

#1018 "BOOMERANG"

INSTALLATION AND GENERAL GAME OPERATION INSTRUCTIONS

INSTALLATION

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 switches) may go out of adjustment. Plumb bob tilt switch should always be adjusted after game is set on location and leg levelers are adjusted.

Visual inspections before plugging in line cord: -

1. Check that all cable plugs are firmly seated in proper sockets.
2. Check that cables are clear of all moving parts and relays.
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)

Before line cord is plugged in: -

Check all plugs and sockets and dress cables:

- (A) Plugs in correct sockets.
- (B) Plugs securely seated in sockets.
- (C) Dress cables away from relays.

Check adjustment of the three (normally open) tilt switches:

- (A) Panel tilt on bottom of play field panel
- (B) Plumb-bob tilt on left side of cabinet near front door.
- (C) 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.

Plug in line cord:

Check adjustment of the (normally open) kick-off switch at rear of cabinet mounting board near cable plugs. Check adjustment of the (normally open) anti-slam switch, on front door. If either of these switches is closed, the delay relay is energized momentarily.

GENERAL GAME OPERATION

Place ball into playfield by out hole.

Coin game:

If coin should be rejected move on-off master switch at bottom right front corner of cabinet to "on" position, then coin game. Coin lock-out device rejects all coins when power (master switch) is off. Also check the delay relay. If this relay is energized, the game will not accept coins.

- 1A. If coin is inserted in 1st (nickel) coin chute and game is conditioned for 1 play -5¢, it will energize the coin relay. If game is conditioned for 1 play -10¢, the first coin inserted will advance the 2 coin unit, then second coin inserted will energize the coin relay thru the 2 coin unit switch. (See 1st coin chute adjustment plug positions on game adjustments sheet).
- 1B. If coin is inserted in 2nd (dime) coin chute and game is conditioned for 1 play-10¢, it will energize the coin relay. If game is conditioned for 2 play-10¢, it will energize the 2nd coin chute relay and 2nd coin chute relay will advance the credit unit (2 steps) thru the credit circuit. (See 2nd coin chute adjustment plug positions on game adjustments sheet).
- 1C. If coin is inserted in 3rd (quarter) coin chute and game is conditioned for 2-3-4-5 or 6 plays-25¢, 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) thru the credit circuit. (See 3rd coin chute adjustment plug positions on game adjustment sheet).

- 1D. When the credit unit has been advanced from 2nd or 3rd coin chute, (as described in section 1B and 1C) the front door credit button switch, (when actuated) will energize the credit relay and then the credit relay will energize coin relay.
- 2A. The coin relay, when energized by any of the ways described, (in sections 1A thru 1D) will stay energized thru its own hold-in switch and (normally closed) #8 score motor switch.
- 2B. The coin relay will energize the lock relay which stays energized thru its own hold-in switch and a delay relay switch.
- 2C. The coin relay will energize the reset relay thru a game over relay switch, operate the score motor and then thru normally open #2 and #11 score motor switches, energize the #1 and #2 score reset relays. The reset relay will operate the score motor. Both the reset and the score reset relays will be energized thru a normally closed #8 score motor switch, or until all score counter units are reset to zero position.
- 2D. The coin relay, thru a normally open #3 score motor switch will advance the total play meter, and thru the reset relay will reset the coin unit, ball count unit and the player up unit. The coin relay will also reset the credit unit, (1 step) when energized by the credit button. Thru a normally open #4 score motor switch, it will energize the game over relay latch coil, and thru another normally open #7 score motor switch, it will energize the four 100,000 relay latch coils.
- 3A. A ball on the outhole switch, at the start of game will energize the outhole relay thru a normally closed #1 score motor switch, and it will stay energized thru its own hold-in and a normally closed #8 score motor switch. For operations after the first ball, see under heading "sequence of operation".
- 3B. When the outhole relay is energized it will operate the score motor and then energize the outhole kicker solenoid thru a normally open #7 score motor switch. The ball will be kicked thru the ball trough to the shooter alley. The game is ready for the first player to play.

- 3C. To condition the game for 2nd player, inserting coin (s) or use the credit button before the 1st ball is played, it 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 thru 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.

SEQUENCE OF OPERATION :

- 1A. When a ball is played, the ball index relay will be energized by the 10 point, 100 point or 1,000 point score relay and it will stay energized thru its own hold in switch and normally closed #6 score motor switch and a normally closed outhole relay switch.
- 1B. 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, this bonus score relay is de-energized and the outhole relay is energized. The outhole relay will remain energized thru its own lock-in switch until the normally closed #8 score motor cam switch opens.
 - b. The outhole relay will advance the player up unit thru #4 score motor cam switch.
 - c. The outhole relay will advance the ball count unit thru #3 score motor cam switch. If an 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 thru #4 score motor cam switch.
 - d. The outhole relay when energized will operate the score motor, and thru #7 score motor cam switch, it will energize the outhole kicker solenoid, which will eject the ball from the outhole to the shooter alley. The outhole relay thru another #7 score motor cam switch, will advance the bonus unit from zero to 1000 position. The outhole relay when energized will de-energize the ball index relay, the extra ball relay and the tilt relay.

DOUBLE BONUS FEATURE:

WHEN DOUBLE BONUS LITE IS LIT AND THE BALL GOES INTO THE OUTHOLE, THE GAME WILL AWARD TWICE THE BONUS SCORE LIT. WHENEVER THE DOUBLE BONUS LITE IS LIT, ROLLOVER BUTTONS A-B-C-D ARE ALL LIT.

OUTHOLE BONUS SCORE COLLECT FEATURE:

WHEN THE BALL GOES INTO THE OUTHOLE, THE GAME WILL ADD THE BONUS SCORE LIT TO THE TOTAL SCORE OF THE PLAYER UP. WHEN THE DOUBLE BONUS LITE IS LIT, THE GAME WILL ADD TWICE THE BONUS SCORE LIT.

SPINNER FEATURE:

WHENEVER THE BALL FLIPS THE SPINNER, LOCATED IN THE CENTER OF THE PLAYFIELD, IT WILL SCORE 100 POINTS AND ADVANCE THE SPINNER LITE ONE POSITION FOR EACH REVOLUTION. IF THE SPIN LITE COMPLETES ONE CYCLE, IT WILL ADVANCE THE BONUS SCORE LITE ONE THOUSAND POINTS.

LEFT AND RIGHT LANES FEATURE:

WHEN THE BALL IN PLAY STRIKES A CAPTIVE BALL IN EITHER THE LEFT OR RIGHT LANE, THE CAPTIVE BALL IS KICKED OVER THE ROLL-OVERS AND AT THE TARGET IN THE LANE. THE ROLL-OVERS SCORE 1,000 POINTS; WHEN THE ROLL-OVERS ARE LIT, THEY ADVANCE THE BONUS SCORE LITE. THE TARGET WHEN HIT AWARDS A "SPECIAL" WHEN LIT. THE SPECIAL IS ADJUSTABLE FOR A CREDIT OR AN EXTRA BALL.

ROLL-OVER BUTTON FEATURE:

HITTING "A" TARGET LITES "A" ROLL-OVER BUTTON.
HITTING "B" TARGET LITES "B" ROLL-OVER BUTTON.
HITTING "C" TARGET LITES "C" ROLL-OVER BUTTON.
HITTING "D" TARGET LITES "D" ROLL-OVER BUTTON.

WHEN THE ROLL-OVERS ARE LIT, THEY ADVANCE THE BONUS SCORE LITE. THE LITES REMAIN LIT DURING THE PLAY OF THAT BALL.

WHEN "A", "B", "C" AND "D" ARE LIT, THE DOUBLE BONUS LITE LITES.

EXTRA BALL FEATURE:

EXTRA BALL RELAY IS ENERGIZED WHEN A BALL PASSES THROUGH EITHER THE RIGHT OR LEFT OUT ROLL-OVERS WHEN LIT. ALSO WHEN THE HIGH SCORE ADJUSTMENT PLUG IS SET FOR EXTRA BALL, AND A PRESET HIGH SCORE IS SCORED, OR WHEN RIGHT AND LEFT LANE TARGETS ARE HIT WHEN LIT, FOR SPECIAL. ONLY ONE EXTRA BALL MAY BE EARNED AT ANY ONE TIME.

GAME ADJUSTMENTS

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.

HI-SCORE ADJUSTMENT PLUG:

Located on back box lite insert. This plug provides a wide range of coverage at which hi-score credits can be scored. (see the score adjustment card in back box for plug positions).

MATCH FEATURE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to operate match feature on or off.

HI-SCORE FEATURE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to award hi-score credit or extra ball.

BALLS PER GAME ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to operate game on 5 ball or 3 ball play.

1ST COIN CHUTE ADJUSTMENT PLUG:

Located on the 2 coin unit, on front cabinet mounting board. This plug provides positions to give 1 play for 1 coin or 1 play for 2 coins thru the 1st (nickel) coin chute.

2ND COIN CHUTE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to give 1 play for 1 coin or 2 plays for 1 coin thru the 2nd (dime) coin chute. NOTE: When this plug is set for 2 plays - 1 coin, brown-white (male plug) wire on 3rd coin chute adjustment must be in position 2.

3RD COIN CHUTE ADJUSTMENT PLUG:

Located on front cabinet mounting board. This plug provides positions to give 2 to 6 plays for 1 coin thru the 3rd (quarter) coin chute. Use orange-white (male plug) wire to set number of credits.

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PARTS LIST

MISCELLANEOUS	PART NO.	ASSEMBLY COILS	PART NO.
TRANSFORMER	E-122-95	COIN LOCKOUT	FC-33-2600
SCORE MOTOR (DOMESTIC)	E-119-354	CHIME 10, 100 & 1000 POINT(3)	CC-29-2000
SCORE MOTOR (EXPORT)	E-119-411	KNOCKER	C-27-1000
TOTAL PLAY METER	E-32-1700	SLINGSHOT, LEFT & RIGHT (2)	A-26-1200
		FLIPPER LEFT & RIGHT (2)	AF-25-600/ 28-800
RELAY COILS		THUMPER BUMPER	A-25-1000
DELAY	G-31-1600	TOP HOLE EJECT	A-27-1100
COIN	G-31-2000	OUTHOLE KICKER	A-25-950
2ND COIN CHUTE	G-31-2000		
3RD COIN CHUTE	G-31-2000	UNIT COILS	
CREDIT	G-31-2000	2 COIN (STEP UP)	CD-29-1600
LOCK	G-33-2800	CREDIT (STEP UP)	B-26-1100
RESET	G-31-2000	COIN (STEP UP)	B-26-1100
#1 SCORE RESET	G-30-1500	CREDIT (RESET)	C-28-1100
#2 SCORE RESET	G-30-1500	COIN (RESET)	C-28-1100
GAME OVER (TRIP)	G-31-2000	BALL COUNT (STEP UP)	B-26-1100
GAME OVER (LATCH)	G-31-2000	BALL COUNT (RESET)	C-28-1100
100,000 (4) (TRIP)	G-31-2000	PLAYER UP (STEP UP)	B-26-1100
100,000 (4) (LATCH)	G-31-2000	PLAYER UP (RESET)	C-28-1100
PLAYER RESET	G-31-2000	00-90 (STEP UP)	CD-29-1600
BONUS ZERO	G-32-2500	SCORE DRUMS (STEP UP) (16)	CD-29-1600
BONUS SCORE	G-31-2000	BONUS UNIT (STEP UP)	B-26-1100
OUTHOLE	G-31-2000	BONUS UNIT (RESET)	C-28-1100
BALL INDEX	G-32-2500	SPINNER (STEP UP)	CD-29-1600
TILT	G-32-2500		
EXTRA BALL	G-31-2000		
10, 100 & 1000 POINT		UNIT DISCS	
(3)	G-31-2000		
BONUS ADVANCE	G-31-2000	COIN	W-923-260
YELLOW & GREEN LANE			
500 (2)	G-31-2000	BALL COUNT	W-1043-17
LITE YELLOW & GREEN		PLAYER UP	W-923-207
LANE (2)	G-32-2500	00-90	W-999-28
SPINNER	G-30-1500		W-999-29
DOUBLE BONUS	G-32-2500	BONUS	W-1072
SPECIAL	G-31-2000		
YELLOW & GREEN THUMPER		UNIT WIPERS	
BUMPER (2)	G-31-2000	COIN	AS-827-460
15,000 BONUS	G-32-2500	BALL COUNT	AS-1046-648
TOP HOLE	G-32-2500	PLAYER UP	AS-1046-620A
		00-90	A1618-3A
		BONUS	A1618-4A
			AS-1046-A

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 considerably 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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#1 MOTOR CAM SWITCHES

- #1A (MAKE) LOCKS IN PLAYER RESET RELAY UNTIL MOTOR STOPS.
- #1B (BREAK) OPENS CIRCUIT TO COIN LOCK OUT COIL WHEN MOTOR RUNS.
- #1C (BREAK) HOLD OUT OUTHOLE RELAY UNTIL SCORE MOTOR IS AT REST.
- #1D (MAKE-BREAK) OPENS CIRCUIT THRU CREDIT BUTTON & RUNS SCORE MOTOR.

#2 MOTOR CAM SWITCHES

- #2A (MAKE) PULSES #1 SCORE RESET RELAY.
- #2B (MAKE) FAST RESET OF BONUS UNIT ON A TILT OR RESET.
- #2C (MAKE) SCORES 500 POINTS WHEN 500 POINT RELAY IS ENERGIZED.

#3 MOTOR CAM SWITCHES

- #3A (MAKE) STEPS BALL COUNT UNIT WHEN BALL IS IN OUTHOLE.
- #3B (MAKE) STEPS TOTAL PLAY METER & RESETS COIN UNIT AND BALL COUNT UNIT.
- #3C (MAKE) WITH #6 SWITCH, ADDS 1000 UNIT WHEN BONUS RELAY IS ENERGIZED.

#4 MOTOR CAM SWITCHES

- #4A (MAKE) 1ST PLAYER MATCH CIRCUIT TO CREDIT UNIT.
- #4B (MAKE) STEPS OR RESETS PLAYER UP UNIT.
- #4C (MAKE) LATCHES GAME OVER RELAY ON RESET.
- #4D (MAKE) WITH SWITCH #7E, SCORES 1000 POINTS EACH WHEN DOUBLE BONUS.

#5 MOTOR CAM SWITCHES

- #5A (MAKE) 2ND PLAYER MATCH CIRCUIT TO CREDIT UNIT.
- #5B (MAKE) WITH SWITCH #8B, RESETS BONUS.
- #5C (BREAK) ADJUSTMENT FOR 2ND & 3RD COIN CHUTE RELAYS TO ADD 2 CREDITS.

#6 MOTOR CAM SWITCHES

- #6A (MAKE) 3RD PLAYER MATCH CIRCUIT TO CREDIT UNIT.
- #6B (MAKE) WITH SWITCH #3C ADDS 1000 UNIT.
- #6C (MAKE) FOR 2DM RELAY.
- #6D (BREAK) BALL INDEX, TILT AND EXTRA BALL RELAY LOCK IN.
- #6E (BREAK) ADJUSTMENT FOR 2ND & 3RD COIN CHUTE RELAY TO ADD 3 CREDITS.

#7 MOTOR CAM SWITCHES

- #7A (MAKE) 4TH PLAYER MATCH CIRCUIT TO CREDIT UNIT.
- #7B (MAKE) LATCHES 1ST, 2ND, 3RD & 4TH PLAYER RELAYS THRU COIN RELAY.
- #7C (MAKE) STEPS BONUS UNIT OFF ZERO.
- #7D (MAKE) ENERGIZES OUTHOLE AND TOP HOLE KICKERS.
- #7E (MAKE) WITH SWITCH #4D SCORE DOUBLE BONUS.

#8 MOTOR CAM SWITCHES

- #8A (MAKE) STEPS BALL COUNT UNIT WHEN GAME IS OVER.
- #8B (MAKE) SEE SWITCH #5B.
- #8C (BREAK) OUTHOLE RELAY LOCK IN.
- #8D (BREAK) 500 POINT RELAY LOCK IN.

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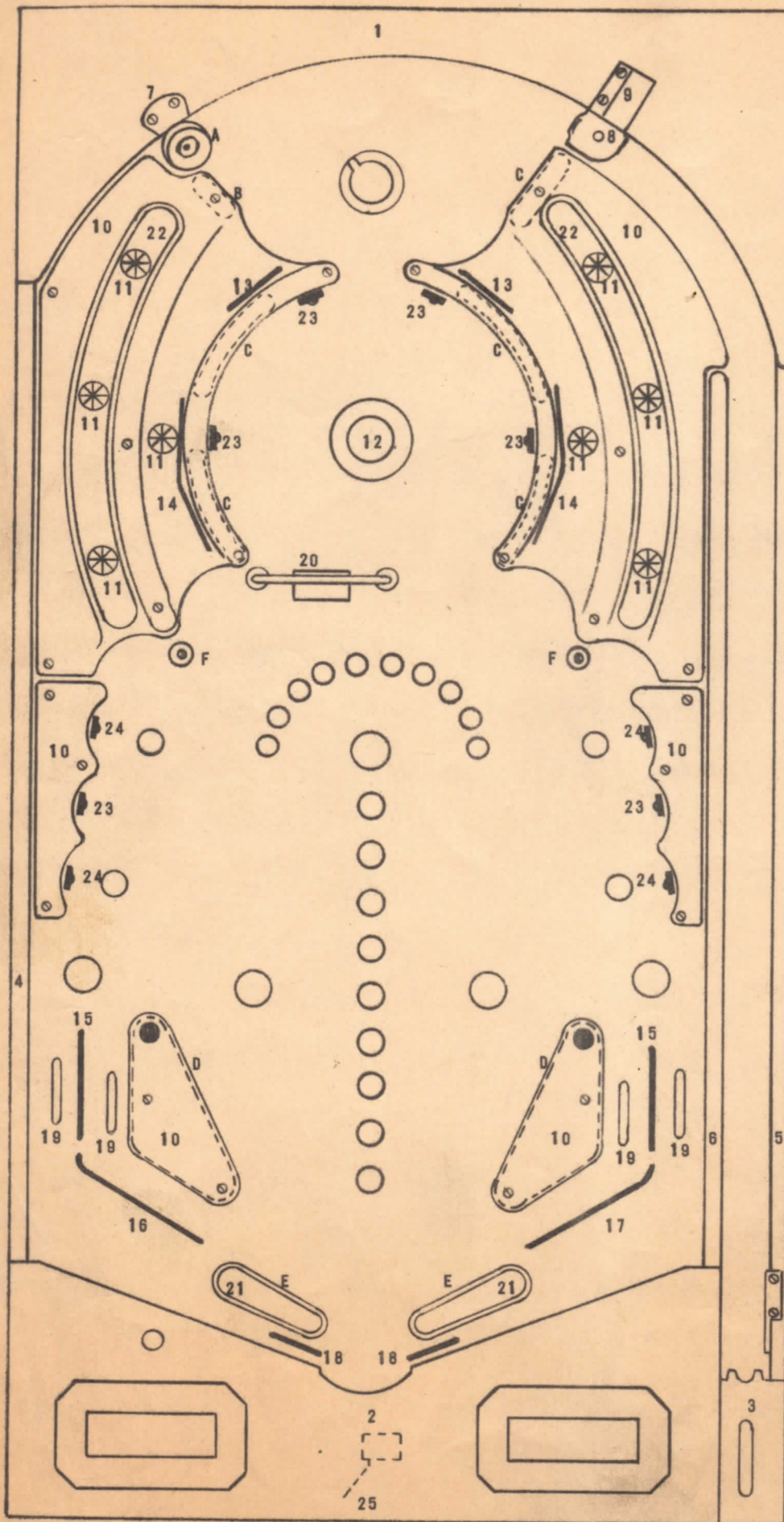
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RUBBER PARTS

A- R-115-4	REBOUND	1
B- R-521-1	1"	1
C- R-521-2	1-1/2"	5
D- R-521-5	3"	2
E- R-408-3	FLIPPER	2
F- R-243	5/16	15

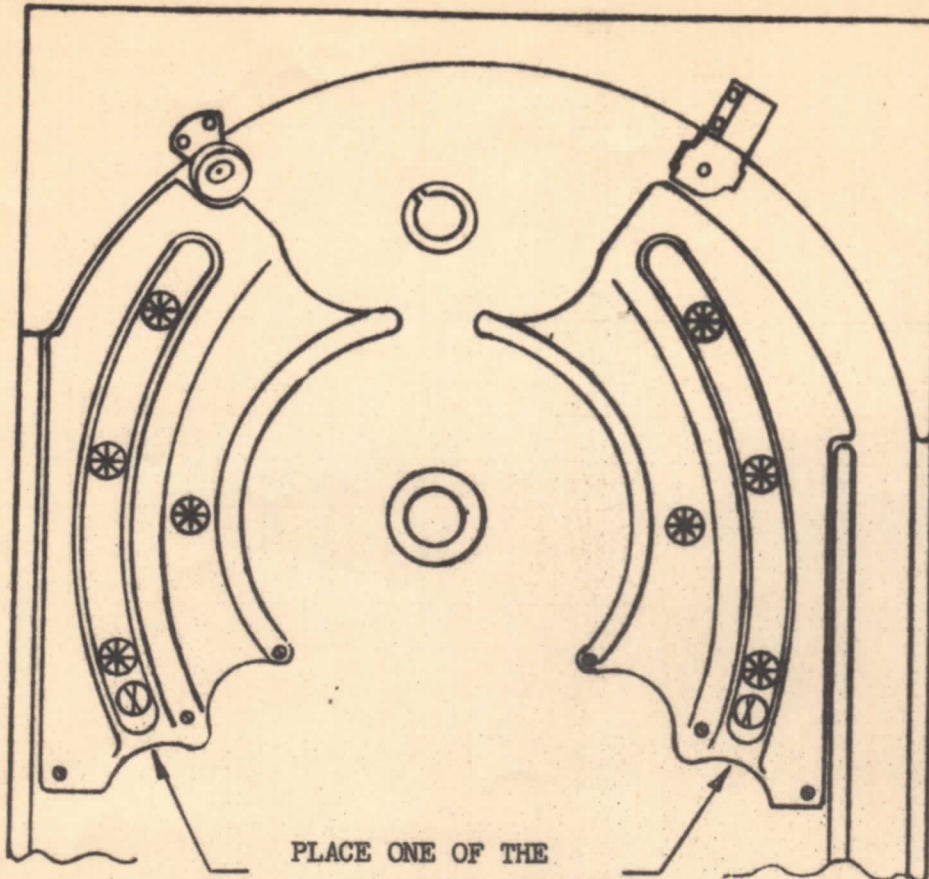
PANEL TOP PARTS

1- TOP ARCH	P-5839-88
2- BOTTOM ARCH	P-5871-47
3- SHOOTER GAUGE	P-8358-13
4- SIDE RAIL	CA-1208-24
5- SIDE RAIL	CA-1208-22
6- INNER RAIL	CA-1208-14
7- REBOUND ASSEMBLY	AS-493-3
8- BALL GATE	A-1475-1
9- BALL GATE COVER	P-2996-5
10- LITE SHIELDS	A-2890-104
11- ROLLOVER BUTTON (8)	C-900
12- BUMPER CAP (RED)	A-3713-7
13- GUIDE WIRE (2)	M-121-24
14- GUIDE WIRE (2)	M-121-54
15- GUIDE WIRE (2)	M-121-18
16- GUIDE WIRE	M-121-43
17- GUIDE WIRE	M-121-44
18- GUIDE WIRE (2)	M-121-53
19- ROLLOVER WIRE (4)	M-1336
20- SPINNER GATE ASSEMBLY	AS-2250-32
21- FLIPPER & PIN ASSEMBLY	AS-2214-19
22- TARGET & SWITCH ASSEMBLY (RED)	AS-982-899
23- TARGET & SWITCH ASSEMBLY (YELLOW)	AS-982-740
24- TARGET & SWITCH ASSEMBLY (WHITE)	AS-982-806
25- BALL RETURN WIRE	M-1336-21



● INDICATES MOVABLE POSTS FOR SCORING ADJUSTMENT.

INSTRUCTIONS FOR PLACING BALL IN SPECIAL LINES



PLACE ONE OF THE
1-1/16" BALLS IN THE LEFT LANE X
AND ONE IN THE RIGHT LANE (X)
PLACE THE OTHER 1/1/16" BALL
ON THE PLAYFIELD AND THE
REMAINING 15/16" BALL GOES INTO
THE "TILT TRACK" LOCATED ON
THE LEFT SIDE OF CABINET.