

Operating Instructions and Parts Catalog

CONFIDENTIAL: DO NOT LEAVE INSTRUCTIONS IN GAME

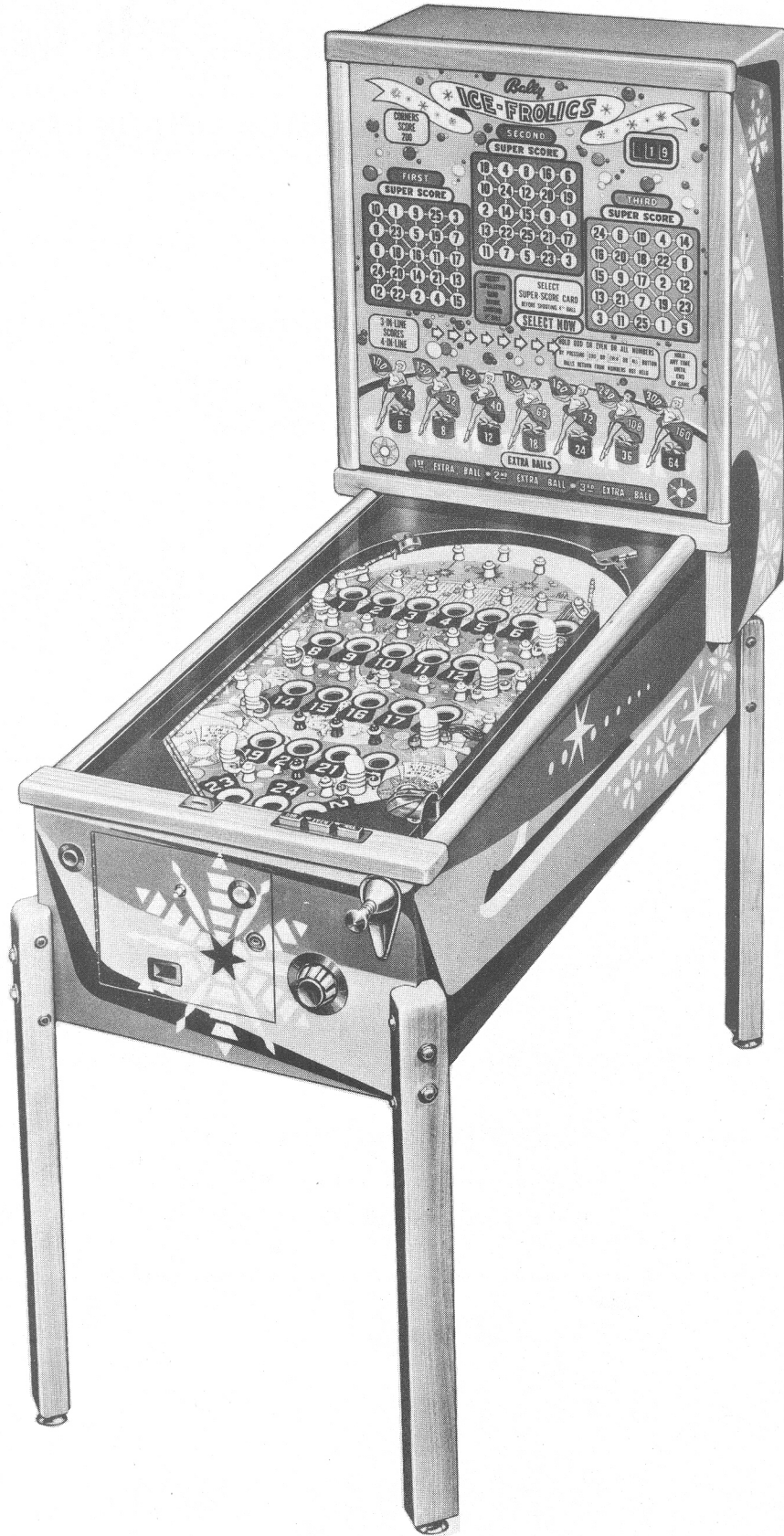
Bally®

ICE-FROLICS

IMPORTANT!

Note that this manual is a combination Operating Instructions AND PARTS CATALOG. Part Numbers are marked on the various illustrations and a list of miscellaneous parts appears on the back cover.

**FOR QUICKEST SERVICE
STATE CORRECT PART NUMBER
WHEN ORDERING PARTS**



ICE-FROLICS amusement-game by Bally

3 Cards*

5 balls plus extra balls

NEW SELECTABLE SUPER-SCORE: As each coin** is deposited

- (1) SUPER-SCORE panels flash above Cards*;
- (2) Panels (2) and (3), described below, flash

At mystery-intervals

- (1) SUPER-SCORE panel lights above one Card*;
- (2) Panel lights to tell player to;

SELECT
SUPER-SCORE CARD
BEFORE SHOOTING 1st BALL;

- (3) Panel lights to tell player to

SELECT
SUPER-SCORE CARD
BEFORE SHOOTING 4th BALL.***

SUPER-SCORE lit above a selected Card* qualifies player to score super-scores**** instead of regular scores****.

-
- * First coin** deposited selects FIRST Card and may light features and advance super-scores****.
 - * Second coin** deposited selects SECOND Card and may light features and advance super-scores****.
 - * Third coin** deposited lights THIRD Card and may light features and advance super-scores****.
 - ** When replays are registered, Buttons may be pressed, instead of coins being deposited.

*** After third ball is shot, panel lights to warn player to

SELECT NOW

**** Regular scores: 5 in line.....100
4 in line..... 20
3 in line..... 4

Super-scores: 5 in line.....100-150-150-150-160-240-300
4 in line..... 24- 32- 40- 60- 72-108-160
3 in line..... 6- 8- 12- 18- 24- 36- 64

Panel (2), described above, when lit, qualifies player to transfer lit SUPER-SCORE from one Card* to another, before shooting first ball. Player's choice is based only on a possible preference for one particular Card*.

Panel (3), described above, when lit, qualifies player to transfer lit SUPER-SCORE from one Card* to another, after shooting 1, 2 or 3*** balls. Player's choice--or series of choices--is based on trend of his score in each of 3 selected Cards*.

NEW SCORE-BOOSTER ROLL-OVERS: Red Star and Yellow Star on backglass and on playfield flash as each coin** is deposited and, at mystery-intervals, light and remain lit.

Each Star Roll-over, hit when corresponding Star is lit, lights panel on backglass to tell player that

3 IN LINE
SCORES
4 IN LINE

"HOLD-AND-DRAW" FEATURE: Arrow-lights pointing to HOLD-panel flash as each coin** is deposited and advance at mystery-intervals. When light advances to final arrow, panel lights to tell player to

HOLD ODD OR EVEN OR ALL NUMBERS
BY PRESSING ODD OR EVEN OR ALL BUTTONS

BALLS RETURN FROM NUMBERS NOT HELD

Card on front-arch explains that

TO GET "PRE-VIEW" OF YOUR CHOICE OF ODD OR EVEN
PRESS BUTTON ONLY PART WAY IN--PRESS EASY

TO RELEASE BALLS
FROM NUMBERS NOT HELD
PRESS HOLDING BUTTON ALL THE WAY IN

* First coin** deposited selects FIRST Card and may light features and advance super-scores****.

* Second coin** deposited selects SECOND Card and may light features and advance super-scores****.

* Third coin** deposited lights THIRD Card and may light features and advance super-scores****.

** When replays are registered, Buttons may be pressed, instead of coins being deposited.

*** After third ball is shot, panel lights to warn player to

SELECT NOW

Card further explains that

TO SCORE REPLAYS
WHEN HOLD-LIGHT IS LIT
PRESS ODD OR EVEN OR ALL BUTTON

SCORING LINE-UP MUST BE HELD
TO REGISTER REPLAYS

By pressing holding-buttons only part way in one at a time player can dim first odd then even numbers to decide which choice is better. Then, if he decides to hold odd numbers, he presses odd-button all the way in, putting out all lit even-numbers and releasing for free shots all balls in even-number holes. All odd-numbers already scored remain lit. Or, if he prefers, he can hold even numbers and get back all balls from odd-number holes.

If player has a scoring line-up, such as 3-in-line, with mixed odd and even numbers, he may either press ALL button to register replays scored or he may sacrifice the line-up and hold either odd or even.

After fifth ball is shot flasher-panel blinks on and off to remind player to

HOLD ANY TIME UNTIL END OF GAME

He may, if he desires, play extra balls before holding odd, even or all numbers.

CORNER-SCORES: Corners-panel flashes as each coin** is deposited and, at mystery intervals, lights and remains lit during entire game to tell player that

CORNERS
SCORE
200

GUARANTEED FEATURES: Regardless of number of coins** deposited, each feature, after lighting, remains lit until end of game. (Location of SUPER-SCORE may be changed by player.)

** When replays are registered, Buttons may be pressed, instead of coins being deposited.

After lighting all features, player may continue to deposit coins** to advance super-scores****.

ADVANCING SUPER-SCORES****: Super-scores**** appear in scene on backglass, advancing at mystery intervals, when coins** are deposited.

GUARANTEED SUPER-SCORES****: Super-scores**** either advance to a higher bracket or remain as high as on previous coin**, never drop back to a lower bracket, regardless of number of coins** deposited.

After advancing super-scores**** to top bracket, player may continue to deposit coins** to light features.

EXTRA-BALLS FEATURE: After shooting 5 balls, player may press Extra-Balls Button and deposit additional coins** to play for extra balls.

At mystery-intervals, after Extra-Balls Button is pressed, (1st) lights on backglass, when coin** is deposited. After (1st) is lit, light advances, at mystery-intervals to (EXTRA), when Extra-Balls Button is pressed and coin** is deposited. After (1st) (EXTRA) is lit, light advances, at mystery-intervals, to (BALL), when Extra-Balls Button is pressed and coin** is deposited.

When (1st) (EXTRA) (BALL) is completely lit, first extra ball is released to player.

After shooting first extra ball, player may continue to press Extra-Balls Button and deposit additional coins** to light (2nd)(EXTRA) (BALL) in order to receive second extra ball and to light (3rd)(EXTRA) (BALL) in order to receive third extra ball.

Coins** deposited to play for extra balls do not light other scoring-advantages.

After playing for extra balls, player may not play to light other scoring-advantages.

** When replays are registered, Buttons may be pressed, instead of coins being deposited.

**** Regular scores: 5 in line.....100
4 in line..... 20
3 in line..... 4

Super-scores: 5 in line.....100-150-150-150-160-240-300
4 in line..... 24- 32- 40- 60- 72-108-160
3 in line..... 6- 8- 12- 18- 24- 36- 64

ICE-FROLICS

INSTALLATION AND OPERATING INSTRUCTIONS

Fasten 4 legs to cabinet with bolts and washers furnished. Place back-box in position. Unlock and open back-door and fasten the back-box to cabinet with bolts and washers furnished. (2 back-door locks are common.)

Plug power line into 110-115 volt 60 cycle Alternating Current only. Turn on power by turning toggle-switch on. Toggle-switch is located on lower left side of back-box.

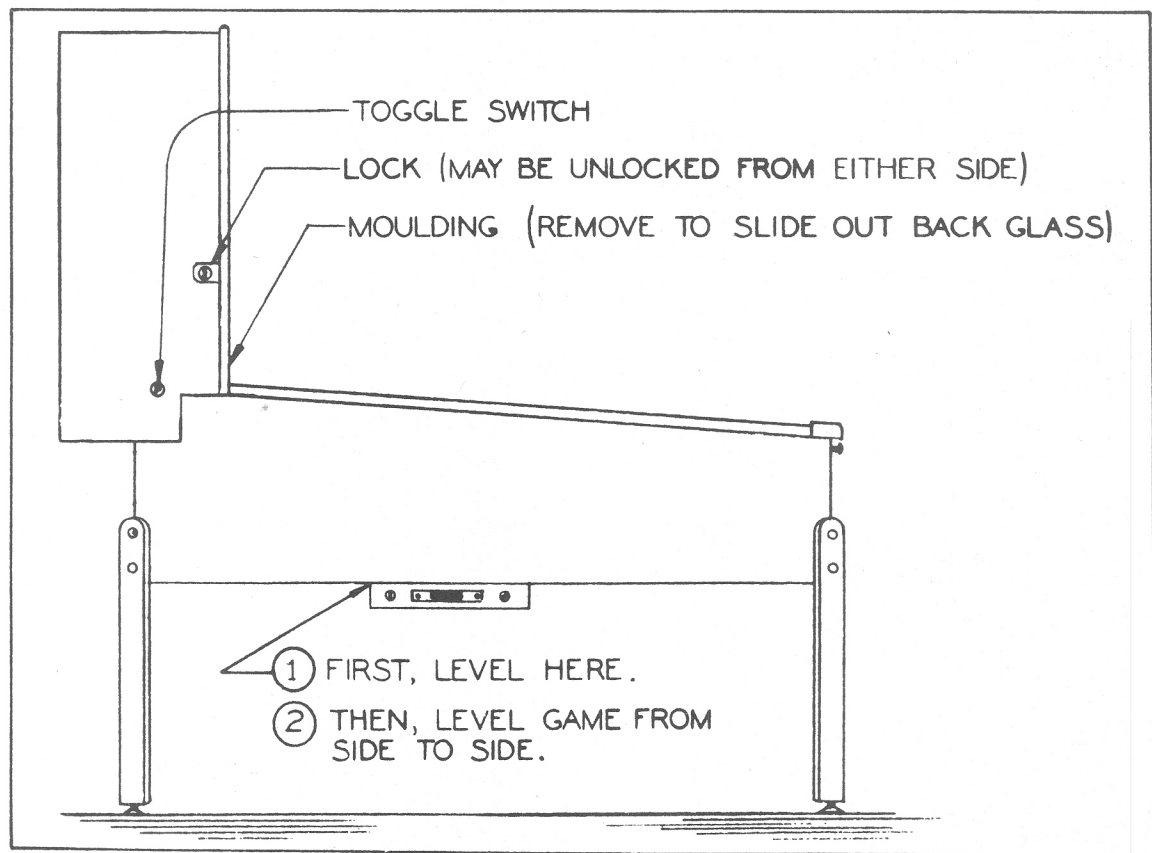
ACCESS TO MECHANISM AND LIGHT BULBS

Back-glass may be removed from either side by unlocking side desired and removing upright moulding. (Remove moulding by pulling bottom portion.)

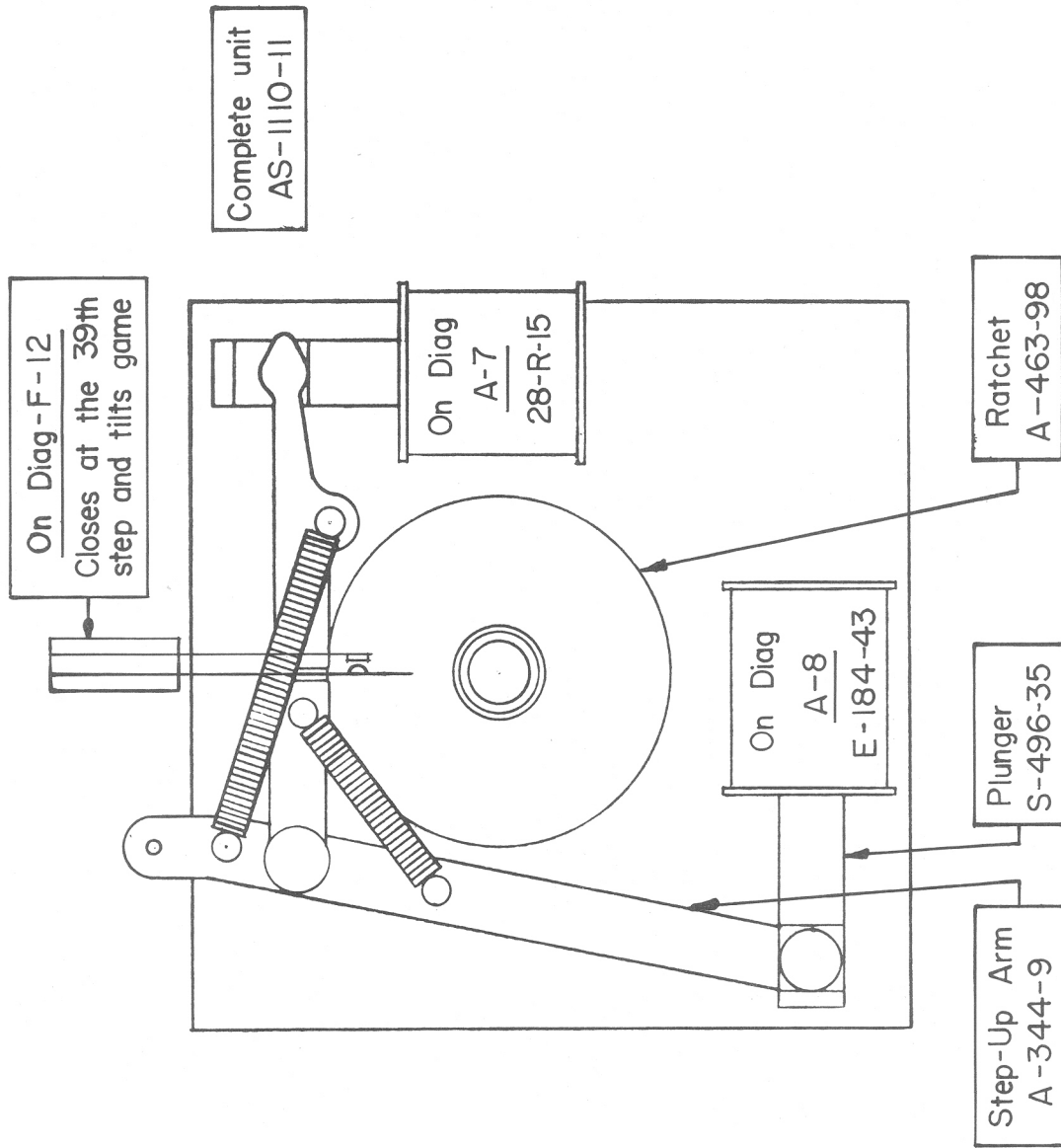
After removing back-glass, access to mechanism may be obtained by raising 2 slide brackets on insert, located on left and right edges of insert. Insert may then be tilted forward for easy accessibility.

BE SURE TO LEVEL GAME

See instructions for leveling below. Place 8 balls in game.

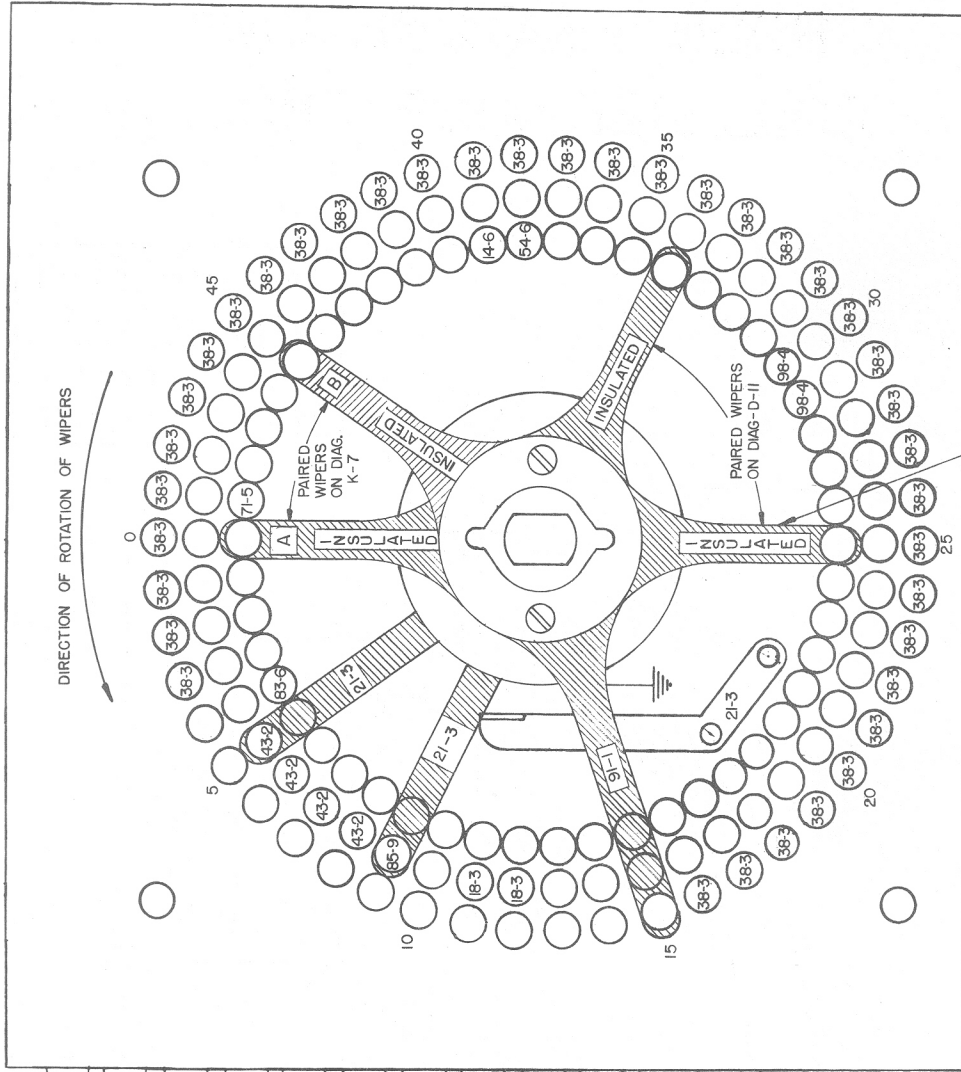


TIMER UNIT - COIL SIDE ICE FROLICS



TIMER UNIT — ICE FROLICS

View is from button or wiper side of contact plate
Wipers shown in zero or reset position. 39 Step Unit



Wiper Assembly
AS-1046-57a

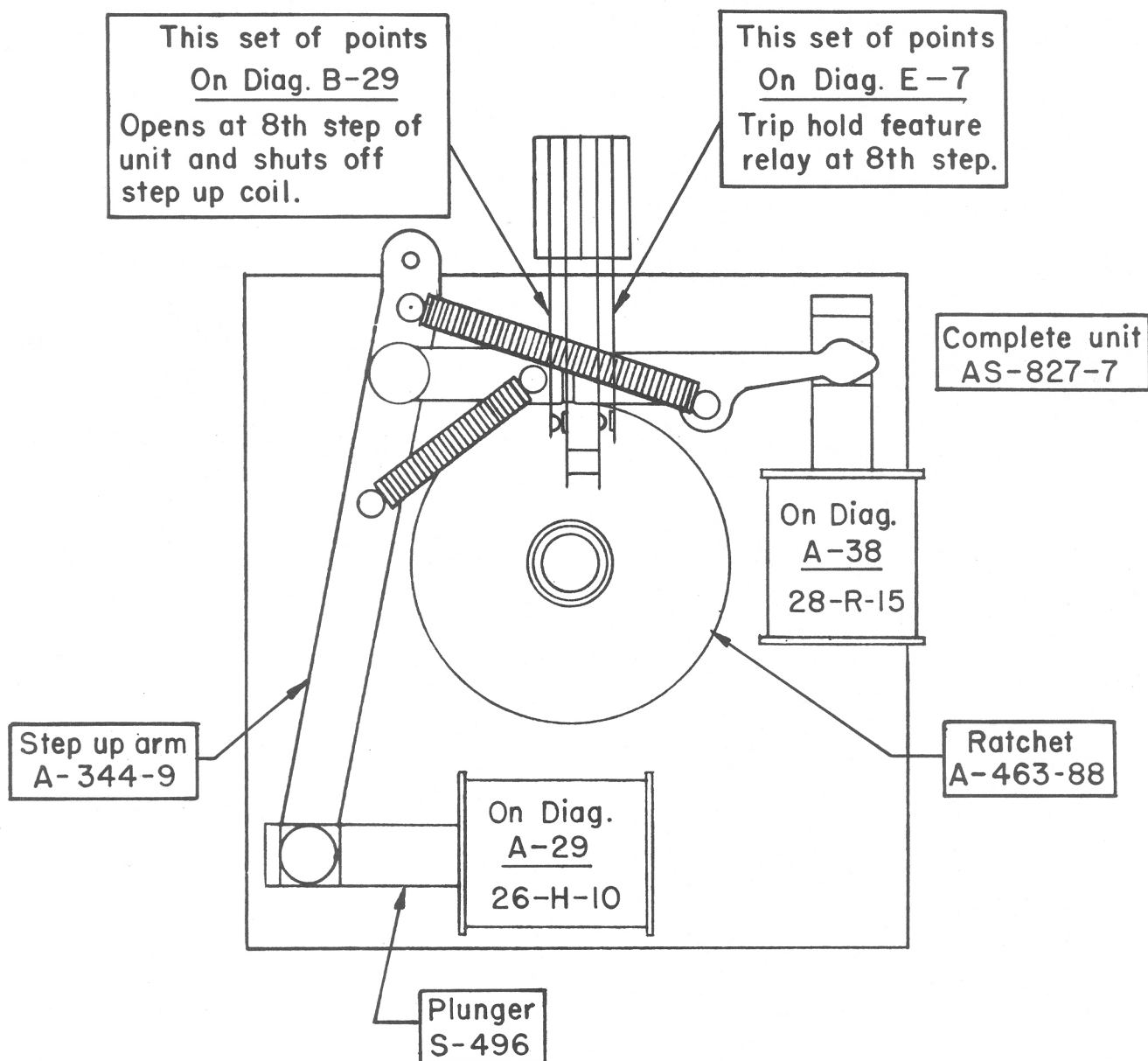
Disc (wired)
W-529b

Note:- Diag-L-7 refers to location on schematic diagram.

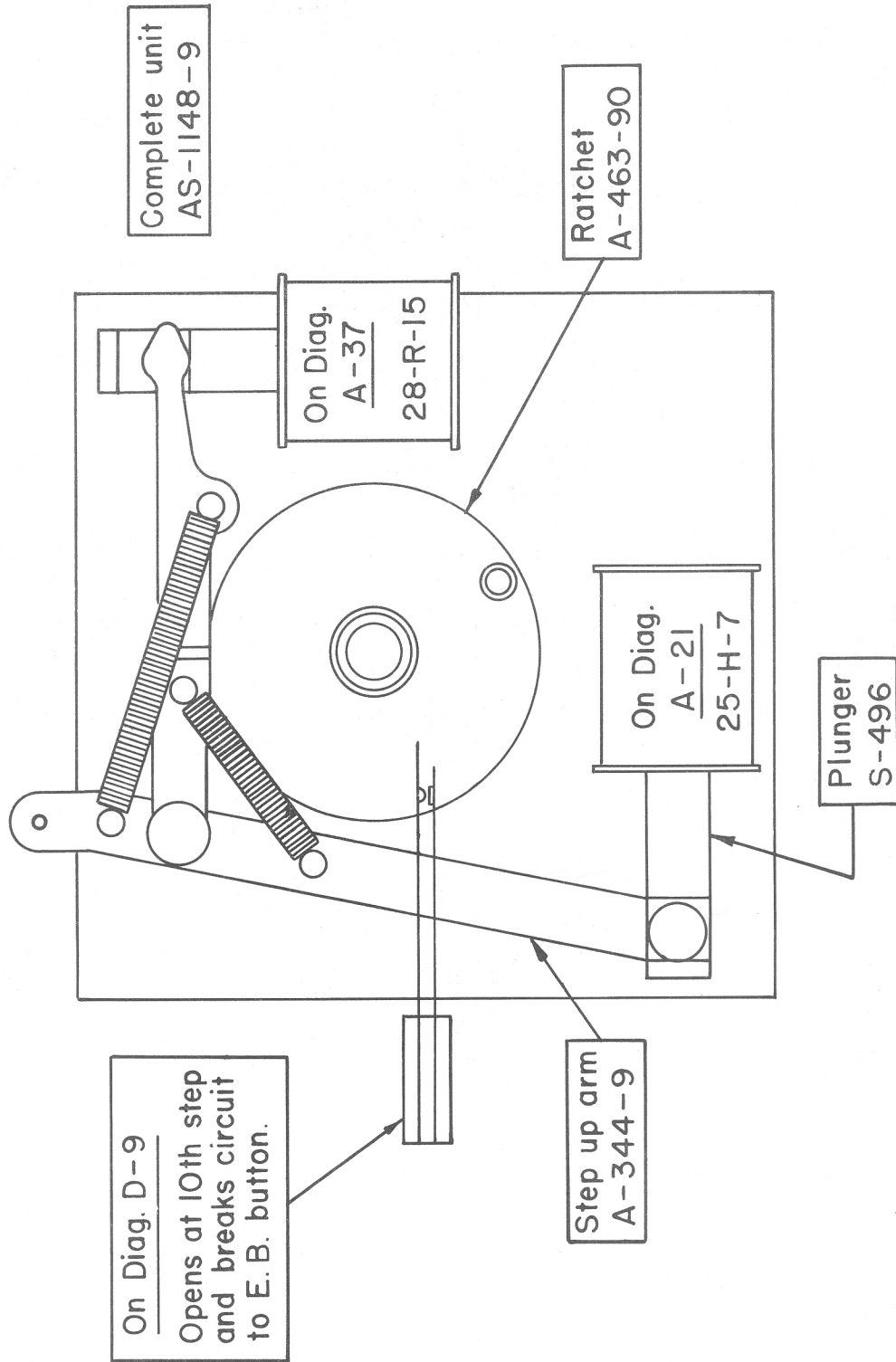
- To "Select Now" Lites (Selectable Super Score) (Diag-L-7) 71-5
- From Mixer & Spotting Pulse Cam completes circuit to "Select Now" lite at 4th Step of this unit (Diag-K-7) 83-6
- To ball lifter cam sw. (Diag-G-8) 43-2
- From Tilt Relay Switch - feeds wiper [A] & [B] (Diag-I-10) 21-3
- Completes circuit to Shutter Motor at 2nd step. (Diag-H-10) 18-3
- Completes circuit to Ball Lifter Motor (Diag-E-13) 38-3
- To trough Sw 4 and then completes circuit to Selector lock trip relay. (Diag-D-11) 54-6
- Completes circuit to 5th ball relay (Diag-D-11) 98-4
- Keeps circuit to ball lifter cam sw. alive. (Diag-G-8) 4-6
- 85-9



HOLD FEATURE UNIT COIL SIDE - ICE FROLICS

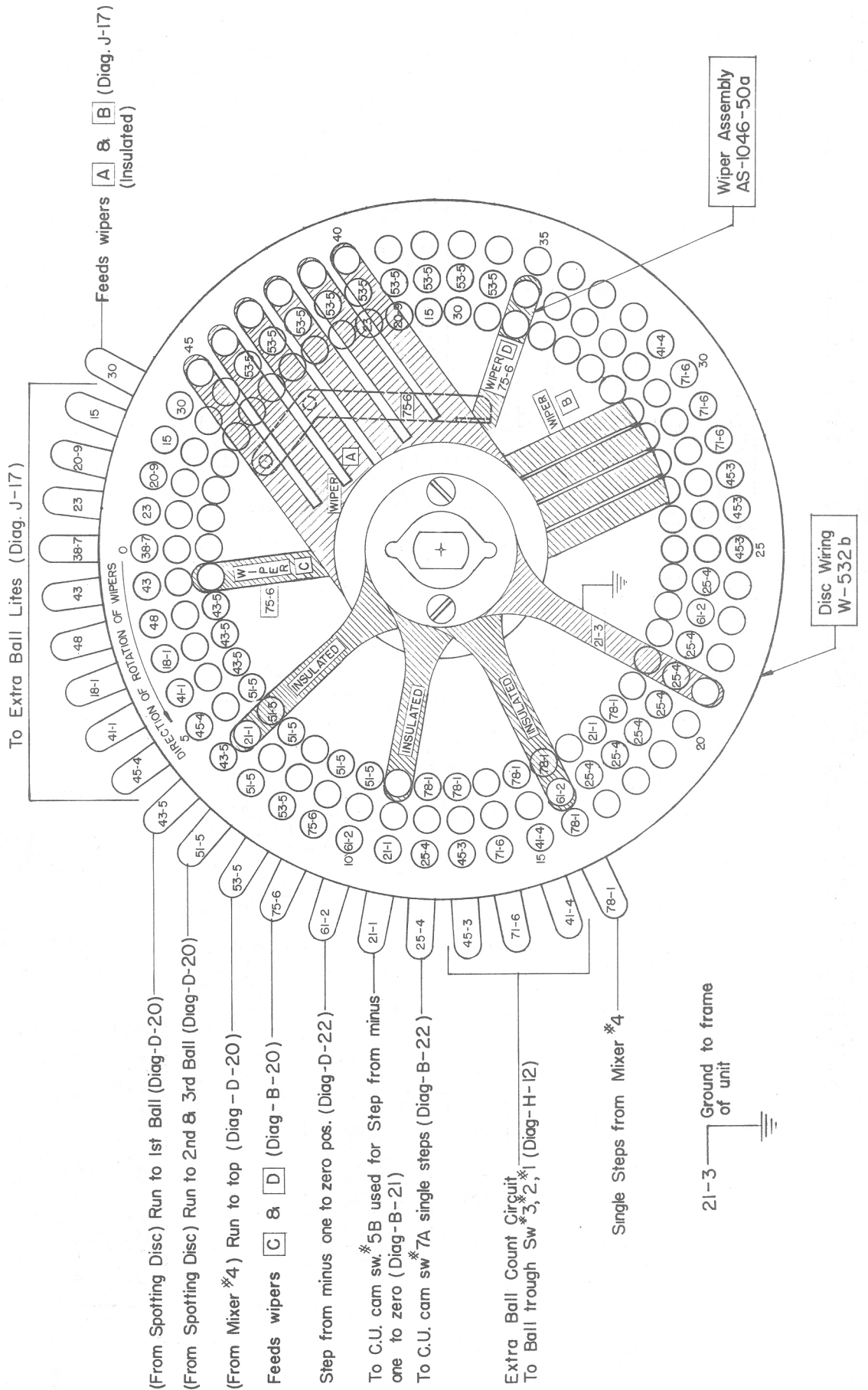


EXTRA BALL UNIT - COIL SIDE ICE FROLICS

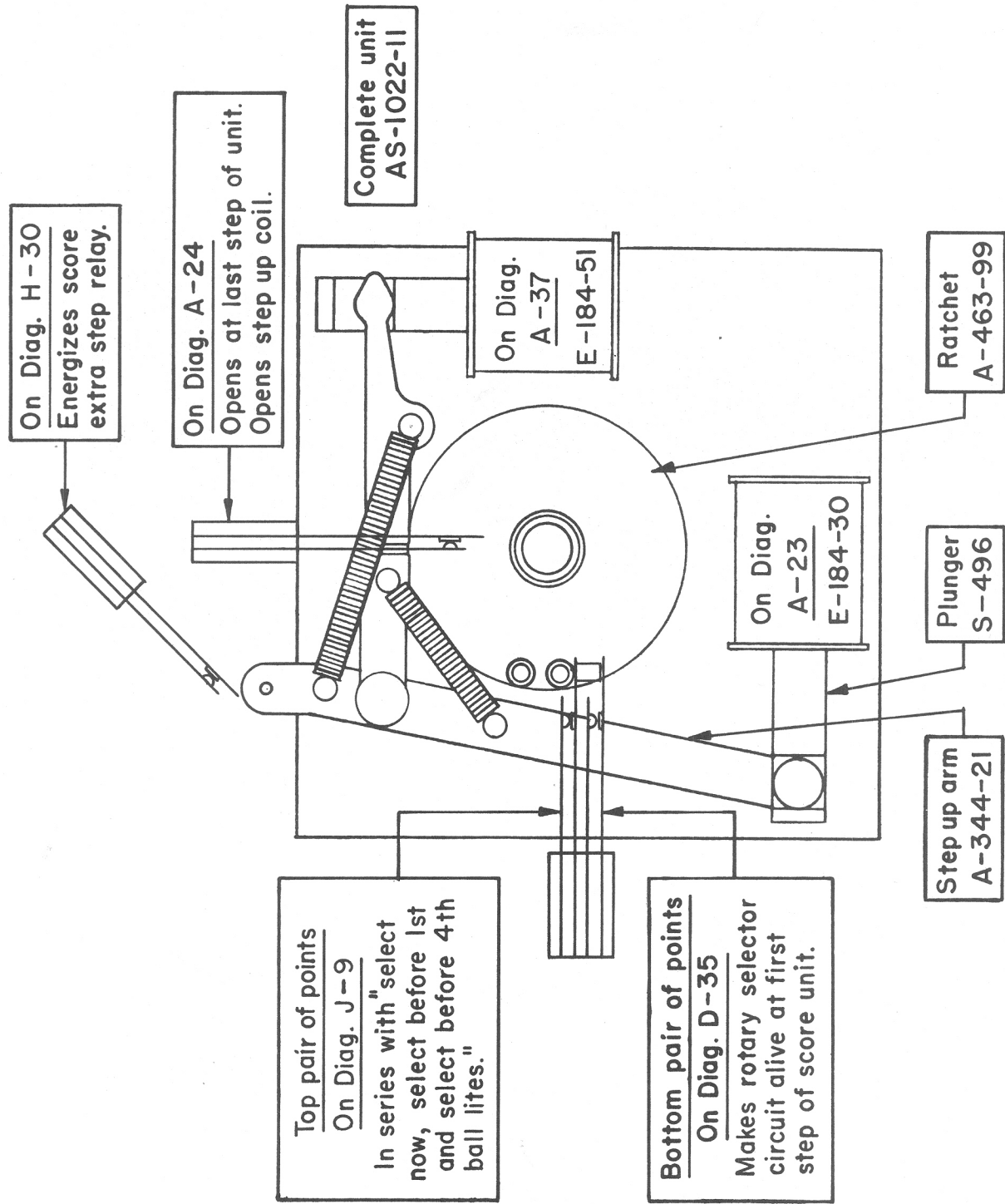


EXTRA BALL UNIT — ICE FROLICS IO Step Unit

View is from button or wiper side of contact plate
Wipers shown in zero or reset position



SCORE UNIT-COIL SIDE-ICE FROLICS

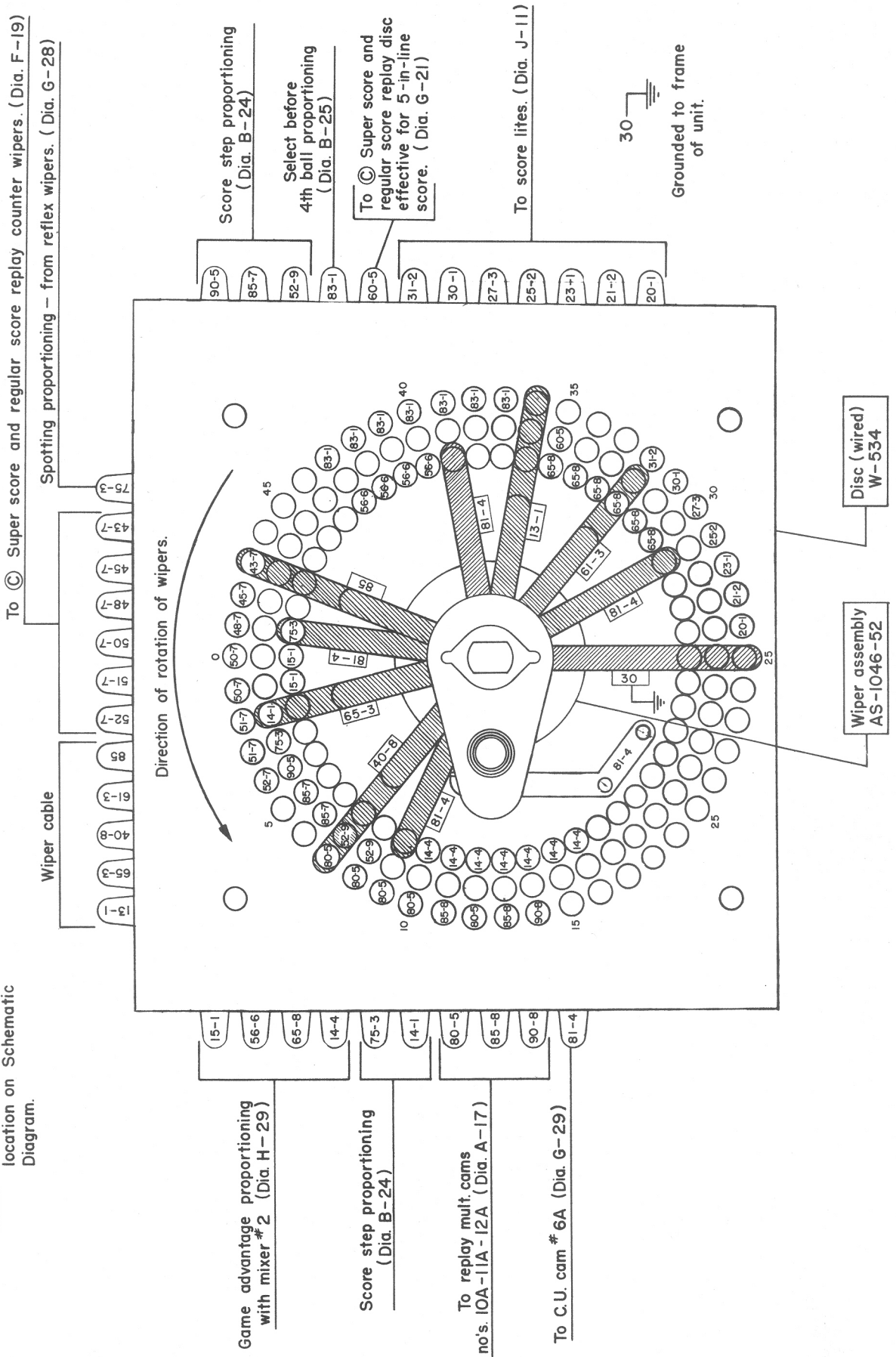


SCORE UNIT - ICE FROLICS

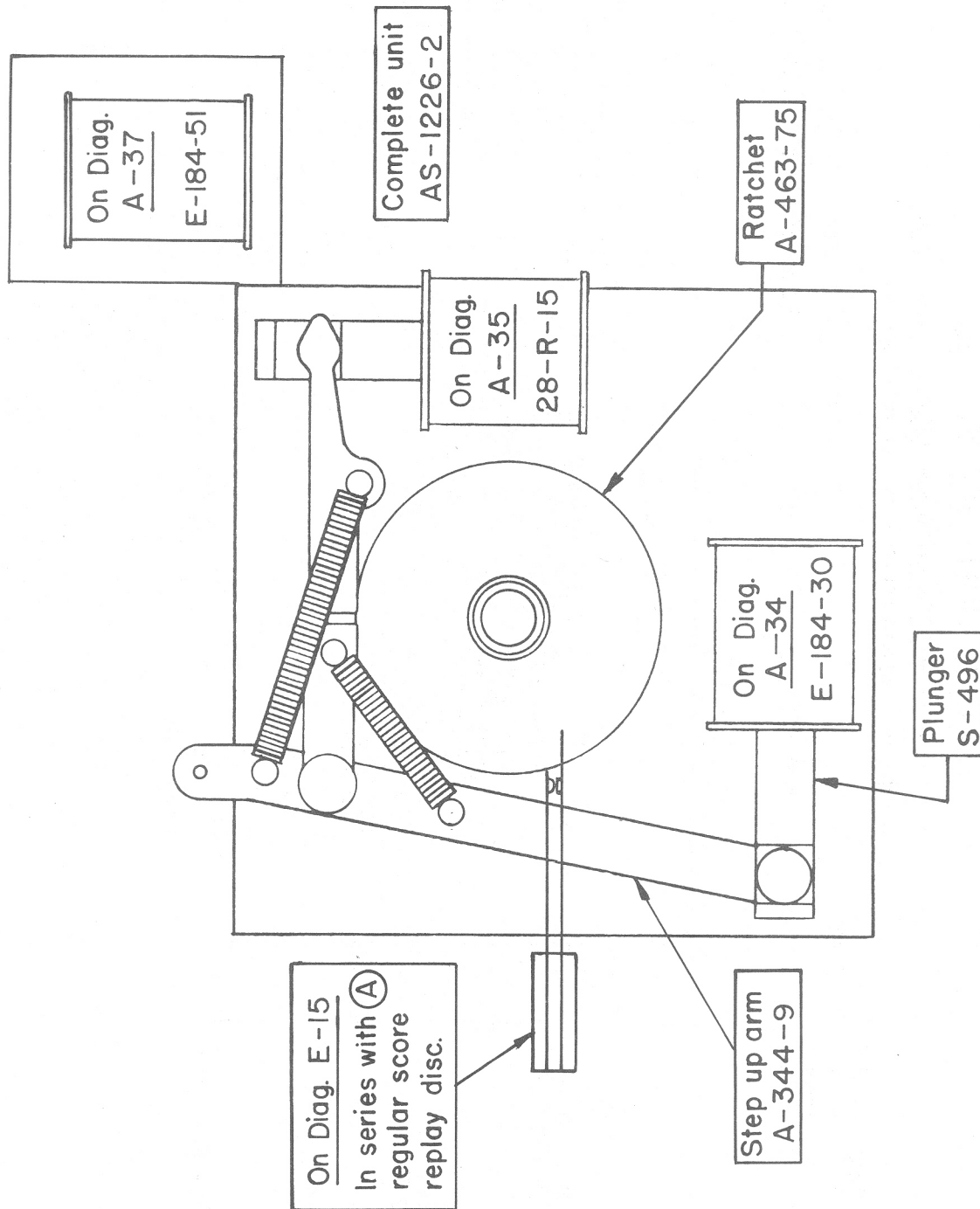
View is from **BUTTON** or **WIPER** SIDE of contact plate.

7 Step unit. Wipers shown in zero or reset position.

NOTE: Dia. H-29 refers to location on Schematic Diagram.

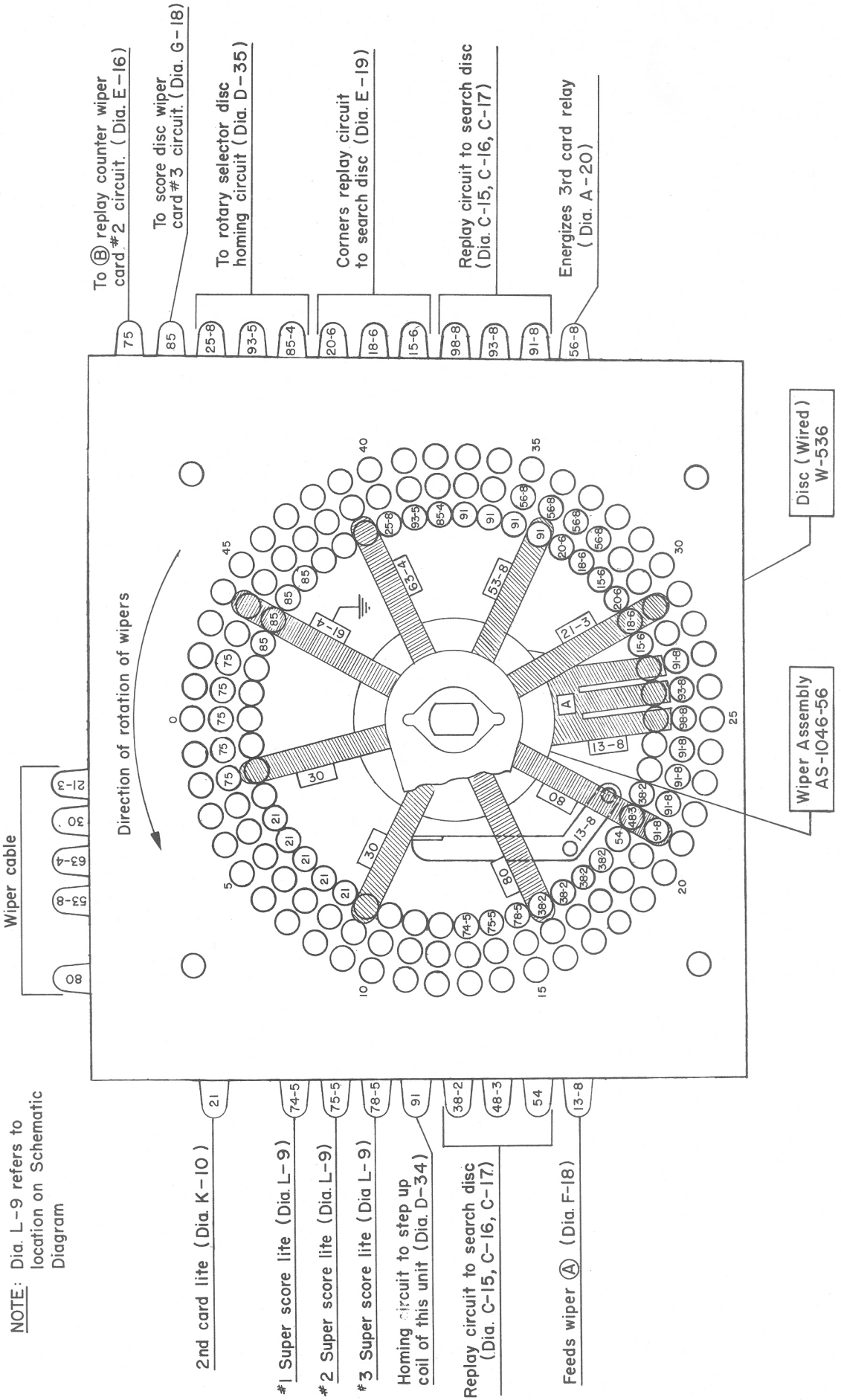


CARD & SUPER SCORE UNIT COIL SIDE - ICE FROLICS



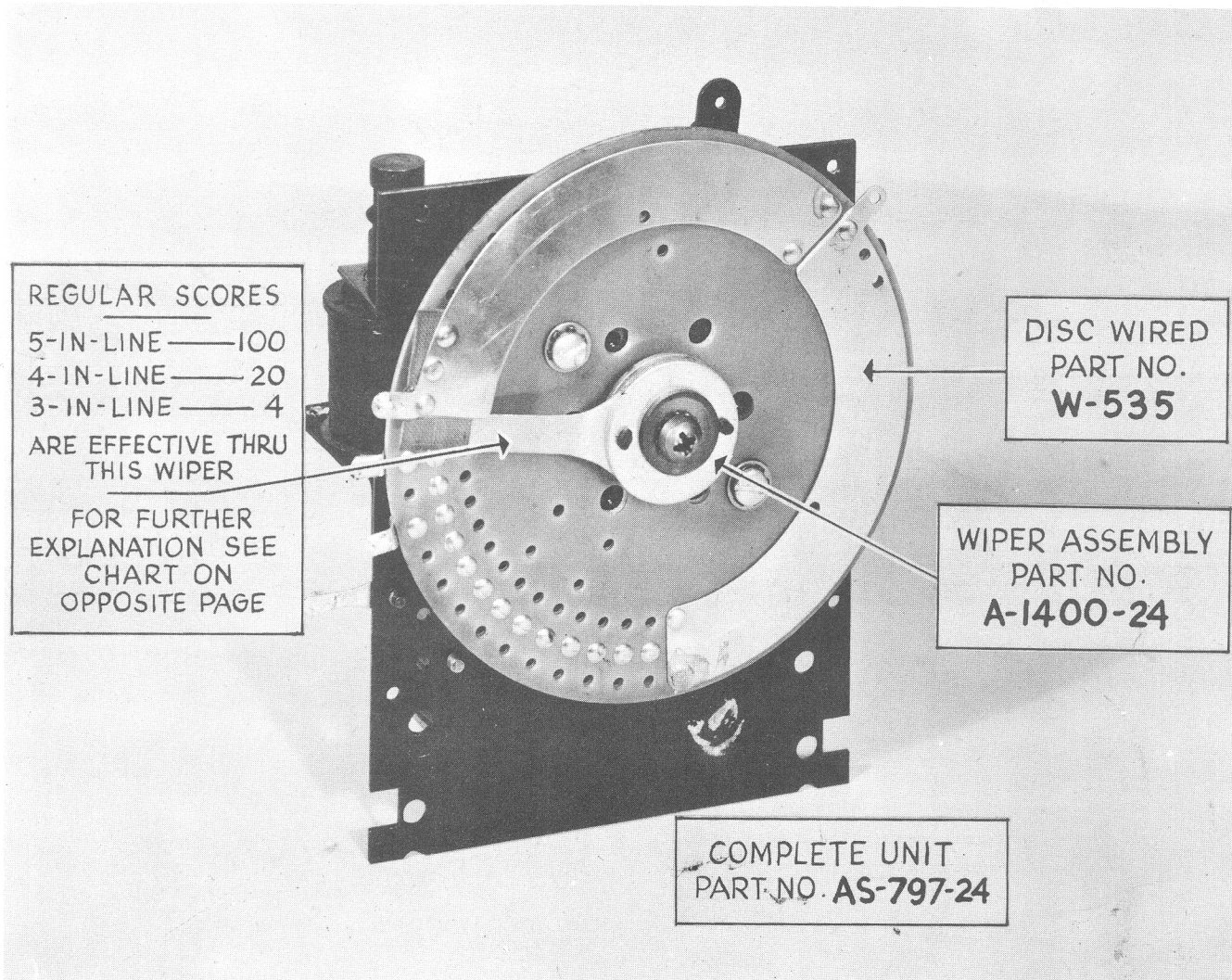
CARD & SUPER SCORE UNIT — ICE FROLICS

View is from **BUTTON** or **WIPER SIDE** of contact plate
8 step unit. Wipers shown in zero or reset position.



REGULAR SCORE REPLAY COUNTER (A)

REGULAR SCORE REPLAY COUNTERS (A) AND (B) ARE EXACTLY ALIKE

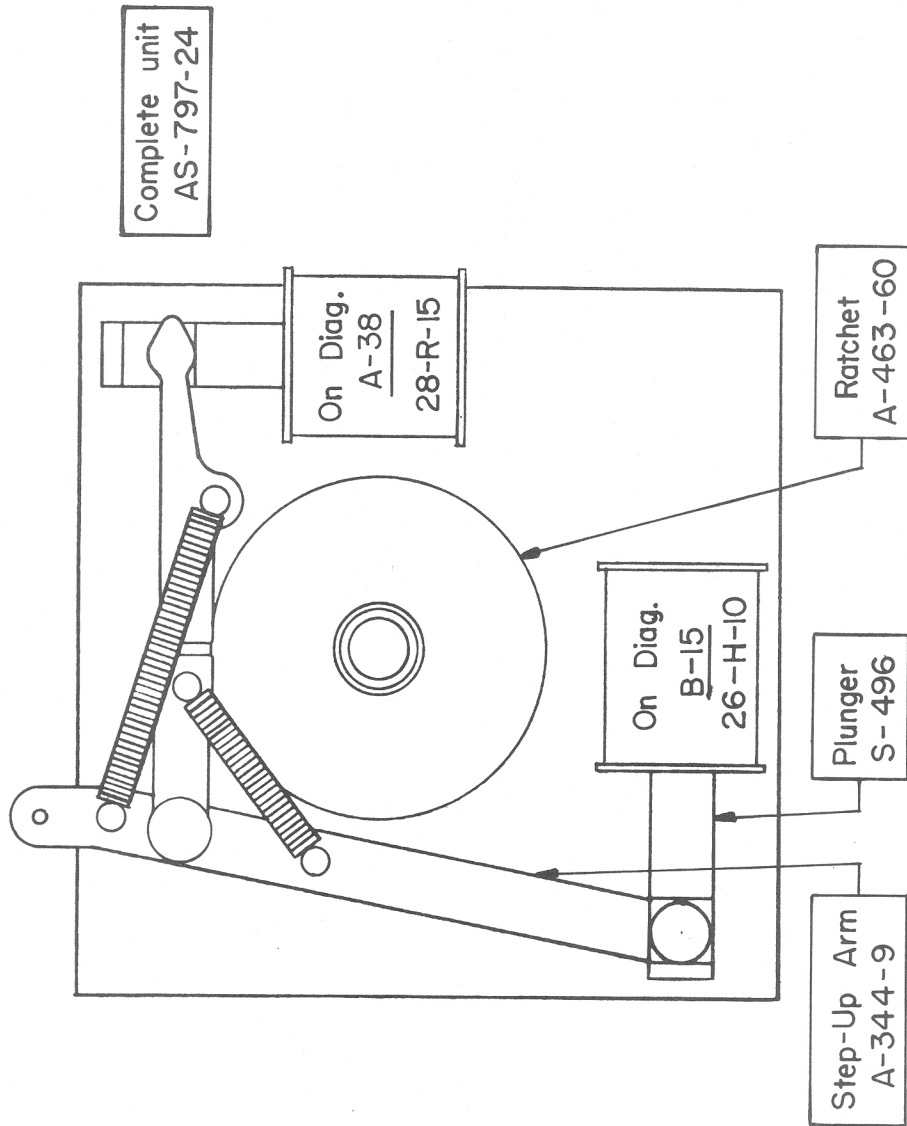


RELATIONSHIP BETWEEN REPLAY COUNTERS AND CARDS.

Condition	LETTER IN THIS COLUMN INDICATES REPLAY COUNTER USED FOR: Card # 1	LETTER IN THIS COLUMN INDICATES REPLAY COUNTER USED FOR: Card # 2	LETTER IN THIS COLUMN INDICATES REPLAY COUNTER USED FOR: Card # 3
No Super Score	A	B	C
Super Score on Card # 1	C	A	B
Super Score on Card # 2	B	C	A
Super Score on Card # 3	A	B	C

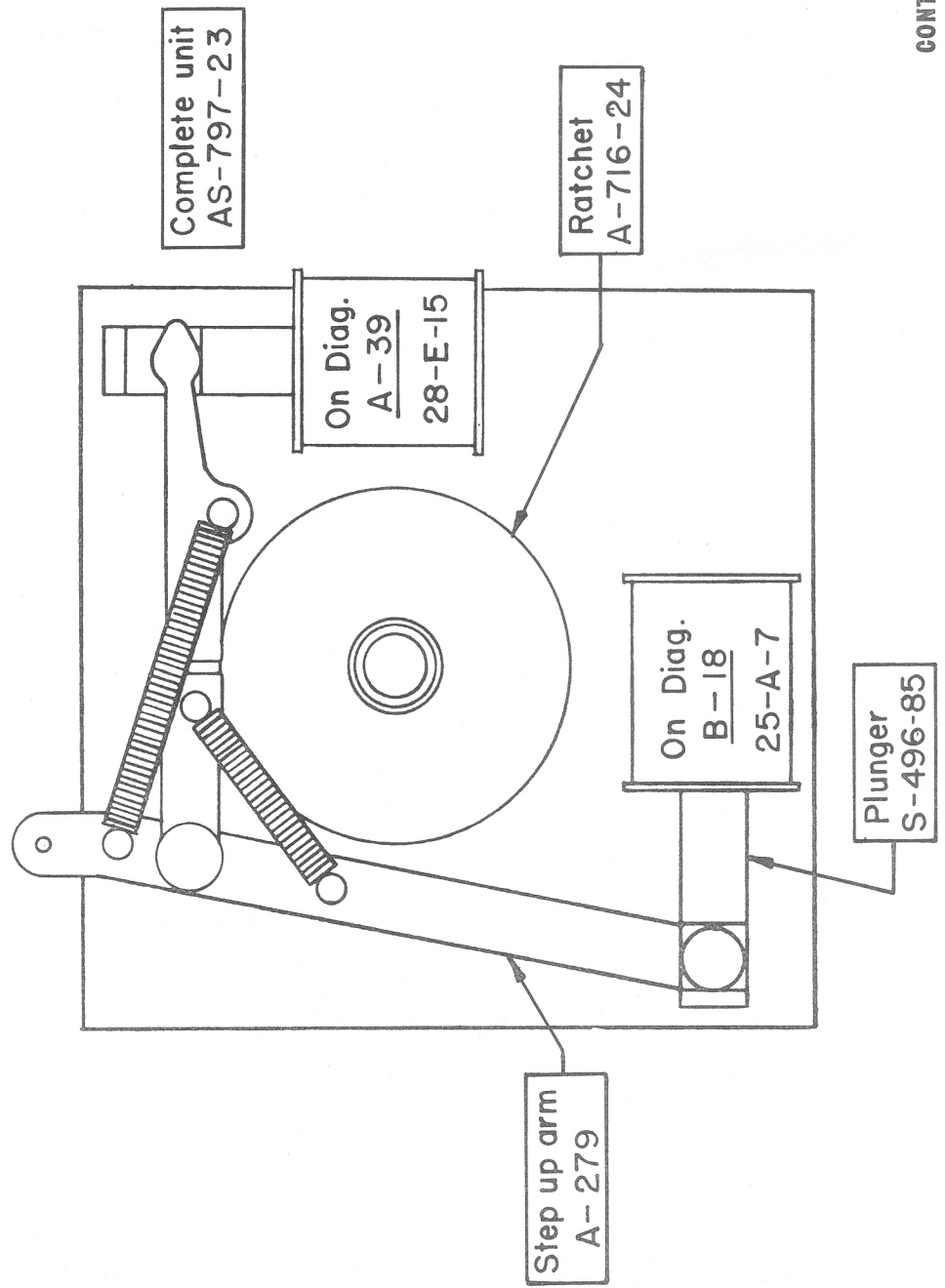
"REGULAR SCORE" REPLAY COUNTER (A)

COIL SIDE — ICE FROLICS



Note-- "Regular Score" replay counters (A) & (B) are exactly the same

"SUPER SCORE & REGULAR SCORE" REPLAY COUNTER ©
COIL SIDE — ICE FROLICS.

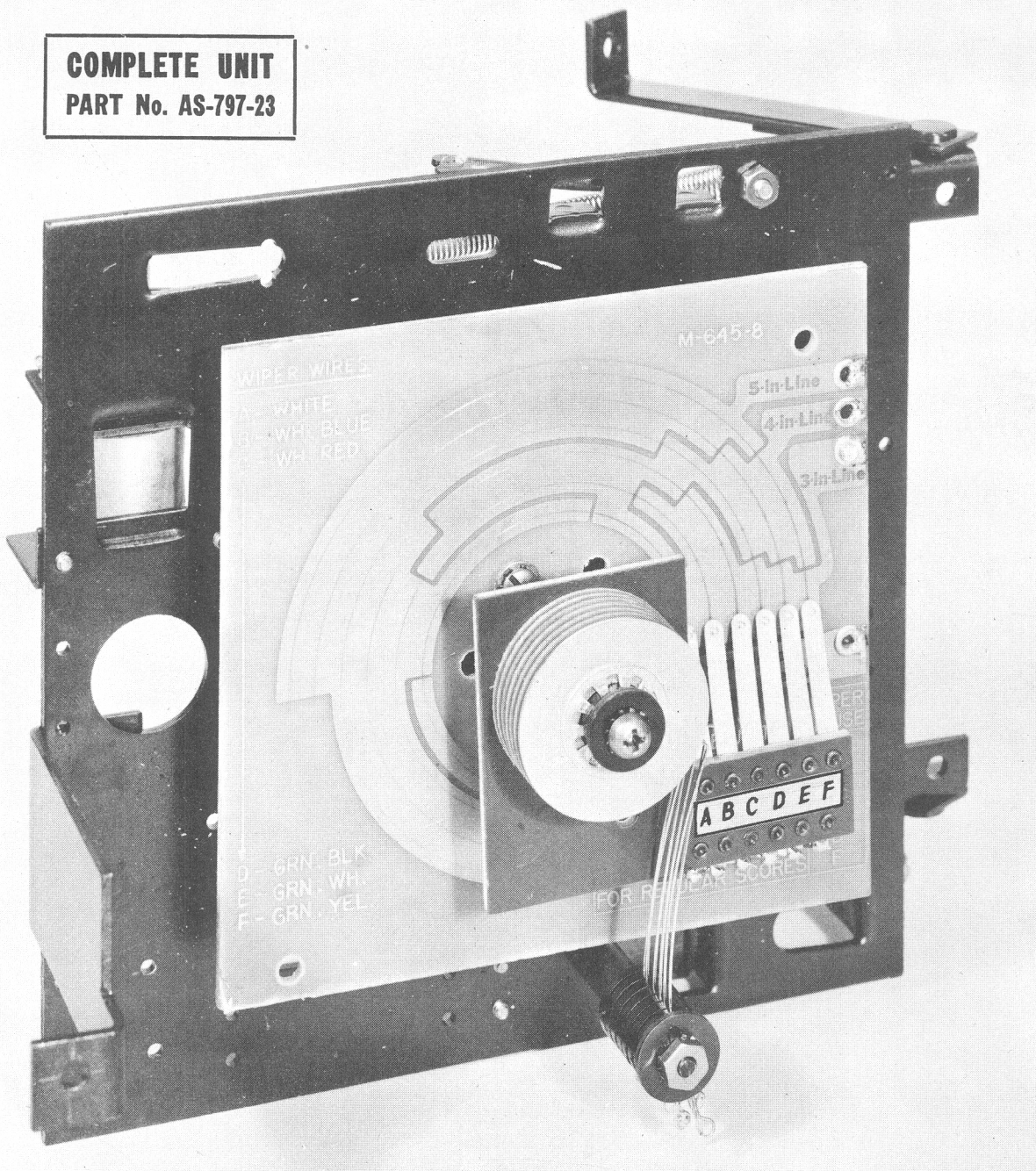


CONTINUED ON NEXT 2 PAGES

SUPER-SCORE AND REGULAR SCORE REPLAY COUNTER ©

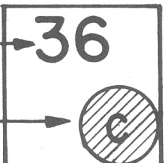

SEE CHART ON OPPOSITE PAGE

COMPLETE UNIT
PART No. AS-797-23

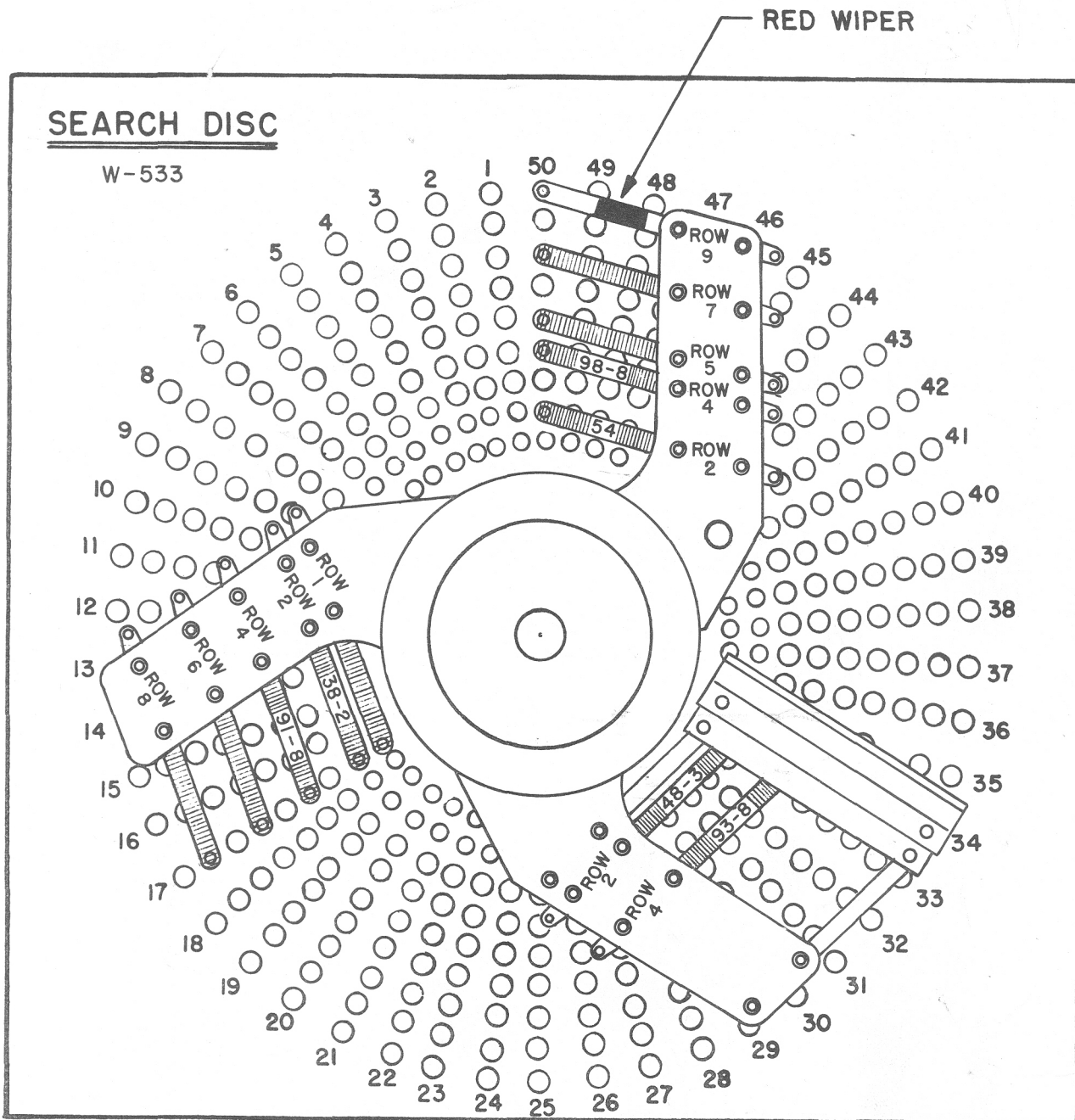


CAM SWITCHES THAT PULSE REPLAY COUNTER © STEP-UP COIL FOR "SUPER SCORE" SCORES ONLY.							
	sw. 12A	sw. 12A	sw. 12A	sw. 11A	sw. 12A	sw. 11A	sw. 10A
5 IN LINE	100 E	150 D	150 A	150 A	160 c	240 c	300 B
4 IN LINE	24 E	32 D	40 A	60 A	72 c	108 c	160 B
3 IN LINE	6 E	8 D	12 A	18 A	24 c	36 c	64 B
POSITION OF SCORE UNIT	1ST STEP	2ND STEP	3RD STEP	4TH STEP	5TH STEP	6TH STEP	7TH STEP

LARGE NUMBERS ARE "SUPER SCORE" SCORES SHOWN ON BACK GLASS. LETTERS IN SHADED CIRCLES INDICATE WHICH WIPER IS EFFECTIVE FOR A PARTICULAR "SUPER-SCORE" REPLAY SCORING.

EXAMPLE: ON A 3-IN-LINE SCORE OF  REPLAYS
THE CIRCUIT IS EFFECTIVE THRU THE  WIPER

NOTE: REGULAR SCORES (NOT SUPER SCORES) ARE EFFECTIVE THRU WIPER "F" WHEN SCORE UNIT IS AT THE ZERO (RESET) POSITION.



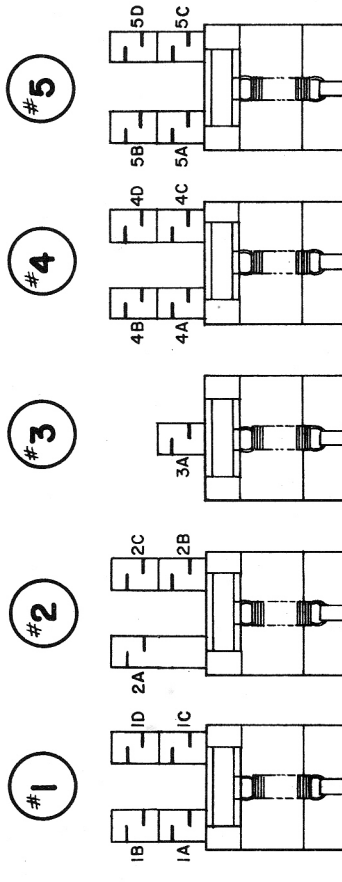
Wipers 38-2 and 91-8 complete circuit to all replay counters, when "Card and Super Score" unit is at the 1st, 2nd, 3rd and 6th steps.

Wipers 54 and 98-8 complete circuit to all replay counters, when "Card and Super Score" unit is at the 4th step.

Wipers 48-3 and 93-8 complete circuit to all replay counters, when "Card and Super Score" unit is at the 5th step.

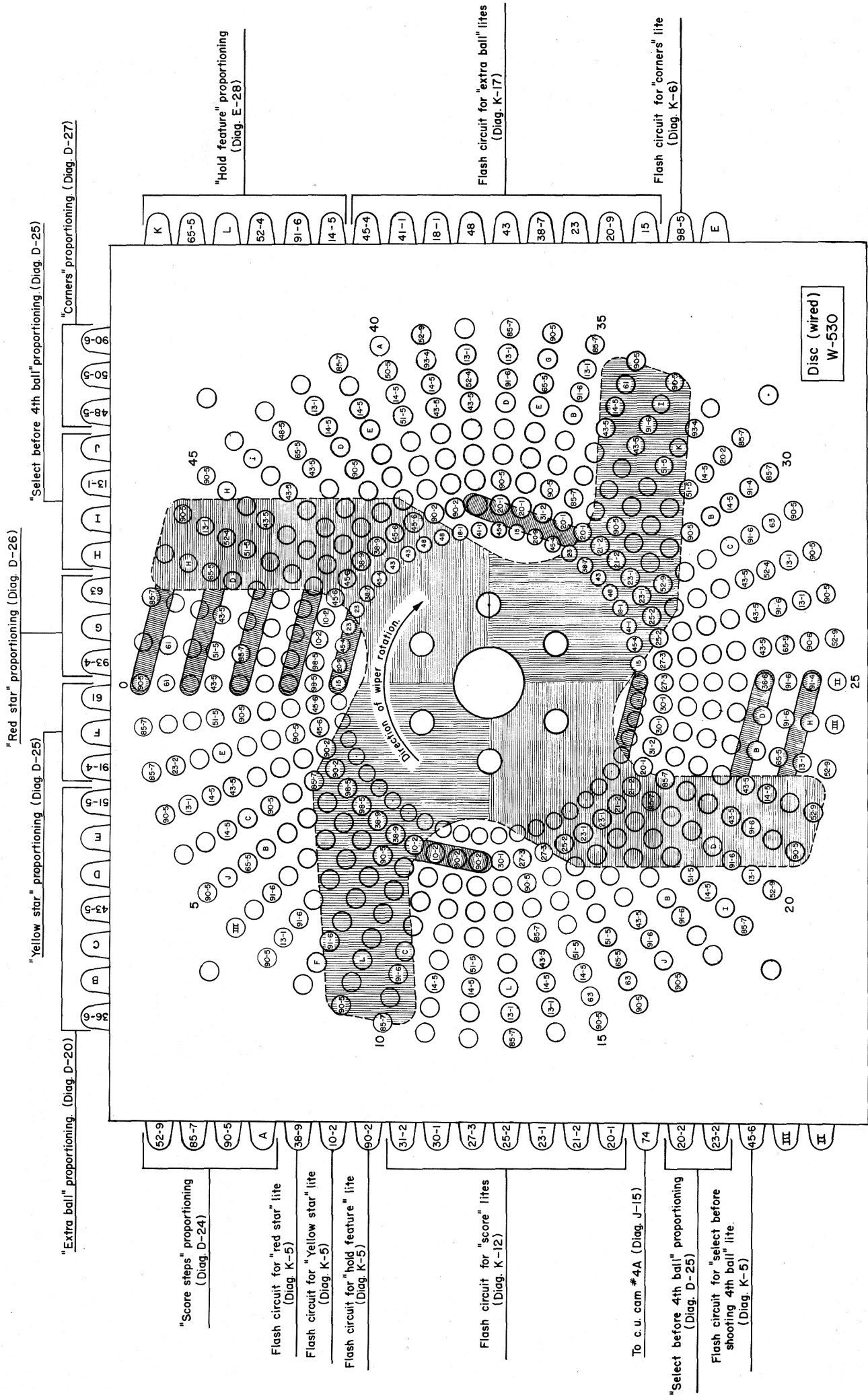
SEARCH POSITIONS								
RED WIPER POSITION	ROW 7 SEARCH RELAY # 1	ROW 8 SEARCH RELAY # 2	ROW 9 SEARCH RELAY # 3	ROW 6 SEARCH RELAY # 4	ROW 5 SEARCH RELAY # 5			
FIRST CARD	HORIZONTAL	1	10	1	9	25	3	
		2	8	23	5	19	7	
		3	6	18	16	11	17	
	VERTICAL	4	24	20	14	21	13	
		5	12	22	2	4	15	
		6	10	8	6	24	12	
		7	1	23	18	20	22	
		8	9	5	16	14	2	
	DIAGONAL	9	25	19	11	21	4	
		10	3	7	17	13	15	
		11	10	23	16	21	15	
		12	12	20	16	19	3	
	13							
	14							
CORNERS	15	12	10	3		15		
	16							
SECOND CARD	HORIZONTAL	17	18	4	8	16	6	
		18	10	24	12	20	19	
		19	2	14	15	9	1	
		20	13	22	25	21	17	
	VERTICAL	21	11	7	5	23	3	
		22	18	10	2	13	11	
		23	4	24	14	22	7	
		24	8	12	15	25	5	
		25	16	20	9	21	23	
		26	6	19	1	17	3	
	DIAGONAL	27	6	20	15	22	11	
		28	18	24	15	21	3	
		29						
		30						
CORNERS	31	18	6	3		11		
	32							
33								
THIRD CARD	HORIZONTAL	34	24	6	10	4	14	
		35	16	20	18	22	8	
		36	15	9	17	2	12	
		37	13	21	7	19	23	
		38	3	11	25	1	5	
	VERTICAL	39	24	16	15	13	3	
		40	6	20	9	21	11	
		41	10	18	17	7	25	
		42	4	22	2	19	1	
		43	14	8	12	23	5	
		44	24	20	17	19	5	
	DIAGONAL	45	3	21	17	22	14	
		46						
		47						
CORNERS		48	24	3	14		5	
	49							
50								

SEARCH RELAYS



CORNERS SCORES		3 IN LINE SCORES		4 IN LINE SCORES		5 IN LINE SCORES	
THRU	Switch no's.	Wire no's. & Color	THRU	Switch no's.	Wire no's. & Color	THRU	Switch no's.
3A	18-4 RED BLACK 50-3 WHITE	18-4 RED BLACK 50-3 WHITE	3A	18-4 RED BLACK 50-3 WHITE	18-4 RED BLACK 50-3 WHITE	3A	18-4 RED BLACK 50-3 WHITE
2B	50-3 WHITE 56-3 BROWN	50-3 WHITE 51-3 WHITE RED	2A	50-3 WHITE 51-3 WHITE RED	50-3 WHITE 56-3 WHITE BROWN	2C	50-3 WHITE 98-3 GRAY BLACK
1D	56-3 WHITE BROWN 36-8 YELLOW BROWN	51-3 WHITE RED 54-3 WHITE GREEN	1C	51-3 WHITE RED 54-3 WHITE GREEN	56-3 WHITE BROWN 53-3 WHITE YELLOW	4B	63 BROWN YELLOW 57-3 WHITE ORANGE
5B	36-8 YELLOW BROWN 14-2 RED GREEN	18-4 RED BLACK 50-3 WHITE	3A	18-4 RED BLACK 50-3 WHITE	53-3 WHITE YELLOW 71-3 ORANGE RED	1A	61-3 BROWN RED 57-3 WHITE ORANGE
		50-3 WHITE 51-3 WHITE RED	2A	50-3 WHITE 51-3 WHITE RED	18-4 RED BLACK 50-3 WHITE	5C	98-3 GRAY BLACK 63 BROWN YELLOW
		51-3 WHITE RED 54-3 WHITE GREEN	4D	51-3 WHITE RED 54-3 WHITE GREEN	50-3 WHITE 56-3 WHITE BROWN		
		18-4 RED BLACK 50-3 WHITE	3A	18-4 RED BLACK 50-3 WHITE	56-3 WHITE BROWN 53-3 WHITE YELLOW		
		50-3 WHITE 52-3 WHITE BLUE 54-3 WHITE GREEN	4A	50-3 WHITE 52-3 WHITE BLUE 54-3 WHITE GREEN	53-3 WHITE YELLOW 71-3 ORANGE RED		

SPOTTING DISC - wiper or button side - ICE FROLICS



CORRECT ADJUSTMENT FOR CONTROL UNIT CAM SWITCHES 13, 13A & 13B

NOTICE:

THE IMPORTANT PART OF THIS ILLUSTRATION IS TO SHOW THAT SWITCH 13 CLOSSES FIRST AND OPENS LAST.

IF AN ADJUSTMENT IS NECESSARY, SWITCH 13 CAN BE MOVED UP OR DOWN. LOOSEN SCREWS THAT HOLD SWITCH, THEN MOVE UP OR DOWN.

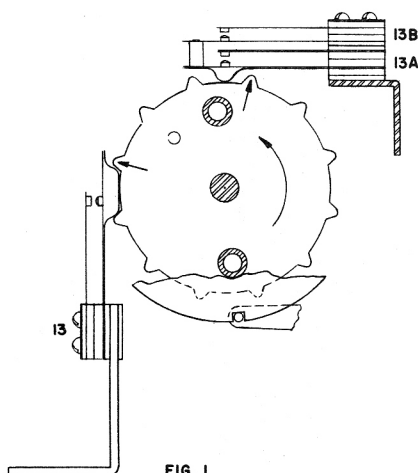


FIG. 1

REPLAY CAMS SHOWN IN THEIR NORMAL INDEXED POSITION. SWITCHES 13A, 13B, & 13 ARE OPEN AT THIS TIME.

NOTE:
ARROWS POINT TO LOBES THAT WILL ACTUATE SWITCHES.

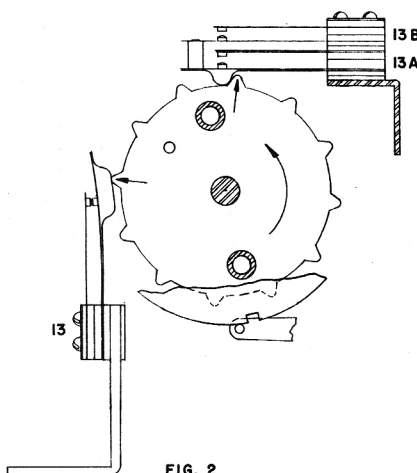


FIG. 2

REPLAY CAMS SHOWN STARTING TO ROTATE. THEY ARE NOW OUT OF THEIR INDEX POSITION. SWITCHES 13A, & 13B ARE STILL OPEN. SWITCH 13 IS NOW CLOSED.

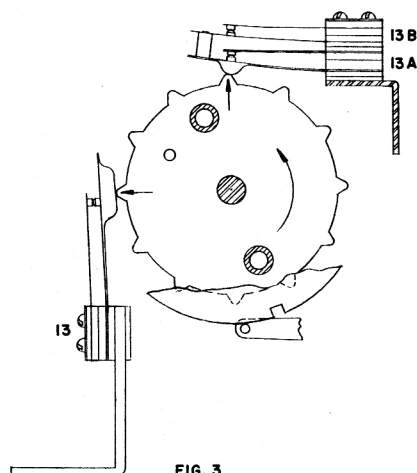


FIG. 3

SWITCHES 13A, & 13B ARE NOW CLOSED. SWITCH 13 IS STILL CLOSED.

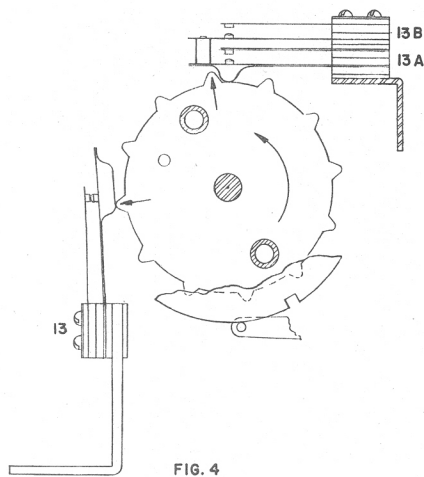


FIG. 4

SWITCHES 13A, & 13B ARE NOW OPEN AGAIN.
SWITCH 13 IS STILL CLOSED.

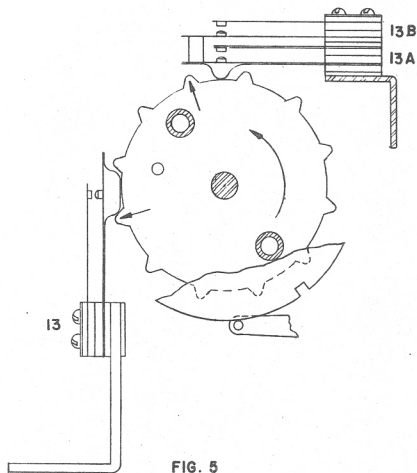
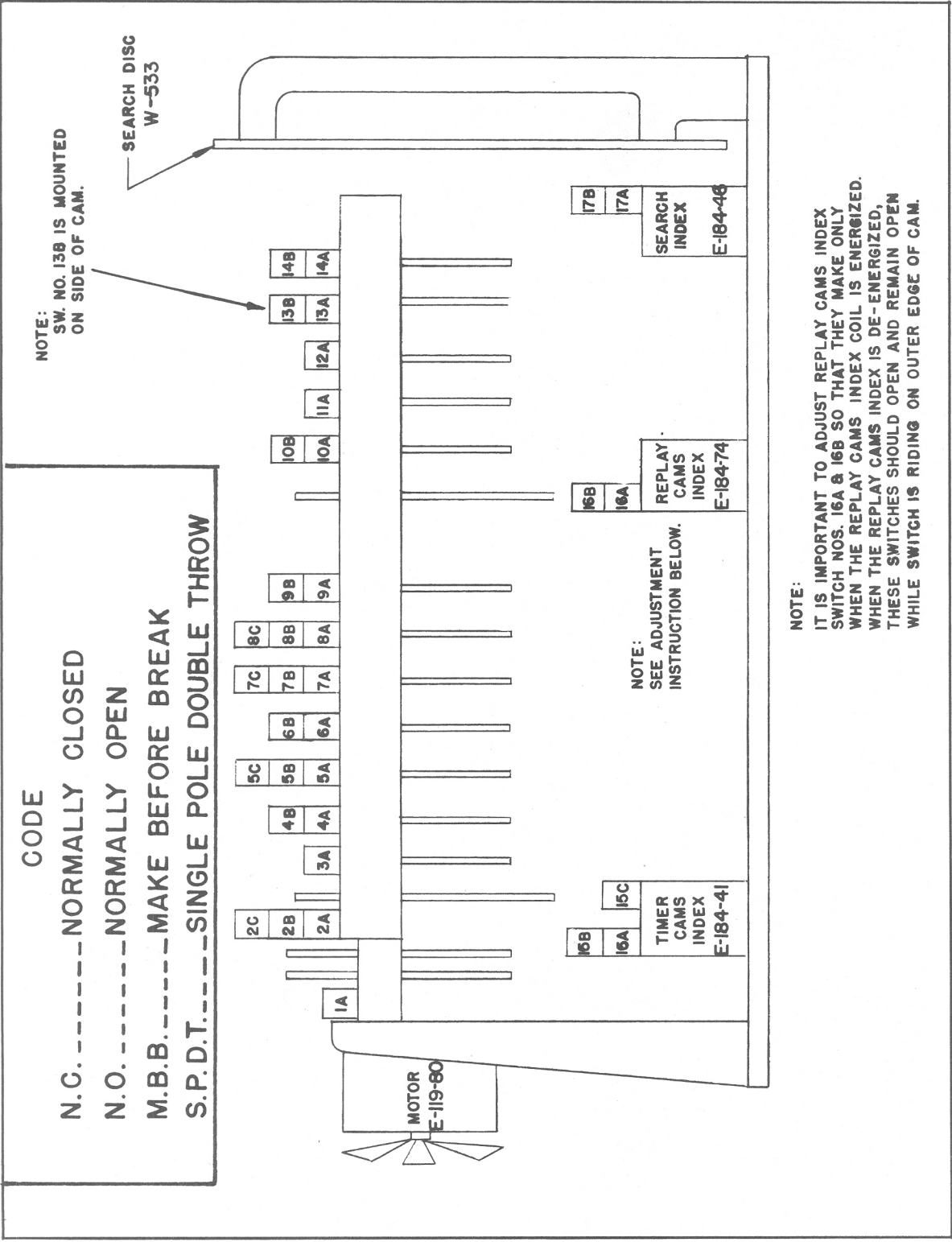


FIG. 5

ALL SWITCHES ARE NOW OPEN AGAIN, SAME AS IN FIG. 1.
THIS SEQUENCE IS REPEATED THRUOUT REPLAY SCORING CYCLE.



CONTROL UNIT PICTORIAL VIEW
 NUMBERS CORRESPOND TO SWITCH CHART

CONTROL UNIT CAM SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
1A N.O.	F-8	65-2 36-10	Brown-White Yellow-Brown	Energizes timer step-up coil when drag arm switch, 5th ball relay switch and cam switch 14A are closed.
2A N.O.	H-7	30 27-4	Yellow Blue-Orange	Energizes replay register reset and reflex play magnet.
2B N.O.	D-30	30 93-1	Yellow Gray-Yellow	Energizes coin kicker magnet.
2C N.C.	F-10	30 15-2	Yellow Red-White	Drops out extra ball play relay.
3A N.C.	I-4	83-3 48-2	Black-Yellow Green-Black	Drops out start, extra ball start relays and acts as a safety switch during spin.
4A N.O.	J-14	74 60	Orange-Green Brown	Flashes extra ball lites.
4B N.O.	D-39	30 98-1	Yellow Gray-Black	Energizes score extra step index and spotting index.
5A N.O.	Q-8	65-2 71-9	Brown-White Orange-Red	Energizes timer reset coil.
5B N.O.	B-21	81-3 21-1	Black-Red Blue-Red	Energizes extra ball unit step-up coil. Steps unit from minus one position to zero position.
5C N.O.	D-36	78-4 10-6	Orange-Black Red	Energizes anti-cheat relay.
6A N.C.	C-29	81-4 74-8	Black-Red Orange-Green	Opens game advantage circuits during timing cycle.
6B N.C.	D-24	43-4 25-3	Green-Yellow Blue-White	Score extra step safety switch.
7A N.O.	B-22	81-3 25-4	Black-Red Blue-White	Extra ball unit steps.
7B N.O.	B-25	65-3 15-3	Brown-White Red-White	Score unit steps.

CONTINUED ON NEXT PAGE

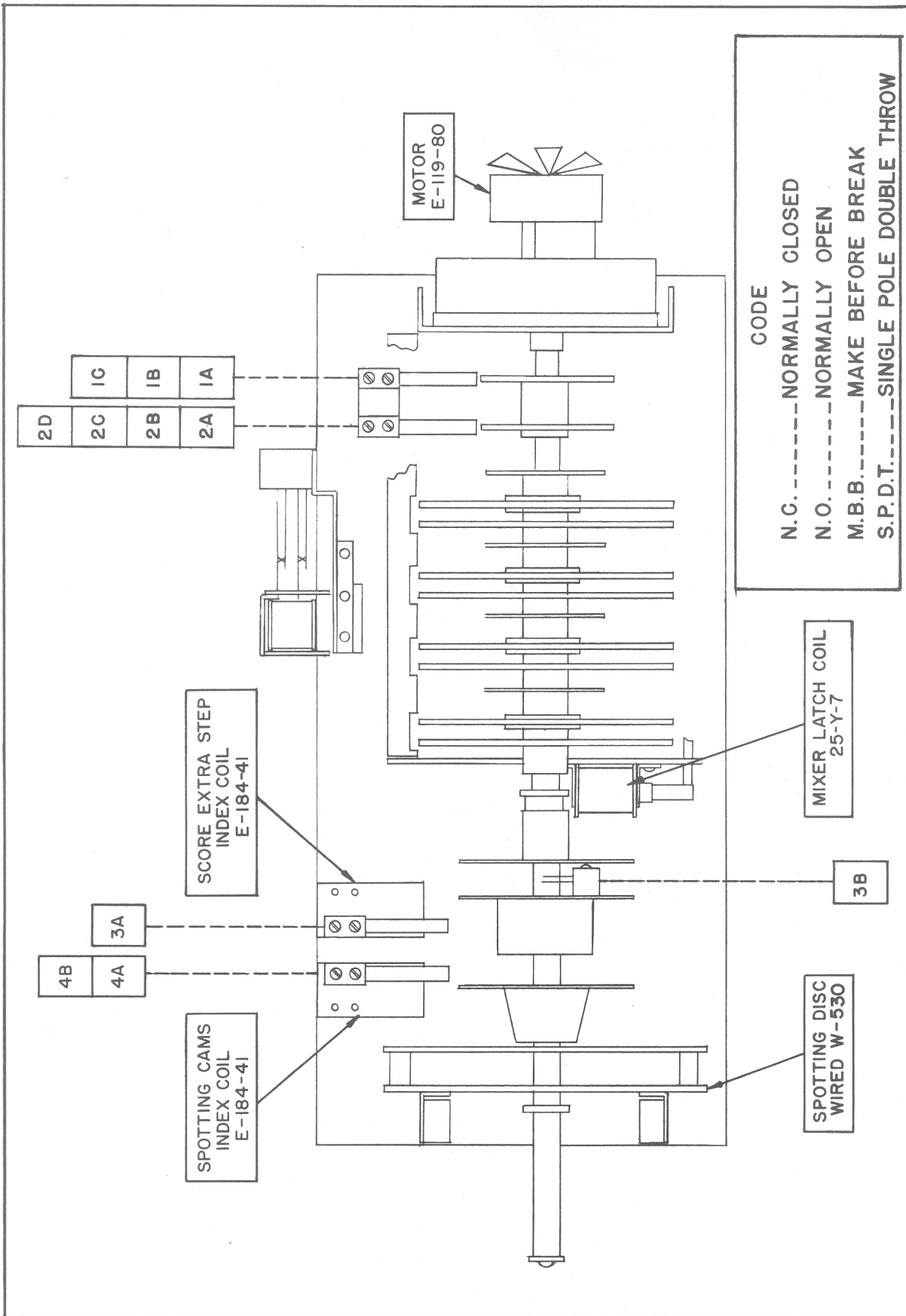
CONTROL UNIT CAM SWITCH CHART — CONTINUED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
7C N.O.	E-30	30 93-1	Yellow Gray-Yellow	Energizes coin kicker magnet.
8A N.O.	E-28	31 71-7	Yellow-Red Orange-Red	Trips "4th ball select" relay, also red star, yellow star and corners relay.
8B N.O.	D-34	83-5 10-5	Black-Yellow Red	Energizes card and super score step-up coil.
8C N.O.	C-29	85-5 36	Black-White Yellow-Brown	Hold feature steps.
9A Alt.	E-24	71 43-4	Orange-Red Green-Yellow	Opens score extra step circuit every other time.
9B Alt.	D-29	63-6 31	Brown-Yellow Yellow-Red	Opens hold feature single step circuit every other time.
10A N.O.	A-17	70 90-8	Orange Gray	Pulses replay counter #3 when score unit is at last step.
10B N.O.	B-19	38-8 56	Yellow-Black White-Brown	Pulses corners replay counter.
11A N.O.	A-17	85-8 70	Black-White Orange	Pulses replay counter #3 when score unit is at 4th and 6th step.
12A N.O.	A-16	80-5 70	Black Orange	Pulses replay counter #3 when score unit is at 1st, 2nd, 3rd and 5th step. Also pulses replay counters #1 and #2.
13A N.O.	B-13	80 38-4	Black Yellow-Black	Pulses replay register and reflex play magnet.
13B (Backside) N.O.	H-13	21-3 27	Blue-Red Blue-Orange	Replay lock-in switch. NOTE: See pictorial view.
14A N.C.	B-8	27-2 90-9	Blue-Orange Gray	Opens circuit to timer step-up during replay winner.
14B N.C.	I-15	56-7 93	White-Brown Gray-Yellow	Prevents the start of another replay scoring until cams are indexed.

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CONTROL UNIT CAM SWITCH CHART — CONCLUDED

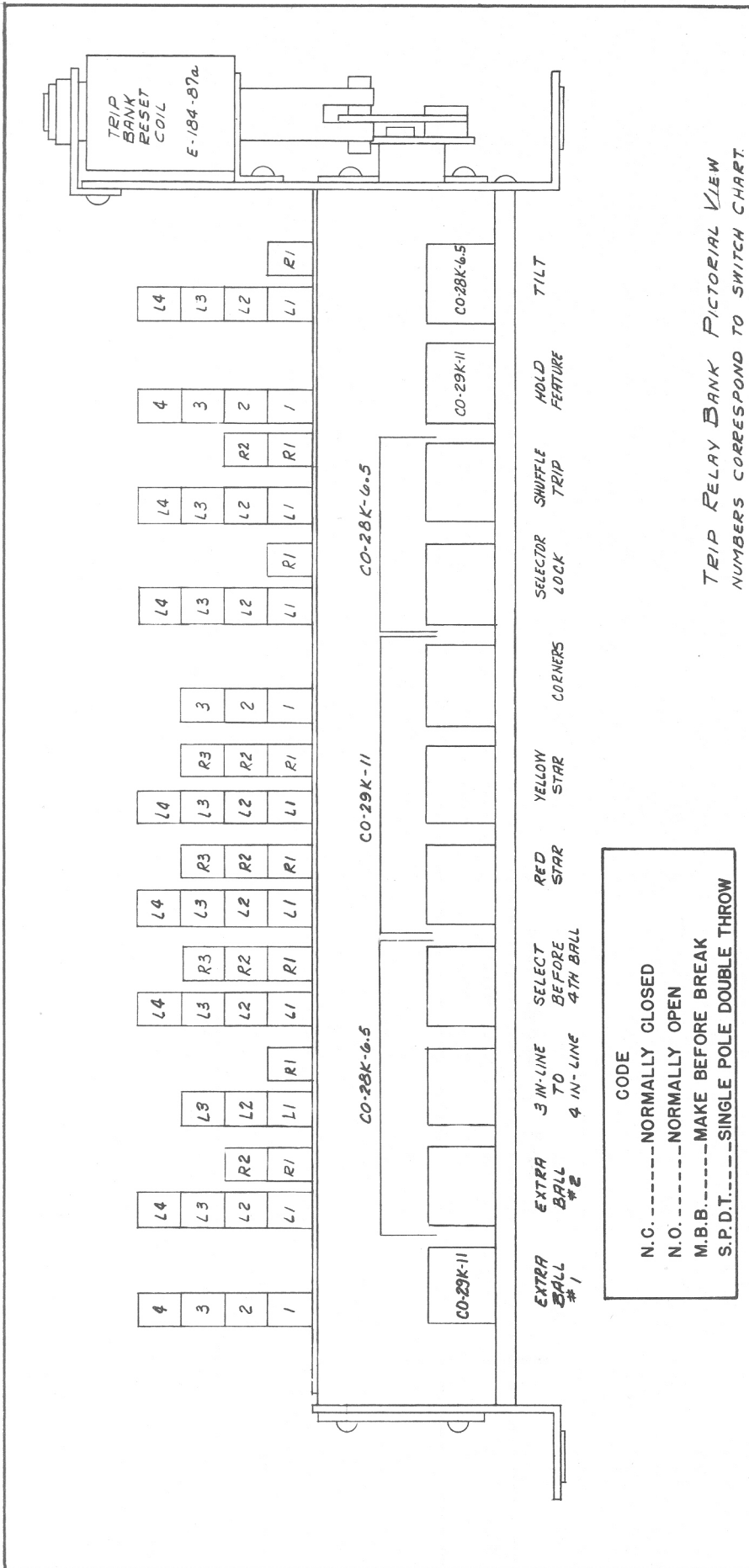
CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
TIMER CAM INDEX COIL	A-10	93-2 70	Gray-Yellow Orange	Energized by switches on start and extra ball start relay, also thru shutter motor cam switch #5.
15A N. O.	E-9	74-2 81-2	Orange-Green Black-Red	Lock-in safety switch for extra ball play relay.
15B N. C.	G-6	71-2 14-9	Orange-Red Red-Green	Opens circuit to coin lock-out magnet during spin.
15C N. O.	F-2	20-P 60-P	Blue (Plastic) Brown(Plastic)	Operates mixer and control unit motor.
REPLAY CAMS INDEX	A-13	40-4 70	Green Orange	Energizes when winning score is made and releases replay cams.
16A N. O.	G-13	27 80	Blue-Orange Black	In series with replay lock-in circuit. NOTE: See pictorial view for correct adj.
16B N. O.	H-14	93 56-7	Gray-Yellow White-Brown	In series with replay winner circuit. NOTE: See pictorial view for correct adj.
SEARCH INDEX COIL	A-12	80 70	Black Orange	Energizes when 3 in line or more is scored.
17A N. O.	B-12	80 40-4	Black Green	Energizes replay cams index if 3 in line or more is scored.
17B N. C.	I-4	83-3 30	Black-Yellow Yellow	Opens start circuit and also acts as a safety switch.



MIXER UNIT ASSEMBLY PICTORIAL VIEW
 NUMBERS CORRESPOND TO SWITCH CHART

MIXER AND SPOTTING UNIT SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
MIXER AND SPOTTING 16 PULSE SWITCHES				
1A N. O.	C-29	36 65-5	Yellow-Brown Brown-White	Steps hold feature unit.
1B N. O.	K-8	83-6 63-5	Black-Yellow Brown-Yellow	Flashes "select now" lite for selectable super score.
1C N. O.	B-20	78 81-3	Orange-Black Black-Red	Steps extra ball unit.
2A N. O.	G-35	13-6 15-8	Red-Yellow Red-White	Pulse switch for "card and super score" step-up and escapement coils.
2B N. O.	D-6	53-2 75-2	White-Yellow Orange-White	Pulse switch for operating replay register reset and replay meter, when replay reset relay is energized.
2C N. O.	K-4	63-3 74-3	Brown-Yellow Orange-Green	Flashes "hold" indicator lite.
2D N. O.	C-19	48-6 85-3	Green-Black Black-White	Steps corners replay counter to its zero position. (In series with corners unit homing switch.)
SCORE EXTRA STEP INDEX COIL	A-39	98-1 70	Gray-Black Orange	Energized during timing cam cycle by control unit cam switch #4B.
3A N. O.	H-30	75-3 81-1	Orange-White Black-Red	Completes lock-in circuit for score extra step relay.
3B N. O.	C-23	25-3 13-2	Blue-White Red-Yellow	Pulse switch for score multiple steps.
SPOTTING CAMS INDEX COIL	A-39	98-1 70	Gray-Black Orange	Energized during timing cycle by control unit cam switch #4B.
4A N. O.	J-6	36-5 83-4	Yellow-Brown Black-Yellow	Completes flash circuit to red and yellow star, corners, and hold feature lites.
4B N. O.	J-13	30-5 13-4	Yellow Red-Yellow	Completes flash circuit for score lites.



TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
EXTRA BALL #1 TRIP COIL	A-4	Jumper 70	Blue Orange	Energized by switch on extra ball play relay.
1 S.P.D.T.	G-26	75-3 90 74-8	Orange-White Gray Orange-Green	Extra ball proportioning.
2 N.C.	B-4	Jumper 20-3	Blue Blue	Breaks circuit to this coil.
3 N.C.	F-29	74-8 83	Orange-Green Black-Yellow	Opens circuits to game advantages during extra ball play.
4 N.C.	F-34	21-3 10-5	Blue-Red Red	Breaks circuit to "card and super score" step-up coil.
EXTRA BALL #2 TRIP COIL	A-4	Jumper 70	Blue Orange	Same as extra ball trip #1. They both energize at the same time.
L1 S.P.D.T.	E-23	71 30 61-2	Orange-Red Yellow Brown-Red	Shuts off score multiple step circuit and completes circuit to step extra ball unit from a minus one to a zero position.
L2 N.C.	B-4	Jumper 20-3	Blue Blue	Breaks circuit to this coil.
L3 N.C.	B-24	80-7 15-3	Black Red-White	Shuts off score steps when playing for extra balls.
L4 S.P.D.T.	J-14	13-4 30 60	Red-Yellow Yellow Brown	Shuts off flashing of score lites and completes circuit to flash extra ball lites.
R1 N.O.	D-12	91-1 38-3	Gray-Red Yellow-Black	Completes circuit to ball lifter motor when timer stepper resets.
R2 N.O.	I-21	43-4 63-6	Green-Yellow Brown-Yellow	Extra ball proportioning.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
3 IN LINE TO 4 IN LINE TRIP COIL	A-35	93-3 70	Gray-Yellow Orange	Energized when red or yellow star relay is tripped and corresponding roll-over is hit.
L1 N.O.	J-2	30 23-5	Yellow Blue-Yellow	Lites lite to show that "3 in line" scores "4 in line".
L2 N.O.	H-17	54-3 71-3	White-Green Orange-Red	Changes "3 in line" replay scoring circuit to "4 in line" scoring.
L3 N.C.	F-21	52-6 31-6	White-Blue Yellow-Red	Extra ball proportioning.
R1 N.C.	B-36	56-5 93-3	White-Brown Gray-Yellow	Breaks circuit to this coil.
SELECT BEFORE 4TH BALL TRIP COIL	A-25	Jumper 70	Black-Yellow Orange	Energized by control unit cam switch #8A, when spotting disc wipers stop on correct buttons.
L1 N.O.	K-9	65-4 45-6	Brown-White Green-White	Completes circuit to lite "select before shooting 4th ball" lite.
L2 N.C.	E-24	90 14	Gray Red-Green	Proportioning for score steps.
L3 N.O.	G-34	21-3 13-6	Blue-Red Red-Yellow	Completes circuit to "card and super score" step-up and escapement coils.
L4 N.C.	D-24	50-4 25-5	White Blue-White	Proportioning for score steps.
R1 S.P.D.T.	J-7	91-5 85-1 63-5	Gray-Red Black-White Brown-Yellow	Breaks circuit to "select before shooting 1st ball" lite and completes circuit to "select now" lite at 4th step of timer.
R2 N.C.	A-26	Jumper 83-1	Black-Yellow Black-Yellow	Breaks circuit to this coil.
R3 N.C.	H-26	18-8 98-2	Red-Black Gray-Black	Proportioning for game advantages.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
RED STAR TRIP COIL	A-26	Jumper 70	Brown-Yellow Orange	Energized by control unit cam switch #8A, when spotting disc wipers stop on correct buttons.
L1 N.O.	J-5	30 38-9	Yellow Yellow-Black	Lites "red star" lite.
L2 N.C.	H-24	80-6 75-3	Black Orange-White	Proportioning for game advantages.
L3 N.O.	E-36	23-7 56-5	Blue-Yellow White-Brown	Completes circuit to energize "3 in line to 4 in line" trip relay.
L4 N.C.	F-24	90 36-2	Gray Yellow-Brown	Proportioning for score steps.
R1 N.C.	B-26	Jumper 63	Brown-Yellow Brown-Yellow	Breaks circuit to this coil.
R2 N.C.	F-25	90 40-2	Gray Green	Proportioning for score steps.
R3 N.C.	C-26	91-4 61	Gray-Red Brown-Red	Proportioning for yellow star trip relay.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
YELLOW STAR TRIP COIL	A-25	Jumper 70	Brown-Red Orange	Energized by control unit cam switch #8A, when spotting disc wipers stop on correct positions.
L 1 N. O.	J-6	30 10-2	Yellow Red	Lites "yellow star" lite.
L 2 N. C.	C-26	93-4 63	Gray-Yellow Brown-Yellow	Proportioning for red star trip relay.
L 3 N. O.	F-35	21-7 56-5	Blue-Red White-Brown	Completes circuit to energize "3 in line to 4 in line" trip relay.
L 4 N. C.	E-24	36-2 14	Yellow-Brown Red-Green	Proportioning for score steps.
R 1 N. C.	B-25	Jumper 61	Brown-Red Brown-Red	Breaks circuit to this coil.
R 2 N. C.	H-25	80-6 18-8	Black Red-Black	Proportioning for game advantages.
R 3 N. C.	E-25	40-2 50-4	Green White	Proportioning for score steps.
CORNERS TRIP COIL	A-27	Jumper 70	Gray Orange	Energized by control unit cam switch #8A, when spotting disc wipers stop on correct positions.
1 N. O.	J-7	30 98-5	Yellow Gray-Black	Lites "corners" lite.
2 N. O.	F-19	21-8 13-8	Blue-Red Red-Yellow	Completes circuit for corners replay scoring.
3 N. C.	B-27	Jumper 90-6	Gray Gray	Breaks circuit to this coil.

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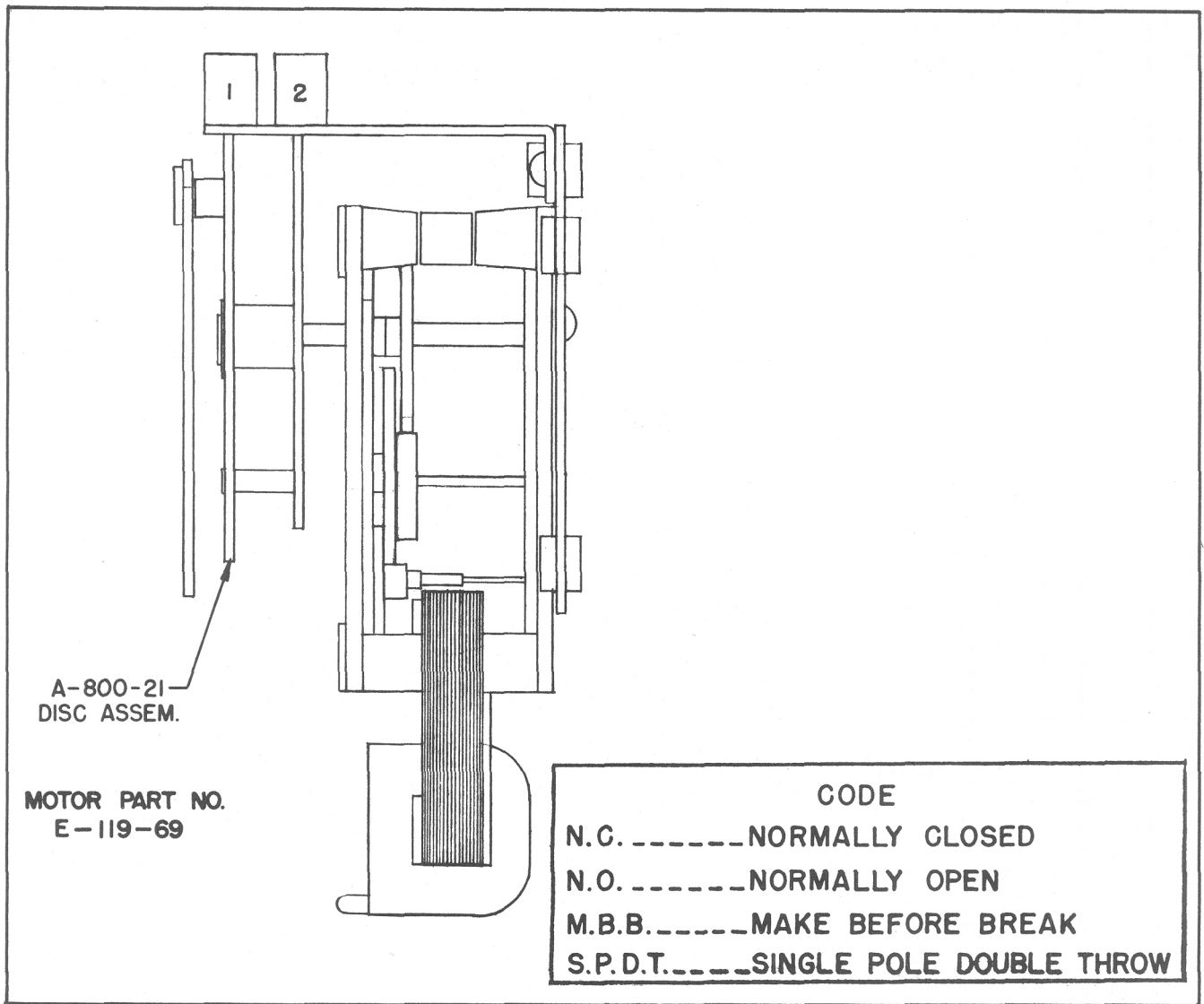
TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
SELECTOR LOCK TRIP COIL	A-11	Jumper 70	Gray-Black Orange	Trips at 4th step of timer unit.
L 1 N.O.	F-11	30 53	Yellow White-Yellow	Completes circuit to energize 5th ball relay.
L 2 N.C.	B-11	Jumper 98	Gray-Black Gray-Black	Breaks circuit to this coil.
L 3 N.O.	G-9	85-9 43-2	Black-White Green-Yellow	Keeps circuit to ball lifter cam switch alive.
L 4 N.C.	E-35	15-8 80-4	Red-White Black	Breaks circuit to "card and super score" step-up and escapement coils.
R 1 N.C.	J-8	85-1 65-4	Black-White Brown-White	Shuts off "select now" lite when this relay trips.
SHUFFLE TRIP COIL	A-32	51-4 70	White-Red Orange	If hold feature is lit, this coil trips when 5th ball is shot, or when "all" button is pushed.
L 1 N.O.	I-27	45-5 30	Green-White Yellow	Completes circuit for even number lites.
L 2 N.C.	I-31	21-3 31-10	Blue-Red Yellow-Red	Breaks circuit to this coil.
L 3 N.O.	I-25	41-7 30	Green-Red Yellow	Completes circuit for odd number lites.
L 4 N.C.	K-4	74-3 10-4	Orange-Green Red	Shuts off "hold" indicator lite.
R 1 N.O.	E-20	80-3 78-1	Black Orange-Black	Extra ball proportioning.
R 2 N.O.	I-15	18-4 56-7	Red-Black White-Brown	Completes circuit to replay scoring circuit. (In series with search relay switches.)

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TRIP RELAY BANK CHART — CONCLUDED

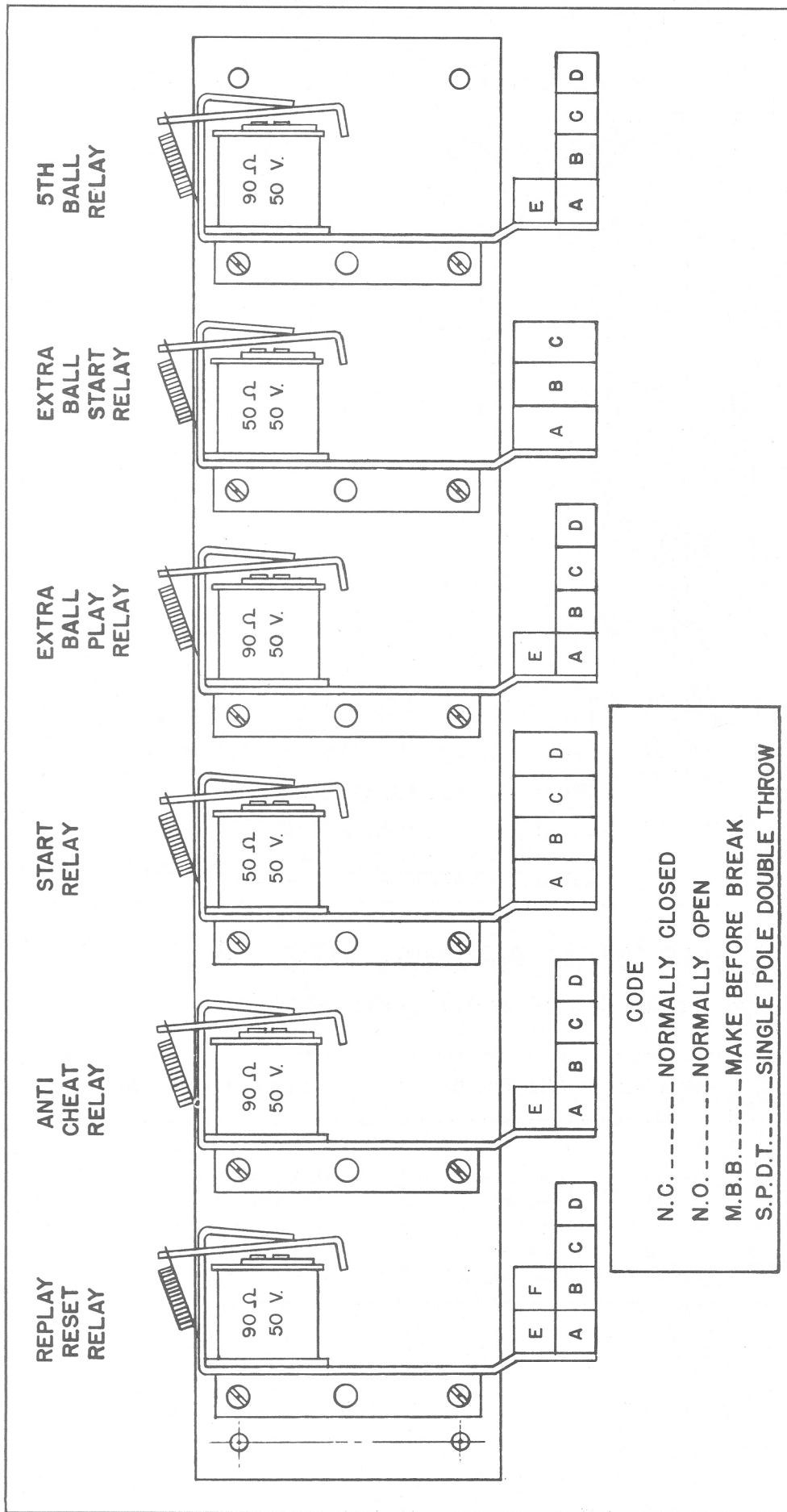
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
HOLD FEATURE TRIP COIL	A-7	Jumper 70	White-Yellow Orange	Trips when hold feature unit is at last step.
1 S.P.D.T.	F-31	51-4 45 57-4	White-Red Green-White White-Orange	Directs circuit to shuffle trip relay or "all" button switch.
2 N.C.	B-7	Jumper 53-6	White-Yellow White-Yellow	Breaks circuit to this coil.
3 N.C.	F-22	90 52-6	Gray White-Blue	Extra ball proportioning.
4 N.C.	E-26	71-7 23-4	Orange-Red Blue-Yellow	Proportioning for "select before 4th ball" yellow and red star, and corners advantages.
TILT TRIP COIL	A-12	Jumper 70	Blue-White Orange	Actuated by any tilt switch or plumb bob.
L1 S.P.D.T.	I-10	21-3 30 36-4	Blue-Red Yellow Yellow-Brown	Breaks circuit to ball counting, extra ball, replay and button circuits. Completes circuit to shutter motor when game is tilted.
L2 N.C.	F-1	20-P 60-P	Blue (Plastic) Brown(Plastic)	Opens circuit to control unit and mixer unit motors, when game is tilted.
L3 N.C.	L-23	20-4 10	Blue Red	Opens 17 volt circuit.
L4 S.P.D.T.	L-20	38 81 41-9	Yellow-Black Black-Red Green-Red	Shuts off 6 volt circuit and lites tilt lite.
R1 N.C.	B-12	Jumper 25-7	Blue-White Blue-White	Breaks circuit to this coil.



BALL LIFT MOTOR PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART BELOW

CAM SWITCH		LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
1	N.O.	G-13	30 91-1	Yellow Grey-Red	Carry-over switch for ball lifter motor.
2	N.O.	E-9	43-2 27-2	Green-Yellow Blue-Orange	Energizes timer unit step-up coll.



6 RELAY BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART

6 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
REPLAY RESET RELAY COIL	A-6	75-2 70	Orange-White Orange	Energizes when replays are cancelled by push button or if anti-cheat relay drops out.
A S.P.D.T.	D-6	53-2 13-9 27-4	White-Yellow Red-Yellow Blue-Orange	Directs circuit to replay meter and replay register reset during replay cancel.
B N.O.	G-1	20-P 60-P	Blue (Plastic) Brown(Plastic)	Energizes control unit motor.
C N.O.	E-6	50-2 75-2	White Orange-White	Lock-in switch for this relay.
D N.C.	E-3	21-6 63-2	Blue-Red Brown-Yellow	Opens start circuit during replay cancel.
E N.C.	E-5	20-3 25-10	Blue Blue-White	Opens extra ball trip and extra ball start relays during cancel.
F N.O.	B-6	61-5 41-6	Brown-Red Green-Red	In series with replay meter.

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6 RELAY BANK SWITCH CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
ANTI-CHEAT RELAY COIL	A-36	78-4 70	Orange-Black Orange	Energized thru cam switch #5C, its switches protect replay and light circuits.
A N.O.	D-37	10-6 78-4	Red Orange-Black	Lock-in switch for this relay.
B N.O.	L-19	54-7 38	White-Green Yellow-Black	Opens 6 volt circuit to lights.
C N.O.	L-22	80-1 20-4	Black Blue	Opens 17 volt circuit when this relay drops out. (Card number lites and search relays.)
D N.O.	B-9	91-2 93-6	Gray-Red Gray-Yellow	Completes circuit to extra ball play relay.
E N.C.	F-6	50-2 75-2	White Orange-White	Energizes replay reset relay when this relay drops out.
START RELAY COIL	A-3	21-6 70	Blue-Red Orange	Energizes every time a coin is played or when a red button is pressed.
A N.C.	C-9	78-2 91-2	Orange-Black Gray-Red	Opens circuit to extra ball play relay when this relay is energized.
B N.C.	E-29	83 31	Yellow Yellow-Red	Opens circuit to number selection and hold feature step up coil.
C N.O.	H-3	48-2 63-2	Green-Black Brown-Yellow	Lock-in switch for this relay.
D N.O.	E-10	41-3 13-3	Green-Red Red-Yellow	Completes circuit to timer cam index coil.

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6 RELAY BANK SWITCH CHART — CONTINUED

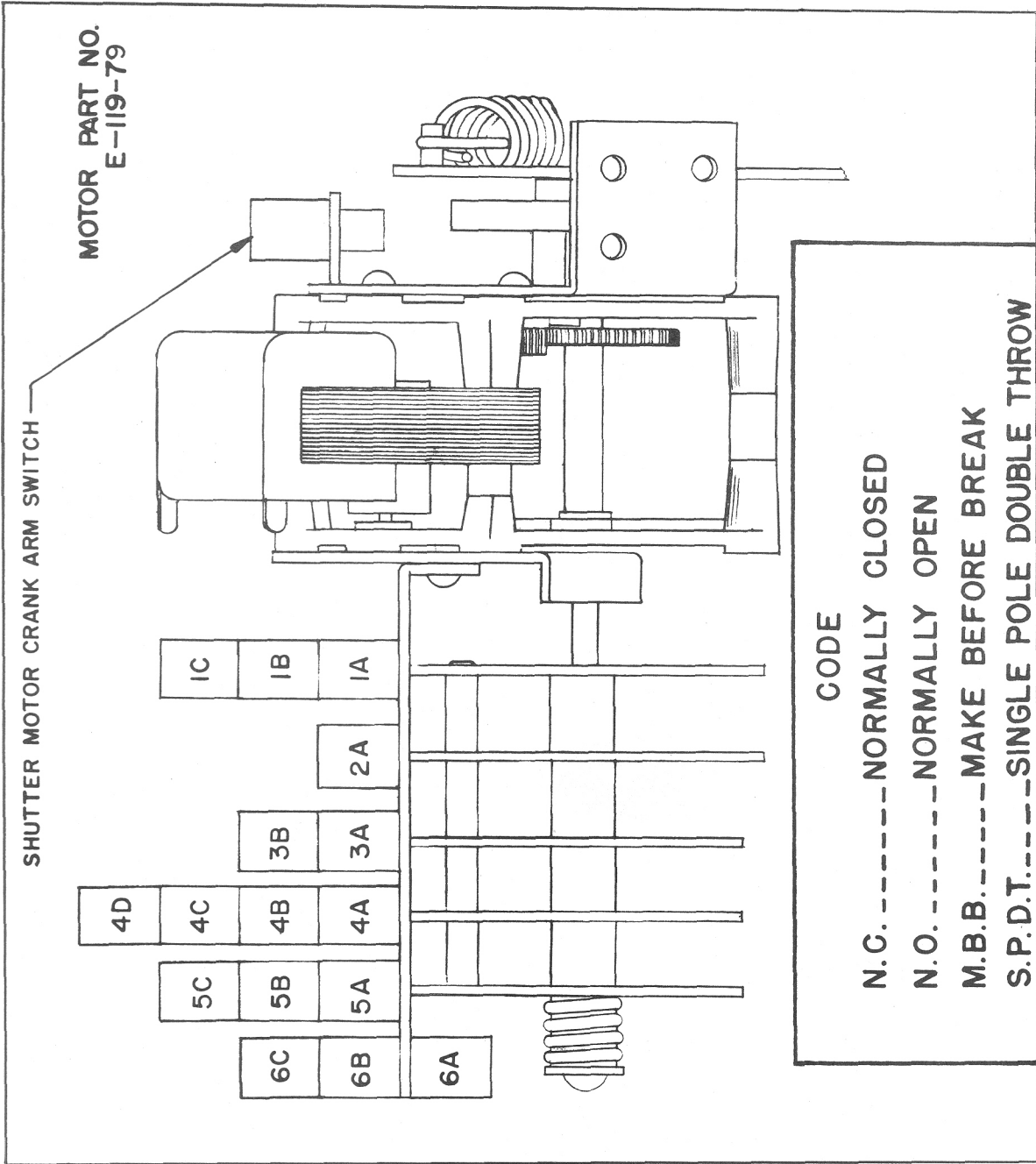
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
EXTRA BALL PLAY RELAY COIL	A-9	93-6 70	Gray-Yellow Orange	Energizes when yellow button is pressed.
A S. P. D. T.	G-4	50-2 51-2 63-2	White White-Red Brown-Yellow	Directs circuit to regular start relay or extra ball start relay.
B S. P. D. T.	F-10	74-2 15-2 41-3	Orange-Green Red-White Green-Red	Breaks timer cams index circuit and also acts as lock-in switch for this relay.
C N. O.	K-20	21-4 30	Blue-Red Yellow	Lights extra ball light in back box.
D N. O.	F-5	51-2 25-10	White-Red Blue-White	Completes circuit to extra ball start and extra ball trip relay.
E N. C.	J-6	83-4 30	Black-Yellow Yellow	Opens flash circuit during extra ball play.
EXTRA BALL START RELAY	A-5	20-3 70	Blue Orange	Energizes when extra ball play relay is energized.
A N. C.	B-20	78 75-6	Orange-Black Orange-White	Opens circuit to extra ball step-up coil during spin of control unit.
B N. O.	D-9	74-2 93-2	Orange-Green Gray-Yellow	Operates mixer latch coil and timer index coil during extra ball play.
C N. O.	H-5	25-10 48-2	Blue-White Green-Black	Lock-in switch for this relay.

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6 RELAY BANK SWITCH CHART — CONCLUDED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
FIFTH BALL RELAY	A-11	23-8 70	Blue-Yellow Orange	Energizes when fifth ball is shot.
A N.O.	C-11	23-8 53	Blue-Yellow White-Yellow	Lock-in switch for this relay.
B N.O.	H-31	31-10 45	Yellow-Red Green-White	Makes odd, even and hold all button circuit alive after fifth ball.
C N.O.	J-4	90-2 10-4	Gray Red	In series with hold indicator lite.
D N.O.	D-8	27-2 78-6	Blue-Orange Orange-Black	In series with timer step-up coil.
E N.O.	C-9	81-2 78-2	Black-Red Orange-Black	Completes circuit to extra ball play relay.

NOTES



SHUTTER MOTOR PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART

SHUTTER MOTOR CAM SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
1A N. C.	I-14	93 21-3	Gray Blue-Red	Completes circuit to replay scoring circuit.
1B N. O.	G-10	30 14-3	Yellow Red-Green	Carry thru switch for shutter motor.
1C N. C.	C-33	90-3 51-4	Gray White-Red	Trips shuffle trip relay, when "hold all" button is pressed.
2A N. C.	F-13	31-3 36-3	Yellow-Red Yellow-Brown	Completes circuit to ball lift motor. (Closed normally, open during shutter cycle.)
3A N. O.	C-39	25 83-2	Blue-White Black-Yellow	Resets all replay counters.
3B N. O.	G-2	10-P 70-P	Red (Plastic) Orange (Plastic)	Resets trip relay bank.
4A N. O.	H-10	36-4 18-3	Yellow-Brown Red-Black	Starts shutter motor if game is tilted when shutter is open.
4B N. O.	G-10	18-3 14-3	Red-Black Red-Green	(Closed when shutter is open) Completes circuit to shutter motor.
4C N. O.	I-30	21-3 13-6	Blue-Red Red-Yellow	Completes circuit to card and super score step-up coil.
4D N. O.	K-7	78-3 91-5	Orange-Black Gray-Red	Completes circuit to "select before shooting first ball" lite.
5A S. P. D. T.	D-10	14-3 93-2 13-3	Red-Green Gray-Yellow Red-Yellow	Breaks circuit to shutter motor and makes circuit to timer index coil.
5B N. C.	I-8	65-2 21-3	Brown-White Blue-Red	Safety switch for timer reset.
5C N. O.	D-19	30 48-6	Yellow Green-Black	Completes circuit to step corners replay counter to a reset position.
6A N. O.	C-37	98-9 25	Gray-Black Blue-White	Resets hold feature, score unit, extra ball unit, also "card and super score" unit. Full reset coil.
6B N. O.	C-36	25 37-6	Blue-White Blue-Orange	Energizes "card and super score" escapement coil.
6C N. O.	H-8	10-1 71-9	Red Orange-Red	Resets timer stepper.
SHUTTER MOTOR ARM SWITCH	E-32	57-4 51-4	White-Orange White-Red	Trips shuffle trip relay.

MISCELLANEOUS PARTS

<u>PART NO.</u>	<u>NAME OF PART</u>
G-228	Back Glass
M-168-13	Ball 1-1/8"
AS-1315	Ball Gate and Switch Assembly
P-3023	Ball Gate Spring only
C-119-4	Bumper Post - Yellow
C-119-5	Bumper Post - Red
C-250-13	Button - All
C-250-14	Button - Odd
C-250-15	Button - Even
P-1900-13	Cash Box
E-101-51	Coil for Coin Kicker Assembly
E-101-45	Coil Coin Lock Out
A-1533	Coin Slide
AS-277-24	Coin Switch Assembly - Complete 5¢
AS-277-25	Coin Switch Assembly - Complete 10¢
E-130-1	Counter 48 Volt
CA-567-13	Front Door Only
CA-671-4	Front Moulding Only
AS-1305	Front Moulding Complete
AS-1316	Kicker Assembly - Front Door
CA-350-1	Leg
C-258-9	Light Shield Post - Top Panel
M-281-6	Lock and Keys - Front Door
M-281-12	Lock and Keys - Back Door - Keyed alike
M-281-14	Lock and Keys - Light Box - Keyed alike
P-2210-8	Plate - Coin Entry 5¢
P-2210-9	Plate - Coin Entry 10¢
P-2210-19	Plate - Buttons Top Moulding
R-203	Rebound Rubber - Top Panel
M-170	Rebound Spring - Double Post - Top Panel
P-2567-1	Ring for Selector Knob
R-243	Rubber Ring - Yellow Post
R-243-2	Rubber Ring - Red Post
AS-187-12	Shooter Assembly
A-1540	Shooter Housing
A-100-7	Shooter Rod
SP-200-24	Shooter Spring (Long)
SP-233	Shooter Spring (Barrel)
R-108-3	Shooter Tip
M-280-15	Slug Rejector 5¢
M-280-16	Slug Rejector 10¢
SW-100-64	Switch under All Button
SW-110-16	Switch under Even Button
SW-110-17	Switch under Odds Button
E-122-19	Transformer
M-412-2	Wire Wiper for Slip Ring

PIN-GAME LUBRICANT AVAILABLE
IN ONE POUND CANS