Bally®

FLIP FLOP!

Bally MANUFACTURING CORPORATION

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SERVICE MANUAL

#1031 FLIP FLOP

1. INSTALLATION HINTS (BEFORE PLUGGING IN LINE CORD)

A) VISUAL INSPECTIONS

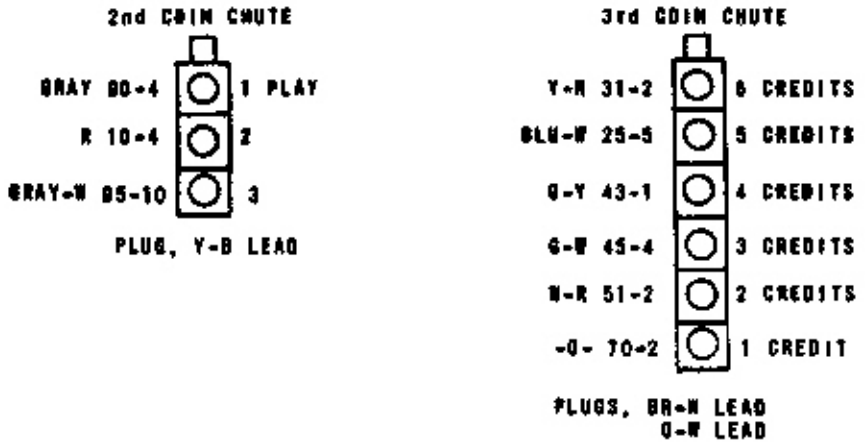
On all games there are certain items that should be checked after shipment. These are visual inspections which may avoid time consuming service work later. Minor troubles caused by abusive handling in shipment are unavoidable. Cable plugs and sockets may be loosened, switches (especially tilt and slam switches) may go out of adjustment. Plumbbob tilt switch should always be adjusted after game is set on location and leg levelers are adjusted.

1. Check that all cable plugs are firmly seated in proper sockets.
2. Check that cables are clear of all moving parts and relays. Dress cables if necessary.
3. Check for any wires that may have become disconnected.
4. Check switches for loose solder or other foreign material that may have come loose in shipment and could cause shorting of contacts.
5. Check wires on relay coils for proper soldering, especially the bare (common) wire connecting a row of relay coils. Cold solder connections may not show up in factory inspection, but vibration in shipment may break contact.
6. Check that fuses are firmly seated and making good contact.
7. Check (manually) the stepping and resetting of all step-up units. The wiper action should not be sluggish.
8. Check transformer for any foreign material shorting across wiring lugs.
9. Check wiring of transformer to correspond to location voltage. (Transformer wiring card in front cabinet).

B) GAME ADJUSTMENTS

Flip Flop was a type #7 door for domestic (U.S.A.) and a type #8 door for export use. The description in steps 1, 2 and 3 applies to games in general, doors with three coin chutes, each chute for a different value coin. Refer to the schematic to follow these steps. The description in steps 2A and 3A applies to the domestic Flip Flop. Step 1 does not apply. Refer to the Coin Chute Circuits Sheet and Figure 1-1 (both the coin chute circuits sheets and the schematic can be found in the envelope packed with the game).

MOUNTING BOARD GAME ADJUSTMENT PLUGS



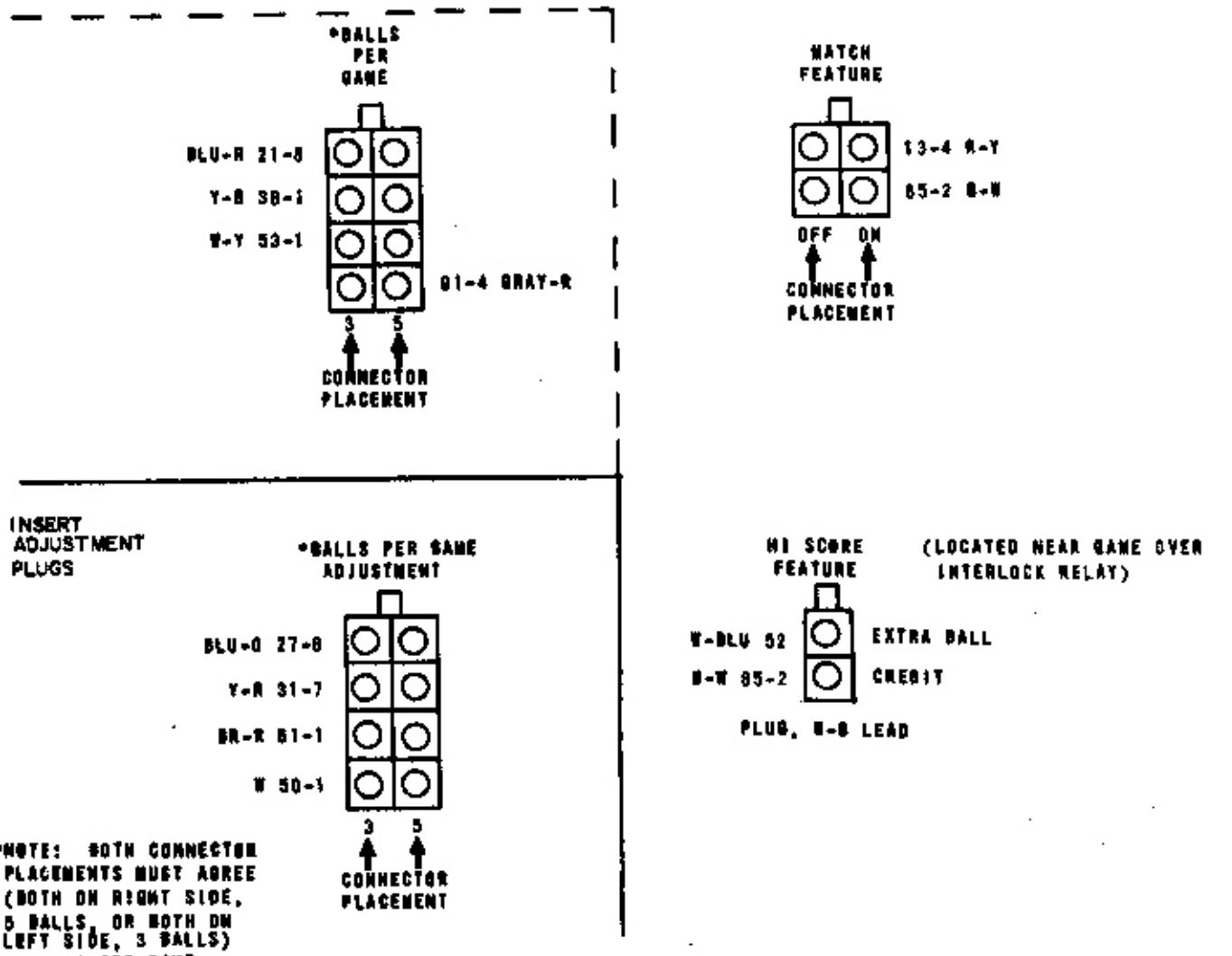


FIGURE 1 - 1A GAME ADJUSTMENTS

1. 1ST COIN CHUTE ADJUSTMENT PLUG (SCHEMATIC)

Located on the 2 coin unit, on front cabinet mounting board. This plug provides positions to give 1 play for 1 coin (position #1) or 1 play for 2 coins (position #2) through the 1st coin chute. Insert plug on white-blue lead in position #1 or position #2, as desired.

2. 2ND COIN CHUTE ADJUSTMENT PLUG (SCHEMATIC)

Located on front cabinet mounting board. This plug provides positions to give 1 play for 1 coin (position #1) or 2 plays for 1 coin (position #2) through the 2nd coin chute. Insert plug on yellow-black lead in position #1 or position #2 as desired. Note: When this plug is set for 2 plays - 1 coin, brown-white (male plug) wire on 3rd coin chute adjustment must be inserted in position 2.

2A. 2ND COIN CHUTE ADJUSTMENT PLUG (COIN CHUTE CIRCUITS SHEET)

Located on front cabinet mounting board. This plug provides positions for one play for one coin or several credits for one coin (the number of credits is determined in step 3A. Insert plug on yellow-black lead in position #1 (1 play - 1 coin) or #2 (several credits - 1 coin) as desired.

3. 3RD COIN CHUTE ADJUSTMENT PLUG (SCHEMATIC)

Located on front cabinet mounting board. This plug provides positions to give 2 to 6 plays (position 2 through 6) for 1 coin through 3rd coin chute. Insert plug on orange-white lead to select desired number of credits.

3A. 3RD COIN CHUTE ADJUSTMENT PLUG (COIN CHUTE CIRCUITS SHEET)

Located on front cabinet mounting board. This plug provides positions to give 2 to 6 credits for 1 coin. Insert plug on orange-white lead to select the desired number of credits. Note: 2nd coin chute adjustment plug must be in #2 position before 3rd coin chute adjustment will operate and credits are given for a coin.

4. BALLS PER GAME ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to operate game on 3 ball or 5 ball play. Insert male connector in three or five ball side of female balls-per-game connector, as desired. Note: Coins per play and balls per game cards to cover all possible combinations are included in the envelope packed with game.

5. HI SCORE FEATURE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to award 'hi-score' credit (free game) or 'extra ball'. Insert plug on white-black lead in E.B. (extra ball) or credit position as desired.

6. HI SCORE AND BALLS PER GAME ADJUSTMENT PLUG:

Located on back box lite insert. These plugs provide a wide range of coverage at which hi-score credits can be scored. Balls per game plug must be placed in female connector to agree with placement of plug in (4), above or improper game operation will result. See the score adjustment card in Figure I-1 and back box for plug positions. Hi-score is set to agree with score and instruction card at factory, but can be adjusted as desired. Select proper score and instruction card, if hi-score adjustment is changed. See envelope for cards.

7. MATCH FEATURE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug can be positioned to operate match feature 'on' or 'off'. Inserting the plug in the right side of the connector turns the match feature 'on'.

8. PLAYFIELD PANEL POST ADJUSTMENTS:

Posts that control left and right outlane opening on panel (see panel sketch) can be moved to make access to outlanes easier or harder for ball to enter. Easier entry will decrease playing time and scoring. Harder entry will increase playing time and scoring. See Section IVa, playfield diagram.

C. TILT/SLAM SWITCH ADJUSTMENTS:

On all games, tilt and slam switches should be adjusted on location after the machine is set in place and leveled. Level machine side to side and front to back along bottom edge.

1. Tilt Switch Adjustments

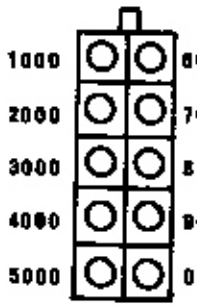
The purpose of the tilt switch is to prevent cheating the machine. Tilting the machine will disable all scoring, bonus and action (flipper, etc.assemblies) on the playfield and cause the player to loose his turn. Check adjustment of the two (normally open) tilt switches:

INSERT

HI SCORE ADJUSTMENT

3 BALL SCORE ADJUSTMENT

BLUE ORANGE WIRE
11,000 TO 20,000
ORANGE BLACK WIRE
21,000 TO 30,000
GRAY RED WIRE
31,000 TO 40,000
WHITE WIRE
41,000 TO 50,000
BROWN WIRE
51,000 TO 60,000

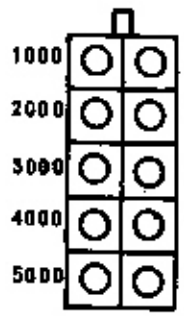


ORANGE WIRE
61,000 TO 70,000
BLACK WIRE
71,000 TO 80,000
GRAY WIRE
81,000 TO 90,000
RED WIRE
91,000 TO 100,000
BLUE WIRE
101,000 TO 110,000

EXAMPLE: IF DESIRED SCORE IS 62,000, INSERT PLUG ON ORANGE LEAD INTO 2000 SOCKET.
IF DESIRED SCORE IS 105,000, INSERT PLUG ON BLUE LEAD INTO 5000 SOCKET

5 BALL SCORE ADJUSTMENT

BLUE WIRE
101,000 TO 110,000
BLUE ORANGE WIRE
111,000 TO 120,000
ORANGE BLACK WIRE
121,000 TO 130,000
GRAY RED WIRE
131,000 TO 140,000
WHITE WIRE
141,000 TO 150,000



BROWN WIRE
151,000 TO 160,000
ORANGE WIRE
161,000 TO 170,000
BLACK WIRE
171,000 TO 180,000
GRAY WIRE
181,000 TO 190,000
RED WIRE
191,000 TO 200,000

EXAMPLE: IF DESIRED SCORE IS 150,000, INSERT PLUG ON WHITE LEAD INTO 0000 SOCKET.
IF DESIRED SCORE IS 175,000, INSERT PLUG ON BLACK LEAD INTO 5000 SOCKET.

FIGURE I - 18 HI SCORE ADJUSTMENT

A) Plumb-bob tilt on left side of cabinet near front door. Recommended plumb-bob position; bottom flush with end of rod.

B) Ball Tilt Above Plumb-Bob Tilt. Insert the smaller ball (15/16"dia.) into the ball tilt assembly and adjust the bracket so the ball will roll free to contact the switch blade, if front of cabinet is raised.

2. Slam Switch Adjustments

The purpose of the slam switch is to prevent abuse of the machine. There are two slam switches; one on the front door and one on the mounting board. The weighted blade should be adjusted to rest lightly on the bearing surface. The switches should be adjusted to have approximately a .020 gap between the contacts. The non-weighted blade can be adjusted to attain the desired sensitivity. Decreasing the gap will make the switch more sensitive. Opening the gap reduces the sensitivity. Additional slam switches can be added by the operator to meet his individual requirement. The slam switch, when actuated, will end the game by energizing the delay relay. This relay will interrupt normal operation for several seconds. The delay is obtained by means of a #455 bulb in the self holding cirucit. As the bulb heats up, it's resistance increases until the relay can no longer self-hold. Normal play can then be resumed.

The time that the delay relay is energized can be changed by replacing the bulb. Westinghouse #455 bulbs give the shortest delay.
NOTE: Location voltage must be sufficient to have 49.5 vac minimum at the transformer secondary, or abnormally long delays will result.

II GAME THEORY

A) GENERAL GAME OPERATION

Refer to the schematic and figures as indicated.

1. TURN ON

Plug in line cord. The power "on" switch is located at right hand corner of bottom of cabinet. Position power "on" switch for door and general illumination. Place ball onto playfield by outhole.

2. COINING

A. General
The coining circuit shown on the schematic is a general circuit using three coin chutes, each for a different value coin. It works as follows:

Insert coin in coin chute.

1. If coin is inserted in 1st coin chute and game is conditioned for 1 play per coin, it will energize the coin relay. If game is conditioned for 1 play - 2 coins, the first coin inserted will advance the 2 coin unit, then second coin inserted will energize the coin relay through the 2 coin unit switch. (See 1st coin chute adjustment plug positions on schematic.

2. If coin is inserted in 2nd coin chute and game is conditioned for 1 play per coin, it will energize the coin relay. The game is conditioned for 2 plays per coin, it will energize the 2nd coin chute relay and 2nd coin chute relay will advance the credit unit (2 steps) through the credit circuit. (See 2nd coin chute adjustment plug positions on schematic)

3. If coin is inserted in 3rd coin chute and game is conditioned for 2-3-4-5 or 6 plays per coin, it will energize the 3rd coin chute relay and the 3rd coin chute relay will advance the credit unit (2-3-4-5-6 steps) through the credit circuit. (See 3rd coin chute adjustment plug positions on schematic)

B. Coining for domestic games used in the States is by means of two coin chutes, both coins the same. See coin chute diagrams, type VII. Upon insertion of a coin, the action is as follows:

1. With the second coin chute adjustment plug inserted in position #1, the game will give one play per coin. The game is set up automatically, that is, the credit button is not used. Inserting of a coin energizes the coin relay. The coin relay initiates the reset cycle (to be described later). The coin unit, ball count unit and player up unit are reset through the coin relay. The game over latch is energized. At the end of the reset cycle, the game is ready for one player to play. Insertion of a second, third or fourth coin will advance the coin unit through the coin relay to allow play by two, three or four players, respectively.

2. If the second coin chute adjustment plug is inserted in position #2, the game can be adjusted to give two to six credits for one coin by means of the third coin chute adjustment. For example, if the third coin chute plug is inserted in the #4 position, four credits are given per coin. Insertion of a coin causes the credit unit to be advanced four positions due to the action of the score motor #11 cam through the 2nd coin chute relay. Actuation of the credit button now causes the game to go into the reset cycle. At the end of the cycle, the game is ready for one player to play and the credits are reduced to three. Actuating the credit unit the second time advances the coin unit to the second position, and reduces the credits to two. The game is now ready for two players. Two more actuations of the credit button result in a game ready for four players. The credit unit now reads zero. The coin circuit as connected in the example gave four credits for one coin. In the number 2 position it gives two credits, in the number 6 position, 6 credits. Credits are converted to player-games through the credit button.

3. RESET CYCLE

A. When the credit unit has been advanced from the 1st, 2nd or 3rd coin chute (as described in section 2A above), the front door credit button switch, when actuated, will energize the credit relay and then the credit relay will energize the coin relay.

B. The coin relay, when energized by any of the ways previously described, will stay energized through its own hold-in switch and (normally closed) #8 score motor switch.

C. The coin relay will energize the reset relay through a game over relay switch, operate the score motor and then through normally open #2 and #11 score motor switches, energize the #1 and #2 score reset relays. The reset relay will continue to operate the score motor. Both the reset and the score reset relays will be energized through a normally closed #8 score motor switch, or until all 16 score drum units are advanced to zero.

D. The coin relay, through a normally open #3 score motor switch, will advance the total play meter, and through the reset relay will reset the coin unit, ball-count unit and the player-up unit.

E. The coin relay will also reset the credit unit (1 step). Through a normally open #4 score motor switch, it will energize the game over relay latch coil, and through a normally open #7 score motor switch, it will energize (latch) the four 100,000 relay latch coils.

F. A ball on the outhole switch at the start of the game will energize the outhole relay through a normally closed #1 score motor switch. The outhole relay will stay energized through its own hold-in and a normally closed #8 score motor switch.

G. When the outhole relay is energized, it operates the score motor and then energizes the outhole kicker solenoid through a normally open #7 score motor switch. The ball will be kicked through the ball through to the shooters alley. The game is now ready for the first player to play.

H. To condition the game for 2nd player, insert coin (s) or use the credit button before the 1st ball is played. This will energize the coin relay again. This time the coin relay will not energize the reset relay. It will operate the score motor, advance the total play meter, subtract a credit from credit unit, (if credit button was used) and advance the coin unit through a normally open #3 score motor switch. The game is now set for 2 players; repeating this sequence will set game for 3rd player and 4th player.

B. FEATURE OPERATION AND SCORING

1. Initiating Scoring:

When a ball is played, the ball index relay will be energized through the 10 point, 100 point or 1000 point score relay and it will stay energized through its own hold-in switch and normally closed #6 score motor switch and a normally closed outhole relay switch (see Figure 11-4). If a ball passes through the playfield without scoring and enters the outhole, it will be returned to the player for another chance to score.

2. General Scoring:

Sling shots, side rebounds (4) and out-lane roll-overs score 10 points each. Thumper-bumpers score 100 points. Saucers score 500 points unless lit. See 'Extra Ball Feature'. Top special roll-overs score 500 points unless lit. See 'Special Feature'.

3. Bonus Score Feature:

A bonus score of 1000 to 19,000 may be scored. The game starts with a bonus score of 1000. The bonus score advances one step at a time through the top roll-over buttons, and the flip targets. It also advances four steps when all four flip targets have been set and the left or right mushroom bumper is hit. When the ball goes into the outhole, the bonus score is added to the players total score. If the double bonus lite is lit, twice the bonus score lit is added to the players total score. The double bonus lite is lit during the play of the 3rd and 5th ball. A tilt nullifies the bonus score.

4. Extra Ball Feature:

At a bonus score level of 11,000 or greater, the game will award an extra ball for placing the ball in the saucer with the lit extra ball indicator. Each time the score motor is actuated the location of the indicator alternates from left to right.
NOTE: Only one extra ball is awarded at any one time; (the extra ball earned must be played off before another extra ball can be scored).

5. Special Feature:

The "special" award is scored when the ball goes over the top right or left special roll-over and the special lite is lit. The "special" lite is lit when a bonus score of 19,000 is registered. The "special" award is adjustable to score a credit or an extra ball.

6. Flip Unit Feature:

The flip unit is actuated by the flip roll-over buttons at the top of the playfield and by the flip targets. For example, either of the #1 roll-over buttons or the #1 flip target will set the #1 flip. Each flip advances the bonus unit once. Each roll-over scores 100 points. Each flip target scores 1000 points.

When all four flips have been set, hitting the left or right mushroom bumper will advance the bonus unit four positions, score 500 points and reset all four flips. When the ball enters the outhole, the flips are also reset.

7. Outlane,Flipper Lane Feature:

When the ball passes through the 'out' or 'flipper' lane, 500 points is scored. When, during the course of play, a bonus score level of 11,000 or greater is accumulated, the 'out' lane and 'flipper' lane alternate their score value between 500 and 5000. The number 12 cam on the score motor will alternatively assign the 500,5000 and 5000, 500 values to the 'out' and 'flipper' lanes each time it is actuated.

by scoring.

8. BONUS SCORE CYCLE:

When the ball goes into the outhole:

A) The bonus score relay is energized and operates the score motor to add the bonus score to the total score of the player. When the scoring is completed, the bonus score relay is de-energized and the outhole relay is energized. The outhole relay will remain energized through its own hole-in switch until the normally closed #8 score motor cam switch opens.

B) The outhole relay will advance the player up unit through #4 score motor cam switch, if more than one player is playing and no extra ball has been scored.

C) The outhole relay will advance the ball count unit through #3 score motor cam switch after the last eligible player has played and if no extra ball was earned (the extra ball must be played off before the ball count unit will advance). When the ball count unit has advanced, the player up unit will reset through #4 score motor cam switch.

D) The outhole relay will operate the score motor and through #7 score motor cam switch. It will energize the outhole kicker solenoid to eject the ball from the outhole to the shooter alley. The outhole relay through another #7 score motor cam switch will advance the bonus unit from the zero to the 1000 position. The outhole relay will de-energize the ball index relay, the extra ball relay and the tilt relay.

E) The outhole relay is de-energized by the score motor as it goes through its 6th position.

F) The score motor is de-energized when it completes one eight-step-cycle.

9. After the last player's last ball enters the outhole, the game over relay trip will be energized through the balls per game adjustment and the action of the ballcount unit.

#1031 FLIP FLOP

Parts List

MISCELLANEOUS

Transformer	E-122-95
Score Motor (Domestic)	E-119-354
Score Motor (Export)	E-119-460
Total Play Meter	E-37-1700

RELAY COILS

G-30-1500
Score Reset (2)

G-31-1600
Game Over (trip)
Delay

G-31-2000
Coin
2nd coin
3rd coin
Credit
Reset
Game Over (latch)
Player reset
10,000 & 1,000 point
500 point
5,000 point
Bonus Score
Outhole
Special
Mushroom Bumper
#1 - #4 targets (4)
Flip reset
Left & Right Hole
100,000 (latch) (4)
100,000 (trip) (4)

G-32-2500
Bonus Zero
Ball index
Tilt
Extra Ball
Cam #12
#1 - #4 Flip relays (4)

G-33-2800
Lock

ASSEMBLY COILS

A-25-850
Outhole Kicker

A-27-1300
Left & Right hole eject (2)

ASSEMBLY COILS

AF-25-500	AF-26-650
28-1000	28-800
Flippers (2)	Flippers (2)

AK-27-1300
Sounder

AP-27-1300
Thumper Bumpers (2)
Sling Shots (2)

B-26-1100
Ball count unit step up
Credit unit step up
Bonus unit step up
Player up unit step up
Coin unit

C-28-1100
Ball count reset
Bonus unit reset
Credit unit reset
Player up unit reset
Coin unit

CC-31-2000
Chimes

CD-29-1600
Score Drums (16)
00-90

CC-30-1700
#1 - #4 Flip Solenoids

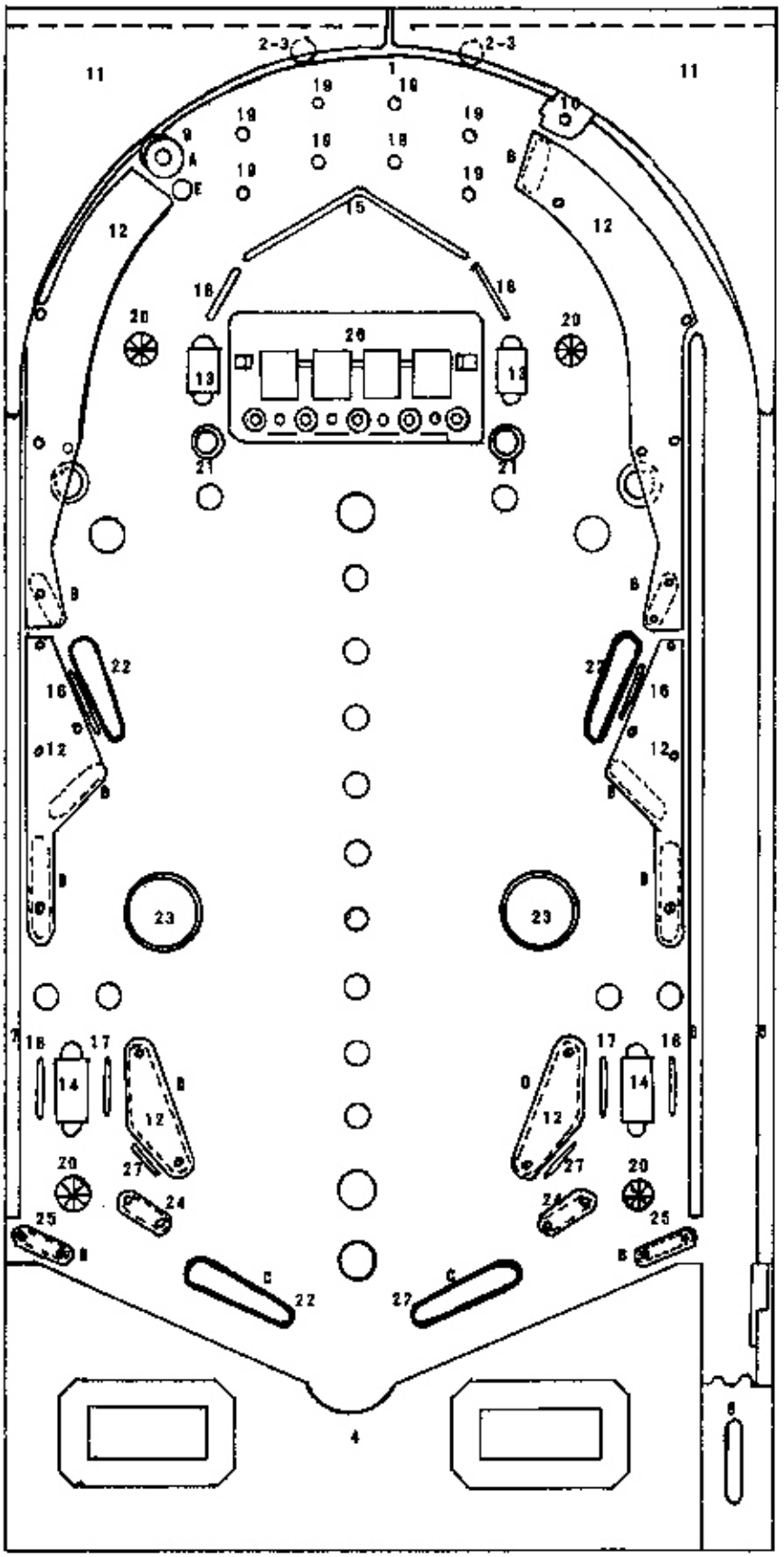
FC-33-2600
Coin Lock-out

UNIT DISC

Ball count	W-1043-27
Coin	W-923-260
Player up	W-923-207
Bonus	W-1072-46
00-90	W-999-28
	29

UNIT WIPER ASSEMBLY

Ball Count	W-1046-791
Coin	AS-1024-128
Player up	AS-1046-620
Bonus	AS-1046-790
00-90	A-1618-3



#1031 FLIP FLOP
RUBBER PARTS

A.	R-115-4	REBOUND	(1)
B.	R-521-1	1" DIA.	(11)
C.	R-406-3	FLIPPER	(4)
D.	R-521-4	2-1/2" DIA.	(2)
E.	R-243	5/16" DIA.	(11)

PANEL TOP PARTS

1.	ARCH RAIL	M-1774
2.	RAIL POST	C-907
3.	RAIL POST CAP	C-908
4.	BOTTOM ARCH	P-5871-52
5.	SIDE RAIL (R)	CA-1208-33
6.	INSIDE RAIL	CA-1208-26
7.	SIDE RAIL (L)	CA-1208-27
8.	BALL SHOOTER GUIDE	P-6359-18
9.	REBOUND ASSEM.	AS-493-6
10.	BALL GATE (R)	A-1475-9
11.	TOP PLASTICS	M-1330-124
12.	LITE SHIELDS	A-2890-109
13.	PLASTIC GUIDE (2)	C-694-5
14.	PLASTIC GUIDE (2)	C-702-1
15.	GUIDE WIRE (1)	M-121-61
16.	GUIDE WIRE (4)	M-121-24
17.	ROLLOVER WIRE (2)	AS-2806-1
18.	ROLLOVER WIRE (2)	AS-2806
19.	ROLLOVER BOTTOM (8)	C-387-6
20.	ROLLOVER BOTTOM (4)	C-900
21.	MUSHROOM BUMPER (8)	AS-2291-2
22.	FLIPPER & SHAFT (4)	AS-2214-24
23.	BUMPER CAP (2)	A-3713-17
24.	PLATE (2)	P-5899-35
25.	PLATE(2)	P-5899-37
26.	FLIP UNIT ASSEM.	AS-2807-1
27.	GUIDE WIRE (2)	M-121-32

A) Schematics

The schematic as drawn shows the power-on and game illumination only condition. The lock relay is de-energized. (See Figure II-1). Figure III-1 shows the location of specific game functions on the schematic. This figure can be used to localize the area of interest on the schematic for a given type of game fault. For example, if the game were coined and the credit button pressed, Figure II-3 shows that the lock relay should be energized. The schematic shows it should be self-holding in the energized position. If 'game over' is lit on the insert, the fault must either be in the lock relay self-holding or in the coin relay contact. Visual inspection will usually reveal the source of the trouble. A volt-ohmmeter will always locate the trouble.

The schematic, therefore, allows us to trace each circuit through the game to the power source (the transformer secondary). A color code is given for each lead to facilitate this tracing in the game.

The numbers on the bottom of the schematic and the letters on the left hand margin of the schematic can be used with the coil location chart at the right hand side to locate relays and solenoids. If the coil number is not recognizable in the game, the schematic will give the number for re-ordering (for example, reset relay G-31-2000). The nominal resistance of each coil is also given.

Score motor operation is detailed on the schematic. See A-29 on the schematic. The score motor is used in the coining, reset and scoring operations. The sequence of operation table indicates that the score motor, when energized, will actuate contacts associated with cams one through twelve in the positions indicated. Cam #1 is physically closest to the motor. Cam switches are lettered alphabetically starting with "A" for the bottom of a switch stack. For example, the switch 2C, SCM, on the schematic is driven by the cam in the second position from the motor and is physically the third switch assembly above the cam in the switch stack. It is actuated by the score motor driven second cam in positions 1, 2, 3, 4 and 5.

The motor receives a starting pulse from various sources. It will index itself one-half revolution (180^{0}) by means of a self-holding switch associated with Cam #1.

Relays shown on the schematic are shown de-energized. (See A-25). A relay consists of a coil of wire (electromagnet, when energized) armature or heel plate, plastic switch actuator, switch assemblies and frame. When the coil is energized, the armature is pulled to the coil by the electromagnetic force created by the current flowing through the turns of the coil. The plastic switch actuator is connected to the armature. The moving armature pulls the actuator and the long switch blades to the energized position. Contacts that were closed in the

de-energized are opened in the energized position and vice-versa. In general, Bally relays are designed to self-hold or remain energized through a contact in the stack after the source of initial energization is removed. (See lock relay, E-10).

B. ASSEMBLY ADJUSTMENTS

1. General

All switch assemblies consist of leaf springs, contacts, separators, plastic tubing and screws to hold them to the mounting surface on the relay frame. Before attempting to adjust a switch assembly, make sure that these screws are tight. If not, tighten screw closest to the contact end of the leaf spring first. This will prevent the assembly from being secured in such a manner that the leaf springs tend to fan out. In general, all leaf springs are adjusted for a 1/32" gap in the open position and .010" overtravel or wipe in the closed position. All contacts should be in good condition. Unless otherwise instructed they should be dry or non-lubricated. All contacts should be free of dust and dirt. Tarnish can be removed with a contact file followed by a burnishing tool. Severely pitted contacts must be replaced as an assembly. In general, contacts need be cleaned or replaced and adjusted when they are found to be a source of game malfunction.

2. Relays

All of the above applies. Relay contacts are operated dry. Beyond the normal 1/32" gap adjustment, relays with a self-holding circuit must be adjusted such that the self-holding contacts make just before the other contacts (adjust to .025" gap). Care in making this adjustment prevents false crediting and false scoring during the game.

The game-over relay and the 100,000 relay are examples of an interlock relay. Interlock relays are adjusted for a .010" gap between the trip and latch coil armatures in the trip position and a .010" gap between the nylon on the latch coil armature and the trip coil armature in the latch position. If an adjustment is necessary, the interlock relay adjustment screws should be loosened and the trip coil repositioned until the trip and latch armature gaps are proper. The screws are then secured. Always check the switch adjustments after a gap adjustment is made. Open contacts should have a 1/32" gap. Closed must show .010" overtravel.

BALLY INTERLOCK RELAY

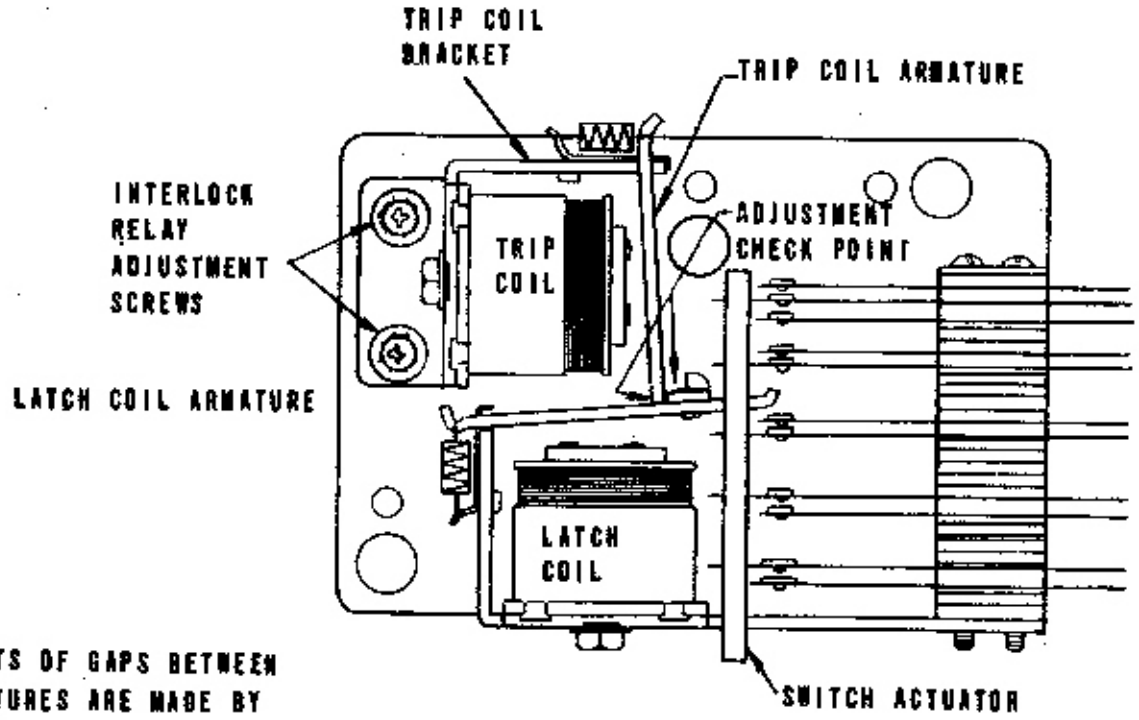


FIGURE III - 2 INTERLOCK RELAY ADJUSTMENTS

WHEN THE LATCH ARMATURE IS HELD DOWN DIRECTLY OVER THE CENTER OF THE LATCH COIL, THERE SHOULD BE A .010 GAP BETWEEN THE TRIP COIL ARMATURE AND THE NYLON PIECE OF THE LATCH COIL ARMATURE AT THE ADJUSTMENT POINT.

WHEN THE TRIP COIL ARMATURE IS HELD DOWN AND THE LATCH ARMATURE IS RELEASED, THERE SHOULD BE A GAP OF ABOUT .010 BETWEEN THE TWO ARMATURES.

ADJUSTMENTS OF GAPS BETWEEN THE TWO ARMATURES ARE MADE BY LOOSENING THE INTERLOCK RELAY ADJUSTMENT SCREWS. BE SURE TO TIGHTEN DOWN THE SCREWS AFTER ADJUSTMENT IS MADE.

ALWAYS CHECK SWITCH ADJUSTMENTS WHENEVER A GAP ADJUSTMENT IS MADE.

3. Printed Circuit and Riveted Disc Units

Examples of these are the bonus, the player up, the ball count, the coin and the 00-90 units. The force exerted on the disc contacts by the rotor requires lubrication of the disc contacts. Periodic maintenance must include an inspection for the presence of lubrication and for contact condition. Touching the contacts with the fingers should result in a shiny trace on the finger. This, and absence of contact pitting and dirt indicate a satisfactory operating condition. Contact pitting can be corrected with a contact file and burnishing tool. Dirt should be removed with a clean, lint free cloth. If contact cleaning fluids are used to remove greasy dirt, a cloth must be used to remove any chemical residue. Finally, apply Bally coin machine lubricant to a clean cloth. Apply a thin film to the contact surfaces.

If, in trouble shooting, a rotor blade is suspected as the source of the problem, it can be checked for proper adjustment. A blade exerting too little pressure can be intermittant. A blade exerting too much pressure may slow or stop the rotor. A check for the force exerted by the rotors can be made as follows: gently warp the disc or printed circuit board away from the rotor. The rotor blade should follow the disc or board for 1/32" before contact is broken. If it follows further, contact force is too great. If it breaks contact too soon, contact force is not great enough. Use a contact adjusting tool to adjust the rotor blade pressure.

4. Credit Unit

The credit unit is used to store in memory the number of credits or games due a player. Credits are payed for or won for high score, match feature or as a special game feature. Improper adjustment of the credit unit can result in too many or too few credits issued to the player. To check for proper adjustment of the credit unit: (See Figure III-3)

a) Slowly hand actuate the step-up plunger. The step-up arm must not engage the next tooth on the ratchet (occasional engagement is acceptable). If the step-up arm does, gently bend the base plate tab down (away from the step-up solenoid) until hand actuation does not cause consistent engagement of the next tooth on the ratchet. This adjustment, properly made, prevents multiple crediting when only one credit is due the player.

CREDIT (REPLAY) UNIT

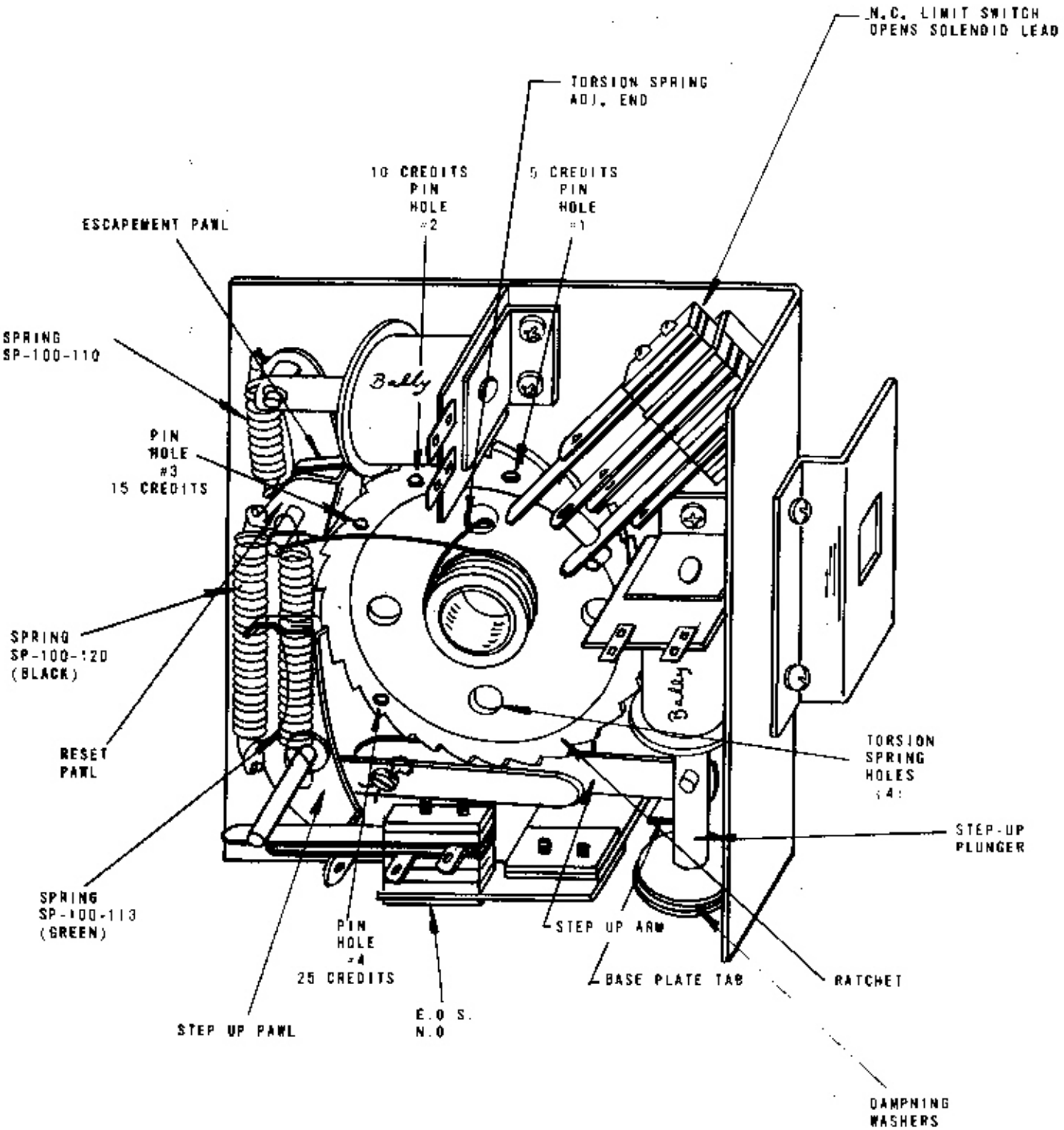


FIGURE III - 3 CREDIT UNIT ADJUSTMENTS

b) If multiple crediting persists, increase spring tension by moving the ratchet torsion spring (short end) one hole or 1/4 turn clockwise to the next hole. This will slow the ratchet wheel and decrease the probability of multiple crediting. Finally, check springs SP-100-120 (black) and SP-100-113 (green) to make sure that they are not interchanged.

c) If the credit unit does not return to zero, check the adjustment of the switch stack just above the step-up solenoid. If the force exerted by the blades in this stack is excessive, the credit unit will not return to zero. Adjust the stack for a 1/32" gap when the credit wheel is not on zero, and a .010" overtravel at zero. Now spin the credit wheel by hand for the maximum allowable number of credit. The normally closed switch in the stack must now be opened by the pin in the ratchet wheel. This switch is the limit switch and opens the lead to the step up solenoid.

d) If two or more credits are subtracted each time the credit button is actuated, the spring (SP-100-110) that positions the escapement pawl is too strong. Gently spread the turns on the spring until the proper action is obtained.

It is to be noted that selection of the #1, 2, 3, or 4 pin hole will limit the maximum number of credits possible to 5, 10, 15 or 25, as desired. This pin actuates the limit switch on the switch stack.

5. Score Drum Unit Adjustment (See Figure III-4)

All sixteen score drum unit assemblies are essentially the same. End of stroke switches are adjusted for a 1/32" gap and .010" overtravel (wipe) at the end of the solenoid stroke. The switches in the stack are adjusted likewise. Note that if the solenoid plunger is actuated by hand, all switches are open in the zero position, i.e., the numeral '0' in the viewing window on the insert. Malfunctions can be corrected by proper adjustment. Typical malfunctions are:

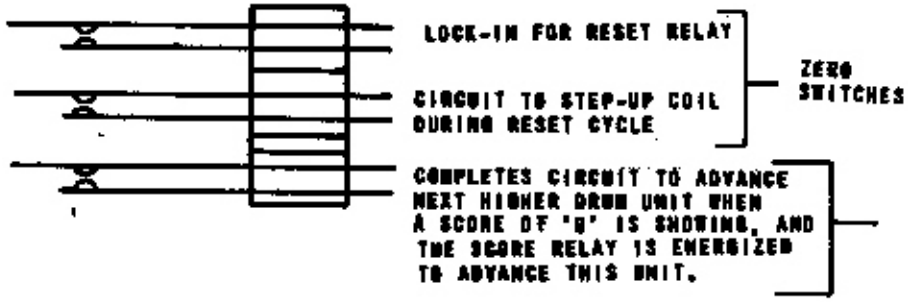
a) Score drum continues to step through zero during the reset cycle (top switch in switch assembly always closed).

b) Score drum does not score (second switch in switch assembly always open).

c) Score drum and next higher drum advance simultaneously on a continuous or intermittant basis. This is proper when advancing from the 9th position to zero. For all other numerical positions it indicates that the last switch (closest to the metal frame) is always or intermittantly closed.

SCORE DRUM UNITS SWITCHES

10-90, 100-900 & 1,000-9,000 UNITS (ALSO 10,000-90,000 UNIT WHEN 100,000 RELAY IS INVOLVED)



10,000-90,000 UNIT (EXCEPT IN GAME HAVING 100,000 RELAYS - SEE ABOVE)

FIGURE III-4 SCORE DRUM UNIT SWITCH ASSEMBLY

Score drums are easy to trouble shoot. A faulty unit can be found visually. Visual inspection and adjustment is adequate to correct the problem. Do not overlook cable dress as a source of the problem. Dress bare leads away from adjacent connections.

SECTION IV SERVICE PARTS

A parts catalogue is available upon request. The catalogue is illustrated and lists all replacement parts for each game manufactured by Bally. Requests should be addressed to :

BALLY MANUFACTURING CORPORATION
2640 WEST BELMONT AVENUE
CHICAGO, ILLINOIS 60618
ATTENTION: PARTS DEPARTMENT

Enclose $1.00 for postage and handling.

SERVICE HINTS

To maintain trouble free operation, all stepping unit contact plates, rivet and printed circuit type should be cleaned and lubricated sparingly every 30 days using Bally coin machine lubricant.

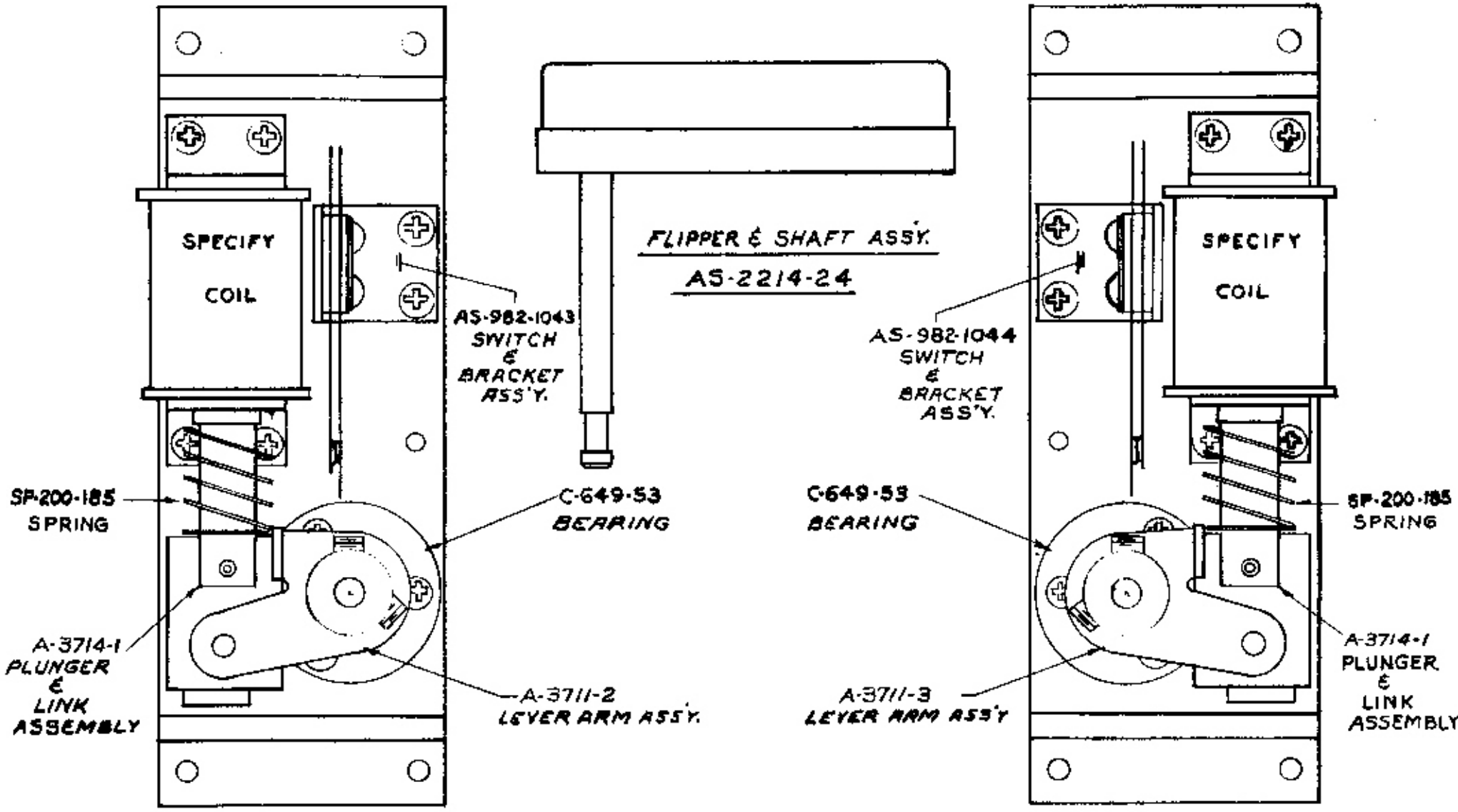
The Bally playfield has an improved tuff-coat finish with excellent wearing properties. It's life expectancy, as well as play appeal, can be extended by periodic cleaning of the playfield.

DO: Consult your local distributor for his product recommendations on this subject. Chances are, he has direct experience based on usage. If not, clean with a mild face type soap and a clean cloth dampened with water or clean with a product manufactured specifically for this purpose. Petroleum disillate based cleaners do not harm the playfield finish. Polish, if desired. A combination cleaner and polish such as Wildcat #125* (Wildcat Chemical Co., 1333 W. Siminary Dr., Ft. Worth, Texas 76115) or simply a cleaner such as Waterless Lemonite Cleaner* (Graco Sales Co., Rebel Labs, 8152 Highway 70, Arlington, Tenn. 38002) cleans even the dirtiest of playfields with ease. Use all cleaning agents sparingly. An accumulation of residue can jam roll-over buttons. Inspect and hand polish the ball in a clean cloth. A chipped ball must be replaced. It can ruin the finish on the playfield in a short period of time.

DON'T: Use water in large quantities, highly caustic cleaners, abrasive cleaners or cleaning pads on the playfield. Do not allow a wax or polish build up. Waxes yellow with age and spoil play appeal.

* Bally has tried these products and found them effective. Bally assumes no responsibility for their use, however, as Bally has no control over the manufacturers and any product changes they may make.

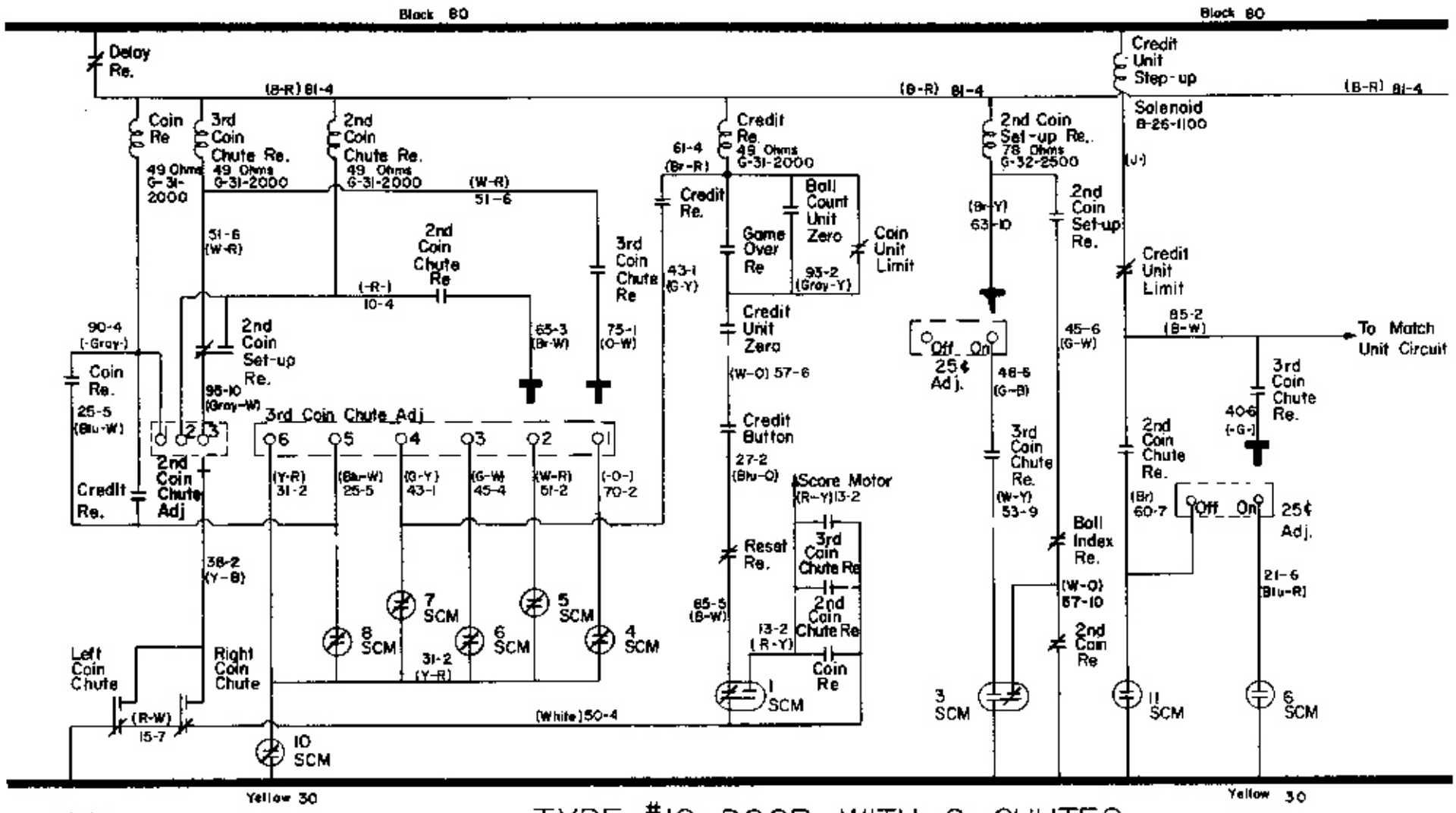
NEW BALLY FLIPPER UNITS



TIME DELAY CIRCUIT

Purpose of the time delay circuit is to prevent unnecessary abuse of the machine it is installed in.

The time delay relay is energized anytime one of the slam switches are made to contact. There are two factory installed slam switches, one on the front door and one on the mechanism mounting board. (Any number of slam switches could be installed by the operator, to meet his individual requirement). The switches should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing the gap between contacts will make switch more sensitive. Opening the gap will reduce sensitivity. The total time the delay relay is energized can be varied by changing the #455 lite bulb mounted on the delay relay frame. If unable to get a short enough time of delay, get a Westinghouse #455 bulb; these units are considerable faster. If still unable to bring the time down, check the location voltage. It should not be under 49.5 V.A.C. on the transformer secondary.



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TYPE #10 DOOR WITH 2 CHUTES

1) Left or Right Chute _____ Takes 1 Coin ___ For 1 to 6 Credits (Off Position)

*2) Left or Right Chute _____ Takes 1 Coin ___ For 1 Credit, 2 Coins-3 Credits (On Position)

*NOTE: For (2), O-W Lead Plug Must Be In Position 6; Coin Chute Adj. Circuit Shown is Connected For Condition 2

*NOTE: For (2), Y-B (38-2) Lead Plug Must Be In Position 3

FO-449