

*Bally*

JANUARY 1996  
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FINAL

# ATTACK FROM MARS™



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CE

**Operations Manual Includes:**

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

Midway Manufacturing Company, 3401 North California Avenue, Chicago, Illinois 60618

# DIP SWITCH SETTINGS AND JUMPERS

| EPROM Jumper Settings for G11 | 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  |
| European | 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 Flashlamp Type |           |
|-----------------------------|---------------------|---------------------|---------------------|-----------------|------------------|-------------------|---------|---------------|------------------|-------------------------------------|-----------|
|                             |                     |                     | Playfield           | Backbox Cabinet |                  | Playfield         | Backbox | Cabinet       |                  | Playfield                           | Backbox   |
| 01                          | AUTO PLUNGER        | High Power          | J133-2              |                 | Q72              | J116-1            |         |               | Vio-Brn          | AE-23-800                           |           |
| 02                          | TROUGH EJECT        | High Power          | J133-2              |                 | Q68              | J116-2            |         |               | Vio-Red          | AE-26-1500                          |           |
| 03                          | LEFT POPPER         | High Power          | J133-2              |                 | Q71              | J116-4            |         |               | Vio-Org          | AE-26-800                           |           |
| 04                          | RIGHT POPPER        | High Power          | J133-2              |                 | Q67              | J116-5            |         |               | Vio-Yel          | AE-25-1000                          |           |
| 05                          | LEFT ALIEN LOW      | High Power          | J133-2              |                 | Q70              | J116-6            |         |               | Vio-Grn          | AE-26-1500                          |           |
| 06                          | LEFT ALIEN HIGH     | High Power          | J133-2              |                 | Q66              | J116-7            |         |               | Vio-Blu          | AE-26-1500                          |           |
| 07                          | KNOCKER             | High Power          |                     | J133-2          | Q69              |                   | J116-8  |               | Vio-Blk          |                                     | AE-23-800 |
| 08                          | RIGHT ALIEN HIGH    | High Power          | J133-2              |                 | Q65              | J116-9            |         |               | Vio-Gry          | AE-26-1500                          |           |
| 09                          | LEFT SLINGSHOT      | Low Power           | J133-3              |                 | Q44              | J113-1            |         |               | Brn-Blk          | AE-26-1200                          |           |
| 10                          | RIGHT SLINGSHOT     | Low Power           | J133-3              |                 | Q48              | J113-3            |         |               | Brn-Red          | AE-26-1200                          |           |
| 11                          | LEFT JET            | Low Power           | J133-3              |                 | Q43              | J113-4            |         |               | Brn-Org          | AE-26-1200                          |           |
| 12                          | BOTTOM JET          | Low Power           | J133-3              |                 | Q47              | J113-5            |         |               | Brn-Yel          | AE-26-1200                          |           |
| 13                          | RIGHT JET           | Low Power           | J133-3              |                 | Q42              | J113-6            |         |               | Brn-Grn          | AE-26-1200                          |           |
| 14                          | RIGHT ALIEN LOW     | Low Power           | J133-3              |                 | Q46              | J113-7            |         |               | Brn-Blu          | AE-26-1500                          |           |
| 15                          | SAUCER SHAKE        | Low Power           | J133-3              |                 | Q41              | J113-8            |         |               | Brn-Vio          | AE-26-1500                          |           |
| 16                          | DROP TARGET         | Low Power           | J133-3              |                 | Q45              | J113-9            |         |               | Brn-Gry          | AE-26-1200                          |           |
| 17                          | RIGHT RAMP HIGH (2) | Flasher             | J133-6              | J134-5          | Q28              | J111-1            | J112-1  |               | Blk-Brn          | #906                                | #906      |
| 18                          | RIGHT RAMP LOW (2)  | Flasher             | J133-6              | J134-5          | Q32              | J111-2            | J112-2  |               | Blk-Red          | #906                                | #906      |
| 19                          | RIGHT SIDE HIGH (2) | Flasher             | J133-6              | J134-5          | Q27              | J111-3            | J112-3  |               | Blk-Org          | #906                                | #906      |
| 20                          | RIGHT SIDE LOW      | Flasher             | J133-6              |                 | Q31              | J111-4            |         |               | Blk-Yel          | #89                                 |           |
| 21                          | CENTER ARROW        | Flasher             | J133-6              |                 | Q26              | J111-5            |         |               | Blu-Grn          | #906                                |           |
| 22                          | JETS                | Flasher             | J133-6              |                 | Q30              | J111-6            |         |               | Blu-Blk          | #89                                 |           |
| 23                          | SAUCER DOME         | Flasher             | J133-6              |                 | Q25              | J111-7            |         |               | Blu-Vio          | #906                                |           |
| 24                          | MOTOR BANK          | Flasher             | J140-2              |                 | Q29              | J111-8            |         |               | Blu-Gry          | 14-8023                             |           |
| 25                          | LEFT RAMP LEFT (2)  | Gen. Purpose        | J133-6              | J134-5          | Q16              | J109-1            | J107-1  |               | Blu-Brn          | #906                                | #906      |
| 26                          | LEFT RAMP RIGHT (2) | Gen. Purpose        | J133-6              | J134-5          | Q15              | J109-2            | J107-3  |               | Blu-Red          | #906                                | #906      |
| 27                          | LEFT SIDE HIGH (2)  | Gen. Purpose        | J133-6              | J134-5          | Q14              | J109-3            | J107-4  |               | Blu-Org          | #906                                | #906      |
| 28                          | LEFT SIDE LOW       | Gen. Purpose        | J133-6              |                 | Q13              | J109-4            |         |               | Blu-Yel          | #89                                 |           |
| 33                          | RIGHT GATE          | High Power          | J119-6,7            |                 | Q84              | J120-6            |         |               | Yel-Vio          | A-14406                             |           |
| 34                          | LEFT GATE           | Low Power           | J119-6,7            |                 | Q86              | J120-4            |         |               | Org-Vio          | A-14406                             |           |
| 35                          | DIVERTER POWER      | High Power          | J119-8,9            |                 | Q81              | J120-3            |         |               | Yel-Gry          | A-20099                             |           |
| 36                          | DIVERTER HOLD       | Low Power           | J119-8,9            |                 | Q83              | J120-1            |         |               | Org-Gry          | A-20099                             |           |
| 37                          | L.E.D. CLOCK        | Flasher             | J140-2              |                 |                  | J110-1            |         |               | Brn-Wht          | A-20670                             |           |
| 38                          | L.E.D. DATA         | Flasher             | J140-2              |                 |                  | J110-3            |         |               | Vio-Wht          | A-20670                             |           |
| 39                          | STROBE LIGHT        | Flasher             | J140-2              |                 |                  | J110-4            |         |               | Org-Wht          | A-20718                             |           |
| <b>General Illumination</b> |                     |                     |                     |                 |                  |                   |         |               |                  |                                     |           |
| 01                          | BOTTOM PLAYFIELD    | G.I.                | J106-1              | J106-1          | Q5               | J106-7            | J106-7  |               | Wht-Brn          | #44                                 | #555      |
| 02                          | MIDDLE PLAYFIELD    | G.I.                | J106-2              |                 | Q4               | J106-8            |         |               | Wht-Org          | #44, #555                           |           |
| 03                          | TOP PLAYFIELD       | G.I.                | J106-3              |                 | Q3               | J106-9            |         |               | Wht-Yel          | #44, #555                           |           |
| 04                          | **TOP INSERT        | G.I.                |                     | J106-5          | Q2               |                   | J106-10 |               | Wht-Grn          |                                     | #555      |
| 05                          | **BOTTOM INSERT     | G.I.                |                     | J106-6          | Q1               |                   | J106-11 |               | Wht-Vio          |                                     | #555      |
| <b>Flipper Circuits</b>     |                     |                     |                     |                 |                  |                   |         |               |                  |                                     |           |
|                             |                     | Voltage Connections | Drive Transistors   |                 | Drive Connectors | Drive Wire Colors |         | Coil Part No. | Coil Color       |                                     |           |
|                             |                     |                     | Power               | Hold            |                  | Playfield         | Hold    |               |                  |                                     |           |
| 29                          |                     | Lwr. Rt. Power      | J119-1 (Red-Grn)    | Q90             | J120-13          | Yel-Grn           |         |               |                  |                                     |           |
| 30                          | Lower Right Flipper | Lwr. Rt. Hold       | J119-1 (Red-Grn)    | Q92             | J120-11          | Org-Grn           |         | FL-11629      | BLUE             |                                     |           |
| 31                          |                     | Lwr. Lt. Power      | J119-4 (Red-Blu)    | Q87             | J120-9           | Yel-Blu           |         |               |                  |                                     |           |
| 32                          | Lower Left Flipper  | Lwr. Lt. Hold       | J119-4 (Red-Blu)    | Q89             | J120-7           | Org-Blu           |         | FL-11629      | BLUE             |                                     |           |
| 33                          |                     | Upr. Rt. Power      | J119-6 (Red-Vio)    | Q84             | J120-6           | Yel-Vio           |         | SEE           | ABOVE            |                                     |           |
| 34                          | Upper Right Flipper | Upr. Rt. Hold       | J119-6 (Red-Vio)    | Q86             | J120-4           | Org-Vio           |         | SEE           | ABOVE            |                                     |           |
| 35                          |                     | Upr. Lt. Power      | J119-8 (Red-Gry)    | Q81             | J120-3           | Yel-Gry           |         | SEE           | ABOVE            |                                     |           |
| 36                          | Upper Left Flipper  | Upr. Lt. Hold       | J119-8 (Red-Gry)    | Q83             | J120-1           | Org-Gry           |         | SEE           | ABOVE            |                                     |           |

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

\*\*These G.I. strings do not brighten and dim, they are always ON.



## **EPILEPSY WARNING**

A very small portion of the population has a condition which may cause them to experience epileptic seizures or have momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are commonly present in our daily environment. These persons who may never have experienced any such symptoms before may experience seizures while watching some kinds of television pictures or playing certain amusement games or witnessing certain flashing light patterns. We recommend that parents observe their children while <sup>to</sup> play this game. If you or your child experience any of the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements or disorientation, **DISCONTINUE USE IMMEDIATELY** and consult your physician.

## **ATTENTION : RISQUE D'EPILEPSIE**

Certaines personnes sont prédisposées aux crises d'épilepsies ou aux pertes de conscience momentanées quand elles regardent certains flashes lumineux ou images que l'on trouve régulièrement dans notre environnement quotidien. Ces personnes, qui n'ont peut-être jamais développé ces symptômes auparavant, peuvent être sujettes à des crises en regardant la télévision, en jouant sur certains jeux d'amusements ou en subissant certains types de flashes lumineux. Nous recommandons donc aux parents de surveiller leurs enfants lorsqu'ils jouent sur ce jeu. Si vous ou vos enfants développez les symptômes suivants : sensation de vertige, trouble de la vision, convulsion, mouvement involontaire ou désorientation, **ARRETEZ IMMEDIATEMENT L'UTILISATION** et consultez votre médecin.

## **EPILEPSY WARNING**

In sehr seltenen Faellen kann es bei zu Epilepsie neigenden Personen zu Bewusstseinsstoerungen beim Betrachten von bestimmten blinkenden Lichtfolgen oder Mustern, die alltaeglich sind, kommen. Auch bei Personen, die niemals derartige Symptome an sich beobachtet haben, kann es beim Betrachten gewisser Fernsehbilder, beim Spiel an bestimmten Geraeten oder dem Beobachten bestimmter blinkender Lichtfolgen zu Stoerungen kommen. Sollten Sie beim Spielen Symptome wie Schwindelgefuehl, veraendertes Sehvermoegen, Augen- oder Muskelzucken, Bewegungs- oder Orientierungsstoerungen feststellen so beenden Sie sofort das Spiel und konsultieren einen Arzt.



## **AVVISO IMPORTANTE!**

Un'esigua parte della popolazione puo' essere soggetta ad attacchi di epilessia o momentaneo perdite di coscienza quando guarda alcuni particolari tipi di scritte luminose lampeggianti comunemente presenti nell'ambiente in cui viviamo. Queste persone, che tuttavia possono non aver mai sperimentato simili sintomi, possono essere colpite da attacchi epilettici quando guardano certi tipi di immagini televisive oppure giocando con alcuni particolari videogiochi oppure guardando particolari scritte luminose lampeggianti. Si raccomanda quindi di controllare i ragazzi mentre giocano con questo flipper. Se si dovessero provare sensazioni come alterazione della vista, vertigini, contrazioni muscolari o degli occhi, movimenti involontari, **INTERROMPETE IL GIOCO IMMEDIATAMENTE** e consultate il vostro medico.

## WARNINGS & NOTICES

### **WARNING**

**FOR SAFETY AND RELIABILITY**, substitute parts and equipment modifications are not recommended. Use of Non-BALLY parts or modifications of game circuitry, may adversely affect game play, or may cause injuries.

**SUBSTITUTE PART OR EQUIPMENT MODIFICATIONS** may void FCC Type Acceptance.

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### **WARNING**

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generated, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### **RF Interference Notice**

CABLE HARNESS PLACEMENTS and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC Rules.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

**FCC STICKER.** Check the back of your game to verify that an FCC-certification sticker was attached to your game at the factory. All Games that leave the BALLY plant have been tested and found to comply with FCC Rules. Because the sticker is proof of this fact, legal repercussions to the owner and distributor may result, if the sticker is missing. If you receive a game, manufactured after December 1982, that has no FCC sticker, call BALLY for advice or write us a note on your Game Registration Card. Be sure that the card bears your game's serial number.

**FOR SERVICE...**  
CALL your authorized  
BALLY Distributor

**MIDWAY Manufacturing Company**  
3401 N. California Avenue  
Chicago, IL 60618

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**CAUTION: Transport this game ONLY  
with hinged backbox DOWN!**

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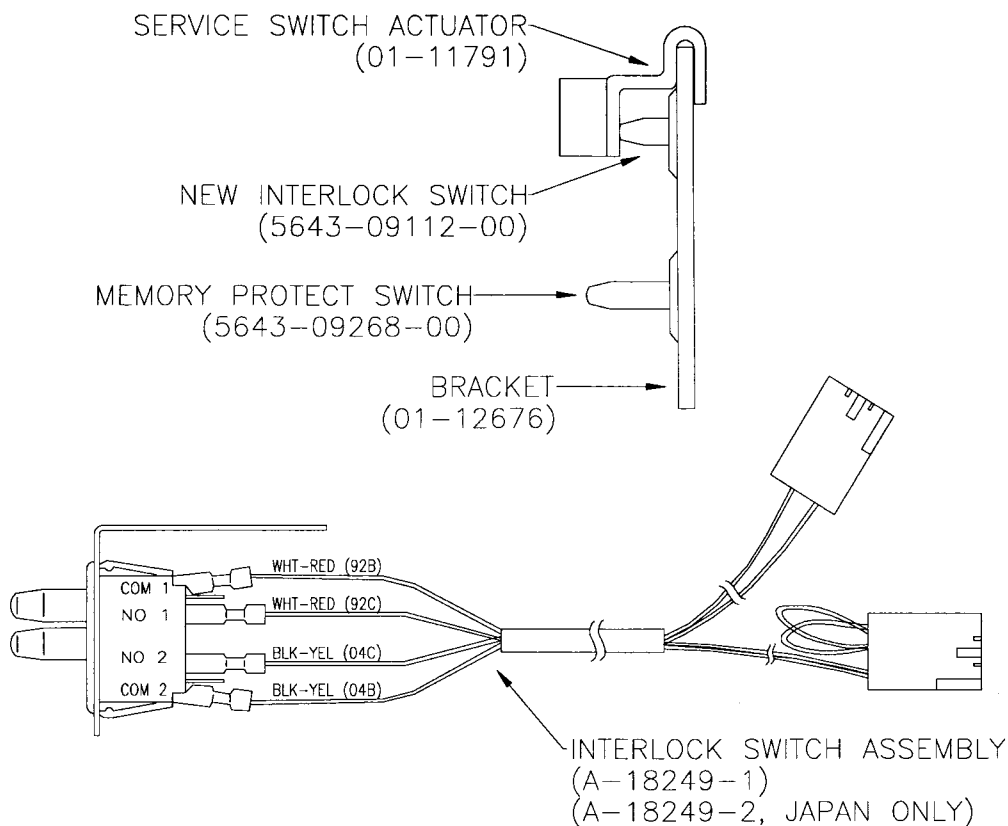
# IMPORTANT NOTICE

## 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.



# **ATTACK FROM MARS™**

Information current at time of release.

Fill out and mail in game registration card. Be sure to include the game serial number.  
For your records, write the game serial number in the manual.

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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(BLANK)



*Bally's*  
**ATTACK FROM MARS™**

**Game Rules and Shotmaps**

# **ATTACK FROM MARS™**

## **GAME RULES**

**SUPER SKILL SHOT:** Hold left flipper button WHILE launching ball. Make any flashing arrow shot to collect.

**ATTACK WAVE:** Complete center 3-bank to start an Attack Wave. Save cities by shooting center shot to destroy the saucer. Save all 5 cities to Attack & Conquer Mars!

**EXTRA BALL:** Complete Attack Waves OR bottom lanes to light Extra Ball. Shoot right eject to collect.

**MULTI-BALL™:** Center loop lights lock. Lock 3 balls in center loop to start 3-ball multi-ball. Shoot ramps and loops to collect jackpots. Collect all 5 jackpots to light moving Super Jackpot.

**MARTIAN ATTACK:** Complete M-A-R-T-I-A-N targets to light Martian Attack at right eject. Shoot right eject to start. Hit all 4 Martians in the time allowed to start Martian Attack 2-ball Multi-ball.

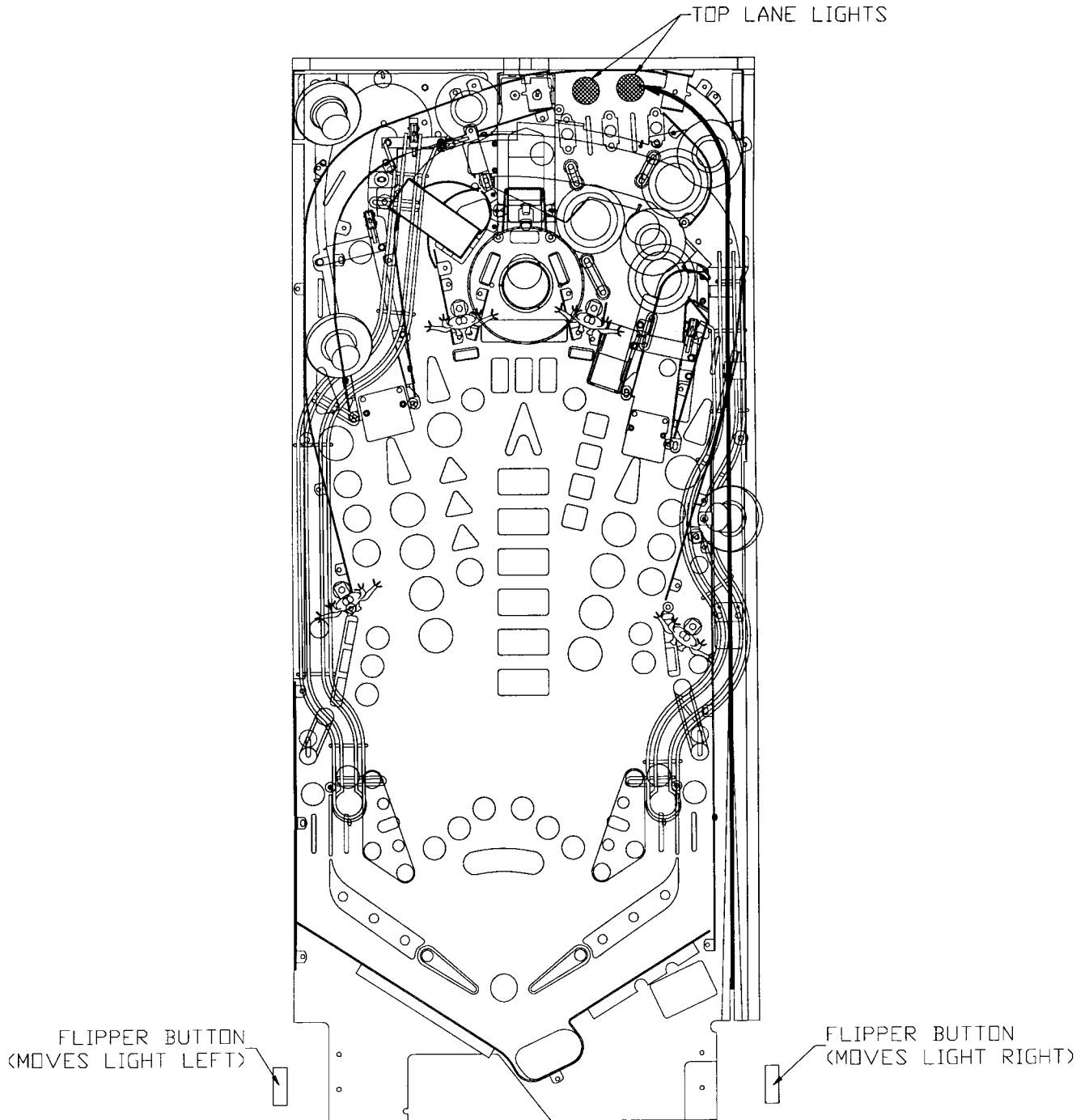
**TOTAL ANNIHILATION:** Complete Capture, Big-O-Beam, Tractor Beam or Atomic Blaster to start HURRY UP. Center shot awards HURRY-UP. Complete all 4 shots to start Total Annihilation 4-ball Multi-ball. Shoot ramps and loops while in Multi-ball to collect big points.

**COMBOS:** Make consecutive ramp and loop shots while red arrows are lit for Combos.

**SUPER JETS:** Get the number of jet hits needed (see display) to start Super Jets for big points.

**RULE THE UNIVERSE:** Collect Super jackpot, Super Jets, Martian Attack Multi-ball, Total Annihilation, Conquer Mars and 5-way combo to light Rule the Universe. Shoot right eject to start. Collect displayed points while in Multi-ball to Rule the Universe.

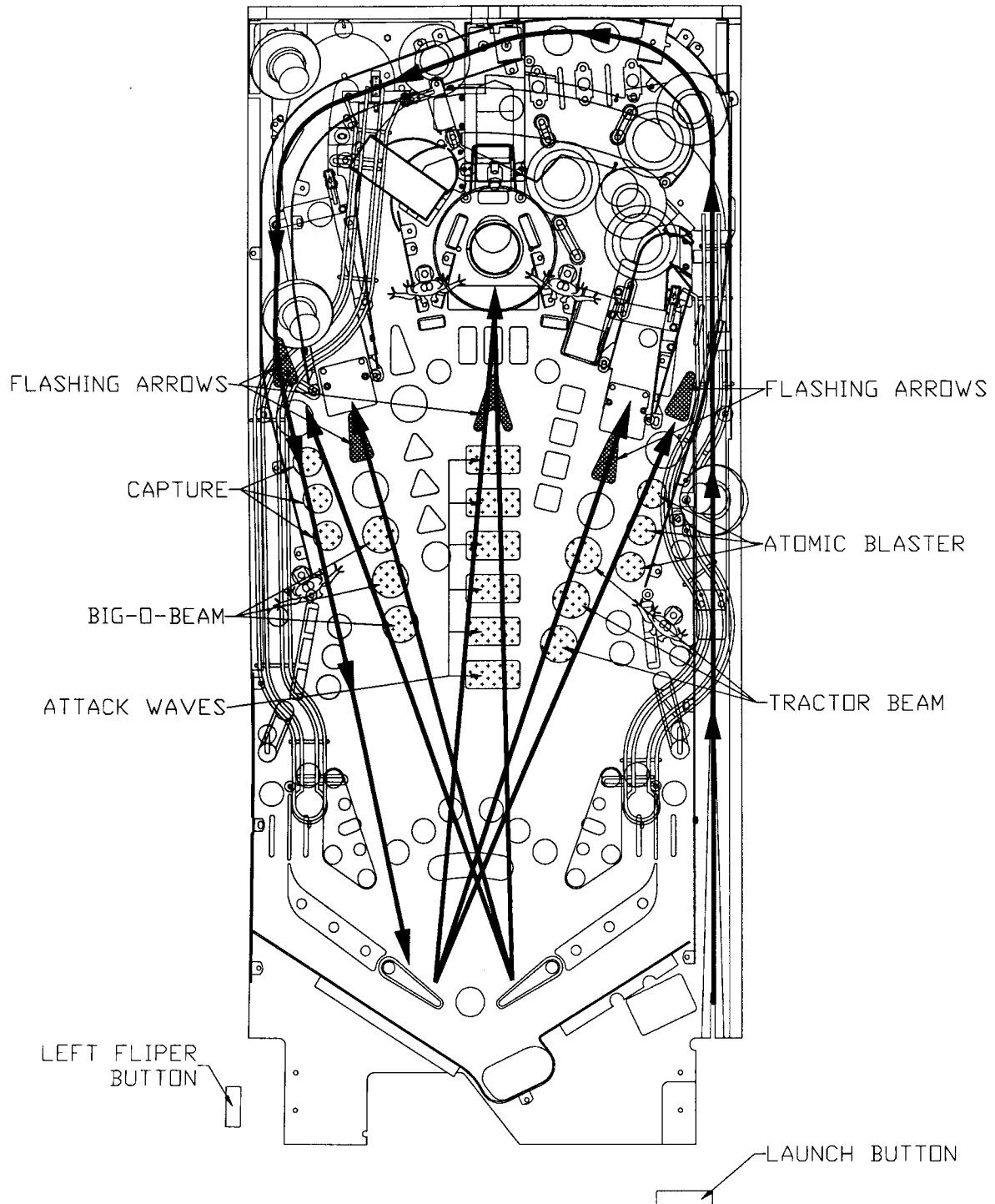
**SKILL SHOT** Collect Skill Shot at ball start by using flippers to move the blinking light on the top lanes to the same lane the ball rolls down. The right flipper button will move the light to the right; the left flipper button will move the light to the left. Skill Shot awards BIG POINTS and Plus 5X Bonus.



**SUPER SKILL SHOT** At ball start, hold left flipper button WHILE launching ball, then make any flashing arrow shot.

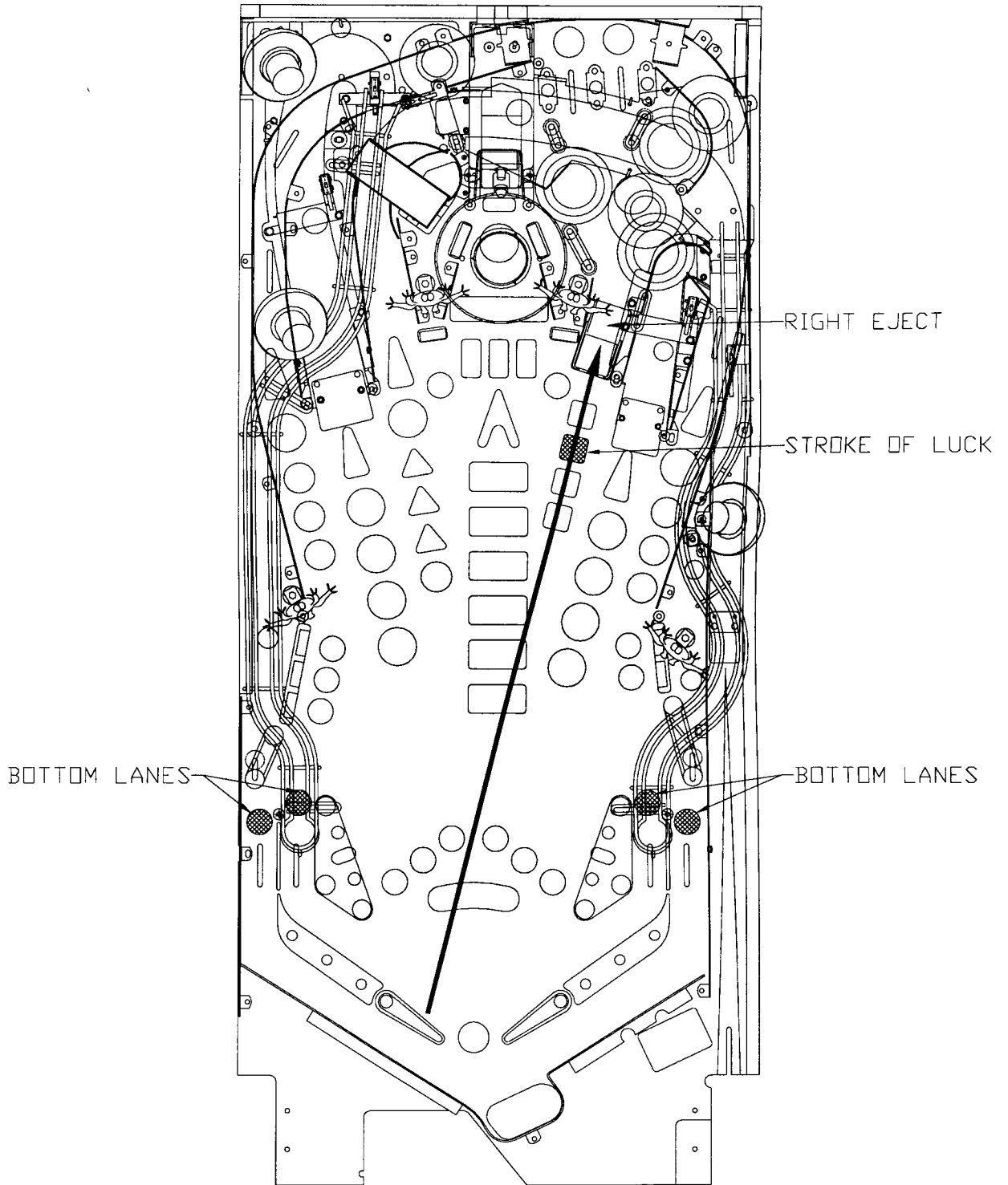
Making a ramp or loop shot will complete all 3 lights (Capture, Big-O-Beam, Atomic Blaster or Tractor Beam) in front of that shot.

Hitting the Center 3-Bank will start an Attack Wave.





**STROKE OF LUCK** Complete bottom lanes to light Stoke of Luck, at right eject. Shoot right eject to collect the Stroke of Luck mystery award (shown in display).

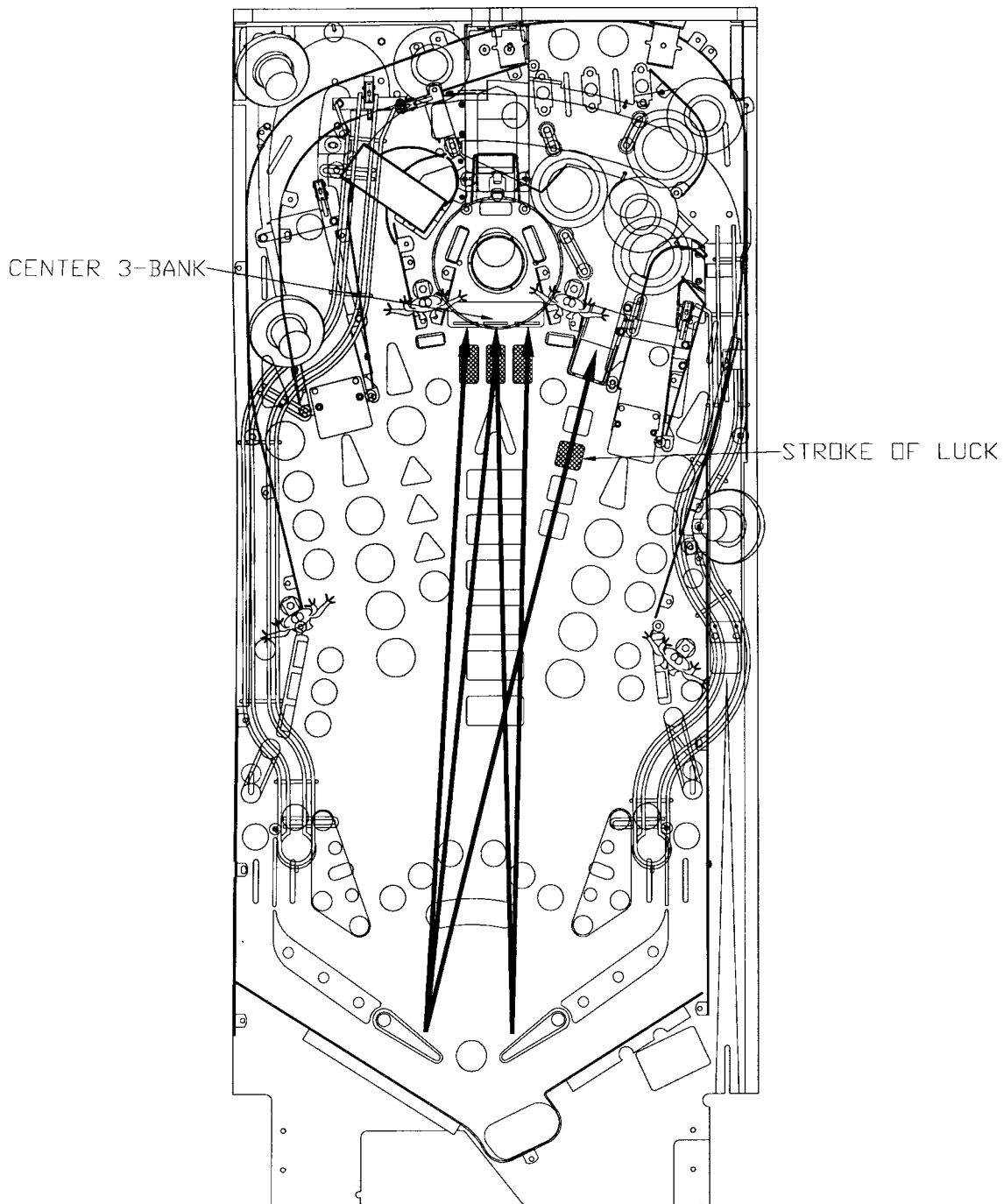


**STROBE MULTI-BALL** A 3-ball multi-ball, awarded by the Stroke of Luck mystery award feature.

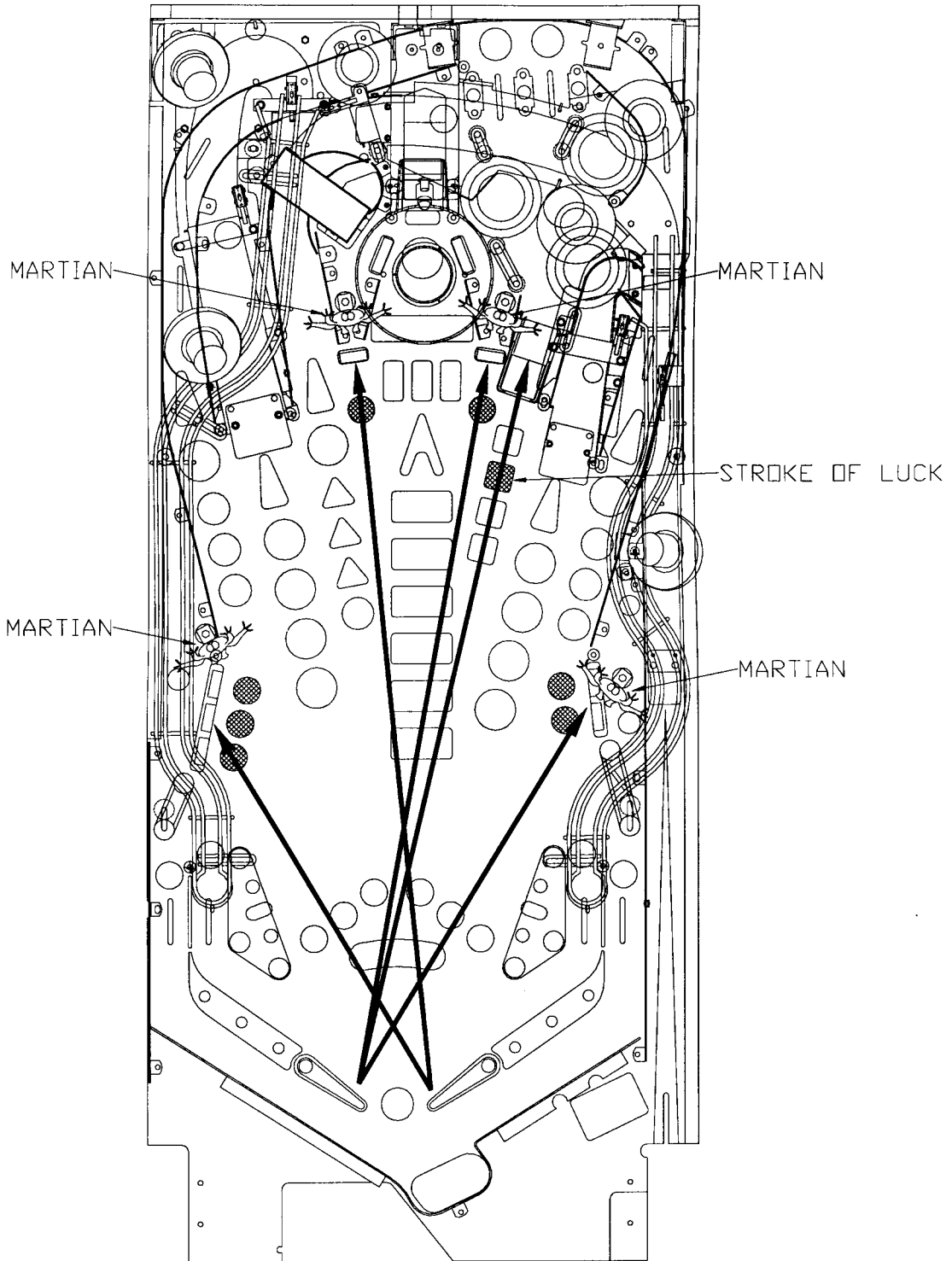
Hit center 3-bank while in multi-ball for BIG POINTS.

Hit center 3-bank, the displayed number of times, to light Extra Ball or collect Strobe Jackpot.

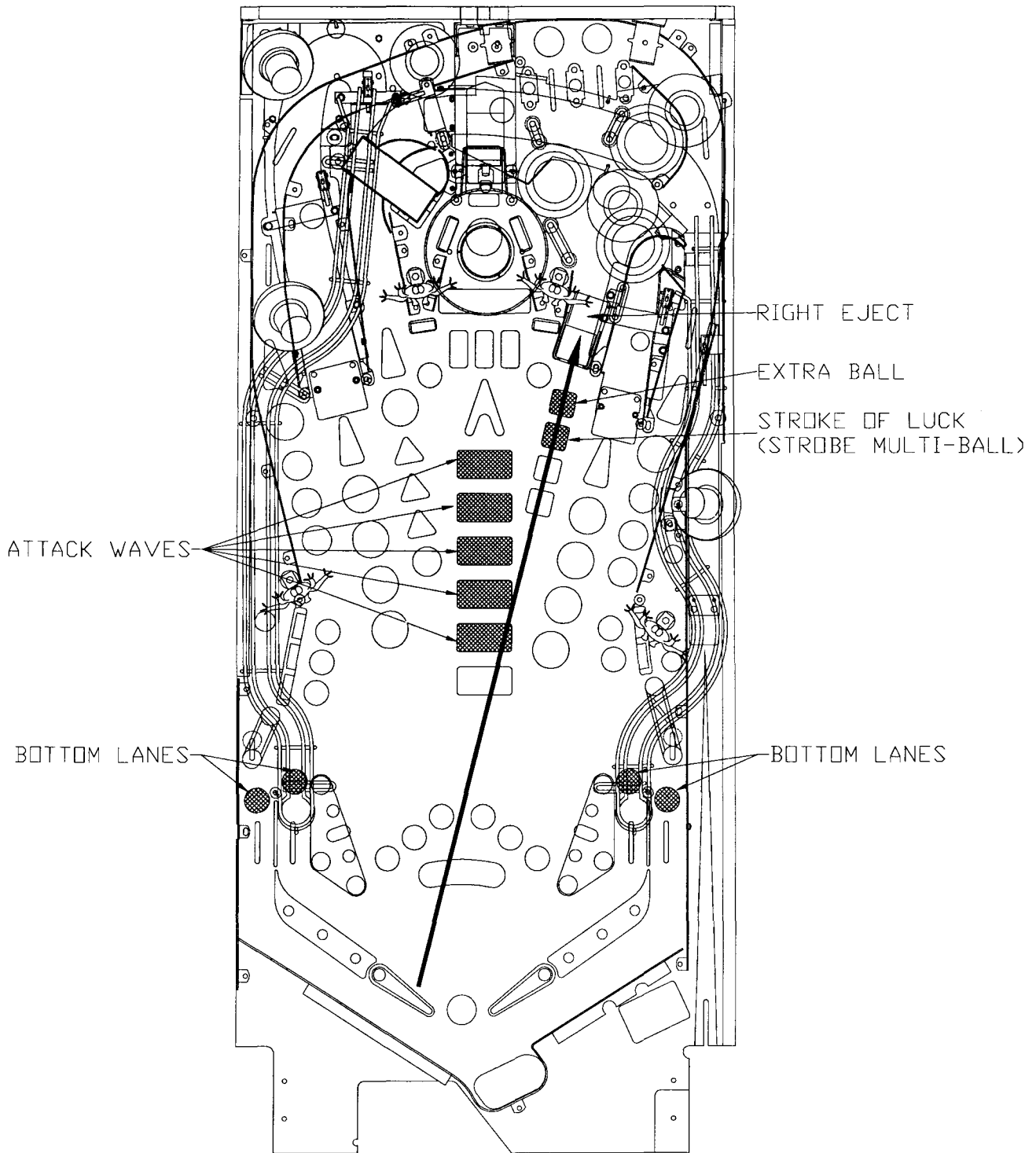
**Note:** During Strobe Multi-ball, the playfield is only lit up by the flashing strobe light.



**SNEAK ATTACK** Awarded by Stroke of Luck mystery award feature, this will start a Hurry-Up on one of the Martians. Hit the jumping Martian in the time allowed to score BIG POINTS.



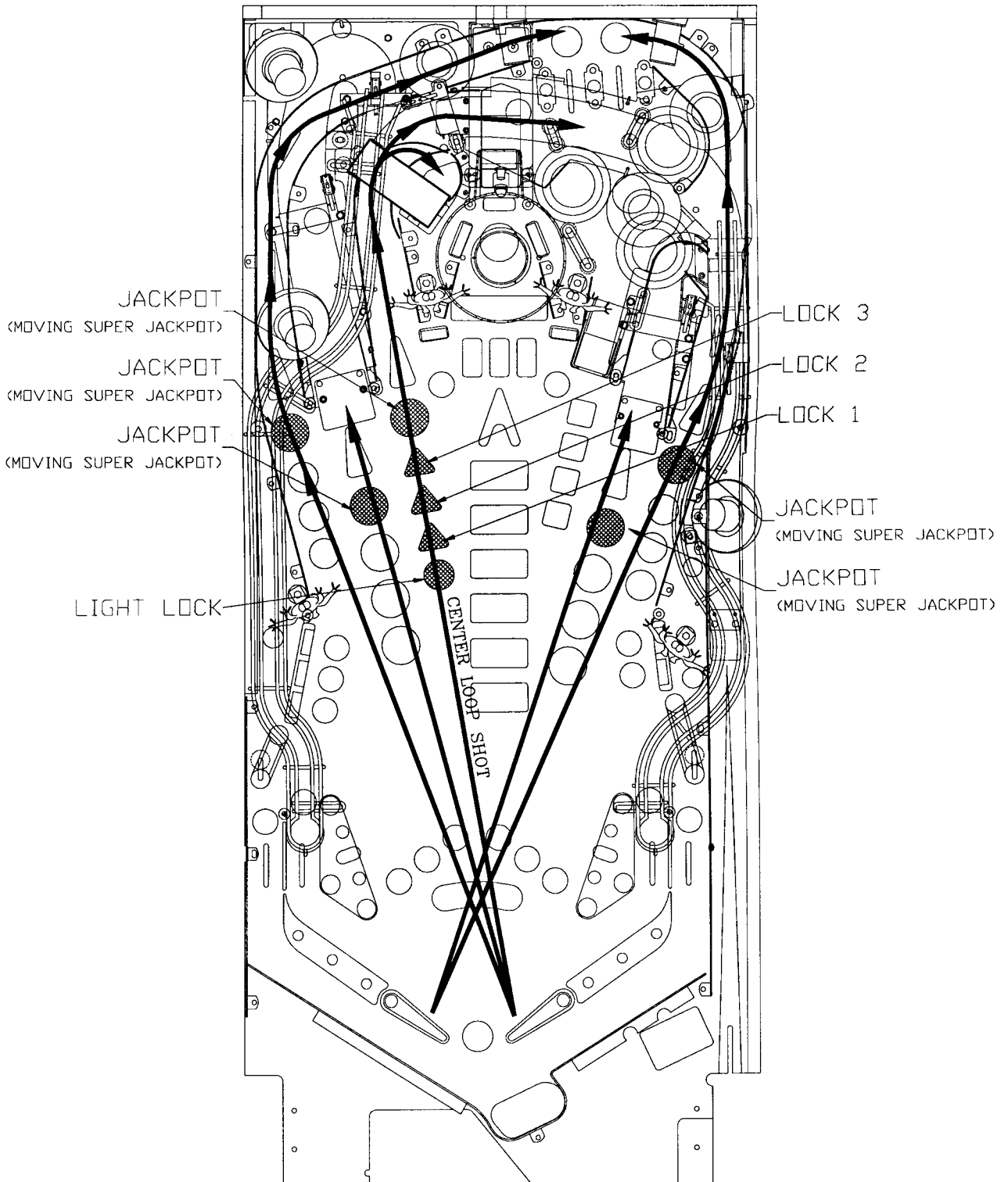
**EXTRA BALL** To light Extra ball, complete Attack Waves or light all 4 bottom rollover lanes (the displayed number of times) or during Strobe Multi-ball. Shoot right eject to collect Extra ball.





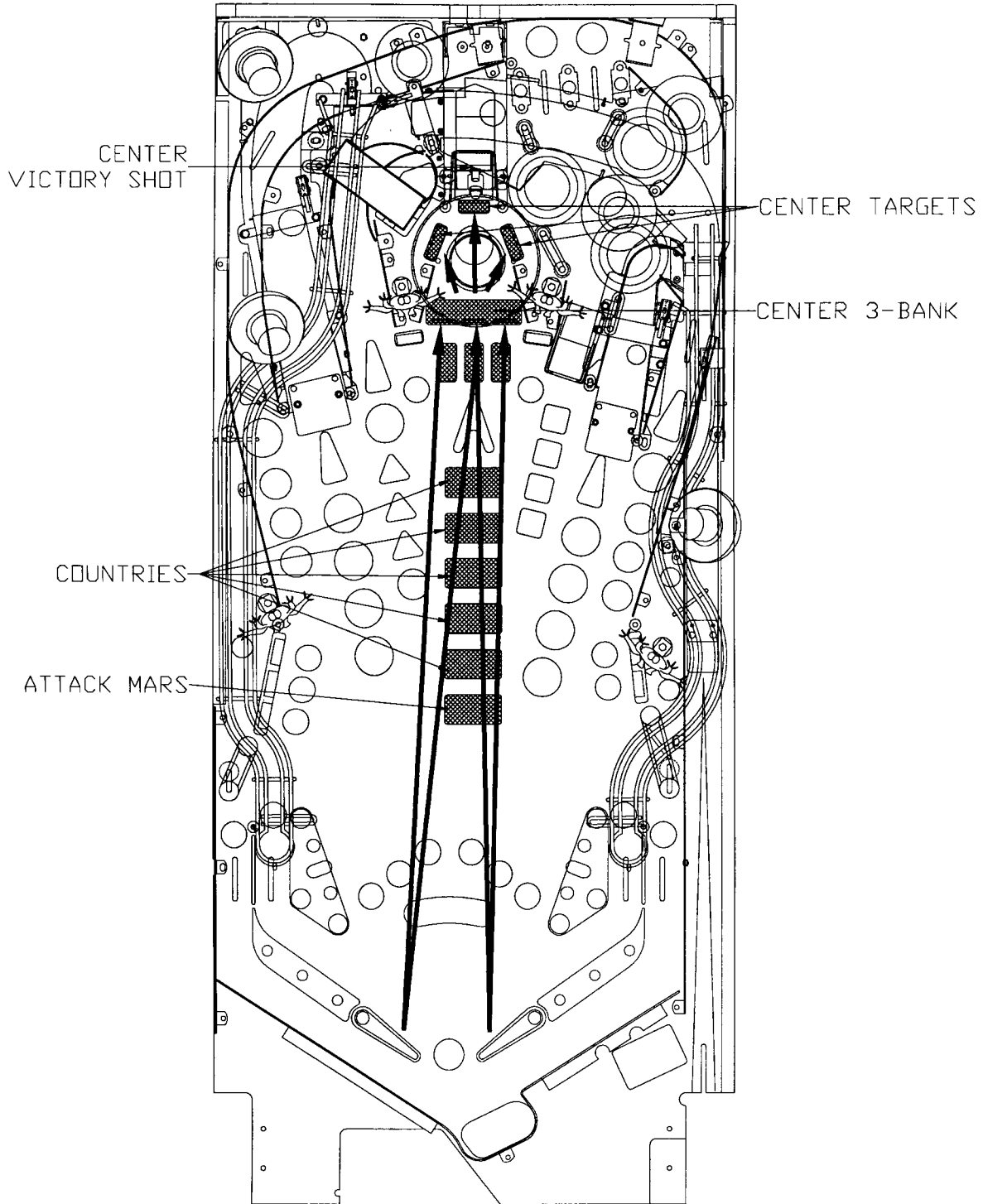
**MULTI-BALL™** Make center loop to light Locks, then shoot center loop to lock ball when lit. Lock 3 balls to start Multi-ball. Make ramp and loop shots to collect Jackpots.

Collect all 5 Jackpots to light moving Super Jackpot. Shoot moving jackpot light to collect Super Jackpot.

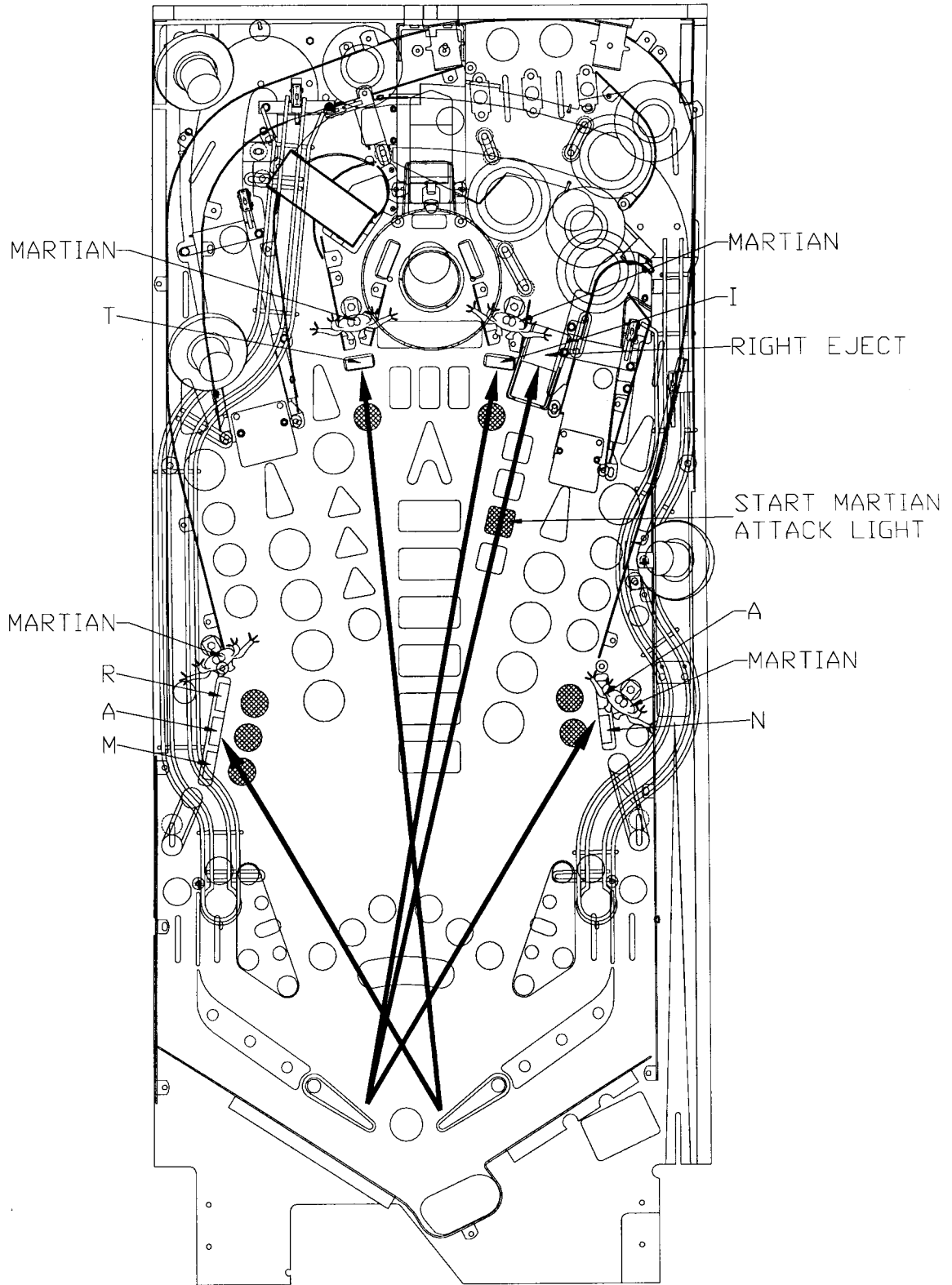


**ATTACK WAVES** Complete center 3-bank to start an Attack Wave. Save countries by shooting the center targets, then make center Victory Shot to destroy the attacking saucer.

Save all 5 countries to Attack Mars! When attacking Mars, shoot the center Victory Shot 10 times to Conquer Mars!

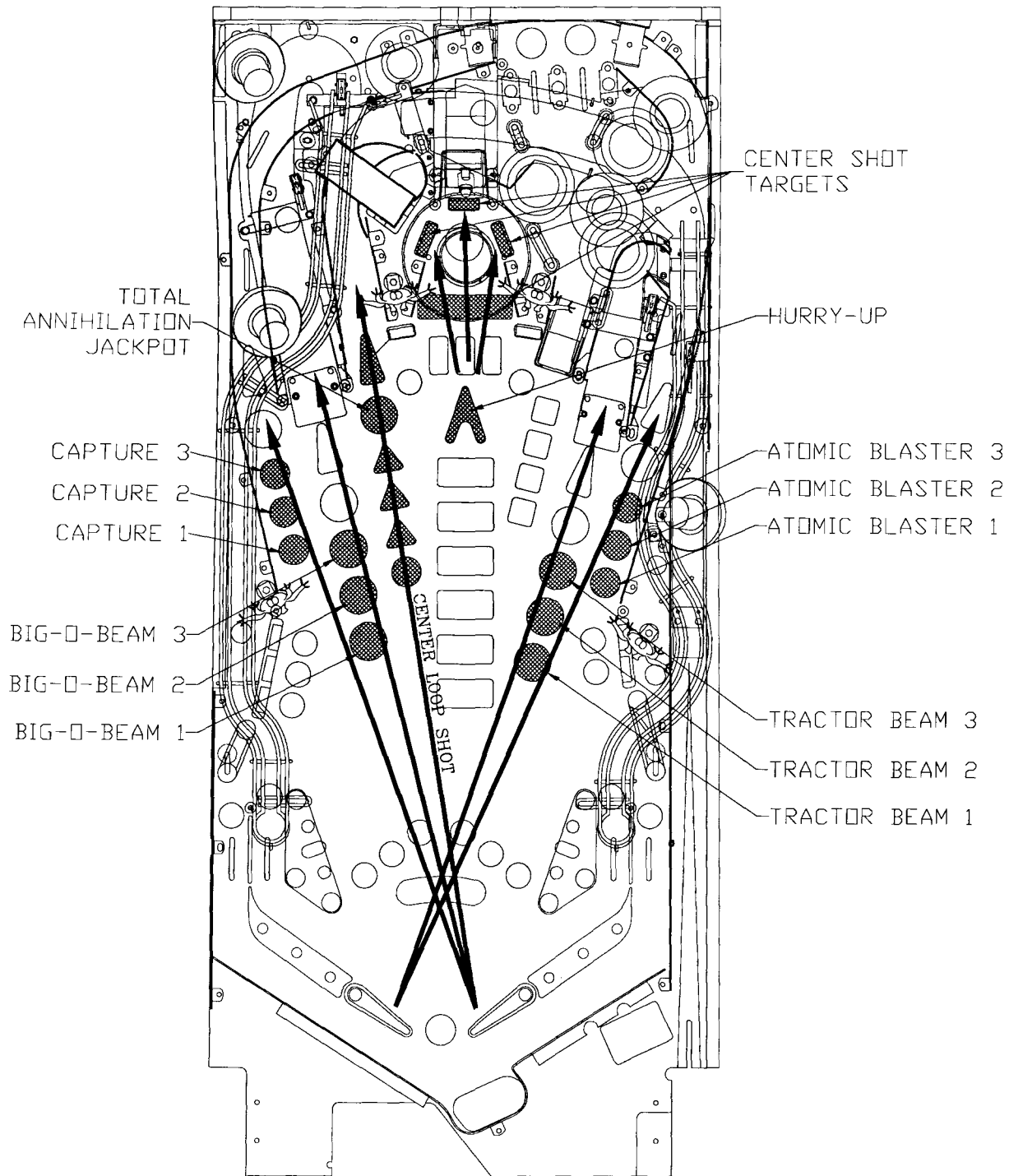


**MARTIAN ATTACK** Complete M-A-R-T-I-A-N targets to light Martian Attack at right eject. Shoot right eject to start Martian Attack. Hit all four Martians (targets) to start Martian Attack 2-ball Multi-ball. Hit as many Martians as you can during Multi-ball to score BIG POINTS.

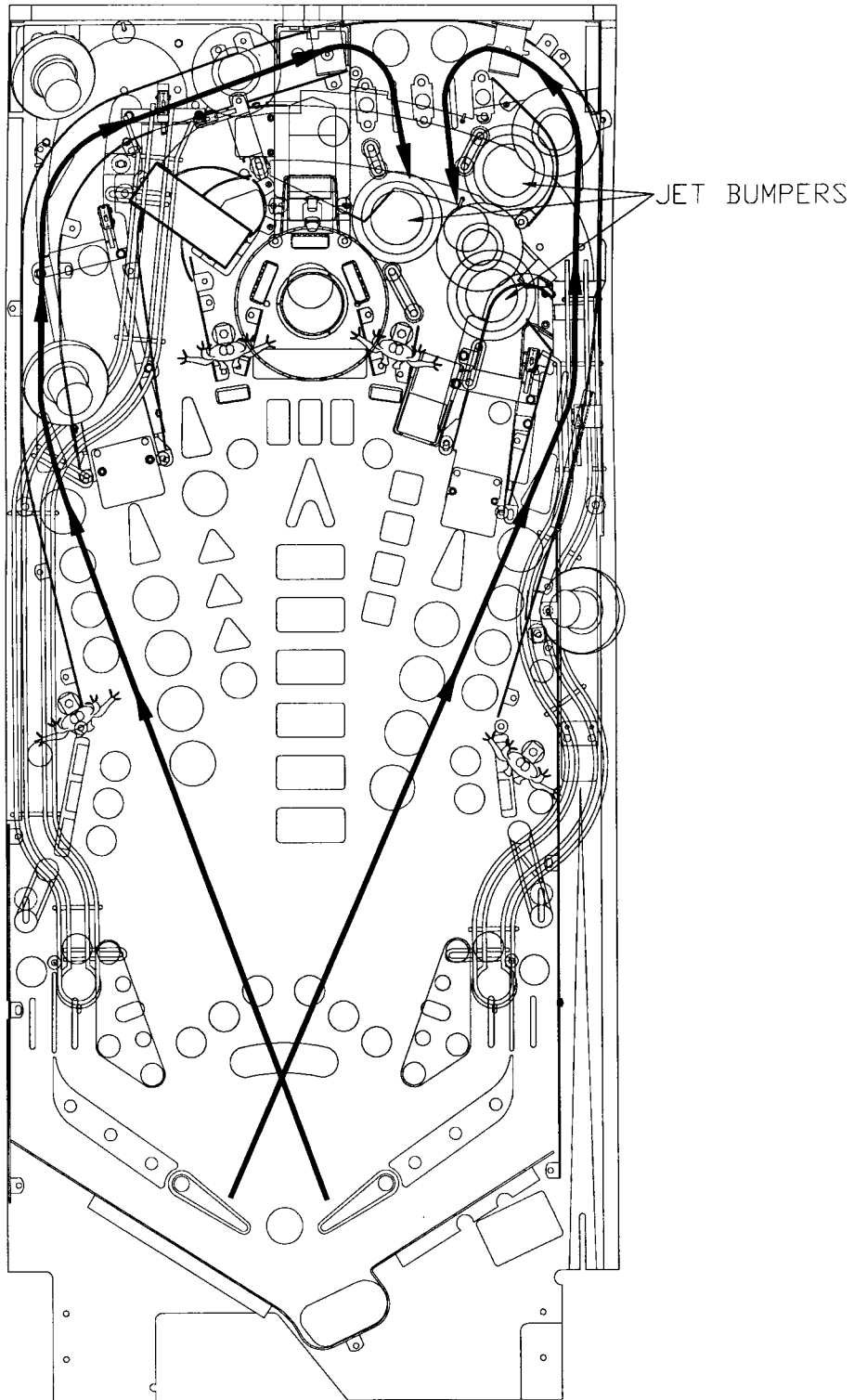


**HURRY-UP** Complete Capture, Big-O-Beam, Tractor Beam or Atomic Blaster to start Hurry-Up. Shoot any center shot to award Hurry-Up.

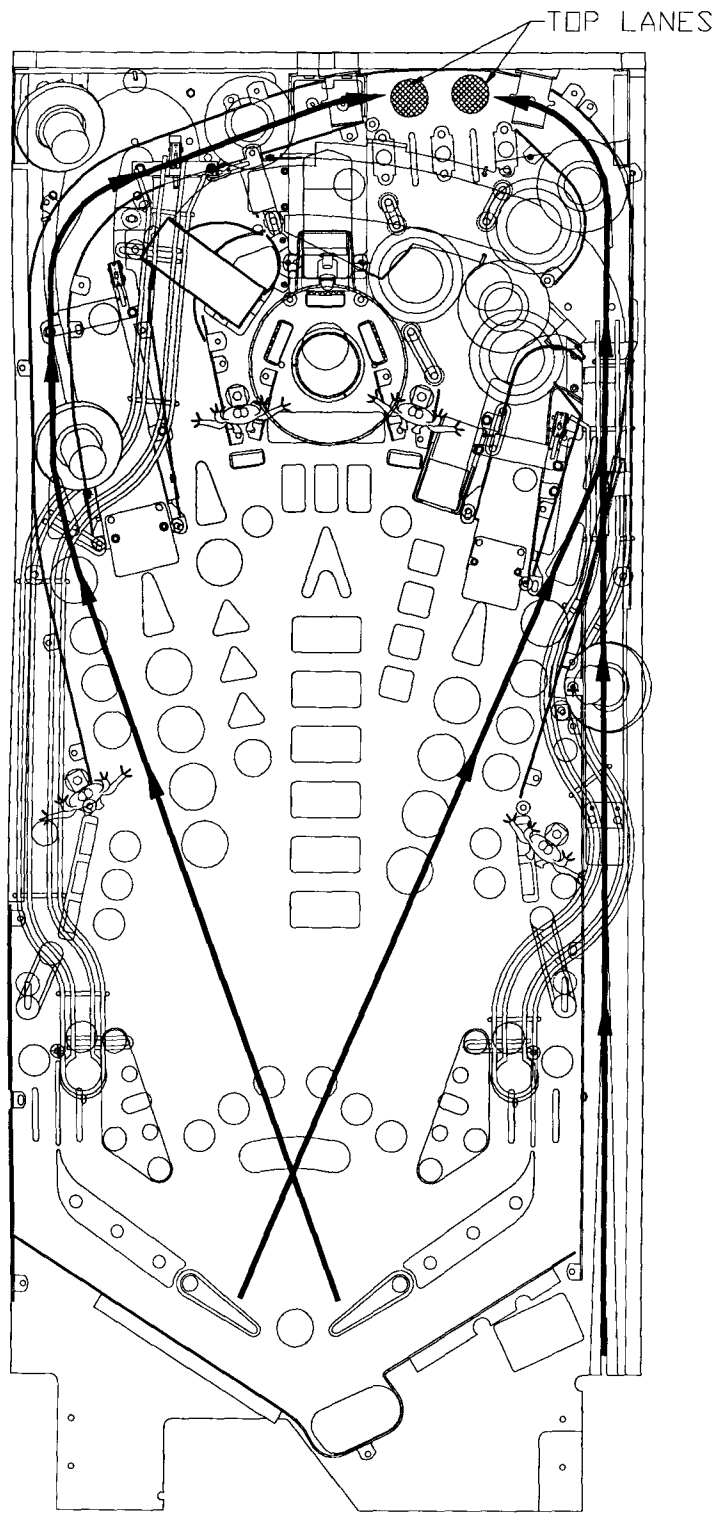
**TOTAL ANNIHILATION** Complete all 4 shots (Capture, Big-O-Beam, Tractor Beam AND Atomic Blaster) to start Total Annihilation 4-Ball Multi-ball. Shoot ramps and loops while in Multi-ball for BIG POINTS. Shoot center loop after making any other ramp or loop shot to collect Total Annihilation Jackpot.



**SUPER JETS** Get the number of jet bumper hits needed (see display) to start Super Jets. Shoot jet bumpers until the end of ball for BIG POINTS.



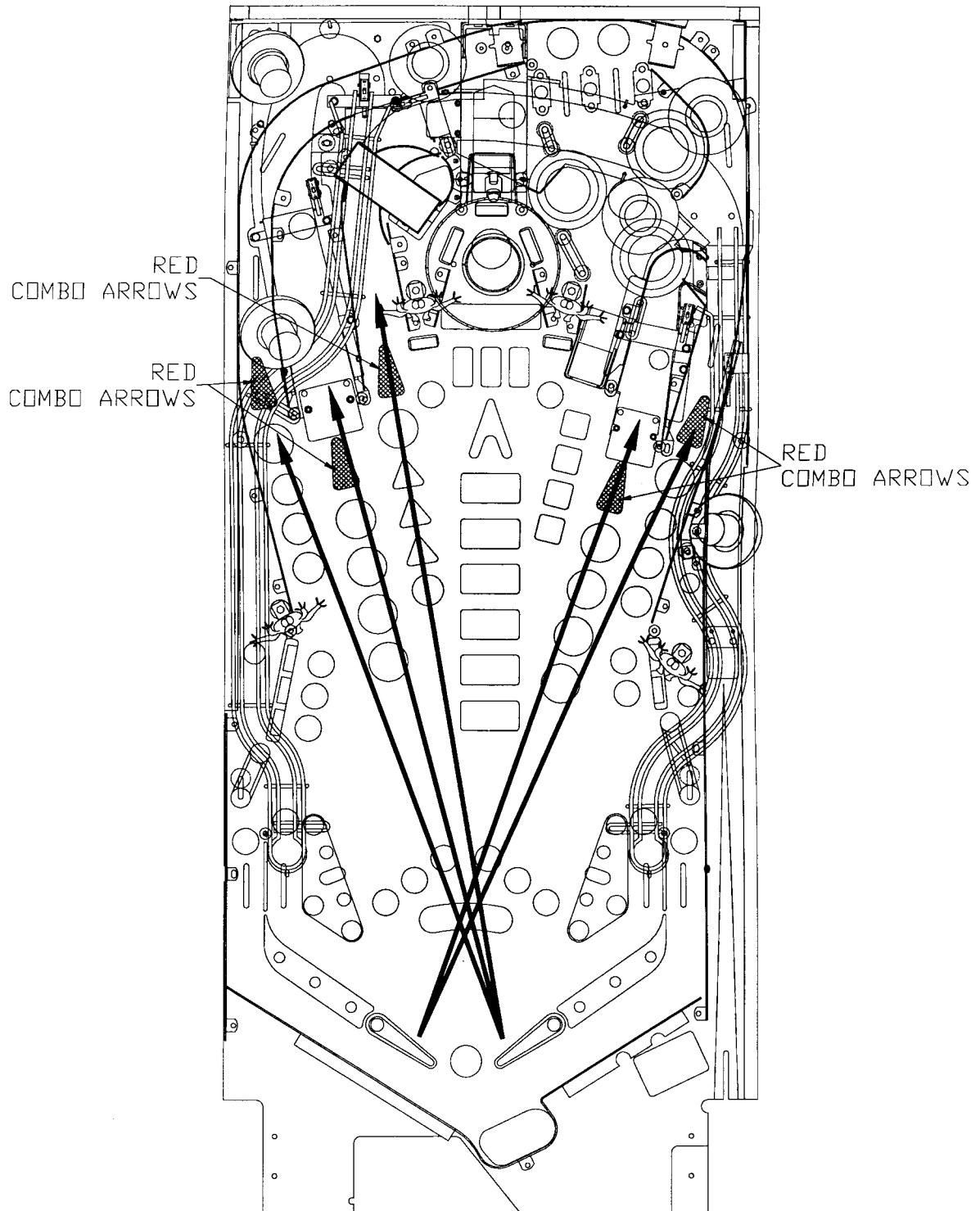
**BONUS X** Complete top lanes to award End-Of-Ball Bonus Multiplier. This also increases the value of the jets bumpers.



N

**COMBOS**

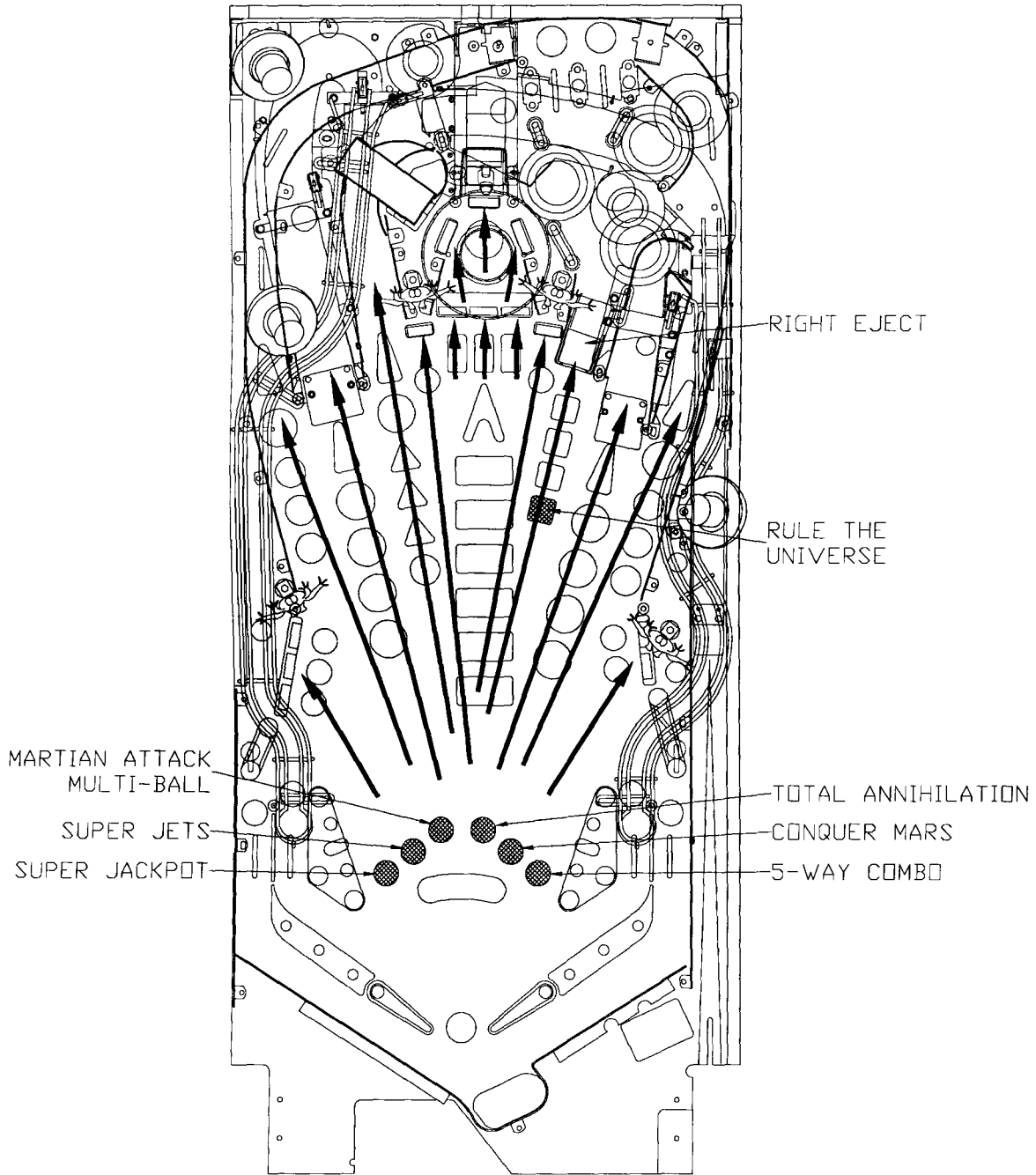
Make consecutive ramp and loop shots while Red Arrows are lit for Combo Awards.



**RULE THE UNIVERSE** Light Rule the Universe at right eject by:

- Collecting a Super Jackpot in 3-Ball Multi-ball,
- Starting Super Jets,
- Starting Martian Attack Multi-ball,
- Starting Total Annihilation,
- Completing all 5 Attack Waves and Conquering Mars,
- AND Making a 5-Way Combo.

Shoot right eject to start Rule the Universe. Make all shots to collect the displayed number of points, while in Multi-ball, to RULE THE UNIVERSE!





NOTES



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# SECTION ONE

## GAME OPERATION AND TEST INFORMATION

### (System WPC) ROM Summary

| IC            | TYPE     | BOARD | LOCATION | PART NUMBER     |
|---------------|----------|-------|----------|-----------------|
| Game 1        | 27c040   | CPU   | G11      | A-5343-50041-1  |
| Security Chip | PIC16C57 | CPU   | G10      | A-5400-50041-1  |
| Music/Speech  | 27c080   | Audio | SU2      | A-5343-50041-S2 |
| Music/Speech  | 27c080   | Audio | SU3      | A-5343-50041-S3 |
| Music/Speech  | 27c080   | Audio | SU4      | A-5343-50041-S4 |

#### NOTICE

Order replacement ROM's 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

## ATTACK FROM MARS IS A 4 BALL GAME.

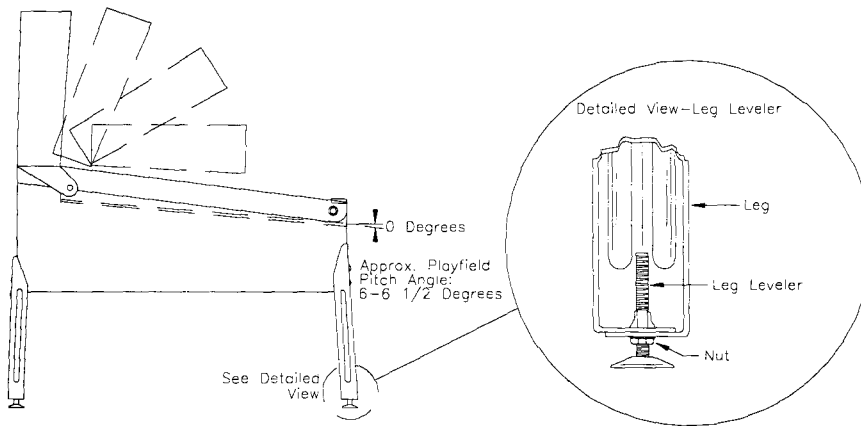
**Power:** Domestic 120V @ 60 Hz  
Foreign 230V @ 50 Hz  
Japan 100V @ 50 Hz

**Dimensions:** Width: 29" Approx.  
Depth: 55" Approx.  
Height: 78" Approx.

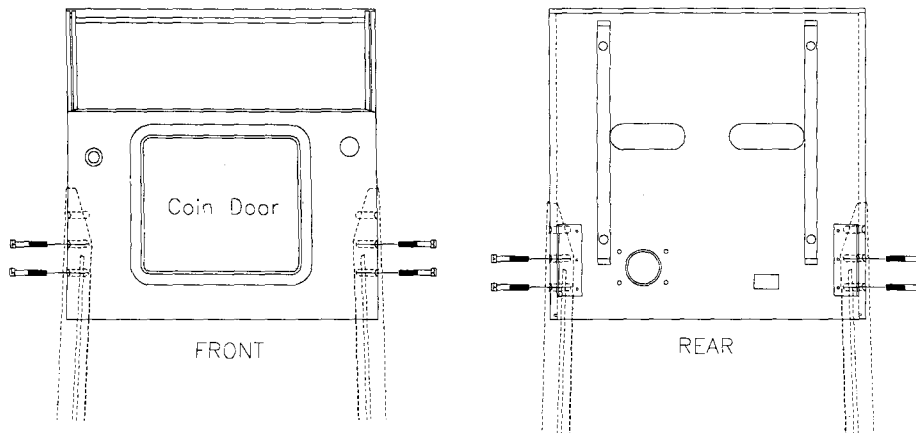
**Temp:** 32° F to 100° F  
(0° C to 38° C)

**Humidity:** Not to exceed 95% relative. **Weight:** 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**

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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.

**Note:** The insert panel is no longer latched to the backbox; it is attached to the backglass. The backglass and the insert panel are removed from the backbox housing as a single unit.

Unlock the backbox, carefully remove the backglass/insert panel, and lay it down on the playfield glass.

**Note:** The speaker panel uses a new hinging system; the bottom of the speaker panel remains attached to the backbox unit when released.

Carefully lift the speaker panel and rotate it away from the backbox, toward the playfield glass. The speaker panel will remain attached to the backbox unit.

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. Replace the speaker panel, the backglass/insert panel, and lock the backbox.



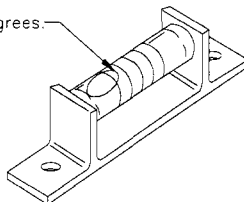
#### CAUTION

**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. 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.
9. 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 is 6 1/2 degrees. The nose of the bubble should be between the first and second line on the level (see diagram below).

TRU-PITCH™ level 6 1/2 degrees.



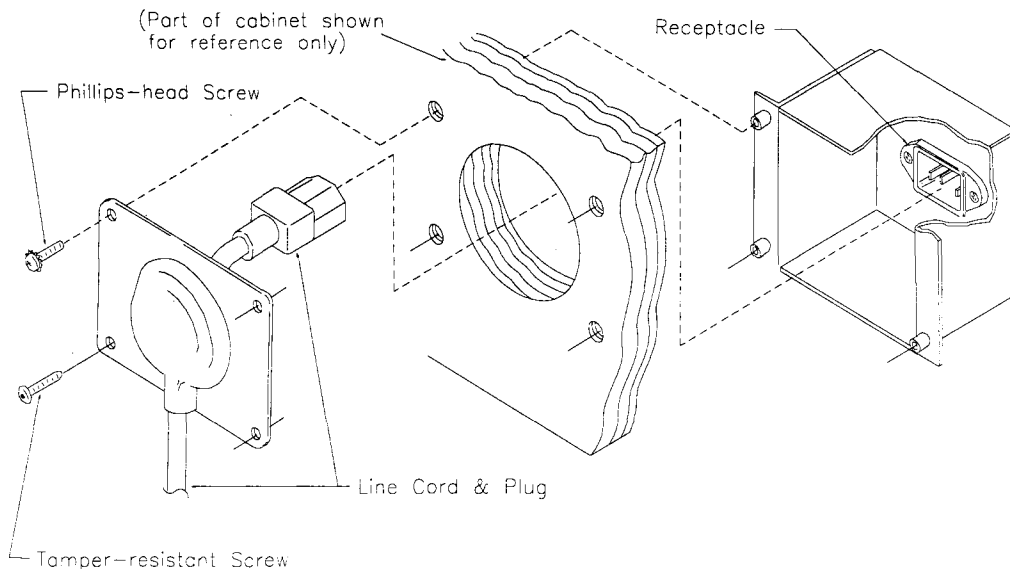
## CAUTION

*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.*

10. Move the game into the desired location; recheck the level and pitch angle of the playfield.
11. Verify that the **required number** of balls are installed in the game. This game uses 4 balls.
- 12 Install playfield mylars if desired.

**NOTE:** This 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 03-9486-1 for full playfield mylar.

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



15. **IMPORTANT:** Fill out and return the registration card.

## RAISING THE PLAYFIELD

### CAUTION

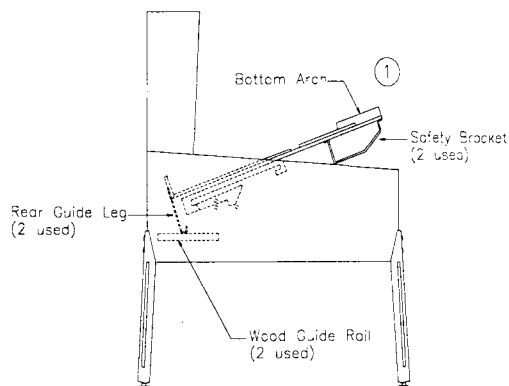
Do not raise the playfield straight up! This game uses a slide assembly to raise and lower the playfield.

#### Before Raising the Playfield:

Make sure there are no balls present in the ball trough or any of the other ball-holding playfield devices (i.e. poppers). Raising the playfield with balls present in these locations may cause them to come loose and damage the playfield. Use "Empty Balls Test" to remove all of the balls from these locations.

#### To Raise Playfield:

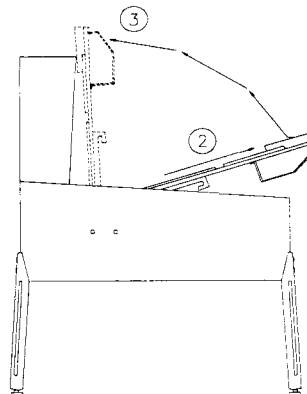
1. Grasp bottom arch and carefully lift up playfield only high enough to clear safety brackets. Rear guide legs should not hit wood guide rails or be used to slide out playfield.



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

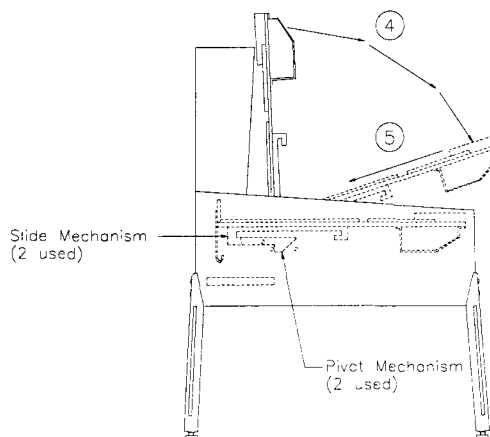
**Be sure playfield is in locked position and does not slide back into the cabinet. If it does, repeat Step 2 before proceeding to Step 3.**

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.

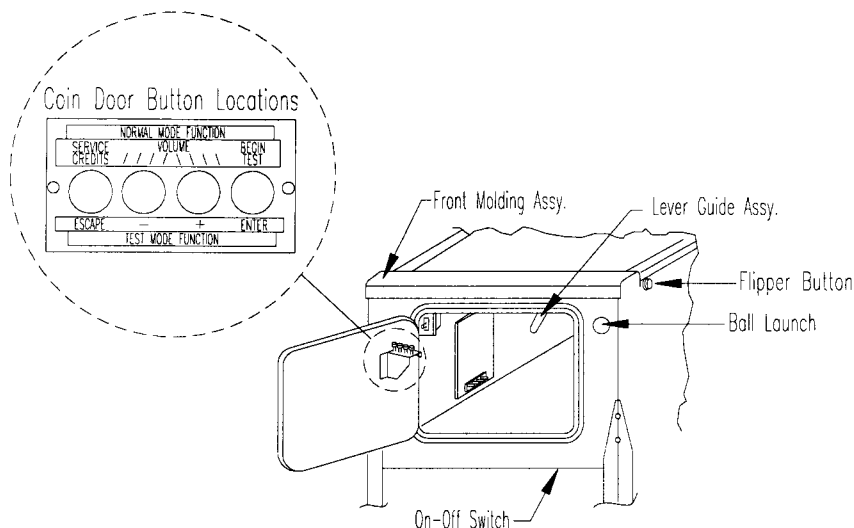
### Test Function

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:* **ATTACK FROM MARS**  
50041 Rev. 1.0

**Sound Rev. 1.0**  
**Sy. 3.55 01/22/96**

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-Stamps     |

#### 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-Stamps          |
| 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 Loop/Gate Test      |
| T.17 Saucer LED Test     |
| T.18 Drop Target Test    |
| T.19 Motor Bank Test     |
| T.20 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-Stamps

**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    | 00 | B.2 | 13 | Total Paid Credits*    | 00 |
| B.2 | 07 | Recent Service Credits | 00 | B.2 | 14 | Total Service Credits* | 00 |

\*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 | 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 Balls        | 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 | Ball Saves<br>The number of times the ball was saved.                                     | 0% | 00 |
| B.4 02 | Total Multi-balls<br>The number of times a Multi-ball feature was started.                | 0% | 00 |
| B.4 03 | Attack Wave Start<br>The number of times an Attack Wave was started.                      | 0% | 00 |
| B.4 04 | Attack Wave Completed<br>The number of times an Attack Wave was completed.                | 0% | 00 |
| B.4 05 | Attack Wave Extra Ball Lit<br>The number of times the Attack Wave Extra Ball was lit.     | 0% | 00 |
| B.4 06 | Locks Lit<br>The number of times a lock was lit.  | 0% | 00 |
| B.4 07 | Balls Locked<br>The number of times a ball was locked.                                    | 0% | 00 |
| B.4 08 | Main Multi-ball Start<br>The number of times Main Multi-ball was started.                 | 0% | 00 |
| B.4 09 | Main Multi-ball Jackpots<br>The number of Main Multi-ball Jackpot awards.                 | 0% | 00 |
| B.4 10 | Main Multi-ball Super Jackpots<br>The number of Main Multi-ball Super Jackpot awards.     | 0% | 00 |
| B.4 11 | First Attack Wave Started<br>The number of times the first Attack Wave was started.       | 0% | 00 |
| B.4 12 | First Attack Wave Completed<br>The number of times the first Attack Wave was completed.   | 0% | 00 |
| B.4 13 | Second Attack Wave Started<br>The number of times the second Attack Wave was started.     | 0% | 00 |
| B.4 14 | Second Attack Wave Completed<br>The number of times the second Attack Wave was completed. | 0% | 00 |
| B.4 15 | Third Attack Wave Started<br>The number of times the third Attack Wave was started.       | 0% | 00 |
| B.4 16 | Third Attack Wave Completed<br>The number of times the third Attack Wave was completed.   | 0% | 00 |
| B.4 17 | Fourth Attack Wave Started<br>The number of times the fourth Attack Wave was started.     | 0% | 00 |

## B.4 Feature Audits Continued

|        |   |    |    |
|--------|---|----|----|
| B.4 18 | Fourth Attack Wave Completed<br>The number of times the fourth Attack Wave was completed.     | 0% | 00 |
| B.4 19 | Fifth Attack Wave Started<br>The number of times the fifth Attack Wave was started.           | 0% | 00 |
| B.4 20 | Fifth Attack Wave Completed<br>The number of times the fifth Attack Wave was completed.       | 0% | 00 |
| B.4 21 | Sixth Attack Wave Started<br>The number of times the sixth Attack Wave was started.           | 0% | 00 |
| B.4 22 | Sixth Attack Wave Completed<br>The number of times the sixth Attack Wave was completed.       | 0% | 00 |
| B.4 23 | Hurry Up Awards<br>The number of Hurry Up awards.   | 0% | 00 |
| B.4 24 | Total Annihilation Started<br>The number of times Total Annihilation was started.             | 0% | 00 |
| B.4 25 | Total Annihilation Awards<br>The number of Total Annihilation awards.                         | 0% | 00 |
| B.4 26 | Total Annihilation Jackpots<br>The number of Total Annihilation jackpots.                     | 0% | 00 |
| B.4 27 | Martian Targets Completed<br>The number of times the Martian targets were completed.          | 0% | 00 |
| B.4 28 | Martian Attack Started<br>The number of times the Martian Attack feature was started.         | 0% | 00 |
| B.4 29 | Martian Attack Kills<br>The number of Martians killed during Martian Attack.                  | 0% | 00 |
| B.4 30 | Martian Bombs Collected<br>The number of Martian bombs collected.                             | 0% | 00 |
| B.4 31 | Martian Bombs Used<br>The number of Martian bombs used.                                       | 0% | 00 |
| B.4 32 | Martian Multi-ball Started<br>The number of times the Martian Multi-ball feature was started. | 0% | 00 |
| B.4 33 | Martian Multi-ball Kills<br>The number of Martians killed during Martian Multi-ball.          | 0% | 00 |
| B.4 34 | 5-Way Combos<br>The number of 5-way Combos.   | 0% | 00 |

## B.4 Feature Audits Continued

|        |  |    |    |
|--------|--|----|----|
| B.4 35 | Super Jets Started<br>The number of times the Super Jets feature was started.                          | 0% | 00 |
| B.4 36 | Rule The Universe Started<br>The number of times the Rule The Universe feature was started.            | 0% | 00 |
| B.4 37 | Rule The Universe Won<br>The number of times the Rule The Universe feature was won.                    | 0% | 00 |
| B.4 38 | Skill Shot Awards<br>The number of Skill Shot awards.  | 0% | 00 |
| B.4 39 | Super Skill Shot Awards<br>The number of Super Skill Shot awards.                                      | 0% | 00 |
| B.4 40 | Bonus Multiplier Awards<br>The number of Bonus Multiplier awards.                                      | 0% | 00 |
| B.4 41 | Bottom Lanes Completed<br>The number of times the bottom lanes were completed.                         | 0% | 00 |
| B.4 42 | Bottom Lane Extra Ball Lit<br>The number of times the bottom lane Extra Ball was lit.                  | 0% | 00 |
| B.4 43 | Random Awards<br>The number of Stroke Of Luck random awards given.                                     | 0% | 00 |
| B.4 44 | Random Award - Light Extra Ball<br>The number of times "Light Extra Ball" was given as a random award. | 0% | 00 |
| B.4 45 | Strobe Multi-ball Started<br>The number of times the Strobe Multi-ball feature was started.            | 0% | 00 |
| B.4 46 | Strobe Extra Ball Lit<br>The number of times an Extra Ball was lit from the Strobe Multi-ball feature. | 0% | 00 |
| B.4 47 | Video Mode Started<br>The number of times Video Mode was started.                                      | 0% | 00 |
| B.4 48 | Video Mode Extra Ball Lit<br>The number of times an Extra Ball was lit from Video Mode.                | 0% | 00 |
| B.4 49 | Sneak Attack Started<br>The number of times the Sneak Attack feature was started.                      | 0% | 00 |
| B.4 50 | Sneak Attack Completed<br>The number of times the Sneak Attack feature was completed.                  | 0% | 00 |
| B.4 51 | Novice Modes<br>The number of "Novice Mode" games played.  | 0% | 00 |
| B.4 52 | Buy In Extra Balls<br>The number of times an Extra Ball was bought.                                    | 0% | 00 |

## B.5 Histograms

|     |    |                           |     |
|-----|----|---------------------------|-----|
| B.5 | 01 | 0 - 199 Million Scores    | 00% |
| B.5 | 02 | 200 - 399 Million Scores  | 00% |
| B.5 | 03 | 400 - 599 Million Scores  | 00% |
| B.5 | 04 | 600 - 799 Million Scores  | 00% |
| B.5 | 05 | 800 - 999 Million Scores  | 00% |
| B.5 | 06 | 1 - 1.49 Billion Scores   | 00% |
| B.5 | 07 | 1.5 - 1.99 Billion Scores | 00% |
| B.5 | 08 | 2 - 2.99 Billion Scores   | 00% |
| B.5 | 09 | 3 - 3.99 Billion Scores   | 00% |
| B.5 | 10 | 4 - 4.99 Billion Scores   | 00% |
| B.5 | 11 | 5 - 6.99 Billion Scores   | 00% |
| B.5 | 12 | 7 - 8.99 Billion Scores   | 00% |
| B.5 | 13 | Over 9 Billion            | 00% |
| B.5 | 14 | Game Time 0.0 - 1.0 Mins  | 00% |
| B.5 | 15 | Game Time 1.0 - 1.5 Mins  | 00% |
| B.5 | 16 | Game Time 1.5 - 2.0 Mins  | 00% |
| B.5 | 17 | Game Time 2.0 - 2.5 Mins  | 00% |
| B.5 | 18 | Game Time 2.5 - 3.0 Mins  | 00% |
| B.5 | 19 | Game Time 3.0 - 3.5 Mins  | 00% |
| B.5 | 20 | Game Time 3.5 - 4.0 Mins  | 00% |
| B.5 | 21 | Game Time 4 - 5 Mins      | 00% |
| B.5 | 22 | Game Time 5 - 6 Mins      | 00% |
| B.5 | 23 | Game Time 6 - 8 Mins      | 00% |
| B.5 | 24 | Game Time 8 - 10 Mins     | 00% |
| B.5 | 25 | Game Time 10 - 15 Mins    | 00% |
| B.5 | 26 | Game Time Over 15 Mins    | 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 | Totals Cleared      |
| 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**

|      |                      |
|------|----------------------|
| T.1  | Switch Edges         |
| T.2  | Switch Levels        |
| T.3  | Single Switch        |
| 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 Tests |
| T.11 | Display Test         |
| T.12 | Flipper Test         |
| T.13 | Ordered Lamps Test   |
| T.14 | Lamp Row-Col Test    |
| T.15 | Dip Switch Test      |
| T.16 | Loop/Gate Test       |
| T.17 | Saucer LED Test      |
| T.18 | Drop Target Test     |
| T.19 | Motor Bank Test      |
| T.20 | Empty Balls Test     |

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 than 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. **Note: G.I strings 4 and 5 do not dim and brighten, they are always ON.**

- 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 Loop/Gate Test** This test is used to verify proper ball delivery from the shooter lane onto the playfield, and to exercise the four (4) loop switches and the two (2) control gates.

To verify proper ball delivery from the shooter lane onto the playfield after entering this test:

- 1a) Verify that the coin door is closed.
- 2a) Press the start button to clear any error messages.
- 3a) Place a ball into the shooter lane, or press the launch button to eject a ball from the trough to the shooter lane.
- 4a) With a ball in the shooter lane, press the launch button to launch the ball onto the playfield. The left control gate should open when the ball is launched from the shooter lane. The ball should travel along the shooter lane, around the outer loop (from right to left), and be delivered cleanly to the left flipper at a reasonable speed.

To repeat the test, repeat steps 2a-4a.

To exercise the four (4) loop switches and the two (2) control gates after entering this test:

- 1b) Verify that the coin door is closed.
- 2b) Press the start button to clear any error messages.
- 3b) Roll a ball around either the left or the right loop. A sound is made as the ball passes over the loop switches, and the state of the loop switches are updated in the display. If the ball is traveling around the loop from left to right, the right control gate should open upon activation of the second left loop switch (L.HI). If the ball is traveling around the loop from right to left, the left control gate should open upon activation of the second right loop switch (R.HI). When the ball has finished its path around the loop (either from left to right, or from right to left), the test should report "TEST PASSED" on the display. Any other result indicates a problem with either the loop switches, or the control gates, or both.

To repeat the test, repeat steps 2b-3b.

During this test, the diagnostic test buttons on the coin door act as follows:

Escape: This button returns to the previous menu.

**T.17 Saucer L.E.D. Test** This test is used to exercise the L.E.D.'s in the saucer. The test has two modes: Automatic and Manual.

In automatic mode, a single L.E.D. will light up in the saucer. The lit L.E.D. will then move automatically around the saucer in a clockwise manner. The position of the lit L.E.D. is shown in the display.

In manual mode, a single L.E.D. will light up in the saucer. The up (+) button moves the lit L.E.D. around the saucer in a clockwise manner. The down (-) button moves the lit L.E.D. around the saucer in a counterclockwise manner. Holding down the up (+) button or the down (-) button moves the lit L.E.D. RAPIDLY around the saucer. The position of the lit L.E.D. is shown in the display.

The lit L.E.D. is always shown in the display for both test operation modes. Should there not be a lit L.E.D. on the saucer for the position of the L.E.D. indicated in the display, then the test has detected a problem with the L.E.D.

During this test, the diagnostic test buttons on the coin door act as follows:

- Escape: This button returns to the previous menu.
- Down: In Manual Mode, this button rotates the lit L.E.D. around the saucer in a counterclockwise manner.
- Up: In Manual Mode, this button rotates the lit L.E.D. around the saucer in a clockwise manner.
- Enter: This button toggles the state of the test between Automatic Mode and Manual Mode.

**T.18 Drop Target Test** This test allows the drop target to be activated while the state of the drop target switch is shown in the display.

There is only one coil for the drop target; this coil raises the target. The test has no way of getting the drop target to its "down" position; this must be done manually.

When the test detects that the drop target is down (by checking to see if the drop target switch is closed), the drop target coil will be activated to reset the drop target to its "up" position. The coil will operate only if the coin door is closed.

Any errors accumulated by this test are shown in the display.

During this test, the diagnostic test buttons on the coin door act as follows:

- Escape: This button returns to the previous menu.
- Enter: This button toggles the state of the test between Running and Stopped.

**T.19 Motor Bank Test** This test allows the motor bank to be activated while the state of the motor bank switches are shown in the display.

This test will continually run the motor bank up and down (with small pauses when a motor bank switch edge is detected) while the test is running. Errors are accumulated, and shown in the display.

If the test accumulates enough errors for the motor bank, the test will stop and show the errors in the display.

During this test, the diagnostic test buttons on the coin door act as follows:

Escape: This button returns to the previous menu.

Enter: This button toggles the state of the test between Running and Stopped.

**T.20 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.





**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 "Executing..." 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.0 04 | Extra Hard<br>U.9 05 |
|----------|---------------------------------|----------------------|----------------|------------------|----------------|----------------------|
| A.2 03   | Ball Saves                      | 02                   | 01             | 01               | 01             | OFF                  |
| A.2 04   | Ball Save Time                  | 06                   | 05             | 04               | 03             | N/A                  |
| A.2 05   | Extra Ball Percent              | 35%                  | 30%            | 25%              | 20%            | 15%                  |
| A.2 07   | Lane Extra Ball                 | 6                    | 8              | 10               | 12             | 14                   |
| A.2 10   | Attack Wave Start Difficulty    | EASY                 | EASY           | EASY             | HARD           | HARD                 |
| A.2 11   | Attack Wave Difficulty          | EX. EASY             | EASY           | MEDIUM           | HARD           | EX. HARD             |
| A.2 12   | First Hard Lock                 | 03                   | 02             | 02               | 02             | 01                   |
| A.2 13   | Super Jackpot Timer             | 14                   | 12             | 10               | 08             | 06                   |
| A.2 14   | Martian Target Memory           | YES                  | YES            | YES              | YES            | NO                   |
| A.2 15   | Martian Attack Start Difficulty | EASY                 | EASY           | EASY             | HARD           | HARD                 |
| A.2 16   | Martian Attack Timer            | 40                   | 35             | 30               | 25             | 20                   |

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

| Adj. 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 03   | Ball Saves                      | 02                   | 01             | 01               | 01             | OFF                  |
| A.2 04   | Ball Save Time                  | 06                   | 05             | 04               | 03             | N/A                  |
| A.2 05   | Extra Ball Percent              | 35%                  | 30%            | 25%              | 20%            | 15%                  |
| A.2 07   | Lane Extra Ball                 | 6                    | 8              | 10               | 12             | 14                   |
| A.2 10   | Attack Wave Start Difficulty    | EASY                 | EASY           | EASY             | HARD           | HARD                 |
| A.2 11   | Attack Wave Difficulty          | EX. EASY             | EASY           | MEDIUM           | HARD           | EX. HARD             |
| A.2 12   | First Hard Lock                 | 03                   | 02             | 02               | 02             | 01                   |
| A.2 13   | Super Jackpot Timer             | 14                   | 12             | 10               | 08             | 06                   |
| A.2 14   | Martian Target Memory           | YES                  | YES            | YES              | YES            | NO                   |
| A.2 15   | Martian Attack Start Difficulty | EASY                 | EASY           | EASY             | HARD           | HARD                 |
| A.2 16   | Martian Attack Timer            | 40                   | 35             | 30               | 25             | 20                   |

**N/A NON-APPLICABLE**

**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**

| Adjustment Number | Adjustment Description | Install 3-Ball U.9 07 (factory) | Install 5 Ball U.9 06 |
|-------------------|------------------------|---------------------------------|-----------------------|
| A.1 01            | Balls Per Game         | 03                              | 05                    |
| A.1 07            | Replay Start           | 4,000,000,000                   | 5,500,000,000         |
| A.2 06            | Attack Wave Extra Ball | 02                              | 03                    |
| A.2 07            | Lane Extra Ball        | 10                              | 14                    |
| A.2 11            | Attack Wave Difficulty | MEDIUM                          | HARD                  |
| A.2 12            | First Hard Lock        | 02                              | 01                    |

**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                 |
| A.4 20            | Alien Champion 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                 |
| A.4 20            | Alien Champion 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.

**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 28 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:

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

**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

NO EXTRA BALL: - No Extra Balls may be accumulated.

#### **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 500,000,000 to 9,500,000,000.

### **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 or four replay levels are chosen, their values are automatically adjusted to three or four times the starting replay level.

\*For Auto % Replay.

### **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.

- Range: - Score is boosted between 200,000,000 and 2,500,000,000 points.
- OFF - Replay score is not boosted.
- AUTO - Replay score is boosted by ½ of the base replay score.

### **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 Not Used**

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

The award automatically provided when the player 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, German, French or Spanish.

#### **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 special effects and Attract Mode.
- NO - Do Not dim General Illumination.

#### **A.1 26 Tournament Play**

Equalize random game features and global score values during multi-player games.

- YES - Equalize random game features and global score values.
- NO - Do Not equalize random game features and global score values.

#### **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 Override**

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

This adjustment determines whether each player may buy an Extra Ball at the end of a game.

- OFF: No Extra Balls may be purchased.  
1/2 CREDIT: An Extra Ball may be purchased for 1/2 credit.  
1 CREDIT: An Extra Ball may be purchased for 1 credit.

### A.2 02 Buy Extra Ball Count

This adjustment specifies the number of Extra Balls that may be bought by each player at the end of a game. **Note:** This adjustment is shown when "A.2 01 Buy Extra Ball" is set to 1/2 Credit or 1 Credit.

- 01-03: 01 to 03 Extra Balls may be bought.  
UNLIMITED: An unlimited number of Extra Balls may be bought.

### A.2 03 Ball Saves

This adjustment determines the number of "full" Ball Saves that each player receives in a game. A ball that is "saved" will be returned to play without a change in the player up number or the ball in play number. A "full" Ball Save is "used" if a ball drains after it is launched into play within the amount of time specified in A.2 04 (Ball Save Time). Once all "full" Ball Saves are used, balls will no longer be returned to play should they drain quickly after being launched into play.

- OFF: Balls will not be saved.  
01-05: 01 to 05 "full" Ball Saves given to each player per game.

### A.2 04 Ball Save Time

This adjustment determines the number of seconds in which a ball may drain after being launched into play, such that it will be returned to play without a change in the player up number or the ball in play number. **Note:** This adjustment is shown when "A.2 03 Ball Saves" is set for 01 to 05 saves.

- 03-15: 03 to 15 seconds.

### A.2 05 Extra Ball Percent

This adjustment determines the total percentage of Extra Balls desired (for all Extra Balls awarded from all features except Replay Score levels). The game will adjust the percentage of the Stroke Of Luck "Light Extra Ball" award to achieve the requested level (the percentage for this random award normally runs between 1% and 10%). When this adjustment is set to FIXED, no automatic percentaging will be done for the Stroke Of Luck "Light Extra Ball" award; it will operate with a FIXED percentage of 5%.

- FIXED: Do not percentage the Stroke Of Luck "Light Extra Ball" award.  
15-40: Percentage the Stroke Of Luck "Light Extra Ball" award to achieve this percentage.

### A.2 06 Attack Wave Extra Ball

This adjustment specifies the number of Attack Waves that need to be completed to light an Extra Ball.

- OFF: Do not light an Extra Ball after completing an Attack Wave.  
01-05: Light an Extra Ball after completing this number of Attack Waves.

#### **A.2 07 Lane Extra Ball**

This adjustment specifies the number of times the Bottom Rollover Lanes need to be completed to light an Extra Ball.

OFF: Do not light an Extra Ball from the Bottom Lanes.

01-20: Light an Extra Ball after completing this number of Bottom Lanes.

#### **A.2 08 Strobe Multi-ball Extra Ball**

This adjustment specifies the number of times the Center Target Bank must be hit during Strobe Multi-ball to light an Extra Ball.

OFF: Do not light an Extra Ball from the Center Target Bank during Strobe Multi-ball.

08-12: Light an Extra Ball after hitting the Center Target Bank this number of times.

#### **A.2 09 Starting Attack Wave**

This adjustment is used to set the country in which the first Attack Wave will occur. This country is set for all players at the start of a new game, and randomized by the left and right slingshots.

RANDOM: Start the first Attack Wave in a random country.

FRANCE: Start the first Attack Wave in France.

GERMANY: Start the first Attack Wave in Germany.

ITALY: Start the first Attack Wave in Italy.

ENGLAND: Start the first Attack Wave in England.

U.S.A.: Start the first Attack Wave in the U.S.A.

#### **A.2 10 Attack Wave Start Difficulty**

This adjustment specifies the difficulty level of starting an Attack Wave. Attack Waves are started by completing the targets on the Motor Bank. When this adjustment is set to EASY, previously scored Motor Bank targets will be counted toward completing the bank to start an Attack Wave. When this adjustment is set to HARD, the three Motor Bank targets must be completed separately to start an Attack Wave.

EASY: Spot previously scored Motor Bank targets.

HARD: Do not spot previously scored Motor Bank targets.

#### **A.2 11 Attack Wave Difficulty**

This adjustment specifies the difficulty level of completing an Attack Wave. This adjustment affects the number of times the Saucer targets must be hit in order to qualify the Center Hole (behind the Drop Target) for destroying a Saucer.

EXTRA EASY:  $1 + (3 * N)$  per country.

EASY:  $2 + (3 * N)$  per country.

MEDIUM:  $3 + (3 * N)$  per country.

HARD:  $4 + (3 * N)$  per country.

EXTRA HARD:  $5 + (3 * N)$  per country.

(N = The number of Attack Waves completed).

#### **A.2 12 First Hard Lock**

This adjustment affects the difficulty of lighting Locks for Multi-ball. An "easy" lock requires one (1) shot up the Center Ramp to light all three (3) Locks. A "hard" lock requires one shot up the Center Ramp to light a single (1) Lock. This adjustment specifies the number of the Center Ramp shot that will result in a "hard" lock. The lower this number is, the harder it is to achieve Multi-ball.

01-03: The number of the Center Ramp shot that will result in a "hard" lock.

**A.2 13 Super Jackpot Timer**

This adjustment specifies the number of times that the Super Jackpot will move from shot to shot after Multi-ball has ended. The higher this number, the easier it is to collect the Super Jackpot after Multi-ball has ended.

05-20: The number of times the Super Jackpot will move from shot to shot after Multi-ball is over.

**A.2 14 Martian Target Memory**

This adjustment determines whether or not scored Martian Targets remain in memory from ball to ball.

YES: Scored Martian Targets remain in memory from ball to ball.

NO: Scored Martian Targets reset at the start of a new ball.

**A.2 15 Martian Attack Start Difficulty**

This adjustment determines the difficulty level for starting the Martian Attack feature. When set to EASY, the first Martian Attack can be started from the back of the Right Popper. When set to HARD, the Martian Attack feature can only be started from the front of the Right Popper.

EASY: The first Martian Attack can be started from the back of the Right Popper.

HARD: The Martian Attack feature must be started from the front of the Right Popper.

**A.2 16 Martian Attack Timer**

This adjustment specifies the number of seconds in which the player has to complete the Martian Attack feature.

10-60: The number of seconds in which the Martian Attack feature must be completed.

**A.2 17 Player Tournament Mode**

This adjustment allows players to simulate the Tournament Mode setting in the game (see A.1 26 for a description of Tournament Mode). If this adjustment is set to YES, and there are credits posted on the game, Tournament Mode may be enabled for the next game start by holding in both flipper buttons for approximately two (2) seconds and pressing the start button while the "Tournament Mode Ready" message is shown on the display.

YES: Allow access to the simulated Tournament Mode.

NO: Do NOT allow access to the simulated Tournament Mode.

**A.2 18 Family Mode**

This adjustment allows the game to operate in "Family Mode". Any possibly offensive or objectionable dot matrix images and sounds will not be utilized.

YES: Do NOT utilize any possibly offensive or objectionable dot matrix images and sounds.

NO: Utilize any possibly offensive or objectionable dot matrix images and sounds.

**A.2 19 Attract Mode Music**

This adjustment is used to allow the playing of music in Attract Mode.

YES: Allow music to be played in Attract Mode.

NO: Do NOT allow music to be played in Attract Mode.

#### **A.2 20 Attract Mode Sounds**

This adjustment is used to allow the playing of sound effects in Attract Mode.

YES: Allow sounds effects to be played in Attract Mode.

NO: Do NOT allow sound effects to be played in Attract Mode.

#### **A.2 21 Attract Mode Lights**

This adjustment allows the game to utilize the Flash Lamps and the Strobe Light in attract mode.

YES: Utilize the Flash Lamps and the Strobe Light in Attract Mode.

NO: Do NOT utilize the Flash Lamps and the Strobe Light in Attract Mode.

#### **A.2 22 Random Seed**

This adjustment is used to initialize the value of the random number generator.

0-65535: The value to use to initialize the random number generator.

#### **A.2 23 Novice Mode**

This adjustment is used to allow the player to select Novice Mode at the start of a game.

OFF: Do NOT allow Novice Mode.

1 MINUTE: Allow Novice Mode, and guarantee 1 minute of game time.

1 1/2 MINUTES: Allow Novice Mode, and guarantee 1.5 minutes of game time.

2 MINUTES: Allow Novice Mode, and guarantee 2 minutes of game time.

2 1/2 MINUTES: Allow Novice Mode, and guarantee 2.5 minutes of game time.

3 MINUTES: Allow Novice Mode, and guarantee 3 minutes of game time.

#### **A.2 24 Timed Plunger**

This adjustment specifies the number of seconds before automatically plunging a ball onto the playfield that can otherwise be plunged by the player via the launch button.

OFF: Never automatically plunge a ball onto the playfield that can otherwise be plunged by the player via the launch button.

30-90: The number of seconds before automatically plunging the ball.

#### **A.2 25 Flipper Plunger**

When this adjustment is set to YES, the right flipper will cause a ball sitting in the shooter lane to be launched onto the playfield. This adjustment is provided for use when the launch button is broken and/or intermittent. The game will automatically detect a broken launch button, but it may take several games to perform the detection. In this case, set this adjustment to YES until the launch button can be repaired.

YES: Allow the right flipper to launch a ball sitting in the shooter lane.

NO: Do NOT allow the right flipper to launch a ball sitting in the shooter lane.

#### **A.2 26 Disable Diverter**

This adjustment is provided for use when the diverter is broken and/or intermittent. The game will automatically detect a broken diverter, but it may take several games to perform the detection. In this case, set this adjustment to YES until the diverter can be repaired.

NO: Do NOT disable the diverter.

YES: Disable the Diverter.

**A.2 27 Disable Left Gate**

This adjustment is provided for use when the left gate is broken and/or intermittent. The game will automatically detect a broken left gate, but it may take several games to perform the detection. In this case, set this adjustment to YES until the left gate can be repaired.

NO: Do NOT disable the Left Gate.  
YES: Disable the Left Gate.

**A.2 28 Disable Right Gate**

This adjustment is provided for use when the right gate is broken and/or intermittent. The game will automatically detect a broken right gate, but it may take several games to perform the detection. In this case, set this adjustment to YES until the right gate can be repaired.

NO: Do NOT disable the Right Gate.  
YES: Disable the Right Gate.

**A.2 29 Disable Motor Bank**

This adjustment is provided for use when the motor bank is broken and/or intermittent. The game will automatically detect a broken motor bank, but it may take several games to perform the detection. In this case, set this adjustment to YES until the motor bank can be repaired.

If it is necessary to set this adjustment to YES, and the motor is operable, use T.18 (Motor Bank Test) to move the Motor Bank to either its UP or its DOWN position. This will minimize possible damage to the top of the unit during game play, and allow for maximum game play software compensation.

NO: Do NOT disable the Motor Bank.  
YES: Disable the Motor Bank.

**A.2 30 Disable Drop Target**

This adjustment is provided for use when the drop target is broken and/or intermittent. The game will automatically detect a broken drop target, but it may take several games to perform the detection. In this case, set this adjustment to YES until the drop target can be repaired.

NO: Do NOT disable the Drop Target.  
YES: Disable the Drop Target.

**A.2 31 Disable Aliens**

This adjustment is provided for use when the alien(s) are broken and/or intermittent. In this case, set this adjustment to YES until the alien(s) can be repaired.

NO: Do NOT disable the Aliens.  
YES: Disable the Aliens.

**A.2 32 Disable Saucer**

This adjustment is provided for use when the saucer is broken and/or intermittent. In this case, set this adjustment to YES until the saucer can be repaired.

NO: Do NOT disable the Saucer.  
YES: Disable the Saucer.

**A.2 33 Disable Strobe Light**

This adjustment is provided for use when the strobe light is broken and/or intermittent. In this case, set this adjustment to YES until the strobe can be repaired.

Note: If this adjustment is set to YES, the Strobe Multi-ball feature will NOT be available.

NO: Do NOT disable the Strobe Light.

YES: Disable the Strobe Light.

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## **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**

These are the values for the coins for these respective coin slots. These values are used for determining collection totals. The corresponding adjustments A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) typically contain the same values and are used to determine the number of credits awarded for the coin slot. Whenever these values are changed, the new value is copied to the corresponding A.3 28 through A.3 31 adjustment. If a bonus is desired for a particular coin (such as 3 credits for dollar coin) then the corresponding A.3 28 through A.3 31 "Credit Value" adjustment should be modified to award the bonus. See "Bonus for Special Coin" section 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 Milliseconds

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)                    | \$1.50 | 4 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.

## Bonus for Special Coins

For most coin modes, the system allows the mixing of any combination of any size coin and awards credits as each appropriate amount is accumulated. With A.3 10 (Coin Door Type) set to "custom", the value of each coin slot may be entered for adjustments A.3 12 (Left slot value) through A.3 15 (4th slot value). Whenever these values are changed, the new values are copied to A.3 28 (Left Slot Credit Value) through A.3 31 (4th Slot Credit Value) respectively. To give a bonus for a particular coin, you need to modify the "Credit Value" adjustment to specify the value to be given for the bonus coin.

For example, in a game with a Left Coin Slot that takes quarters and a center coin slot that takes dollars, if you wish to charge 50 cents for 1 play and \$1.00 for 2 plays, you setup the pricing editor to show:

- |    |        |       |      |
|----|--------|-------|------|
| 1) | \$0.25 | 1/2   | Cred |
| 2) | \$0.50 | 1     | Cred |
| 3) | \$0.75 | 1 1/2 | Cred |
| 4) | \$1.00 | 2     | Cred |

If you set A.3 10 (Coin Door Type) to "custom" you will see the following coin door specifier adjustments:

- |        |                          |      |
|--------|--------------------------|------|
| A.3 12 | Left Slot Value          | 0.25 |
| A.3 13 | Center Slot Value        | 1.00 |
| A.3 28 | Left Slot Credit Value   | 0.25 |
| A.3 29 | Center Slot Credit Value | 1.00 |

To change the pricing to 1 play for \$0.50, 2 plays for \$1.00 and 3 plays for a dollar coin, you change A.3 29 (Center Slot Credit Value) to 1.50. This will result in the following settings:

- |        |                          |      |
|--------|--------------------------|------|
| A.3 12 | Left Slot Value          | 0.25 |
| A.3 13 | Center Slot Value        | 1.00 |
| A.3 28 | Left Slot Credit Value   | 0.25 |
| A.3 29 | Center Slot Credit Value | 1.50 |

This will cause \$1.50 worth of credits (3) to be awarded for each coin inserted in the center coin slot (dollar coin). This is due to the \$1.50 setting of A.3 29 (Center Slot CREDIT VALUE). Note that the 1.00 setting of A.3 13 tells the game that each coin in the center slot adds \$1.00 to the total collection.

### A.3 28 Left Slot Credit Value

### A.3 29 Center Slot Credit Value

### A.3 30 Right Slot Credit Value

### A.3 31 4th Slot Credit Value

This adjustment specifies the value to be used for awarding credits. It is typically the same value as the corresponding A.2 12 (Left Slot Value) through A.2 15 (4th Slot Value) adjustment.

The A.3 12 through A.3 15 values are used to determine the auditing value of each coin (for collection totals) while the A.3 28 through A.3 31 value determine the coin value for awarding credits. By making this "Credit Value" adjustment higher than the A.3 12 through A.3 15 "Value" adjustment, a bonus may be given for a specific call (see "Bonus for Special Coin" section for more information).

## Pricing Table

| Country     | Coin Chutes |         |         | 4th Chute       | Games/Coins  | Display                          | Pricing Adjustments A3 |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|-------------|-------------|---------|---------|-----------------|--|----------------------------------|------------------------|----|----|----|----|----|----|----|--|--|--|--|--|--|--|--|
|             | Left        | Center  | Right   |                 |  |                                  | 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                         |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 25¢         | 25¢     | 25¢     | -               | 1/4x25¢ <sup>2</sup>                                 | 1/\$1.00                         |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| 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¢, 2/\$1.00, 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                           |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| 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, 5/5Fr                           | SWISS 2                          |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 1Fr         | 2Fr     | 5Fr     | -               | 1/1Fr, 5/5Fr   | SWISS 3                          |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 1Fr         | 2Fr     | 5Fr     | -               | 1/1Fr, 2/2Fr, 6/5Fr                                  | SWISS 4                          |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 1Fr         | 1Fr     | 1Fr     | -               | 1/1Fr  | SWISS 5                          |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| Belgium     | 5Fr         | 20Fr    | 50Fr    | -               | 1/4x5Fr, 1/20Fr, 3/50Fr <sup>2</sup>                 | BELGIUM 1                        |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 5Fr         | 20Fr    | 50Fr    | -               | 1/20Fr, 3/60Fr, 3/50Fr                               | BELGIUM 2                        |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| Germany     | 1DM         | 2DM     | 5DM     | -               | 1/2DM, 2/3DM, 3/4DM, 4/5DM <sup>1,2</sup>            | GER. 4/5DM                       |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             |             |         |         | -               | 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                           |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 25P         | -       | 100P    | -               | 1/25P, 4/100P  | CUSTOM                           |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 25P         | -       | 100P    | -               | 1/2x25P, 2/100P                                      | CUSTOM                           |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| 25P         | -           | 100P    | -       | 1/2x25P, 3/100P | CUSTOM   |                                  |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| Japan       | 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 <sup>2</sup>                            | 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 1                    |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
|             | 1Hfl        | 2.5Hfl  | 2.5Hfl  | -               | 1/1Hfl, 3/3Hfl, 3/2.5Hfl                             | NETHERLANDS 2                    |                        |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |
| Hungary     | 20 Old      | 20 New  | 50F     | -               | 1/40F, 2/60F, 4/100F <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 - 9,500,000,000.



**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 - 9,500,000,000.

**A.4 15 Backup Buy-In H.S.T.D. 1**

**A.4 16 Backup Buy-In H.S.T.D. 2**

**A.4 17 Backup Buy-In H.S.T.D. 3**

**A.4 18 Backup Buy-In H.S.T.D. 4**

The first through the fourth Back-up Buy-In High Score values. The game automatically restores these values when the High Score Reset Every value is reached. **Note:** These adjustments are shown when "A.2 01 Buy Extra Ball" is set to ½ Credit or 1 Credit.

Range: 00 to 9,500,000,000

**A.4 19 Alien Champion**

This adjustment is used to set the number of Aliens that must be destroyed in a game to become the new Alien Champion.

Range: 5 to 50

**A.4 20 Alien Champion Credits**

This adjustment specifies the number of credits to award for a new Alien Champion.

Range: 00 to 03

## **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 a 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.

### **Check Diverter - Stuck Closed.**

The game has detected that the Diverter is stuck closed. Check the Diverter Power coil and the Diverter Hold coil in Coil Test, and verify that the Diverter is not sticking when moved manually. This error message will be cleared in game play when the game detects four (4) consecutive successful shots to the correct side of the Diverter.

### **Check Diverter - Stuck Open.**

The game has detected that the Diverter is stuck open. Verify that the Diverter is not sticking when moved manually. If the Diverter appears to be functioning properly, check the Left Popper Optical Switch for spurious behavior. This error message will be cleared in game play when the game detects four (4) consecutive successful shots to the correct side of the Diverter.

### **Check Motor Bank - Down Switch Broken.**

The game has detected that the Motor Bank Down Switch is broken. Use T.19 (Motor Bank Test) to verify proper operation of the Motor Bank. Adjust the switch as necessary. The Motor Bank Down Switch should be CLOSED when the Motor Bank is all the way DOWN (flush with the playfield), and OPEN otherwise. When the Motor Bank Test detects three (3) consecutive successful openings of the Motor Bank, the test will clear this error (the bottom line of the display for the test will reflect this when it happens).

### **Check Motor Bank - Up Switch Broken.**

The game has detected that the Motor Bank Up Switch is broken. Use T.19 (Motor Bank Test) to verify proper operation of the Motor Bank. Adjust the switch as necessary. The Motor Bank Up Switch should be CLOSED when the Motor Bank is all the way UP, and OPEN otherwise. When the Motor Bank Test detects three (3) consecutive successful closings of the Motor Bank, the test will clear this error (the bottom line of the display for the test will reflect this when it happens).

### **Check Drop Target - Stuck Closed**

The game has detected that the Drop Target Switch is Stuck Closed. Use T.18 (Drop Target Test) to verify proper operation of the Drop Target. The Drop Target Switch should be CLOSED when the Drop Target is DOWN, and OPEN when the Drop Target is UP. When the Drop Target Test detects three (3) consecutive successful attempts at raising the Drop Target, the test will clear this error (the bottom line of the display for the test will reflect this when it happens).

### **Check Left Gate - Stuck Closed.**

The game has detected that the Left Gate is stuck closed. Check the Left Gate coil in Coil Test, and check the spring attached to the Left Gate behind the back panel. Verify that the Left Gate is not sticking or making contact with anything when moved manually. Then use T.16 (Loop/Gate Test) to verify proper operation of the Left Gate. When the Loop/Gate Test detects one (1) successful attempt at rolling a ball around the right loop, the test will clear this error.

**Check Left Gate - Stuck Open.**

The game has detected that the Left Gate is stuck open. Check the spring attached to the Left Gate behind the back panel. Verify that the Left Gate is not sticking or making contact with anything when moved manually. This error message will be cleared in game play when the game detects one (1) successful shot up the Right Loop that is delivered to the Top Rollover Lanes when the state of the game dictates that the Left Gate should be closed.

**Check Right Gate - Stuck Closed.**

The game has detected that the Right Gate is stuck closed. Check the Right Gate coil in Coil Test, and check the spring attached to the Right Gate behind the back panel. Verify that the Right Gate is not sticking or making contact with anything when moved manually. Then use T.16 (Loop/Gate Test) to verify proper operation of the Right Gate. When the Loop/Gate Test detects one (1) successful attempt at rolling a ball around the left loop, the test will clear this error.

**Check Right Gate - Stuck Open.**

The game has detected that the Right Gate is stuck open. Check the spring attached to the Right Gate behind the back panel. Verify that the Right Gate is not sticking or making contact with anything when moved manually. This error message will be cleared in game play when the game detects one (1) successful shot up the Left Loop that is delivered to the Top Rollover Lanes when the state of the game dictates that the Right Gate should be closed.

**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 60 balls or approximately 20 games). The game program compensates the game play requirements affected by each disabled switch to allow 'nearly normal' play. This helps keep your 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' (ball poppers, etc.) need to be checked for proper power connections (+12V dc and ground).

**Check Fuses F101 and F106 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 (F109), or at connectors J138, J139, J140 or J141 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 four balls, however, it will operate with less. This message announces that a ball is missing or stuck. When the ball is located, return it to the Ball Trough. Other possibilities for this problem could be malfunctions of the Ball Trough switches 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 hangers, 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 is NOT a switch problem; however, for most games it is a very rare possibility.

### G10 Error

The security chip is incorrect or faulty. If this occurs, replace the security chip.

### G11 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. Go to U.4 of the Utilities Menu and set the time and date.

### Factory Settings Restored.

This message indicates that the CMOS RAM (U8) 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 voltages 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 +4V, 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. (Readings taken with an 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 and Audio Visual Board Error Codes

The CPU has three LED's, 201, 202, and 203. At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing. If the system detects an error the following happens:

|                        |                               |                             |
|------------------------|-------------------------------|-----------------------------|
| <b>CPU BOARD</b>       | Center LED blinks once        | = G11 ROM Failure           |
| <b>LED ERROR CODES</b> | Center LED blinks twice       | = U8 RAM Failure            |
|                        | Center LED blinks three times | = G10 Security Chip Failure |

Upon game turn-on you will hear one of the following.

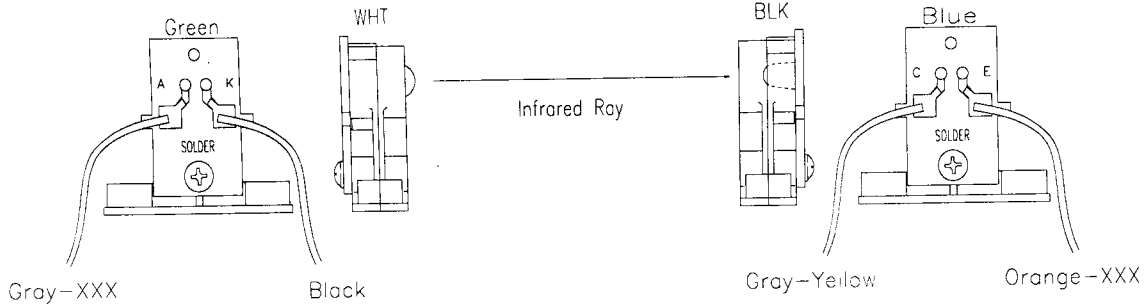
|                           |          |                              |
|---------------------------|----------|------------------------------|
| <b>AUDIO VISUAL BOARD</b> | 1 Beep   | = Audio Visual Board is O.K. |
| <b>BEEP ERROR CODES</b>   | 2 Beeps  | = S2 Failure                 |
|                           | 3 Beeps  | = S3 Failure                 |
|                           | 4 Beeps  | = S4 Failure                 |
|                           | 5 Beeps  | = S5 Failure                 |
|                           | 6 Beeps  | = S6 Failure                 |
|                           | 7 Beeps  | = S7 Failure                 |
|                           | 10 Beeps | = Audio Static RAM Failure   |

### Opto Theory

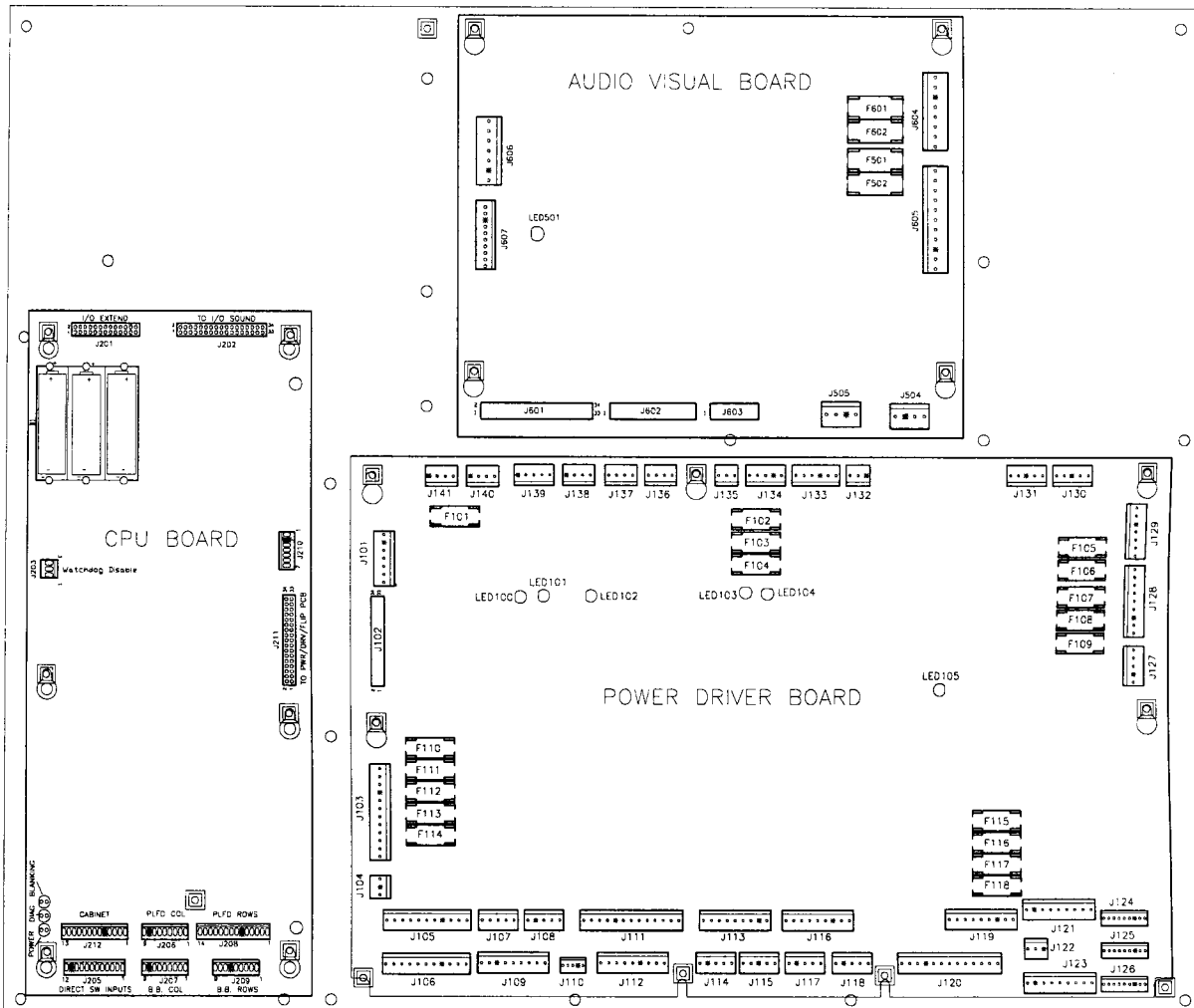
The opto receiver (Photo Transistor) should be approximately 0.1 - 0.7 volts when the opto beam is unblocked and approximately 11 - 13 volts when the opto beam is blocked. The opto transmitter (LED) should always be approximately 1.4 volts. **Note:** The transmitter (LED) is larger than the receiver (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

- LED 201 Blanking
- LED 202 Power
- LED 203 Diagnostics

At game turn-on, LED 201 and LED 202 are on, LED 203 is off. During normal operation LED 201 is off, LED 202 is on, and LED 203 is flashing.

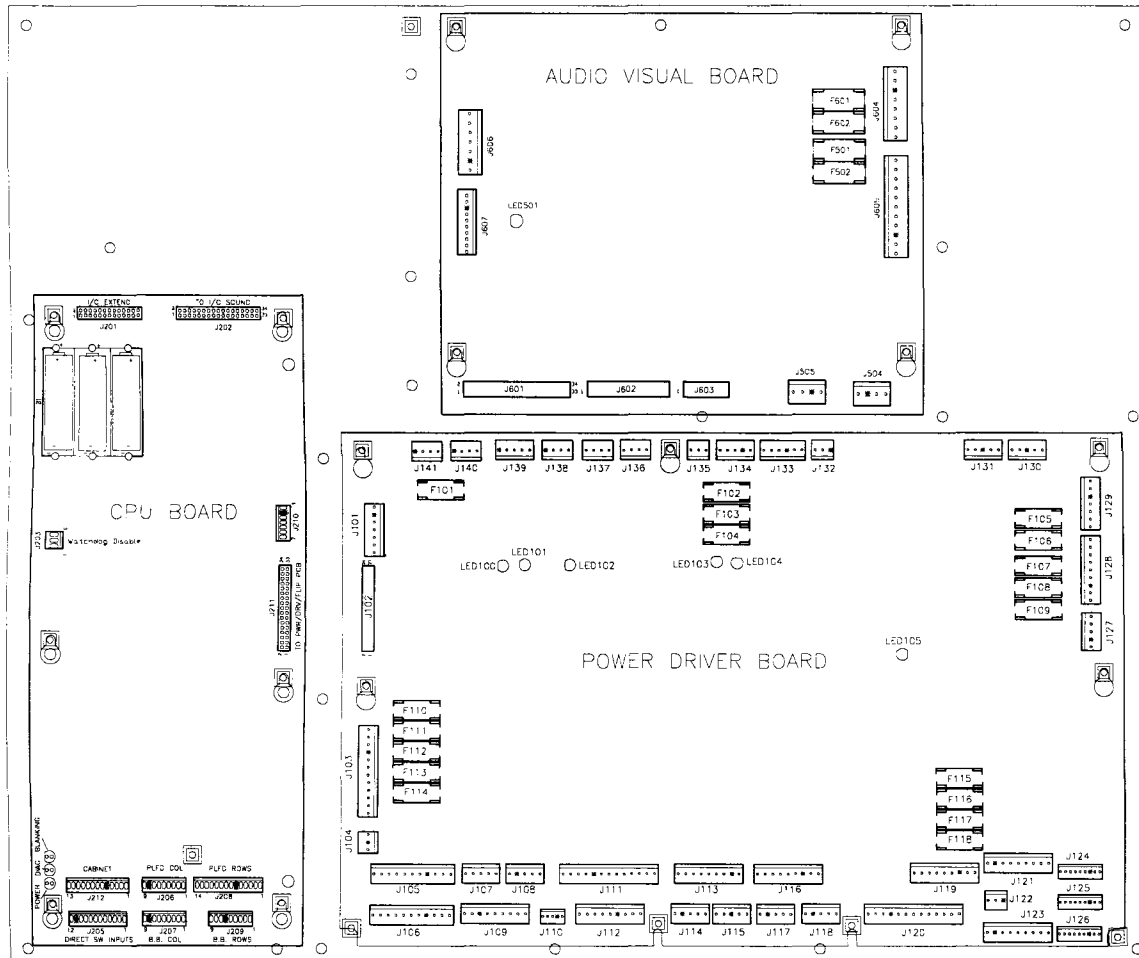
### AUDIO VISUAL BOARD

- LED 501 +5VDC, Normally Flashing at a slower rate than LED 203.

### POWER DRIVER BOARD

- LED 100 +12VDC Regulated, Normally On
- LED 101 +5VDC Digital, Normally On
- LED 102 +18VDC Lamps, Normally On
- LED 103 +12VDC Unregulated, Normally On
- LED 104 +20VDC Flashlamps, Normally On
- LED 105 +50VDC Coils, Normally On

## FUSE LIST



### AUDIO VIDEO BOARD

|      |               |              |
|------|---------------|--------------|
| F501 | -25V          | T2.5A, 250V  |
| F502 | +25V          | T2.5A, 250V  |
| F601 | +62V          | T0.25A, 250V |
| F602 | -113V & -125V | T0.25A, 250V |

### CPU BOARD

There are no fuses on the CPU board.

### POWER DRIVER BOARD

|      |                      |              |      |                      |             |
|------|----------------------|--------------|------|----------------------|-------------|
| F101 | Regulated 12V        | T0.63A, 250v | F110 | G.I. #5 White-Violet | T4.0A, 250V |
| F102 | Solenoids #9 to #16  | T4.0A, 250V  | F111 | G.I. #4 White-Green  | T4.0A, 250V |
| F103 | Solenoids #1-#8      | T4.0A, 250V  | F112 | G.I. #3 White-Yellow | T4.0A, 250V |
| F104 | Solenoids #25 to #28 | T4.0A, 250V  | F113 | G.I. #2 White-Orange | T4.0A, 250V |
| F105 | +5V Logic            | T4.0A, 250V  | F114 | G.I. #1 White-Brown  | T4.0A, 250V |
| F106 | +18V Lamp Matrix     | T5.0A, 250V  | F115 | +50V Flippers        | T4.0A, 250V |
| F107 | Flasher Secondary    | T4.0A, 250V  | F116 | +50V Flippers        | T4.0A, 250V |
| F108 | Solenoid Secondary   | T6.3A, 250V  | F117 | +50V Flippers        | T4.0A, 250V |
| F109 | Unregulated 12V      | T4.0A, 250V  | F118 | +50V Flippers        | T4.0A, 250V |

### LINE FILTER

|          |             |
|----------|-------------|
| Foreign  | T4.0A, 250V |
| Domestic | T5.0A, 250V |



## 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 NO 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 misadjusted switch 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.

# **ATTACK FROM MARS™**

## **Unit Disassembly for Repair**

Major Component Service Instructions

# Flying Saucer Mechanism

## **A. To access saucer coil.**

1. Remove the two mounting screws (p/n 4008-01113-16) that attach the Flying Saucer Assembly (p/n A-20608) and Playfield Plastic Assembly #5 (A-20771-5) to the Back Panel Assembly (A-20578). (See Fig.1)

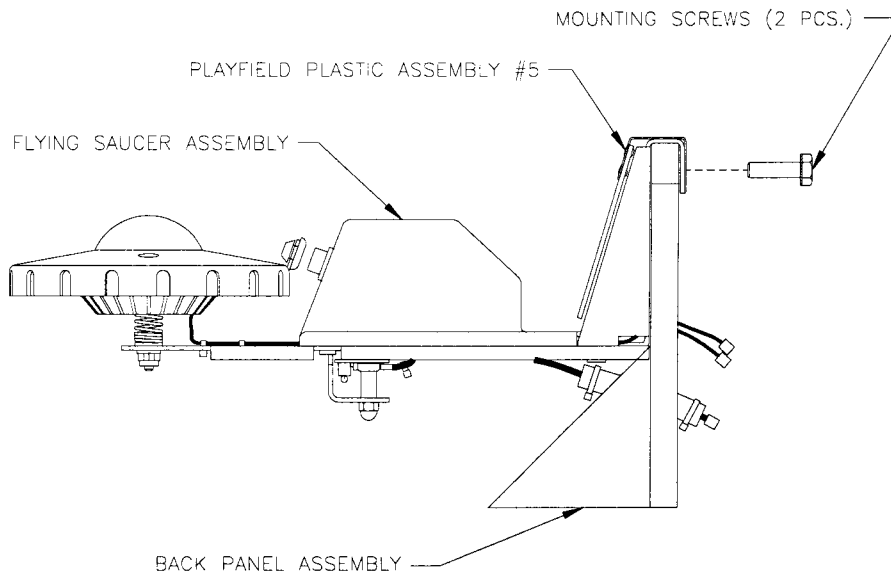


FIGURE 1

2. Place Playfield Plastic Assembly #5 to the side and remove the four mounting screws (p/n 4008-01017-05) that mount the COIL COVER ASSEMBLY (p/n A-20870) to the Saucer Support Weldment (p/n 04-10315.1). You may now access and/or service the Saucer Coil Assembly (p/n AE-26-1500), the Saucer Armature (p/n 04-10361) or the Saucer Cable Assembly (p/n H-20704.1). (See Fig.2 & 3)

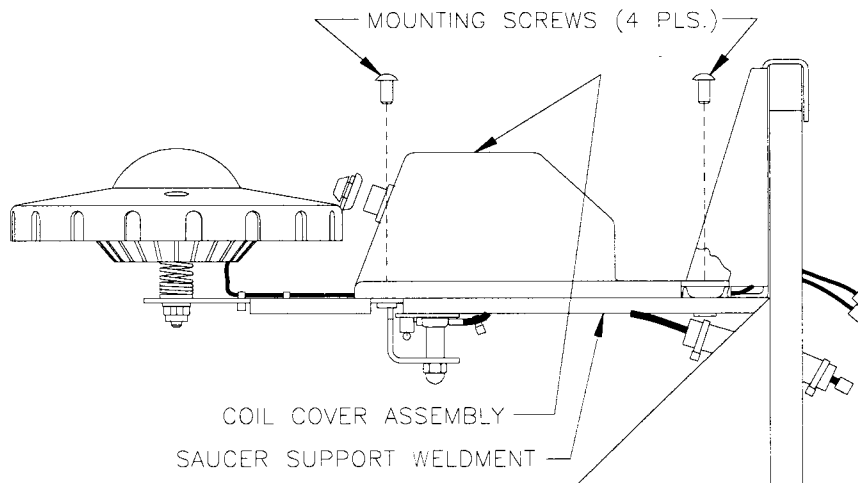


FIGURE 2

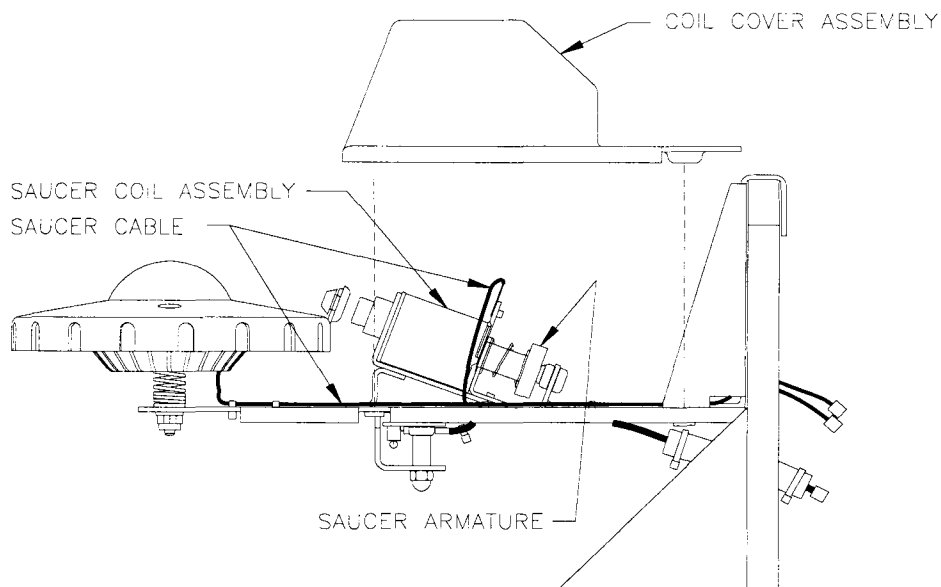


FIGURE 3

**B. To access internal saucer parts.**

1. Remove the entire saucer assembly (p/n A-20608) from the Back Panel Assembly (p/n A-20578) after unplugging it from the Strobe Lamp PCB Assembly (p/n A-20669) located on the back side of the Back Panel Assembly.
2. Remove the two plastic mounting screws (p/n 4008-01198-06) from the Saucer Top (p/n 03-9467.1). (See Fig.4)
3. Carefully lift the Saucer Top straight up and set aside. (See Fig.5)

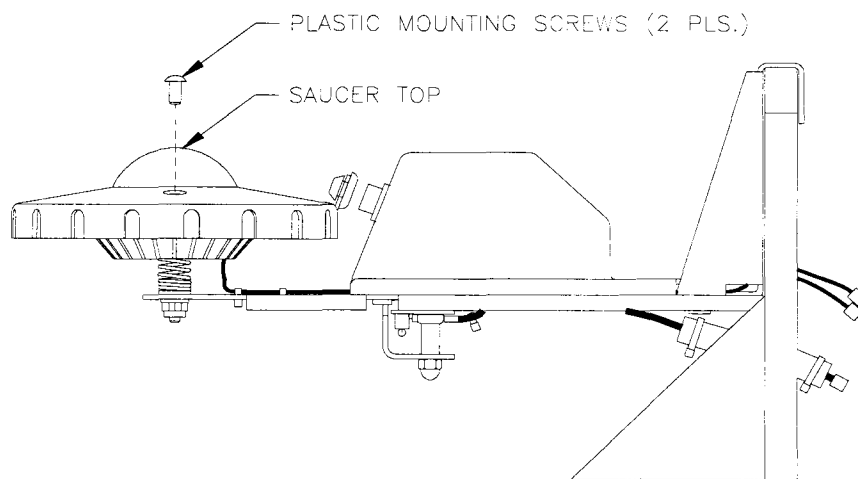


FIGURE 4

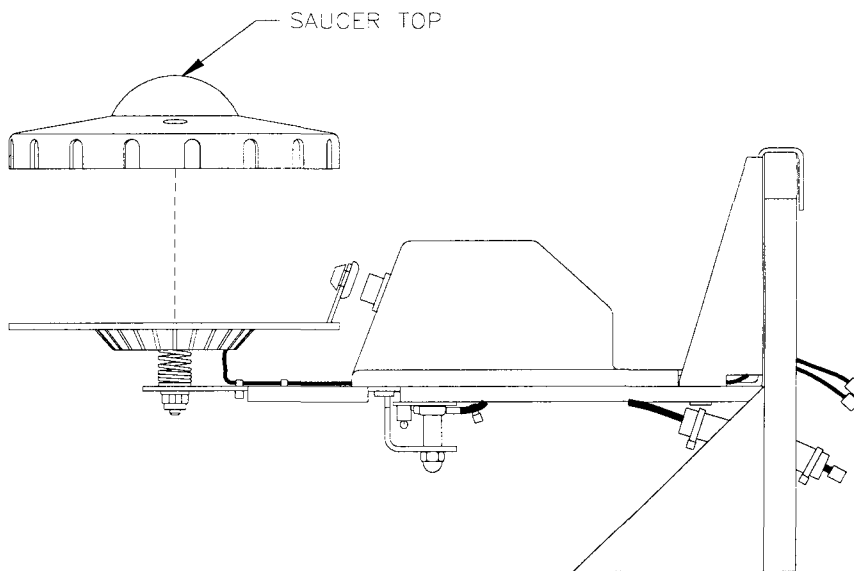


FIGURE 5

4. Carefully unplug the Saucer Cable (p/n H-20704.1) from the L.E.D. Chase Light PCB (p/n A-20670) and push the cable out of the Saucer Body Assembly through the rectangular access hole in the bottom of the Saucer Body Assembly. (See Fig.6)

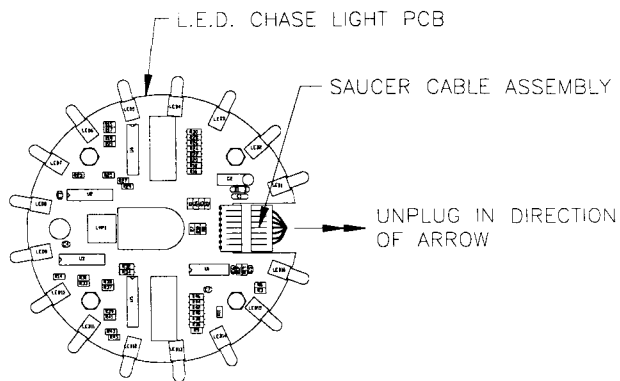


FIGURE 6  
(TOP VIEW OF SAUCER)

5. To remove the L.E.D. Chase Light PCB (p/n A-20670) and the Saucer PCB Insulator (p/n 01-14210), remove the four PCB mounting screws (p/n 4008-01168-06). (See Fig.7)  
The PCB and PCB Insulator may now be lifted straight up off of the Main Saucer Bracket (p/n 04-10319.1). (See Fig.8)

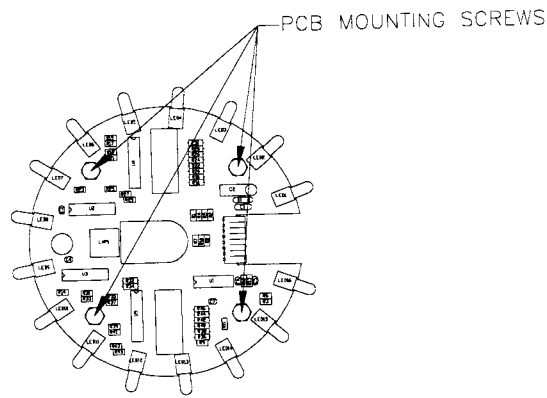


FIGURE 7  
(TOP VIEW OF SAUCER)

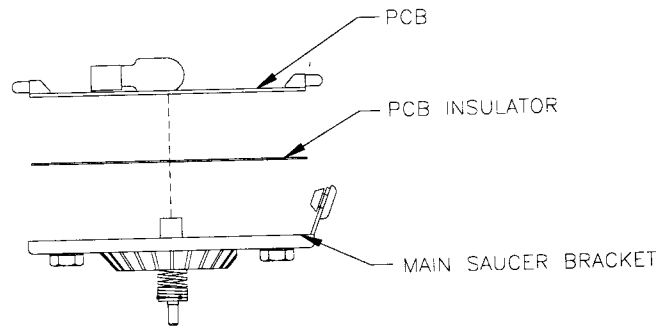


FIGURE 8

### C. Removing Saucer Body Assembly

1. To remove the entire Saucer Body Assembly (p/n A-20713) from the Main Saucer Assembly (p/n A-20608), remove the nut (p/n 4408-01119-00) and washer (p/n 4700-00011-00) from the underside of the Main Saucer Assembly. (See Fig.9 & 10)
2. To re-install, reverse procedure stated in step 1, being certain that the flats on the bottom of the saucer spring are aligned with the flats in the cutout of the Main Saucer Assembly.

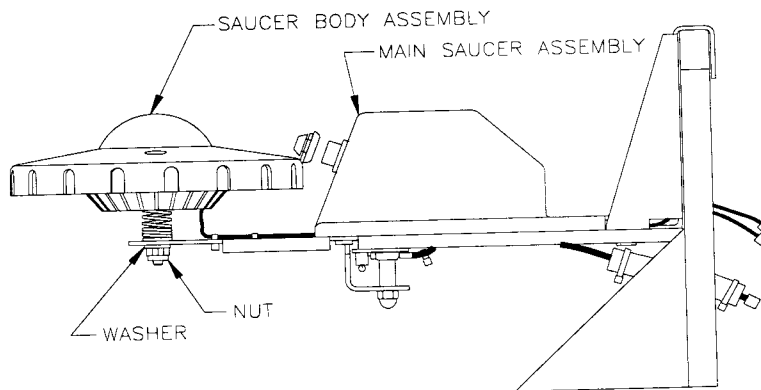


FIGURE 9

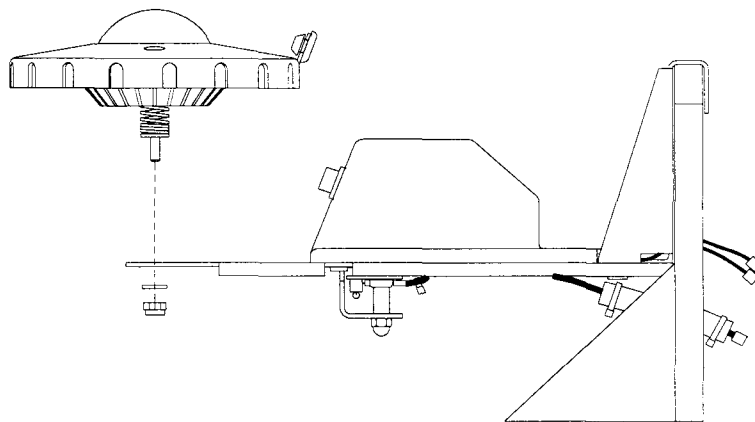


FIGURE 10

**IMPORTANT! DO NOT TOUCH XENON FLASH TUBE WHEN ASSEMBLING. ALWAYS USE GLOVES. GREASE AND OIL FROM THE FINGERS WILL SHORTEN THE LIFE OF THE BULB.**

**D. To Access Xenon Flash Tube Assembly**

1. Carefully unplug Strobe Cable Assembly (p/n 5797-14773) from the Xenon Flash Tube Assembly (p/n A-20718) (See Fig.11)

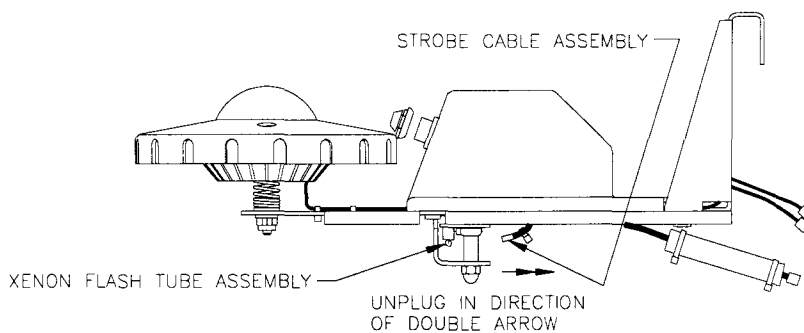


FIGURE 11

2. Remove the two acorn nuts (p/n 4408-01138-00) from the underside of Saucer Assembly (p/n A-20608) (See Fig.12)

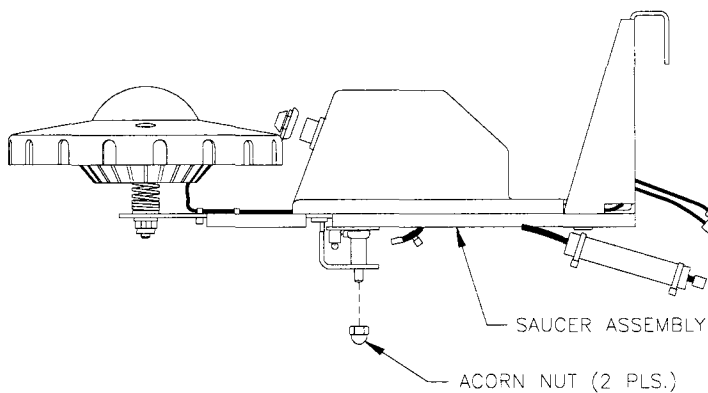


FIGURE 12

3. Slide Strobe Light Cover (p/n 03-9478.3) and Plastic Spacers (p/n 03-6047-3) off of the mounting studs. (See Fig.13)

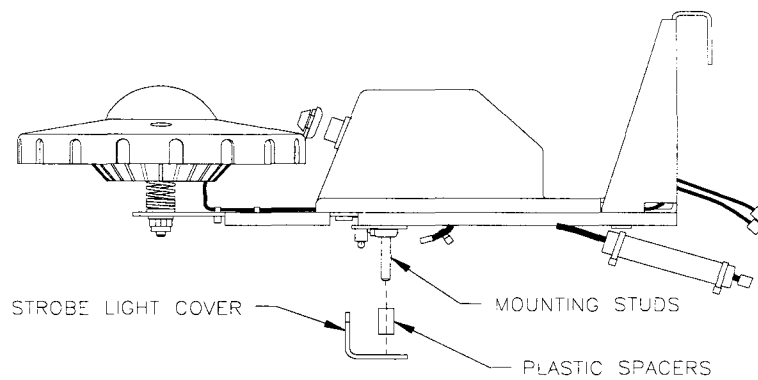


FIGURE 13

4. Remove the Xenon Flash Tube Assembly (p/n A-20718) from the mounting studs, being careful not to pull the Rubber Grommets (p/n 23-6420) out of the Xenon Flash Tube Assembly. (See Fig.14)

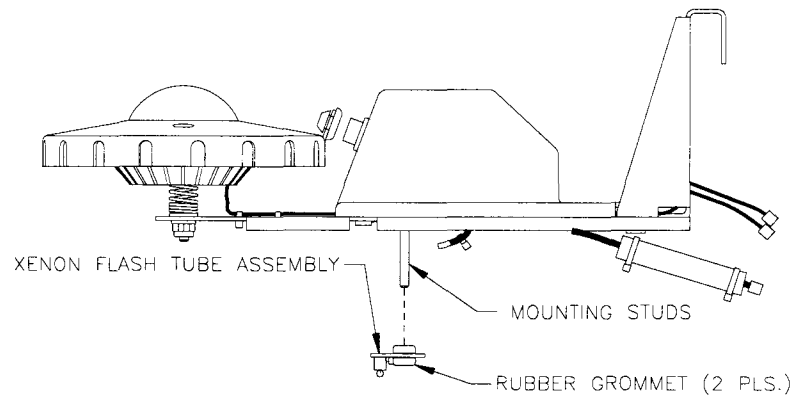


FIGURE 14



# Back Panel Assembly

## A. To access Strobe Lamp PCB Assembly

1. To access the Strobe Lamp PCB Assembly (p/n A-20669), lift and slide out main playfield until it is in its service position. (See Fig.15).

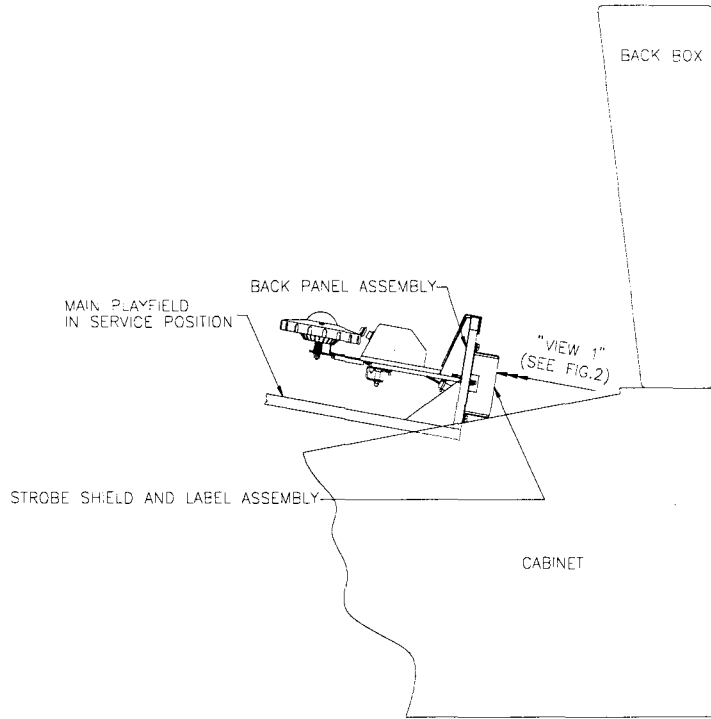
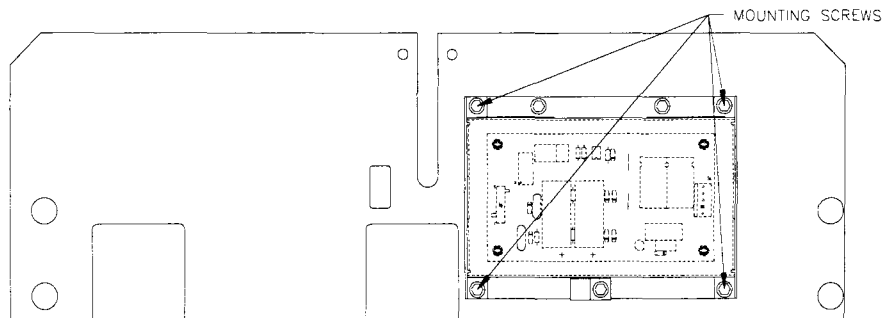


FIGURE 15

2. Remove the four mounting screws (p/n 4808-01175-08) that mount the Strobe Shield & Label Assembly (p/n A-20809) to the Back Panel Assembly (p/n A-20578) (See Fig.16). Carefully remove the Strobe Shield And Label Assembly and set aside. The Strobe Lamp PCB Assembly is now fully accessible and may be disconnected, removed and/or serviced.



"VIEW 1"  
FIGURE 16

3. When re-installing the Strobe Shield & Label Assembly, make certain that it is installed with the caution labels facing up. (See Fig.17)

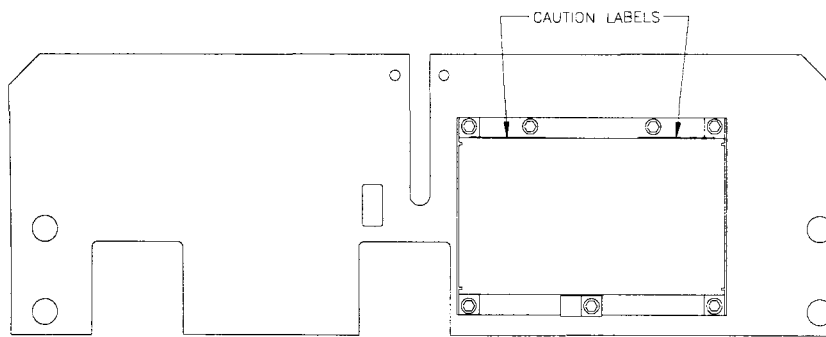
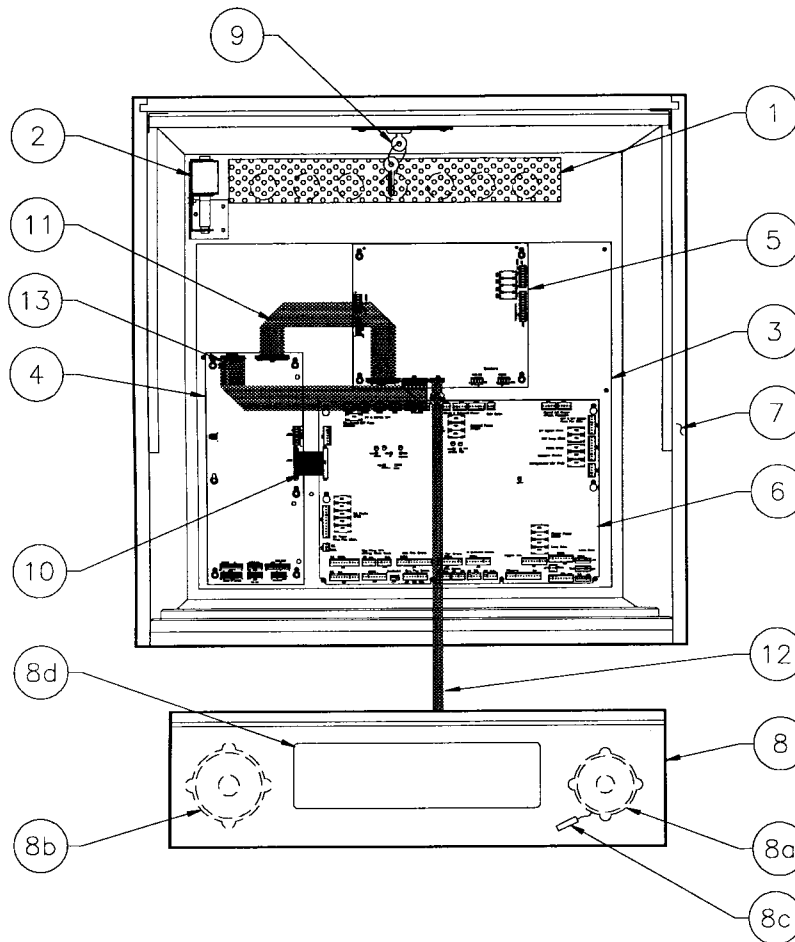


FIGURE 17

# SECTION TWO

## GAME PARTS INFORMATION

# 50041-BB Backbox Assembly



### Ribbon Cables

| Item | Part Number    | Description                     | Item | Part Number   | Designator                     |
|------|----------------|---------------------------------|------|---------------|--------------------------------|
| 1    | 01-6645        | Venting Screen                  | 10   | 5795-12653-03 | Ribbon Cable, 34-pin, 3"       |
| 2    | B-10686-1      | Knocker Assembly                | 11   | 5795-12653-12 | Ribbon Cable, 34-pin, 12"      |
| 3    | A-14092-7      | WPC '95 Mounting Plate Assy.    | 12   | 5795-13434-25 | Ribbon Cable, 14-pin w/Ferrite |
| 4    | A-20028        | WPC '95 Power Driver PCB        | 13   | 5795-10938-15 | Ribbon Cable, 26-pin, 15"      |
| 5    | A-20516-50041  | WPC '95 Audio Visual PCB        |      |               |                                |
| 6    | A-20119-50041  | WPC '95 CPU PCB                 |      |               |                                |
| 7    | 04-10276-50041 | Backbox, Wood                   |      |               |                                |
| 8    | A-20796        | Speaker/Display Assembly        |      |               |                                |
| a)   | 5555-12924-00  | Speaker Tweeter, 15w, 4Ω        |      |               |                                |
| b)   | 5555-12856-00  | Speaker, 5-1/4", 25w, 4Ω        |      |               |                                |
| c)   | 5045-12914-00  | Capacitor, 10μfd., 50v (±20%)   |      |               |                                |
| d)   | 5901-12784-00  | Dot Matrix Display/Driver Board |      |               |                                |
| e)   | 5556-13957-00  | Ferrite Bead 2-piece 3/4" Sq.   |      |               |                                |
| 9    | A-13379        | Lock & Plate Assembly           |      |               |                                |
| 10   | 50041-IN       | Insert Assembly                 |      |               |                                |

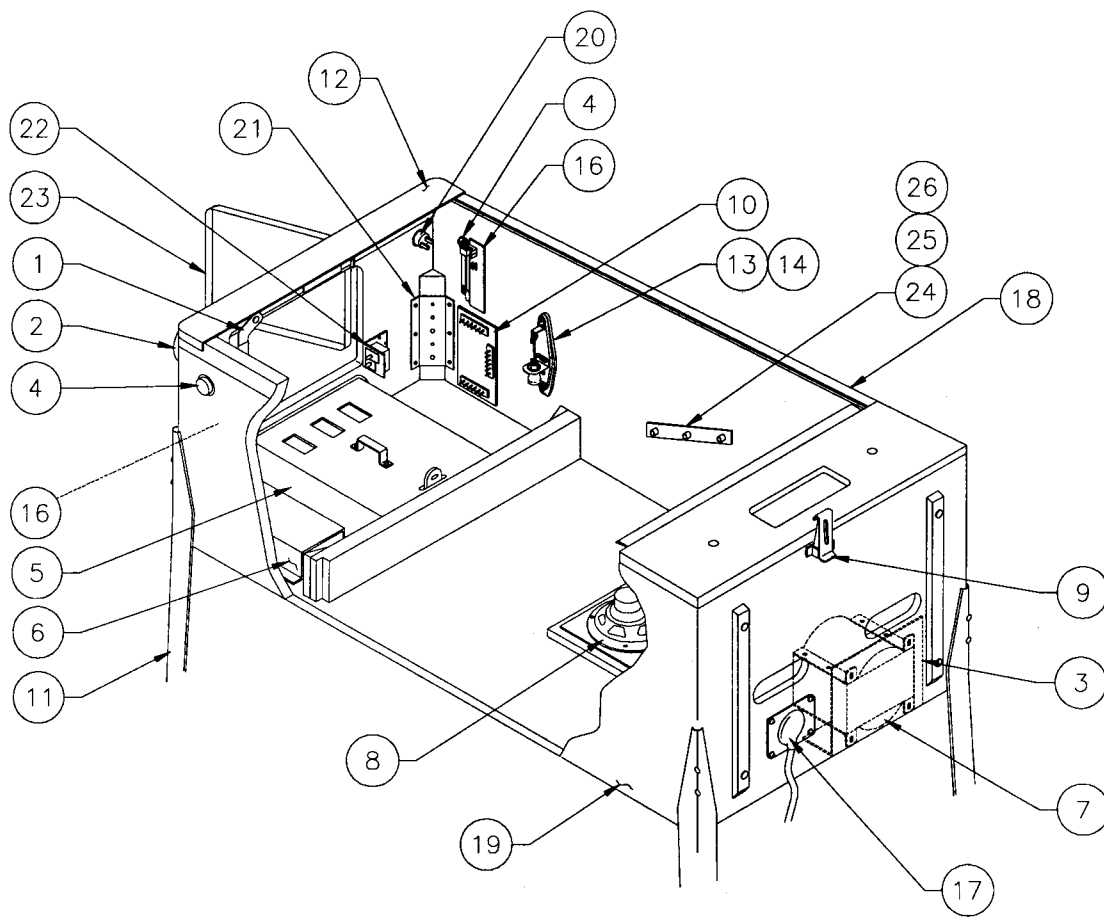
### Miscellaneous Parts

|               |                             |
|---------------|-----------------------------|
| 08-7456       | Backbox Glass: 27 x 18-7/8" |
| 20-9718       | Wing Screw, 3/8-16 x 2"     |
| 31-1357-50041 | Screened Translight         |

### Backbox Cables

|         |                                |
|---------|--------------------------------|
| H-20479 | Dot Matrix Display Power Cable |
| H-20477 | Logic Power Cable              |
| H-20478 | Secondary Cable                |
| H-20723 | Insert Cable                   |

# 50041-CAB Cabinet Assembly



### Miscellaneous Parts (Not Shown)

| Item | Part Number   | Description                              | Part Number | Description                     |
|------|---------------|--|-------------|---------------------------------|
| 1    | A-16773-1     | Lever Guide Assembly                     | A-17195     | Tilt Switch Assy. w/Cable       |
| 2    | 20-9663-B-4   | Push Button w/Light, <i>Launch</i> (Red) | A-19562.1   | Stay Arm Assembly               |
| 3    | 01-13936      | Drip Plate                               | 01-12352    | Clip Bracket                    |
| 4    | A-16883-4     | Flipper Button, Red (2)                  | 01-9011.1-L | Backbox Mtg. Bracket, Left      |
| 5    | A-20538-5     | 4-Ball Cashbox Assembly                  | 01-9011.1-R | Backbox Mtg. Bracket, Right     |
| 6    | A-17540-1     | Univ. Power Interface Assy.              | 01-6389-1   | Cashbox Lock Bracket            |
| 7    | 5610-14515-00 | WPC Transformer                          | 08-7028-T   | Playfield Glass                 |
| 8    | 5555-12929-00 | Speaker, 4 $\Omega$ , 6", 25w            | 08-7377     | Leg Leveler Adjuster, 3"        |
| 9    | 20-9347       | Toggle Latch                             | 20-6500     | Steel Ball, 1-1/16" (4)         |
| 10   | A-20580       | Coin Door Interface Board                |             |                                 |
| 11   | A-19514       | Leg Assembly, Chrome (4)                 |             |                                 |
| 12   | D-12615       | Front Molding Assembly                   |             |                                 |
| 13   | 20-6502-A     | Plumb Bob                                |             |                                 |
| 14   | A-15361       | Tilt Mechanism Assembly                  |             |                                 |
| 15   | *             | Cordset                                  |             |                                 |
| 16   | A-17316       | Opto Flipper Assembly (2)                | A-20201     | Cable & Jumper Assy., Coin Door |
| 17   | 01-10714      | Line Cord Cover                          | H-17217     | Plumb/Bob Mech. Protect Cable   |
| 18   | A-12359-3     | Side Molding Assembly (2)                | H-17837-2   | Voltage Program Jumper Cable    |
| 19   | 11-1310.1     | Wood Cabinet                             | H-20599-1.1 | Cabinet Cable                   |
| 20   | 20-9663-2     | Push Button w/Sw., <i>Start</i> (Green)  | H-19601-1   | Power Extension Cable           |
| 21   | 01-11400      | Leg Plate (4)                            | H-20840     | Cabinet Switch/Lamp Cable       |
| 22   | A-18249-1     | Cable & Interlock Switch Assy.           |             |                                 |
| 23   | 09-61000-1    | Coin Door-USA                            |             |                                 |
| 24   | 01-11408      | Plate Spacer (2)                         |             |                                 |
| 25   | 02-4329-1     | Pivot Nut, 7/8" (4)                      |             |                                 |
| 26   | 02-4352       | Pivot Bushing (2)                        |             |                                 |

### Cabinet Cables

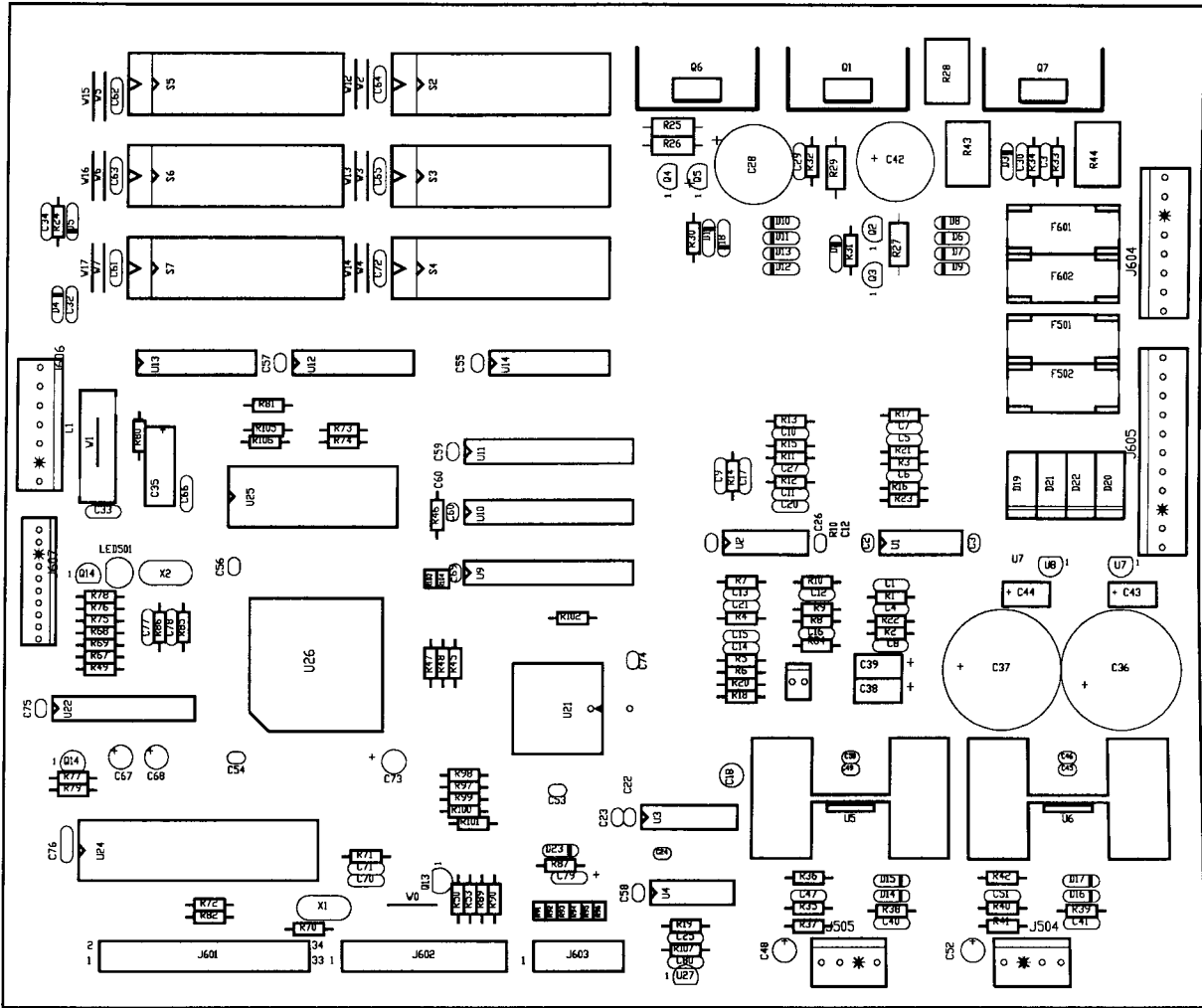
\* See Application Chart p.2-33.

# A-20516-50041

## WPC '95 Audio Visual PCB Assembly

| Part Number   | Designator   | Description                             | Part Number   | Designator             | Description                   |
|---------------|--|---|---------------|------------------------|-------------------------------|
| 4004-01005-06 | -  | Mach. Screw, 4-40 x 3/8"                | 5048-11033-00 | C1                     | Cap., .022m, 50v, 10% Ax.     |
| 4404-01119-00 | -  | Nut 4-40 ESN                            | 5048-12036-00 | C40, C41               | Cap., .22m, 50v, Axial        |
| 5010-08774-00 | R2, R17, R22, R23,<br>R35, R36, R40, R42,<br>R87   | Resistor, 22K $\Omega$ , 1/4w, 5%       | 5048-13172-00 | C78                    | Cap., 47pf, 50v, 20% Ax.      |
| 5010-08991-00 | R20, R46-R48, R50,<br>R72, R76, R77, R107  | Resistor, 4.7K $\Omega$ , 1/4w, 5%      | 5048-13418-00 | C4 - C6                | Cap., .047m, 50v, 5% Ax.      |
| 5010-09034-00 | R21  | Resistor, 10K $\Omega$ , 1/4w, 5%       | 5048-13609-00 | C9, C12, C15           | Cap., 3900pf, 50v, 5% Ax.     |
| 5010-09036-00 | R19  | Resistor, 100 $\Omega$ , 1/4w, 5%       | 5048-13610-00 | C8, C10, C11, C13, C14 | Cap., 1000pf, 50v, 5% Ax.     |
| 5010-09134-00 | R32-R34  | Resistor, 150K $\Omega$ , 1/4w, 5%      | 5048-13611-00 | C16, C17, C20, C21     | Cap., 680pf, 50v, 5% Ax.      |
| 5010-09219-00 | R1, R3   | Resistor, 8.2K $\Omega$ , 1/4w, 5%      | 5048-14563-00 | C29-C31                | Cap., .01uf, 200v, 10% Axial  |
| 5010-09416-00 | R73, R74, R80-R82,<br>R88, R105, R106  | Resistor, 470 $\Omega$ , 1/4w, 5%       | 5070-09045-00 | D19-D22                | Diode MR501, 3.0A             |
| 5010-09807-00 | R30, R31, R67-R69,<br>R102   | Resistor, 120 $\Omega$ , 1/4w, 5%       | 5070-09054-00 | D4, D6-D17, D23        | Diode 1N4004, 1.0A            |
| 5010-10171-00 | R24  | Resistor, 56 $\Omega$ , 1/4w, 5%        | 5075-12823-00 | D1, D18                | Zener, 1N4758A 56v, 1w        |
| 5010-10258-00 | R86  | Resistor, 1M $\Omega$ , 1/4w, 5%        | 5075-12824-00 | D3, D5                 | Zener, 1N4742A 12v, 1w        |
| 5010-10983-00 | R53, R75, R79, R84,<br>R85, R89, R90   | Resistor, 1.8K $\Omega$ , 1/4w, 5%      | 5075-12826-00 | D2                     | Zener, 1N4759, 62v, 1w        |
| 5010-12832-00 | R25, R26, R27, R29   | Resistor, 47K $\Omega$ , 1/4w, 5%       | 5160-08938-00 | Q13-Q15                | Transistor, 2N4401 NPN        |
| 5010-13215-00 | R78, R97-R101  | Resistor, 200K $\Omega$ , 1/4w, 5%      | 5164-09056-00 | Q2, Q3                 | Transistor, MPSD02 NPN        |
| 5010-13372-00 | R91-R96, R103, R104  | Resistor, 220 $\Omega$ , 1/8w, 5%       | 5164-12154-00 | Q1, Q7                 | Transistor, MJE15030 NPN      |
| 5010-13420-00 | R37, R41   | Resistor, 680 $\Omega$ , 1/4w, 5%       | 5194-09055-00 | Q4, Q5                 | Transistor, MPSD52 PNP        |
| 5010-13517-00 | R38, R39   | Resistor, 15 $\Omega$ , 1/4w, 5%        | 5194-12155-00 | Q6                     | Transistor, MJE15031 PNP      |
| 5010-13607-00 | R4, R5, R7-R15   | Resistor, 6.19K $\Omega$ , 1/8w, 1%     | 5250-13302-00 | U7                     | Reg. 78L05T 5v                |
| 5012-14558-00 | R44  | Resistor, 1.8K $\Omega$ , 5w vertical   | 5250-13303-00 | U8                     | Reg. 79L05T 5v                |
| 5012-14559-00 | R43  | Resistor, 4.7K $\Omega$ , 5w vertical   | 5311-12538-00 | U4                     | IC 74HC14 Hex. S-T            |
| 5012-14560-00 | R28  | Resistor, 120 $\Omega$ , 5w vertical    | 5315-13081-00 | U12-U14                | IC Octal Buffer HCT541        |
| 5013-13661-00 | R16  | Resistor, 9.09K $\Omega$ , 1/4w, 1%     | 5340-12278-00 | U25                    | S/Ram 2064 150NS              |
| 5013-14456-00 | R6, R18  | Resistor, 3.32K $\Omega$ , 1/4w, 1%     | 5370-12687-00 | U27                    | IC MC 340640Reset Chp         |
| 5040-14569-00 | C35  | Cap., 100mf, 25v, Axial                 | 5349-14351-00 | U9-U11                 | SRAm 8Kx8-35ms, 28pdlp        |
| 5040-09365-00 | C38, C39, C43, C44   | Cap., 1m, 63v(+50,-10%)Ax.              | 5370-12730-00 | U1, U2                 | IC Op Amp TL084               |
| 5040-12750-00 | C48, C52, C73  | Cap., 22m, 35v Radial                   | 5370-13419-00 | U5, U6                 | IC TDA 2030AV 18w, Audio Amp  |
| 5040-13098-00 | C18, C67, C68  | Cap., 4.7 $\mu$ , 35v ( $\pm$ 20%)      | 5371-13299-00 | U3                     | IC Ad-1851 16bit mono         |
| 5040-13417-00 | C36, C37   | Cap., 10000 $\mu$ f, 35v Radial         | 5520-14561-00 | X2                     | Crystal 20mHz, parallel 20pf  |
| 5040-14564-00 | C28, C42   | Cap., 150 $\mu$ f, 160v, 20%Rad.        | 5671-14516-00 | LED 501                | Led-Display Red T 1-3/4       |
| 5043-08996-00 | C2, C3, C19, C22-<br>C24, C26, C32, C34,<br>C45, C46, C49, C50,<br>C53-C66, C69, C72,<br>C74-C76, C79, C80 | Cap., 0.1 $\mu$ f, 50v ( $\pm$ 20%) Ax. | 5700-08985-00 | U24                    | Socket IC 40-pin .6           |
| 5043-10267-00 | C47, C51   | Cap., 150pf, 100v Cer. Ax.              | 5700-12047-00 | U22                    | Socket IC 24.3P               |
| 5048-10992-00 | C27  | Cap., .0047m, 50v, 10% Ax.              | 5700-12088-00 | S2-S7                  | Socket Dip 32.6P"             |
| 5048-11028-00 | C77  | Cap., 22p, 50v, Axial                   | 5705-12638-00 | -                      | Heatsink 5298B                |
| 5048-11029-00 | C25  | Cap., 100p, 50v, 5% Axial               | 5705-14562-00 | -                      | Heatsink 10-220 wave sol 287  |
| 5048-11030-00 | C7   | Cap., 470p, 50v, Axial                  | 5733-14528-00 | -                      | Fuse Holder 5x20mm 10A.       |
|               |  |   | 5791-10850-00 | J602                   | Connector, 26-pin Header Str. |
|               |  |   | 5791-10862-04 | J504, J505             | Connector, 4-pin Header Str.  |
|               |  |   | 5791-10862-07 | J606                   | Connector, 7-pin Header Str.  |
|               |  |   | 5791-10862-08 | J604                   | Connector, 8-pin Header Str.  |
|               |  |   | 5791-10862-11 | J605                   | Connector, 11-pin Header Str. |
|               |  |   | 5791-12516-00 | J601                   | Connector, 34 hdr 2 x 17 .100 |
|               |  |   | 5791-12827-00 | J603                   | Connector, 14 Hen 7x2 Str.    |
|               |  |   | 5791-13830-10 | J607                   | Connector, 10-pin Str. Sq.    |
|               |  |   | 5010-09534-00 | W0, W1-W7, R49         | Resistor, 0 $\Omega$ , 0w     |

# A-20516-50041 WPC '95 Audio Visual PCB Assembly



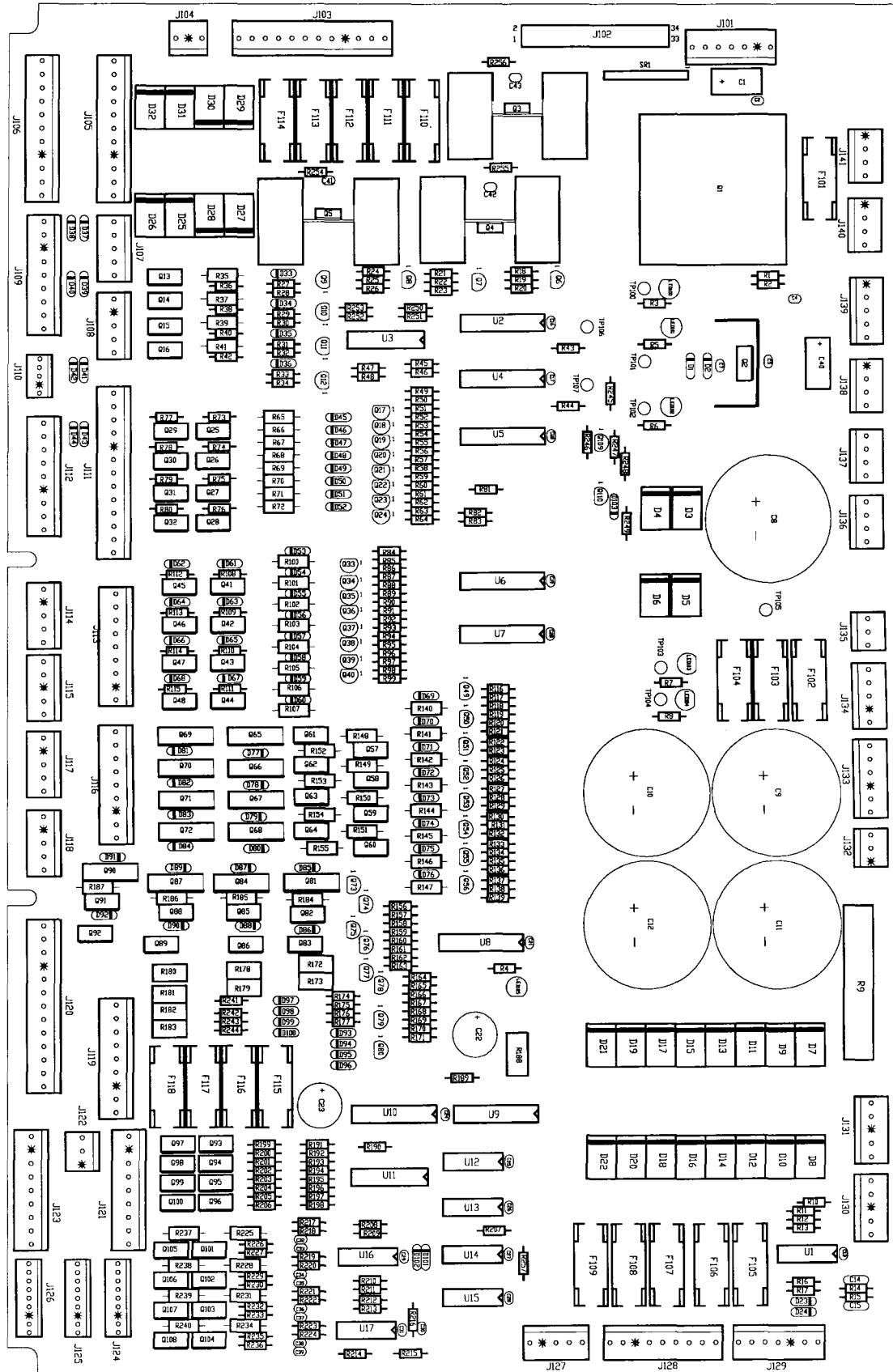
# A-20028

## WPC '95 Power Driver PCB Assembly

| Part Number   | Designator  | Description                         | Part Number   | Designator  | Description               |
|---------------|---|-------------------------------------|---------------|---|---------------------------|
| 5040-14569-00 | C1, C40   | Capacitor, 100µF, 25v, Ax.          | 5013-14534-00 | R2  | Resistor, 243Ω, 1/4w, 1%  |
| 5043-08996-00 | C2, C4, C5, C7, C13, C16, C17, C18, C19, C20, C21, C24-C39, C41-C43                   | Capacitor, 0.1m, 50v (±20%) Ax.     | 5010-09999-00 | R3, R4, R6-R8, R43, R44, R81-R83, R190  | Resistor, 2KΩ, 1/4w, 5%   |
| 5040-13417-00 | C8 - C12  | Capacitor, 10000µf, 35v Radial      | 5010-09224-00 | R5, R14 - R17   | Resistor, 270Ω, 1/4w, 5%  |
| 5048-11031-00 | C14, C15  | Capacitor, .001m, 50v, 10% Ax.      | 5012-12632-00 | R9  | Resistor, 12Ω, 10w, 5%    |
| 5040-09537-00 | C22, C23  | Capacitor, 100µ, 100v (±20%) Radial | 5010-09324-00 | R10   | Resistor, 27KΩ, 1/4w, 5%  |
| 5070-09054-00 | D1, D2, D23, D24, D33 - D100, D103  | Diode 1N4004                        | 5010-09358-00 | R11, R157, R159, R161, R163, R165, R167, R169, R171, R216-R224, R247  | Resistor, 1KΩ, 1/4w, 5%   |
| 5070-14526-00 | D3-D22, D25-D32   | Diode P600G 6A 400 PIV              | 5010-09034-00 | R12, R13, R189, R208-R215, R248   | Resistor, 10KΩ, 1/4w, 5%  |
| 5070-08919-00 | D101, D102  | Diode, 1N4148 150mA.                | 5010-08992-00 | R18, R21, R24, R192, R194, R196, R198, R200, R202, R204, R206   | Resistor, 560Ω, 1/4w, 5%  |
| 5731-14531-00 | F101  | Fuse 5 x 20mm TO 63A., 250V         | 5010-08991-00 | R19, R22, R25, R28, R30, R32, R34, R50, R52, R54, R56, R58, R60, R62, R64, R84, R86, R88, R90, R92, R94, R96, R98, R116, R119, R122, R125, R128, R131, R134, R137, R246   | Resistor, 4.7KΩ, 1/4w, 5% |
| 5731-14532-00 | F115-F118   | Fuse 5 x 20mm T2 50A., 250V         |               |   |                           |
| 5731-14530-00 | F102-F105, F107, F109-F114  | Fuse 5 x 20mm T 4A, 250V            |               |   |                           |
| 5731-14046-00 | F106  | Fuse S-B, 5A, 5x20mm                |               |   |                           |
| 5731-14529-00 | F108  | Fuse 5 x 20mm T 6.3A, 250V          |               |   |                           |
| 5733-14528-00 | F101-F118   | Fuse Holder 5 x 20mm 10A            |               |   |                           |
| 5705-14724-00 | Q1  | Heat Sink TO-3 5.1DEG/W             |               |   |                           |
| 5701-09652-00 | Q1  | Thermal Pad TO-3                    |               |   |                           |
| 4406-01128-00 | Q1  | Nut 6-32 KEPS                       | 5010-11079-00 | R20, R23, R26, R254-R256  | Resistor, 51Ω, 1/4w, 5%   |
| 4006-01005-06 | Q1  | Mach. Screw, 6-32 x 3/8"            |               |   |                           |
| 5705-14562-00 | Q2  | Heat Sink 10-220 Wave Sol 287       | 5010-09416-00 | R27, R29, R31, R33, R45-R49, R51, R53, R55, R57, R59, R61, R63, R85, R87, R89, R91, R93, R95, R97, R99, R117, R120, R123, R126, R129, R132, R135, R138, R156, R158, R160, R162, R164, R166, R168, R170, R245, R250-R253, R257 | Resistor, 470Ω, 1/4w, 5%  |
| 4004-01005-06 | Q2-Q5   | Mach. Screw, 4-40 x 3/8"            |               |   |                           |
| 4404-01119-00 | Q2-Q5   | Nut 4-40 ESN                        |               |   |                           |
| 5705-12638-00 | Q3-Q5   | Heat Sink 5298B                     |               |   |                           |
| 5791-10862-07 | J101, J129  | Connector, 7-pin Header Str.        |               |   |                           |
| 5791-12516-00 | J102  | Connector, 34 Hdr 2x17              |               |   |                           |
| 5791-10862-12 | J103  | Connector, 12-pin Header Str.       |               |   |                           |
| 5791-10862-03 | J104, J122, J132, J135  | Connector, 3-pin Header Str.        |               |   |                           |
| 5791-10862-11 | J105, J106  | Connector, 11-pin Header Str.       |               |   |                           |
| 5791-10862-05 | J107, J108, J114, J115, J117, J118, J127, J130, J131, J134, J139                      | Connector, 5-pin Header Str.        | 5010-08993-00 | R35, R37, R39, R41, R65-R72, R100-R107, R140-R147   | Resistor, 68Ω, 1/4w, 5%   |
| 5791-10862-09 | J109, J112, J113, J116, J119, J121, J123, J128  | Connector, 9-pin Header Str.        | 5010-08997-00 | R36, R38, R40, R42, R73-R80, R108, R109, R110-R115, R118, R121, R124, R127, R130, R133, R136, R139  | Resistor, 2.7kΩ, 1/4w, 5% |
| 5791-10862-13 | J111, J120  | Connector, 13-pin Header Str.       |               |   |                           |
| 5791-13830-09 | J124-J126   | Connector, 9-pin Header Str.        | 5010-09361-00 | R148-R155, R184-R187  | Resistor, 220Ω, 1/4w, 5%  |
| 5791-10862-06 | J133  | Connector, 6-pin Header Str.        | 5011-12956-00 | R172, R173, R178-R183   | Resistor, 2.7KΩ, 1/4w, 5% |
| 5791-10862-04 | J136-J138, J140, J141   | Connector, 4-pin Header Str.        | 5010-10171-00 | R174-R177, R241-R244  | Resistor, 56Ω, 1/4w, 5%   |
| 5671-14516-00 | LED100-LED105   | LED Dspl Red T-1                    | 5010-14711-00 | R188  | Resistor, 10KΩ, 1/4w, 5%  |
| 5250-14527-00 | Q1  | Regulator Voltage LM317K            | 5010-09314-00 | R191, R193, R195, R197, R199, R201, R203, R205  | Resistor, 1.2kΩ, 1/4w, 5% |
| 5460-12423-00 | Q2  | I.C. LM7812                         |               |   |                           |
| 5131-12725-00 | Q3-Q5   | Triac BT138E                        | 5010-09086-00 | R207  | Resistor, 6.8kΩ, 1/4w, 5% |
| 5194-09055-00 | Q6-Q12, Q17-Q24, Q33-Q40, Q49-Q56, Q109   | Transistor, MPSD52 PNP              | 5010-12427-00 | R225, R228, R231, R234, R237-R240   | Resistor, .22kΩ, 1/4w, 5% |
| 5162-12635-00 | Q13-Q16, Q25-Q32, Q41-Q48, Q57-Q64, Q82, Q83, Q85, Q86, Q88, Q89, Q91, Q92, Q101-Q108 | Transistor, TIP102                  | 5010-08998-00 | R226, R227, R229, R230, R232, R233, R235, R236  | Resistor, 2.2kΩ, 1/4w, 5% |
| 5191-12179-00 | Q65-Q72, Q81, Q84, Q87, Q90   | Transistor, TIP36C                  | 5010-09040-00 | R249  | Resistor, 33Ω, 1/4w, 5%   |
| 5190-09016-00 | Q73 - Q80   | Transistor, 2N4403 PNP              | 5019-10143-00 | SRI   | SIP RES 470 x 9R          |
| 5192-12428-00 | Q93 - Q100  | Transistor, TIP107                  | 5824-09248-00 | TP100-TP107   | Test Point #1502-1        |
| 5160-10269-00 | Q110  | Transistor, 2N3904                  | 5370-12272-00 | U1, U16, U17  | I.C. LM339 Quad Comp      |
| 5013-14535-00 | R1  | Resistor, 750Ω, 1/4w, 1%            | 5281-09486-00 | U2, U4-U8, U10  | I.C. 74LS374 8dff         |
|               |   |                                     | 5162-12422-00 | U3, U11   | Trans uln 2803 Oc-drl     |
|               |   |                                     | 5281-10182-00 | U9  | I.C. 74LS240 l/drvr       |
|               |   |                                     | 5281-09487-00 | U12 - U15   | I.C. 74LS74 Dual d fff    |
|               |   |                                     | 5791-13830-05 | J110  | Connector, 5-pin Header   |



# A-20028 WPC '95 Power Driver PCB Assembly

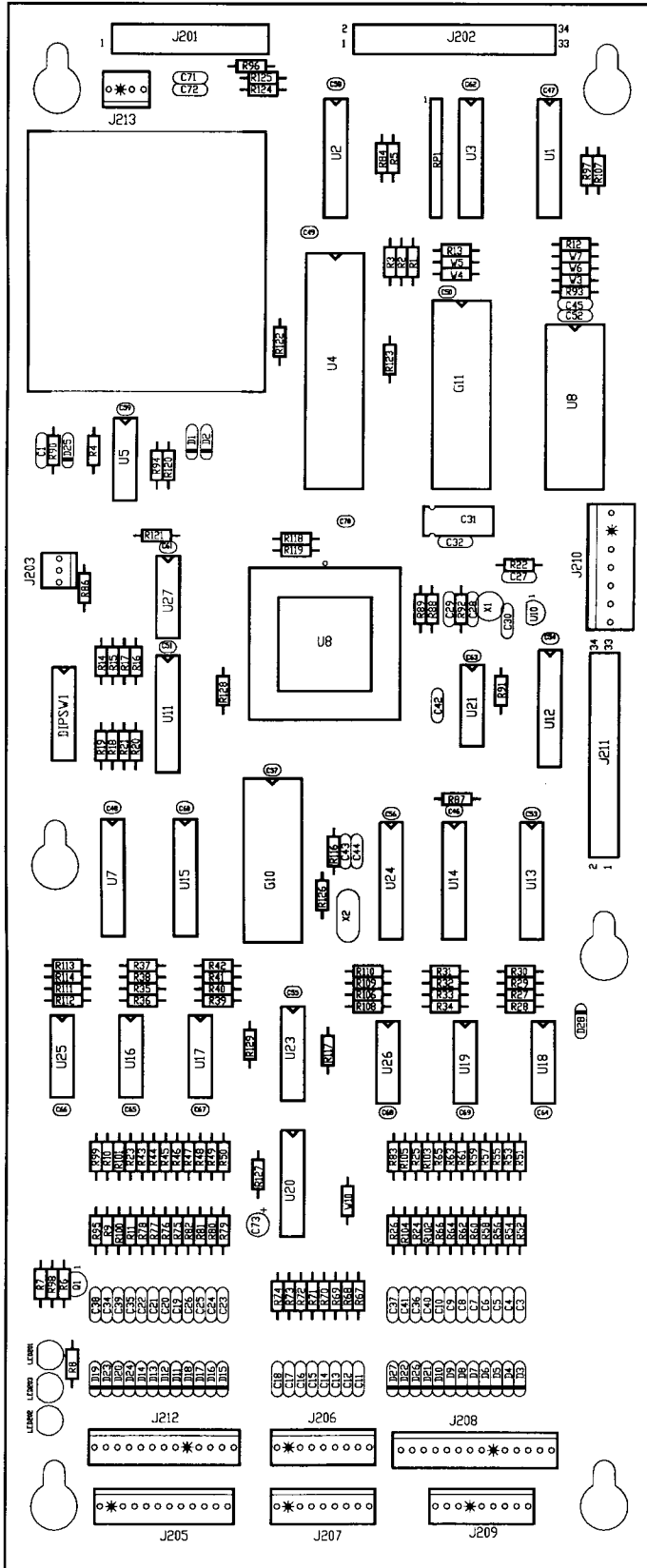


# A-20119-50041

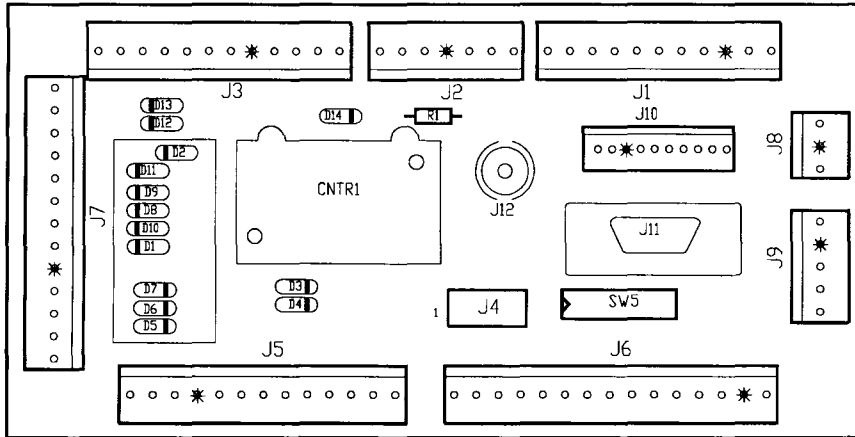
## WPC '95 CPU PCB Assembly

| Part Number     | Designator   | Description                            |
|-----------------|--|--|
| A-15814         | B1   | Battery Holder                         |
| 5048-11033-00   | C1, C42  | Cap., .022 $\mu$ . 50v, 10% Ax.        |
| 5048-11030-00   | C3-C26, C34-C41  | Cap., 470p, 50v Axial                  |
| 5043-09030-00   | C27  | Cap., .047m, 50v ( $\pm$ 20%) Ax.      |
| 5048-13375-00   | C28  | Cap., 100p, 50v, 10% Axial             |
| 5048-11028-00   | C29, C30, C43, C44   | Cap., 22p, 50v Axial                   |
| 5040-14569-00   | C31  | Cap., 100 $\mu$ , 25v, Axial           |
| 5048-11031-00   | C32  | Cap., .001 $\mu$ , 50v, Axial          |
| 5043-08996-00   | C45 - C70  | Cap., 0.1 $\mu$ , 50v ( $\pm$ 20%) Ax. |
| 5040-13098-00   | C73  | Cap., 4.7 $\mu$ F, 35v ( $\pm$ 20%)    |
| 5645-09025-00   | DIPSW1   | Switch Dip 8-Position                  |
| 5070-09266-00   | D1, D25, D28   | Diode 1N5817 1.0A.                     |
| 5070-08919-00   | D2 - D24, D26, D27   | Diode 1N4148 150mA.                    |
| 5700-10176-00   | G10  | Socket Dip 28.6                        |
| 5700-12088-00   | G11  | Socket Dip 32.6p"                      |
| 5700-08985-00   | U4   | IC Socket 40-pin                       |
| 5700-12424-00   | U9   | Socket 84-pin                          |
| 5700-10389-00   | U20  | IC Socket 18-pin 3"                    |
| 5791-10850-00   | J201   | Connector, 26-pin Header               |
| 5791-12516-00   | J202, J211   | Connector, 34-pin Hdr. 2x17            |
| 5791-13830-12   | J205   | Connector, 12-pin Header Str.          |
| 5791-13830-09   | J206, J207, J209   | Connector, 9-pin Header                |
| 5791-13830-14   | J208   | Connector, 14-pin Header               |
| 5791-10862-07   | J210   | Connector, 7-pin Header                |
| 5791-13830-13   | J212   | Connector, 13-pin Header               |
| 5671-14516-00   | LED201 - LED203  | LED Dspl. Red T-1-3/4                  |
| 5160-10269-00   | Q1   | Transistor, 2N3904 NPN                 |
| 5019-09669-00   | RP1  | SIP 4.7K, 9R, 10 (5%)                  |
| 5010-09358-00   | R1-R4, R9-R11,<br>R23-R26, R43-R84,<br>R93, R95-R97, R99-R114,<br>R117 | Resistor, 1k $\Omega$ , 1/4W, 5%       |
| 5010-08774-00   | R129   | Resistor, 22K $\Omega$ , 1/4w, 5%      |
| 5010-09416-00   | R5-R8, R12, R13,<br>R87-R89  | Resistor, 470 $\Omega$ , 1/4w, 5%      |
| 5010-09034-00   | R14-R22, R27-R42,<br>R86, R90, R94, R98                                | Resistor, 10K $\Omega$ , 1/4w, 5%      |
| 5010-12104-00   | R91  | Resistor, 22M, 1/4w, 5%                |
| 5010-10989-00   | R92  | Resistor, 470K $\Omega$ , 1/4w, 5%     |
| 5010-09187-00   | R118 - R123, R128  | Resistor, 150 $\Omega$ , 1/4w, 5%      |
| 5010-09040-00   | R127   | Resistor, 33 $\Omega$ , 1/4w, 5%       |
| 5010-09534-00   | W3, W4, W7, R124, R125   | Resistor, 0 $\Omega$                   |
| 5010-10258-00   | R126   | Resistor, 1M, 5% 1/4w                  |
| 5281-09867-00   | U1, U2, U7   | I.C. 74HCT244                          |
| 5281-09851-00   | U5   | I.C. 74LS14 SMT/TRG                    |
| 5281-09308-00   | U3   | IC 74LS245 Trnc                        |
| 5340-13062-00   | U8   | IC RAM 32k x 8 Static                  |
| 5370-12687-00   | U10  | I.C. MC 34064 Reset Chp.               |
| 5281-10182-00   | U11-U13, U15   | I.C. 74LS240 I/drvr                    |
| 5311-14068-00   | U14, U24   | I.C. 74HC574 Octal d-latch             |
| 5370-12272-00   | U16-U19, U25, U26  | I.C. LM339 Quad Comp.                  |
| 5284-12651-00   | U21  | I.C. 4584 Hex Schmitt                  |
| 5311-14554-00   | U23  | I.C. 74HC237 3 to 8 non inv            |
| 5281-09743-00   | U27  | I.C. 74LS08 Quad.                      |
| 5520-12084-00   | X1   | Crystal 32.768KHz                      |
| 5520-14761-00   | X2   | Xtal-8M Anti Res Parallel Cut          |
| A-5400-50041-1  | G10  | PIC16C57 Assembly                      |
| 5880-09022-00   | B1   | Battery 1.5v AA Alkaline               |
| 5400-10320-00   | U4   | I.C. MPU68B09E                         |
| 5410-12426-00   | U9   | I.C. WPC-89 ASIC                       |
| 5162-12422-00   | U20  | Trans uln 2803 Oc-Drl                  |
| A-5343-50041-1A | G11  | Game ROM Assembly                      |

# A-20119-50041 WPC '95 CPU PCB Assembly

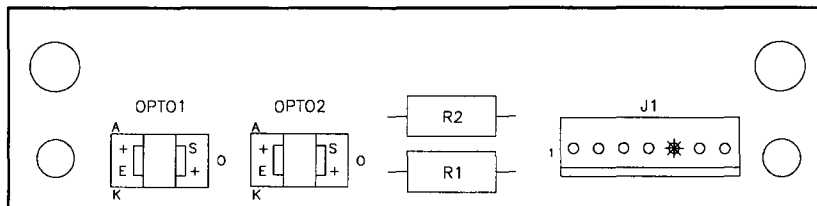


## A-20580 Coin Interface PCB Assembly



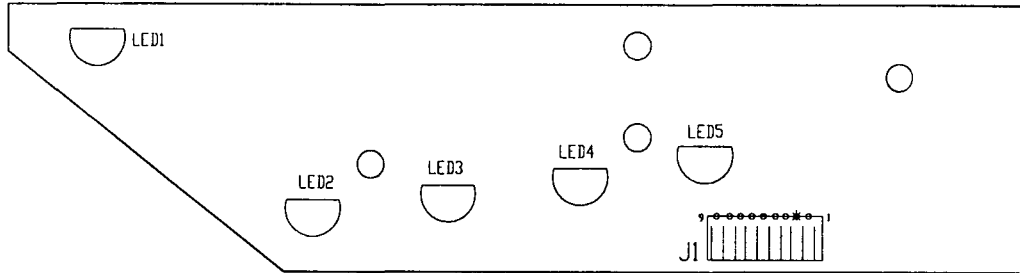
| Part Number   | Designator | Description                       |
|---------------|------------|-----------------------------------|
| 5070-09054-00 | D1-D14     | Diode 1N4004 1.0A.                |
| 5791-10862-11 | J1         | Connector, 11-pin Header Str. Sq. |
| 5791-10862-07 | J2         | Connector, 7-pin Header Str. Sq.  |
| 5791-10862-12 | J3         | Connector, 12-pin Header Str. Sq. |
| 5791-11000-10 | J4         | Connector, 10-pin Header Str. Sq. |
| 5791-10862-13 | J5, J7     | Connector, 13-pin Header Str. Sq. |
| 5791-10862-15 | J6         | Connector, 15-pin Header Str. Sq. |
| 5791-10862-03 | J8         | Connector, 3-pin Header Str. Sq.  |
| 5791-10862-05 | J9         | Connector, 5-pin Header Str. Sq.  |
| 5791-12462-10 | J10        | Connector, 10-pin Header Str. Sq. |
| 5010-09040-00 | R1         | Resistor, 33, 1/4w, 5%            |
| 5645-09025-00 | SW5        | Switch DIP 8 Pos.                 |

## A-17316 Flipper Opto PCB Assembly



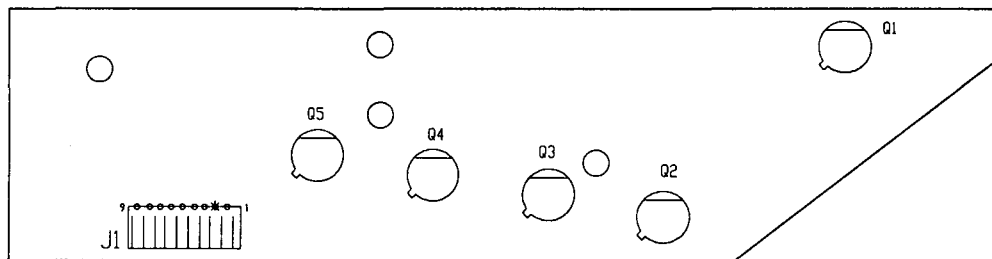
| Part Number   | Designator      | Description                       |
|---------------|-----------------|-----------------------------------|
| A-20207       | -               | Flipper Opto Switch PCB           |
| 5010-09061-00 | R1, R2          | Resistor, 680Ω, 1/2w, 5%          |
| 5490-14575-00 | OPTO1,<br>OPTO2 | IC Opto Integ Schmitt 10mA.       |
| 5791-13830-07 | J1              | Connector, 7-pin Header Solid Sq. |
| 03-9001       | -               | Interrupter Flip-Opto             |

## A-18617-1 Trough IRED LED PCB Assembly



| Part Number   | Designator  | Description                 |
|---------------|-------------|-----------------------------|
| 5671-12731-00 | LED1 - LED5 | Infra Red Diode             |
| 5791-12622-09 | J1          | Connector, 9-pin Header Sq. |

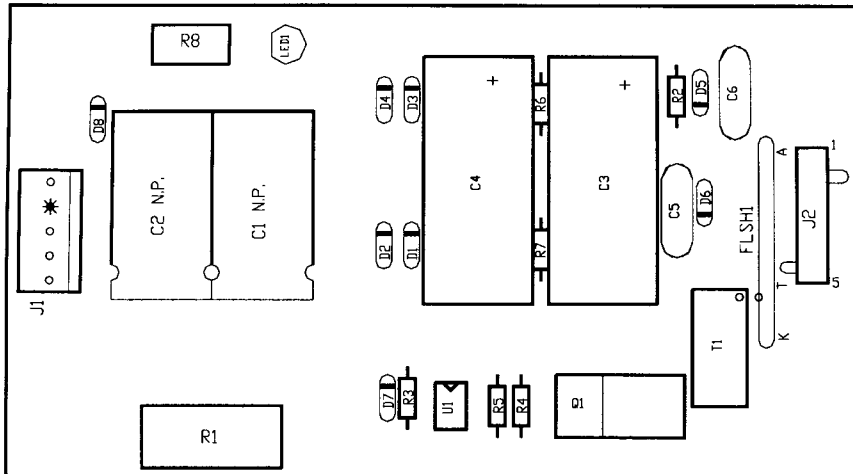
## A-18618-1 Trough IRED LED PCB Assembly



| Part Number   | Designator | Description                 |
|---------------|------------|-----------------------------|
| 5671-14114-00 | Q1 - Q5    | Infra Red Photo Transistor  |
| 5791-12622-09 | J1         | Connector, 9-pin Header Sq. |

# A-20669

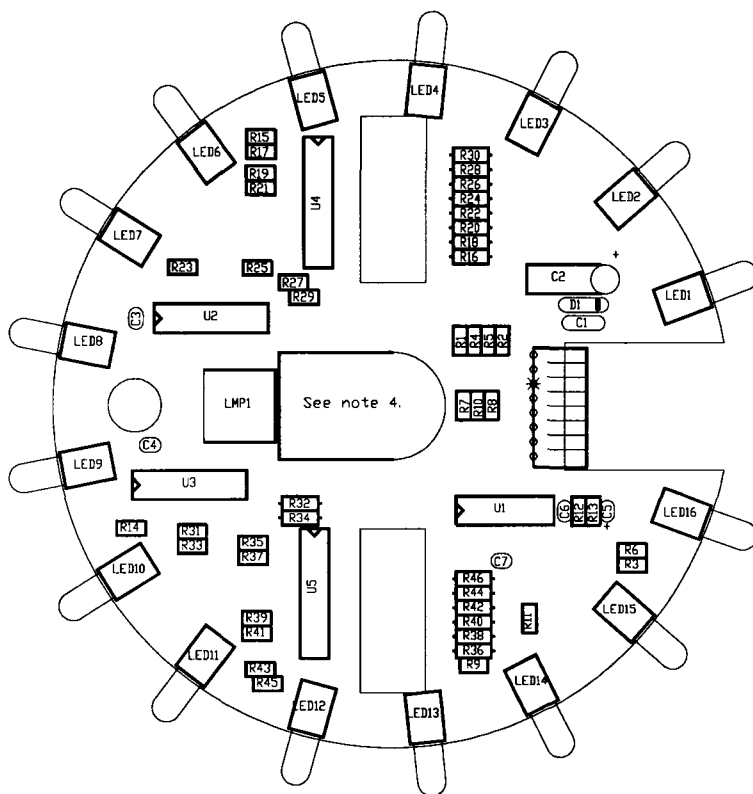
## Strobe Lamp PCB Assembly



| Part Number   | Designator | Description                           |
|---------------|------------|---------------------------------------|
| 5045-13523-00 | C1, C2     | Capacitor, 100fd, 100v, 10Ax.         |
| 5040-09794-00 | C3, C4     | Capacitor, 100M, 250v Axial           |
| 5045-10728-00 | C5, C6     | Capacitor, .22fd, 250v ( $\pm 10\%$ ) |
| 5070-09054-00 | D1-D8      | Diode 1N4004 1.0A.                    |
| 5791-10862-05 | J1         | Connector, 5-pin Header Str Sq.       |
| 5791-14779-00 | J2         | Connector 5-pin Header Vert Mini Fit  |
| 5671-14516-00 | LED1       | LED Display Red                       |
| 5131-13524-00 | Q1         | Triac C106d 4A, 400v                  |
| 5012-13560-00 | R1         | Resistor, 120 $\Omega$ , 5w, 5%       |
| 5010-08772-00 | R2, R4     | Resistor, 15K $\Omega$ , 1/4w, 5%     |
| 5010-09358-00 | R3, R5     | Resistor, 1K $\Omega$ , 5%, 1/4w      |
| 5010-09162-00 | R6, R7     | Resistor, 100K $\Omega$ , 5%, 1/4w    |
| 5010-14711-00 | R8         | Resistor, 10K $\Omega$ , 5%, 1/4w     |
| 5551-13525-00 | T1         | Ind. Trigger Coil                     |
| 5490-13526-00 | U1         | IC Opto Isolator Moc 3011             |

# A-20670

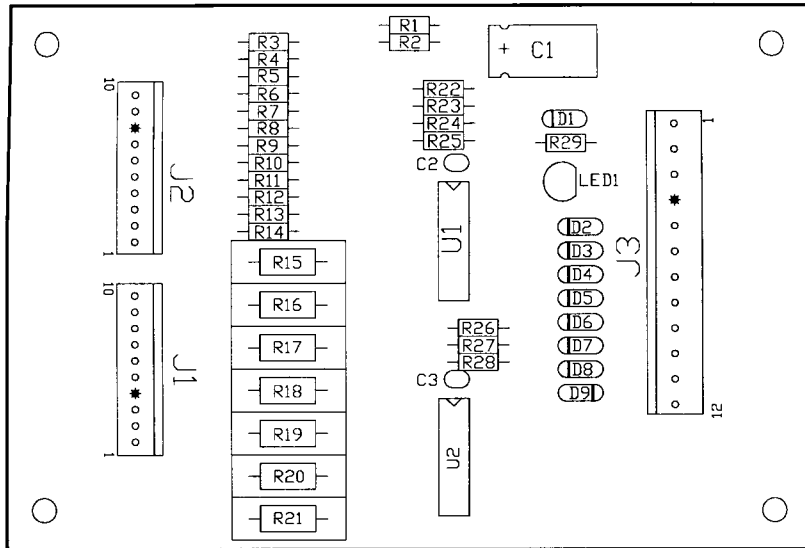
## 16-LED PCB Chase Assembly



| Part Number   | Designator   | Description                                     |
|---------------|--|---|
| 5043-08996-00 | C1, C3, C4, C6, C7   | Capacitor, 0.1 $\mu$ fd, 50v ( $\pm$ 20%) Axial |
| 5040-09343-00 | C2   | Capacitor, 10 $\mu$ fd, 20v ( $\pm$ 20%) Axial  |
| 5048-10994-00 | C5   | Capacitor, .33 $\mu$ fd, 50v ( $\pm$ 20%) Axial |
| 5070-09054-00 | D1   | Diode 1N4004 1.0A                               |
| 5791-12622-08 | J1   | Connector, 8-pin Header R/A Lck                 |
| 24-8802       | J2   | Flash Lamp Wedge Base                           |
| 5671-13732-01 | LED1 - LED16   | LED Display Red                                 |
| 24-8857       | LP1  | Flash Lamp Socket                               |
| 5010-13594-00 | R1, R2, R4, R5, R7, R8, R10  | Resistor, 1K $\Omega$ , 1/8w, 5% Film           |
| 5010-13593-00 | R3, R6, R9, R12-R14  | Resistor, 10K $\Omega$ , 1/8w, 5% Film          |
| 5010-13843-00 | R11  | Resistor, 22K $\Omega$ , 1/8w, 5% Film          |
| 5010-13367-00 | R15, R17, R19, R21, R23, R25,<br>R27, R29, R31, R33, R35, R37,<br>R39, R41, R43, R45 | Resistor, 2.2K $\Omega$ , 1/8w, 5% Film         |
| 5010-09416-00 | R16, R18, R20, R22, R24, R26,<br>R28, R30, R32, R34, R36, R38,<br>R40, R42, R44, R46 | Resistor, 470 $\Omega$ , 1/8w, 5% Film          |
| 5370-12272-00 | U1   | IC LM339 Quad Comp                              |
| 5310-14760-00 | U2, U3   | IC 4094 Parallel Out Shif                       |
| 5162-12422-00 | U4, U5   | Trans ULN 2803 Oc-Drl                           |
| 03-9473       | LED1 - LED16   | Spacer T1&3/4 Rt Angle LED                      |

# A-15576

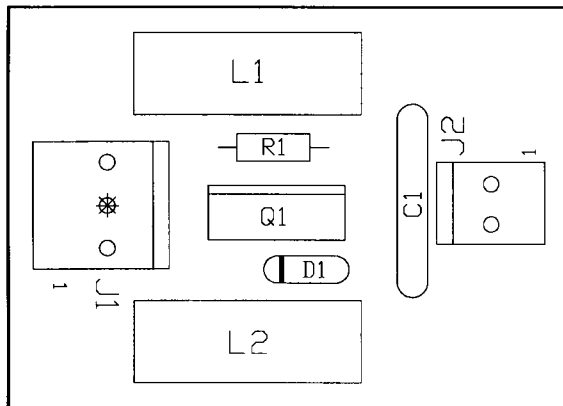
## 7-Switch Opto PCB Assembly



| Part Number   | Designator    | Description                               |
|---------------|---------------|---|
| 5040-12298-00 | C1            | Capacitor, 100 $\mu$ Fd, 40v ( $\pm$ 50%) |
| 5043-08980-00 | C2, C3        | Capacitor, 0.01 $\mu$ , 50v               |
| 5671-13732-00 | LED1          | Display LED Red                           |
| 5370-12272-00 | U1, U2        | ICLM339 Quad                              |
| 5070-09054-00 | D1 - D9       | Diode 1N4004 1.0A.                        |
| 5010-12928-00 | R15 - R21     | Resistor, 270 $\Omega$ , 2w, 5%           |
| 5010-09999-00 | R1 - R14      | Resistor, 2K $\Omega$ , 1/4w, 5%          |
| 5010-10631-00 | R29           | Resistor, 1.2K $\Omega$ , 1/4w, 5%        |
| 5010-09162-00 | R23, R25, R26 | Resistor, 100K $\Omega$ , 1/4w, 5%        |
| 5010-08774-00 | R22, R24      | Resistor, 22K $\Omega$ , 1/4w, 5%         |
| 5010-09034-00 | R28           | Resistor, 10K $\Omega$ , 1/4w, 5%         |
| 5791-10862-12 | J3            | Connector, 12-pin Header Sq.              |
| 5791-13830-10 | J1, J2        | Connector, 10-pin Header Sq.              |

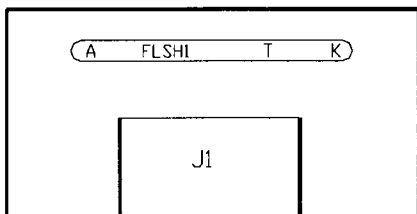


## A-15340 Motor EMI w/Brake PCB Assembly



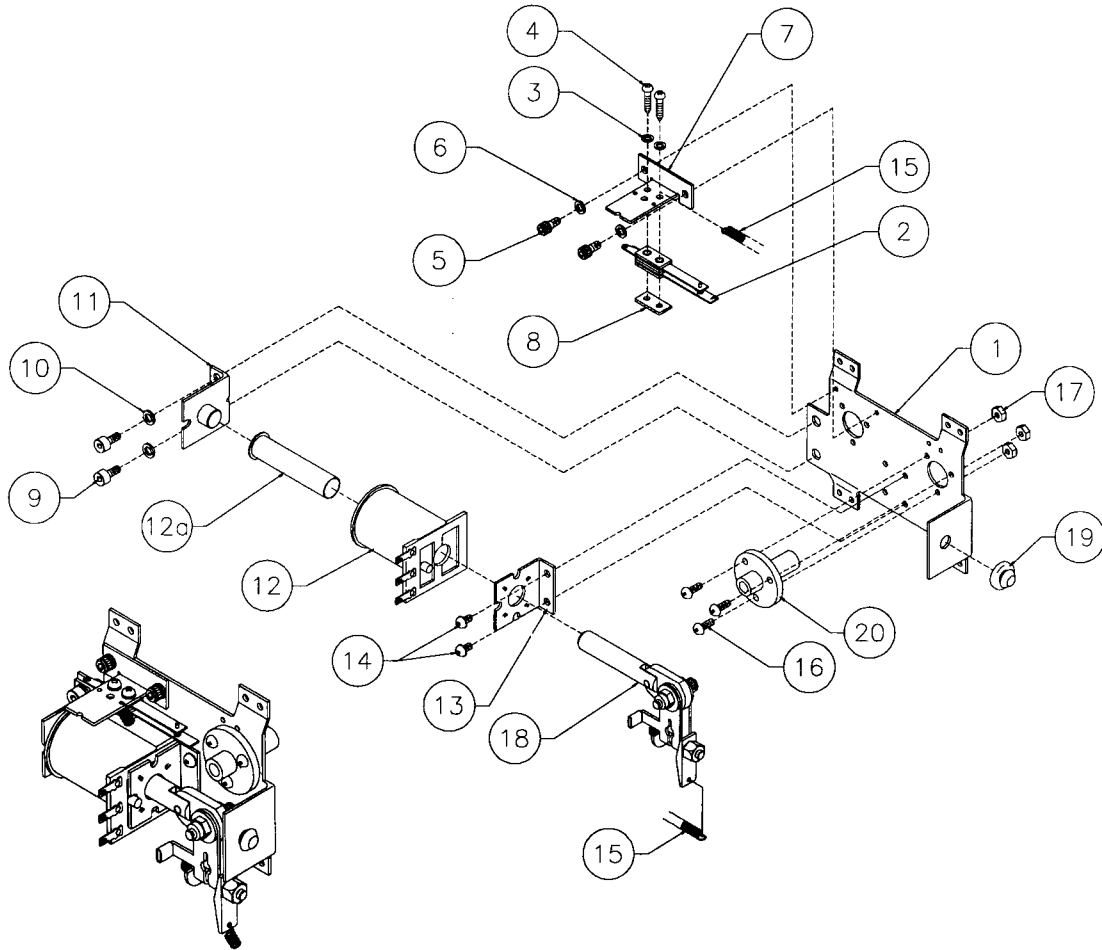
| Part Number   | Designator | Description                        |
|---------------|------------|------------------------------------|
| 5551-09822-00 | L1, L2     | Inductor, 4.7MH3AMP                |
| 5791-12273-03 | J1         | Connector, 3-pin Header Str Sq.    |
| 5791-12273-02 | J2         | Connector, 2-pin Header Str Sq.    |
| 5070-09054-00 | D1         | Diode, 1N4004 1.0A.                |
| 5010-08998-00 | R1         | Resistor, 2.2K $\Omega$ , 1/4w, 5% |
| 5162-12635-00 | Q1         | Transistor TIP 102                 |

## A-20718 Strobe Tube PCB Assembly



| Part Number   | Designator | Description                      |
|---------------|------------|----------------------------------|
| 5791-14774-00 | J1         | Connector, 5-pin Header Mini Fit |
| 03-9495       |            | Xenon Tube Spacer                |
| 24-8835       | FLSH1      | Xenon Flash Tube                 |

# A-15849-L-2 Flipper Assembly



| Item | Part Number   | Description                 |
|------|---------------|-----------------------------|
| 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   | 01-7695-1     | 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.               |

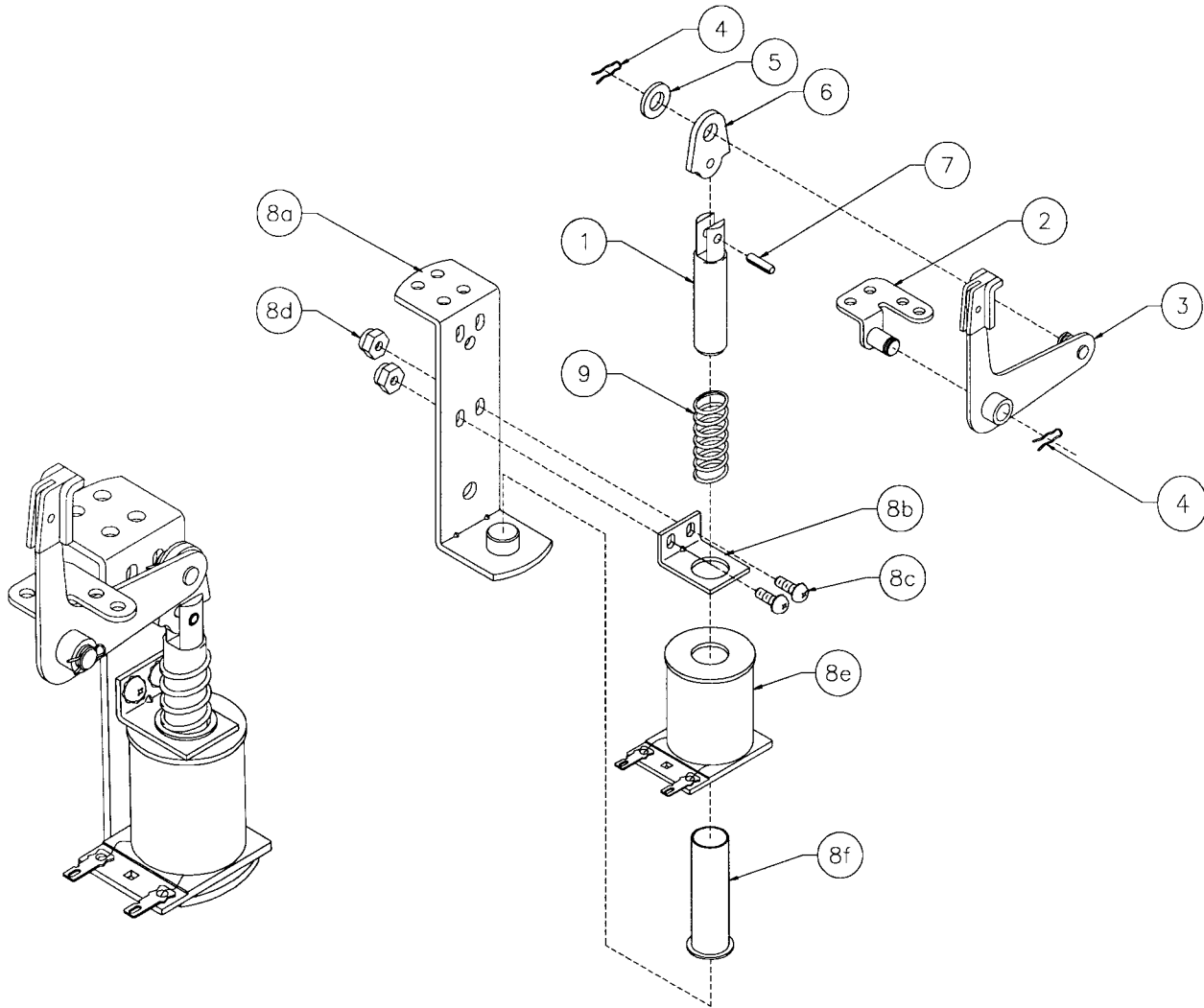
| Item | Part Number   | Description                      |
|------|---------------|----------------------------------|
| 18   | A-15848-L     | Crank Link Assembly, Left        |
| a)   | A-17050-L     | Flipper Crank Assembly, Left     |
| b)   | A-15847       | Flipper Link Assembly            |
| c)   | 02-4676       | Link Spacer Bushing              |
| d)   | 4010-01086-14 | Cap Screw, 10-32 x 7/8"          |
| e)   | 4700-00023-00 | Flat Washer, 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 | 23-6695    | Flipper Rubber Ring, Black   |
| 22 | 20-10110-5 | Flipper Bat & Shaft Assembly |



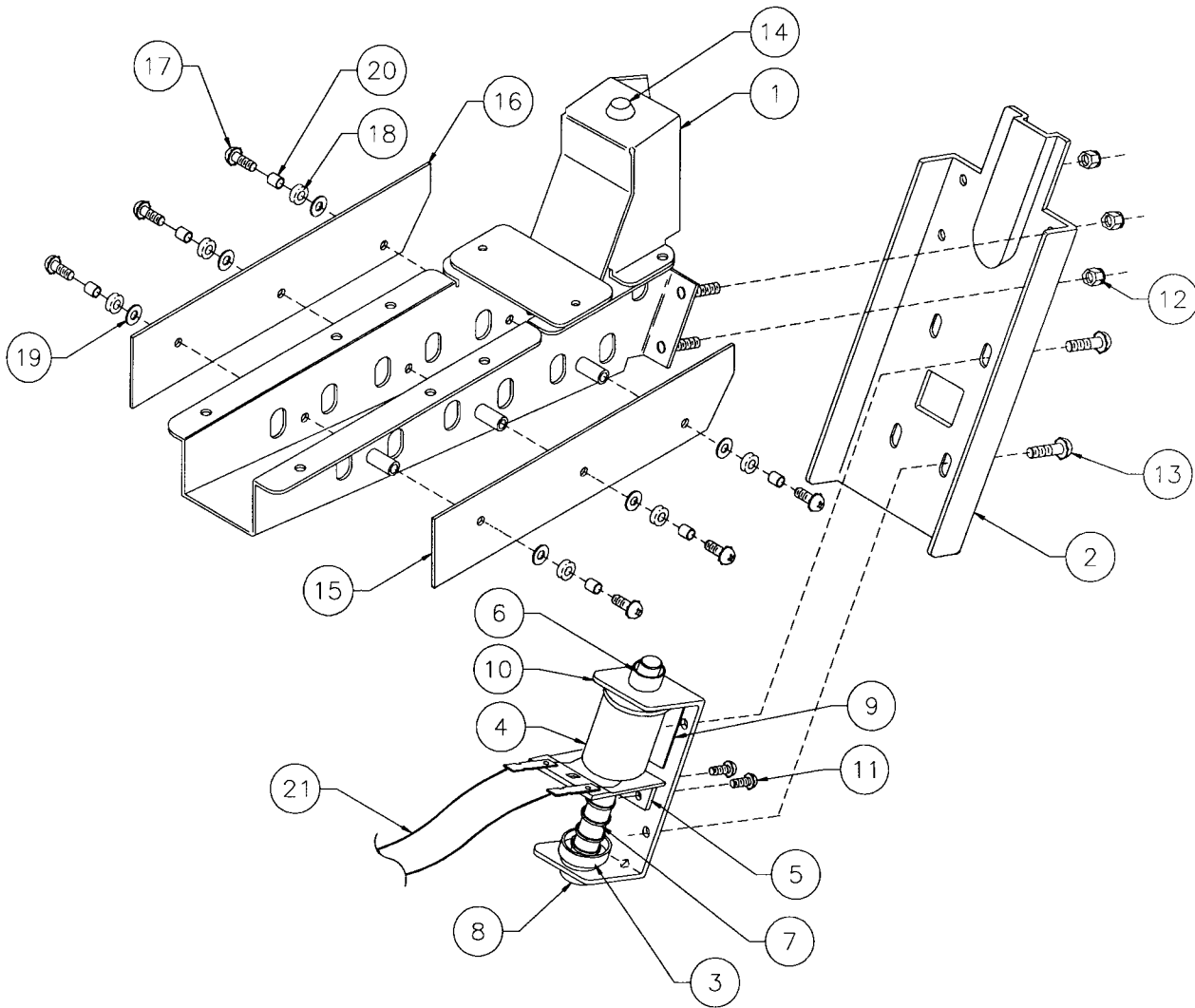
# A-17811 Kicker Arm (Slingshot) Assembly



### Associated Parts for Right & Left Kickers:

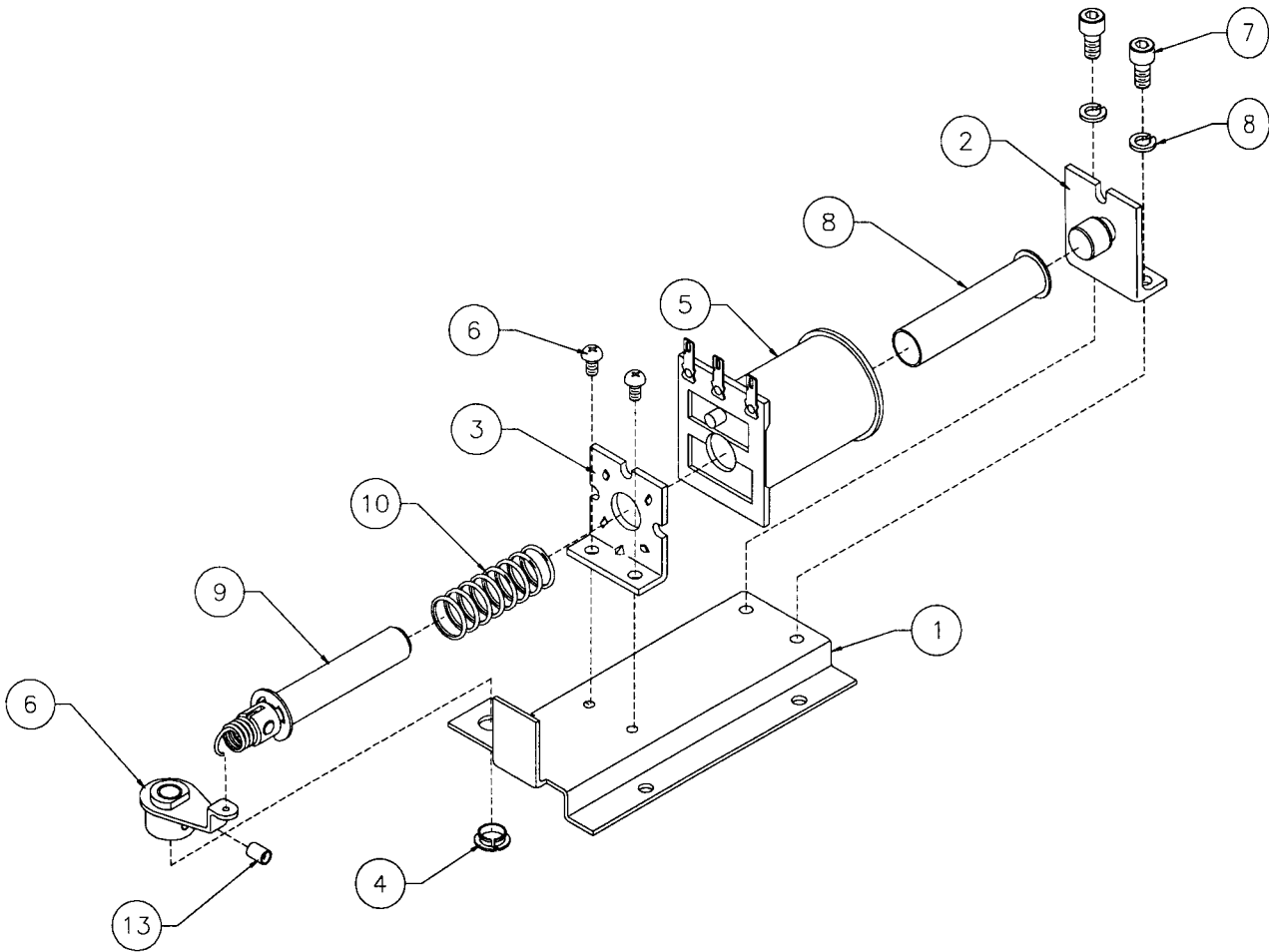
| Item | Part Number   | Description               | Item | Part Number       | Description                               |
|------|---------------|---------------------------|------|-------------------|---|
| 1    | 02-2364       | Coil Plunger              | 8    | <b>B-9362-L-2</b> | <b>Coil &amp; Bracket Assembly, Left</b>  |
| 2    | A-17810       | Mounting Bracket Assembly |      | <b>B-9362-R-3</b> | <b>Coil &amp; Bracket Assembly, Right</b> |
| 3    | A-12664       | Kicker Crank Assembly     | a)   | A-17808           | Bracket & Stop Assembly                   |
| 4    | 12-6227       | Hairpin Clip              | b)   | 01-8-508-S        | Coil Retaining Bracket                    |
| 5    | 4700-00030-00 | FW, 17/64 x 1/2 x 15ga.   | c)   | 4006-01017-06     | Mach. Screw, 6-32 x 3/8"                  |
| 6    | 03-8085       | Armature Link             | d)   | 4406-01119-00     | Nut, 6-32 ESN                             |
| 7    | 20-8716-5     | Roll Pin, 1/8 x 7/16"     | e)   | AE-26-1200        | Coil Assembly                             |
|      |               |                           | f)   | 03-7066           | Coil Tubing                               |
|      |               |                           | 9    | 10-128            | Spring                                    |

# A-19963-1 Ball Trough Assembly Complete



| Item | Part Number   | Description               | Item | Part Number   | Description                      |
|------|---------------|---------------------------|------|---------------|----------------------------------|
| 1    | A-16809-2     | Ball Trough Welded Assy.  | 12   | 4408-01119-00 | Nut 8-32 ESN                     |
| 2    | 01-11587      | Ball Trough Front         | 13   | 4008-01017-06 | Mach. Screw, 8-32 x 3/8"         |
| 3    | A-6306-2      | Bell Armature Assembly    | 14   | 23-6702       | Bumper Plug                      |
| 4    | AE-26-1500    | Coil Assembly             | 15   | A-18617-1     | Trough IRED LED PCB Assembly     |
| 5    | 01-8-508-T    | Solenoid Assembly         | 16   | A-18618-1     | Trough IRED Transistor PCB Assy. |
| 6    | 03-7067-5     | Coil Tubing               | 17   | 4006-01003-10 | Mach. Screw, 6-32 x 5/8" SEMS    |
| 7    | 10-135        | Spring                    | 18   | 23-6626       | Rubber Grommet                   |
| 8    | 23-6420       | Rubber Grommet            | 19   | 4700-00004-00 | Flat Washer, 9/64 x 7/16 x 21ga. |
| 9    | 03-8523       | Insulator                 | 20   | 02-4975       | Bushing                          |
| 10   | 01-1158       | Coil Mounting Bracket     | 21   | H-19523       | Mini Solenoid Cable              |
| 11   | 4008-01017-05 | Mach. Screw, 8-32 x 5/16" |      |               |                                  |

# A-17241 Ramp Diverter Assembly

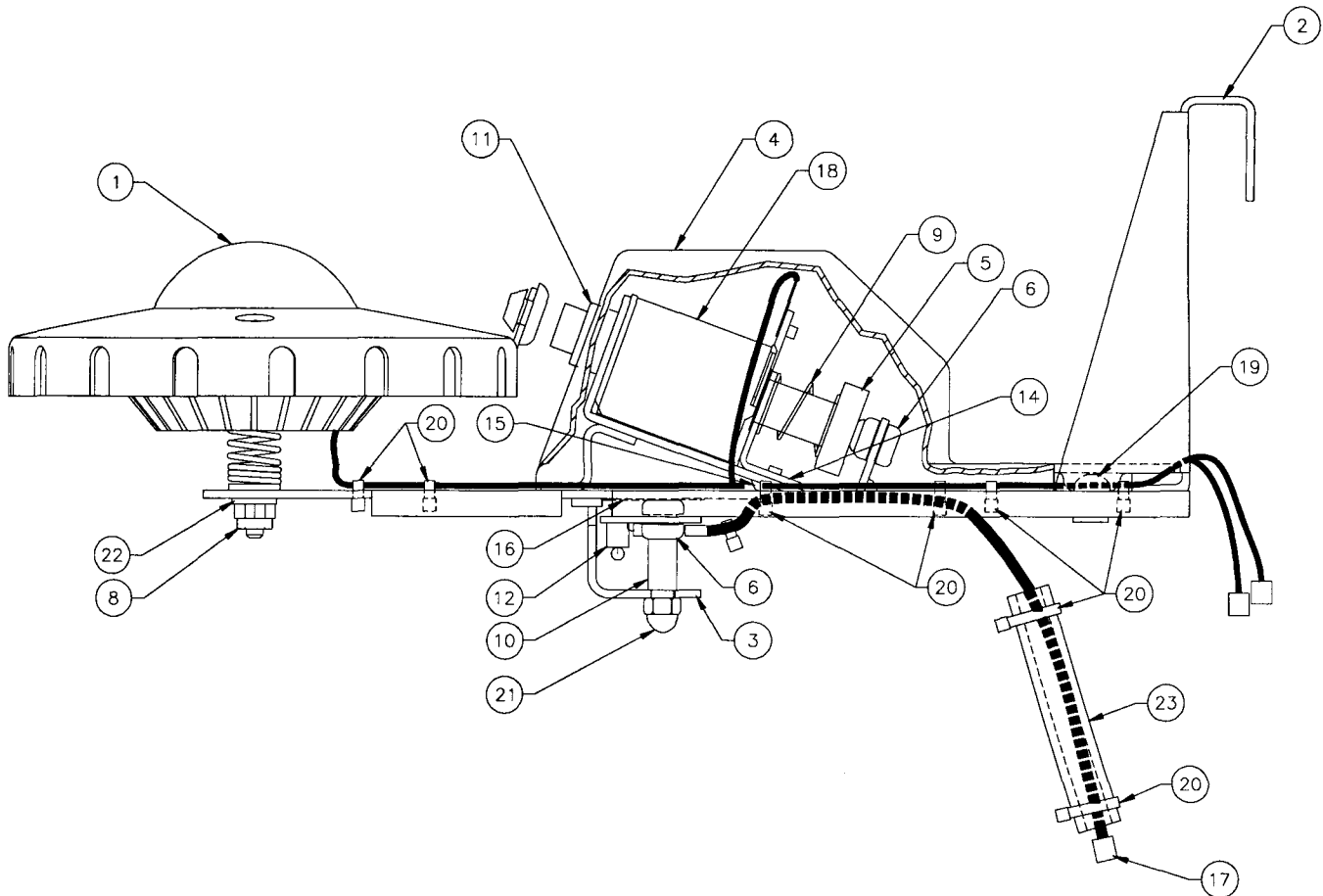


| Item | Part Number   | Description               |
|------|---------------|---------------------------|
| 1    | 01-11957      | Mounting Bracket          |
| 2    | A-12390       | Flipper Stop Bracket      |
| 3    | 01-7695       | Solenoid Bracket          |
| 4    | 20-8790       | Nyliner Bearing           |
| 5    | A-20099       | Coil Assembly             |
| 6    | 4006-01017-04 | Mach. Screw, 6-32 x 1/4"  |
| 7    | 4010-01066-06 | Mach. Screw, 10-32 x 3/8" |
| 8    | 4701-00004-00 | Lockwasher #10 Split      |
| 9    | 03-7066-5     | Coil Tubing               |
| 10   | A-16636       | Diverter Plunger Assembly |
| 11   | 10-303        | Spring Master             |
| 12   | A-14185       | Drive Arm Assembly        |
| 13   | 4010-01169-04 | Set Screw, 10-32 x 1/4"   |

**Associated Parts:**  
(Not Shown)

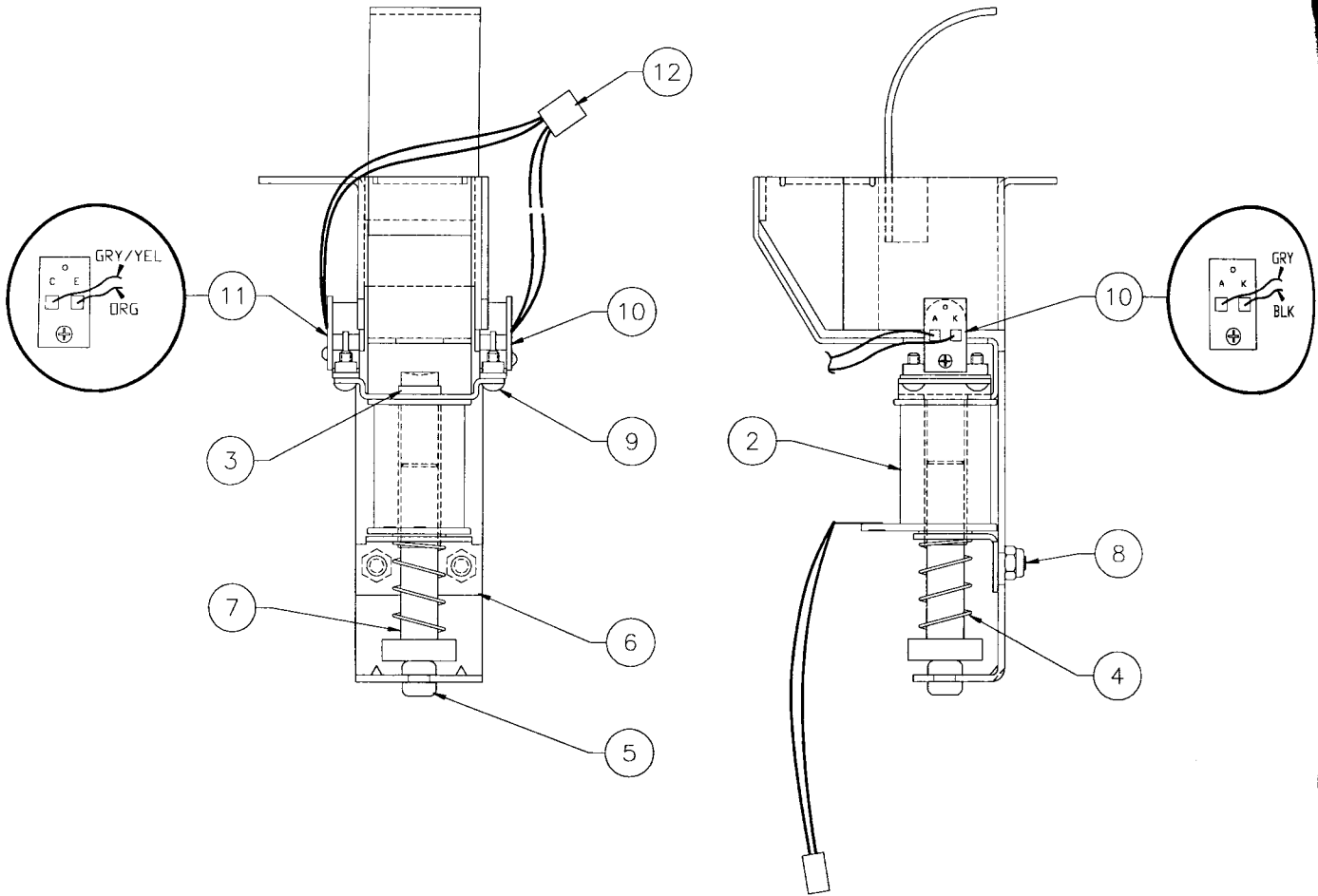
|               |                           |
|---------------|---------------------------|
| A-20556       | Shaft & Blade Assembly    |
| 20-10283      | Bearing                   |
| 4700-00030-00 | Flat Washer, 17/64 x 1/2" |

# A-20608 Saucer Assembly



| Item | Part Number   | Description             | Item | Part Number   | Description                      |
|------|---------------|-------------------------|------|---------------|----------------------------------|
| 1    | A-20713       | Saucer Assembly         | 12   | A-20718       | Xenon Flash Tube Assembly        |
| 2    | 04-10315.1    | Saucer Support Weldment | 13   | RM-27-03      | Slit Hose Sleeve                 |
| 3    | 03-9478.3     | Strobe Light Cover      | 14   | 01-8-508-T    | Coil Retainer Bracket            |
| 4    | A-20870       | Coil Cover Assembly     | 15   | 4008-01003-04 | Mach. Screw, 8-32 x 1/4"         |
| 5    | 04-10361      | Saucer Armature         | 16   | 01-14220      | Strobe Light Insulator           |
| 6    | 23-6420       | Rubber Grommet          | 17   | 5797-14773-00 | Strobe Cable                     |
| 7    | 03-9454       | Tie Wrap                | 18   | AE-26-1500    | Coil Assembly                    |
| 8    | 4408-01119-00 | Nut 8-32 ESNA           | 19   | 4008-01017-05 | Mach. Screw, 8-32                |
| 9    | 10-135        | Armature Spring         | 20   | 03-9454       | Tie Wrap                         |
| 10   | 03-6047-3     | Plastic Spacer, 1/2"    | 21   | 4408-01138-00 | Nut, 8-32 ACORN                  |
| 11   | 03-7067-3     | Coil Tubing             | 22   | 4700-00011-00 | Flatwasher, 11/64 x 7/16 x 16ga. |

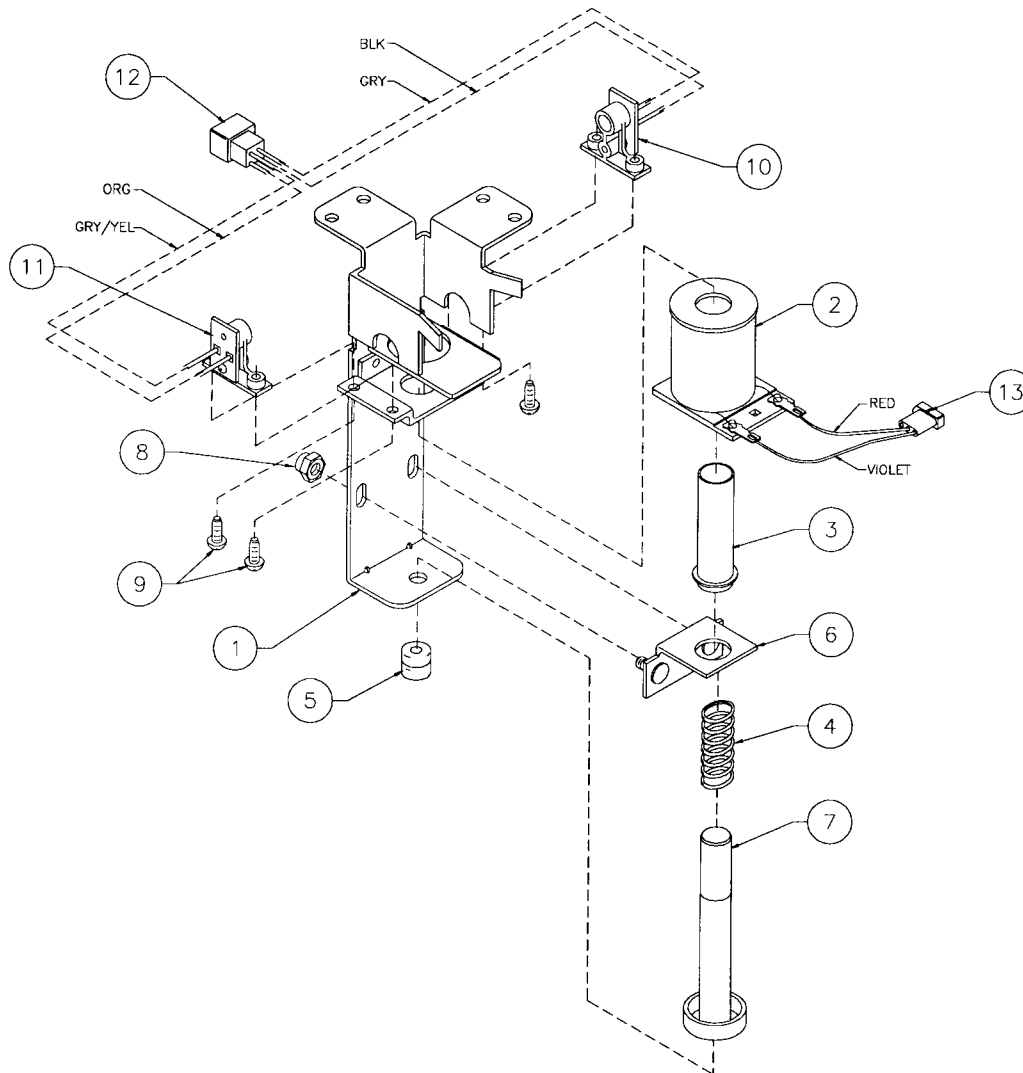
# A-20573 Right Popper Assembly



| Item | Part Number   | Description                    |
|------|---------------|--------------------------------|
| 1    | 04-10279.1    | Weldment Right Popper          |
| 2    | AE-25-1000    | Coil Assembly                  |
| 3    | 03-7067       | Coil Tubing                    |
| 4    | 10-135        | Solenoid Spring                |
| 5    | 23-6420       | Rubber Grommet                 |
| 6    | 04-10086.1    | Mounting Bracket               |
| 7    | A-17767       | Bell Armature Assembly         |
| 8    | 4408-01119-00 | Nut, 8-32 ESN                  |
| 9    | 4106-01013-06 | Sh. Metal Screw, #6 x 3/8"     |
| 10   | A-16908       | LED Assembly, RTV              |
| 11   | A-16909       | Photo Transistor Assembly, RTV |
| 12   | H-17609-5     | Cable - Gen. Opto              |
| 13   | H-19523       | Cable - Mini Solenoid          |



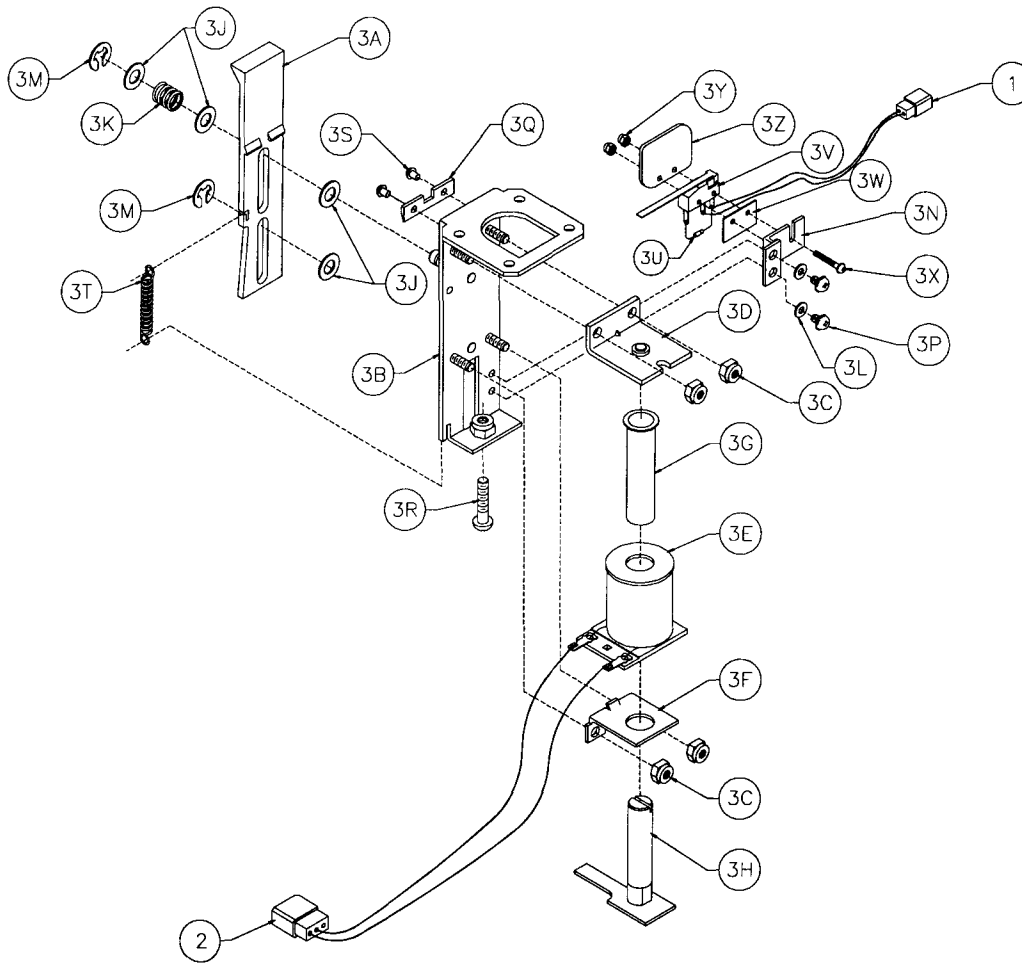
# A-20633 Left Popper Assembly



| Item | Part Number   | Description                 |
|------|---------------|-----------------------------|
| 1    | 04-10312      | Weldment Left Popper        |
| 2    | AE-23-800     | Coil Assembly               |
| 3    | 03-7067       | Coil Tubing                 |
| 4    | 10-135        | Solenoid Spring             |
| 5    | 23-6420       | Rubber Grommet              |
| 6    | 04-10086.1    | Mounting Bracket            |
| 7    | A-17767       | Bell Armature Assembly      |
| 8    | 4408-01119-00 | Nut, 8-32 ESN               |
| 9    | 4106-01013-06 | Sh. Metal Screw, #6 x 3/8"  |
| 10   | A-16908       | LED Assembly, RTV           |
| 11   | A-16909       | Photo Transistor Assy., RTV |
| 12   | H-17609-5     | Cable - Gen. Opto           |
| 13   | H-19523       | Cable - Mini Solenoid       |

# A-20657

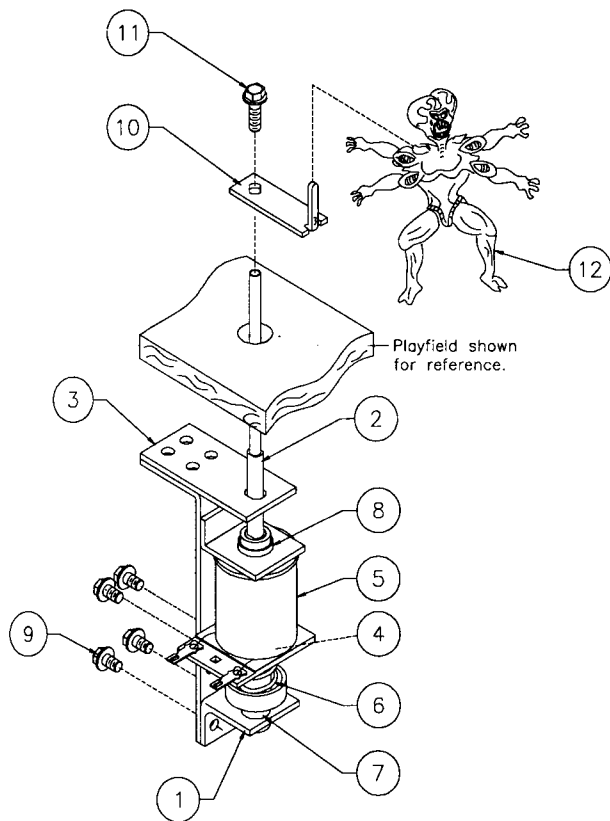
## 1-Bank Drop Target Assembly w/Cables



| Item | Part Number   | Description                      | Item | Part Number   | Description              |
|------|---------------|----------------------------------|------|---------------|--------------------------|
| 1    | H-16437       | Cable Assembly                   | 3U)  | 5070-09054-00 | Diode 1N4001             |
| 2    | H-19523-1     | Mini Solenoid Cable 3-Pin        | V)   | 5647-12693-31 | Mini Micro Switch        |
| 3    | A-16267-2     | 1-Bank Drop Target Assembly      | W)   | 01-8600       | Switch Insulator         |
| A)   | 03-8750-2     | Target, Flush                    | X)   | 4002-01105-12 | Mach. Screw, 2-56 x 3/4" |
| B)   | A-14617       | Bracket & Post Assembly          | Y)   | 4402-01119-00 | Nut, 2-56 ESNA           |
| C)   | 4408-01119-00 | Nut #8 ESNA                      | Z)   | 03-8630       | Actuator Guide           |
| D)   | A-11397       | Stop Bracket Assembly            |      |               |                          |
| E)   | AE-26-1200    | Coil Assembly                    |      |               |                          |
| F)   | 01-8413       | Bracket & Coil Mounting          |      |               |                          |
| G)   | 03-7066-4     | Coil Tubing                      |      |               |                          |
| H)   | A-11388-2     | Plate & Reset Plate Assembly     |      |               |                          |
| J)   | 4700-00072-00 | Flat Washer, 17/64 x 1/2 x 22ga. |      |               |                          |
| K)   | 10-392        | Spring - Compression             |      |               |                          |
| L)   | 4700-00003-00 | Flat Washer, 1/8x9/32x21ga.      |      |               |                          |
| M)   | 20-8712-25    | "E"-Ring, 1/4" Shaft             |      |               |                          |
| N)   | 01-10183      | Switch Bracket                   |      |               |                          |
| P)   | 4006-01003-03 | Mach. Screw, 6-32 x 3/16"        |      |               |                          |
| Q)   | 03-8034       | Stop Single Target               |      |               |                          |
| R)   | 4010-01025-14 | Mach. Screw, 10-32 x 7/8"        |      |               |                          |
| S)   | 07-6688-17N   | Rivet, 5/32 x 7/32"              |      |               |                          |
| T)   | 10-433        | Spring, Extension                |      |               |                          |

# A-20579-1 & A-20579-2 Alien Mechanism Assembly

(A-20579-1 & A-20579-2 are identical in assembly  
with exception to the orientation of the coil assembly)

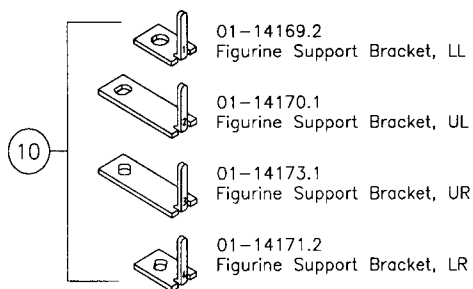


| Item | Part Number   | Description              |
|------|---------------|--------------------------|
| 1    | 01-14172      | Coil Stop Bracket        |
| 2    | 04-10360      | Armature Assembly        |
| 3    | 04-10311      | Alien Weldment Bracket   |
| 4    | 01-8-508-T    | Coil Retainer Bracket    |
| 5    | AE-26-1500    | Coil Assembly            |
| 6    | 10-135        | Spring - Plunger         |
| 7    | 23-6420       | Rubber Grommet           |
| 8    | 03-7067       | Coil Tubing              |
| 9    | 4008-01113-04 | Mach. Screw, 8-32 x 1/4" |

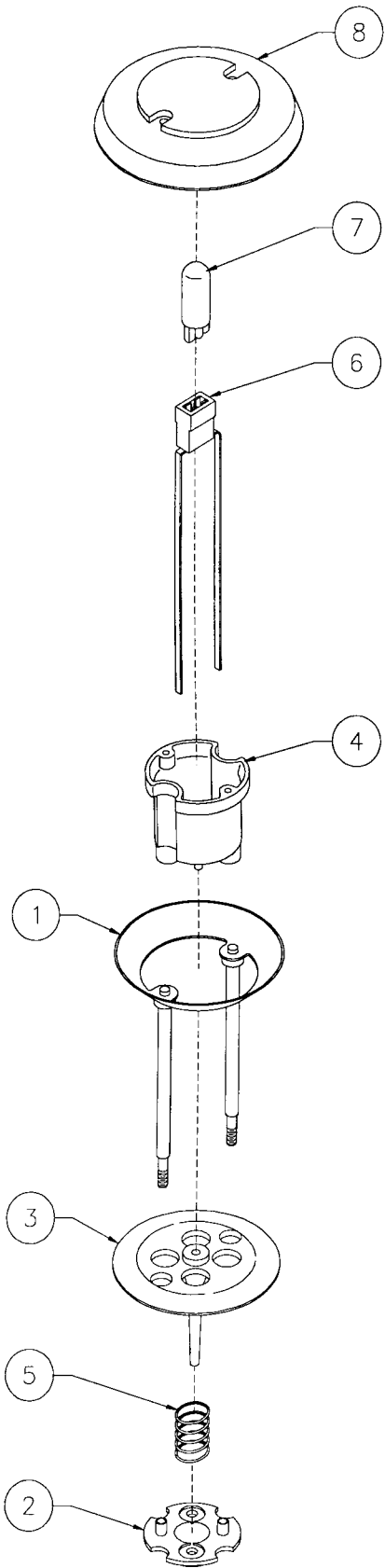
### Associated Parts:

|    |               |                              |
|----|---------------|------------------------------|
| 10 | 01-14173.1    | Figurine Support Bracket, UR |
| 11 | 4008-01168-06 | Mach. Screw, 8-32 x 3/8"     |
| 12 | 23-6768       | Alien Figurine               |

The following are brackets substituting item #10 .



# B-9414-3 Jet Bumper Assembly

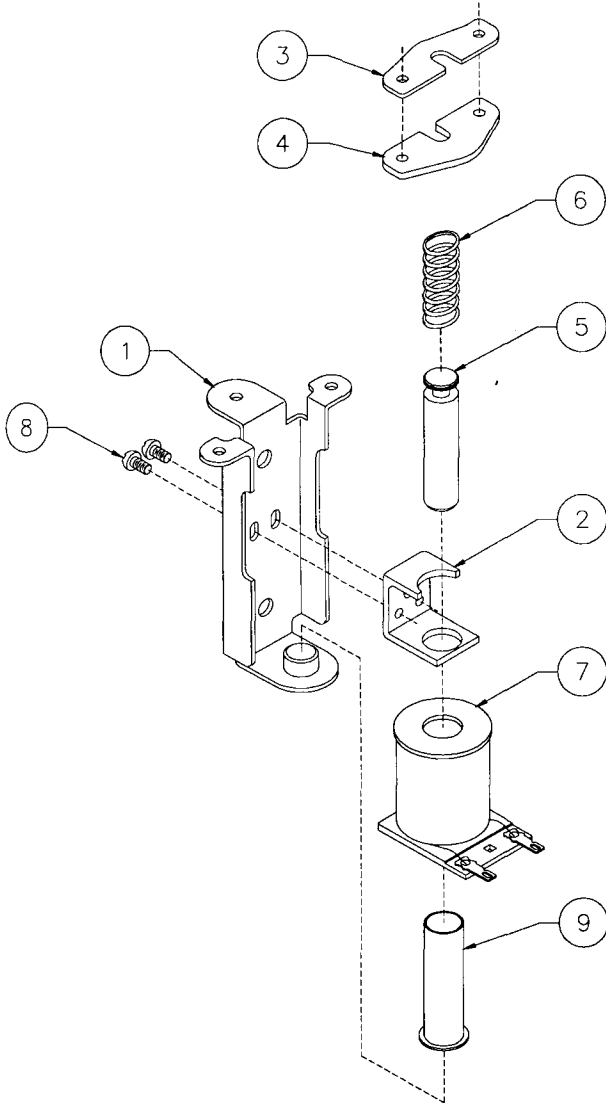


| Item | Part Number | Description              |
|------|-------------|--------------------------|
| 1    | A-4754      | Bumper Ring Assembly     |
| 2    | 03-6009-A5  | Bumper Base, White       |
| 3    | 03-6035-4   | Bumper Wafer, Red        |
| 4    | 03-7443-5   | Bumper Body, White       |
| 5    | 10-7        | Spring                   |
| 6    | 24-8776     | Socket-Wedge Base        |
| 7    | 24-8768     | Bulb #555(6.3v., 0.25A.) |

### Associated Parts:

|   |           |                         |
|---|-----------|-------------------------|
| 8 | 03-9007-9 | Jet Bumper Cap, Red (3) |
|---|-----------|-------------------------|

# A-9415-2 Jet Bumper Coil Assembly

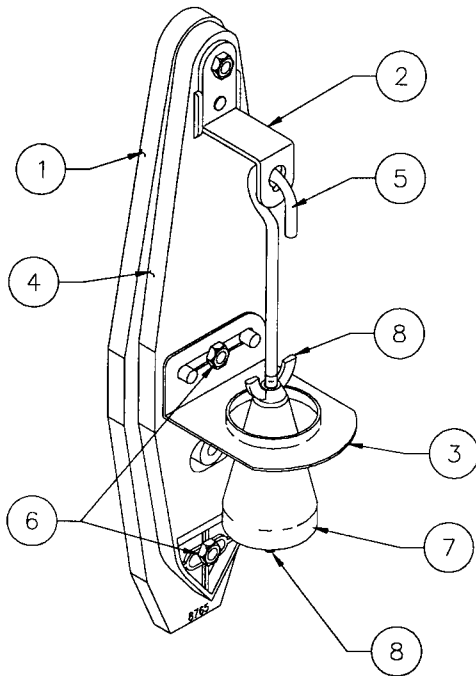


| Item | Part Number   | Description              |
|------|---------------|--------------------------|
| 1    | B-7417        | Bracket & Stop Assembly  |
| 2    | 01-1747       | Coil Retaining Bracket   |
| 3    | 01-5492       | Armature Link, Steel     |
| 4    | 01-5493       | Armature Link, Bakelite  |
| 5    | 02-3406-1     | Coil Plunger             |
| 6    | 10-326        | Armature Spring          |
| 7    | AE-26-1200    | Coil Assembly            |
| 8    | 4006-01017-04 | Mach. Screw, 6-32 x 1/4" |
| 9    | 03-7066       | Coil Tubing              |

**Associated Parts:  
(Not Shown)**

|    |               |                          |
|----|---------------|--------------------------|
| 10 | B-12030-2     | Leaf Switch Assembly     |
| a) | A-16443       | Switch & Diode Assembly  |
| b) | 01-1168       | Switch Mounting Bracket  |
| c) | 01-3670       | Switch Plate             |
| d) | 03-7395       | Switch Actuator          |
| e) | 4005-01003-12 | Mach. Screw, 5-40 x 3/4" |
| f) | 4405-01117-00 | Nut 5-40 Hex.            |

## A-15361 Tilt Mechanism Assembly

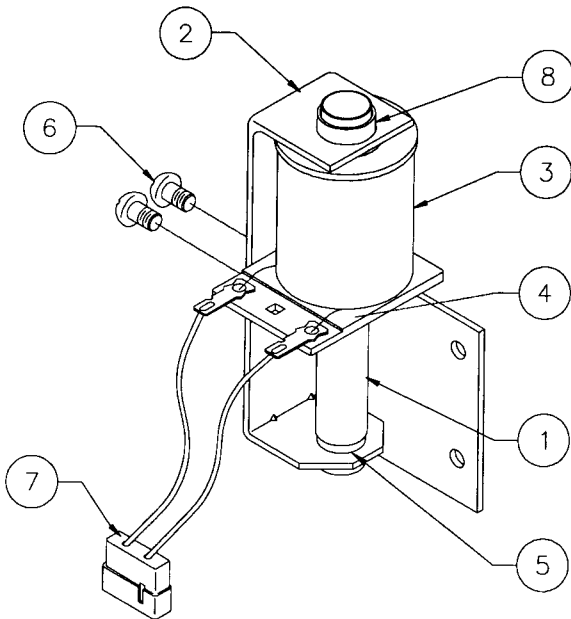


| Item | Part Number   | Description              |
|------|---------------|--------------------------|
| 1    | A-15360       | Mount Plate              |
| 2    | 01-3444       | Bracket, Tilt Upper      |
| 3    | 01-3445       | Bracket, Tilt Lower      |
| 4    | 03-8668       | Pendulum       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

### Associated Parts:

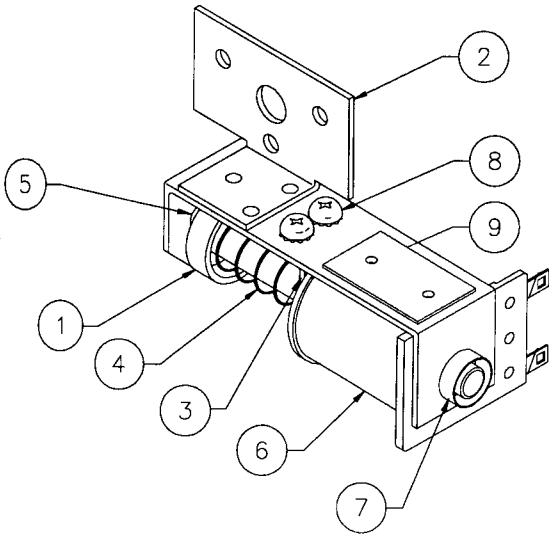
|   |               |              |
|---|---------------|--------------|
| 7 | 20-6502-A     | Plumb Bob    |
| 8 | 4406-01120-00 | Wing Nut (2) |

## B-10686-1 Knocker Assembly



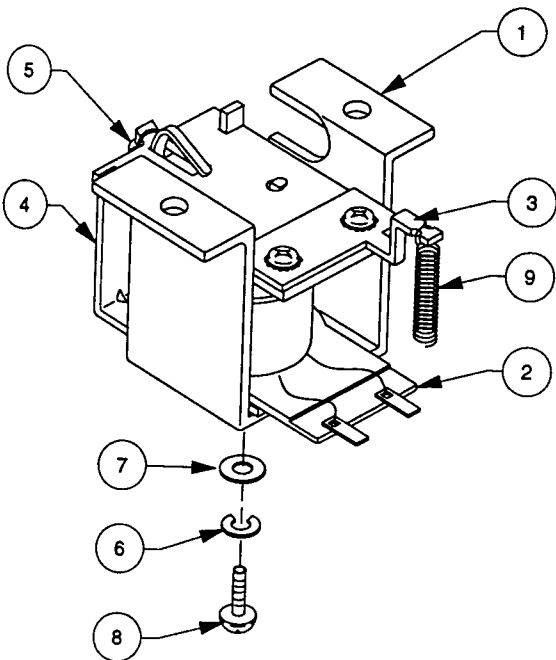
| Item | Part Number   | Description               |
|------|---------------|---------------------------|
| 1    | A-5387        | Coil Plunger Assembly     |
| 2    | 01-11273      | Mounting Bracket Assembly |
| 3    | AE-23-800     | Coil Sub-Assembly         |
| 4    | 01-8-508-T    | Coil Retaining 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-14525 Kicker Bracket Assembly



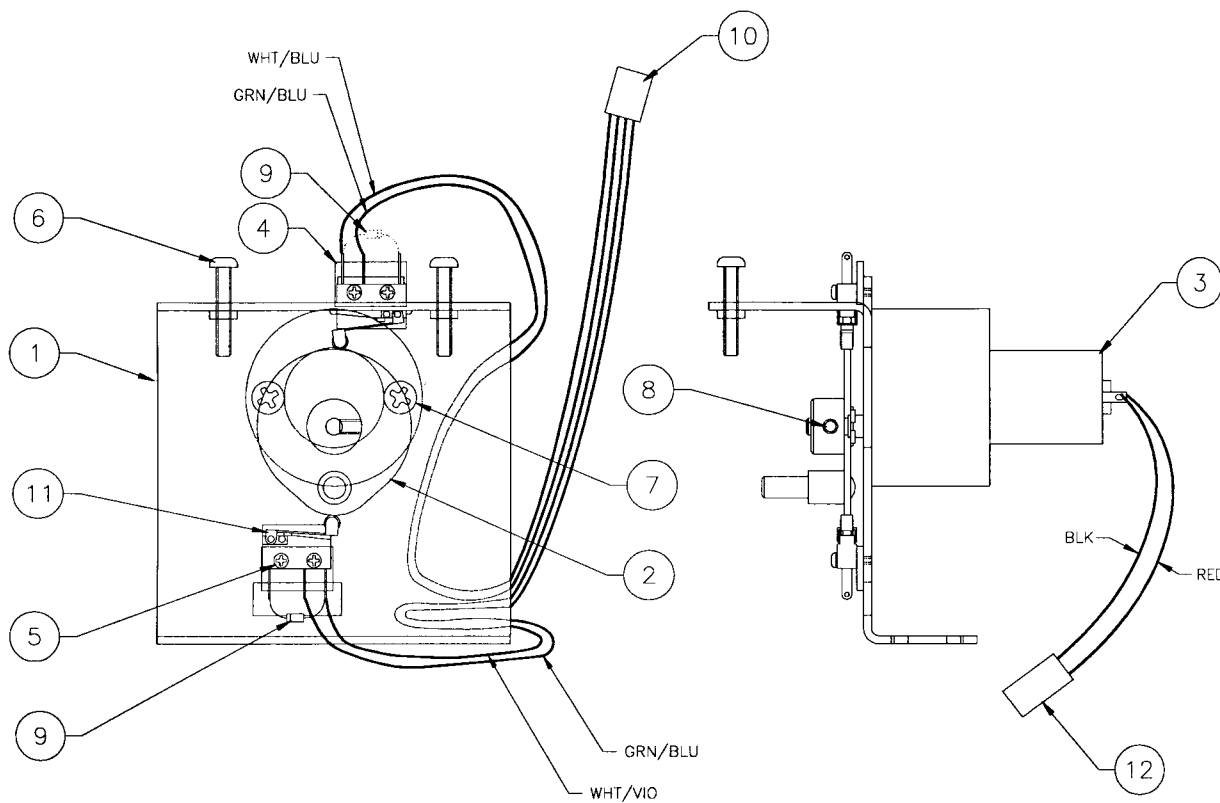
| Item | Part Number   | Description               |
|------|---------------|---------------------------|
| 1    | A-6306-2      | Bell Armature Assembly    |
| 2    | A-14526       | Mounting Bracket Assembly |
| 3    | 01-8-508-T    | Solenoid Bracket          |
| 4    | 10-135        | Solenoid Spring           |
| 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-17796 Ball Gate Actuator Assembly



| Item | Part Number   | Description               |
|------|---------------|---------------------------|
| 1    | 01-12348      | Ball Gate Coil Bracket    |
| 2    | A-14406       | Coil Assembly             |
| 3    | A-11146       | Armature Assembly         |
| 4    | A-6892        | Frame & Eyelet Assembly   |
| 5    | 10-120        | Spring                    |
| 6    | 4701-00003-00 | Lockwasher, #18 Split     |
| 7    | 4700-00089-00 | FW, 11/64 x 7/16 x 16ga.  |
| 8    | 4008-01021-07 | Mach. Screw, 8-32 x 7/16" |
| 9    | 10-194        | Extension Spring          |

# A-20572 3-Bank Motor Assembly

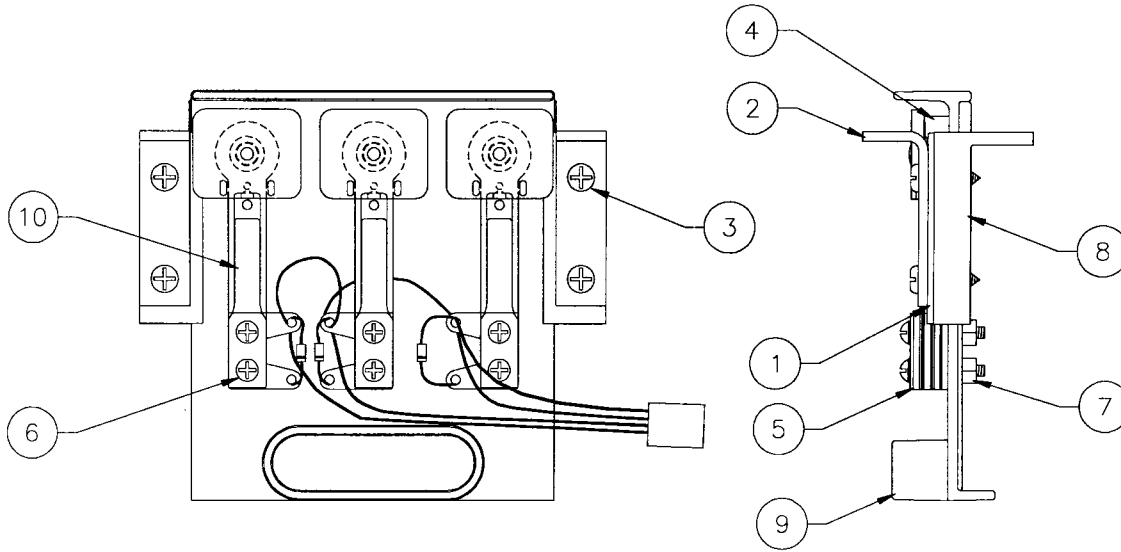


| Item | Part Number   | Description                 |
|------|---------------|-----------------------------|
| 1    | 04-10338.1    | Motor Bracket Assembly      |
| 2    | 04-10278      | 3-Bank Lift Cam             |
| 3    | 14-8023       | Motor                       |
| 4    | 01-14289.1    | Plastic Insulator           |
| 5    | 4002-01105-08 | Mach. Screw, 2-56 x 1/2"    |
| 6    | 4010-01007-16 | Mach. Screw, 10-32 x 1"     |
| 7    | 4010-01044-04 | Mach. Screw, 10-32 x 1/4"   |
| 8    | 4008-01083-04 | Set Screw, 8-32 x 1/4"      |
| 9    | 5070-09054-00 | Diode 1N4004 1.0A.          |
| 10   | H-20736       | Cable, 3-pin 3 Bank Pos.    |
| 11   | 5647-12693-06 | Sub-Miniature Switch        |
| 12   | H-18600-2     | Cable, Gen. Motor 2-pin 10" |



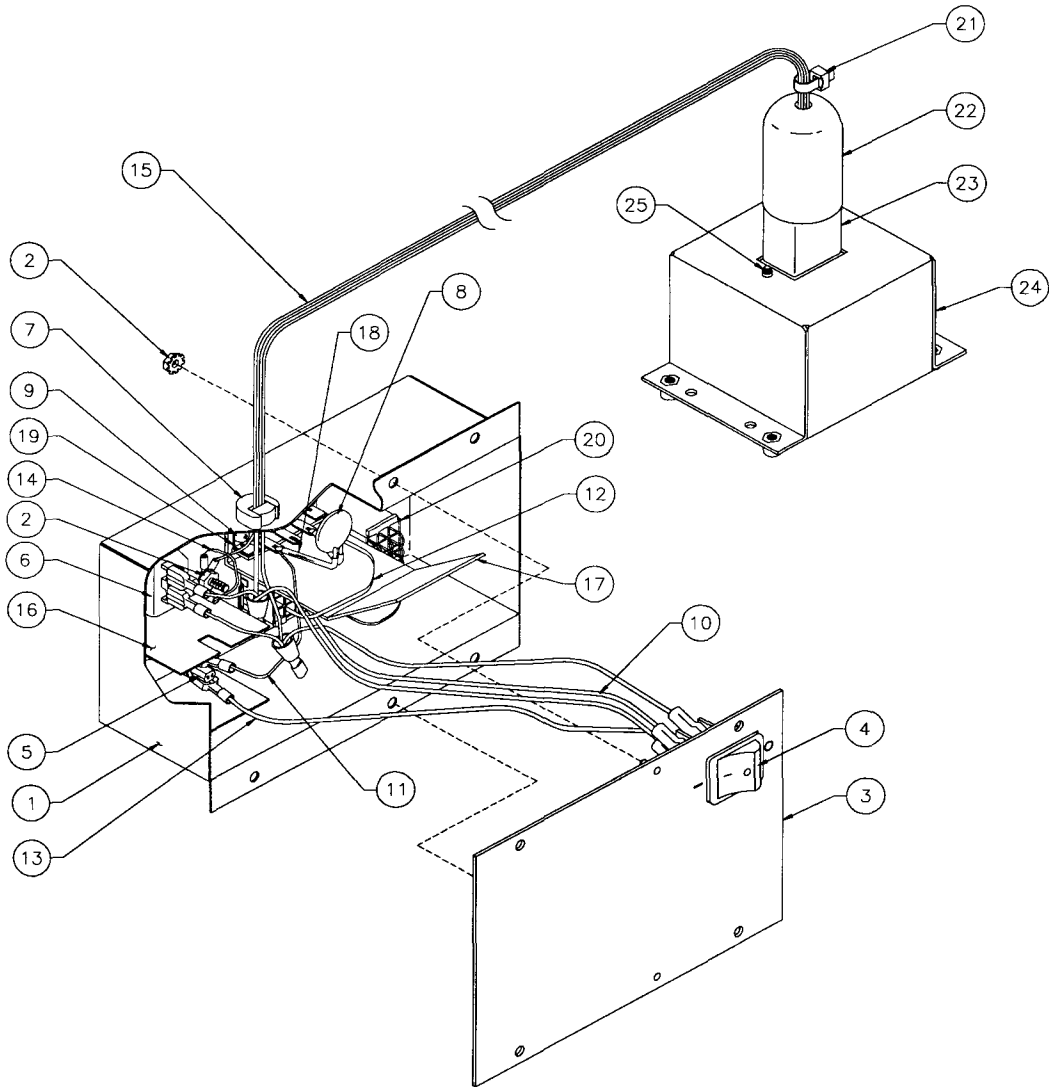
# A-20683

## 3-Bank Moving Target Assembly



| Item | Part Number   | Description                 |
|------|---------------|-----------------------------|
| 1    | 03-8028       | Retainer Carrier            |
| 2    | 01-8494       | Support Bracket             |
| 3    | 4106-01001-10 | Sh. Metal Screw, #6 x 5/8"  |
| 4    | 23-6534-9     | Edge Protector              |
| 5    | 01-3670-1     | Switch Plate - Flat         |
| 6    | 4004-01003-12 | Mach. Screw, 4-40 x 3/4"    |
| 7    | 4404-01119-00 | Nut 4-40 ESNA               |
| 8    | 03-8235       | Target Guide                |
| 9    | 03-8236       | Carrier Target              |
| 10   | A-20833       | 3-Bank Target & Cable Assy. |

# A-17540-1 Universal Power Interface Assembly

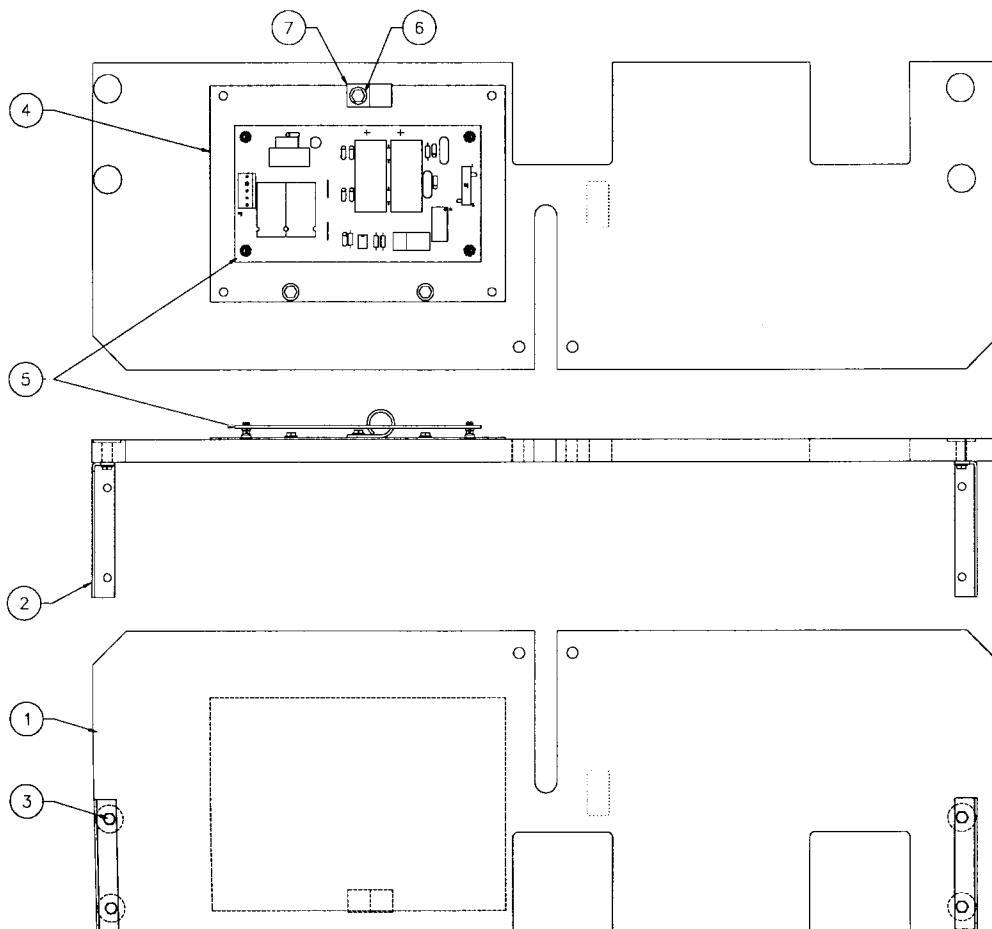


| Item | Part Number   | Description                      | Item | Part Number   | Description                     |
|------|---------------|----------------------------------|------|---------------|---------------------------------|
| 1    | 04-10292      | Power Control Chassis Box        | 14   | H-17542       | Ground Jumper Grn/Yel Cable     |
| 2    | 4406-01128-00 | Nut #6-32 KEPS (3)               | 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    | 5733-14734-00 | Fuse Holder Panel (5x20mm)       | 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   | 04-10293      | Line Filter Chassis Box         |
| 12   | H-17546       | Jumper Interface Hot Black Cable | 25   | 4004-01003-05 | Mach. Screw, #4-40 x 5/16" (2)  |
| 13   | H-17545       | Jumper Switch/Fuse Black Cable   |      |               |                                 |

# Universal Power Interface/Cordset Application Chart

| COUNTRY                | UNIVERSAL POWER INTERFACE ASSEMBLY | VOLTAGE PROGRAMMING JUMP CABLE |           |           |           | 5AMP FUSE/LABEL |                          | 8AMP FUSE/LABEL |                          | LABEL HIGH VOLTAGE CAUTION | POWER ADAPTER CORD | CORDSET |         |               |               |               |               |               |               |               |               |               |           |   |
|------------------------|------------------------------------|--------------------------------|-----------|-----------|-----------|-----------------|--------------------------|-----------------|--------------------------|----------------------------|--------------------|---------|---------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|-----------|---|
|                        |                                    | A-17540-1                      | H-17837-1 | H-17837-2 | H-17837-3 | H-17837-4       | 5731-09651-00 FUSE LABEL | 16-9668         | 5730-09252-00 FUSE LABEL |                            |                    | 16-8670 | 16-9669 | 5850-14052-00 | 5850-13271-00 | 5850-13272-00 | 5850-13273-00 | 5850-13274-00 | 5850-13275-00 | 5850-13276-00 | 5850-13277-00 | 5850-13278-00 | A-17175-2 |   |
| UNITED STATES          | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            | ✓                  | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| CANADA                 | ✓                                  | ✓                              |           |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| TAIWAN                 | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| MEXICO                 | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| CENTRAL AMERICA        | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| SOUTH KOREA            | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| PUERTO RICO            | ✓                                  |                                | ✓         |           |           |                 |                          | ✓               | ✓                        |                            |                    | ✓       |         |               |               |               |               |               |               |               |               |               |           |   |
| AUSTRIA                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| BELGIUM                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| FINLAND                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| FRANCE                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| GREECE                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| HOLLAND                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| HUNGARY                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| NETHERLANDS            | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| NETH. ANTILLES         | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| NORWAY                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| POLAND                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| PORTUGAL               | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| SPAIN                  | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| SWEDEN                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| TURKEY                 | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| WEST GERMANY           | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         | ✓       |               |               |               |               |               |               |               |               |               |           |   |
| UNITED KINGDOM         | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         | ✓             |               |               |               |               |               |               |               |               |           |   |
| IRELAND                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         | ✓             |               |               |               |               |               |               |               |               |           |   |
| HONG KONG              | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         | ✓             |               |               |               |               |               |               |               |               |           |   |
| DENMARK                | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               | ✓             |               |               |               |               |               |               |               |           |   |
| ITALY                  | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| CHILE                  | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| PEOPLE'S REP. OF CHINA | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| SWITZERLAND            | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| AUSTRALIA              | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| NEW ZEALAND            | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         |   |
| ARGENTINA              | ✓                                  |                                |           | ✓         |           | ✓               | ✓                        |                 |                          | ✓                          |                    |         |         |               |               |               |               |               |               |               |               |               |           |   |
| JAPAN                  | ✓                                  |                                |           |           | ✓         |                 |                          | ✓               | ✓                        |                            |                    |         |         |               |               |               |               |               |               |               |               |               | ✓         | ✓ |

# A-20578 Back Panel Assembly



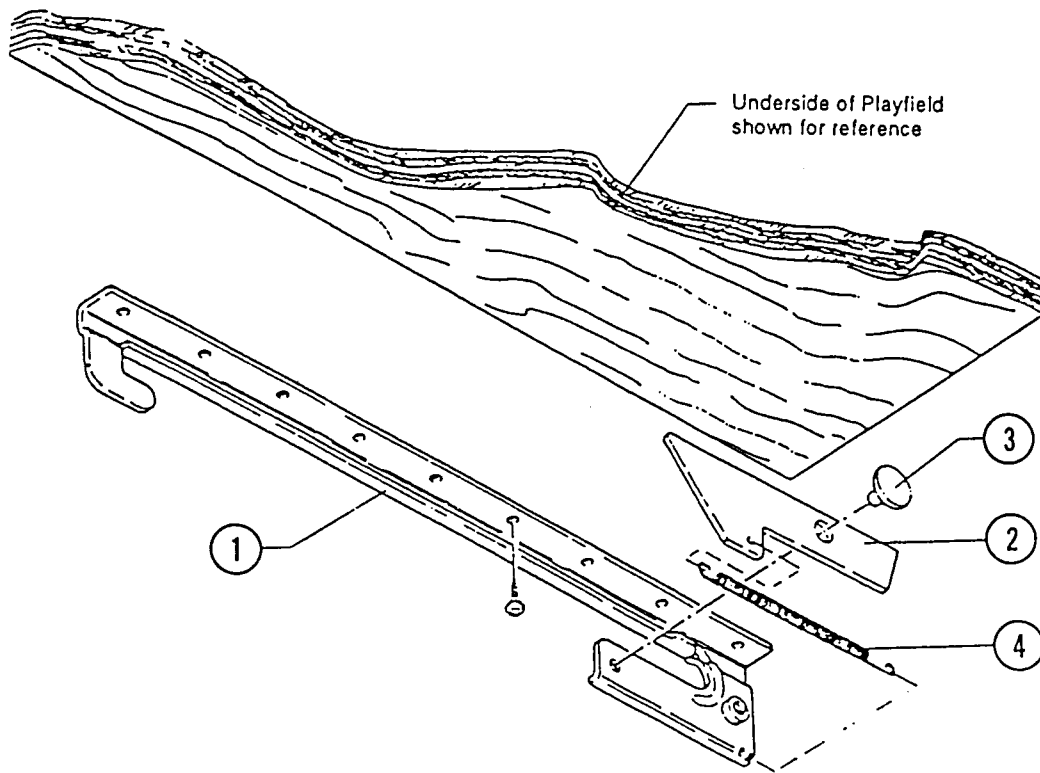
| Item | Part Number   | Description              |
|------|---------------|--------------------------|
| 1    | 11-1305       | Back Panel               |
| 2    | 01-12569      | Gusset Bracket           |
| 3    | 4008-01168-10 | Mach. Screw, 8-32 x 5/8" |
| 4    | 04-10359      | Base Plate-Strobe Driver |
| 5    | A-20669       | Strobe Lamp PCB Assembly |
| 6    | 4808-01175-08 | E-P #8 x 1/2"            |
| 7    | 03-7655-8     | Cable Clamp, 1/2"        |

**Associated Assembly:**  
(Not Shown)

|   |         |                             |
|---|---------|-----------------------------|
| 8 | A-20809 | Strobe Shield & Label Assy. |
|---|---------|-----------------------------|

# Playfield Slide Mechanism Assembly

(Left Assembly Shown)



**A-17749.1-1**  
**Playfield Slide Mechanism**  
 (Left Assembly)

| Item | Part Number | Description    |
|------|-------------|----------------|
| 1    | 01-12304-1  | Slide, Left    |
| 2    | 01-10664.1  | Lever Retainer |
| 3    | 02-4615     | Shoulder Rivet |

**Associated Part:**

|   |        |        |
|---|--------|--------|
| 4 | 10-439 | Spring |
|---|--------|--------|

**A-17749.1-2**  
**Playfield Slide Mechanism**  
 (Right Assembly)

| Item | Part Number | Description    |
|------|-------------|----------------|
| 1    | 01-12304-1  | Slide, Right   |
| 2    | 01-10664.1  | Lever Retainer |
| 3    | 02-4615     | Shoulder Rivet |

**Associated Part:**

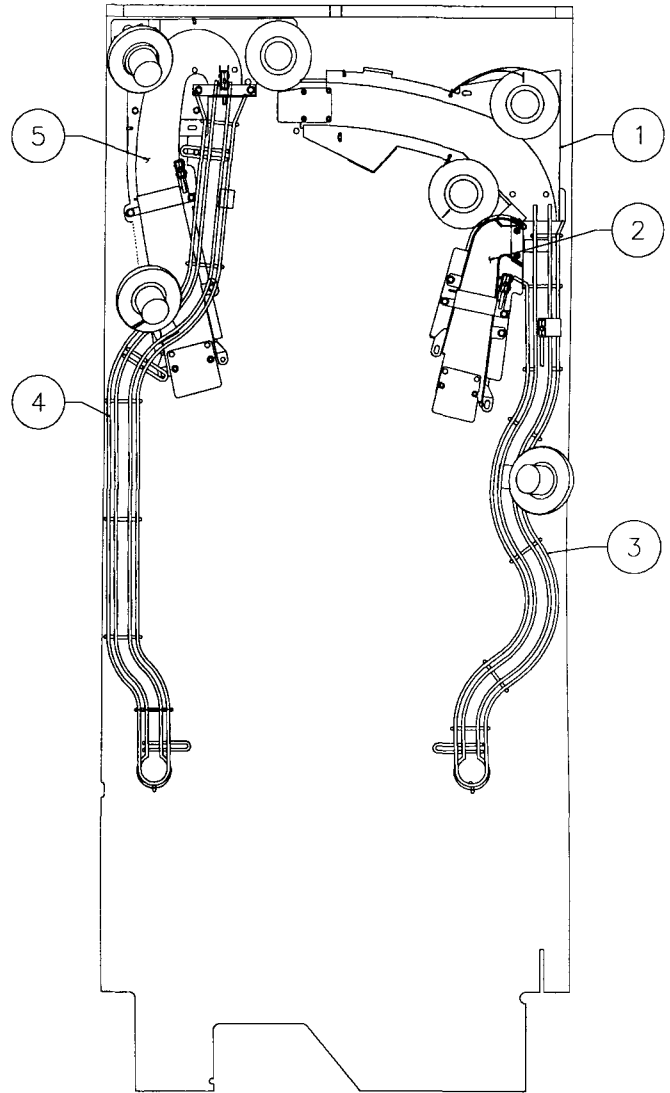
|   |        |        |
|---|--------|--------|
| 4 | 10-439 | Spring |
|---|--------|--------|

## Posts

| Part Number | Description          |
|-------------|----------------------|
| 02-4425-1   | Post Fastner 8-32    |
| 02-4425-2   | Post Fastner 8-32    |
| 02-4425-3   | Post Fastner 8-32    |
| 02-4436-2   | F-F Spacer 8-32      |
| 02-4660     | Single Bumper Post   |
| 02-5107     | Adjusting Post       |
| 02-5222     | Post #10, 8-32       |
| 02-5254     | Post 8-32 Bumper     |
| 03-8044-9   | Mini Post Trans. Red |
| 03-8319-9   | Post #8 Trans. Red   |
| 03-8365-9   | Post #8 Trans. Red   |
| 03-9357-9   | Post #8 x 1.06"      |

# Ramps

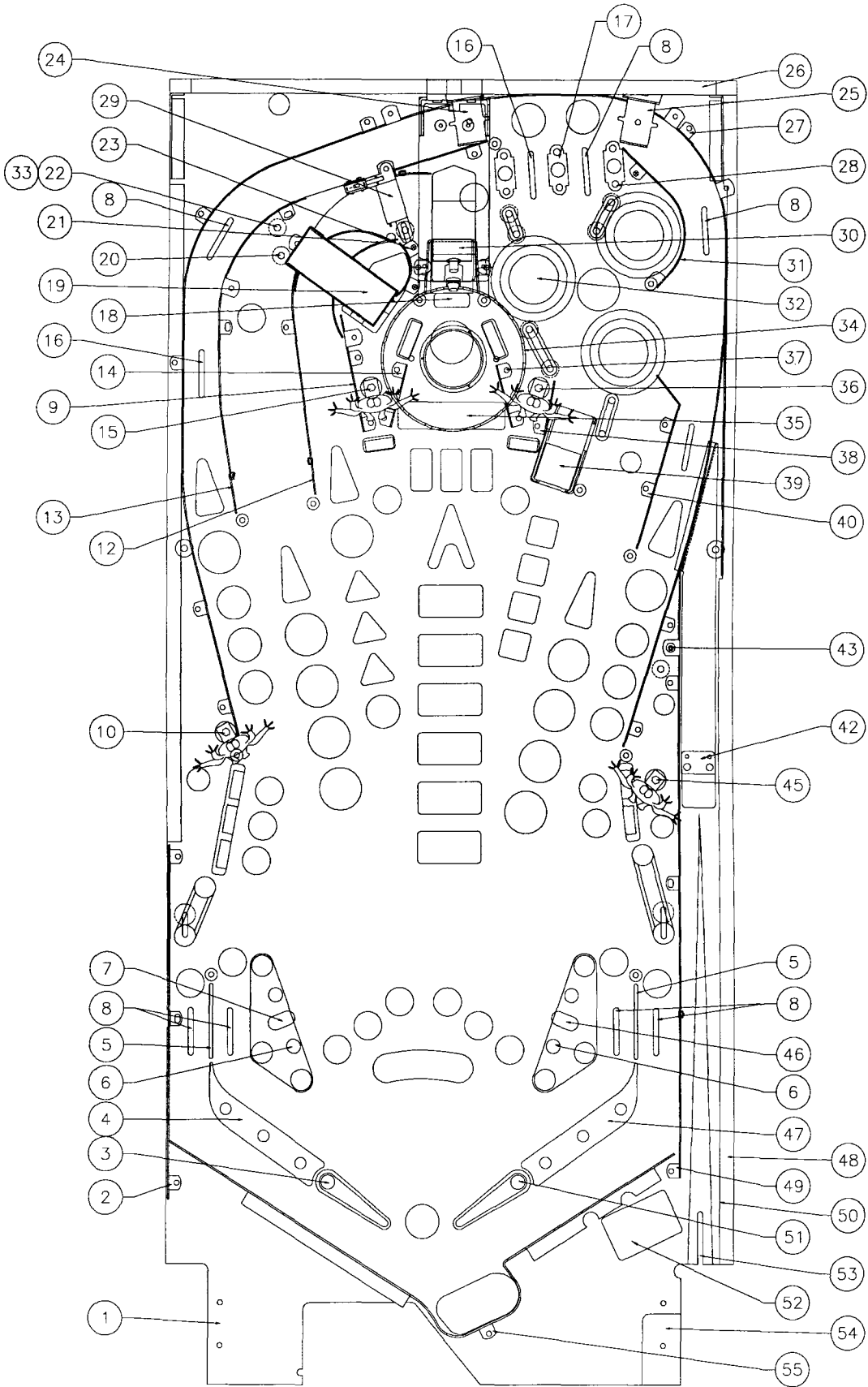
| Item | Part Number | Description                 |
|------|-------------|-----------------------------|
| 1    | A-20621     | Middle Ramp Assembly        |
| 2    | A-20547     | Right Plastic Ramp Assembly |
| 3    | A-20549     | Right Wire Ramp Assembly    |
| 4    | A-20546     | Left Wire Ramp Assembly     |
| 5    | A-20553     | Left Plastic Ramp Assembly  |





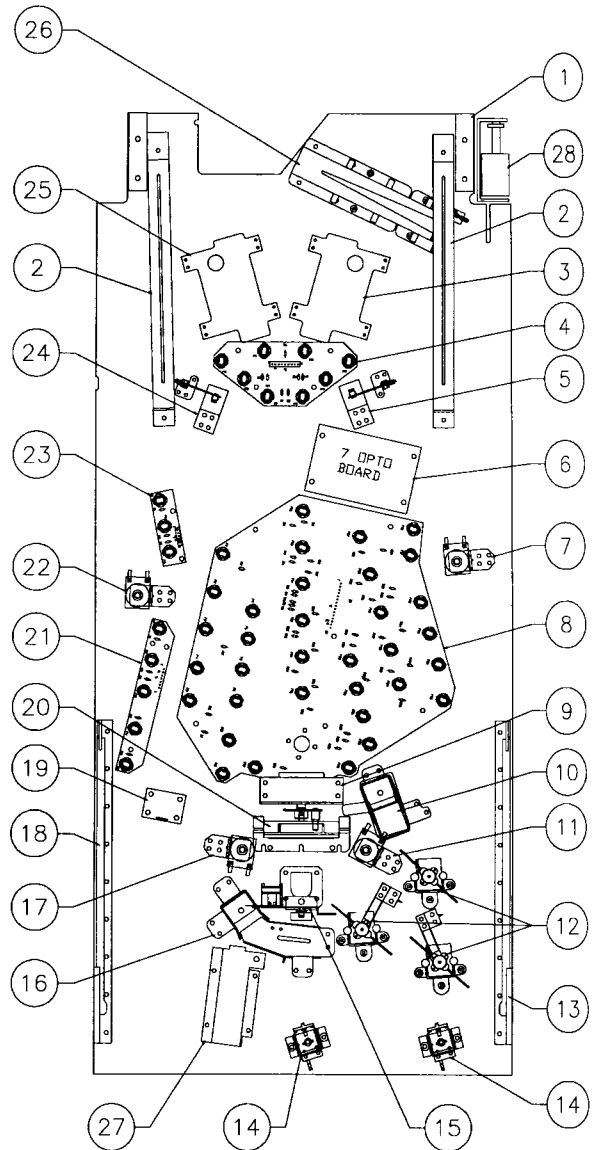


# Upper Playfield Parts

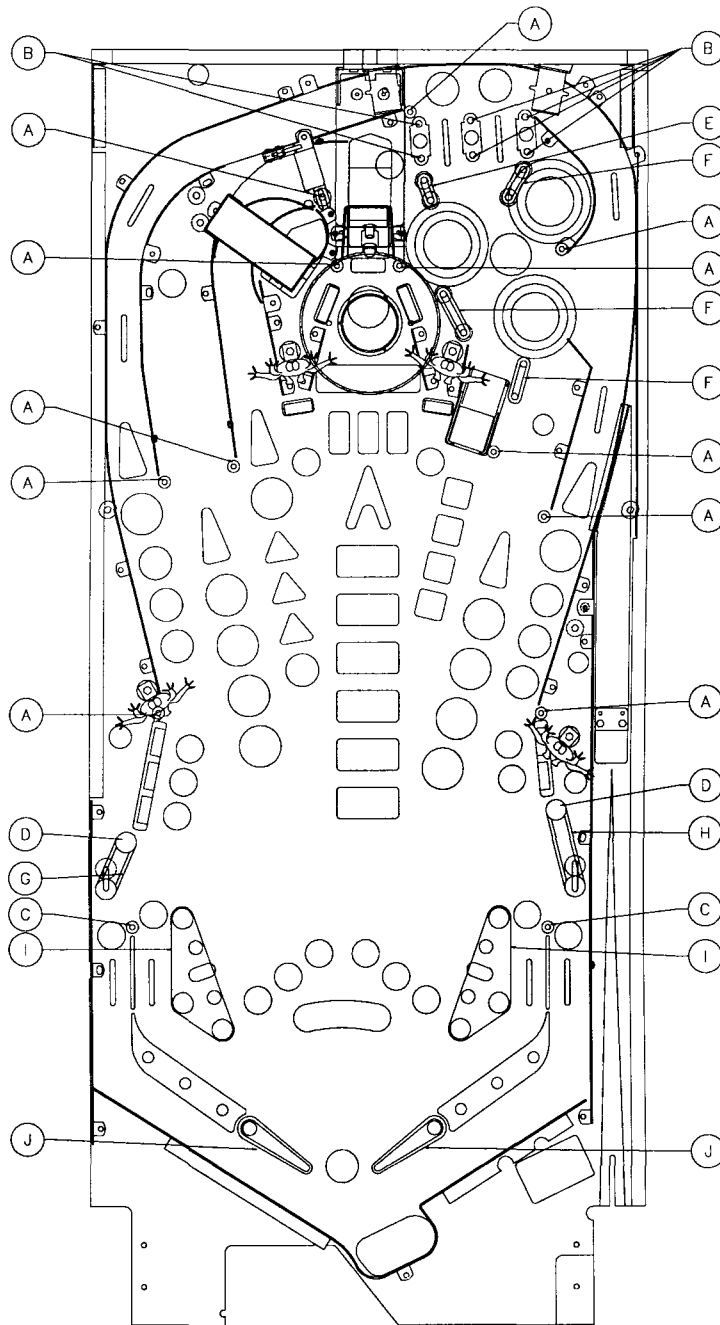


# Lower Playfield Parts

| Item | Part Number | Description                   |
|------|-------------|-------------------------------|
| 1    | 01-9211     | Bracket Playfield Hanger (2)  |
| 2    | 01-11781    | Leg Support (2)               |
| 3    | A-15849-R   | Flipper Assembly              |
| 4    | A-20622     | 8-Lamp Board Assembly         |
| 5    | A-17811     | Kicker Arm (Slingshot) Assy.  |
|      | B-9362-R-3  | Coil & Bracket Assembly       |
| 6    | A-15576     | 7-Switch Opto PCB Assembly    |
| 7    | A-20579-1   | Alien Mech. Assembly          |
|      | 01-14171.2  | Figurine Support Bracket      |
| 8    | A-20624     | 37-Lamp PCB Assembly          |
| 9    | A-20572     | 3-Bank Motor Assembly         |
| 10   | A-20573     | Right Ball Popper Assembly    |
| 11   | A-20579-1   | Alien Mech. Assembly          |
|      | 01-14173.1  | Figurine Support Bracket      |
| 12   | A-9415-2    | Jet Bumper Coil Assembly      |
| 13   | A-17749.1-2 | Playfield Slide Mechanism, R. |
| 14   | A-17796     | Ball Gate Actuator Assy. (2)  |
| 15   | A-20657     | 1-Bank Drop Target Assembly   |
| 16   | A-20633     | Left Popper Assembly          |
|      | 04-10296    | Left Popper Scoop             |
| 17   | A-20479-2   | Alien Mech. Assembly          |
|      | 01-14170.1  | Figurine Support Bracket      |
| 18   | A-17749.1-1 | Playfield Slide Mechanism, L. |
| 19   | A-15340     | Motor EMI w/Brake PCB Assy.   |
| 20   | A-20683     | 3-Bank Moving Target Assy.    |
| 21   | A-20623     | 5-Lamp PCB Assembly           |
| 22   | A-20579-1   | Alien Mech. Assembly          |
|      | 01-14169.2  | Figurine Support Bracket      |
| 23   | A-20629     | 3-Lamp PCB Assembly           |
| 24   | A-17811     | Kicker Arm (Slingshot) Assy.  |
|      | B-9362-L-2  | Coil & Bracket Assembly       |
| 25   | A-15849-L-2 | Flipper Assembly              |
| 26   | A-19963-1   | Ball Trough Assembly          |
| 27   | A-17241     | Ramp Diverter Assembly        |
| 28   | A-14525     | Kicker Bracket Assembly       |



# Rubber Rings



| Item No. | Part Number | Description.         | Qty | Item No. | Part Number | Description.        | Qty |
|----------|-------------|----------------------|-----|----------|-------------|---------------------|-----|
| A        | 23-6556     | Black Sleeve         | 11  | F        | 23-6694-5   | Ring 3/4", Black    | 3   |
| B        | 23-6641     | Bumper Rubber, Black | 6   | G        | 23-6694-6   | Ring 1", Black      | 1   |
| C        | 23-6694-1   | Grommet 3/32", Black | 2   | H        | 23-6694-7   | Ring 1 1/4", Black  | 1   |
| D        | 23-6694-3   | Ring 5/16", Black    | 2   | I        | 23-6694-10  | Ring 2 1/2", Black  | 2   |
| E        | 23-6694-4   | Ring 7/16", Black    | 1   | J        | 23-6695     | Flipper Ring, Black | 2   |

# LAMP MATRIX

Yellow (B+) O → Red

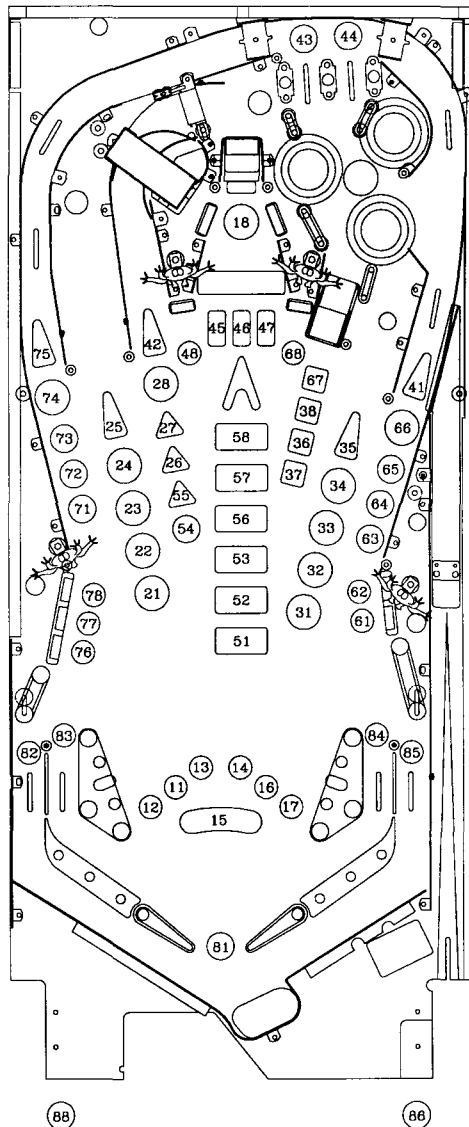
| Column \ Row                   | 1<br>Yellow-Brown<br>J121-1<br>Q96 | 2<br>Yellow-Red<br>J121-2<br>Q100 | 3<br>Yellow-Orange<br>J121-3<br>Q95 | 4<br>Yellow-Black<br>J121-4<br>Q99 | 5<br>Yellow-Green<br>J121-5<br>Q94 | 6<br>Yellow-Blue<br>J121-6<br>Q98 | 7<br>Yellow-Violet<br>J121-7<br>Q93 | 8<br>Yellow-Gray<br>J121-9<br>Q97 |
|--------------------------------|------------------------------------|-----------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1<br>Red-Brown<br>J125-1 Q104  | SUPER JETS<br>11                   | BIG-O-BEAM 1<br>21                | TRACTOR BEAM 1<br>31                | RIGHT LOOP ARROW<br>41             | ATTACK MARS<br>51                  | MARTIA"N" TARGET<br>61            | CAPTURE 1<br>71                     | SHOOT AGAIN<br>81                 |
| 2<br>Red-Black<br>J125-2 Q108  | SUPER JACKPOT<br>12                | BIG-O-BEAM 2<br>22                | TRACTOR BEAM 2<br>32                | CENTER RAMP ARROW<br>42            | D.C. U.S.A.<br>52                  | MARTIA"N" TARGET<br>62            | CAPTURE 2<br>72                     | LEFT OUTLANE<br>82                |
| 3<br>Red-Orange<br>J125-4 Q103 | MARTIAN ATTACK MULTIBALL<br>13     | BIG-O-BEAM 3<br>23                | TRACTOR BEAM 3<br>33                | LEFT TOP LANE<br>43                | LONDON ENGLAND<br>53               | ATOMIC BLASTER 1<br>63            | CAPTURE 3<br>73                     | LEFT RETURN<br>83                 |
| 4<br>Red-Yellow<br>J125-5 Q107 | ANNIHILATION<br>14                 | LEFT RAMP JACKPOT<br>24           | RIGHT RAMP JACKPOT<br>34            | RIGHT TOP LANE<br>44               | LIGHT LOCK<br>54                   | ATOMIC BLASTER 2<br>64            | LEFT LOOP JACKPOT<br>74             | RIGHT RETURN<br>84                |
| 5<br>Red-Green<br>J125-6 Q102  | RETURN TO BATTLE<br>15             | LEFT RAMP ARROW<br>25             | RIGHT RAMP ARROW<br>35              | LEFT MOTOR BANK<br>45              | LOCK 1<br>55                       | ATOMIC BLASTER 3<br>65            | LEFT LOOP ARROW<br>75               | RIGHT OUTLANE<br>85               |
| 6<br>Red-Blue<br>J125-7 Q106   | CONQUER MARS<br>16                 | LOCK 2<br>26                      | MARTIAN ATTACK<br>36                | CENTER MOTOR BANK<br>46            | PISA ITALY<br>56                   | RIGHT LOOP JACKPOT<br>66          | "M"ARTIAN TARGET<br>76              | LAUNCH BUTTON<br>86               |
| 7<br>Red-Violet<br>J125-8 Q101 | 5-WAY COMBO<br>17                  | LOCK 3<br>27                      | RULE UNIVERSE<br>37                 | RIGHT MOTOR BANK<br>47             | BERLIN GERMANY<br>57               | EXTRA BALL<br>67                  | M"ARTIAN TARGET<br>77               | NOT USED<br>87                    |
| 8<br>Red-Gray<br>J125-9 Q105   | DROP TARGET<br>18                  | CENTER RAMP JACKPOT<br>28         | STROKE OF LUCK<br>38                | MAR"TI"AN TARGET<br>48             | PARIS FRANCE<br>58                 | MART"IA"N TARGET<br>68            | MA"RTIAN TARGET<br>78               | START 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       | 24-8768  | A-20622        | Super Jets                | 35       | 24-8768  | A-20624        | Right Ramp Arrow  |
| 12       | 24-8768  | A-20622        | Super Jackpot             | 36       | 24-8768  | A-20624        | Martian Attack    |
| 13       | 24-8768  | A-20622        | Martian Attack Multi-ball | 37       | 24-8768  | A-20624        | Rule Universe     |
| 14       | 24-8768  | A-20622        | Annihilation              | 38       | 24-8768  | A-20624        | Stroke Of Luck    |
| 15       | 24-8768  | A-20622        | Return To Battle (2)      | 41       | 24-6549  | A-17835        | Right Loop Arrow  |
| 16       | 24-8768  | A-20622        | Conquer Mars              | 42       | 24-8768  | A-20624        | Center Ramp Arrow |
| 17       | 24-8768  | A-20622        | 5-Way Combo               | 43       | 24-6549  | A-17835        | Left Top Lane     |
| 18       | 24-6549  | A-17807        | Drop Target               | 44       | 24-6549  | A-17835        | Right Top Lane    |
| 21       | 24-8768  | A-20624        | Big-O-Beam 1              | 45       | 24-8768  | A-20624        | Left Motor Bank   |
| 22       | 24-8768  | A-20624        | Big-O-Beam 2              | 46       | 24-8768  | A-20624        | Center Motor Bank |
| 23       | 24-8768  | A-20624        | Big-O-Beam 3              | 47       | 24-8768  | A-20624        | Right Motor Bank  |
| 24       | 24-8768  | A-20624        | Left Ramp Jackpot         | 48       | 24-8768  | A-20624        | MAR"TI"AN Target  |
| 25       | 24-8768  | A-20624        | Left Ramp Arrow           | 51       | 24-8768  | A-20624        | Attack Mars       |
| 26       | 24-8768  | A-20624        | Lock 2                    | 52       | 24-8768  | A-20624        | D.C., U.S.A.      |
| 27       | 24-8768  | A-20624        | Lock 3                    | 53       | 24-8768  | A-20624        | London, England   |
| 28       | 24-8768  | A-20624        | Center Ramp Jackpot       | 54       | 24-8768  | A-20624        | Light Lock        |
| 31       | 24-8768  | A-20624        | Tractor Beam 1            | 55       | 24-8768  | A-20624        | Lock 1            |
| 32       | 24-8768  | A-20624        | Tractor Beam 2            | 56       | 24-8768  | A-20624        | Pisa, Italy       |
| 33       | 24-8768  | A-20624        | Tractor Beam 3            | 57       | 24-8768  | A-20624        | Berlin, Germany   |
| 34       | 24-8768  | A-20624        | Right Ramp Jackpot        | 58       | 24-8768  | A-20624        | Paris, France     |

## Lamp Locations (Continued)



| Item No. | Bulb No. | Lamp Assy. No. | Description        |
|----------|----------|----------------|--------------------|
| 61       | 24-8768  | A-20624        | MARTIA"N" Target   |
| 62       | 24-8768  | A-20624        | MARTI"A"N Target   |
| 63       | 24-8768  | A-20624        | Atomic Blaster 1   |
| 64       | 24-8768  | A-20624        | Atomic Blaster 2   |
| 65       | 24-8768  | A-20624        | Atomic Blaster 3   |
| 66       | 24-8768  | A-20624        | Right Loop Jackpot |
| 67       | 24-8768  | A-20624        | Extra Ball         |
| 68       | 24-8768  | A-20624        | MART"I"AN Target   |
| 71       | 24-8768  | A-20623        | Capture 1          |
| 72       | 24-8768  | A-20623        | Capture 2          |
| 73       | 24-8768  | A-20623        | Capture 3          |
| 74       | 24-8768  | A-20623        | Left Loop Jackpot  |
| 75       | 24-8768  | A-20623        | Left Loop Arrow    |
| 76       | 24-8768  | A-20629        | "M"ARTIAN Target   |


| Item No. | Bulb No. | Lamp Assy. No. | Description      |
|----------|----------|----------------|------------------|
| 77       | 24-8768  | A-20629        | M"A"RTIAN Target |
| 78       | 24-8768  | A-20629        | MA"R"TIAN Target |
| 81       | 24-6549  | A-17807        | Shoot Again      |
| 82       | 24-6549  | A-17835        | Left Outlane     |
| 83       | 24-6549  | A-17835        | Left Return      |
| 84       | 24-6549  | A-17835        | Right Return     |
| 85       | 24-6549  | A-17835        | Right Outlane    |
| 86       | ---      | 20-9663-B-4    | Launch Button    |
| 87       | ---      | ---            | Not Used         |
| 88       | ---      | 20-9663-2      | Start Button     |

24-8768 = #555 Bulb

24-6549 = #44 Bulb

\*Not Shown

# SWITCH MATRIX

White  Green

| Dedicated Grounded Switches  | Column                               | 1                               | 2                             | 3                                | 4                                | 5                               | 6                              | 7                                | 8                              | Flipper Grounded Switches  |
|--|--------------------------------------|---------------------------------|-------------------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------|----------------------------------|--------------------------------|--|
|  | Row                                  | Green-Brown<br>J206-1<br>U20-18 | Green-Red<br>J206-2<br>U20-17 | Green-Orange<br>J206-3<br>U20-16 | Green-Yellow<br>J206-4<br>U20-15 | Green-Black<br>J206-5<br>U20-14 | Green-Blue<br>J206-6<br>U20-13 | Green-Violet<br>J206-7<br>U20-12 | Green-Gray<br>J206-9<br>U20-11 |  |
| Orange-Brown<br>J205-1 U17-5<br>Left Coin Chute D1                               | 1<br>White-Brown<br>J208-1<br>U18-11 | LAUNCH<br>BUTTON<br>11          | SLAM<br>TILT<br>21            | TROUGH<br>EJECT<br>31            | MARTIA" N<br>TARGET<br>41        | LEFT<br>SLINGSHOT<br>51         | LEFT<br>RAMP<br>ENTER<br>61    | RIGHT<br>LOOP<br>HIGH<br>71      | NOT<br>USED<br>81              | Black-Green<br>J208-13<br>Lower Right<br>Flipper EOS F1                |
| Orange-Red<br>J205-2 U17-7<br>Center Coin Chute D2                               | 2<br>White-Red<br>J208-2<br>U18-9    | NOT<br>USED<br>12               | COIN<br>DOOR<br>CLOSED<br>22  | TROUGH<br>BALL 1<br>32           | MARTIA" N<br>TARGET<br>42        | RIGHT<br>SLINGSHOT<br>52        | CENTER<br>RAMP<br>ENTER<br>62  | RIGHT<br>LOOP<br>LOW<br>72       | NOT<br>USED<br>82              | Blue-Violet<br>J212-12<br>Lower Right<br>Flipper Opto F2               |
| Orange-Black<br>J205-3 U17-11<br>Right Coin Chute D3                             | 3<br>White-Orange<br>J208-3<br>U18-5 | START<br>BUTTON<br>13           | NOT<br>USED<br>23             | TROUGH<br>BALL 2<br>33           | MARTIA" N<br>TARGET<br>43        | LEFT<br>JET<br>53               | RIGHT<br>RAMP<br>ENTER<br>63   | LEFT<br>LOOP<br>HIGH<br>73       | NOT<br>USED<br>83              | Black-Blue<br>J208-12<br>Lower Left<br>Flipper EOS F3                  |
| Orange-Yellow<br>J205-4 U17-9<br>4th Coin Chute D4                               | 4<br>White-Yellow<br>J208-4<br>U18-7 | PLUMB<br>BOB<br>TILT<br>14      | ALWAYS<br>CLOSED<br>24        | TROUGH<br>BALL 3<br>34           | MARTIA" N<br>TARGET<br>44        | BOTTOM<br>JET<br>54             | LEFT<br>RAMP<br>EXIT<br>64     | LEFT<br>LOOP<br>LOW<br>74        | NOT<br>USED<br>84              | Blue-Gray<br>J212-11<br>Lower Left<br>Flipper Opto F4                  |
| Orange-Green<br>J205-6 U16-9<br>Normal Function Ser Credits Test Function Esc D5 | 5<br>White-Green<br>J208-5<br>U19-11 | NOT<br>USED<br>15               | NOT<br>USED<br>25             | TROUGH<br>BALL 4<br>35           | LEFT<br>MOTOR<br>BANK<br>45      | RIGHT<br>JET<br>55              | RIGHT<br>RAMP<br>EXIT<br>65    | LEFT<br>SAUCER<br>TARGET<br>75   | NOT<br>USED<br>85              | Black-Violet<br>J208-11<br>Upper Right<br>Flipper EOS F5<br>(NOT USED) |
| Orange-Blue<br>J205-7 U16-11<br>Normal Function Vol Down Test Function Down D6   | 6<br>White-Blue<br>J208-7<br>U19-9   | LEFT<br>OUTLANE<br>16           | LEFT<br>RETURN<br>26          | LEFT<br>POPPER<br>36             | CENTER<br>MOTOR<br>BANK<br>46    | MARTIA" N<br>TARGET<br>56       | MOTOR<br>BANK<br>DOWN<br>66    | RIGHT<br>SAUCER<br>TARGET<br>76  | NOT<br>USED<br>86              | Black-Yellow<br>J212-10<br>Upper Right<br>Flipper Opto F6              |
| Orange-Violet<br>J205-8 U16-7<br>Normal Function Vol Up Test Function Up D7      | 7<br>White-Violet<br>J208-8<br>U19-5 | RIGHT<br>RETURN<br>17           | RIGHT<br>OUTLANE<br>27        | RIGHT<br>POPPER<br>37            | RIGHT<br>MOTOR<br>BANK<br>47     | MARTIA" N<br>TARGET<br>57       | MOTOR<br>BANK<br>UP<br>67      | DROP<br>TARGET<br>77             | NOT<br>USED<br>87              | Black-Gray<br>J208-10<br>Upper Left<br>Flipper EOS F7<br>(NOT USED)    |
| Orange-Gray<br>J205-9 U16-5<br>Normal Function Begin Test Test Function Enter D8 | 8<br>White-Gray<br>J208-9<br>U19-7   | SHOOTER<br>LANE<br>18           | NOT<br>USED<br>28             | LEFT<br>TOP<br>LANE<br>38        | RIGHT<br>TOP<br>LANE<br>48       | MARTIA" N<br>TARGET<br>58       | NOT<br>USED<br>68              | CENTER<br>TROUGH<br>78           | NOT<br>USED<br>88              | Black-Blue<br>J212-9<br>Upper Left<br>Flipper Opto F8                  |

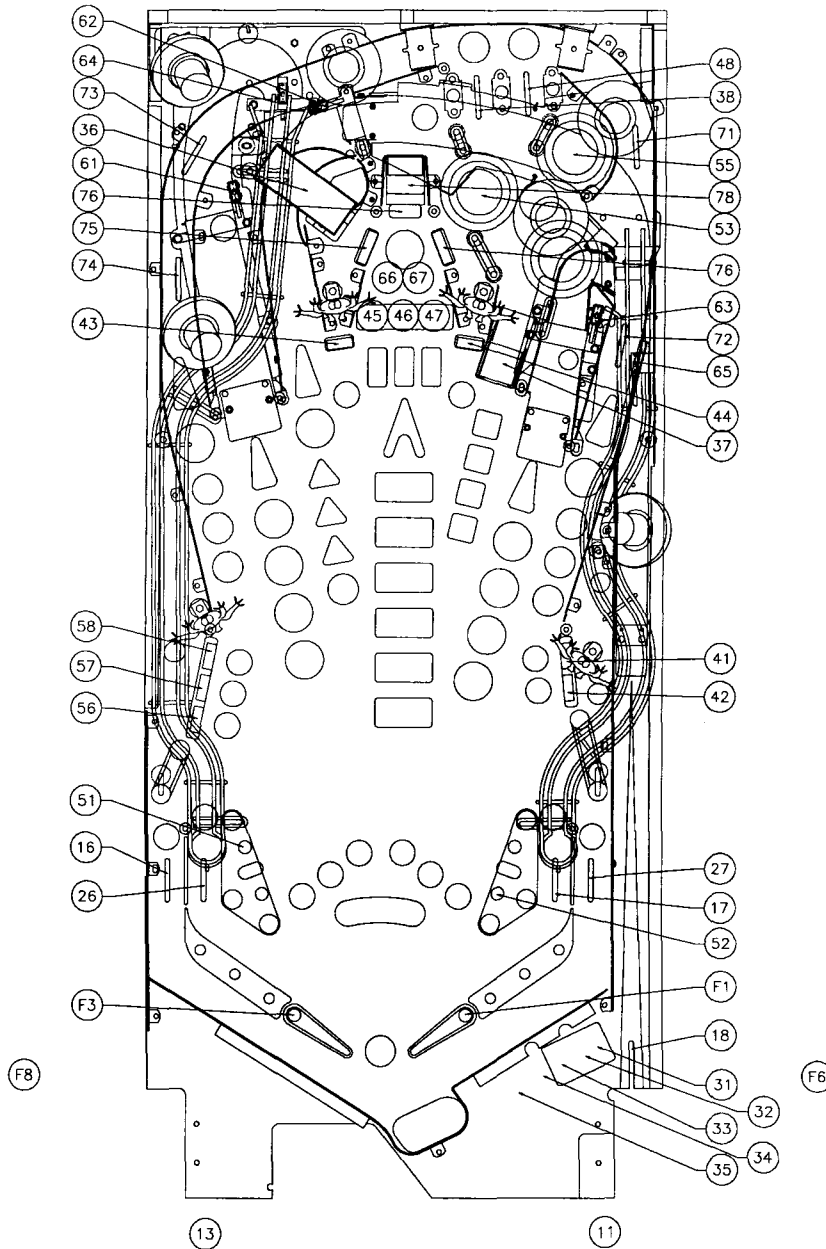
J2XX = CPU Board;  = Opto, Typically Closed

## Switch Locations

| Item No. | Switch Part No. | Description                  | Item No. | Switch Part No. | Description         |
|----------|-----------------|------------------------------|----------|-----------------|---------------------|
| F1       | SW-1A-194       | Lower Right Flipper EOS      | 31       | A-18617-1       | Trough Eject (LED)  |
| F2       | A-17316         | *Lower Right Flipper Cabinet |          | A-18618-1       | (Transistor)        |
| F3       | SW-1A-194       | Lower Left Flipper EOS       | 32       | A-18617-1       | Trough Ball 1 (LED) |
| F4       | A-17316         | *Lower Left Flipper Cabinet  |          | A-18618-1       | (Transistor)        |
| F5       | ---             | Not Used                     | 33       | A-18617-1       | Trough Ball 2 (LED) |
| F6       | ---             | Not Used                     |          | A-18618-1       | (Transistor)        |
| F7       | ---             | Not Used                     | 34       | A-18617-1       | Trough Ball 3 (LED) |
| F8       | ---             | Not Used                     |          | A-18618-1       | (Transistor)        |
| 11       | 20-9663-B-4     | Launch Button                | 35       | A-18617-1       | Trough Ball 4 (LED) |
| 12       | ---             | Not Used                     |          | A-18618-1       | (Transistor)        |
| 13       | 20-9663-2       | Start Button                 | 36       | A-16908         | Left Popper (LED)   |
| 14       | 04-10346        | *Plumb Bob Tilt              |          | A-16909         | (Transistor)        |
| 15       | ---             | Not Used                     | 37       | A-16908         | Right Popper (LED)  |
| 16       | 5647-12693-19   | Left Outlane                 |          | A-16909         | (Transistor)        |
| 17       | 5647-12693-19   | Right Return                 | 38       | 5647-12693-19   | Left Top Lane       |
| 18       | 5647-12693-32   | Shooter Lane                 | 41       | A-18018-21      | MARTIA" N Target    |
| 21       | ---             | *Slam Tilt                   | 42       | A-18018-21      | MARTIA" N Target    |
| 22       | 5643-09288-00   | *Coin Door Closed            | 43       | A-18018-21      | MARTIA" N Target    |
| 23       | ---             | Not Used                     | 44       | A-18018-21      | MARTIA" N Target    |
| 24       | 5643-09112-00   | *Always Closed               | 45       | SW-1A-201-4     | Left Motor Bank     |
| 25       | ---             | Not Used                     | 46       | SW-1A-200-4     | Center Motor Bank   |
| 26       | 5647-12693-19   | Left Return                  | 47       | SW-1A-200-4     | Right Motor Bank    |
| 27       | 5647-12693-19   | Right Outlane                | 48       | 5647-12693-19   | Right Top Lane      |
| 28       | ---             | Not Used                     |          |                 |                     |

\*Not Shown  
† Located Under Playfield

## Switch Locations (Continued)



| Item No. | Switch Part No. | Description              |
|----------|-----------------|--------------------------|
| 51       | SW-1A-114       | Left Slingshot (Kicker)  |
|          | SW-1A-120       | (Score)                  |
| 52       | SW-1A-114       | Right Slingshot (Kicker) |
|          | SW-1A-120       | (Score)                  |
| 53       | SW-11A-37-1     | Left Jet                 |
| 54       | SW-11A-37-1     | Bottom Jet               |
| 55       | SW-11A-37-1     | Right Jet                |
| 56       | A-18018-21      | "M"ARTIAN Target         |
| 57       | A-18018-21      | M"A"RTIAN Target         |
| 58       | A-18018-21      | MA"R"TIAN Target         |
| 61       | 5647-12693-11   | Left Ramp Enter          |
| 62       | 5647-12693-11   | Center Ramp Enter        |
| 63       | 5647-12693-11   | Right Ramp Enter         |

\*Not Shown

| Item No. | Switch Part No. | Description         |
|----------|-----------------|---------------------|
| 64       | 5647-12693-21   | Left Ramp Exit      |
| 65       | 5647-12693-13   | Right Ramp Exit     |
| 66       | 5647-12693-06   | Motor Bank Down     |
| 67       | 5647-12693-06   | Motor Bank Up       |
| 68       | ---             | Not Used            |
| 71       | 5647-12693-19   | Right Loop High     |
| 72       | 5647-12693-19   | Right Loop Low      |
| 73       | 5647-12693-19   | Left Loop High      |
| 74       | 5647-12693-19   | Left Loop Low       |
| 75       | A-20784-4       | Left Saucer Target  |
| 76       | A-20784-4       | Right Saucer Target |
| 77       | 5647-12693-31   | Drop Targets        |
| 78       | 5647-12693-26   | Center Trough       |
| 81-88    | ---             | Not Used            |

## 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       | AUTO PLUNGER        | High Power    | J133-2              |         |         | Q72          | J116-1            |         |         | Vio-Brn          | AE-23-800                           |           |
| 02       | TROUGH EJECT        | High Power    | J133-2              |         |         | Q68          | J116-2            |         |         | Vio-Red          | AE-26-1500                          |           |
| 03       | LEFT POPPER         | High Power    | J133-2              |         |         | Q71          | J116-4            |         |         | Vio-Org          | AE-26-800                           |           |
| 04       | RIGHT POPPER        | High Power    | J133-2              |         |         | Q67          | J116-5            |         |         | Vio-Yel          | AE-25-1000                          |           |
| 05       | LEFT ALIEN LOW      | High Power    | J133-2              |         |         | Q70          | J116-6            |         |         | Vio-Grn          | AE-26-1500                          |           |
| 06       | LEFT ALIEN HIGH     | High Power    | J133-2              |         |         | Q66          | J116-7            |         |         | Vio-Blu          | AE-26-1500                          |           |
| 07       | KNOCKER             | High Power    |                     | J133-2  |         | Q69          |                   | J116-8  |         | Vio-Blk          |                                     | AE-23-800 |
| 08       | RIGHT ALIEN HIGH    | High Power    | J133-2              |         |         | Q65          | J116-9            |         |         | Vio-Gry          | AE-26-1500                          |           |
| 09       | LEFT SLINGSHOT      | Low Power     | J133-3              |         |         | Q44          | J113-1            |         |         | Brn-Blk          | AE-26-1200                          |           |
| 10       | RIGHT SLINGSHOT     | Low Power     | J133-3              |         |         | Q48          | J113-3            |         |         | Brn-Red          | AE-26-1200                          |           |
| 11       | LEFT JET            | Low Power     | J133-3              |         |         | Q43          | J113-4            |         |         | Brn-Org          | AE-26-1200                          |           |
| 12       | BOTTOM JET          | Low Power     | J133-3              |         |         | Q47          | J113-5            |         |         | Brn-Yel          | AE-26-1200                          |           |
| 13       | RIGHT JET           | Low Power     | J133-3              |         |         | Q42          | J113-6            |         |         | Brn-Grn          | AE-26-1200                          |           |
| 14       | RIGHT ALIEN LOW     | Low Power     | J133-3              |         |         | Q46          | J113-7            |         |         | Brn-Blu          | AE-26-1500                          |           |
| 15       | SAUCER SHAKE        | Low Power     | J133-3              |         |         | Q41          | J113-8            |         |         | Brn-Vio          | AE-26-1500                          |           |
| 16       | DROP TARGET         | Low Power     | J133-3              |         |         | Q45          | J113-9            |         |         | Brn-Gry          | AE-26-1200                          |           |
| 17       | RIGHT RAMP HIGH (2) | Flasher       | J133-6              | J134-5  |         | Q28          | J111-1            | J112-1  |         | Blk-Brn          | #906                                | #906      |
| 18       | RIGHT RAMP LOW (2)  | Flasher       | J133-6              | J134-5  |         | Q32          | J111-2            | J112-2  |         | Blk-Red          | #906                                | #906      |
| 19       | RIGHT SIDE HIGH (2) | Flasher       | J133-6              | J134-5  |         | Q27          | J111-3            | J112-3  |         | Blk-Org          | #906                                | #906      |
| 20       | RIGHT SIDE LOW      | Flasher       | J133-6              |         |         | Q31          | J111-4            |         |         | Blk-Yel          | #89                                 |           |
| 21       | CENTER ARROW        | Flasher       | J133-6              |         |         | Q26          | J111-5            |         |         | Blu-Grn          | #906                                |           |
| 22       | JETS                | Flasher       | J133-6              |         |         | Q30          | J111-6            |         |         | Blu-Blk          | #89                                 |           |
| 23       | SAUCER DOME         | Flasher       | J133-6              |         |         | Q25          | J111-7            |         |         | Blu-Vio          | #906                                |           |
| 24       | MOTOR BANK          | Flasher       | J140-2              |         |         | Q29          | J111-8            |         |         | Blu-Gry          | 14-8023                             |           |
| 25       | LEFT RAMP LEFT (2)  | Gen. Purpose  | J133-6              | J134-5  |         | Q16          | J109-1            | J107-1  |         | Blu-Brn          | #906                                | #906      |
| 26       | LEFT RAMP RIGHT (2) | Gen. Purpose  | J133-6              | J134-5  |         | Q15          | J109-2            | J107-3  |         | Blu-Red          | #906                                | #906      |
| 27       | LEFT SIDE HIGH (2)  | Gen. Purpose  | J133-6              | J134-5  |         | Q14          | J109-3            | J107-4  |         | Blu-Org          | #906                                | #906      |
| 28       | LEFT SIDE LOW       | Gen. Purpose  | J133-6              |         |         | Q13          | J109-4            |         |         | Blu-Yel          | #89                                 |           |
| 33       | RIGHT GATE          | High Power    | J119-6,7            |         |         | Q84          | J120-6            |         |         | Yel-Vio          | A-14406                             |           |
| 34       | LEFT GATE           | Low Power     | J119-6,7            |         |         | Q86          | J120-4            |         |         | Org-Vio          | A-14406                             |           |
| 35       | DIVERTER POWER      | High Power    | J119-8,9            |         |         | Q81          | J120-3            |         |         | Yel-Gry          | A-20099                             |           |
| 36       | DIVERTER HOLD       | Low Power     | J119-8,9            |         |         | Q83          | J120-1            |         |         | Org-Gry          | A-20099                             |           |
| 37       | L.E.D. CLOCK        | Flasher       | J140-2              |         |         |              | J110-1            |         |         | Brn-Wht          | A-20670                             |           |
| 38       | L.E.D. DATA         | Flasher       | J140-2              |         |         |              | J110-3            |         |         | Vio-Wht          | A-20670                             |           |
| 39       | STROBE LIGHT        | Flasher       | J140-2              |         |         |              | J110-4            |         |         | Org-Wht          | A-20718                             |           |

### General Illumination

|    |                  |      |        |        |  |    |        |         |  |         |           |      |
|----|------------------|------|--------|--------|--|----|--------|---------|--|---------|-----------|------|
| 01 | BOTTOM PLAYFIELD | G.I. | J105-1 | J106-1 |  | Q5 | J105-7 | J106-7  |  | Wht-Brn | #44       | #555 |
| 02 | MIDDLE PLAYFIELD | G.I. | J105-2 |        |  | Q4 | J105-8 |         |  | Wht-Org | #44, #555 |      |
| 03 | TOP PLAYFIELD    | G.I. | J105-3 |        |  | Q3 | J105-9 |         |  | Wht-Yel | #44, #555 |      |
| 04 | **TOP INSERT     | G.I. |        | J106-5 |  | Q2 |        | J106-10 |  | Wht-Grn |           | #555 |
| 05 | **BOTTOM INSERT  | G.I. |        | J106-6 |  | Q1 |        | J106-11 |  | Wht-Vio |           | #555 |

### Flipper Circuits

|    | Voltage Connections | Drive Transistors | Drive Connectors | Drive Wire Colors | Coil Part No. | Coil Color |           |            |
|----|---------------------|-------------------|------------------|-------------------|---------------|------------|-----------|------------|
|    |                     |                   |                  |                   |               |            | Playfield | Power Hold |
| 29 | Lwr. Rt. Power      | J119-1 (Red-Grn)  | Q90              | J120-13           | Yel-Grn       |            |           |            |
| 30 | Lower Right Flipper | Lwr. Rt. Hold     | J119-1 (Red-Grn) | Q92               | J120-11       | Org-Grn    | FL-11629  | BLUE       |
| 31 |                     | Lwr. Lt. Power    | J119-4 (Red-Blu) | Q87               | J120-9        | Yel-Blu    |           |            |
| 32 | Lower Left Flipper  | Lwr. Lt. Hold     | J119-4 (Red-Blu) | Q89               | J120-7        | Org-Blu    | FL-11629  | BLUE       |
| 33 |                     | Upr. Rt. Power    | J119-6 (Red-Vio) | Q84               | J120-6        | Yel-Vio    | SEE       | ABOVE      |
| 34 | Upper Right Flipper | Upr. Rt. Hold     | J119-6 (Red-Vio) | Q86               | J120-4        | Org-Vio    | SEE       | ABOVE      |
| 35 |                     | Upr. Lt. Power    | J119-8 (Red-Gry) | Q81               | J120-3        | Yel-Gry    | SEE       | ABOVE      |
| 36 | Upper Left Flipper  | Upr. Lt. Hold     | J119-8 (Red-Gry) | Q83               | J120-1        | Org-Gry    | SEE       | ABOVE      |

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

\*\*These G.I. strings do not brighten and dim, they are always ON.

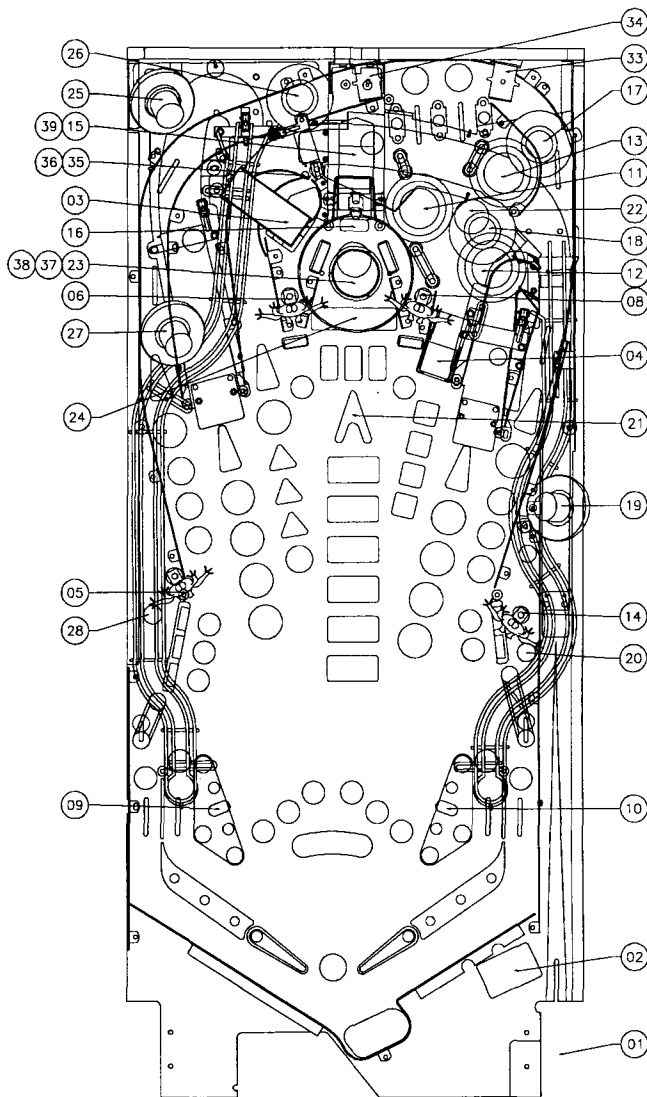
## Solenoid/Flasher Locations

| Item No. | Coil/ Flasher No. | Assy. Number | Description      | Item No. | Coil/ Flasher No. | Assy. Number | Description     |
|----------|-------------------|--------------|------------------|----------|-------------------|--------------|-----------------|
| 01       | AE-23-800         | A-14525      | Auto Plunger     | 09       | AE-26-1200        | B-9362-L-2   | Left Slingshot  |
| 02       | AE-26-1500        | A-19963-1    | Trough Eject     | 10       | AE-26-1200        | B-9362-R-3   | Right Slingshot |
| 03       | AE-26-800         | A-20633      | Left Popper      | 11       | AE-26-1200        | A-9415-2     | Left Jet        |
| 04       | AE-25-1000        | A-20573      | Right Popper     | 12       | AE-26-1200        | A-9415-2     | Bottom Jet      |
| 05       | AE-26-1500        | A-20579-1    | Left Alien Low   | 13       | AE-26-1200        | A-9415-2     | Right Jet       |
| 06       | AE-26-1500        | A-20579-2    | Left Alien High  | 14       | AE-26-1500        | A-20579-1    | Right Alien Low |
| 07       | AE-23-800         | B-10686-1    | Knocker          | 15       | AE-26-1500        | A-20608      | Saucer Shake    |
| 08       | AE-26-1500        | A-20579-1    | Right Alien High | 16       | AE-26-1200        | A-20657      | Drop target     |

\*NOT SHOWN



## Solenoid/Flasher Locations (Continued)



| Item No. | Coil/Flasher No. | Assy. Number. | Description         |
|----------|------------------|---------------|---------------------|
| 17       | 24-8802          | A-20621       | Right Ramp High (2) |
| 18       | 24-8802          | A-20621       | Right Ramp Low (2)  |
| 19       | 24-8802          | A-20549       | Right Side High (2) |
| 20       | 24-8704          | A-17983       | Right Side Low      |
| 21       | 24-8802          | A-20624       | Center Arrow        |
| 22       | 24-8704          | A-17803       | Jets                |
| 23       | 24-8802          | A-20670       | Saucer Dome         |
| 24       | 14-8023          | A-20572       | Motor Bank          |
| 25       | 24-8802          | A-20553       | Left Ramp Left      |
| 26       | 24-8802          | A-20553       | Left Ramp Right     |
| 27       | 24-8802          | A-20546       | Left Side High      |
| 28       | 24-8704          | A-17983       | Left Side Low       |
| 33       | A-14406          | A-17796       | Right Gate          |
| 34       | A-14406          | A-17796       | Left Gate           |
| 35       | A-20099          | A-17241       | Diverter Power      |
| 36       | A-20099          | A-17241       | Diverter Hold       |
| 37       | ---              | A-20670       | L.E.D. Clock        |
| 38       | ---              | A-20670       | L.E.D. Data         |
| 39       | ---              | A-20718       | Strobe Light        |

### General Illumination Circuits

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

### Flipper Coils

| Item No. | Coil No. | Color | Assy. No.   | Description   |
|----------|----------|-------|-------------|---------------|
| 29 & 30  | FL-11629 | Blue  | A-15849-R-2 | Lwr R Flipper |
| 31 & 32  | FL-11629 | Blue  | A-15849-L-2 | Lwr L Flipper |

# Notes

# SECTION THREE

## GAME WIRING AND SCHEMATICS

### CONNECTOR & COMPONENT IDENTIFICATION

Each plug or jack receives a number that identifies the circuit board and the position on that board that it connects to. J-designations refer to a male connector. P-designations refer to a female 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 is a fuse on the Audio Video board.

Prefix numbers for WPC circuit boards are listed below.

J1XX - Power Driver board jacks; F1XX - Power Driver board fuses.

J2XX - CPU Board (There are no fuses on the CPU board.)

J5XX and J6XX - Audio Video board (AV board) jacks; F5XX and F6XX - Audio Video board fuses.

**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

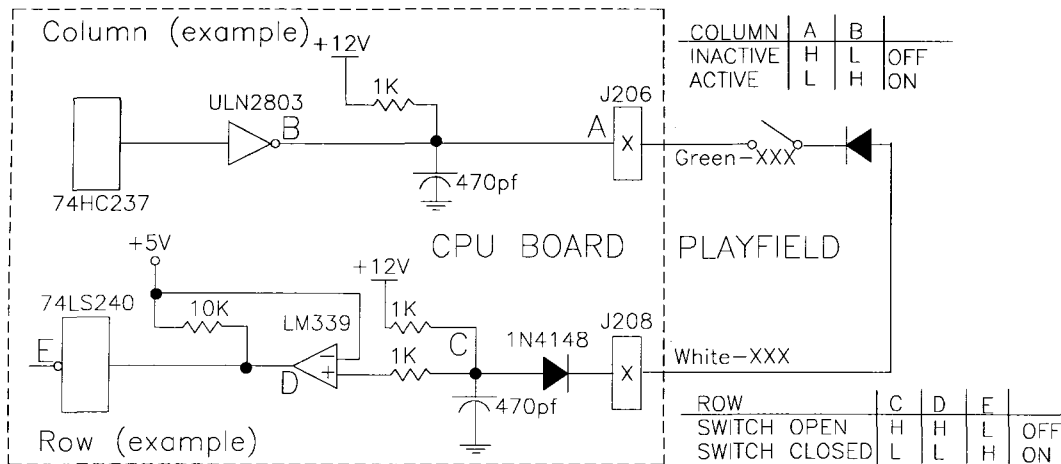
White Green

| Dedicated Grounded Switches  | Column | 1 Green-Brown<br>J206-1<br>U20-18 | 2 Green-Red<br>J206-2<br>U20-17 | 3 Green-Orange<br>J206-3<br>U20-16 | 4 Green-Yellow<br>J206-4<br>U20-15 | 5 Green-Black<br>J206-5<br>U20-14 | 6 Green-Blue<br>J206-6<br>U20-13 | 7 Green-Violet<br>J206-7<br>U20-12 | 8 Green-Gray<br>J206-9<br>U20-11 | Flipper Grounded Switches   |
|--|--------|-----------------------------------|---------------------------------|------------------------------------|------------------------------------|-----------------------------------|----------------------------------|------------------------------------|----------------------------------|---|
|  | Row    | 1 White-Brown<br>J208-1<br>U18-11 | 2 White-Red<br>J208-2<br>U18-9  | 3 White-Orange<br>J208-3<br>U18-5  | 4 White-Yellow<br>J208-4<br>U18-7  | 5 White-Green<br>J208-5<br>U19-11 | 6 White-Blue<br>J208-7<br>U19-9  | 7 White-Violet<br>J208-8<br>U19-5  | 8 White-Gray<br>J208-9<br>U19-7  |   |
| Orange-Brown<br>J205-1 U17-5<br>Left Coin Chute D1                                 | 1      | LAUNCH BUTTON<br>11               | SLAM TILT<br>21                 | TROUGH EJECT<br>31                 | MARTIAN TARGET<br>41               | LEFT SLINGSHOT<br>51              | LEFT RAMP ENTER<br>61            | RIGHT LOOP HIGH<br>71              | NOT USED<br>81                   | Black-Green<br>J208-13<br>Lower Right Flipper EOS F1                |
| Orange-Red<br>J205-2 U17-7<br>Center Coin Chute D2                                 | 2      | NOT USED<br>12                    | COIN DOOR CLOSED<br>22          | TROUGH BALL 1<br>32                | MARTIAN TARGET<br>42               | RIGHT SLINGSHOT<br>52             | CENTER RAMP ENTER<br>62          | RIGHT LOOP LOW<br>72               | NOT USED<br>82                   | Blue-Violet<br>J212-12<br>Lower Right Flipper Opto F2               |
| Orange-Black<br>J205-3 U17-11<br>Right Coin Chute D3                               | 3      | START BUTTON<br>13                | NOT USED<br>23                  | TROUGH BALL 2<br>33                | MARTIAN TARGET<br>43               | LEFT JET<br>53                    | RIGHT RAMP ENTER<br>63           | LEFT LOOP HIGH<br>73               | NOT USED<br>83                   | Black-Blue<br>J208-12<br>Lower Left Flipper EOS F3                  |
| Orange-Yellow<br>J205-4 U17-9<br>4th Coin Chute D4                                 | 4      | PLUMB BOB TILT<br>14              | ALWAYS CLOSED<br>24             | TROUGH BALL 3<br>34                | MARTIAN TARGET<br>44               | BOTTOM JET<br>54                  | LEFT RAMP EXIT<br>64             | LEFT LOOP LOW<br>74                | NOT USED<br>84                   | Blue-Gray<br>J212-11<br>Lower Left Flipper Opto F4                  |
| Orange-Green<br>J205-6 U16-9<br>Normal Function Ser Credits   Test Function Esc D5 | 5      | NOT USED<br>15                    | NOT USED<br>25                  | TROUGH BALL 4<br>35                | LEFT MOTOR BANK<br>45              | RIGHT JET<br>55                   | RIGHT RAMP EXIT<br>65            | LEFT SAUCER TARGET<br>75           | NOT USED<br>85                   | Black-Violet<br>J208-11<br>Upper Right Flipper EOS F5<br>(NOT USED) |
| Orange-Blue<br>J205-7 U16-11<br>Normal Function Vol Down   Test Function Down D6   | 6      | LEFT OUTLANE<br>16                | LEFT RETURN<br>26               | LEFT POPPER<br>36                  | CENTER MOTOR BANK<br>46            | MARTIAN TARGET<br>56              | MOTOR BANK DOWN<br>66            | RIGHT SAUCER TARGET<br>76          | NOT USED<br>86                   | Black-Yellow<br>J212-10<br>Upper Right Flipper Opto F6              |
| Orange-Violet<br>J205-8 U16-7<br>Normal Function Vol Up   Test Function Up D7      | 7      | RIGHT RETURN<br>17                | RIGHT OUTLANE<br>27             | RIGHT POPPER<br>37                 | RIGHT MOTOR BANK<br>47             | MARTIAN TARGET<br>57              | MOTOR BANK UP<br>67              | DROP TARGET<br>77                  | NOT USED<br>87                   | Black-Gray<br>J208-10<br>Upper Left Flipper EOS F7<br>(NOT USED)    |
| Orange-Gray<br>J205-9 U16-5<br>Normal Function Begin Test   Test Function Enter D8 | 8      | SHOOTER LANE<br>18                | NOT USED<br>28                  | LEFT TOP LANE<br>38                | RIGHT TOP LANE<br>48               | MARTIAN TARGET<br>58              | NOT USED<br>68                   | CENTER TROUGH<br>78                | NOT USED<br>88                   | Black-Blue<br>J212-9<br>Upper Left Flipper Opto F8                  |

J2XX = CPU Board;

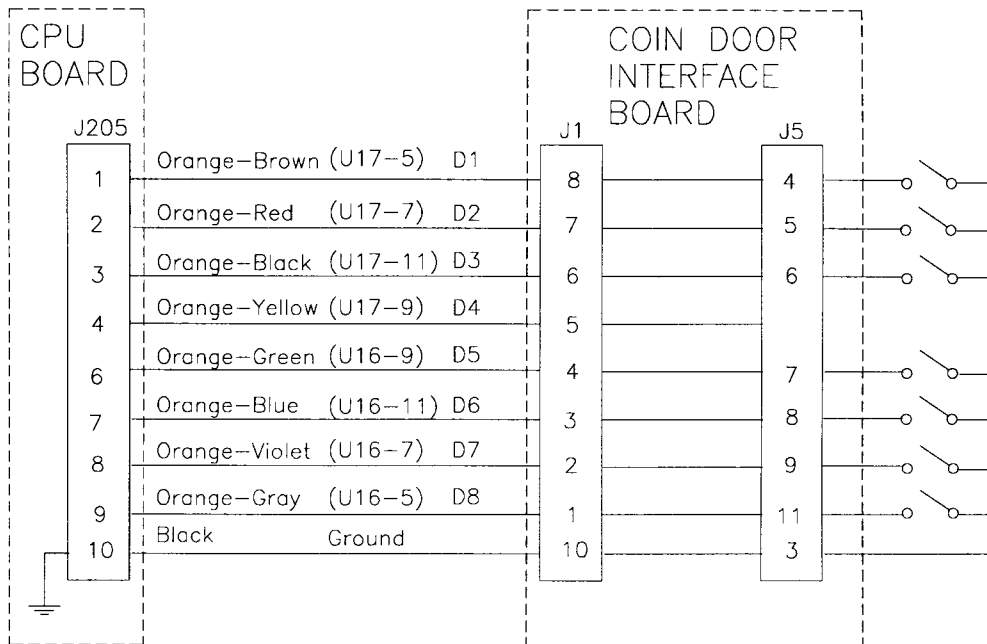
= Opto, Typically Closed

## 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, therefore, its output is 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



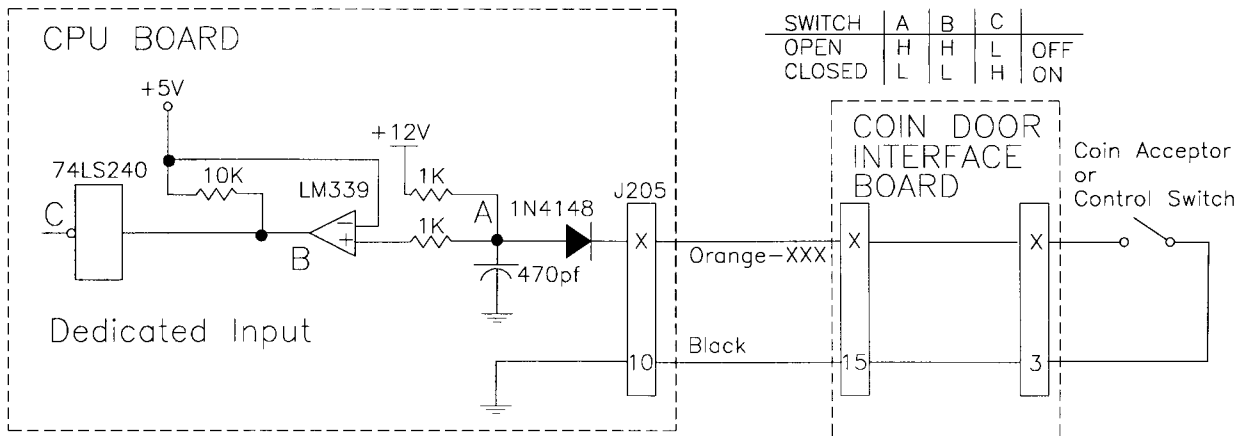
### Coin Acceptor Switches

- D1 - Left Coin Chute
- D2 - Center Coin Chute
- D3 - Right Coin Chute
- D4 - Fourth Coin Chute

### Control Switches

- D5 - Normal Function, Service Credits; Test Function, Escape
- D6 - Normal Function, Volume Down; Test Function, Down
- D7 - Normal Function, Volume Up; Test Function, Up
- D8 - Normal Function, Begin Test; Test Function, Enter

## DEDICATED SWITCH CIRCUIT



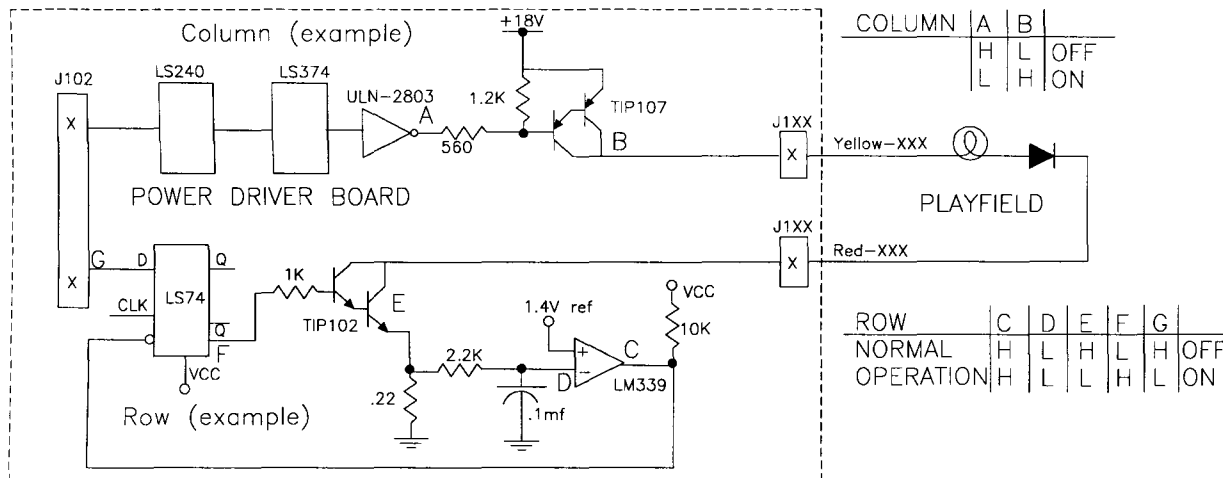
The dedicated switches operate similar in the matrix, except that instead of a column circuit there is a direct tie to ground. Therefore, the column side is constantly active (low). When a switch closes, the row side (dedicated input) of the circuit activates. The "+" input to the LM339 drops below +5V, therefore the output is 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 above +5V, its output is high and the row is inactive.

# LAMP MATRIX

| Column                         | 1<br>Yellow-Brown<br>J121-1<br>Q96 | 2<br>Yellow-Red<br>J121-2<br>Q100 | 3<br>Yellow-Orange<br>J121-3<br>Q95 | 4<br>Yellow-Black<br>J121-4<br>Q99 | 5<br>Yellow-Green<br>J121-5<br>Q94 | 6<br>Yellow-Blue<br>J121-6<br>Q98 | 7<br>Yellow-Violet<br>J121-7<br>Q93 | 8<br>Yellow-Gray<br>J121-9<br>Q97 |
|--------------------------------|------------------------------------|-----------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1<br>Red-Brown<br>J125-1 Q104  | SUPER JETS<br>11                   | BIG-O-BEAM 1<br>21                | TRACTOR BEAM 1<br>31                | RIGHT LOOP ARROW<br>41             | ATTACK MARS<br>51                  | MARTIA"N" TARGET<br>61            | CAPTURE 1<br>71                     | SHOOT AGAIN<br>81                 |
| 2<br>Red-Black<br>J125-2 Q108  | SUPER JACKPOT<br>12                | BIG-O-BEAM 2<br>22                | TRACTOR BEAM 2<br>32                | CENTER RAMP ARROW<br>42            | D.C. U.S.A.<br>52                  | MARTI"A"N TARGET<br>62            | CAPTURE 2<br>72                     | LEFT OUTLANE<br>82                |
| 3<br>Red-Orange<br>J125-4 Q103 | MARTIAN ATTACK MULTIBALL<br>13     | BIG-O-BEAM 3<br>23                | TRACTOR BEAM 3<br>33                | LEFT TOP LANE<br>43                | LONDON ENGLAND<br>53               | ATOMIC BLASTER 1<br>63            | CAPTURE 3<br>73                     | LEFT RETURN<br>83                 |
| 4<br>Red-Yellow<br>J125-5 Q107 | ANNIHILATION<br>14                 | LEFT RAMP JACKPOT<br>24           | RIGHT RAMP JACKPOT<br>34            | RIGHT TOP LANE<br>44               | LIGHT LOCK<br>54                   | ATOMIC BLASTER 2<br>64            | LEFT LOOP JACKPOT<br>74             | RIGHT RETURN<br>84                |
| 5<br>Red-Green<br>J125-6 Q102  | RETURN TO BATTLE<br>15             | LEFT RAMP ARROW<br>25             | RIGHT RAMP ARROW<br>35              | LEFT MOTOR BANK<br>45              | LOCK 1<br>55                       | ATOMIC BLASTER 3<br>65            | LEFT LOOP ARROW<br>75               | RIGHT OUTLANE<br>85               |
| 6<br>Red-Blue<br>J125-7 Q106   | CONQUER MARS<br>16                 | LOCK 2<br>26                      | MARTIAN ATTACK<br>36                | CENTER MOTOR BANK<br>46            | PISA ITALY<br>56                   | RIGHT LOOP JACKPOT<br>66          | "M"ARTIAN TARGET<br>76              | LAUNCH BUTTON<br>86               |
| 7<br>Red-Violet<br>J125-8 Q101 | 5-WAY COMBO<br>17                  | LOCK 3<br>27                      | RULE UNIVERSE<br>37                 | RIGHT MOTOR BANK<br>47             | BERLIN GERMANY<br>57               | EXTRA BALL<br>67                  | M"A"RTIAN TARGET<br>77              | NOT USED<br>87                    |
| 8<br>Red-Gray<br>J125-9 Q105   | DROP TARGET<br>18                  | CENTER RAMP JACKPOT<br>28         | STROKE OF LUCK<br>38                | MAR"TI"AN TARGET<br>48             | PARIS FRANCE<br>58                 | MART"PI"AN TARGET<br>68           | MA"RT"IAN TARGET<br>78              | START BUTTON<br>88                |

J1XX = Power Driver Board

## LAMP MATRIX CIRCUIT



The microprocessor sends a signal to the column circuit causing the output of the UNL-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 microprocessor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of the TIP102 causes the transistor to conduct, bringing the row circuit to ground and turning the lamp on. The microprocessor changes the input of the 74LS74 to a high state to turn the lamp off. In over-current conditions, the lamp 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 circuit off.

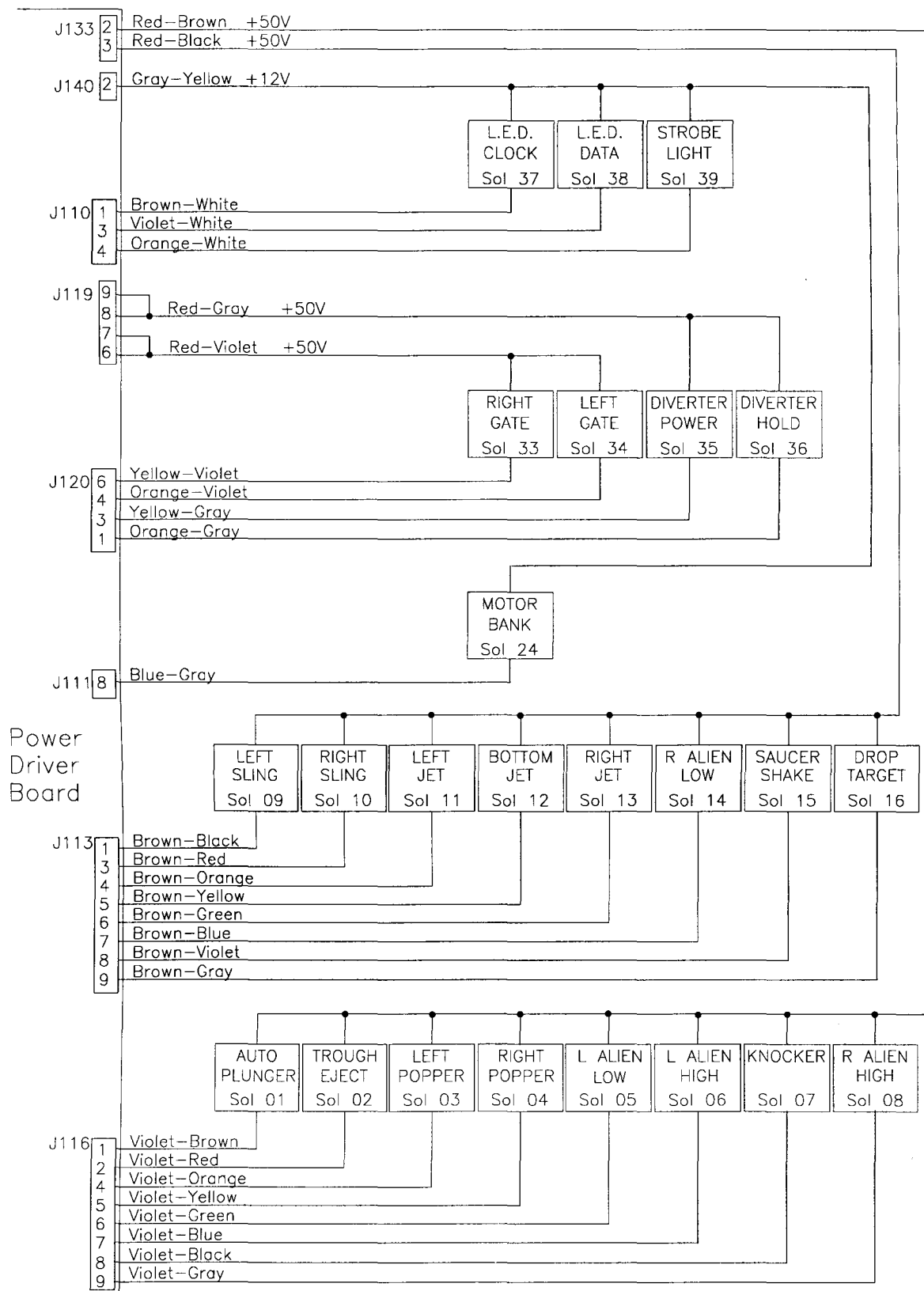
## SOLENOID/FLASHER TABLE

| 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                          | AUTO PLUNGER        | High Power          | J133-2              |            |                  | Q72               | J116-1            |               |            | Vio-Brn          | AE-23-800                           |           |
| 02                          | TROUGH EJECT        | High Power          | J133-2              |            |                  | Q68               | J116-2            |               |            | Vio-Red          | AE-26-1500                          |           |
| 03                          | LEFT POPPER         | High Power          | J133-2              |            |                  | Q71               | J116-4            |               |            | Vio-Org          | AE-26-800                           |           |
| 04                          | RIGHT POPPER        | High Power          | J133-2              |            |                  | Q67               | J116-5            |               |            | Vio-Yel          | AE-25-1000                          |           |
| 05                          | LEFT ALIEN LOW      | High Power          | J133-2              |            |                  | Q70               | J116-6            |               |            | Vio-Grn          | AE-26-1500                          |           |
| 06                          | LEFT ALIEN HIGH     | High Power          | J133-2              |            |                  | Q66               | J116-7            |               |            | Vio-Blu          | AE-26-1500                          |           |
| 07                          | KNOCKER             | High Power          |                     | J133-2     |                  | Q69               |                   | J116-8        |            | Vio-Blk          |                                     | AE-23-800 |
| 08                          | RIGHT ALIEN HIGH    | High Power          | J133-2              |            |                  | Q65               | J116-9            |               |            | Vio-Gry          | AE-26-1500                          |           |
| 09                          | LEFT SLINGSHOT      | Low Power           | J133-3              |            |                  | Q44               | J113-1            |               |            | Brn-Blk          | AE-26-1200                          |           |
| 10                          | RIGHT SLINGSHOT     | Low Power           | J133-3              |            |                  | Q48               | J113-3            |               |            | Brn-Red          | AE-26-1200                          |           |
| 11                          | LEFT JET            | Low Power           | J133-3              |            |                  | Q43               | J113-4            |               |            | Brn-Org          | AE-26-1200                          |           |
| 12                          | BOTTOM JET          | Low Power           | J133-3              |            |                  | Q47               | J113-5            |               |            | Brn-Yel          | AE-26-1200                          |           |
| 13                          | RIGHT JET           | Low Power           | J133-3              |            |                  | Q42               | J113-6            |               |            | Brn-Grn          | AE-26-1200                          |           |
| 14                          | RIGHT ALIEN LOW     | Low Power           | J133-3              |            |                  | Q46               | J113-7            |               |            | Brn-Blu          | AE-26-1500                          |           |
| 15                          | SAUCER SHAKE        | Low Power           | J133-3              |            |                  | Q41               | J113-8            |               |            | Brn-Vio          | AE-26-1500                          |           |
| 16                          | DROP TARGET         | Low Power           | J133-3              |            |                  | Q45               | J113-9            |               |            | Brn-Gry          | AE-26-1200                          |           |
| 17                          | RIGHT RAMP HIGH (2) | Flasher             | J133-6              | J134-5     |                  | Q28               | J111-1            | J112-1        |            | Blk-Brn          | #906                                | #906      |
| 18                          | RIGHT RAMP LOW (2)  | Flasher             | J133-6              | J134-5     |                  | Q32               | J111-2            | J112-2        |            | Blk-Red          | #906                                | #906      |
| 19                          | RIGHT SIDE HIGH (2) | Flasher             | J133-6              | J134-5     |                  | Q27               | J111-3            | J112-3        |            | Blk-Org          | #906                                | #906      |
| 20                          | RIGHT SIDE LOW      | Flasher             | J133-6              |            |                  | Q31               | J111-4            |               |            | Blk-Yel          | #89                                 |           |
| 21                          | CENTER ARROW        | Flasher             | J133-6              |            |                  | Q26               | J111-5            |               |            | Blu-Grn          | #906                                |           |
| 22                          | JETS                | Flasher             | J133-6              |            |                  | Q30               | J111-6            |               |            | Blu-Blk          | #89                                 |           |
| 23                          | SAUCER DOME         | Flasher             | J133-6              |            |                  | Q25               | J111-7            |               |            | Blu-Vio          | #906                                |           |
| 24                          | MOTOR BANK          | Flasher             | J140-2              |            |                  | Q29               | J111-8            |               |            | Blu-Gry          | 14-8023                             |           |
| 25                          | LEFT RAMP LEFT (2)  | Gen. Purpose        | J133-6              | J134-5     |                  | Q16               | J109-1            | J107-1        |            | Blu-Brn          | #906                                | #906      |
| 26                          | LEFT RAMP RIGHT (2) | Gen. Purpose        | J133-6              | J134-5     |                  | Q15               | J109-2            | J107-3        |            | Blu-Red          | #906                                | #906      |
| 27                          | LEFT SIDE HIGH (2)  | Gen. Purpose        | J133-6              | J134-5     |                  | Q14               | J109-3            | J107-4        |            | Blu-Org          | #906                                | #906      |
| 28                          | LEFT SIDE LOW       | Gen. Purpose        | J133-6              |            |                  | Q13               | J109-4            |               |            | Blu-Yel          | #89                                 |           |
| 33                          | RIGHT GATE          | High Power          | J119-6,7            |            |                  | Q84               | J120-6            |               |            | Yel-Vio          | A-14406                             |           |
| 34                          | LEFT GATE           | Low Power           | J119-6,7            |            |                  | Q86               | J120-4            |               |            | Org-Vio          | A-14406                             |           |
| 35                          | DIVERTER POWER      | High Power          | J119-8,9            |            |                  | Q81               | J120-3            |               |            | Yel-Gry          | A-20099                             |           |
| 36                          | DIVERTER HOLD       | Low Power           | J119-8,9            |            |                  | Q83               | J120-1            |               |            | Org-Gry          | A-20099                             |           |
| 37                          | L.E.D. CLOCK        | Flasher             | J140-2              |            |                  |                   | J110-1            |               |            | Brn-Wht          | A-20670                             |           |
| 38                          | L.E.D. DATA         | Flasher             | J140-2              |            |                  |                   | J110-3            |               |            | Vio-Wht          | A-20670                             |           |
| 39                          | STROBE LIGHT        | Flasher             | J140-2              |            |                  |                   | J110-4            |               |            | Org-Wht          | A-20718                             |           |
| <b>General Illumination</b> |                     |                     |                     |            |                  |                   |                   |               |            |                  |                                     |           |
| 01                          | BOTTOM PLAYFIELD    | G.I.                | J106-1              | J106-1     |                  | Q5                | J106-7            | J106-7        |            | Wht-Brn          | #44                                 | #555      |
| 02                          | MIDDLE PLAYFIELD    | G.I.                | J106-2              |            |                  | Q4                | J106-8            |               |            | Wht-Org          | #44, #555                           |           |
| 03                          | TOP PLAYFIELD       | G.I.                | J106-3              |            |                  | Q3                | J106-9            |               |            | Wht-Yel          | #44, #555                           |           |
| 04                          | **TOP INSERT        | G.I.                |                     | J106-5     |                  | Q2                |                   | J106-10       |            | Wht-Grn          |                                     | #555      |
| 05                          | **BOTTOM INSERT     | G.I.                |                     | J106-6     |                  | Q1                |                   | J106-11       |            | Wht-Vio          |                                     | #555      |
| <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                          |                     | Lwr. Rt. Power      | J119-1 (Red-Grn)    | Q90        |                  | J120-13           | Yel-Grn           |               |            |                  |                                     |           |
| 30                          | Lower Right Flipper | Lwr. Rt. Hold       | J119-1 (Red-Grn)    | Q92        |                  | J120-11           | Org-Grn           | FL-11629      | BLUE       |                  |                                     |           |
| 31                          |                     | Lwr. Lt. Power      | J119-4 (Red-Blu)    | Q87        |                  | J120-9            | Yel-Blu           |               |            |                  |                                     |           |
| 32                          | Lower Left Flipper  | Lwr. Lt. Hold       | J119-4 (Red-Blu)    | Q89        |                  | J120-7            | Org-Blu           | FL-11629      | BLUE       |                  |                                     |           |
| 33                          |                     | Upr. Rt. Power      | J119-6 (Red-Vio)    | Q84        |                  | J120-6            | Yel-Vio           | SEE           | ABOVE      |                  |                                     |           |
| 34                          | Upper Right Flipper | Upr. Rt. Hold       | J119-6 (Red-Vio)    | Q86        |                  | J120-4            | Org-Vio           | SEE           | ABOVE      |                  |                                     |           |
| 35                          |                     | Upr. Lt. Power      | J119-8 (Red-Gry)    | Q81        |                  | J120-3            | Yel-Gry           | SEE           | ABOVE      |                  |                                     |           |
| 36                          | Upper Left Flipper  | Upr. Lt. Hold       | J119-8 (Red-Gry)    | Q83        |                  | J120-1            | Org-Gry           | SEE           | ABOVE      |                  |                                     |           |

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

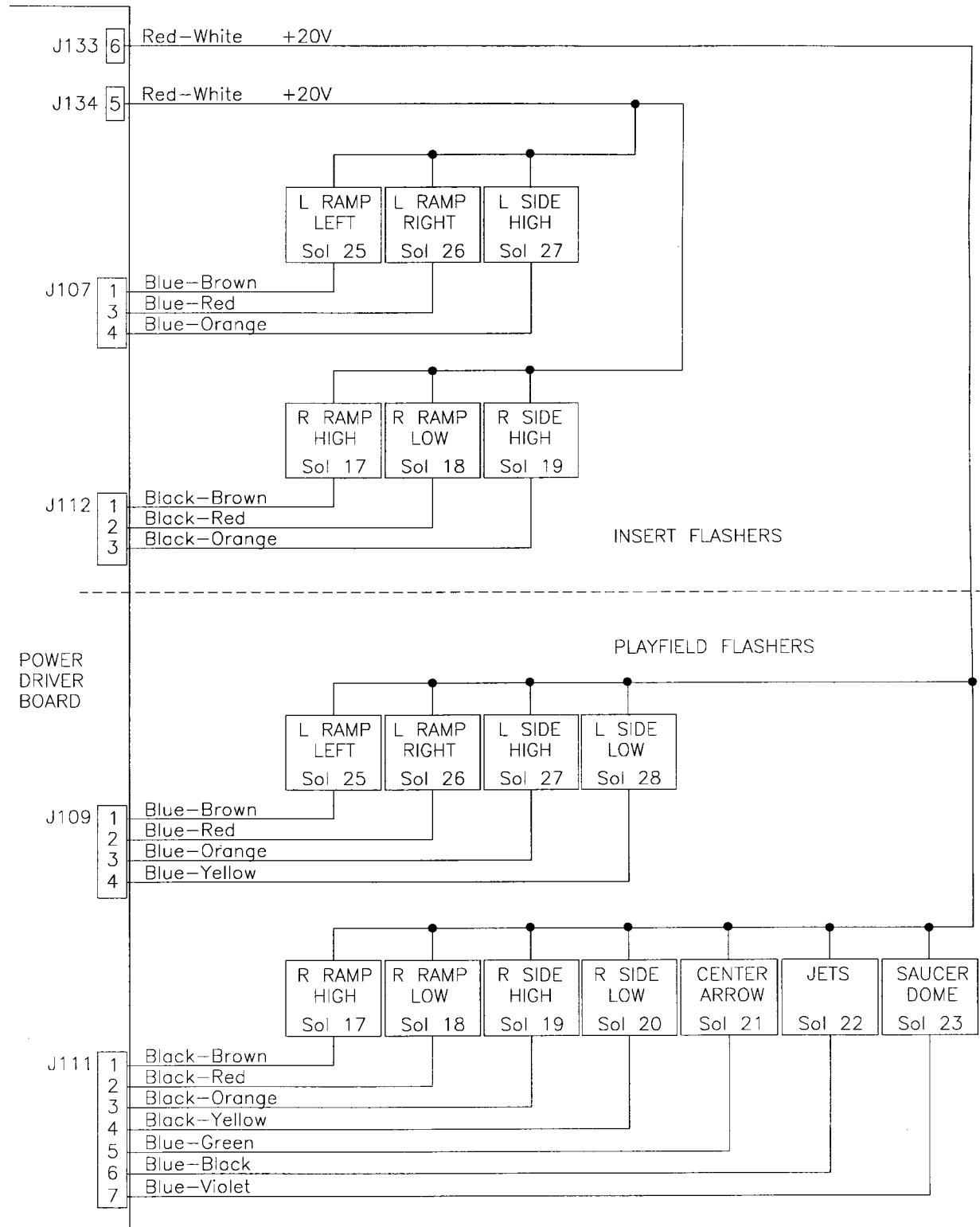
\*\*These G.I. strings do not brighten and dim, they are always ON.

# SOLENOID WIRING

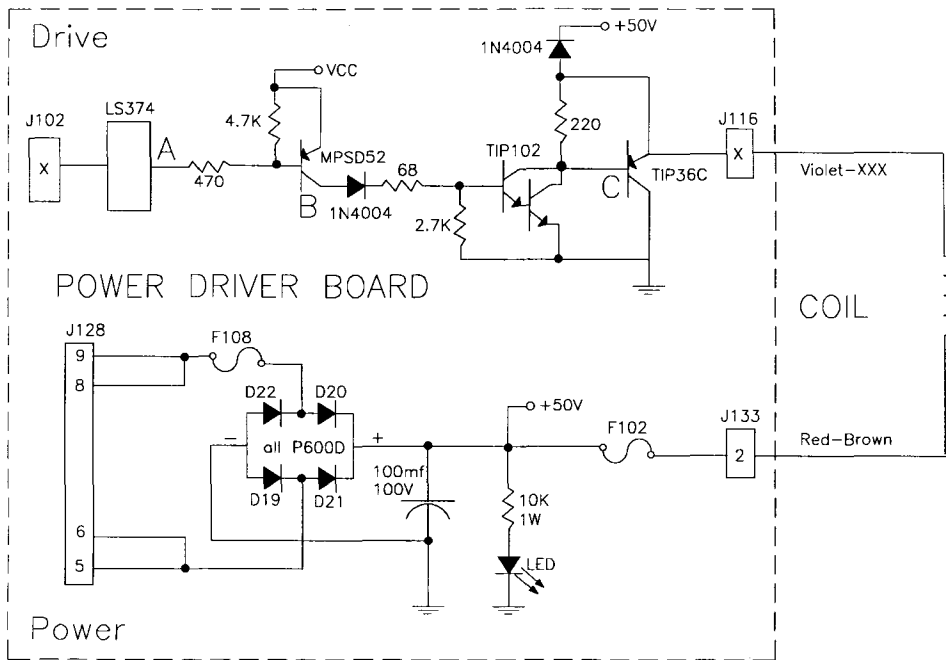




# FLASHER WIRING

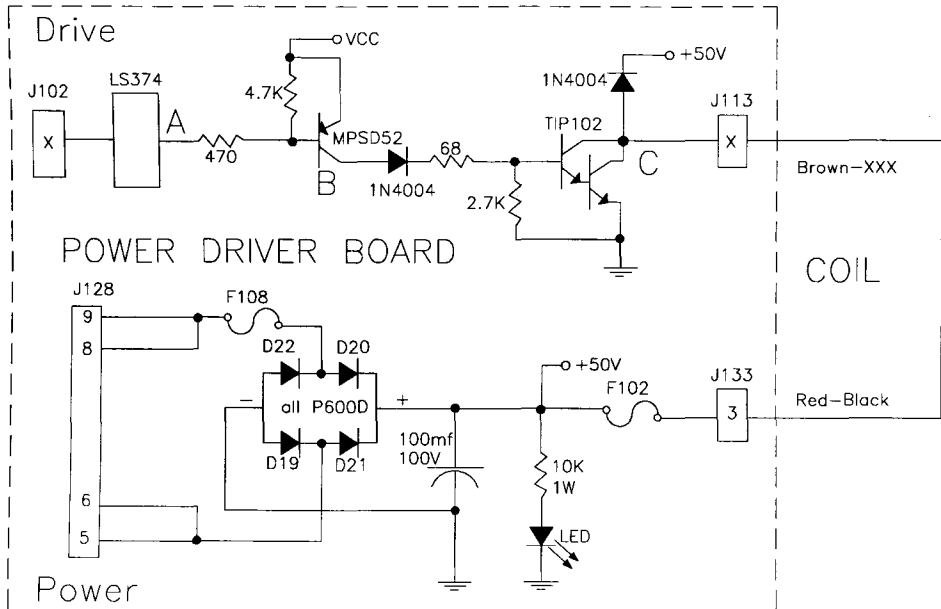


## HIGH POWER SOLENOID CIRCUIT



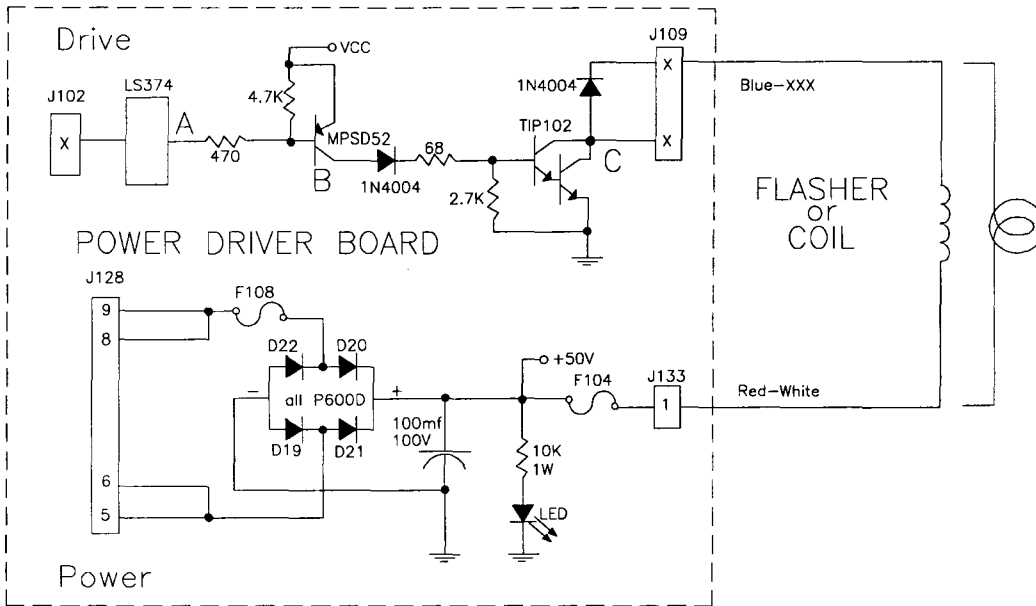
The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B", the collector of the 2N5401 transistor, is high. A high at point "B" causes point "C", the collector of the TIP102 transistor and point "D", the emitter of the TIP36C transistor, to drop low. When point "D" is low, the coil is grounded through the transistor and 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 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 turns on. The coil shuts off when point "A" toggles high.

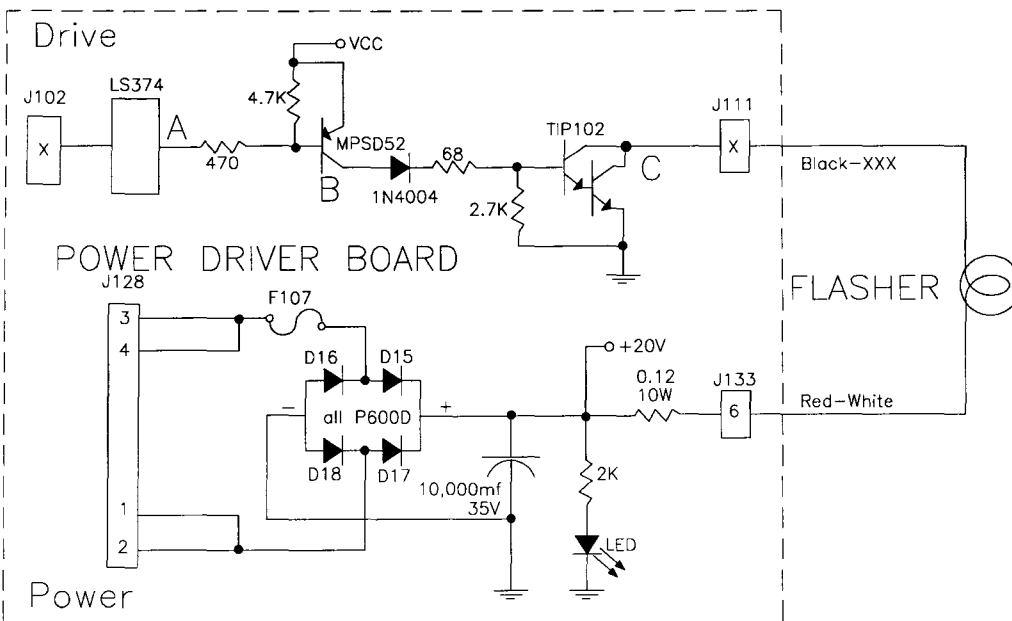
## SPECIAL (GENERAL PURPOSE) SOLENOID CIRCUIT



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. A high at point "B" causes a low at point "C". When point "C" is low, the coil/flashlamp is grounded through the transistor and turns on. When point "A" toggles high the coil/flashlamp turns off.

\* Tieback diode is not used for flashlamp circuit.

## FLASHLAMP CIRCUIT



The microprocessor toggles the output of the 74LS374. When point "A" is low, point "B" the collector of the 2N5401 transistor, is high. Once point "B" is high, point "C" the collector of the TIP102 transistor is low. When point "C" is low, the flashlamp is grounded through the transistor and turns on. When point "A" toggles high, the current shuts off.

## GENERAL ILLUMINATION CIRCUIT

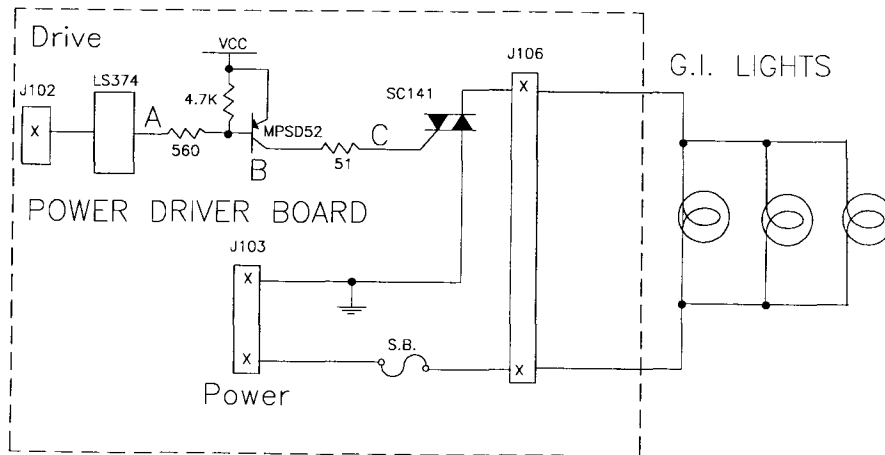


Figure #1

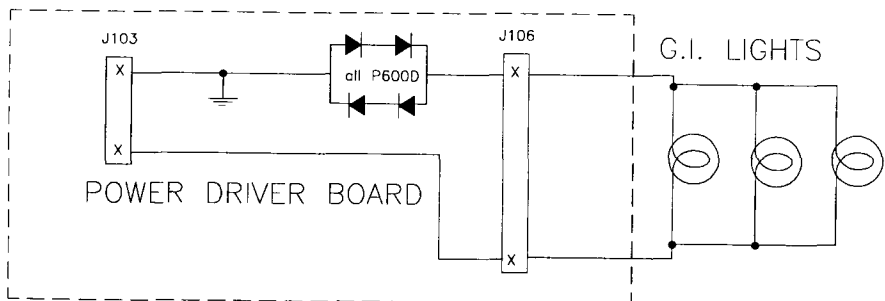
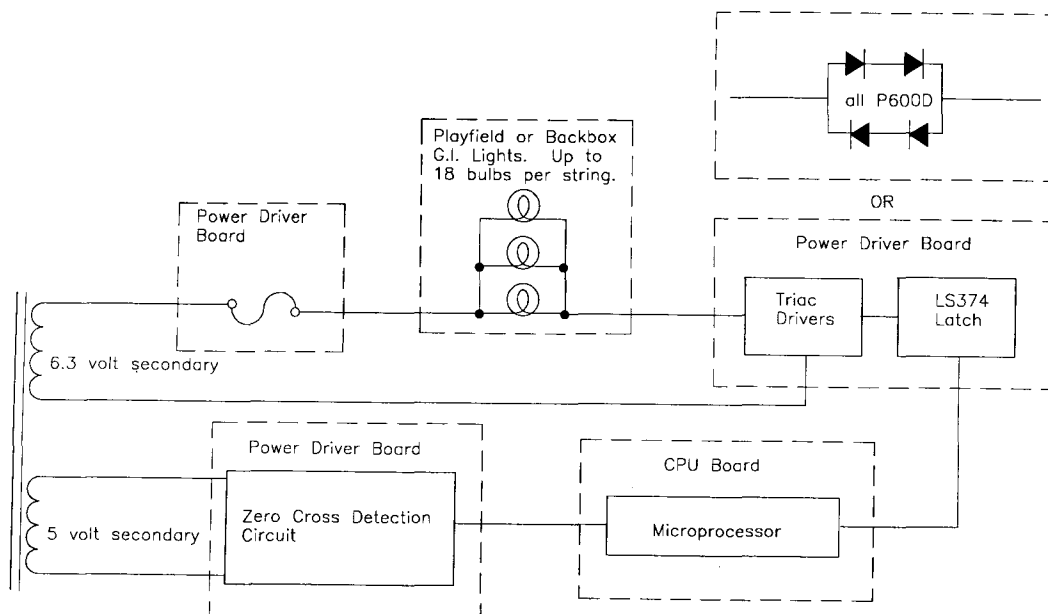


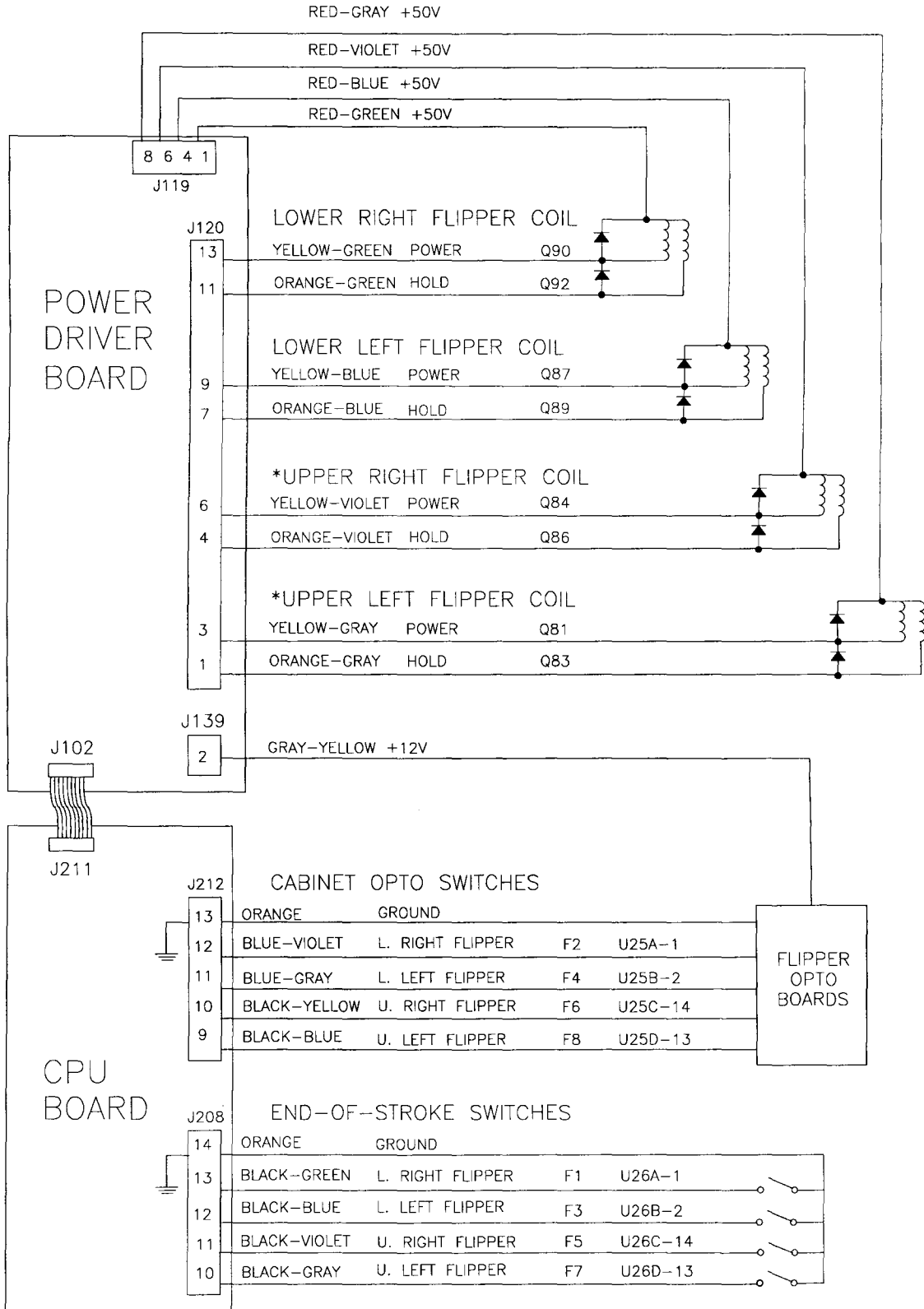
Figure #2

There are five general illumination strings; three like figure #1 and two like figure #2. When point "A" toggles low, points, "B" and "C" are high. This turns on the triac and the desired general illumination string of lights.

## BLOCK DIAGRAM OF GENERAL ILLUMINATION CIRCUIT



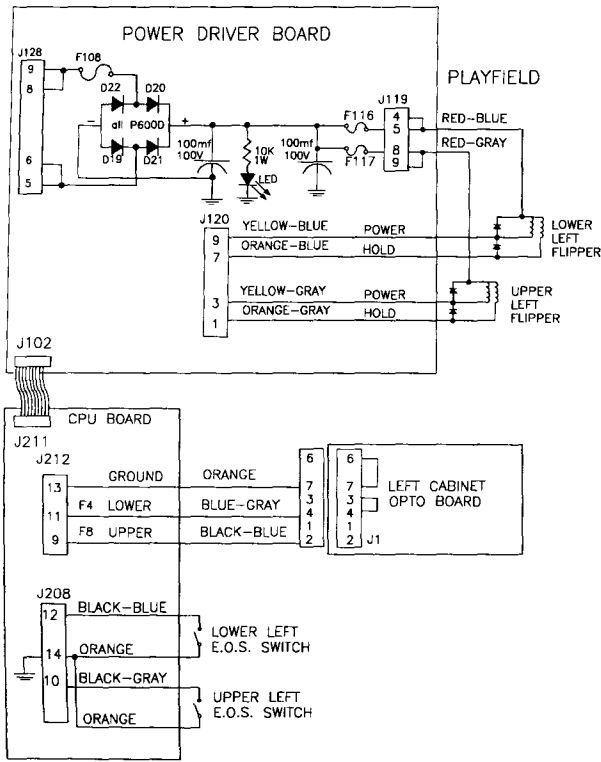
# FLIPPER CIRCUIT DIAGRAM



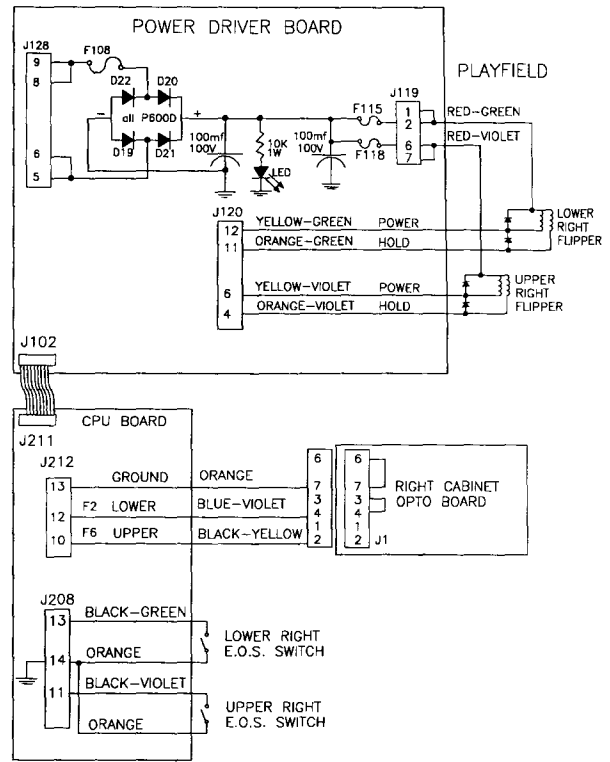
**\*NOTE: May be used as circuits other than flipper circuits.**

## FLIPPER COIL CIRCUITS

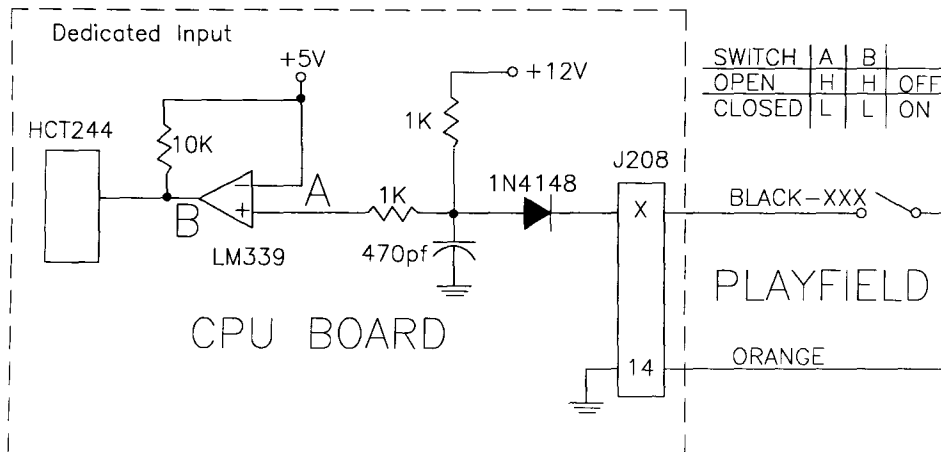
LEFT FLIPPER CIRCUIT



RIGHT FLIPPER CIRCUIT

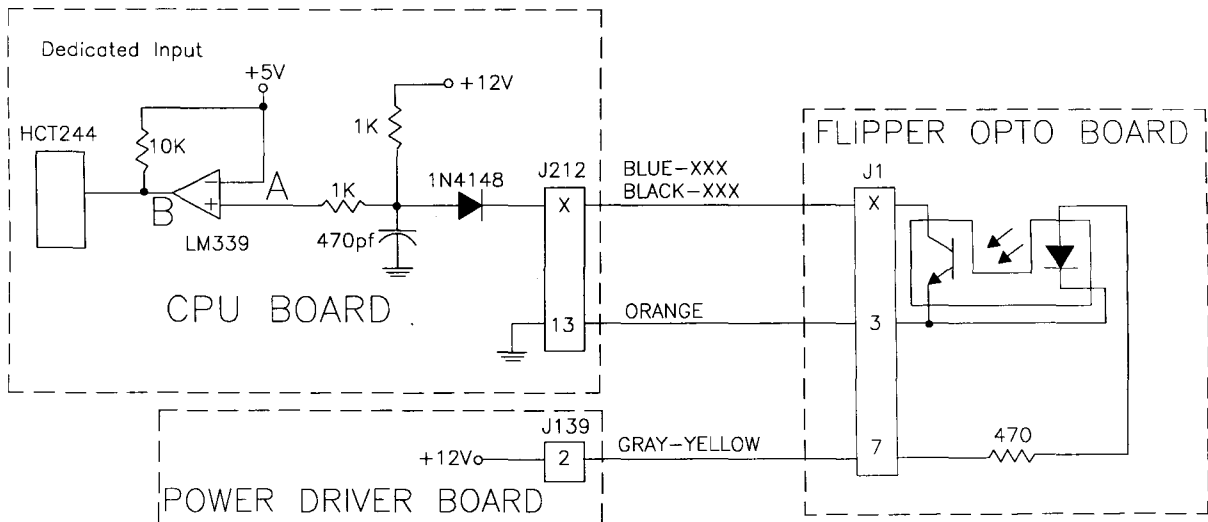
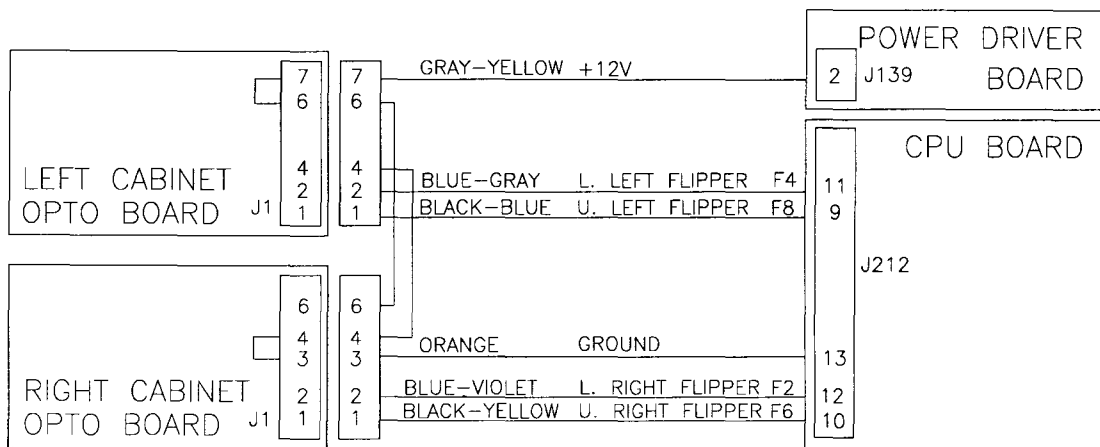


## FLIPPER END-OF-STROKE SWITCH CIRCUIT



The flipper E.O.S. 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 of 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 above +5V, its output is high and the row (dedicated input) is inactive.

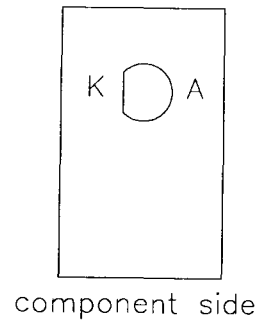
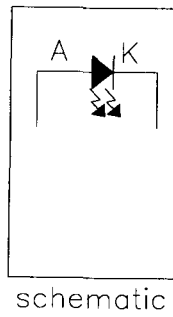
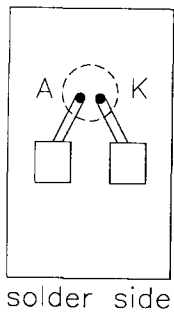
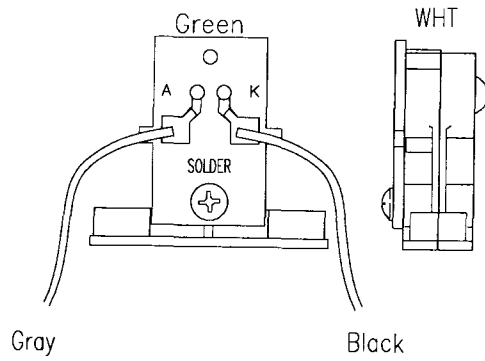
## FLIPPER CABINET SWITCH CIRCUITS



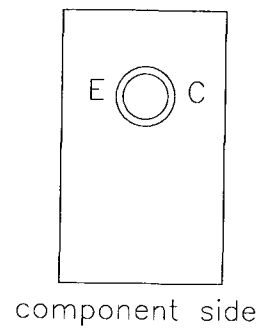
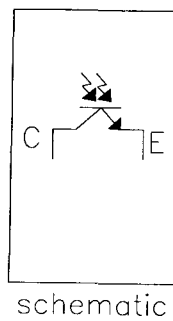
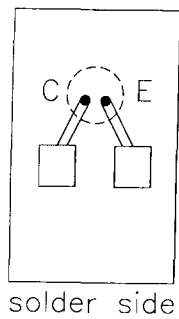
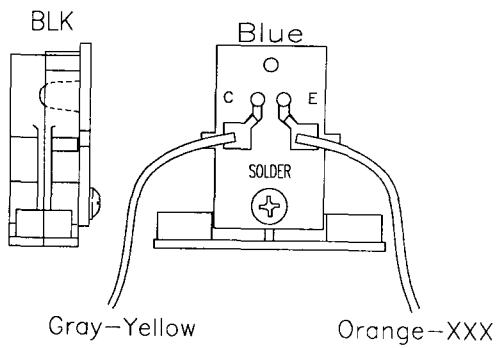
The flipper switch circuits operate similar to the dedicated switch circuit. The circuits are active low and tied to ground through the switch circuit.

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 above +5V, its output is high and the row, (dedicated Input) is inactive.

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

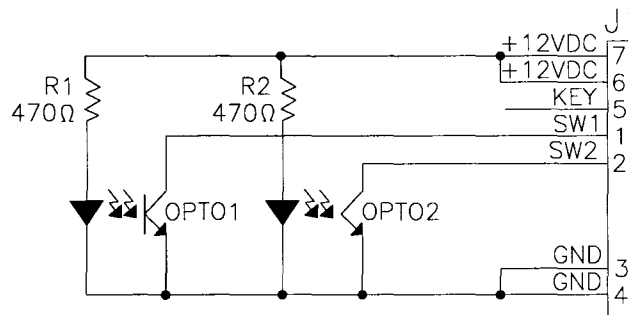
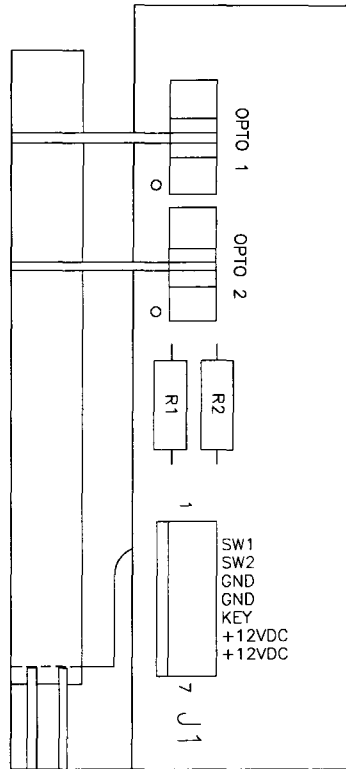


**Photo Transistor P.C.B. Assembly (receiver)  
A-16909**





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



### Left Side Flipper Cabinet Opto Switch Board

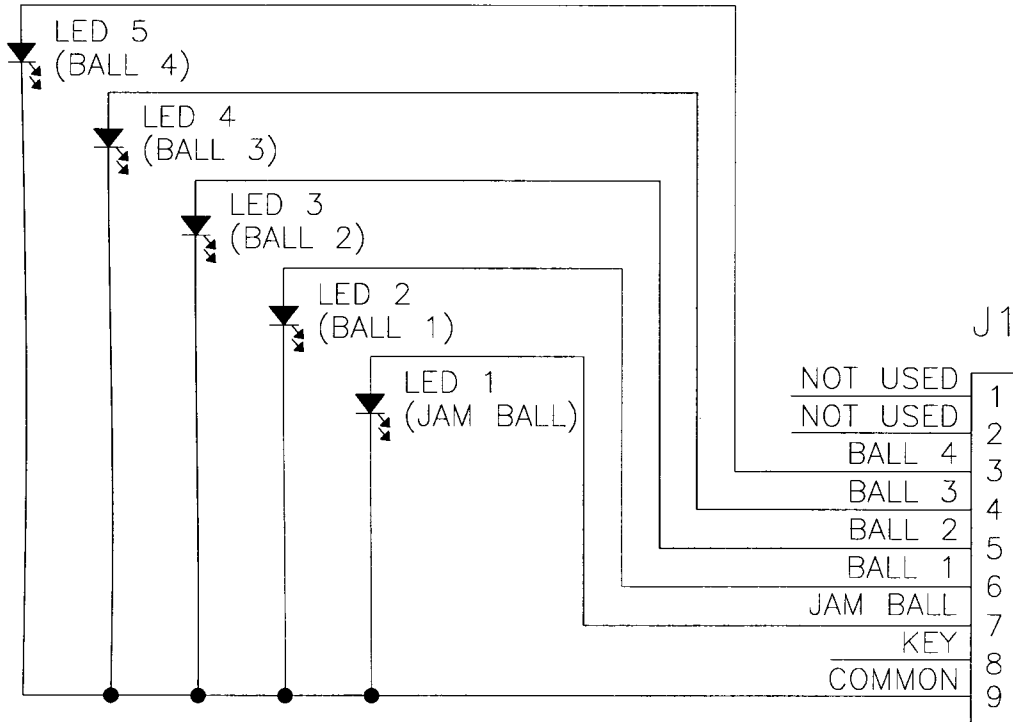
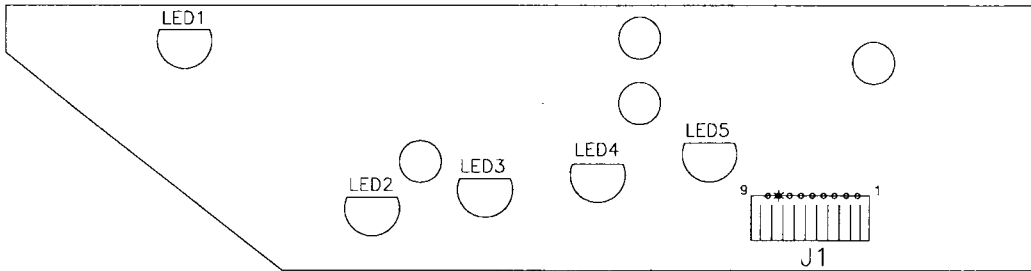
- J1-1 Black-Blue from CPU Bd. J212-9
- J1-2 Blue-Gray from CPU Bd. J212-11
- J1-3 Not Used
- J1-4 Orange to/from Right Flipper Opto Bd. J1-4
- J1-5 Key
- J1-6 Gray-Yellow to/from Right Flipper Opto Bd. J1-6
- J1-7 Gray-Yellow from Power Driver Bd. J139-2

### Right Side Flipper Cabinet Opto Switch Board

- J1-1 Black-Yellow from CPU Bd. J212-10
- J1-2 Blue-Violet from CPU Bd. J212-12
- J1-3 Orange from CPU Bd. J212-13
- J1-4 Orange to/from Left Flipper Opto Bd. J1-4
- J1-5 Key
- J1-6 Gray-Yellow to/from Left Flipper Opto J1-6
- J1-7 Not Used

# TROUGH IRED LED P.C.B. ASSEMBLY A-18617-1

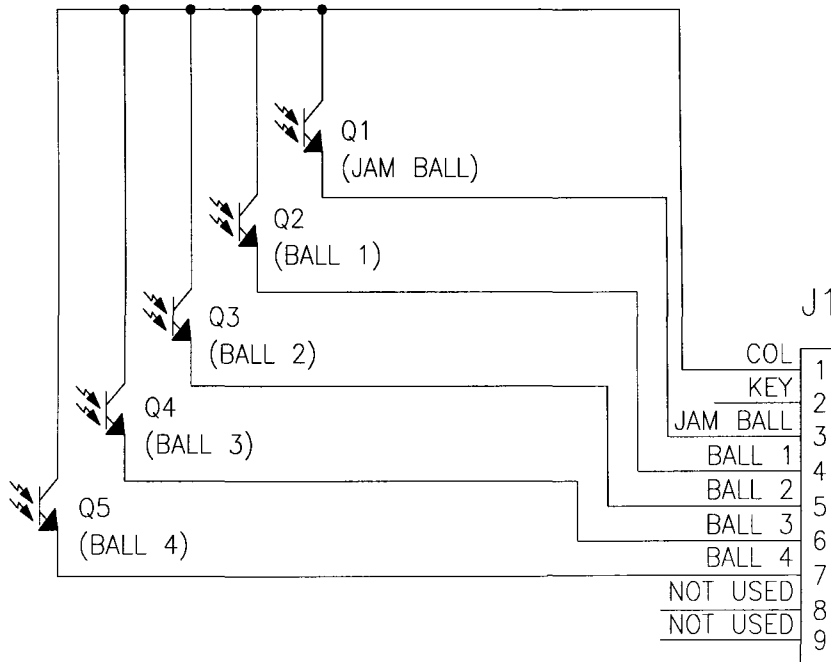
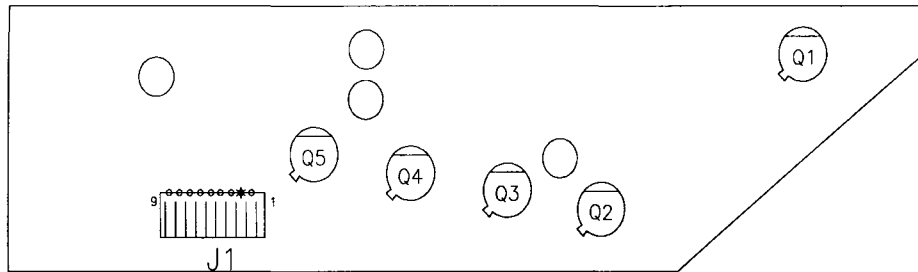
- J1-1 Not Used
- J1-2 Not Used
- J1-3 Gray-Green, from SW-7 Opto P.C.B. J1-3
- J1-4 Gray-Black, from SW-7 Opto P.C.B. J1-5
- J1-5 Gray-Orange, from SW-7 Opto P.C.B. J1-6
- J1-6 Gray-Red, from SW-7 Opto P.C.B. J1-7
- J1-7 Gray-Brown, from SW-7 Opto P.C.B. J1-8
- J1-8 Key
- J1-9 Black, from SW-7 Opto P.C.B. J1-10



Trough 7 IRED Circuit

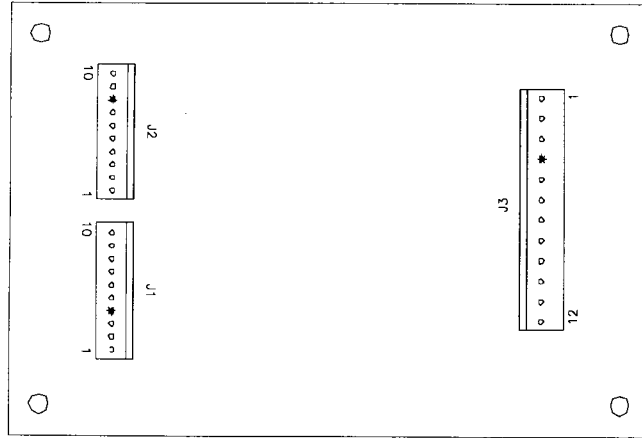
# TROUGH IRED TRANSISTOR P.C.B. ASSEMBLY A-18618-1

- J1-1 Gray-Yellow, from SW-7 Opto P.C.B. J2-10
- J1-2 Key
- J1-3 Orange-Brown, from SW-7 Opto P.C.B. J2-7
- J1-4 Orange-Red, from SW-7 Opto P.C.B. J2-6
- J1-5 Orange-Black, from SW-7 Opto P.C.B. J2-5
- J1-6 Orange-Yellow, from SW-7 Opto P.C.B. J2-4
- J1-7 Orange-Green, from SW-7 Opto P.C.B. J2-3
- J1-8 Not Used
- J1-9 Not Used



Trough 7 IR TSTR Circuit

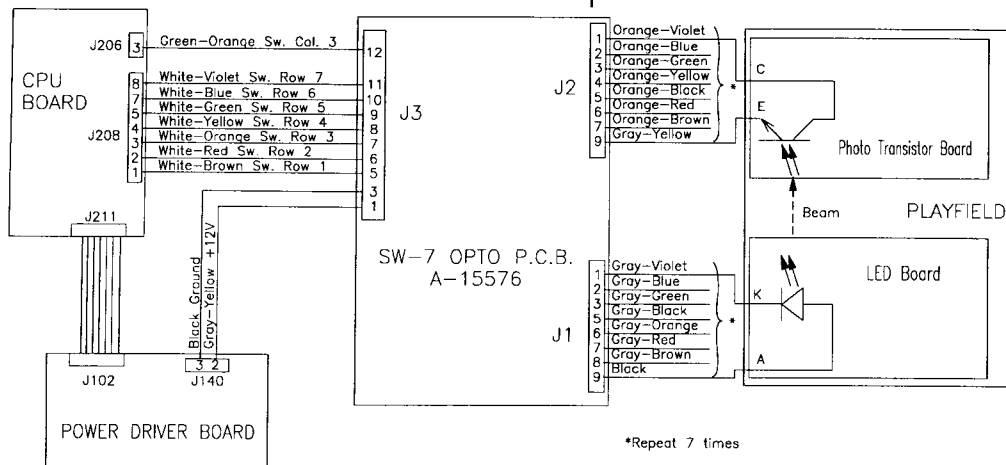
## SW-7 Opto Board A-15576



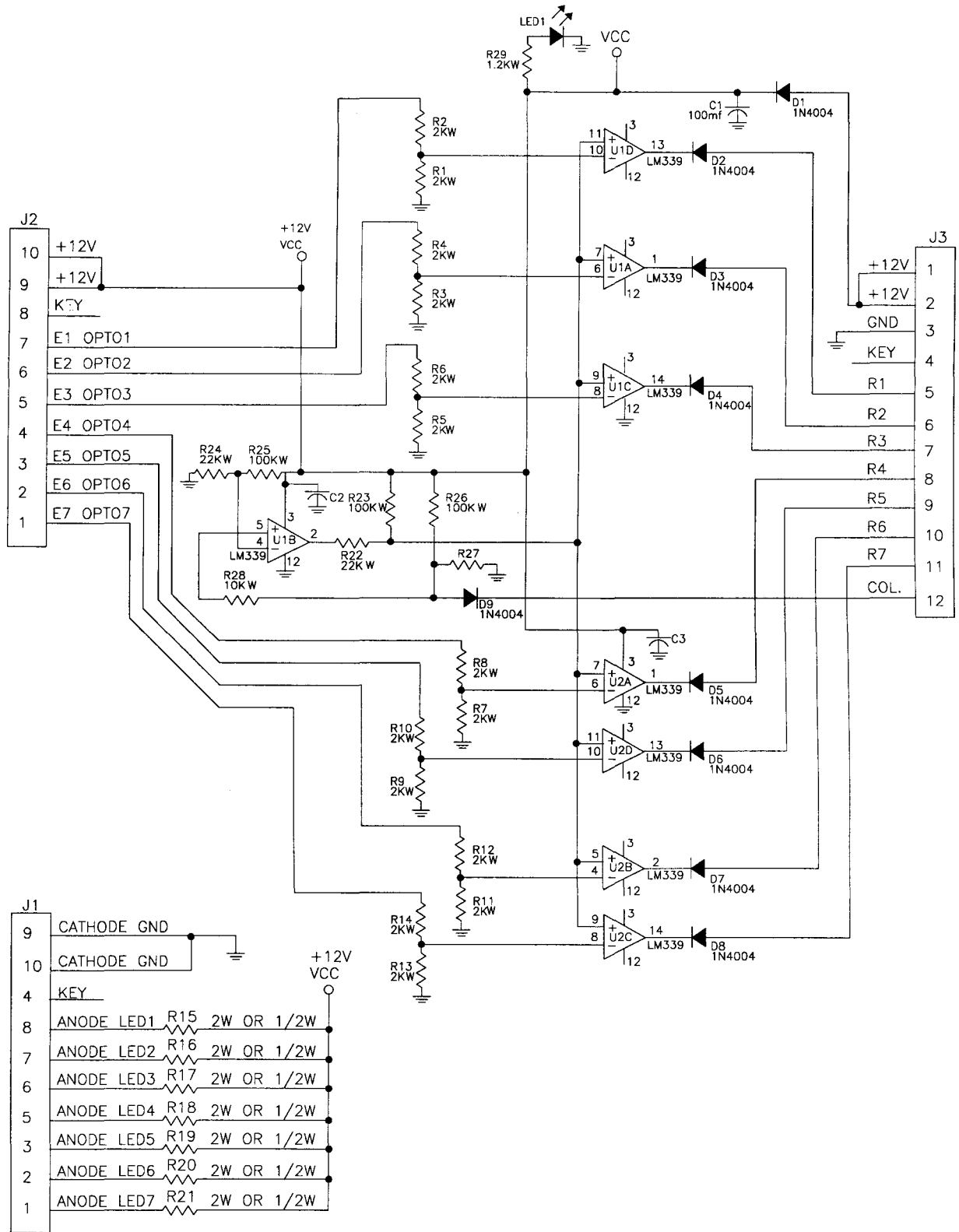
- J1-1 Gray-Violet to Sw #37
- J1-2 Gray-Blue to Sw #36
- J1-3 Gray-Green to A-18617-1 (LED) J1-3 Sw #35
- J1-4 Key
- J1-5 Gray-Black to A-18617-1 (LED) J1-4 Sw #34
- J1-6 Gray-Orange to A-18617-1 (LED) J1-5 Sw #33
- J1-7 Gray-Red to A-18617-1 (LED) J1-6 Sw #32
- J1-8 Gray-Brown to A-18617-1 (LED) J1-7 Sw #31
- J1-9 Black Ground to Sw #36 & #35
- J1-10 Black Ground to A-18617-1 J1-9

- J2-1 Orange-Violet to Sw #37
- J2-2 Orange-Blue Sw #36
- J2-3 Orange-Green to A-18618-1 (Photo) J1-7 Sw #35
- J2-4 Orange-Yellow to A-18618-1 (Photo) J1-6 Sw #34
- J2-5 Orange-Black to A-18618-1 (Photo) J1-5 Sw #33
- J2-6 Orange-Red to A-18618-1 (Photo) J1-4 Sw #32
- J2-7 Orange-Brown to A-18618-1 (Photo) J1-3 Sw #31
- J2-8 Key
- J2-9 Gray-Yellow +12VDC to Sw #36 & #35
- J2-10 Gray-Yellow +12VDC to A-18618 (Photo) J1-1

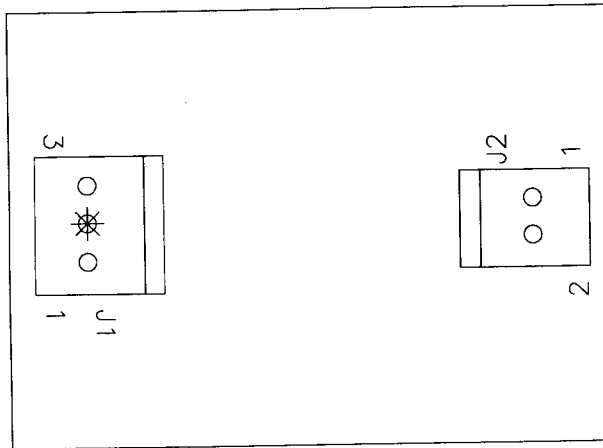
- J3-1 Gray-Yellow +12VDC from J140-2
- J3-2 Not Used
- J3-3 Black Ground from J140-3
- J3-4 Key
- J3-5 White-Brown from J208-1
- J3-6 White-Red from J208-2
- J3-7 White-Orange from J208-3
- J3-8 White-Yellow from J208-4
- J3-9 White-Green from J208-5
- J3-10 White-Blue from J208-7
- J3-11 White-Violet from J208-8
- J3-12 Green-Orange from J206-3



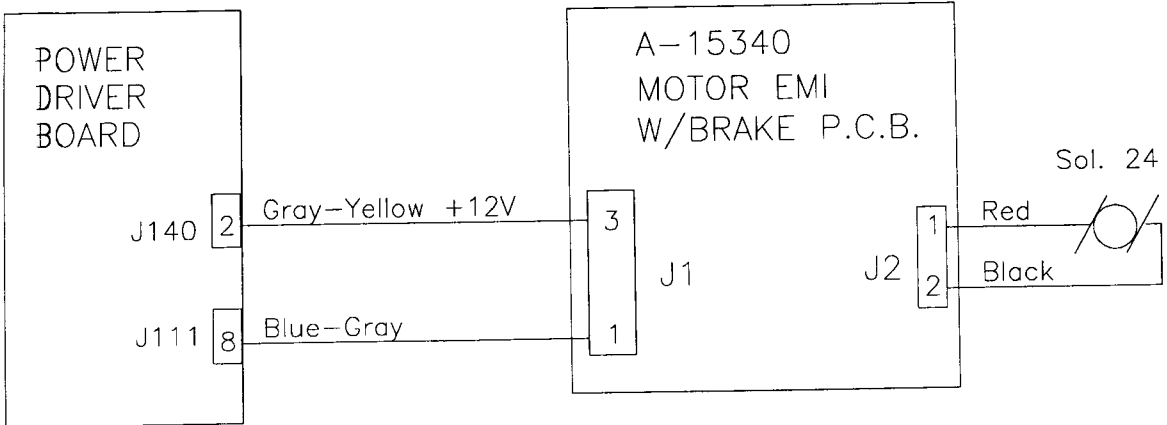
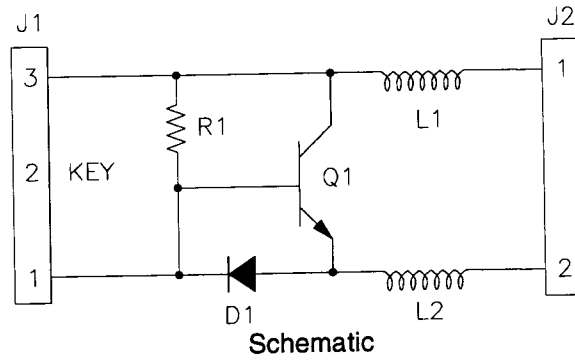
# SW-7 Opto Board A-15576



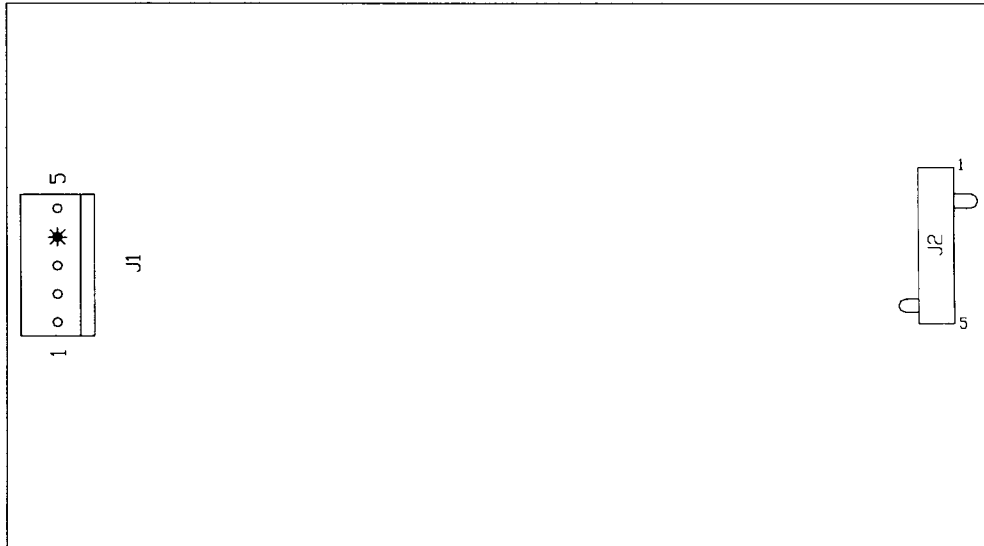
# Motor EMI w/Brake P.C.B. Assembly A-15340



- J1-1 Blue-Gray from J111-8
- J1-2 Key
- J1-3 Gray-Yellow +12V from J140-2
  
- J2-1 Red to Sol 24 Motor Bank
- J2-2 Black to Sol 24 Motor Bank



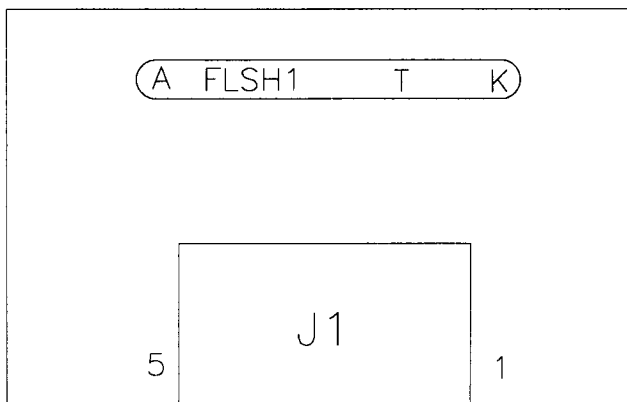
**Strobe Lamp P.C.B. Assembly  
A-20669**



J1-1 Gray-Yellow +12V from J140-2  
 J1-2 Orange-White from J110-4  
 J1-3 White-Blue from J130-1  
 J1-4 Key  
 J1-5 White-Blue from J130-2

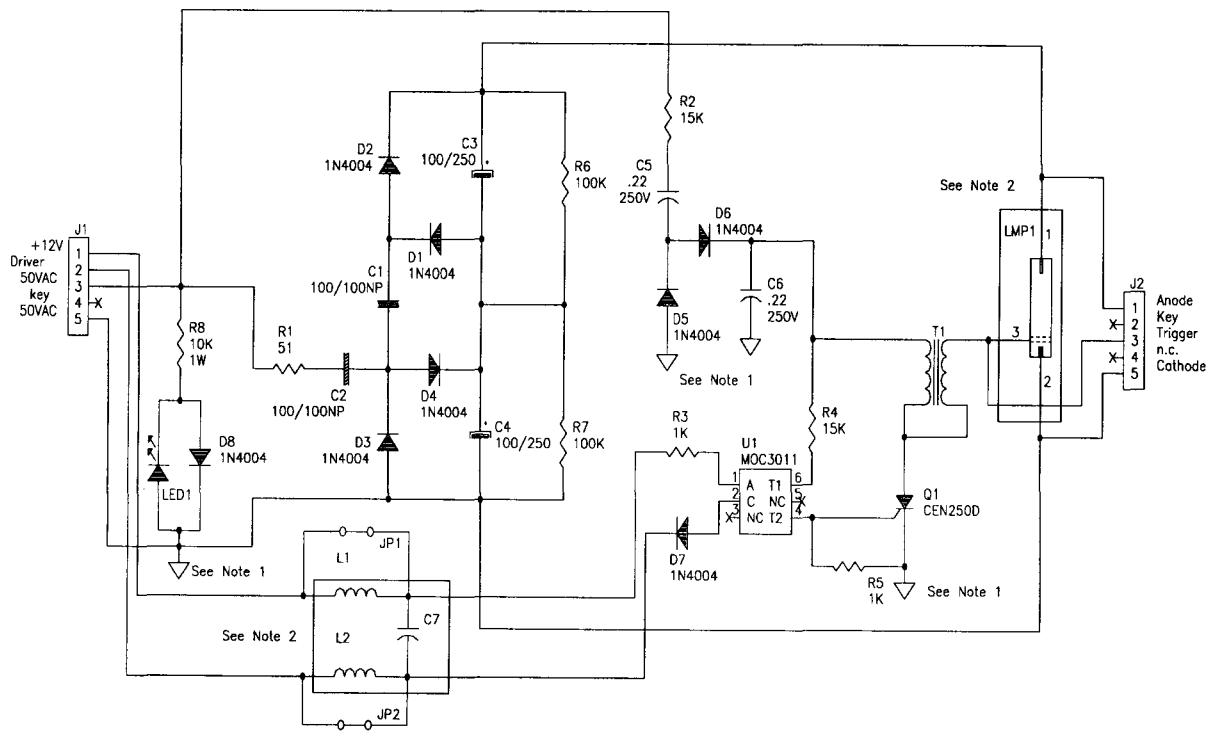
J2-1 White to Strobe Tube P.C.B. J1-1  
 J2-2 Key  
 J2-3 White to Strobe Tube P.C.B. J1-3  
 J2-4 Not Used  
 J2-5 White to Strobe Tube P.C.B. J1-5

**Strobe Tube P.C.B. Assembly  
A-20718**

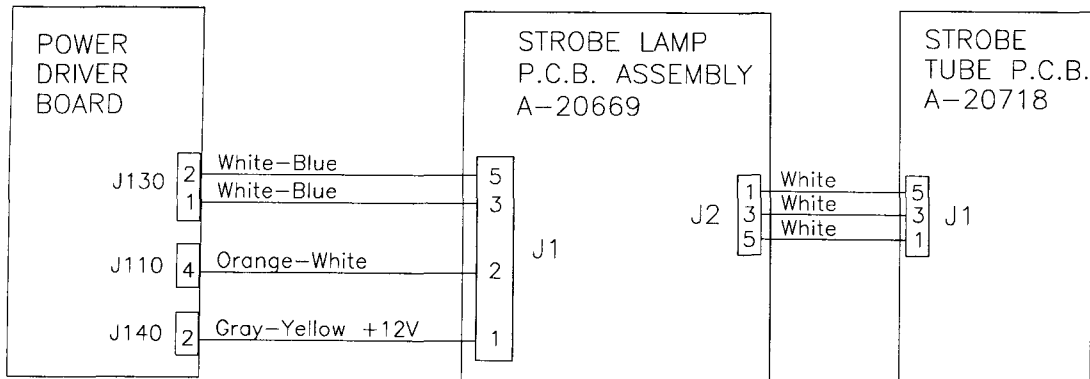
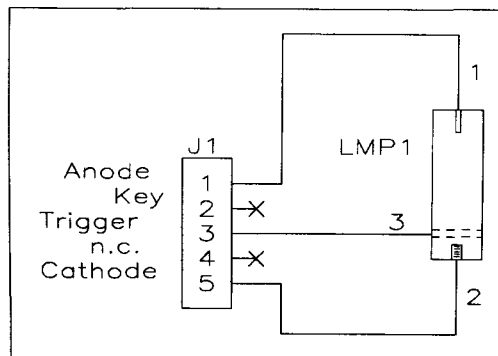


J1-1 White from Strobe Lamp P.C.B. J2-1  
 J1-2 Key  
 J1-3 White from Strobe Lamp P.C.B. J2-3  
 J1-4 Not Used  
 J1-5 White from Strobe Lamp P.C.B. J2-5

## Strobe Lamp P.C.B. Schematic A-20669



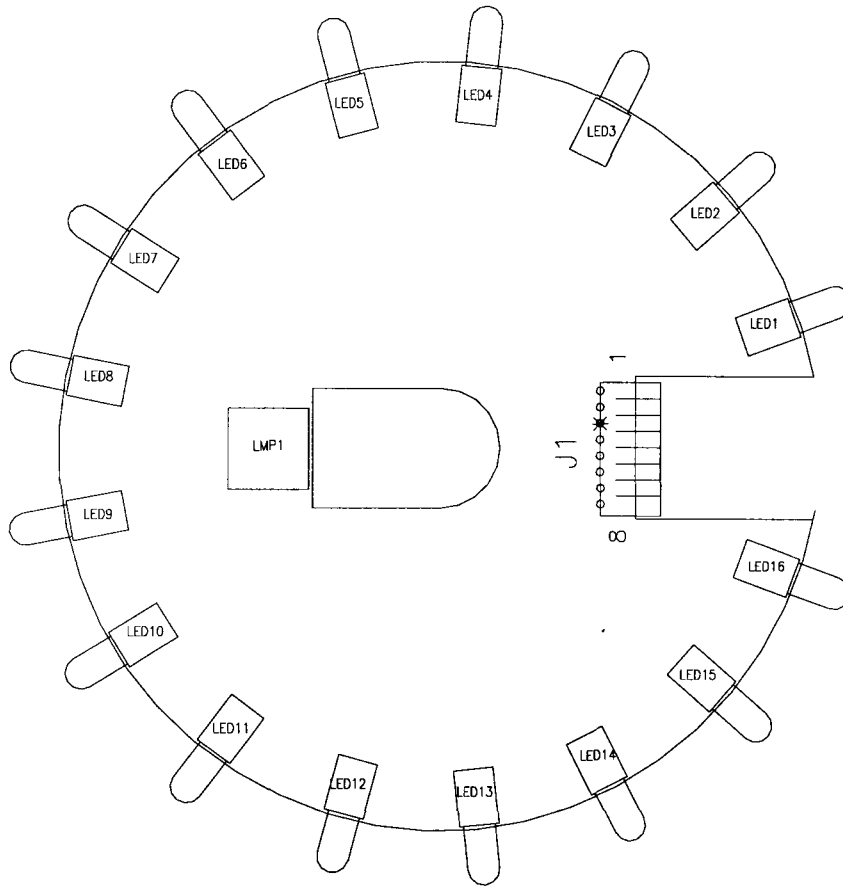
## Strobe Tube P.C.B. Schematic A-20718



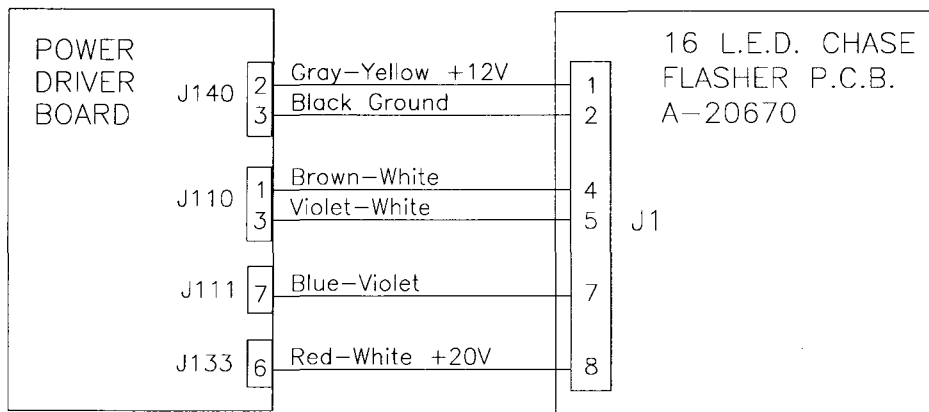
Strobe Circuit Diagram



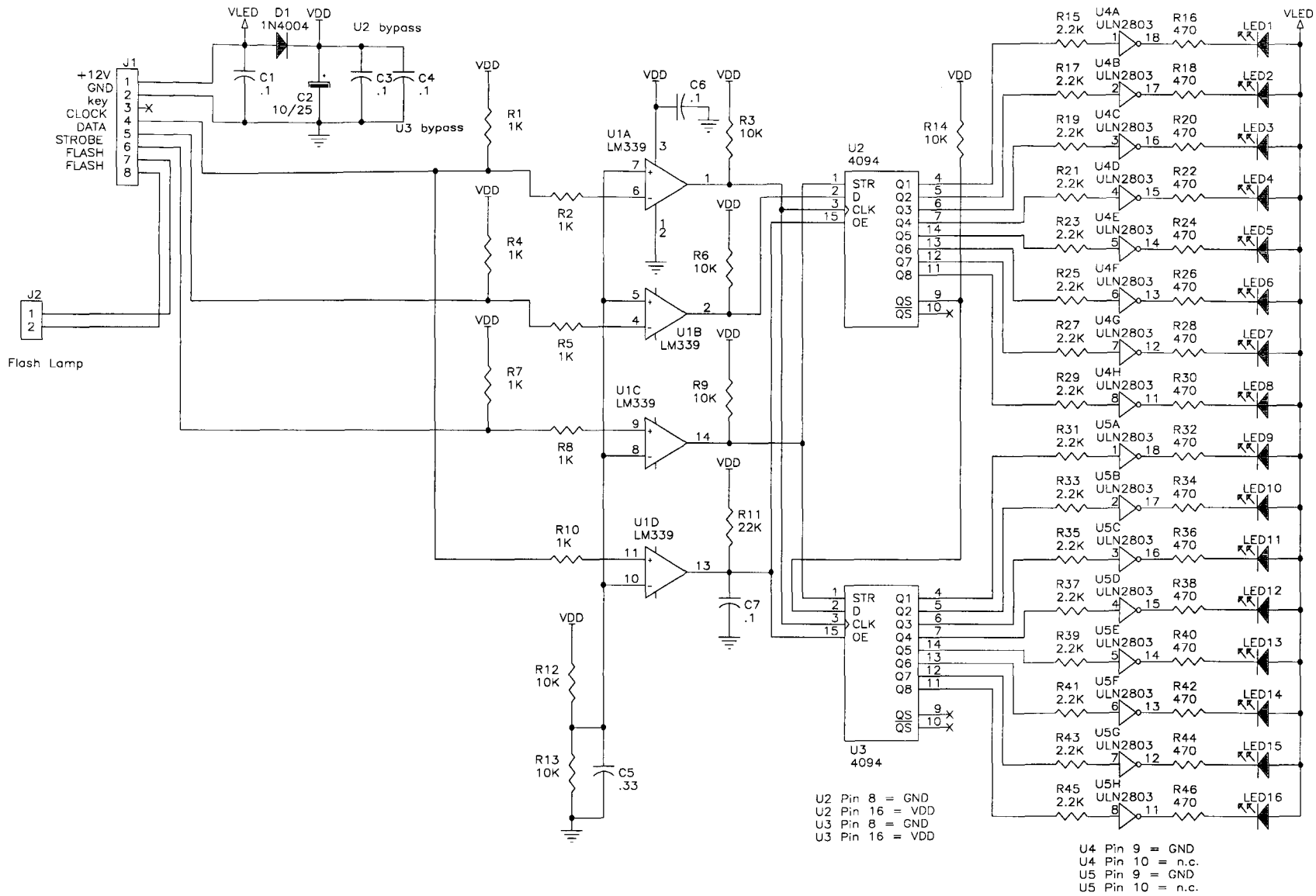
# 16 LED Chase & Flasher P.C.B. Assembly A-20670



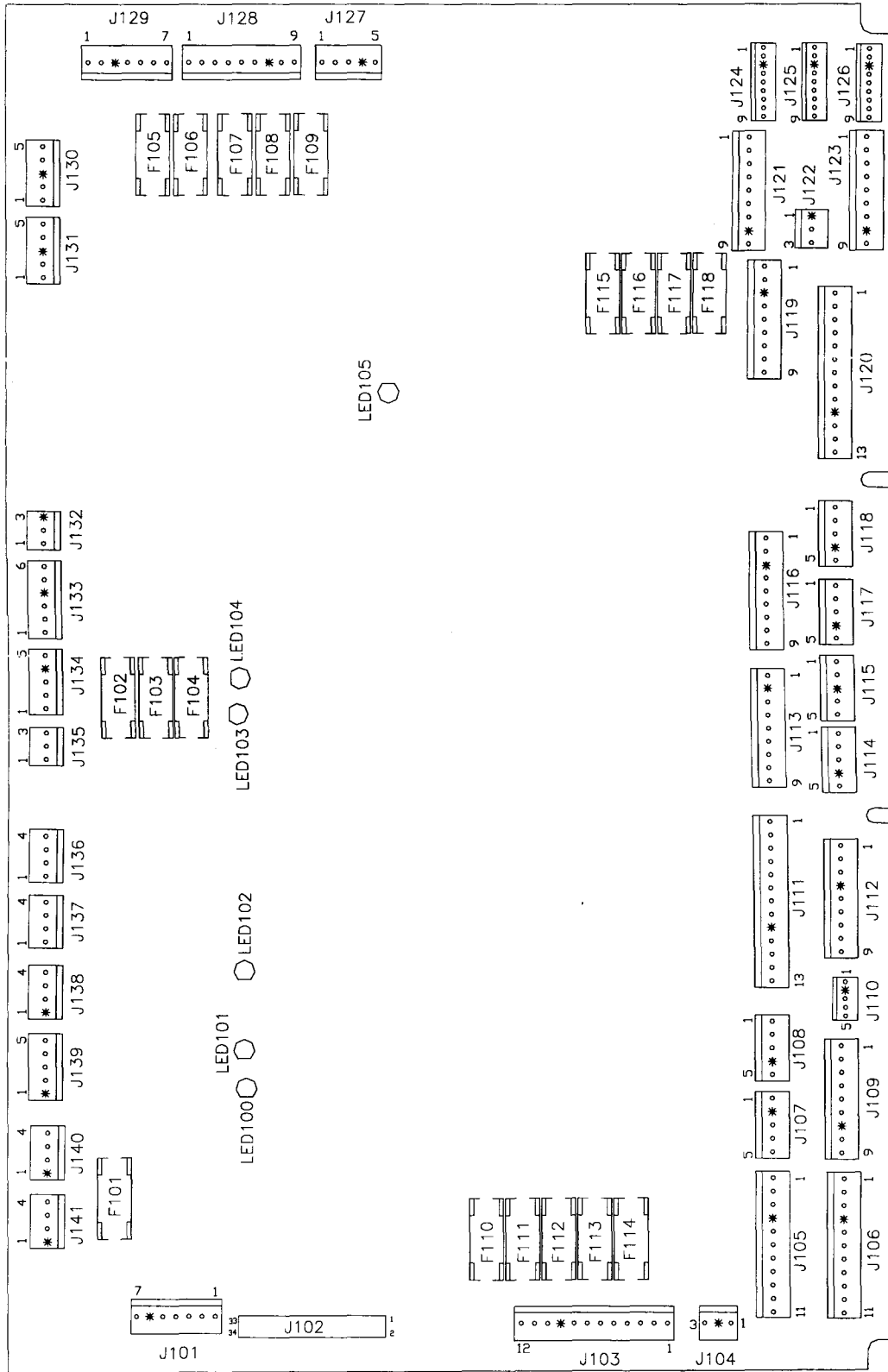
- J1-1 Gray-Yellow +12V from J140-2
- J1-2 Black Ground from J140-3
- J1-3 Key
- J1-4 Brown-White from J110-1
- J1-5 Violet-White from J110-3
- J1-6 Not Used
- J1-7 Blue-Violet J111-7
- J1-8 Red-White J133-6



16 L.E.D. CHASE & FLASH P.C.B. SCHEMATIC  
A-20670



# Power Driver Board Assembly A-20028



J101-1 Gray-Green, +12V to J210-7, J606-7  
J101-2 Gray-Green, +12V to J210-6, J606-6  
J101-3 Gray, +5V to J210-5, J606-5  
J101-4 Gray, +5V to J210-4, J606-4  
J101-5 Black, Ground to J210-3, J606-3  
J101-6 Key  
J101-7 Black, Ground to J210-1, J606-1

J102 34-Pin Ribbon Cable, Data to/from CPU J211

J103-1 Yellow-White, 6.8VAC from Xformer Secondary  
J103-2 White-Brown, 6.8VAC from Xformer Secondary  
J103-3 White-Brown, 6.8VAC from Xformer Secondary  
J103-4 White-Orange, 6.8VAC from Xformer Secondary  
J103-5 White-Yellow, 6.8VAC from Xformer Secondary  
J103-6 White-Yellow, 6.8VAC from Xformer Secondary  
J103-7 Orange, 6.8VAC from Xformer Secondary  
J103-8 Orange, 6.8VAC from Xformer Secondary  
J103-9 Key  
J103-10 Green, 6.8VAC from Xformer Secondary  
J103-11 Brown, 6.8Vc from Xformer Secondary  
J103-12 Brown, 6.8VAC from Xformer Secondary

J104-1 White-Violet, 6.8VAC, G.I. to Coin Door Bd. J2-3  
J104-2 Key  
J104-3 Violet, Return, G.I. to Coin Door Board J2-5

J105-1 Brown, Return, G.I. to Playfield  
J105-2 Orange, Return, G.I. to Playfield  
J105-3 Yellow, Return, G.I. to Playfield  
J105-4 Key  
J105-5 Not Used  
J105-6 Not Used  
J105-7 White-Brown, 6.8VAC, G.I. to Playfield  
J105-8 White-Orange, 6.8VAC, G.I. to Playfield  
J105-9 White-Yellow, 6.8VAC, G.I. to Playfield  
J105-10 Not Used  
J105-11 Not Used

J106-1 Brown, Return, G.I. to Insert Panel  
J106-2 Not Used  
J106-3 Not Used  
J106-4 Key  
J106-5 Green, Return, G.I. to Insert Panel  
J106-6 Violet, Return, G.I. to Insert Panel  
J106-7 White-Brown, 6.8VAC, G.I. to Insert Panel  
J106-8 Not Used  
J106-9 Not Used  
J106-10 White-Green, 6.8VAC, G.I. to Insert Panel  
J106-11 White-Violet, 6.8VAC, G.I. to Insert Panel

J107-1 Blue-Brown, Solenoid 25 to Playfield Flasher  
J107-2 Key  
J107-3 Blue-Red, Solenoid 26 to Playfield Flasher  
J107-4 Blue-Orange, Solenoid 27 to Playfield Flasher  
J107-5 Not Used

J108 Not Used

J109-1 Blue-Brown, Solenoid 25 to Playfield Flasher  
J109-2 Blue-Red, Solenoid 26 to Playfield Flasher  
J109-3 Blue-Orange, Solenoid 27 to Playfield Flasher  
J109-4 Blue-Yellow, Solenoid 28 to Playfield Flasher  
J109-5 Not Used  
J109-6 Not Used  
J109-7 Key  
J109-8 Not Used  
J109-9 Not Used

J110-1 Brown-White to Solenoid 37 to Playfield  
J110-2 Key  
J110-3 Violet-White to Solenoid 38 to Playfield  
J110-4 Orange-White to Solenoid 39 to Playfield  
J110-5 Not Used

J111-1 Black-Brown, Solenoid 17 to Playfield Flasher  
J111-2 Black-Red, Solenoid 18 to Playfield Flasher  
J111-3 Black-Orange, Solenoid 19 to Playfield Flasher  
J111-4 Black-Yellow, Solenoid 20 to Playfield Flasher  
J111-5 Blue-Green, Solenoid 21 to Playfield Flasher  
J111-6 Blue-Black, Solenoid 22 to Playfield Flasher  
J111-7 Blue-Violet, Solenoid 23 to Playfield Flasher  
J111-8 Blue-Gray, Solenoid 24 to Playfield Motor  
J111-9 Key  
J111-10 Not Used  
J111-11 Not Used  
J111-12 Not Used  
J111-13 Not Used

J112-1 Black-Brown, Solenoid 17 to Insert Flasher  
J112-2 Black-Red, Solenoid 18 to Insert Flasher  
J112-3 Black-Orange, Solenoid 19 to Insert Flasher  
J112-4 Key  
J112-5 Not Used  
J112-6 Not Used  
J112-7 Not Used  
J112-8 Not Used  
J112-9 Not Used

J113-1 Brown-Black, Solenoid 9 Drive to Playfield Coil  
J113-2 Key  
J113-3 Brown-Red, Solenoid 10 to Playfield Coil  
J113-4 Brown-Orange, Solenoid 11 to Playfield Coil  
J113-5 Brown-Yellow, Solenoid 12 to Playfield Coil  
J113-6 Brown-Green, Solenoid 13 to Playfield Coil  
J113-7 Brown-Blue, Solenoid 14 to Playfield Coil  
J113-8 Brown-Violet, Solenoid 15 to Playfield Coil  
J113-9 Brown-Gray, Solenoid 16 to Playfield Coil

J114 Not Used

J115 Not Used

J116-1 Violet-Brown, Solenoid 1 to Playfield Coil  
J116-2 Violet-Red, Solenoid 2 to Playfield Coil  
J116-3 Key  
J116-4 Violet-Orange, Solenoid 3 to Playfield Coil  
J116-5 Violet-Yellow, Solenoid 4 to Playfield Coil  
J116-6 Violet-Green, Solenoid 5 to Playfield Coil  
J116-7 Violet-Blue, Solenoid 6 to Playfield Coil  
J116-8 Violet-Black, Solenoid 7 to Backbox Coil  
J116-9 Violet-Gray, Solenoid 8 to Playfield Coil

J117 Not Used

J118 Not Used

J119-1 Red-Green, +50V to Lower Right Flipper Coil  
J119-2 Red-Green, Loop End from J119-1  
J119-3 Key  
J119-4 Red-Blue, +50V to Lower Left Flipper  
J119-5 Red-Blue, Loop End from J119-4  
J119-6 Red-Violet, +50V to Playfield Coil 33 & 34  
J119-7 Red-Violet, Loop End from J119-6  
J119-8 Red-Gray, +50V to Playfield Coil 35 & 36  
J119-9 Red-Gray, Loop End from J119-8

J120-1 Orange-Gray, Holding, Playfield Coil 36  
J120-2 Not Used  
J120-3 Yellow-Gray, Power, Playfield Coil 35  
J120-4 Orange-Violet, Holding, Playfield Coil 34  
J120-5 Not Used  
J120-6 Yellow-Violet, Power, Playfield Coil 33  
J120-7 Orange-Blue, Holding, Lower Left Flipper Coil  
J120-8 Not Used  
J120-9 Yellow-Blue, Power, Lower Left Flipper Coil  
J120-10 Key  
J120-11 Orange-Green, Holding, Lwr Right Flipper Coil  
J120-12 Not Used  
J120-13 Yellow-Green, Power, Lower Right Flipper Coil

J121-1 Yellow-Brown, Lamp Col. 1 to Playfield  
J121-2 Yellow-Red, Lamp Col. 2 to Playfield  
J121-3 Yellow-Orange, Lamp Col. 3 to Playfield  
J121-4 Yellow-Black, Lamp Col. 4 to Playfield  
J121-5 Yellow-Green, Lamp Col. 5 to Playfield  
J121-6 Yellow-Blue, Lamp Col. 6 to Playfield  
J121-7 Yellow-Violet, Lamp Col. 7 to Playfield  
J121-8 Key  
J121-9 Yellow-Gray, Lamp Col. 8 to Playfield

J122-1 Key  
J122-2 Not Used  
J122-3 Yellow-Gray, Lamp Col 8 to Coin Door Bd. J3-8

J123 Not Used

J124 Not Used

J125-1 Red-Brown, Lamp Row 1 to Playfield  
J125-2 Red-Black, Lamp Row 2 to Playfield  
J125-3 Key  
J125-4 Red-Orange, Lamp Row 3 to Playfield  
J125-5 Red-Yellow, Lamp Row 4 to Playfield  
J125-6 Red-Green, Lamp Row 5 to Playfield  
J125-7 Red-Blue, Lamp Row 6 to Playfield  
J125-8 Red-Violet, Lamp Row 7 to Playfield  
J125-9 Red-Gray, Lamp Row 8 to Playfield

J126-1 Not Used  
J126-2 Not Used  
J126-3 Key  
J126-4 Not Used  
J126-5 Not Used  
J126-6 Not Used  
J126-7 Red-Blue, Lamp Row 6 to Coin Door Bd. J3-9  
J126-8 Red-Violet, Lamp Row 7 to Coin Door Bd. J3-10  
J126-9 Red-Gray, Lamp Row 8 to Coin Door Bd. J3-11

J127-1 White-Green, 9.8VAC from Xformer Secondary  
J127-2 White-Green, 9.8VAC Loop End from J127-1  
J127-3 White-Green, 9.8VAC from Xformer Secondary  
J127-4 Key  
J127-5 White-Green, 9.8VAC Loop End from J127-3

J128-1 White-Red, 16VAC Loop End from J128-2  
J128-2 White-Red, 16VAC from Xformer Secondary  
J128-3 White-Red, 16VAC Loop End from J128-4  
J128-4 White-Red, 16VAC from Xformer Secondary  
J128-5 Black-Yellow, 16VAC Loop End from J128-6  
J128-6 Black-Yellow, 16VAC from Xformer Secondary  
J128-7 Key  
J128-8 Black-Yellow, 16VAC Loop End from J128-9  
J128-9 Black-Yellow, 16VAC from Xformer Secondary

J129-1 Red, 9VAC from Xformer Secondary  
J129-2 Red, 9VAC from Xformer Secondary  
J129-3 Key  
J129-4 Blue-White, 13VAC from Xformer Secondary  
J129-5 Blue-White, 13VAC Loop End from J129-4  
J129-6 Blue-White, 13VAC from Xformer Secondary  
J129-7 Blue-White, 13VAC Loop End from J129-6

J130-1 White-Blue +50VAC to Playfield Coil  
J130-2 White-Blue +50VAC to Playfield Coil  
J130-3 Key  
J130-4 Not Used  
J130-5 Not Used

J131 Not Used

J132 Not Used

J133-1 Not Used  
J133-2 Red-Brown, +50V to Playfield Coils  
J133-3 Red-Black, +50V to Playfield Coils  
J133-4 Key  
J133-5 Not Used  
J133-6 Red-White, +20V to Playfield Flashlamps

J134-1 Not Used  
J134-2 Not Used  
J134-3 Not Used  
J134-4 Key  
J134-5 Red-White, +20VDC to Insert Flashlamps

J135 Not Used

J136 Not Used

J137 Not Used

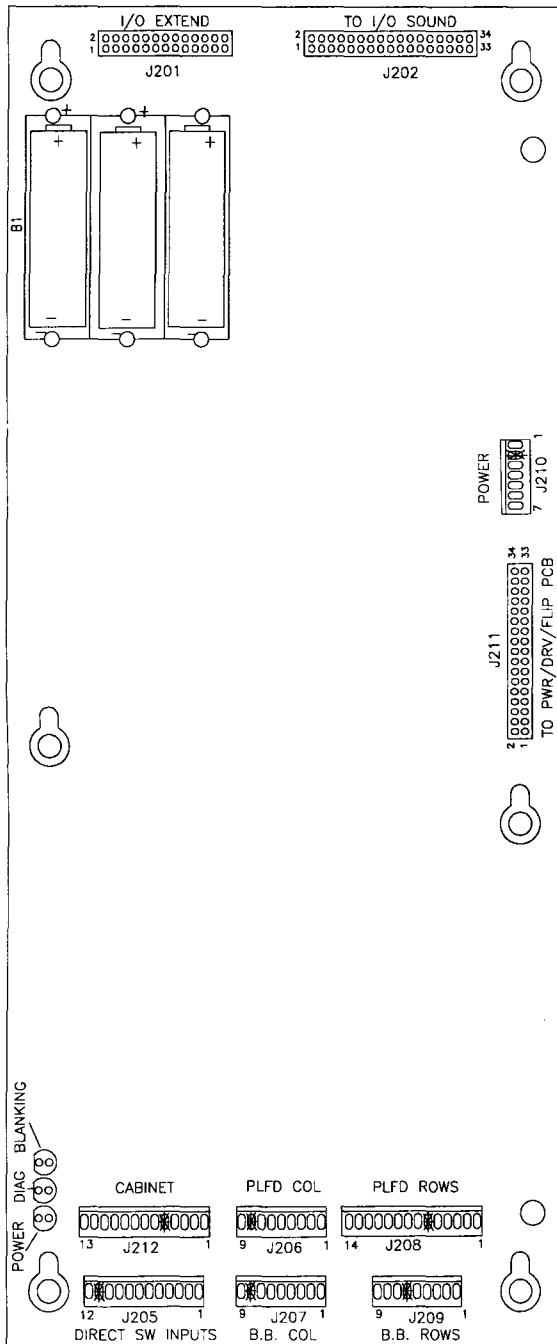
J138 Not Used

J139 -1 Key  
J139 -2 Gray-Yellow +12V to Cabinet  
J139 -3 Black Ground to Cabinet  
J139 -4 Not Used  
J139-5 Black-White to Coin Door Bd. J2-7

J140-1 Key  
J140-2 Gray-Yellow, +12V to Playfield  
J140-3 Black, Ground to Playfield  
J140-4 Not Used

J141-1 Key  
J141-2 Gray-Yellow, +12V to Coin Door Board J2-2  
J141-3 Black, Ground to Coin Door Board J2-1  
J141-4 Not Used

# Security CPU Board Assembly A-20119-50041



J201 26-Pin Ribbon Cable, Data to/from J602

J202 34-Pin Ribbon Cable, Data to/from J601

J203 Not Used

J204 Not Used

- J205-1 Orange-Brown, Ded. Sw. Row 1, to Coin Door Bd. J1-8
- J205-2 Orange-Red, Ded. Sw. Row 2, to Coin Door Bd. J1-7
- J205-3 Orange-Black, Ded. Sw. Row 3, to Coin Door Bd. J1-6
- J205-4 Orange-Yellow, Ded. Sw. Row 4, to Coin Door Bd. J1-5
- J205-5 Not Used
- J205-6 Orange-Green, Ded. Sw. Row 5, to Coin Door Bd. J1-4
- J205-7 Orange-Blue, Ded. Sw. Row 6, to Coin Door Bd. J1-3
- J205-8 Orange-Violet, Ded. Sw. Row 7, to Coin Door Bd. J1-2
- J205-9 Orange-Gray, Ded. Sw. Row 8, to Coin Door Bd. J1-1
- J205-10 Black, Ground, to Coin Door Bd. J1-10
- J205-11 Key
- J205-12 Orange-White, Sw. Enable, to Coin Door Bd. J1-11

- J206-1 Green-Brown, Sw. Col. 1, to Playfield Sw.
- J206-2 Green-Red, Sw. Col. 2, to Playfield Sw.
- J206-3 Green-Orange, Sw. Col. 3, to Playfield Sw.
- J206-4 Green-Yellow, Sw. Col. 4, to Playfield Sw.
- J206-5 Green-Black, Sw. Col. 5, to Playfield Sw.
- J206-6 Green-Blue, Sw. Col. 6, to Playfield Sw.
- J206-7 Not Used
- J206-8 Key
- J206-9 Not Used

J207 Not Used

- J208-1 White-Brown, Sw. Row 1, to Playfield Sw.
- J208-2 White-Red, Sw. Row 2, to Playfield Sw.
- J208-3 White-Orange, Sw. Row 3, to Playfield Sw.
- J208-4 White-Yellow, Sw. Row 4, to Playfield Sw.
- J208-5 White-Green, Sw. Row 5, to Playfield Sw.
- J208-6 Key
- J208-7 White-Blue, Sw. Row 6, to Playfield Sw.
- J208-8 White-Violet, Sw. Row 7, to Playfield Sw.
- J208-9 White-Gray, Sw. Row 8, to Playfield Sw.
- J208-10 Not Used
- J208-11 Not Used
- J208-12 Black-Blue, F3, to Lower Left E.O.S. Sw.
- J208-13 Black-Green, F1, to Lower Right E.O.S. Sw.
- J208-14 Orange, Ground to E.O.S. Sw.

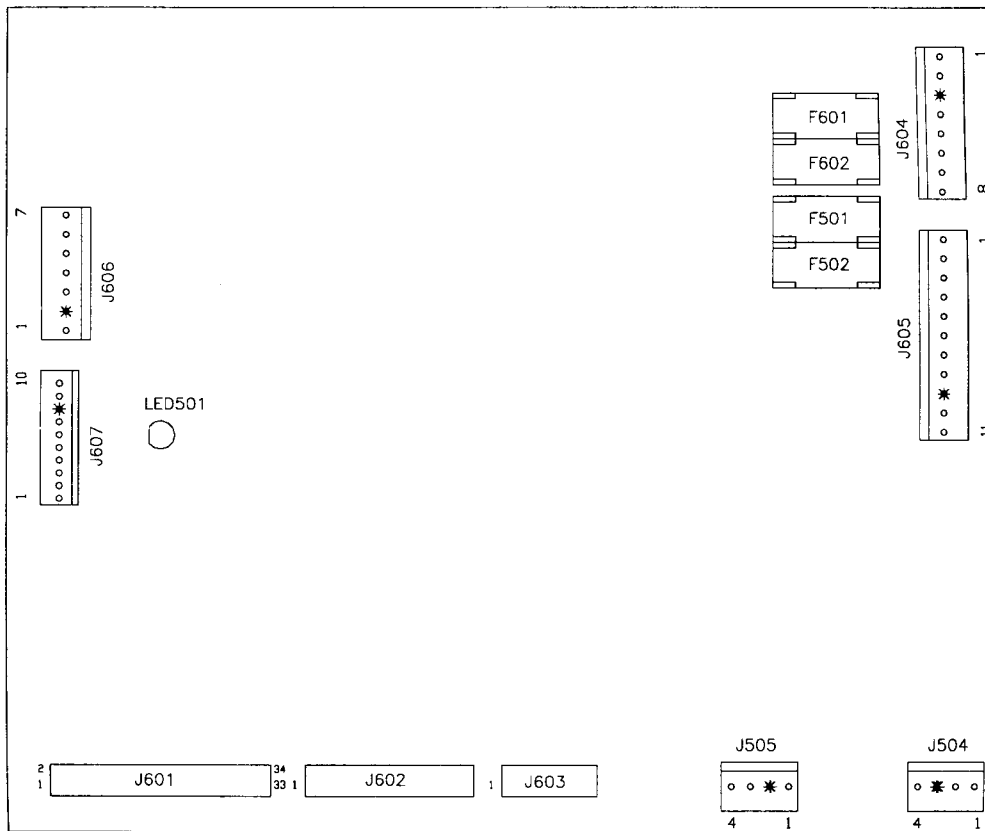
J209 Not Used

- J210-1 Black, Ground, to/from J101-7, J606-1
- J210-2 Key
- J210-3 Black, Ground, to/from J101-5, J606-3
- J210-4 Gray, +5V, to/from J101-4, J606-4
- J210-5 Gray, +5V, to/from J101-3, J606-5
- J210-6 Gray-Green, +12V, to/from J101-2, J606-6
- J210-7 Gray-Green, +12V, to/from J101-1, J606-7

J211 34-Pin Ribbon Cable, Data to/from J102

- J212-1 Green-Brown, Sw. Col. 1, to Coin Door Board J3-1
- J212-2 Green-Red, Sw. Col. 2, to Coin Door Board J3-2
- J212-3 Not Used
- J212-4 White-Brown, Sw. Row 1, to Coin Door Board J3-3
- J212-5 Key
- J212-6 White-Red, Sw. Row 2, to Coin Door Board J3-4
- J212-7 White-Orange, Sw. Row 3, to Coin Door Board J3-5
- J212-8 White-Yellow, Sw. Row 4, to Coin Door Board J3-6
- J212-9 Black-Blue, F8, to Left Flipper Opto Board J1-1
- J212-10 Black-Yellow, F6, to Right Flipper Opto Board J1-1
- J212-11 Blue-Gray, F4, to Left Flipper Opto Board J1-2
- J212-12 Blue-Violet, F2, to Right Flipper Opto Board J1-2
- J212-13 Orange, Ground to Right Flipper Opto Board J1-3

## Audio Visual Board Assembly A-20516-50041



J601 34-Pin Ribbon Cable, Data to CPU J202

J602 26-Pin Ribbon Cable, Data to CPU J201

J603 14-Pin Ribbon Cable, Data to/from Dot Matrix Display Driver

J604-1 Orange, -125V to Display Driver Pin 8

J604-2 Blue, -113V to Display Driver Pin 7

J604-3 Key

J604-4 Black, Ground to Display Driver Pin 5

J604-5 Black, Ground to Display Driver Pin 4

J604-6 Gray, +5V to Display Driver Pin 3

J604-7 Gray-Yellow, +12 to Display Driver Pin 2

J604-8 Brown, +62 to Display Driver Pin 1

J605-1 White, 80VAC from Transformer Secondary

J605-2 White, 80VAC from Transformer Secondary

J605-3 Violet, 100VAC from Transformer Secondary

J605-4 Violet, 100VAC from Transformer Secondary

J605-5 Gray-White, 18VAC from Transformer Secondary

J605-6 Gray-White, Loop End from J605-5

J605-7 Gray, 18VAC from Transformer Secondary

J605-8 Gray, Loop End from J605-7

J605-9 Not Used

J605-10 Gray-Green, 18VAC from Transformer Secondary

J605-11 Gray-Green, 18VAC Loop End from J605-10

J606-1 Black, Ground to/from J101-7, J210-1

J606-2 Key

J606-3 Black, Ground to/from J101-5, J210-3

J606-4 Gray, +5V to/from J101-4, J210-4

J606-5 Gray, +5V to/from J101-3, J210-5

J606-6 Gray-Green, +12V to/from J101-2, J210-6

J606-7 Gray-Green, +12V to/from J101-1, J210-7

J607 Not Used

J504-1 Black-Yellow, Signal to Cabinet Speaker

J504-2 Key

J504-3 Not Used

J504-4 Black, Signal to Cabinet Speaker

J505-1 Black-Yellow, Signal to Backbox Speaker

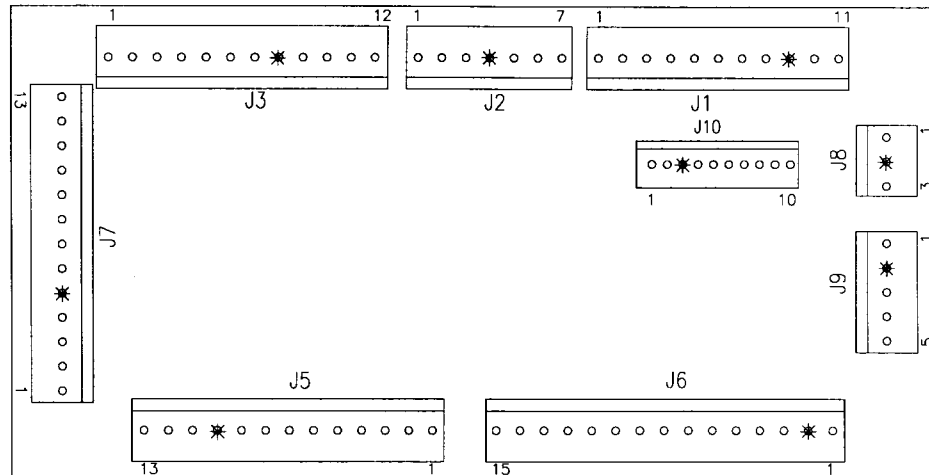
J505-2 Not Used

J505-3 Key

J505-4 Black, Signal to Backbox Speaker



## Coin Door Interface Board A-20580



J1-1 Orange-Gray, Ded. Sw. Row 8 Form CPU J205-9  
 J1-2 Orange-Violet, Ded. Sw. Row 7 from CPU J205-8  
 J1-3 Orange-Blue, Ded. Sw. Row 6 from CPU J205-7  
 J1-4 Orange-Green, Ded. Sw. Row 5 from CPU J205-6  
 J1-5 Orange-Yellow, Ded. Sw. Row 4 from CPU J205-4  
 J1-6 Orange-Black, Ded. Sw. Row 3 from CPU J205-3  
 J1-7 Orange-Red, Ded. Sw. Row 2 from CPU J205-2  
 J1-8 Orange-Brown, Ded. Sw. Row 1 from CPU J205-1  
 J1-9 Key  
 J1-10 Black, Ground from CPU J205-10  
 J1-11 Orange-White, Sw. Enable from CPU J205-12

J2-1 Black, Ground from Power Driver Board J141-3  
 J2-2 Gray-Yellow, +12VAC For Power Driver Bd. J141-2  
 J2-3 White-Violet, G.I. 6.8VAC from Power Driver J104-1  
 J2-4 Key  
 J2-5 Violet, G.I. from Power Driver Bd. J104-3  
 J2-6 Not Used  
 J2-7 Black-White from J139-5

J3-1 Green-Brown, Sw. Col. 1 from CPU J212-1  
 J3-2 Green-Red, Sw. Col. 2 from CPU J212-2  
 J3-3 White-Brown, Sw. Row 1 from CPU J212-4  
 J3-4 White-Red, Sw. Row 2 from CPU J212-6  
 J3-5 White-Orange, Sw. Row 3 from CPU J212-7  
 J3-6 White-Yellow, Sw. Row 4 from CPU J212-8  
 J3-7 Key  
 J3-8 Yellow-Gray, Lamp Col. 8 from Power Driver J122-3  
 J3-9 Red-Blue, Lamp Row 6 from Power Driver J126-7  
 J3-10 Red-Violet, Lamp Row 7 from Power Driver J126-8  
 J3-11 Red-Gray, Lamp Row 8 from Power Driver J126-9

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, Ded. Sw. Row 1 to Coin Door  
 J5-5 Orange-Red, Ded. Sw. Row 2 to Coin Door  
 J5-6 Not Used  
 J5-7 Orange-Green, Ded. Sw. Row 5 to Coin Door  
 J5-8 Orange-Blue, Ded. Sw. Row 6 to Coin Door  
 J5-9 Orange-Violet, Ded. Sw. Row 7 to Coin Door  
 J5-10 Key  
 J5-11 Orange-Gray, Ded. Sw. Row 8 to Coin Door  
 J5-12 Green-Red, Sw. Col. 2 to Coin Door Slam Tilt  
 J5-13 White-Brown, Sw. Row 1 to Coin Door Slam Tilt

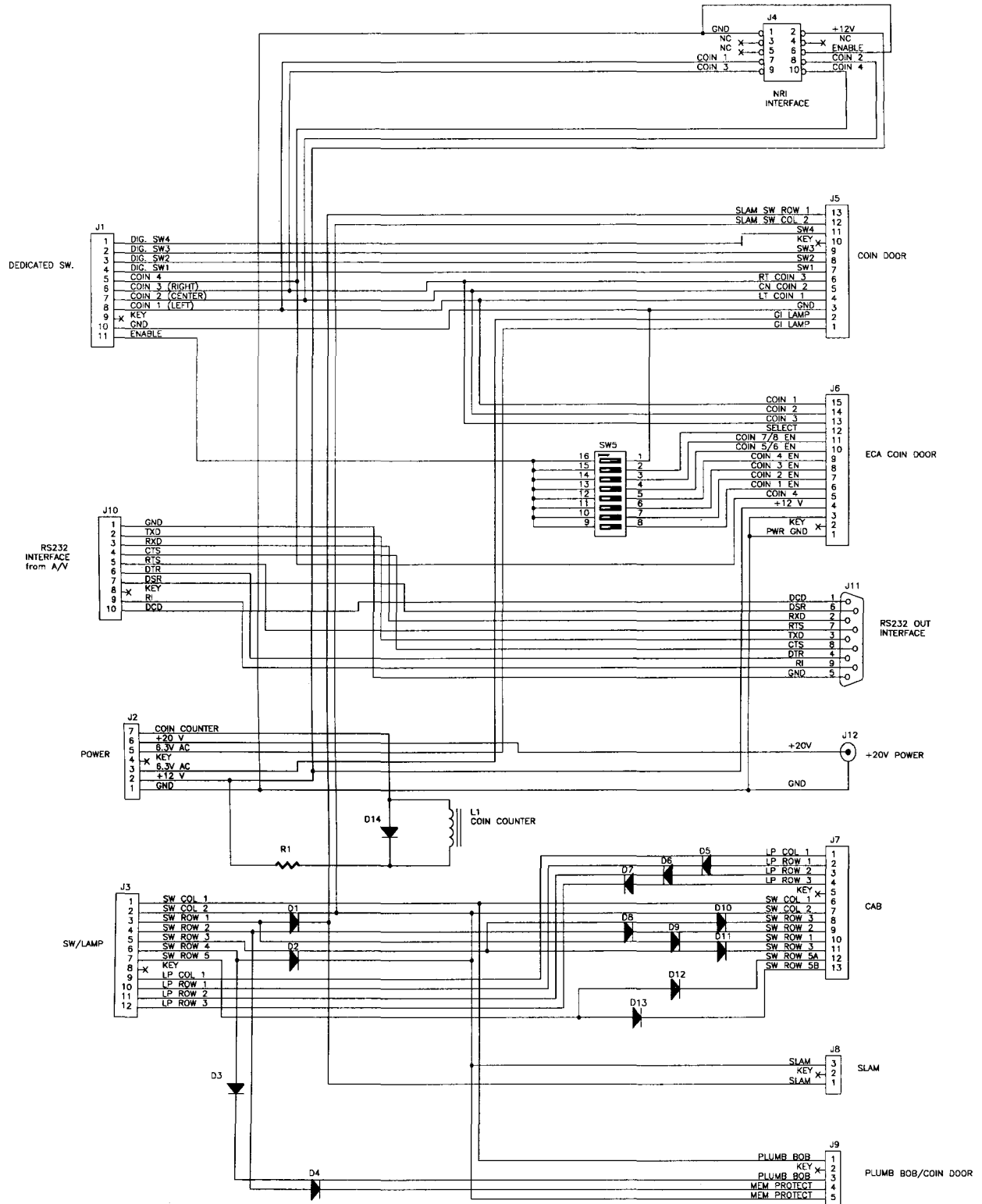
J6 Not Used

J7-1 Yellow-Gray, Lamp Col. 8 to Cabinet  
 J7-2 Red-Blue, Lamp Row 6 to Cabinet  
 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, Sw. Col. 1 to Cabinet  
 J7-7 Green-Red, Sw. Col. 2 to Cabinet  
 J7-8 White-Orange, Sw. Row 3 to Cabinet  
 J7-9 Not Used  
 J7-10 White-Brown, Sw. Row 1 to Cabinet  
 J7-11 White-Orange, Sw. Row 3 to Cabinet


J8-1 White, Sw. Row to Cabinet Slam Tilt  
 J8-2 Key  
 J8-3 Green, Sw. Col. to Cabinet Slam Tilt

J9-1 White-Yellow, Sw. Row 4 to Plumb Bob Tilt  
 J9-2 Key  
 J9-3 Green-Brown, Sw. Col. 1 to Plumb Bob Tilt  
 J9-4 White-Red, Sw. Row 2 to Interlock Sw.  
 J9-5 Green-Red, Sw. Col. 2 to Interlock Sw.

# Coin Door Interface Board Schematic A-20580




# LAMP MATRIX

Yellow (B+)  Red

| Column \ Row                   | 1<br>Yellow-Brown<br>J121-1<br>Q96 | 2<br>Yellow-Red<br>J121-2<br>Q100 | 3<br>Yellow-Orange<br>J121-3<br>Q95 | 4<br>Yellow-Black<br>J121-4<br>Q99 | 5<br>Yellow-Green<br>J121-5<br>Q94 | 6<br>Yellow-Blue<br>J121-6<br>Q98 | 7<br>Yellow-Violet<br>J121-7<br>Q93 | 8<br>Yellow-Gray<br>J121-9<br>Q97 |
|--------------------------------|------------------------------------|-----------------------------------|-------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1<br>Red-Brown<br>J125-1 Q104  | SUPER JETS<br>11                   | BIG-O-BEAM 1<br>21                | TRACTOR BEAM 1<br>31                | RIGHT LOOP ARROW<br>41             | ATTACK MARS<br>51                  | MARTIA" N TARGET<br>61            | CAPTURE 1<br>71                     | SHOOT AGAIN<br>81                 |
| 2<br>Red-Black<br>J125-2 Q108  | SUPER JACKPOT<br>12                | BIG-O-BEAM 2<br>22                | TRACTOR BEAM 2<br>32                | CENTER RAMP ARROW<br>42            | D.C. U.S.A.<br>52                  | MARTIA" N TARGET<br>62            | CAPTURE 2<br>72                     | LEFT OUTLANE<br>82                |
| 3<br>Red-Orange<br>J125-4 Q103 | MARTIAN ATTACK MULTIBALL<br>13     | BIG-O-BEAM 3<br>23                | TRACTOR BEAM 3<br>33                | LEFT TOP LANE<br>43                | LONDON ENGLAND<br>53               | ATOMIC BLASTER 1<br>63            | CAPTURE 3<br>73                     | LEFT RETURN<br>83                 |
| 4<br>Red-Yellow<br>J125-5 Q107 | ANNIHILATION<br>14                 | LEFT RAMP JACKPOT<br>24           | RIGHT RAMP JACKPOT<br>34            | RIGHT TOP LANE<br>44               | LIGHT LOCK<br>54                   | ATOMIC BLASTER 2<br>64            | LEFT LOOP JACKPOT<br>74             | RIGHT RETURN<br>84                |
| 5<br>Red-Green<br>J125-6 Q102  | RETURN TO BATTLE<br>15             | LEFT RAMP ARROW<br>25             | RIGHT RAMP ARROW<br>35              | LEFT MOTOR BANK<br>45              | LOCK 1<br>55                       | ATOMIC BLASTER 3<br>65            | LEFT LOOP ARROW<br>75               | RIGHT OUTLANE<br>85               |
| 6<br>Red-Blue<br>J125-7 Q106   | CONQUER MARS<br>16                 | LOCK 2<br>26                      | MARTIAN ATTACK<br>36                | CENTER MOTOR BANK<br>46            | PISA ITALY<br>56                   | RIGHT LOOP JACKPOT<br>66          | "M"ARTIAN TARGET<br>76              | LAUNCH BUTTON<br>86               |
| 7<br>Red-Violet<br>J125-8 Q101 | 5-WAY COMBO<br>17                  | LOCK 3<br>27                      | RULE UNIVERSE<br>37                 | RIGHT MOTOR BANK<br>47             | BERLIN GERMANY<br>57               | EXTRA BALL<br>67                  | M"ARTIAN TARGET<br>77               | NOT USED<br>87                    |
| 8<br>Red-Gray<br>J125-9 Q105   | DROP TARGET<br>18                  | CENTER RAMP JACKPOT<br>28         | STROKE OF LUCK<br>38                | MARTIAN TARGET<br>48               | PARIS FRANCE<br>58                 | MARTIAN TARGET<br>68              | MARTIAN TARGET<br>78                | START BUTTON<br>88                |


J1XX = Power Driver Board

# SWITCH MATRIX

White  Green

| Dedicated Grounded Switches   | Column \ Row                         | 1<br>Green-Brown<br>J206-1<br>U20-18 | 2<br>Green-Red<br>J206-2<br>U20-17 | 3<br>Green-Orange<br>J206-3<br>U20-16 | 4<br>Green-Yellow<br>J206-4<br>U20-15 | 5<br>Green-Black<br>J206-5<br>U20-14 | 6<br>Green-Blue<br>J206-6<br>U20-13 | 7<br>Green-Violet<br>J206-7<br>U20-12 | 8<br>Green-Gray<br>J206-9<br>U20-11 | Flipper Grounded Switches   |
|---|--------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|---|
| Orange-Brown<br>J205-1 U17-5<br>Left Coin Chute D1                                    | 1<br>White-Brown<br>J208-1<br>U18-11 | LAUNCH BUTTON<br>11                  | SLAM TILT<br>21                    | TROUGH EJECT<br>31                    | MARTIA" N TARGET<br>41                | LEFT SLINGSHOT<br>51                 | LEFT RAMP ENTER<br>61               | RIGHT LOOP HIGH<br>71                 | NOT USED<br>81                      | Black-Green<br>J208-13<br>Lower Right Flipper EOS F1                |
| Orange-Red<br>J205-2 U17-7<br>Center Coin Chute D2                                    | 2<br>White-Red<br>J208-2<br>U18-9    | NOT USED<br>12                       | COIN DOOR CLOSED<br>22             | TROUGH BALL 1<br>32                   | MARTIA" N TARGET<br>42                | RIGHT SLINGSHOT<br>52                | CENTER RAMP ENTER<br>62             | RIGHT LOOP LOW<br>72                  | NOT USED<br>82                      | Blue-Violet<br>J212-12<br>Lower Right Flipper Opto F2               |
| Orange-Black<br>J205-3 U17-11<br>Right Coin Chute D3                                  | 3<br>White-Orange<br>J208-3<br>U18-5 | START BUTTON<br>13                   | NOT USED<br>23                     | TROUGH BALL 2<br>33                   | MARTIAN TARGET<br>43                  | LEFT JET<br>53                       | RIGHT RAMP ENTER<br>63              | LEFT LOOP HIGH<br>73                  | NOT USED<br>83                      | Black-Blue<br>J208-12<br>Lower Left Flipper EOS F3                  |
| Orange-Yellow<br>J205-4 U17-9<br>4th Coin Chute D4                                    | 4<br>White-Yellow<br>J208-4<br>U18-7 | PLUMB BOB TILT<br>14                 | ALWAYS CLOSED<br>24                | TROUGH BALL 3<br>34                   | MARTIAN TARGET<br>44                  | BOTTOM JET<br>54                     | LEFT RAMP EXIT<br>64                | LEFT LOOP LOW<br>74                   | NOT USED<br>84                      | Blue-Gray<br>J212-11<br>Lower Left Flipper Opto F4                  |
| Orange-Green<br>J205-6 U16-9<br>Normal Function: Ser Credits<br>Test Function: Esc D5 | 5<br>White-Green<br>J208-5<br>U19-11 | NOT USED<br>15                       | NOT USED<br>25                     | TROUGH BALL 4<br>35                   | LEFT MOTOR BANK<br>45                 | RIGHT JET<br>55                      | RIGHT RAMP EXIT<br>65               | LEFT SAUCER TARGET<br>75              | NOT USED<br>85                      | Black-Violet<br>J208-11<br>Upper Right Flipper EOS F5<br>(NOT USED) |
| Orange-Blue<br>J205-7 U16-11<br>Normal Function: Vol Down<br>Test Function: Down D6   | 6<br>White-Blue<br>J208-7<br>U19-9   | LEFT OUTLANE<br>16                   | LEFT RETURN<br>26                  | LEFT POPPER<br>36                     | CENTER MOTOR BANK<br>46               | "M"ARTIAN TARGET<br>56               | MOTOR BANK DOWN<br>66               | RIGHT SAUCER TARGET<br>76             | NOT USED<br>86                      | Black-Yellow<br>J212-10<br>Upper Right Flipper Opto F6              |
| Orange-Violet<br>J205-8 U16-7<br>Normal Function: Vol Up<br>Test Function: Up D7      | 7<br>White-Violet<br>J208-8<br>U19-5 | RIGHT RETURN<br>17                   | RIGHT OUTLANE<br>27                | RIGHT POPPER<br>37                    | RIGHT MOTOR BANK<br>47                | M"ARTIAN TARGET<br>57                | MOTOR BANK UP<br>67                 | DROP TARGET<br>77                     | NOT USED<br>87                      | Black-Gray<br>J208-10<br>Upper Left Flipper EOS F7<br>(NOT USED)    |
| Orange-Gray<br>J205-9 U16-5<br>Normal Function: Begin Test<br>Test Function: Enter D8 | 8<br>White-Gray<br>J208-9<br>U19-7   | SHOOTER LANE<br>18                   | NOT USED<br>28                     | LEFT TOP LANE<br>38                   | RIGHT TOP LANE<br>48                  | MA"RTIAN TARGET<br>58                | NOT USED<br>68                      | CENTER TROUGH<br>78                   | NOT USED<br>88                      | Black-Blue<br>J212-9<br>Upper Left Flipper Opto F8                  |

J2XX = CPU Board;

 = Opto, Typically Closed

# 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 Attack from Mars 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.

|            |               |             |
|------------|---------------|-------------|
| TESTING    |               |             |
| 50041      |               | EPROM D.0 A |
| <b>541</b> | <b>100020</b> | 65349       |