

# Bally®

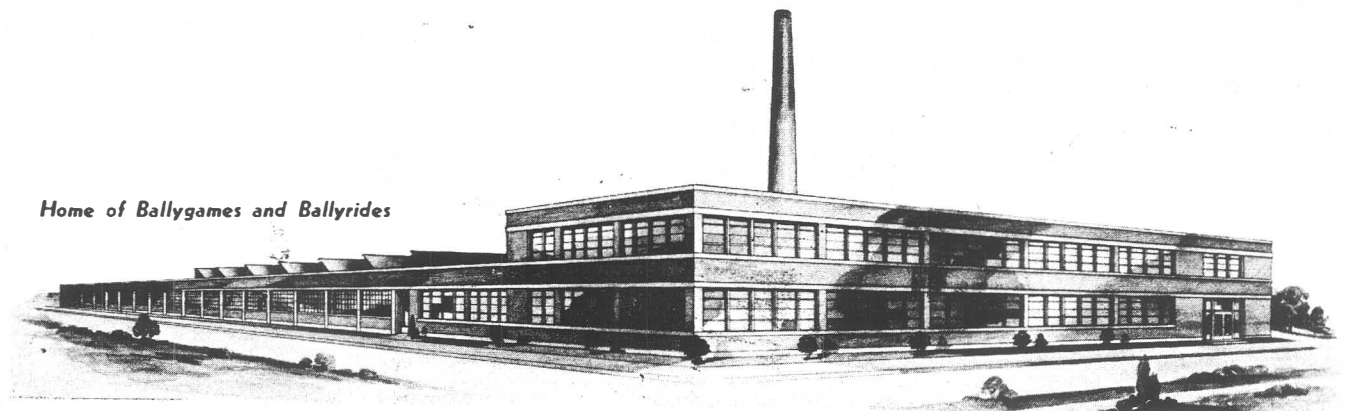
## Beach Beauty

### OPERATING INSTRUCTIONS AND PARTS CATALOG

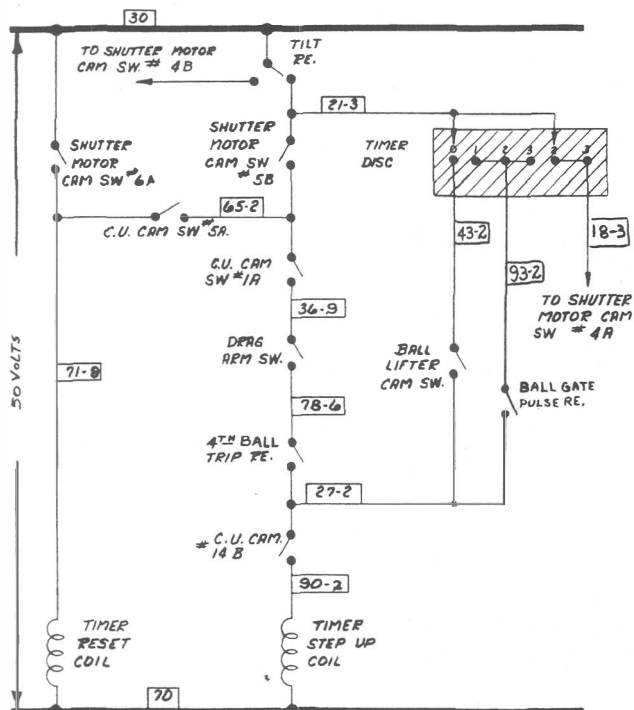
Part Numbers are marked on illustrations  
and a list of miscellaneous parts appears  
on Page 453

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

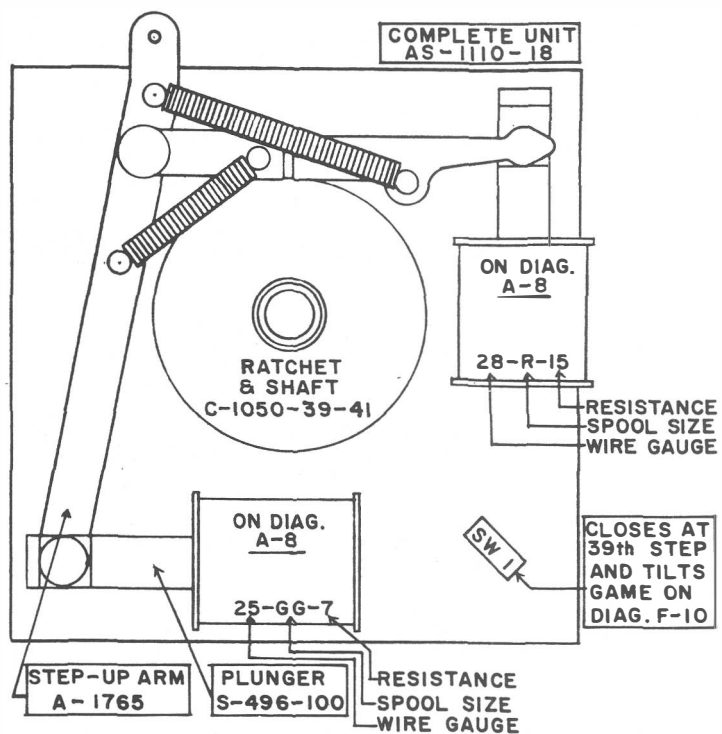
*Home of Ballygames and Ballyrides*



# TIMER UNIT STEP-UP AND RESET CIRCUIT



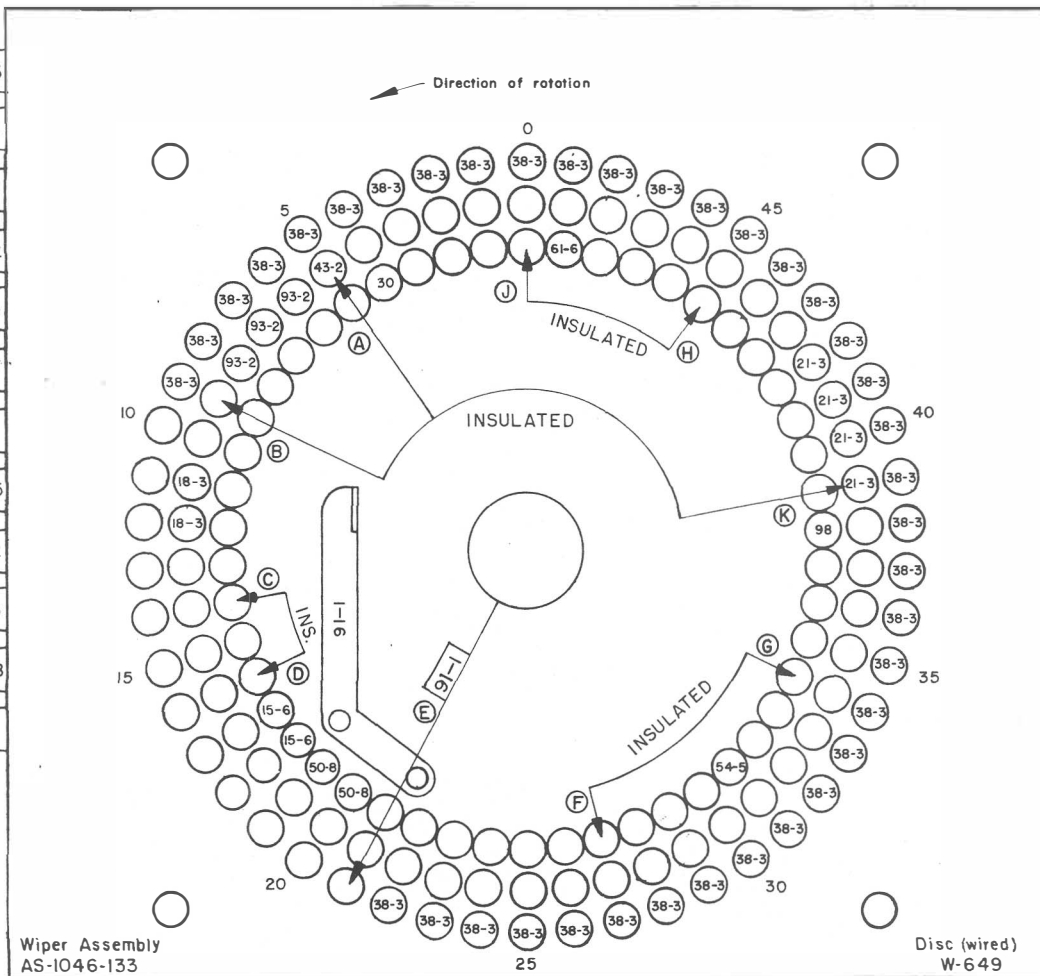
# TIMER UNIT viewed from COIL side



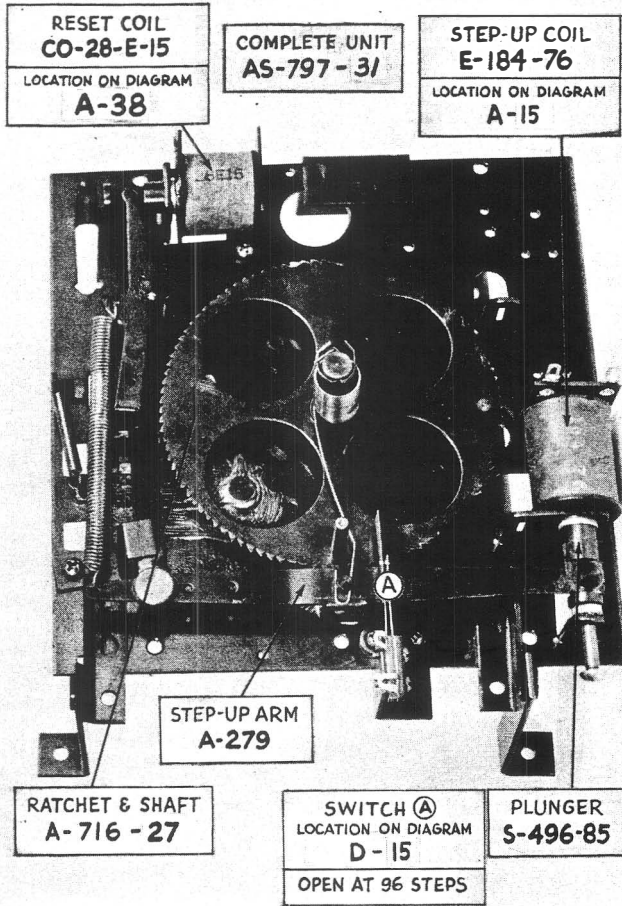
# TIMER UNIT viewed from BUTTON or WIPER side

39 step unit. Wipers shown in zero or reset position

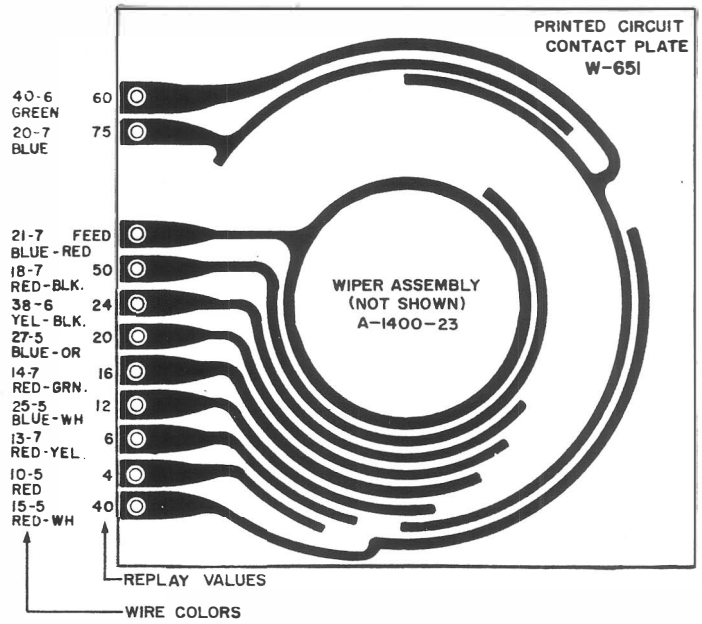
- Completes circuit to ball lift motor at 1st step of unit to 39th step when 8th ball trough switch opens. Thru wiper (E) (Diag. E-11) 38-3
- Completes circuit to "Turn Knob Now Lite" at 4th step of this unit. Thru wipers (H) & (J) (Diag. J-1) 61-6
- Completes circuit to step this unit for 1st ball count. Thru wiper (A) (Diag. H-7) 30
- Completes circuit to shutter motor cam switch \*4A and then to shutter motor at 2nd step of this unit. Thru wiper (B) (Diag. H-8) 43-2
- Feeds the above two circuits. Thru wiper (K) 18-3
- Completes circuit to energize "4th Ball Trip Relay." Thru wipers (F) & (G) (Diag. C-34) 21-3
- Completes circuit to step this unit for 2nd 3rd & 4th ball count. Thru wiper (A) (Diag. H-7) 98
- Completes circuit to reset "Ball Gate De-lay Unit." Thru wipers (C) & (D) (Diag. C-33) 54-5
- To wiper (E) thru feed ring. For ball lift motor circuit. (Diag. E-11) 93-2
- 15-6
- 50-8
- 91-1



# REPLAY COUNTER viewed from COIL side



# REPLAY COUNT



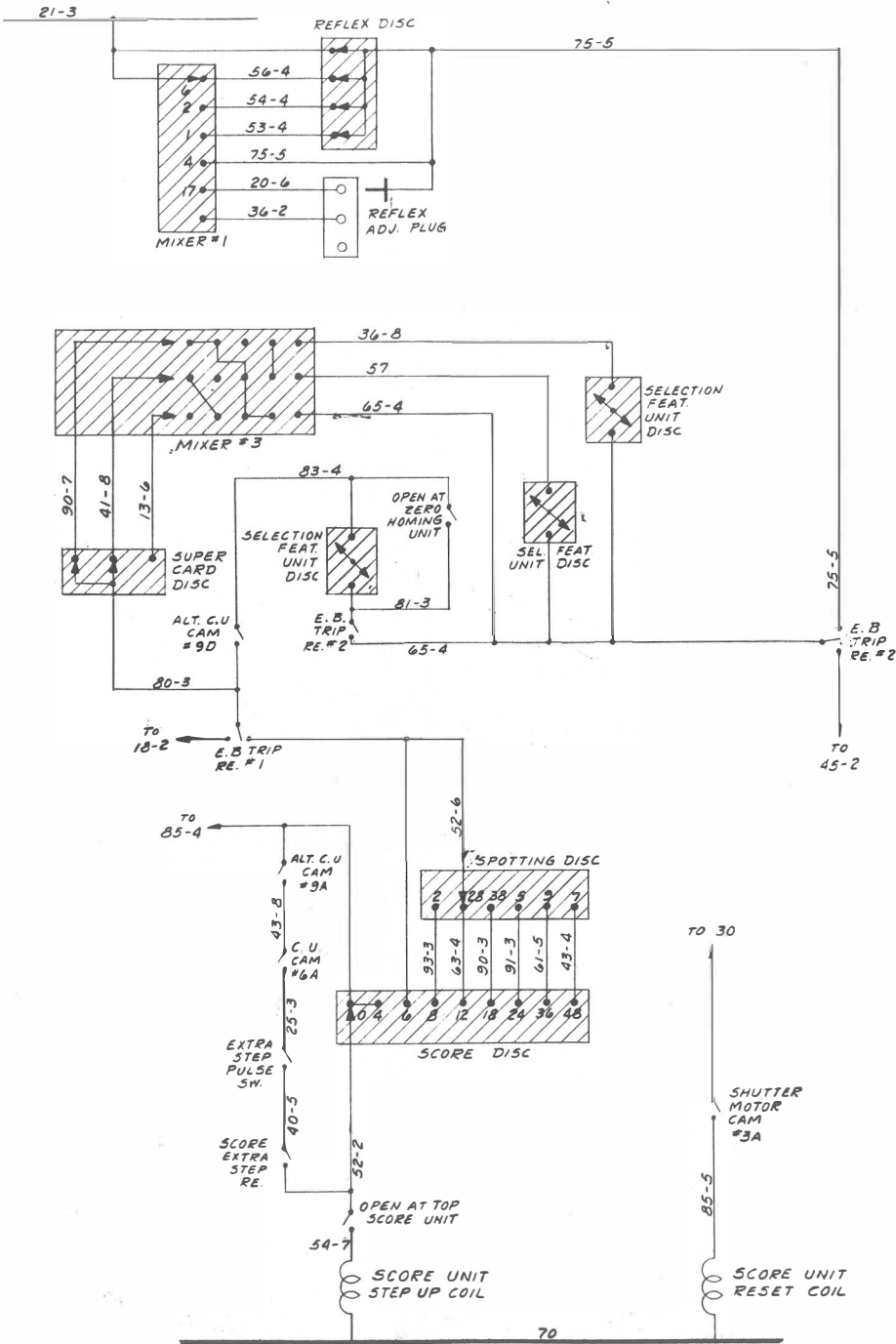
	CAM SWITCHES THAT PULSE REPLAY COUNTER STEP-UP COIL								
	SW. 13A	SW. 13A	SW. 12A	SW. 12A	SW. 11A	SW. 10A	SW. 11A	SW. 12A	SW. 10A
<b>5 IN LINE</b>	96 <small>(NOTE)</small>	96 <small>(NOTE)</small>	100 <small>(50)</small>	120 <small>(60)</small>	150 <small>(50)</small>	160 <small>(40)</small>	180 <small>(60)</small>	192 <small>(NOTE)</small>	300 <small>(75)</small>
<b>4 IN LINE</b>	16 <small>(16)</small>	20 <small>(20)</small>	24 <small>(12)</small>	32 <small>(16)</small>	48 <small>(16)</small>	64 <small>(16)</small>	72 <small>(24)</small>	100 <small>(50)</small>	200 <small>(50)</small>
<b>3 IN LINE</b>	4 <small>(4)</small>	6 <small>(6)</small>	8 <small>(4)</small>	12 <small>(6)</small>	18 <small>(6)</small>	24 <small>(6)</small>	36 <small>(12)</small>	48 <small>(24)</small>	64 <small>(16)</small>

LARGE NUMBERS ARE REPLAY SCORES SHOWN ON BACK GLASS.  
NUMBERS IN SHADED CIRCLES INDICATE WHICH PORTION OF REPLAY CIRCUIT STRIP IS EFFECTIVE FOR A PARTICULAR REPLAY SCORE.

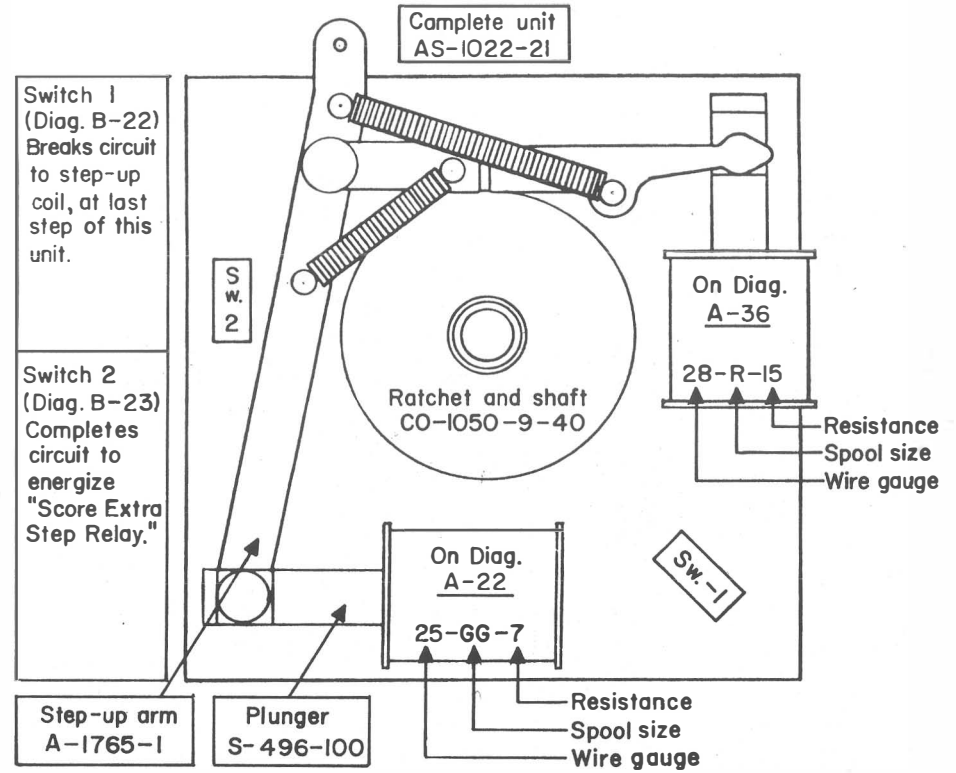
EXAMPLE: ON A 3-IN-LINE SCORE OF **36** REPLAYS  
THE CIRCUIT IS EFFECTIVE THRU THE **12** REPLAY CIRCUIT STRIP

**NOTE:** 96 AND 192 VALUE REPLAY SCORES ARE EFFECTIVE THRU THE OPEN AT 96 SWITCH.

# SCORE UNIT STEP-UP AND RESET CIRCUIT

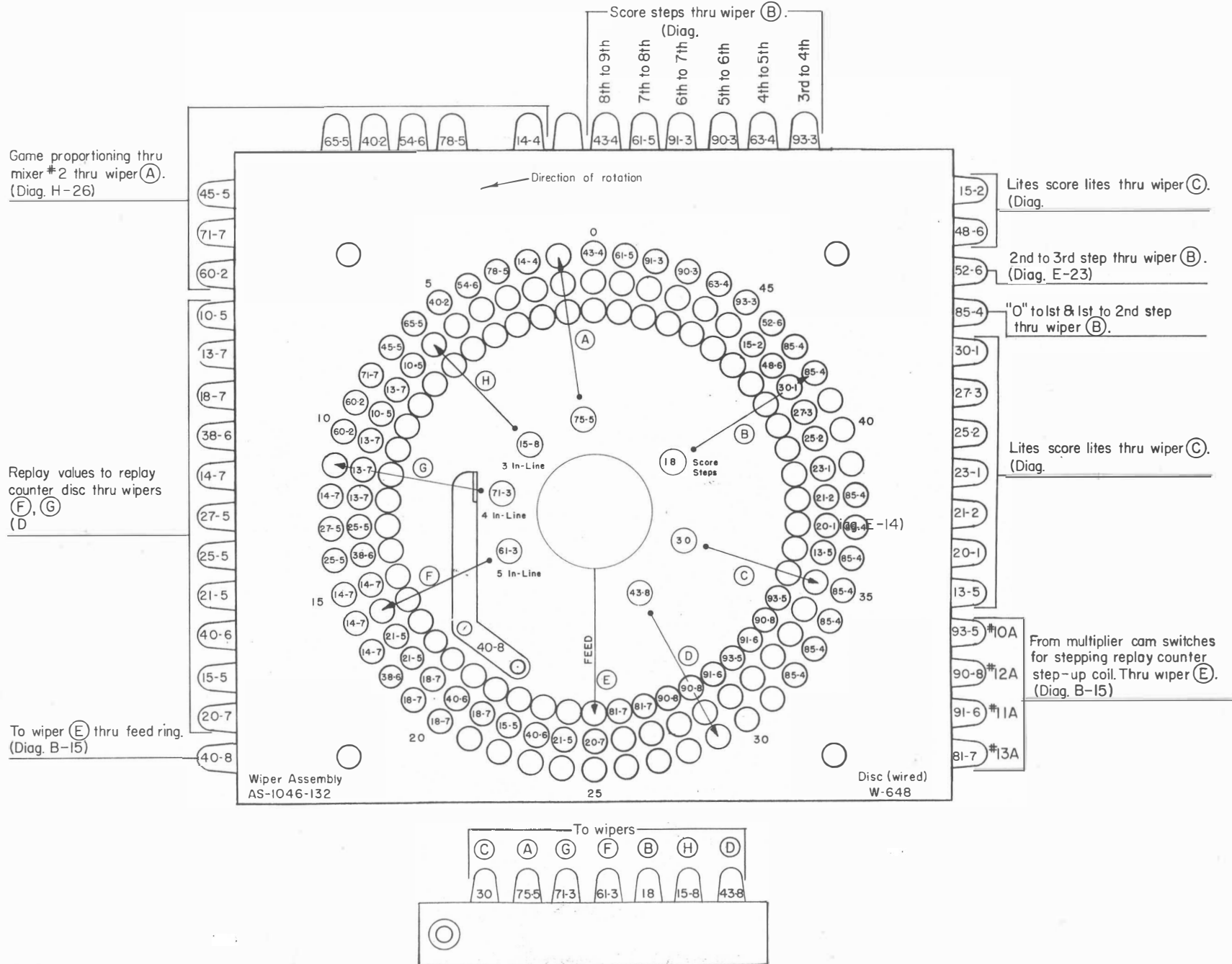


# SCORE UNIT viewed from COIL side

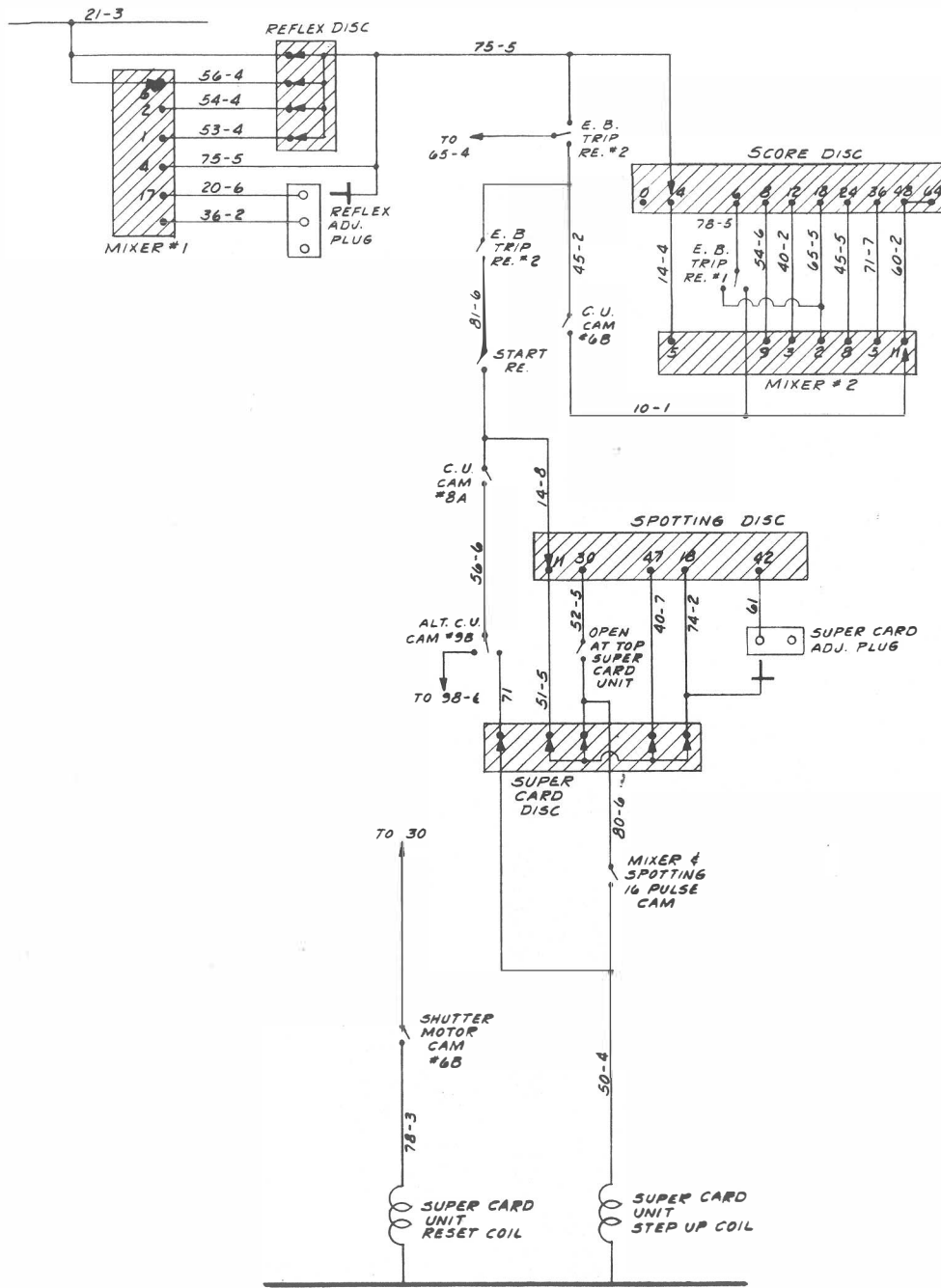


# SCORE UNIT viewed from BUTTON or WIPER side

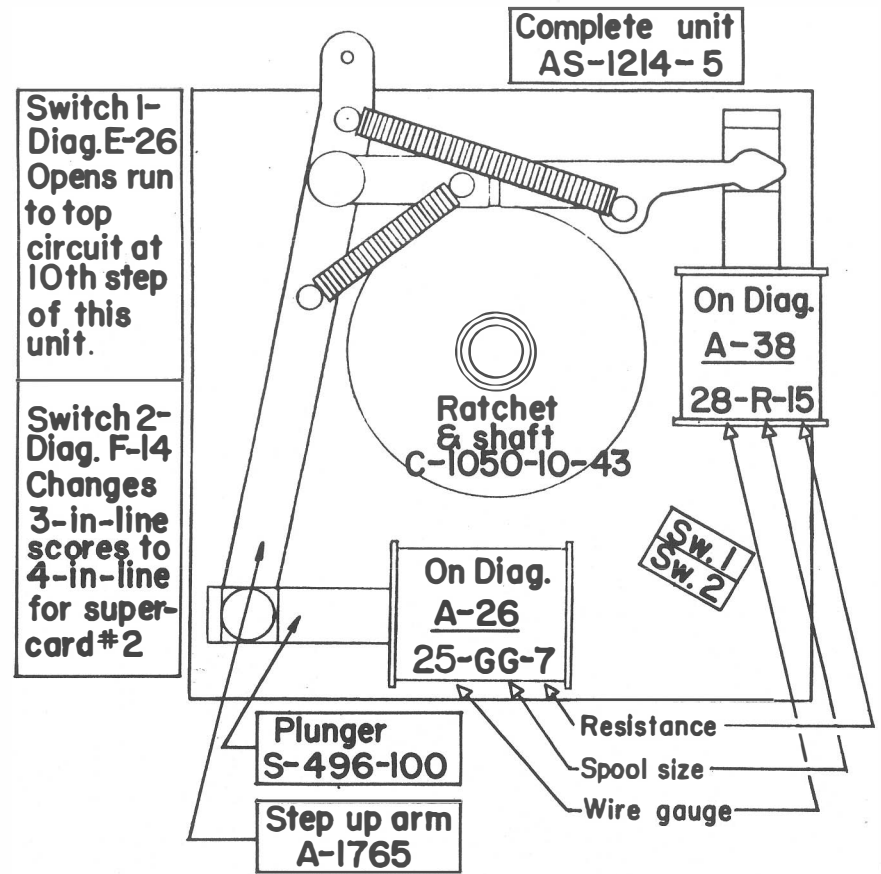
9 step unit. Wipers shown in zero or reset position



# SUPER CARD UNIT STEP-UP AND RESET CIRCUIT

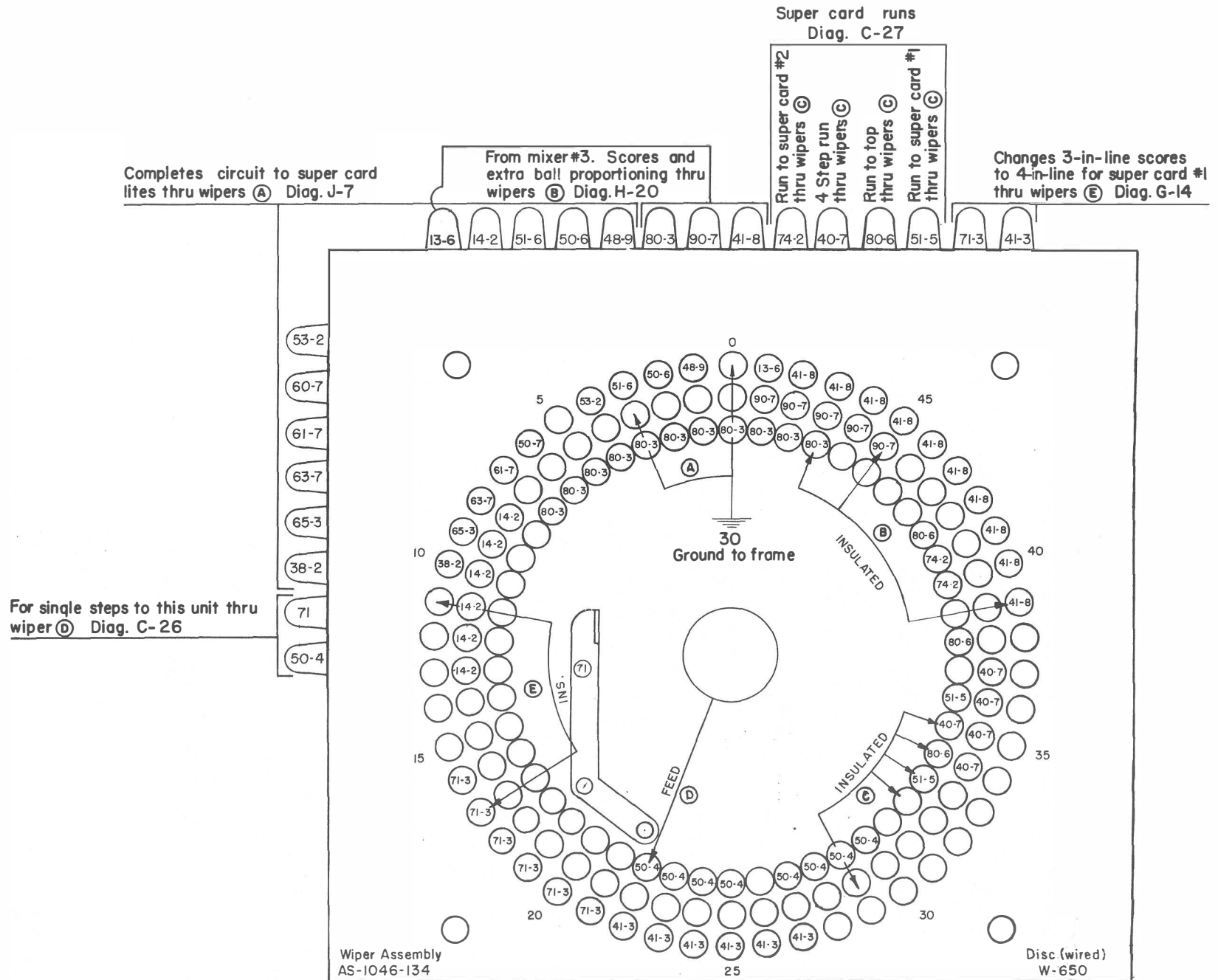


# SUPER CARD UNIT viewed from COIL side

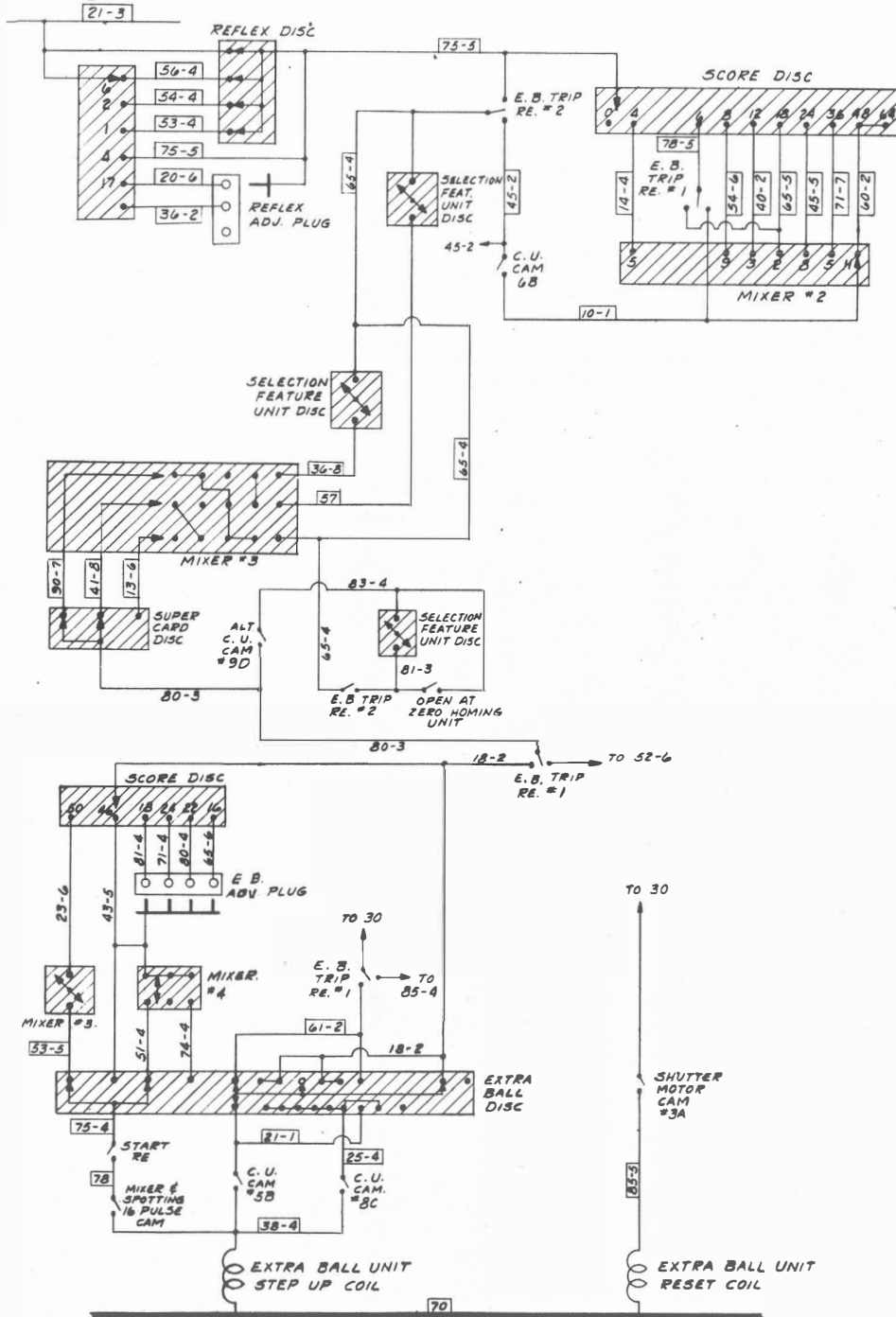


# SUPER CARD viewed from BUTTON or WIPER side

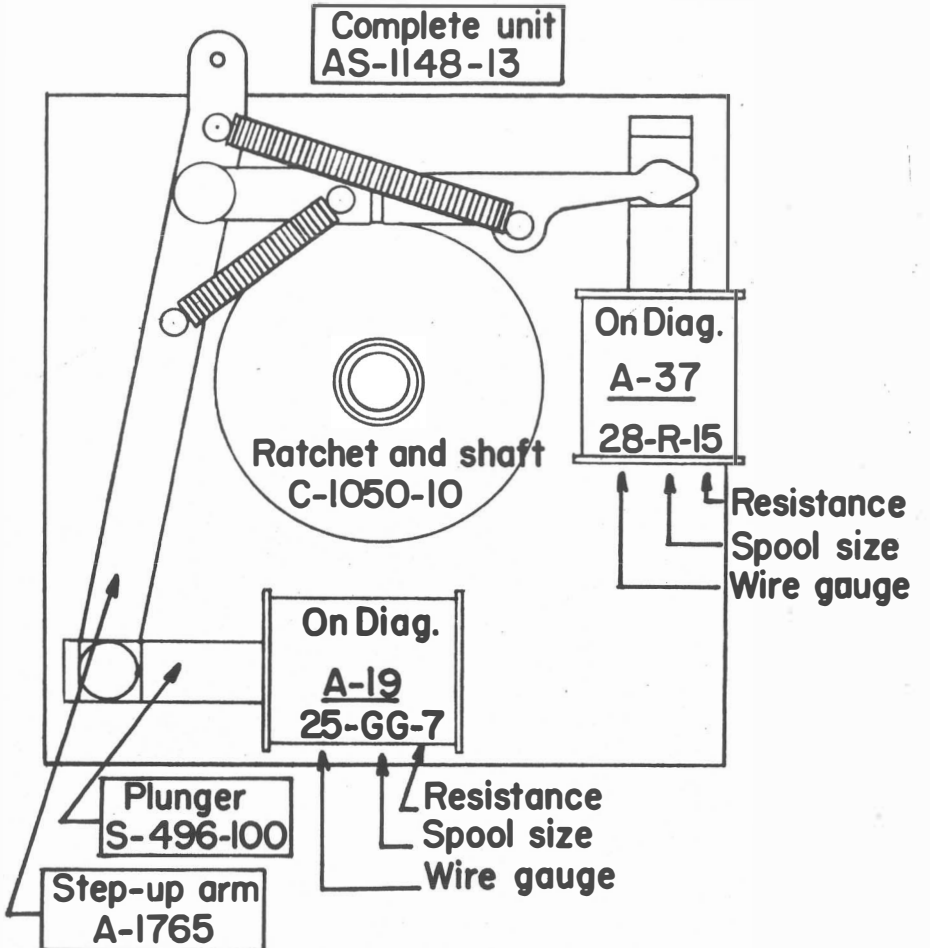
10 step unit. Wipers shown in zero or reset position



# EXTRA BALL STEP-UP AND RESET CIRCUIT



# 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

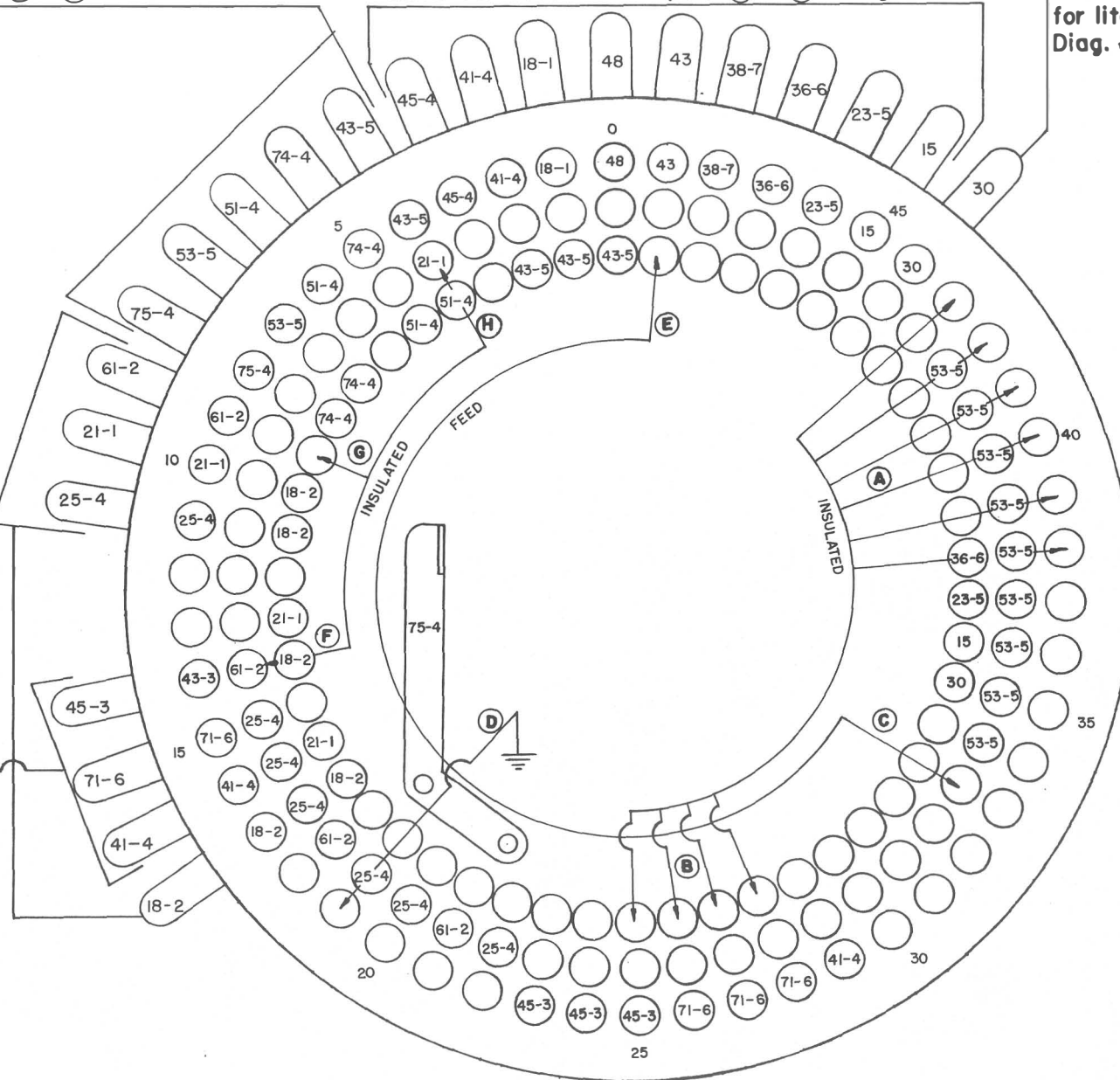
Extra ball runs. Thru wipers (C) & (E) Diag. C-18

Extra ball lites. Thru wipers (A) & (B) Diag. J-19

Feeds wipers (A) & (B) for lite circuits Diag. J-19

Single steps thru wipers (F), (G) & (H)

Extra ball count circuit to ball trough switches #3, #2 & #1 Thru wiper (D) Diag. I-11

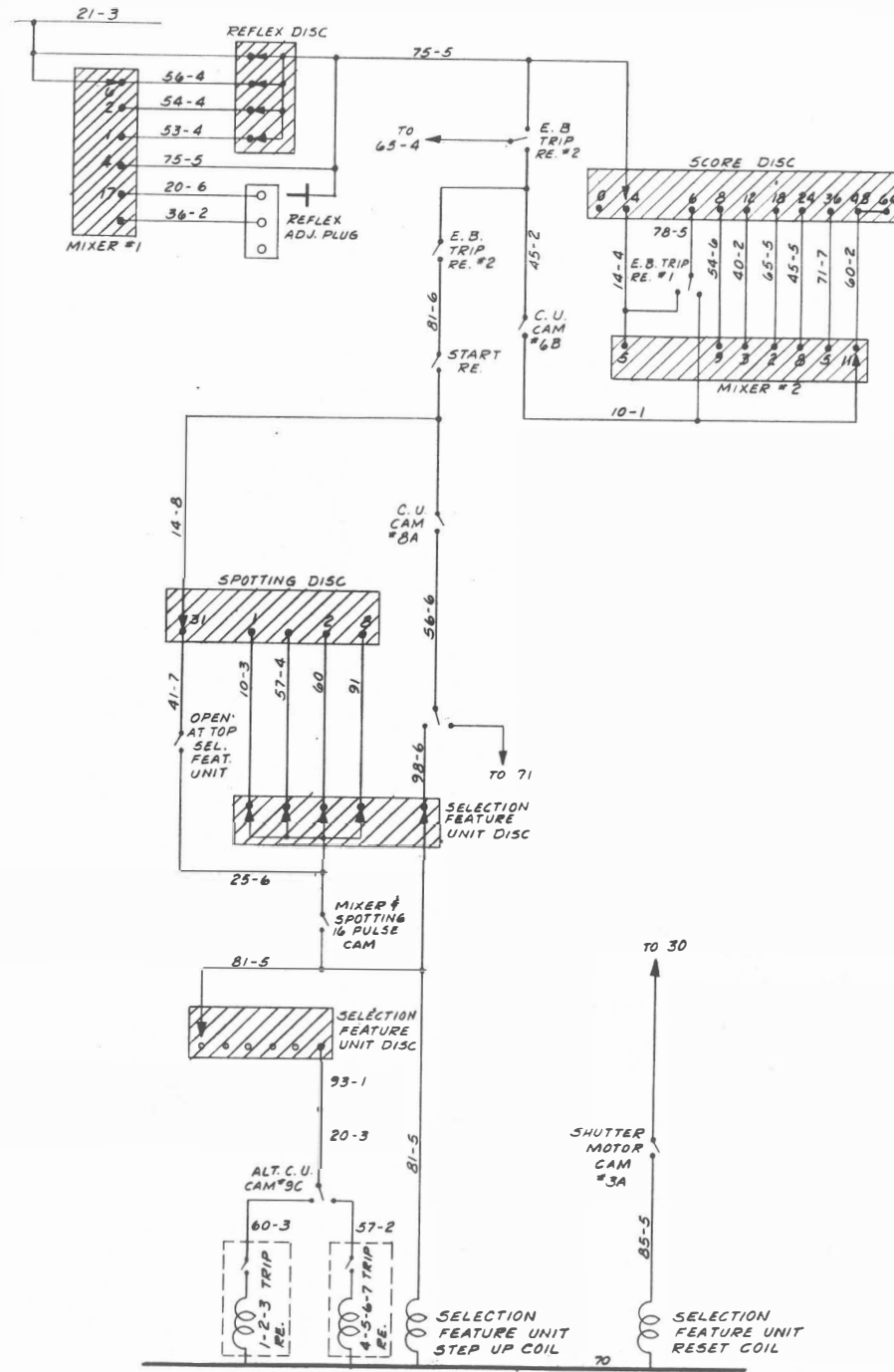


**WIPER ASSEMBLY  
AS-1046-118**

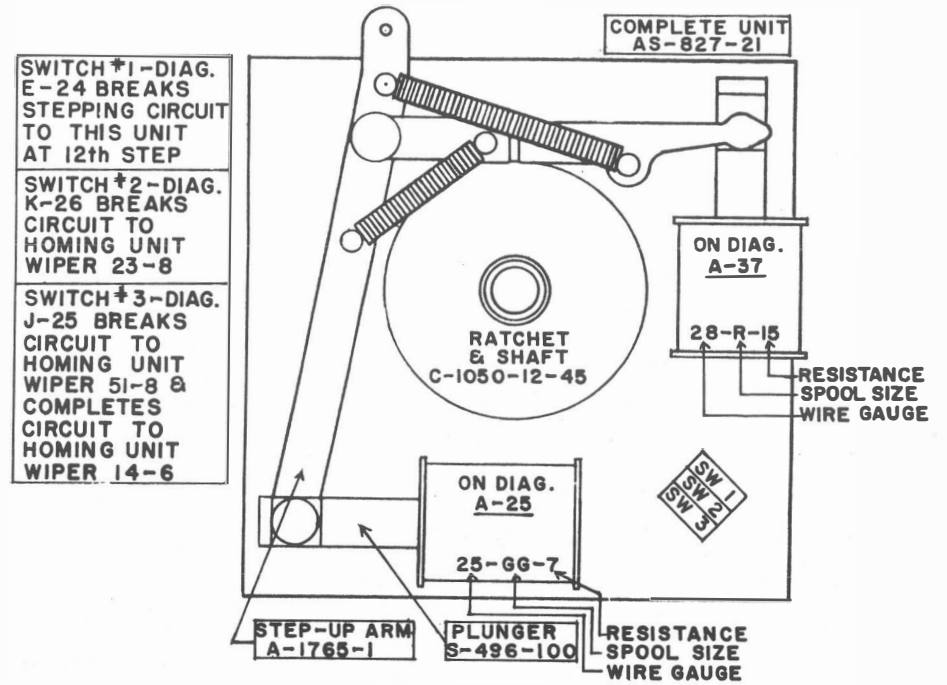
Direction of rotation

**DISC (WIRED)  
W-658**

# SELECTION FEATURE UNIT STEP-UP AND RESET CIRCUIT



# SELECTION FEATURE UNIT viewed from COIL side



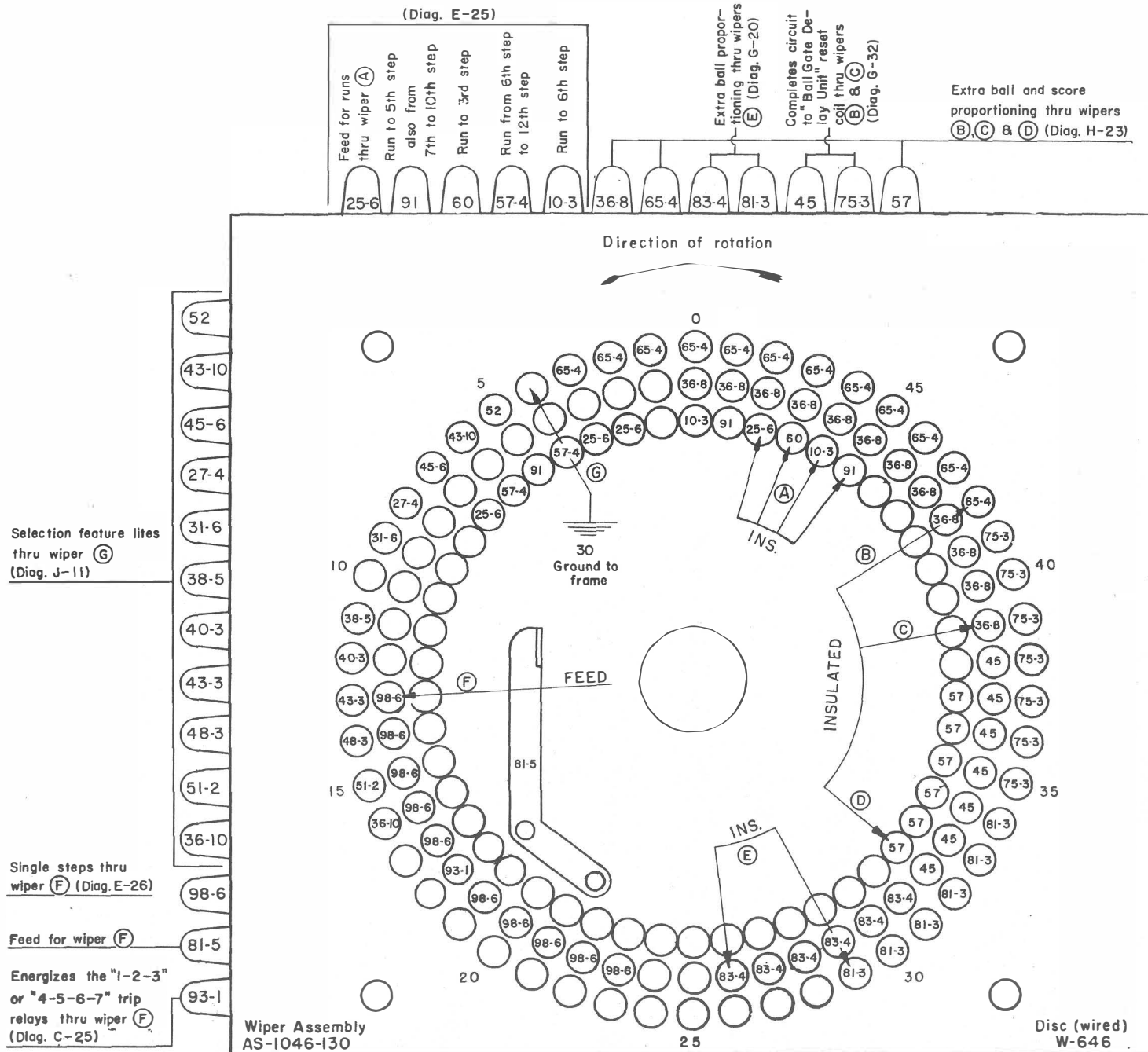
SWITCH #1-DIAG. E-24 BREAKS STEPPING CIRCUIT TO THIS UNIT AT 12th STEP

SWITCH #2-DIAG. K-26 BREAKS CIRCUIT TO HOMING UNIT WIPER 23-8

SWITCH #3-DIAG. J-25 BREAKS CIRCUIT TO HOMING UNIT WIPER 51-8 & COMPLETES CIRCUIT TO HOMING UNIT WIPER 14-6

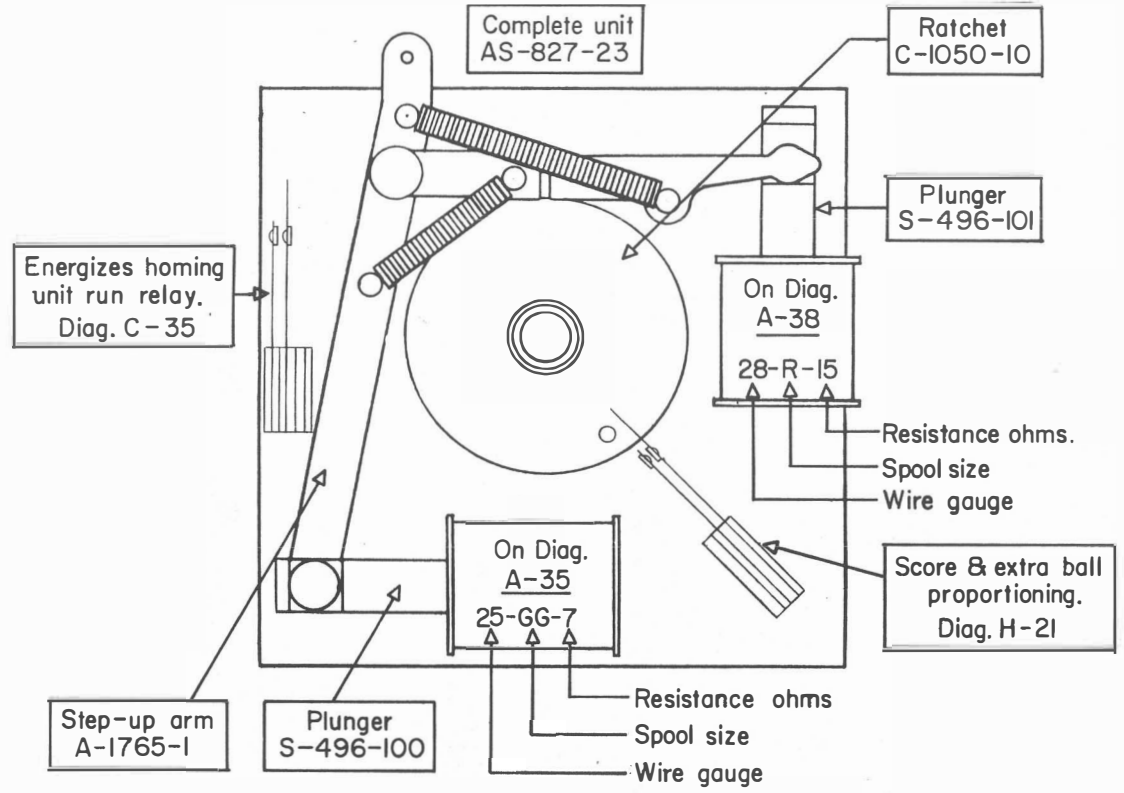
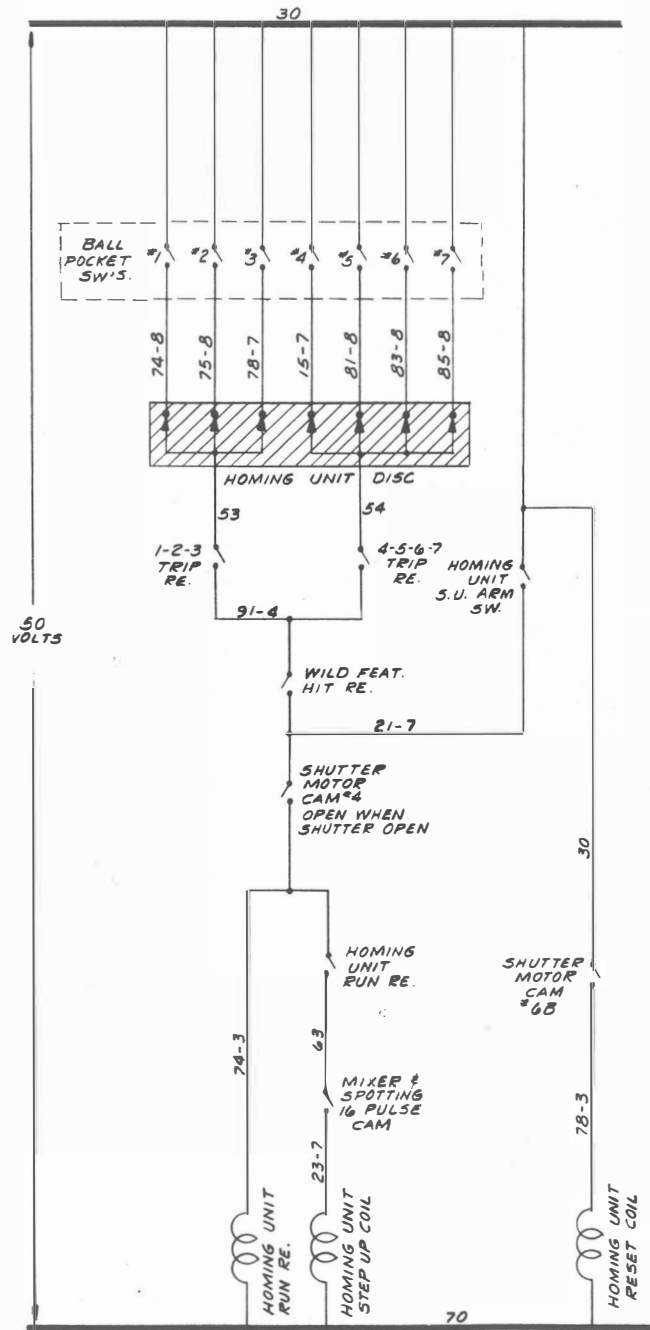
# SELECTION FEATURE UNIT viewed from BUTTON or WIPER side

12 step unit. Wipers shown in zero or reset position



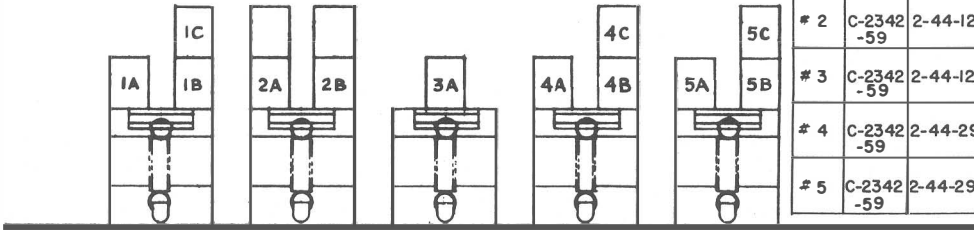
# HOMING UNIT STEP-UP AND RESET CIRCUIT

# HOMING UNIT viewed from COIL side





# SEARCH RELAYS

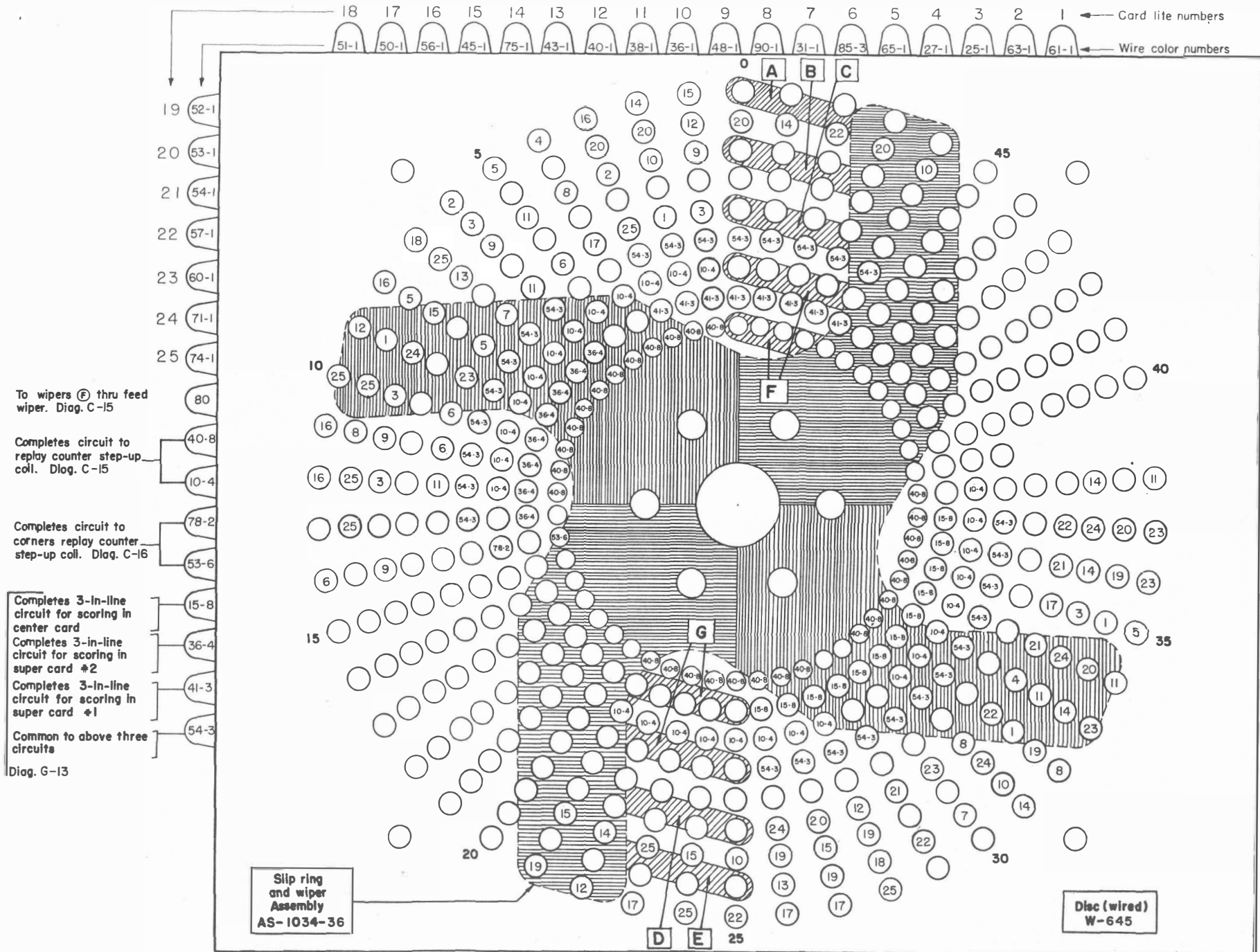


Relay	Coll	Armature
# 1	C-2342-59	2-44-29
# 2	C-2342-59	2-44-12
# 3	C-2342-59	2-44-12
# 4	C-2342-59	2-44-29
# 5	C-2342-59	2-44-29

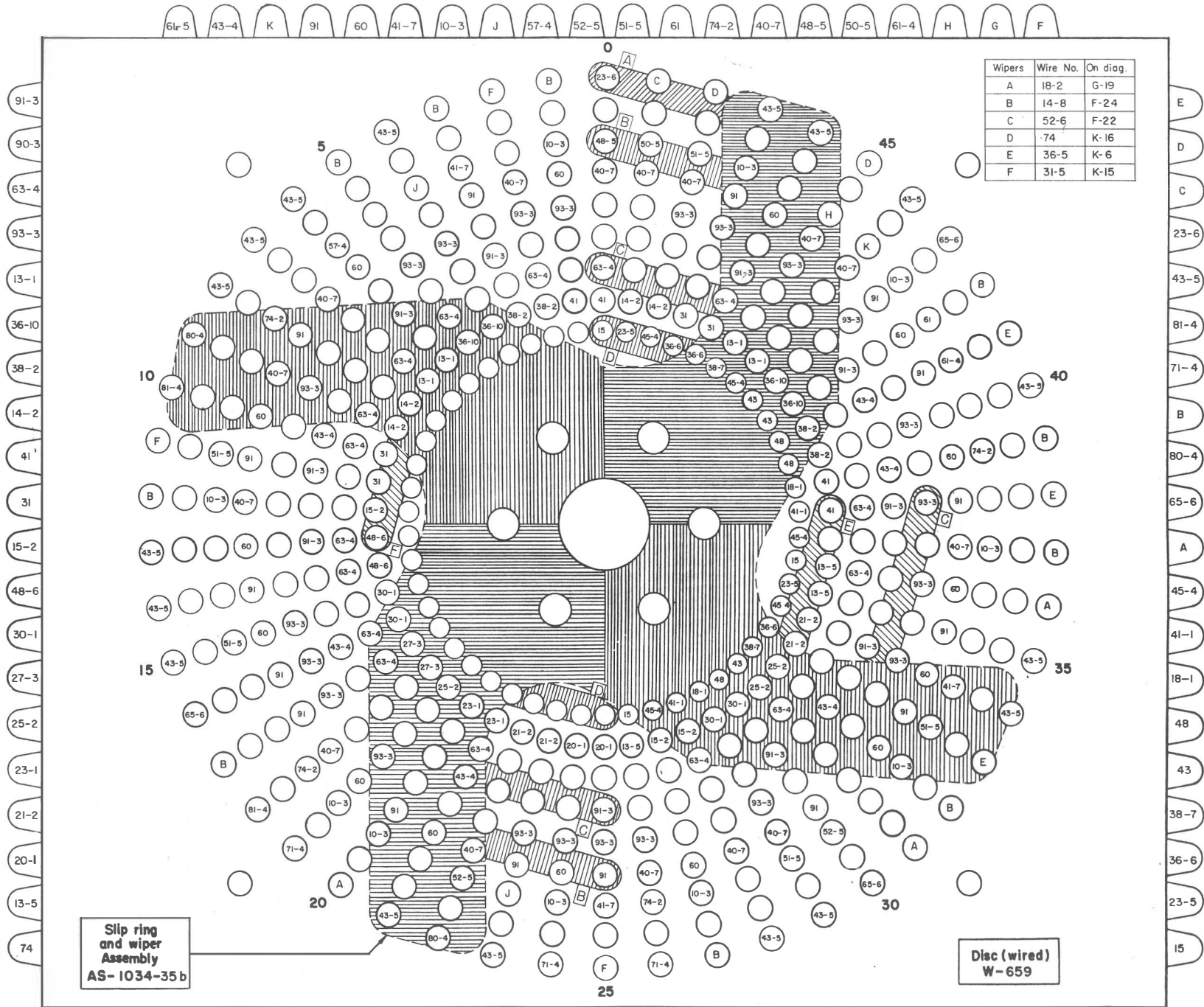
Corners Scores		3 in line scores		4 in line scores		5 in line scores	
Thru	Wire No's & Color	Thru	Wire No's & Color	Thru	Wire No's & Color	Thru	Wire No's & Color
3 A	21-8 Blue-Red 50-3 White	3 A	21-8 Blue-Red 50-3 White	3 A	21-8 Blue-Red 50-3 White	3 A	21-8 Blue-Red 50-3 White
2 B	50-3 White 51-3 White-Red	2 A	50-3 White 52-3 White-Blue	2 B	50-3 White 51-3 White-Red	2 B	50-3 White 51-3 White-Red
4 B	51-3 White-Red 53-3 White-Yellow	1 B	52-3 White-Blue 54-3 White-Green	4 B	51-3 White-Red 53-3 White-Yellow	4 B	51-3 White-Red 53-3 White-Yellow
1 C	53-3 White-Yellow 71-3 Orange-Red	3 A	21-8 Blue-Red 50-3 White	1 C	53-3 White-Yellow 71-3 Orange-Red	5 C	53-3 White-Yellow 57-3 White-Orange
		3 A	50-3 White 52-3 White-Blue	3 A	21-8 Blue-Red 50-3 White	1 A	57-3 White-Orange 61-3 Brown-Red
		2 A	52-3 White-Blue 54-3 White-Green	2 B	50-3 White 51-3 White-Red		
		4 A	21-8 Blue-Red 50-3 White	4 B	51-3 White-Red 53-3 White-Yellow		
		3 A	50-3 White 56-3 White-Brown	5 B	53-3 White-Yellow 71-3 Orange-Red		
		4 C	56-3 White-Brown 54-3 White-Green				
		5 A					

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

# SEARCH DISC viewed from BUTTON or WIPER side



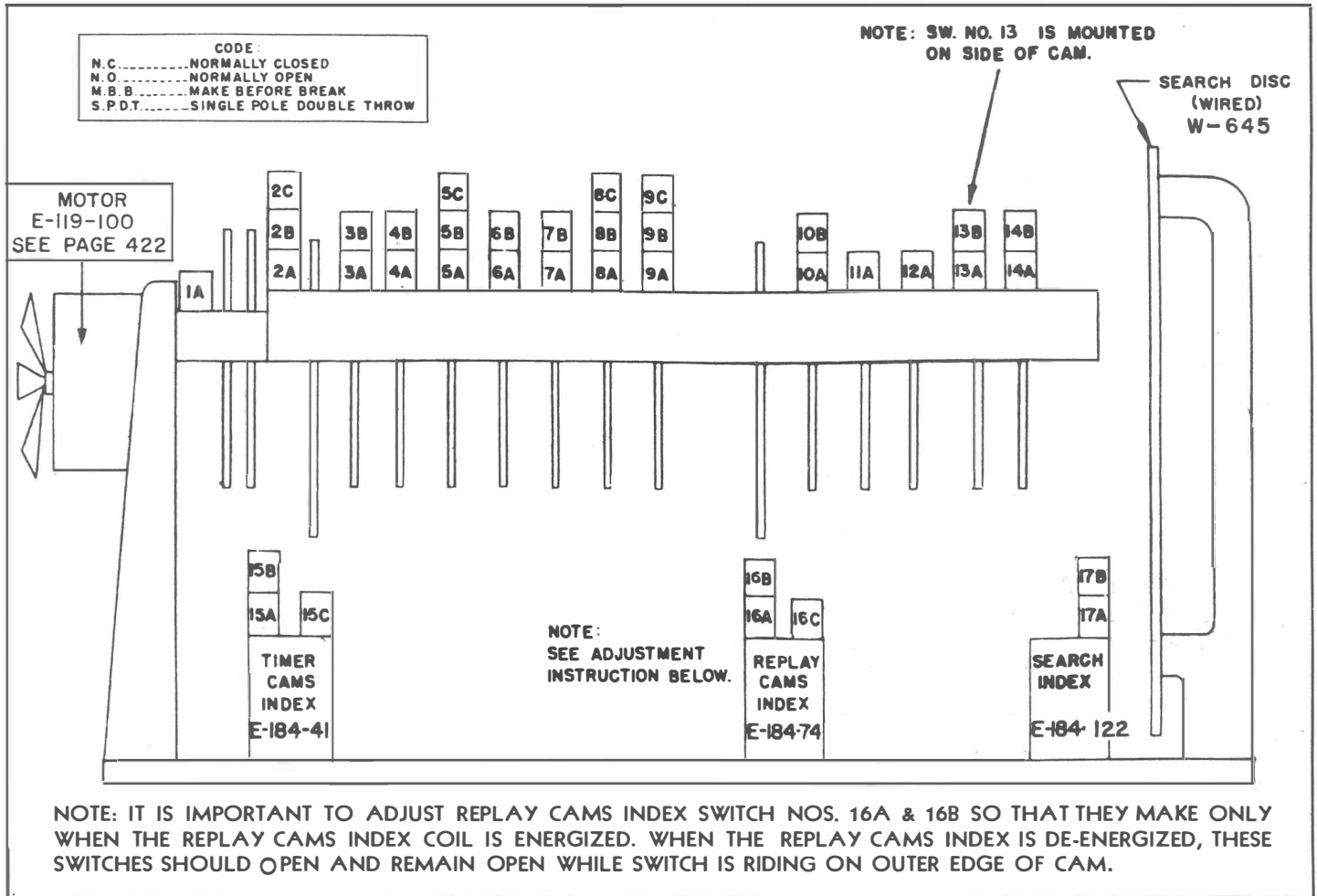
# CONTROL UNIT SPOTTING DISC viewed from BUTTON or WIPER side





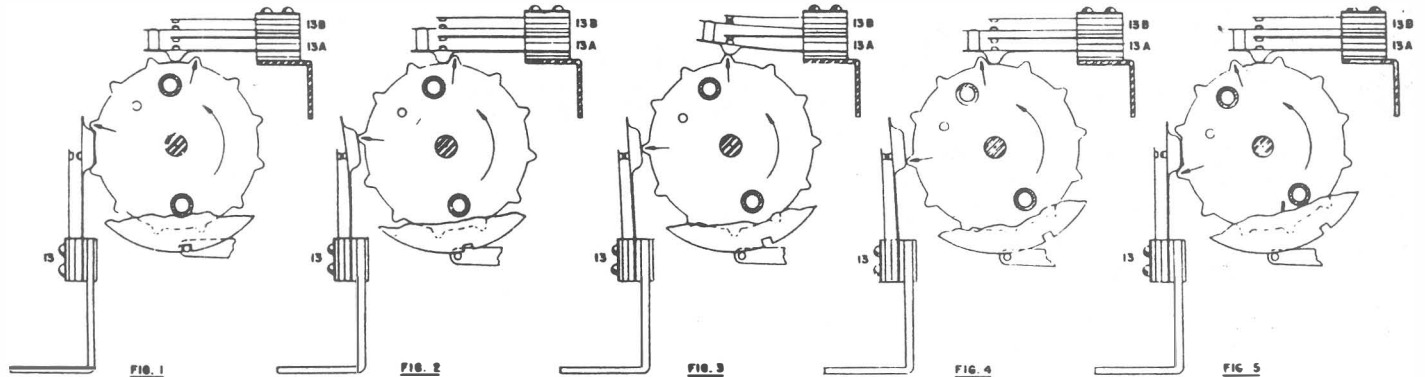
# CONTROL UNIT PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART



## CORRECT ADJUSTMENT: CONTROL UNIT CAM SWITCHES 13, 13A & 13B

**NOTICE:** IMPORTANT PART OF 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.



REPLAY NORMAL INDEXED POSITION. SWITCHES 13A, 13B, & 13 ARE OPEN AT THIS TIME.  
**NOTE:** ARROWS POINT TO LOBES THAT WILL ACTUATE SWITCHES.

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.

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

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

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

# CONTROL UNIT SWITCH CHART FOR POSITION OF SWITCHES SEE PICTORIAL VIEW

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A N. O.	F-8	65-2 36-9	Brown-White Yellow-Brown	Energizes timer step-up coil, when drag arm switch, selector lock relay switch and cam switch #14B are closed.
2A N. O.	I-3	90-5 30	Gray Yellow	Energizes reflex play magnet, and replay register reset.
2B N. O.	C-36	93-4 30	Gray-Yellow Yellow	Energizes coin kicker magnet.
2C N. C.	E-9	31-7 57-6	Yellow-Red White-Orange	Drops out red button relay.
3A N. C.	I-4	83-3 48-2	Black-Yellow Green-Black	Drops out start relay and sets as safety switch during spin.
3B S. P. D. T.	B-14	93-7 98-4 91-7	Gray-Yellow Gray-Black Gray-Red	Directs circuit to replay meter or total plays meter.
4A N. O.	C-39	98-1 30	Gray-Black Yellow	Energizes score extra step index and control unit spotting index coils.
4B N. O.	H-5	14-9 80-2	Red-Green Black	Used if coin meter is added in front cabinet.
5A N. O.	G-8	65-2 71-8	Brown-White Orange-Red	Energizes timer reset coil.
5B N. O.	B-19	38-4 21-1	Yellow-Black Blue-Red	Energizes extra ball unit step-up coil. Steps unit from minus one position to zero position.
5C N. O.	B-21	78-4 85-4	Orange-Black Black-White	Energizes anti-cheat relay.
6A N. C.	D-21	43-8 25-3	Green-Yellow Blue-White	Score extra step safety switch.
6B N. C.	G-25	10-1 45-2	Red Green-White	Opens game advantage circuits during timing cycle.
7A N. O.	B-22	18 52-2	Red-Black White-Blue	Score unit steps.
7B N. O.	D-37	93-4 30	Gray-Yellow Yellow	(Safety switch) energizes coin kicker magnet.
8A N. O.	E-27	14-8 56-6	Red-Green White-Brown	Single "selection feature" and "super card" steps.
8B N. O.	D-27	61-4 63-3	Brown-Red Brown-Yellow	Energizes "300 corners" relay, when circuit is complete thru all other factors.
8C N. O.	B-19	25-4 38-4	Blue-White Yellow-Black	Extra ball unit steps.
9A Alt.	E-21	85-4 43-8	Black-White Green-Yellow	Opens score extra step circuit every other time.
9B Alt.	D-27	98-6 56-6 71	Gray-Black White-Brown Orange-Red	Single step circuit, for "super-card" or selection feature unit.
9C Alt.	B-25	57-2 93-1 60-3	White-Orange Gray-Yellow Brown	Completes circuit to the "1-2-3" or "4-5-6-7" trip relays.

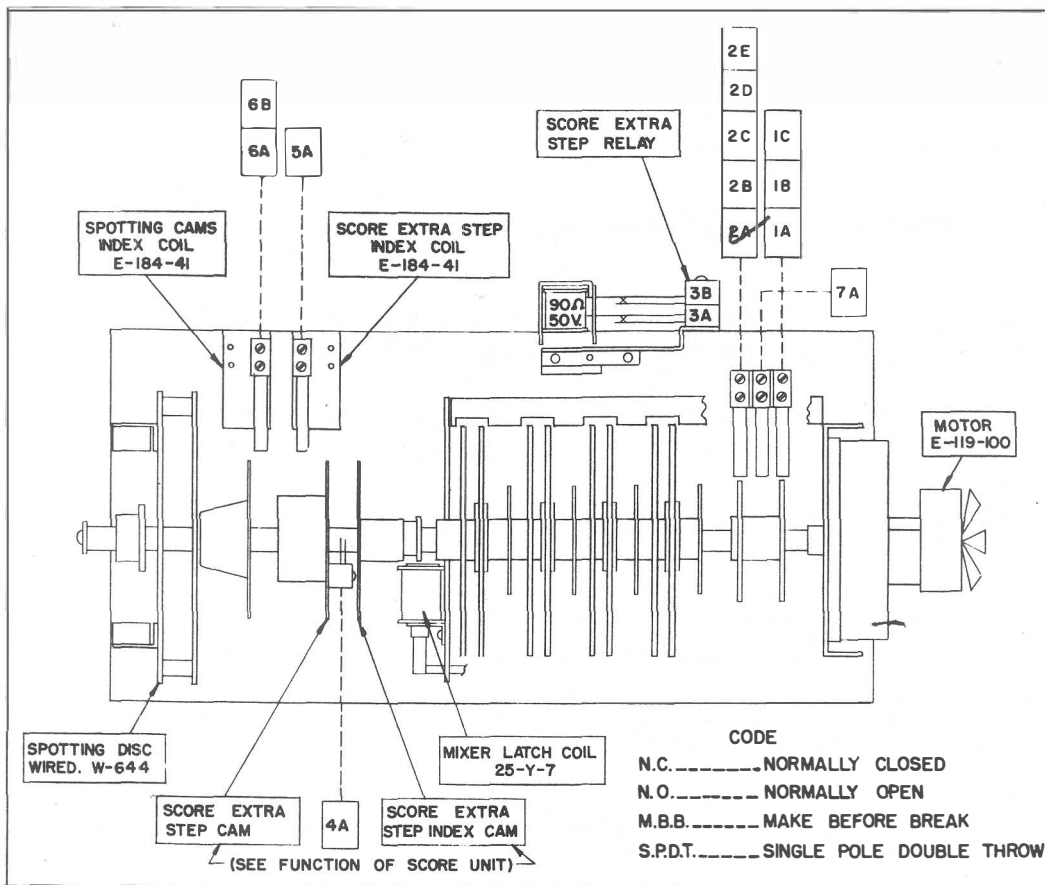
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# CONTROL UNIT CAM SWITCH CHART — CONCLUDED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
10A N. O.	B-15	54-8 93-5	White-Green Gray-Yellow	Pulses replay counter, when score unit is at 6th and 9th steps.
10B N. O.	B-16	38-8 53-6	Yellow-Black White-Yellow	Pulses "corners" replay counter.
11A N. O.	B-15	54-8 91-6	White-Green Gray-Red	Pulses replay counter, when score unit is at 5th and 7th steps.
12A N. O.	B-15	54-8 90-8	White-Green Gray	Pulses replay counter, when score unit is at 3rd, 4th and 8th steps.
13A N. O.	B-14	54-8 81-7	White-Green Black-Red	Pulses replay counter, when score unit is at 1st and 2nd steps.
13B N. O.	C-13	48-4 80	Green-Black Black	Pulses replay register step-up coil, and reflex replay magnet.
13 N. O. (Backside)	H-13	21-3 27	Blue-Red Blue-Orange	Replay lock-in switch. NOTE: See control unit pictorial view.
14A N. C.	I-14	56-7 93	White-Brown Gray-Yellow	Prevent the start of another replay scoring, when unit cams are indexed.
14B N. C.	C-8	27-2 90-2	Blue-Orange Gray	Opens circuit to timer step-up coil, during replay winner.
TIMER CAMS INDEX COIL	A-6	83-6 70	Black-Yellow Orange	Energized by switch on start relay. Also thru shutter motor cam switch #5C.
15A N. O.	G-1	20-P 60-P	Blue (Plastic) Brown (Plastic)	Operates control unit and mixer and spotting motors.
15B N. C.	G-5	14-9 71-2	Red-Green Orange-Red	Opens circuit to coin lockout magnet during spin.
15C N. C.	D-9	13 30	Red-Yellow Yellow	Lock in safety switch for red button relay.
REPLAY CAMS INDEX COIL	A-12	40-4 81-9	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 control unit pictorial view for correct adj.
16B N. O.	I-14	56-7 93	White-Brown Gray-Yellow	In series with replay winner circuit. NOTE: See control unit pictorial view for correct adj.
16C N. C.	C-12	15-2 80	Red-White Black	Opens direct 50 volt circuit to search index coil, coil then held in thru resistor.
SEARCH INDEX COIL	A-12	15-2 70	Red-White Orange	Energizes when 3-in-line or more is scored.
17A N. O.	C-12	40-4 80	Green Black	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 safety
17C N. C.	C-12	80 15-1	Black Red-White	Shunts out 20 ohm resistor in series with this coil.

# MIXER AND SPOTTING UNIT ASSEMBLY PICTORIAL VIEW

Numbers correspond to switch chart below



## MIXER AND SPOTTING UNIT SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

CAM SWITCH	LOCATION ON DIAGRAM	WIRES NO.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N. O.	B-26	80-6 50-4 Black White	Pulses super card step-up coil for multiple steps.
1B	N. O.	D-3	75-2 53-7 Orange-White White-Yellow	Pulses replay register reset coil.
1C	N. C.	K-24	31-8 10-2 Yellow-Red Red	Used for blinking "wild" lite in cards.
2A	N. O.	B-18	78 38-4 Orange-Black Yellow-Black	Pulses extra ball step-up coil for multiple steps.
2B	N. O.	E-17	40-9 85-2 Green Black-White	Pulses corners unit back to zero at next game if corners was hit.
2C	N. O.	L-1	41-5 71-5 Green-Red Orange-Red	Flashes "select now" lite.
2D	N. O.	B-35	23-7 63 Blue-Yellow Brown-Yellow	Pulses homing unit step-up coil.
2E	N. O.	C-25	25-6 81-5 Blue-White Black-Red	Pulses "selection feature" step-up coil for multiple steps.

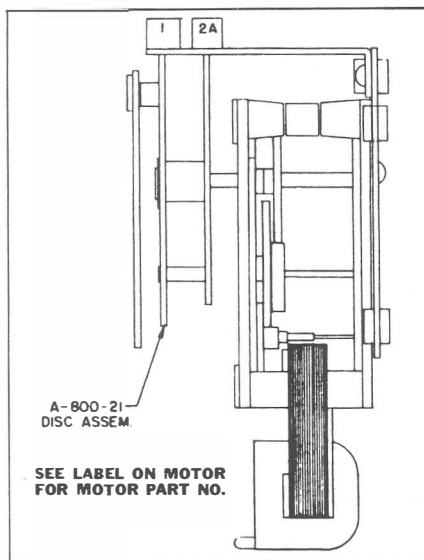
CONCLUDED ON NEXT PAGE

# MIXER AND SPOTTING UNIT SWITCH CHART — CONCLUDED

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SCORE EXTRA STEP RELAY COIL	A-24	43-6 70	Green-Yellow Orange	Energized by score unit step-up arm switch.
3A N.O.	F-24	43-6 81-1	Green-Yellow Black-Red	Completes lock-in circuit to score extra step relay.
3B N.O.	B-21	40-5 52-2	Green White-Blue	Completes circuit to score unit step-up coil for multiple steps.
4A N.O.	C-21	25-3 40-5	Blue-White Green	Pulses score unit step-up coil for multiple steps.
SCORE EXTRA STEP INDEX COIL	A-39	98-1 70	Gray-Black Orange	Energized during timing cam cycle by control unit cam switch #4B.
5A N.O.	G-24	75-5 81-1	Orange-White Black-Red	Completes lock-in circuit for score extra step relay.
SPOTTING CAM INDEX COIL	A-39	98-1 70	Gray-Black Orange	Energized during timing cam cycle by control unit cam switch #4B.
6A N.O.	J-6	83-1 30	Black-Yellow Yellow	Completes flash circuit for wild section, super card, selection feature, corners, and scores lites.
6B N.O.	J-16	13-4 30	Red-Yellow Yellow	(Same as above) Also flashes extra ball lites when playing for extra balls.
7A N.O.	E-33	15-9 45-9	Red-White Green-White	One second pulse switch for ball gate delay unit step-up coil.

## BALL LIFT MOTOR PICTORIAL VIEW

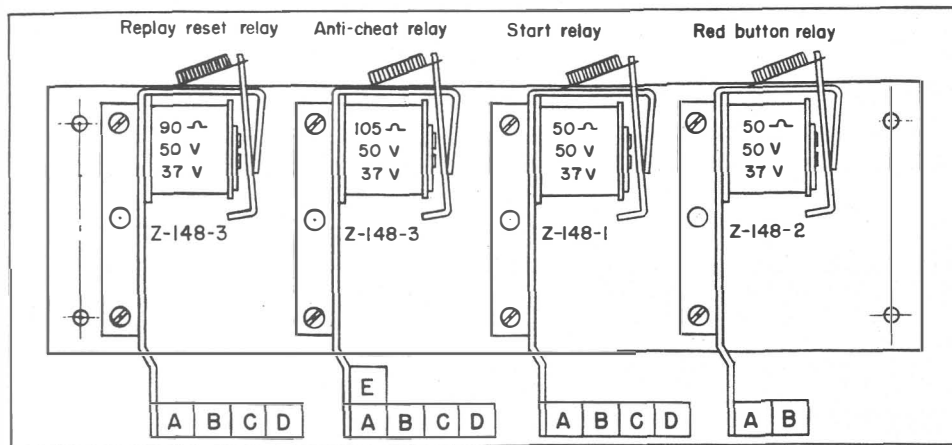
NUMBERS CORRESPOND TO SWITCH CHART BELOW



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

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCH
1 N.O.	H-12	30 91-1	Yellow Grey-Red	Carry-over switch for ball lifter motor.
2 N.O.	E-7	43-2 27-2	Green-Yellow Blue-Orange	Energizes timer unit step-up coil.

## 4 RELAY BANK PICTORIAL VIEW NUMBERS CORRESPOND TO SWITCH CHART



Coil part numbers	
50 ~ 50 V	C-2794-9
90 ~ 50 V	C-2794-1
105 ~ 50 V	C-2794-23

Code	
N.C.	Normally Closed
N.O.	Normally Open
M.B.B.	Make Before Break
S.P.D.T.	Single Pole Double Throw

## 4 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE NO.	WIRE COLORS	FUNCTION OF SWITCHES
REPLAY RESET RELAY COIL	A-4	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-3	90-5 13-9 53-7	Gray Red-Yellow White-Yellow	Directs replay register reset circuit thru control unit cam switch #2A, when replays are being played, or thru 16 pulse cam when replays are being cancelled.
B N.O.	F-1	20-P 60-P	Blue (Plastic) Brown (Plastic)	Completes circuit to control unit motor.
C N.O.	G-3	56-2 75-2	White-Brown Orange-White	Lock-in switch for this relay.
D N.C.	C-4	21-6 63-2	Blue-Red Brown-Yellow	Opens start circuit during replay cancel.
ANTI-CHEAT RELAY COIL	A-21	78-4 70	Orange-Black Orange	Energized thru control unit cam switch #5C, its switches protect replay, and lite circuits.
A S.P.D.T.	G-4	75-2 56-2 50-2	Orange-White White-Brown White	Breaks start relay circuit, and completes circuit to replay reset relay when this relay drops out.
B N.O.	L-23	20-4 80-1	Blue Black	Opens 17 volt circuit when this relay drops out.
C N.O.	D-21	78-4 30	Orange-Black Yellow	Lock-in switch for this relay.
D N.C.	E-9	57-6 85-7	White-Orange Black-White	Safety switch.
E S.P.D.T.	M-21	91-2 38 54-2	Gray-Red Yellow-Black White-Green	Opens 6 volt circuit, and lites tilt lite, when this relay drops out.

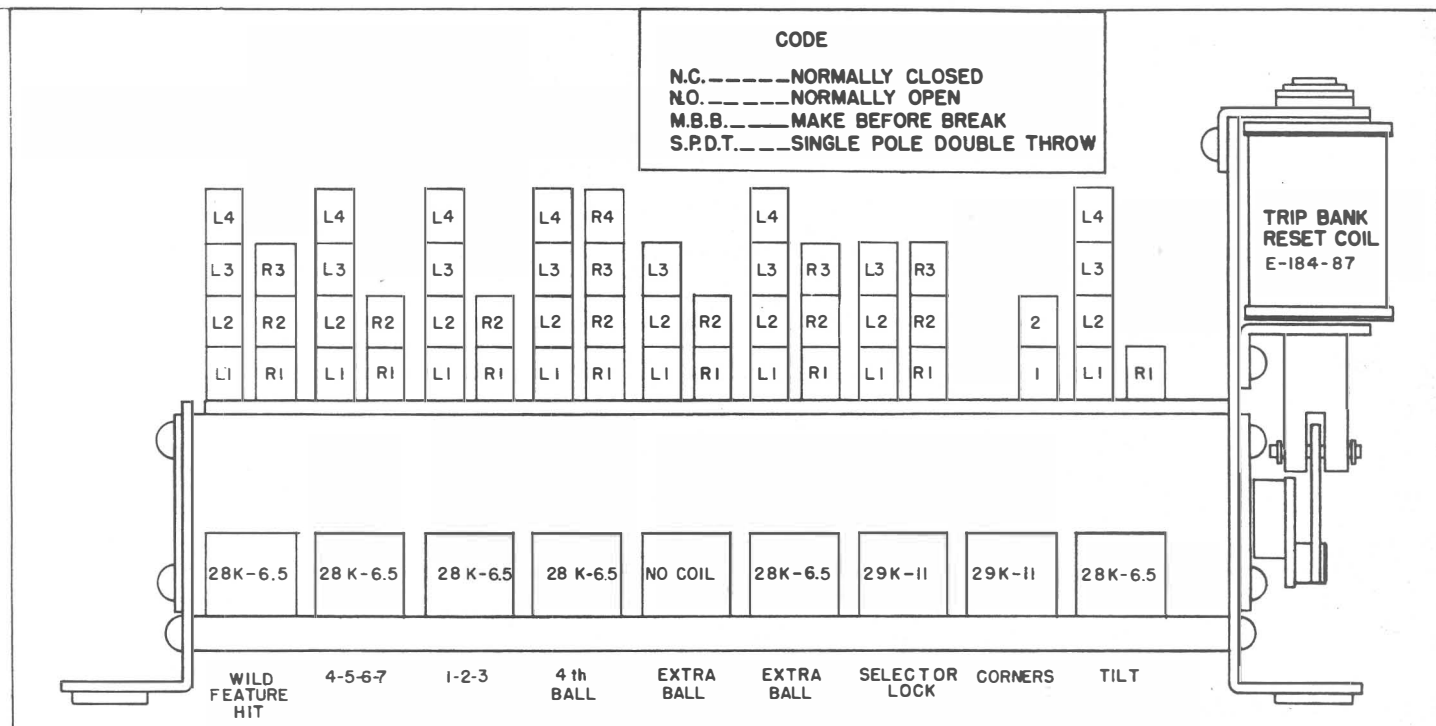
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# 4 RELAY BANK SWITCH CHART — CONCLUDED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
START RELAY COIL	A-4	21-6 70	Blue-Red Orange	Energized every time a coin is played, or when a red or yellow button is pressed.
A N.C.	G-25	14-8 81-6	Red-Green Black-Red	Opens game advantage circuits during spin of control unit.
B N.C.	C-18	75-4 78	Orange-White Orange-Black	Opens extra ball step-up circuit during spin of control unit.
C N.O.	F-5	13-3 90-9	Red-Yellow Black-White	Completes circuit to timer cams index, and mixer latch coils.
D N.O.	F-4	48-2 63-2	Green-Black Brown-Yellow	Lock-in switch for this relay.
RED BUTTON RELAY COIL	A-9	85-7 70	Black-White Orange	Energizes when red button is pressed.
A S.P.D.T.	C-6	83-6 98-2 14-3	Gray-Yellow Gray-Black Red-Green	Directs circuit from mixer latch, and timer cams index coils during extra ball play, to shutter motor when starting new game after extra ball play.
B N.O.	C-9	31-7 85-7	Yellow-Red Black-White	Lock-in switch for this relay.
C N.C.	K-22	50-9 21-4	White Blue-Red	Opens extra ball lite circuit.

## TRIP RELAY BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH-CHART



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

RELAY SWITCH	LOCATION ON DIAGRAM	WIRES NO.	WIRE COLORS	FUNCTION OF SWITCHES
WILD FEATURE HIT TRIP COIL	A-31	J 70	Jumper Orange	Energizes when homing unit run relay drops out.
L1	N.O.	K-1 60-5 71-5	Brown Orange-Red	Completes circuit to "select now" lite.
L2	N.C.	A-31 90 Jumper	Gray Jumper to coil	Breaks circuit to this coil.
L3	N.O.	K-24 31-8 30	Yellow-Red Yellow	Completes circuit to 4 volt secondary winding which flashes "wild number".
L4	N.O.	K-1 18-9 30	Red-Black Yellow	Completes circuit to "select before 4th or next ball".
R1	N.O.	G-28 83-3 23-2	Black-Yellow Blue-Yellow	Energizes rotary selector lock coil.
R2	N.O.	F-29 45 81-10	Green-White Black-Red	In series with selector lock trip coil.
R3	N.C.	E-35 21-7 91-4	Blue-Red Gray-Red	Opens circuit to homing unit run relay.
4-5-6-7 TRIP COIL	A-25	J 70	Jumper Orange	Energizes when circuit is complete thru spotting, selection feature and mixer #4 discs.
L1	N.O.	J-4 41 30	Green-Red Yellow	Completes circuit to "wild section" lite.
L2	N.C.	A-25 J 57-2	Jumper to coil White-Orange	Breaks circuit to this coil.
L3	N.O.	K-25 14-6 10-2	Red-Green Red	In series with 4 volt secondary transformer winding for flashing "wild lite".
L4	N.C.	K-26 51-8 23-9	White-Red Blue-Yellow	Opens wiper 51-8 on Rotary selector disc.
R1	N.O.	E-35 54 91-4	White-Green Gray-Red	Completes circuit to homing unit run relay.
R2	N.C.	B-28 45-10 36-10	Green-White Yellow-Brown	Opens corners trip coil circuit.
1-2-3-TRIP COIL	A-25	J 70	Jumper Orange	Energizes when circuit is complete thru spotting, selection feature and mixer #4 discs.
L1	N.O.	J-3 31 30	Yellow-Red Yellow	Completes circuit to red "wild section" lite.
L2	N.C.	K-26 23-8 48-8	Blue-Yellow Green-Black	Opens wiper 23-8 on Rotary selector disc.
L3	N.O.	J-25 10-2 18-8	Red Red-Black	Makes circuit to correct wiper on rotary selector.
L4	N.C.	A-25 J 60-3	Brown Jumper to coil	Breaks circuit to this coil when tripped.
R1	N.O.	E-34 53 91-4	White-Yellow Gray-Red	Completes circuit to homing unit run relay.
R2	N.C.	C-28 63-3 36-10	Brown-Yellow Jumper to 1-2-3 coil	Opens corners trip coil circuit.

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# TRIP RELAY BANK CHART — CONTINUED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
4th BALL TRIP COIL	A-36	98 70	Gray-Black Orange	Trips at 4th step of timer unit.
L1 N. O.	J-2	61-6 30	Brown-Red Yellow	Completes circuit to "select now" lite at 4th step of timer unit.
L2 N. O.	C-8	78-6 27-2	Orange-Black Blue-Orange	Completes circuit to timer step up coil.
L3 N. O.	I-14	56-7 21-8	White-Brown Blue-Red	In series with replay scoring circuit.
L4 N. O.	E-4	50-2 18-6	White Red-Black	Completes circuit for making "yellow" button alive.
R1 N. O.	C-10	25-8 52-4	Blue-White White-Blue	Completes circuit to extra ball trip relays.
R2 N. C.	A-36	J 98	Jumper Gray-Black	Breaks circuit to this coil when tripped.
R3 N. O.	C-29	81-10 31-10	Black-Red Yellow-Red	In series with selector lock trip coil.
R4 N. O.	C-31	15-6 50-8	Red-White White	Opens circuit to ball gate lock magnet.
EXTRA BALL TRIP	A-10			
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 S. P. D. T.	G-20	52-6 80-3 18-3	White-Blue Black Red-Black	Shuts off score steps and further completes circuit for extra ball steps.
L3 S. P. D. T.	G-26	10-1 78-5 65-5	Red Orange-Black Brown-White	Extra ball proportioning.
R1 S. P. D. T.	E-19	85-4 30 61-2	Black-White Yellow Brown-Red	Breaks guaranteed score step circuit and completes circuit extra ball unit for 1st step.
R2 N. O.	J-21	21-4 30	Blue-Red Yellow	Lites extra ball lite on backglass.
EXTRA BALL TRIP #2	A-10	52-4 70	White-Blue Orange	Energized by yellow button.
L1 S. P. D. T.	J-15	31-5 13-4 74	Yellow-Red Red-Yellow Orange-Green	Directs circuit to flash score lites or extra ball lites.
L2 N. C.	J-6	36-5 83-1	Yellow-Brown Black-Yellow	Shuts flash circuit to "wild section" lites.
L3 N. C.	A-10	52-4 52-4	Blue-White Blue-White (Jumper)	Breaks circuit to this coil.
L4 S. P. D. T.	B-6	14-3 43-9 98-2	Red-Green Green-Yellow Gray-Black	Breaks circuit to shutter motor and completes circuit to timer index during extra ball play.

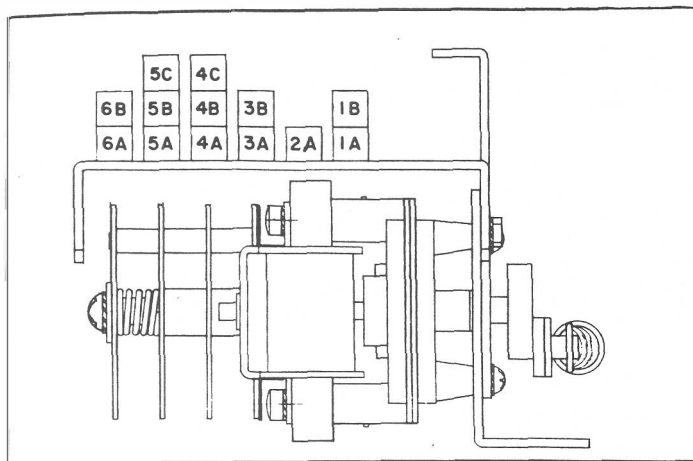
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# TRIP RELAY BANK CHART — CONCLUDED

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
R1 S.P.D.T.	I-25	75-5 65-4 45-2	Orange-White Brown-White Green-White	Extra ball proportioning switch.
R2 N.C.	H-24	45-2 81-6	Green-White Black-Red	Circuit break to game features when playing for extra balls.
R3 N.C.	F-22	65-4 81-3	Brown-White Black-Red	Score step proportioning from 2nd step.
SELECTOR LOCK TRIP COIL	A-29	J 70	Jumper Orange	Trips when 4th ball relay trips if "wild feature" relay is energized.
L1 N.C.	K-1	60-5 61-6	Brown Brown-Red	Breaks circuit to "select now" lite.
L2 N.C.	E-28	23-2 13-2	Blue-Yellow Red-Yellow	Breaks rotary selector lock coil if 4th ball relay is tripped.
L3 N.C.	E-31	75-3 15-6	Orange-White Red-White	Breaks circuit to all gate delay unit reset coil.
R1 N.O.	B-11	38-3 52-8	Yellow-Black White-Blue	Shuts out delay unit switch in circuit to all lift motor.
R2 N.C.	A-29	31-10 J	Yellow-Red Jumper	Breaks circuit to this coil.
R3 N.C.	C-31	10-7 98-7	Red Gray-Black	Breaks circuit to ball gate lock magnet.
CORNERS TRIP COIL	A-28	45-10 70	Green-White Orange	Energized by cam sw. #8B when other circuits are complete.
1 N.O.	J-13	13-1 30	Red-Yellow Yellow	Lites corners lite.
2 N.O.	D-16	78-2 14	Orange-Black Red-Green	In corners replay scoring circuit.
TILT TRIP COIL	A-11	14-5 70	Red-Green Orange	Energized by any tilt switch and also at 39th step of timer unit.
L1 S.P.D.T.	I-7	21-3 30 45-8	Blue-Red Yellow Green-White	Breaks circuit to game features, replay scoring, ball counting, and completes circuit to shutter motor when game is tilted.
L2 N.C.	G-2	20-P 60-P	Blue (Plastic) Brown(Plastic)	Breaks circuit to control unit and mixer motor.
L3 N.C.	M-23	10 20-4	Red Blue	Breaks 17 volt circuit.
L4 S.P.D.T.	M-22	38 81 91-2	Yellow-Black Black-Red Gray-Red	Breaks 6 volt circuit and lites tilt lite.
R1 N.O.	E-10	57-6 85-7	White-Orange Black-White	Safety circuit for red button relay.

# SHUTTER MOTOR PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART



SEE LABEL ON MOTOR FOR MOTOR PART NO.

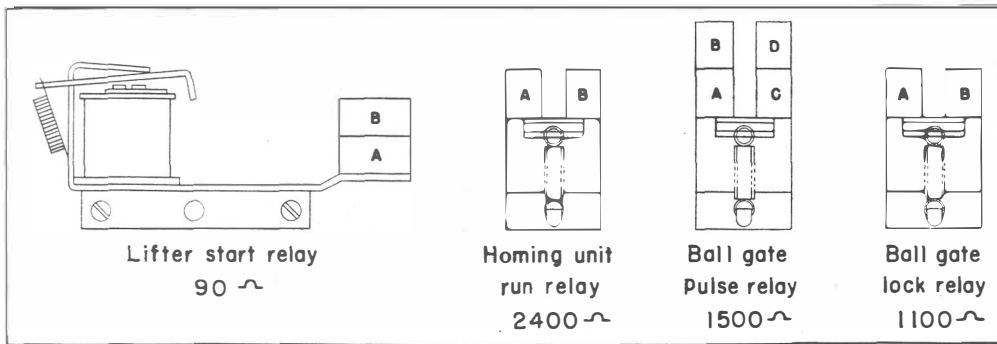
CODE

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

## SHUTTER MOTOR CAM SWITCH CHART FOR POSITION OF SWITCHES SEE PICTORIAL VIEW

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-6	30 14-3 Yellow Red-Green	Carry thru for shutter motor.
2A	N. C.	F-11	31-3 36-3 Yellow-Red Yellow-Brown	Completes circuit to ball lifter motor (closed normally) open during shutter cycle.
3A	N. O.	C-38	30 85-5 Yellow Black-White	Resets score, extra ball, and selection feature units.
3B	N. O.	H-2	20-P 70-P Blue (Plastic) Brown (Plastic)	Resets trip relay bank.
4A	N. O.	F-6	18-3 14-3 Red-Black Red-Green	(Closed when shutter is open). Completes circuit to shutter motor.
4B	N. C.	C-35	21-7 74-3 Blue-Red Orange-Green	Opens circuit to Homing stepper and Homing Unit run relay.
4C	N. O.	H-6	45-8 18-3 Green-White Red-Black	Starts shutter motor if game is tilted when shutter is open.
5A	N. O.	F-17	30 40-9 Yellow Green	Completes circuit to step corners replay counter to reset position.
5B	N. C.	H-8	21-3 65-2 Blue-Red Brown-White	Safety switch for timer reset.
5C	S. P. D. T.	E-5	43-9 13-3 83-6 Green-Yellow Red-Yellow Black-Yellow	Breaks circuit to shutter motor and makes circuit to timer index coil.
6A	N. O.	H-8	30 71-8 Yellow Orange-Red	Completes circuit to timer reset coil.
6B	N. O.	C-39	30 78-3 Yellow Orange-Black	Resets replay counter, and card feature units.

# RELAYS MOUNTED IN BOTTOM OF PLAYFIELD NUMBERS CORRESPOND TO SWITCH CHART

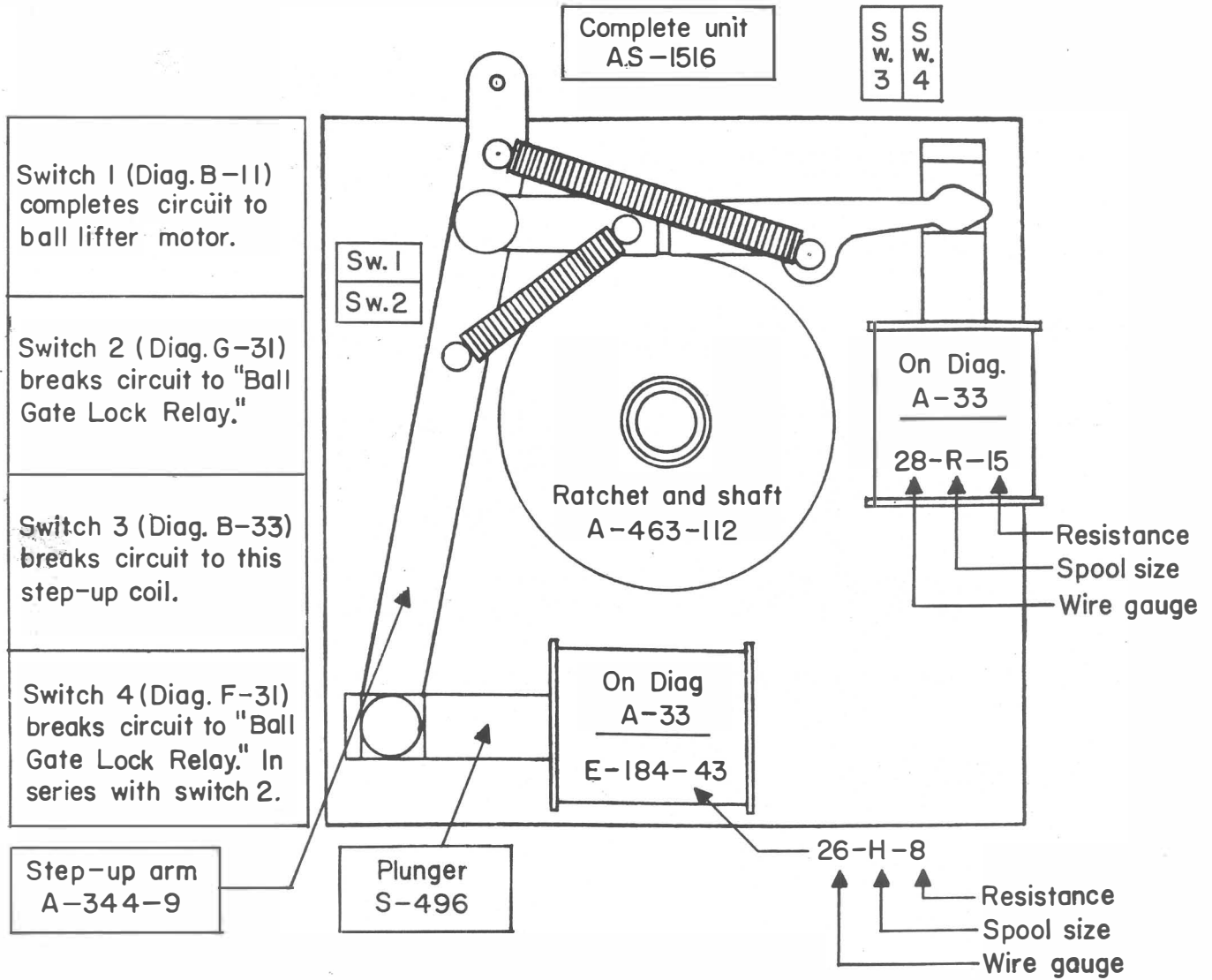


Coil & armature part no's.	
Coil	Armature
90 ~ - C-2794-1	Z-148-2
2400 ~ - C-2342-412	Z-370-12 a
1500 ~ - C-2342-403	Z-371-22 a
1100 ~ - C-2342-392	Z-372-2

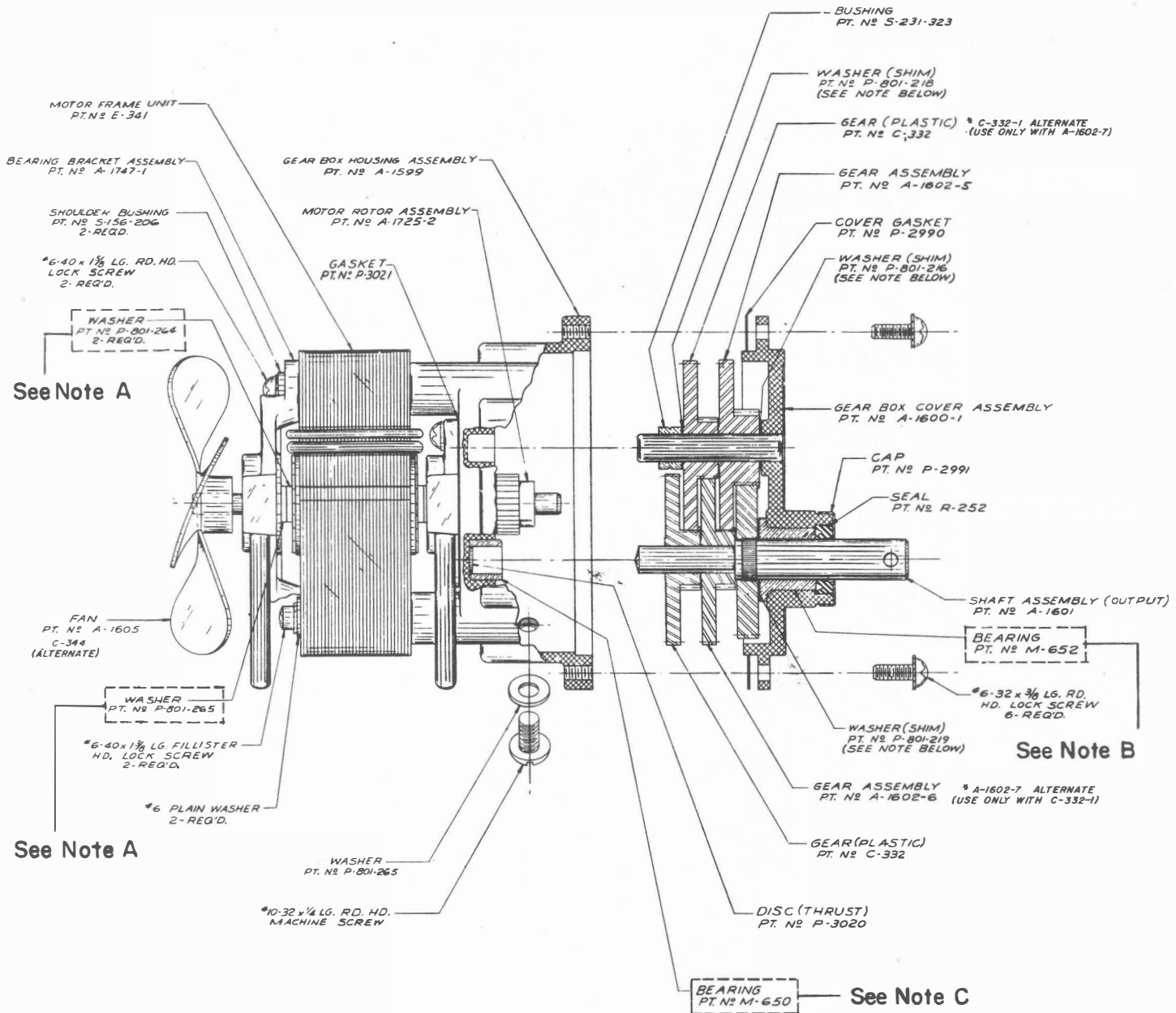
## RELAY CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
LIFTER START RELAY COIL	A-30	38-5 70	Yellow-Black Orange	Energized by ball run way switch.
A N. C.	G-11	31-3 41-4	Yellow-Red Green-Red	Breaks circuit to ball lifter motor.
B N. O.	C-30	36 38-5	Yellow-Brown Yellow-Black	Lock-in switch for this relay.
HOMING UNIT RUN RELAY COIL	A-34	74-3 70	Orange-Green Orange	Energizes when "1-2-3" or "4-5-6-7" trip relays are tripped.
A N. C.	D-31	56-5 30	White-Brown Yellow	Opens circuit to "wild feature hit relay".
B N. O.	C-35	63 74-3	Brown-Yellow Orange-Green	Completes circuit to homing unit step-up coil.
BALL GATE PULSE RELAY COIL	A-32	23-3 70	Blue-Yellow Orange	Energized by ball gate switch.
A N. O.	F-30	10-7 85-1	Red Black-White	Completes circuit to energize "ball gate lock relay".
B S. P. D. T.	C-31	90-4 56-9 23-3	Gray White-Brown Blue-Yellow	Lock-in circuit for this relay. Also charges 100 mfd. condenser.
C N. O.	F-7	27-2 93-2	Blue-Orange Gray-Yellow	Steps timer unit for 2nd, 3rd & 4th ball.
D S. P. D. T.	I-32	15-9 21-3 45	Red-White Blue-Red Green-White	Normally completes circuit to ball gate unit step-up coil. Completes circuit to ball gate unit reset coil and selector lock relay, when this relay is energized.
BALL GATE LOCK RELAY COIL	A-31	10-7 70	Red Orange	Energized by switch "A" on "ball gate pulse relay".
A N. O.	G-31	81-2 85-1	Black-Red Black-White	Lock-in switch for this relay.
B N. C.	G-30	31-4 30	Yellow-Red Yellow	Opens circuit to lifter start relay.

# BALL-GATE DELAY UNIT viewed from COIL side



# MOTOR ASSEMBLY (Part No. E-119-100)



**NOTE**  
 IN ORDER TO MAINTAIN PROPER CLEARANCES BETWEEN GEARS IT IS MOST IMPORTANT THAT WHEN REASSEMBLING GEAR TRAIN:  
 1. SHIMS BE REPLACED IN THEIR RESPECTIVE LOCATIONS.  
 2. SAME NUMBER OF SHIMS BE REPLACED IN EACH RESPECTIVE LOCATION.  
 CHECK PART NUMBER ON GEAR BEFORE ORDERING GEAR

**NOTE A:** Washers P-801-264 and P-801-265 are parts of Motor Rotor Assembly A-1725-2 and cannot be ordered separately.

**NOTE B:** Bearing M-652 is part of Gear Box Cover Assembly A-1600-1 and cannot be ordered separately.

**NOTE C:** Bearing M-650 is part of Gear Box Housing Assembly A-1599 and cannot be ordered separately.

# MISCELLANEOUS PARTS

## **Back Cabinet Assembly:**

Part No.

G-250	Back glass
M-281-14	Lock and keys (2) keyed alike
E-122-43	Transformer

## **Back Door Assembly:**

M-281-12	Lock and Keys (2) keyed alike
E-300-73	Search relay bank complete

## **Front Cabinet Assembly:**

M-168-15	Ball
AS-187-12	Ball shooter assembly
A-1540	Ball shooter housing
A-100-7	Ball shooter rod
SP-200-24	Ball shooter spring (long)
SP-237	Ball shooter spring (short)
R-108-3	Ball shooter tip
A-429-14	Ball trough only
P-1900-18	Cash box
E-130-10	Counter—48 volt
CA-756-2	Front moulding only
CA-350-1	Leg
M-163-4	Leg Adjuster
M-106	Leg Bolt
M-310-2	Leg—Anti-Split Bolt
P-2210-8	Plate—Coin entry—5¢
P-2210-9	Plate—Coin entry—10¢
M-497	Wire (long) for A-429-14 ball trough
M-497-1	Wire (short) for A-429-14 ball trough

## **Front Door Assembly:**

Part No.

A-1729-4	Button—Metal
C-2342-102	Coil for coin kicker assembly
E-101-45	Coil for coin lock out
AS-1316	Coin kicker assembly
AS-277-26	Coin switch assembly complete 5¢
AS-277-27	Coin switch assembly complete 10¢
CA-567-24	Front door only
AS-1511	Front door complete 5¢
AS-1511-1	Front door complete 10¢
A-254-37	Hinge and bracket
M-281-6	Lock and keys
E-108-32	Micro switch—Coin switch assembly 5¢ or 10¢ play
P-2768-5	Ring—Red—for A-1729-4 button
P-2768-6	Ring—Yellow—for A-1729-4 button
M-280-15	Slug rejector 5¢
M-280-16	Slug rejector 10¢

## **Rotary Switch Assembly—Front Cabinet:**

A-1123-3	Arm and roller
W-653	Contact plate
A-105-8	Gear
A-776-2	Knob and shaft
AS-901-6	Magnet and bracket assembly
E-101-53	Magnet only
AS-832-10	Rotary switch assembly complete
AS-1046-135	Wiper assembly

## **Panel Assembly—Top:**

AS-1315-1	Ball gate and switch assembly
C-326-9	Light shield post
R-115-4	Rebound rubber
M-170	Rebound Spring—Double post
R-243	Rubber ring for Yellow post
R-243-2	Rubber ring for Red post

