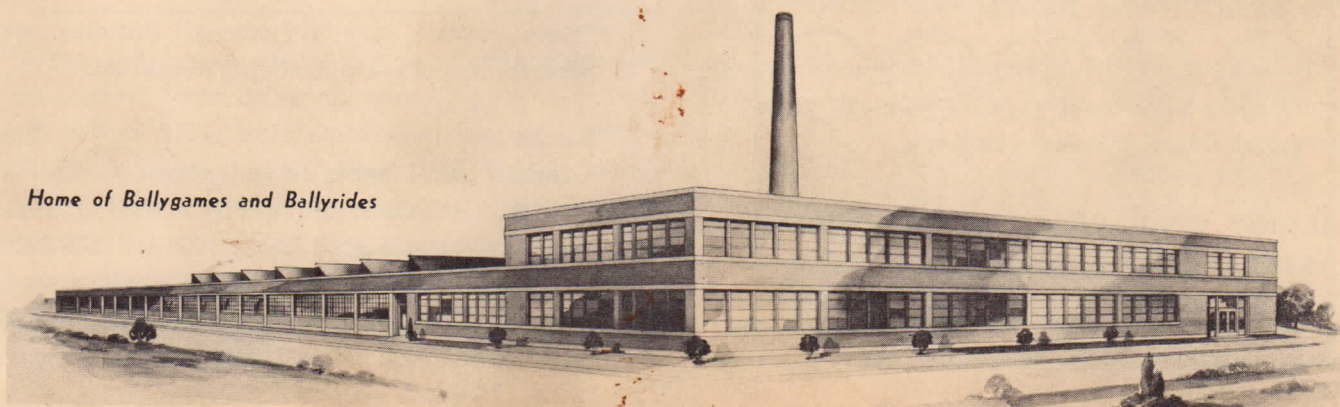


Bally **VARIETY** **OPERATING INSTRUCTIONS** **AND PARTS CATALOG**

Part Numbers are marked on illustrations
and a list of miscellaneous parts appears
on the back cover.

FOR QUICKEST SERVICE
STATE CORRECT PART NUMBER
WHEN ORDERING PARTS

Home of Ballygames and Ballyrides



INSTALLATION

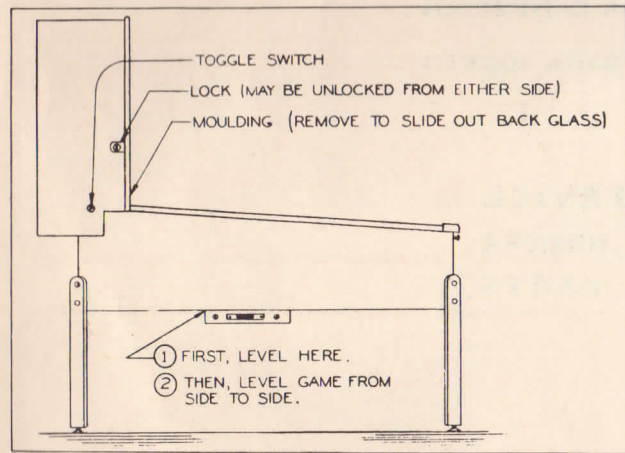
AND GENERAL INSTRUCTIONS

Fasten 4 legs to cabinet with bolts and washers furnished. Place back-cabinet in position on front-cabinet. Unlock and open back-door and fasten back-cabinet to front-cabinet with bolts and washers furnished. (2 back-door locks are keyed alike.) Connect back-cabinet and front-cabinet electrically by tightly plugging male-plugs from front-cabinet and panel into corresponding female-plugs in back-cabinet.

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

Place 8 balls in game.

BE SURE TO LEVEL GAME, as instructed in drawing below.



TO REMOVE TOP PANEL

Unlock front door, remove screws holding front glass-rail, remove rail and glass, remove screws holding sides of panel.

ACCESS TO BACK-CABINET MECHANISM AND BACKGLASS LAMPS

Backglass may be removed from either side by unlocking side of back-cabinet and removing

upright moulding. (Remove moulding by pulling lower part of moulding.)

After removing backglass, access to mechanism is by raising 2 slide-brackets on insert, located on left and right edges of insert, which may then be tilted forward for easy access.

PLAY FEATURES

NEW MAGIC-LINES FEATURE: Arrow-lights, pointing to (MAGIC-LINES) on backglass flash for each coin* deposited and advance at mystery-intervals. When light advances to fourth arrow, (MAGIC-LINES) lights, together with instructions-panel, telling player

**WHEN
(MAGIC-LINES)
IS LIT
MOVE FIRST 3 LINES
UP OR DOWN
BY TURNING KNOBS,**

and instructions-panel, telling player to

**TURN KNOBS
BEFORE
SHOOTING
4TH BALL****

Player may then turn knobs on front-moulding to move first 3 lines of Card up or down, as shown on page 3.

EXTRA TIME: After lighting Magic Lines and panel with words "TURN KNOB BEFORE SHOOTING 4TH BALL", player may deposit additional coins* to light panel with words

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

Knobs are inoperative after 4TH ball is shot—unless panel lights to tell player to **TURN KNOBS BEFORE SHOOTING 5TH BALL. Warning-panel with words **TURN KNOBS NOW** lights after third or fourth ball is shot, depending on whether 4TH or 5TH BALL panel is lit.

"TURN KNOBS BEFORE SHOOTING 5TH BALL"—to delay locking** Selector-Knob until after fifth ball is shot.

When lighted, panel with words "TURN KNOB BEFORE SHOOTING 5TH BALL" remains lit during entire game, and player may deposit additional coins* to light other scoring-advantages.

HOW MAGIC-LINES WORK

Top picture shows Card with all numbers in normal position. Player has already lit 1, 16 and 22 by shooting first 3 balls into corresponding holes, but numbers are not lined up in a scoring line-up. With Magic-Lines lit, player can turn his lop-sided line-up into a scoring line-up in 3 different ways.

Middle Card shows first possible method of straightening out 3 lit numbers to score 3-in-line. First line of Card is moved DOWN. Each number in first line moves down one circle, bottom number (11) jumping to top circle. Lights transfer with movement of numbers, lining up 1-22-16 as a **DIAGONAL 3-IN-LINE**.

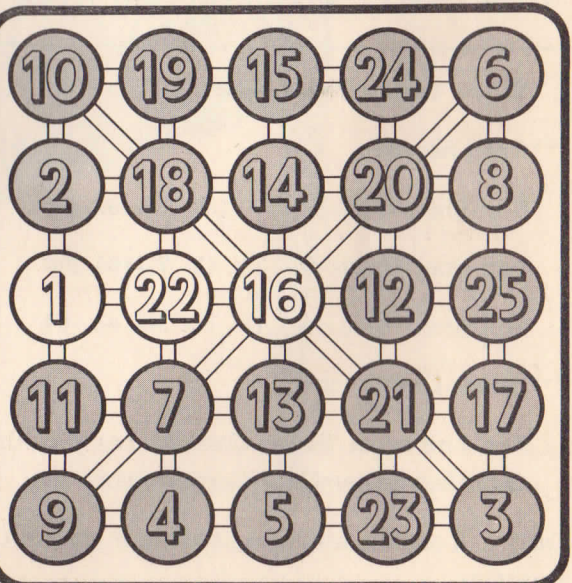
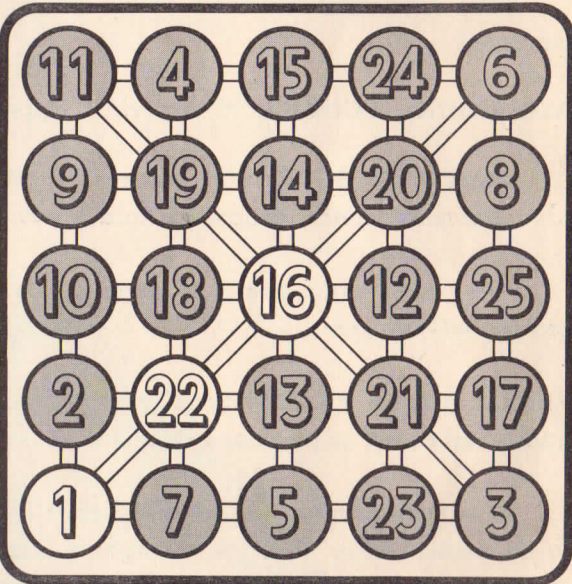
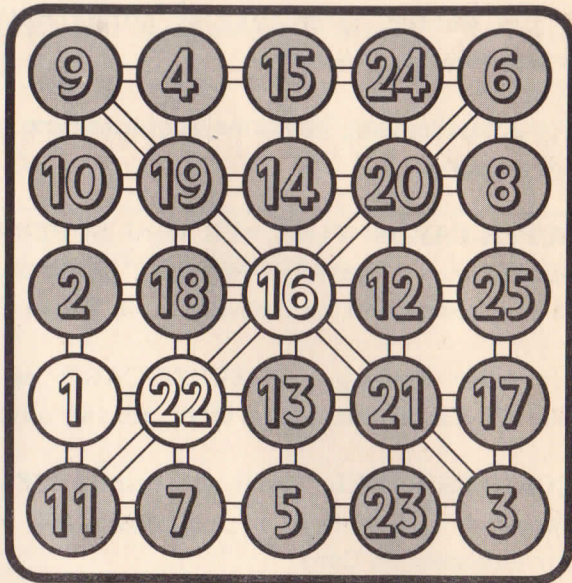
Bottom Card shows another method of lining up the 3 lit numbers. First and second lines are moved UP. Each number moves up one circle, top numbers in each line (9 and 4) dropping to bottom circles. Lit numbers 1, 22 and 16 are then lined up as **HORIZONTAL 3-IN-LINE**.

SPOT-FEATURE: 2 Stars on backglass and playfield flash for each coin* deposited and, at mystery-intervals, light and remain lit during entire game.

Player who hits Rollover, when corresponding Star is lit, lights (Red Rollover) 10 or (Yellow Rollover) 25 on Card.

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

Knobs are inoperative after 4TH ball is shot—unless panel lights to tell player to **TURN KNOBS BEFORE SHOOTING 5TH BALL. Warning-panel with words **TURN KNOB NOW** lights after third or fourth ball is shot, depending on whether 4TH or 5TH BALL panel is lit.



In addition to spotting by hitting rollovers, 10 and 25 are directly spotted at mystery-intervals when coins* are deposited.

After lighting Stars or spot-numbers, player may deposit additional coins* to light other scoring-advantages.

SUPER-CARDS: Panel with word SUPER-CARD above each Super-Card flashes for each coin* deposited and, at mystery-intervals, lights and remains lit during entire game, qualifying player for in-line scores and corners-scores on Super-Card with corresponding SUPER-CARD panel lit.

After lighting one SUPER-CARD panel, player may deposit additional coins* to light second SUPER-CARD panel and other scoring advantages.

CORNERS-PANEL: Panel with words "CENTER CARD CORNERS SCORE 200" flashes for each coin* deposited and, at mystery intervals, lights and remains lit during entire game, qualifying players for corners-score on Card.

After lighting CORNERS-panel, player may deposit additional coins* to light other scoring advantages.

ADVANCING SCORES*:** Scores*** appear at top of backglass, advancing at mystery intervals.

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 highest bracket, player may deposit additional coins* to light additional scoring-advantages.

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 replays are registered, Buttons are pressed, instead of coins being deposited.

***Card Scores

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: 3- 6- 8- 12- 18- 36- 48- 64

***Super-Card Scores

3-in-line on a Super-Card scores 4-in-line scores, when corresponding SUPER-CARD panel is lit. Qualified Super-Card Corners score 200.

Only 1 4-in-line score registers per game. Only highest in-line-score registers. Only first corners score registers.

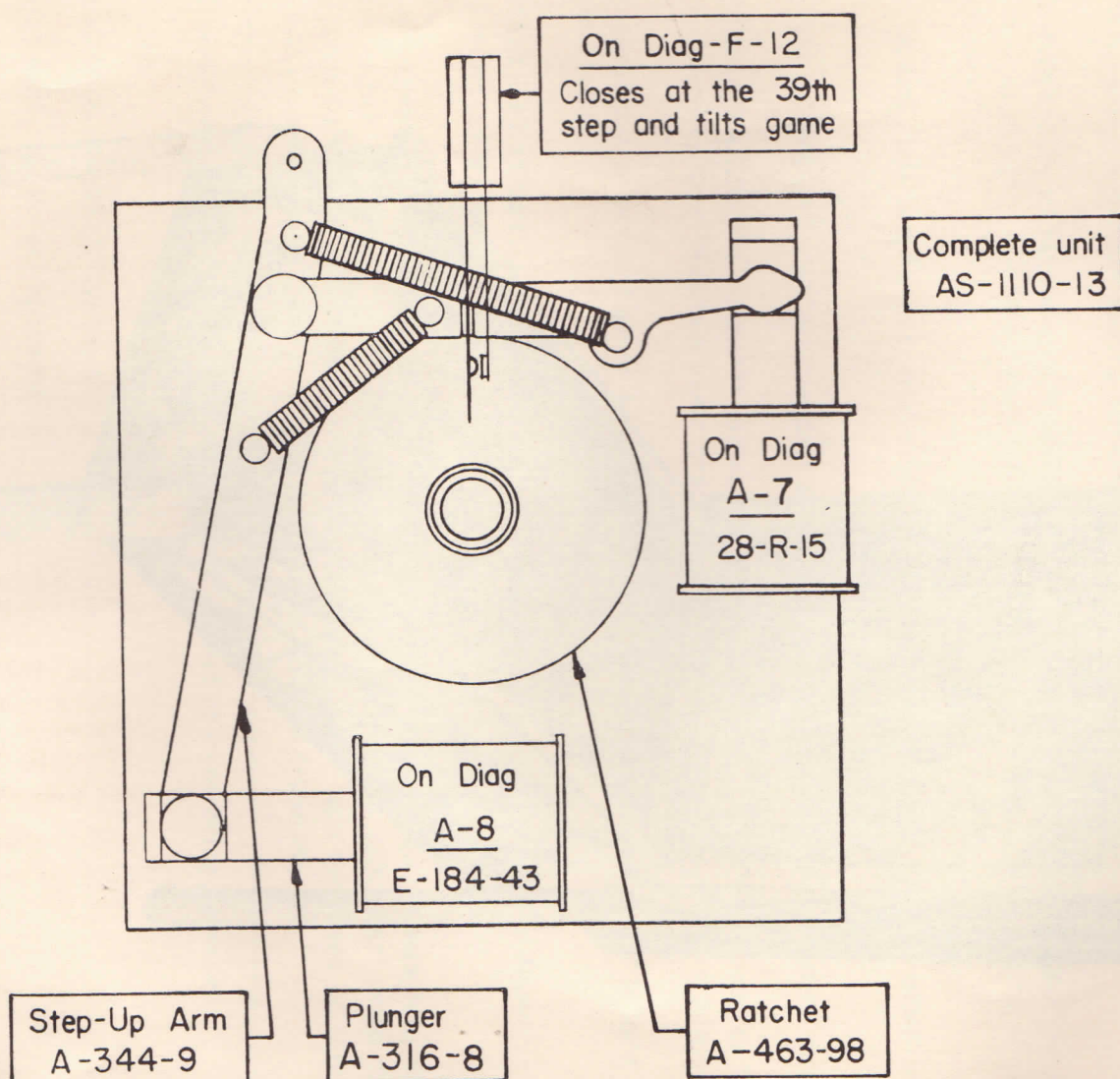
When (1st) (EXTRA) (BALL) is completely lit, first extra ball is released to player.

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.

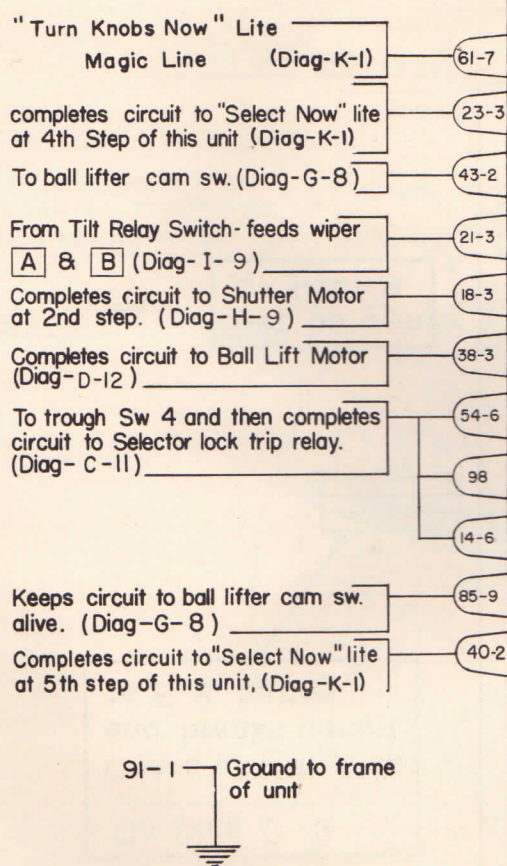
*When replays are registered, Buttons are pressed, instead of coins being deposited.



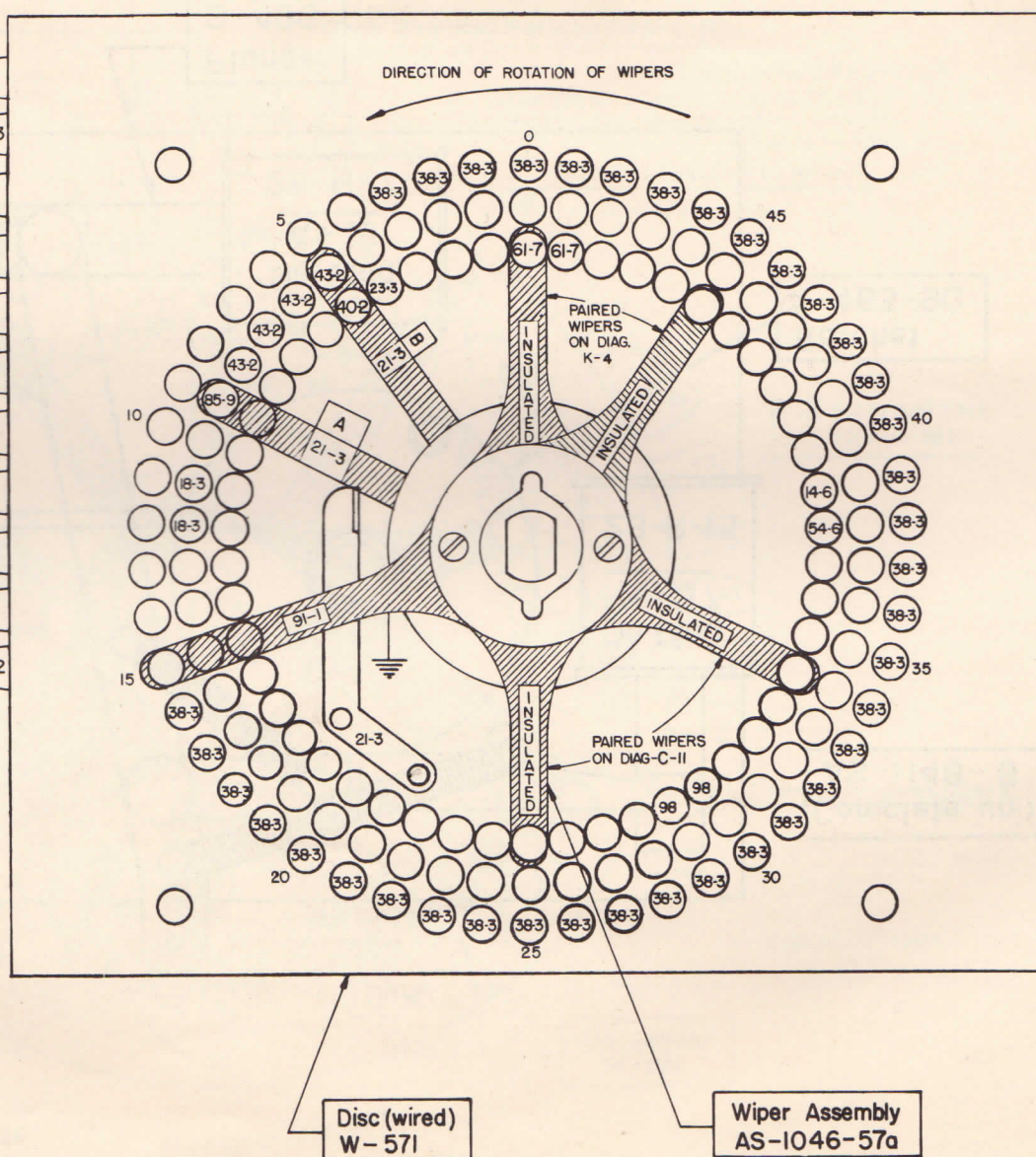
9 **TIMER UNIT** viewed from COIL side



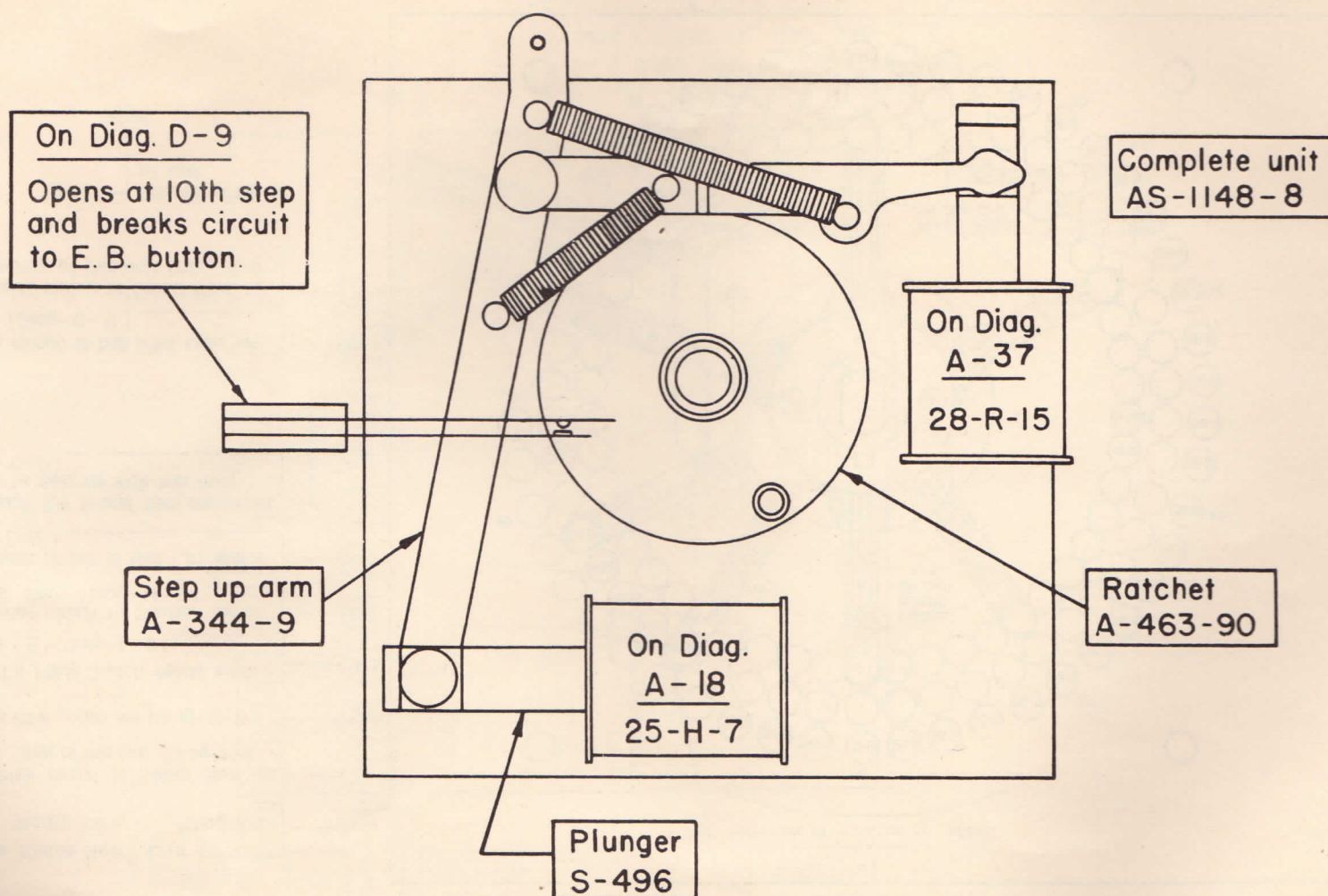
TIMER UNIT viewed from BUTTON or WIPER side
39 step unit. Wipers shown in zero or reset position



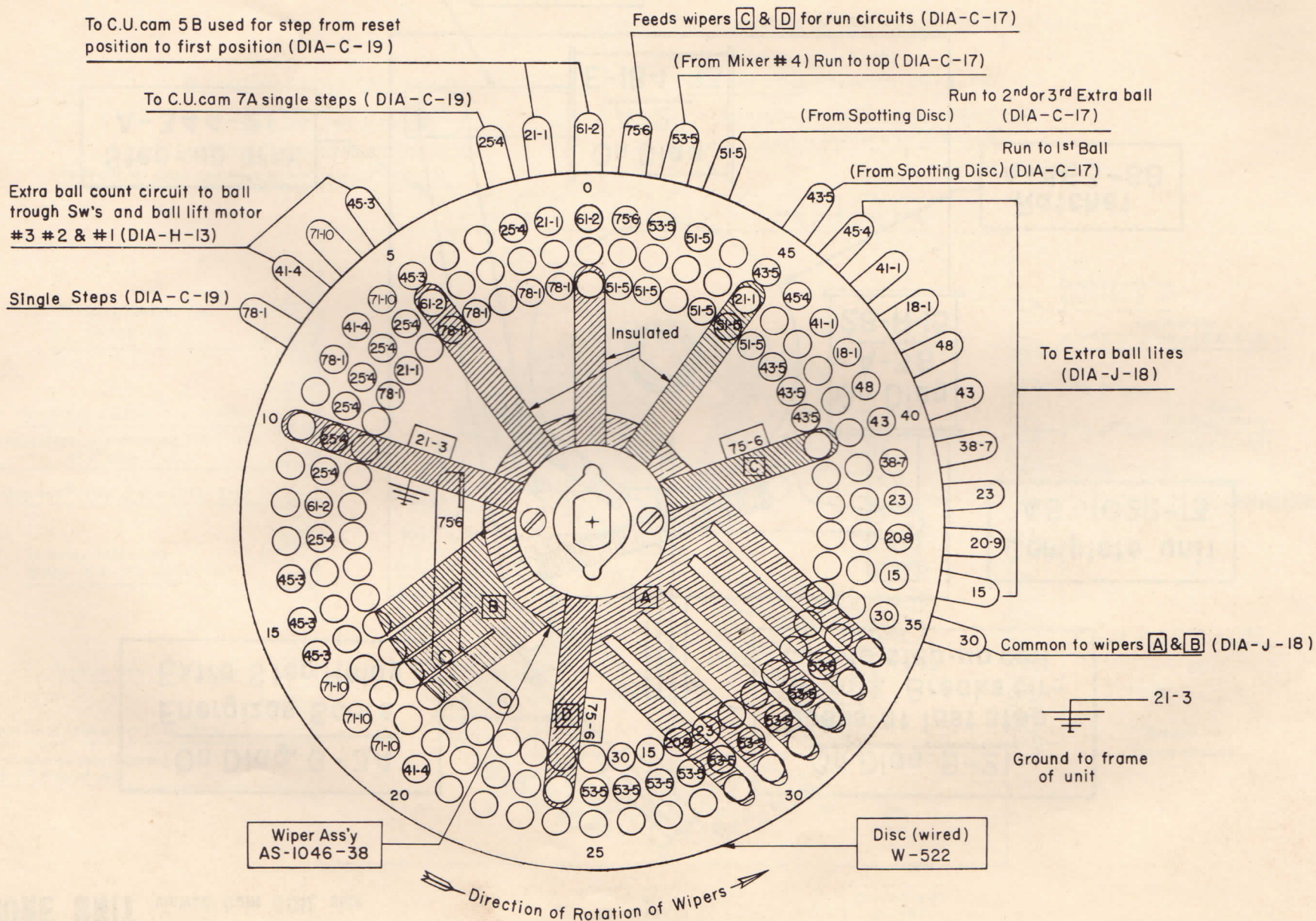
Note:- Diag-L-4 refers to location on schematic diagram.



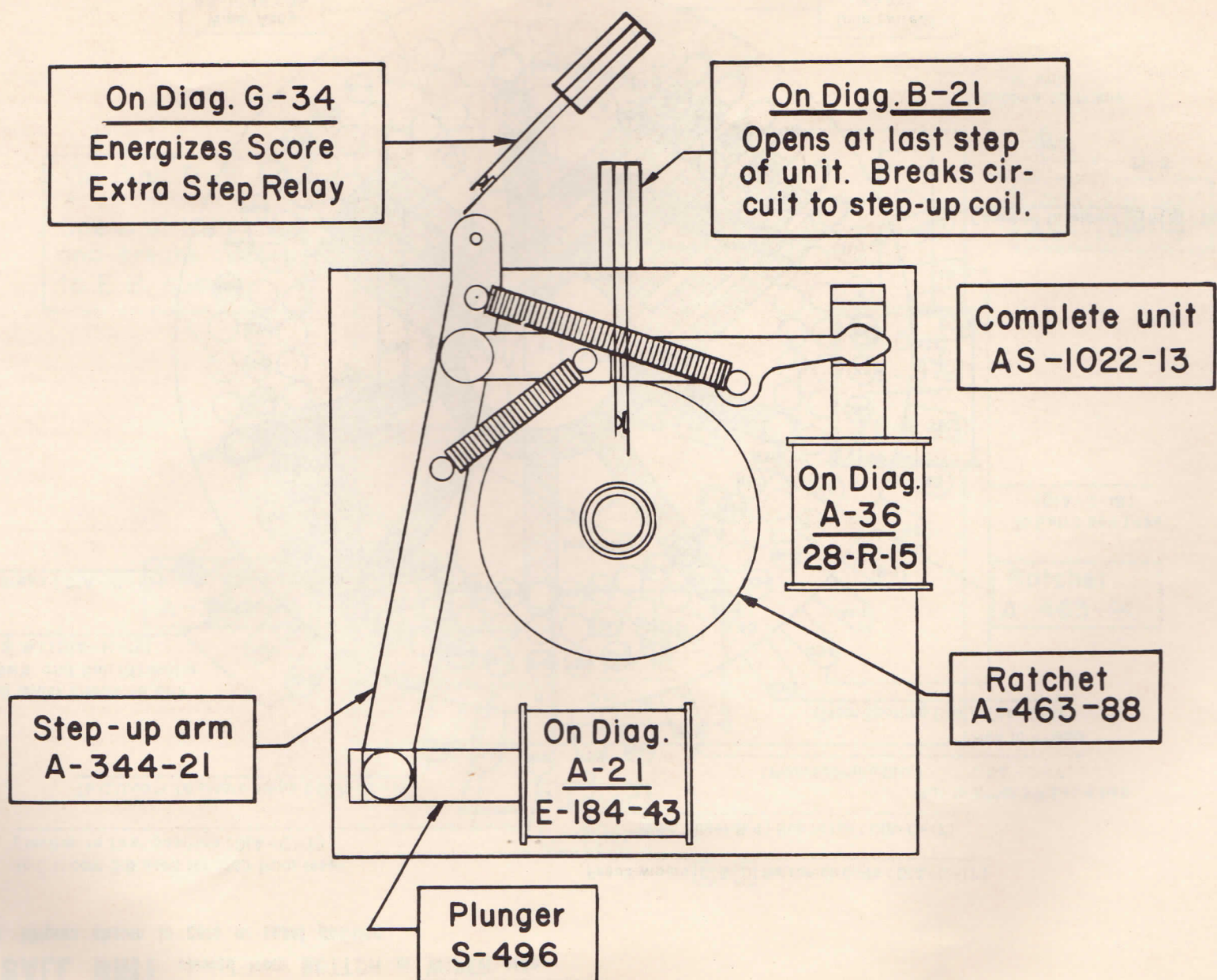
8 **EXTRA BALL UNIT** viewed from COIL side



EXTRA BALL UNIT viewed from BUTTON or WIPER side
10 step unit. Wipers shown in zero or reset position

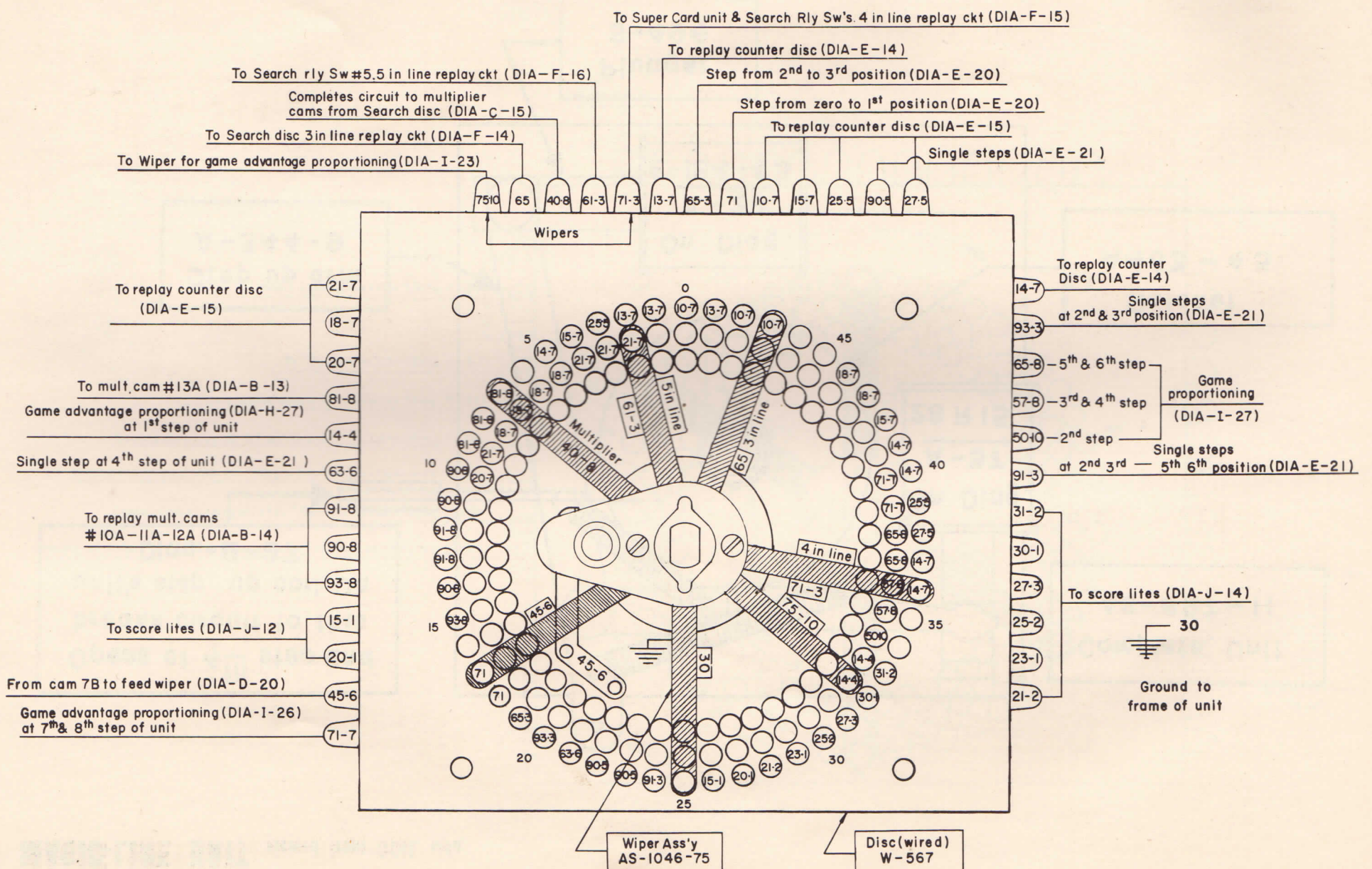


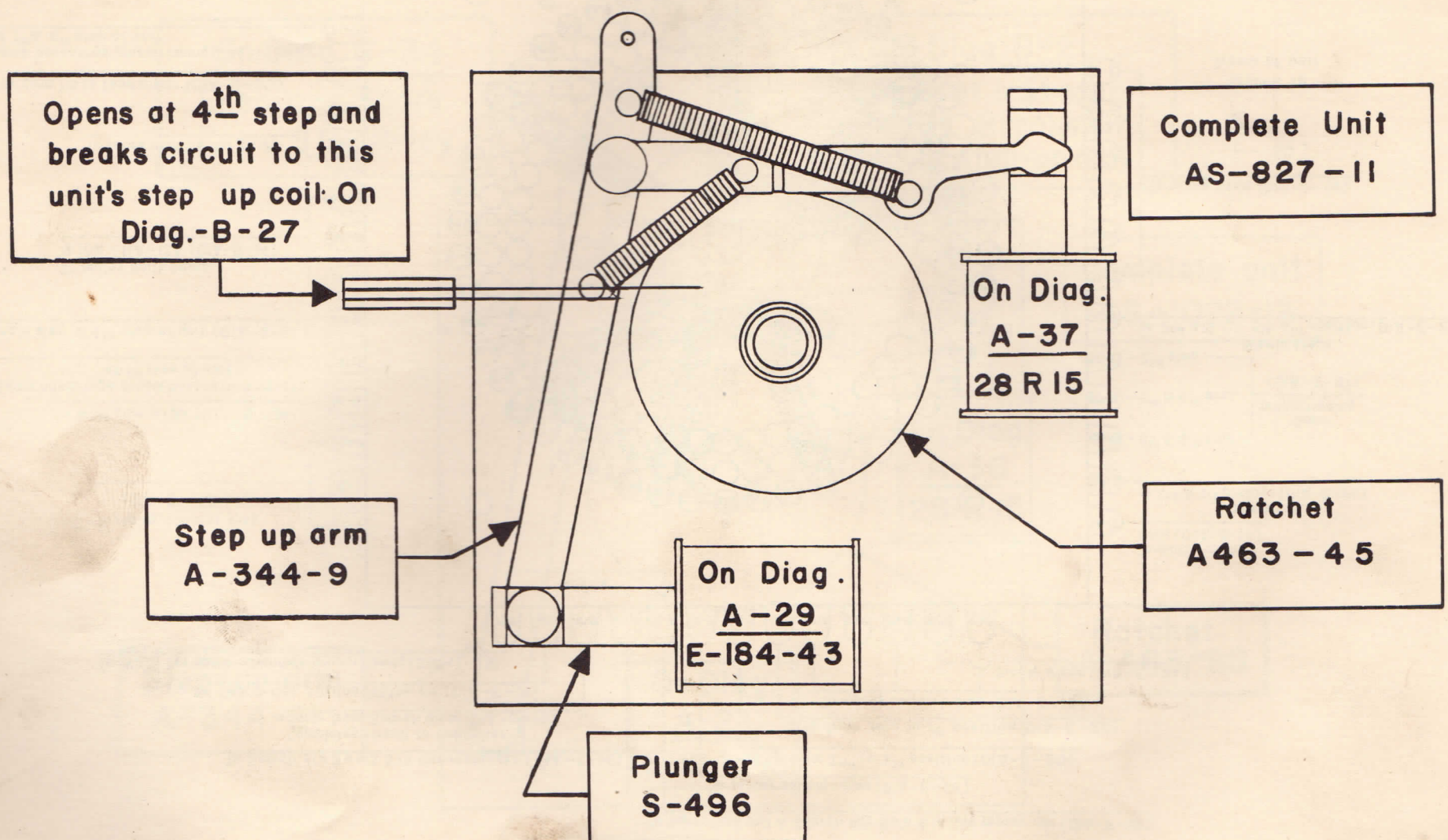
SCORE UNIT viewed from COIL side



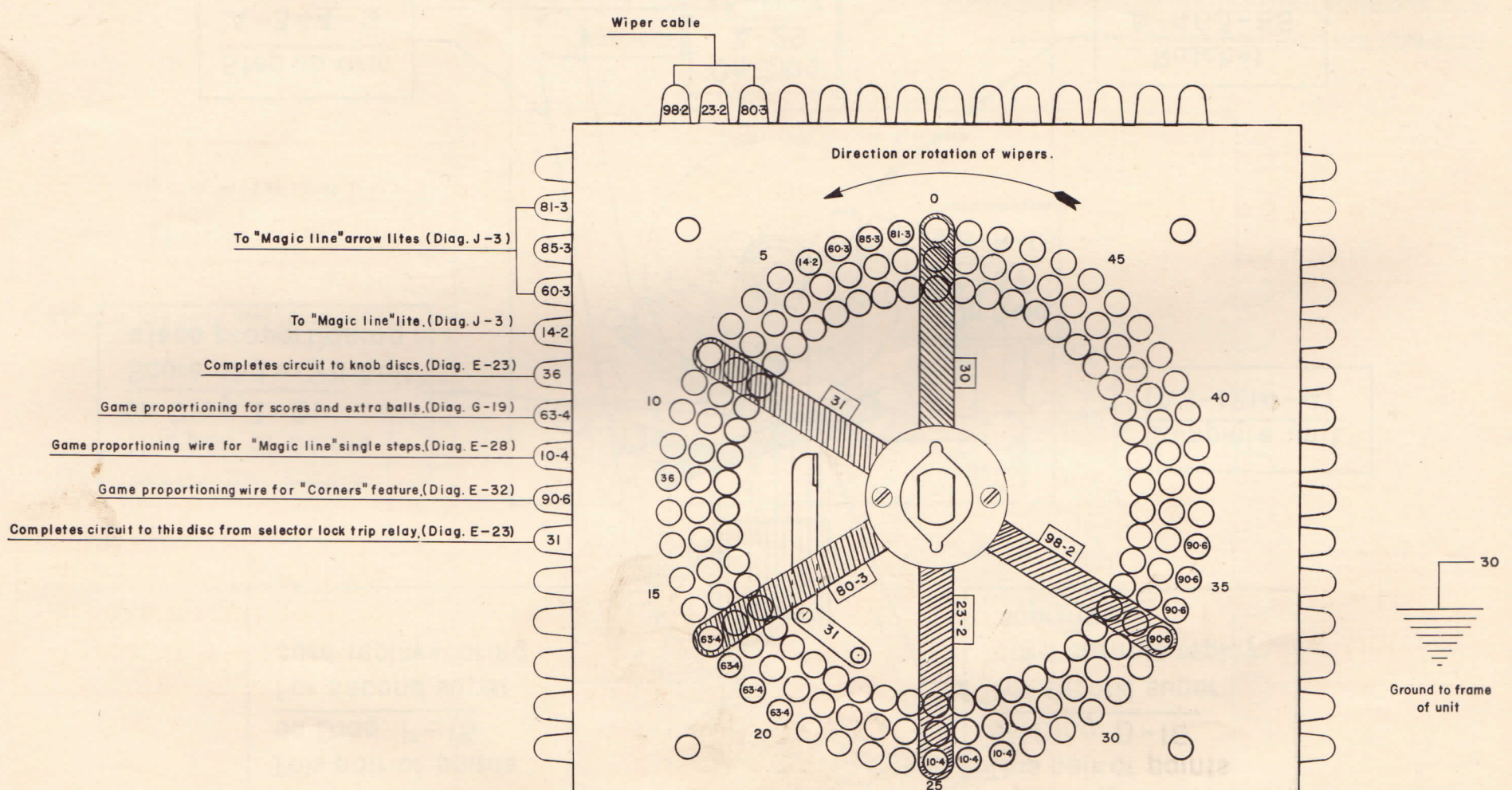
SCORE UNIT viewed from BUTTON or WIPER side

8 step unit. Wipers shown in zero or reset position

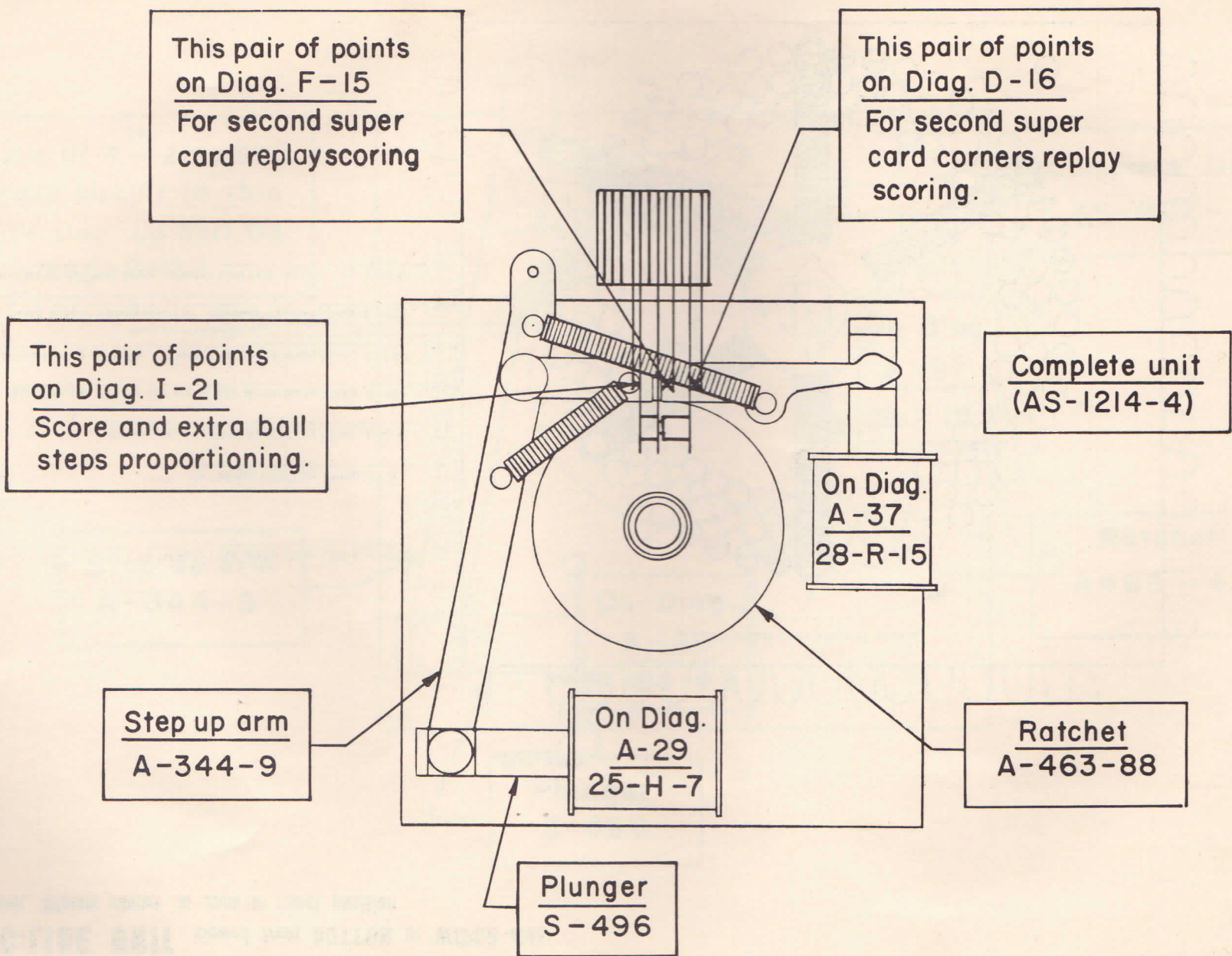




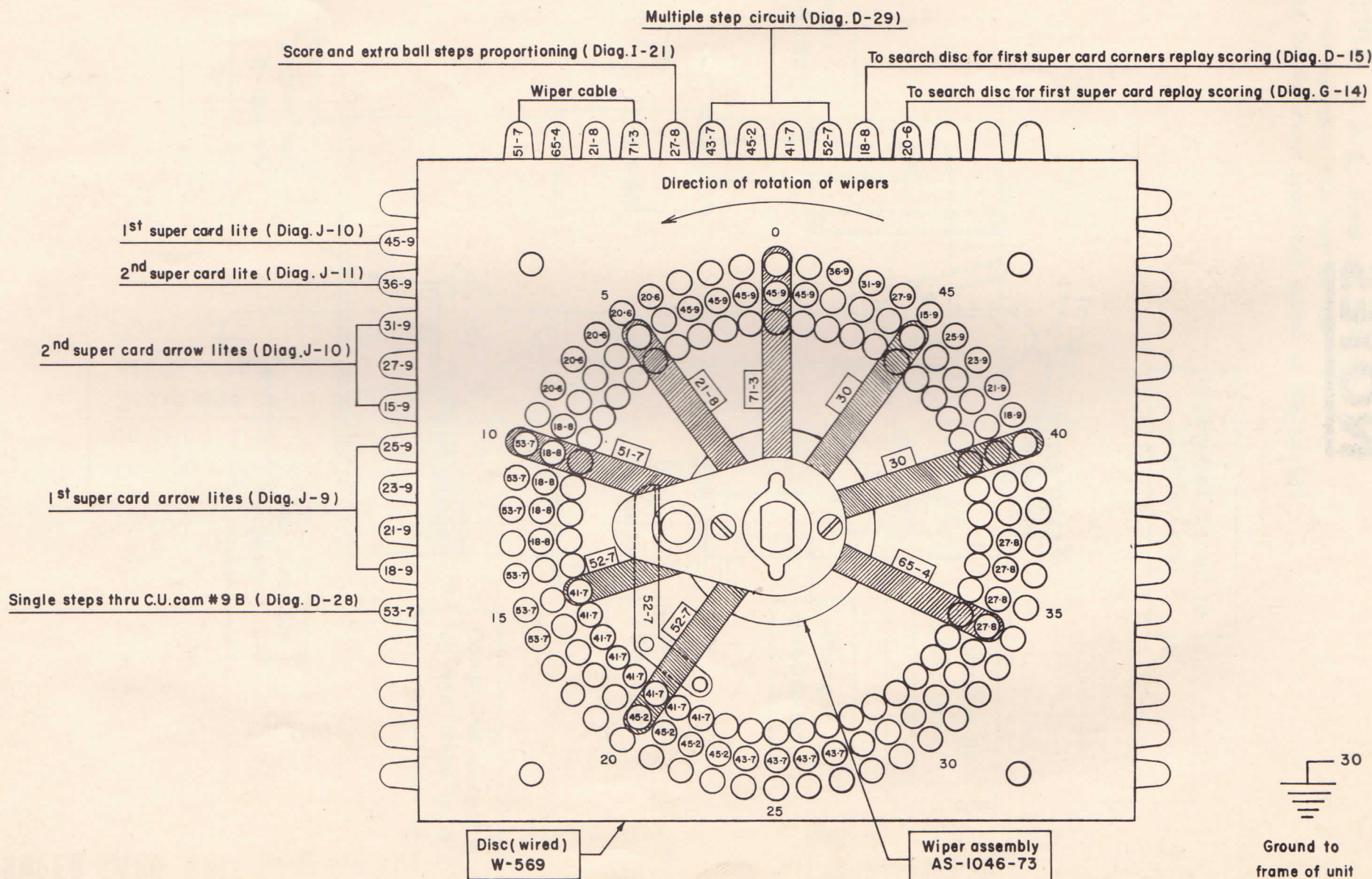
MAGIC-LINE UNIT viewed from **BUTTON** or **WIPER** side
4 step unit. Wipers shown in zero or reset position



SUPER-CARD UNIT viewed from COIL side



SUPER-CARD UNIT viewed from BUTTON or WIPER side
8 step unit. Wipers shown in zero or reset position

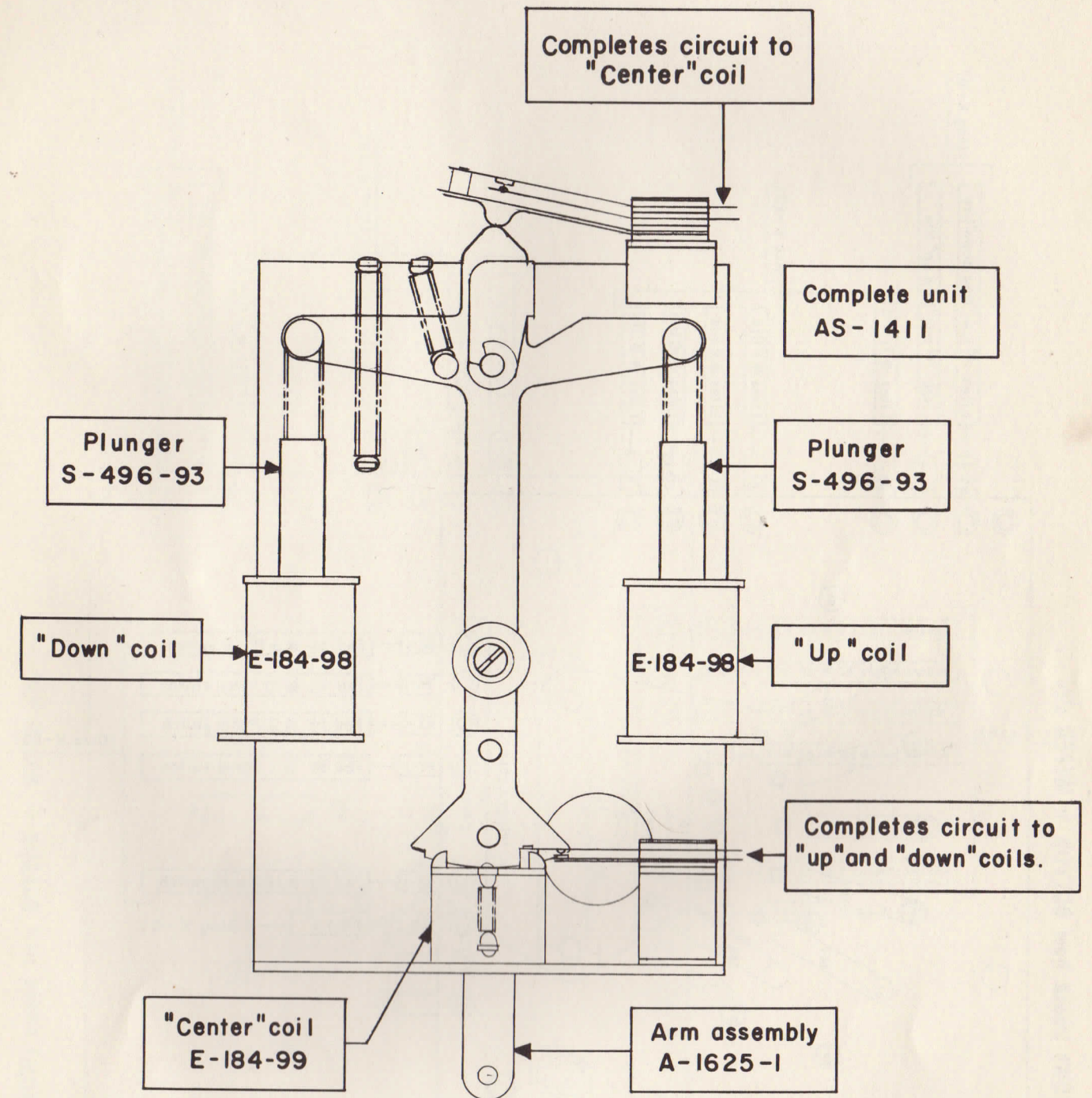


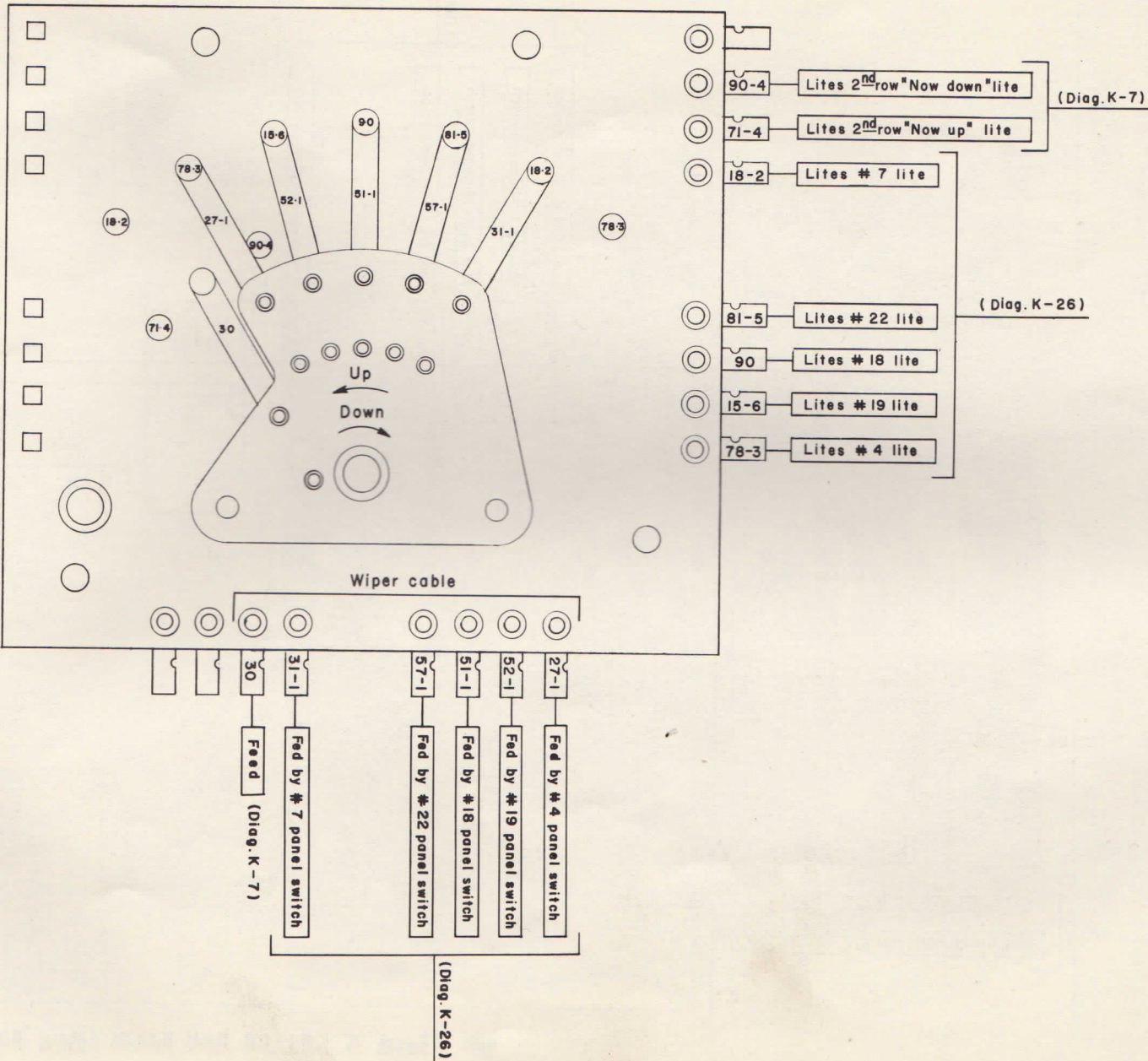
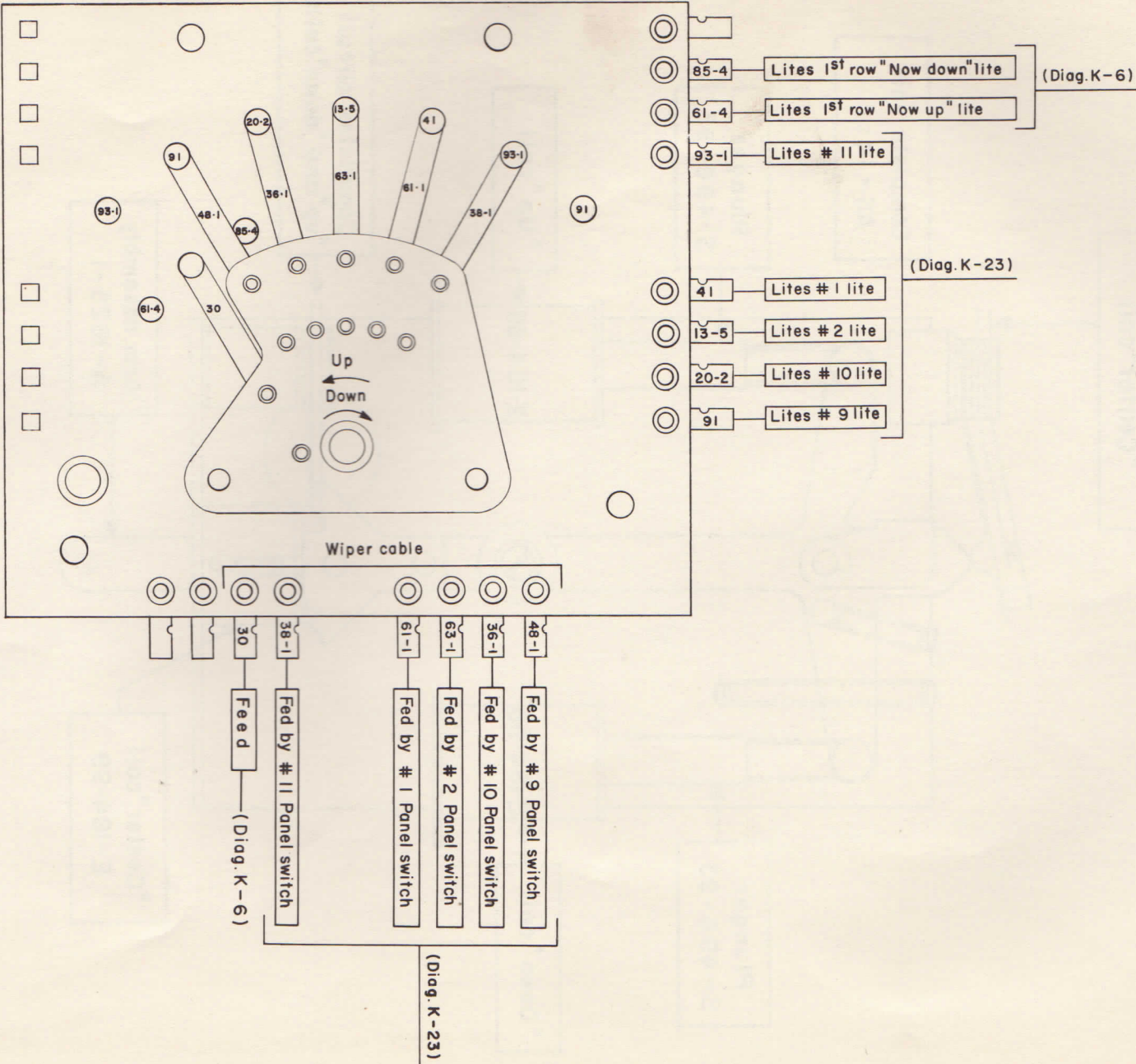
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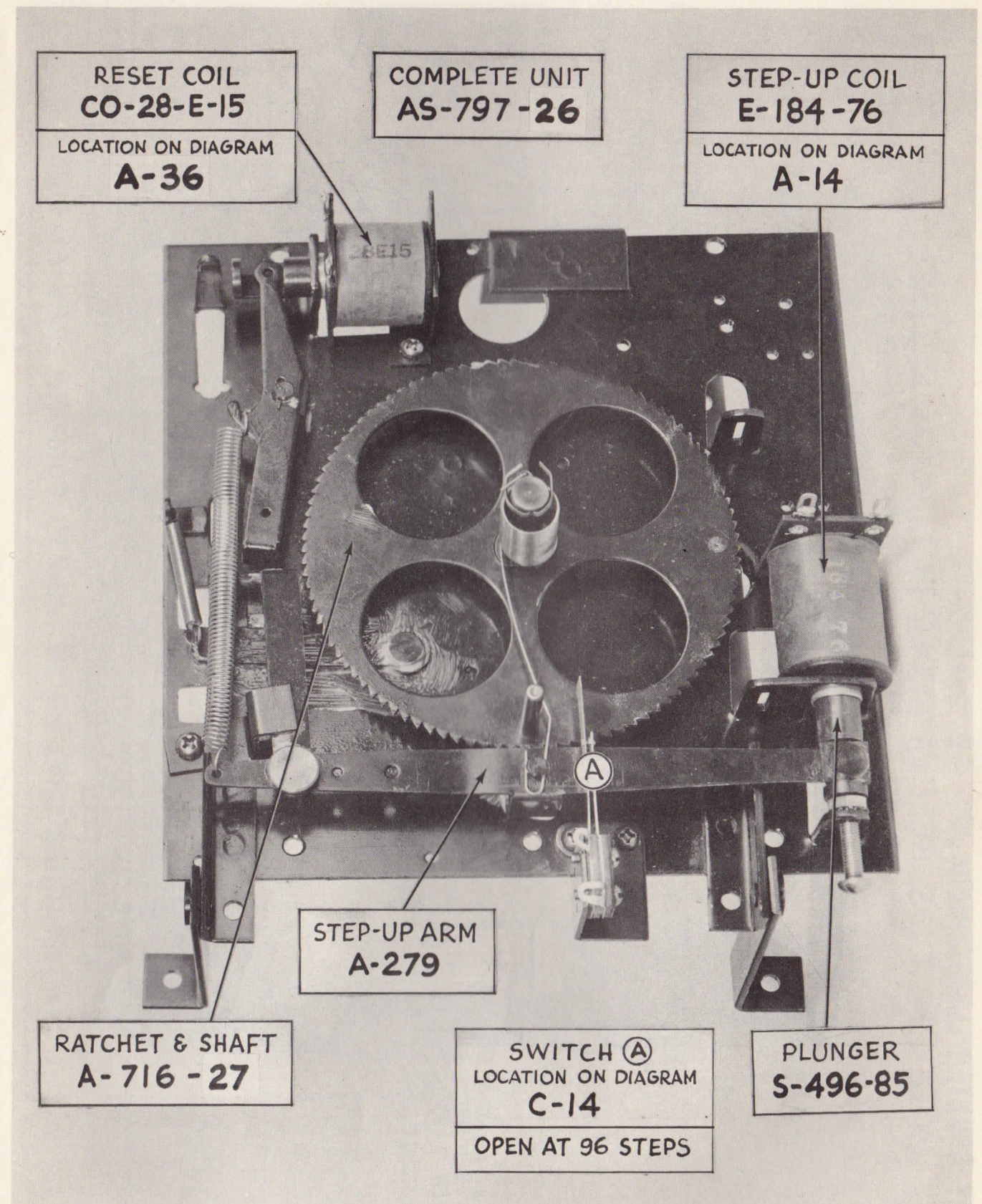
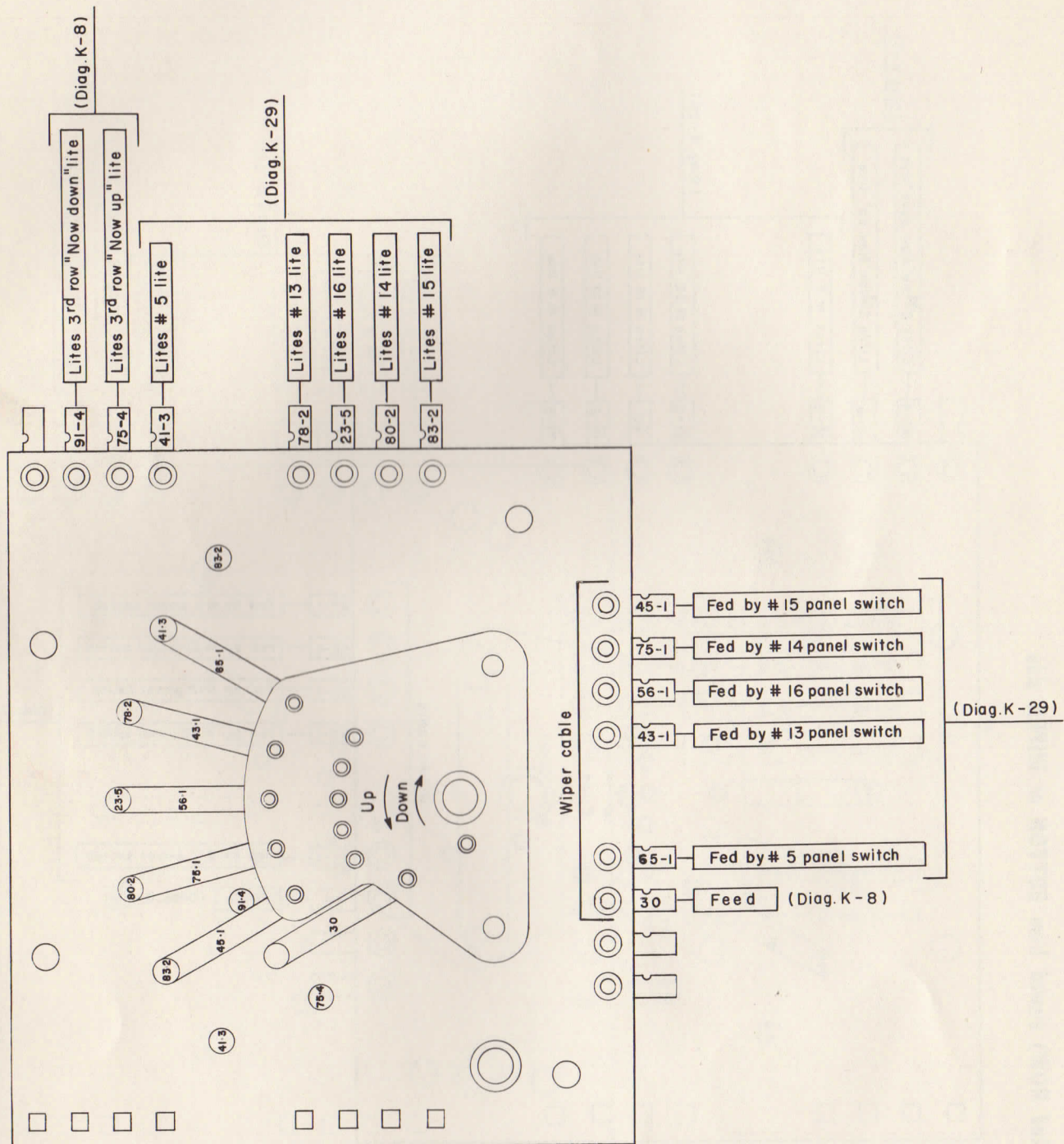
SHIFT UNIT (1st ROW) viewed from COIL side

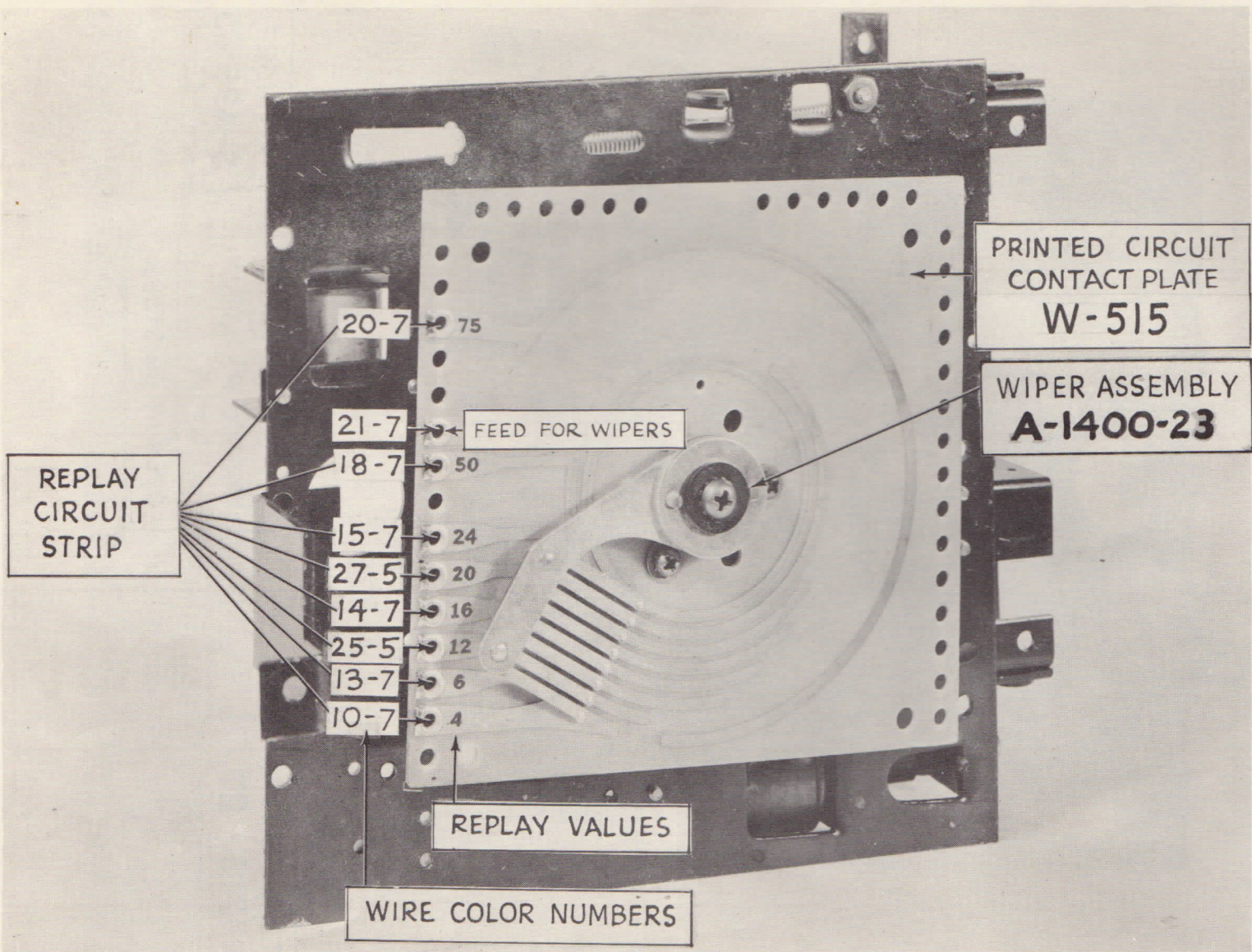
All 3 Shift Units are exactly alike from coil side

All Coils and Switches shown approximate position on Diagram B-24







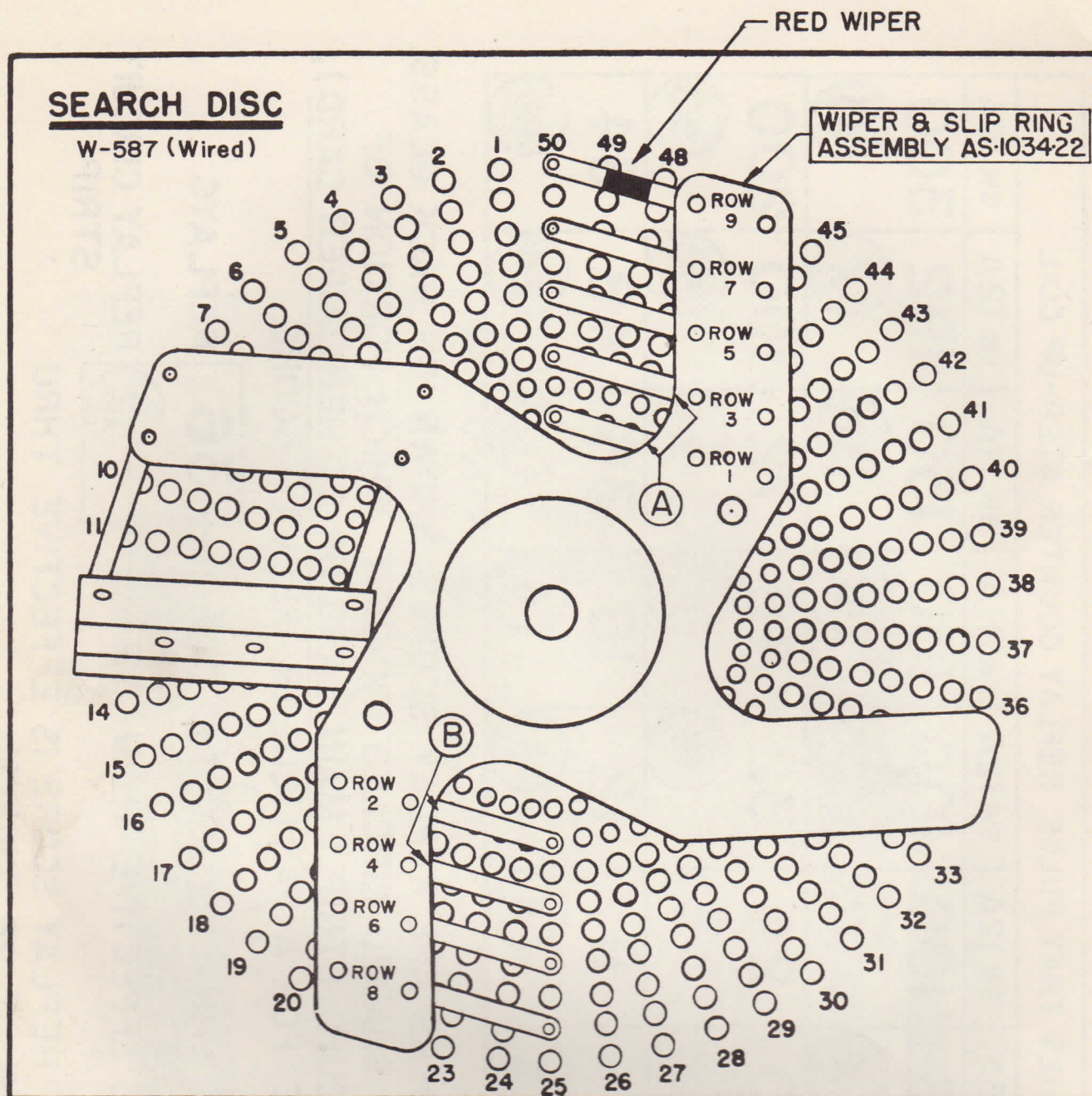


CAM SWITCHES THAT PULSE REPLAY COUNTER STEP-UP COIL								
	SW.13A	SW.13A	SW.12A	SW.12A	SW.11A	SW.11A	SW.12A	SW.10A
5 IN LINE	96 X	96 X	100 50	100 50	150 50	150 50	192 X	300 75
4 IN LINE	16 16	20 20	24 12	32 16	48 16	72 24	100 50	200 50
3 IN LINE	4 4	6 6	8 4	12 6	18 6	36 12	48 24	64 16

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.



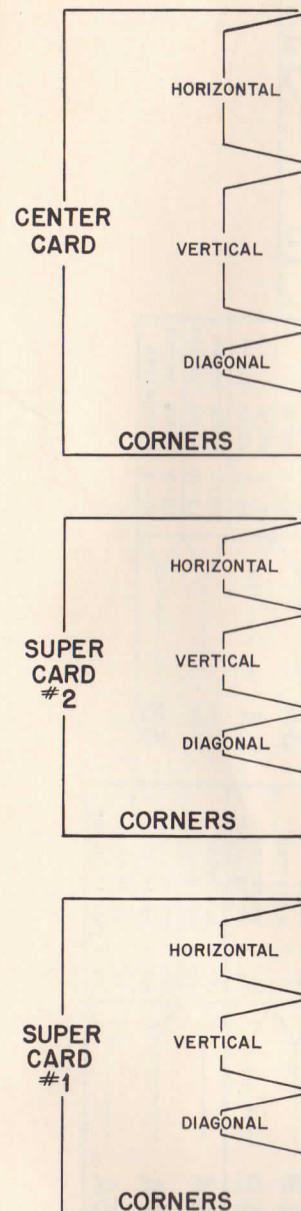
WIPERS (A) FED BY WIRE 80 (ON DIAG. C-15) THRU FEED WIPER.
COMPLETES CIRCUIT TO SEARCH INDEX COIL & REPLAY
COUNTER STEP-UP COIL, WHEN SCORING REPLAYS

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.

40
39
38
37
36

ER.

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
1	A	F	K	24	6
2	B	G	L	20	8
3	C	H	M	12	25
4	D	I	N	21	17
5	E	J	O	23	3
6	A	B	C	D	E
7	F	G	H	I	J
8	K	L	M	N	O
9	24	20	12	21	23
10	6	8	25	17	3
11	6	20	M	I	E
12	A	G	M	21	3
13					
14	A	6	3	E	
15					
16					
17	15	7	11		
18	1	10	13		
19	17	4	18		
20	15	1	17		
21	7	10	4		
22	11	13	18		
23	11	10	17		
24	15	10	18		
25					
26	15	11	18	17	
27					
28					
29	23	3	18		
30	9	25	11		
31	12	24	14		
32	23	9	12		
33	3	25	24		
34	18	11	14		
35	18	25	12		
36	23	25	14		
37					
38	23	18	14	12	
39					
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50					



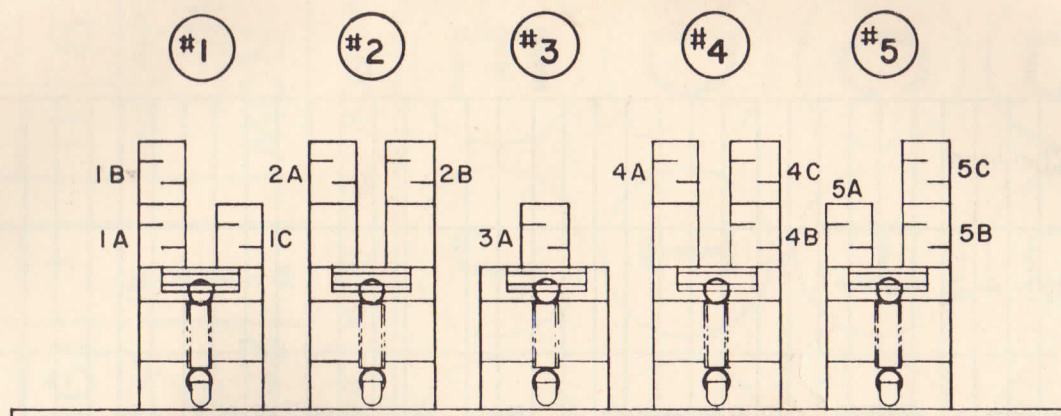
CENTER CARD WINDOWS

UP	A	F	K	24	6
	B	G	L	20	8
	C	H	M	12	25
	D	I	N	21	17
DOWN	E	J	O	23	3

1st ROW | 2nd ROW | 3rd ROW

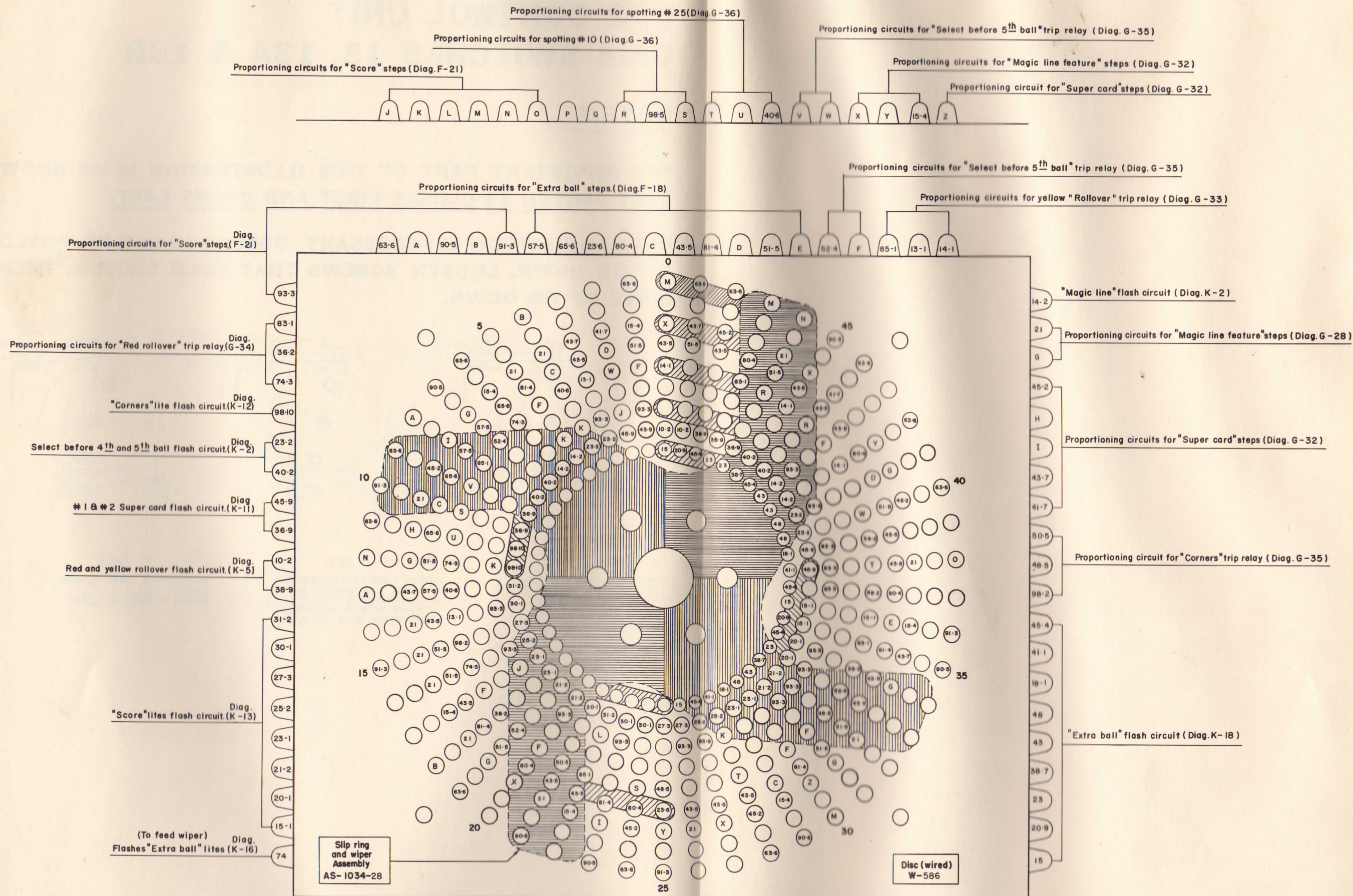
W I N D O W	1st ROW SHIFT			W I N D O W	2nd ROW SHIFT			W I N D O W	3rd ROW SHIFT		
	Up	Center	Down		Up	Center	Down		Up	Center	Down
A	10	9	11	F	19	4	7	K	14	15	5
B	2	10	9	G	18	19	4	L	16	14	15
C	1	2	10	H	22	18	19	M	13	16	14
D	11	1	2	I	7	22	18	N	5	13	16
E	9	11	1	J	4	7	22	O	15	5	13

SEARCH RELAYS



Corners Scores		3 in line scores		4 in line scores		5 in line scores	
Thru →		Thru →		Thru →		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
2A	50-3 white 56-3 white-brown	2B	50-3 white 51-3 white-red	2A	50-3 white 56-3 white-brown	2A	50-3 white 56-3 white-brown
4C	56-3 white-brown 53-3 white-yellow	1B	51-3 white-red 54-3 white-green	4C	56-3 white-brown 53-3 white-yellow	4C	56-3 white-brown 53-3 white-yellow
1A	53-3 white-yellow 71-3 orange-red	3A	18-4 red-black 50-3 white	1A	53-3 white-yellow 71-3 orange-red	5C	53-3 white-yellow 57-3 white-orange
		2B	50-3 white 51-3 white-red	3A	18-4 red-black 50-3 white	1C	57-3 white-orange 61-3 brown-red
		4B	51-3 white-red 54-3 white-green	2A	50-3 white 56-3 white-brown		
		3A	18-4 red-black 50-3 white	4C	56-3 white-brown 53-3 white-yellow		
		4A	50-3 white 52-3 white-blue	5B	53-3 white-yellow 71-3 orange-red		
		5A	52-3 white-blue 54-3 white-green				

SPOTTING DISC viewed from BUTTON or WIPER side



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.

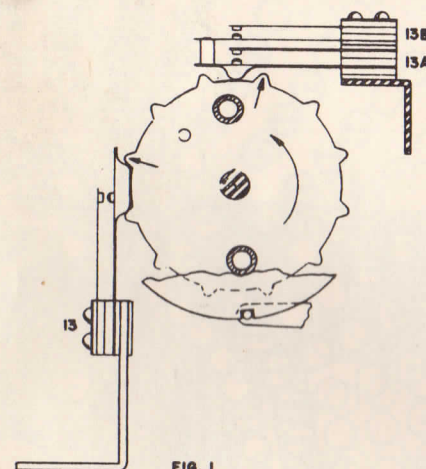


FIG. 1
REPLAY CAMS SHOWN IN THEIR
NORMAL INDEXED POSITION.
SWITCHES 13A, 13B, & 13 ARE
OPEN AT THIS TIME.
NOTE:
ARROWS POINT TO LOBES
THAT WILL ACTUATE SWITCHES.

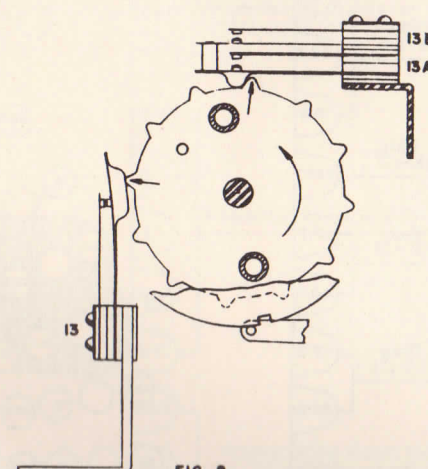


FIG. 2
REPLAY CAMS SHOWN STARTING
TO ROTATE. THEY ARE NOW OUT
OF THEIR INDEX POSITION.
SWITCHES 13A, & 13B ARE STILL
OPEN. SWITCH 13 IS NOW CLOSED.

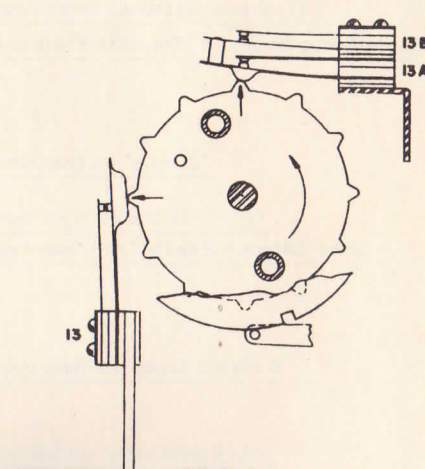


FIG. 3
SWITCHES 13A, & 13B ARE NOW
CLOSED.
SWITCH 13 IS STILL CLOSED.

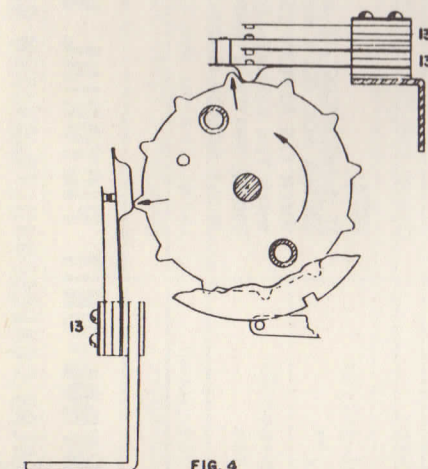


FIG. 4
SWITCHES 13A, & 13B ARE NOW
OPEN AGAIN.
SWITCH 13 IS STILL CLOSED.

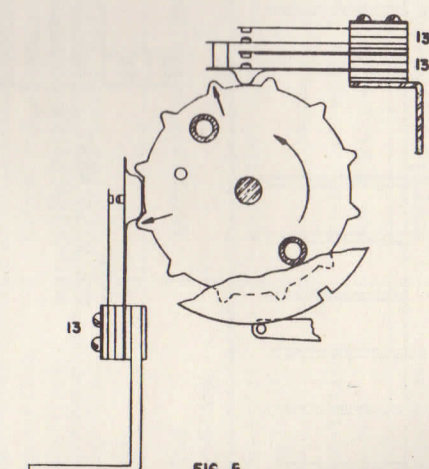
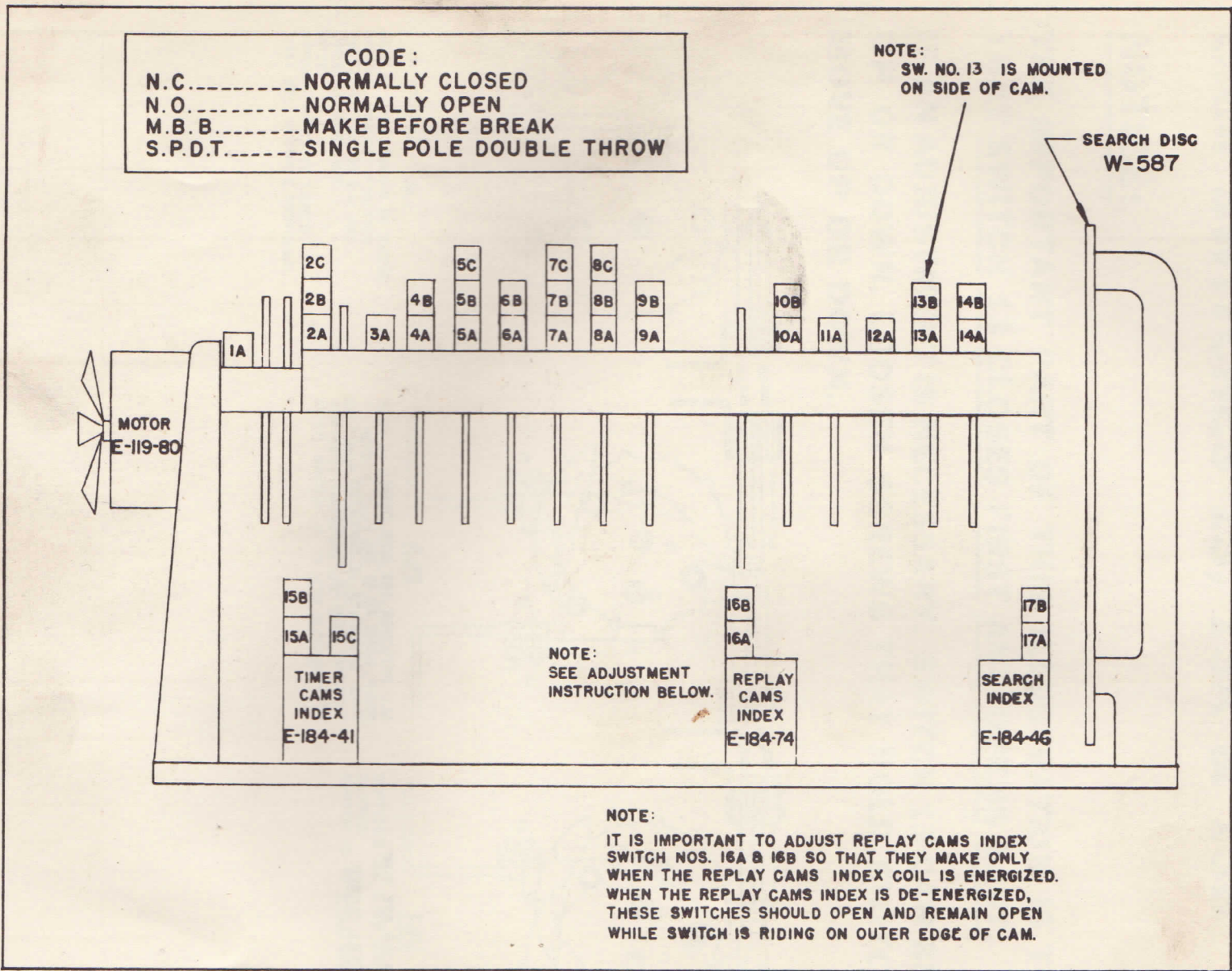


FIG. 5
ALL SWITCHES ARE NOW OPEN
AGAIN, SAME AS IN FIG. 1.
THIS SEQUENCE IS REPEATED
THRUOUT REPLAY SCORING
CYCLE.



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 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 14B are closed.
2A	N.O.	H-7	30 27-4	Yellow Blue-Orange	Energizes replay register reset and reflex play magnet.
2B	N.O.	B-34	30 93-4	Yellow Gray-Yellow	Energizes coin kicker magnet.
2C	N.O.	G-9	30 15-2	Yellow Red-White	Drops out extra ball play relay.
3A	N.C.	I-5	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-15	74 60	Orange-Green Brown	Flashes extra ball lites.
4B	N.O.	D-38	30 98-1	Yellow Gray-Black	Energizes score extra step index and spotting index.
5A	N.O.	G-8	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-36	78-4 10-6	Orange-Black Red	Energizes anti-cheat relay.
6A	N.C.	H-29	83 74-6	Black-Yellow Orange-Green	Opens game advantage circuits during timing cycle.
6B	N.C.	C-20	43-8 25-3	Green-Yellow Blue-White	Score extra step safety switch.
7A	N.O.	C-18	63-10 25-4	Brown-Yellow Blue-White	Extra ball unit steps.
7B	N.O.	D-21	45-6 52-9	Green-White White-Blue	Score unit steps.
7C	N.O.	C-34	30 93-4	Yellow Gray-Yellow	Pulses coin lock out magnet.

CONTINUED ON NEXT PAGE

32

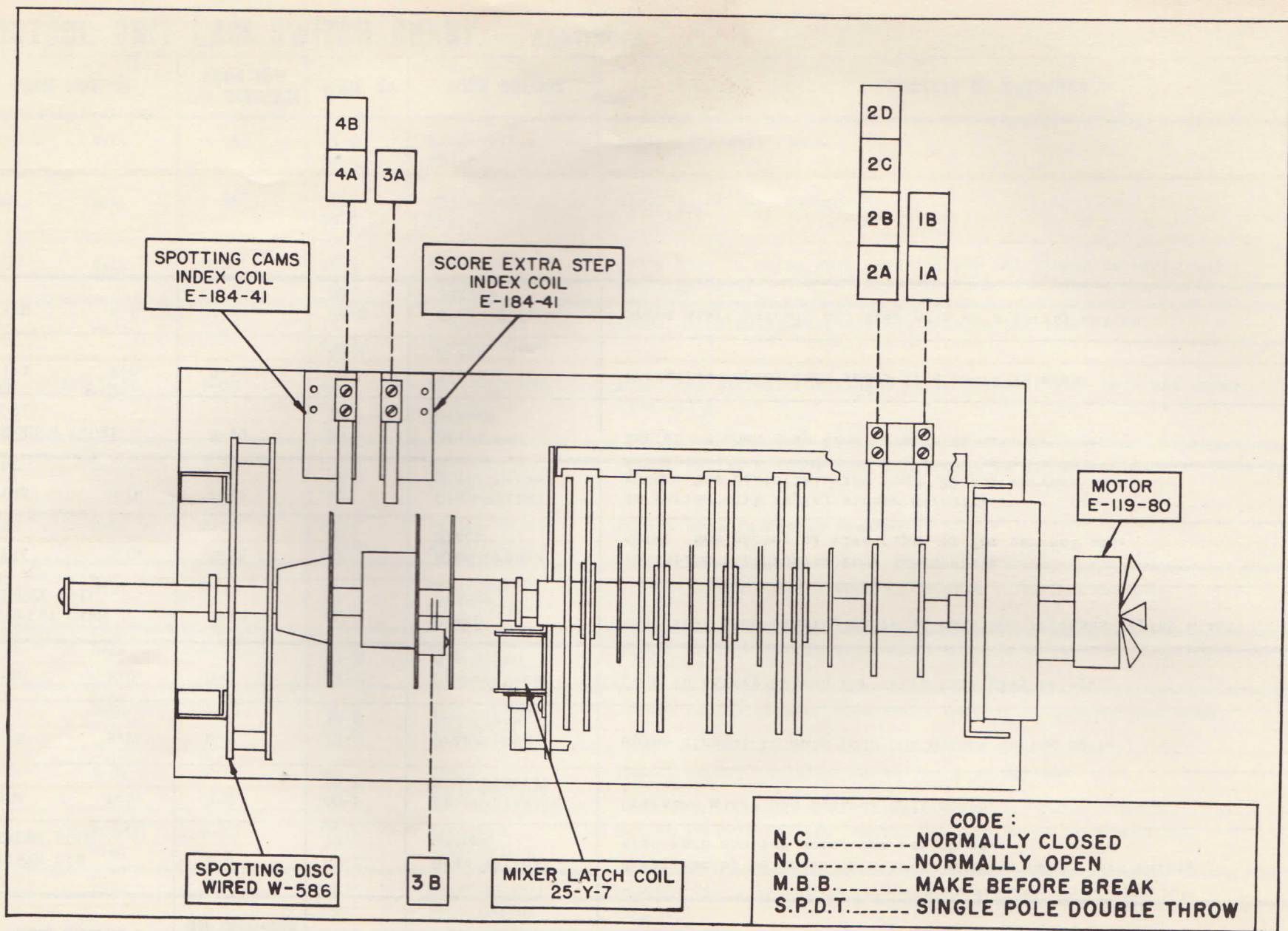
CONTROL UNIT CAM SWITCH CHART — CONTINUED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
8A N.O.	C-28	23-2 50-8	Blue-Yellow White	Magic line unit steps.
8B N.O.	C-28	51-7 40-7	White-Red Green	Steps super card stepper.
8C N.O.	F-30	14-8 63-3	Red-Green Brown-Yellow	Trips corners relay when circuits are all closed on mixer and spotting disc.
9A Alt.	D-20	71 43-8	Orange-Red Green-Yellow	Opens score extra step circuit every other time.
9B S.P.D.T.	E-28	53-7 14-8 10-4	White-Yellow Red-Green Red	Completes circuit for single steps to magic line unit and super card unit.
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-14	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-13	54-8 81-8	White-Green Black-Red	Pulses replay counter when score unit is at 1st and 2nd step.
13B N.O.	B-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 28.
14A N.C.	I-14	56-7 93	White-Brown Gray-Yellow	Prevent the start of another replay scoring until cams are indexed.
14B N.C.	B-8	27-2 90-9	Blue-Orange Gray	Opens circuit to timer step up during replay winner.

CONCLUDED ON NEXT PAGE

CONTROL UNIT CAM SWITCH CHART — CONCLUDED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
TIMER CAM INDEX COIL	A-9	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.	H-2	60-P 20-P	Brown-Plastic Blue-Plastic	Operates mixer and control unit motor.
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.	D-9	74-2 81-2	Orange-Green Black-Red	Lock in safety switch for extra ball play relay.
REPLAY CAMS INDEX COIL	A-12	40-4 70	Green Orange	Energizes when winning score is made and releases replay cams.
16A N.O.	E-13	27 80	Blue-Orange Black	In series with replay lock in circuit. NOTE: See pictorial view Page 30 for correct adj.
16B N.O.	I-14	93 56-7	Gray-Yellow White-Brown	In series with replay winner circuit. NOTE: See pictorial view Page 30 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 a score is made.
17B N.C.	J-4	83-3 30	Black-Yellow Yellow	Opens start circuit and also acts as a safety switch.



MIXER AND SPOTTING 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
1A N.O.	E-6	75-2 53-2	Orange-White White-Yellow	Pulse switch for operating replay register reset, and replay meter, when replay relay is energized.
1B N.O.	C-26	21 50-8	Blue-Red White	Pulse switch for multiple steps of "magic line" unit.
2A N.O.	C-29	40-7 52-7	Green White-Blue	Super card multiple steps.
2B N.O.	L-1	60-5 71-5	Brown Orange-Red	Flashes "turn knobs now" lite.
2C N.O.	E-17	78 63-10	Orange-Black Brown-Yellow	Steps extra ball unit.
2D N.O.	C-16	31-5 85-7	Yellow-Red Black-White	Steps corners replay to its zero position. (In series with corners unit homing switch)
SCORE EXTRA STEP INDEX COIL	A-38	70 98-1	Orange Gray-Black	Energized during timing cam cycle by control unit cam switch #4B.
3A N.O.	G-33	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 CAM INDEX COIL	A-38	70 98-1	Orange Gray-Black	Energized during timing cam cycle by control unit cam switch #4B.
4A N.O.	K-5	36-5 83-4	Yellow-Brown Black-Yellow	Completes flash circuit for "magic line" lites also red and yellow rollover lites.
4B N.O.	J-14	30-5 13-4	Yellow Red-Yellow	Completes flash circuit for score lites and super card lites, also corners lite.

TRIP RELAY BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH-CHART

TRIP RELAY BANK CHART

RELAY SWITCH		LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
YELLOW ROLLOVER TRIP COIL		A-30	70 13-1	Orange Red-Yellow	Energized by control unit cam switch 8C when circuit is complete thru all other factors.
L1	N.O.	E-21	40-6 93-7	Green Gray-Yellow	Completes circuit to energize #25 trip when yellow rollover is hit.
L2	N.C.	D-31	36-2 74-3	Yellow-Brown Orange-Green	Proportioning circuit for red star trip.
L3	N.O.	J-5	38-9 30	Yellow-Black Yellow	Lites yellow rollover lite.
L4	N.C.	B-30	13-1 13-1	Red-Yellow Red-Yellow	Breaks circuit to this coil.
RED ROLLOVER TRIP COIL		A-31	70 74-3	Orange Orange-Green	Energized by control unit cam switch 8C when circuit is complete thru all other factors.
L1	N.O.	E-22	98-5 91-7	Gray-Black Gray-Red	Completes circuit to energize #10 trip when red rollover is hit.
L2	N.C.	B-31	74-3 74-3	Orange-Green Orange-Green	Breaks circuit to this coil.
L3	N.O.	J-4	30 10-2	Yellow Red	Lites red rollover lite.
L4	N.C.	D-31	13-1 14-1	Red-Yellow Red-Green	Proportioning circuit for yellow star trip.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
E.B. #1 TRIP COIL	A-4	70 23-11	Orange Blue-Yellow	Energized by switch on extra ball play relay.
L1 N.O.	D-11	91-1 38-3	Gray-Red Yellow-Black	Completes circuit to ball lifter motor when playing for extra balls.
L2 N.C.	B-4	20-3 23-11	Blue Blue-Yellow	Breaks circuit to this coil.
L3 S.P.D.T.	H-26	75-10 65-4 74-6	Orange-White Brown-White Orange-Green	Extra ball proportioning.
L4 S.P.D.T.	H-27	83 50-10 14-4	Black-Yellow White Red-Green	Proportioning switch.
R1 N.O.	G-21	80-3 25-6	Black Blue-White	Extra ball proportioning switch.
E.B. #2 TRIP COIL	A-4	70 25-11	Orange Blue-White	Energized by switch on extra ball play relay.
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	20-3 25-11	Blue Blue-White	Breaks circuit to this coil.
L3 S.P.D.T.	G-19	78-1 80-3 65-3	Orange-Black Black Brown-White	Shuts off score advantages and completes circuit to extra ball steps, during extra ball play.
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.C.	G-27	81-6 74-6	Black-Red Orange-Green	Breaks circuit to all other game advantages when playing for extra balls.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
#10 TRIP COIL	A-22	70 98-5	Orange Gray-Black	Energized by red panel switch, or control unit cam switch #8C when spotting disc wipers stop on correct position.
1 N.O.	J-23	36-1 30	Yellow-Brown Yellow	Lites number 10 spotted number.
2 N.C.	B-22	98-5 98-5	Gray-Black Gray-Black	Breaks circuit to this coil.
3 N.C.	G-20	51-4 80-3	White-Red Black	Proportioning switch for extra balls.
#25 TRIP COIL	A-21	70 40-6	Orange Green	Energized by yellow panel switch, or control unit cam switch #8C when spotting disc wipers stop on correct position.
1 N.O.	J-34	74-1 30	Orange-Green Yellow	Lites number 25 spotted number.
2 N.C.	B-21	40-6 40-6	Green Green	Breaks circuit to this coil.
3 N.C.	G-20	80-3 78-5	Black Orange-Black	Proportioning switch for extra balls.

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TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SELECT BEFORE 5th BALL TRIP COIL	A-33	70 52-4	Orange White-Blue	Energized by control unit cam switch #8C, when spotting disc wipers stop on correct position.
L1 N.O.	G-8	85-9 43-2	Black-White Green-Yellow	Keeps circuit to ball lifter cam switch alive.
L2 N.C.	B-33	52-4 52-4	White-Blue White-Blue	Breaks circuit to this coil.
L3 S.P.D.T.	E-10	90-3 30 98-4	Gray Yellow Gray-Black	Directs circuit to energize selector lock relay coil at 4th or 5th step of timer unit.
L4 S.P.D.T.	J-1	23-3 14-2 40-2	Blue-Yellow Red-Green Green	Directs circuit to flash "turn knobs now" lite at 4th or 5th step of timer unit.
R1 N.C.	H-20	53 80-3	White-Yellow Black	Proportioning switch for extra ball steps, and score steps.

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TRIP RELAY BANK CHART — CONTINUED

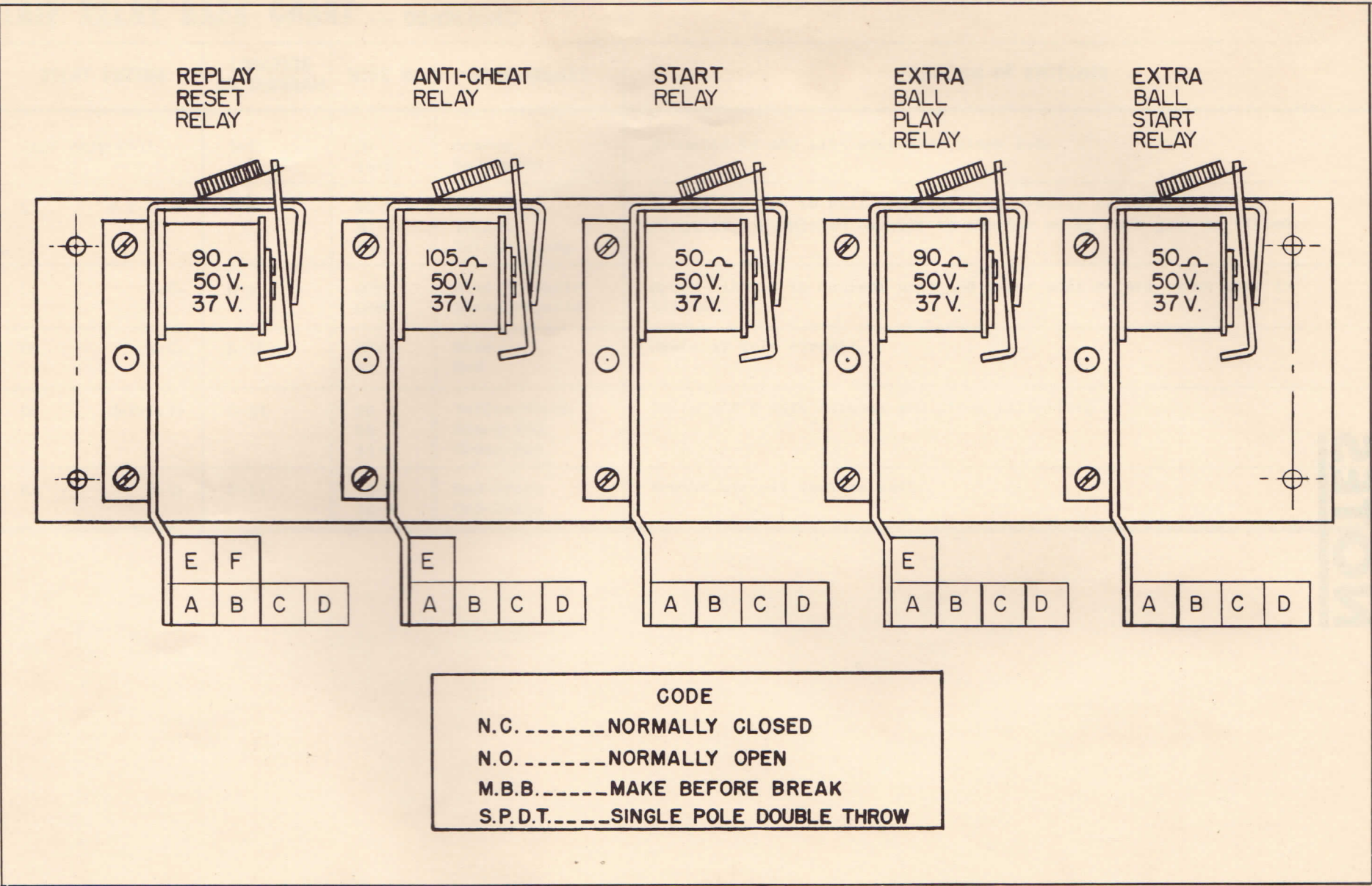
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SELECTOR LOCK TRIP COIL	A-11	70 98	Orange Gray-Black	Energized by 4th or 5th step of timer unit, directed by "select before 5th ball" trip relay switch.
L1 N.O.	C-8	81-2 52-6	Black-Red White-Blue	Completes circuit to energize extra ball play relay.
L2 N.C.	B-11	98 98	Gray-Black Gray-Black	Breaks circuit to this coil.
L3 N.O.	D-7	78-6 27-2	Orange-Black Blue-Orange	Completes circuit to timer step-up coil thru control unit cam switch 1A.
L4 N.C.	F-23	60-6 31	Brown Yellow-Red	Opens circuit to shift unit coils.
R1 N.O.	I-14	56-7 18-4	White-Brown Red-Black	Completes replay circuit, when relay is tripped.
R2 N.C.	L-1	71-5 61-7	Orange-Red Brown-Red	Shuts off "turn knobs now" lite.
CORNERS TRIP COIL	A-32	70 90-6	Orange Gray	Energized by control unit cam switch #8C, when spotting disc wipers stop on correct position.
1 N.O.	J-12	98-10 30	Gray-Black Yellow	Lites "corners" lite.
2 N.O.	D-16	13-8 21-8	Red-Yellow Blue-Red	Completes circuit for corners replay scoring.
3 N.C.	B-32	90-6 90-6	Gray Gray	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	70 14-5	Orange Red-Green	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.	G-2	20P 60P	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-21	38 81 41-9	Yellow-Black Black-Red Green-Red	Shuts off 6 volt circuit and lites tilt lite.
R1 N.C.	B-11	14-5 14-5	Red-Green Red-Green	Breaks circuit to this coil.

NOTES



5 RELAY BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART

5 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.	D-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	20-P 60-P	Blue-(Plastic) Brown (Plastic)	Energizes control unit motor.
C N.O.	D-6	50-2 75-2	White Orange-White	Lock-in switch for this relay.
D N.C.	D-4	20-3 25-10	Blue Blue-White	Opens extra ball trip and extra ball start relays during cancel.
E N.C.	C-3	21-6 63-2	Blue-Red Brown-Yellow	Opens start circuit during replay cancel.
F N.O.	B-6	61-5 41-5	Brown-Red Green-Red	In series with replay meter.
ANTI-CHEAT RELAY COIL	A-38	78-4 70	Orange-Black Orange	Energized thru cam switch #5, its switches protect replay and light circuits.
A N.O.	L-20	54-7 38	White-Green Yellow-Black	Opens 6 volt circuit to lites.
B N.O.	L-22	20-4 80-1	Blue Black	Opens 17 volt circuit when this relay drops out.
C N.O.	D-36	10-6 78-4	Red Orange-Black	Lock-in switch for this relay.
D N.O.	B-8	91-2 93-6	Gray-Red Gray-Yellow	Completes circuit to extra ball play relay.
E N.C.	G-6	50-2 75-2	White Orange-White	Energizes replay reset relay when this relay drops out.

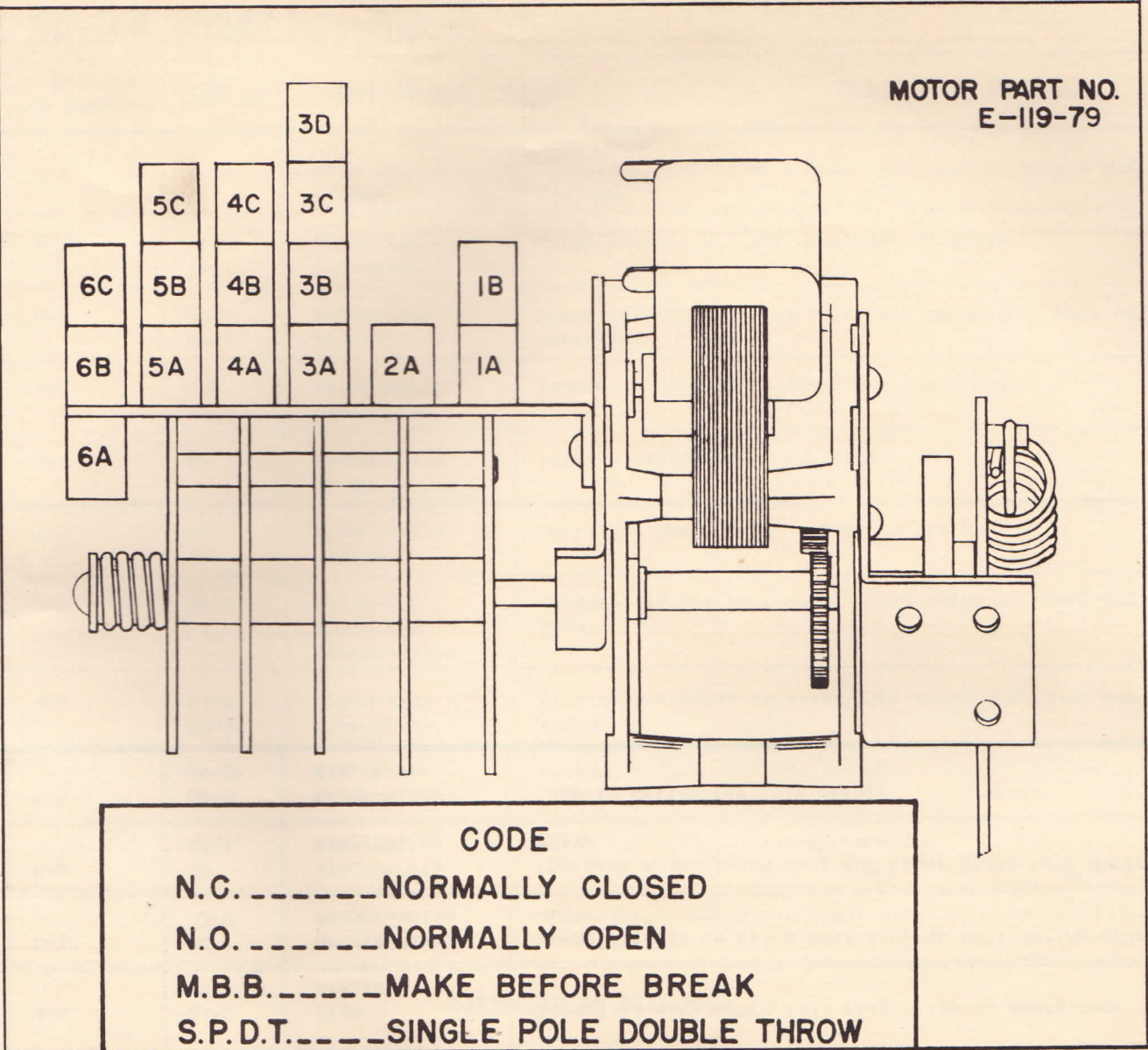
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RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
START RELAY COIL	A-3	21-6 70	Blue-Red Orange	Energizes every time a coin is played or when a red button is pressed.
A N.C.	F-28	81-6 14-8	Black-Red Red-Green	Opens circuit to game advantage circuits.
B N.C.	C-8	52-6 91-2	White-Blue Gray-Red	Opens circuit to extra ball play relay when this relay is energized.
C N.O.	E-9	85 13-3	Black-White Red-Yellow	Completes circuit to timer cam index coil.
D N.O.	H-3	48-2 63-2	Green-Black Brown-Yellow	Lock-in switch for this relay.
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.	E-5	51-2 25-10	White-Red Blue-White	Completes circuit to extra ball start and extra ball trip relay.
C N.O.	F-9	15-2 74-2	Red-White Orange-Green	Lock-in switch for this relay.
D N.O.	J-20	21-4 30	Blue-Red Yellow	Lites extra ball light in back box.
E N.C.	J-5	83-4 30	Black-Yellow Yellow	Opens flash circuit to magic line and rollover lites.

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5 RELAY BANK SWITCH CHART — CONCLUDED

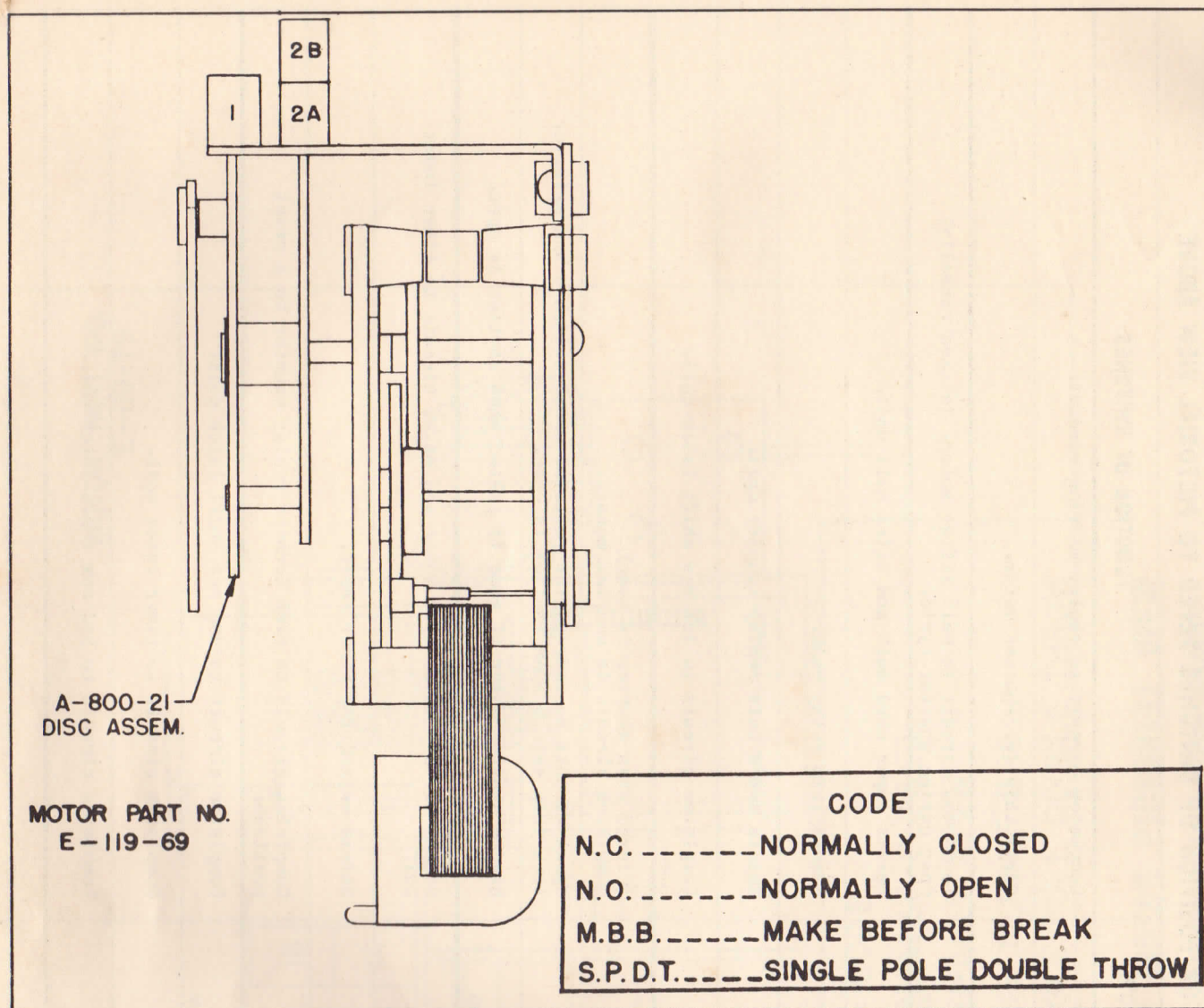
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
EXTRA BALL START RELAY COIL	A-4	20-3 70	Blue Orange	Energizes when extra ball play relay is energized.
A N.C.	C-17	78 75-6	Orange-Black Orange-White	Opens circuit to extra ball step-up coil during spin of control unit.
B N.O.	C-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.



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-13	93 21-3	Gray-Yellow Blue-Red	Completes circuit to replay scoring circuit.
1B N.O.	G-9	30 14-3	Yellow Red-Green	Carry thru for shutter motor.
2A N.C.	F-13	31-3 36-3	Yellow-Red Yellow-Brown	Completes circuit to ball lifter motor. (closed normally) Open during shutter cycle.
3A N.O.	D-37	30 85-10	Yellow Black-White	Resets super card unit and extra ball unit.
3B N.O.	G-2	20-P 70-P	Blue Orange	Resets trip relay bank.
3C N.O.	D-36	30 98-9	Yellow Gray-Black	Resets score unit replay counter unit.
3D N.O.	D-23	30 52	Yellow White-Blue	Completes circuit to 1st row shift latch coil.
4A N.O.	G-10	18-3 14-3	Red-Black Red-Green	(Closed when shutter is open) Completes circuit to shutter motor.
4B N.C.	G-22	21-3 60-6	Blue-Red Brown	Opens circuit to red, yellow rollover panel switches and selector lock trip switch when shutter is open.
4C N.O.	H-10	18-3 36-4	Red-Black Yellow-Brown	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.	I-8	21-3 65-2	Blue-Red Brown-White	Safety switch for timer reset.
5C N.O.	E-17	30 31-5	Yellow Yellow-Red	Completes circuit to step corners replay counter to a reset position.
6A N.O.	D-26	30 63	Yellow Brown-Yellow	Completes circuit to 2nd row shift latch coil.
6B N.O.	H-7	30 71-9	Yellow Orange-Red	Completes circuit to timer reset coil.
6C N.O.	D-26	30 10-1	Yellow Red	Completes circuit to 3rd row shift latch 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.
2A N.O.	E-8	43-2 27-2	Green-Yellow Blue-Orange	Energizes timer unit step-up coil.
2B N.O.	D-11	90-3 98-3	Gray Gray-Black	Completes circuit to selector lock trip relay.

MISCELLANEOUS PARTS

G-235	Back glass
M-168-15	Ball 1-1/8"
AS-1315	Ball gate and switch assembly
A-429-14	Ball trough only to ball lifter assembly
C-178-3	Button-Red-Front cabinet
C-178-4	Button-Yellow-Front door
C-274-1	Button - Top panel
P-1900-13	Cash box
E-101-51	Coil for coin kicker assembly
E-101-45	Coil for coin lock out
AS-277-26	Coin switch assembly - complete 5¢
AS-277-27	Coin switch assembly - complete 10¢
E-130-8	Counter 48 Volt
CA-567-17	Front door only
AS-1305-3	Front moulding complete
CA-711-2	Front moulding only
A-254-27	Hinge and bracket - front door
AS-1316	Kicker assembly - front door
A-1704	Knob and shaft (front moulding)
CA-350-1	Legs
M-163-4	Leg adjuster
M-106	Leg bolt and washer
C-326-9	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
E-108-32	Micro switch - Coin switch assembly 5¢ or 10¢
C-275-2	Panel insert (red) for C-274-1 button
C-275-3	Panel insert (yellow) for C-274-1 button
P-2210-8	Plate - Coin entry - 5¢
P-2210-9	Plate - Coin entry - 10¢
P-2210-31	Plate - for A-1704 knob and shaft
R-203	Rebound rubber - Top panel
M-170	Rebound spring - Double post - Top panel
P-2768	Ring for C-178-3 & 4 button
R-243	Rubber ring - yellow post - top panel
R-243-2	Rubber ring - red post - top panel
AS-187-12	Shooter assembly complete
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-010-26	Switch for AS-1315
E-122-19	Transformer
M-412-2	Wire wiper for slip ring
M-497	Wire (long) for A-429-14 ball trough
M-497-1	Wire (short) for A-429-14 ball trough