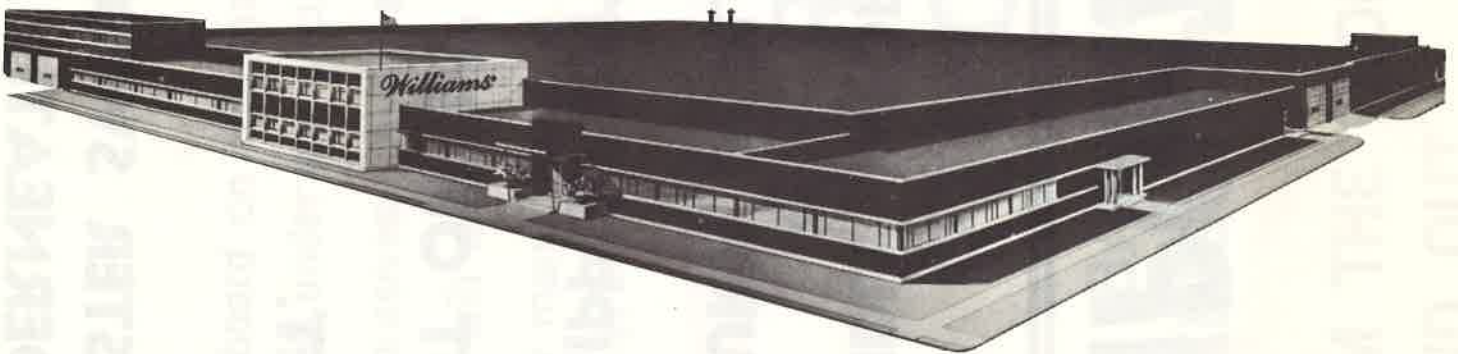


# Instruction Manual

*for*

# ZODIAC



**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.

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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.**

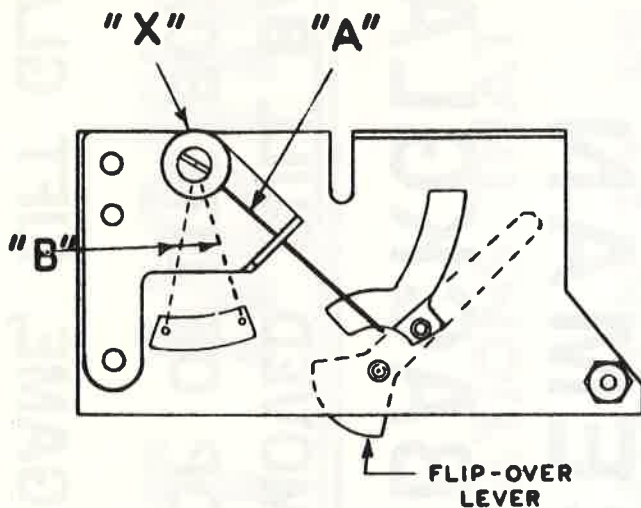
# INSTRUCTIONS FOR ALTERING COIN CHUTES EQUIPPED WITH A FLIP-OVER DEVICE.

FOR 1 COIN - FOR 1 PLAY

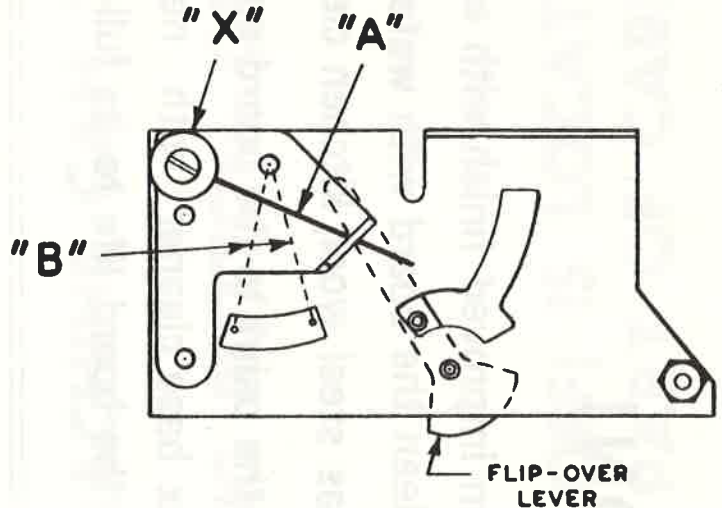
OR

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.

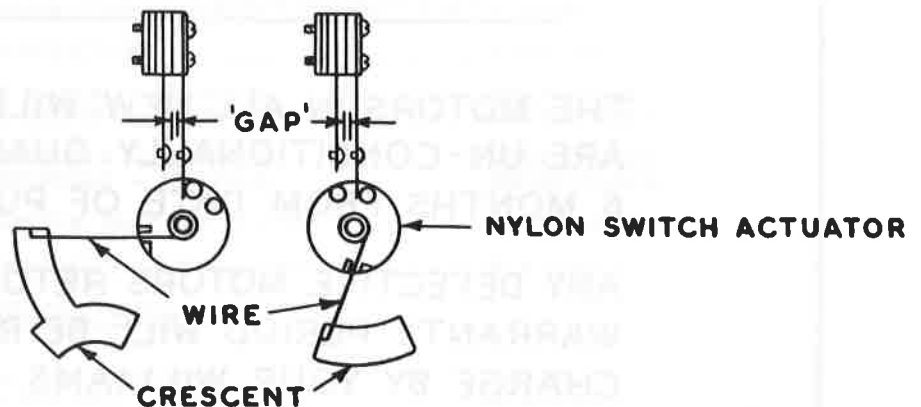
## **NOTE:**

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.

# 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  $.040$ .

## THE POWER TRANSFORMER,

located on panel. Is equipped with a secondary tap. If your game is on location with extremely low line voltage, remove lead from lug marked 24 volt and solder to alternate lug marked "HIGH". This will increase secondary voltage for proper operation.

## 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 or decrease scores, raise rear leg levelers to increase pitch.

# WARRANTY

THE MOTORS IN ALL NEW WILLIAMS PRODUCTS ARE UN-CONDITIONALLY GUARANTEED FOR 6 MONTHS FROM DATE OF PURCHASE.

ANY DEFECTIVE MOTORS RETURNED DURING THE WARRANTY PERIOD WILL BE REPLACED FREE OF CHARGE BY YOUR WILLIAMS DISTRIBUTOR.

# IMPORTANT NOTICE

WHEN ORDERING PARTS ALWAYS SPECIFY NAME OF UNIT, GAME AND SERIAL NUMBER, IN ADDITION TO A CLEAR DESCRIPTION OF THE PART AND PART NUMBER IF POSSIBLE.

## UNIT PARTS LIST

UNIT NAME	CONTACT DISC	WIPER ASSEMBLY	RATCHET GEAR ASSEMBLY	MOTORS
REPLAY	-----	-----	A-6400	
BALL COUNT	C-6878	C-6520	A-6402-10	SCORE MOTOR
LEFT BONUS	C-6417	C-6520	A-6402-20	14A-7805 (60 CYCLE)
RIGHT BONUS	C-6417	C-6520	A-6402-20	
10 POINT	-----	-----	3C-7272	14A-7806 (50 CYCLE)
100 POINT	-----	-----	3C-7272	
1000 POINT	A-7195	A-6294	3C-7272	
10,000 POINT	A-7195	A-6294	3C-7272	

"ZODIAC" COIL CHART

NOTICE:

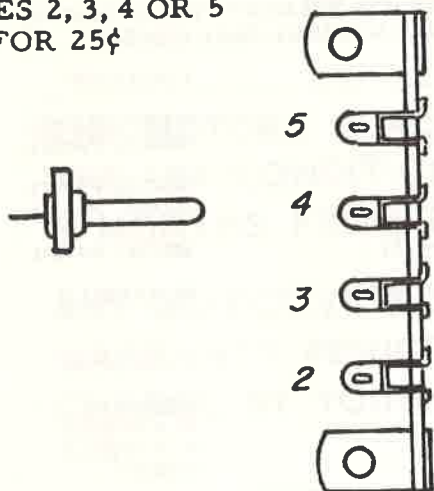
THIS GAME OPERATES ON 24 VOLTS. WHEN ORDERING REPLACEMENT TRANSFORMERS, MOTORS, COILS OR METERS ... MAKE SURE TO SPECIFY CORRECT PART NUMBER.

NUMBER	DESCRIPTION	LOCATION
14 A 7805	SCORE MOTOR - 50 CYCLE	MECH. PANEL
14 A 7806	SCORE MOTOR - 60 CYCLE	MECH. PANEL
15 A 6771-1	TRANSFORMER - 60 CYCLE	MECH. PANEL
15 A 6782-1	TRANSFORMER - 50 CYCLE	MECH. PANEL
B 6396	PLAYMETER (COIL XM 27-675)	MECH. PANEL
20 A 8991	MAGNET COIL #22-675 .. (2 req'd.)	PLAYFIELD
<u>SOLENOID COILS</u>		
A 22-550	ZODIAC UNIT STEP UP SUN BONUS UNIT STEP UP MOON BONUS UNIT STEP UP BALL UNIT STEP UP	INSERT PLAYFIELD PLAYFIELD INSERT
A 23-600	REPLAY UNIT STEP UP	INSERT
A2-23-750	KNOCKER	CABINET
B1-26-800	SCORE DRUM UNITS ... (8 req'd.)	INSERT
B-26-800	CREDIT UNIT RESET ZODIAC UNIT RESET SUN BONUS UNIT SINGLE RESET MOON BONUS UNIT SINGLE RESET BALL UNIT RESET	INSERT INSERT PLAYFIELD PLAYFIELD INSERT
C2-26-800	SMALL BELL	PLAYFIELD
D1-24-1150	RELAY BANK RESET COIL	PLAYFIELD
FL 20-300/ 28-400	FLIPPER COILS - BOTTOM ... (2 req'd.)	PLAYFIELD
FL 21-375/ 28-400	FLIPPER COILS - TOP ... (2 req'd.)	PLAYFIELD
G 21-400	BALL RELEASE	PLAYFIELD
G 23-750	KICKER COILS ... (4 req'd.)	PLAYFIELD
<u>RELAY COILS</u>		
M1-31-1500	COIN LOCKOUT	DOOR
M 29-1000	CHANGE RELAY (TRIP) SCORE RESET RELAY 1 POINT RELAY 10 POINT RELAY 100 POINT RELAY 2nd COIN RELAY (TRIP)	PLAYFIELD INSERT INSERT INSERT INSERT MECH. PANEL
M 29-1100	ZODIAC SPECIAL RELAY 10¢ RELAY 25¢ RELAY SUN BONUS UNIT ESCAPEMENT MOON BONUS UNIT ESCAPEMENT ZODIAC ADVANCE RELAY SUN ADVANCE RELAY MOON ADVANCE RELAY BALL RELEASE RELAY	MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD INSERT PLAYFIELD PLAYFIELD PLAYFIELD
Z 27-1000	CHANGE RESET RELAY OUT HOLE RELAY COIN RELAY SCORE MOTOR RELAY START RELAY 2nd COIN RELAY RESET SUN COLLECT RELAY MOON COLLECT RELAY	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL PLAYFIELD PLAYFIELD
Z 28-1150	LOCK RELAY BALL INDEX RELAY BALL IN PLAY RELAY PLAYER RELAY	MECH. PANEL MECH. PANEL MECH. PANEL INSERT
S 27-500	RELAY BANK COILS ... (13 req'd.)	MECH. PANEL

# ADJUSTMENTS ON MECHANISM PANEL

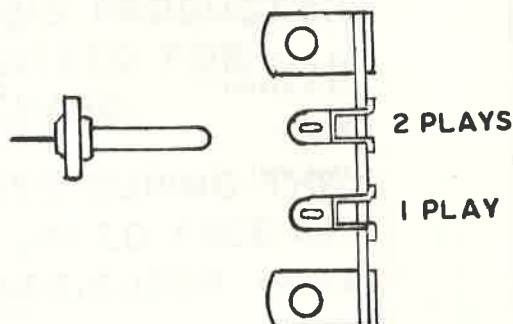
## 25¢ Adjustment

PROVIDES 2, 3, 4 OR 5 PLAYS FOR 25¢

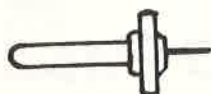
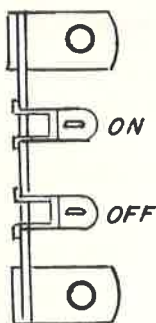


## 10¢ Adjustment

PROVIDES 1 OR 2 PLAYS FOR 1 COIN

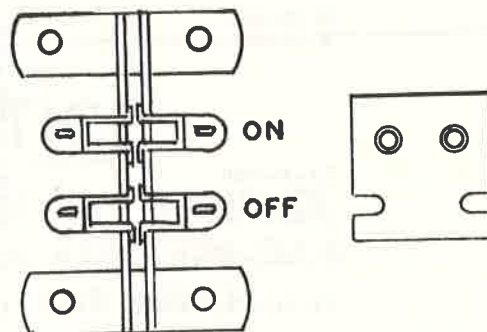


## Motor Service Jack



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

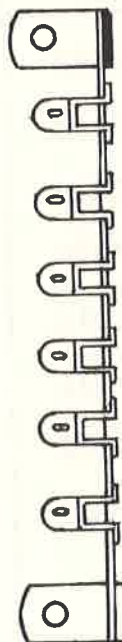
## EXTRA BALL ADJ.



MAKING PISCES, LAST SIGN IN HOROSCOPE ACROSS TOP OF LITE BOX, SCORES "ZODIAC SPECIAL".

IN "ON" POSITION, ENERGIZING "A" & "B" RELAYS PREVENTS BALL UNIT FROM STEPPING UP WHEN BALL LEAVES PLAYFIELD.

## ZODIAC SPECIAL ADJ.



LIBERAL 3

NORMAL 2

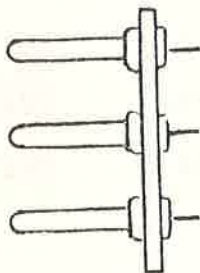
CONSERVATIVE 1

WHEN "ZODIAC SPECIAL RELAY" IS ENERGIZED: IN "LIBERAL" POSITION, 3 PULSES IN CIRCUIT THRU "NOVELTY-REPLAY" ADJUSTMENT JACK.

IN NORMAL POSITION, 2 PULSES.

IN CONSERVATIVE POSITION, 1 PULSE.

(SEE "NOVELTY-REPLAY" EXPLANATION.)



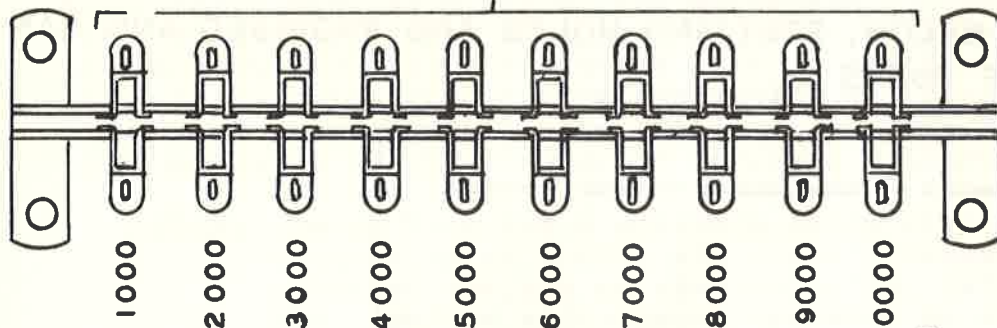
FOR  
SUGGESTED SCORE CARDS

SEE PAGE 14



# ADJUSTMENTS IN BACKBOX

Storage



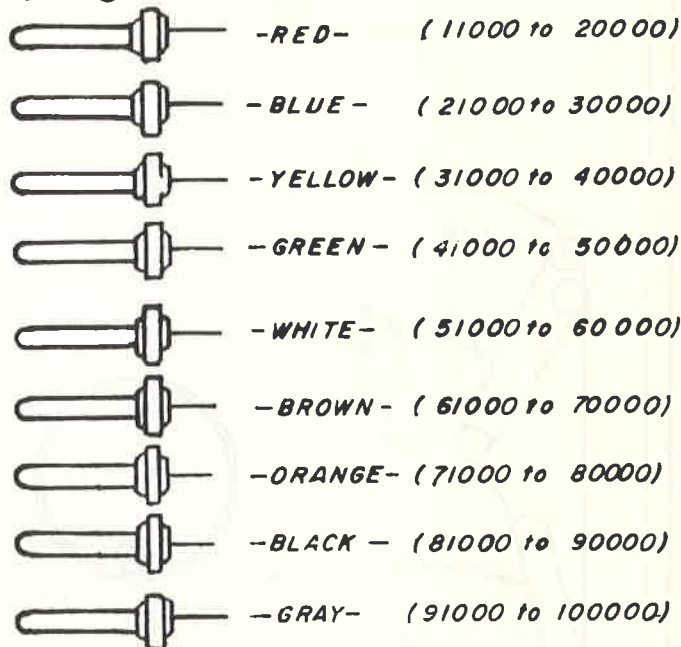
INSERT PLUGS INTO 20 POINT FEMALE AT DESIRED POSITIONS.

EXAMPLES:

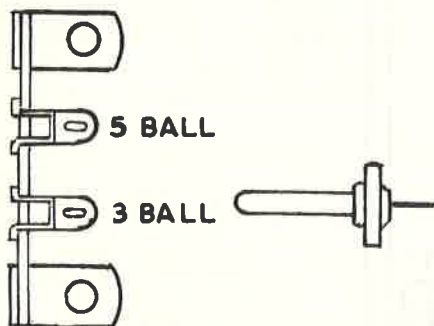
RED WIRE INTO 9000 POSITION SCORES AT 19,000.

BLUE WIRE INTO 1000 POSITION SCORES AT 21,000.

BLUE WIRE INTO 0000 POSITION SCORES AT 30,000.

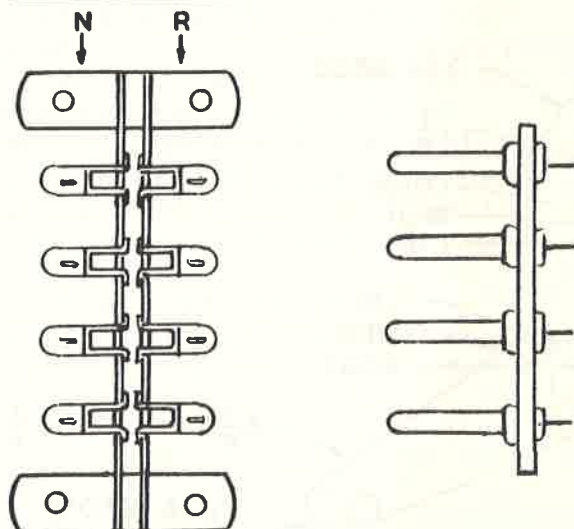


## NO. OF BALLS ADJ.



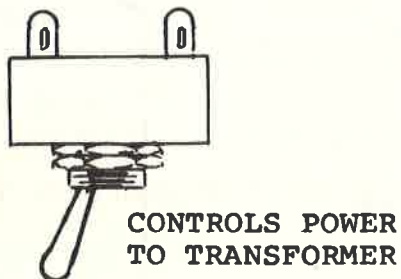
Plug changes 3 to 5 ball play, or vice versa.

## NOVELTY-REPLAY ADJ.



## MASTER ON-OFF SW.

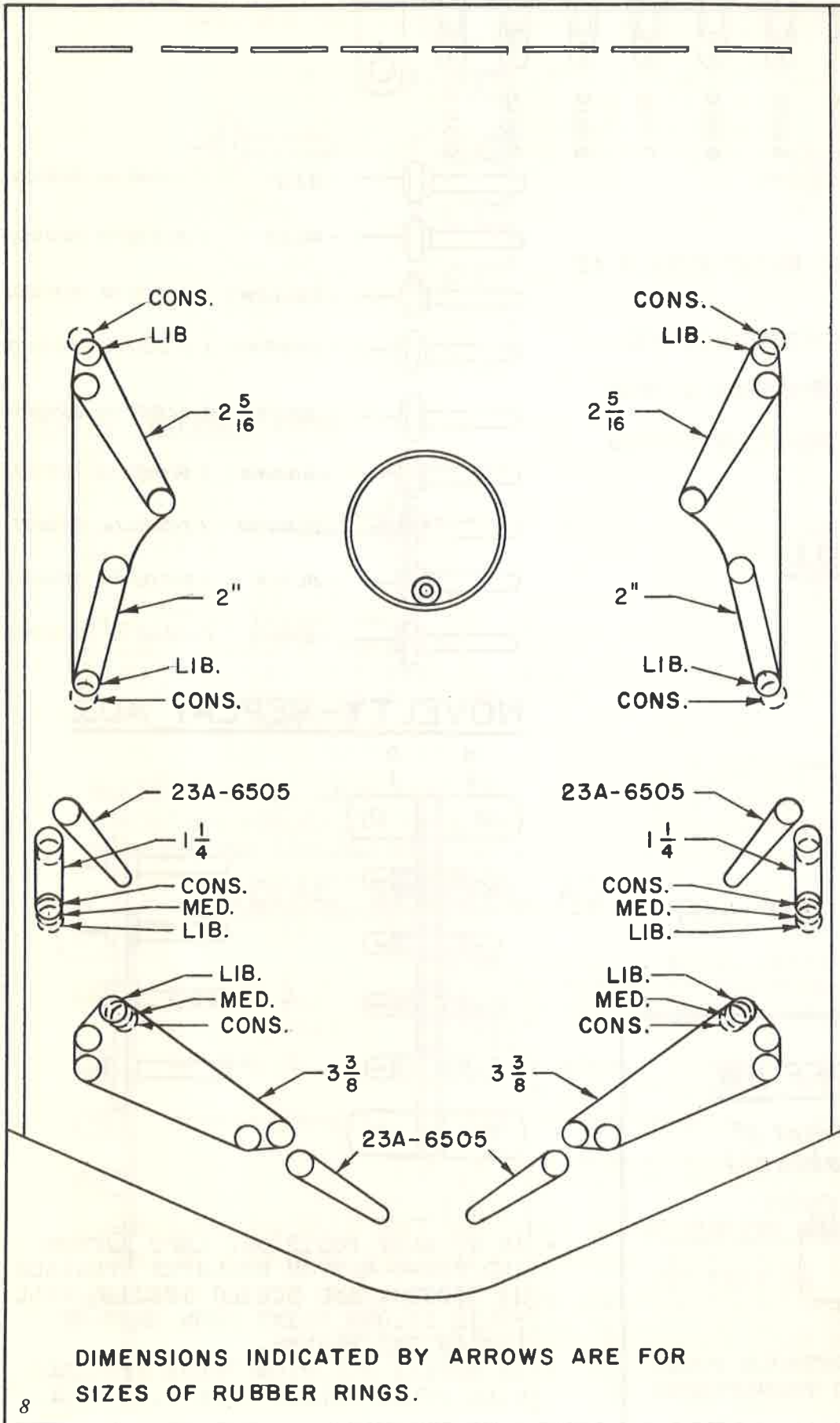
(Located under front of Cabinet)



- IN NOVELTY POSITION: LEFT BOTTOM AND RIGHT BOTTOM ROLLOVER SPECIALS, HI SCORES, AND ZODIAC SPECIAL WILL PULSE 10,000 POINT DRUM UNIT OF 1ST OR 2ND PLAYER.
- IN REPLAY POSITION: THESE SPECIALS WILL PULSE CREDIT UNIT S.U. COIL 7

# " ZODIAC " - 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

## RUBBER RING NUMBERS:

23A-6300	$\frac{5}{16}$ " I. D.
23A-6303	$1\frac{1}{4}$ " I. D.
23A-6305	2" I. D.
23A-6306	$2\frac{5}{16}$ " I. D.
23A-6308	$3\frac{3}{8}$ " I. D.

DIMENSIONS INDICATED BY ARROWS ARE FOR SIZES OF RUBBER RINGS.

30D-4621-1  
PLAYFIELD ARCH

## 1. GENERAL

NEVER EXPERIMENT with any of the mechanism. Locate any trouble with the aid of Wiring Diagrams or Operating & Servicing Information supplied with the machine, then check for proper adjustment of the units involved before making any changes. Improper adjustment or make-shift repair will only cause serious damage to other parts of the machine or repeated failure of the part.

NOTE: Always look for a possible loose wire, bad connection at a plug and socket, broken or unhooked springs on step-up units, relays, etc., before adjustments are made or wires reconnected.

## 2. FUSES

IMPORTANT: Never replace fuses with any rating other than specified on the fuse block; this block is located adjacent to the transformer.

## 3. LUBRICATION

Over-lubrication causes far more trouble in coin operated equipment than under-lubrication. Practically all cases of poor contact on switches and wiper discs are due to oil or grease, or oil vapor, which forms a film or residue on the contacts and will not allow current to pass through. Excess lubricant may also seep into clutches causing them to slip.

IMPORTANT: NEVER USE VASELINE FOR LUBRICATION OF ANY PART OF THE MACHINE. Vaseline is not a true lubricant. It leaves a dirty and gummy residue and it becomes very thick when cold. A special Coin Machine Lubricant is supplied with each machine.

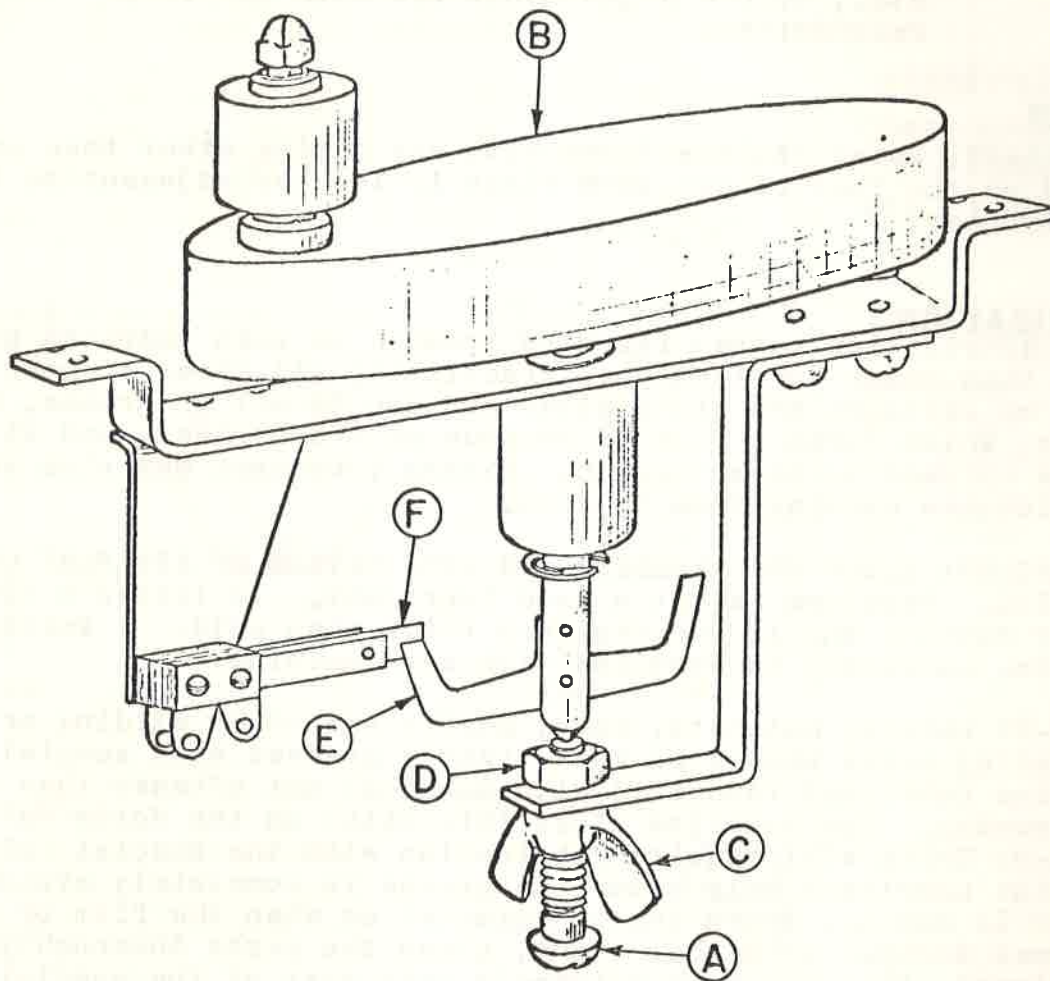
STEP-UP Levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs (biscuits) on the Motor Units and Step-up Units will require lubrication with the special Coin Machine Lubricant only after the grease is completely evaporated (3 to 12 months, depending on climate) or when the film of grease becomes dirty. In either event, clean the parts thoroughly with a solvent, then apply an extremely thin coat of the special grease.

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

## SWITCH ADJUSTMENT

BEFORE ADJUSTING SWITCHES, MAKE CERTAIN THE SCREWS HOLDING THE SWITCH STACKS ARE DOWN TIGHTLY. BAKELITE SPACERS IN THE SWITCH STACKS, DUE TO EXCESSIVE MOISTURE, HAVE OCCASIONALLY SHRUNK BY DRYING OUT, CAUSING POOR ADJUSTMENT.

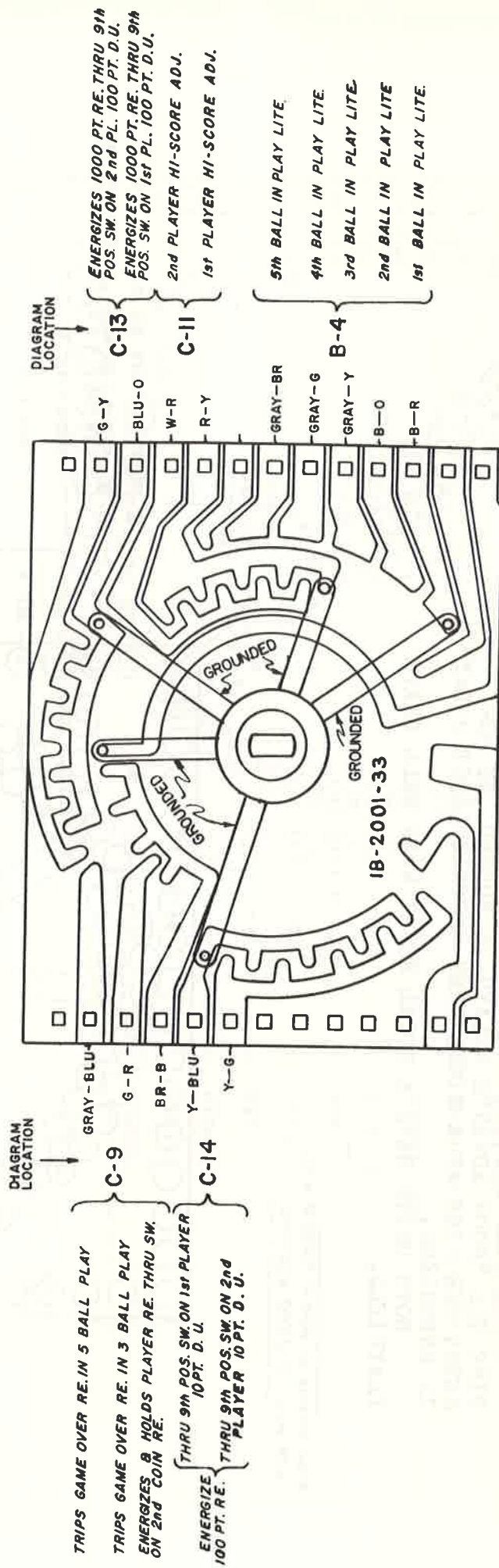
## ROTATING BUMPER UNIT ASSEMBLY



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) .

## 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

# SUN BONUS DISC & MOON BONUS DISC.

BOTH DISCS AND WIPER FINGERS ARE IDENTICAL.

EXCEPT FOR LUGS #14 & 15, WIRE COLORS ARE THE SAME.

THE SUN BONUS UNIT ADVANCES ONE STEP EACH TIME

THE "SUN ADVANCE RELAY" IS PULSED. IT RESETS, ONE

STEP AT A TIME, WHEN "SUN COLLECT RELAY" IS ENER-

GIZED.

THE MOON BONUS UNIT ADVANCES ONE STEP EACH

TIME THE "MOON ADVANCE RELAY" IS PULSED. IT RE-

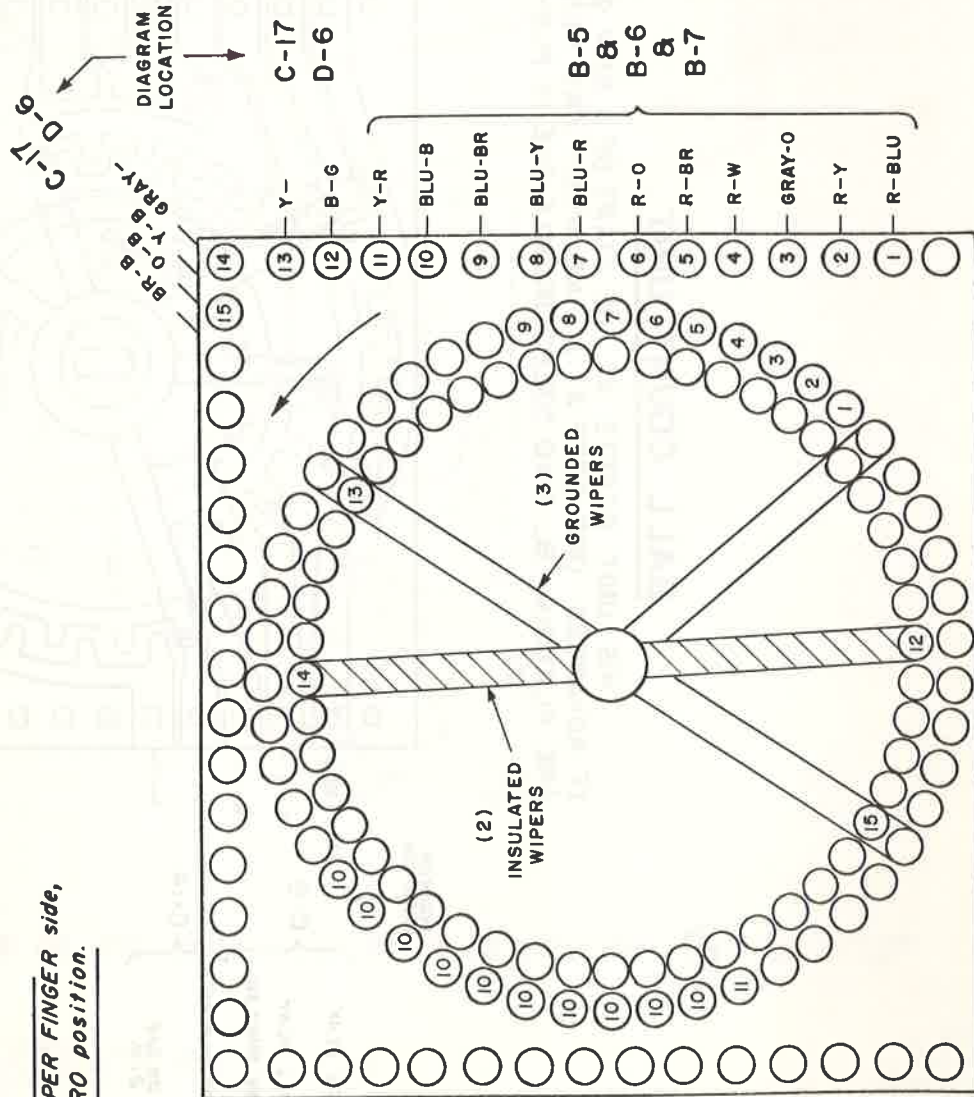
SETS, ONE STEP AT A TIME, WHEN "MOON COLLECT RELAY"

IS ENERGIZED.

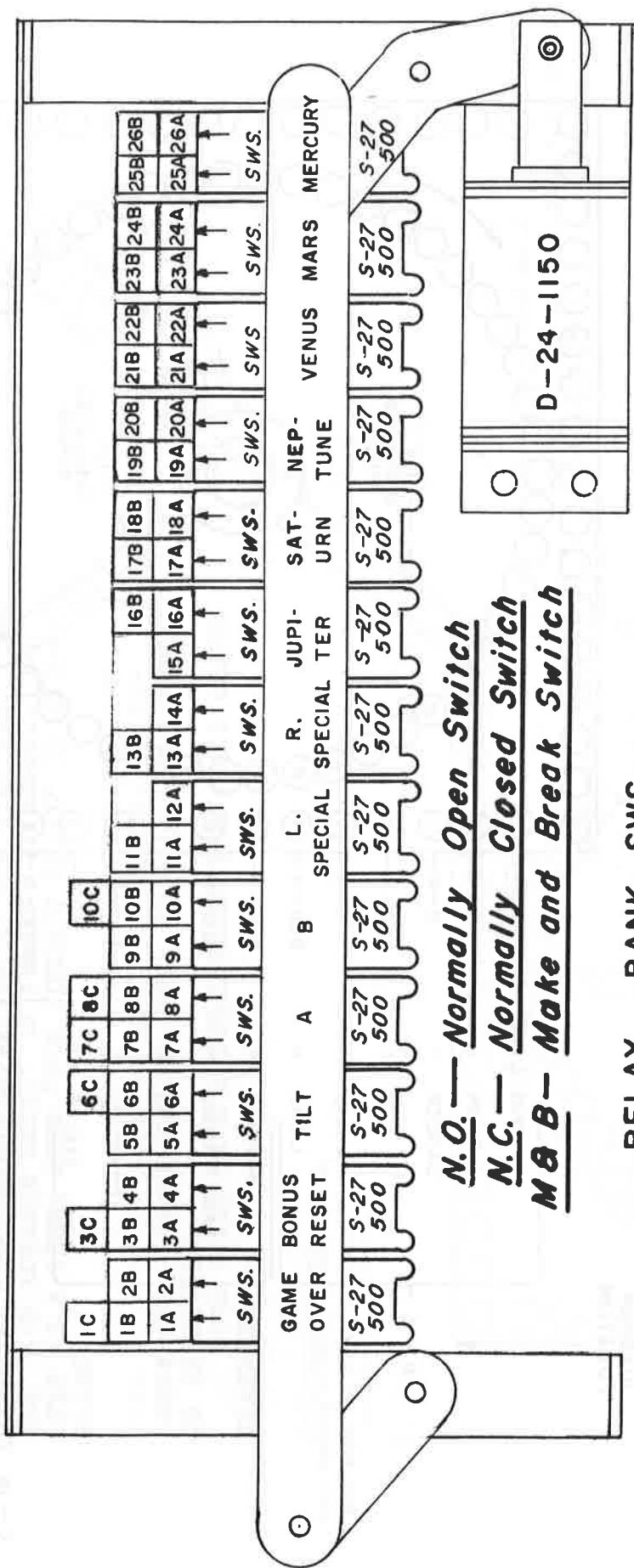
BOTH UNITS HAVE A TOTAL RESET WHEN BALL LEAVES

PLAYFIELD.

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







N.O. — Normally Open Switch  
N.C. — Normally Closed Switch  
M & B — Make and Break Switch

RELAY BANK SWS.

SUGGESTED SCORE CARDS, "ZODIAC"

5 BALL PLAY---394-12  
 3 BALL PLAY---394-10

FOR REPLAY GAMES:  
 INSTRUCTION CARDS 394-1 & 394-3

FOR NOVELTY PLAY:  
 INSTRUCTION CARDS 394-2 & 394-4

FOR 3 BALL PLAY:  
 USE INSERT CARD 16D 8615-1A.

SUGGESTED SCORE CARDS, "PLANETS"

5 BALL PLAY\*\*394-1-NY & 394-3-NY  
 3 BALL PLAY\*\*394-2-NY & 394-3-ny

WHEN EXTRA BALL FEATURE IS TAKEN  
 OUT, USE SCORE CARD 394-4-NY  
 INSTEAD OF 394-3-NY.



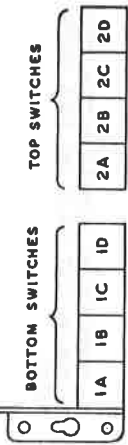
RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
GAME-OVER RELAY	1C	R-Y-W BLU-Y-W	E-9	N.C.	OPENS CIRCUITS TO PLAYFIELD SWITCHES.
	1B	BLU-W -Y-	C-5	N.O.	IN CIRCUIT TO START RELAY, THRU SWITCH ON COIN RELAY.
	1A	BLU-R W-O	C-3	N.O.	IN CIRCUIT TO COIN RELAY, THRU ZERO SWITCH ON CREDIT UNIT.
	2B	BR-Y-W -BR- B-Y	A-3	M&B	OPENS IN CIRCUIT TO "BALL IN PLAY" LITES AND CLOSES TO "GAME - OVER" LITE.
	2A	-J- -W-	A-8	N.C.	IN CIRCUIT TO PLANET LITES AND OTHER PLAYFIELD LITES.
BONUS RESET RELAY	3C	Y-BLU BLU-B	D-6	N.C.	IN CIRCUIT TO ESCAPEMENT COIL ON "SUN BONUS" UNIT.
	3B	Y-G BLU-B	C-7	N.C.	IN CIRCUIT TO ESCAPEMENT COIL ON "MOON BONUS" UNIT.
	3A	BLU-B GREY-BLU	D-6	N.C.	IN CIRCUIT TO SINGLE RESET COIL ON "SUN BONUS" UNIT.
	4B	W-R -J-	D-7	N.C.	TO BONUS RESET RELAY COIL, FROM CORN SWITCH 4B ON SCORE MOTOR.
	4A	BLU-B GREY-BR	C-6	N.C.	IN CIRCUIT TO SINGLE RESET COIL ON "MOON BONUS" UNIT.
TILT RELAY	5B	Y-G B-W O-BLU	C-10	M&B	IN SERIES WITH OUTHOLE SWITCH TO BALL RELEASE RELAY OR OUTHOLE RELAY.
	5A	-Y- Y-BR	C-10	N.C.	OPENS CIRCUIT TO BALL IN PLAY RELAY.
	6C	R-Y BLU-W	D-5	N.O.	IN CIRCUIT TO BALL UNIT S.U. COIL, THRU SWITCH ON OUTHOLE RELAY.
	6B	-J- -BLU- GREY-W	A-8	M&B	CLOSES TO TILT LITE.
	6A	GREY-G -J-	D-20	N.C.	TO TILT RELAY COIL, FROM PLUMB BOB, BALL ROLL OR SLAM TILT SWITCHES.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
"A" RELAY	7C	BR-Y W-G G-R	D-14	M&B	TO 1000 POINT RELAY OR ZODIAC ADVANCE RELAY. (THIS SWITCH IN SERIES WITH URANUS ROLLOVER SWITCH).
	7B	R-Y BLU-W	C-5	N.C.	CIRCUIT TO BALL UNIT S.U. COIL, THRU SWITCH ON OUTHOLE RELAY.
	7A	-Y- R-B	B-9	N.O.	TO "A" ROLLOVER LITE.
	8C	-J- BR-R BR-Y	D-14	M&B	OPENS IN CIRCUIT TO "A" RELAY COIL AND CLOSES TO 1000 POINT RELAY.
	8B	BR-B G-Y	D-16	N.O.	IN CIRCUIT TO "LEFT SPECIAL" RELAY.
	8A	G-B BLU-B	B-10	N.O.	TO "SAME PLAYER SHOOT AGAIN" LITE, THRU ADJUSTMENT JACK.
"B" RELAY	9B	BR-Y W-BR G-R	D-14	M&B	TO 1000 POINT RELAY OR ZODIAC ADVANCE RELAY. (THIS SWITCH IN SERIES WITH PLUTO ROLLOVER SWITCH).
	9A	-Y- BLU-B	B-10	N.O.	TO "B" ROLLOVER LITE AND PLUTO ROLLOVER LITE.
	10C	-J- BR-BLU BR-Y	D-14	M&B	OPENS IN CIRCUIT TO "B" RELAY COIL AND CLOSES TO 1000 POINT RELAY.
	10B	R-Y BLU-W	D-5	N.C.	CIRCUIT TO BALL UNIT S.U. COIL, THRU SWITCH ON OUTHOLE RELAY.
	10A	O-B G-W	D-17	N.O.	IN CIRCUIT TO "RITE SPECIAL" RELAY.
LEFT SPEC- IAL RELAY	11B	BR-Y G-O B-W	D-13	M&B	OPENS IN CIRCUIT TO 1000 POINT RELAY AND CLOSES TO CREDIT UNIT S.U. COIL.
	11A	-Y- BLU-W	B-8	N.O.	TO LEFT SPECIAL LITE.
	12A	G-Y -J-	D-16	N.C.	IN SERIES WITH SWITCH 8B ON "A" RELAY.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
RITE SPEC- IAL RELAY	13B	BR-Y R-G B-W	D-13	M&B	OPENS IN CIRCUIT TO 1000 POINT RELAY AND CLOSES TO CREDIT UNIT S.U. COIL.
	13A	-Y- BLU-O	B-8	N.O.	TO "RITE SPECIAL" LITE.
	14A	G-W -J-	D-17	N.C.	IN SERIES WITH SWITCH 10A ON "B" RELAY.
JUP- ITER RELAY	15A	-Y- R-BLU	B-9	N.O.	TO JUPITER TARGET LITE.
	16B	-J- -G- W-R	D-15	M&B	OPENS IN CIRCUIT TO JUPITER RELAY COIL AND CLOSES TO 100 POINT RELAY.
	16A	O-W B-R -J-	D-17	M&B	IN CIRCUIT TO "ADVANCE SUN" RELAY OR "SUN COLLECT" RELAY.
SAT- URN RELAY	17B	R-BLU -J-	B-9	N.O.	IN SERIES WITH SWITCH 19B ON NEPTUNE RELAY.
	17A	-Y- GREY-G	B-9	N.O.	TO "SATURN TARGET" LITE.
	18B	-J- W-BR W-R	D-15	M&B	OPENS IN CIRCUIT TO COIL IN THIS RELAY AND CLOSES TO 100 POINT RELAY.
	18A	O-W -J- -J-	D-17	M&B	IN CIRCUIT TO "ADVANCE SUN" RELAY OR "SUN COLLECT" RELAY.
NEP- TUNE RELAY	19B	GREY-O -J-	B-9	N.O.	TO "SUN TARGET" LITE.
	19A	-Y- B-BLU	B-9	N.O.	TO NEPTUNE TARGET LITE.
	20B	-J- W-O W-R	D-15	M&B	OPENS IN CIRCUIT TO COIL ON THIS RELAY AND CLOSES TO 100 POINT RELAY.
	20A	O-W -J- O-R	D-17	M&B	IN CIRCUIT TO "ADVANCE SUN" RELAY OR "SUN COLLECT" RELAY.

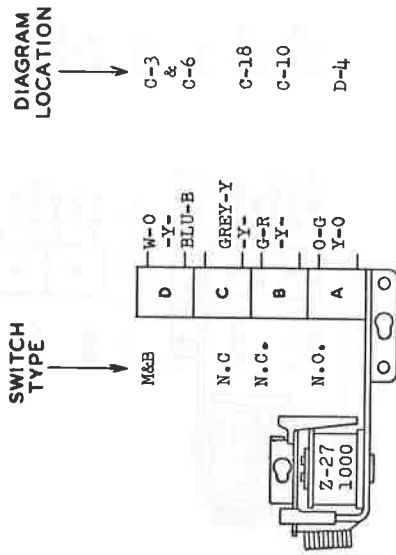
RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
VENUS RELAY	21B	Y-BLU -J-	B-9	N.O.	TO MOON TARGET LITE.
	21A	-Y- BR-O	B-9	N.O.	TO VENUE TARGET LITE.
	22B	-J- W-GREY W-R	D-15	M&B	OPENS IN CIRCUIT TO COIL ON THIS RELAY AND CLOSES TO 100 POINT RELAY.
	22A	B-Y B-O -J-	D-18	M&B	IN CIRCUIT TO "ADVANCE MOON" RELAY OR "MOON COLLECT" RELAY.
MARS RELAY	23B	Y-G -J-	B-9	N.O.	IN SERIES WITH SWITCH 21B ON VENUS RELAY.
	23A	-Y- W-B	B-9	N.O.	TO MARS TARGET LITE..
	24B	-J- BR-G W-R	D-16	M&B	OPENS IN CIRCUIT TO COIL ON THIS RELAY AND CLOSES TO 100 POINT RELAY
	24A	B-Y -J- -J-	D-18	M&B	IN CIRCUIT TO "ADVANCE MOON" RELAY OR "MOON COLLECT" RELAY.
MER- CURY RELAY	25B	-J- R-W W-R	D-16	M&B	OPENS IN CIRCUIT TO COIL IN THIS RELAY AND CLOSES TO 100 POINT RELAY.
	25A	-Y- Y-G	B-9	N.O.	TO MERCURY TARGET LITE.
	26A	B-Y -J- GREY-W	D-18	M&B	IN CIRCUIT TO "ADVANCE MOON" RELAY OR "MOON COLLECT" RELAY.

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



## SCORE MOTOR RELAY

IS ENERGIZED, AT SCORE MOTOR INDEX CAM SWITCH B, BY THE SAME CIRCUIT WHICH RUNS THE SCORE MOTOR..



OPENS IN CIRCUIT TO COIN RELAY AND COIN LOCKOUT COIL--CLOSES TO RESET THE SUN BONUS AND MOON BONUS UNITS.

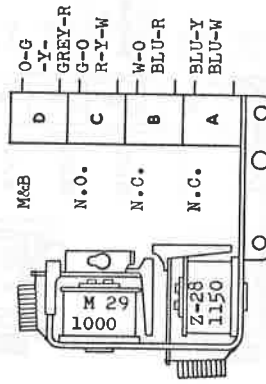
OPENS CIRCUITS TO BOTH SUN AND MOON ADVANCE RELAYS AND COLLECT RELAYS.

IN CIRCUIT TO OUTHOLE RELAY AND BALL RELEASE RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

## 2ND COIN RELAY INTERLOCK

TRIP COIL IS ENERGIZED BY COIN RELAY AT SCORE MOTOR CAM SWITCH 1B. LATCH COIL IS PULSED AT CAM SWITCH 3B BY SAME CIRCUIT THAT HOLDS IN START RELAY.



TO "1 CAN PLAY" AND "2 CAN PLAY" LITES.

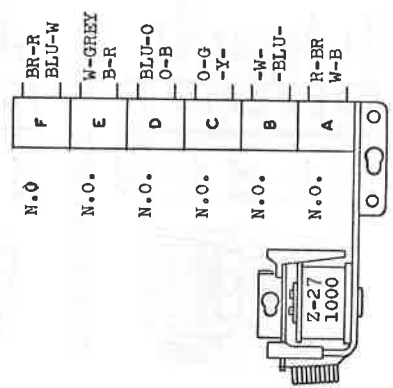
ENERGIZES PLAYER RELAY, THRU BALL UNIT DISC.

IN SERIES WITH SWITCH D ON SCORE MOTOR RELAY.

IN CIRCUIT TO BALL UNIT S.U. COIL.

## COIN RELAY

IS ENERGIZED BY COIN SWITCH. ALSO BY CREDIT BUTTON, THRU CREDIT UNIT ZERO SWITCH.



ENERGIZES START RELAY.

ENERGIZES LOCK RELAY.

ENERGIZES 2ND COIN RELAY (TRIP COIL) AND CREDIT UNIT RESET COIL.

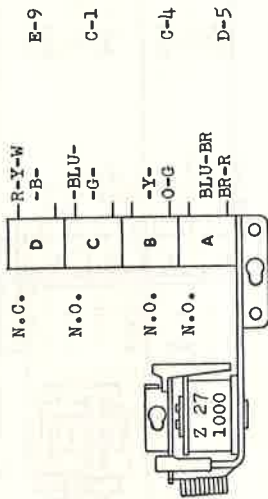
RUNS SCORE MOTOR.

ENERGIZES 110 V. BANK RESET COIL AT SCORE MOTOR CAM SWITCH 3A.

IN HOLD CIRCUIT TO THIS RELAY.

### START RELAY

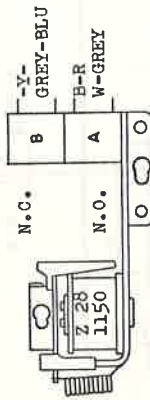
IS ENERGIZED BY COIN RELAY, THRU SWITCH ON GAME-OVER RELAY OR BALL COUNT UNIT ZERO SWITCH.



E-9 OPENS CIRCUITS TO ALL PLAYFIELD SWITCHES.  
 C-1 IN SERIES WITH SWITCH B ON COIN RELAY.  
 C-4 RUNS SCORE MOTOR.  
 D-5 IN HOLD CIRCUIT TO THIS RELAY.

### LOCK RELAY

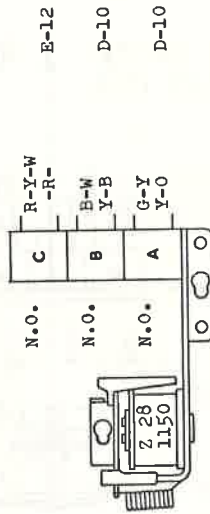
IS ENERGIZED BY COIN RELAY. CABINET BOTTOM SLAM SWITCH IS IN THIS CIRCUIT.



C-9 ENERGIZES GAME-OVER RELAY.  
 C-5 IN HOLD CIRCUIT TO THIS RELAY.

### BALL IN PLAY RELAY

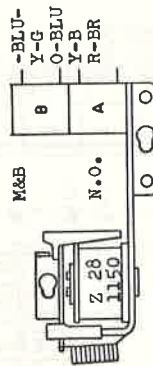
IS ENERGIZED BY BALL RELEASE RELAY, THRU SWITCH ON TILT RELAY.



E-12 OPENS CIRCUITS TO ALL PLAYFIELD SWITCHES.  
 D-10 IN "HI-SCORE" AND "ZODIAC SPECIAL" CIRCUITS TO CREDIT UNIT S.U. COIL.  
 D-10 IN HOLD CIRCUIT TO THIS RELAY.

### BALL INDEX RELAY

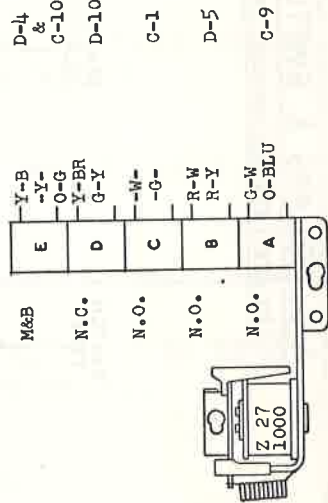
IS ENERGIZED BY 10 POINT, 100 POINT OR 1,000 POINT RELAY.



D-10 OPENS IN CIRCUIT TO BALL RELEASE RELAY AND CLOSES TO OUTHOLE RELAY.  
 D-10 IN HOLD CIRCUIT TO THIS RELAY.

### OUTHOLE RELAY

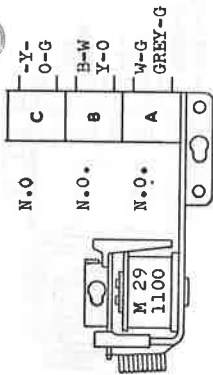
IS ENERGIZED BY OUTHOLE SWITCH, THRU SWITCH ON TILT RELAY AND BALL INDEX RELAY.



D-4 & C-10 IN SERIES WITH SWITCH A ON BALL INDEX RELAY-----ALSO RUNS SCORE MOTOR.  
 D-10 IN SERIES WITH SWITCH A ON BALL IN PLAY RELAY.  
 C-1 ENERGIZES 110 VOLT RELAY BANK RESET COIL AT SCORE MOTOR CAM SWITCH 3A.  
 D-5 IN CIRCUIT TO BALL UNIT S.U. COIL.  
 C-9 IN HOLD CIRCUIT TO THIS RELAY.

## ZODIAC SPECIAL RELAY

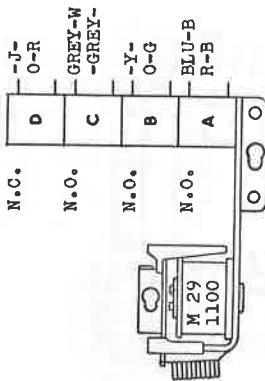
IS ENERGIZED BY LAST POSITION ON ZODIAC UNIT DISC, THRU SWITCH C ON SCORE MOTOR RELAY.



- C-4 RUNS SCORE MOTOR.
- D-11 IN CIRCUIT TO CREDIT UNIT S.U. COIL.
- D-18 IN HOLD CIRCUIT TO THIS RELAY.

## 10¢ RELAY

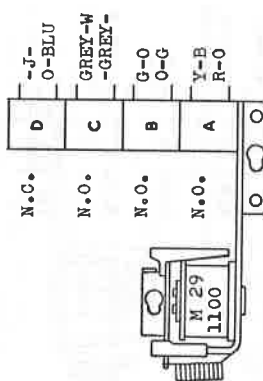
IS ENERGIZED BY 10¢ COIN SWITCH IF 10¢ ADJUSTMENT JACK IS IN "2 PLAYS FOR 1 COIN" POSITION.



- D-17 OPENS CIRCUIT TO KNOCKER COIL.
- C-8 PULSES CREDIT UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.
- D-4 RUNS SCORE MOTOR.
- D-2 IN HOLD CIRCUIT TO THIS RELAY.

## 25¢ RELAY

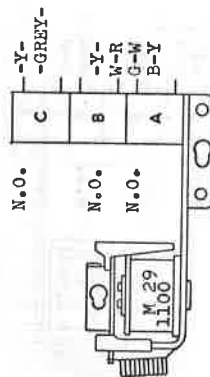
IS ENERGIZED BY 25¢ COIN SWITCH



- D-17 IN SERIES WITH SWITCH D ON 10¢ RELAY.
- D-8 PULSES CREDIT UNIT S.U. COIL, THRU IMPULSE CAM SWITCH B.
- D-3 RUNS SCORE MOTOR.
- D-3 IN HOLD CIRCUIT TO THIS RELAY.

## ADVANCE MOON RELAY

IS ENERGIZED BY MOON TARGET SWITCH, THRU VENUS, MARS OR MERCURY RELAYS.  
ALSO BY REVOLVING TARGET SWITCH, THRU CHANGE RELAY.

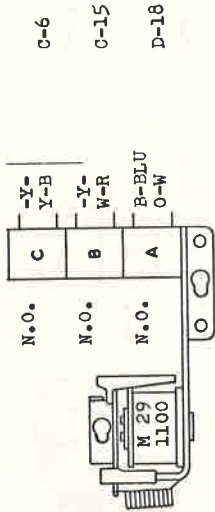


- C-6 ENERGIZES "MOON BONUS" UNIT S.U. COIL.
- C-15 PULSES 100 POINT RELAY.
- D-18 HOLD CIRCUIT, THRU END-OF-STROKE SWITCH ON MOON BONUS UNIT.

LOCATED ON PLAYFIELD

## ADVANCE SUN RELAY

IS ENERGIZED BY SUN TARGET RELAY, THRU JUPITER, SATURN OR NEPTUNE RELAYS. ALSO BY REVOLVING TARGET SWITCH, THRU CHANGE RELAY.



ENERGIZES "SUN BONUS" UNIT S.U. COIL.

PULSES 100 POINT RELAY.

HOLD CIRCUIT, THRU END-OF-STROKE SWITCH ON SUN BONUS UNIT.

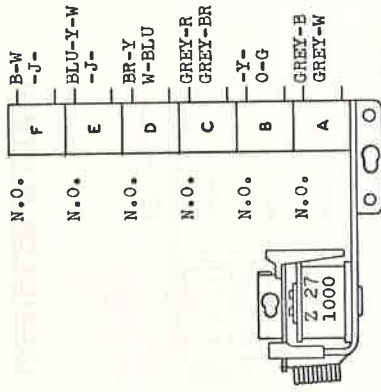
C-6

C-15

D-18

## MOON COLLECT RELAY

IS ENERGIZED BY MOON TARGET SWITCH WHEN VENUS, MARS AND MERCURY RELAYS ARE TRIPPED.



C-2

D-2

C-13

D-6

C-4

C-18

IN SERIES WITH SWITCH E ON THIS RELAY.

TO "MOON TARGET MAGNET" IN D.C. CIRCUIT.

PULSES 1000 POINT RELAY, THRU IMPULSE CAM SWITCH A.

PULSES "MOON BONUS" UNIT SINGLE RESET COIL, THRU IMPULSE CAM SWITCH C.

RUNS SCORE MOTOR.

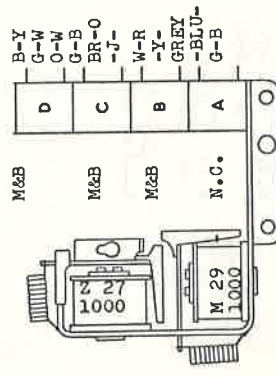
HOLD CIRCUIT, THRU ZERO SWITCH ON "MOON BONUS" UNIT.

## CHANGE RELAY

### INTERLOCK

TRIP COIL IS ENERGIZED BY MOON ROLLOVER BUTTON SWITCH.

LATCH COIL IS ENERGIZED BY SUN ROLLOVER BUTTON SWITCH.



D-18

D-16

B-8

D-16

OPENS IN CIRCUIT TO "ADVANCE SUN" RELAY AND CLOSSES TO "ADVANCE MOON" RELAY.

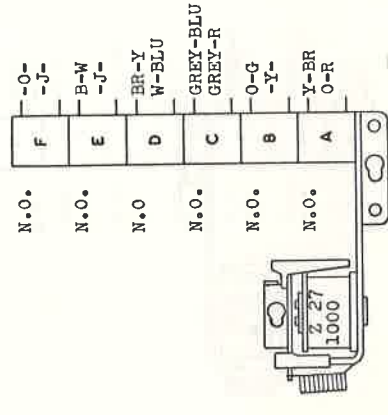
TO TRIP COIL ON THIS RELAY AND TO 10 POINT RELAY. (IN SERIES WITH MOON ROLLOVER BUTTON SWITCH).

TO MOON ADVANCE LITE AND SUN ADVANCE LITE.

TO 10 POINT RELAY. (IN SERIES WITH SUN ADVANCE ROLLOVER BUTTON SWITCH).

## SUN COLLECT RELAY

IS ENERGIZED BY SUN TARGET SWITCH WHEN JUPITER, SATURN AND NEPTUNE RELAYS ARE TRIPPED.



D-2

C-2

D-13

D-6

D-4

D-17

IN SERIES WITH SWITCH E ON THIS RELAY.

ENERGIZES "SUN TARGET MAGNET" IN D.C. CIRCUIT.

PULSES 1000 POINT RELAY THRU IMPULSE CAM SWITCH A.

PULSES "SUN BONUS" UNIT SINGLE RESET COIL, THRU IMPULSE CAM SWITCH C.

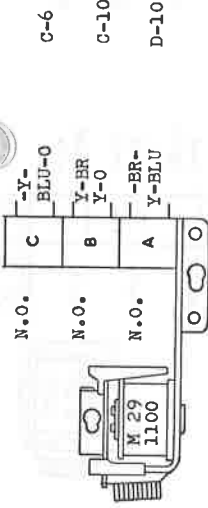
RUNS SCORE MOTOR.

HOLD CIRCUIT TO THIS RELAY, THRU ZERO SWITCH ON "SUN BONUS" UNIT.



## BALL RELEASE RELAY

IS ENERGIZED BY BALL BUTTON SWITCH (LOCATED ON TOP OF FRONT MOULDING), THRU OUTHOLE SWITCH.



ENERGIZES BALL RELEASE COIL.

ENERGIZES "BALL IN PLAY" RELAY.

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

C-6

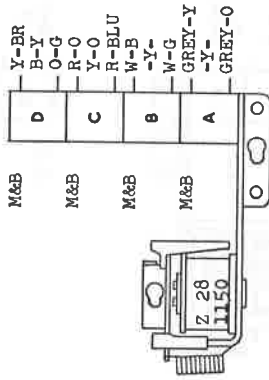
C-10

D-10

## PLAYER RELAY

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

LOCATED IN BACKBOX



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

TO 1ST & 2ND PLAYER 10,000 POINT DRUM UNIT, THRU "NOVELTY" POSITION ON ADJUSTMENT JACK.

IN CIRCUIT TO ALL SCORING DRUMS, THRU SWITCHES ON 10 POINT, 100 POINT OR 1000 POINT RELAYS.

TO 1ST PLAYER UP" OR "2ND PLAYER UP" LITES

D-11

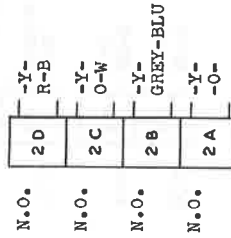
D-8

C-7

B-4

## SCORE RESET RELAY

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



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 2ND PLAYER 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

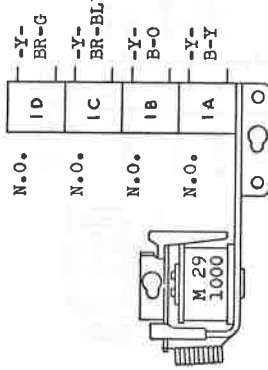
PULSES 1ST PLAYER 10 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

D-8

D-7

D-7

D-7



PULSES 2ND PLAYER 10,000 DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

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

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

PULSES 1ST PLAYER 1,000 POINT DRUM UNIT, THRU ZERO SWITCH ON THAT UNIT.

D-8

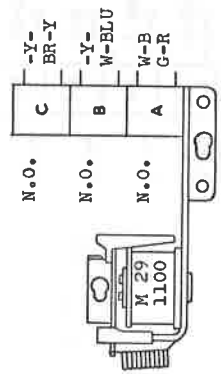
D-8

D-8

D-8

## ZODIAC ADVANCE RELAY

IS ENERGIZED BY URANUS ROLLOVER SWITCH WHEN "A" RELAY IS TRIPPED OR BY PLUTO ROLLOVER SWITCH WHEN "B" RELAY IS TRIPPED.



PULSES 1,000 POINT RELAY.

ENERGIZES ZODIAC UNIT S.U. COIL.

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

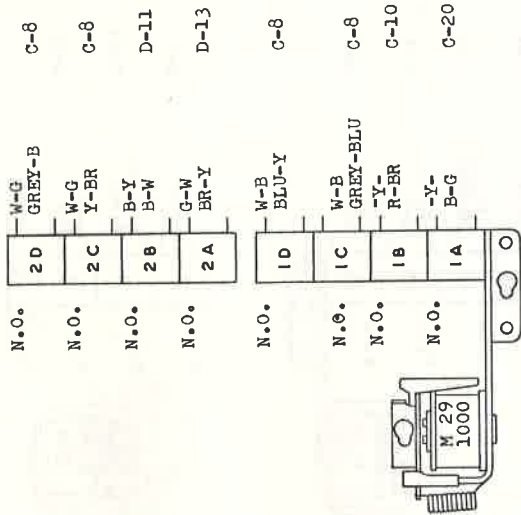
D-13

C-19

D-14

# 1000 POINT RELAY

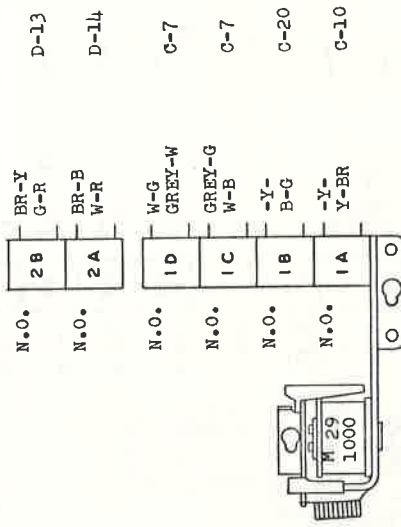
IS PULSED WHEN "SUN COLLECT" RELAY OR "MOON COLLECT" RELAY IS ENERGIZED (COLLECTING BONUS)---ALSO BY ZODIAC ADVANCE RELAY, AND AS INDICATED ON PLAYFIELD BY LEFT AND RIGHT OUTLANES, A & B ROLLOVERS, URANUS AND PLUTO ROLLOVERS, AND LEFT CENTER AND RIGHT CENTER ROLLOVERS.



C-8 PULSES 2ND PLAYER 1000 POINT DRUM UNIT, THRU PLAYER RELAY.  
 C-8 PULSES 10,000 POINT DRUM UNIT OF 2ND PLAYER, THRU 9TH POSITION SWITCH ON 1000 POINT D.U.  
 D-11 IN SERIES WITH SWITCH D ON PLAYER RELAY.  
 D-13 IN HOLD CIRCUIT TO THIS RELAY.  
 C-8 PULSES 1ST PLAYER 10,000 POINT D.U., THRU 9TH POSITION SWITCH ON THAT UNIT.  
 C-8 PULSES 1ST PLAYER 1,000 POINT DRUM UNIT.  
 C-10 ENERGIZES BALL INDEX RELAY.  
 C-20 ENERGIZES BELL COIL.

# 100 POINT RELAY

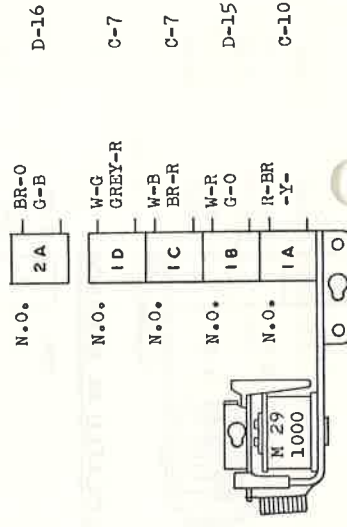
IS PULSED BY (6) SIX PLANET TARGETS, SUN ADVANCE AND MOON ADVANCE RELAYS.



D-13 PULSES 1000 POINT RELAY, THRU 9TH POSITION SWITCH ON 1ST OR 2ND PLAYER 100 POINT DRUM UNIT.  
 D-14 IN HOLD CIRCUIT TO THIS RELAY.  
 C-7 PULSES 2ND PLAYER 100 POINT DRUM UNIT.  
 C-7 PULSES 1ST PLAYER 100 POINT DRUM UNIT.  
 C-20 ENERGIZES BELL COIL.  
 C-10 ENERGIZES BALL INDEX RELAY.

# 10 POINT RELAY

IS PULSED BY MOON AND SUN ROLLOVER BUTTONS AND BY STANDUP AND KICKER SWITCHES.



D-16 IN HOLD CIRCUIT TO THIS RELAY.  
 C-7 PULSES 2ND PLAYER 10 POINT DRUM UNIT, THRU PLAYER RELAY.  
 C-7 PULSES 1ST PLAYER 10 POINT DRUM UNIT, THRU PLAYER RELAY.  
 D-15 PULSES 100 POINT RELAY, THRU 9TH POSITION SWITCHES ON 1ST OR 2ND PLAYER 10 POINT DRUM UNITS.  
 C-10 ENERGIZES BALL INDEX RELAY.