

*Bally*

NOVEMBER 1994

16-50032-101

FINAL

# *The Shadow*™



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**Operations Manual Includes:**

Operations & Adjustments • Testing & Problem Diagnosis • Parts Information •  
Reference Diagrams & Schematics

## DIP SWITCH SETTINGS AND JUMPERS

| EPROM Jumper Settings for U6 | W1 | W2  |
|------------------------------|----|-----|
| 1MEG, 2MEG, 4 MEG EPROM      | In | Out |

### Dip Switch Chart

| Country | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| America | Off | Off | On  | On  | On  | On  | On  | On  |
| Euopean | Off | Off | On  | On  | On  | Off | On  | On  |
| French  | Off | Off | On  | On  | On  | On  | Off | Off |
| German  | Off | Off | On  | On  | On  | On  | On  | Off |
| Spain   | Off | Off | On  | On  | Off | On  | On  | On  |

## SOLENOID/FLASHER TABLE

| Sol. No.                    | Function               | Solenoid Type       | Voltage Connections |         |                   | Drive Xister | Drive Connections |         |                   | Drive Wire Color | Solenoid Part number |            |
|-----------------------------|------------------------|---------------------|---------------------|---------|-------------------|--------------|-------------------|---------|-------------------|------------------|----------------------|------------|
|                             |                        |                     | Playfield           | Backbox | Cabinet           |              | Playfield         | Backbox | Cabinet           |                  | Flashlamp Type       | Backbox    |
| 01                          | BALL LAUNCH            | High Power          | J107-2              |         |                   | Q82          | J130-1            |         |                   | Vio-Brn          | AE-23-800            |            |
| 02                          | LOCKUP KICKOUT         | High Power          | J107-2              |         |                   | Q80          | J130-2            |         |                   | Vio-Red          | A-14189              |            |
| 03                          | LEFT DIVERter LEFT     | High Power          | J107-2              |         |                   | Q78          | J130-4            |         |                   | Vio-Org          | AE-25-1000           |            |
| 04                          | LEFT DIVERter RIGHT    | High Power          | J107-2              |         |                   | Q76          | J130-5            |         |                   | Vio-Yel          | AE-25-1000           |            |
| 05                          | RIGHT DIVERter RIGHT   | High Power          | J107-2              |         |                   | Q64          | J130-6            |         |                   | Vio-Grn          | AE-25-1000           |            |
| 06                          | RIGHT DIVERter LEFT    | High Power          | J107-2              |         |                   | Q66          | J130-7            |         |                   | Vio-Blu          | AE-25-1000           |            |
| 07                          | KNOCKER                | High Power          |                     | J107-2  |                   | Q68          |                   | J130-8  |                   | Vio-Blk          |                      | AE-23-800  |
| 08                          | WALL TARGET UP         | High Power          | J107-2              |         |                   | Q70          | J130-9            |         |                   | Vio-Gry          | AE-23-800            |            |
| 09                          | LEFT SLINGSHOT         | Low Power           | J107-3              |         |                   | Q58          | J127-1            |         |                   | Brn-Blk          | AE-26-1200           |            |
| 10                          | RIGHT SLINGSHOT        | Low Power           | J107-3              |         |                   | Q56          | J127-3            |         |                   | Brn-Red          | AE-26-1200           |            |
| 11                          | RIGHT EJECT            | Low Power           | J107-3              |         |                   | Q54          | J127-4            |         |                   | Brn-Org          | AE-27-1200           |            |
| 12                          | LEFT EJECT             | Low Power           | J107-3              |         |                   | Q52          | J127-5            |         |                   | Brn-Yel          | AE-26-1500           |            |
| 13                          | BALL RELEASE           | Low Power           | J107-3              |         |                   | Q50          | J127-6            |         |                   | Brn-Grn          | AE-26-1500           |            |
| 14                          | BALL POPPER            | Low Power           | J107-3              |         |                   | Q48          | J127-7            |         |                   | Brn-Blu          | AE-25-1000           |            |
| 15                          | MINI KICKER            | Low Power           | J107-3              |         |                   | Q46          | J127-8            |         |                   | Brn-Vio          | AE-25-1000           |            |
| 16                          | WALL TARGET DOWN       | Low Power           | J107-3              |         |                   | Q44          | J127-9            |         |                   | Brn-Gry          | SM-30-1100-DC        |            |
| 17                          | MINI PLAYFIELD FLASHER | Flasher             | J107-6              | J106-5  |                   | Q42          | J126-1            | J125-1  |                   | Blk-Brn          | #89                  | #906 (2)   |
| 18                          | LEFT SIDE FLASHER      | Flasher             | J107-6              | J106-5  |                   | Q40          | J126-2            | J125-2  |                   | Blk-Red          | #89                  | #906       |
| 19                          | MINI MOTOR RIGHT       | Flasher             | J116-2              |         |                   | Q38          | J126-3            |         |                   | Blk-Org          | 14-8014              |            |
| 20                          | MINI MOTOR LEFT        | Flasher             | J116-2              |         |                   | Q36          | J126-4            |         |                   | Blk-Yel          | 14-8014              |            |
| 21                          | RIGHT SIDE FLASHER     | Flasher             | J107-6              |         |                   | Q28          | J126-5            |         |                   | Blu-Grn          | #906, #89            |            |
| 22                          | RIGHT RAMP FLASHER     | Flasher             | J107-6              |         |                   | Q30          | J126-6            |         |                   | Blu-Blk          | #906, #89            |            |
| 23                          | LEFT RAMP FLASHER      | Flasher             | J107-6              |         |                   | Q34          | J126-7            |         |                   | Blu-Vio          | #906, #89            |            |
| 24                          | MINI DROP BANK         | Flasher             | J107-1              |         |                   | Q32          | *J126-8           |         |                   | Blu-Gry          | AE-25-1000           |            |
| 25                          | SINGLE DROP UP         | Gen. Purpose        | J107-1              |         |                   | Q26          | *J122-1           |         |                   | Blu-Brn          | AE-26-1200           |            |
| 26                          | LEFT BACK FLASHER      | Gen. Purpose        | J107-6              | J106-5  |                   | Q24          | J122-2            | J124-2  |                   | Blu-Red          | #906                 | #906       |
| 27                          | CENTER BACK FLASHER    | Gen. Purpose        | J107-6              | J106-5  |                   | Q22          | J122-3            | J124-3  |                   | Blu-Org          | #906                 | #906       |
| 28                          | RIGHT BACK FLASHER     | Gen. Purpose        | J107-6              | J106-5  |                   | Q20          | J122-4            | J124-5  |                   | Blu-Yel          | #906                 | #906       |
| 35                          | MAGNET                 | High Power          | J907-8,9            |         |                   | Q2           | J902-3            |         |                   | Yel-Gry          | 20-9247              |            |
| 36                          | SINGLE DROP DOWN       | Low Power           | J907-8,9            |         |                   | Q7           | J902-1            |         |                   | Org-Gry          | SM1-26-600           |            |
| <b>General Illumination</b> |                        |                     |                     |         |                   |              |                   |         |                   |                  |                      |            |
| 01                          | BOTTOM PLAYFIELD       | G.I.                | J121-1              |         |                   | Q18          | J121-7            |         |                   | Wht-Brn          | #44                  |            |
| 02                          | TOP LEFT PLAYFIELD     | G.I.                | J121-2              |         |                   | Q10          | J121-8            |         |                   | Wht-Org          | #44                  |            |
| 03                          | INSERT BOTTOM          | G.I.                |                     | J120-3  |                   | Q14          |                   | J120-9  |                   | Wht-Yel          |                      | #555       |
| 04                          | INSERT TOP             | G.I.                |                     | J120-5  |                   | Q16          |                   | J120-10 |                   | Wht-Grn          |                      | #555       |
| 05                          | TOP RIGHT PLAYFIELD    | G.I.                | J121-6              |         |                   | Q12          | J121-11           |         |                   | Wht-Vio          | #44                  |            |
| <b>Flipper Circuits</b>     |                        |                     |                     |         |                   |              |                   |         |                   |                  |                      |            |
|                             |                        | Voltage Connections |                     |         | Drive Transistors |              | Drive Connectors  |         | Drive Wire Colors |                  | Coil Part No.        | Coil Color |
|                             |                        | Playfield           | Power               | Hold    |                   |              | Playfield         | Power   | Hold              |                  |                      |            |
| 29                          | Lower Right Flipper    | Lwr. Rt. Power      | J907-1 (Red-Grn)    |         | Q4                |              | J902-13           | Yel-Grn |                   |                  | FL-11629             | BLUE       |
| 30                          |                        | Lwr. Rt. Hold       | J907-1 (Red-Grn)    |         | Q11               |              | J902-11           | Org-Grn |                   |                  |                      |            |
| 31                          | Lower Left Flipper     | Lwr. Lt. Power      | J907-4 (Red-Blu)    |         | Q3                |              | J902-9            | Yel-Blu |                   |                  | FL-11629             | BLUE       |
| 32                          |                        | Lwr. Lt. Hold       | J907-4 (Red-Blu)    |         | Q9                |              | J902-7            | Org-Blu |                   |                  |                      |            |
| 33                          | Upper Right Flipper    | Upr. Rt. Power      | J907-6 (Red-Vio)    |         | Q2                |              | J902-6            | Yel-Vio |                   |                  | FL-15411             | ORANGE     |
| 34                          |                        | Upr. Rt. Hold       | J907-6 (Red-Vio)    |         | Q7                |              | J902-4            | Org-Vio |                   |                  |                      |            |
| 35                          | Upper Left Flipper     | Upr. Lt. Power      | J907-8 (Red-Gry)    |         | Q1                |              | J902-3            | Yel-Gry |                   |                  | NOT                  | USED       |
| 36                          |                        | Upr. Lt. Hold       | J907-8 (Red-Gry)    |         | Q5                |              | J902-1            | Org-Gry |                   |                  |                      |            |

J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb

\* Tieback Diode J122-5 (loop) from J126-11 (end).

# THE SHADOW (50032)

A-18536

## Gun Handle Installation

### Installation De La Crosse

### Pistolengriff am Gehäuse innen lösen

### Istruzioni Per L'Installazione Dell'Impugnatura Della Pistola

Remove gun handle from the inside bottom of the cabinet. Then, using the hardware included with the gun handle plus two more 10-24 bolts, 10-24 ESN nuts and .219x.500x.063 flat washers located in the parts bag, attach the gun handle to the outside of the cabinet in the upper right corner. (See diagram below.) After the gun handle is in place, plug the connector from the handle into the matching connector from the cabinet.

4410-01119-00 (4 used) Nut 10-24 ESN (To install 10-24 ESN nut use 3/8" nut driver: color code, blue)

4700-00060-00 (4 used) Flat Washer .219x.500x.063

4310-01123-24B (4 used) Bolt 10-24 x1-1/2 CB

Démontez la crosse du revolver située à l'intérieur de l'appareil. Avec les vis récupérées après démontage, ainsi que les vis supplémentaires, les écrous et les rondelles se trouvant dans la pochette, installez cette crosse à l'extérieur de l'appareil. (voir dessin ci-dessous). Après la mise en place de la crosse, branchez son connecteur avec son correspondant à l'intérieur de l'appareil.

4410-01119-00 (Quantité 4) Ecrou 10-24 ESN (Pour installer l'Ecrou 10-24 ESN utilisez une clé plate de 3/8)

4700-00060-00 (Quantité 4) Rondelle plate .219x.500x.063

4310-01123-24B (Quantité 4) Vis 10-24x1-1/2 CB

Dann mit beiliegenden Schrauben und Muttern an der Außenseite des Gehäuses oben rechts montieren, s. Abbildung. Ist der Pistolengriff angebaut, den Steckkontakt des Griffes und den entsprechenden Gehäusestecker zusammenstecken.

4 Sechskantmuttern, 4410-01119-00 (Sechskantmuttern Mit 3/8" Schlüssel Anziehen)

4 Unterlegscheiben, 4700-00060-00

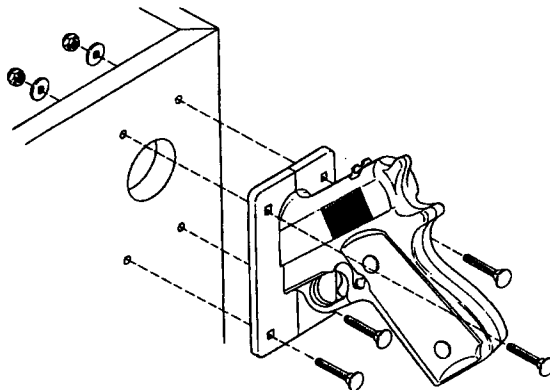
4 Schrauben, 4310-01123-24B

Rimuovere l'impugnatura della pistola dal fondo del flipper. Usando l'attrezzo in dotazione, le 2 viti, i 2 dadi e le rondelle piane situate nel sacchetto delle parti, installare l'impugnatura della pistola all'esterno del flipper nell'angolo superiore destro. (Vedi figura sottostante.) Una volta installata l'impugnatura della pistola collegare i connettori.

4410-01119-00 (4 utilizzati) dadi 10-24 ESN (Per installare i dadi utilizzare la chiave blu da 3/8")

4700-00060-00 (4 utilizzati) rondelle piane .219x.500x.063

4310-01123-24B (4 utilizzati) viti 10-24x1-1/2 CB



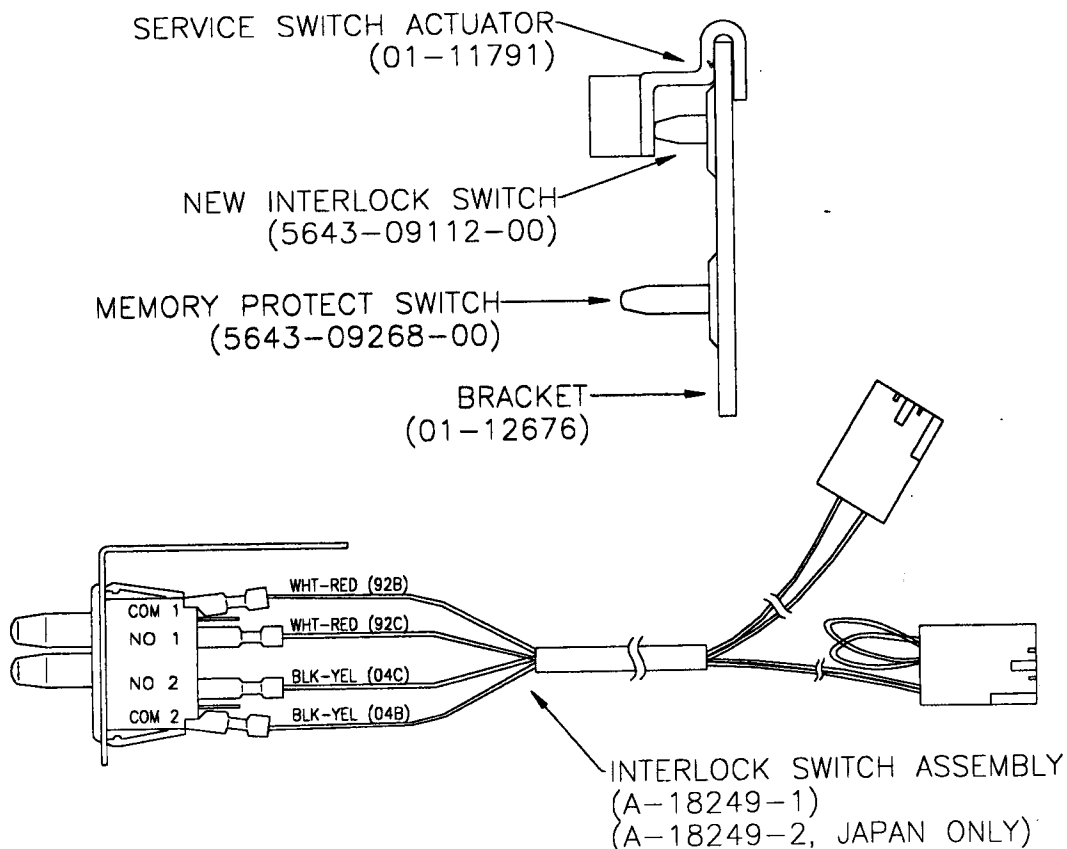
# IMPORTANT NOTICE

## PLEASE READ

This pinball game is equipped with a SAFETY FEATURE to prevent shocks from the solenoid circuit when the coin door is open. A new interlock switch assembly (part no. A-18249-1), located at the left of the coin door opening, has been added to the game. This assembly is a bracket containing the existing memory protect switch on the bottom and a new interlock switch on the top. When the coin door is open, the new interlock switch opens, breaking the connection to the +50V and +20V winding of the transformer secondary.

A special tool called the Service Switch Actuator is provided for the serviceman/technician that repairs the game. This tool is painted yellow and located in a bag stapled inside the cabinet. The Service Switch Actuator slips over the interlock switch and holds it closed while the coin door is open, allowing the serviceman to test and repair the solenoid circuit.

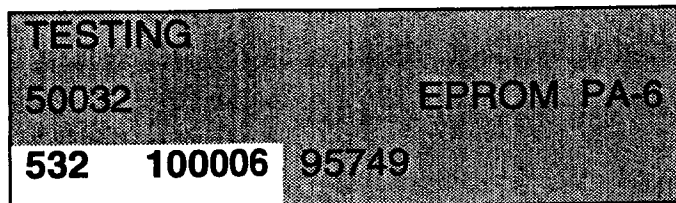
Hold the top interlock switch in, then slide the short end of the Service Switch Actuator over the top of the interlock switch bracket and the long end over the center of the switch plunger to hold it in.



# ATTENTION

This game uses a new Security CPU Board that is not downward compatible to the CPU boards used in previous games. The new board has an added security chip that can be interchanged between other Shadow games and software revision levels. The CPU board itself is interchangeable with later model games, but must be equipped with the correct security chip and software for that specific game.

The games' electronic ID number is shown in the display during power-up. The number displayed is the same nine digit number printed on the security chip label. The first three digits are the project number without a country specific code. An example of the power-up display is shown below, the electronic ID number is bolded.



# ***THE SHADOW™***

Midway Manufacturing Company reserves the rights to make modifications and improvements to its products.

The specifications and parts identified in this manual are subject to change without notice.

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# **Bally's** **THE SHADOW Pinball**

## **Game Rules & Shot Maps**

## **RULES**

**OBJECT:** Defeat Shiwan Khan in the final battle to save the world.

**SKILL SHOT:** Use left blue button to choose award. Make Left ramp to collect award.

**START SCENE:** Make left or right eject when Start Scene light is lit.

**SHADOW MULTI-BALL™:** Hit Sanctum brick wall to light locks, then shoot Sanctum to lock balls.

**KHAN MULTI-BALL™:** Spell K-H-A-N to light Khan multiball at the left eject. Shoot in left eject to start Khan multiball.

**JACKPOTS:** When in Shadow or Khan multiball shoot lit jackpot lights. Left and right ball ejects double and triple jackpots.

**VENGEANCE:** Use blue side buttons to move Phurba divertors to light all 4 Shadow rings to start Vengeance Mode. During Vengeance complete all rings in the given time.

**MONGOL ATTACK:** Spell M-O-N-G-O-L by hitting targets. Once completed shoot for the outer loops.

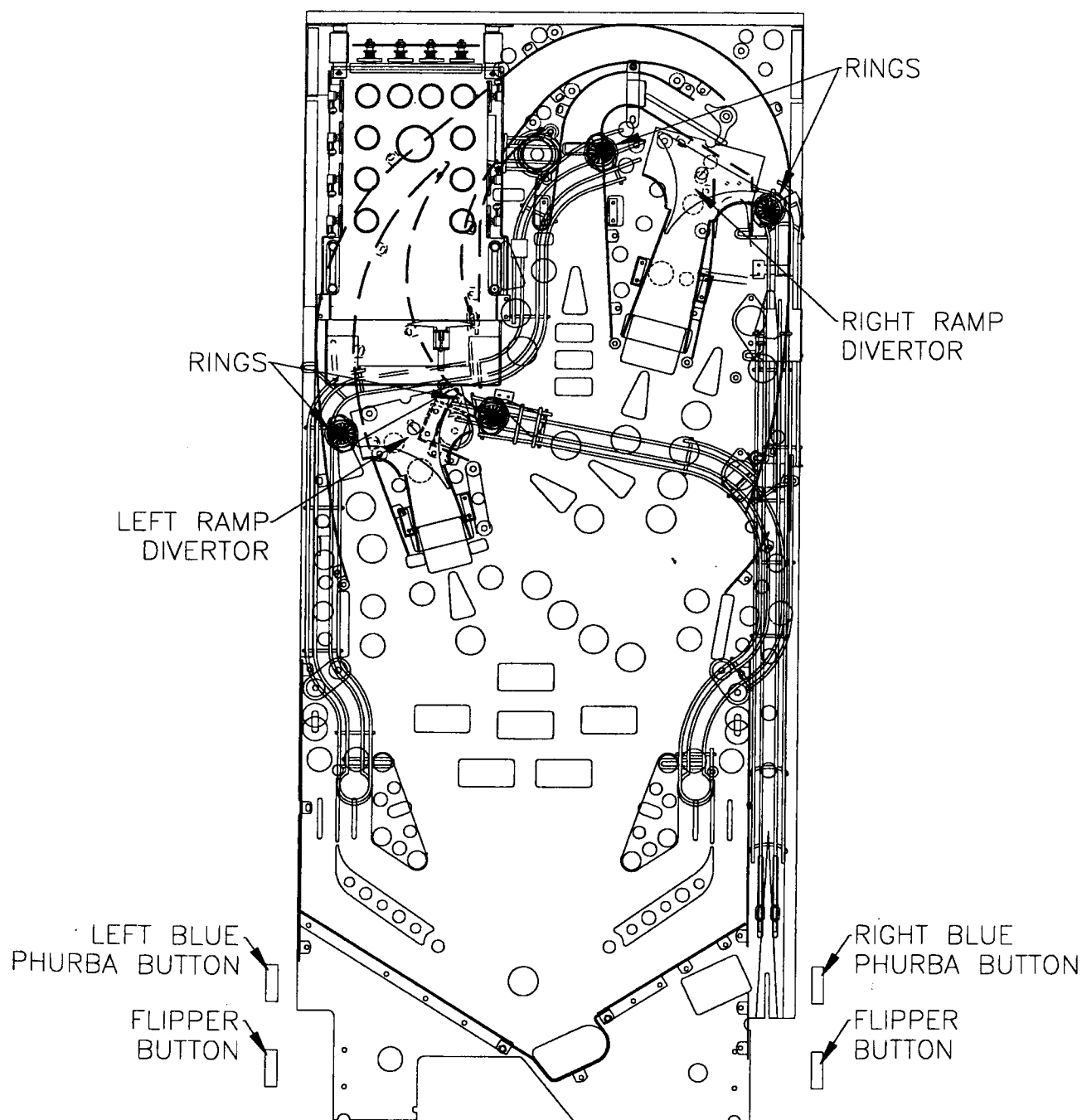
**BATTLEFIELD:** Hit target to gain access to the battlefield. Use flippers to move kicker head to the right and left. Make displayed number of hits and then break through the back to wall to collect jackpot.

**FINAL BATTLE:** Complete Shadow multiball, Khan multiball, Battlefield and all the scenes to light THE FINAL BATTLE.

**EXTRA BALL:** Complete Battlefield or make displayed Shadow loops IN-A-ROW to light Extra Ball. Shoot right eject to collect Extra Ball.

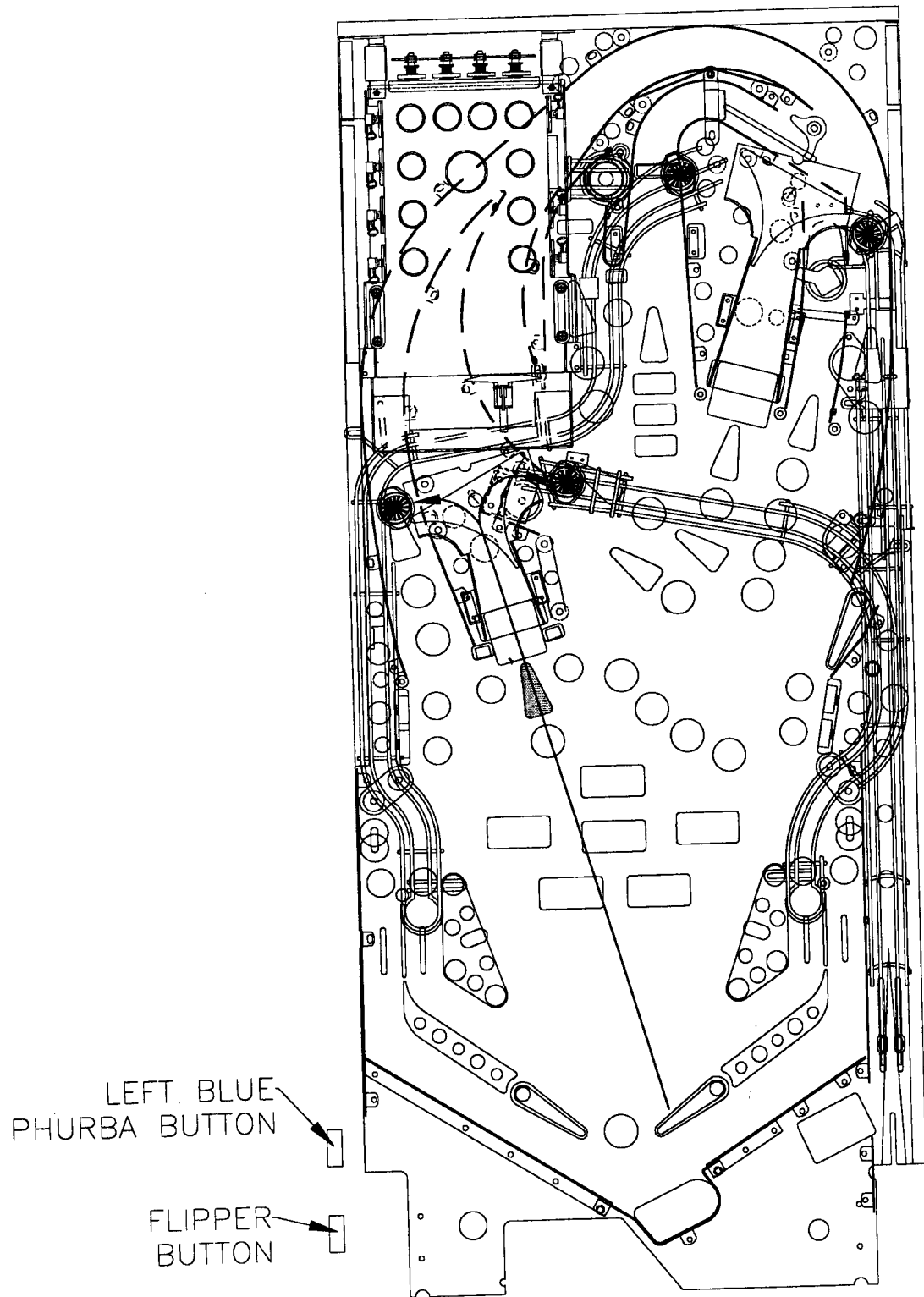
## **PHURBA RAMP DIVERTORS**

Use blue Phurba cabinet buttons (located above flipper buttons) to control the ramp divertors. The left blue button will toggle the left ramp divertor to the right and left. The right blue button will toggle the right ramp divertor to the right and left. Use divertors to light rings and to return the ball to the flipper needed to best play the game.



## SKILL SHOT

At ball start use left blue Phurba diverter button to choose award in display. Make left ramp shot to collect awards.

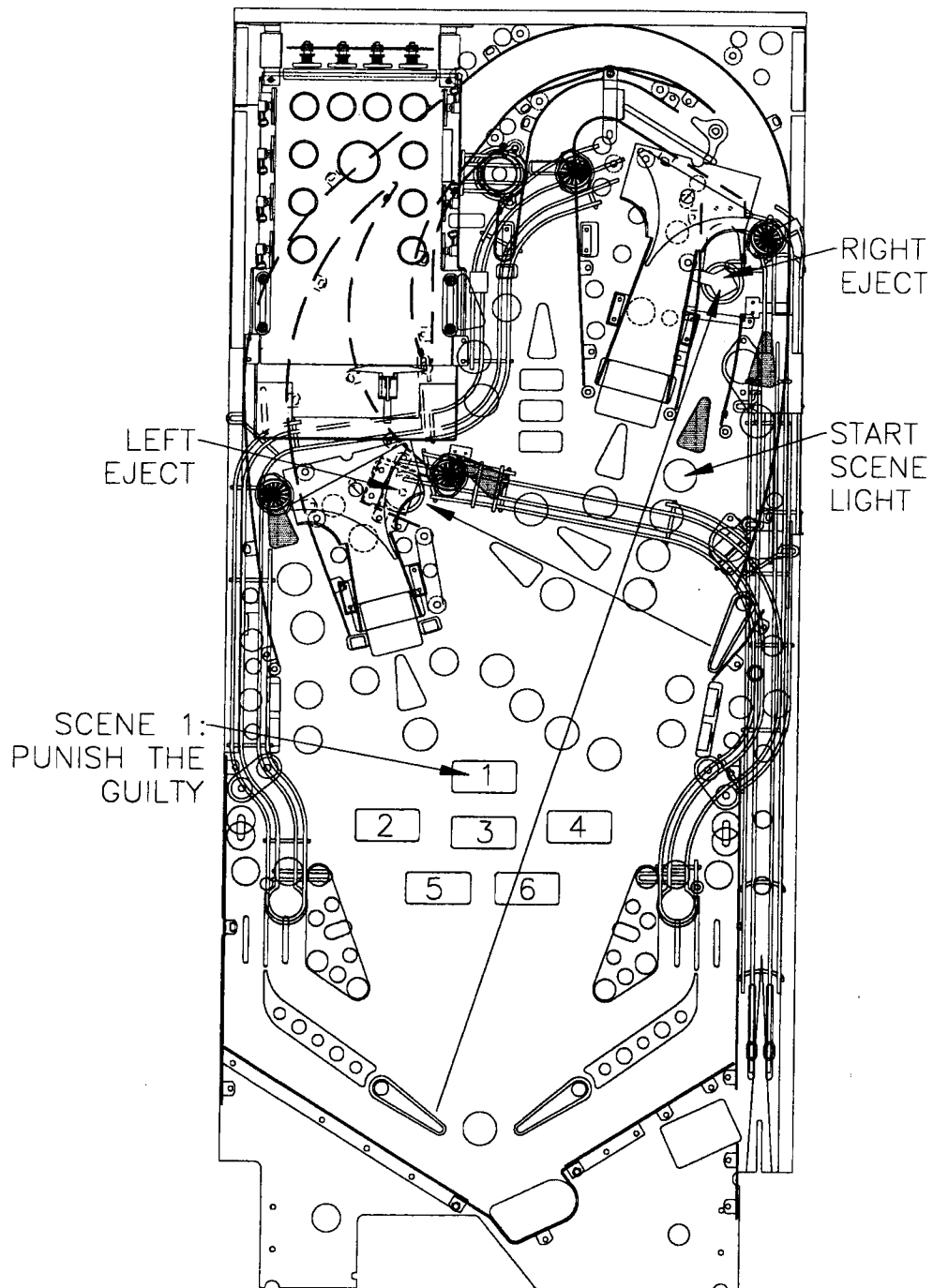


## **START SCENE**

To start a scene, make left or right eject when Start Scene light is lit.

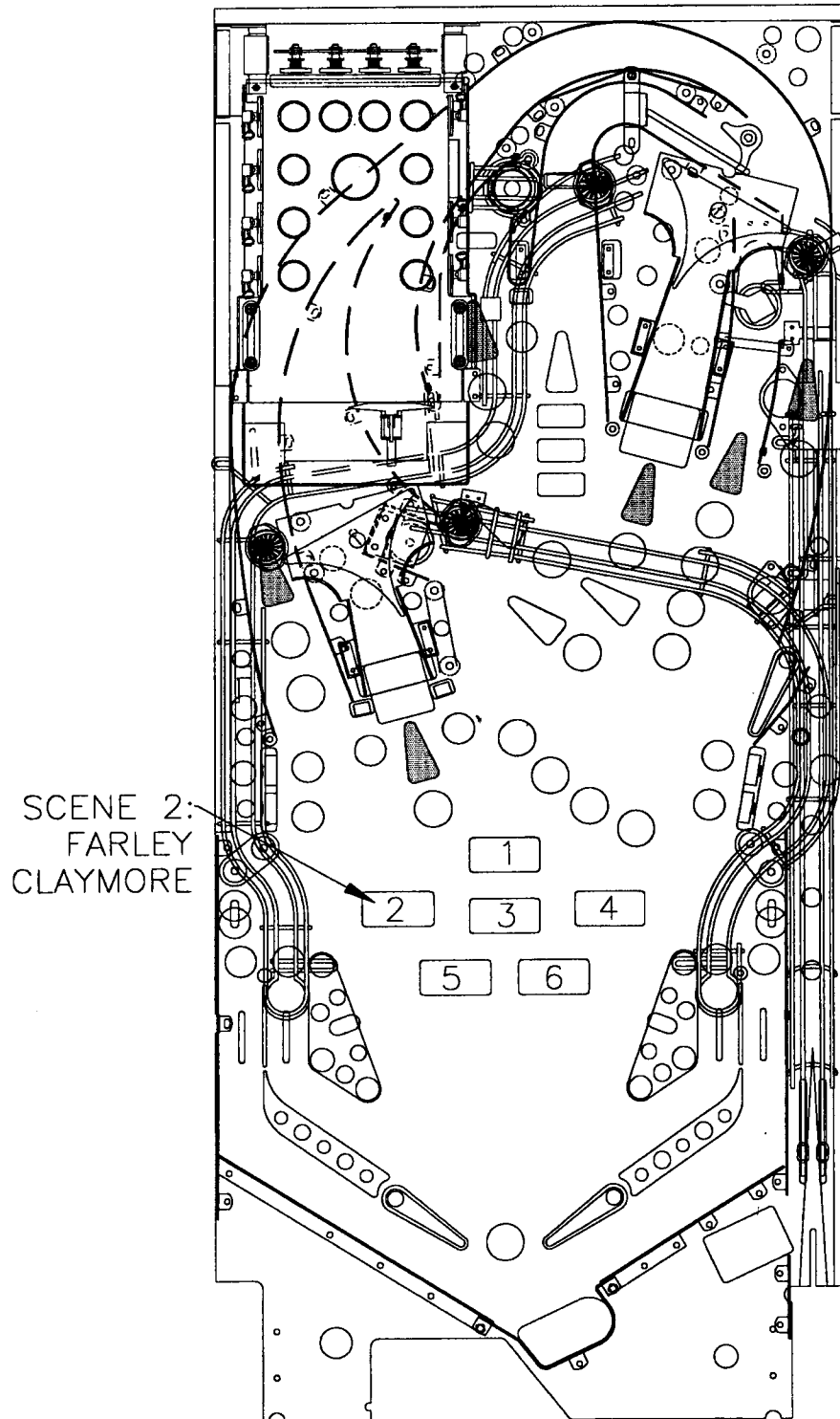
### **Scene 1: *Punish the Guilty***

Shoot lit arrows (outer and inner loops), then shoot the right eject to rescue Tam.



## Scene 2: *Farley Claymore*

Shoot lit arrows and stand-up targets. Each shot reduces the Hit-O-Meter Bar (display). Make enough shots and the Hit-O-Meter Bar disappears. This will complete the scene and make Farley drool and jump out a window.

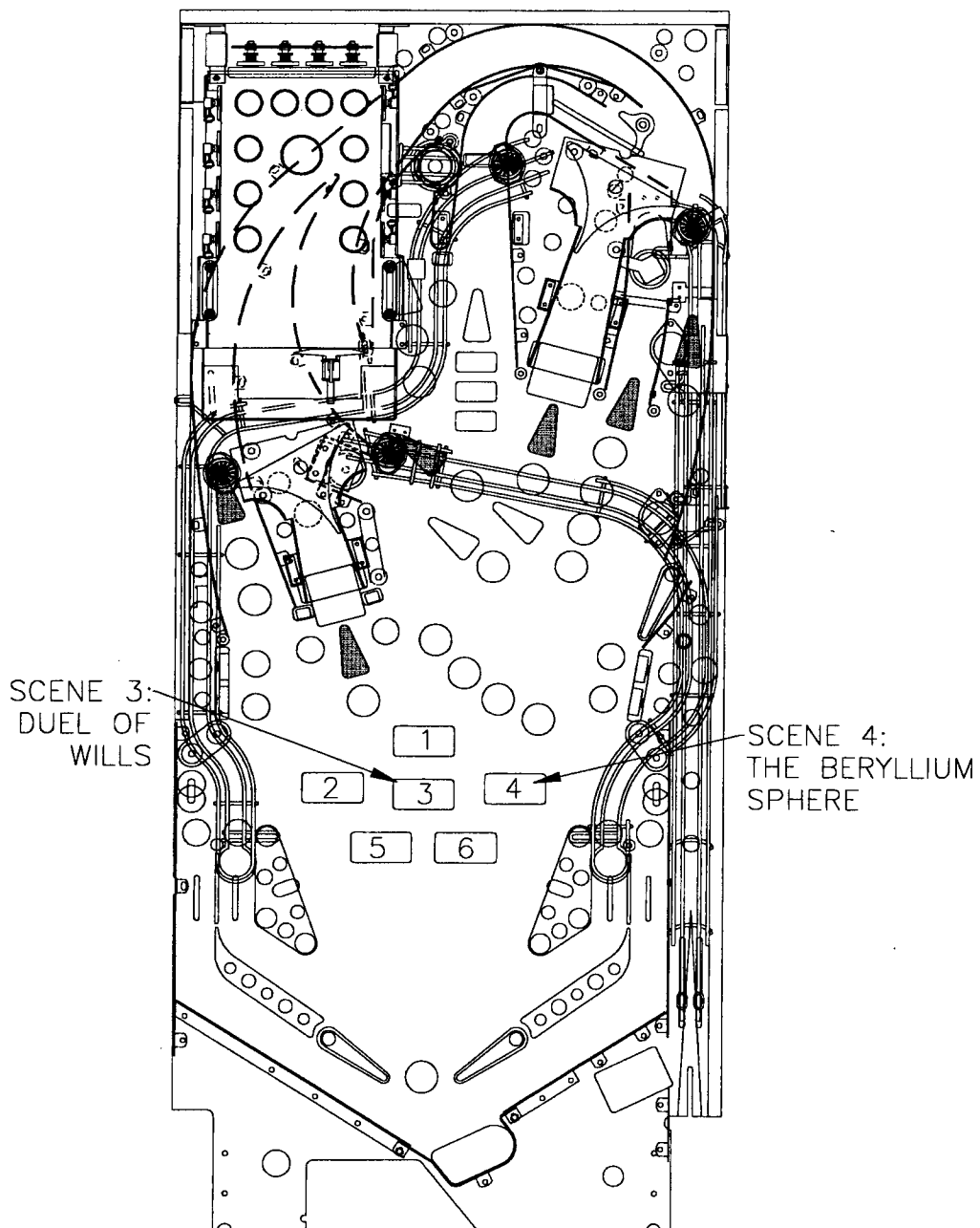


### Scene 3: *Duel of Wills*

This is a video mode. Use the left and right flippers to avoid the Phurba knives. Collect square items by running into them for points and extra ball.

### Scene 4: *The Beryllium Sphere*

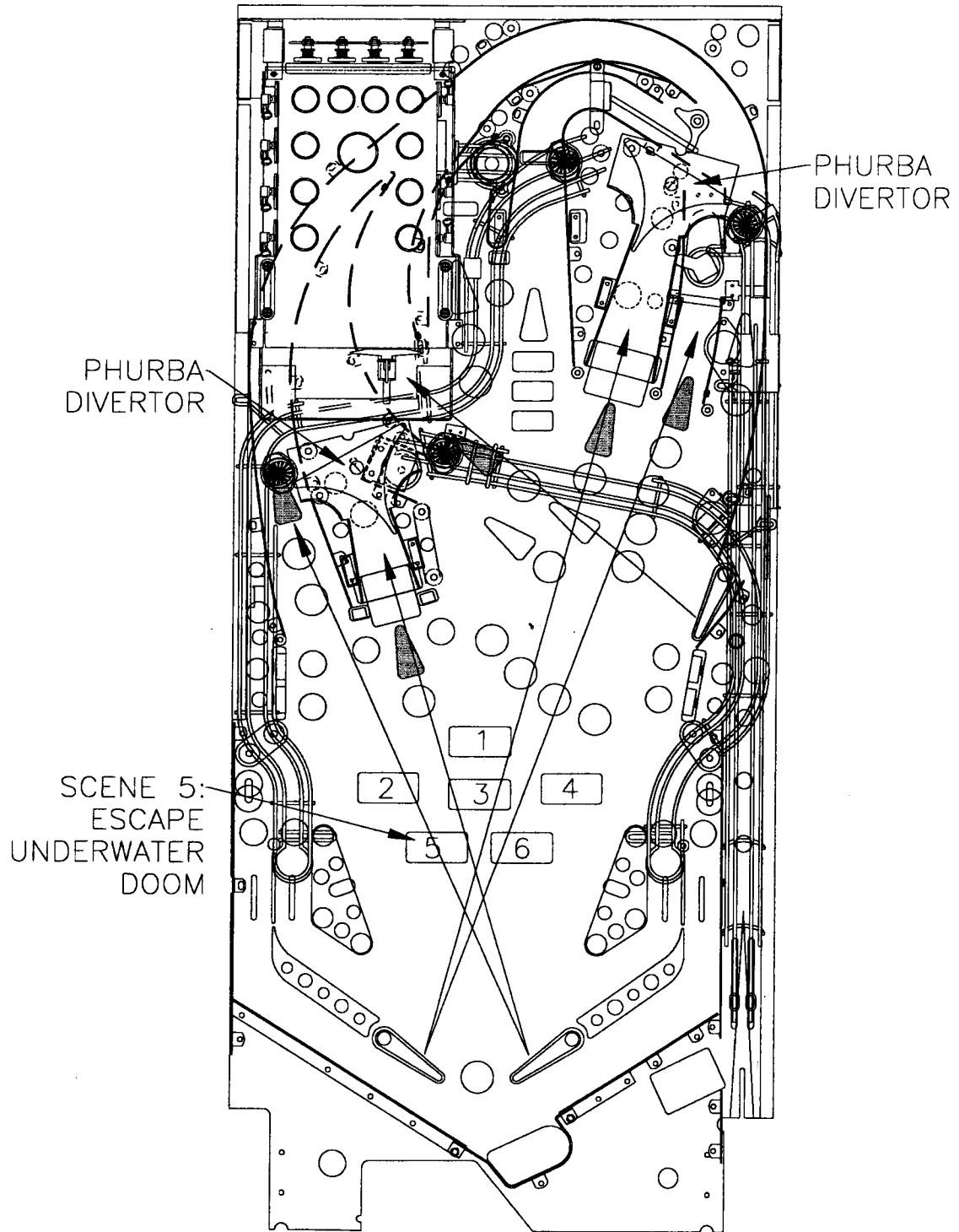
Shoot all the lit arrows to diffuse the bomb and save the world.





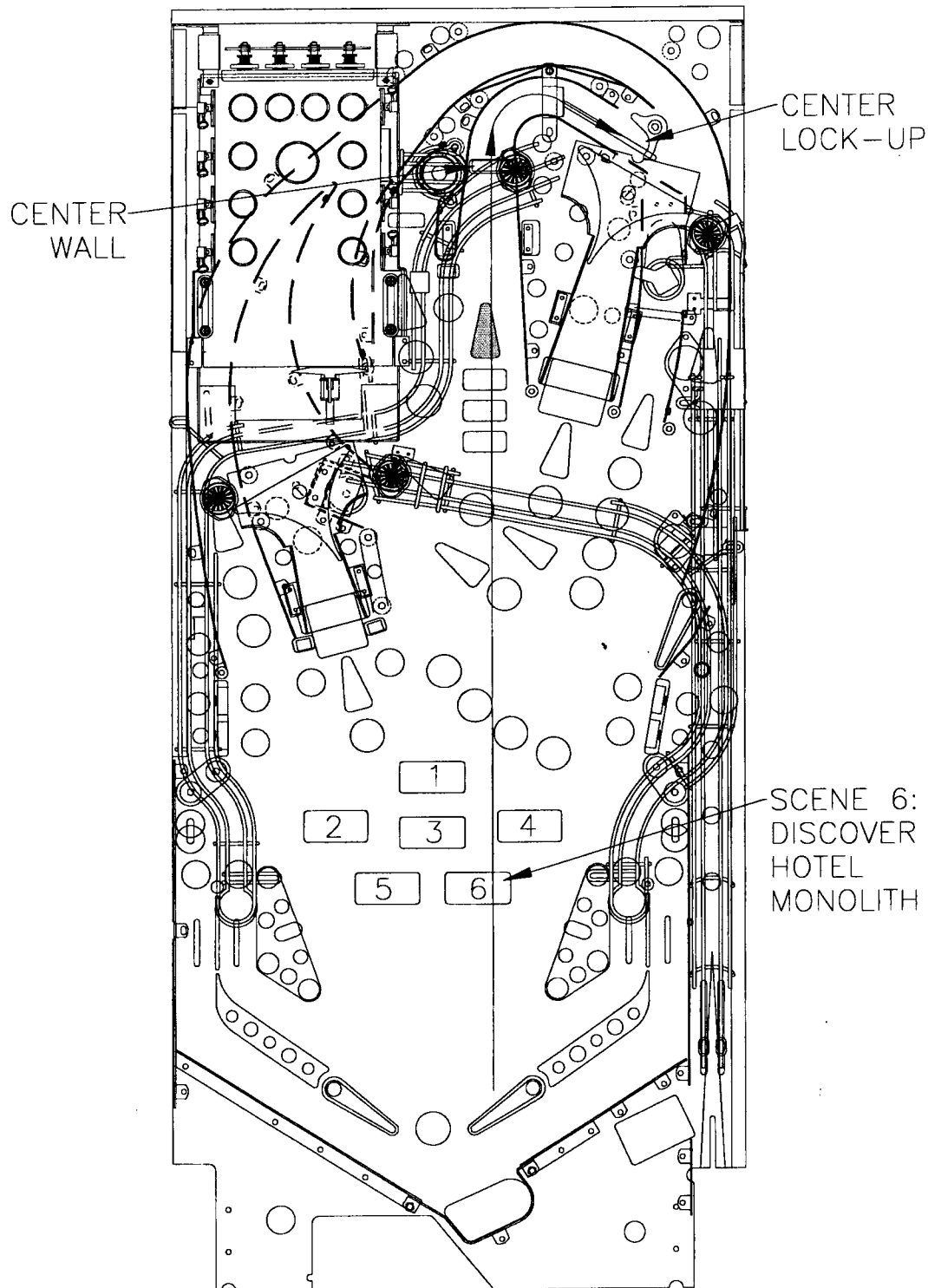
### Scene 5: *Escape Underwater Doom*

Shoot lit arrows to save The Shadow. Shots light up in a flowing pattern once each is made. Use Phurba divertors to get the ball back to the needed flipper. The score for each shot is counting down in the display. Make shots early for the most points.



### Scene 6: *Discover Hotel Monolith*

This will start a 2-Ball Multi-ball. Make the Center Wall shot (lit arrow) 3 times to reveal the hotel. Then shoot into Center Lock-up to start a Mongol Attack. Make all lit arrows to defeat the Mongols.

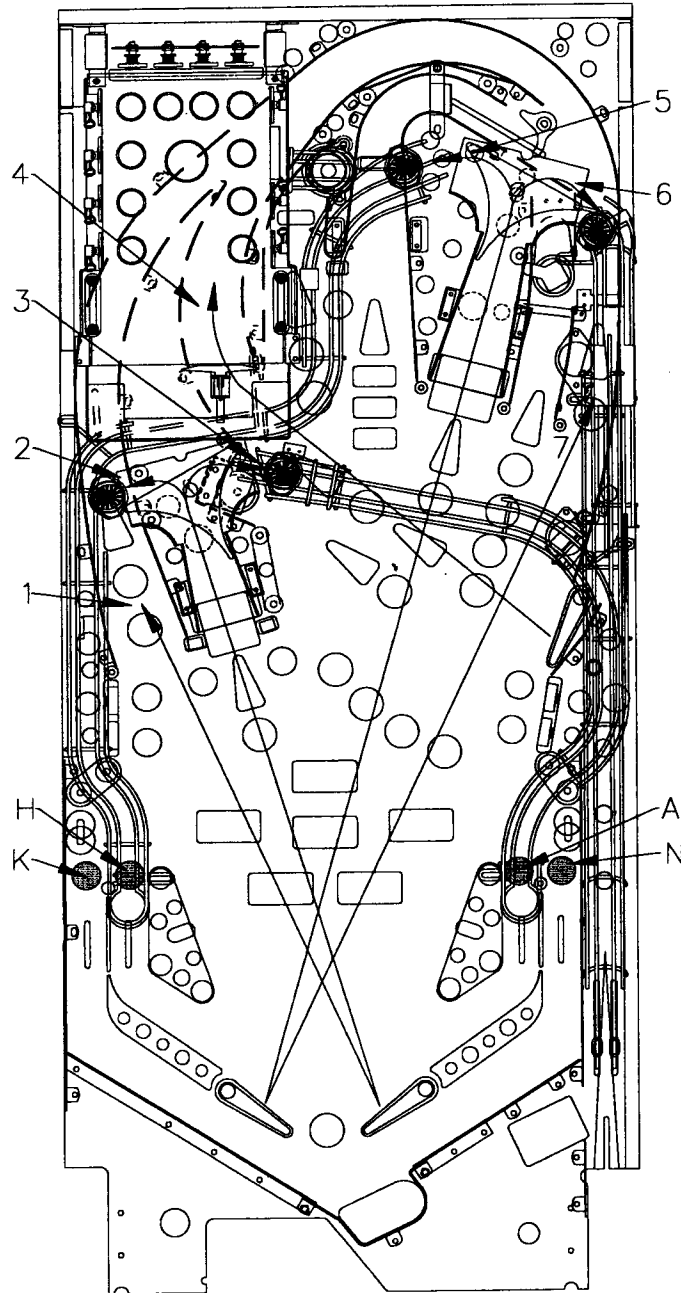


## COMBO'S

Making unique consecutive loops and ramp shots, in any order, will collect 3- to 7-Way Combo Bonus.

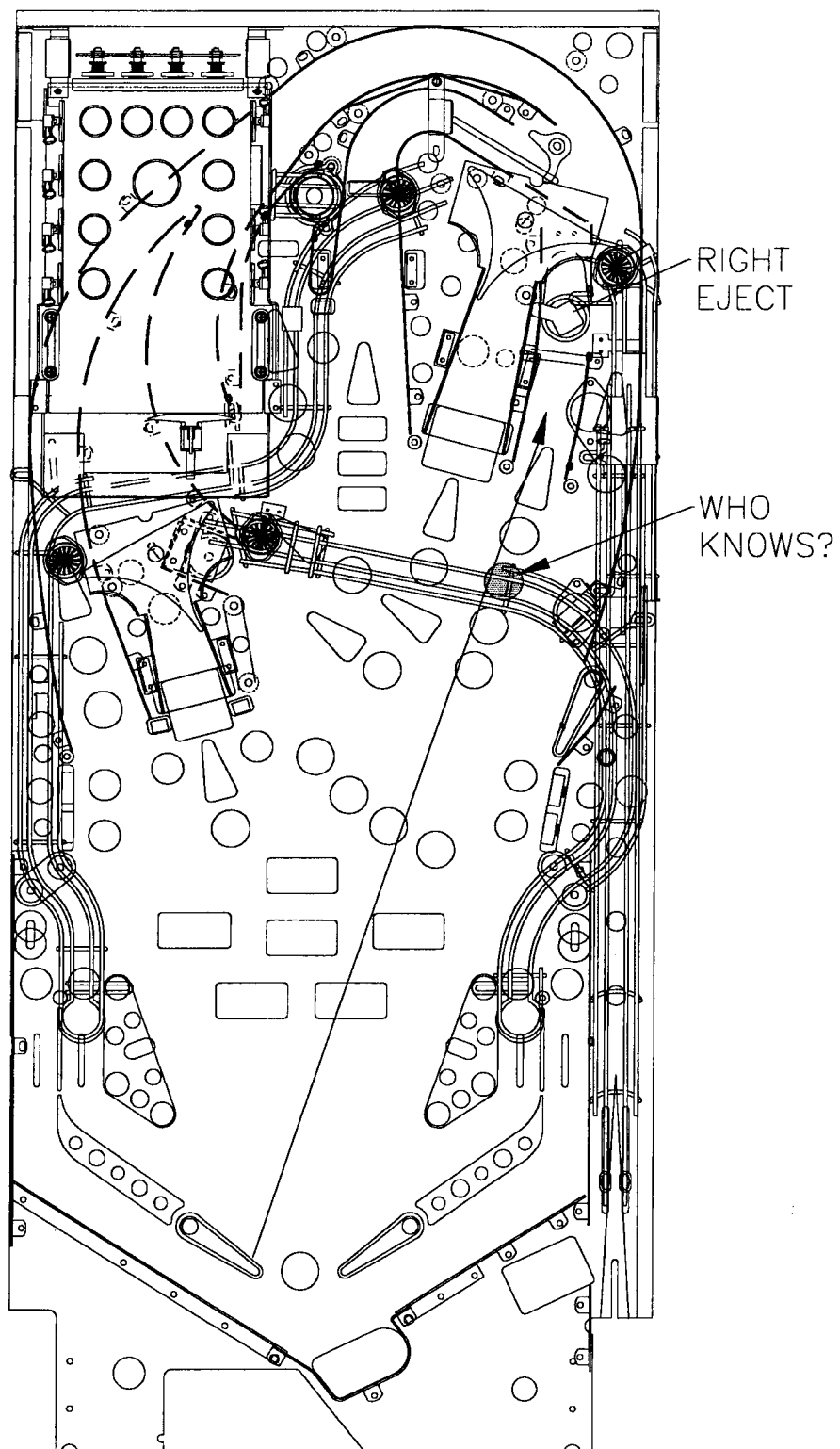
## BONUS X

Completing K-H-A-N lanes when Khan Multi-ball is lit, or in Multi-balls, will increase the end of ball bonus multiplier.



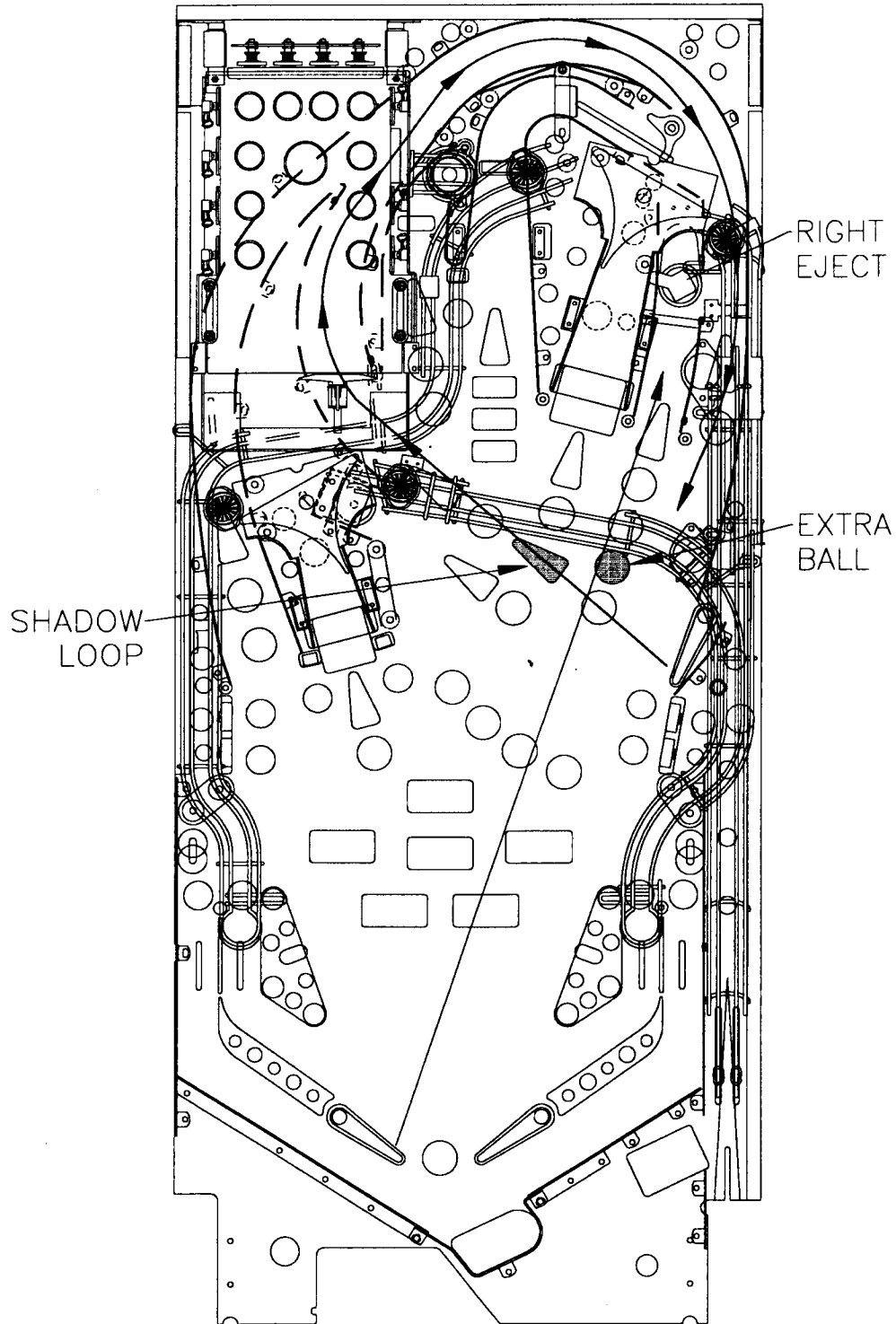
## WHO KNOWS?

Starting a Mongol Attack will light Who Knows. Shoot right eject to collect Who Knows Random Award.



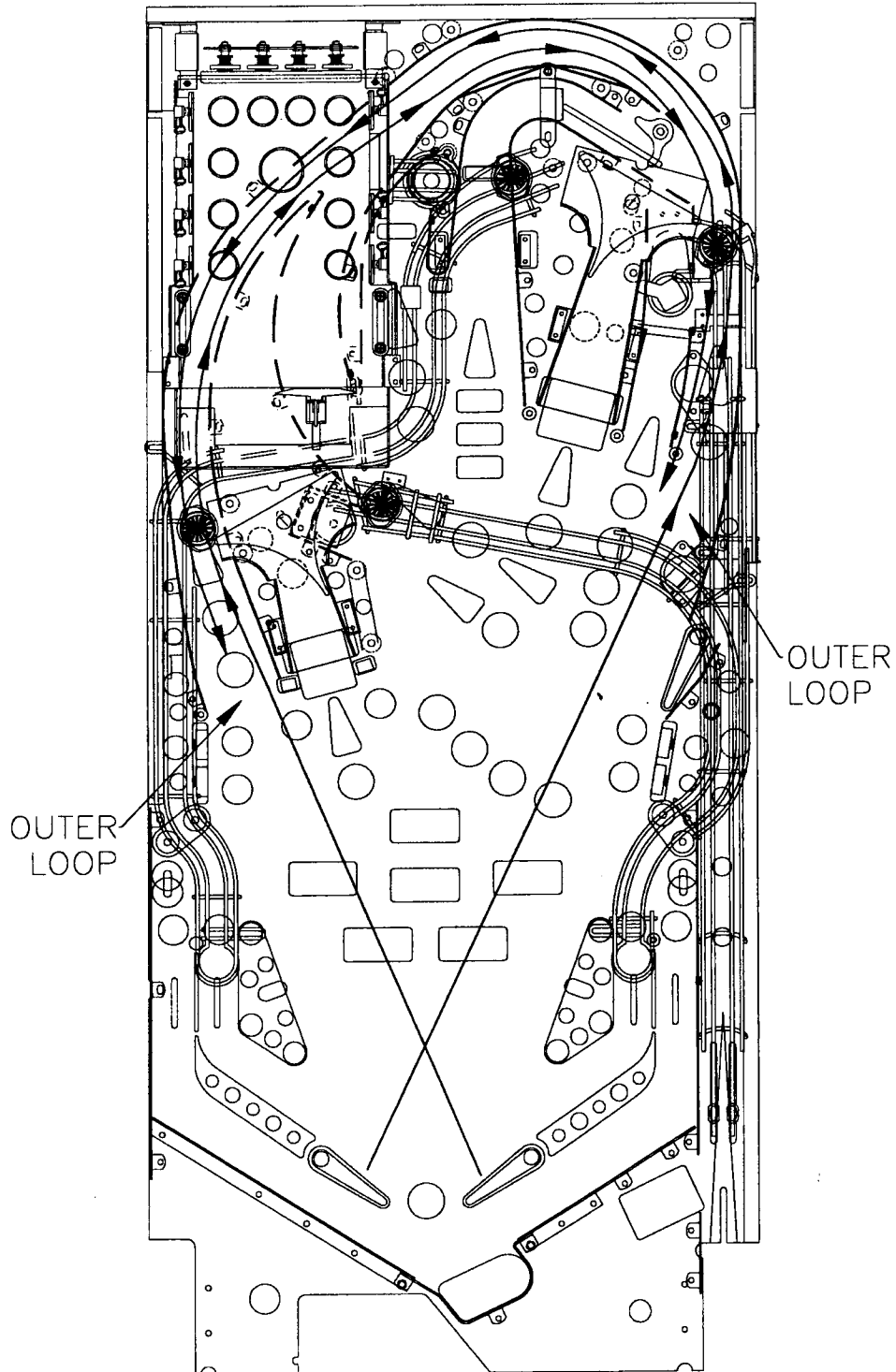
## **EXTRA BALL**

Shoot right eject to collect Extra Ball when lit. Light Extra Ball by completing the Battlefield or by making the displayed number of Shadow loops In-A-Row. Skill Shot and Who Knows can also light Extra ball.



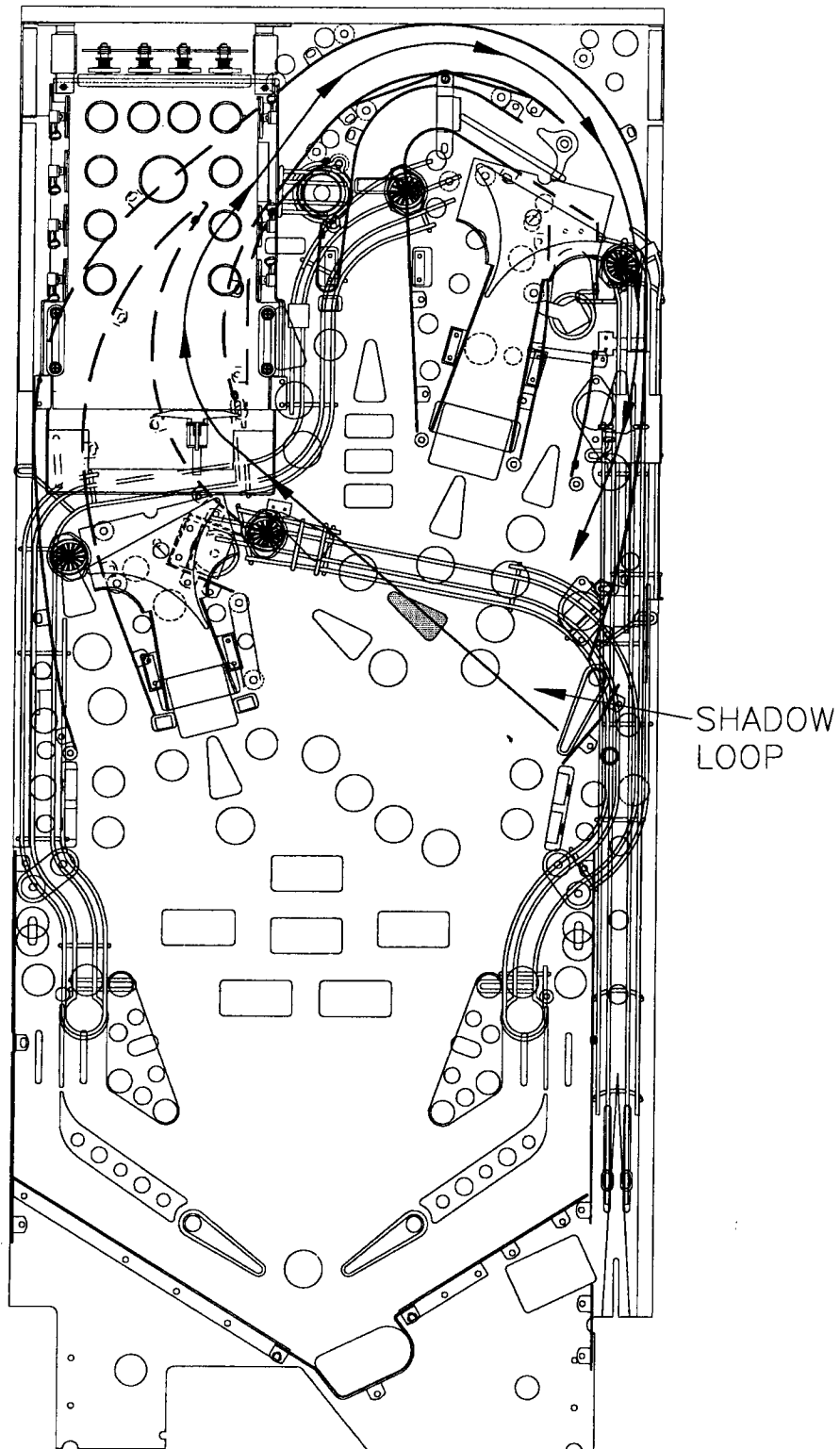
## OUTER LOOPS

Each loop shot made gets you closer to a Destination. Make it to all the Destinations to start Super Loops. When in Super Loops, outer loops are worth 20 million until the end of the ball.



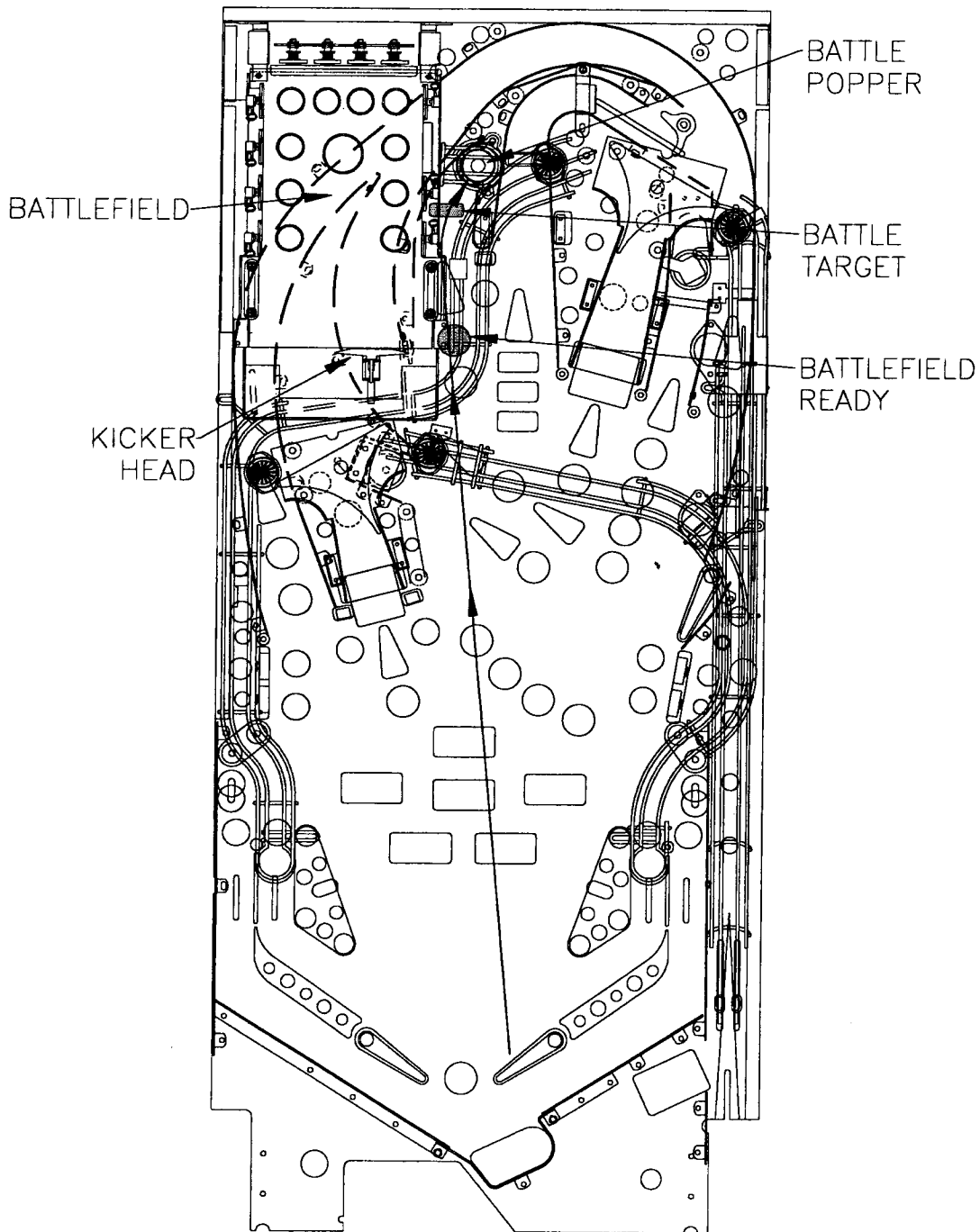
## INNER SHADOW LOOPS

Make inner loops for increasing value. Make the number of loops stated in the display In-A-Row to light Extra Ball or Collect Shadow Bonus.



## THE BATTLEFIELD

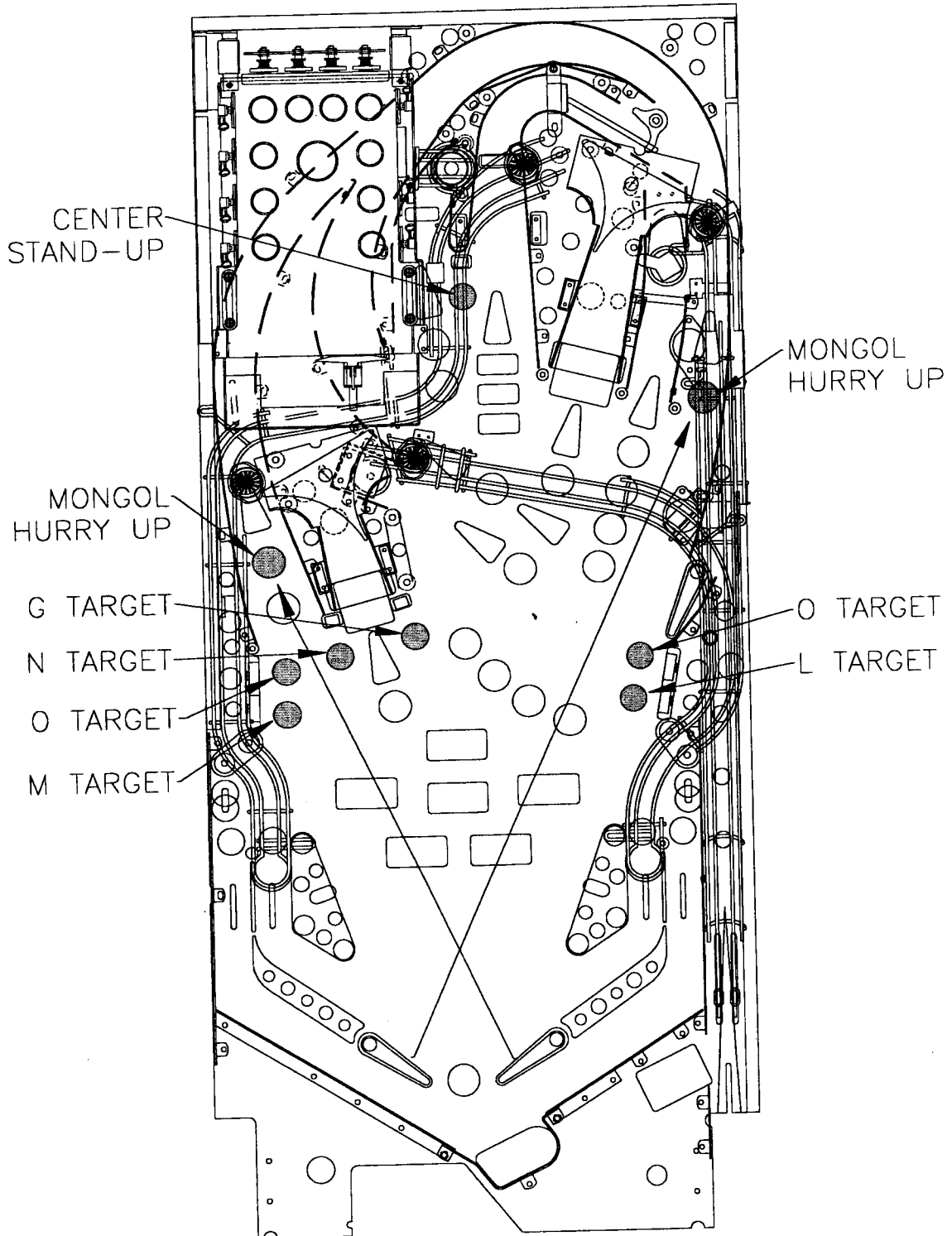
Hit Battle Drop Target to gain access to the Battlefield Mini-playfield. Shoot into the Battle Popper to enter the Battlefield. When on the Battlefield, use the flippers to move the kicker head to the right and left. Kicker head will fire automatically. Hit the amount of targets shown in the display and then break through the back drop targets to collect the Battlefield Jackpot and light Extra Ball. Completing all the lights on the Battlefield will increase the Jackpot value.





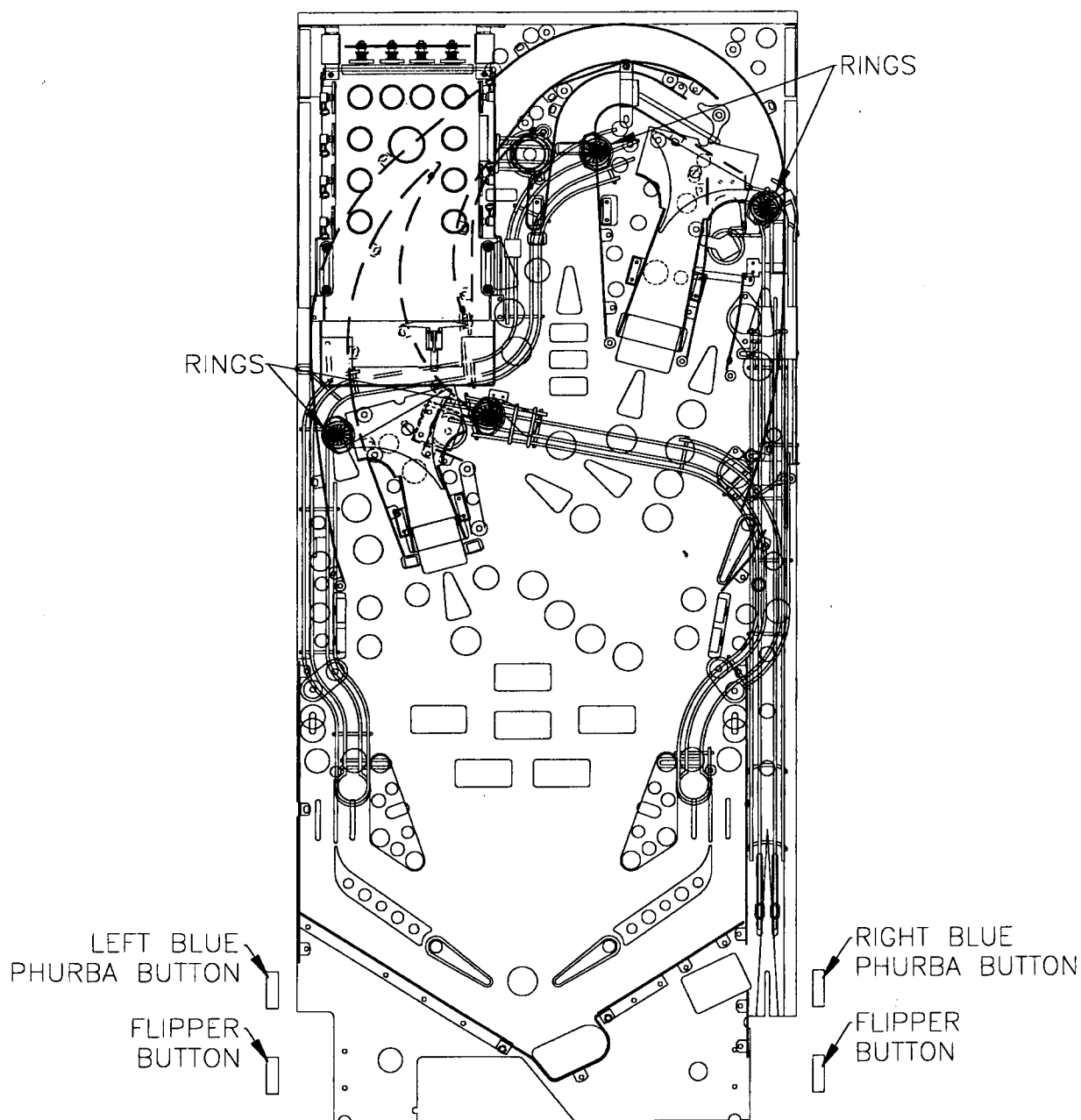
## MONGOL ATTACK

Complete M-O-N-G-O-L Targets to start Mongol Attack Hurry Up. Make outer loop to collect Mongol Hurry Up value in display. Center stand-up will spot a letter in M-O-N-G-O-L when lit.



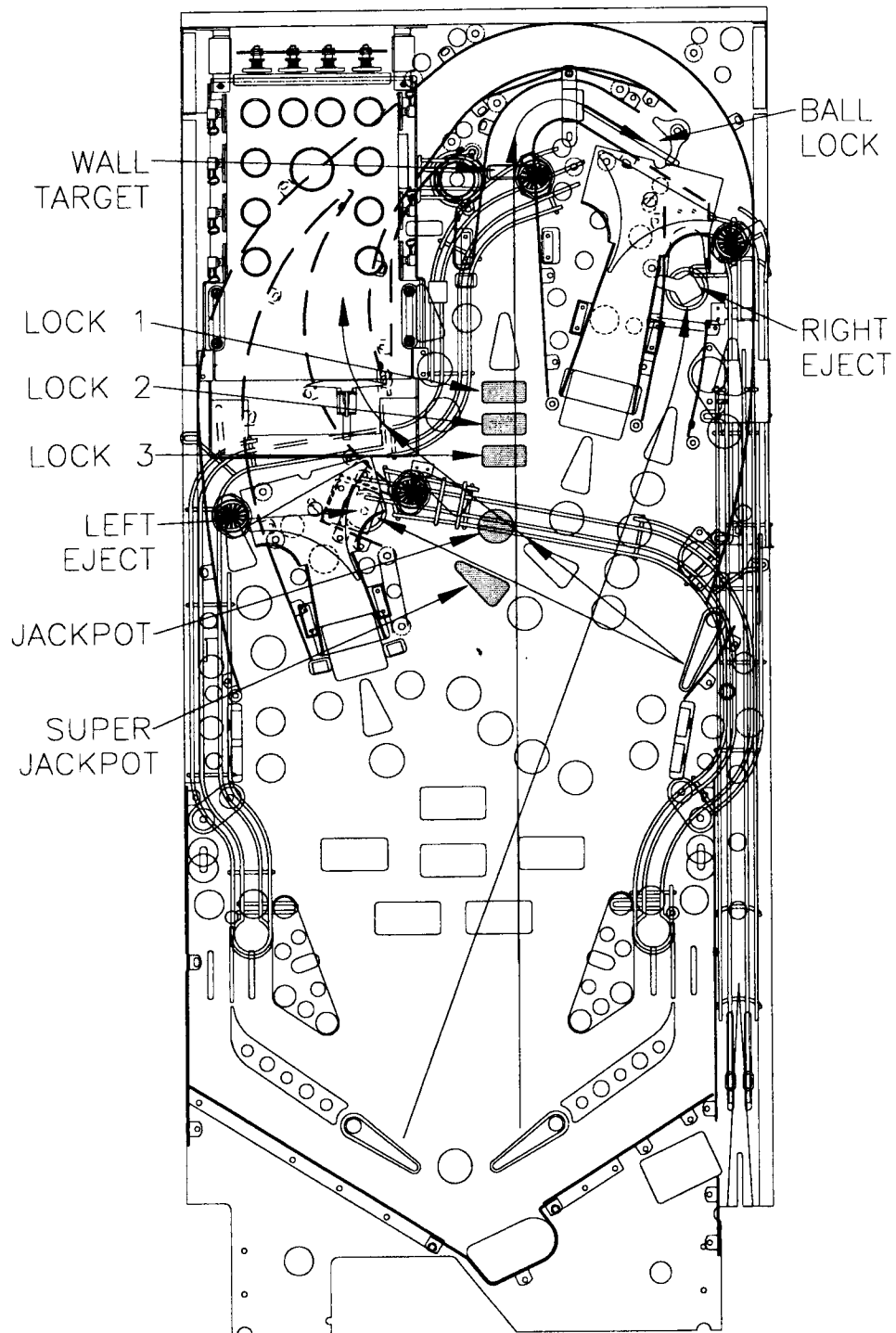
## VENGEANCE MODE

Use blue Phurba diverter buttons to direct the ball to all 4 ramp directions. When you make a shot the corresponding Ring will light solid. Collect all 4 Rings to start Vengeance Mode. Make all 4 Ring Shots in the time given for Bonus and re-starting of Vengeance Mode. Each ramp shot made will increase that shots value.



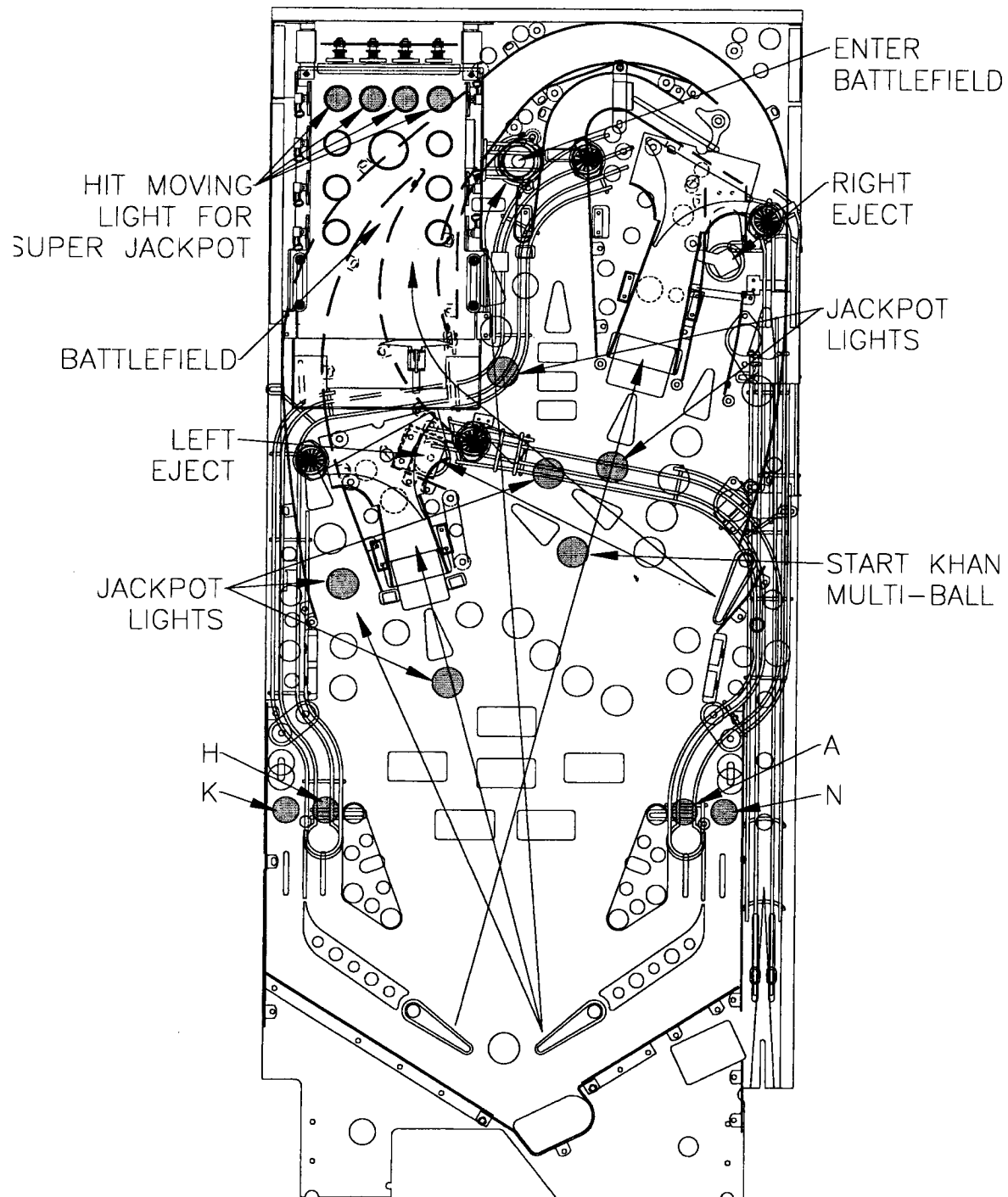
## SHADOW MULTI-BALL

Hit center Wall Target (Sanctum) to light Locks. Lock 3 balls to start Shadow Multi-ball. Shoot inner loop for Jackpot. Left and Right ejects double and triple Jackpot value. Make 5 Jackpots while in Multi-ball to light Shadow Super Jackpot at left eject. Make left eject to collect Super Jackpot.



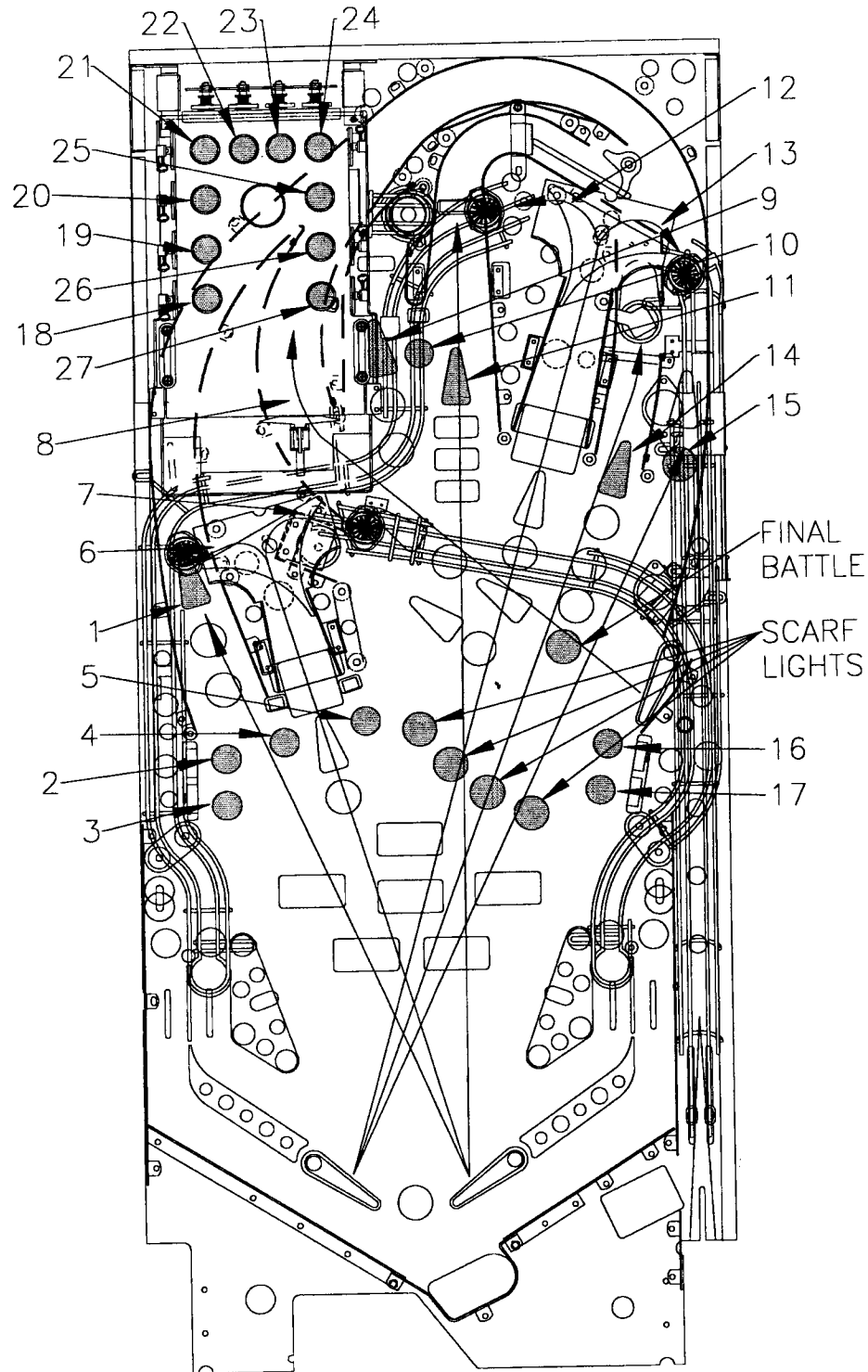
## KHAN MULTI-BALL

Complete K-H-A-N Lanes to light Khan Multi-ball at left eject. Shoot in left eject to start Khan 3-Ball Multi-ball (2 balls will kick out of the trough). Make lit jackpot lights to collect Jackpot. Left and right ejects double and triple Jackpot value. Make all 5 Jackpots to light Khan Super Jackpot on the Battlefield. Collect Super Jackpot by entering the Battlefield and hitting the moving light.



## FINAL BATTLE

Complete all items on Shadow Scarf to light Final Battle at the right eject. Start Final Battle by making the right eject. Final Battle is a 5-Ball Multi-ball. You must make all 27 shots on the playfield while in Multi-ball to collect 1 BILLION points and defeat Khan.



## Notes

## Notes

# SECTION ONE

## GAME OPERATION AND TEST INFORMATION

### (System WPC) ROM Summary

| IC           | TYPE   | BOARD | LOCATION | PART NUMBER                |
|--------------|--------|-------|----------|----------------------------|
| Game 1       | 27c040 | CPU   | U6       | A-5343-50032-1A (Domestic) |
| Game 1       | 27c040 | CPU   | U6       | A-5343-50032-1X (Foreign)  |
| Music/Speech | 27c040 | Audio | SU2      | A-5343-50032-S2            |
| Music/Speech | 27c040 | Audio | SU3      | A-5343-50032-S3            |
| Music/Speech | 27c040 | Audio | SU4      | A-5343-50032-S4            |
| Music/Speech | 27c040 | Audio | SU5      | A-5343-50032-S5            |
| Music/Speech | 27c040 | Audio | SU6      | A-5343-50032-S6            |
| Music/Speech | 27c040 | Audio | SU7      | A-5343-50032-S7            |

### NOTICE

Order replacement ROMs from your authorized MIDWAY MANUFACTURING CO. Distributor. Specify:  
(1) Part Number (if available); (2) ROM Level (number on the label); (3) Game in which ROM is used.

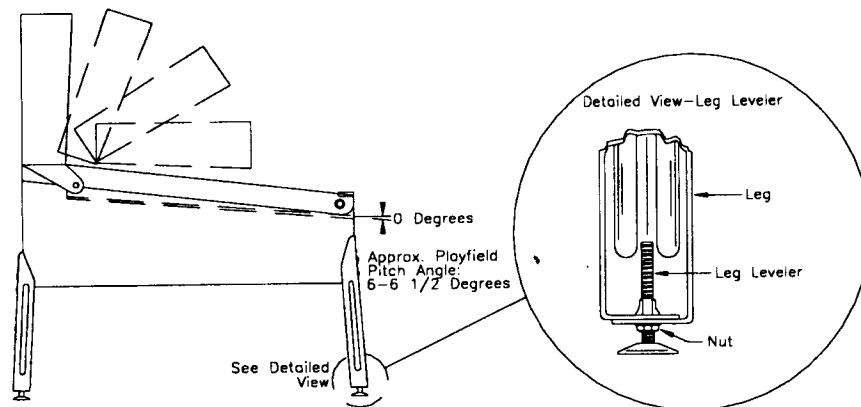


# PINBALL GAME ASSEMBLY INSTRUCTIONS

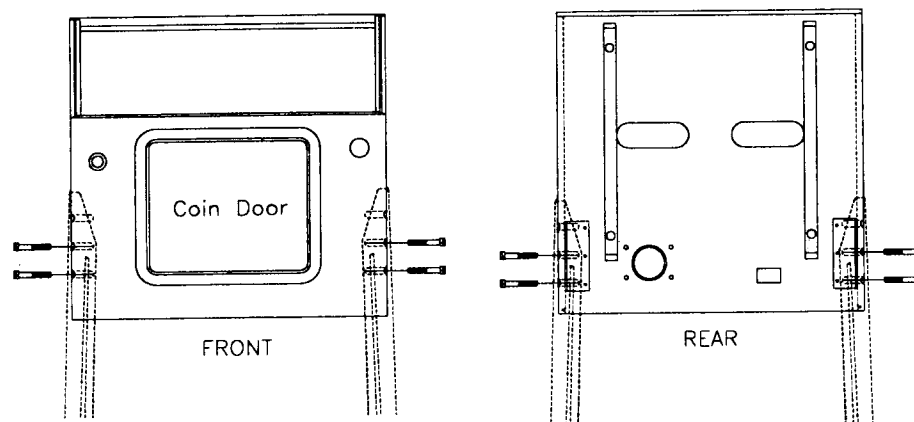
## THE SHADOW IS A 5 BALL GAME.

|                         |                                                                     |                           |                                                                 |
|-------------------------|---------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------|
| <b><u>Power:</u></b>    | Domestic 120V @ 60 Hz<br>Foreign 230V @ 50 Hz<br>Japan 100V @ 50 Hz | <b><u>Dimensions:</u></b> | Width: 29" Approx.<br>Depth: 56" Approx.<br>Height: 76" Approx. |
| <b><u>Temp:</u></b>     | 32° F to 100° F<br>(0° C to 38° C)                                  |                           |                                                                 |
| <b><u>Humidity:</u></b> | Not to exceed 95% relative.                                         | <b><u>Weight:</u></b>     | Approx. 325 Lbs. (crated)                                       |

1. Remove all cartons, parts, and miscellaneous items from the shipping container and set them aside.
2. Leg levelers and leg bolts are provided among the parts in the cash box. Install leg levelers on front and back legs (View 1). Place the cabinet on a support and attach rear legs using leg bolts (View 2).
3. Attach the front legs using leg bolts (View 2).



VIEW 1



VIEW 2

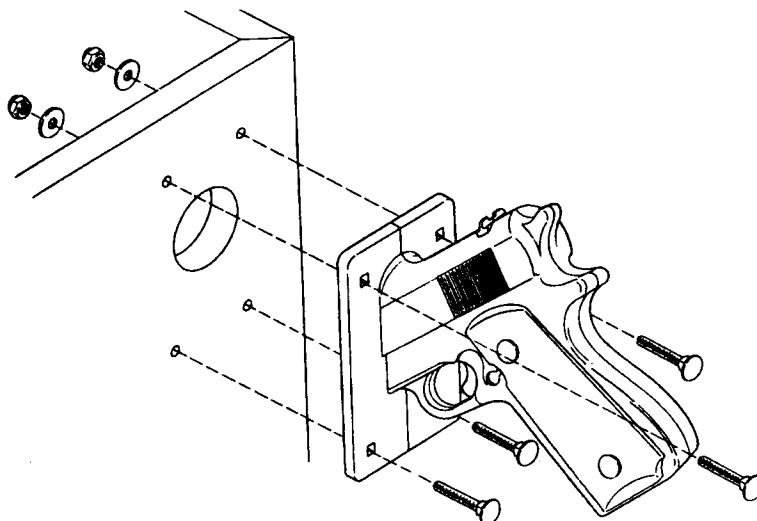
4. Reach into the cabinet and backbox and ensure that the interconnecting cables are not kinked or pinched. Be careful to avoid damaging wires at any stage of the assembly process.
5. Raise the hinged backbox upright and latch it into position. Unlock the backbox, and remove the backglass, storing it carefully to avoid damage. Remove the shipping screws holding the Insert Panel. Unlatch and open the Insert Panel. Carefully lift the Speaker Panel and lay it down on the playfield glass. Be careful not to damage the Dot Matrix Display/Driver Board. This allows access to the bolt holes used for securing the backbox upright. Install the washer-head mounting bolts through the bottom holes of the backbox into the threaded fasteners in the cabinet to secure the backbox. Close the Insert Panel and latch into position. Replace the Speaker Panel. Reinstall the backglass, and lock the backbox.



#### CAUTION

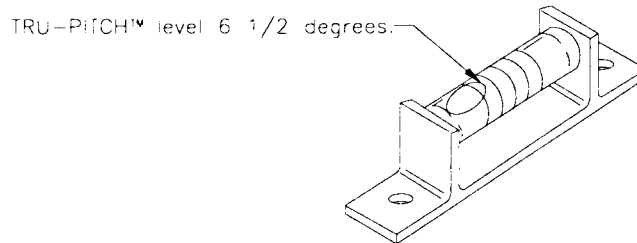
**FAILURE TO INSTALL** the backbox mounting hardware properly can cause personal injury.  
**NEVER TRANSPORT** a pinball game with the hinged backbox erect. Always lower the backbox forward onto the playfield cabinet on a layer of protective material to prevent marring or damage and possible personal injury.

6. Extend each leg leveler slightly below the leg bottom, so that all four foot pads protrude approximately the same distance. Remove the cabinet from its support and place it on the floor.
7. Unlock and open the coin door. Move the molding latch lever toward the left side of the game, to release the front molding. Lift the front molding off the playfield cover glass, return the latch lever to the right, and close the coin door. Carefully slide the glass downward, until it clears the grooves of the left and right side moldings. Lift the glass up and away from the game, storing it carefully to avoid breakage.
8. Install gun handle. Remove gun handle from the inside bottom of the cabinet. Then, using the hardware included with the gun handle plus two more 10-24 bolts, 10-24 ESN nuts and .219 x .500 x .063 flat washers located in the parts bag, attach the gun handle to the outside of the cabinet in the upper right corner (see diagram below). After the gun handle is in place, plug the connector from the handle into the matching connector from the cabinet.



9. Place a level or an inclinometer on the playfield surface. Adjust the leg levelers for proper playfield level (side-to-side). NOTE: These measurements must be made ON the playfield, not the cabinet nor the playfield cover glass. Tighten the nut on each leg leveler shaft to maintain this setting.

10. The TRU-PITCH™ level is located on the right shooter rail. This allows the playfield pitch angle to be accurately adjusted **WITHOUT REMOVING THE GLASS**. The first line (closest to the front of the game) on the level is approximately 6 degrees. Every line thereafter is approximately another 1/2 degree of pitch. The recommended pitch for The Shadow is 6 1/2 degrees. The nose of the bubble should be between the first and second line on the level (see diagram below).



## CAUTION

*Playfield pitch angle adjustments can affect the operation of the plumb bob tilt, inside the cabinet. The plumb bob weight is among the parts in the cash box; the operator should install the weight and adjust this tilt mechanism for proper operation, after completion of the desired playfield pitch angle setting. The unit is factory installed for a 6 1/2 degree angle. If an adjustment is necessary, loosen screw at the bottom of the unit. Move the pointer, one groove at a time to the left or right, depending on the degree desired. Hold pointer in place and tighten screw.*

11. Move the game into the desired location; recheck the level and pitch angle of the playfield.

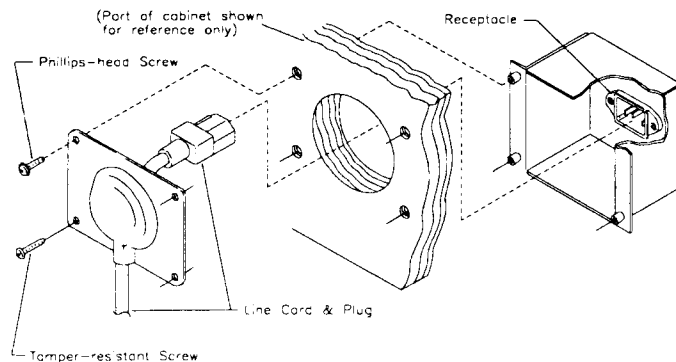
12. Verify that the **required number** of balls are installed in the game. **THE SHADOW** uses 5 balls.

13. Install playfield mylars if desired.

**NOTE: The SHADOW** playfield has a special hardcoat surface and does not require a full protective mylar. However, mylars can be purchased through your local Bally Distributor. Specify part number 03-9315-1 for full playfield mylar.

14. Clean and reinstall the playfield cover glass, reversing the procedure of step 7.

15. To attach line cord, remove envelope stapled to the inside cabinet (near cashbox). Remove the four Phillips-head screws that mount the line cord cover plate to the rear cabinet. Match the prongs on the plug with the holes in the receptacle and push line cord securely into place. Make sure cord aligns with the indentation of plate (indentation should point toward bottom of cabinet). Remount line cord cover plate. If desired, tamper resistant screws are provided in an envelope marked "Security Screws" (located in cashbox) to remount cover plate.



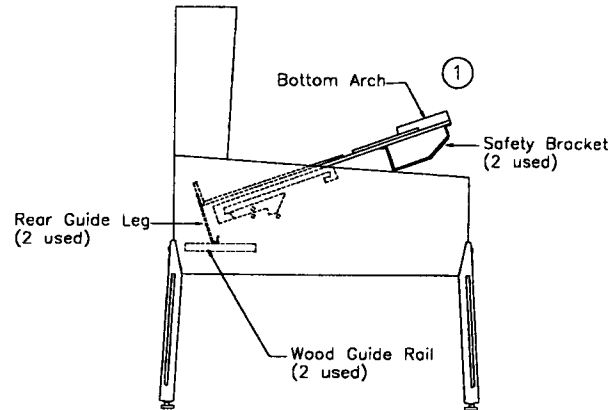
## RAISING THE PLAYFIELD

### CAUTION

Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

#### To Raise Playfield:

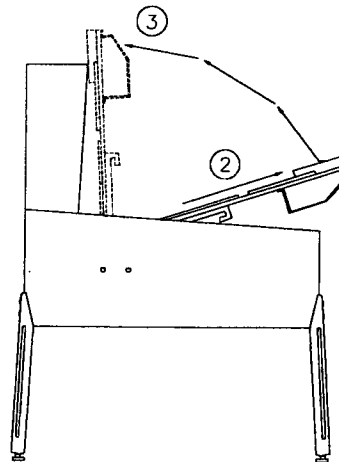
1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.



2. Pull the playfield out toward you until it stops (rest position) and raise it approximately 3".

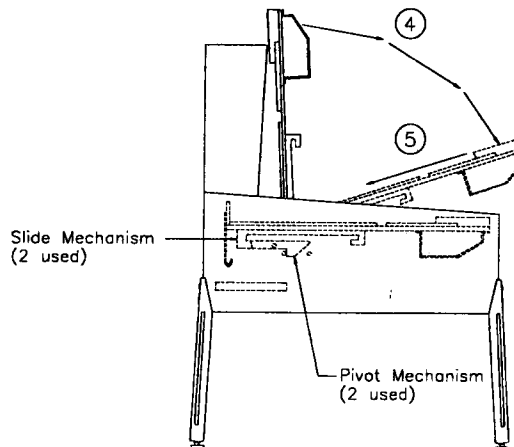
**Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.**

3. Rotate playfield to upright service position (lean on backbox) by pulling toward you and up. Listen for the sound of a click; this insures locking and pivoting sequence.



#### To Lower Playfield:

4. Rotate the playfield to the rest position. This unlocks the pivoting sequence.
5. Push back playfield into cabinet and into playing position.



# GAME CONTROL LOCATIONS

## Cabinet Switches

The On-Off switch is located on the bottom of the cabinet near the right front leg.

The Start Button is the push-button to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

## Coin Door Switches

The operator controls all game adjustments, obtains bookkeeping information, and diagnoses problems, using only four push-button switches mounted on the inside of the coin door. The Coin Door Switches have two modes of operation Normal Function and Test Function.

### Normal Function

The Service Credits button puts credits on the game that are not included in any of the game audits.

The Volume Up (+) button raises the sound level of the game. Press and hold the button until the desired level is reached.

The Volume Down (-) button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to shut sound OFF completely.

The \*Begin Test button starts the Menu System Operation and changes the Coin Door Switches from Normal Function to Test Function.

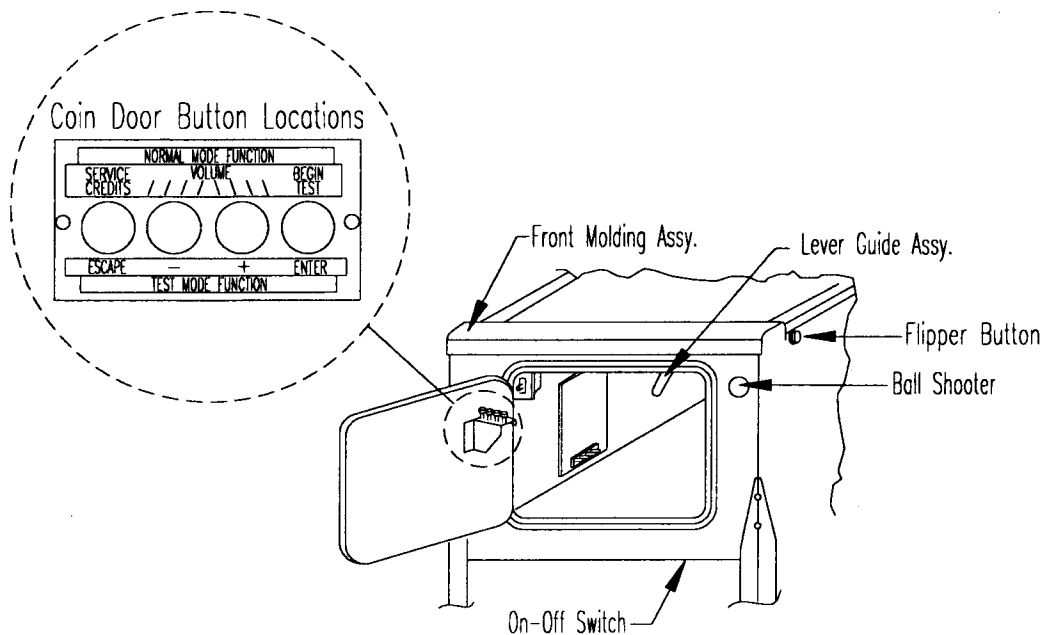
### Test Function

The Escape button allows you to get out of a menu selection or return to the Attract Mode.

The Up (+) button allows you to cycle forward through the menu selections or adjustment choices.

The Down (-) button allows you to cycle backward through the menu selections or adjustment choices.

The \*Enter button allows you to get into a menu selection or lock in an adjustment choice.



***\*To reset High Score, hold down the Begin Test/Enter switch for 5 seconds while in the Attract Mode.***

# GAME OPERATION



## CAUTION

After assembly and installation at the site location, this game must be plugged into a properly grounded outlet to prevent shock hazard, and to assure proper game operation. DO NOT use a 'cheater' plug to defeat the ground pin on the line cord. DO NOT cut off the ground pin.

**POWERING UP.** With the coin door closed, plug the game in and switch it On. In normal operation, testing will show in the display as the game performs Start-Up Tests. Once the Start-Up Tests have been successfully completed the last score is displayed. After which, the game goes into the Attract Mode.

**Note:** After the game has been on location for a period of time, the Start-Up Tests may contain messages concerning game problems. See 'Error Messages' for more detailed information regarding messages.

Open the coin door and press the Begin Test Switch. The display shows the game name, number, and software revision. The message changes. The display shows the sound software revision, revision level of the system software and date the game software was revised.

**Example:**            **SHADOW**  
                  50032    Rev. PA-O

**Sound Rev. P-O**  
                                  **Sy. 3.24    12/9/93**

Press the Enter button to enter the WPC Menu System (refer to the section entitled 'Menu System Operation' for more information). Slide the Service Switch Actuator over the top interlock switch located in the bottom left corner of the coin door opening. Perform the entire Test Menu routine to verify the game is operating satisfactorily.

**ATTRACT MODE\*.** After completing the Test Menu routine, press the Escape button three times to enter the Attract Mode. During the Attract Mode the display shows a series of messages informing the player of the recent highest scores\*, "custom messages\*", and the score to achieve to obtain a replay award\*

**CREDIT POSTING.** Insert coin(s). A sound is heard for each coin and the display shows the number of credits purchased. So long as the number of maximum allowable credits\* are NOT exceeded by coin purchase or high score, credits are posted correctly.

**STARTING A GAME.** Press the Start button once. A startup sound plays and the credit amount shown in the display decreases by one. The display flashes 00 (until the first playfield switch is actuated), and shows ball 1. If credits are posted, additional players may enter the game by pressing the Start button once for each player, before the end of play on the first ball.

**TILTS.** Actuating the cabinet tilt switch inside the cabinet ends the current game and proceeds to the Game Over Mode. With the third closure\* of the plumb bob tilt switch, the player loses the remaining play of that ball, but can complete the game.

**END OF GAME.** All earned scores and bonuses are awarded. If a player's final score exceeds the specified value, the player receives a designated award for achieving the current highest score. A random digit set\* appears in the display. Credit\* may be awarded when the last two digits of any player's score match the random digits. Match, high score, and game over sounds are made, as appropriate.

**GAME OVER MODE.** Game Over will show in the display. Afterward, the high scores flash on the display. The game proceeds to the Attract Mode.

\*Operator-adjustable feature.

## MENU SYSTEM OPERATION

The Main Menu allows you to choose from several categories, which in turn lead to other menus. To access the Main Menu, open the coin door and press the Begin Test button, then press the Enter button. Press the Up or Down buttons to cycle through the Main Menu. Press the Enter button to access a menu. Press the Escape button to return to the Main Menu. Press the Start button for HELP at any time.

### Main Menu

|                     |                          |
|---------------------|--------------------------|
| B. Bookkeeping Menu |                          |
|                     | B.1 Main Audits          |
|                     | B.2 Earnings Audits      |
|                     | B.3 Standard Audits      |
|                     | B.4 Feature Audits       |
|                     | B.5 Histograms           |
|                     | B.6 Time-Stamped         |
| P. Printouts Menu   |                          |
|                     | P.1 Earnings Data        |
|                     | P.2 Main Audits          |
|                     | P.3 Standard Audits      |
|                     | P.4 Feature Audits       |
|                     | P.5 Score Histograms     |
|                     | P.6 Game Time Histograms |
|                     | P.7 Time-Stamped         |
|                     | P.8 All Data             |
| T. Test Menu        |                          |
|                     | T.1 Switch Edges         |
|                     | T.2 Switch Levels        |
|                     | T.3 Single Switches      |
|                     | T.4 Solenoid Test        |
|                     | T.5 Flasher Test         |
|                     | T.6 General Illumination |
|                     | T.7 Sound & Music Test   |
|                     | T.8 Single Lamps         |
|                     | T.9 All Lamps            |
|                     | T.10 Lamp & Flasher Test |
|                     | T.11 Display Test        |
|                     | T.12 Flipper Test        |
|                     | T.13 Ordered Lamp Test   |
|                     | T.14 Lamp Row-Col Test   |
|                     | T.15 Dip Switch Test     |
|                     | T.16 Mini-playfield Test |
|                     | T.17 Magnet Test         |
|                     | T.18 Empty Balls Test    |
| U. Utilities Menu   |                          |
|                     | U.1 Clear Audits         |
|                     | U.2 Clear Coins          |
|                     | U.3 Reset H.S.T.D.       |
|                     | U.4 Set Time & Date      |
|                     | U.5 Custom Message       |
|                     | U.6 Set Game I.D.        |
|                     | U.7 Factory Adjustments  |
|                     | U.8 Factory Resets       |
|                     | U.9 Presets              |
|                     | U.10 Clear Credits       |
|                     | U.11 Auto Burn-In        |
| A. Adjustments Menu |                          |
|                     | A.1 Standard Adjustments |
|                     | A.2 Feature Adjustments  |
|                     | A.3 Pricing Adjustments  |
|                     | A.4 H.S.T.D. Adjustments |
|                     | A.5 Printer Adjustments  |

#### Press Escape

To move out of a menu selection.

#### Press Enter

To get into a menu selection.

#### Press Up

Increases sequence; Example A.1, A.2, A.3, A.4.

#### Press Down

Decreases Sequence; Example A.4, A.3, A.2, A.1.

Use Up and Down to cycle through the selections in a menu.

Use Escape and Enter to move into and out of the selected menu

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an audit menu. Press the Escape button to return to the Bookkeeping Menu.

## **B. BOOKKEEPING MENU**

### **B.1 Main Audits**

### **B.2 Earning Audits**

### **B.3 Standard Audits**

### **B.4 Feature Audits**

### **B.5 Histograms**

### **B.6 Time-Stamp**

**One Button Audit System.** The Bookkeeping Menu is obtainable directly from the Attract Mode. Repeatedly pressing the Enter button, while in the Attract Mode, will cycle through all of the game audits.

### **B.1 Main Audits**

|     |    |                   |    |     |    |                    |    |
|-----|----|-------------------|----|-----|----|--------------------|----|
| B.1 | 01 | Total Earnings    | 00 | B.1 | 06 | Total Plays        | 00 |
| B.1 | 02 | Recent Earnings   | 00 | B.1 | 07 | Replay Awards      | 00 |
| B.1 | 03 | Free Play Percent | 00 | B.1 | 08 | Percent Replays    | 00 |
| B.1 | 04 | Average Ball Time | 00 | B.1 | 09 | Extra Balls        | 00 |
| B.1 | 05 | Time Per Credit   | 00 | B.1 | 10 | Percent Extra Ball | 00 |

### **B.2 Earning Audits\***

|     |    |                        |    |     |    |                        |    |
|-----|----|------------------------|----|-----|----|------------------------|----|
| B.2 | 01 | Recent Earnings        | 00 | B.2 | 08 | Total Earnings*        | 00 |
| B.2 | 02 | Recent Left Slot       | 00 | B.2 | 09 | Total Left Slot*       | 00 |
| B.2 | 03 | Recent Center Slot     | 00 | B.2 | 10 | Total Center Slot*     | 00 |
| B.2 | 04 | Recent Right Slot      | 00 | B.2 | 11 | Total Right Slot*      | 00 |
| B.2 | 05 | Recent 4th Slot        | 00 | B.2 | 12 | Total 4th Slot*        | 00 |
| B.2 | 06 | Recent Paid Credits    |    | B.2 | 13 | Total Paid Credits*    |    |
| B.2 | 07 | Recent Service Credits |    | B.2 | 14 | Total Service Credits* |    |

\*These audits are NOT resettable. They are a record of the earnings of the game since the "CLOCK 1ST SET" Time-Stamp.

### **B.3 Standard Audits**

|     |    |                    |    |     |    |                      |          |
|-----|----|--------------------|----|-----|----|----------------------|----------|
| B.3 | 01 | Games Started      | 00 | B.3 | 20 | Time Per Credit      | 00       |
| B.3 | 02 | Total Plays**      | 00 | B.3 | 21 | Play Time            | 00:00:00 |
| B.3 | 03 | Total Free Play    | 00 | B.3 | 22 | Minutes On           | 00       |
| B.3 | 04 | Free Play Percent  | 00 | B.3 | 23 | Balls Played         | 00       |
| B.3 | 05 | Replay Awards      | 00 | B.3 | 24 | Tilts                | 00       |
| B.3 | 06 | Percent Replays    | 00 | B.3 | 25 | Replay 1 Awards      | 00       |
| B.3 | 07 | Special Awards     | 00 | B.3 | 26 | Replay 2 Awards      | 00       |
| B.3 | 08 | Percent Special    | 00 | B.3 | 27 | Replay 3 Awards      | 00       |
| B.3 | 09 | Match Awards       | 00 | B.3 | 28 | Replay 4 Awards      | 00       |
| B.3 | 10 | Percent Match      | 00 | B.3 | 29 | 1 Player Games       | 00       |
| B.3 | 11 | H.S.T.D. Credits   | 00 | B.3 | 30 | 2 Player Games       | 00       |
| B.3 | 12 | Percent H.S.T.D    | 00 | B.3 | 31 | 3 Player Games       | 00       |
| B.3 | 13 | Extra Ball         | 00 | B.3 | 32 | 4 Player Games       | 00       |
| B.3 | 14 | Percent Extra Ball | 00 | B.3 | 33 | H.S.T.D. Reset Count | 00       |
| B.3 | 15 | Tickets Awarded    | 00 | B.3 | 34 | Burn-in Time †       | 00:00:00 |
| B.3 | 16 | Percent Tickets    | 00 | B.3 | 35 | 1st Replay Level     | 00       |
| B.3 | 17 | Left Drains        | 00 | B.3 | 36 | Left Flipper         | 00       |
| B.3 | 18 | Right Drains       | 00 | B.3 | 37 | Right Flipper        | 00       |
| B.3 | 19 | Average Ball Time  | 00 |     |    |                      |          |

\*\* "Total Plays" only counts completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored, therefore test and servicing operations do not affect the Audits.

† This Audit is not resettable.



## B.4 Feature Audits

|     |    |                                                                  |    |
|-----|----|------------------------------------------------------------------|----|
| B.4 | 01 | Number of games that bought an extra ball from buy in            | 00 |
| B.4 | 02 | Number of multi player games that bought extra ball from buy in  | 00 |
| B.4 | 03 | Total Multi-balls (Shadow, Khan, Hotel Monolith, & Final Battle) | 00 |
| B.4 | 04 | Number of eject hole Scenes started                              | 00 |
| B.4 | 05 | Number of times the BATTLEFIELD mini-playfield was played        | 00 |
| B.4 | 06 | Number of times ramp VENGEANCE Mode was started                  | 00 |
| B.4 | 07 | Number of times Khan Multi-ball started                          | 00 |
| B.4 | 08 | Number of Khan Multi-ball Jackpots collected                     | 00 |
| B.4 | 09 | Number of Khan Multi-ball Super Jackpots collected               | 00 |
| B.4 | 10 | Number of times Shadow Multi-ball was started                    | 00 |
| B.4 | 11 | Number of Shadow Multi-ball Jackpots collected                   | 00 |
| B.4 | 12 | Number of Shadow Multi-ball Super Jackpots collected             | 00 |
| B.4 | 13 | Number of times all Scenes were completed                        | 00 |
| B.4 | 14 | Number of times Farley Claymore Scene was started                | 00 |
| B.4 | 15 | Number of times a lit shot was made in Farley Claymore Scene     | 00 |
| B.4 | 16 | Number of times Farley Claymore Scene was completed              | 00 |
| B.4 | 17 | Number of times Escape Underwater Doom Scene was started         | 00 |
| B.4 | 18 | Number of times a lit shot made in Escape Under Water Doom Scene | 00 |
| B.4 | 19 | Number of times Escape Under Water Doom Scene was completed      | 00 |
| B.4 | 20 | Number of times Punish the Guilty Scene was started              | 00 |
| B.4 | 21 | Number of times a lit shot was made in Punish the Guilty Scene   | 00 |
| B.4 | 22 | Number of times Punish the Guilty Scene was completed            | 00 |
| B.4 | 23 | Number of times Beryllium Sphere Mode was started                | 00 |
| B.4 | 24 | Number of times a lit shot was made in Beryllium Sphere Scene    | 00 |
| B.4 | 25 | Number of times Beryllium Sphere Scene was completed             | 00 |
| B.4 | 26 | Number of times Hotel Monolith Scene was started                 | 00 |
| B.4 | 27 | Number of times a lit center "Reveal the Hotel" shot was made    | 00 |
| B.4 | 28 | Number of times Hotel Monolith Mongol Mode was started           | 00 |
| B.4 | 29 | Number of times lit shot was made in Hotel Monolith Mongol Mode  | 00 |
| B.4 | 30 | Number of times Duel of Wills Video Mode was started             | 00 |
| B.4 | 31 | Number of times Duel of Wills Video Mode was won                 | 00 |
| B.4 | 32 | Number of times a shot was made in Vengeance Mode                | 00 |
| B.4 | 33 | Number of times Vengeance Mode was completed                     | 00 |
| B.4 | 34 | Number of times Super Vengeance was started                      | 00 |
| B.4 | 35 | Number of times Mongol Hurry Up was started                      | 00 |
| B.4 | 36 | Number of times Mongol Hurry Up was awarded                      | 00 |
| B.4 | 37 | Number of times lamps completed on Battlefield to increase score | 00 |
| B.4 | 38 | Number of times Battlefield was completed                        | 00 |
| B.4 | 39 | Number of times Final Battle was started                         | 00 |
| B.4 | 40 | Number of times Final Battle was completed                       | 00 |
| B.4 | 41 | Number of left loops made                                        | 00 |
| B.4 | 42 | Number of right loops made                                       | 00 |
| B.4 | 43 | Number of inner Shadow loops made                                | 00 |
| B.4 | 44 | Number of 2 way loop combos made                                 | 00 |
| B.4 | 45 | Number of 3 way combos made                                      | 00 |
| B.4 | 46 | Number of 4 way combos made                                      | 00 |
| B.4 | 47 | Number of 5 way combos made                                      | 00 |
| B.4 | 48 | Number of 6 way combos made                                      | 00 |
| B.4 | 49 | Number of 7 way combos made                                      | 00 |
| B.4 | 50 | Extra Balls collected percentage                                 | 00 |
| B.4 | 51 | Number of times extra ball was lit by making inner Shadow loops  | 00 |
| B.4 | 52 | Number of times extra ball was collected from Dual of Wills Mode | 00 |
| B.4 | 53 | Number of times extra ball was lit by completing the Battlefield | 00 |

#### **B.4 Feature Audits continued...**

|     |    |                                                                                                                                  |    |
|-----|----|----------------------------------------------------------------------------------------------------------------------------------|----|
| B.4 | 54 | Number of times extra ball was lit by Who Knows/Skill Shot Award                                                                 | 00 |
| B.4 | 56 | Number of times any Skill Shot was awarded                                                                                       | 00 |
| B.4 | 57 | Number of times a EOB Bonus Multiplier was collected                                                                             | 00 |
| B.4 | 58 | Number of times EOB Bonus Multiplier was maxed out                                                                               | 00 |
| B.4 | 59 | Number of times a Loop Destination was made                                                                                      | 00 |
| B.4 | 60 | Number of times Super Loops was started                                                                                          | 00 |
| B.4 | 62 | Number of Super Loops shots made                                                                                                 | 00 |
| B.4 | 63 | Number of ball start balls saved                                                                                                 | 00 |
| B.4 | 64 | Number of Shadow Multi-ball balls saved                                                                                          | 00 |
| B.4 | 65 | Number of Khan Multi-ball balls saved                                                                                            | 00 |
| B.4 | 66 | Number of Hotel Monolith Multi-ball balls saved                                                                                  | 00 |
| B.4 | 67 | Number of Shadow Multi-ball double jackpots collected                                                                            | 00 |
| B.4 | 68 | Number of Shadow Multi-ball triple jackpots collected                                                                            | 00 |
| B.4 | 69 | Number of Khan Multi-ball double jackpots collected                                                                              | 00 |
| B.4 | 70 | Number of Khan Multi-ball triple jackpots collected                                                                              | 00 |
| B.4 | 71 | Number of times LEFT Phurba button was pressed during a game                                                                     | 00 |
| B.4 | 72 | Number of times RIGHT Phurba button was pressed during a game                                                                    | 00 |
| B.4 | 73 | Number of times the ball was saved when drained down the center after hitting Battle or Wall Drop Target (Adjustment must be ON) | 00 |

## **B.5 Histograms**

|     |    |                        |     |    |
|-----|----|------------------------|-----|----|
| B.5 | 01 | 1-39 Million Scores    | 00% | 00 |
| B.5 | 02 | 40-59 Million Scores   | 00% | 00 |
| B.5 | 03 | 60-79 Million Scores   | 00% | 00 |
| B.5 | 04 | 80-99 Million Scores   | 00% | 00 |
| B.5 | 05 | 100-149 Million Scores | 00% | 00 |
| B.5 | 06 | 150-249 Million Scores | 00% | 00 |
| B.5 | 07 | 250-399 Million Scores | 00% | 00 |
| B.5 | 08 | 400-599 Million Scores | 00% | 00 |
| B.5 | 09 | 600-999 Million Scores | 00% | 00 |
| B.5 | 10 | 1-1.49 Billion Scores  | 00% | 00 |
| B.5 | 11 | 1.5-1.9 Billion Scores | 00% | 00 |
| B.5 | 12 | 2-2.9 Billion Scores   | 00% | 00 |
| B.5 | 13 | Over 3 Billion         | 00% | 00 |
| B.5 | 14 | Game Time 0.0-1.0 Mins | 00% | 00 |
| B.5 | 15 | Game Time 1.0-1.5 Mins | 00% | 00 |
| B.5 | 16 | Game Time 1.5-2.0 Mins | 00% | 00 |
| B.5 | 17 | Game Time 2.0-2.5 Mins | 00% | 00 |
| B.5 | 18 | Game Time 2.5-3.0 Mins | 00% | 00 |
| B.5 | 19 | Game Time 3.0-3.5 Mins | 00% | 00 |
| B.5 | 20 | Game Time 3.5-4.0 Mins | 00% | 00 |
| B.5 | 21 | Game Time 4-5 Mins     | 00% | 00 |
| B.5 | 22 | Game Time 5-6 Mins     | 00% | 00 |
| B.5 | 23 | Game Time 6-8 Mins     | 00% | 00 |
| B.5 | 24 | Game Time 8-10 Mins    | 00% | 00 |
| B.5 | 25 | Game Time 10-15 Mins   | 00% | 00 |
| B.5 | 26 | Game Time Over 15 Mins | 00% | 00 |

## **B.6 Time-Stamps**

The Time-Stamps Menu allows you to view dates and times that are important to game software.

|     |    |                     |
|-----|----|---------------------|
| B.6 | 01 | Current Time        |
| B.6 | 02 | Clock 1st Set       |
| B.6 | 03 | Clock Last Set      |
| B.6 | 04 | Audits Cleared      |
| B.6 | 05 | Coins Cleared       |
| B.6 | 06 | Factory Setting     |
| B.6 | 07 | Last Game Start     |
| B.6 | 08 | Last Replay         |
| B.6 | 09 | Last H.S.T.D. Reset |
| B.6 | 10 | Champion Reset      |
| B.6 | 11 | Last Printout       |
| B.6 | 12 | Last Service Credit |

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a menu. Press the Escape button to return to the Printouts Menu.

## **P. PRINTOUTS MENU**

(optional board required)

|            |                         |
|------------|-------------------------|
| <b>P.1</b> | <b>Earnings Data</b>    |
| <b>P.2</b> | <b>Main Audits</b>      |
| <b>P.3</b> | <b>Standard Audits</b>  |
| <b>P.4</b> | <b>Feature Audits</b>   |
| <b>P.5</b> | <b>Score Histograms</b> |
| <b>P.6</b> | <b>Time Histograms</b>  |
| <b>P.7</b> | <b>Time-Stamps</b>      |
| <b>P.8</b> | <b>All Data</b>         |

The Printouts Menu is a combination of the other menus. This menu allows you to access and print information in the available menu selections.

If no printer is attached the message "Waiting for Printer" appears in the displays.

Note: Set print specification from the Adjustment Menu, A.5 Printer Adjustments.

**Use the Service Switch Actuator to hold in the top interlock switch located in the bottom left corner of the coin door opening. The actuator must be in place in order to activate the solenoids and flashlamps.**

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a test. Press the Escape button to return to the Test Menu.

**Note:** During any test, press the Start button to obtain the wire color, driver number, connector number and fuse location.

## **T. TEST MENU**

|             |                                 |
|-------------|---------------------------------|
| <b>T.1</b>  | <b>Switch Edges</b>             |
| <b>T.2</b>  | <b>Switch Levels</b>            |
| <b>T.3</b>  | <b>Single Switch</b>            |
| <b>T.4</b>  | <b>Solenoid Test</b>            |
| <b>T.5</b>  | <b>Flasher Test</b>             |
| <b>T.6</b>  | <b>General Illumination</b>     |
| <b>T.7</b>  | <b>Sound &amp; Music Test</b>   |
| <b>T.8</b>  | <b>Single Lamps</b>             |
| <b>T.9</b>  | <b>All Lamps</b>                |
| <b>T.10</b> | <b>Lamp &amp; Flasher Tests</b> |
| <b>T.11</b> | <b>Display Test</b>             |
| <b>T.12</b> | <b>Flipper Test</b>             |
| <b>T.13</b> | <b>Ordered Lamps Test</b>       |
| <b>T.14</b> | <b>Lamp Row-Col Test</b>        |
| <b>T.15</b> | <b>Dip Switch Test</b>          |
| <b>T.16</b> | <b>Mini-playfield Test</b>      |
| <b>T.17</b> | <b>Magnet Test</b>              |
| <b>T.18</b> | <b>Empty Balls Test</b>         |

The switch matrix, on the left side of the display, shows the state of all switches. A dot indicates the switch is open, and a square indicates the switch is closed. The numbers assigned to each switch indicate where the switch is located in the matrix. The number on the left indicates the column, and the number on the right indicates the row. Example: Switch 23 is 2nd column, 3rd row.

A short to ground, on either the row or column wire, appears as a shorted row(s). However, a column wire shorted to ground disappears when all the indicated row switches are open. A row wire shorted to ground does not disappear.

A shorted diode in the switch matrix can cause other switches to appear closed. These "phantom" switches (though not actually closed) complete a rectangle in the switch matrix. Therefore, if two switches in the same column are closed (example; #22 and #24), and a third switch is pressed in another column but in the same row as one of the first two (example; #32), the "phantom" switch #34 is falsely indicated as closed. The switch with the shorted diode is diagonally opposite the "phantom" switch (in this case #22).

**T.1 Switch Edges** Press each switch one at a time. The name and number of the switch is shown in the display. If a switch other than the one pressed, or no switch at all is indicated, the system has detected a problem with the switch circuit.

**T.2 Switch Levels** This test automatically cycles through all switches that are detected closed. The name and number of each switch that is detected is shown in the display. A filled square indicates the switch's position in the matrix.

**T.3 Single Switches** The Single Switch Test isolates a particular switch by blocking signals from all other switches. Use the Up or Down buttons to select the switch to be tested.

#### **T.4 Solenoid Test**

The Solenoid Test has three modes: Repeat, Stop, and Run. Only one solenoid should pulse at a time. The system has detected a problem if; more then one solenoid pulses, a solenoid comes On and stays On, or no solenoids pulse during the Repeat or Run modes.

- Repeat - The Repeat Mode pulses a single solenoid. After entering this test, Solenoid 1 shows in the display. and the corresponding solenoid activates. Press the Up or Down button to cycle through the solenoids, one at a time. The same solenoid pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop Mode halts the Solenoid Test. Press Enter during the Repeat mode and the Solenoid Test Stops. No solenoids should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Run - The Run Mode cycles through the solenoids automatically. The display shows the name and number of the solenoid currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

#### **T.5 Flasher Test**

This tests the flashlamp part of the solenoid circuit exclusively. This, like the Solenoid Test has three test modes: Repeat, Stop, and Run. During this test, only one flashlamp circuit should pulse at a time. The system has detected a problem if more than one circuit pulses, a circuit stays On, or no circuits pulse during the Repeat or Run modes.

- Repeat - The Repeat mode pulses a single flashlamp. After entering this test, the name and number of the first flashlamp circuit will show in the display and the corresponding bulb(s) flash. Press the Up or Down button to cycle through all of the flashlamp circuits one at a time. The same circuit pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop Mode halts the Flasher Test. No flashlamp circuit should be active during this mode. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Run - The Run Mode cycles through the flashlamps automatically. The display shows the name and number of the flashlamp circuit currently being pulsed and the corresponding bulb(s) flash. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

#### **T.6 General Illumination**

This test checks all of the General Illumination circuits. There are two modes of operation: Stop and Run.

- Stop - Press the Up or Down buttons to cycle through the General Illumination Test manually. All illumination is tested first, followed by an individual circuit test. The circuit name and number will show in the display while the corresponding lamps light. If any other results occur the system has detected an error.
- Run - Press the Enter button any time during Stop mode and the General Illumination Test cycles through automatically. For each circuit shown in the displays the corresponding bulbs should light. If any other results occurs the system has detected a problem.

**T.7 Sound and Music Test** The Sound and Music Test allows you to check the audio circuits. This test has three modes for testing the sound and music circuits: Run, Repeat, and Stop.

- Run - The Run Mode steps through a sequence of sounds and music. Pressing the Up or Down button during this portion of the Sound and Music test advances to a particular sound/tune without having to wait for the program to play all the sounds available in the test. A sound/tune should be heard for each name and number that appears in the display. Any other results indicate the system has detected a problem.
- Repeat - Press the Enter button at any time during the Run Mode to cause the program to stop and repeat a particular sound/tune. The same sound should repeat continuously until the Up or Down button is pressed. Any other results indicates the system has detected a problem.
- Stop - Press the Enter button at any time during the Repeat Mode to stop this test altogether. No sound/tune should be heard. Any other results indicates the system has detected a problem.

**T.8 Single Lamp Test** The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example: Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through this test. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicate the system has detected a problem.

**T.9 All Lamps Test** This test causes all the controlled lamps to flash at the same time. Every controlled lamp should flash. Any other results indicate the system has detected a problem.

**T.10 Lamp and Flasher Test** This test causes all the flashlamps and the controlled lamps to flash at the same time. The controlled lamps blink, while the flashlamps cycle from highest to lowest. Any other results indicates the system has detected a problem.

**T.11 Display Test** This test automatically lights every dot in the Dot Matrix Display. A series of patterns appear in sequence. Each pattern turns On and Off a section of dots. Every dot on the display should be turned On and Off during this test.

### **T.12 Flipper Coil Test**

The Flipper Coil Test has three modes: Repeat, Stop, and Run. Only one flipper should pulse at a time. The system has detected a problem if more than one flipper pulses, a flipper comes On and stays On, or no flippers pulse during the Repeat or Run modes.

- Repeat - The Repeat Mode pulses a single flipper. After entering this test, coil 01 shows in the display and the corresponding flipper activates. Press the Up or Down button to cycle through the flipper coils, one at a time. The same flipper coil pulses until the Up or Down button is pressed. Either press the Escape button to return to the Test Menu, or press the Enter button to advance to the next mode.
- Stop - The Stop Mode halts the Flipper Coil Test. Press Enter during the Repeat mode and the Flipper Coil Test stops. No flipper coil should be activated while the test is stopped. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.
- Run - The Run Mode cycles through the flippers automatically. The display shows the name and number of the flipper coil currently being pulsed. Either press the Escape button to return to the Test Menu, or the Enter button to advance to the next mode.

### **T.13 Ordered Lamp Test**

The number assigned to each lamp indicates the lamp's position in the matrix. The number on the left indicates the column. The number on the right indicates the row. Example - Lamp 23 means 2nd column, 3rd row.

This test checks each lamp circuit individually. Press the Up or Down button to cycle through the lamps. Lamps light in a clock-wise or counter clock-wise direction starting from the bottom of the playfield. Direction depends on which button, Up or Down, is pressed. For each name and number that is shown in the display the corresponding lamp should light. Any other results indicates the system has detected a problem.

### **T.14 Lamp Row-Col Test**

This test allows individual rows and columns in the lamp matrix to be operated. This is useful for trouble-shooting wiring and driver problems.

Press the UP or DOWN buttons to cycle trough the different rows and columns.

### **T.15 Dip Switch Test**

This test is used to show the positions of the dip switches on the CPU board (U27).

### **T.16 Mini-playfield Test**

This will test the mini-playfield left & right motor and the left and right limit switches. When first entering this test the mini-playfield will be automatically checked. This will test the mini-playfield to see if it functioning correctly. If it passes this test a message will appear saying so. If it fails then a message will appear showing it failed. The test will then show an error and may not work correctly until the problem is fixed.

The diagnostic test switches act as follows:

- ESC - Returns to the previous menu
- FWD - motor on right while held down (or limit switch hit)
- REV - motor on left while held down (or limit switch hit)
- ENTER - switch between ONCE & CONTINUOUS MODES



**T.17 Magnet Test** This will test the magnet's ability to throw the ball. Upon entering or during the test if the Inner sanctum opto switch (#33) does not work a message will be displayed (OPTO 33 IS BAD). This opto switch must be working for the magnet to be able to capture and throw the ball. Toss a pinball into the sanctum shot to test if the magnet is able to capture and throw the ball. If the magnets catch or throw is weak adjust the height of the magnet core to be closer to the playfield (adjustable from bottom of playfield).

The diagnostic test switches act as follows:

- ESC - Returns to the previous menu
- FWD - Does nothing
- REV - Does nothing
- ENTER - Does nothing

**T.18 Empty Balls Test** Select T.18 from the Test Menu and press 'ENTER" to begin the Empty Balls Test.

This test kicks out all balls loaded in troughs, lockups, poppers, and kickouts until no balls remain in those locations.

Note: As the trough kicks out balls, they will stack up in the shooter groove, which may require manual clearing in order to allow further balls to be kicked out.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access a utility. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a choice. If a mistake is made, press Escape while "Saving Adjustment Value" is in the display. The original settings is retained and the new settings is ignored. Press the Escape button to return to the Utility Menu.

## **U. UTILITIES MENU**

- U.1 Clear Audits**
- U.2 Clear Coins**
- U.3 Reset H.S.T.D.**
- U.4 Set Time & Date**
- U.5 Custom Message**
- U.6 Set Game I.D.**
- U.7 Factory Adjustments**
- U.8 Factory Resets**
- U.9 Presets**
- U.10 Clear Credits**
- U.11 Auto Burn-in**

**U.1 Clear Audits** Press the Enter button to clear the Standard Audits (except Burn-In Time), Feature Audits, and Histograms.

**U.2 Clear Coins** Press the Enter button to clear the Earnings Audits.

**U.3 Reset H.S.T.D.** Press the Enter button to clear the High Score to Date Table and the Grand Champion.

**U.4 Set Time and Date** Press the Enter button to activate the time and date. Use the Up or Down button to change the value, then press the Enter button to lock in that value. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

**U.5 Custom Message** Set A.1 20 to ON before writing a Custom Message. Press the Enter button to begin entry of the custom message. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation. If you make a mistake, use Up and Down to select the "back-arrow" character. The "back-arrow" character is located before the space character and after the number nine. Press Enter while the back-arrow shows to erase the previously entered character. Once your message is complete, press and hold the Enter button until "Message Stored" is displayed.

Press the Escape button to cancel the new message. The message "Press Enter to Reset" appears. If you press Enter, the custom message is cleared and no message is displayed. If Escape is pressed, the original message remains intact.

**U.6 Set Game I.D.** This utility allows the operator to install a message, such as game location, that only appears on printouts. Press the Enter button to activate Set Game I.D.. Use the Up or Down button to cycle through letters. Use the Start button to cycle through punctuation marks. Press the Enter button to lock in the desired letter and punctuation.

**U.7 Factory Adjustment** Press the Enter button to restore the adjustments to factory settings.

**U.8 Factory Reset** Press the Enter button to restore the adjustments to their factory setting, clear the Audits, H.S.T.D Table, and Custom Message/Game I.D.

**U.9 Presets** Use the Up or Down buttons to cycle through the available Presets. When the desired Preset is displayed, press the Enter button to lock in that Preset. If a mistake is made, press the Escape button while "Saving Adjustment Value" is displayed. The new value is ignored and the original value is retained.

**Game Difficulty Levels** The game play difficulty adjustments can be changed to a combination that is MUCH LESS to MUCH MORE difficult than Factory Settings. The Game Difficulty Setting Table lists the adjustments and settings that comprise the individual groups.

**U.9 01 Install Extra Easy** MUCH LESS difficult than factory setting.

**U.9 02 Install Easy** Somewhat LESS difficult than factory setting.

**U.9 03 Install Medium** About the SAME as factory setting.

**U.9 04 Install Hard** Somewhat MORE difficult than factory setting.

**U.9 05 Install Extra Hard** MUCH MORE difficult than factory setting.

**Game Difficulty Setting Table for U.S./Canadian/French Games**

| Adj. No. | Adjustment Description     | Extra Easy<br>U.9 01 | Easy<br>U.9 02 | Medium<br>U.9 03 | Hard<br>U.9 04 | Extra Hard<br>U.9 05 |
|----------|----------------------------|----------------------|----------------|------------------|----------------|----------------------|
| A.2 27   | Mongol Hurry Up            | EX. EASY             | EASY           | MEDIUM           | HARD           | EX. HARD             |
| A.2 16   | Vengeance Timer            | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 13   | Punish the Guilty Timer    | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 12   | Farley Claymore Timer      | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 14   | Beryllium Sphere Timer     | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 15   | Escape Doom Start Value    | 45 MIL.              | 40 MIL         | 30 MIL           | 25 MIL         | 20 MIL               |
| A.2 08   | Shadow Multi-ball Save     | 15 SEC               | 13 SEC         | 12 SEC           | 10 SEC         | OFF                  |
| A.2 09   | Khan Multi-ball Save       | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | OFF                  |
| A.2 10   | Hotel Multi-ball Save      | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | OFF                  |
| A.2 11   | Center Shot Ball Save      | YES                  | YES            | NO               | NO             | NO                   |
| A.2 07   | Ball Save Timer            | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | SEC                  |
| A.2 17   | Multi-lock Hold Timer      | 15 SEC               | 12 SEC         | 10 SEC           | 8 SEC          | 5 SEC                |
| A.2 18   | Extra Ball Percentage      | 30%                  | 25%            | 20%              | 15%            | 10%                  |
| A.2 19   | Mystery EB Lit Memory      | YES                  | YES            | YES              | YES            | NO                   |
| A.2 20   | Skill Shot EB Lit Memory   | YES                  | YES            | YES              | YES            | NO                   |
| A.2 22   | Shadow Loop EB Lit Memory  | YES                  | YES            | YES              | NO             | NO                   |
| A.2 21   | Battlefield EB Lit Memory  | YES                  | YES            | YES              | NO             | NO                   |
| A.2 23   | Shadow Loop EB Lit Start   | 2 LOOPS              | 2 LOOPS        | 3 LOOPS          | 4 LOOPS        | 5 LOOPS              |
| A.2 24   | Khan Multi-ball Lit Memory | YES                  | YES            | YES              | NO             | NO                   |
| A.2 25   | Khan Multi-ball Lit Timer  | 25 SEC               | 20 SEC         | 15 SEC           | 10 SEC         | 7 SEC                |
| A.4 15   | Shadow Loop Champ Default  | 1 LOOP               | 2 LOOPS        | 2 LOOPS          | 3 LOOPS        | 4 LOOPS              |

**Game Difficulty Setting Table for German/European Games**

| Adj.<br>No. | Adjustment Description     | Extra Easy<br>U.9 01 | Easy<br>U.9 02 | Medium<br>U.9 03 | Hard<br>U.0 04 | Extra Hard<br>U.9 05 |
|-------------|----------------------------|----------------------|----------------|------------------|----------------|----------------------|
| A.2 27      | Mongol Hurry Up            | EX. EASY             | EASY           | MEDIUM           | HARD           | EX. HARD             |
| A.2 16      | Vengeance Timer            | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 13      | Punish the Guilty Timer    | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 12      | Farley Claymore Timer      | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 14      | Beryllium Sphere Timer     | 40 SEC               | 35 SEC         | 30 SEC           | 25 SEC         | 20 SEC               |
| A.2 15      | Escape Doom Start Value    | 45 MIL.              | 40 MIL         | 30 MIL           | 25 MIL         | 20 MIL               |
| A.2 08      | Shadow Multi-ball Save     | 15 SEC               | 13 SEC         | 12 SEC           | 10 SEC         | OFF                  |
| A.2 09      | Khan Multi-ball Save       | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | OFF                  |
| A.2 10      | Hotel Multi-ball Save      | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | OFF                  |
| A.2 11      | Center Shot Ball Save      | YES                  | YES            | NO               | NO             | NO                   |
| A.2 07      | Ball Save Timer            | 8 SEC                | 7 SEC          | 5 SEC            | 4 SEC          | SEC                  |
| A.2 17      | Multi-lock Hold Timer      | 15 SEC               | 12 SEC         | 10 SEC           | 8 SEC          | 5 SEC                |
| A.2 18      | Extra Ball Percentage      | 30%                  | 25%            | 20%              | 15%            | 10%                  |
| A.2 19      | Mystery EB Lit Memory      | YES                  | YES            | YES              | YES            | NO                   |
| A.2 20      | Skill Shot EB Lit Memory   | YES                  | YES            | YES              | YES            | NO                   |
| A.2 22      | Shadow Loop EB Lit Memory  | YES                  | YES            | YES              | NO             | NO                   |
| A.2 21      | Battlefield EB Lit Memory  | YES                  | YES            | YES              | NO             | NO                   |
| A.2 23      | Shadow Loop EB Lit Start   | 2 LOOPS              | 2 LOOPS        | 3 LOOPS          | 4 LOOPS        | 5 LOOPS              |
| A.2 24      | Khan Multi-ball Lit Memory | YES                  | YES            | YES              | NO             | NO                   |
| A.2 25      | Khan Multi-ball Lit Timer  | 25 SEC               | 20 SEC         | 15 SEC           | 10 SEC         | 7 SEC                |
| A.4 15      | Shadow Loop Champ Default  | 1 LOOP               | 2 LOOPS        | 2 LOOPS          | 3 LOOPS        | 4 LOOPS              |

**U.9 06 Install 5 Ball****U.9 07 Install 3 Ball**

Adjustments U.9 06 and U.9 07 can be used to change a game to 3 or 5 ball play, including the changing of certain features to the recommended 3- and 5-ball level. The Preset Game Adjustments Table for U.S./Canadian Games lists the adjustments and settings that comprise the individual groups.

**Preset Game Adjustments Table for U.S./Canadian Games**

| Adjustment Number | Adjustment Description     | Install 3-Ball<br>U.9 07<br>(factory) | Install 5 Ball<br>U.9 06 |
|-------------------|----------------------------|---------------------------------------|--------------------------|
| A.1 01            | Balls Per Game             | 3                                     | 5                        |
| A.1 07            | Replay Start               | 500,000,000                           | 750,000,000              |
| A.2 27            | Mongol Hurry Up            | Medium                                | Hard                     |
| A.2 16            | Vengeance Timer            | 10 Seconds                            | 25 Seconds               |
| A.2 15            | Escape Doom Start Value    | 30 Million                            | 25 Million               |
| A.2 08            | Shadow Multi-ball Save     | 12 Seconds                            | 10 Seconds               |
| A.2 09            | Khan Multi-ball Save       | 5 Seconds                             | 4 Seconds                |
| A.2 10            | Hotel Multi-ball Save      | 5 Seconds                             | 4 Seconds                |
| A.2 07            | Ball Save Timer            | 5 Seconds                             | 4 Seconds                |
| A.2 17            | Multi Lock Hold Timer      | 10 Seconds                            | 8 Seconds                |
| A.2 18            | Extra Ball Percentage      | 15%                                   | 10%                      |
| A.2 22            | Shadow Loop EB Lit Memory  | Yes                                   | No                       |
| A.2 21            | Battlefield EB Lit Memory  | Yes                                   | No                       |
| A.2 23            | Shadow Loop EB Lit Start   | 3 Loops                               | 4 Loops                  |
| A.2 24            | Khan Multi-ball Lit Memory | Yes                                   | No                       |
| A.2 25            | Khan Multi Lit Timer       | 15 Seconds                            | 10 Seconds               |
| A.4 15            | Shadow Loop Champ Default  | 2 Loops                               | 3 Loops                  |

**U.9 08 Install Add-A-Ball** This option deletes all Free Play awards and replaces them with Extra Ball awards. Individual adjustments are affected, as follows:

| <u>Adjustment</u> | <u>Name</u>          | <u>New Setting</u> |
|-------------------|----------------------|--------------------|
| A.1 13            | Replay Boost         | Off                |
| A.1 14            | Replay Award         | Extra Ball         |
| A.1 15            | Special Award        | Extra Ball         |
| A.1 17            | Extra Ball Ticket    | No                 |
| A.1 19            | Match Feature        | Off                |
| A.4 04            | Champion Credits     | 00                 |
| A.4 05            | High Score 1 Credits | 00                 |
| A.4 06            | High Score 2 Credits | 00                 |
| A.4 08            | High Score 3 Credits | 00                 |
| A.4 07            | High Score 4 Credits | 00                 |

**U.9 09 Install Ticket** This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected, as follows:

| <u>Adjustment</u> | <u>Name</u>            | <u>New Setting</u> |
|-------------------|------------------------|--------------------|
| A.1 14            | Replay Award           | Ticket             |
| A.1 15            | Special Award          | Ticket             |
| A.1 16            | Match Award            | Ticket             |
| A.1 17            | Extra Ball Ticket      | Yes                |
| A.1 31            | Ticket Expansion Board | Yes                |
| A.4 02            | H.S.T.D. Award         | Ticket             |

**U.9 10 Install Novelty** This option removes all Free Play and Extra Ball awards. Individual adjustments are affected, as follows:

| <u>Adjustment</u> | <u>Name</u>          | <u>New Setting</u> |
|-------------------|----------------------|--------------------|
| A.1 04            | Max. Extra Ball      | Off                |
| A.1 05            | Replay System        | Fixed              |
| A.1 09            | Replay Level 1       | Off                |
| A.1 10            | Replay Level 2       | Off                |
| A.1 11            | Replay Level 3       | Off                |
| A.1 12            | Replay Level 4       | Off                |
| A.1 15            | Special Award        | Points             |
| A.1 19            | Match Feature        | Off                |
| A.4 01            | Highest Score        | On                 |
| A.4 04            | Champion Credits     | 00                 |
| A.4 05            | High Score 1 Credits | 00                 |
| A.4 06            | High Score 2 Credits | 00                 |
| A.4 07            | High Score 3 Credits | 00                 |
| A.4 08            | High Score 4 Credits | 00                 |

**U.9 11 Not Used**

**U.9 12 Serial Capture** This sets up the printer adjustments for serial transmission to a laptop computer (9600 baud, 40 column, no page breaks, serial printer). This option requires the installation of the optional printer kit, part number 63110.

**U.9 13 thru U.9 16 Not Used**

**U.9 17 Install German 1•**

**U.9 18 Install German 2•**

**U.9 19 Install German 3•**

**U.9 20 Install German 4•**

**U.9 21 Install German 5•**

**U.9 22 Install German 6•** Adjustments U.9 17 through U9 22 are used to modify game pricing and type of game play. The Preset Game Adjustments Table for German/European Games lists the adjustments and settings that comprise the individual groups. **NOTE:** German Replay starts at 50,000,000.

**Preset Game Adjustments Table for German/European Games**

| Adj. # | Adj. Description     | German 1<br>U.9 17 | German 2<br>U.9 18 | German 3<br>U.9 19 | German 4<br>U.9 20 | German 5<br>U.9 21 | German 6<br>U.9 22 |
|--------|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| A.1 14 | Replay Award         | Credit             | Ticket             | Audit              | Credit             | Ticket             | Audit              |
| A.1 15 | Special Award        | Credit             | Extra Ball         | Points             | Credit             | Extra Ball         | Points             |
| A.1 15 | Match Award          | Credit             | Ticket             | Credit             | Credit             | Ticket             | Credit             |
| A.1 19 | Match Feature        | 7%                 | 7%                 | Off                | 7%                 | 7%                 | Off                |
| A.3 01 | Game Pricing         | 6 spiele/5 DM      | 6 spiele/5 DM      | 6 spiele/5 DM      | 7 spiele/5 DM      | 7 spiele/5 DM      | 7 spiele/5 DM      |
| A.4 02 | H.S.T.D. Award       | Credit             | Ticket             | Credit             | Credit             | Ticket             | Credit             |
| A.4 04 | Champion Credits     | 03                 | 03                 | 00                 | 03                 | 03                 | 00                 |
| A.4 05 | High Score 1 Credits | 01                 | 01                 | 00                 | 01                 | 01                 | 00                 |
| A.4 06 | High Score 2 Credits | 00                 | 00                 | 00                 | 00                 | 00                 | 00                 |
| A.4 07 | High Score 3 Credits | 00                 | 00                 | 00                 | 00                 | 00                 | 00                 |
| A.4 08 | High Score 4 Credits | 00                 | 00                 | 00                 | 00                 | 00                 | 00                 |

• The German DIP Switch Settings are:

|            |            |            |            |            |
|------------|------------|------------|------------|------------|
| <b>SW4</b> | <b>SW5</b> | <b>SW6</b> | <b>SW7</b> | <b>SW8</b> |
| On         | On         | On         | On         | Off        |

- U.9 23 Install French 1\***
- U.9 24 Install French 2\***
- U.9 25 Install French 3\***
- U.9 26 Install French 4\***
- U.9 27 Install French 5\***
- U.9 28 Install French 6\***

Adjustments U.9 23 through U.9 26 are used to modify game pricing and type of play. The Preset Game Adjustments Table for French Games lists the adjustments and settings that comprise the individual groups.

\* The French DIP Switch Settings are:

| <b>SW4</b> | <b>SW5</b> | <b>SW6</b> | <b>SW7</b> | <b>SW8</b> |
|------------|------------|------------|------------|------------|
| <b>On</b>  | <b>On</b>  | <b>On</b>  | <b>Off</b> | <b>Off</b> |

**U.10 Clear Credits** Press the Enter button to clear the game Credits.

**U.11 Auto Burn-in** Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This will help in find intermittent problems. The tests that Auto Burn-in cycle through are: the Display Test, Sound and Music Test, All Lamps Test, Solenoid Test, Flashers Test, General Illumination Test, and the Flipper Coil Test. All of the tests are run concurrently. The time spent on the current burn-in cycle, and the total time the game has spent in burn-in are displayed.

Press the Up or Down buttons to cycle through the menu. Press the Enter button to access an adjustment. Press the Up or Down buttons to see the setting choices. Press the Enter button to lock in a choice. If a mistake is made, press Escape while "Saving Adjustment Value" is in the display. The original settings is retained and the new value is ignored. Press the Escape button to return to the Adjustment Menu.

## **A. ADJUSTMENTS MENU**

- A.1 Standard Adjustments**
- A.2 Feature Adjustments**
- A.3 Pricing Adjustments**
- A.4 H.S.T.D Adjustments**
- A.5 Printer Adjustments (optional board required)**

### **A.1 Standard Adjustments**

#### **A.1 01 Balls Per Game**

A "game" is defined by specifying the number of balls to be played.  
Range: 1-10

#### **A.1 02 Tilt Warnings**

The number of total actuation's of the plumb bob mechanism that can occur before the game is "tilted".  
Range: 1-10

#### **A.1 03 Maximum Extra Balls**

The number of extra balls that a player may accumulate.  
Range: 1-10

#### **A.1 04 Maximum Extra Balls/Ball in Play**

The number of extra balls to be awarded per ball in play.

|      |   |                                                    |
|------|---|----------------------------------------------------|
| OFF  | - | No maximum number of Extra Balls per ball in play. |
| 1-10 | - | 1 through 10 Extra Balls per ball in play.         |

#### **A.1 05 Replay System**

The type of replay system to be used.

|        |   |                                                                                                           |
|--------|---|-----------------------------------------------------------------------------------------------------------|
| Fixed  | - | Replay value is set and does not change during game play.                                                 |
| Auto % | - | Replay starting value is set and changes every 50 games to comply with the percentage of replays desired. |

#### **A.1 06 Replay Percent\***

The percentage of replays the players are able to earn when Auto Replay is used.  
Range: 5-50%

#### **A.1 07 Replay Start\***

The replay start value when Auto % Replay is used. The range of this setting is 100,000,000 to 700,000,000.



#### **A.1 08 Replay Levels\***

The number of replay levels used by the Auto % Replay mode. The range of this setting is 1 to 4. When two replay levels are chosen, the second replay level is automatically adjusted to twice the starting replay level value. When three of four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

\*For Auto % Replay.

#### **A.1 09 Replay Level 1**

#### **A.1 10 Replay Level 2**

#### **A.1 11 Replay Level 3**

#### **A.1 12 Replay Level 4**

The values used for the 1st through 4th levels of Fixed Replay. Range: 00 - 25,000,000.

#### **A.1 13 Replay Boost**

The replay score can be temporarily boosted by the selected amount EACH time the player reaches or exceeds the replay score. This temporary boost is canceled when credits equal 0, the player inserts another coin, or Begin Test is pressed.

|     |   |                                                           |
|-----|---|-----------------------------------------------------------|
| ON  | - | Score is boosted between 1,000,000 and 75,000,000 points. |
| OFF | - | Replay score is not boosted.                              |

#### **A.1 14 Replay Award**

For the form of award automatically provided when the player exceeds any replay level for either Auto % Replay, or Fixed Replay.

|        |   |                                                                                                                                                     |
|--------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Credit | - | Reaching each Replay level awards credit.                                                                                                           |
| Ticket | - | Reaching each Replay level awards a ticket.                                                                                                         |
| Ball   | - | Reaching each Replay level awards an Extra Ball.                                                                                                    |
| Audit  | - | Reaching each Replay level awards nothing to the player; it does increase the entry value of the Audit Item(s) maintaining a tally of these awards. |

#### **A.1 15 Special Award**

The award automatically provided when the player scores a special.

|        |   |                                             |
|--------|---|---------------------------------------------|
| Credit | - | Scoring a Special awards a Credit.          |
| Ticket | - | Scoring a Special awards a Ticket.          |
| Ball   | - | Scoring a Special awards an Extra Ball.     |
| Points | - | Scoring a Special awards 30 Million points. |

#### **A.1 16 Match Award**

The award automatically provided when the players wins a match.

|        |   |                                  |
|--------|---|----------------------------------|
| Credit | - | Winning a Match awards a Credit. |
| Ticket | - | Winning a Match awards a Ticket. |

**A.1 17 Extra Ball Ticket**

A Ticket is awarded when the player earns an Extra Ball.

- YES - The player is awarded a Ticket in addition to an Extra Ball.
- NO - The player is not awarded a Ticket.

**A.1 18 Maximum Ticket/Player**

The amount of Tickets each player can earn.  
Range 00 - 100

**A.1 19 Match Feature**

The desired percentage for the Match Feature occurring at the end of the game.

- OFF - Match Feature is not available.
- 1 -50% - 1% is 'hard'; 50% is 'extremely easy'. The Match Feature selects a random two-digit number at the end of the game and compares each players score for an identical two digits in the rightmost two positions. A matching of these two digits results in an award of a Credit or a Ticket.

**A.1 20 Custom Message**

The message displayed during the Attract Mode.

- YES - A message is displayed
- NO - A message is not displayed.

**A.1 21 Language**

The language the game uses: English, French, or German.

**A.1 22 Clock Style**

The style of clock the game uses: A.M./P.M., or 24 Hours.

**A.1 23 Date Style**

The style of date the game uses: Month/Date/Year, or Date/Month/Year.

**A.1 24 Show Date and Time**

The date and time show in the Attract Mode.

- YES - Show date and time in status report, or Attract Mode.
- NO - Do Not show date and time in status report or Attract Mode.

**A.1 25 Allow Dim Illumination**

The game program dims the General Illumination for special effects and during the Attract Mode.

- YES - Dim General Illumination for spiral effects and Attract Mode.
- NO - Do Not dim General Illumination.

**A.1 26 Tournament Play**

Equalize Multi-ball and Jackpots during multi-player games, (do not carry over to next player).

- YES - Keep Multi-ball and Jackpots equal.
- NO - Do Not Keep Multi-ball and Jackpots equal.

**A.1 27 Euro. Scr. Format**

Use either commas or dots between digits when numbers are displayed.

- YES - Dots instead of commas, (example 1.000.000).
- NO - Commas instead of dots, (example 1,000,000).

**A.1 28 Minimum Volume Control**

The volume can be turned Off.

- YES - Volume can be turned Off.
- NO - Volume can be turned Down but not Off.

**A.1 29 General Illumination Power Saver**

This allows the general illumination and controlled lamps to be dimmed following a time interval after a game is played. Power Saver Level (A.1 30) determines dimness of the lamps. Using this feature will substantially increase the life of the lamps.

Setting: - Off, 2-60 Minutes

**A.1 30 Power Saver Level**

When General Illumination Power Saver (A.1 29) is set to On, this controls the intensity of the G.I. and controlled lamps once the game has been idle for a specified period of time.

Range: 4-7 (4 = dimmest, 7 = brightest)

**A.1 31 Ticket Expansion Board**

When a Ticket Expansion Board is connected, full control of the ticket dispenser is available. This includes a ticket low/error lamp, resume on ticket jam switch, and manual ticket dispense switch.

- Yes - Ticket Expansion Board is connected.
- No - Ticket Expansion Board is NOT installed in the game.

**A.1 32 No Bonus Flips**

The activation of flippers during the end of ball "bonus" sequence. Setting this to "YES" may extend the life of the flipper mechanisms.

### **A.1 33 Game Restart**

When the start button is pressed during or after the 2nd ball, the game in progress will end and a new game will begin. This adjustment has 3 settings to determine how this is handled.

- Never: - Do not allow a new game to start until the current game is over.
- Slow: - Restart if the start button is pressed continuously for over 1/2 second. This helps to prevent the unintended restart of game in progress.
- Instantly: - Restart as soon as the start button is pressed.

When the start button is pressed during game over, or during the 1st ball (to add a player), it is always handled instantly.

## **A.2 Feature Adjustments**

### **A.2 01 BUY EXTRA BALL - BUY IN FEATURE**

This determines whether each player may buy 1 extra ball for 1 credit at the end of the game.

Settings:        1 Credit  
                    Off

Factory Default: 1 Credit

### **A.2 02 MAXIMUM BUY-IN BALLS**

If A.2 01 (BUY EXTRA BALL) is set to "1 CREDIT", This determines the number of Extra Balls that may be purchased at the end of the game. The choices are 1-3.

Factory Default: 1

### **A.2 03 ATTRACT MODE SOUNDS**

The operator can select whether or not the attract mode has sound on the flipper and gun buttons to attract players. The choices are:

ON = The attract mode does have sound on buttons  
OFF = The attract mode does not have sound on buttons

Factory Default: ON

### **A.2 04 ATTRACT MODE MUSIC**

The operator can select whether or not the attract mode will play music to attract players. The choices are:

ON = The attract mode does have music  
OFF = The attract mode does not have music

Factory Default: OFF

### **A.2 05 TIMED PLUNGER**

This is the time allowed for a player to hit the plunger switch (or the launch ball switch) to start a ball. When this time is exceeded, the ball is automatically launched.

Settings:        OFF = Do not automatically launch the ball.  
                    5-120 Seconds = Time allowed before the ball is launched automatically.

Factory Default: OFF

#### **A.2 06 FLIPPER PLUNGER**

If the "launch ball" switch is malfunctioning, set this adjustment to "YES" to use the left flipper to fire the plunger. Normally, the software tries to detect a malfunctioning "launch ball" switch and will automatically use the left flipper to launch a ball. Also, the plumb bob tilts' first switch hit will also launch a ball.

Settings:        NO = Do not use the left flipper to launch a ball.  
                 YES = Use the left flipper to launch a ball.

Factory Default: OFF

#### **A.2 07 BALL SAVE TIMER**

After ball start, this is the amount of time that the "SHOOT AGAIN" ball saver lamp is lit. It allows players who drain within this time to be served another ball. This adjustment is for when player is not in a multi-ball. The choices are:

OFF = No ball save is enabled  
1-60 seconds = minimum amount of time ball is on playfield

Factory Default: 5 seconds

#### **A.2 08 BALL SAVE TIMER SHADOW MULTI-BALL**

After multi-ball start, this is the amount of time that the "SHOOT AGAIN" ball saver lamp is lit. It allows players who drain within this time to be served another ball. This adjustment is for when player is in the 3 ball lockup shadow multi-ball. The choices are:

OFF = No ball save is enabled  
1-60 seconds = minimum amount of time ball is on playfield

Factory Default: 12 seconds

#### **A.2 09 BALL SAVE TIMER KHAN MULTI-BALL**

After multi-ball start, this is the amount of time that the "SHOOT AGAIN" ball saver lamp is lit. It allows players who drain within this time to be served another ball. This adjustment is for when player is in the left eject lockup Khan multi-ball. The choices are:

OFF = No ball save is enabled  
1-60 seconds = minimum amount of time ball is on playfield

Factory Default: 5 seconds

#### **A.2 10 BALL SAVE TIMER 2 BALL HOTEL MONOLITH MULTI-BALL**

After multi-ball start, this is the amount of time that the "SHOOT AGAIN" ball saver lamp is lit. It allows players who drain within this time to be served another ball. This adjustment is for when player is in a scene start hotel monolith 2 ball multi-ball. The choices are:

OFF = No ball save is enabled  
1-60 seconds = minimum amount of time ball is on playfield

Factory Default: 5 seconds

**A.2 11 CENTER SHOT HIT BALL SAVER**

The operator selects whether or not during game play a ball will be saved when a ball hits the battlefield drop target OR the inner sanctum wall shot and the ball drains immediately down the center (with about 2 seconds).

YES - allow special ball save

NO - do not allow special ball save

Factory Default: NO

**A.2 12 FARLEY CLAYMORE SCENE TIMER**

The operator selects the amount of time that the FARLEY CLAYMORE scene is active once started. The setting range is 5-90 seconds.

Factory Default: 30 seconds

**A.2 13 PUNISH THE GUILTY SCENE TIMER**

The operator selects the amount of time that the PUNISH THE GUILTY scene is active once started. The setting range is 5-90 seconds.

Factory Default: 30 seconds

**A.2 14 BERYLLIUM SPHERE SCENE TIMER**

The operator selects the amount of time that the FARLEY CLAYMORE scene is active once started. The setting range is 5-90 seconds.

Factory Default: 30 seconds

**A.2 15 ESCAPE UNDER WATER DOOM HURRY UP START VALUE**

The operator selects the starting score value of the ESCAPE UNDER WATER DOOM scene. The setting range is 20 million to 45 million.

**A.2 16 VENGEANCE MODE TIMER**

The operator selects the amount of time that the VENGEANCE MODE is active once started. The setting range is 5-90 seconds.

Factory Default: 30 seconds

**A.2 17 MULTI-BALL JACKPOT MULTIPLIER TIMER**

The operator selects the amount of time that balls remain held in and eject during KHAN or SHADOW multi-ball. The setting range is 1-30 seconds.

Factory Default: 10 seconds

#### **A.2 18 EXTRA BALL PERCENTAGE**

The operator selects the percentage of Extra Balls desired. The game will try to match this percentage by:

- 1) Increasing or decreasing the number of inner shadow loops needed in-a-row to light extra ball.
- 2) Increasing or decreasing the number of times the "WHO KNOWS?" mystery award will award an extra ball lit.
- 3) Increasing or decreasing the number of times the Skill Shot will award an extra ball lit.

The setting range is OFF-35 percent.

Factory Default: 20 seconds

#### **A.2 19 WHO KNOWS MYSTERY AWARD EXTRA BALL LIT MEMORY**

The operator selects whether or not an extra ball lit by the WHO KNOWS award will remain lit from ball to ball. The choices are:

YES = extra ball stays lit until the end of GAME or when collected.  
NO = extra ball stays lit until the end of the BALL or when collected.

Factory Default: YES

#### **A.2 20 SKILL SHOT AWARD EXTRA BALL LIT MEMORY**

The operator selects whether or not an extra ball lit by the SKILL SHOT award will remain lit from ball to ball. The choices are:

YES = extra ball stays lit until the end of GAME or when collected.  
NO = extra ball stays lit until the end of the BALL or when collected.

Factory Default: YES

#### **A.2 21 BATTLEFIELD COMPLETE EXTRA BALL LIT MEMORY**

The operator selects whether or not an extra ball lit by the completing the battlefield will remain lit from ball to ball. The choices are:

YES = extra ball stays lit until the end of GAME or when collected.  
NO = extra ball stays lit until the end of the BALL or when collected.

Factory Default: YES

#### **A.2 22 INNER SHADOW LOOPS EXTRA BALL LIT MEMORY**

The operator selects whether or not an extra ball lit by the inner SHADOW LOOP will remain lit from ball to ball. Choices are:

YES = extra ball stays lit until the end of GAME or when collected.  
NO = extra ball stays lit until the end of the BALL or when collected.

Factory Default: YES



**A.2 23 INNER SHADOW LOOPS IN A ROW EXTRA BALL START**

The operator selects the number of loops in a row needed to light an extra ball. If adjustment A.2 18 EXTRA BALL PERCENTAGE is set to 5-35 percent then the game will decide from this starting value if it need to set the loop count higher or lower to maintain the proper extra ball percentage. If adjustment A.2 18 EXTRA BALL PERCENTAGE is set to OFF then this value will be the number of shadow loops needed in a row to lit extra ball and will not change. The setting range is 2-10 shadow loops in a row.

Factory Default: 3

**A.2 24 KHAN MULTI-BALL LIT MEMORY**

The operator selects whether or not Khan multi-ball will remain lit from ball to ball. The choices are:

YES = Khan multi-ball stays lit until the end of GAME or when collected.

NO = Khan multi-ball stays lit until the end of the BALL or when collected.

Factory Default: YES

**A.2 25 KHAN MULTI-BALL LIT START TIMER**

The operator selects how long the "Khan multi-ball lit" lamp is lit once started. The setting range is 5-90 seconds)

Factory Default: 15 Seconds

**A.2 26 HOLD SANCTUM LOCKS AT GAME OVER**

The operator selects whether or not the player can have balls left in the top Sanctum 3 ball lockup at game over. A player must still "earn" their sanctum locks. The choices are:

YES = keep balls locked between games

NO = Release any locked balls at game over

Factory Default: NO

**A.2 27 MONGOL HURRY UP DIFFICULTY**

The operator selects the amount of time that the Mongol Hurry Up is active once lit. The choices are Extra Easy, Easy, Medium, Hard and Extra Hard. The harder this is set to the shorter the time that the Mongol Hurry Up is active.

Factory Default: MEDIUM

**A.2 28 FAMILY MODE**

The operator can prevent the speech phrases "Let's get the hell out of here" and "What the Christ was that" from being played. The choices are:

OFF = Use all speech

ON = Remove above speech phrases

Factory Default: OFF

#### **A.2 29 LEFT DIVERTOR**

The operator selects whether or not the player can move the left ramp divertor by pressing the left blue button. This adjustment is provided so the operator can lock the divertor in a position if it is broken. The choices are:

ON = Players can control the left ramp divertor

OFF = Players can not control the left ramp divertor

Factory Default: ON

#### **A.2 30 RIGHT DIVERTOR**

The operator selects whether or not the player can move the right ramp divertor by pressing the right blue button. This adjustment is provided so the operator can lock the divertor in a position if it is broken. The choices are:

ON = Players can control the right ramp divertor

OFF = Players can not control the right ramp divertor

Factory Default: ON

#### **A.2 31 MINI-PLAYFIELD**

The operator selects whether or not the player can control the mini-playfield kicker or not. This adjustment is provided so the operator can lock the mini-playfield in a position to prevent ball hang ups if it is broken. The game will always reset the battle drop target when this is set to OFF to help prevent the ball from entering the mini-playfield. The choices are:

ON = Players can control the mini-playfield

OFF = Players can not control the mini-playfield

Factory Default: ON

#### **A.2 32 AUTOFIRE LOCKS**

The operator selects whether or not the ball will autofire onto the playfield when a center shadow multiball lock is made. Note: This also turns off the left ramp skill shot on locked balls. The choices are:

YES = Balls will be autofired when a lock is made

NO = Balls will not be autofired when a lock is made, the player must pull the gun trigger to launch ball.

Factory Default: NO

## **A.3 Pricing Adjustments**

### **A.3 01 Game Pricing (if set to custom, then 02 to 09 are available)**

The cost of a game is selected here, from the Standard Pricing Table or by using the Custom Pricing Editor (A.3 27).

### **A.3 02 thru A.3 09 Not Used**

### **A.3 10 Coin Door Type (if set to custom, then 11 to 15, 20 and 25 are available)**

This adjustment is used to preset adjustments 11 through 15, 20 and 25, based on standard coin doors (U.S.A., German, Etc.).

### **A.3 11 Collection Text**

The coin system used to display the Earning Audits.

### **A.3 12 Left Slot Value**

### **A.3 13 Center Slot Value**

### **A.3 14 Right Slot Value**

### **A.3 15 4th Slot Value**

The monetary value of the left, center, right, and 4th coin chutes. Formerly, these values only affected the way in which the coins were totaled for auditing displays. In the new 10/94 pricing system, these values are added for each coin inserted and credits are awarded based on the amount of money accumulated. See Pricing Editor (A.3 27) for more information.

### **A.3 16 Maximum Credits**

The maximum number of credits the game can accumulate, either through game play awards or coin purchases. The range of this setting is 5 through 99. Reaching the specified setting prevents the award of any credits. The factory default is 10.

### **A.3 17 Free Play**

The player can operate the game without a coin (free play) or with a coin.

|     |   |                                      |
|-----|---|--------------------------------------|
| NO  | - | A coin is necessary for game play.   |
| YES | - | Game play is free; no coin required. |

### **A.3 18 Hide Coin Audits**

The coin audits may, or may not be displayed.

|            |   |                                                       |
|------------|---|-------------------------------------------------------|
| YES        | - | The coin audits are not displayed.                    |
| NO         | - | The coin audits are displayed.                        |
| HIDE NAMES | - | The coin audit value is shown but not the audit name. |

### **A.3 19 Not Used**

### **A.3 20 Base Coin Size**

This is the smallest unit of coin that may be used when creating a custom pricing mode using the Pricing Editor (A.3 27). For example, in the USA this is typically \$0.25. All pricing levels are then specified in 25 cent (or greater) increments.

### **A.3 21 Coin Meter Units**

It is possible to connect a coin meter to the knocker coil driver which will log all coins through all slots. This adjustment activates the use of the knocker driver for this purpose, and determines the value of each unit on the meter. For example, to show the total amount of money collected as "total quarters", set this adjustment to "0.25". To show the amount of money collected as "total dollars", set this adjustment to "1.00".

Setting this adjustment to anything other than Off establishes the coin unit for a meter attached to the knocker driver, and overrides use of the knocker during awards.

### **A.3 22 Dollar Bill Slot**

The system normally requires 150 microseconds between coin pulses. This is too long a delay for a fast-pulsing dollar bill validator. This adjustment may be used to tell the game that there is a fast pulsing dollar bill validator connected to one of the coin switches. The options are:

|        |   |                                     |
|--------|---|-------------------------------------|
| NONE   | = | No validator connected.             |
| LEFT   | = | Validator connected to left slot.   |
| CENTER | = | Validator connected to center slot. |
| RIGHT  | = | Validator connected to right slot.  |
| FOURTH | = | Validator connected to fourth slot. |

### **A.3 23 Minimum Coin Microseconds**

This is the minimum width required for coin pulses to be accepted as valid coins. This may be changed to prevent certain kinds of cheating.

### **A.3 25 Allow Hundredths**

This is used for a custom door specifier. If set to "YES", then the values for A.3 12-15 are specified in units and hundredths (such as dollars and quarters). If set to "NO", then all values are in units (such as Francs and Lire).

### **A.3 26 Credit Fraction**

This determines the smallest fraction used for credits. It must always be even to accommodate the extra ball buy-in option of 1/2 credit, and is typically 1/2 but may need to be a different value for modes requiring more coins per credit.

### **A.3 27 Pricing Editor**

This function is now used to enter information for a custom pricing mode. The adjustment A.3 26 (Credit Fraction) may need to be set before entering the Custom Pricing Editor. This specifies the smallest fraction available for partial credits.

Because of the availability of an extra ball (buy-in) for 1/2 credit, this value is always even (1/2, 1/4, 1/6 etc.). The typical setting for A.3 26 is 1/2 (such that there are only full credits and half credits) but you may need to use a different value for other pricing modes.

Please note that formerly, the coin values specified by custom coin door adjustments A.3 12-15 only affected audit totals that showed collection totals. In the 10/94 pricing system, these coin values are added up for each coin received and credits are awarded based on pricing levels being reached. The pricing editor described here allows you to set these levels, however, it may be necessary for you to set A.3 10 (Coin Door Type) to "CUSTOM" and then change A.3 11-15, 20 and 25 to reflect the value of the coins being used. This is usually NOT NECESSARY, but must be done BEFORE using the custom pricing editor when it is necessary.

Begin the custom pricing function by pressing the "Enter" button while A.3 27 "PRICING EDITOR" is showing on the display.

The pricing editor will now show the data for the currently selected pricing mode. If this is the 1st use of the pricing editor then this will show the last built-in pricing that was selected. Otherwise it will be the last custom mode created by this function. (Note that A.3 01 will display "Custom" any time a non-standard pricing has been used.)

Assuming that last mode installed was 1/\$0.50 2/\$0.75 3/\$1.00 the display will appear as follows:

| Custom Pricing Editor |        |           |
|-----------------------|--------|-----------|
| 1)                    | \$0.25 | 1/2 cred. |
| 2)                    | \$0.50 | 1 cred.   |
| 3)                    | \$0.75 | 2 cred.   |
| 4)                    | \$1.00 | 3 cred.   |

Display View

The "\$0.25" field will be flashing. You may now use the test mode buttons to perform the following functions:

- Escape:* Undo any changes to the current field and move to the previous field.
- "-" (Down):* Make the current field lower.
- "+" (Up):* Made the current field higher.
- Enter:* Save any change to the current field and move to the next field. Note that there are two columns of fields. Price levels are in the left column and credit levels are in the right column. Pressing "Enter" will move from the left column to the right column before moving to the next line.
- Start:* Save the current custom price mode or start over.

By using the above functions, simply enumerate each pricing level and the number of credits that should be awarded at that level. Please note that you must specify each fractional level in the sequence.

|          |          |          |             |          |
|----------|----------|----------|-------------|----------|
| Example: | 1/\$0.50 | 2/\$1.00 | 4/\$1.50    | 6/\$2.00 |
|          | 1)       | \$0.25   | 1/2 cred.   |          |
|          | 2)       | \$0.50   | 1 cred.     |          |
|          | 3)       | \$0.75   | 1 1/2 cred. |          |
|          | 4)       | \$1.00   | 2 cred.     |          |
|          | 5)       | \$1.25   | 2 1/2 cred. |          |
|          | 6)       | \$1.50   | 4 cred.     |          |
|          | 7)       | \$1.75   | 4 1/2 cred. |          |
|          | 8)       | \$2.00   | 6 cred.     |          |

Also note that once the value of the coins repeat that no further specification is necessary.

Example:        1/\$0.50        2/\$1.00

                  1)        \$0.25        1/2 cred.

In the above example, only one line needs to be specified, indicating that 1/2 credit is awarded for each \$0.25 received.

### **Special Features:**

There are some special features available by pressing the “-” (Down) button while in the left column. The following words will be displayed instead of a pricing level:

*End*  
*Delete*  
*Insert*  
*Clear*  
*Repeat 1*  
*Repeat 2*  
*Repeat 3*  
*Repeat 4*  
*Repeat 5*  
*Repeat 6*  
*Repeat 7*  
*Repeat 8*  
*Repeat 9*  
*Repeat 10*  
*Repeat 11*  
*Repeat 12*  
*Repeat 13*  
*Repeat 14*  
*Repeat 15*  
*Repeat 16*  
*Repeat 17*  
*Repeat 18*  
*Repeat 19*  
*Repeat 20*

Pressing “Enter” with the above words selected will activate the following functions:

**End**    This is the same as pressing the start button. A menu of choices will be provided (see “Start Button” below).

**Delete** This will delete the current level from the pricing mode.

**Insert** This will insert a new pricing level ABOVE the current level. The current level will be unaffected. There must be room for at least 1 coin between the current level and the previous level, and at least one fractional credit unit between the current level and the previous level.

Example: Inserting a new pricing level.

| Custom Pricing Editor |        |         |
|-----------------------|--------|---------|
| 1)                    | \$0.50 | 1 cred. |
| 2)                    | \$1.00 | 2 cred. |
| 3)                    | \$1.50 | 4 cred. |
| 4)                    | \$2.00 | 6 cred. |

Display View

Use the "Enter" button to move to the \$1.50 field. Now press the "-" button once to create the following display:

| Custom Pricing Editor |        |         |
|-----------------------|--------|---------|
| 1)                    | \$0.50 | 1 cred. |
| 2)                    | \$1.00 | 2 cred. |
| 3)                    | INSERT | 4 cred. |
| 4)                    | \$2.00 | 6 cred. |

Display View

Now press the "Enter" button. The display will now show:

| Custom Pricing Editor |        |             |
|-----------------------|--------|-------------|
| 1)                    | \$0.50 | 1 cred.     |
| 2)                    | \$1.00 | 2 cred.     |
| 3)                    | \$1.25 | 2 1/2 cred. |
| 4)                    | \$2.00 | 6 cred.     |

Display View

Note that the line "5) \$2.00 6 cred." no longer fits on the display. Whenever there are more than 4 pricing levels the display will scroll up and down as "Enter" and "Escape" are used to move from field to field. If you repeatedly press "Enter" the display will then show:

| Custom Pricing Editor |        |             |
|-----------------------|--------|-------------|
| 2)                    | \$1.00 | 2 cred.     |
| 3)                    | \$1.25 | 2 1/2 cred. |
| 4)                    | \$1.50 | 4 cred.     |
| 5)                    | \$2.00 | 6 cred.     |

Display View

**Clear** This will clear out the current entries to allow a new price mode to be entered.

**Repeat (1-20)** This will cause all entries above the current line to be repeated the number of times specified. This is only available when there are no pricing levels below the current line.

Example: 1/\$0.50      2/\$1.00      15/\$5.00

Use the "Edit New Pricing Mode" feature described below to clear out the current levels.

Use "+" and "Enter" to specify 1/2 credit for \$0.25:

| Custom Pricing Editor |        |           |
|-----------------------|--------|-----------|
| 1)                    | \$0.25 | 1/2 cred. |

Display View

Now, use "-" until the display shows "Repeat 20". The display will show the following:

| Custom Pricing Editor |           |         |
|-----------------------|-----------|---------|
| 1)                    | \$0.50    | 1 cred. |
| 2)                    | REPEAT 20 |         |

Display View

Press "Enter" and the display will show the following:

| Custom Pricing Editor |        |             |
|-----------------------|--------|-------------|
| 1)                    | \$0.25 | 1/2 cred.   |
| 2)                    | \$0.50 | 1 cred.     |
| 3)                    | \$0.75 | 1 1/2 cred. |
| 4)                    | \$1.00 | 2 cred.     |

Display View

Actually, by repeating the 1st line 20 times the pricing mode is currently set up as follows, but only the 1st 4 lines are displayed.

| Custom Pricing Editor |        |             |
|-----------------------|--------|-------------|
| 1)                    | \$0.25 | 1/2 cred.   |
| 2)                    | \$0.50 | 1 cred.     |
| 3)                    | \$0.75 | 1 1/2 cred. |
| 4)                    | \$1.00 | 2 cred.     |
| 5)                    | \$1.25 | 2 1/2 cred. |
| 6)                    | \$1.50 | 3 cred.     |
| 7)                    | \$1.75 | 3 1/2 cred. |
| 8)                    | \$2.00 | 4 cred.     |
| 9)                    | \$2.25 | 4 1/2 cred. |
| 10)                   | \$2.50 | 5 cred.     |
| 11)                   | \$2.75 | 5 1/2 cred. |
| 12)                   | \$3.00 | 6 cred.     |
| 13)                   | \$3.25 | 6 1/2 cred. |
| 14)                   | \$3.50 | 7 cred.     |
| 15)                   | \$3.75 | 7 1/2 cred. |
| 16)                   | \$4.00 | 8 cred.     |
| 17)                   | \$4.25 | 8 1/2 cred. |
| 18)                   | \$4.50 | 9 cred.     |
| 19)                   | \$4.75 | 9 1/2 cred. |
| 20)                   | \$5.00 | 10 cred.    |



Now, repeatedly press "Enter" to move to the right hand column of the 20th level. The display will show (with "10 cred." blinking):

| Custom Pricing Editor |        |             |
|-----------------------|--------|-------------|
| 17)                   | \$4.25 | 8 1/2 cred. |
| 18)                   | \$4.50 | 9 cred.     |
| 19)                   | \$4.75 | 9 1/2 cred. |
| 20)                   | \$5.00 | 10 cred.    |

Display View

Now, press "+" repeatedly until the right hand column of line 20) reads "15 cred."

**Start Button:** Once the pricing mode has been specified, exit the custom pricing editor by pressing the "Start" button. This will bring up a menu with (some or all of) the following choices:

|                   |
|-------------------|
| Choose an Option: |
| Return to Editor  |
| Clear Pricing     |
| Ignore Changes    |
| Save Changes      |

Display View

Use the "+" and "-" button to select your choice and press the "Enter" button to activate. The selections cause the following actions:

**Return to Editor:** This option will allow you to continue to edit the pricing information.

**Clear Pricing:** This option will clear out all pricing levels and bring you back to the pricing editor to create a pricing mode from scratch.

**Ignore Changes:** This option will discard the work done in the pricing editor and leave the previously installed pricing mode in the game.

**Save Changes:** Press "Enter" to save your custom edited pricing mode and install it as the pricing for the game. Note that this choice will not be displayed if there is not at least one pricing level specified in the pricing editor, or if no changes have been made.

**Exit Pricing Editor:** This option will appear if no changes have been made. It will exit the Pricing Editor leaving the pricing as is.

## Pricing Table

| Country     | Coin Chutes |         |         |           | Games/Coins                                          | Display           | Pricing Adjustments A3  |
|-------------|-------------|---------|---------|-----------|------------------------------------------------------|-------------------|-------------------------|
|             | Left        | Center  | Right   | 4th Chute |                                                      |                   | 02 03 04 05 06 07 08 09 |
| USA         | 25¢         | \$1.00* | 25¢     | \$1.00    | 1/50¢, 2/75¢, 3/\$1 <sup>2</sup>                     | 50¢, 75¢, \$1.00  |                         |
|             | 25¢         | \$1.00* | 25¢     | \$1.00    | 1/75¢, 2/\$1.50, 3/\$2.00 <sup>2</sup>               | 1/75, 3/2.00      |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/3X25¢ <sup>2</sup>                                 | USA1 1/\$0.75     |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/50¢, 2/\$1 <sup>2</sup>                            | USA 2/\$1.00      |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/50¢, 3/\$1.00 <sup>2</sup>                         | USA 3/\$1.00      |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/2x25¢, 2/\$1.00, 3/\$1.50, 6/\$2.00 <sup>2</sup>   | USA 6/\$2.00      |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/2x25¢, 2/\$1.00, 3/\$1.50, 5/\$2.00 <sup>1,2</sup> | USA 5/\$2.00      |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/3X25¢, 2/\$1.50, 4/\$2.00 <sup>2</sup>             | 1/75, 4/\$2.00    |                         |
|             | 25          | \$1.00  | 25¢     | \$1.00    | 1/2x25¢, 2/\$1.00, 4/\$1.50, 6/\$2.00 <sup>2</sup>   | 6/\$2.00 4/\$1.50 |                         |
|             | 25¢         | 25¢     | 25¢     | -         | 1/4x25¢, 6/\$5.00 <sup>2</sup>                       | 1/1, 6/5          |                         |
| Canada      | 25¢         | -       | \$1.00* | -         | 1/50¢, 2/75¢, 3/\$1 <sup>2</sup>                     | CAN. 50-75-1      |                         |
|             | 25          | -       | \$1.00  | -         | 1/50¢, 2/\$1 <sup>2</sup>                            | CAN. 2/\$1.00     |                         |
|             | 25          | -       | \$1.00  | -         | 1/50¢, 3/\$1.00 <sup>2</sup>                         | CAN. 3/\$1.00     |                         |
|             | 25          | -       | \$1.00  | -         | 1/2x25¢, 2/4x25¢, 3/\$1.00 <sup>2</sup>              | 3/\$1.00 Coin     |                         |
|             | 25          | -       | \$1.00  | -         | 1/2x25¢, 2/\$1.00, 3/\$1.50, 6/\$2.00 <sup>2</sup>   | CAN. 6/\$2.00     |                         |
|             | 25          | -       | \$1.00  | -         | 1/2x25¢, 2/\$1.00, 3/\$1.50, 5/\$2.00 <sup>1,2</sup> | CAN. 5/\$2.00     |                         |
|             | 25          | -       | \$1.00  | -         | 1/2x25¢, 2/\$1.00, 4/\$1.50, 6/\$2.00 <sup>2</sup>   | 6/\$2 4/1.50      |                         |
|             | 25          | -       | \$1.00  | -         | 1/3X25¢, 2/\$1.50, 4/\$2.00 <sup>2</sup>             | 1/75, 4/2.00      |                         |
|             | 25¢         | -       | \$1.00* | -         | 1/75¢, 2/\$1.50, 3/\$2.00 <sup>2</sup>               | 1/75, 3/2.00      |                         |
|             | 25          | -       | \$1.00  | -         | 1/3X25¢ <sup>2</sup>                                 | CAN. 1/\$0.75     |                         |
| Austria     | 5sch        | 10sch   | 10sch   | -         | 1/2x5sch, 3/2x10sch <sup>2</sup>                     | AUSTRIA           |                         |
|             | 5sch        | -       | 10sch   | -         | 2/5sch, 5/10sch                                      | CUSTOM            | 02 00 05 00 01 00 01 00 |
| Australia   | 20¢         | \$1     | \$1     | \$2       | 1/\$1, 3/\$2 <sup>2</sup>                            | AUSTRALIA 1       |                         |
|             | 20¢         | \$1     | \$1     | \$2       | 1/\$1, 2/\$2                                         | AUSTRALIA 2       |                         |
| U.K.        | £1.00       | 50P     | 20P     | 10P       | 1/3x10P, 2/50P, 4/£1 <sup>2</sup>                    | U. KINGDOM        |                         |
| Switzerland | 1Fr         | 2Fr     | 5Fr     | -         | 1/1Fr, 3/2Fr, 7/5Fr <sup>2</sup>                     | SWISS 1           |                         |
|             | 1Fr         | 2Fr     | 5Fr     | -         | 1/2Fr, 2/3Fr, 3/4Fr, 5/5F                            | SWISS 2           |                         |
| Belgium     | 5Fr         | 20Fr    | 50Fr    | -         | 1/4x5Fr, 1/20Fr, 3/50Fr <sup>2</sup>                 | BELGIUM           |                         |
| Germany     | 1DM         | 2DM     | 5DM     | -         | 1/2DM, 2/3DM, 3/4DM, 5/5DM <sup>1,2</sup>            | GER. 1/2DM        |                         |
|             |             |         |         | -         | 1/1DM, 2/2DM, 5/5DM <sup>2</sup>                     | GER. 1/1DM        |                         |
|             |             |         |         | -         | 1/1DM, 2/2DM, 6/5DM <sup>2</sup>                     | GER. 6/5DM        |                         |
| Holland     | 1G          | -       | 1G      | -         | 1/1G <sup>2</sup>                                    | HOLLAND           |                         |
| Sweden      | 1Kr         | 5Kr     | 10Kr    | 1Kr       | 1/10Kr, 2/15Kr, 3/20Kr <sup>1,2</sup>                | SWEDEN 1          |                         |
|             | 1Kr         | 5Kr     | 10Kr    | 1Kr       | 1/5Kr <sup>2</sup>                                   | SWEDEN 2          |                         |
| France      | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 1/3x1Fr, 2/5Fr, 5/10Fr, 10/20Fr <sup>2,3</sup>       | TARIF 1           |                         |
|             | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 1/2x1Fr, 3/5Fr, 7/10Fr, 14/20Fr <sup>2,3</sup>       | TARIF 2           |                         |
|             | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 1/5Fr, 3/10Fr, 7/2x10Fr, 7/20Fr <sup>1,2,3</sup>     | TARIF 3           |                         |
|             | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 2/5Fr, 4/10Fr, 9/2x10Fr, 9/20Fr <sup>2,3</sup>       | TARIF 4           |                         |
|             | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 2/5Fr, 5/10Fr, 11/2x10Fr, 11/20Fr <sup>2,3</sup>     | TARIF 5           |                         |
|             | 1Fr         | 5Fr     | 10Fr    | 20Fr      | 1/5Fr, 3/10Fr, 6/20Fr <sup>2,3</sup>                 | TARIF 6           |                         |
| Italy       | 500L        | 500L    | 500L    | -         | 1/500L <sup>2</sup>                                  | ITALY 1           |                         |
|             | 500L        | 500L    | 500L    | -         | 1/2x500L, 3/4x500L <sup>1,2</sup>                    | ITALY 2           |                         |
|             | 500L        | 500L    | 500L    | -         | 1/2x500L, 2/4x500L <sup>2</sup>                      | ITALY 3           |                         |
| Spain       | 100P        | -       | 500P    | -         | 1/100P, 6/500P <sup>2</sup>                          | SPAIN             |                         |
|             | 25P         | -       | 100P    | -         | 1/25P, 5/100P                                        | CUSTOM            | 01 00 04 00 01 04 01 00 |
|             | 25P         | -       | 100P    | -         | 1/25P, 4/100P                                        | CUSTOM            | 01 00 04 00 01 00 01 00 |
|             | 25P         | -       | 100P    | -         | 1/2x25P, 2/100P                                      | CUSTOM            | 01 00 04 00 02 00 01 00 |
| Japan       | 100¥        | -       | 100¥    | -         | 1/2x25P, 3/100P                                      | CUSTOM            | 03 00 12 00 04 00 01 06 |
|             | 100¥        | -       | 100¥    | -         | 1/100¥ <sup>2</sup>                                  | JAPAN             |                         |
| Chile       | Token       | -       | Token   | -         | 1/1Token <sup>2</sup>                                | CHILE             |                         |
| Denmark     | 1Kr         | 5Kr     | 10Kr    | 20Kr      | 1/2x1kr, 3/5kr, 7/10kr <sup>2</sup>                  | DENMARK 1         |                         |
|             | 1Kr         | 5Kr     | 10Kr    | 20Kr      | 1/5kr, 3/10kr, 6/20kr <sup>1,2</sup>                 | DENMARK 2         |                         |
| Finland     | 1Mka        | -       | 5Mka    | -         | 1/2x1Mka, 3/5Mka <sup>2</sup>                        | FINLAND 1         |                         |
|             | 1Mka        | -       | 5Mka    | -         | 1/3x1Mka, 2/5Mka <sup>2</sup>                        | FINLAND 2         |                         |
| New Zealand | \$1.00      | -       | \$2.00  | -         | 1/\$1, 3/\$2                                         | NEW ZEALAND 1     |                         |
|             | \$2.00      | -       | \$1.00  | -         | 1/\$1, 3/\$2, (\$2-\$1 door)                         | NEW ZEALAND 2     |                         |
| Norway      | 5Kr         | -       | 10Kr    | -         | 1/5Kr, 2/10Kr, 5/20Kr <sup>2</sup>                   | NORWAY            |                         |
| Argentina   | 10¢         | 10¢     | 10¢     | -         | 1/1 Token <sup>2</sup>                               | ARGENTINA         |                         |
| Greece      | 10D         | 20D     | 50D     | -         | 1/2x10D, 1/20D, 3/50D                                | GREECE            |                         |
| Antilles    | 25¢         | 25¢     | 1G      | -         | 1/25¢, 4/1G                                          | ANTILLES          |                         |
| Netherlands | 1Hfl        | 2.5Hfl  | 2.5Hfl  | -         | 1/1Hfl, 3/2.5Hfl                                     | NETHERLANDS       |                         |
| Hungary     | 10F         | 10F     | 20F     | -         | 1/1x20F, 1/2x10F, 3/2x20F <sup>2</sup>               | HUNGARY           |                         |

Note: 1. Factory Default. 2. Standard Setting - Change by pressing Enter button. 3. Other functions are also affected.

\* Only if Bill Acceptor and Center Coin Chute are available.

## **A.4 H.S.T.D. Adjustments**

### **A.4 01 Highest Scores**

The game maintains a record of the four highest scores achieved to date.

- OFF - No high scores are recorded, or displayed.
- ON - The four highest scores are stored in memory and displayed in the Attract Mode.

### **A.4 02 H.S.T.D. Award**

The award given for achieving the High Score To Date, or the Champion H.S.T.D: Credit or Ticket.

### **A.4 03 Champion H.S.T.D.**

The "Highest" High Score is displayed in the Attract Mode. This score is not cleared when "High Score Reset Every" occurs.

- ON - The "Highest" High Score is retained in memory and is displayed.
- OFF - The "Highest" High Score is not retained.

### **A.4 04 Champion Credits**

The operator chooses the number of credits or tickets awarded for a Grand Champion Score. Range: 00 - 10.

### **A.4 05 H.S.T.D. 1 Credits**

### **A.4 06 H.S.T.D. 2 Credits**

### **A.4 07 H.S.T.D. 3 Credits**

### **A.4 08 H.S.T.D. 4 Credits**

The number of credits or tickets to be awarded whenever a player exceeds the 1st, 2nd, 3rd, and 4th highest scores. Range: 00 - 10.

### **A.4 09 High Score Reset Every**

The number of games to be played before an automatic reset of the displayed "Highest Score" occurs. The values provided upon reset are those selected by the operator in the Back-up High Scores. Range: OFF (disabled); 250 to 20, 000.

### **A.4 10 Backup Champion**

The Back-up Grand Champion Score. Range: 00 - 99,900,000.

### **A.4 11 Backup H.S.T.D. 1**

### **A.4 12 Backup H.S.T.D. 2**

### **A.4 13 Backup H.S.T.D. 3**

### **A.4 14 Backup H.S.T.D. 4**

The first through the fourth Back-up High Score values. The game automatically restores this value when the High Score Reset Every value is reached. Range: 00 - 99,900,000.

**A.4 15 Shadow Loop Champ Default**

The operator selects the default number of Shadow loops a player must make in a row to be on the SHADOW LOOP CHAMP table. The setting range is 1-6 Shadow loops in a row.

Factory Default:           2

**A.4 16 Backup Aux Grand Champion H.S.T.D.**

This is the backup BUY-IN grand champion score. Players are placed on this H.S.T.D. table IF they have bought in at least once. The setting range is 0 - 99,900,000.

**A.4 17 Backup Aux H.S.T.D. 1**

**A.4 18 Backup Aux H.S.T.D. 2**

**A.4 19 Backup Aux H.S.T.D. 3**

**A.4 20 Backup Aux H.S.T.D. 4**

The first through the fourth BUY-IN high score values. The game automatically restores this value when the High Score Reset value is reached. Players are placed on this H.S.T.D. table IF they have bought in at least once. The setting range is 0 - 99,900,000.

## **A.5 Printer Adjustments** (optional board required)

### **A.5 01 Column Width**

The column width to be printed. Range: 22 - 80.

### **A.5 02 Lines Per Page**

The amount of lines per page. Range: 20 - 80.

### **A.5 03 Pause Every Page**

Choose whether the printer pauses at the end of a page.

- YES - The printer does pause.
- NO - The printer does not pause.

### **A.5 04 Printer Type**

Select the type of printer . Choices: Parallel, Serial, ADP., Mini-Drucker, or NSM.

### **A.5 05 Serial Baud Rate**

The baud rate used for Serial or ADP communications (bit rate). Choices: 300, 600, 1200, 2400, 4800, or 9600.

### **A.5 06 Serial D.T.R. (Data Terminal Ready)**

When a Serial Printer is used, this line may be connected to a printer output line signaling that the printer is busy.

- Normal - Normal D.T.R. signal goes low to indicate the printer is not ready.
- Inverted - Inverted D.T.R. (busy) signal goes high to indicate printer is not ready.
- Ignore - D.T.R. signal is ignored.

### **A.5 07 Auto Printout**

With the optional printer board installed, this adjustment allows the initiation of printouts whenever the game detects a printer connected to the game. Parallel printers are detected automatically by plugging them in and putting them on-line. Serial printers (or computers) are detected by sending a carriage return (ASCII 0x0D) or XON (ASCII 0x11).

This adjustment has the following settings:

|             |                             |
|-------------|-----------------------------|
| OFF         | Disable automatic printouts |
| MAIN AUDS   | Main Audit table (B.1)      |
| EARNINGS    | Earning Audits (B.2)        |
| STD. AUDITS | Standard Audits (B.3)       |
| FEATURES    | Feature Audits (B.4)        |
| HISTOGRAMS  | Histograms (B.5)            |
| TIMESTAMPS  | Time Stamps (B.6)           |
| ALL DATA    | All of the above data       |

The table specified above will automatically be printed when a printer (or computer) is detected.

If the printer is detected during game over or test mode, the printout will take place right away.

If the printer is connected while a game is being played, it will take up to 10 seconds to be detected, after which the printout will occur. The game will resume after the printout is complete.

Automatic printout will only take place if the coin door is open.

After an automatic printout has been generated, a second automatic printout will not be possible until a new game has started, or test mode begins.

## ERROR MESSAGES

The WPC game program has the capability to aid the operator and service personnel. At Game Turn-on, or after pressing the Begin Test switch, (once the game has been operating for an extended period), the display may signal with the message, "Press ENTER for Test Report". This indicates the game program has detected a possible problem with the game.

To obtain details of the problem, open the coin door and press the Begin Test switch. Press the Enter button to begin displaying the message(s). The following messages apply to your game.

### **ER. MINI PFD. BAD CHK. SWITCHES/MTR**

This is saying the mini-playfield is not working correctly. Check the mini-playfield motor (20 - mini motor left, 19 - mini motor right), Bridge driver board, Power Driver board, CPU board, and the two mini-playfield limit switches (38 - mini-playfield right and 37 - mini-playfield left). Also check for blown fuses.

### **ER. MAGNET OPTO IS NOT WORKING**

This is saying that opto switch #33 (inner sanctum) is not working. This switch must be working for the magnet to be able to capture and throw the ball. Check the opto driver board, 12v power supply, CPU board and proper alignment of the opto pair. Also check for blown fuses.

### **ER. BATTLE KICKER OPTO NOT WORKING**

This is saying that opto switch #36 (inner sanctum) is not working. This switch must be working for the magnet to be able to capture and throw the ball. Check the 24 inch opto driver board, 12v power supply, CPU board and proper alignment of the opto pair. Also check for blown fuses.

### **ER. LOCKUP IS BAD CHK. SWITCH/COIL**

This is saying that the 3 ball lockup at the top of the playfield is not working correctly. Check to see that the three lockup switches (lockup right #63, lockup middle #64, lockup left #65) are working properly (check with balls sitting on switches) and that the lockup kickout coil (#02) is working correctly. Also check for blown fuses.

### **ER. WALL TGT. BAD CHK. SWITCH/COIL**

This is saying that the sanctum wall controlled target is not working correctly. Check to see that the wall drop down switch (#51) is functioning correctly (it should trigger closed when the wall is down) and coils #08 (wall target up) & #16 (wall target down) are functioning. Also check for blown fuses.

### **ER. DROP BANK BAD CHK. SWITCH/COIL**

This is saying the mini-playfield 4 bank drop targets are not functioning properly. Check the mini drop bank coil (#24) and the four drop target switches (#85-#88), 12v power supply and the CPU board. Also check for blown fuses.

### **ER. BAT. DROP BAD CHK. SWITCH/COIL**

This is saying that the single drop target at the entrance to the popper (battlefield) is not functioning correctly. Check to see that the battle drop down switch (#55) is functioning correctly (it should trigger closed when the drop target is down) and coils #25 (single drop up) & #36 (single drop down) are functioning. Also check for blown fuses.

#### **ER. MAGNET BAD CHK. SWITCH/COIL**

This is saying that the sanctum magnet is unable to capture and/or throw the pinball into the 3 ball lockup. Check to make sure the magnet (coil #35) that the inner sanctum opto switch (#33) are working correctly & the alignment of the opto pair correct. Also check to make sure the height of the magnet core is adjusted properly (the magnets height can be adjusted from the bottom of the playfield). Check to make sure 3 ball lockup switches (lockup right #63, lockup middle #64, lockup left #65) are working properly. Also check for blown fuses on flipper board and power driver board.

#### **ER. POPPER IS BAD CHK. SWITCH/COIL**

This is saying that the popper was unable to get the pinball out of the popper. Check to make sure the popper switch (#68) is working properly and is adjusted correctly. This switch can be difficult to adjust. Make sure it is not too sensitive or it make trigger from coils being fired. The weight of the ball falling into the popper should trigger the switch closed. Once the ball is kicked out the switch should open up immediately. Check to make sure the popper coil (#14) is functioning correctly. Also check for blown fuses.

#### **Check Switch ##.**

This message indicates that at least one switch was stuck 'On' at game turn-on or has NOT been actuated during ball play (for 90 balls or A30 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep the game earning, until the service technician can repair the problem.

To verify the problem, refer to the Test Menu text describing Switch Testing, and check each reported switch using applicable switch tests. Always check switch operation using a ball, to simulate game conditions. Switch problems may often be resolved by adjusting the wire switch actuators, fixing switch circuitry problems, securing loose connectors, etc. Mechanisms using 'opto switches' (drop targets, etc.) need to be checked for proper power connections (+12V dc and ground).

#### **Check Fuses F115 and F116 and Opto 12V Supply.**

This message will be displayed if the game senses that all optical switches are not functioning. This usually occurs when there is no 12V supply to the playfield optics.

The problem is likely to be a blown fuse (F115 or F116) or at connectors J112, J116, J117 or J118 on the power driver board.

#### **Opto Trough Bad Check Connectors, Wires and 12V Supply**

This message will be displayed if all of the optics in the playfield ball trough are not functioning. This is usually caused by a problem with a ball trough connector supplying 12V and Ground for the optical circuits.

#### **Pinball Missing.**

This game normally uses 5 balls; however, it will operate with as few as one ball. This message announces that a ball is missing or stuck. When the ball is located, return it to the game via the Outhole. Other possibilities for this problem could be malfunctions of the Ball Trough optos or the Ball Shooter switch.

**xxxxx Sw. is Stuck On.**

This message indicates that a switch, which is not usually On, remains in the On position after the game is switched On. The stuck switch is essential for game play (for example, a coin chute switch, the slam tilt switch, the plumb bob tilt switch), and should be cleared to permit proper game operation.

**Ground Short Row-N, Wht-xxx.**

This message indicates that the switch wires being called out are touching a grounded part on the playfield or coin door. The following should be checked:

1. Slam Tilt (or other coin door) switch touching the grounded coin door.
2. A leaf-type, playfield switch touching a grounded part.
3. Players poking metallic objects (wires, coat hanger, etc.) into the game
4. Switch cable insulation pierced or damaged allowing bare wire contact with a grounded part
5. All switches in a row closing at the same time. Note: This instance is NOT a switch problem; however, for most games this is a very rare possibility.

**U6 Checksum Error.**

The game ROM checksum is invalid. If this occurs replace the game ROM.

**Time and Date Not Set.**

The real time clock is not set. If this occurs go to U.4 of the Utilities Menu and set the time and date.

**Factory Settings Restored.**

This message indicates that the CMOS RAM no longer retains any custom Pricing or Game Adjustment settings and has reverted to factory default settings. Generally, the following CPU checks will isolate the cause of the CMOS RAM memory failure. The voltage at pin 28 and pin 26 of U8 should be +5V (game turned On) and at least +4V (game turned Off). When the voltage drops below +4 V, memory reset occurs. Check the batteries and battery holder. Be sure that the batteries are good and that there is no contamination on the battery holder terminals. Turn the game OFF, and use an ohmmeter to check diodes D1 and D2 on the CPU Board. D1 should read 0 ohms when forward-biased and infinite ohms when reverse-biased. D2 should read 15 ohms when forward-biased and infinite ohms when reverse-biased. Note: Readings taken from Analog Meter. This message can also indicate that there is an open diode on a 50V coil circuit and noise is entering the circuit.



## CPU L.E.D.'s

The CPU has three L.E.D.'s located on the upper left side of the board: D19, D20, and D21. On game power-up D19 and D21 turn on for a moment then, D19 turns off and D20 starts to blink rapidly. D21 remains on. The system has detected a problem if the following happens:

### CPU Board L.E.D. Error Codes

|                                  |   |                        |
|----------------------------------|---|------------------------|
| Center L.E.D. blinks one time    | - | ROM Error U6           |
| Center L.E.D. blinks two times   | - | RAM Error U8           |
| Center L.E.D. blinks three times | - | Custom Chip Failure U9 |

### Sound Board Beep Error Codes

#### Upon Game Turn-On:

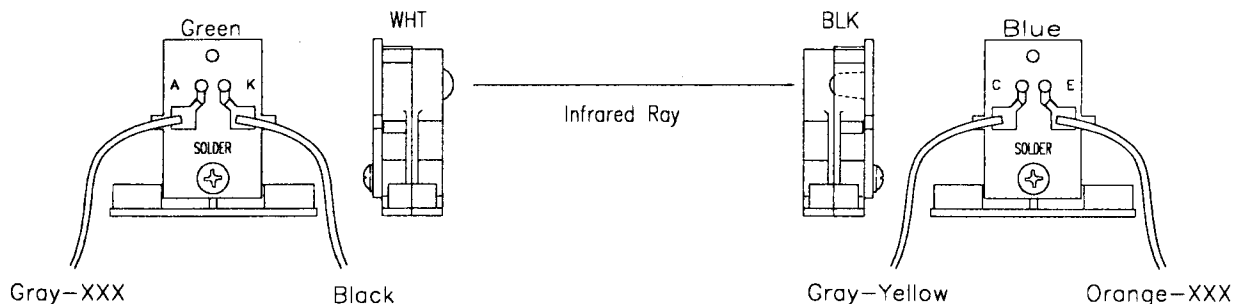
|         |   |                  |
|---------|---|------------------|
| 1 Beep  | = | Sound Board O.K. |
| 2 Beeps | = | U2 Failure       |
| 3 Beeps | = | U3 Failure       |
| 4 Beeps | = | U4 Failure       |
| 5 Beeps | = | U5 Failure       |
| 6 Beeps | = | U6 Failure       |
| 7 Beeps | = | U7 Failure       |
| 8 Beeps | = | U8 Failure       |
| 9 Beeps | = | U9 Failure       |

## OPTO THEORY

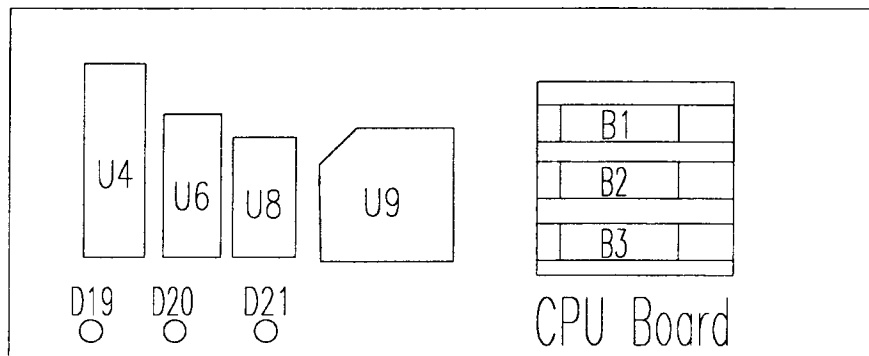
The opto receiver (Photo Transistor) should be approximately 0.1-0.7 volts when the opto beam is unblocked and approximately 11-13 volts when the opto beam is blocked. The opto transmitter (L.E.D.) should always be approximately 1.4 volts. Note, the transmitter (L.E.D.) is larger than the receiver (Photo Transistor); it protrudes further from its case.

LED Board (A-16908)  
Transmitter  
1.0-1.1 Volts

Photo Transistor Board (A-16909)  
Receiver  
0.1-0.7V Unblocked  
11-13V Blocked



## LED List



### **CPU Board**

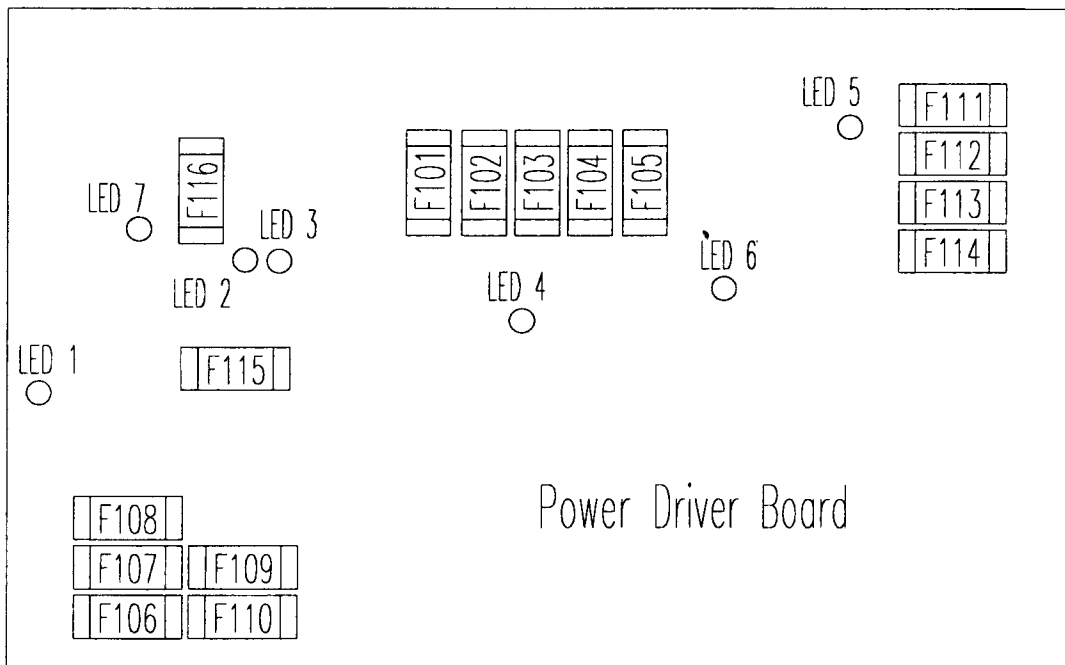
D19, Blanking

D20, Diagnostic

D21, +5vdc

At Game Turn-On = D19 & D21 On, D20 Off

During Normal Operation = D19 Off, D20 flashing, D21 On



### **Power Driver Board**

LED 1, +12vdc, Switch Circuit, Normally On

LED 2, High/Low Line Voltage Sensor, Normally On

LED 3, High/Low Line Voltage Sensor, Normally Off

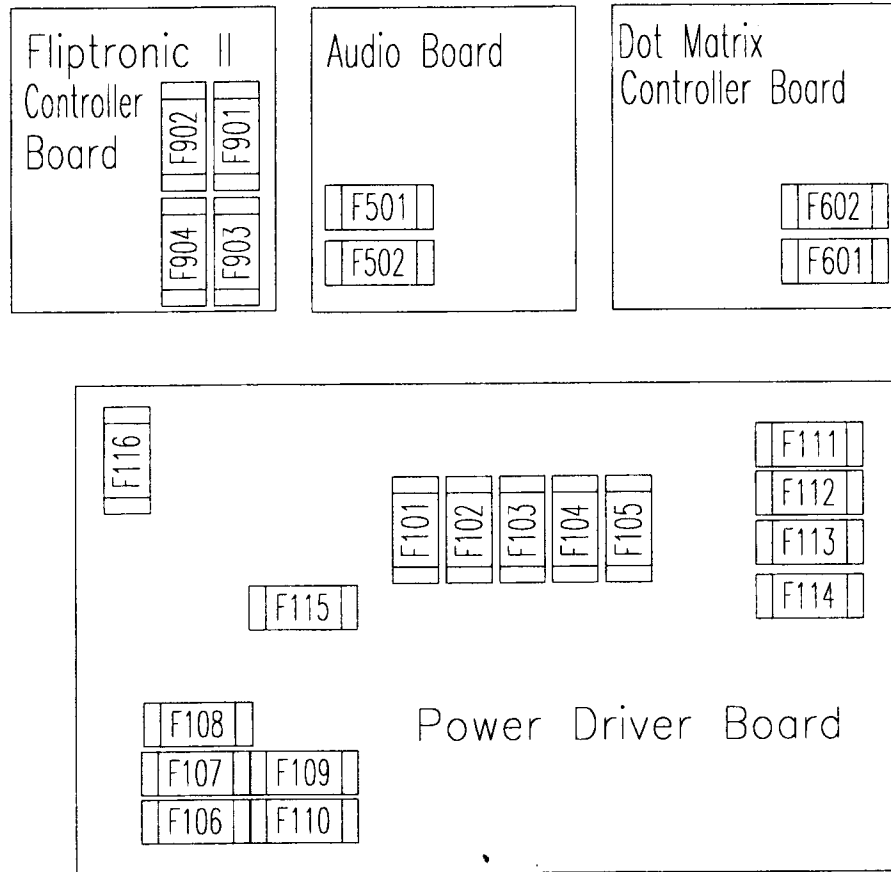
LED 4, +5vdc, Digital Circuit, Normally On

LED 5, +20vdc, Flashlamp Circuit, Normally On

LED 6, +18vdc, Lamps Circuit, Normally On

LED 7, +12vdc, Power Circuit (Motors, Relays, Etc.), Normally On

## Fuse List



### **Audio Board**

|                   |                |
|-------------------|----------------|
| F501 -25V Circuit | 3A, 250V, S.B. |
| F502 +25V Circuit | 3A, 250V, S.B. |

### **Dot Matrix Controller Board**

|                               |                  |
|-------------------------------|------------------|
| F601 +62V Circuit             | 3/8A, 250V, F.B. |
| F602 -113V and -125V Circuits | 3/8A, 250V, F.B. |

### **Fliptronic II Controller Board**

|                          |                |
|--------------------------|----------------|
| F901 Upper Right Flipper | 3A, 250V, S.B. |
| F902 Upper Left Flipper  | 3A, 250V, S.B. |
| F903 Lower Right Flipper | 3A, 250V, S.B. |
| F904 Lower Left Flipper  | 3A, 250V, S.B. |

### **Power Driver Board**

|                                     |                  |
|-------------------------------------|------------------|
| F101 +50VDC General (Left Flipper)  | 3A, 250V, S.B.   |
| F102 +50VDC General (Right Flipper) | 3A, 250V, S.B.   |
| F103 Solenoid #25-#28               | 3A, 250V, S.B.   |
| F104 Solenoid #9-#16                | 3A, 250V, S.B.   |
| F105 Solenoid #1-#8                 | 3A, 250V, S.B.   |
| F106 G.I. #5 Wht-Vio                | 5A, 250V, S.B.   |
| F107 G.I. #4 Wht-Grn                | 5A, 250V, S.B.   |
| F108 G.I. #3 Wht-Yel                | 5A, 250V, S.B.   |
| F109 G.I. #2 Wht-Org                | 5A, 250V, S.B.   |
| F110 G.I. #1 Wht-Brn                | 5A, 250V, S.B.   |
| F111 Flasher Secondary              | 5A, 250V, S.B.   |
| F112 Solenoid Secondary             | 7A, 250V, S.B.   |
| F113 +5V Logic                      | 5A, 250V, S.B.   |
| F114 +18V Lamp Matrix               | 8A, 32V, N.B.    |
| F115 +12V Switch Matrix             | 3/4A, 250V, F.B. |
| F116 +12V Secondary                 | 3A, 250V, S.B.   |

### **Line Filter**

|               |          |
|---------------|----------|
| Domestic Game | 8A       |
| Foreign Game  | 5A, S.B. |

## **MAINTENANCE INFORMATION**

### **LUBRICATION**

The two main lubrication points of the Ball Eject mechanism\* are the pivots for the arm. The mechanisms of other playfield devices are somewhat similar and have the same lubrication requirements. A medium viscosity oil (switch target grease) is satisfactory for these devices. Also, regularly lubricate the slide-mechanism rails and the leg levers.

Because of the functional design (arm-actuated via solenoid plunger operation), the pivot points of the Left and Right Kickers ("Slingshots") all require lubrication as a regular servicing procedure.

Lubrication to ensure proper operation also applies to the target blades of Drop Targets. MBI Instrument Grease, also known as Drop Target Switch Lubricant, (Bally part number of EI 165), is a recommended lubricant.

### **SWITCH CONTACTS**

#### **Playfield Switches**

For proper game operation, switch contacts should be free of dust, dirt, contamination, and corrosion. Blade switch contacts are plated to resist corrosion. Cleaning blade switch contacts requires gentle closing of the contacts on a clean business card or piece of paper, and then pulling the paper about 2 inches, which should restore the clean contact surface. Adjust the switch contacts to a 1/16-inch gap.

#### **Flipper Switches**

This game uses the new Fliptronic II Electronic Flipper System. The end-of-stroke switches are NORMALLY OPEN and should close when the flipper is energized. All end-of-stroke switches are gold flashed computer grade leaf switches. Only low computer current is carried through these switches. DO NOT FILE or abrasively clean these switches! DO NOT REPLACE these switches with the old style tungsten high current type switches, as intermittent operation could occur. Please note that unlike the old style of flipper, an end-of-stroke switch failure will not harm the flipper. The game will notify the operator of a switch being misadjusted in the test report, but will continue to play. The end-of-stroke switches are a means by which the new electronic flippers feel and play with all of the subtleties of the old flippers.

### **CLEANING**

Good game action and extended playfield life are the results of regular playfield cleaning. During each collection stop, the playfield glass should be removed and thoroughly cleaned and the playfield should be wiped off with a clean, lint-free cloth. The game balls should be cleaned and inspected for any chips, nicks, or pits. Replace any damaged balls to prevent playfield damage.

Regular, more extensive, playfield cleaning is recommended. However, avoid excessive use of water and caustic or abrasive cleaners because they tend to damage the playfield surface. Playfield wax (or any carnauba based wax), or polish may be used sparingly, to prevent a buildup on the playfield surface. Do not use cleaners containing petroleum distillates on any playfield plastics because they may dissolve the plastic material or damage the artwork.

\*May not be used on all games.

# ***The Shadow***

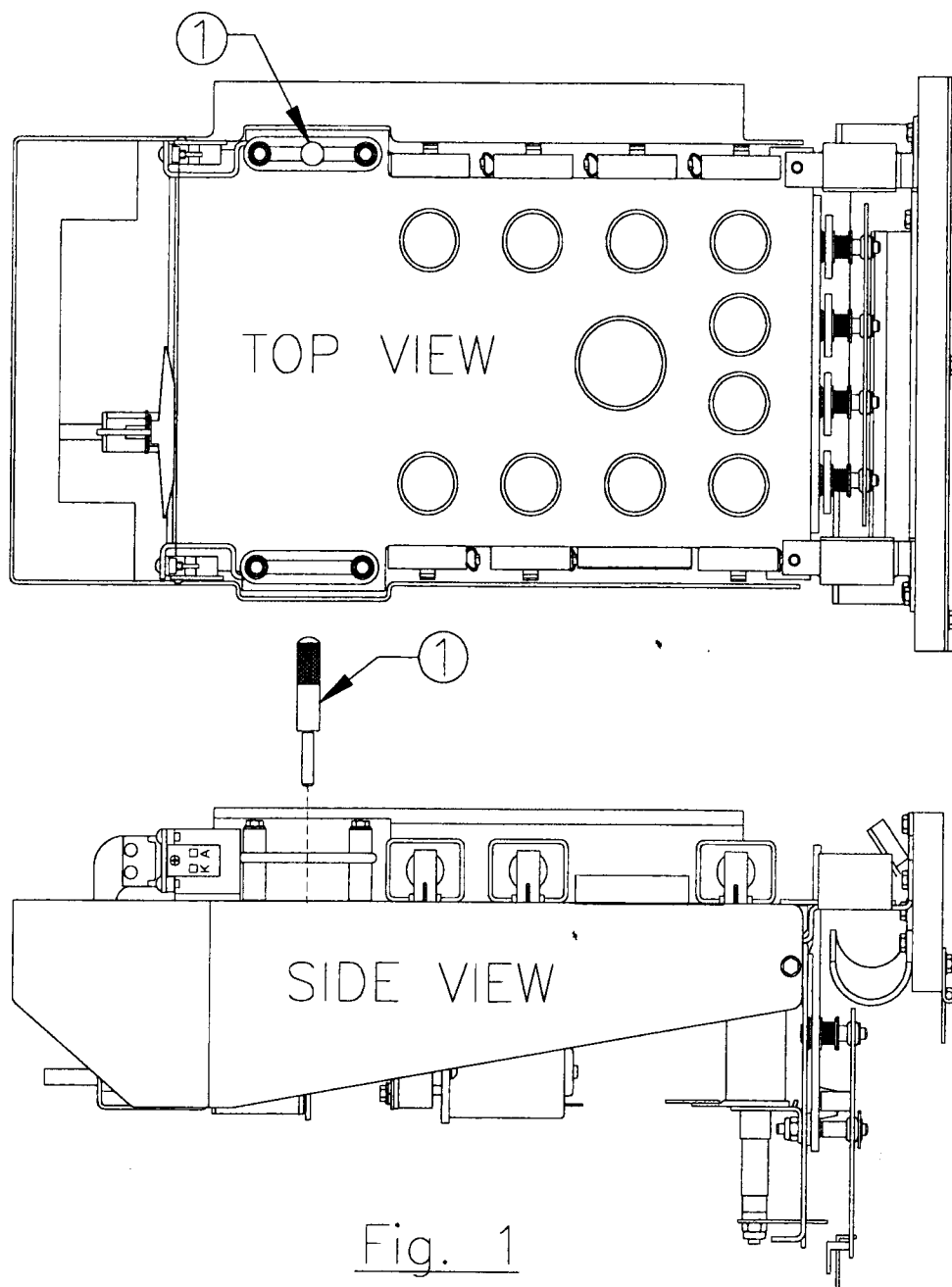
## **Unit Disassembly for Repair**

### **Major Component Service Instructions**

## **Mini-playfield**

### **A. To access mini-playfield.**

1. Unscrew thumb screw (Item 1) from the mini-playfield. (See Fig.1) This may be tight the first time it is removed. A straight blade screwdriver may be necessary to remove the thumb screw. Subsequent removals and insertions may be done with just your fingers.



2. With the main playfield in its service position (i.e. tilted up and moved forward resting on its support brackets), grasp the front edge of the mini-playfield and swing it up and over its hinge point and rest it against the back box. (See Fig. 2)
3. All required service and maintenance required can be performed on the mini play-field while it is in this position.

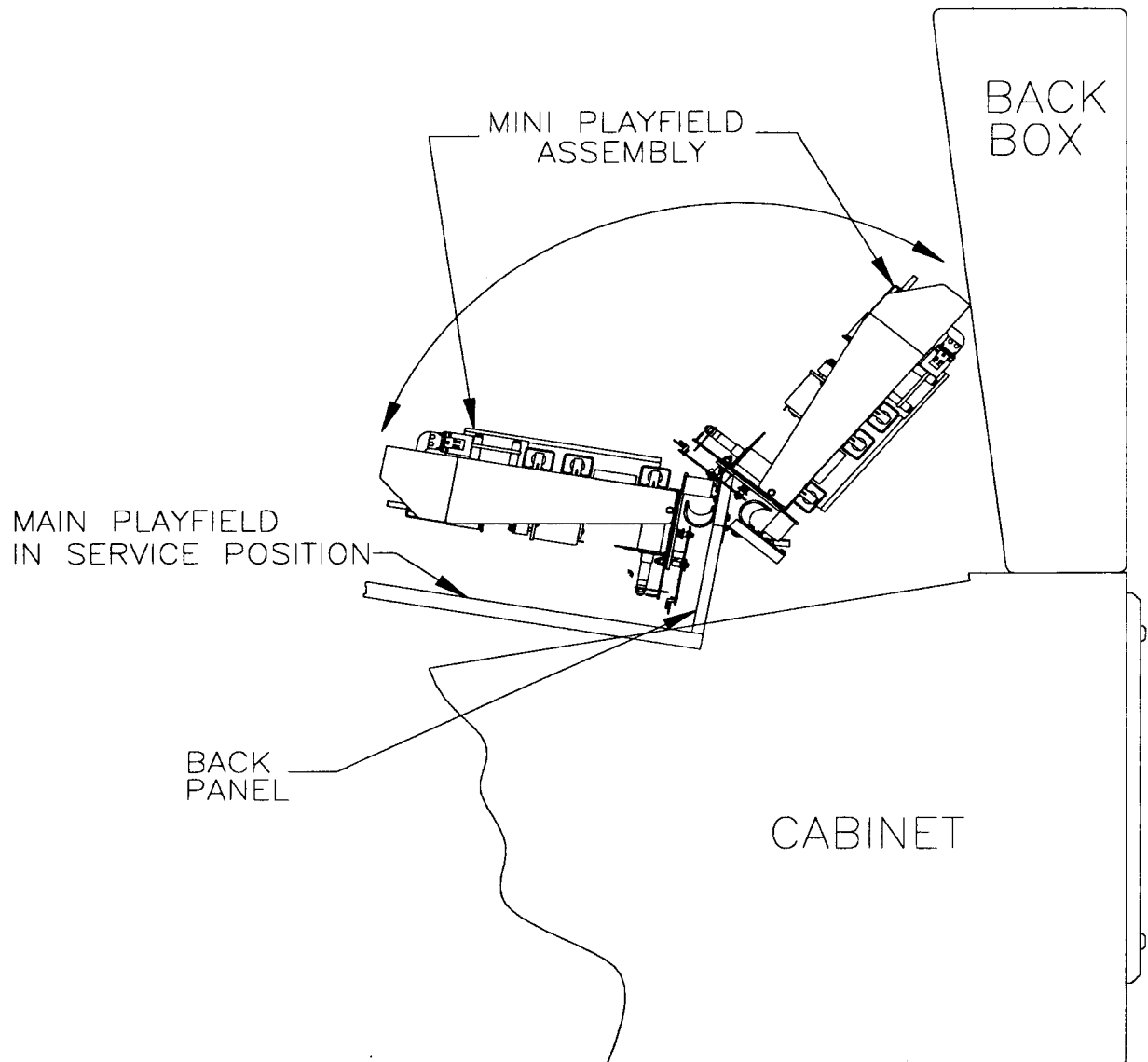


Fig. 2

## B. To service mini-playfield unique mechanisms

### 1. To service kicker assembly

- a. Remove four (4) #8 ESNA nuts that secure coil mounting bracket and coil stop brackets.
- b. Coil wire guard may then be removed. (See Fig. 3)

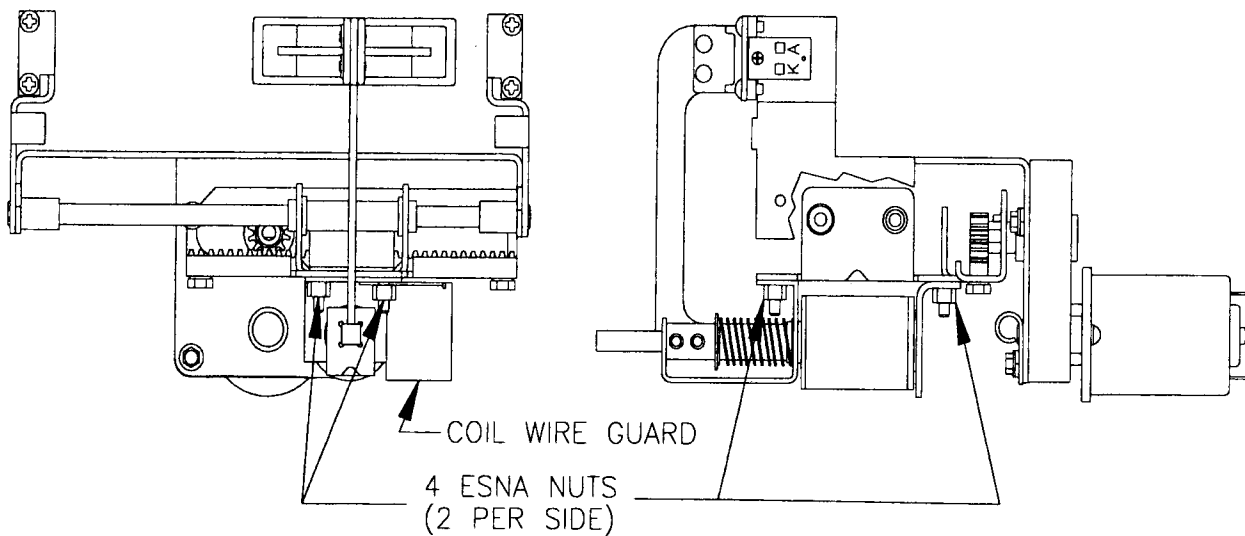


Fig. 3

- c. If coil needs to be replaced, de-solder wires from lugs. If coil is okay then let coil hang by wire leads.
- d. Entire kicker assembly can be removed from mini-playfield. (See Fig. 4)

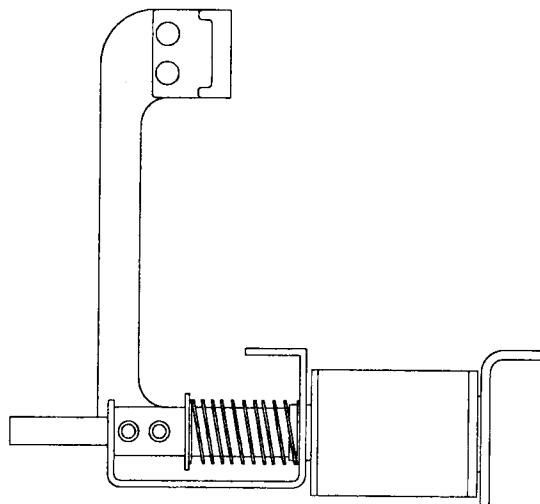


Fig. 4



e. To replace coil spring, remove "E" ring from kicker armature. (See Fig. 5a)

Compress kicker armature until square shaft can be removed from square hole. (See Fig. 5b)

With kicker armature removed, replace spring. (See Fig. 5c) Slide kicker armature back through the round hole in coil mounting bracket and compress until square shaft can be re-inserted into square hole. After re-inserting square shaft into square hole, compress just the coil spring far enough back so that the "E" ring can be re-installed.

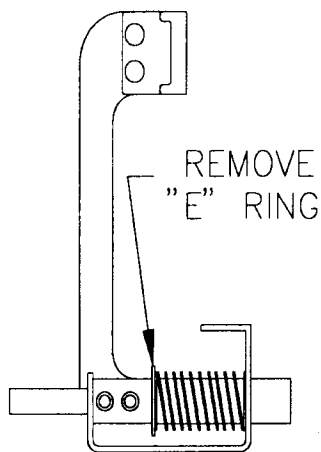


Fig. 5a

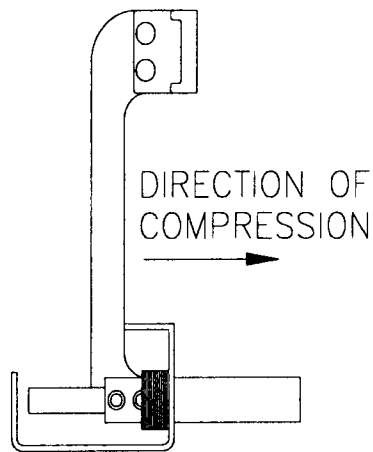


Fig. 5b

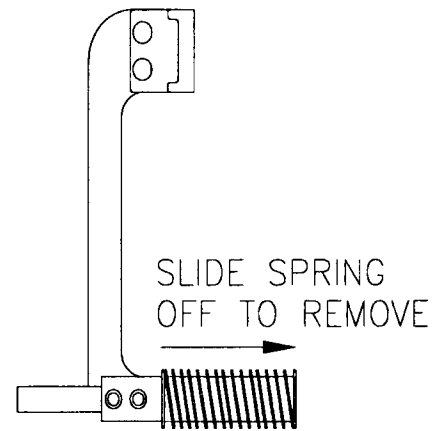


Fig. 5c

f. Reassemble kicker assembly and remount using the four (4) #8 ESNA nuts making sure coil wire guard is re-inserted before nut is secured tight.

## 2. To service motor

- a. De-solder motor wire leads, noting which color wire belongs to which terminal.
- b. Remove four (4) motor mounting screws. Motor can now be removed. (See Fig. 6)

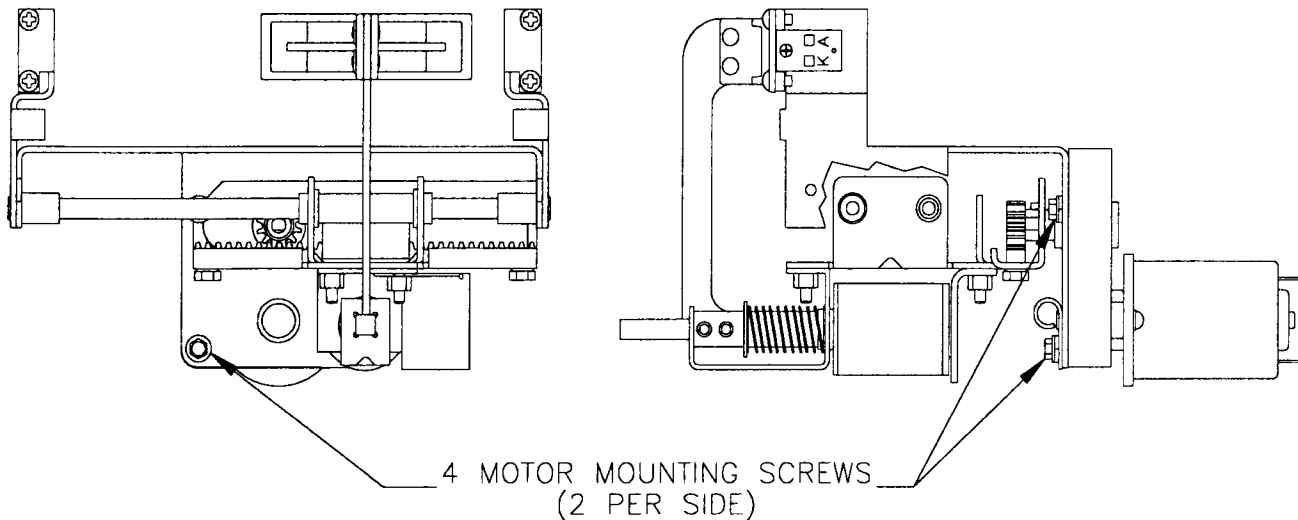


Fig. 6

- c. If replacing motor, be sure to remove pinion gear from the motor shaft and install it on the new motor shaft. (See Fig. 7) Apply Loctite to set-screw and use a .050 Hex Allen wrench to re-install. Do not over tighten, screw may strip.

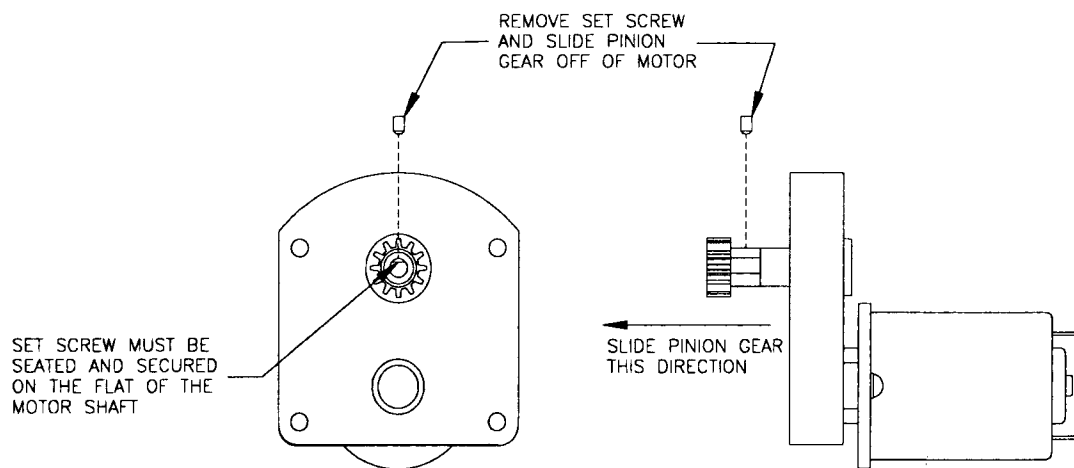


Fig. 7

- d. Re-install new motor, making sure that there is proper engagement between the rack and pinion.
- e. Solder wire leads back onto terminals.

### 3. Lubrication points

- a. Periodically (every 2 to 3 months depending on usage) wipe clean the square shaft of the kicker assembly with an absorbent rag or towel, carefully removing as much grease, grime and dirt as possible. Re-apply a small amount of Teflon grease, using a cotton swab or similar applicator, to all four sides of the square shaft. Compress the kicker shaft several time to work in the grease. (See Fig. 8)

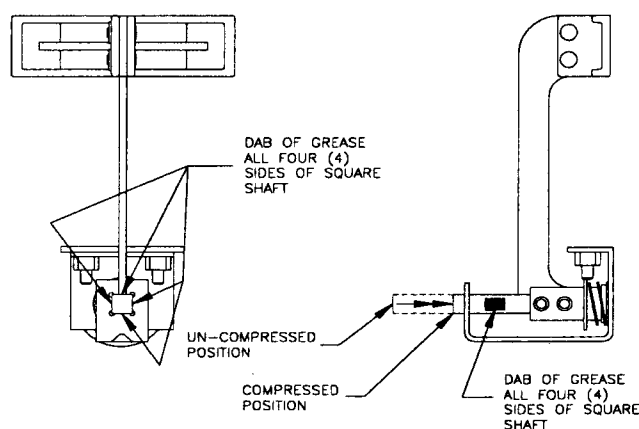


Fig. 8

- b. Do Not lubricate the four bronze bushing that are found on the sliding carriage of the kicker assembly. They are oil impregnated and will not need to be lubricated. If lubricated, contamination may occur and subsequently destroy the bushings. (See Fig. 9)
- c. Do Not lubricate the rack or the pinion gear. They are made of a plastic material that does not require any lubrication. If the rack or pinion are lubricated they may become contaminated and subsequently be destroyed resulting in the failure of the mechanism. (See Fig. 9)

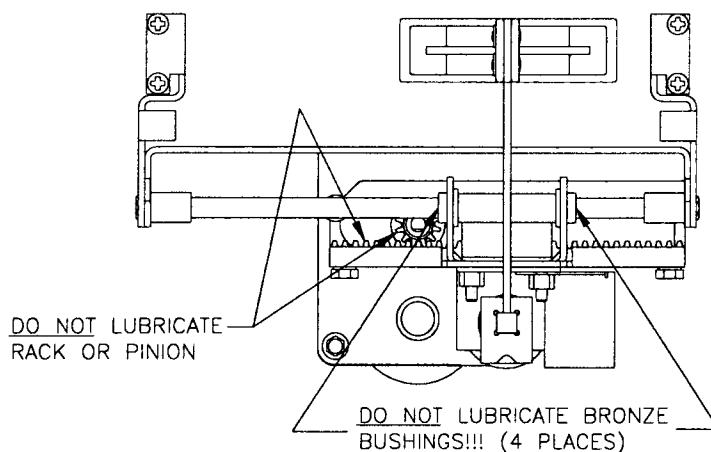


Fig. 9

### 4. Miscellaneous standard parts and mechanisms

- a. All other items on the mini-playfield are standard parts (i.e. lamps, targets, optos, 4-bank drop target). To be serviced as regular standard mechanisms.

## **Left And Right Divert Mechanisms**

### **1. To service diverter mechanism - Left ramp divertor.**

- a. Unplug mechanism from main wire harness.
- b. Remove tension spring carefully. (See Fig. 10)

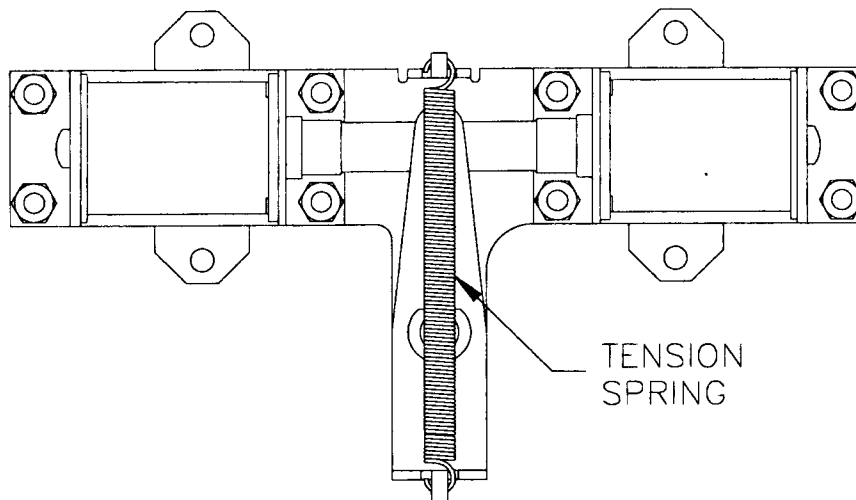


Fig. 10

- c. Unscrew set-screws (2 places) using a 3/32 Hex Allen wrench, until diverter shaft can drop through top of playfield. (See Fig. 11)

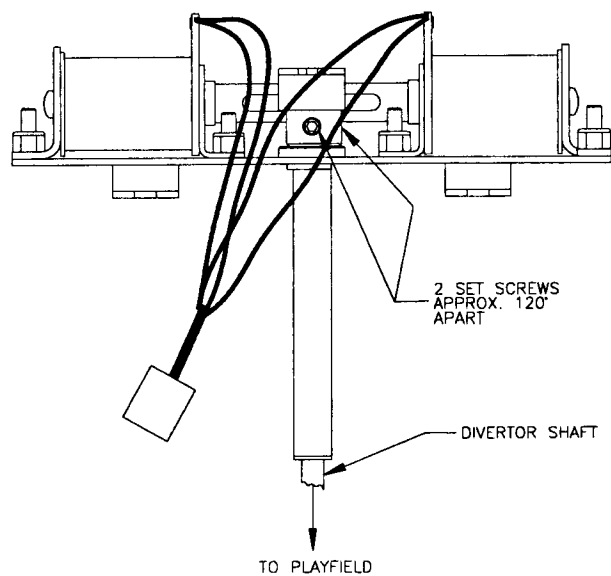


Fig. 11

d. Remove eight (8) #8 ESNA nuts from the top of mechanism. (See Fig. 12)

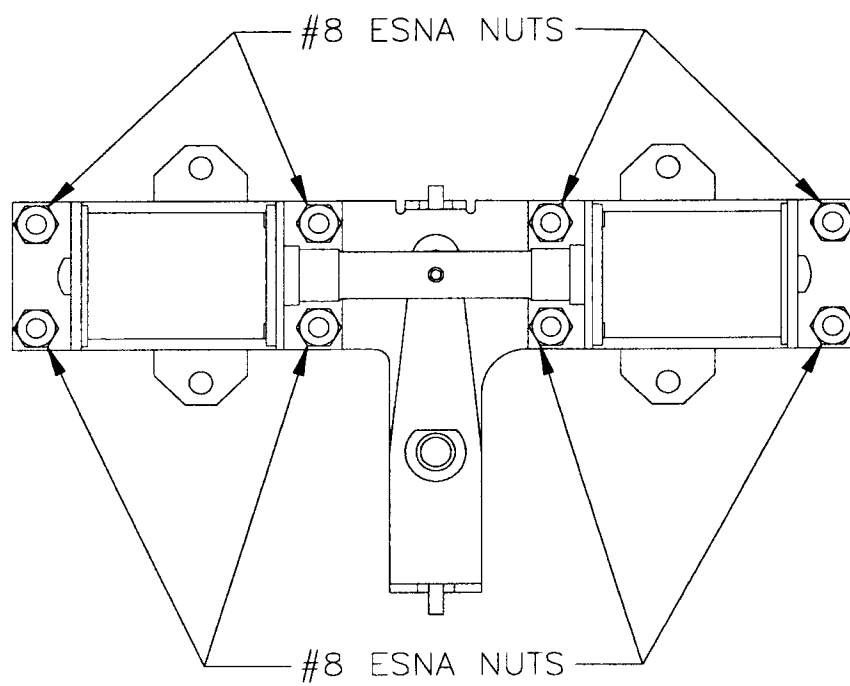


Fig. 12

e. The entire working part of the mechanism can now be removed from the main support bracket.  
(See Fig. 13)

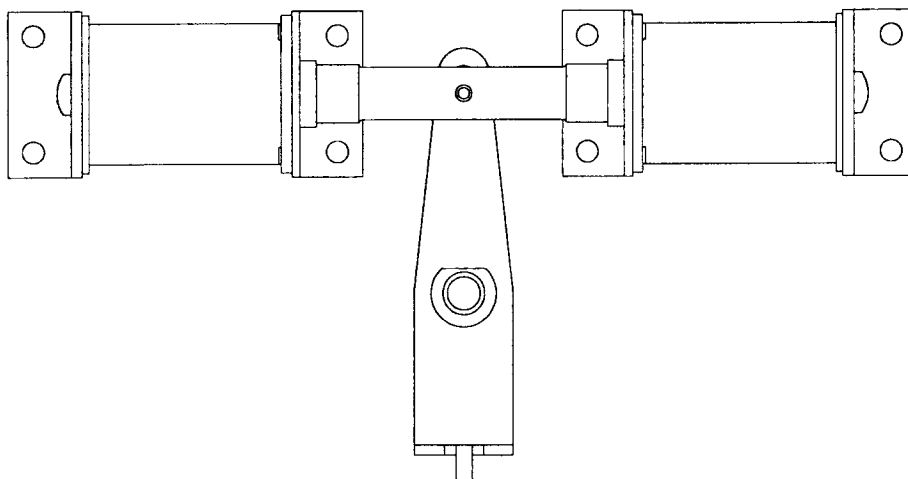


Fig. 13

f. If coils are to be replaced, do so now.

- g. If armature and crank are to be replaced, remove the armature/crank assembly from the coils by sliding the coils and coil brackets off of the armature. (See Fig. 14)

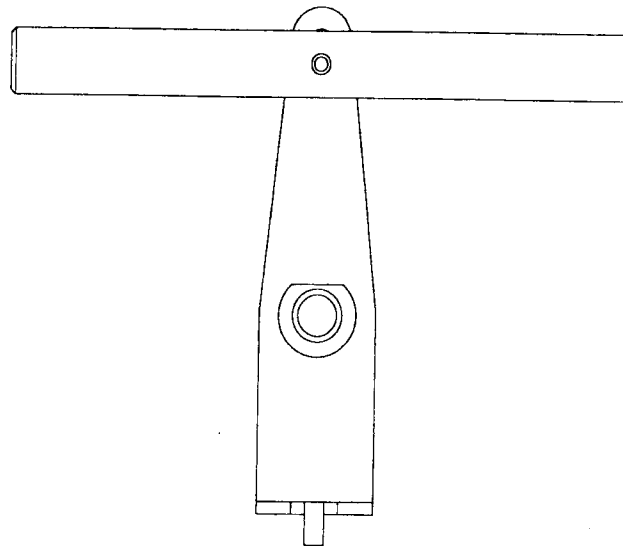


Fig. 14

- h. To separate the crank from the armature, carefully drive out the roll pin until the crank can be removed from the slot in the armature. The roll pin does not have to be removed completely from the armature. Leaving the roll pin partially inserted in the armature will make reassembly easier. (See Fig. 15)

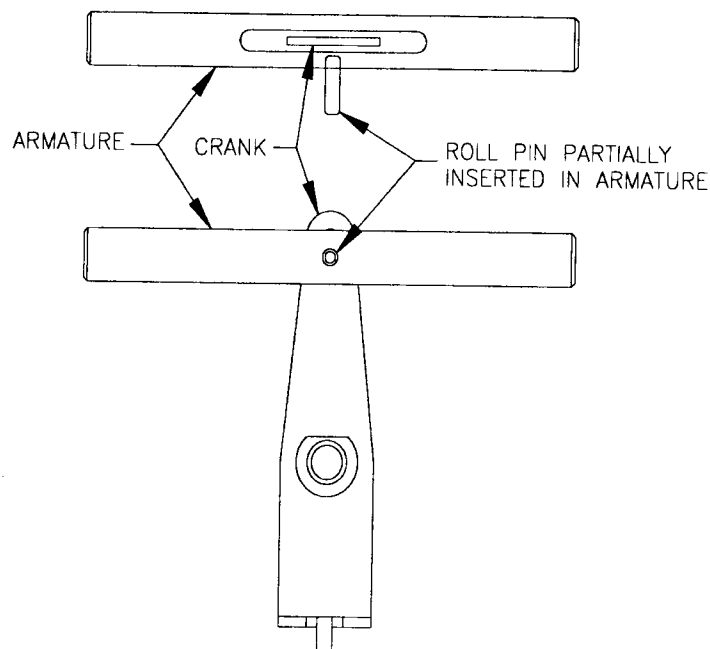


Fig. 15

**2. To service diverter mechanism - Right ramp diverter.**

- a. Follow the same procedures as for the left ramp diverter mechanism.

**3. Lubrication points.**

- a. Periodically (every 2 to 3 months, depending on usage) apply a small amount of Teflon grease, with a cotton swab or similar applicator, between the armature and crank interface. (See Fig. 16)

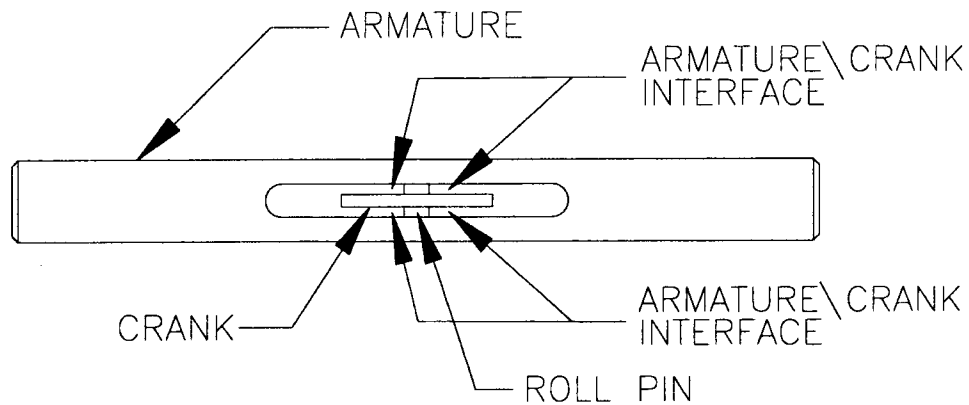


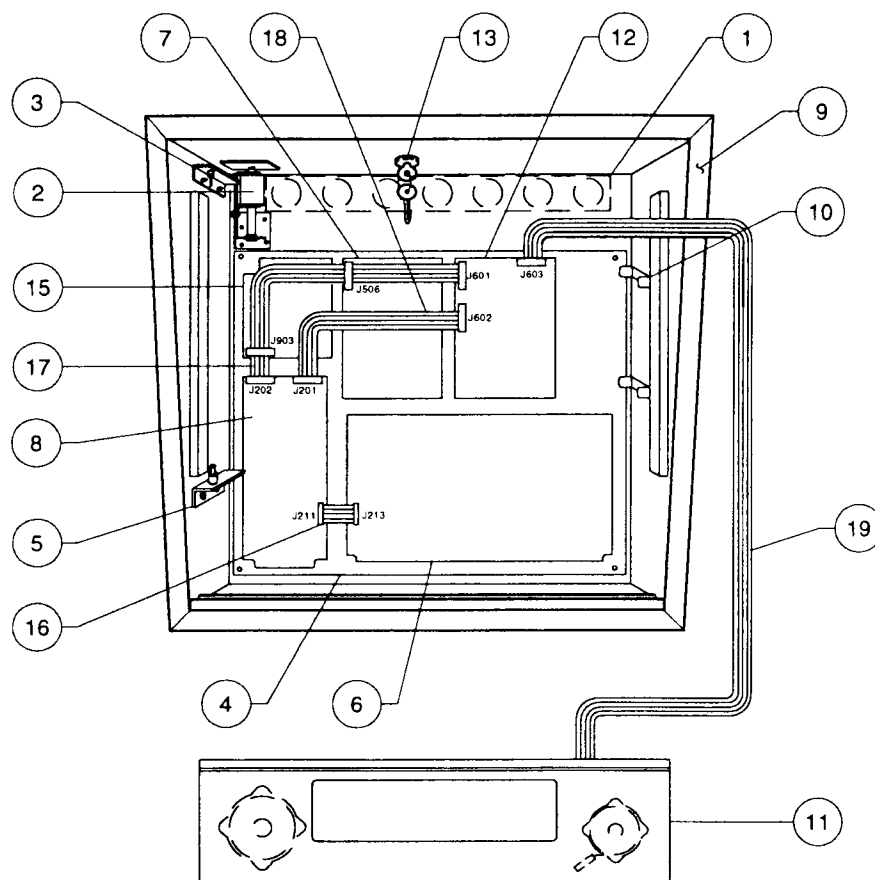
Fig. 16

# SECTION TWO

## GAME PARTS INFORMATION



# 50032-BB Backbox Assembly



## ◆ Ribbon Cables

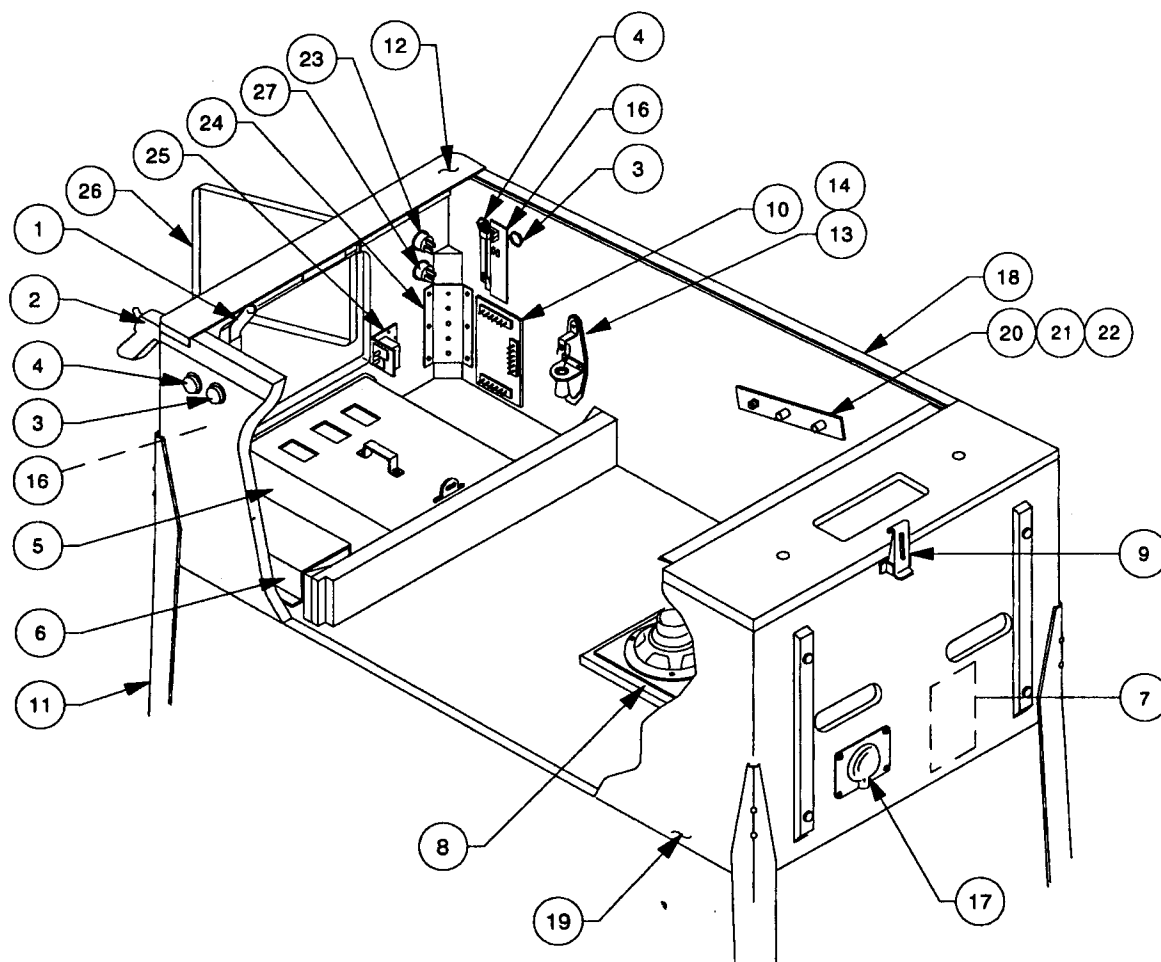
| Item | Part Number   | Description                  |
|------|---------------|------------------------------|
| 1    | 01-6645       | Venting Screen               |
| 2    | B-10686-1     | Klocker Assembly             |
| 3    | A-12497       | Insert Bd.Hinge Assy., Upr.  |
| 4    | A-14092-6     | WPC Mounting Plate Assy.     |
| 5    | A-12498       | Insert Bd. Hinge Assy., Lwr. |
| 6    | A-12697-3     | Power Driver Assembly        |
| 7    | A-16917-50032 | Sound Board Assembly         |
| 8    | A-17651-50032 | WPC Security CPU Board       |
| 9    | A-19031       | Backbox, Screened            |
| 10   | 01-9047       | Insert Stop Bracket          |
| 11   | A-19032       | Speaker/Display Assembly     |
| 12   | A-14039.1     | Dot Matrix Controller Board  |
| 13   | A-13379       | Lock & Plate Assembly        |
| 14   | 50032-IN      | Insert Board                 |
| 15   | A-15472-1     | Fliptronic II Board          |

| Item | Part Number   | Description                |
|------|---------------|----------------------------|
| 16   | 5795-12653-03 | Ribbon Cable, 3"           |
| 17   | 5795-13018-01 | Ribbon Cable, 23.5"        |
| 18   | 5795-10938-15 | Ribbon Cable, 15"          |
| 19   | 5795-13434-32 | Ribbon Cable w/Ferrite 32" |

## ◆ Miscellaneous Parts

|               |                          |
|---------------|--------------------------|
| A-8552-50032  | Tempered Backglass Assy. |
| 03-8228-2     | Glass Channel Top (1)    |
| 03-8228-3     | Glass Channel Edge (2)   |
| 03-8229-1     | Glass Lift Channel (1)   |
| 08-7456       | Backbox Glass:27x18-7/8" |
| 31-1357-50032 | Screened Translight      |

# 50032-CAB Cabinet Assembly



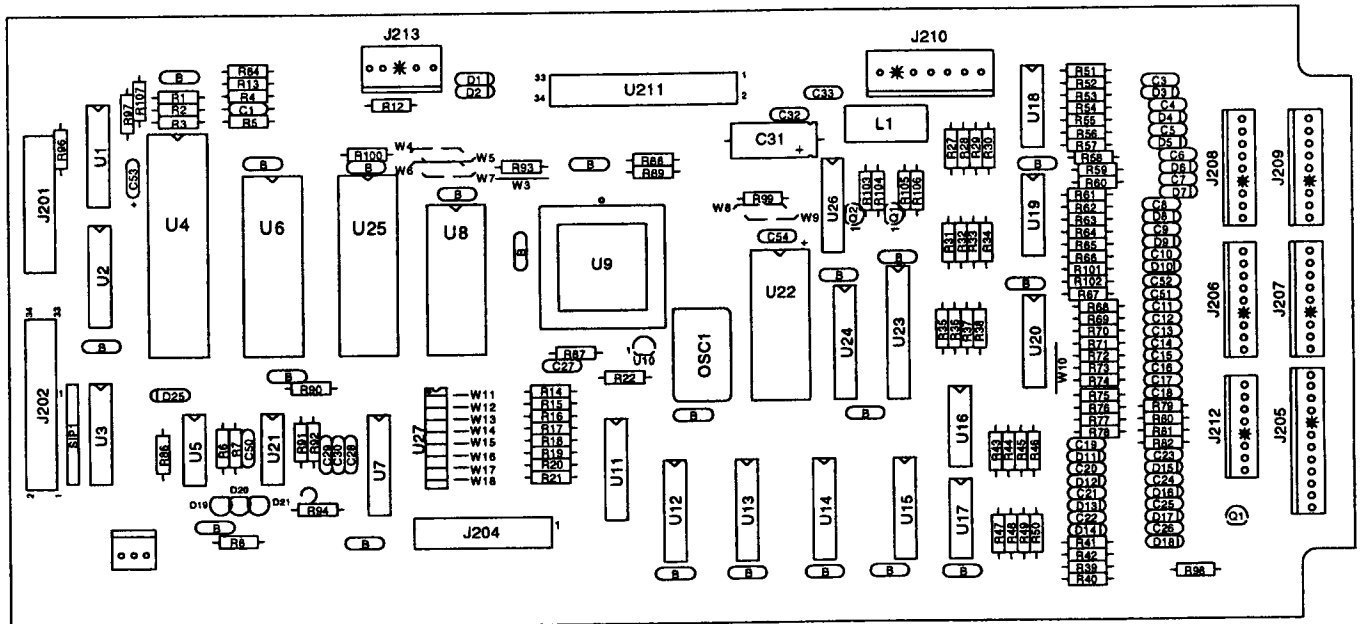
| <u>Item</u> | <u>Part Number</u> | <u>Description</u>          | <u>Item</u> | <u>Part Number</u> | <u>Description</u>             |
|-------------|--------------------|-----------------------------|-------------|--------------------|--------------------------------|
| 1           | A-16773-1          | Lever Guide Assembly        | 22          | 02-4352            | Pivot Bushing (2)              |
| 2           | A-18536            | Gun Assembly                | 23          | 20-9663-1          | Push Button w/Sw., Start       |
| 3           | A-16883-1          | Flipper Button, Blue (2)    | 24          | 01-11400           | Leg Plate (4)                  |
| 4           | A-16883-4          | Flipper Button, Red(2)      | 25          | A-18249-1          | Cable & Interlock Switch Assy. |
| 5           | A-17900-1          | 5-Ball Cashhbox Assembly    | 26          | 09-61000-1         | Coin Door-USA                  |
| 6           | A-17540            | Univ. Power Interface Assy. | 27          | 20-9663-9          | Push Button w/Sw., Extra Ball  |
| 7           | 5610-13953-00      | WPC Transformer             |             |                    |                                |
| 8           | 5555-12929-00      | Speaker, 4Ω, 6", 25w        |             |                    |                                |
| 9           | 20-9347            | Toggle Latch                |             |                    |                                |
| 10          | A-17051-1          | Coin Door Interface Board   |             |                    |                                |
| 11          | A-19514            | Leg Assembly, Chrome        |             |                    |                                |
| 12          | D-12615            | Front Molding Assembly      |             |                    |                                |
| 13          | 20-6502-A          | Plum Bob                    |             |                    |                                |
| 14          | A-15361            | Tilt Mechanism Assembly     |             |                    |                                |
| 15          | *                  | Cordset                     |             |                    |                                |
| 16          | A-17316            | Opto Flipper Assembly (2)   |             |                    |                                |
| 17          | 01-10714           | Line Cord Cover             |             |                    |                                |
| 18          | A-12359-3          | Side Molding Assembly (2)   |             |                    |                                |
| 19          | 11-1209            | Wood Cabinet                |             |                    |                                |
| 20          | 01-11408           | Plate Spacer (2)            |             |                    |                                |
| 21          | 02-4329-2          | Pivot Nut, 11/16" (4)       |             |                    |                                |

## ♦ Miscellaneous

|           |                             |
|-----------|-----------------------------|
| A-17195   | Tilt Switch Assy. w/Cable   |
| A-19562.1 | Stay Arm Assembly           |
| 01-12352  | Clip Bracket                |
| 01-9011-L | Backbox Mtg. Bracket, Left  |
| 01-9011-R | Backbox Mtg. Bracket, Right |
| 08-7028-T | Playfield Glass             |
| 08-7377   | Leg Leveler Adjuster, 3"    |
| 20-6500   | Steel Ball, 1-1/16" (5)     |

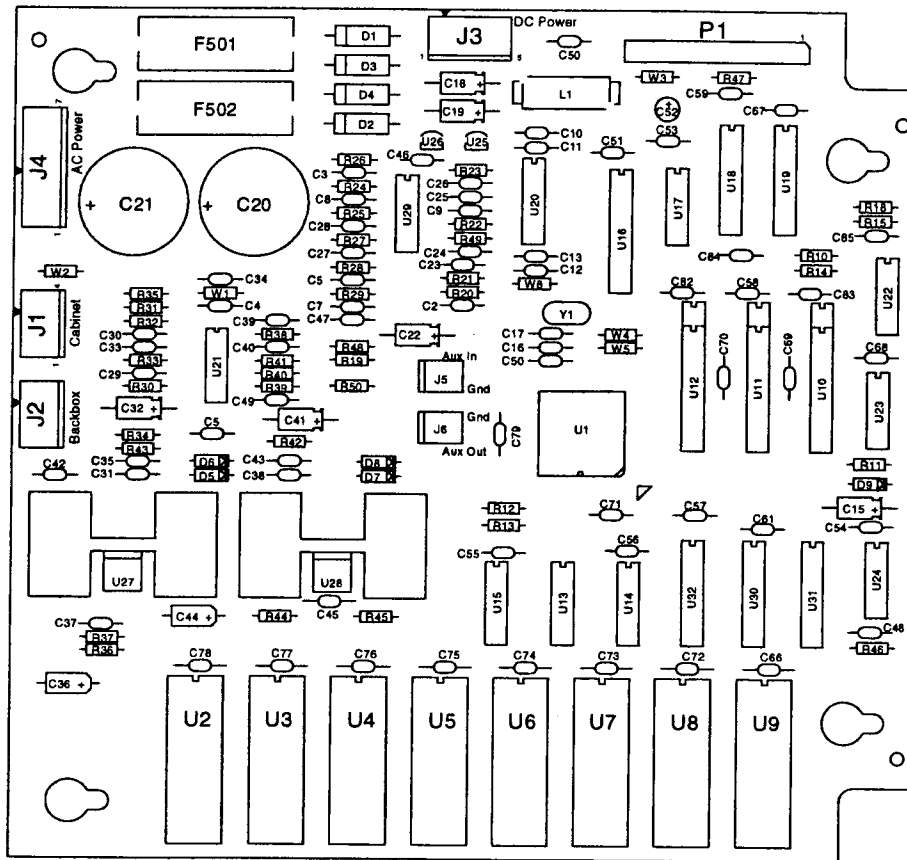
\* See Application Chart p.2-35.

# A-17651-50032 WPC CPU Security Board Assembly



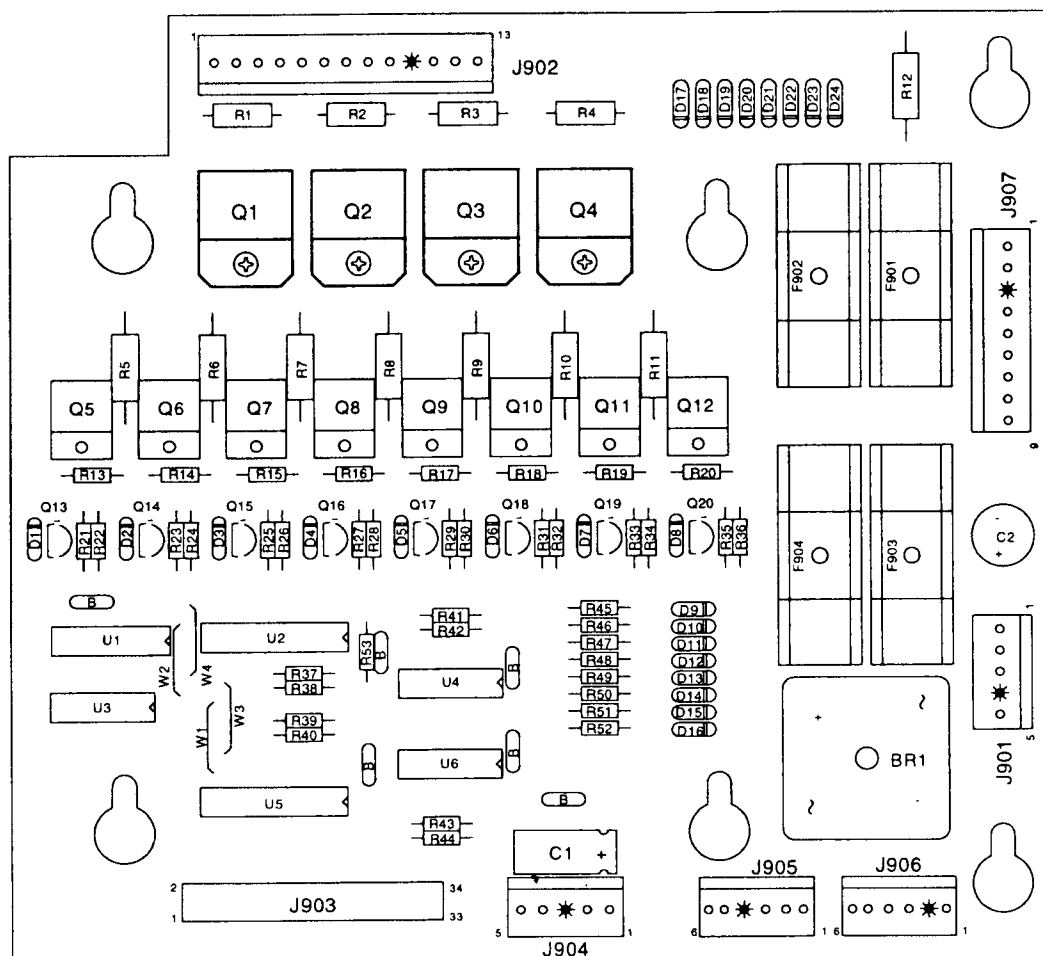
| Part Number   | Designator                                                                           | Description                       | Part Number    | Designator   | Description                   |
|---------------|--------------------------------------------------------------------------------------|-----------------------------------|----------------|--------------|-------------------------------|
| 5010-09034-00 | R14-R22, R27-R42, R86, R94, R90, R98                                                 | Res., 10K $\Omega$ , 1/4w, 5%     | 5281-10182-00  | U11-U13, U15 | IC, 74LS240 / DRV R           |
| 5010-09314-00 | R52, R54, R56, R58, R60, R62, R64, R66, R75-R82                                      | Res., 1.2K $\Omega$ , 1/4w, 5%    | 5284-12651-00  | U21          | IC, 4548                      |
| 5010-09358-00 | R3, R43-R51, R53, R55, R57, R59, R61, R63, R65, R67-R74, R84, R101, R102, R105, R106 | Res., 1K $\Omega$ , 1/4w, 5%      | 5315-13924-00  | U23          | IC, 74HC4514 LTCH 11to16 Dec. |
| 5010-09416-00 | R5-R8, R12, R13, R87-R89, R99, R100                                                  | Res., 470 $\Omega$ , 1/4w, 5%     | 5281-09246-00  | U26          | IC, 74LS139 2 T 4 Decoder     |
| 5010-09085-00 | R1, R2, R4, R96, R97, R107                                                           | Res., 1.5K $\Omega$ , 1/4w, 5%    | 5340-12558-00  | U8           | S/DRAM 8Kx8 Low Power         |
| 5010-09534-00 | W4, W7, W9                                                                           | Res., 0 $\Omega$                  | 5370-12558-00  | U16-U19      | IC, LM339 Quad Comp           |
| 5010-10989-00 | R92                                                                                  | Res., 470K $\Omega$ , 1/4w, 5%    | 5370-12687-00  | U10          | MC 34064                      |
| 5010-12104-00 | R91                                                                                  | Res., 22M $\Omega$ , 1/4w, 5%     | 5521-10931-00  | OSC1         | 8.00MHZ OSC 14PIN DIP         |
| 5010-08991-00 | R103, R104                                                                           | Res., 4.7K $\Omega$ , 1/4w, 5%    | 5520-12084-00  | X1           | Crystal 32.768 KHz            |
| 5019-09362-00 | SIP1                                                                                 | SIP 4.7K, 9R, 10P, 5%             | 5551-09822-00  | L1           | Inductor, 4.7 $\mu$ H, 3.0A.  |
| 5040-08986-00 | C31                                                                                  | Cap., 100M, 10v ( $\pm$ 20%)      | 5671-13732-00  | D19-D21      | Display LED Red               |
| 5043-08980-00 | B                                                                                    | Cap., .01M, 50v ( $\pm$ 80, -20%) | 5700-08985-00  | U4           | Socket IC 40P .6"             |
| 5043-09030-00 | C27                                                                                  | Cap., .047M, 50v, ( $\pm$ 20%)    | 5700-12088-00  | U6           | Socket IC 32P .6"             |
| 5043-09065-00 | C3-C26, C51, C52                                                                     | Cap., 470P, 50v, ( $\pm$ 20%)     | 5700-12424-00  | U9           | Socket 84 Pin PLCC            |
| 5043-09491-00 | C29, C30                                                                             | Cap., 22P, 1KV ( $\pm$ 10%)       | 5700-10176-00  | U22          | Socket IC 28 P .6"            |
| 5043-09492-00 | C28                                                                                  | Cap., 100P, 50v ( $\pm$ 10%)      | 5791-10850-00  | J201, J204   | Connector, 26-pin Header Str  |
| 5041-09163-00 | C53, C54                                                                             | Cap., 2.2 $\mu$ F, 15v (20%) Ax.  | 5791-14090-05  | J213         | Connector, 5-pin Header Str   |
| 5070-08919-00 | D2-D18                                                                               | Diode, 1N4148 150MA               | 5791-10862-07  | J210         | Connector, 7-pin Header Str   |
| 5070-09266-00 | D1, D25                                                                              | Diode, 1N5817, 1.0A.              | 5791-13830-08  | J212         | Connector, 8-pin Header Str   |
| 5160-10269-00 | Q1-Q3                                                                                | Trans., 2N3904 NPN                | 5791-13830-09  | J208, J209   | Connector, 9-pin Header Str   |
| 5700-10389-00 | U20                                                                                  | IC Socket 18-pin                  | 5791-13830-11  | J206, J207   | Connector, 11-pin Header Str  |
| 5281-09308-00 | U3                                                                                   | IC, 74LS245 TRNCV                 | 5791-12516-00  | J202, J211   | 34 Hen 2x17 Str               |
| 5281-09486-00 | U14, U24                                                                             | IC, 74LS374 8 D F/F               | 5048-11033-00  | C50          | Cap., .022 $\mu$ F            |
| 5281-09851-00 | U5                                                                                   | IC, 74LS14 SMT TRG                | 5791-13830-12  | J205         | Cap., 12-pin Header Str       |
| 5281-09867-00 | U1, U2, U7                                                                           | IC, 74LS244 OCT BUF               | 5043-09845-00  | C32, C33     | Cap., 1KP, 50v ( $\pm$ 10%)   |
|               |                                                                                      |                                   | 5645-09025-00  | U27          | Switch DIP 8 POS              |
|               |                                                                                      |                                   | 5162-12422-00  | U20          | IC, ULN 2803A                 |
|               |                                                                                      |                                   | A-5400-50032-1 | U22          | WPC PIC 16C57 Micro-C         |
|               |                                                                                      |                                   | A-5343-50032-1 | U6           | Game ROM Assembly             |
|               |                                                                                      |                                   | A-17643        | -            | Battery Holder PCB Assy.      |
|               |                                                                                      |                                   | 5400-10320-00  | U4           | MC68B09E 2Mhz $\mu$ P         |
|               |                                                                                      |                                   | 5410-12426-00  | U9           | WPC ASIC-89                   |
|               |                                                                                      |                                   | 20-9665-1      | -            | PCB Standoffs                 |
|               |                                                                                      |                                   | H-18258        | -            | WPC CPU Security Cable        |

# A-16917-50032 Sound Board Assembly



| Part Number   | Designator                  | Description                         | Part Number     | Designator | Description                      |
|---------------|-----------------------------|-------------------------------------|-----------------|------------|----------------------------------|
| 4004-01005-06 | U27, U28                    | MS, 4-40 x 3/8"                     | 5070-09054-00   | D5-D9      | Diode Signal 1N4004              |
| 4404-01119-00 | U27, U28                    | Nut 4-40                            | 5250-13302-00   | U25        | 78L05 Pos 5V reg TO-92           |
| 5010-08772-00 | R39, R41                    | Resistor, 15K $\Omega$ , 1/4w, 5%   | 5250-13303-00   | U26        | 79L05 Neg 5V Reg TO-92           |
| 5010-08774-00 | R30, R34, R37, R42, R45     | Resistor, 22K $\Omega$ , 1/4w, 5%   | 5283-10551-00   | U17        | IC74F00 Fast Quad NAND           |
| 5010-08991-00 | R10, R12-R16                | Resistor, 4.7K $\Omega$ , 1/4 w, 5% | 5311-10946-00   | U22        | IC74HC74 Dual D Flip Flop        |
| 5010-09034-00 | R47                         | Resistor, 10K $\Omega$ , 1/4w, 5%   | 5311-10948-00   | U23        | IC74HC125 Quad Tri-State Buffer  |
| 5010-09035-00 | R11, R19, R33, R40          | Resistor, 47K $\Omega$ , 1/4w, 5%   | 5315-12009-00   | U15        | IC74HC138 1 of 8 Decoder         |
| 5010-09036-00 | R46                         | Resistor, 100 $\Omega$ , 1/4w, 5%   | 5311-12043-00   | U18, U19   | IC74HCT374 Octal D Flip Flop     |
| 5010-09219-00 | R31, R32, R38               | Resistor, 8.2K $\Omega$ , 1/4w, 5%  | 5311-12538-00   | U13, U14   | IC74HC174 Hex D Flip Flop        |
| 5010-09358-00 | R50                         | Resistor, 1K $\Omega$ , 1/4 w, 5%   | 5311-12287-00   | U24        | IC74HC14 Hex Schmitt Inverter    |
| 5010-09534-00 | W4, W6                      | Resistor, 0 $\Omega$ (Jumper)       | 5311-12287-00   | U30-U32    | IC74HC541 Octal Bus Driver       |
| 5010-13420-00 | R36, R44                    | Resistor, 680 $\Omega$ , 1/4w, 5%   | 5340-13304-00   | U10-U12    | ICSRAM 2Kx8 35ns .300 DIP        |
| 5010-13607-00 | R20-R29, R48, R49           | Resistor, 6.2K $\Omega$ , 1/8w, 1%  | 5370-12730-00   | U21, U29   | ICTL084 Quad Op AMP              |
| 5010-13517-00 | R35, R43                    | Resistor, 15 $\Omega$ , 1/4w, 5%    | 5370-13419-00   | U27, U28   | Audio Power Amp TDA2030AV        |
| 5040-09365-00 | C15, C18, C19, C32, C41     | Cap., 1 $\mu$ F, 63v, Alum Ax.      | 5520-13301-00   | U20        | IC DAC AD-1851 16Bit             |
| 5040-09421-00 | C52                         | Cap., 100 $\mu$ F, 25v, Alum Ax.    | 5551-09822-00   | Y1         | Crystal 10MHz Parallel resonant  |
| 5040-13417-00 | C20, C21                    | Cap., 10,000 $\mu$ F, 35v, Alum.    | 5700-12047-00   | L1         | Inductor, 4.7 $\mu$ H, 3Amp.     |
| 5041-09009-00 | C36, C44                    | Cap., 22 $\mu$ F, 10v, Tant Alum    | 5700-12088-00   | U16        | IC, Socket 24-Pin .300 DIP       |
| 5041-13187-00 | C22                         | Cap., 4.7 $\mu$ F, Tant Axial.      | 5705-12638-00   | U2-U9      | IC, Socket 32-Pin .600 DIP       |
| 5043-08996-00 | C4, C5, C10-C13             | Cap., .10 $\mu$ F, 50v, Cer Ax.     | 5733-12060-01   | U27, U28   | Heatsink 5298-B                  |
| 5043-10267-00 | C31, C35, C38, C43, C46, C4 | Cap., 150pF, 50v, Cer Ax.           | 5791-10862-04   | F501, F502 | MT3AG PCMounted Fuse Holder      |
| 5048-11028-00 | C16, C17                    | Cap., 22pF, 50v, Cer Ax.            | 5791-10862-05   | J1, J2     | Connector, 4-pin Header STR .156 |
| 5048-11029-00 | C48                         | Cap., 100pF, 50v, Cer Ax.           | 5791-10862-07   | J3         | Connector, 5-pin Header STR .156 |
| 5048-11030-00 | C49                         | Cap., 470pF, 50v, Cer Ax.           | 5791-12516-00   | J4         | Connector, 7-pin Header STR .156 |
| 5048-11033-00 | C33                         | Cap., .022 $\mu$ F, 50v, CerAx.     | A-17002         | P1         | Connector, 34 Hen 2x17 STR .100  |
| 5048-12036-00 | C34, C4                     | Cap., .22 $\mu$ F, 50v, Cer Ax.     | A-5343-50032-S2 | U16        | PAL Sub-Assembly                 |
| 5048-13418-00 | C30, C39, C40               | Cap., .047 $\mu$ F, 50v, Cer Ax.    | A-5343-50032-S3 | U2         | ROM Sub-Assembly                 |
| 5048-13608-00 | C8                          | Cap., 6800pF, 50v, Cer Ax.          | A-5343-50032-S4 | U3         | ROM Sub-Assembly                 |
| 5048-13609-00 | C7, C24, C26                | Cap., 3900pF, 50v, Cer Ax.          | A-5343-50032-S5 | U4         | ROM Sub-Assembly                 |
| 5048-13610-00 | C2, C3, C9, C27, C29        | Cap., 1000pF, 50v, Cer Ax.          | A-5343-50032-S6 | U5         | ROM Sub-Assembly                 |
| 5048-13611-00 | C6, C23, C25, C28           | Cap., 680pF, 50v, Cer Ax.           | A-5343-50032-S7 | U6         | ROM Sub-Assembly                 |
| 5070-09045-00 | D1-D4                       | MR-501 Rectifier Diode              | A-5343-50032-S8 | U7         | ROM Sub-Assembly                 |
|               |                             |                                     | A-5343-50032-S9 | U8         | ROM Sub-Assembly                 |
|               |                             |                                     | 5731-10356-00   | U9         | ROM Sub-Assembly                 |
|               |                             |                                     |                 | F501, F502 | Fuse, 3Amp, 250v, Slow Blow      |

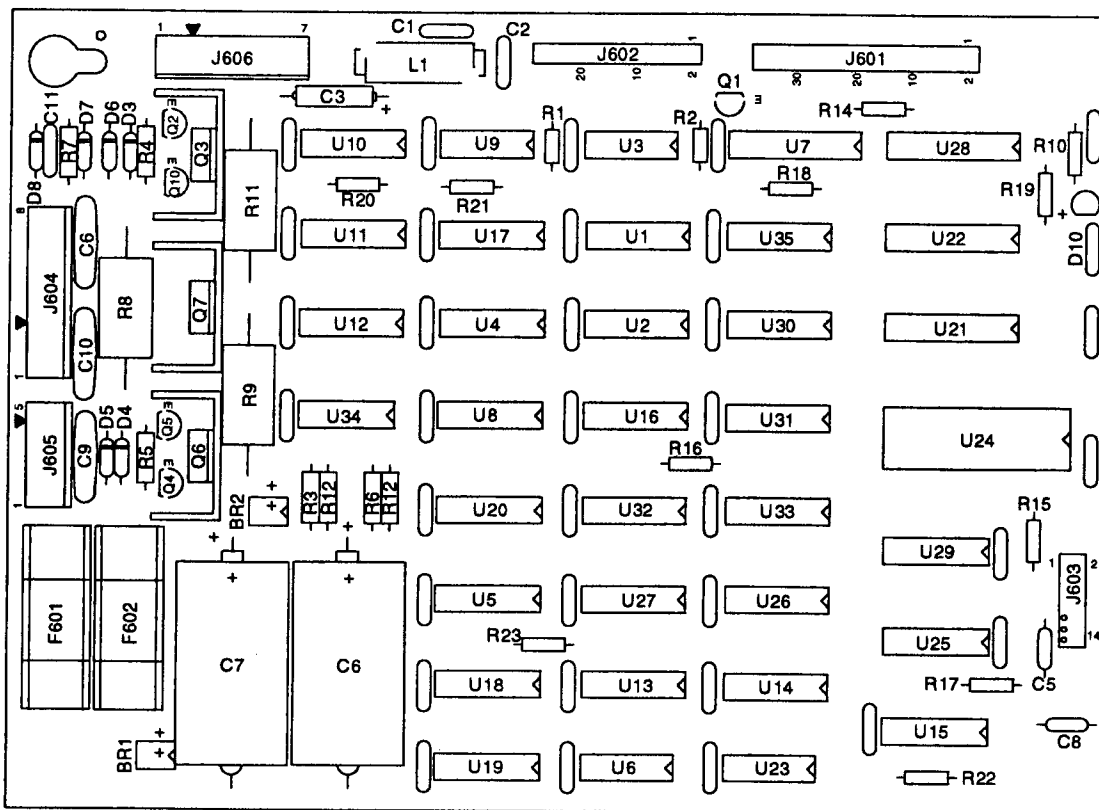
# A-15472-1 Fliptronic II Board Assembly



| Part Number   | Designator                                      | Description                   | Part Number   | Designator | Description                 |
|---------------|-------------------------------------------------|-------------------------------|---------------|------------|-----------------------------|
| 01-10572      | Q1-Q4                                           | Heatsink                      | 5070-09054-00 | D1-D24     | Diode, 1N4004               |
| 20-9684       | Q5-Q12                                          | Fastener Snap In              | 5100-09690-00 | BR1        | Bridge Rectifier            |
| 4006-10003-08 | Q1-Q4                                           | Mach. screw, 6-32             | 5162-12635-00 | Q5-Q12     | Trans., TIP102 NPN          |
| 4406-01128-00 | Q1-Q4                                           | Nut 6-32 KEPS                 | 5190-09016-00 | Q13, Q20   | Trans., 2N4403 PNP          |
| 5010-09034-00 | R37-R44, R53                                    | Res., 10K $\Omega$ , 1/4w, 5% | 5191-12179-00 | Q1-Q4      | Trans., TIP36C PNP          |
| 5010-09358-00 | R22, R24, R26, R28, R30, R32, R34, R36, R45-R52 | Res., 1K $\Omega$ , 1/4w, 5%  | 5315-12009-00 | U2         | IC, 74HCT374                |
| 5010-09361-00 | R1-R4                                           | Res., 220 $\Omega$ , 1/4w, 5% | 5315-12031-00 | U5         | IC, 74HCT244                |
| 5010-09416-00 | R21, R23, R25, R27, R29, R31, R33, R35          | Res., 470 $\Omega$ , 1/4w, 5% | 5315-12812-00 | U1         | IC, 74HCT138                |
| 5010-09534-00 | W3, W4                                          | Res., 0 $\Omega$              | 5315-12951-00 | U3         | IC, 74HCT00                 |
| 5010-10171-00 | R13, R20                                        | Res., 56 $\Omega$ , 1/4w, 5%  | 5370-12272-00 | U4, U6     | IC, LM339 Quad Comp         |
| 5011-12956-00 | R5, R12                                         | Res., 2.7K $\Omega$ , 1w, 5%  | 5731-10356-00 | F901-F904  | Fuse S-B, 3A., 250v         |
| 5040-08986-00 | C1                                              | Cap., 100M, 10v               | 5733-12060-01 |            | Fuse Holder (F901-F904)     |
| 5040-09537-00 | C2                                              | Cap., 100 $\mu$ F, 100v       | 5791-10862-05 | J901, J904 | Connector, 5-pin Header     |
| 5043-08980-00 | B                                               | Cap., .01 $\mu$ F, 50v        | 5791-10862-09 | J907       | Connector, 9-pin Header     |
|               |                                                 |                               | 5791-10862-13 | J902       | Connector, 13-pin Header    |
|               |                                                 |                               | 5791-13830-06 | J905, J906 | Connector, Str Sq. Pin Hdr. |
|               |                                                 |                               | 5791-12516-00 | J903       | 34 Hen 2 x 17 STR           |

# A-14039.1

## Dot Matrix Assembly



| Part Number   | Designator       | Description                    | Part Number   | Designator            | Description              |
|---------------|------------------|--------------------------------|---------------|-----------------------|--------------------------|
| 5010-08991-00 | R1               | Res., 4.7K $\Omega$ , 1/4w, 5% | 5311-10946-00 | U4, U5, U17, U18, U20 | IC, 74HC74               |
| 5010-09036-00 | R14-R23          | Res., 100 $\Omega$ , 1/4w, 5%  | 5311-10947-00 | U9                    | IC, 74HC125              |
| 5010-09224-00 | R10              | Res., 270 $\Omega$ , 1/4w, 5%  | 5311-10951-00 | U10, U11              | IC, 74HC161              |
| 5010-12832-00 | R3, R6, R12, R13 | Res., 4.7K $\Omega$ , 1/4w, 5% | 5311-10977-00 | U6                    | IC, 74HC04               |
| 5010-12841-00 | R4, R5           | Res., 120 $\Omega$ , 1/4w, 5%  | 5311-12817-00 | U29                   | IC, 74HC165              |
| 5012-12830-00 | R9               | Res., 1.8K $\Omega$ , 5w, 5%   | 5311-12819-00 | U21                   | IC, 74HC688              |
| 5012-12842-00 | R11              | Res., 120 $\Omega$ , 5w, 5%    | 5311-12820-00 | U23                   | IC, 74HC27               |
| 5012-12843-00 | R8               | Res., 4.7K $\Omega$ , 5w, 5%   | 5311-12822-00 | U13-U15               | IC, 74HC193              |
| 5010-10171-00 | R7               | Res., 56 $\Omega$ , 1/4w, 5%   | 5315-12009-00 | U22                   | IC, 74HCT374             |
| 5043-09492-00 | C5, C8           | Cap., 100P, 50v, ( $\pm$ 10%)  | 5315-12812-00 | U1, U2, U30, U12      | IC, 74HCT138             |
| 5040-08986-00 | C3               | Cap., 100M, 10v ( $\pm$ 20%)   | 5281-09308-00 | U28                   | IC, 74HCT245             |
| 5040-12324-00 | C4, C7           | Cap., 150M, 160v ( $\pm$ 50%)  | 5315-12815-00 | U8, U34               | IC, 74HCT08              |
| 5043-08980-00 | BYPASS           | Cap., .01M, 50v (+80,-20%)     | 5315-12816-00 | U19                   | IC, 74HCT32              |
| 5043-09072-00 | C6, C9, C10      | Cap., .1M, 500v (+80,-20%)     | 5315-12821-00 | U7                    | IC 74HCT240              |
| 5043-09845-00 | C1, C2, C11      | Cap., 1KP, 50v ( $\pm$ 20%)    | 5340-12278-00 | U24                   | S/RAM 2064 150NS         |
| 5070-09054-00 | D7               | Diode, 1N4004, 1.0A.           | 5551-09822-00 | L1                    | Ind. 4.7 $\mu$ H, 3A.    |
| 5075-12824-00 | D6, D8           | Zener, 1N4742A, 12v            | 5671-13732-00 | D10                   | Display LED Red          |
| 5075-12823-00 | D4, D5           | Zener, 1N4758, 56v             | 5705-09199-00 | Q3, Q6, Q7            | Heatsink, 6030B          |
| 5075-12826-00 | D3               | Zener, 1N4759A, 62v            | 5731-12328-00 | F601, F602            | Fuse, 3/8A., SB, 250v    |
| 5100-12833-00 | BR1, BR2         | Bridge, 400v, 1A               | 5733-12060-01 | J602                  | Fuse Holder (F601, F602) |
| 5150-10269-00 | Q1               | Trans., 2N3904 NPN             | 5791-10850-00 | J602                  | Connector, 26-pin Header |
| 5164-09056-00 | Q2, Q10          | Trans., MPSD02 NPN             | 5791-10862-05 | J605                  | Connector, 5-pin Header  |
| 5164-12154-00 | Q3, Q7           | Trans., MJE15030 NPN           | 5791-10862-07 | J606                  | Connector, 7-pin Header  |
| 5194-09055-00 | Q4, Q5           | Trans., MPSD52 PNP             | 5791-10862-08 | J604                  | Connector, 8-pin Header  |
| 5194-12155-00 | Q6               | Trans., MJE15031 PNP           | 5791-12516-00 | J601                  | 34 Hen 17x2 STR          |
| 5281-09738-00 | U16, U25-U27     | IC, 74LS157                    | 5791-12827-00 | J603                  | 14 Hen 7x2 STR           |
| 5281-10033-00 | U3               | IC, 74LS30                     |               |                       |                          |
| 5281-10043-00 | U31-U33, U35     | IC, 74LS175                    |               |                       |                          |

# A-12697-3

## WPC Power Driver Assembly

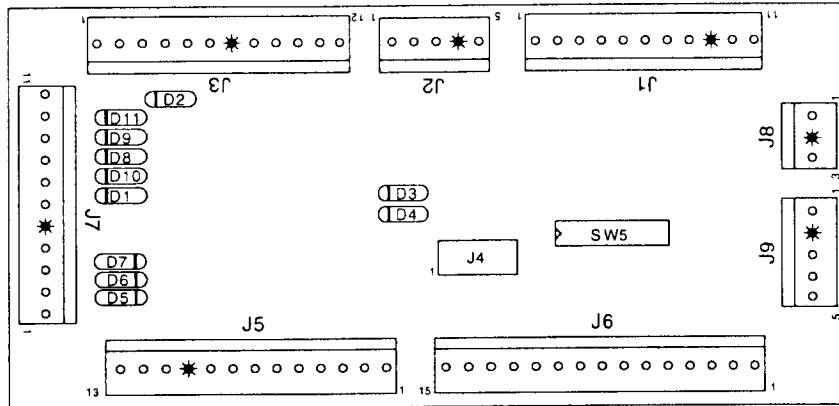
| Part Number   | Designator                                                                                                                                                                       | Description                       | Part Number   | Designator                                                                                                                                          | Description                          |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 5010-08981-00 | R260                                                                                                                                                                             | Res., 10K $\Omega$ , 1/2w, 5%     | 5040-12313-00 | C5-C7, C11, C30                                                                                                                                     | Cap., 15KM, 25v ( $\pm 20\%$ )       |
| 5010-08991-00 | R9, R12, R15, R18, R21, R23, R27, R31, R35, R39, R43, R47, R51, R55, R59, R63, R67, R71, R75, R79, R83, R87, R91, R95, R99, R126, R128, R130, R132, R134, R136, R138, R140, R227 | Res., 4.7K $\Omega$ , 1/4w, 5%    | 5043-08980-00 | B-BYPASS                                                                                                                                            | Cap., .01M, 50v (+80, -20%)          |
|               |                                                                                                                                                                                  |                                   | 5043-08996-00 | C13-C20, C31                                                                                                                                        | Cap., .1M, 50v ( $\pm 20\%$ )        |
|               |                                                                                                                                                                                  |                                   | 5043-09845-00 | C1, C12                                                                                                                                             | Cap., 1KP, 50v ( $\pm 20\%$ ) Axial  |
|               |                                                                                                                                                                                  |                                   | 5048-10994-00 | C3                                                                                                                                                  | Cap., .33M, 50v ( $\pm 20\%$ ) Axial |
|               |                                                                                                                                                                                  |                                   | 5070-08919-00 | D33, D34                                                                                                                                            | Diode 1N4148, 150MA.                 |
|               |                                                                                                                                                                                  |                                   | 5070-09054-00 | D1-D3, D5-D12, D17-D32, D38                                                                                                                         | Diode 1N4004, 1.0A.                  |
|               |                                                                                                                                                                                  |                                   | 5100-09690-00 | BR1-BR5                                                                                                                                             | Bridge, 35A., Rect, 200v             |
|               |                                                                                                                                                                                  |                                   | 5131-12725-00 | Q10, Q12, Q14, Q16, Q18                                                                                                                             | Triac BT138E                         |
| 5010-08992-00 | R8, R11, R14, R17, R20, R177, R179, R181, R183, R185, R187, R189, R191                                                                                                           | Res., 560 $\Omega$ , 1/4w, 5%     | 5162-12422-00 | U19                                                                                                                                                 | IC ULN 2803 OC-DRL                   |
|               |                                                                                                                                                                                  |                                   | 5162-12635-00 | Q20, Q22, Q24, Q26, Q28, Q30, Q32, Q34, Q36, Q38, Q40, Q42, Q44, Q46, Q48, Q50, Q52, Q54, Q56, Q58, Q63, Q65, Q67, Q69, Q75, Q77, Q79, Q81, Q83-Q90 | Transistor, TIP 102                  |
| 5010-08993-00 | R25, R29, R33, R37, R41, R45, R49, R53, R57, R61, R65, R69, R73, R77, R81, R85, R89, R93, R97, R101, R103, R106, R109, R112, R115, R118, R121, R124                              | Res., 68K $\Omega$ , 1/2w, 5%     | 5194-09055-00 | Q9, Q11, Q13, Q15, Q17, Q19, Q21, Q23, Q25, Q27, Q29, Q31, Q33, Q35, Q37, Q39, Q41, Q43, Q45, Q47, Q49, Q51, Q53, Q55, Q57, Q59-Q62, Q71-Q74        | Transistor, 2N5401 PNP               |
| 5010-08997-00 | R24, R28, R32, R36, R40, R44, R48, R52, R56, R60, R64, R68, R72, R76, R80, R84, R88, R92, R96, R100, R102, R105, R108, R111, R114, R117, R120, R123                              | Res., 2.7K $\Omega$ , 1/4w, 5%    | 5191-12179-00 | Q64, Q66, Q68, Q70, Q76, Q78, Q80, Q82                                                                                                              | Transistor, TIP36C PNP               |
| 5010-08998-00 | R155, R157, R159, R161, R165, R167, R169, R171                                                                                                                                   | Res., 2.2K $\Omega$ , 1/4w, 5%    | 5192-12428-00 | Q91-Q98                                                                                                                                             | Transistor, TIP 107                  |
| 5010-09034-00 | R142-R149, R197-R198                                                                                                                                                             | Res., 10K $\Omega$ , 1/4w, 5%     | 5250-12634-00 | Q1                                                                                                                                                  | Reg LM 323 5v                        |
| 5010-09085-00 | R194, R196, R251, R253-R257                                                                                                                                                      | Res., 1.5K $\Omega$ , 1/4w, 5%    | 5281-09486-00 | U1-U5, U18                                                                                                                                          | IC, 74LS374 8D F/F                   |
| 5010-09086-00 | R252                                                                                                                                                                             | Res., 6.8K $\Omega$ , 1/4w, 5%    | 5281-09487-00 | U10-U13                                                                                                                                             | IC, 74LS74 Dual D F/F                |
| 5010-09224-00 | R192, R202-R205                                                                                                                                                                  | Res., 270 $\Omega$ , 1/4w, 5%     | 5281-10182-00 | U9                                                                                                                                                  | IC, 74LS240 L/Drvr.                  |
| 5010-09314-00 | R176, R178, R180, R182, R184, R186, R188, R190                                                                                                                                   | Res., 1.2K, 1/4w, 5%              | 5370-12272-00 | U6, U15, U16                                                                                                                                        | IC, LM339 Quad Comp.                 |
| 5010-09324-00 | R206                                                                                                                                                                             | Res., 27K $\Omega$ , 1/4w, 5%     | 5460-12423-00 | Q2                                                                                                                                                  | IC, LM7812                           |
| 5010-09358-00 | R154, R156, R158, R160, R162, R164, R166, R168, R170, R193, R199, R250                                                                                                           | Res., 1K $\Omega$ , 1/4w, 5%      | 5671-13732-00 | LED1, LED4-LED7                                                                                                                                     | Display LED Red                      |
| 5010-09361-00 | R104, R107, R110, R113, R116, R119                                                                                                                                               | Res., 220 $\Omega$ , 1/2w, 5%     | 5701-09652-00 | Q1                                                                                                                                                  | Thermal Pad                          |
| 5010-09416-00 | R122, R125, R22, R26, R30, R34, R38, R42, R46, R50, R54, R58, R62, R66, R70, R74, R78, R82, R86, R90, R94, R98, R127, R129, R131, R133, R135, R137, R139, R141                   | Res., 470 $\Omega$ , 1/4w, 5%     | 5705-09199-00 | Q2                                                                                                                                                  | Heatsink 6030B                       |
| 5010-11079-00 | R7, R10, R13, R16, R19                                                                                                                                                           | Res., 51 $\Omega$ , 1/4w, 5%      | 5705-12637-00 | Q1                                                                                                                                                  | Heatsink 5054                        |
| 5010-12427-00 | R150-R153, R172-R175                                                                                                                                                             | Res., .22 $\Omega$ , 1w, 5%       | 5705-12638-00 | Q10, Q12, Q14, Q16, Q18                                                                                                                             | Heatsink 5298B                       |
| 5012-12632-00 | R224                                                                                                                                                                             | Res., .12 $\Omega$ , 10w, 5%      | 5733-12060-01 | F101-F116                                                                                                                                           | Fuse Holder PC MT3AG                 |
| 5019-10143-00 | SR1                                                                                                                                                                              | SIP 470 $\Omega$ , 9R, 10-pin, 5% | 5791-10862-03 | J108, J119, J136                                                                                                                                    | Connector, 3-pin Header .156         |
| 5040-08986-00 | C4                                                                                                                                                                               | Cap., 100M, 10v ( $\pm 20\%$ )    | 5791-10862-04 | J103, J116-J118                                                                                                                                     | Connector, 4-pin Header .156         |
| 5040-09421-00 | C2                                                                                                                                                                               | Cap., 100M, 25v (+50, -10%)       | 5791-10862-05 | J104-J106, J112, J123, J124, J128, J129, J131, J132                                                                                                 | Connector, 5-pin Header .156         |
| 5040-09537-00 | C8                                                                                                                                                                               | Cap., 100M, 100v ( $\pm 20\%$ )   | 5791-10862-06 | J107                                                                                                                                                | Connector, 6-pin Header .156         |
|               |                                                                                                                                                                                  |                                   | 5791-10862-07 | J101, J109, J114                                                                                                                                    | Connector, 7-pin Header .156         |
|               |                                                                                                                                                                                  |                                   | 5791-10862-09 | J102, J122, J125, J127, J130, J137, J138                                                                                                            | Connector, 9-pin Header .156         |
|               |                                                                                                                                                                                  |                                   | 5791-10862-11 | J120, J121                                                                                                                                          | Connector, 11-pin Header .156        |
|               |                                                                                                                                                                                  |                                   | 5791-10862-12 | J115                                                                                                                                                | Connector, 12-pin Header .156        |
|               |                                                                                                                                                                                  |                                   | 5791-10862-13 | J126                                                                                                                                                | Connector, 13-pin Header .156        |
|               |                                                                                                                                                                                  |                                   | 5791-13830-05 | J111                                                                                                                                                | Connector, 5-pin Header              |
|               |                                                                                                                                                                                  |                                   | 5791-13830-09 | J133-J135                                                                                                                                           | Connector, 9-pin Header              |
|               |                                                                                                                                                                                  |                                   | 5791-12516-00 | J113                                                                                                                                                | 34 Hen 2x17 STR                      |
|               |                                                                                                                                                                                  |                                   | 5824-09248-00 | TP1-TP8                                                                                                                                             | Test Point #1502-1                   |
|               |                                                                                                                                                                                  |                                   | 5041-09163-00 | C9                                                                                                                                                  | Cap., 2.2MF Tant                     |
|               |                                                                                                                                                                                  |                                   | 5730-09071-00 | F114                                                                                                                                                | Fuse, 8A, 32v                        |
|               |                                                                                                                                                                                  |                                   | 5731-09432-00 | F112                                                                                                                                                | Fuse, S-B, 7A., 250v                 |
|               |                                                                                                                                                                                  |                                   | 5731-09651-00 | F106-F111, F113                                                                                                                                     | Fuse, S-B, 5A., 250v                 |
|               |                                                                                                                                                                                  |                                   | 5731-10356-00 | F101-F105, F116                                                                                                                                     | Fuse, S-B, 3A., 250v                 |
|               |                                                                                                                                                                                  |                                   | 5730-09797-00 | F115                                                                                                                                                | Fuse, S-B, 3/4A., 250v               |
|               |                                                                                                                                                                                  |                                   | 5705-12698-00 |                                                                                                                                                     | Heatsink #62365                      |

**A-12697-3**



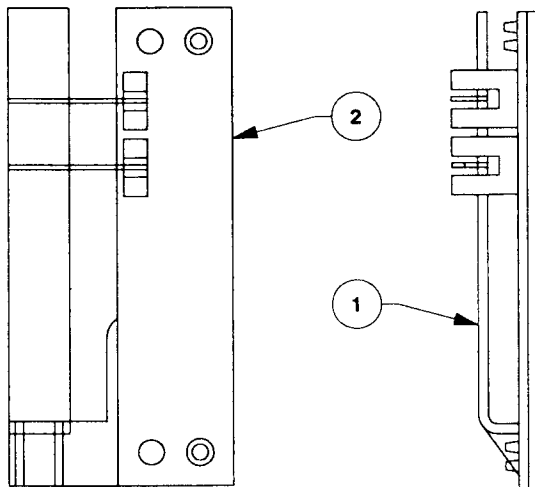


## A-17051-1 Coin Door Interface PCB Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>               |
|--------------------|-------------------|----------------------------------|
| 5791-10862-03      | J8                | Connector, 3-pin Header Str Sq.  |
| 5791-10862-05      | J2, J9            | Connector, 5-pin Header Str Sq.  |
| 5791-10862-11      | J1, J7            | Connector, 11-pin Header Str Sq. |
| 5791-10862-12      | J3                | Connector, 12-pin Header Str Sq. |
| 5791-10862-13      | J5                | Connector, 13-pin Header Str Sq. |
| 5791-10862-15      | J6                | Connector, 15-pin Header Str Sq. |
| 5645-09025-00      | SW5               | Switch DIP 8 Pos.                |
| 5070-09054-00      | D1 - D11          | Diode, 1N4004, 1.0A.             |
| 5791-11000-10      | J4                | Connector, 10-pin Header Str Sq. |

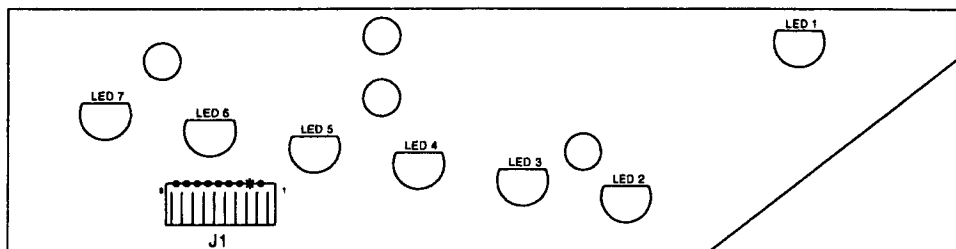
## A-17316 Flipper Opto PCB Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>      |
|-------------|--------------------|-------------------------|
| 1           | 03-9001            | Interrupter Flip-Opto   |
| 2           | A-16384            | Flipper Opto Sw. Assy.  |
|             | 5010-08930-00      | Res., 470Ω, ½w, 5%      |
|             | 5490-12451-00      | Opto Inter Lg. 10mA.    |
|             | 5791-12462-07      | Connector, 7-pin Header |

## A-18617

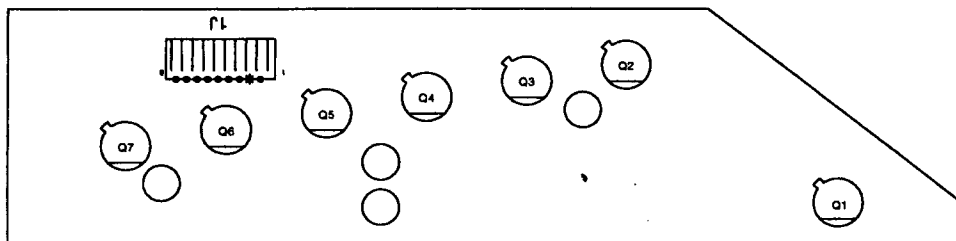
### Trough 7 IRED PCB Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>          |
|--------------------|-------------------|-----------------------------|
| 5671-12731-00      | LED1 - LED7       | Infra Red Diode             |
| 5791-12622-09      | J1                | Connector, 9-pin Header Sq. |

## A-18618

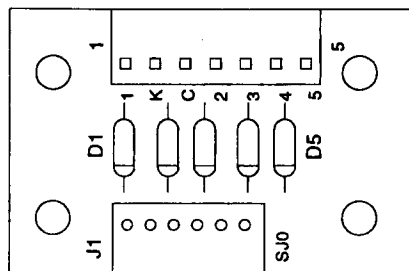
### Trough 7 IR TSTR PCB Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>          |
|--------------------|-------------------|-----------------------------|
| 5163-14114-00      | Q1 - Q7           | Infra Red Photo Transistor  |
| 5791-12622-09      | J1                | Connector, 9-pin Header Sq. |

## C-13940

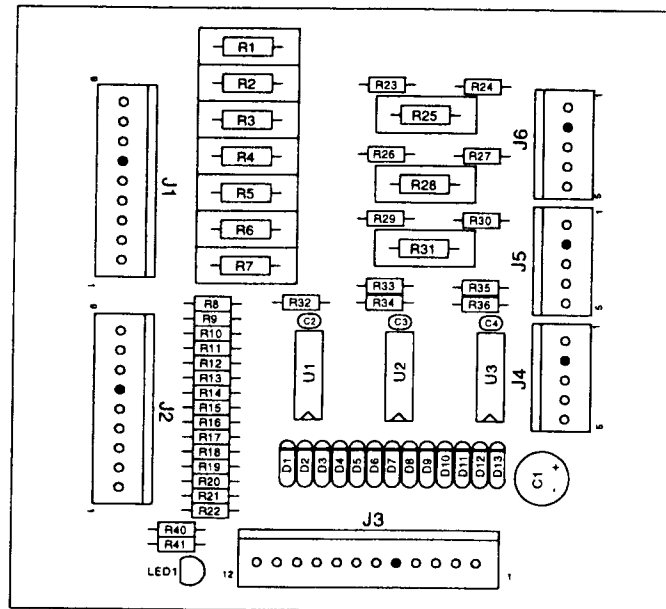
### 5-Switch & Diode PCB Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>          |
|--------------------|-------------------|-----------------------------|
| 5070-09054-00      | D1-D5             | Diode 1N4004 1.0A.          |
| 5791-10862-07      | J2                | Connector, 7-pin Header Sq. |
| 5791-12462-06      | J1                | Connector, 6-pin Header Sq. |

# A-18159-1

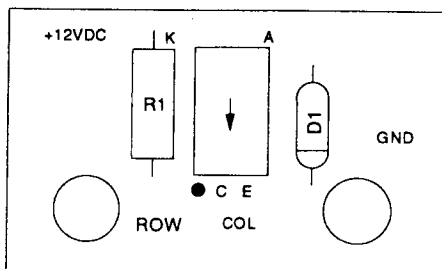
## 10-Opto Switch PCB & Bracket Assembly



| Item | Part Number   | Designator                           | Description                    |
|------|---------------|--------------------------------------|--------------------------------|
| 1    | A-18159       | -                                    | 10-Opto PCB Assembly           |
|      | 5040-10974-00 | C1                                   | Cap., 100 $\mu$ Fd, 35v        |
|      | 5043-08980-00 | C2-C4                                | Cap., 0.01 $\mu$ Fd, 50v       |
|      | 5671-13732-00 | LED1                                 | Display Red LED1               |
|      | 5370-12272-00 | U1-U3                                | I.C. LM339, Quad Compar        |
|      | 5070-09054-00 | D1-D13                               | Diode, 1N4004, 1.0A.           |
|      | 5010-12928-00 | R1-R7, R25, R28, R31                 | Res., 270 $\Omega$ , 2w, 5%    |
|      | 5010-09999-00 | R8-R21, R23, R24, R26, R27, R29, R30 | Res., 2K $\Omega$ , 1/4w, 5%   |
|      | 5010-09314-00 | R22                                  | Res., 1.2K $\Omega$ , 1/4, 5%  |
|      | 5010-09162-00 | R32, R35, R39-R41                    | Res., 100K $\Omega$ , 1/4w, 5% |
|      | 5010-08774-00 | R33, R34, R36                        | Res., 22K $\Omega$ , 1/4w, 5%  |
|      | 5010-09034-00 | R37, R38                             | Res., 10K $\Omega$ , 1/4w, 5%  |
|      | 5791-10862-12 | J3                                   | Connector, 12-pin Header       |
|      | 5791-10862-09 | J1, J2                               | Connector, 9-pin Header        |
|      | 5791-10862-05 | J4-J6                                | Connector, 5-pin Header        |
| 2    | 01-10756      | -                                    | Bracket                        |
| 3    | 07-6688-18N   | -                                    | Rivet, 3/16 X 1/8"             |

## A-14534

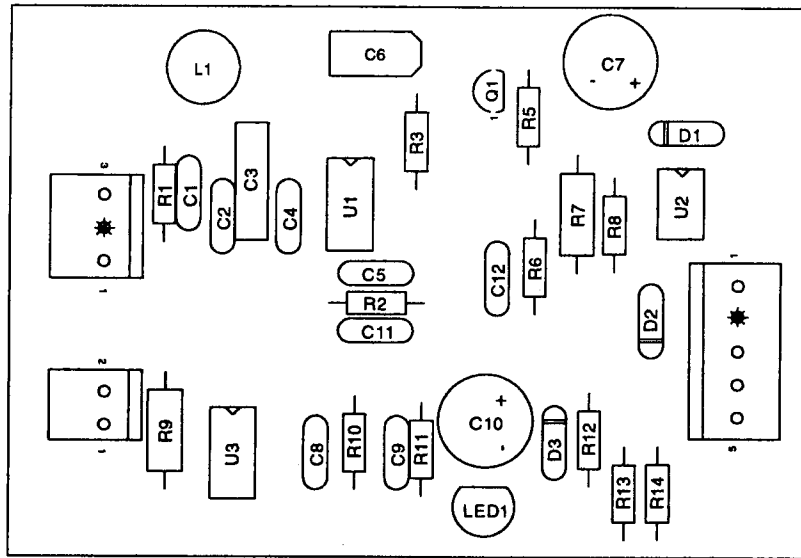
### Opto Switch PCB Assembly



| Part Number   | Designator | Description                       |
|---------------|------------|-----------------------------------|
| 5070-09054-00 | D1         | Diode 1N4004 1.0A.                |
| 5010-08930-00 | R1         | Resistor, 470 $\Omega$ , 1/2w, 5% |
| 5490-12451-00 | -          | Opto Inter lg. 10MA               |

# A-15646-2

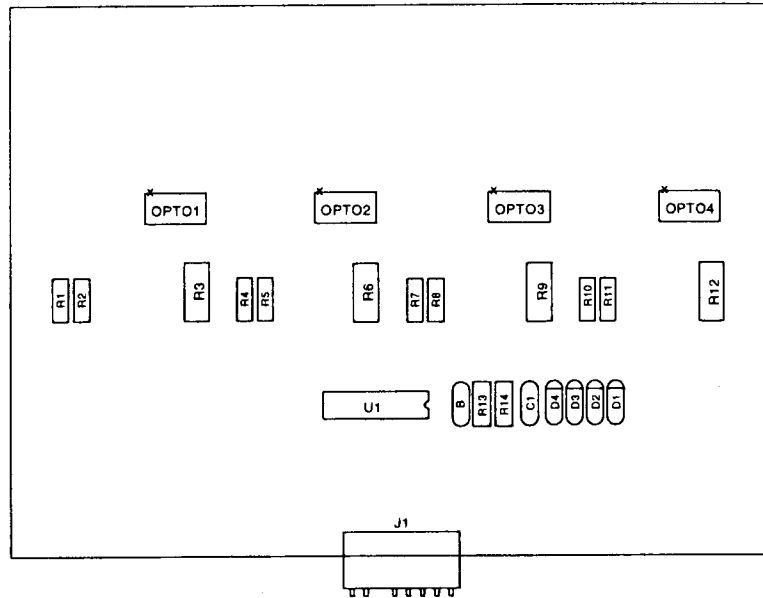
## Opto Sw-24 PCB Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>           |
|--------------------|-------------------|------------------------------|
| 5768-13243-01      | -                 | Opto 24-Sw PCB               |
| 5370-10891-00      | U1                | IC Opto Receiver MC3373      |
| 5490-10892-00      | U2                | IC Opto Isolator             |
| 5431-10449-00      | U3                | IC 555 Timer                 |
| 5192-13591-00      | Q1                | Trans MPSZ64 PNP Darlington  |
| 5043-10893-00      | C3                | Capacitor .0015mfd           |
| 5043-09065-00      | C4, C12           | Capacitor 470pf              |
| 5043-08996-00      | C5, C11           | Capacitor 0.1mfd             |
| 5041-10588-00      | C6                | Capacitor 6.8mfd             |
| 5043-08980-00      | C8                | Capacitor .01mfd             |
| 5048-12577-00      | C2                | Capacitor .47mfd             |
| 5043-09845-00      | C1, C9            | Capacitor .001mfd            |
| 5070-09054-00      | D1, D2, D3        | Diode 1N4004 1.0A            |
| 5040-10974-00      | C7, C10           | Capacitor 100mfd 35V +80/-20 |
| 5010-08997-00      | R1                | Resistor 2.7K 1/4w 5%        |
| 5010-09162-00      | R2, R6            | Resistor 100K 1/4w 5%        |
| 5010-09768-00      | R3                | Resistor 180 1/4w 5%         |
| 5010-09039-00      | R4                | Resistor 10 1/4w 5%          |
| 5010-09324-00      | R5                | Resistor 27K 1/4w 5%         |
| 5010-08930-00      | R7                | Resistor 470 1/2w 5%         |
| 5010-09034-00      | R8                | Resistor 10K 1/4w 5%         |
| 5010-10022-00      | R10               | Resistor 7.5K 1/4w 5%        |
| 5010-08773-00      | R11               | Resistor 18K 1/4w 5%         |
| 5010-09085-00      | R13               | Resistor 1.5K 1/4w 5%        |
| 5671-13732-00      | LED1              | Display LED Red 1            |
| 5791-12273-03      | J1                | 3H Str. Sq.Lock .156         |
| 5791-12273-02      | J2                | 2H Str. Sq.Lock .156         |
| 5791-12273-05      | J3                | 5H Str. Sq.Lock .156         |
| 5551-10890-00      | L1                | Inductor 10mH                |
| 5010-09534-00      | R12               | Resistor 0Ω Jumper           |
| 5010-09085-00      | R9                | Resistor 1.5K 1/4w 5%        |

# C-12499

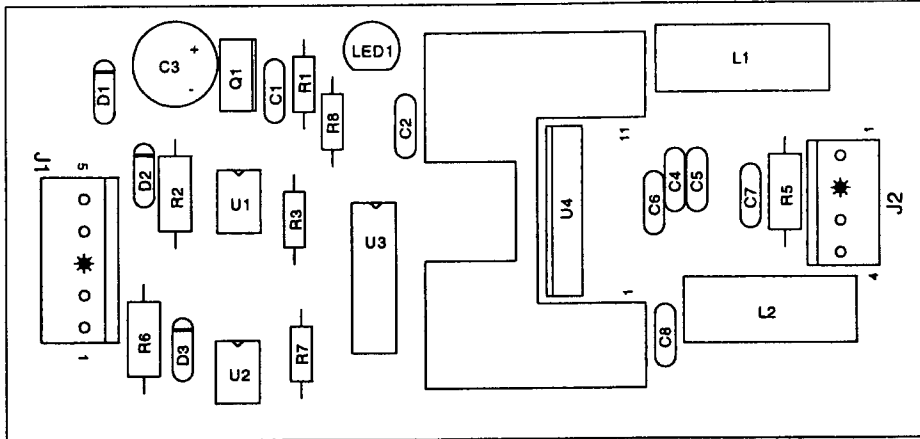
## 4-Bank Drop Target Opto Assembly



| <u>Part Number</u> | <u>Designator</u> | <u>Description</u>           |
|--------------------|-------------------|------------------------------|
| 5010-08930-00      | R3, R6, R9, R12   | Resistor, 470, 1/2w, 5%      |
| 5010-09324-00      | R2, R5, R8, R11   | Resistor, 27K, 1/4w, 5%      |
| 5010-08773-00      | R1, R4, R7, R10,  | Resistor, 18K, 1/4w, 5%      |
| 5010-08774-00      | R14               | Resistor, 22K, 1/4w, 5%      |
| 5010-09162-00      | R13               | Resistor, 100K, 1/4w, 5%     |
| 5043-08980-00      | C1, B             | Capacitor, .01mfd (+80,-20%) |
| 5370-12272-00      | U1                | IC LM339 Quad Comp.          |
| 5490-10159-00      | OPTO1-OPTO4       | Opto. Inter Mdl L/G          |
| 5070-09054-00      | D1-D4             | Diode 1N4004 1.0A.           |
| 5791-12622-08      | J1                | Connector, 8-pin Header .100 |

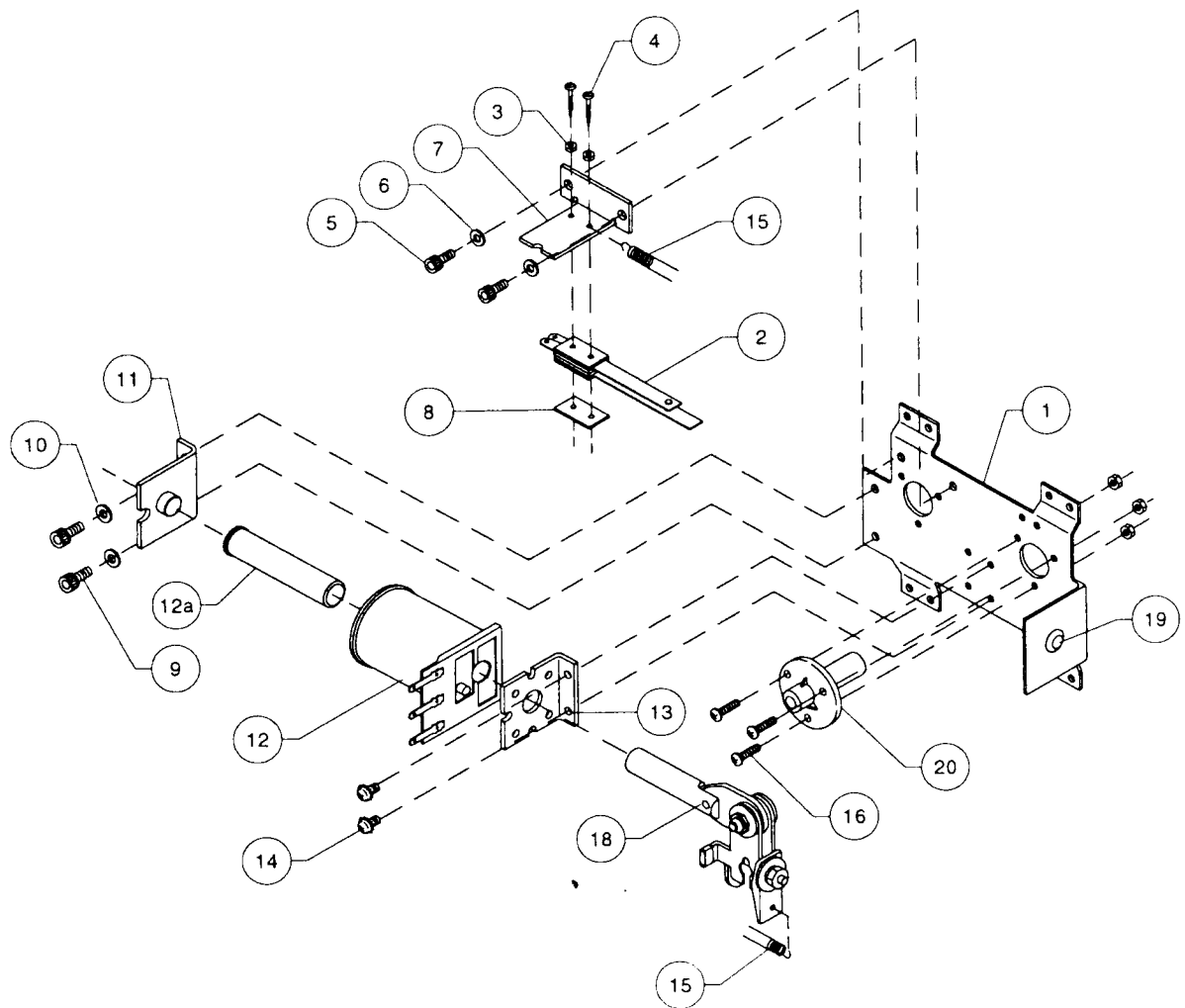
**A-16120**

## D.C. Motor Control PCB Assembly



| <u>Part Number</u> | <u>Designator</u>  | <u>Description</u>             |
|--------------------|--------------------|--------------------------------|
| 5768-13402-00      | -                  | PCB DC Motor Control Board     |
| 5791-12273-04      | J2                 | 4H Str. Sq. Lock .156          |
| 5791-12273-05      | J1                 | 5H Str. Sq. Lock .156          |
| 5671-13732-00      | LED1               | Display Red LED                |
| 5070-09054-00      | D1, D2, D3         | Diode 1N4004 1.0A              |
| 5551-09822-00      | L1, L2             | Indicator 4.7 mH 3A            |
| 5010-09061-00      | R2, R6             | Resistor 680 1/2w 5%           |
| 5010-10255-00      | R5                 | Resistor 10 1/2w 5%            |
| 5010-08997-00      | R3, R7, R8         | Resistor 2.7K 1/2W 5%          |
| 5010-09085-00      | R1                 | Resistor 1.5K 1/4w 5%          |
| 5040-10974-00      | C3                 | Capacitor 100 mfd 35V Rad      |
| 5370-13342-00      | U4                 | IC 3A DMOS Bridge Drive        |
| 5490-10892-00      | U1, U2             | Opto Isolator 4N25)            |
| 5250-09157-00      | Q1                 | Regulator 7805 1A 5V           |
| 5043-08980-00      | C2, C4, C6, C7, C8 | Capacitor .01mfd 50V +80/-20   |
| 5041-09031-00      | C1                 | Capacitor 1mfd 25V +/-20 Axial |
| 5281-09500-00      | U3                 | IC 74LS32 Quad OR              |
| 5043-08996-00      | C5                 | Capacitor .1M 50V +/-20        |

# A-15849-L-2 Flipper Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>          |
|-------------|--------------------|-----------------------------|
| 1           | B-13104-L          | Flipper Base Assembly, Left |
| 2           | SW-1A-194          | Switch Assembly             |
| 3           | 4701-00002-00      | Lockwasher, #6 Split        |
| 4           | 4105-01019-10      | Sh. Metal Screw, #5 x 5/8"  |
| 5           | 4008-01079-05      | Mach. Screw, 8-32 x 5/16"   |
| 6           | 4701-00003-00      | Lockwasher #8 Split         |
| 7           | 01-9375            | Switch Mounting Bracket     |
| 8           | 20-6516            | Speednut, Tinnerman         |
| 9           | 4010-01066-06      | Cap Screw, 10-32 x 3/8"     |
| 10          | 4701-00004-00      | Lockwasher #10 Split        |
| 11          | A-12390            | Flipper Stop Assembly       |
| 12          | FL-11629           | Flipper Coil, Blue          |
| a)          | 03-7066-5          | Coil Tubing                 |
| 13          | 01-7695            | Solenoid Bracket            |
| 14          | 4006-01017-04      | Mach. Screw, 6-32 x 1/4"    |
| 15          | 10-364             | Spring                      |
| 16          | 4006-01005-06      | Mach. Screw, 6-32 x 3/8"    |
| 17          | 4406-01117-00      | Nut, 6-32 Hex               |

| <u>Item</u> | <u>Part Number</u> | <u>Description</u>              |
|-------------|--------------------|---------------------------------|
| 18          | A-15848-L          | Crank Link Assembly, Left       |
| a)          | A-17050-L          | Flipper Crank Assembly, Left    |
| b)          | A-15847            | Flipper Link Assembly           |
| c)          | 02-4676            | Link Spacer Bushing             |
| d)          | 4010-01086-14      | Cap Screw, 10-32 x 7/8"         |
| e)          | 4700-00023-00      | Flatwasher, 5/8 x 13/64 x 16ga. |
| f)          | 4701-00004-00      | Lockwasher #10 Split            |
| g)          | 4410-01132-00      | Nut, 10-32 ESN                  |
| 19          | 23-6577            | Bumper Plug, 5/8"               |
| 20          | 03-7568            | Flipper Bushing                 |

**Associated Parts:**  
(Not Shown)

|    |           |                          |
|----|-----------|--------------------------|
| 21 | 23-6519-4 | Flipper Rubber Ring, Red |
| 22 | 20-9250-5 | Flipper & Shaft          |

## A-15849-R-4 Flipper Assembly

| <u>Item</u> | <u>Part Number</u> | <u>Description</u>         | <u>Item</u> | <u>Part Number</u> | <u>Description</u>              |
|-------------|--------------------|----------------------------|-------------|--------------------|---------------------------------|
| 1           | A-13104-R          | Flipper Bracket Sub-Assy.  | 18          | A-15848-R          | Crank Link Assembly, Right      |
| 2           | SW-1A-194          | Switch Assembly            | a)          | A-17050-R          | Flipper Crank Assembly, Right   |
| 3           | 4701-00002-00      | Lockwasher, #6 Split       | b)          | A-15847            | Flipper Link Assembly           |
| 4           | 4105-01019-10      | Sh. Metal Screw, #5 x 5/8" | c)          | 02-4676            | Link Spacer Bushing             |
| 5           | 4008-01079-05      | Mach. Screw, 8-32 x 5/16"  | d)          | 4010-01086-14      | Cap Screw, 10-32 x 7/8"         |
| 6           | 4701-00003-00      | Lockwasher #8 Split        | e)          | 4700-00023-00      | Flatwasher, 5/8 x 13/64 x 16ga. |
| 7           | 01-9375            | Switch Mounting Bracket    | f)          | 4701-00004-00      | Lockwasher #10 Split            |
| 8           | 20-6516            | Speednut, Tinnerman        | g)          | 4410-01132-00      | Nut, 10-32 ESN                  |
| 9           | 4010-01066-06      | Cap Screw, 10-32 x 3/8"    | 19          | 23-6577            | Bumper Plug, 5/8"               |
| 10          | 4701-00004-00      | Lockwasher #10 Split       | 20          | 03-7568            | Flipper Bushing                 |
| 11          | A-12390            | Flipper Stop Assembly      |             |                    |                                 |
| 12          | FL-15411           | Flipper Coil, Orange       |             |                    |                                 |
| a)          | 03-7066-5          | Coil Tubing                |             |                    |                                 |
| 13          | 01-7695            | Solenoid Bracket           |             |                    |                                 |
| 14          | 4006-01017-04      | Mach. Screw, 6-32 x 1/4"   |             |                    |                                 |
| 15          | 10-364             | Spring                     |             |                    |                                 |
| 16          | 4006-01005-06      | Mach. Screw, 6-32 x 3/8"   | 21          | 23-6519-4          | Flipper Rubber Ring, Red        |
| 17          | 4406-01117-00      | Nut, 6-32 Hex              | 22          | 20-9250-5          | Flipper & Shaft                 |

**Associated Parts:**  
(Not Shown)

## A-15849-R-2 Flipper Assembly

(Parts listed replace same items of A-15849-R-4)

| <u>Item</u> | <u>Part Number</u> | <u>Description</u> |
|-------------|--------------------|--------------------|
| 12          | FL-11629           | Flipper Coil, Blue |

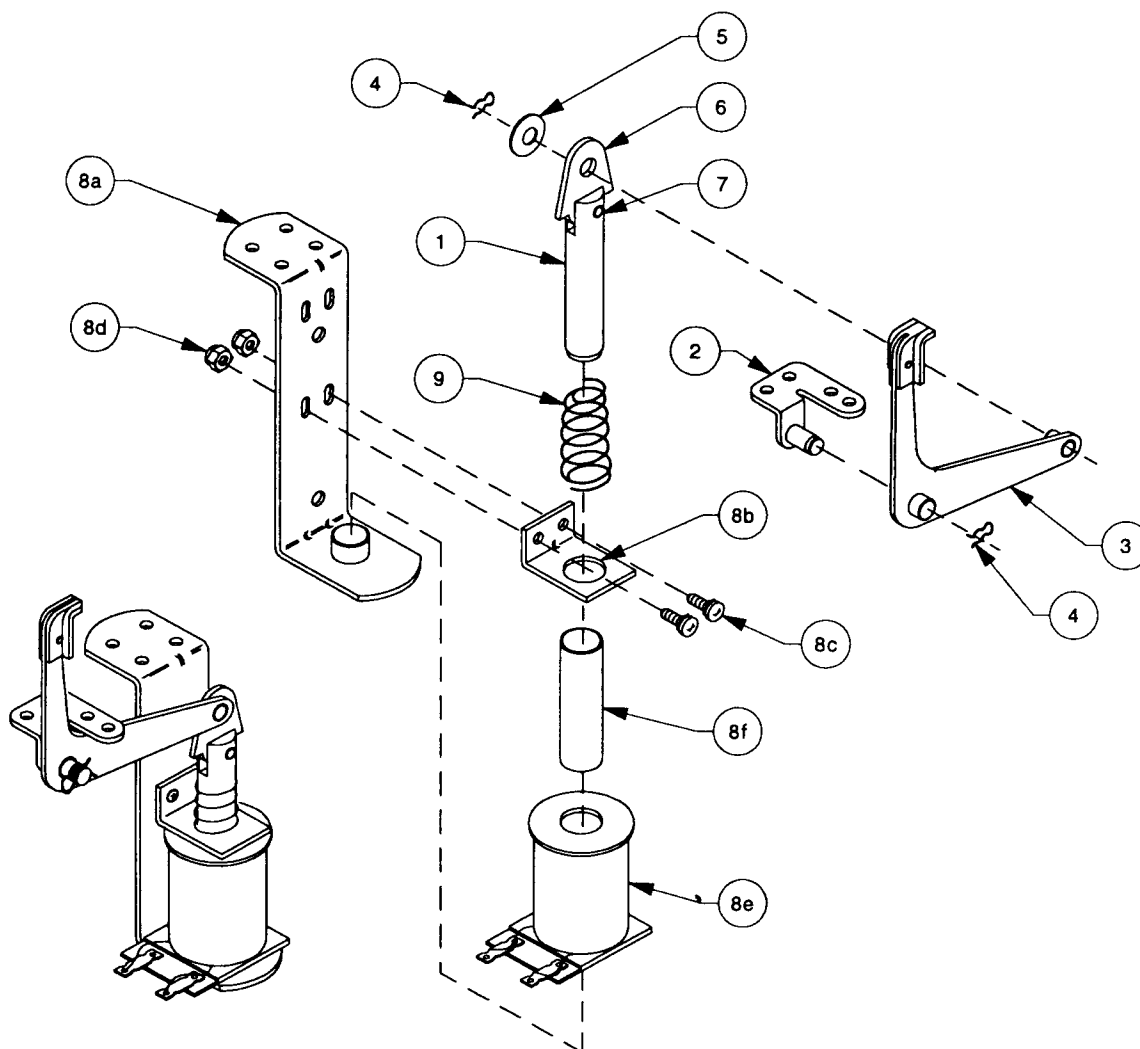
### *Flipper Notes...*

- Each Flipper Assembly is mounted beneath the playfield, in conjunction with the Plastic Flipper & Shaft, and Flipper Rubber on the upper side of the playfield.
- With the flipper, in the non-activated position, the E.O.S. Switch contacts must have a gap of .062 ( $\pm .015$ ) inch. When flipper is activated switch must close.
- Any adjustment of the E.O.S. switch must be made at a minimum distance of 0.25 inch from the switch body.
- Longer blade of E.O.S. switch must be made straight. Gap adjustment is done by adjusting shorter blade.
- All moving elements of the assembly must operate freely without any evidence of binding.
- Apply Loctite™ 245 when reattaching screws to the Flipper Stop Assembly, the Solenoid Bracket, and the Flipper Bushing.



# A-17811

## Kicker Arm (Slingshot) Assembly



### Associated Parts for Right & Left Kickers:

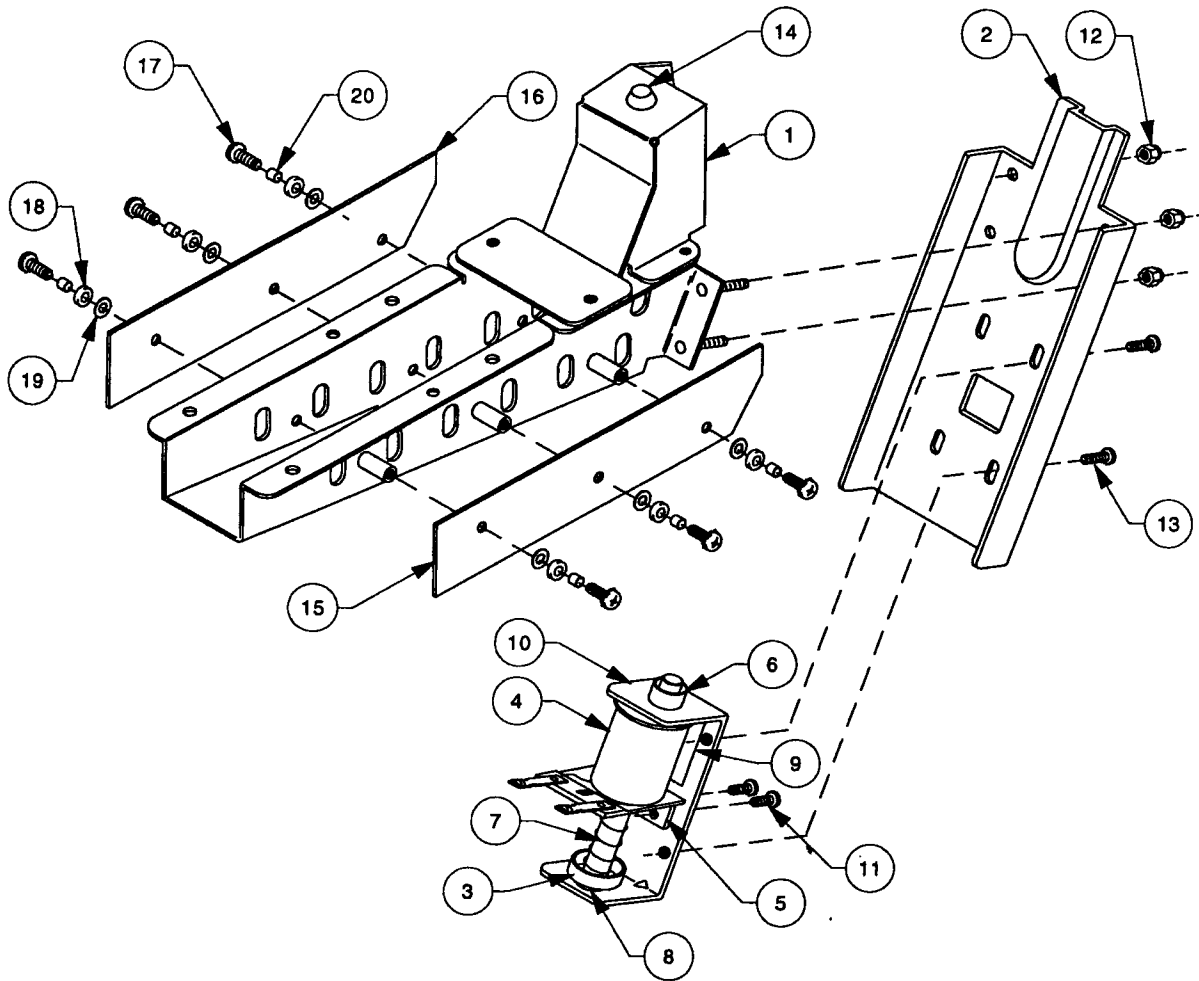
#### Item   Part Number   Description

- |    |               |                                 |
|----|---------------|---------------------------------|
| 1. | 02-2364       | Coil Plunger                    |
| 2. | A-17810       | Mounting Bracket Assembly       |
| 3. | A-12664       | Kicker Crank Assembly           |
| 4. | 12-6227       | Hairpin Clip                    |
| 5. | 4700-00030-00 | Flatwasher, 17/64 x 1/2 x 15ga. |
| 6. | 03-8085       | Armature Link                   |
| 7. | 20-8716-5     | Roll Pin, 1/8 x 7/16"           |

#### Item   Part Number   Description

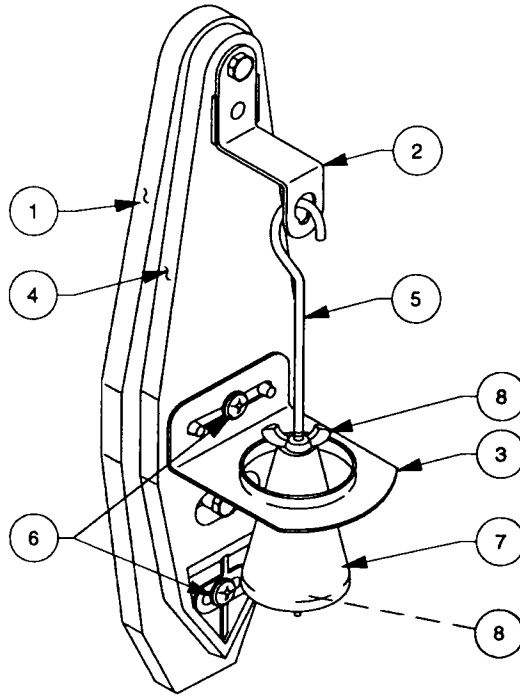
- |    |               |                             |
|----|---------------|-----------------------------|
| 8. | B-9362-R-3    | Coil & Bracket Assy., Left  |
|    | B-9362-L-2    | Coil & Bracket Assy., Right |
| a) | A-17808       | Bracket & Stop Assembly     |
| b) | 01-8-508-S    | Coil Retaining Bracket      |
| c) | 4006-01017-06 | Mach. Screw, 6-32 x 3/8"    |
| d) | 4406-01119-00 | Nut, 6-32 ESN               |
| e) | AE-26-1200    | Coil Assembly               |
| f) | 03-7066       | Coil Tubing                 |
| 9. | 10-128        | Spring                      |

# A-18753 Outhole Ball Trough Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>         | <u>Item</u> | <u>Part Number</u> | <u>Description</u>              |
|-------------|--------------------|----------------------------|-------------|--------------------|---------------------------------|
| 1           | A-16809-2          | Ball Trough Welded Assy.   | 11          | 4008-01017-05      | Mach. Screw, 8-32 x 5/16"       |
| 2           | 01-11587           | Ball Trough Front          | 12          | 4408-01119-00      | Nut 8-32 ESN                    |
| 3           | A-6306-2           | Bell Armature Assembly     | 13          | 4008-01017-06      | Mach. Screw, 8-32 x 3/8"        |
| 4           | AE-26-1500         | Coil Assembly              | 14          | 23-6702            | Bumper Plug                     |
| 5           | 01-8-508-T         | Solenoid Assembly          | 15          | A-18617            | Trough 7 IRED PCB Assembly      |
| 6           | 03-7067-5          | Coil Tubing                | 16          | A-18618            | Trough 7 IR TSTR PCB Assy.      |
| 7           | 10-135             | Spring                     | 17          | 4006-01003-10      | Mach. Screw, 6-32 x 5/8" SEMS   |
| 8           | 23-6420            | Rubber Grommet             | 18          | 23-6626            | Grommet                         |
| 9           | 03-8523            | Insulator                  | 19          | 4700-00004-00      | Flatwasher, 9/64 x 7/16 x 21ga. |
| 10          | 01-11586           | Coil Mounting Brkt. (Bell) | 20          | 02-4975            | Bushing                         |

## A-15361 Tilt Mechanism Assembly

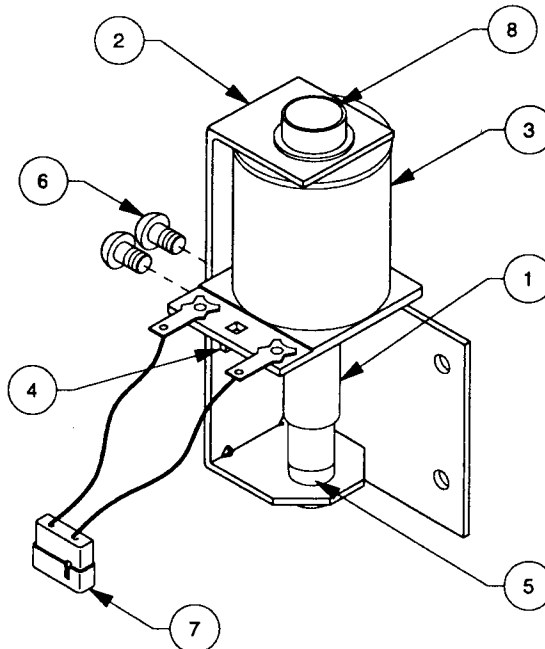


| <u>Item</u> | <u>Part Number</u> | <u>Description</u>       |
|-------------|--------------------|--------------------------|
| 1           | A-15360            | Mount Plate, Tilt Mech.  |
| 2           | 01-3444            | Bracket, Tilt Upper      |
| 3           | 01-3445            | Bracket, Tilt Lower      |
| 4           | 03-8668            | Pendulum, Tilt Mech.     |
| 5           | 12-6231            | Wire, Plum Bob           |
| 6           | 4006-01113-06      | Mach. Screw, 6-32 x 3/8" |

### **Associated Parts:**

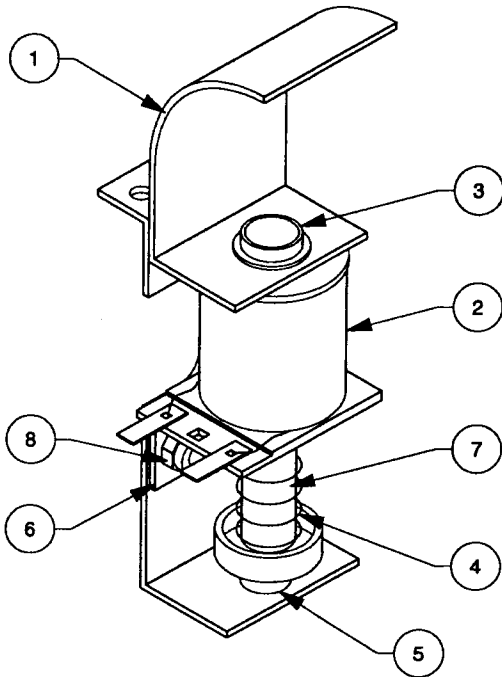
|   |               |              |
|---|---------------|--------------|
| 7 | 20-6502-A     | Plumb Bob    |
| 8 | 4406-01120-00 | Wing Nut (2) |

## B-10686-1 Knocker Assembly



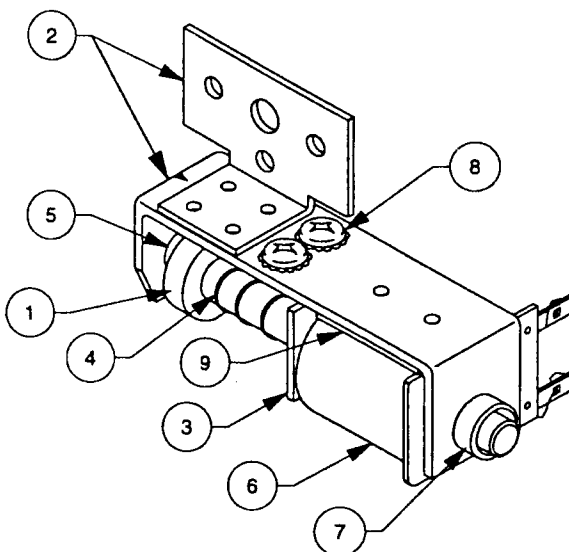
| <u>Item</u> | <u>Part Number</u> | <u>Description</u>       |
|-------------|--------------------|--------------------------|
| 1           | A-5387             | Coil Plunger Assembly    |
| 2           | 01-11273           | Mounting Bracket Assy.   |
| 3           | AE-23-800          | Coil Sub-Assembly        |
| 4           | 01-8-508-T         | Coil Retaining Bracket   |
| 5           | 23-6420            | Rubber Grommet           |
| 6           | 4008-01017-04      | Mach. Screw, 8/32 x 1/4" |
| 7           | H-11835            | Knocker Cable            |
| 8           | 03-7067-5          | Coil Tubing              |

## A-18768 Eject Assembly



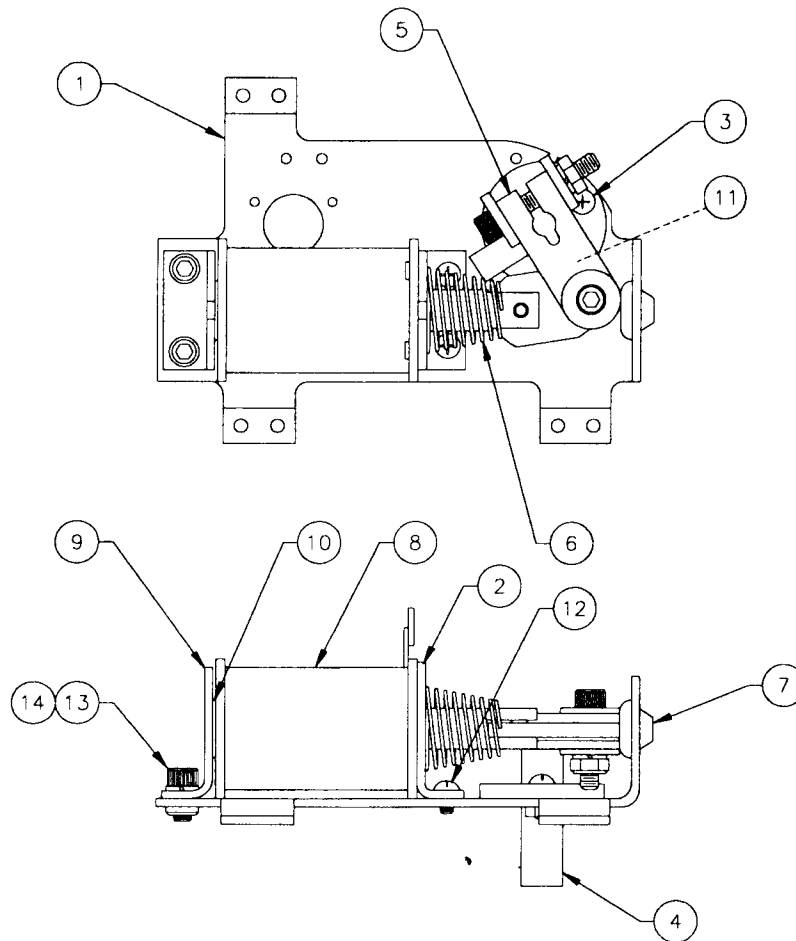
| <u>Item</u> | <u>Part Number</u> | <u>Description</u>     |
|-------------|--------------------|------------------------|
| 1           | A-18767            | Bracket Assembly       |
| 2           | AE026-1500         | Coil Assembly          |
| 3           | 03-7067            | Coil Tubing            |
| 4           | 10-135             | Solenoid Spring        |
| 5           | 23-6420            | Rubber Grommet         |
| 6           | 01-9784            | Coil Bracket           |
| 7           | A-17767            | Bell Armature Assembly |
| 8           | 4408-01119-00      | Nut #8-32 ESN          |

## A-14525 Kicker Bracket Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>        |
|-------------|--------------------|---------------------------|
| 1           | A-6306-2           | Bell Armature Assembly    |
| 2           | A-14526            | Mounting Bracket Assembly |
| 3           | 01-8-508-T         | Solenoid Bracket          |
| 4           | 10-135             | Solenoid Spring           |
| 5           | 23-6420            | Rubber Grommet            |
| 6           | AE-23-800          | Coil Assembly             |
| 7           | 03-7067-5          | Coil Tubing               |
| 8           | 4008-01017-04      | Mach. Screw, #8-32 x 1/4" |
| 9           | 03-8523            | Insulator                 |

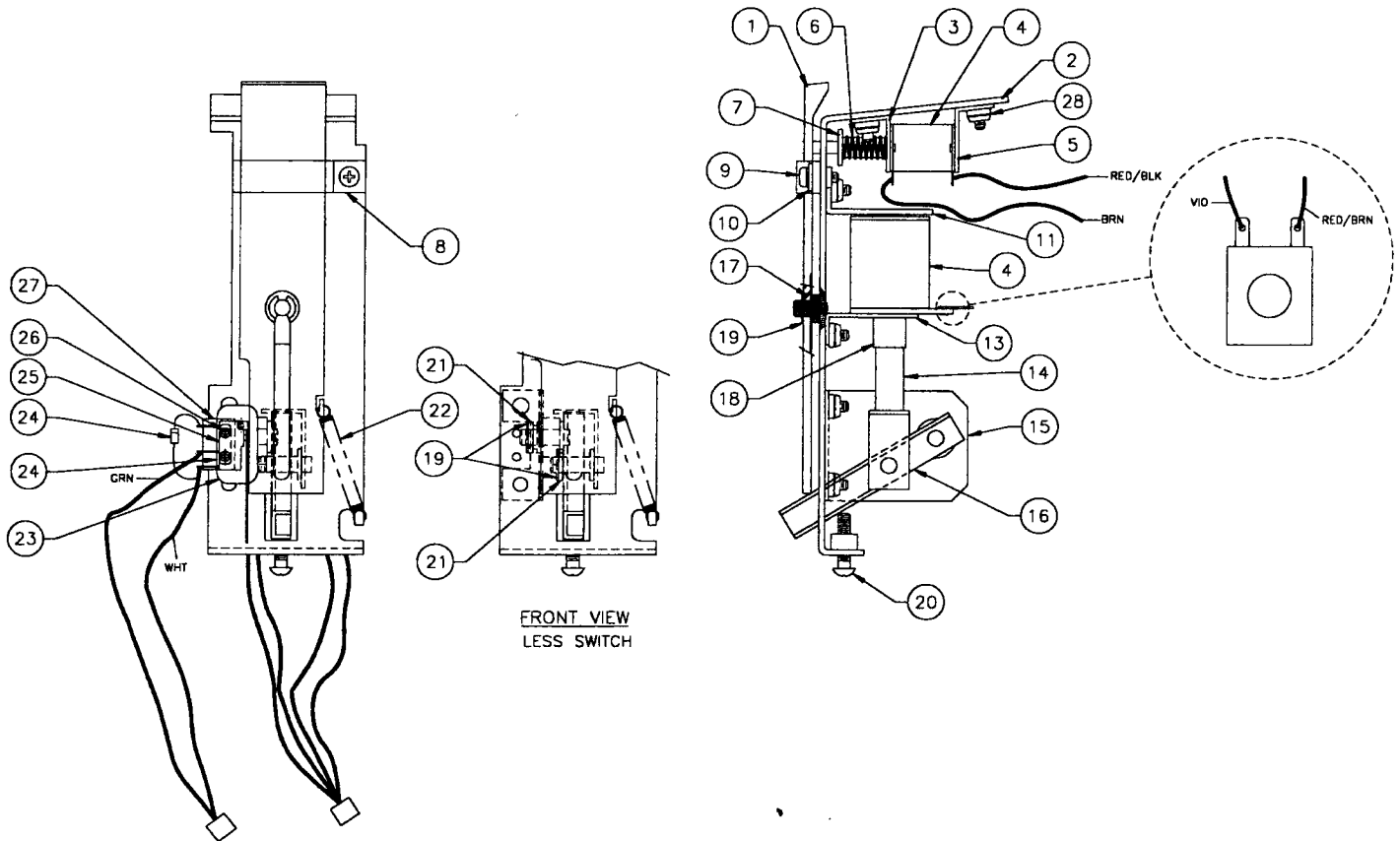
## A-18952 Ball Kicker Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>            |
|-------------|--------------------|-------------------------------|
| 1           | A-18816            | Bracket Sub-Assembly          |
| 2           | 01-7695            | Solenoid Bracket              |
| 3           | 4006-01005-06      | Mach. Screw, #6-32 x 3/8"     |
| 4           | 03-7568            | Flipper Bushing               |
| 5           | A-15848-L          | Crank Link Assembly           |
| 6           | 10-376             | Spring                        |
| 7           | 23-6577            | Rubber Bumper Plug            |
| 8           | A-14189            | Coil Assembly                 |
| 9           | A-12390            | Flipper Stop Bracket Assembly |
| 10          | 03-7066-5          | Coil Tubing                   |
| 11          | 4406-01117-00      | Nut #6-32 Hex.                |
| 12          | 4006-01017-04      | Mach. Screw, #6-32 x 1/4"     |
| 13          | 4010-01066-06      | Cap Screw, #10-32 x 3/8"      |
| 14          | 4701-00004-00      | Lockwasher, #10 Split         |

# A-18622

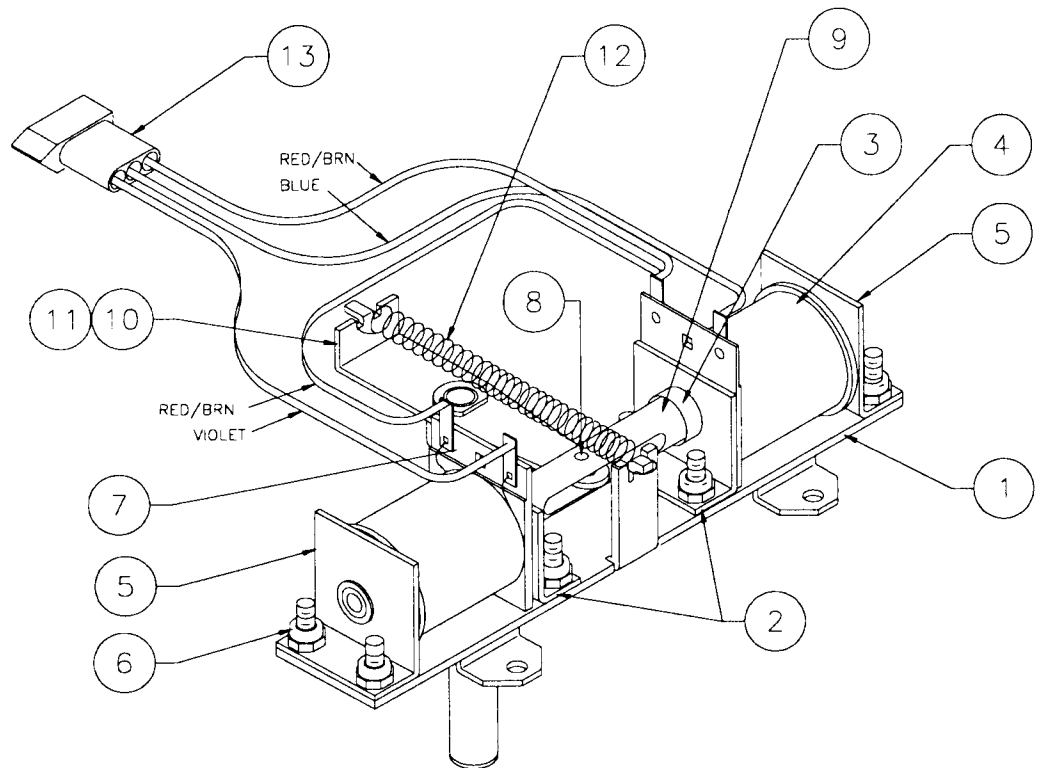
## Extended Target Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>           | <u>Item</u> | <u>Part Number</u> | <u>Description</u>              |
|-------------|--------------------|------------------------------|-------------|--------------------|---------------------------------|
| 1           | 03-9210            | Target Extended              | 17          | 4700-00072-00      | Flatwasher, 17/64 x 1/2 x 21ga. |
| 2           | A-18776            | Main Target Bracket Assy.    | 18          | 03-7066-4          | Tubing                          |
| 3           | 01-13048           | Coil Mounting Bracket        | 19          | 20-8712-25         | "E"-Ring, 1/4" Shaft            |
| 4           | SM-30-1100-DC      | Coil Assembly                | 20          | 4010-01025-14      | Mach. Screw, #10-32 x 7/8"      |
| 5           | A-18745            | Stop Bracket Assembly        | 21          | 4700-00079-00      | Flatwasher, 1/4 x 1/2 x 16ga.   |
| 6           | 10-483             | Spring Compression           | 22          | 10-495             | Spring Target Retractor         |
| 7           | A-19686            | Plunger - Extended Target    | 23          | 01-13646           | Plate Guide Actuator            |
| 8           | 03-9209            | Guide Extruded               | 24          | 5647-12693-31      | Switch                          |
| 9           | 4008-01003-08      | Mach. Screw, #8-32 x 1/2"    | 25          | 01-8240            | Nut Plate                       |
| 10          | 4700-00089-00      | Flatwasher, 11/64x7/16x16ga. | 26          | 4002-01105-10      | Mach. Screw, #2-56 x 5/8"       |
| 11          | A-18746            | Stop Bracket Assembly        | 27          | 01-8600            | Switch Insulator                |
| 12          | AL-23-800          | Coil Assembly                | 28          | 4408-01119-00      | Nut, #8-32 ESNA                 |
| 13          | 01-13050           | Coil Mounting Bracket        | 29          | H-19692            | Extended Target Cable Assy.     |
| 14          | A-18752            | Bracket & Plunger Assy.      | 30          | H-19739            | Switch Cable Assembly           |
| 15          | A-18778            | Bracket-Bushing Assembly     | 31          | 5070-09054-00      | Diode 1N4004 1.0A               |
| 16          | A-18777            | Bracket Pivot Assembly       |             |                    |                                 |

# A-18954

## Divertor Mechanism Assembly (Left Side)

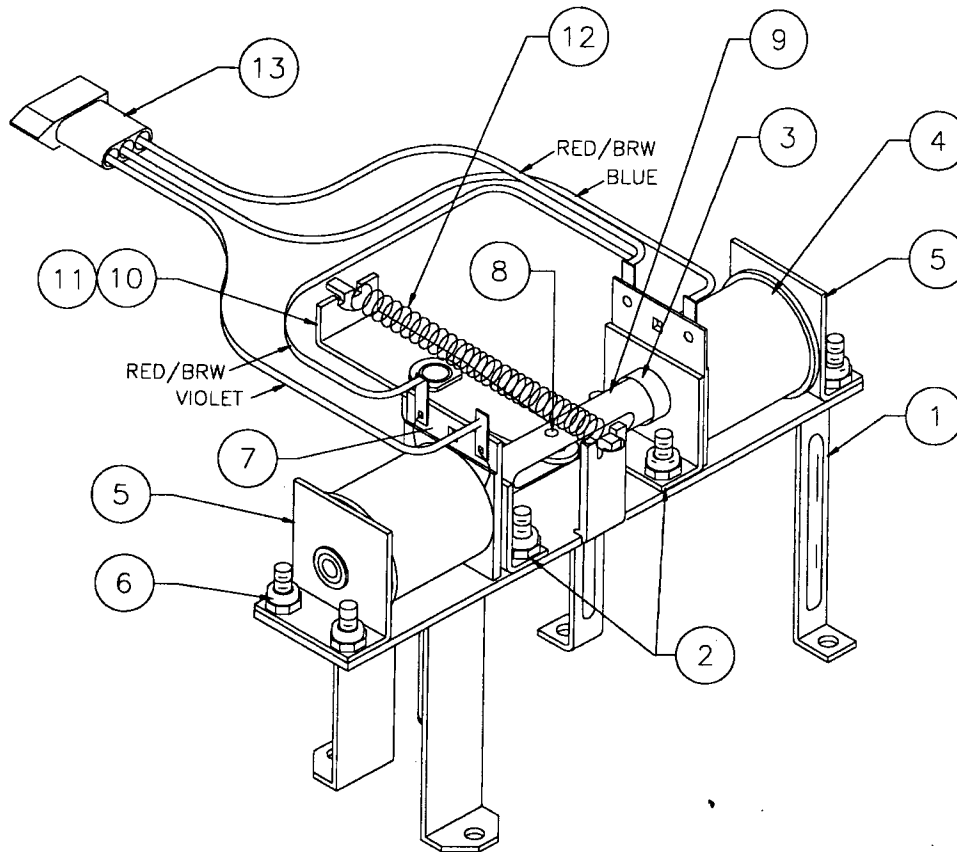


| <u>Item</u> | <u>Part Number</u> | <u>Description</u>                | <u>Associated Parts:</u> |                        |
|-------------|--------------------|-----------------------------------|--------------------------|------------------------|
| 1           | A-18956-2          | Left Bracket, Divertor Mech.      | A-19638-1                | Knife & Diverter Assy. |
| 2           | 01-13116           | Bracket - Large Coil              | 20-8712-25               | "E"-Ring, 1/4" Shaft   |
| 3           | 03-7066            | Coil Tubing, 1-3/4"               | 4700-00027-00            | FW, 1/4 x 1/2 x 21ga.  |
| 4           | AE-25-1000         | Coil Assembly                     |                          |                        |
| 5           | A-18957            | Coil Stop Bracket Assembly, Large |                          |                        |
| 6           | 4408-01119-00      | Nut, 8-32 ESNA                    |                          |                        |
| * 7         | 5070-09054-00      | Diode 1N4004, 1.0A.               |                          |                        |
| 8           | 20-8716-5          | Roll Pin, 1/8 x 7/16"             |                          |                        |
| 9           | 02-5135            | Armature                          |                          |                        |
| 10          | A-18983            | Crank Arm Assembly                |                          |                        |
| 11          | 4010-01186-04      | Set Screw, 10-32 x 1/4"           |                          |                        |
| 12          | 10-320             | Extension Spring                  |                          |                        |
| 13          | H-19704            | Divertor Cable                    |                          |                        |

\* Only item location shown.

# A-18955

## Diverter Mechanism Assembly (Right Side)

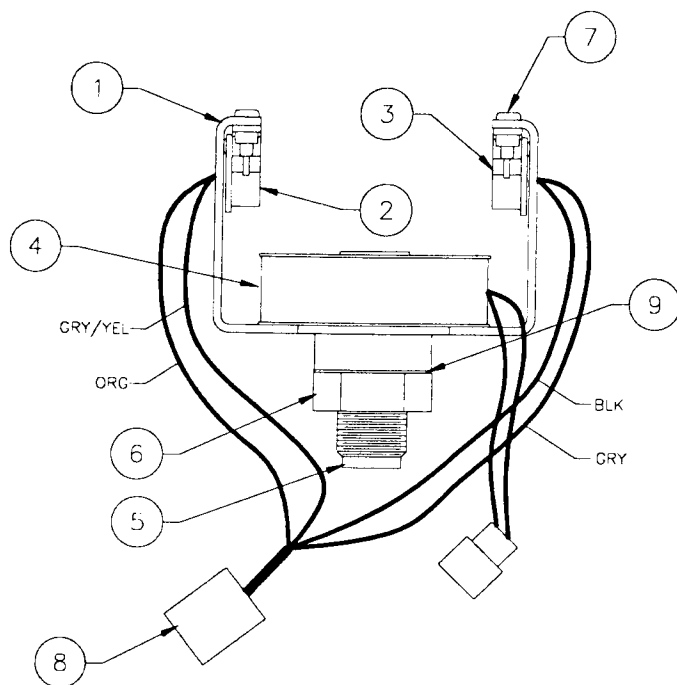


| <u>Item</u> | <u>Part Number</u> | <u>Description</u>                | <u>Associated Parts</u> |                        |
|-------------|--------------------|-----------------------------------|-------------------------|------------------------|
| 1           | A-18956-1          | Right Bracket, Diverter Mech.     | A-19638-2               | Knife & Diverter Assy. |
| 2           | 01-13116           | Bracket - Large Coil              | 20-8712-25              | "E"-Ring, 1/4" Shaft   |
| 3           | 03-7066            | Coil Tubing, 1-3/4"               | 4700-00027-00           | FW, 1/4 x 1/2 x 21ga.  |
| 4           | AE-25-1000         | Coil Assembly                     |                         |                        |
| 5           | A-18957            | Coil Stop Bracket Assembly, Large |                         |                        |
| 6           | 4408-01119-00      | Nut, 8-32 ESNA                    |                         |                        |
| * 7         | 5070-09054-00      | Diode 1N4004, 1.0A.               |                         |                        |
| 8           | 20-8716-5          | Roll Pin, 1/8 x 7/16"             |                         |                        |
| 9           | 02-5135            | Armature                          |                         |                        |
| 10          | A-18983            | Crank Arm Assembly                |                         |                        |
| 11          | 4010-01186-04      | Set Screw, 10-32 x 1/4"           |                         |                        |
| 12          | 10-320             | Extension Spring                  |                         |                        |
| 13          | H-19704            | Diverter Cable                    |                         |                        |

\* Only item location shown.

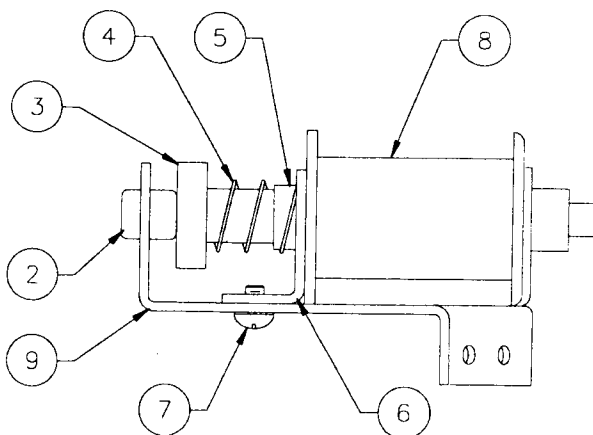


## A-18388 Magnet & Opto Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>            |
|-------------|--------------------|-------------------------------|
| 1           | A-18387            | Magnet & Opto Brkt. w/Nut     |
| 2           | A-16908            | Opto LED Assembly-RTV         |
| 3           | A-16909            | Opto Photo Trans. Assy.RTV    |
| 4           | 20-9247            | Coil Magnet & Thermal Breaker |
| 5           | 02-4773            | Core - Adj. Magnet            |
| 6           | 4428-01135-00      | 3/4-16 Hex. Jam Nut           |
| 7           | 4106-01013-06      | SMS #6 x 3/8"                 |
| 8           | H-17607-4          | Cable Assembly                |
| 9           | 20-9612            | Spring Washer                 |

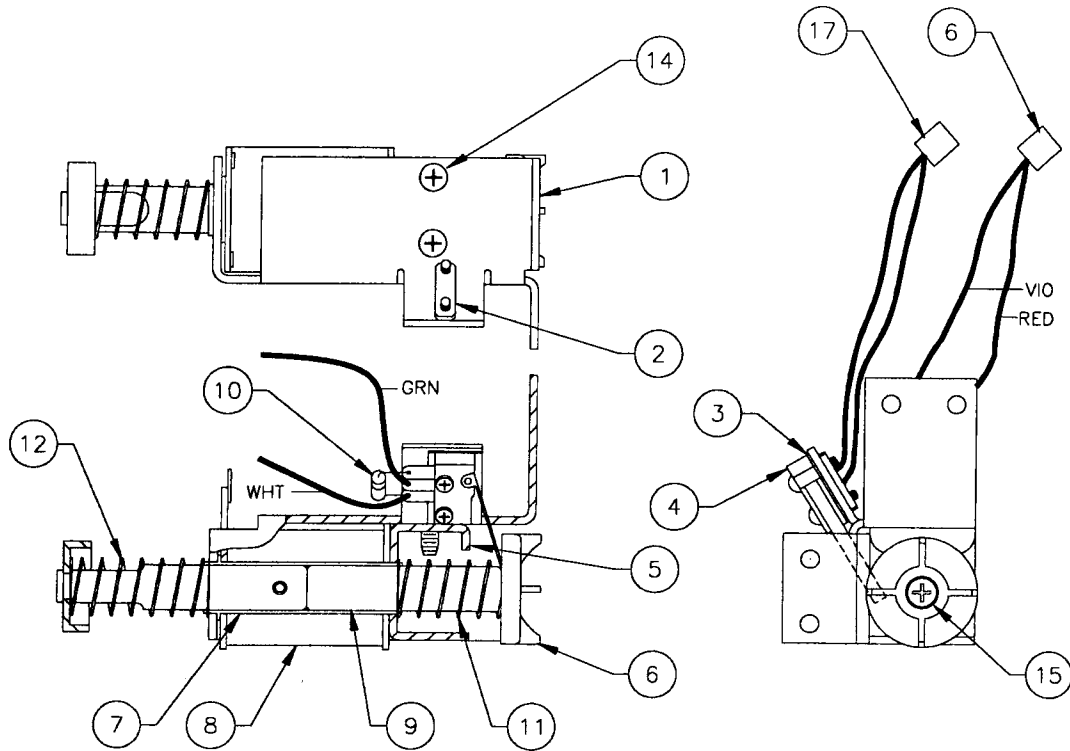
## A-15368 Eject Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>        |
|-------------|--------------------|---------------------------|
| 1           | 01-10652           | Bracket                   |
| 2           | 23-6420            | Rubber Grommet            |
| 3           | A-15371            | Plunger Assembly          |
| 4           | 10-135             | Spring                    |
| 5           | 03-7067-5          | Coil Tubing               |
| 6           | 01-8-508-T         | Solenoid Bracket          |
| 7           | 4008-01017-04      | Mach. Screw, #8-32 x 1/4" |
| 8           | AE-27-1200         | Coil Assembly             |

# A-18950

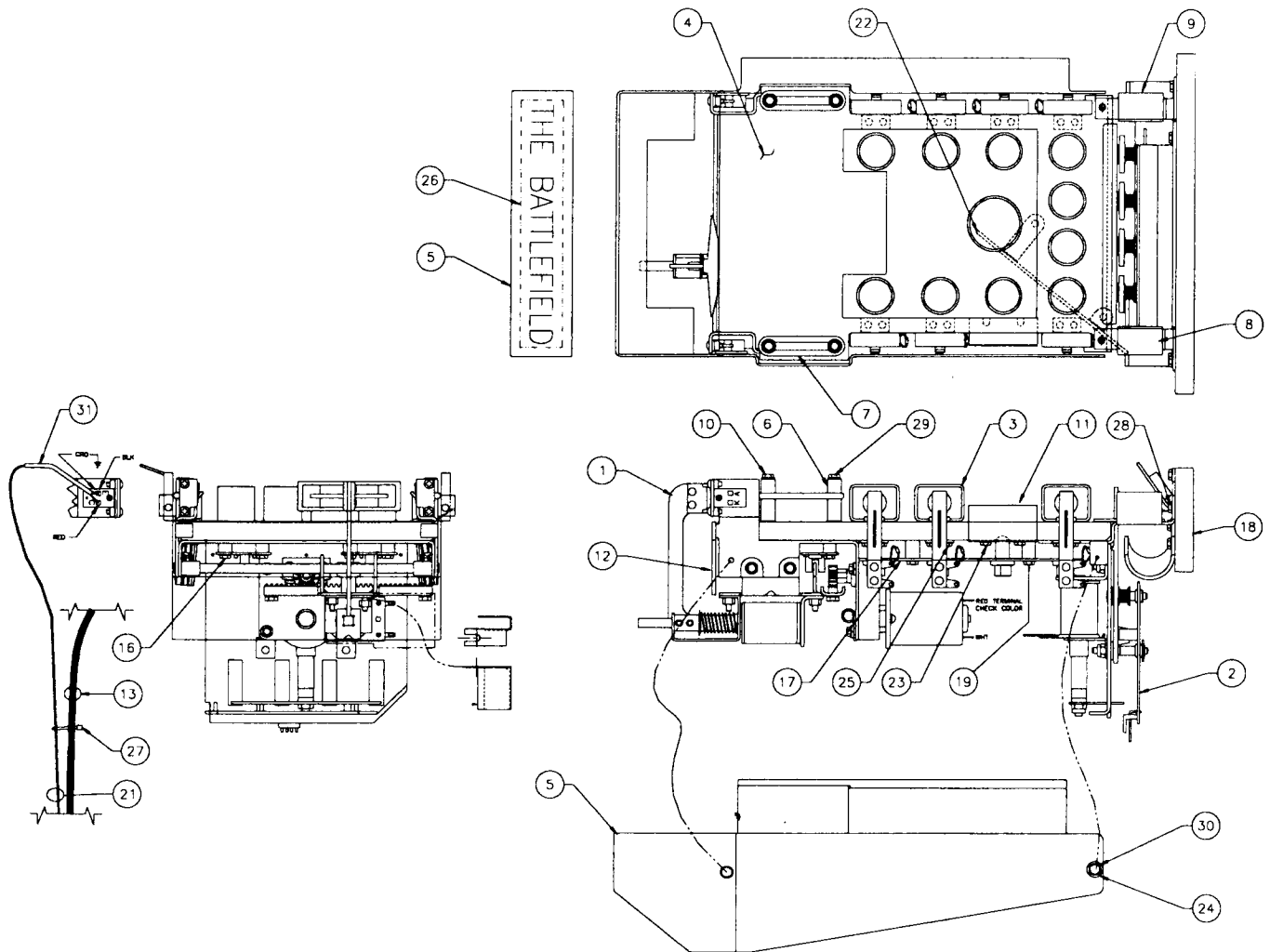
## Ball Popper Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>         |
|-------------|--------------------|----------------------------|
| 1           | 01-13110           | Ball Popper Bracket        |
| 2           | 01-8240            | Nut Plate #2-56            |
| 3           | 01-8600            | Insulator                  |
| 4           | 5647-12693-24      | Mini Micro Switch          |
| 5           | 01-10167           | Bracket-Coil Retainer      |
| 6           | 03-8561            | Ball Popper Cup            |
| 7           | 03-7067-7          | Coil Tubing                |
| 8           | AE-25-1000         | Coil Assembly              |
| 9           | A-19640            | Armature & Extension Assy. |
| 10          | 5070-09054-00      | Diode 1N4004               |
| 11          | 10-148             | Spring                     |
| 12          | 10-135             | Spring                     |
| 13          | 4002-01105-07      | Mach. Screw, #2-56 x 7/16" |
| 14          | 4008-01015-06      | Mach. Screw, #8-32 x 3/8"  |
| 15          | 4106-01152-06      | Sh. Metal Screw, #6 Thd.   |
| 16          | H-19523            | Ball Popper Cable Assembly |
| 17          | H-16437            | Switch Cable Assembly      |

# A-18382

## Mini-Playfield Assembly



### Item   Part Number   Description

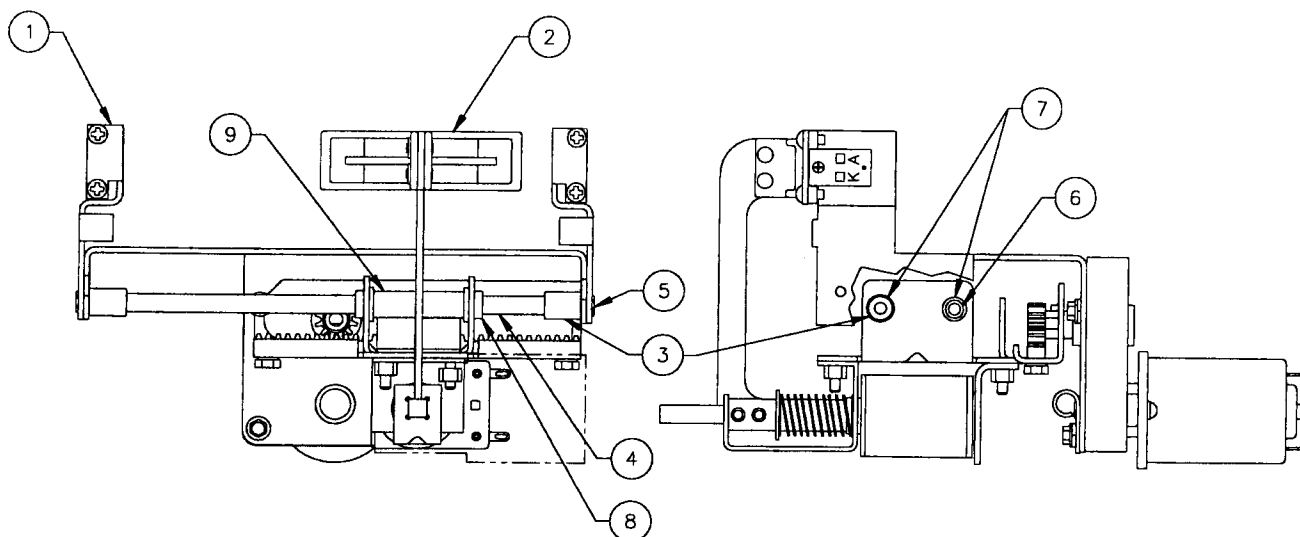
|    |               |                                   |
|----|---------------|-----------------------------------|
| 1  | A-17789       | Coil Slide Motor Assy.            |
| 2  | A-18783       | 4-Bank Drop Target Assy.          |
| 3  | A-18379-6     | Side Target                       |
| 4  | 36-50032-1    | Mini Playfield & Insert Assy.     |
| 5  | 03-9229       | Mini Playfield Guard              |
| 6  | 02-4435       | Single Post, Groove #8 x 1-3/16"  |
| 7  | 23-6694-6     | Rubber Ring, 1" I.D.              |
| 9  | A-19113-2     | Mounting Bracket Assy., Left      |
| 10 | 4008-01113-28 | Mach. Screw, 8-32 x 1-3/4"        |
| 11 | 01-13596      | Spring Steel Target               |
| 12 | A-19603-1     | Plfd. Plastic/Bracket Assy.-Front |
| 13 | A-19751       | Opto/Lamp-Cable Assembly          |
| 14 | 17-1116-3     | Jumper Wire, 3" (Yellow)          |
| 15 | 17-1116-5     | Jumper Wire, 5" (Yellow)          |
| 16 | 4006-01113-12 | Mach. Screw, #6-32 x 3/4"         |

### Item   Part Number   Description

|    |                |                           |
|----|----------------|---------------------------|
| 17 | A-19107-1      | 4-Lamp Assembly           |
| 18 | A-19786        | Back Board Assembly       |
| 19 | 4106-01115-16  | Sh. Metal Screw, #6 x 1"  |
| 20 | 01-13590       | Coil Wire Guard           |
| 21 | H-16293-2      | Receiver Cable            |
| 22 | A-19603-2      | Mini Plfd. Low Guard      |
| 23 | 4808-01175-07Y | E-P #8 x 7/16"            |
| 24 | 4006-01113-06  | Mach. Screw, #6-32 x 3/8" |
| 25 | 4808-01175-08  | E-P #8 x 1/2"             |
| 26 | *31-2028-2     | Decal                     |
| 27 | 03-7520-2      | Tie Wrap                  |
| 28 | 4008-01168-08  | Mach. Screw, #8-32 x 1/2" |
| 29 | 4408-01118-00  | Nut 8-32 x 3/8" Long Tee  |
| 30 | 4700-00011-00  | FW, 11/64 x 7/16 x 16ga.  |
| 31 | 23-6710-3      | Tube-Clear #10 x 2"       |

\* Not available for individual sale. Order Decal Set 31-2028.

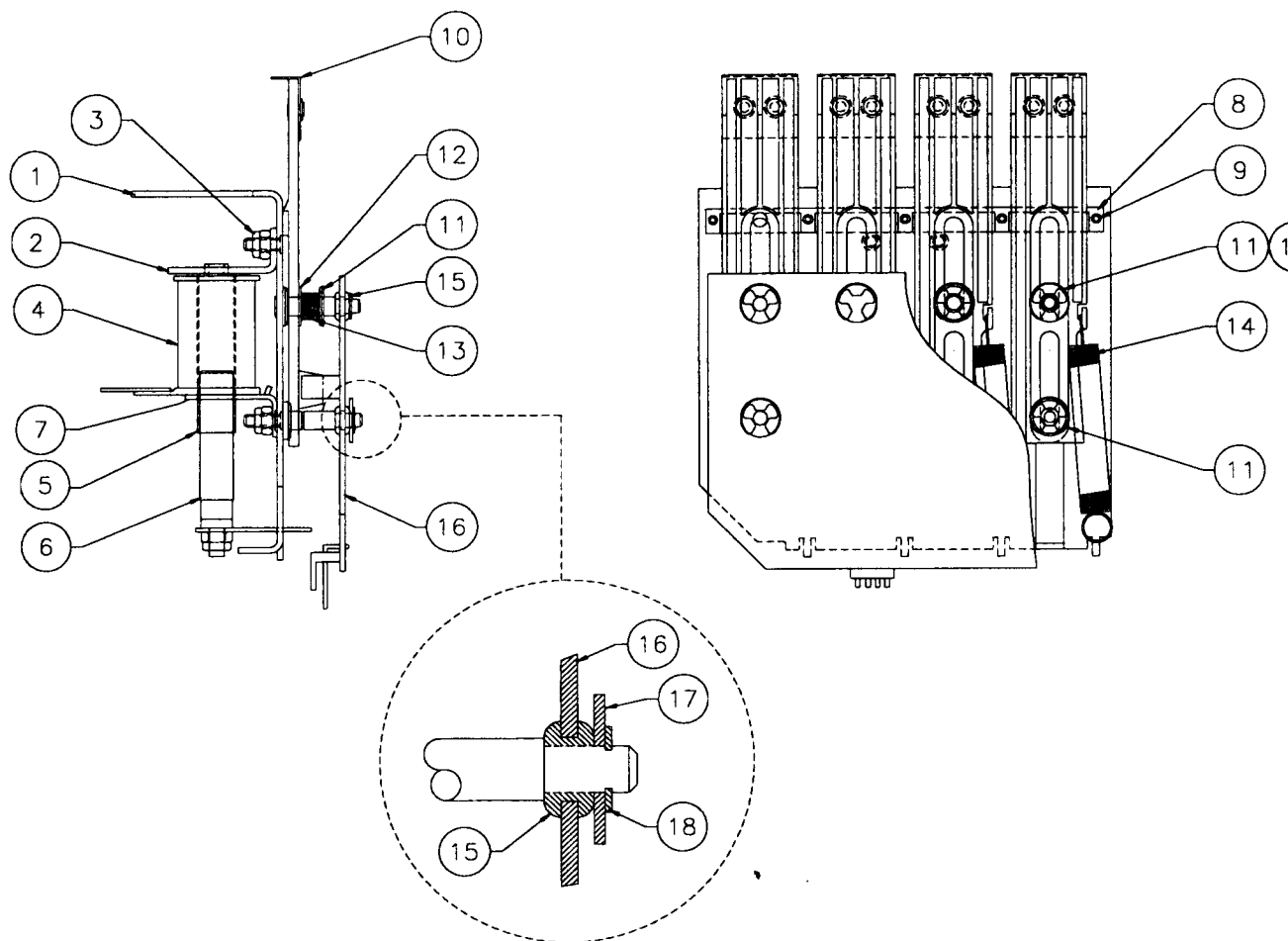
## A-17789 Coil Slide Motor Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>       |
|-------------|--------------------|--------------------------|
| 1           | A-19170            | Motor/Opto Assembly      |
| 2           | A-19070            | Coil/Slide Assembly      |
| 3           | 20-10121           | Rubber Isolator          |
| 4           | 02-4947            | Coil Slide Shaft         |
| 5           | 4008-01113-04      | Mach. Screw, 8-32 x 1/4" |
| 6           | 02-4947            | Coil Slide Shaft         |
| 7           | 4701-00003-00      | Lockwasher, #8 Split     |
| 8           | 20-9610            | Flange Bushing           |

# A-18783

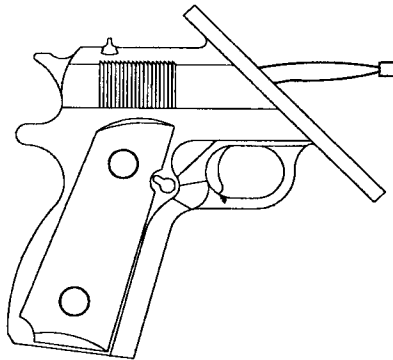
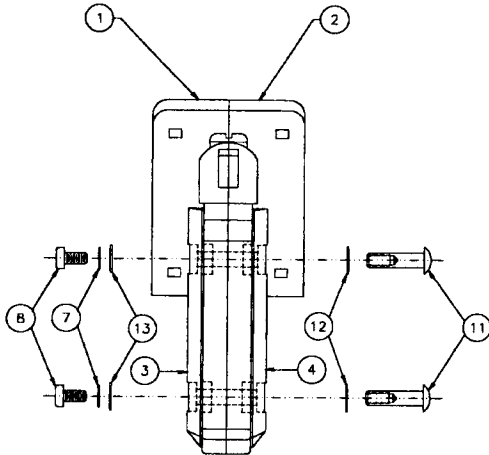
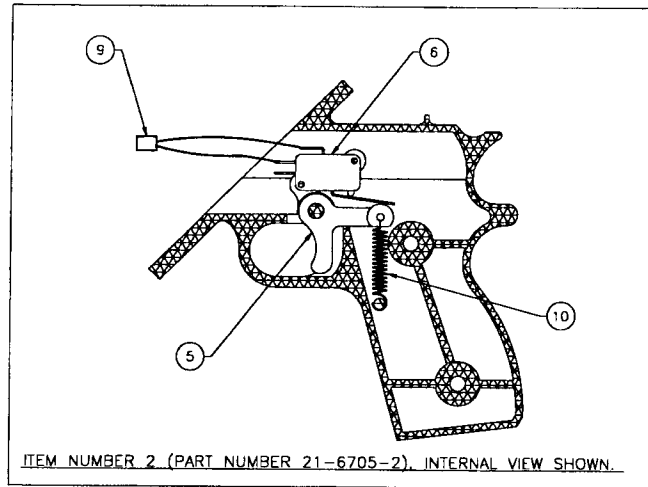
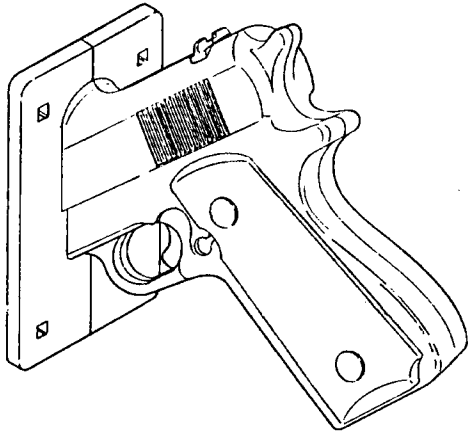
## 4-Bank Drop Target Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>           |
|-------------|--------------------|------------------------------|
| 1           | A-18781            | Bracket & Post Assembly      |
| 2           | A-11397            | Stop Bracket Assembly        |
| 3           | 4408-01119-00      | Nut #8 ESN Clinch            |
| 4           | AE-25-1000         | Coil Assembly                |
| 5           | 03-7066-4          | Coil Tubing, 2.093" Long     |
| 6           | A-19651            | Reset Plate Assembly         |
| 7           | 01-9548            | Bracket Coil Mounting        |
| 8           | 03-8334-4          | 4-Bank Target Stop           |
| 9           | 4004-01005-04      | Mach. Screw, #4-40 x .25     |
| 10          | A-19552            | Target Cap Assembly          |
| 11          | 20-8712-25         | Retaining Clip               |
| 12          | 4700-00072-00      | Flatwasher #12               |
| 13          | 10-392             | Compression Spring           |
| 14          | 10-364             | Extension Spring             |
| 15          | 23-6626            | Rubber Grommet               |
| 16          | A-19666            | 4-Drop Target Opto PCB Assy. |
| 17          | 4700-00016-00      | Flatwasher #8                |
| 18          | 20-8712-18         | Retaining Clip               |

# A-18536

## Gun Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>                |
|-------------|--------------------|-----------------------------------|
| 1           | 21-6705-1          | Gun Handle, Left                  |
| 2           | 21-6705-2          | Gun Handle, Right                 |
| 3           | 03-9196-1          | Gun Grip, Left                    |
| 4           | 03-9196-2          | Gun Grip, Right                   |
| 5           | 01-12942           | Trigger                           |
| 6           | 5647-12133-16      | Switch                            |
| 7           | 4702-00013-00      | Lockwasher, #10 Int. Tooth        |
| 8           | 4010-01097-06B     | Mach. Screw, #10-32 x 3/8"        |
| 9           | H-19739            | Cable Assembly                    |
| 10          | 10-320             | Extension Spring, Red             |
| 11          | 02-5041-15G        | Fastener, Butt Head               |
| 12          | 4702-00014-00B     | Lockwasher, 1/4" Int. Tooth       |
| 13          | 4700-00129-00B     | Flatwasher, 13/64 x 15/32 x 21ga. |

# A-14615-1

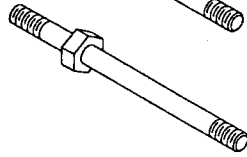
## 1-Bank Drop Target Assembly

| <u>Item</u> | <u>Part Number</u> | <u>Description</u>               |
|-------------|--------------------|----------------------------------|
| 1           | 03-8750-1          | Target Flush, Yellow             |
| 2           | A-14617            | Bracket & Post Assembly          |
| 3           | 4408-01119-00      | Nut 8-32 ESN                     |
| 4           | A-11397            | Drop Target Stop Bracket         |
| 5           | AE-26-1200         | Coil Assembly                    |
| 6           | 01-8413            | Bracket Coil Mounting            |
| 7           | 03-7066-4          | Coil Tubing                      |
| 8           | A-11388-2          | Plunger & Reset Plate Assembly   |
| 9           | 4700-00072-00      | Flatwasher, 17/64 x 1/2 x 21ga.  |
| 10          | 10-392             | Extension Spring                 |
| 11          | 20-8712-25         | "E"-Ring, 1/4" Shaft             |
| 12          | 01-10183           | Switch Bracket                   |
| 13          | 4006-01003-03      | Mach. Screw, 6-32 x 3/16"        |
| 14          | 4010-01025-14      | Mach. Screw, 10-32 x 7/8"        |
| 15          | 10-433             | Extension Spring                 |
| 16          | 5070-09054-00      | Diode 1N4004, 1.0A               |
| 17          | 5647-12693-31      | Mini Micro Switch                |
| 18          | 01-8600            | Insulator                        |
| 19          | 4002-01105-10      | Mach. Screw, 2-56 x 5/8"         |
| 20          | 01-8240            | Nut Plate #2-56                  |
| 21          | A-14908            | Target Knock Down Assembly       |
|             | a) 01-8647-L       | Actuator                         |
|             | b) A-15821         | Armature Sub-Assembly            |
|             | c) A-14913         | Frame & Eyelet Assembly          |
|             | d) SM1-26-600      | Coil Assembly                    |
|             | e) 10-363          | Extension Spring                 |
|             | f) 4006-01003-03   | Mach. Screw, 6-32 x 3/16"        |
|             | g) 4700-00089-00   | Flatwasher, 11/64 x 7/16 x 16ga. |
|             | h) 4701-00003-00   | Lockwasher, #8 Split             |
|             | j) 4008-01005-06   | Mach. Screw, 8-32 x 3/8"         |
| 22          | 03-8084            | Single Stop Target               |
| 23          | 07-6688-17N        | Rivet, 5/32 x 1/8 Nickel         |
| 24          | 03-8630            | Guide Actuator                   |

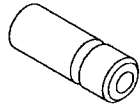
# Posts



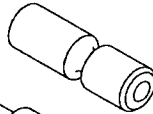
02-4424-1  
POST #8-32 X 15/32" (18)



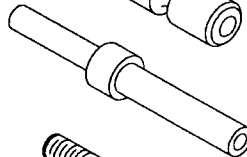
02-4425-1  
FASTENER POST, 6-32/8-32 (2)



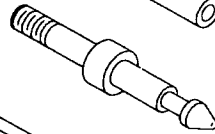
02-4434  
FASTENER POST, 6-32/8-32 (1)



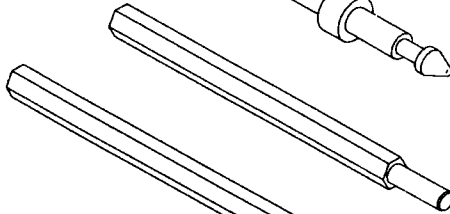
02-4435  
POST #8 X 1" (1)



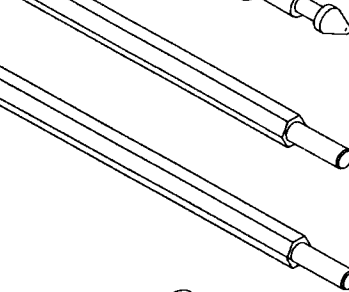
02-4659  
MINI-POST (6)



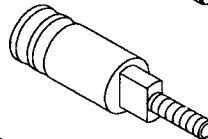
02-4660  
SINGLE BUMPER POST (2)



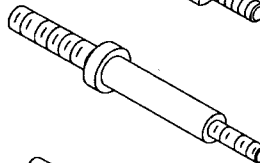
02-5001  
POST- SMALL RAMP (1)



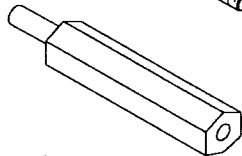
02-5002  
POST- LARGE RAMP (1)



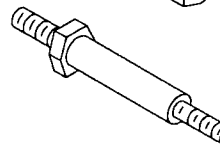
02-5107  
ADJUSTING POST (2)



02-5109  
EXTENDED POST (1)



02-5139  
POST - LONG HEX. (2)



02-5140  
EXTENDED POST (T-NUT) (1)

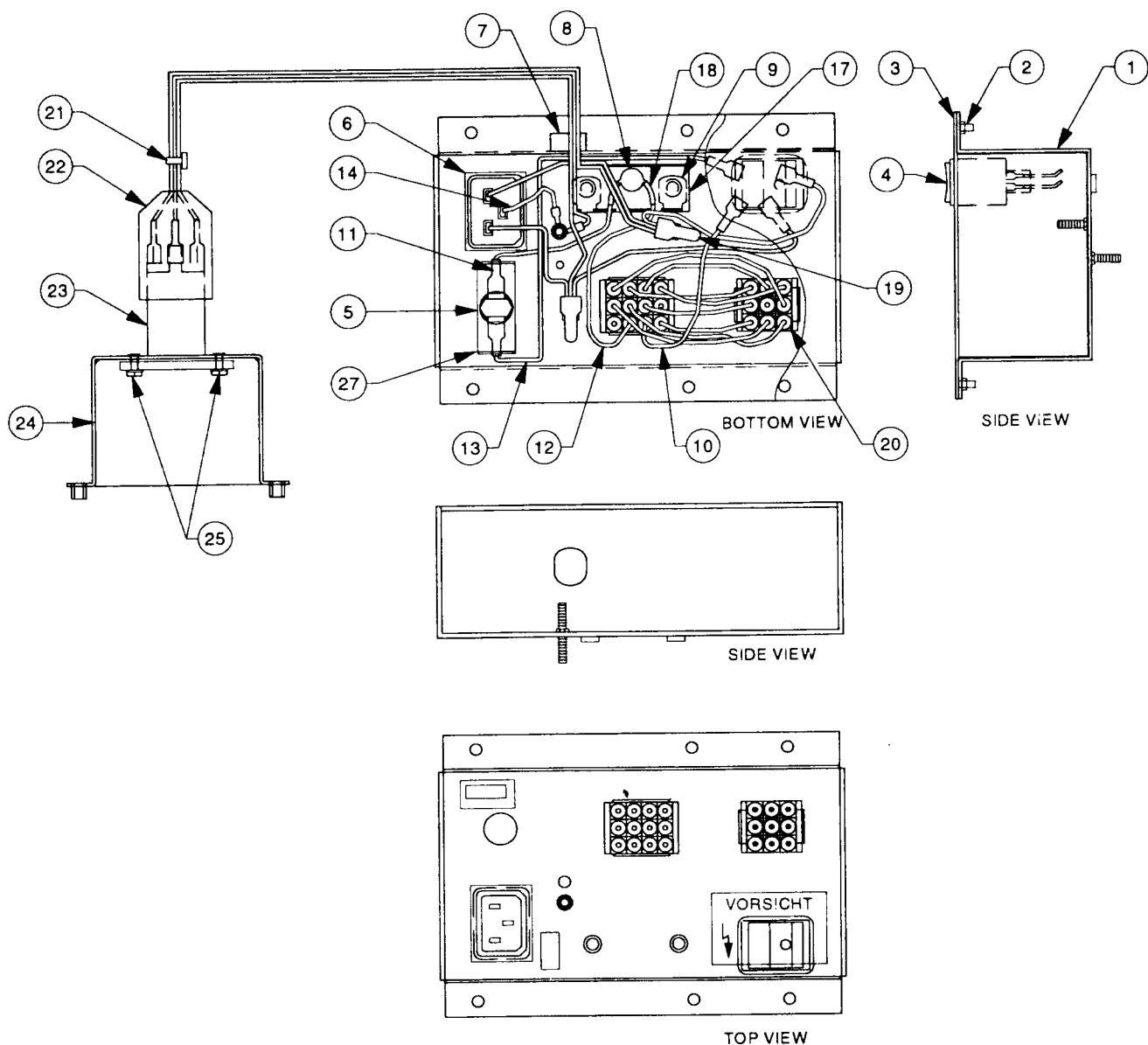


03-8319-13  
POST #8 STARRED (11)



# A-17540

## Universal Power Interface Assembly



| <u>Item</u> | <u>Part Number</u> | <u>Description</u>               | <u>Item</u> | <u>Part Number</u> | <u>Description</u>              |
|-------------|--------------------|----------------------------------|-------------|--------------------|---------------------------------|
| 1           | 01-12293.1         | Power Control Chassis Box        | 14          | H-17542            | Ground Jumper Grn/Yel Cable     |
| 2           | 4406-01128-00      | Nut #6-32 KEPS                   | 15          | 5797-13940-01      | Jumper Cable                    |
| 3           | 01-12294           | Switch Mounting Plate Assembly   | 16          | 01-10623           | Insulator, Thermistor           |
| 4           | 5642-13935-00      | Power Switch                     | 17          | 01-12299           | Insulator, Terminal Strip       |
| 5           | 5733-12869-00      | Fuse Holder Panel                | 18          | RM-21-06           | #18 Vinyl Fgls                  |
| 6           | 5851-13867-00      | Outlet-IEC Conn. 237 Socket      | 19          | 5822-13865-00      | Terminal Strip 3-CKT 2-Mtg.     |
| 7           | 03-8712            | Strain Relief Bushing            | 20          | H-18050            | Jumper Cable, Transformer Prog. |
| 8           | 5016-12978-00      | Thermistor 8A., 2.5R25           | 21          | 03-7933            | Ty-Wrap Nylon                   |
| 9           | 4006-01003-10      | Mach. Screw, #6-32 x 5/8"        | 22          | 20-9682-1          | Boot w/9-32 Dia. Hole           |
| 10          | H-17992            | Jumper Cable Neutral Sw/1FC      | 23          | 5102-13864-00      | Line Filter w/IEC Connector     |
| 11          | H-17543            | Hot Jumper Black Cable           | 24          | 01-12292           | Line Filter Chassis Box         |
| 12          | H-17546            | Jumper Interface Hot Black Cable | 25          | 4004-01003-05      | Mach. Screw, #4-40 x 5/16"      |
| 13          | H-17545            | Jumper Switch/Fuse Black Cable   |             |                    |                                 |

# Universal Power Interface/Cordset Application Chart

| COUNTRY                | UNIVERSAL PWR.<br>INTERFACE<br>ASSEMBLY | VOLTAGE<br>PROGRAMMING<br>JUMP CABLE |           |           |           | 5AMP<br>FUSE/<br>LABEL         | 8AMP<br>FUSE/<br>LABEL   | LABEL<br>HIGH/<br>VOLTAGE<br>CAUTION | POWER<br>ADAPTER<br>CORD | CORDSET |               |               |               |               |               |               |               |               |               |
|------------------------|-----------------------------------------|--------------------------------------|-----------|-----------|-----------|--------------------------------|--------------------------|--------------------------------------|--------------------------|---------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                        |                                         | H-17837-1                            | H-17837-2 | H-17837-3 | H-17837-4 | 5731-09851-00<br>FUSE<br>LABEL | 16-9668<br>FUSE<br>LABEL | 5730-09252-00<br>FUSE<br>LABEL       | 16-9670<br>FUSE<br>LABEL | 16-9669 | 5850-14062-00 | 5850-13271-00 | 5850-13272-00 | 5850-13273-00 | 5850-13274-00 | 5850-13275-00 | 5850-13276-00 | 5850-13277-00 | 5850-13278-00 |
| UNITED STATES          | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         | X             | X             |               |               |               |               |               |               |               |
| CANADA                 | X                                       | X                                    |           |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| TAIWAN                 | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| MEXICO                 | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| CENTRAL AMERICA        | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| SOUTH KOREA            | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| PUERTO RICO            | X                                       |                                      | X         |           |           |                                |                          | X                                    | X                        |         |               | X             |               |               |               |               |               |               |               |
| AUSTRIA                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| BELGIUM                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| FINLAND                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| FRANCE                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| GREECE                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| HOLLAND                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| HUNGARY                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| NETHERLANDS            | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| NETH. ANTILLES         | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| NORWAY                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| POLAND                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| PORTUGAL               | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| SPAIN                  | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| SWEDEN                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| TURKEY                 | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| WEST GERMANY           | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               | X             |               |               |               |               |               |               |
| UNITED KINGDOM         | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               | X             |               |               |               |               |               |
| IRELAND                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               | X             |               |               |               |               |               |
| HONG KONG              | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               | X             |               |               |               |               |               |
| DENMARK                | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               | X             |               |               |               |               |
| ITALY                  | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               | X             |               |               |               |
| CHILE                  | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               | X             |               |               |               |
| PEOPLE'S REP. OF CHINA | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               | X             |               |               |               |
| SWITZERLAND            | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               |               | X             |               |               |
| AUSTRALIA              | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               |               |               | X             |               |
| NEW ZEALAND            | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               |               |               | X             |               |
| ARGENTINA              | X                                       |                                      |           | X         |           | X                              | X                        |                                      |                          | X       |               |               |               |               |               |               |               | X             |               |
| JAPAN                  | X                                       |                                      |           |           | X         |                                |                          | X                                    | X                        |         |               |               |               |               |               |               |               |               | X             |

# Cables

## ***Backbox Cables***

|         |                                |
|---------|--------------------------------|
| H-14584 | Dot Matrix Display Power Cable |
| H-15476 | Logic Power Cable              |
| H-15736 | Secondary Cable                |
| H-19657 | Insert Cable                   |

## ***Cabinet Cables***

|           |                               |
|-----------|-------------------------------|
| H-16810   | 50Volt Disconnect Cable       |
| H-17217   | Plum Bob/Mech. Protect Cable  |
| H-17837-2 | Voltage Program Jumper Cable  |
| H-19130   | Dixie-Vend Interconnect Cable |
| H-19524   | Cabinet Cable                 |
| H-19601   | Power Extension Cable         |
| H-19663.1 | Cable Switch/Lamp             |
| H-19691.1 | Phurba Cable                  |

## ***Playfield Cables***

|         |                        |
|---------|------------------------|
| H-19653 | Playfield Switch Cable |
| H-19654 | Playfield Lamp Cable   |
| H-19656 | Playfield Opto Cable   |
| H-19736 | 2-Target Switch Cable  |

## Unique Parts

| <u>Part Number</u> | <u>Description</u>                  | <u>Part Number</u> | <u>Description</u>                    |
|--------------------|-------------------------------------|--------------------|---------------------------------------|
| A-13204-50032      | Bottom Arch Assembly                | A-19603-11         | Plfd. Plastic Assembly                |
| A-13769-50032      | Playfield & Insert Assembly         | A-19603-2          | Plfd. Plastic Assembly, Lower Guard   |
| A-14615-1          | 1-Bank Drop Target Assembly         | A-19603-3          | Plfd. Plastic Assembly, Mongol Right  |
| A-16883-1          | Flipper Button Assembly, Blue       | A-19603-4          | Plfd. Plastic Assembly, Mongol Left   |
| A-16917-50032      | Sound Board PCB Assembly            | A-19603-5          | Plfd. Plastic Sub-Assy., Rear         |
| A-17651            | WPC Security CPU PCB Assy.          | A-19603-6          | Plfd. Plastic Sub-Assy., Left         |
| A-17854            | Ramp Assembly, Small                | A-19603-7          | Plfd. Plastic Sub-Assy., Right        |
| A-17855            | Ramp Assembly, Large                | A-19603-8          | Plfd. Plastic Assy., Large Right Rear |
| A-18512            | Ball Guide Assy.-Upper Loop         | A-19603-9          | Plfd. Plastic Assy., Small Rear       |
| A-18513            | Ball Guide Assy.-Right Drain        | A-19638-1          | Diverter & Knife Assembly, Left       |
| A-18514            | Ball Guide Assy.-Main Loop Short    | A-19638-2          | Diverter & Knife Assembly, Right      |
| A-18515            | Ball Guide Assy.-Inner Sanctum      | A-19642            | 1-Bank Drop Target Assembly           |
| A-18518            | Opto Bracket Assembly-Upper Loop    | A-19676-1          | Flipper Ball Guide, Right             |
| A-18529            | Back Panel Assembly                 | A-19676-2          | Flipper Ball Guide, Left              |
| A-18530-6          | Standup Target - Oblong, Yellow     | A-19679            | Ball Stop Assembly                    |
| A-18536            | Gun Assembly                        | A-19693            | Micro Switch & Bracket Assembly       |
| A-18537.1          | Bracket Assembly                    | A-19737            | Switch & Cable Assembly               |
| A-18622            | Extended Target Assembly            | A-19792            | Shaft/Cam Assembly                    |
| A-18768            | Eject Assembly                      | A-19794            | Switch Gate Assembly                  |
| A-18950            | Ball Popper Assembly                | 01-12915           | Ball Guide, Left Drain                |
| A-18952            | Ball Kicker Assembly                | 01-12916           | Ball Guide, Main Loop                 |
| A-18954            | Divertor Mech. Assembly, Left Side  | 01-12918           | Ball Guide, Upper Flipper             |
| A-18955            | Divertor Mech. Assembly, Right Side | 01-12921           | Ball Guide, Left Eject                |
| A-19031            | Backbox & Decal Assembly            | 02-5001            | Post, Small Ramp                      |
| A-19032            | Speaker/Display Panel Assembly      | 02-5002            | Post, Large Ramp                      |
| A-19052            | Ball Guide Assembly, Right Side     | 02-5109            | Post-Extended                         |
| A-19060            | Rt. Ball Guide Assembly, Right Side | 02-5139            | Post- Long Hex.                       |
| A-19061.1          | Lt. Ball Guide Assembly, Right Side | 02-5142            | Thumb Screw                           |
| A-19066            | Ball Guide Assembly, Pop Left       | 03-9252            | Spacer                                |
| A-19076            | 3-Switch Bracket Assembly           | 12-7241            | Ramp Wire, Mini-Plfd. Feed            |
| A-19107-1          | 4-Lamp PCB & Spacer Assembly        | 31-2002-           | Playfield Plastic Set                 |
| A-19108-1          | 16-Lamp Board Assembly              | 31-2028-           | Decal                                 |
| A-19109-1          | 19-Lamp Board Assembly              | 36-50032           | Playfield Hardcoat                    |
| A-19603-1          | Plfd. Plastic Assy., Front Bracket  | 36-50032-1         | Mini-Playfield Hardcoat               |
| A-19603-10         | Plfd. Plastic Assy., Right Rail     |                    |                                       |

# LAMP MATRIX

Yellow (B+) → Red

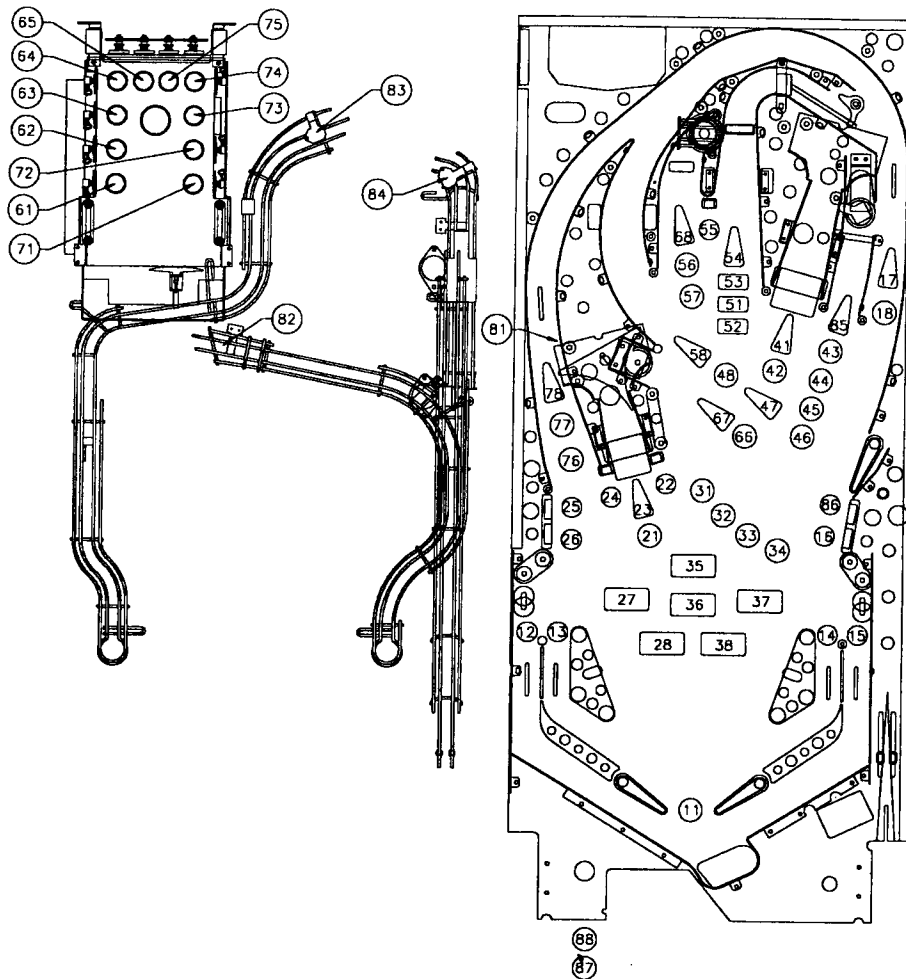
| Column<br>Row                 | 1<br>Yellow-Brown<br>J137-1<br>Q98 | 2<br>Yellow-Red<br>J137-2<br>Q97 | 3<br>Yellow-Orange<br>J137-3<br>Q96 | 4<br>Yellow-Black<br>J137-4<br>Q95 | 5<br>Yellow-Green<br>J137-5<br>Q94 | 6<br>Yellow-Blue<br>J137-6<br>Q93 | 7<br>Yellow-Violet<br>J138-7<br>Q92 | 8<br>Yellow-Gray<br>J138-9<br>Q91 |
|-------------------------------|------------------------------------|----------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1<br>Red-Brown<br>J133-1 Q90  | SHOOT AGAIN<br>11                  | LEFT RAMP JACKPOT<br>21          | SCARF SCENES COMPLETE<br>31         | RIGHT RAMP ARROW<br>41             | LOCK 2<br>51                       | MINI LEFT STANDUP 4<br>61         | MINI RIGHT STANDUP 4<br>71          | LEFT RAMP LEFT RING<br>81         |
| 2<br>Red-Black<br>J133-2 Q89  | LEFT OUTLANE<br>12                 | MON(G)OL<br>22                   | SCARF BATTLEFIELD<br>32             | RIGHT RAMP JACKPOT<br>42           | LOCK 3<br>52                       | MINI LEFT STANDUP 23<br>2         | MINI RIGHT STANDUP 3<br>72          | LEFT RAMP RIGHT RING<br>82        |
| 3<br>Red-Orange<br>J133-4 Q88 | LEFT RETURN LANE<br>13             | LEFT RAMP ARROW<br>23            | SCARF SHADOW MULTIBALL<br>33        | "START SCENE"<br>43                | LOCK 1<br>53                       | MINI LEFT STANDUP 12<br>63        | MINI RIGHT STANDUP 2<br>73          | RIGHT RAMP LEFT RING<br>83        |
| 4<br>Red-Yellow<br>J133-5 Q87 | RIGHT RETURN LANE<br>14            | MO(N)GOL<br>24                   | SCARF KHAN MULTIBALL<br>34          | WHO KNOWS<br>44                    | INNER SANCTUM ARROW<br>54          | MINI LEFT STANDUP 1<br>64         | MINI RIGHT STANDUP 1<br>74          | RIGHT RAMP RIGHT RING<br>84       |
| 5<br>Red-Green<br>J133-6 Q86  | RIGHT OUTLANE<br>15                | M(O)NGOL<br>25                   | PUNISH GUILTY<br>35                 | EXTRA BALL<br>45                   | CENTER STANDUP<br>55               | MINI TOP CENTER LEFT<br>65        | MINI TOP CENTER RIGHT<br>75         | RIGHT EJECT ARROW<br>85           |
| 6<br>Red-Blue<br>J133-7 Q85   | MONGO(L)<br>16                     | (M)ONGOL<br>26                   | DUAL OF WILLS<br>36                 | FINAL BATTLE<br>46                 | BATTLEFIELD READY<br>56            | KHAN MULTIBALL<br>66              | LEFT LOOP JACKPOT<br>76             | MONG(O)L<br>86                    |
| 7<br>Red-Violet<br>J133-8 Q84 | RIGHT LOOP ARROW<br>17             | FARLEY CLAYMORE<br>27            | BERYLLIUM SPHERE<br>37              | SHADOW LOOP<br>47                  | BATTLE DROP JACKPOT<br>57          | SUPER JACKPOT<br>67               | LEFT MONGOL HURRY<br>77             | BUY-IN BUTTON<br>87               |
| 8<br>Red-Gray<br>J133-9 Q83   | RIGHT MONGOL HURRY<br>18           | UNDERWATER DOOM<br>28            | HOTEL MONOLITH<br>38                | INNER LOOP JACKPOT<br>48           | INNER LOOP ARROW<br>58             | BATTLE DROP ARROW<br>68           | LEFT LOOP ARROW<br>78               | CREDIT BUTTON<br>88               |

J1XX = Power Driver Board

## LAMP LOCATIONS

| Item No. | Bulb No. | Lamp Assy. No. | Description        | Item No. | Bulb No. | Lamp Assy. No. | Description            |
|----------|----------|----------------|--------------------|----------|----------|----------------|------------------------|
| 11       | 24-6549  | A-17807        | Shoot Again        | 31       | 24-8768  | A-19108        | Scarf Scenes Complete  |
| 12       | 24-6549  | A-17807        | Left Outlane       | 32       | 24-8768  | A-19108        | Scarf Battlefield      |
| 13       | 24-6549  | A-17835        | Left Return Lane   | 33       | 24-8768  | A-19108        | Scarf Shadow Multiball |
| 14       | 24-6549  | A-17835        | Right Return Lane  | 34       | 24-8768  | A-19108        | Scarf Khan Multiball   |
| 15       | 24-6549  | A-17835        | Right Outlane      | 35       | 24-8768  | A-19108        | Punish Guilty          |
| 16       | 24-6549  | A-17835        | MONGO(L)           | 36       | 24-8768  | A-19108        | Dual of Wills          |
| 17       | 24-6549  | A-17807        | Right Loop Arrow   | 37       | 24-8768  | A-19108        | Beryllium Sphere       |
| 18       | 24-6549  | A-17807        | Right Mongol Hurry | 38       | 24-8768  | A-19108        | Hotel Monolith         |
| 21       | 24-8768  | A-19108        | Left Ramp Jackpot  | 41       | 24-8768  | A-19109        | Right Ramp Arrow       |
| 22       | 24-8768  | A-19108        | MON(G)OL           | 42       | 24-8768  | A-19109        | Right Ramp Jackpot     |
| 23       | 24-8768  | A-19108        | Left Ramp Arrow    | 43       | 24-8768  | A-19109        | "Start Scene"          |
| 24       | 24-8768  | A-19108        | MO(N)GOL           | 44       | 24-8768  | A-19109        | Who Knows              |
| 25       | 24-8768  | A-19108        | M(O)NGOL           | 45       | 24-8768  | A-19109        | Extra Ball             |
| 26       | 24-8768  | A-19108        | (M)ONGOL           | 46       | 24-8768  | A-19109        | Final Battle           |
| 27       | 24-8768  | A-19108        | Farley Claymore    | 47       | 24-8768  | A-19109        | Shadow Loop            |
| 28       | 24-8768  | A-19108        | Underwater Doom    | 48       | 24-8768  | A-19109        | Inner Loop Jackpot     |

## LAMP LOCATIONS (continued)



| Item No. | Bulb No. | Lamp Assy. No. | Description          | Item No. | Bulb No.   | Lamp Assy. No. | Description           |
|----------|----------|----------------|----------------------|----------|------------|----------------|-----------------------|
| 51       | 24-8768  | A-19109        | Lock 2               | 71       | 24-8768    | A-19107        | Mini Right Standup 4  |
| 52       | 24-8768  | A-19109        | Lock 3               | 72       | 24-8768    | A-19107        | Mini Right Standup 3  |
| 53       | 24-8768  | A-19109        | Lock 1               | 73       | 24-8768    | A-19107        | Mini Right Standup 2  |
| 54       | 24-8768  | A-19109        | Inner Sanctum Arrow  | 74       | 24-8768    | A-19107        | Mini Right Standup 1  |
| 55       | 24-8768  | A-19109        | Center Standup       | 75       | 24-6549    | A-17807        | Mini Top Center Right |
| 56       | 24-8768  | A-19109        | Battlefield Ready    | 76       | 24-8768    | A-17624        | Left Loop Jackpot     |
| 57       | 24-8768  | A-19109        | Battle Drop Jackpot  | 77       | 24-8768    | A-17624        | Left Mongol Hurry     |
| 58       | 24-8768  | A-19109        | Inner Loop Arrow     | 78       | 24-8768    | A-17624        | Left Loop Arrow       |
| 61       | 24-8768  | A-19107        | Mini Left Standup 4  | 81       | 24-8855    | A-19545-1      | Left Ramp Left Ring   |
| 62       | 24-8768  | A-19107        | Mini Left Standup 3  | 82       | 24-8855    | A-19545-2      | Left Ramp Right Ring  |
| 63       | 24-8768  | A-19107        | Mini Left Standup 2  | 83       | 24-8855    | A-19545-1      | Right Ramp Left Ring  |
| 64       | 24-8768  | A-19107        | Mini Left Standup 1  | 84       | 24-8855    | A-19545-2      | Right Ramp Right Ring |
| 65       | 24-6549  | A-17807        | Mini Top Center Left | 85       | 24-6549    | A-17807        | Right Eject Arrow     |
| 66       | 24-8768  | A-19109        | Khan Multiball       | 86       | 24-6549    | A-17835        | MONG(O)L              |
| 67       | 24-8768  | A-19109        | Super Jackpot        | 87       | 20-9663-18 | ---            | Buy In                |
| 68       | 24-8768  | A-19109        | Battle Drop Arrow    | 88       | 20-9663-2  | ---            | Start Button          |

24-8768 = #555 Bulb  
24-6549 = #44 Bulb

# SWITCH MATRIX

White ——— | ——— Green

| Dedicated Grounded Switches                                                    | Column<br>Row                        | 1<br>Green-Brown<br>J207-1<br>U20-18 | 2<br>Green-Red<br>J207-2<br>U20-17 | 3<br>Green-Orange<br>J207-3<br>U20-16 | 4<br>Green-Yellow<br>J207-4<br>U20-15 | 5<br>Green-Black<br>J207-5<br>U20-14 | 6<br>Green-Blue<br>J207-6<br>U20-13 | 7<br>Green-Violet<br>J207-7<br>U20-12 | 8<br>Green-Gray<br>J207-9<br>U20-11 | Flipper Grounded Switches                                |
|--------------------------------------------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|----------------------------------------------------------|
| Orange-Brown (1)<br>J205-1<br>Left Coin Chute D1                               | 1<br>White-Brown<br>J209-1<br>U18-11 | GUN TRIGGER<br>11                    | SLAM TILT<br>21                    | LEFT RAMP ENTER<br>31                 | TROUGH 1<br>41                        | WALL TARGET DOWN<br>51               | LEFT SLINGSHOT<br>61                | MINI LEFT STANDUP 1<br>71             | MINI RIGHT STANDUP 4<br>81          | Black-Green<br>J906-1<br>Right Flipper EOS<br>F1         |
| Orange-Red (2)<br>J205-2<br>Center Coin Chute D2                               | 2<br>White-Red<br>J209-2<br>U18-9    | RIGHT PHURBA CONTROL<br>12           | COIN DOOR CLOSED<br>22             | RIGHT RAMP ENTER<br>32                | TROUGH 2<br>42                        | MO(N)GOL TARGET<br>52                | RIGHT SLINGSHOT<br>62               | MINI LEFT STANDUP 2<br>72             | MINI RIGHT STANDUP 3<br>82          | Black-Violet<br>J906-1<br>Right Flipper Opto<br>F2       |
| Orange-Black (3)<br>J205-3<br>Right Coin Chute D3                              | 3<br>White-Orange<br>J209-3<br>U18-5 | START BUTTON<br>13                   | BUY-IN BUTTON<br>23                | INNER SANCTUM<br>33                   | TROUGH 3<br>43                        | MON(G)OL TARGET<br>53                | LOCKUP RIGHT<br>63                  | MINI LEFT STANDUP 3<br>73             | NOT USED<br>83                      | Black-Blue<br>J906-3<br>Left Flipper EOS<br>F3           |
| Orange-Yellow (4)<br>J205-4<br>4th Coin Chute D4                               | 4<br>White-Yellow<br>J209-4<br>U18-7 | PLUMB BOB TILT<br>14                 | ALWAYS CLOSED<br>24                | LEFT PHURBA CONTROL<br>34             | TROUGH 4<br>44                        | LEFT LOOP ENTER<br>54                | LOCKUP MIDDLE<br>64                 | MINI LEFT STANDUP 4<br>74             | MINI RIGHT STANDUP 1<br>84          | Black-Gray<br>J906-2<br>Left Flipper Opto<br>F4          |
| Orange-Green (5)<br>J205-5<br>Normal Function Ser Credits Test Function Esc D5 | 5<br>White-Green<br>J209-5<br>U19-11 | RIGHT OUTLANE<br>15                  | (M)ONGOL TARGET<br>25              | LEFT RUBBER<br>35                     | TROUGH 5<br>45                        | BATTLE DROP DOWN<br>55               | LOCKUP LEFT<br>65                   | LEFT RAMP LEFT MADE<br>75             | MINI DROP LEFT<br>85                | Black-Violet<br>J906-4<br>Upper Right Flipper EOS<br>F5  |
| Orange-Blue (6)<br>J205-7<br>Normal Function Test Function Vol Down Down D6    | 6<br>White-Blue<br>J209-7<br>U19-9   | RIGHT RETURN LANE<br>16              | M(O)NGOL TARGET<br>26              | MINI KICKER<br>36                     | TOP TROUGH<br>46                      | CENTER STANDUP<br>56                 | LEFT EJECT<br>66                    | LEFT RAMP RIGHT MADE<br>76            | MINI DROP MIDDLE LEFT<br>86         | Black-Yellow<br>J906-3<br>Upper Right Flipper Opto<br>F6 |
| Orange-Violet (7)<br>J205-8<br>Normal Function Test Function Vol Up Up D7      | 7<br>White-Violet<br>J209-8<br>U19-5 | LEFT RETURN LANE<br>17               | MONGO(L) TARGET<br>27              | MINI LIMIT LEFT<br>37                 | INNER LOOP ENTER<br>47                | RIGHT LOOP ENTER<br>57               | RIGHT EJECT<br>67                   | RIGHT RAMP LEFT MADE<br>77            | MINI DROP MIDDLE RIGHT<br>87        | Black-Gray<br>J906-5<br>Upper Left Flipper EOS<br>F7     |
| Orange-Gray (8)<br>J205-9<br>Normal Function Test Function Begin Test Enter D8 | 8<br>White-Gray<br>J209-9<br>U19-7   | LEFT OUTLANE<br>18                   | MONG(O)L TARGET<br>28              | MINI LIMIT RIGHT<br>38                | SHOOTER<br>48                         | MINI EXIT TUBE<br>58                 | POPPER<br>68                        | RIGHT RAMP RIGHT MADE<br>78           | MINI DROP RIGHT<br>88               | Black-Blue<br>J906-5<br>Upper Left Flipper Opto<br>F8    |

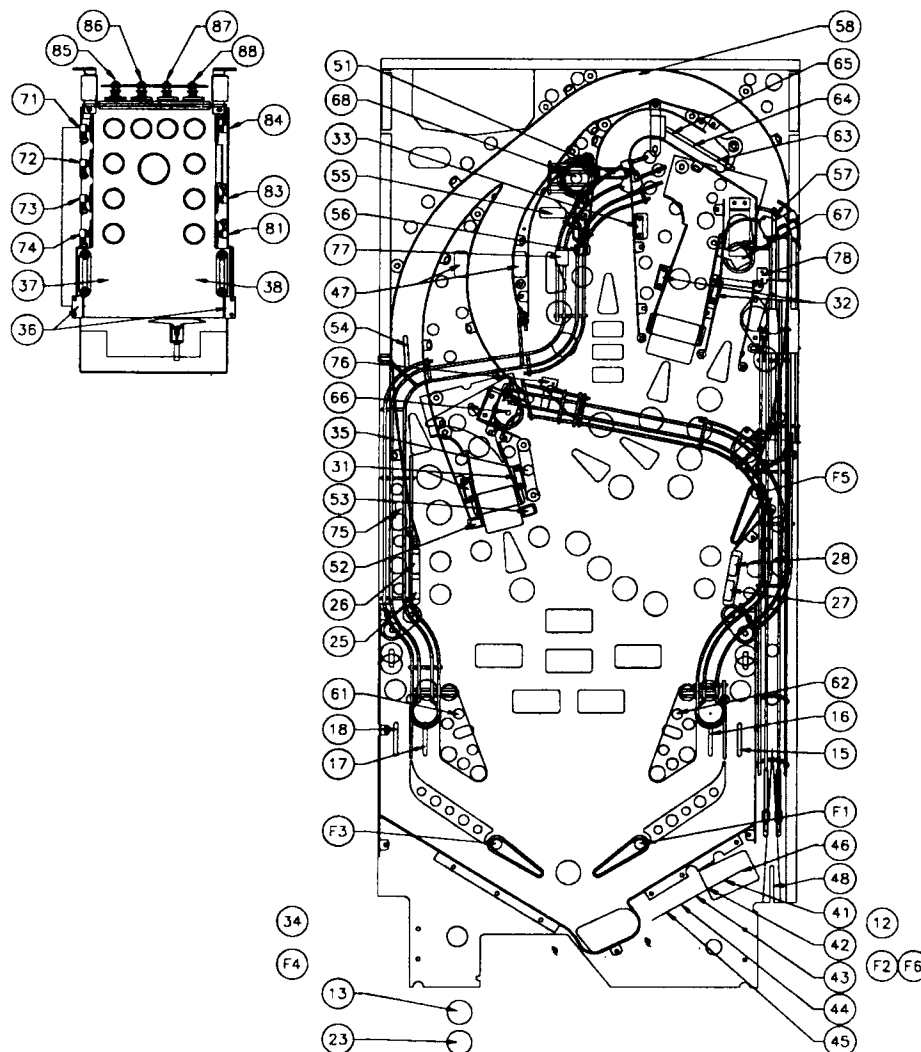
J2XX = CPU Board; J9XX = Fliptronic II Board;

☐ = Opto, Typically Closed

## SWITCH LOCATIONS

| Item No. | Switch Part No. | Description                 | Item No. | Switch Part No. | Description            |
|----------|-----------------|-----------------------------|----------|-----------------|------------------------|
| F1       | SW-1A-194       | Lower Right Flipper EOS     | 26       | A-18019-6       | M(O)NGOL Target        |
| F2       | A-17316         | Lower Right Flipper Cabinet | 27       | A-18019-6       | MONGO(L) Target        |
| F3       | SW-1A-194       | Lower Left Flipper EOS      | 28       | A-18019-6       | MONG(O)L Target        |
| F4       | A-17316         | Lower Left Flipper Cabinet  | 31       | A-16908         | Left Ramp Enter (LED)  |
| F5       | SW-1A-194       | Upper Right Flipper EOS     |          | A-16909         | (Transistor)           |
| F6       | A-17316         | Upper Right Flipper Cabinet | 32       | A-16908         | Right Ramp Enter (LED) |
| F7       | ---             | Not Used                    |          | A-16909         | (Transistor)           |
| F8       | ---             | Not Used                    | 33       | A-16908         | Inner Sanctum (LED)    |
| 11       | 5647-12133-16   | Gun Trigger                 |          | A-16909         | (Transistor)           |
| 12       | SW-1A-195       | Right Phurba Control        | 34       | SW-1A-195       | Left Phurba Control    |
| 13       | 20-9663-2       | Start Button                | 35       | SW-1A-120       | Left Rubber            |
| 14       | A-15361         | *Plumb Bob Tilt             | 36       | A-16908         | Mini Kicker (LED)      |
| 15       | 5647-12693-19   | Right Outlane               |          | A-16909         | (Transistor)           |
| 16       | 5647-12693-19   | Right Return Lane           | 37       | A-14534         | **Mini Limit Left      |
| 17       | 5647-12693-19   | Left Lane                   | 38       | A-14534         | **Mini Limit Right     |
| 18       | 5647-12693-19   | Left Outlane                | 41       | A-18617         | Trough Ball 1 (LED)    |
| 21       | A-17238         | *Slam Tilt                  |          | A-18618         | (Transistor)           |
| 22       | 5643-09288-00   | *Coin Door Closed           | 42       | A-18617         | Trough Ball 2 (LED)    |
| 23       | 20-9663-18      | Buy In Button               |          | A-18618         | (Transistor)           |
| 24       | 5643-09112-00   | *Always Closed              | 43       | A-18617         | Trough Ball 3 (LED)    |
| 25       | A-18019-6       | (M)ONGOL Target             |          | A-18618         | (Transistor)           |

## SWITCH LOCATIONS (continued)



| Item No. | Switch Part No. | Description              |
|----------|-----------------|--------------------------|
| 44       | A-18617         | Trough Ball 4 (LED)      |
|          | A-18618         | (Transistor)             |
| 45       | A-18617         | Trough Ball 5 (LED)      |
|          | A-18618         | (Transistor)             |
| 46       | A-18617         | Top Trough (LED)         |
|          | A-18618         | (Transistor)             |
| 47       | A-16908         | Inner Loop Enter (LED)   |
|          | A-16909         | (Transistor)             |
| 48       | 5647-12693-32   | Shooter                  |
| 51       | 5647-12693-31   | Wall Target Down         |
| 52       | A-18530-6       | MO(N)GOL Target          |
| 53       | A-18530-6       | MON(G)OL Target          |
| 54       | 5647-12693-19   | Left Loop Enter          |
| 55       | 5647-12693-31   | Battle Drop Down         |
| 56       | A-18530-6       | Center Standup           |
| 57       | 5647-12693-19   | Right Loop Enter         |
| 58       | 5647-12693-13   | Mini Exit Tube           |
| 61       | SW-1A-114       | Left Slingshot (kicker)  |
|          | SW-1A-120       | (score)                  |
| 62       | SW-1A-114       | Right Slingshot (kicker) |
|          | SW-1A-120       | (score)                  |
| 63       | 5647-12073-34   | Lockup Right             |

\*Not Shown; \*\*Located under mini-playfield assembly.

| Item No. | Switch Part No. | Description            |
|----------|-----------------|------------------------|
| 64       | 5647-12073-33   | Lockup Middle          |
| 65       | 5647-12693-32   | Lockup Left            |
| 66       | 5647-12693-43   | Left Eject             |
| 67       | 5647-12133-11   | Right Eject            |
| 68       | 5647-12693-24   | Popper                 |
| 71       | A-18378-6       | Mini Left Standup 1    |
| 72       | A-18378-6       | Mini Left Standup 2    |
| 73       | A-18378-6       | Mini Left Standup 3    |
| 74       | A-18378-6       | Mini Left Standup 4    |
| 75       | 5647-12693-13   | Left Ramp Left Made    |
| 76       | 5647-12693-13   | Left Ramp Right Made   |
| 77       | 5647-12693-13   | Right Ramp Left Made   |
| 78       | 5647-12693-13   | Right Ramp Right Made  |
| 81       | A-18378-6       | Mini Right Standup 4   |
| 82       | A-18378-6       | Mini Right Standup 3   |
| 83       | ---             | Not Used               |
| 84       | A-18378-6       | Mini Right Standup 1   |
| 85       | A-19666         | Mini Drop Left         |
| 86       | A-19666         | Mini Drop Middle Left  |
| 87       | A-19666         | Mini Drop Middle Right |
| 88       | A-19666         | Mini Drop Right        |



## SOLENOID/FLASHER TABLE

| Sol. No.                    | Function               | Solenoid Type       | Voltage Connections |         |                   | Drive Xister | Drive Connections |         |                   | Drive Wire Color | Solenoid Part number Flashlamp Type |           |
|-----------------------------|------------------------|---------------------|---------------------|---------|-------------------|--------------|-------------------|---------|-------------------|------------------|-------------------------------------|-----------|
|                             |                        |                     | Playfield           | Backbox | Cabinet           |              | Playfield         | Backbox | Cabinet           |                  | Playfield                           | Backbox   |
| 01                          | BALL LAUNCH            | High Power          | J107-2              |         |                   | Q82          | J130-1            |         |                   | Vio-Brn          | AE-23-800                           |           |
| 02                          | LOCKUP KICKOUT         | High Power          | J107-2              |         |                   | Q80          | J130-2            |         |                   | Vio-Red          | A-14189                             |           |
| 03                          | LEFT DIVERter LEFT     | High Power          | J107-2              |         |                   | Q78          | J130-4            |         |                   | Vio-Org          | AE-25-1000                          |           |
| 04                          | LEFT DIVERter RIGHT    | High Power          | J107-2              |         |                   | Q76          | J130-5            |         |                   | Vio-Yel          | AE-25-1000                          |           |
| 05                          | RIGHT DIVERter RIGHT   | High Power          | J107-2              |         |                   | Q64          | J130-6            |         |                   | Vio-Grn          | AE-25-1000                          |           |
| 06                          | RIGHT DIVERter LEFT    | High Power          | J107-2              |         |                   | Q66          | J130-7            |         |                   | Vio-Blu          | AE-25-1000                          |           |
| 07                          | KNOCKER                | High Power          |                     | J107-2  |                   | Q68          |                   | J130-8  |                   | Vio-Blk          |                                     | AE-23-800 |
| 08                          | WALL TARGET UP         | High Power          | J107-2              |         |                   | Q70          | J130-9            |         |                   | Vio-Gry          | AE-23-800                           |           |
| 09                          | LEFT SLINGSHOT         | Low Power           | J107-3              |         |                   | Q58          | J127-1            |         |                   | Brn-Blk          | AE-26-1200                          |           |
| 10                          | RIGHT SLINGSHOT        | Low Power           | J107-3              |         |                   | Q56          | J127-3            |         |                   | Brn-Red          | AE-26-1200                          |           |
| 11                          | RIGHT EJECT            | Low Power           | J107-3              |         |                   | Q54          | J127-4            |         |                   | Brn-Org          | AE-27-1200                          |           |
| 12                          | LEFT EJECT             | Low Power           | J107-3              |         |                   | Q52          | J127-5            |         |                   | Brn-Yel          | AE-26-1500                          |           |
| 13                          | BALL RELEASE           | Low Power           | J107-3              |         |                   | Q50          | J127-6            |         |                   | Brn-Grn          | AE-26-1500                          |           |
| 14                          | BALL POPPER            | Low Power           | J107-3              |         |                   | Q48          | J127-7            |         |                   | Brn-Blu          | AE-25-1000                          |           |
| 15                          | MINI KICKER            | Low Power           | J107-3              |         |                   | Q46          | J127-8            |         |                   | Brn-Vio          | AE-25-1000                          |           |
| 16                          | WALL TARGET DOWN       | Low Power           | J107-3              |         |                   | Q44          | J127-9            |         |                   | Brn-Gry          | SM-30-1100-DC                       |           |
| 17                          | MINI PLAYFIELD FLASHER | Flasher             | J107-6              | J106-5  |                   | Q42          | J126-1            | J125-1  |                   | Blk-Brn          | #89                                 | #906 (2)  |
| 18                          | LEFT SIDE FLASHER      | Flasher             | J107-6              | J106-5  |                   | Q40          | J126-2            | J125-2  |                   | Blk-Red          | #89                                 | #906      |
| 19                          | MINI MOTOR RIGHT       | Flasher             | J116-2              |         |                   | Q38          | J126-3            |         |                   | Blk-Org          | 14-8014                             |           |
| 20                          | MINI MOTOR LEFT        | Flasher             | J116-2              |         |                   | Q36          | J126-4            |         |                   | Blk-Yel          | 14-8014                             |           |
| 21                          | RIGHT SIDE FLASHER     | Flasher             | J107-6              |         |                   | Q28          | J126-5            |         |                   | Blu-Grn          | #906, #89                           |           |
| 22                          | RIGHT RAMP FLASHER     | Flasher             | J107-6              |         |                   | Q30          | J126-6            |         |                   | Blu-Blk          | #906, #89                           |           |
| 23                          | LEFT RAMP FLASHER      | Flasher             | J107-6              |         |                   | Q34          | J126-7            |         |                   | Blu-Vio          | #906, #89                           |           |
| 24                          | MINI DROP BANK         | Flasher             | J107-1              |         |                   | Q32          | *J126-8           |         |                   | Blu-Gry          | AE-25-1000                          |           |
| 25                          | SINGLE DROP UP         | Gen. Purpose        | J107-1              |         |                   | Q26          | *J122-1           |         |                   | Blu-Brn          | AE-26-1200                          |           |
| 26                          | LEFT BACK FLASHER      | Gen. Purpose        | J107-6              | J106-5  |                   | Q24          | J122-2            | J124-2  |                   | Blu-Red          | #906                                | #906      |
| 27                          | CENTER BACK FLASHER    | Gen. Purpose        | J107-6              | J106-5  |                   | Q22          | J122-3            | J124-3  |                   | Blu-Org          | #906                                | #906      |
| 28                          | RIGHT BACK FLASHER     | Gen. Purpose        | J107-6              | J106-5  |                   | Q20          | J122-4            | J124-5  |                   | Blu-Yel          | #906                                | #906      |
| 35                          | MAGNET                 | High Power          | J907-8,9            |         |                   | Q2           | J902-3            |         |                   | Yel-Gry          | 20-9247                             |           |
| 36                          | SINGLE DROP DOWN       | Low Power           | J907-8,9            |         |                   | Q7           | J902-1            |         |                   | Org-Gry          | SM1-26-600                          |           |
| <b>General Illumination</b> |                        |                     |                     |         |                   |              |                   |         |                   |                  |                                     |           |
| 01                          | BOTTOM PLAYFIELD       | G.I.                | J121-1              |         |                   | Q18          | J121-7            |         |                   | Wht-Brn          | #44                                 |           |
| 02                          | TOP LEFT PLAYFIELD     | G.I.                | J121-2              |         |                   | Q10          | J121-8            |         |                   | Wht-Org          | #44                                 |           |
| 03                          | INSERT BOTTOM          | G.I.                |                     | J120-3  |                   | Q14          |                   | J120-9  |                   | Wht-Yel          |                                     | #555      |
| 04                          | INSERT TOP             | G.I.                |                     | J120-5  |                   | Q16          |                   | J120-10 |                   | Wht-Grn          |                                     | #555      |
| 05                          | TOP RIGHT PLAYFIELD    | G.I.                | J121-6              |         |                   | Q12          | J121-11           |         |                   | Wht-Vio          | #44                                 |           |
| <b>Flipper Circuits</b>     |                        |                     |                     |         |                   |              |                   |         |                   |                  |                                     |           |
|                             |                        | Voltage Connections |                     |         | Drive Transistors |              | Drive Connectors  |         | Drive Wire Colors |                  | Coil Part No.                       |           |
|                             |                        |                     |                     |         | Power             | Hold         |                   |         | Power             | Hold             |                                     |           |
| 29                          |                        | Lwr. Rt. Power      | J907-1 (Red-Grn)    |         | Q4                |              | J902-13           |         | Yel-Grn           |                  |                                     |           |
| 30                          | Lower Right Flipper    | Lwr. Rt. Hold       | J907-1 (Red-Grn)    |         | Q11               |              | J902-11           |         | Org-Grn           |                  | FL-11629                            | BLUE      |
| 31                          |                        | Lwr. Lt. Power      | J907-4 (Red-Blu)    |         | Q3                |              | J902-9            |         | Yel-Blu           |                  |                                     |           |
| 32                          | Lower Left Flipper     | Lwr. Lt. Hold       | J907-4 (Red-Blu)    |         | Q9                |              | J902-7            |         | Org-Blu           |                  | FL-11629                            | BLUE      |
| 33                          |                        | Upr. Rt. Power      | J907-6 (Red-Vio)    |         | Q2                |              | J902-6            |         | Yel-Vio           |                  |                                     |           |
| 34                          | Upper Right Flipper    | Upr. Rt. Hold       | J907-6 (Red-Vio)    |         | Q7                |              | J902-4            |         | Org-Vio           |                  | FL-15411                            | ORANGE    |
| 35                          |                        | Upr. Lt. Power      | J907-8 (Red-Gry)    |         | Q1                |              | J902-3            |         | Yel-Gry           |                  |                                     |           |
| 36                          | Upper Left Flipper     | Upr. Lt. Hold       | J907-8 (Red-Gry)    |         | Q5                |              | J902-1            |         | Org-Gry           |                  | NOT                                 | USED      |

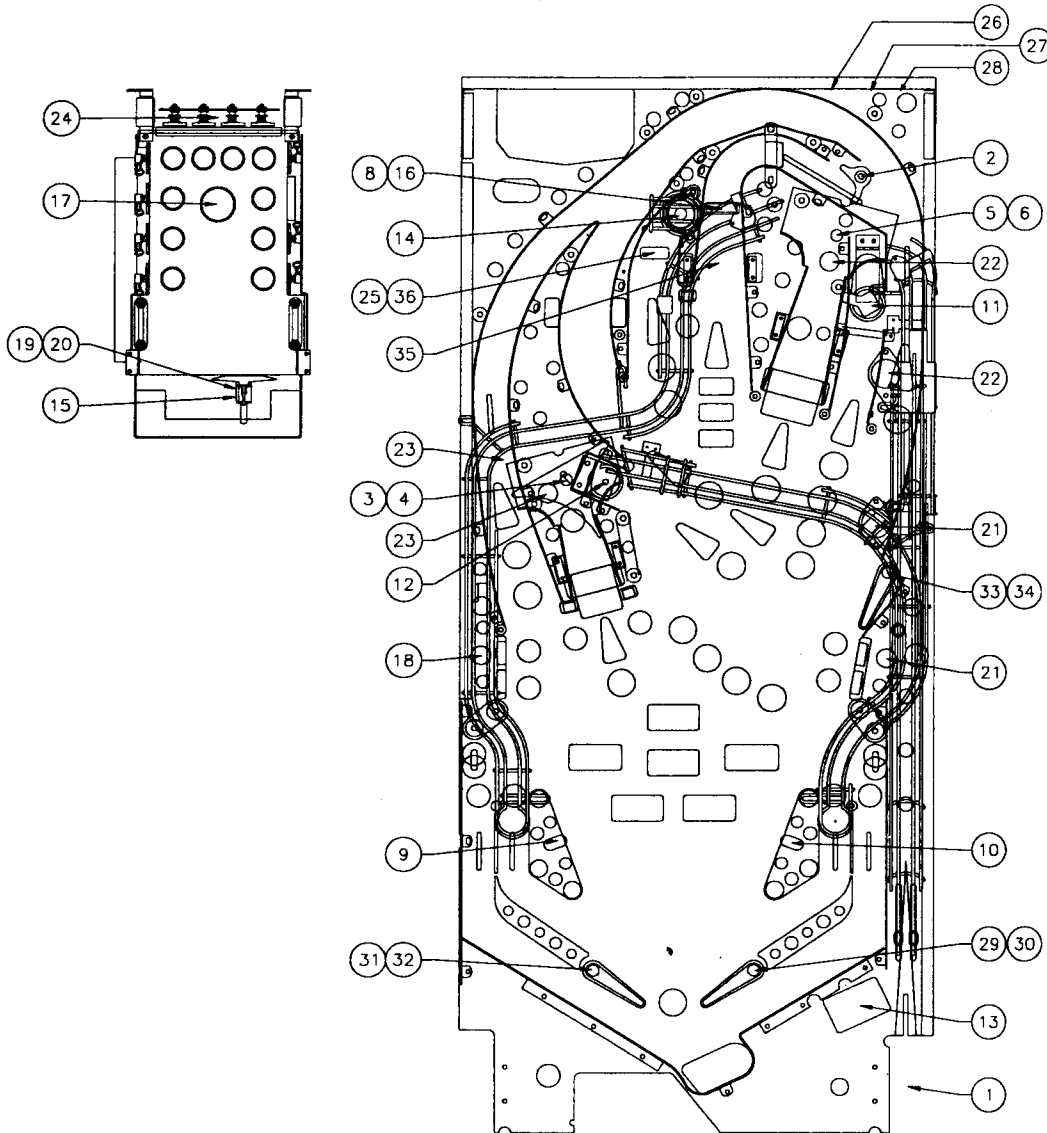
J1xx=Power Driver Board; J9xx=Fliptronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb

\* Tieback Diode J122-5 (loop) from J126-11 (end).

## SOLENOID/FLASHER LOCATIONS

| Item No. | Coil/ Flasher No. | Assy. Number. | Description          | Item No. | Coil/ Flasher No. | Assy. Number. | Description            |
|----------|-------------------|---------------|----------------------|----------|-------------------|---------------|------------------------|
| 01       | AE-23-800         | A-14525       | Ball Launch          | 12       | AE-26-1500        | A-18768       | Left Eject             |
| 02       | A-14189           | A-18952       | Lockup Kickout       | 13       | AE-26-1500        | A-18753       | Ball Release           |
| 03       | AE-25-1000        | A-18954       | Left Diverter Left   | 14       | AE-25-1000        | A-18950       | Ball Popper            |
| 04       | AE-25-1000        | A-18954       | Left Diverter Right  | 15       | AE-25-1000        | A-19070       | Mini Kicker            |
| 05       | AE-25-1000        | A-18955       | Right Diverter Right | 16       | SM-30-1100-DC     | A-18622       | Wall Target Down       |
| 06       | AE-25-1000        | A-18955       | Right Diverter Left  | 17       | 24-8704           | A-17803       | Mini Playfield Flasher |
| 07       | AE-23-800         | B-10686-1     | Knocker              | 18       | 24-8704           | A-17983       | Left Side Flasher      |
| 08       | AL-23-800         | A-18622       | Wall Target Up       | 19       | 14-8014           | A-19170       | Mini Motor Right       |
| 09       | AE-26-1200        | B-9362-R-3    | Left Slingshot       | 20       | 14-8014           | A-19170       | Mini Motor Left        |
| 10       | AE-26-1200        | B-9362-L-2    | Right Slingshot      |          |                   |               |                        |
| 11       | AE-27-1200        | A-15368       | Right Eject          |          |                   |               |                        |

## SOLENOID/FLASHER LOCATIONS (continued)



| Item No. | Coil/Flasher No. | Assy. Number. | Description         |
|----------|------------------|---------------|---------------------|
| 21       | 24-8704          | A-17983       | Right Side Flasher  |
|          | 24-8802          | B-12156       |                     |
| 22       | 24-8704          | A-17983       | Right Ramp Flasher  |
|          | 24-8802          | B-12156       |                     |
| 23       | 24-8704          | A-17983       | Left Ramp Flasher   |
|          | 24-8802          | A-12156       |                     |
| 24       | AE-25-1000       | A-18783       | Mini Drop Bank      |
| 25       | AE-26-1200       | A-19642       | Single Drop Up      |
| 26       | 22-8802          | B-12156       | Left Back Flasher   |
| 27       | 22-8802          | B-12156       | Center Back Flasher |
| 28       | 22-8802          | B-12156       | Right Back Flasher  |
| 35       | 20-9247          | A-18388       | Magnet              |
| 36       | SM1-26-600       | A-19642       | Single Drop Down    |

### General Illumination Circuits

| Item No. | Description         | Bulb No. |               |
|----------|---------------------|----------|---------------|
| 01       | Bottom Playfield    | #44      | G.I. String 1 |
| 02       | Top Left Playfield  | #44      | G.I. String 2 |
| 03       | Insert Bottom       | #555     | G.I. String 3 |
| 04       | Insert Top          | #555     | G.I. String 4 |
| 05       | Top Right Playfield | #44      | G.I. String 5 |

### Flipper Coils

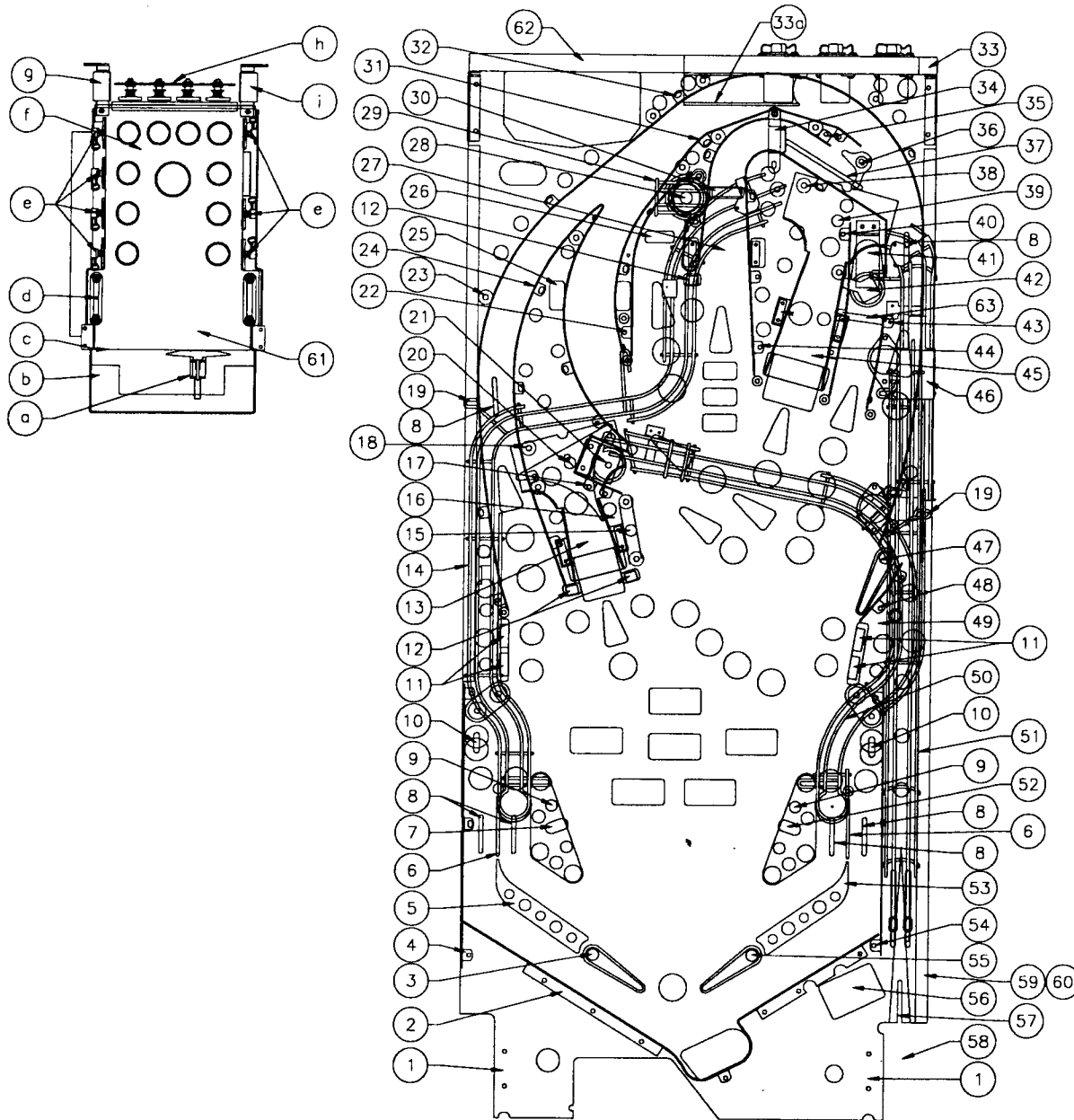
| Coil No. | Color  | Assy. No.   | Description         |
|----------|--------|-------------|---------------------|
| FL-11629 | (blue) | A-15849-R-2 | Lower Right Flipper |
| FL-11629 | (blue) | A-15849-L-2 | Lower Left Flipper  |
| FL-15411 | (org)  | A-15849-R-4 | Upper Right Flipper |

24-6549 = #44 bulb  
 24-8704 = #89 bulb  
 24-8768 = #555 bulb  
 24-8802 = #906 bulb

## UPPER PLAYFIELD PARTS

| Item No. | Part Number   | Description                   |    |               |                                 |
|----------|---------------|-------------------------------|----|---------------|---------------------------------|
| 1        | 01-9211       | Playfield Hanger Bracket (2)  | 37 | A-19076       | 3 Switch Bracket Assembly       |
| 2        | 01-13593      | Bottom Arch Ball Guide        | 38 | 02-5002       | Large Ramp Post                 |
| 3        | A-15849-L-2   | Flipper Assembly Complete     | 39 | A-18955       | Right Diverter Mech. Assy.      |
|          | 20-9250-5     | Flipper & Shaft, White        |    | A-19638-2     | Knife & Diverter Assy., Right   |
| 4        | 01-12915      | Left Drain Ball Guide         |    | 20-8712-25    | E-ring 1/4"                     |
| 5        | A-19676-2     | Left Flipper Ball Guide       |    | 4700-00027-00 | Flat Washer .1/4 x 1/2 21G      |
| 6        | 12-6466-10    | Ball Guide Wire 2 1/2" (2)    | 40 | A-19061       | Ball Guide                      |
| 7        | A-17811       | Sling Shot Kicker Assembly    | 41 | A-19679       | Ball Stop Assembly              |
|          | B-9362-R-3    | Coil & Bracket Assembly       | 42 | A-15368       | Eject Assembly                  |
|          | 10-128        | Spring                        |    | A-17985-R     | Eject Switch Assembly           |
| 8        | A-17813       | Rollover Switch Assembly (6)  | 43 | A-19060       | Ball Guide                      |
| 9        | A-17801       | Kicker Count Switch Assy.     | 44 | A-18515       | Inner Sanctum Ball Guide Rt.    |
| 10       | 02-5107       | Adjusting Post (2)            | 45 | A-17855       | Large Ramp Assembly             |
| 11       | A-18019-6     | Skirted Target, Yellow (4)    | 46 | A-19700       | Right Drain Wire Ramp Assy.     |
| 12       | A-18530-6     | Oblong Target, Yellow (3)     | 47 | A-15849-R-4   | Flipper Assembly Complete       |
| 13       | A-17854       | Small Ramp Assembly           |    | 20-9250-5     | Flipper & Shaft, White          |
| 14       | A-19702       | Left Drain Wire Ramp Assy.    | 48 | 01-19218      | Upper Flipper Ball Guide        |
| 15       | A-17794       | Kicker Switch Assembly        | 49 | A-19603-3     | Right Mongol Plastic Assy.      |
| 16       | A-19603-4     | Left Mongol Plastic Assembly  | 50 | A-19701       | Wire Ramp Assembly              |
| 17       | 01-12921      | Left Eject Ball Guide         | 51 | A-19730       | Shooter Ramp Assembly           |
| 18       | 02-5001       | Small Ramp Post               | 52 | A-17811       | Sling Shot Kicker Assembly      |
| 19       | A-17838       | #8 Stud Plate                 |    | B-9362-L-2    | Coil & Bracket Assembly         |
| 20       | A-18954       | Left Diverter Mech. Assembly  |    | 10-128        | Spring                          |
|          | A-19638-1     | Knife & Diverter Assy., Left  | 53 | A-19676-1     | Right Flipper Ball Guide        |
|          | 20-8712-25    | E-ring 1/4"                   | 54 | A-18513       | Right Drain Ball Guide          |
|          | 4700-00027-00 | Flat Washer .1/4 x 1/2 21G    | 55 | A-15849-R-2   | Flipper Assembly Complete       |
| 21       | A-18768       | Eject Assembly                |    | 20-9250-5     | Flipper & Shaft, White          |
|          | A-19693       | Micro Switch & Bracket Assy.  | 56 | A-18753       | Ball Trough Assembly Comp.      |
| 22       | A-19066       | Left Popper Ball Guide Assy.  | 57 | A-18973       | Shooter Lane Switch Assy.       |
| 23       | A-18537       | Bracket Assembly              | 58 | A-14525       | Kicker Bracket Assembly         |
|          | 02-5061       | Post 6-32 x 3/8"              | 59 | A-15802-P     | Level & Holder Assembly         |
| 24       | A-18512       | Upper Loop Ball Guide Assy.   | 60 | 01-10621      | Strike Plate                    |
| 25       | A-18518       | Opto Bracket Assembly         | 61 | A-18382       | Mini-playfield Assy. Comp.      |
| 26       | A-19642       | 1-Bank Drop Target Assembly   | a) | A-17789       | Coil Slide Motor Assembly       |
| 27       | A-18388       | Magnet Opto & Nut Assembly    | b) | 03-9229       | Plastic Guard                   |
| 28       | A-18950       | Ball Popper Assembly          | c) | A-19603-1     | *Front Plastic Guard            |
| 29       | 12-7241       | Mini-Playfield Wire Ramp      | d) | 02-5142       | Thumb Screw                     |
| 30       | A-18622       | Extended Target Assembly      | e) | A-18379-6     | Rect. Target Assy. Yellow (7)   |
| 31       | A-18514       | Main Loop Short Ball Guide    | f) | A-19603-2     | †Low Plastic Guard              |
| 32       | 01-12916      | Main Loop Long Ball Guide     | g) | A-19113-2     | Left Mounting Bracket           |
| 33       | A-18529       | Back Panel Assembly           | h) | A-18783       | 4-Bank Drop Target Assembly     |
| 33a      | 03-9215-2     | Bottom Half Tube              | i) | A-19113-1     | Right Mounting Bracket          |
| 34       | A-13505-1     | Ball Gate Assembly            | 62 | A-19786       | Mini-playfield Back Board Assy. |
| 35       | A-19052       | Inner Sanotum Ball Guide Left |    | A-19522       | *Deflector Assembly             |
| 36       | A-18952       | Ball Kicker Assembly          |    | 03-9214       | *Mini-playfield Rear Ramp       |
|          | 01-13111      | Cam                           | 63 | A-19794       | Switch Gate Assembly            |
|          | 03-9252       | Spacer                        |    |               |                                 |
|          | 4700-00008-00 | Flat Washer 5/32 x 5/8 x 21G  |    |               |                                 |

## UPPER PLAYFIELD PARTS



### Miscellaneous

A-13204-50032  
A-13769-50032  
A-13769A-50032  
A-15646-3  
A-16120-1  
A-18159-1  
A-19603-8  
A-19603-9  
A-19603-10  
C-13940-1  
03-9315-1  
03-9315-2

Bottom Arch Assembly  
Screened Playfield  
Screened Mini-playfield  
Opto SW-24 P.C.B. Assy.  
D.C. Motor Control Assembly  
10 Opto P.C.B. Assembly  
Large Right Rear Plastic Assy.  
Small Rear Plastic Assy.  
Wood Rail Plastic Assy.  
5 Sw & Diode P.C.B. Assy.  
\*\*Full Playfield Mylar  
Mini-playfield Mylar

03-9315-3  
03-9315-4  
03-9315-5  
03-9315-6  
20-6500

Ball Return Mylar  
Ball Return Mylar  
Upper Loop Mylar  
Main Loop Mylar  
Steel Ball 1 1/6" (5)

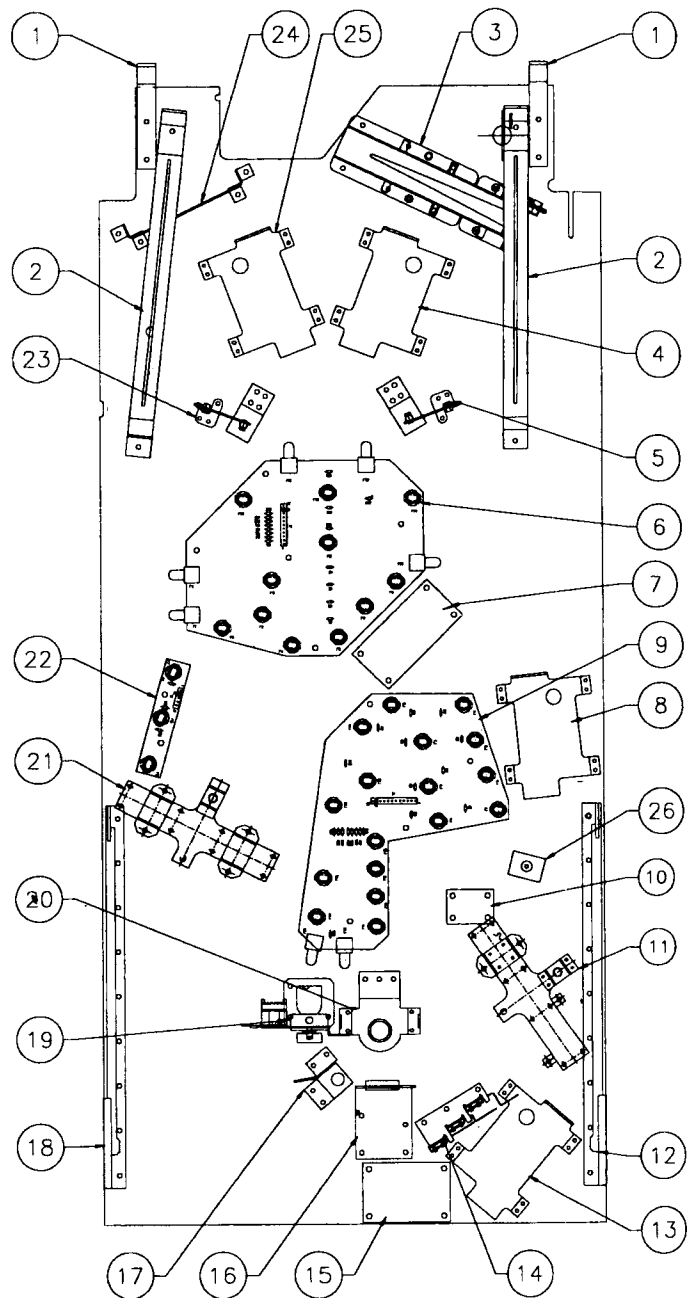
†Located Under Mini-playfield

\*Not Shown

\*\*The Shadow hardcoat playfield does not require a full mylar. However, mylars can be purchased through your local Bally Distributor.

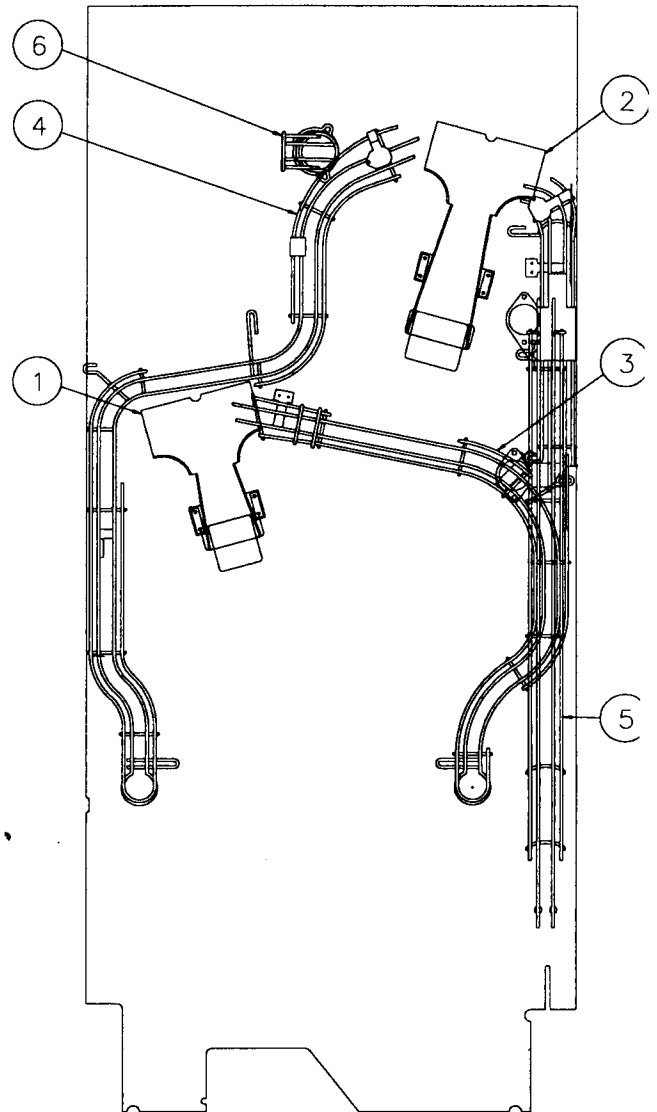
## LOWER PLAYFIELD PARTS

| <u>Item</u> | <u>Part Number</u> | <u>Description</u>             |
|-------------|--------------------|--------------------------------|
| 1           | 01-9211            | Plfd. Hanger Bracket Assy. (2) |
| 2           | 01-11781           | Leg Support (2)                |
| 3           | A-18753            | Outhole Ball Trough Assembly   |
| 4           | A-15849-R-4        | Flipper Assembly, Lwr. Right   |
| 5           | A-17811            | Kicker arm (Slingshot) Assy.   |
| a)          | B-9362-L-2         | Coil & Bracket Assembly        |
| 6           | A-19108            | 16-Lamp Board Assembly         |
| 7           | A-16120            | D.C. Motor Control PCB Assy.   |
| 8           | A-15849-R-2        | Flipper Assembly, Upr. Right   |
| 9           | A-19109            | 19-Lamp Board Assembly         |
| 10          | C-13940-1          | 5-Sw. & Diode Assy. w/Spacers  |
| 11          | A-18955            | Divertor Mech. Assembly, Right |
| a)          | A-19638-2          | Knife & Diverter Assy., Right  |
| 12          | A-17749.1-2        | Plfd. Slide Mechanism, Right   |
| 13          | A-18952            | Ball Kicker Assembly           |
| 14          | A-19076            | 3-Switch Bracket Assembly      |
| 15          | A-15646-2          | Opto Sw-24 PCB Assembly        |
| 16          | A-18622            | Extended Target Assembly       |
| 17          | A-18950            | Ball Popper Assembly           |
| 18          | A-17749.1-1        | Plfd. Slide Mechanism, Left    |
| 19          | A-19642            | 1-Bank Drop Target Assembly    |
| 20          | A-18388            | Magnet Opto & Nut Assembly     |
| 21          | A-18954            | Divertor Mech. Assembly, Left  |
| a)          | A-19638-1          | Knife & Diverter Assy., Left   |
| 22          | A-17624            | 3-Lamp Board Assembly          |
| 23          | A-17811            | Kicker Arm (Slingshot) Assy.   |
| a)          | B-9362-R-3         | Coil & Bracket Assembly        |
| 24          | A-18159-1          | Opto Sw-10 PCB Assembly        |
| 25          | A-15849-L-2        | Flipper Assembly, Lwr. Left    |
| 26          | A-15368            | Eject Assembly                 |



## RAMPS

| <u>Item</u> | <u>Part Number</u> | <u>Description</u>             |
|-------------|--------------------|--------------------------------|
| 1           | A-17854            | Ramp Assembly, Small           |
| a)          | A-16909            | RTV Opto Photo Trans. Assy.    |
| b)          | A-16908            | RTV Opto LED Assembly          |
| c)          | A-19160-1          | Ring Assembly                  |
| d)          | B-12156            | Single Flash Lamp Assembly     |
| 2           | A-17855            | Ramp assembly, Large           |
| a)          | A-16909            | RTV Opto Photo Trans. Assy.    |
| b)          | A-16908            | RTV Opto LED Assembly          |
| 3           | A-19701            | Left Ramp Assy. - Right Drain  |
| a)          | A-19160-2          | Ring Assembly                  |
| b)          | 5647-12693-13      | Mini Micro Switch              |
| 4           | A-19702            | Right Ramp Assy. - Left Drain  |
| a)          | A-19160-1          | Ring Assembly                  |
| b)          | 5647-12693-13      | Mini Micro Switch              |
| 5           | A-19730            | Wire Ramp Assembly, Right      |
| a)          | A-19700            | Right Ramp Assy., -Right Drain |
| 6           | 12-7241            | Mini-Playfield Wire Ramp       |



## Notes

## Notes



## Notes

## Notes

# SECTION THREE

## GAME WIRING AND SCHEMATICS

### CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack (except the Audio Board and Dot Matrix Display/Driver Board) receives a number that identifies the circuit board and position on that board that it connects to. J-designations refer to the male part of a connector. P-designations refer to the female part of a connector. For example, J101 designates jack 1 of board 1 (a Power Driver Board jack); P206 designates plug 6 of board 2 (a CPU Board plug). Identifying the specific pin number of a connector involves a hyphen, which separates the pin number from the plug or jack designation. For example, J101-3 refers to pin 3 of jack 1 on board 1.

Other game components may also have similar numbers to clarify their locations or related circuits. For example, F501 refers to a fuse located on the Sound Board.

Prefix number for the WPC circuit boards are as listed below.

- 1-Power Driver Board
- 2-CPU Board
- 6-Dot Matrix Controller
- 9-Fliptronic II Controller Board

|                                    |
|------------------------------------|
| P.C. BOARD LEGEND                  |
| J1XX = Power Driver Board          |
| J2XX = CPU Board                   |
| J3XX = Dot Matrix Controller Board |
| J4XX = Fliptronic II Board         |

The Audio Board and the Dot Matrix Display/Driver Board do not have an identification number.

**Schematics for standard WPC backbox boards are found in the WPC Schematics Manual. Playfield, cabinet, and all other backbox board schematics are found in this section.**

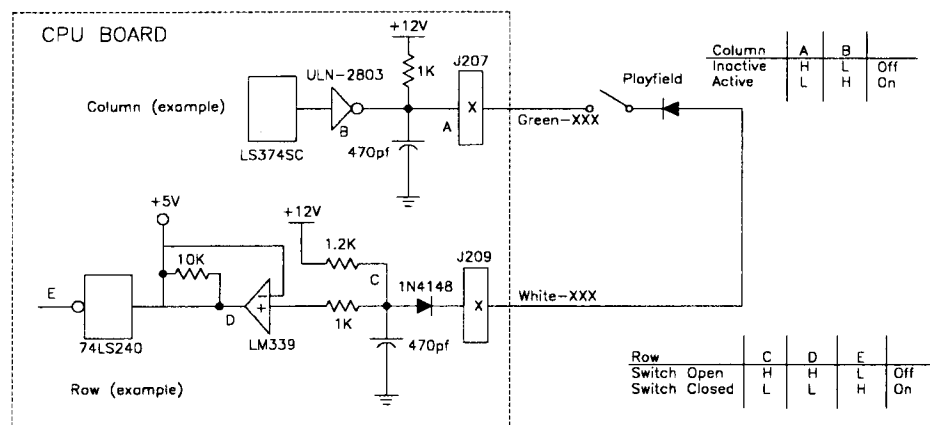
# SWITCH MATRIX

| Dedicated Grounded Switches                                                       | Column<br>Row                        | 1<br>Green-Brown<br>J207-1<br>U20-18 | 2<br>Green-Red<br>J207-2<br>U20-17 | 3<br>Green-Orange<br>J207-3<br>U20-16 | 4<br>Green-Yellow<br>J207-4<br>U20-15 | 5<br>Green-Black<br>J207-5<br>U20-14 | 6<br>Green-Blue<br>J207-6<br>U20-13 | 7<br>Green-Violet<br>J207-7<br>U20-12 | 8<br>Green-Gray<br>J207-8<br>U20-11 | Flipper Grounded Switches                             |
|-----------------------------------------------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------------------------|
|                                                                                   |                                      |                                      |                                    |                                       |                                       |                                      |                                     |                                       |                                     |                                                       |
| Orange-Brown (1)<br>J205-1<br>Left Coin Chute D1                                  | 1<br>White-Brown<br>J209-1<br>U18-11 | GUN TRIGGER<br>11                    | SLAM TILT<br>21                    | LEFT RAMP ENTER<br>31                 | TROUGH 1<br>41                        | WALL TARGET DOWN<br>51               | LEFT SLINGSHOT<br>61                | MINI LEFT STANDUP 1<br>71             | MINI RIGHT STANDUP 4<br>81          | Black-Green<br>J906-1<br>Right Flipper EOS F1         |
| Orange-Red (2)<br>J205-2<br>Center Coin Chute D2                                  | 2<br>White-Red<br>J209-2<br>U18-9    | RIGHT PHURBA CONTROL<br>12           | COIN DOOR CLOSED<br>22             | RIGHT RAMP ENTER<br>32                | TROUGH 2<br>42                        | MO(N)GOL TARGET<br>52                | RIGHT SLINGSHOT<br>62               | MINI LEFT STANDUP 2<br>72             | MINI RIGHT STANDUP 3<br>82          | Black-Violet<br>J906-1<br>Right Flipper Opto F2       |
| Orange-Black (3)<br>J205-3<br>Right Coin Chute D3                                 | 3<br>White-Orange<br>J209-3<br>U18-5 | START BUTTON<br>13                   | BUY-IN BUTTON<br>23                | INNER SANCTUM<br>33                   | TROUGH 3<br>43                        | MON(G)OL TARGET<br>53                | LOCKUP RIGHT<br>63                  | MINI LEFT STANDUP 3<br>73             | NOT USED<br>83                      | Black-Blue<br>J906-3<br>Left Flipper EOS F3           |
| Orange-Yellow (4)<br>J205-4<br>4th Coin Chute D4                                  | 4<br>White-Yellow<br>J209-4<br>U18-7 | PLUMB BOB TILT<br>14                 | ALWAYS CLOSED<br>24                | LEFT PHURBA CONTROL<br>34             | TROUGH 4<br>44                        | LEFT LOOP ENTER<br>54                | LOCKUP MIDDLE<br>64                 | MINI LEFT STANDUP 4<br>74             | MINI RIGHT STANDUP 1<br>84          | Black-Gray<br>J906-2<br>Left Flipper Opto F4          |
| Orange-Green (5)<br>J205-6<br>Normal Function Ser Credits<br>Test Function Esc D5 | 5<br>White-Green<br>J209-5<br>U19-11 | RIGHT OUTLANE<br>15                  | (M)ONGOL TARGET<br>25              | LEFT RUBBER<br>35                     | TROUGH 5<br>45                        | BATTLE DROP DOWN<br>55               | LOCKUP LEFT<br>65                   | LEFT RAMP LEFT MADE<br>75             | MINI DROP LEFT<br>85                | Black-Violet<br>J906-4<br>Upper Right Flipper EOS F5  |
| Orange-Blue (6)<br>J205-7<br>Normal Function Vol Down<br>Test Function Down D6    | 6<br>White-Blue<br>J209-7<br>U19-9   | RIGHT RETURN LANE<br>16              | M(O)NGOL TARGET<br>26              | MINI KICKER<br>36                     | TOP TROUGH<br>46                      | CENTER STANDUP<br>56                 | LEFT EJECT<br>66                    | LEFT RAMP RIGHT MADE<br>76            | MINI DROP MIDDLE LEFT<br>86         | Black-Yellow<br>J906-3<br>Upper Right Flipper Opto F6 |
| Orange-Violet (7)<br>J205-8<br>Normal Function Vol Up<br>Test Function Up D7      | 7<br>White-Violet<br>J209-8<br>U19-5 | LEFT RETURN LANE<br>17               | MONGO(L) TARGET<br>27              | MINI LIMIT LEFT<br>37                 | INNER LOOP ENTER<br>47                | RIGHT LOOP ENTER<br>57               | RIGHT EJECT<br>67                   | RIGHT RAMP LEFT MADE<br>77            | MINI DROP MIDDLE RIGHT<br>87        | Black-Gray<br>J906-5<br>Upper Left Flipper EOS F7     |
| Orange-Gray (8)<br>J205-9<br>Normal Function Begin Test<br>Test Function Enter D8 | 8<br>White-Gray<br>J209-9<br>U19-7   | LEFT OUTLANE<br>18                   | MONG(O)L TARGET<br>28              | MINI LIMIT RIGHT<br>38                | SHOOTER<br>48                         | MINI EXIT TUBE<br>58                 | POPPER<br>68                        | RIGHT RAMP RIGHT MADE<br>78           | MINI DROP RIGHT<br>88               | Black-Blue<br>J906-5<br>Upper Left Flipper Opto F8    |

J2XX = CPU Board; J9XX = Fliptronic II Board;

■ = Opto, Typically Closed

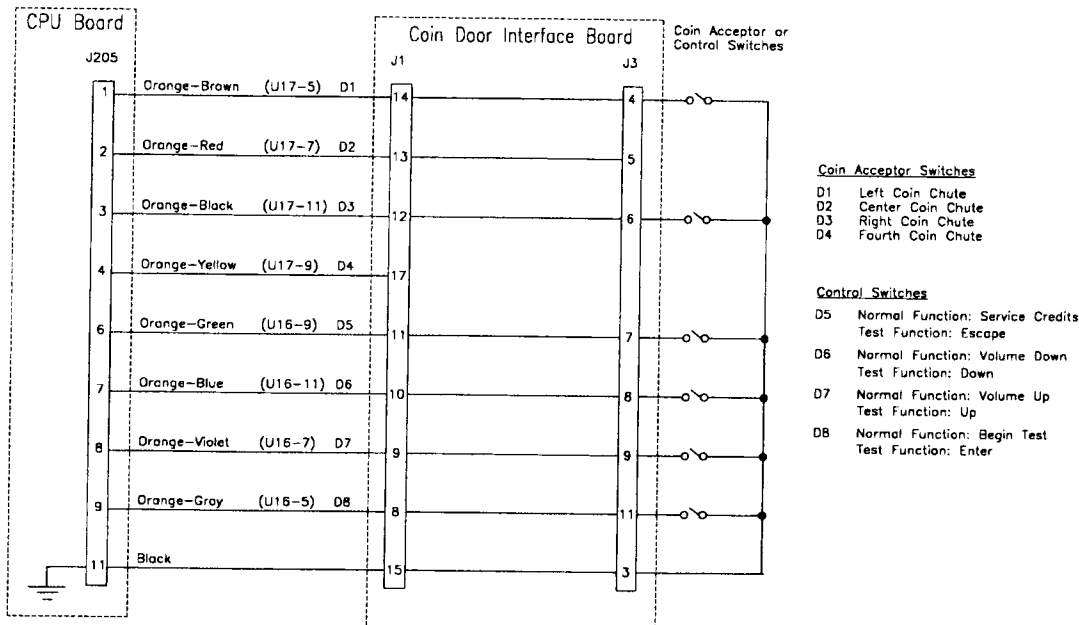
## SWITCH MATRIX CIRCUIT



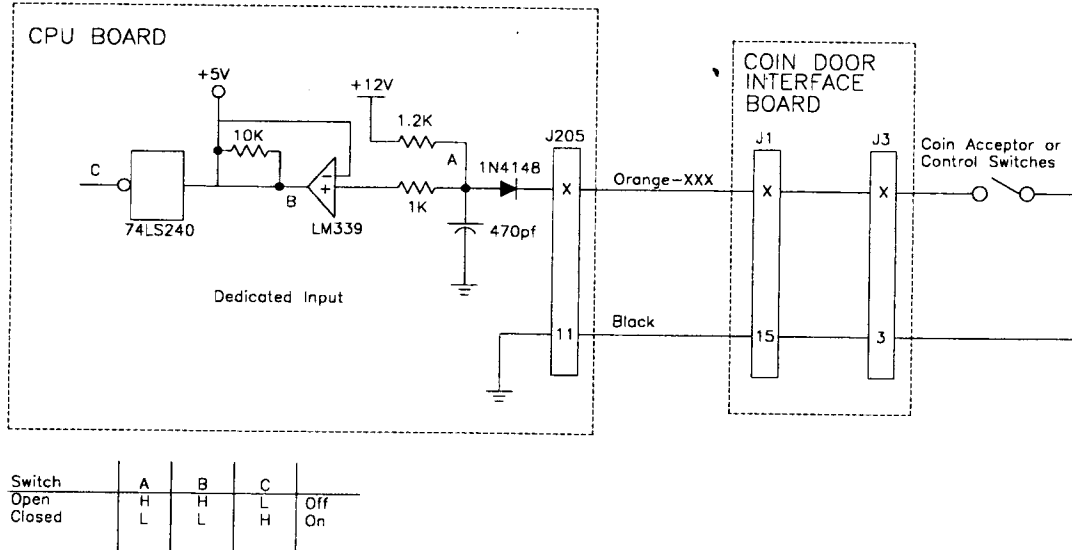
The microprocessor is constantly strobing the column side of the switch. When point "A" on the column circuit toggles low, the column side is active.

When a switch closes, the row side of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Corresponding row and column switches must be low at the same time for the switch to be considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is above +5V, its output is high and the row is inactive.

## DEDICATED SWITCHES



## DEDICATED SWITCH CIRCUIT



The dedicated switches operate similar to switches in the matrix except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low).

When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V causing its output to go low. Since the row circuit (dedicated input) is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is about +5V, its output is high and the row is inactive.

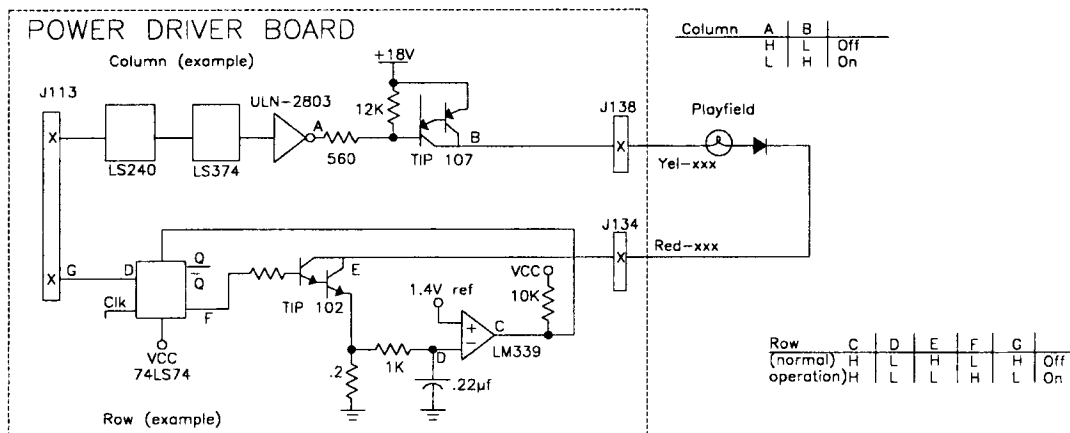
## LAMP MATRIX

Yellow (B+) → Red

| Column<br>Row                 | 1<br>Yellow-Brown<br>J137-1<br>Q98 | 2<br>Yellow-Red<br>J137-2<br>Q97 | 3<br>Yellow-Orange<br>J137-3<br>Q96 | 4<br>Yellow-Black<br>J137-4<br>Q95 | 5<br>Yellow-Green<br>J137-5<br>Q94 | 6<br>Yellow-Blue<br>J137-6<br>Q93 | 7<br>Yellow-Violet<br>J138-7<br>Q92 | 8<br>Yellow-Gray<br>J138-9<br>Q91 |
|-------------------------------|------------------------------------|----------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1<br>Red-Brown<br>J133-1 Q90  | SHOOT AGAIN<br>11                  | LEFT RAMP JACKPOT<br>21          | SCARF SCENES COMPLETE<br>31         | RIGHT RAMP ARROW<br>41             | LOCK 2<br>51                       | MINI LEFT STANDUP 4<br>61         | MINI RIGHT STANDUP 4<br>71          | LEFT RAMP LEFT RING<br>81         |
| 2<br>Red-Black<br>J133-2 Q89  | LEFT OUTLANE<br>12                 | MON(G)OL<br>22                   | SCARF BATTLE-FIELD<br>32            | RIGHT RAMP JACKPOT<br>42           | LOCK 3<br>52                       | MINI LEFT STANDUP 23<br>2         | MINI RIGHT STANDUP 3<br>72          | LEFT RAMP RIGHT RING<br>82        |
| 3<br>Red-Orange<br>J133-4 Q88 | LEFT RETURN LANE<br>13             | LEFT RAMP ARROW<br>23            | SCARF SHADOW MULTIBALL<br>33        | "START SCENE"<br>43                | LOCK 1<br>53                       | MINI LEFT STANDUP 12<br>63        | MINI RIGHT STANDUP 2<br>73          | RIGHT RAMP LEFT RING<br>83        |
| 4<br>Red-Yellow<br>J133-5 Q87 | RIGHT RETURN LANE<br>14            | MO(N)GOL<br>24                   | SCARF KHAN MULTIBALL<br>34          | WHO KNOWS<br>44                    | INNER SANCTUM ARROW<br>54          | MINI LEFT STANDUP 1<br>64         | MINI RIGHT STANDUP 1<br>74          | RIGHT RAMP RIGHT RING<br>84       |
| 5<br>Red-Green<br>J133-6 Q86  | RIGHT OUTLANE<br>15                | M(O)NGOL<br>25                   | PUNISH GUILTY<br>35                 | EXTRA BALL<br>45                   | CENTER STANDUP<br>55               | MINI TOP CENTER LEFT<br>65        | MINI TOP CENTER RIGHT<br>75         | RIGHT EJECT ARROW<br>85           |
| 6<br>Red-Blue<br>J133-7 Q85   | MONGO(L)<br>16                     | (M)ONGOL<br>26                   | DUAL OF WILLS<br>36                 | FINAL BATTLE<br>46                 | BATTLE-FIELD READY<br>56           | KHAN MULTIBALL<br>66              | LEFT LOOP JACKPOT<br>76             | MONG(O)L<br>86                    |
| 7<br>Red-Violet<br>J133-8 Q84 | RIGHT LOOP ARROW<br>17             | FARLEY CLAYMORE<br>27            | BERYLLIUM SPHERE<br>37              | SHADOW LOOP<br>47                  | BATTLE DROP JACKPOT<br>57          | SUPER JACKPOT<br>67               | LEFT MONGOL HURRY<br>77             | BUY-IN BUTTON<br>87               |
| 8<br>Red-Gray<br>J133-9 Q83   | RIGHT MONGOL HURRY<br>18           | UNDER-WATER DOOM<br>28           | HOTEL MONOLITH<br>38                | INNER LOOP JACKPOT<br>48           | INNER LOOP ARROW<br>58             | BATTLE DROP ARROW<br>68           | LEFT LOOP ARROW<br>78               | CREDIT BUTTON<br>88               |

J1XX = Power Driver Board

## LAMP MATRIX CIRCUIT



The processor sends a signal to the column circuit, causing the output of the ULN-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time the processor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp On.

The processor changes the input of the 74LS74 to a high state to turn the lamp Off.

In overcurrent conditions the lamps is shut Off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V the output changes to a low, which is fed back to the 74LS74 and shuts the row circuit Off.

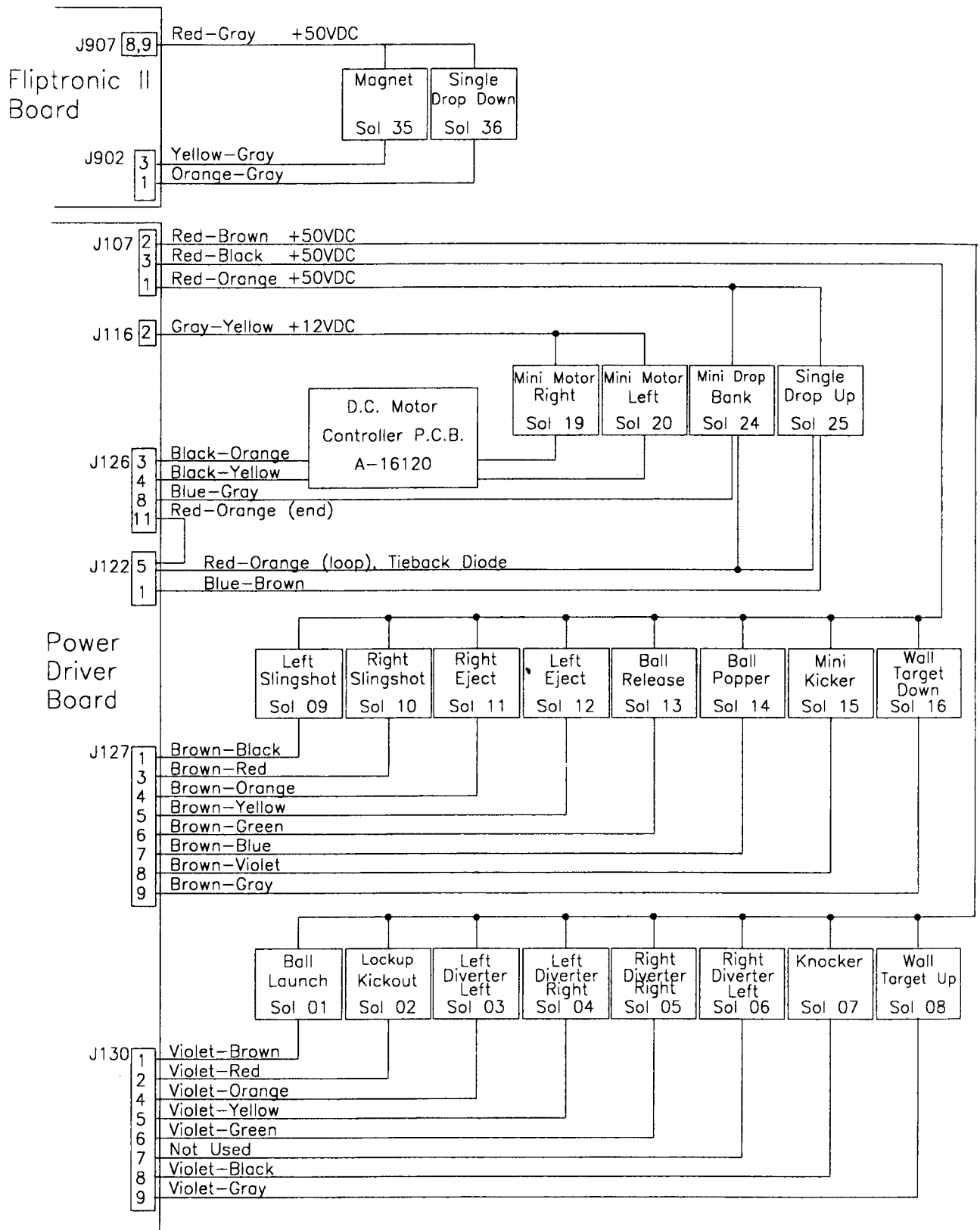
# SOLENOID/FLASHER TABLE

| Sol. No.             | Function               | Solenoid Type  | Voltage Connections |            |                   | Drive Xister     | Drive Connections |            |               | Drive Wire Color | Solenoid Part number |           |
|----------------------|------------------------|----------------|---------------------|------------|-------------------|------------------|-------------------|------------|---------------|------------------|----------------------|-----------|
|                      |                        |                | Playfield           | Backbox    | Cabinet           |                  | Playfield         | Backbox    | Cabinet       |                  | Flashlamp Type       |           |
|                      |                        |                |                     |            |                   |                  |                   |            |               |                  | Playfield            | Backbox   |
| 01                   | BALL LAUNCH            | High Power     | J107-2              |            |                   | Q82              | J130-1            |            |               | Vio-Brn          | AE-23-800            |           |
| 02                   | LOCKUP KICKOUT         | High Power     | J107-2              |            |                   | Q80              | J130-2            |            |               | Vio-Red          | A-14189              |           |
| 03                   | LEFT DIVERTER LEFT     | High Power     | J107-2              |            |                   | Q78              | J130-4            |            |               | Vio-Org          | AE-25-1000           |           |
| 04                   | LEFT DIVERTER RIGHT    | High Power     | J107-2              |            |                   | Q76              | J130-5            |            |               | Vio-Yel          | AE-25-1000           |           |
| 05                   | RIGHT DIVERTER RIGHT   | High Power     | J107-2              |            |                   | Q64              | J130-6            |            |               | Vio-Grn          | AE-25-1000           |           |
| 06                   | RIGHT DIVERTER LEFT    | High Power     | J107-2              |            |                   | Q66              | J130-7            |            |               | Vio-Blu          | AE-25-1000           |           |
| 07                   | KNOCKER                | High Power     |                     | J107-2     |                   | Q68              |                   | J130-8     |               | Vio-Blk          |                      | AE-23-800 |
| 08                   | WALL TARGET UP         | High Power     | J107-2              |            |                   | Q70              | J130-9            |            |               | Vio-Gry          | AE-23-800            |           |
| 09                   | LEFT SLINGSHOT         | Low Power      | J107-3              |            |                   | Q58              | J127-1            |            |               | Brn-Blk          | AE-26-1200           |           |
| 10                   | RIGHT SLINGSHOT        | Low Power      | J107-3              |            |                   | Q56              | J127-3            |            |               | Brn-Red          | AE-26-1200           |           |
| 11                   | RIGHT EJECT            | Low Power      | J107-3              |            |                   | Q54              | J127-4            |            |               | Brn-Org          | AE-27-1200           |           |
| 12                   | LEFT EJECT             | Low Power      | J107-3              |            |                   | Q52              | J127-5            |            |               | Brn-Yel          | AE-26-1500           |           |
| 13                   | BALL RELEASE           | Low Power      | J107-3              |            |                   | Q50              | J127-6            |            |               | Brn-Grn          | AE-26-1500           |           |
| 14                   | BALL POPPER            | Low Power      | J107-3              |            |                   | Q48              | J127-7            |            |               | Brn-Blu          | AE-25-1000           |           |
| 15                   | MINI KICKER            | Low Power      | J107-3              |            |                   | Q46              | J127-8            |            |               | Brn-Vio          | AE-25-1000           |           |
| 16                   | WALL TARGET DOWN       | Low Power      | J107-3              |            |                   | Q44              | J127-9            |            |               | Brn-Gry          | SM-30-1100-DC        |           |
| 17                   | MINI PLAYFIELD FLASHER | Flasher        | J107-6              | J106-5     |                   | Q42              | J126-1            | J125-1     |               | Blk-Brn          | #89                  | #906 (2)  |
| 18                   | LEFT SIDE FLASHER      | Flasher        | J107-6              | J106-5     |                   | Q40              | J126-2            | J125-2     |               | Blk-Red          | #89                  | #906      |
| 19                   | MINI MOTOR RIGHT       | Flasher        | J116-2              |            |                   | Q38              | J126-3            |            |               | Blk-Org          | 14-8014              |           |
| 20                   | MINI MOTOR LEFT        | Flasher        | J116-2              |            |                   | Q36              | J126-4            |            |               | Blk-Yel          | 14-8014              |           |
| 21                   | RIGHT SIDE FLASHER     | Flasher        | J107-6              |            |                   | Q28              | J126-5            |            |               | Blu-Grn          | #906, #89            |           |
| 22                   | RIGHT RAMP FLASHER     | Flasher        | J107-6              |            |                   | Q30              | J126-6            |            |               | Blu-Blk          | #906, #89            |           |
| 23                   | LEFT RAMP FLASHER      | Flasher        | J107-6              |            |                   | Q34              | J126-7            |            |               | Blu-Vio          | #906, #89            |           |
| 24                   | MINI DROP BANK         | Flasher        | J107-1              |            |                   | Q32              | *J126-8           |            |               | Blu-Gry          | AE-25-1000           |           |
| 25                   | SINGLE DROP UP         | Gen. Purpose   | J107-1              |            |                   | Q26              | *J122-1           |            |               | Blu-Brn          | AE-26-1200           |           |
| 26                   | LEFT BACK FLASHER      | Gen. Purpose   | J107-6              | J106-5     |                   | Q24              | J122-2            | J124-2     |               | Blu-Red          | #906                 | #906      |
| 27                   | CENTER BACK FLASHER    | Gen. Purpose   | J107-6              | J106-5     |                   | Q22              | J122-3            | J124-3     |               | Blu-Org          | #906                 | #906      |
| 28                   | RIGHT BACK FLASHER     | Gen. Purpose   | J107-6              | J106-5     |                   | Q20              | J122-4            | J124-5     |               | Blu-Yel          | #906                 | #906      |
| 35                   | MAGNET                 | High Power     | J907-8,9            |            |                   | Q2               | J902-3            |            |               | Yel-Gry          | 20-9247              |           |
| 36                   | SINGLE DROP DOWN       | Low Power      | J907-8,9            |            |                   | Q7               | J902-1            |            |               | Org-Gry          | SM1-26-600           |           |
| General Illumination |                        |                |                     |            |                   |                  |                   |            |               |                  |                      |           |
| 01                   | BOTTOM PLAYFIELD       | G.I.           | J121-1              |            |                   | Q18              | J121-7            |            |               | Wht-Brn          | #44                  |           |
| 02                   | TOP LEFT PLAYFIELD     | G.I.           | J121-2              |            |                   | Q10              | J121-8            |            |               | Wht-Org          | #44                  |           |
| 03                   | INSERT BOTTOM          | G.I.           |                     | J120-3     |                   | Q14              |                   | J120-9     |               | Wht-Yel          |                      | #555      |
| 04                   | INSERT TOP             | G.I.           |                     | J120-5     |                   | Q16              |                   | J120-10    |               | Wht-Grn          |                      | #555      |
| 05                   | TOP RIGHT PLAYFIELD    | G.I.           | J121-6              |            |                   | Q12              | J121-11           |            |               | Wht-Vio          | #44                  |           |
| Flipper Circuits     |                        |                |                     |            |                   |                  |                   |            |               |                  |                      |           |
|                      |                        |                | Voltage Connections |            | Drive Transistors | Drive Connectors | Drive Wire Colors |            | Coil Part No. | Coil Color       |                      |           |
|                      |                        |                | Playfield           | Power Hold |                   |                  | Playfield         | Power Hold |               |                  |                      |           |
| 29                   |                        | Lwr. Rt. Power | J907-1 (Red-Grn)    |            | Q4                |                  | J902-13           | Yel-Grn    |               |                  |                      |           |
| 30                   | Lower Right Flipper    | Lwr. Rt. Hold  | J907-1 (Red-Grn)    |            | Q11               |                  | J902-11           | Org-Grn    |               | FL-11629         |                      | BLUE      |
| 31                   |                        | Lwr. Lt. Power | J907-4 (Red-Blu)    |            |                   |                  | J902-9            | Yel-Blu    |               |                  |                      |           |
| 32                   | Lower Left Flipper     | Lwr. Lt. Hold  | J907-4 (Red-Blu)    |            | Q9                |                  | J902-7            | Org-Blu    |               | FL-11629         |                      | BLUE      |
| 33                   |                        | Upr. Rt. Power | J907-6 (Red-Vio)    |            | Q2                |                  | J902-6            | Yel-Vio    |               |                  |                      |           |
| 34                   | Upper Right Flipper    | Upr. Rt. Hold  | J907-6 (Red-Vio)    |            | Q7                |                  | J902-4            | Org-Vio    |               | FL-15411         |                      | ORANGE    |
| 35                   |                        | Upr. Lt. Power | J907-8 (Red-Gry)    |            | Q1                |                  | J902-3            | Yel-Gry    |               |                  |                      |           |
| 36                   | Upper Left Flipper     | Upr. Lt. Hold  | J907-8 (Red-Gry)    |            | Q5                |                  | J902-1            | Org-Gry    |               | NOT              |                      | USED      |

J1xx=Power Driver Board; J9xx=Flitronic II Board; 24-6549=#44 bulb; 24-8704=#89 bulb; 24-8768=#555 bulb; 24-8802=#906 bulb

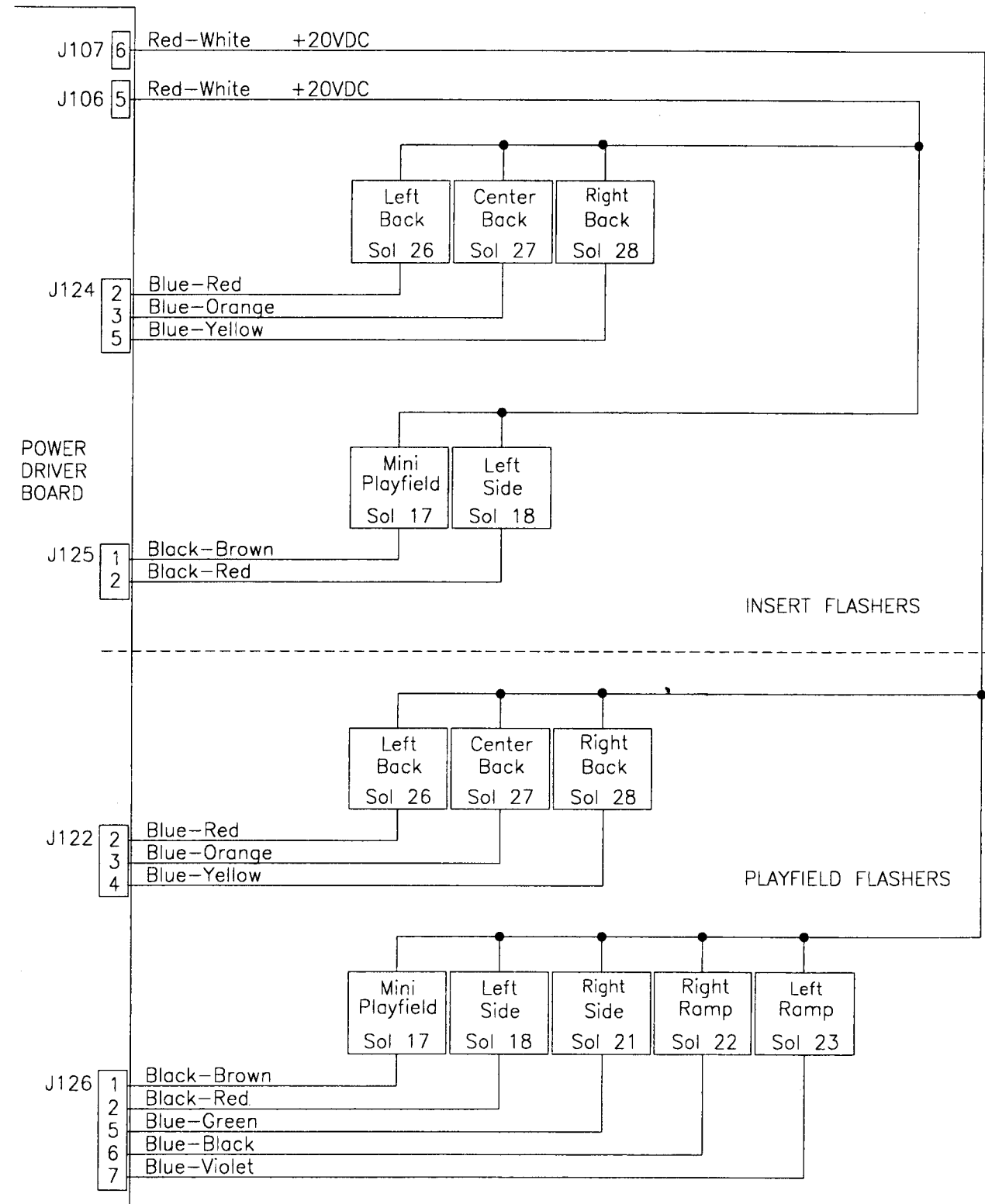
\* Tieback Diode J122-5 (loop) from J126-11 (end).

## SOLENOID WIRING

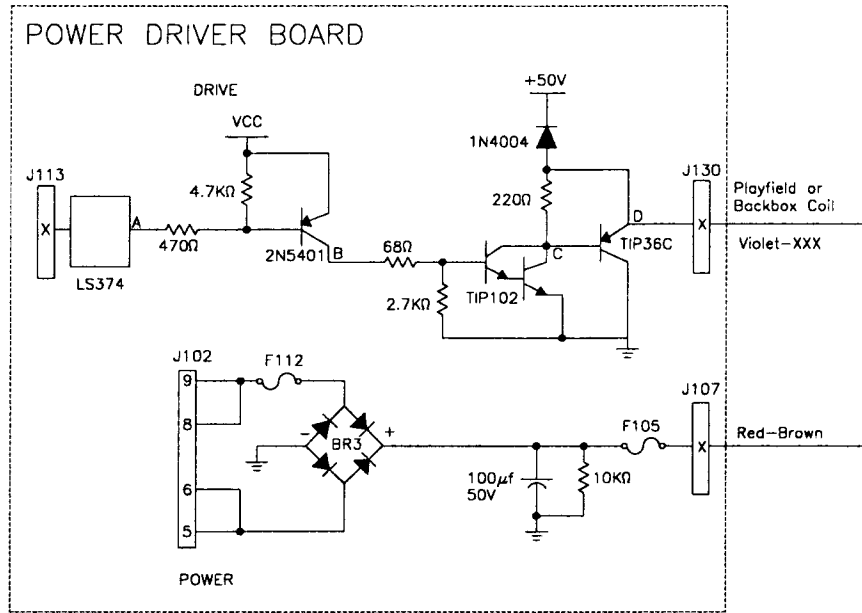




## FLASHER WIRING

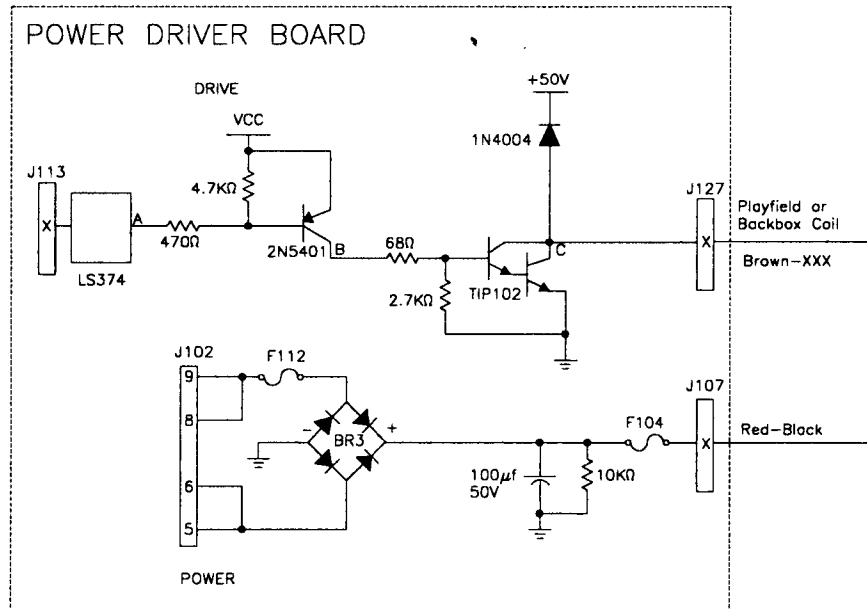


## High Power Solenoid Circuit



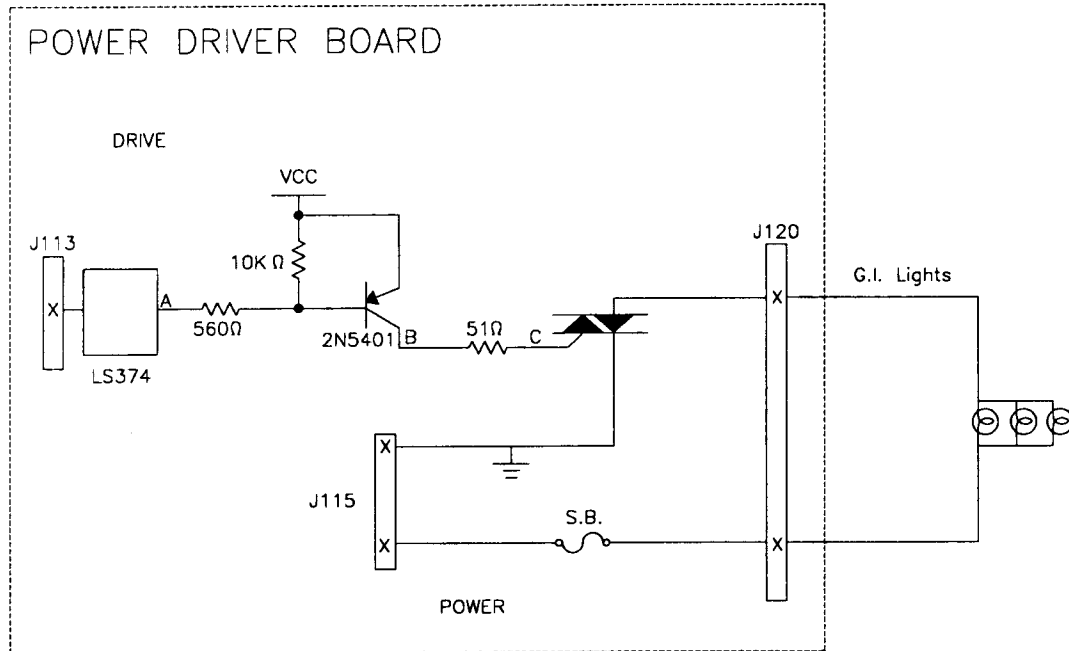
The microprocessor toggles the output of the 74LS374. When point "A" drops low, point "B" the collector of the 2N5401 transistor is high. A high at point "B" causes point "C" the collector of the TIP102 transistor, and point "D" the emitter of the TIP36 transistor to drop low. When point "D" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

## Low Power Solenoid Circuit

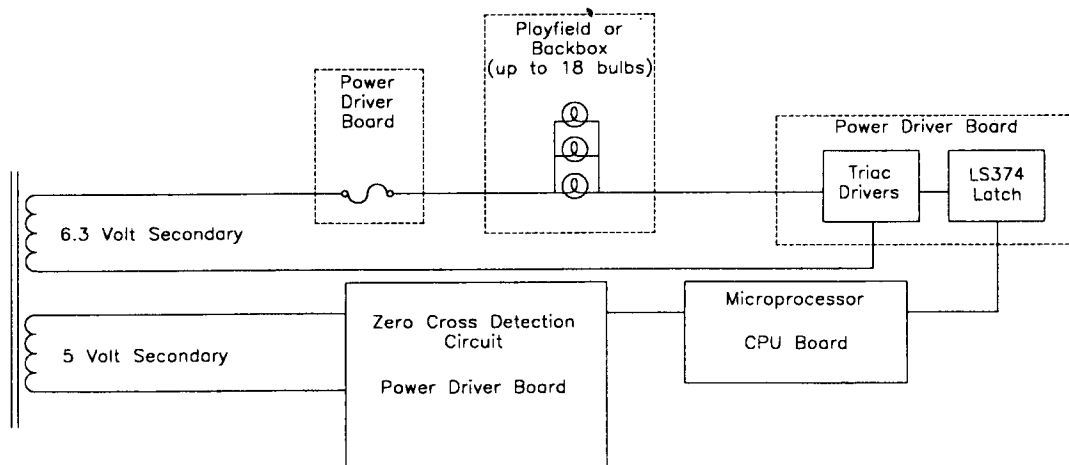


The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor is driven high. A high at point "B" turns On the TIP102 transistor, and causes point "C" to drop low. When point "C" is low the coil is grounded through the transistor and the coil turns On. The coil shuts Off when point "A" toggles high.

## General Illumination Circuit

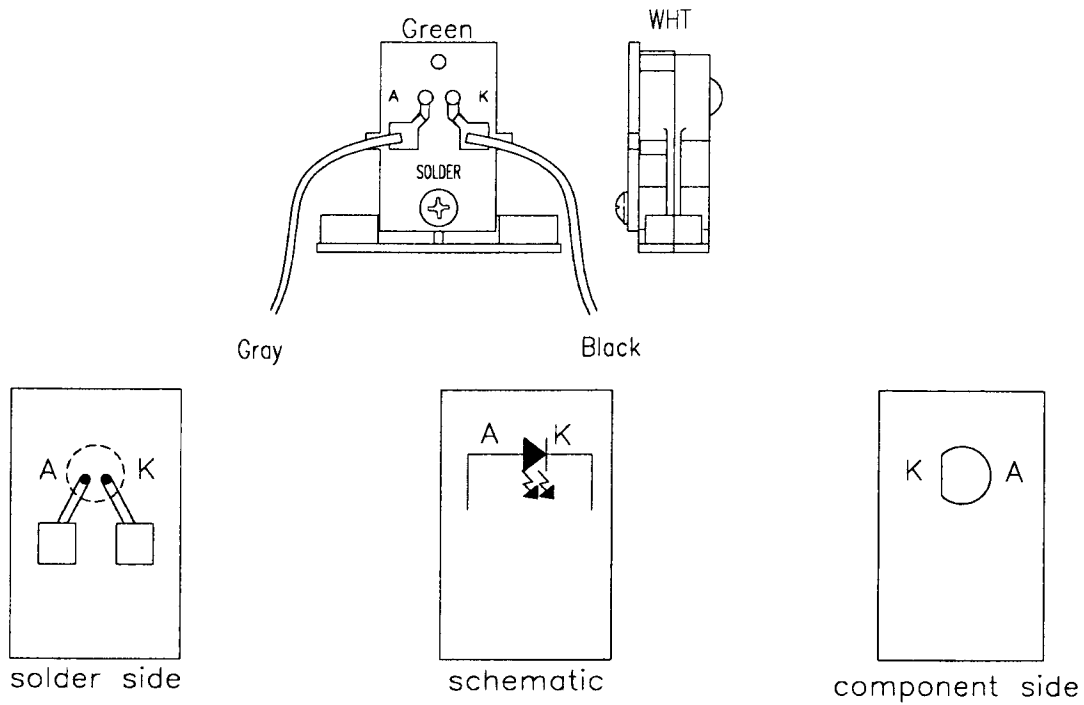


## Block Diagram of General Illumination Circuit

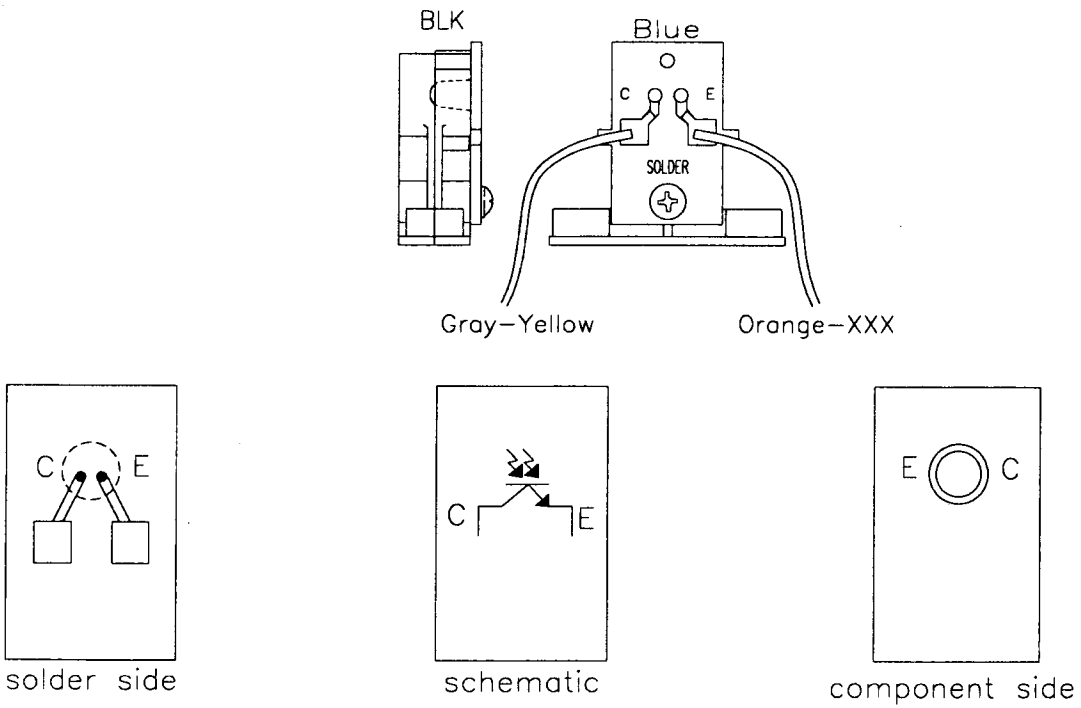


When point "A" toggles low, then points "B" and "C" are high. This turns On the triac and the desired general illumination string lights.

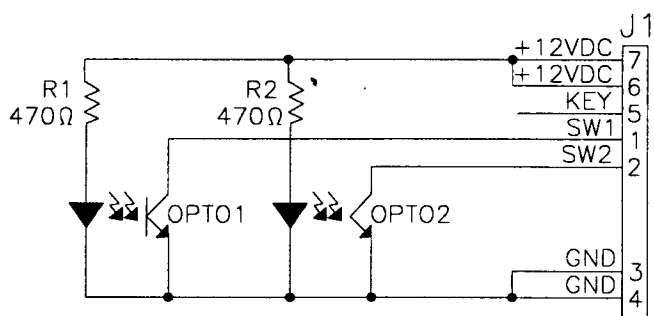
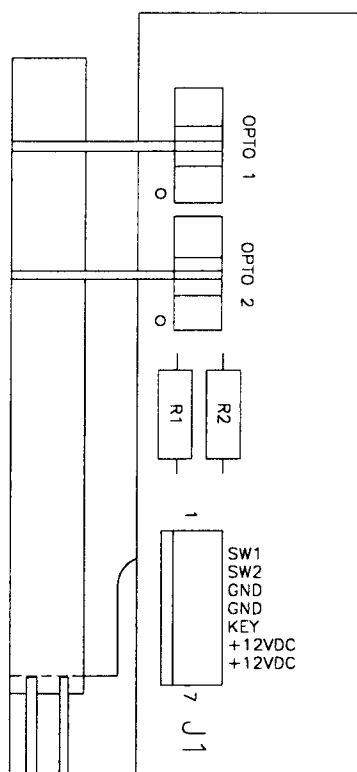
# **LED P.C.B. Assembly (transmitter)** **A-16908**



# **Photo Transistor P.C.B. Assembly (receiver)** **A-16909**



## Flipper Opto P.C.B. Assembly A-17316



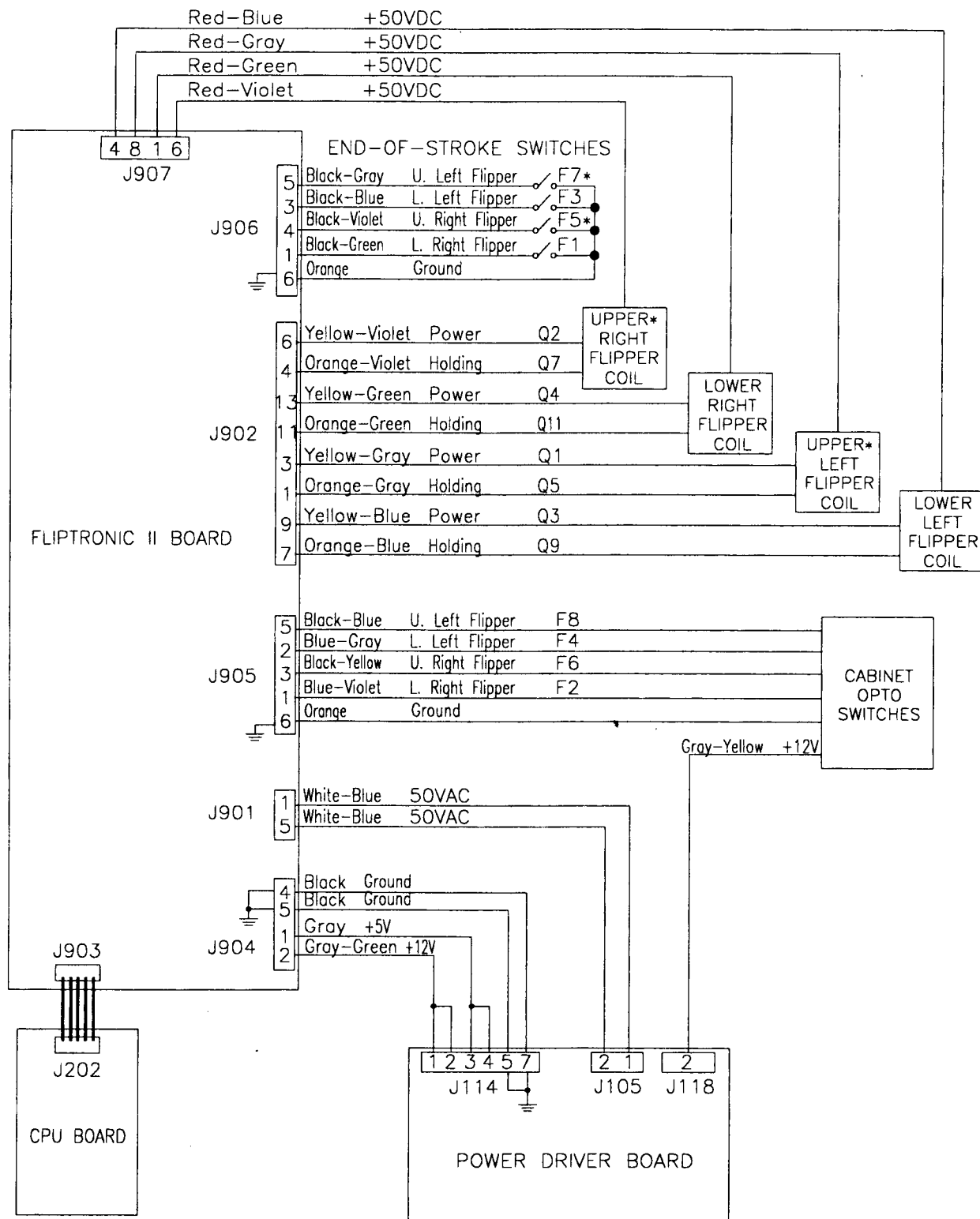
### **Left Side Flipper Cabinet Opto Switch Board**

J1-1 Black-Blue from Fliptronic II Board J905-5  
 J1-2 Blue-Gray from Fliptronic II Board J905-2  
 J1-3 Not Used  
 J1-4 Orange from Fliptronic II Board J905-6  
 J1-5 Not Used  
 J1-6 Gray-Yellow to Right Flipper Opto Board J1-6  
 J1-7 Gray-Yellow from Fliptronic II Board J118-2

### **Right Side Flipper Cabinet Opto Switch Board**

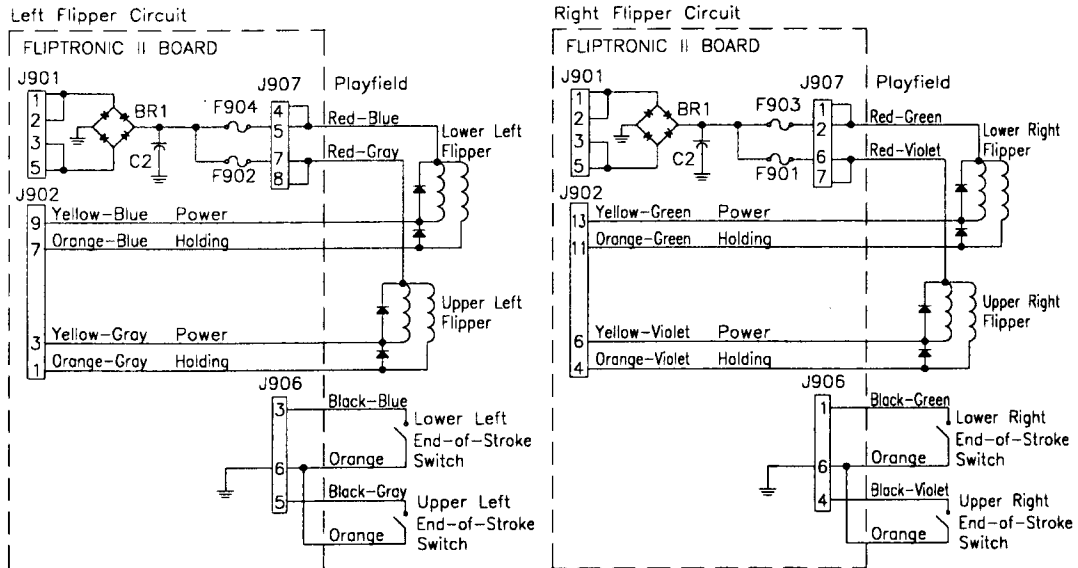
J2-1 Black-Yellow from Fliptronic II Board J905-3  
 J2-2 Blue-Violet from Fliptronic II Board J905-1  
 J2-3 Orange from Fliptronic II Board J905-6  
 J2-4 Orange from Left Flipper Opto Board J1-4  
 J2-5 Not Used  
 J2-6 Gray-Yellow to Left Flipper Opto Board J1-6  
 J2-7 Not Used

## Flipper Circuit Diagram



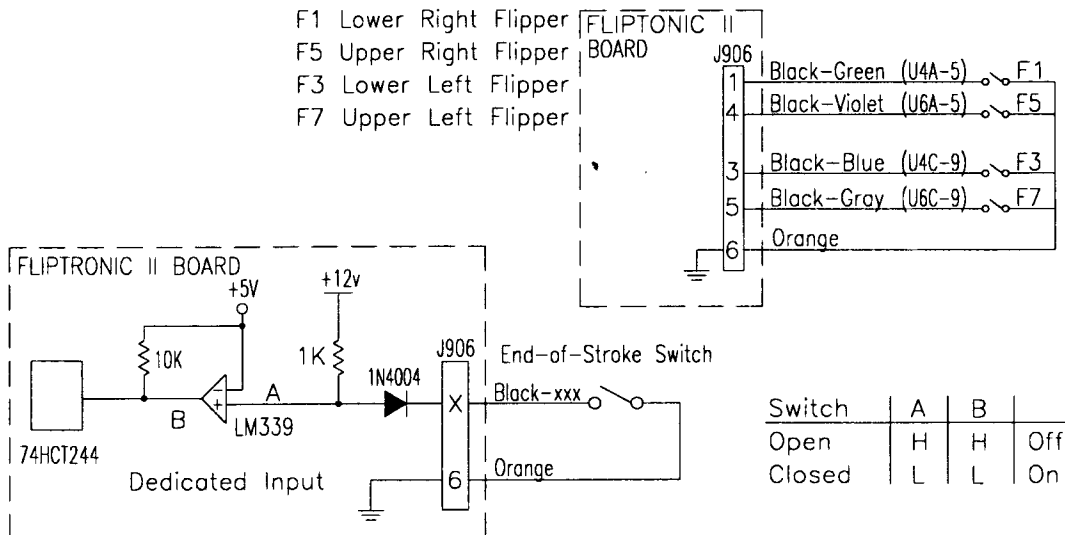
**\*NOTE: Used as circuits other than flipper circuits in this game.**

## Flipper Coil Circuits



## Flipper End-of-Stroke Switches

F1 Lower Right Flipper  
 F5 Upper Right Flipper  
 F3 Lower Left Flipper  
 F7 Upper Left Flipper

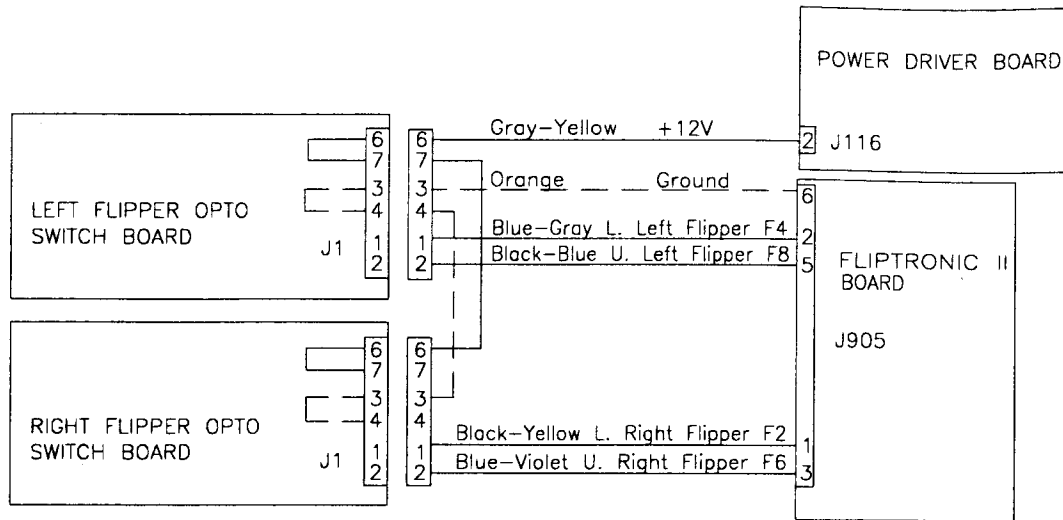


| Switch | A | B |     |
|--------|---|---|-----|
| Open   | H | H | Off |
| Closed | L | L | On  |

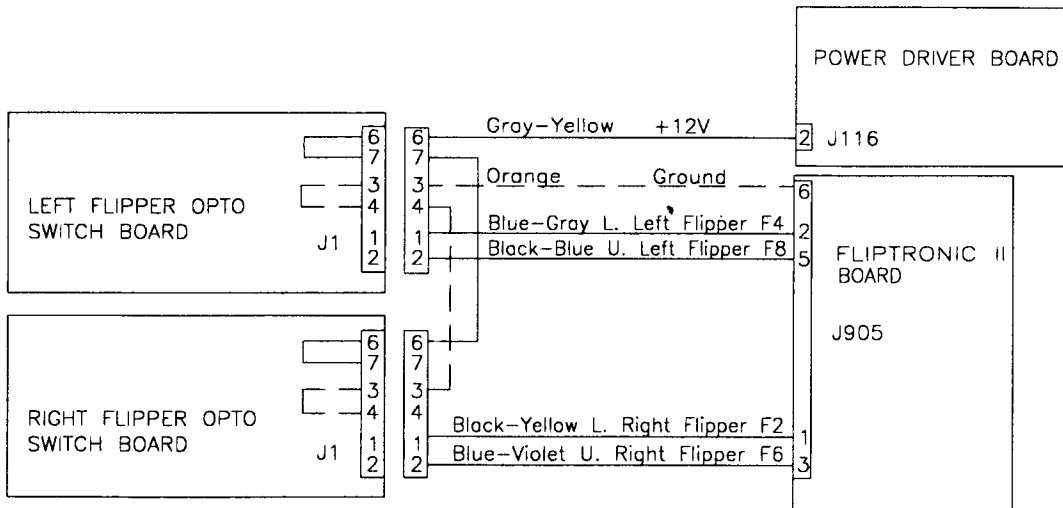
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch.

When a switch closes the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V therefore its output is low. Since the row (dedicated input) circuit is tied directly to ground through the switch, the switch is considered closed by the microprocessor. When the switch opens, the "+" input to the LM339 is about +5V, its output is high and the row (dedicated input) is inactive.

### Flipper Cabinet Switch Circuit Diagram



### Flipper Cabinet Switches



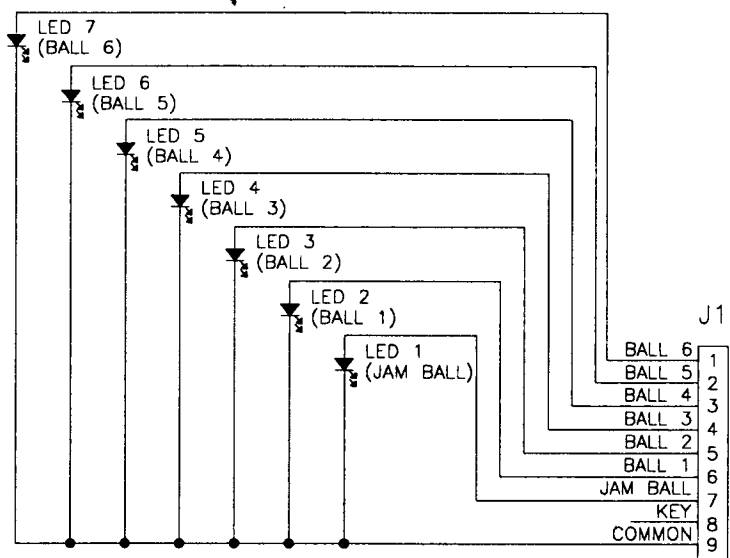
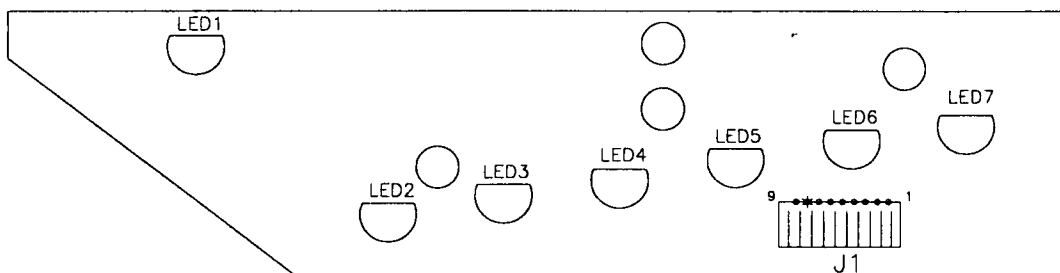
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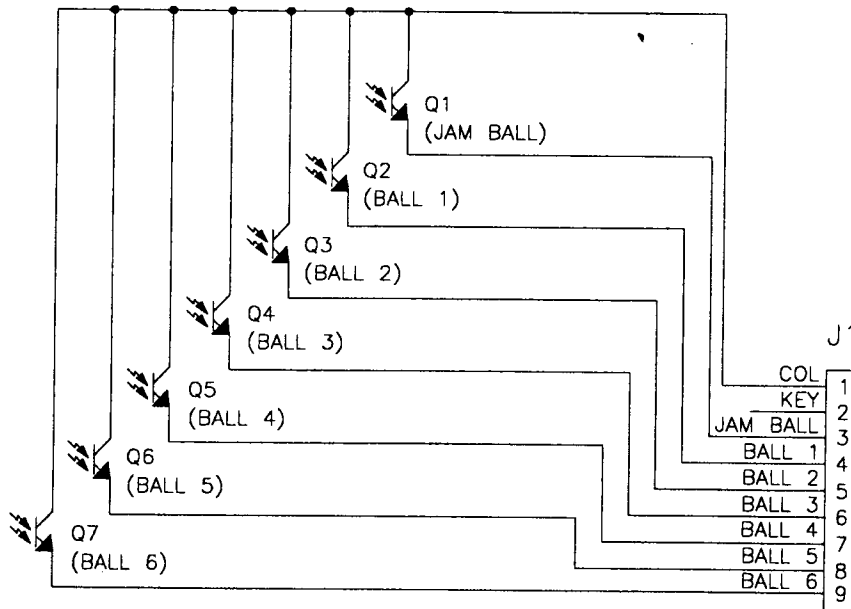
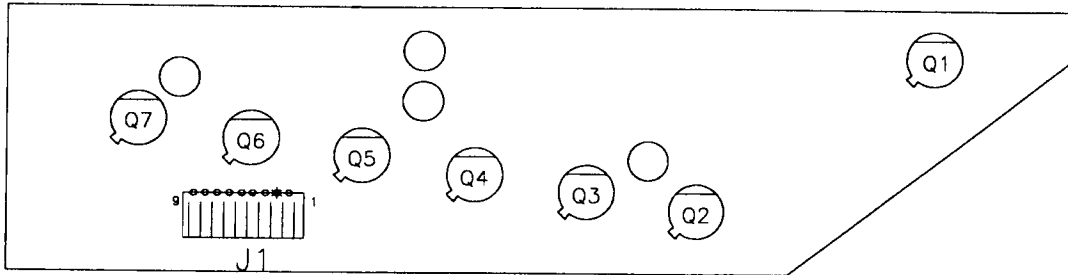
# **TROUGH 7 IRED PCB ASSEMBLY** **A-18617**

J1-1 Not Used  
 J1-2 Gray-Green, from Opto SW10 Board J1-3  
 J1-3 Gray-Black, from Opto SW10 Board J1-4  
 J1-4 Gray-Orange, from Opto SW10 Board J1-5  
 J1-5 Gray-Red, from Opto SW10 Board J1-6  
 J1-6 Gray-Brown, from Opto SW10 Board J1-7  
 J1-7 Gray-Blue, from Opto SW10 Board J1-2  
 J1-8 Key  
 J1-9 Black, from Opto SW10 Board J1-9

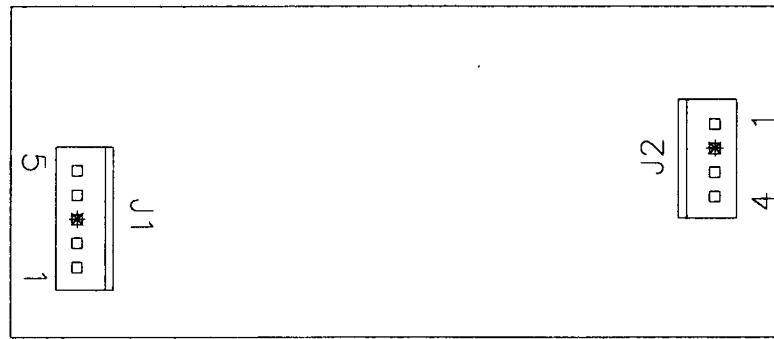


# **TROUGH 7 IR TSTR PCB ASSEMBLY** **A-18618**

J1-1 Gray-Yellow, from Opto SW10 Board J2-9  
 J1-2 Key  
 J1-3 Orange-Blue, from Opto SW10 Board J2-2  
 J1-4 Orange-Brown, from Opto SW10 Board J2-8  
 J1-5 Orange-Red, from Opto SW10 Board J2-7  
 J1-6 Orange-Black, from Opto SW10 Board J2-5  
 J1-7 Orange-Yellow, from Opto SW10 Board J2-4  
 J1-8 Orange-Green, from Opto SW10 Board J2-3  
 J1-9 Not Used

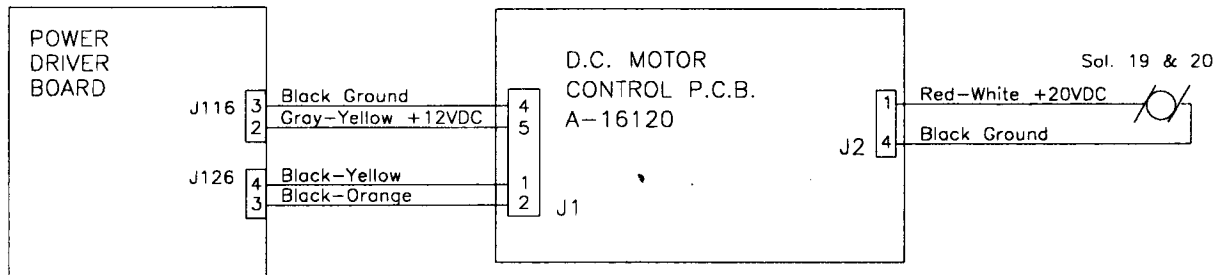


# **D.C. MOTOR CONTROL P.C.B. A-16120**

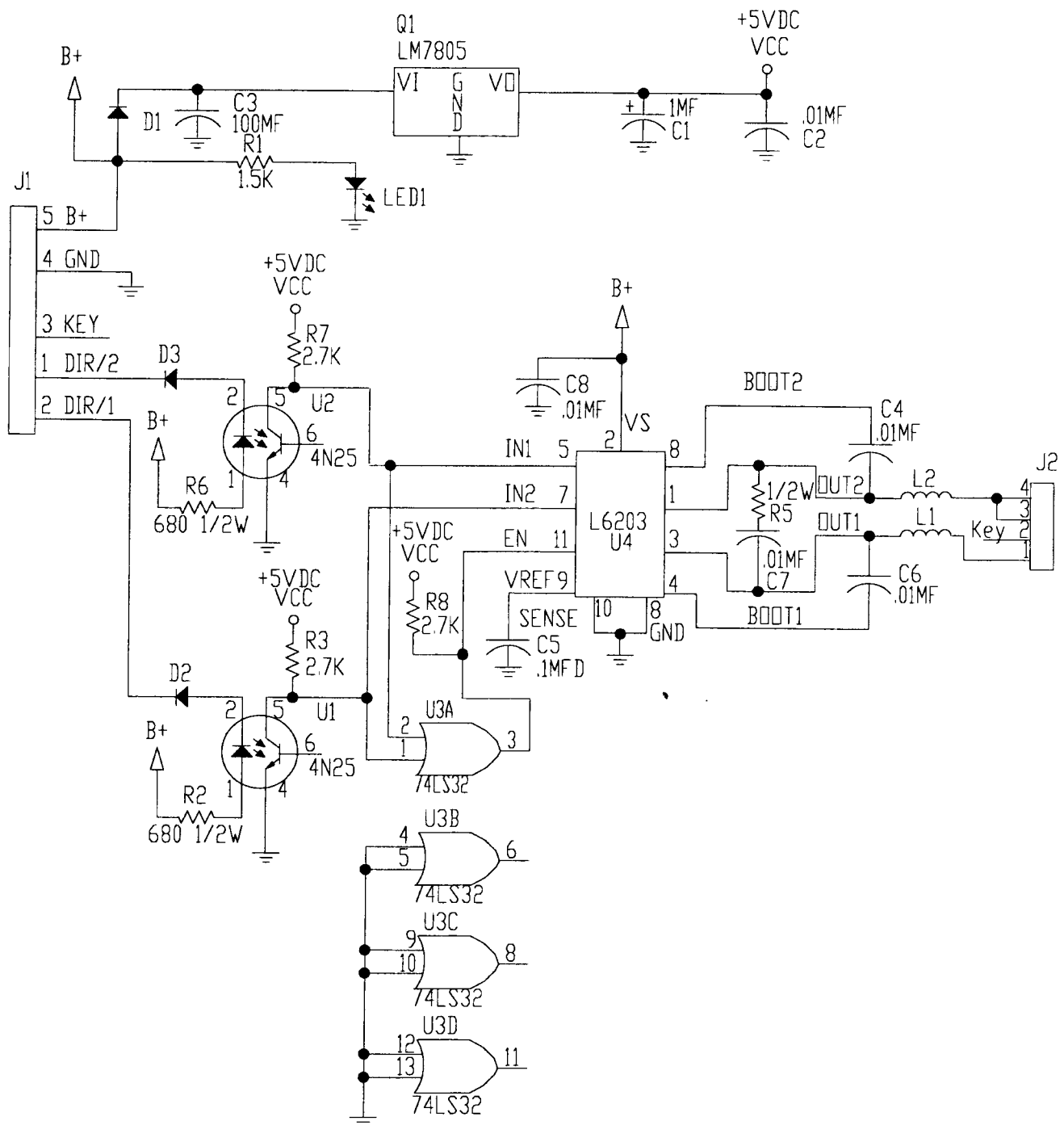


J1-1 Black-Yellow from J126-4  
 J1-2 Black Orange from J126-3  
 J1-3 Key  
 J1-4 Black Ground from J116-3  
 J1-5 Gray-Yellow +12VDC from J116-2

J2-1 Red to Solenoids 19 & 20  
 J2-2 Key  
 J2-3 Not Used  
 J2-4 Black Ground to Solenoids 19 & 20



### D.C. MOTOR CONTROL P.C.B. SCHEMATIC



# **OPTO SW10 P.C.B. A-18159**

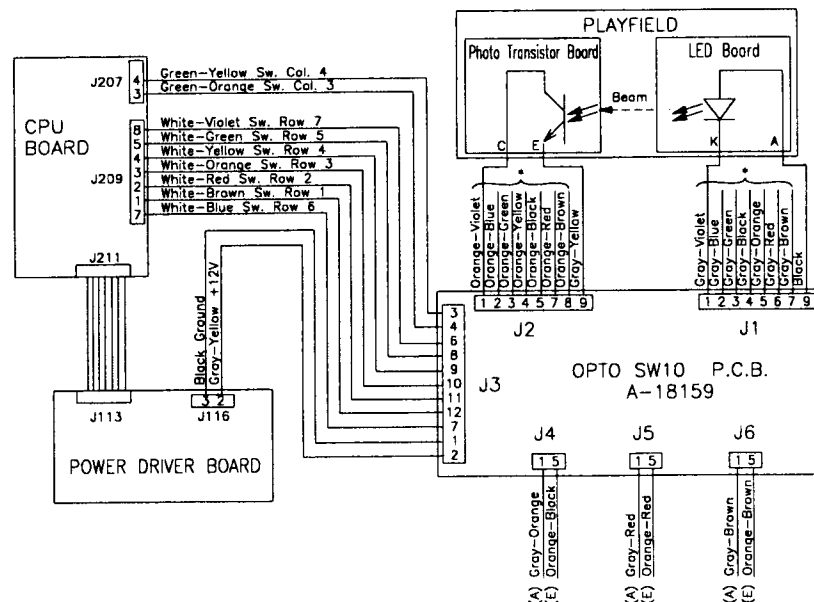
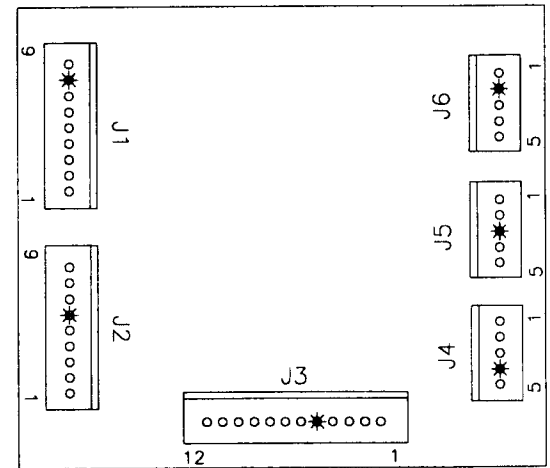
J1-1 Gray-Violet to A-16908 (LED) Sw #47  
 J1-2 Gray-Blue to A-18617 (LED) J1-7 Sw #46  
 J1-3 Gray-Green to A-18617 (LED) J1-2 Sw #45  
 J1-4 Gray-Black to A-18617 (LED) J1-3 Sw #44  
 J1-5 Gray-Orange to A-18617 (LED) J1-4 Sw #43  
 J1-6 Gray-Red to A-18617 (LED) J1-5 Sw #42  
 J1-7 Gray-Brown to A-18617 (LED) J1-6 Sw #41  
 J1-8 Key  
 J1-9 Black Ground to A-18617 J1-9

J2-1 Orange-Violet to A-16909 (Photo) Sw #47  
 J2-2 Orange-Blue to A-18618 (Photo) J1-3 Sw #46  
 J2-3 Orange-Green to A-18618 (Photo) J1-8 Sw #45  
 J2-4 Orange-Yellow to A-18618 (Photo) J1-7 Sw #44  
 J2-5 Orange-Black to A-18618 (Photo) J1-6 Sw #43  
 J2-6 Key  
 J2-7 Orange-Red to A-18618 (Photo) J1-5 Sw #42  
 J2-8 Orange-Brown to A-18618 (Photo) J1-4 Sw #41  
 J2-9 Gray-Yellow +12VDC to A-18618 (Photo) J1-1

J3-1 Black Ground from J116-3  
 J3-2 Gray-Yellow +12VDC from J116-2  
 J3-3 Green-Yellow from J207-4  
 J3-4 Green-Orange from J207-3  
 J3-5 Key  
 J3-6 White-Violet from J209-8  
 J3-7 White-Blue from J209-7  
 J3-8 White-Green from J209-5  
 J3-9 White-Yellow from J209-4  
 J3-10 White-Orange from J209-3  
 J3-11 White-Red from J209-2  
 J3-12 White-Brown from J209-1

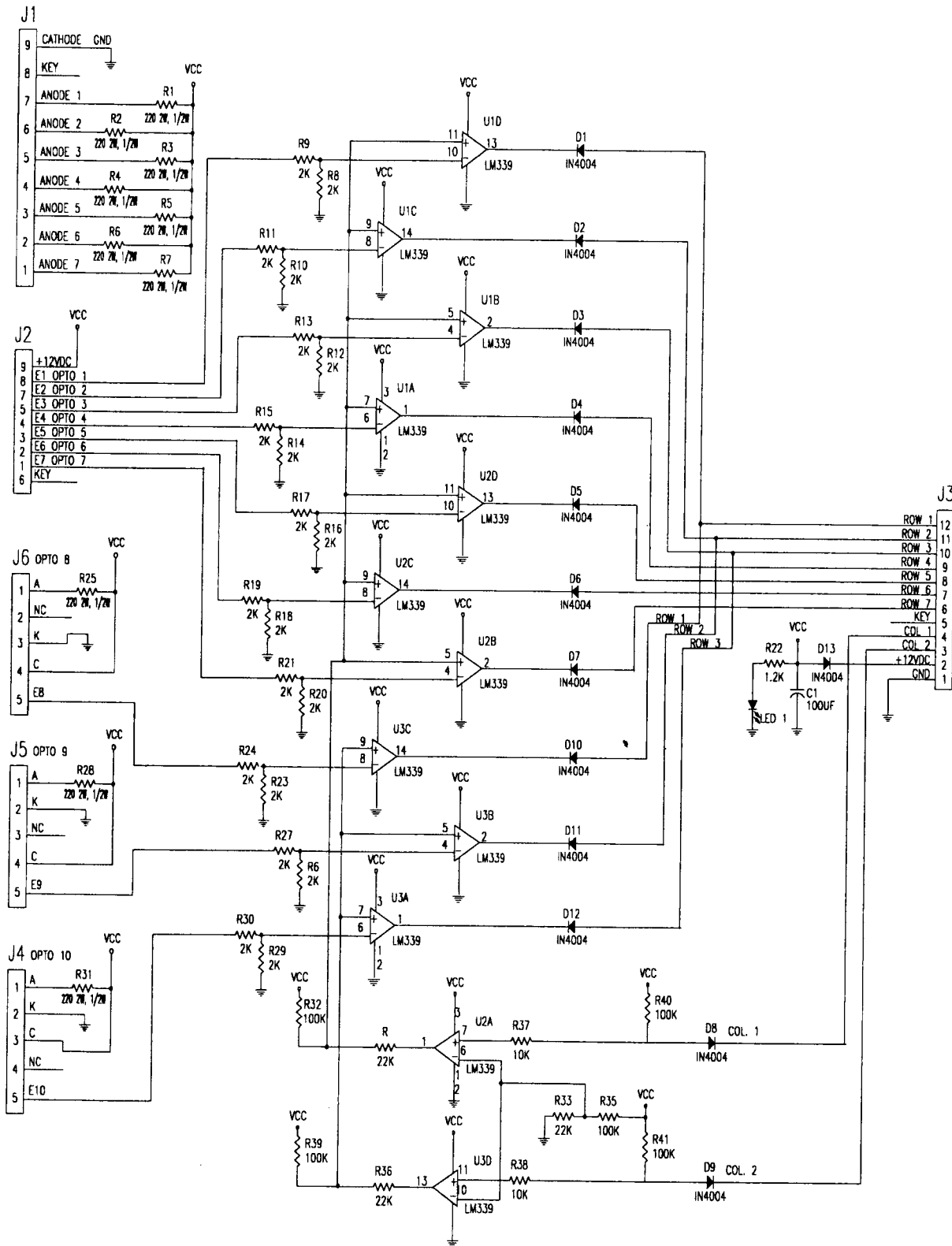
J4-1 Gray-Orange to A-16908 (LED) Sw #33  
 J4-2 Not Used  
 J4-3 Not Used

J4-4 Key  
 J4-5 Orange-Black to A-16909 (Photo) Sw #33  
 J5-1 Gray-Red to A-16908 (LED) Sw #32  
 J5-2 Not Used  
 J5-3 Key  
 J5-4 Not Used  
 J5-5 Orange-Red to A-16909 (Photo) Sw #32  
 J6-1 Gray-Brown to A-16908 (LED) Sw #31  
 J6-2 Key  
 J6-3 Not Used  
 J6-4 Not Used  
 J6-5 Orange-Brown to A-16909 (Photo) Sw #31



\*Repeat 7 times

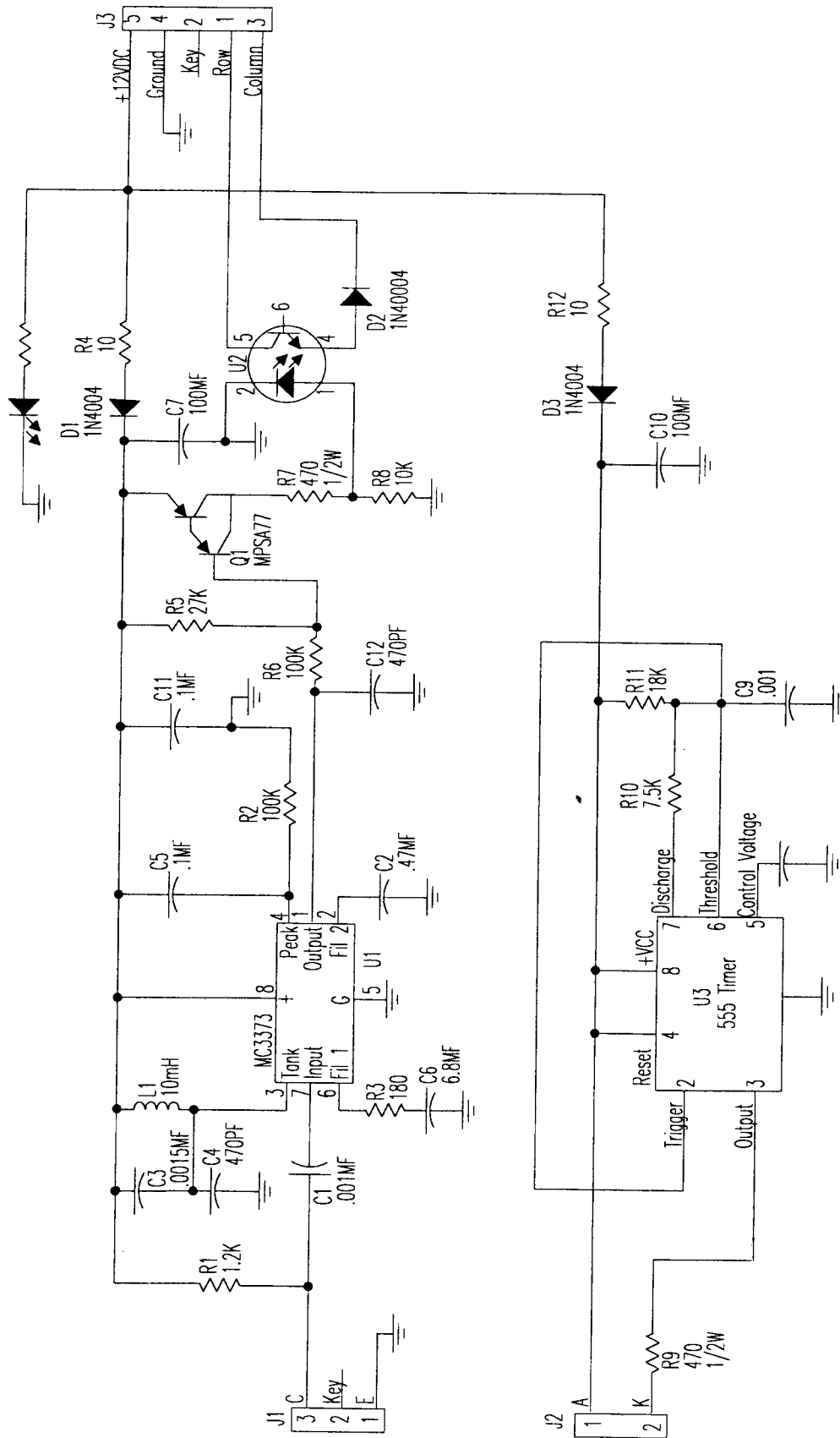
# OPTO SW10 P.C.B. SCHEMATIC



J3-1 White-Blue from J209-7  
J3-2 Key  
J3-3 Green-Orange from J207-3  
J3-4 Black Ground from J116-3  
J3-5 Gray-Yellow +12VDC from J116-2

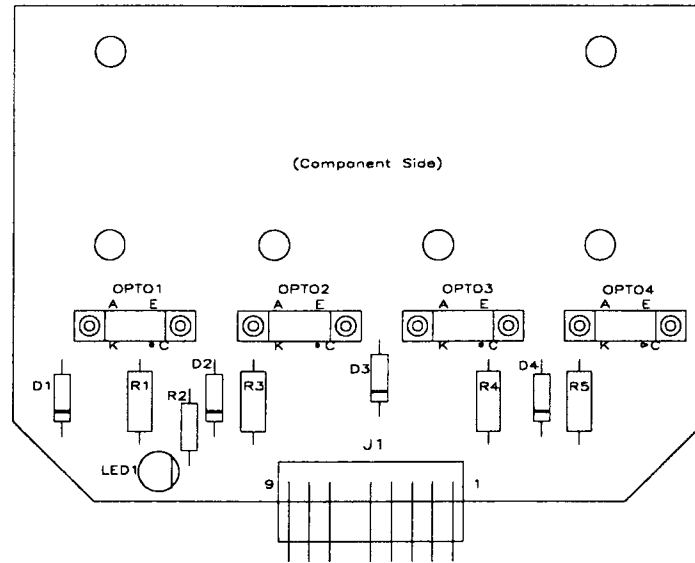


# OPTO SW24 P.C.B. SCHEMATIC

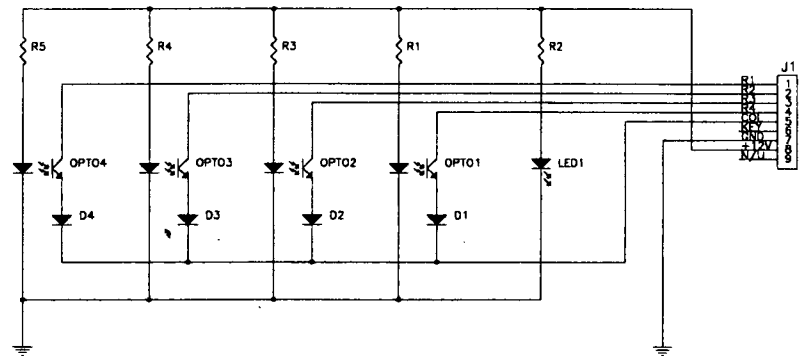




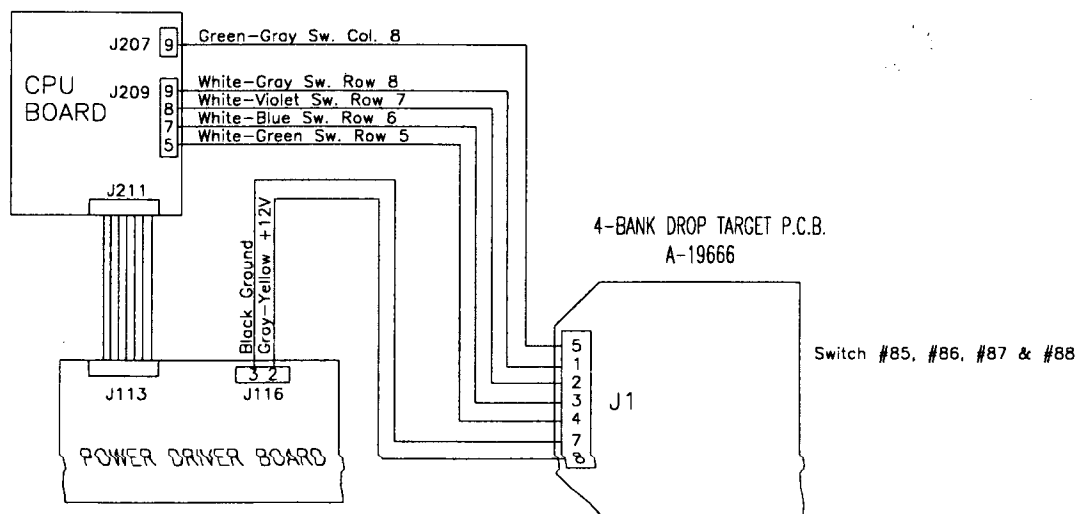
# **4-BANK DROP TARGET OPTO P.C.B. A-19666**



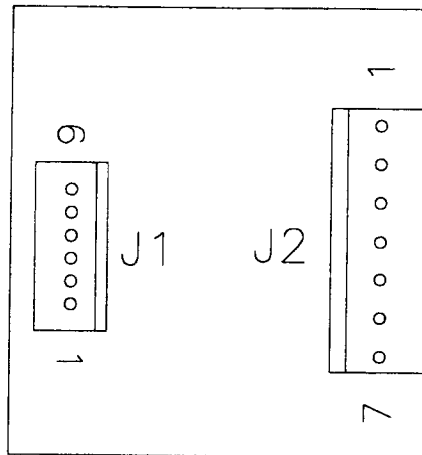
- J1-1 White-Gray from J209-9
- J1-2 White-Violet from J209-8
- J1-3 White-Blue from J209-7
- J1-4 White-Green from J209-5
- J1-5 Green-Gray from J207-9
- J1-6 Key
- J1-7 Black Ground from J116-3
- J1-8 Gray-Yellow +12VDC from J116-2
- J1-9 Not Used



**SCHEMATIC**

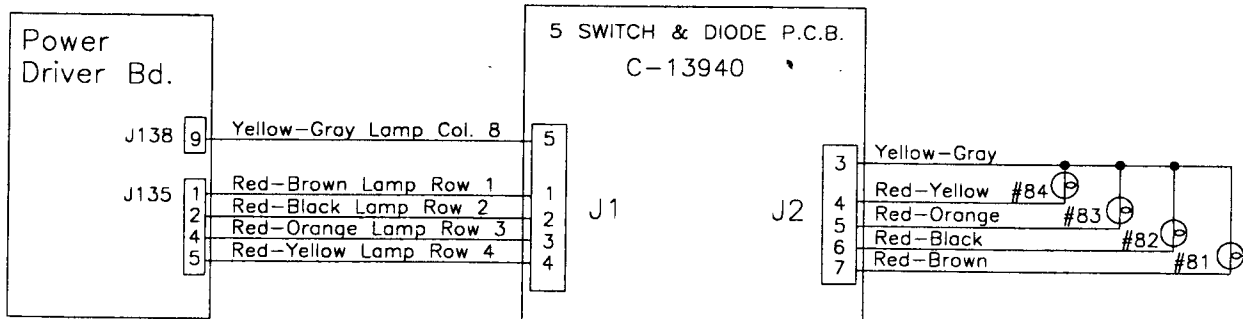


# **5 SWITCH & DIODE P.C.B. C-13940**

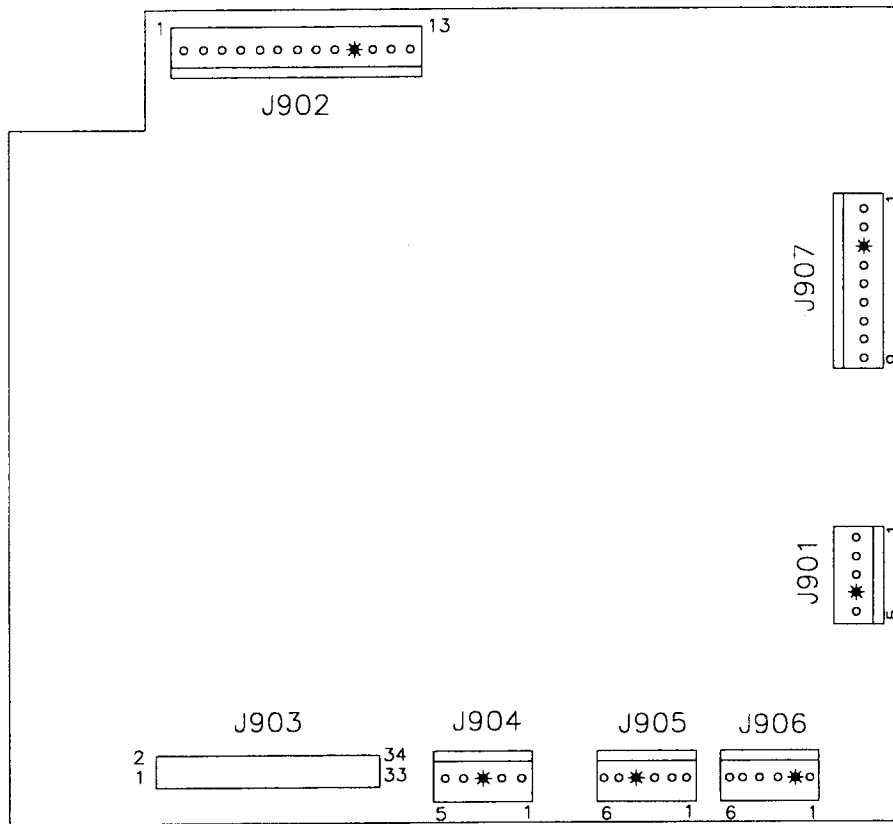


J1-1 Red-Brown from J135-1  
J1-2 Red-Black from J135-2  
J1-3 Red-Orange from J135-4  
J1-4 Red-Yellow from J135-5  
J1-5 Yellow-Gray from J138-9  
J1-6 Not Used

J2-1 Not Used  
J2-2 Key  
J2-3 Yellow-Gray lamp column 8 to switch #81, #82, #83 & #84  
J2-4 Red-Yellow lamp row 4 to switch #84  
J2-5 Red-Orange lamp row 3 to switch #83  
J2-6 Red-Black lamp row 2 to switch #82  
J2-7 Red-Brown lamp row 1 to switch #81



## Fliptronic II Board A-15472-1



J901-1 White-Blue, 50VAC from J104-1  
 J901-2 White-Blue, loop from J901-1  
 J901-3 White-Blue, 50VAC from J104-2  
 J901-4 Key  
 J901-5 White-Blue, loop from J901-3

J902-1 Orange-Gray, Sol 36 to playfield coil  
 J902-2 Not Used  
 J902-3 Yellow-Gray, Sol 35 to playfield magnet  
 J902-4 Orange-Violet, holding upper right flipper  
 J902-5 Not Used  
 J902-6 Yellow-Violet, power upper right flipper  
 J902-7 Orange-Blue, holding lower left flipper  
 J902-8 Not Used  
 J902-9 Yellow-Blue, power lower left flipper  
 J902-10 Key  
 J902-11 Orange-Green, holding lower right flipper  
 J902-12 Not Used  
 J902-13 Yellow-Green, power lower right flipper

J903 Ribbon Cable, data to/from J202; J506; J601

J904-1 Gray, +5V to/from J114-4; J210-4  
 J904-2 Gray-Green, +12V to/from J114-2; J210-6  
 J904-3 Key  
 J904-4 Black, Ground to/from J114-7; J210-1

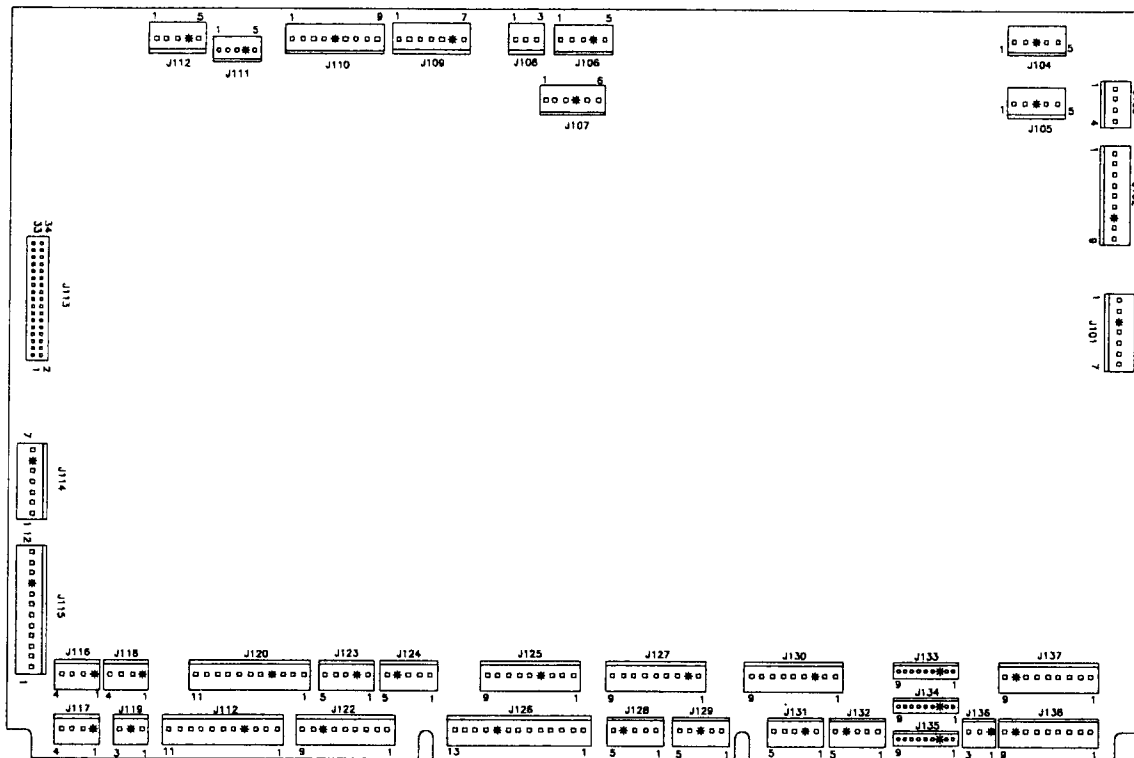
J904-5 Black, Ground to/from J114-5; J210-3

J905-1 Black-Violet, to right flipper opto  
 J905-2 Blue-Gray, to left flipper opto  
 J905-3 Black-Yellow, to right flipper opto  
 J905-4 Key  
 J905-5 Black-Blue, to left flipper opto  
 J905-6 Orange, Switch Ground

J906-1 Black-Green, to lower right E.O.S. switch  
 J906-2 Key  
 J906-3 Black-Blue, to lower left E.O.S. switch  
 J906-4 Black-Violet, to upper right E.O.S. switch  
 J906-5 Not Used  
 J906-6 Orange, Switch Ground

J907-1 Red-Green, +50V to lower right flipper  
 J907-2 Red-Green, loop from J907-1  
 J907-3 Key  
 J907-4 Red-Blue, +50V to lower left flipper  
 J907-5 Red-Blue, loop from J907-4  
 J907-6 Red-Violet, +50V to upper right flipper  
 J907-7 Red-Violet, loop from J907-6  
 J907-8 Red-Gray, +50V to upper left flipper  
 J907-9 Red-Gray, loop from J907-8

## Power Driver Board A-12697-3



J101-1 Red 9VAC from xfrmr secondary  
 J101-2 Red 9VAC from xfrmr secondary  
 J101-3 Key  
 J101-4 Blue-White 13VAC from xfrmr secondary  
 J101-5 Blue-White loop from J101-4  
 J101-6 Blue-White 13VAC from xfrmr secondary  
 J101-7 Blue-White loop from J101-6

J102-1 White-Red loop from J102-2  
 J102-2 White-Red 16VAC from xfrmr secondary  
 J102-3 White-Red loop from J102-4  
 J102-4 White-Red 16VAC from xfrmr secondary  
 J102-5 Black-Yellow loop from J102-6  
 J102-6 Black-Yellow 16VAC from xfrmr secondary  
 J102-7 Key  
 J102-8 Black-Yellow loop from J102-9  
 J102-9 Black Yellow 16VAC from xfrmr secondary

J103 Not Used

J104-1 White-Blue 50VAC to J901-1,2  
 J104-2 White-Blue 50VAC to J901-3,5  
 J104-3 Key  
 J104-4 Not Used  
 J104-5 Not Used

J105 Not Used

J106-1 Not Used  
 J106-2 Not Used  
 J106-3 Not Used  
 J106-4 Key  
 J106-5 Red-White +20V to insert flashlamps

J107-1 Red-Orange 50V to playfield coils  
 J107-2 Red-Brown 50V to playfield coils  
 J107-3 Red-Black 50V to playfield coils  
 J107-4 Key  
 J107-5 Not Used  
 J107-6 Red-White +20V to playfield flashlamps

J108 Not Used

J109 Not Used

J110 Not Used

J111 Not Used

J112-1 White-Green 9.8VAC from xfrmr secondary  
 J112-2 White-Green loop from J112-1  
 J112-3 White-Green 9.8VAC from xfrmr secondary  
 J112-4 Key  
 J112-5 White-Green loop from J112-3

J113 Ribbon Cable data to/from J211

J114-1 Gray-Green +12VDC to J210-7  
J114-2 Gray-Green +12VDC to J904-2; J210-6  
J114-3 Gray +5VDC to J3-3 Sound Bd; J210-5  
J114-4 Gray +5VDC to J3-1 Sound Bd; J904-1; J210-4  
J114-5 Black Ground to J3-5 Sound Bd; J904-5; J210-3  
J114-6 Key  
J114-7 Black Ground to J3-4 Sound Bd; J904-4; J210-1

J115-1 Yellow-White 6.8VAC from xfrmr secondary  
J115-2 White-Brown 6.8VAC from xfrmr secondary  
J115-3 White-Brown loop from J115-2  
J115-4 White-Orange 6.8VAC from xfrmr secondary  
J115-5 White-Yellow loop from J115-6  
J115-6 White-Yellow 6.8VAC from xfrmr secondary  
J115-7 Orange 6.8VAC from xfrmr secondary  
J115-8 Orange 6.8VAC loop from J115-7  
J115-9 Key  
J115-10 Green 6.8VAC from xfrmr secondary  
J115-11 Brown 6.8VAC from xfrmr secondary  
J115-12 Brown 6.8VAC loop from J115-11

J116-1 Key  
J116-2 Gray-Yellow +12VDC to playfield  
J116-3 Black Ground  
J116-4 Gray +5VDC to playfield

J117-1 Key  
J117-2 Gray-Yellow +12VDC to J606-6,7  
J117-3 Black Ground to J606-1,3  
J117-4 Gray +5VDC to J606-4,5

J118-1 Key  
J118-2 Gray-Yellow +12VDC to cabinet  
J118-3 Black Ground  
J118-4 Not Used

J119-1 White-Violet 6.8VAC G.I. to A-17051-1 J2-3  
J119-2 Key  
J119-3 Violet Return G.I. to A-17051-1 J2-5

J120-1 Not Used  
J120-2 Not Used  
J120-3 Yellow Return G.I. to playfield  
J120-4 Key  
J120-5 Green Return G.I. to playfield  
J120-6 Not Used  
J120-7 Not Used  
J120-8 Not Used  
J120-9 White-Yellow 6.8VAC to playfield  
J120-10 White-Green 6.8VAC to playfield  
J120-11 Not Used

J121-1 Brown Return G.I. to insert  
J121-2 Orange Return G.I. to insert  
J121-3 Not Used  
J121-4 Key  
J121-5 Not Used  
J121-6 Violet Return G.I. to insert  
J121-7 White-Brown 6.8VAC to insert  
J121-8 Not Used  
J121-9 Not Used  
J121-10 White-Green 6.8VAC to insert  
J121-11 White-Violet 6.8VAC to insert

J122-1 Blue-Brown Sol 25 to playfield coil  
J122-2 Blue-Red Sol 26 to playfield flashlamps  
J122-3 Blue-Orange Sol 27 to playfield flashlamps  
J122-4 Blue-Yellow Sol 28 to playfield flashlamps  
J122-5 Red-Orange Tieback Diode to Sol 24 & 25  
J122-6 Not Used  
J122-7 Key  
J122-8 Not Used  
J122-9 Not Used

J123 Not Used

J124-1 Not Used  
J124-2 Blue-Red Sol 26 to insert flashlamps  
J124-3 Blue-Orange Sol 27 to insert flashlamps  
J124-4 Key  
J124-5 Blue-Yellow Sol 28 to insert flashlamps

J125-1 Black-Brown Sol 17 to insert flashlamps  
J125-2 Black-Red Sol 18 to insert flashlamps  
J125-3 Not Used  
J125-4 Key  
J125-5 Not Used  
J125-6 Not Used  
J125-7 Not Used  
J125-8 Not Used  
J125-9 Not Used

J126-1 Black-Brown Sol 17 to playfield flashlamps  
J126-2 Black-Red Sol 18 to playfield flashlamps  
J126-3 Black-Orange Sol 19 to playfield motor  
J126-4 Black-Yellow Sol 20 to playfield motor  
J126-5 Blue-Green Sol 21 to playfield flashlamps  
J126-6 Blue-Black Sol 22 to playfield flashlamps  
J126-7 Blue-Violet Sol 23 to playfield flashlamps  
J126-8 Blue-Gray Sol 24 to playfield coil  
J126-9 Key  
J126-10 Not Used  
J126-11 Red-Orange Tieback Diode from J122-5  
J126-12 Not Used  
J126-13 Not Used

J127-1 Brown-Black Sol 9 to playfield coil  
J127-2 Key  
J127-3 Brown-Red Sol 10 to playfield coil  
J127-4 Brown-Orange Sol 11 to playfield coil  
J127-5 Brown-Yellow Sol 12 to playfield coil  
J127-6 Brown-Green Sol 13 to playfield coil  
J127-7 Brown-Blue Sol 14 to playfield coil  
J127-8 Brown-Violet Sol 15 to playfield coil  
J127-9 Brown-Gray Sol 16 to playfield coil

J128 Not Used

J129 Not Used

J130-1 Violet-Brown Sol 1 to playfield coil  
J130-2 Violet-Red Sol 2 to playfield coil  
J130-3 Key  
J130-4 Violet-Orange Sol 3 to playfield coil  
J130-5 Violet-Yellow Sol 4 to playfield coil  
J130-6 Violet-Green Sol 5 to playfield coil  
J130-7 Violet-Blue Sol 6 to playfield coil  
J130-8 Violet-Black Sol 7 to playfield coil  
J130-9 Violet-Gray Sol 8 to playfield coil

J131 Not Used

J132 Not Used

J133 Not Used

J134-1 Not Used  
J134-2 Not Used  
J134-3 Key

J134-4 Not Used  
J134-5 Not Used  
J134-6 Not Used  
J134-7 Red-Blue Row 6 to cabinet lamp  
J134-8 Red-Violet Row 7 to cabinet lamp  
J134-9 Red-Gray Row 8 to cabinet lamp

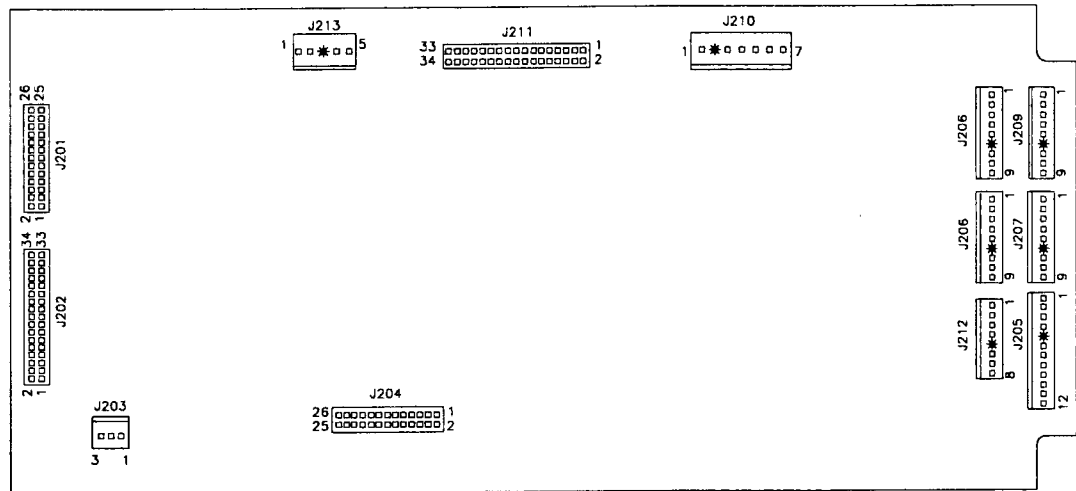
J135-1 Red-Brown Row 1 to playfield lamps  
J135-2 Red-Black Row 2 to playfield lamps  
J135-3 Key  
J135-4 Red-Orange Row 3 to playfield lamps  
J135-5 Red-Yellow Row 4 to playfield lamps  
J135-6 Red-Green Row 5 to playfield lamps  
J135-7 Red-Blue Row 6 to playfield lamps  
J135-8 Red-Violet Row 7 to playfield lamps  
J135-9 Red-Gray Row 8 to playfield lamps

J136-1 Key  
J136-2 Not Used  
J136-3 Yellow-Gray Col 8 to insert lamps

J137 Not Used

J138-1 Yellow-Brown Col 1 to playfield lamps  
J138-2 Yellow-Red Col 2 to playfield lamps  
J138-3 Yellow-Orange Col 3 to playfield lamps  
J138-4 Yellow-Black Col 4 to playfield lamps  
J138-5 Yellow-Green Col 5 to playfield lamps  
J138-6 Yellow-Blue Col 6 to playfield lamps  
J138-7 Yellow-Violet Col 7 to playfield lamps  
J138-8 Key  
J138-9 Yellow-Gray Col 8 to playfield lamps

## Security CPU Board A-17651-50036



J201 Ribbon Cable data to J602

J202 Ribbon Cable data to J903; J506; J601

J203 Not Used

J204 Ribbon Cable data to A-16100 J1

J205-1 Orange-Brown Dir Sw 1, Left Coin to J1-14  
 J205-2 Orange-Red Dir Sw 2, Center Coin to J1-13  
 J205-3 Orange-Black Dir Sw 3, Right Coin to J1-12  
 J205-4 Orange-Yellow Dir Sw 4, 4th Coin to J1-17  
 J205-5 Key  
 J205-6 Orange-Green Dir Sw 5, Escape/Service to J1-11  
 J205-7 Orange-Blue Dir Sw 6, Down/Vol Down to J1-10  
 J205-8 Orange-Violet Dir Sw 7, Up/Vol Up to J1-9  
 J205-9 Orange-Gray Dir Sw 8, Enter/Test to J1-8  
 J205-10 Black ground to J1-15  
 J205-11 Not Used  
 J205-12 Orange-White Enable to J1-18

J206 Not Used

J207-1 Green-Brown Sw Col 1 to playfield switches  
 J207-2 Green-Red Sw Col 2 to playfield switches  
 J207-3 Green-Orange Sw Col 3 to playfield switches  
 J207-4 Green-Yellow Sw Col 4 to playfield switches  
 J207-5 Green-Black Sw Col 5 to playfield switches  
 J207-6 Green-Blue Sw Col 6 to playfield switches  
 J207-7 Green-Violet Sw Col 7 to playfield switches  
 J207-8 Key  
 J207-9 Green-Gray Sw Col 8 to playfield switches  
 J207-10 Not Used  
 J207-11 Not Used

J208 Not Used

J209-1 White-Brown Sw Row 1 to playfield switches  
 J209-2 White-Red Sw Row 2 to playfield switches  
 J209-3 White-Orange Sw Row 3 to playfield switches  
 J209-4 White-Yellow Sw Row 4 to playfield switches  
 J209-5 White-Green Sw Row 5 to playfield switches  
 J209-6 Key  
 J209-7 White-Blue Sw Row 6 to playfield switches  
 J209-8 White-Violet Sw Row 7 to playfield switches  
 J209-9 White-Gray Sw Row 8 to playfield switches

J210-1 Black ground from J904-4; J3-4 Sound Bd; J114-7  
 J210-2 Key  
 J210-3 Black ground from J904-4; J3-5 Sound Bd; J114-5  
 J210-4 Gray +5VDC from J901-1; J3-1 Sound Bd; J114-4  
 J210-5 Gray +5VDC from J3-3 Sound Bd; J114-3  
 J210-6 Gray-Green +12VDC from J904-2; J114-2  
 J210-7 Gray-Green +12VDC from J114-1

J211 Ribbon Cable data from J113

J212-1 Green-Brown Sw Col 1 to J1-1  
 J212-2 Green-Red Sw Col 2 to J1-7  
 J212-3 Not Used  
 J212-4 White-Brown Sw Row 1 to J1-6  
 J212-5 Key  
 J212-6 White-Red Sw Row 2 to J1-5  
 J212-7 White-Orange Sw Row 3 to J1-4  
 J212-8 White-Yellow Sw Row 4 to J1-3

J213-1 Black to battery holder J1-1  
 J213-2 Black to battery holder J1-2  
 J213-3 Key  
 J213-4 Gray to battery holder J1-4  
 J213-5 Gray to battery holder J1-5

## Sound Board A-16917-50036

P1 34-pin Ribbon Cable data to/from J601; J903; J202

J1-1 Black-Yellow signal to cabinet speaker

J1-2 Not Used

J1-3 Key

J1-4 Black ground

J2-1 Black-Yellow signal to display panel speakers

J2-2 Key

J2-3 Not Used

J2-4 Black ground

J3-1 Gray +5V from J114-4; J904-1; J210-4

J3-2 Key

J3-3 Gray +5V from J114-3; J210-5

J3-4 Black ground from J114-7; J904-4; J210-1

J3-5 Black ground from J114-5; J904-5; J210-3

J4-1 Gray-Green 18VAC from xfrmr secondary

J4-2 Gray-Green 18VAC loop from J4-1

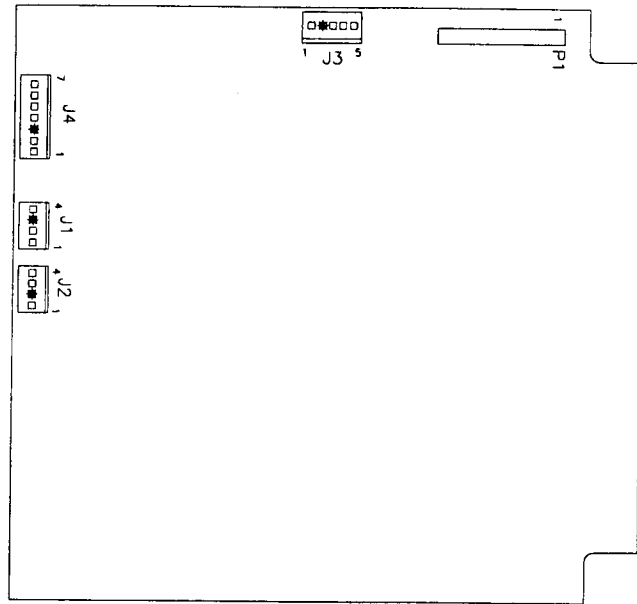
J4-3 Key

J4-4 Gray 18VAC from xfrmr secondary

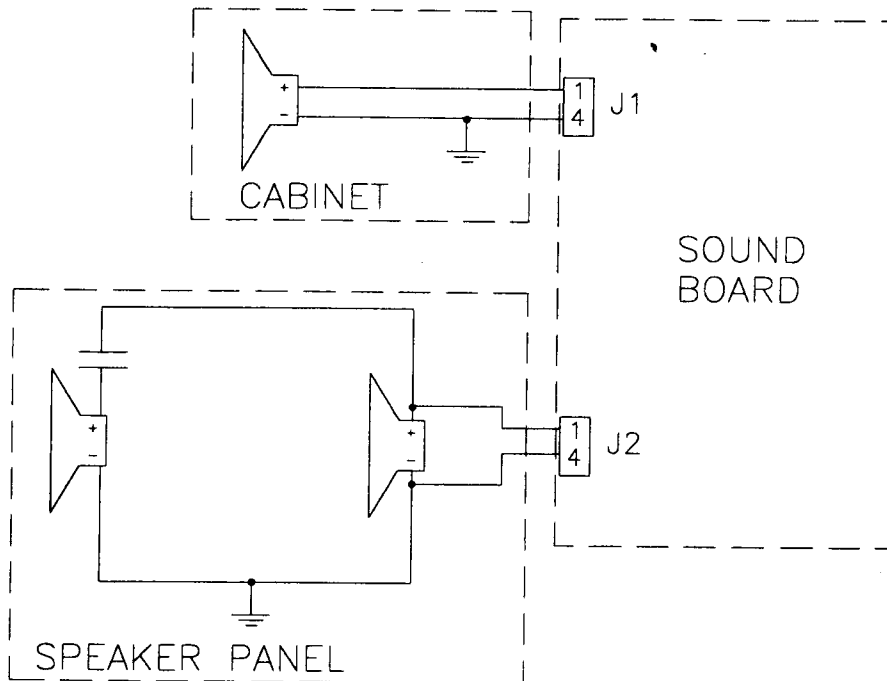
J4-5 Gray 18VAC loop from J4-4

J4-6 Gray-White 18VAC from xfrmr secondary

J4-7 Gray-White loop from J4-6

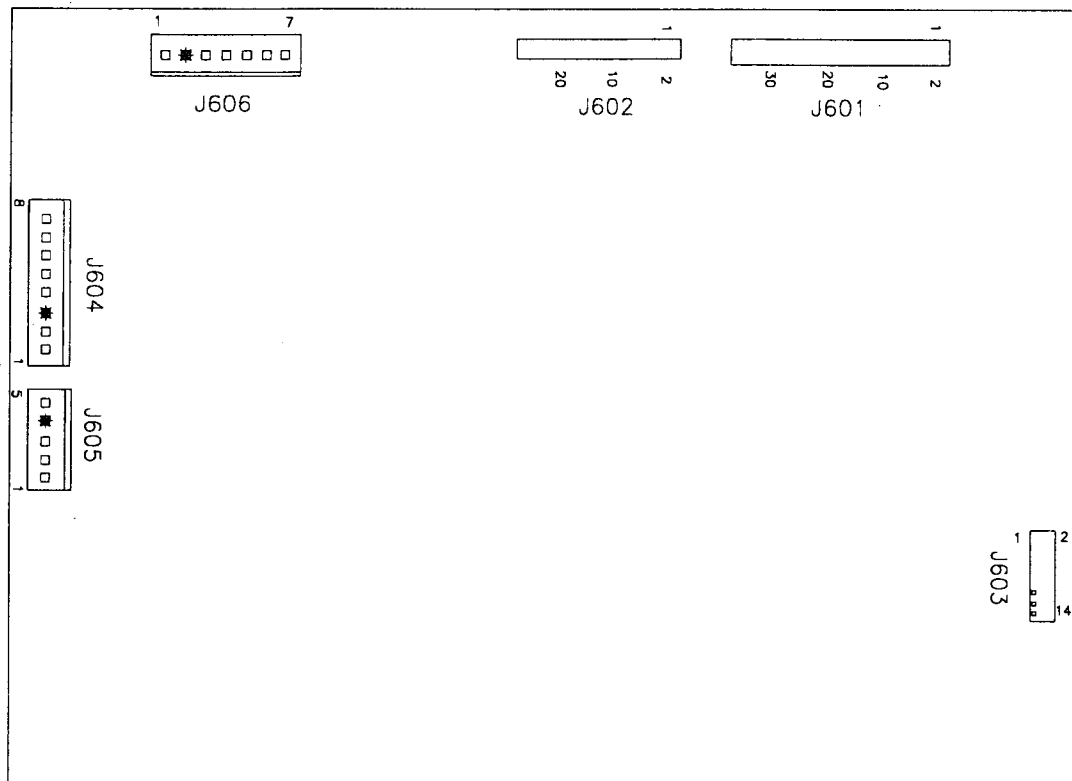


### Speaker Wiring Diagram





## Dot Matrix Contoller Board A-14039.1



J601 Ribbon Cable data to/from J202; J903; Dot Matrix Display/Driver P1

J601 Ribbon Cable data from J201

J603 Ribbon Cable data to Dot Matrix Display/Driver

J604-1 Orange -125V to Dot Matrix Display/Driver Pin 1

J604-2 Blue -113V to Dot Matrix Display/Driver Pin 2

J604-3 Key

J604-4 Black ground to Dot Matrix Display/Driver Pin 4

J604-5 Black ground to Dot Matrix Display/Driver Pin 5

J604-6 Gray +5V to Dot Matrix Display/Driver Pin 6

J604-7 Gray-Yellow +12V Dot Matrix Display/Driver Pin 7

J604-8 Brown +62 to Dot Matrix Display/Driver Pin 8

J605-1 White 80VAC from xfrmr secondary

J605-2 White 80VAC from xfrmr secondary

J605-3 Violet 100VAC from xfrmr secondary

J605-4 Key

J605-5 Violet 100VAC from xfrmr secondary

J606-1 Black ground loop from J606-3

J606-2 Key

J606-3 Black ground from J117-3

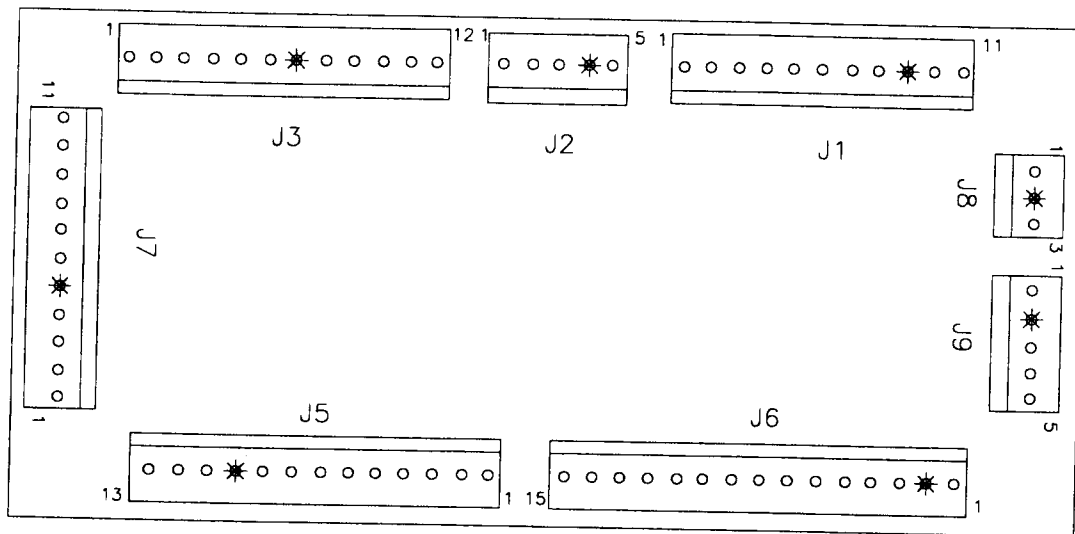
J606-4 Gray +5V loop from J606-5

J606-5 +5V from J117-4

J606-6 Gray-Yellow +12V loop from J606-7

J606-7 Gray-Yellow +12V from J117-2

## Coin Door Interface P.C.B. Assembly A-17051-1



J1-1 Orange-Gray dedicated row 8 from J205-9  
 J1-2 Orange-Violet dedicated row 7 from J205-8  
 J1-3 Orange-Blue dedicated row 6 from J205-7  
 J1-4 Orange-Green dedicated row 5 from J205-6  
 J1-5 Orange-Yellow dedicated row 4 from J205-4  
 J1-6 Orange-Black dedicated row 3 from J205-3  
 J1-7 Orange-Red dedicated row 2 from J205-2  
 J1-8 Orange-Brown dedicated row 1 from J205-1  
 J1-9 Key  
 J1-10 Black ground from J205-10  
 J1-11 Orange-White switch enable from J205-12

J2-1 Black ground from J116-3  
 J2-2 Gray-Yellow +12VAC from J116-2  
 J2-3 White-Violet G.I. 6.8VAC from J119-1  
 J2-4 Key  
 J2-5 Violet G.I. from J119-3

J3-1 Green-Brown switch column 1 from J212-1  
 J3-2 Green-Red switch column 2 from J212-2  
 J3-3 White-Brown switch row 1 from J212-4  
 J3-4 White-Red switch row 2 from J212-6  
 J3-5 White-Orange switch row 3 from J212-7  
 J3-6 White-Yellow switch row 4 from J212-8  
 J3-7 Key  
 J3-8 Yellow-Gray lamp column 8 from J136-3  
 J3-9 Red-Blue lamp row 6 from J134-7  
 J3-10 Red-Violet lamp row 7 from J134-8  
 J3-11 Red-Gray lamp row 8 from J134-9  
 J3-12 Not Used

J4 Not Used

J5-1 Violet G.I. return to coin door  
 J5-2 White-Violet G.I. 6.8VAC to coin door  
 J5-3 Black ground to coin door  
 J5-4 Orange-Brown dedicated switch row 1 to coin door  
 J5-5 Orange-Red dedicated switch row 2 to coin door  
 J5-6 Orange-Black dedicated switch row 3 to coin door  
 J5-7 Orange-Green dedicated switch row 5 to coin door  
 J5-8 Orange-Blue dedicated switch row 6 to coin door  
 J5-9 Orange-Violet dedicated switch row 7 to coin door  
 J5-10 Key  
 J5-11 Orange-Gray dedicated switch row 8 to coin door  
 J5-12 Green-Red switch column 2 to coin door Slam Tilt  
 J5-13 White-Brown switch row 1 to coin door Slam Tilt

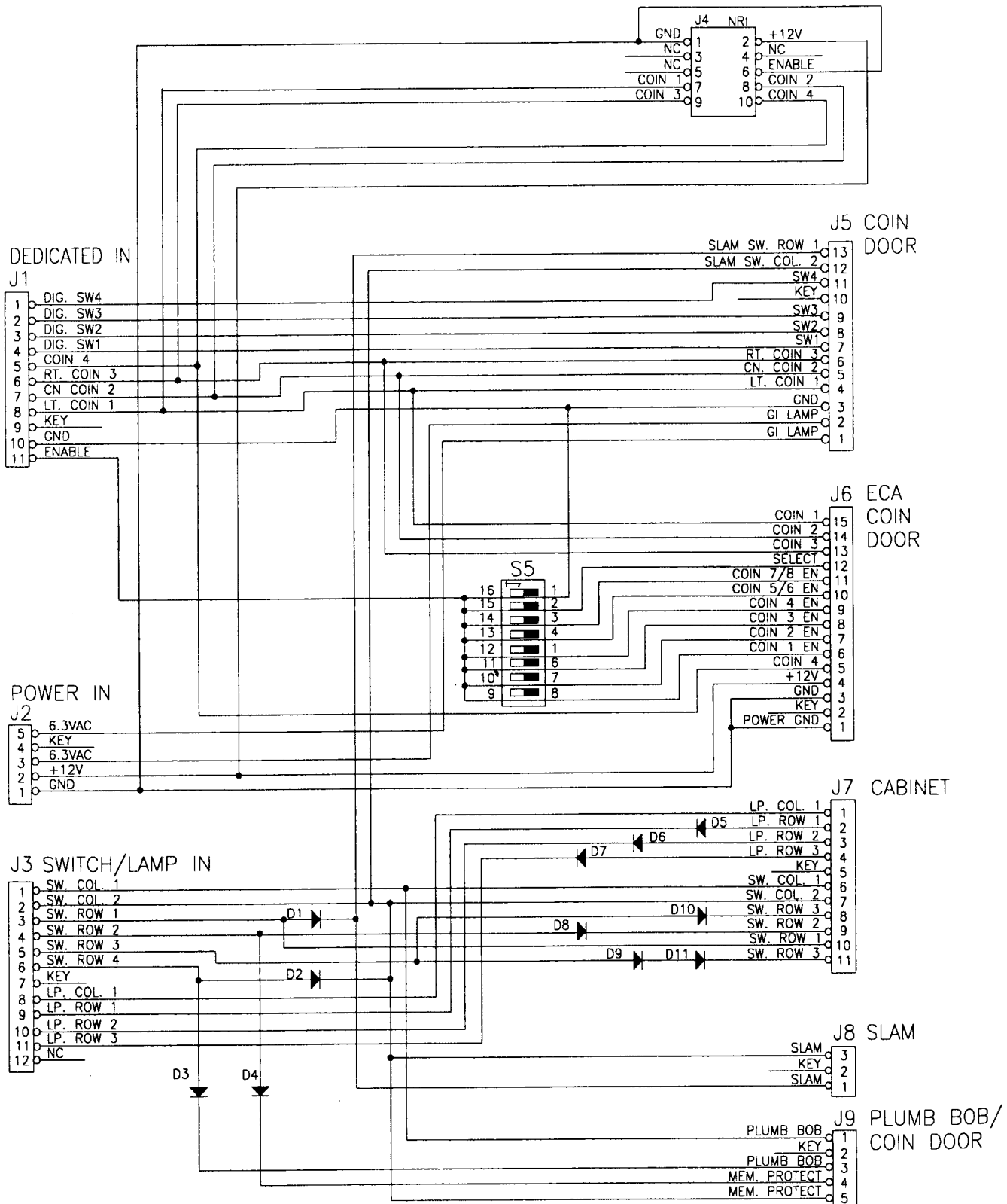
J6 Not Used

J7-1 Yellow-Gray lamp column 8 to cabinet  
 J7-2 Not Used  
 J7-3 Red-Violet lamp row 7 to cabinet  
 J7-4 Red-Gray lamp row 8 to cabinet  
 J7-5 Key  
 J7-6 Green-Brown switch column 1 to cabinet  
 J7-7 Green-Red switch column 2 to cabinet  
 J7-8 White-Orange switch row 3 to cabinet  
 J7-9 White-Red switch row 2 to cabinet  
 J7-10 White-Brown switch row 1 to cabinet  
 J7-11 White-Orange switch row 3 to cabinet

J8-1 White switch row to cabinet Slam Tilt  
 J8-2 Key  
 J8-3 Green switch column to cabinet Slam Tilt

J9-1 White-Yellow switch row 4 to Plumb Bob Tilt  
 J9-2 Key  
 J9-3 Green-Brown switch column 1 to Plumb Bob Tilt  
 J9-4 White-Red switch row 2 to Interlock Switch  
 J9-5 Green-Red switch column 2 to Interlock Switch

# Coin Door Interface P.C.B. Schematic

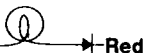


# Notes

## Notes

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# LAMP MATRIX

|                          |                          | Yellow (B+)  |                              |                          |                           |                            |                             |                             |
|--------------------------|--------------------------|------------------------------------------------------------------------------------------------|------------------------------|--------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|
| Column                   | 1                        | 2                                                                                              | 3                            | 4                        | 5                         | 6                          | 7                           | 8                           |
| Row                      | 1                        | 2                                                                                              | 3                            | 4                        | 5                         | 6                          | 7                           | 8                           |
| Red-Brown<br>J133-1 Q90  | SHOOT AGAIN<br>11        | LEFT RAMP JACKPOT<br>21                                                                        | SCARF SCENES COMPLETE<br>31  | RIGHT RAMP ARROW<br>41   | LOCK 2<br>51              | MINI LEFT STANDUP 4<br>61  | MINI RIGHT STANDUP 4<br>71  | LEFT RAMP LEFT RING<br>81   |
| Red-Black<br>J133-2 Q89  | LEFT OUTLANE<br>12       | MON(G)OL<br>22                                                                                 | SCARF BATTLE-FIELD<br>32     | RIGHT RAMP JACKPOT<br>42 | LOCK 3<br>52              | MINI LEFT STANDUP 23<br>62 | MINI RIGHT STANDUP 3<br>72  | LEFT RAMP RIGHT RING<br>82  |
| Red-Orange<br>J133-4 Q88 | LEFT RETURN LANE<br>13   | LEFT RAMP ARROW<br>23                                                                          | SCARF SHADOW MULTIBALL<br>33 | "START SCENE"<br>43      | LOCK 1<br>53              | MINI LEFT STANDUP 12<br>63 | MINI RIGHT STANDUP 2<br>73  | RIGHT RAMP LEFT RING<br>83  |
| Red-Yellow<br>J133-5 Q87 | RIGHT RETURN LANE<br>14  | MO(N)GOL<br>24                                                                                 | SCARF KHAN MULTIBALL<br>34   | WHO KNOWS<br>44          | INNER SANCTUM ARROW<br>54 | MINI LEFT STANDUP 1<br>64  | MINI RIGHT STANDUP 1<br>74  | RIGHT RAMP RIGHT RING<br>84 |
| Red-Green<br>J133-6 Q86  | RIGHT OUTLANE<br>15      | M(O)NGOL<br>25                                                                                 | PUNISH GUILTY<br>35          | EXTRA BALL<br>45         | CENTER STANDUP<br>55      | MINI TOP CENTER LEFT<br>65 | MINI TOP CENTER RIGHT<br>75 | RIGHT EJECT ARROW<br>85     |
| Red-Blue<br>J133-7 Q85   | MONGO(L)<br>16           | (M)ONGOL<br>26                                                                                 | DUAL OF WILLS<br>36          | FINAL BATTLE<br>46       | BATTLE-FIELD READY<br>56  | KHAN MULTIBALL<br>66       | LEFT LOOP JACKPOT<br>76     | MONG(O)L<br>86              |
| Red-Violet<br>J133-8 Q84 | RIGHT LOOP ARROW<br>17   | FARLEY CLAYMORE<br>27                                                                          | BERYLLIUM SPHERE<br>37       | SHADOW LOOP<br>47        | BATTLE DROP JACKPOT<br>57 | SUPER JACKPOT<br>67        | LEFT MONGOL HURRY<br>77     | BUY-IN BUTTON<br>87         |
| Red-Gray<br>J133-9 Q83   | RIGHT MONGOL HURRY<br>18 | UNDER-WATER DOOM<br>28                                                                         | HOTEL MONOLITH<br>38         | INNER LOOP JACKPOT<br>48 | INNER LOOP ARROW<br>58    | BATTLE DROP ARROW<br>68    | LEFT LOOP ARROW<br>78       | CREDIT BUTTON<br>88         |

J1XX = Power Driver Board

# SWITCH MATRIX

| Dedicated Grounded Switches                                                             |  | Column<br>Row | 1<br>Green-Brown<br>J207-1<br>U20-18 | 2<br>Green-Red<br>J207-2<br>U20-17 | 3<br>Green-Orange<br>J207-3<br>U20-16 | 4<br>Green-Yellow<br>J207-4<br>U20-15 | 5<br>Green-Black<br>J207-5<br>U20-14 | 6<br>Green-Blue<br>J207-6<br>U20-13 | 7<br>Green-Violet<br>J207-7<br>U20-12 | 8<br>Green-Gray<br>J207-9<br>U20-11 | Flipper Grounded Switches    |                                                          |
|-----------------------------------------------------------------------------------------|--|---------------|--------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|------------------------------|----------------------------------------------------------|
| Orange-Brown (1)<br>J205-1<br>Left Coin Chute D1                                        |  | 1             | White-Brown<br>J209-1<br>U18-11      | GUN TRIGGER<br>11                  | SLAM TILT<br>21                       | LEFT RAMP ENTER<br>31                 | TROUGH 1<br>41                       | WALL TARGET DOWN<br>51              | LEFT SLINGSHOT<br>61                  | MINI LEFT STANDUP 1<br>71           | MINI RIGHT STANDUP 4<br>81   | Black-Green<br>J906-1<br>Right Flipper EOS<br>F1         |
| Orange-Red (2)<br>J205-2<br>Center Coin Chute D2                                        |  | 2             | White-Red<br>J209-2<br>U18-9         | RIGHT PHURBA CONTROL<br>12         | COIN DOOR CLOSED<br>22                | RIGHT RAMP ENTER<br>32                | TROUGH 2<br>42                       | MO(N)GOL TARGET<br>52               | RIGHT SLINGSHOT<br>62                 | MINI LEFT STANDUP 2<br>72           | MINI RIGHT STANDUP 3<br>82   | Black-Violet<br>J905-1<br>Right Flipper Opto<br>F2       |
| Orange-Black (3)<br>J205-3<br>Right Coin Chute D3                                       |  | 3             | White-Orange<br>J209-3<br>U18-5      | START BUTTON<br>13                 | BUY-IN BUTTON<br>23                   | INNER SANCTUM<br>33                   | TROUGH 3<br>43                       | MON(G)OL TARGET<br>53               | LOCKUP RIGHT<br>63                    | MINI LEFT STANDUP 3<br>73           | NOT USED<br>83               | Black-Blue<br>J906-3<br>Left Flipper EOS<br>F3           |
| Orange-Yellow (4)<br>J205-4<br>4th Coin Chute D4                                        |  | 4             | White-Yellow<br>J209-4<br>U18-7      | PLUMB BOB TILT<br>14               | ALWAYS CLOSED<br>24                   | LEFT PHURBA CONTROL<br>34             | TROUGH 4<br>44                       | LEFT LOOP ENTER<br>54               | LOCKUP MIDDLE<br>64                   | MINI LEFT STANDUP 4<br>74           | MINI RIGHT STANDUP 1<br>84   | Black-Gray<br>J905-2<br>Left Flipper Opto<br>F4          |
| Orange-Green (5)<br>J205-6<br>Normal Function<br>Ser Credits<br>Test Function<br>Esc D5 |  | 5             | White-Green<br>J209-5<br>U19-11      | RIGHT OUTLANE<br>15                | (M)ONGOL TARGET<br>25                 | LEFT RUBBER<br>35                     | TROUGH 5<br>45                       | BATTLE DROP DOWN<br>55              | LOCKUP LEFT<br>65                     | LEFT RAMP LEFT MADE<br>75           | MINI DROP LEFT<br>85         | Black-Violet<br>J906-4<br>Upper Right Flipper EOS<br>F5  |
| Orange-Blue (6)<br>J205-7<br>Normal Function<br>Vol Down<br>Test Function<br>Down D6    |  | 6             | White-Blue<br>J209-7<br>U19-9        | RIGHT RETURN LANE<br>16            | M(O)NGOL TARGET<br>26                 | MINI LOCKER<br>36                     | TOP TROUGH<br>46                     | CENTER STANDUP<br>56                | LEFT EJECT<br>66                      | LEFT RAMP RIGHT MADE<br>76          | MINI DROP MIDDLE LEFT<br>86  | Black-Yellow<br>J905-3<br>Upper Right Flipper Opto<br>F6 |
| Orange-Violet (7)<br>J205-8<br>Normal Function<br>Vol Up<br>Test Function<br>Up D7      |  | 7             | White-Violet<br>J209-8<br>U19-5      | LEFT RETURN LANE<br>17             | MONGOL(L) TARGET<br>27                | MINI LIMIT LEFT<br>37                 | INNER LOOP ENTER<br>47               | RIGHT LOOP ENTER<br>57              | RIGHT EJECT<br>67                     | RIGHT RAMP LEFT MADE<br>77          | MINI DROP MIDDLE RIGHT<br>87 | Black-Gray<br>J906-5<br>Upper Left Flipper EOS<br>F7     |
| Orange-Gray (8)<br>J205-9<br>Normal Function<br>Begin Test<br>Test Function<br>Enter D8 |  | 8             | White-Gray<br>J209-9<br>U19-7        | LEFT OUTLANE<br>18                 | MONG(O)L TARGET<br>28                 | MINI LIMIT RIGHT<br>38                | SHOOTER<br>48                        | MINI EXIT TUBE<br>58                | POPPER<br>68                          | RIGHT RAMP RIGHT MADE<br>78         | MINI DROP RIGHT<br>88        | Black-Blue<br>J905-5<br>Upper Left Flipper Opto<br>F8    |

J2XX = CPU Board; J9XX = Fliptronic II Board;

 = Opto, Typically Closed

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