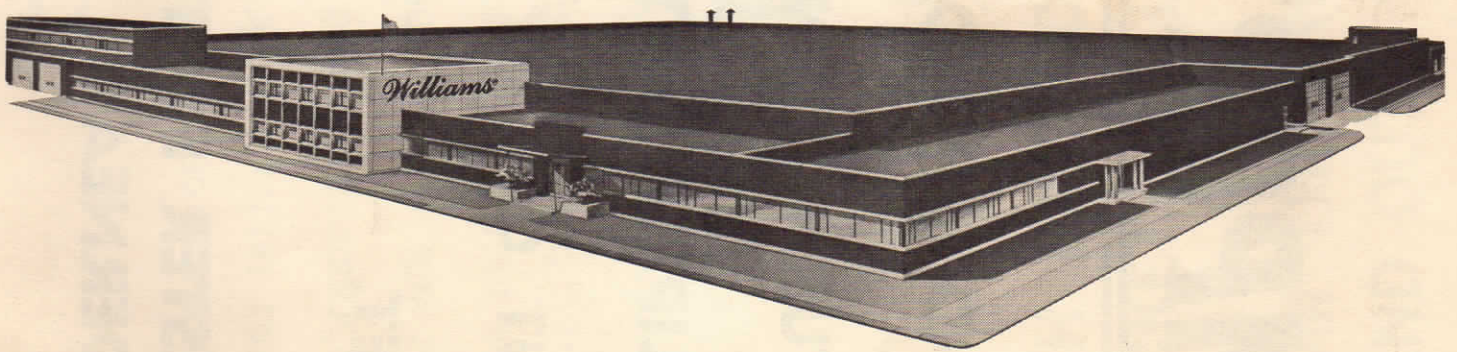


Instruction Manual

for

DAFFIE



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.**

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

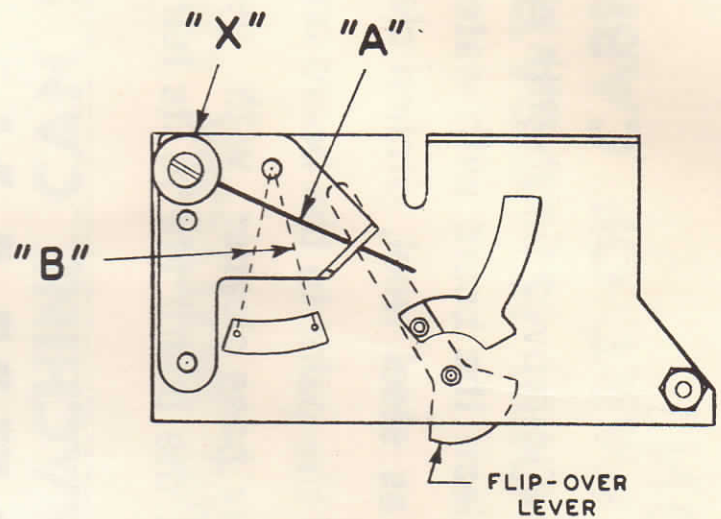
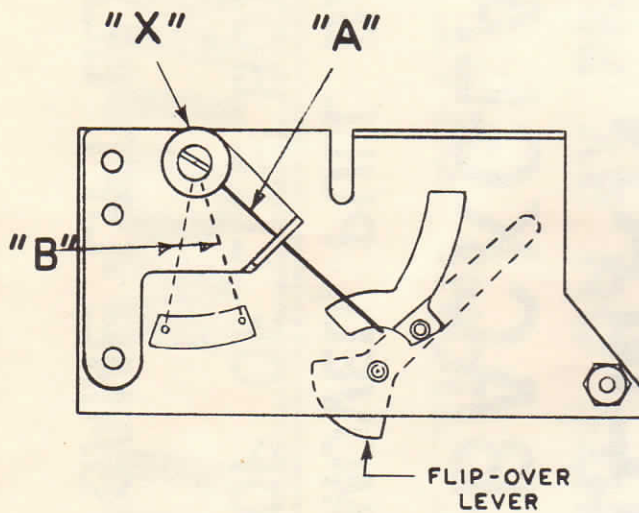
FOR 1 COIN-FOR 1 PLAY

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.

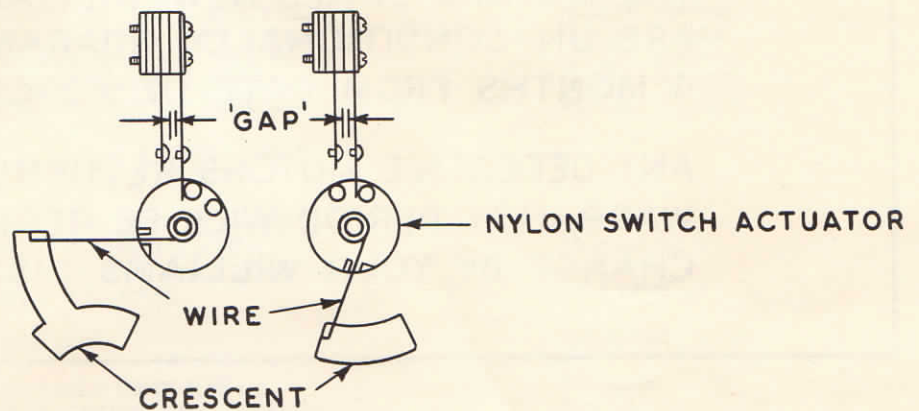
NOTE:

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.

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 "DAFFIE"

UNIT NAME	CONTACT DISC	WIPER ASSEMBLY	RATCHET GEAR ASSEMBLY	MOTORS
BALL COUNT	C-6937	C-6520-8	A-6402-9	
ADVANCE	C-6417	C-6521	A-6404-8	
TENS	B-6297	A-6294	3C-7128	14A-7805 (60 CYCLE)
HUNDREDS	-----	-----	3C-7128	14A-7806 (60 CYCLE)
THOUSANDS	-----	-----	3C-7128	
TEN THOUSANDS	B-6297	A-6294	3C-7128	

"DAFFIE" 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 6773	TRANSFORMER - 50 CYCLE	MECH. PANEL
B 6396	24 VOLT METER (Coil XM 27-675)	MECH. PANEL

SOLENOID COILS

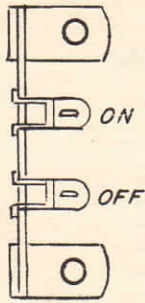
A 22-550	ADVANCE UNIT STEP UP FLIPPER UNIT LATCH BALL COUNT UNIT STEP UP BALL RELEASE	INSERT PLAYFIELD INSERT PLAYFIELD
A2-23-750	KNOCKER	CABINET
B 26-800	ADVANCE UNIT RESET BALL COUNT UNIT RESET SCORE DRUM UNITS ... (4 req'd.)	INSERT INSERT INSERT
C 2-26-800	CHIME SMALL BELL	INSERT CABINET
FL 21-375/ 28-400	FLIPPERS ... (2 req'd.)	PLAYFIELD
D 24-1600	BANK RESET	PLAYFIELD
G 23-750	AUTO KICKERS ... (2 req'd.)	PLAYFIELD
G 22-550	JET BUMPERS ... (4 req'd.) CENTER TARGET	PLAYFIELD PLAYFIELD

RELAY COILS

M1-25-400	FLIPPER UNIT TRIP	PLAYFIELD
M 29-1000	GAME TRIP GAME OVER TRIP 5,000 CONTROL RELAY TRIP	MECH. PANEL MECH. PANEL PLAYFIELD
M 29-1100	NO. 1 BUMPER NO. 2 BUMPER 5,000 RELAY TROUGH RELAY TARGET RELAY 10 POINT 100 POINT 1,000 POINT 5,000 CONTROL RELAY LATCH	PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD PLAYFIELD INSERT INSERT INSERT PLAYFIELD
M 30-1300	GATE	PLAYFIELD
M 30-1400	CHANGE	PLAYFIELD
M1-31-1500	COIN LOCKOUT	DOOR
Z 27-1000	COIN OUTHOLE RESET GAME LATCH GAME OVER LATCH 3,000 RELAY 2 PLAY	MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL MECH. PANEL
Z 28-1150	LOCK CREDIT	MECH. PANEL MECH. PANEL
Z 28-1200	BALL INDEX	MECH. PANEL
S 27-500	RELAY BANK ... (5 req'd.)	PLAYFIELD

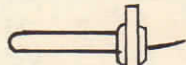
LOCATED ON MECH. PANEL

Motor Service Jack



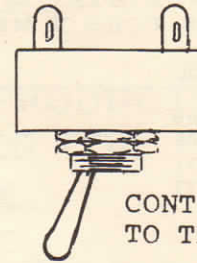
INSERT PHONE TIP IN 'OFF' POSITION - CAMS CAN BE TURNED BY HAND TO CHECK

ADJUSTMENT OF SWITCHES.



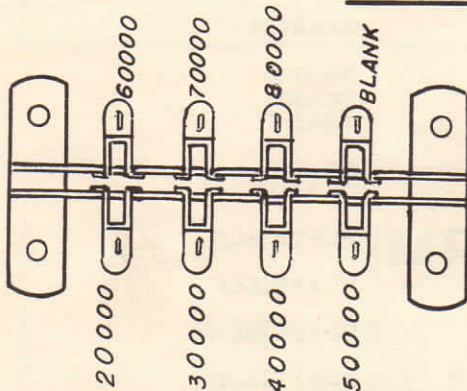
MASTER ON-OFF SW.

(Located under front of Cabinet)

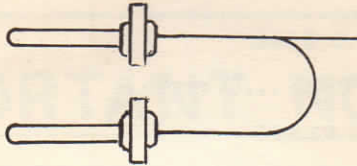


CONTROLS POWER TO TRANSFORMER

ADJUSTMENTS IN BACKBOX



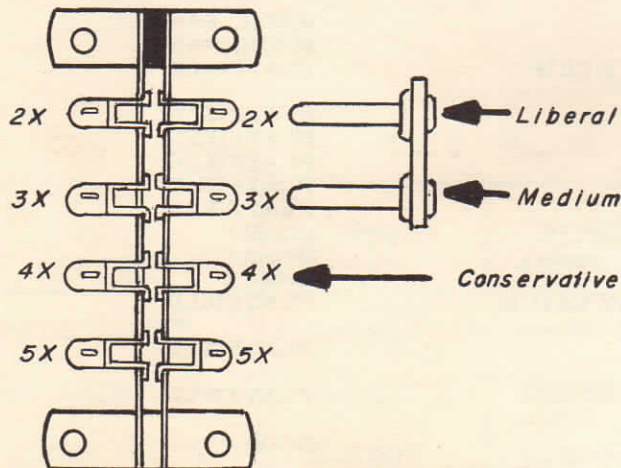
HI-Score Adjustment



INSERT PLUGS INTO 8 POINT FEMALE AT DESIRED POSITIONS.

EXAMPLE:

PLUG INTO 3,000 POSITION SCORES AT 3,000.



GATE SPECIAL ADJUSTMENT

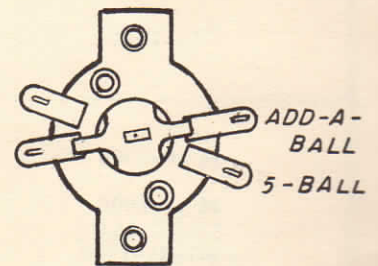
BALL GOING THRU OPEN GATE SCORES SPECIAL WHEN THE FOLLOWING X'S ARE LIT:

LIBERAL-2X OR 3X

MEDIUM-3X OR 4X

CONSERVATIVE-4X OR 5X

ADD-A-BALL ADJUSTMENT

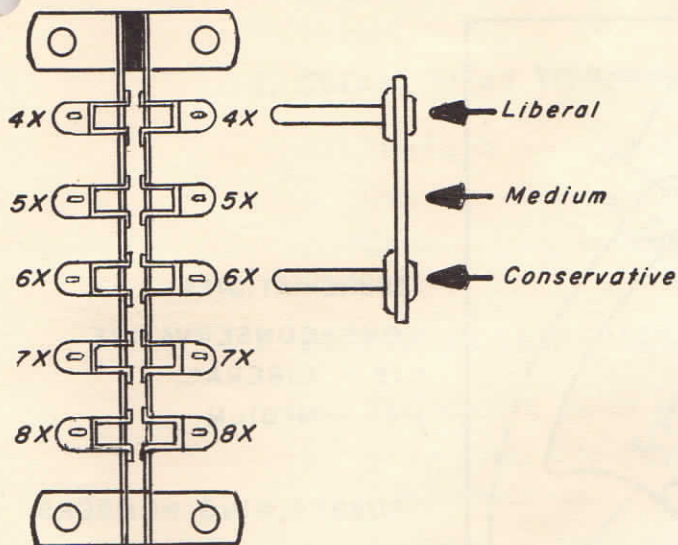


ADD-A-BALL POSITION: SCORES EXTRA BALLS WHEN MAKING "SPECIALS" OR HI-SCORES AS INDICATED.

5 BALL POSITION GAME SETS UP FOR 5 BALLS AND SCORES 10,000 POINTS WHEN MAKING "SPECIALS". IN THIS POSITION, THERE ARE NO SPECIALS AWARDED FOR HI-SCORE.

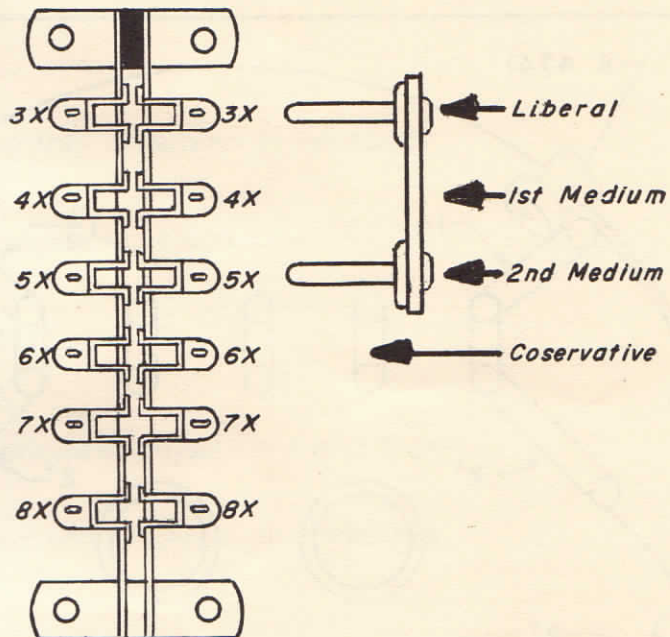
ADJUSTMENTS IN BACKBOX

BOTTOM ROLL OVER SWITCHES SPECIAL ADJUSTMENT



TWO BOTTOM ROLLOVER LANES LITE
FOR SPECIAL AS FOLLOWS:
LIBERAL-WHEN 4X OR 6X IS LIT.
MEDIUM-WHEN 5X OR 7X IS LIT.
CONSERVATIVE-WHEN 6X OR 8X IS LIT.

AUTOMATIC SPECIAL ADJUSTMENT



A SPECIAL IS REGISTERED WHEN
MAKING THE FOLLOWING X'S:
LIBERAL-3X-ALSO 5X
1ST MEDIUM-4X-ALSO 6X
2ND MEDIUM-5X-ALSO 7X
CONSERVATIVE-6X-ALSO 8X

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.

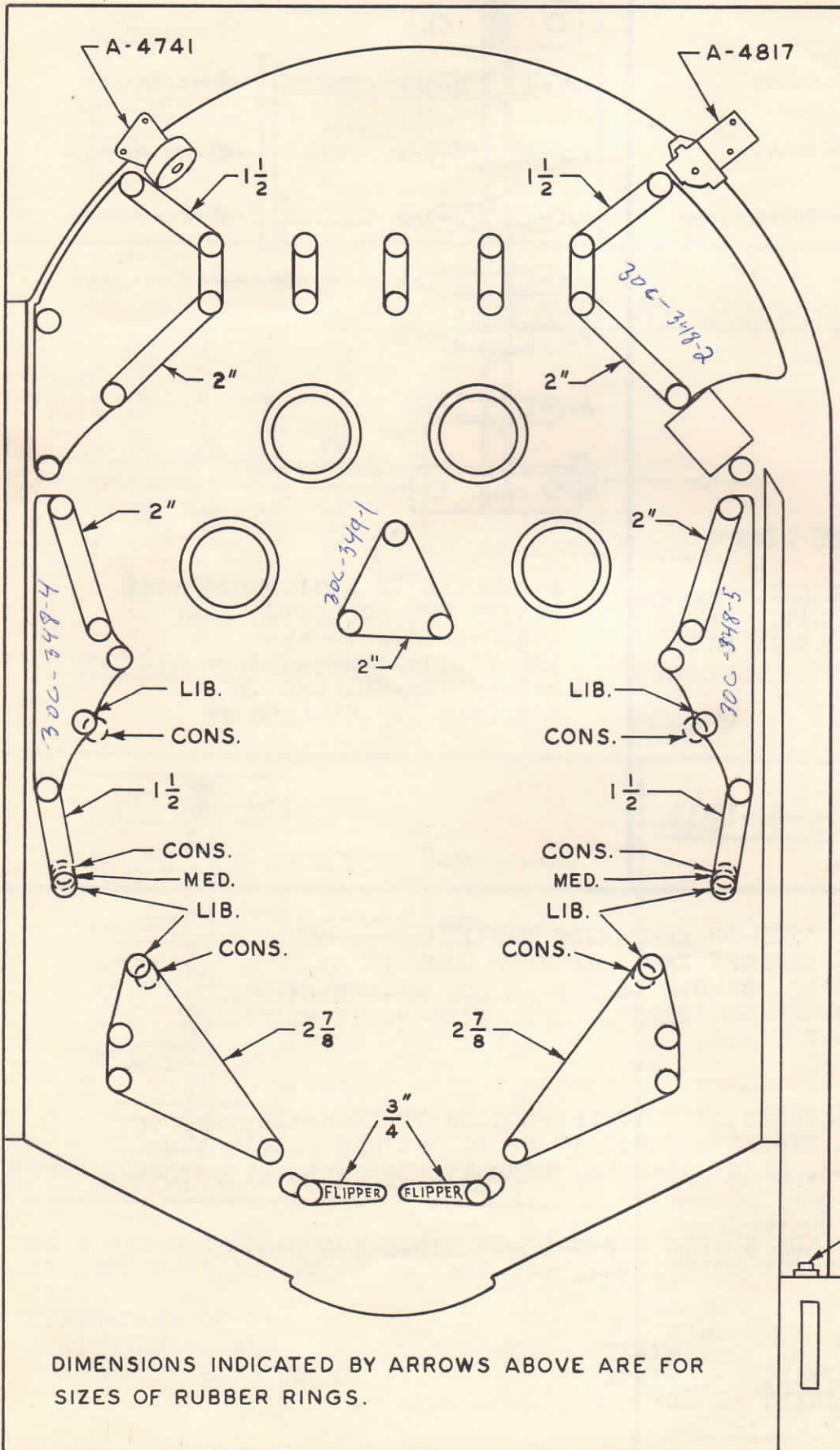
LEG LEVELERS:
ARE PROVIDED FOR TWO PURPOSES, 1ST TO LEVEL GAME ON LOCATION, 2ND TO
INCREASE PITCH FOR GAME PERCENTAGING. IF IT IS DESIRED TO SPEED UP
PLAY AND DECREASE SCORES, RAISE REAR LEG LEVELERS TO INCREASE PITCH.

SUGGESTED SCORE CARDS:
ADD-A-BALL PLAY: USE CARDS NUMBERED 349-1 AND 349-3 AND 349-7.
5 BALL PLAY: USE CARD NUMBER 349-4.

SUGGESTED ADJUSTMENTS:
GATE SPECIAL ADJUSTMENT 2X-3X
AUTOMATIC SPECIAL ADJUSTMENT 5X-7X
BOTTOM R.O. LANES ADJUSTMENT 6X

"DAFFIE" — 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 5/16" I.D.
 23A-6301 3/4" I.D.
 23A-6304 1 1/2" I.D.
 23A-6305 2" I.D.
 23A-6307 2 7/8" I.D.

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

23A-6327-BALL SHOOTER
 RUBBER TIP

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

SUGGESTED TIPS FOR PEAK COLLECTIONS

1. CLEAN, NEAT EQUIPMENT:

- a. Playfields — clean semi-monthly or sooner if necessary.
- b. Cabinet — same as above.
- c. Glass — ask location to cooperate, clean daily.

2. PROPER WORKING EQUIPMENT:

- a. Replace lite bulbs if blown.
- b. Bring game into shop for periodical adjustment and thorough check-up.
- c. Rubbers — clean or replace often, keeps playfield live.

3. ROTATE GAMES:

- a. Cash box should indicate time for change, however eight weeks is the usual peak player interest.

Remember: to keep player interest high - **Rotate, Rotate Rotate**. Playing games is a habit. Don't let your players lose it.

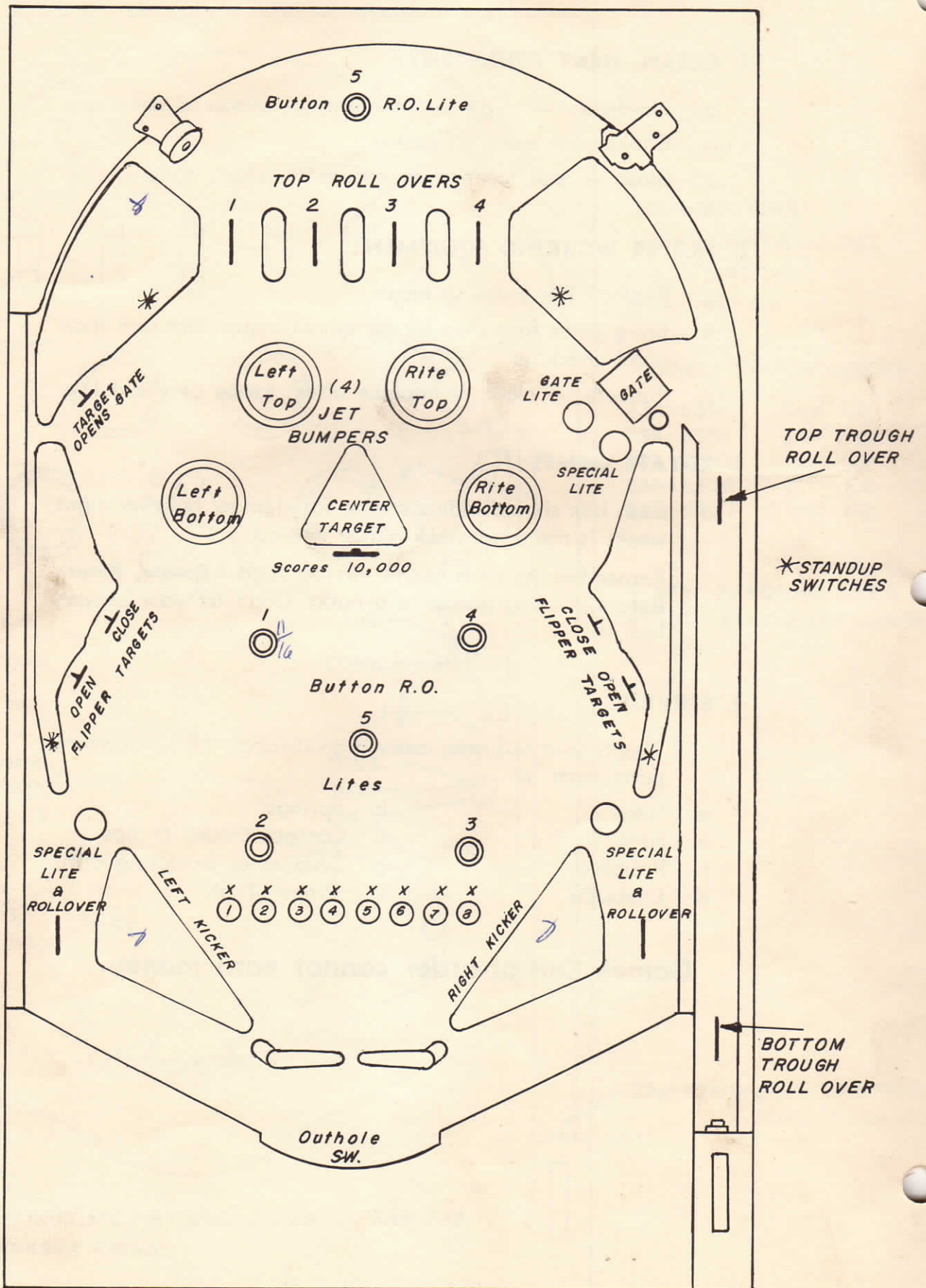
4. SERVICE:

This is your business; carry a good supply of replacement parts such as:

- | | |
|--------------|------------------------------|
| a. fuses | e. Springs |
| b. coils | f. Contact blades & tips |
| c. Rubbers | g. Step-up or actuating arms |
| d. Litebulbs | h. Proper Tools |

Games Out-of-order cannot earn money.

PLAYFIELD LAYOUT SHOWING LOCATIONS OF TARGETS, ROLL OVERS, AND JET BUMPERS



"DAFFIE"

"DAFFIE" OPERATES AS FOLLOWS:

FOUR TOP ROLLOVER LANES, TOP ROLLOVER BUTTON, AND FIVE BOTTOM ROLLOVER BUTTONS TRIP THE NUMBERED RELAY AS INDICATED. TRIPPING ALL FIVE RELAYS ON THE RELAY BANK WILL ENERGIZE THE 3000 RELAY AND SCORE AN X. BALL GOING THRU OPEN GATE WILL ALSO ENERGIZE THE 3000 RELAY, BUT WILL NOT SCORE AN X. HITTING THE TOP LEFT TARGET WILL OPEN GATE. CENTER TARGET SCORES 5000 POINTS; THIS TARGET RESETS EVERY TIME AN "X" IS SCORED.

SPECIALS ARE SCORED AS FOLLOWS:

- 1.) BALL GOING THRU OPEN GATE WHEN GATE "SPECIAL" LITE IS ON.
 - 2.) BALL GOING THRU LEFT OR RIGHT BOTTOM ROLLOVER LANES WHEN "SPECIAL" LITE IS ON.
 - 3.) SCORING ANOTHER X WHEN "NEXT X SCORES SPECIAL" LITE IS ON.
- THESE "SPECIAL" LITES ARE CONTROLLED BY THE ADJUSTMENT JACKS AS SHOWN ON PAGES 6 AND 7.

SPECIALS ARE ALSO REGISTERED BY HI-SCORES AS INDICATED.

FOR THE VARIOUS SCORING VALUES OF JET BUMPERS, TARGETS, ROLLOVERS ETC., REFER TO EXPLANATIONS OF 10 POINT RELAY, 100 POINT RELAY AND 1000 POINT RELAY.

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

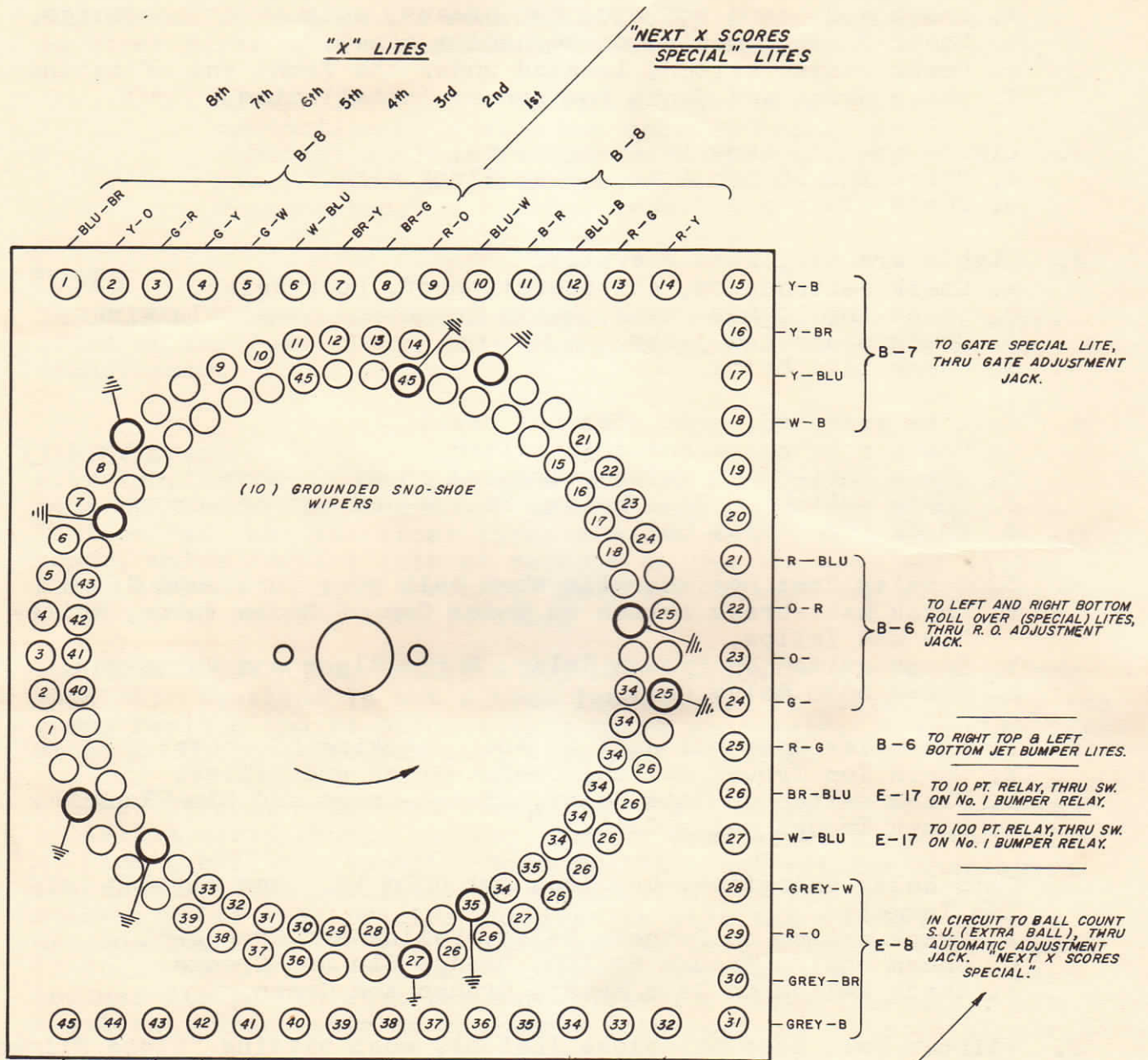
Where relay adjustments are called for, before bending blades, in all cases, on any machine, make certain that the screws holding the switch stacks are down very tightly. This is suggested because the plastic spacers in the switch stacks have occasionally shrunk by drying out, causing a poor adjustment.

WHAT TO DO IF:

1. Lights are out, game is inoperative:
 - a. Check A.C. cord and plug for breaks, cuts or other damage.
 - b. Check fuses, located on mechanism panel.
 - c. Check master switch, located under the front end of cabinet.
 - d. Check plugs and jacks for proper installation.
2. Lights are on, game is inoperative:
 - a. Check the 15 Amp fuse, heavy Black wire.
 - b. Check plugs and jacks.
3. Lights are out, game operates:
 - a. Check switches on, and operation of, Lock Relay.
 - b. Check the 10 AMP fuses, heavy Brown and heavy Blu wires.
 - c. Check plugs and jacks.
 - d. Check lite bulbs.
4. Coin is accepted, game does not reset:
 - a. Check coin chute and coin switch.
 - b. Check Anti-Cheat switch, located on front door.
 - c. Check switch on Game Relay, Yellow-Red and Red-Orange.
 - d. Check Coin Relay Coil.
5. 3000 Relay does not energize when ball goes thru open Gate:
 - a. Check make-break switch on Index Cam of Score Motor, White-Blu and Yellow.
 - b. Check switch on Trough Relay, White-Black and White-Blu.
 - c. Check 3000 Relay Coil.
6. Trough Relay does not pull in when checking 5B above:
 - a. Check Top Trough Switch, Orange-Green and Yellow.
 - b. Check switch on Gate Relay, Orange-Green and Blu-Black.
 - c. Check Trough Relay Coil.
7. Gate Relay energizes, but does not hold in, when hitting Left Top Target:
 - a. Check switch on Outhole Relay, Yellow and Orange-Blu.
 - b. Check Bottom Trough Switch, Orange-Blu and Orange.
 - c. Check switch on Gate Relay, Orange and Green.
8. Flipper Unit does not close (Latch), when hitting "Close Flippers" Target:
 - a. Left or Right ("Close Flippers") Target switch should energize Target Relay.
 - b. Target Relay should remain energized thru switch on Target Relay (Red-Orange and Red-Black) and E.O.S. switch on Flipper Unit.
 - c. Flipper Unit Latch Coil is energized by switch on Target Relay, Red-Brown and Yellow.
 - d. As Flipper Unit Latches completely, End-Of-Stroke switch opens, causing the Target Relay to drop out.

ADVANCE S. U. DISC

THIS UNIT ADVANCES ONE STEP EACH TIME THE No. 1 THRU No. 5 RELAYS ARE TRIPPED. IT HAS A COMPLETE RESET AT THE START OF A GAME. (RESET CYCLE)



TO RIGHT BOTTOM & LEFT TOP-JET BUMPER LITES

IN CIRCUIT TO BALL COUNT S.U. (EXTRA BALL) THRU GATE ADJUSTMENT JACK

IN CIRCUIT TO BALL COUNT S.U. (EXTRA BALL) THRU LEFT OR RIGHT BOTTOM ROLLOVER

ENERGIZES 100 PT. RE. THRU SW. ON No. 2 BUMPER

ENERGIZES 10 PT. RELAY THRU SWITCH ON No. 2 BUMPER RELAY.

SAME NOTE APPLIES.

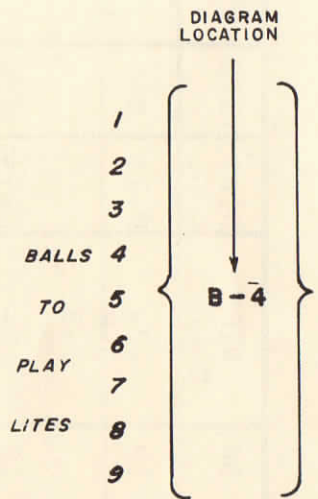
View looking at SNO-SHOE WIPER side with wiper in ZERO POSITION

BALL COUNT S. U. DISC

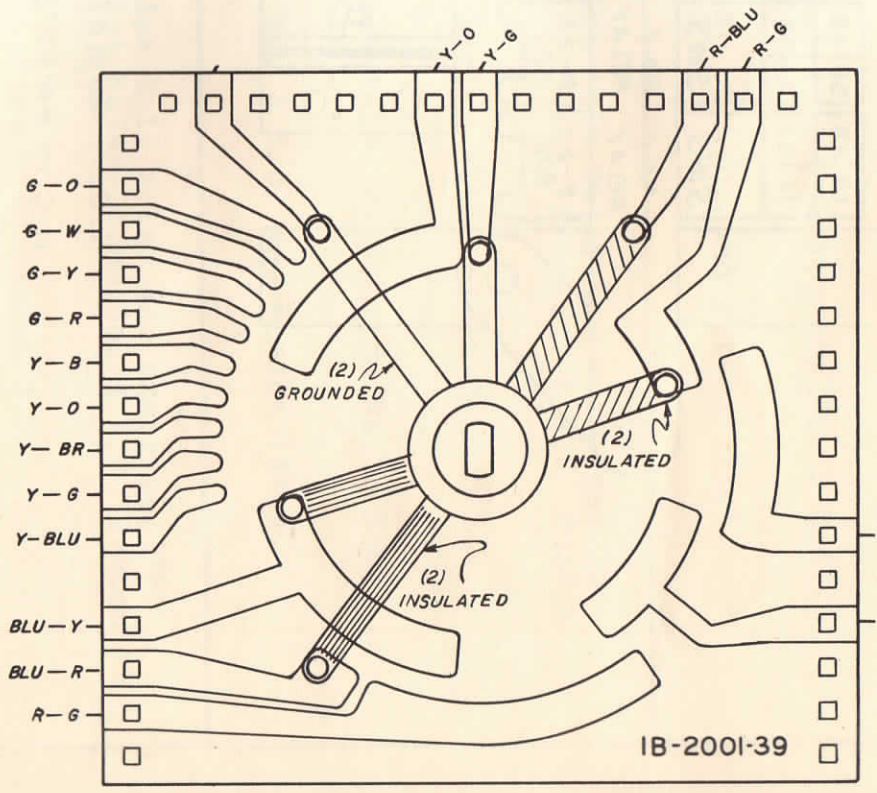
THIS UNIT ADVANCES FIVE STEPS AT START OF NEW GAME. IT RESETS ONE STEP EACH TIME THE BALL LEAVES THE PLAYFIELD (MAKES THE OUTHOLE SWITCH). THIS UNIT ALSO ADVANCES ONE STEP THRU ADJUSTMENT JACKS, WHEN SCORING A 'SPECIAL' OR HIGH SCORE. THE ADJUSTMENT JACK EXPLANATIONS ARE FOUND IN THE FORWARD PART OF THIS MANUAL.

View looking at WIPER FINGERS side
with WIPER in ZERO position

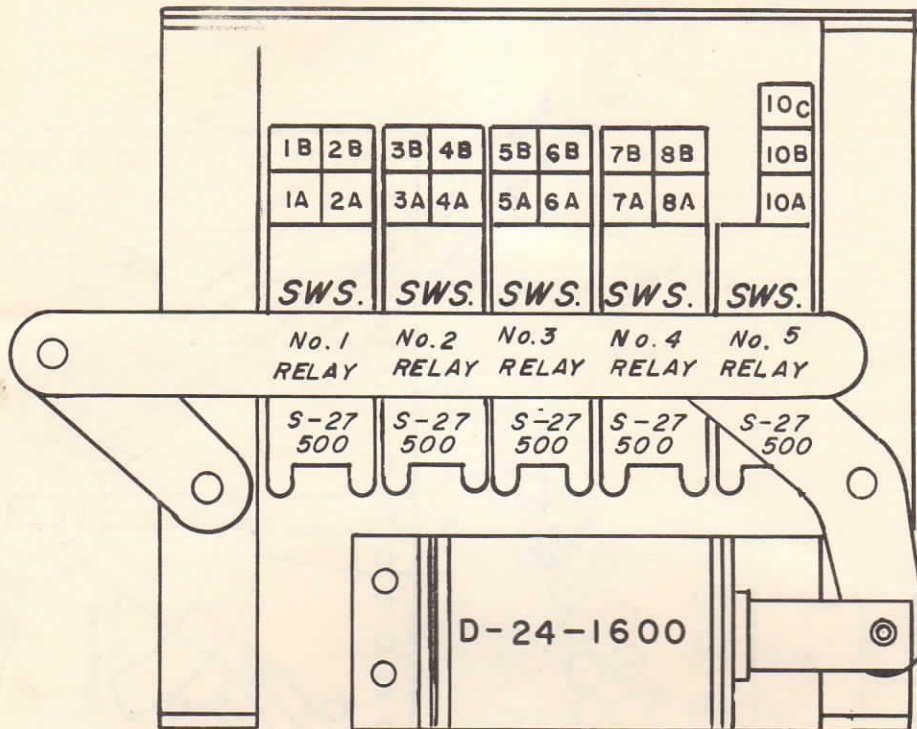
DIAGRAM LOCATION
C-4 TO TILT LITE
C-4 TO GAME OVER LITE
D-6 TO GAME RELAY (LATCH COIL)
D-6 FEED TO R-BLU FROM SW. ON COIN RELAY



FEEDS BLU-R & R-G (BELOW) FROM BALL INDEX & OUTHOLE RELAY SWITCHES. E-7
TO GAME OVER RELAY (TRIP COIL) E-7
TO GAME OVER RELAY (LATCH COIL) E-7



RELAY BANK SWS.



N. O. — *Normally Open Switch*

N. C. — *Normally Closed Switch*

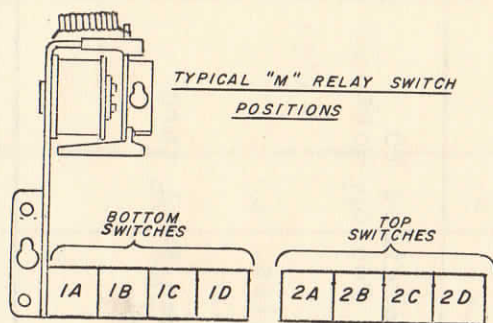
M & B — *Make And Break Switch*

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 1 RELAY	1B	-J- O-R G-B	F-15	M&B	Trips this relay and energizes 10 Point Relay, from No. 1 R.O. Button switch.
	1A	-Y- -J-	D-14	N.O.	In series with switch 3A.
	2B	-J- Y-BR	F-15	N.C.	Trips this relay, from No. 1 R.O. switch.
	2A	GREY-O -J-	C-10	N.C.	To No. 1 R.O. and Button lites.

RELAY	SW.	WIRE COLORS	DIAG. LOC.	TYPE	SWITCH OPERATION
NO. 2 RELAY	3B	-J- G-Y -J-	F-15	M&B	Trips this relay and energizes 10 Point Relay, from No. 2 R.O. Button switch.
	3A	-J- -J-	D-14	N.O.	In series with switch 5A.
	4B	-J- Y-O	F-15	N.C.	Trips this relay, from No. 2 R.O. switch.
	4A	-J- GREY-W	C-10	N.C.	To No. 2 R.O. and Button lites.
NO. 3 RELAY	5B	-J- BLU-R -J-	F-15	M&B	Trips this relay and energizes 10 Point Relay, from No. 3 R.O. Button switch.
	5A	-J- -J-	E-14	N.O.	In series with switch 7A.
	6B	-J- BLU-W	F-15	N.C.	Trips this relay, from No. 3 R.O. switch.
	6A	-J- GREY-G	C-11	N.C.	To No. 3 R.O. and Button lites.
NO. 4 RELAY	7B	-J- G-R -J-	F-16	M&B	Trips this relay and energizes 10 Point Relay, from No. 4 R.O. Button switch.
	7A	-J- -J-	E-14	N.O.	In series with switch 10A.
	8B	-J- O-B	F-16	N.C.	Trips this relay, from No. 4 R.O. switch.
	8A	-J- GREY-Y	C-11	N.C.	To No. 4 R.O. and Button lites.
NO. 5 RELAY	10C	-J- W-G -J-	F-16	M&B	Trips this relay and energizes 10 Point Relay, from No. 5 Top or Bottom R.O. Button switch.
	10B	GREY-BLU -J-	C-11	N.C.	To No. 5 R.O. Button lites.
	10A	-J- W-B	F-14	N.O.	Energizes 3000 Relay when No. 1 thru No. 5 Relays are tripped.

A. C. RELAYS & SWITCHES

On Mechanism Panel



GAME RELAY

(Interlock)

LATCH COIL IS ENERGIZED BY THE COIN RELAY, THRU THE BALL COUNT UNIT DISC.
TRIP COIL IS ENERGIZED BY THE 1000 POINT RELAY OR GAME OVER RELAY.

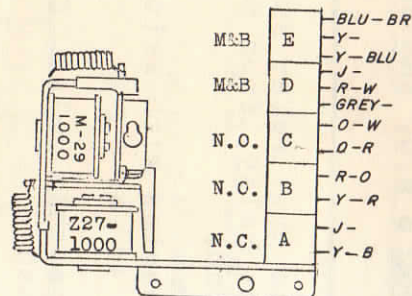


DIAGRAM LOCATION



C-3

E-8

E-7

D-2

F-8

OPERATION

IN HOLD CIRCUIT TO COIN RELAY---ALSO ENERGIZES RESET RELAY, THRU SWITCH ON LOCK RELAY.

ENERGIZES BALL COUNT RESET AND S.U. COILS. (DURING RESET CYCLE).

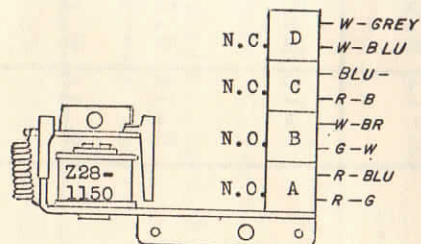
IN CIRCUIT TO BALL COUNT RESET COIL, WHEN BALL MAKES OUTHOLE SWITCH.

IN CIRCUIT TO COIN RELAY, THRU COIN SWITCHES OR REPLAY BUTTON.

IN CIRCUIT TO GAME RELAY (TRIP COIL), FROM SWITCH ON 1000 POINT RELAY.

CREDIT RELAY

THIS RELAY IS USED ONLY ON GAMES WITH 2 PLAYS FOR 1 COIN FEATURE.
IT IS ENERGIZED BY THE 2PLAY RELAY.



F-5

B-3

F-2

E-6

BREAKS CIRCUIT TO COIN LOCKOUT COIL.

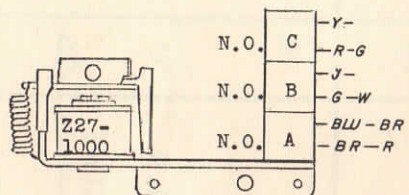
TO CREDIT LITE.

TO COIN RELAY, FROM REPLAY BUTTON SWITCH.

IN HOLD CIRCUIT TO THIS RELAY.

2 PLAY RELAY

THIS RELAY IS USED ONLY ON GAMES WITH 2 PLAYS FOR 1 COIN FEATURE.
IT IS ENERGIZED BY 2 PLAY COIN SWITCH.



E-6

E-3

E-3

ENERGIZES CREDIT RELAY.

ENERGIZES COIN RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

LOCK RELAY

IS ENERGIZED BY THE COIN RELAY OR LEFT FLIPPER SWITCH.

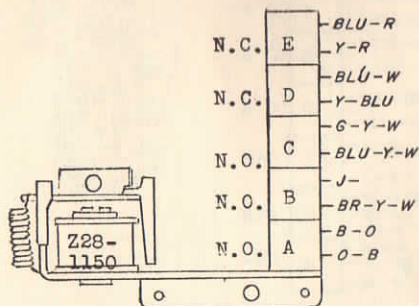


DIAGRAM LOCATION

D-7

D-3

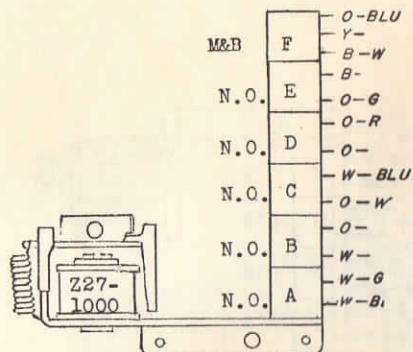
A-2

A-2

E-5

3000 RELAY

IS ENERGIZED BY THE TROUGH RELAY OR BY A SERIES CIRCUIT THRU NO. 1,2,3,4 AND 5 RELAYS.



D-19

D-21

G-4

E-5

E-14

B-1

F-14

OPERATION

ENERGIZES GAME OVER RELAY (TRIP COIL).

TO RESET RELAY, FROM SWITCH E ON GAME RELAY.

6 VOLTS FROM TRANSFORMER TO LITES.

6 VOLTS FROM TRANSFORMER TO LITES.

IN HOLD CIRCUIT TO THIS RELAY, FROM KICKOFF SWITCH.

BREAKS HOLD CIRCUIT TO 5000 RELAY, AND COMPLETES CIRCUIT TO PULSE 1000 POINT RELAY.

RUNS SCORE MOTOR.

ENERGIZES CENTER TARGET RESET COIL AND 5000 CONTROL RELAY (LATCH COIL).

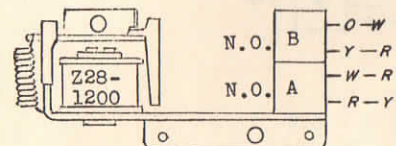
ENERGIZES ADVANCE S.U. COIL, FROM INDEX CAM SWITCH D.

IN CIRCUIT TO RELAY BANK RESET COIL (110V.)

IN HOLD CIRCUIT TO THIS RELAY.

BALL INDEX RELAY

IS ENERGIZED BY THE 1000 POINT RELAY.



D-7

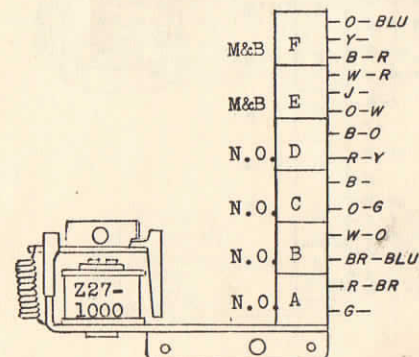
F-13

IN CIRCUIT TO GAME OVER RELAY (LATCH COIL). ALSO IN SERIES WITH SWITCH C ON GAME RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

OUTHOLE RELAY

IS ENERGIZED BY OUTHOLE SWITCH, THRU GAME OVER RELAY OR BALL COUNT ZERO SWITCH.



D-19

D-20

D-7

D-13

F-13

G-4

E-12

F-14

IN HOLD CIRCUIT TO GATE RELAY---ALSO ENERGIZES BALL RELEASE COIL THRU CAM SWITCH 4A.

IN SERIES WITH SWITCH B ON BALL INDEX RELAY. ALSO IN HOLD CIRCUIT TO BALL INDEX RELAY.

IN CIRCUIT TO BALL INDEX RELAY, FROM SWITCH ON GAME OVER RE.

RUNS SCORE MOTOR.

ENERGIZES FLIPPER UNIT (TRIP COIL), FROM CAM SWITCH 3B

IN HOLD CIRCUIT TO THIS RELAY.

RESET RELAY

IS ENERGIZED BY THE COIN RELAY.

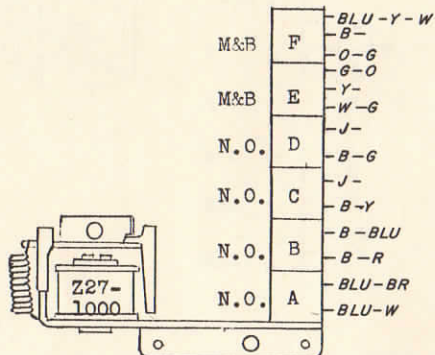


DIAGRAM LOCATION



G-4
G-12

C-9

D-11

D-11

D-11

D-3

OPERATION

RUNS SCORE MOTOR AND BREAKS CURRENT TO ALL PLAYFIELD SWITCHES.

IN SERIES WITH SWITCHES D, C & B ON THIS RELAY (DURING RESET CYCLE).

PULSES 10,000 POINT DRUM UNIT.

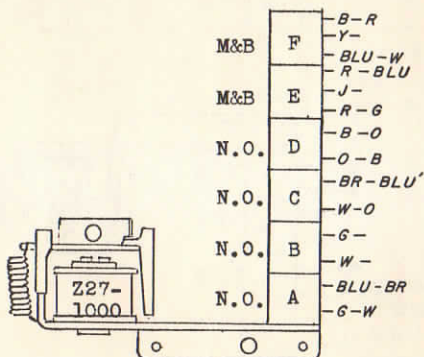
PULSES 1,000 POINT DRUM UNIT.

PULSES 10 POINT DRUM UNIT.

IN HOLD CIRCUIT TO THIS RELAY.

COIN RELAY

IS ENERGIZED BY THE COIN SWITCH OR 2 PLAY RELAY, ALSO BY THE REPLAY BUTTON WHEN A CREDIT IS AVAILABLE.



D-3

D-6

E-4

E-12

B-1

E-2

IN CIRCUIT TO KNOCKER COIL---ALSO ENERGIZES RESET RELAY.

ENERGIZES GAME RELAY AND GAME OVER RELAY (LATCH COILS).

ENERGIZES LOCK RELAY.

ENERGIZES FLIPPER UNIT (TRIP COIL), FROM CAM SWITCH 3B.

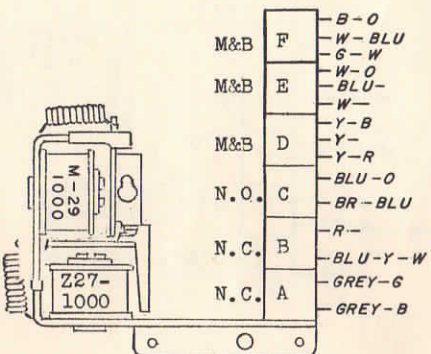
ENERGIZES RELAY BANK RESET COIL, THRU CAM SWITCH 1A (110 VOLTS).

IN HOLD CIRCUIT TO THIS RELAY.

GAME OVER RELAY

(Interlock)

LATCH COIL IS ENERGIZED BY COIN RELAY, DURING RESET CYCLE. DURING PLAY, IT IS ENERGIZED BY OUTHOLE AND BALL INDEX RELAYS THRU THE BALL COUNT UNIT DISC. TRIP COIL IS ENERGIZED BY TILT SWITCHES OR WHEN LOCK RELAY DROPS OUT.



D-13

A-5

C-7

C-8

E-12

G-13

G-10

ENERGIZES OUTHOLE RELAY THRU OUTHOLE SWITCH.

MAKES TO TILT AND GAME OVER LITES.

ENERGIZES GAME RELAY (TRIP COIL).

ENERGIZES FLIPPER UNIT (TRIP COIL), FROM E.O.S. SWITCH ON FLIPPER UNIT.

BREAKS CIRCUIT TO ALL PLAYFIELD SWITCHES.

IN CIRCUIT TO BALL COUNT S.U., FROM LEFT OR RIGHT BOTTOM R.O. SWITCHES.

LOCATED ON PLAYFIELD

No. 1 BUMPER RELAY

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

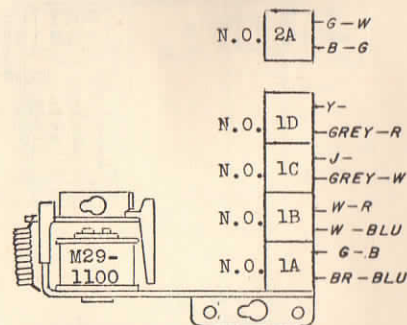


DIAGRAM LOCATION

F-20

OPERATION

IN HOLD CIRCUIT TO THIS RELAY.

ENERGIZES LEFT TOP JET BUMPER.

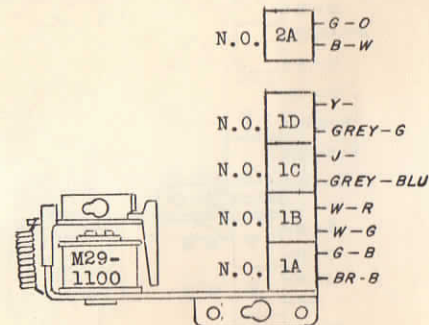
ENERGIZES RIGHT BOTTOM JET BUMPER.

ENERGIZES 100 POINT RELAY, FROM ADVANCE UNIT DISC.

ENERGIZES 10 POINT RELAY, FROM ADVANCE UNIT DISC.

No. 2 BUMPER RELAY

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



F-21

IN HOLD CIRCUIT TO THIS RELAY.

ENERGIZES LEFT BOTTOM JET BUMPER.

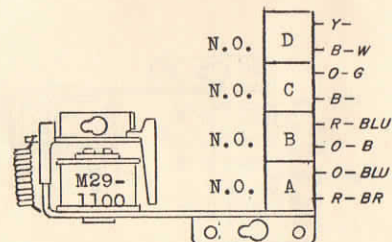
ENERGIZES RIGHT TOP JET BUMPER.

ENERGIZES 100 POINT RELAY, FROM ADVANCE UNIT DISC.

ENERGIZES 10 POINT RELAY, FROM ADVANCE UNIT DISC.

5000 RELAY

IS ENERGIZED BY CENTER TARGET SWITCH, THRU SWITCH ON 5000 CONTROL RELAY.



D-19

COMPLETES CIRCUIT TO PULSE 1000 POINT RELAY.

G-3

RUNS SCORE MOTOR.

F-18

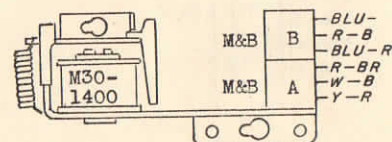
ENERGIZES 5000 CONTROL RELAY (TRIP COIL).

F-21

IN HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON 5000 CONTROL RELAY.

CHANGE RELAY

IS ENERGIZED BY THE 10 POINT DRUM UNIT DISC (EVERY OTHER STEP).



B-6

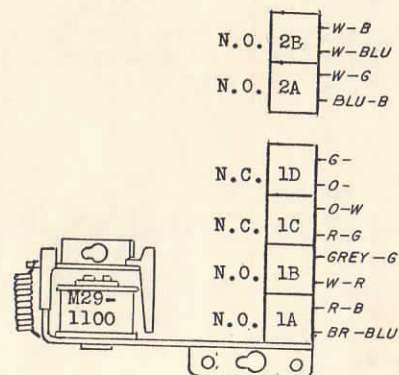
TO LEFT AND RIGHT BOTTOM ROLLOVER LITES.

E-10

IN SERIES WITH SWITCH A ON GAME OVER RELAY.

TROUGH RELAY

IS ENERGIZED BY THE TOP TROUGH SWITCH AND GATE RELAY.

**DIAGRAM LOCATION**

D-14

E-23

C-1

F-14

F-10

D-12

OPERATION

ENERGIZES 3000 RELAY, FROM INDEX CAM SWITCH D. IN HOLD CIRCUIT TO THIS RELAY.

IN SERIES WITH SWITCH B ON 3000 RELAY.

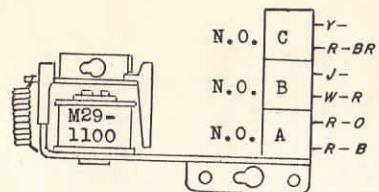
IN SERIES WITH SWITCH C ON 3000 RELAY.

IN CIRCUIT TO BALL COUNT S.U.

ENERGIZES FLIPPER UNIT (TRIP COIL).

TARGET RELAY

IS ENERGIZED BY LEFT OR RIGHT TARGET SWITCHES.



F-23

F-17

E-23

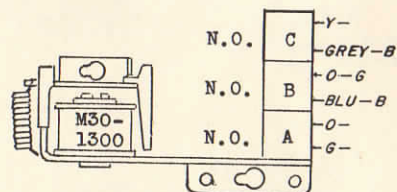
ENERGIZES FLIPPER UNIT (LATCH COIL).

ENERGIZES 100 POINT RELAY.

IN HOLD CIRCUIT TO THIS RELAY.

GATE RELAY

IS ENERGIZED BY THE TOP TARGET SWITCH.



C-5

E-23

F-19

TO GATE LITE.

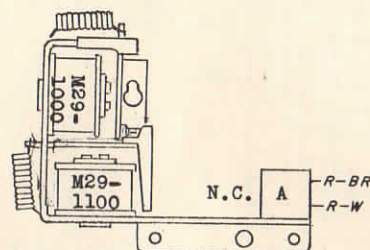
ENERGIZES TROUGH RELAY, FROM TROUGH SWITCH.

IN HOLD CIRCUIT TO THIS RELAY.

5000 CONTROL RELAY
(Interlock)

TRIP COIL IS ENERGIZED BY SWITCH ON 5000 RELAY AND SCORE MOTOR CAM SWITCH 5A.

LATCH COIL IS ENERGIZED BY SWITCH ON 3000 RELAY AND SCORE MOTOR INDEX CAM SWITCH C.



F-21

IN CIRCUIT TO 5000 RELAY, FROM CENTER TARGET SWITCH.

IN BACK BOX

10 POINT RELAY

IS ENERGIZED BY THE 6 ROLL-OVER BUTTONS, KICKER SWITCHES, STANDUP SWITCHES, AND JET BUMPERS AS INDICATED.

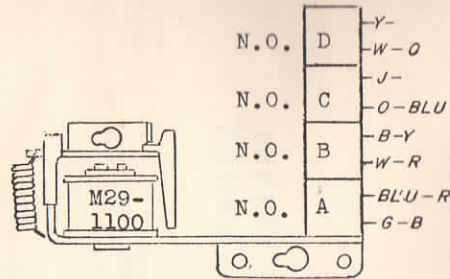


DIAGRAM
LOCATION
↓
D-22

OPERATION

D-22 ENERGIZES SMALL BELL COIL.

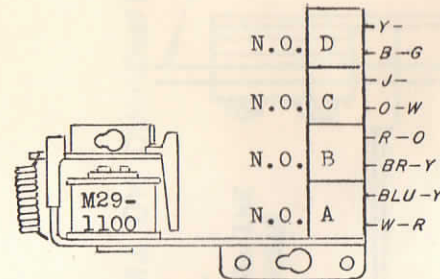
C-11 ENERGIZES 10 POINT DRUM UNIT.

F-19 ENERGIZES 100 POINT RELAY, FROM 9th POSITION SWITCH ON 10 POINT DRUM UNIT.

F-18 IN HOLD CIRCUIT TO THIS RELAY.

100 POINT RELAY

IS ENERGIZED BY LEFT OR RIGHT (OPENS FLIPPERS) TARGET SWITCHES, TARGET RELAY, AND JET BUMPERS AS INDICATED.



D-21 ENERGIZES CHIME COIL.

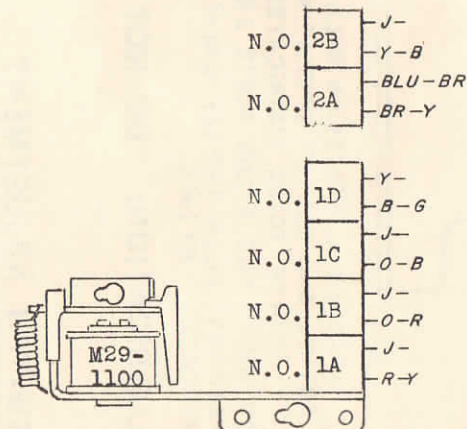
D-11 ENERGIZES 100 POINT DRUM UNIT.

F-18 ENERGIZES 1000 POINT RELAY, FROM 9th POSITION SWITCH ON 100 POINT DRUM UNIT.

F-18 IN HOLD CIRCUIT TO THIS RELAY.

1000 POINT RELAY

IS ENERGIZED BY 4 TOP AND 2 BOTTOM ROLLOVER SWITCHES, TOP TARGET SWITCH, 5000 RELAY, AND BY THE 3000 RELAY.



C-8 ENERGIZES GAME RELAY (TRIP COIL).

F-18 IN HOLD CIRCUIT TO THIS RELAY.

D-21 ENERGIZES CHIME COIL.

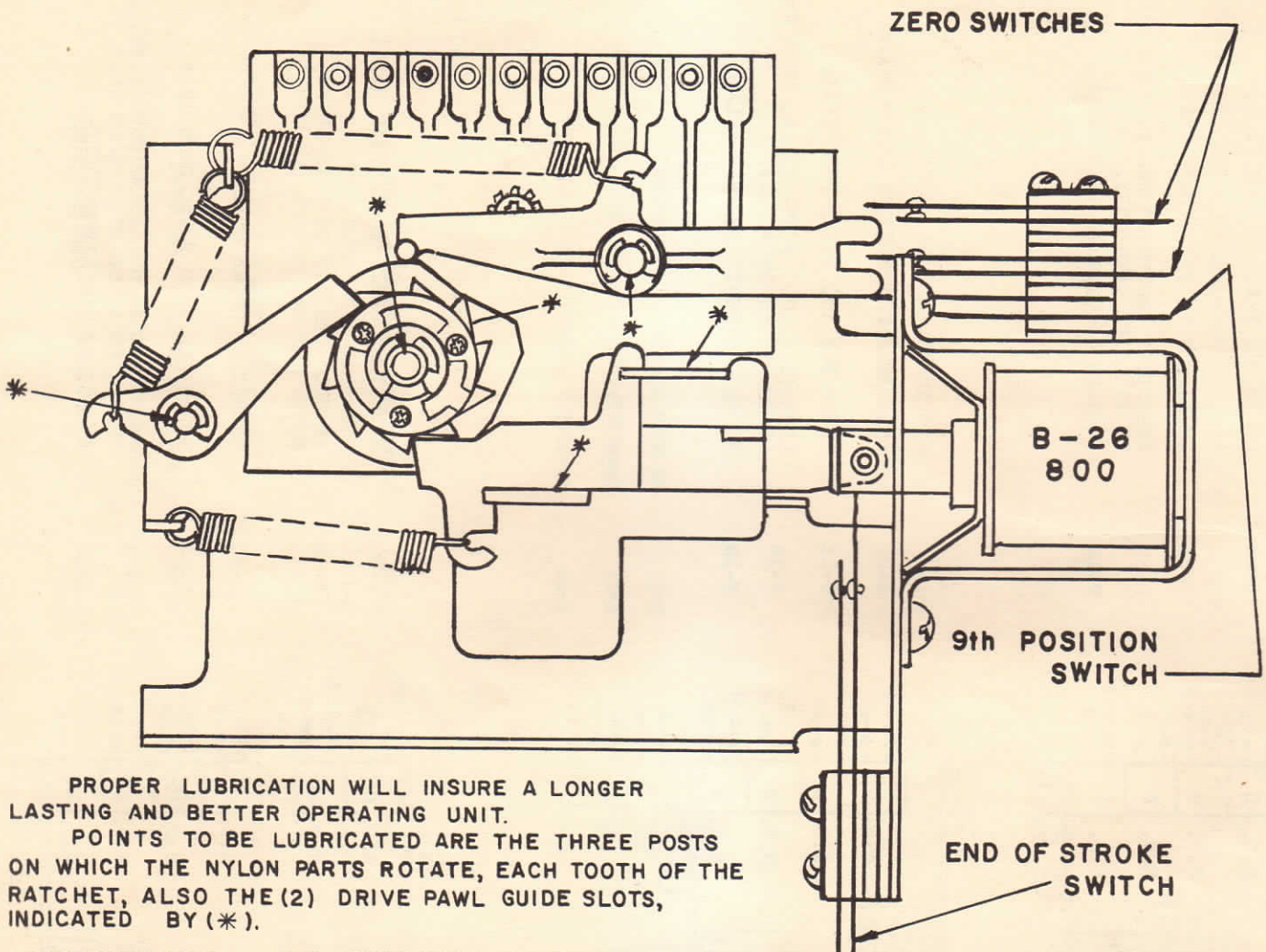
D-11 ENERGIZES 1000 POINT DRUM UNIT.

D-11 ENERGIZES 10,000 POINT DRUM UNIT, THRU 9TH POSITION SWITCH ON 1,000 POINT DRUM UNIT.

D-13 ENERGIZES BALL INDEX RELAY.

SCORE DRUM UNIT

WITH PRINTED CIRCUIT AND CONTACT RING



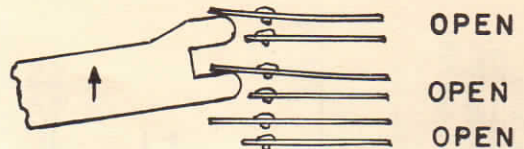
PROPER LUBRICATION WILL INSURE A LONGER LASTING AND BETTER OPERATING UNIT.

POINTS TO BE LUBRICATED ARE THE THREE POSTS ON WHICH THE NYLON PARTS ROTATE, EACH TOOTH OF THE RATCHET, ALSO THE (2) DRIVE PAWL GUIDE SLOTS, INDICATED BY (*).

LUBRICATION: DO NOT PUT LUBRICANT ON DRIVE ARMATURE

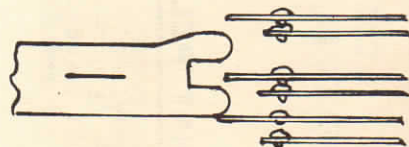
SWITCH ADJUSTMENT

AT "0" OR INDEX POSITION ALL SWITCHES ARE OPEN AS SHOWN.



OPEN
OPEN
OPEN

AT 1st. TO 8th. POSITION TOP SWITCHES ARE CLOSED - BOTTOM SWITCH REMAINS OPEN.



CLOSED
CLOSED
OPEN

AT 9th POSITION ALL SWITCHES ARE CLOSED AS SHOWN



CLOSED
CLOSED
CLOSED

NOTES

