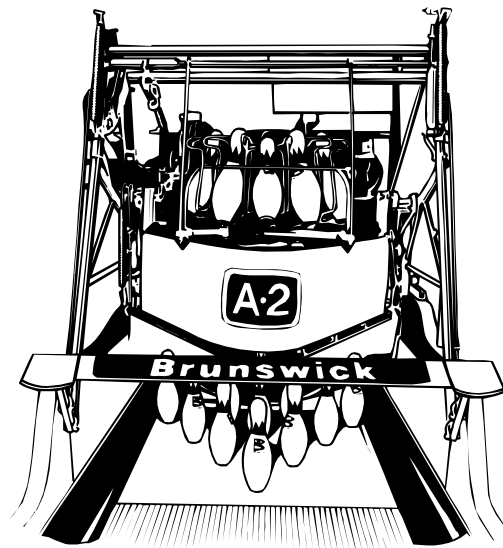


**Supplemental Instructions
for Installing the
Brunswick®
Electronic Pinsetter
Trigger/Control System**

**onto
Model A Pinsetters**



BRUNSWICK SERVICE PARTS AND SUPPLIES • MUSKEGON, MI 49443

October 1993

12-900261-000

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

GS-10 and GS-92 are registered trademarks of Brunswick Bowling and Billiards Corporation.

Copyright © October 1993 by Brunswick Bowling and Billiards Corporation.
All rights reserved.

ELECTRONIC PINSETTER TRIGGER/CONTROL SYSTEM ONTO MODEL A PINSETTERS

Reorder Part No. 12-900261-000

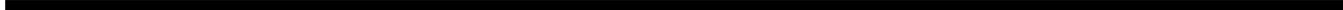
Confidential material under license.
DO NOT reproduce or disclose.

Brunswick Bowling and Billiards Corporation
Electronics - Publications
525 West Laketon Avenue
P.O. Box 329
Muskegon, MI 49443-0329

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Contents

- Introduction 1
- Preparation 1
- Tools Required 2
- Removal of Existing Cycle Relay 2
- Installation of New Control Board 5
- Installation of Rake-Up/Trigger Switch 8
- Modification of Low Voltage Terminal Strip 10
- Wire Connection of Control Board 15
- Mechanical Modifications 17



Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

Introduction

This supplemental package provides the additional instructions and parts needed to install the part no. 12-862900-400 Electronic Trigger/Control System onto Model "A" pinsetters - i.e. pinsetters that do NOT have an A-2 style pit cushion and rake trip shaft (shotgun) to produce a quick rake drop, and also do NOT have an electrical time delay module. Follow the instructions in this manual first to properly connect the control board wiring and other steps unique to the Model "A" pinsetter. Then refer to the standard electronic trigger/control system installation and operations manual to complete the installation.

Preparation

Make sure all the parts listed below are included in the supplied kit (Part no. 12-860811-000). This kit contains the necessary supplemental parts to equip one lane pair of two Model A pinsetters with the Electronic Trigger/Control System.

Note: Since this is only a supplemental kit, a part no. 12-862900-400 Electronic Trigger/Control System and included parts are required to complete the installation.

<u>Qty.</u>	<u>Part No.</u>	<u>Description</u>
2	12-752310-000	Rake-Up/Trigger Microswitch Assembly (includes U-bolt, trigger clip, and wires #56T & #69T)
2	10-750572-000	wire #52
2	10-750573-000	wire #53
2	10-750574-000	wire #54
2	10-750827-000	wire #55K
2	10-750557-000	wire #57
2	10-750828-000	wire #58K
2	10-750568-000	wire #68
1	12-860810-000	Hardware Package (includes electrical connectors and hardware to eliminate 90 degree overtravel and plastic blocks for slot in rake lift upper rod ends)
1	12-900261-000	Supplemental Installation Instructions

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Tools Required

1. Screw Driver (Phillips) - for electrical box cover removal.
2. Socket (7/16") and Drive Ratchet (3/8") or Nut Driver (7/16").
3. Screw Starter (Holder) - slotted.
4. Screw Driver - small #1 Phillips.
5. Crimpers
6. Wire Stripper
7. Safety Glasses
8. Tape Measure
9. Electric Drill
10. Drill Bit (3/16" dia.)
11. Drill Bit (3/4" or 7/8" dia.) or Greenlee Knockout Punch (available from electrician supply)
12. Magnet
13. Clean dry cloth

CAUTION!!

*Be sure the circuit breaker is off and unplug the high voltage input power cord before removing the cover of the pinsetter electrical control box. **Lethal voltages are present.***

Removal of Existing Cycle Relay

1. Turn off the main circuit breaker and unplug the high voltage input power cord. Also remove cannon plug CP3 from the top of the pinsetter electrical control box.
2. Remove the cover from the pinsetter electrical control box.

Note: In making the following electrical modifications, it is essential that specified lengths of wire cuts and stripping lengths be followed. All connections must be secure. Be careful not to sever wires when making crimped connections with wire connectors.

3. Remove the screw that mounts the cycle relay to the bottom of the control box.
4. Cut existing wire #22 (from the cycle solenoid) at its connection to the cycle relay (Figure 1). Strip off 1/4 inch of insulation and

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

install a spade receptacle connector (supplied) to the wire end. Set this wire aside for later connection to the new control board.

Note: In older machines, the #22 wires may not be marked for identification. If this is the case, it will be necessary to trace them back to the connector in the wire channel. These wires are non-polarized and are interchangeable. Refer to Figure 1 or Figure 10 for cycle solenoid wiring diagram.

5. The second wire from the cycle solenoid must be connected to terminal D of the high voltage terminal strip TS1. This wire could be in any of four possible locations. On most 208-230 Volt Model "A" pinsetters, this wire (#11) is connected to terminal E. This wire may already be connected to terminal D, or it may be connected to terminal B. If this wire is connected to the cycle relay, strip off 1/4" of insulation and install the ring-type terminal lug (supplied). It may be necessary to lengthen this wire in order to connect it to terminal D.
6. Cut two (2) #14 wires at the coil connection of the cycle relay. Allow both wires to hang free. On older machines, these two wires will be number 9 and number 11.
7. Inspect terminal B of the high voltage terminal strip TS1. If only one #11 wire is connected to terminal B, the connection is satisfactory. If two (2) #11 wires are connected to terminal B, wire #11 to the cycle relay must be removed from the terminal strip (Figure 1).
8. Disconnect wire #7 from terminal H on terminal strip TS1 (attached to cycle relay).
9. Discard the cycle relay.

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

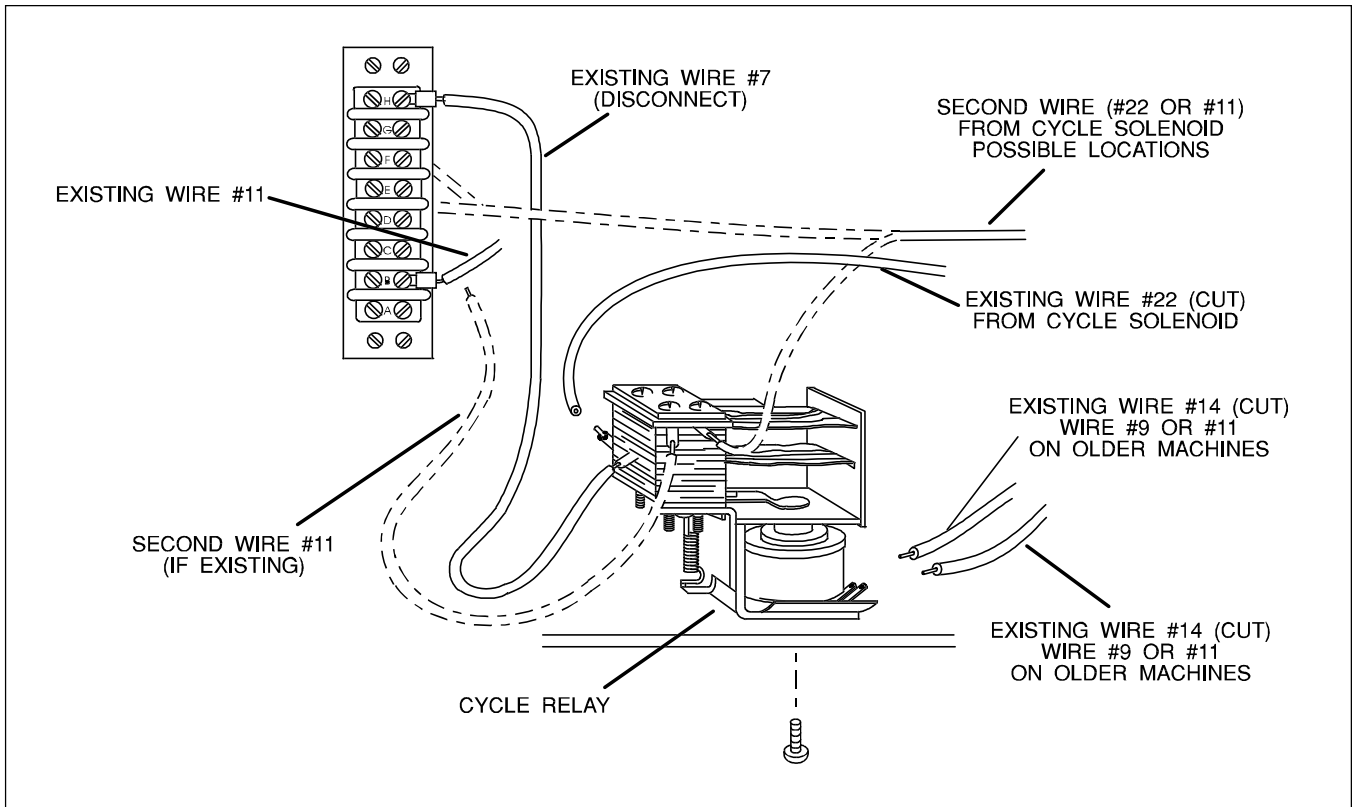


Figure 1. Cycle Relay Removal

Installation of New Control Board

1. Position template TP-1 for drilling the mounting holes for the control board against the bottom of the electrical box (Figure 2). Scribe the two center points.

Note: See inside back cover for template TP-1.

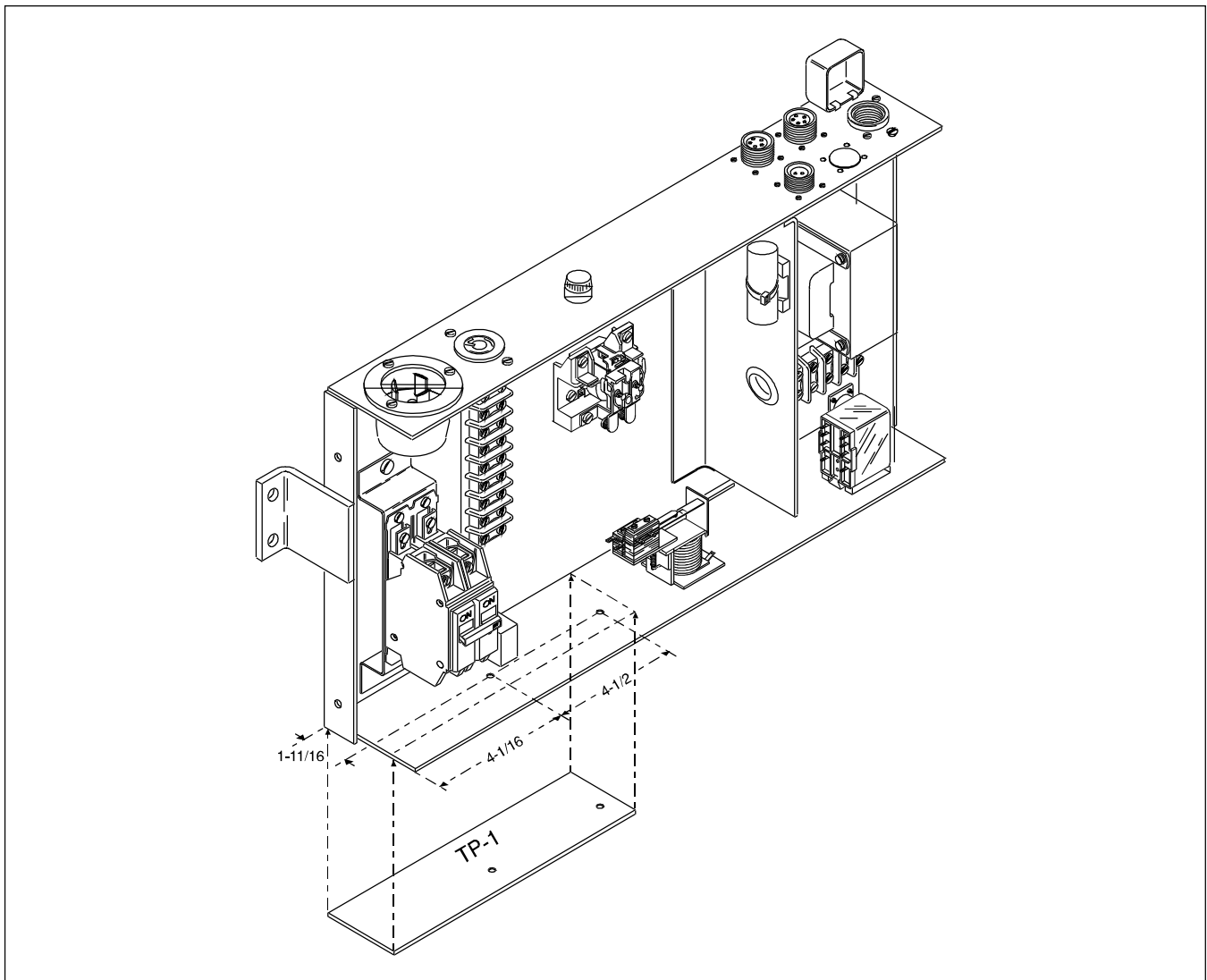


Figure 2. Control Board Template Drilling Diagram

2. Drill two $\frac{3}{16}$ " diameter holes through the bottom of the electrical box.
3. A hole will need to be drilled in the top of the pinsetter electrical box for routing wires to the ball detector, Rake Down

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

microswitch, Rake Up/Trigger microswitch, etc. Locate an area on top of the electrical box above the motor contactor with proper clearance. (See Figure 3). Center punch this location. Place a cloth inside the box to keep the metal drilling shavings off the electrical components. Drill the 3/4" or 7/8" diameter hole or use a Greenlee knockout punch and fasten the supplied cable (Romex) clamp through the hole.

Note: If sufficient space is available in existing cable clamp, installing a new cable clamp may not be necessary. Check cable clamp for sharp edges which could cut through wire insulation and remove sharp edges through wire insulation and remove sharp edges and/or wrap cable with protective layer of electrical tape where it passes through cable clamp.

4. Brush or use a magnet to remove the drilling shavings from the bottom of the box.

Note: To reduce risk of static discharge damage to the control board, leave the board in its protective bag until installed and always touch a grounded surface before handling the control board.

5. Screw the new control board to the electrical box with supplied hardware as shown in Figure 3.

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

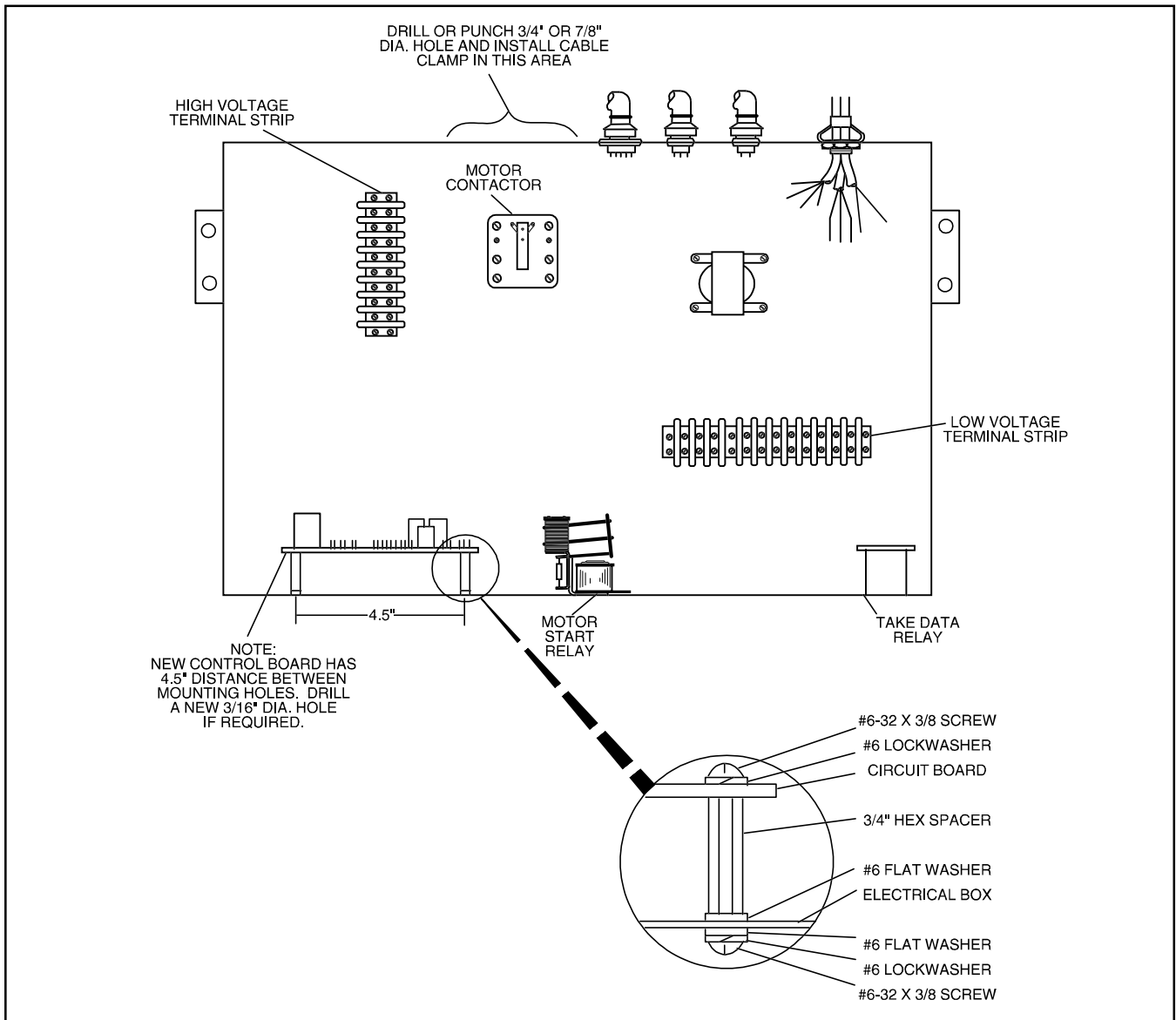


Figure 3. Control Board Mounting Diagram

Installation of Rake-Up/Trigger Switch

1. Locate the Rake-Up/Trigger microswitch assembly and install it with the U-bolt clamped around the center cross brace. (Figure 4) (This switch assembly is identical to the Rake Down microswitch assembly included in the standard electrical trigger/control system except the microswitch is positioned differently and the wire harness is connected to the Common & Normally Open terminals.) The Rake Up/Trigger microswitch assembly can be installed on either side of the electrical control box, but make sure the switch is positioned on the REAR side of the pinsetter. Rotate the switch assembly so the end of the actuator lever clears the rake lift shaft by 1/16". Tighten the U-bolt nuts.
2. Wear your safety glasses and install the clip onto the rake lift shaft so it's longer end is just above the switch actuator lever. Make sure the pinsetter is at the 0 degree starting position with the rake fully raised. Rotate the clip until it moves the actuator lever far enough to open the microswitch (an audible click can be heard when the switch opens). Then rotate the clip slightly farther until the actuator lever clears the switch plunger by a 1/16" gap.
3. The Rake-Up/Trigger switch wire harness should already be connected to the Normally Open (wire #69T) and Common (wire #56T) terminals. Route the other ends of the wire harness through the cable clamp on top of the electrical control box and leave for later connections. Secure wire harness away from moving parts with cable ties as required. (The Normally Closed terminal of the Rake-Up/Trigger switch should NOT be used.)

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

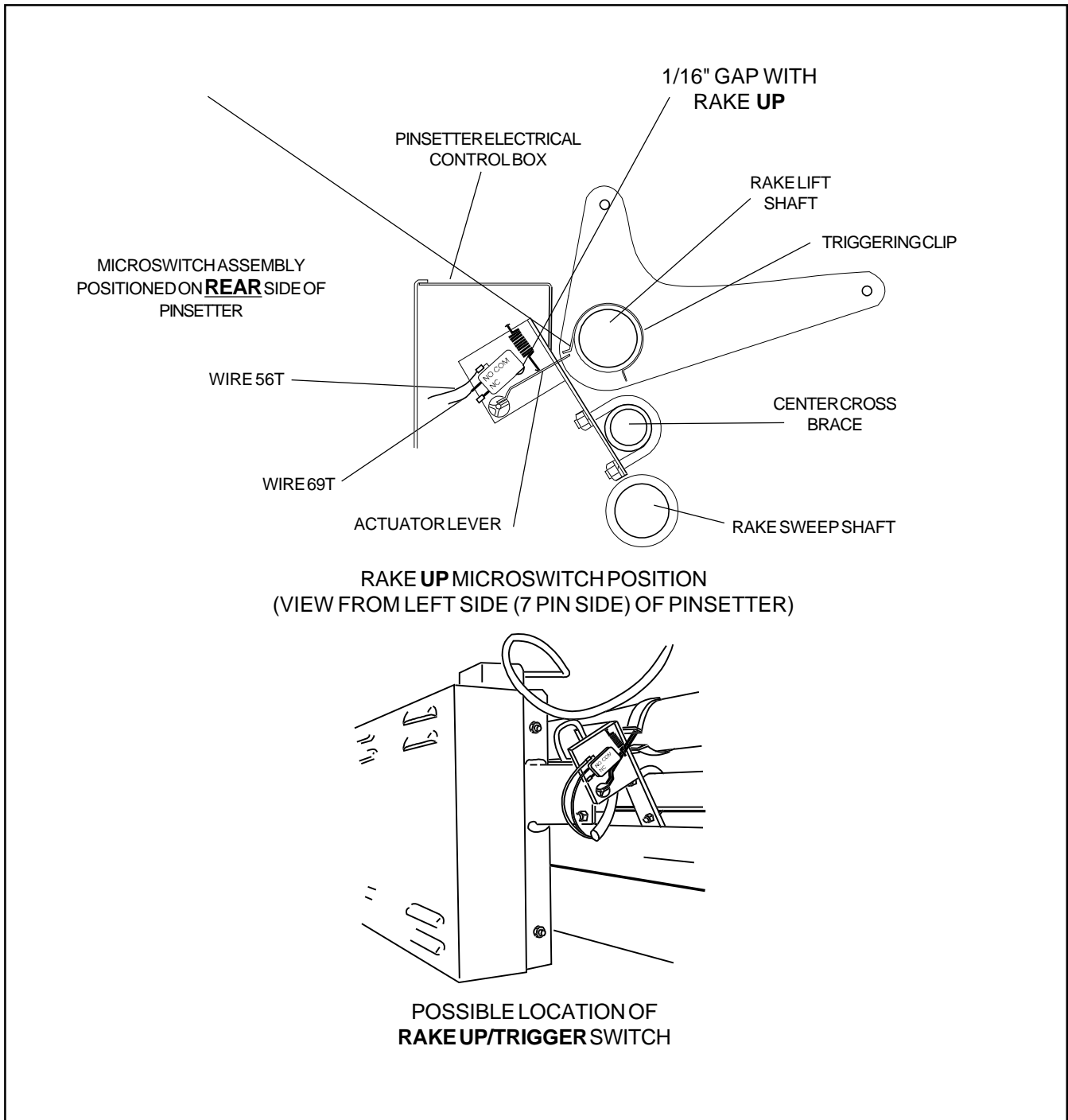


Figure 4. Rake Position Safety Switch Locations and Adjustments

Modification of Low Voltage Terminal Strip

Make the following changes to the connections of the low voltage terminal strip (TS2).

Terminal #1 - See Figure 5

- a. Disconnect wire #46 (from pin B of 2-prong cannon plug CN2 to ball return rack cycle button). Remove terminal lug, strip 5/8 inch of insulation from end.
- b. Disconnect wire #47 (from rear mechanic cycle button). Remove terminal lug, strip 5/8 inch of insulation from end.
- c. Locate new wire #55K and connect the stripped end of this wire to wires #46 and #47 stripped above with the included wire nut connector. Connect the other end of wire #55K to terminal #17 of the new control board. See Figure 10. (Make sure wire #52 from the Normally Closed terminal of the Rake-Up/Trigger switch is Not included in the connection).
- d. Disconnect green wire from the 1st and 2nd ball light switch and set aside.
- e. Locate existing wire from pin C of 5-prong connector CN5 and connect to terminal #1. (This will involve moving wire #28 from terminal #4 or #12 or wire #9 from terminal #9).
- f. Reconnect all other wires previously connected to terminal #1.

Terminal #2 - No Change

Terminal #3 - No Change

Terminal #4 - See Figure 5

- a. Connect green wire from the ball light switch (just removed from terminal #1).
- b. If no other transformer lead is already attached to terminal #4, move the transformer lead from terminal #12 to terminal #4.

Terminal #5 - No Change

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

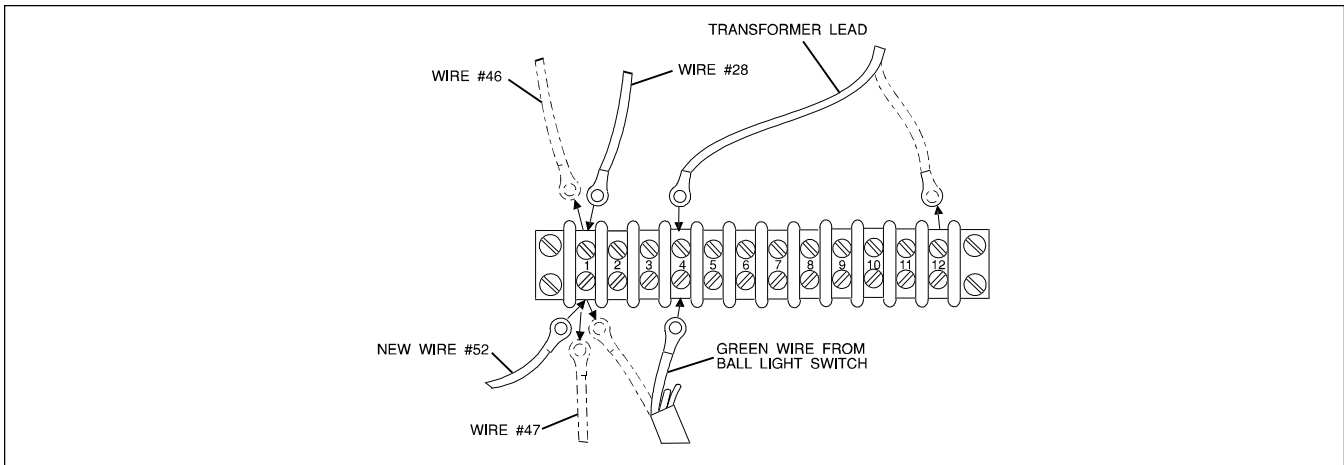


Figure 5. Modification to Terminals #1 - #4

Terminal #6 - See Figure 6

- Disconnect wire #16 or #6 (to motor relay terminal B) and set aside.
- Disconnect black wire from fuse (if existing) and wire from transformer (if existing) and set aside.
- Remove transformer wire from terminal #9 and connect to terminal #6. (115V - blue, 208V - orange, 230V - blue)
- Locate new wire #57, and connect ring connector end to terminal #6. Connect other end of wire #57 to terminal #13 of the new control board.
- Reconnect all other wires previously connected to terminal #6.

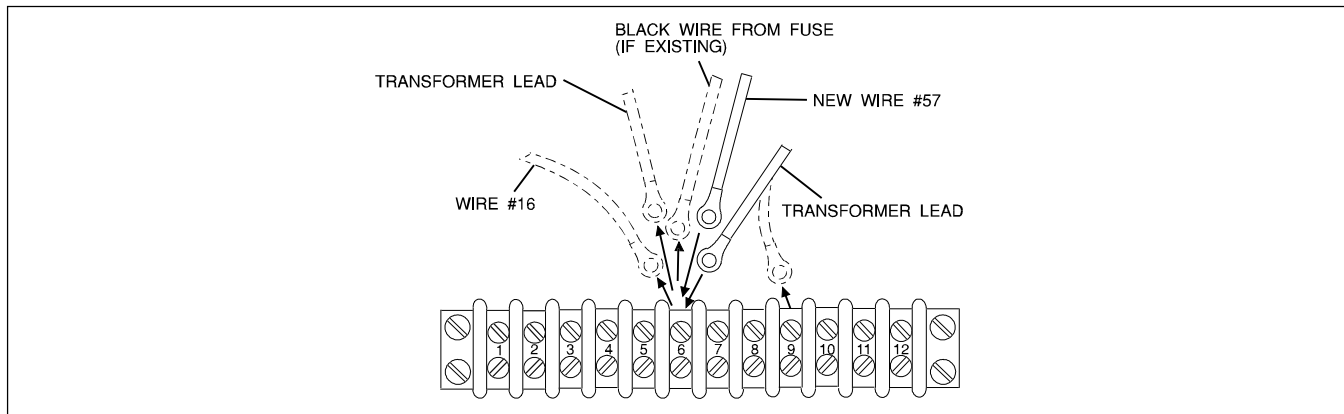


Figure 6. Modifications to Terminal #6

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Terminal #7 - No Change

Terminal #8 - See Figure 7

- a. Locate new wire #53, and connect ring connector end to terminal #8. Connect other end of wire #53 to terminal #15 of the new control board.
- b. Reconnect all other wires previously connected to terminal #8. (The white wire from the Normally Closed terminal of the 1st and 2nd ball light switch SW6 should be connected to terminal #8).

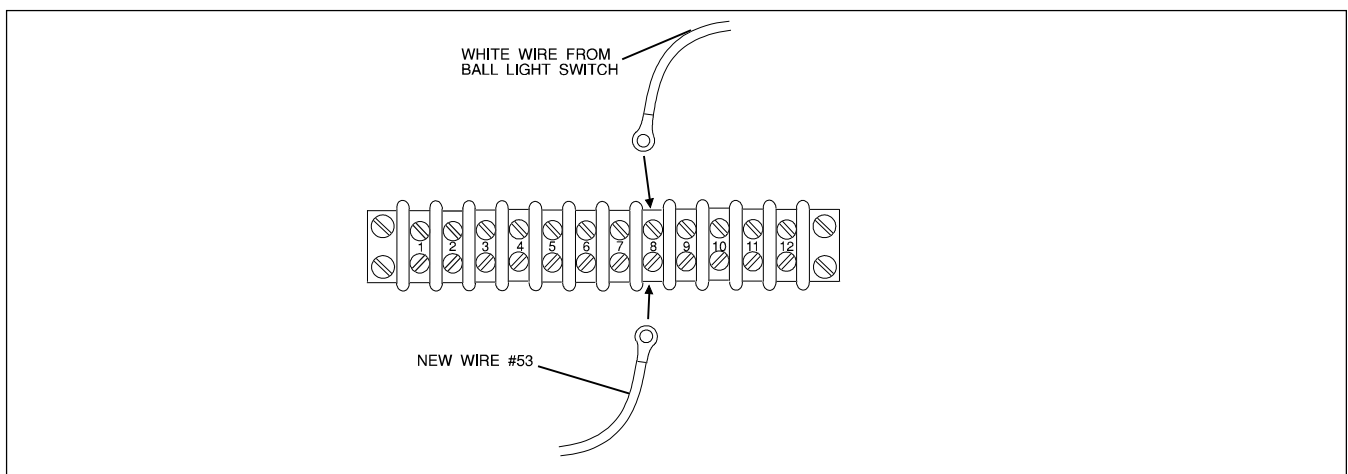


Figure 7. Modifications to Terminal #8

Terminal #9 - See Figure 8

- a. Disconnect and discard wire #14 or #9 (previously cut from coil of old cycle relay).
- b. Connect wire #16 or #6 just removed from terminal #6 (from motor start relay terminal B).
- c. Connect black wire from fuse and wire from transformer (if existing) just removed from terminal #6.
- d. Reconnect all other wires previously connected to terminal #9 including wire #12 from terminal H (coil) of the motor start relay.

Terminal #10 - No Change

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

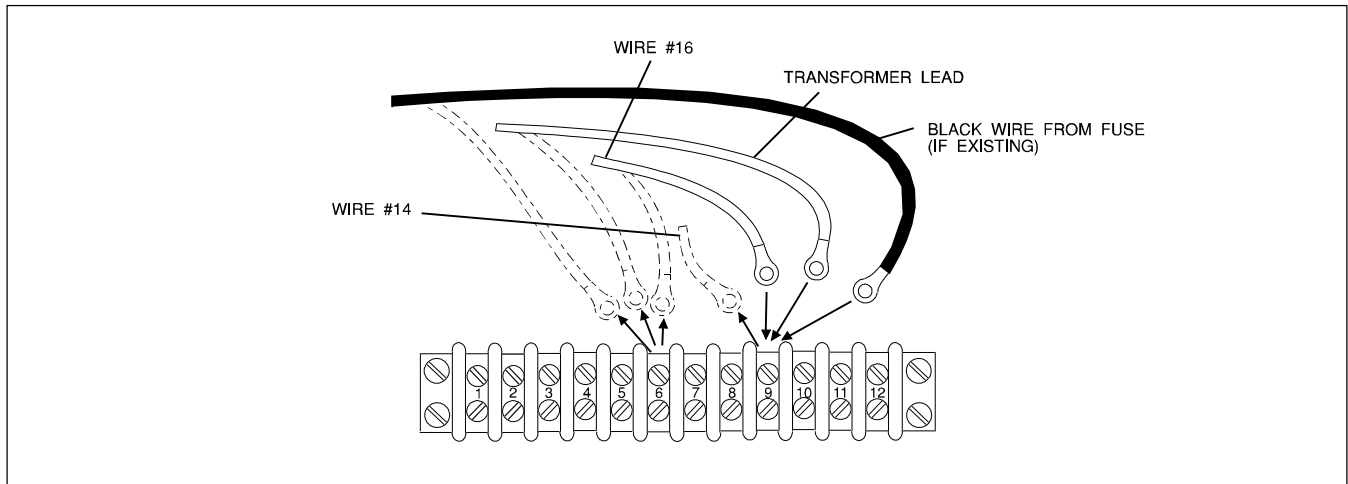


Figure 8. Modifications to Terminal #9

Terminal #11 - See Figure 9

- Disconnect and discard wire #14 or #11 (previously cut from coil of old cycle relay).
- Disconnect wire #47 or #11 (to rear mechanic cycle button) and set aside.
- If wire #42 (from pin A of 2-prong cannon plug CN2 to the ball return rack cycle button) is connected to terminal #11, remove it and set aside.
- Reconnect all other wires previously connected to terminal #11.

Terminal #12 - See Figure 9

- If a transfer wire is still connected to terminal #12, remove the wire and tape the end with insulation tape.
- Connect wire #47 or #11 just removed from terminal #11 (to rear mechanic cycle button).
- Locate new wire #68, and connect ring connector end to terminal #12. Connect other end of wire #68 to terminal #16 of the new control board.
- Locate new wire #69T from the Normally Open terminal of the Rake-Up/Trigger switch, and connect to terminal #12.

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

- e. Locate wire #42 (from pin A of 2-prong cannon plug CN2 to the ball return rack cycle button) which may have been previously attached to terminal #11 or #12 and connect terminal #12.
- f. Reconnect all other wires previously connected to terminal #12.

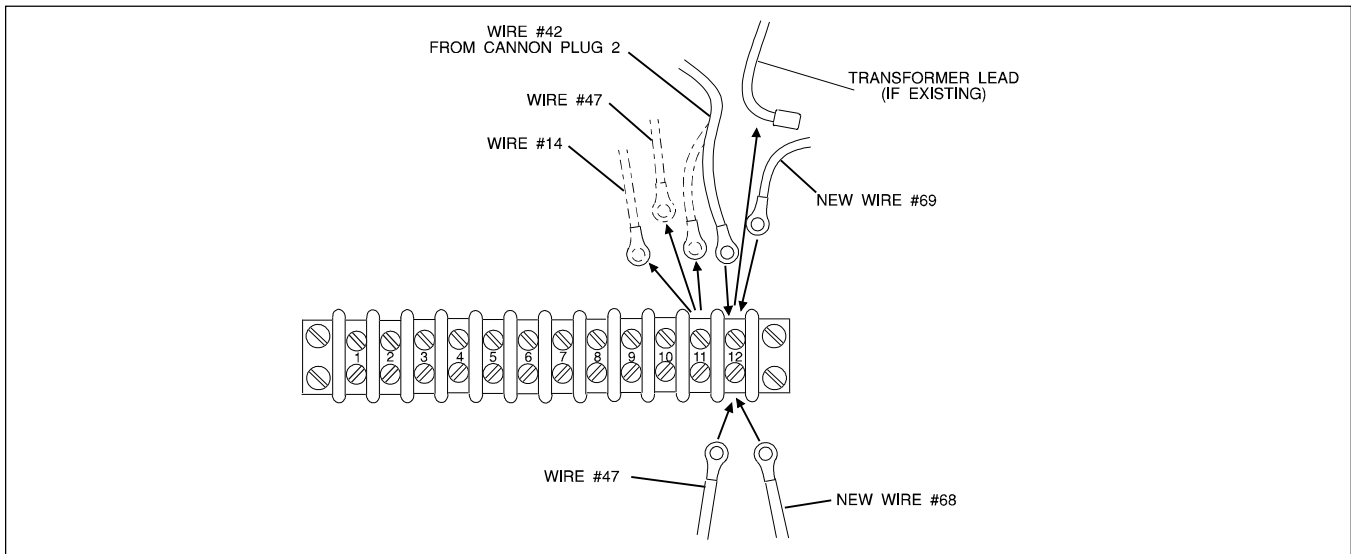


Figure 9. Modifications to Terminal #11 & #12

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Terminal #19

Using new wire #58K supplied, connect the spade receptacle to terminal #19 of the control board. Connect the ring terminal of new wire #58K to terminal #3 of the motor contactor, as shown in Figure 10 (depending on the type of contactor used). This should result in the proper voltage for the cycle solenoid, but measure the voltage if in doubt. Alternate connection may be terminal H of the high voltage terminal strip TS1 for 208-230V solenoids or terminal F for 115V solenoids.

Terminal #18

Locate new wire #56T routed from the Common terminal of the new Rake-Up/Trigger switch and connect the spade receptacle to terminal #18 of the control board.

Terminal #17

New wire #55K should already be connected from terminal #17 of the control board to the cycle switches from the ball return & mechanic area.

Note: Make sure there is no wire (#52) connecting to Normally Closed terminal of Rake-Up/Trigger switch.

Terminal #16

New wire #68 should already be connected from terminal #15 of the control board to terminal 12 of the low voltage terminal strip TS2. (Other wires connected to terminal #12 of the low voltage terminal strip include new wire #69 to the Normally Open terminal of the Rake-Up/Trigger switch, wire #47 to the rear mechanic cycle button, and wire #42 to the ball return rack cycle button.)

Terminal #15

New wire #53 should already be connected from terminal #15 of the control board to terminal #8 of the low voltage terminal strip TS2. (Other wires connected to terminal #8 of the low voltage terminal strip include the white wire from N.C. of #1/#2 ball switch SW-6.)

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

Terminal #14

Using new wire #54 supplied connect the spade receptacle to terminal #14 of the control board. Locate existing wire #12 or #9 (from terminal #12 of the low voltage terminal strip TS2 to terminal H of the motor start relay coil) and cut the wire approximately 3 inches from the motor start relay. Strip 5/8 inch of insulation from both ends of the cut wire and connect both ends with wire #54 with the supplied wire nut connector as shown in Figure 10. (Other wires connected to terminal 12 of the low voltage terminal strip include the black wire from the fuse end of the transformer).

Terminal #13

New wire #57 should already be connected from terminal #13 of the control board to terminal strip TS2. (Other wires connected to terminal #6 of the low voltage terminal strip include the transformer wire).

Note: If control board does not include a 1 amp fuse, an in-line fuse holder & installation instructions are supplied to be spliced into wire #57.

Mechanical Modifications

Eliminate Mechanical Time Delay

Reposition the existing time delay stem in the rake crank housing. (Figure 11) The stem must be withdrawn at least 1/4 turn to eliminate any mechanical time delay caused by the plunger. Time delay is now obtained electrically by the control board.

Note: Part number 11-001376-001 hex head cap screw and 12-100344-003 gasket can also be ordered and used to eliminate the mechanical time delay stem. Also the EP 80-90 heavier weight gear box oil can now be used for extra protection. Use part no. 12-752024-000 Brunswick gearbox oil (1 Gal).

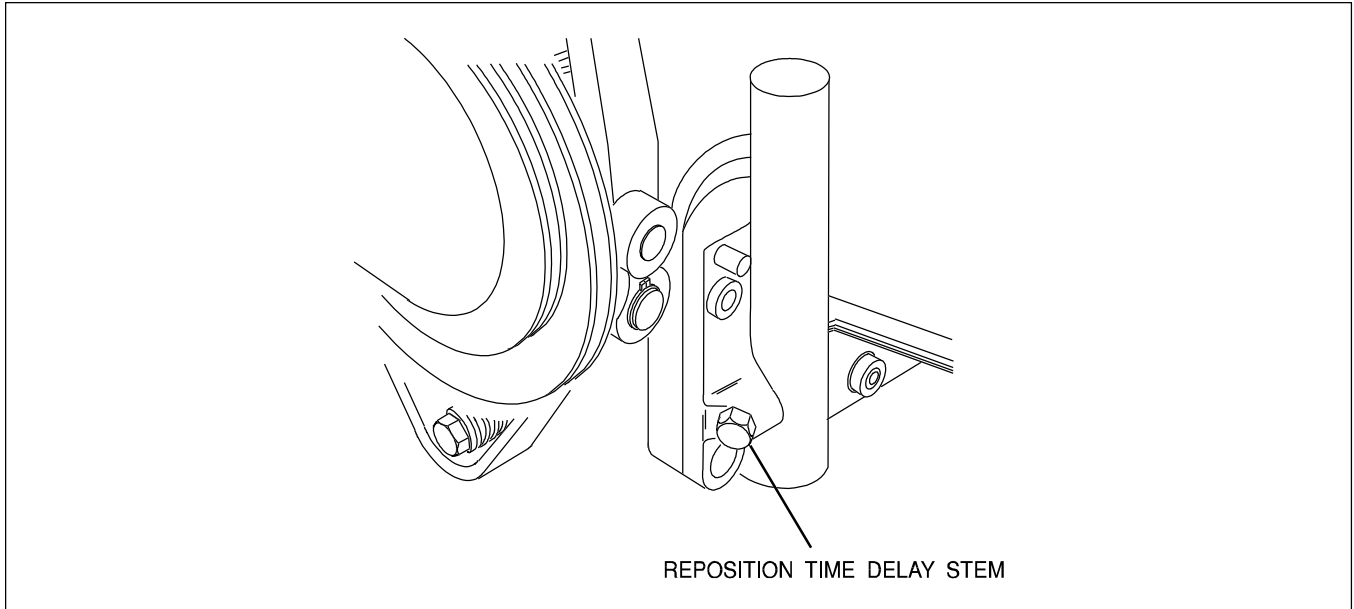


Figure 11. Mechanical Time Delay Elimination

Remove Mechanical Trigger Components

Cycle the pinsetter to 180°. Remove cable, tension spring, and brackets at both ends of cable (Figure 12).

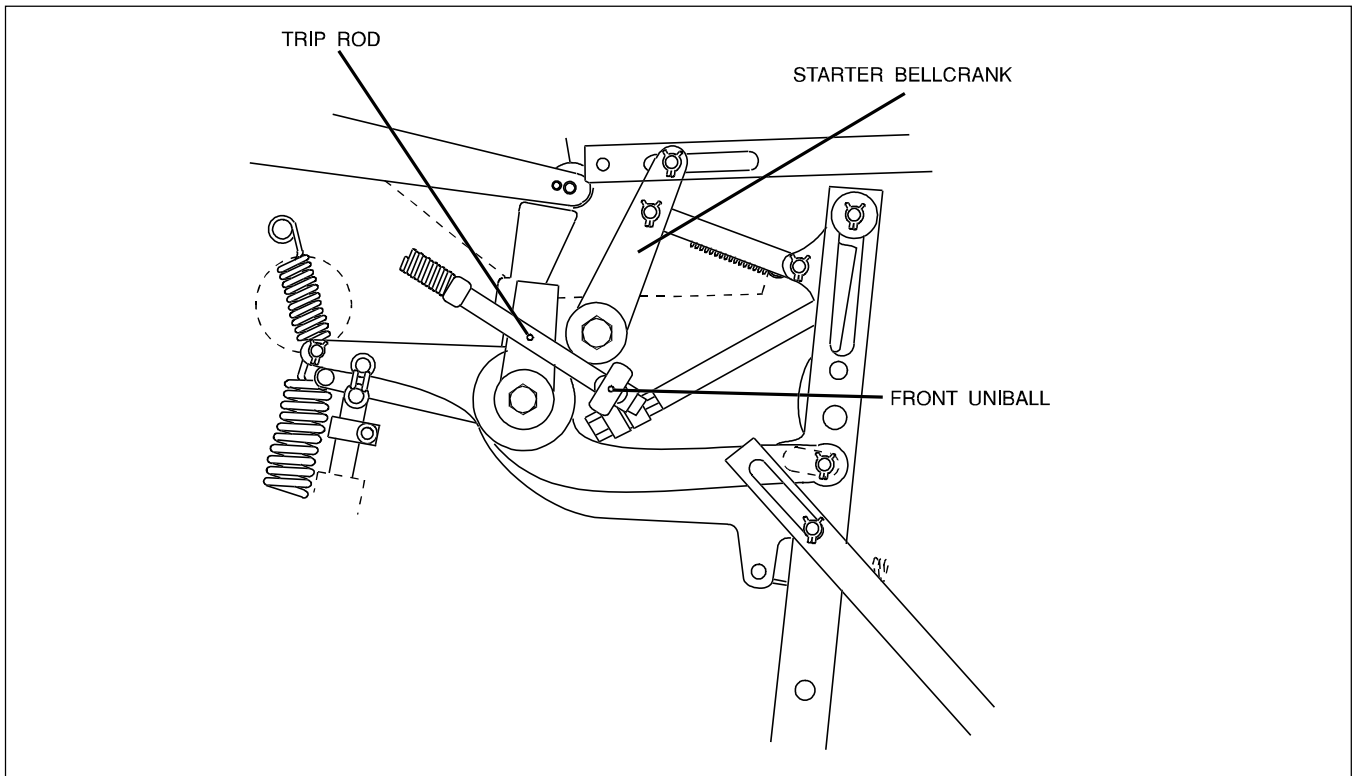


Figure 12. Mechanical Trigger System Removal

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

Eliminate 90 Degree Overtravel

1. Remove the pin (part no. 11-360462-000) and the rake overtravel latch selector (part no 12-100155-000) from the "C" shaft of the detector and discard these parts (Figure 13).
2. Remove the "X" washer (part no. 11-230000-000), pin (part no. 12-100166-026), and 0-90 degree stop selector wire link (part no 12-100350-000) from the detector "C" shaft and discard these parts (Figure 13).

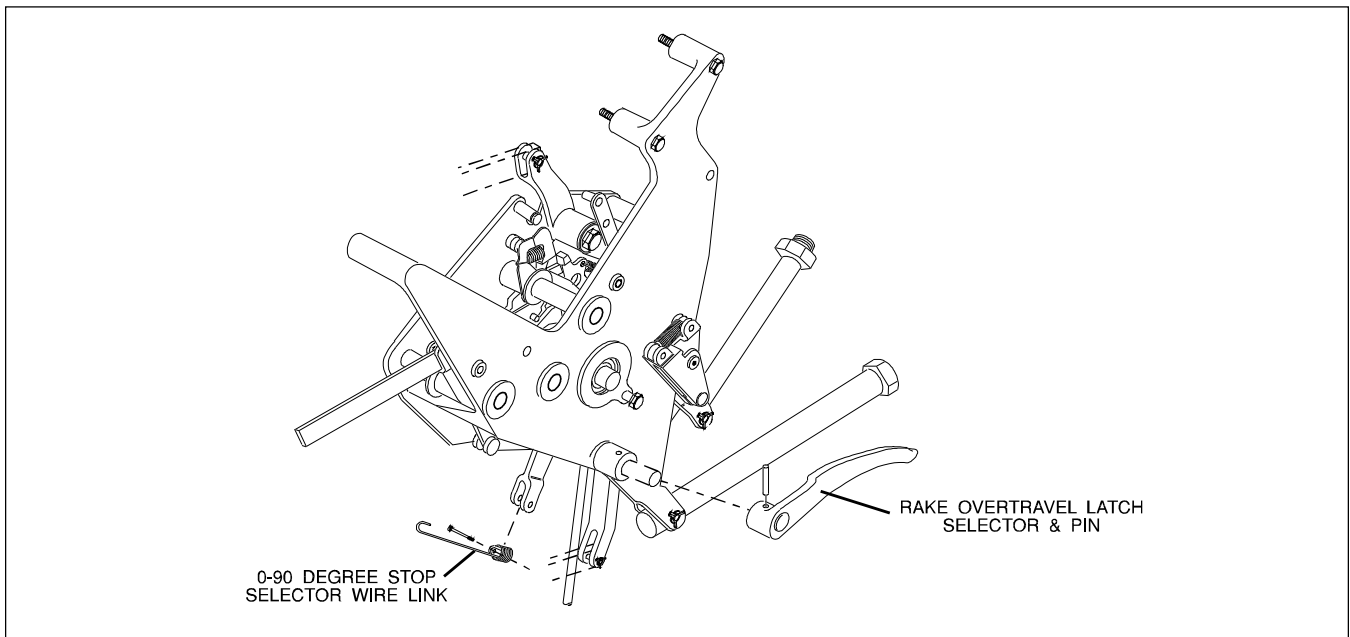


Figure 13. 90 Degree Overtravel Elimination

3. Modify the clutch reset lever assembly as follows:

On older pinsetters with the cast reset lever (part no 12-100251-000 now obsolete): (See Figure 14)

- Remove the "X" washer, pin, and spring from the reset lever latch. Save the spring for re-use.
- Install the included link (part no. 12-102033-000), "x" washer pin (part no. 12-100166-005), "X" washer (part no. 11-230001-001) and existing spring (part no. 12-100149-000) as shown in Figure 14.

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

On pinsetters with the flat reset lever (part no. 12-100490-000): (See Figure 15)

- Install the included link (part no. 12-102033-000), lockwasher (part no. 11-195010-001) on the end of existing bolt as shown in Figure 15.

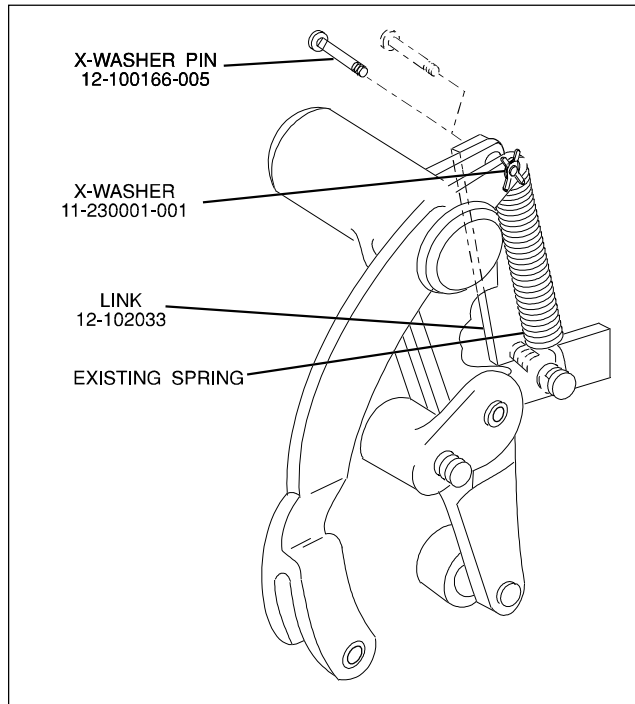


Figure 14. Older Cast Reset Lever Modifications

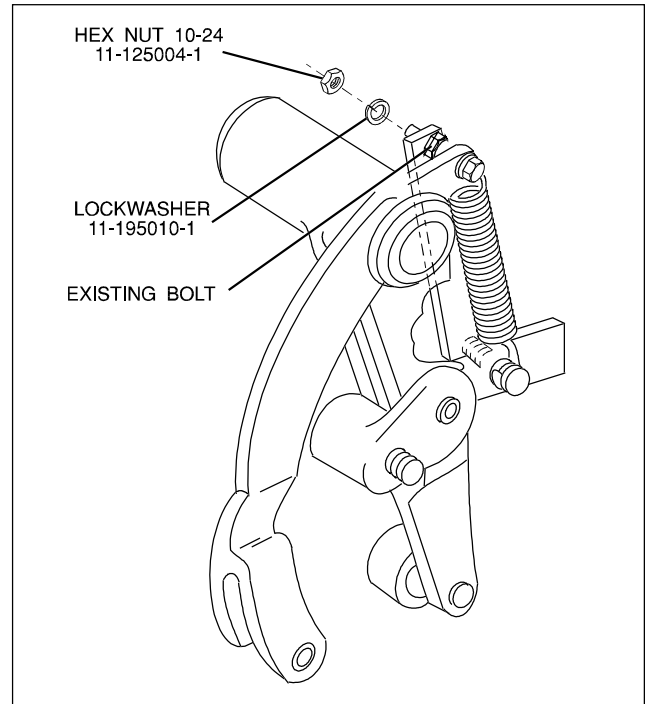


Figure 15. Flat Reset Lever Modifications

4. Remove the outer cam follower assembly (part no. 12-250242-000) from the rake cam follower assembly (part no. 12-250235-000). Discard the outer cam follower and hardware shown in Figures 16 and 17.
5. Remove the rake overtravel latch (part no. 12-250033-000) and the rake hook lever (part no. 12-250262-000) from the rake cam follower assembly and discard these parts (Figure 17).

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

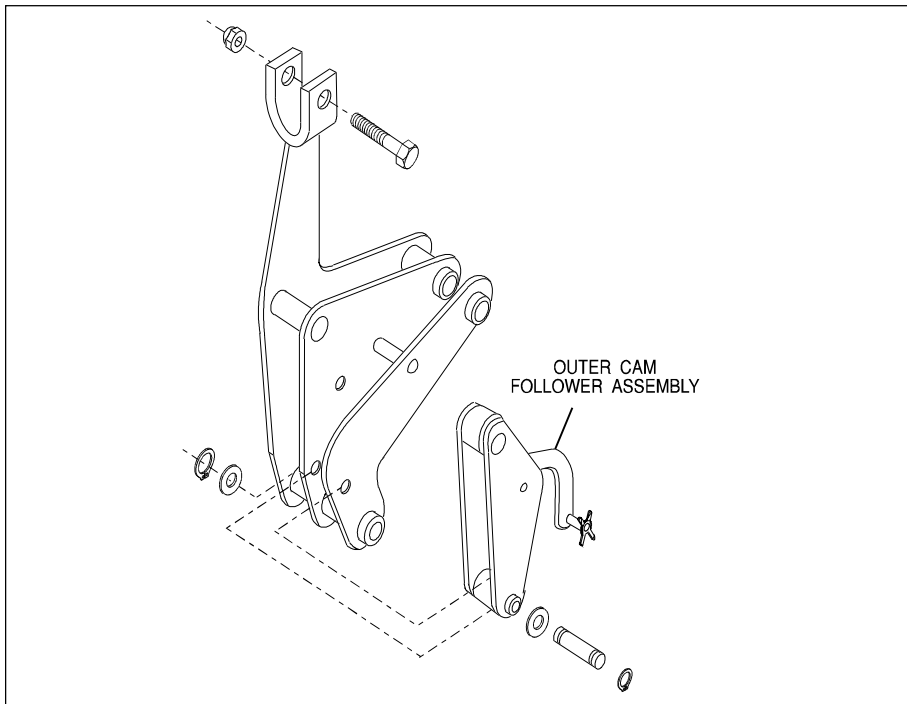


Figure 16. Outer Cam Follower Modifications

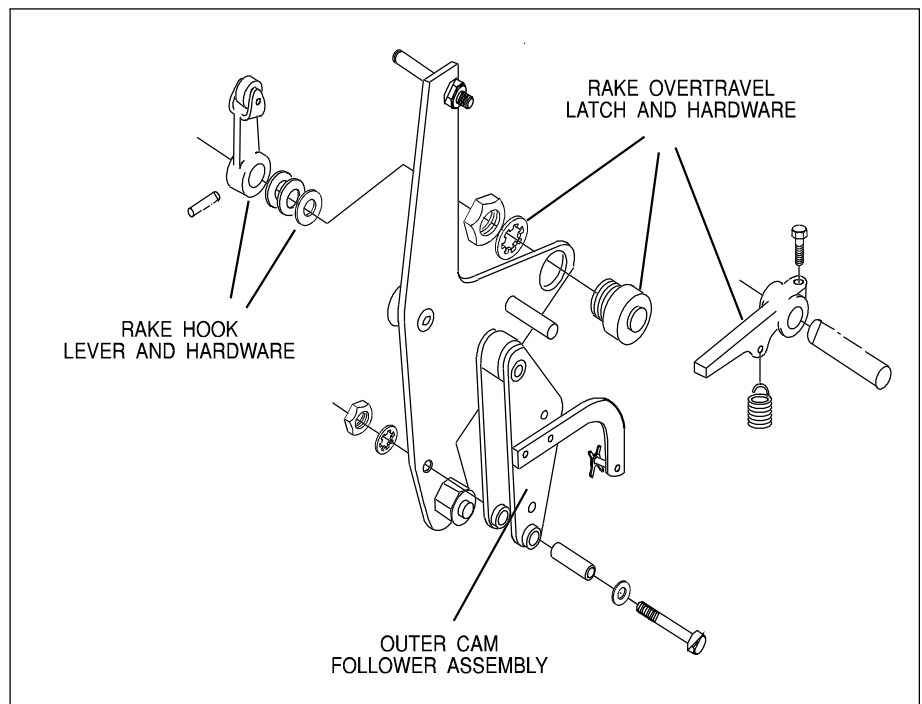


Figure 17. Rake Cam Follower Modifications

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Rake Lift Rod Modifications

1. Locate the plastic blocks, 1/4" x 1-1/2" bolts, 1-1/4" dia. flat washers and 1/4" lock nuts in the hardware package.
2. Place the plastic blocks into the slot of the rake lift upper rod ends as shown in Figure 18.

Note: The bottom corners of the plastic block may need to be trimmed to fit the alternate forged rod ends.

3. *Secure the plastic blocks with the 1-1/4" dia. flat washers, bolts and lock nuts tightened around the rod ends shown in Figure 18.*
4. *Make sure this plastic block is added to both upper rod ends to effectively fix the "V" lever connecting bolt and roller at the top of the slot. This allows the safety shut-off system to sense when the rake is blocked and shut the moter off to prevent damage. If the roller is loose at the top of the plastic block, check to make sure that the proper bumper assembly is installed over the bolt and roller.*

Electronic Pinsetter Trigger/Control System-Model "A"-Supplement

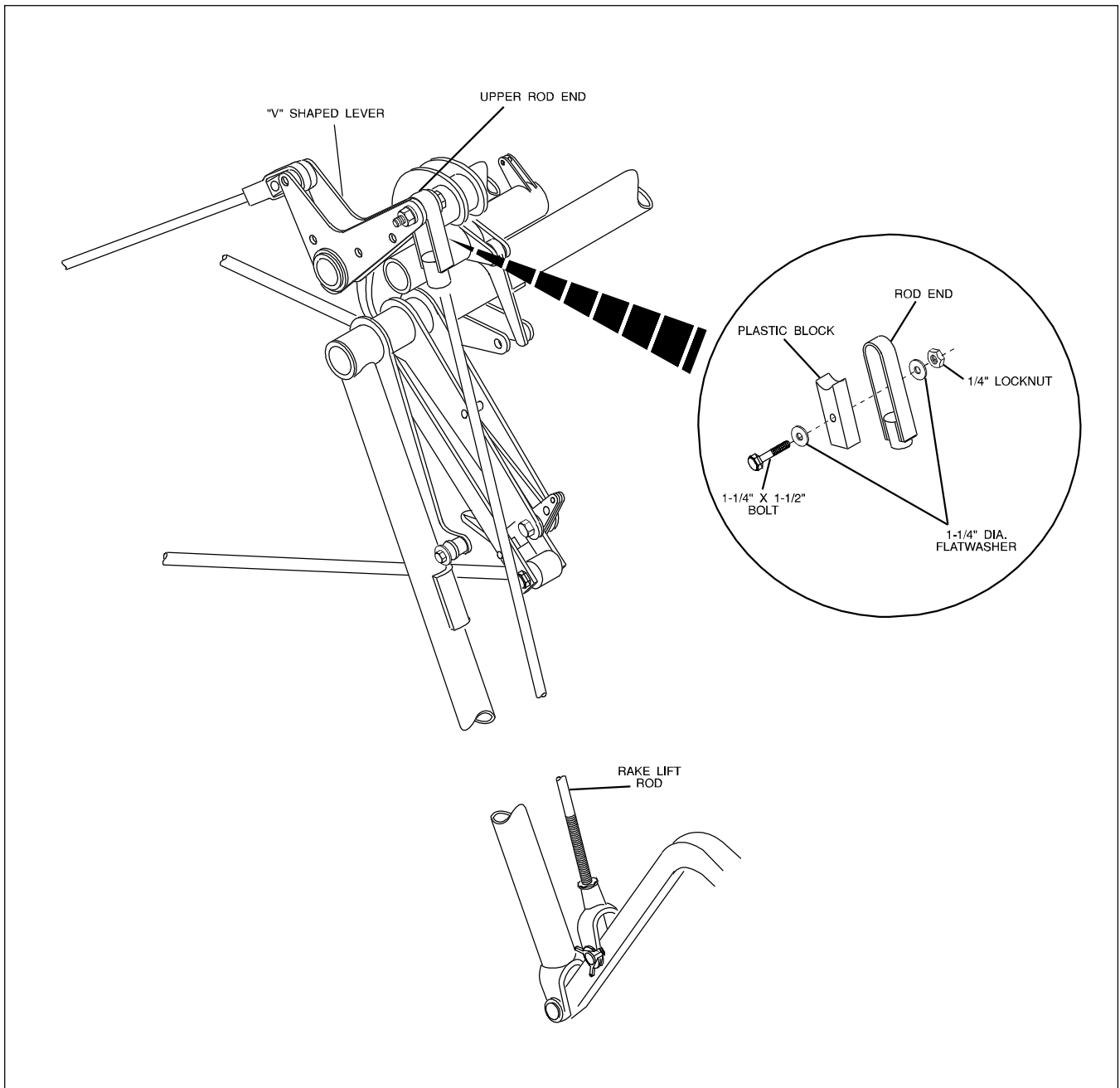


Figure 18. Rake Lift Rod Modification

Electronic Pinsetter Trigger/Control System-Model "A" Supplement

Cycle Solenoid Modification

Note: For best reliability, it is recommended that the model A cycle solenoid and starter bellcrank lever be upgraded to the model A-2 system. Order A-2 solenoid conversion kits part no. 12-862507-000 for 208-230 Volt or part no. 12-862506-000 for 115 Volt system.

If the model A cycle solenoid is left in operation, it is suggested that the stroke be limited by drilling a hole in the solenoid mounting bracket and installing the proper length bolt to limit the stroke of the solenoid plunger so it doesn't extend out all the way. (Figure 18) Position the bolt so the solenoid plunger only extends enough to produce 1/8" gap between the slot in the connecting link and the pin in the starter bellcrank lever. It is also recommended that the "X" washer pin in the bellcrank and connecting link slot be replaced with the model A-2 pin (part no. 10-229451-000) and "O" ring (part no. 11-625538-000). This will extend the life of the solenoid plunger, connecting link, and pin on the starter bellcrank lever.

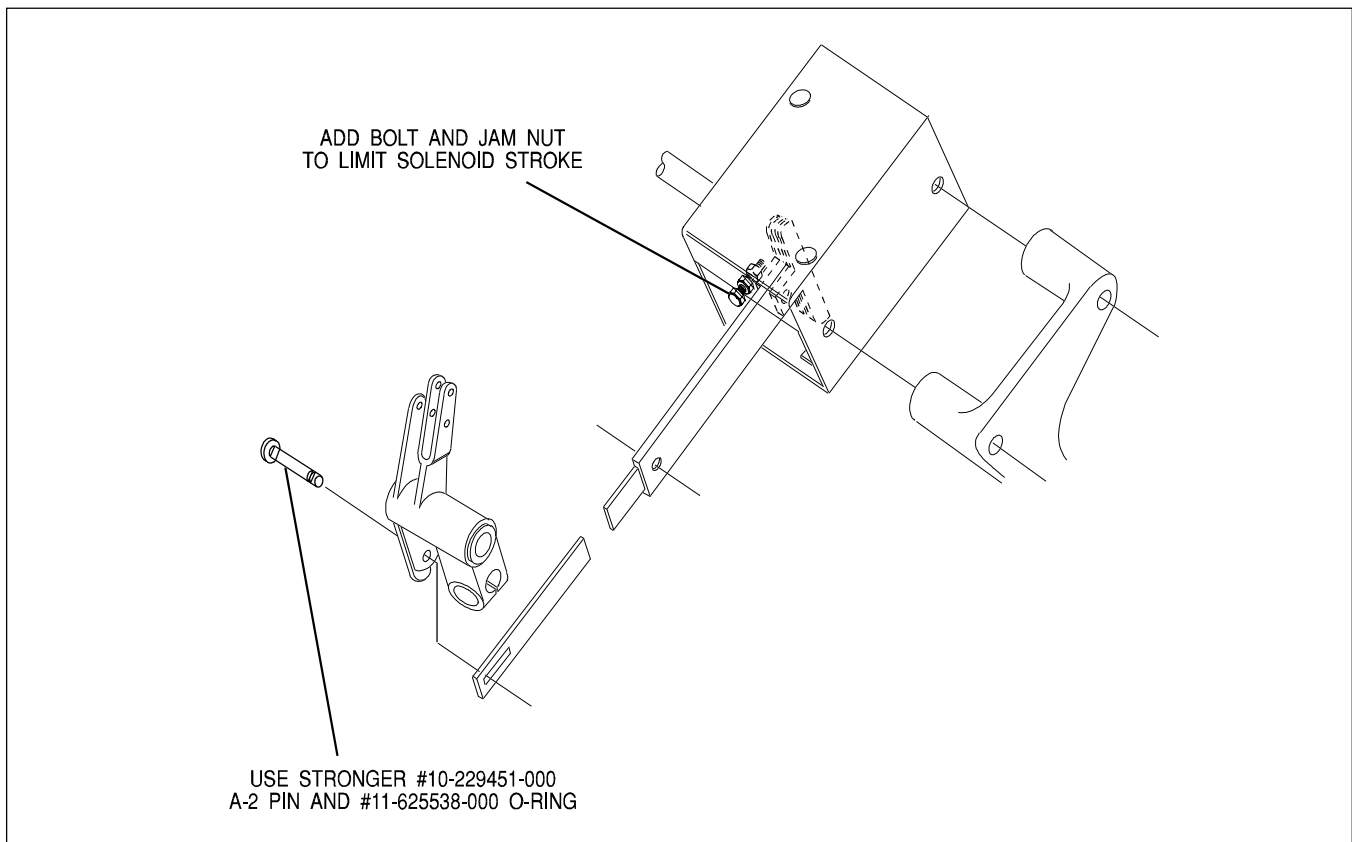
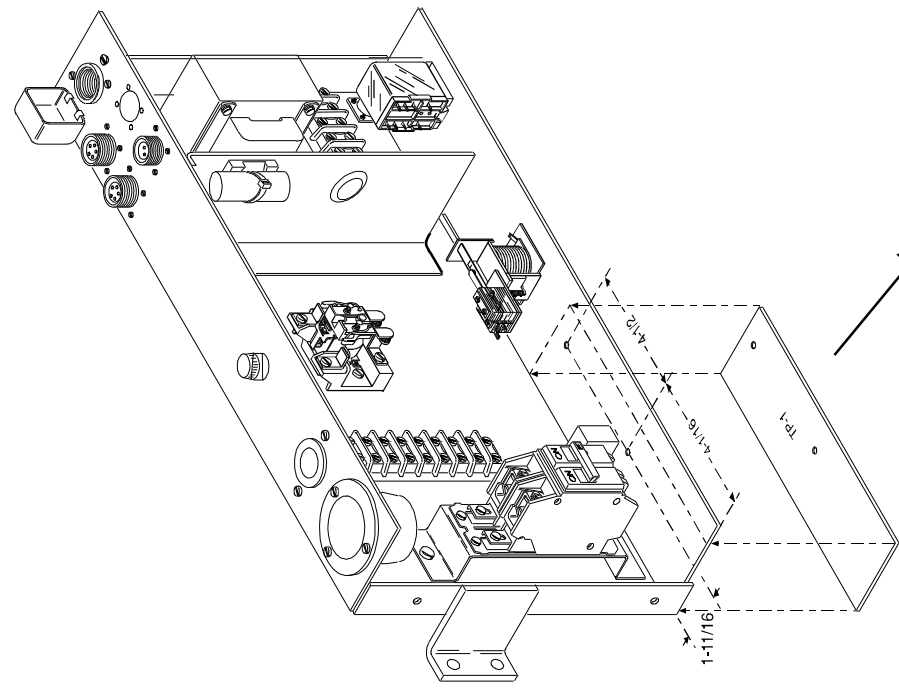


Figure 19. Suggested Cycle Solenoid Modifications (if not upgrading to A-2 System)

Continuation of Electronic Trigger Installation

Refer to the Installation and Operations Manual for the Brunswick Electronic Pinsetter Trigger/Control System (part no. 12-902256-000). Turn to the section "Installation of the Safety Shut-off Connections" and proceed with Step #2. Since this supplemental package has effectively upgraded your control board and related wiring to the A-2 level, the rest of the A-2 installation, operations and troubleshooting sections of the manual will directly apply.

Note: If you already have auto scoring with a take data relay, it will be necessary to change the diode and capacitor of the relay back to its original configuration. Call the support line for further information.



1. CUT OUT TEMPLATES REQUIRED.
2. PUNCH OUT HOLE CENTERLINES.
3. LOCATE TEMPLATE AND MARK HOLE LOCATIONS.

CUT ON DOTTED LINES

TO OUTER EDGES OF BOX

TP-1 TEMPLATE

