GENERAL INSTRUCTIONS FOR SHUFFLE ALLEY

1. INSTALLATION: See Installation Instructions. After game is assembled, plug in connection jacks tightly. Plug line cord into A.C. ONLY, 60 cycles, 115 volts. The power to this game is controlled by a toggle switch which is located under the front part of the cabinet.

2. In low voltage areas (105 Volts or less) an additional boost in the output voltage of the transformer can be obtained by switching Rotary Adjustment Jack to “LOW”.

3. To prevent abuse and cheating of this game, a vibration switch is installed on the back-door. Instructions for sensitivity are located adjacent to the switch.

4. To make the playfield rollover switches accessible for servicing, remove two screws from the access panel located directly below the switches and pull panel forward.

5. To change lite bulbs in hood insert or to work on pin panel assembly; open back door and remove (2) screws (shipping screws) from top rear of pin panel. Now remove screw from each side of bottom member of hood frame and slide pin panel forward.
To remove pin panel completely, disconnect pin panel jacks.

6. Two rows of relays at bottom of back door are mounted to a hinged board. For easy service and adjustment, loosen wing nuts holding brackets at each side of board, pick board up 90 degrees and secure with stay arm.

7. All (6) Strike-Spare Units are mounted on a panel in bottom section of back-box. Entire panel can be taken out by removing (4) bolts.

8. To remove back glass, pull back on lock brackets at inside top of back box. From front of game, lift glass up and out.

9. The equipment panel (insert) is hinged for better servicing.

10. This game has multiple methods of play. Press the button on the front of the cabinet, at the start of the game, to select the type of scoring desired.

A. REGULATION: Scoring is identical to official bowling.

B. ONE SHOT: Each player shoots only once in every frame. If strike is not made, game will score pin count. Strikes will score as indicated by hood lites. Frames 1, 2 and 3 score 800. Frames 4 and 5 score 600. Frame 6 scores 500. Frame 7 scores 400. Frames 8, 9 and 10 score 300.

C. ROTO: Scores 90 for a strike, 60 for a spare. If a strike is made, same player shoots to stop flashing lites. Strikes and spares score as indicated.

D. STRIKES 90: This game scores 90 for a strike, 60 for a spare. Player continues to shoot as long as he makes a strike. A spare, or blow, will advance to next players turn, or to next frame.

E. FLASH SCORING: Strike and spare scores are indicated by flashing lites. Lites stop flashing when the pins are hit on first shot.
WARRANTY

THE MOTORS IN ALL NEW WILLIAMS PRODUCTS ARE UN-CONDITIONALLY GUARANTEED FOR 6 MONTHS FROM DATE OF PURCHASE.

ANY DEFECTIVE MOTORS RETURNED DURING THE WARRANTY PERIOD WILL BE REPLACED FREE OF CHARGE BY YOUR WILLIAMS DISTRIBUTOR.

IMPORTANT NOTICE

WHEN ORDERING PARTS ALWAYS SPECIFY NAME OF UNIT, GAME AND SERIAL NUMBER, IN ADDITION TO A CLEAR DESCRIPTION OF THE PART AND PART NUMBER IF POSSIBLE.

UNIT PARTS LIST

<table>
<thead>
<tr>
<th>UNIT NAME</th>
<th>CONTACT DISC</th>
<th>WIPER ASSEMBLY</th>
<th>RATCHET GEAR ASSEMBLY</th>
<th>MOTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRIKE SPARE</td>
<td>C-6414</td>
<td>A-6443-3</td>
<td>A-6402-5</td>
<td>Score (60)</td>
</tr>
<tr>
<td>FRAME CONTROL</td>
<td>C-6417</td>
<td>B-7456-31</td>
<td>A-6402A-11</td>
<td>14A-7765</td>
</tr>
<tr>
<td>PLAYER UP</td>
<td>C-6417</td>
<td>C-6521-4</td>
<td>A-6404-5</td>
<td>SCORE (50)</td>
</tr>
<tr>
<td>GAME SELECTION</td>
<td>C-6415</td>
<td></td>
<td></td>
<td>14A-7776</td>
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<tr>
<td>EXTRA SHOTS</td>
<td>C-6414</td>
<td>G-6521</td>
<td>A-6403</td>
<td>PIN RESET (60)</td>
</tr>
<tr>
<td>COIN</td>
<td>B-7253-1</td>
<td>A-6443-4</td>
<td>A-6402A-5</td>
<td>14A-7869</td>
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<tr>
<td>1-9</td>
<td></td>
<td></td>
<td>3C-7272</td>
<td>PIN RESET (50)</td>
</tr>
<tr>
<td>TENS</td>
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<td></td>
<td>3C-7272</td>
<td>14A-7870</td>
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<tr>
<td>HUNDREDS</td>
<td></td>
<td></td>
<td>3C-7272</td>
<td>FLASH (60C)</td>
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<td>THOUSANDS</td>
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<td></td>
<td>3C-7272</td>
<td>14A-7766</td>
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<tr>
<td>ROTO</td>
<td></td>
<td></td>
<td>3C-7272</td>
<td>FLASH (500)</td>
</tr>
<tr>
<td>SCORE MOTOR</td>
<td>C-6413-9</td>
<td>C-6519-7</td>
<td>3C-7272</td>
<td>14A-7775</td>
</tr>
<tr>
<td>FLASH MOTOR</td>
<td>C-6413-9</td>
<td>B-7456-4</td>
<td>B-6833</td>
<td></td>
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</table>

2
<table>
<thead>
<tr>
<th>COIL NUMBER</th>
<th>DESCRIPTION</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 A-7765</td>
<td>SCORE MOTOR</td>
<td>BACK DOOR</td>
</tr>
<tr>
<td>14 A-7768</td>
<td>FLASH MOTOR</td>
<td>BACK DOOR</td>
</tr>
<tr>
<td>14 A-7868</td>
<td>PIN RESET MOTOR</td>
<td>PIN PANEL</td>
</tr>
<tr>
<td>15 A-6775</td>
<td>TRANSFORMER</td>
<td>BACK DOOR</td>
</tr>
<tr>
<td>24 A-6597-7</td>
<td>FLUORESCENT LAMP</td>
<td>INSERT</td>
</tr>
<tr>
<td>24 A-6597-5</td>
<td>FLUORESCENT LAMP ... (2 req'd.)</td>
<td>PIN PANEL</td>
</tr>
<tr>
<td>1 B-6276</td>
<td>CASH BOX COVER</td>
<td>COIN BOX</td>
</tr>
<tr>
<td>2 6872 SA</td>
<td>COIN BOX (with door only)</td>
<td>CENTER FRONT</td>
</tr>
<tr>
<td>C 6376</td>
<td>CASH BOX</td>
<td>COIN BOX</td>
</tr>
</tbody>
</table>

**Solenoid Coils**

- A 24-975: PLAYER UP UNIT STEP UP, BACK DOOR
- A 25-1000: EXTRA SHOTS UNIT STEP UP, BACK DOOR
- B 27-1100: FRAME CONTROL UNIT STEP UP ... (6 req'd.), BACK DOOR
- B 28-1450: PIN RELEASE UNIT STEP UP, BACK DOOR
- B1-19-1600: FRAME DRUM UNIT, PIN PANEL
- C 27-1300: CHIME COIL, INSERT
- D1-24-1400: RELAY BANK RESET COIL, BACK DOOR
- F1 26P-950/250: GAME SELECTION UNIT STEP UP, BACK DOOR

**Relay Coils**

- M 31 P-1500: 1-9 SCORE RELAY, BACK DOOR
- M 31 P-1500: 10-90 SCORE RELAY, BACK DOOR
- M 31 P-1500: 100'S SCORE RELAY, BACK DOOR
- M 31 P-1500: STRIKE SPARE ADVANCE RELAY, BACK DOOR
- M 31 P-1500: ROTO RELAY, BACK DOOR
- M 31 P-1500: GAME OVER RELAY, BACK DOOR
- M 31 P-1500: STRIKE SPARE RESET RELAY, BACK DOOR
- M 31 P-1500: ROTO ADVANCE RELAY, BACK DOOR
- MX 33-2400: COIN LOCKOUT COIL, FRONT DOOR
- S 27-750: RELAY BANK COIL (#1 RELAY), RELAY BANK
- S 28-950: RELAY BANK COIL ... (15 req'd.), RELAY BANK
- XM 29-1100: COIN METER, CABINET
- Z 25 P-1400: COIN RELAY, BACK DOOR
- Z 25 P-1400: SCORE RESET RELAY ... (3 req'd.), BACK DOOR
- Z 30 P-1800: ROLLEROVER MOTOR RELAY, BACK DOOR
- Z 30 P-1800: PLAYER RESET RELAY, BACK DOOR
- Z 30 P-1800: EXTRA SHOTS RESET RELAY, BACK DOOR
- Z 30 P-1800: SCORE CONTROL RELAY, BACK DOOR
- Z 30 P-1800: SCORE MOTOR RELAY, BACK DOOR
- Z 30 P-1800: 3RD POSITION RELAY, BACK DOOR
- Z 30-1600: FLASH MOTOR RELEASE COIL, BACK DOOR
- Z 31- P-2000: ONE SHOT RELAY, BACK DOOR
- Z 31- P-2000: REAR ROLLEROVER RELAY, BACK DOOR
- Z 31- P-2000: PIN RESET RELAY, BACK DOOR
- Z 31- P-2000: REPEAT STRIKE RELAY, BACK DOOR
- Z 31- P-2000: FLASH RELAY, BACK DOOR
- Z 31- P-2000: STRIKE RELAY, BACK DOOR
- Z 31- P-2000: GAME OVER RELAY, BACK DOOR
- Z 32-2700: LOCK RELAY, BACK DOOR
INSTRUCTIONS FOR ALTERING COIN CHUTES EQUIPPED WITH A FLIP-OVER DEVICE.

FOR 1 COIN - FOR 1 PLAY OR 2 COINS - FOR 1 PLAY

FIGURE 1

"X"  "A"
"B"

FLIP-OVER LEVER

FIGURE 2

"X"  "A"
"B"

FLIP-OVER LEVER

1 COIN - FOR 1 PLAY (FIGURE 1):

Wire form "A" should be in position as shown in Figure 1. Flip-over lever should rebound from wire form "A" and return to position shown in Figure 1 every time a coin is inserted. All coins pass over the coin trip switch wire "B".

2 COINS - FOR 1 PLAY (FIGURE 2):

Wire form "A" should be in position as shown in Figure 2 (see note). Flip-over lever should alternate from side to side. 1st coin should go to cash box without actuating coin trip switch wire "B", 2nd coin should pass the coin trip switch wire "B" and returns flip-over to position as shown in Figure 2.

NOTE:

To change from 1 coin play to 2 coin play or vice versa - loosen screw "X" and move screw, bushing & wire form "A" to position as required - shown in Figure 1 position as required - shown in Figure 1 or Figure 2.

When using 1 coin for 1 play, wire form "A" should not under any circumstances be allowed to enter the "Banana" slot and cause binding of flip-over lever.
INSTRUCTIONS FOR COIN TRIP SWITCH ADJUSTMENT

WIRE SHOULD BE IN CONTACT WITH END OF CRESCENT OPENING WHEN BLADE ADJUSTMENT IS MADE.

NYLON SWITCH ACTUATOR

WIRE
CRESCENT

Long blade should be in contact with nylon switch actuator and have a maximum overtravel of 1/32.

or

Using a gram gauge, tension of long blade should not exceed 10 grams.

SWITCH ADJUSTMENT

1. For small coins, such as dimes, adjust short blade so that the ‘gap’ between the silver contacts is .045 to .055.

2. For larger & heavier coins the ‘gap’ should be .045 to .060.

3. Do not adjust ‘gap’ closer than .040.
1. 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 make-shift 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-up units, relays, etc., before adjustments are made or wires reconnected.

2. FUSES
IMPORTANT: Never replace fuses with any rating other than specified on the fuse block; this block is located adjacent to the transformer.

3. 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 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 a solvent, then apply an extremely thin coat of the special grease.

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.

SWITCH ADJUSTMENT

BEFORE ADJUSTING SWITCHES, MAKE CERTAIN THE SCREWS HOLDING THE SWITCH STACKS ARE DOWN TIGHTLY. BAKELITE SPACERS IN THE SWITCH STACKS, DUE TO EXCESSIVE MOISTURE, HAVE OCCASIONALLY SHRUNK BY DRYING OUT, CAUSING POOR ADJUSTMENT.
WHAT TO DO IF:

1. Lights are out, game is in-operative:
   a. Check A.C. cord and plug for breaks, cuts or other damage.
   b. Check fuses, located on back door.
   c. Check master switch, located under the front end of the cabinet.
   d. Check plugs and jacks for proper installation.

2. Lights are on, game is in-operative:
   a. Check the 15 Amp fuse, heavy Black wire.
   b. Check plugs and jacks.

3. Lights are out, game operates:
   a. Check the 15 Amp fuses, heavy White wire and heavy Orange wire.
   b. Check plugs and jacks.
   c. Check light bulbs.

4. Coin is accepted, game is in-operative:
   a. Check Drop Chute Switch.
   b. Check coin Relay Coil and Switches.
   c. Check Start Relay Switch, Black-White to Green-Yellow-White.
   d. Check switch on Score Motor Relay, Red-White and Green-Yellow-White.
   e. Check front door Slam Switch.
   f. Check Coin Chute adjustment jack.

5. Drum Units fail to reset at start of game:
   a. Check switches on the 'A', 'B', & 'C' Reset Relays.
   b. Check Zero Position Switches on the Drum Units.

6. Drum Units fail to score properly:
   a. Check 1-9, 10-90 or 100's Score relay Switches.
   b. Check Wiper Fingers on Score Motor Disc.
   c. Check 9th Position Switch on Drums.

7. Game Selection S.U. does not advance to 'Regulation' in reset cycle:
   a. Check Game Selection S.U. Coil, Gray-Red and Black.
   b. Check switch on 'B' Reset Relay, Gray-Red and Red-Black.
   c. Check Game Selection disc., Red-Black. Also, snow-shoe wipers on that unit.

8. Player gets only one shot per frame:
   a. Check 1st & 2nd Ball Relays.
   b. Check Score Motor for over-riding.

9. Bowling Pins do not reset:
   a. Check switch on Pin Reset Relay, Yellow and Gray-Black.
   b. Check Zero Position Switch on Pin Reset Motor.

10. Game shows 'Game Over' in 1st Frame:
    a. Check Lock Relay.
    b. Check switches on the Lock Relay.
    c. Check Tilt Switch for proper adjustment.
    d. Check Frame Control S.U. Unit for proper resetting.
ROTO S.U. UNIT

THIS UNIT ADVANCES ONE STEP EACH TIME THE ROTO ADVANCE RELAY IS ENERGIZED. ITS FUNCTION IS TO ALLOW THE SAME PLAYER TO SHOOT AGAIN FOR "FLASH" SCORING.

(A-4)
ENERGIZES S.U. COIL ON THIS UNIT, THRU SWITCH ON START RELAY.

W-O
GRAY-O

Y-R
GRAY-G

(E-7)
TO "BOWL AGAIN" LITE

(A-5)
IN CIRCUIT TO 10-90 SCORE RELAY — ALSO ENERGIZES FLASH RELAY.

(A-4)
ENERGIZES ROTO RELAY, THRU SWITCH ON STRIKE RELAY—ALSO RUNS FLASH MOTOR.
LUBRICATION:

Do not put lubricant on drive armature.

Proper lubrication will insure a longer lasting and better operating unit.

Points to be lubricated are the three posts on which the nylon parts to rotate, each tooth of the ratchet, also ratchet cam and top of drive pawl - bracket, indicated by *.

SWITCH ADJUSTMENT:

AT "O" OR INDEX POSITION BOTH SWITCHES ARE OPEN AS SHOWN.

AT 1st TO 8th POSITION TOP SWITCH IS CLOSED. BOTTOM SWITCH REMAINS OPEN.

AT 9th POSITION BOTH SWITCHES ARE CLOSED AS SHOWN.
WIPER FINGERS:
NO. 1-GROUNDED
NO. 3 & 6 INSULATED
NO. 2 & 5 INSULATED
NO. 4 & 7 INSULATED

SCORE MOTOR DISC
WITH SCORE MOTOR CAM AT "O" POSITION AND CAM RIDER
RESTING AT BEGINNING OF DWELL, WIPER ASSEMBLY SHOULD
NOW BE SET SO THAT LONG FINGER IS LINED UP WITH
INDEX POINT AS SHOWN.

VIEW LOOKING AT
WIPER FINGERS
<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

**Score Motor Disc**
COIN DRUM UNIT DISC

THIS IS A CONTINUOUS STEPPING UNIT. IT ADVANCES TO ZERO POSITION DURING THE RESET CYCLE OF A NEW GAME. IT THEN ADVANCES ONE STEP EACH TIME THE COIN RELAY IS PULSED, EXCEPT IN MULTIPLE PLAY, WHERE IT ADVANCES EACH TIME THE CREDIT UNIT RESET END-OF-STROKE SWITCH IS MADE.

VIEW LOOKING AT WIPER FINGER SIDE, WITH WIPER IN 9TH POSITION.
EXTRA SHOTS UNIT DISC

This unit operates in the 10th frame in "Regulation" and "Flash" games only. It advances two times per strike and once on a spare. The function of this unit is to give extra shots to the player.

Diagram Location

- O - B (D-11) Runs score motor thru SW. on 1st ball relay or zero position cam sw. on score motor
- W - G (E-7) Spare lite
- W - R (E-7) 2nd strike lite
- W - O (E-7) 1st strike lite
- B - W (D-12) To 'V' rivet on score motor disc
- O - G (D-12) To switch on 2nd ball relay
- G - Y (D-12) To switch on 1-10 relay
- R - B (D-12) To switch on score control relay
- Y - R (E-7) 'Bowl again' lite

Five wiper fingers grounded to yellow.

View looking at wiper finger side and with wiper in reset, or zero position.
## PLAYER UP UNIT DISC

<table>
<thead>
<tr>
<th>LUG</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>TO PLAYER UP LITES</td>
</tr>
<tr>
<td>2</td>
<td>IN CIRCUIT TO ENERGIZE PLAYER RESET RELAY.</td>
</tr>
<tr>
<td>3</td>
<td>IN CIRCUIT TO ENERGIZE GAME SELECTION S.U. COIL.</td>
</tr>
<tr>
<td>4</td>
<td>TO 1000 DRUM S.U. COILS, THRU 9th POSITION SWITCHES ON 100's DRUM UNITS.</td>
</tr>
<tr>
<td>5</td>
<td>THESE WIRES CONNECT TO 1-9 DRUM S.U. COILS.</td>
</tr>
<tr>
<td>6</td>
<td>FEEDS 49 to 54 FROM SW. ON 1-9 SCORE RE.</td>
</tr>
<tr>
<td>7</td>
<td>IN CIRCUIT TO SCORE CONTROL RELAY, STRIKE-SPARE RESET RELAY, &amp; 10-90 SCORE RELAY IN &quot;REGULATION&quot; GAME THESE WIRES CONNECT TO THEIR RESPECTIVE STRIKE-SPARE UNIT DISCS.</td>
</tr>
<tr>
<td>8</td>
<td>IN CIRCUIT TO 100's SCORE RELAY THRU 9th POSITION SWITCHES ON 10-90 DRUM UNITS.</td>
</tr>
<tr>
<td>9</td>
<td>THESE WIRES CONNECT TO 10-90 DRUM S.U. COILS.</td>
</tr>
<tr>
<td>10</td>
<td>FEEDS 55 to 61 FROM SW. ON 10-90 SCORE RE.</td>
</tr>
<tr>
<td>11</td>
<td>TO STRIKE-SPARE UNIT RESET COILS THRU ZERO POSITION SWITCHES ON THOSE UNITS.</td>
</tr>
<tr>
<td>12</td>
<td>THESE WIRES CONNECT TO THE 100's DRUM UNIT COILS.</td>
</tr>
<tr>
<td>13</td>
<td>IN CIRCUIT TO STRIKE-SPARE S.U. COILS.</td>
</tr>
<tr>
<td>14</td>
<td>FEEDS 62 to 68, AND 63 to 68 THRU SW. ON 100's RE.</td>
</tr>
</tbody>
</table>
There are (6) strike-spare units—one for each player. The discs are identical. The top 3 wire colors (strike and spare lites) at E-11 to E-14, the "P.U." position wires (feeds from player up disc) to the other five discs are shown at A-8 on diagram.

Diagram Location

1st Strike Lite
2nd Strike Lite
Spare Lite

Feed from player up disc to A-B-C-D-E positions

In circuits to operate the 10-90 score control relay and the score control relay thru A-B-C-D-E relays on score control motor disc. These same wires also go to the A-B-C-D-E positions of the other five strike-spare unit discs.

Diagram:

Strike-Spare Unit

Rotation

Diagram:

Strike-Spare Unit

Rotation

1B-2001-19

View looking at wiper finger side with wiper in reset position

Two insulated wipers

Four grounded wipers

Y-R BRN W-G B-R GRAY-B GRAY-Y GRAY-R GRAY-W GRAY
FRAME CONTROL S.U. UNIT

THIS UNIT ADVANCES ONE STEP EACH TIME THE LAST PLAYER COMPLETES HIS TURN. IT RESETS TO ZERO POSITION WHEN START RELAY IS TRIPPED, DURING RESET CYCLE.

Y-G  C-6 CIRCUIT TO 2ND PLAYER STRIKE-SPARE RESET COIL.
BR-3  A-7 IN CIRCUIT TO 100's SCORE RELAY
O-B  C-10 TRIPS GAME-OVER RELAY.
R-BLU  C-7 CIRCUIT TO 6TH PLAYER STRIKE-SPARE RESET COIL.
G-W  D-8 TO START RELAY COIL.
W-BLU  B-6 TO "10TH FRAME" LITE.
Y-B  C-6 CIRCUIT TO 3RD PLAYER STRIKE-SPARE RESET COIL.
R-G  C-7 CIRCUIT TO 4TH PLAYER STRIKE-SPARE RESET COIL.
BR-O  D-10 IN CIRCUIT TO GAME SELECTION S.U. COIL.
-Y-  E-10 6VOLT AND 50 VOLT COMMON.
D-13
GAME SELECTION DISC

THE FUNCTION OF THIS UNIT IS TO SELECT THE CIRCUITS NEEDED FOR THE PARTICULAR GAME WHICH THE BOWLER DECIDES TO PLAY. THIS UNIT ALWAYS ADVANCES TO "REGULATION" WHEN MACHINE IS RESET. IT ALSO ADVANCES EACH TIME THE BUTTON ON THE COIN BOX HOUSING IS DEPRESSED (BEFORE FIRST PUCK IS THROWN).

G-W A-5 To 10-90 Score Relay, thru "Y 1" rivets.
BLU-R A-5 Circuit to Flash Re. or 10-90 Score Re.
D-BLU A-5 To 100's Score Relay, thru 2 "S 1" rivets
R-W D-11 In circuit to Chime Coll.
R-B D-10 circuit to Strike Re. & Game Selection S.U. Coll.
BLU-O E-5 To "Flash" light.
W-R E-5 To "Strike-90" light.
W-BR E-4 To "Roto" light.
W-B E-4 To "One Shot" light.
W-O E-3 To "Regulation" light.
-Y- 6 & 20 volt common.

PRINTED CIRCUIT WIPER WITH (10) PAIR OF INSULATED SNO-SHOES.
<table>
<thead>
<tr>
<th>RELAY</th>
<th>SW</th>
<th>WIRE COLORS</th>
<th>DIAG. LOC.</th>
<th>TYPE</th>
<th>SWITCH OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>1C</td>
<td>GRAY-BR O-B</td>
<td>D-11</td>
<td>N.O.</td>
<td>RUNS SCORE MOTOR THRU SWITCH ON SCORE MOTOR RELAY.</td>
</tr>
<tr>
<td></td>
<td>1B</td>
<td>-B- B-0</td>
<td>B-9</td>
<td>N.C.</td>
<td>OPENS CIRCUIT TO SCORE CONTROL RELAY AND FLASH MOTOR.</td>
</tr>
<tr>
<td></td>
<td>1A</td>
<td>O-W BR-Y</td>
<td>B-8</td>
<td>N.C.</td>
<td>IN CIRCUIT TO STRIKES-Spare RESET RELAY, THRU 'K' RIVETS ON SCORE MOTOR.</td>
</tr>
<tr>
<td></td>
<td>2C</td>
<td>G-Y R-W</td>
<td>D-12</td>
<td>N.C.</td>
<td>IN CIRCUIT TO EXTRA SHOTS RESET RELAY, IN 10TH FRAME, AFTER ONE OR TWO STRIKES</td>
</tr>
<tr>
<td></td>
<td>2B</td>
<td>-J- -J-</td>
<td>B-4</td>
<td>N.C.</td>
<td>SAFETY SWITCH TO THIS RELAY COIL.</td>
</tr>
<tr>
<td></td>
<td>2A</td>
<td>Y-BLU R-G Y-R</td>
<td>B-7</td>
<td>M&amp;B</td>
<td>CIRCUIT TO 10-90 SCORE RELAY, FROM 3 'G' OR 5 'J' RIVETS ON SCORE MOTOR ---IN &quot;REGULATION&quot;.</td>
</tr>
<tr>
<td>1-10</td>
<td>3C</td>
<td>-G- BLU-BR</td>
<td>B-5</td>
<td>N.O.</td>
<td>IN CIRCUIT TO 10-90 SCORE REPLAY, IN &quot;STRIKE-90&quot; OR &quot;ROTO&quot;.</td>
</tr>
<tr>
<td></td>
<td>3B</td>
<td>W-R BLU-Y</td>
<td>B-6</td>
<td>N.O.</td>
<td>IN CIRCUIT TO 100'S SCORE RELAY, IN &quot;ROTO&quot;, &quot;FLASH&quot; OR &quot;ONE SHOT&quot;.</td>
</tr>
<tr>
<td></td>
<td>3A</td>
<td>R-B G-B</td>
<td>C-10</td>
<td>N.O.</td>
<td>ENERGIZES STRIKE RELAY, THRU 'M' &amp; 'D1' RIVETS ON SCORE MOTOR.</td>
</tr>
<tr>
<td></td>
<td>4C</td>
<td>BR-B W-G</td>
<td>C-11</td>
<td>N.O.</td>
<td>ENERGIZES BELL COIL AT 2ND POSITION CAM SWITCH ON SCORE MOTOR.</td>
</tr>
<tr>
<td></td>
<td>4B</td>
<td>-J- -J-</td>
<td>B-4</td>
<td>N.C.</td>
<td>SAFETY SWITCH TO THIS RELAY COIL.</td>
</tr>
<tr>
<td></td>
<td>4A</td>
<td>R-O -GRAY- O-G</td>
<td>B-9</td>
<td>M&amp;B</td>
<td>OPENS IN CIRCUIT TO 1-9 SCORE RELAY AND CLOSES TO STRIKE-Spare ADVANCE RELAY.</td>
</tr>
<tr>
<td>1-10</td>
<td>5B</td>
<td>BLU-Y -J-</td>
<td>A-12</td>
<td>N.C.</td>
<td>IN CIRCUIT TO 10 PIN COIL, ON SECOND SHOT, WHEN PLAYER HAS A 3-10 LEAVE.</td>
</tr>
<tr>
<td></td>
<td>5A</td>
<td>BR-G -Y-B-</td>
<td>B-13</td>
<td>N.C.</td>
<td>IN CIRCUIT TO 7 PIN COIL, ON SECOND SHOT, WHEN PLAYER HAS A 7-10 LEAVE.</td>
</tr>
<tr>
<td></td>
<td>6B</td>
<td>-J- -J-</td>
<td>B-4</td>
<td>N.O.</td>
<td>IN SERIES CIRCUIT TO TRIP 1-10 RELAYS.</td>
</tr>
<tr>
<td></td>
<td>6A</td>
<td>-J- O-B BR-R</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>IN CIRCUIT TO TRIP #10 RELAY-ALSO TO PULSE 1-9 SCORE RELAY.</td>
</tr>
<tr>
<td>#9</td>
<td>8A</td>
<td>-J- BLU-B BR-</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>IN CIRCUIT TO TRIP #9 RELAY---ALSO TO PULSE 1-9 SCORE RELAY.</td>
</tr>
<tr>
<td>RELAY</td>
<td>SW.</td>
<td>WIRE COLORS</td>
<td>DIAG. LOC.</td>
<td>TYPE</td>
<td>SWITCH OPERATION</td>
</tr>
<tr>
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<td>------------------</td>
</tr>
<tr>
<td>#8 Relay</td>
<td>10A</td>
<td>J-Y, B-Y, BR-Y</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>Opens in circuit to #8 relay and closes to pulse 1-9 score relay.</td>
</tr>
<tr>
<td>#7 Relay</td>
<td>11B</td>
<td>R-G, J-</td>
<td>A-12</td>
<td>N.C.</td>
<td>In circuit to 7 pin coil, on second shot, when player has a 2-7 leave.</td>
</tr>
<tr>
<td></td>
<td>11A</td>
<td>BR-G, Y-R</td>
<td>B-13</td>
<td>N.C.</td>
<td>In circuit to 10 pin coil, on second shot, when player has a 7-10 leave.</td>
</tr>
<tr>
<td></td>
<td>12B</td>
<td>J-J</td>
<td>A-4</td>
<td>N.O.</td>
<td>In series with switch 6B on #10 relay.</td>
</tr>
<tr>
<td></td>
<td>12A</td>
<td>J-B-G, BR-W</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>Opens in circuit to #7 relay and closes to 1-9 score relay.</td>
</tr>
<tr>
<td>#6 Relay</td>
<td>13B</td>
<td>J-J</td>
<td>A-4</td>
<td>N.O.</td>
<td>In series with switch 12B on #7 relay.</td>
</tr>
<tr>
<td></td>
<td>13A</td>
<td>J-J</td>
<td>A-12</td>
<td>M&amp;B</td>
<td>Opens in circuit to switch 24A on #1 relay and closes to switch 5B on #10 relay.</td>
</tr>
<tr>
<td></td>
<td>14C</td>
<td>O-R, BLU-Y</td>
<td>B-13</td>
<td>N.C.</td>
<td>To 10 pin coil from 'K' or 'L' roll-over switch.</td>
</tr>
<tr>
<td></td>
<td>14B</td>
<td>BLU-R, J-J</td>
<td>A-12</td>
<td>N.C.</td>
<td>In series with switch 23A on #1 relay.</td>
</tr>
<tr>
<td></td>
<td>14A</td>
<td>J-J, R-BLU, BR-B</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>Opens in circuit to #6 relay coil and closes to pulse 1-9 score relay.</td>
</tr>
<tr>
<td>#5 Relay</td>
<td>16B</td>
<td>J-J</td>
<td>A-4</td>
<td>N.O.</td>
<td>In series with switch 13B on #6 relay.</td>
</tr>
<tr>
<td></td>
<td>16A</td>
<td>J-R-Y, BLU-W</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>Opens in circuit to #5 relay coil and closes to 1-9 score relay.</td>
</tr>
<tr>
<td>#4 Relay</td>
<td>17B</td>
<td>J-J</td>
<td>A-4</td>
<td>N.O.</td>
<td>In series with switch 16B on #5 relay.</td>
</tr>
<tr>
<td></td>
<td>17A</td>
<td>B-0, J-J</td>
<td>A-12</td>
<td>M&amp;B</td>
<td>Opens in series circuit to switch 23A on #1 relay and closes to switch 11B on #7 relay.</td>
</tr>
<tr>
<td>RELAY</td>
<td>SW.</td>
<td>WIRE COLORS</td>
<td>DIAG LOC.</td>
<td>TYPE</td>
<td>SWITCH OPERATION</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>#4 RELAY</td>
<td>18C</td>
<td>G-W R-G</td>
<td>B-13</td>
<td>N.C.</td>
<td>ENERGIZES 7 PIN COIL THRU 'I' OR 'J' ROLLOVER SWITCH.</td>
</tr>
<tr>
<td></td>
<td>18B</td>
<td>Y-G -J-</td>
<td>A-12</td>
<td>N.C.</td>
<td>IN SERIES WITH SWITCH 24A ON #1 RELAY.</td>
</tr>
<tr>
<td></td>
<td>18A</td>
<td>-J- O-W B-Y</td>
<td>A-10</td>
<td>M&amp;B</td>
<td>OPENS IN CIRCUIT TO #4 RELAY COIL AND CLOSES TO 1-9 SCORE RELAY.</td>
</tr>
<tr>
<td>#3 RELAY</td>
<td>19B</td>
<td>R-B BLU-Y</td>
<td>B-13</td>
<td>N.C.</td>
<td>IN CIRCUIT TO 10 PIN COIL, THRU 'T' ROLLOVER SWITCH.</td>
</tr>
<tr>
<td></td>
<td>19A</td>
<td>GRAY-W -J-</td>
<td>B-12</td>
<td>N.C.</td>
<td>IN SERIES WITH SWITCH 13A ON #6 RELAY.</td>
</tr>
<tr>
<td></td>
<td>20B</td>
<td>-J- -J-</td>
<td>A-4</td>
<td>N.O.</td>
<td>IN SERIES WITH SWITCH 17B ON #4 RELAY.</td>
</tr>
<tr>
<td></td>
<td>20A</td>
<td>-J- O-G BLU-R</td>
<td>A-9</td>
<td>M&amp;B</td>
<td>OPENS IN CIRCUIT TO #3 RELAY COIL AND CLOSES TO 1-9 RELAY.</td>
</tr>
<tr>
<td>#2 RELAY</td>
<td>21B</td>
<td>B-R -J-</td>
<td>B-12</td>
<td>N.C.</td>
<td>IN SERIES WITH SWITCH 17A ON #4 RELAY.</td>
</tr>
<tr>
<td></td>
<td>21A</td>
<td>R-W R-G</td>
<td>A-13</td>
<td>N.C.</td>
<td>ENERGIZES 7 PIN COIL, THRU 'W' ROLLOVER SWITCH.</td>
</tr>
<tr>
<td></td>
<td>22B</td>
<td>-J- -J-</td>
<td>A-4</td>
<td>N.O.</td>
<td>IN SERIES WITH SWITCH 20B ON #3 RELAY.</td>
</tr>
<tr>
<td></td>
<td>22A</td>
<td>-J- O-R BLU-Y</td>
<td>A-9</td>
<td>M&amp;B</td>
<td>OPENS IN CIRCUIT TO #2 RELAY COIL AND CLOSES TO 1-9 SCORE RELAY.</td>
</tr>
<tr>
<td>#1 RELAY</td>
<td>23C</td>
<td>Y-O BR-W</td>
<td>G-8</td>
<td>N.O.</td>
<td>IN CIRCUIT TO &quot;R.O. SWITCHES CONTROL RELAY,&quot; THRU SCORE MOTOR DISC OR SWITCH ON 2ND BALL 'B' RELAY.</td>
</tr>
<tr>
<td></td>
<td>23B</td>
<td>-Y- -J-</td>
<td>A-4</td>
<td>N.O.</td>
<td>IN SERIES WITH SWITCH 22B ON #2 RELAY.</td>
</tr>
<tr>
<td></td>
<td>23A</td>
<td>-J- B-O</td>
<td>A-12</td>
<td>N.O.</td>
<td>IN CIRCUIT TO 6 PIN COIL, ON 2ND SHOT, WHEN PLAYER HAS A 2-4-6 LEAVE.</td>
</tr>
<tr>
<td></td>
<td>24C</td>
<td>Y-BR -J-</td>
<td>A-4</td>
<td>N.C.</td>
<td>IN CIRCUIT TO FLASH MOTOR AND FLASH MOTOR RELEASE COIL.</td>
</tr>
<tr>
<td></td>
<td>24B</td>
<td>-J- G-Y-W</td>
<td>B-11</td>
<td>M&amp;B</td>
<td>ENERGIZES 1 PIN COIL---ALSO IN CIRCUIT TO STRIKE ZONE SWITCHES.</td>
</tr>
<tr>
<td>RELAY</td>
<td>SW.</td>
<td>WIRE COLORS</td>
<td>DIAG. LOC.</td>
<td>TYPE</td>
<td>SWITCH OPERATION</td>
</tr>
<tr>
<td>-------</td>
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<td>-----------</td>
<td>------</td>
<td>-----------------</td>
</tr>
<tr>
<td>#1 RELAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24A</td>
<td>24A</td>
<td>-J-</td>
<td>A-12</td>
<td>N.O.</td>
<td>IN CIRCUIT TO 4 PIN COIL, ON SECOND SHOT, WHEN PLAYER HAS A 3-4-6 LEAVE.</td>
</tr>
<tr>
<td>25C</td>
<td>25C</td>
<td>W-R R-W</td>
<td>C-13</td>
<td>N.C.</td>
<td>OPENS CIRCUIT TO COIN LOCKOUT COIL.</td>
</tr>
<tr>
<td>25B</td>
<td>25B</td>
<td>GRAY-G -Y-</td>
<td>E-7</td>
<td>N.C.</td>
<td>IN CIRCUIT TO &quot;BOWL AGAIN&quot; LITE, THRU SWITCH ON ROTO UNIT.</td>
</tr>
<tr>
<td>25A</td>
<td>25A</td>
<td>GRAY-Y O-B</td>
<td>C-11</td>
<td>N.O.</td>
<td>RUNS SCORE MOTOR TO 1ST POSITION.</td>
</tr>
<tr>
<td>1st BALL</td>
<td>26D</td>
<td>-B- B-G</td>
<td>C-14</td>
<td>N.C.</td>
<td>OPENS CIRCUIT TO &quot;SET-UP RELAY&quot; AND &quot;1 CREDIT RELAY&quot;.</td>
</tr>
<tr>
<td>RELAY</td>
<td>26C</td>
<td>GRAY-BR -Y-</td>
<td>D-8</td>
<td>N.O.</td>
<td>IN HOLD CIRCUIT TO ROLLOVER SWITCHES CONTROL RELAY.</td>
</tr>
<tr>
<td>26B</td>
<td>26B</td>
<td>-J- -Y-</td>
<td>A-4</td>
<td>N.C.</td>
<td>IN SERIES WITH SWITCH 24C ON #1 RELAY.</td>
</tr>
<tr>
<td>26A</td>
<td>26A</td>
<td>G-O -J-</td>
<td>A-3</td>
<td>N.C.</td>
<td>SAFETY SWITCH TO THIS RELAY COIL.</td>
</tr>
<tr>
<td>27C</td>
<td>27C</td>
<td>R-BR O-W</td>
<td>A-6</td>
<td>N.C.</td>
<td>IN CIRCUIT TO 100'S SCORE RELAY, THRU 'P1' RIVET ON SCORE MOTOR.</td>
</tr>
<tr>
<td>28C</td>
<td>28C</td>
<td>-BR- G-Y-W</td>
<td>B-11</td>
<td>N.C.</td>
<td>OPENS CIRCUIT TO ALL ROLLOVER SWITCHES.</td>
</tr>
<tr>
<td>BALL &quot;A&quot;</td>
<td>28A</td>
<td>BLU-W Y-BR</td>
<td>A-4</td>
<td>N.C.</td>
<td>IN CIRCUIT TO FLASH MOTOR, THRU SWITCH ON ROTO UNIT.</td>
</tr>
<tr>
<td>RELAY</td>
<td>28A</td>
<td>-J- -Y- Y-R</td>
<td>A-3 &amp; D-13</td>
<td>M&amp;B</td>
<td>OPENS IN CIRCUIT TO THIS RELAY COIL AND CLOSES TO 2ND BALL 'B' RELAY.</td>
</tr>
<tr>
<td>29A</td>
<td>29A</td>
<td>O-G G-Y</td>
<td>D-12</td>
<td>N.O.</td>
<td>RUNS SCORE MOTOR, THRU SWITCH 25A ON 1ST BALL RELAY.</td>
</tr>
<tr>
<td>BALL &quot;B&quot;</td>
<td>30C</td>
<td>Y-G BR-Y</td>
<td>B-8</td>
<td>N.O.</td>
<td>IN CIRCUIT TO EXTRA SHOTS RESET RELAY IN 10TH FRAME.</td>
</tr>
<tr>
<td>RELAY</td>
<td>30B</td>
<td>BR-W -Y-</td>
<td>D-8</td>
<td>N.O.</td>
<td>TO STRIKE-Spare RESET RELAY, THRU 'P' RIVET ON SCORE MOTOR.</td>
</tr>
<tr>
<td>30A</td>
<td>30A</td>
<td>W-BR -J-</td>
<td>C-13</td>
<td>N.C.</td>
<td>SAFETY SWITCH TO THIS RELAY COIL.</td>
</tr>
<tr>
<td>RELAY</td>
<td>SW.</td>
<td>WIRE COLORS</td>
<td>DIAG. LOC.</td>
<td>TYPE</td>
<td>SWITCH OPERATIONS</td>
</tr>
<tr>
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</tr>
<tr>
<td>31D</td>
<td></td>
<td>G-Y-W</td>
<td>C-13</td>
<td>N.C.</td>
<td>OPENS CIRCUIT TO COIN RELAY AND COIN LOCKOUT COIL.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B-W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31C</td>
<td></td>
<td>GRAY-O Y-B</td>
<td>B-4</td>
<td>N.O.</td>
<td>IN CIRCUIT TO ROTO UNIT S.U. COIL.</td>
</tr>
<tr>
<td>31B</td>
<td></td>
<td>G-O Y-</td>
<td>D-9</td>
<td>N.O.</td>
<td>ENERGIZES RESET COILS ON FRAME CONTROL UNIT AND GAME-OVER RELAY, THRU 2ND POSITION CAM SW. ON SCORE MOTOR.</td>
</tr>
<tr>
<td>31A</td>
<td></td>
<td>BLU-Y-W B-W</td>
<td>B-3</td>
<td>M&amp;B</td>
<td>OPENS IN SERIES CIRCUIT WITH SWITCH C ON GAME-OVER RELAY AND CLOSES TO PULSE 'A', 'B' AND 'C' RESET RELAYS.</td>
</tr>
<tr>
<td>START</td>
<td></td>
<td>BLU-W BR-W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RELAY</td>
<td>32D</td>
<td>BR-R</td>
<td>D-5</td>
<td>N.C.</td>
<td>PREVENTS FEEDBACK TO 1000 DRUM S.U. DURING RESET CYCLE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BLU-W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32C</td>
<td></td>
<td>O-R BR-Y</td>
<td>B-8</td>
<td>N.O.</td>
<td>PULSES STRIKE-SPARE RESET RELAY, THRU (5) 'TI' RIVETS ON SCORE MOTOR.</td>
</tr>
<tr>
<td>32B</td>
<td></td>
<td>GRAY-B Y-</td>
<td>D-11</td>
<td>N.O.</td>
<td>RUNS SCORE MOTOR.</td>
</tr>
<tr>
<td>32A</td>
<td></td>
<td>G-R -O- Y-</td>
<td>C-13</td>
<td>M&amp;B</td>
<td>TO PLAYER UP UNIT RESET COIL</td>
</tr>
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</tr>
</tbody>
</table>
**A.C. RELAYS & SWITCHES**

### HI-LOW RELAY
Is energized by wipers on game selection disc.

#### DIAGRAM LOCATION
- IN CIRCUIT TO 100'S SCORE RELAY, closes to frame control disc (1, 2, 3 & 7TH FRAMES).
- IN CIRCUIT TO 100'S SCORE RELAY, closes to frame control disc (1, 2, 3 & 4TH FRAMES).
- IN CIRCUIT TO 100'S SCORE RELAY, closes to frame control disc (1, 2, 3 & 9TH FRAMES).

### FLASH RELAY
Is energized by game selection disc in "Flash". Also in "Roto", thru switch on Roto unit.

#### DIAGRAM LOCATION
- IN CIRCUIT TO ROTO ADVANCE RELAY IN "ROTO".
- IN CIRCUIT TO 100'S SCORE RELAY, thru 'V1' rivets on score motor.
- TO FLASH MOTOR AND FLASH MOTOR RELEASE COIL.
- TO HOOD AND PLAYFIELD FLASHING LIGHTS.

### STRIKE RELAY
Is energized by switch 3A on 1-10 relay, (in all games except "Regulation").

#### DIAGRAM LOCATION
- IN CIRCUIT TO 100'S SCORE RELAY, thru (2) 81 rivets on score motor.
- Energizes ROTO ADVANCE RELAY IN "ROTO" GAME.
- Energizes ROTO RELAY IN "ROTO" GAME.
- Energizes REPEAT STRIKE RELAY IN "STRIKE 90".
- In hold circuit to this relay, thru score motor zero position cam switch.

### 3rd POSITION RELAY
Is energized by 3rd position cam switch on score motor.

#### DIAGRAM LOCATION
- Opens circuit to "2 PLAY RELAY" and "3 OR MORE PLAY RELAY" and "2 CREDIT RELAY".
- Runs score motor.
- In circuit to frame control S.U., player up unit coils, and extra shots unit reset coil.
- Energizes relay bank reset coil (115 Volts).
- Energizes relay bank reset coil (115 Volts).
ROLL OVER SWITCHES CONTROL RELAY
SEE SWITCH 23C ON #1 RELAY.

REAR ROLL OVER RELAY
IS ENERGIZED BY ANY OF THE (9) NINE REAR ROLL OVER SWITCHES.

GAME OVER RELAY
INTERLOCK
TRIP COIL IS ENERGIZED BY SWITCH B ON LOCK RELAY, OR BY WIPER FINGER ON FRAME CONTROL DISC.
LATCH COIL IS ENERGIZED BY START RELAY.

ROTO ADVANCE RELAY
IS ENERGIZED IN "ROTO", BY FLASH RELAY OR STRIKE RELAY, THRU 'R' AND 'R1' RIVETS ON SCORE MOTOR.

ROTO RELAY
IS ENERGIZED IN "ROTO", BY THE STRIKE RELAY, THRU A SWITCH ON THE ROTO UNIT.

B-11 OPENS CIRCUITS TO ROLL OVER SWITCHES IN STRIKE ZONES.
A-9 PULSES 1-9 SCORE RELAY, THRU 'X' AND '1' RIVETS ON SCORE MOTOR.
B-13 IN SERIES WITH SWITCH 11A ON #7 RELAY AND 5A ON #10 RELAY.
D-8 HOLD CIRCUIT TO THIS RELAY, THRU SWITCH ON 1ST BALL RELAY.
C-11 OPENS CIRCUIT TO SCORE MOTOR.
B-3 TRIPS 1ST BALL RELAY AND 2ND BALL 'A' RELAY.
D-6 TRIPS START RELAY, THRU SWITCH ON COIN RELAY.
B-3 OPENS CIRCUITS TO ALL SCORING RELAYS AND ROLL OVER SWITCHES.
C-10 SAFETY SWITCH TO TRIP COIL ON THIS RELAY.
E-5 OPENS IN CIRCUIT TO MOST OF THE LITES AND CLOSE TO GAME-OVER LITE.
A-4 ENERGIZES ROTO UNIT S.U. COIL.
D-12 IN SERIES WITH SWITCH C ON REPEAT STRIKE RELAY.
E-7 TO "BOWL AGAIN" LITE.
R-4 HOLD CIRCUIT TO THIS RELAY, THRU ZERO POSITION CAM SWITCH ON SCORE MOTOR.
STRIKE SPARE ADVANCE RELAY

Is pulsed once for a spare and twice for a strike by the "P" rivets on score motor disc.

Enjoys extra shots unit S.U. coil in 10th frame.

0-7 Energizes (5) strike-spare unit S.U. coils, thru player up disc.

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STRIKE SPARE RESET RELAY

Is pulsed, during reset cycle, by (5) "P1" rivets on score motor disc. This relay is controlled by the position of the player's strike-spare unit thru the "L", "L" and "F" rivets on score motor disc.

These switches, in parallel, energize the strike-spare unit reset coils thru the corresponding strike-spare unit zero switches.

0-7

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1-9 SCORE RELAY

Operates when less than 10 pins are made on two shots. It also operates after the first shot, when player is holding a spare or two strikes and gets less than 10 pins.

Pulses 10-90 score relay, thru 9th position switches on 1-9 drum units.

B-5

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10-90 SCORE RELAY

Operates in "ratio" or "strikes-90", thru "P1" & "P1" rivets on score motor. It also operates in "registration", thru "R" or "2" rivets on score motor.

Pulses 100's score relay, thru 9th position switches on 10-90 drum units.

A-6

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Pulses 10-90 drum units, thru player up disc.

C-10

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EN IRRIGATES CHIRP COILO.

D-4
100'S SCORE RELAY
OPERATES IN "ROTO", "FLASH" AND "HI-LOW", THRU 'V1' RIVETS ON SCORE MOTOR.

SCORE MOTOR RELAY
IS ENERGIZED BY THE SAME CIRCUITS THAT RUN THE SCORE MOTOR.

SCORE CONTROL RELAY
IS ENERGIZED BY THE 'H' RIVETS ON SCORE MOTOR, WHEN A PLAYER IS HOLDING A SPADE OR TWO STRIKES AND GETS LESS THAN 10 PINS ON THE FIRST SHOT. ALSO WHEN A STRIKE IS FOLLOWED BY A BLOW.

EXTRA SHOTS RESET RELAY
IS ENERGIZED BY 'G' & 'V' RIVETS ON SCORE MOTOR DIALS. THRU CIRCUITS ORIGINATING IN THE EXTRA SHOTS UNIT DIAL.
REPEAT STRIKE RELAY

IS ENERGIZED BY A SWITCH ON STRIKE RELAY, IN "STRIKE- 90".

- N.O.
- N.O.
- N.O.
- N.O.
- N.O.
- N.O.
- N.O.

- E
- D
- C
- B
- C
- B
- A

- G-B
- Y-BR
- Y-R
- Y-I
- O-W
- O-W
- BLU-D

- A-13
- D-10
- D-12
- E-7
- A-4

- OPENS "EASY STRIKE" CIRCUIT.
- OPENS CIRCUIT TO GAME SELECTION UNIT S.U. COIL.
- IN CIRCUIT TO EXTRA SHOTS RESET RELAY.
- TO "POW! AGAIN" LITE.
- HOLD CIRCUIT TO THIS RELAY, THRU 1ST POSITION CAM SWITCH ON SCORE MOTOR.

ROLL OVER MOTOR RELAY

IS ENERGIZED, ON FIRST SHOT, BY THE SAME CIRCUIT THAT RUNS THE SCORE MOTOR. IT IS THEN HELD IN 2ND POSITION CAM SWITCH ON SCORE MOTOR.

- N.O.
- N.O.
- N.O.
- N.O.
- N.O.
- N.O.
- N.O.

- B
- B-Y-W
- O-W
- O-W
- B-11
- B-11

- OPENS CIRCUITS TO ROLLOVER SWITCHES AS PUCK RETURNS TO PLAYER.
- HOLD CIRCUIT TO THIS RELAY, THRU 1ST POSITION CAM SWITCH ON SCORE MOTOR.

PLAYER RESET RELAY

IS ENERGIZED BY THE IN AND "PM" RIVETS ON SCORE MOTOR, FOR THE COIN DISC AND PLAYER UP DISC.

- N.O.
- N.O.
- N.O.
- N.O.
- N.O.

- B-11
- C-12
- C-11

- IN CIRCUIT TO PLAYER UP UNIT COILS AND FRAME CONTROL UNIT S.U. COIL.
- IN HOLD CIRCUIT TO THIS RELAY.
**A. C. Relays & Switches**

**A. Reset Relay**

This relay is pulsed by (11) "Y" rivets on shock motor disc. When switch on start relay is closed.

(During reset cycle)

**B. Reset Relay**

This relay is pulsed by (11) "Y" rivets on shock motor disc. Turn SW. on start relay.

(During reset cycle)

**C. Reset Relay**

This relay is pulsed by (11) "Y" rivets on shock motor disc. Turn SW. on start relay.

(During reset cycle)

**Operation**

Pulses 1st & 2nd player 100-400 drum.

Pulses 1st & 2nd player 1,000 drum units.

Pulses 1st & 2nd player 1-9 drum units.

Pulses 1st & 2nd player 10-90 drum units.

Energizes lock relay.

Pulses 3rd & 5th player 100-400 drum units.

Pulses 3rd & 5th player 1,000 drum units.

Pulses 3rd & 5th player 1-9 drum units.

Pulses 3rd & 5th player 10-90 drum units.

Energizes game selection S.U. coil thru game selection disc.

Pulses 4th & 6th player 100-400 drum units.

Pulses 4th & 6th player 1,000 drum units.

Pulses 4th & 6th player 1-9 drum units.

Pulses 4th & 6th player 10-90 drum units.

Pulses frame drum S.U. & coin drum S.U.
OPERATOR — PLEASE FILL IN CARD & RETURN

Name of Product: ___________________________ Serial Number: ___________ Date Purchased: ___________

Dealer from
Whom Purchased: ____________________________________________________________

Your Name: ____________________________________________

Address: ___________________________ City: ___________ State: ___________

Was this game received in good condition? Yes [ ] No [ ]

Were any adjustments necessary? [ ]

If so - what adjustment? __________________________________________________________

What manufacturer’s games do you prefer? ________________________________________

Why? __________________________________________________________________________

Suggested improvements: __________________________________________________________