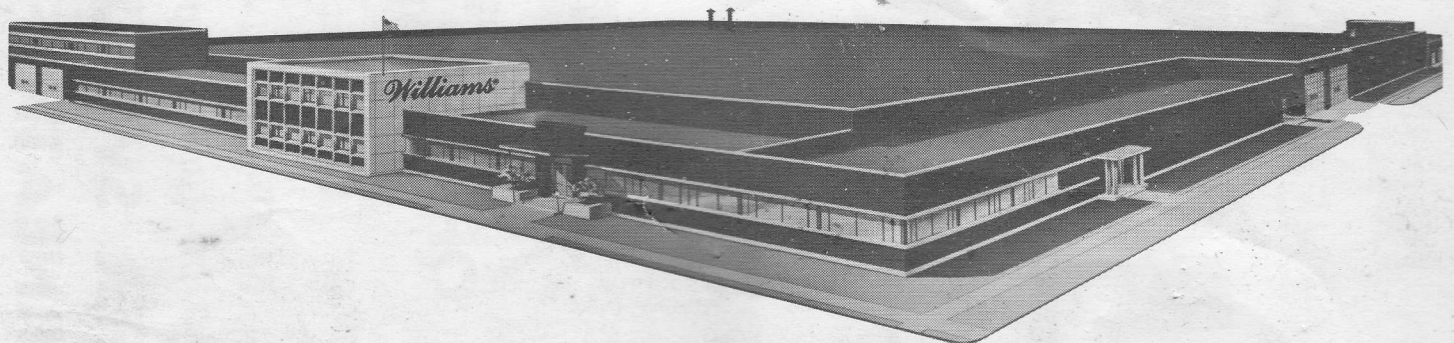


# Instruction Manual

*for*

# SOLIDS & STRIPES



**Williams<sup>®</sup> ELECTRONICS, INC.**  
SUBSIDIARY OF THE SEEBURG CORPORATION

3401 N. California Ave.  
Phone 267-2240

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

# **IMPORTANT NOTICE**

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

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

# CAUTION!

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

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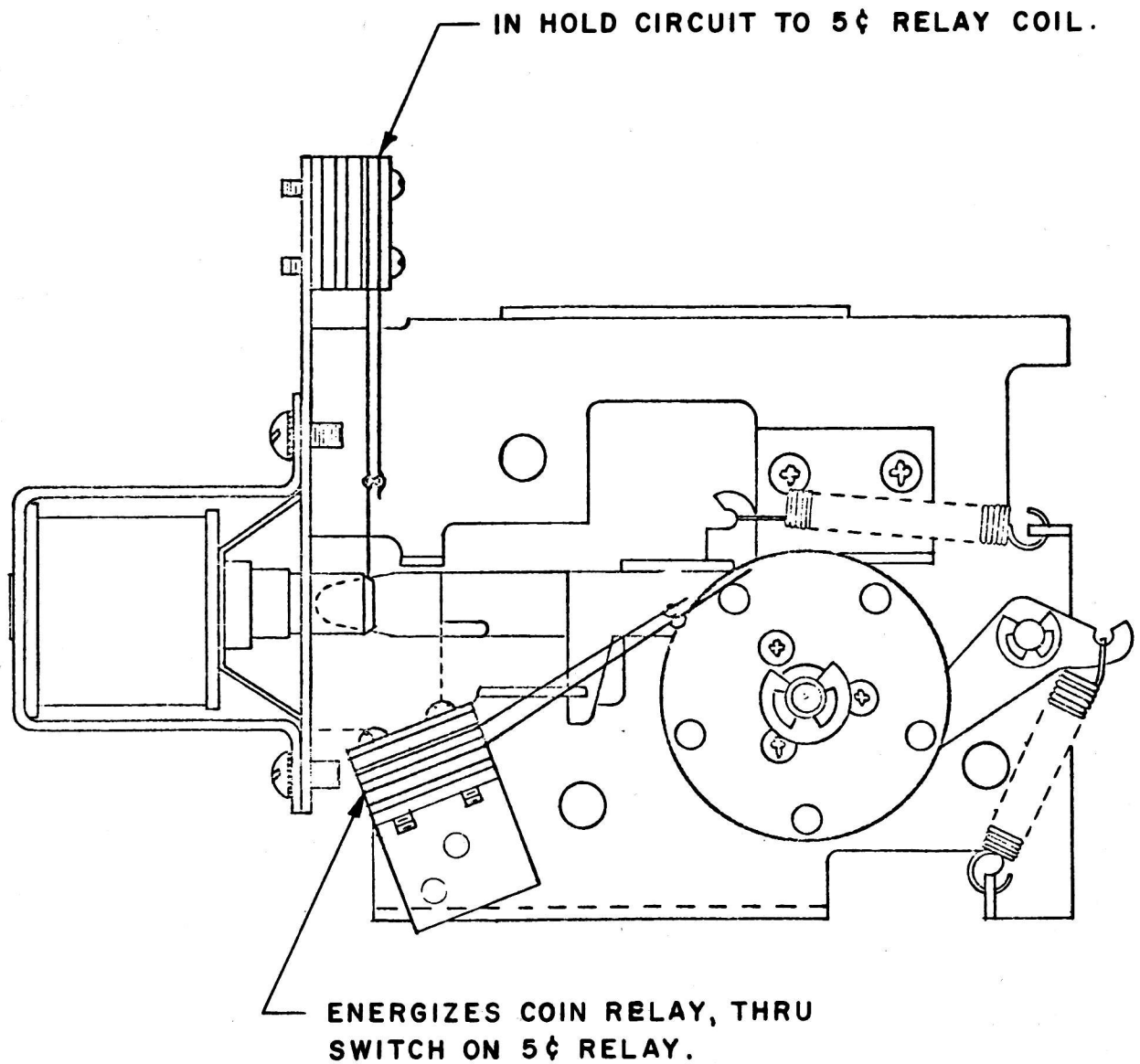
## SERVICEMAN TO REMOVE BACKGLASS:

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

# ALTERNATOR UNIT

LOCATED ON MECHANISM PANEL.

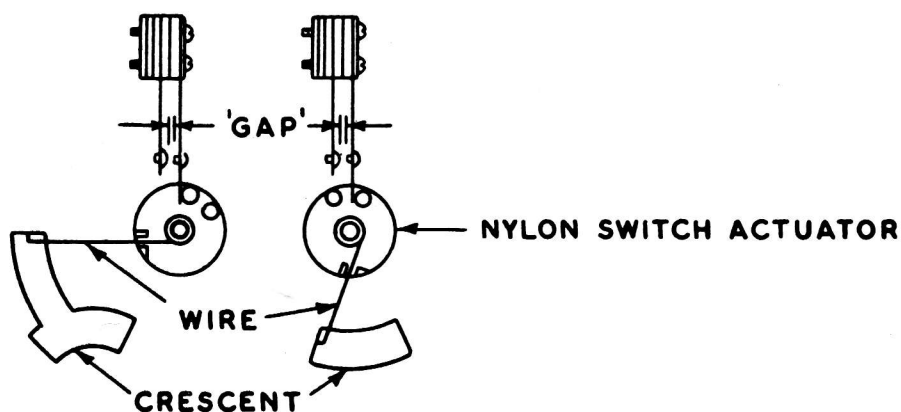
USED IN CONJUNCTION WITH 5¢ RELAY FOR "2 COINS - 1 PLAY" FEATURE.





# 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.

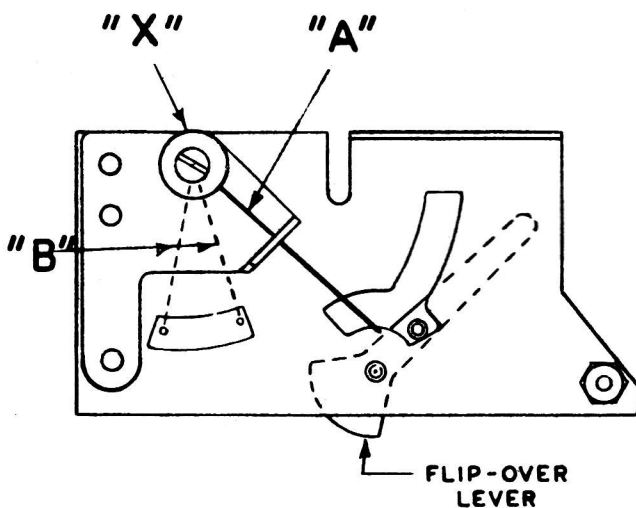
# INSTRUCTIONS FOR ALTERING COIN CHUTES EQUIPPED WITH A FLIP-OVER DEVICE.

FOR 1 COIN - FOR 1 PLAY

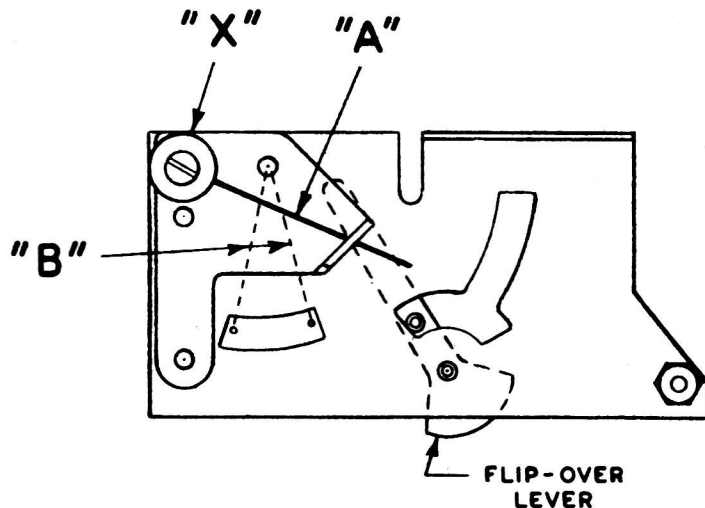
OR

2 COINS - FOR 1 PLAY

**FIGURE 1**



**FIGURE 2**



## 1 COIN - FOR 1 PLAY (FIGURE 1):

Wire form "A" should be in position as shown in Figure 1. Flip-over lever should rebound from wire form "A" and return to position shown in Figure 1 everytime a coin is inserted. All coins pass over the coin trip switch wire "B".

## 2 COINS - FOR 1 PLAY (FIGURE 2):

Wire form "A" should be in position as shown in Figure 2 (see note). Flip-over lever should alternate from side to side. 1st coin should go to cash box without actuating coin trip switch wire "B", 2nd coin should pass the coin trip switch wire "B" and returns flip-over to position as shown in Figure 2.

## NOTE:

To change from 1 coin play to 2 coin play or vice versa - loosen screw "X" and move screw, bushing & wire form "A" to position as required - shown in Figure 1 position as required - shown in Figure 1 or Figure 2.

When using 1 coin for 1 play, wire form "A" should not under any circumstances be allowed to enter the "Banana" slot and cause binding of flip-over lever.

# 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.

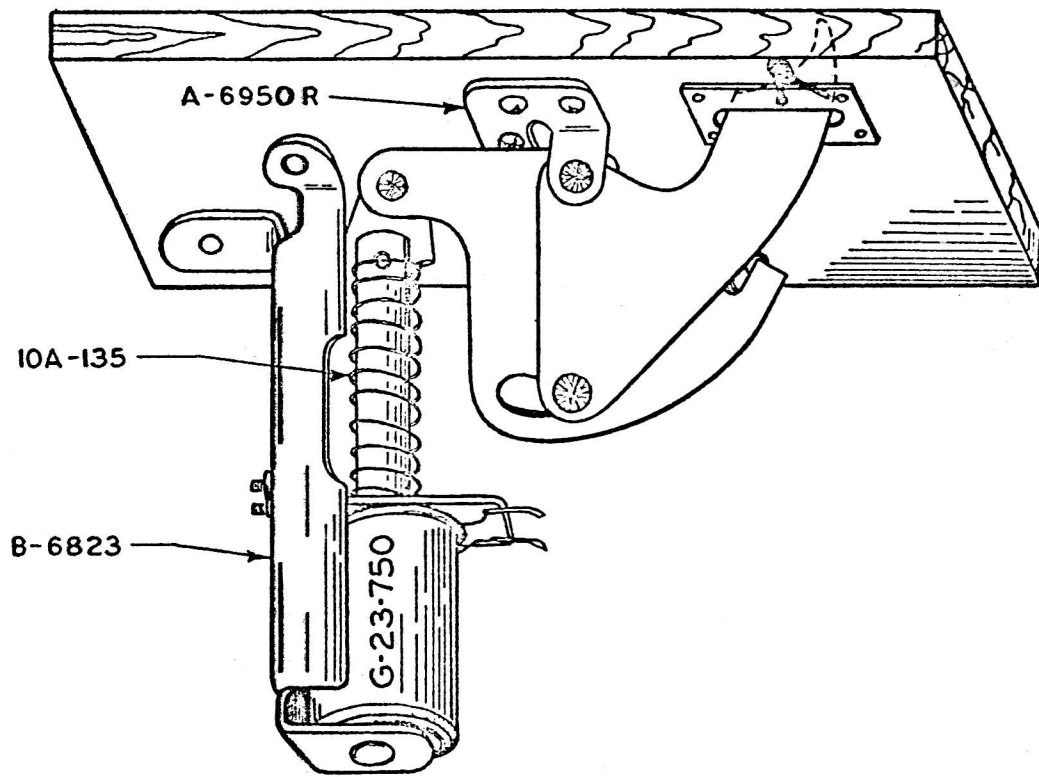
## IMPORTANT NOTICE

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

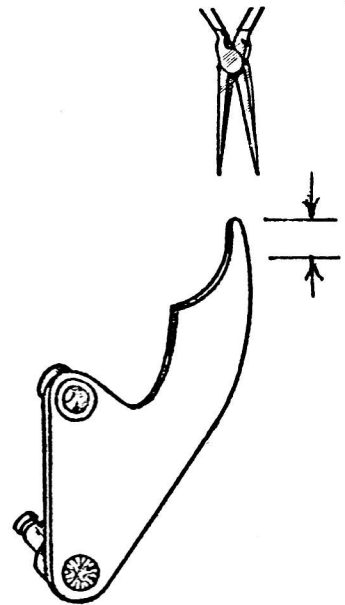
UNIT NAME	CONTACT DISC	WIPER ASSEMBLY	RATCHET GEAR ASSEMBLY	MOTORS
REPLAY	-----	-----	A-6400	SCORE MOTOR
BALL COUNT	C-6878	C-6520	A-6402-10	
NO. MATCH	C-6417	C-6520	A-6401	14A-7805 (60 CYCLE)
ALTERNATOR	-----	-----	3C-7272	
TENS	A-7195	A-6294	3C-7272	14A 7806 (50 CYCLE)
HUNDREDS	-----	-----	3C-7272	
THOUSANDS	A-7195	A-6294	3C-7272	
10 THOUSANDS	A-7195	A-6294	3C-7272	

# BALL EJECT CAM UNIT

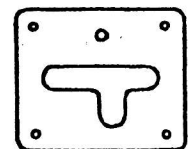


TO CHANGE DIRECTION OF BALL,  
WHEN EJECTED, GRASP "BALL EJECT CAM"  
WITH LONG-NOSED PLIERS (APPROXIMATELY  
1/4") AND BEND SLIGHTLY.

BENDING TO THE LEFT WILL CHANGE  
DIRECTION OF EJECTED BALL SLIGHTLY  
TO THE RIGHT, AND VICE-VERSA.



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



3A-6015G-6

"SOLIDS & STRIPES" COIL CHART

NOTICE:

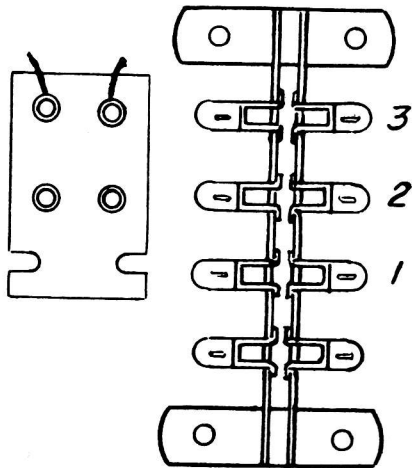
THIS GAME OPERATES ON 24 VOLTS. WHEN ORDERING REPLACEMENT TRANSFORMERS, MOTORS, COILS OR METERS ... MAKE SURE TO SPECIFY CORRECT PART NUMBER.

NUMBER	DESCRIPTION	LOCATION
14 A 7871	SCORE MOTOR - 50 CYCLE OR 60 CYCLE	MECH. PANEL
15 A 6771	TRANSFORMER - 60 CYCLE	MECH. PANEL
15 A 6773	TRANSFORMER - 50 CYCLE	MECH. PANEL
B 6396	24 VOLT METER	MECH. PANEL
<u>SOLENOID COILS</u>		
A 22-550	BALL RELEASE	PLAYFIELD
	BALL COUNT UNIT STEP UP	INSERT
	NO. MATCH UNIT STEP UP	"
A 23-600	REPLAY UNIT STEP UP	INSERT
A 2-23-750	KNOCKER	CABINET
B 26-800	REPLAY UNIT RESET	INSERT"
	BALL COUNT UNIT RESET	INSERT
	SCORE DRUM UNITS ... (8 req'd.)	INSERT
	ALTERNATOR UNIT	MECH. PANEL
C2-26-800	CHIME	INSERT
D1-24-1400	RELAY BANK RESET COILS ... (2 req'd.)	PLAYFIELD
FL 21-375/ 28-400	FLIPPERS ... (2 req'd.)	PLAYFIELD
G 22-550	JET BUMPERS ... (5 req'd.)	PLAYFIELD
G 23-750	AUTOMATIC KICKERS ... (2 req'd.)	PLAYFIELD
	POST COIL	PLAYFIELD
	EJECT COILS ... (3 req'd.)	PLAYFIELD
<u>RELAY COILS</u>		
M 29-1000	POST COIL	PLAYFIELD
	2nd COIN (TRIP)	MECH. PANEL
	SCORE RESET	INSERT
M 29-1100	#1 BUMPER	PLAYFIELD
	#2 BUMPER	PLAYFIELD
	#3 BUMPER	PLAYFIELD
	POST RELAY	PLAYFIELD
	10 POINT	INSERT
	100 POINT	INSERT
	1000 POINT	INSERT
	5¢ RELAY	MECH. PANEL
	10¢ RELAY	MECH. PANEL
	25¢ RELAY	MECH. PANEL
	3000 RELAY	PLAYFIELD
M1-31-1500	COIN LOCKOUT	DOOR
XM 27-675	METER COIL	MECH. PANEL
Z 27-1000	OUTHOLE RELAY	MECH. PANEL
	RESET RELAY	MECH. PANEL
	2nd COIN RELAY (LATCH)	MECH. PANEL
	COIN RELAY	MECH. PANEL
	REPLAY RELAY	MECH. PANEL
Z 28-1150	LOCK RELAY	MECH. PANEL
	EXTRA BALL RELAY	MECH. PANEL
	PLAYER RELAY	INSERT
	BALL INDEX RELAY	MECH. PANEL
	EJECT RELAY	MECH. PANEL
	TILT RELAY	MECH. PANEL
	1-7 RELAY	PLAYFIELD
	9-15 RELAY	PLAYFIELD
	NO. 8 RELAY	PLAYFIELD
Z 28-1200	ON YELLOW RELAY	PLAYFIELD
	ON GREEN RELAY	PLAYFIELD
S 27-500	RELAY BANK COILS ... (15 req'd.)	PLAYFIELD



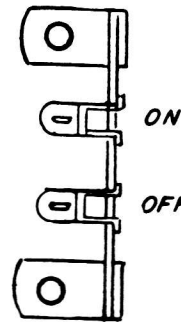
# ADJUSTMENTS ON MECHANISM PANEL

## 10¢ Adjustment



PROVIDES  
1, 2 OR  
3 PLAYS  
FOR ONE  
COIN.

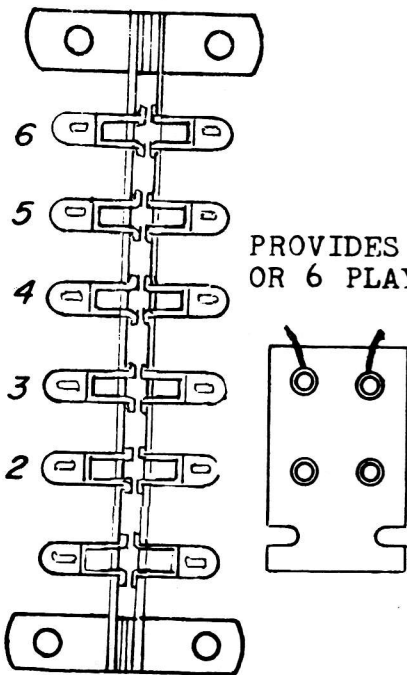
## Motor Service Jack



INSERT PHONE TIP IN  
'OFF' POSITION - CAMS  
CAN BE TURNED BY  
HAND TO CHECK

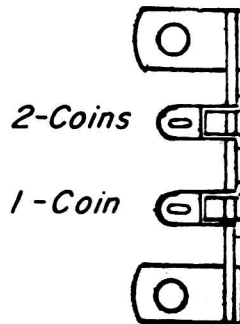
ADJUSTMENT OF  
SWITCHES.

## 25¢ Adjustment



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

## 5¢ Adjustment



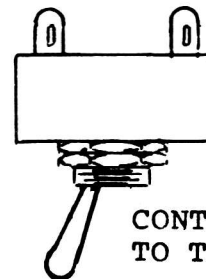
IN "2 COINS FOR 1  
PLAY", CIRCUIT TO  
COIN RELAY PASSES  
THRU  
SWITCH  
ON ALTER-  
NATOR  
UNIT.

### SUGGESTED SCORE CARDS

- 5 BALL PLAY.. 391-9
- 3 BALL PLAY.. 391-4

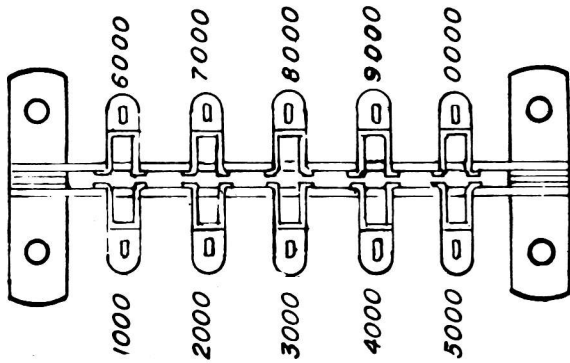
## MASTER ON-OFF SW.

(Located under front of  
Cabinet)

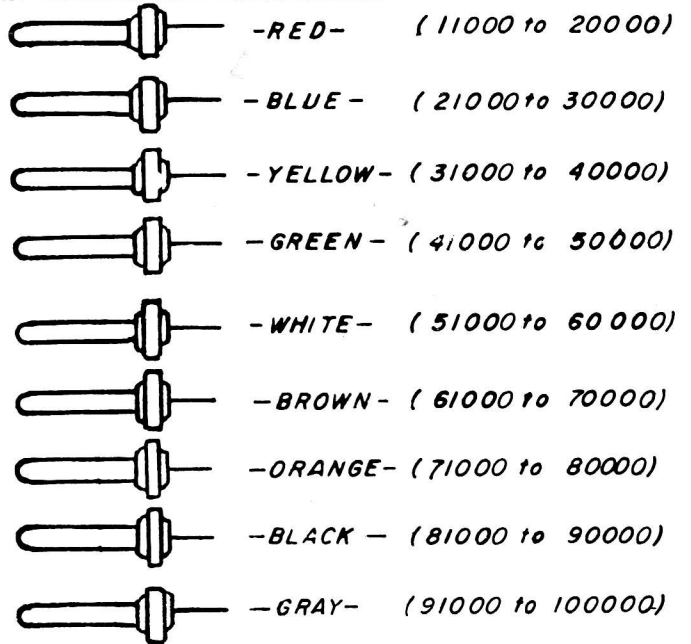


CONTROLS POWER  
TO TRANSFORMER

# ADJUSTMENTS IN BACKBOX



## Hi-Score Adjustment



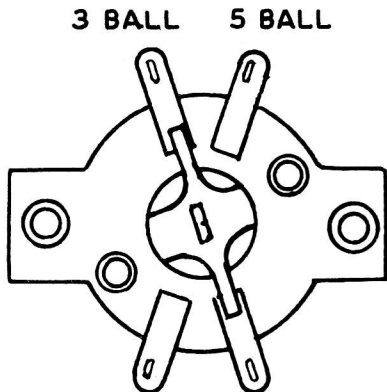
Insert plugs into 10 Point Female at desired positions.

Examples:

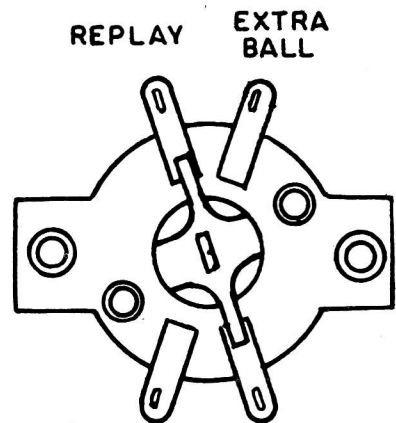
Yellow wire into 3000 position scores at 33000.  
 Yellow wire into 0000 position scores at 40000.

## No. of Balls Adjustment

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

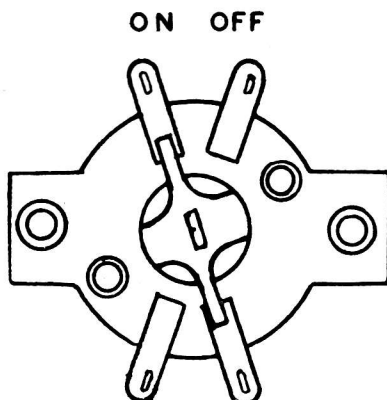


## Extra Ball Jack Adj.



IN REPLAY POSITION, HI-SCORES AWARD REPLAYS.  
 IN EXTRA BALL POSITION, HI-SCORES AWARD EXTRA BALL.

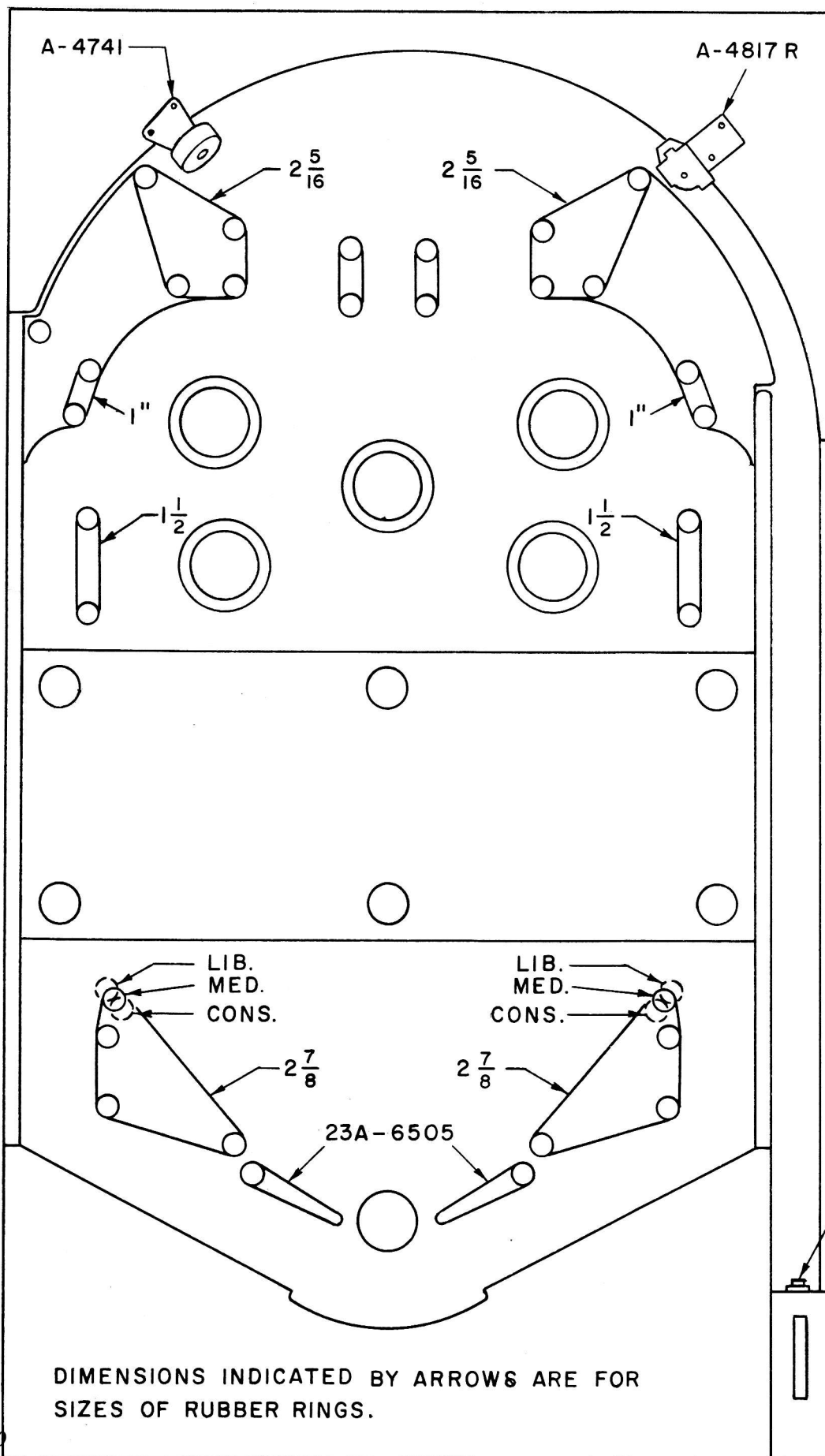
## NUMBER MATCH ADJUSTMENT



IN "ON" POSITION, NUMBER MATCH LITE WILL APPEAR WHEN GAME IS OVER. IF THIS NUMBER MATCHES THE LAST TWO DIGITS OF POINT SCORE, A REPLAY IS AWARDED.  
 IN "OFF" POSITION, NUMBER MATCH IS IN-OPERATIVE.

# SOLIDS "N" STRIPES — 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
- MED. - MEDIUM

**RUBBER RING NUMBERS :**

23A-6300	5/16"	I. D.
23A-6302	1"	I. D.
23A-6304	1 1/2"	I. D.
23A-6306	2 5/16"	I. D.
23A-6307	2 7/8"	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.

## **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.

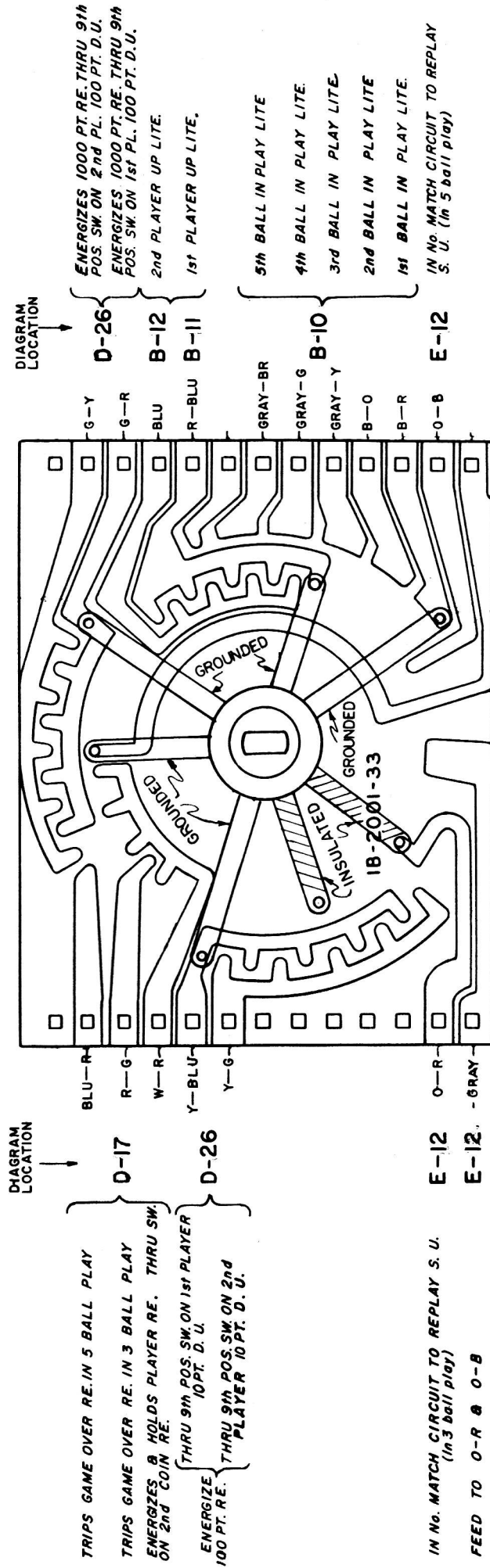
Solenoid Plungers should not have a lubricant of any kind. Should there be a sluggish tendency or if plungers are sticking, the parts should be cleaned with a solvent and flaked graphite applied on reassembly.

## **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

THIS UNIT RESETS AT THE START OF A NEW GAME.  
IT ADVANCES ONE STEP AT A TIME WHEN TWO PERSONS  
ARE PLAYING & TWO STEPS IF ONLY ONE IS PLAYING.



View looking at WIPER FINGERS with  
WIPER in RESET POSITION

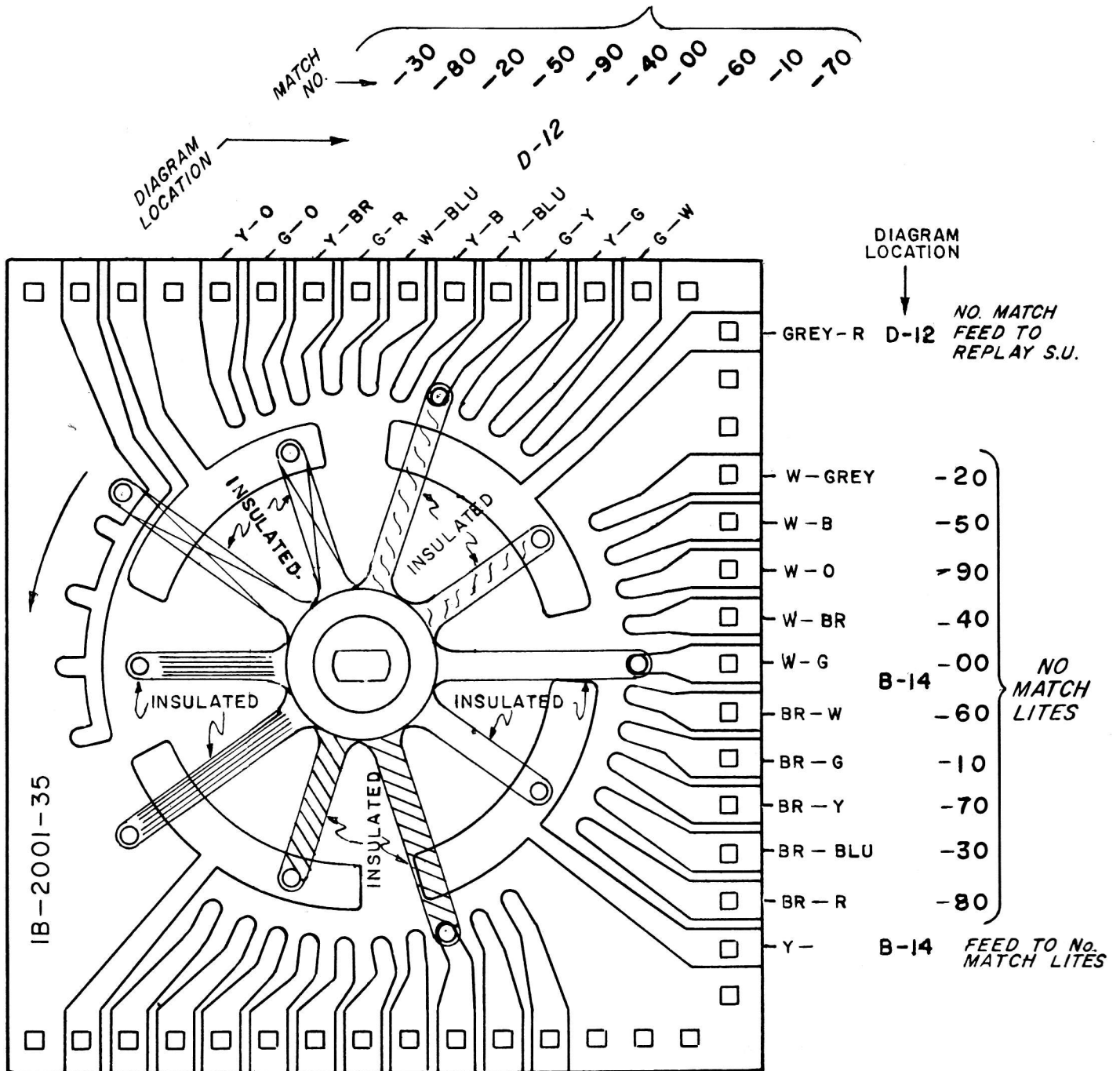


# No. MATCH UNIT

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

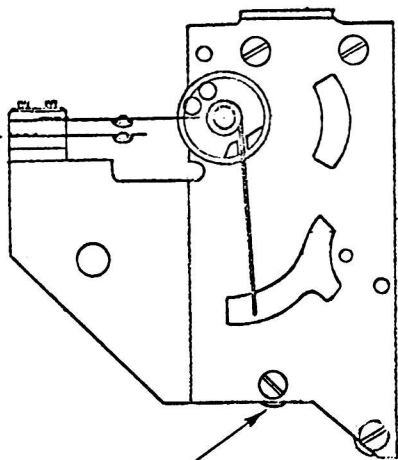
View looking at  
WIPER FINGER side

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



- CONVERTING FROM (10¢-25¢) PLAY TO (2/25¢ - 2/25¢) PLAY
- REPLACE 10¢ COIN CHUTE WITH 25¢ COIN CHUTE.
- REPLACE 10¢ COIN INSERT PLATE WITH (1A-4215) 25¢ COIN INSERT PLATE.
- REPLACE 10¢ IDENTIFICATION PLATE WITH (16C-8640-100) 2 PLAYS-QUARTER.
- REPLACE 10¢ COIN SWITCH WITH 25¢ COIN SWITCH (3M-3)

REMOVE MACHINE SCREW AND SPACER IN "COIN TRIP AND SWITCH ASSEMBLY" B-6853, TO ALLOW QUARTER TO PASS THRU.

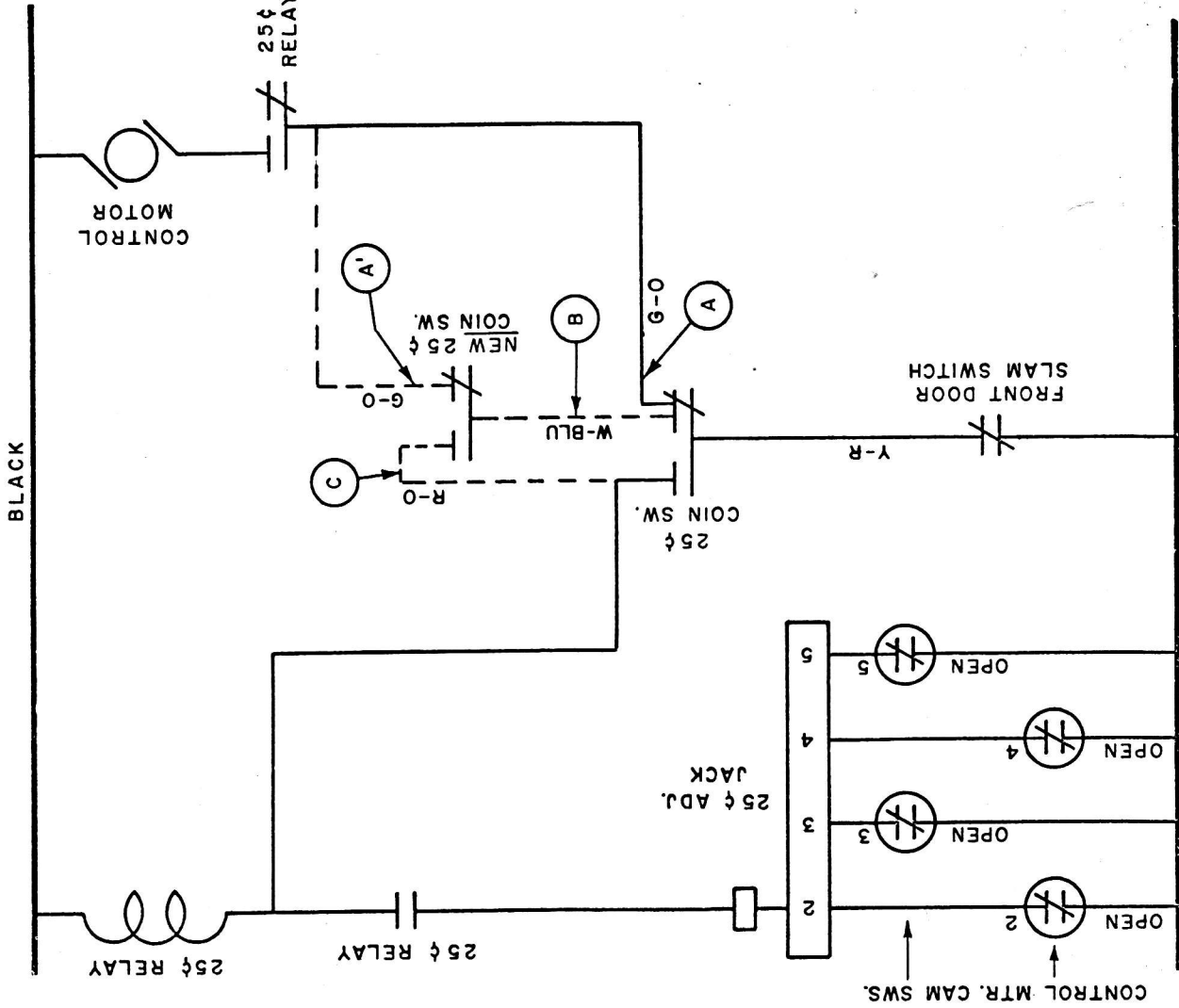


B-6853 COIN TRIP & SWITCH ASS'Y.

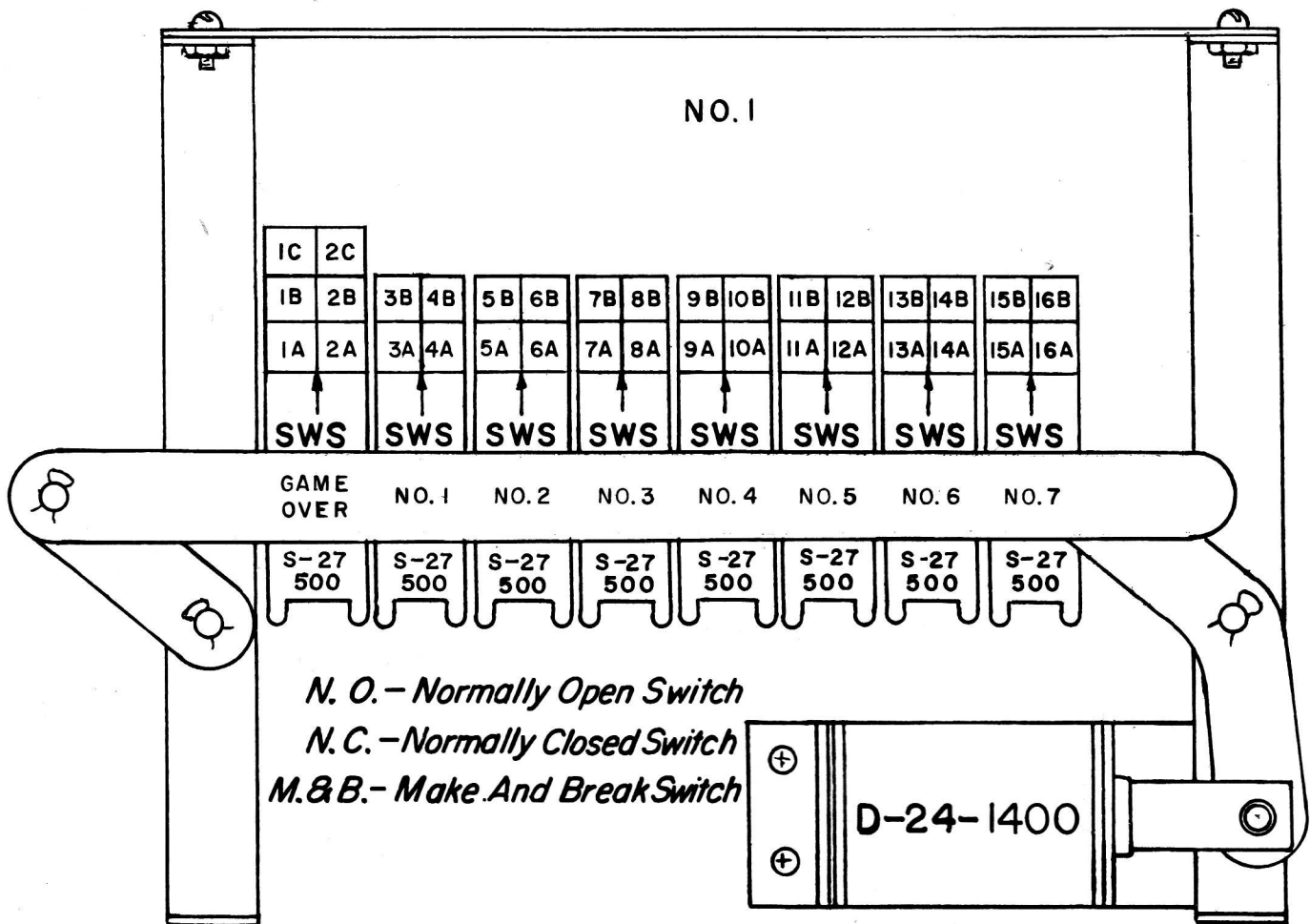
- TO CONVERT FROM (5¢ 5¢ - 10¢ - 25¢) TO (2/25¢ - 2/25¢)
- REPLACE (5¢ 5¢) COIN TRIP AND SWITCH ASSEMBLY WITH B-6853 (10¢) COIN TRIP AND SWITCH ASSEMBLY.
- REPLACE 5¢ COIN CHUTE WITH 25¢ COIN CHUTE.
- REPLACE 5¢ COIN INSERT PLATE WITH (1A-4215) 25¢ COIN INSERT PLATE.
- REPLACE 5¢ IDENTIFICATION PLATE WITH (16C-8640-100) 2 PLAYS - QUARTER.
- MAKE CHANGES ON B-6853 "COIN TRIP AND SWITCH ASSEMBLY" AS SHOWN ABOVE.
- USE PART NO. 16A-8636 (DUMMY COIN ENTRY COVER) ON CENTER CHUTE.

WIRING INSTRUCTIONS

- AT ORIGINAL 25¢ COIN SWITCH, UNSOLDER GREEN-ORANGE WIRE (A) AND TAPE IT. REMOVE TAPE FROM WHITE-BLUE WIRE AND SOLDER IN ITS PLACE.
- AT NEW 25¢ COIN SWITCH, REMOVE TAPE FROM GREEN-ORANGE, WHITE-BLUE AND RED-ORANGE WIRES AND SOLDER AS SHOWN BY DOTTED LINES (A), (B) AND (C).
- INSERT 25¢ ADJUSTMENT JACK INTO "2 PLAYS FOR QUARTER" POSITION.



YELLOW



## RELAY BANK SW'S.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
GAME-OVER RELAY	1C	BR-Y-W -BR- Gray-O	A-10	M&B	OPENS CIRCUIT TO "BALL IN PLAY" LITES AND CLOSES TO "GAME-OVER" AND "NO. MATCH" LITES.
	1B	BLU-W G-R	D-8	N.O.	ENERGIZES RESET RELAY, THRU SWITCH ON COIN RELAY.
	1A	W-BR G-O	F-5	N.O.	IN CIRCUIT TO REPLAY RELAY.
	2B	BLU-Y-W -B-	F-16	N.C.	OPENS CIRCUIT TO ALL PLAYFIELD SWITCHES
	2A	R-BLU R-Y	E-16	N.O.	ENERGIZES POST RELAY.

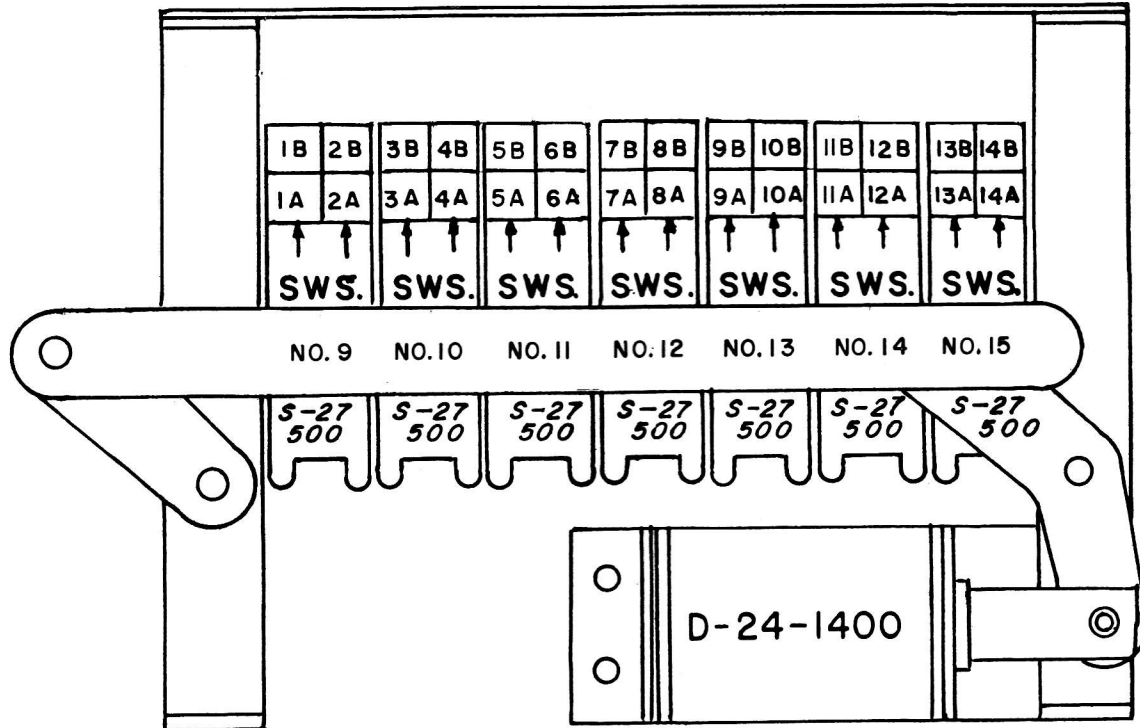
RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 1 RELAY	3B	BLU-R -Y- BLU-B	B-5	M&B	OPENS CIRCUIT TO 1 BALL LITE ON PLAYFIELD AND CLOSES TO 1 BALL LITE ON BACKGLASS.
	3A	BLU-Y -J-	D-18	N.O.	IN SERIES WITH SWITCH 5A ON NO.2 RELAY. (IN CIRCUIT TO NO.8 RELAY COIL)
	4B	-J- Y-BR -J-	D-20	M&B	OPENS IN CIRCUIT TO NO.1 RELAY AND CLOSES TO NO.6 RELAY.
	4A	BR-0 -J-	A-9	N.O.	IN SERIES WITH SWITCH 6A ON NO.2 RELAY.
NO. 2 RELAY	5B	Y-BLU -Y- Y-G	B-5	M&B	OPENS CIRCUIT TO 2 BALL LITE ON PLAYFIELD AND CLOSES TO 2 BALL LITE ON BACKGLASS
	5A	-J- -J-	D-18	N.O.	IN SERIES WITH SWITCH 7A ON NO.3 RELAY.
	6B	GRAY-G -J-	E-21	N.C.	TO NO.2 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	6A	-J- -J-	A-9	N.O.	IN SERIES WITH SWITCH 8A ON NO. 3 RELAY.
NO. 3 RELAY	7B	Y-O -Y- Y-B	B-6	M&B	OPENS CIRCUIT TO 3 BALL LITE ON PLAYFIELD AND CLOSES TO 3 BALL LITE ON BACKGLASS.
	7A	-J- -J-	D-18	N.O.	IN SERIES WITH SWITCH 9A ON NO.4 RELAY.
	8B	-J- -J-	D-21	N.C.	TO NO.3 RELAY COIL, FROM SWITCH 12B ON NO.5 RELAY.
	8A	-J- -J-	A-9	N.O.	IN SERIES WITH SWITCH 10A ON NO.4 RELAY.
NO. 4 RELAY	9B	G-R -Y- G-Y	B-6	M&B	OPENS CIRCUIT TO 4 BALL LITE ON PLAYFIELD AND CLOSES TO 4 BALL LITE ON BACKGLASS
	9A	-J- -J-	E-18	N.O.	IN SERIES WITH SWITCH 11A ON NO.5 RELAY.
	10B	GRAY-BR -J-	E-22	N.C.	TO NO.4 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	10A	-J- -J-	B-9	N.O.	IN SERIES WITH SWITCH 12A ON NO.5 RELAY.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 5 RELAY	11B	BR-Y -Y- O-BLU	B-6	M&B	OPENS CIRCUIT TO 5 BALL LITE ON PLAYFIELD AND CLOSES TO 5 BALL LITE ON BACKGLASS
	11A	-J- -J-	E-18	N.O.	IN SERIES WITH SWITCH 13A ON NO.6 RELAY.
	12B	-J- GRAY-R -J-	D-20	M&B	IN CIRCUIT TO NO.5 OR NO.3 RELAY, FROM SWITCH ON 9-15 RELAY.
	12A	-J- -J-	B-9	N.O.	IN SERIES WITH SWITCH 14A ON NO.6 RELAY.
NO. 6 RELAY	13B	B-BLU -Y- B-Y	B-7	M&B	OPENS CIRCUIT TO 6 BALL LITE ON PLAYFIELD AND CLOSES TO 6 BALL LITE ON BACKGLASS
	13A	-J- -J-	E-18	N.O.	IN SERIES WITH SWITCH 15A ON NO.7 RELAY.
	14B	-J- -J-	D-19	N.C.	TO NO. 6 RELAY COIL, FROM SWITCH 4B ON NO. 1 RELAY.
	14A	-J- -J-	B-9	N.O.	IN SERIES WITH SWITCH 16A ON NO.7 RELAY.
NO. 7 RELAY	15B	B-G -Y- B-W	B-7	M&B	OPENS CIRCUIT TO 7 BALL LITE ON PLAYFIELD AND CLOSES TO 7 BALL LITE ON BACKGLASS
	15A	-J- BR-G	E-18	N.O.	IN SERIES CIRCUIT TO ENERGIZE NO.8 RELAY, THRU SWITCHES ON NO.1 THRU NO.6 RELAYS.
	16B	GRAY-B -J-	E-22	N.C.	TO NO.7 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	16A	-J- -O-	B-9	N.O.	IN CIRCUIT TO 8 BALL LITES, THRU SWITCHES ON NO.1 THRU NO.6 RELAYS.



# RELAY BANK SWS.

NO. 2



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. 9 RELAY	1B	-O- -Y- O-G	B-7	M&B	OPENS CIRCUIT TO 9 BALL LITE ON PLAYFIELD AND CLOSES TO 9 BALL LITE ON BACKGLASS
	1A	BLU-BR -J-	D-18	N.O.	IN SERIES WITH SWITCH 3A ON NO. 10 RELAY. (IN CIRCUIT TO NO. 8 RELAY COIL).
	2B	GRAY-O -J-	E-22	N.C.	TO NO. 9 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	2A	BR-B -J-	A-10	N.O.	IN SERIES WITH SWITCH 4A ON NO. 10 RELAY. (IN CIRCUIT TO 8 BALL LITES).

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO.10 RELAY	3B	O-W -Y- R-Y	B-8	M&B	OPENS IN CIRCUIT TO 10 BALL LITE ON PLAYFIELD AND CLOSES TO 10 BALL LITE ON BACKGLASS.
	3A	-J- -J-	D-18	N.O.	IN SERIES WITH SWITCH 5A ON NO.11 RELAY.
	4B	-J- -J-	D-20	N.C.	TO NO. 10 RELAY COIL, FROM SWITCH 8B ON NO. 12 RELAY.
	4A	-J- -J-	A-10	N.C.	IN SERIES WITH SWITCH 6A ON NO.11 RELAY.
NO.11 RELAY	5B	R-BR -Y- BLU-Y	B-8	M&B	OPENS IN CIRCUIT TO 11 BALL LITE ON PLAYFIELD AND CLOSES TO 11 BALL LITE ON BLACKGLASS
	5A	-J- -J-	D-18	N.O.	IN SERIES WITH SWITCH 7A ON NO. 12 RELAY.
	6B	-J- GRAY-BLU -J-	D-21	M&B	IN CIRCUIT TO NO.11 OR NO.13 RELAY, FROM SWITCH ON 9-15 RELAY.
	6A	-J- -J-	A-10	N.O.	IN SERIES WITH SWITCH 8A ON NO. 12 RELAY.
NO.12 RELAY	7B	BLU-BR -Y- G-O	B-8	M&B	OPENS IN CIRCUIT TO 12 BALL LITE ON PLAYFIELD AND CLOSES TO 12 BALL LITE ON BACKGLASS
	7A	-J- -J-	D-18	N.O.	IN SERIES WITH SWITCH 9A ON NO.13 RELAY.
	8B	-J- G-W -J-	D-20	M&B	IN CIRCUIT TO NO.12 OR NO. 10 RELAY, FROM SWITCH ON 9-15 RELAY.
	8A	-J- -J-	A-10	N.O.	IN SERIES WITH SWITCH 10A ON NO. 13 RELAY.
NO.13 RELAY	9B	W-BLU -Y- W-G	B-9	M&B	OPENS IN CIRCUIT TO 13 BALL LITE ON PLAYFIELD AND CLOSES TO 13 BALL LITE ON BACKGLASS
	9A	-J- -J-	E-18	N.O.	IN SERIES WITH SWITCH 11A ON NO. 14 RELAY.
	10B	-J- -J-	D-21	N.C.	TO NO. 13 RELAY COIL, FROM SWITCH 6B ON NO. 11 RELAY.
	10A	-J- -J-	B-10	N.O.	IN SERIES WITH SWITCH 12A ON NO. 14 RELAY.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 14 RELAY	11B	W-O -Y- W-GRAY	B-9	M&B	OPENS IN CIRCUIT TO 14 BALL LITE ON PLAYFIELD AND CLOSES TO 14 BALL LITE ON BACKGLASS
	11A	-J- -J-	E-18	N.O.	IN SERIES WITH SWITCH 13A ON NO. 15 RELAY.
	12B	-G- -J-	E-22	N.C.	TO NO. 14 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	12A	-J- -J-	B-10	N.O.	IN SERIES WITH SWITCH 14A ON NO. 15 RELAY.
NO. 15 RELAY	13B	BR-R -Y- BR-BLU	B-9	M&B	OPENS IN CIRCUIT TO 15 BALL LITE ON PLAYFIELD AND CLOSES TO 15 BALL LITE ON BACKGLASS
	13A	-J- BR-G	E-18	N.O.	IN SERIES CIRCUIT TO ENERGIZE NO. 8 RELAY, THRU SWITCHES ON NO. 9 THRU NO. 14 RELAYS.
	14B	GRAY-W -J-	E-21	N.C.	TO NO. 15 RELAY COIL, FROM SWITCH ON 1-7 RELAY.
	14A	-J- -O-	B-10	N.O.	IN CIRCUIT TO 8 BALL LITES, THRU SWITCHES ON NO. 9 THRU NO. 14 RELAYS.

Replay unit

N.O.

Closes to Credit light on PF

(Credit wheel)  
at zero position

N.O.

Closes to \*enable start button

N.C.

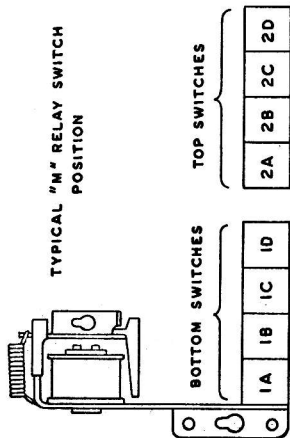
Closed till max credit reached

Ball count unit  
at zero position

N.O.

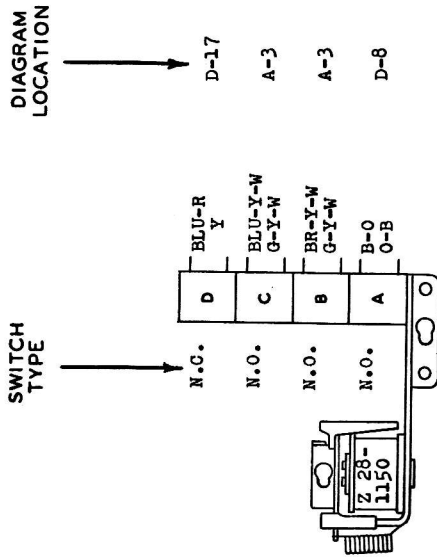
N.O.

# A.C. RELAYS & SWITCHES LOCATED ON MECHANISM PANEL



## LOCK RELAY

IS ENERGIZED BY 5¢ RELAY, 10¢ RELAY, 25¢ RELAY, COIN RELAY OR LEFT FLIPPER SWITCH.



ENERGIZES GAME-OVER RELAY.

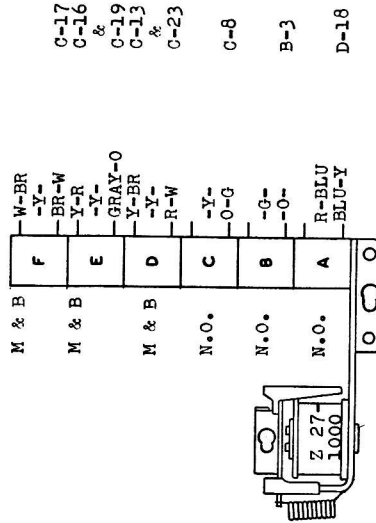
6 VOLTS FROM TRANSFORMER TO LITES.

6 VOLTS FROM TRANSFORMER TO LITES.

HOLD CIRCUIT TO THIS RELAY, THRU KICKOFF SWITCH.

## OUTHOLE RELAY

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



OPENS IN HOLD CIRCUIT TO TILT RELAY AND CLOSSES TO PULSE "BALL RELEASE" COIL.

OPENS IN CIRCUIT TO BALL INDEX RELAY AND CLOSSES TO PULSE "DOWN POST" COIL.

OPENS IN HOLD CIRCUIT TO "ON YELLOW" RELAY AND CLOSSES IN CIRCUIT TO BALL COUNT UNIT S.U. COIL.

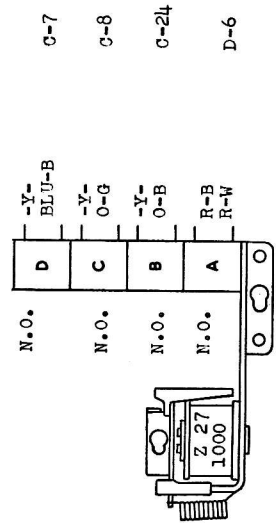
RUNS SCORE MOTOR.

IN CIRCUIT TO PULSE BOTH RELAY BANK RESET COILS.

IN HOLD CIRCUIT TO THIS RELAY.

## EJECT RELAY

IS ENERGIZED BY ANY OF (6) EJECT POCKET SWITCHES WHEN SCORE MOTOR IS AT INDEX POSITION.



IN CIRCUIT TO LEFT, RIGHT AND CENTER EJECT COILS.

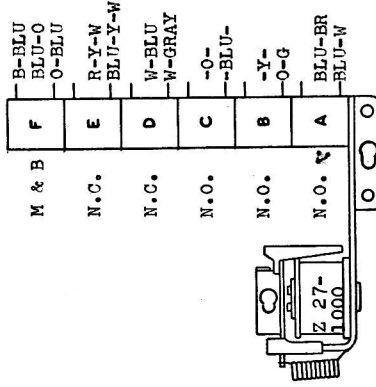
RUNS SCORE MOTOR.

IN SERIES WITH SWITCH F ON NO. 8 RELAY.

HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON CAM 6 OF SCORE MOTOR.

### RESET RELAY

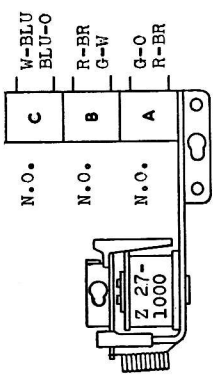
IS ENERGIZED BY COIN RELAY, THRU SWITCH ON GAME-OVER RELAY.



E-9 OPENS CIRCUIT TO 2ND COIN RELAY (TRIP COIL) AND CLOSSES TO LATCH COIL.  
 F-17 OPENS CIRCUITS TO PLAYFIELD SWITCHES.  
 C-6 OPENS CIRCUIT TO REPLAY RELAY DURING RESET CYCLE.  
 D-3 CONNECTS NO. 1 AND NO. 2 RELAY BANK RESET COILS.  
 C-8 RUNS SCORE MOTOR.  
 D-8 IN HOLD CIRCUIT TO THIS RELAY.

### REPLAY RELAY

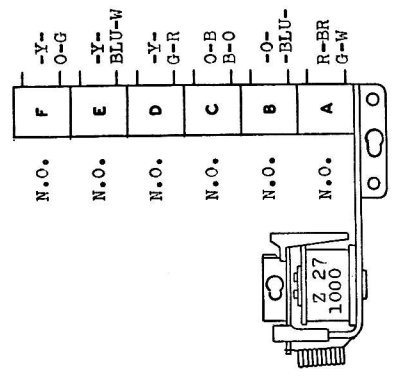
IS ENERGIZED BY REPLAY BUTTON THRU ZERO SWITCH ON REPLAY UNIT.



E-9 TO REPLAY UNIT RESET COIL.  
 D-5 ENERGIZES COIN RELAY.  
 E-6 IN HOLD CIRCUIT TO THIS RELAY.

### COIN RELAY

IS ENERGIZED BY COIN SWITCH, REPLAY RELAY OR 5¢ RELAY --- ALSO BY 25¢ RELAY IF GAME IS ADJUSTED FOR "6 PLAYS FOR 25¢".

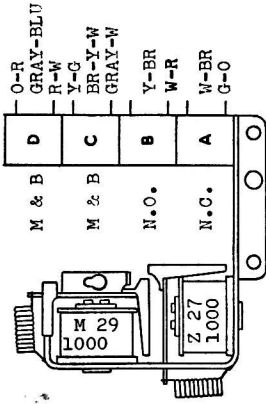


C-8 RUNS SCORE MOTOR.  
 C-17 TRIPS GAME-OVER RELAY, THRU BALL COUNT ZERO BREAK SWITCH.  
 C-9 ENERGIZES RESET RELAY, THRU SWITCH ON GAME-OVER RELAY.  
 D-7 ENERGIZES LOCK RELAY.  
 C-2 IN CIRCUIT TO NO. 1 AND NO. 2 RELAY BANK RESET COILS.  
 E-5 IN HOLD CIRCUIT TO THIS RELAY.



## 2 ND COIN RELAY INTERLOCK

LATCH AND TRIP COILS ARE ENERGIZED BY SWITCH D ON COIN RELAY, THRU SWITCH F ON RESET RELAY.

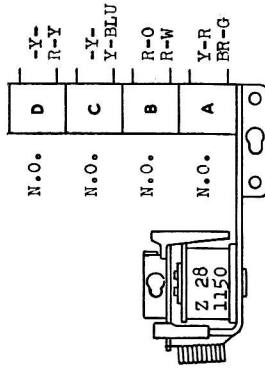


C-12  
A-12  
E-17  
E-6

IN CIRCUIT TO BALL COUNT S.U. COIL---ALSO IN NO. MATCH CIRCUIT.  
OPENS TO "1 CAN PLAY" LITE AND CLOSES TO "2 CAN PLAY" LITE.  
ENERGIZES "PLAYER RELAY" AND "1-7 RELAY", THRU BALL COUNT UNIT DISC.  
IN CIRCUIT TO REPLAY RELAY.

## BALL INDEX RELAY

IS ENERGIZED BY 100 POINT RELAY, 1000 POINT RELAY OR TILT RELAY.

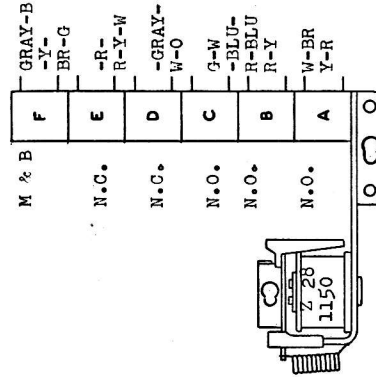


D-18  
C-19  
C-13  
E-19

IN HOLD CIRCUIT TO NO. 8 RELAY.  
IN HOLD CIRCUIT TO EXTRA BALL RELAY.  
IN SERIES WITH SWITCH D ON EXTRA BALL RELAY.  
HOLD CIRCUIT TO THIS RELAY, THRU SWITCH E ON OUTHOLE RELAY.

## TILT RELAY

IS ENERGIZED BY BALL ROLL TILT SWITCH, VIBRATION TILT SWITCH ON PLAYFIELD, AND PLUMB BOB TILT.

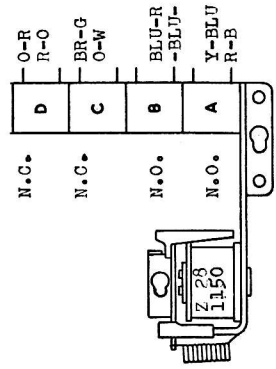


D-18 & C-18  
F-19  
E-11  
A-16  
E-16  
C-17

OPENS IN CIRCUIT TO NO. 8 RELAY AND CLOSES TO BALL INDEX RELAY.  
OPENS CIRCUIT TO ALL PLAYFIELD SWITCHES.  
IN HI-SCORE CIRCUIT TO REPLAY S.U. COIL.  
TO TILT LITE.  
ENERGIZES POST RELAY.  
IN HOLD CIRCUIT TO THIS RELAY.

## EXTRA BALL RELAY

IS ENERGIZED BY NO. 8 RELAY --- ALSO BY HI-SCORE CIRCUIT, THRU "EXTRA BALL-REPLAY" ADJUSTMENT JACK.

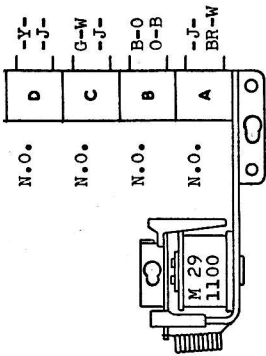


C-13  
E-19  
A-16  
E-19

IN CIRCUIT TO BALL COUNT S.U.---ALSO IN NO. MATCH CIRCUIT TO REPLAY S.U.  
IN CIRCUIT TO BALL INDEX RELAY.  
TO "SHOOT AGAIN" LITES.  
IN HOLD CIRCUIT TO THIS RELAY.

### 5¢ RELAY

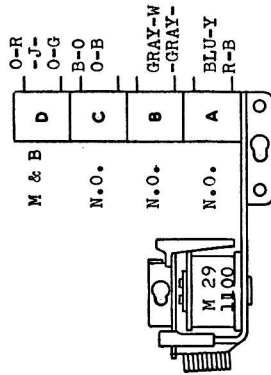
IS ENERGIZED BY 5¢ COIN SWITCH.



- C-13 ENERGIZES ALTERNATOR UNIT COIL.
- D-5 ENERGIZES COIN RELAY, THRU SWITCH ON ALTERNATOR UNIT.
- D-8 ENERGIZES LOCK RELAY.
- D-5 IN HOLD CIRCUIT TO THIS RELAY.

### 10¢ RELAY

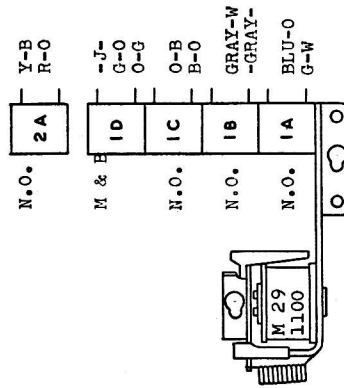
IS ENERGIZED BY 10¢ COIN SWITCH, IF 10¢ ADJUSTMENT JACK IS IN "2 PLAYS" OR "3 PLAYS" POSITION.



- E-8 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.
- D-7 ENERGIZES LOCK RELAY.
- D-11 PULSES REPLAY S.U. COIL, THRU IMPULSE CAM SWITCH C.
- E-4 IN HOLD CIRCUIT.

### 25¢ RELAY

IS ENERGIZED BY 25¢ COIN SWITCH

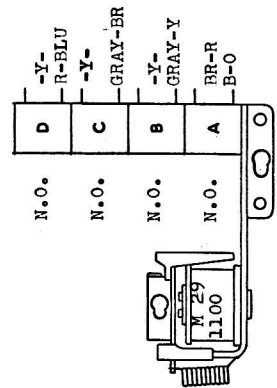


- E-4 IN HOLD CIRCUIT TO THIS RELAY.
- D-8 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.
- D-7 ENERGIZES LOCK RELAY.
- D-11 PULSES REPLAY S.U. COIL, THRU IMPULSE CAM SWITCH C.
- E-5 IN HOLD CIRCUIT TO THIS RELAY.

### LOCATED ON PLAYFIELD

### NO. 3 BUMPER RELAY

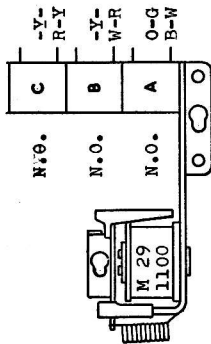
IS ENERGIZED BY RIGHT TOP OR LEFT BOTTOM JET BUMPER SWITCH.



- C-14 ENERGIZES RIGHT TOP JET BUMPER COIL.
- C-14 ENERGIZES LEFT BOTTOM JET BUMPER COIL.
- C-24 IN SERIES WITH SWITCH C ON "ON GREEN" RELAY.
- E-28 IN HOLD CIRCUIT TO THIS RELAY.

## NO. 2 BUMPER RELAY

IS ENERGIZED BY CENTER JET BUMPER SWITCH.



C-14  
C-24  
E-28

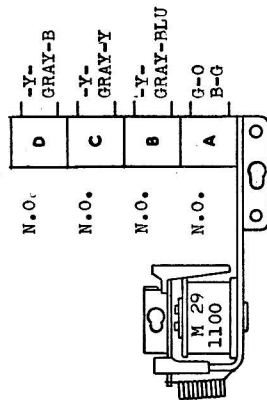
ENERGIZES CENTER JET BUMPER.

PULSES 100 POINT RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

## NO. 1 BUMPER RELAY

IS ENERGIZED BY LEFT TOP OR RIGHT BOTTOM JET BUMPER SWITCH.



C-14  
C-13  
C-24  
E-28

ENERGIZES RIGHT BOTTOM JET BUMPER COIL.

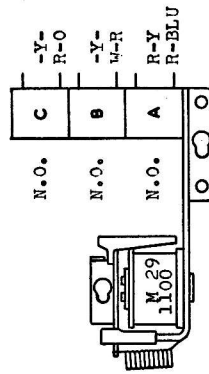
ENERGIZES LEFT TOP JET BUMPER COIL.

IN SERIES WITH SWITCH C ON "ON YELLOW" RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

## POST RELAY

IS ENERGIZED BY ROLLOVER BUTTON (DOWN POST), TILT RELAY, OR GAME-OVER RELAY.



C-16  
C-24  
E-16

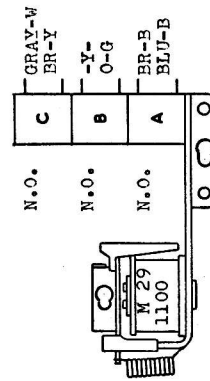
ENERGIZES DOWN POST COIL.

PULSES 100 POINT RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

## 3000 RELAY

IS ENERGIZED BY TOP CENTER ROLLOVER AND BY LEFT OR RIGHT BOTTOM ROLLOVER.



E-25  
C-8  
E-27

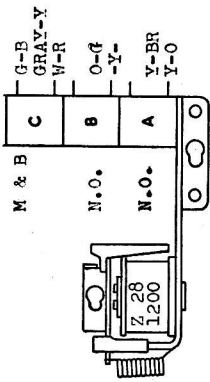
PULSES 1000 POINT RELAY, THRU IMPULSE CAM SWITCH C.

RUNS SCORE MOTOR.

IN HOLD CIRCUIT TO THIS RELAY.

## ON GREEN RELAY

IS ENERGIZED BY TOP RIGHT TARGET SWITCH.

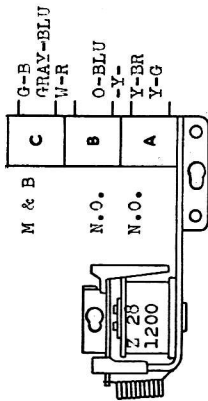


OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSES TO 100 POINT RELAY.  
 TO LEFT BOTTOM AND RIGHT TOP JET BUMPER LITES.  
 IN HOLD CIRCUIT TO THIS RELAY.

E-24  
 B-15  
 D-23

## ON YELLOW RELAY

IS ENERGIZED BY TOP LEFT TARGET SWITCH.

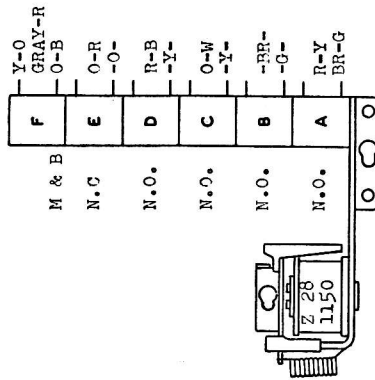


OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSES TO 100 POINT RELAY.  
 TO RIGHT BOTTOM AND LEFT TOP JET BUMPER LITES.  
 IN HOLD CIRCUIT TO THIS RELAY.

E-24  
 B-14  
 E-23

## NO. 8 RELAY

IS ENERGIZED BY #6 EJECT SWITCH (8 BALL POCKET), THRU SWITCHES ON NO. 1 THRU NO. 7 RELAYS OR NO. 9 THRU NO. 15 RELAYS.

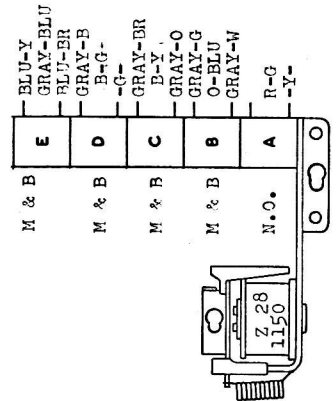


OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSES IN CIRCUIT TO 1000 POINT RELAY.  
 TO PLAYFIELD AND INSERT " 8 BALL" LITES.  
 ENERGIZES EXTRA BALL RELAY.  
 TO " 2000" EJECT LITES.  
 IN SERIES WITH SWITCH A ON " 9-15" RELAY.  
 HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON BALL INDEX RELAY.

D-24  
 B-9  
 E-19  
 B-15  
 C-3  
 F-18

## I - 7 RELAY

IS ENERGIZED BY BALL COUNT UNIT DISC, THRU SWITCH ON 2ND COIN RELAY.

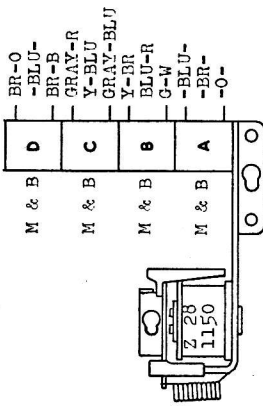


IN CIRCUIT TO ENERGIZE NO. 8 RELAY, THRU SWITCHES ON NO. 1 THRU NO. 7, OR NO. 9 THRU NO. 15 RELAYS.  
 OPENS IN CIRCUIT TO NO. 7 RELAY AND CLOSES TO NO. 14 RELAY.  
 OPENS IN CIRCUIT TO NO. 4 RELAY AND CLOSES TO NO. 9 RELAY.  
 OPENS IN CIRCUIT TO NO. 2 RELAY AND CLOSES TO NO. 15 RELAY.  
 ENERGIZES " 9-15" RELAY.

D-18  
 D-22  
 D-22  
 D-21  
 C-6

## 9-15 RELAY

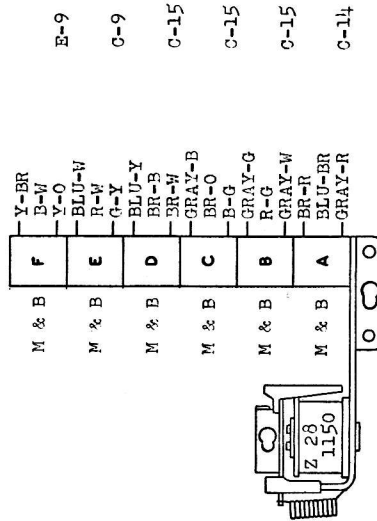
IS ENERGIZED BY SWITCH A ON 1-7 RELAY.



LOCATED IN BACKBOX

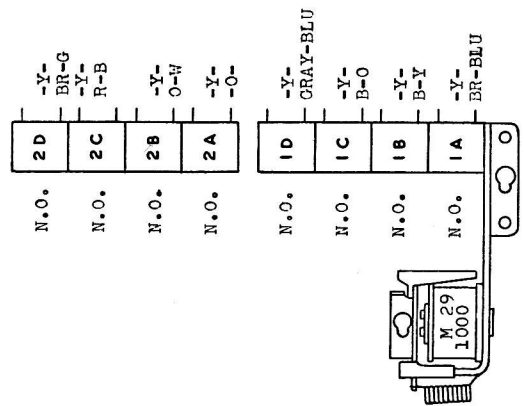
## PLAYER RELAY

IS ENERGIZED BY SAME CIRCUIT AS 1-7 RELAY. (THESE COILS ARE WIRED IN PARALLEL.)



## SCORE RESET RELAY

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



OPENS IN CIRCUIT TO NO. 1 THRU NO. 7 LITES AND CLOSES TO NO. 9 THRU NO. 15 LITES.  
 OPENS IN CIRCUIT TO NO. 5 AND NO. 3 RELAYS AND CLOSES IN CIRCUIT TO NO. 11 AND NO. 13 RELAYS.  
 OPENS IN CIRCUIT TO NO. 6 AND NO. 1 RELAYS AND CLOSES TO NO. 12 AND NO. 10 RELAYS.  
 TO NO. 1 OR NO. 2 RELAY BANK RESET COIL.

A-5  
 C-20  
 C-20  
 D-3

IN HI-SCORE CIRCUIT TO REPLAY S.U. OR EXTRA BALL RELAY.  
 IN A SERIES CIRCUIT WITH SWITCH F ON THIS RELAY.  
 TO 10,000 POINT DRUM UNIT COILS, THRU 9TH POSITION SWITCHES ON 1000 POINT DRUM UNITS.  
 TO 1000 POINT DRUM UNIT COILS.  
 TO 100 POINT DRUM UNIT COILS.  
 TO 10 POINT DRUM UNIT COILS.

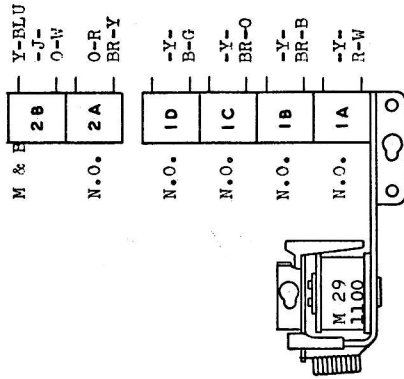
E-9  
 C-9  
 C-15  
 C-15  
 C-15  
 C-14

PULSES 2ND PLAYER 10,000 DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 2ND PLAYER 100 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 1ST PLAYER 100 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 1ST PLAYER 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 2ND PLAYER 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 2ND PLAYER 1000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 1ST PLAYER 1000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.  
 PULSES 1ST PLAYER 10,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT

D-16  
 D-15  
 D-15  
 D-14  
 D-14  
 D-15  
 D-15  
 D-15

### 1000 POINT RELAY

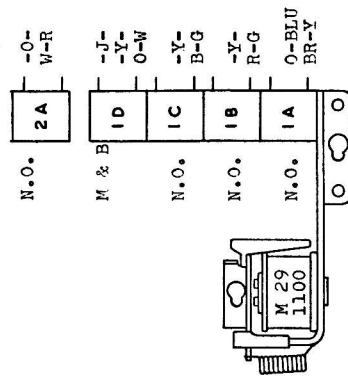
IS PULSED BY:  
 LEFT AND RIGHT TARGET SWITCH  
 LEFT AND RIGHT BOTTOM ROLLOVER SWITCH  
 TOP ROLLOVER BUTTON SWITCH  
 3000 RELAY  
 EJECT RELAY, THRU SWITCH ON NO.8 RELAY.



D-19 OPENS IN CIRCUIT TO EXTRA BALL RELAY AND CLOSES TO BALL INDEX RELAY.  
 E-27 IN HOLD CIRCUIT TO THIS RELAY.  
 C-29 TO CHIME COIL.  
 C-15 IN SERIES WITH SWITCH C ON PLAYER RELAY.  
 C-15 IN SERIES WITH SWITCH D ON PLAYER RELAY.  
 C-9 IN SERIES WITH SWITCH E ON PLAYER RELAY.

### 100 POINT RELAY

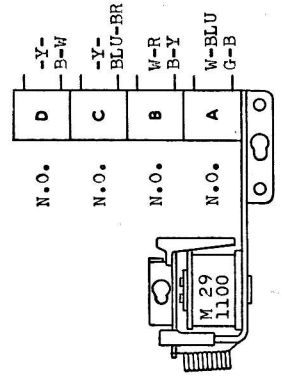
IS PULSED BY:  
 NO. 1, 2 AND 3 BUMPER RELAYS  
 POST RELAY  
 LEFT AND RIGHT TOP ROLLOVER SWITCH  
 EJECT RELAY, THRU SWITCH NO.8 RELAY.



F-27 IN HOLD CIRCUIT TO THIS RELAY.  
 C-19 IN SERIES WITH SWITCH 2B ON 1000 POINT RELAY.  
 C-29 TO CHIME COIL.  
 C-15 IN SERIES WITH SWITCH B ON PLAYER RELAY.  
 F-27 PULSES 1000 POINT RELAY, THRU 9TH POSITION SWITCH ON 100 POINT DRUM UNIT.

### 10 POINT RELAY

IS PULSED BY KICKER SWITCHES AND NO. 1 AND 3 BUMPER RELAYS.



G-28 ENERGIZES NO. MATCH UNIT S.U. COIL.  
 C-14 IN SERIES WITH SWITCH A ON PLAYER RELAY.  
 F-26 IN CIRCUIT TO 100 POINT RELAY, THRU 9TH POSITION SWITCHES ON 10 POINT DRUM UNITS.  
 E-27 IN HOLD CIRCUIT TO THIS RELAY.



**NOTES**