

Instruction Manual for

LUCKY ACE



Williams® ELECTRONICS

A DIVISION OF
THE SEEBURG CORPORATION OF DELAWARE

3401 N. California Ave.
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Chicago, Ill. 60618, U.S.A.
Cable Address: Wilcoin

" LUCKY ACE "

SINGLE PLAYER

GAME OPERATES AS FOLLOWS:

MAKING TEN, JACK, QUEEN, KING AND ACE WILL LITE BOTTOM ROLLOVER TO SCORE "SPECIAL".

MAKING TEN, JACK, QUEEN, KING AND ACE AGAIN WILL LITE SIDE ROLLOVER TO SCORE "SPECIAL".

BALL THRU ROLLOVER, WHEN "SPECIAL" LITE IS LIT, SCORES A REPLAY, EXTRA BALL OR 10,000 POINTS. (SEE "REPLAY-ADD-A-BALL-NOVELTY" ADJUSTMENT JACK ON PAGE 5).

MAKING 1 TO 9 DOUBLES BONUS VALUE.

MAKING 1 TO 9 AGAIN TRIPLES BONUS VALUE AND LITES 1 TO 9 SPECIAL LITE.

EACH TIME 1 TO 9 IS MADE, WHEN SPECIAL LITE IS LIT, SCORES A REPLAY, EXTRA BALL OR 10,000 POINTS. (SEE "REPLAY-ADD-A-BALL-NOVELTY" ADJUSTMENT).

1 REPLAY FOR MATCHING LAST TWO NUMBERS ON SCORE REELS TO LITED NUMBER THAT APPEARS ON BACK GLASS WHEN GAME IS OVER.

TILT ADJUSTMENT DETERMINES WHETHER PLAYER IS PENALIZED ONLY THE BALL IN PLAY OR THE ENTIRE GAME.

SEE OTHER ADJUSTMENTS ON PAGES 3, 4 AND 5.

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.

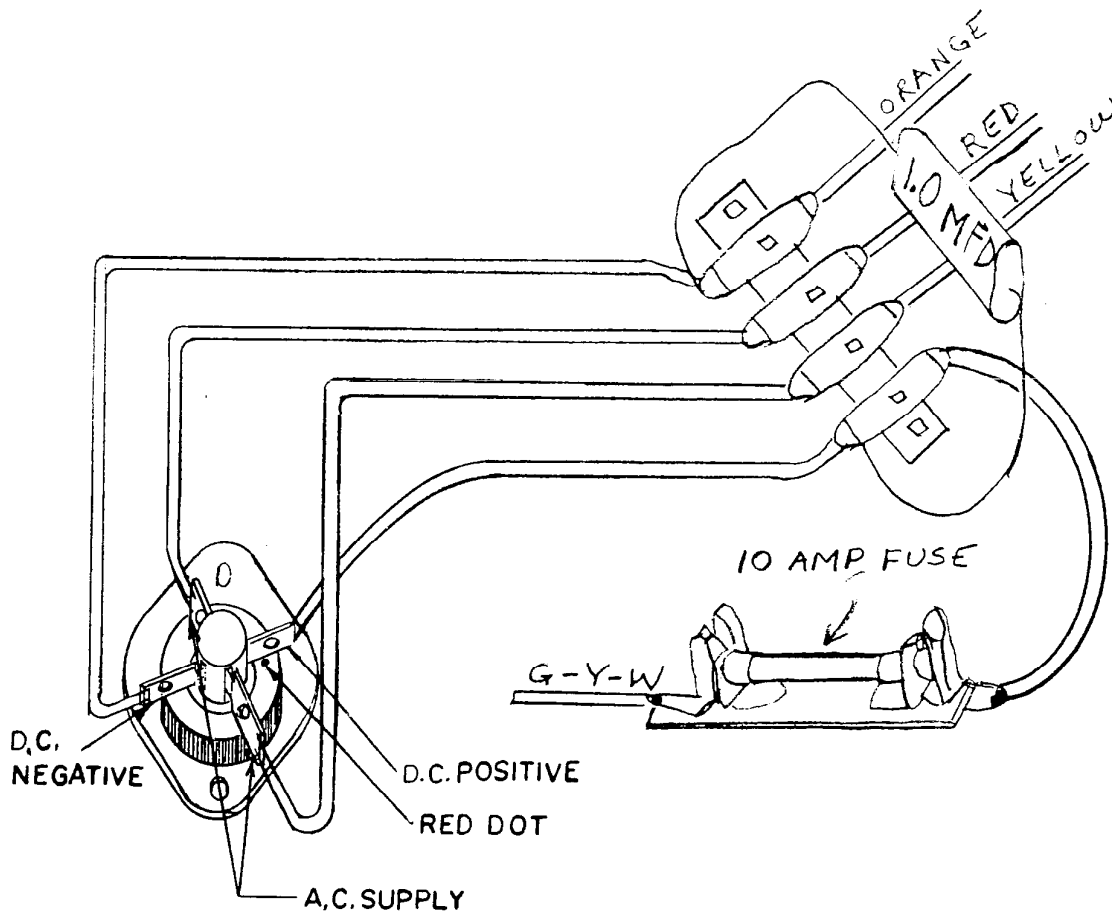
STEP-UP Levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs (biscuits) on the Motor Units and Step-up Units will require lubrication with 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.

SILICON BRIDGE RECTIFIER



THE FUNCTION OF THE RECTIFIER AND CAPACITOR IS TO CONVERT THE ALTERNATING CURRENT (A.C.) TO DIRECT CURRENT (D.C.), SUPPLYING D.C. TO THE BUMPERS, KICKERS ETC.

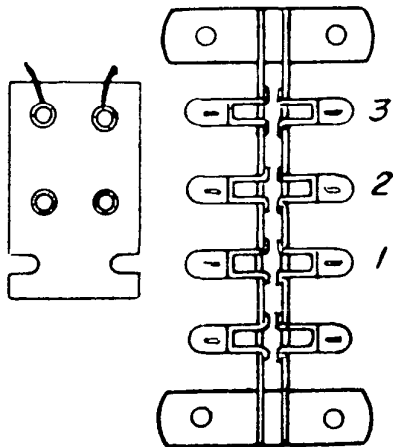
THE BRIDGE RECTIFIER SHOULD PRACTICALLY NEVER NEED REPLACING, AS IT IS RATED WELL OVER THE VOLTAGE AND CURRENT REQUIREMENTS OF THE COMPONENTS IT SUPPLIES.

IF, HOWEVER, THE 15 AMP 24 VOLT FUSE ON THE MECHANISM PANEL OPENS, IT COULD BE DUE TO A FAULTY RECTIFIER. DISCONNECT THE A.C. INPUT TO RECTIFIER, REPLACE FUSE, AND RECHECK.

IF THE 10 AMP FUSE LOCATED NEXT TO THE RECTIFIER OPENS, CHECK ALL D.C. COMPONENTS I.E. BUMPERS, KICKERS ETC. FOR SHORTS.

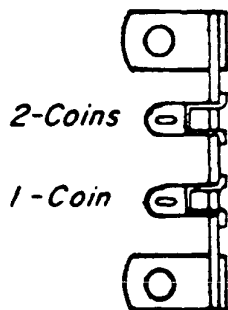
ADJUSTMENTS ON MECHANISM PANEL

10¢ Adjustment



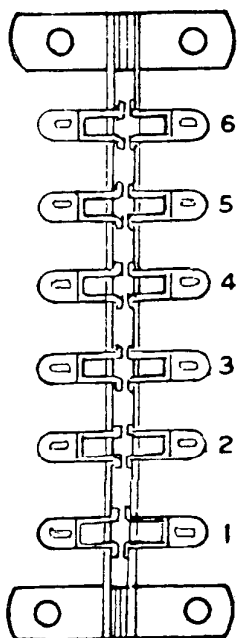
PROVIDES
1, 2 OR
3 PLAYS
FOR ONE
COIN.

5¢ Adjustment



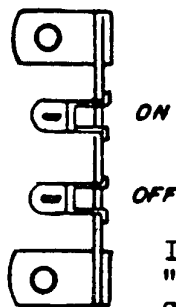
IN "2 COINS FOR
1 PLAY", CIRCUIT
TO COIN RELAY
PASSES THRU SW.
ON ALTERNATOR
UNIT.

25¢ Adjustment



PROVIDES 1, 2, 3, 4, 5
OR 6 PLAYS FOR 25¢.

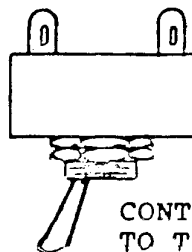
Motor Service Jack



INSERT PHONE TIP IN
"OFF" POSITION - CAMS
CAN BE TURNED BY HAND
TO CHECK ADJUSTMENT OF
SWITCHES.

MASTER ON-OFF SW.

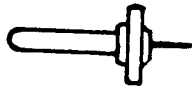
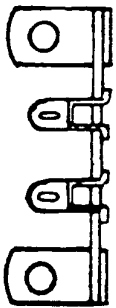
(Located under front of
Cabinet)



CONTROLS POWER
TO TRANSFORMER

ADJUSTMENTS ON MECHANISM PANEL

1 TO 9 FEATURE ADJ.



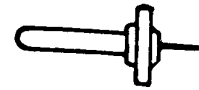
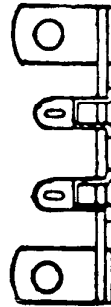
CONS.

LIB.

IN "CONSERVATIVE" POSITION, 1 TO 9 RELAY BANK RESET COIL WILL ENERGIZE WHEN STARTING A NEW GAME.

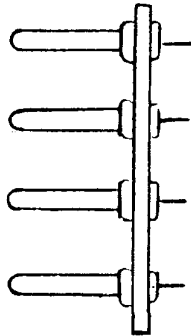
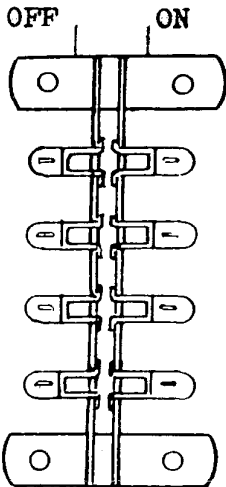
IN "LIBERAL" POSITION, IT WILL NOT ENERGIZE.

TILT ADJ.



IN "BALL" POSITION, PLAYER IS PENALIZED ONE BALL WHEN TILTING THE GAME.

IN "GAME" POSITION, PLAYER IS PENALIZED THE ENTIRE GAME.



1 COIN - 1 PLAY 2 COINS - 3 PLAYS ADJ.

IN "ON" POSITION, 10¢ ADJUSTMENT MUST BE IN #2 POSITION & 25¢ ADJUSTMENT MUST BE IN #6 POSITION. FIRST COIN WILL START A NEW GAME. SECOND COIN WILL ADVANCE CREDIT UNIT 2 STEPS.

IN "OFF" POSITION, 25¢ ADJUSTMENT AND/OR 10¢ ADJUSTMENT SHOULD BE PUT IN PROPER POSITION.

ADJUSTMENTS IN BACKBOX

POINT SCORE ADJUSTMENT

PLUG IN GREY-BR FOR SCORES 10,000 TO 90,000

PLUG IN RED WIRE FOR SCORES 100,000 TO 190,000

FOR REPLAY AT 100,000 PLUG RED WIRE INTO 00,000 POSITION

10,000 60,000

20,000 70,000

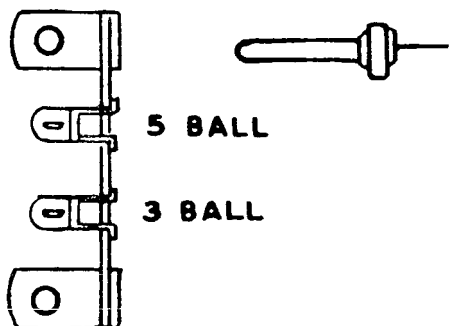
30,000 80,000

40,000 90,000

50,000 00,000

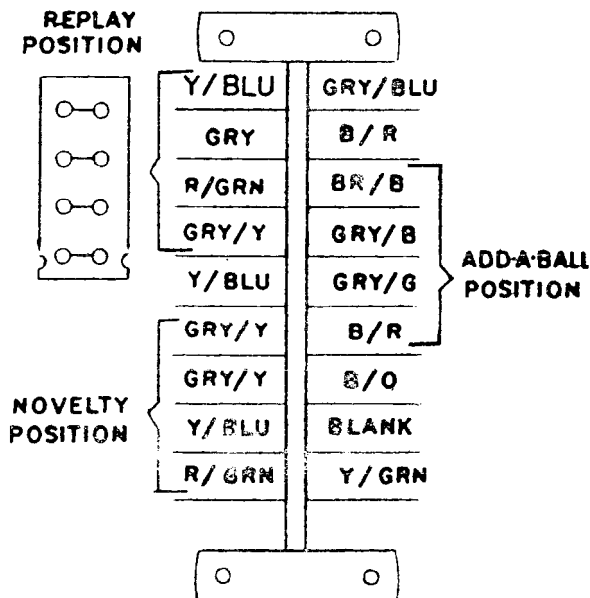
ADJUSTMENTS IN BACKBOX

No. of Balls Adjustment

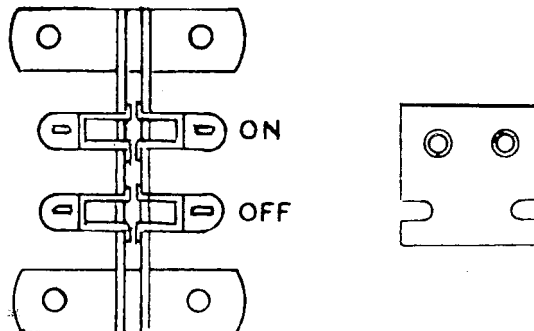


Plug changes 3 to 5 ball play, or vice versa.

ADJUSTMENT JACK FOR REPLAY-ADD-A-BALL-NOVELTY



NUMBER MATCH ADJUSTMENT



IN "ON" POSITION, A NUMBER MATCH LIFE WILL APPEAR WHEN GAME IS OVER. TO AWARD CREDIT, WHEN NUMBER IS MATCHED, "REPLAY-ADD-A-BALL-NOVELTY" ADJUSTMENT MUST BE IN REPLAY POSITION.

IF IT IS IN "ADD-A-BALL" OR "NOVELTY" POSITION, NUMBER MATCH ADJUSTMENT MUST BE TURNED TO "OFF".

IN "REPLAY" POSITION, HI-SCORE AND NUMBER MATCH CIRCUITS WILL ADVANCE CREDIT UNIT. RIGHT SIDE ROLLOVER SWITCH, THRU SW. ON SPECIAL REPLAY ADVANCES CREDIT UNIT. SWITCH ON TRIPLE BONUS RELAY, THRU SW. ON "1 TO 9 RESET RELAY" ADVANCES CREDIT UNIT. RIGHT BOTTOM (INSIDE) ROLLOVER SWITCH, THRU SW. ON SET-UP RELAY ADVANCES BALL COUNT UNIT.

IN "ADD-A-BALL" POSITION, ALL OF THE ABOVE CIRCUITS WILL ADVANCE BALL COUNT UNIT. NUMBER MATCH ADJUSTMENT MUST BE IN "OFF" POSITION.

IN "NOVELTY" POSITION, ALL OF THE ABOVE CIRCUITS (EXCEPT HI-SCORES) WILL ADVANCE 10,000 POINT DRUM UNIT. NUMBER MATCH ADJUSTMENT IN "OFF" POSITION.

POWER TRANSFORMER:

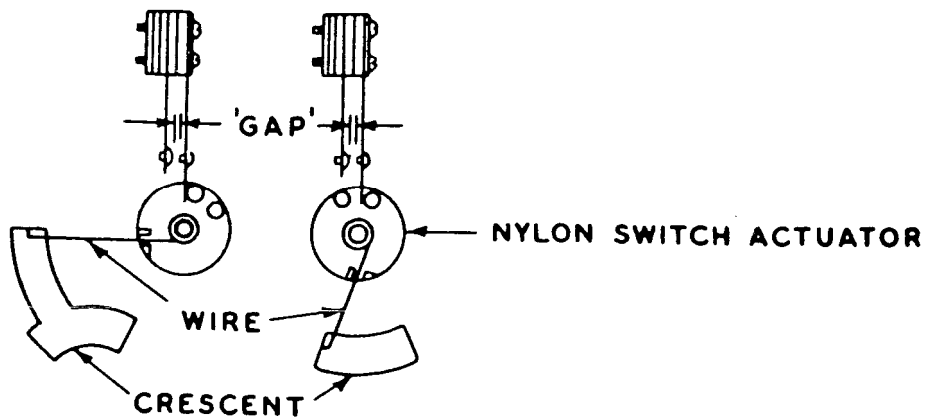
LOCATED ON MECHANISM PANEL, IT IS EQUIPPED WITH A SECONDARY TAP. IF YOUR GAME IS ON LOCATION WITH EXTREMELY LOW LINE VOLTAGE, REMOVE LEAD FROM LUG MARKED 24 VOLTS AND SOLDER TO ALTERNATE LUG MARKED "HIGH". THIS WILL BOOST SECONDARY VOLTAGE APPROXIMATELY 2-3 VOLTS.

LEG LEVELERS:

ARE PROVIDED FOR TWO PURPOSES - 1ST TO LEVEL GAME ON LOCATION, 2ND TO INCREASE PITCH FOR GAME PERCENTAGING. IF IT IS DESIRED TO SPEED UP PLAY AND DECREASE SCORES. RAISE REAR LEG LEVELERS TO

INSTRUCTIONS FOR COIN TRIP SWITCH ADJUSTMENT

WIRE SHOULD BE IN CONTACT WITH END OF CRESCENT OPENING WHEN BLADE ADJUSTMENT IS MADE.



Long blade should be in contact with nylon switch actuator and have a maximum overtravel of $1/32$.

or

Using a gram gauge, tension of long blade should not exceed 10 grams.

SWITCH ADJUSTMENT

1. For small coins, such as dimes, adjust short blade so that the 'gap' between the silver contacts is .045 to .055.
2. For larger & heavier coins the 'gap' should be .045 to .060.
3. Do not adjust 'gap' closer than .040.

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-7456-44	A-6402-10	
(RIGHT SIDE)	B-7568	A-7614		
NO. MATCH			A-7548-1	
(LEFT SIDE)	B-7569	A-7615		
BONUS	C-6417	B-7456-33	A-6402-10	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	

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.**

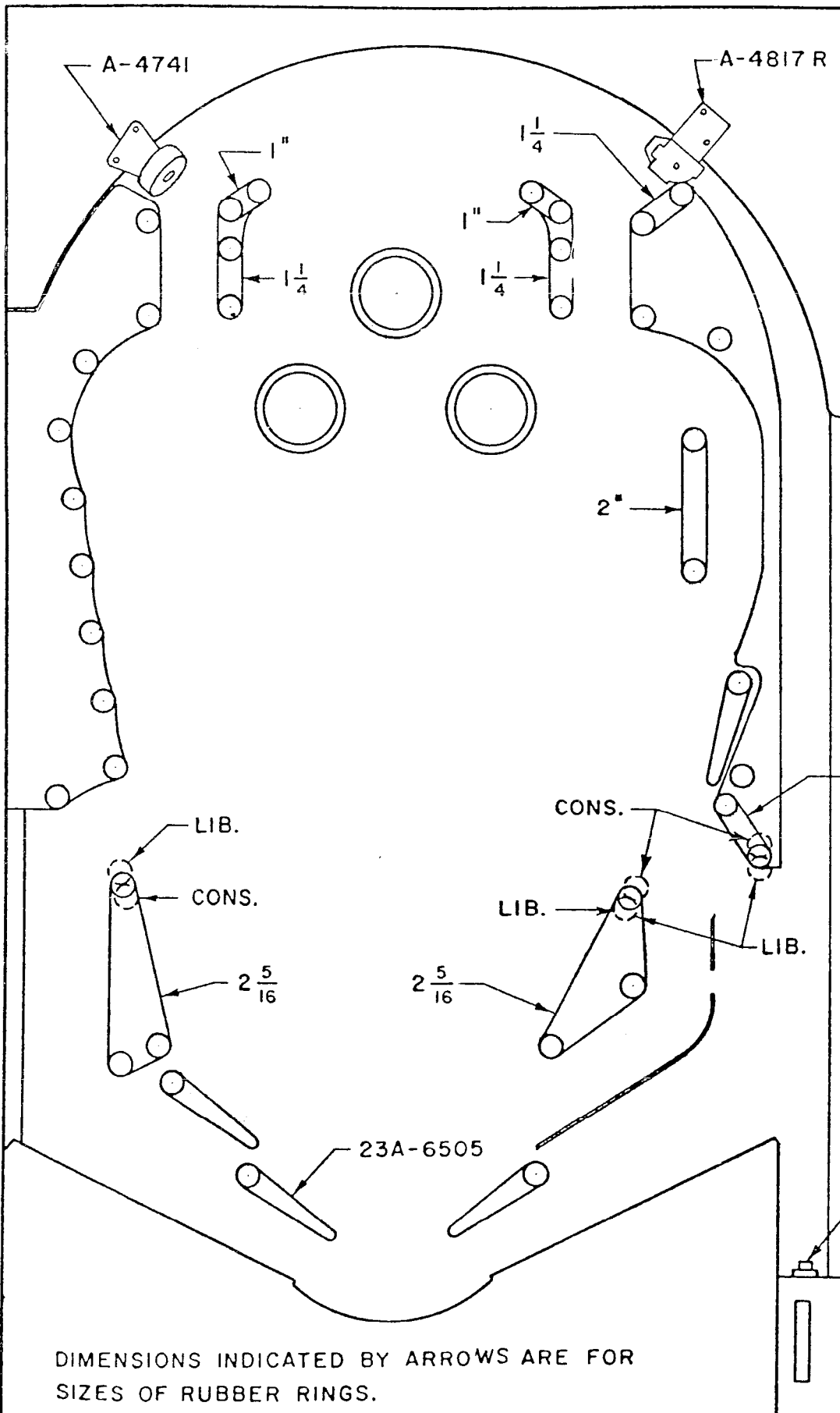
IMPORTANT NOTICE

**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.**

"LUCKY ACE" - POST ADJUSTMENT SHEET

TO MAKE GAME MORE "CONSERVATIVE" OR "LIBERAL" - MOVE POST 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-6302	1" I.D.
23A-6303	1 1/4" I.D.
23A-6304	1 1/2" I.D.
23A-6305	2" I.D.
23A-6306	2 5/16" I.D.
23A-6505	1 1/2" I.D.

A-4741 REBOUND ASS'Y.
 A-4817R BALL GATE ASS'Y.

23A-6327 BALL SHOOTER
 RUBBER TIP

DIMENSIONS INDICATED BY ARROWS ARE FOR
 SIZES OF RUBBER RINGS.

"LUCKY ACE" COIL CHART

NOTICE:

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

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>LOCATION</u>
14A-7883	CONTROL MOTOR - 60 CYCLE	MECH. PANEL
14A-7884	CONTROL MOTOR - 50 CYCLE	MECH. PANEL
15A-6771	TRANSFORMER - 60 CYCLE	MECH. PANEL
15A-6782-1	TRANSFORMER - 50 CYCLE	MECH. PANEL
B-6396	24 VOLT METER	MECH. PANEL
<u>SOLENOID COILS</u>		
A-22-550	BONUS UNIT STEP UP BALL RELEASE COIL BALL COUNT UNIT STEP UP	PLAYFIELD PLAYFIELD INSERT
A-23-600	CREDIT UNIT STEP UP	INSERT
A-2-23-750	KNOCKER	CABINET
A-2-26-1300	TRIPLE CHIME COILS (3 req'd)	CABINET
B1-26-800	ALTERNATOR UNIT STEP UP SCORE DRUM UNITS (4 req'd) BALL COUNT UNIT RESET CREDIT UNIT RESET BONUS UNIT RESET	MECH. PANEL INSERT INSERT INSERT PLAYFIELD
D1-24-1400	RELAY BANK 1 TO 9 RESET	PLAYFIELD
D1-24-1600	RELAY BANK 10 TO ACE RESET	PLAYFIELD
FL-21-375/28-400	FLIPPERS...(4 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
S-27-500	BANK COILS (14 req'd)	PLAYFIELD
M-29-1000	GAME RELAY TRIP	MECH. PANEL
M-29-1100	5¢ RELAY 10¢ RELAY 25¢ RELAY 10 POINT RELAY 100 POINT RELAY 1000 POINT RELAY SCORE RESET RELAY ADVANCE RELAY 50 POINT RELAY BONUS RELAY 1 TO 9 RESET RELAY 10 TO ACE RESET RELAY	MECH. PANEL MECH. PANEL MECH. PANEL INSERT INSERT INSERT INSERT INSERT PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD
XS-28-1000	NO. MATCH STEP UP	INSERT
M-30-1300	COIN SET UP RELAY	MECH. PANEL
M-30-1400	100,000 RELAY	INSERT
M1-31-1500	COIN LOCKOUT COIL	DOOR
XM-27-675	TOTAL PLAY METER COIL	MECH. PANEL
Z-27-1000	OUTHOLE RELAY RESET RELAY COIN RELAY GAME RELAY (LATCH)	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL
Z-28-1150	GAME OVER RELAY TILT RELAY BALL INDEX RELAY SET UP RELAY DOUBLE BONUS RELAY TRIPLE BONUS RELAY	MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD PLAYFIELD

JACK LAYOUT

GAME LUCY ACE

POSITION PAN - P.F. SIZE 20

FEED	-B-	1	% SCORE MOTOR	Y/BR-J
"	-R-	2	BR/Y 1000 PT. RE	BLU/O 10 TO ACE RESET RE.
PANA RESET	G(P)	3	W/R 100 "	BONUS RE. W-2 GRY
"	BLU(P)	4	G/B 10 "	" " B-1 BK
"	O-(P)	5	W- FEED	OUTHOLE RE. R-1 W
"	BR(P)	6	BLU. "	" " B-1 B
FEED	-Y-	7	GRY CREDIT UNIT S.U.	FEED R.(P)
"	PURPLE	8	BLU 10 TO ACE RESET RE.	BALL COUNT GRY S.U. Y
RESET RE.	BR-1	9	W/ BR-2 TILT RE.	
CREDIT LITE	R-1	10	GRY SCORE RESET RE.	
PAN = PANEL				P.F. = PLAYFIELD (P) = PLASTIC

JACK LAYOUT

GAME LUCY ACE

POSITION PAN - P.F. SIZE 16

1	BLU/W-4 BALL RELEASE
2	BR/W-6 BONUS RESET
3	Y/R-3 TILT RE.
4	B/Y-2 TRIPLE BONUS RE.
5	BR/BLU-2 DOUBLE BONUS RE.
6	BR/O SETUP RE.
7	GRY/O-2 "
8	BR/R SPL. RE

JACK LAYOUT

GAME LUCY-ACE

POSITION PAN-INS. SIZE 22

FEEED	-B-	1	R/B-1 CREDIT LITE
"	-R-	2	B/G-3 LARGE CHIME
BALL IND. RE.	G/Y W-1	3	W/G R.P.S.U.
R.P. RESET	B/Y	4	O/R-1 BALL COUNT RESET
FEEED	-Y-	5	W/GRY COIN RE.
R.P. RESET	R/BW	6	W/O " "
R.P.S.U.	B/R	7	W/BY BR-1 SCORE RESET RE.
FEEED	BR.	8	G/Y. R.P.S.U.
R.P.S.U.	Y/B-3	9	W/B-1 COIN RE.
COIN RE.	R/O-2	10	B/W-1 CREDIT S.U.
BLANK		11	R/BR-2 " "
NO. BALLS			INS - RESET

JACK LAYOUT

GAME LUCY ACE

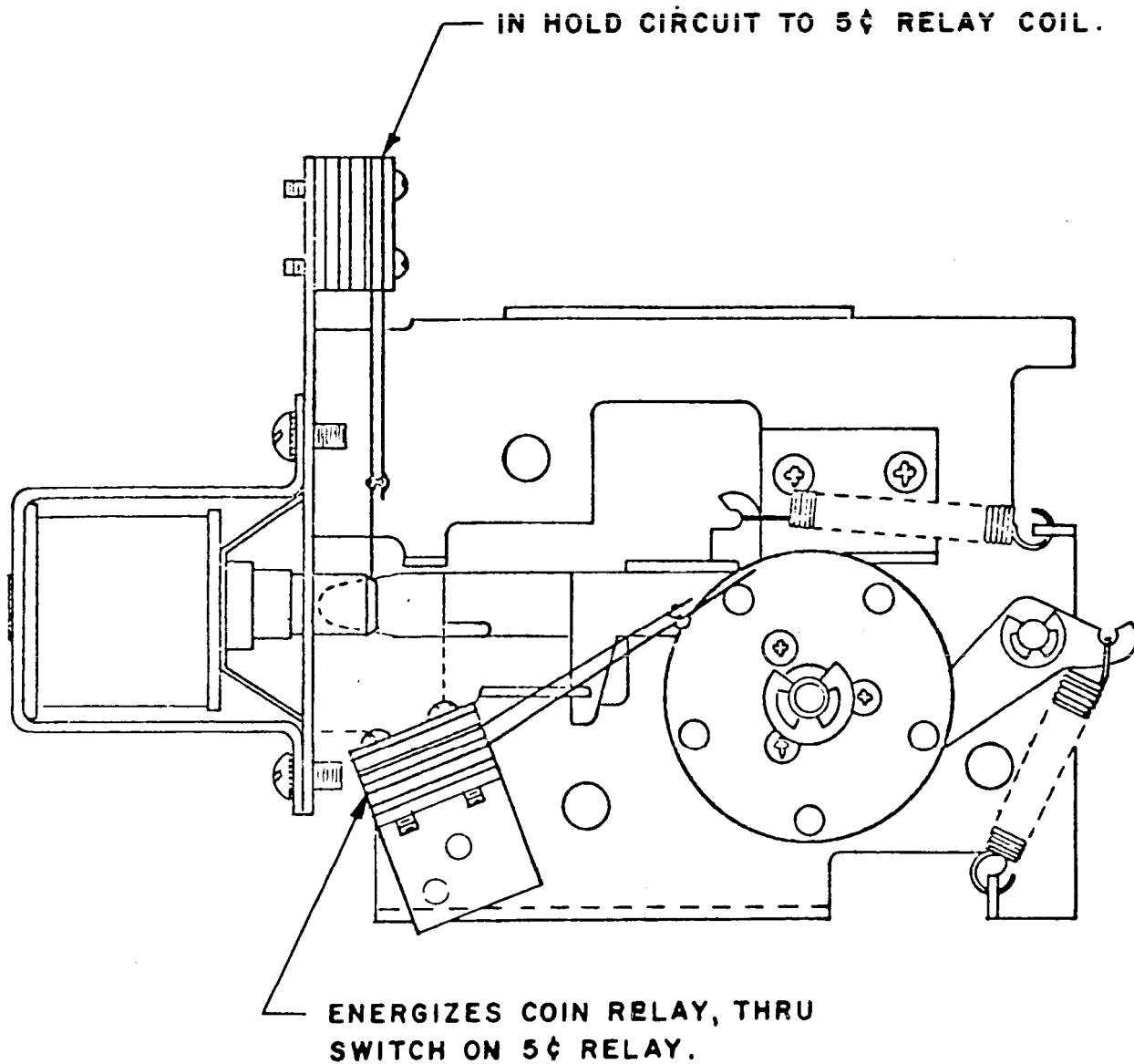
POSITION PAN-INS. SIZE 18

		1	FRONTER R/W	BW/BR-1	RESET RE.
		2	NO. MATCH S.U.	G/Y B/BK1	R-5 STALL CHIME
		3	TIKT LITE	Y/O-3	Y/RU J-L. RE.
		4	G-O. RE	R/G-1	R/W COIN RE.
		5	" "	BR/R	BR/Y 1000 PT. RE.
		6	BALL COUNT S.U.	G/Y B	W/R 100 " "
		7	NO. MATCH LITES	W/O-3	G/B 10 " "
		8	TED. CHITE	O-4	B/A-3 COIN LOCOUT
		9	BALL COUNT S.U.	G/Y Y	BLANK

ALTERNATOR UNIT

LOCATED ON MECHANISM PANEL.

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



BALL COUNT UNIT DISC

DURING RESET CYCLE, THIS UNIT RESETS TO ZERO AND THEN ADVANCES 5 STEPS.

DURING PLAY, IT RESETS ONE STEP EACH TIME THE BALL MAKES OUTHOLE SWITCH.

IF THE "REPLAY-ADD A BALL-NOVELTY"

ADJUSTMENT JACK IS IN "REPLAY" OR "ADD A

BALL" POSITION, THE BALL COUNT UNIT WILL

ADVANCE WHEN BALL MAKES RIGHT BOTTOM

(INSIDE) ROLLOVER SWITCH, THRU A SWITCH

ON SET-UP RELAY.

IF ADJUSTMENT JACK IS IN "ADD A BALL"

POSITION, BALL COUNT UNIT WILL ADVANCE BY:

1. TRIPLE BONUS RELAY, THRU SWITCH

ON 1 TO 9 RELAY.

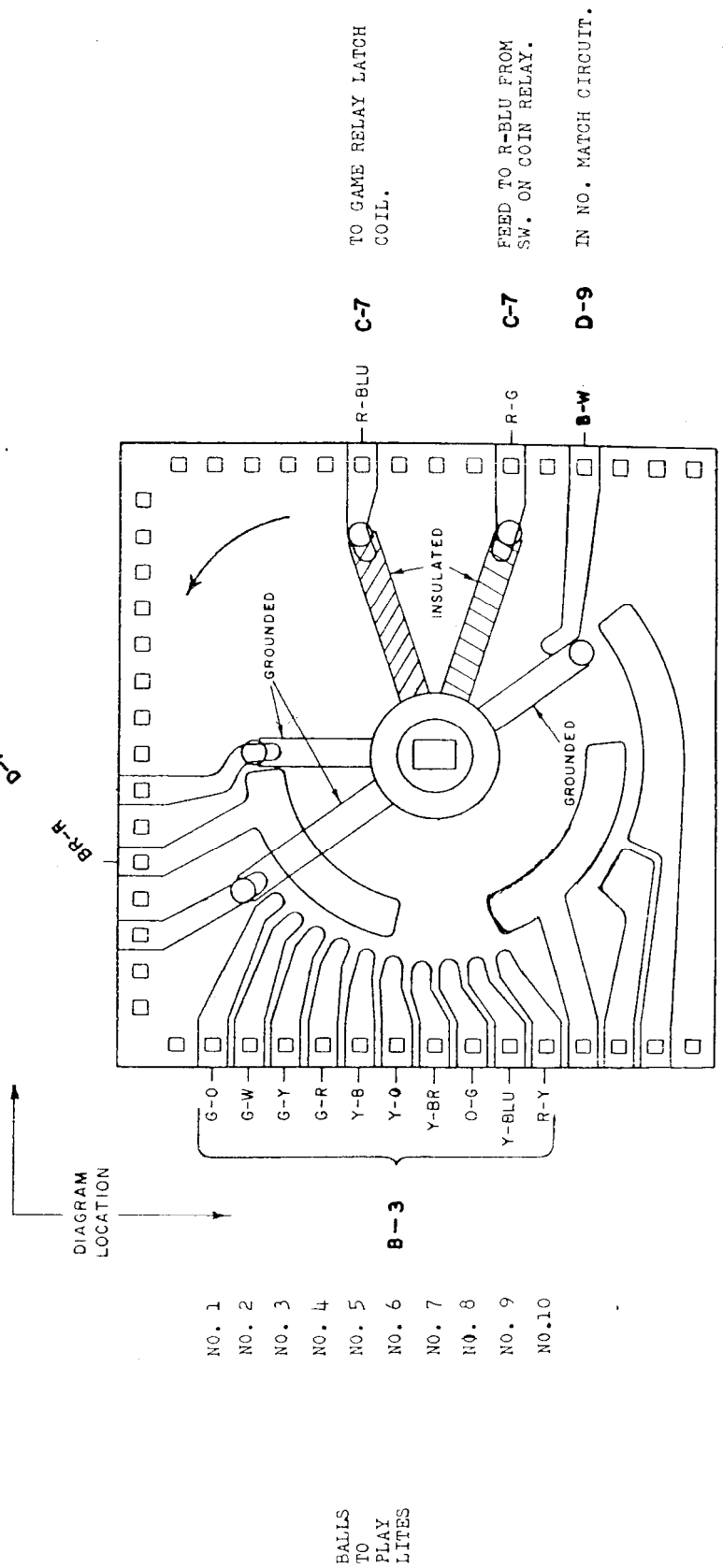
2. RIGHT SIDE ROLLOVER SWITCH, THRU

SWITCH ON SPECIAL RELAY.

3. HI-SCORE CIRCUITS.

VIEW LOOKING AT WIPER FINGERS,
WITH WIPER IN RESET POSITION.

0-1 IN HOLD CIRCUIT TO
GAME-OVER RELAY.



BONUS UNIT

THIS UNIT STEPS UP EACH TIME THE 'ADVANCE RELAY' IS PULSED.

ALSO, AFTER THIS UNIT HAS BEEN RESET TO ZERO, THE STEP-UP COIL IS ENERGIZED ONCE BY SCORE MOTOR CAM SWITCH 6A, THRU BONUS UNIT WIPER FINGERS.

THE RESET COIL IS ENERGIZED BY BONUS RELAY, THRU DOUBLE BONUS RELAY AND SCORE MOTOR CAM SWITCH 4C OR IMPULSE CAM SWITCH D

1000 B-6

2000

3000

4000

5000

6000

7000

8000

9000

10.000 B-7

TO BONUS UNIT S.U. COIL
THRU CAM SWITCH 6A.

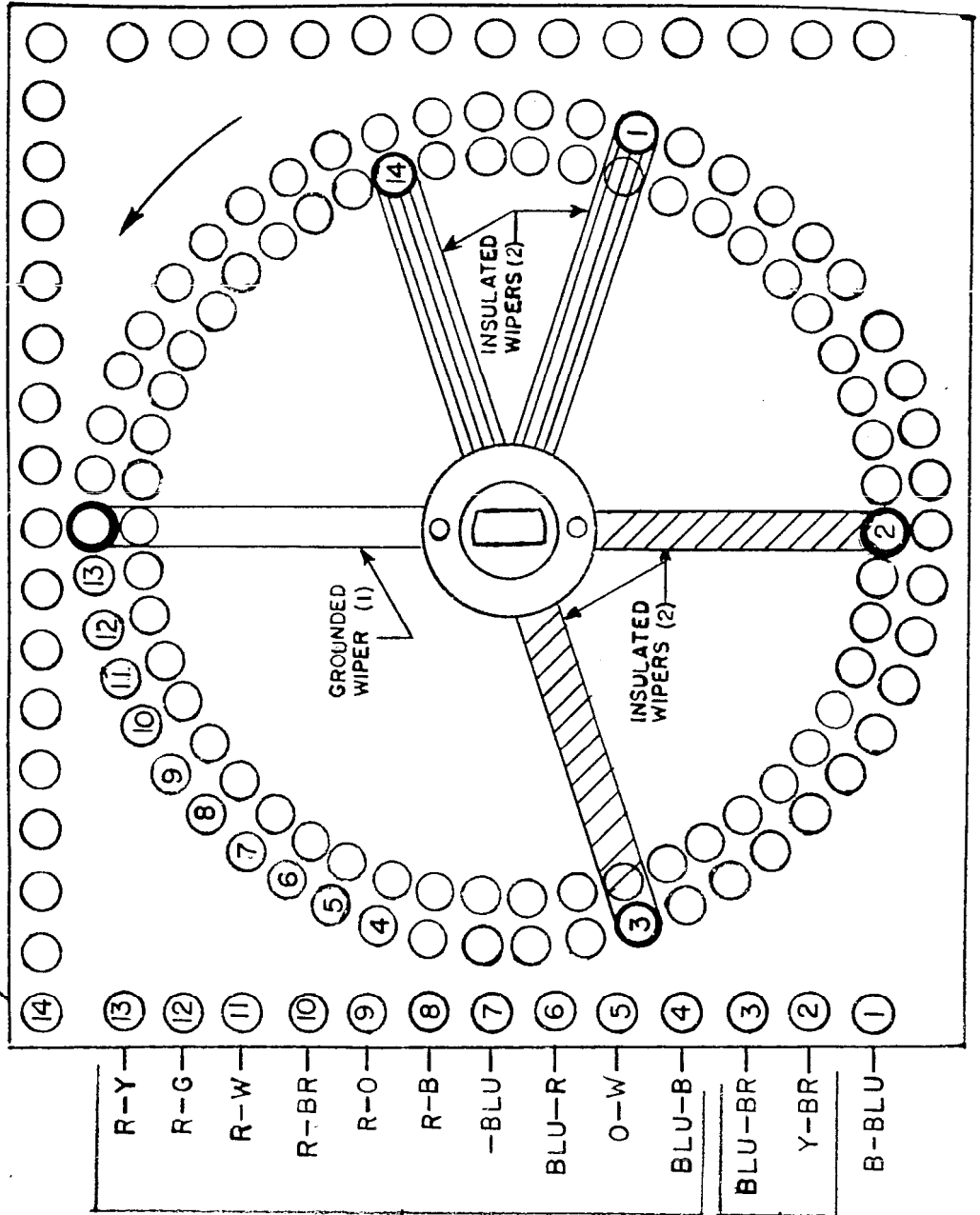
D-11

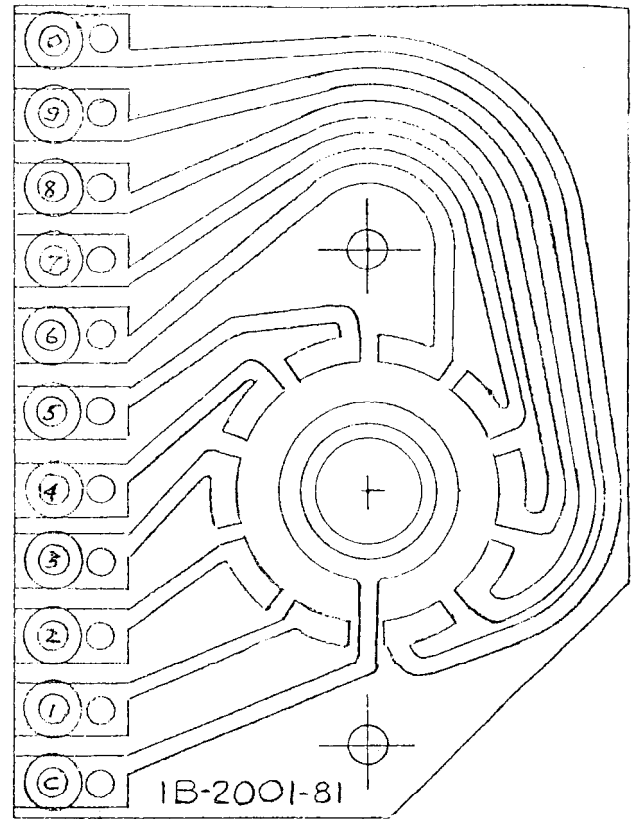
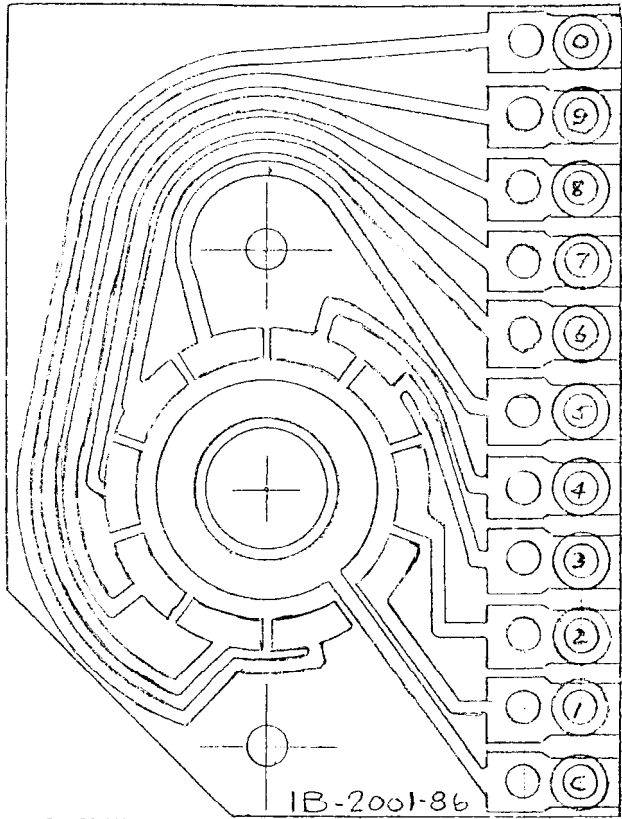
PULSES OUTHOLE RELAY
AT CAM SWITCH 6B.

D-12

SEE #1 (B-BLU) SEE #12 D-12 W-R

VIEW LOOKING AT WIPER FINGER SIDE,
WITH WIPER IN ZERO POSITION.





No. MATCH UNIT

DIAGRAM LOCATION

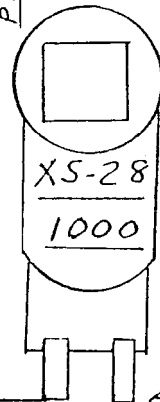
B-4

B-5

60 - LITE	BR/W-1	0
10 - "	BR/G-1	9
70 - "	BR/Y-1	8
30 - "	BR/BLU-1	7
80 - "	BR/R-2	6
20 - "	W/GRY-1	5
50 - "	W/B-2	4
90 - "	W/O-2	3
40 - "	W/BR	2
00 - "	W/G-1	1
FEED	BR/O-1	C

PRINTED CIRCUIT IB-2001-86

PRINTED CIRCUIT IB-2001-81



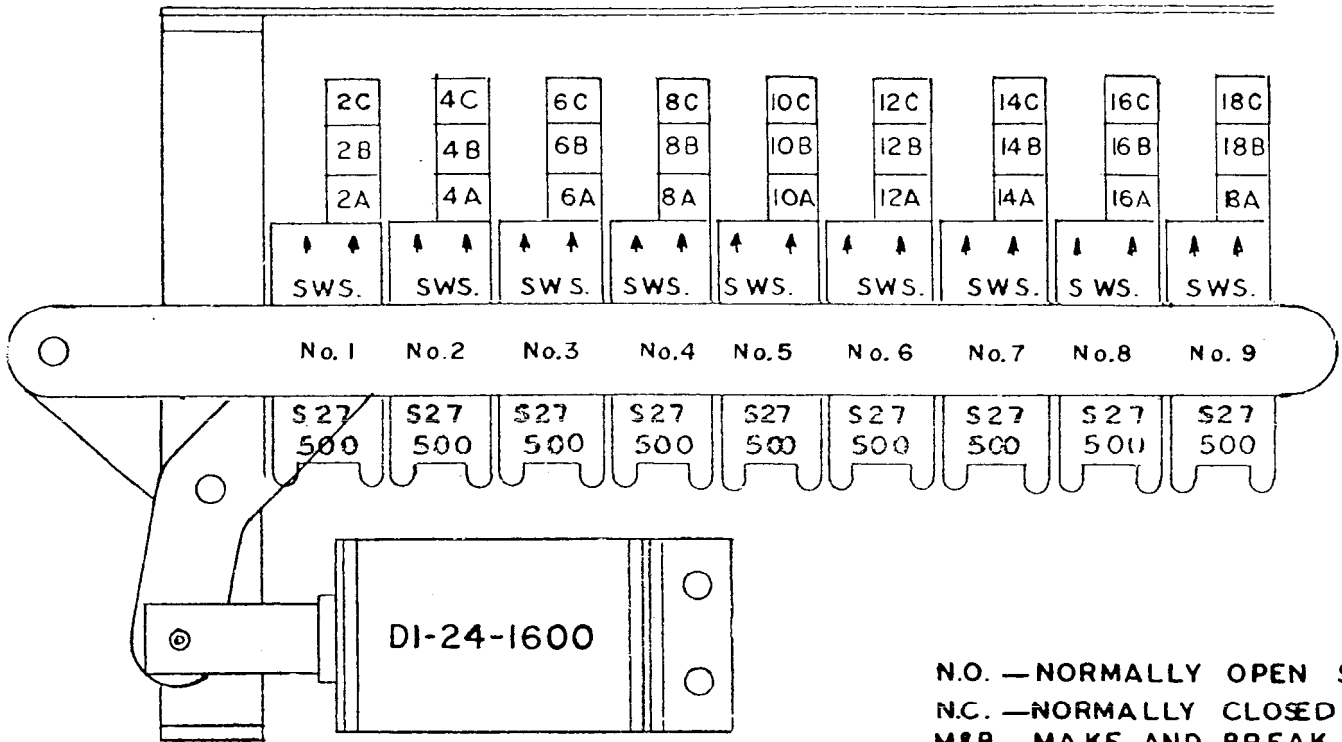
DRIVE SPRING 10A-324-1

0	G/Y-3	60 - MATCH
9	Y/G-3	10 - "
8	G/W-3	70 - "
7	Y/O-1	30 - "
6	G/O-1	80 - "
5	Y/BR	20 - "
4	G/R	50 - "
3	W/BLU-2	90 - "
2	Y/B-0	40 - "
1	Y/BLU-1	00 - "
C	BLU/O-2	FEED

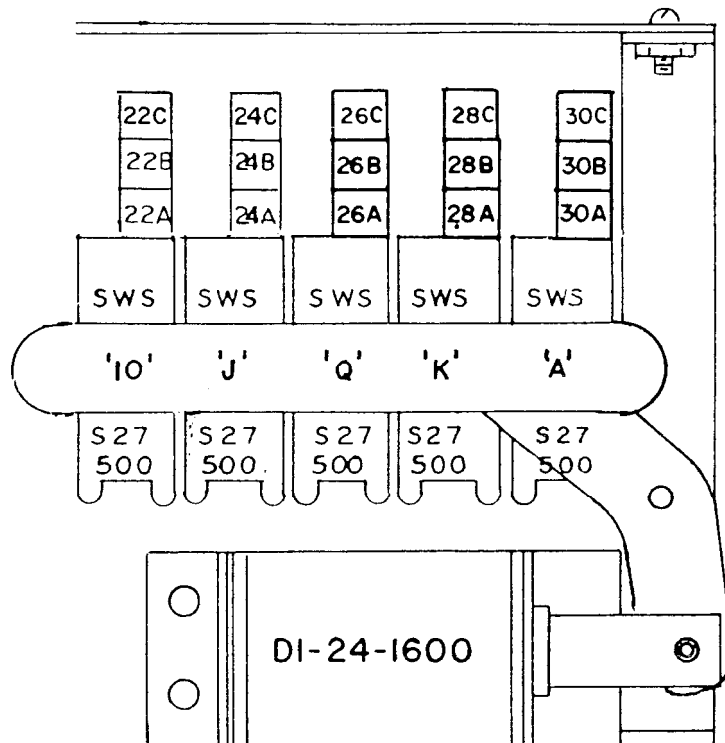
E-9

E-10

RELAY BANK SWS.



N.O. — NORMALLY OPEN SWITCH
 N.C. — NORMALLY CLOSED SWITCH
 M&B — MAKE AND BREAK SWITCH

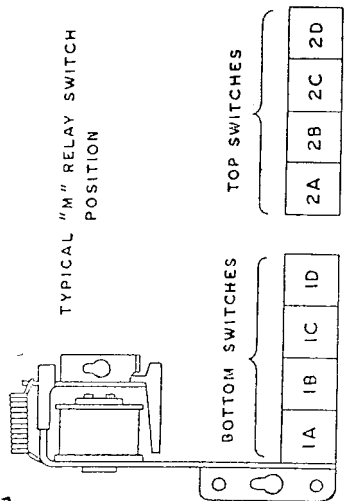


RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 1 RELAY	2C	-J- R-Y R-G	E-16	M&B	OPENS TO NO. 1 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 1 ROLLOVER BUTTON SWITCH).
	2B	-O- -BLU-	A-7	N.C.	TO NO. 1 ROLLOVER BUTTON LITE.
	2A	BLU-O -J-	C-11	N.O.	IN SERIES WITH SWITCH 4A ON NO. 2 RELAY. (IN CIRCUIT TO "1 TO 9 RESET RELAY").
NO. 2 RELAY	4C	-J- R-W R-G	E-16	M&B	OPENS TO NO. 2 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 2 ROLLOVER BUTTON SWITCH).
	4B	O-R -BLU-	A-8	N.C.	TO NO. 2 ROLLOVER BUTTON LITE.
	4A	-J- -J-	C-11	N.O.	IN SERIES WITH SWITCH 6A ON NO. 3 RELAY.
NO. 3 RELAY	6C	-J- R-O R-G	E-16	M&B	OPEN TO NO. 3 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 3 ROLLOVER BUTTON SWITCH).
	6B	O-BLU -BLU-	A-8	N.C.	TO NO. 3 ROLLOVER BUTTON LITE.
	6A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 8A ON NO. 4 RELAY.
NO. 4 RELAY	8C	-J- R-B R-G	E-16	M&B	OPENS TO NO. 4 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 4 ROLLOVER BUTTON SWITCH).
	8B	O-G -BLU-	A-8	N.C.	TO NO. 4 ROLLOVER BUTTON LITE.
	8A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 10A ON NO. 5 RELAY
NO. 5 RELAY	10C	-J- BLU-Y R-G	E-16	M&B	OPENS TO NO. 5 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 5 ROLLOVER BUTTON SWITCH).
	10B	O-W -BLU-	A-8	N.C.	TO NO. 5 ROLLOVER BUTTON LITE.
	10A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 12A ON NO. 6 RELAY

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 6 RELAY	12C	-J- BLU-0 R-G	E-16	M&B	OPENS TO NO. 6 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 6 ROLLOVER BUTTON SWITCH).
	12B	0-B -B LU-	A-8	N.C.	TO NO. 6 ROLLOVER BUTTON LITE.
	12A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 14A ON NO. 7 RELAY.
NO. 7 RELAY	14C	-J- Y-BLU R-G	E-17	M&B	OPENS TO NO. 7 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 7 ROLLOVER BUTTON SWITCH).
	14B	B-R -BLU-	A-8	N.C.	TO NO. 7 ROLLOVER BUTTON LITE.
	14A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 16A ON NO. 8 RELAY.
NO. 8 RELAY	16C	-J- Y-G R-G	E-17	M&B	OPENS TO NO. 8 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 8 ROLLOVER BUTTON SWITCH).
	16B	B-Y -BLU-	A-8	N.C.	TO NO. 8 ROLLOVER BUTTON LITE.
	16A	-J- -J-	E-11	N.O.	IN SERIES WITH SWITCH 18A ON NO. 9 RELAY.
NO. 9 RELAY	18C	-J- Y-0 R-G	E-17	M&B	OPENS TO NO. 9 RELAY COIL AND CLOSES TO 50 POINT RELAY. (WHEN MAKING NO. 9 ROLLOVER SWITCH).
	18B	B-G -BLU-	A-8	N.C.	TO NO. 9 ROLLOVER BUTTON LITE.
	18A	-J- R-0	E-11	N.O.	IN SERIES CIRCUIT TO "1 TO 9 RESET RELAY". (CIRCUIT ORIGINATES AT SWITCH 2A ON NO. 1 RELAY).
NO. 10 RELAY	22C	-J- G-R	E-17	N.C.	IN CIRCUIT TO '10' RELAY COIL. THRU '10' TARGET SWITCH.
	22B	GRAY-R -BLU-	A-9	N.C.	TO '10' TARGET LITE.
	22A	BLU-0 -J-	C-11	N.O.	IN SERIES WITH SWITCH 24A ON "J" RELAY. (IN CIRCUIT TO "10 TO ACE RESET RELAY").

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
J RELAY	24C	G-O -J-	E-17	N.C.	IN CIRCUIT TO 'J' RELAY COIL, THRU 'J' TARGET SWITCH.
	24B	GRAY-BLU -BLU-	A-9	N.C.	TO 'J' TARGET LITE.
	24A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 26A ON "Q" RELAY.
Q RELAY	26C	W-G -J-	E-17	N.C.	IN CIRCUIT TO 'Q' RELAY COIL, THRU 'Q' TARGET SWITCH.
	26B	GRAY-Y -BLU-	A-9	N.C.	TO 'Q' TARGET LITE.
	26A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 28A ON "K" RELAY.
K RELAY	28C	BR-G -J-	E-18	N.C.	IN CIRCUIT TO 'K' RELAY COIL, THRU 'K' TARGET SWITCH.
	28B	GRAY-G -BLU-	A-9	N.C.	TO 'K' TARGET LITE.
	28A	-J- -J-	D-11	N.O.	IN SERIES WITH SWITCH 30A ON "A" RELAY.
A RELAY	30C	BR-B -J-	E-18	N.C.	IN CIRCUIT TO 'A' RELAY COIL, THRU 'A' TARGET SWITCH.
	30B	GRAY-BR -BLU-	A-9	N.C.	TO 'A' TARGET LITE.
	30A	-J- R-BLU	E-11	N.O.	IN SERIES CIRCUIT TO "10 TO ACE RESET RELAY. (ORIGINATES AT SWITCH 22A ON "10" RELAY).

RELAYS & SWITCHES (ON MECHANISM PANEL)



COIN SET-UP

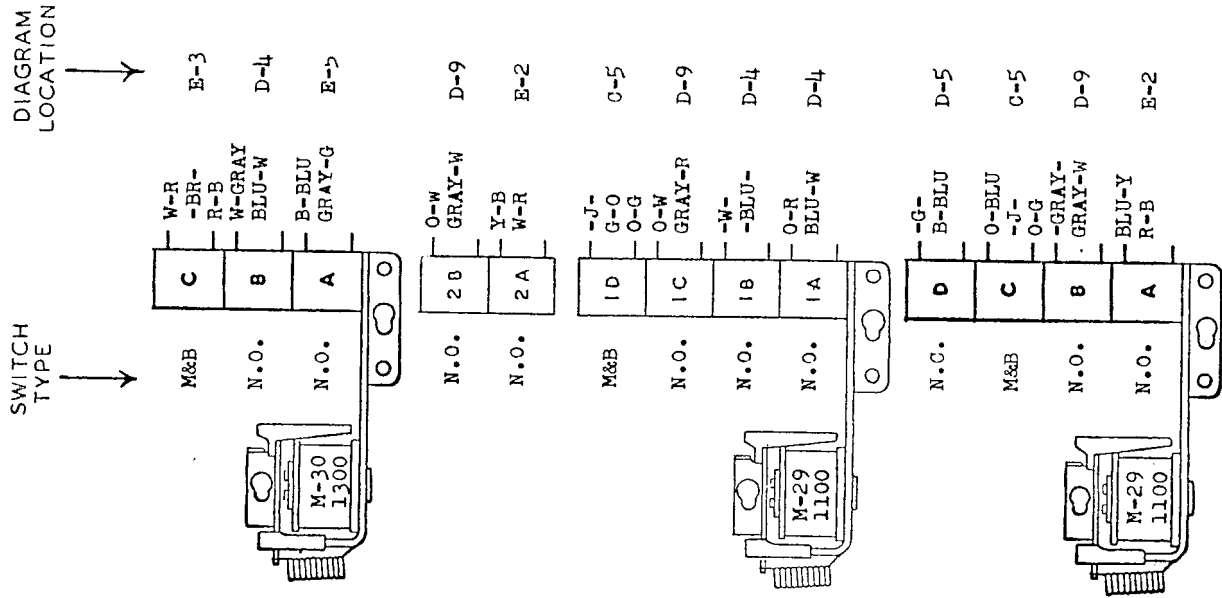
IS ENERGIZED BY 25¢ RELAY, THRU "ON-OFF" ADJUSTMENT JACK.

25¢

IS ENERGIZED BY 25¢ COIN SWITCH, THRU "ON-OFF" ADJUSTMENT JACK.

10¢

IS ENERGIZED BY 25¢ COIN SWITCH, THRU SWITCH ON COIN SET-UP RELAY.



OPENS IN CIRCUIT TO 25¢ RELAY AND CLOSES TO 10¢ RELAY.

IN CIRCUIT TO COIN LOCKOUT COIL.

IN HOLD CIRCUIT TO THIS RELAY.

PULSES CREDIT UNIT S.U. COIL, THRU "ON-OFF ADJUSTMENT JACK".

IN HOLD CIRCUIT TO THIS RELAY.

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

PULSES CREDIT UNIT S.U. COIL, THRU "ON-OFF ADJUSTMENT JACK".

ENERGIZES "COIN SET-UP" RELAY, THRU "ON-OFF ADJUSTMENT JACK".

ENERGIZES COIN RELAY, THRU "ON-OFF ADJUSTMENT JACK".

IN HOLD CIRCUIT TO "COIN SET-UP" RELAY.

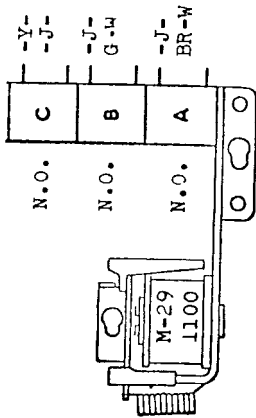
OPEN IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.

PULSES CREDIT UNIT S.U. COIL, THRU IMPULSE CAM SWITCH C.

IN HOLD CIRCUIT TO THIS RELAY.

5¢

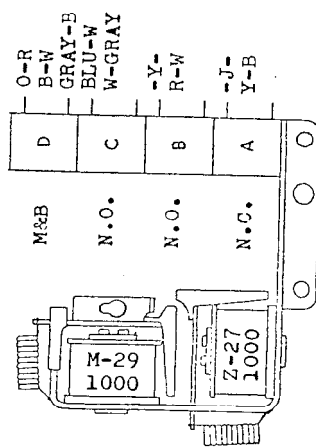
IS ENERGIZED BY 5¢ COIN SWITCH, IF 5¢ ADJUSTMENT JACK IS IN "2 COINS FOR 1 PLAY" POSITION.



C-2 ENERGIZES ALTERNATOR UNIT S.U. COIL.
 B-4 ENERGIZES COIN RELAY, THRU SWITCH ON ALTERNATOR UNIT.
 D-3 IN HOLD CIRCUIT TO THIS RELAY.

GAME INTERLOCK

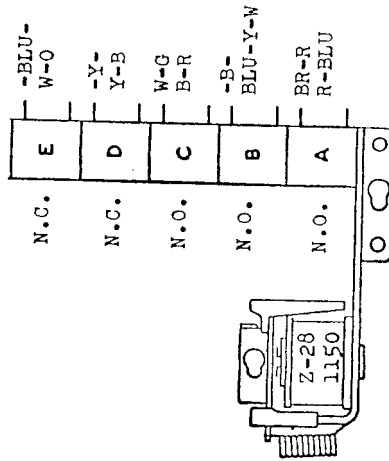
LATCH COIL IS ENERGIZED BY COIN RELAY, THRU WIPER FINGERS ON BALL COUNT UNIT (AT ZERO POSITION). TRIP COIL IS ENERGIZED BY BALL INDEX RELAY OR GAME-OVER RELAY.



E-8 OPENS IN CIRCUIT TO BALL COUNT S.U. COIL AND CLOSES TO BALL COUNT RESET COIL.
 D-4 IN CIRCUIT TO COIN RELAY OR COIN LOCKOUT COIL, THRU REPLAY UNIT ZERO SWITCH.
 D-3 IN HOLD CIRCUIT TO COIN RELAY.
 D-7 IN CIRCUIT TO GAME RELAY (TRIP COIL).

GAME-OVER

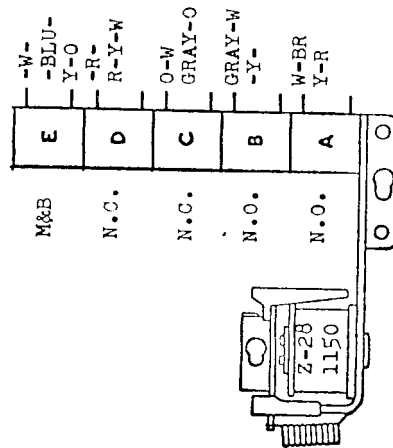
IS ENERGIZED BY COIN RELAY. IT THEN HOLDS IN BY WIPERS ON BALL COUNT UNIT OR BY ZERO SWITCH ON BALL COUNT UNIT.



A-4 OPENS CIRCUIT TO NUMBER MATCH LITES AND GAME-OVER LITE.
 C-7 IN SERIES WITH SWITCH A ON GAME RELAY.
 D-9 IN HI-SCORE AND NUMBER MATCH CIRCUIT.
 F-11 OPENS CIRCUITS TO PLAYFIELD SWITCHES.
 E-7 IN HOLD CIRCUIT TO THIS RELAY.

TILT

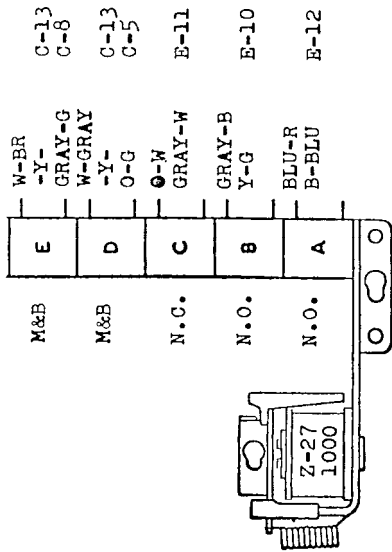
IS ENERGIZED BY PLUMB BOB TILT, BALL ROLLOVER TILT OR PLAYFIELD VIBRATION TILT SWITCH.



B-2 OPENS TO PLAYFIELD DISPLAY LITES AND CLOSES TO TILT LITE.
 A-5 OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.
 F-13 IN CIRCUIT TO BONUS RELAY.
 D-11 ENERGIZES BALL INDEX RELAY.
 E-12 IN HOLD CIRCUIT TO THIS RELAY.
 E-13 IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE

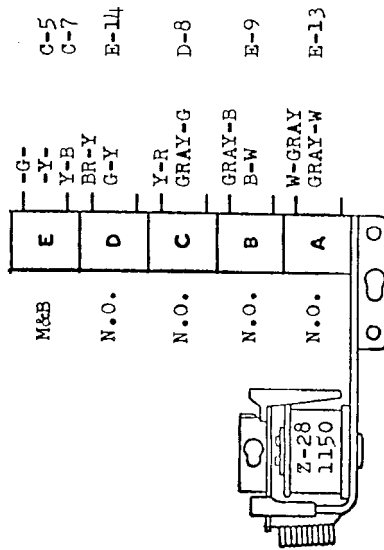
IS ENERGIZED BY SCORE MOTOR CAM SWITCH B, THRU WIPERS ON BONUS UNIT (IN ZERO POSITION).



OPENS IN HOLD CIRCUITS TO TILT, TRIPLE BONUS, DOUBLE BONUS AND SET-UP RELAY, & CLOSES TO BALL COUNT RESET COIL.
 OPENS IN HOLD CIRCUIT TO BALL INDEX RELAY AND CLOSES TO RUN SCORE MOTOR.
 IN CIRCUIT TO BONUS RELAY, THRU OUTHOLE SWITCH.
 IN NUMBER MATCH CIRCUIT.
 IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX

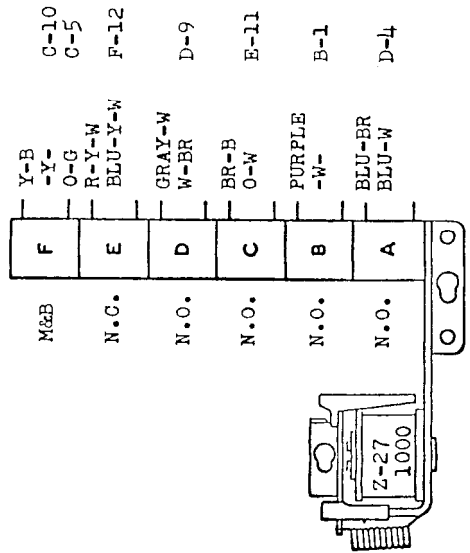
IS ENERGIZED BY 10 POINT RELAY, 100 POINT RELAY, 1,000 POINT RELAY OR TILT RELAY.



OPENS IN HOLD CIRCUIT TO COIN SET-UP RELAY AND CLOSES TO GAME RELAY (TRIP COIL).
 IN CIRCUIT TO 1,000 POINT RELAY.
 TO BALL COUNT RESET COIL, THRU SCORE MOTOR CAM SWITCH 2A.
 IN SERIES WITH SWITCH B ON OUTHOLE RELAY.
 IN HOLD CIRCUIT TO THIS RELAY.

RESET

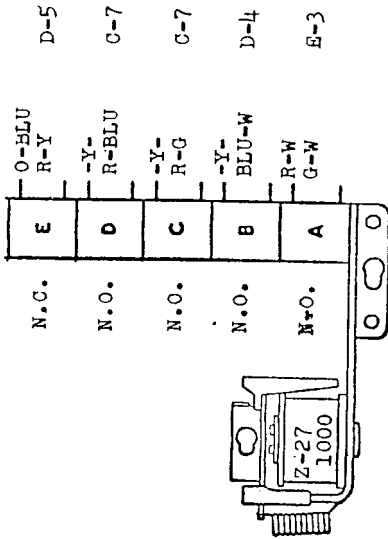
IS ENERGIZED BY COIN RELAY.



OPENS IN HI-SCORE CIRCUIT AND CLOSES TO RUN SCORE MOTOR.
 OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.
 PULSES SCORE RESET RELAY, THRU IMPULSE CAM SWITCH C.
 IN CIRCUIT TO BONUS RELAY.
 IN CIRCUIT TO 1 TO 9 RELAY BANK RESET COIL, THRU "LIBERAL-CONSERVATIVE" ADJUSTMENT JACK.
 IN HOLD CIRCUIT TO THIS RELAY.

COIN

ENERGIZED BY CREDIT BUTTON, THRU ZERO SWITCH ON CREDIT UNIT; OR BY COIN SWITCH. ALSO BY 25¢ RELAY, THRU "ON-OFF" ADJUSTMENT JACK.



D-5 OPENS CIRCUIT TO KNOCKER COIL.

C-7 ENERGIZES GAME-OVER RELAY.

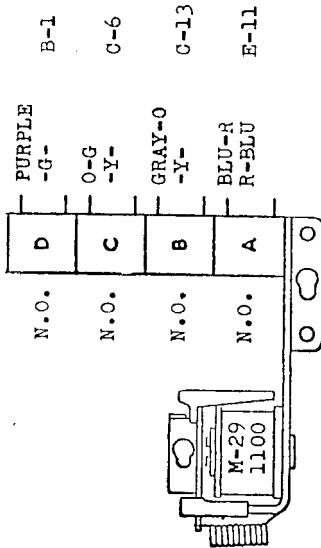
C-7 IN CIRCUITS TO BALL COUNT RESET, BALL COUNT S.U. AND CREDIT RESET COILS. ALSO GAME RELAY (LATCH COIL).

D-4 ENERGIZES RESET RELAY.

E-3 IN HOLD CIRCUIT TO THIS RELAY.

**10 TO ACE
RESET**

ENERGIZED BY SERIES CIRCUIT THRU "10", "Q", "K" AND "A" RELAYS, AT SCORE FOR INDEX CAM SWITCH C.



B-1 ENERGIZES 10 TO ACE RELAY BANK RESET COIL THRU CAM SWITCH 1A.

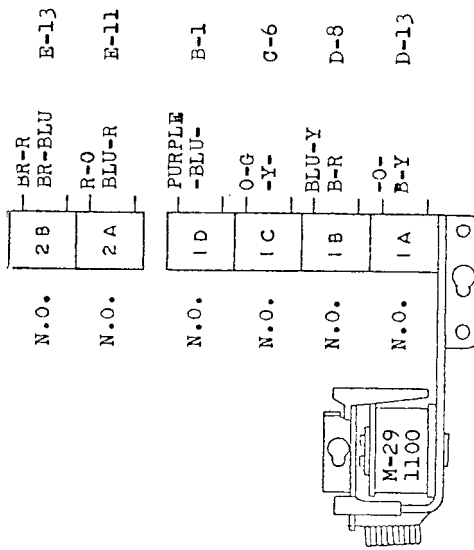
C-6 RUNS SCORE MOTOR.

C-13 IN CIRCUIT TO ENERGIZE SET-UP RELAY AND SPECIAL RELAY.

E-11 IN HOLD CIRCUIT TO THIS RELAY.

**1 TO 9
RESET**

ENERGIZED BY SERIES CIRCUIT OF SWITCHES NO. 1 THRU NO. 9 RELAYS, AT SCORE MOTOR EX CAM SWITCH C.



E-13 ENERGIZES DOUBLE BONUS RELAY, THRU CAM SWITCH 4E.

E-11 IN HOLD CIRCUIT TO THIS RELAY.

B-1 ENERGIZES 1 TO 9 RELAY BANK RESET COIL, THRU CAM SWITCH 3A.

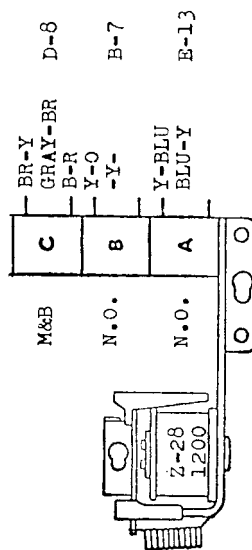
C-6 RUNS SCORE MOTOR.

D-8 TO "CREDIT-ADD-A-BALL-NOVELTY" ADJUSTMENT JACK, FROM SWITCH ON TRIPLE BONUS RELAY.

D-13 ENERGIZES TRIPLE BONUS RELAY, THRU SWITCH ON DOUBLE BONUS RELAY.

SPECIAL

ENERGIZED BY "10 TO ACE RESET RELAY" THRU SWITCH ON SET-UP RELAY.



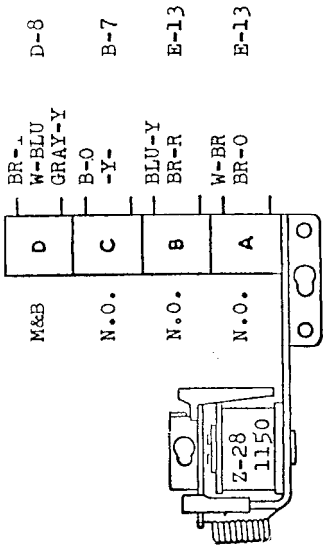
D-8 OPENS IN CIRCUIT TO 1,000 POINT RELAY AND CLOSSES IN CIRCUIT TO "CREDIT-ADD-A-BALL-NOVELTY" ADJ. JACK.

E-7 TO RIGHT SIDE ROLLOVER LITE.

E-13 IN HOLD CIRCUIT TO THIS RELAY.

SET-UP

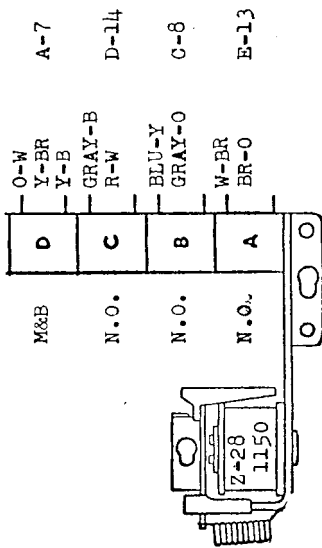
ENERGIZED BY "10 TO ACE RESET RELAY",
J SCORE MOTOR CAM SWITCH 4B.



D-8 OPENS IN CIRCUIT TO 1,000 POINT RELAY AND CLOSES IN CIRCUIT TO "CREDIT-ADD-A-BALL-NOVELTY" ADJ. JACK.
B-7 TO RIGHT BOTTOM ROLLOVER LITE.
E-13 ENERGIZES SPECIAL RELAY, THRU SWITCH ON "10 TO ACE RESET RELAY".
E-13 IN HOLD CIRCUIT TO THIS RELAY.

TRIPLE BONUS

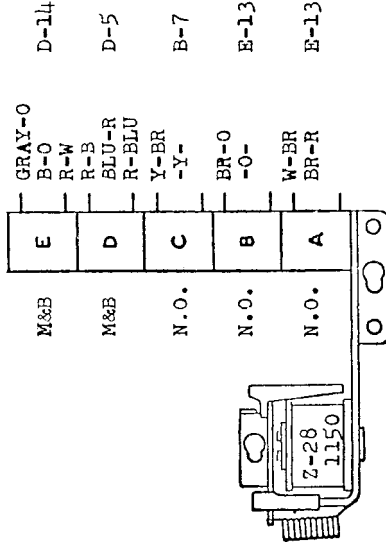
ENERGIZED BY "1 TO 9 RESET RELAY",
RU SWITCH ON DOUBLE BONUS RELAY.



A-7 OPENS IN CIRCUIT TO DOUBLE BONUS LITE AND CLOSES TO TRIPLE BONUS LITE AND 1 TO 9 SPECIAL LITE.
D-14 IN CIRCUIT TO 1,000 POINT RELAY. (WHEN COLLECTING BONUS).
C-8 IN SERIES WITH SWITCH 1B ON "1 TO 9 RESET RELAY".
E-13 IN HOLD CIRCUIT TO THIS RELAY.

DOUBLE BONUS

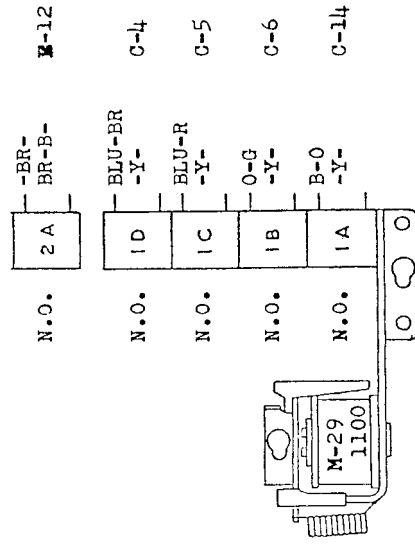
ENERGIZED BY "1 TO 9 RESET RELAY",
RU SCORE MOTOR CAM SWITCH 4E.



D-14 IN CIRCUIT TO 1,000 POINT RELAY. (WHEN COLLECTING BONUS).
D-5 IN CIRCUIT TO BONUS UNIT RESET COIL, THRU SWITCH ON BONUS RELAY.
B-7 IN SERIES WITH SWITCH D ON TRIPLE BONUS RELAY.
E-13 IN SERIES WITH SWITCH 1A ON "1 TO 9 RESET RELAY".
E-13 IN HOLD CIRCUIT TO THIS RELAY.

BONUS

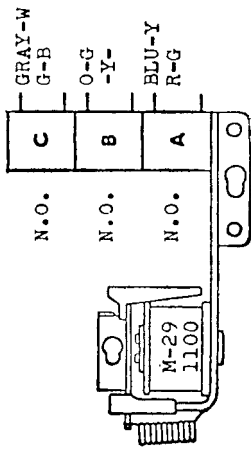
S ENERGIZED BY OUTHOLE SWITCH, THRU
OUTHOLE RELAY AND TILT RELAY.



M-12 HOLD CIRCUIT TO THIS RELAY, THRU ZERO SWITCH ON BONUS UNIT.
C-4 IN SERIES WITH SWITCH A ON RESET RELAY.
C-5 IN SERIES WITH SWITCH D ON DOUBLE BONUS RELAY.
C-6 RUNS SCORE MOTOR.
C-14 IN SERIES WITH SWITCH E ON DOUBLE BONUS RELAY.

50 POINT

IS ENERGIZED BY ANY ROLLOVER BUTTON FROM NO. 1 TO NO. 9.



E-15 IN CIRCUIT TO PULSE 10 POINT RELAY.

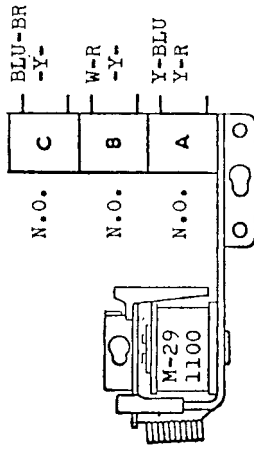
C-6 RUNS SCORE MOTOR.

E-17 IN HOLD CIRCUIT TO THIS RELAY, THRU SCORE MOTOR CAM SWITCH 5G.

ADVANCE

ENERGIZED BY:

1. TOP ROLLOVER BUTTON SWITCH.
2. LEFT OR RIGHT TOP TARGET SWITCH.
3. LEFT OR RIGHT TOP ROLLOVER SWITCH.
4. LEFT SIDE TARGET SWITCH.



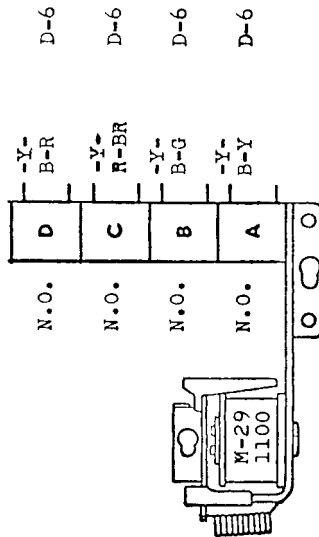
C-11 ENERGIZES BONUS UNIT S.U. COIL.

C-14 ENERGIZES 100 POINT RELAY.

E-16 HOLD CIRCUIT TO THIS RELAY, THRU END-OF-STROKE SWITCH ON BONUS UNIT.

SCORE RESET

ENERGIZED BY IMPULSE CAM SWITCH C, THRU SWITCH ON RESET RELAY.



D-6 PULSES 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

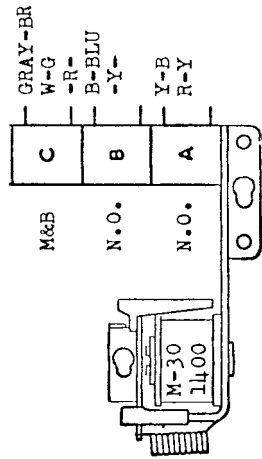
D-6 PULSES 100 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

D-6 PULSES 10,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

D-6 PULSES 1,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

100,000

ENERGIZED BY 1,000 POINT RELAY, THRU PER ON 1,000 POINT DRUM UNIT DISC AND H POSITION SWITCH ON 10,000 POINT DRUM UNIT. IN "NOVELTY" ADJUSTMENT, BY 10,000 POINT DRUM UNIT END-OF-STROKE SWITCH, THRU 9TH POSITION SWITCH ON 10,000 POINT DRUM UNIT.



D-9 IN HI-SCORE CIRCUIT TO CREDIT S.U. OR BALL COUNT S.U. COIL.

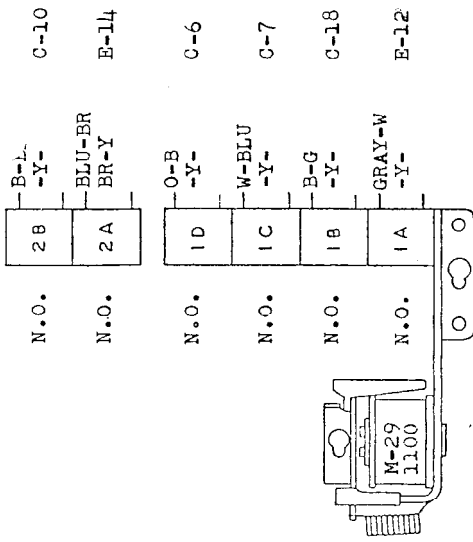
B-2 TO 100,000 LITE.

E-11 IN HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON RESET RELAY.

1,000 POINT

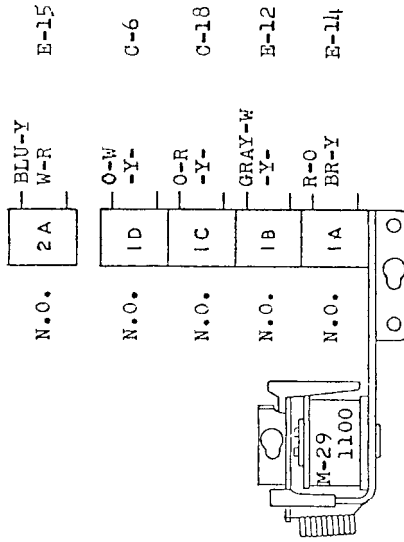
IS ENERGIZED BY:

1. RIGHT BOTTOM ROLLOVER SWITCH, THRU SW. ON SET-UP RELAY.
2. RIGHT SIDE ROLLOVER SWITCH, THRU SW. ON SPECIAL RELAY.
3. BONUS RELAY, THRU SWITCH ON DOUBLE BONUS RELAY AND VARIOUS CAM SWITCHES.
4. ANY OF (5) TARGET SWITCHES---
10 TO ACE.



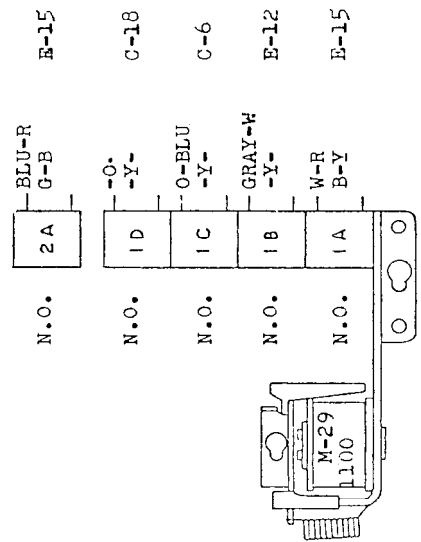
100 POINT

IS ENERGIZED BY ADVANCE RELAY OR ANY OF (2) JET BUMPER SWITCHES.



10 POINT

IS ENERGIZED BY 50 POINT RELAY, THRU IMPULSE CAM SWITCH C---OR BY (2) KICKER SWITCHES.



IN CIRCUIT TO 100,000 RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

PULSES 1,000 POINT DRUM UNIT.

PULSES 10,000 POINT DRUM UNIT, THRU 9TH POSITION SWITCH ON 1,000 POINT DRUM UNIT.

PULSES LARGE CHIME COIL.

ENERGIZES BALL INDEX RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

PULSES 100 POINT DRUM UNIT.

PULSES SMALL CHIME COIL.

ENERGIZES BALL INDEX RELAY.

PULSES 1,000 POINT RELAY, THRU 9TH POSITION SWITCH ON 100 POINT DRUM UNIT.

IN HOLD CIRCUIT TO THIS RELAY.

PULSES MEDIUM CHIME COIL.

PULSES 10 POINT DRUM UNIT.

ENERGIZES BALL INDEX RELAY.

PULSES 100 POINT DRUM UNIT, THRU 9TH POSITION SWITCH ON 10 POINT DRUM UNIT.