BRUNSWICK CORPORATION

INSTALLATION-SERVICE MANUAL

ALIVE!™

HOME PINBALL GAME

MODEL NUMBER
55-860224 -2

★ FEATURES ★

- 1-4 Players
- Electronic Solid State Scoring with Memory
- Electronic Musical Tones
- Independent Flippers
- Game Over Indicator
- Eighteen Scoring Areas
- Thumper Bumpers
- Jet Kickers
- Tilt Mechanism
- Double and Triple Bonus Scoring
- Adjustable Leg Levelers

ELECTRIFYING EXCITEMENT AND ULTRA-FAST ACTION!
SETS UP WITH PHILLIPS AND STANDARD HEAD SCREW DRIVERS AND ADJUSTABLE WRENCH!

CONSUMER DIVISION™

A BRUNSWICK COMPANY

SERVICE DEPARTMENT MARION, VIRGINIA

THE BRUNSWICK CORPORATION, CONSUMER DIV., 325 BRUNSWICK LANE, MARION, VA. 24354

OCT, 1978

PRINTED IN U.S.A.

55-900251-002

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LIMITED BRUNSWICK Since 1845™ WARRANTY

Brunswick warrants to the original purchaser only, that the HOME PINBALL GAME, and all parts and components thereof, except those specifically excluded herein, will remain free from defects in material and workmanship for a period of six (6) months from date of purchase, provided recommended assembly and maintenance procedures set forth in this Owner's Manual have been followed, and ownership has been properly registered.

In order to obtain service from the nearest repair center, replacement of defective warranty parts or technical assistance, call our Toll Free Number 1-800-336-8771 or, if busy, call 1-800-336-8772. Calls made between the hours of 8:00 A.M./5:00 P.M. (Virginia Time) will be handled directly by Service Department personnel. Calls made outside of this time period will automatically be handled by tape recorders standing by for this purpose. For calls within the State of Virginia, call 1-703-783-3121. The two 800 Toll Free Numbers above are applicable only from within the continental United States.

Parts specifically excluded and not covered by this warranty or any implied warranty are: Playfield face sheet, upper cabinet face sheet, rubber bands and light bulbs, parts, components and/or sub-assemblies which have been subjected to abuse, misuse, corrosive fumes, fire or water damage or any other similar perils.

In-Home Service for both parts and labor is provided for the first 30 days following purchase. After this 30-day period, removal of defective part/s and installation of replacement/s is the responsibility of the purchaser. Any labor charges resulting from such removals or replacements by any private or commercial service repair organization will be borne by the pinball game owner.

THE OWNER REGISTRATION CARD included in this package must be filled in as directed on the Registration Card and forwarded to Brunswick within ten (10) days of purchase. Failure to register your purchase voids this Warranty in its entirety, and releases all parties hereto, from any liability.

SHIPPING DAMAGES, both obvious and concealed, are the responsibility of the carrier and purchaser. Inspect your purchase immediately upon receipt and if any damage is noted, notify the carrier within fifteen (15) days of receipt and file a formal claim.

The game is intended for home recreational use only. This Warranty does not apply to games used in commercial or institutional locations.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

BRUNSWICK
Attn: Service Department
325 Brunswick Lane
Marion, Virginia 24354
U.S.A.

— INTRODUCTION —

This Home Pinball Game design was thoroughly field tested to assure a reliability which will afford you with many hours of recreation and pleasure with a minimum of maintenance and problems. The game has incorporated certain solid state features in addition to its mechanical features to insure its reliability. This manual has been developed to thoroughly acquaint you with the various functions of your game, how to maintain it, and, in the event of a problem, how to recognize its cause and correct it. It also contains instructions for obtaining parts and technical assistance in the event they may be required.

GENERAL

1. If you have not already done so, please read your Warranty carefully so that you are familiar with its contents and return your Owner Registration Card.
2. Each Pinball machine has been tested and inspected at the factory to insure the completeness of its functional operation. Vendor parts have been sample inspected to assure conformance to our specifications. However, in spite of all precautions, human errors do occur. In the event one of these errors results in a problem with your game, we have taken significant action to provide you with speedy recourse to the problem.
3. Should you encounter a problem during the warranty period, check the Problem Solving section of this manual and effect the solution for your specific problem. If the solution does not correct the problem, call one of our two Toll Free Numbers 1-800-336-8771 or if busy, call 1-800-336-8772. Calls made between the hours of 8:00 a.m./5:00 p.m. (Virginia time) will be handled directly by Service Department personnel. Calls made outside of this time period will automatically be handled by tape recorders standing by for this purpose.

   The two Toll Free Numbers shown above are applicable only from within the continental United States. For calls made within the State of Virginia, call 1-703-783-3121.

   In certain extenuating circumstances and at the discretion of the Brunswick Corporation, an authorized service representative may be dispatched to your home to repair your pinball game if the problem has occurred within the 30 day in-warranty period. After the 30-day period, Brunswick Service Department will provide technical assistance in helping you repair your game.

   If you require warranty parts during the first 6 months following purchase, call TOLL FREE 1-800-336-8771 or 8772 and give your name, mailing address, machine serial number (located on rear panel of lower cabinet assembly), part number, description of part, and quantity needed. Part numbers and descriptions of parts are contained in the Parts List.
4. Warranty parts are available direct from the Brunswick Service Department. Major components are available as assemblies and are designed for easy replacement. During Warranty, these units are on a no-charge basis.
5. SERVICE PARTS ORDERING: After the expiration of your Warranty, service parts may be ordered by using the order form included with this package. Simply fill out the form listing the parts desired, enclose your check or money order, and mail. You may obtain pricing information regarding your part orders by calling one of our TOLL FREE telephone numbers.
6. If you have purchased your Pinball Game from a "Franchised" Brunswick Dealer or a Brunswick Leisure Mart, they will assist you in resolving any problems you may encounter with parts and functions of your game.

NOTICE: Stapled to a vertical member inside the upper cabinet is a small bag containing an assortment of spare parts. This spare parts kit should not be removed until needed.

ASSEMBLY INSTRUCTIONS

1. Position lower cabinet on top of a bar, table or other surface that is at least 28" from floor. (Figure 1).

2. Thread a nut onto each leg leveler until it "bottoms out", then thread the levelers into the bottom of the four legs as far as possible.

3. Attach the four legs to cabinet as shown, using hex head bolts, 5/16-18x2¼".

4. Remove game from table and position it in its playing location.

5. Level the unit by placing a level along the bottom edge of the lower cabinet (Figure 3). Adjust the leg levelers up or down as required.

6. With game reasonably level and all four levelers having positive bearing against the floor, securely tighten the lock nuts against the bottom of the four legs.

7. Remove the screw from rear or upper cabinet as shown in Figure 2. Slide the back panel up and out of the grooves as shown. Set back panel aside.

8. Position the upper cabinet on top of lower cabinet as shown in Figure 3.

9. Reach down inside of lower cabinet and retrieve the two (2) wiring harness assemblies. Route the two wiring harness assemblies through the 3" hole in bottom panel of upper cabinet as shown in Figure 3.

10. Plug in the two wiring harnesses to the P.C. Board as shown making sure that the metal tabs on the harness connectors are in contact with the metal strip side of the P.C. Board. Connect the two small connectors as shown. (Figure 3)

11. Secure the upper cabinet to the lower cabinet as shown in Figure 3 with two Hex Head Bolts, ¼-20x1½", two lock washers and two flat washers. Replace the back panel.

12. Remove the end trim at player end of lower cabinet as described on page 13, step 1 and slide the playfield cover out approximately 3". Install the steel game ball onto the playing surface. Then re-position the playfield cover and re-install the end trim.

FIGURE 1

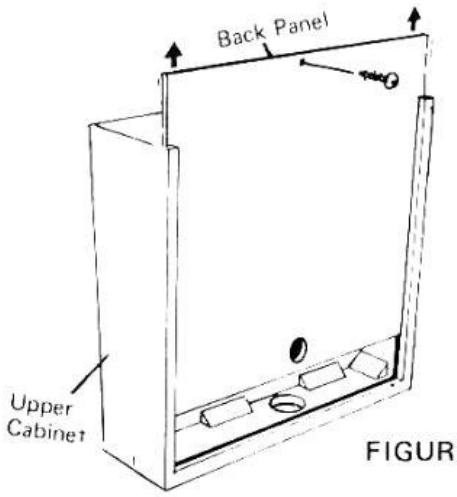


FIGURE 2

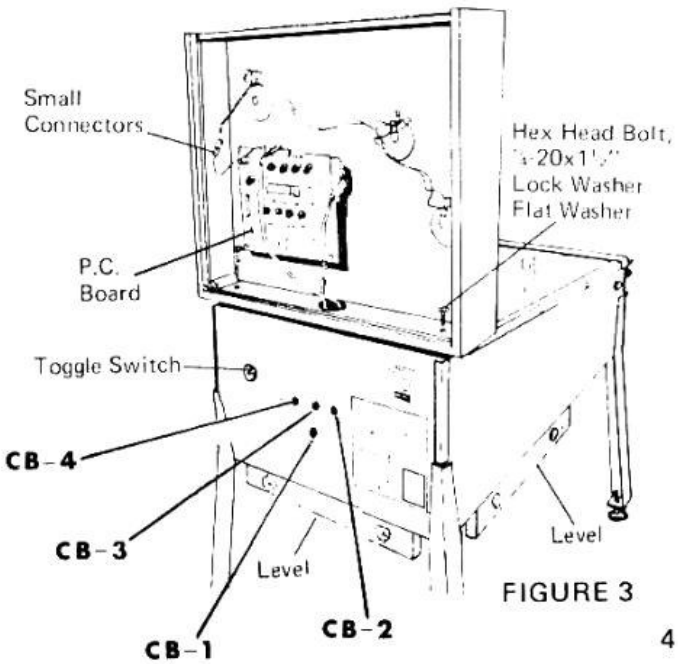


FIGURE 3

BASIC GAME OPERATION

First, your Home Pinball Game should be plugged into an appropriate electrical outlet and the on/off (toggle) switch at rear of unit turned "on". (Printed circuit board digits may not illuminate totally until start/reset switch is activated.)

Second, depress the START/RESET button once for each player. Player Up light 1 illuminates with one push of button, player Up light 2 illuminates with second push of button, etc. This also resets the Solid State Scorer to zero. Ball in play light 1 will illuminate and the Ball return mechanism positions the first ball for player number 1 in front of the Ball Shooter automatically. After Player No. 1 finishes the first ball, Player Number 2 light will illuminate allowing Player No. 2 to play his/her first ball. After Player No. 2 completes the first ball, Player No. 1 light and ball-in-play light number 2 will illuminate, allowing Player No. 1 to complete the second ball. When completed, Player No. 2 light and ball-in-play light will illuminate, allowing Player No. 2 to complete his/her second ball. The sequence will be repeated until both players play a total of five (5) balls each.

NOTE: This game utilizes only **One** ball. The same ball is used repeatedly for each of the game plays.

Third, pull back the Ball Shooter and release it to shoot the ball into the playfield. Once the ball enters the playfield, scoring will begin. Each player's objective is to get as high a score as possible with five plays. (Balls which go into the LUCK OUT lane are played again for additional scoring).

Scoring occurs when the ball hits the Thumper Bumper, Targets, or Kickers; goes over Rollovers; or goes through spin gates. The Flippers are used by the player to keep the ball in play and increase the score. As skill and timing improve, so will the player's score.

A bonus Feature increases the scoring potential. When a ball passes over the 1,000-point Bonus Rollover switch in the upper center of the playfield, two Bonus Lights are lighted. During all remaining play with that ball, the 10-point Score areas score 100 points and the 100-point Score areas score 1,000 points.

If more than one player is playing, the Solid State Scorer will cycle to show each player's score after each ball is played. All players will play their first ball, then all players will play their second ball, etc. After the last player plays his fifth ball, the GAME OVER lamp will light. The scores will continue to cycle, showing each player's score, until the game is turned off or the START/RESET button is depressed.

This Home Pinball game is equipped with a Tilt feature. If the game is pushed, shaken, or tilted in excess of the game's limits, all scoring will stop and Flippers, Kickers, and Thumper Bumper will not function. The Scorer will display "ouch" and a musical tune will play indicating a "Tilt" condition. This condition continues until the next ball is ready for play. The player will not lose any points scored prior to the tilt condition and will be able to continue normal play with his next ball. To adjust Tilt Mechanism, refer to page 27, figure 24.

For a more detailed explanation of the games functions and the various scoring possibilities including double and triple bonus features, refer to the "How It Works" section on Page 7 thru 11.

HOW IT WORKS

This Section will help explain how the game actually operates so that the maintenance and service sections of this manual are more understandable.

Basically, this Home Pinball Game is a combination of levers, switches, lights, and solenoids that operate at low voltages (6 volts or 28 volts). This game has six main operating sections: (1) Solid State Scorer (PC Board), (2) Playfield, (3) Player Controls, (4) Electronic Sound, (5) Tilt Mechanism, and (6) Power Supply. The six sections are joined together by wiring harnesses and connectors. Each section is described in the following text.

SOLID STATE SCORER (PC BOARD)

The Solid State Scorer is the control center for this game (See Service Parts Assembly Drawing, Page 32). This board tabulates all scores, determines when the Bonus is in effect, memorizes who is to play next, detects any tilt condition, and determines when the game is over.

PLAYFIELD

The playfield has all the parts that cause scoring and ball action. When the ball hits the bumper or kickers, a switch is closed, sending a signal to the corresponding solenoid. This solenoid takes electrical energy that provides the mechanical motion for the required ball action. In the case of your Home Pinball Game, the bumper and kickers move the ball away faster than it hits. At the same time all this is going on, a signal is sent through the wire harness to the Scorer, which records the points. The Ball Return functions in a similar manner to the other Solenoid. After completing a play, the ball closes a switch. A signal is sent from the switch to the Scorer. The Scorer, in turn, signals the Ball Return Solenoid to kick the ball up the ball track and in front of the Ball Shooter. In the case of the Rollover, Target, Rubber Band, and Spin Gate switches, no solenoids are activated, but a signal is sent directly to the Scorer to register the points.

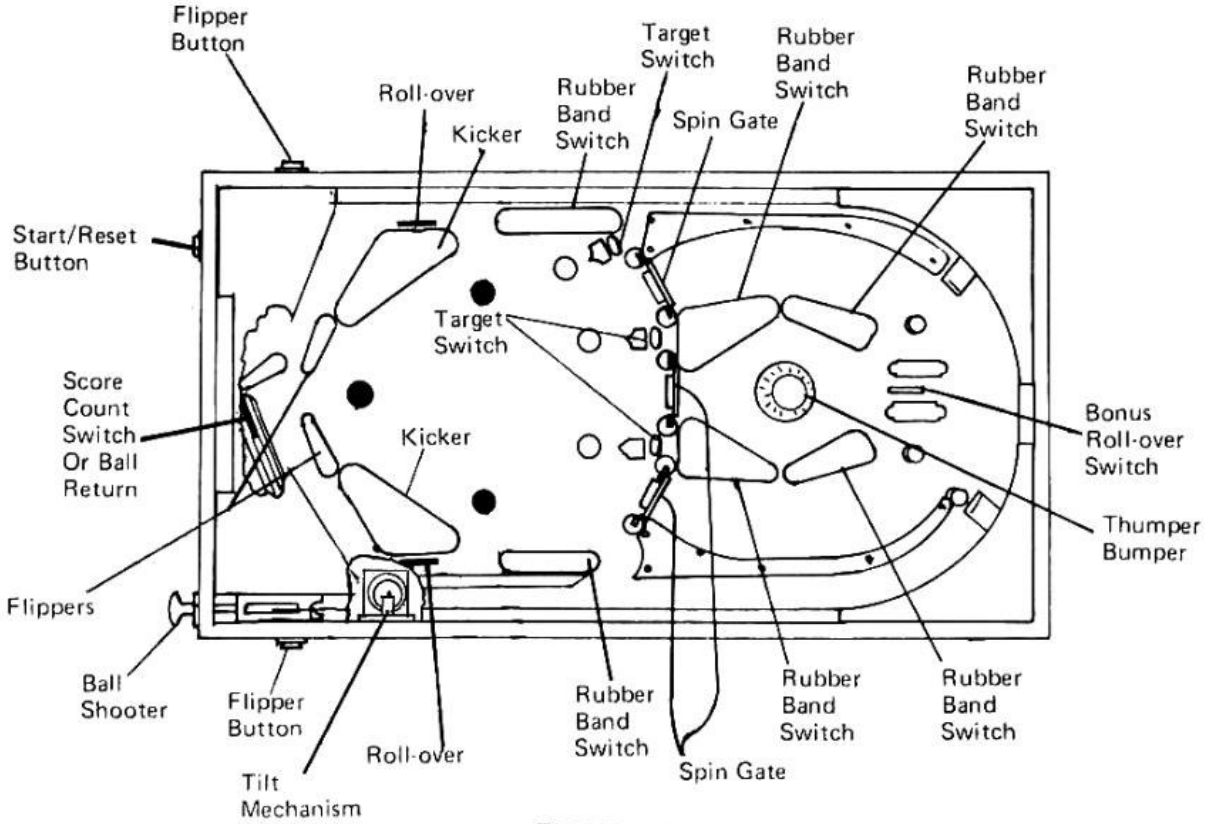


FIGURE 4

HOW IT WORKS

PLAYER CONTROLS

The Player Controls are located on the outside of the lower cabinet and are: the START/RESET button, the two Flipper buttons, and the Ball Shooter (see Figure 4). They are mechanical inputs from the player that either moves the ball or closes a switch. The Ball Shooter applies force directly to the ball. Pushing the START button closes a switch that signals the scorer to: set the score to zero, position the ball for play, and start tabulating all scores. Pushing in either Flipper button closes a switch that causes the Flipper solenoid to move the Flipper on that side of the playfield. Flippers function independently.

ELECTRONIC SOUND

The unit has electronic sound with a volume control accessible to the owner. The volume control is mounted on the Printed Circuit Board in the upper left hand corner when viewed from the rear of the machine. The P.C. Board is located in the upper cabinet. It can be adjusted to decrease the sound by turning the control (blue colored knurled knob) clockwise or to increase the sound by turning counter-clockwise. Score will be indicated by a single tone and the bonus function by a tune. Different tunes will play for the following:

1. At the entering of the first player.
2. Upon the award of the X10 bonus.
3. Upon the award of double advance bonus.
4. Upon the award of triple advance bonus.
5. Upon the award of free ball.
6. When the unit is in tilt.
7. At game over.

MAINTENANCE

Your Home Pinball Game has been designed to be relatively trouble free and easy to service. Simple adjustments and repairs can be made in the home. Under normal playing conditions, no regular lubrication or cleaning of the mechanical or electrical parts is needed. If the game has received very heavy play, has been in a dusty environment, or has been played over an extended length of time . . . the following parts may be lubricated, after the part has been wiped clean: (lubricate with a fine machine oil, 3 in one, sewing machine oil, etc.)

Ball Shooter Rod	Page 6	Figure 4
Kicker Arm Pivots	Page 22	Figure 18

The Playfield surface can be cleaned with a soft cloth and a mild, non-abrasive detergent. The Playfield and Upper Cabinet Face sheets can also be cleaned with a soft cloth and a mild, non-abrasive detergent or with glass cleaner. Cleaners using Ammonia or solvents could cause damage and should not be used.

Any nicks or chips in the steel game ball could possibly damage the playfield.

Servicing steps are detailed in the PROBLEM SOLVING section, and they will help solve most of the problems that could occur.

PRECAUTIONARY STATEMENT

BEFORE DISASSEMBLING OR PERFORMING ANY MAINTENANCE OR SERVICE PROCEDURES ON ANY PART OF THE POWER SUPPLY, THE ELECTRICAL CORD MUST BE DISCONNECTED FROM THE HOME'S ELECTRICAL OUTLET AND REMAIN DISCONNECTED UNTIL IT HAS BEEN COMPLETELY REASSEMBLED.

HOW IT WORKS

I. Power On

With AC power on the display should present 000000 and the game over light will be on. No players, ball-in play or scores should be displayed.

II. Start Up

To begin play, the start/reset switch S-16 is activated once for each person playing the game, maximum of four players. On the first reset activation all scores from the previous game are "zeroed" player one and ball one lamps are lit flashing, a tune plays, the ball return eject is energized, the ball is kicked up for play, and the playfield is set to non bonus scoring mode.

Subsequent reset activations display and enter lamps for "player 2, 3, 4" (lit steadily) in the game. A tone is generated as each player is entered. When the ball contacts the first score switch, "player 2, 3, 4" display lamps are blanked, and "player 1", "ball 1" lamps are lit steadily.

Before the second ball is played, additional players can be added if only one or two players are playing by pushing the reset button. The game can be canceled by pressing the reset button a total of four times before the second ball is played or one time after the second ball is played.

III. Play Sequence

The play sequence is such that each player plays ball 1 then ball 2 in turn, etc. The display indicates the proper player and the ball in play as well as the score accumulated from previous balls for each player.

Example Sequence:
Player 1 Ball 1, Player 2 Ball 1, Player 3 Ball 1,
Player 4 Ball 1 – through
Player 4 Ball 5, Game over.

The game is complete when last player ball 5 has been counted and the GAME OVER light is activated.

IV. Display Sequence

After each ball has been completed, the "player up" score is displayed for .6 sec., then each of the other players scores are displayed for .6 seconds. The cycle is in reverse of player sequence.

Example

Three players in the game; player 2 ball 3 completed. Display sequence is as follows:

A. Player 2 Ball 3, score (.6 sec.)
B. Player 1 Ball 3, score (.6 sec.)
C. Player 3 Ball 3, score (con't. during play)

As (C) occurs, the ball return eject is energized, Player 3 is starting play of ball 3, his score is displayed and incremented with the playfield scoring.

HOW IT WORKS

V. Playfield Description

The playfield has eighteen score points and five bonus features. The score point locations are shown in Figure 5 and the score values are listed in the score values chart on page 11. The bonus features are as follows:

1. **Times 10 Bonus** – When the ball activates switch S-1 the times 10 bonus is in effect and multiplies the value of all other score points S-2, S-3, S-5 through S-14, S-18, S-19, S-20, S-21 by 10 until the ball rolls out and activates S-17. This bonus does not carryover to the next ball. The award of this bonus is accompanied by a tune.

2. **Advance Bonus** – Score points S-2, S-3, S-5, S-7, S-9, S-11, S-12, S-13 and S-14 have been designated as advance bonus points. These switches not only score the marked immediate scores but also score the advance bonus values shown in the score values chart on page 11. These advance points are added to the player score on ball rollout in 1000 point increments with a tone sounding for each increment.

3. **Double Bonus** – The activation of switches S-5 and S-9 will put the game in double bonus mode, light the double bonus light and play a tune. The double bonus mode applies a 2 times factor on all advance bonus points scored while the ball is in play. The double bonus ends upon ball rollout and activation of S-17. The activation of switches S-5 and S-9 are accumulations from ball to ball for each player. Example: switch S-5 may be hit on ball one and the lamp will go out until the player either reaches 2x bonus or game ends. If the player on the 3rd ball hits S-9 then the 2x bonus will be awarded. Upon the ball rollout he will then start over on ball four in his efforts to again hit S-5 and S-9 to obtain the double bonus.

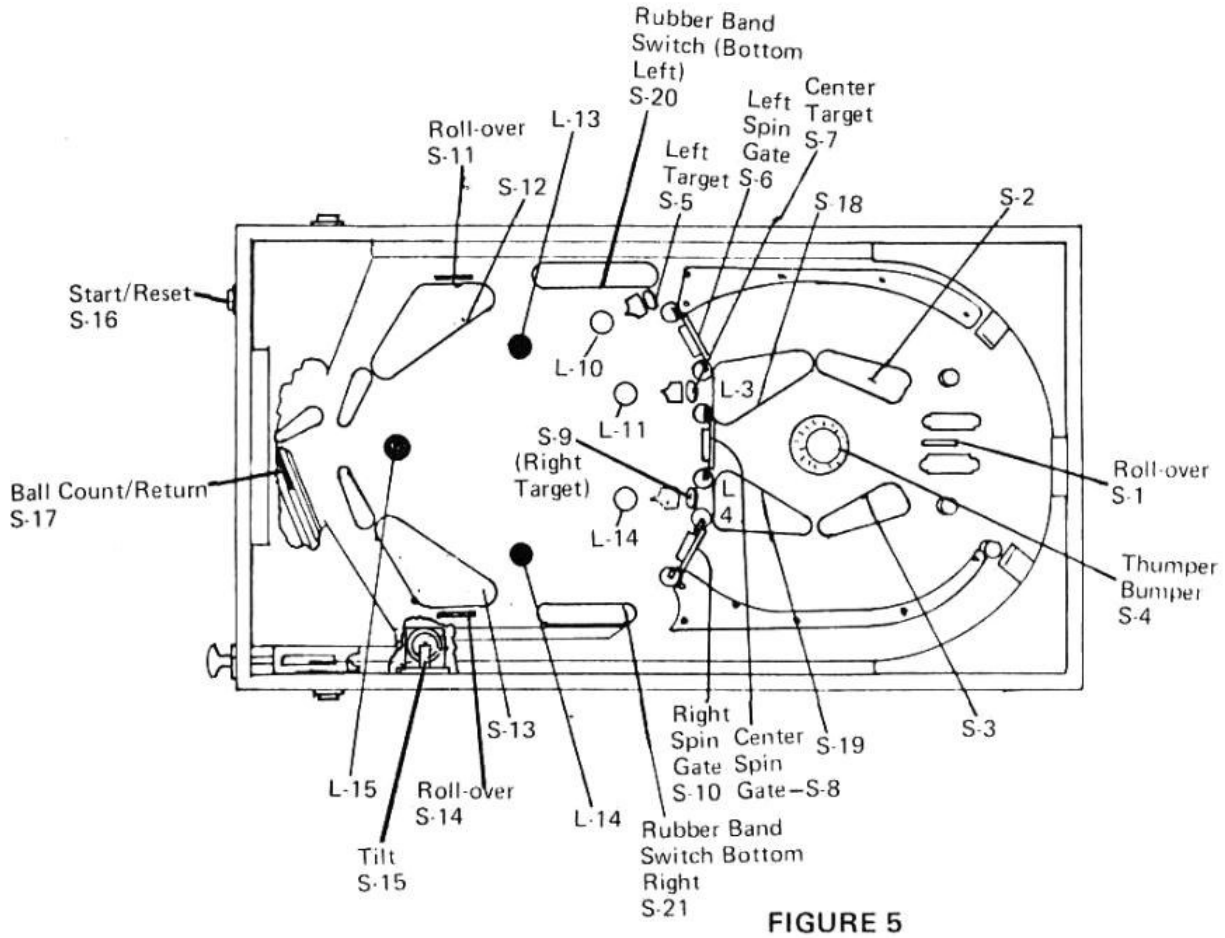


FIGURE 5

4. **Triple Bonus** – The activation of switches S-5, S-7 and S-9 will put the game in triple bonus mode, light the double and triple bonus lights and play a tune. The triple bonus mode applies a 3x factor on all advance bonus points scored while the ball is in play. The triple bonus ends upon ball rollout. It is also accumulative from ball to ball for each player so long as double bonus is not received.

5. **Free Ball** – A free ball is awarded upon the activation of switches S-1, S-2, S-3, S-4, S-6, S-8, S-10, S-12, S-13 and rolling out through either S-11 or S-14. These switch activations are accumulated from ball to ball for each player until a free ball has been awarded. After the award the accumulation is started over. The award is signaled by the "same player plays again" light, a tune and a ball kicked up for play without changing of the player light or ball light.

VI. Tilt

The unit is equipped with a tilt switch (S-15) which when activated, will result in the following:

1. All scoring is terminated.
2. The word ouch appears in the display.
3. All scoring sounds are terminated.
4. The above features continue until the ball activates S-17. At this time any advance bonus occurring prior to the tilt will be added to the player score and the next player ball will be ejected.

VII. Ball Eject

The ball eject occurs as follows:

1. When the ball activates switch S-17, the eject coil C1 is energized for 50-millisec.
2. S-17 will advance ball count only if a score switch has been activated since last count.

VIII. Game Over

When the last player completes ball 5 the "Game Over" light is lit, the ball is locked out, and a tune plays. If the reset is activated immediately the tune is aborted. Each player number and his score are continuously cycled for .6 sec. each.

IX. Control Circuit Outputs

1. 6 digit Futaba display.
2. Lights – 10X Bonus, Game Over, (4) Players, (5) Balls, S-5, S-7, S-9 targets, Double Bonus, Triple Bonus, Same Player Plays Again.
3. Sound – appropriate tunes and notes to the speaker.
4. Coils – C1.

HOW IT WORKS

Thoroughly read page 9 and page 10 for explanation of the Score Values Chart shown below.

SCORE VALUES CHART

Score Switches	Initial Score	Bonus	Advance Bonus	Free Ball
S1	1000	10X		X
S2	50		1000	X
S3	50		1000	X
S4	1000			X
S5	100	2X/3X	2000	
S6	50			X
S7	100	3X	2000	
S8	50			X
S9	100	2X/3X	2000	
S10	50			X
S11	100		1000	(1) REQ.
S12	50		1000	X
S13	50		1000	X
S14	100		1000	(1) REQ.
S18	50			
S19	50			
S20	50			
S21	50			

Double and triple bonus lights (lamp status)

	Triple Score	Double Score
Triple bonus light	ON	OFF
Double bonus light	ON	ON

For location of score switches, see illustrated view on page 9, figure 5.

PROBLEM SOLVING

DIAGNOSTIC LAMP AND SWITCH TEST

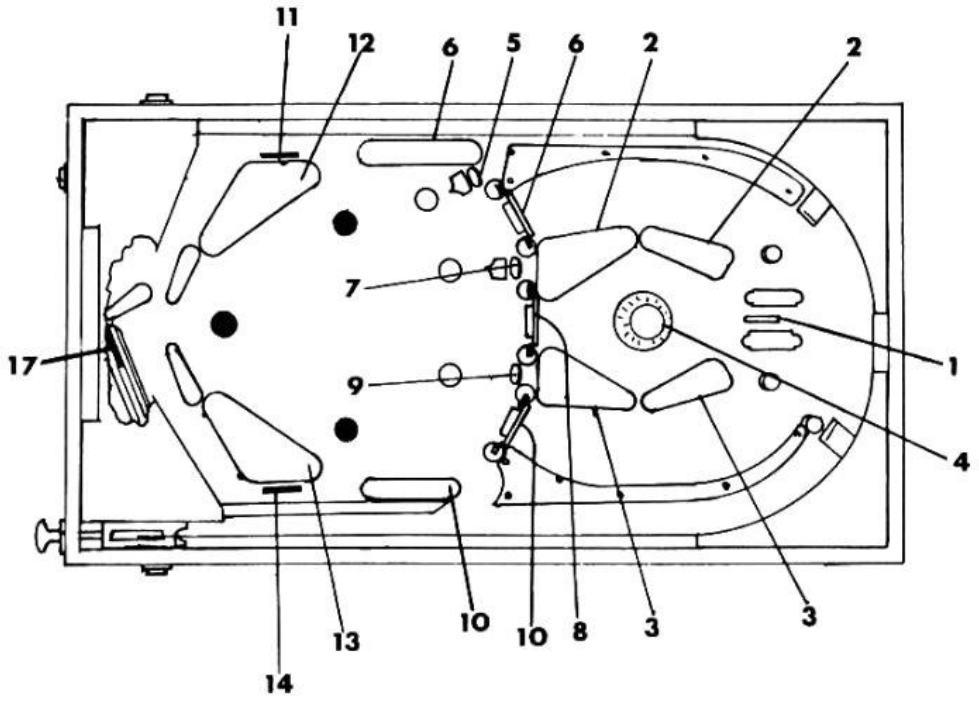
A lamp and switch test has been programmed into the microprocessor (located on the printed circuit board) to facilitate system trouble-shooting. The two test procedures are as follows:

Lamp Test – The lamp test mode is initiated by depressing first the start/reset button, then right rollover switch, (S14) then the left rollover switch (S11). The order is important. This will cause "LT" to appear in the left hand portion of the display indicating the unit is in the lamp test mode. Once in this mode, subsequent depressions of the left hand target switch (S5) will cause each of the backscreen and the playfield lamps to light in order. These tests will verify operation of the microprocessor, outputs to the lamps, the lamp drivers, wiring and the lamps themselves. NOTE: The lamp test verifies the condition of the 6V D.C. lamps only. The 6V A.C. lamps are always on and are not included in this test. After lamp test is completed, again depress the start/reset button for normal play.

Switch Test – The switch test mode is initiated by depressing first the start/reset button, then the left rollover switch, (S11) then the right rollover switch (S14). This will cause "ST" to appear in the left hand portion of the display. Once this has occurred the depression of any switch on the playfield will result in the corresponding switch number appearing in the display. These tests will verify operation of the switches, switch wiring and the inputs to the microprocessor. After switch test has been completed, again depress the start/reset button for normal play.

NOTE: During the switch test; the top rollover switch will be shown on the display as switch number 1 and the rest of the switch numbers will be displayed in numerical order as each switch is tested from left to right and progressing down to the bottom of the playfield. (See diagram below).

The switch numbers displayed during the switch test does not relate to the actual physical position of the respective switches on the playfield. The physical position of the switches is shown on page 9, figure 5.



PROBLEM SOLVING

Most of the problems that could happen are minor in nature and are relatively easy to solve. As with any machine that delivers as much action as your Home Pinball Game, some adjustments will be required periodically to maintain maximum performance.

Reading the previous sections of this manual is strongly recommended to help you understand the terms used in this section. BEFORE PERFORMING ANY OF THE STEPS IN THIS SECTION, MAKE SURE YOU HAVE THOROUGHLY READ THE PRECAUTIONARY STATEMENT ON PAGE 7.

For a detailed exploded view of how each item is assembled or disassembled, refer to the SERVICE PARTS section of this manual. Component identification can be simplified by reviewing each assembly breakdown. For reference, a schematic wiring diagram is available on page 30.

BEFORE DOING ANY OF THE RECOMMENDED SOLUTIONS READ THE FOLLOWING INFORMATION.

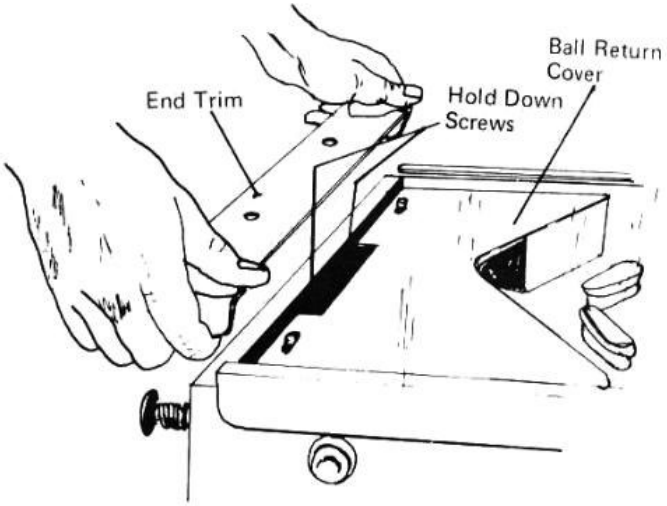


FIGURE 6

HOW TO REMOVE PLAYFIELD:

1. Remove the two screws from the end trim as shown in Figure 6. Set end trim and the attaching screws aside.
2. Slide the Playfield Cover out of the Cabinet. CAUTION: The Playfield cover is tempered glass and should be handled with care. Set the cover in a safe place after it is removed from the unit. (Figure 7)
3. Remove ball from Playfield.
4. Remove the two hold down screws from the playfield as indicated in Figure 6 and set aside until playfield is re-installed.
5. While standing at the player end of the unit, grasp Ball Return cover and lift that end of the Playfield approximately 4" inches out of the cabinet. (See Figure 9).

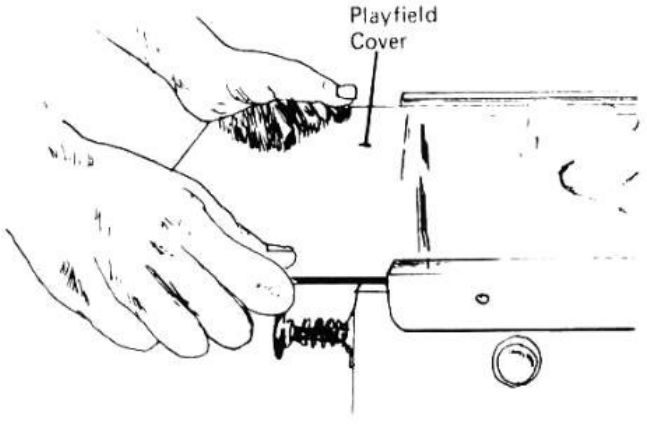


FIGURE 7

PROBLEM SOLVING

6. While continuing to stand at the end of the unit, pull the playfield toward you until the rear edge of the playfield drops into the slots cut into the playfield ledge (Figure 8).

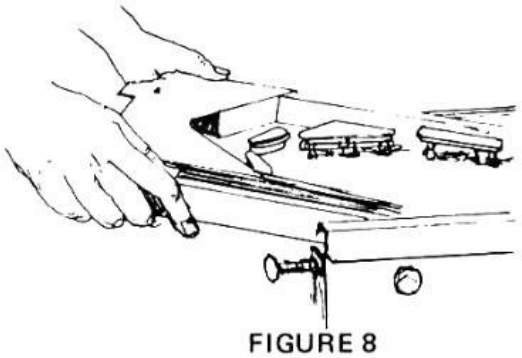


FIGURE 8

7. Carefully lift the player end of the playfield up and lower the rear edge into the lower cabinet (Figure 9). Be sure that the rear edge of playfield is resting against the retainer cleat as shown in Figure 9.

8. With rear edge of playfield carefully lowered, lean playfield toward you so that playfield is resting against edge of support shelf as shown (Figure 9).

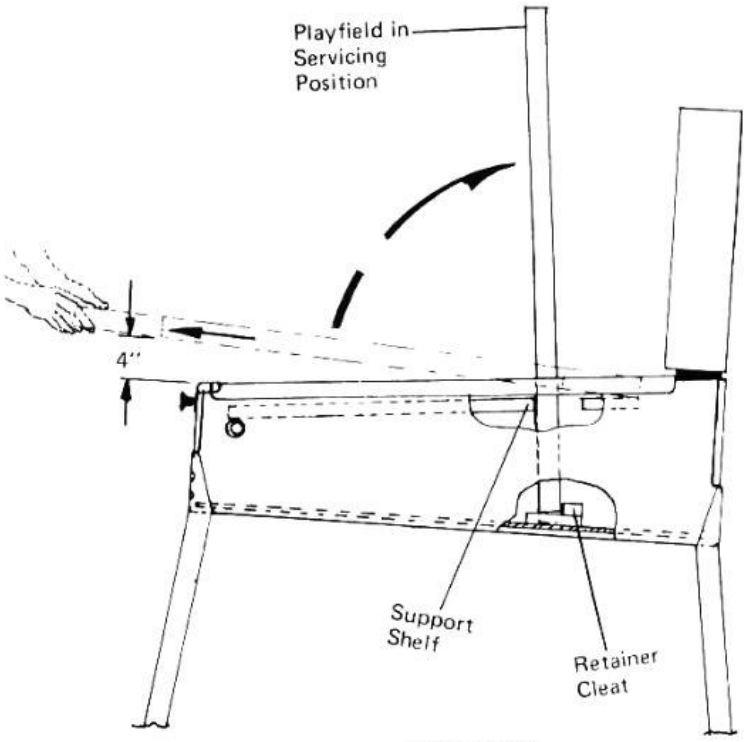


FIGURE 9

HOW TO REPLACE PLAYFIELD INTO PLAYING POSITION:

1. Carefully lift playfield up while slowly swinging the player end down. Be sure that the playfield is drawn out of lower cabinet sufficiently to be lowered back into playing position.

2. Slide the playfield back toward rear of cabinet, then lower the player end completely.

3. Pull playfield up against front of cabinet, then reinstall the 2 hold-down screws.

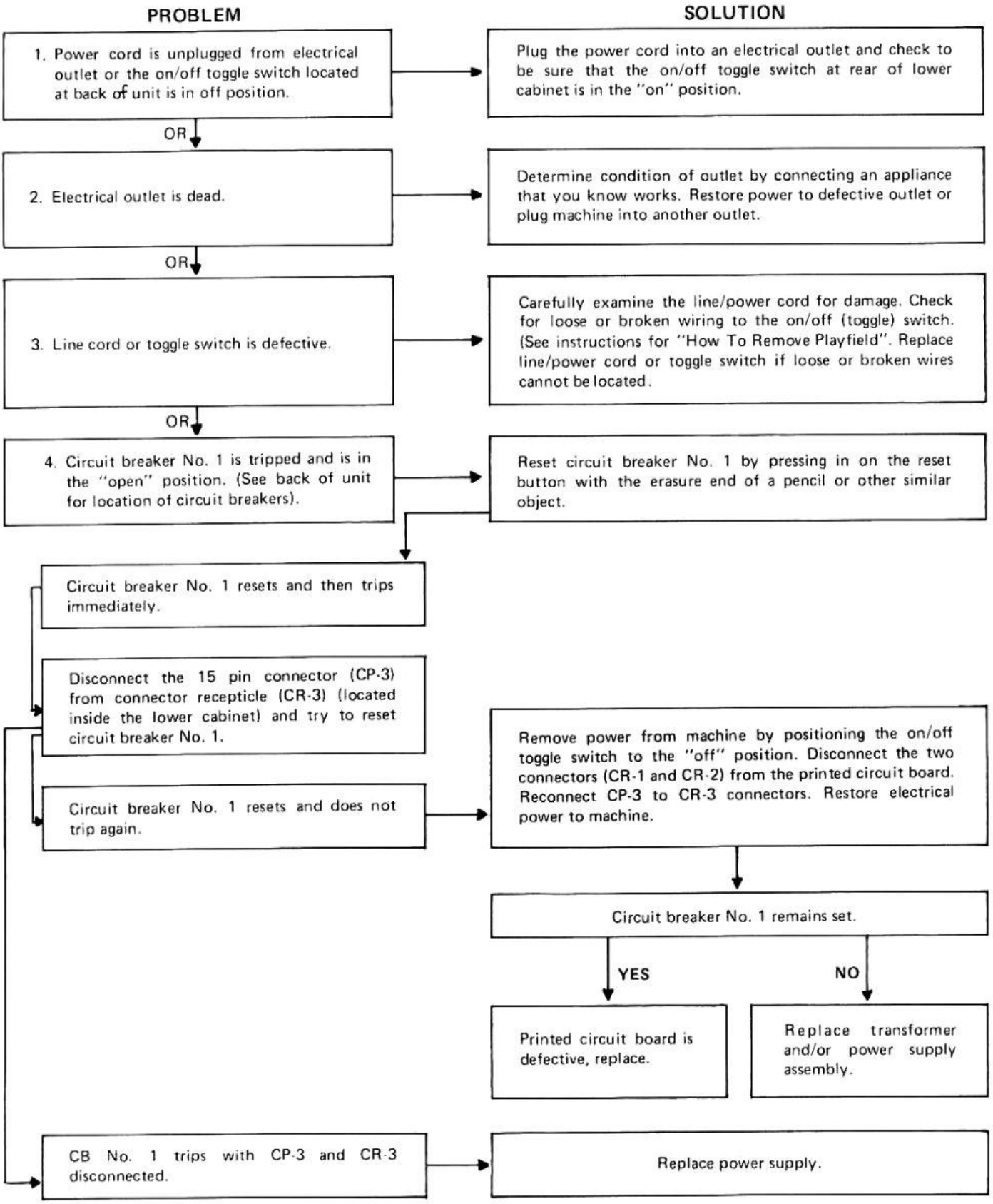
4. Place the game ball in the return area of playfield.

5. Slide the playfield cover back into the player end of the lower cabinet. (See Figure 7, Page 13).

6. Place end trim back into position and re-install the two screws. (See Figure 6, Page 13).

PROBLEM SOLVING

MACHINE IS INOPERATIVE (DEAD) NOTHING WORKS.



PROBLEM SOLVING

TOP ROLLOVER SWITCH S-1

(SEE FIGURE 10 and 11)

PROBLEM	SOLUTION
Switch actuator wire sticking against slot opening in playfield.	1. Gently bend switch actuator arm to conform to slot opening in playfield. Audible clicks should be heard when wire is depressed and released. There should be no binding or sticking of actuator wire against the slot opening.
Scoring does not take place when ball rolls over rollover switch.	2. Check switch assembly for loose mounting screws, connections and wires at switch terminals, or replace switch assembly.
Switch registers 1,000 points score but does not multiply other scoring functions by a factor of 10 times.	3. a. Check P.C. board connectors CR-1 and CR-2 to be sure they are properly plugged onto P.C. Board. b. Check pins 15 and 19 on connector CR-2 and P.C. board edge connector leads for cleanliness.
	4. Replace P.C. board only as a last resort.

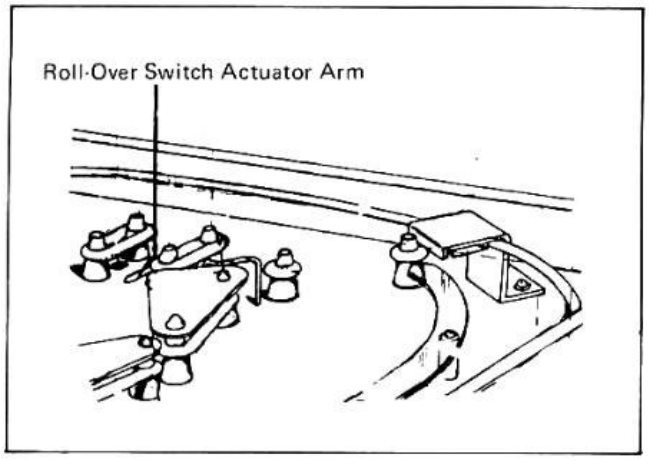


FIGURE 10

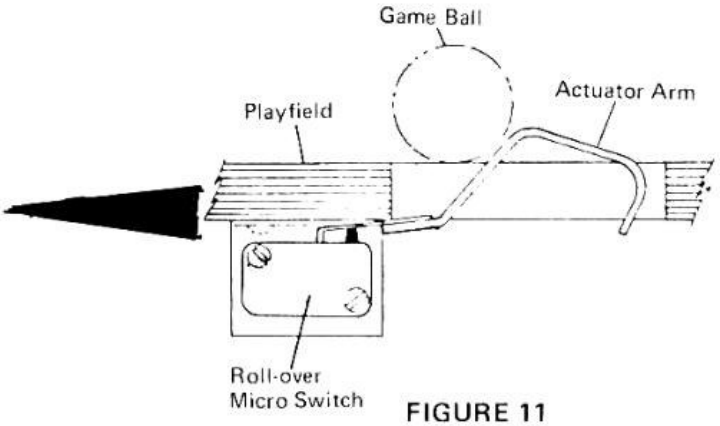


FIGURE 11

PROBLEM SOLVING

THUMPER BUMPER ASSEMBLY AND SCORE SWITCH (S-4).

(SEE FIGURE 12)

PROBLEM

Thumper Bumper does not operate, and no scoring takes place

SOLUTION

Flippers and/or kickers operate O.K.?

YES

Check Cup blade switch and plastic stem for correct centering.

Cup Blade Switch contacts open and correctly set to .020".

NO

Reset circuit breaker No. 2 on back panel. (28V D.C.)

Circuit breaker resets but quickly trips again.

Replace diode, observe diode polarity during replacement.

Thumper Bumper operates normally but no scoring takes place.

Replace solenoid coil.

Thumper Bumper and scoring work O K. but Thumper Bumper action is sluggish.

a. Check audible clicking action of score switch by operating solenoid plunger in and out by hand with power turned off.

b. Score switch and bracket securely mounted to playfield

c. Wiring to score switch terminals in place and securely fastened.

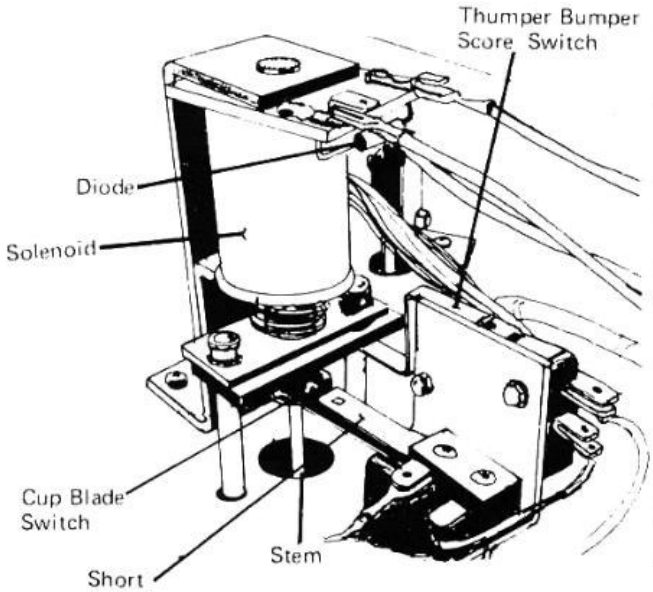


FIGURE 12

All other scoring functions operate O.K.?

YES

Replace score switch.

NO

Replace P.C. board.

a. Clean and gap thumper bumper Cup Blade Switch contacts.

b. Check thumper bumper assy. for mechanical binding.

PROBLEM SOLVING

RUBBER BAND SCORE SWITCHES
S-2, S-3, S-18, S-19, S-20, and S-21.

FOR LOCATION OF SWITCHES, SEE ELECTRICAL SYSTEM DIAGRAM ON PAGE 30 OR THE ILLUSTRATED SERVICE PARTS ON PAGE 36.

PROBLEM	SOLUTION
Scoring does not take place when rubber band/switch is stuck by playing ball.	a. Striking force of ball insufficient to close switch contacts. b. Switch contacts not closing because of improperly adjusted switch actuator arm or loose switch assembly. c. Broken or loose wire at switch terminal. d. Defective micro switch.
Audible clicking sound can be heard when moving switch actuator arm back and forth by hand but no scoring takes place.	b. Move switch actuator arm by hand and listen for audible clicking sound when actuator is pushed back and then released. Bend actuator arm carefully to obtain this condition. (See Figure 13).
Switch registers 50 point score when struck by playing ball but does not register 500 point bonus score if ball passes through top rollover switch which multiplies switch scoring by 10 times.	c. Examine wiring at switch terminals for break and/or loose connection. Correct as required. d. Use an Ohm meter to check continuity of switch. Replace if necessary. a. Check 21 pin connector CR-2 to be sure it is correctly plugged into P.C. board. b. Check wiring to and from connector CR-2. Refer to solution No. 3 and 4 for top rollover switch.

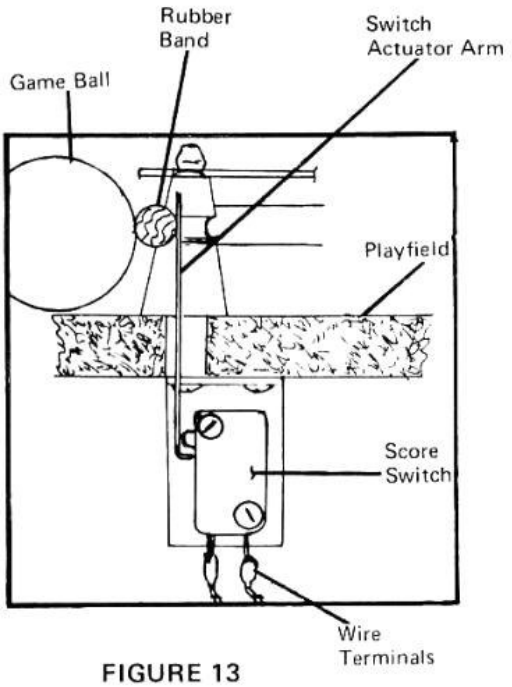


FIGURE 13

PROBLEM SOLVING

TARGET SCORE SWITCHES S-5, S-7, and S-9.

SEE FIGURE 14

PROBLEM	SOLUTION
Scoring does not take place when Target Switch is stuck by playing ball.	Follow procedures outlined for Rubber Band Switches. (Page 18).
Audible clicking sound can be heard when moving switch actuator arm back and forth by hand but no scoring takes place.	
Switch registers 100 points score when struck by playing ball but does not register 1,000 point bonus score if ball has passed through top rollover switch which multiplies switch scoring by 10 times.	Refer to solution No. 3 and 4 for Top Rollover Switch. (Page 16).

ROLLOVER SWITCHES, LEFT (S-11) AND RIGHT (S-14)

SEE FIGURE 15

Switch actuator wire sticking against slot opening in playfield.	Refer to solution No. 1 for top rollover switch.
Scoring does not take place when ball passes over rollover switch actuator wire.	Refer to solution No. 2 for top rollover switch.
Switch registers 100 point score when ball passes over rollover switch actuator wire but does not register 1,000 point bonus score if ball passes through top rollover switch which multiplies switch scoring by 10 times.	Refer to solution No. 3 and 4 for top rollover switch.

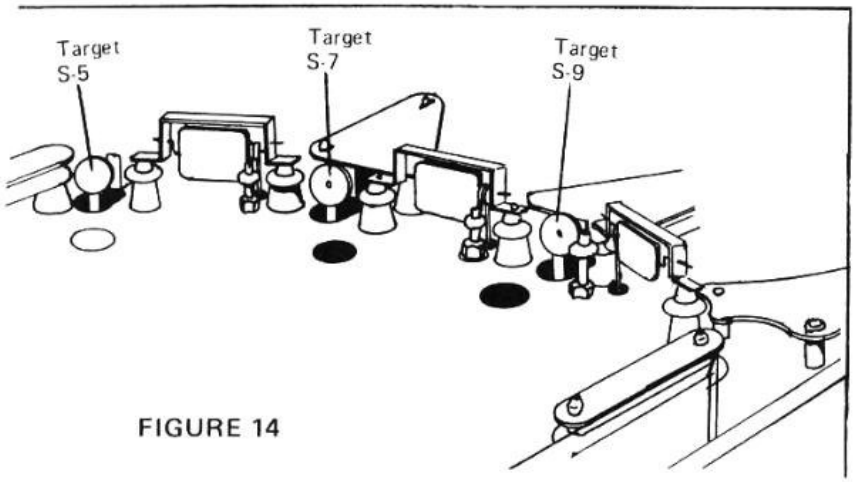


FIGURE 14

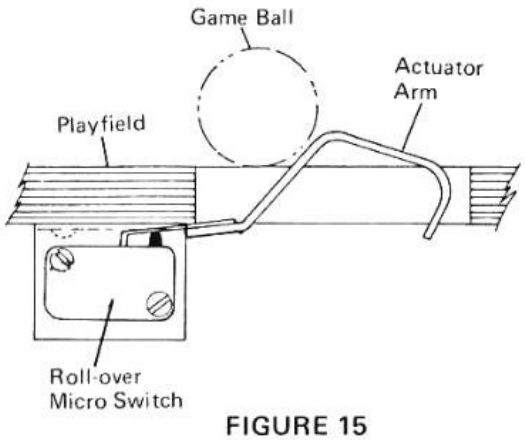


FIGURE 15

PROBLEM SOLVING
FLIPPER ASSEMBLY, LEFT HAND OR RIGHT HAND

PROBLEM

Left and/or right hand flipper does not operate and no scoring takes place.

SOLUTION

Kickers and/or Thumper Bumper working O.K.?

YES

a. Left and right hand flipper button switches operating O.K. Check to be sure contacts are clean and closing when button is depressed.

b. FSS-1 and FSS-2 (Coil shunt switches) contacts clean and in closed condition.

c. Coil and shunt switch leads in place and in good condition.

d. Coil plungers move up and down smoothly and easily.

e. Plate and hub assy. screws tight on flipper shafts.

NO

Reset circuit breaker No. 2 (28 V.D.C.).

If circuit breaker No. 2 resets O.K., no further action is required.

If circuit breaker No. 2 "trips" immediately:

f. Check condition of solenoid coils. Use an OHM meter to measure resistance/continuity of the coil.

g. Check solenoid diode for a shorted condition. Observe the polarity of the diode if replacement is necessary.

h. Be sure that the shunt switches FSS-1 and FSS-2 are opening after the coils are energized.

Flippers operate O.K. but action is sluggish.

Left and/or right hand flippers operate O.K. but do not return to the rest position.

a. Check flipper assemblies for friction or mechanical binding.

b. Check flipper assembly mounting screws for tightness.

c. Check coil plungers for ease of operation.

d. Check FSS-1 and FSS-2 shunt switches for dirty or burned contacts. Clean as required.

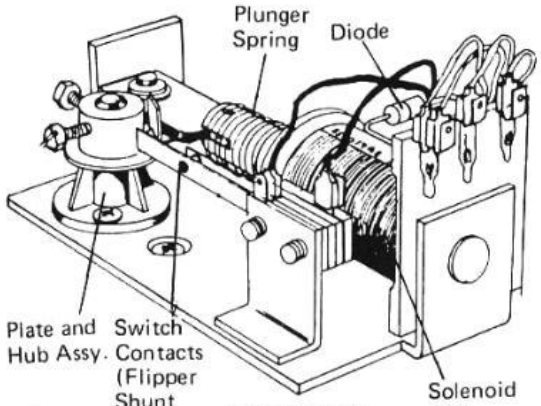


FIGURE 16

a. Coil plunger spring broken or not in place.

b. Plunger sticking in coil core and not releasing.

c. Left and/or right hand push button switch contacts remain in closed position.

PROBLEM SOLVING

SPIN GATE SCORE SWITCHES, (S-6, S-8, and S-10).

SEE ELECTRICAL SYSTEM DIAGRAM ON PAGE 30

PROBLEM	SOLUTION
Scoring does not take place when playing ball passes through spin gate.	a. Switch contacts not closing because of improperly adjusted switch actuator arm. Adjust contacts. b. Broken or loose wire at switch terminals. Repair as required. c. Defective micro switch. Replace.
	a. Move switch actuator arm back and forth by hand and listen for audible clicking sound from switch in each direction. Actuator may be contacting bottom surface of playfield thereby keeping the switch contacts from closing. Adjust actuator arm to remove this condition by bending arm carefully.
	b. Examine wiring at switch terminals for break and/or loose connection. Correct as necessary.
	c. Use an ohm meter to check continuity of switch. Replace if necessary.
Ball "hangs" up on spin gate.	a. Switch actuator arm is touching bottom surface of playfield and introducing mechanical friction to the spin gate. b. Spin gate is rubbing against upper supporting bracket.
Switch registers 50 point scores when ball passes through spin gate but does not register 500 point bonus score if ball has passed through top rollover switch which multiplies switch scoring by 10 times.	a. Carefully bend switch actuator arm so it clears the bottom surface of the playfield when the spin gate is rotated.
	b. Carefully bend support bracket slightly to clear edge of spin gate when rotated.
	Refer to solution No. 3 and 4 for Top Rollover Switch. (Page 16).

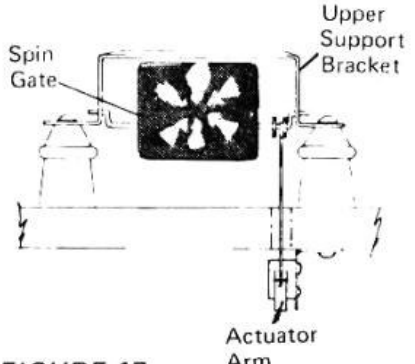


FIGURE 17

PROBLEM SOLVING

KICKER ASSEMBLY (SCORE SWITCHES S-12, and S-13).

PROBLEM

Left and/or right hand kicker does not operate and no scoring takes place.

SOLUTION

Flippers and/or Thumper Bumper working O.K.?

YES

a. Check solenoid coil and rubber band switches for proper switch contact closing action.

b. Clean and dress switch contacts drawing find sandpaper between contact blades while holding blades gently together between fingertips.

NO

Reset Circuit Breaker No. 2 on back panel (28V D.C.) of machine. If C.B. 2 remains set, no further action required.

If circuit breaker No. 2 trips immediately after it was reset:

c. Check condition of solenoid coil. Use an ohm meter to measure resistance and continuity of coil.

d. Check solenoid diode for shorted condition.

e. Check rubber band switches to be sure that contacts are not touching.

Left and/or right hand kicker operates O.K. and scoring takes place but operation of kicker/s is sluggish.

a. Check all moving parts for mechanical friction and binding.

b. Check kicker assembly mounting screws for tightness.

c. Check coil plunger for ease of operation by pushing plunger into coil core and allowing plunger spring to push plunger out of coil core.

d. Check all rubber band switches for blackened and burned contacts as outlined in step b. above.

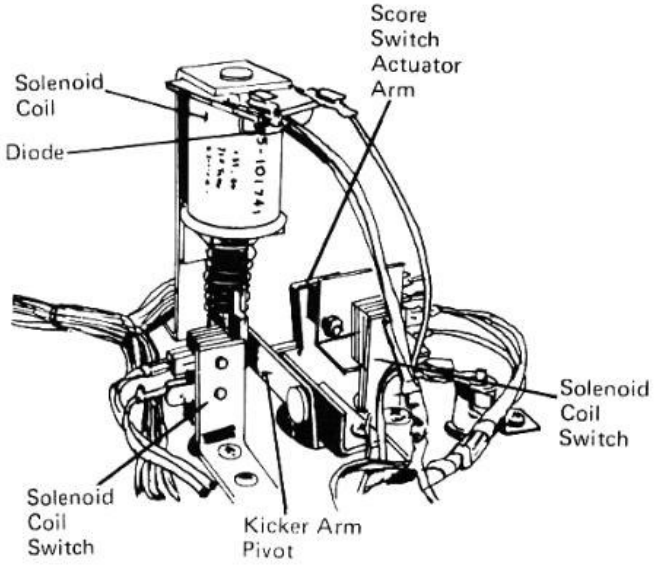


FIGURE 18

PROBLEM SOLVING

BALL RETURN ASSEMBLY AND RETURN SWITCH (S-17).

PROBLEM

Ball return assembly does not return ball to ball shooter track.

Ball eject solenoid coil energizes but ball does not eject into ball shooter track.

Ball eject assembly trips circuit breaker No. 2 when playing ball rolls out onto ball eject ramp.

SOLUTION

a. Check ball return switch for proper operation. Audible click should be heard when depressing switch actuator wire and second click when releasing wire.

b. Wire spade lugs properly attached to return switch terminals.

c. Wire spade lugs properly attached to ball return assembly solenoid coil.

d. Ball return switch/bracket securely attached to bottom of playfield.

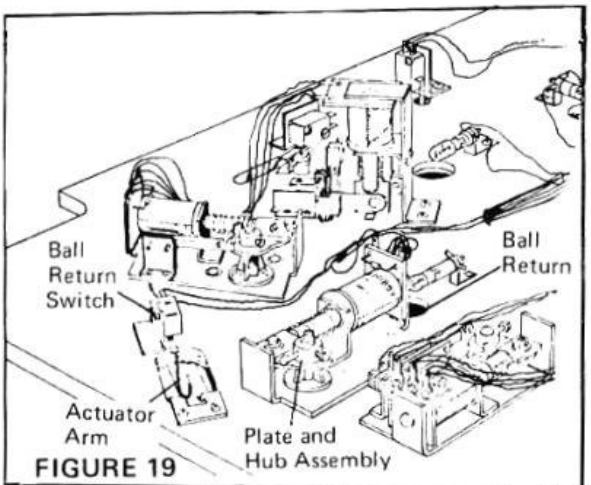


FIGURE 19

a. Assembly screws loose on ball ejector shaft. Align front surface of ball ejector so it clears end of ball return ramp and tighten both set screws on the plate and hub assembly securely to the ball ejector shaft.

b. Main plate and hub assembly plunger pin sheared off. Replace plate and hub assembly and follow alignment procedures in step a. above.

c. Ball ejector rubbing against playfield surface or switch actuator wire. Carefully bend switch actuator wire so ball ejector clears wire when activated. If rubbing against playfield, loosen two set screws on plate and hub assy. and raise ejector slightly to clear playfield surface and retighten screws.

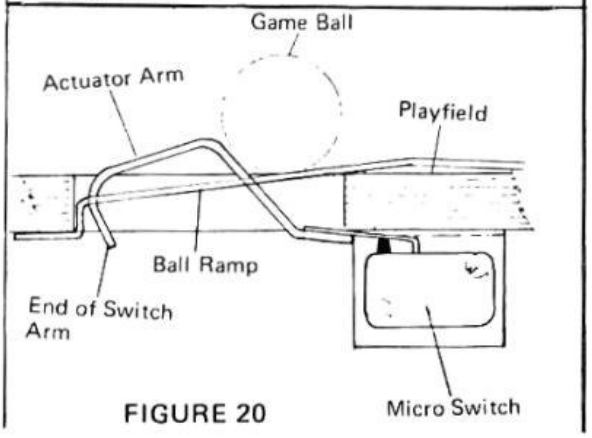


FIGURE 20

a. Solenoid coil shorted, replace.

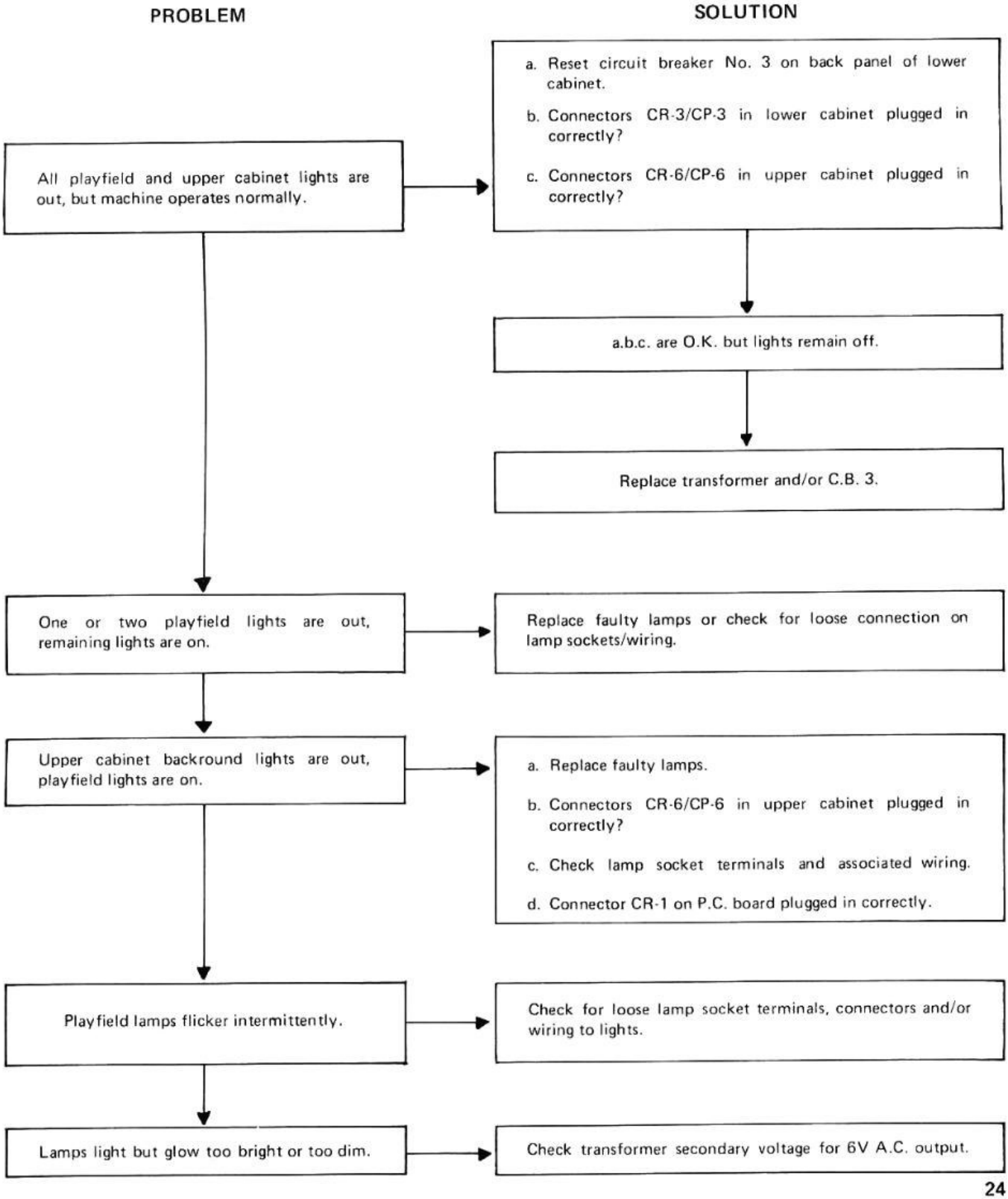
b. Solenoid coil diode shorted, replace.

c. Trace wiring for short, or damaged insulation.

PROBLEM SOLVING

LAMPS, 6 V.A.C.

(PLAYFIELD LIGHTS AND UPPER CABINET LIGHTS).



PROBLEM SOLVING

LAMPS 6 V.D.C.

PLAYER UP - BALL IN PLAY - GAME OVER - TARGETS - BONUS - FREE BALL

PROBLEM	SOLUTION
All lights are out, machine operates normally.	a. Reset circuit breaker No. 4 on Back Panel of lower cabinet. b. Connectors CR-1 and CR-2 connected to P.C. board correctly? c. Connectors CR-3/CP-3 in lower cabinet connected correctly?
One or two lights out, remaining lights are O.K.	A.B.C. are O.K. but lights remain off.
Lights are O.K. but flicker on and off intermittently.	Perform diagnostic lamp test
Player up and ball in play lights do not light up and/or go out in correct sequence.	Diagnostic lamp test has no effect on lights, lamps are still off.
Lights come on but will not turn off.	Target and bonus lights are also out.
Lights burn out after a short period of operating time.	YES Replace Bridge Rectifier BR-1 and or transformer, P.C. board.
Lamps work O.K. but glow too bright or too dim when lit.	NO Replace P.C. Board.
	Replace faulty lights as outlined in Figure 21 and 22.
	Check lamps for loose connections, bad sockets, loose and/or defective wires.
	Replace P.C. Board.
	Check voltage across bridge rectifier for 6V D.C. and transformer secondary for 9/10V A.C.

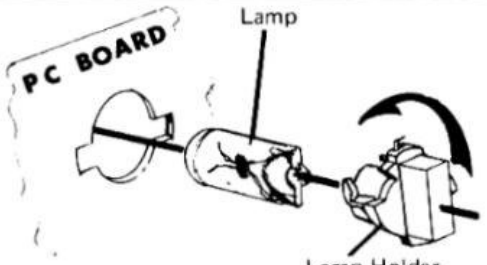


FIGURE 21

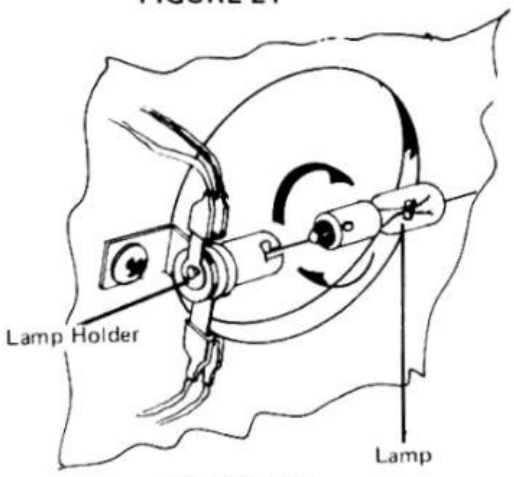


FIGURE 22

PROBLEM SOLVING
START/RESET SWITCH S-16.

PROBLEM	SOLUTION
Start/reset switch has no effect on machine operation.	a. Check switch to be sure contacts are closing and clean. b. Check wiring at switch terminals, are spade lugs properly positioned and securely fastened to switch terminals? Check for loose or broken wires. c. Check harness connectors CP-4/CR-4 for proper connections and tightness. d. Check wires at pins 13 and 20 of P.C. Board connector CR-2.
Start/reset switch does not reset previous game score reading on digital display to zero's.	Replace P.C. Board as a last resort.
	d. Is P.C. Board connector CR-2 properly engaged to P.C. Board edge connector. e. Specifically, check wires and pins No. 13 and 20 of Connector CR-2 for tightness and cleanliness. f. Replace P.C. Board as a last resort.

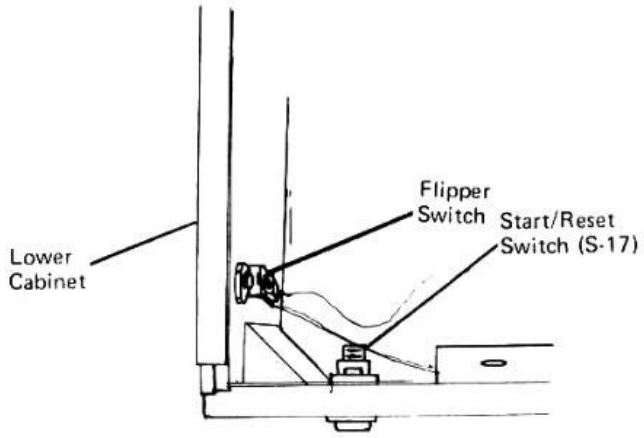


FIGURE 23

PROBLEM SOLVING

TILT MECHANISM

PROBLEM	SOLUTION
Tilt mechanism does not function, machine cannot be tilted.	a. Check wiring to tilt switch mechanism. Are spade lugs properly attached to switch terminals? b. Plumb bob raised too high. Loosen set screw and lower plumb bob to a narrower air gap. c. Check connector CP-4 and CR-4 for proper mating and tightness in lower cabinet. d. Check P.C. board connector CR-2 for proper connection to P.C. Board. Check wires 11 and 17 at CR-2 connector for tightness and cleanliness. e. Replace P.C. board as a last resort.
Tilt mechanism works O.K. The display presents the word "OUCH" but no tune is heard from the speaker.	f. Check wires to speaker terminals. Be sure they are connected and tight. g. Check connector CP-4 and CR-4 for proper mating and tightness. h. Replace speaker. j. Replace P.C. board as a last resort.
Tilt mechanism works O.K. Tune is heard but the word "OUCH" on the display has letters or segments missing.	Replace P.C. Board.

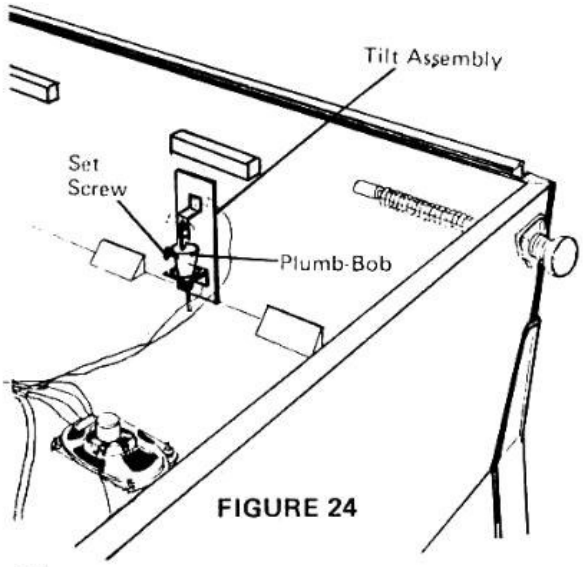


FIGURE 24

PROBLEM SOLVING

ADVANCE BONUS

PROBLEM

Advance bonus points are not registered on display when ball rolls out at bottom of playfield after having scored regular points for switches S-2, S-3, S-5, S-7, S-9, S-11, S-12, S-13 and S-14.

SOLUTION

a. Check switch operation of collect advance bonus switch S-17 at bottom of playfield. See solution a, b, c, d, for ball return switch.

b. Perform diagnostic switch test as outlined on Page 12 to verify condition of switches, wiring and P.C. board. Check connector CR-2 on P.C. Board for proper connection to board.

c. Replace P.C. Board as last resort.

Double bonus feature does not operate. Double bonus light does not work and no tune is heard from the speaker.

Triple bonus feature does not operate, triple bonus light does not work and no tune is heard from the speaker.

d. Check solution for steps a and b above.

e. Perform diagnostic lamp test to check condition of double bonus and triple bonus lamps. Replace if necessary.

f. Replace P.C. Board as last resort.

Double bonus switches, S-5 and S-9 are O.K. as verified by diagnostic switch test but double bonus points are not registered on display after ball rollout.

g. Check wire leads and connectors attached to speaker terminals in lower cabinet.

h. Be sure connectors CP-4 and CR-4 are properly mated and tight.

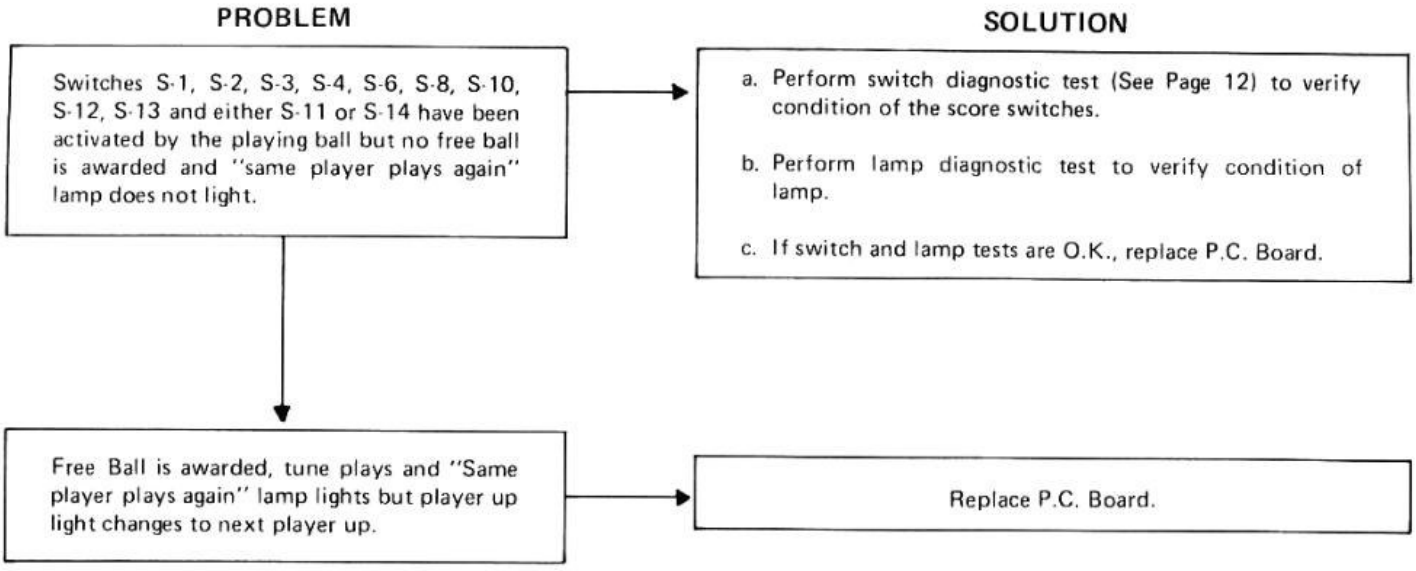
Triple bonus switches S-5, S-7 and S-9 are O.K. as verified by diagnostic switch test but triple bonus points are not registered on display after ball rollout.

j. Check solution for step a. above.

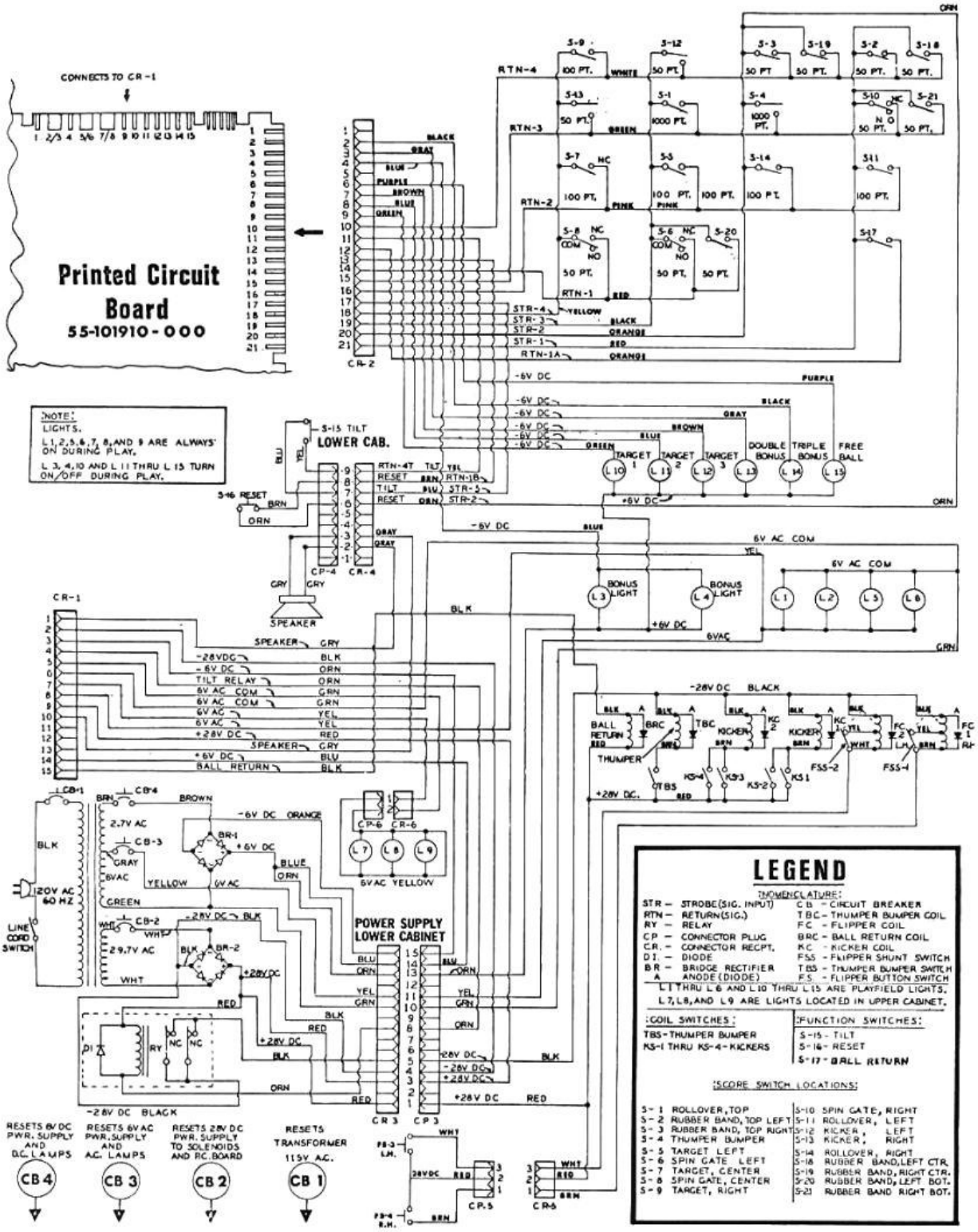
k. Replace P.C. board at last resort.

PROBLEM SOLVING

FREE BALL



ELECTRICAL SYSTEM



LEGEND

NOMENCLATURE:

STR –	STROBE (SIG. INPUT)	CB	– CIRCUIT BREAKER
RTN –	RETURN (SIG.)	TBC	– THUMPER BUMPER COIL
RY –	RELAY	FC	– FLIPPER COIL
CP –	CONNECTOR PLUG	BRC	– BALL RETURN COIL
CR. –	CONNECTOR RECPT.	KC	– KICKER COIL
DI. –	DIODE	FSS	– FLIPPER SHUNT SWITCH
BR –	BRIDGE RECTIFIER	TBS	– THUMPER BUMPER SWITCH
A	– ANODE (DIODE)	FS	– FLIPPER BUTTON SWITCH

L1 THRU L6 AND L10 THRU L15 ARE PLAYFIELD LIGHTS.
L7, L8, AND L9 ARE LIGHTS LOCATED IN UPPER CABINET.

COIL SWITCHES:
TBS - THUMPER BUMPER
KS-1 THRU KS-4 - KICKERS

FUNCTION SWITCHES:
S-15 - TILT
S-16 - RESET
S-17 - BALL RETURN

SCORE SWITCH LOCATIONS:

S-1 ROLLOVER, TOP	S-10 SPIN GATE, RIGHT
S-2 RUBBER BAND, TOP LEFT	S-11 ROLLOVER, LEFT
S-3 RUBBER BAND, TOP RIGHT	S-12 KICKER, LEFT
S-4 THUMPER BUMPER	S-13 KICKER, RIGHT
S-5 TARGET LEFT	S-14 ROLLOVER, RIGHT
S-6 SPIN GATE LEFT	S-18 RUBBER BAND, LEFT CTR.
S-7 TARGET, CENTER	S-19 RUBBER BAND, RIGHT CTR.
S-8 SPIN GATE, CENTER	S-20 RUBBER BAND, LEFT BOT.
S-9 TARGET, RIGHT	S-21 RUBBER BAND RIGHT BOT.

SERVICE PARTS

ALIVE PROFESSIONAL STYLE PINBALL GAME - MODEL NO. 55-860224-2

UPPER CABINET, LOWER CABINET AND COMPONENTS

ITEM NO.	PART NUMBER	PART DESCRIPTION
1.	55-860207-004	Cabinet Assembly, Upper (Wood Housing Only)
2.	55-860231-000	Back Panel
3.	55-860232-000	Printed Circuit Board
4.	55-101558-000	Lamp Holder
5.	11-675553-000	Lamp
6.	55-101833-000	Lamp Holder
7.	55-860209-002	Face Sheet, For Upper Cabinet
8.	55-101936-000	Retainer Strip
9.	55-860211-004	Lower Cabinet, Wood Assembly Only
10.	55-860213-000	Glass Cover for Playfield
11.	55-101506-000	End Cap
12.	55-101505-000	Extrusion, Side
13.	55-860212-000	Leg
14.	11-125204-001	Nut, Hex, 3/8 - 16 U.N.C.
15.	11-695104-000	Glide, Adjustable, 3/8 - 16 U.N.C.
16.	11-675578-000	Lamp, No. G.E. No. 44

FLIPPER BUTTON AND SWITCH COMPONENTS

17.	55-101450-000	Push Button Assembly (Flipper Buttons and Start Button)
18.	55-101448-000	Switch and Bracket Assembly (For Flippers and Start Button)
19.	11-125453-000	Stamped Nut, 5/16-11 Thread

BALL SHOOTER ASSEMBLY AND COMPONENTS

20.	55-860227-000	Ball Shooter Assembly Complete
21.	55-101764-003	Knob and Shaft Assy.
22.	55-101245-000	Retainer Plate
23.	55-101763-002	Guide Bushing and Face Plate
24.	55-101139-000	Rubber Tip
25.	55-101768-000	Spring

TILT ASSEMBLY

26.	55-860234-000	Tilt Assembly
27.	11-001273-001	Bolt, Hex Head, 5/16-18 x 2¼" (For Attachment of Legs)

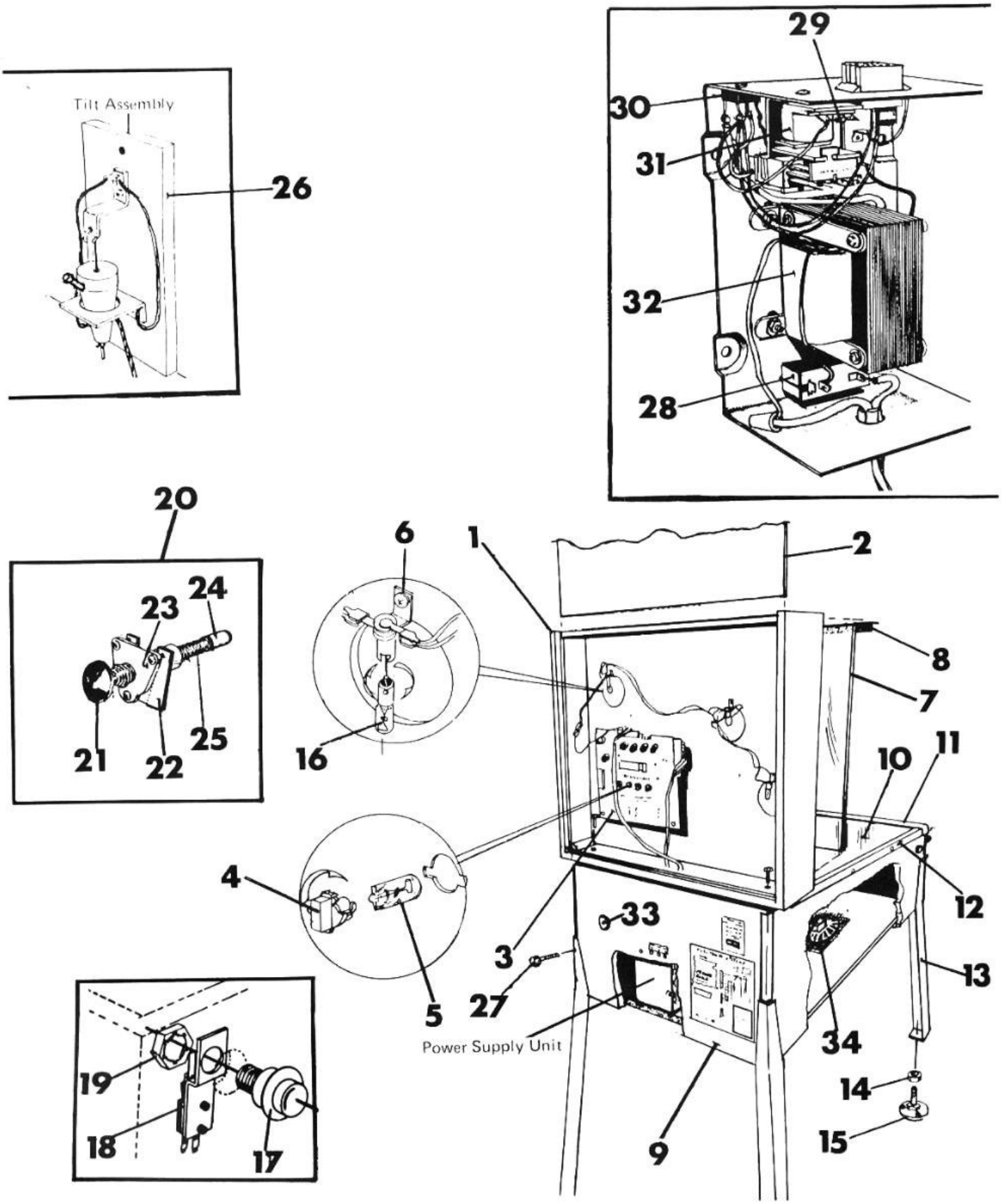
COMPONENTS OF POWER SUPPLY UNIT (55-860222-002)

28.	55-101062-005	Circuit Breaker (Rating 125 V.A.C. Hold Current 2.5 Amps, Trip. 4.37)
29.	11-693008-000	Diode
30.	55-101937-000	Bridge Rectifier
31.	70-609018-000	Relay
32.	55-860230-000	Transformer
33.	55-101951-000	Toggle Switch
34.	55-860233-000	Audio Speaker

NOT ILLUSTRATED

55-101462-000	Magnifying Lens (For L.E.D.)
55-101518-000	Lens Frame
55-860202-000	Pkg. of Installation Hardware with Game Ball

SERVICE PARTS



SERVICE PARTS

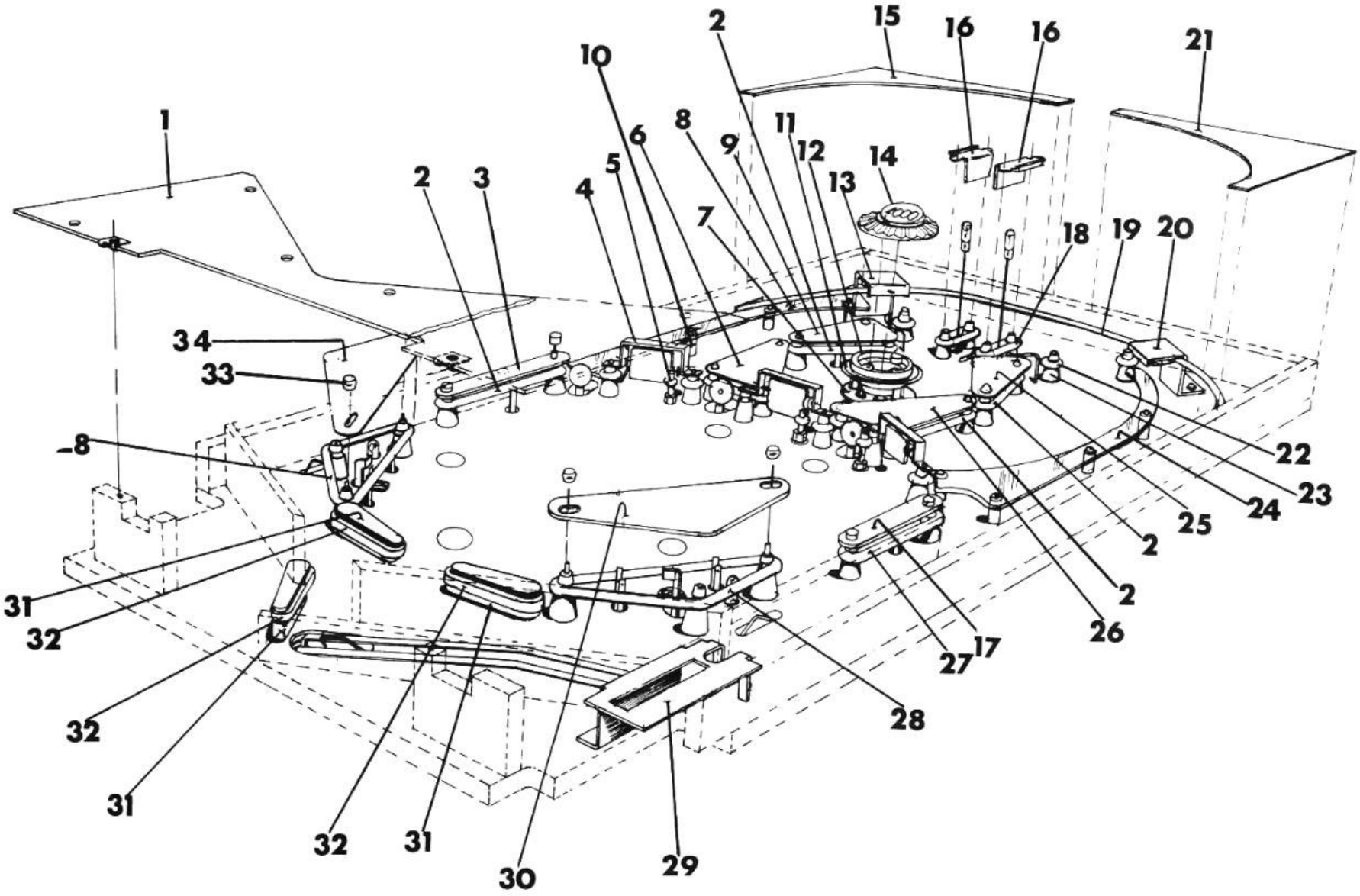
ALIVE PLAYFIELD ASSEMBLY COMPLETE - 55-860214-003

COMPONENTS OF PLAYFIELD, TOP SIDE

ITEM NO.	PART NUMBER	PART DESCRIPTION
1.	55-860215-002	Cover Assembly
2.	55-101106-004	Rubber Band, 2½" Diameter
3.	55-101912-003	Screened Cover, Left Hand, Small
4.	55-101778-004	Spin Target Assy.
5.	55-101888-000	Mini Post Assy.
6.	55-101912-005	Screened Cover, Bonus, Left Hand Center
7.	55-101013-000	Skirt (Component of Thumper Bumper)
8.	55-101442-001	Ball Guide, Left Hand, Clear
9.	55-101912-007	Screened Cover, Upper Left Hand
10.	55-101413-001	Nylon Spacer
11.	55-101014-000	Rod and Ring Assy., Component of Thumper Bumper
12.	55-101015-000	Bumper Body
13.	55-101460-001	Ball Gate Assy. Left Hand
14.	55-101894-000	Cap
15.	55-101912-009	Screened Cover, Left Hand Arch
16.	55-101412-001	Guide Rail
17.	55-101912-004	Screened Cover, Right Hand, Small
18.	55-101106-002	Rubber Band, 1¼" Diameter
19.	55-101156-000	Ball Guide Wire, Head End
20.	55-101460-002	Ball Gate Assy., Right Hand
21.	55-101912-010	Screened Cover, Right Hand Arch
22.	55-101106-003	Rubber Band, For Bumper Post
23.	55-101122-000	Bumper Post
24.	55-101442-002	Ball Guide, Right Hand, Clear
25.	55-101912-008	Screened Cover, Upper Right Hand
26.	55-101912-006	Screened Cover, Bonus, Right Hand Center
27.	55-101106-007	Rubber Band, 1½" Diameter
28.	55-101106-008	Rubber Band, 3" Diameter
29.	55-101424-001	Cover For Ball Shooter
30.	55-101912-002	Screened Cover, Lower Right Hand
31.	55-101557-000	Flipper Base Assy.
32.	55-101739-000	Rubber Band, for Flipper Base
33.	55-101860-000	Cap, for Post Screw

SERVICE PARTS

ALIVE PROFESSIONAL STYLE PINBALL, MODEL NO. 55-860224-2

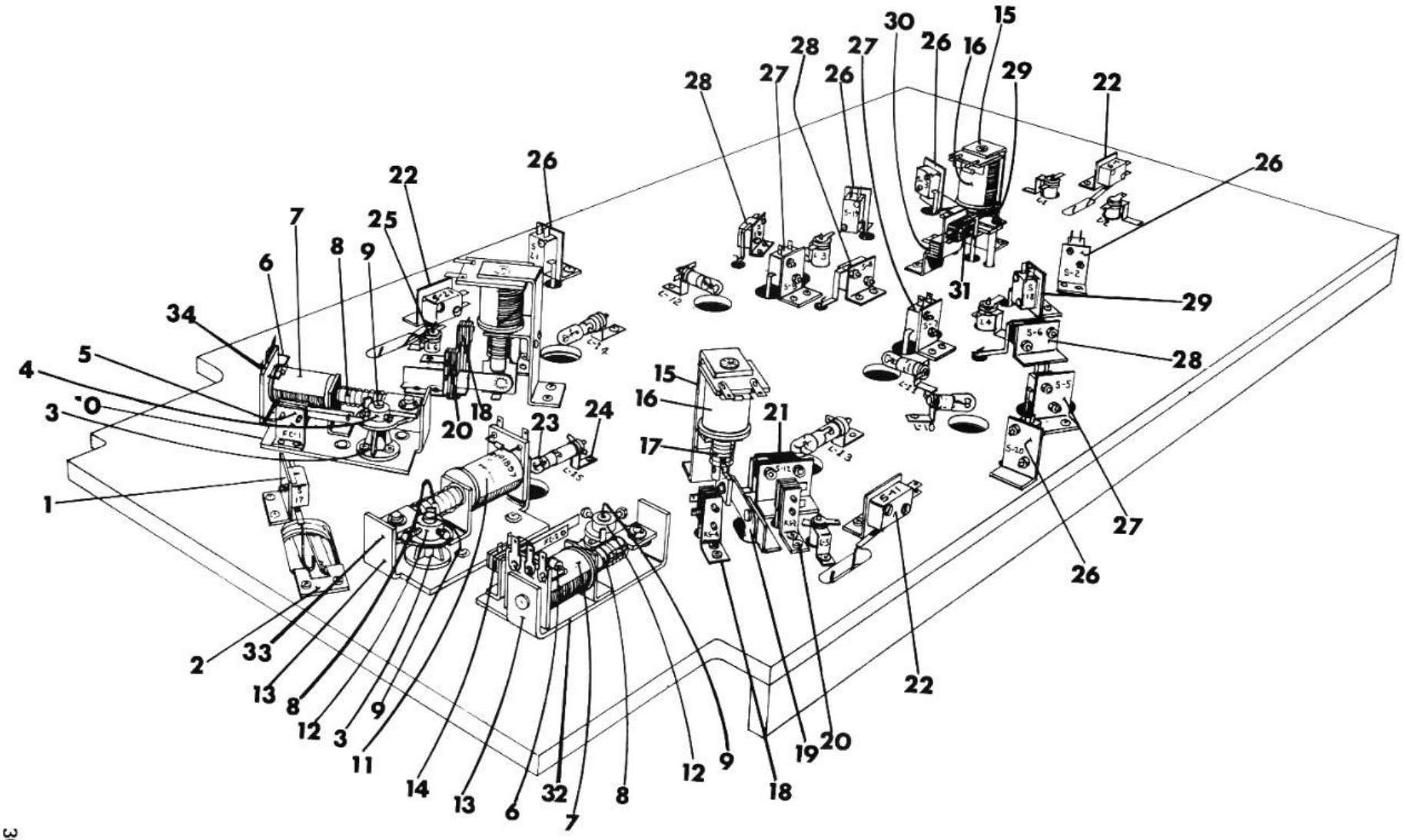


SERVICE PARTS

COMPONENTS OF PLAYFIELD, BOTTOM SIDE

ITEM NO.	PART NUMBER	DESCRIPTION
1.	55-101492-002	Rollover Switch and Bracket Assy. (S-17)
2.	55-101440-000	Ball Ramp Track
3.	55-101092-000	Flipper Bushing
4.	55-101724-000	Flipper Pawl and Hub Assy. (Left Hand)
5.	55-101867-003	Switch and Bracket Assy. (Left Hand) FC-1
6.	11-693008-000	Diode (In4003)
7.	55-860235-000	Solenoid with Diode and Sleeve (For flippers)
8.	55-101866-000	Plunger and Link Arm Assy.
9.	55-101557-000	Flipper Base Assy.
10.	55-101708-003	Base Plate Only, for Left Hand Flipper Assy.
11.	55-860237-000	Solenoid with Diode and Sleeve (For Ball Return)
12.	55-101713-000	Flipper Pawl and Hub Assy. (Right Hand)
13.	55-101708-002	Base Plate Only (Right Hand)
14.	55-101867-002	Switch and Bracket Assy., Right Hand (FC-2)
15.	55-101548-000	Mounting Bracket
16.	55-860236-000	Solenoid With Diode and Sleeve (Kickers and Thumper Bumper)
17.	55-101890-000	Plunger and Link Arm Assy. (For Kicker Assy.)
18.	55-101745-003	Switch and Bracket Assy. L.H. (KS-1 and KS-3)
19.	55-101555-000	Kicker Arm and Bracket Assy.
20.	55-101745-002	Switch and Bracket Assy. R.H. (KS-2 and KS-4)
21.	55-101493-004	Switch and Bracket Assy. for Left Kicker (S-12)
22.	55-101492-001	Switch and Bracket Assy. Rollover (S-4, S-20 and S-21)
23.	11-675578-000	Lamp, G.E. No. 44 (Playfield Lamps, 12 Used)
24.	55-101833-000	Lamp Holder (Socket) 6 Used on Playfield
25.	55-101117-000	Lamp Holder (Vertical Type) 6 Used on Playfield
26.	55-101494-002	Switch and Bracket Assy. (Rubber Band Switches No. S-3, S-8, S-20 & S-21)
27.	55-101494-005	Switch and Bracket Assy. with Target (S-5, S-7 and S-9) (Red Target with Bulls Eye Stripes)
	55-101494-006	Switch and Bracket Assy. with Target (S-5, S-7 and S-9) (Solid Red Target)
28.	55-101493-003	Switch and Bracket Assy. for Spin Gates (S-6, S-8, and S-10)
29.	55-101727-000	Plunger (For Thumper Bumper Solenoid)
30.	55-101850-000	Switch and Bracket Assy. (For Thumper Bumper)
31.	55-101487-001	Switch Assy. (Score Switch S-4) for Thumper Bumper
	FLIPPER UNIT COMPLETE	
32.	55-860218-000	Flipper Unit, Right Hand, Complete
33.	55-860216-000	Ball Return Unit, Complete
34.	55-860217-000	Flipper Unit, Left Hand, Complete

SERVICE PARTS



ADJUSTMENT AND AIR GAP SETTINGS FOR BLADE TYPE LEVER SWITCHES

1. **Thumper Bumper Switch** (Air gap setting ≈ .020")

   a. Adjust cup blade switch (long blade) so that center of cup area is seated against the end of the white plastic stem. The Stem is the lower end of the circular plastic skirt on the playfield called out as Item No. 7 on Page 34 of your service manual. (For illustration of cup blade switch, see Page 17, Figure 12).

   Theory:

   When the game ball strikes the plastic skirt on the playfield, it causes the skirt to deflect and this forces the lower stem end to move away from the center of the cup area thereby forcing the cup blade switch downward so that it comes into contact with the short switch blade resulting in a switch closure and activation of the Thumper Bumper solenoid. This activation causes the round metal ring around the Thumper Bumper body to be forced downward thereby striking the game ball and driving it away from the Thumper Bumper area in order to enhance the player's scoring possibilities.

   Adjustment:

   b. Gently bend the cup blade switch so that it is centered and rests firmly against the end of the white plastic stem on the bottom (underside) of the playfield. (Figure 12, Page 17)

   c. Gently bend short switch blade away from the long cup blade switch until the above air gap setting is established.

   d. Using your finger depress the circular plastic skirt on the playfield and observe the switch action on the bottom side to be sure that the contacts of both switch blades physically contact one another. Try this two or three times pressing the skirt down in different directions.

2. **Rubber Band Kicker Switches** (4) (Air gap setting ≈ .030")

   a. Adjust kicker switches so that front (long blade) switch is just touching inside surface of white rubber band. Gently bend rear short blade switch until an air gap of ≈ .030" is established. See Page 22, Figure 18 for illustration of Kicker Switches).

   b. Visually inspect the switch contacts for any blackened burn spots or pitted condition.

      This condition can be remedied by drawing a piece of fine sandpaper or emory board across the contacts while gently pressing both of the switch blades together between the thumb and forefinger. Next draw a piece of ordinary writing paper across the contacts to remove any traces of sandpaper particles that may have been left behind by the cleaning.

   c. Verify that the air gap setting of ≈.030" has not changed during the contact cleaning process.

3. **Flipper Button Switches** (2) (Air gap setting ≈ .060")

   a. Refer to the adjustment and cleaning process outlined for the rubber band kicker switches.

   b. Adjust long blade switch so that it is just touching end of white plastic button stem. Adjust short blade switch to obtain a ≈ .060" air gap. Depress outside button to be sure contacts physically contact each other.

4. **Flipper Solenoid Shunt Switches** (2) (Air gap—None)

   a. Adjust the long blade switch so that it is as straight as possible and parallel to the coil plunger. Adjust the short blade switch so that the contacts between both the long and short blades are positively in contact with one another. (See Page 20, Figure 16).

   b. Cleaning of the contacts is the same as for the kicker switches outlined in Step No. 2 above.

5. **Start/Reset Switch**

   a. Refer to procedure outlined for flipper button switches for both adjustment and cleaning process.