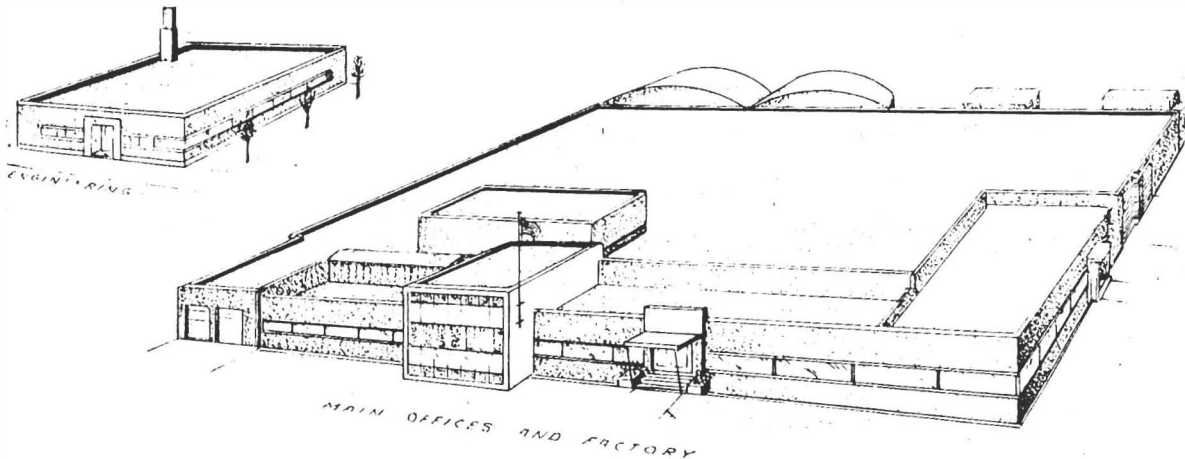


Instruction Manual for **TRIPLE PLAY**

"Pennant" Modified Game

V1.1



United Manufacturing Company

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GAME

The "pennant" games were modified Triple Plays operated in the San Francisco bay area. The machines were not all modified the same way.

The machine modifications for one example is documented in this manual.

The major changes to the game are:

- 1] the game would only accept one coin. A second deposited coin reset the game. This has been disabled to allow cycling the machine as many times as you want to increase scores/features.
- 2] the extra ball unit steps during normal machine cycling, and does not reset until the player pushes the extra ball button. Up to 3 extra balls accumulate over multiple games and the player decides when to take all of them.
- 3] each card scores separately is permanently enabled.
- 4] an added cabinet button needs to be pushed to scan for winners.
- 5] the spell name feature unit reset position is modified so only one rollover activations are required to win the 5-In-line score, but only one rivet on the spotting disc enabled the feature.
- 6] scores are reduced, and only 4 score levels instead of 8.
- 7] a deposited coin enables all three cards. If the game is reset using credits, cards are enabled 1 card per credit.

Changes made to the game appear in red in this manual. It's likely I didn't get everything.

INSTALLATION INSTRUCTIONS

Fasten 4 legs to cabinet with bolts and washers furnished. Place back-box in position. Unlock and open back-door and fasten the back-box to cabinet with bolts and washers furnished.

Plug power line into 110-115 volt 60 cycle Alternating Current only. Turn on power by turning toggle-switch on. Toggle-switch is located on bottom right front of cabinet.

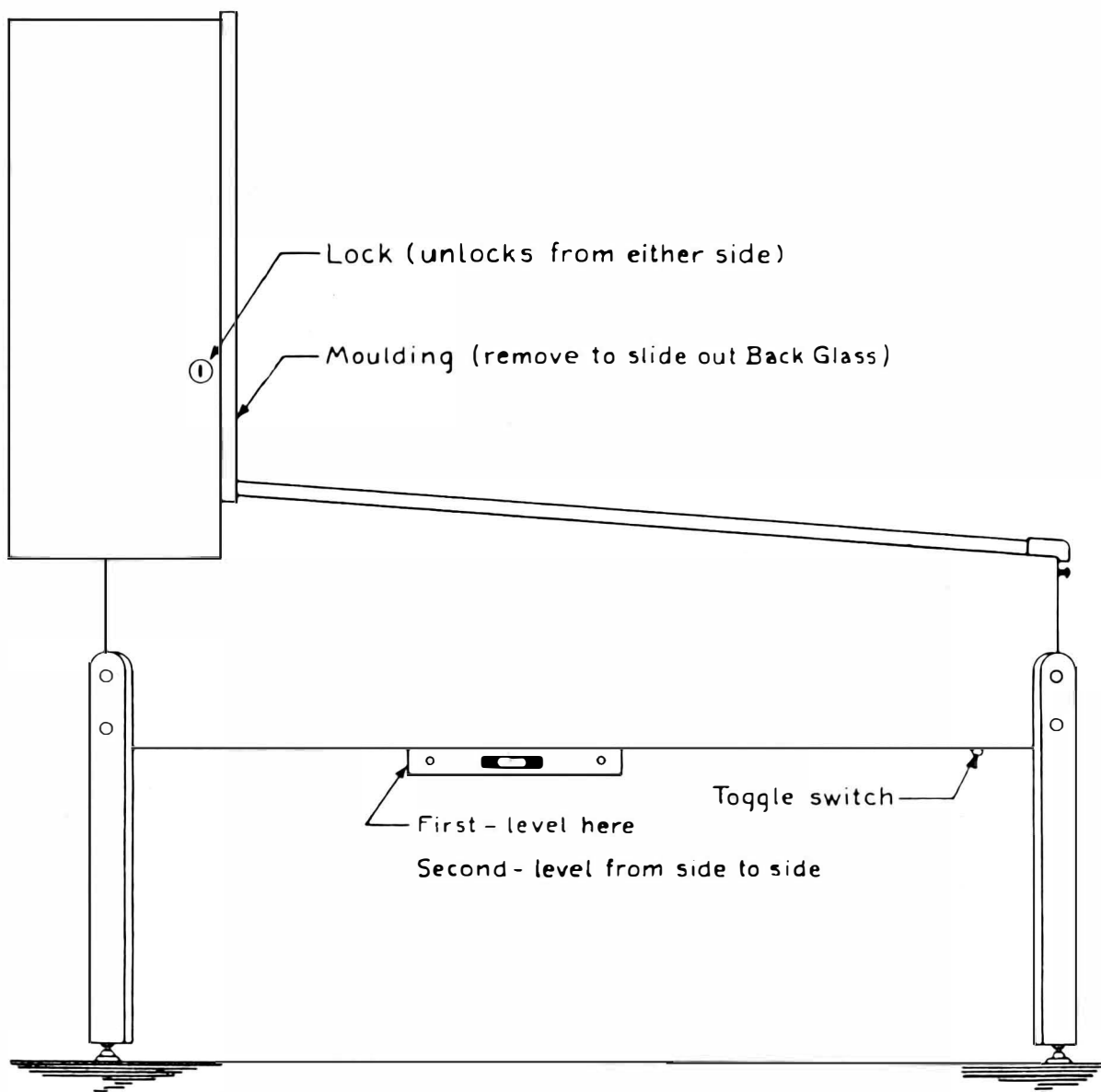
ACCESS TO MECHANISM AND LIGHT BULBS

Back-glass may be removed from either side by unlocking side desired and removing upright moulding. (Remove moulding by pulling bottom portion.)

After removing back-glass, access to mechanism may be obtained by raising 2 slide brackets on insert, located on left and right edges of insert. Insert may then be tilted forward for easy accessibility.

BE SURE TO LEVEL GAME

See instructions for leveling below. Place 8 balls in game.



TRIPLE PLAY

GAME OPERATION

5-BALL PLAY:

Additional coins or replays can be played:

1. To lite 2nd Card (positive lite on 2nd Play).
2. To lite 3rd Card (positive lite on 3rd Play).
3. To advance scores (positive advance to 2nd score position on second play).
4. To lite "Select a Lit number Before Shooting 4th Ball" panel and thus qualify.
(a) To select a "Spot" number by turning knob on cabinet front.
5. To lite "Select a Lit number Before Shooting 5th Ball" panel and qualify:
(a) To shoot 4 balls before making selection.
6. To lite additional, selectable numbers.
7. To lite "Each Card Scores" panel and thus qualify, separate score for 1st, 2nd and 3rd Card when lit.
8. To lite "4 Corners Score 5-in-line" panels and thus qualify, to score 5-in-line for lighting Corner Numbers on corresponding card.
9. To lite pennant and thus qualify to spot numbers 5-8 or 2-15 by hitting pennant roll-over on playfield.
10. To lite "Lite-A-Name" panel and qualify to lite next letter in name, by hitting indicated roll-over on playfield.
11. To obtain 1 to 3 additional balls.

IN-LINE SCORES:

All cards on backglass contain twenty-five numbers, 1 to 25 inclusive, arranged in a square 5 numbers wide by 5 numbers high, not in numerical order.

The Playfield contains twenty-five Skill Holes, numbered 1 to 25 inclusive, arranged in numerical order from top to bottom of playfield and a Ball Return Hole through which balls return for free shots.

The object of the game is to shoot balls into numbered skill holes, lighting corresponding numbers on backglass.

- (a) To light 3, 4, or 5 adjoining numbers connected by white line -- horizontally, vertically or diagonally -- on 1st, 2nd or 3rd Card when Card is lit.

In-line Scores are listed under Advancing Scores on Page 3.

CORNERS SCORES:

Further object of the game is:

- (a) To lite 4 Corner numbers of 1st, 2nd or 3rd Card when corresponding Corners panel is lit. (see Corners panel on Page 3)

SELECTION FEATURE:

Arrows to left of selection numbers, and selection numbers, flash with each play, and advance at mystery intervals. When lite advances to "Select a Lit Number Before Shooting 4th Ball" panel:

- (a) Selection numbers light (4 numbers guaranteed) 19, 20, 21 and 22; other numbers 25, 10 and 16, light at mystery intervals and/or can be obtained on additional plays.

Any one of the above numbers can be selected, when lit, by turning the knob on the front of the cabinet.

- (b) "Select a Lit Number Before Shooting 5th Ball", when lit, player can shoot 4 balls before making selection.

NOTE: "Select Now" will flash, warning player to select before shooting next ball.

EACH CARD SCORES PANEL

Panel with words "Each Card Scores" flashes with each play and arrows above panel will advance at mystery intervals. When panel is lighted, player is eligible to Score Winners on 1st, 2nd and 3rd Card when lit.

CORNERS PANEL:

Panels with words "4 Corners Score 5-in-line" flashes with each play and at mystery intervals, light and remain lit during entire game, qualifying player for Corners Score on indicated card.

LITE-A-NAME

Objective is to lite name TRIPLE PLAY, by hitting name ROLL-OVER on playfield when lit. Name will not reset with each game, only when it has been completed and scored a 5-in-line score.

In-line Scores are listed under Advancing Scores Below.

SPOTTEM FEATURE:

The PENNANT on backglass will flash with each play and at mystery intervals, will light and remain lit during the entire game. Pennant Roll-over hit on playfield spots numbers 5-8 or 2-15 as indicated on Roll-over when lit.

GUARANTEED FEATURES:

Regardless of number of plays, each feature, after lighting remains lit until the end of game.

EXTRA BALL FEATURE:

After shooting at least 4 balls, player may press "Extra Balls Button" and play for extra balls, the "1st Extra Ball", "2nd Extra Ball", and "3rd Extra Ball" panels will flash.

At mystery intervals, after 1st play and first pointer is lit, (guaranteed on 1st play) pointers light will advance on succeeding plays at mystery intervals, until fifth pointer is lit and "1st Extra Ball" panel is lighted. Then first extra ball will be released to player. After shooting "1st Extra Ball" player may continue to play for 2nd and 3rd extra balls.

GUARANTEED ADVANCE:

Pointer lights either advance or remain as far advanced as on previous play — they never drop back to a lesser position.

ADVANCING SCORES:

Scores appear in Scene on backglass, advancing at mystery intervals. First and second scores are guaranteed for the first two plays — Additional play will advance scores or remain as high as on previous play. They never drop back regardless of number of plays.

Scores appearing on backglass are as follows:

5-In -Line	50	75	100	100	150	150	200	300
4-In -Line	16	20	24	32	48	72	100	200
3-In -Line	4	4	8	12	18	36	48	64

MAINTENANCE AND ADJUSTMENT

I. GENERAL

NEVER EXPERIMENT with any of the mechanism. Locate any trouble with the aid of Wiring Diagrams or Operating & Servicing Information supplied with the machine, then check for proper adjustment of the units involved before making any changes. Improper adjustment or makeshift repair will only cause serious damage to other parts of the machine or repeated failure of the part.

NOTE: Always look for a possible loose wire, bad connection at a plug and socket, broken or unhooked springs on step-ups, relays, etc., before adjustments are made or wires connected.

II. FUSES

IMPORTANT: Never replace fuses with any rating other than specified on fuse block. Fuse Block is mounted on transformer board assembly in bottom of cabinet and can be reached from the side door.

III. LUBRICATION

Over-lubrication causes far more trouble in coin-operated equipment than under-lubrication. Practically all cases of poor contact on switches and wiper discs are due to oil or grease, or oil vapor which forms a film or residue on the contacts and will not allow current to pass through. Excess lubricant may also seep into the clutches, causing them to slip.

IMPORTANT: NEVER USE VASELINE FOR LUBRICATION OF ANY PART OF THE MACHINE. Vaseline is not a true lubricant. It leaves a dirty and gummy residue and it becomes very thick when cold. A special Coin Machine Lubricant is supplied with each machine.

STEP-UP Levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs (biscuits) on the Motor Units and Step-up Units will require lubrication with the special Coin Machine Lubricant only after the grease is completely evaporated (3 to 12 months, depending on climate) or when the film of grease becomes dirty. In either event, clean the parts thoroughly with Benzol, Naptha, White Gasoline or Carbon Tetrachloride, then apply an extremely thin coat of the special grease with a fine camel's hair brush.

Solenoid Plungers should not have a lubricant of any kind. Should there be a sluggish tendency or if plungers are sticking, the parts should be cleaned with a solvent and flaked graphite applied on reassembly.

IV. CONTINUITY CHECKS

Continuity of coils, contacts, wire connections, etc. may be checked with an Ohmmeter or several types of Test Lites. If regular test equipment is not available, an efficient Test Lite may be made from a few miscellaneous parts as shown on page 10. The following paragraphs describe this equipment and give information that will prove helpful to the service man.

- (a) Battery Test Lite should be used only with all current in the machine turned OFF. When the leads from the Lite are placed across the wires leading to the Coils, Switches, etc., the bulb will light if there is contact through the unit being checked. If the bulb does not light, there is a break in the circuit. However, only open circuits on coils may be located by this method since shorted coils will also show contact through the coil. If a short is suspected use the Test Prod to check the coil.
- (b) The Test Prod must be used with current turned ON. The clip on the end of the lead wire may be attached to any common ground in the machine. This would be Black wire for 17 to 50 Volt tests, or White or White-Black wire for 6 Volt tests. The Prod end of the tester may then be touched to various connections or contact points in the circuit being checked. Using the tester in this manner leaves the service man with one hand free to manually operate relays or other units.

If a particular Coil on a Relay, Solenoid, etc., is not energized, place the clip end of the Test Prod on the Black lead to the Coil. Touch the Test Prod to the opposite lead of the Coil. If the bulb lights but the Relay Coil, or other unit being checked, is not energized, then the coil is faulty and must be replaced.

Wiper Contacts may be checked by placing the Test Prod Clip on the common ground wire for the circuit (Black for 17 or 50 Volts, White-Black for 6 Volt circuits) and checking the solder lugs of the Contact Discs as follows:

- (a) Use the Test Prod to locate the "hot" wires leading into the Disc.
- (b) Check the Wiring Diagram for the wire colors of the contacts opposite the hot leads.
- (c) Place the Test Prod on the contacts, thus located, and turn the wipers or Wiper Disc of the unit by hand. The Test Lite should light before one revolution of the wiper is completed.

Broken Wires may be located by placing the leads of the Battery Test Lite on each end of the wire in question. If the bulb fails to light, a break in the circuit is indicated.

V. RELAY ADJUSTMENTS

All Relays are adjusted by the factory and should require little or no servicing in the field. Should a Relay fail to actuate the Unit or Lights to which its switches are connected, the difficulty might possibly be due to dirty Switch Contacts, loose wires or a broken wire between the Relay and other Units.

NOTE: DO NOT make any adjustments to the Relay itself until all other possibilities in the troublesome circuit have been checked.

The Gap between the Coil and the Armature of the Relay should be approximately $\frac{3}{64}$ of an inch. This allows for about $\frac{3}{32}$ of an inch movement at the end of the Armature into which the switch blades are inserted. The Gap may be adjusted (if necessary) by bending the Armature Stop Arm.

CAUTION: The Armature Stop Arm on all Relays is carefully adjusted at the factory. Do not change this adjustment unless absolutely necessary.

The Armature Spring should have enough tension to bring the Armature up against the Armature Stop Arm when the Relay is not energized. SEE THAT PRESSURE, FROM POORLY ADJUSTED SWITCHES, IS NOT AFFECTING THE ARMATURE BEFORE ATTEMPTING ADJUSTMENTS ON THE SPRING.

If a Relay "chatters" or "hums" but does not pull in, check to see that switches, located on it, are not out of adjustment and causing too much tension on the Armature or that a burr on top of the Relay Coil is not interfering with action of the Armature. Burrs on the core of the Coil may be removed with a small contact file.

The Continuity of a Relay Coil may be checked with an Ohmmeter, or if one is not available, see Paragraph IV for use of Test Prod.

VI. SWITCH ADJUSTMENT - GENERAL

The majority of switches used in United machines are composed of a series of blades and spacers built up with normally open and/or normally closed contacts as required to perform the specific function for which the switch is intended. These switches may be actuated by Relays, Solenoids, or by mechanical movement of other parts of the machine. However, the adjustment of the switch contacts and blades remain fairly constant, as shown in the following paragraphs.

With the exception of a few cases, in which special adjustment instructions are given, all blade type switches should have at least 1/32" gap beyond the point at which the contacts close. This follow-thru action provides a wiping motion between the contacts, keeping them clean and insuring good contact between the points.

When adjusting blade type switches, first adjust the blade actuated by other parts of the machine with relation to the part it contacts and then set the gap and follow through. Specific instructions pertaining to each switch are given, where necessary, in other paragraphs and may be found by referring to the index.

CAUTION: NEVER BEND BLADES SHARPLY, at the spacers or otherwise. Sharp bends tend to straighten out slightly with use, and will weaken the Blade. Blades should be formed by a stroking action over the entire length of the blade, using a blade tool or duck-bill pliers.

VII. SWITCH ADJUSTMENTS - PLAYBOARD POCKET

All Pocket Switches are mounted on the Masonite Shuffle-board and can be easily serviced by removing the screws along the edge of the Playboard and raising the front end as far as desired.

The blades of the Pocket Switches should be centered in the round opening of the Shuffle-board. If they rub the side of the opening they will not function correctly and may stick in open or closed position.

The Actuator Blade should lay against the Shuffle Board with very little tension when the Ball is not in the pocket.

VII. SWITCH ADJUSTMENTS - PLAYBOARD POCKET (continued)

There should be $1/32''$ to $1/16''$ gap between contact points when the switch is open.

Check to see that combined tension of the blades keeps the ball $3/16''$ above the masonite when it drops into the pocket. If the switches are not adjusted properly, a second ball may hang up in saucer around ball pocket.

VIII. SWITCH ADJUSTMENTS - CAM

All Cam Switches should be adjusted for at least $1/16''$ gap, when open, and at least $1/32''$ follow-through after their contact points close.

Score Cam Switches should not have any more than $1/32''$ follow-through after their contact points close.

IX. SWITCH ADJUSTMENT - RELAY

GENERAL - Unless special instructions are given, all blade-type switches mounted on relays should be adjusted according to the instructions for General Switch Adjustments as given in Paragraph VI and below.

TRIP OR LATCH RELAYS - This type of Relay is locked in one position mechanically and usually assembled in banks. When this type Relay is energized, the flap that operates the switches falls down until it rests against the shoulders on the top edge of the armature. The actuator arm should snap back against the armature, but the switch blades should not have enough tension to cause the arm to bounce. Bouncing can be reduced or stopped by relieving the tension of the switch blades on the pin of the Actuator arm. These switches should be set for $1/16''$ gap and $1/32''$ follow-through.

X. SWITCH ADJUSTMENTS - TILT

SLAM TILT switches are the blade type switch with one blade weighted. Rough handling of the machine will cause the weighted blade to vibrate, closing the switch contacts and Tilting the mechanism. The gap between points on these switches may be set as close as desired (depending on how rough the Players treat the machine). Average gap for this type of switch is approximately $1/16''$. However, closer settings will soon discourage rough players.

THE PENDULUM TILT, located in the front left corner of the cabinet (alongside the cas -box) can be set by loosening the thumb screw and sliding up or down or moving the ring forward or back.

XI. SWITCH ADJUSTMENTS - BALL SHOOTER

The Ball Shooter Switch is located directly ahead of the Ball Shooter Plunger on the Playboard and is operated by the weight of the Ball resting on the small wire form that protrudes through the Playboard. Be sure the wire form is not rubbing the sides of the opening and that its movement is great enough to operate the switch. Also, check to see that the wire form is not bent back far enough to be struck by the plunger during play. The contacts on this switch should have at least $1/32''$ gap and $1/32''$ follow-through.

XII. STEP-UP UNIT ADJUSTMENTS

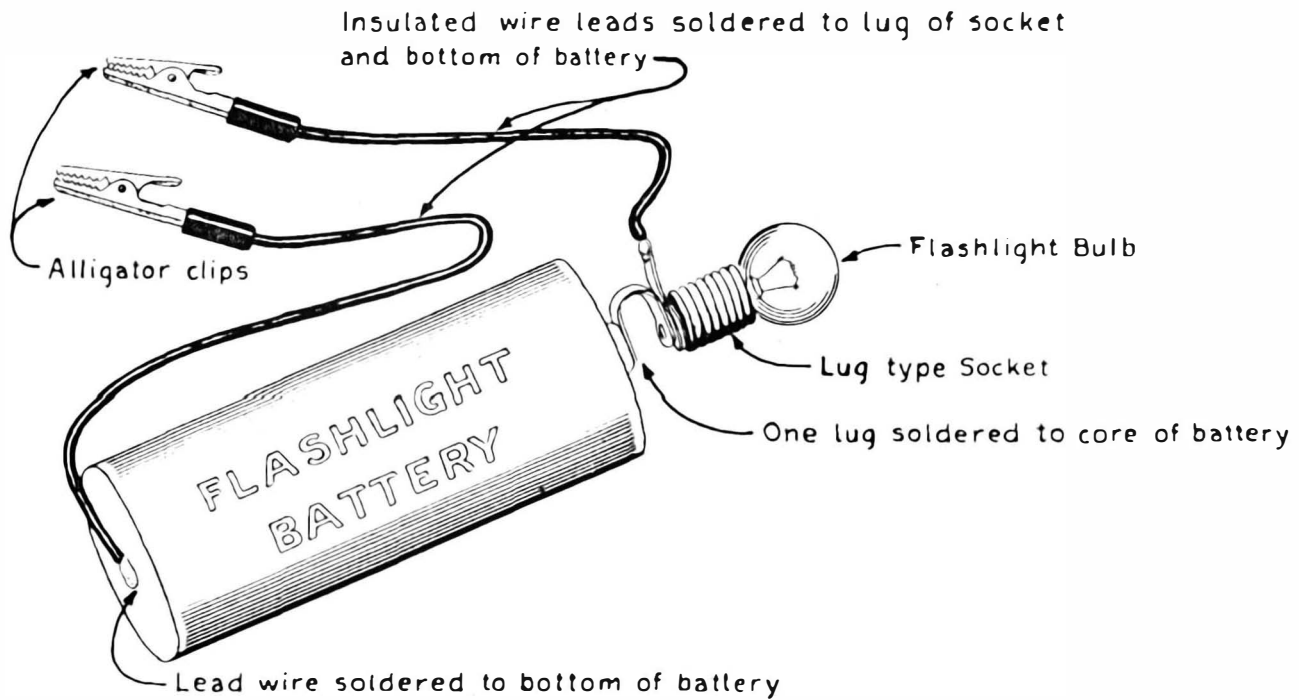
The DRIVE ARM, that moves the ratchet on the Step-up Units, should not ride more than half way up the slope of the second tooth on its return stroke. This arm should never need adjustment, however it can be changed by bending the arm slightly.

CAUTION: Excess bending of the Drive Arm will cause it to break. Check all other points thoroughly before attempting adjustments at this point.

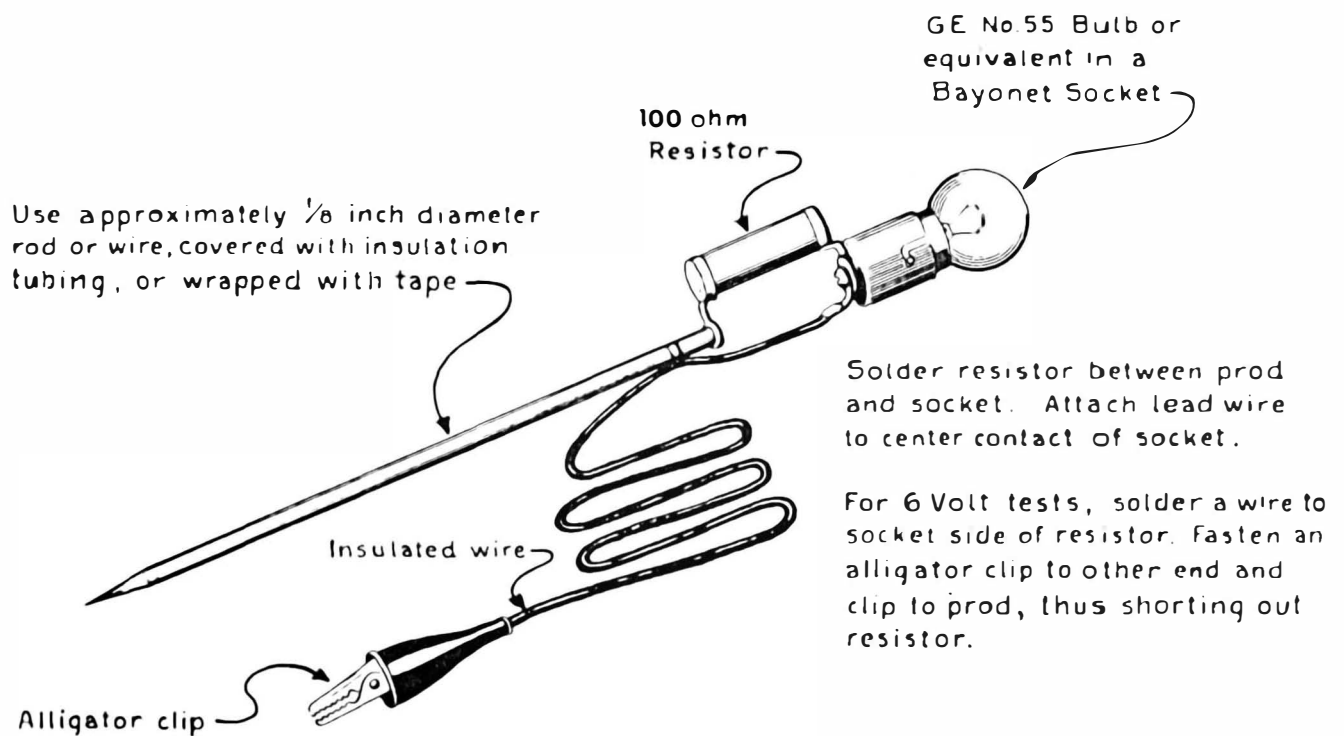
The Drive Adjustment Screw, at the solenoid end of the Drive arm, should be adjusted so that, after the unit has advanced two or three positions, there is very little play in the ratchet when manually turned in reset direction.

XIII. STEP-UP UNIT WIPER BLADE ADJUSTMENT

Where blade type Wiper Arms are used (Mixers, selector, timer, replay control) the Wiper Blade should have sufficient tension to follow the Stationary Plate for at least 1/16" when it is pressed away from the contact Wiper Arm.



BATTERY TEST LIGHT



TEST PROD

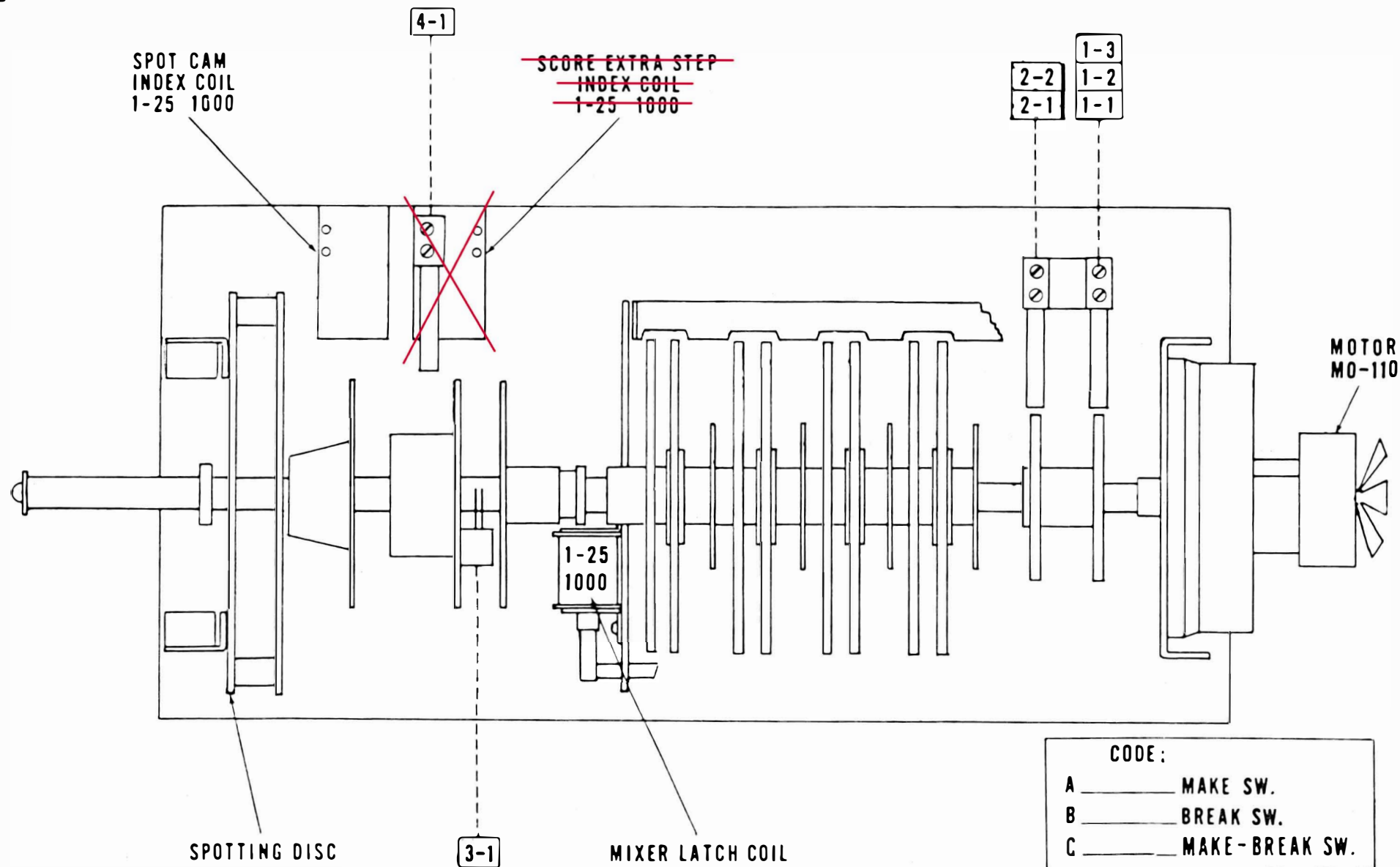
WHAT TO DO IF:

1. Lights are out, game is inoperative:
 - a. Check A. C. cord and plug for breaks, cuts or other damage.
 - b. Check fuses, located on transformer panel inside ball-lift door.
 - c. Check master switch, in cabinet bottom under right front of cabinet.
 - d. Check plugs and jacks for proper installation.
2. Lights are on, game is inoperative:
 - a. Check the 10 Amp fuse, heavy Black wire.
 - b. Check plugs and jacks.
3. Lights are out, game operates:
 - a. Check the 15 Amp fuse, heavy White wire.
 - b. Check 15 Amp fuse, heavy Red-Yellow-White wire.
 - c. Check plugs and jacks.
 - d. Check lite bulbs.
4. Number lites are out, display lites are on.
 - a. Check 10 Amp fuse, Gray-Black wire.
 - b. Check switch 3-R on Tilt Relay Gray-Black to Gray.
 - c. Check plugs and jacks.
 - d. Check bulbs.
5. Display lites lite, Flash and Feature lites do not;
 - a. Check switch 1-R on Tilt Relay, Red-Yellow-White to White-Black.
 - b. Check bulbs.
 - c. Check 15 Amp fuse, Red-Yellow-White wire.
6. No Replays are shown, coin chute rejects coin.
 - ~~a. Check coin lock out coil, if it is not energized, check Replay Step-up Zero switch. Brown-White to White-Blue. also control Unit #3 Cam switch. Brown White to Brown Black, and scan Index switch, Brown Black to Yellow.~~
 - b. If Coin lock out coil is energized check coin chute for cleanliness and general maintenance.
7. Coin is accepted, game is inoperative:
 - a. Check coin switch.
 - b. Check for action of Coin Relay, if Coin Relay fails to operate, check Replay Reset Relay switch #2, Orange-White to Black.
 - c. Check Coin Relay Switch #2, Green-Yellow to Yellow-Red.
 - d. Check Sequence Index Coil, Yellow-Red to Black.
8. Sequence Cams operate but Shuffle Motor in inoperative:
 - a. Check connections on Shuffle Motor.
 - b. Check switch #1 on 2nd position of Shuffle Motor.
 - c. Check switch #1 on Zero position of Shuffle Motor.
 - d. Coin Relay switch #3.
9. Latch Relay Bank fails to set up;
 - a. Check connections on Relay Bank Reset coil, Green and Orange plastic-coated wires.
 - b. Check switch #3 on 1st position Shuffle Motor.
10. Lock Relay does not energize;
 - a. Check control Unit #5 Cam Switch, Black-White to Yellow.
 - b. Check Lock Relay switch #1.
11. Tilt Relay does not set up;
 - a. Check switch #2 on Lock Relay.
 - b. Check Timer S. U. limit switch, Red to Blue.

11. (continued)

- c. Check switch #3 Replay Reset Relay.
 - d. Check pendulum tilt.
 - e. Check shakeproof tilts, one on transformer block, one on back door near lock, one on side of lite-box, and one on front door.
 - f. Check Tilt Relay for mechanical locking action.
12. Card Replay Control Units, Score S.U., ~~Extra Ball S.U.~~, etc. fail to reset;
- a. Check switch #1 on 1st Position of Shuffle Motor, Yellow to Orange-Green.
 - b. Check individual reset coils.
13. Replay Step-up unit fails to subtract a replay;
- a. Check Replay Step-up Zero switch - Yellow to Black-Red.
 - b. Check control unit #2 Cam Switch, Black-Red to Black-Yellow.
 - c. Check switch #1 on Replay Reset Relay.
 - d. Check reset coil on Replay Step-up unit.
 - e. Check mechanical adjustment and operation of Reset assembly.
14. Extra advantage lites do not flash, spot disc wipers move:
- a. Check wiper assembly for proper blade tension.
 - b. Check contact wipers on slip rings for proper location.
 - c. Check Control Unit cam switch #4, Gray-Red to Yellow.
 - d. Check Extra Ball Relay switch #2-R, Gray-Red to Gray-Yellow.
- ~~15. Extra advantage lites flash, score lites do not:~~
- ~~a. Check Control Unit cam switch #4, Green-White to Yellow.~~
 - ~~b. Check switch #1-L on 5th Ball Relay A, Green-White to Red-Yellow.~~
 - ~~c. Check #1 Slip Ring Wiper for proper location and contact, Red-Yellow wire.~~
- ~~16. Extra advantage lites flash, Extra Ball lites do not:~~
- ~~a. Check switch #1-L on 5th Ball Relay - A, Green-White to Black-Red.~~
 - ~~b. Check control unit cam switch #4 Green-White to Yellow.~~
17. Timer Step-up fails to reset at start of game;
- a. Check switch #2 on 1st position Shuffle Motor.
 - b. Check Timer Reset coil.
18. Timer Step-up fails to reset on Extra Ball play:
- a. Check Extra Ball Push Button relay switch #3, Orange-Red.
19. Ball Lift fails to operate;
- a. Check motor connections.
 - b. Check Switch #1 Zero position Ball Lift Motor.
 - c. Check 1st, 5th, 6th and 7th Ball Trough switches.
 - d. Check Timer Step-up Zero switch (Yellow-Black to Yellow-Red).
20. Score unit fails to step up on second play;
- a. Check Score unit for free operation.
 - b. Check Wiper Contacts on disc.
 - c. Check Control Unit cam switch #7, Orange-Black to Red-Green.
 - d. Check switch #3-R Extra Ball Relay, Red-Green to Green-Yellow.

- ~~21. "Each Card Scores" panel is never lit.~~
- ~~a. Check Each Card Scores Step up wiper blades for proper tension.~~
 - ~~b. Check Each Card Scores Step up, last position break switch.~~
 - ~~c. Check Each Card Scores Step-up.~~
 - ~~d. Check "Each Card Scores" light bulbs, 6 volts.~~
22. Selection Feature never lit;
- a. Check Selection Feature light bulbs, 6-V.
 - b. Check Switch #1-L Selection Feature Relay "B," (Orange-Black to Yellow).
 - c. Check Switch #4-R on 5th Ball Relay (Black-Yellow to Red).
23. Selection Knob inoperative;
- a. Check Switch 1-R Selection Feature Relay "A".
 - b. Check operation of Selector Release Coil.
 - c. Check Switch 1-L Selection Feature Relay "B".
 - d. Check Switch #2-L 5th ball relay B, White-Orange to Yellow-Green.
24. Card winner fails to score;
- a. Check Scan disc for loose wire.
 - b. Check Scan wiper blades for proper tension.
 - c. Check Row relays for proper adjustment.
 - d. Check for loose wire or bad contact on Score S.U. Disc.
 - e. Check for loose wire or bad contact on Card Replay Control S. U.
 - f. Check each card scores relay A, B, C & D for proper operation & switch adjustment.
 - g. Check switch #1-L, 5th Ball Relay - A, Gray-Red to Yellow.
25. Card Corners fail to score when Corners panel is lit;
- a. Check Switch #2 on Corners Relay.
 - b. See number 24 above.
26. Replays score incorrectly;
- a. Check impulse switches on Replay Cams; see wiring diagrams for **correct** switches on any given score position.
 - b. Check for loose wire or poor contact on Card Replay Control S. U.
 - c. Check Switch #2 on 3, 4 or 5 numbers win relay, (yellow to red-black).
 - d. Check Scan Index Arm switch (red-black to gray-red).
 - e. Check Scan Disc Wiper Blades Row 6 & 8 for proper tension.
 - f. Check Scan Disc for loose wire or bad contact. (red-black to green-white).
 - g. Check Scan Index Coil.
 - h. Check Replay S.U. Coil Plungers for Binding or Mechanical Defect.

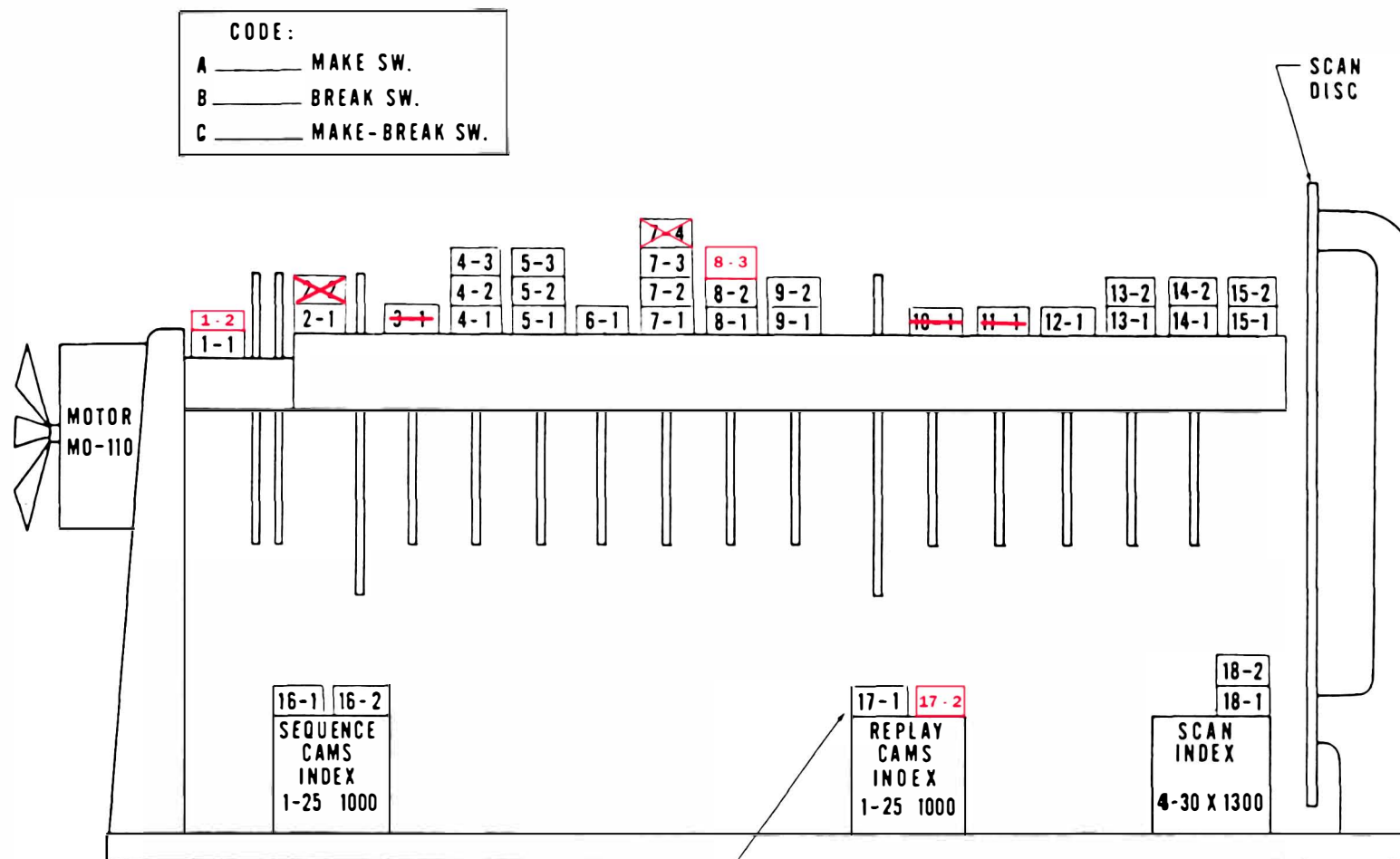


Mixer Unit Assembly - pictorial view

NUMBERS CORRESPOND TO SWITCH CHART

MIXER UNIT

Switch	Diagram Location	Wire Color	Operation
1-1-A	4-A	Red-Blue Blue-White	Flashes "Select Now" panel.
1-2-A	16-F	White-Red Green	Pulses Extra Ball Step-up run.
1-3-A	22-H	Yellow-Red Brown-White	Pulses Each Card Scores Step-up and/or Selection Feature Step-up.
2-1-A	4-B	Yellow Green-Black	Pulses Replay Step-up Reset Coil and Replay Meter.
2-2-A	22-F	Brown-Yellow Yellow	Pulses Selection Feature Step-up run.
3-1-A	16-G	~~White-Brown~~ ~~Blue-Red~~	Pulses Score Step-up run, when Control Unit Cam #9 switch and Sequence Index switch are closed.
~~4-1-A~~	~~18-F~~	~~White-Red~~ ~~White-Brown~~	Completes circuit for Score Multiple Run.



NOTE:
IT IS IMPORTANT TO ADJUST REPLAY CAMS INDEX SWITCH
SO THAT IT MAKES ONLY WHEN THE REPLAY CAMS INDEX COIL IS ENERGIZED.
WHEN THE REPLAY CAMS INDEX COIL IS DE-ENERGIZED, THIS SWITCH SHOULD
OPEN AND REMAIN OPEN WHILE FOLLOWER IS RIDING ON OUTER EDGE OF CAM.

Control Unit - pictorial view

NUMBERS CORRESPOND TO SWITCH CHART

CONTROL UNIT

Switch	Diagram Location	Wire Color	Operation
1-1-A	9-D	Brown Yellow-Blue	Energizes Timer Step-up coil when 5th Ball Re. Switch, Ball gate Re. switch & Drag. arm switch are closed.
1-2-A	21-E	10 53m	In hold circuit to winner check relay.
2-1-A	1-B	Brown-White Brown-Black	Drops out Coin Relay and Coin Lockout Coil during spin, acts as safety switch.
~~3-1-B~~			CU cam 3 switches moves to cam 2. Cam 3 switch not used. Cam 2 switch lifted so only outer peg operates stack.
4-1-A	6-A	Green-White Yellow	Completes feed to Flash Score lites or Extra Ball lites when playing for Extra Ball
4-2-A	8-A	Gray-Red Jumper	Completes feed to flash all feature lights during spin.
4-3-A	19-D	Yellow-Blue Jumper	Energizes Score Extra Step Index coil and Spot Disc Index coil.
5-1-A	8-C	Black-White Jumper	Energizes Lock Relay.
5-2-A	3-C	81 83	Energizes Replay Step-up reset coil, if replays are registered.
5-3-A	13-C	Brown-Red Brown	Energizes 3rd Card Relay, when Score Step-up is on second position and Shuffle motor Position 2, Switch 3 is closed.
6-1-B	16-G	Yellow Yellow	Open feed to score step-up during spin.
7-1-A	17-C	Black-White Jumper	Completes Name Step-up intermediate step circuit.
7-2-A	17-F	Red-Green Orange-Black	Completes circuit for Score Step-up, single step.
7-3-A	16-F	Red-Yellow Green	Completes circuit for Extra Ball Step-up, single step.
7-4-A	16-F	Red-Yellow Green-White	Completes circuit for Extra Ball Step-up, single step, fed from extra Ball adj. switch.

CONTROL UNIT

Switch	Diagram Location	Wire Color	Operation
8-1-A	4-C	White-Brown Jumper	Energizes Reflex Reset Coil through Replay Reset Relay switch #5.
8-2-A	19-H	Brown Brown-White	Pulse feed for extra advantage features.
9-1-A	16-F	Blue-Red Blue-Yellow	Controls Extra Step impulse circuit to Score Step-up.
9-2-A	16 - F	Jumper Green	Alternator cam for E.B. step-up
10-1-A	12-D	~~Red-Green Orange-Green~~	~~Pulses #1, #2 or #3 Replay Control Step-up thru Each Card Scores Relay switch, on Score 8th position.~~
11-1-A	12-D	~~Brown-Red Jumper~~	~~Pulses #1, #2 or #3 Replay Control Step-up thru Each Card Scores Relay switch, on Score 5th & 6th position.~~
12-1-A	12-D	Orange + wires from 10-1 and 11-1 Jumper	Pulses #1, #2 or #3 Replay Control Step-up thru Each Card Scores Relay switch, on Score 3rd - 8th positions.
13-1-A	12-D	Blue-White Jumper	Pulses #1, #2 or #3 Replay Control Step-up thru Each Card Scores Relay switch, on Score 1st & 2nd positions.
13-2-A	11-D	Brown-Yellow White-Orange	Pulses Replay Step-up & Reflex Step-up when Replay Index Arm switch is closed.
14-1-B	9-D	Yellow-Blue White-Orange	Opens feed to Timer Step-up during replay scoring cycle.
14-2-B	13-H	Green-Red Orange-Red	Safety switch prevents start of scoring, until replay cams are in index position.
15-1-B	13-E	White-Green Brown-Yellow	Controls operation of 3 Numbers Win Relay during scan period.
15-2-B	14-E	Yellow-Red Yellow-Black	Controls operation of 4 Numbers Win Relay during scan period.
16-1-A	0-D	Red) 110 V. Brown) Plastic	Starts Control Unit & Mixer Unit motors.
16-2-B	17-F	Red-Green Blue-Yellow	Controls Score extra-step operation.
17-1-A	11-C	White-Orange Yellow	Completes feed to Replay Control Step-up, Reflex and Replay Step-up.
17-2-A	21 - E	10 53m	In hold circuit for winner check relay.
18-1-A	11-D	Gray-Red Red-Black	Energizes Replay Cam's Index coil.
18-2-B	1-B	Brown-Black Yellow	Breaks circuit to Coin Relay and Coin Lockout, coil, acts as safety switch.



REPLAY CONTROL RELAYS

Diagram Location	Wire Color	Operation
11-C	Jumper Jumper	Feeds Scan Index Switch to energize Replay Cam Index.
13-D	Green-Yellow White-Green	Lock-in Switch for this relay.
13-E	Jumper Jumper	Row relays energize coil.
11-C	Red-Black Jumper	Feeds Scan Index Switch to energize Replay Cam Index.
14-D	Gray-Yellow Yellow-Red	Lock-in Switch for this relay.
14-E	Jumper Jumper	Row relays energize coil.
11-C	Jumper Yellow	Feeds Scan Index Switch to energize Replay Cam Index.
15-D	Black-Yellow White-Blue	Lock-in Switch for this relay.
15-E	Red Jumper	Row relays energize coil.

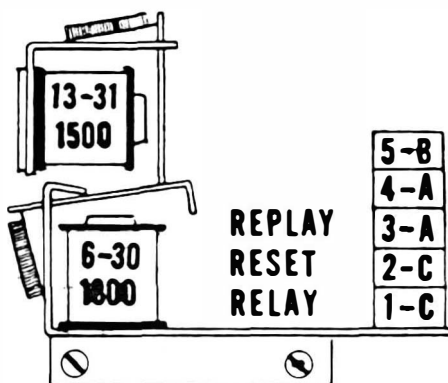


Diagram Location	Wire Color	Operation
3-E	Red-Blue Black-Green	13-31 1500 Coil energized by Replay Step-up Zero Switch
4-D	Orange White-Brown	Breaks circuit to Reflex Reset Coil.
0-D	Brown) 110 V. Red) Plastic	(110 volts) Starts Control Unit and Mixer Unit motors.
9-E	Jumper Jumper	Energizes Tilt Relay
2-E	Orange-White Black Jumper	Breaks circuit to Coin & Extra Ball Relays, completes circuit to Replay meter & Replay Reset Relay Trip coil.
3-D	Black-Yellow Green-Red Green-Black	Switches feed from Control Unit Cam #2, switch #1 to Mixer Impulse Switch 1-B, for Replay Step-up Reset coil.
3-E	Black-Red Jumper	Coil is energized by Replay Reset Push Button Switch or Lock relay switch #3.
3-E	Black-Yellow Jumper	Energizes Replay Reset relay when this relay drops out.
8-E	Red Green	Energizes Tilt relay.
8-C	Yellow Jumper	Lock switch for this relay.
8-E	Black Black-White	Coil is energized by Control Unit Cam #5, switch 1.

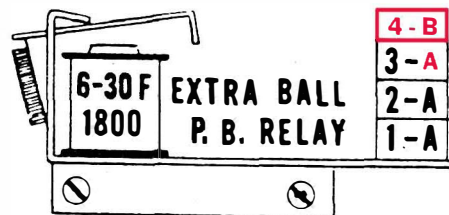


Diagram Location	Wire Color	Operation
7-D	Blue-Red Yellow-Green	Energizes 5th Ball relays when Timer Step-up is on 4th or 5th position.
7-D	Black-Red Red-Green	Starts Ball Lift Motor, fed from series of trough switches.
9-C	Gray-White Black-Green	Completes circuit thru 5th Ball relay B, switch 1-L Drag Arm switch and Control Unit Cam #1 to pulse Timer Step-up.
10-C	White-Blue Brown-Yellow	Lock Switch for this relay.
10-E	Red Yellow-Green	Coil is energized by Ball Gate switch
3-C	50m 50m	Breaks replay S.U. reset coil circuit.
13-B	58m 58m	In parallel to CU 5-3 to trip 3rd card relay.
17-A	Jumper Red-Black	Lights Extra Ball Panel.
2-D	71-50 Jumper	Energizes coin relay coil.
2-E	Green-Black	lower coin switch energizes coil. Relay used to implement 3 cards per coin vs. one card per credit.
6-C	93 Green-Yellow	Completes circuit to start shuffle motor
5-D	Yellow-Red Yellow-Blue	Energizes Sequence Index coil and Mixer Latch coil.
2-C	Brown-White Jumper	Lock Switch for this relay.
2-E	Orange-White Red-White	Drop Chute switch or Play-All Push Button energizes coil.

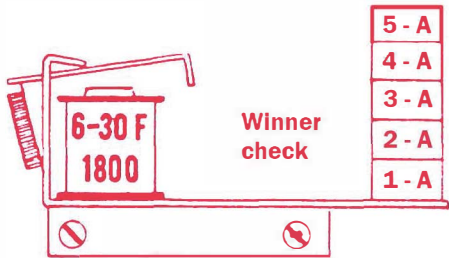
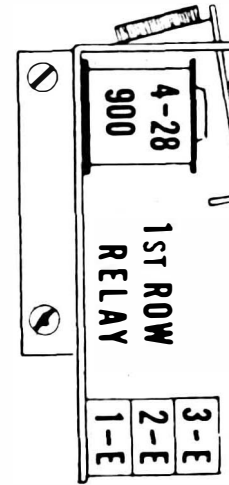
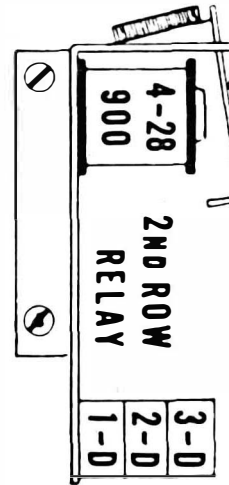
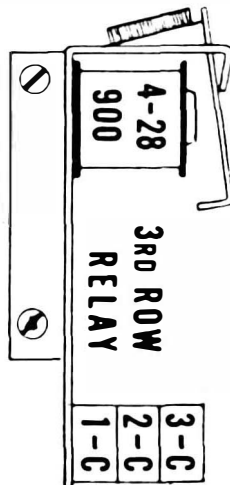
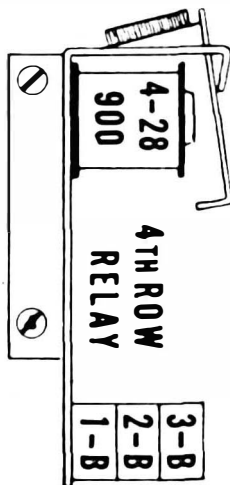
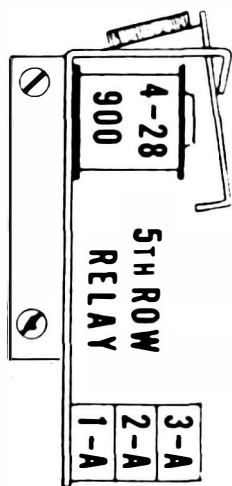


Diagram Location	Wire Color	Operation
0 - D	60m 60m	Run motors when winner check relay powered.
12 - H	20m 20m	In circuit to 3rd row relay
13 - E	80m 80m	In circuit to power each card scores relays.
9 - D	40m 40m	Enable drag arm timer step-up after winner check activated.
18 - E	51-50 51-51	In hold circuit for winner check relay.
19 - D	51-50 90m	Coli is energized when winner check P.B. switch closed after 5th ball relay tripped.



IN LINE SCORES

3 IN-LINE SCORES
THROUGH SWITCHES

2-C
3-C
3-D
1-E
1-C
3-C
3-B
1-A
1-C
2-C
3-C
1-B
1-D

4-IN-LINE SCORES
THROUGH SWITCHES

1-C
2-C
3-C
2-B
3-D
2-E
1-C
2-C
3-C
2-A
3-B
2-D

5 IN-LINE SCORES
THROUGH SWITCHES

1-C
2-C
3-C
3-A
3-B
3-D
3-E

CODE

All switches normally open.

Number indicates switch build-up from Frame.

Letter indicates Relay.

- A - 5th Row Relay
- B - 4th Row Relay
- C - 3rd Row Relay
- D - 2nd Row Relay
- E - 1st Row Relay

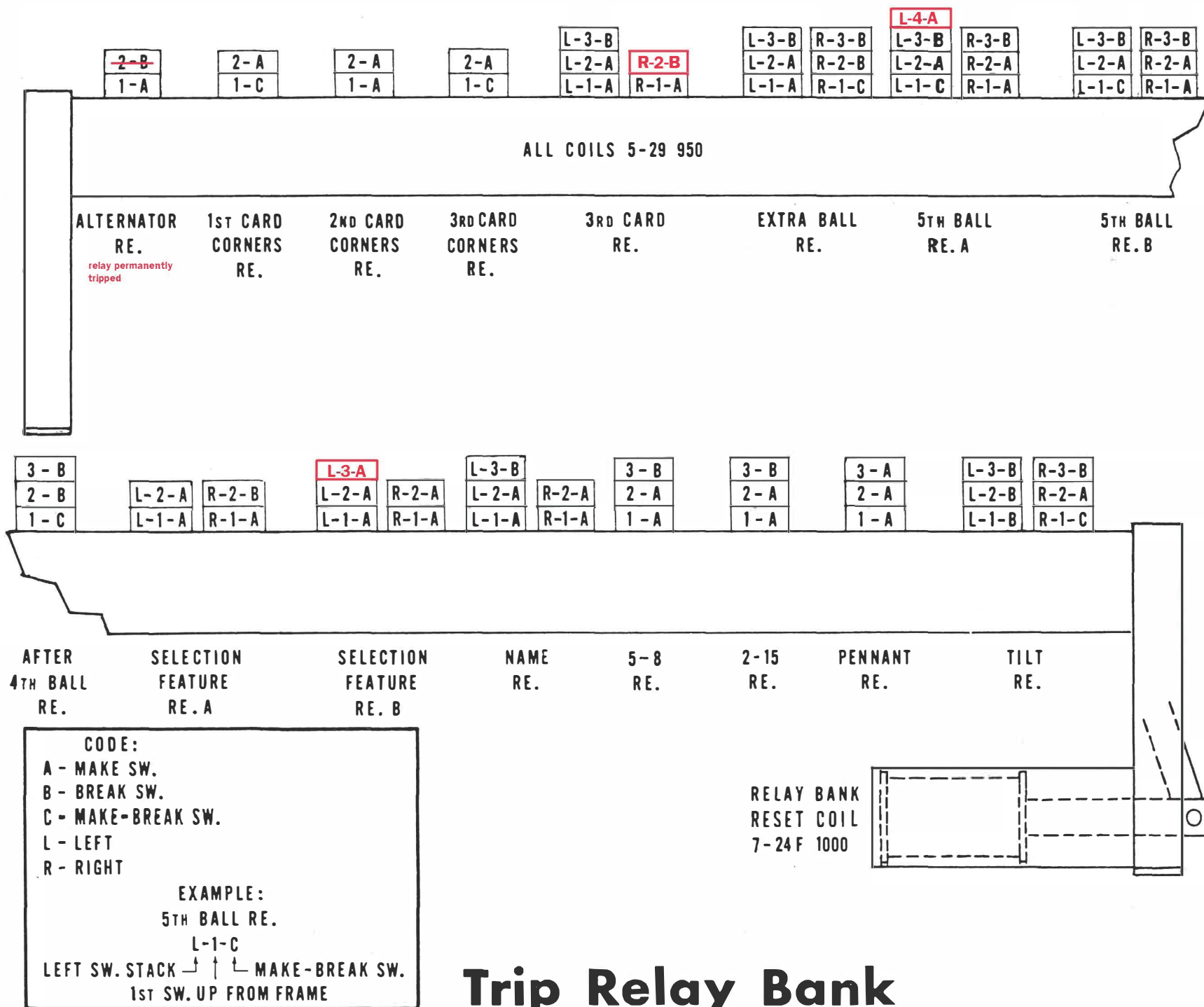
REPLAY IMPULSE CAM SWS.	CONTROL UNIT CAM NO.13 SW.	CONTROL UNIT CAM NO.12 SW.		
5 IN LINE	75 75	100 50	100 50	100 50
4 IN LINE	20 20	24 12	48 24	100 50
3 IN LINE	3 3	6 3	24 12	48 24
REPLAY S.U. R REPLAY A CONTROL S.U. T I O	$\frac{1}{1}$	$\frac{2}{1}$		

Large numbers are replay scores shown on ~~back glass.~~ **score card.**

Numbers in corner panels indicate number of steps pulsed on Replay Control S.U.

Note: 96 steps is effective thru 96th position switch on Replay Control S.U.

All others on Replay Control S.U. disc.



Trip Relay Bank

Switch	Diagram Location	Wire Color	Operation
Alternator Coil	18-F	Jumper Jumper	~~Zero position Score Step-up disc energizes coil.~~ Relay latching disabled - immediately trips after reset.
1-A	17-H	Orange Green-White	Controls Score Step-up circuit.
2-B	18-F	~~Green~~ disconnected Jumper	Break Switch for this relay.
1st Card Corners Coil	19-F	Jumper Yellow-Blue	Spot Disc energizes coil.
1-C	11-A	Blue Jumper	Lites 1st Card Corners Lite.
2-A	13-H	Jumper Yellow-Red	Completes circuit to 3rd Row Relay, to scan corners.
2nd Card Corners Coil	20-F	Red-Blue Jumper	Spot Disc energizes coil.
1-A	11-A	White-Brown Jumper	Lites 2nd Card Corners Lite.
2-A	13-H	White-Black Green-Red	Completes circuit to 3rd Row Relay, to scan corners.

Switch	Diagram Location	Wire Color	Operation
3rd Card Corners Coil	20F	Jumper Black-White	Spot Disc energizes coil.
1-C	11-A	Jumper Black-Green Jumper	Lites 3rd Card Corners lite.
2-A	13-G	Orange White-Brown	Completes circuit to 3rd Row relay, to Scan corners.
3rd Card Relay Coil	13-E	Jumper Jumper	Control Unit Cam #5 switch 3, through shuffle motor and Score Step-up disc energizes coil.
L-1-A	13-A	Jumper Green-Black	Lights 3rd Card panel.
L-2-A	13-G	Jumper Jumper	Completes circuit to 3rd Row Relay.
L-3-B	13-C	Brown Jumper	Break switch for this relay.
R-1-A	13-D	Black-Yellow White-Green	Completes circuit to operate Each Card Scores Relay C & D.
R-2-B	17-E	40-51 14-4+43-8	Impulse sw. 2 step up score unit when 3rd card trip relay not tripped.

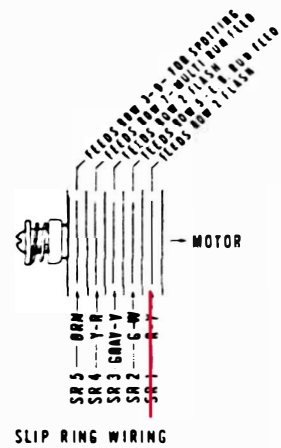
Switch	Diagram Location	Wire Color	Operation
Extra Ball Coil	2-E	Jumper Jumper	Extra Ball Push Button switch energizes coil.
L-1-A	16-F	Green Gray-White	Completes circuit to Extra Ball Step-up coil.
L-2-A	16-G	Orange-Red Blue-Red	Tied together on one switch blade with jumper to 5th ball relay A switch 1-L so feature enable feed active.
L-3-B	2-D	Jumper Jumper	Break Switch for this relay.
R-1-C	6-B	Orange Purple not used	Completes circuit to extra ball unit reset coil.
R-2-B	~~9-B~~	~~Gray-Red~~ ~~Gray-Yellow~~	~~Breaks feed to Spot Disc, flashing Feature Lites.~~
~~R-3-B~~	~~17-F~~	~~Red-Green~~ ~~Green-Yellow~~	~~Breaks feed to Score Step-up when playing for Extra Ball.~~
5th Ball Relay "A" Coil	6-E	Jumper Jumper	Timer Step-up energizes coil on 4th or 5th step.
L-1-C	17-H	Brown-White Jumper Jumper	Switches feed line from Spot Disc to Extra Ball Step-up.
L-2-A	12-E	Black-Yellow Jumper	Completes circuit to Each Card Scores Relays A" & "B".
L-3-B	6-E	Blue-Red Jumper	Break switch for this relay.
R-1-A	14-B	Gray-Red Jumper	Completes feed to Scoring circuit.
R-2-A	7-D	Yellow-Black Black-Red	Completes circuit to Ball Lift motor on Extra Ball play.
R-3-B	4-A	Jumper Blue-White	Stops "Select Now" light flashing.

Switch	Diagram Location	Wire Color	Operation
5th Ball Relay "B" Coil	6-E	Jumper Jumper	Timer Step-up energizes coil on 4th or 5th step.
L-1-C	9-B	Orange-White Jumper Black-Green	Switches Timer Step-up pulse circuit from Ball Lift motor switch #1 to Control Unit series switches.
L-2-A	8-F	White-Orange Jumper	Completes circuit for Selected Number.
L-3-B	6-E	Jumper Jumper	Break Switch for this relay.
L-4-B	0-C	Jumper Jumper	Runs motors when selection feature B tripped
R-1-A	2-D	71-50 Jumper	Completes circuit for Extra Ball Push Button relay.
R-2-A	16-G	Gray-Black Jumper	Completes feed to Extra Ball run circuit.
R-3-B	18-D	Jumper Gray-Red	Breaks circuit to Selector Release coil.
After 4th Ball Coil	20-F	Jumper Jumper	Spot Disc energizes coil thru switch #2-L on Selection Feature Relay "A".
1-C	8-A	Gray-White Orange-Green Green-White	Switches "Before 4th Ball" to "Before 5th Ball" panel light.
2-B	4-B	Blue-Black Jumper	Breaks circuit from Timer Step-up to flash "Select Now" after 4th ball is shot.
3-B	6-C	Red-Black Brown-White	Opens circuit to "5th Ball Relays" until the 4th Ball is shot.

Selection Feature "A" Coil	20-F	Jumper Blue-Yellow	Spot Disc energizes coil.
L-1-A	4-B	Jumper Blue-Yellow	Completes circuit to flash "Select Now" panel.
L-2-A	20-G	Blue-White Jumper	Completes circuit to "After 4th Ball Relay" coil.
R-1-A	10-A	Orange-Black Jumper	Completes circuit to "Selection Feature Step-up" to light selection numbers.
R-2-B	17-H	Yellow-Blue Brown-Red	Controls feed line to #3 Mixer for advancing Score Step-up.
Selection Feature "B" Coil	20-F	Jumper Jumper	Spot Disc energizes coil.
L-1-A	18-C	Jumper Jumper	Completes circuit to Selector Release coil thru switch 3-R, 5th Ball Relay "B"
L-2-A	8-F	Jumper Yellow-Green	Completes circuit to Selector Disc, feed line for red lights.
R-1-A	21-F	Yellow-Black Green-Black	Completes circuit to Selection Feature Step-up coil from Spot Disc.
R-2-A	21-F	Yellow-Red Jumper	Completes run circuit to Selection Feature Step-up.

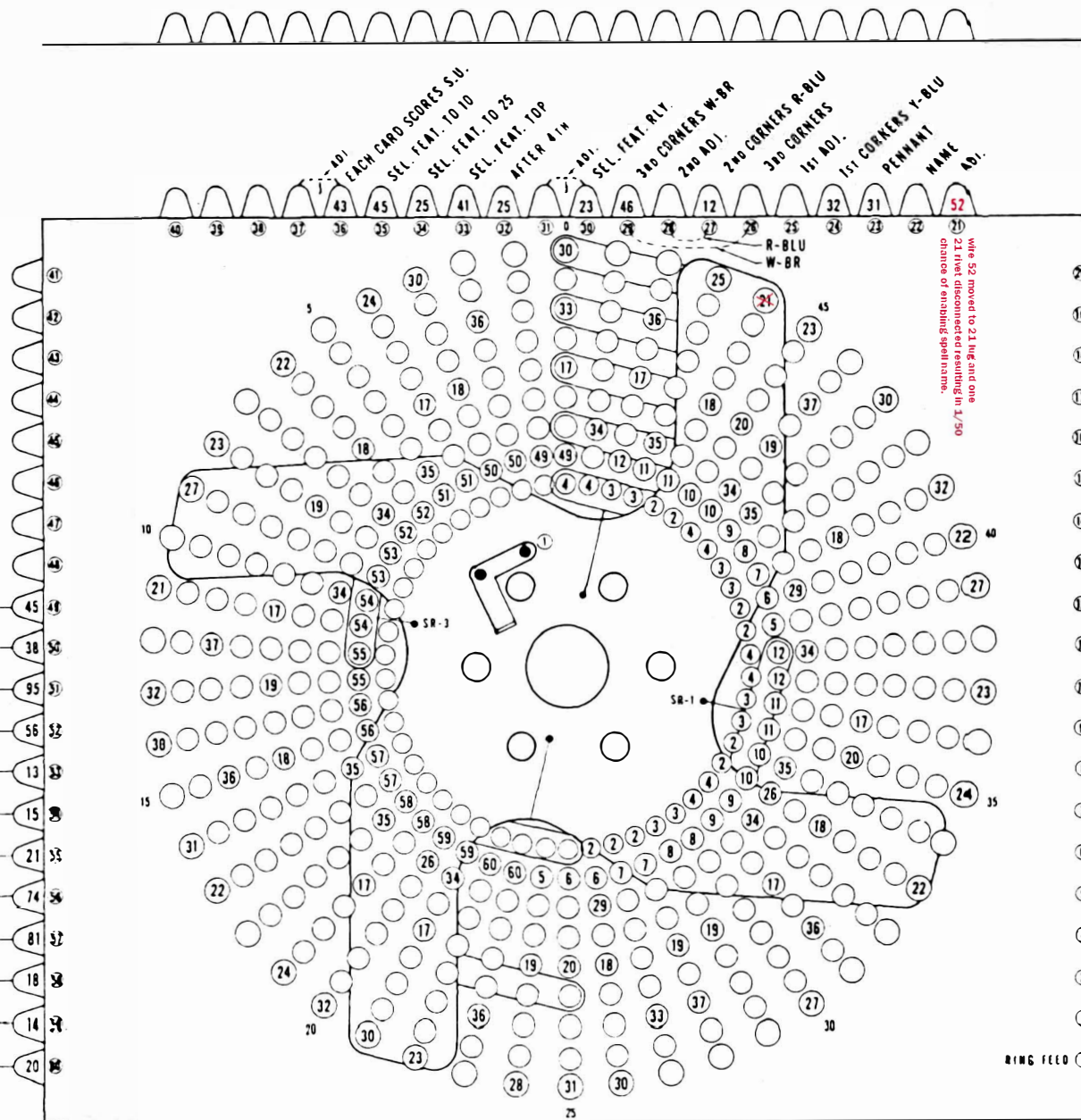
Switch	Diagram Location	Wire Color	Operation
Name Relay Coil	19-F	Jumper White-Blue	Spot Disc energizes coil.
L-1-A	10-A	Gray-White Jumper	Lights "Lite-A-Name" panel.
L-2-A	15-A	Orange-Black Jumper	Completes circuit to Playfield Name Rollover indicator lites.
L-3-B	17-C	Black-White Yellow-Green	Controls intermediate step pulse to Name Step-up coil.
R-1-A	17-C	Yellow-Red Jumper	Completes feed line from Right Rollover switch to Name Step-up Disc.
R-2-A	17-C	Jumper Brown-Yellow	Completes feed line from Left Rollover switch to Name step-up Disc.
5-8 Relay Coil	17-E	Jumper Jumper	Left Rollover switch energizes coil thru switch #3 on Pennant relay.
1-A	3-F	White-Brown Jumper	Lights #5 on 1st and 2nd Card.
2-A	4-F	Yellow-Red Jumper	Lights #8 on 1st and 2nd Card.
3-B	17-E	Jumper Jumper	Break switch for this relay.
2-15 Relay Coil	17-E	Jumper Jumper	Right Rollover switch energizes coil thru switch #2 on Fennant relay.
1-A	2-F	White-Green Jumper	Lights #2 on 1st and 2nd Card.
2-A	L-F	Red-White Jumper	Lights #15 on 1st and 2nd Card.
3-B	17-E	Jumper Jumper	Break Switch for this relay.

Switch	Diagram Location	Wire Color	Operation
Pennant Coil	19-F	Yellow-Red Jumper	Spot Disc energizes coil.
1-A	10-A	Green-White Jumper	Lights Pennant on backglass & Playfield Rollover lights.
2-A	17-D	Red-Yellow Jumper	Completes circuit to trip 2-15 relay and next letter if Name Relay is tripped.
3-A	17-D	Blue-White Jumper	Completes circuit to trip 5-8 relay and next letter if Name Relay is tripped.
Tilt Coil	8-D	Green Jumper	Lock relay, Shakeproof Tilts, Pendulum Tilt and Timer Step-up switch, energize coil.
L-1-B	2-D	Jumper Orange-Black	Breaks circuit to Extra Ball trip relay.
L-2-B	8-F	Red Black	Breaks 50 volt circuits when this relay is tripped.
L-3-B	O-D	Red) 110 V. Green Plastic	Breaks feed to Control Unit & Mixer Unit motors 110 volts.
R-1-C	2-A	White-Black Red-Yellow-White White-Green	Breaks feed line to all Feature Lights & lights Tilt panel - 6 volts.
R-2-A	6-B	Green-Yellow Yellow	Runs Shuffle motor to Zero position if relay is tripped with Shuffleboard in UP position.
R-3-B	1-H	Gray Gray-Black	Breaks 17 volt.circuits when this relay is tripped.



SPOT AND FEATURE
FLASH CIRCUIT,
ROW 2, FED BY
RINGS 1 AND 3

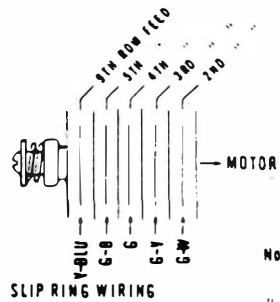
- PENNANT — 45
- EACH CARD SCORE — 38
- LITE-A-NAME — 95
- R. 4 CORNERS — 56
- No. 25 — 13
- No. 10 — 15
- No. 16 — 21
- No. 22 — 74
- 3rd ARROW LITES — 81
- 2nd ARROW LITES — 18
- 1st ARROW LITES — 14
- L. 4 CORNERS — 20



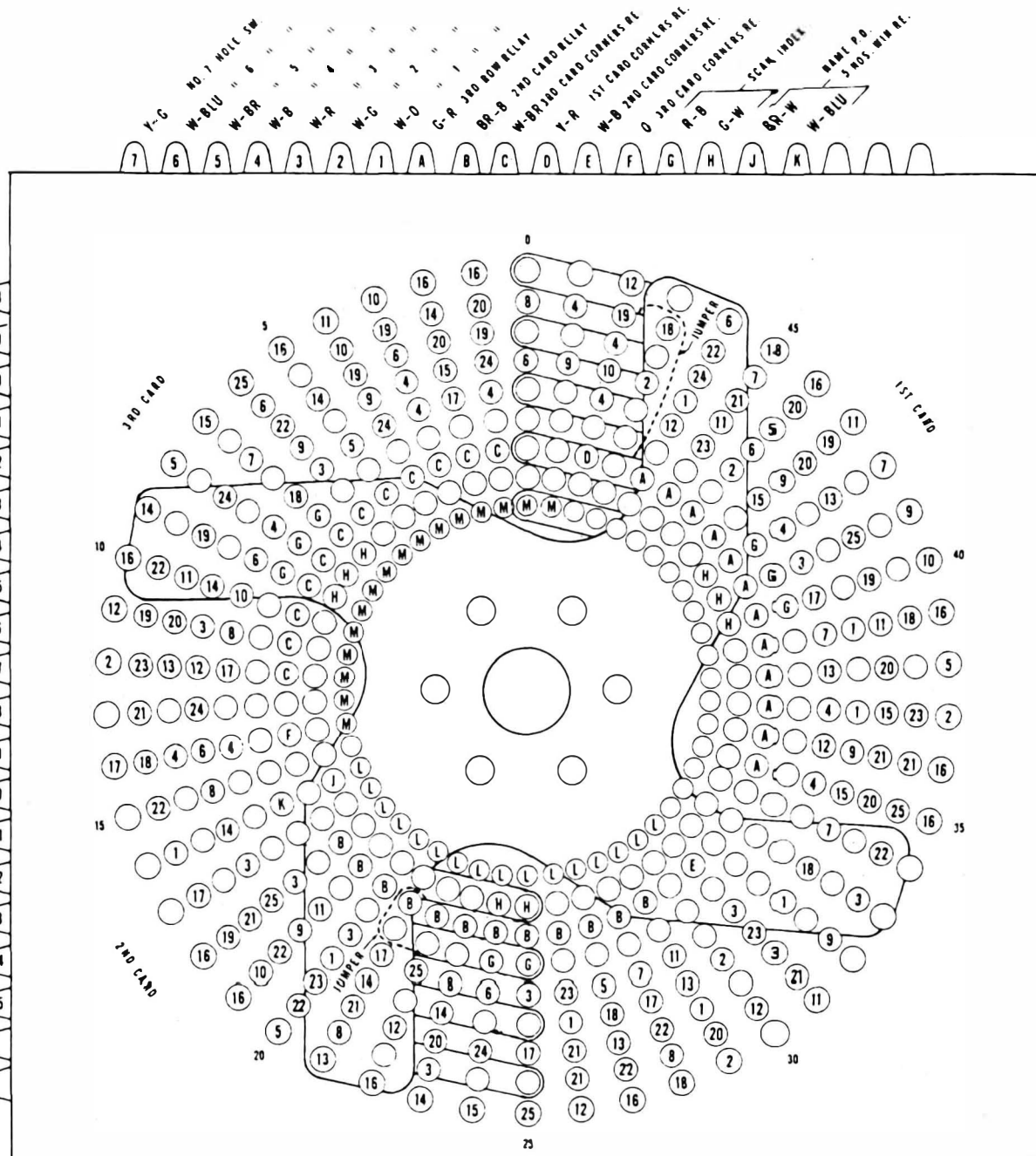
- POS. 25-35-45
3rd E.B. RUN
 - POS. 8-13-24-28-29-44
2nd E.B. RUN
 - POS. 3-6-15-26-33-41-46
1st E.B. RUN
 - POS. 0-4-11-19-21
31-36-48
- ROW 5
No. 8
SLIP RING
FEED
- 1st
 - 2nd
 - 3rd
 - 4th
 - 5th
 - 6th
 - 7th
 - 8th
- SCORE FLASH LITES, ROW 2,
FED BY RINGS 1 AND 3
- 1st E.B.
 - 2nd E.B.
 - 3rd E.B.
 - E.B. FEED
- E.B. FLASH LITES
- RING FEED

Spotting Disc - wiper or button side

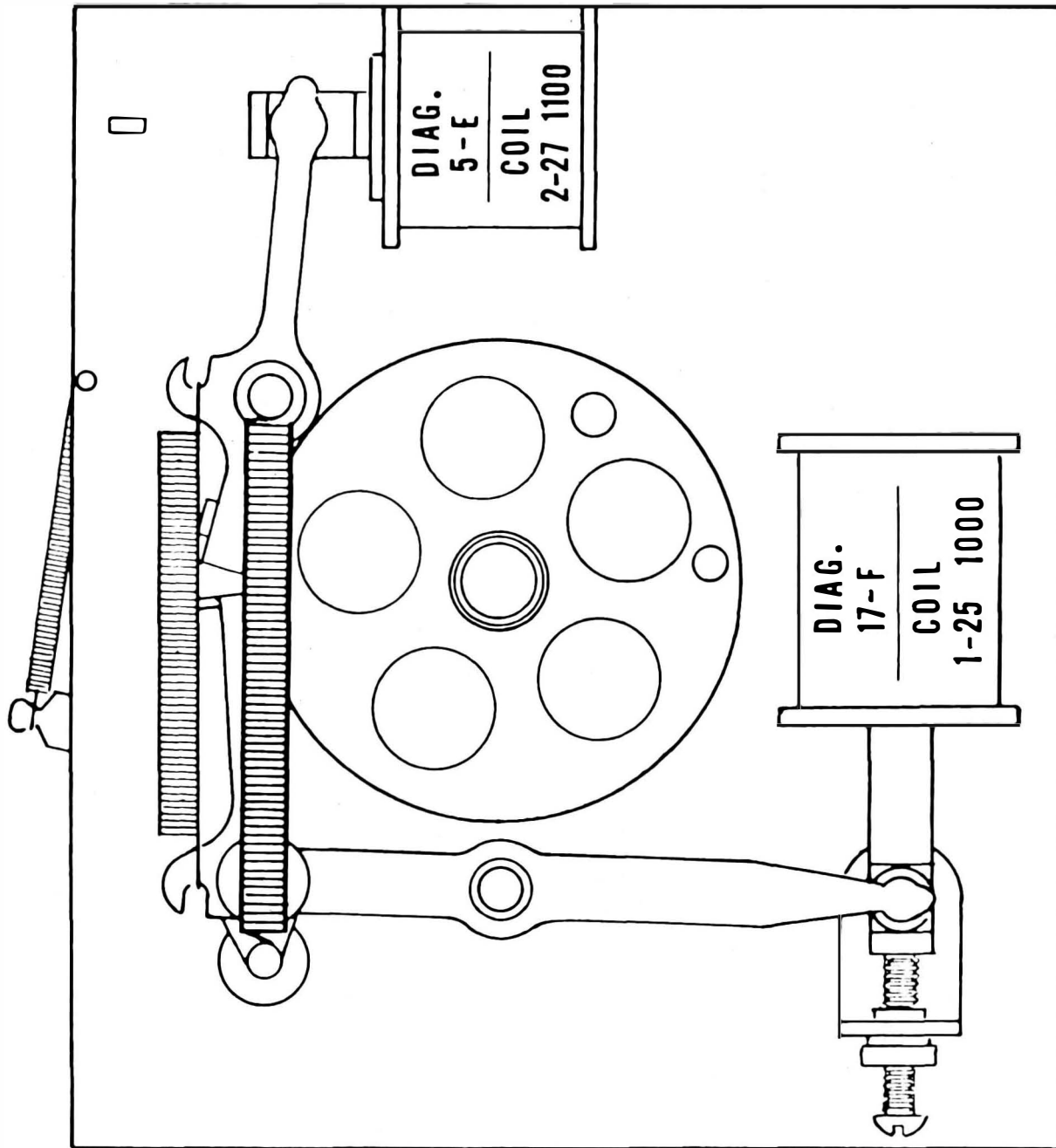
Row 4-6-8 not used



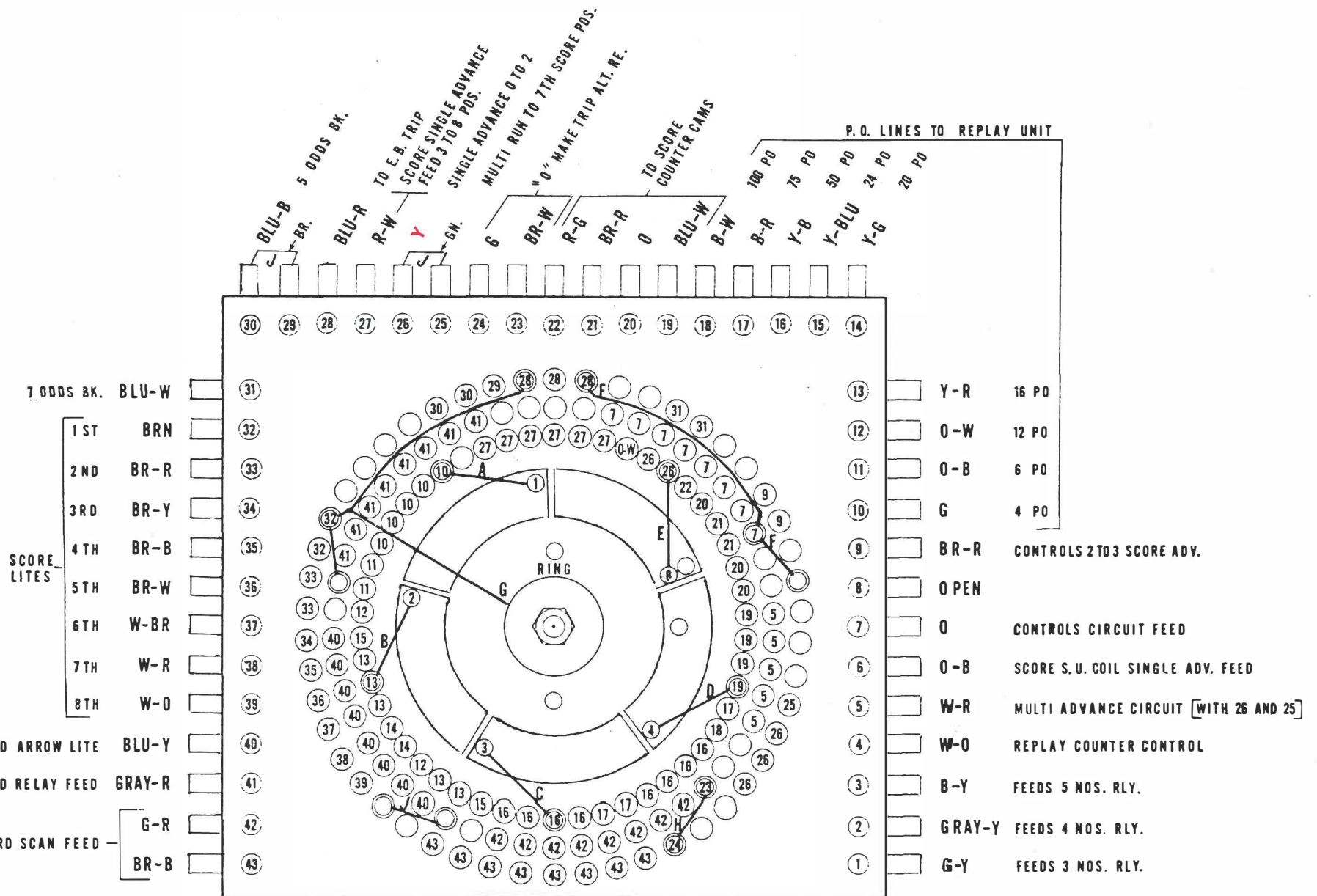
No. 8 HOLE SW.	Y-R	8
9	Y-B	9
10	O	10
11	O-W	11
12	O-R	12
13	O-G	13
14	O-B	14
15	R-W	15
16	R-G	16
17	R-Y	17
18	R-BLU	18
19	R-B	19
20	BLU	20
21	BLU-W	21
22	BLU-R	22
23	BLU-Y	23
24	BLU-B	24
25	G-B	25



Scan Disc - wiper or button side



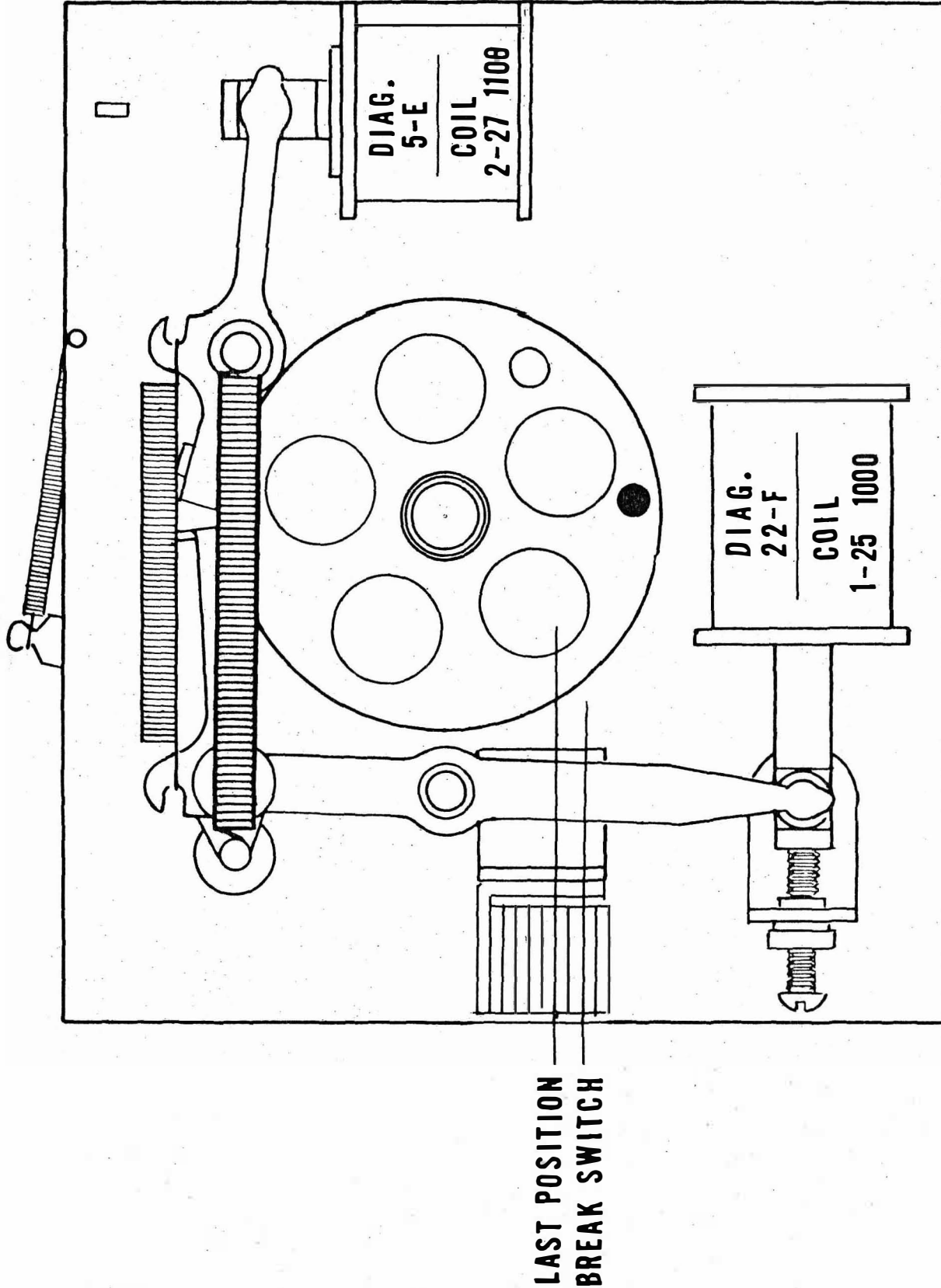
Score Step Up Unit



USE PC-10 WIPER PLATE

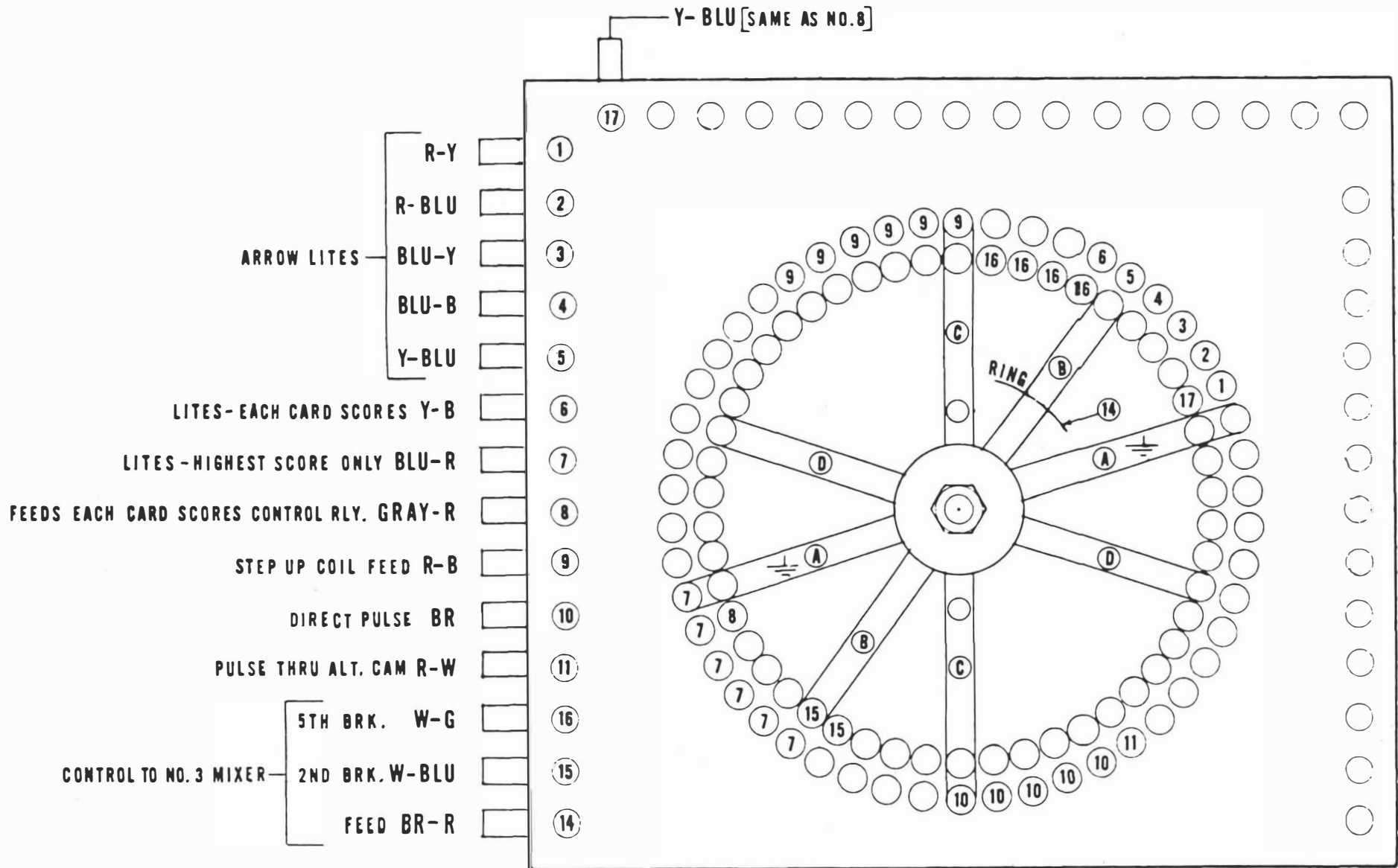
Score Unit

Wiper or Button Side



Each Card Scores Step Up Unit

Note: wipers permanently positioned at top step. Unit stepping disabled.

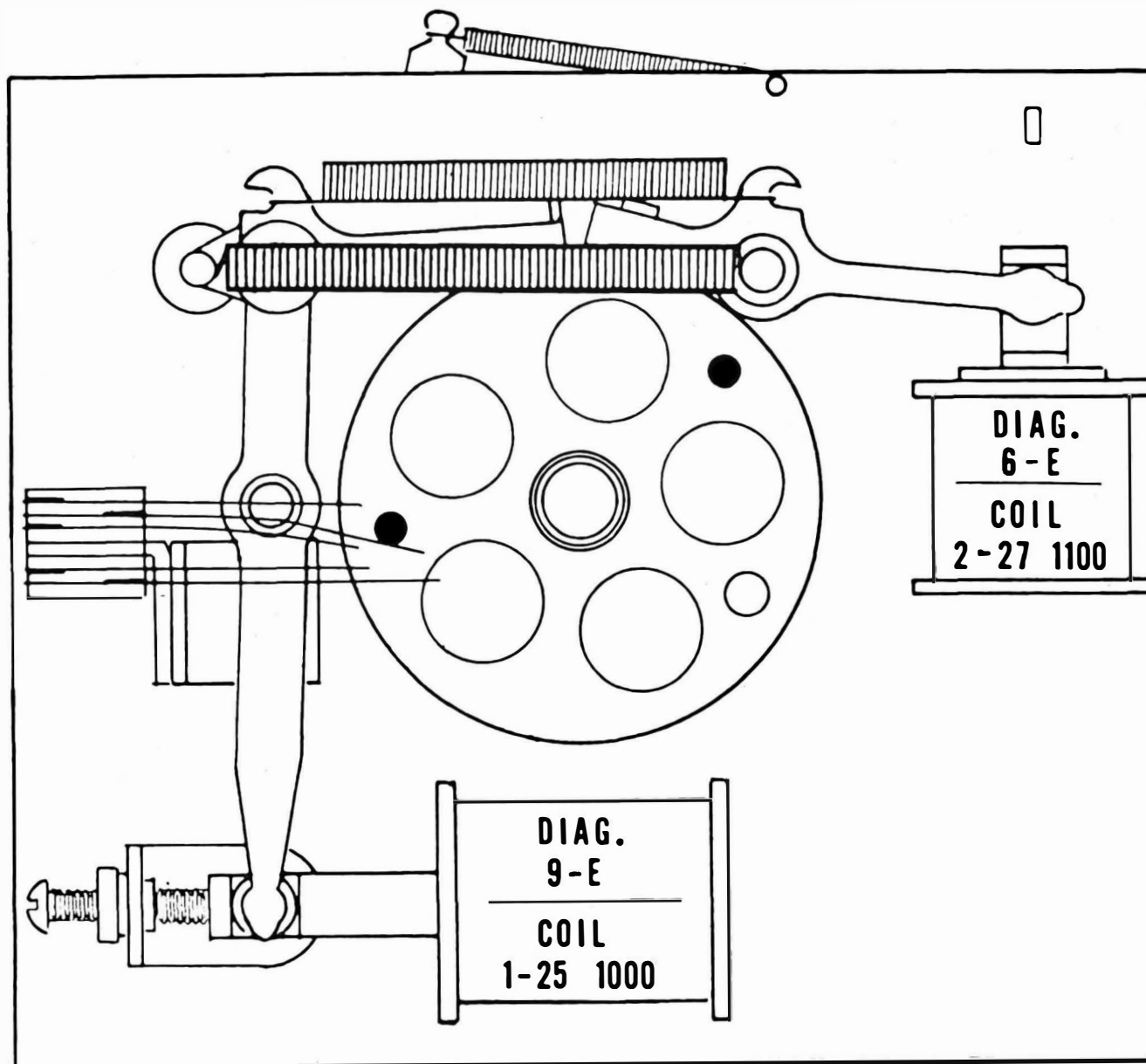


Ⓑ WIPERS TO RING
 ⊥ GROUND TO FRAME

Each Card Scores Step Up

Wiper or Button Side

CONTROLS FEED
TO BALL LIFT
MOTOR
LAST POSITION
TILTS MACHINE



Timer Step Up Unit

FLASH AFTER 4TH BALL FEEDS "SELECT NOW" LITE
 FLASH BEFORE 4TH BALL

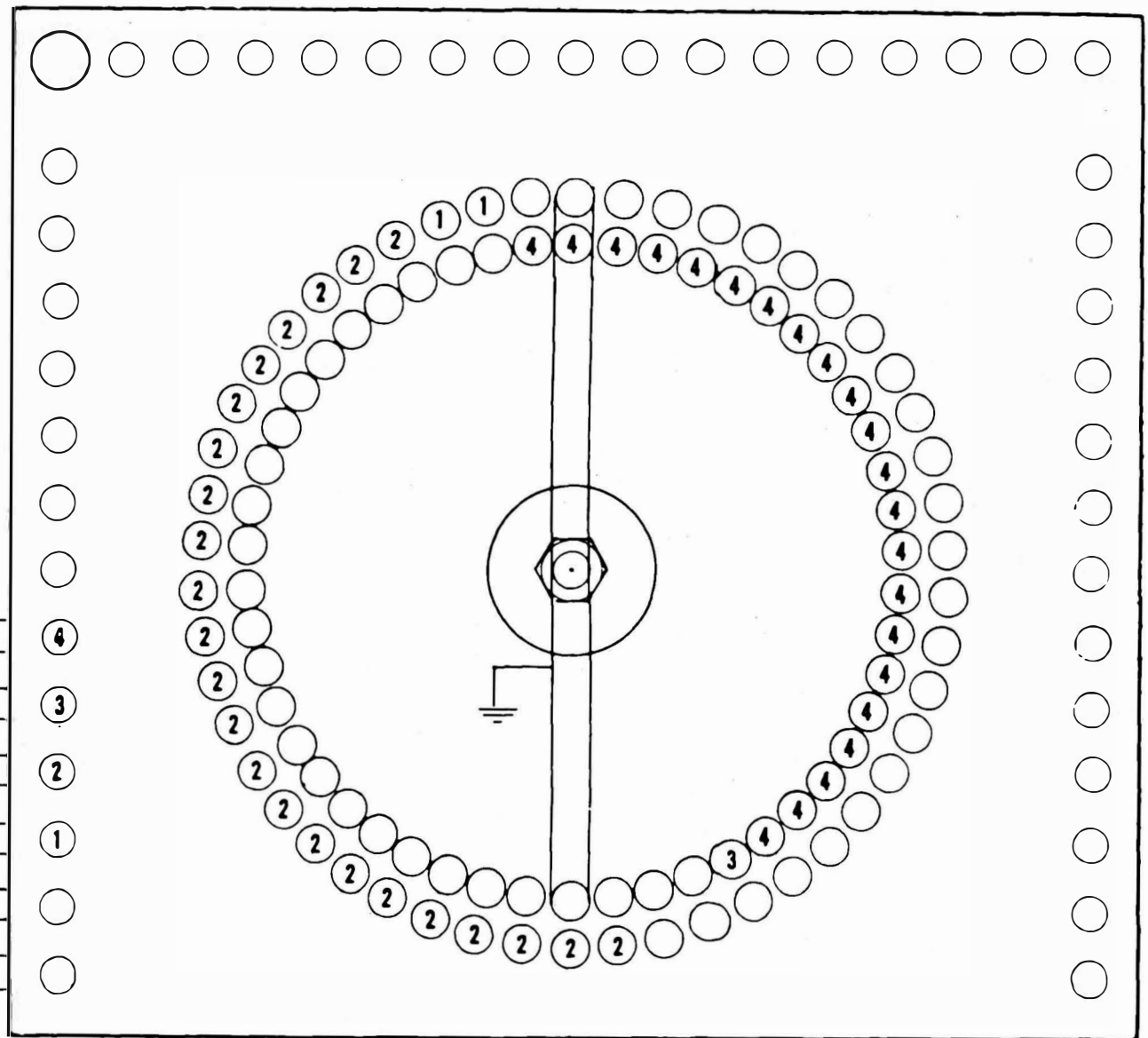
BLU-Y

BLU-B

FEEDS 5TH BALL RELAYS R-B

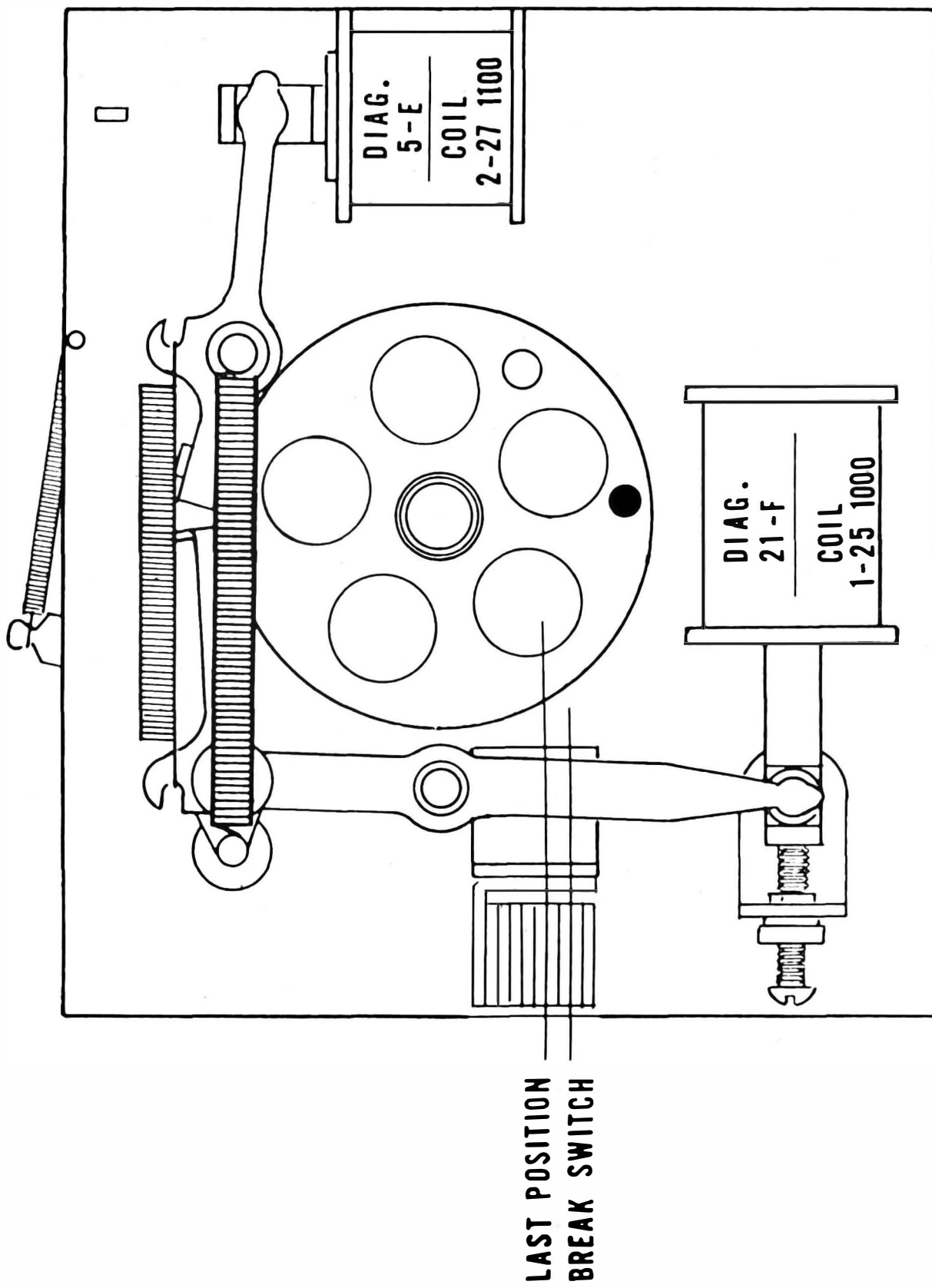
FEEDS SHUFFLE MOTOR G-Y

EMPTY

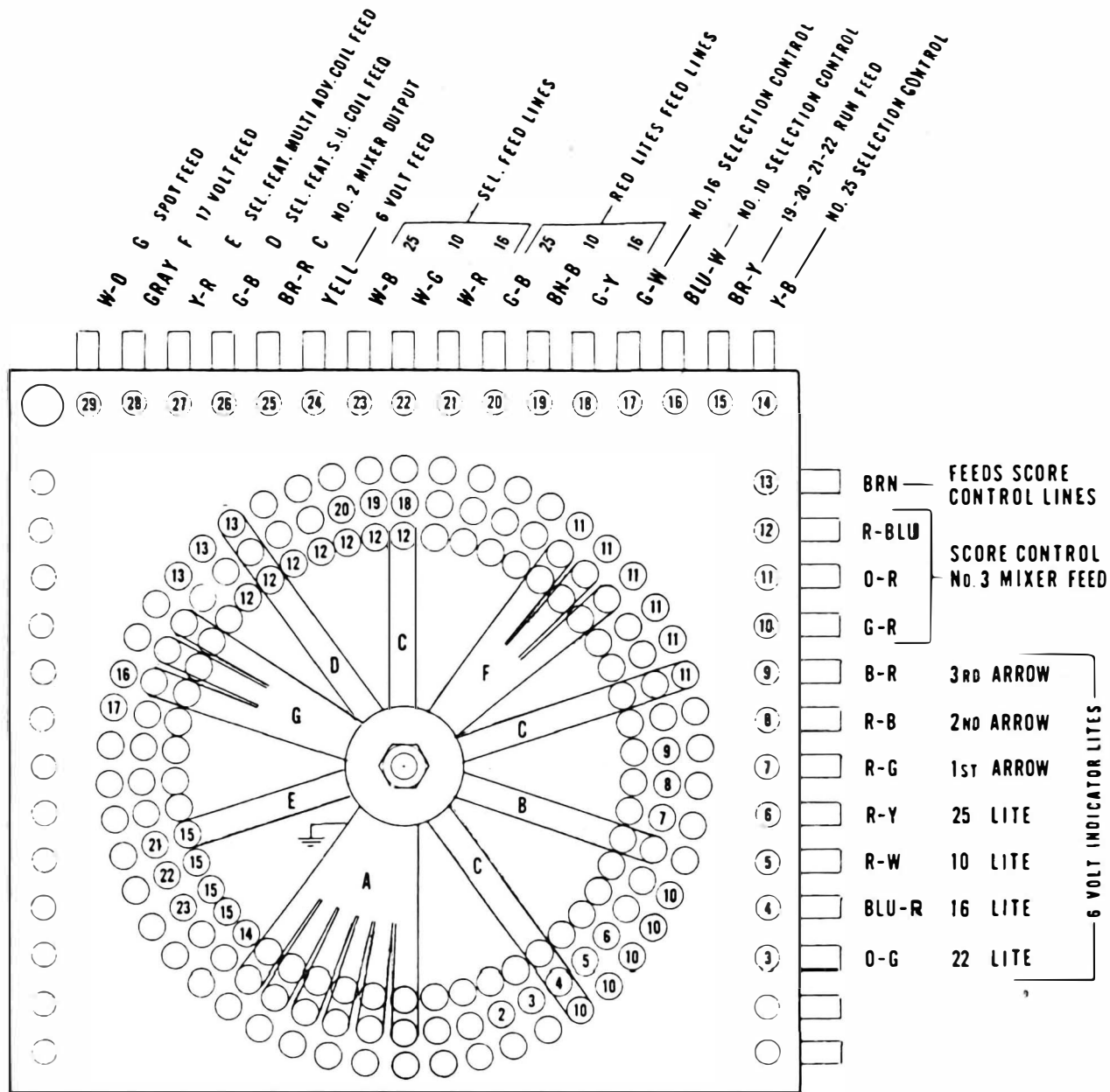


Timer Step Up

Wiper or Button Side



Selection Feature Step Up Unit

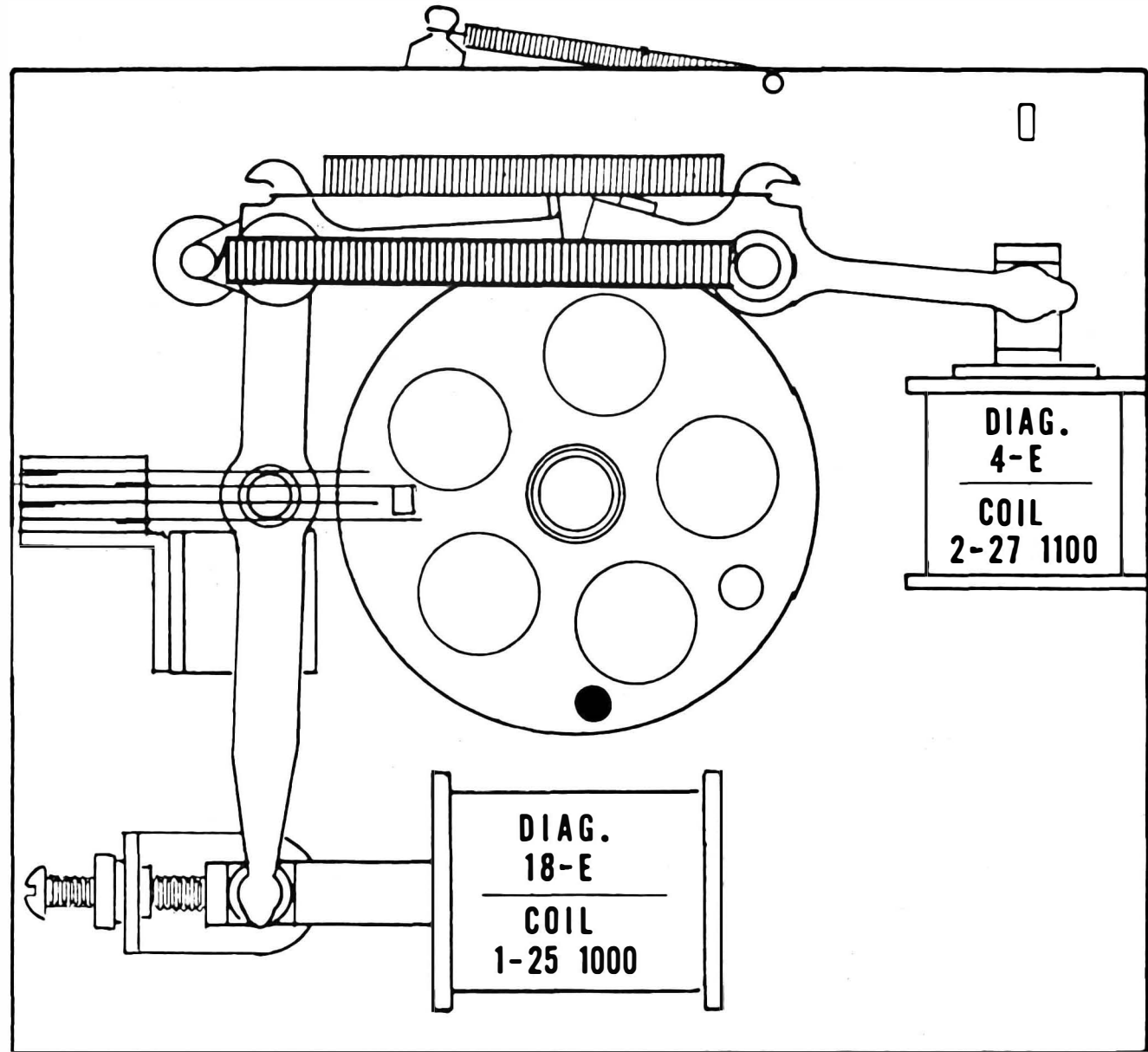


Selection Feature Step Up

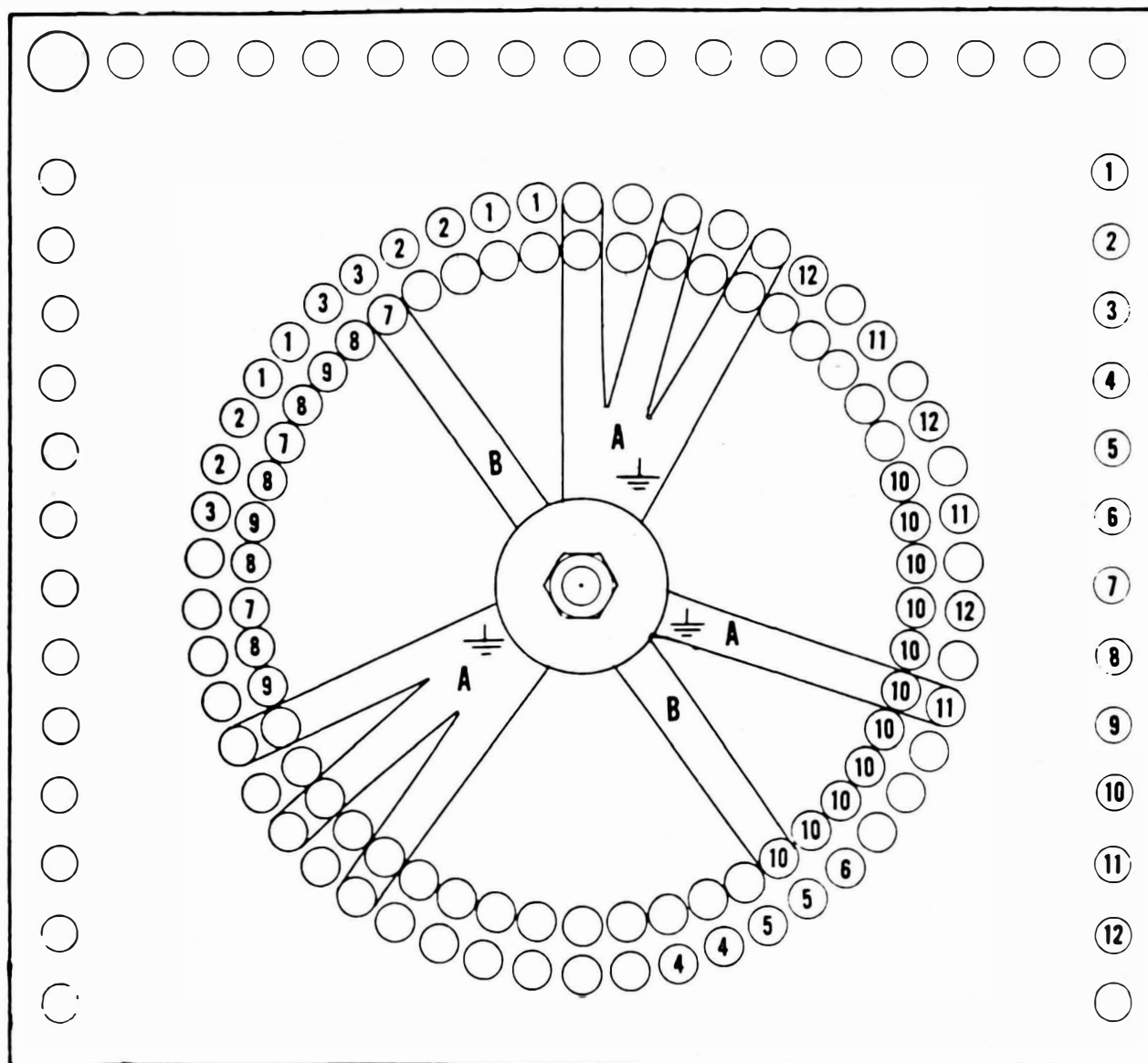
Wiper or Button Side

SWITCH No. 2
COMPLETES
RESET
CIRCUIT

SWITCH No. 1
COMPLETES
FEED TO 5 Nos.
WIN RELAY



Name Step Up Unit



1	B-W — H	LITES
2	B-Y — A	
3	B-R — T	
4	GRAY-B — T	
5	GRAY-W — A	
6	GRAY-Y — N	
7	BR-Y — LEFT R.O. SW.	
8	Y-G — NAME RLY. SW.	
9	Y-R — RITE R.O. SW.	
10	GRAY-R — NAME S.U. COIL FEED	
11	B-G — LEFT R.O. LITE	
12	G-B — RITE R.O. LITE	

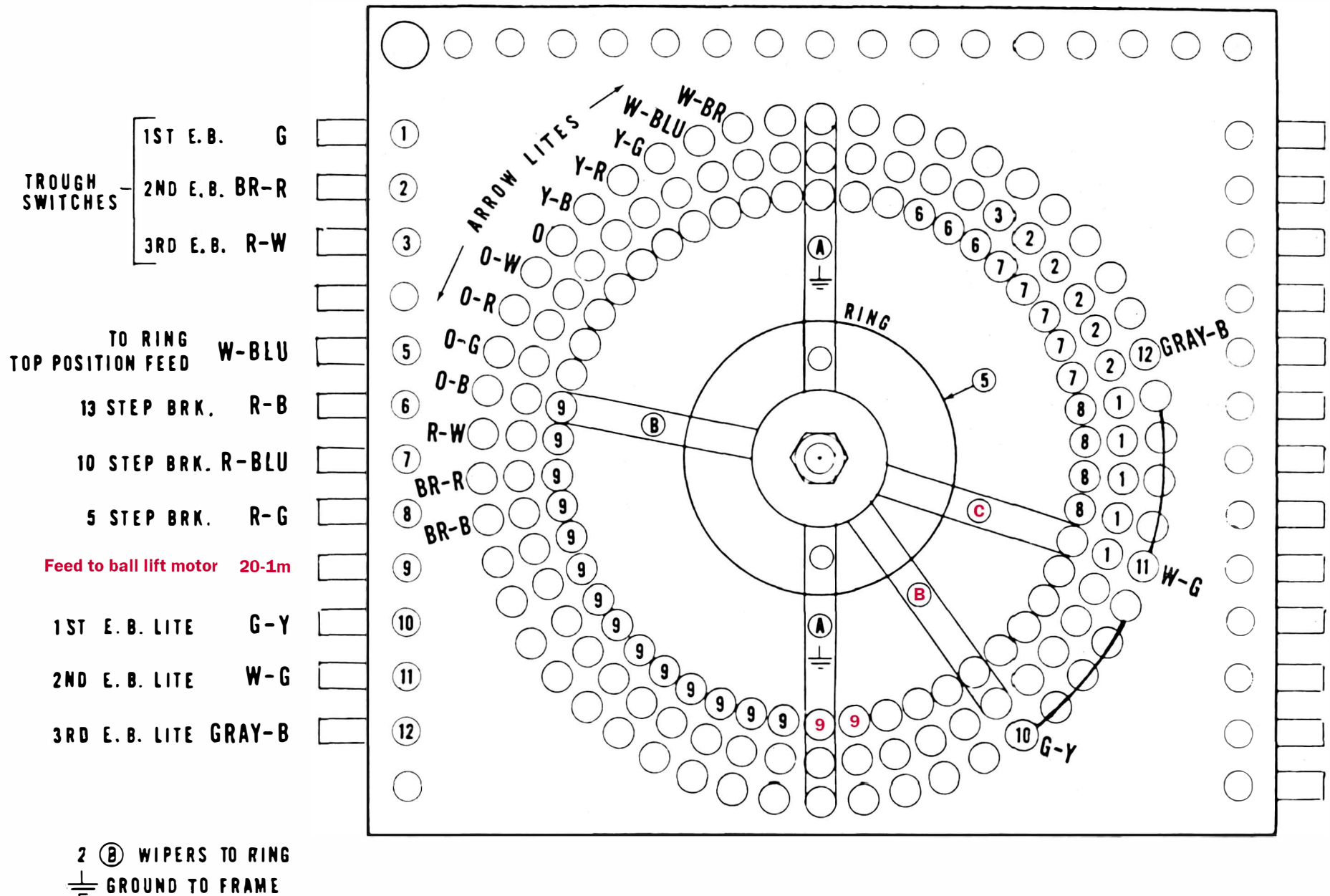
Name Step Up Unit

Wiper or Button Side

YELLOW
 GROUND TO FRAME

Extra Ball Step Up Unit

Note: wipers have been restacked on hub. Wiper C is not used and is isolated on hub.



Extra Ball Step Up

Wiper or Button Side