

Instruction Manual for OXO



Williams® ELECTRONICS, INC.
SUBSIDIARY OF THE SEEBURG CORPORATION

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Phone 267-2240

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1973

Chicago, Ill. 60618, U.S.A.
Cable Address: Wilcoin

1. GENERAL

NEVER EXPERIMENT with any of the mechanism. Locate any trouble with the aid of Wiring Diagrams or Operating & Servicing Information supplied with the machine, then check for proper adjustment of the units involved before making any changes. Improper adjustment or make-shift repair will only cause serious damage to other parts of the machine or repeated failure of the part.

NOTE: Always look for a possible loose wire, bad connection at a plug and socket, broken or unhooked springs on step-up units, relays, etc., before adjustments are made or wires reconnected.

2. FUSES

IMPORTANT: Never replace fuses with any rating other than specified on the fuse block; this block is located adjacent to the transformer.

3. LUBRICATION

Over-lubrication causes far more trouble in coin operated equipment than under-lubrication. Practically all cases of poor contact on switches and wiper discs are due to oil or grease, or oil vapor, which forms a film or residue on the contacts and will not allow current to pass through. Excess lubricant may also seep into clutches causing them to slip.

IMPORTANT: NEVER USE VASELINE FOR LUBRICATION OF ANY PART OF THE MACHINE. Vaseline is not a true lubricant. It leaves a dirty and gummy residue and it becomes very thick when cold. A special Coin Machine Lubricant is supplied with each machine.

STEP-UP Levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs (biscuits) on the Motor Units and Step-up Units will require lubrication with the special Coin Machine Lubricant only after the grease is completely evaporated (3 to 12 months, depending on climate) or when the film of grease becomes dirty. In either event, clean the parts thoroughly with a solvent, then apply an extremely thin coat of the special grease.

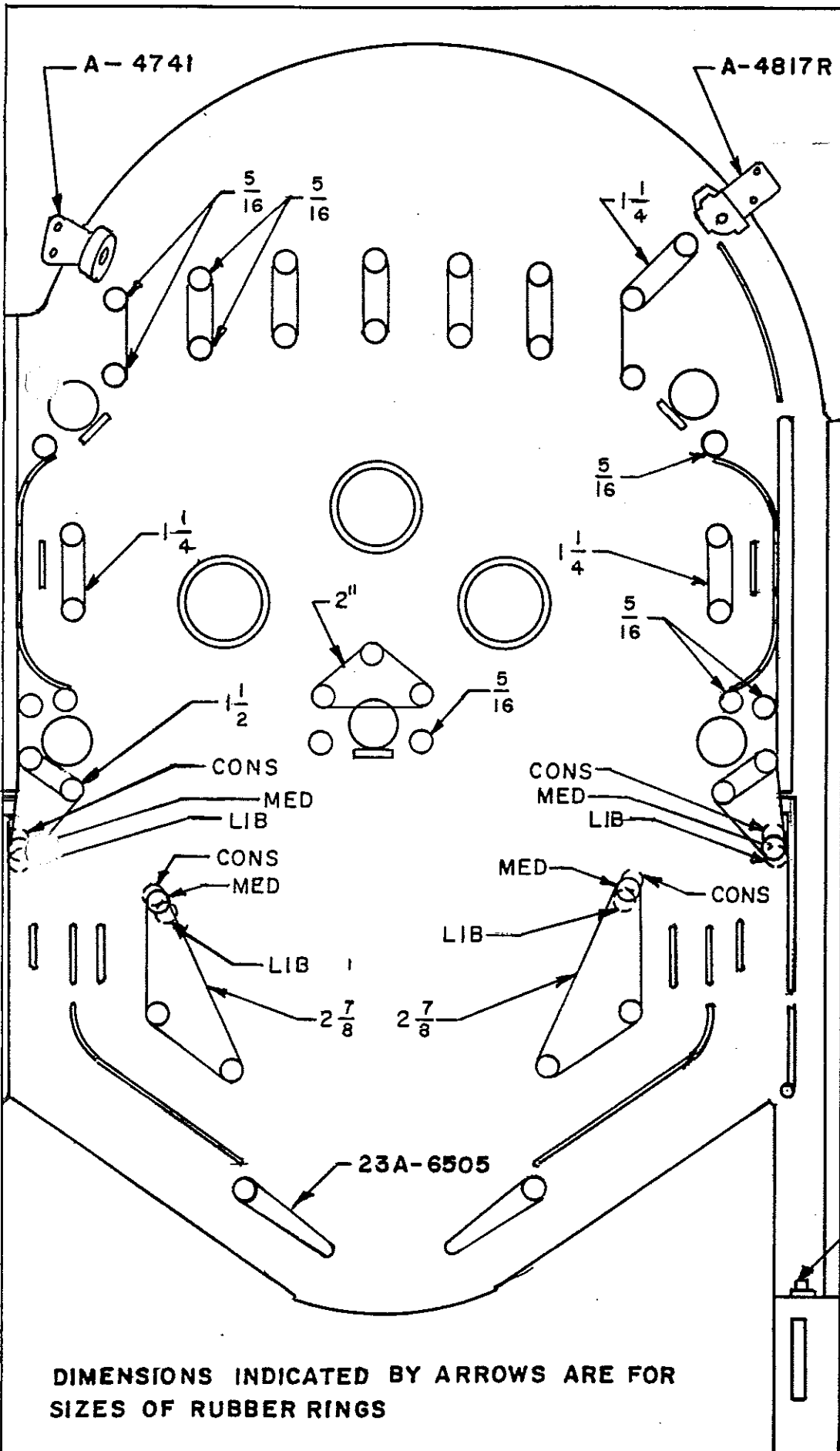
Solenoid Plungers should not have a lubricant of any kind. Should there be a sluggish tendency or if plungers are sticking, the parts should be cleaned with a solvent and flaked graphite applied on reassembly.

SWITCH ADJUSTMENT

BEFORE ADJUSTING SWITCHES, MAKE CERTAIN THE SCREWS HOLDING THE SWITCH STACKS ARE DOWN TIGHTLY. BAKELITE SPACERS IN THE SWITCH STACKS, DUE TO EXCESSIVE MOISTURE, HAVE OCCASIONALLY SHRUNK BY DRYING OUT, CAUSING POOR ADJUSTMENT.

"OXO"-POST ADJUSTMENT SHEET

TO MAKE GAME MORE "CONSERVATIVE" OR "LIBERAL" — MOVE POST $\frac{3}{16}$ AS SHOWN IN SKETCH BELOW, SPOTTING HOLES ARE PROVIDED AND CAN BE SEEN ON REMOVAL OF POSTS.



ABBREVIATIONS:

CONS - CONSERVATIVE
LIB - LIBERAL

RUBBER RING NUMBERS

23A-6300	5/16" I.D.
23A-6303	1 1/4" I.D.
23A-6304	1 1/2" I.D.
23A-6305	2" I.D.
23A-6307	2 7/8" I.D.
23A-6505	1 1/2" I.D.

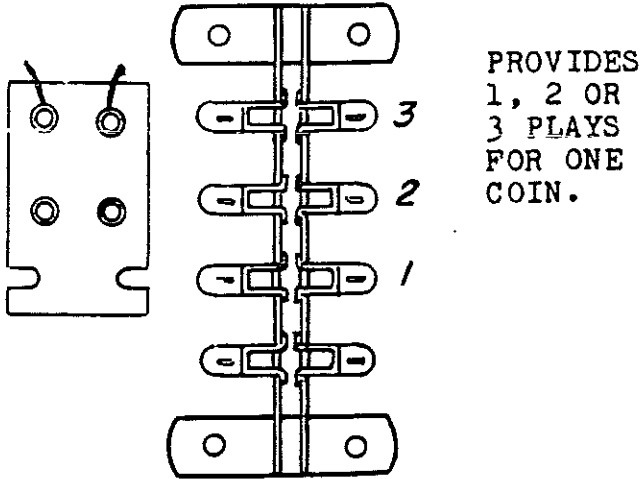
A-4741 REBOUND ASSY
A-4817R BALL GATE AS

23A-6327 BALL SHOOT
RUBBER TIP

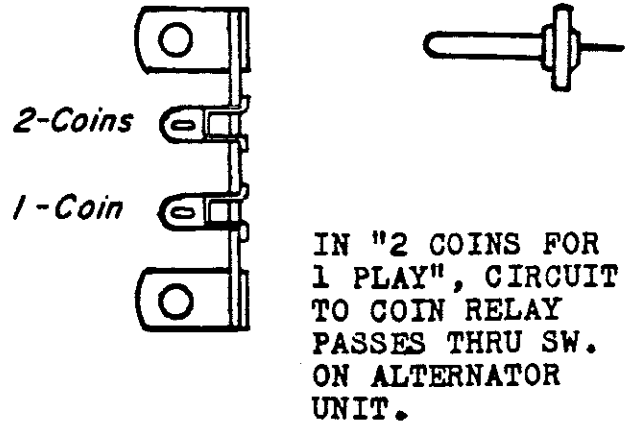
DIMENSIONS INDICATED BY ARROWS ARE FOR SIZES OF RUBBER RINGS

ADJUSTMENTS ON MECHANISM PANEL

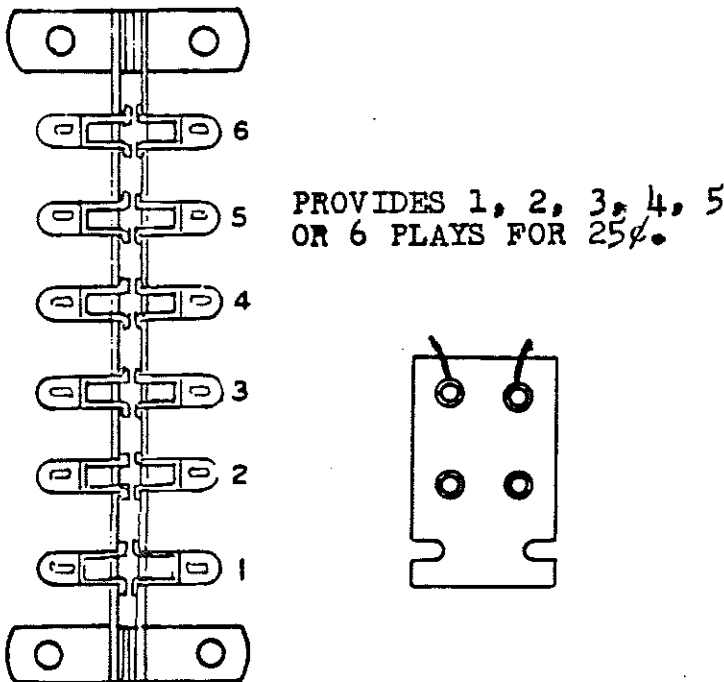
10¢ Adjustment



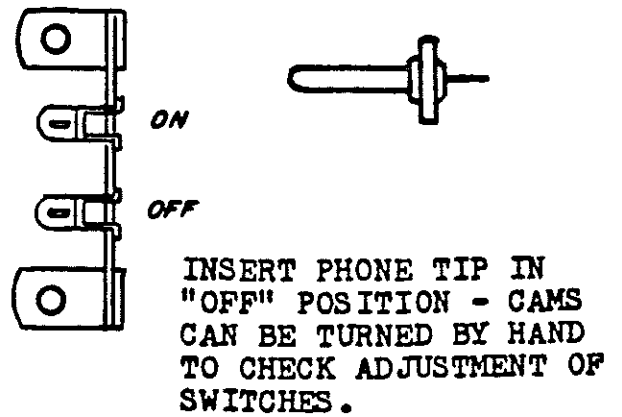
5¢ Adjustment



25¢ Adjustment

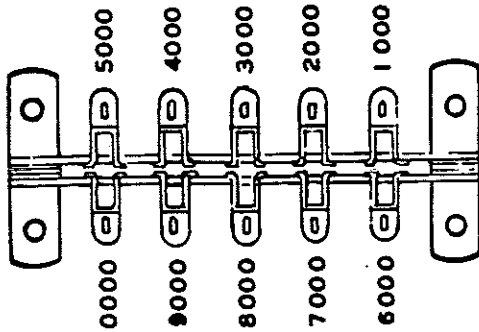


Motor Service Jack



ADJUSTMENTS IN BACKBOX

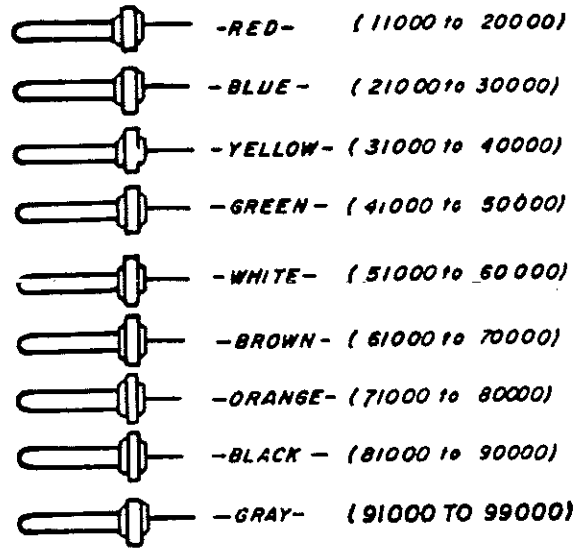
HI-Score Adjustment



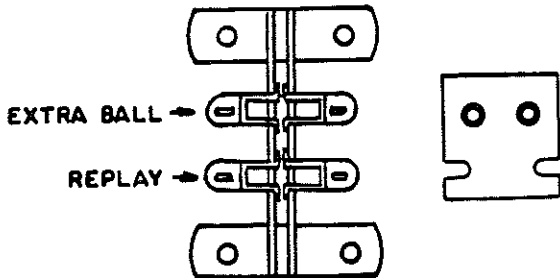
Insert plugs into 10 Point Female at desired positions.

Examples:

Yellow wire into 3000 position scores at 33000.
 Yellow wire into 0000 position scores at 40000.

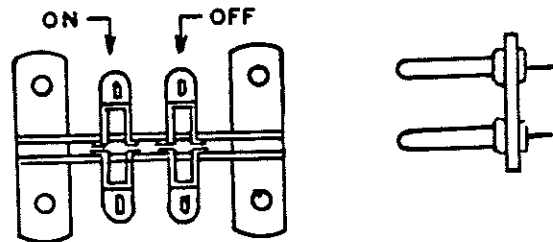


REPLAY-EXTRA BALL ADJ.



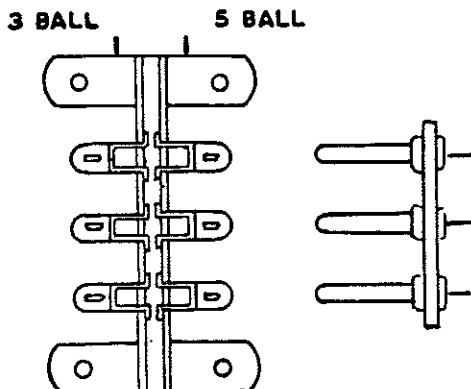
IN REPLAY POSITION; HI-SCORES AND NUMBER MATCH WILL AWARD REPLAYS--- ALSO LEFT OR RIGHT SIDE ROLLOVER WHEN BONUS UNIT IS AT 9th POSITION. IN EXTRA BALL POS.; HI-SCORES, LEFT OR RIGHT SIDE ROLLOVER (AS EXPLAINED ABOVE), AND 3-IN-LINE RELAY (THRU SW. ON EJECT RELAY) WILL AWARD EXTRA BALL.

NUMBER MATCH ADJUSTMENT



In 'ON' position, a number match lite will appear when game is over. To award replays, when number is matched, Extra Ball Adjustment Jack must be in 'Replay' position. In 'Off' position, Number Match is inoperative.

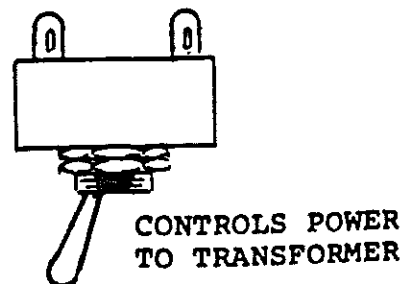
No. of Balls Adjustment



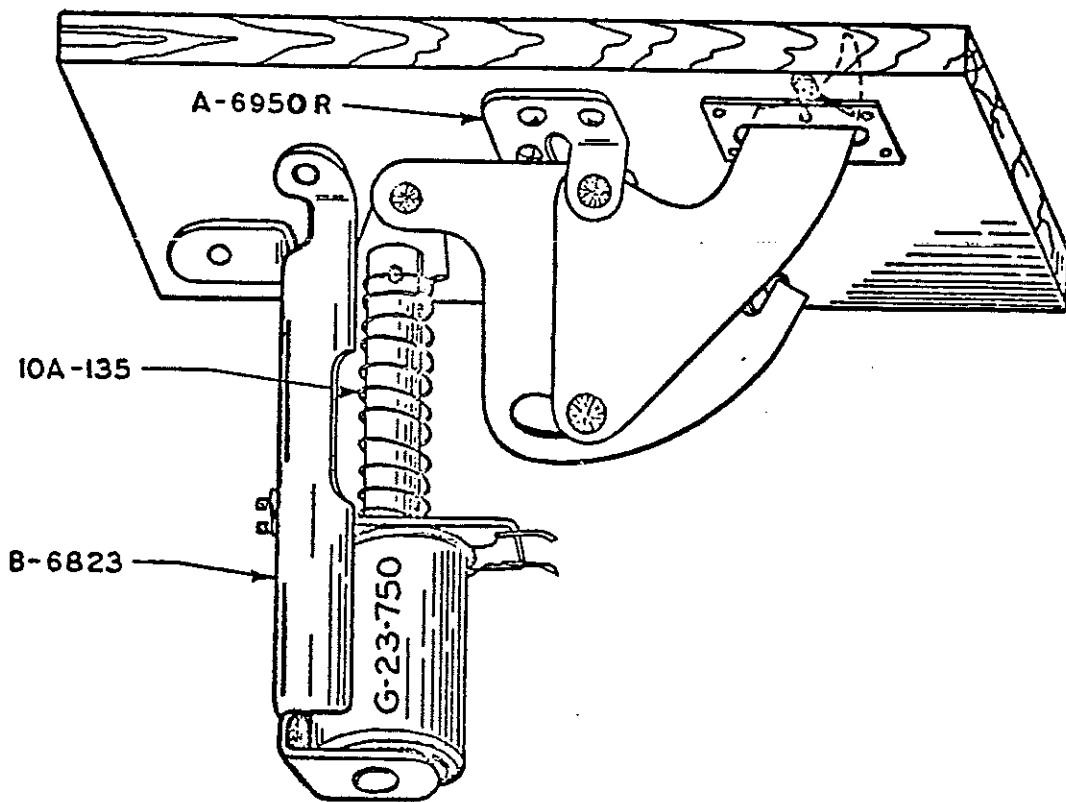
THIS JACK CHANGES 3 BALL TO 5 BALL PLAY OR VICE VERSA.

MASTER ON-OFF SW.

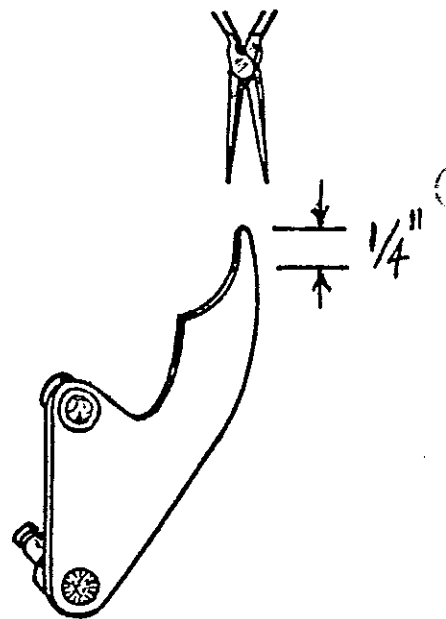
(Located under front of Cabinet)



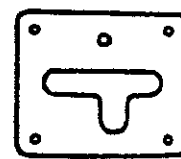
BALL EJECT CAM UNIT



TO CHANGE DIRECTION OF BALL,
 WHEN EJECTED, GRASP "BALL EJECT CAM"
 WITH LONG-NOSED PLIERS (APPROXIMATELY
 1/4") AND BEND SLIGHTLY.
 BENDING TO THE LEFT WILL CHANGE
 DIRECTION OF EJECTED BALL SLIGHTLY
 TO THE RIGHT, AND VICE-VERSA.



CAUTION
 IF BEND IS TOO GREAT, IT MAY
 CAUSE A BIND WHEN "BALL EJECT CAM"
 IS RESTING IN PART #3A-6015G-6.



3A-6015G-6

IMPORTANT NOTICE

**KINDLY INFORM LOCATIONS THAT THEY
CAN TURN DISPLAY LIGHTS ON BY PRESSING
LEFT FLIPPER BUTTON. MACHINE CAN STILL
BE SHUT OFF BY TAPPING BOTTOM OF
CABINET.**

**MASTER SWITCH (ON-OFF) IS LOCATED
UNDERNEATH FRONT PART OF CABINET.**

CAUTION!

The playboard on this machine has an improved finish with excellent wearing properties. Do not under any circumstances clean the board with water, water soap solutions or harsh abrasives. Avoid such things as steel wool, kitchen cleansers or abrasive hand soap. Water will weaken the adhering of the paint to the board and abrasives shorten the board life by many thousand plays. A wax base cleaner with negligible abrasive qualities used lightly, but frequently, will extend the board life to its full capabilities.

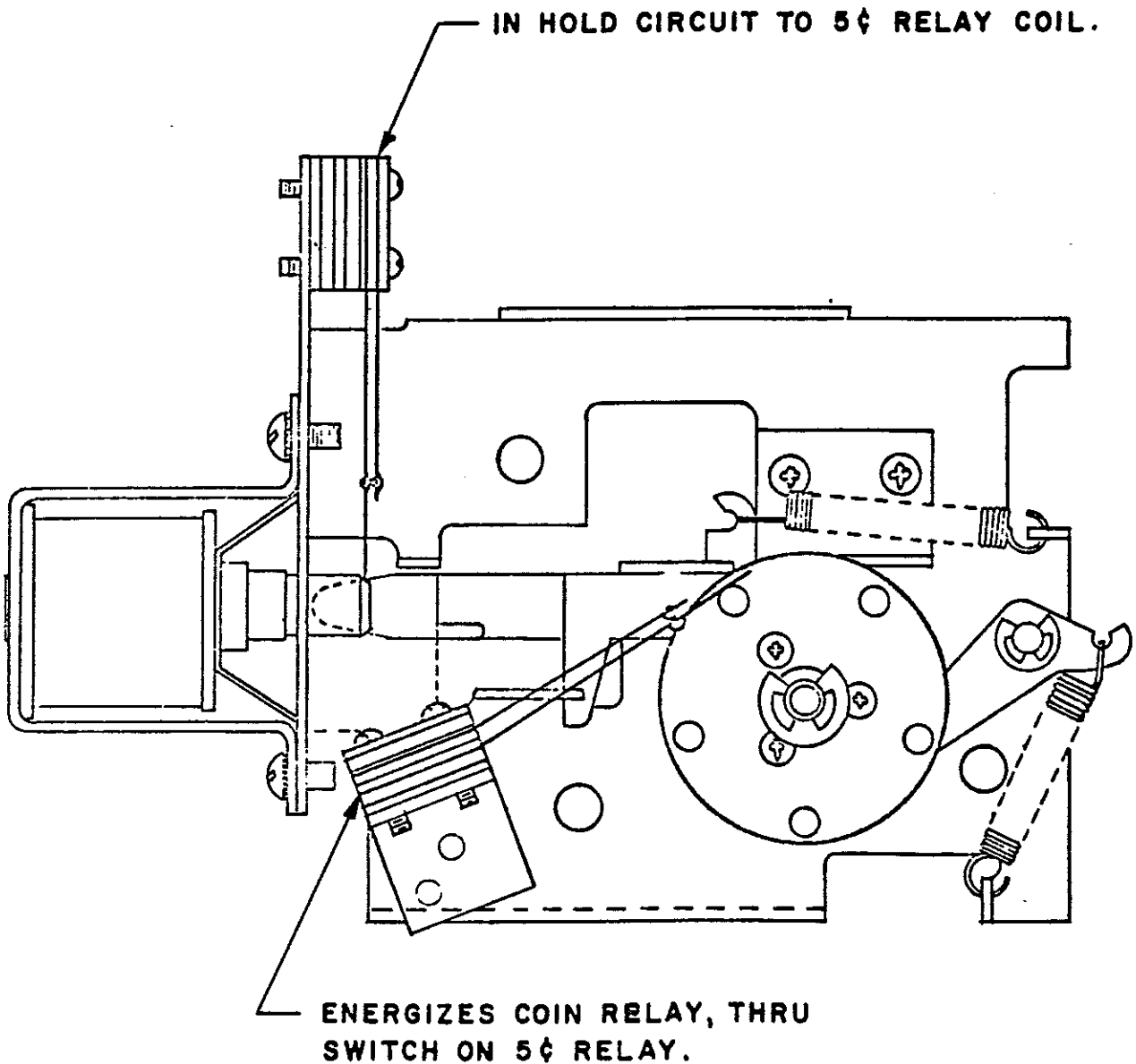
SERVICEMAN TO REMOVE BACKGLASS:

- **WITH BACK DOOR REMOVED, PULL BACK ON BRACKETS AT INSIDE TOP OF LITE BOX.**
- **FROM THE FRONT OF GAME, LIFT GLASS UP AND OUT.**

ALTERNATOR UNIT

LOCATED ON MECHANISM PANEL.

USED IN CONJUNCTION WITH 5¢ RELAY FOR "2 COINS-1 PLAY" FEATURE.



WARRANTY

THE MOTORS IN ALL NEW WILLIAMS PRODUCTS ARE UN-CONDITIONALLY GUARANTEED FOR 6 MONTHS FROM DATE OF PURCHASE.

ANY DEFECTIVE MOTORS RETURNED DURING THE WARRANTY PERIOD WILL BE REPLACED FREE OF CHARGE BY YOUR WILLIAMS DISTRIBUTOR.

IMPORTANT NOTICE

WHEN ORDERING PARTS ALWAYS SPECIFY NAME OF UNIT, GAME AND SERIAL NUMBER, IN ADDITION TO A CLEAR DESCRIPTION OF THE PART AND PART NUMBER IF POSSIBLE.

UNIT PARTS LIST

UNIT NAME	CONTACT DISC	WIPER ASSEMBLY	RATCHET GEAR ASSEMBLY	MOTORS
REPLAY	-----	-----	A-6400	
BALL COUNT	C-6414	B-7456-6	A-6402-5	
NO. MATCH	C-6414	B-7456-2	A-6401	
PLAYER	C-6417	C-6521	A-6404-3	
COIN	C-6414	B-7456-9	A-6402-3	
BONUS	C-6417	B-7456-6	A-6402-9	SCORE MOTOR
10 POINT	B-7253	A-6294	3C-7272	14A-7883 (60 CYCLE)
100 POINT	-----	-----	3C-7272	14A-7884 (50 CYCLE)
1000 POINT	B-7253	A-6294	3C-7272	
10000 POINT	B-7253	A-6294	3C-7272	
ALTERNATOR	-----	-----	3C-7272	

"OXO" COIL CHART

NOTICE:

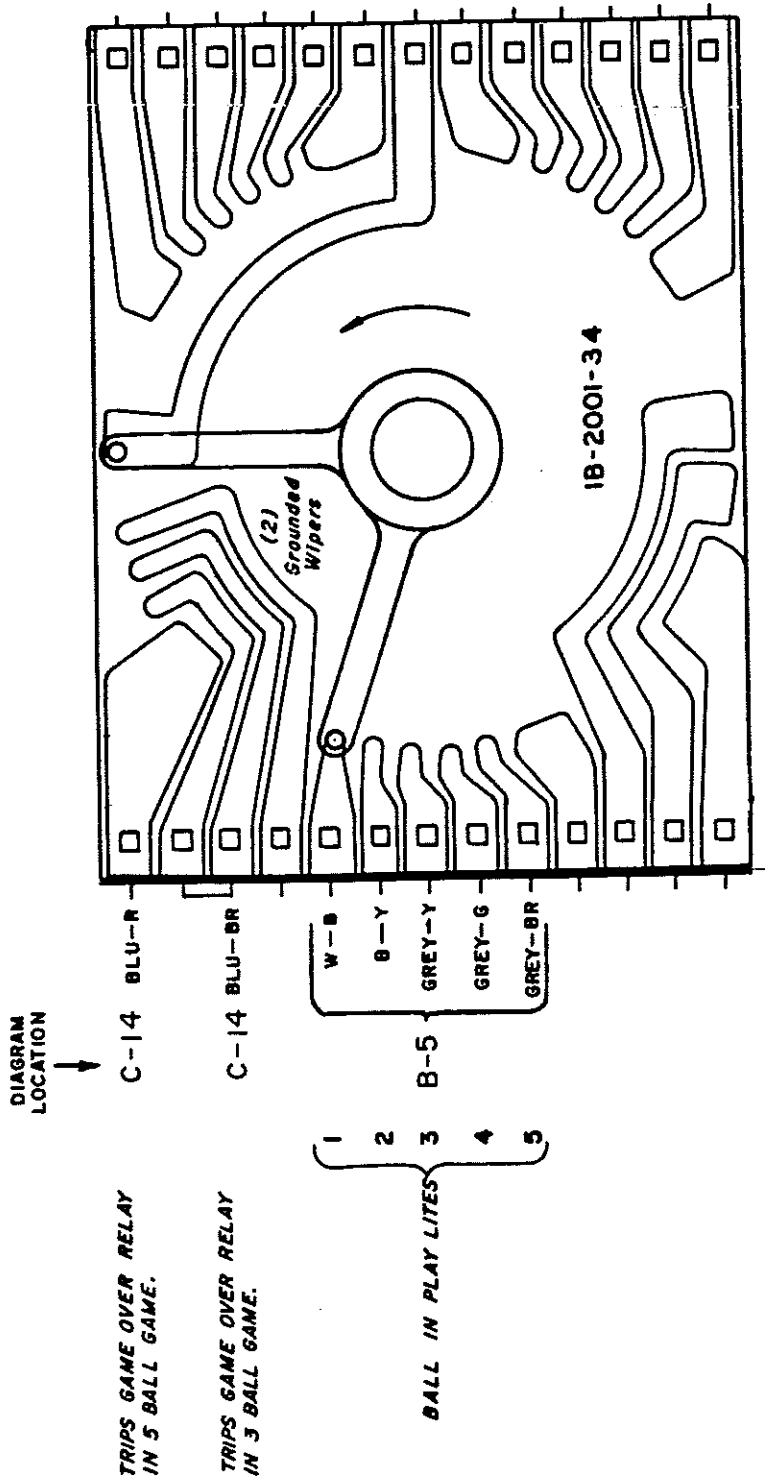
THIS GAME OPERATES ON 24 VOLTS. WHEN ORDERING REPLACEMENT TRANSFORMERS, MOTORS, COILS OR METERS ... MAKE SURE TO SPECIFY CORRECT PART NUMBER.

NUMBER	DESCRIPTION	LOCATION
<u>MOTORS & TRANSFORMERS</u>		
14 A-7883	CONTROL MOTOR - 60 CYCLE	MECH. PANEL
14 A-7884	CONTROL MOTOR - 50 CYCLE	MECH. PANEL
15 A-6771	TRANSFORMER - 60 CYCLE	MECH. PANEL
15 A-6782-1	TRANSFORMER - 50 CYCLE	MECH. PANEL
B 6396	24 VOLT METER	MECH. PANEL
<u>SOLENOID COILS</u>		
A 22-550	COIN UNIT STEP UP BALL RELEASE COIL PLAYER UP UNIT STEP UP	MECH. PANEL PLAYFIELD INSERT
A 23-600	BALL COUNT UNIT STEP UP REPLAY UNIT STEP UP BONUS UNIT STEP UP NUMBER MATCH STEP UP	MECH. PANEL INSERT PLAYFIELD INSERT
A2-23-750	KNOCKER	CABINET
A2-26-1300	TRIPLE CHIME COILS ... (3 req'd.)	CABINET
B 26-800	BALL COUNT UNIT RESET COIN UNIT RESET ALTERNATOR UNIT STEP UP REPLAY UNIT RESET PLAYER UP UNIT RESET BONUS UNIT RESET	MECH. PANEL MECH. PANEL MECH. PANEL INSERT INSERT PLAYFIELD
B1-26-800	SCORE DRUM UNITS ... (16 req'd.)	INSERT
D1-24-1150	RELAY BANK RESET COIL	PLAYFIELD
FL 20-300/ 28-400	FLIPPERS ... (2 req'd.)	PLAYFIELD
G 23-750	EJECT COILS (2 req'd.)	PLAYFIELD
G 23-750 D.C.	D.C. JET BUMPER COILS ... (3 req'd.) D.C. KICKER COILS ... (2 req'd.)	PLAYFIELD PLAYFIELD
M 24-350	TRIPLE BONUS RELAY	PLAYFIELD
M 29-900	1 - 2 RESET RELAY 3 - 4 RESET RELAY	INSERT INSERT
M 29-1100	5¢ RELAY 10 ¢ RELAY 25¢ RELAY ROLL-OVER BUTTON RELAY ADVANCE RELAY CENTER TARGET RELAY BONUS RELAY 10 POINT RELAY 100 POINT RELAY 1,000 POINT RELAY RIGHT SIDE ROLL-OVER RELAY LEFT SIDE ROLL-OVER RELAY	MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD INSERT INSERT INSERT PLAYFIELD PLAYFIELD
M 29-1000	GAME OVER RELAY TRIP RESET RELAY	MECH. PANEL MECH. PANEL
M1-31-1500	COIN LOCKOUT COIL	FRONT DOOR
S 27-500	RELAY BANK TRIP COILS ... (19 req'd.)	PLAYFIELD
XM 27-675	TOTAL PLAY METER COIL	MECH. PANEL
Z 27-1000	EJECT RELAY COIN RELAY GAME OVER RELAY LATCH OUTHOLE RELAY PLAYER RESET RELAY REPLAY RELAY	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL
Z 28-1150	EXTRA BALL RELAY TILT RELAY "A" RELAY "B" RELAY NO. 1 CHANGE RELAY	MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD PLAYFIELD
Z 28-1200	NO. 2 CHANGE RELAY BALL INDEX RELAY GATE RELAY	PLAYFIELD MECH. PANEL PLAYFIELD
Z 29-1250	LOCK RELAY	MECH. PANEL

BALL COUNT UNIT DISC

THIS UNIT RESETS AT THE START OF A NEW GAME, (DURING RESET CYCLE). IT ADVANCES ONE STEP EACH TIME THE LAST PLAYER COMPLETES HIS TURN.

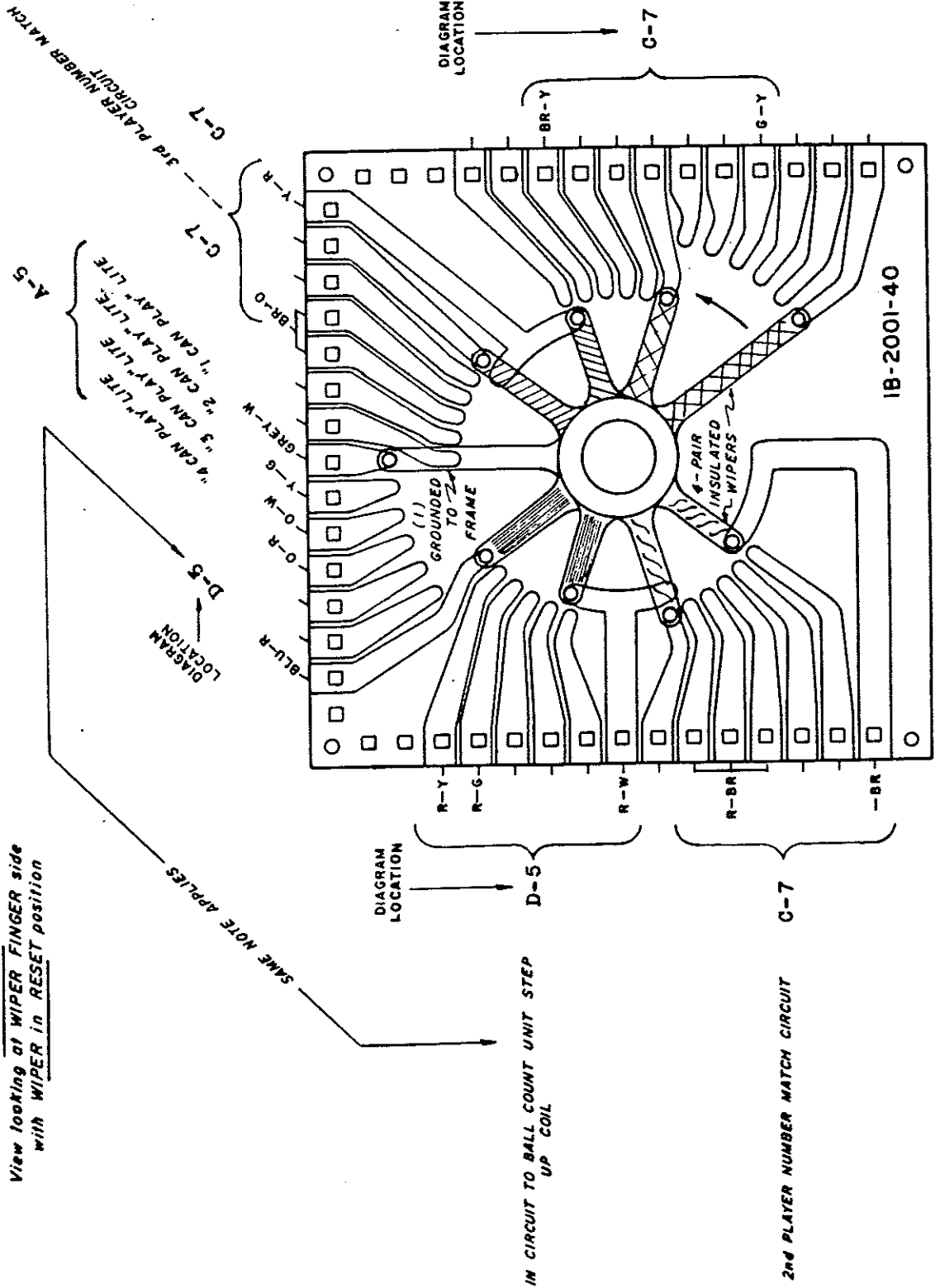
View looking at WIPER FINGER side with WIPER in ZERO position.



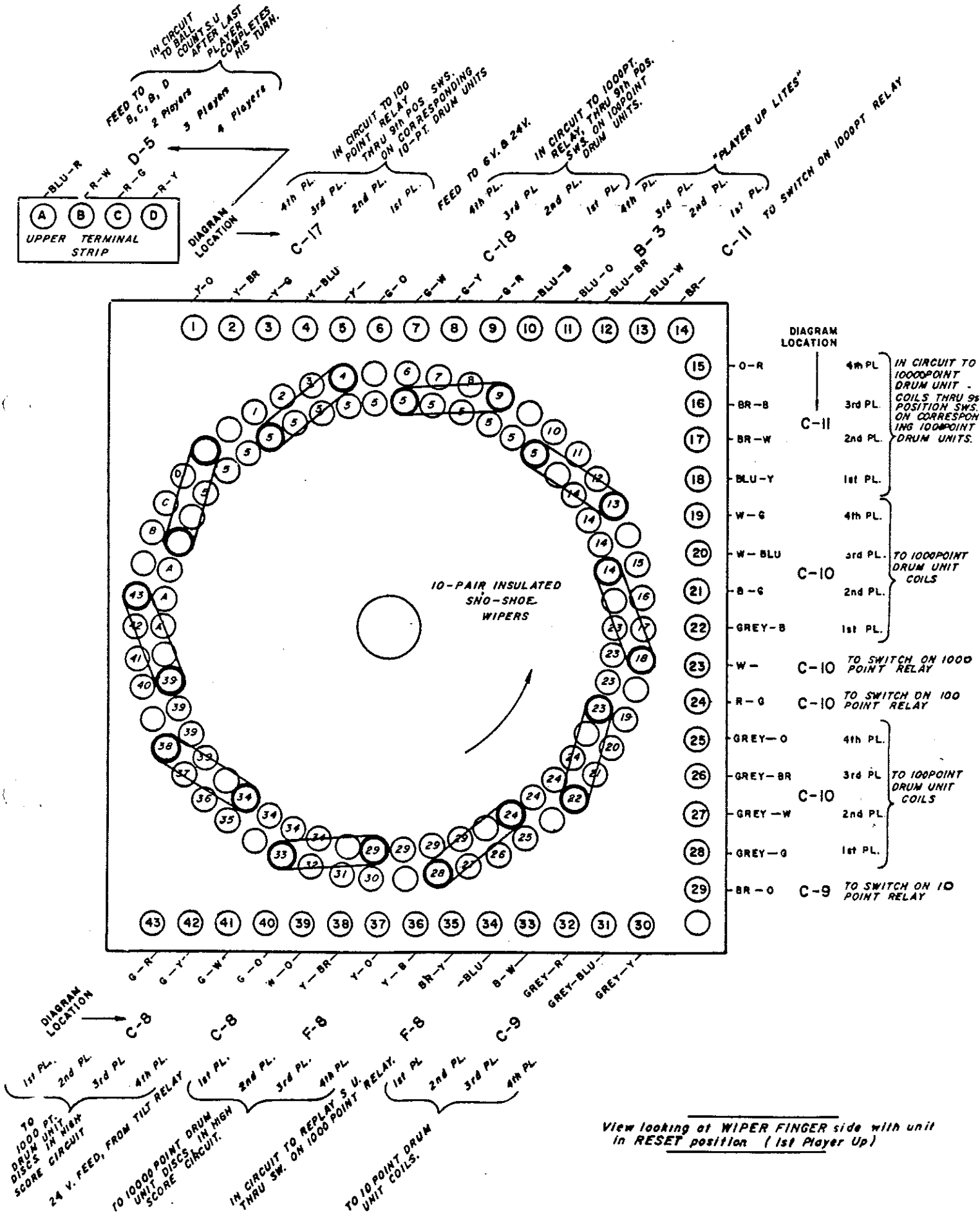
COIN S. U. DISC

THIS UNIT RESETS AT START OF A GAME (DURING RESET CYCLE). IT THEN ADVANCES ONE STEP EACH TIME THE COIN RELAY IS PULSED.

View looking at WIPER FINGER side with WIPER in RESET position



PLAYER UNIT DISC



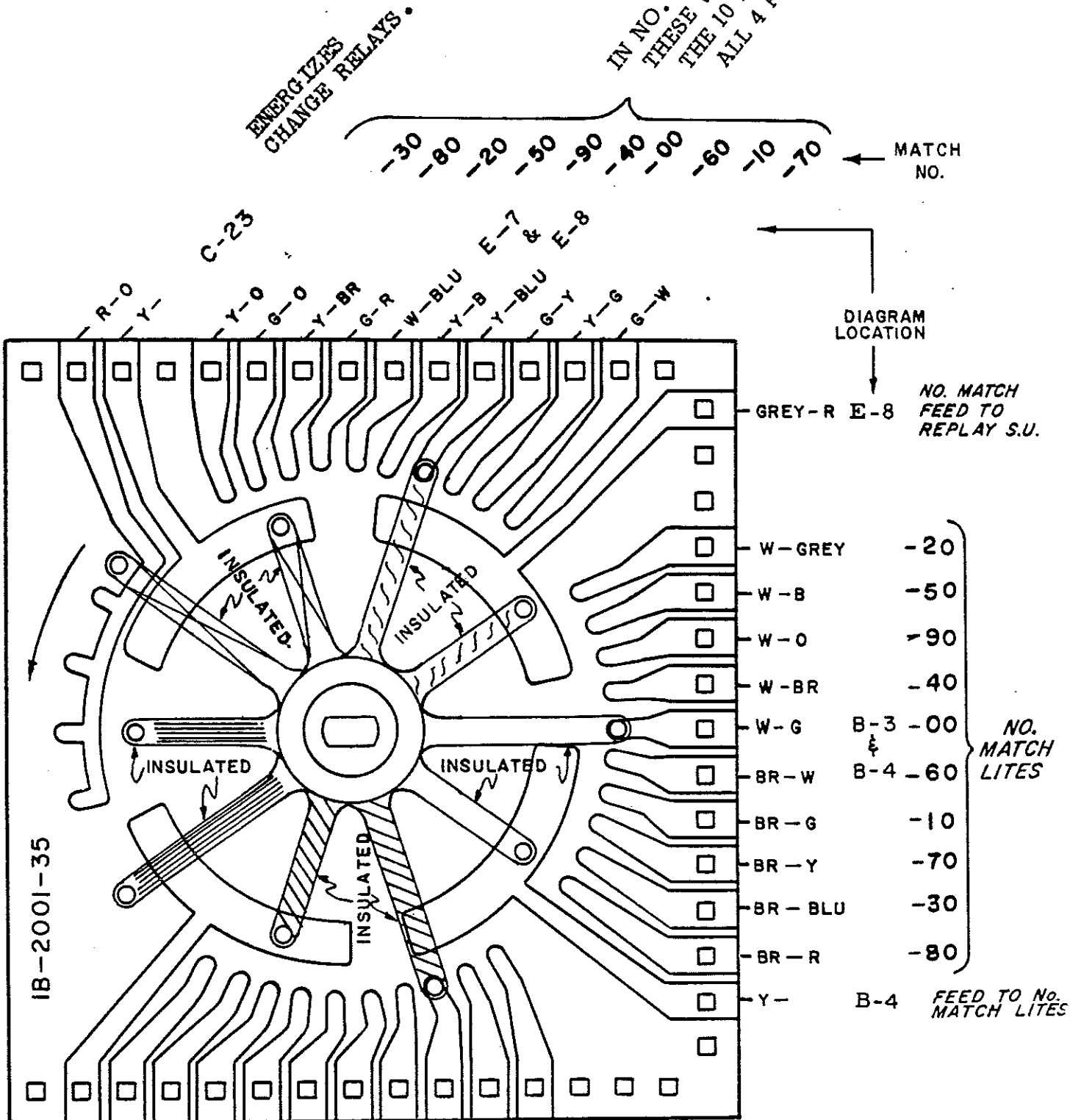
No. MATCH UNIT

THIS UNIT ADVANCES ONE STEP EACH TIME THE TEN POINT RELAY IS PULSED.

VIEW LOOKING AT WIPER FINGER SIDE

IN NO. MATCH CIRCUIT, THESE WIRES COME FROM THE 10 PT. D.U. DISC OF ALL 4 PLAYERS.

ENERGIZES CHANGE RELAYS.



BONUS UNIT

THIS UNIT STEPS UP EACH TIME THE "ADVANCE RELAY" IS PULSED.
THE RESET COIL ON THIS UNIT ENERGIZED BY SCORE MOTOR CAM SWITCH-5B, THRU SWITCH ON "BONUS RELAY."

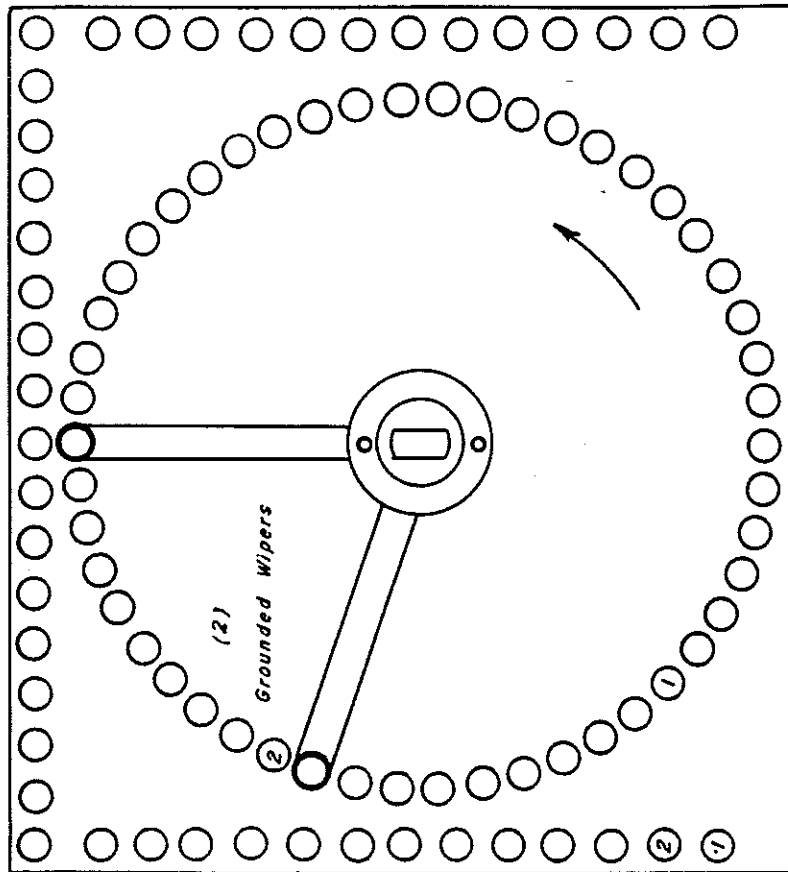


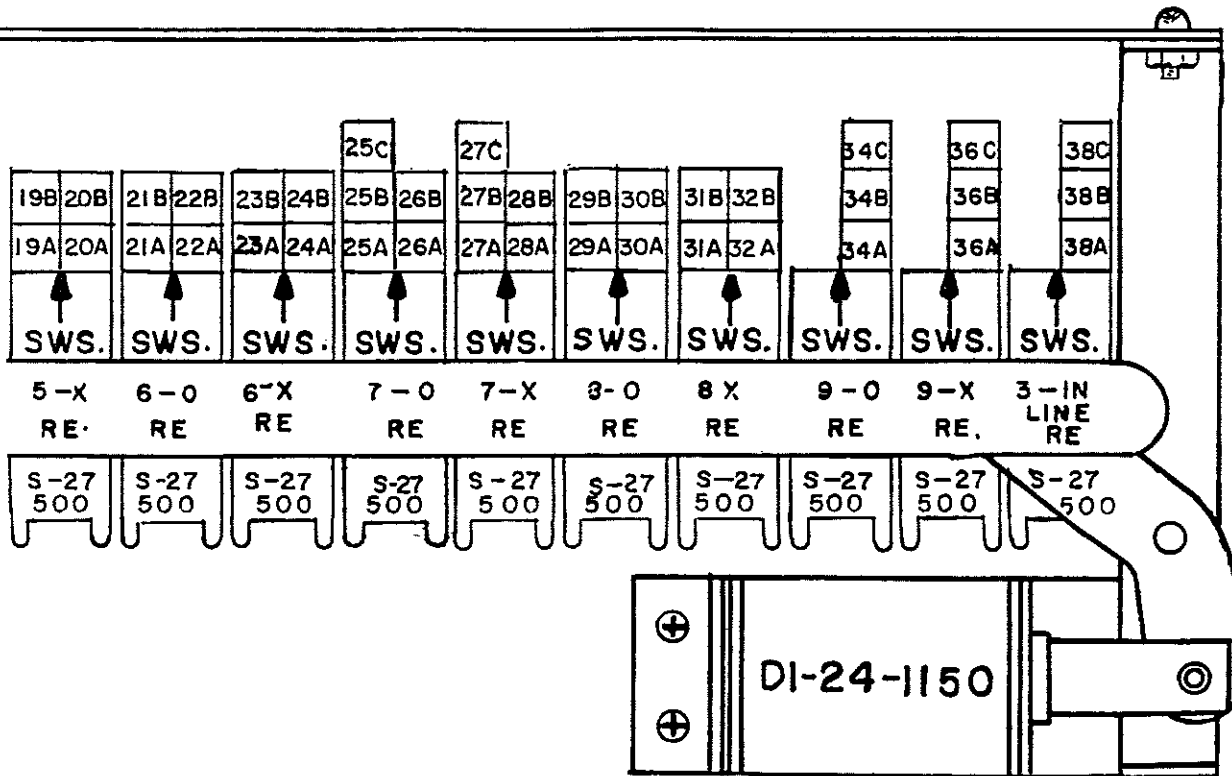
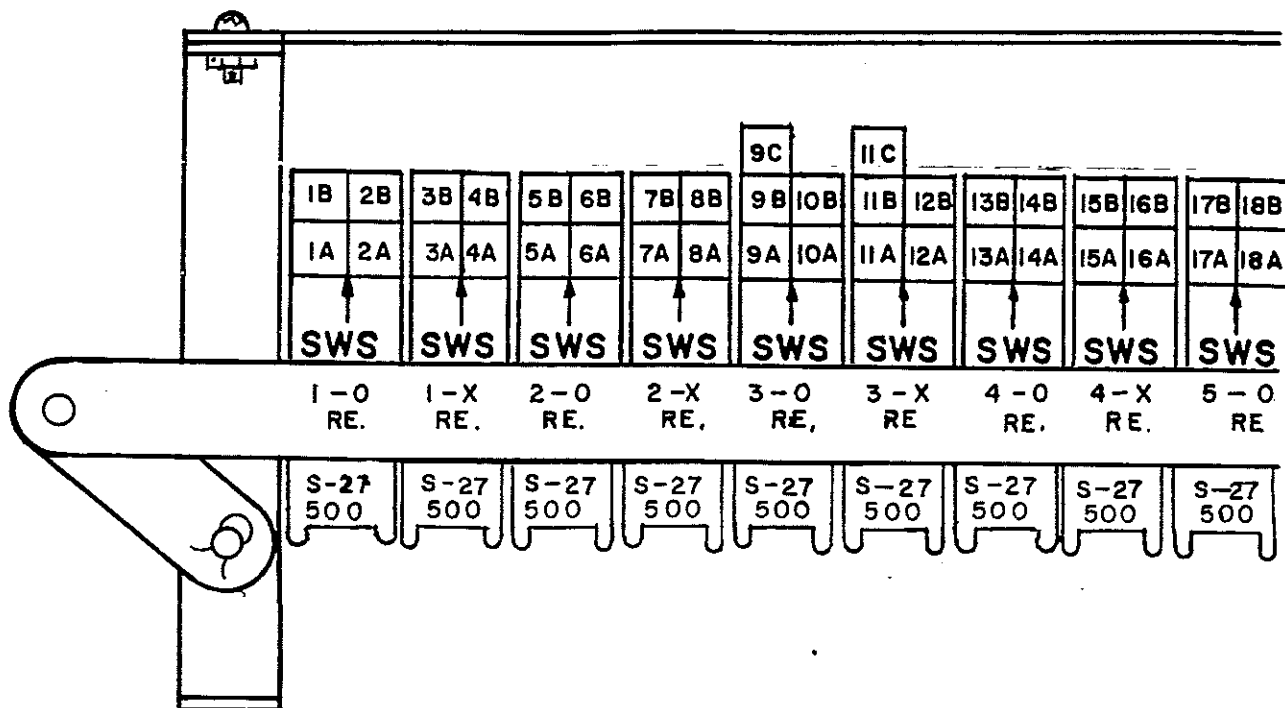
DIAGRAM
LOCATION



In Circuit To Replay S.U. or Extra Ball
Relay.
To Left and Right Side Rollover
Lights.

A-9
D-12
GRAY-BR-2
R-B-1

RELAY BANK SWS.



RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"1-0" RELAY	1B	R-G -Y-	B-6	N.O.	TO LEFT TOP "0" LITE.
	1A	-Y- -J-	C-22	N.O.	IN SERIES WITH SWITCH 5A ON "2-0" RELAY, AND 13A ON "4-0" RELAY. (1-2-3 AND 1-4-7 COMBINATIONS).
	2B	-J- R-BLU BR-Y	D-15	M&B	OPENS IN SERIES WITH SWITCH 4B ON "1-X" RELAY AND CLOSSES TO 1,000 POINT RELAY (WHEN MAKING LEFT TOP "0" OR "X" ROLL-OVER SWITCH).
	2A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-5-1 COMBINATION. (SEE SWITCH 34A ON "9-0" RELAY).
"1-X" RELAY	3B	R-W -Y-	B-6	N.O.	TO LEFT TOP "X" LITE.
	3A	-Y- -J-	C-22	N.O.	IN SERIES WITH SWITCH 7A ON "2-X" RELAY, AND 15A ON "4-X" RELAY. (1-2-3 AND 1-4-7 COMBINATIONS).
	4B	R-O -J- BR-Y	E-15	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSSES TO 1,000 POINT RELAY. (SEE SWITCH 2B ON "1-0" RELAY).
	4A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-5-1 COMBINATION. (SEE SWITCH 36A ON "9-X" RELAY).
"2-0" RELAY	5B	R-BR -Y-	B-6	N.O.	TO CENTER TOP "0" LITE.
	5A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 9A ON "3-0" RELAY. (1-2-3- COMBINATION).
	6B	-J- R-B BR-Y	D-15	M&B	OPENS IN SERIES WITH SWITCH 8B ON "2-X" RELAY AND CLOSSES TO 1,000 POINT RELAY (WHEN MAKING CENTER TOP "0" OR "X" ROLL-OVER SWITCH).
	6A	-J- -J-	D-23	N.O.	IN CIRCUIT TO "3-IN-LINE RELAY", IN 5-82 COMBINATION. (SEE SWITCH 18A ON "5-0" RELAY).
"2-X" RELAY	7B	BLU-R -Y-	B-6	N.O.	TO CENTER TOP "X" LITE.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"2-X" RELAY	7A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 11A ON "3-X" RELAY. (1-2-3 COMBINATION).
	8B	R-O -J- BR-Y	E-15	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSES TO 1,000 POINT RELAY. (SEE SWITCH 6B ON "2-0" RELAY).
	8A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 5-8-2 COMBINATION. (SEE SWITCH 20A ON "5-X" RELAY).
"3-0" RELAY	9C	-J- -J-	D-23	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 5-7-3 COMBINATION. (SEE SWITCH 18A ON "5-0" RELAY).
	9B	BLU-Y -Y-	B-7	N.O.	TO RIGHT TOP "0" LITE.
	9A	-J- -J-	D-22	N.O.	IN CIRCUIT TO ENERGIZE "3-IN-LINE" RELAY (SEE SWITCH 1A ON "1-0" RELAY).
	10B	-J- -BLU- BR-Y	D-15	M&B	OPENS IN SERIES WITH SWITCH 12B ON "3-X" RELAY AND CLOSES TO 1,000 POINT RELAY (WHEN MAKING CENTER TOP "0" OR "X" ROLL-OVER SWITCH).
	10A	-J- -J-	D-23	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-6-3 COMBINATION. (SEE SWITCH 34A ON "9-0" RELAY).
"3-X" RELAY	11C	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 5-7-3 COMBINATION. (SEE SWITCH 20A ON "5-X" RELAY).
	11B	BLU-BR -Y-	B-7	N.O.	TO RIGHT TOP "X" LITE.
	11A	-J- -J-	D-22	N.O.	IN CIRCUIT TO ENERGIZE "3-IN-LINE" RELAY. (SEE SWITCH 3A ON "1-X" RELAY).
	12B	R-O -J- BR-Y	E-15	M&B	OPEN IN CIRCUIT TO ADVANCE RELAY AND CLOSES TO 1,000 POINT RELAY. (SEE SWITCH 10B ON "3-0" RELAY).
	12A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-6-3 COMBINATION. (SEE SWITCH 36A ON "9-X" RELAY).

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"4-0" RELAY	13B	BLU-B -Y-	B-7	N.O.	TO LEFT SIDE "0" LITE.
	13A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 25A ON "7-0" RELAY. (1-4-7 COMBINATION).
	14B	-J- BLU-W BR-Y	D-15	M&B	OPENS IN SERIES WITH SWITCH 16B ON "4-X" RELAY, AND CLOSSES TO 1,000 POINT RELAY. (SEE SWITCH D ON LEFT SIDE ROLL-OVER RELAY).
	14A	-J- -J-	D-23	N.O.	IN SERIES WITH SWITCH 22A ON "6-0" RELAY (5-4-6 COMBINATION).
"4-X" RELAY	15B	G-B -Y-	B-7	N.O.	TO LEFT SIDE "X" LITE.
	15A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 27A ON "7-X" RELAY. (1-4-7 COMBINATION).
	16B	R-O -J- BR-Y	E-15	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSSES TO 1,000 POINT RELAY.
	16A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 24A ON "6-X" RELAY (5-4-6 COMBINATION).
"5-0" RELAY	17B	B-R -Y-	B-7	N.O.	TO CENTER "0" LITE.
	17A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 2A ON "1-0" RELAY (9-5-1 COMBINATION).
	18B	-J- -W-	D-15	N.C.	IN SERIES WITH SWITCH 20B ON "5-X" RELAY
	18A	-Y- -J-	C-23	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY. (5-7-3 5-4-6 AND 5-8-2 COMBINATIONS.)
"5-X" RELAY	19B	B-BLU -Y-	B-7	N.O.	TO CENTER "X" LITE.
	19A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 4A ON "1-X" RELAY. (9-5-1 COMBINATION).
	20B	R-O -J-	E-15	N.C.	IN CIRCUIT TO PULSE ADVANCE RELAY. (SEE SWITCH 1B ON CENTER TARGET RELAY).
	20A	-Y- -J-	C-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY. (5-7-3 5-4-6 AND 5-8-2 COMBINATIONS.)

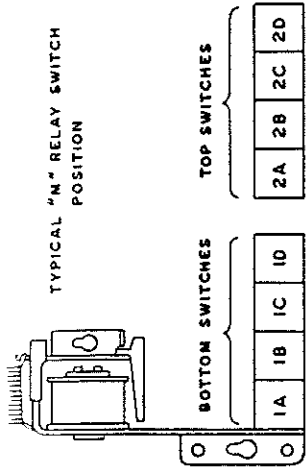
RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"6-0" RELAY	21B	B-Y -Y-	B-8	N.O.	TO RIGHT SIDE "0" LITE.
	21A	-J- -J-	D-23	N.O.	IN SERIES WITH SWITCH 10A ON "3-0" RELAY. (9-6-3 COMBINATION).
	22B	-J- W-BLU BR-Y	D-15	M&B	OPENS IN SERIES WITH SWITCH 24B ON "6-X" RELAY AND CLOSES TO 1,000 POINT RELAY. (SEE SWITCH C ON RIGHT SIDE ROLLOVER RELAY).
	22A	-J- -J-	D-23	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 5-4-6 COMBINATION. (SEE SWITCH 18A ON "5-0" RELAY).
"6-X" RELAY	23B	B-G -Y-	B-8	N.O.	TO RIGHT SIDE "X" LITE.
	23A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 12A ON "3-X" RELAY. (9-6-3 COMBINATION).
	24B	R-O -J- BR-Y	E-15	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSES TO 1,000 POINT RELAY. (SEE SWITCH C ON RIGHT SIDE ROLLOVER RELAY).
	24A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 5-4-6 COMBINATION. (SEE SWITCH 20A ON "5-X" RELAY).
"7-0" RELAY	25C	-J- -J-	D-23	N.O.	IN SERIES WITH SWITCH 9C ON "3-0" RELAY. (5-7-3- COMBINATION).
	25B	B-W -Y-	B-8	N.O.	TO LEFT BOTTOM "0" LITE.
	25A	-J- -J-	D-22	N.O.	IN CIRCUIT TO ENERGIZE "3-IN-LINE" RELAY (SEE SWITCH 1A ON "1-0" RELAY).
	26B	-J- W-GRAY BR-Y	D-16	M&B	OPENS IN SERIES WITH SWITCH 28B ON "7-X" RELAY, AND CLOSES TO 1,000 POINT RELAY (WHEN MAKING LEFT BOTTOM (INSIDE) ROLLOVER SWITCH).
	26A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-8-7 COMBINATION. (SEE SWITCH 34A ON "9-0" RELAY).

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"7-X" RELAY	27C	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 11C ON "3-X" RELAY. (5-7-3 COMBINATION).
	27B	B-O -Y-	B-8	N.O.	TO LEFT BOTTOM "X" LITE.
	27A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY. (SEE SWITCH 3A ON "1-X" RELAY).
	28B	R-O -J- BR-Y	E-16	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSSES TO 1,000 POINT RELAY. (SEE SWITCH 26B ON "7-0" RELAY).
	28A	-J- -J-	D-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY, IN 9-8-7 COMBINATION. (SEE SWITCH 36A ON "9-X" RELAY).
"8-0" RELAY	29B	GRAY-R -Y-	B-8	N.O.	TO CENTER BOTTOM "0" LITE.
	29A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 26A ON "7-0" RELAY. (9-8-7 COMBINATION).
	30B	-J- -BR-	D-16	N.C.	IN SERIES WITH SWITCH 32B ON "8-X" RELAY.
	30A	-J- -J-	D-23	N.O.	IN SERIES WITH SWITCH 6A ON "2-0" RELAY (5-8-2 COMBINATION).
"8-X" RELAY	31B	GRAY-BLU -Y-	B-8	N.O.	TO CENTER BOTTOM "X" LITE.
	31A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 28A ON "7-X" RELAY. (9-8-7 COMBINATION).
	32B	R-O -J-	E-16	N.C.	IN CIRCUIT TO ADVANCE RELAY. (SEE SWITCH 1B ON ROLLOVER BUTTON RELAY).
	32A	-J- -J-	D-22	N.O.	IN SERIES WITH SWITCH 8A ON "2-X" RELAY. (5-8-2 COMBINATION).
"9-0" RELAY	34C	-J- GRAY-W BR-Y	D-16	M&B	OPENS IN SERIES WITH SWITCH 36C ON "9-X" RELAY, AND CLOSSES TO 1,000 POINT RELAY. (WHEN MAKING RIGHT BOTTOM (INSIDE) ROLLOVER SWITCH).
	34B	GRAY-Y -Y-	B-8	N.O.	TO RIGHT BOTTOM "0" LITE.
	34A	-Y- -J-	C-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY. (9-5-1, 9-8-7 AND 9-6-3 COMBINATIONS).

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"9-X" RELAY	36C	R-0 -J- BR-Y	E-16	M&B	OPENS IN CIRCUIT TO ADVANCE RELAY AND CLOSSES TO 1,000 POINT RELAY. (SEE SWITCH 34C ON "9-0" RELAY).
	36B	GRAY-G -Y-	B-9	N.O.	TO RIGHT BOTTOM "X" LITE.
	36A	-Y- -J-	C-22	N.O.	IN CIRCUIT TO "3-IN-LINE" RELAY. (9-5-9-8-7 AND 9-6-3 COMBINATIONS).
"3-IN- LINE" RELAY	38C	-J- -J-	E-22	N.C.	TO COIL ON THIS RELAY, FROM ALL COMBINATIONS OF 3-IN-LINE NUMBERS.
	38B	R-Y -Y-	C-23	N.O.	ENERGIZES EXTRA BALL RELAY, THRU SWITCH ON EJECT RELAY.
	38A	-Y- GRAY-0	B-9	N.O.	TO LEFT & RIGHT EJECT POCKET LITES.

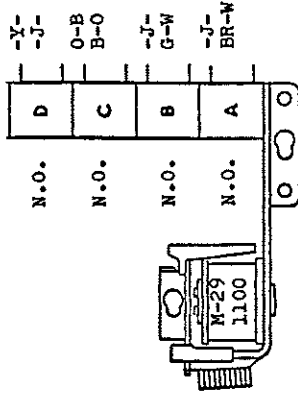
A. C. RELAYS & SWITCHES

On Mechanism Panel



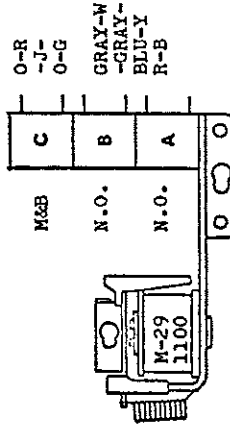
5¢

IS ENERGIZED BY 5¢ COIN SWITCH.



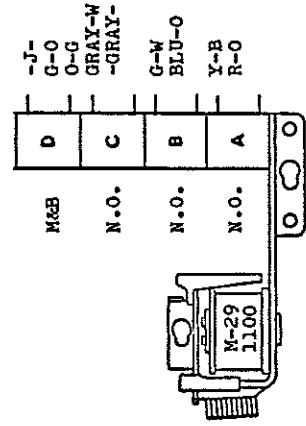
10¢

IS ENERGIZED BY 10¢ COIN SWITCH, IF 10¢ ADJUSTMENT JACK IS IN "2 PLAYS" OR "3 PLAYS" POSITION.



25¢

IS ENERGIZED BY 25¢ COIN SWITCH.



ENERGIZES ALTERNATOR UNIT COIL.

ENERGIZES LOCK RELAY.

ENERGIZES COIN RELAY, THRU SWITCH ON ALTERNATOR UNIT.

IN HOLD CIRCUIT TO THIS RELAY.

OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.

PULSES REPLAY S.U. COIL, THRU IMPULSE CAM SWITCH B.

IN HOLD CIRCUIT TO THIS RELAY.

OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.

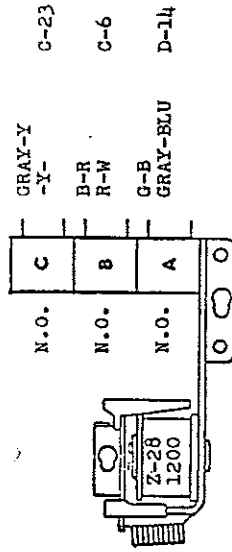
PULSES REPLAY S.U. COIL, THRU IMPULSE CAM SWITCH B.

ENERGIZES COIN RELAY IN "6 PLAYS FOR 25¢" ADJUSTMENT.

IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX

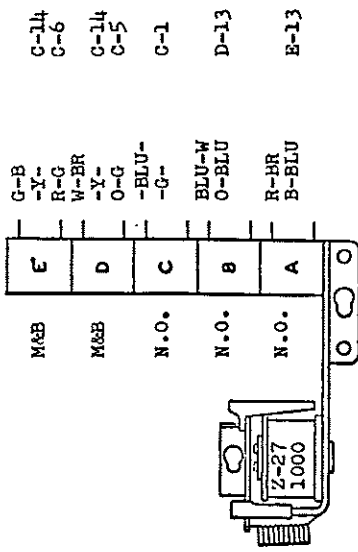
IS ENERGIZED BY 1,000 RELAY, THRU SWITCH ON EXTRA BALL RELAY---ALSO BY TILT RELAY.



C-23 IN SERIES WITH SWITCH A ON EXTRA BALL RELAY.
 C-6 IN CIRCUIT TO BALL COUNT UNIT S.U.---ALSO IN SERIES WITH SWITCH C ON PLAYER RESET RELAY.
 D-14 IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE

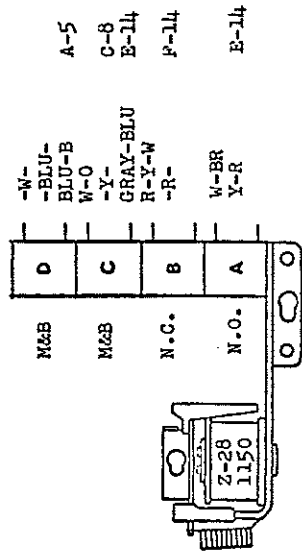
IS ENERGIZED BY OUTHOLE SWITCH, THRU SWITCH ON BONUS RELAY AND ZERO POSITION SWITCH ON BONUS UNIT.



C-14 OPENS IN HOLD CIRCUIT TO BALL INDEX RELAY AND CLOSSES IN SERIES WITH SWITCH C ON EXTRA BALL RELAY.
 C-14 OPENS IN CIRCUIT TO TILT RELAY, AND CLOSSES TO RUN SCORE MOTOR.
 C-5 EMERGIIZES RELAY BANK RESET COIL AT SCORE MOTOR CAM SWITCH 1D.
 C-1 EMERGIIZES "BALL RELEASE COIL" AT SCORE MOTOR CAM SWITCH 4C.
 D-13 IN HOLD CIRCUIT TO THIS RELAY.
 E-13

TILT

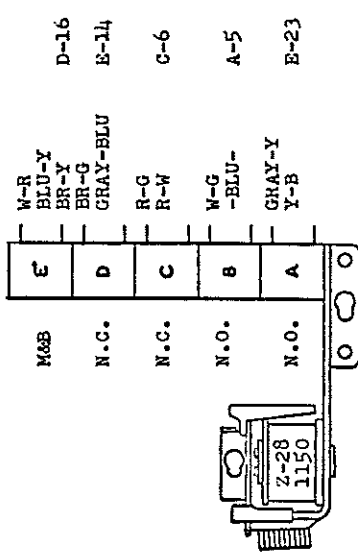
IS ENERGIZED BY PLUMB BOB TILT, BALL ROLLDOWN TILT OR PLAYFIELD VIBRATION TILT SWITCH.



A-5 OPENS IN CIRCUIT TO MOST PLAYFIELD LITES AND CLOSSES TO TILT LIFE.
 C-8 OPENS IN HI-SCORE CIRCUIT TO REPLAY S.U. COIL AND CLOSSES TO EMERGIIZE BALL INDEX RELAY.
 E-14 OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.
 E-14 HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON OUTHOLE RELAY.

EXTRA BALL

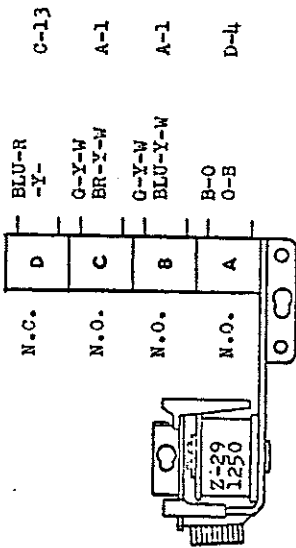
IS ENERGIZED BY EJECT RELAY, THRU SWITCH ON "3 IN LINE" RELAY---ALSO BY HI-SCORE CIRCUIT, THRU "REPLAY-EXTRA BALL" ADJUSTMENT JACK.



D-16 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSSES TO 1,000 POINT RELAY.
 E-14 TO BALL INDEX RELAY FROM SWITCH ON 1,000 POINT RELAY.
 G-6 IN SERIES WITH SWITCH B ON BALL INDEX RELAY.
 A-5 TO "SHOOT AGAIN" LITES.
 E-23 IN HOLD CIRCUIT TO THIS RELAY.

LOCK

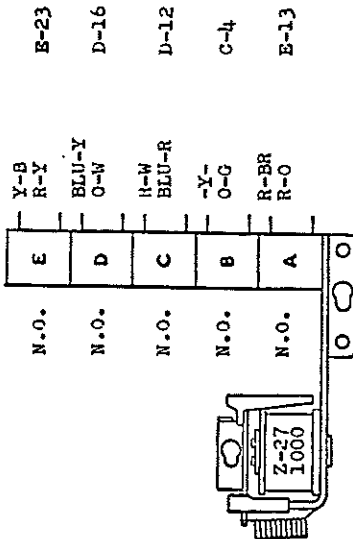
IS ENERGIZED BY THE 5/8 RELAY, LEFT FLIP-
PER SWITCH OR SCORE MOTOR CAM SWITCH 5A.



C-13 ENERGIZES GAME-OVER RELAY (TRIP COIL).
A-1 6 VOLTS FROM TRANSFORMER TQ LINES.
A-1 6 VOLTS FROM TRANSFORMER TC LINES.
D-4 HOLD CIRCUIT TO THIS RELAY THRU CABINET BOTTOM KICK-OFF SWITCH.

EJECT

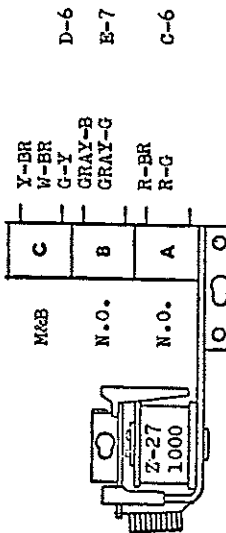
IS ENERGIZED BY LEFT OR RIGHT EJECT
SWITCH, THRU SCORE MOTOR INDEX CAM
SWITCH C.



B-23 ENERGIZES EXTRA BALL RELAY, THRU SWITCH ON "3 IN LINE"
RELAY.
D-16 IN SERIES WITH SWITCH E ON EXTRA BALL RELAY.
D-12 PULSES LEFT AND RIGHT EJECT COILS, THRU SCORE MOTOR CAM
SWITCH 1A.
C-4 RUNS SCORE MOTOR.
E-13 IN HOLD CIRCUIT TO THIS RELAY.

PLAYER RESET

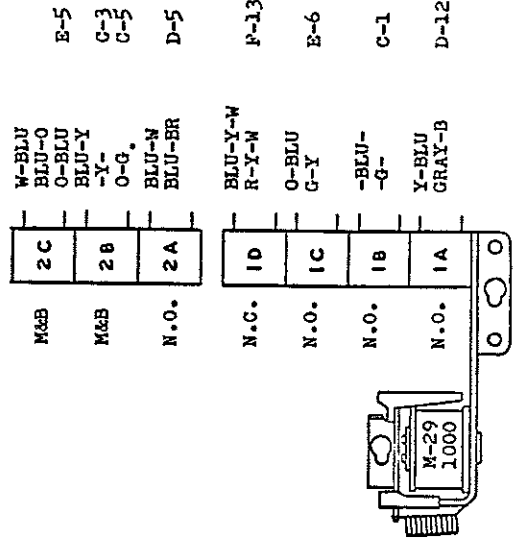
IS ENERGIZED BY BALL COUNT UNIT END-OF-
STROKE SWITCH. IT THEN HOLDS IN THRU
SCORE MOTOR INDEX CAM SWITCH D.



D-6 OPENS IN CIRCUIT TO PLAYER UNIT S.U. COIL AND CLOSSES TO
PLAYER UNIT RESET COIL.
E-7 IN NUMBER MATCH CIRCUIT TO REPLAY S.U. COIL.
C-6 IN HOLD CIRCUIT TO THIS RELAY.

RESET

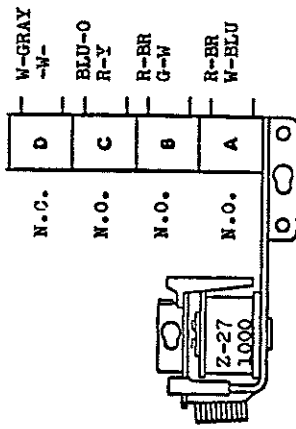
IS ENERGIZED BY COIN RELAY, THRU SWITCH
ON GAME-OVER RELAY.



E-5 OPENS IN CIRCUIT TO COIN UNIT S.U. COIL AND CLOSSES TO RESET
COILS ON COIN, BALL COUNT AND GAME-OVER.
C-3 OPENS IN CIRCUIT TO REPLAY RELAY AND COIN LOCKOUT COIL---
C-5 CLOSSES TO RUN SCORE MOTOR.
D-5 IN HOLD CIRCUIT TO THIS RELAY.
F-13 IN SERIES WITH SWITCH A ON GAME-OVER RELAY.
E-6 IN CIRCUIT TO PLAYER UNIT RESET COIL.
C-1 ENERGIZES RELAY BANK RESET COIL, THRU CAM SWITCH 1D ON SCORE
MOTOR.
D-12 IN CIRCUIT TO BONDS RELAY, THRU SWITCH ON COIN RELAY AND
INDEX CAM SWITCH D.

REPLAY

IS ENERGIZED BY REPLAY BUTTON, THRU ZERO SWITCH ON REPLAY UNIT.



D-3 OPENS CIRCUIT TO COIN LOCKOUT COIL.

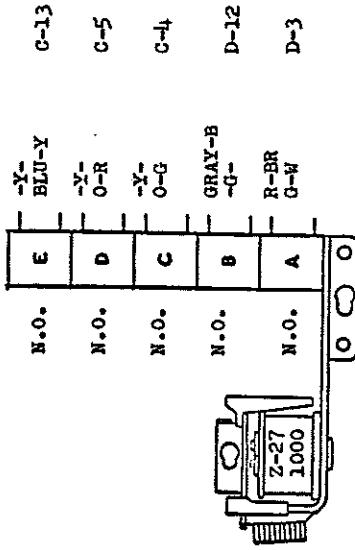
E-5 PULSES REPLAY UNIT RESET COIL AT SCORE MOTOR GAM SWITCH 1B.

D-3 ENERGIZES COIN RELAY.

D-3 IN HOLD CIRCUIT TO THIS RELAY.

COIN

IS ENERGIZED BY COIN SWITCH OR REPLAY RELAY---ALSO BY 5¢ RELAY, THRU SWITCH ON ALTERNATOR UNIT---ALSO BY 25¢ RELAY IF GAME IS ADJUSTED TO 6 PLAYS FOR 25¢.



C-13 TRIPS GAME-OVER RELAY, THRU ZERO SWITCH ON PLAYER UNIT OR BALL COUNT UNIT.

C-5 ENERGIZES RESET RELAY, THRU SWITCH C ON GAME-OVER RELAY.

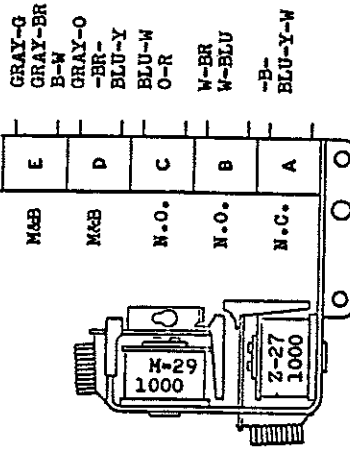
C-4 RUNS SCORE MOTOR.

D-12 IN SERIES WITH SWITCH 1A ON RESET RELAY.

D-3 IN HOLD CIRCUIT TO THIS RELAY.

GAME-OVER

LATCH COIL IS ENERGIZED BY SCORE MOTOR GAM SWITCH 1B, THRU SWITCHES ON COIN RE-LAY AND RESET RELAY.
TRIP COIL IS ENERGIZED BY LOCK RELAY OR WIPER FINGER ON BALL COUNT UNIT---ALSO BY COIN RELAY, THRU A ZERO SWITCH ON EITHER THE BALL COUNT UNIT OR PLAYER UNIT.



E-7 OPENS IN HI-SCORE CIRCUITS AND CLOSSES TO NUMBER MATCH CIRCUITS.

A-3 OPENS TO "PLAYER UP" LITES, AND CLOSSES TO "NUMBER MATCH" AND "GAME-OVER" LITES.

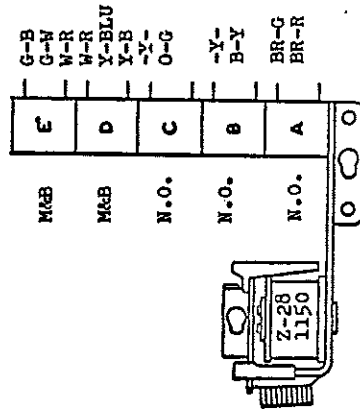
E-5 CIRCUIT TO RESET RELAY, THRU SWITCH ON COIN RELAY.

E-3 IN CIRCUIT TO REPLAY RELAY.

F-13 OPENS MOST CIRCUITS TO PLAYFIELD SWITCHES.

"A"

IS ENERGIZED BY LEFT TARGET SWITCH.



D-17 OPENS TO 10 POINT RELAY AND CLOSSES TO 100 POINT RELAY (FROM LEFT AND RIGHT KICKER SWITCHES).

D-17 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSSES IN SERIES WITH SWITCH E ON "B RELAY".

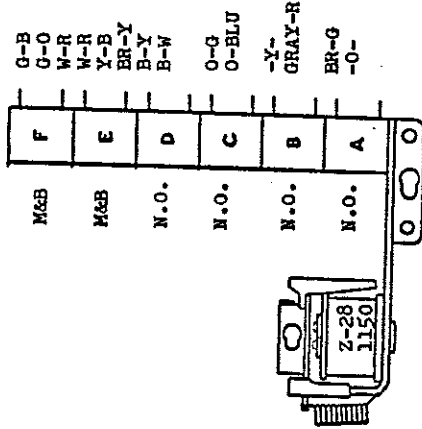
C-23 IN SERIES WITH SWITCH C ON "B RELAY".

B-9 TO "LEFT TARGET" LITE AND "LEFT JET BUMPER" LITE---ALSO IN SERIES WITH SWITCH D ON "B RELAY".

D-23 HOLD CIRCUIT TO THIS RELAY, THRU TROUGH SWITCH.

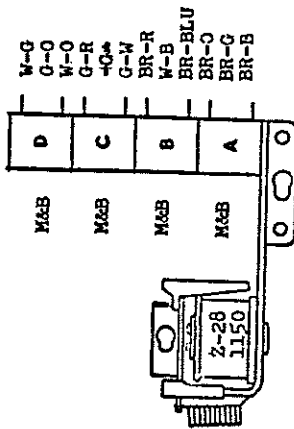
"B"

IS ENERGIZED BY RIGHT TARGET SWITCH.



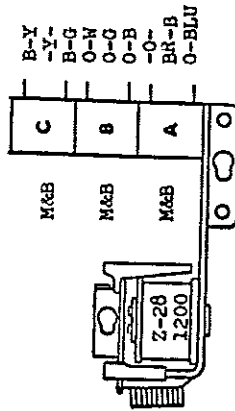
No. 1 CHANGE

IS ENERGIZED BY WIPER FINGERS ON NUMBER MATCH UNIT. (EVERY OTHER STEP).



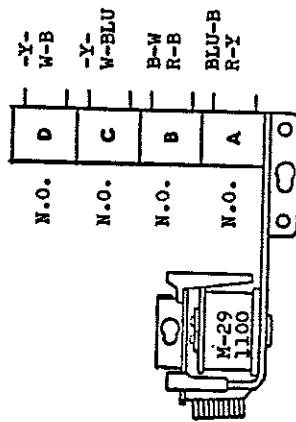
No. 2 CHANGE

IS ENERGIZED BY WIPER FINGERS ON NUMBER MATCH UNIT. (EVERY OTHER STEP).



RIGHT SIDE ROLLOVER

IS ENERGIZED BY RIGHT SIDE ROLLOVER SWITCH.



D-17 OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSSES TO 100 POINT RELAY (WHEN MAKING RIGHT JET BUMPER SWITCH).

B-17 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSSES TO 1,000 POINT RELAY.

B-9 TO "CENTER JET BUMPER" LITE, THRU SWITCH B ON "A RELAY".

D-23 ENERGIZES GATE RELAY, THRU SWITCH C ON "A RELAY".

B-10 TO "RIGHT TARGET" LITE AND "RIGHT JET BUMPER" LITE.

D-23 HOLD CIRCUIT TO THIS RELAY, THRU TROUGH SWITCH.

D-19 OPENS IN CIRCUIT TO "5-0" RELAY AND CLOSSES TO "5-X" RELAY. (THRU SWITCH ON CENTER TARGET RELAY).

D-19 OPENS IN CIRCUIT TO "4-0" RELAY AND CLOSSES TO "4-X" RELAY. (THRU SWITCH ON "LEFT SIDE ROLLOVER RELAY").

D-20 OPENS IN CIRCUIT TO "6-0" RELAY, AND CLOSSES TO "6-X" RELAY. (THRU SWITCH ON "RIGHT SIDE ROLLOVER RELAY").

D-20 OPENS IN CIRCUIT TO "7-0" RELAY, AND CLOSSES TO "7-X" RELAY. (THRU LEFT BOTTOM ROLLOVER SWITCH).

B-10 OPENS TO "0" LITE AND CLOSSES TO "X" LITE.

D-21 OPENS IN CIRCUIT TO "9-0" RELAY, AND CLOSSES TO "9-X" RELAY. (THRU RIGHT BOTTOM ROLLOVER SWITCH).

D-20 OPEN IN CIRCUIT TO "8-0" RELAY, AND CLOSSES TO "8-X" RELAY. (THRU SWITCH ON "ROLLOVER BUTTON" RELAY).

C-20 IN SERIES WITH SWITCH B ON "NO. 1 CHANGE RELAY".

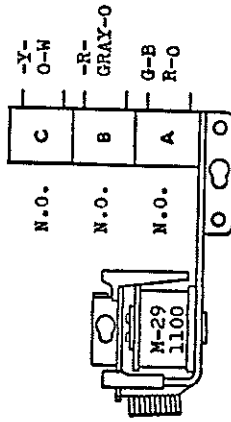
C-15 IN CIRCUIT TO ADVANCE RELAY AND 1,000 POINT RELAY. (IN SERIES WITH SWITCH 22B ON "6-0" RELAY).

D-12 ENERGIZES REPLAY S.U. OR EXTRA BALL RELAY, THRU WIPER ON BONUS UNIT.

E-21 HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON 1,000 RELAY.

ADVANCE

IS ENERGIZED BY ANY OF THE (12) TWELVE SWITCHES, AS INDICATED ON PLAYFIELD, THRU THE CORRESPONDING "O" AND "X" RELAYS ON RELAY BANK. FOR EXAMPLE: THE LEFT TOP "O" OR "X" ROLLOVER SWITCH, THRU THE NORMALLY CLOSED SIDE OF SWITCHES ON THE "1-0" AND "1-X" RELAYS.

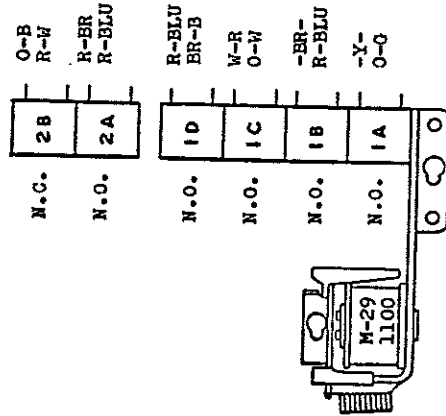


- C-21
- F-18
- E-15

ENERGIZES BONUS UNIT S.U. COIL.
 IN CIRCUIT TO ENERGIZE (1 TO 9) "O" COILS AND (1 TO 9) "X" COILS.
 HOLD CIRCUIT TO THIS RELAY, THRU END-OF-STROKE SWITCH ON BONUS UNIT.

ROLLOVER BUTTON

IS ENERGIZED BY ROLLOVER BUTTON SWITCH.

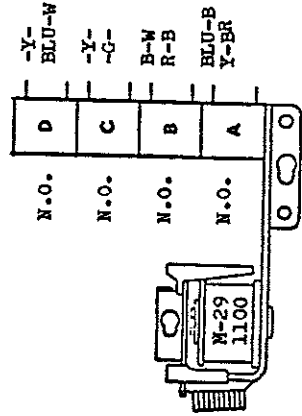


- E-24
- E-21
- C-20
- D-16
- C-16
- C-5

IN CIRCUIT TO NUMBER MATCH S.U. COIL. (SET SWITCH C ON 10 POINT RELAY).
 IN HOLD CIRCUIT TO THIS RELAY.
 IN SERIES WITH SWITCH A ON "NO. 2 CHANGE" RELAY.
 PULSES 100 POINT RELAY, THRU IMPULSE CAM SW. C.
 ENERGIZES ADVANCE RELAY THRU SWITCH ON 8 "O" RELAY AND 8 "X" RELAY.
 RUNS SCORE MOTOR.

LEFT SIDE ROLLOVER

IS ENERGIZED BY LEFT SIDE ROLLOVER SWITCH.

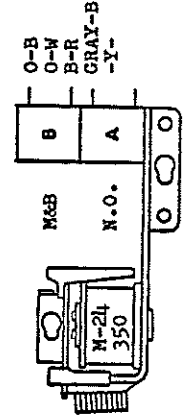


- C-15
- C-19
- D-12
- E-21

IN SERIES WITH SWITCH 14B ON "1-0" RELAY. (IN CIRCUIT TO ADVANCE RELAY AND 1,000 POINT RELAY).
 IN SERIES WITH SWITCH C ON "NO. 1 CHANGE RELAY".
 ENERGIZES REPLAY S.U. OR EXTRA BALL RELAY, THRU WIPER ON BONUS UNIT.
 HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON 1,000 POINT RELAY.

TRIPLE BONUS

THIS 6 VOLT COIL IS ENERGIZED BY WIPER FINGER ON BALL COUNT UNIT, THRU THE "3-5 BALL ADJUSTMENT JACK".

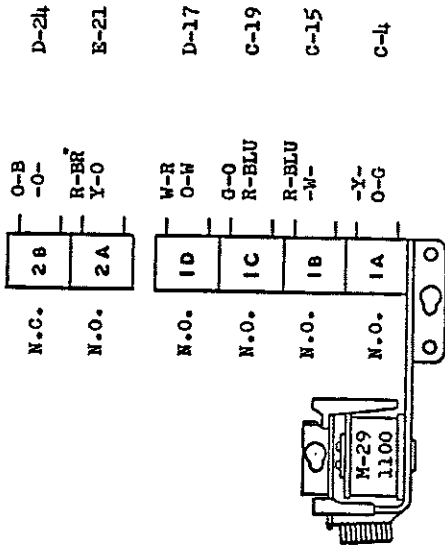


- D-18
- B-9

IN CIRCUIT TO 1,000 POINT RELAY, THRU SWITCH 1D ON BONUS RELAY.
 TO "TRIPLE BONUS" LITE.

CENTER TARGET

IS ENERGIZED BY CENTER TARGET SWITCH.



D-24 IN SERIES WITH SWITCH 2B ON "ROLLOVER BUTTON RELAY".

E-21 IN HOLD CIRCUIT TO THIS RELAY.

D-17 PULSES 100 POINT RELAY, THRU IMPULSE CAM SWITCH C.

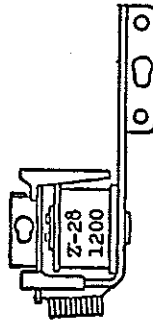
C-19 IN SERIES WITH SWITCH D ON NO. 1 CHANGE RELAY.

C-15 IN CIRCUIT TO ADVANCE RELAY, THRU SWITCHES ON "5-0" AND "5-X" RELAYS.

C-4 RUNS SCORE MOTOR.

GATE

IS ENERGIZED BY A SWITCH ON "A" RELAY, THRU A SWITCH ON "B" RELAY.



E-13 OPENS CIRCUIT TO ENERGIZE OUTHOLE RELAY.

D-12 HOLD CIRCUIT TO THIS RELAY, THRU ZERO POSITION SWITCH ON BONUS UNIT.

E-18 IN CIRCUIT TO 1,000 POINT RELAY, THRU SWITCH B ON TRIPLE BONUS RELAY.

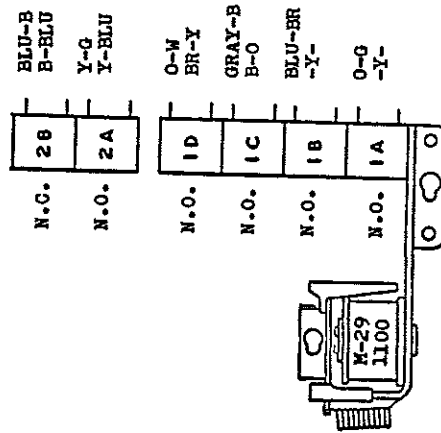
D-12 PULSES BONUS UNIT RESET COIL, THRU SCORE MOTOR CAM SWITCH 5B.

C-5 IN HOLD CIRCUIT TO RESET RELAY.

C-5 RUNS SCORE MOTOR.

BONUS

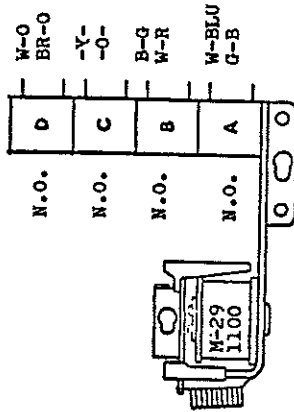
IS ENERGIZED, DURING RESET CYCLE, BY SCORE MOTOR INDEX CAM SWITCH D, THRU COIN RELAY AND RESET RELAY. DURING PLAY IT IS ENERGIZED BY INDEX CAM SWITCH C, THRU THE OUTHOLE SWITCH AND ZERO POSITION SWITCH ON BONUS UNIT.



10 POINT

IS PULSED BY:

1. LEFT AND RIGHT KICKER SWITCHES.
2. LEFT JET BUMPER, THRU SW. ON "A RELAY".
3. RIGHT JET BUMPER, THRU SW. ON "B RELAY".



C-9 PULSES 10 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

C-24 PULSES MEDIUM CHIME COIL---ALSO ENERGIZES NUMBER MATCH S.U. THRU SWITCH 2B ON CENTER TARGET RELAY.

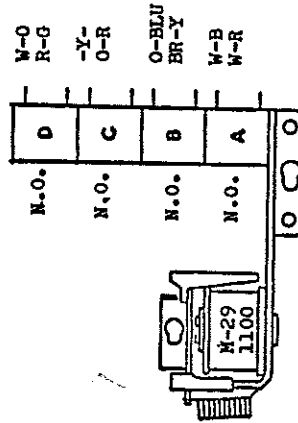
E-17 PULSES 100 POINT RELAY, THRU 9TH POSITION SWITCHES ON 10 POINT DRUM UNITS.

E-17 IN HOLD CIRCUIT TO THIS RELAY.

100 POINT

IS PULSED BY:

1. LEFT AND RIGHT TARGET SWITCHES.
2. LEFT JET BUMPER, THRU SW. ON "A RELAY".
3. RIGHT JET BUMPER, THRU SW. ON "B RELAY".
4. CENTER JET BUMPER, THRU SW. ON "A RELAY".
5. CENTER TARGET RELAY.
6. ROLLOVER BUTTON RELAY.
7. EJECT RELAY, THRU SWITCH ON EXTRA BALL RELAY.



C-10 PULSES 100 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

C-24 PULSES SMALL CHIME COIL.

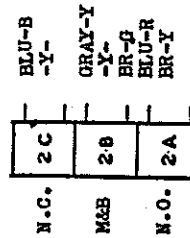
E-18 PULSES 1,000 POINT RELAY, THRU 9TH POSITION SWITCHES ON 100 POINT DRUM UNITS.

E-18 IN HOLD CIRCUIT TO THIS RELAY.

1000 POINT

IS PULSED BY:

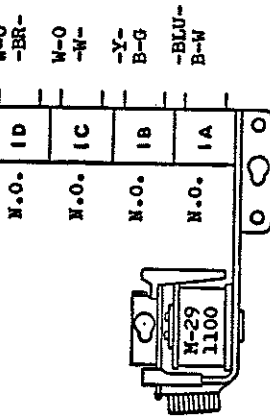
1. SIX TOP ROLLOVER SWITCHES.
2. RIGHT SIDE ROLLOVER RELAY.
3. LEFT SIDE ROLLOVER RELAY.
4. LEFT & RIGHT BOTTOM ROLLOVER SWITCHES.



C-21 OPENS HOLD CIRCUITS TO "LEFT SIDE ROLLOVER RELAY" AND "RIGHT SIDE ROLLOVER RELAY".

C-23 C-14 OPENS IN HOLD CIRCUIT TO EXTRA BALL RELAY AND CLOSES IN CIRCUIT TO ENERGIZE BALL INDEX RELAY.

E-18 IN HOLD CIRCUIT TO THIS RELAY.



C-11 PULSES 10,000 POINT DRUM UNITS, THRU 9TH POSITION SWITCHES ON 1,000 POINT DRUM UNITS.

C-10 PULSES 1,000 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

C-24 PULSES LARGE CHIME COIL.

E-8 IN HI-SCORE CIRCUIT TO REPLAY S.U. COIL OR EXTRA BALL RELAY.