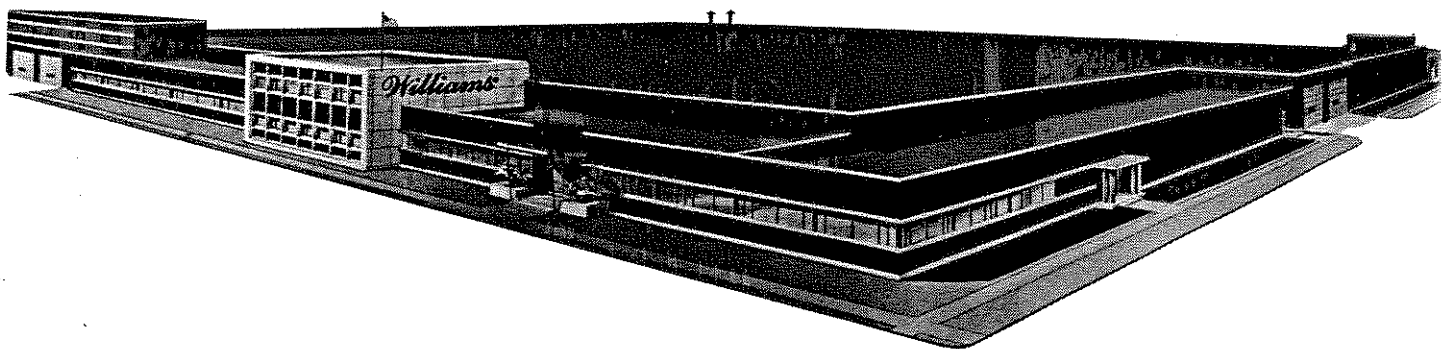


Instruction Manual

for

ACES & KINGS



Williams[®] ELECTRONICS, INC.
SUBSIDIARY OF THE SEEBURG CORPORATION

3401 N. California Ave.
Phone 267-2240

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

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

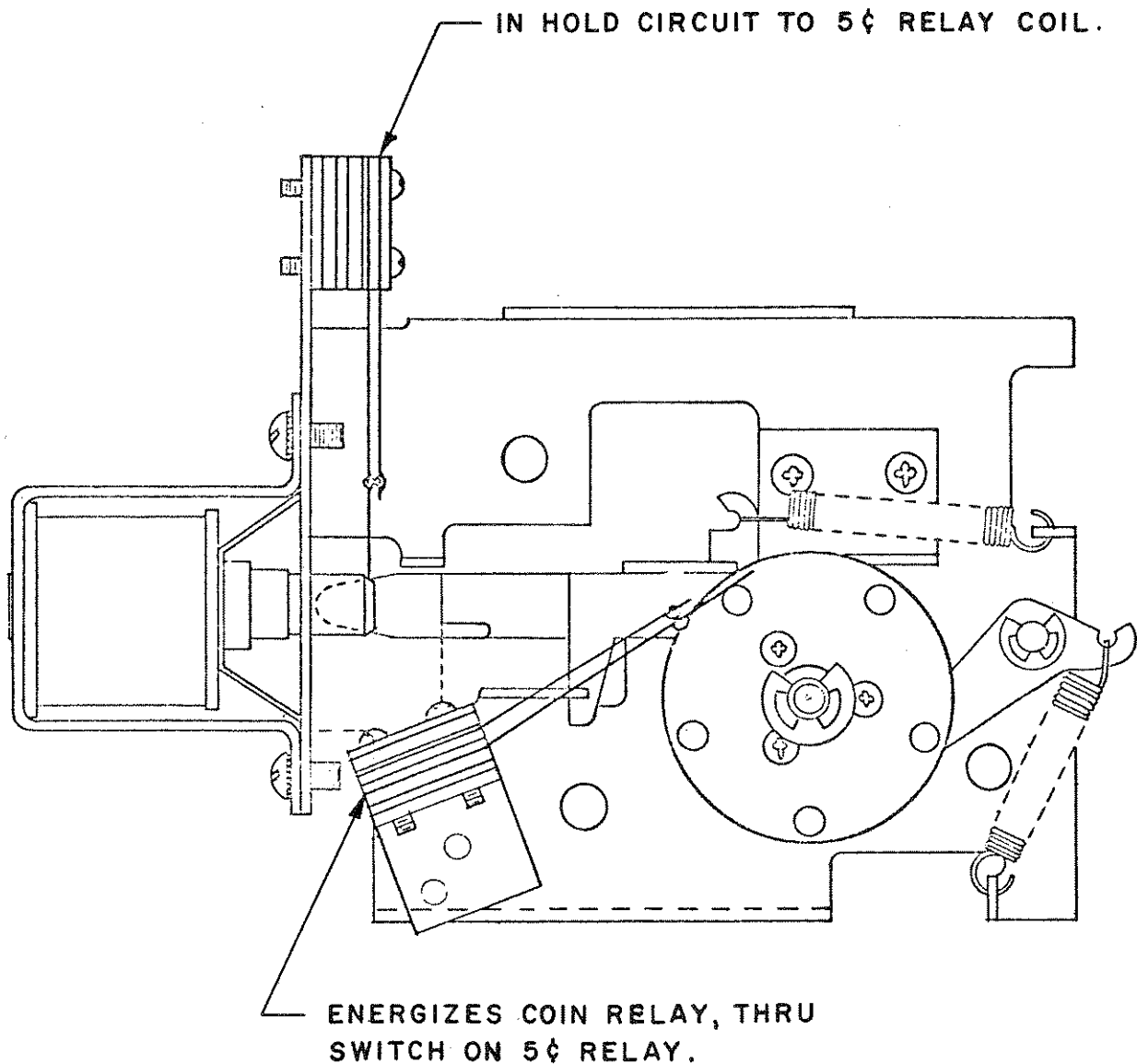
**KINDLY INFORM LOCATIONS THAT THEY
CAN TURN DISPLAY LIGHTS ON BY PRESSING
LEFT FLIPPER BUTTON. MACHINE CAN STILL
BE SHUT OFF BY TAPPING BOTTOM OF
CABINET.**

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

ALTERNATOR UNIT

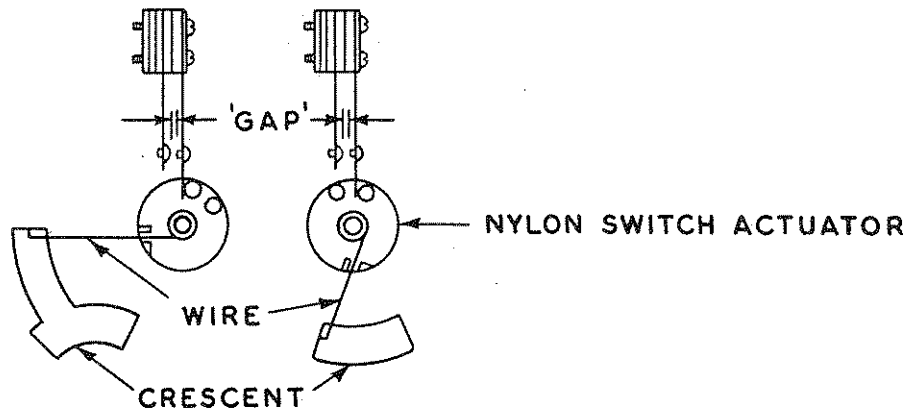
LOCATED ON MECHANISM PANEL.

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



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.

SUGGESTED SCORE CARDS

5 Ball Play — 377-7A

3 Ball Play — 377-14A

ON NOVELTY PLAY

5 Ball Play — 377-EB-6

3 Ball Play — 377-EB-13

"ACES & KINGS" 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
14 A 7805	SCORE MOTOR - 60 CYCLE	MECH. PANEL
14 A 7806	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	PLAY METER (COIL XM 27-675)	MECH. PANEL

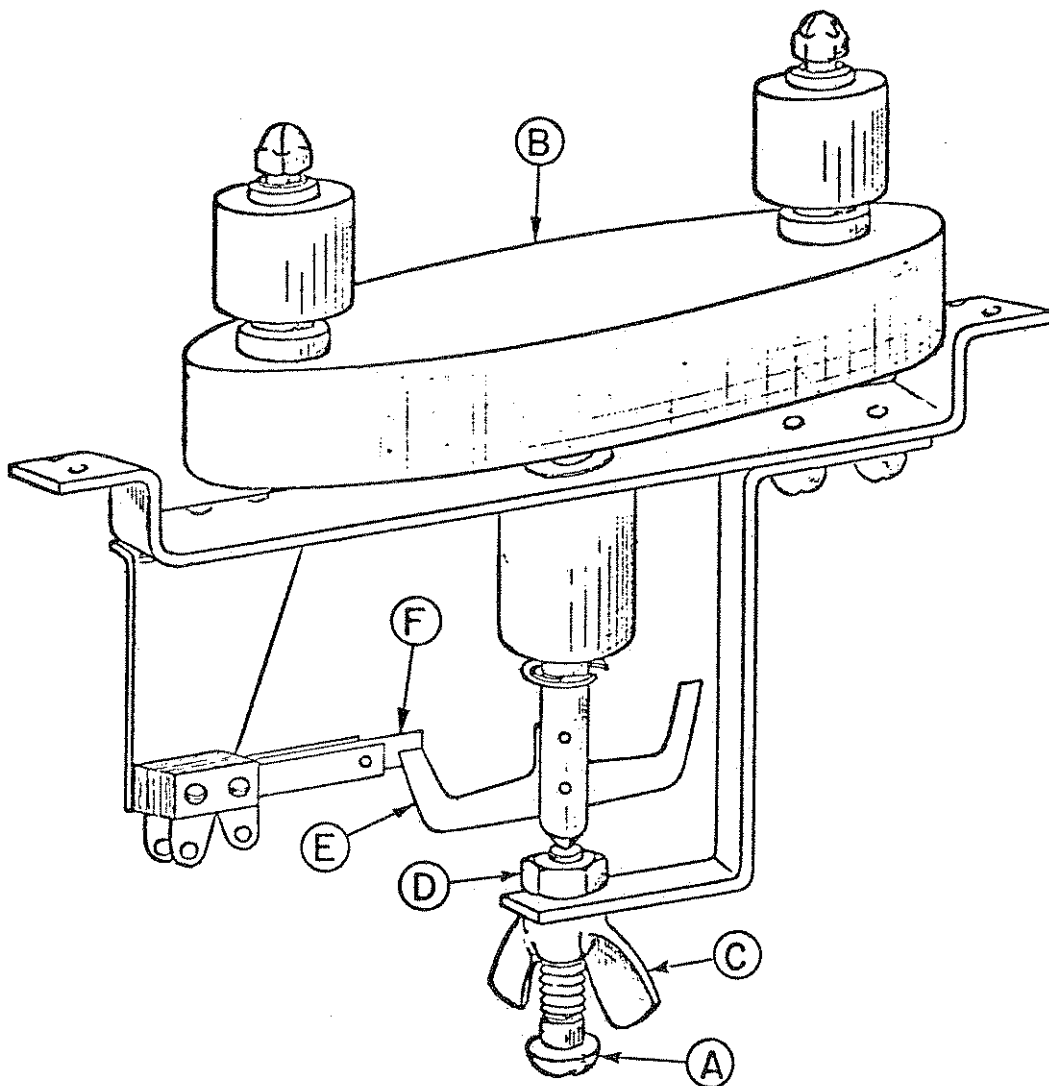
SOLENOID COILS

A 22-550	MATCH UNIT STEP UP	INSERT
	BALL RELEASE COIL	PLAYFIELD
	L BONUS STEP UP	PLAYFIELD
	R BONUS STEP UP	PLAYFIELD
	PLAYER UNIT STEP UP	INSERT
	COIN UNIT STEP UP	MECH. PANEL
A 23-600	BALL COUNT UNIT STEP UP	MECH. PANEL
	REPLAY UNIT STEP UP	INSERT
A2-23-750	LARGE BELL	CABINET
	KNOCKER	CABINET
B 26-800	SCORE DRUM UNIT ... (16 req'd.)	INSERT
	PLAYER UNIT RESET	INSERT
	REPLAY UNIT RESET	INSERT
	L BONUS RESET	PLAYFIELD
	R BONUS RESET	PLAYFIELD
	BALL COUNT UNIT RESET	MECH. PANEL
	COIN UNIT RESET	MECH. PANEL
	ALTERNATOR UNIT	MECH. PANEL
D 24-1150	RELAY BANK RESET COIL	PLAYFIELD
FL 21-375/28-400	FLIPPER COILS ... (2 req'd.)	PLAYFIELD
G 22-550	JET BUMPER COILS ... (3 req'd.)	PLAYFIELD
G.23-750	KICKER COILS ... (2 req'd.)	PLAYFIELD
	DISAPPEARING POST (LATCH COIL)	PLAYFIELD
	EJECT COILS ... (2 req'd.)	PLAYFIELD

RELAY COILS

M1-31-1500	COIN LOCKOUT	DOOR
M 29-1000	DISAPPEARING POST (TRIP)	PLAYFIELD
	1st & 2nd SCORE RESET RELAY	INSERT
	3rd & 4th SCORE RESET RELAY	INSERT
M 29-1100	1 POINT RELAY	INSERT
	10 POINT RELAY	INSERT
	100 POINT RELAY	INSERT
	5¢ RELAY	MECH. PANEL
	10¢ RELAY	MECH. PANEL
	25¢ RELAY	MECH. PANEL
	L BONUS RELAY	PLAYFIELD
	R BONUS RELAY	PLAYFIELD
	POST RELAY	PLAYFIELD
	L ADVANCE RELAY	PLAYFIELD
	R ADVANCE RELAY	PLAYFIELD
	NUMBER MATCH RELAY	PLAYFIELD
	NO. 1 BUMPER RELAY	PLAYFIELD
	NO. 2 BUMPER RELAY	PLAYFIELD
	NO. 3 BUMPER RELAY	PLAYFIELD
Z 27-1000	PLAYER RESET RELAY	MECH. PANEL
	OUTHOLE RELAY	MECH. PANEL
	RESET RELAY	MECH. PANEL
	REPLAY RELAY	MECH. PANEL
	EJECT RELAY	MECH. PANEL
	300 RELAY	MECH. PANEL
	COIN RELAY	MECH. PANEL
	BONUS RESET RELAY	MECH. PANEL
Z 28-1150	LOCK RELAY	MECH. PANEL
	CHANGE RELAY	PLAYFIELD
	BALL INDEX RELAY	MECH. PANEL
	EXTRA BALL RELAY	MECH. PANEL
S 27-500	RELAY BANK COILS ... (12 req'd.)	PLAYFIELD

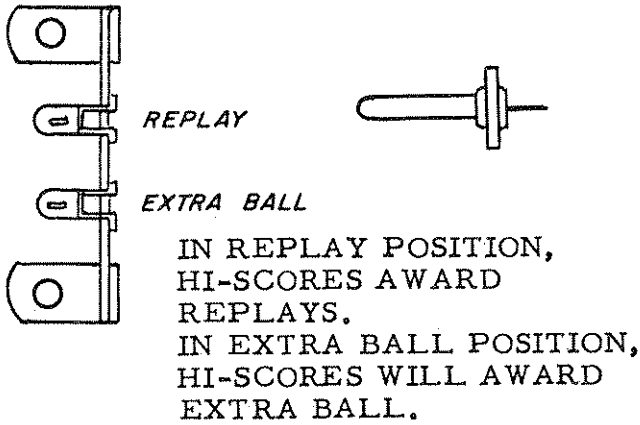
ROTATING BUMPER UNIT ASSEMBLY



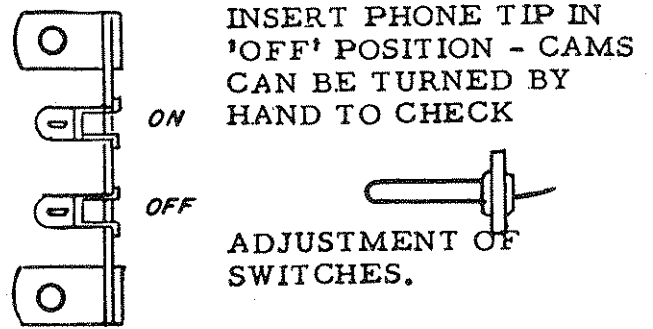
1. TURN SCREW (A) IN OR OUT UNTIL TOP EDGE OF SPINNER (B) IS 1/16" ABOVE PLAYFIELD.
2. TIGHTEN WING NUT (C) AND HEX NUT (D) .
3. ADJUST NYLON SWITCH ACTUATOR (E) SO THAT TOP EDGE IS IN LINE WITH CENTER OF BLADE (F) .

ADJUSTMENTS ON MECHANISM PANEL

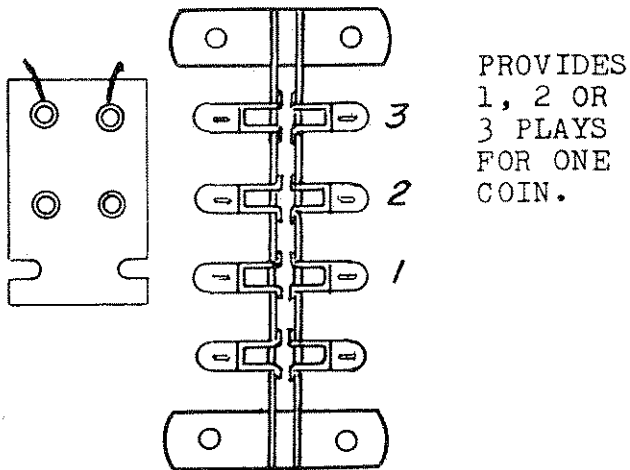
Extra Ball Jack Adj.



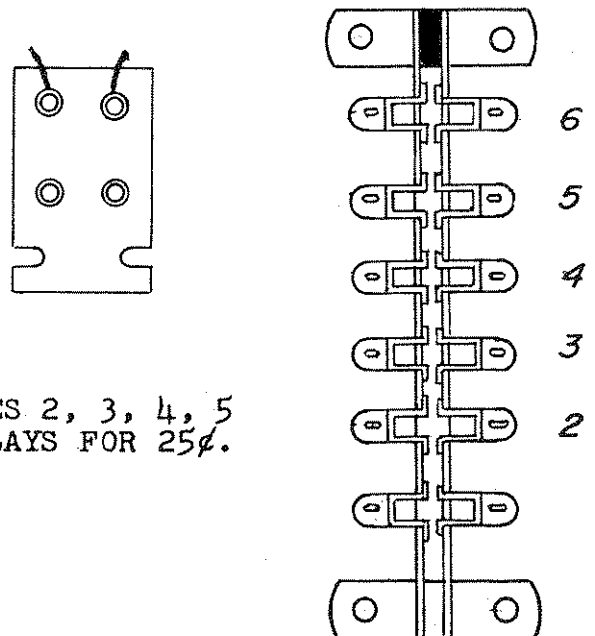
Motor Service Jack



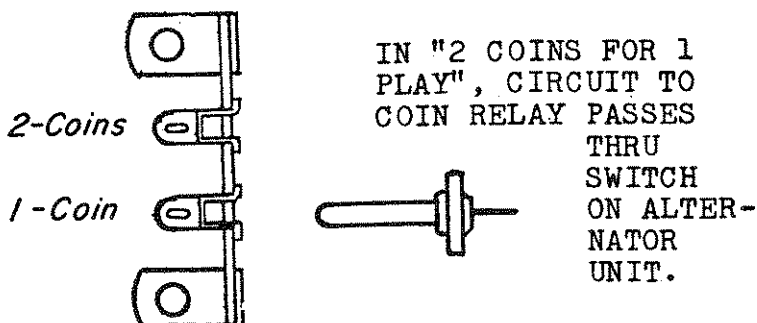
10¢ Adjustment



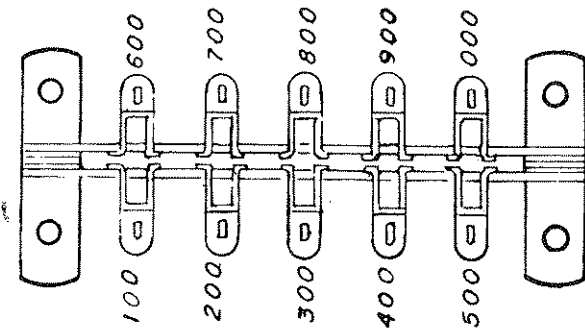
25¢ Adjustment



5¢ Adjustment



ADJUSTMENTS IN BACKBOX



- RED- (1100 to 2000)
- BLUE- (2100 to 3000)
- YELLOW- (3100 to 4000)
- GREEN- (4100 to 5000)
- WHITE- (5100 to 6000)
- BROWN- (6100 to 7000)
- ORANGE- (7100 to 8000)
- BLACK- (8100 to 9000)

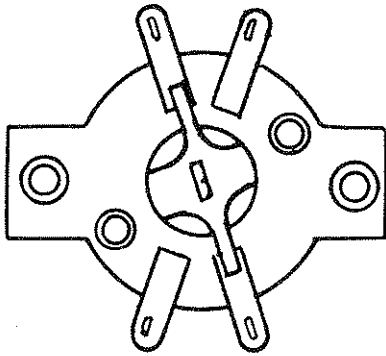
Hi-Score Adjustment

Insert plugs into 10 Point Female at desired positions.

Examples:

Yellow wire into 300 position scores at 3300.

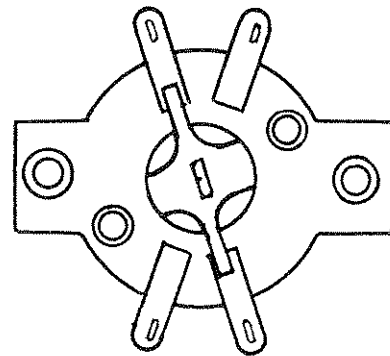
Yellow wire into 000 position scores at 4000.



ON OFF

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.

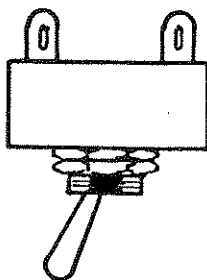


3 BALL 5 BALL

No. of Balls Adjustment

This switch changes 3 Ball to 5 Ball play, or vice versa.

(Located under front of Cabinet)

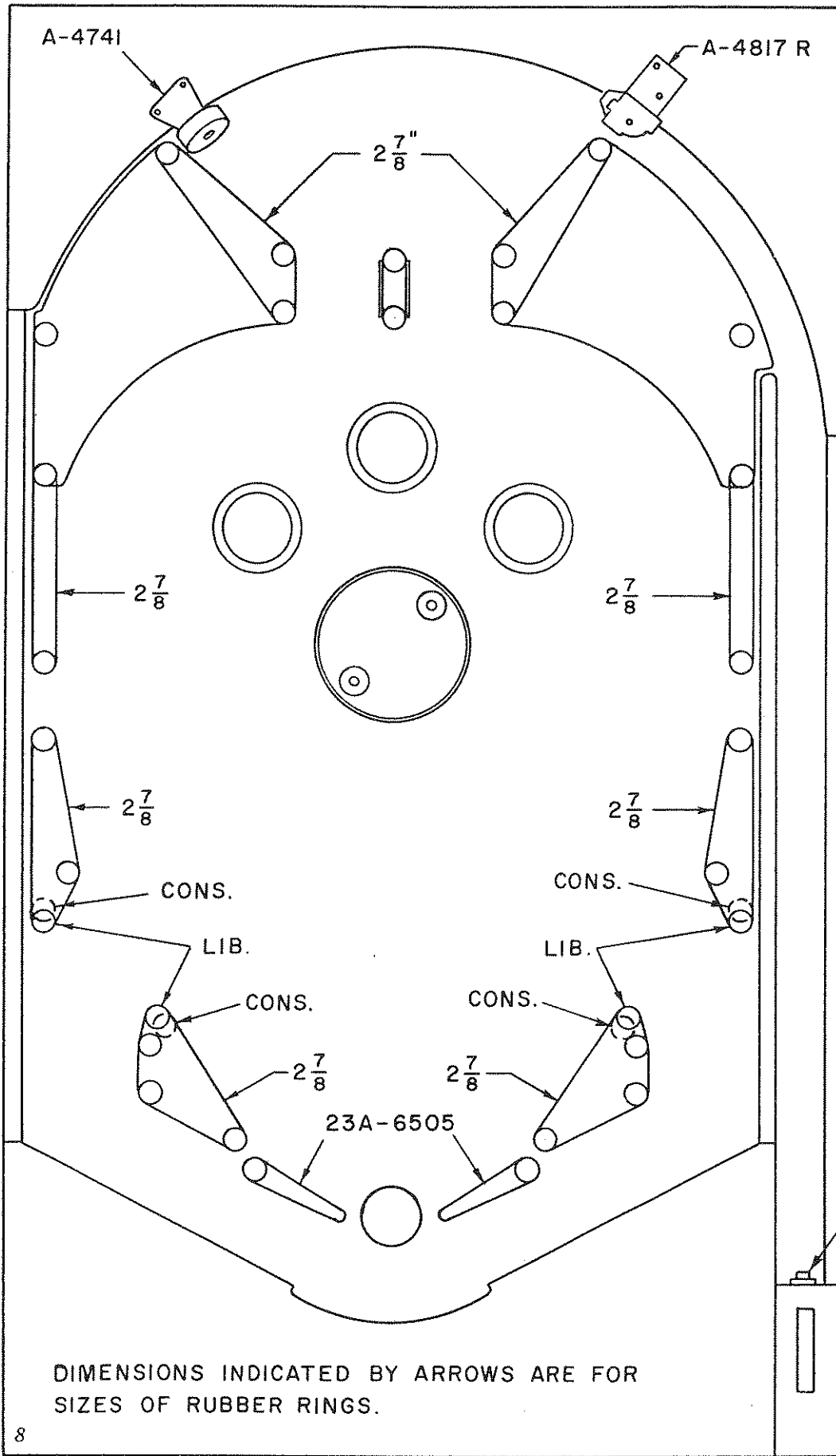


Master On-Off Switch

CONTROLS POWER TO TRANSFORMER

"ACES & KINGS"—POST ADJUSTMENT SHEET

TO MAKE GAME MORE "CONSERVATIVE" OR "LIBERAL"—MOVE POSTS $3/16"$ 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-6307 $2\ 7/8"$ I. D.

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

23A-6327 BALL SHOOTER
RUBBER TIP

DIMENSIONS INDICATED BY ARROWS ARE FOR SIZES OF RUBBER RINGS.

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 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.

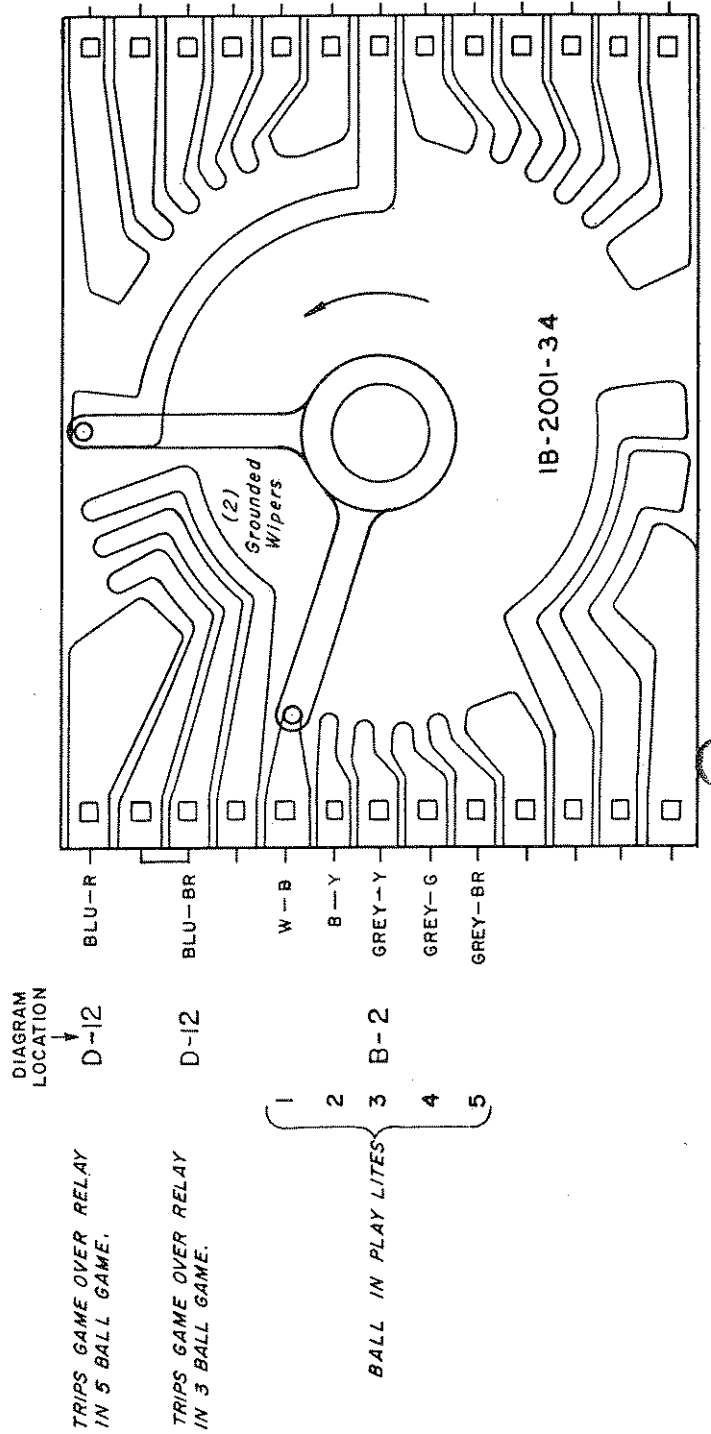
4. RELAY and SWITCH ADJUSTMENT

Where relay adjustments are called for, before bending blades, in all cases, on any machine, make certain that the screws holding the switch stacks are down very tightly. This is suggested because the plastic spacers in the switch stacks have occasionally shrunk by drying out, causing a poor adjustment.

BALL COUNT UNIT DISC

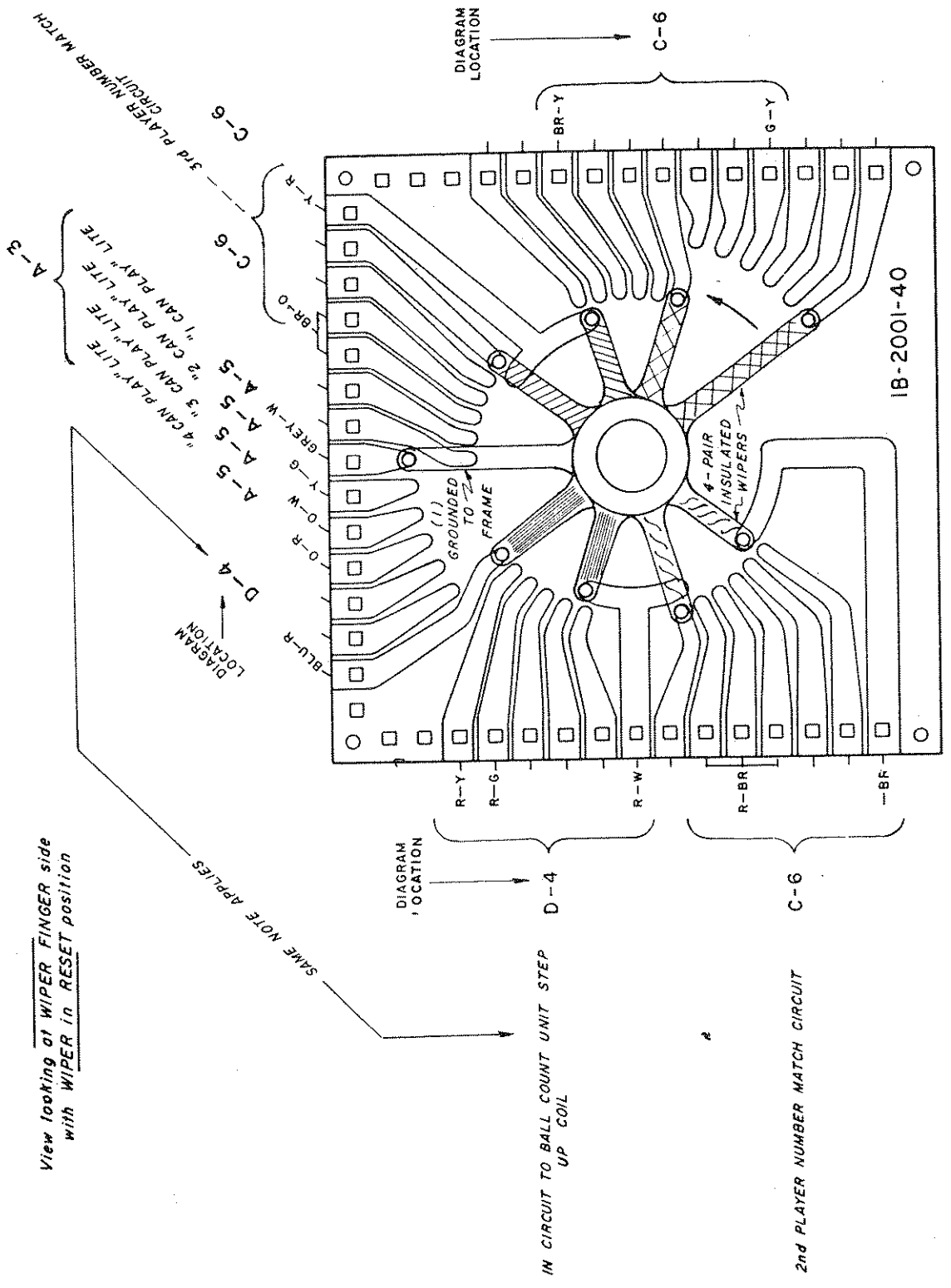
THIS UNIT RESET AT THE START OF A NEW GAME, (DURING RESET CYCLE). IT ADVANCES ONE STEP EACH TIME THE LAST PLAYER COMPLETES HIS TURN.

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



COIN S.U. DISC

THIS UNIT RESET 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

SAME NOTE APPLIES

IN CIRCUIT TO BALL COUNT UNIT STEP
UP COIL

2nd PLAYER NUMBER MATCH CIRCUIT

4th PLAYER NUMBER MATCH CIRCUIT

PLAYER UNIT DISC

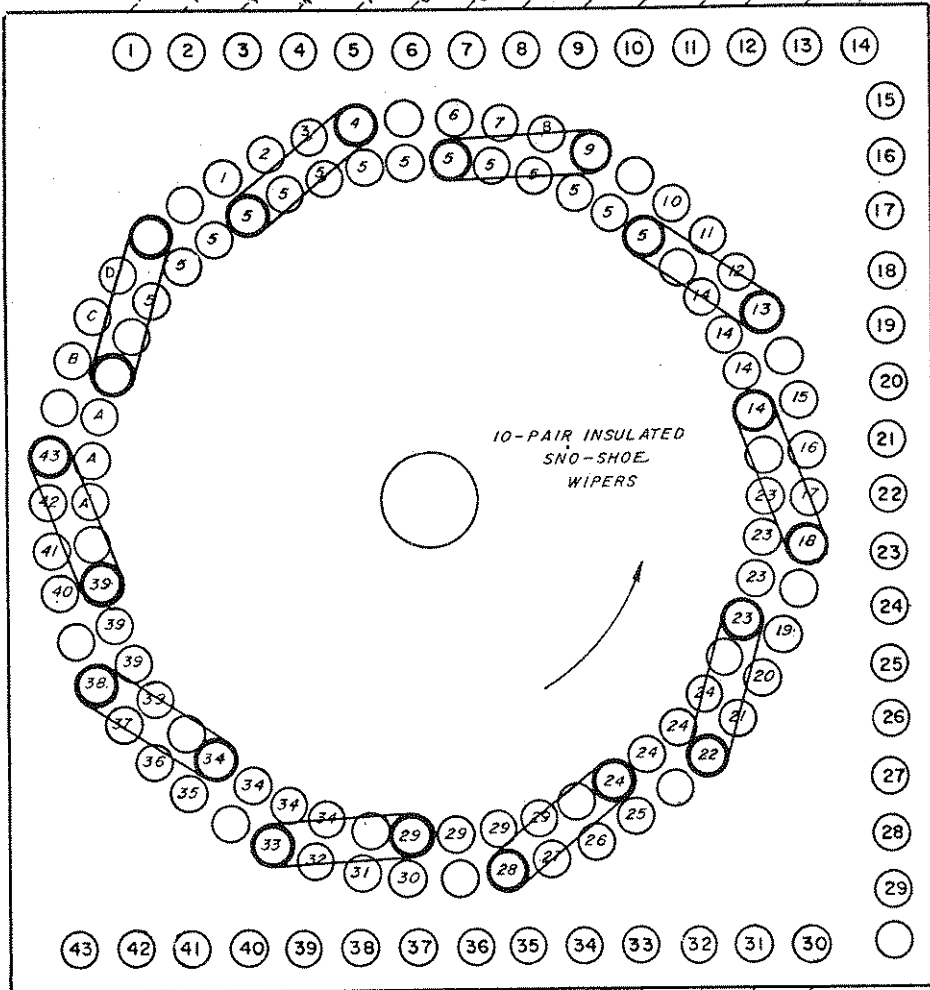
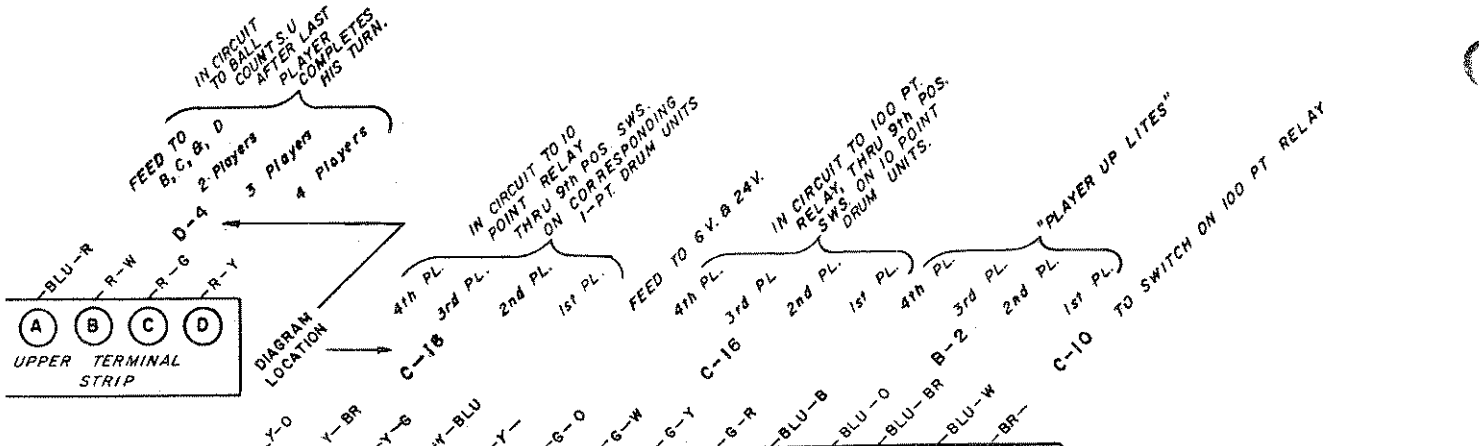
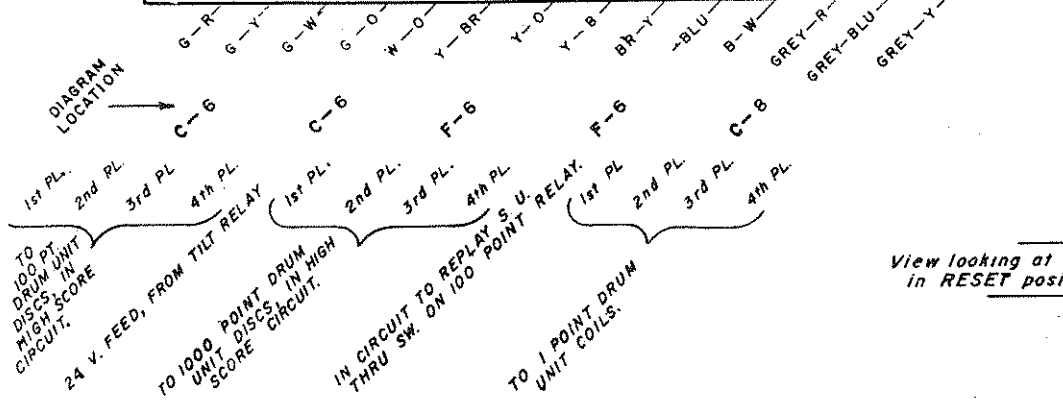


Diagram Location	Terminal	Notes
C-10	4th PL. O-R	IN CIRCUIT TO 1000 POINT DRUM UNIT COILS THRU 9th POSITION SWS. ON CORRESPONDING 100 POINT DRUM UNITS.
	3rd PL. BR-B	
	2nd PL. BR-W	
	1st PL. BLU-Y	
C-9	4th PL. W-G	TO 100 POINT DRUM UNIT COILS
	3rd PL. W-BLU	
C-9	2nd PL. B-G	TO SWITCH ON 100 POINT RELAY
	1st PL. GREY-B	
C-8	R-G	TO SWITCH ON 10 POINT RELAY
C-8	4th PL. GREY-O	TO 10 POINT DRUM UNIT COILS
	3rd PL. GREY-BR	
	2nd PL. GREY-W	
C-8	GREY-G	1st PL.
C-8	BR-O	TO SWITCH ON 1 POINT RELAY



View looking at WIPER FINGER side with unit in RESET position (1st Player Up)

No. MATCH UNIT

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

View looking at
WIPER FINGER side

ENERGIZES CHANGE RELAY

IN No. MATCH CIRCUIT THESE WIRES COME FROM THE 1-PT. D.U. DISC OF ALL FOUR PLAYERS.

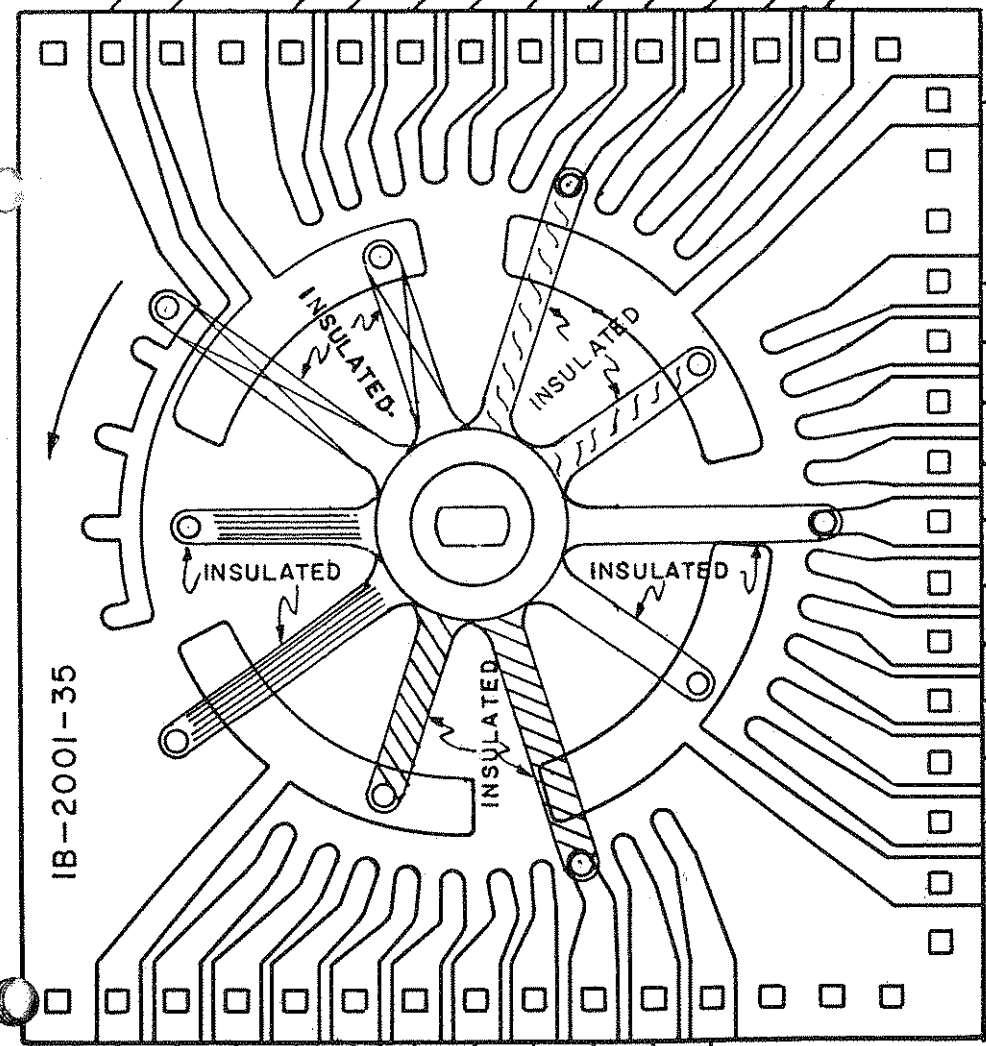
DIAGRAM LOCATION
C-17

MATCH NO. → -3 -8 -2 -5 -9 -4 -0 -6 -1 -7

BLU-O
Y-
Y-O
G-O
Y-BR
G-R
W-BLU
Y-B
Y-BLU
G-Y
Y-G
G-W

DIAGRAM LOCATION

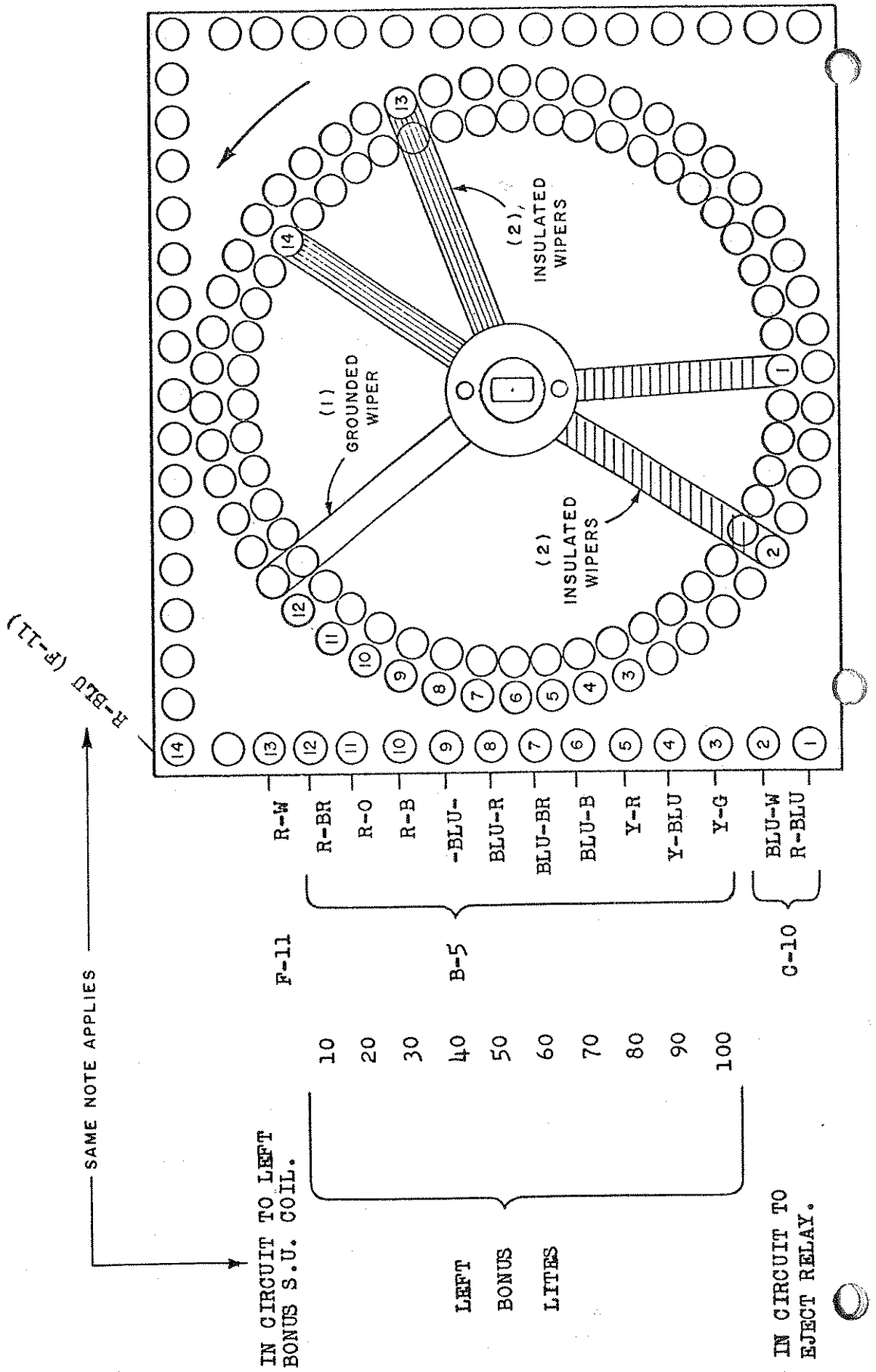
NO. MATCH FEED TO REPLAY S.U.



- GREY-R D-6
 - W-GREY -2
 - W-B -5
 - W-O -9
 - W-BR -4
 - W-G B-2 -0
 - BR-W & -6
 - BR-G B-3 -1
 - BR-Y -7
 - BR-BLU -3
 - BR-R -8
 - Y- B-3
- NO. MATCH LITES
- FEED TO No. MATCH LITES

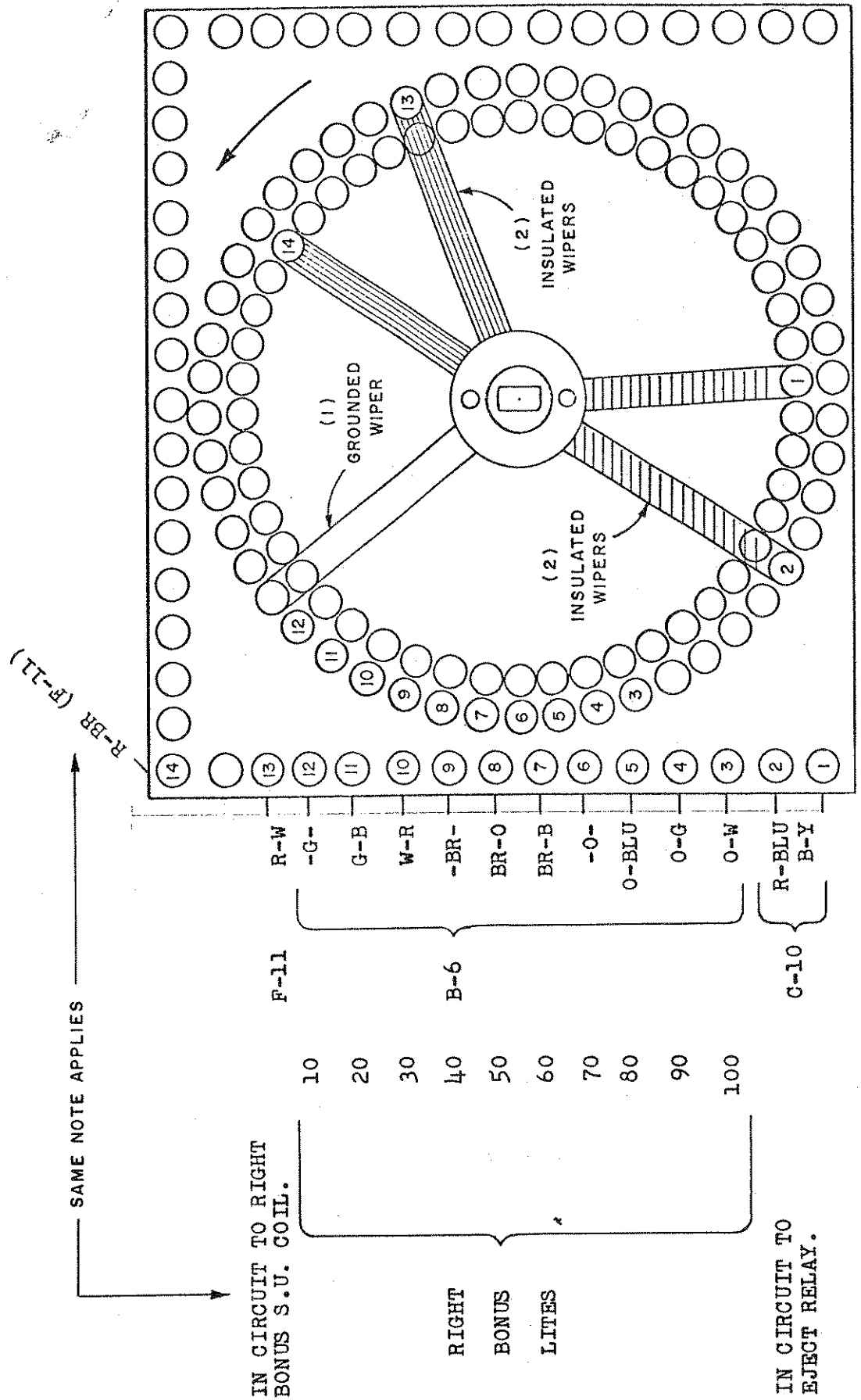
LEFT BONUS UNIT DISC

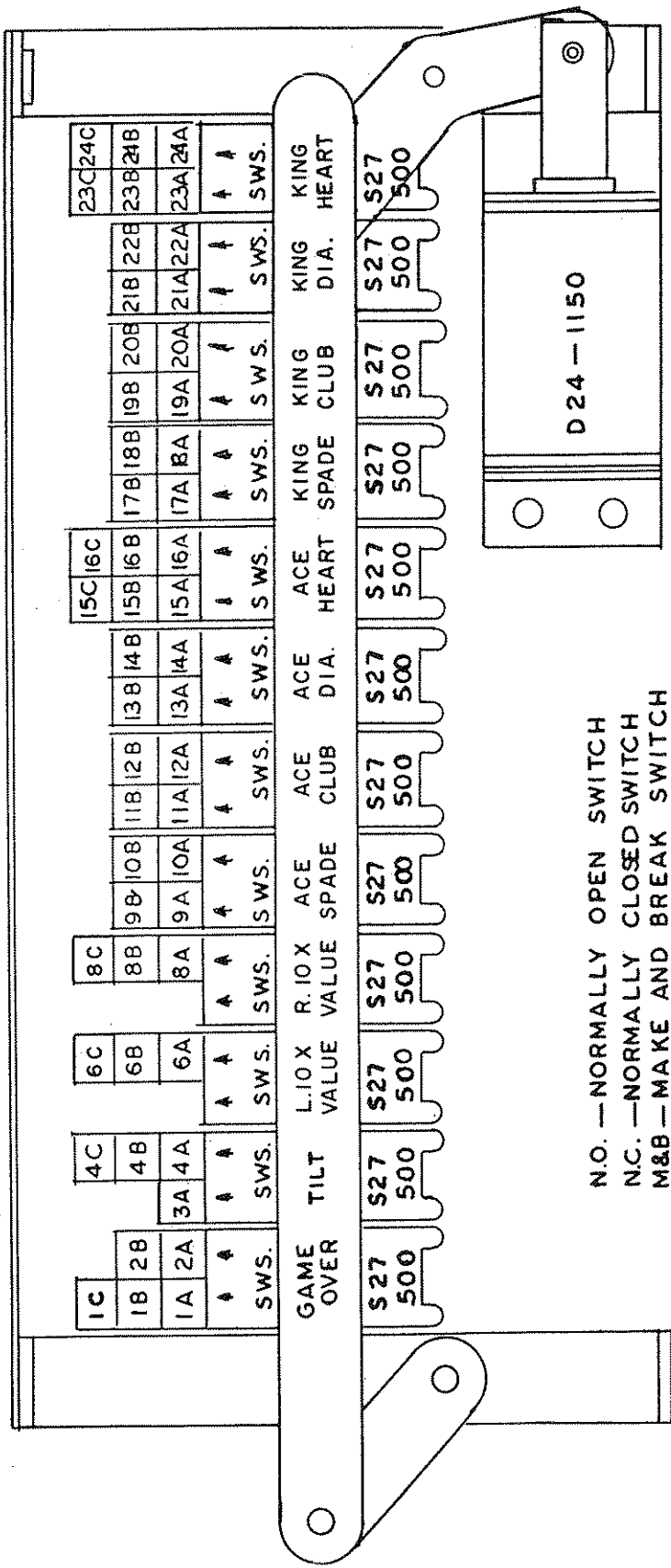
THIS UNIT ADVANCES ONE STEP EACH TIME THE "LEFT ADVANCE RELAY" IS PULSED. IT RESETS, ONE STEP AT A TIME, WHEN "LEFT BONUS RELAY" OR "BONUS RESET RELAY" IS ENERGIZED.



RIGHT BONUS UNIT DISC

THIS UNIT ADVANCES ONE STEP EACH TIME THE "RIGHT ADVANCE RELAY" IS PULSED. IT RESETS, ONE STEP AT A TIME, WHEN "RIGHT BONUS RELAY" OR "BONUS RESET RELAY" IS ENERGIZED.





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
	1C	BLU-Y -BR- GRAY-O	A-2	M&B	OPENS IN CIRCUIT TO PLAYER UP LITES AND CLOSES TO GAME-OVER AND NO. MATCH LITES.
GAME-OVER RELAY	1B	-B- BLU-Y-W	F-12	N.C.	OPENS CIRCUITS TO PLAYFIELD SWITCHES.
	1A	W-BLU W-BR	E-2	N.O.	IN CIRCUIT TO REPLAY RELAY.
	2B	B-W GRAY-BR GRAY-G	E-6	M&B	OPENS HI-SCORE CIRCUIT AND CLOSES IN NO. MATCH CIRCUIT TO REPLAY S.U. OR EXTRA BALL RELAY.
	2A	BLU-W O-R	D-4	N.O.	IN CIRCUIT TO RESET RELAY, THRU SWITCH ON COIN RELAY.

RELAY	SW.	WIRE COLORS	DIAGRAM LOCATION	TYPE	SWITCH OPERATION
TILT RELAY	3A	O-B G-R	E-11	N.O.	ENERGIZES POST RELAY.
	4C	-W- -BLU- BLU-B	A-4	M&B	OPENS IN CIRCUIT TO PLAYFIELD LITES AND CLOSSES TO TILT LITE.
	4B	W-O -Y- W-B	C-6 C-12	M&B	OPENS IN HI-SCORE CIRCUIT TO REPLAY S.U. AND CLOSSES TO BALL INDEX RELAY.
	4A	R-Y-W -R-	F-12	N.C.	OPENS IN CIRCUIT TO PLAYFIELD SWITCHES.
LEFT 10X VALUE RELAY	6C	W-R W-G BR-Y	E-14	M&B	OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSSES TO 100 POINT RELAY.
	6B	O-W -J-	E-13	N.C.	TO COIL ON THIS RELAY, THRU LEFT TOP ROLLOVER SWITCH.
	6A	-Y- GRAY-BR	B-7	N.O.	TO LEFT EJECT POCKET "10X VALUE" LITE.
RIGHT 10X VALUE RELAY	8C	W-R -G- BR-Y	E-14	M&B	OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSSES TO 100 POINT RELAY.
	8B	R-Y -J-	E-13	N.C.	TO COIL ON THIS RELAY, THRU RIGHT TOP ROLLOVER SWITCH.
	8A	-Y- GRAY-O	B-7	N.O.	TO RIGHT EJECT POCKET "10X VALUE" LITE.
ACE OF SPADES RELAY	9B	R-BLU -J-	C-13	N.O.	IN SERIES WITH SWITCH 11B ON ACE OF CLUBS RELAY.
	9A	GRAY-B -J-	A-7	N.O.	TO LEFT EJECT POCKET "EXTRA BALL" LITE.
	10B	-J- BLU-BR W-R	E-13	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSSES TO 10 POINT RELAY.
	10A	-Y- BR-BLU	B-6	N.C.	TO ACE OF SPADES "TARGET" LITE.

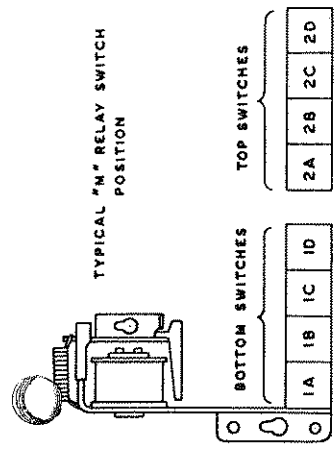
RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
ACE OF CLUBS RELAY	11B	-J- -J-	D-13	N.O.	IN SERIES WITH SWITCH 13B ON ACE OF DIAMONDS RELAY.
	11A	-J- -J-	B-7	N.O.	IN SERIES WITH SWITCH 9A ON ACE OF SPADES RELAY.
	12B	-J- Y-BLU W-R	E-13	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	12A	-Y- B-BLU	B-6	N.C.	TO ACE OF CLUBS "TARGET" LITE.
ACE OF DIA- MONDS RELAY	13B	-J- -J-	E-13	N.O.	IN SERIES WITH SWITCH 15B ON ACE OF HEARTS RELAY.
	13A	-J- -J-	B-7	N.O.	IN SERIES WITH SWITCH 11A ON ACE OF CLUBS RELAY.
	14B	-J- Y-G W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	14A	-Y- B-Y	B-7	N.C.	TO ACE OF DIAMONDS "TARGET" LITE.
ACE OF HEARTS RELAY	15C	BLU-R -Y-	B-4	N.O.	TO LEFT JET BUMPER LITE.
	15B	R-W -J-	E-13	N.O.	IN CIRCUIT TO EXTRA BALL RELAY.
	15A	B-R -J-	B-7	N.O.	IN SERIES WITH SWITCH 13A ON ACE OF DIAMONDS RELAY.
	16C	G-B Y-R W-R	E-15	M&B	OPENS IN CIRCUIT TO 1 POINT RELAY AND CLOSES TO 10 POINT RELAY.
	16B	-J- Y-BR W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	16A	-Y- GRAY-R	B-7	N.C.	TO ACE OF HEARTS "TARGET" LITE.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
KING OF SPADES RELAY	17B	R-W -J-	E-13	N.O.	IN CIRCUIT TO EXTRA BALL RELAY.
	17A	B-R -J-	B-7	N.O.	IN SERIES WITH SWITCH 19A ON KING OF CLUBS RELAY.
	18B	-J- Y-O W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	18A	-Y- GRAY-BLU	B-7	N.C.	TO KING OF SPADES "TARGET" LITE.
KING OF CLUBS RELAY	19B	-J- -J-	E-13	N.O.	IN SERIES WITH SWITCH 17B ON ACE OF SPADES RELAY.
	19A	-J- -J-	B-7	N.O.	IN SERIES WITH SWITCH 21A ON KING OF DIAMONDS RELAY.
	20B	-J- Y-B W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	20A	-Y- GRAY-Y	B-7	N.C.	TO KING OF CLUBS "TARGET" LITE.
KING OF DIA- MONDS RELAY	21B	-J- -J-	D-13	N.O.	IN SERIES WITH SWITCH 19B ON ACE OF CLUBS RELAY.
	21A	-J- -J-	B-7	N.O.	IN SERIES WITH SWITCH 23A ON KING OF HEARTS RELAY.
	22B	-J- R-B W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	22A	-Y- GRAY-G	B-7	N.C.	TO KING OF DIAMONDS "TARGET" LITE.
KING OF HEARTS RELAY	23C	R-Y -Y-	B-4	N.O.	TO RIGHT JET BUMPER LITE.
	23B	R-G -J-	C-13	N.O.	IN SERIES WITH SWITCH 21B ON ACE OF DIAMONDS RELAY.
	23A	R-BLU -J-	A-7	N.O.	TO RIGHT EJECT POCKET "EXTRA BALL" LITE.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
KING OF HEARTS RELAY	24C	G-B G-O W-R	E-15	M&B	OPENS IN CIRCUIT TO 1 POINT RELAY AND CLOSES TO 10 POINT RELAY.
	24B	-J- -BR- W-R	E-14	M&B	OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 10 POINT RELAY.
	24A	-Y- GRAY-W	B-7	N.C.	TO KING OF HEARTS "TARGET" LITE.

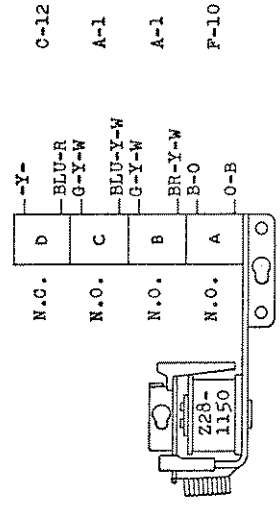
A.C. RELAYS & SWITCHES

LOCATED ON MECHANISM PANEL



LOCK RELAY

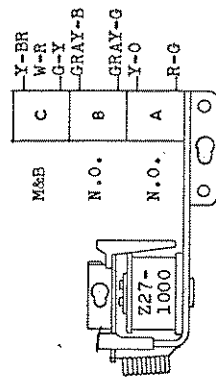
IS ENERGIZED BY 5¢, 10¢, 25¢ OR BONUS RESET RELAYS. ALSO BY LEFT FLIPPER SWITCH.



C-12 TRIPS GAME-OVER RELAY.
 A-1 6 VOLTS TO LITES FROM TRANSFORMER.
 A-1 6 VOLTS FROM LITES TO TRANSFORMER.
 F-10 IN HOLD CIRCUIT TO THIS RELAY.

PLAYER RESET RELAY

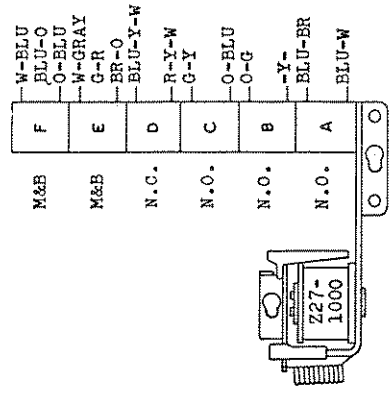
IS ENERGIZED BY BALL COUNT UNIT END-OF-STROKE SWITCH.



E-5 OPENS IN CIRCUIT TO PLAYER UNIT S.U. COIL AND CLOSES TO PLAYER UNIT RESET COIL.
 E-6 TO REPLAY S.U. COIL, IN NO. MATCH CIRCUIT.
 D-5 IN HOLD CIRCUIT TO THIS RELAY.

RESET RELAY

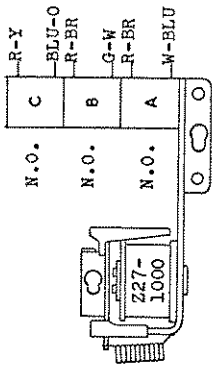
IS ENERGIZED BY COIN RELAY, THRU SWITCH ON GAME-OVER RELAY.



E-4 CLOSES TO BALL COUNT, COIN AND PLAYER UNITS RESET COILS.
 C-3 OPENS IN CIRCUIT TO REPLAY RELAY AND CLOSES TO BONUS RESET RELAY.
 F-12 OPENS CIRCUITS TO ALL PLAYFIELD SWITCHES.
 E-5 TO PLAYER UNIT RESET COIL.
 C-4 RUNS SCORE MOTOR.
 D-4 IN HOLD CIRCUIT TO THIS RELAY, THRU (16) DRUM UNIT ZERO SWITCHES.

REPLAY RELAY

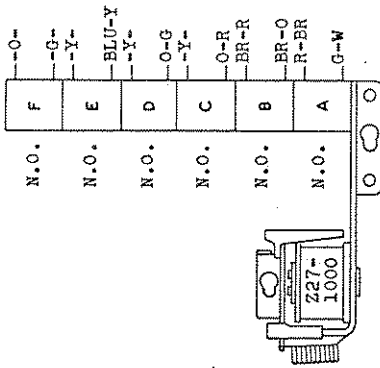
IS ENERGIZED BY REPLAY BUTTON, THRU REPLAY UNIT ZERO SWITCH.



- E-4 ENERGIZES REPLAY UNIT RESET COIL AT CAM SWITCH 1C.
- C-2 ENERGIZES COIN RELAY.
- C-2 IN HOLD CIRCUIT TO THIS RELAY.

COIN RELAY

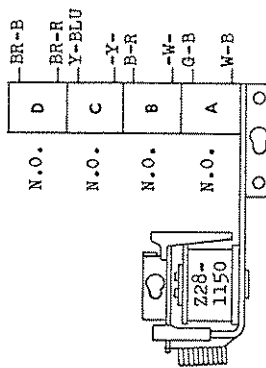
- IS ENERGIZED BY
1. COIN SWITCH
 2. REPLAY RELAY
 3. 5¢ RELAY, THRU SWITCH ON ALTERNATOR UNIT.
 4. 25¢ RELAY, THRU #6 PLAYS FOR 25¢th ADJUSTMENT JACK.



- C-1 ENERGIZES RELAY BANK RESET COIL AT CAM SWITCH 1A (110 VOLTS).
- C-12 IN CIRCUIT TO GAME-OVER RELAY.
- C-3 RUNS SCORE MOTOR.
- C-4 ENERGIZES RESET RELAY, THRU SWITCH ON GAME-OVER RELAY.
- F-3 ENERGIZES "MONUS RESET RELAY" THRU SWITCH ON "RESET RELAY."
- C-2 IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX RELAY

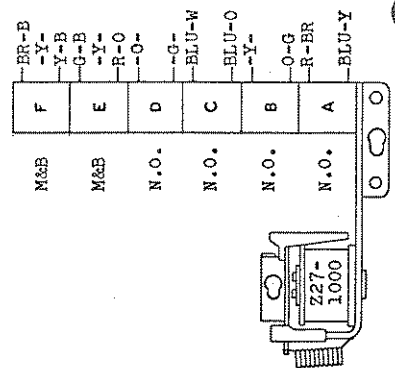
IS ENERGIZED BY 100 POINT RELAY, THRU SWITCH ON EXTRA BALL RELAY. ALSO BY TILT RELAY.



- C-13 IN SERIES WITH SWITCH A ON CHANGE RELAY, THRU ROTATING BUMPER SWITCH.
- C-13 IN SERIES WITH SWITCH A ON EXTRA BALL RELAY.
- D-5 IN CIRCUIT TO BALL COUNT S.U. WHEN LAST PLAYER COMPLETES HIS TURN.
- E-12 IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE RELAY

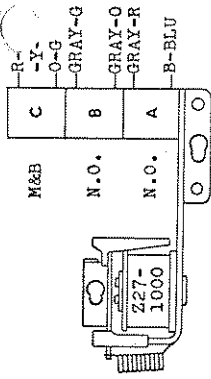
IS ENERGIZED BY OUTHOLE SWITCH WHEN SCORE# MOTOR IS AT INDEX POSITION.



- C-13 OPENS IN CIRCUIT TO LEFT OR RIGHT ADVANCE RELAY AND CLOSURES TO "DOWN POST" COIL.
- C-11 OPENS IN HOLD CIRCUIT TO BALL INDEX RELAY AND CLOSURES IN SERIES WITH SWITCH D ON EXTRA BALL RELAY.
- C-5 ENERGIZES 110 VOLT RELAY BANK RESET COIL AT CAM SWITCH 1A.
- E-12 ENERGIZES BALL RELEASE COIL AT CAM SWITCH 3B.
- D-3 RUNS SCORE MOTOR.
- C-12 IN HOLD CIRCUIT TO THIS RELAY.

EJECT RELAY

IS ENERGIZED BY LEFT BONUS RELAY WHEN LEFT BONUS UNIT REACHES ZERO POSITION, OR BY RIGHT BONUS RELAY WHEN RIGHT BONUS UNIT REACHES ZERO POSITION.



OPENS IN HOLD CIRCUIT TO LEFT AND RIGHT BONUS LINES, AND CLOSURES TO RUN SCORE MOTOR.

ENERGIZES (2) EJECT COILS AT CAM SWITCH 4A.

IN HOLD CIRCUIT TO THIS RELAY.

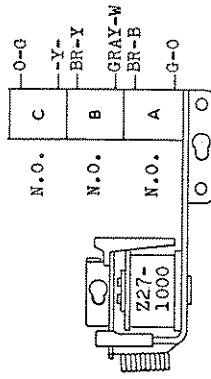
C-10
D-4

D-11

E-10

300 RELAY

IS ENERGIZED BY LEFT OR RIGHT TOP ROLLOVER, THRU SWITCH ON CHANGE RELAY.



RUNS SCORE MOTOR.

IN CIRCUIT TO PULSE 100 POINT RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

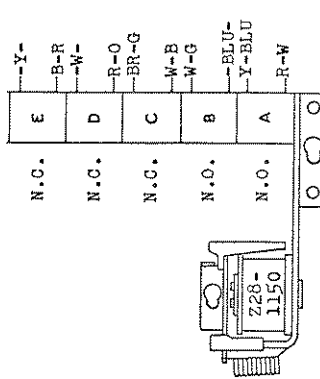
D-4

C-15

C-15

EXTRA BALL RELAY

IS ENERGIZED BY LEFT BONUS RELAY WHEN ALL (4) ACE RELAYS ON RELAY BANK ARE TRIPPED ---OR BY RIGHT BONUS RELAY WHEN ALL (4) KING RELAYS ON RELAY BANK ARE TRIPPED.



IN CIRCUIT TO LEFT AND RIGHT EJECT POCKET "EXTRA BALL" LITES.

IN SERIES WITH SWITCH B ON BALL INDEX RELAY.

TO BALL INDEX RELAY.

TO PLAYFIELD AND INSERT "SHOOT AGAIN" LITES.

IN HOLD CIRCUIT TO THIS RELAY.

B-7

C-5

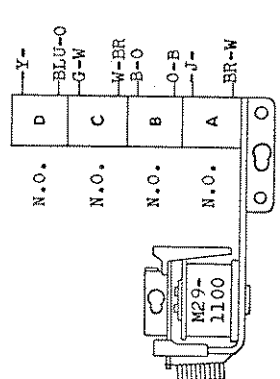
E-12

A-4

E-13

5¢ RELAY

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



ENERGIZES ALTERNATOR UNIT COIL.

ENERGIZES COIN RELAY THRU SWITCH ON ALTERNATOR UNIT.

ENERGIZES LOCK RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

C-1

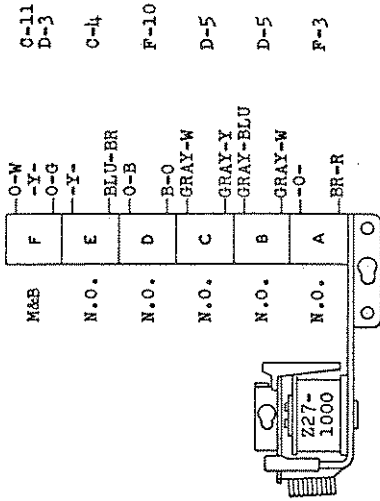
D-2

F-10

D-2

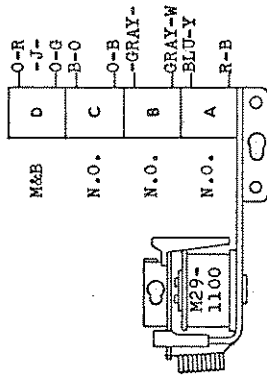
BONUS RESET RELAY

IS ENERGIZED, DURING RESET CYCLE, BY SWITCHES ON COIN RELAY AND RESET RELAY. DURING PLAY, IT IS ENERGIZED BY OUTHOLE RELAY, THRU INDEX CAM SWITCH C.



10¢ RELAY

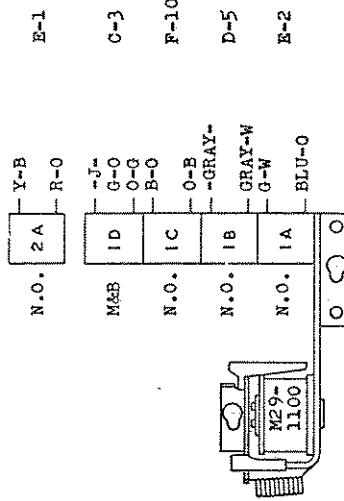
IS ENERGIZED BY 10¢ COIN SWITCH, WHEN 10¢ ADJUSTMENT JACK IS IN "2 PLAYS" OR "3 PLAYS" POSITION.



LOCATED ON PLAYFIELD

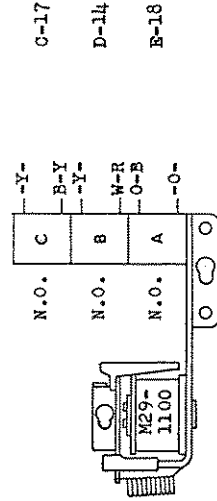
25¢ RELAY

IS ENERGIZED BY 25¢ COIN SWITCH.



NO. MATCH RELAY

IS ENERGIZED BY (4) STANDUP SWITCHES ON PLAYFIELD.



C-11 IN CIRCUIT TO PULSE LEFT OR RIGHT BONUS S.U. FROM ZERO TO 1ST POSITION.

C-4 IN SERIES WITH SWITCH A ON RESET RELAY.

F-10 ENERGIZES LOCK RELAY.

D-5 IN CIRCUIT TO PULSE RIGHT BONUS UNIT RESET COIL.

D-5 IN CIRCUIT TO PULSE LEFT BONUS UNIT RESET COIL.

F-3 IN HOLD CIRCUIT TO THIS RELAY.

D-3 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.

F-10 ENERGIZES LOCK RELAY.

D-6 PULSES REPLAY UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.

E-1 IN HOLD CIRCUIT TO THIS RELAY.

E-1 IN HOLD CIRCUIT TO THIS RELAY.

C-3 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.

F-10 ENERGIZES LOCK RELAY.

D-5 PULSES REPLAY UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.

E-2 ENERGIZES COIN RELAY ON 6 PLAYS FOR 25¢.

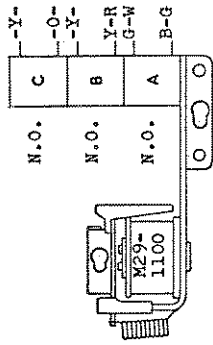
C-17 ENERGIZES NO. MATCH UNIT S.U. COIL.

D-14 PULSES 10 POINT RELAY.

E-18 IN HOLD CIRCUIT TO THIS RELAY.

NO. 1 BUMPER RELAY

IS ENERGIZED BY LEFT JET BUMPER SWITCH.



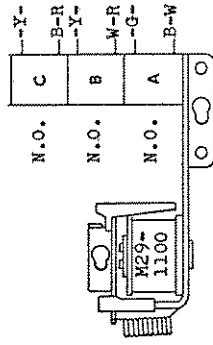
C-3
O-15
D-17

PULSES LEFT JET BUMPER COIL.
IN SERIES WITH SWITCH 16C ON ACE OF HEARTS RELAY
(ON RELAY BANK).

IN HOLD CIRCUIT TO THIS RELAY.

NO. 2 BUMPER RELAY

IS ENERGIZED BY CENTER JET BUMPER SWITCH.

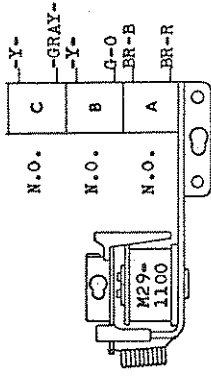


C-3
O-15
D-17

PULSES CENTER JET BUMPER COIL.
PULSES 10 POINT RELAY.
IN HOLD CIRCUIT TO THIS RELAY.

NO. 3 BUMPER RELAY

IS ENERGIZED BY RIGHT JET BUMPER SWITCH.

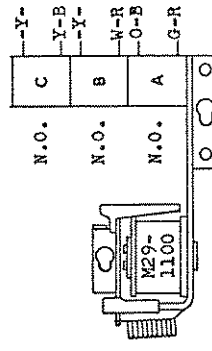


C-3
O-15
D-17

PULSES RIGHT JET BUMPER COIL.
IN SERIES WITH SWITCH 24C ON KING OF HEARTS RELAY
(ON RELAY BANK).
IN HOLD CIRCUIT TO THIS RELAY.

POST RELAY

IS ENERGIZED BY "DOWN POST" ROLLOVER
BUTTON, OR BY TILT RELAY.

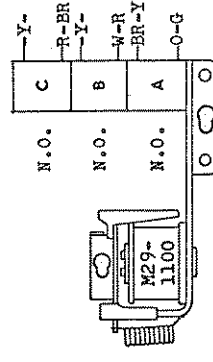


O-11
C-14
E-11

ENERGIZES "DOWN POST" COIL.
PULSES 10 POINT RELAY.
IN HOLD CIRCUIT TO THIS RELAY.

RIGHT ADVANCE RELAY

IS PULSED BY ROTATING BUMPER SWITCH,
THRU SWITCH ON CHANGE RELAY.

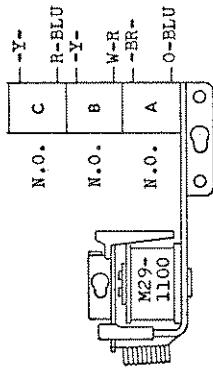


O-11
D-15
D-13

ENERGIZES RIGHT BONUS UNIT S.U. COIL.
PULSES 10 POINT RELAY.
IN HOLD CIRCUIT TO THIS RELAY.

LEFT ADVANCE RELAY

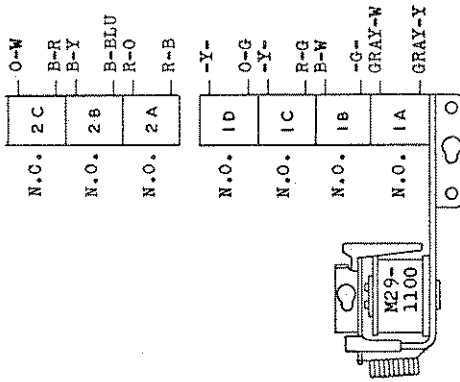
IS PULSED BY ROTATING BUMPER SWITCH,
THRU SWITCH ON CHANGE RELAY.



C-11 ENERGIZES LEFT BONUS UNIT S.U. COIL.
D-15 PULSES 10 POINT RELAY.
E-13 IN HOLD CIRCUIT TO THIS RELAY.

RIGHT BONUS RELAY

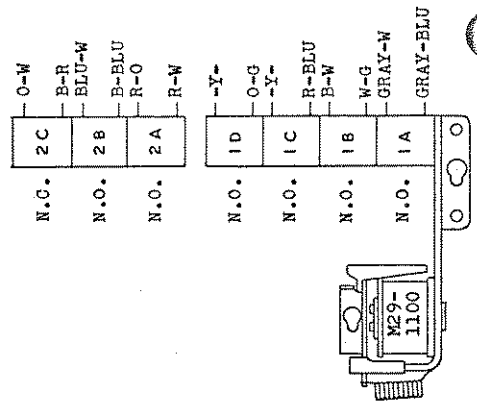
IS ENERGIZED BY RIGHT EJECT POCKET SWITCH,
THRU INDEX CAM SWITCH A.



D-11 IN SERIES WITH SWITCH 2C ON LEFT BONUS RELAY.
E-10 IN CIRCUIT TO ENERGIZE EJECT RELAY, THRU ZERO POSITION ON RIGHT BONUS UNIT DISC.
F-11 IN HOLD CIRCUIT TO THIS RELAY.
C-4 RUNS SCORE MOTOR.
C-13 IN SERIES WITH SWITCH 23B ON KING OF HEARTS RELAY (ON RELAY BANK).
D-14 IN SERIES WITH SWITCH 8C ON "RIGHT 10X VALUE" RELAY (ON RELAY BANK).
D-5 IN CIRCUIT TO PULSE RIGHT BONUS UNIT RESET COIL.

LEFT BONUS RELAY

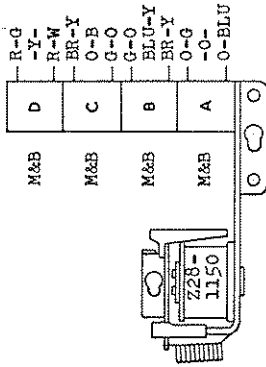
IS ENERGIZED BY LEFT EJECT POCKET SWITCH,
THRU INDEX CAM SWITCH A.



D-11 IN SERIES WITH SWITCH F ON BONUS RESET RELAY.
E-10 IN CIRCUIT TO ENERGIZE EJECT RELAY, THRU ZERO POSITION ON LEFT BONUS UNIT DISC.
F-10 IN HOLD CIRCUIT TO THIS RELAY.
D-4 RUNS SCORE MOTOR.
C-13 IN SERIES WITH SWITCH 9B ON ACE OF SPADES RELAY (ON RELAY BANK).
D-14 IN SERIES WITH SWITCH 6C ON "LEFT 10X VALUE" RELAY (ON RELAY BANK).
D-5 IN CIRCUIT TO PULSE LEFT BONUS UNIT RESET COIL.

CHANGE RELAY

IS ENERGIZED BY WIPER FINGER ON NO. MATCH UNIT DISC. (EVERY OTHER RIVET).



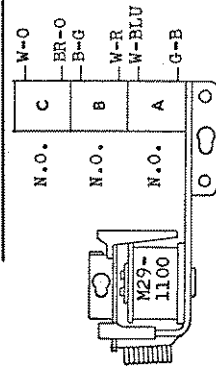
B-4 IN 6 VOLT CIRCUIT TO LEFT TOP OR RIGHT TOP ROLLOVER LITES. (300)

E-15 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSSES TO 300 RELAY, THRU RIGHT TOP R.O. SW.

D-15 OPENS IN CIRCUIT TO 300 RELAY AND CLOSSES TO 100 POINT RELAY, THRU LEFT TOP R.O. SW.

E-13 TO LEFT ADVANCE OR RIGHT ADVANCE RELAY.

LOCATED IN BACKBOX



C-8 PULSES 1 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

E-16 PULSES 10 POINT RELAY, THRU 9TH POSITION SWITCHES ON 1 POINT DRUM UNITS.

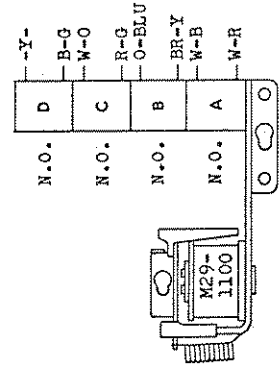
E-16 HOLD CIRCUIT TO THIS RELAY, THRU E.O.S. SWITCHES ON 1 POINT DRUM UNITS.

IS PULSED BY NO.1 BUMPER RELAY, NO.3 BUMPER RELAY, STANDUP SWITCHES AND KICKER SWITCHES.

10 POINT RELAY

IS PULSED BY:

- (4) ACE AND (4) KING TARGETS
- NO.2 BUMPER RELAY.
- POST RELAY.
- LEFT BONUS RELAY, THRU "LEFT 10X VALUE" RELAY.
- RIGHT BONUS RELAY, THRU "RIGHT 10X VALUE" RELAY.



E-16 ENERGIZES LARGE BELL COIL.

C-8 PULSES 10 POINT DRUM UNITS, THRU PLAYER UP DISC.

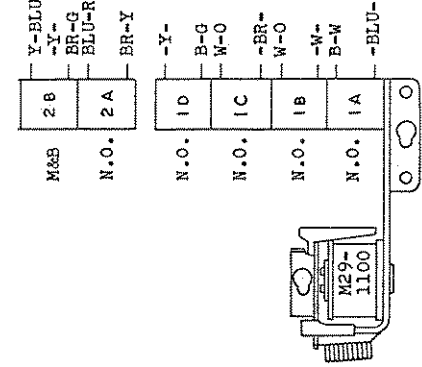
E-16 PULSES 100 POINT RELAY, THRU 9TH POSITION SWITCHES ON 10 POINT DRUM UNITS.

E-16 IN HOLD CIRCUIT TO THIS RELAY, THRU E.O.S. SWITCHES ON 10 POINT DRUM UNITS.

100 POINT RELAY

IS PULSED BY:

- LEFT AND RIGHT BOTTOM ROLLOVERS.
- 300 RELAY.
- LEFT OR RIGHT TOP ROLLOVERS, THRU SWITCH ON CHANGE RELAY.
- LEFT BONUS RELAY, THRU "LEFT 10X VALUE" RELAY.
- RIGHT BONUS RELAY, THRU "RIGHT 10X VALUE" RELAY.



C-13 OPENS IN HOLD CIRCUIT TO EXTRA BALL RELAY AND CLOSSES TO ENERGIZE BALL INDEX RELAY.

E-16 IN HOLD CIRCUIT TO THIS RELAY.

E-16 ENERGIZES LARGE BELL COIL.

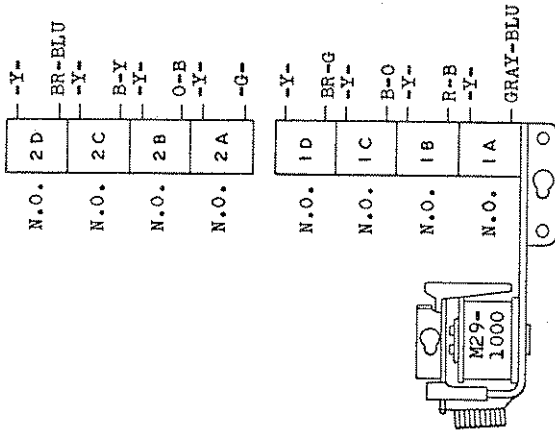
C-9 PULSES 1000 POINT DRUM UNITS, THRU 9TH POSITION SWITCHES ON 100 POINT DRUM UNITS.

C-9 PULSES 100 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

F-6 IN HI-SCORE CIRCUIT TO REPLAY S.U. COIL OR EXTRA BALL RELAY.

1-2 RESET RELAY

IS PULSED, DURING RESET CYCLE, BY IMPULSE CAM SWITCH D AND SWITCH A OF RESET RELAY.

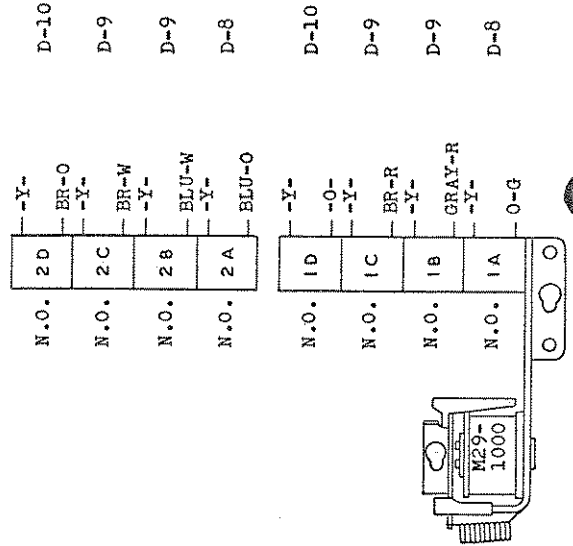


D-9 1ST PLAYER 1000 POINT DRUM UNIT
 D-9 1ST PLAYER 100 POINT DRUM UNIT
 D-8 1ST PLAYER 10 POINT DRUM UNIT
 D-8 1ST PLAYER 1 POINT DRUM UNIT
 D-9 2ND PLAYER 1000 POINT DRUM UNIT
 D-9 2ND PLAYER 100 POINT DRUM UNIT
 D-8 2ND PLAYER 10 POINT DRUM UNIT
 D-8 2ND PLAYER 1 POINT DRUM UNIT

THESE DRUM UNITS ARE PULSED, IN THE RESET CYCLE, THRU THE CORRESPONDING DRUM UNITS.

3-4 RESET RELAY

IS PULSED, DURING RESET CYCLE, BY IMPULSE CAM SWITCH A AND SWITCH A OF RESET RELAY.



D-10 3RD PLAYER 1000 POINT DRUM UNIT
 D-9 3RD PLAYER 100 POINT DRUM UNIT
 D-9 3RD PLAYER 10 POINT DRUM UNIT
 D-8 3RD PLAYER 1 POINT DRUM UNIT
 D-10 4TH PLAYER 1000 POINT DRUM UNIT
 D-9 4TH PLAYER 100 POINT DRUM UNIT
 D-9 4TH PLAYER 10 POINT DRUM UNIT
 D-8 4TH PLAYER 1 POINT DRUM UNIT

THESE DRUM UNITS ARE PULSED, IN THE RESET CYCLE, THRU ZERO SWITCHES ON THE CORRESPONDING DRUM UNITS.

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-6932	C-6520	A-6402-5	
NO. MATCH	C-6879	C-6520	A-6401	
PLAYER	C-6417	C-6521	A-6405-3	
COIN	C-6896	C-6520	A-6402-3	14A-7805 (60 CYCLE) SCORE MOTOR
LEFT BONUS	C-6417	C-6520	A-6402-10	14A-7806 (50 CYCLE) SCORE MOTOR
RIGHT BONUS	C-6417	C-6520	A-6402-10	
1 POINT	A-7195	A-6294	3C-7272	
10 POINT	-----	-----	3C-7272	
100 POINT	A-7195	A-6294	3C-7272	
1000 POINT	A-7195	A-6294	3C-7272	

15B-6782 POWER TRANSFORMER

(Replaces — 15A-6773)

<i>USE TAP</i>	<i>IF LINE VOLTAGE IS</i>
105 V.	109 or LESS
117 V.	110 to 122
130 V.	123 to 135
160 V.	150 to 170

<i>USE TAP</i>	<i>IF LINE VOLTAGE IS</i>
205 V.	190 to 208
225 V.	209 to 228
240 V.	229 to 250

If game has sluggish action and dim lites, check line voltage and use proper primary tap as suggested above. For example, if line voltage is below 110V., wire may be disconnected from 117V. tap and soldered to 105V. tap. This will increase secondary voltage approximately 2-3 volts.

If action is sluggish, and proper primary tap is being used, disconnect wire from 24V. tap and solder to "high" tap. This will increase voltage to coils approximately 2-3 volts.