

Bally®

CIRCUS QUEEN

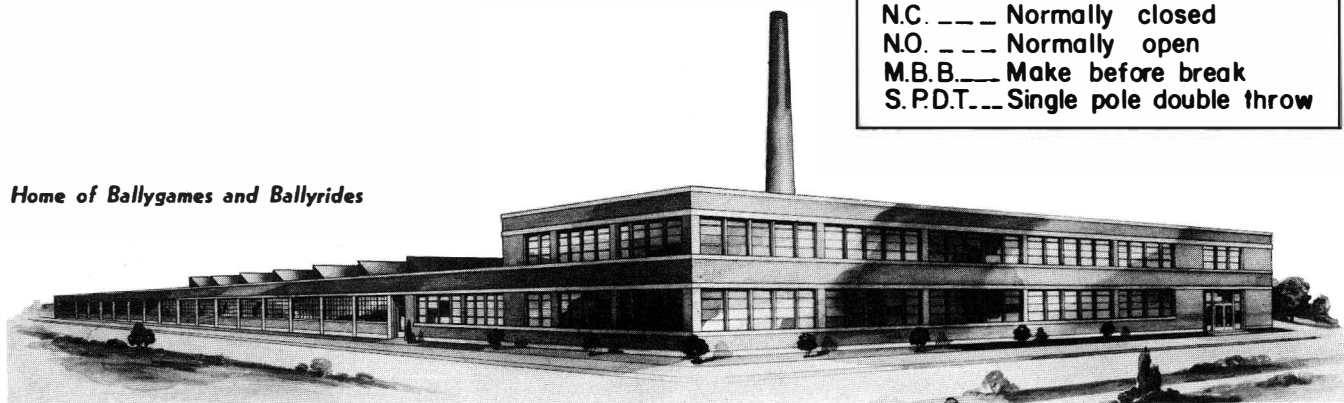
OPERATING INSTRUCTIONS AND PARTS CATALOG

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

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

Code	
N.C. ___	Normally closed
N.O. ___	Normally open
M.B.B. ___	Make before break
S.P.D.T. ___	Single pole double throw

Home of Ballygames and Ballyrides

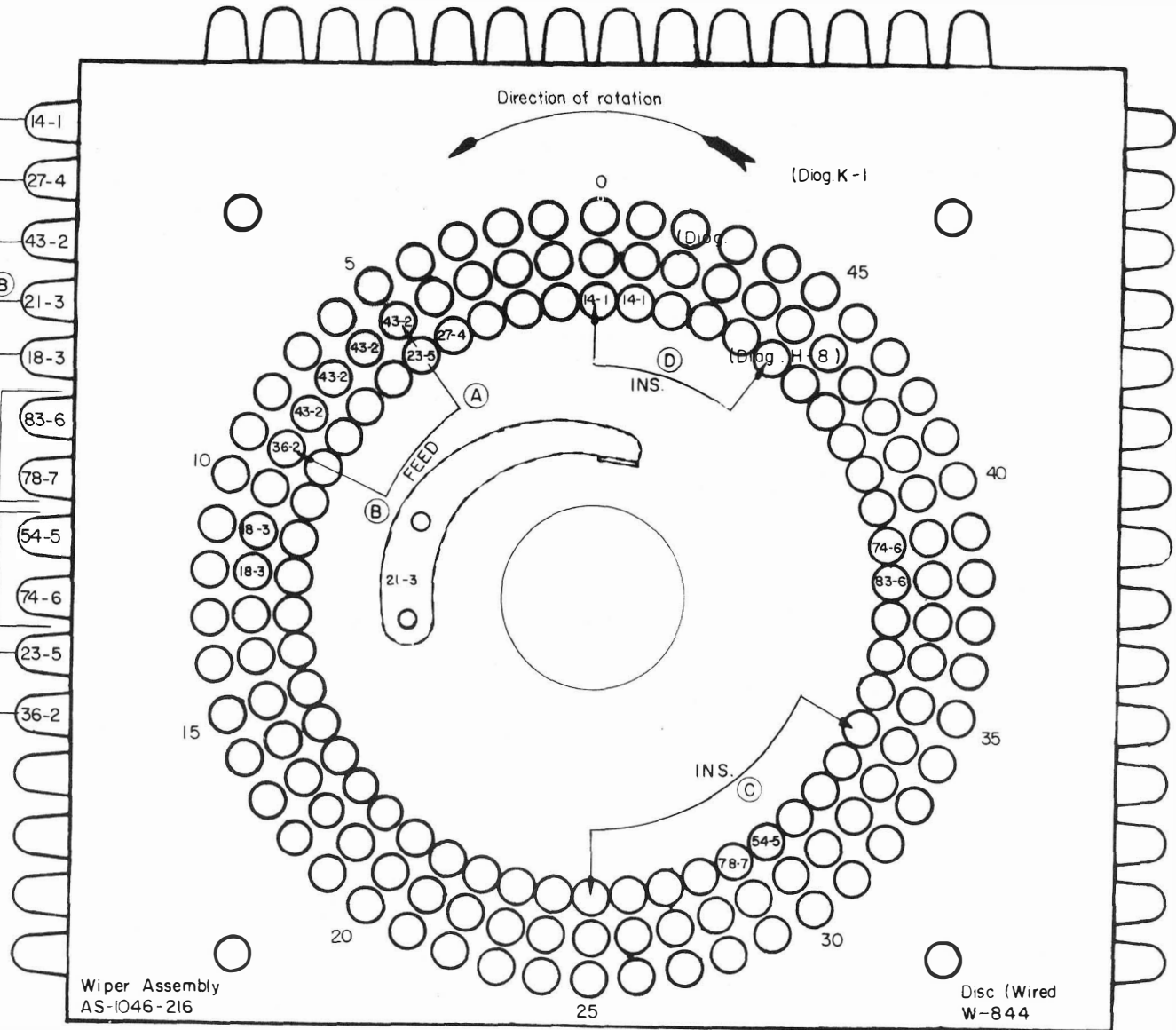




TIMER UNIT viewed from BUTTON or WIPER side

8 step unit. Wipers shown in zero or reset position

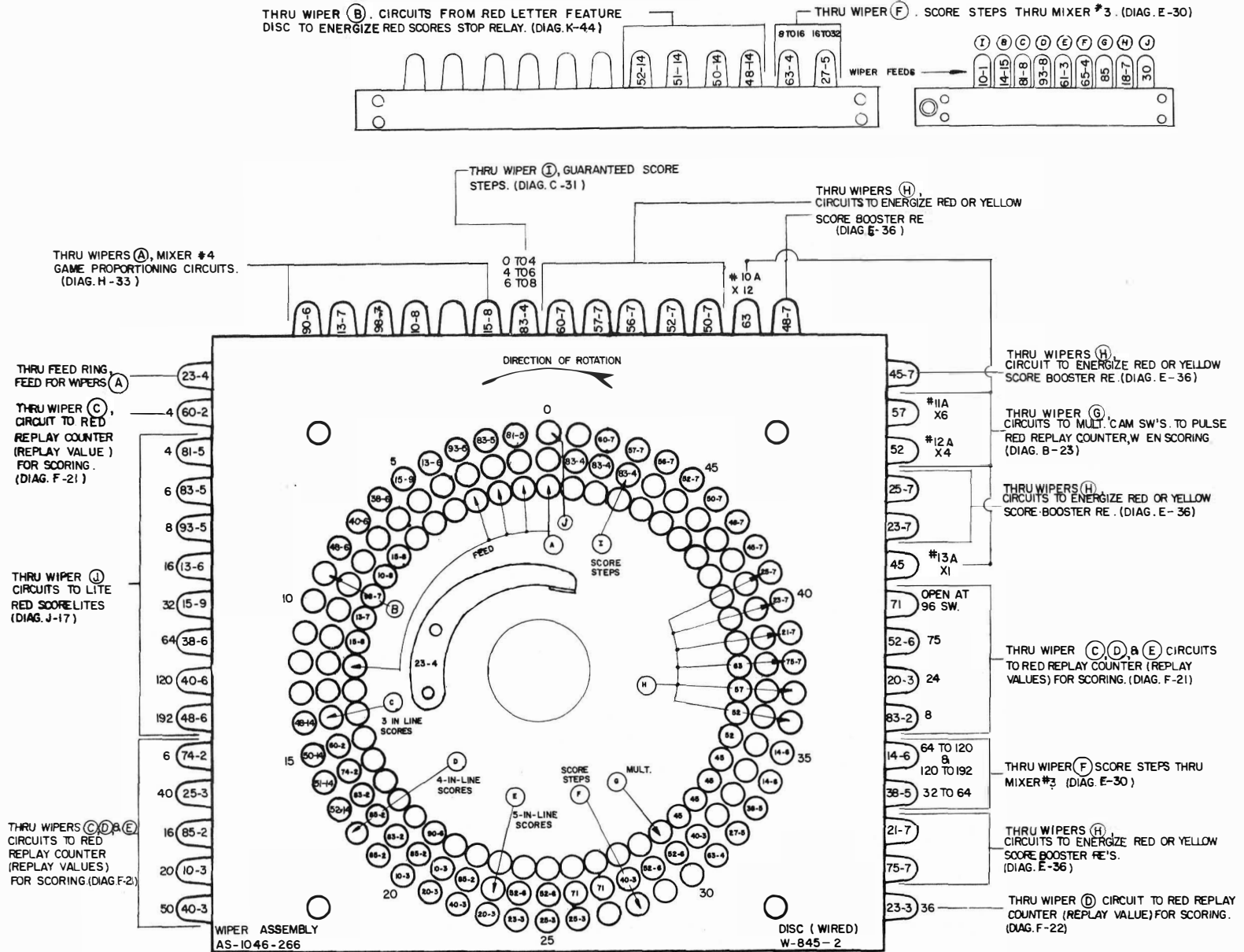
- Feed for wipers (D) ——— 14-1
- Thru wipers (D), circuit to flash
"select-now" lite at 4th step. ——— 27-4
- Thru wiper (A), circuit to step this
unit 1st 4 steps. ——— 43-2
- Thru feed ring, feed for wipers (A) & (B) ——— 21-3
- Thru wiper (B), circuit to close shutter
at 2nd step of unit. ——— 18-3
- Thru wipers (C), circuit to energize
before 4th selector lock trip relay,
when 4th ball is shot. (Diag.C-11) ——— 83-6
- Thru wipers (C), circuit to energize
before 5th selector lock trip relay,
when 5th ball is shot. (Diag.C-11) ——— 78-7
- Thru wipers (C), circuit to energize
before 5th selector lock trip relay,
when 5th ball is shot. (Diag.C-11) ——— 54-5
- Thru wipers (C), circuit to energize
before 5th selector lock trip relay,
when 5th ball is shot. (Diag.C-11) ——— 74-6
- Thru wipers (D), circuit to flash
"select-now" lite at 5th step. (Diag.K-1) ——— 23-5
- Thru wiper (A), circuit to step unit
from 4th to 5th step. (Diag.H-8) ——— 36-2



- Complete unit... AS-110-
- Reset coil... 28-R-15
- Step-up coil... 25-GG-7
- Step-up plunger... S-496-100
- Step-up arm... A-1765-4
- Ratchet & shaft... C-1050-8-43

RED SCORE UNIT viewed from BUTTON or WIPER side

8 step unit. Wipers shown in zero or reset position



THRU WIPER (B), CIRCUITS FROM RED LETTER FEATURE DISC TO ENERGIZE RED SCORES STOP RELAY. (DIAG. K-44)

THRU WIPER (F), SCORE STEPS THRU MIXER #3. (DIAG. E-30)

THRU WIPERS (A), MIXER #4 GAME PROPORTIONING CIRCUITS. (DIAG. H-33)

THRU WIPER (I), GUARANTEED SCORE STEPS. (DIAG. C-31)

THRU WIPERS (H), CIRCUITS TO ENERGIZE RED OR YELLOW SCORE BOOSTER RE. (DIAG. E-36)

THRU FEED RING FEED FOR WIPERS (A) 23-4

THRU WIPER (C), CIRCUIT TO RED REPLAY COUNTER (REPLAY VALUE) FOR SCORING. (DIAG. F-21)

THRU WIPER (J) CIRCUITS TO LITE RED SCORE LITES (DIAG. J-17)

THRU WIPERS (C, D, & E) CIRCUITS TO RED REPLAY COUNTER (REPLAY VALUES) FOR SCORING (DIAG. F-2)

THRU WIPERS (H) CIRCUIT TO ENERGIZE RED OR YELLOW SCORE BOOSTER RE. (DIAG. E-36)

THRU WIPER (G) CIRCUITS TO MULT. CAM SW'S. TO PULSE RED REPLAY COUNTER, W EN SCORING (DIAG. B-23)

THRU WIPERS (H) CIRCUITS TO ENERGIZE RED OR YELLOW SCORE BOOSTER RE. (DIAG. E-36)

THRU WIPER (C, D, & E) CIRCUITS TO RED REPLAY COUNTER (REPLAY VALUES) FOR SCORING. (DIAG. F-21)

THRU WIPER (F) SCORE STEPS THRU MIXER #3. (DIAG. E-30)

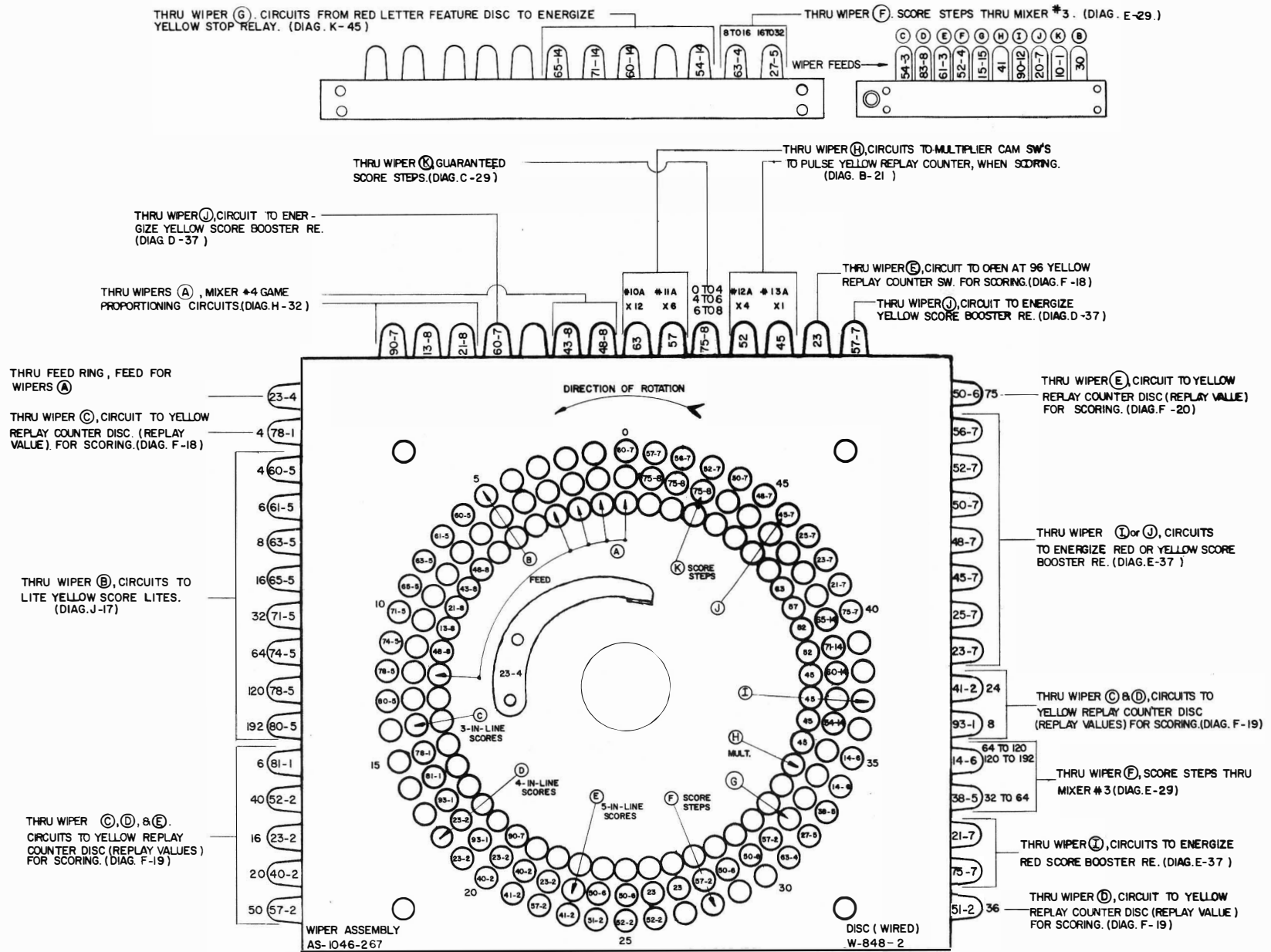
THRU WIPERS (H) CIRCUITS TO ENERGIZE RED OR YELLOW SCORE BOOSTER RE'S. (DIAG. E-36)

THRU WIPER (D) CIRCUIT TO RED REPLAY COUNTER (REPLAY VALUE) FOR SCORING. (DIAG. F-22)

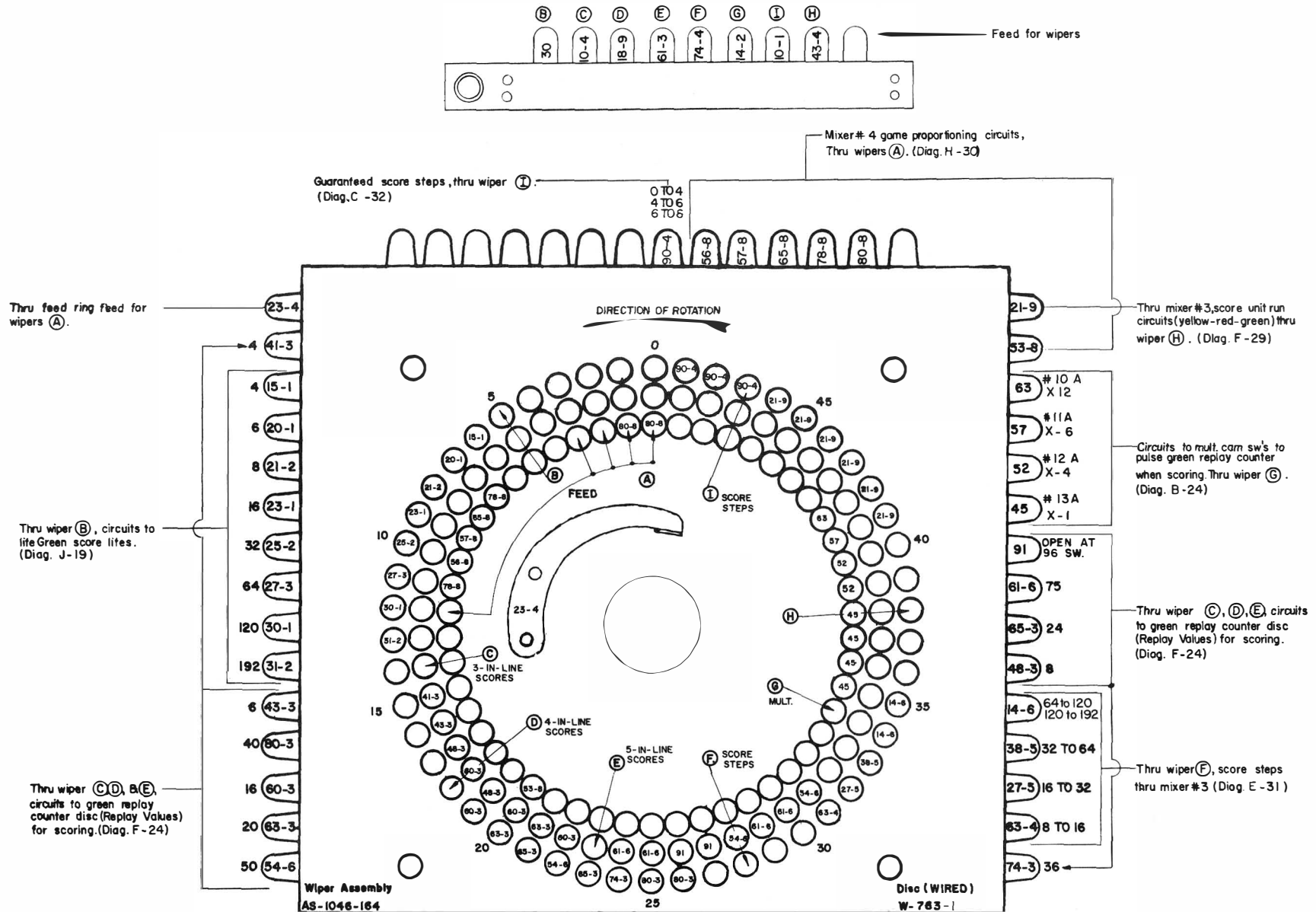
- COMPLETE UNIT — AS-1022-57
- RESET COIL — 28-R-15
- STEP-UP COIL — 25-GG-7
- STEP-UP PLUNGER — S-496-100
- STEP-UP ARM — A-1765-8
- RAICHET & S AFT — C-1050-B-39

YELLOW SCORE UNIT viewed from BUTTON or WIPER side

8 step unit. Wipers shown in zero or reset position



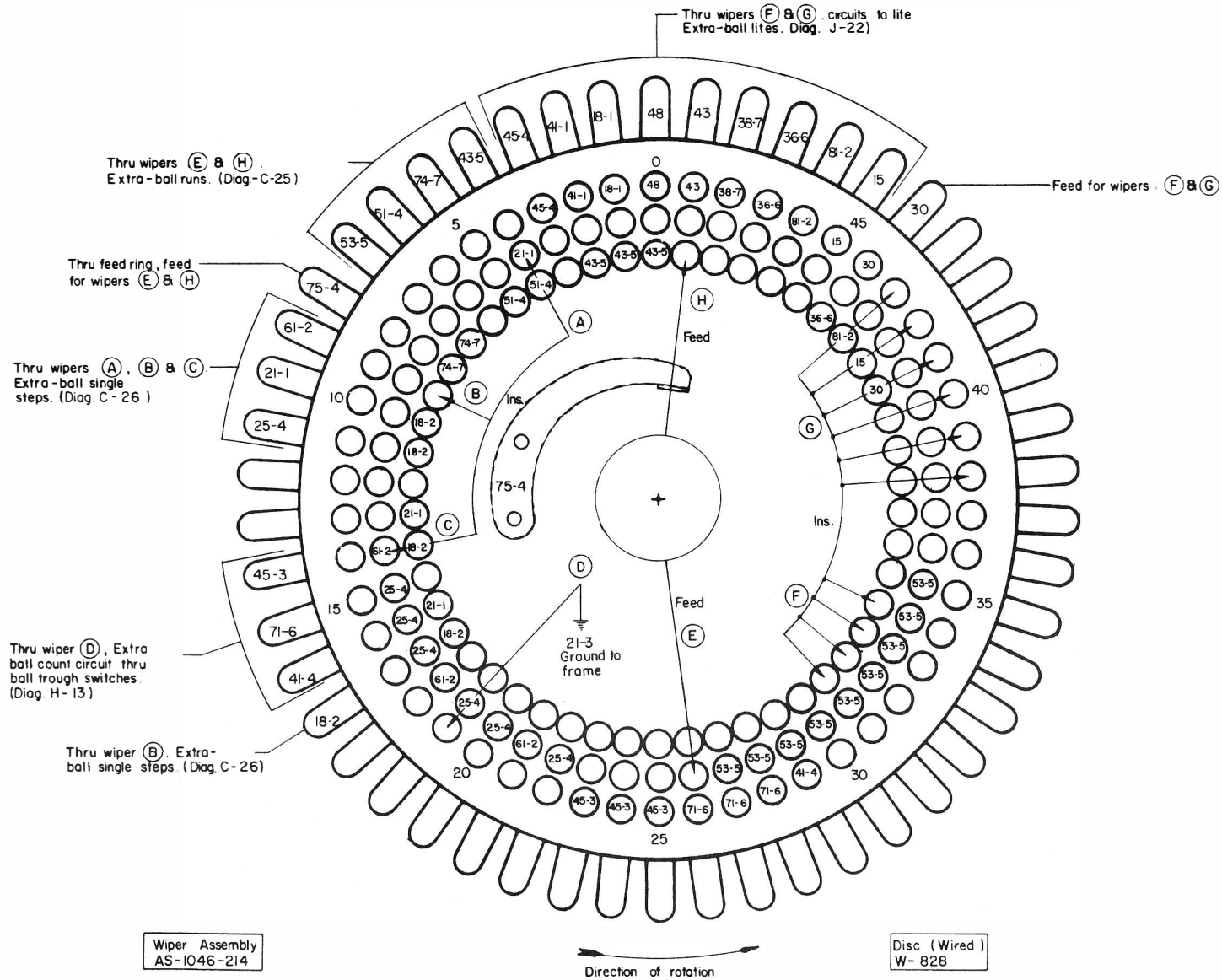
- COMPLETE UNIT — AS-1022-56
- RESET COIL — 28-R-15
- STEP-UP COIL — 25-GG-7
- STEP-UP PLUNGER — S-496-100
- STEP-UP ARM — A-1765-8
- RATCHET & SHAFT — C-1050-8-39



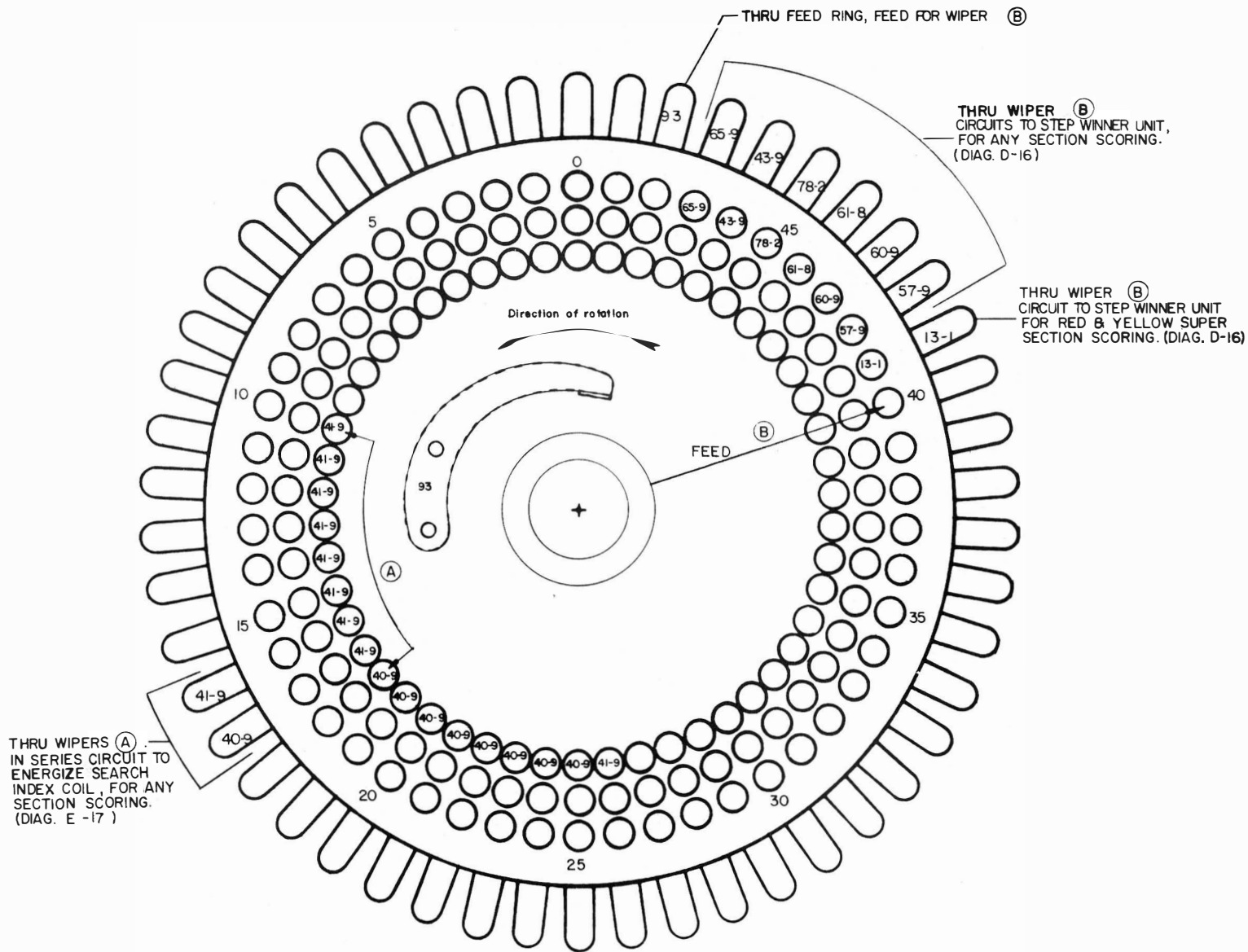
- Complete Unit — AS-1022-58
- Reset Coil — 28-R-15
- Step-Up Coil — 25-GG-7
- Step-Up Plunger — S-496-100
- Step-Up Arm — A-1765-8
- Ratchet & Shaft — C-1050-8-39

EXTRA BALL UNIT viewed from BUTTON or WIPER side

10 step unit. Wipers shown in zero or reset position



- Complete unit _ _ _ AS-1148-16
- Reset coil _ _ _ 28-R-15
- Step-up coil _ _ _ 25-GG-7
- Step-up plunger _ _ _ S-496-100
- Step-up arm _ _ _ A-1765-4
- Ratchet & shaft _ _ _ C-1050-10



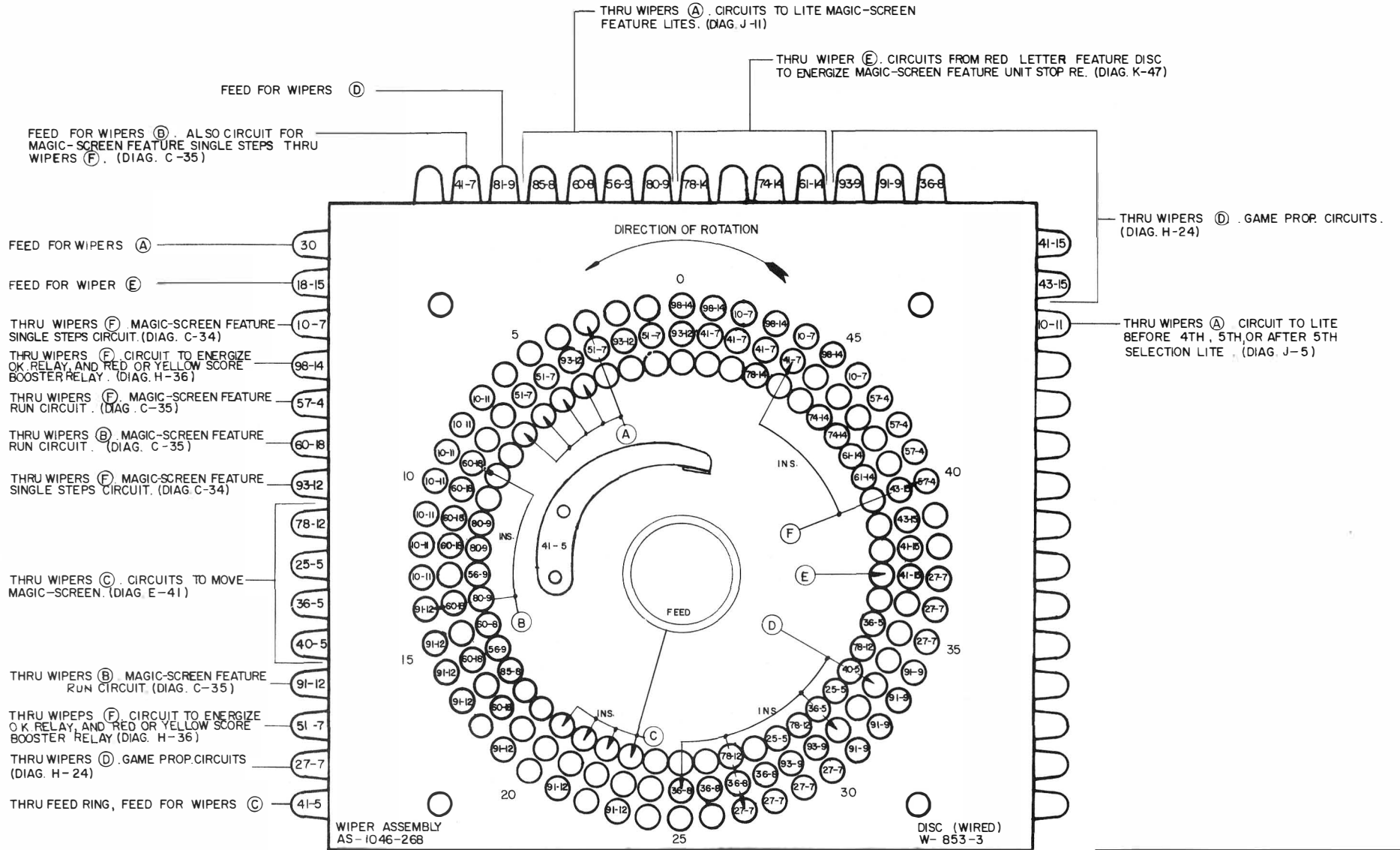
Complete unit...AS-827-71
 Reset coil...28-R-15
 Step-up coil...E-184-160
 Step-up arm...A-1765-4
 Step-up plunger...S-496-92
 Ratchet A shaft-C-1050-9-43

Wiper Assembly
 AS-1046-224

Disc (Wired)
 W-847

MAGIC SCREEN FEATURE UNIT viewed from BUTTON or WIPER side

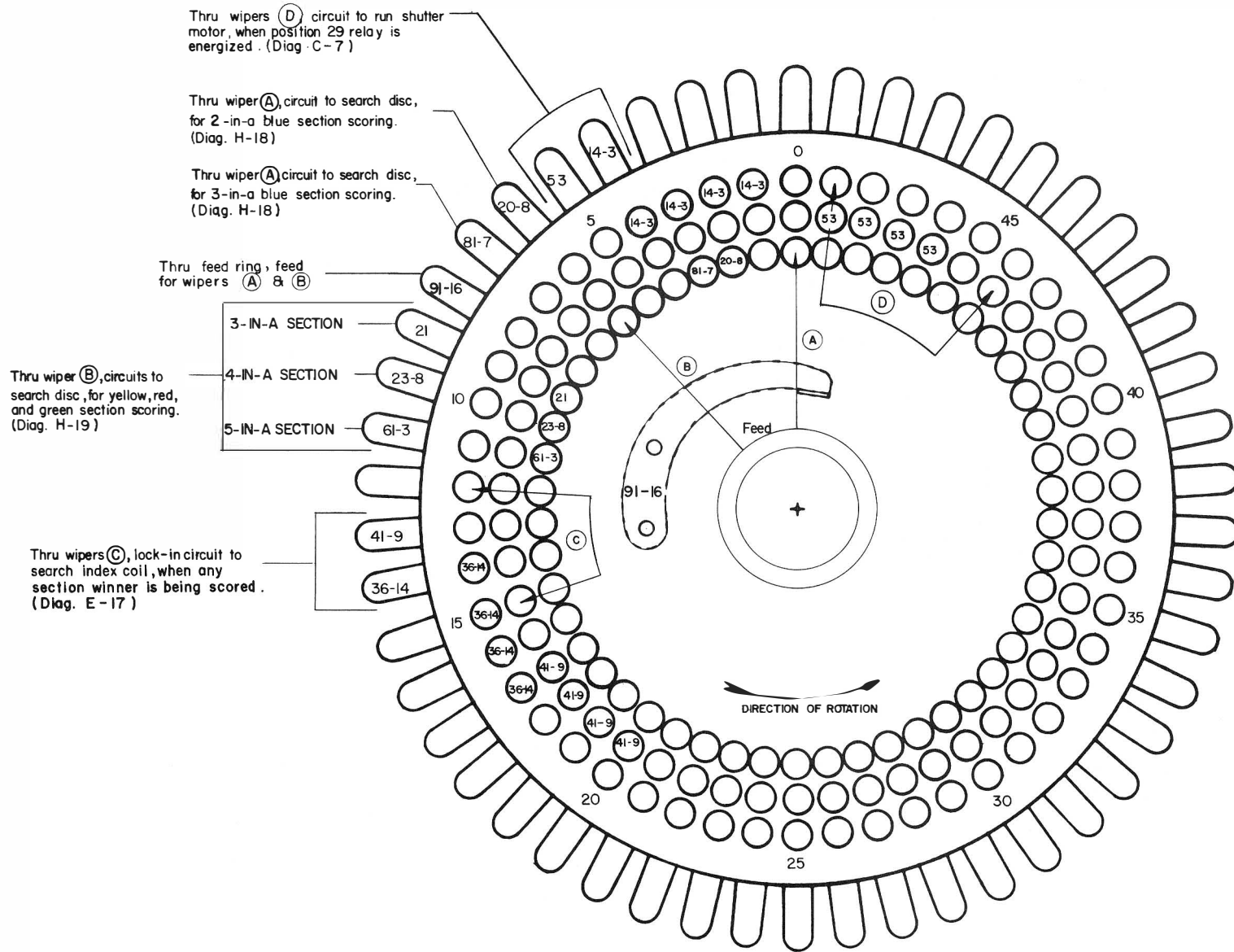
12 step unit. Wipers shown in zero or reset position



COMPLETE UNIT	AS-827-95
RESET COIL	28-R-15
STEP-UP COIL	25-GG-7
STEP-UP PLUNGER	S-496-100
STEP-UP ARM	A-1765-4
RATCHET & SHAFT	C-1050-10-43

WINNER UNIT viewed from **BUTTON** or **WIPER** side

5 step unit. Wipers shown in zero or reset position



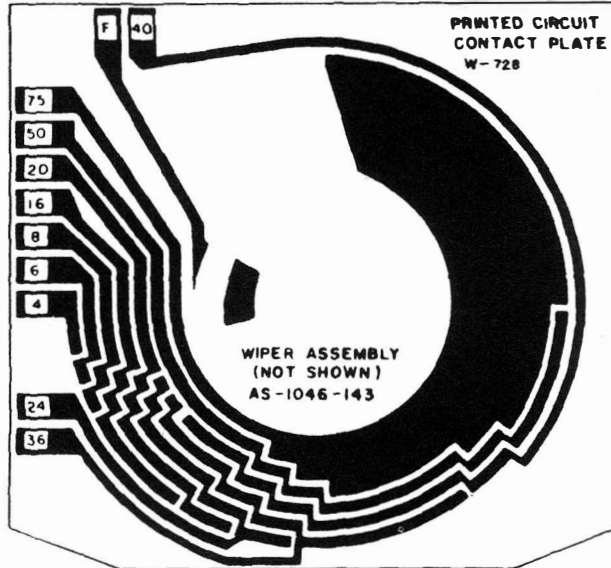
Complete unit... AS-827-94
 Reset coil 28-R-15
 Step-up coil.... 25-GG-7
 Step-up arm... A-1765-4
 Step-up plunger... S-496-100
 Ratchet & shaft... C-1050-5

Wiper Assembly
 AS-1046-265

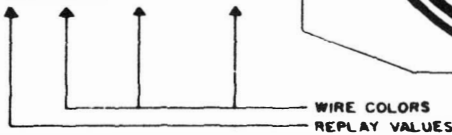
Disc (Wired)
 W-846-1

REPLAY COUNTER viewed from WIPER side 3 used (see code box at left)

LUG	YELLOW REPLAY COUNTER	RED REPLAY COUNTER	GREEN REPLAY COUNTER
50	57-2	40-3	54-6
75	50-6	52-6	61-6
F	23	71	91
36	51-2	23-3	74-3
24	41-2	20-3	65-3
20	40-2	10-3	63-3
16	23-2	85-2	60-3
8	93-1	83-2	48-3
6	81-1	74-2	43-3
4	78-1	60-2	41-3
40	52-2	25-3	80-3



Complete Unit - AS-797-36
 Reset Coil - 28-R-15
 Step-up Coil - 25-GG-7
 Step-up Plunger - S-496-116
 Step-up Arm - A-1765-4
 Ratchet & Shaft - C-100

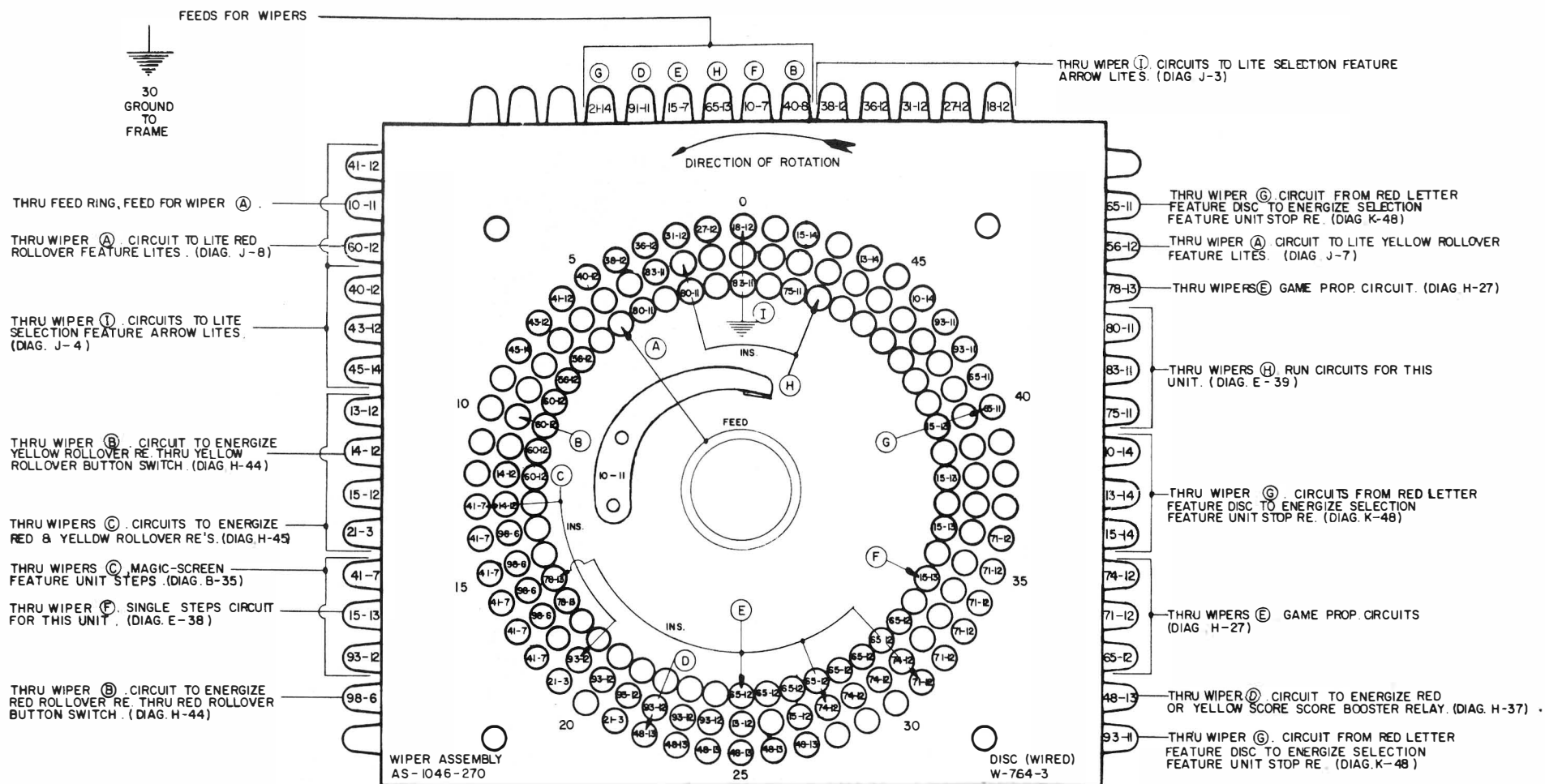


CAM SWITCHES THAT PULSE YELLOW, GREEN & RED REPLAY COUNTER STEP-UP COILS								
	SW 13A	SW 13A	SW 13A	SW 13A	SW 12A	SW 12 A	SW 11 A	SW 10A
5 IN LINE	75 	75 	96 	96 	200 	300 	450 	600
4 IN LINE	16 	20 	24 	50 	96 	144 	240 	480
3 IN LINE	4 	6 	8 	16 	32 	64 	120 	192

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.

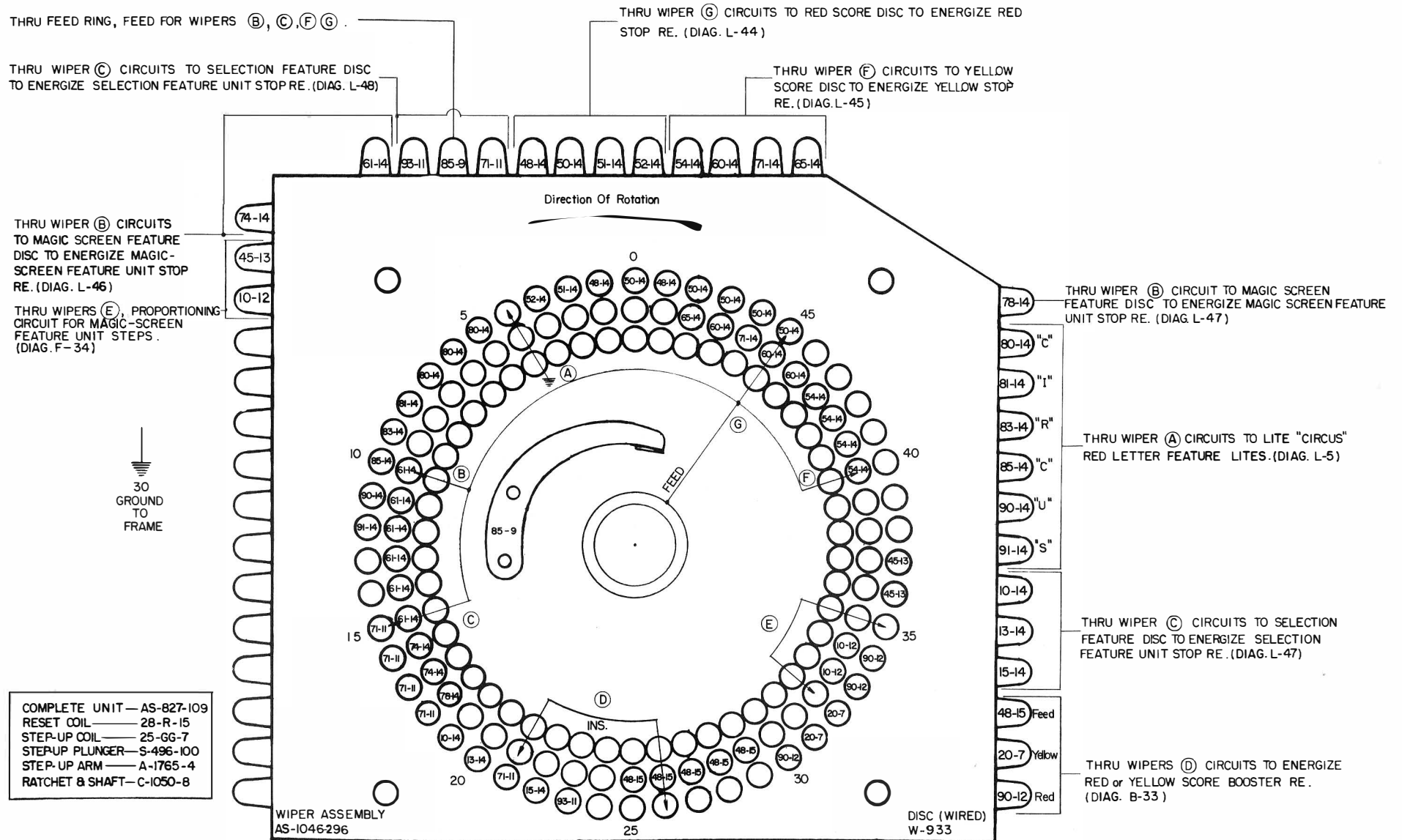
EXAMPLE: ON A 3-IN-LINE SCORE OF REPLAYS THE CIRCUIT IS EFFECTIVE THRU THE REPLAY CIRCUIT STRIP

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



RED LETTER FEATURE UNIT viewed from BUTTON or WIPER side

8 step unit. Wipers shown in zero or reset position



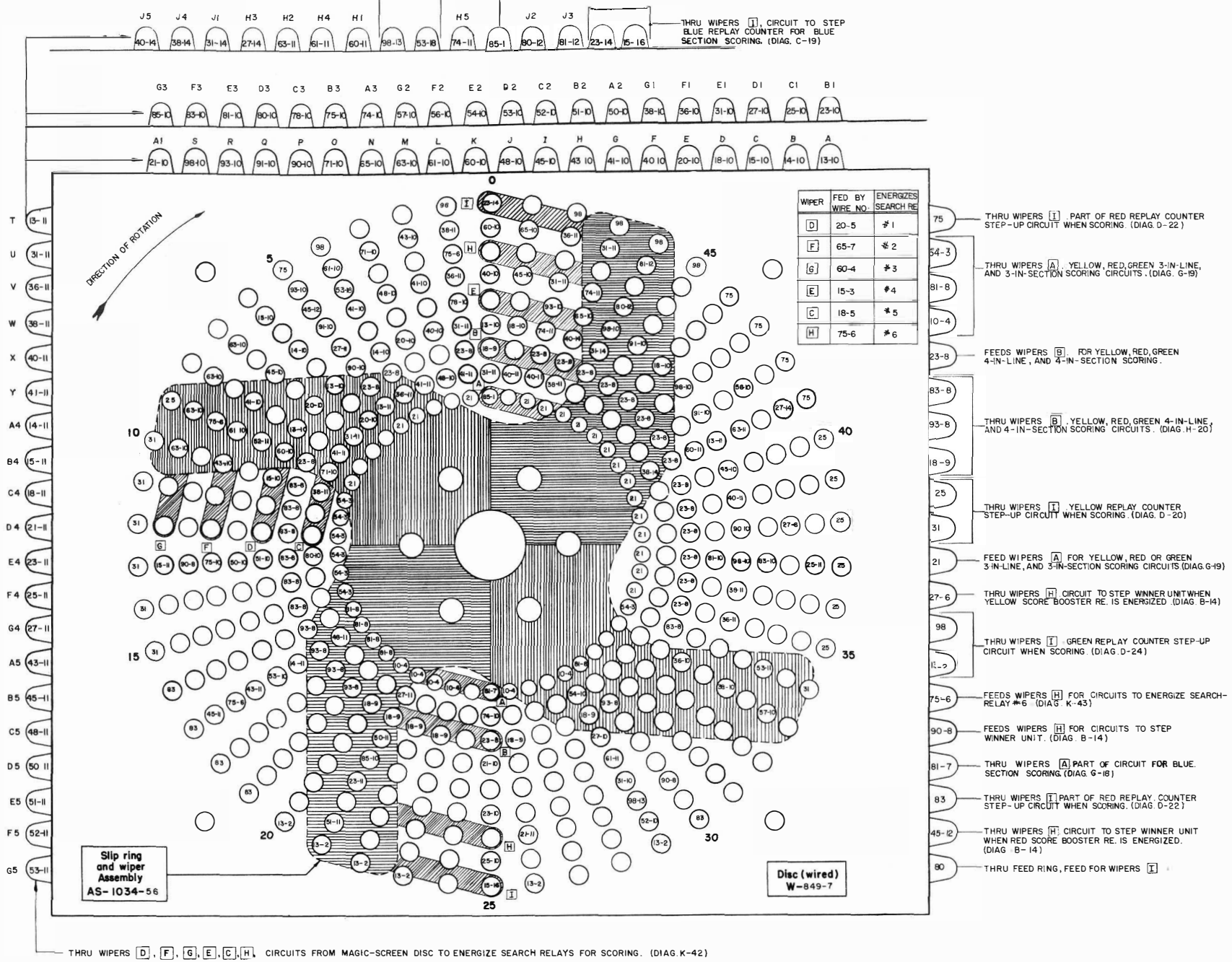
SEARCH POSITIONS CHART

	RED WIPER AT POSITION	WIPER D ROW 4 SEARCH RE. # 1	WIPER F ROW 6 SEARCH RE. # 2	WIPER G ROW 8 SEARCH RE. # 3	WIPER E ROW 5 SEARCH RE. # 4	WIPER C ROW 2 SEARCH RE. # 5	WIPER H ROW 7 SEARCH RE. # 6
6 NO. GREEN SECTION	1	B2	B3	B4	C3	D3	D4
	2						
	3						
	4						
RED SUPER SECTION	5	A4	A5	B5	C4	C5	
	6						
	7						
	8						
YELLOW SECTION	9	D5	E4	E5	F5	G4	G5
	10						
	11						
	12						
YELLOW SUPER SECTION	13	A1	B1	C1	A2	A3	
	14						
	15						
	16						
RED SECTION	17	D1	E1	C2	D2	E2	F2
	18						
	19						
	20						
4 NO. GREEN SECTION	21	F1	G1	G2	G3		
	22						
	23						
	24						
BLUE SECTION	25	E3	F3	F4			
	26						
	27						
	28						
ORANGE SECTION	29	H1	H2	H3	H4	J4	
	30						
	31						
	32						
	33						
YELLOW	VERTICAL LINE	34	J1	J2	J3		
	HORIZONTAL LINE	35	J5	H5	U	V	W
	HORIZONTAL LINE	36	H5	U	V	W	X
	VERTICAL LINE	37	D	I	N	S	X
RED	VERTICAL LINE	38	A	F	K	P	U
	HORIZONTAL LINE	39	U	V	W	X	Y
	HORIZONTAL LINE	40	F	G	H	I	J
	VERTICAL LINE	41	E	J	O	T	Y
GREEN	VERTICAL LINE	42	B	G	L	Q	V
	HORIZONTAL LINE	43	P	Q	R	S	T
	HORIZONTAL LINE	44	A	B	C	D	E
	DIAGONAL LINE	45	E	I	M	Q	U
DIAGONAL LINE	46	A	G	M	S	Y	
HORIZONTAL LINE	47	K	L	M	N	O	
VERTICAL LINE	48	C	H	M	R	W	
	49						
	50						

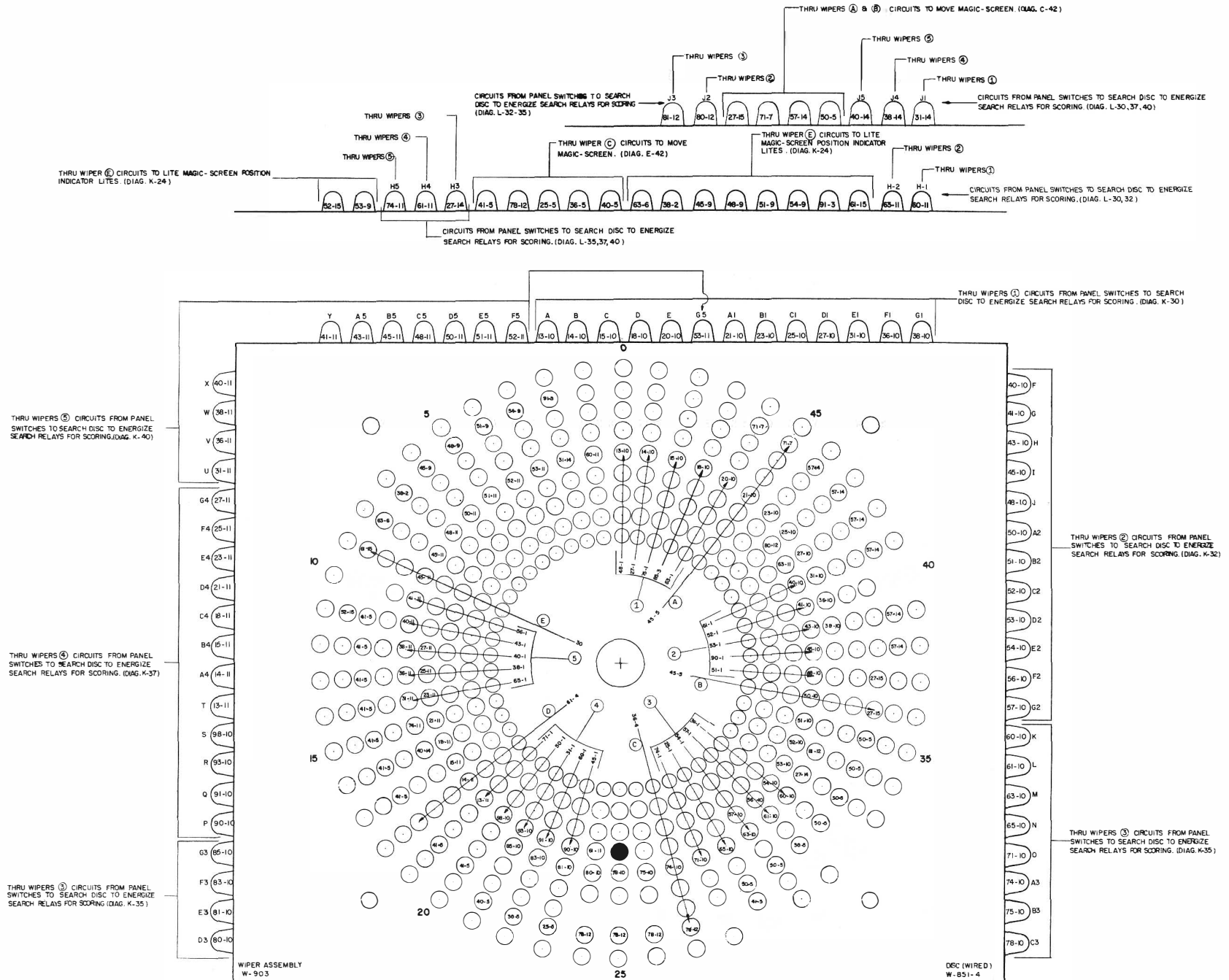
ROTATION OF SEARCH DISC WIPERS FROM 50 TO 1

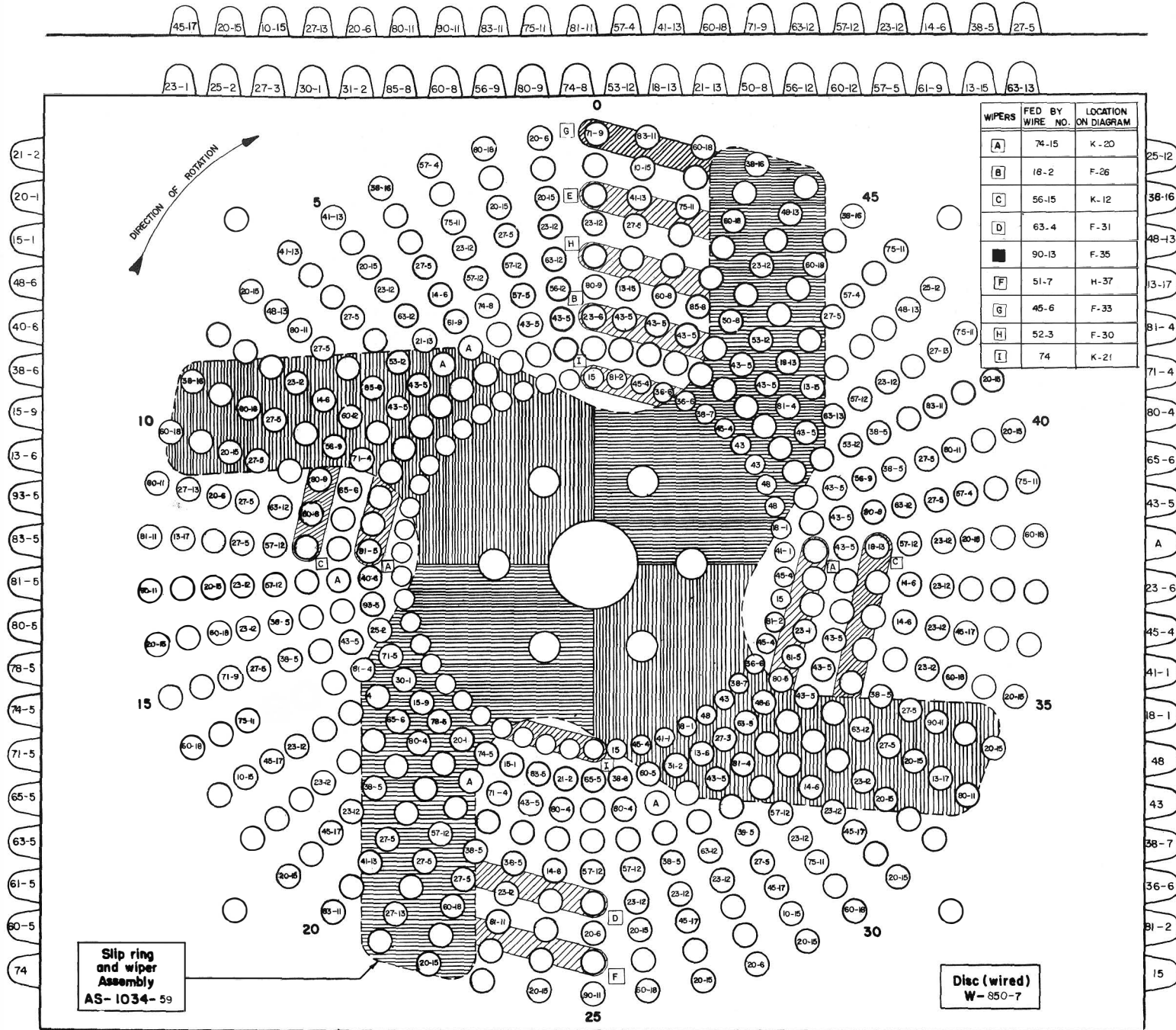
THRU WIPERS [H] CIRCUIT TO ENERGIZE POSITION 29 RE. (DIAG. G-44)

THRU WIPERS [A] PART OF CIRCUIT FOR BLUE SECTION SCORING. (DIAG. G-18)

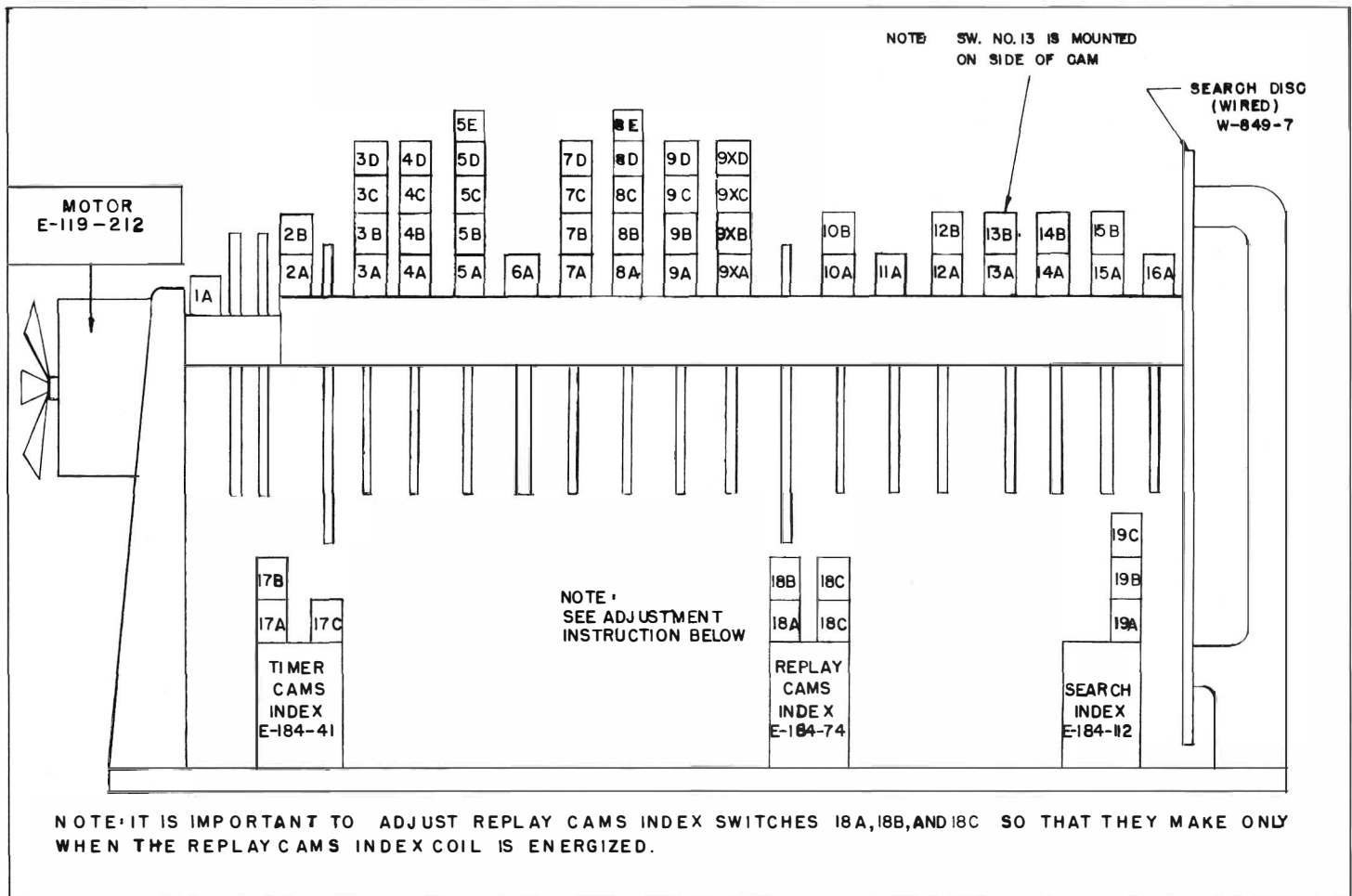


MAGIC SCREEN UNIT viewed from BUTTON or WIPER side



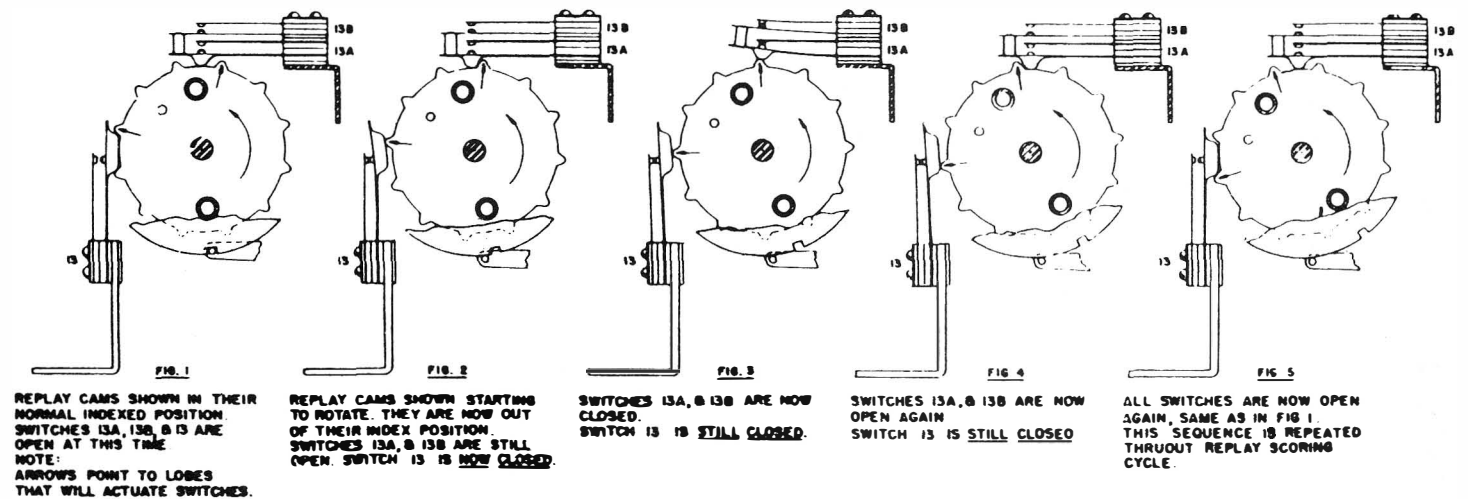


CONTROL UNIT PICTORIAL VIEW NUMBERS CORRESPOND TO SWITCH CHART ON PAGE 134



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.



CONTROL UNIT CAM SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 133

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.O.	G-8 36-9 65-2	Yellow-Brown Brown-White	In series with circuit to step timer unit after 5th ball is shot.
2A	N.O.	I-3 90-5 30	Gray Yellow	Pulses reflex play magnet coil, replay register unit reset coil, and total plays meter.
2B	N.O.	F-38 10-2 61-7	Red Brown-Red	Completes circuit to energize red or yellow score booster trip relay.
3A	N.C.	I-4 48-2 30	Green-Black Yellow	Opens start circuit.
3B	S.P.D.T.	B-18 93-7 98-4 91-7	Gray-Yellow Gray-Black Gray-Red	Directs circuit from replay meter to total plays meter.
3C	S.P.D.T.	C-49 60-13 57-13 21-3	Brown White-Orange Blue-Red	Directs circuit to energize, and lock-in play scores relay.
3D	S.P.D.T.	C-47 71-16 81-13 21-3	Orange-Red Black-Red Blue-Red	Completes circuit to energize, and lock-in play features relay.
4A	N.O.	I-47 98-1 30	Gray-Black Yellow	Energizes spotting cams index coil.
4B	N.O.	E-46 56-5 30	White-Brown Yellow	Energizes score extra-step index coil.
4C	N.O.	D-5 27-9 80-2	Blue-Orange Black	Pulses coin meter (when coin meter is used).
4D	S.P.D.T.	G-5 13-9 90-9 14-5	Red-Yellow Gray Red-Green	(Safety circuit) opens start circuit, and completes a circuit to energize tilt relay if coin switch closed too long.
5A	N.O.	G-9 65-2 83-1	Brown-White Black-Yellow	Completes a circuit to reset timer unit when playing extra-balls.
5B	N.O.	B-26 21-1 38-4	Blue-Red Yellow-Black	Completes circuit for extra-ball unit single steps. (Guaranteed)
5C	N.O.	D-27 78-4 91-6	Orange-Black Gray-Red	Completes circuit to energize anti-cheat relay.
5D	N.O.	F-32 10-7 85-4	Red Black-White	Completes circuit for magic-screen feature unit, and selection feature unit single steps. (Guaranteed)
5E	N.C.	D-47 21-3 40-15	Blue-Red Green	Opens features lock relay, and scores lock relay lock-in circuit.
6A	N.C.	I-29 21-3 75-5	Blue-Red Orange-White	Opens circuit for features and scores during spin.
7A	N.O.	D-28 10-1 54-12	Red White-Green	Completes circuit for yellow, red, and green score unit guaranteed single steps.
7B	N.O.	D-47 21-3 43-14	Blue-Red Green-Yellow	Completes circuit to energize features lock relay or scores lock relay when playing for scores or features.
7C	N.O.	F-28 60-6 63-4	Brown Brown-Yellow	Completes circuit for yellow, red, and green score unit steps.
7D	N.O.	F-29 52-3 60-6	White-Blue Brown	Same function as switch 7C above.
8A	N.O.	B-27 25-4 38-4	Blue-White Yellow-Black	Completes circuit for extra-ball unit steps.
8B	N.O.	F-36 18-7 61-7	Red-Black Brown-Red	Completes circuit to energize red or yellow score booster trip relay.
8C	N.O.	G-36 20-6 27-13	Blue Blue-Orange	Completes circuit to energize OK feature trip relay.
8D	N.O.	F-30 56-11 63-4	White-Brown Brown-Yellow	Completes circuit for yellow, red, and green score unit steps when playing for scores only.
8E	N.O.	D-28 54-12 91-5	White-Green Gray-Red	Completes circuit for yellow, red, and green score unit guaranteed steps when playing for scores only.

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
9A	Alt.	D-26 43-5 74-7	Green-Yellow Orange-Green	Proportioning circuit for extra-ball unit steps.
9B	Alt.	C-37 90-12 10-2 20-7	Gray Red Blue	Proportioning circuit for red or yellow score booster feature.
9C	Alt.	I-28 15-7 54-8	Red-White White-Green	Proportioning circuit for score unit steps, and extra-ball unit steps.
9D	Alt.	C-34 41-7 93-12	Green-Red Gray-Yellow	Proportioning circuit for magic-screen feature unit steps.
9XA	Alt.	D-38 14-13 25-12	Red-Green Blue-White	Proportioning circuit for blue score booster feature, and super blue feature.
9XB	Alt.	C-39 15-13 65-13	Red-White Brown-White	Proportioning circuit for selection feature unit steps.
9XC	Alt.	I-38 48-13 91-11	Green-Black Gray-Red	Proportioning circuit for red or yellow score booster feature.
9XD	Alt.	C-36 20-6 52-16	Blue White-Blue	Proportioning circuit for OK feature.
Mult. X12 10A	N.O.	A-22 63 70	Brown-Yellow Orange	Pulses yellow, red, and green replay counter unit step-up coil, when scoring with red, yellow and green scores at 8th step.
Mult. X12 10B	N.O.	B-19 23-17 27-17	Blue-Yellow Blue-Orange	Puls section score.
Mult. X6 11A	N.O.	A-22 57 70	White-Orange Orange	Pulses yellow, red, and green replay counter unit step-up coil, when scoring with yellow, red, and green scores at 7th step.
Mult. X4 12A	N.O.	A-21 52 70	White-Blue Orange	Pulses yellow, red and green replay counter unit step-up coil, when scoring with yellow, red and green scores at 5th or 6th step.
Mult. X4 12B	N.O.	B-20 10-16 27-17	Red Blue-Orange	Pulses blue replay counter coil, when scoring 300 for blue section score.
Mult. X1 13A	N.O.	A-21 45 70	Green-White Orange	Pulses yellow, red, and green replay counter unit step-up coil, when scoring with yellow, red, and green scores at 1st, 2nd, 3rd or 4th step.
13B	N.O.	D-18 48-4 80	Green-Black Black	Pulses replay register unit step-up coil, reflex replay magnet coil, and replay meter when scoring.
Backside 13	N.O.	H-18 21-3 27	Blue-Red Blue-Orange	Completes in-line or section replay scoring lock-in circuit when scoring. (See control unit pictorial view for important adjustment instruction)
14A	N.C.	H-15 14 18	Red-Green Red-Black	In series with all in-line and section replay scoring circuits.
14B	N.C.	C-8 27-2 90-2	Blue-Orange Gray	Opens timer unit step-up circuit during replay scoring.
CHANGEOVER 15A	S.P.D.T.	H-17 56 18 54	White-Brown Red-Black White-Green	Directs circuit for in-line or section replay scoring.
CHANGEOVER 15B	S.P.D.T.	D-17 80 51-8 41-9	Black White-Red Green-Red	Directs circuit to energize search index coil for in-line or section replay scoring.
16A	N.O.	I-48 21-3 31-6	Blue-Red Yellow-Red	Completes circuit to reset sequence unit, and winner unit.
TIMERCAMS INDEXCOIL	A-6	93-2 70	Gray-Yellow Orange	Energized when playing coins or replays. (Each time start relay is energized)
17A	N.O.	G-1 20P 60P	Blue(Plastic) Brown(Plastic)	Completes a circuit to run control unit, and mixer-spotting unit motors.
17B	N.C.	G-6 27-9 71-2	Blue-Orange Orange-Red	Opens circuit to coin lock-out magnet coil.
17C	N.C.	F-12 13 30	Red-Yellow Yellow	Opens circuit to red button relay, and extra-ball trip relays.

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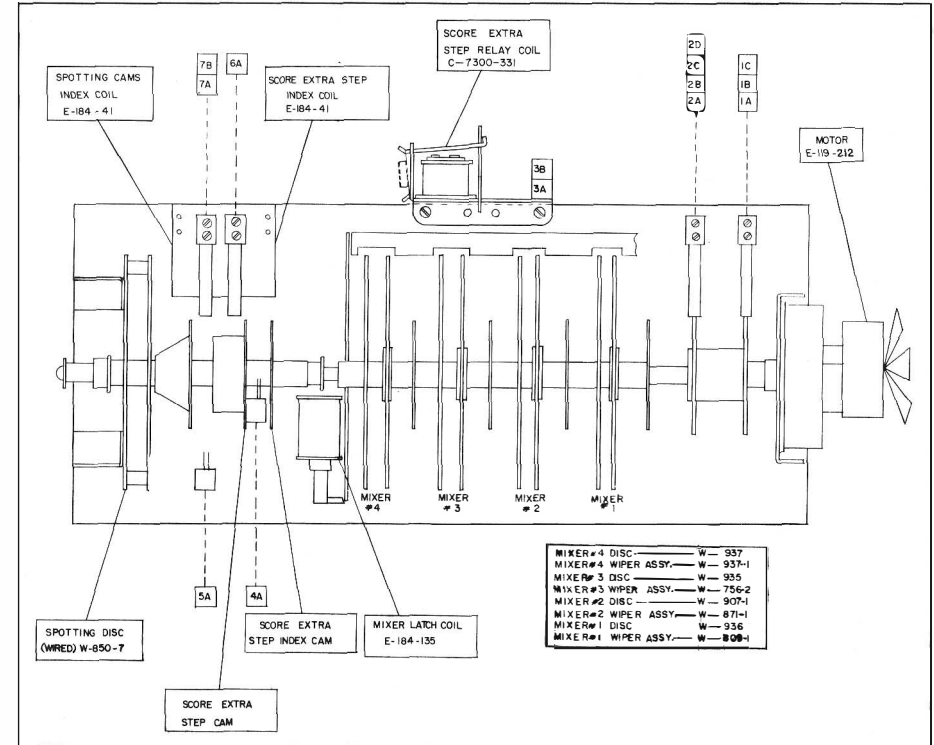
CONTROL UNIT CAM SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 133

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
REPLAY CAMS INDEX COIL	A-16	40-4 70	Green Orange	Energized by search index switch #19C when scoring, and releases replay cams to register replays.
18A N.O.	G-18	27 80	Blue-Orange Black	In series with in-line or section replay scoring lock-in circuit when scoring. (See control unit pictorial view for important adjustment instruction of switches 18A, 18B, 18C.)
18B N.O.	H-15	14 18	Red-Green Red-Black	Same function as switch 18A above.
18C N.O.	F-18	36-14 80	Yellow-Brown Black	In series with section replay scoring lock-in circuit.
18D N.C.	B-16	15-2 91-8	Red-White Gray-Red	Opens direct 50 volt circuit to search index coil.
SEARCH INDEX COIL	A-16	15-2 70	Red-White Orange	Energized when scoring in-line or section scores, and stops search wipers at proper position to record scores.
19A N.O.	E-43	10-9 98-13	Red Gray-Black	Completes circuit to energize position 29 relay for scoring a red letter game.
19B N.O.	H-18	54 91-16	White-Green Gray-Red	In series with section replay scoring circuit.
19C N.O.	C-16	40-4 60	Green Brown	Completes circuit to energize replay cams index coil.
SEARCH INDEX LOCK MAGNET COIL	A-40	23-16 70	Blue-Yellow Orange	(Not shown on pictorial view) Energized by front rail collect scores button switch, and releases search wipers to search for scores.
SEARCH WIPER CAM 20A N.C.	H-42	14-4 20-2	Red-Green Blue	(Not shown on pictorial view) Opens circuit to magic screen buttons during search for scores.
SEARCH WIPER CAM 20B N.C.	C-5	13-16 83-3	Red-Yellow Black-Yellow	(Not shown on pictorial view) Opens circuit to start relay during search for scores.
SEARCH WIPER CAM 20C N.C.	D-40	23-16 52-9	Blue-Yellow White-Blue	(Not shown on pictorial view) Opens circuit to search index lock magnet coil after it has been energized.

MIXER AND SPOTTING UNIT ASSEMBLY

NUMBERS CORRESPOND TO SWITCH CHART BELOW



MIXER AND SPOTTING UNIT CAM SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

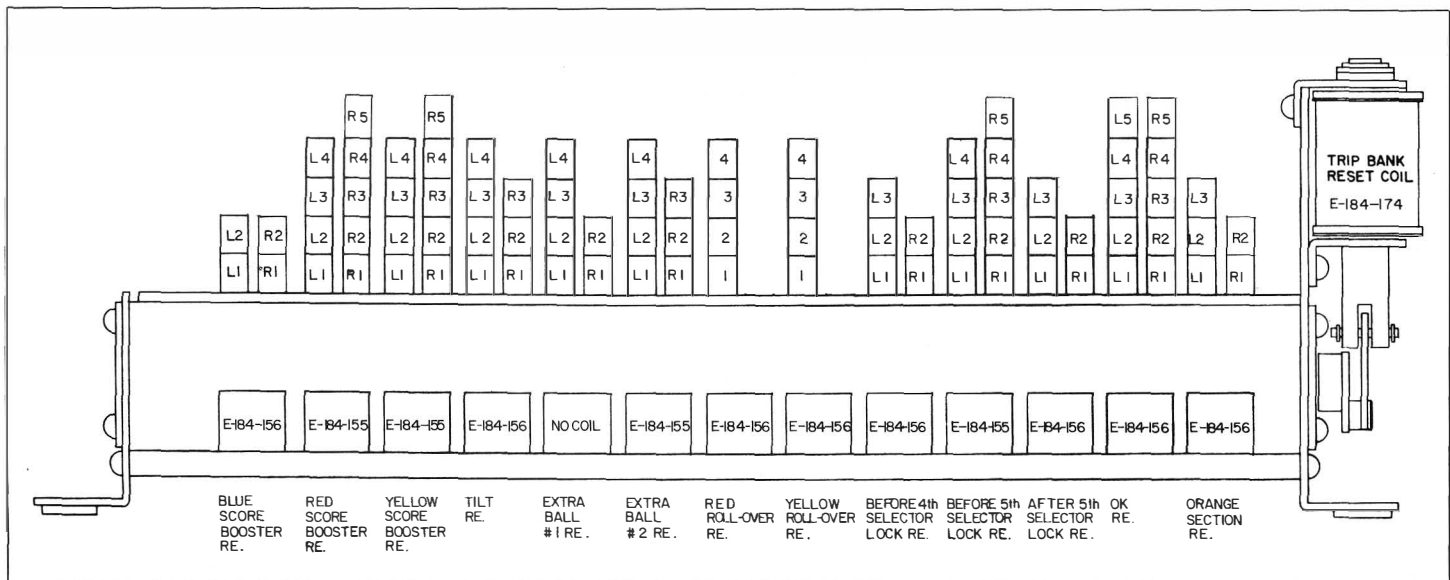
CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
16 PULSE 1A N.O.	G-34	45-6 98-14	Green-White Gray-Black	Completes circuit for game advantages thru spotting disc and other factors.
16 PULSE 1B N.O.	D-4	53-7 75-2	White-Yellow Orange-White	Completes replay register reset circuit when replay reset relay is energized.
16 PULSE 1C N.O.	J-2	10-11 90	Red Gray	Completes circuit to flash press buttons now lite for magic-screen feature.
16 PULSE 2A N.O.	G-15	52-8 93	White-Blue Gray-Yellow	Completes circuit to step sequence unit, and winner unit when searching for section scores.
16 PULSE 2B N.O.	B-26	38-4 78	Yellow-Black Orange-Black	Completes circuit for extra-ball unit multiple steps.
16 PULSE 2C N.O.	E-33	36-7 61-12	Yellow-Brown Brown-Red	Completes circuit for guaranteed game advantages when scoring red letter games.
16 PULSE 2D N.O.	B-18	40-16 80-16	Green Black	Completes circuit to put blue replay counter back to zero when starting new game.

MIXER AND SPOTTING UNIT CAM SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 135

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SCORE EXTRA STEP RELAY COIL	A-9	43-6 70	Green-Yellow Orange	Energized by red, yellow, or green score unit step-up arm switches.
3A N.O.	C-10	43-6 81-3	Green-Yellow Black-Red	Lock-in circuit for this relay.
3B N.O.	D-28	50-4 51-6	White White-Red	In series with circuit for yellow, red, and green score unit multiple steps.
SCORE EXTRA STEP PULSE SWITCH 4A N.O.	E-28	43-4 50-4	Green-Yellow White	Pulses yellow, red, and green score units for multiple steps.
SQUARE PIN SWITCH 5A N.C.	D-10	13-5 21-3	Red-Yellow Blue-Red	Opens lock-in circuit to score extra step relay.
SCORE EXTRA STEP INDEX COIL	A-46	56-5 70	White-Brown Orange	Energized by control unit cam switch 4B during each spin of game.
6A N.O.	C-10	13-5 81-3	Red-Yellow Black-Red	In series with score extra step relay lock-in circuit.
SPOTTING CAMS INDEX COIL	I-50	98-1 70	Gray-Black Orange	Energized by control unit cam switch 4A during each spin, and releases spotting wipers for cycle.
7A N.O.	J-21	13-4 30	Red-Yellow Yellow	Completes circuit to flash score lites or extra-ball lites.
7B N.O.	J-12	81-6 30	Black-Red Yellow	Completes circuit to flash game advantage lites.

TRIP RELAY BANK PICTORIAL VIEW NUMBERS CORRESPOND TO SWITCH CHART ON PAGE 137



TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 136

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
BLUE SCORE BOOSTER RELAY COIL	A-38	J 70	Jumper Orange	Energized thru spotting disc when circuit complete thru other factors.
L1 N.C.	A-38	38-16 J	Yellow-Black Jumper	Opens circuit to coil.
L2 S.P.D.T.	L-12	18-4 60-8 61-9	Red-Black Brown Brown-Red	Directs circuit to lite blue 3 scores 300, blue 3 scores 600, or blue 2 scores 600 feature lite.
R1 S.P.D.T.	B-19	10-16 15-16 23-17	Red Red-White Blue-Yellow	Directs circuit to step blue replay counter for scoring 300 or 600 for blue section score.
R2 S.P.D.T.	D-19	75-14 85-1 83-13	Orange-White Black-White Black-Yellow	In series with function of switch R1 above.
RED SCORE BOOSTER RELAY COIL	C-38	10-5 90-12	Red Gray	Energized thru spotting disc when circuit complete thru other factors. Also energized thru red letter feature disc as part of red letter game scoring.
L1 N.C.	E-35	41-13 93-13	Green-Red Gray-Yellow	Proportioning circuit for magic screen feature unit steps.
L2 N.O.	J-8	54-7 80-9	White-Green Black	Completes circuit to red score booster feature lite.
L3 S.P.D.T.	D-30	65-4 63-7 52-4	Brown-White Brown-Yellow White-Blue	Proportioning circuit for red or yellow score unit steps.
L4 S.P.D.T.	D-30	83-4 25-14 75-8	Black-Yellow Blue-White Orange-White	Same function as switch L3.
R1 N.C.	H-24	27-7 78-11	Blue-Orange Orange-Black	Open circuit to mixer #2 relay.
R2 N.O.	B-14	13-1 45-12	Red-Yellow Green-White	Completes a circuit thru search disc to step winner unit when searching for section scores.
R3 N.C.	B-37	10-5 53-6	Red White-Yellow	Opens circuit to this coil. Also opens circuit to yellow score booster trip relay coil.
R4 N.C.	D-39	15-13 36-13	Red-White Yellow-Brown	Proportioning circuit for selection feature unit steps.
R5 N.C.	L-9	21-13 43-7	Blue-Red Green-Yellow	Opens circuit for flashing yellow score booster feature lite.

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
YELLOW SCORE BOOSTER RELAY COIL	C-36	10-5 20-7	Red Blue	Energized thru spotting disc when circuit complete thru other factors. Also energized thru red letter feature disc as part of red letter game scoring.
L1 N.C.	D-35	91-12 93-13	Gray-Red Gray-Yellow	Proportioning circuit for magic screen feature unit steps.
L2 N.O.	K-9	43-7 80-9	Green-Yellow Black	Completes circuit to yellow score booster feature lite.
L3 S.P.D.T.	D-30	52-4 31-9 65-4	White-Blue Yellow-Red Brown-White	Proportioning circuit for red or yellow score unit steps.
L4 S.P.D.T.	C-30	75-8 38-9 83-4	Orange-White Yellow-Black Black-Yellow	Same function as switch L3.
R1 N.C.	A-37	53-6 70	White-Yellow Orange	Opens circuit to this coil. Also opens circuit to red score booster trip relay coil.
R2 N.O.	B-15	13-1 27-6	Red-Yellow Blue-Orange	Completes a circuit thru search disc to step winner unit when searching for section scores.
R3 N.C.	D-39	36-13 65-13	Yellow-Brown Brown-White	Proportioning circuit for selection feature unit steps.
R4 N.C.	I-24	78-11 81-9	Orange-Black Black-Red	Opens circuit to mixer #2 relay.
R5 N.C.	L-9	18-13 54-7	Red-Black White-Green	Opens circuit for flashing red score booster lite.
TILT RELAY COIL	A-12	14-5 70	Red-Green Orange	Energized by any tilt switch. Also thru control unit cam switch 4D if coin switch is closed too long.
L1 N.C.	H-38	40-8 93-3	Green Gray-Yellow	Opens circuits for moving magic-screen, and energizing search index lock magnet.
L2 N.C.	M-27	10 20-4	Red Blue	Opens 17 volt circuits.
L3 S.P.D.T.	I-7	21-3 30 45-8	Blue-Red Yellow Green-White	Opens circuit to this coil. Also opens game advantages, scoring, and playing circuits, and completes circuit to close shutter if tilt occurs with shutter open.
L4 S.P.D.T.	L-25	38 54-2 91-2	Yellow-Black White-Green Gray-Red	Opens 6 volt lite circuits, and completes circuit to tilt lite.
R1 N.C.	G-2	30P 60P	Yellow(Plastic) Brown(Plastic)	Opens circuit to control unit, and mixer-spotting unit motors.
R2 N.O.	F-13	57-6 85-7	White-Orange Black-White	Completes a circuit to energize red button relay.
R3 N.O.	B-4	13-6 83-3	Red-Yellow Black-Yellow	Completes a circuit for starting new game if tilt occurred during search cycle.

CONTINUED ON NEXT PAGE

TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 136

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
EXTRA-BALL #1 RELAY				Trips with extra-ball #2 relay.
L1 N.C.	E-27	85-4 91-6	Black-White Gray-Red	In series with circuit to energize anti-cheat relay.
L2 N.O.	G-9	71-8 83-1	Orange-Red Black-Yellow	In series with circuit to reset timer unit while playing extra-balls.
L3 S.P.D.T.	E-26	85-4 30 61-2	Black-White Yellow Brown-Red	In series with circuits to energize anti-cheat relay, and score units guaranteed steps when relay is latched. In series with extra ball step-up circuit when relay is tripped.
L4 S.P.D.T.	H-28	60-6 56-6 18-2	Brown White-Brown Red-Black	Opens circuit for score steps, and completes circuit for extra-ball steps.
R1 N.C.	J-12	27-16 81-6	Blue-Orange Black-Red	Opens circuit for flashing other game feature lites.
R2 S.P.D.T.	I-28	75-5 15-7 45-2	Orange-White Red-White Green-White	In series with function of switch L4 above.
EXTRA-BALL #2 RELAY COIL	A-13	J 70	Jumper Orange	Energized by yellow button switch when playing for extra-balls. (After 5 balls are shot)
L1 N.C.	A-13	10-6 J	Red Jumper	Opens circuit to coil.
L2 N.O.	D-14	38-3 91-1	Yellow-Black Gray-Red	In series with circuit to run ball lifter motor to raise extra-balls.
L3 S.P.D.T.	D-6	14-3 61 98-2	Red-Green Brown-Red Gray-Black	Opens circuit to run shuttermotor when starting new game, and completes a circuit to energize mixer latch, and timer cams index coils.
L4 S.P.D.T.	J-21	31-5 13-4 74	Yellow-Red Red-Yellow Orange-Green	Opens circuit to flash score lites, and completes circuit to flash extra-ball lites.
R1 N.C.	H-28	45-2 83-9	Green-White Black-Yellow	Opens other game feature circuits.
R2 N.O.	K-25	21-4 50-9	Blue-Red White	Completes circuit to lite extra balls feature lite.
R3 N.O.	H-28	56-6 54-8	White-Brown White-Green	In series with circuit for extra ball steps.
RED ROLLOVER RELAY COIL	A-45	J 70	Jumper Orange	Energized directly thru selection feature disc, also by red rollover button switch, thru selection feature disc.
1 N.C.	B-45	25-13 J	Blue-White Jumper	Opens circuit to coil.
2 N.O.	H-40	21-12 93-3	Blue-Red Gray-Yellow	Completes a circuit to keep magic screen buttons (left & right) alive until 6th ball (1st extra ball) is shot.
3 S.P.D.T.	J-1	51-12 90 52-13	White-Red Gray White-Blue	Opens circuit to flash select-now lite before 4th, and before 5th ball, and completes circuit to flash select-now lite after 5th ball.
4 S.P.D.T.	J-6	31-8 10-11 53-12	Yellow-Red Red White-Yellow	Opens circuit to select before 4th, and select before 5th ball feature lites, and completes circuit to lite select after 5th ball feature lite.

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
YELLOW ROLLOVER RELAY COIL	A-44	J 70	Jumper Orange	Energized directly thru selection feature disc. Also by yellow rollover button switch, thru selection feature disc.
1 N.C.	B-44	38-13 J	Yellow-Black Jumper	Opens circuit to coil.
2 N.O.	G-40	93-3 98-3	Gray-Yellow Gray-Black	Completes circuit to keep magic screen buttons (left & right) alive until 5th ball is shot.
3 S.P.D.T.	J-1	50-12 51-12 23-5	White White-Red Blue-Yellow	Opens circuit to flash select-now lite before 4th ball, and completes circuit to flash select-now before 5th ball.
4 S.P.D.T.	K-6	57-5 31-8 74-8	White-Orange Yellow-Red Orange-Green	Opens circuit to select before 4th ball feature lite, and completes circuit to select before 5th ball feature lite.
BEFORE 4th SELECTOR LOCK RELAY COIL	A-11	J 70	Jumper Orange	Energized thru timer unit disc, when 4th ball is shot.
L1 N.C.	B-11	83-6 J	Black-Yellow Jumper	Opens circuit to coil.
L2 S.P.D.T.	G-40	98-3 93-3 53-18	Gray-Black Gray-Yellow White-Yellow	Opens circuit to magic screen buttons (left & right) and, completes circuit to collect scores (R) button.
L3 N.O.	H-8	36-2 43-2	Yellow-Brown Green-Yellow	Thru timer unit disc, completes a circuit to step timer unit from 4th to 5th step.
R1 N.C.	K-1	27-4 50-12	Blue-Orange White	Opens circuit to flash select-now lite at 4th step of timer unit.
R2 N.O.	C-17	23-13 51-8	Blue-Yellow White-Red	In series with circuit to energize search index coil for scoring.
BEFORE 5th SELECTOR LOCK RELAY COIL	A-11	J 70	Jumper Orange	Energized thru timer unit disc, when 5th ball is shot.
L1 N.C.	B-11	74-6 J	Orange-Green Jumper	Opens circuit to coil.
L2 N.O.	C-13	10-6 25-8	Red Blue-White	Completes circuit to energize extra-ball relays, during extra-ball play.
L3 N.O.	E-4	18-6 50-2	Red-Black White	Completes circuit to energize start relay, during extra-ball play.
L4 S.P.D.T.	L-1	14-1 48-12 53-2	Red-Green Green-Black White-Yellow	Opens circuit to flash select-now lite before 5th ball, and completes circuit to flash it after 5th ball.
R1 N.C.	L-7	52-12 56-12	White-Blue White-Brown	Opens circuit to yellow rollover lite (on panel)
R2 N.C.	C-44	13-12 38-13	Red-Yellow Yellow-Black	Opens circuit to yellow rollover relay.
R3 N.O.	G-10	54-11 71-8	White-Green Orange-Red	Completes circuit to reset timer unit thru collect scores (R) button switch.
R4 N.O.	F-9	27-2 78-6	Blue-Orange Orange-Black	In series with circuit to step timer unit after 5th ball is shot.
R5 N.C.	G-41	21-12 98-3	Blue-Red Gray-Black	Opens circuit to magic-screen buttons (left and right).

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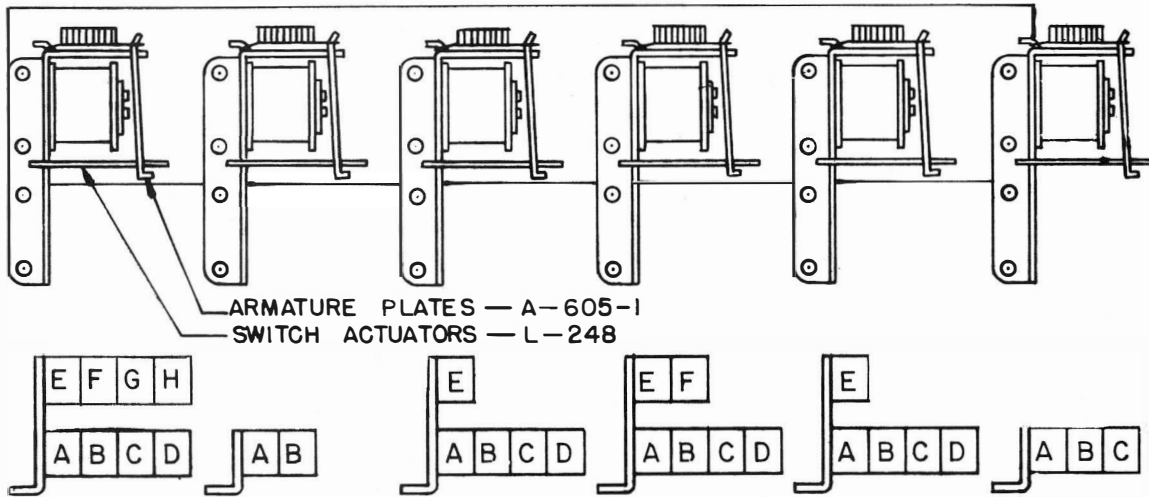
TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 136

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
AFTER 5th SELECTOR RELAY COIL	A-11	J 70	Jumper Orange	Energized when 6th ball (1st extra-ball) is shot.	
L1	N.C.	G-41	14-4 21-12	Red-Green Blue-Red	Opens circuit to magic screen buttons (left and right).
L2	N.C.	C-45	15-12 25-13	Red-White Blue-White	Opens circuit to red rollover relay.
L3	N.C.	A-11	98-11 J	Gray-Black Jumper	Opens circuit to coil.
R1	N.C.	K-2	52-13 53-2	White-Blue White-Yellow	Opens circuit to flash select-now lite.
R2	N.C.	L-8	41-8 60-12	Green-Red Brown	Opens circuit to red rollover lite (on panel).

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
OK RELAY COIL	A-36	J 70	Jumper Orange	Energized thru spotting disc, when circuit complete thru other factors.	
L1	N.C.	B-36	52-16 J	White-Blue Jumper	Opens circuit to coil.
L2	N.O.	L-10	50-8 30	White Yellow	Completes circuit to OK feature lite.
L3	N.O.	B-42	57-14 71-7	White-Orange Orange-Red	Thru magic screen unit disc, completes a circuit to magic screen unit index coil.
L4	N.O.	C-43	27-15 98-12	Blue-Orange Gray-Black	Thru magic screen unit disc, completes a circuit to move right winding of magic screen motor, and circuit to energize move right button relay.
L5	N.O.	E-34	20-15 21-16	Blue Blue-Red	In series with circuit to energize orange section feature relay.
R1	N.C.	H-26	53-13 74-12	White-Yellow Orange-Green	Proportioning circuit for scores, and extra-ball steps.
R2	N.O.	J-6	10-11 30	Red Yellow	In series with a circuit to flash select-now lite, and thru selection feature disc lite red or yellow rollover lite.
R3	N.C.	H-26	54-13 65-12	White-Green Brown-White	Proportioning circuit for scores, and extra ball steps.
R4	N.C.	I-25	21-3 56-13	Blue-Red White-Brown	Proportioning circuit for scores and extra ball steps.
R5	N.C.	F-39	83-11 90-11	Black-Yellow Gray	Proportioning circuit for selection feature unit steps.
ORANGE SECTION RELAY COIL	A-34	J 70	Jumper Orange	Energized thru spotting disc, when circuit complete thru other factors.	
L1	N.C.	B-34	21-16 J	Blue-Red Jumper	Opens circuit to coil.
L2	N.O.	J-9	13-15 30	Red-Yellow Yellow	Completes circuit to orange section feature lite.
L3	N.O.	C-18	60 80	Brown Black	Completes a circuit to energize replay cams index coil for orange section replay scoring.
R1	N.C.	H-26	43-13 65-12	Green-Yellow Brown-White	Proportioning circuit for scores, and extra-ball steps.
R2	N.C.	H-25	45-13 72-12	Green-White Orange-Red	Proportioning circuit for scores, and extra-ball steps.

6 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 141



NAME	POSITION #29 RE.	RIGHT BUTTON RE.	REPLAY RESET RE.	ANTI-CHEAT RE.	START RE.	RED BUTTON RE.
COIL TURNS & WIRE GAUGE	1800 # 33	2300 # 33	2300 # 33	2300 # 33	1800 # 33	2000 # 33
COIL RESISTANCE / NOMINAL %	65 Ω	85 Ω	85 Ω	85 Ω	65 Ω	75 Ω
OPERATING VOLTAGE	50 V.	50 V.	50 V.	50 V.	50 V.	50 V.
TEST VOLTAGE	37 V.	37 V.	37 V.	39 V.	32 V.	32 V.
EXTENSION SPRING LOAD	GREEN	CLEAR	YELLOW	YELLOW	YELLOW	CLEAR
SW. ACTUATOR STROKE	3/32	3/32	3/32	3/32	3/32	3/32
ADDITIONAL INFORMATION				THERMALEZE WIRE OR EQUIVALANT. NO WRAP ON COIL.		THERMALEZE WIRE OR EQUIVALANT. NO WRAP ON COIL.
COIL PART NO.	C-7300-334	C-7300-331	C-7300-331	C-7300-336	C-7300-334	C-7300-3310

SPRING CODE		
COLOR	PART NO.	LOAD
CLEAR	SP-199-13	13 OZ AT 15/16
BLUE	SP-199-14	21 OZ AT 15/16
YELLOW	SP-199-15	15 OZ AT 15/16
RED	SP-199-16	9 OZ AT 15/16
GREEN	SP-199-17	17 OZ AT 15/16

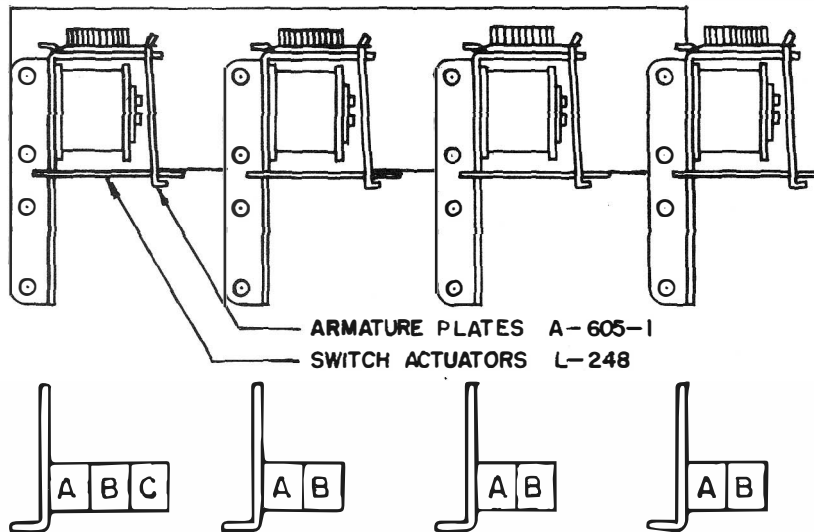
6 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 140

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
POSITION 29 RELAY COIL	A-44	38-15 70	Yellow-Black Orange	Energized thru search disc when scoring a red letter game.
A N.C.	B-32	15-4 74-3	Red-White Orange-Green	Opens green score unit step-up circuit.
B N.C.	C-18	60 80	Brown Black	Opens circuit to replay cams index coil.
C N.O.	F-33	25-18 61-12	Blue-White Brown-Red	Completes circuit for game advantages or red letter game scores.
D N.O.	D-44	10-9 63-8	Red Brown-Yellow	Lock-in circuit for this relay.
E N.C.	H-48	14-9 78-3	Red-Green Orange-Black	Opens green score unit, and red letter feature unit reset circuit.
F N.C.	H-29	18-16 83-9	Red-Black Black-Yellow	Opens regular game advantages circuit.
G N.O.	M-44	85-9 30	Black-White Yellow	Completes circuit to energize the stop relays to stop scores, and features at proper place, when scoring red letter games.
H N.O.	D-7	50-16 53	White White-Yellow	Completes a circuit to run shutter motor. (Opens shutter to dump balls)
RIGHT BUTTON RELAY COIL	A-43	45-5 70	Green-White Orange	Energized by right button switch on front rail, when circuit complete thru other factors.
A S.P.D.T.	B-43	48-5 25-6 45-5	Green-Black Blue-White Green-White	Opens circuit to move left winding of magic screen motor, and completes lock-in circuit to this relay.
B N.C.	G-42	31-16 36-4	Yellow-Black Yellow-Brown	Opens circuit left button switch on front rail.
REPLAY RE-SET RELAY COIL	A-4	75-2 70	Orange-White Orange	Energized when anti-cheat relay drops out.
A S.P.D.T.	C-4	90-5 41-6 53-7	Gray Green-Red White-Yellow	Opens replay register reset circuit thru control unit cam switch 2A, and completes replay register reset circuit thru mixer-spotting 16 pulse cam switch 1B.
B N.O.	G-1	20-P 60-P	Blue(Plastic) Brown(Plastic)	Completes a circuit to run control unit, and mixer-spotting unit motors.
C N.O.	G-4	56-2 75-2	White-Brown Orange-White	Lock-in circuit for this relay.
D N.C.	C-5	13-9 83-3	Red-Yellow Black-Yellow	Opens circuit to start relay.
E N.O.				Not used.

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
ANTI-CHEAT RELAY COIL	A-27	78-4 70	Orange-Black Orange	Energized by control unit cam switch 5C when circuit complete thru other factors, switches on this relay protect scoring, game advantage and lite circuits.
A S.P.D.T.	G-4	75-2 56-2 50-2	Orange-White White-Brown White	Opens circuit to start relay, and completes circuit to replay reset relay when this relay drops out.
B N.O.	M-26	20-4 80-1	Blue Black	Opens 17 volt circuit when this relay drops out.
C N.O.	E-27	78-4 30	Orange-Black Yellow	Completes lock-in circuit for this relay when energized.
D N.C.	I-7	14-14 30	Red-Green Yellow	(Safety circuit) in series with circuit to close shutter if this relay drops out while shutter is open.
E S.P.D.T.	L-24	91-2 38 40	Gray-Red Yellow-Black Green	Opens 6 volt circuit to score lites, and completes circuit to tilt lite when relay drops out.
F N.C.	F-13	57-6 85-7	White-Orange Black-White	(Safety circuit) completes a circuit to energize red button relay when this relay drops out.
START RELAY COIL	A-5	13-16 70	Red-Yellow Orange	Energized on each coin or replay played.
A N.C.	C-26	75-4 78	Orange-White Orange-Black	Opens extra-ball step-up circuit during spin.
B N.C.	H-29	18-16 85-12	Red-Black Black-White	Opens circuit for other game advantages during spin.
C N.O.	F-4	13-16 48-2	Red-Yellow Green-Black	Lock-in circuit for this relay.
D N.O.	F-6	10-10 48-2	Red Green-Black	In series with circuits to shutter motor, mixer latch, and timer cams index coils.
E N.C.	B-43	10-9 38-15	Red Yellow-Black	Opens circuit to position 29 relay.
REDBUTTON RELAY COIL	B-12	85-7 91-15	Black-White Gray-Red	Energized by red button switch on front door. Also energized when game is tilted, or anti-cheat relay drops out.
A S.P.D.T.	C-6	93-2 98-2 14-3	Gray-Yellow Gray-Black Red-Green	Directs circuit from energizing mixer latch, and timer cams index coil during extra-ball play to open shutter when starting new game after extra-ball play.
B S.P.D.T.	L-13	21-4 51-15 25-15	Blue-Red White-Red Blue-White	Directs circuit from extra-balls feature lite to all features lite.
C N.O.	D-12	27-8 57-6	Blue-Orange White-Orange	Lock-in circuit for this relay.

(VERTICAL) 4 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 143



Name	MAGIC - SCREEN FEATURE UNIT STOP RE.	YELLOW SCORE STOP RE.	RED SCORE STOP RE.	SELECTION FEATURE UNIT STOP RE.
Coil turns & wire gauge	2300 # 33	2300 # 33	2300 # 33	2300 # 33
Coil resistance (nominal)	85 Ω	85 Ω	85 Ω	85 Ω
Operating voltage	50 V.	50 V.	50 V.	50 V.
Test voltage	37 V.	37 V.	37 V.	37 V.
Extension spring load	CLEAR	CLEAR	CLEAR	CLEAR
Sw actuator stroke	3/32	3/32	3/32	3/32
Additional information				
COIL PART NO.	C-7300-331	C-7300-331	C-7300-331	C-7300-331

SPRING CODE		
COLOR	PART NO.	LOAD
CLEAR	SP-199-13	13 OZ. AT 15/16
BLUE	SP-199-14	21 OZ. AT 15/16
YELLOW	SP-199-15	15 OZ. AT 15/16
RED	SP-199-16	9 OZ. AT 15/16
GREEN	SP-199-17	17 OZ. AT 15/16

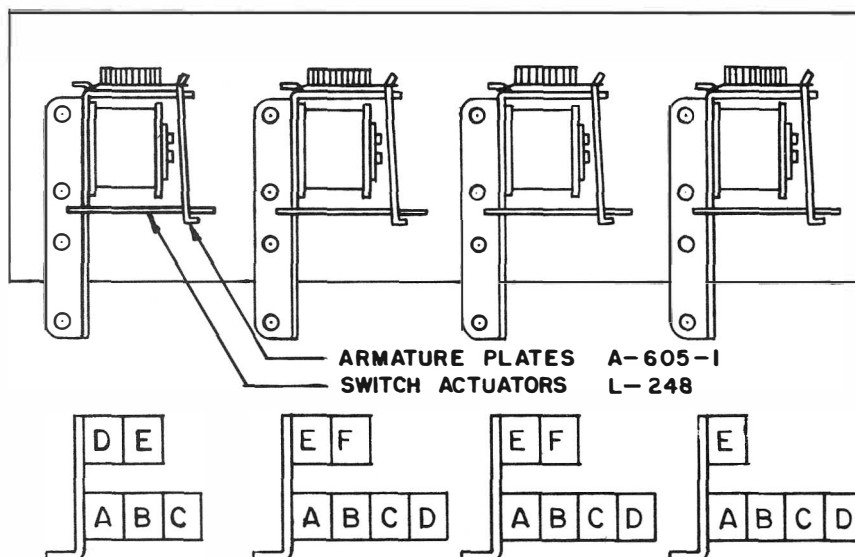
(VERTICAL) 4 RELAY BANK SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 142

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
MAGIC SCREEN FEATURE UNIT STOP RELAY COIL	J-46	18-15 70	Red-Black Orange	Energized thru red letter feature disc, and magic-screen feature disc, when position #29 relay is energized. (For red letter games scoring).
A S. P. D. T	D-33	52-5 41-14 45-15	White-Blue Green-Red Green-White	Opens circuit for stepping magic-screen feature unit, and completes circuit for other guaranteed features of a red letter game.
B N. C.	B-39	15-13 78-15	Red-White Orange-Black	Opens regular selection feature unit step-up circuit.
C N. O.	K-49	65-11 71-11	Brown-White Orange-Red	Thru selection feature, and red letter feature discs, completes a circuit to energize selection feature unit stop relay.
YELLOW SCORE STOP RELAY COIL	J-45	15-15 70	Red-White Orange	Energized thru red letter feature disc, and yellow score disc when position #29 relay is energized. (For red letter games scoring.)
A S. P. D. T.	E-33	56-3 40-13 41-14	White-Brown Green Green-Red	Opens circuit for stepping yellow score unit, and completes circuit for other guaranteed features of a red letter game.
B N. C.	B-34	52-5 93-12	White-Blue Gray-Yellow	Opens regular magic-screen feature unit step-up circuit.
RED SCORE STOP RELAY COIL	J-44	14-15 70	Red-Green Orange	Energized thru red letter feature disc, and red score disc when position #29 relay is energized. (For red letter game scoring.)
A S. P. D. T.	E-33	85-15 36-7 40-13	Black-White Yellow-Brown Green	Opens circuit for stepping red score unit, and completes circuit for other guaranteed features of a red letter game.
B N. C.	B-30	13-3 85-15	Red-Yellow Black-White	Opens regular red score unit step-up circuit.
SELECTION FEATURE UNIT STOP RELAY COIL	J-47	21-14 70	Blue-Red Orange	Energized thru red letter feature disc, and selection feature disc when position #29 relay is energized. (For red letter game scoring.)
A S. P. D. T.	C-33	78-15 45-15 48-15	Orange-Black Green-White Green-Black	Opens circuit for stepping selection feature unit, and completes circuit for other guaranteed features of a red letter game.
B N. C.	G-37	61-7 91-11	Brown-Red Gray-Red	(Safety circuit) opens regular circuit for energizing red or yellow score booster relay.

(HORIZONTAL) 4 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 145



Name	FEATURES LOCK RE.	PLAY FEATURES RE.	SCORES LOCK RE.	PLAY SCORES RE.
Coil turns & wire gauge	2300 #33	2300 #33	2300 #33	2300 #33
Coil resistance (nominal)	85 Ω	85 Ω	85 Ω	85 Ω
Operating voltage	50 V.	50 V.	50 V.	50 V.
Test voltage	37 V.	37 V.	37 V.	37 V.
Extension spring load	CLEAR	CLEAR	CLEAR	CLEAR
Sw actuator stroke	3 / 32	3 / 32	3 / 32	3 / 32
Additional information	THERMALEZE WIRE OR EQUIVALANT. NO WRAP ON COIL.		THERMALEZE WIRE OR EQUIVALANT. NO WRAP ON COIL.	
COIL PART NO.	C-7300-336	C-7300-331	C-7300-336	C-7300-331

SPRING CODE		
COLOR	PART NO.	LOAD
CLEAR	SP-199-13	13 OZ AT 15/16
BLUE	SP-199-14	21 OZ AT 15/16
YELLOW	SP-199-15	15 OZ AT 15/16
RED	SP-199-16	9 OZ AT 15/16
GREEN	SP-199-17	17 OZ AT 15/16

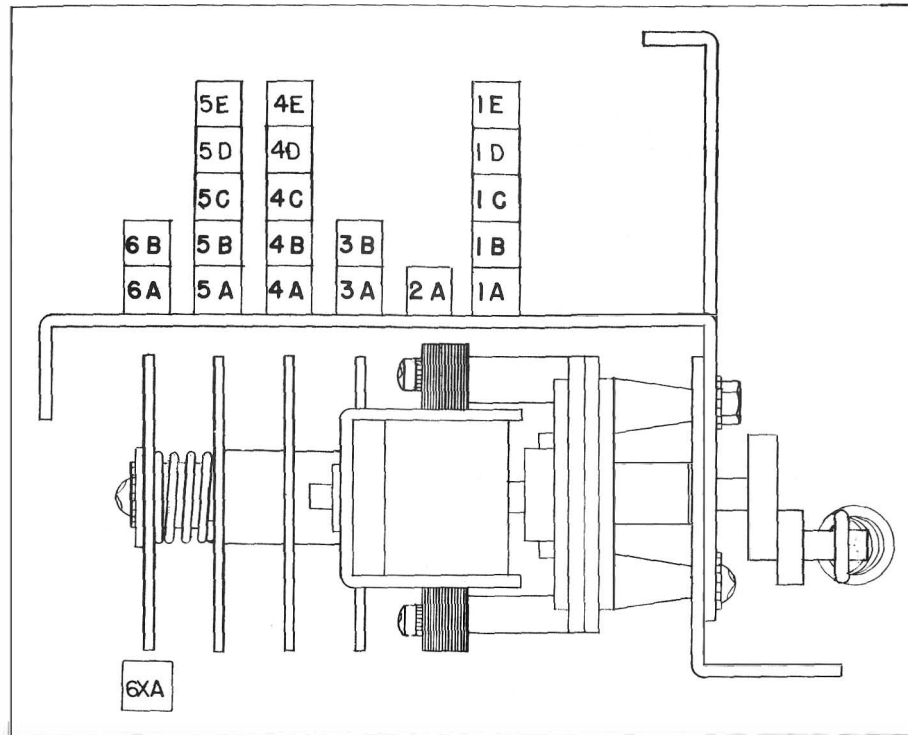
(HORIZONTAL) 4 RELAY BANK SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 144

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
FEATURES LOCK RELAY COIL	A-46	31-15 53-14	Yellow-Red White-Yellow	Energized by control unit cam switch 7B, when play feature relay is energized. (Playing for features only)
A N.O.	B-46	40-15 53-14	Green White-Yellow	Lock-in circuit for this relay.
B N.O.	E-34	50-13 71-9	White Orange-Red	In series with circuit for magic-screen feature unit steps.
C N.O.	G-35	45-6 90-13	Green-White Gray	In series with circuit for all game advantages.
D N.C.	I -29	21-3 80-8	Blue-Red Black	Opens a circuit to mixer #4 relay.
E N.O.	H-38	13-17 48-13	Red-Yellow Green-Black	In series with circuit for red or yellow score booster feature.
PLAY FEATURES RELAY COIL	A-47	31-15 61-13	Yellow-Red Brown-Red	Energized by green play features button switch on front door when playing for features only.
A S.P.D.T.	J-13	36-15 30 23-15	Yellow-Brown Yellow Blue-Yellow	Directs circuit from extra-balls, all features, and play scores feature lites, to play feature lite.
B N.O.	C-46	43-14 53-14	Green-Yellow White-Yellow	In series with circuit to energize features lock relay.
C N.O.	G-36	10-15 27-13	Red Blue-Orange	In series with circuit for OK feature.
D N.O.	B-48	61-13 81-13	Brown-Red Black-Red	Lock-in circuit for this relay.
E N.C.	A-31	71-13 70	Orange-Red Orange	Opens yellow, red, and green score unit step-up circuit.
F N.C.	K-20	31-5 74-15	Yellow-Red Orange-Green	Opens score lites flash circuit.
SCORES LOCK RELAY COIL	A-47	31-15 93-14	Yellow-Red Gray-Yellow	Energized by control unit cam switch 7B when play scores relay is energized. (Playing for scores only)
A N.O.	F-30	23-12 27-5	Blue-Yellow Blue-Orange	In series with circuit for yellow, red, and green score steps.
B N.O.	F-30	38-5 57-12	Yellow-Black White-Orange	In series with circuit for yellow, red, and green score steps.
C N.O.	F-30	14-6 63-12	Red-Green Brown-Yellow	In series with circuit for yellow, red, and green score steps.
D N.O.	G-29	56-11 60-6	White-Brown Brown	In series with circuit for yellow, red, and green score steps.
E N.C.	G-33	91-13 98-14	Gray-Red Gray-Black	Opens game advantages circuit.
F N.O.	B-47	40-15 93-14	Green Gray-Yellow	Lock-in circuit for this relay.
PLAY SCORES RELAY COIL	A-49	31-15 65-15	Yellow-Red Brown-White	Energized by blue play scores button switch on front door when playing for scores only.
A S.P.D.T.	K-13	51-15 36-15 21-15	White-Red Yellow-Brown Blue-Red	Directs circuit from extra-ball feature, or all feature lite, to play scores feature lite.
B N.O.	D-28	10-1 91-5	Red Gray-Red	In series with circuit for yellow, red, and green score steps.
C N.O.	C-47	43-14 93-14	Green-Yellow Gray-Yellow	In series with circuit to energize scores lock relay.
D N.O.	B-49	57-13 65-13	White-Orange Brown-White	Lock-in circuit for this relay.
E N.C.	K-12	27-16 56-15	Blue-Orange White-Brown	Opens feature lites flash circuit.

SHUTTER MOTOR PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART BELOW



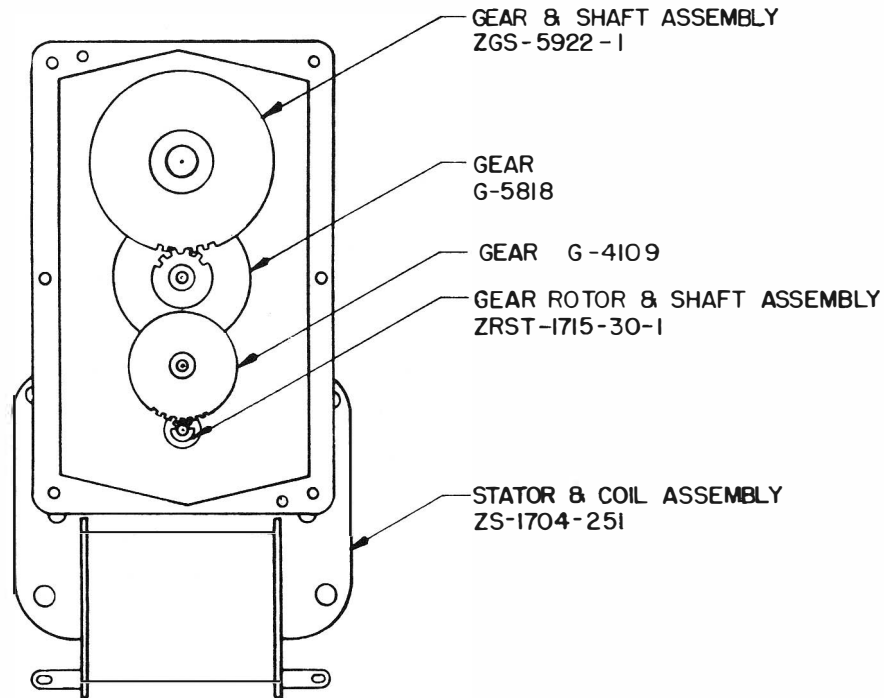
SHUTTER MOTOR CAM SWITCH CHART

FOR POSITION OF SWITCHES SEE PICTORIAL VIEW AT LEFT

CAM SWITCH		LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.C.	I-15	14 21-3	Red-Green Blue-Red	(Closed when shutter is closed) In series with in-line or section replay scoring circuits thru control unit change-over cam switch 15A.
1B	N.O.	G-6	14-3 30	Red-Green Yellow	Completes shutter motor carry-over circuit.
1C	N.C.	I-9	21-3 98-8	Blue-Red Gray-Black	(Closed when shutter is closed) In series with circuit to step timer unit after 5th ball is shot. Also in series with circuit to reset timer unit when playing extra-balls.
1D	N.O.	F-44	63-8 30	Brown-Yellow Yellow	Starts lock-in circuit for position 29 relay.
1E	N.C.	I-35	21-3 90-3	Blue-Red Gray	(Closed when shutter closed) In series with circuit to give advantages for red letter game scoring.
2A	N.C.	F-14	31-3 36-3	Yellow-Red Yellow-Brown	(Closed when shutter is closed) In series with circuit to run ball lifter motor.
3A	N.O.	G-46	85-5 30	Black-White Yellow	Resets selection feature unit, green, red, and yellow replay counter units, and extra-ball unit when starting new game.
3B	N.O.	H-2	20P 70P	Blue(Plastic) Orange(Plastic)	Resets trip relay bank when starting new game.
4A	N.O.	F-7	14-3 18-3	Red-Green Red-Black	(Closed when shutter is open) In series with circuit to close shutter if game is tilted while shutter is open.
4B	N.C.	I-38	21-3 40-8	Blue-Red Green	(Closed when shutter is closed) In series with circuits to move magic-screen, collect scores, energize selector lock relays, and energize red, or yellow roll-over trip relays.
4C	N.O.	H-7	18-3 45-8	Red-Black Green-White	(Closed when shutter is open) In series with function of switch 4A.
4D	N.C.	I-11	10-13 40-8	Red Green	(Closed when shutter is closed) In series with circuit to energize before 5th or after 5th selector lock relays.
4E	N.O.	F-44	63-8 30	Brown-Yellow Yellow	Completes lock-in circuit for position 29 relay.
5A	N.C.	H-9	65-2 98-8	Brown-White Gray-Black	(Closed when shutter is closed) Same function as switch 1C.
5B	N.O.	G-45	31-4 91-4	Yellow-Red Gray-Red	(Closed when shutter is open) In series with lock-in circuit for lifter start relay.
5C	N.O.	G-32	85-2 91-13	Black-White Gray-Red	(Closed when shutter is open) In series with circuit for game advantages.
5D	N.O.	B-18	80-16 30	Black Yellow	(Closed when shutter is open) In series with circuit to put blue replay counter back to zero when starting new game.
5E	S.P.D.T.	E-6	61 10-10 93-2	Brown-Red Red Gray-Yellow	Directs circuits to open shutter, and energize mixer latch, and timer cams index coils.
6XA	N.C.	B-12	91-15 70	Gray-Red Orange	NOTE: This switch is mounted on bracket under cam 6. (Open only during shutter cycle) Completes circuit to energize red button relay.
6A	N.O.	H-9	71-8 30	Orange-Red Yellow	Resets timer unit when starting new game.
6B	N.O.	H-46	78-3 30	Orange-Black Yellow	Resets red letter feature unit, green, red and yellow score units, and magic screen feature unit when starting new game.

SHUTTER MOTOR

(MOTOR PART NO. E-119-99)



NOTE:

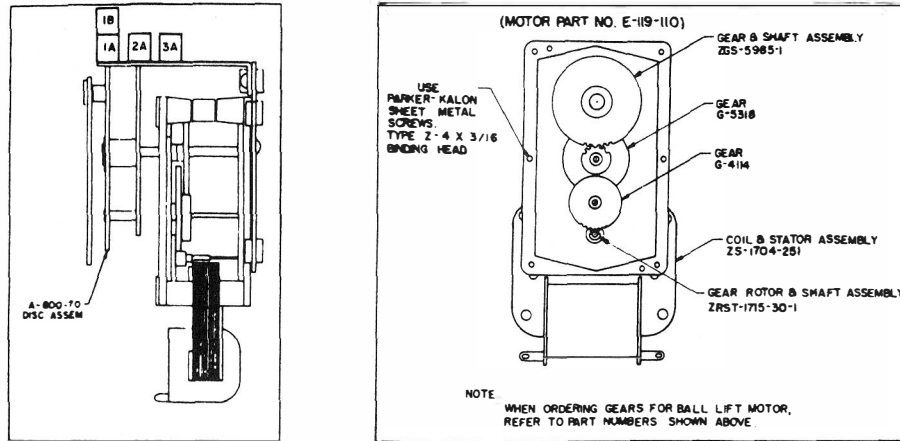
WHEN ORDERING GEARS FOR SHUTTER MOTOR,
REFER TO PART NUMBERS SHOWN ABOVE.

NEW ANTI-CHEAT COIN SWITCH CIRCUIT

The coin switch gives a very short pulse, when operated by a coin. With this new circuit, the game will tilt if the pulse is not as short as from a coin, so that operating the coin switch with wire, strings, etc., usually results in a tilt.

The circuit is completed thru control unit cam switch #4D (on wiring diagram at G-5).

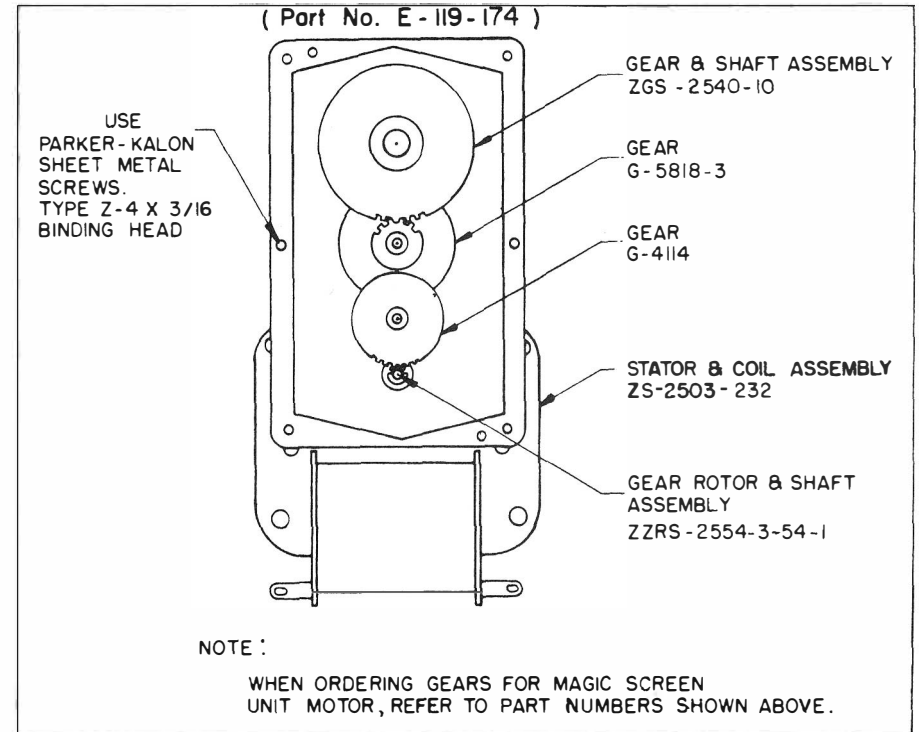
BALL LIFT MOTOR PICTORIAL VIEW



BALL LIFT MOTOR CAM SWITCH CHART FOR POSITION OF SWITCHES SEE PICTORIAL VIEW

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.C.	G-11 15-6 85-6	Red-White Black-White	(Safety circuit) for before 5th selector lock trip relay.
1B	N.O.	G-14 91-1 30	Gray-Red Yellow	Completes carry-over circuit to ball lift motor.
2A	N.O.	F-8 27-2 43-2	Blue-Orange Green-Yellow	Completes circuit to energize timer unit step-up coil.
3A	N.O.	H-11 21-3 83-7	Blue-Red Black-Yellow	Completes circuit to energize before 4th selector lock relay, thru timer unit disc.

MAGIC SCREEN UNIT MOTOR



MAGIC SCREEN UNIT PARTS

PART No.	NAME
AS-1809-2	Complete Magic Screen Unit assembly
W-851-4	Contact plate
26-GG-10	Coil
A-613-55	Core plug
AS-1846-1	Index Arm and plunger assembly
P-163-32	Key Washer
M-943	Ladder Chain
P-801-310	Leather Washer
E-119-174	Motor
S-496-152	Plunger only for AS-1846-1

CABINET				PANEL					
24		22		8		24		24	
20-2	57-14	13	45-3	57-13	74-16	14-3	61	10-10	52-12
25-8	71-2	14-5	48-2	60-13	75-13	25-1	71-1	14	57-1
27-8	78-7	15-6	50-2	61-13	81-13	31-1	74-1	15-6	61-4
30	80-2	18-6	54-5	65-15		36-3	75-13	18-3	63-1
31-16	81	21-3	63-2			40-8	78-3	21-3	65-1
40-7	85-13	27-2	70			41-5	80-16	25-18	70
45-16	90-5	31-4	71-6			43-1	81-16	30	71-8
48-4	91-7	36-3	80-6			45-8	85-3	36-1	75-1
50-16	93-7	38-3	85-7			51-1	90-1	40-1	80-6
52-9	98-11	41-4	90-9			53-1	91-15	41-4	85-5
53-18	40 P	43-2	91-1			54-1	93-2	45-1	91-13
54-11	90 P					60-1	98-12	50-1	98-6

PANEL		TRANSFORMER		FRONT DOOR	
20		10		20	
13-12	50-5	20	81	13	61-13
14-12	52-1	30	20 P	14-5	63-2
15-12	56-1	54-2	40 P	18-6	70
20	61-1	70	50 P	21-3	71-2
27-1	63-8	80-1	90 P	25-8	74-16
31-4	65-2			27-8	75-13
38-1	85-12			40-7	80-13
41-8	91-4			48-2	85-7
45-16	20 P			50-2	90-9
48-1	70 P			57-13	

PLUG SHEET FOR CIRCUS QUEEN

MISCELLANEOUS RELAYS SWITCH CHART

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
SUPERBLUE RELAY COIL	A-38	31-15 31-15	Yellow-Red Yellow-Red	Energized thru spotting disc when circuit complete thru other factors.
A N.O.	C-38	14-13 38-16	Red-Green Yellow-Black	Completes a circuit to energize blue score booster trip relay.
B M.B.B.	B-38	21-3 31-15 14-13	Blue-Red Yellow-Red Red-Green	Completes lock-in circuit, and breaks pull in circuit for this relay.
C S.P.D.T.	L-12	13-13 61-9 63-13	Red-Yellow Brown-Red Brown-Yellow	Directs circuit from blue 3 scores 600 feature lite, to blue 2 scores 600 feature lite.
D N.O.	G-18	20-8 81-7	Blue Black-Red	In series with 2 in blue section replay scoring circuit.
LIFTER START RELAY COIL	A-45	38-8 70	Yellow-Black Orange	Energized by ball runway switch. This relay controls ball count circuit.
A N.C.	H-11	10-13 15-6	Red Red-White	In series with circuit to energize before 5th, and after 5th selector lock relays.
B N.C.	G-14	31-3 41-4	Yellow-Red Green-Red	In series with ball lifter motor circuit to raise balls.
C N.O.	E-45	36 38-8	Yellow-Brown Yellow-Black	Lock-in circuit for this relay.
MIXER #2 RELAY COIL	A-28	27-7 70	Blue-Orange Orange	Energized thru mixer #2 disc when circuit complete thru other factors. This relay is used to proportion scores, and extra-ball.steps.
A N.O.	H-28	15-7 56-6	Red-White White-Brown	Completes probable circuits for scores, or extra ball steps.
B N.O.	E-28	54-12 85-4	White-Green Black-White	Completes probable circuits for score steps when playing for scores only. (Blue Button)
MIXER #4 RELAY COIL	A-33	23-4 70	Blue-Yellow Orange	Energized thru mixer #4 disc when circuit complete thru other factors. This relay is used to proportion game advantages.
A N.C.	I-28	45-2 51-5	Green-White White-Red	Opens circuit for game advantages.

NOTES

NOTES

MISCELLANEOUS PARTS

Back Cabinet Assembly:

Part No.	Name of Part
G-292-11	Back glass
M-281-14	Lock and keys (2) keyed alike
E-122-19	Transformer

Back Door Assembly:

M-281-24	Lock and keys (2) keyed alike
SW-100-106	Lock switch
E-300-115	Search relay bank assembly

Front Cabinet Assembly:

M-168-15	Ball
AS-187-17	Ball shooter assembly
AS-1835	Ball shooter housing
A-100-7	Ball shooter rod
SP-200-24	Ball shooter spring (long)
SP-243	Ball shooter spring (short)
R-108-3	Ball shooter tip
P-711-1	Cigarette holder
P-1900-47	Coin box
A-2304-2	Coin box cover
E-130-10	Counter—48 volt
P-4052	Legs
M-106-1	Leg bolt
M-163-4	Leg adjuster
P-2768-15	Ring—blue
E-108-57	Toggle switch

Front Door Assembly:

A-1538-2	Armature plate (AS-277-50)
A-1729-6	Button—metal
E-101-45	Coil for coin lock out
AS-277-50	Coin switch assembly 5¢ or 10¢
CA-567-116	Front door only
AS-2041-3	Front door assembly 5¢

Front Door Assembly (Continued):

Part No.	Name of Part
A-254-33	Hinge and bracket
M-281-6	Lock and keys
E-108-14	Micro switch for coin switch assembly 5¢ or 10¢
P-2768-5	Ring—red
P-2768-6	Ring—yellow
P-2768-7	Ring for M-281-6 lock
P-2768-16	Ring—green
M-280-15	Slug rejector 5¢
M-280-16	Slug rejector 10¢

Front Moulding Assembly:

A-2359	Coin slide 5¢ or 10¢
AS-1305-16	Front moulding assembly complete
A-1272-29	“R” Button
A-1272-30	Right button
A-1272-21	Left button
P-2210-81	5¢ plate
P-2210-80	10¢ Plate
P-2210-84	Plate—Red letter game
P-2210-85	Plate—Register all replays
P-2210-63	Plate for left & right button
P-2210-38	Plate for “R” button
CA-1053-2	Front moulding only

Panel Assembly:

AS-1315	Ball gate and switch assembly
C-326-9	Light shield post
R-115-4	Rebound rubber
M-170	Rebound spring—double post
C-387-1	Roll over button—red
C-387-2	Roll over button—yellow
R-243	Rubber ring for yellow post
R-243-2	Rubber ring for red post

Bally pin game lubricant now available in one half-pint (8 Oz.) containers with plastic spout and screw cap.