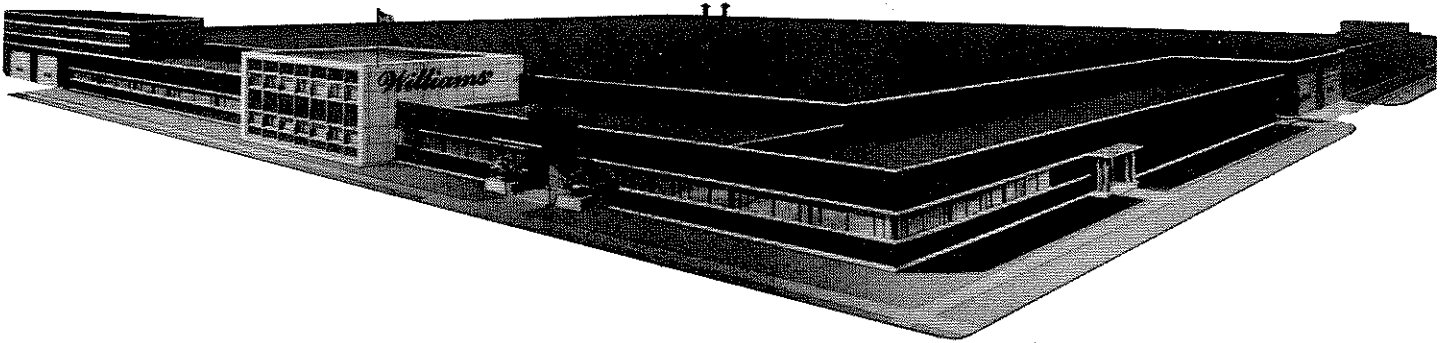


Instruction Manual

for

DIPSY DOODLE



Williams[®] 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.

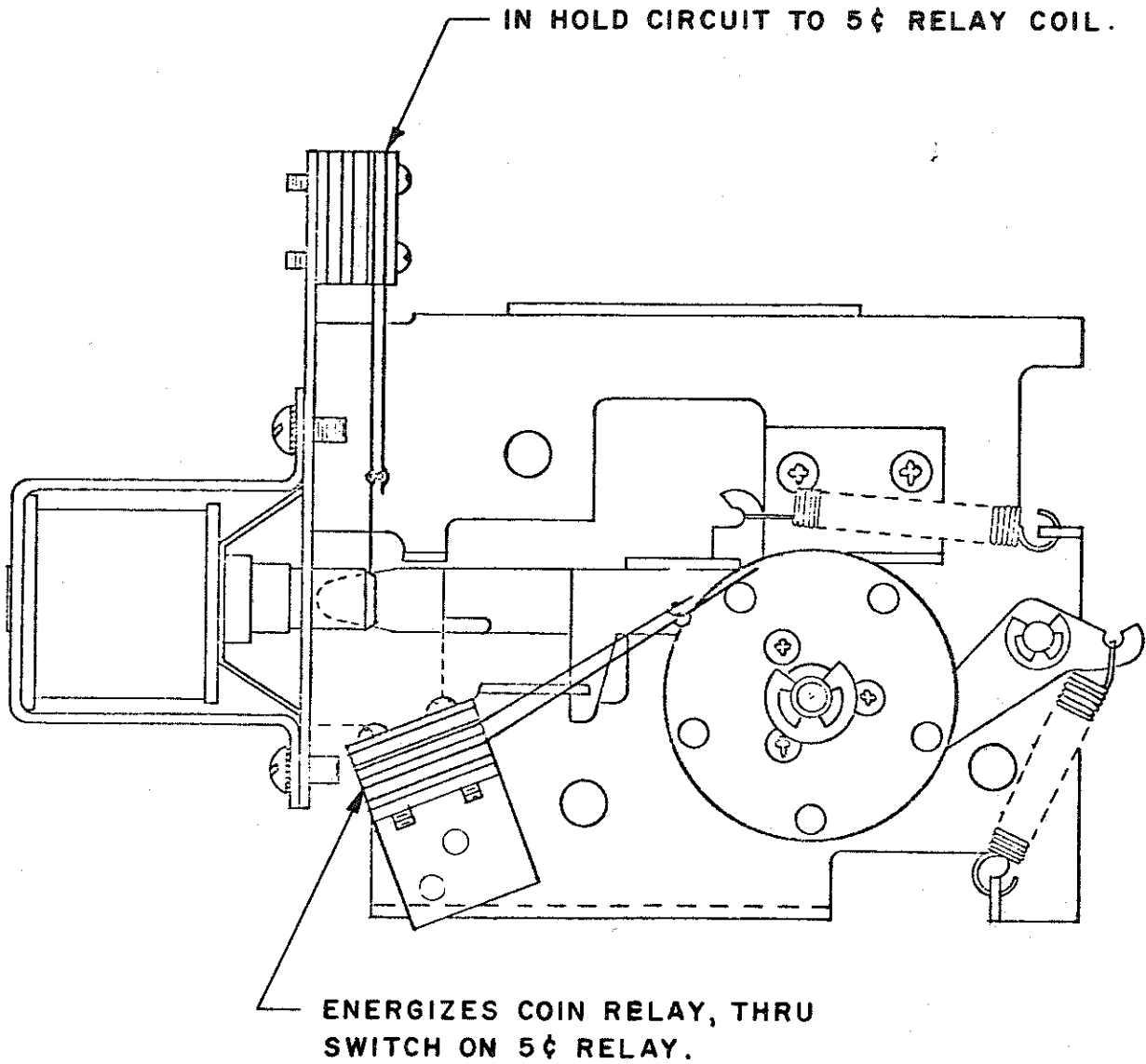
SERVICEMAN TO REMOVE BACKGLASS:

- **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

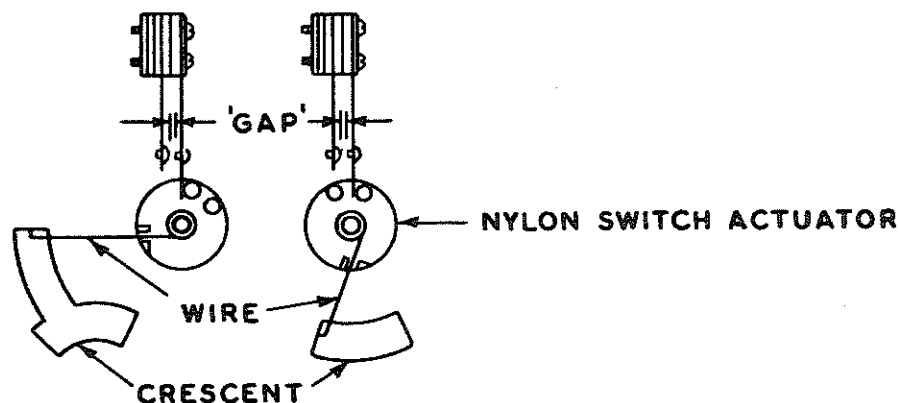
LOCATED ON MECHANISM PANEL.

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.

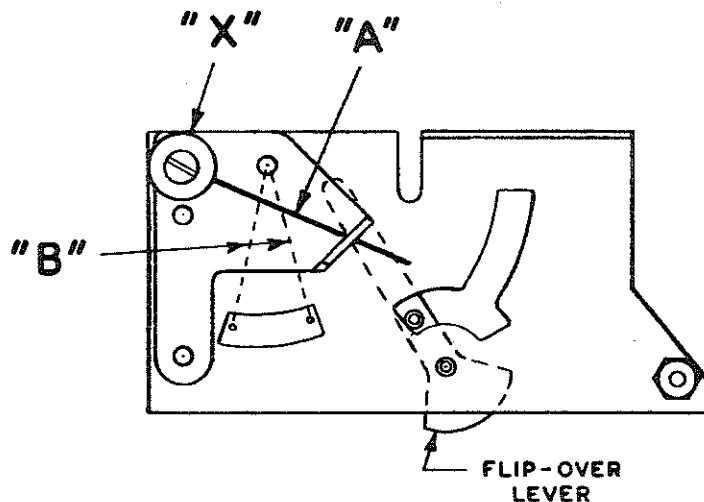
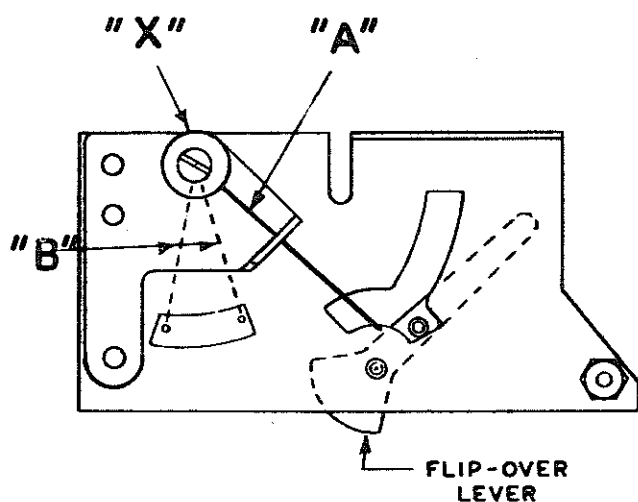
FOR 1 COIN-FOR 1 PLAY

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	
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
ADVANCE	C-6417	C-6520	A-6402-4	14A-7806 (50 CYCLE) SCORE MOTOR
10 POINT	B-7253	A-6294	3C-7272	
100 POINT	-----	-----	3C-7272	
1000 POINT	B-7253	A-6294	3C-7272	
10000 POINT	B-7253	A-6294	3C-7272	

"DIPSY DOODLE" COIL CHART

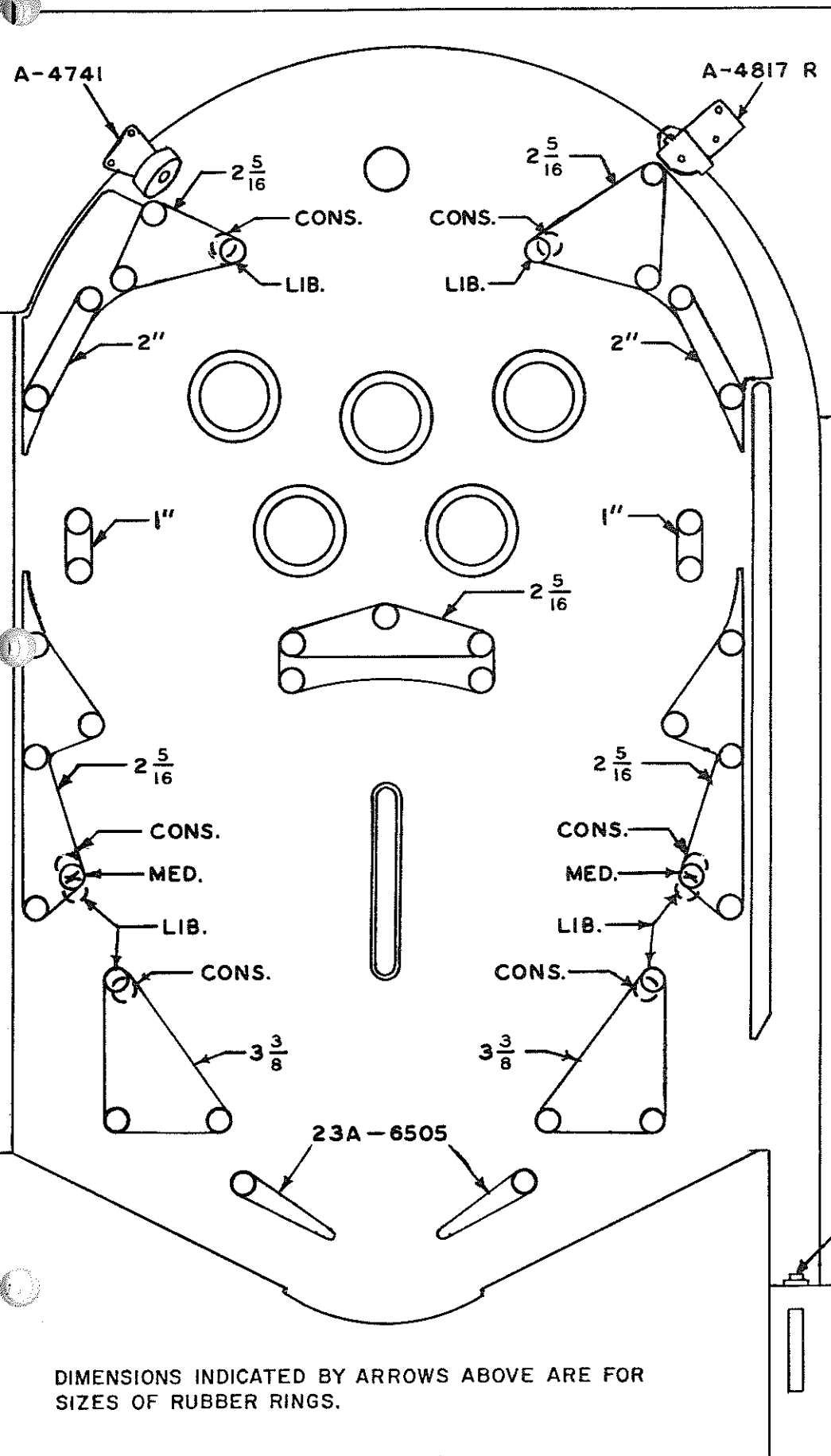
NOTICE:

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
20 A 8702	DOODLE BUG COIL	PLAYFIELD
B 6396	PLAY METER (COIL XM 27-675)	MECH. PANEL
<u>SOLENOID COILS</u>		
A 22-550	MATCH UNIT STEP UP	INSERT
	BALL RELEASE COIL	PLAYFIELD
	ADVANCE 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
	ADVANCE RESET	PLAYFIELD
	BALL COUNT UNIT RESET	MECH. PANEL
	COIN UNIT RESET	MECH. PANEL
	ALTERNATOR UNIT	MECH. PANEL
FL 21-375/28-400	FLIPPER COILS ..(2 req'd.)	PLAYFIELD
G 22-550	JET BUMPER COILS .. (5 req'd.)	PLAYFIELD
G 23-750	KICKER COILS .. (2 req'd.)	PLAYFIELD
	DISAPPEARING POST (LATCH COIL)	PLAYFIELD
	EJECT COIL	PLAYFIELD
<u>RELAY COILS</u>		
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
	GAME OVER RELAY	MECH. PANEL
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
	PULSE RELAY	PLAYFIELD
	STOP RELAY	PLAYFIELD
	POST RELAY	PLAYFIELD
	ADVANCE RELAY	PLAYFIELD
	NO. 1 BUMPER RELAY	PLAYFIELD
	NO. 2 BUMPER RELAY	PLAYFIELD
	NO. 3 BUMPER RELAY	PLAYFIELD
	ROLLOVER RELAY	PLAYFIELD
M 30-1300	DOODLE BUG 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
	COIN RELAY	MECH. PANEL
	GAME OVER RELAY	MECH. PANEL
Z 28-1150	LOCK RELAY	MECH. PANEL
	GATE RELAY	PLAYFIELD
	TILT RELAY	MECH. PANEL
	EXTRA BALL RELAY	MECH. PANEL
	BALL INDEX RELAY	MECH. PANEL
	ON YELLOW RELAY	PLAYFIELD
	ON GREEN RELAY	PLAYFIELD
M 30-1400	TROUGH RELAY	PLAYFIELD

"DIPSY DOODLE" — POST ADJUSTMENT SHEET

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



ABBREVIATIONS:

CONS.—CONSERVATIVE
LIB.—LIBERAL
MED.—MEDIUM

23A-6300	$\frac{5}{16}$ " I.D.
23A-6302	1" I.D.
23A-6305	2" I.D.
23A-6306	$2 \frac{5}{16}$ " I.D.
23A-6308	$3 \frac{3}{8}$ " I.D.

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

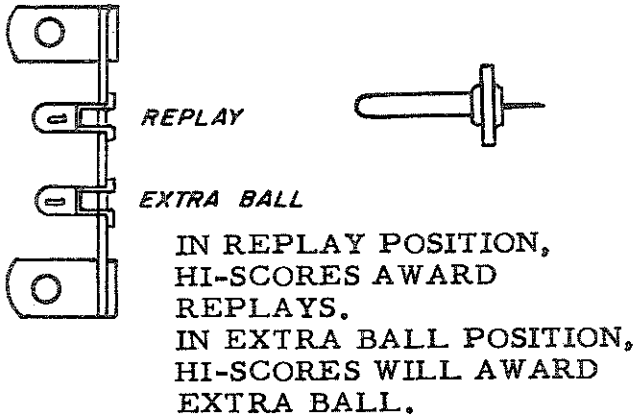
23A-6327 BALL SHOOTER
RUBBER TIP

DIMENSIONS INDICATED BY ARROWS ABOVE ARE FOR SIZES OF RUBBER RINGS.

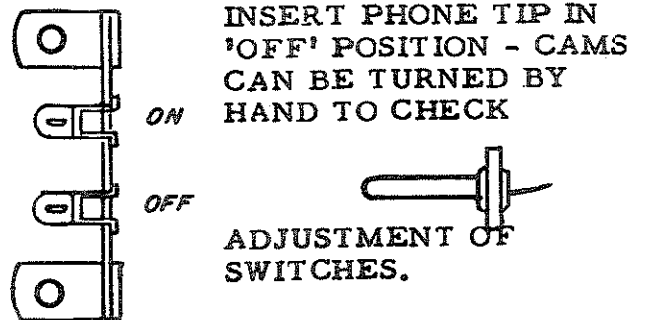
16A-386 PA

ADJUSTMENTS ON MECHANISM PANEL

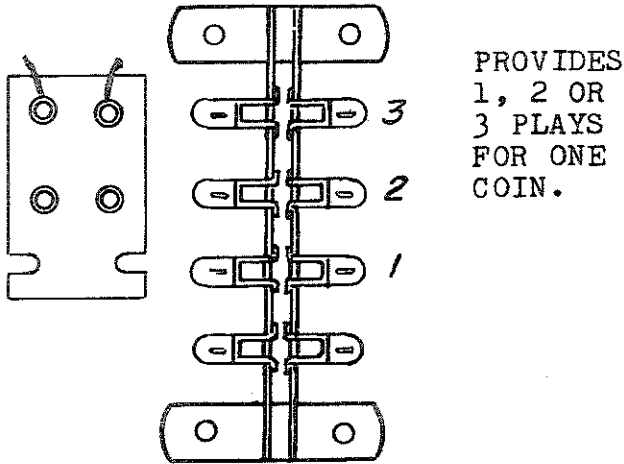
Extra Ball Jack Adj.



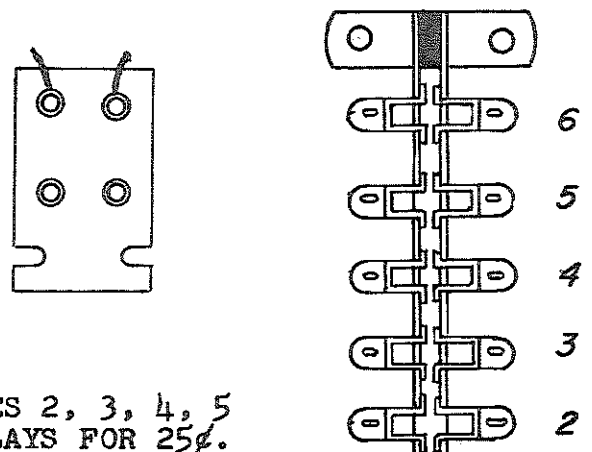
Motor Service Jack



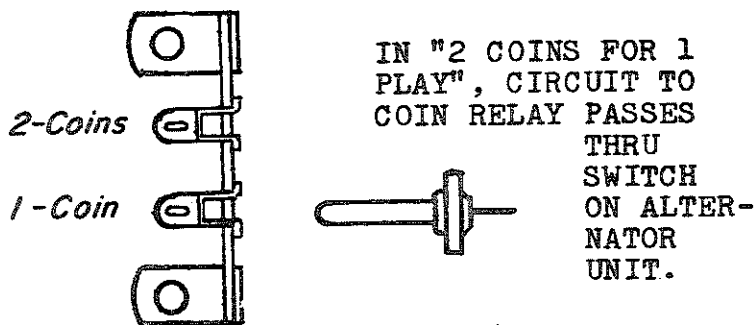
10¢ Adjustment



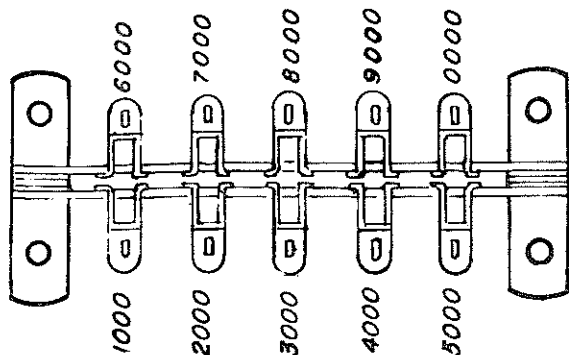
25¢ Adjustment



5¢ Adjustment



ADJUSTMENTS IN BACKBOX

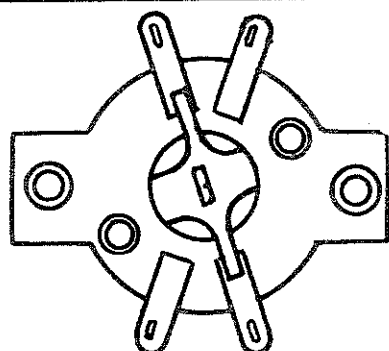
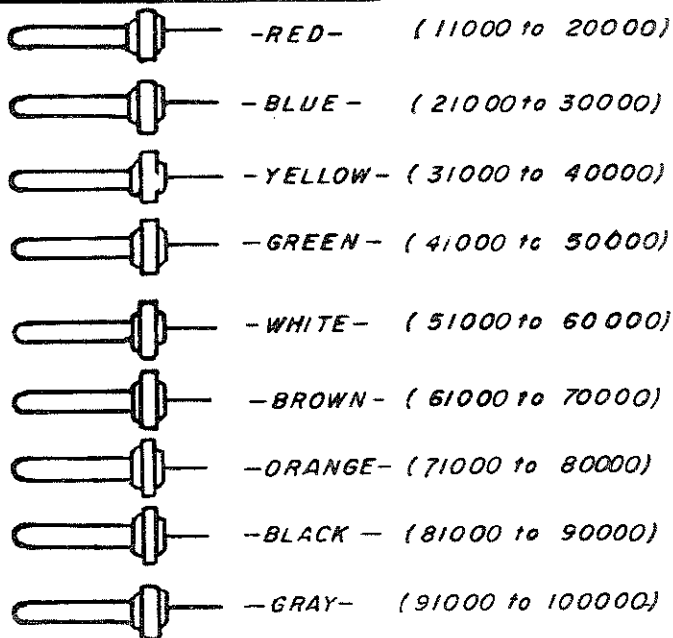


HI-Score Adjustment

Insert plugs into 10 Point Female at desired positions.

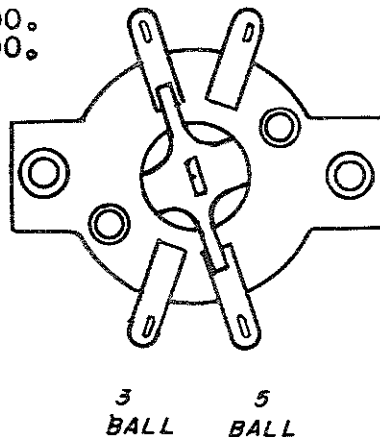
Examples:

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



Number Match Adjustment

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



No. of Balls Adjustment

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

SUGGESTED SCORE CARDS

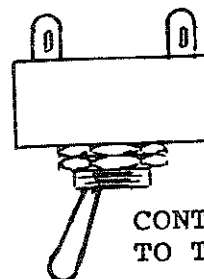
5BALL PLAY--386-1 3 BALL PLAY-386-2

ON NOVELTY PLAY

5 BALL PLAY-386-EB-1 3 BALL PLAY-386EB-2

MASTER ON-OFF SW.

(Located under front of Cabinet)



CONTROLS POWER TO TRANSFORMER

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.

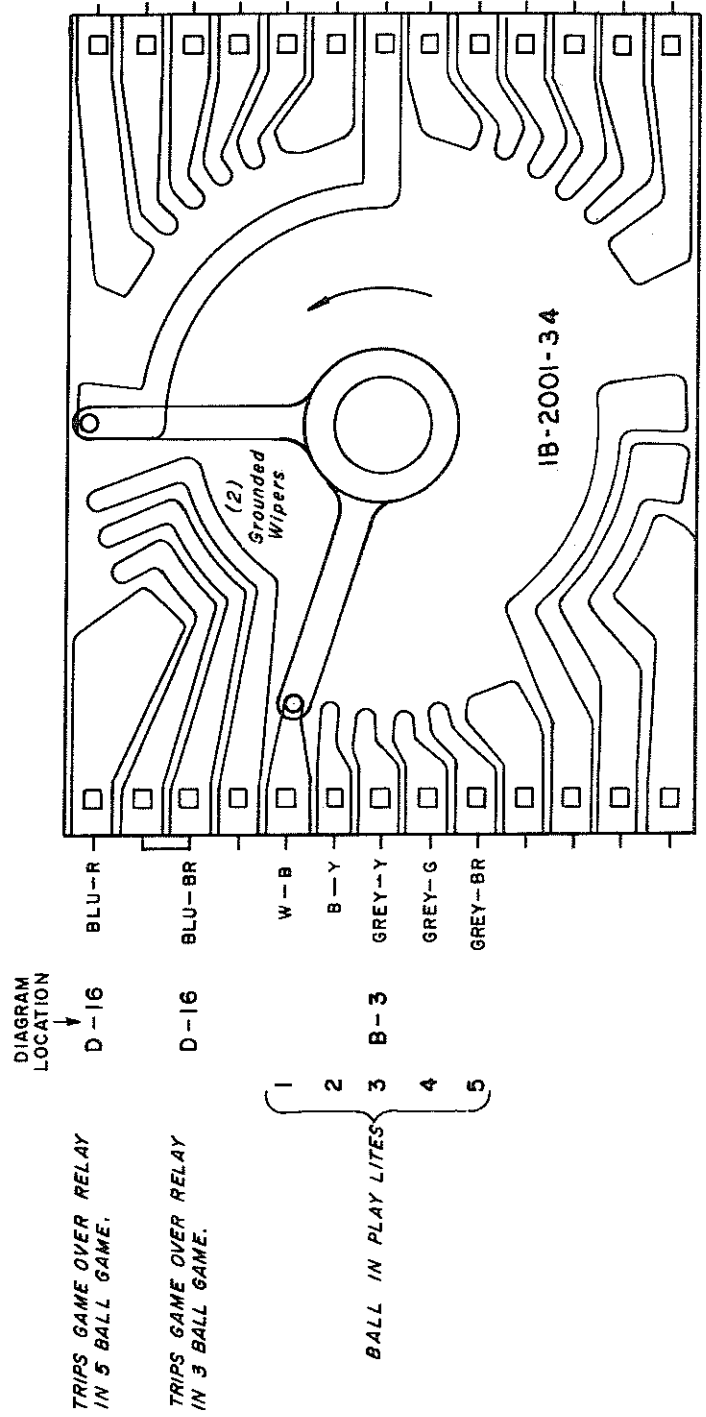
4. RELAY and SWITCH ADJUSTMENT

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 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.*



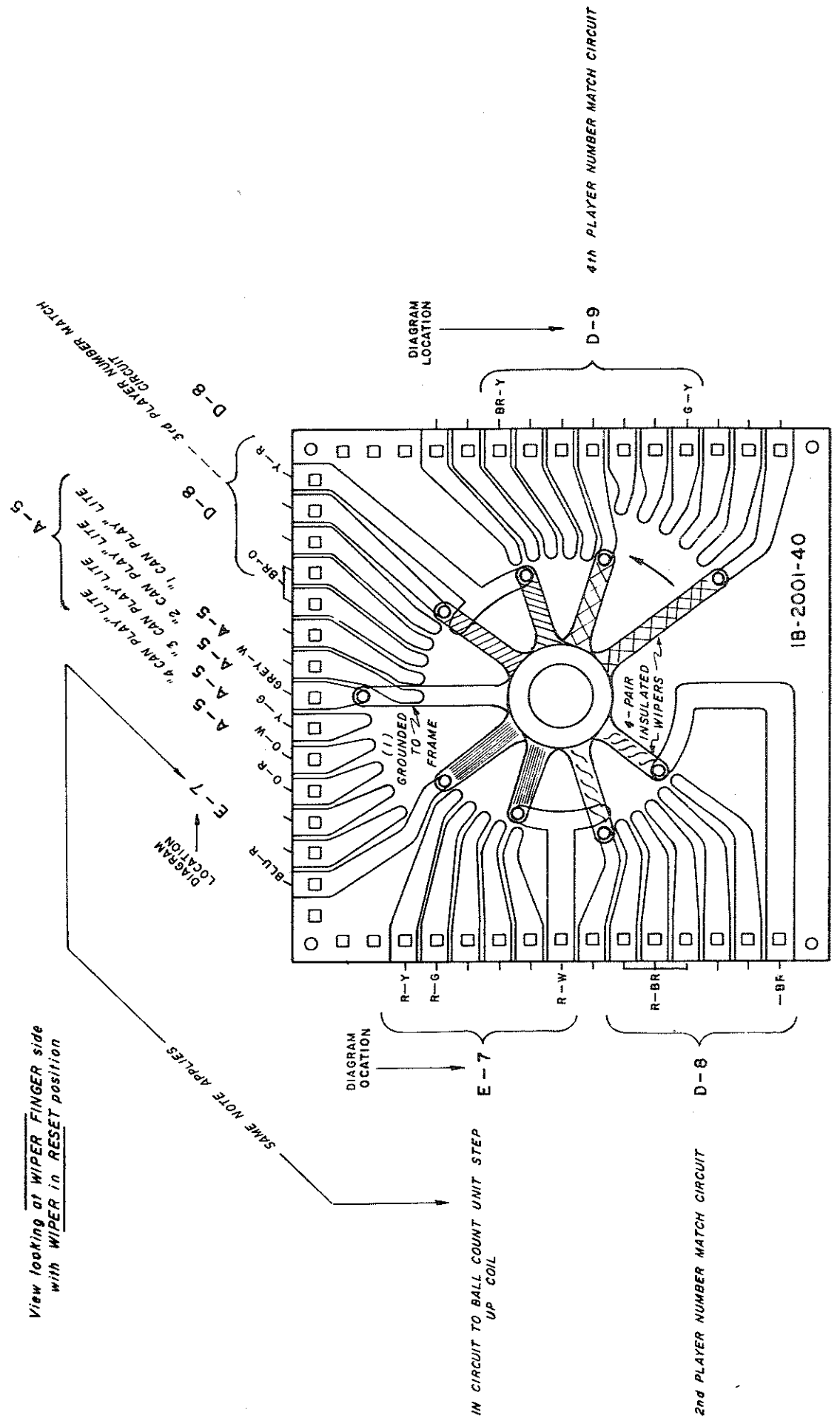
TRIPS GAME OVER RELAY
IN 5 BALL GAME.

TRIPS GAME OVER RELAY
IN 3 BALL GAME.

BALL IN PLAY LITES

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

D-8

DIAGRAM LOCATION

E-7

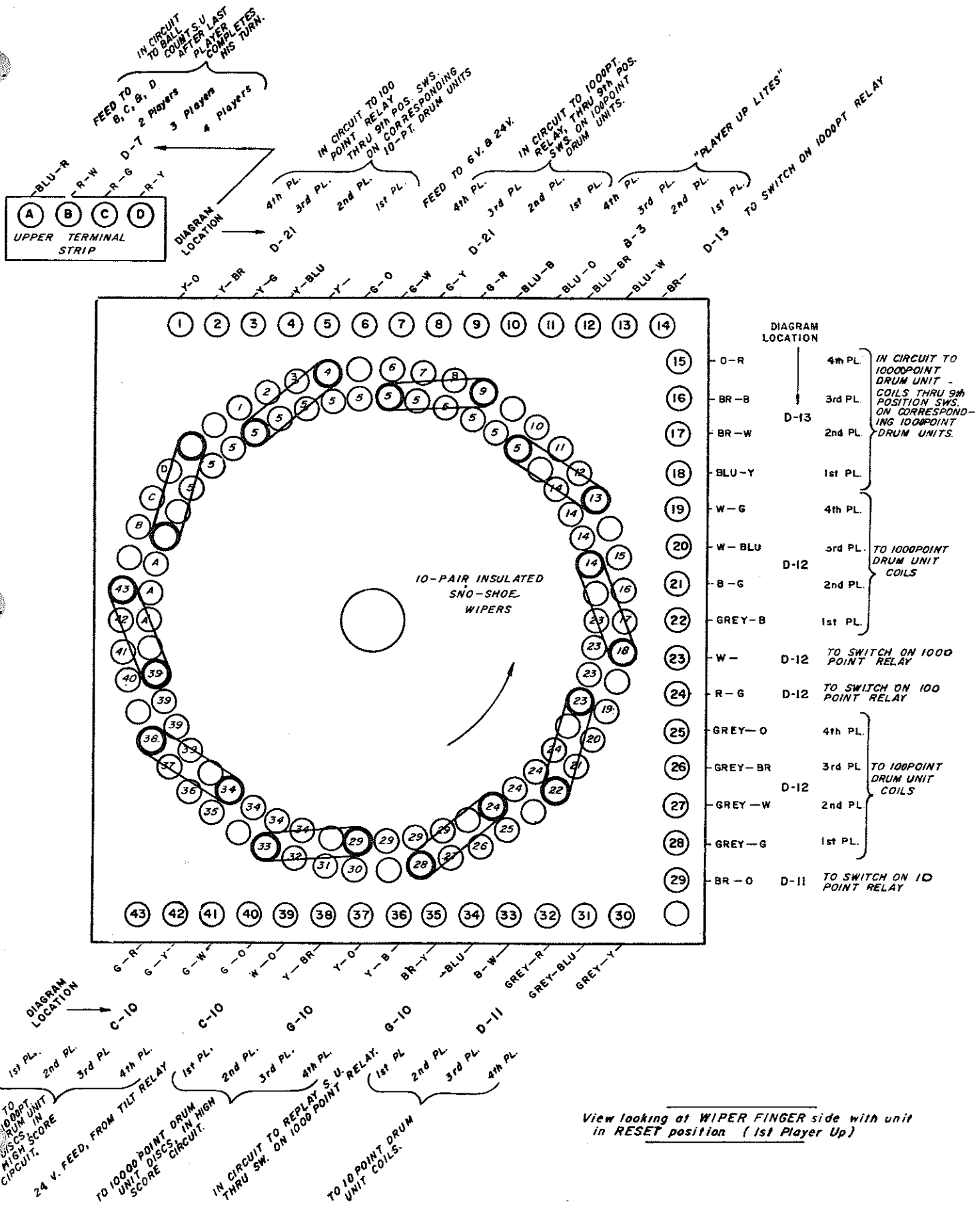
D-9

4th PLAYER NUMBER MATCH CIRCUIT

DIAGRAM LOCATION

IB-2001-40

PLAYER UNIT DISC



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

ADVANCE UNIT DISC

THIS UNIT ADVANCES EACH TIME
THE ADVANCE RELAY OR EJECT
RELAY IS ENERGIZED.

VIEW LOOKING AT WIPER
FINGER SIDE.

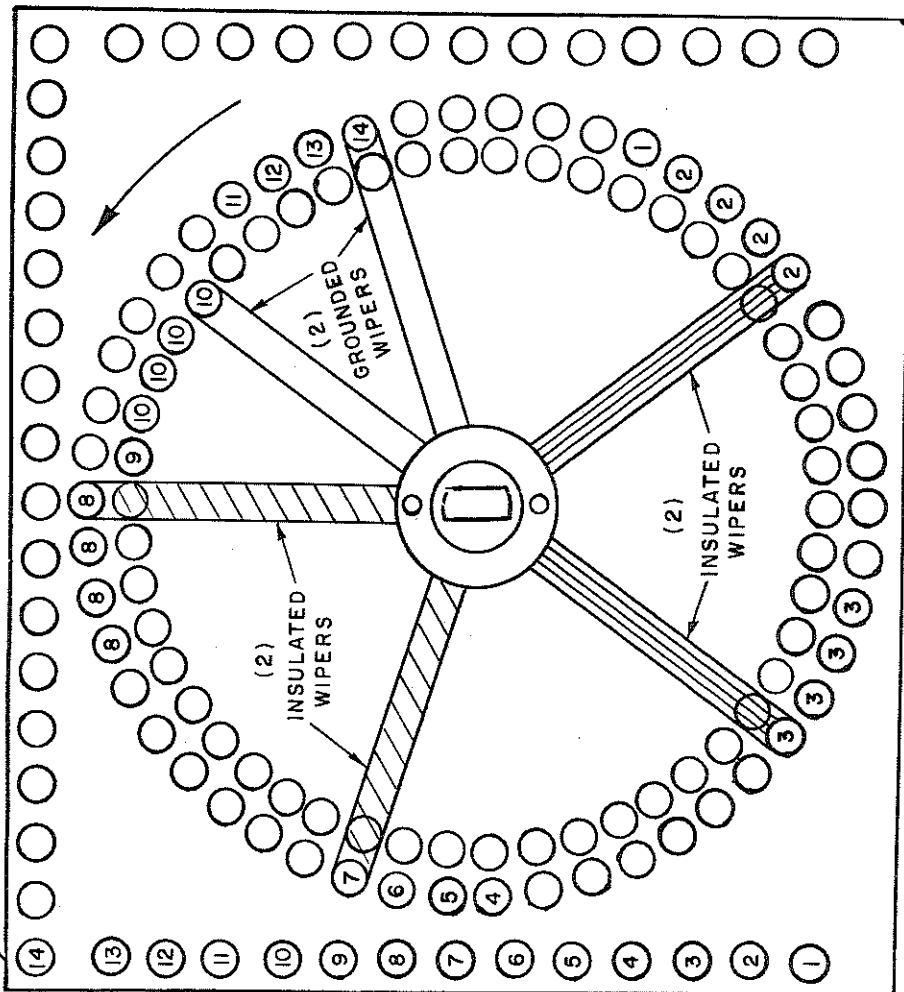
TO NO. 1 TARGET LITE.

B-7

DIAGRAM
LOCATION

9-0

- TO NO. 2 TARGET LITE. B-7 0-BLU
- TO NO. 3 TARGET LITE. B-7 BR-Y
- TO NO. 4 TARGET LITE. B-7 -0
- TO "DOODLE BUG SCORES 10 POINTS" LITE. B-8 8-BLU
- TO "DOODLE BUG SCORES 100 POINTS" LITE. B-8 0-W
- TO "ADVANCE RELAY" COIL. D-17 BLU-BR
- TO NO. 1 TARGET SWITCH. D-17 BLU-R
- TO NO. 2 TARGET SWITCH. D-17 R-B
- TO NO. 3 TARGET SWITCH. D-17 R-0
- TO NO. 4 TARGET SWITCH. D-17 -BR
- TO SWITCH ON PULSE RELAY. D-18 BR-BLU
- TO 10 POINT RELAY COIL. D-18 6-B
- TO 100 POINT RELAY COIL. D-18 W-R

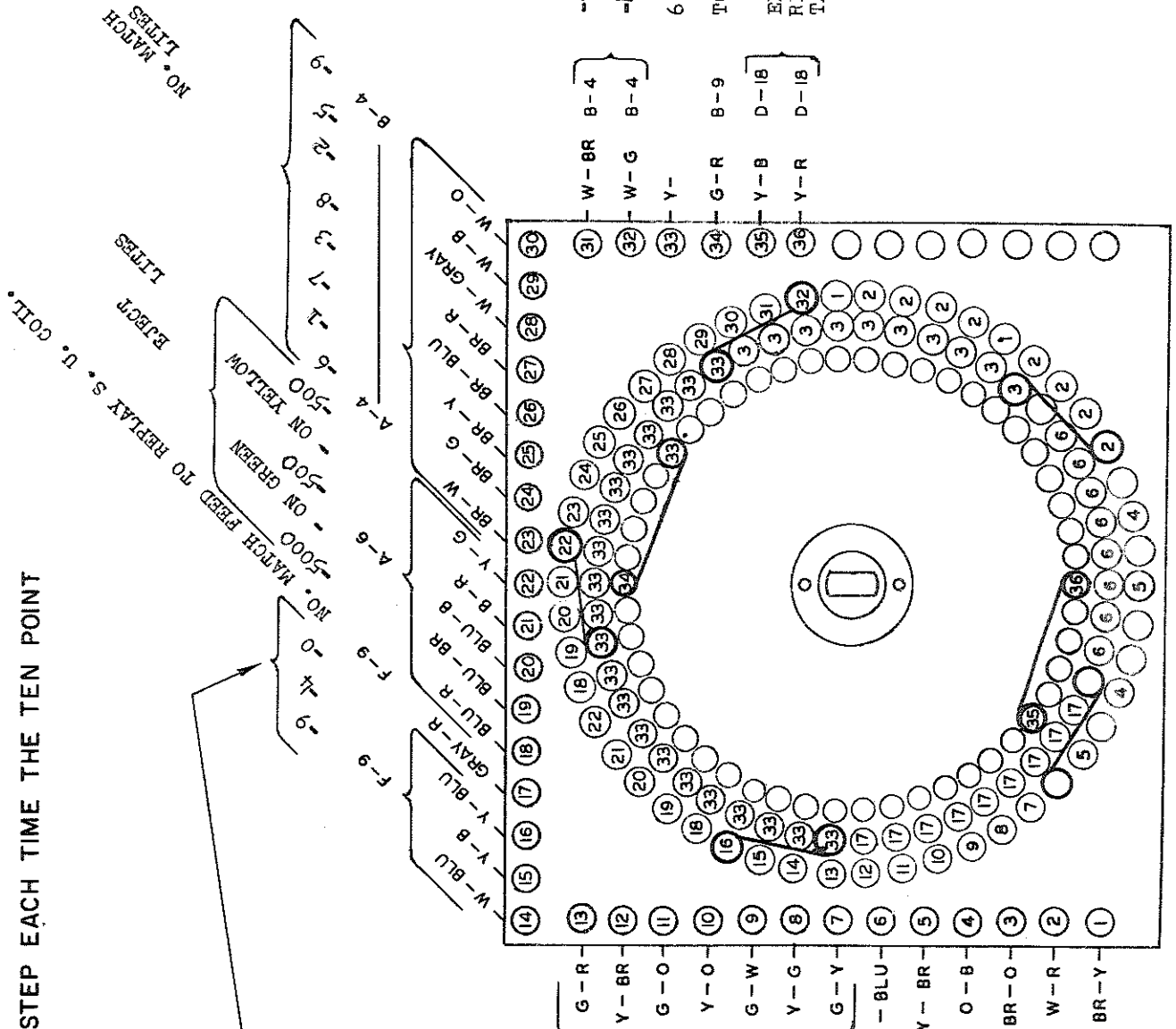


No. MATCH UNIT DISC

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

(7) PAIR OF INSULATED SNO-SHOE WIPERS

VIEW LOOKING AT SNO-SHOE WIPER SIDE



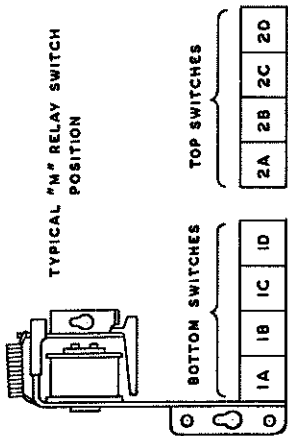
SAME NOTE APPLIES

IN NO. MATCH CIRCUIT. THESE WIRES COME FROM THE 10 POINT D. U. DISC OF ALL FOUR PLAYERS.

- 5- FROM SWITCH ON EJECT RELAY.
- 2- TO "ON YELLOW" RELAY.
- 8- TO "ON GREEN" RELAY.
- 3- FROM SWITCH ON EJECT RELAY.
- 7- TO 100 POINT RELAY.
- 1- TO 1000 POINT RELAY.
- 6- FROM SWITCH ON EJECT RELAY.
- 10- TO "ON YELLOW" RELAY.
- 11- TO "ON GREEN" RELAY.
- 12- FROM SWITCH ON EJECT RELAY.
- 13- TO 100 POINT RELAY.
- 14- TO 1000 POINT RELAY.

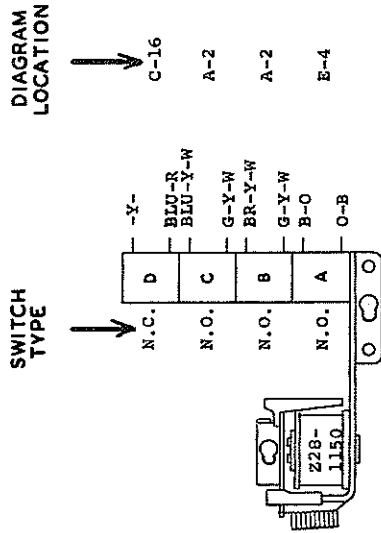
- 0 NO. MATCH LITES.
- 4 6 VOLT FEED.
- TO CENTER TARGETY LITE.
- ENERGIZE EXTRA BALL RELAY, THRU CENTER TARGET SWITCH.

A.C. RELAYS & SWITCHES LOCATED ON MECHANISM PANEL



LOCK RELAY

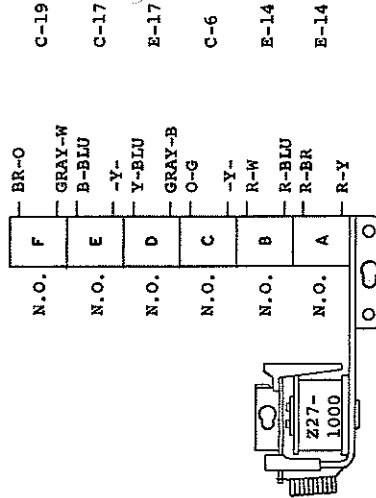
IS ENERGIZED BY LEFT FLIPPER SWITCH OR 5¢, 10¢, 25¢, OR COIN RELAYS.



ENERGIZES GAME-OVER RELAY (TRIP COIL).
6 VOLTS FROM TRANSFORMER TO LITES.
6 VOLTS FROM TRANSFORMER TO LITES.
IN HOLD CIRCUIT TO THIS RELAY.

EJECT RELAY

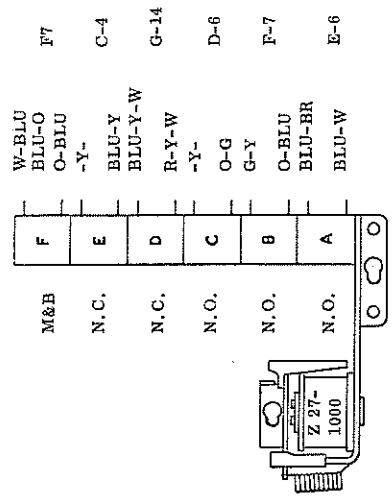
IS ENERGIZED BY EJECT SWITCH, THRU SCORE MOTOR INDEX CAM SWITCH C.



PULSES 100 POINT RELAY OR 1000 POINT RELAY, THRU NO. MATCH UNIT DISC.
ENERGIZES "ON YELLOW" RELAY OR "ON GREEN" RELAY, THRU NO. MATCH UNIT DISC.
ENERGIZES ADVANCE UNIT S.U., AT SCORE MOTOR CAM SWITCH 1B.
RUNS SCORE MOTOR
ENERGIZES EJECT COIL AT SCORE MOTOR CAM SWITCH 4A.
IN HOLD CIRCUIT TO THIS RELAY.

RESET RELAY

IS ENERGIZED BY SWITCH D ON COIN RELAY.

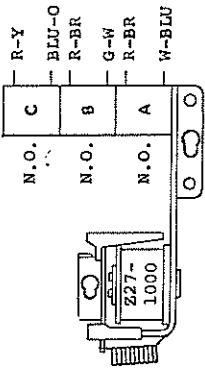


W-BLU
BLU-O
O-BLU
-Y-
BLU-Y
BLU-Y-W
R-Y-W
-Y-
O-G
G-Y
O-BLU
BLU-BR
BLU-W

OPEN IS CIRCUIT TO COIN UNIT S.U. AND CLOSURES TO RESET COILS ON COIN.
IN CIRCUIT TO REPLAY RELAY.
OPENS CIRCUIT TO ALL PLAYFIELD SWITCHES.
RUNS SCORE MOTOR.
IN CIRCUIT TO PLAYER UNIT RESET COIL.
IN HOLD CIRCUIT TO THIS RELAY.

REPLAY RELAY

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



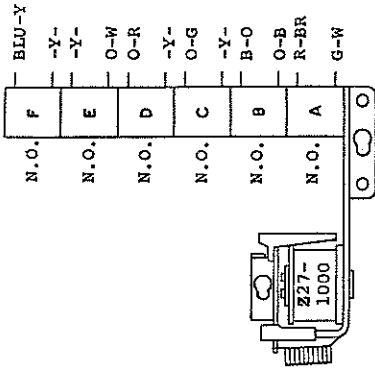
F-6 IN CIRCUIT TO REPLAY UNIT RESET COIL.

E-3 ENERGIZES COIN RELAY.

E-3 IN HOLD CIRCUIT TO THIS RELAY.

COIN RELAY

IS ENERGIZED BY REPLAY RELAY OR COIN SWITCH.



C-16 ENERGIZES GAME-OVER RELAY (TRIP COIL).

C-13 ENERGIZES ADVANCE UNIT RESET COIL AT SCORE MOTOR CAM SWITCH 2A.

C-6 ENERGIZES RESET RELAY, THRU SWITCH B ON GAME-OVER RELAY.

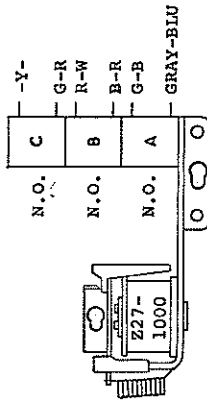
C-6 RUNS SCORE MOTOR.

E-4 ENERGIZES LOCK RELAY.

E-3 IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX RELAY

IS ENERGIZED BY 10 POINT, 100 POINT OR 1000 POINT RELAY, THRU SWITCH D ON EXTRA BALL RELAY. IT IS ALSO ENERGIZED BY SWITCH E ON TILT RELAY.



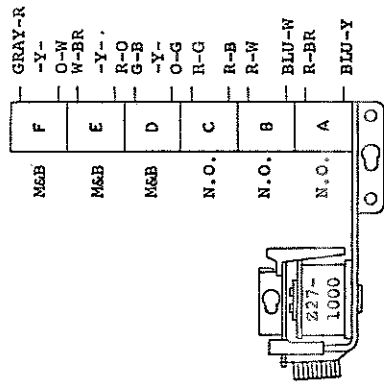
C-18 IN SERIES WITH SWITCH A ON EXTRA BALL RELAY.

D-7 IN CIRCUIT TO BALL COUNT S.U. COIL---ALSO IN SERIES WITH SWITCH C ON PLAYER RESET RELAY.

E-15 IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE RELAY

IS ENERGIZED BY OUTHOLE SWITCH, THRU SCORE MOTOR INDEX CAM SWITCH C.



C-13 OPENS IN HOLD CIRCUIT TO DOODLE BUG RELAY AND CLOSSES TO ADVANCE UNIT RESET COIL.

C-7 OPENS IN HOLD CIRCUITS TO "ON YELLOW" & "ON GREEN" RELAYS AND CLOSSES IN SERIES WITH SWITCH C ON EXTRA BALL RELAY.

C-6 OPENS IN HOLD CIRCUIT TO BALL INDEX RELAY AND CLOSSES TO RUN SCORE MOTOR.

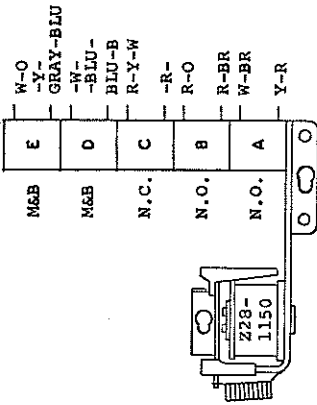
C-14 ENERGIZES "DOWN POST" COIL AT CAM SWITCH 1D.

E-15 ENERGIZES "BALL RELEASE" COIL AT SCORE MOTOR CAM SWITCH 1A.

E-14 IN HOLD CIRCUIT TO THIS RELAY.

TILT RELAY

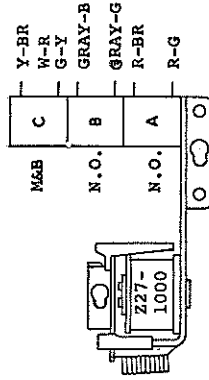
IS ENERGIZED BY PLUMB BOB TILT, BALL ROLL-DOWN TILT SWITCH OR PLAYFIELD VIBRATION SWITCH.



- C-10 OPENS IN HI-SCORE CIRCUIT TO REPLAY S.U. AND CLOSES TO BALL INDEX RELAY.
- C-15 OPENS IN CIRCUIT TO PLAYFIELD LITES AND CLOSES TO TILT LITE.
- A-5 OPENS CIRCUITS TO ALL PLAYFIELD SWITCHES.
- G-15 ENERGIZES POST RELAY, THRU POST END-OF STROKE SWITCH.
- E-14 IN HOLD CIRCUIT TO THIS RELAY.
- E-15

PLAYER RESET RELAY

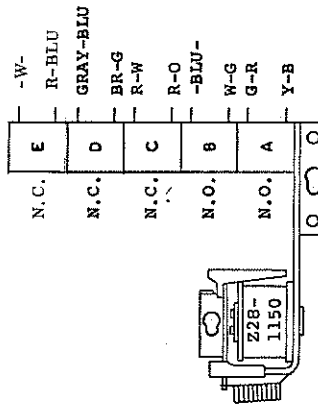
IS ENERGIZED BY BALL COUNT END-OF-STROKE SWITCH. IT THEN HOLDS IN UNTIL SCORE MOTOR INDEX CAM SWITCH B OPENS.



- E-7 OPENS IN CIRCUIT TO PLAYER UNIT S.U. COIL AND CLOSES TO PLAYER UNIT RESET COIL.
- G-9 IN NO. MATCH CIRCUIT TO REPLAY S.U. COIL.
- D-8 IN HOLD CIRCUIT TO THIS RELAY.

EXTRA BALL RELAY

IS ENERGIZED BY CENTER TARGET SWITCH, THRU MATCH UNIT DISC--- ALSO BY HI-SCORE CIRCUIT, THRU "REPLAY-EXTRA BALL" ADJUSTMENT JACK.

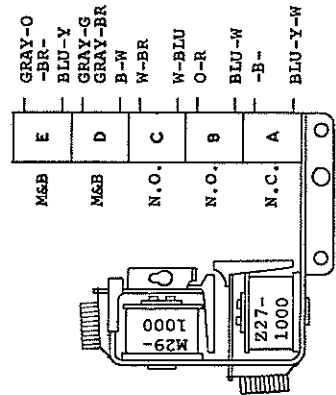


- A-9 OPENS CIRCUIT TO CENTER TARGET LITE.
- E-15 ENERGIZES BALL INDEX RELAY, THRU SWITCH ON 10PT., 100 PT., OR 1000 PT. RELAY.
- C-7 IN SERIES WITH SWITCH B ON BALL INDEX RELAY.
- A-5 TO PLAYFIELD AND INSERT "SHOOT AGAIN" LITES.
- F-18 IN HOLD CIRCUIT TO THIS RELAY.

GAME OVER RELAY

INTERLOCK

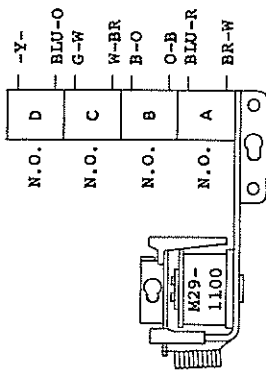
LATCH COIL IS PULSED BY SCORE MOTOR CAM SWITCH IC, THRU SWITCHES ON COIL RELAY AND RESET RELAY. TRIP COIL IS PULSED BY WIPER FINGER ON BALL COUNT UNIT DISC---ALSO BY SWITCH D ON LOCK RELAY OR SWITCH F ON COIN RELAY.



- A-3 OPENS IN CIRCUIT TO "PLAYER UP" LITES AND CLOSES TO "GAME-OVER" LITE.
- G-8 OPENS IN HI-SCORE CIRCUIT TO REPLAY S.U. AND CLOSES IN NO. MATCH CIRCUIT.
- F-4 IN CIRCUIT TO REPLAY RELAY.
- E-6 IN SERIES WITH SWITCH D ON COIN RELAY.
- G-14 OPENS ALL CIRCUITS TO PLAYFIELD SWITCHES.

5¢ RELAY

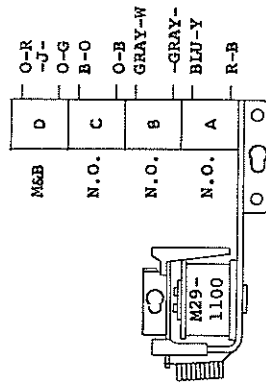
IS ENERGIZED BY 5¢ COIN SWITCH. THIS RELAY IS USED ON GAMES WITH "2 COINS FOR 1 PLAY" FEATURE.



- C-4 ENERGIZES ALTERNATOR UNIT COIL.
- E-3 ENERGIZES COIN RELAY, THRU SWITCH ON ALTERNATOR UNIT.
- E-4 ENERGIZES LOCK RELAY.
- E-3 IN HOLD CIRCUIT TO THIS RELAY, THRU END-OF-STROKE SWITCH ON ALTERNATOR UNIT.

10¢ RELAY

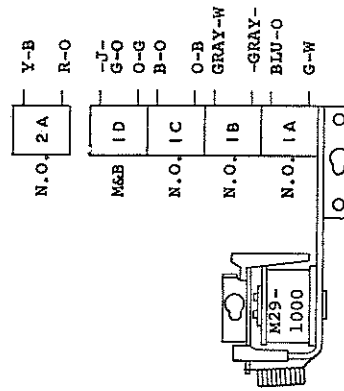
IS ENERGIZED BY 10¢ COIN SWITCH, IF 10¢ ADJUSTMENT JACK IS IN "2 PLAYS" OR "3 PLAYS" POSITION.



- D-5 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.
- E-4 ENERGIZES LOCK RELAY.
- E-8 PULSES REPLAY UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.
- F-2 IN HOLD CIRCUIT TO THIS RELAY.

25¢ RELAY

IS ENERGIZED BY 25¢ COIN SWITCH.

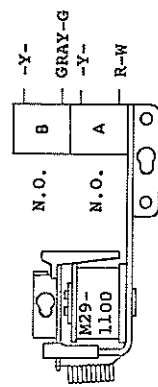


- F-2 IN HOLD CIRCUIT TO THIS RELAY.
- C-5 OPENS IN CIRCUIT TO KNOCKER COIL AND CLOSES TO RUN SCORE MOTOR.
- E-4 ENERGIZES LOCK RELAY.
- E-8 PULSES REPLAY UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.
- E-3 ENERGIZES COIN RELAY ON "6 PLAYS FOR 25¢".

LOCATED ON PLAYFIELD

ROLLOVER RELAY

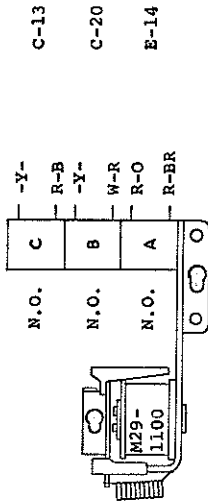
IS ENERGIZED BY LEFT SIDE OR RIGHT SIDE ROLLOVER SWITCHES.



- C-15 ENERGIZES "STOP RELAY".
- D-24 ENERGIZES "UP POST" COIL.

POST RELAY

IS ENERGIZED BY THE DOODLE-BUG RELAY, TILT RELAY, OR (2) STAND-UP SWITCHES.



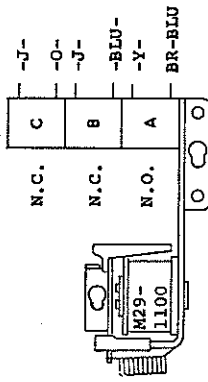
ENERGIZES "DOWN POST" COIL.
PULSES 100 POINT RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

C-13
C-20
E-14

PULSE RELAY

IS ENERGIZED BY DOODLE -BUG ROLLOVER SWITCH, THRU SWITCH 1A ON DOODLE-BUG RELAY.



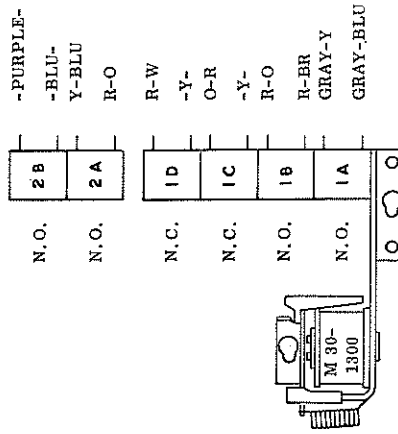
IN CIRCUIT TO DOODLE BUG COIL (115 VOLTS).
IN SERIES WITH SWITCH C ON PULSE RELAY.

PULSES 10 POINT RELAY OR 100 POINT RELAY, THRU ADVANCE UNIT DISC.

C-1
C-1
C-18

DOODLE BUG RELAY

IS ENERGIZED BY CENTER TARGET SWITCH.



IN SERIES WITH SWITCH B ON PULSE RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

IN CIRCUIT TO LARGE BELL COIL.

IN CIRCUIT TO NO. MATCH S.U. COIL.

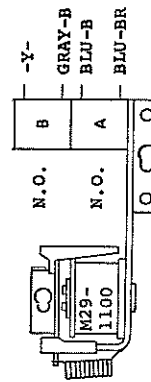
ENERGIZES POST RELAY.

ENERGIZES PULSE RELAY, THRU DOODLE BUG ROLLOVER SWITCH.

B-1
E-15
C-22
C-23
E-14
E-15

ADVANCE RELAY

IS ENERGIZED BY NO.1, NO.2, NO.3, OR NO.4 TARGET SWITCH, THRU WIPER FINGER ON ADVANCE UNIT DISC.



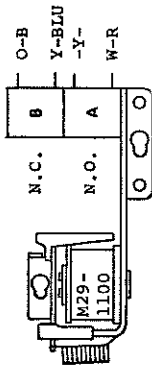
ENERGIZES ADVANCE UNIT S.U. COIL.

IN HOLD CIRCUIT TO THIS RELAY.

C-17
E-17

STOP RELAY

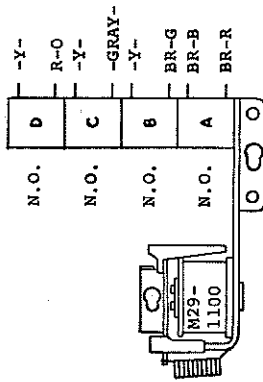
IS ENERGIZED BY (2) TOP STAND-UP SWITCHES OR (2) ROLLOVER BUTTON SWITCHES AS INDICATED ON PLAYFIELD, "STOP DOODLE-BUG". ALSO BY SWITCH E ON ROLLOVER RELAY.



E-15 IN SERIES WITH SWITCH 2A ON DOODLE BUG RELAY.
C-18 PULSES 100 POINT RELAY.

NO.3 BUMPER RELAY

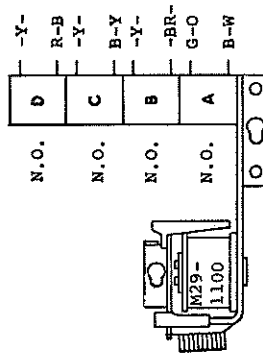
IS ENERGIZED BY LEFT BOTTOM OR RIGHT TOP JET BUMPER SWITCH.



C-5 PULSES LEFT BOTTOM JET BUMPER COIL.
C-5 PULSES RIGHT TOP JET BUMPER COIL.
C-19 IN SERIES WITH SWITCH E ON "ON GREEN" RELAY.
F-22 IN HOLD CIRCUIT TO THIS RELAY.

NO. 2 BUMPER RELAY

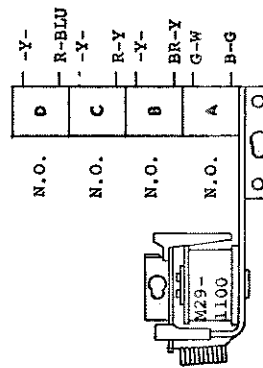
IS ENERGIZED BY CENTER JET BUMPER SWITCH.



C-5 PULSES CENTER JET BUMPER.
D-23 ENERGIZES NO. MATCH UNIT S.U. COIL.
C-19 IN SERIES WITH SWITCH E ON "ON YELLOW" RELAY.
F-22 IN HOLD CIRCUIT TO THIS RELAY.

NO.1 BUMPER RELAY

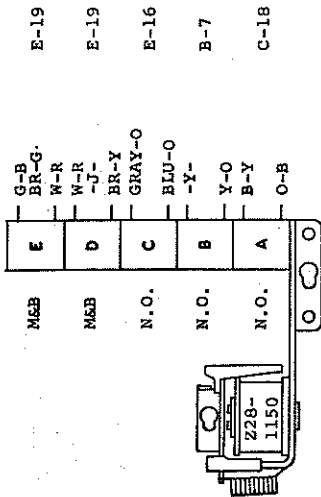
IS ENERGIZED BY LEFT TOP OR RIGHT BOTTOM JET BUMPER SWITCH.



C-5 PULSES LEFT TOP JET BUMPER COIL.
C-5 PULSES RIGHT BOTTOM JET BUMPER COIL.
C-19 IN SERIES WITH SWITCH F ON "ON YELLOW" RELAY.
F-22 IN HOLD CIRCUIT TO THIS RELAY.

ON GREEN RELAY

IS ENERGIZED BY SWITCH E ON EJECT RELAY, THRU NO. MATCH UNIT DISC.



E-19 OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSES TO 100 POINT RELAY.

E-19 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSES TO 1000 POINT RELAY.

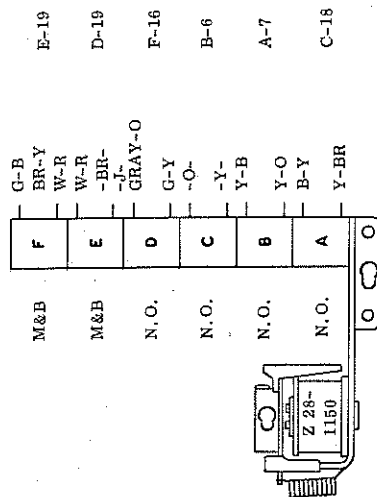
E-16 ENERGIZES GATE RELAY, THRU RIGHT SIDE ROLLOVER SWITCH.

B-7 TO LEFT BOTTOM AND RIGHT TOP JET BUMPER LITES---ALSO IN SERIES WITH SWITCH B ON "ON YELLOW" RELAY.

C-18 IN HOLD CIRCUIT TO THIS RELAY, THRU SWITCH C ON TROUGH RELAY.

ON YELLOW RELAY

IS ENERGIZED BY SWITCH E ON EJECT RELAY, THRU NO MATCH UNIT DISC.



E-19 OPENS IN CIRCUIT TO 10 POINT RELAY AND CLOSES TO 100 POINT RELAY.

D-19 OPENS IN CIRCUIT TO 100 POINT RELAY AND CLOSES IN SERIES WITH SWITCH D ON "ON GREEN" RELAY.

F-16 ENERGIZES GATE RELAY, THRU LEFT SIDE ROLLOVER SWITCH.

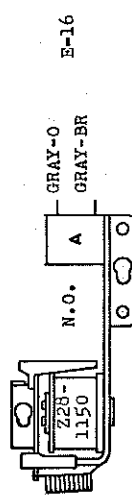
B-6 TO LEFT TOP AND RIGHT BOTTOM JET BUMPER LITES---ALSO TO LEFT SIDE ROLLOVER LITE.

A-7 TO CENTER JET BUMPER LITE; ALSO TO RIGHT SIDE ROLLOVER LITE.

C-18 IN HOLD CIRCUIT TO THIS RELAY, THRU SWITCH C ON TROUGH RELAY.

GATE RELAY

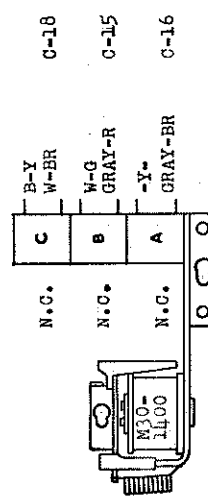
IS ENERGIZED BY RIGHT SIDE ROLLOVER SWITCH, THRU SWITCH C ON "ON GREEN" RELAY. ALSO BY LEFT SIDE ROLLOVER SWITCH, THRU SWITCH D ON "ON YELLOW" RELAY.



E-16 IN HOLD CIRCUIT TO THIS RELAY, THRU SWITCH A ON TROUGH RELAY.

TROUGH RELAY

IS ENERGIZED BY TROUGH SWITCH.



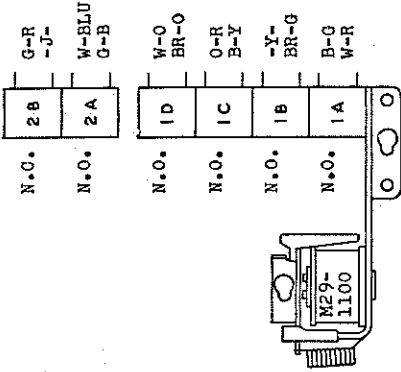
C-18 IN SERIES WITH SWITCH A ON "ON GREEN" RELAY OR SWITCH A ON "ON YELLOW" RELAY.

C-15 IN SERIES WITH SWITCH C ON STOP RELAY.

C-16 IN SERIES WITH SWITCH A ON GATE RELAY.

10 POINT RELAY

IS PULSED BY SWITCH B ON NO.1 OR NO.3 BUMPER RELAYS ---ALSO BY STAND-UP SWITCHES AND KICKER SWITCHES.



IN SERIES WITH SWITCH A ON EXTRA BALL RELAY

IN HOLD CIRCUIT TO THIS RELAY

PULSES 10POINT DRUM UNITS, THRU PLAYER UNIT DISC.

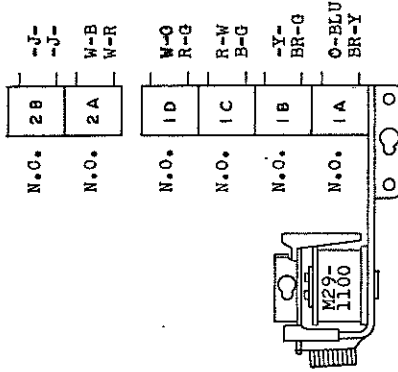
PULSES NO. MATCH UNIT S.U. COIL

IN SERIES WITH SWITCH D ON EXTRA BALL RELAY

PULSES 100 POINT RELAY, THRU 9th POSITION SWITCHES ON 10 POINT DRUM UNITS

100 POINT RELAY

IS PULSED BY SWITCH B ON NO.1, NO.2 OR NO.3 BUMPER RELAYS ---ALSO BY LEFT AND RIGHT BOTTOM R.O. BUTTON SWITCHES OR BY POST RELAY.



IN SERIES WITH SWITCH 2B ON 10 POINT RELAY

IN HOLD CIRCUIT TO THIS RELAY

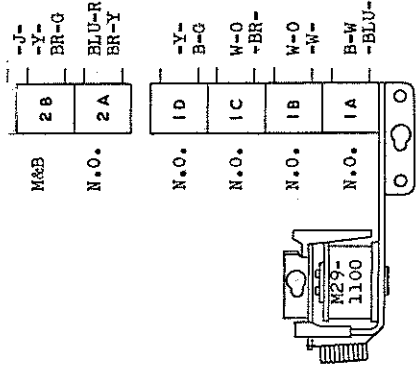
PULSES 100 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

PULSES LARGE BELL COIL

IN SERIES WITH SWITCH D ON EXTRA BALL RELAY.

1000 POINT RELAY

IS PULSED BY NO.1, NO.2, NO.3, OR NO.4 TARGET SWITCHES, LEFT BOTTOM OR RIGHT BOTTOM ROLLOVER SWITCH, SWITCH B ON NO.2 BUMPER RELAY, OR BY SWITCH F ON EJECT RELAY.



OPENS IN SERIES CIRCUIT WITH SWITCH 2 B ON 100 POINT RELAY AND CLOSSES IN CIRCUIT TO BALL INDEX RELAY.

IN HOLD CIRCUIT TO THIS RELAY

PULSES LARGE BELL COIL

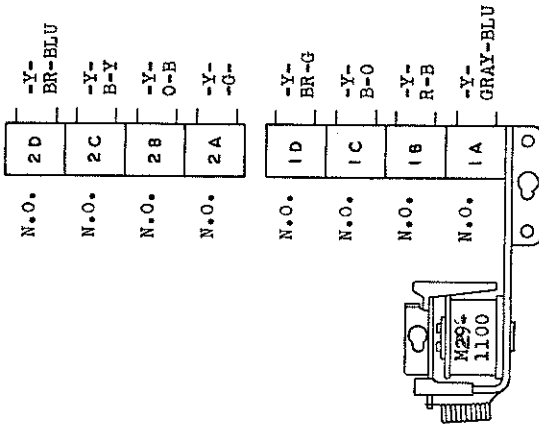
PULSES 1000 POINT DRUM UNITS, THRU 9TH POSITION SWITCHES ON 1000 POINT DRUM UNITS

PULSES 1000 POINT DRUM UNITS, THRU PLAYER UNIT DISC.

IN HI-SCORE CIRCUIT TO REPLAY UNIT S.U. COIL.

1-2 RESET RELAY

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

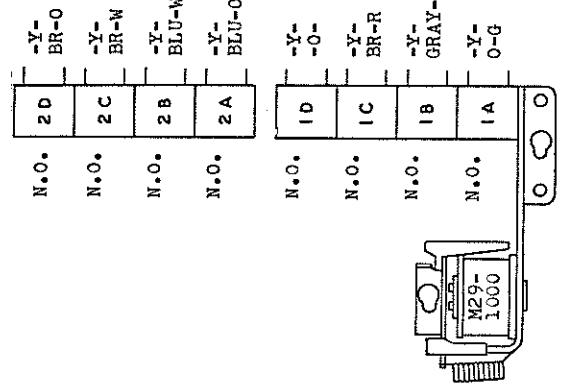


E-13 1ST PLAYER 10000 POINT DRUM UNIT
 E-12 1ST PLAYER 1000 POINT DRUM UNIT
 E-11 1ST PLAYER 100 POINT DRUM UNIT
 E-11 1ST PLAYER 10 POINT DRUM UNIT
 E-13 2ND PLAYER 10000 POINT DRUM UNIT
 E-12 2ND PLAYER 1000 POINT DRUM UNIT
 E-12 2ND PLAYER 100 POINT DRUM UNIT
 E-11 2ND PLAYER 10 POINT DRUM UNIT

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

3-4 RESET RELAY

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



E-13 3RD PLAYER 10000 POINT DRUM UNIT
 E-12 3RD PLAYER 1000 POINT DRUM UNIT
 E-12 3RD PLAYER 100 POINT DRUM UNIT
 E-11 3RD PLAYER 10 POINT DRUM UNIT
 E-13 4TH PLAYER 10000 POINT DRUM UNIT
 E-12 4TH PLAYER 1000 POINT DRUM UNIT
 E-12 4TH PLAYER 100 POINT DRUM UNIT
 E-11 4TH PLAYER 10 POINT DRUM UNIT

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

NOTES