

Operating Instructions and Parts Catalog

CONFIDENTIAL: DO NOT LEAVE INSTRUCTIONS IN GAME

Bally®

SURF-CLUB

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**



SURF-CLUB amusement-game by Bally

1 Card, 2 Super-Cards, 1 Super-Line

5 balls plus extra balls

NEW SELECTABLE SUPER-LINE: 4 arrow-lights, pointing to SELECT-panel, flash for each coin* deposited and advance at mystery-intervals. When light advances to fourth arrow, panel lights to tell player to

(BEFORE SHOOTING 4TH BALL)
SELECT A LIT SPOT-NUMBER OR SELECT 3
SUPER-LINE NUMBERS WHEN (SUPER-LINE) LIT

First 2 spot-numbers --- 15 and 14 --- light when SELECT-panel lights. When additional coins* are deposited, third spot-number -- 9 -- and (SUPER-LINE) flash, and light advances, at mystery-intervals, first to 9, then to (SUPER-LINE).

When (SUPER-LINE) is lit, player may, by turning knob on front of cabinet, select

15, spotted, or

14, spotted, or

9, spotted, or (in Super-Line of 6 numbers)

3 16 11 10 20 5 (3 RED NUMBERS) or

3 16 11 10 20 5 (3 RED NUMBERS) or

3 16 11 10 20 5 (3 RED NUMBERS) or

3 16 11 10 20 5 (3 RED NUMBERS).

Selection may be changed as often as desired until third ball is shot**. Selection that shows selected when fourth ball is shot** remains selection until end of game.

2-IN-LINE SCORES: Panel above Super-Line tells player that

WHEN SELECTED NUMBERS ARE HIT
2-IN-LINE IN SUPER-LINE SCORE 4-IN-LINE
3-IN-LINE IN SUPER-LINE SCORE 5-IN-LINE

SELECT-A-SPOT FEATURE: 15, 14 or 9 may be spotted by turning knob on front of cabinet, as described above under heading NEW SELECTABLE SUPER-LINE.

* 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

NEW 2-WAY SUPER-CARDS: Player may qualify to score in each of 2 Super-Cards in 2 different ways:

- (1) 4 arrow-lights above each Super-Card flash for each coin* deposited and advance at mystery-intervals. When light advances to fourth arrow above Super-Card 1, title-panel (SUPER-CARD 1) lights, qualifying player to score in Super-Card 1.

After (SUPER-CARD 1) is lit, arrow-lights above Super-Card 2 continue to flash, advancing at mystery-intervals. When light advances to fourth arrow above Super-Card 2, title-panel (SUPER-CARD 2) lights, qualifying player to score in Super-Card 2.

- (2) Yellow and Red Roll-Overs flash for each coin* deposited and, at mystery-intervals, light and remain lit until end of game.

When Yellow Roll-Over is hit when lit, (SUPER-CARD 1) lights, qualifying player to score in Super-Card 1.

When Red Roll-Over is hit when lit, (SUPER-CARD 2) lights, qualifying player to score in Super-Card 2.

Panels above Super-Cards tell player that

WHEN (SUPER-CARD 1) IS LIT
3-IN-LINE IN SUPER-CARD 1
SCORE 4-IN-LINE

and

WHEN (SUPER-CARD 2) IS LIT
3-IN-LINE IN SUPER-CARD 2
SCORE 4-IN-LINE

NEW DOUBLE-HOLD FEATURE: 4 arrow-lights, pointing to HOLD-panel, flash for each coin* deposited and advance at mystery-intervals. When light advances to fourth arrow, panel lights to tell player to

(BEFORE PLAYING FOR EXTRA BALLS)
HOLD
ODD OR EVEN
OR ALL

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

After HOLD-panel is lit, light continues to flash above DOUBLE-HOLD signal and, at mystery-intervals, lights to tell player that he has privilege of

DOUBLE
HOLD
IF ALL BUTTON
NOT PRESSED

When HOLD is lit player may, before playing for extra balls***, press his choice of

- (a) Odd-Button,
holding odd numbers already scored,
releasing for free shots all balls
in even-numbered holes;
- (b) Even-Button,
holding even numbers already scored,
releasing for free shots all balls
in odd-numbered holes;
- (c) All-Button,
holding all numbers already scored
in order to register scoring line-ups
on Replay-Register.

When DOUBLE-HOLD is lit, player may, after shooting released balls, and before playing for extra balls, hold odd or even (or all) numbers again, releasing balls from numbers not held.

(Spotted number -- 15, 14 or 9 -- is always held.)

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

CENTER CARD
CORNERS
SCORE
200

GUARANTEED FEATURES: Regardless of number of coins* deposited, each feature, after lighting, remains lit until end of game.

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

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

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

HOLD NOW

**** 5-IN-LINE:	96	96	100	100	150	150	192	300
4-IN-LINE:	16	20	24	32	48	72	100	200
3-IN-LINE:	4	6	8	12	18	36	48	64

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

GUARANTEED SCORES****: 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 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.

****	5-IN-LINE:	96	96	100	100	150	150	192	300
	4-IN-LINE:	16	20	24	32	48	72	100	200
	3-IN-LINE:	4	6	8	12	18	36	48	64

SURF-CLUB

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.

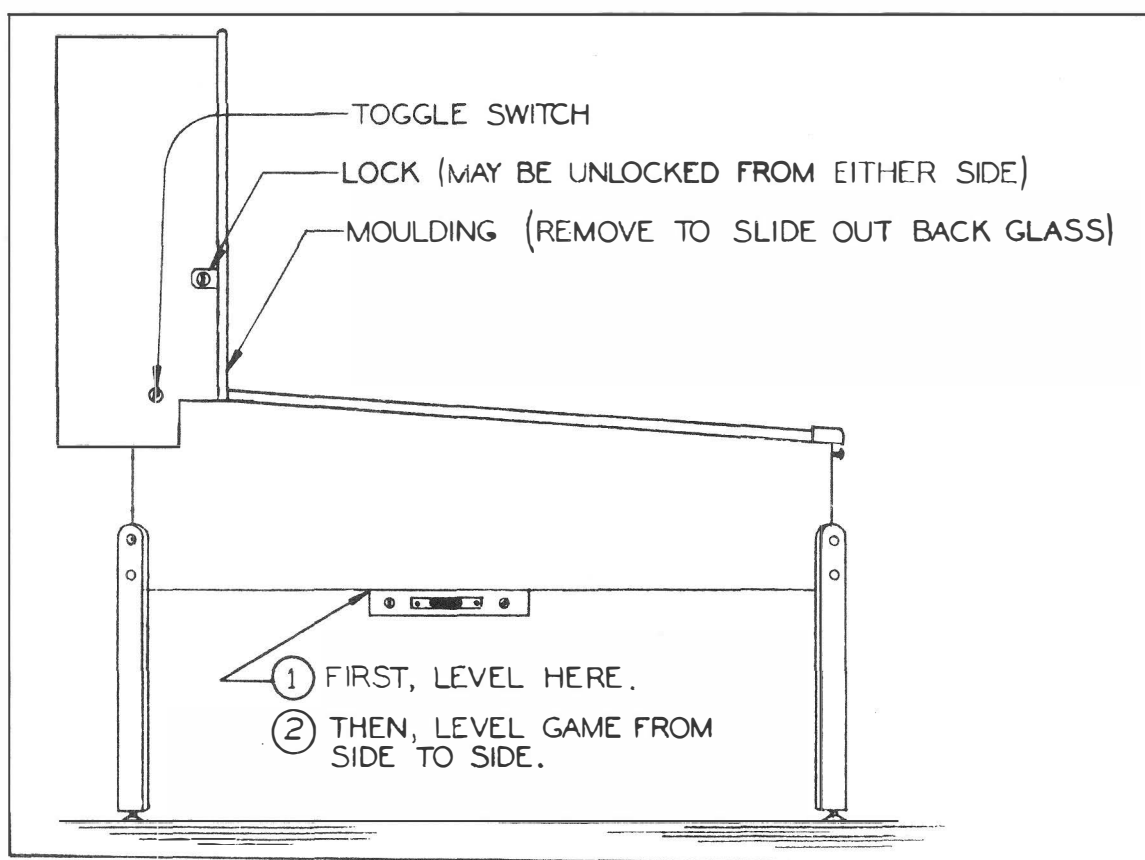
ACCESS TO MECHANISM AND LIGHT BULBS

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

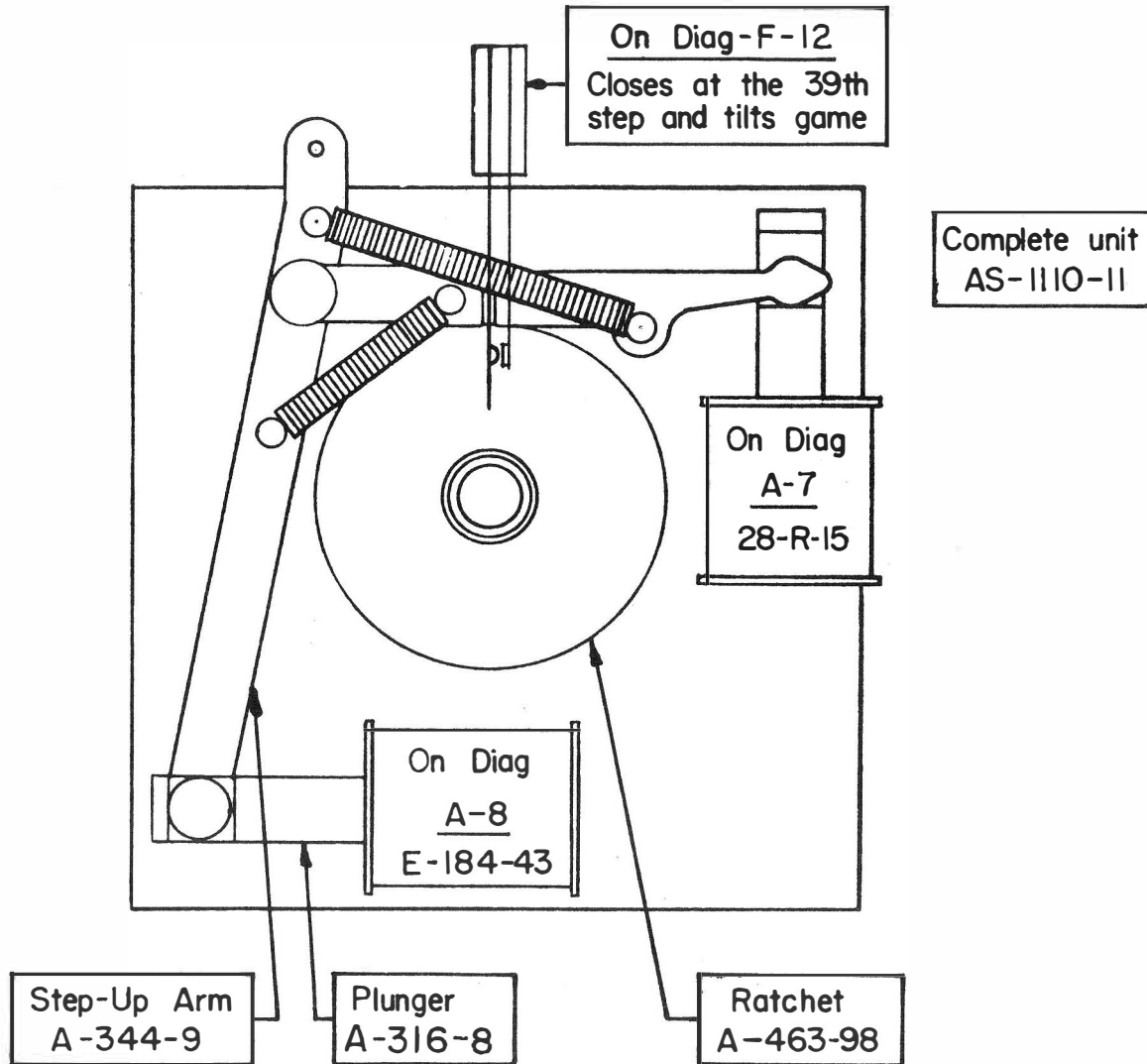
After removing back-glass, access to mechanism may be obtained by raising 2 slide brackets on insert, located on left and right edges of insert. Insert may then be tilted forward for easy accessibility.

BE SURE TO LEVEL GAME

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



TIMER UNIT - COIL SIDE SURF-CLUB

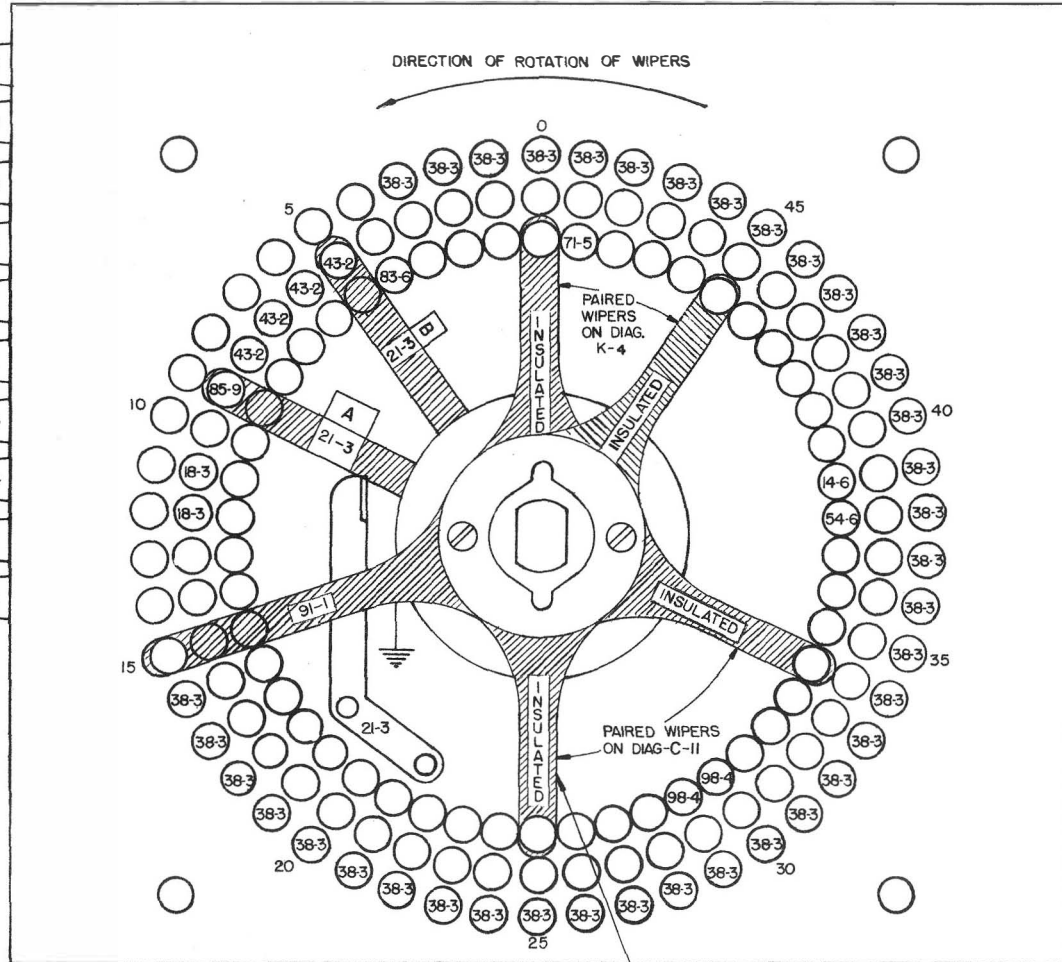
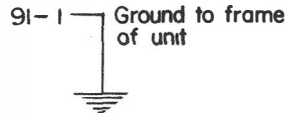


TIMER UNIT — SURF-CLUB

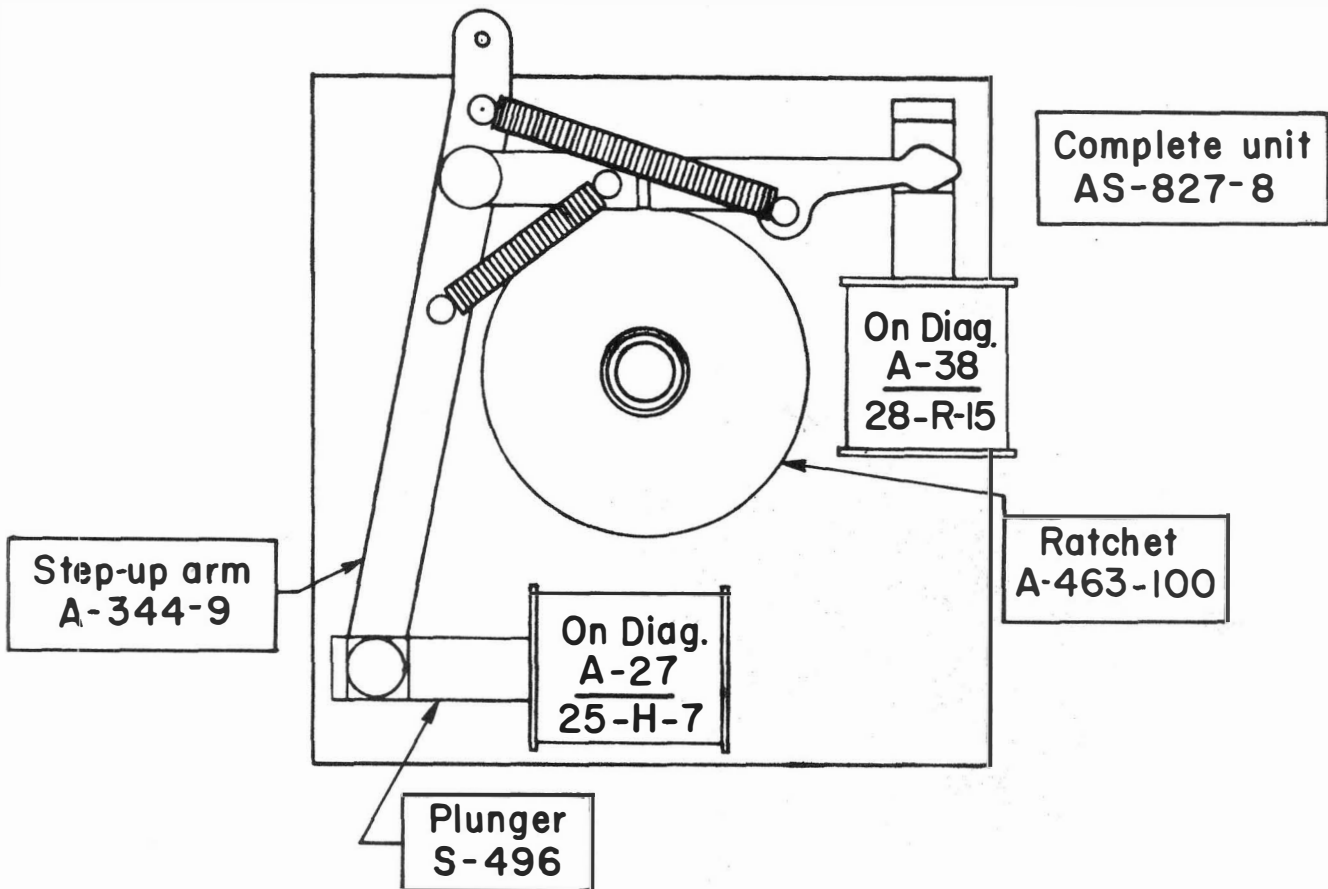
View is from button or wiper side of contact plate
Wipers shown in zero or reset position. 39 Step Unit

Note: - Diag-L-4 refers to location on schematic diagram.

- To "Select Now" Lites (Selection Feature) (Diag-L-4) 71-5
- From Mixer & Spotting Pulse Cam completes circuit to "Select Now" lite at 4th Step of this unit (Diag-K-4) 83-6
- To ball lifter cam sw. (Diag-G-8) 43-2
- From Tilt Relay Switch- feeds wiper **A** & **B** (Diag-I-9) 21-3
- Completes circuit to Shutter Motor at 2nd step. (Diag-H-9) 18-3
- Completes circuit to Ball Lift Motor (Diag-D-12) 38-3
- To trough Sw 4 and then completes circuit to Selector lock trip relay. (Diag-C-11) 54-6
- Completes circuit to 5th ball relay (Diag-C-11) 98-4
14-6
- Keeps circuit to ball lifter cam sw. alive. (Diag-G-8) 85-9

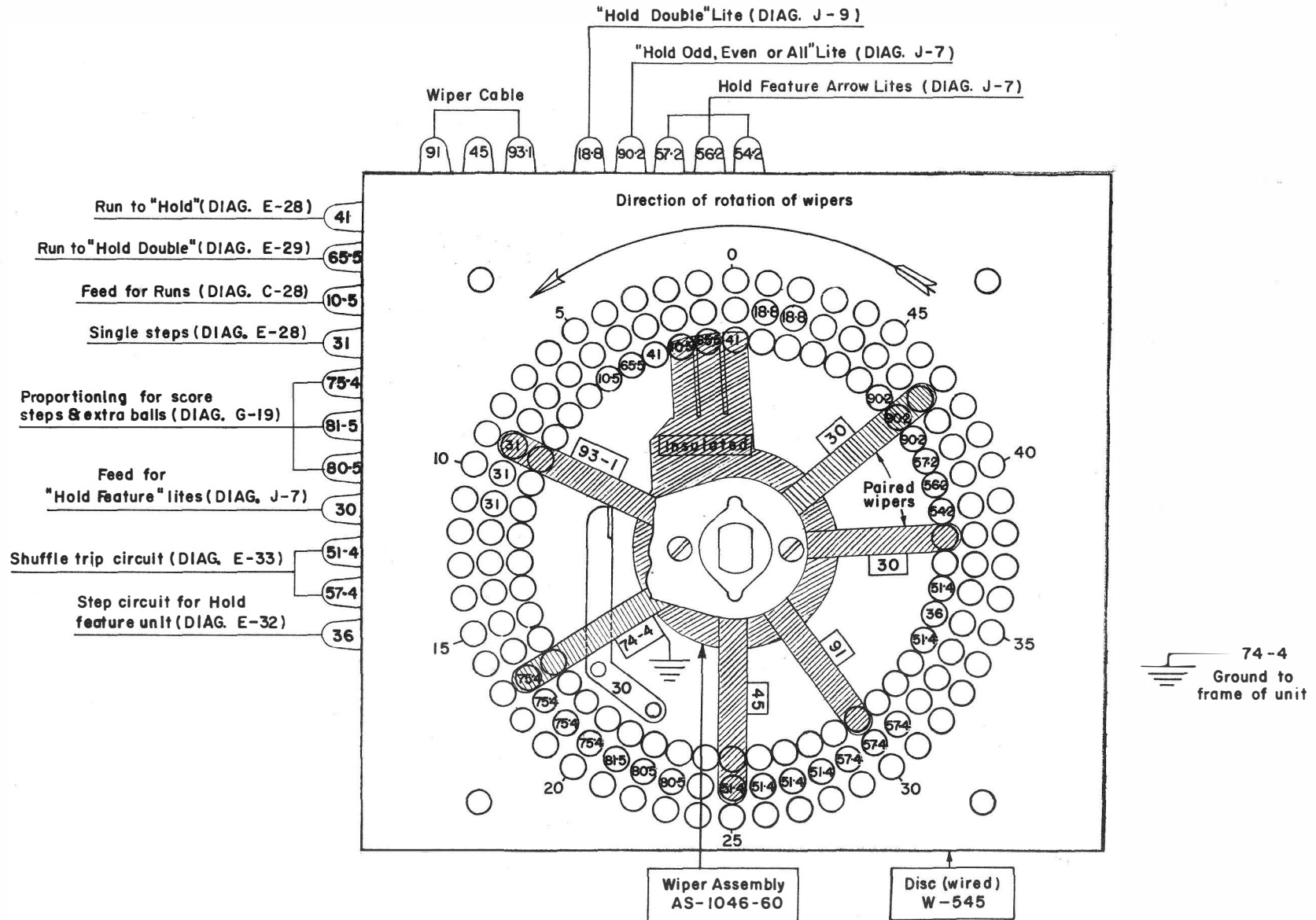


HOLD FEATURE UNIT COIL SIDE - SURF-CLUB

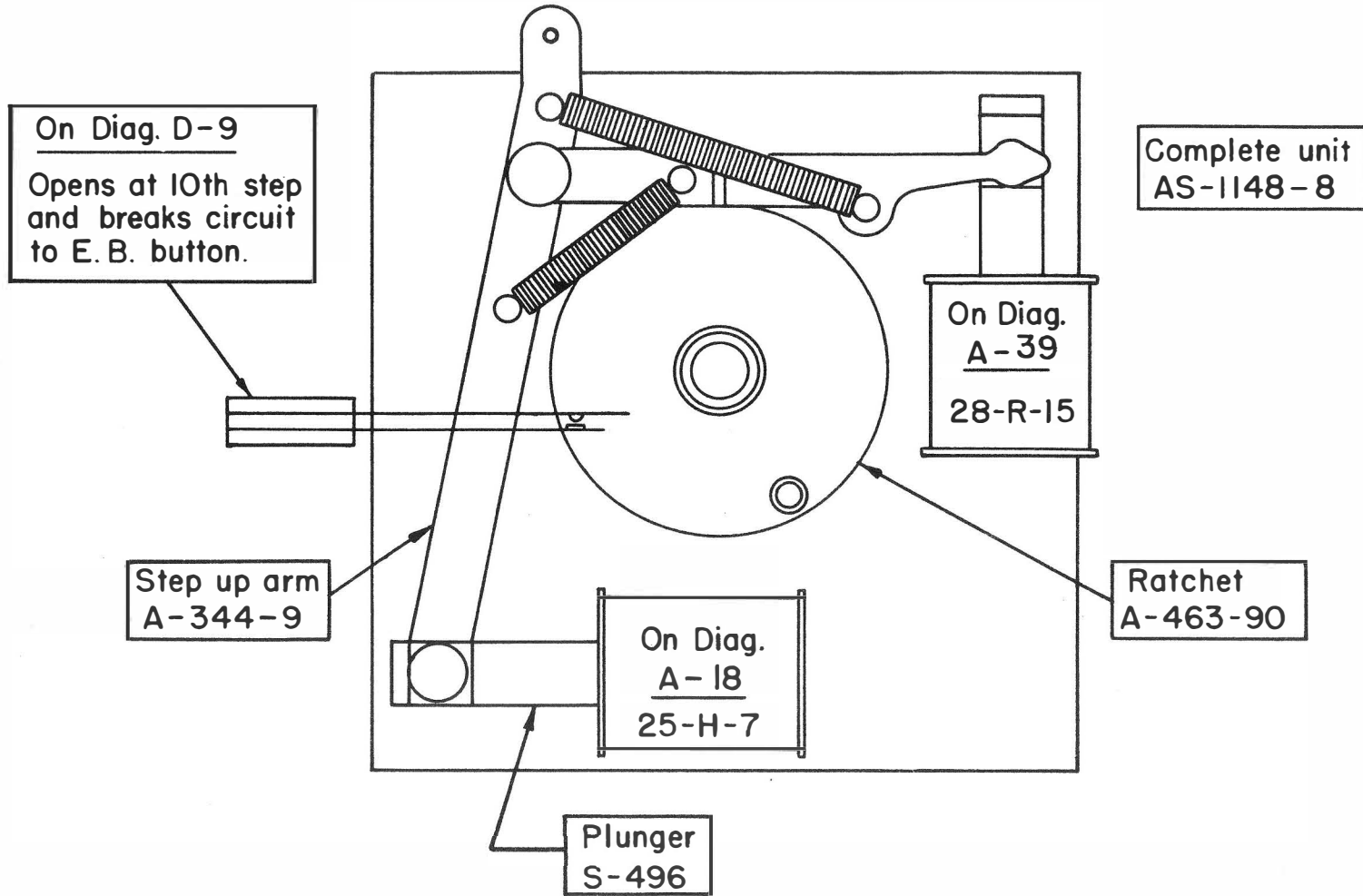


HOLD FEATURE UNIT – SURF CLUB

View is from BUTTON or WIPER SIDE of plate
wipers shown in zero or reset position. 6 step
unit.



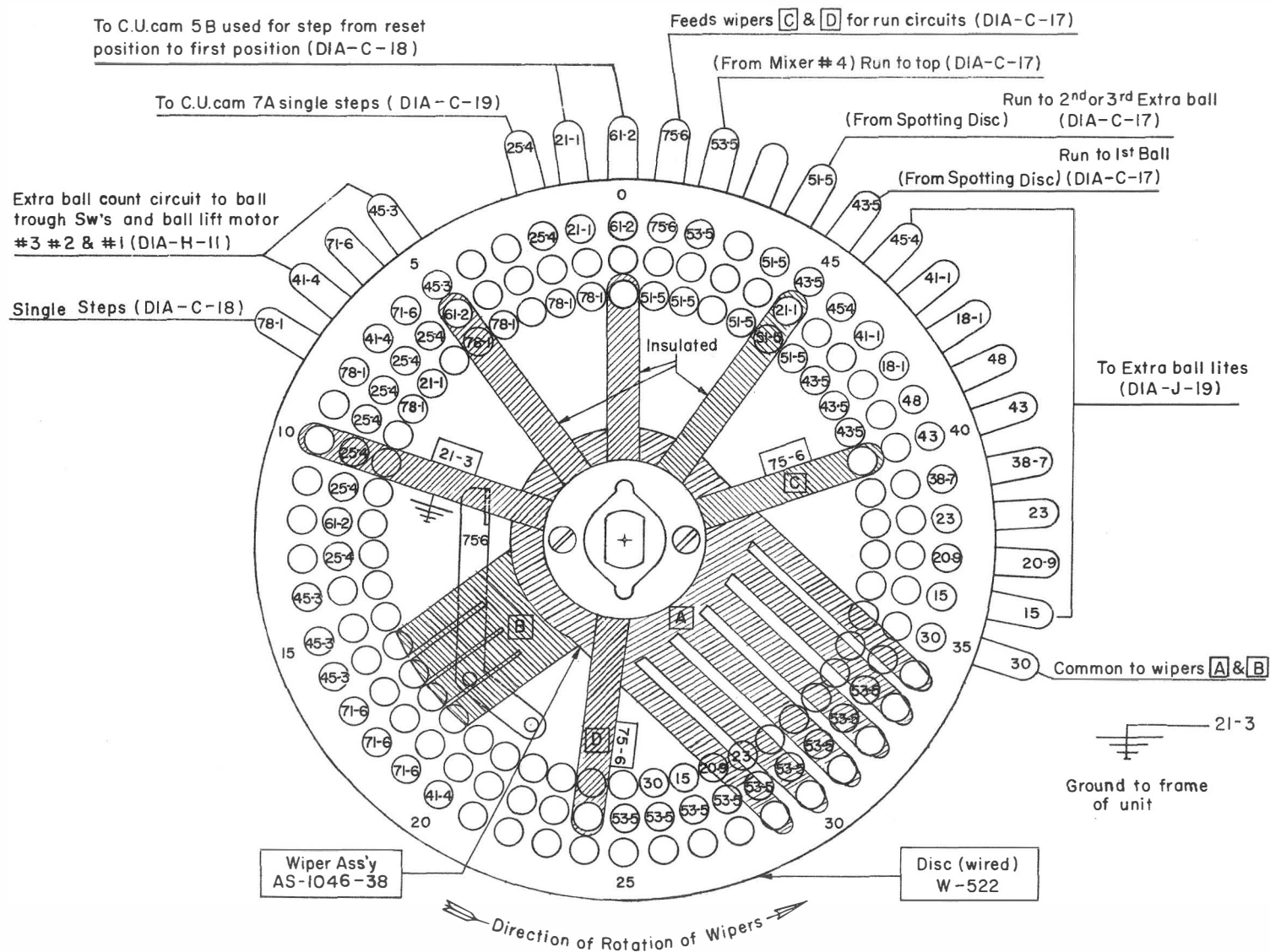
EXTRA BALL UNIT - COIL SIDE SURF-CLUB



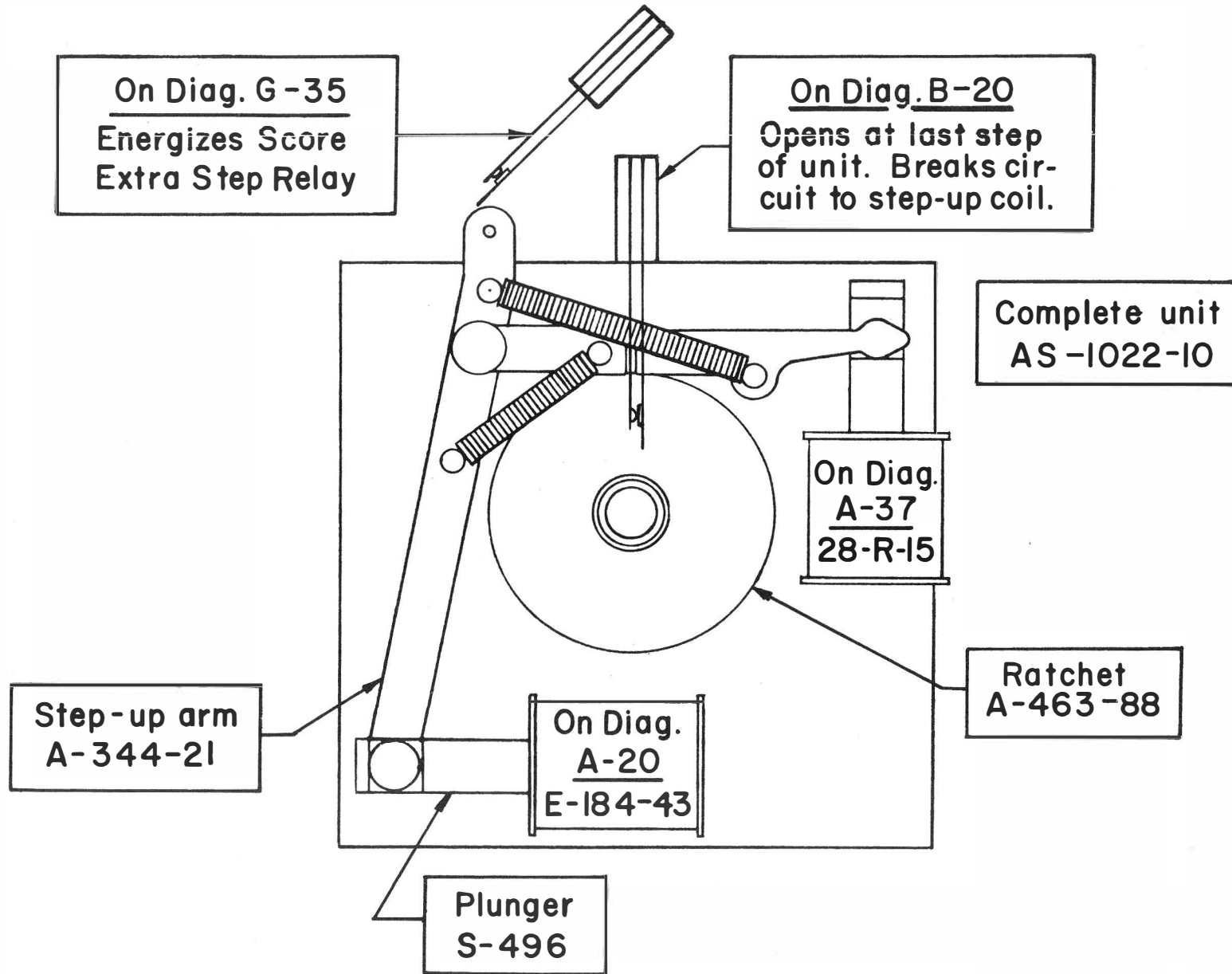
EXTRA BALL UNIT — SURF-CLUB

10 Step Unit

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

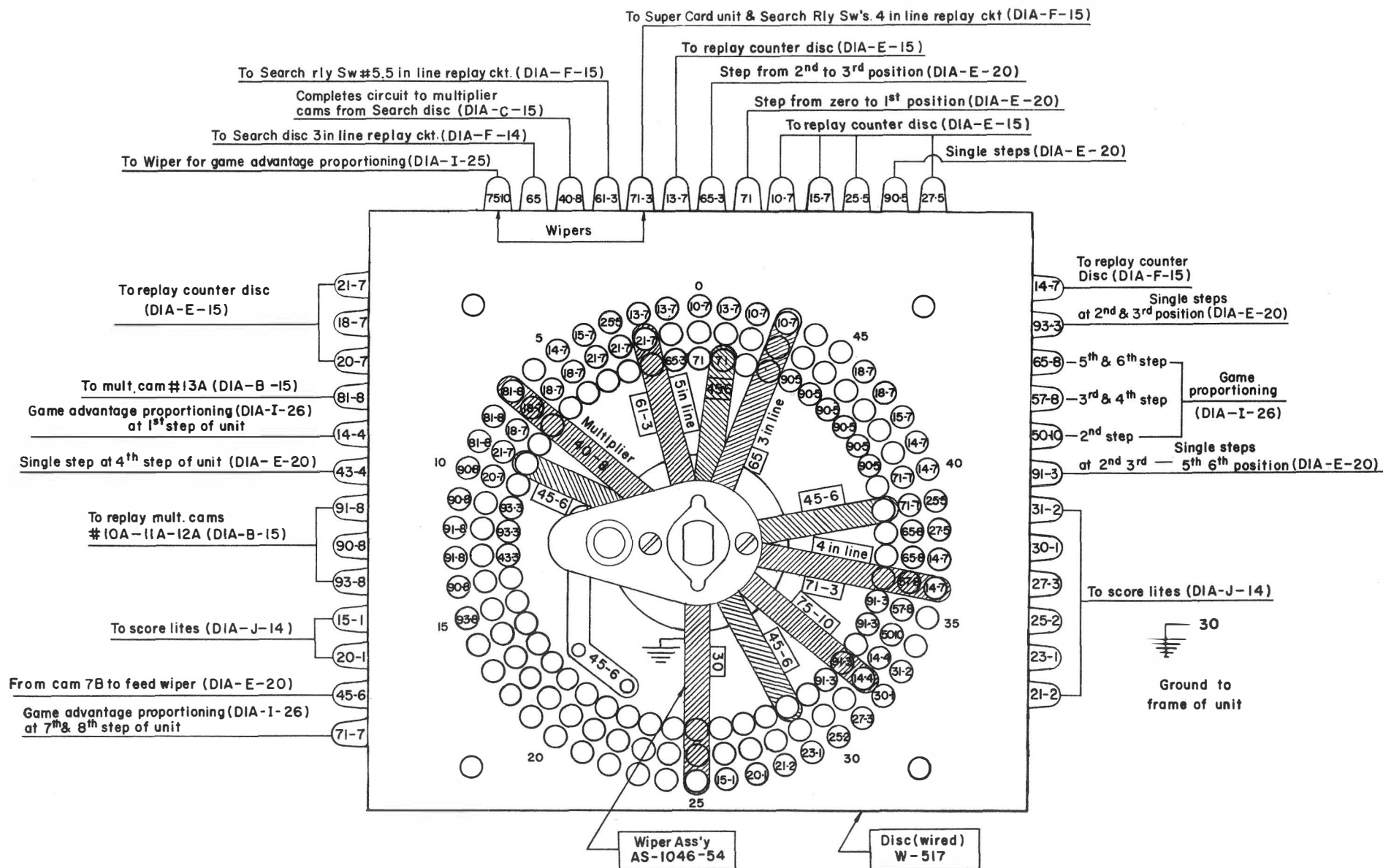


SCORE UNIT-COIL SIDE - SURF-CLUB



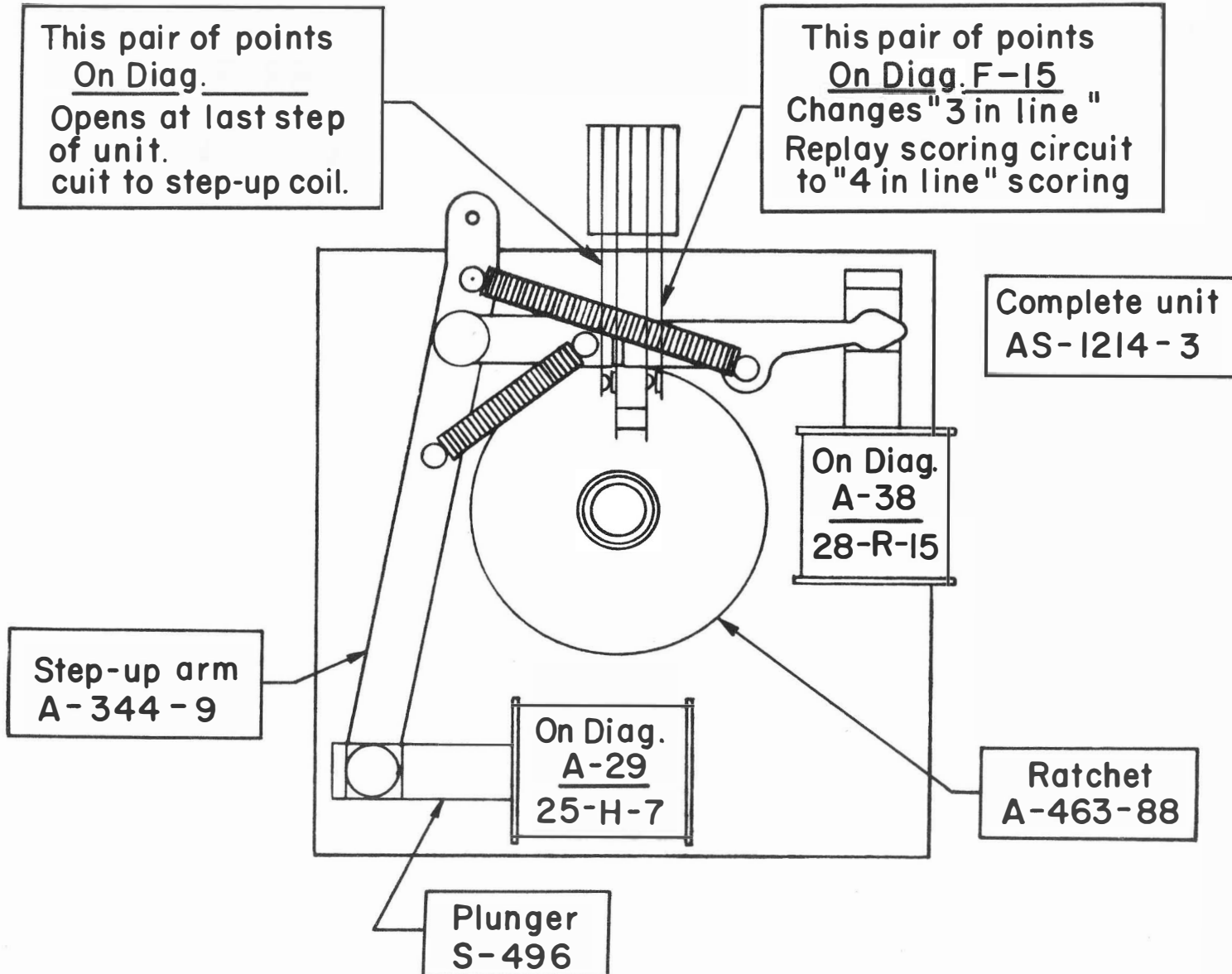
SCORE UNIT - SURF-CLUB

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



SUPER CARD UNIT

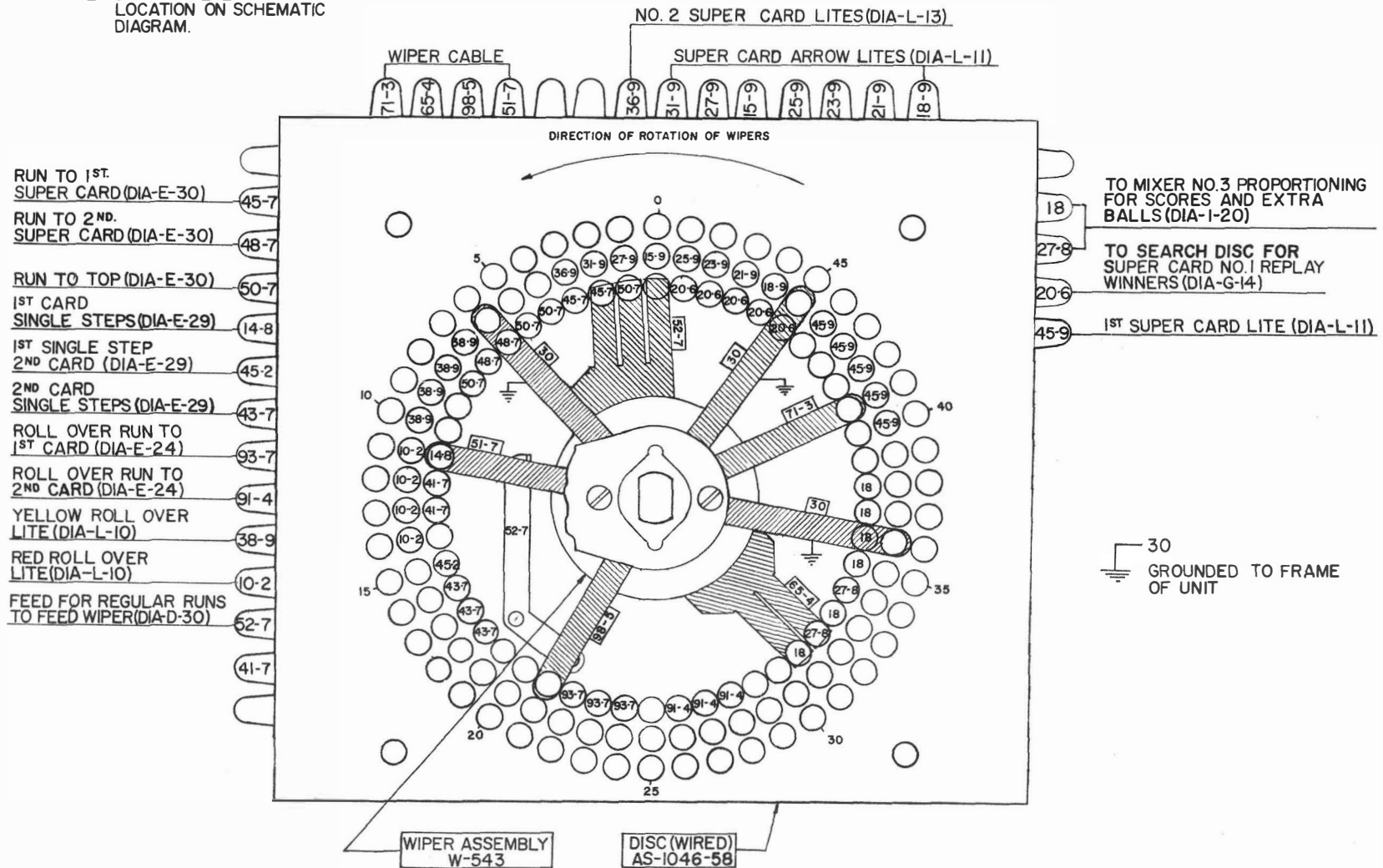
COIL SIDE - SURF - CLUB



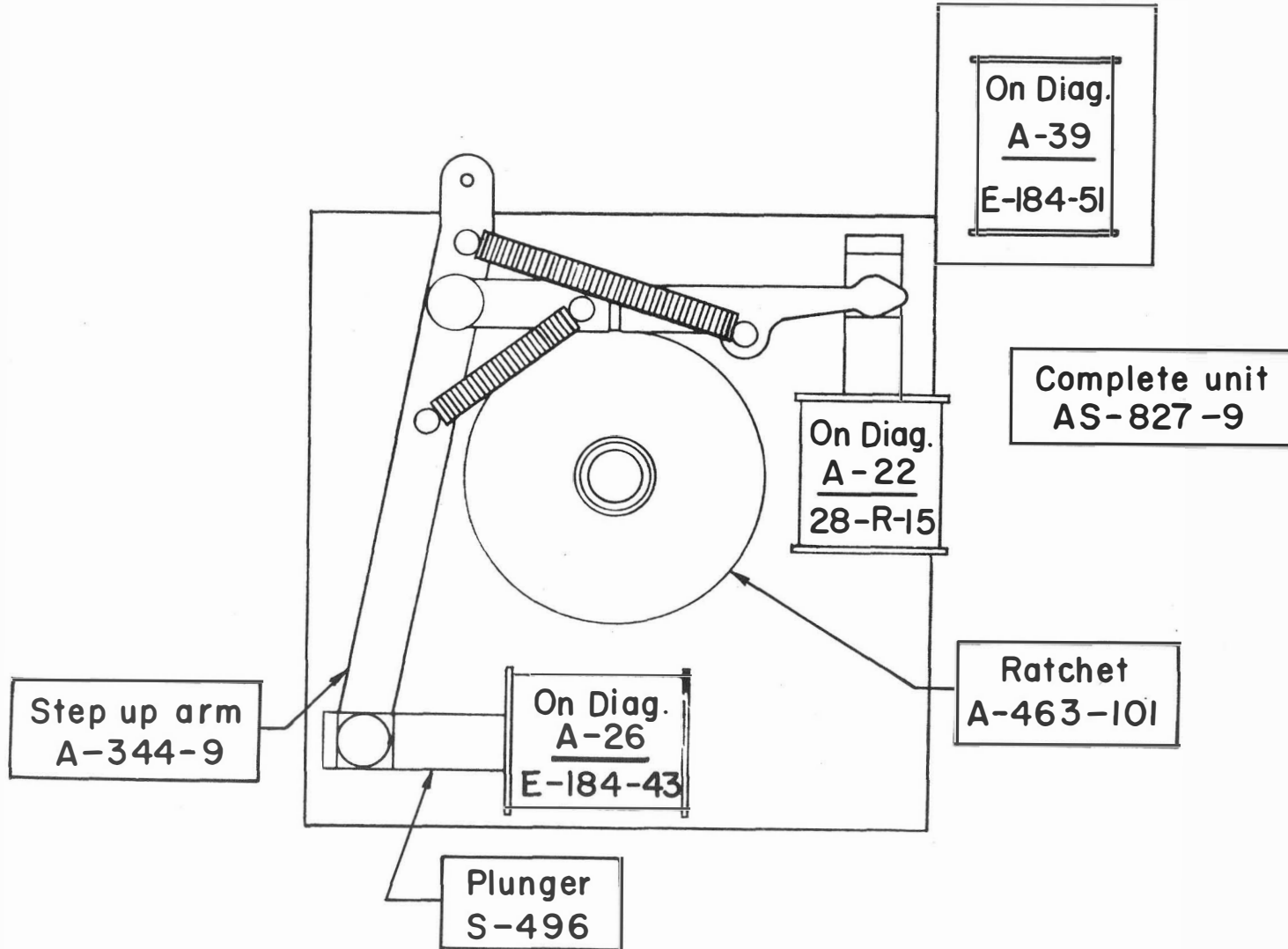
SUPER CARD UNIT - SURF-CLUB

VIEW IS FROM **BUTTON** OR **WIPER** SIDE
 8 STEP UNIT. WIPERS SHOWN IN ZERO OR
 RESET POSITION

NOTE: DIA. L-9 REFERS TO
 LOCATION ON SCHEMATIC
 DIAGRAM.

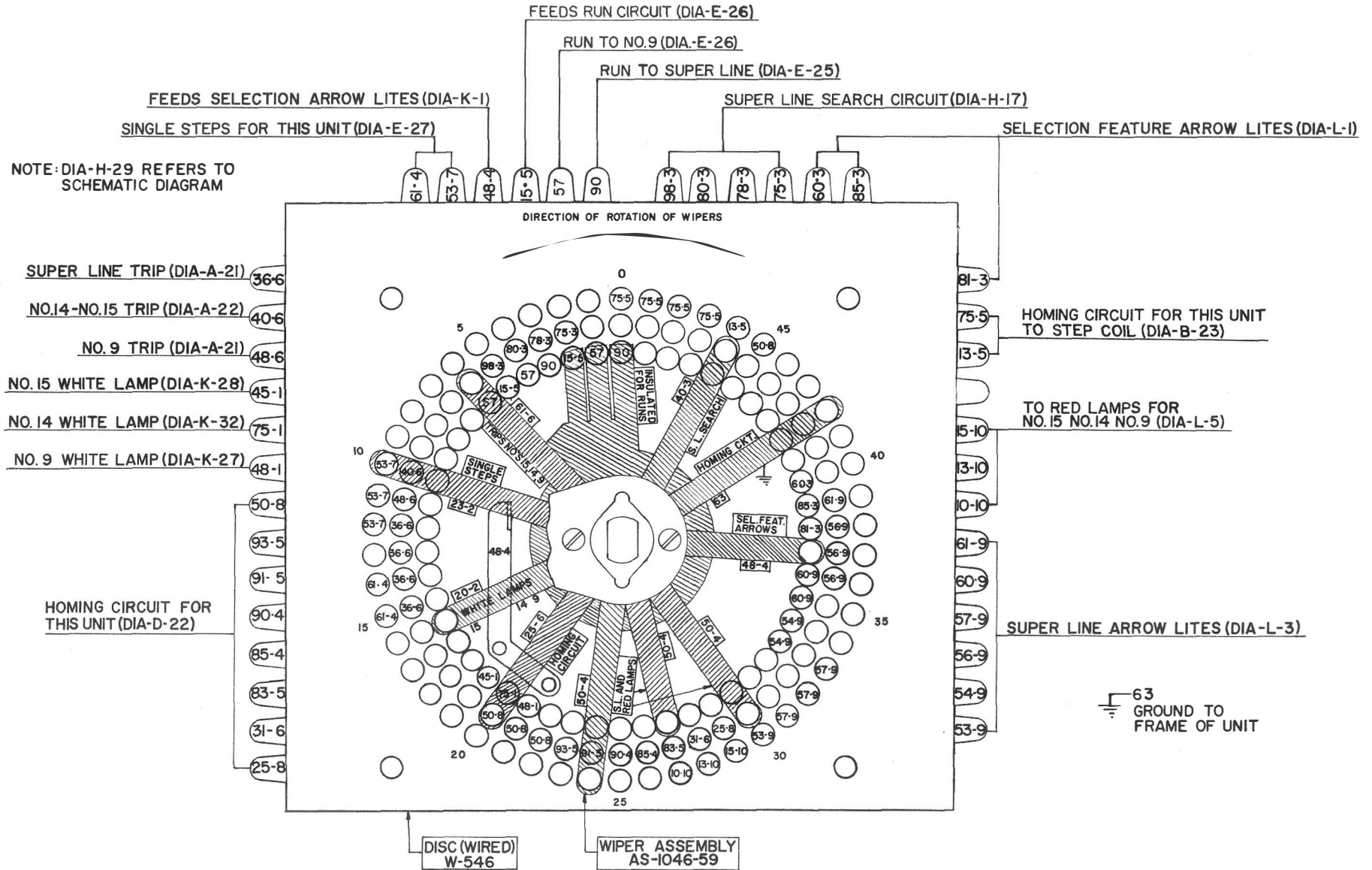


SELECTION FEATURE UNIT COIL SIDE - SURF - CLUB



SELECTION FEATURE UNIT - SURF-CLUB

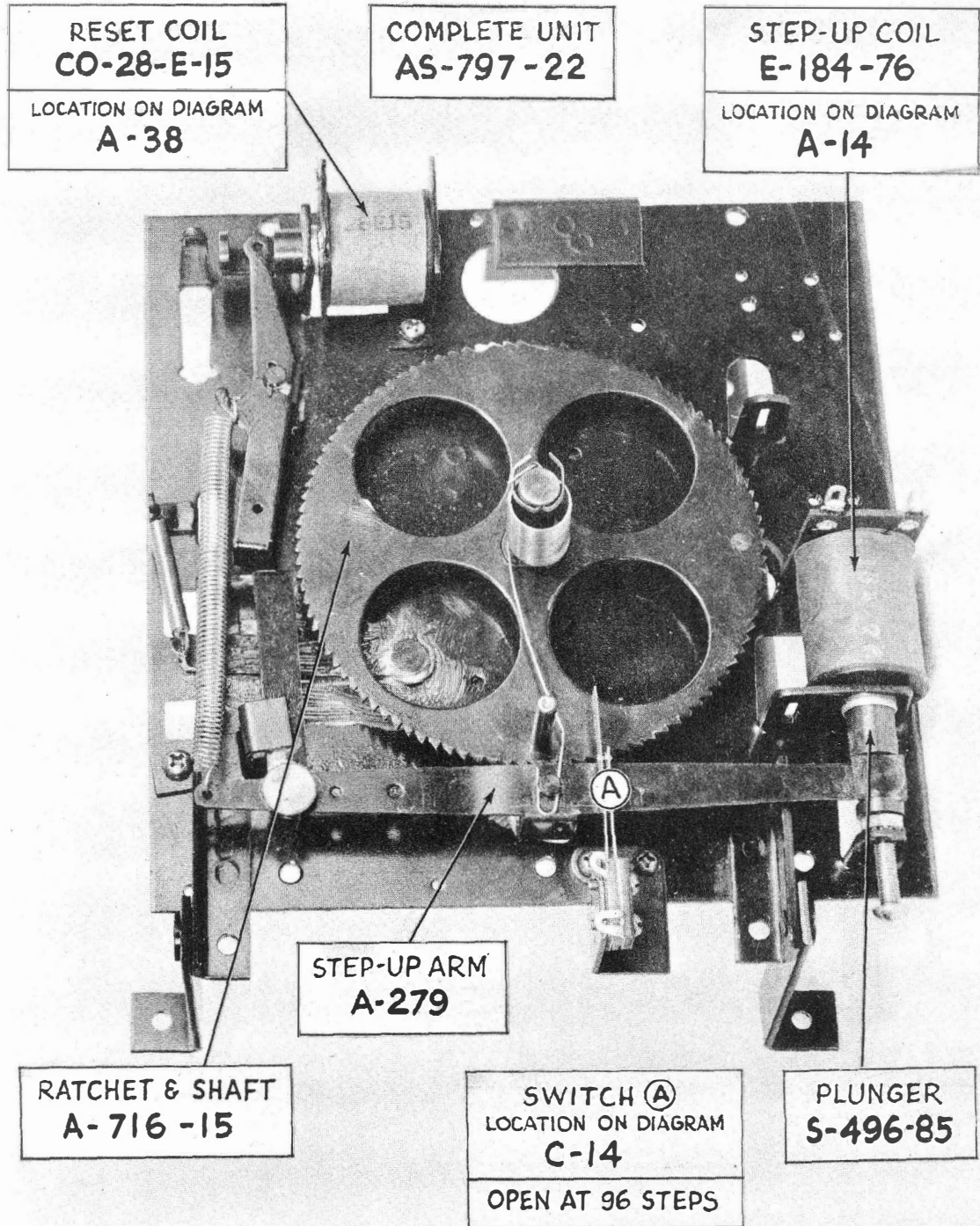
VIEW IS FROM **BUTTON** OR **WIPER** SIDE
 9 STEP UNIT. WIPERS SHOWN IN ZERO OR
 RESET POSITION



NOTES

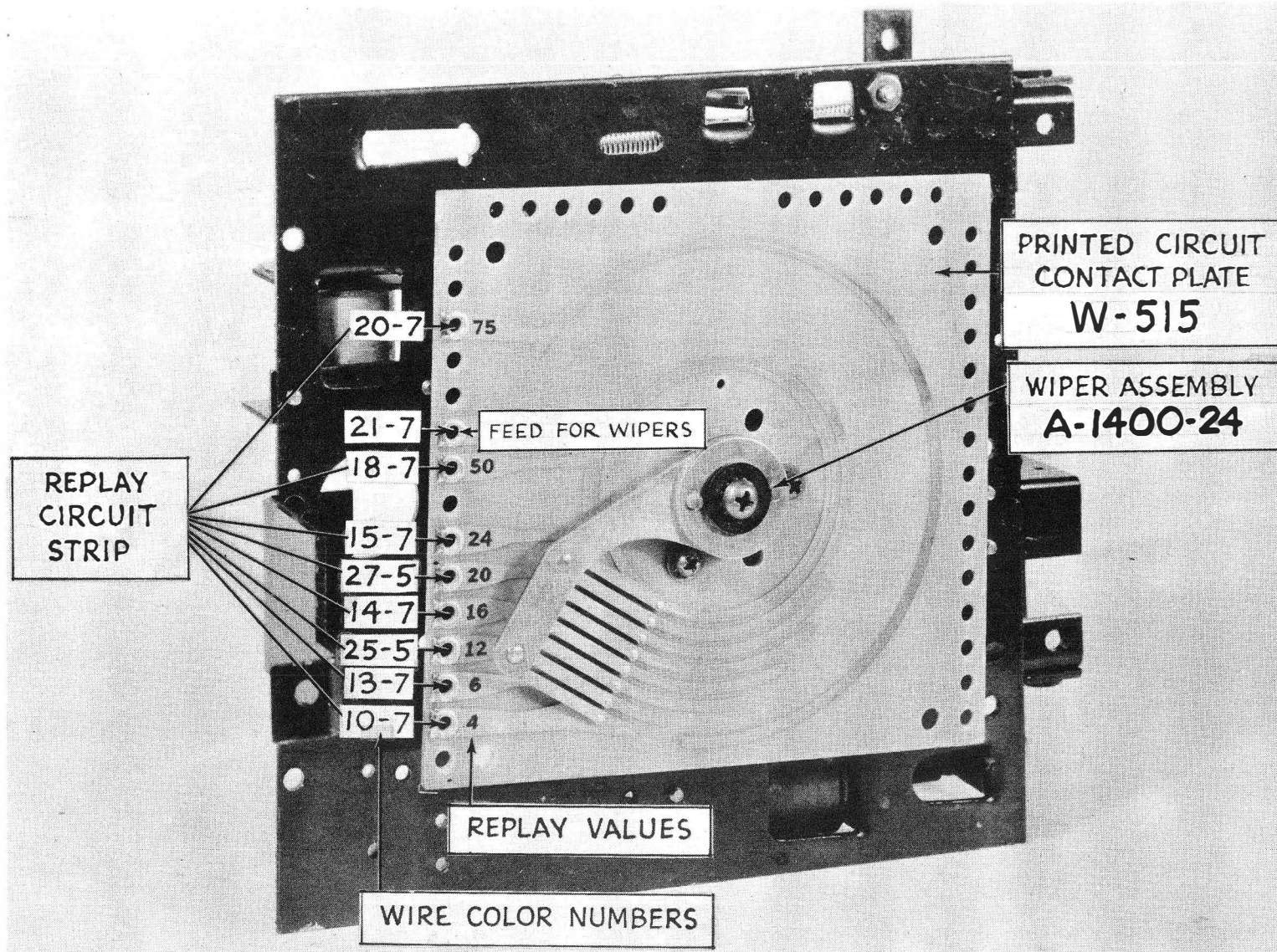
SURF-CLUB

REPLAY COUNTER — COIL SIDE



SURF-CLUB

REPLAY COUNTER — WIPER SIDE

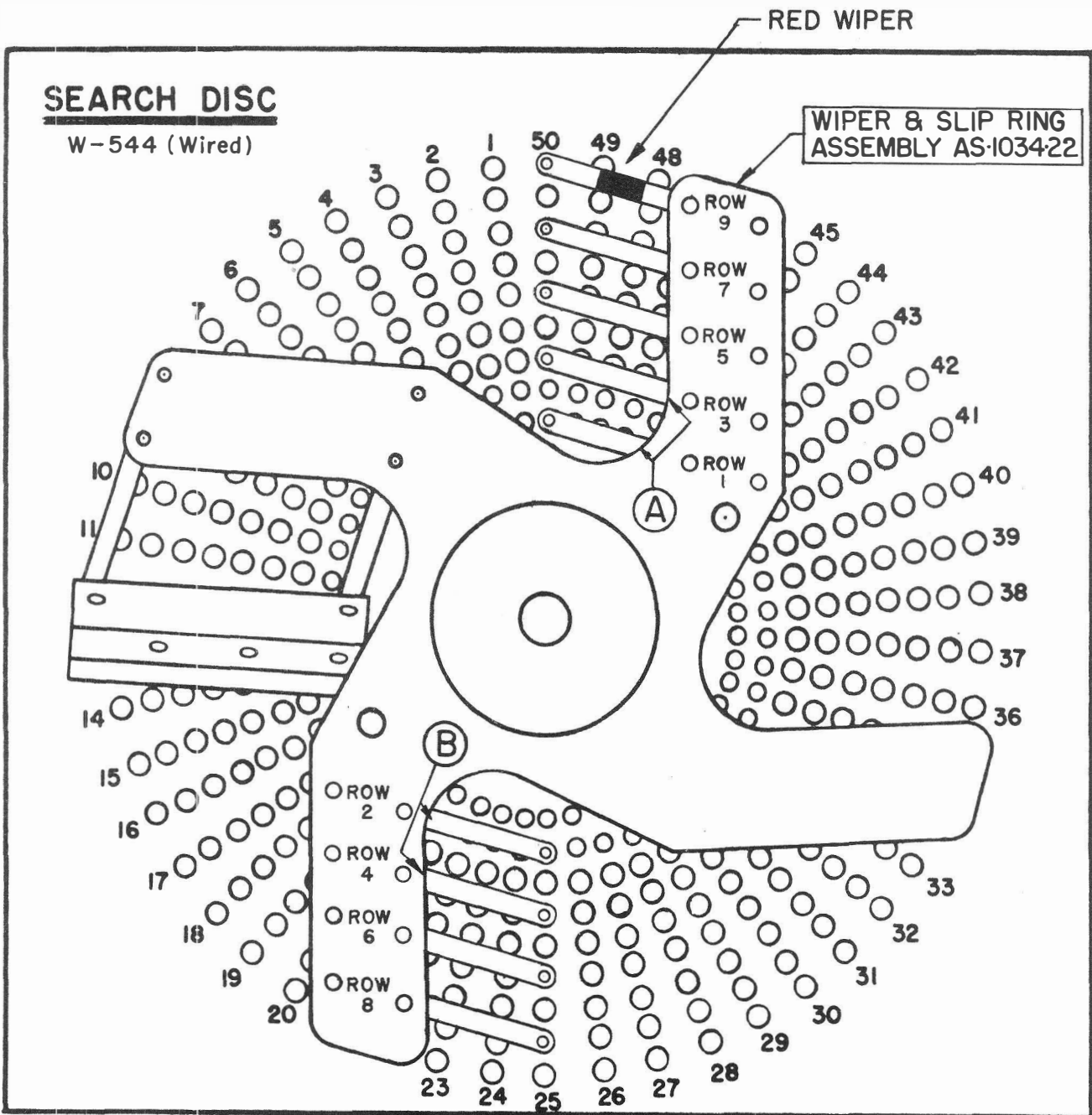


CAM SWITCHES THAT PULSE REPLAY COUNTER STEP-UP COIL								
	sw. 13A	sw. 13A	sw. 12A	sw. 12A	sw. 11A	sw. 11A	sw. 12A	sw. 10A
5 IN LINE	96	96	100	100	150	150	192	300
	X	X	50	50	50	50	X	75
4 IN LINE	16	20	24	32	48	72	100	200
	16	20	12	16	16	24	50	50
3 IN LINE	4	6	8	12	18	36	48	64
	4	6	4	6	6	12	24	16

LARGE NUMBERS ARE REPLAY SCORES SHOWN ON BACK GLASS. NUMBERS IN SHADED CIRCLES INDICATE WHICH PORTION OF REPLAY CIRCUIT STRIP (MAIN CARD OR EITHER SUPER CARD), IS EFFECTIVE FOR A PARTICULAR REPLAY SCORE.

EXAMPLE: ON A 3-IN-LINE SCORE OF **36** REPLAYS
 THE CIRCUIT IS EFFECTIVE THRU THE **12** REPLAY CIRCUIT STRIP

NOTE: 96 & 192 REPLAY SCORE IS EFFECTIVE THRU THE OPEN AT 96 SWITCH.

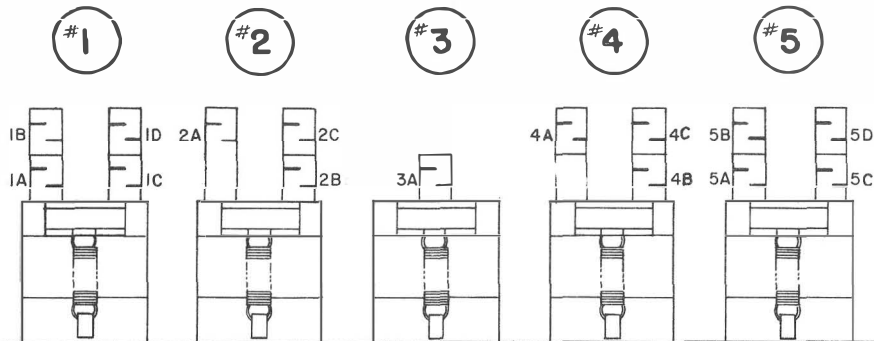


WIPERS (A) FED BY WIRE 80 (ON DIAG. D-15) THRU FEED WIPER. COMPLETES CIRCUIT TO SEARCH INDEX COIL & REPLAY COUNTER STEP-UP COIL, WHEN SCORING REPLAYS

WIPERS (B) (ON DIAG. F-14) COMPLETES CIRCUIT TO SCORE 3 IN LINE SCORES, WHEN SEARCHING THRU CENTER CARD ALSO COMPLETES CIRCUIT TO SCORE 4 IN LINE SCORES FOR 3 IN LINE, WHEN SEARCHING THRU SUPER CARD NO.1 AND SUPER CARD NO.2.

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

SEARCH RELAYS



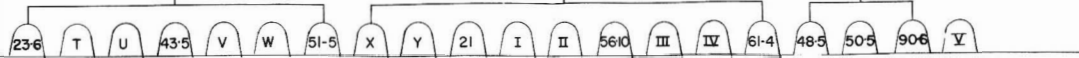
CORNERS SCORES THRU		3 IN LINE SCORES THRU		4 IN LINE SCORES THRU		5 IN LINE SCORES THRU	
Switch no's.	Wire no's. & Color	Switch no's.	Wire no's. & Color	Switch no's.	Wire no's. & Color	Switch no's.	Wire no's. & Color
3A	18-4 RED-BLACK 50-3 WHITE	3A	18-4 RED-BLACK 50-3 WHITE	3A	18-4 RED-BLACK 50-3 WHITE	3A	18-4 RED-BLACK 50-3 WHITE
2B	50-3 WHITE 56-3 WHITE-BROWN	2A	50-3 WHITE 51-3 WHITE-RED	2B	50-3 WHITE 56-3 WHITE-BROWN	2B	50-3 WHITE 56-3 WHITE-BROWN
4B	56-3 WHITE-BROWN 53-3 WHITE-YELLOW	1C	51-3 WHITE-RED 54-3 WHITE-GREEN	4B	56-3 WHITE-BROWN 53-3 WHITE-YELLOW	4B	56-3 WHITE-BROWN 53-3 WHITE-YELLOW
1B	53-3 WHITE-YELLOW 71-3 ORANGE-RED	3A	18-4 RED-BLACK 50-3 WHITE	1B	53-3 WHITE-YELLOW 71-3 ORANGE-RED	1A	53-3 WHITE-YELLOW 57-3 WHITE-ORANGE
SUPER LINE SCORES THRU (2 IN LINE)		2A	50-3 WHITE 51-3 WHITE-RED	3A	18-4 RED-BLACK 50-3 WHITE	5C	57-3 WHITE-ORANGE 61-3 BROWN-RED
SWITCH NO'S.	WIRE NO'S. & COLOR	4C	51-3 WHITE-RED 54-3 WHITE-GREEN	2B	50-3 WHITE 56-3 WHITE-BROWN		
3A	18-4 RED-BLACK 50-3 WHITE	3A	18-4 RED-BLACK 50-3 WHITE	4B	56-3 WHITE-BROWN 53-3 WHITE-YELLOW		
2C	23-3 BLUE-YELLOW 71-3 ORANGE-RED	4A	50-3 WHITE 52-3 WHITE-BLUE	5B	53-3 WHITE-YELLOW 71-3 ORANGE-RED		
SUPER LINE SCORES THRU (3 IN LINE)		5A	52-3 WHITE-BLUE 54-3 WHITE-GREEN				
SWITCH NO'S.	WIRE NO'S. & COLOR						
3A	18-4 RED-BLACK 50-3 WHITE						
1D	23-3 BLUE-YELLOW 36-8 YELLOW-BROWN						
5D	36-8 YELLOW-BROWN 61-3 BROWN-RED						

SPOTTING DISC - WIPER OR BUTTON SIDE - SURF-CLUB.

"Extra Ball" Proportioning (DIAG. E-17)

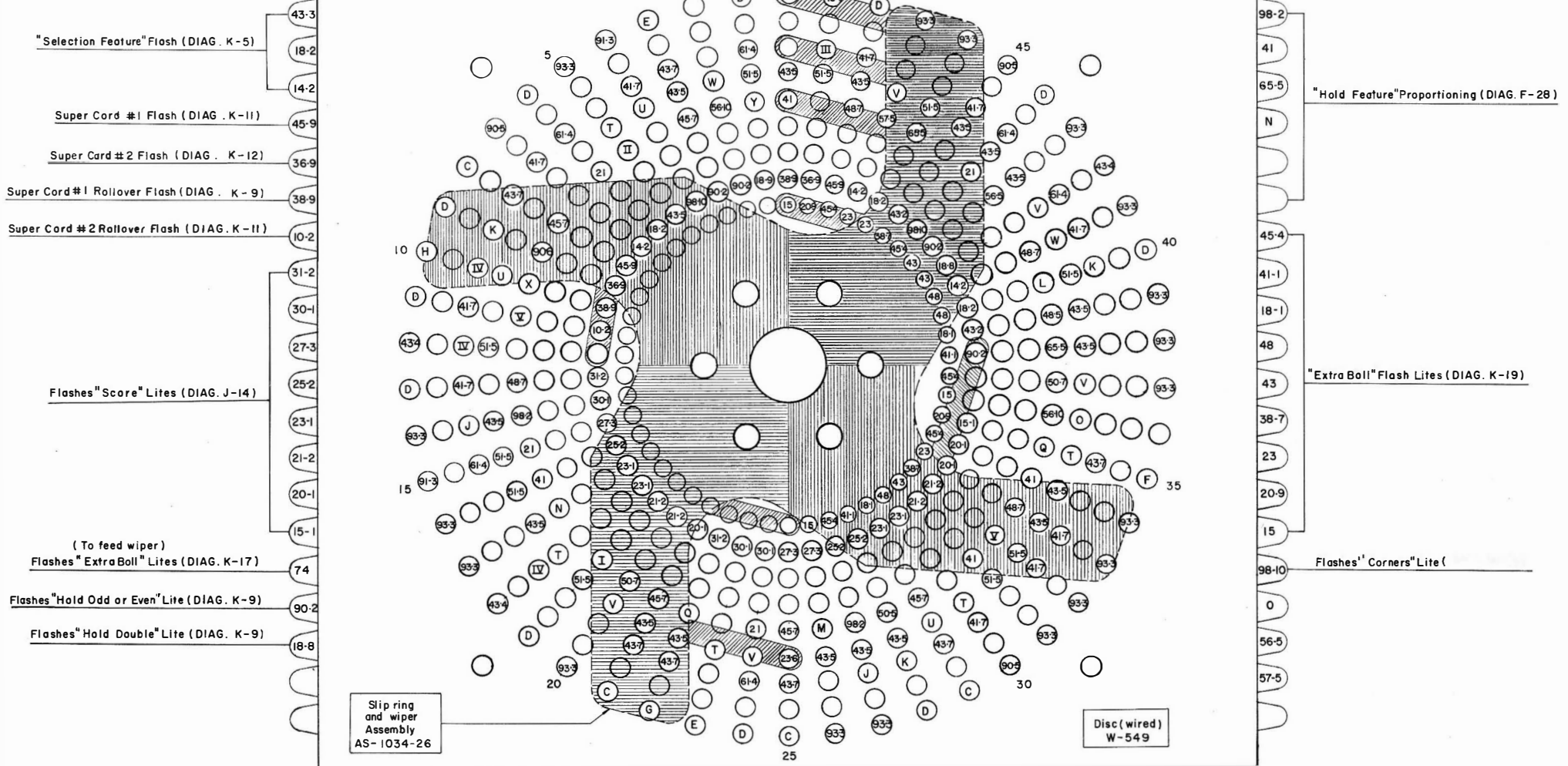
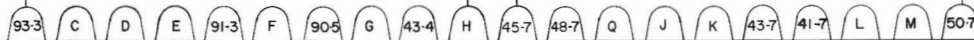
"Selection Feature" Proportioning (DIAG. F-26)

"Corners" Proportioning (DIAG. F-31)



"Score steps" Proportioning (DIAG. E-21)

"Super Cards" Proportioning (DIAG. F-29)



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.

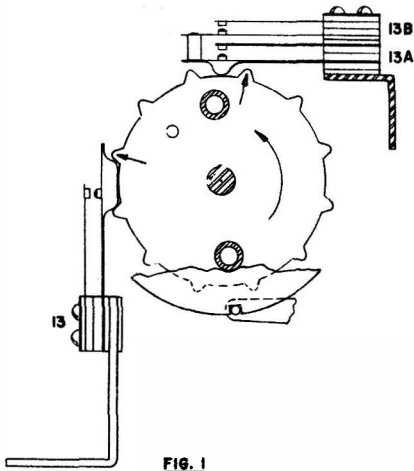


FIG. 1

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.

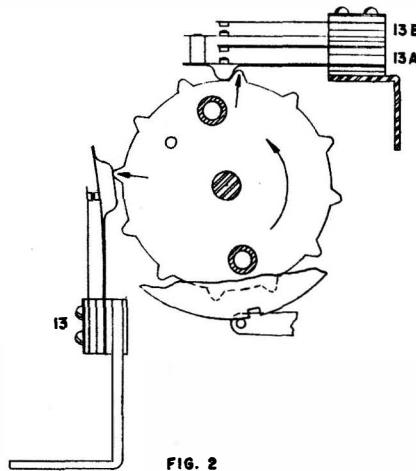


FIG. 2

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.

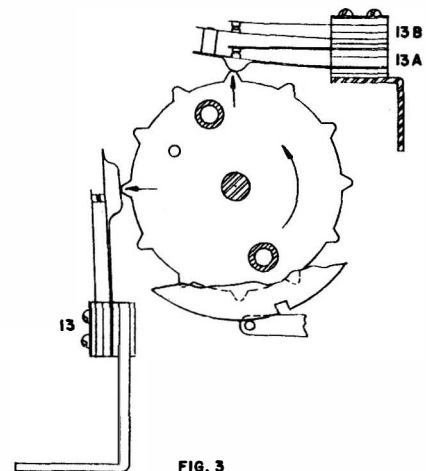


FIG. 3

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

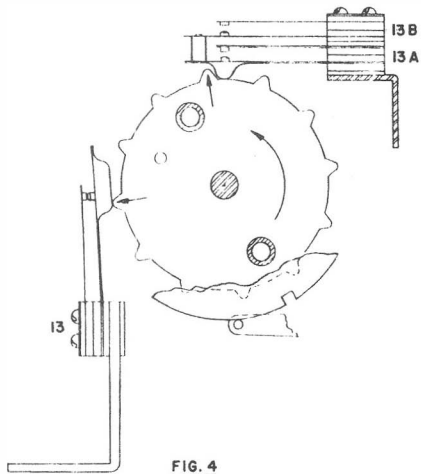


FIG. 4

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

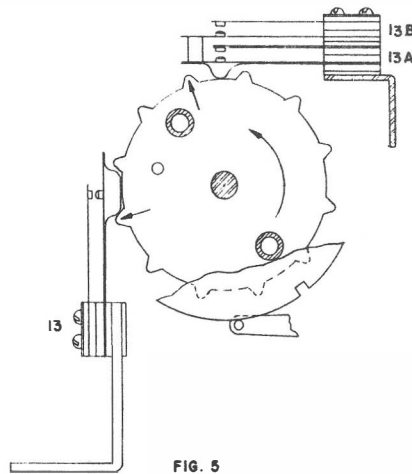


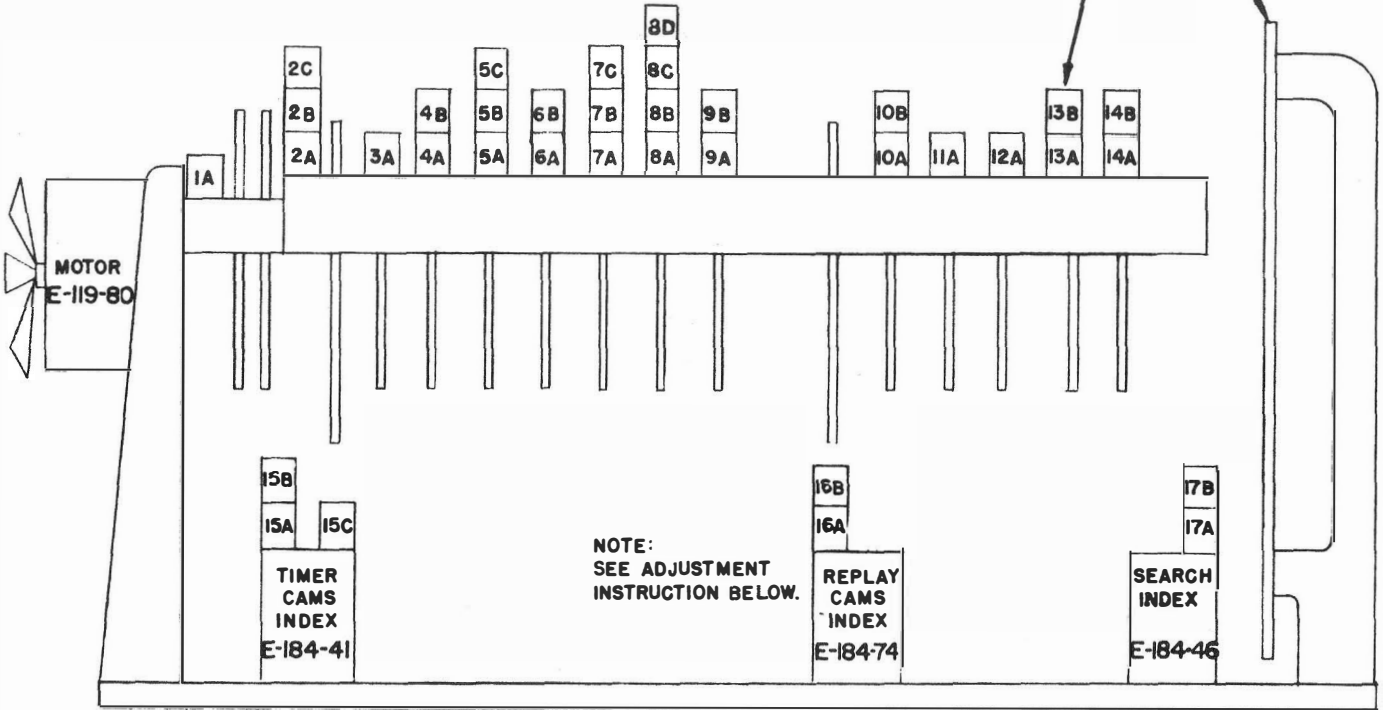
FIG. 5

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

CODE :
 N.C.----- NORMALLY CLOSED
 N.O.----- NORMALLY OPEN
 M.B.B.----- MAKE BEFORE BREAK
 S.P.D.T.----- SINGLE POLE DOUBLE THROW

NOTE:
 SW. NO. 13. IS MOUNTED
 ON SIDE OF CAM.

SEARCH DISC
 W-544



NOTE:
 SEE ADJUSTMENT
 INSTRUCTION BELOW.

NOTE:
 IT IS IMPORTANT TO ADJUST REPLAY CAMS INDEX
 SWITCH NOS. 16A & 16B SO THAT THEY MAKE ONLY
 WHEN THE REPLAY CAMS INDEX COIL IS ENERGIZED.
 WHEN THE REPLAY CAMS INDEX IS DE-ENERGIZED,
 THESE SWITCHES SHOULD OPEN AND REMAIN OPEN
 WHILE SWITCH IS RIDING ON OUTER EDGE OF CAM.

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 SWITCHES
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-35	30 93-4	Yellow Gray-Yellow	Energizes coin kicker magnet.
2C	N. C.	G-9	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-17	74 60	Orange-Green Brown	Flashes extra ball lites.
4B	N. O.	E-40	30 98-1	Yellow Gray-Black	Energizes score extra step index and spotting index.
5A	N. O.	G-7	65-2 71-9	Brown-White Orange-Red	Energizes timer reset coil.
5B	N. O.	B-18	63-10 21-1	Brown-Yellow Blue-Red	Energizes extra ball unit step-up coil. Steps unit from minus one position to zero position
5C	N. O.	D-37	78-4 10-6	Orange-Black Red	Energizes anti-cheat relay.
6A	N. C.	H-27	83 74-8	Black-Yellow Orange-Green	Opens game advantage circuits during timing cycle.
6B	N. C.	C-20	43-4 25-3	Green-Yellow Blue-White	Score extra step safety switch.

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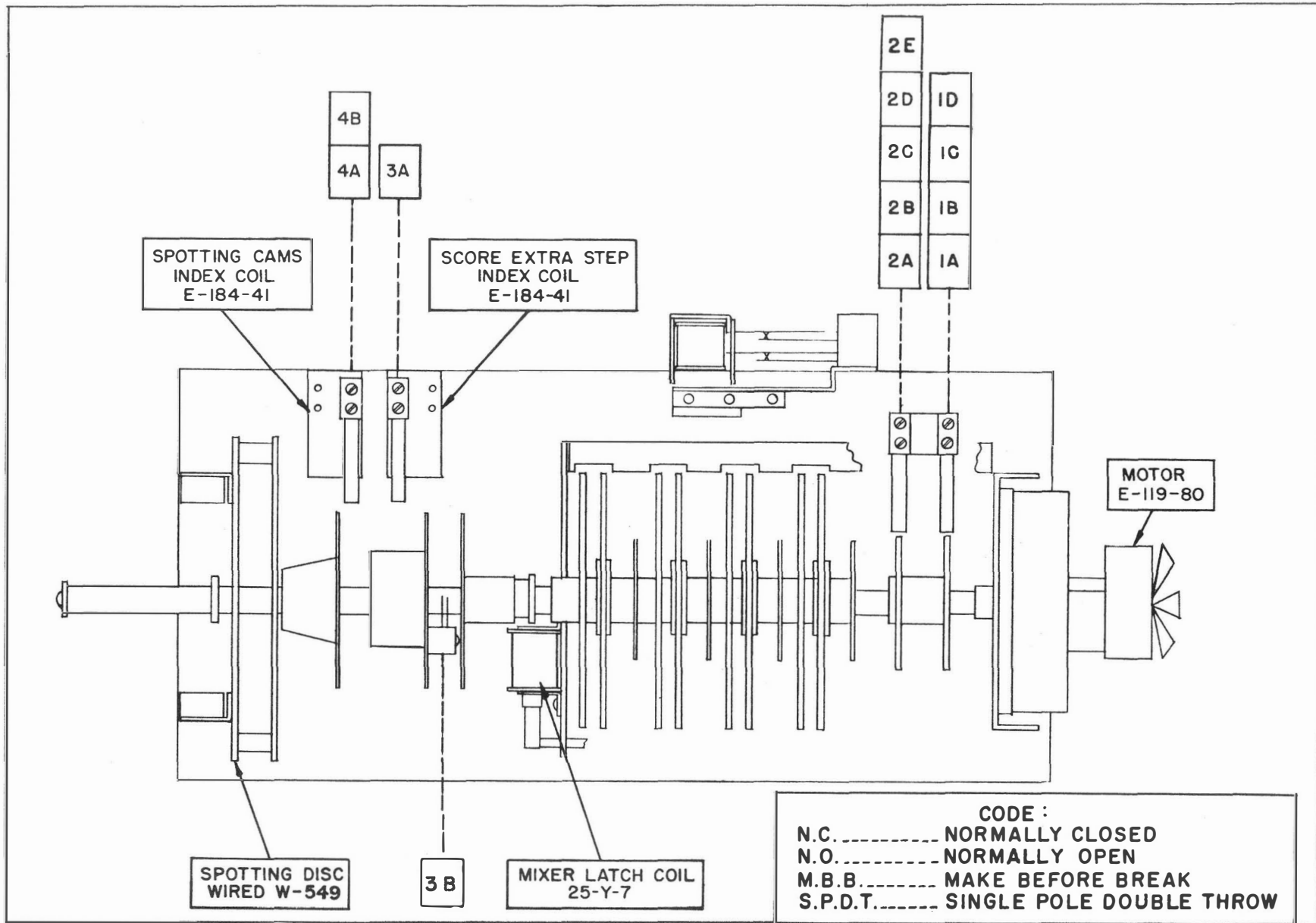
CONTROL UNIT CAM SWITCH CHART — CONTINUED

CAM SWITCH		LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
7A	N. O.	B-18	63-10 25-4	Brown-Yellow Blue-White	Extra ball unit steps.
7B	N. O.	C-20	45-6 52-9	Green-White White-Blue	Score unit steps.
7C	N. O.	D-35	30 93-4	Yellow Gray-Yellow	Pulses coin lock out magnet.
8A	N. O.	D-27	93-1 36	Gray-Yellow Yellow-Brown	Hold feature steps.
8B	N. O.	C-27	23-2 50-8	Blue-Yellow White	Selection feature steps.
8C	N. O.	D-29	51-7 40-7	White-Red Green	Steps super card stepper.
8D	N. O.	C-31	90-6 41-5	Gray Green-Red	Trips corners relay when circuits are all closed on mixer and spotting disc.
9A	Alt.	D-20	71 43-4	Orange-Red Green-Yellow	Opens score extra step circuit every other time.
9B	Alt.	F-27	53-7 14-8 31	White-Yellow Red-Green Yellow-Red	Directs circuit to either a hold feature or selection feature steps.
10A	N. O.	B-15	54-8 93-8	White-Green Gray-Yellow	Pulses replay counter when score unit is at last step.
10B	N. O.	B-16	38-8 53-10	Yellow-Black White-Yellow	Pulses corners replay counter.
11A	N. O.	B-15	91-8 54-8	Gray-Red White-Green	Pulses replay counter when score unit is at 5th and 6th step.
12A	N. O.	B-14	90-8 54-8	Gray White-Green	Pulses replay counter when score unit is at 3rd and 4th step.
13A	N. O.	B-14	54-8 81-8	White-Green Black-Red	Pulses replay counter when score unit is at 1st and 2nd step.
13B	N. O.	C-13	80 38-4	Black Yellow-Black	Pulses replay register and reflex play magnet.
13 (Backside) N. O.		H-13	21-3 27	Blue-Red Blue-Orange	Replay lock-in switch. NOTE: see pictorial view page 326.

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CONTROL UNIT CAM SWITCH CHART — CONCLUDED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
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-14	56-7 93	White-Brown Gray-Yellow	Prevent the start of another replay scoring until cams are indexed.
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-8	74-2 81-2	Orange-Green Black-Red	Lock-in safety switch for extra ball play relay.
15B N. C.	G-5	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 80-10	Blue-Orange Black	In series with replay lock in circuit. NOTE: See pictorial view Page 328 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 Page 328 for correct adj.
SEARCH INDEX COIL	A-12	80-10 70	Black Orange	Energizes when 3 in line or more is scored.
17A N. O.	B-12	80-10 40-4	Black Green	Energizes replay cams index if a score is made.
17B N. C.	I-4	83-3 30	Black-Yellow Yellow	Opens start circuit and also acts as a safety switch.



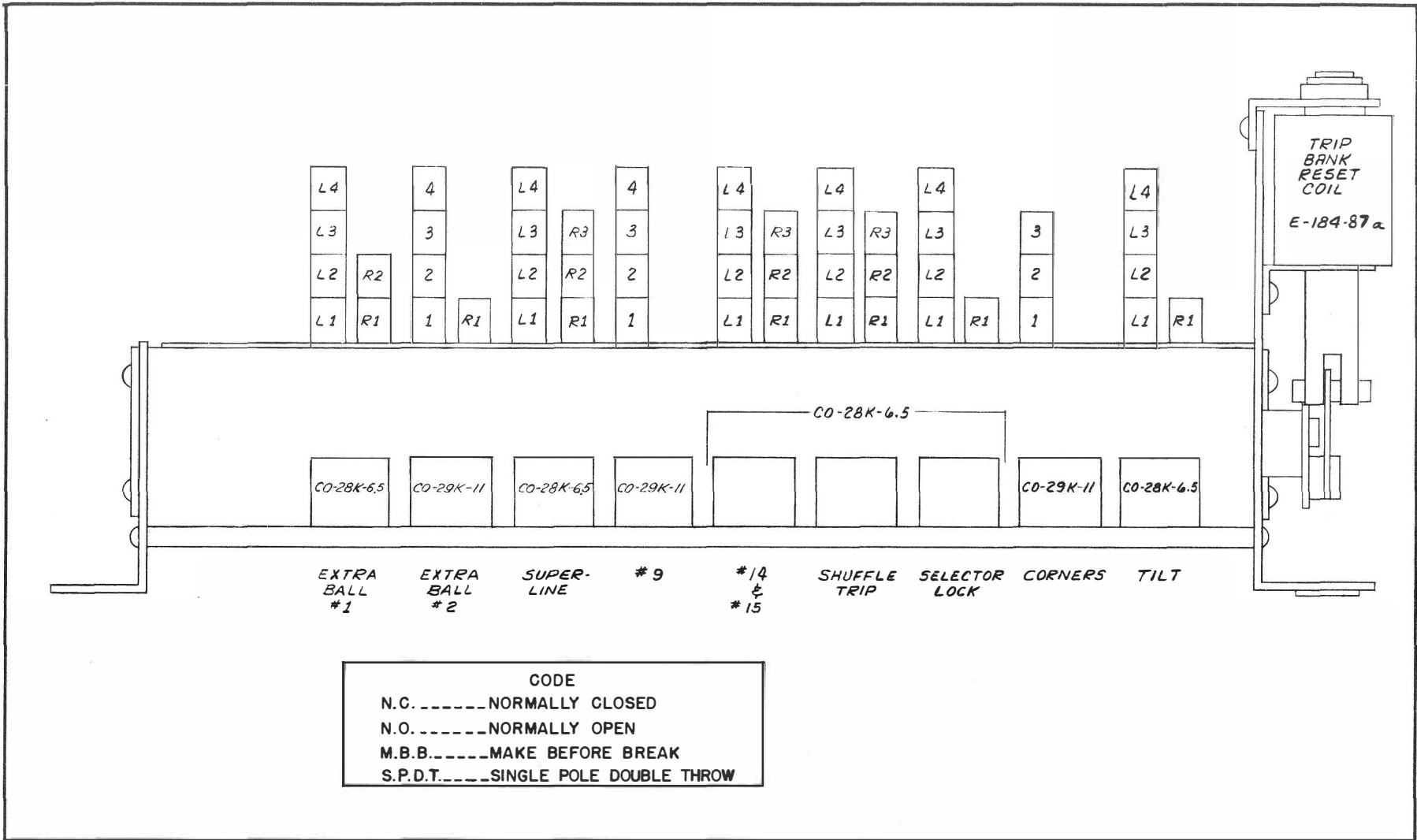
MIXER UNIT ASSEMBLY PICTORIAL VIEW

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 SWITCHES	
MIXER AND SPOTTING 16 PULSE SWITCHES					
1A	N. O.	C-29	36 10-5	Yellow-Brown Red	Steps hold feature unit.
1B	N. O.	L-4	60-5 71-5	Brown Orange-Red	Flashes "select now" lite for "selection feature" advantages.
1C	N. O.	B-17	78 63-10	Orange-Black Brown-Yellow	Steps extra ball unit.
1D	N. O.	D-30	52-7 40-7	White-Blue Green	Steps super card unit.
2A	N. O.	D-26	50-8 15-5	White Red-White	Pulse switch for selection feature unit multiple steps.
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-8	63-3 75-3	Brown-Yellow Orange-Green	Flashes "hold now" indicator lite.
2D	N. O.	C-16	31-5 85-7	Yellow-Red Black-White	Steps corners replay counter to its zero position. (In series with corners unit homing switch)
2E	N. O.	G-22	60-6 13-6	Brown Red-Yellow	Pulse switch for homing selection feature unit thru rotary selector.
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-35	75-10 81-1	Orange-White Black-Red	Completes lock-in circuit for score extra step relay.
3B	N. O.	C-20	25-3 40-5	Blue-White Green	Pulse switch for score multiple steps.
SPOTTING CAMS INDEX COIL	A-40	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 for selection feature lites, selected number lites, super line arrow lites, and super line lite.
4B	N. O.	J-16	30-5 13-4	Yellow Red-Yellow	Completes flash circuit for score lites, super card lites, red & yellow rollover lites and "hold double" lite.



TRIP RELAY BANK PICTORIAL VIEW
NUMBERS CORRESPOND TO SWITCH-CHART

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

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
EXTRA BALL #1 TRIP COIL	A-4	25-11 70	Blue-White Orange	Energized by switch on extra ball play relay.
L1 N.O.	C-12	38-3 91-1	Yellow-Black Gray-Red	Completes circuit to ball lifter motor when playing for extra balls.
L2 N.C.	B-4	25-11 20-3	Blue-White Blue	Breaks circuit to this coil.
L3 S.P.D.T.	H-24	75-10 65-4 74-8	Orange-White Brown-White Orange-Green	Extra ball proportioning.
L4 S.P.D.T.	H-26	83 50-10 14-4	Black-Yellow White Red-Green	Proportioning switch.
R1 N.C.	G-27	74-8 81-6	Orange-Green Black-Red	Opens circuitsto game advantages during extra ball play.
R2 N.O.	G-20	65-4 40-2	Brown-White Green	Proportioning switch.
EXTRA BALL #2 TRIP COIL	A-4	23-11 70	Blue-Yellow Orange	Same as extra ball trip #1. They both energize at the same time.
L1 S.P.D.T.	D-19	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	23-11 20-3	Blue-Yellow Blue	Breaks circuit to this coil.
L3 S.P.D.T.	E-19	65-3 75-4 78-1	Brown-White Orange-White Orange-Black	Shuts off score advantages and completes circuit to extra ball steps, during extra ball play.
L4 S.P.D.T.	J-16	13-4 30 60	Red-Yellow Yellow Brown	Shuts off flashing of score lites and completes circuit to flash extra ball lites.
R1 N.C.	G-29	75-10 45-2	Orange-Red Green-White	Breaks super card steps.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SUPER LINE TRIP COIL	A-21	Jumper 70	Yellow-Brown Orange	Energized by 6th step of selection feature unit.
L1 N. O.	J-5	30 43-3	Yellow Green-Yellow	Lites super line lite.
L2 N. C.	B-21	Jumper 36-6	Yellow-Brown Yellow-Brown	Breaks circuit to this coil.
L3 N. O.	G-17	40-3 23-3	Green Blue-Yellow	Completes replay circuit for scoring super line replays.
L4 N. O.	B-23	75-5 50-8	Orange-White White	Completes circuit to selection feature step-up coil.
R1 N. O.	L-4	60-5 41-3	Brown Green-Red	Flashes Super-Line Light
R2 N. C.	H-18	63-4 74-4	Brown-Yellow Orange-Green	Proportioning for score steps and extra ball steps.
R3 N. C.	E-26	56-10 57	White-Brown White-Orange	Selection feature proportioning
#9 Trip Coil	A-21	Jumper 70	Green-Black Orange	Energized by 5th step of selection feature unit.
1 N. O.	J-5	30 18-2	Yellow Red-Black	Lites #9 selection feature lite.
2 N. C.	B-21	Jumper 48-6	Green-Black Green-Black	Breaks circuit to this coil.
3 N. O.	B-22	13-5 50-8	Red-Yellow White	Completes circuit to selection feature step-up coil.
4 N. C.	H-19	71-4 74-4	Orange-Red Orange-Green	Proportioning for score steps and extra ball steps.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
#14 and #15 TRIP COIL	A-22	Jumper 70	Green Orange	Energized by 4th step of selection feature unit.
L1 N.O.	J-5	30 14-2	Yellow Red-Green	Lites #14 and #15 selection feature lites.
I-2 N.C.	B-22	Jumper 40-6	Green Green	Breaks circuit to this coil.
L-3 N.O.	B-23	15-6 25-6	Red-White Blue-White	Completes circuit to selection feature step-up and escapement coils.
L-4 N.O.	J-32	56 30	White-Brown Yellow	Completes circuit to lite #9, #14 and #15 card lites, thru selection feature disc.
R1 S. P. D. T.	J-1	48-4 30 50-4	Green-Black Yellow White	Breaks circuit to selection feature arrow lites and completes circuit to super-line arrow lites.
R2 N.C.	H-19	65-4 74-4	Brown-White Orange-Green	Proportioning for score steps and extra ball steps.
R3 N.C.	E-25	21 90	Blue-Red Gray	Selection feature proportioning

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SHUFFLE TRIP COIL	A-33	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.
L1 N. O.	J-33	45-5 30	Green-White Yellow	Completes circuit for even number lites.
L2 N. C.	I-33	21-3 31-10	Blue-Red Yellow-Red	Breaks circuit to this coil.
L3 N. O.	J-27	41-2 30	Green-Red Yellow	Completes circuit for odd number lites.
L4 N. C.	K-8	74-3 10-4	Orange-Green Red	Shuts off "hold" indicator lite.
R1 N. O.	C-8	81-2 52-6	Black-Red White-Blue	Complete circuit to extra ball play relay.
R2 N. O.	I-15	18-4 56-7	Red-Black White-Brown	Completes circuit to replay scoring circuit. (In series with search relay switches).
R3 N. O.	J-31	56 20-2	White-Brown Blue	Completes circuit to lite #9, #14 and #15 card lites, thru selection feature disc.

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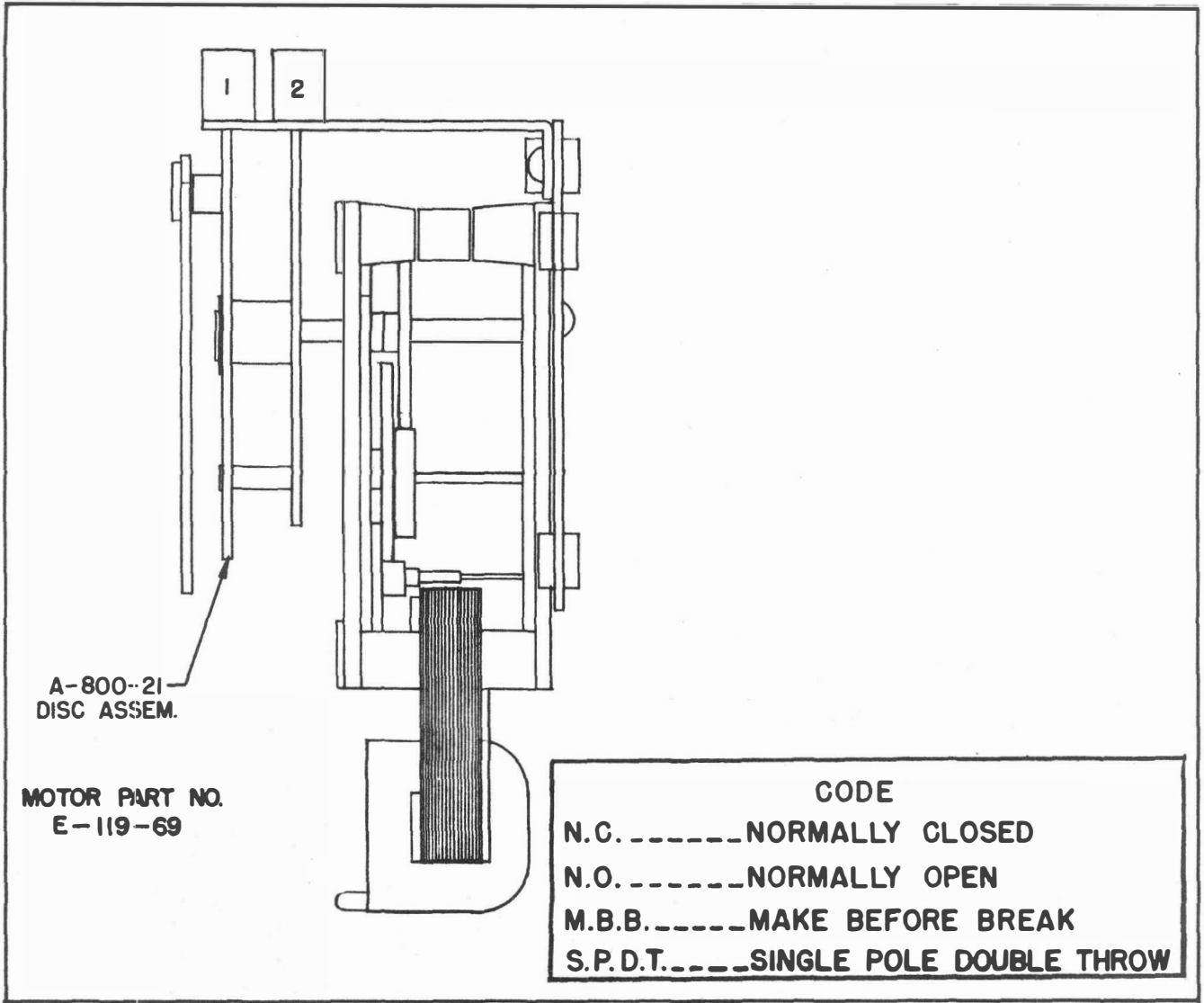
TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SELECTOR LOCK TRIP COIL	A-11	Jumper 70	Gray-Black Orange	Trips at 4th step of timer unit.
L1 N.O.	F-10	30 53	Yellow White-Yellow	Completes circuit to energize 5th ball relay.
L2 N.C.	B-11	Jumper 98	Gray-Black Gray-Black	Breaks circuit to this coil.
L3 N.O.	G-8	85-9 43-2	Black-White Green-Yellow	Keeps circuit to ball lifter cam switch alive.
L4 N.C.	J-4	83-6 14-2	Black-Yellow Red-Green	Shuts off "select now" lite.
R1 N.C.	F-22	13-6 15-6	Red-Yellow Red-White	Breaks circuit to selection feature step-up and escapement coils.
CORNERS TRIP COIL	A-31	Jumper 70	Green-Red Orange	Energized by control unit cam switch #8D, when spotting disc wipers stop on correct positions.
1 N.O.	J-13	30 98-10	Yellow Gray-Black	Lites "corners" lite.
2 N.O.	D-16	21-8 13-8	Blue-Red Red-Yellow	Completes circuit for corners replay scoring.
3 N.C.	B-31	Jumper 41-5	Green-Red Green-Red	Breaks circuit to this coil.

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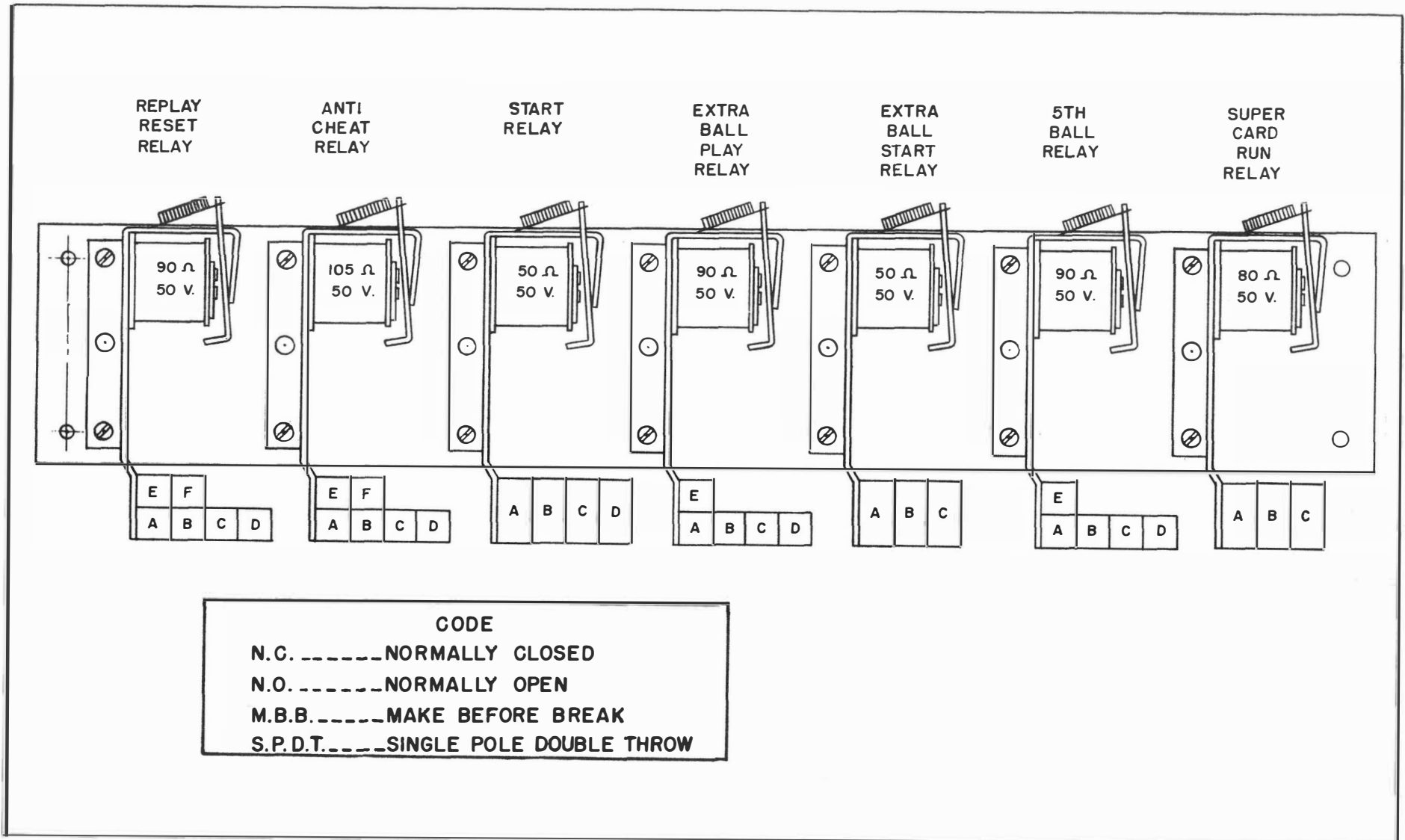
TRIP RELAY BANK CHART — CONCLUDED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
TILT TRIP COIL	A-11	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	20P 60P	Blue (Plastic) Brown (Plastic)	Opens circuit to control unit and mixer unit motors, when game is tilted.
L3 N. C.	L-25	20-4 10	Blue Red	Opens 17 volt circuit.
L4 S. P. D. T.	L-22	38 81 41-9	Yellow-Black Black-Red Green-Red	Shuts off 6 volt circuit and lites tilt lite.
R1 N. C.	B-11	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-8	43-2 27-2	Green-Yellow Blue-Orange	Energizes timer unit step-up coil.



7 RELAY BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART

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

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
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.	C-6	53-2 13-9 27-4	White-Yellow Red-Yellow Blue-Orange	Directs circuit to replay meter during replay cancel.
B N.O.	G-1	20P 60P	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.	C-3	21-6 63-2	Blue-Red Brown-Yellow	Opens start circuit during replay cancel.
E N.C.	C-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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7 RELAY BANK SWITCH CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
ANTI-CHEAT RELAY COIL	A-37	78-4 70	Orange-Black Orange	Energized thru cam switch #5, 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-22	54-7 38	White-Green Yellow-Black	Opens 6 volt circuit to lites.
C N.O.	L-24	80-1 20-4	Black Blue	Opens 17 volt circuit when this relay drops out.
D N.O.	B-8	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	B-8	54 91-2	White-Green Gray-Red	Opens circuit to extra ball play relay when this relay is energized.
B N.C.	G-28	81-6 14-8	Black-Red Red-Green	Opens circuit to game advantage circuits.
C N.O.	H-3	48-2 63-2	Green-Black Brown-Yellow	Lock-in switch for this relay.
D N.O.	E-9	85 13-3	Black-White Red-Yellow	Completes circuit to timer cam index coil.

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7 RELAY BANK SWITCH CHART — CONTINUED

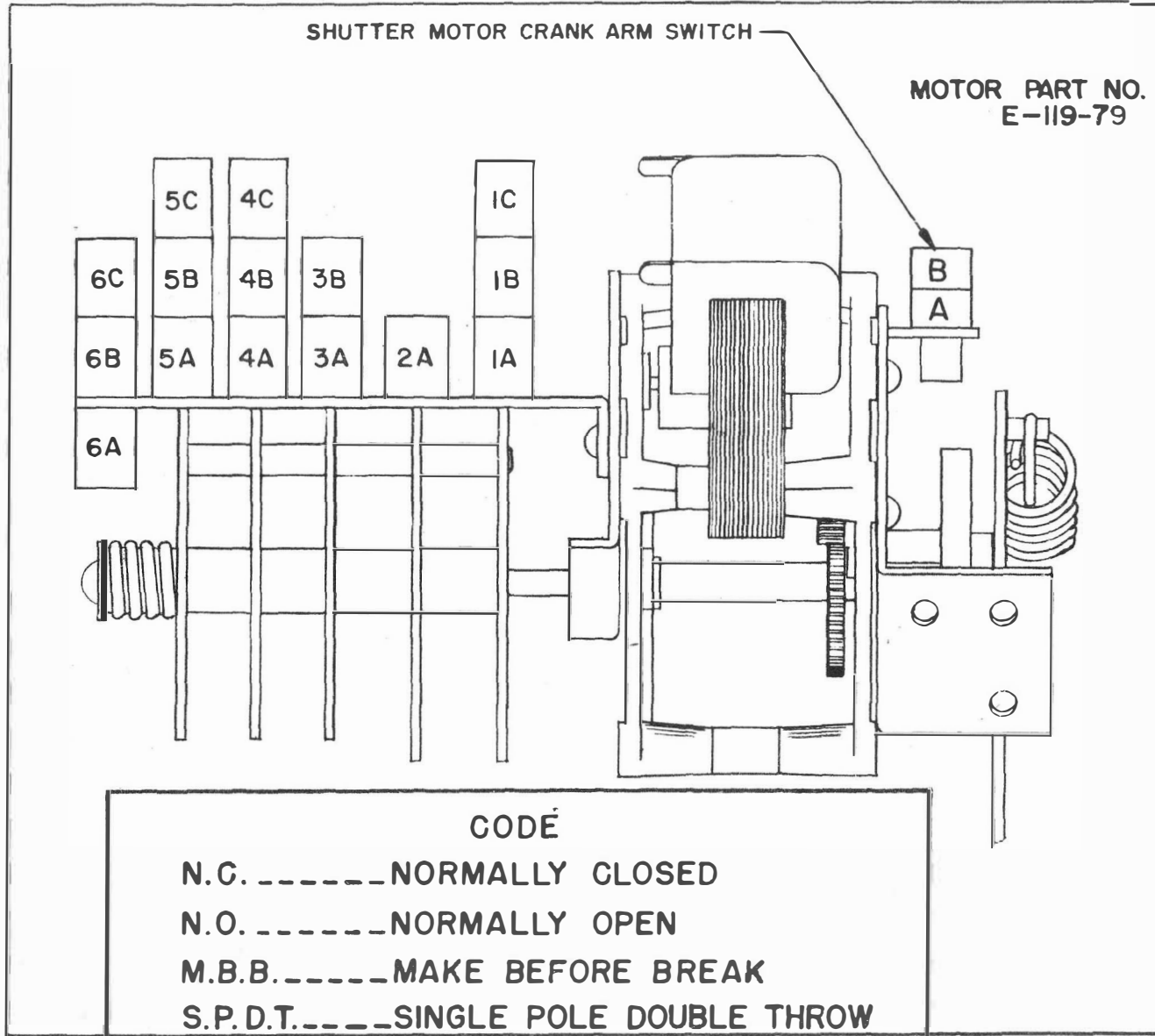
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
EXTRA BALL PLAY RELAY COIL	A-8	93-6 70	Gray-Yellow Orange	Energizes when yellow button is pressed.
A S.P.D.T.	E-4	50-2 51-2 63-2	White White-Red Brown-Yellow	Directs circuit to regular start relay or extra ball start relay.
B N.O.	F-9	74-2 15-2	Orange-Green Red-White	Lock-in switch for this relay.
C N.O.	J-22	21-4 30	Blue-Red Yellow	Lights extra ball light in back box.
D N.O.	E-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 to selection feature lites.
EXTRA BALL START RELAY COIL	A-5	20-3 70	Blue Orange	Energizes when extra ball play relay is energized.
A N.C.	B-17	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	85 93-2	Black-White Gray-Yellow	Operates mixer latch coil and timer index coil during extra ball play.
C N.O.	H-5	48-2 25-10	Green-Black Blue-White	Lock-in switch for this relay.

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7 RELAY BANK SWITCH CHART — CONCLUDED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
FIFTH BALL RELAY COIL	A-11	23-8 70	Blue-Yellow Orange	Energizes when fifth ball is shot.
A N.O.	C-10	23-8 53	Blue-Yellow White-Yellow	Lock-in switch for this relay.
B N.O.	H-33	31-10 45	Yellow-Red Green-White	Makes odd, even and hold all button circuit alive after fifth ball.
C N.O.	K-8	90-2 10-4	Gray Red	In series with hold indicator lite.
D N.O.	C-8	27-2 78-6	Blue-Orange Orange-Black	In series with timer step-up coil.
E N.O.	C-8	52-6 54	White-Blue White-Green	In series with extra ball play relay.
SUPER CARD RUN RELAY COIL	A-24	98-5 70	Gray-Black Orange	Energized by yellow or red rollover switch.
A N.O.	G-30	60-6 50-7	Brown White	Completes circuit to super card step-up coil.
B N.O.	F-23	93-7 60-6	Gray-Yellow Brown	Lock-in switch if yellow rollover is hit.
C N.O.	F-24	60-6 91-4	Brown Gray-Red	Lock-in switch if red rollover is hit.

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 SWITCHES
1A	N. C.	I-14	93 21-3	Gray Blue-Red	Completes circuit to replay scoring circuit.
1B	N. O.	G-9	30 14-3	Yellow Red-Green	Carry thru switch for shutter motor.
1C	N. C.	B-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.	D-39	25 85-10	Blue-White Black-White	Resets super card, selection feature, and extra ball units.
3B	N. O.	G-2	10-P 70-P	Red (Plastic) Orange (Plastic)	Resets trip relay bank.
4A	S. P. D. T.	H-22	60-6 30 61-6	Brown Yellow Brown-Red	Completes circuit to super-line, #9 and #14 & 15 trip coils (when shutter is open); completes circuit to selection feature step-up and escapement coils, and super card run relay (when shutter is closed).
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.	H-10	36-4 18-3	Yellow-Brown Red-Black	Starts shutter motor if game is tilted when shutter is open.
5A	S. P. D. T.	D-9	14-3 13-3 93-2	Red-Green Red-Yellow Gray-Yellow	Breaks circuit to shutter motor and makes circuit to timer index coil.
5B	N. C.	H-8	65-2 21-3	Brown-White Blue-Red	Safety switch for timer reset.
5C	N. O.	C-16	30 31-5	Yellow Yellow-Red	Completes circuit to step corners replay counter to a reset position.
6A	N. O.	D-37	98-9 25	Gray-Black Blue-White	Resets hold feature, score unit, and replay counter unit.
6B	N. O.	D-38	25 27-6	Blue-White Blue-Orange	Energizes "selection feature" escapement coil.
6C	N. O.	H-7	10-1 71-9	Red Orange-Red	Resets timer stepper.
CRANK ARM SWITCH "A" N. O.		G-32	45 91	Green-White Gray	Trips shuffle trip relay.
CRANK ARM SWITCH "B" N. C.		D-33	81-4 80-2	Black-Red Black	Drops out shuffle relay at the end of each shuffle.

MISCELLANEOUS PARTS

<u>PART NO.</u>	<u>NAME OF PART</u>
G-229	Back Glass
M-168-15	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-277-26	Coin Switch Assembly - Complete 5¢
AS-277-27	Coin Switch Assembly - Complete 10¢
E-130-1	Counter 48 Volt
CA-567-15	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
SW-010-26	Switch for AS-1315
E-122-19	Transformer
M-412-2	Wire Wiper for Slip Ring

PIN-GAME LUBRICANT AVAILABLE
IN ONE POUND CANS