

Bally[®]

BIG WHEEL

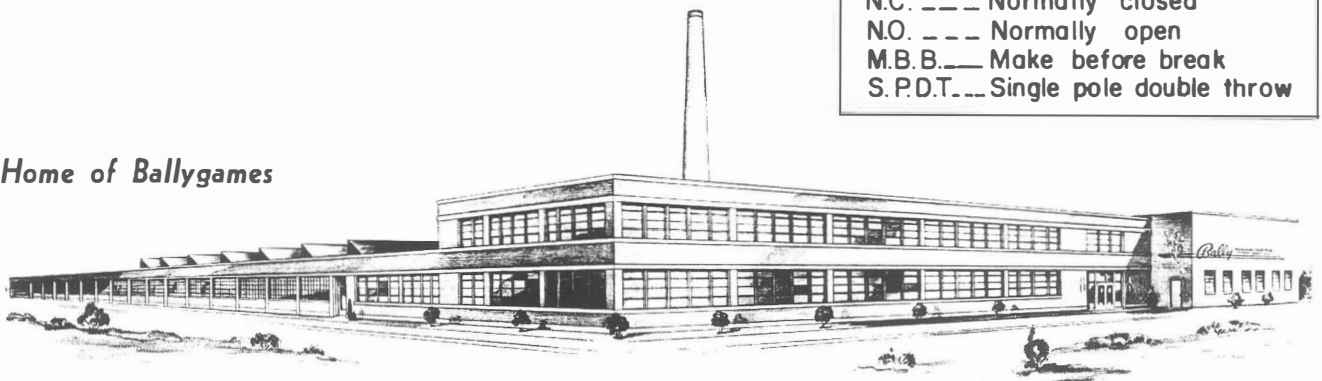
OPERATING INSTRUCTIONS AND PARTS CATALOG

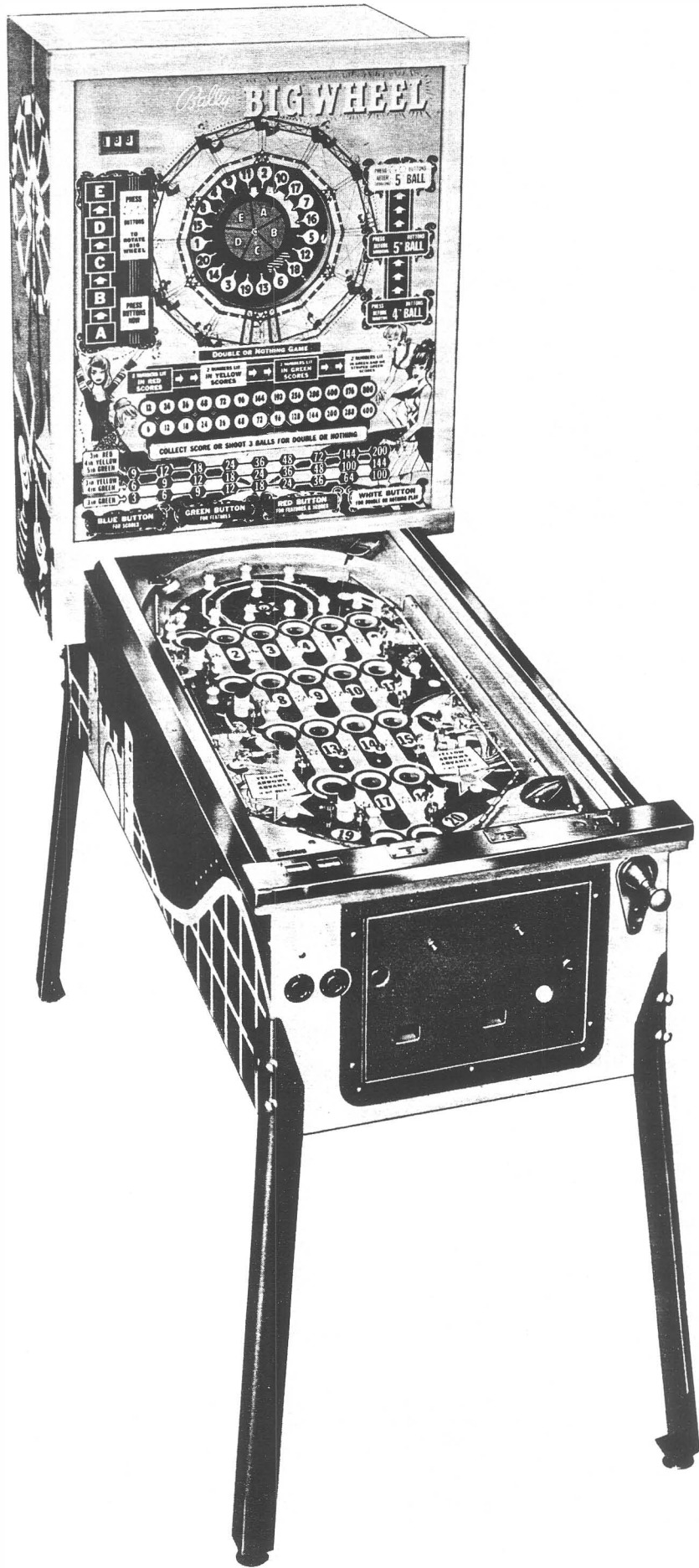
Part Numbers are marked on illustrations
and a list of miscellaneous parts appears
on page 21.

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

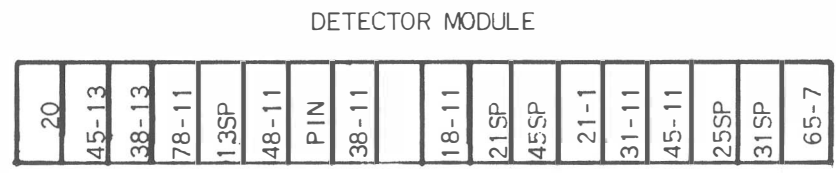
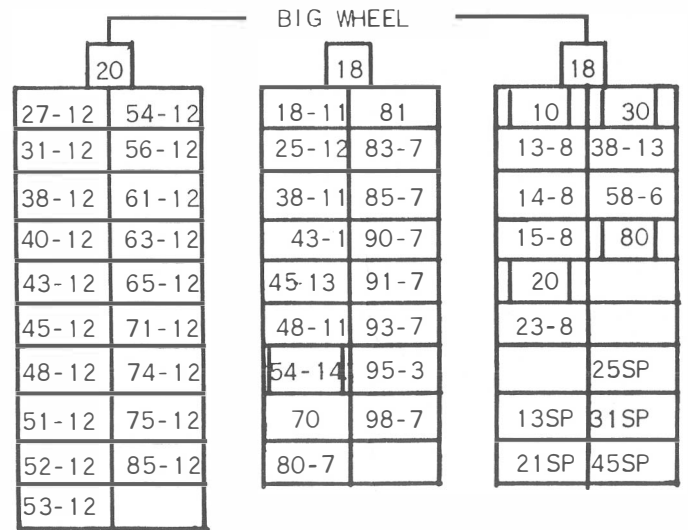
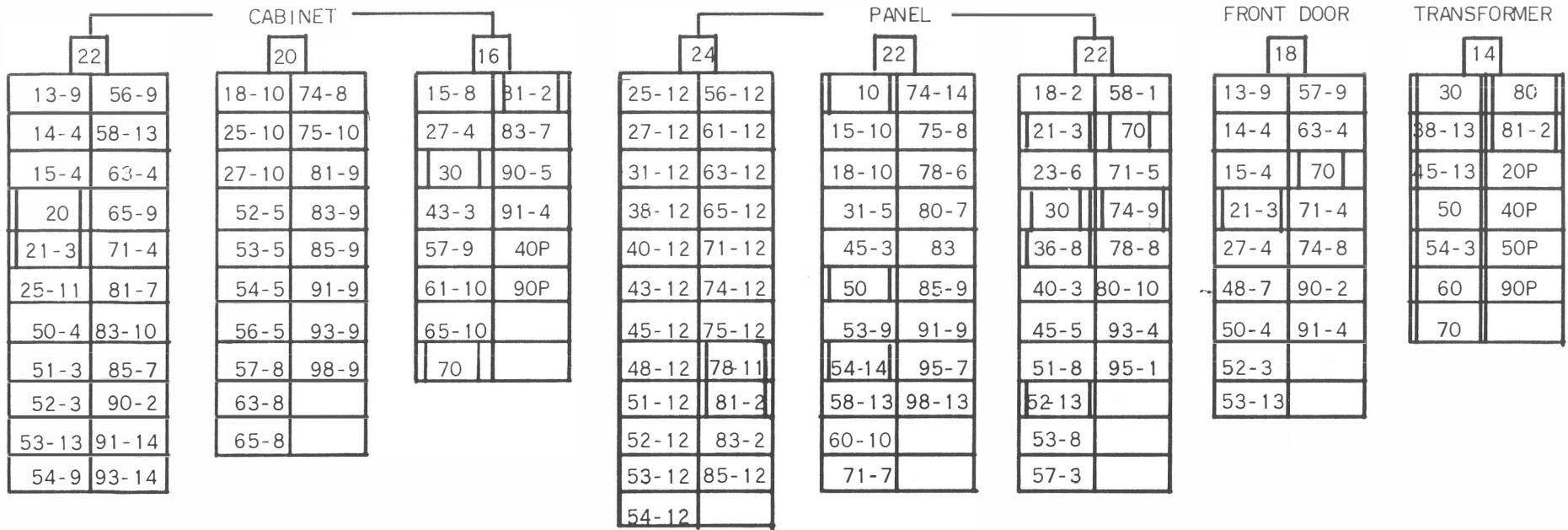
Code	
N.C. ___	Normally closed
N.O. ___	Normally open
M.B.B. ___	Make before break
S.P.D.T. ___	Single pole double throw

Home of Ballygames

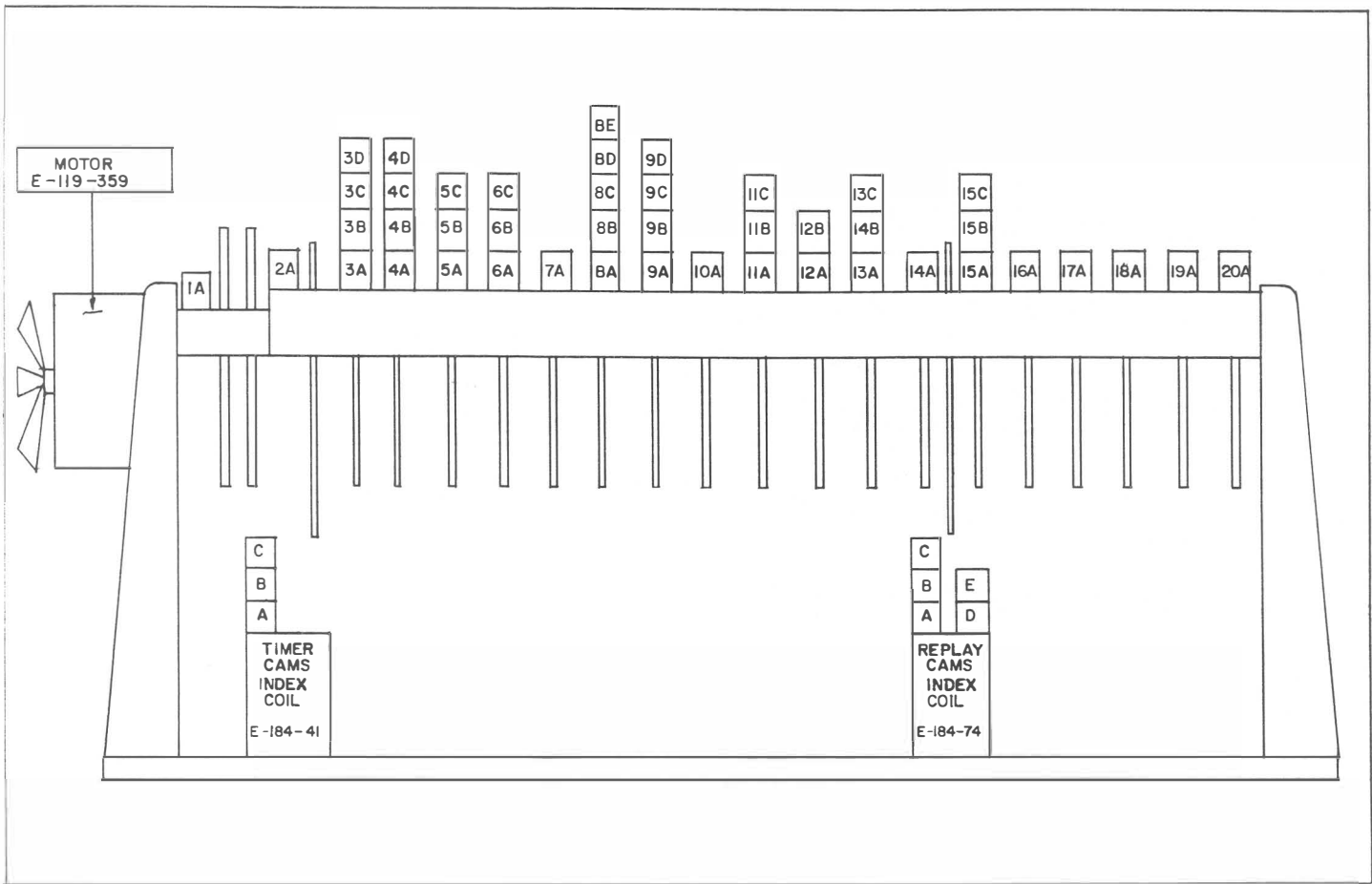




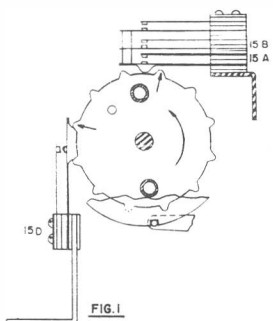
CONNECTOR PLUGS CHART



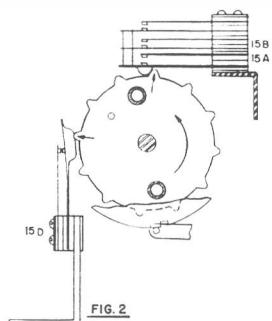
CONTROL UNIT PICTORIAL VIEW NUMBERS CORRESPOND TO SWITCH CHART ON PAGE 5



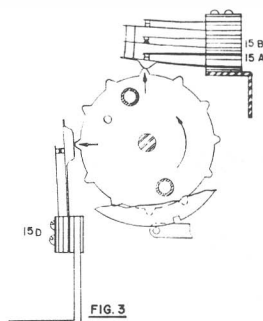
CORRECT ADJUSTMENT: CONTROL UNIT SWITCHES 15A, 15B, & 15D NOTICE: IMPORTANT PART OF ILLUSTRATION IS TO SHOW THAT SWITCH 15D CLOSURES FIRST AND OPENS LAST. IF AN ADJUSTMENT IS NECESSARY, SWITCH 15D CAN BE MOVED UP OR DOWN. LOOSEN SCREWS THAT HOLD SWITCH, THEN MOVE UP OR DOWN.



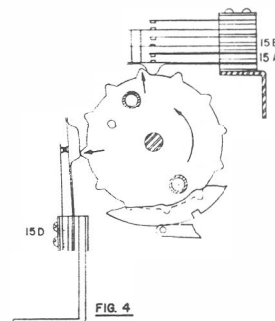
REPLAY CAMS SHOWN IN THEIR NORMAL INDEXED POSITION. SWITCHES 15A, 15B & 15D ARE OPEN AT THIS TIME.
NOTE:
ARROWS POINT TO LOBES THAT WILL ACTUATE SWITCHES.



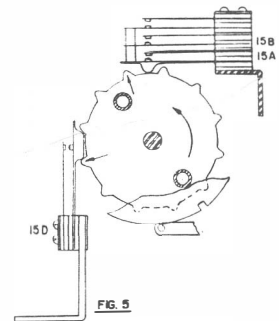
REPLAY CAMS SHOWN STARTING TO ROTATE. THEY ARE NOW OUT OF THEIR INDEX POSITION. SWITCHES 15A & 15B ARE STILL OPEN. SWITCH 15D IS NOW CLOSED.



SWITCHES 15A & 15B ARE NOW CLOSED. SWITCH 15D IS STILL CLOSED.



SWITCHES 15A & 15B ARE NOW OPEN AGAIN. SWITCH 15D 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 REFER TO PICTORIAL VIEW ON PAGE 4

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A N.O.	G-14	31-13 78-4	Yellow-Red Orange-Black	Completes after 5 balls timer unit step-up circuit.
DRAG ARM SW. (BACK-SIDE) N.O.	F-14	78-4 25-11	Orange-Black Blue-White	(Not shown in pictorial view) pulses timer unit step-up coil when circuit thru switch 1A is complete.
2A N.C.	M-9	30 25-3	Yellow Blue-White	Opens lock-in circuit to 25¢ relay.
3A N.C.	P-7	30 48-2	Yellow Green-Black	Opens game start circuits.
3B S.P.D.T.	H-25	75-10 53-5 50-4	Orange-White White-Yellow White	Directs pull-in and lock-in circuits to play features relay.
3C S.P.D.T.	H-26	83-10 52-5 50-4	Black-Yellow White-Blue White	Directs pull-in and lock-in circuits to play scores relay.
3D S.P.D.T.	D-58	63-8 71-8 65-8	Brown-Yellow Orange-Red Brown-White	Directs total-out meter or total-in meter circuits.
4A N.O.	M-67	30 41-11	Yellow Green-Red	Completes spotting disc index circuit.
4B N.O.	N-17	21-3 57-9	Blue-Red White-Orange	Completes 25¢ armature (anti-cheat) circuit to tilt relay.
4C N.O.	F-8	27-4 80-13	Blue-Orange Black	Test switch.
4D S.P.D.T.	K-7	10-5 13-9 14-4	Red Red-Yellow Red-Green	Directs 5¢ coin switch start relay or tilt relay (anti-cheat) circuits.
5A N.C.	G-45	58-3 43-8	White-Black Green-Yellow	Opens 1 extra step relay and 2 extra step relay lock-in circuits.
5B N.C.	F-27	50-4 60-5	White Brown	Opens features lock relay and scores lock relay lock-in circuits.
5C N.C.	M-21	21-3 40-11	Blue-Red Green	Opens mixer #2 relay and mixer #3 relay lock-in circuits.
6A N.O.	K-28	23-13 13-6	Blue-Yellow Red-Yellow	Completes ABCDE feature unit single step circuits.
6B N.O.	J-17	30 78-5	Yellow Orange-Black	Completes anti-cheat relay pull-in circuit.
6C S.P.D.T.	L-42	90-6 95-1 85-6	Gray Gray-White Black-White	Directs roving cam and 1st double spin relay circuits, or double feature unit single step circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
7A N.C.	K-30	61-6 23-6	Brown-Red Blue-Yellow	Opens ABCDE feature unit, selection control feature unit, and double feature unit step-up circuit during play cycle.
8A N.O.	P-21	40-11 31-2	Green Yellow-Red	Completes mixer #2 relay circuits.
8B N.O.	L-75	90-6 63-14	Gray Brown-Yellow	Completes roving cam relay circuits.
8C N.O.	L-73	21-3 10-11	Blue-Red Red	Completes "F" relay circuit.
8D N.O.	G-26	50-4 57-5	White White-Orange	Completes feature play circuit to feature lock relay and play scores circuit to scores lock relay.
8E N.O.	P-21	40-11 78	Green Orange-Black	Completes mixer #3 relay circuits.
9A N.O.	K-29	23-13 15-6	Blue-Yellow Red-White	Completes ABCDE feature unit single step circuits.
9B N.O.	G-4	14-10 90-5	Red-Green Gray	Completes reflex unit play magnet, replay register subtract, and total-in meter circuit during play cycle.
9C N.O.	M-41	95-1 81-6	Gray-White Black-Red	Completes double feature unit single step circuits.
9D N.O.	D-45	75-13 61-13	Orange-White Brown-Red	Completes master score unit single step circuits.
10A N.O.	K-43	90-6 48-8	Gray Green-Black	Completes 1st double spin relay circuits.
11A N.O.	L-44	38-6 61-13	Yellow-Black Brown-Red	Completes 1 extra step master score unit circuit.
11B N.O.	K-44	50-6 61-13	White Brown-Red	Completes a 2 extra step master score unit circuit.
11C N.O.	L-55	51-8 52-8	White-Red White-Blue	Completes 0 to 1 and 2 to 3 2nd half sequence unit step-up circuit.

CONCLUDED ON NEXT PAGE

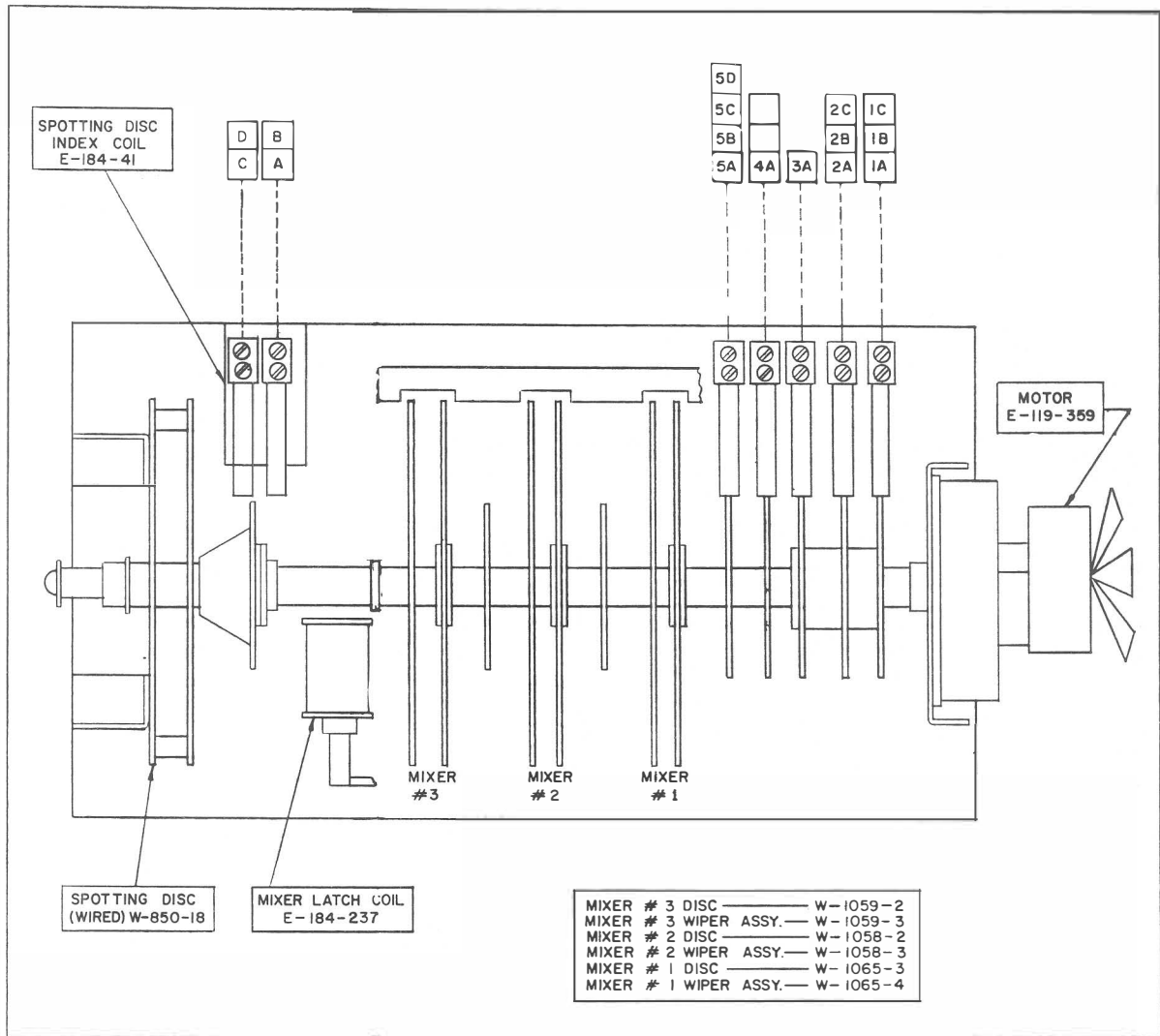
CONTROL UNIT SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 4

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
12A	N.O.	H-44	50-6 61-13	White Brown-Red	Completes a 2 extra step master score unit circuit.
12B	N.O.	E-36	63 80-5	Brown-Yellow Black	Completes selection control feature unit single step circuits.
13A(Alt.)	N.O.	K-76	60-11 71	Brown Orange-Red	Completes roving cam relay circuits.
13B(Alt.)	N.O.	H-48	75-2 10-2	Orange-White Red	Completes master score 1 extra step relay circuits.
13C(Alt.)	N.O.	E-37	36-2 83-5	Yellow-Brown Black-Yellow	Completes a selection control feature unit multiple step circuit.
14A	N.O.	M-56	21-3 54-8	Blue-Red White-Green	Completes replay register unit 25¢ credit step-up circuit.
15A	N.O.	G-57	60-8 85-13	Brown Black-White	Pulses replay register unit step-up coil, reflex unit replay magnet and total out meter during winner scoring.
15B	N.O.	C-59	41-9 51-9	Green-Red White-Red	Pulses replay counter unit step-up coil for any winner scoring using X1 multiplier circuit. (See charts on replay counter disc page)
15C	N.O.		51-9	White-Red	Extra switch.
(BACKSIDE)					(Not shown in pictorial view)
15D	N.O.	K-57	56-8 60-8	White-Brown Brown	Completes replay scoring lock-in circuit. (See important adjustment instructions on pictorial page)
16A	N.O.	D-59	43-9 51-9	Green-Yellow White-Red	Pulses replay counter unit step-up coil for any winner scoring using X2 multiplier circuit. (See charts on replay counter disc page)
17A	N.O.	C-60	45-9 51-9	Green-White White-Red	Pulses replay counter unit step-up coil for any winner scoring using X4 multiplier circuit. (See charts on replay counter disc page)

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
18A	N.O.	D-60	48-9 51-9	Green-Black White-Red	Pulses replay counter unit step-up coil for any winner scoring using X8 multiplier circuit. (See charts on replay counter disc page)
19A	N.O.	C-61	50-9 51-9	White White-Red	Pulses replay counter unit step-up coil for any winner scoring using X16 multiplier circuit. (See charts on replay counter disc page)
20A	N.C.	P-34	74-13 61-10	Orange-Green Brown-Red	Opens detector module win trip relay circuits thru collect button and Gold button switches.
TIMER CAMS INDEX COIL	A-11	93-4 70	Gray-Yellow Orange	Energized thru start relay circuit and releases timer cams for play cycle.	
A	N.O.	Q-1	20P 60P	Blue (Plastic) Brown(Plastic)	Completes a control unit and mixer-spotting unit motor circuit.
B	N.C.	J-9	90-2 91-4	Gray Gray-Red	Opens 5¢ coin lock-out magnet circuit.
C	N.C.	K-10	27-4 71-4	Blue-Orange Orange-Red	Opens 25¢ coin lock-out magnet circuit.
REPLAY CAMS INDEX COIL	A-56	60-8 70	Brown Orange	Energized thru replay winner circuits and releases replay cams to score winners.	
A	N.O.	K-57	21-3 56-8	Blue-Red White-Brown	Completes replay scoring lock-in circuit.
B	N.O.	F-15	31-13 81-10	Yellow-Red Black-Red	Completes timer unit reset circuit.
C	N.C.	D-13	25-11 58	Blue-White White-Black	Opens timer unit step-up circuit.
D	N.O.	Q-1	20P 60P	Blue (Plastic) Brown(Plastic)	Completes a control unit and mixer spotting unit motor circuit.
E	N.C.	F-7	75-14 13-4	Orange-White Red-Yellow	Opens regular start relay circuit.

MIXER AND SPOTTING UNIT PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART BELOW



MIXER AND SPOTTING UNIT SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
16 PULSE CAM 1A	N.O. B-30	98-6 90-13	Gray-Black Gray	Pulses ABCDE feature unit step-up coil for multiple step circuits.
1B	N.O. Q-27	80-2 56-3	Black White-Brown	Flashes ABCDE feature press buttons now lite.
1C	N.O. B-36	93-11 78-6	Gray-Yellow Orange-Black	Pulses selection control feature unit step-up coil for multiple step circuits.

CONTINUED ON NEXT PAGE

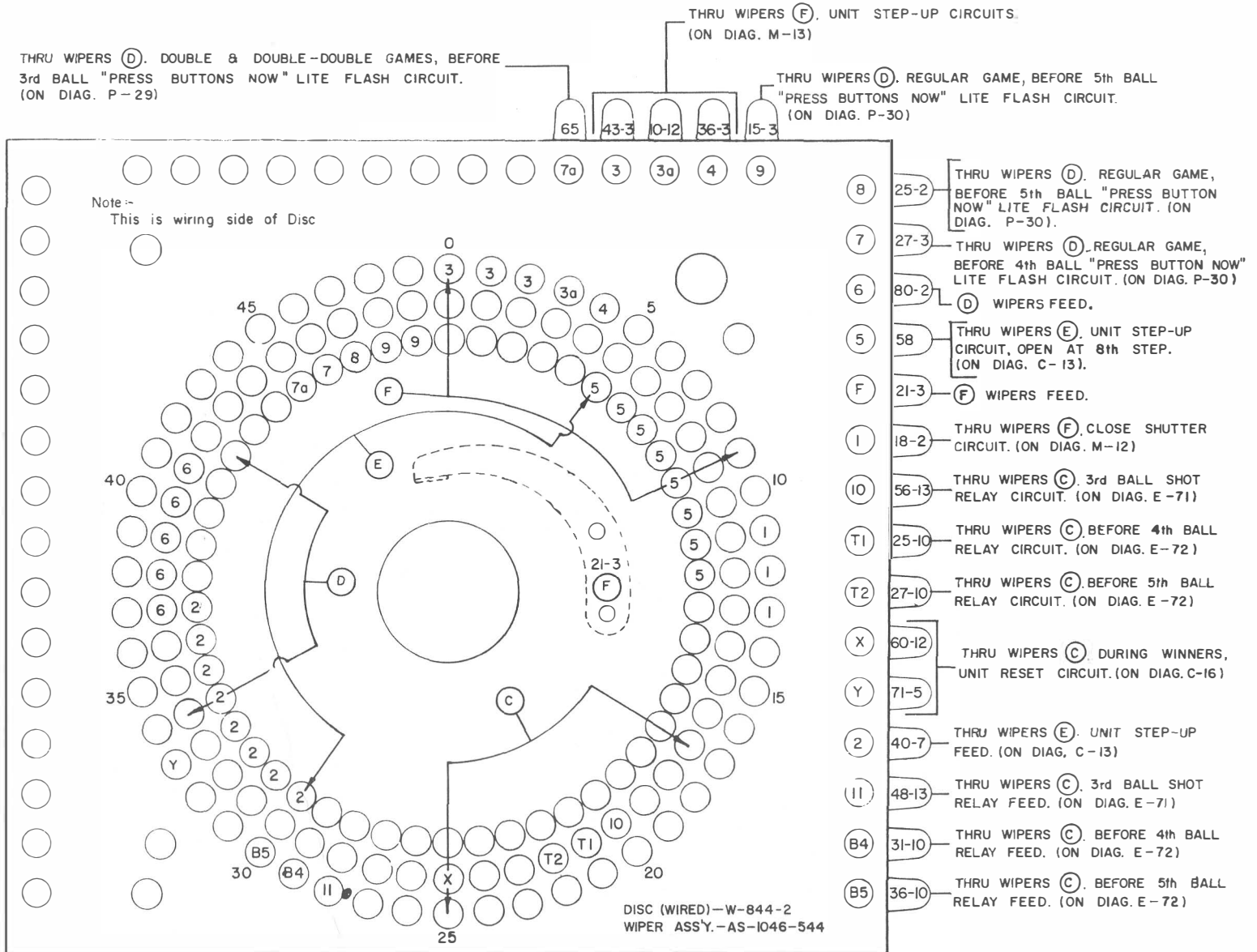
MIXER AND SPOTTING UNIT SWITCH CHART

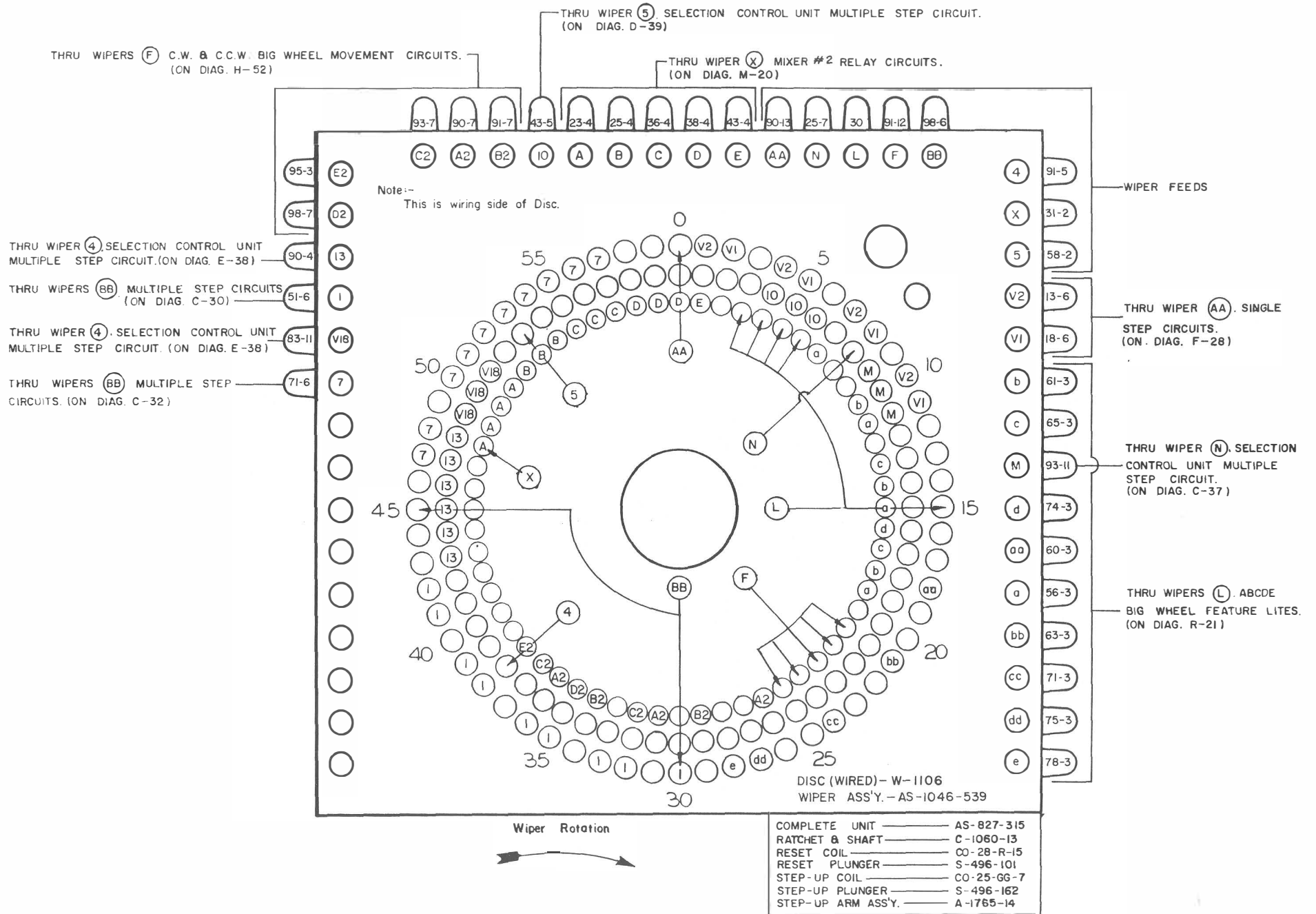
FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ABOVE

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
MIXER CAM 2A	N.O.	C-75	43-10 51-13	Green-Yellow White-Red	Opens and closes roving cam relay circuits.
2B	N.C.	L-41	81-6 95-4	Black-Red Gray-White	Opens and closes double feature unit single step circuits.
2C	N.C.	J-29	15-6 18-6	Red-White Red-Black	Opens and closes ABCDE feature unit single step circuits.
MIXER CAM 3A	N.O.	H-49	75-2 45-7	Orange-White Green-White	Opens and closes a master score unit single step circuit.
MIXER CAM 4A	N.O.	F-74	91-11 43-10	Gray-Red Green-Yellow	Opens and closes roving cam relay circuits.
	N.O.				Extra switch.
	N.O.				Extra switch.
16 PULSE CAM 5A	N.O.	D-5	74-15 53-3	Orange-Green White-Yellow	Pulses replay register unit reset coil thru replay reset circuit.
5B	N.O.	E-41	58-4 27-11	White-Black Blue-Orange	Pulses double feature unit step-up coil thru multiple step circuits.
5C	N.O.	B-49	63-7 13-11	Brown-Yellow Red-Yellow	Pulses slave score unit step-up coil thru master score unit circuits.
5D	N.O.	Q-15	50-10 85	White Black-White	Completes flash circuit to collect or shoot for double or nothing lites.
SPOTTING DISC INDEX COIL		A-67	41-11 70	Green-Red Orange	Energized by control unit cam switch 4 circuit during play cycle and releases spotting disc wipers.
A	N.O.	Q-8	15-1 14-2	Red-White Red-Green	Completes spotting disc regular score lites flash circuit.
B	N.O.	S-24	98-1 91-10	Gray-Black Gray-Red	Completes spotting disc ABCDE feature lites flash circuit.
C	N.O.	S-24	57-2 78-2	White-Orange Orange-Black	Completes spotting disc selection feature lites flash circuit.
D	N.O.	S-45	13 36-6	Red-Yellow Yellow-Brown	Completes spotting disc double or nothing games feature lites flash circuit.
MIXER LATCH COIL		A-11	93-4 70	Gray-Yellow Orange	Energized thru start relay circuit during play cycle and releases mixer disc wipers.

TIMER UNIT DISC viewed from WIRING side

8 step unit. Wipers shown in zero or reset position



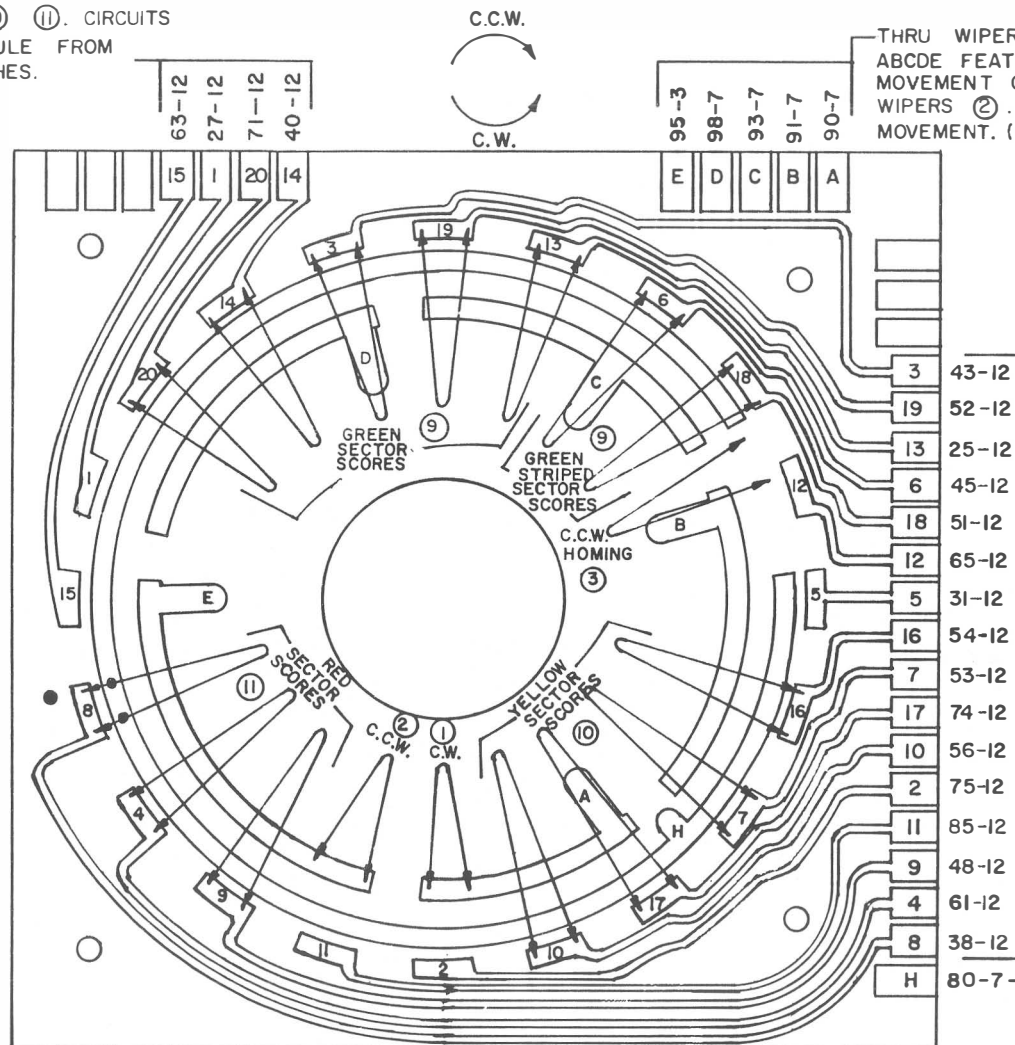


BIG WHEEL UNIT viewed from WIPER side

THRU WIPERS ⑨ ⑩ ⑪. CIRCUITS TO DETECTOR MODULE FROM PANEL HOLE SWITCHES. (ON DIAG. S-39)

WIPER FEEDS THRU SLIP RING	
WIPERS	WIRE No.
1	85-7
2	83-7
3	15-8
9	45-11
10	31-11
11	21-11

● RED PAINT WIPER "O" KEY.

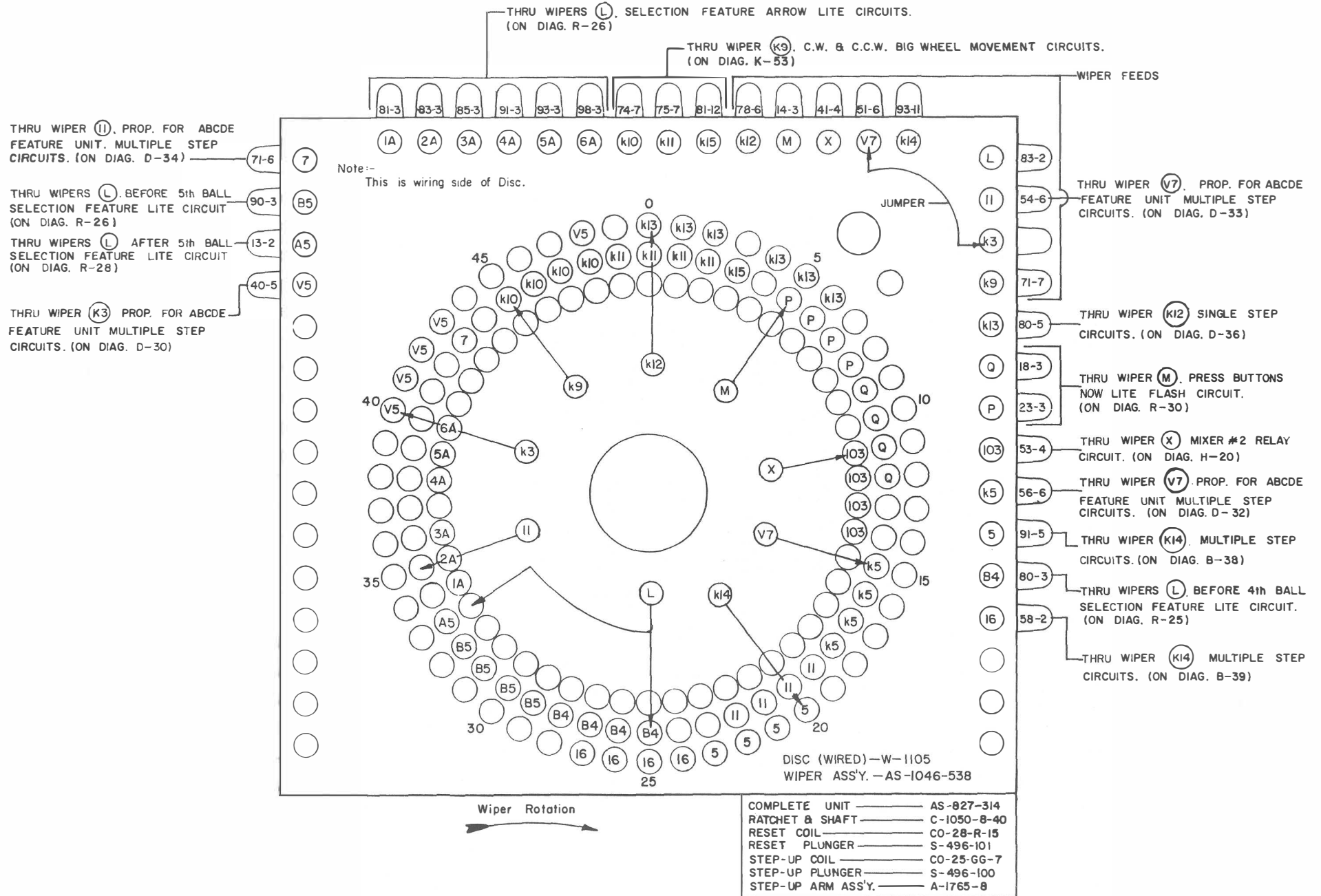


THRU WIPER ①. CIRCUITS FROM ABCDE FEATURE DISC FOR CLOCKWISE MOVEMENT OF BIG WHEEL. THRU WIPERS ②. FOR COUNTER-CLOCKWISE MOVEMENT. (ON DIAG. G-51)

THRU WIPERS ⑨ ⑩ ⑪. CIRCUITS TO DETECTOR MODULE FROM PANEL HOLE SWITCHES. (ON DIAG. S-39)

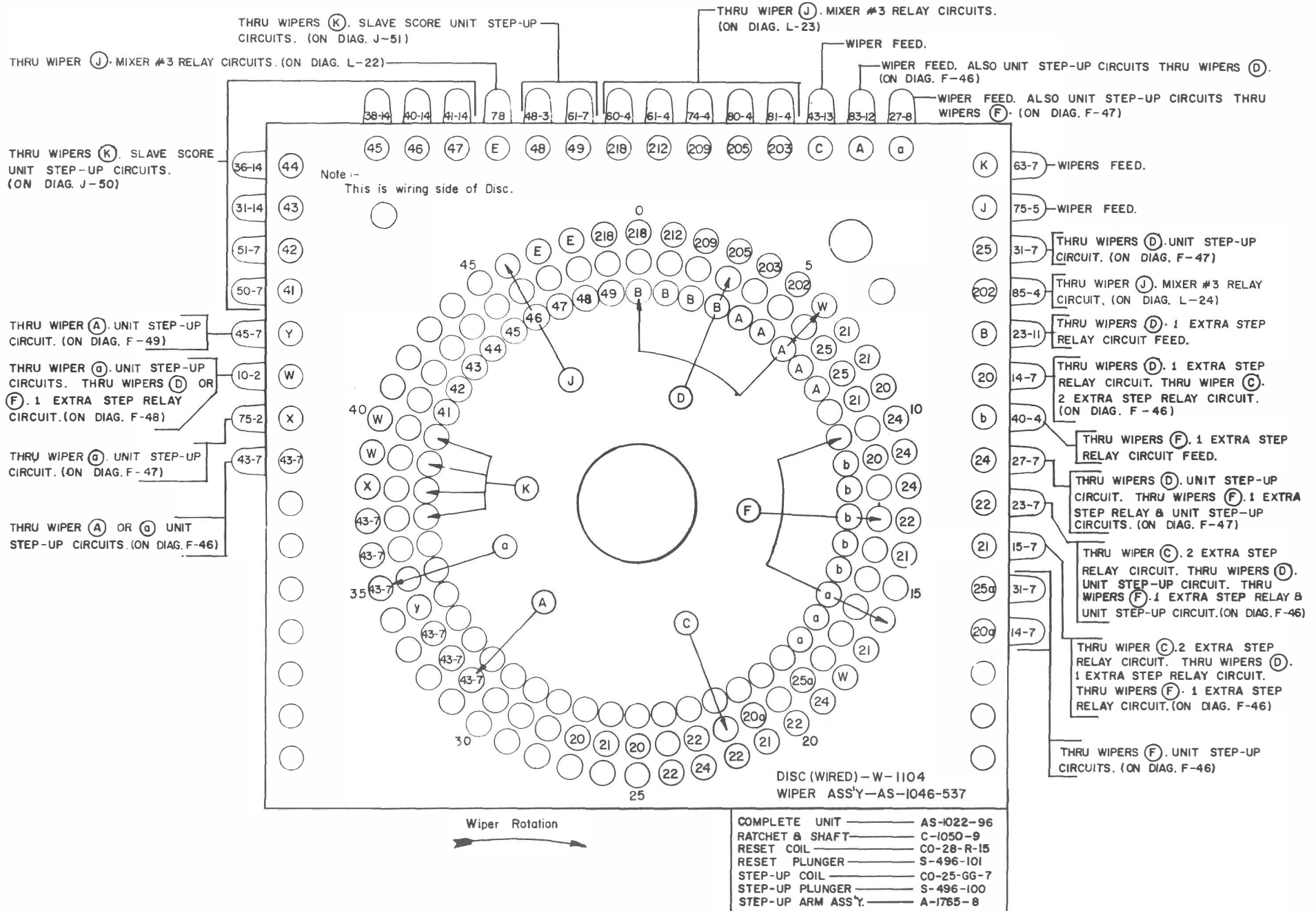
THRU WIPER ③. HOMING CIRCUIT TO C.C.W. BUTTON RELAY. (ON DIAG. H-50.)

DISC (WIRED)	COMPLETE UNIT	AS-1809-8
W-923-123	WIPER SLIP RING ASS'Y.	AS-579-36
	ROTOR ASS'Y.	AS-2512
	DRIVE MOTOR	E-119-373
	INDEX COIL	E-184-249
	INDEX PLUNGER	S-496-183
	INDEX ARM ASS'Y.	A-1138-15
	INDEX RELAY COIL	C-7800-332
	LADDER CHAIN	M-943-6
	NUMBERED PLASTIC DISC	M-1476-1
	LETTERED PLASTIC DISC	M-1477-1
	WIPER ASS'Y. (COMPLETE)	AS-2516



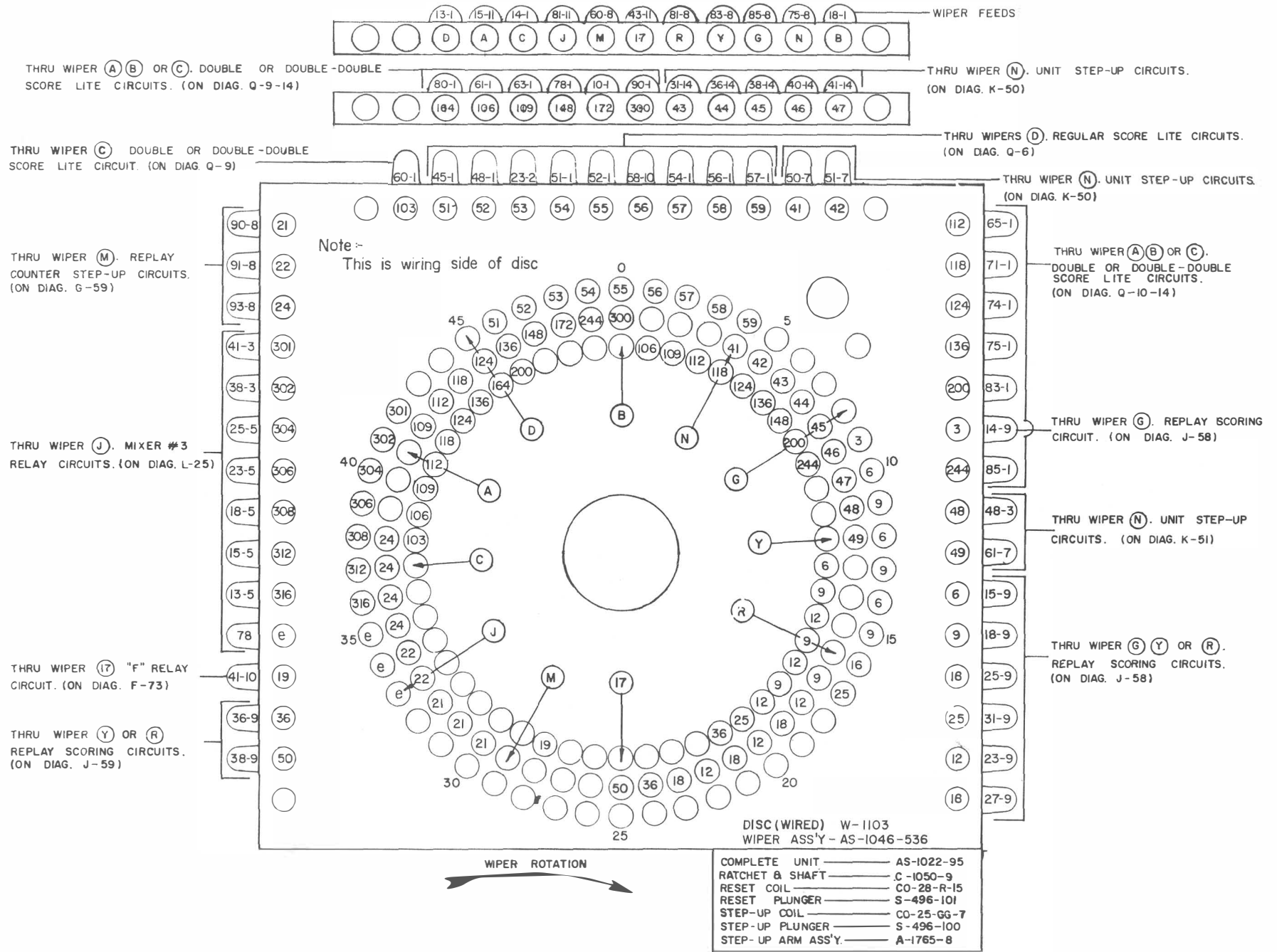
MASTER SCORE UNIT DISC viewed from WIRING side

9 step unit. Wipers shown in zero or reset position



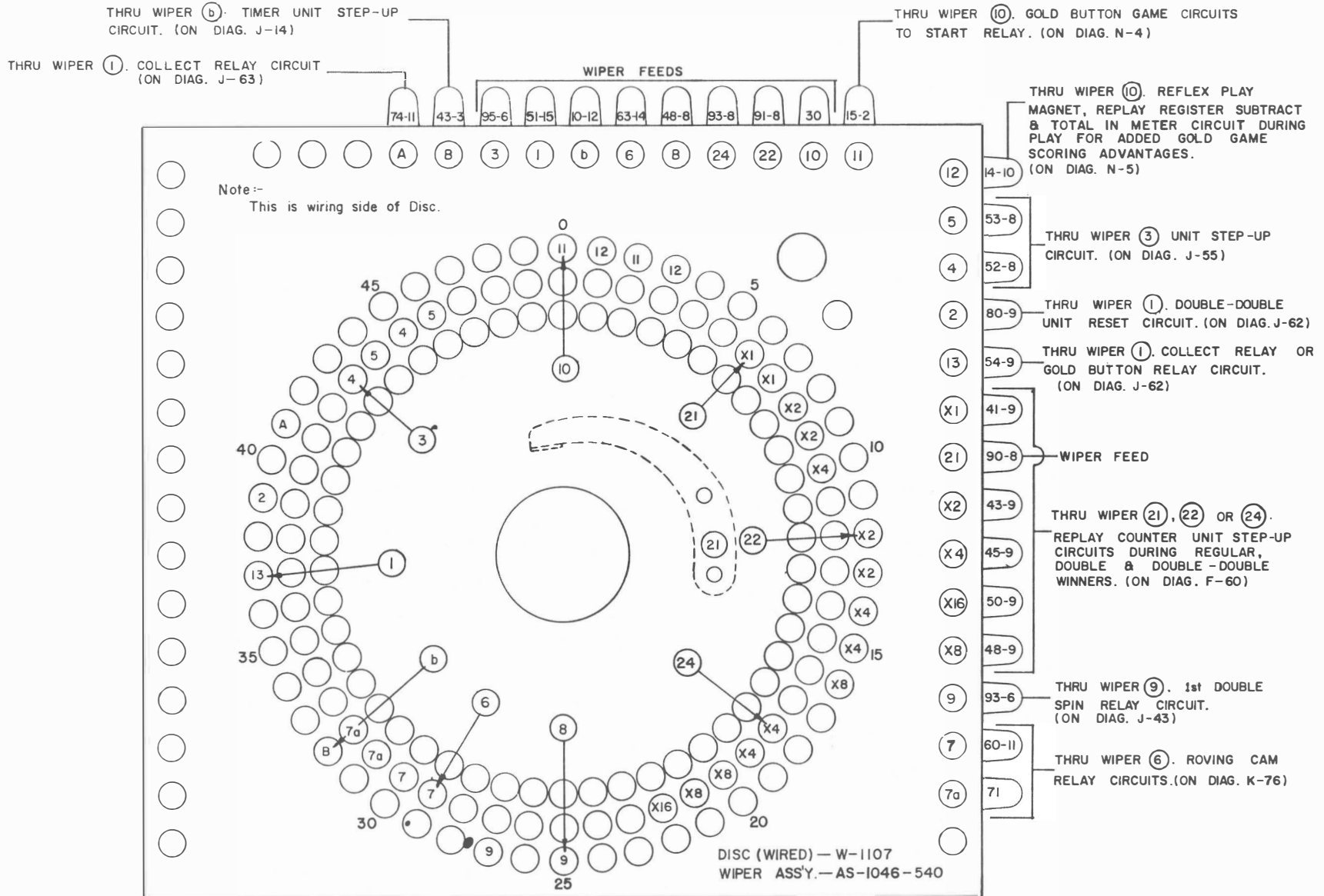
SLAVE SCORE UNIT DISC viewed from WIRING side

9 step unit. Wipers shown in zero or reset position

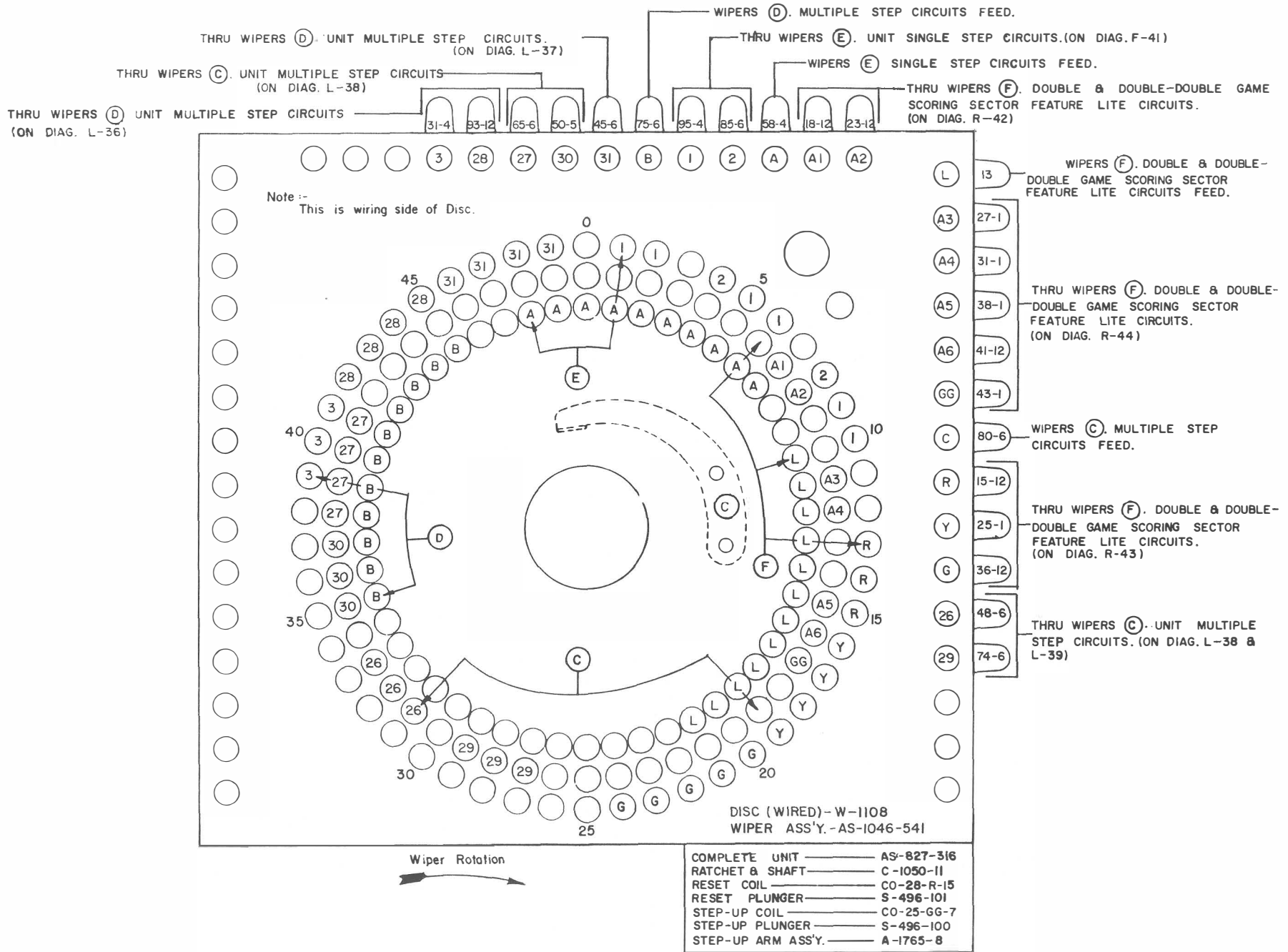


2ND HALF SEQUENCE UNIT viewed from WIRING side

4 step unit. Wipers shown in zero or reset position

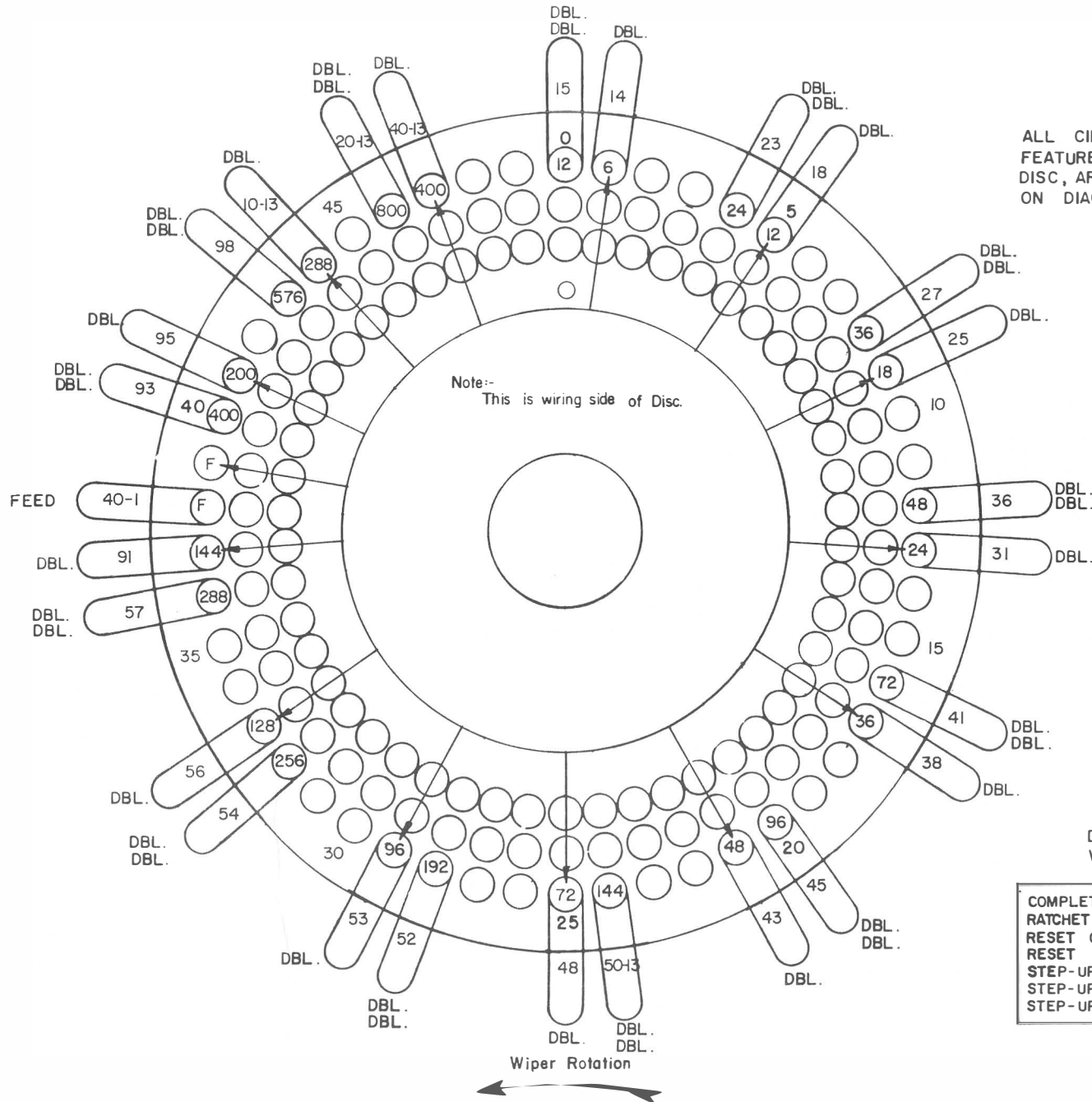


COMPLETE UNIT	AS-1022-97
RATCHET & SHAFT	C-1050-4-38
RESET COIL	CO-28-R-15
RESET PLUNGER	S-496-101
STEP-UP COIL	CO-25-GG-7
STEP-UP PLUNGER	S-496-100
STEP-UP ARM ASS'Y	A-1765-8



DOUBLE-DOUBLE UNIT viewed from WIRING side

1 step unit. Wipers shown in stepped position



ALL CIRCUITS (DOUBLE & DOUBLE-DOUBLE FEATURE SCORE LITES) THRU THIS UNIT DISC, ARE LOCATED AT S-9 TO 15 ON DIAGRAM..

IMPORTANT

THIS UNIT OPERATES IN REVERSE OF THE REGULAR OPERATION OF OUR STEPPING UNITS.

IT IS NORMALLY IN ITS STEPPED POSITION, WHERE IT FUNCTIONS FOR DOUBLE SCORES. IT RESETS TO ITS ZERO POSITION, TO FUNCTION FOR DOUBLE-DOUBLE SCORES.

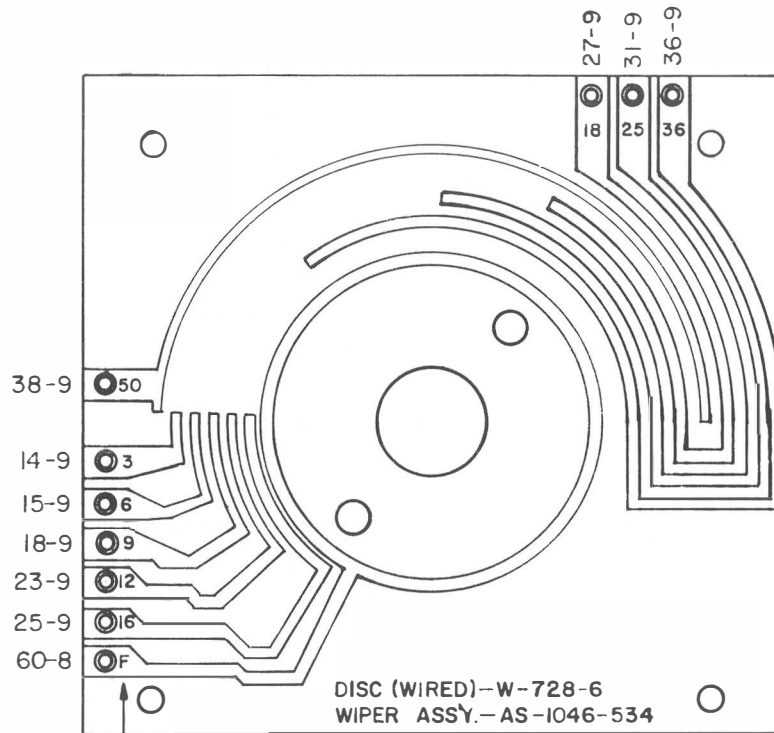
DISC (WIRED)-W-1109
WIPER ASS'Y.-AS-1046-542

COMPLETE UNIT	AS-1022-98
RATCHET & SHAFT	C-1050-1
RESET COIL	CO-28-R-15
RESET PLUNGER	S-496-101
STEP-UP COIL	CO-25-GG-7
STEP-UP PLUNGER	S-496-100
STEP-UP ARM ASS'Y.	A-1765-8

REPLAY COUNTER UNIT viewed from WIPER side

50 step unit

CONTROL UNIT MULTIPLIER CAM SW'S. THAT PULSE REPLAY COUNTER UNIT STEP-UP COIL DURING REGULAR, DOUBLE AND DOUBLE-DOUBLE WINNERS. LARGE NUMBERS ARE THE REPLAY SCORES SHOWN ON BACKGLASS. CIRCLED NUMBERS ARE THE REPLAY VALUES SCORES ARE EFFECTIVE THRU DURING WINNERS.



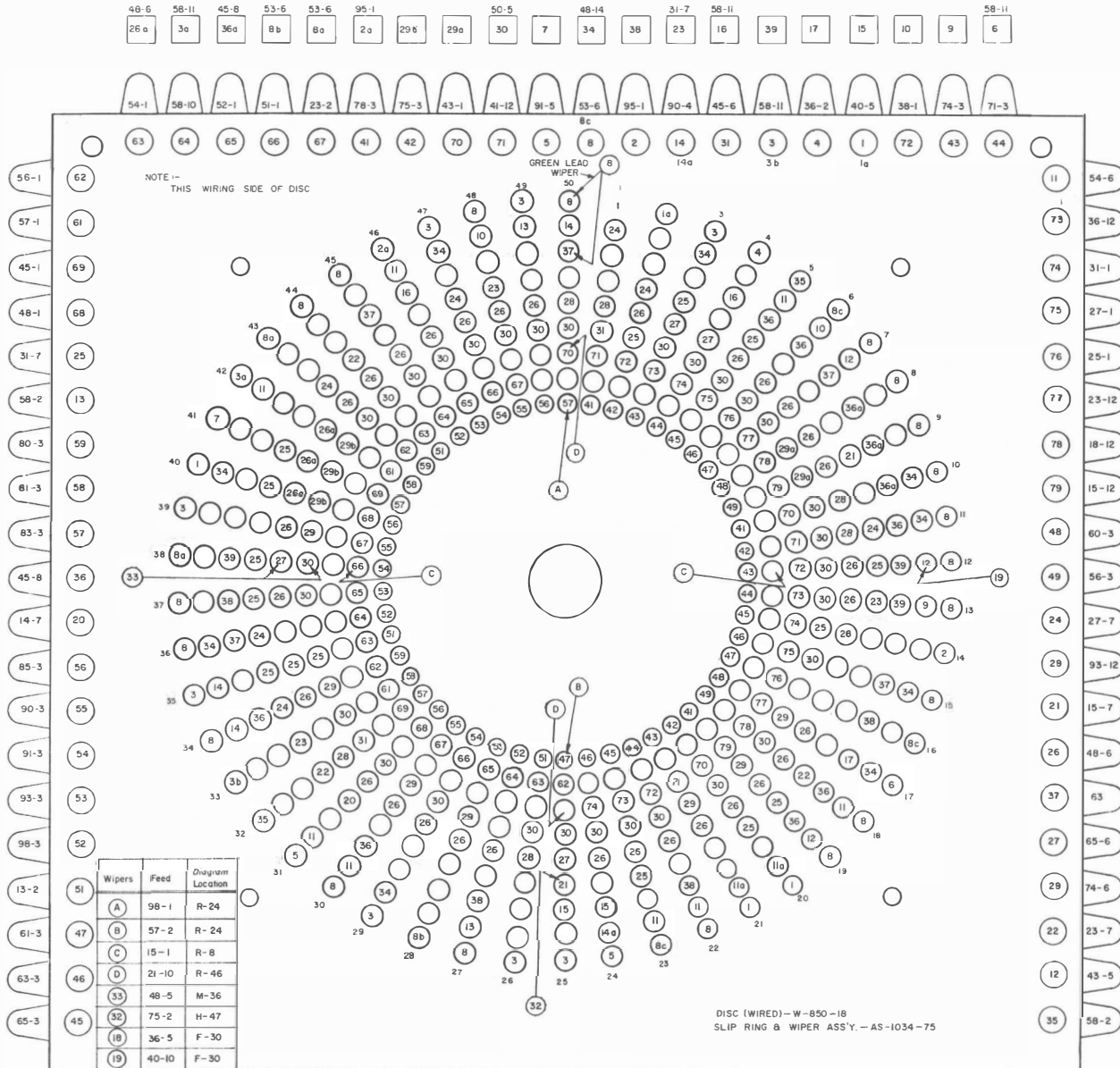
- COMPLETE UNIT — AS-797-149
- RATCHET & SHAFT — C-100-50
- RESET COIL — CO-28-R-15
- RESET PLUNGER — S-496-101
- STEP-UP COIL — CO-25-GG-7
- STEP-UP PLUNGER — S-496-116
- STEP-UP ARM ASSY. — A-1765-B

REGULAR WINNERS	SW. 15B X1	SW. 15B X1	SW. 15B X1	SW. 16A X2	SW. 16A X2	SW. 17A X4	SW. 17A X4	SW. 17A X4	SW. 17A X4
HIGH SCORES	9 <small>9</small>	12 <small>12</small>	18 <small>18</small>	24 <small>12</small>	36 <small>18</small>	48 <small>12</small>	72 <small>18</small>	144 <small>36</small>	200 <small>50</small>
MEDIUM SCORES	6 <small>6</small>	9 <small>9</small>	12 <small>12</small>	18 <small>9</small>	24 <small>12</small>	36 <small>9</small>	48 <small>12</small>	100 <small>25</small>	144 <small>36</small>
LOW SCORES	3 <small>3</small>	6 <small>6</small>	9 <small>9</small>	12 <small>6</small>	18 <small>9</small>	24 <small>6</small>	36 <small>9</small>	64 <small>16</small>	100 <small>25</small>

DOUBLE WINNERS	SW. 16A X2	SW. 16A X2	SW. 16A X2	SW. 17A X4	SW. 17A X4	SW. 18A X8	SW. 18A X8	SW. 18A X8	SW. 18A X8
HIGH SCORES	18 <small>9</small>	24 <small>12</small>	36 <small>18</small>	48 <small>12</small>	72 <small>18</small>	96 <small>12</small>	144 <small>18</small>	288 <small>36</small>	400 <small>50</small>
MEDIUM SCORES	12 <small>6</small>	18 <small>9</small>	24 <small>12</small>	36 <small>9</small>	48 <small>12</small>	72 <small>9</small>	96 <small>12</small>	200 <small>25</small>	288 <small>36</small>
LOW SCORES	6 <small>3</small>	12 <small>6</small>	18 <small>9</small>	24 <small>6</small>	36 <small>9</small>	48 <small>6</small>	72 <small>9</small>	128 <small>16</small>	200 <small>25</small>

DOUBLE DOUBLE WINNERS	SW. 17A X4	SW. 17A X4	SW. 17A X4	SW. 18A X8	SW. 18A X8	SW. 19A X16	SW. 19A X16	SW. 19A X16	SW. 19A X16
HIGH SCORES	36 <small>9</small>	48 <small>12</small>	72 <small>18</small>	96 <small>12</small>	144 <small>18</small>	192 <small>12</small>	288 <small>18</small>	576 <small>36</small>	800 <small>50</small>
MEDIUM SCORES	24 <small>6</small>	36 <small>9</small>	48 <small>12</small>	72 <small>9</small>	96 <small>12</small>	144 <small>9</small>	192 <small>12</small>	400 <small>25</small>	576 <small>36</small>
LOW SCORES	12 <small>3</small>	24 <small>6</small>	36 <small>9</small>	48 <small>6</small>	72 <small>9</small>	96 <small>6</small>	144 <small>9</small>	256 <small>16</small>	400 <small>25</small>

SPOTTING DISC viewed from WIRING side



MISCELLANEOUS PARTS

Back Cabinet Assembly:

Part No.	Name of Part
G-292-29	Backglass
M-1424-7	Backglass (Plexiglass)
M-281-31	Lock & Keys (2 Keyed Alike)
E-122-107	Transformer

Back Door Assembly:

M-281-24	Lock & Keys (2 Keyed Alike)
SW-100-106	Lock Switch
E-105-6	Resistor (8200 ohm 1/2 watt)

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
A-2790-19	Coin Box
P-3089-30	Coin Box Cover
E-130-10	Counter (Total Play-Replay)
A-2618	Leg
M-106-1	Leg Bolt
M-168-4	Leg Adjuster
AS-2183-11	Push Button (Blue)
AS-2183-10	Push Button (Green)
E-138-3	Plumb Bob Tilt
E-116-622	Relay (Ball Detector)
C-7800-3312	Relay (Coil Only)
G-213	Top Glass
E-108-57	Toggle Switch

Front Door Assembly:

Coin Switch & Rejector Mount Assembly*

E-101-58	Coin Lockout Magnet Coil
E-108-92	Coin Switch
	Coin Guide Assembly*
	Coin Slide Assembly*

Front Door Assembly (Continued):

Part No.	Name of Part
AS-2041-56	Front Door Assembly (Single Coin)
AS-2041-57	Front Door Assembly (Double Coin)
CA-567-172	Front Door Only
A-254-84	Hinge & Bracket Assembly
M-281-6	Lock & Keys
S-490-18	Push Button (Reject)
A-1729-16	Push Button (Red)
A-1729-18	Push Button (White)
	Slug Rejector*

Front Moulding Assembly:

AS-1305-48	Front Moulding Assembly
CA-1119-20	Front Moulding Only
A-3080-4	Front Moulding (Plate Only)
A-1272-50	Button (Gold)
A-1272-54	Button (Clockwise)
A-1272-55	Button (Counter clockwise)
A-1272-29	Button (R)
	Coin Entry Plate*

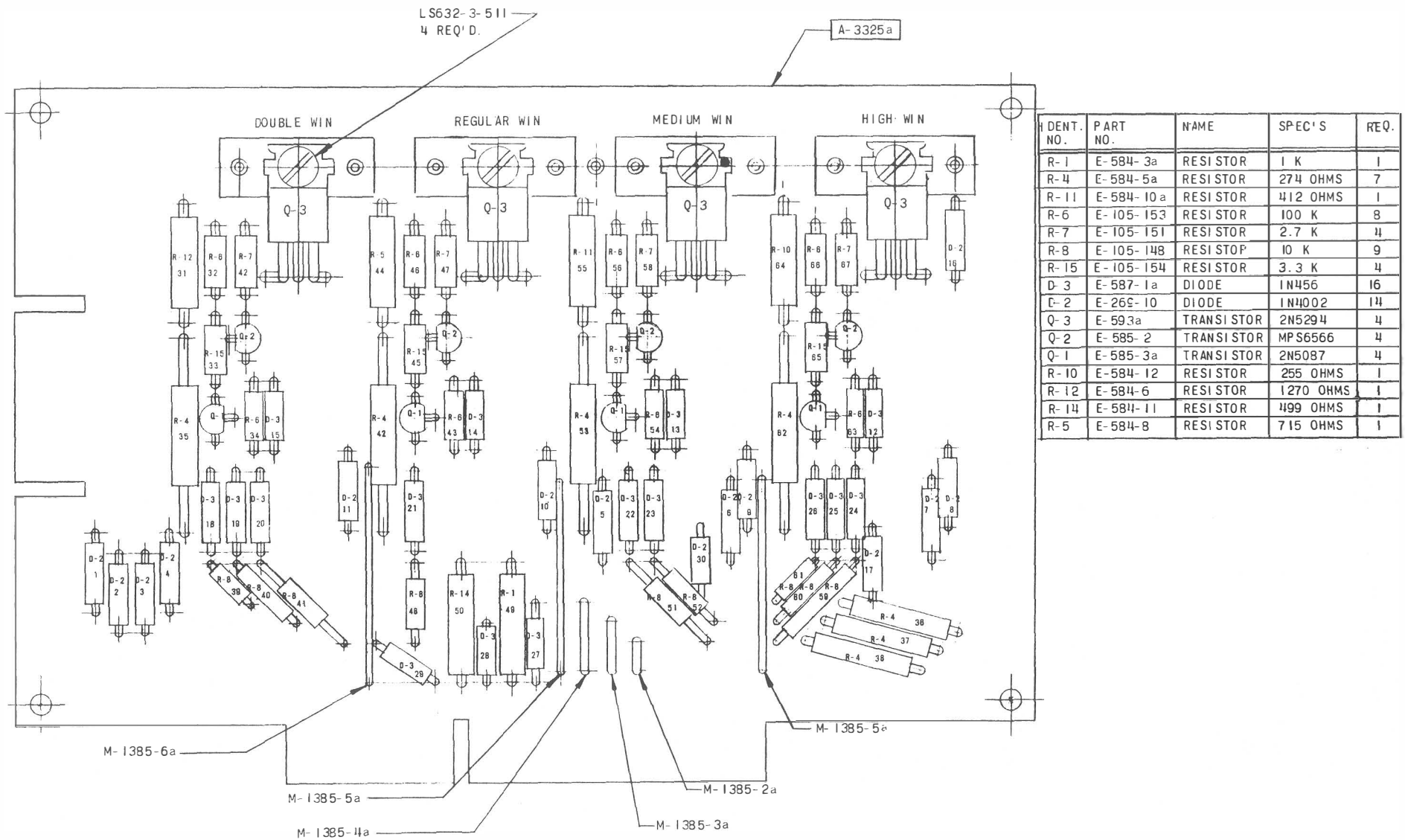
Panel Assembly:

AS-1315	Ball Gate & Switch Assembly
AS-493-2	Ball Rebound Assembly
C-153	Ball Lifter Cover
R-115-4	Ball Rebound Rubber (Only)
C-119-4	Bumper Post (Yellow)
C-119-5	Bumper Post (Red)
R-243	Rubber Ring (Yellow Post)
SP-112	Panel Spring (Long)
SP-112-1	Panel Spring (Short)
R-243-2	Rubber Ring (Red-Post)
R-135	Rubber Ring (Double Post)
M-170	Rebound Spring
E-146-439	Relay (Lifter Start)
C-7800-335	Relay (Coil Only)
C-326-9	Light Shield Post
C-387-2	Rollover Button (Yellow)

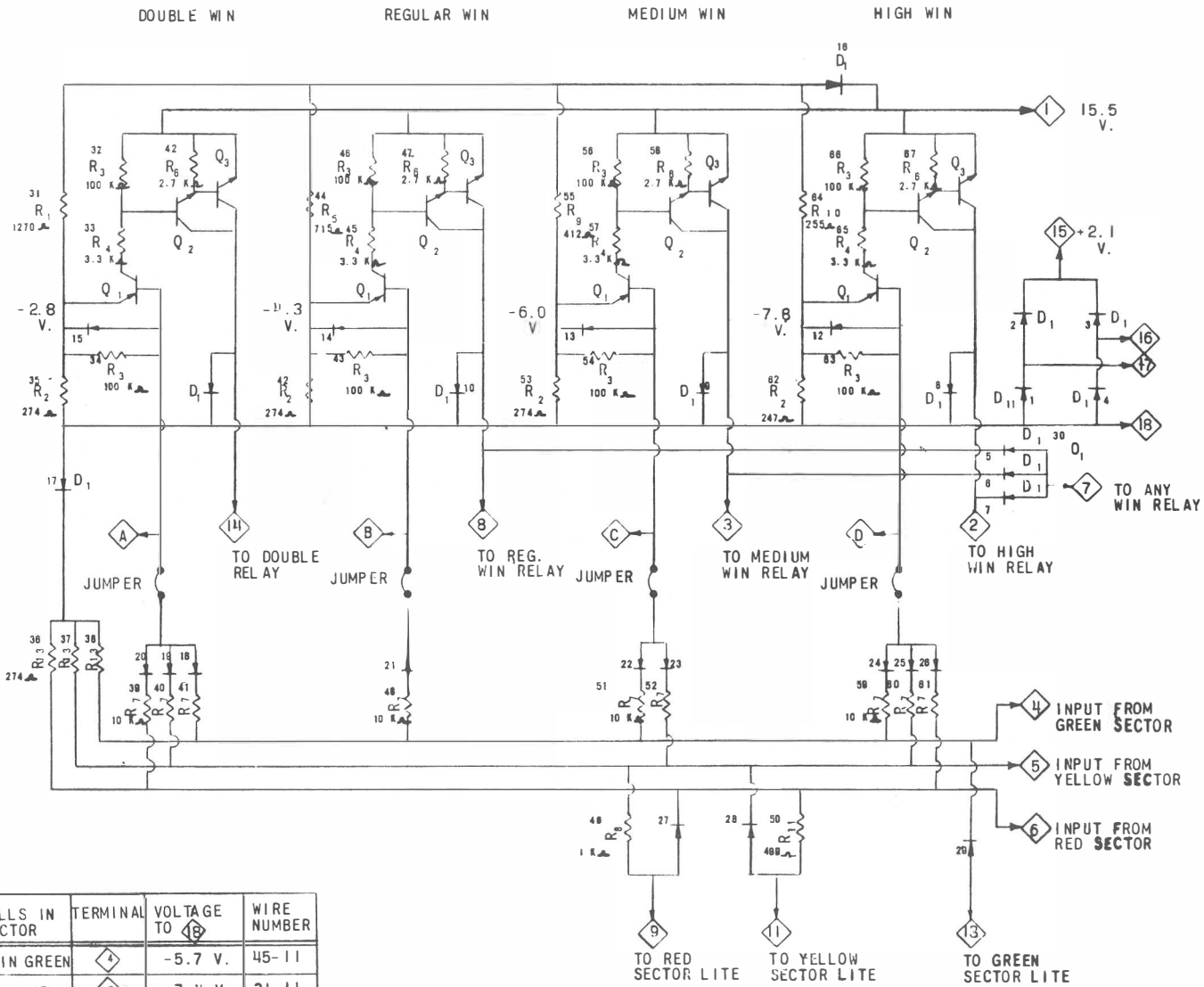
*When ordering part, specify full name of game, part name and type of coin(s) used.

Bally Pin Game Lubricant Available in 8 oz. containers with plastic spout and screw cap.

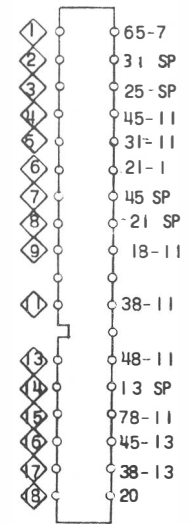
DETECTOR MODULE ASSEMBLY



DETECTOR MODULE CIRCUIT



CONNECTOR

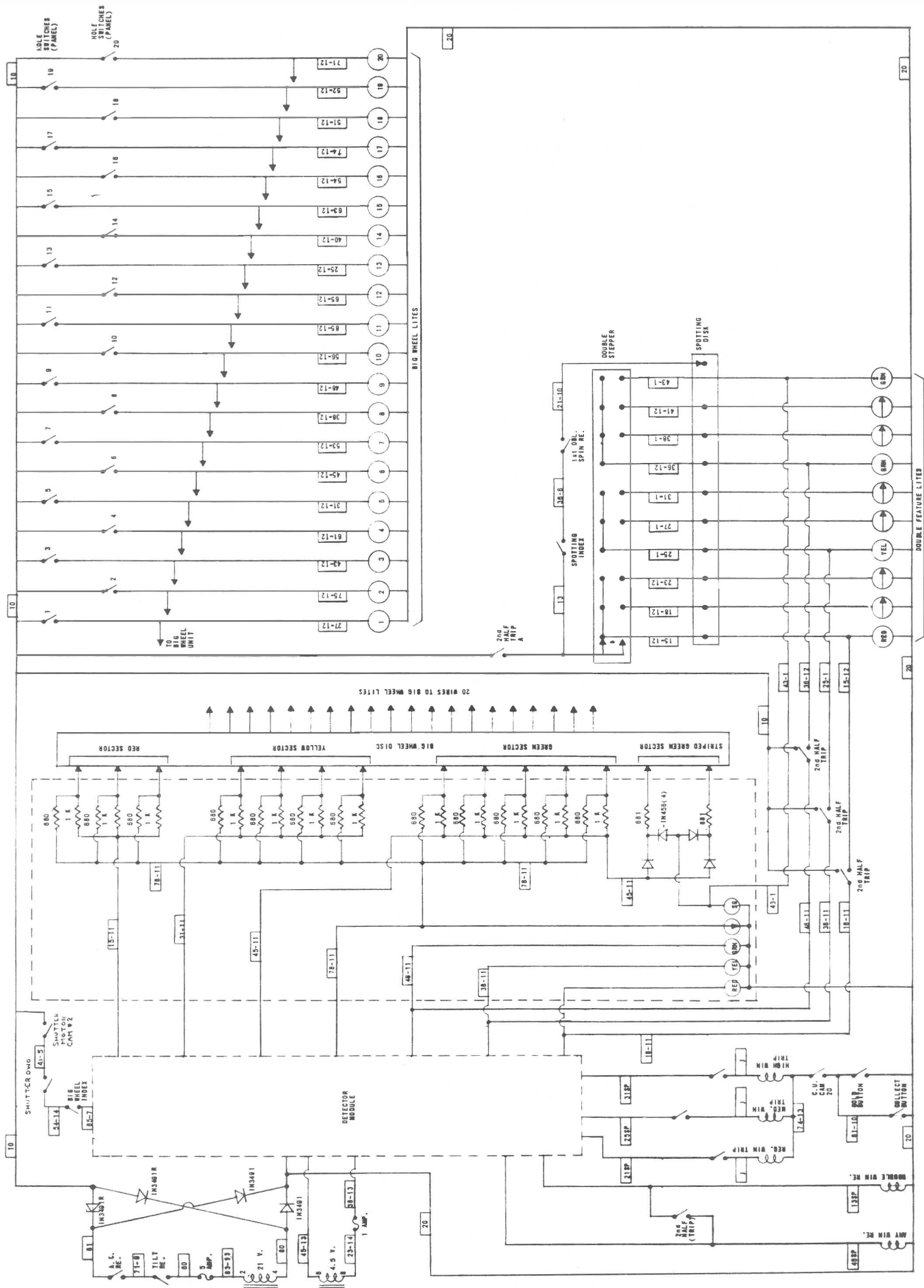


R ₁	1270 Ω	1%	\pm	W	(1)
R ₂	274 Ω	1%	\pm	W	(4)
R ₃	100K Ω	10%	\pm	W	(8)
R ₄	3.3K Ω	10%	\pm	W	(4)
R ₅	715 Ω	1%	\pm	W	(1)
R ₆	2.7K Ω	10%	\pm	W	(4)
R ₇	10K Ω	10%	\pm	W	(9)
R ₈	1K Ω	1%	\pm	W	(2)
R ₉	412 Ω	1%	\pm	W	(1)
R ₁₀	255 Ω	1%	\pm	W	(1)
R ₁₁	499 Ω	1%	\pm	W	(1)
R ₁₃	274 Ω	1%	\pm	W	(3)

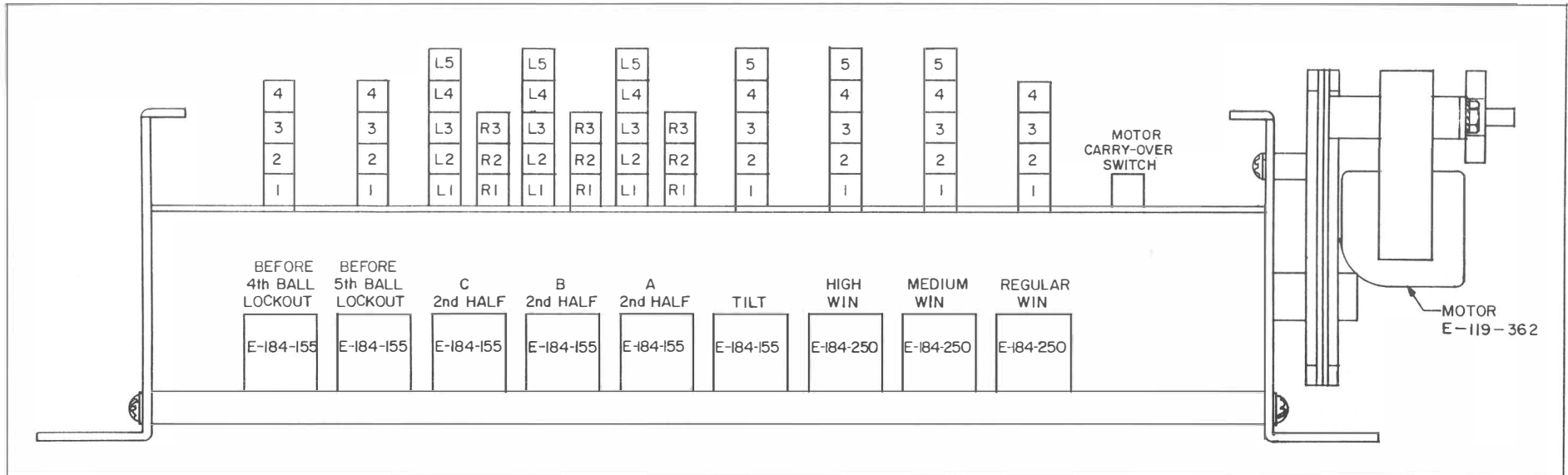
D₁ - 1N4002
ALL OTHER DIODES, 1N456

Q₁ - 2N5087
Q₂ - MPS-6566
Q₃ - 2N5294

GAME	BALLS IN SECTOR	TERMINAL	VOLTAGE TO D_8	WIRE NUMBER
5-BALL	3 IN GREEN	D_4	-5.7 V.	45-11
5-BALL	3 IN YEL.	D_5	-7.4 V.	31-11
5-BALL	3 IN RED	D_6	-9.1 V.	21-1
DOUBLE	2 IN GREEN	D_4	-4.0 V.	45-11
DOUBLE	2 IN YEL.	D_5	-4.0 V.	31-11
DOUBLE	2 IN RED	D_6	-4.0 V.	21-1



TRIP RELAY BANK PICTORIAL VIEW NUMBERS CORRESPOND TO SWITCH CHART BELOW



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

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
BEFORE 4TH BALL LOCK-OUT RELAY COIL	A-73	31-10J 70	Yellow-Red Orange	Energized thru timer unit disc ball count circuit when 4th ball is shot.
1	N.C.	B-71 31-10 31-10J	Yellow-Red Yellow-Red	Opens circuit to this relay.
2	N.C.	R-30 23-3 27-5	Blue-Yellow Blue-Orange	Opens before 4th ball press buttons new lite flash circuit.
3	N.C.	J-52 74-7 81-12	Orange-Green Black-Red	Opens before 4th ball circuits to move Big Wheel.
4	N.O.	L-14 36-3 43-3	Yellow-Brown Green-Yellow	Completes timer unit 4th to 5th step circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
BEFORE 5TH BALL LOCK-OUT RELAY COIL	A-72	36-10J 70	Yellow-Brown Orange	Energized thru timer unit disc ball count circuit when 5th ball is shot.
1	N.C.	B-72 36-10 36-10J	Yellow-Brown Yellow-Brown	Opens circuit to this relay.
2	N.C.	J-53 75-7 81-12	Orange-White Black-Red	Opens before 5th ball circuits to have Big Wheel.
3	S.P.D.T.	R-30 18-3 25-2 15-3	Red-Black Blue-White Red-White	Directs before 5th ball or after 5th ball press buttons now lite flash circuits.
4	N.O.	H-14 57-3 71-13	White-Orange Orange-Red	Completes timer unit 5th to 8th step circuit. Also completes winner timer unit reset circuit.

CONTINUED ON NEXT PAGE

TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 25

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
C 2nd HALF RELAY COIL	C-65	95-5J 70	Gray-White Orange	Energized thru regular game winner circuit by Gold button relay switch.
L1 N.C.	D-65	95-5 95-5J	Gray-White Gray-White	Opens circuit to this relay.
L2 S.P.D.T.	K-23	75-5 61-2 81-11	Orange-White Brown-Red Black-Red	Directs master score unit disc or Slave score unit disc mixer #3 relay circuits.
L3 S.P.D.T.	J-30	27-6 74-14 31-4	Blue-Orange Orange-Green Yellow-Red	Directs spotting disc control circuit to advance ABCDE feature unit and selection control feature unit, or double feature unit.
L4 S.P.D.T.	M-29	58-1 21-3 80-10	White-Black Blue-Red Black	Directs ABCDE feature unit single steps circuit and selection control feature unit rollover button step-up circuit, or ABCDE feature unit step to top double games circuit.
L5 N.O.	M-56	21-3 51-8	Blue-Red White-Red	Completes 2nd half sequence unit step-up circuits.
R1 N.C.	L-4	30 14-10	Yellow Red-Green	Opens regular game play reflex unit (play), replay register subtract and total in meter circuit.
R2 N.C.	Q-24	78-2 85-11	Orange-Black Black-White	Opens spotting disc selection control feature lites flash circuit.
R3 S.P.D.T.	S-30	13-3 93-10 90-10	Red-Yellow Gray-Yellow Gray	Directs before 4th ball, before 5th ball, after 5th ball, or before 3rd ball press buttons now lite flash circuit.
B 2nd HALF RELAY COIL	C-64	95-5J 70	Gray-White Orange	Energized thru regular game winner circuit by Gold button relay switch.
L1 N.C.	C-64	95-5 95-5J	Gray-White Gray-White	Opens circuit to this relay.
L2 S.P.D.T.	P-17	40-2 30 60-10	Green Yellow Brown	Directs red, green, blue, button play lite circuits, or white button play lite circuit.
L3 S.P.D.T.	P-11	13-1 30 43-2	Red-Yellow Yellow Green-Yellow	Directs regular game score lite circuits, or double and double-double game score lite circuits.
L4 S.P.D.T.	M-6	51-3 53-13 52-3	White-Red White-Yellow White-Blue	Directs blue and green button play, replay start relay circuits, or white button play, replay start relay circuit.
L5 N.O.	Q-34	13-SP 45-SP	Red-Yellow Green-White	Completes any win detector module circuit to double win relay.
R1 N.C.	Q-24	91-10 65-13	Gray-Red Brown-White	Opens spotting disc ABCDE feature lites flash circuit.
R2 N.C.	M-69	81-9 83-9	Black-Red Black-Yellow	Opens regular game ball lift motor and ball detector relay circuits.
R3 N.C.	L-44	21-3 58-3	Blue-Red White-Black	Opens master score unit step-up circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
A 2nd HALF RELAY COIL	C-63	95-5J 70	Gray-White Orange	Energized thru regular game winner circuit by Gold button relay switch.
L1 N.C.	D-63	95-5 95-5J	Gray-White Gray-White	Opens circuit to this relay.
L2 S.P.D.T.	P-41	10 48-11 36-12	Red Green-Black Yellow-Brown	Directs Big Wheel green scoring sector lite circuits.
L3 S.P.D.T.	P-40	10 38-11 25-1	Red Yellow-Black Blue-White	Directs Big Wheel yellow scoring sector lite circuits.
L4 S.P.D.T.	P-39	10 18-11 15-12	Red Red-Black Red-White	Directs Big Wheel red scoring sector lite circuits.
L5 N.O.	S-41	10 13	Red Red-Yellow	Completes red, yellow, green, striped green, double games feature lite circuits.
R1 N.C.	Q-26	83-2 56-3	Black-Yellow White-Brown	Opens panel rollover lite circuit.
R2 N.C.	M-27	31-5 50-4	Yellow-Red White	Opens green button play features and blue button play scores circuits.
R3 N.O.	N-53	71-7 81-12	Orange-Red Black-Red	Completes before 3rd ball circuits to move Big Wheel.
TILT RELAY COIL	A-17	14-4 70	Red-Green Orange	Energized by tilt switches, anti-cheat coin switch circuits or anti-cheat ball lift circuit.
1 N.C.	S-31	60 71-9	Brown Orange-Red	Opens 12 volt and 4.5 volt circuits.
2 N.C.	N-2	30P 60P	Yellow Brown	Opens timer unit circuit to control unit and mixer-spotting unit motors.
3 S.P.D.T.	N-12	21-3 30 45-3	Blue-Red Yellow Green-White	Directs secondary 50 volt circuits for game operation or a shutter motor close shutter circuit.
4 S.P.D.T.	S-4	36-13 54-3 91-2	Yellow-Brown White-Green Gray-Red	Directs score lite circuits or tilt lite circuit.
5 N.O.	F-6	75-14 13-4	Orange-White Red-Yellow	Completes safety start relay circuit.

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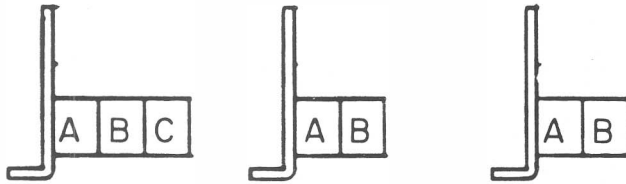
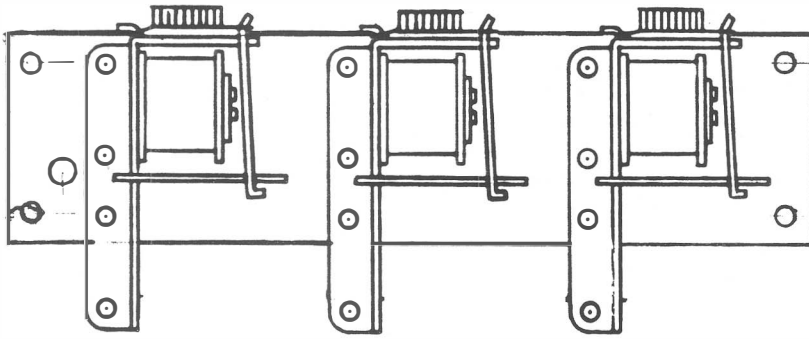
TRIP RELAY BANK CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 25

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
HIGH WIN RELAY COIL	R-35	31-SPJ 74-13	Yellow-Red Orange-Green	Energized thru winner detector module circuit for high score winners, 3 red-4 yellow-5 green.
1 N.C.	R-35	31-SP 31-SPJ	Yellow-Red Yellow-Red	Opens circuit to this relay.
2 S.P.D.T.	Q-11	41-2 43-2 15-11	Green-Red Green-Yellow Red-White	Directs low, medium or high score winners, double and double-double score lite circuits.
3 S.P.D.T.	M-60	98-11 80-8 81-8	Gray-Black Black Black-Red	Directs all low, medium or high score winners replay scoring circuits.
4 S.P.D.T.	J-76	54-13 60-11 91-11	White-Green Brown Gray-Red	Directs 2nd half sequence disc circuits to roving cam relay.
5 N.O.	M-63	40-3 21-3	Green Blue-Red	Completes a collect relay or Gold button and 2nd half trip relays circuit. Also completes double-double unit reset circuit.
MEDIUM WIN RELAY COIL	R-35	25-SPJ 74-13	Blue-White Orange-Green	Energized thru winner detector module circuit for medium score winners, 4 green-3 yellow.
1 N.C.	R-35	25-SP 25-SPJ	Blue-White Blue-White	Opens circuit to this relay.
2 S.P.D.T.	Q-11	63-10 41-2 18-1	Brown-Yellow Green-Red Red-Black	Directs low or medium score winners, double and double-double score lite circuits.
3 S.P.D.T.	L-60	78-10 98-11 83-8	Orange-Black Gray-Black Black-Yellow	Directs all low or medium score winners replay scoring circuits.
4 S.P.D.T.	G-75	43-10 54-13 51-13	Green-Yellow White-Green White-Red	Directs 2nd half sequence disc circuits to roving cam relay.
5 N.O.	N-61	40-3 21-3	Green Blue-Red	Completes a collect relay or Gold button and 2nd half trip relays circuit. Also completes double-double unit reset circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
REGULAR WIN RELAY COIL	R-35	21-SPJ 74-13	Blue-Red Orange-Green	Energized thru winner detector module circuit for low score winners, 3 green.
1 N.C.	R-35	21-SP 21-SPJ	Blue-Red Blue-Red	Opens circuit to this relay.
2 N.O.	L-60	78-10 85-8	Orange-Black Black-White	Completes all low score winners replay scoring circuits.
3 N.O.	M-60	40-3 21-3	Green Blue-Red	Completes a collect relay or Gold button and 2nd half trip relays circuit. Also completes double-double unit reset circuit.
4 N.O.	Q-10	14-1 63-10	Red-Green Brown-Yellow	Completes low score winners, double and double-double score lite circuits.
TRIP BANK MOTOR CARRY-OVER N.O.	K-63	30 52-13	Yellow White-Blue	Completes motor circuit to insure full cycle.

3 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 29



NAME	1st. DOUBLE SPIN	COUNTERCLOCK MOTOR	COUNTERCLOCK BUTTON
Coil turns & wire gauge	2300 # 33	2500 # 33	2500 # 33
Coil Resistance (nominal)	85 OHMS	100 OHMS	100 OHMS
Operating voltage	50 VOLTS	50 VOLTS	50 VOLTS
Test voltage	37 VOLTS	37 VOLTS	37 VOLTS
Extension spring load	CLEAR	CLEAR	CLEAR
Sw. actuator stroke	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$
Additional Information		NOTE "C"	NOTE "C"
Coil Part No.	C-7800-331	C-7800-332	C-7800-332

NOTE "C"
.0005 DUROCHROME ON ARMATURE. MINIMUM DROPOUT VOLTAGE = 20 VOLTS AFTER ENERGIZED AT 50 VOLTS

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

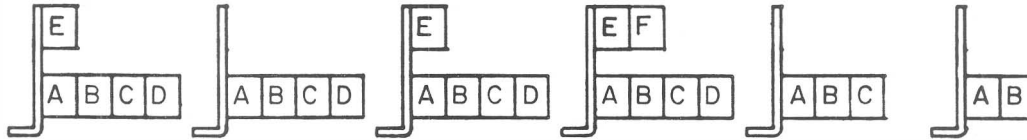
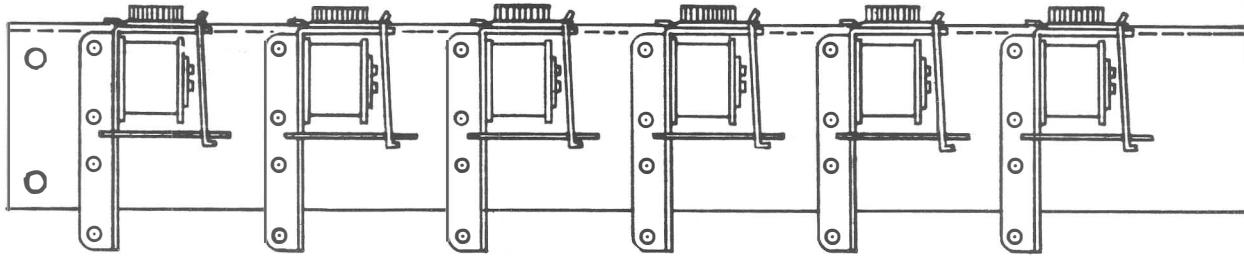
3 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 28

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1st DOUBLE SPIN RELAY COIL	A-43	93-6 70	Gray-Yellow Orange	Energized thru 2nd half sequence unit disc circuit during double and double-double play cycles.
A N.O.	H-42	90-6 93-6	Gray Gray-Yellow	Completes lock-in circuit to this relay.
B N.C.	R-46	36-6 21-10	Yellow-Brown Blue-Red	Opens spotting disc double feature lites flash circuit.
C S.P.D.T.	L-36	80-6 27-11 75-6	Black Blue-Orange Orange-White	Directs double feature unit multiple step circuit.
COUNTER CLOCK WISE MOTOR RELAY COIL	A-53	13-8 70	Red-Yellow Orange	Energized by C.C.W. button relay circuit.
A N.C.	D-51	98-10 81-7	Gray-Black Black-Red	Opens C.W. button circuit to Big Wheel index relay.
B S.P.D.T.	B-54	23-8 14-8 13-8	Blue-Yellow Red-Green Red-Yellow	Directs C.W. motor circuit or C.C.W. motor and lock-in circuit to this relay.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
COUNTER CLOCK WISE BUTTON RELAY COIL	A-50	15-8 70	Red-White Orange	Energized by C.C.W. button thru ABCDE Big Wheel feature disc circuit. Also thru Big Wheel disc homing circuit.
A N.O.	C-54	13-8 14-8	Red-Yellow Red-Green	Completes C.C.W. motor relay and C.C.W. motor circuit.
B S.P.D.T.	C-51	98-10 58-6 21-3	Gray-Black White-Black Blue-Red	Directs Big Wheel index relay circuits for C.W. or C.C.W. movement of wheel.

6 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 31



Name	REPLAY RESET	START	25c START	ANTI-CHEAT	ANY-WIN	DOUBLE WIN
Coil turns & wire gauge	2300 # 33	1800 # 33	1800 # 33	2300 # 33	1980 # 32	1980 # 32
Coil resistance (nominal)	85 OHMS	65 OHMS	65 OHMS	85 OHMS	60 OHMS	60 OHMS
Operating voltage	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	18 V. D.C.	18 V. D.C.
Test voltage	37 VOLTS	32 VOLTS	32 VOLTS	39 VOLTS	10 V. D.C.	10 V. D.C.
Extension spring load	CLEAR	RED	CLEAR	RED	RED	RED
Sw actuator stroke	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$
Additional information				NOTE "A"	NOTES "N" & "T"	NOTES "N" & "T"
Coil Part No.	C-7800-331	C-7800-334	C-7800-334	C-7800-331	C-7800-322	C-7800-322
SPRING CODE				Note "A" Thermalize wire or equivalent. No wrap on coil	Note "N" Brass rivet in armature D.C. core plug.	Note "T" Test for D.C. relays pull in voltage 10 V. D.C. full wave D.C. unfiltered diode 1N4002 across coil.
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				

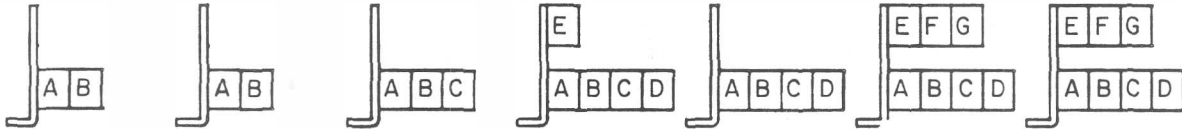
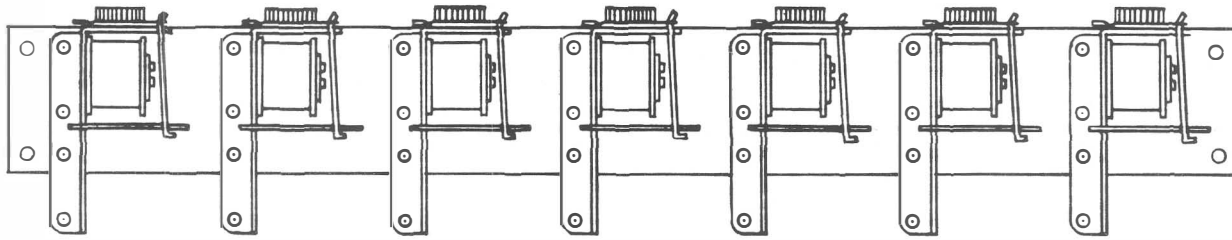
6 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 30

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
REPLAY RE-SET RELAY COIL	A-5	74-15 70	Orange-Green Orange	Energized by anti-cheat relay circuit.
A N.O.	N-5	74-15 52-10	Orange-Green White-Blue	Completes lock-in circuit to this relay. Also completes replay register unit cancel circuit.
B N.O.	P-1	20P 60P	Blue (Plastic) Brown(Plastic)	Completes a circuit to control unit and mixer spotting unit motor.
C S.P.D.T.	C-5	90-5 98-4 53-3	Gray Gray-Black White-Yellow	Directs play or cancel replay register unit reset circuit.
D N.C. N.O.	J-7	10-5 83-4	Red Black-Yellow	Opens replay button and coil switch circuits to start relay. Extra switch.
START RELAY COIL	A-7	13-4 70	Red-Yellow Orange	Energized by replay button or coin switch circuits for regular play cycles. Also by Gold relay circuit for Gold button play cycles.
A N.O.	F-10	13-4 45-5	Red-Yellow Green-White	Completes shutter motor (open shutter) circuit and control unit index - mixer latch coil circuit.
B N.O.	J-10	13-4 48-2	Red-Yellow Green-Black	Completes lock-in circuit to this relay. Also in series with switch A circuits.
C N.C.	F-73	21-3 38-10	Blue-Yellow Yellow-Black	Opens lock-in circuit to "F" relay.
D N.C.	K-62	53-9 51-15	White-Yellow White-Red	Opens sequence unit circuits to collect relay, Gold button relay, and double-double unit reset.
25¢ RELAY COIL	A-9	15-4 70	Red-White Orange	Energized by 25¢ coin switch circuit.
A N.O.	L-9	25-3 15-4	Blue-White Red-White	Completes lock-in circuit to this relay.
B N.O.	K-7	90-2 10-5	Gray Red	Completes a circuit to start relay.
C S.P.D.T.	E-56	57-8 61-8 54-8	White-Orange Brown-Red White-Green	Directs teplay register unit step-up circuit for winners or 25¢ play credits (4).
D N.C.	B-5	98-5 45-2	Gray-Black Green-White	Opens replay register unit reset (subtract) circuit.
E N.C.	D-8	80-13 93-14	Black Gray-Yellow	Opens circuit to nickel coin meter (when meter is used).

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
ANTI-CHEAT RELAY COIL	A-18	78-5 70	Orange-Black Orange	Energized by control unit switch #6 circuit and stays energized unless power is interrupted.
A N.O.	H-17	30 78-5	Yellow Orange-Black	Completes lock-in circuit to this relay, when energized.
B N.O.	S-31	81 71-9	Black-Red Orange-Red	Opens 12 volt and 4.5 volt circuits when relay de-energized.
C S.P.D.T.	N-7	74-15 52-10 53-13	Orange-Green White-Blue White-Yellow	Directs start relay circuit or replay reset relay circuit.
D N.C.	N-12	30 14-6	Yellow Red-Green	Completes a shutter motor (close shutter) circuit, when relay de-energized while shutter is open.
E S.P.D.T.	S-5	91-2 36-13 40-1	Gray-Red Yellow-Brown Green	Directs 6 volt score lites or tilt lite circuit.
F N.O.	B-62	18-7 63-9	Red-Black Brown-Yellow	Opens Gold button relay circuit, when relay de-energized.
ANY WIN RELAY COIL	Q-34	45-SP 20	Green-White Blue	Energized thru detector module winner circuit for all winners.
A N.O.	P-16	85 18-13	Black-White Red-Black	Completes double or nothing lite flash circuit.
B N.O.	D-16	81-10 60-12	Black-Red Brown	Completes a timer unit reset circuit.
C N.C.	G-7	83-4 75-14	Black-Yellow Orange-White	Opens replay button and coin switch circuits to start relay.
DOUBLE WIN RELAY COIL	Q-34	13-SP 20	Red-Yellow Blue	Energized thru detector module winner circuit for double and double-double games.
A N.O.	K-61	53-9 54-9	White-Yellow White-Green	Completes double winner circuit to collect relay or Gold button relay.
B N.O.	J-62	65-9 74-11	Brown-White Orange-Green	Completes double-double winner circuit to collect relay.

(TOP) 7 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 33



Name	ROVING CAM	MIXER # 2	MIXER # 3	PLAY FEATURES	FEATURES LOCK	PLAY SCORES	SCORES LOCK
Coil turns & wire gauge	2300 # 33	2500 # 33	2500 # 33	2300 # 33	2300 # 33	2300 # 33	2300 # 33
Coil resistance (nominal)	85 OHMS	100 OHMS	100 OHMS	85 OHMS	85 OHMS	85 OHMS	85 OHMS
Operating voltage	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS
Test voltage	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS
Extension spring load	CLEAR	CLEAR	CLEAR	RED	RED	RED	RED
Sw actuator stroke	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$
Additional Information	NOTES "A" & "C"	NOTES "A" & "C"	NOTES "A" & "C"				
Coil Part No.	C-7800-331	C-7800-332	C-7800-332	C-7800-331	C-7800-331	C-7800-331	C-7800-331

SPRING CODE			Note "A" Thermalize wire or equivalent. No wrap on coil.	Note "C" 0005 Durochrome on armature. Min. dropout voltage = 20V. after energized at 50 Volts
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		

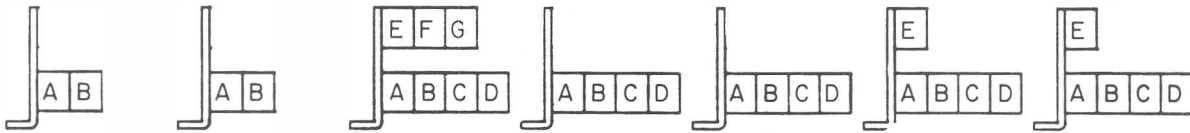
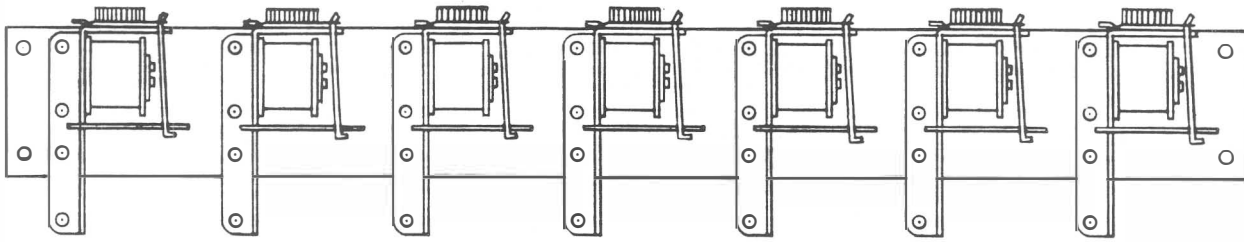
(TOP) 7 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 32

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
ROVING CAM RELAY COIL	A-76	43-10 70	Green-Yellow Orange	Energized thru 2nd half sequence disc circuits. Controls double games scoring advantage build up.
A N.O.	C-74	90-6 43-10	Gray Green-Yellow	Completes lock-in circuit to this relay.
B N.O.	J-36	48-5 51-11	Green-Black White-Red	Completes spotting disc circuits for double unit advance.
MIXER #2 RELAY COIL	A-19	41-4 70	Green-Red Orange	Energized thru mixer #2 disc score control circuit. Controls score build up.
A N.O.	F-21	40-11 41-4	Green Green-Red	Completes lock-in circuit to this relay.
B N.O.	L-45	58-3 80-11	White-Black Black	Completes circuits for master score unit advance.
MIXER #3 RELAY COIL	A-23	61-2 70	Brown-Red Orange	Energized thru mixer #3 disc feature control circuits. Controls features build up and double games scoring advantage build up.
A N.O.	D-22	40-11 61-2	Green Brown-Red	Completes lock-in circuit to this relay.
B N.O.	H-30	27-6 10-4	Blue-Orange Red	Completes circuits for ABCDE feature unit and selection control feature unit advance.
C N.O.	J-35	31-4 51-11	Yellow-Red White-Red	Completes spotting disc circuits for double unit advance.
PLAY FEATURES RELAY COIL	A-25	54-5 70	White-Green Orange	Energized thru green button play circuit.
A N.O.	B-25	53-5 54-5	White-Yellow White-Green	Completes lock-in circuit to this relay.
B N.O.	C-26	57-5 61-5	White-Orange Brown-Red	Completes circuit to features lock relay.
C N.C.	Q-8	13-1 14-2	Red-Yellow Red-Green	Opens spotting disc score lites flash circuit.
D N.C.	L-46	80-11 43-7	Black Green-Yellow	Opens master score unit step-up circuit.
E S.P.D.T.	S-17	83 36-1 91-18	Black-Yellow Yellow-Brown Gray-Red	Directs red button play lite circuit or green button play lite circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
FEATURES LOCK RELAY COIL	A-26	61-5 70	Brown-Red Orange	Energized thru play features relay circuit.
A N.O.	B-27	60-5 61-5	Brown Brown-Red	Completes lock-in circuit to this relay.
B N.O.	F-33	53-6 56-6	White-Yellow White-Brown	Completes added spotting disc circuits for ABCDE feature unit advance.
C N.O.	H-31	36-5 40-10	Yellow-Brown Green	Completes added spotting disc circuits for ABCDE feature unit and selection control feature unit advance.
D N.O.	F-38	45-8 83-11	Green-White Black-Yellow	Completes added spotting disc circuits for selection control feature unit advance.
PLAY SCORES RELAY COIL	A-26	56-5 70	White-Brown Orange	Energized thru blue button play circuit.
A N.O.	B-26	52-5 56-5	White-Blue White-Brown	Completes lock-in circuit to this relay.
B N.O.	B-28	57-5 63-5	White-Orange Brown-Yellow	Completes circuit to scores lock relay.
C S.P.D.T.	Q-17	36-1 40-2 93-13	Yellow-Brown Green Gray-Yellow	Directs red button play lite circuit, green button play lite circuit or blue button play lite circuit.
D N.C.	L-29	23-13 58-1	Blue-Yellow White-Black	Opens ABCDE feature unit single step circuit.
E N.C.	P-23	65-13 30	Brown-White Yellow	Opens spotting disc ABCDE feature lites flash circuit.
F N.C.	P-24	85-11 30	Black-White Yellow	Opens spotting disc selection control feature lites flash circuit.
G N.C.	K-20	48-4 53-4	Green-Black White-Yellow	Opens a circuit to mixer #2 relay.
SCORES LOCK RELAY COIL	A-28	63-5 70	Brown-Yellow Orange	Energized thru play scores relay circuit.
A N.O.	C-27	60-5 63-5	Brown Brown-Yellow	Completes lock-in circuit to this relay.
B N.O.	D-48	43-13 90-12	Green-Yellow Gray	Completes master score disc circuit to 2 extra steps relay.
C S.P.D.T.	D-47	23-11 78-12 40-4	Blue-Yellow Orange-Black Green	Directs master score disc circuits to 1 extra step relay.
D S.P.D.T.	D-46	25-8 75-13 27-8	Blue-White Orange-White Blue-Orange	Directs master score disc circuits to advance unit.
E N.C.	H-30	10-4 36-5	Red Yellow-Brown	Opens ABCDE feature unit and selection control feature unit step-up circuits.
F N.C.	L-19	45-4 41-4	Green-White Green-Red	Opens a circuit to mixer #2 relay.
G N.C.	L-21	98-12 54-4	Gray-Black White-Green	Opens a circuit to mixer #2 relay.

(BOTTOM) 7 RELAY BANK PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART ON PAGE 35



Name	1 EXTRA STEP	2 EXTRA STEPS	GOLD BUTTON	COLLECT	"A"	"F"	3rd SHOT
Coil turns & wire gauge	2300 # 33	2300 # 33	1800 # 33	2500 # 33	2300 # 33	2300 # 33	2300 # 33
Coil resistance (nominal)	85 OHMS	85 OHMS	65 OHMS	100 OHMS	85 OHMS	85 OHMS	85 OHMS
Operating voltage	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS	50 VOLTS
Test voltage	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS	37 VOLTS
Extension spring load	CLEAR	CLEAR	RED	RED	RED	RED	RED
Sw actuator stroke	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$
Additional information							
Coil Part No.	C-7800-33I	C-7800-33I	C-7800-334	C-7800-332	C-7800-33I	C-7800-33I	C-7800-33I

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

(BOTTOM) 7 RELAY BANK SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 34

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1 EXTRA STEP RELAY COIL	A-48	80-12 70	Black Orange	Energized thru master score disc score control circuits.
A N.O.	B-46	43-8 80-12	Green-Yellow Black	Completes lock-in circuit to this relay.
B N.O.	K-44	58-3 38-6	White-Black Yellow-Black	Completes a master score unit step-up circuit.
2 EXTRA STEPS RELAY COIL	A-49	38-8 70	Yellow-Black Orange	Energized thru master score disc score control circuits.
A N.O.	B-48	43-8 38-8	Green-Yellow Yellow-Black	Completes lock-in circuit to this relay.
B N.O.	J-44	58-3 50-6	White-Black White	Completes two master score unit step-up circuits.
GOLD BUTTON RELAY COIL	A-62	63-9 70	Brown-Yellow Orange	Energized thru Gold button play circuit for double and double-double games.
A N.O.	E-63	80-9 45-10	Black Green-White	Completes double-double unit reset circuit.
B N.O.	E-62	53-9 56-9	White-Yellow White-Brown	Completes lock-in circuit to this relay.
C N.O.	G-63	40-3 95-5	Green Gray-White	Completes circuit to A-B-C 2nd half trip relays.
D N.O.	M-5	15-2 13-4	Red-White Red-Yellow	Completes double and double-double game circuits to start relay.
E N.C.	M-64	36-8 30	Yellow-Brown Yellow	Opens reset circuit to trip bank, ABCDE feature, master score, Slave score and 2nd half sequence units, also opens step-up circuit to double-double unit.
F N.C.	C-61	65-9 61-9	Brown-White Brown-Red	Opens collect relay circuit.
G N.C.	F-57	85-13 57-8	Black-White White-Orange	Opens replay winner circuit to replay register, reflex unit and total out meter.
COLLECT RELAY COIL	A-61	61-9 70	Brown-Red Orange	Energized thru collect button (R) circuit following regular play winners and double play winners, direct following double-double play winners.
A N.O.	L-58	78-8 80-8	Orange-Black Black	Completes winner replay scoring circuits.
B N.O.	G-61	53-9 65-9	White-Yellow Brown-White	Completes lock-in circuit to this relay.
C N.O.	H-6	83-4 75-14	Black-Yellow Orange-White	Completes a start relay circuit.
D N.C.	F-62	56-9 60-9	White-Brown Brown	Opens Gold button relay circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
"A" RELAY COIL	A-43	52-2 70	White-Blue Orange	Energized thru selection control unit closed at top circuit. Controls ABCDE feature unit and selection feature unit advance.
A S.P.D.T.	S-30	14-3 13-3 15-3	Red-Green Red-Yellow Red-White	Directs press buttons now lite flash circuit for before 4th, before 5th or after 5th ball selection.
B N.C.	E-32	58-11 51-6	White-Black White-Red	Opens a spotting disc ABCDE feature unit multiple step circuit.
C N.C.	J-20	54-4 41-4	White-Green Green-Red	Opens a mixer #2 disc circuit to mixer #2 relay.
D N.C.	C-37	83-5 25-7	Black-Yellow Blue-White	Opens a spotting disc selection control unit multiple step circuit.
"F" RELAY COIL	A-73	41-10 70	Green-Red Orange	Energized thru a Slave score disc and ABCDE feature unit circuit. Controls ABCDE feature unit and master scores advance.
A N.O.	D-73	38-10 41-10	Yellow-Black Green-Red	Completes lock-in circuit to this relay.
B N.O.	F-30	36-5 40-10	Yellow-Brown Green	Completes a spotting disc ABCDE feature unit multiple step circuit.
C N.O.	E-32	53-6 56-6	White-Yellow White-Brown	Completes a spotting disc ABCDE feature unit multiple step circuit.
D N.O.	N-22	60-4 78	Brown Orange-Black	Completes a master score disc circuit to mixer #3 relay.
E N.C.	E-46	83-12 25-8	Black-Yellow Blue-White	Opens a spotting disc master score unit step-up circuit.
3rd SHOT RELAY COIL	A-71	48-13 70	Green-Black Orange	Energized thru timer unit disc ball count circuit during double and double-double game play.
A N.O.	G-72	15-10 48-13	Red-White Green-Black	Completes lock-in circuit to this relay.
B N.O.	H-15	57-3 31-13	White-Orange Yellow-Red	Completes after 3rd ball shot, timer unit step-up circuit. Also completes winner, timer unit reset circuit.
C N.O.	K-14	43-3 10-12	Green-Yellow Red	Completes a timer unit disc circuit to advance unit from 3rd to 4th step.
D N.C.	G-52	81-12 91-12	Black-Red Gray-Red	Opens circuits to rotate Big Wheel.
E N.C.	S-29	90-10 65	Gray Brown-White	Opens timer unit disc press buttons now lite flash circuit.

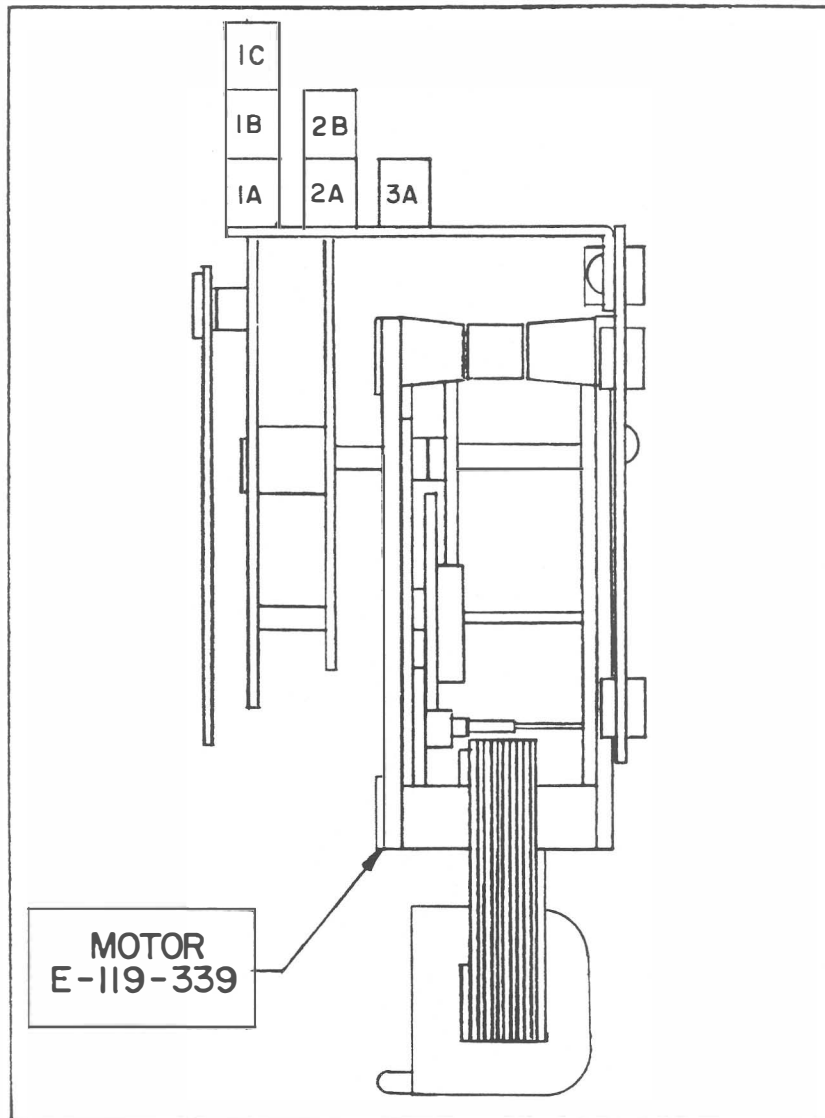
SINGLE RELAY SWITCH CHART

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
LIFTER START RELAY COIL	A-68	95-8 70	Gray-White Orange	Energized by ball runway switch circuit, when a ball is delivered to shoot position, then de-energized by ball gate switch when a ball is shot.
A N.C.	J-69	85-9 90-9	Black-White Gray	Completes lock-in circuit to this relay.
B N.C.	M-72	15-10 18-10	Red-White Red-Black	When relay drops out, completes ball count timer disc circuits to 3rd ball shot relay, before 4th, and before 5th ball lock-out relays.
C N.O.	J-68	98-8 95-8	Gray-Black Gray-White	When relay drops out, completes ball lifter motor circuits.
BIG WHEEL INDEX RELAY COIL	A-51	58-6 70	White-Black Orange	Energized thru ABCDE Big Wheel feature disc by C.W. or C.C.W. button circuits.
A N.O.	B-52	74 30	Orange-Green Yellow	Completes Big Wheel unit index solenoid circuit.

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
BALL DETECTOR RELAY COIL	A-71	83-9 70	Black-Yellow Orange	Energized thru ball count circuit to safety ball lifter motor circuit
A N.O.	M-70	13-10 83-9	Red-Yellow Black-Yellow	Completes lock-in circuit to this relay.
B N.O.	K-69	83-9 85-9	Black-Yellow Black-White	Completes ball lifter motor circuits.
C N.C.	L-16	95-9 14-4	Gray-White Red-Green	Completes tilt relay circuit thru ball lifter switch #2, if lifter motor cycles when relay not energized.
A-B-C-D-E SAFETY RELAY COIL	E-51	83-7 70	Black-Yellow Orange	Energized thru Big Wheel ABCDE feature circuit when wheel is moved clock-wise. Stays energized until wheel returns to zero position.
A N.C.	H-51	80-18 91-12	Black Gray-Red	Completes a safety counter clock-wise homing circuit, if relay drops out when wheel is out of zero position.
B N.C.	H-51	80-18 91-12	Black Gray-Red	Same function as switch A.

BALL LIFTER MOTOR PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART BELOW



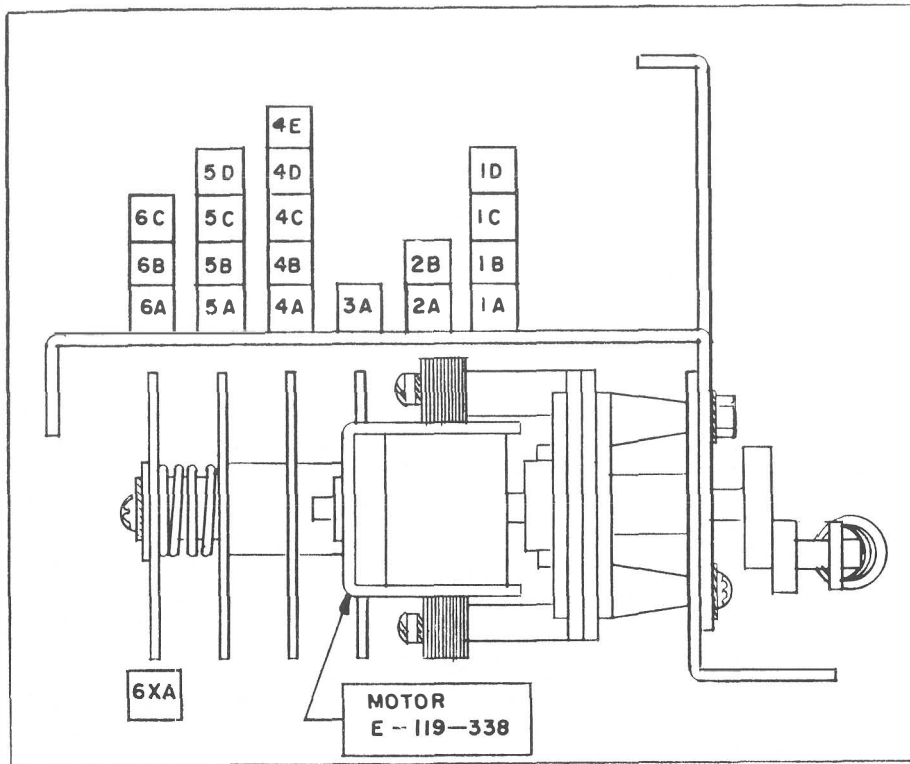
BALL LIFTER MOTOR SWITCH CHART

FOR POSITION OF SWITCHES SEE PICTORIAL VIEW ABOVE

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES	
1A	N.C.	L-72	18-10 23-10	Red-Black Blue-Yellow	During cycle, opens timer disc 3rd ball shot relay and before 5th ball lockout relay circuits.
1B	N.●	K-70	93-9 30	Gray-Yellow Yellow	During cycle, completes motor carry-over circuit.
1C	N.O.	M-70	13-10 21-3	Red-Yellow Blue-Red	During cycle, opens ball detector relay lock-in circuit.
2A	N.O.	G-13	43-3 25-11	Green-Yellow Blue-White	During cycle, pulses timer unit step-up coil thru 0 to 5th step circuits.
2B	N.O.	M-16	95-9 21-3	Gray-White Blue-Red	During cycles, completes ball detector relay safety tilt relay circuit.
3A	N.O.	N-71	21-3 14-12	Blue-Red Red-Green	During cycle, completes timer disc before 4th ball lock-out relay circuit.

SHUTTER MOTOR PICTORIAL VIEW

LETTERS CORRESPOND TO SWITCH CHART AT RIGHT

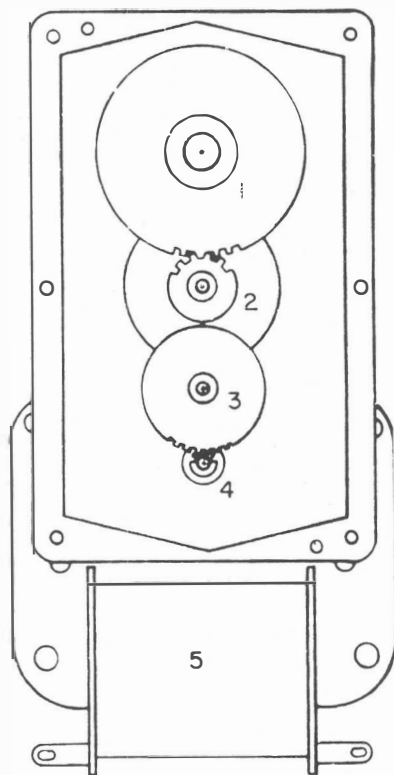


SHUTTER MOTOR SWITCH CHART

FOR POSITION OF SWITCHES SEE PICTORIAL VIEW AT LEFT

SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.C.	J-30 13-12 74-14	Red-Yellow Orange-Green	During shutter cycles, opens ABCDE feature unit and selection feature unit step-up circuits, or double feature unit step-up circuits.
1B	N.O.	P-11 30 14-5	Yellow Red-Green	During shutter cycles, completes shutter motor carry-over circuit.
1C	N.C.	K-14 21-3 48-10	Blue-Red Green-Black	When shutter is closed, in series with timer unit step-up and reset circuits.
1D	N.O.	M-58 21-3 75-8	Blue-Red Orange-White	During shutter cycles, opens Slave score unit step-up circuit and replay scoring circuits.
2A	N.C.	H-69 90-9 91-9	Gray Gray-Red	When shutter closes, completes ball lifter motor circuit.
2B	N.C.	S-35 10 41-5	Red Green-Red	When shutter closed, completes detector module win relay circuits.
3A	N.O.	K-66 30 78-11	Yellow Orange-Black	When shutter opens, completes selection control feature unit, double feature unit, replay counter unit reset circuit.
4A	N.C.	L-61 53-9 40-3	White-Yellow Green	When shutter is closed, completes win circuits to collect relay, Gold button relay, Double-Double unit reset coil.
4B	N.C.	P-72 21-3 15-10	Blue-Red Red-White	When shutter closed, completes timer disc ball count circuits to 3rd ball shot relay, before 5th ball lock-out relay and lock-in circuit to 3rd ball shot relay.
4C	S.P.D.T.	L-52 71-7 21-3 80-7	Orange-Red Blue-Red Black	Directs Big Wheel feature C.W. and C.C.W. movement circuits when shutter closed, or C.C.W. homing circuit when shutter opens.
4D	N.O.	K-12 45-3 18-2	Green-White Red-Black	When shutter opens, completes shutter motor tilt circuit to close shutter.
4E	N.O.	J-12 14-5 18-2	Red-Green Red-Black	When shutter open, completes shutter motor timer disc circuit to close shutter. Also in series with switch 4D circuit.
5A	S.P.D.T.	D-11 14-5 45-5 93-4	Red-Green Green-White Gray-Yellow	Directs shutter motor start relay circuit when shutter closed, or control unit timer cams index coil and mixer larch coil circuit when shutter open.
5B	N.O.	K-29 13-12 23-6	Red-Yellow Blue-Yellow	When shutter open, completes play circuits for ABCDE feature unit steps, selection feature unit steps, or double feature unit steps.
5C	N.O.	K-68 95-7 58-13	Gray-White White-Black	When shutter open, completes lock-in circuit to lifter start relay.
5D	S.P.D.T.	Q-18 83 60-10 98-13	Black-Yellow Brown Gray-Black	Directs red button play lite circuit when shutter closed, white button play lite circuit when shutter open.
6XA	N.O.	K-56 51-8 53-8	White-Red White-Yellow	When shutter closes, completes 1st to 2nd and 3rd to 4th, 2nd half sequence unit step-up circuits.
6A	N.O.	K-15 30 71-5	Yellow Orange-Red	When shutter opens, completes a timer unit reset circuit.
6B	N.O.	G-65 74-9 36-8	Orange-Green Yellow-Brown	When shutter opens, completes ABCDE feature unit, master score unit, Slave score unit, 2nd half sequence unit reset circuit, and Double-Double feature unit step-up circuit.
6C	N.O.	F-64 36-8 52-13	Yellow-Black White-Blue	When shutter opens, completes trip bank reset motor circuit.
SHUTTER SWITCHES				
A	N.C.	L-35 61 58-1	Brown-Red White-Black	Shutter switches below not shown in pictorial view. These switches are operated when shutter board opens and closes. When shutter closed, completes panel rollover button selection control feature unit step-up circuits.
B	N.C.	M-58 75-8 78-8	Orange-White Orange-Black	When shutter closed, completes collect winner replay scoring circuits.
C	N.C.	H-15 48-10 57-3	Green-Black White-Orange	When shutter closed, completes after 5th ball and after 3rd ball timer unit step-up circuits. Also after 3rd ball any win timer unit reset circuit.
D	N.C.	T-35 54-10 41-5	White-Green Green-Red	When shutter closed, completes detector module win relay circuits.
E	N.O.	M-28 80-10 95-1	Black Gray-White	When shutter open, completes 2nd half relay circuits to advance ABCDE feature unit, Double feature unit and energize 1st Double spin and roving cam relays.
F	N.O.	N-27 21-3 31-5	Blue-Red Yellow-Red	When shutter open, completes green button circuits to play features and features lock relay, and blue button circuits to play scores and scores lock relay.

MOTOR PARTS GUIDE



SHUTTER MOTOR (E-119-338)

- 1 ZGS-1725-15
- 2 G-5818-1
- 3 G-4109-1
- 4 ZRST-1715-30-1
- 5 ZS-1708-2519

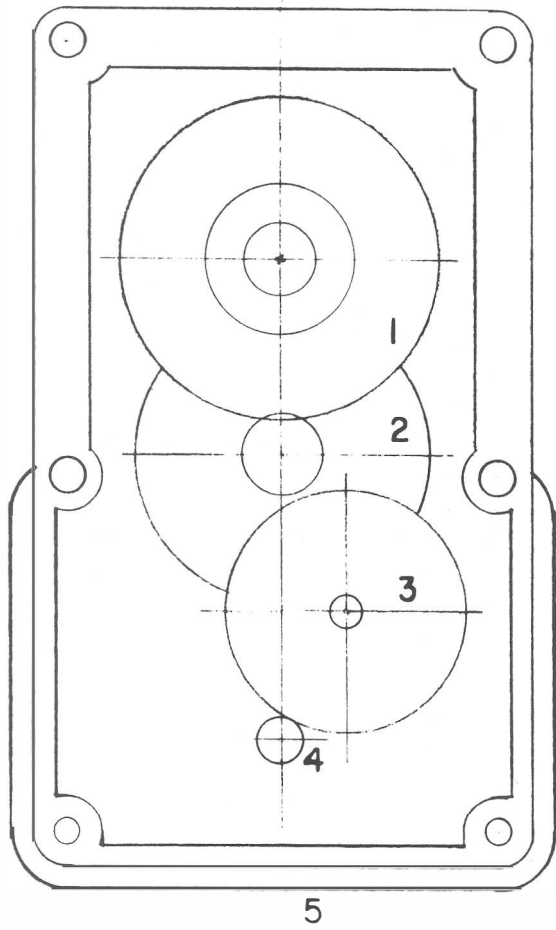
BALL LIFTER MOTOR (E-119-339)

- 1 ZGS-1745-12
- 2 G-5318-1
- 3 G-4114-1
- 4 ZRST-1715-30-1
- 5 ZS-1708-2519

CODE

- 1 GEAR & SHAFT ASSEMBLY.
- 2 GEAR.
- 3 GEAR.
- 4 GEAR ROTOR & SHAFT ASSEMBLY.
- 5 STATOR & COIL ASSEMBLY.

MOTOR FOR CONTROL UNIT AND MIXER & SPOTTING UNIT



Motor
(E -119-359)

- Bearing & Bracket Assembly ———— ZBB-7553-20
- Gear Case Ass'y. (Minus Stator & Coil) ——— ZEGB-4020-1
- 1. Output Gear & Shaft Ass'y. ———— ZEGS-4020-1
- 2 Gear ———— G-6712-32
- 3. Gear ———— GL-6312-21
- 4. Gear-Rotor & Shaft Ass'y. ———— ZRS-4038-52-1 R.H.
- 5 Stator & Coil Ass'y. ———— ZS-4018-26109

Misc Parts

- Fan ———— P-1036-1
- Oil Pad Retaining Plate ———— A-1417
- Oil Pad ———— P-4010
- Washer, Bottom (for ZEGS-4020-1) ——— W-2060-2
- Spacer (for ZEGS-4020-1) ———— B-1887
- Washer, Top (for ZEGS-4020-1) ——— W-2044
- Spacer (for G-6712-32) ———— V-1309-3
- Washers, Two (for G-6712-32) ——— W-2078
- Spacer (for GL-6312-21) ———— V-1309-1
- Washers, Two (for GL-6312-21) ——— W-2077