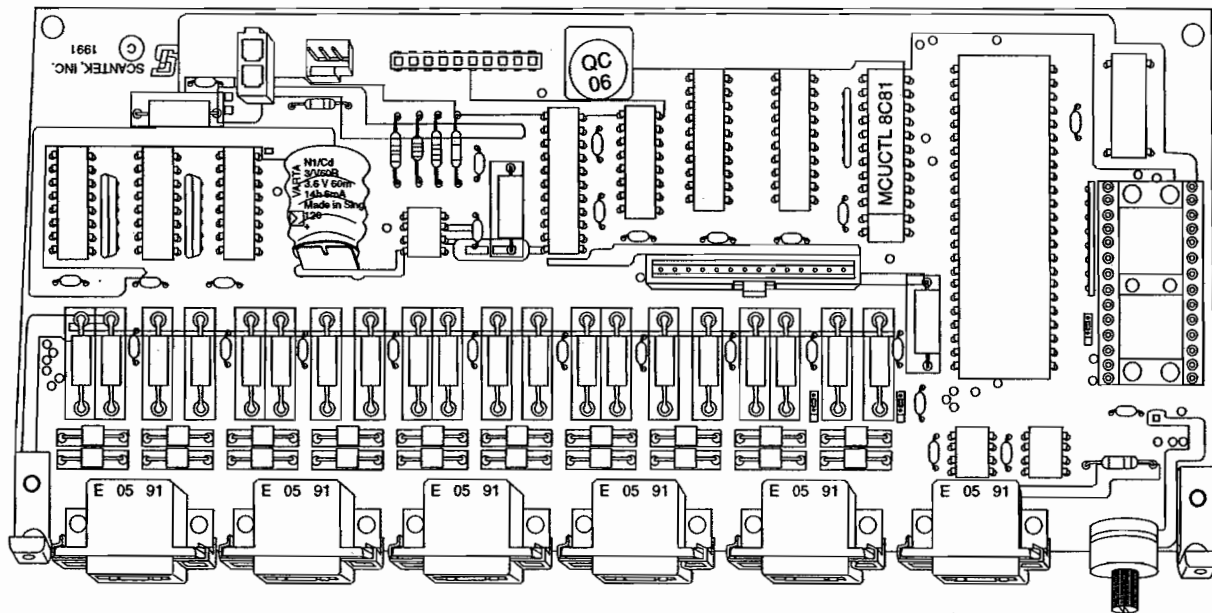
DRAWING #C.5



GRAPHIC NUMBER TB31/4.12

FRONT END BOX PC BOARD
Part #090-004-765

DRAWING #C.6

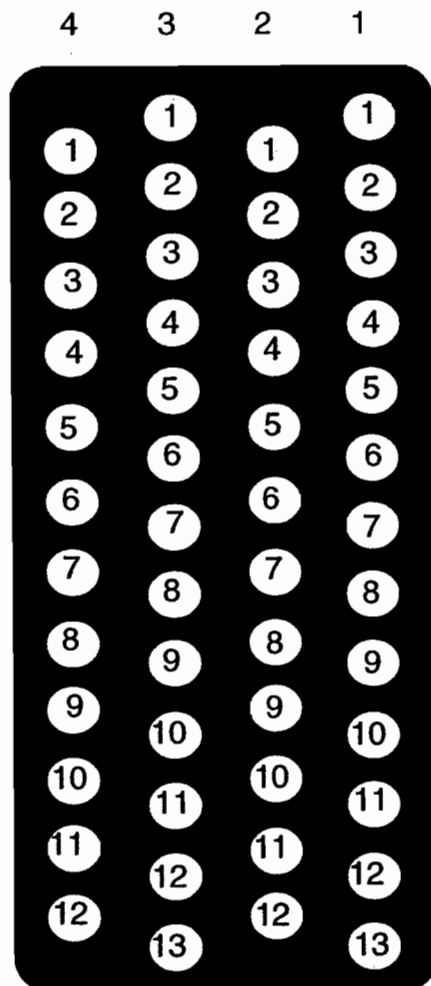


GRAPHIC NUMBER TB32/4.14

MCU PC BOARD
Part #090-004-750

DRAWING #C.7

C.4 TERMINAL INFORMATION



DRAWING #C.8

1. Viewing the plug from the back, held vertically and facing you, and with the outside row of 13 terminals to your right, then the right column of 13 terminals is column 1.
2. The next column to the left, having 12 terminals, is column 2, etc.
3. Starting on column 1, the upper right hand point is pin 1, The next one below is pin 2, etc. The last point in column 1 is pin 13.
4. This method of numbering has been incorporated for all 50 point AMP type "M" plugs and receptacles.

5. The exact same method of numbering is incorporated for the receptacle as mounted in the machine chassis, except that the receptacle is viewed horizontally.
6. In this manner, column 1 of the plug will mate with row 1 of the receptacle, with row 1 being the row toward the bottom of the chassis.
7. Terminal 1 of each row of the receptacle will be the first pin to the right in each row.
8. The first digit of the number on the drawings indicates the row; the second digit or digits indicates the terminal. Thus, terminal 35 would mean row (or column) 3, terminal 5. Terminal 311 would mean row (or column) 3, terminal 11.
9. Letters of the alphabet are also used at each terminal for further identification.



NOTE: The 34 terminal plug and receptacle are read in a similar fashion. Row (or column) 1 contains 9 terminals; row 2, 8 terminals; row 3, 9 terminals; and row 4, 8 terminals.

**7.2 MOTOR & GEARBOX
MANUAL**

7.3 CHASSIS MANUAL

**7.4 MANAGER'S CONTROL UNIT (MCU)
MANUAL**

7.5 Camera Manual

PLACE
STAMP
HERE

AMFBOWLING, INC.
P.O. BOX 15060
RICHMOND, VIRGINIA 23227

ATTN: ENGINEERING

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DETACH ALONG DOTTED LINES

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