

"BIG BEN"

GAMES OPERATES AS FOLLOWS:

1. THREE TOP ROLLOVER LANES LITE B-I-G.
2. MAKING B-I AND G SCORES 5,000 POINTS AND LITES EJECT HOLE FOR 5,000 POINTS.
3. MAKING B-I AND G A SECOND TIME SCORES 5,000 POINTS AND LITES EJECT HOLE FOR SPECIAL.
4. LETTERS B-I AND G LITE LEFT SIDE ROLLOVER BUTTONS FOR 1,000 POINTS.
5. BONUS VALUE IS ADVANCED ON TOP ROLLOVER BUTTON AND B-I AND G ROLLOVER LANES.
6. MAKING THREE DROP TARGETS B-E AND N LITES DOUBLE BONUS AND INCREASES DROP TARGET VALUES TO 1,000 POINTS.
7. MAKING THREE DROP TARGETS B-E AND N A SECOND TIME LITES STAR AT BOTTOM OF PLAYFIELD FOR EXTRA BALL.
8. BONUS IS COLLECTED WHEN BALL LEAVES PLAYFIELD.
9. WHEN GAME IS SET IN "CREDIT" POSITION, EJECT HOLE SCORES ONE CREDIT WHEN SPECIAL IS LIT.
10. WHEN GAME IS SET IN "EXTRA BALL" POSITION, EJECT HOLE, WHEN LIT SPECIAL, SCORES 10,000 POINTS AND EXTRA BALL.
11. WHEN GAME IS SET IN "NOVELTY" POSITION, EJECT HOLE, WHEN LIT SPECIAL, SCORES 10,000 POINTS.

SUGGESTED SCORE CARDS

CREDIT PLAY

5 BALL PLAY - 456-10 X (65,000 - 89,000)
3 BALL PLAY - 456-19 X (52,000 - 73,000 - 94,000)

EXTRA BALL PLAY

5 BALL PLAY - 456-45 X (50,000)
3 BALL PLAY - 456-41 X (30,000)

SEQUENCE OF OPERATION

RESET CYCLE

COIN RELAY IS ENERGIZED AT SCORE MOTOR INDEX CAM SWITCH C, THRU SWITCH ON COIN RELAY, GAME RELAY, ZERO SWITCH ON CREDIT UNIT AND CREDIT BUTTON SWITCH.

SWITCHES ON COIN RELAY WILL ENERGIZE GAME-OVER RELAY, ENERGIZE RESET RELAY, ENERGIZE B-E-N TARGET RESET COILS IN 3 BALL GAME, ENERGIZE GAME RELAY LATCH COIL THRU WIPER ON BALL COUNT UNIT (AT ZERO POSITION), AND PULSE BALL COUNT RESET AND S.U. COILS THRU SWITCH D ON GAME RELAY.

SWITCHES ON RESET RELAY WILL RUN SCORE MOTOR, PULSE SCORE RESET RELAY, THRU SCORE MOTOR IMPULSE CAM SWITCH C, AND ENERGIZE BONUS RELAY THRU ZERO SWITCH ON ADVANCE UNIT.

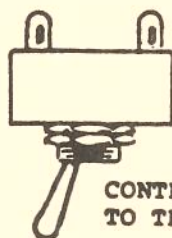
SWITCHES ON SCORE RESET RELAY WILL PULSE 4 SCORE DRUM UNITS UNTIL THEY REACH ZERO.

SWITCHES ON BONUS RELAY WILL RUN SCORE MOTOR, HOLD RESET RELAY IN, PULSE ADVANCE UNIT RESET COIL, AND OPEN CIRCUIT TO OUTHOLE RELAY. (BONUS RELAY IS HELD IN BY ZERO SWITCH ON ADVANCE UNIT).

WHEN BONUS RELAY DROPS OUT, OUTHOLE RELAY IS ENERGIZED THRU ZERO SWITCH ON ADVANCE UNIT.

SWITCHES ON OUTHOLE RELAY WILL RUN SCORE MOTOR, ENERGIZE B-E-N TARGET RESET COILS (IN 5 BALL PLAY), PULSE ADVANCE UNIT S.U. COIL, AND ENERGIZE BALL RELEASE COIL TO PROPEL BALL TOWARD PLUNGER.

RELAYS AND SWITCHES ARE SHOWN ON THE LAST 8 PAGES OF THIS MANUAL.



MASTER ON-OFF SW.

*(Located under front of
Cabinet)*

CONTROLS POWER
TO TRANSFORMER

I. 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 in to 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.

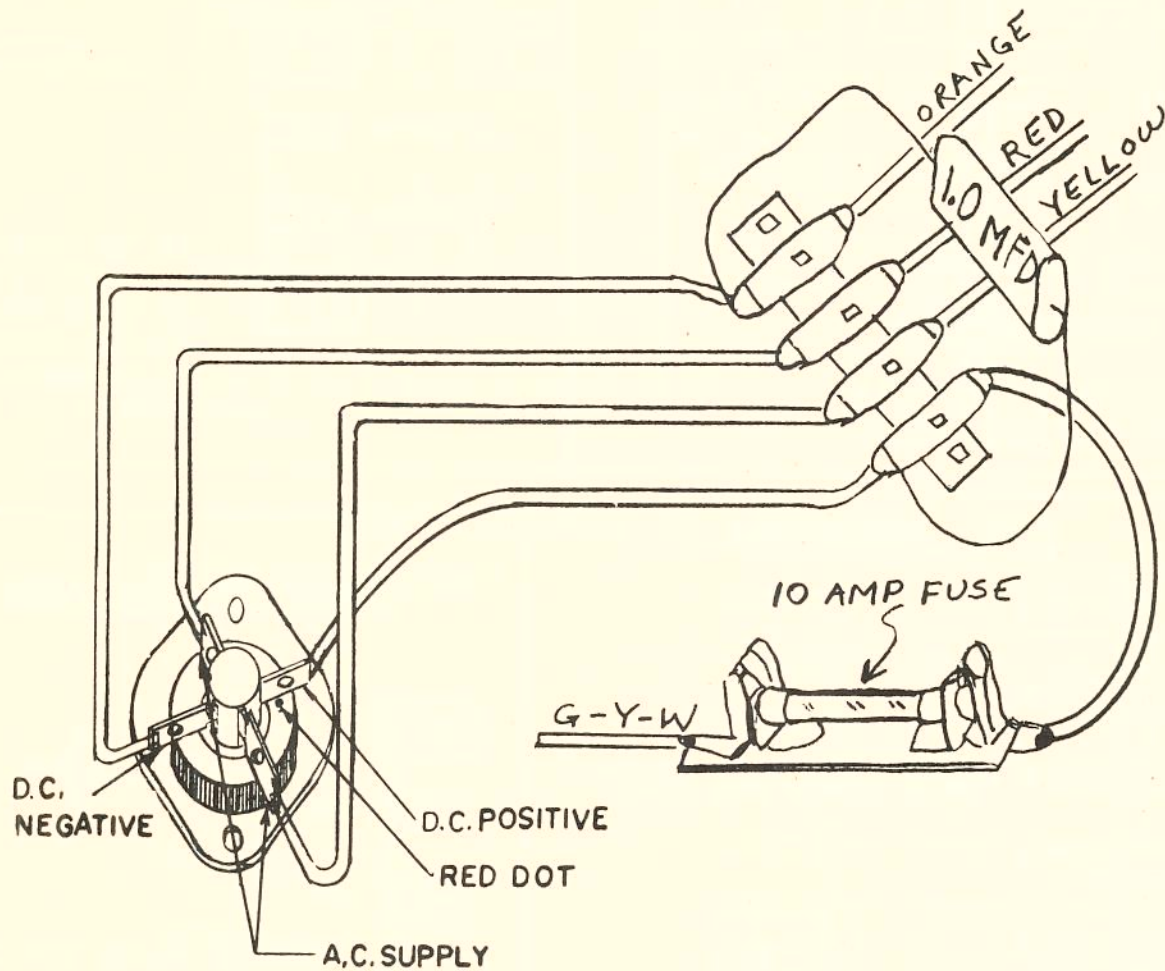
STEP-UP Levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs (biscuits) on the Motor Units and Step-up Units will require lubrication with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

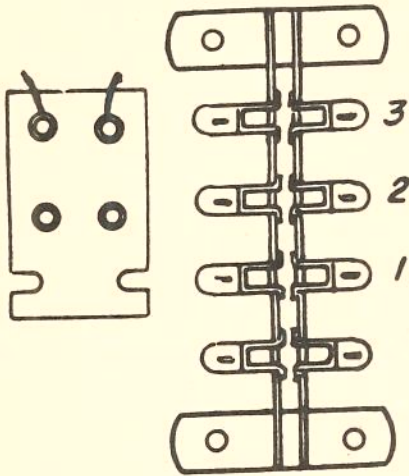
THE BRIDGE RECTIFIER SHOULD PRACTICALLY NEVER NEED REPLACING, AS IT IS RATED WELL OVER THE VOLTAGE AND CURRENT REQUIREMENTS OF THE COMPONENTS IT SUPPLIES.

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.

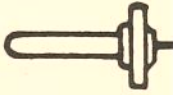
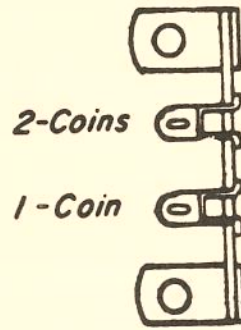
ADJUSTMENTS ON MECHANISM PANEL

10¢ Adjustment



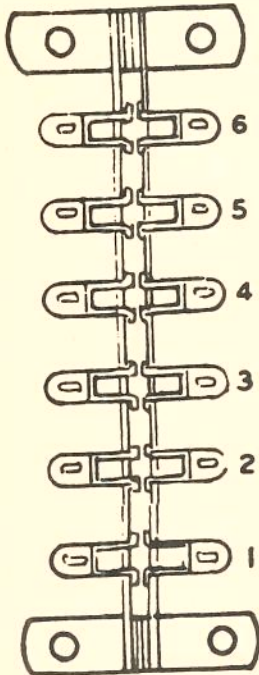
PROVIDES
1, 2 OR
3 PLAYS
FOR ONE
COIN.

5¢ Adjustment

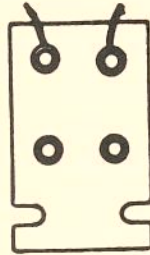


IN "2 COINS FOR
1 PLAY", CIRCUIT
TO COIN RELAY
PASSES THRU SW.
ON ALTERNATOR
UNIT.

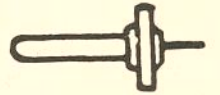
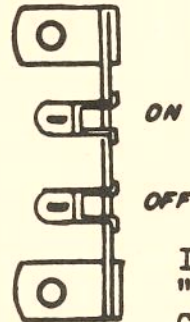
25¢ Adjustment



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



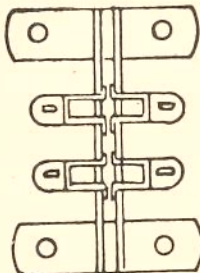
Motor Service Jack



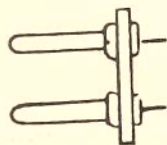
INSERT PHONE TIP IN
"OFF" POSITION - CAMS
CAN BE TURNED BY HAND
TO CHECK ADJUSTMENT OF
SWITCHES.

NUMBER MATCH ADJUSTMENT

ON OFF

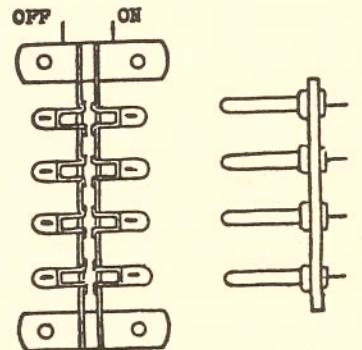


LOCATED IN BACKBOX



IN "ON" POSITION, A CREDIT IS SCORED
IF LAST TWO DIGITS IN POINT SCORE ARE
IDENTICAL TO NUMBER MATCH LIFE. IN
"OFF" POSITION, NUMBER MATCH IS

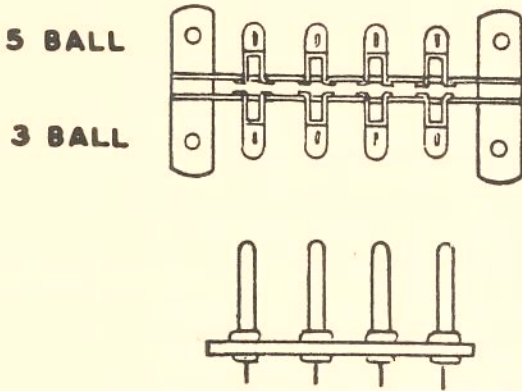
1 COIN - 1 PLAY
2 COINS - 3 PLAYS ADJ.



IN "ON" POSITION, 10¢ ADJUSTMENT
MUST BE IN #2 POSITION & 25¢ ADJUSTMENT
MUST BE IN #6 POSITION. FIRST COIN
ADVANCES CREDIT UNIT 1 STEP. SECOND
COIN WILL ADVANCE CREDIT UNIT 2 STEPS.
IN "OFF" POSITION, 25¢ ADJUSTMENT
AND/OR 10¢ ADJUSTMENT SHOULD BE PUT
PROPER POSITION.

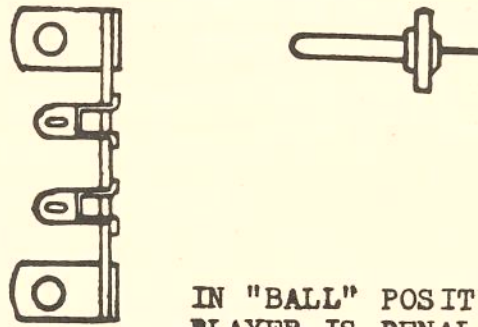
ADJUSTMENTS ON MECHANISM PANEL

No. of Balls Adjustment



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

TILT ADJ.



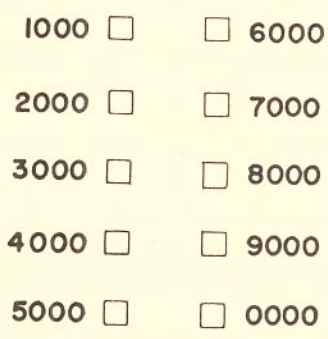
IN "BALL" POSITION, PLAYER IS PENALIZED ONE BALL WHEN TILTING

THE GAME.

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

ADJUSTMENTS IN BACKBOX

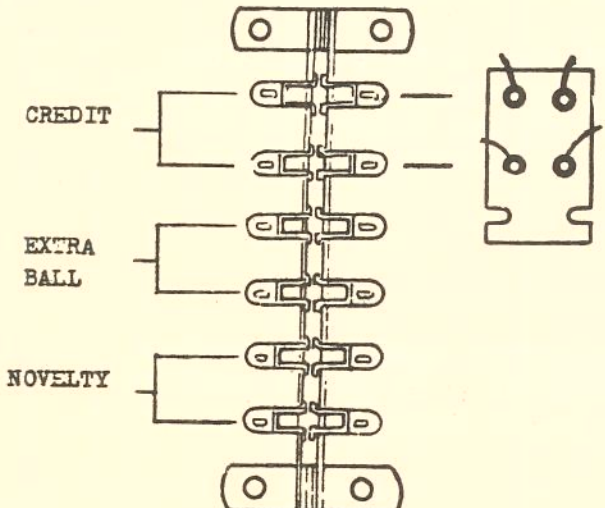
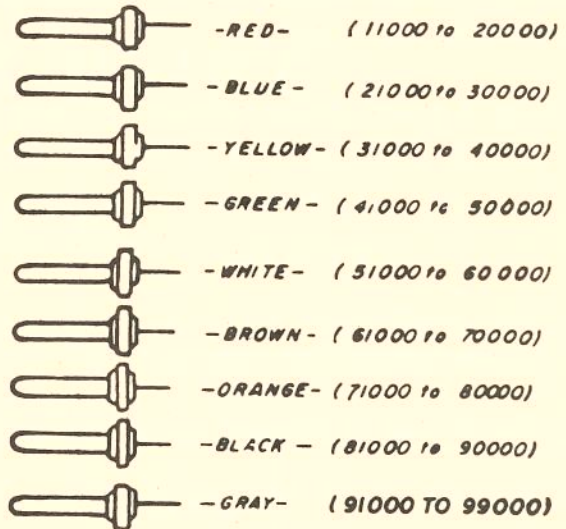
Hi-Score Adjustment



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.



PLAY ADJUSTMENT

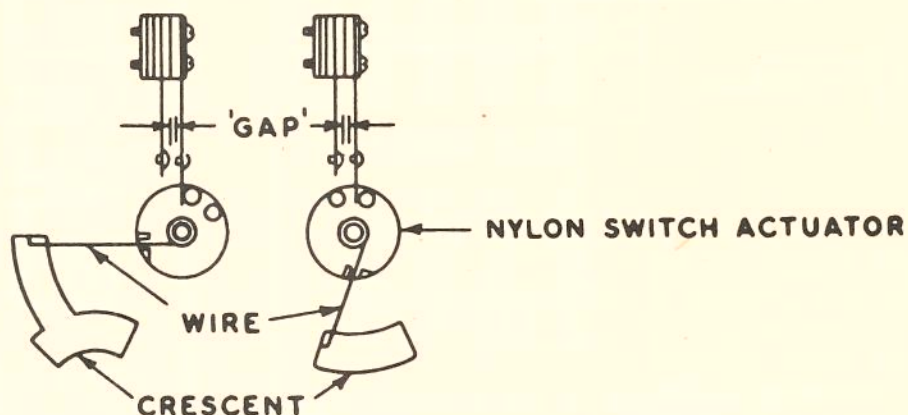
IN CREDIT POSITION: HI-SCORES AND NO. MATCH SCORE A CREDIT. MAKING EJECT HOLE, WHEN "SPECIAL" IS LIT, SCORES A CREDIT. MAKING B-E-N TARGETS TWICE, SCORES EXTRA BALL.

IN EXTRA BALL POSITION: HI-SCORE AWARDS EXTRA BALL. MAKING EJECT HOLE, WHEN "SPECIAL" IS LIT, SCORES EXTRA BALL AND 10,000 POINTS. MAKING B-E-N TARGETS TWICE, SCORES EXTRA BALL. (NO. MATCH IN "OFF" POS.)

IN NOVELTY POSITION: MAKING EJECT HOLE, WHEN "SPECIAL" IS LIT, SCORES 10,000 POINTS.

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.

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 INCREASE PITCH.

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-6402-5	
(RIGHT SIDE)	B-7568	A-7614		
NO. MATCH			A-7548-1	SCORE MOTOR
(LEFT SIDE)	B-7569	A-7615		
ADVANCE	C-6417	B-7456-50	A-6402-10	14A-7883 (60 CYCLE)
10 POINT	B-7253	A-6294	3C-7272	14A-7884 (50 CYCLE)
100 POINT	-----	-----	3C-7272	
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.**

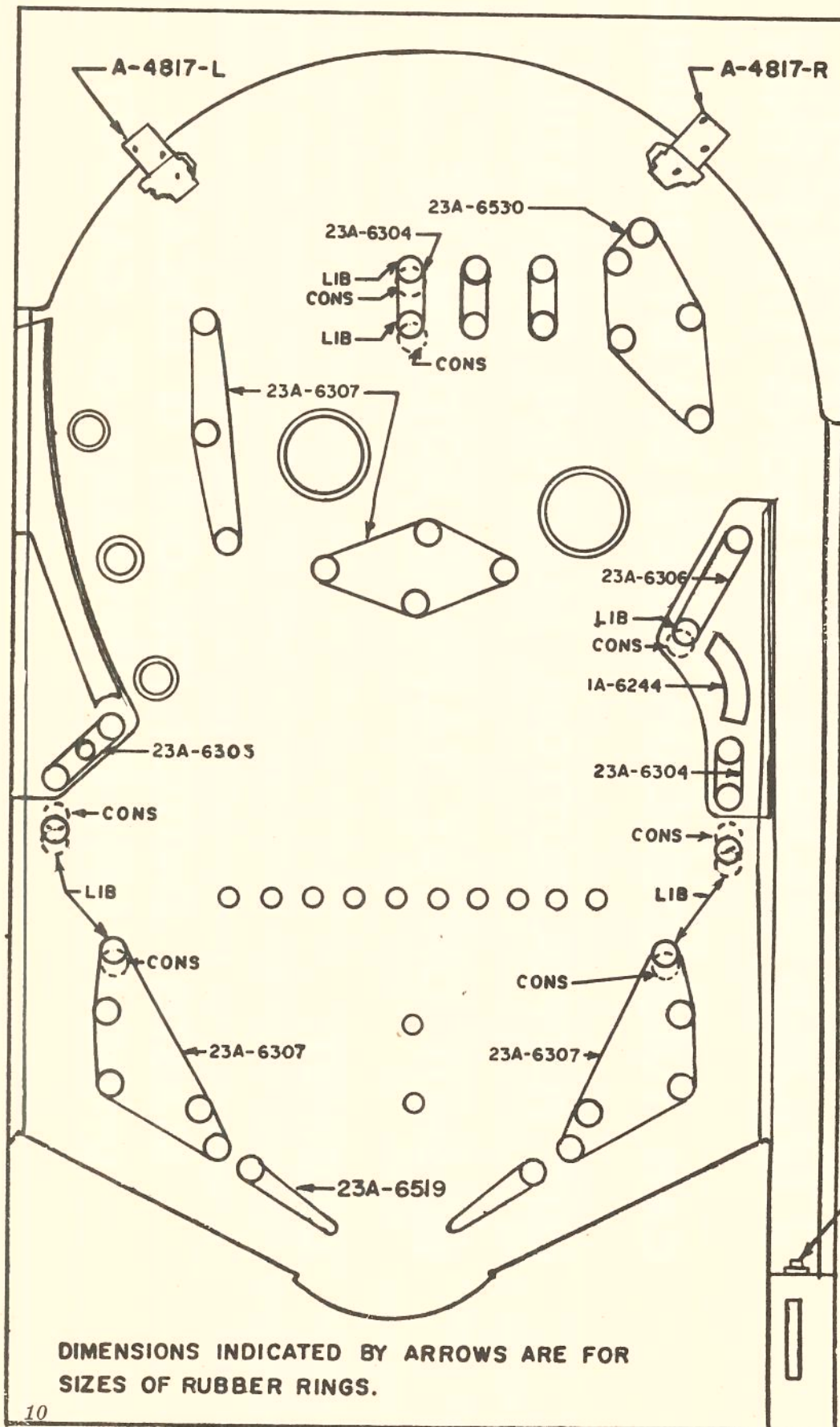
IMPORTANT NOTICE

**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.**

"BIG BEN" - 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-6304	1 1/2	I.D.
23A-6306	2 5/16	I.D.
23A-6307	2 7/8	I.D.
23A-6530	4 1/2	I.D.
23A-6305	2"	I.D.
23A-6519	FLIPPER RUBBER	

DIMENSIONS INDICATED BY ARROWS ARE FOR SIZES OF RUBBER RINGS.

"BIG BEN" COIL CHART

NOTICE:

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

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>LOCATION</u>
14 A-7883	SCORE MOTOR - 60 CYCLE	MECH. PANEL
14 A-7884	SCORE MOTOR - 50 CYCLE	MECH. PANEL
15 A-6771	TRANSFORMER - 60 CYCLE	MECH. PANEL
15 A-6782-1	TRANSFORMER - 50 CYCLE	MECH. PANEL
B 6396	METER - 24 VOLT	MECH. PANEL
<u>SOLENOID COILS</u>		
A 22-550	ADVANCE 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
B 1-26-800	SCORE DRUM UNITS ... (4 req'd.) BALL COUNT UNIT RESET CREDIT UNIT RESET ADVANCE UNIT RESET	INSERT INSERT INSERT PLAYFIELD
FL 20-300 / 28-400	FLIPPERS ... (2 req'd.)	PLAYFIELD
G 23-750 D.C.	D.C. JET BUMPER COILS ... (2 req'd.) D.C. KICKER COILS ... (2 req'd.)	PLAYFIELD PLAYFIELD
M 29-1000	GAME RELAY TRIP	MECH. PANEL
M 29-1100	10 ¢ RELAY 25 ¢ RELAY 10 POINT RELAY 100 POINT RELAY 1000 POINT RELAY SCORE RESET RELAY ADVANCE RELAY 50 POINT RELAY 5000 RELAY TARGET RELAY	MECH. PANEL MECH. PANEL INSERT INSERT INSERT INSERT PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD
M 30-1300	COIN SET UP RELAY	MECH. PANEL
XS 28-1000	NUMBER MATCH ALTERNATOR UNIT	INSERT MECH. PANEL
M 1-31-1500	COIN LOCKOUT COIL	DOOR
XM 27-675	TOTAL PLAY METER COIL	CABINET
Z 27-1000	OUTHOLE RELAY RESET RELAY COIN RELAY GAME RELAY (LATCH) BONUS RELAY EJECT RELAY	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD MECH. PANEL
Z 28-1150	GAME OVER RELAY TILT RELAY BALL INDEX RELAY EXTRA BALL RELAY DOUBLE BONUS RELAY "B" RELAY "I" RELAY "G" RELAY EJECT 5000 RELAY EJECT SPECIAL RELAY	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD MECH. PANEL MECH. PANEL
G 22-550	"B-E-N" TARGET RESET ... (3 req'd.)	PLAYFIELD
G 23-750	EJECT COIL	PLAYFIELD

JACK LAYOUT

GAME BIG BEN

POSITION PAN-PLAY. SIZE 24

FEED	B(A)	GRY/BLU BONUS RE.	
"	R(A)	GRY/G-3 " "	
MOTOR RUN	%G	BLU/B-1 " "	
RESET RE.	BLU/BR-1	Y/R-3 TILT RE.	
TARGET RESET	BLU/R	W/BR-2 " "	
"	" G-3	GRY/BR 1.00OPT.RE.	
"	" W-2	G/W-1 DOUBLE BONUS RE.	
EJECT COIL	R/O-2	BR/R-1 " "	
EJECT RE.	BLU/W-4	W/GRY-2 " "	
ADV. UNIT RESET	O/W	R/Y-1 PLAY ADJ. JACK	
"	%O-4	GRY/B-1 EJECT SPL. RE.	
CUT HOLE RE.	BLU/Y-4	Y(A) FEED	

JACK LAYOUT

GAME BIG BEN

POSITION PAN-PLAY. SIZE 22.

BALL RELEASE COIL	BLU/W-5	
"	R-Y-W(A)	
ADV. UNIT STEP UP	GRY/Y-1	
100PT. RE.	G/B	
100PT. RE.	W/R	
1.000PT. RE.	BR/Y	
TARGET RE.	R/BR	
EJECT 5.000 LITE	W/G-2	
EJECT SPL. LITE	GRY/BR-1	
FEED	BLU(A)	
100 POINT RE.	%W-2	

1	GRY/W-3 10PT. RE.
2	B/BLU-3 1.000 PT. RE.
3	GRY/G-4 BALL IND. RE.
4	GRY/BLU-1 PLAY ADJ. JACK
5	BR/W-5(A) FLIPPER
6	B/W-5(A) FLIPPER
7	BLU/BR-4 EJECT RE.
8	GRY/R-2 LITE EXT. BALL
9	R/B-1 CREDIT LITE
10	Y/BR-3 B-I-G LOCK RE.
11	G/W-2 EJECT RE.

JACK LAYOUT

GAME BIG BEN

POSITION PAN. - INSERT SIZE 22

JACK LAYOUT

GAME BIG BEN

POSITION PAN. - INSERT SIZE 18

FEED	B [Ⓐ]
"	R [Ⓐ]
CREDIT U. STEP UP	B/R-4
"	GRY
COIN RE.	W/O
"	W/GRY
RESET RE.	BLU/BR-1
KNOCKER	B/W
PLAY ADJ. JACK	R/B-5
"	R/BR-4
"	Y/B-1
PAN. = PANEL	

1	R/BLU CREDIT U. RESET
2	B/Y "
3	GRY/B BALLCOUNT STEP UP
4	O/R-1 " RESET
5	BR/R GAME OVER RE.
6	W/BR-3 SCORE RESET RE.
7	BR/G-2 PLAY ADJ. JACK
8	GRY/O-1 " "
9	W/G " "
10	O-3 M. CHIME
11	Y [Ⓐ] FEED
Ⓐ = 16 GAUGE	

1	LITE FEED BR [Ⓐ]	O-BALL IND. RE.
2	TILT LITE Y/O-3	BR/Y 1.000 PT. RE.
3	NO. MATCH U. STEP UP B/R-2	W/R 100 PT. RE.
4	L. CHIME B/G-2	G/B 10 PT. RE.
5	S. " R/Y-2	GRY/G-4 BALL IND. RE.
6	NO. MATCH LITES W/O-3	GRY/JACK BLU-1 PLAY ADJ.
7	PLAY ADJ. JACK BR/O-2	R/B-1 CREDIT LITE
8	—	GRY-Y EJECT SPL. RE
9	—	—

JACK LAYOUT

GAME BIG BEN

POSITION CABINET SIZE 10

JACK LAYOUT

GAME BIG BEN

POSITION DOOR SIZE 8

TOGELE SW. R (P)	1	PURPLE (P) TOGGLE SW.
FLIPPER SW. BR/W.5 (A)	2	B/W.5 (A) FLIPPER SW.
FEED Y (A)	3	Y/R.3 TILT SW.3
CREDIT BUTON SW. G/W	4	W/O CREDIT BUTON SW.
TILT SW.S. W/BR.2	5	G (P) GROUND

25¢ SW. R/O	1	Y (A) FEED
COIN LOCKOUT B/R.4	2	W.3 COIN LOCKOUT
LITE FEED BU (A)	3	W/B 5¢ SW.
25¢ SW. G/O	4	BU/BR 10¢ RE.

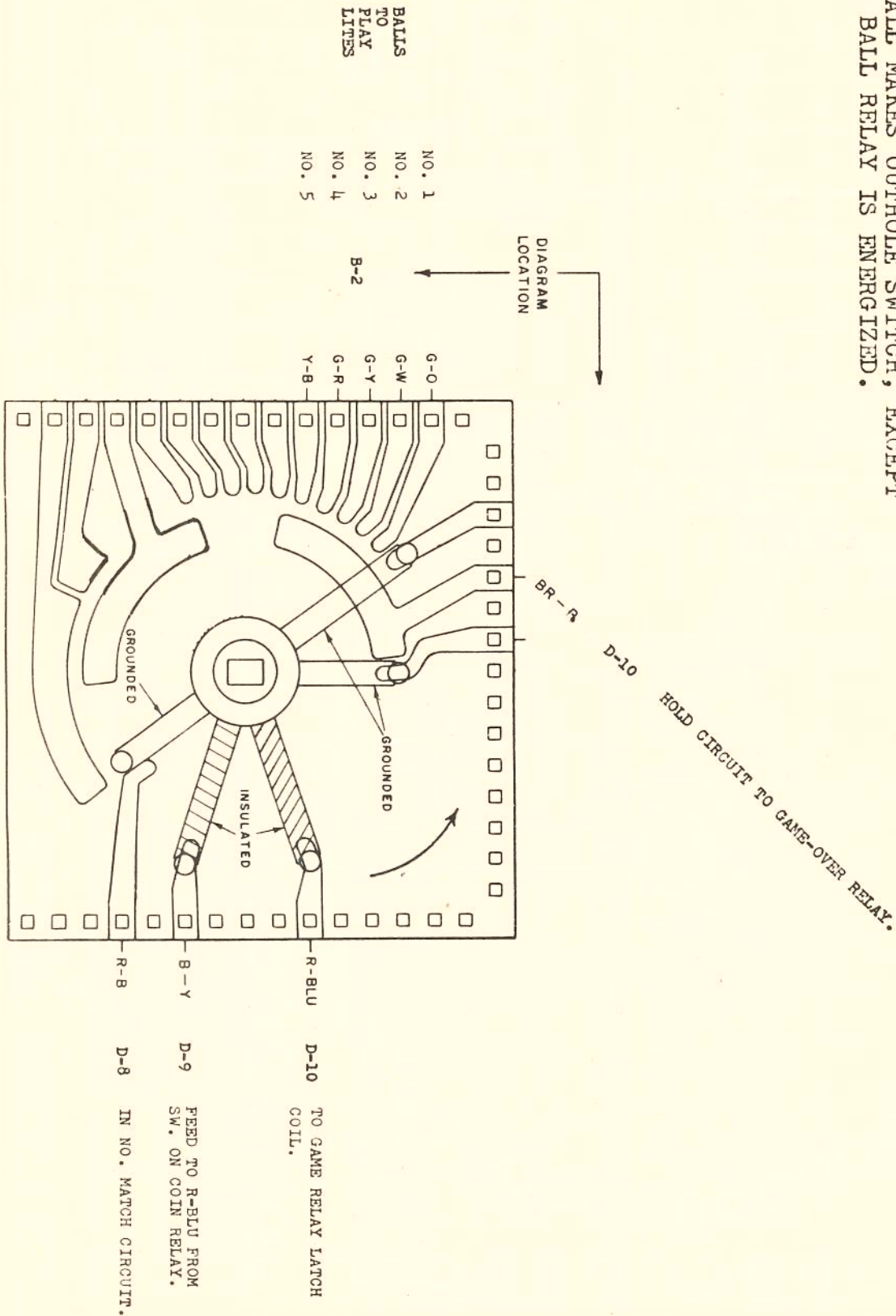
(A) = 16 GAUGE

(P) = PANEL

BALL COUNT UNIT DISC

DURING RESET CYCLE, THIS UNIT RESETS TO ZERO AND THEN ADVANCES 3 OR 5 STEPS. DURING PLAY, IT RESETS ONE STEP EACH TIME THE BALL MAKES OUTHOLE SWITCH, EXCEPT WHEN EXTRA BALL RELAY IS ENERGIZED.

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

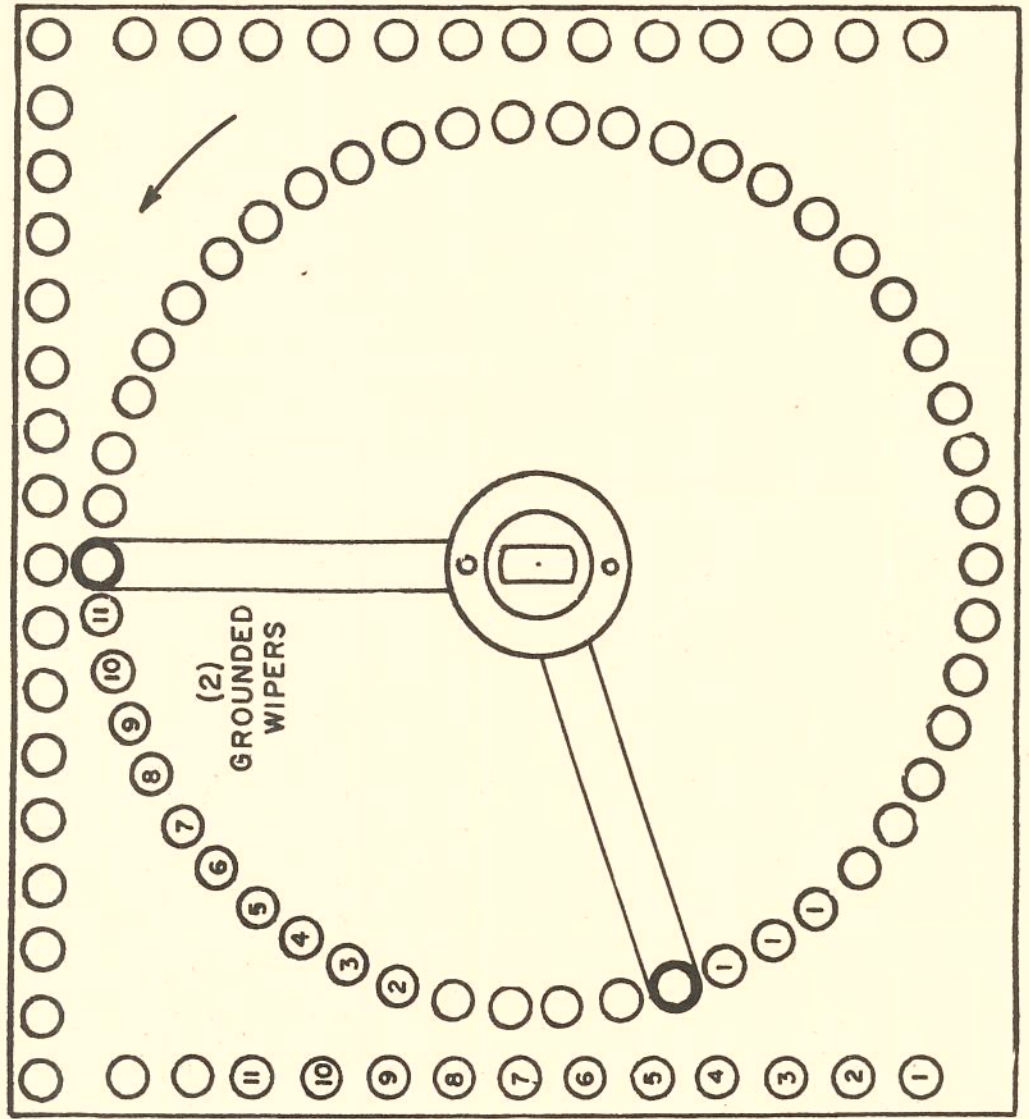


ADVANCE UNIT DISC

DURING RESET CYCLE, AND WHEN BALL MAKES OUTHOLE SWITCH DURING PLAY OF GAME, THIS UNIT RESET TO ZERO AND THEN ADVANCES ONE STEP.

WHILE PLAYING GAME, THIS UNIT ADVANCES EACH TIME THE ADVANCE RELAY IS ENERGIZED.

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



1000	B-6	W-R
2000		W-BLU
3000		W-B
4000		R-C
5000		R-W
6000		R-BR
7000		R-O
8000		R-B
9000		-BLU-
10000	B-7	BLU-R

BONUS

LITES

IN CIRCUIT TO BALL INDEX RE.

C-13 GRAY-G

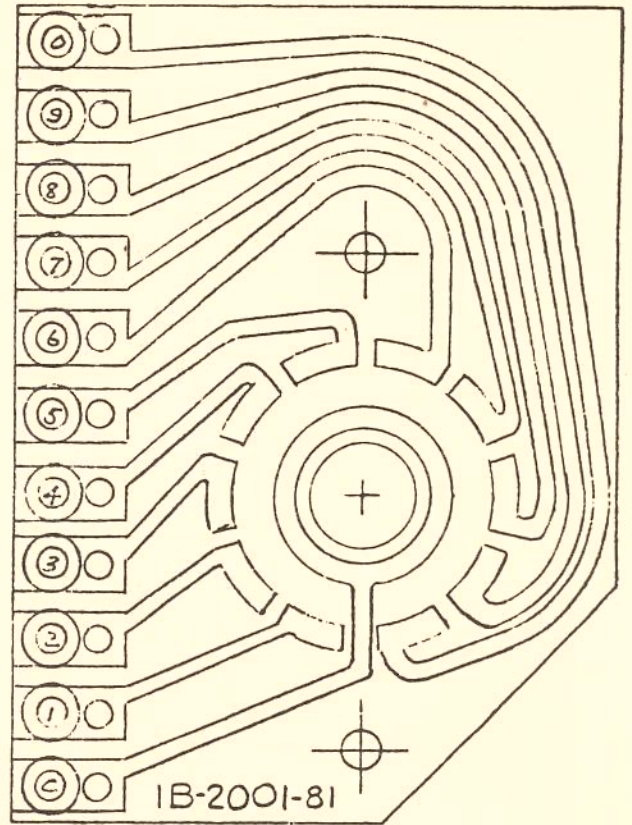
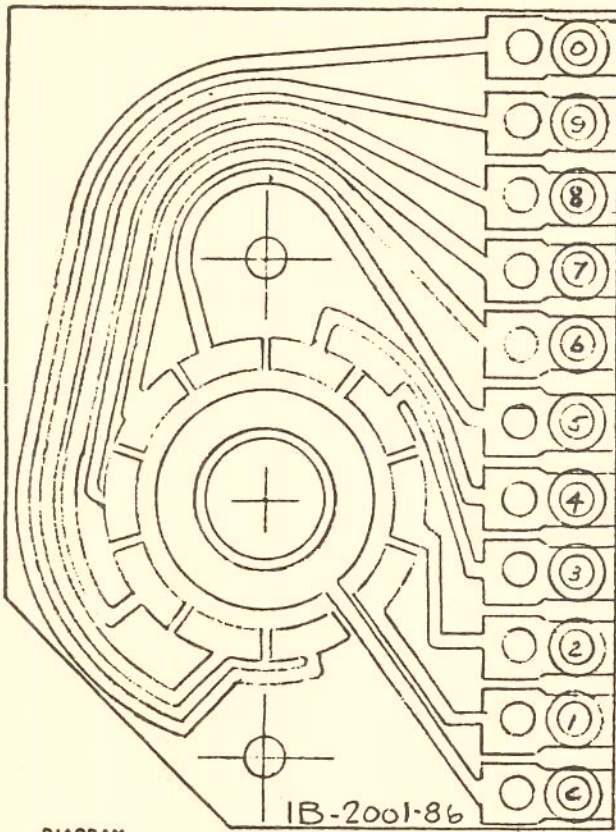


DIAGRAM LOCATION
↓

No. MATCH UNIT

B-4

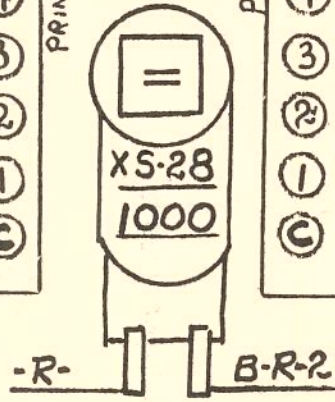
00 LITE	W/G-1	⑩
60 "	BR/W-1	⑨
10 "	BR/G-1	⑧
70 "	BR/Y-1	⑦
30 "	BR/BLU-1	⑥
80 "	BR/R-2	⑤
20 "	W/GRY-1	④
50 "	W/B-2	③
90 "	W/O-2	②
40 "	W/BR	①
FEED	BR/O-1	⑥

PRINTED CIRCUIT - IB-2001-86

Y/BLU-1	00-MATCH	⑩
G/Y-3	60 "	⑨
Y/G-2	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-5	40 "	①
BLU/O-2	FEED	⑥

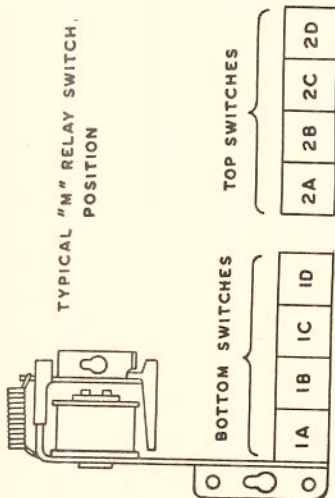
PRINTED CIRCUIT - IB-2001-81

E-8



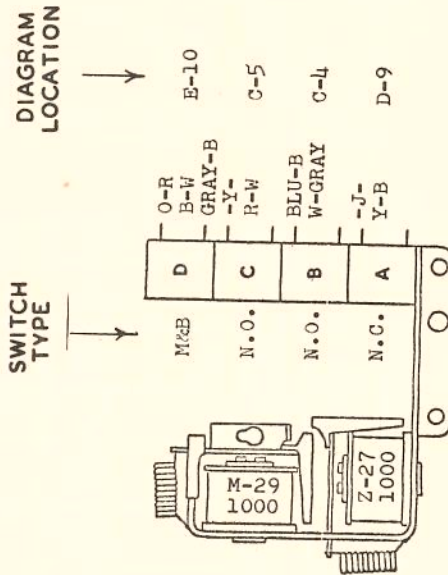
DRIVE SPRING 10A-324-1

A.C. RELAYS & SWITCHES LOCATED ON MECHANISM PANEL



GAME

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.



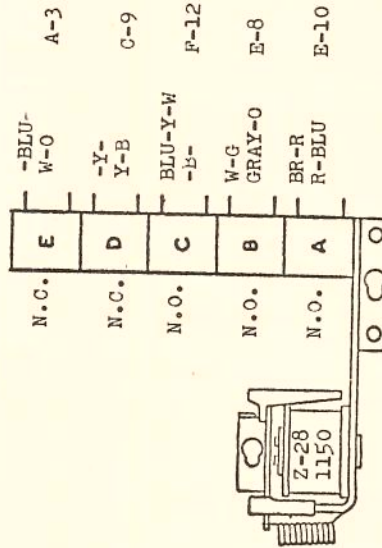
OPENS IN CIRCUIT TO BALL COUNT S.U. COIL AND CLOSES TO B COUNT RESET COIL.
IN HOLD CIRCUIT TO COIN RELAY.

IN CIRCUIT TO COIN RELAY OR COIN LOCKOUT COIL, THRU CRED UNIT ZERO SWITCH.

TO GAME RELAY TRIP COIL, FROM BALL INDEX RELAY OR GAME-OVER RELAY.

GAME-OVER

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



TO GAME-OVER AND NUMBER MATCH LITES.

IN SERIES WITH SWITCH A ON GAME RELAY.

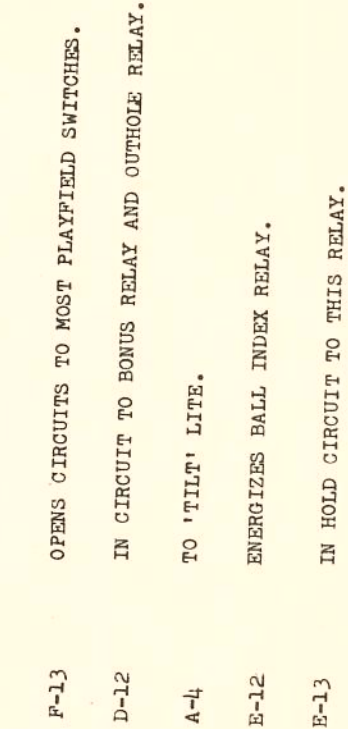
OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.

OPENS HI-SCORE AND NUMBER MATCH CIRCUITS.

IN HOLD CIRCUIT TO THIS RELAY, THRU WIPER OR ZERO SWITCH ON BALL COUNT UNIT.

TILT

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



OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.

IN CIRCUIT TO BONUS RELAY AND OUTHOLE RELAY.

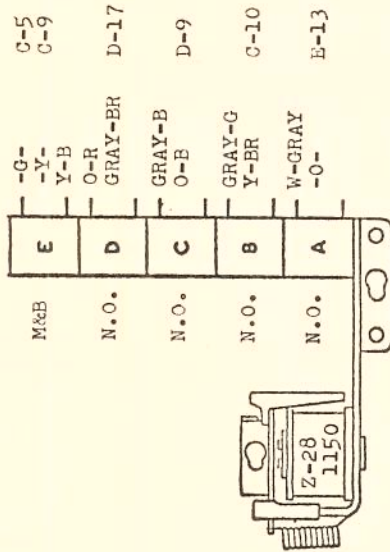
TO 'TILT' LITE.

ENERGIZES BALL INDEX RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX

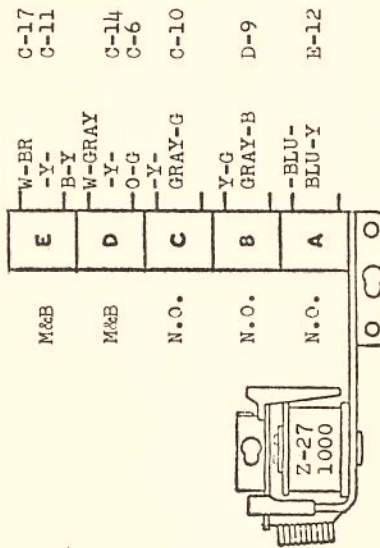
IS ENERGIZED BY 10 POINT, 100 POINT OR 1,000 POINT RELAY, THRU WIPER FINGER ON ADVANCE UNIT---ALSO BY TILT RELAY.



OPENS IN HOLD CIRCUIT TO COIN SET-UP RELAY AND CLOSES TO ENERGIZE GAME RELAY TRIP COIL.
 IN CIRCUIT TO 1,000 POINT RELAY (WHEN COLLECTING BONUS).
 IN SERIES WITH SWITCH B ON OUTHOLE RELAY.
 IN SERIES WITH SWITCH C ON EXTRA BALL RELAY.
 IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE

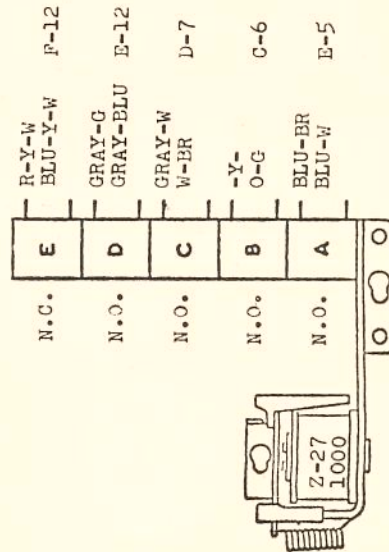
IS ENERGIZED BY BONUS RELAY, THRU ZERO SWITCH ON ADVANCE UNIT AND TILT RELAY SWITCH.



OPENS IN SERIES WITH SWITCH F ON DOUBLE BONUS RELAY AND CLOSES TO RESET 'B', 'E' AND 'N' TARGETS (IN 5 BALL PLAY).
 OPENS IN HOLD CIRCUIT TO BALL INDEX, EXTRA BALL AND DOUBLE BONUS RELAYS---CLOSES TO RUN SCORE MOTOR.
 IN SERIES WITH SWITCH B ON BALL INDEX RELAY.
 IN NUMBER MATCH CIRCUIT TO CREDIT UNIT S.U. COIL.
 IN HOLD CIRCUIT TO THIS R RELAY.

RESET

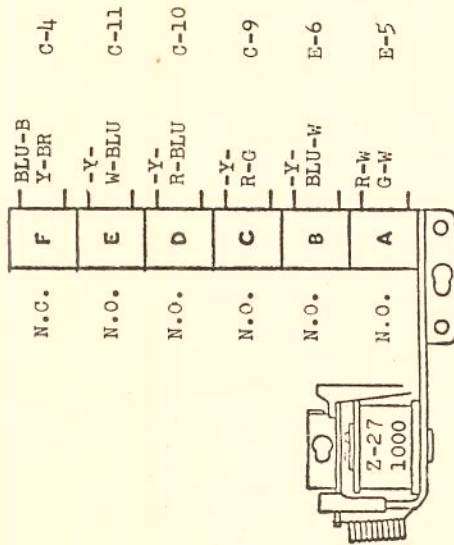
IS ENERGIZED BY COIN RELAY.



OPENS CIRCUITS TO MOST PLAYFIELD SWITCHES.
 ENERGIZES BONUS RELAY, THRU ZERO SWITCH ON ADVANCE UNIT.
 PULSES SCORE RESET RELAY, THRU SCORE MOTOR IMPULSE CAM SWITCH C.
 RUNS SCORE MOTOR.
 IN HOLD CIRCUIT TO THIS RELAY.

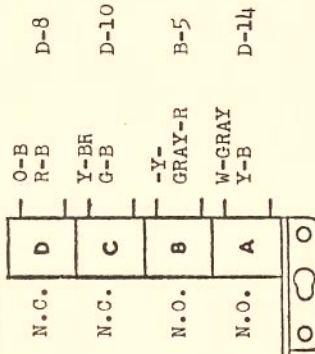
COIN

IS ENERGIZED BY 10¢ COIN SWITCH, IF 10¢ ADJUSTMENT IS IN "1 PLAY" POSITION--- ALSO BY CREDIT BUTTON, THRU ZERO SWITCH ON CREDIT UNIT.



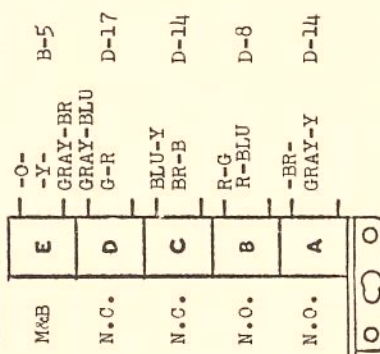
EXTRA BALL

IS ENERGIZED BY TARGET RELAY, THRU SWITCH ON DOUBLE BONUS RELAY (WHEN "PLAY ADJUSTMENT JACK" IS IN CREDIT OR EXTRA BALL POSITION---ALSO BY HI-SCORE CIRCUIT IF "PLAY ADJUSTMENT" IS IN EXTRA BALL POSITION ONLY---ALSO BY EJECT RELAY, THRU SWITCH ON EJECT SPECIAL RELAY (IN EXTRA BALL POSITION ONLY).



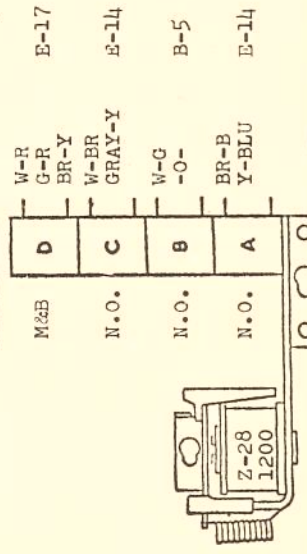
EJECT SPECIAL

IS ENERGIZED BY "5000 RELAY", THRU SWITCH ON "EJECT 5000 RELAY"---ALSO, WHEN "PLAY ADJUSTMENT JACK" IS IN NOVELTY POSITION, BY TARGET RELAY, THRU SWITCH ON DOUBLE BONUS RELAY.



EJECT 5000

IS ENERGIZED BY "5000 RELAY" AT SCORE MOTOR CAM SWITCH 4c.



OPENS CIRCUIT TO COIN LOCKOUT COIL AND CREDIT BUTTON SWITCH.

ENERGIZES 'B', 'E' AND 'N' TARGET RESET COILS (IN 3 BALL PLAY).

ENERGIZES GAME-OVER RELAY.

IN CIRCUIT TO GAME RELAY LATCH COIL AND CREDIT UNIT RESET COIL---ALSO IN SERIES WITH SWITCH D ON GAME RELAY.

ENERGIZES RESET RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

IN SERIES WITH SWITCH C ON BALL INDEX RELAY.

IN CIRCUIT TO BALL COUNT UNIT RESET COIL.

TO "EXTRA BALL" LITE.

IN HOLD CIRCUIT TO THIS RELAY.

OPENS TO "EJECT 5000 POINTS" LITE AND CLOSURES TO "EJECT SPECIAL" LITE.

IN SERIES WITH SWITCH D ON EJECT 5000 RELAY.

IN HOLD CIRCUIT TO EJECT 5000 RELAY.

IN CIRCUIT TO CREDIT UNIT S.U. OR 10,000 POINT DRUM UNIT, THRU "PLAY ADJUSTMENT" JACK.

IN HOLD CIRCUIT TO THIS RELAY.

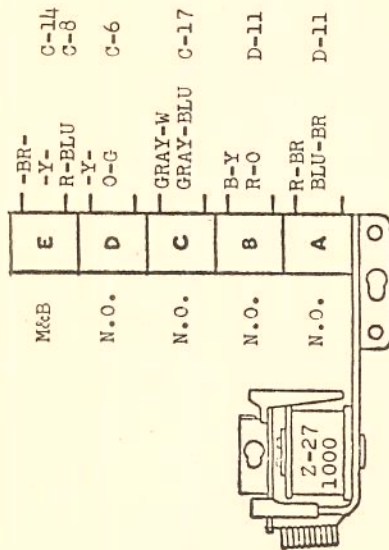
OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSURES TO 1,000 POINT RELAY.

IN CIRCUIT TO ENERGIZE EJECT SPECIAL RELAY.

TO "EJECT 5000 POINT" LITE.

IN HOLD CIRCUIT TO THIS RELAY.

EJECT



IS ENERGIZED BY EJECT POCKET SWITCH AT SCORE MOTOR INDEX CAM SWITCH D.

OPENS IN SERIES WITH SWITCH A ON 'EJECT SPECIAL' RELAY AND CLOSSES IN SERIES WITH SWITCH B ON 'EJECT SPECIAL' RELAY.

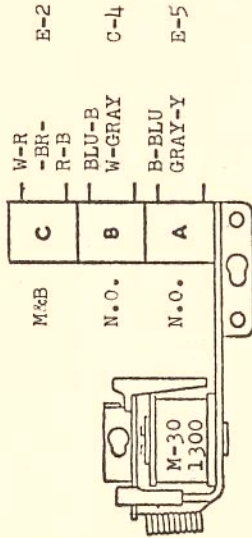
RUNS SCORE MOTOR.

IN SERIES WITH SWITCH D ON 'EJECT SPECIAL' RELAY.

PULSES EJECT COIL, THRU SCORE MOTOR CAM SWITCH 5A.

HOLD CIRCUIT TO THIS RELAY, THRU CAM SWITCH 6A.

COIN SET-UP



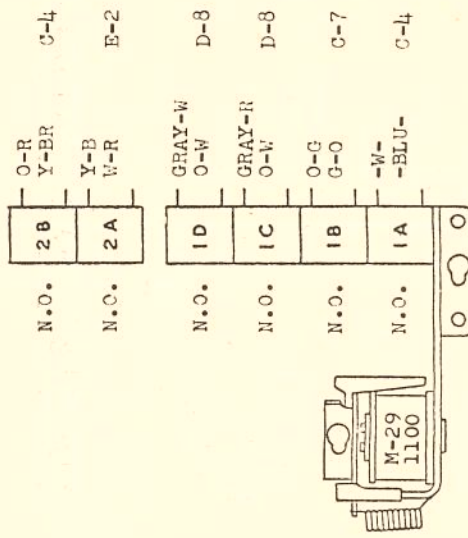
IS ENERGIZED BY 25¢ RELAY, IF "1 COIN = 1 PLAY - 2 COINS = 3 PLAYS ADJUSTMENT JACK" IS IN "ON" POSITION.

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

IN CIRCUIT TO COIN LOCKOUT COIL AND CREDIT BUTTON SWITCH.

IN HOLD CIRCUIT TO THIS RELAY.

25¢



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

ENERGIZES COIN RELAY, THRU "1 COIN = 1 PLAY/2 COINS = 3 PLAYS" ADJUSTMENT JACK.

IN HOLD CIRCUIT TO THIS RELAY.

PULSES CREDIT UNIT S.U., THRU "2 COINS = 3 PLAYS" ADJUSTMENT JACK.

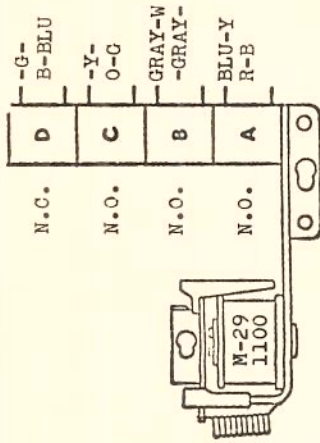
PULSES CREDIT UNIT ONCE (IN "6 PLAYS/25¢" ADJUSTMENT).

RUNS SCORE MOTOR.

ENERGIZES COIN SET-UP RELAY, THRU "2 COINS = 3 PLAYS" ADJUSTMENT.

10¢

IS ENERGIZED BY 10¢ COIN SWITCH, IF 10¢ ADJUSTMENT JACK IS IN "2 PLAYS" OR "3 PLAYS" POSITION---ALSO BY 25¢ COIN SWITCH, THRU SWITCH ON COIN SET-UP RELAY IF "2 COINS FOR 3 PLAYS" ADJUSTMENT IS IN "ON" POSITION.

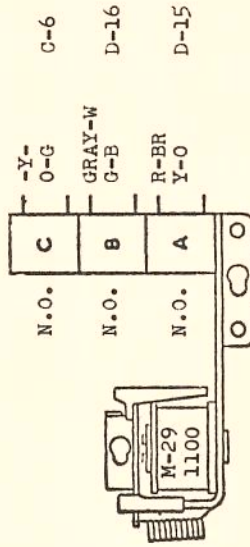


C-5 IN HOLD CIRCUIT TO COIN SET-UP RELAY.
 C-6 RUNS SCORE MOTOR.
 D-8 PULSES CREDIT UNIT S.U. COIL, THRU IMPULSE CAM SWITCH C.
 E-2 IN HOLD CIRCUIT TO THIS RELAY.

LOCATED ON PLAYFIELD

50 POINT

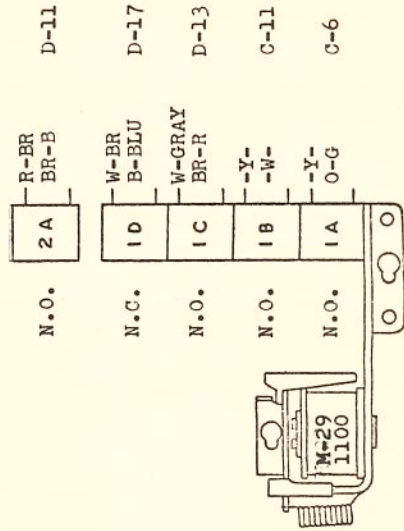
IS ENERGIZED BY (2) TOP STAND-UP SWITCHES OR BY CENTER ROLLOVER BUTTON SWITCH.



C-6 RUNS SCORE MOTOR.
 D-16 IN CIRCUIT TO PULSE 10 POINT RELAY.
 D-15 IN HOLD CIRCUIT TO THIS RELAY.

TARGET

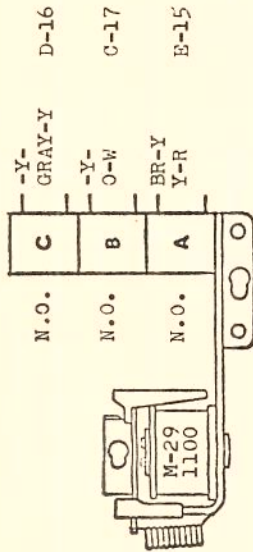
IS ENERGIZED BY 'B' TARGET SWITCH, THRU 'E' AND 'N' TARGET SWITCHES.



D-11 IN HOLD CIRCUIT TO THIS RELAY.
 D-17 IN SERIES WITH SWITCH F ON DOUBLE BONUS RELAY.
 D-13 IN CIRCUIT TO DOUBLE BONUS RELAY AND THEN EXTRA BALL RELAY.
 C-11 IN CIRCUIT TO ENERGIZE 'B', 'E' AND 'N' TARGET RESET COILS.
 C-6 RUNS SCORE MOTOR.

ADVANCE

IS ENERGIZED BY TOP ROLLOVER BUTTON SWITCH OR BY (5) ROLLOVER SWITCHES.



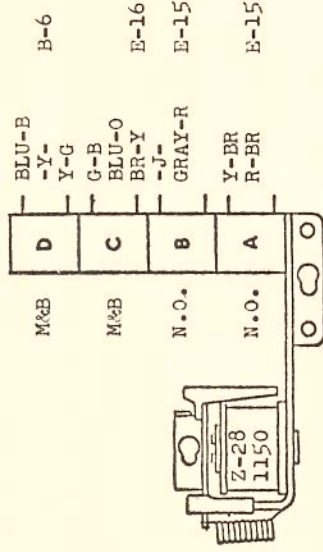
ENERGIZES ADVANCE UNIT S.U. COIL.

PULSES 1,000 POINT RELAY IN 3 BALL GAME OR 100 POINT RELAY IN 5 BALL GAME.

HOLD CIRCUIT TO THIS RELAY, THRU END-OF-STROKE SWITCH ON ADVANCE UNIT.

"G"

IS ENERGIZED BY 'G' ROLLOVER SWITCH.



OPENS TO TOP ROLLOVER "G" LITE AND CLOSSES TO "G" ROLLOVER BUTTON LITE.

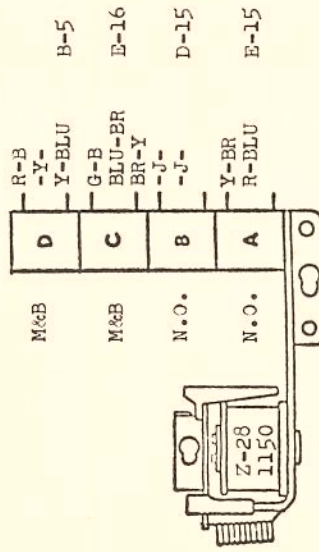
OPENS TO 10 POINT RELAY AND CLOSSES TO 1,000 POINT RELAY.

TO 5000 RELAY. (SEE SWITCH B ON "B" RELAY).

IN HOLD CIRCUIT TO THIS RELAY.

"I"

IS ENERGIZED BY 'I' ROLLOVER SWITCH.



OPENS TO TOP ROLLOVER "I" LITE AND CLOSSES TO "I" ROLLOVER BUTTON LITE.

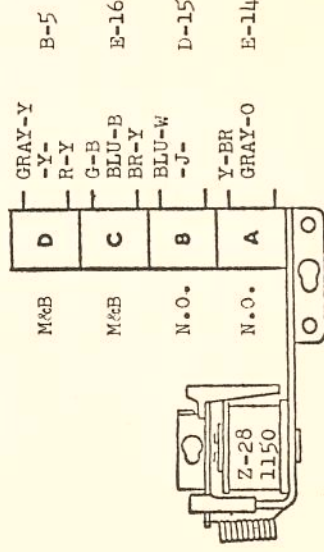
OPENS TO 10 POINT RELAY AND CLOSSES TO 1,000 POINT RELAY.

IN SERIES WITH SWITCH B ON "G" RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

"B"

IS ENERGIZED BY 'B' ROLLOVER SWITCH.



OPENS TO TOP ROLLOVER "B" LITE AND CLOSSES TO "B" ROLLOVER BUTTON LITE.

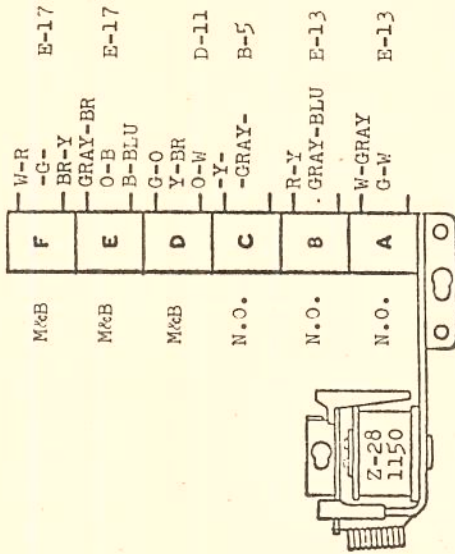
OPENS TO 10 POINT RELAY AND CLOSSES TO 1,000 POINT RELAY.

IN SERIES WITH SWITCH B ON "I" RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

DOUBLE BONUS

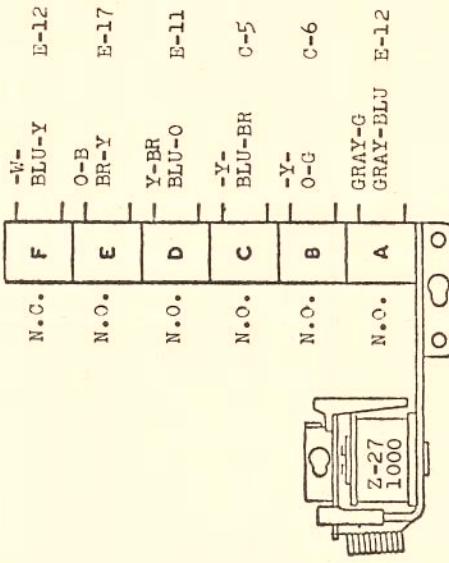
IS ENERGIZED BY TARGET RELAY, THRU SCORE MOTOR CAM SWITCH 4B.



OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSES TO 1,000 POINT RELAY.
 IN SERIES WITH SWITCH E ON BONUS RELAY.
 IN SERIES WITH SWITCH D ON BONUS RELAY.
 TO DOUBLE BONUS LITE----ALSO TO B-E-N TARGETS 1,000 POINT LITE.
 IN CIRCUIT TO EXTRA BALL RELAY OR 10,000 POINT D.U., THRU "PLAY ADJUSTMENT JACK".
 IN HOLD CIRCUIT TO THIS RELAY.

BONUS

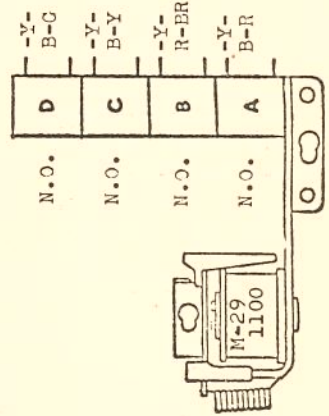
IS ENERGIZED BY RESET RELAY, THRU ZERO SWITCH ON ADVANCE UNIT---ALSO BY OUT-HOLE SWITCH, THRU ANOTHER ZERO SWITCH ON ADVANCE UNIT.



IN CIRCUIT TO ENERGIZE OUTHOLE RELAY.
 IN CIRCUIT TO 1,000 POINT RELAY (WHEN COLLECTING BONUS).
 IN CIRCUIT TO RESET COIL ON ADVANCE UNIT (WHEN COLLECTING BONUS).
 IN HOLD CIRCUIT TO RESET RELAY.
 RUNS SCORE MOTOR.
 IN HOLD CIRCUIT TO THIS RELAY, THRU ZERO SWITCH ON ADVANCE UNIT.

SCORE RESET

IS PULSED BY IMPULSE CAM SWITCH C, THRU SWITCH ON RESET RELAY.



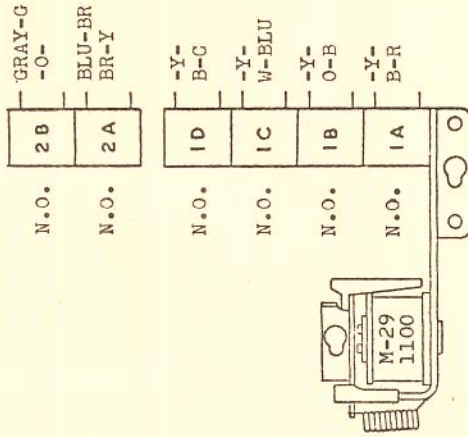
PULSES 10,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.
 PULSES 1,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.
 PULSES 100 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.
 PULSES 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

LOCATED IN BACKBOX

1,000 POINT

IS PULSED BY:

1. 'B', 'I' OR 'G' ROLLOVER BUTTON SWITCH.
2. 5,000 RELAY.
3. 'B', 'E' OR 'N' TARGET SWITCHES, THRU SWITCH ON DOUBLE BONUS RELAY.
4. EJECT RELAY, THRU SWITCH ON "EJECT 5000 RELAY".
5. ADVANCE RELAY, WHEN GAME IS ADJUSTED TO 3 BALL PLAY.
6. BONUS RELAY, THRU SWITCH ON DOUBLE BONUS RELAY AND BALL INDEX RELAY (WHEN COLLECTING BONUS).



ENERGIZES BALL INDEX RELAY, THRU ADVANCE UNIT DISC.
IN HOLD CIRCUIT TO THIS RELAY.

PULSES LARGE CHIME COIL.

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

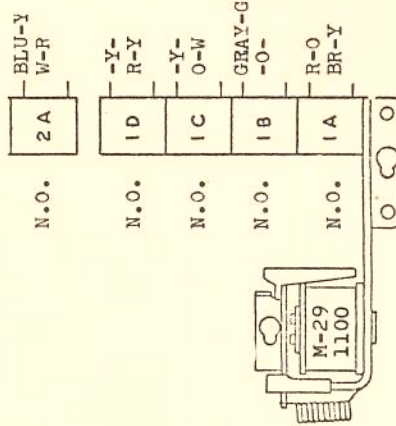
PULSES 1,000 POINT DRUM UNIT.

IN HI-SCORE CIRCUIT, THRU "PLAY ADJUSTMENT JACK".

100 POINT

IS PULSED BY:

1. 'B', 'E' OR 'N' TARGET SWITCHES, THRU SWITCH ON DOUBLE BONUS RELAY.
2. EJECT RELAY, THRU SWITCH ON "EJECT 5000 RELAY".
3. ADVANCE RELAY, WHEN GAME IS ADJUSTED TO 5 BALL PLAY.
4. LEFT AND RIGHT JET BUMPER SWITCHES.



IN HOLD CIRCUIT TO THIS RELAY.

PULSES SMALL CHIME COIL.

PULSES 100 POINT DRUM UNIT.

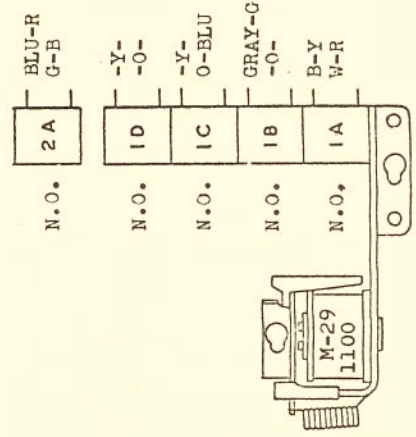
ENERGIZES BALL INDEX RELAY, THRU ADVANCE UNIT DISC.

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

10 POINT

IS PULSED BY:

1. 50 POINT RELAY.
2. LEFT OR RIGHT KICKER SWITCHER.
3. RIGHT CENTER STAND-UP SWITCH.
4. 'B', 'I' OR 'G' ROLLOVER BUTTON SWITCH.



IN HOLD CIRCUIT TO THIS RELAY.

PULSES MEDIUM CHIME COIL.

PULSES 10 POINT DRUM UNIT.

ENERGIZES BALL INDEX RELAY, THRU ADVANCE UNIT DISC.

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