

Bally[®]

SHOOT-A-LINE

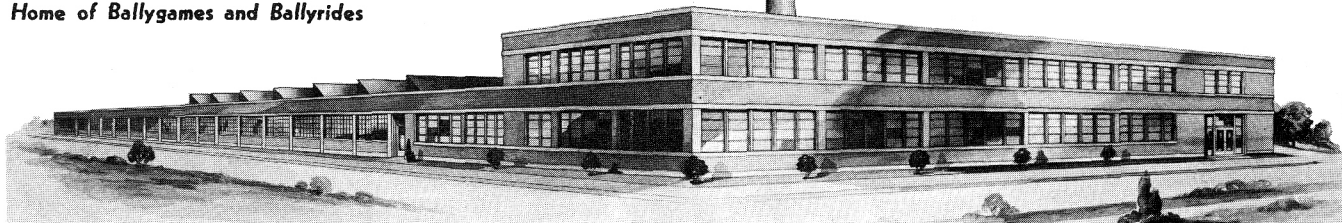
OPERATING INSTRUCTIONS AND PARTS CATALOG

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

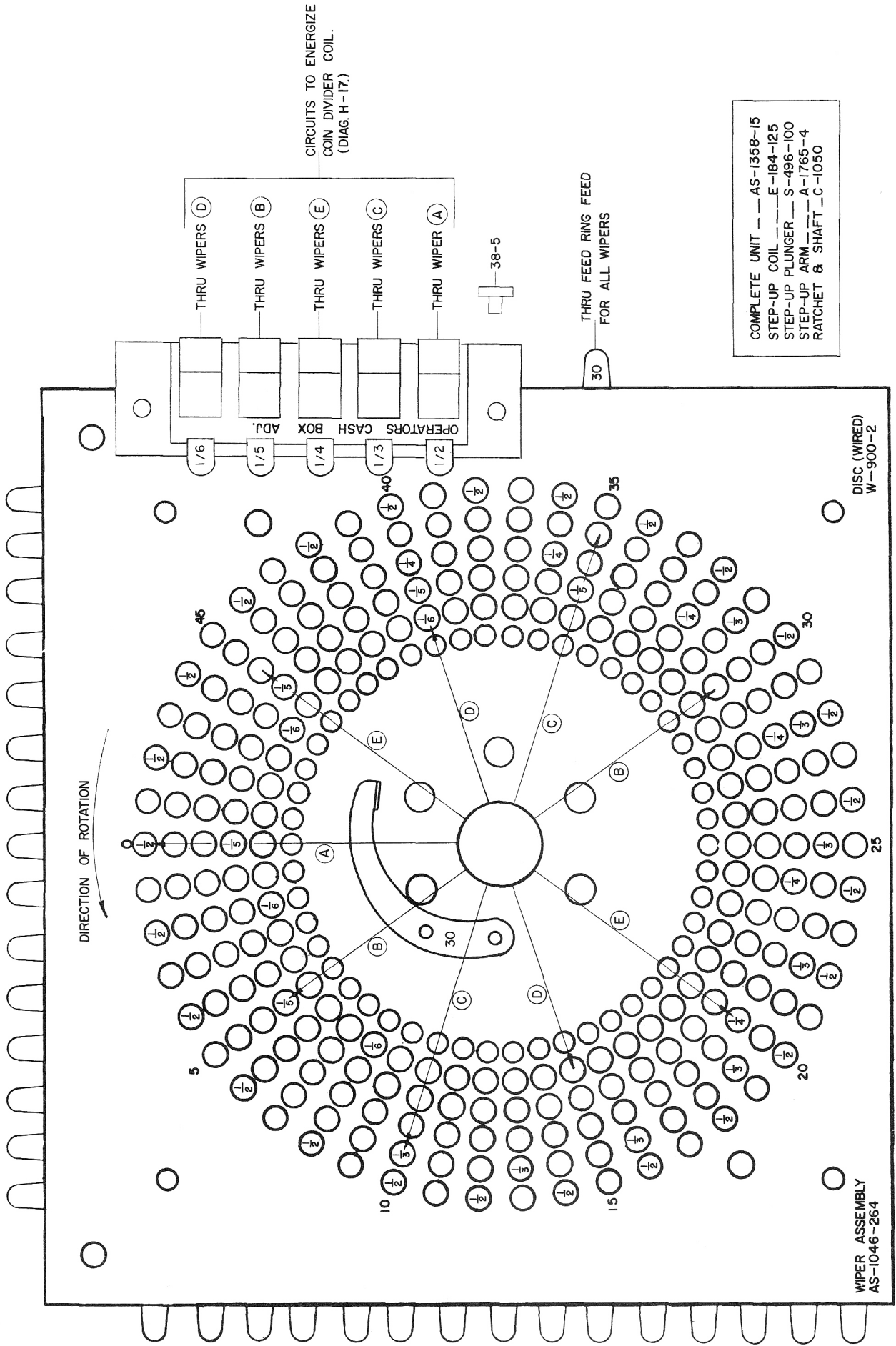
Home of Ballygames and Ballyrides





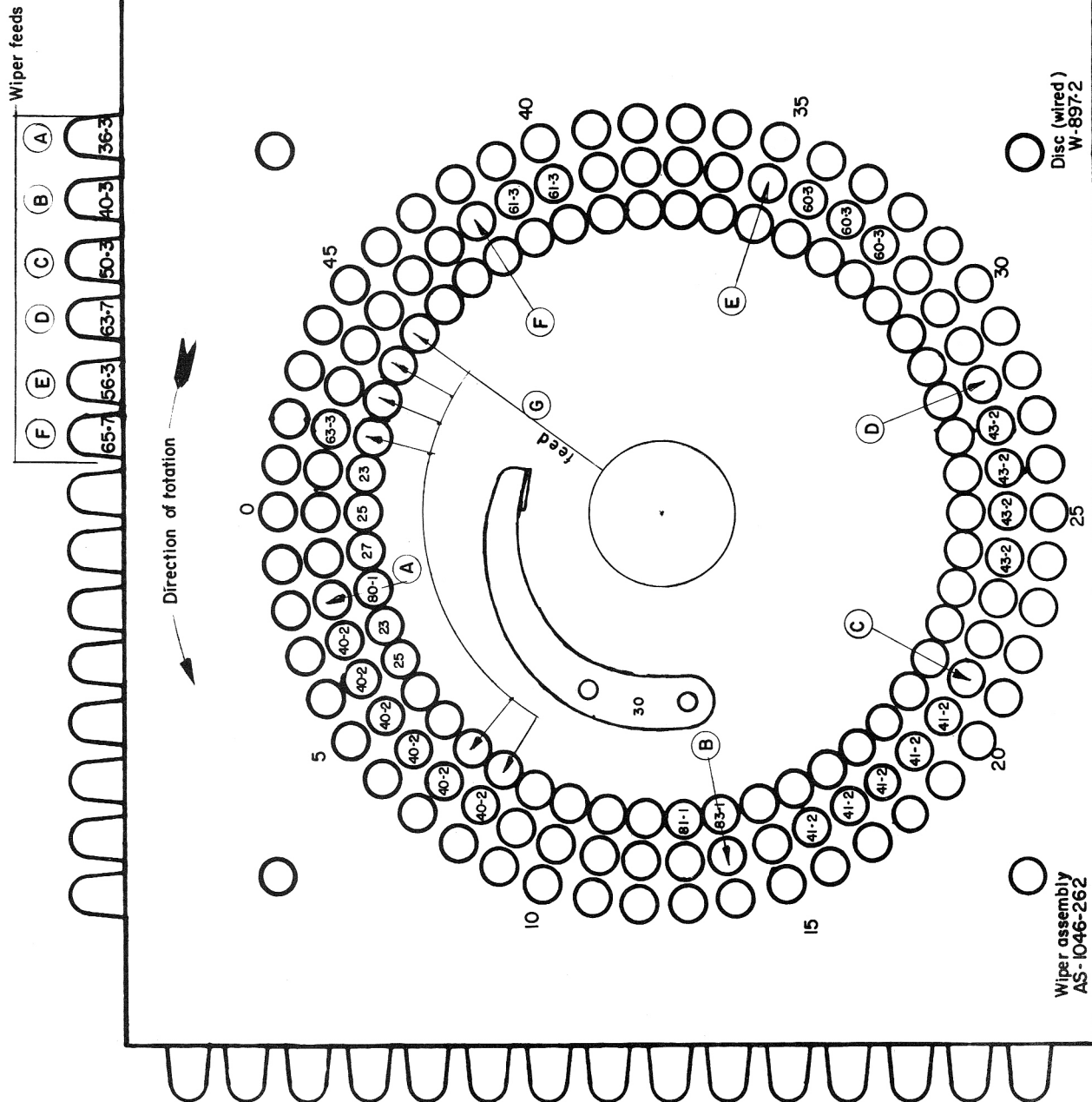
COIN UNIT DISC viewed from BUTTON or WIPER side

Continuous step unit



SELECTION UNIT DISC viewed from BUTTON or WIPER side

6 step unit. Wipers shown in zero or reset position



Thru wipers (G) circuits to life selection lines. (Diag. M-8)

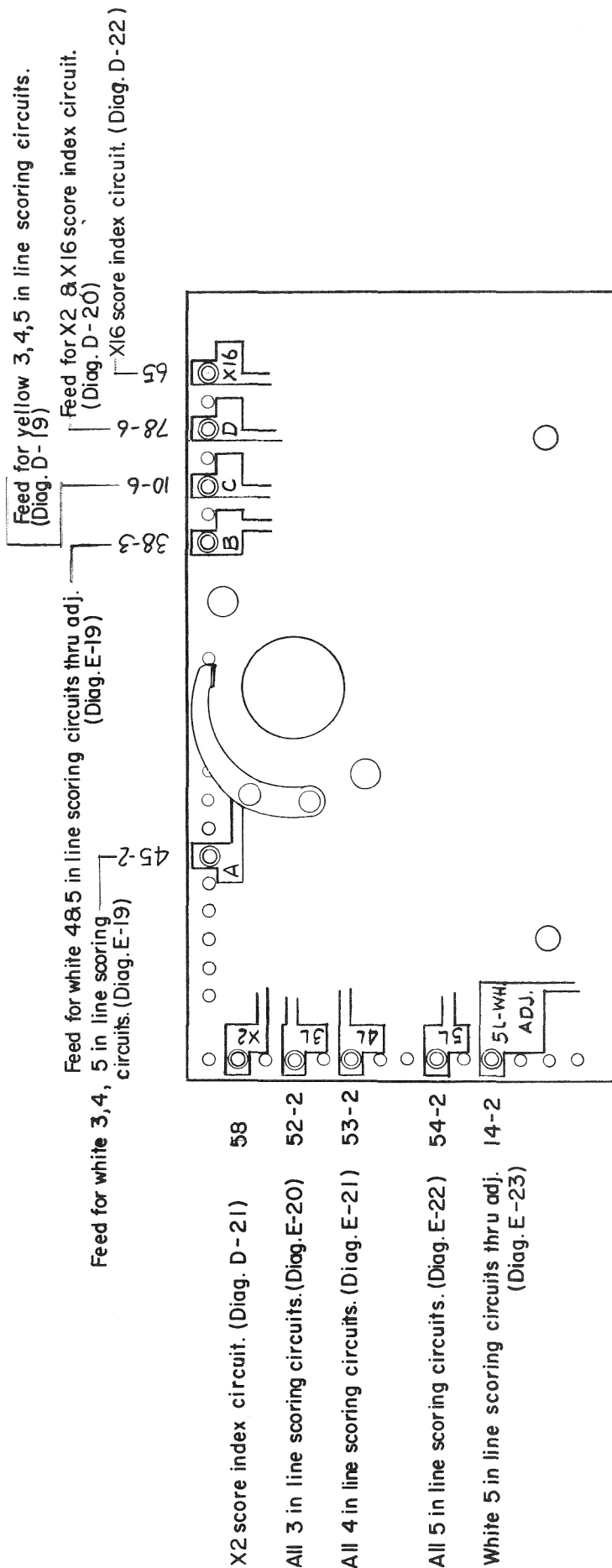
Scoring circuits for the 6 selections

- 63-1 6 TH
- 81-1 5 TH
- 80-1 4 TH
- 27 3 RD
- 25 2 ND
- 23 1 ST
- 63-3 6th Selection, thru wiper (F). (Diag. C-48)
- 61-3 5th Selection, thru wiper (E). (Diag. C-43)
- 60-3 4th Selection, thru wiper (D). (Diag. C-38)
- 43-2 3rd Selection, thru wiper (C). (Diag. C-30)
- 41-2 2nd Selection, thru wiper (B). (Diag. C-25)
- 40-2 1st Selection, thru wiper (A). (Diag. C-21)
- 30 Thru feed ring, feed for wipers (G).

- Complete unit AS-1022-69
- 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-1050-6-39

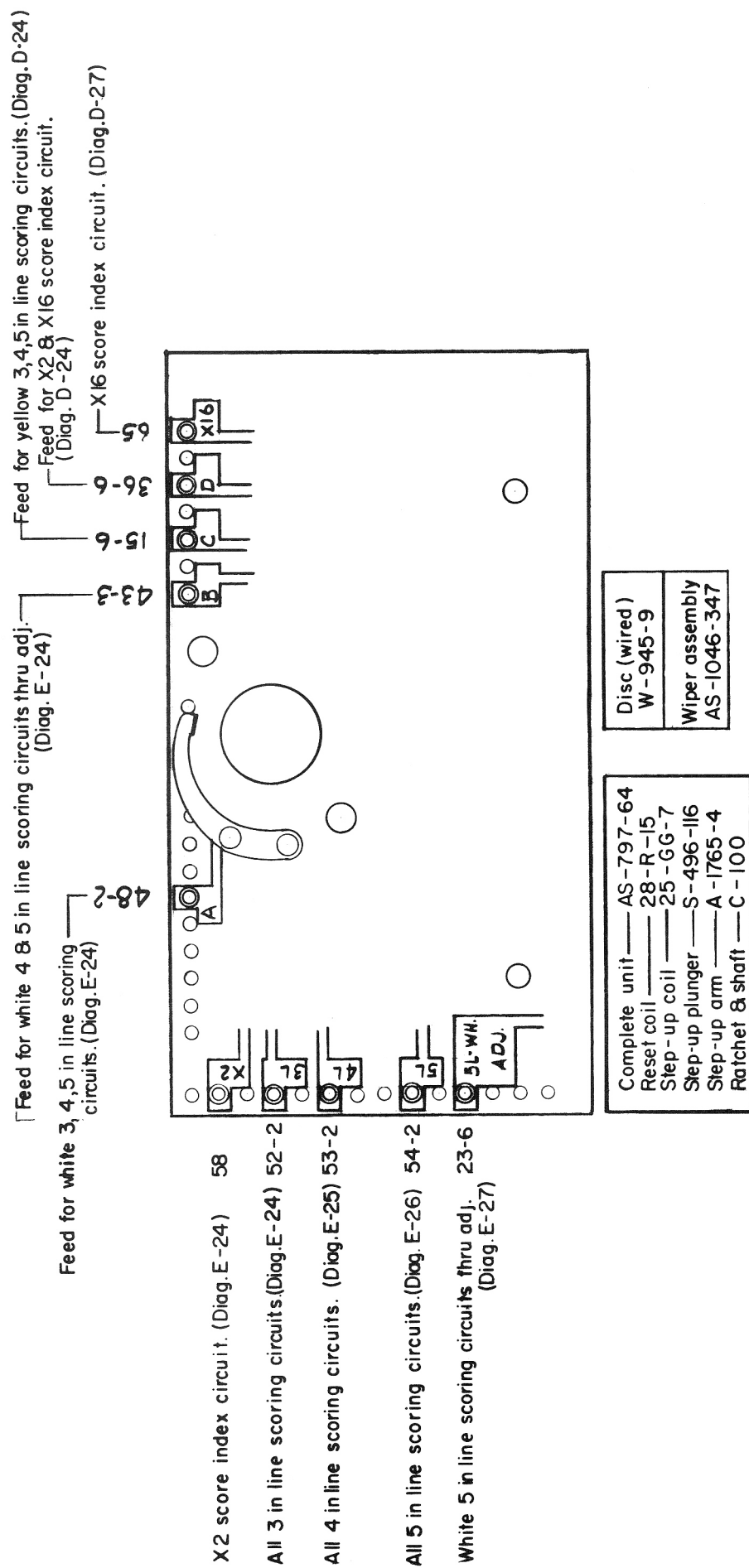
No. 1 SCORE COUNTER UNIT DISC

viewed from WIPER side

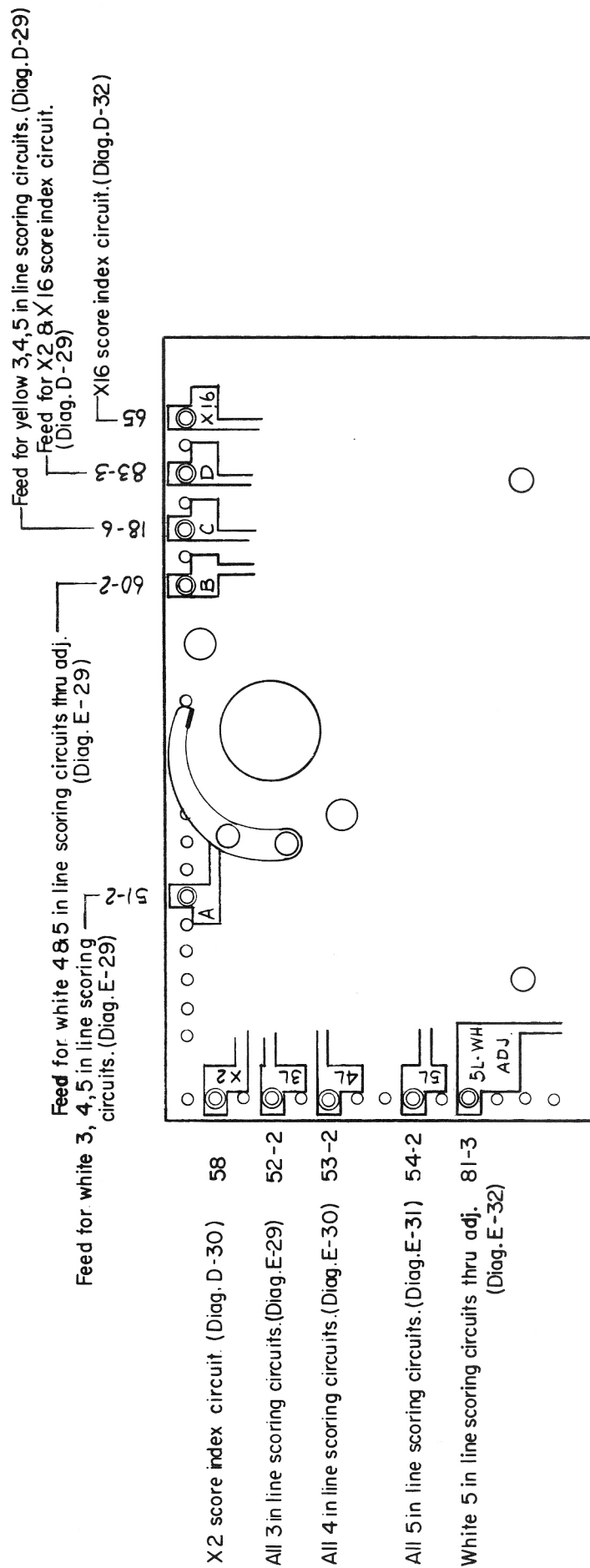


Complete unit	AS-797-63
Reset coil	28-R-15
Step-up coil	25-GG-7
Step-up plunger	S-496-116
Step-up arm	A-1765-4
Ratchet & shaft	C-100

Disc (wired)	W-945-8
Wiper assembly	AS-1046-347



No. 3 SCORE COUNTER UNIT DISC viewed from WIPER side



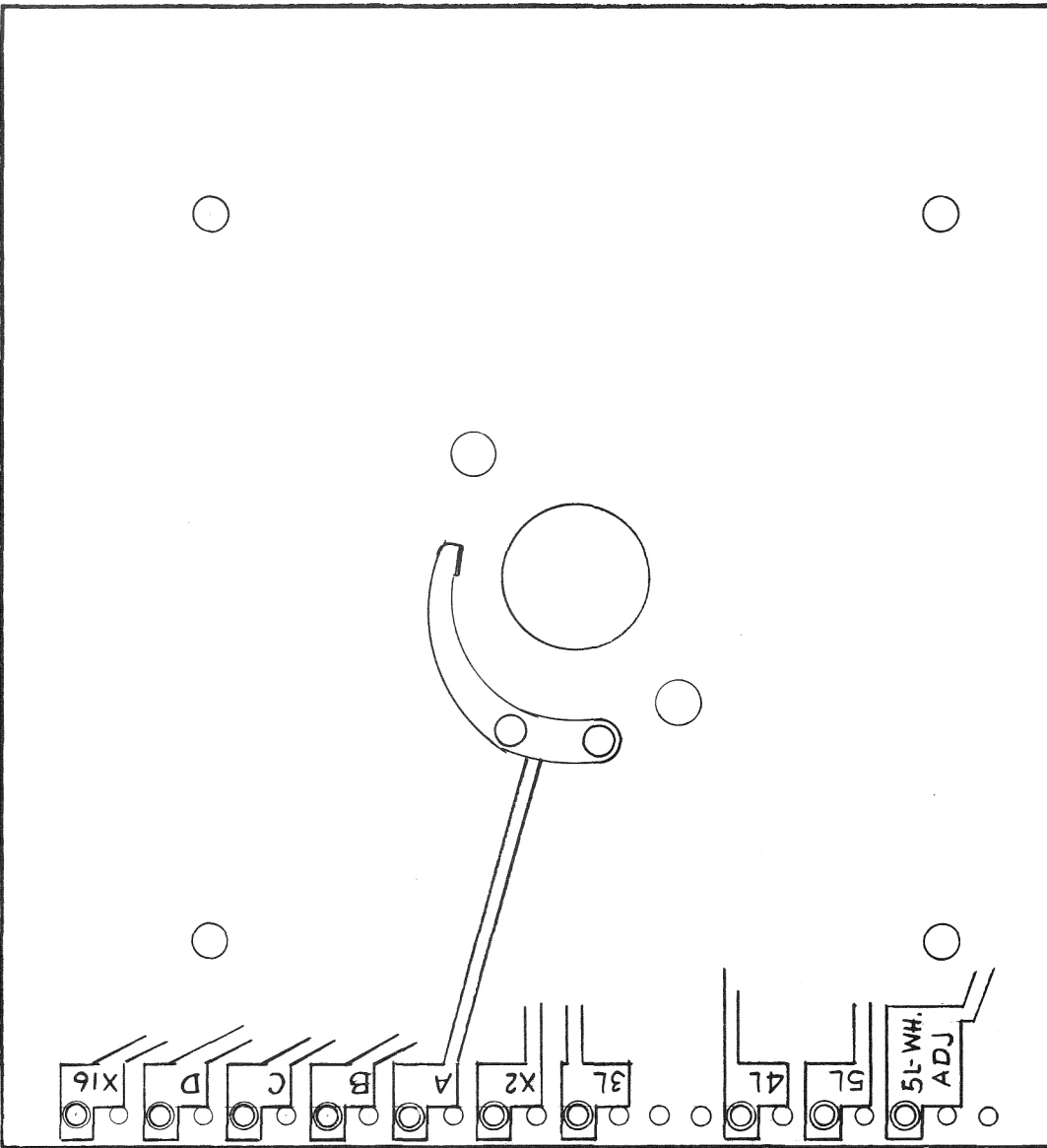
Complete unit	AS-797-65
Reset coil	28-R-15
Step-up coil	25-GG-7
Step-up plunger	S-496-116
Step-up arm	A-1765-4
Ratchet & shaft	C-100

Disc (wired)	W-945-10
Wiper assembly	AS-1046-347

No. 4 SCORE COUNTER UNIT DISC

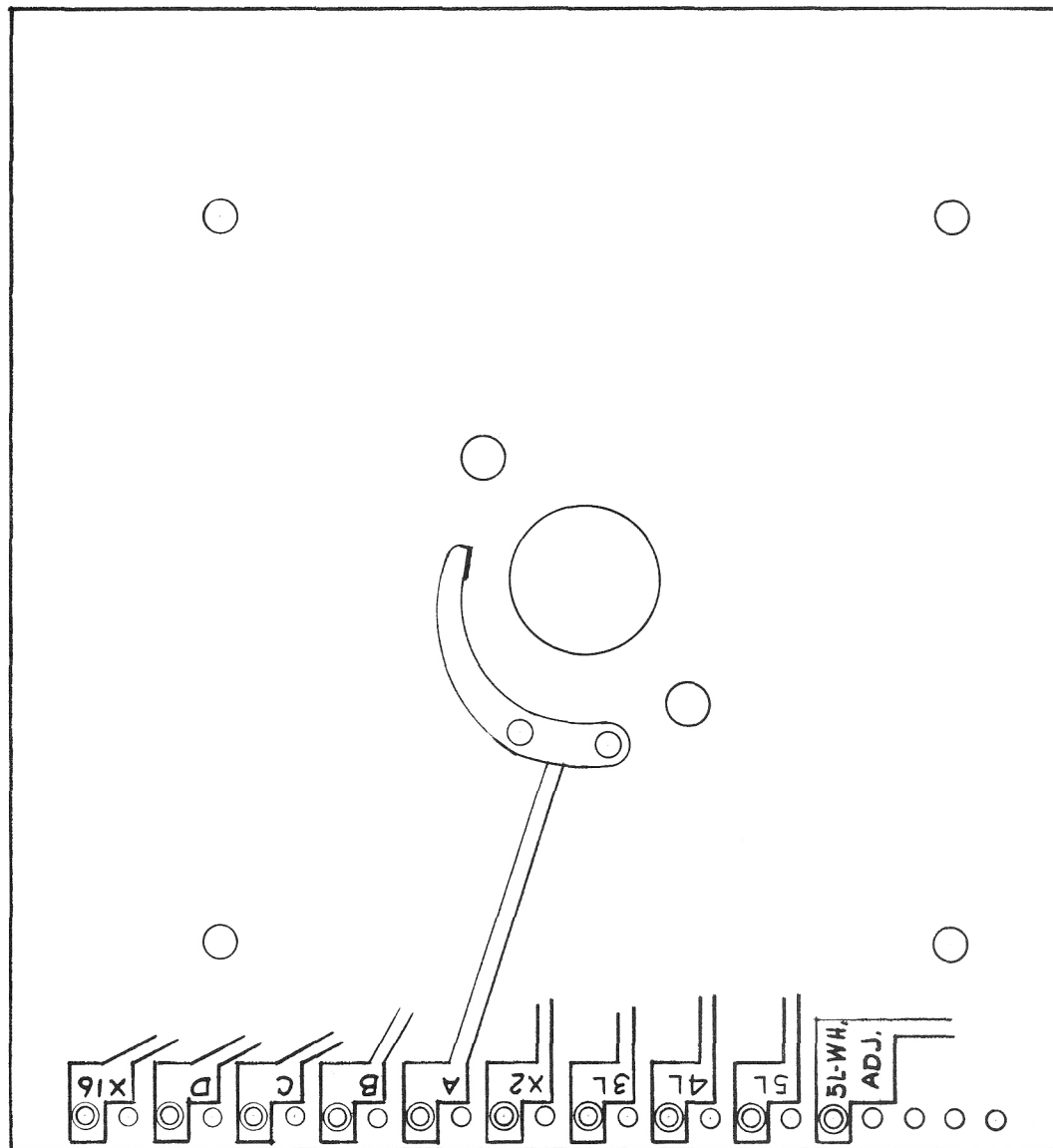
viewed from WIPER side

- X16 score index circuit. (Diag. D-40) 65
- Feed for X2 & X16 score index circuit. (Diag. D-37) 71-6
- Feed for yellow 3, 4, 5 in line scoring circuits. (Diag. D-37) 14-3
- Feed for white 4 & 5 in line scoring circuits thru adj. (Diag. E-37) 90-2
- Feed for white 3, 4, 5 in line scoring circuits. (Diag. E-37) 91-1
- X2 score index circuit. (Diag. D-38) 58
- All 3 in line scoring circuits. (Diag. E-37) 52-2
- All 4 in line scoring circuits. (Diag. E-38) 53-2
- All 5 in line scoring circuits. (Diag. E-40) 54-2
- White 5 in line scoring circuits thru adj. (Diag. E-40) 85-3



Complete unit — AS-797-66	Disc (wired)
Reset coil — 28-R-15	W-945-11
Step-up coil — 25-GG-7	
Step-up plunger — S-496-116	Wiper assembly
Step-up arm — A-1765-4	AS-1046-347
Ratchet & shaft — C-100	

No. 5 SCORE COUNTER UNIT DISC viewed from **WIPER** side

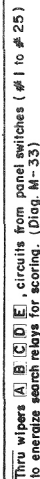


- X16 score index circuit.(Diag. D-44) 65
- Feed for X2 & X16 score index circuit. (Diag.D-42) 43-6
- Feed for yellow 3,4,5 in line scoring circuits. (Diag. D-41) 20-4
- Feed for white 4 & 5 in line scoring circuits thru adj. (Diag. E-41) 27-5
- Feed for white 3, 4, 5 in line scoring circuits. (Diag. E-41) 21-3
- X2 score index circuit. (Diag.D-43) 58
- All 3 in line scoring circuits. (Diag.E-41) 52-2
- All 4 in line scoring circuits. (Diag.E-43) 53-2
- All 5 in line scoring circuits.(Diag.E-44) 54-2
- White 5 in line scoring circuits thru adj. 93-3 (Diag. E-44)

Disc (wired)
W-945-12
Wiper assembly
AS-1046-347

Complete unit	AS-797-67
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

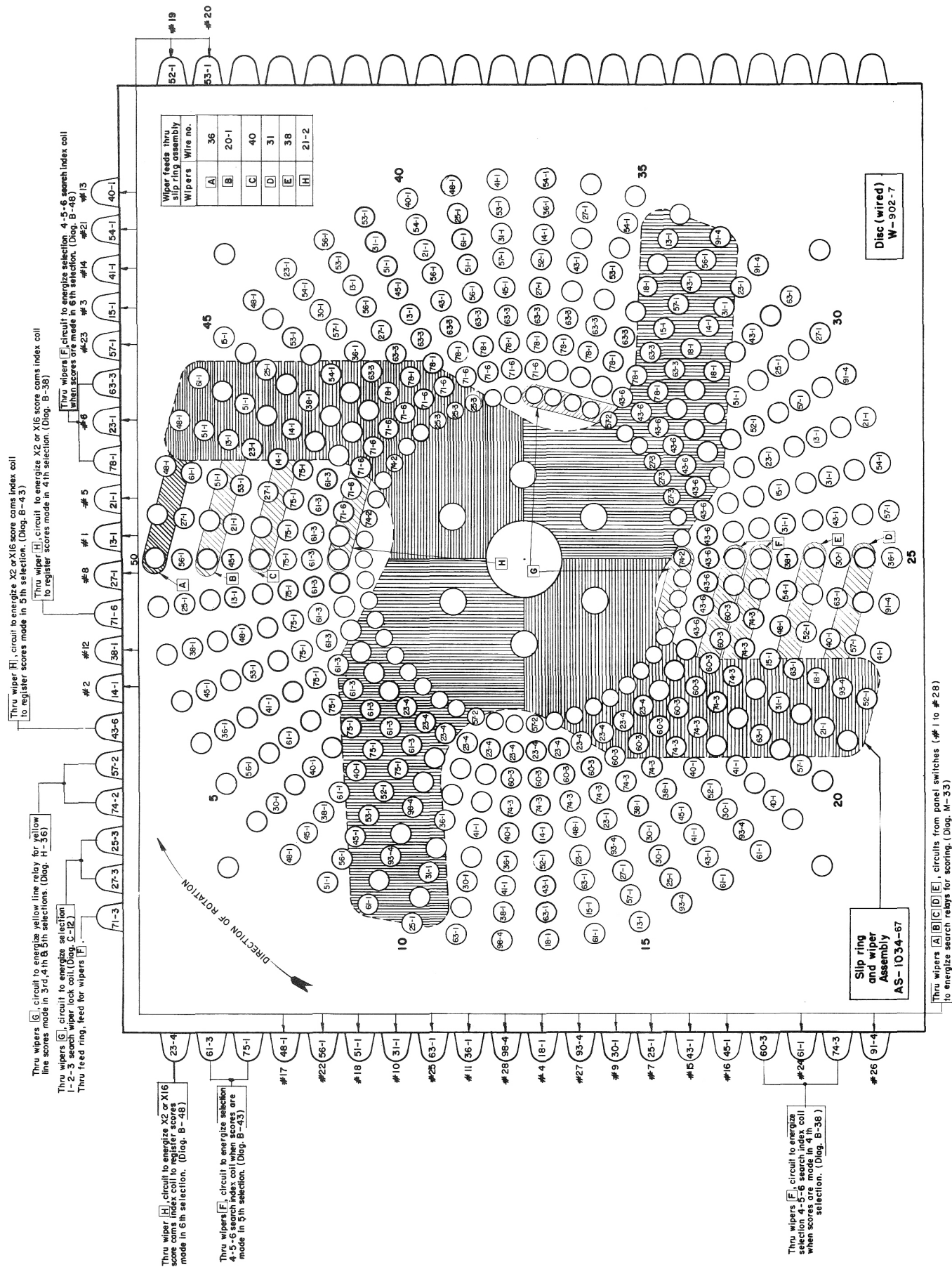
NOTES



SELECTIONS 1-2-3

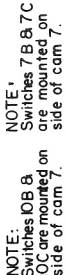
SEARCH POSITIONS CHART						
WIPER A AT POSITION	WIPER B SEARCH RELAY #1	WIPER D SEARCH RELAY #2	WIPER A SEARCH RELAY #3	WIPER E SEARCH RELAY #4	WIPER C SEARCH RELAY #5	
1						
2						
3						
4						
5						
6						
YELLOW LINE HORIZONTAL	7	6	17	2	15	10
	8	24	8	19	14	22
	9	11	16	23	3	13
	10	21	1	12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

SEARCH DISC for Selections 4, 5, 6 viewed from BUTTON or WIPER side



SELECTIONS 4-5-6

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



CONTROL UNIT CAM SWITCH CHART FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW ON PAGE 16

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.O.	40-7 63-2	Green Brown-Yellow	Steps Timer Unit
16 PULSE 2A	N.O.	75 83	Orange-White Black-Yellow	Pulses Score Register Unit - Escapement Coil When Score Reset Relay is Energized.
3A	N.C.	93-1 30	Gray-Yellow Yellow	Opens Start Circuit
3B	S.P.D.T.	A-34 18-7 20-7 15-7	Red-Black Blue Red-White	Directs Circuit From Scores Meter to Total Plays Meter.
4A	N.O.	F-5 30	White-Red Yellow	Energizes Anti-Cheat Relay.
4B	N.O.	E-10 63	White Brown-Yellow	Pulses Coin Unit Step-Up Coil on 1st Coin Played. (Thru Red Button Adjustment Plug)
4C	N.O.	D-10 63	Green-White Brown-Yellow	Pulses Coin Unit Step-Up Coil on Every Coin Played.
4D	S.P.D.T.	D-6 81 14-5 13-5	Black-Red Red-Green Red-Yellow	Opens Start Circuit, and Completes a Circuit to Tilt Relay if Coin Switch is Closed Too Long.
5A	N.O.	J-8 43	Green-Yellow Yellow	Pulses Total Plays Meter. Also Pulses Score Register Unit Escapement Coil when Score Reset Relay is Not Energized, and Circuit Complete Thru other Factors.
5B	N.O.	J-18 36-4 30	Yellow-Brown Yellow	Steps Selection Unit.
6A	N.O.	A-31 78-4 30	Orange-Black Gray	Steps #1, #2, and #3 Score Counter Units When Scoring in 1st, 2nd, and 3rd Selections.
6B	N.O.	A-37 15-4 80	Red-White Black	Steps #4, #5, and #6 Score Counter Units when Scoring in 4th, 5th and 6th Selections.
7A	N.O.	C-35 21-2 23-2	Blue-Red Blue-Yellow	Pulses Replay Meter, and Steps Score Register Unit When Scoring.
VERTICAL SWITCH 7B	N.O.	E-35 21-2	Blue-Red Blue-Orange	In Series with Lock-In Circuit for Selections 1-2-3, or Selection 4-5-6 Search Index Coil.
VERTICAL SWITCH 7C	N.O.	E-33 65	Blue-Orange Brown-White	In Series with Lock-In Circuit for X 16 Score Index Coil.
8A	N.C.	J-21 50 71-1	White Orange-Red	In Series with Search Relay Switches to Start Scoring Circuits.
9A	N.O.	A-31 78-4 90	Orange-Black Gray	Steps #1, #2, and #3 Score Counter Units When Scoring in 1st, 2nd, and 3rd Selections.
9B	N.O.	A-38 15-4 80	Red-White Black	Steps #4, #5, and #6 Score Counter Units When Scoring in 4th, 5th, and 6th Selections.
10A	N.O.	C-34 21-2	Blue-Red Blue-Yellow	Pulses Replay Meter, and Steps Score Register When Scoring.
VERTICAL SWITCH 10B	N.O.	E-34 21-2 27-2	Blue-Red Blue-Orange	In Series with Lock-In Circuit for Selection 1-2-3, or Selection 4-5-6 Search Index Coil.
VERTICAL SWITCH 10C	N.O.	E-33 27-2 58	Blue-Orange White-Black	In Series with Lock-In Circuit for X2 Score Index Coil.

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
11A	N.C.	J-20 71-1 90-1	Orange-Red Gray	In Series with Search Relay Switches to Start Scoring Circuits.
SELECTIONS 1-2-3 SEARCH WIPER LOCK COIL	A-12	27-3 70	Blue-Orange Orange	Energized by Front Rail "R" Button When Circuit Complete Thru Other Factors. This Coil When Energized Releases Selection 1-2-3 Search Wipers to Search for Scores.
SEARCH CAM 12A	N.O.	H-2 10P 20P	Red (Plastic) Blue(Plastic)	Completes Circuit to Control Unit Motor.
SEARCH CAM 12B	S.P.D.T.	G-12 52 38-7 31-3	White-Blue Yellow-Black Yellow-Red	Directs Circuit From Selection 1-2-3 Search Wiper Lock Coil to Selection 4-5-6 Search Wiper Lock Coil.
SELECTION 4-5-6 SEARCH WIPER LOCK COIL	A-11	41-3 70	Green-Red Orange	Energized When Search for Scores in Selections 1-2-3 is Completed and Releases Selection 4-5-6 Search Wipers to Search for Scores.
SEARCH CAM 13A	N.O.	G-2 10P 20P	Red (Plastic) Blue(Plastic)	Completes Circuit to Control Unit Motor.
SEARCH CAM 13B	S.P.D.T.	E-12 27-3 53-4 25-3	Blue-Orange White-Yellow Blue-White	Directs Circuit to Selection 1-2-3 Search Wiper Lock Coil at Start of Search Cycle, or After Selection 4-5-6 Search Cycle is Completed.
START CAMS INDEX COIL	A-15	56 70	White-Brown Orange	Energized Thru Shutter Motor Cam Switch 4C When Start Relay is Energized.
14A	N.O.	G-2 10P 20P	Red (Plastic) Blue(Plastic)	Completes Circuit to Control Unit Motor.
X16 SCORE CAMS INDEX COIL	A-33	60 70	Brown Orange	Energized thru Score Counter Discs to Register Scores made in any Selection (When X16 Multiplier circuit is needed to register scores.)
15A	N.O.	H-35 27-2 50	Blue-Orange White	In series with Score Lock-In Circuit When scoring in any selection.
15B	N.O.	J-20 50 90-1	White Gray	Same function as 15A.
15C	N.C.	B-32 20-2 51-3	Blue White-Red	Opens 50 Volts pull-in circuit to selection 1-2-3 Search Index Coil, Coil then holds thru resistor.
15D	N.C.	B-36 10-4	Red	Opens 50 volts pull-in circuit to selection 4-5-6 Search Index Coil, Coil then holds in thru resistor.
15E	N.O.	F-2 10P 20P	White-Blue Red (Plastic) Blue(Plastic)	Completes circuit to Control Unit Motor.
15F	N.C.	E-13 13-2	Red-Yellow Red-Yellow	Opens Timer Unit Step-Up Circuit.
15G	N.C.	C-33 48 58	Brown-Red Green-Black White-Black	Opens circuit to X2 Score Cams Index Coil.
X2 SCORE CAMS INDEX COIL	A-33	48 70	Green-Black Orange	Energized thru Score Counter Discs to register score made in any selection (All scores begin thru X2 multiplier circuit).

CONCLUDED ON NEXT PAGE

CONTROL UNIT CAM SWITCH CHART

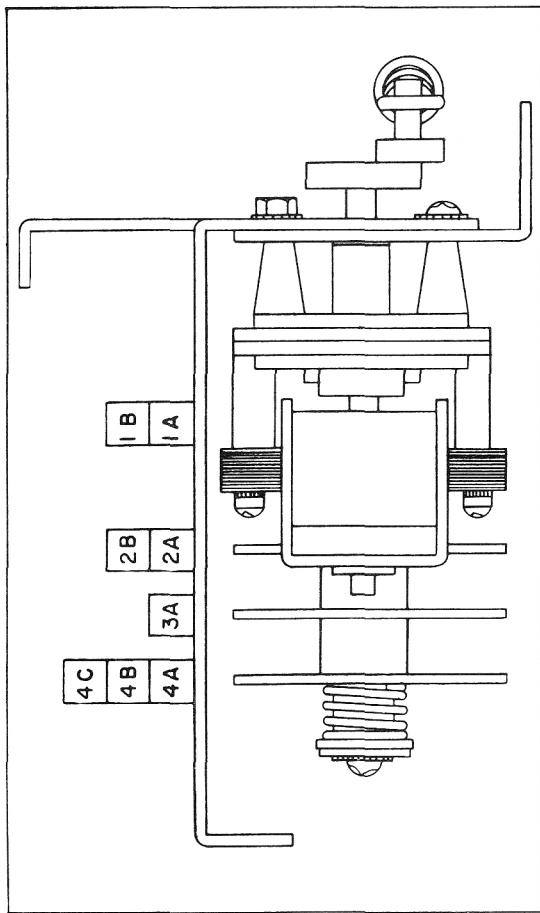
FOR POSITION OF SWITCHES REFER TO VIEW ON PAGE 16

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
16A N.O.	H-34	27-2 50	Blue-Orange White	In series with scoring lock-in circuit, when scoring any selection.
16B N.O.	J-20	50 90-1	White Gray	Same function as 16A.
16C N.C.	B-32	20-2 91-2	Blue Gray-Red	Opens 50 volt pull-in circuit to selection 1-2-3 Search Index Coil, Coil then holds thru resistor.
16D N.C.	B-36	10-4 Red	Gray-Red	Opens 50 volt pull-in circuit to selection 4-5-6 Search Index Coil, Coil then holds thru resistor.
16E N.O.	F-2	10P 20P	Orange-Red Red (Plastic)	Complete circuit to Control Unit Motor.
16F N.C.	F-13	13-2 63-2	Red-Yellow Brown-Yellow	Opens Timer Unit Step-Up Circuit.
16G N.C.	C-33	60 65	Brown Brown-White	Opens circuit to X16 Score Cams Index Coil.
SELECTIONS 1-2-3 SEARCH INDEX COIL	A-32	51-3 90	White-Red Gray	Energized thru selection 1-2-3 Search Disc, when scores are made in 1st, 2nd and 3rd selections.
17A N.C.	J-7	15-5 93-1	Red-White Gray-Yellow	Opens start circuit.
17B N.C.	A-36	80 70	Black Orange	Opens circuit to selection 4-5-6 Search Index Coil.
17C N.O.	C-32	21-2 91-2	Blue-Red Gray-Red	In series with Lock-In Circuit for this coil, also completes circuit to selections 1-2-3 Search Disc to energize X2 and X16 Score Cam Index Coils.
SELECTIONS 4-5-6 SEARCH INDEX COIL	A-36	52-3 80	White-Blue Black	Energized thru selection 4-5-6 Search Disc when scores are made in the 4th, 5th and 6th selections.
18A N.C.	H-7	15-5 57	Red-White White-Orange	Open start circuit.
18B N.C.	A-32	90 70	Gray Orange	Opens circuit to selection 1-2-3 Search Index Coil.
18C N.O.	C-36	21-2 71-3	Blue-Red Orange-Red	In series with Lock-In Circuit for this coil, also completes circuit to selection 4-5-6 Search disc to energize X2 and X16 Score Cams Index Coils.

MISCELLANEOUS RELAYS SWITCH CHART

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
INTERLOCK RELAY (Tilt reset coil)	E-18	85 70	Black-White Orange	Energized by shutter motor cam switch 2B when starting new game.
A N.C.	E-1	10P 20P	Red (Plastic) Blue (Plastic)	Opens circuit to control unit motor when tilt coil is energized.
B N.C.	B-6	13-5 13-5	Red-Yellow Red-Yellow	Opens circuit to tilt coil when tilt coil is energized.
C N.C.	P-7	15 20	Red-White Blue	Opens 17 Volt circuit when tilt coil is energized.
D N.O.	N-5	18 31-4	Red-Black Yellow-Red	Completes circuit to tilt lite when tilt coil is energized.
E S.P.D.T.	K-13	60 38-2 30	Brown Yellow-Black Yellow	Opens timer unit step-up circuit and scoring search circuit, and completes circuit to shutter motor when tilt coil is energized.
INTERLOCK RELAY (Tilt Coil)	A-6	13-5 70	Red-Yellow Orange	Energized by tilt switch, also by anti-cheat coin switch circuit.
BALL GATE RELAY COIL	A-16	98 70	Gray-Black Orange	Energized by shutter motor cam switch 2A when starting new game.
A N.O.	F-15	71 98	Orange-Red Gray-Black	Relay stays energized until 1st ball is shot.
B N.C.	J-14	38 30	Gray-Black Yellow-Black Yellow	Completes lock-in circuit for this relay.
				Completes circuit to shutter motor. (To close shutter) when this relay drops out.

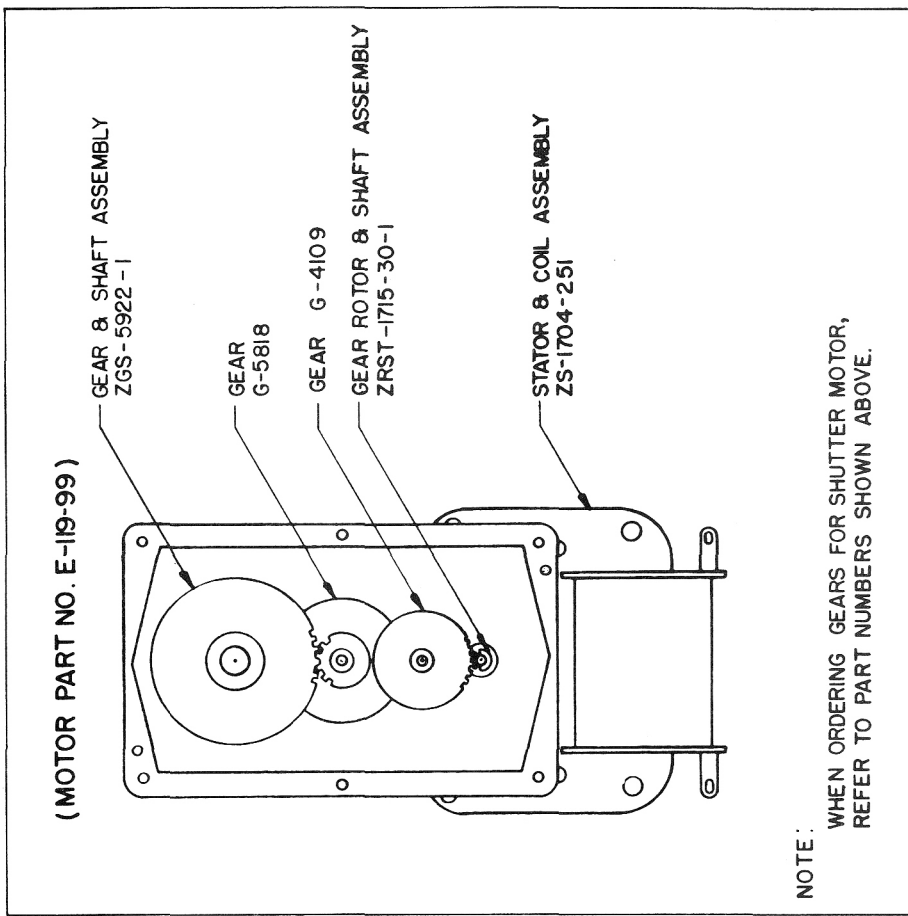
SHUTTER MOTOR PICTORIAL VIEW



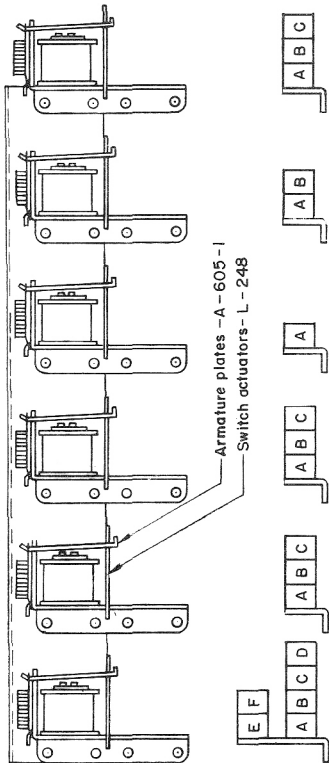
SHUTTER MOTOR CAM SWITCH CHART FOR POSITION OF SWITCHES SEE PICTORIAL VIEW

CAM SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
1A	N.C.	91-1 30	Gray Yellow	(Closed when shutter is closed) In series with scoring circuit.
1B	N.O.	80-2 30	Black Yellow	Completes carry-over circuit for shutter motor when it operates.
2A	N.O.	98 30	Gray-Black Yellow	Energizes Ball Gate relay when starting game.
2B	N.O.	85 30	Black-White Yellow	Resets the (6) Score Counter Units, Timer Unit, Selection Unit and energizes tilt reset coil when starting game.
3A	N.O.	38-2 80-2	Yellow-Black Black	(Closed when shutter is open) In series with circuit, to close shutter if game is tilted while shutter is open.
4A	N.O.	78 81	Orange-Black Black-Red	(Closed when shutter is open) In series with automatic Start circuit thru Red Button adjustment plug.
4B	N.C.	60-1 93-2	Brown Gray-Yellow	(Closed when shutter is closed) In series with Timer Unit Step-Up circuit. Also in series with Search circuit when searching for scores.
4C	S.P.D.T.	80-2 54 56	Black White-Green White-Brown	Directs circuit to open shutter, and energize start cams index coil.

SHUTTER MOTOR



6 RELAYS BANK PICTORIAL VIEW
NUMBERS CORRESPOND TO SWITCH CHART AT RIGHT



Name	Yellow line relay	Search relay # 5	Search relay # 4	Search relay # 3	Search relay # 2	Search relay # 1
Coil turns & wire gauge	1800 # 33	850 # 29	850 # 29	850 # 29	850 # 29	850 # 29
Coil resistance (nominal)	63 Ω	12 Ω	12 Ω	12 Ω	12 Ω	12 Ω
Operating voltage	50 V.	18 V.	18 V.	18 V.	18 V.	18 V.
Test voltage	32 V.	Under 12 V. Over 9 V.	Under 12 V. Over 9 V.	Under 12 V. Over 9 V.	Under 12 V. Over 9 V.	Under 12 V. Over 9 V.
Extension spring load	Clear	Red	Red	Clear	Clear	Red
Sw. actuator stroke	3/32	3/32	3/32	3/32	3/32	3/32
Additional information		Note: 0004 - 0006 chrome plate on armature.	See Note.	See Note.	See Note.	See Note.
Coil part no.	C-7300-334	C-7300-291	C-7300-291	C-7300-291	C-7300-291	C-7300-291

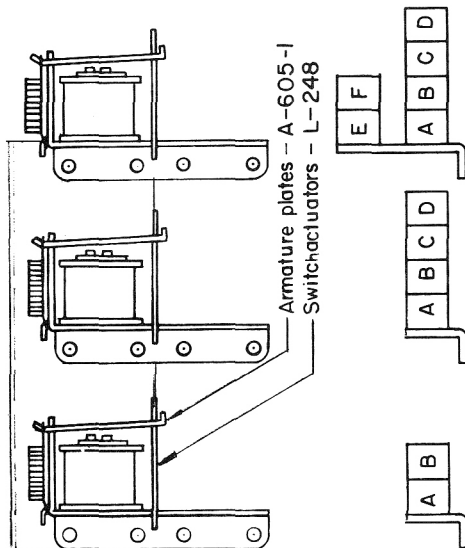
SPRING CODE		
Color	Part no.	Load
Clear	SP-199-13	13 oz. at 15/16
Blue	SP-199-14	21 oz. at 15/16
Yellow	SP-199-15	15 oz. at 15/16
Red	SP-199-16	9 oz. at 15/16
Green	SP-199-17	17 oz. at 15/16

6 RELAYS BANK SWITCH CHART
FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW

RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
YELLOW LINE RELAY COIL A	M.B.B.	E-19	Yellow-Brown Green-White	Energized thru Search Disc 1-2-3 or 4-5-6, switches on this Relay direct all scoring circuits.
B	M.B.B.	E-23	Green Green-Black	Directs White or Yellow 3, 4, and 5 in line scoring circuits in 1st selection.
C	M.B.B.	E-28	White White-Red	Directs White or Yellow 3, 4, and 5 in line scoring circuits in 2nd selection.
D	M.B.B.	E-36	Red-Black Brown-Yellow	Directs White or Yellow 3, 4, and 5 in line scoring circuits in 3rd selection.
E	M.B.B.	E-41	Gray-Red Red-Green	Directs White or Yellow 3, 4, and 5 in line scoring circuits in 4th selection.
F	M.B.B.	E-46	Blue Blue-Red	Directs White or Yellow 3, 4, and 5 in line scoring circuits in 5th selection.
				Directs White or Yellow 3, 4, and 5 in line scoring circuits in 6th selection.
SEARCH RELAY #5 COIL	N-34	10 40	Red Green	Energized by Panel switches, thru search disc 1-2-3 or 4-5-6.
A	N.O.	H-24	White-Green Gray-Black	In series with 5 in line scoring circuit.
B	N.O.	H-22	White-Blue Black-White	In series with 3 in line scoring circuit.
C	N.O.	H-23	White-Yellow Black-Red	In series with 4 in line scoring circuit.
SEARCH RELAY #4 COIL	N-34	10 38	Red Yellow-Black	Energized by Panel switches, thru Search Disc 1-2-3 or 4-5-6.
A	N.O.	H-22	White-Blue Orange-White	In series with 3 in line scoring circuit.
B	N.O.	H-23	Black-Yellow Black-White	In series with 4 and 5 in line scoring circuit.
C	N.O.	H-22	Orange-Green Black-Red	In series with 3 in line scoring circuit.
SEARCH RELAY #3 COIL	N-33	10 36	Red Yellow-Brown	Energized by Panel switches, thru Search Disc 1-2-3 or 4-5-6.
A	N.O.	J-22	White Orange-Green	In series with 3, 4, and 5 line Scoring circuits, also in series with circuit to energize Yellow line Relay.
SEARCH RELAY #2 COIL	N-33	10 31	Red Yellow-Red	Energized by Panel switches, thru Search Disc 1-2-3 or 4-5-6.
A	N.O.	H-22	Orange-Green Orange-White	In series with 3 in line scoring circuit.
B	N.O.	H-23	Orange-Green Black-Yellow	In series with 4 and 5 in line scoring circuit.
SEARCH RELAY #1 COIL	N-32	10 20-1	Red Blue	Energized by Panel switches, thru Search Disc 1-2-3 or 4-5-6.
A	N.O.	H-23	White-Yellow Black-White	In series with 4 in line scoring circuit.
B	N.O.	H-24	Black-White Gray-Black	In series with 5 in line scoring circuit.
C	N.O.	H-21	White-Blue Orange-White	In series with 3 in line scoring circuit.

3 RELAYS BANK PICTORIAL VIEW

NUMBERS CORRESPOND TO SWITCH CHART AT RIGHT



Name	Start re.	Anti - cheat re.	Score reset re.
Coil turns & wire gauge	1800 # 33	2300 # 33	2300 # 33
Coil resistance (nominal)	65 Ω	85 Ω	85 Ω
Operating voltage	50 V.	50 V.	50 V.
Test voltage	32 V.	39 V.	37 V.
Extension spring load	Green	Yellow	Clear
Sw actuator stroke	3/32	3/32	3/32
Additional information		Thermalize wire or equiv. No wrap on coil.	
Coil part no.	C-7300-334	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

3 RELAYS BANK SWITCH CHART

FOR POSITION OF SWITCHES REFER TO PICTORIAL VIEW

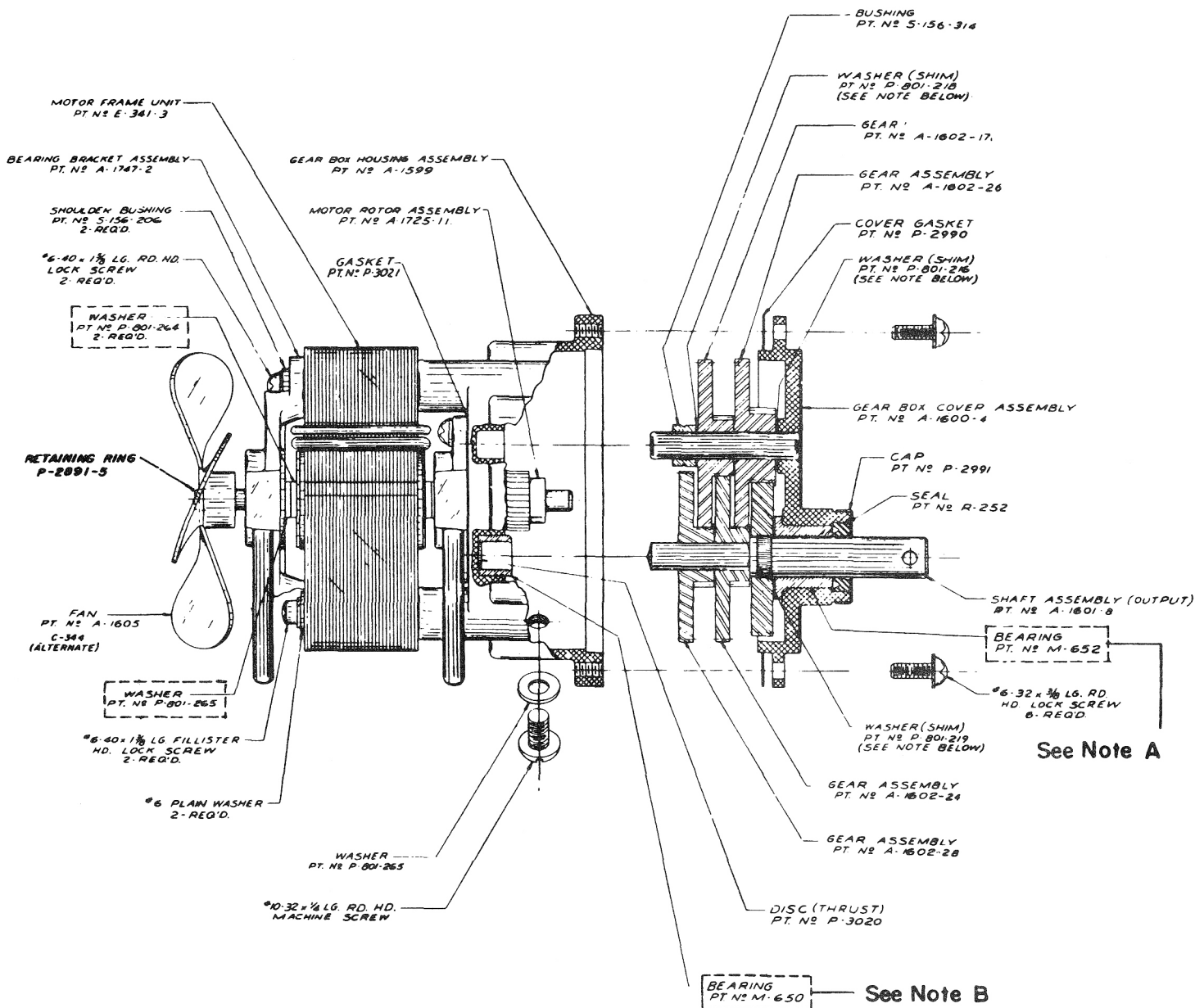
RELAY SWITCH	LOCATION ON DIAGRAM	WIRE No.	WIRE COLORS	FUNCTION OF SWITCHES
START RELAY COIL A	A-7	90-7	Gray	Energized by coin switch or red button switch when circuit complete thru other factors.
N.O.	E-7	57	White-Orange	Completes lock-in circuit for this relay.
B	D-15	81	Black-Red	Completes circuit to open shutter, and energize start cams index coil.
N.O.	D-15	54	White-Green	
		30	Yellow	
ANTI CHEAT RELAY COIL A	A-5	51	White-Red	Energized by Control unit cam switch 4A, this relay stays energized during operation of game.
N.O.	E-5	51	White-Red	Completes lock-in circuit for this relay.
B	N-7	14	Red-Green	Opens 17 Volt Circuit, when relay drops out.
		15	Red-White	
C	F-10	74	Orange-Green	Completes circuit to score reset relay, when relay drops out.
		75	Orange-White	
D	N-4	18	Red-Black	Completes circuit to tilt lite, when relay drops out.
		31-4	Yellow-Red	
SCORE RESET RELAY COIL A	A-10	75	Orange-White	Energized thru score register switch when anti-cheat relay drops out.
N.O.	F-9	74	Orange-Green	Completes lock-in circuit for this relay.
		75	Orange-White	
B	N.O.	10P	Red (Plastic)	Completes circuit to control unit motor.
		20P	Blue(Plastic)	
C	N.C.	53	White-Yellow	Opens Timer Unit step-up circuit.
		61-2	Brown-Red	
D	N.C.	81	Black-Red	Opens start relay circuit.
		98	Gray-Black	
E	S.P.D.T.	91	Gray-Red	Directs score register escapement circuit thru control unit cam switch 5A or control unit 16 pulse cam switch 2A.
		93	Gray-Yellow	
F	N.O.	83	Black-Yellow	(Not Used)

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 D-6).

MOTOR ASSEMBLY (Part No. E-119-212)



NOTE

IN ORDER TO MAINTAIN PROPER CLEARANCES BETWEEN GEARS IT IS MOST IMPORTANT THAT WHEN REASSEMBLING GEAR TRAIN:

1. SHIMS BE REPLACED IN THEIR RESPECTIVE LOCATIONS.
2. SAME NUMBER OF SHIMS BE REPLACED IN EACH RESPECTIVE LOCATION.

NOTE A: Bearing M-652 is part of Gear Box Cover Assembly A-1600-4 and cannot be ordered separately.

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

MISCELLANEOUS PARTS

Back Cabinet Assembly:

Part No.	Name of Part
G-303-8	Back glass
M-281-31	Lock and keys (2) keyed alike

Back Door Assembly:

M-281-22	Lock and keys
P-758-16	Lock cam
E-122-19	Transformer

Front Cabinet Assembly:

M-168-15	Ball
AS-187-18	Ball shooter assembly
A-1540-3	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-1272-29	Button and Pin "R"
P-711-1	Cigarette holder
A-1533	Coin return cup
P-2210-80	Coin entry plate 10¢
P-2210-81	Coin entry plate 5¢
P-1900-49	Coin box (front)
P-1900-50	Coin box (side)
A-2359	Coin slide to slug rejector
E-130-10	Counter
CA-1102-4	Front moulding only
AS-1305-23	Front moulding complete
A-2618	Legs
M-163-4	Leg adjuster
M-106-1	Leg bolt

Front Cabinet Assembly (Continued):

Part No.	Name of Part
M-281-22	Lock and keys—side door
P-2210-70	Plate 5¢
P-2210-68	Plate 10¢
P-2210-38	Plate—R—Button
CA-1105-1	Side door

Front Door Assembly:

A-1538-3	Armature plate (AS-277-56)
E-101-45	Coil—Coin lockout
AS-277-56	Coin switch assembly 5¢ or 10¢
CA-567-131	Front door only
AS-1971-10	Front door assembly complete
A-254-33	Hinge and bracket
M-281-6	Lock and keys
P-4005	Lock cam
E-108-32	Micro switch 5¢ and 10¢
A-1729-6	Push button—replay
SW-100-157	Push button switch
P-2768-5	Ring for A-1729-6 button
P-2768-7	Ring for M-281-6 lock
M-280-15	Slug rejector 5¢
M-280-16	Slug rejector 10¢

Panel Assembly:

AS-1315	Ball gate and switch assembly
R-115-4	Rebound rubber
R-243	Rubber ring for yellow post
R-295-5	Rubber ring for White post

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