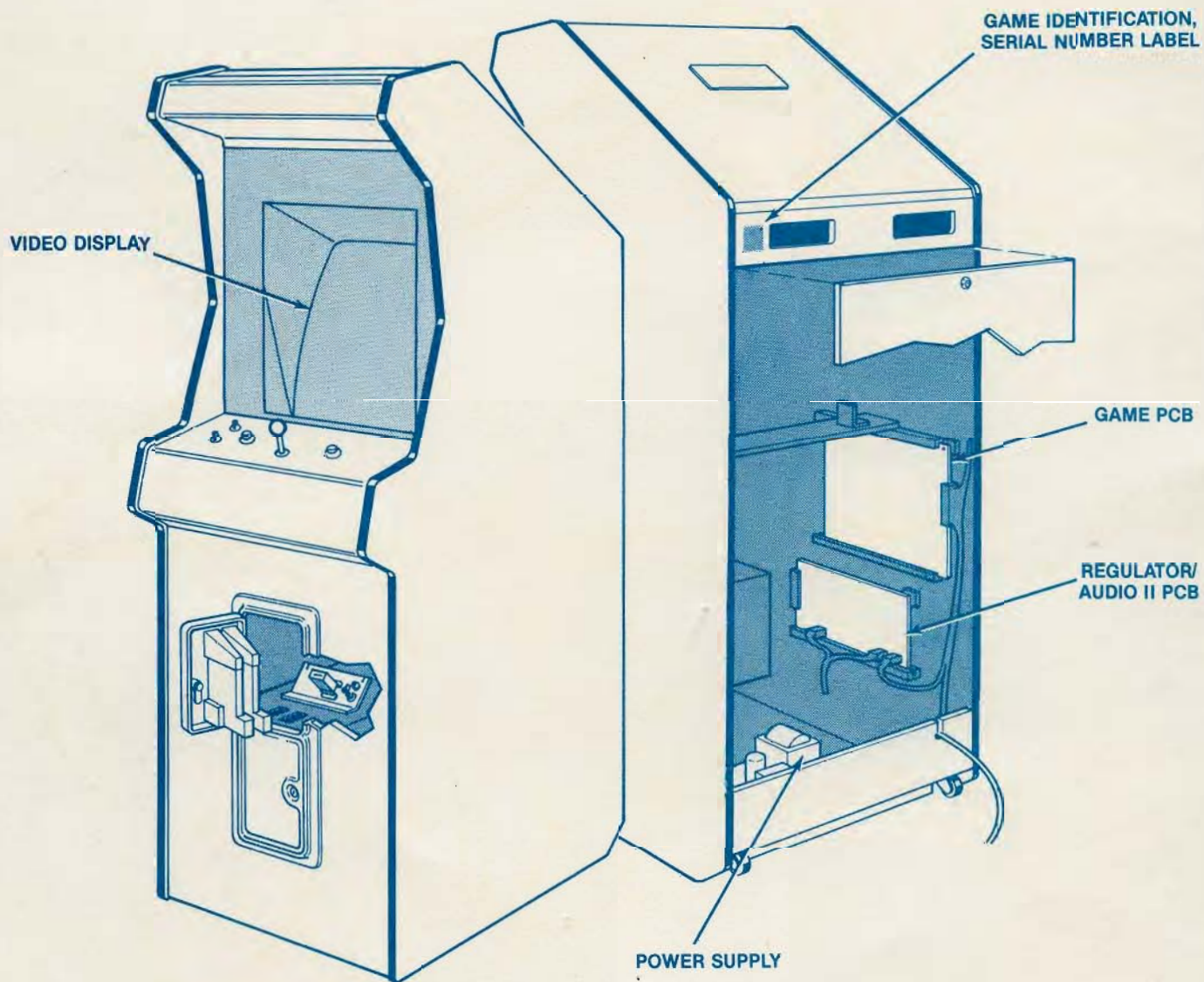


# **FAST** **FREDDIE**™

Operation, Maintenance and Service Manual  
Complete with Illustrated Parts Lists

## GAME SERIAL NUMBER LOCATION

Your game's serial number is printed on a label on the outside back of the game. The same number is also printed on a label on the chassis of the video display, power supply, Regulator/Audio II Printed Circuit Board (PCB), and the game PCB. Please mention this number when calling your distributor for service.

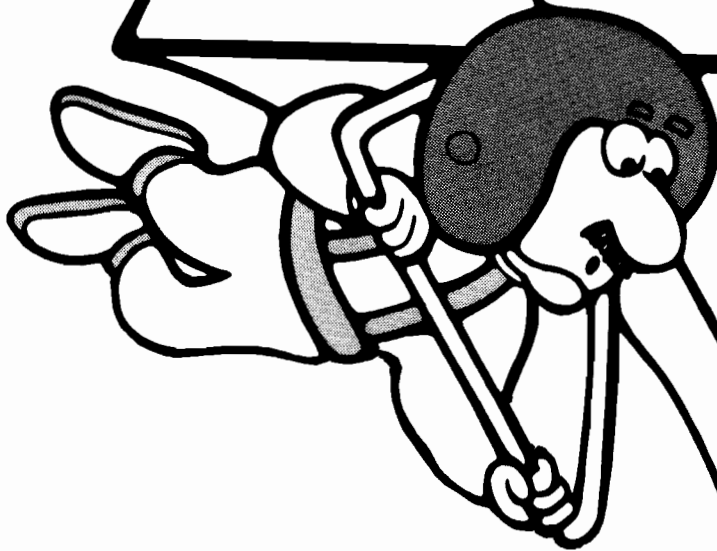


**FAST**

**FREDDIE™**

Operation, Maintenance  
and Service Manual

Complete with  
Illustrated Parts Lists



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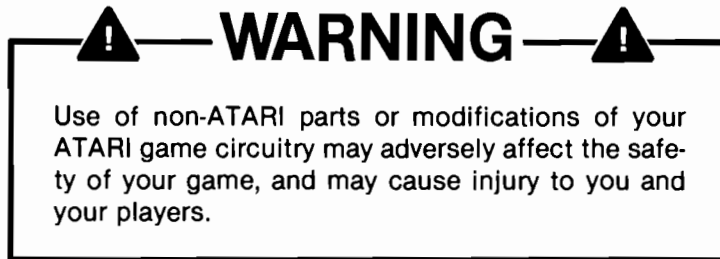
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The warranty printed on the inside back cover of this manual may be voided, if you do any of the following:

- 1) Substitute non-ATARI parts in your coin-operated game, or
- 2) Modify or alter any circuits in your ATARI game by using kits or parts **not** supplied by Atari.

Not only may the use of any non-ATARI parts void the warranty, but any such alteration may also adversely affect the safety of the game, and may cause injury to you and your players.

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If reading through this manual does not lead to solving a certain maintenance problem, call TELEHELP® at the Atari Customer Service office in your geographical area, as shown below.

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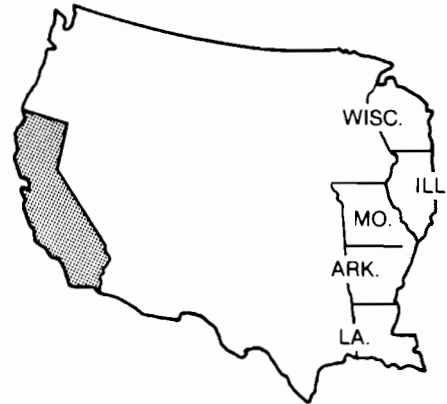
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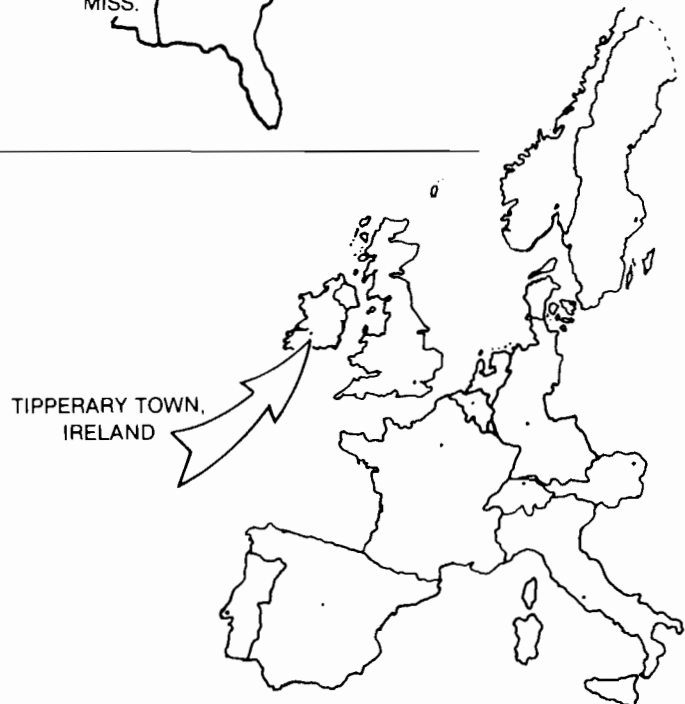
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062-52155





# Set-Up Procedures



## How to Use This Manual

This manual, written for game operators and service technicians, describes the Fast Freddie™ game.

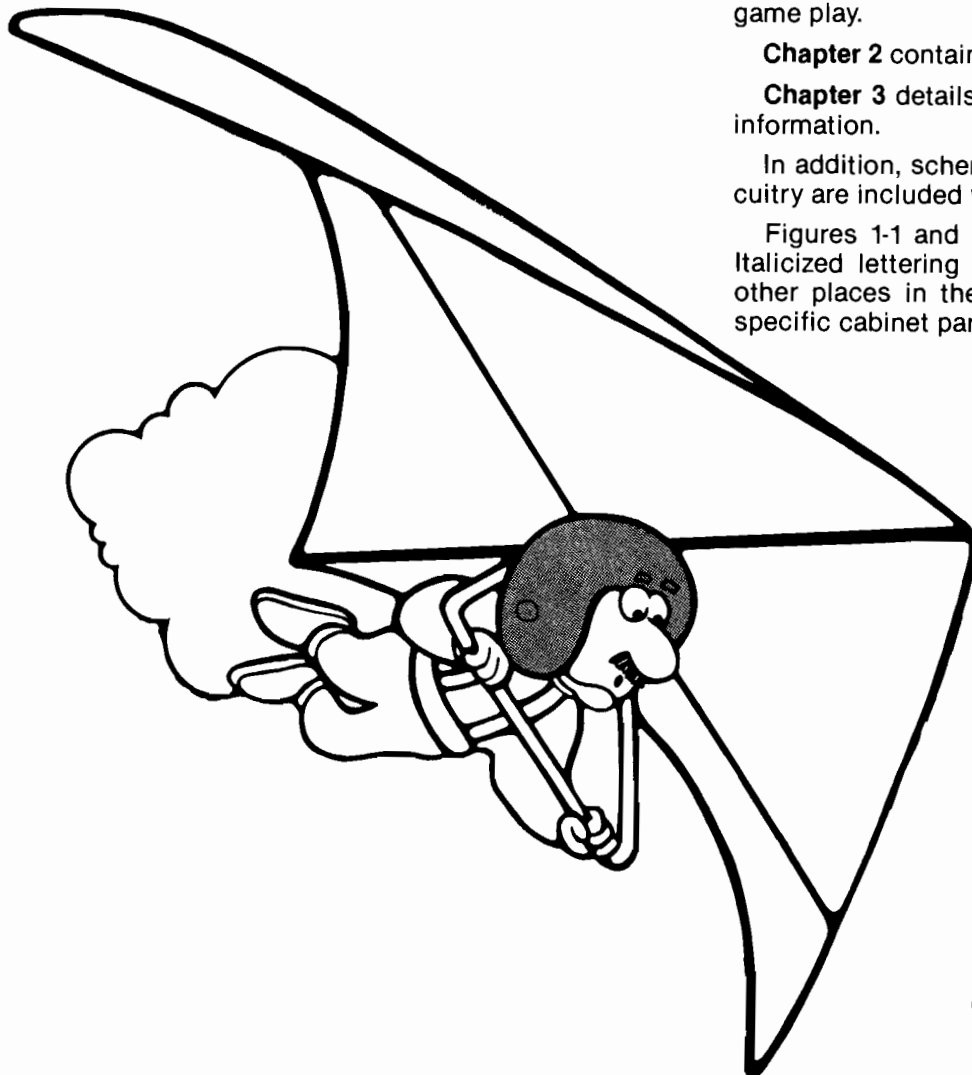
**Chapter 1** describes new features, game setup, option switch settings, self-test procedures, and game play.

**Chapter 2** contains troubleshooting procedures.

**Chapter 3** details maintenance, repair, and parts information.

In addition, schematic diagrams of the game circuitry are included with this manual.

Figures 1-1 and 3-1 illustrate the game cabinet. Italicized lettering on these figures refers you to other places in the manual for information about specific cabinet parts.



Chapter

**1**

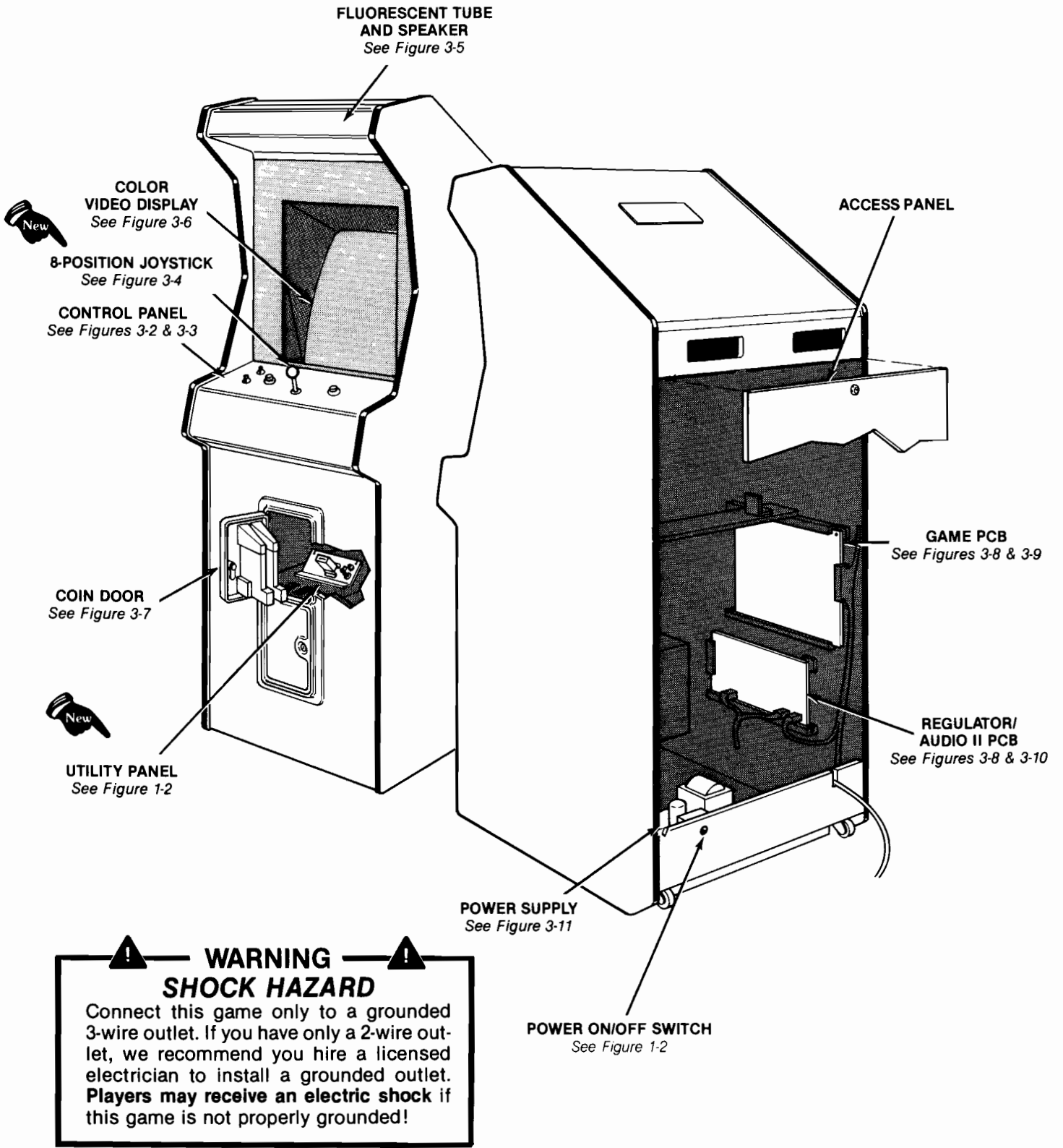


Figure 1-1 Game Overview

## A. New Features

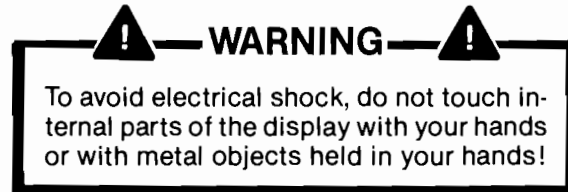
The Fast Freddie™ game has three new features. Even if you are familiar with ATARI® games, you should note these important differences:

1. **Joystick Control.** This new eight-position control is made of steel and molded plastic. It has few parts, which make servicing easier. The leaf switches snap in and out for easy replacement. The rubber bellows are designed for a quick return to center.
2. **Game Cabinet.** The Fast Freddie™ cabinet has several new features. The cabinet grille is both a speaker grille and display-shield retainer. In addition, the upper part of the display shield also serves as the attraction panel.
3. **Key Loops.** The utility panel has two key loops. This provides a convenient place to store keys for the rear access panel and lower coin door.

New features and all other major parts in the game are illustrated in Figure 1-1. Throughout this manual, wherever one of these new features is mentioned, you will see this symbol:



- c. Remove the tie-wrap that holds the coiled power cord on the inside cabinet wall. Check the power cord for any cuts or dents in the insulation. Place the square black plastic strain-relief plate in the wood slot at the bottom of the rear panel opening.



- d. Note the game serial number. It is printed on a label on the back of the cabinet. Verify that the same serial number is also on the Fast Freddie game PCB, Regulator/Audio II PCB, power supply, and video display. A drawing of the serial-numbered components is on the inside front cover of this manual. Please mention this number whenever you call your distributor for service.
- e. Check major subassemblies, such as the power supply, control panel, and video display for secure mounting.

## B. Game Inspection

Please inspect your game carefully to ensure that it was delivered to you in good condition.

### NOTE

Do not plug the game in yet!

1. Examine the exterior of the game cabinet for dents, chips, or broken parts.
2. Remove the screws that were used as extra security to seal the rear access panel. Unlock and open this panel and the coin door; inspect the interior of the game as follows:
  - a. Check that all plug-in connectors (on the game harness) are firmly seated. Replug any connectors found unplugged. **Don't force connectors together.** The connectors are keyed so they only go on in the proper orientation. **A reversed edge connector will damage a PCB** and will void your warranty.
  - b. Check that all plug-in integrated circuits on the PCB are firmly seated in their sockets.

## C. Game Installation

### 1. Installation Requirements

Power	150 W
Temperature	0 to 38°C (32 to 100°F)
Humidity	Not over 95% relative
Space Required	64 x 79 cm (25 $\frac{3}{8}$ x 31 in.)
Game Height	174 cm (68 $\frac{3}{4}$ in.)

### 2. Voltage Selection

The power supply used in this game operates on the line voltage of almost any country in the world. The power supply may have three different voltage selection plugs: 100 VAC (violet wire color), 220 VAC (blue wire color), and 240 VAC (brown wire color).

Before plugging in your game, check your line voltage. Then check the wire color on the voltage selection plug that is plugged into your power supply. Make sure the voltage selection plug is correct for your location's line voltage (see *Figure 3-11*).

# D. Switch Locations

## 1. On/Off Switch

The on/off switch is located on the back of the cabinet, lower left side (see *Figure 1-2*).

## 2. Utility Panel Switches

The utility panel includes the volume control, self-test, coin switch, and coin counter(s). The coin switch is used to credit the game, and it activates

the left coin counter. These switches are located inside the upper coin door (see *Figure 1-2*).

## 3. Option Switches

Option switches are located on the game PCB at location B5 (see *Figure 1-2*).

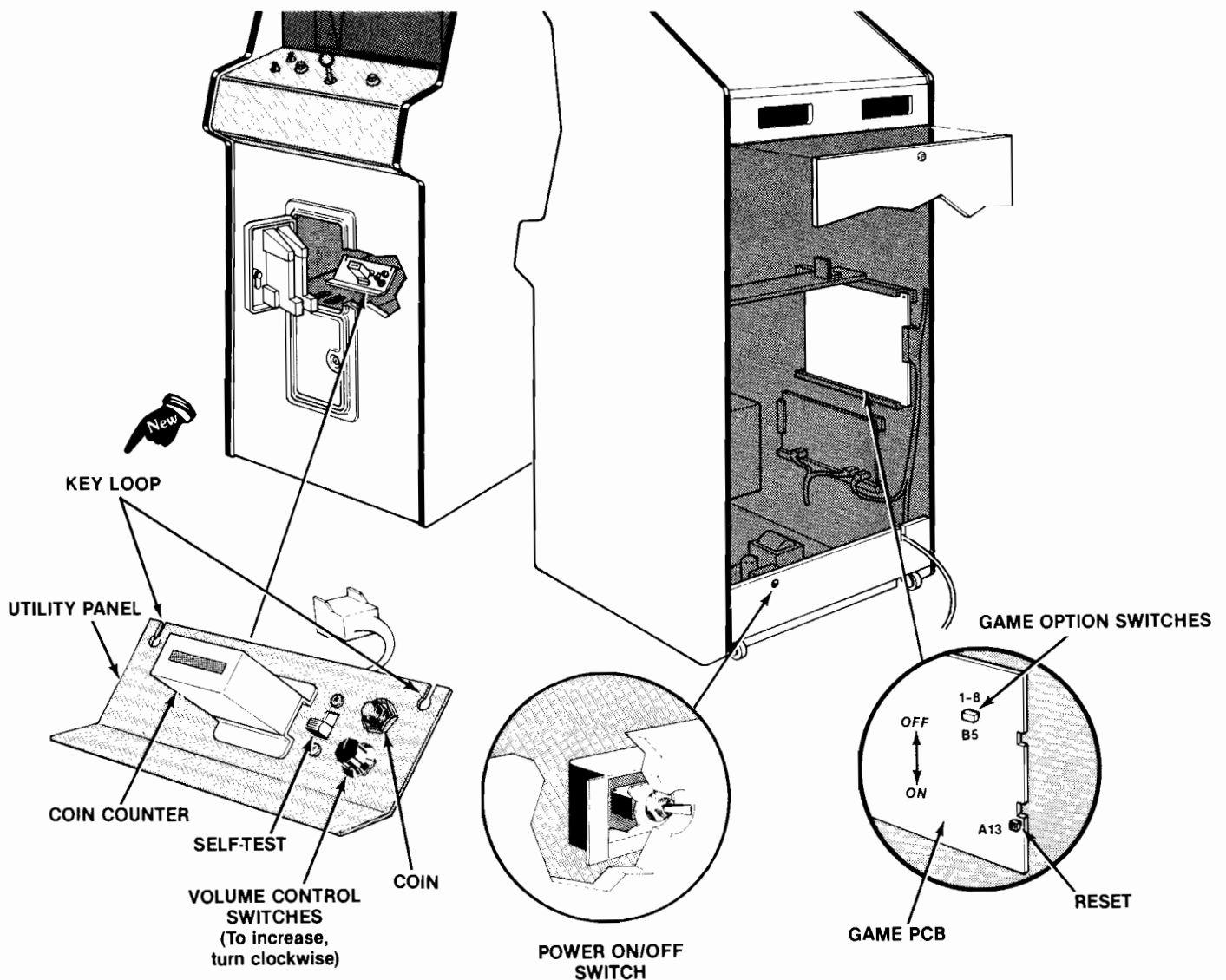


Figure 1-2 Game Switch Locations

# E. Option Switch Settings

Table 1-1 details game option switch settings on the game PCB. Options are preset at the factory and shown by the ◀ symbols. However, you may change the settings to suit your individual needs.

To verify option switch settings, push reset button or power the game off and then on again. Set the self-test switch to *on* and verify the settings on the self-test screen. Then set the self-test switch to *off*.

**Table 1-1 Option Switch Settings**

This table contains switch settings for options relating to game price, number of Fast Freddie lives, and bonus options. The switches are on the game PCB at location B5.

Settings of 8-Toggle Switch on Fast Freddie PCB (at B5)								Option
1	2	3	4	5	6	7	8	
								<b>Left Coin Mechanism</b> 1 coin counter
Off	Off	Off	Off					1 coin for 1 credit
On	Off	Off	Off					2 coins for 1 credit
Off	On	Off	Off					2 coins for 1 credit
On	On	Off	Off					1 coin for 1 credit
Off	Off	On	Off					1 coin for 1 credit
On	Off	On	Off					1 coin for 1 credit
Off	On	On	Off					1 coin for 1 credit
On	On	On	Off					1 coin for 1 credit
Off	Off	Off	On					1 coin for 2 credits
On	Off	Off	On					1 coin for 2 credits
Off	On	Off	On					1 coin for 2 credits
On	On	Off	On					1 coin for 2 credits
Off	Off	On	On					1 coin for 2 credits
On	Off	On	On					1 coin for 2 credits
Off	On	On	On					1 coin for 2 credits
On	On	On	On					Free play
				Off				3 Fast Freddie lives ◀
				On				5 Fast Freddie lives
					Off	Off		No bonus
					On	Off		Bonus life every 30,000 points
					Off	On		Bonus life every 50,000 points ◀
					On	On		Bonus life every 100,000 points
							Off	Upright cabinet ◀
							On	Cocktail cabinet

◀ *Manufacturer's recommended settings*

## F. Self-Test Procedure

This game will test itself and provide data to show that the game's circuitry and controls are operating properly. The data is provided on the video display and speaker. No additional equipment is necessary.

We suggest you perform the self-test procedure when you first set up the game, any time you collect money from the game, when you change game options, or when you suspect game failure.

Refer to Figure 1-2 for the location of the self-test switch and option switches. To perform the self-test, set the self-test switch to *on*. To end the self-test, set the self-test switch to *off*.

The complete self-test procedure is explained in *Chapter 2, Self-Test Procedure*. If a part of the test described in Figure 1-3 fails, refer to Chapter 2.

**Figure 1-3 Self-Test Procedure**

Instruction	Test Passes																				
1. Set the self-test switch to <i>on</i> (see Figure 1-2).	The screen shows the self-test display. The RAMs and ROMs are tested and if they are good, the screen displays <i>RAM OK</i> and <i>ROM OK</i> . If the screen is different from the self-test display, refer to <i>Chapter 2, Self-Test Procedure</i> .																				
2. Observe the eight colored squares.	Colors are blue, violet, green, yellow, light blue, white, red, and blue. If colors are not as described, refer to the raster-scan video display manual.																				
3. Activate control panel and coin switches.	The 0 changes to 1 as the switch is activated. If the test fails, refer to <i>Chapter 2, Self-Test Procedure</i> .  Push the joystick diagonally up and to the left. For proper game operation, both the top and left switches <b>must</b> close at the same time, and the top and left 0s should each become 1s. Push the joystick in the three other diagonal directions (up and right, down and left, down and right), repeating the above procedure. The corresponding pair of switches should close in the same manner. If the test fails, refer to <i>Chapter 3, 8-Position Joystick Assembly</i> .																				
4. Simultaneously press the start 1 and KICK switches.	A game sound is produced. To go to the next sound simultaneously press the start 1 and KICK switches. Test all 10 sounds in this manner. If test fails, refer to <i>Chapter 2, Self-Test Procedure</i> .  <div style="text-align: center;"> <p>Game Sounds</p> <table border="0"> <tr><td><i>SOUND 0</i></td><td>Beginning of round</td></tr> <tr><td><i>SOUND 1</i></td><td>Fast Freddie gliding</td></tr> <tr><td><i>SOUND 2</i></td><td>Fast Freddie kicking</td></tr> <tr><td><i>SOUND 3</i></td><td>Picking up a letter</td></tr> <tr><td><i>SOUND 4</i></td><td>Fast Freddie falling</td></tr> <tr><td><i>SOUND 5</i></td><td>Fast Freddie gliding</td></tr> <tr><td><i>SOUND 6</i></td><td>Airplane falling</td></tr> <tr><td><i>SOUND 7</i></td><td>Helicopter, bird falling</td></tr> <tr><td><i>SOUND 8</i></td><td>Genie falling</td></tr> <tr><td><i>SOUND 9</i></td><td>Landing on platform</td></tr> </table> </div>	<i>SOUND 0</i>	Beginning of round	<i>SOUND 1</i>	Fast Freddie gliding	<i>SOUND 2</i>	Fast Freddie kicking	<i>SOUND 3</i>	Picking up a letter	<i>SOUND 4</i>	Fast Freddie falling	<i>SOUND 5</i>	Fast Freddie gliding	<i>SOUND 6</i>	Airplane falling	<i>SOUND 7</i>	Helicopter, bird falling	<i>SOUND 8</i>	Genie falling	<i>SOUND 9</i>	Landing on platform
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<i>SOUND 7</i>	Helicopter, bird falling																				
<i>SOUND 8</i>	Genie falling																				
<i>SOUND 9</i>	Landing on platform																				
5. To end the self-test.	Simultaneously press the start 1 and start 2 switches. A cross-hatch pattern appears on the screen. Then set the self-test switch to <i>off</i> . The Attract Mode will now be displayed.																				

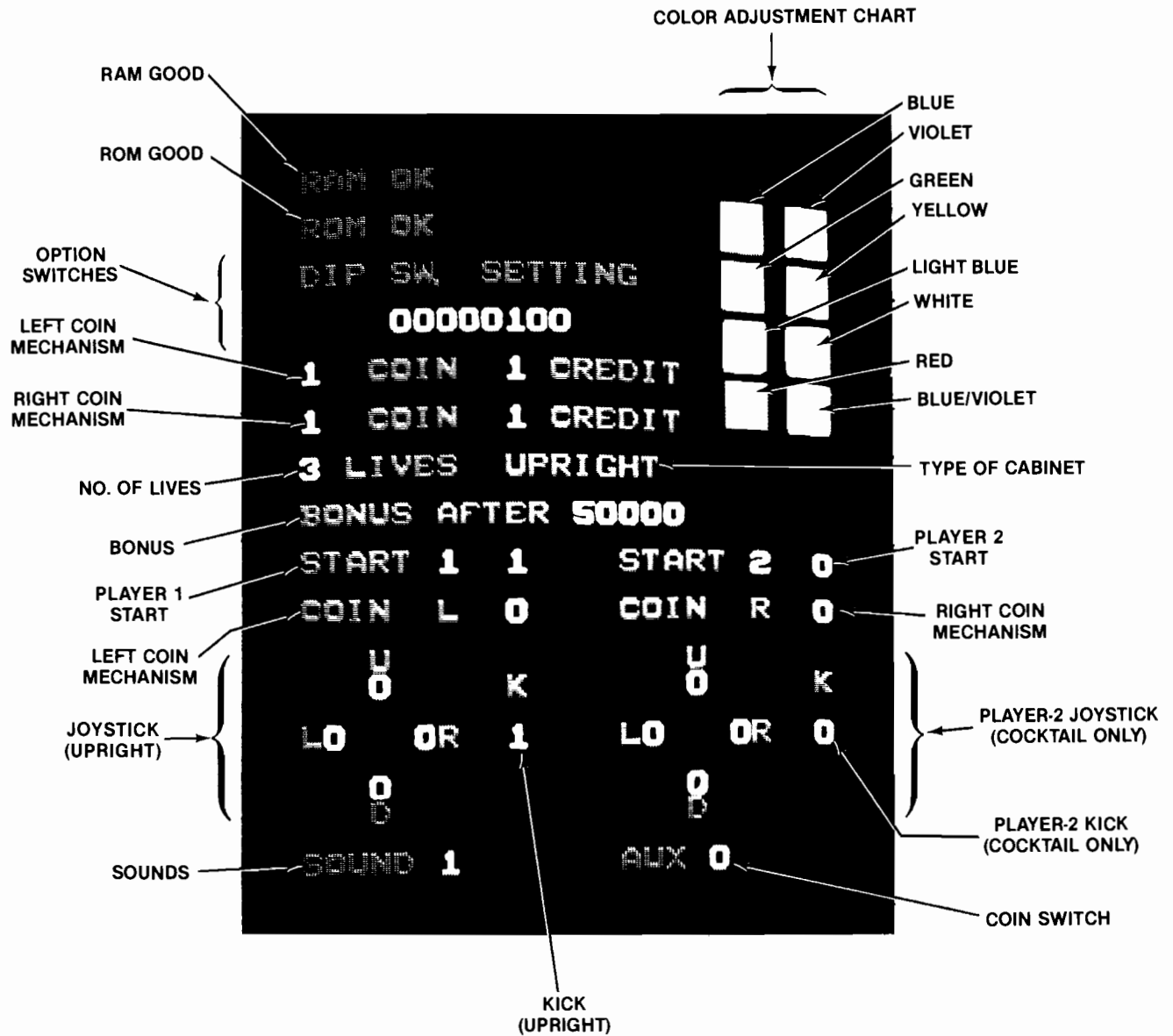


Figure 1-3 Self-Test Procedure, continued  
Self-Test Display

## G. Game Play

The Fast Freddie™ game is a one- or two-player game with a color raster-scan video display. The game depicts a hang-glider, Fast Freddie, gliding in the sky. Fast Freddie glides over the land and must avoid obstacles on the land and in the sky. As he glides along, he may pick up letters to spell the word *BONUS* for bonus points. He must pick up the letters in the correct order (*B* first, *O* second, etc). To end each round he must land on a landing platform.

Fast Freddie has six possible modes of operation: demonstration, attract, ready-to-play, play, high-score and self-test. Self-test is a special mode for checking the game switches and computer functions. You may enter self-test at any time. (All credits will be cancelled and the high score table will be erased.)

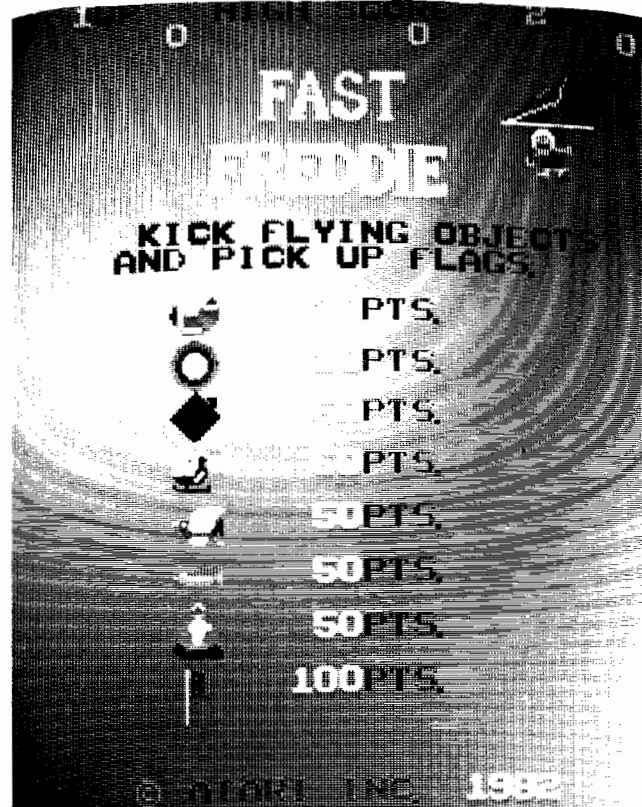
### 1. Demonstration Mode

Enter this mode by simultaneously pressing the coin switch and the self-test switch (see *Figure 2*). In this mode, you may see the more advanced rounds of game play. If Fast Freddie collides with any object in the sky, he does not crash. However, he must avoid obstacles on the ground and land on a platform to go to the next round. To end this mode, set the self-test switch to *off*.

### 2. Attract Mode

The attract mode begins when power is applied to the game, after a play or high-score mode, or after self-test. This mode lasts for about 35 seconds, and ends only when a credit is entered, or when in self-test. In the attract mode, the screen displays one of three possible pictures.

The first picture shows various ways a player may score points. At the top of the screen are the words *1UP*, *HIGH SCORE* and *2UP* (with corresponding scores). The words *FAST FREDDIE* flash on the screen and Fast Freddie is to the right of these words. The message *KICK FLYING OBJECTS AND PICK UP FLAGS* appears. Obstacles and their corresponding point value appear in the center of the screen. At the bottom of the screen is the message © ATARI, INC. 1982.



**Figure 1-4 Attract Mode Screen**

The second picture shows the high-score table. The words *1UP*, *HIGH SCORE* and *2UP* (with corresponding scores) appear at the top of the screen. The 10 highest scores and their corresponding initials appear in the center of the screen. The words © ATARI, INC. 1982 appear at the bottom of the screen.

The third picture shows one of three versions of game play. Fast Freddie glides over an alpine setting and a plane hits him and he crashes to the ground. Or he glides over the ocean and a bird sends him crashing down. Or he glides over Egypt and a genie on a flying carpet hits him and he crashes to the ground. The words *1UP*, *HIGH SCORE* and *2UP* (with corresponding scores) appear at the top of the screen. The words *SPELL BONUS* and *KICK* and a rectangular gauge showing the amount of kick appear at the bottom of the screen.



### 3. Ready-To-Play Mode

This mode begins when coins are inserted and accepted for game play. The words *1UP*, *HIGH SCORE* and *2UP* (with corresponding scores) appear at the top of the screen. The words *PUSH START BUTTON* and *ONLY 1PLAYER* or *1PLAYER OR 2PLAYER* and bonus life information appear in the center of the screen. The number of credits appears at the bottom right of the screen. If a game is set for two credits for one play and a player inserts only one coin, credits will not appear at the bottom of the screen until the second coin is inserted. This mode ends when a player presses a start button.

### 4. Play Mode

In the Play Mode, the player controls Fast Freddie with an eight-position joystick. Thus, the player

causes Fast Freddie to glide in the sky and to avoid obstacles on the land and in the sky. The player may use *KICK* to destroy objects in the sky that are below him. Fast Freddie begins each life with about 12 seconds of *KICK*. A rectangular gauge at the bottom right of the screen shows the amount of kick remaining.

Fast Freddie may pick up letters worth 100 points each to spell the word *BONUS* for bonus points. The letters he picks up are displayed on a line at the bottom of the screen. However, he must pick up the letters in the correct order to get the bonus points. If he spells the word *BONUS*, any remaining letters are worth 200 points each if picked up.

Round one begins with Fast Freddie on a mountain in an alpine setting. He runs off the top of the mountain and glides in the sky. As he glides along, a

**Table 1-2 Fast Freddie Game Play and Scoring**

<i>Round</i>	<i>Terrain</i>	<i>Obstacles</i>	<i>Points</i>
1	Alpine (summer)	Airplanes Helicopters	30 50
2	Sea (blue)	Airplanes Birds	30 50
3	Egypt (green)	Disks Genie on Carpet	30 50
4	Alpine (autumn)	Airplanes Helicopters	50 70
5	Sea (purple)	Airplanes Birds	50 70
6	Egypt (red)	Disks Flying Carpet	50 70
7	Alpine (winter)	Airplanes Helicopters	70 90
8	Sea (brown)	Airplanes Birds	70 90
9	Egypt (blue)	Genie on Carpet Flying Carpet	70 90

Gliding is worth 10 points per  $\frac{1}{8}$  inch (1.6 cm).

Picking up a letter on a flag is worth 100 points. If *BONUS* is spelled out, picking up a letter is worth 200 points.

Landing platforms are worth 1,000 to 5,000 points. If *BONUS* is spelled out, platforms are worth 5,000 to 25,000 points.

flag with a letter on it appears below. He may pick up the letter and begin to spell out the word *BONUS* for extra points. As he picks up a letter it is displayed on a line at the bottom of the screen. He must pick up the letters in the order they appear in the word. If he picks up a letter out of sequence, the letters appearing on the line at the bottom of the screen will be erased.

After a period of time, airplanes appear. They will destroy Fast Freddie if they hit him. The player uses his joystick to avoid the airplanes and KICK to destroy them. Fast Freddie must be above the airplanes (and other flying objects) to destroy them. A helicopter also appears, and Fast Freddie must avoid or destroy it also.

Toward the end of the round, landing platforms appear on the ground. Fast Freddie must land on a platform to end the round. Each platform has a different point value. If the word *BONUS* is not spelled out, the platforms are worth 5,000 to 25,000 points. If the word *BONUS* is spelled out, the platforms are worth 10,000 to 50,000 points. The words *LANDING TIME:10* also appear. Fast Freddie has 10 seconds to land. If the landing is successful the next round will begin.

Fast Freddie has nine rounds of game play. The first, fourth, and seventh rounds show an alpine setting in summer, autumn, and winter. The second, fifth, and eighth rounds depict an ocean setting with different colored backgrounds. The third, sixth, and ninth rounds take place in Egypt with different colored backgrounds. Each round has different obstacles. The game ends when all of Fast Freddie's lives are used up.

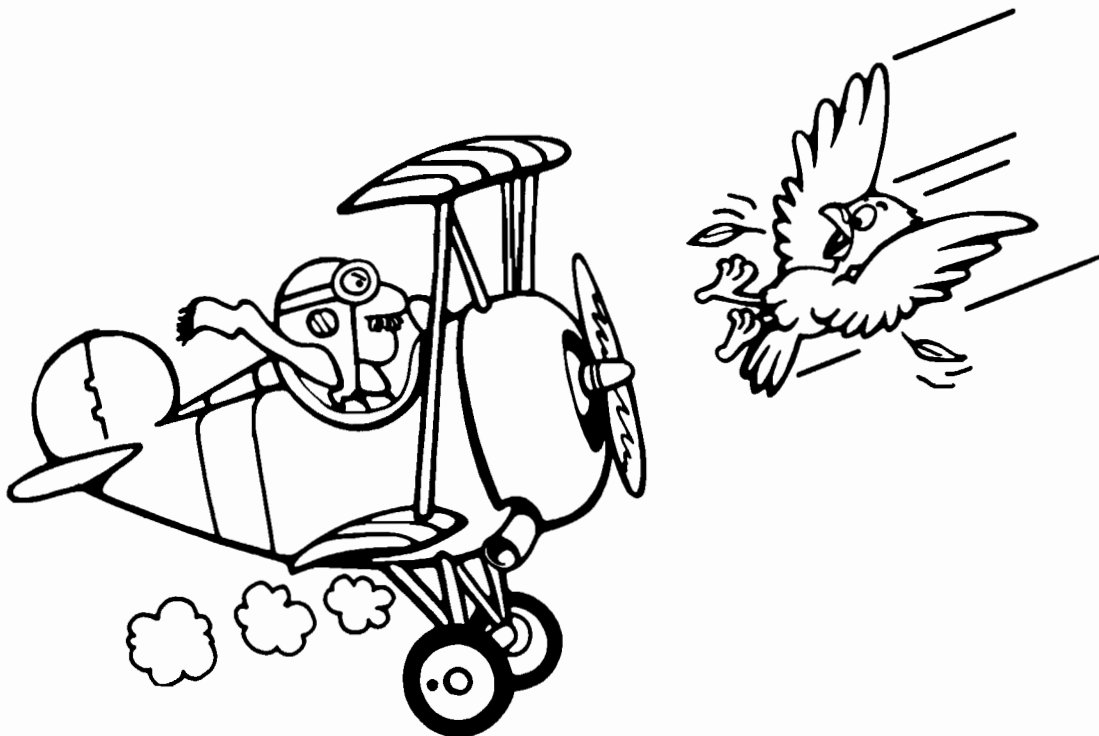
The screen displays several messages during game play. At the top of the screen are the words *1UP*, *HIGH SCORE* and *2UP* (with corresponding scores). At the bottom of the screen are the number of lives remaining, the bonus word or letter(s) collected, and gauge measuring the amount of kick remaining.

## 5. High-Score Mode

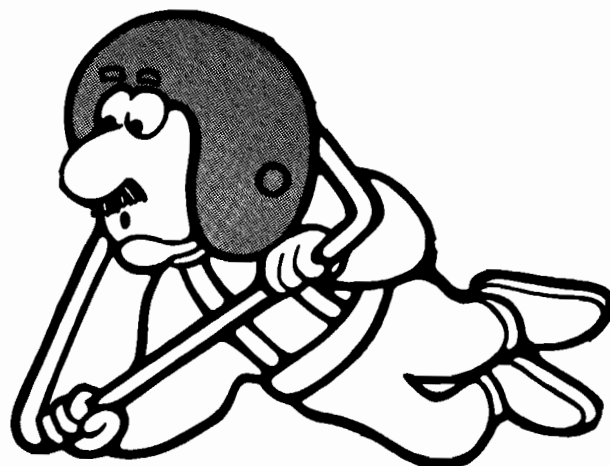
This mode begins when a player has one of the ten top scores. The message *REGISTER YOUR NAME* appears on the screen. Below these words is a line containing the characters of the alphabet, *RUB* (erase), and *END*. A player enters his initials by moving the joystick to the left or the right to locate the correct letter. He causes the letter to be transferred to the right of the word *NAME* by pushing the KICK button. When he has entered three characters, they are automatically transferred into the high-score table.

## 6. Hints for Game Play

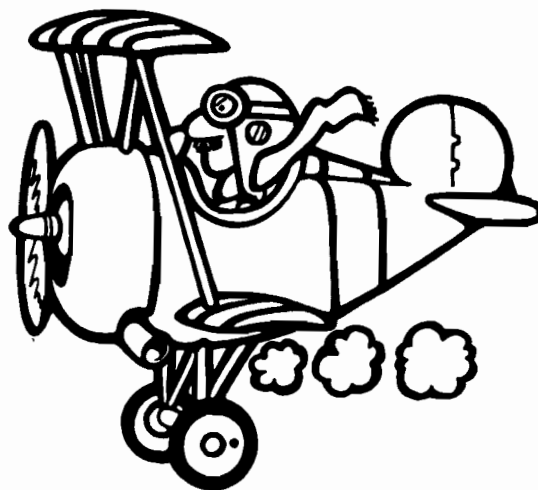
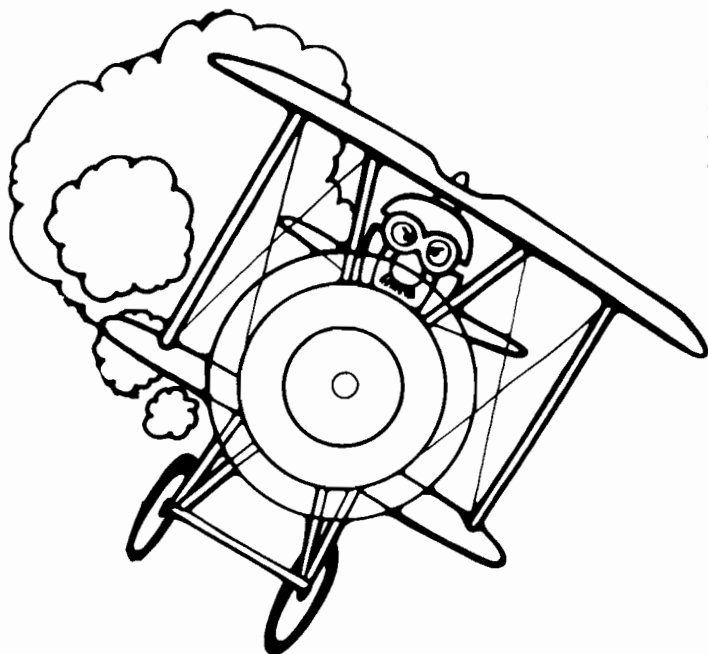
- Stay in the center of the screen when possible.
- It is not necessary to spell *BONUS* to get to the end of a round.
- Avoid clouds in the ocean round.
- Kick at any flying object that is below you and within range.
- Try to land on the last landing platform for the most points.



# Troubleshooting



This game tests itself when the self-test switch is set to the *on* position. If there is a failure, the game produces audiovisual aids to help you isolate the failing portion of the game. The self-test procedure included in Chapter 1 will help you decide if the game is or isn't working properly. The expanded self-test procedures in this chapter are included to help the qualified electronic technician determine why the game isn't working properly.



Chapter

**2**

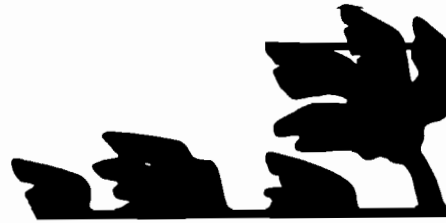
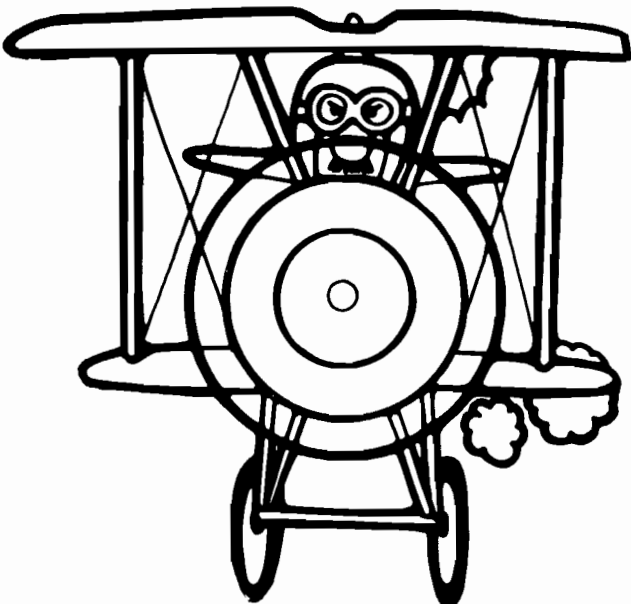
# A. Comments on Troubleshooting

When troubleshooting, first determine the symptom(s) of the failure. After determining the symptom, look over the wiring diagram and determine what assemblies could cause the failure. Could it be caused by the power supply, Regulator/Audio II PCB, or the video display?

The next step is to check all harness wires and connectors to the suspected failing assembly. If you find no harness or connector problem, substitute an assembly known to be good for the suspected failing assembly. If the game functions properly, you have successfully isolated the failure. If it doesn't, repeat the procedure with another assembly.

When you have isolated the failing assembly, you must troubleshoot that assembly and make the necessary repairs. If the video display is failing, we suggest that a qualified video display technician handle the troubleshooting and repair. If the power supply or Regulator/Audio II PCB is failing, troubleshooting and repair are relatively simple, as these assemblies are not too complicated. If a game PCB is failing, troubleshooting and repair depend on your understanding of the operation of the PCB.

To effectively troubleshoot a game PCB, it is necessary for you, the technician, to become familiar with the PCB hardware. The diagrams in the schematic package (included with the game) show the functions of the circuitry. Again, while troubleshooting the PCB, first determine the symptom of the failure, then locate the suspected area on the schematic diagram.



# B. Self-Test Procedure

To enter Self-Test, set the self-test switch to the on position. The screen displays the picture below. See Chapter 1, Section F, Self-Test Procedure for a complete description of this picture.

**NOTE**

This procedure does not test the coin door lockout coils and coin counter. If the Self-Test passes, but the lockout coils do not energize when power is applied to the game, suspect the lockout coil wiring or coin door harness. Troubleshoot using the game schematics.

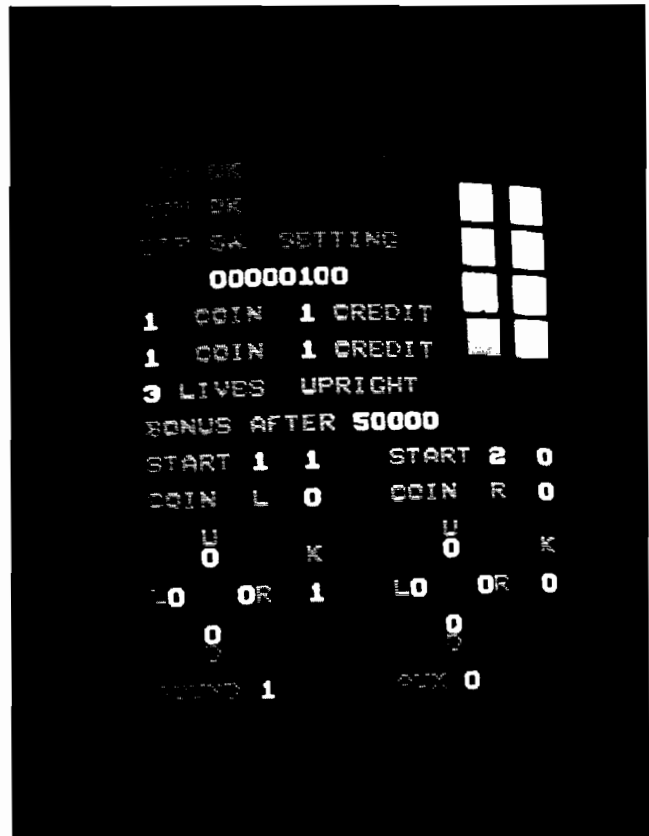
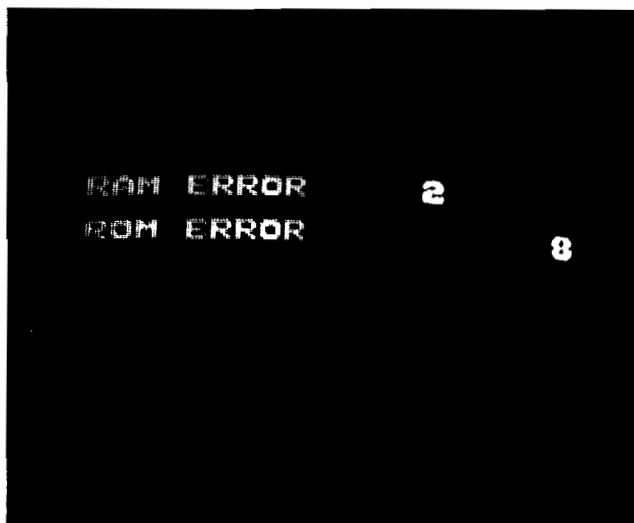


Figure 2-1 Self-Test Screen 1  
Test Passes



**Figure 2-2 Self-Test Screen 1 Test Fails**

**SCREEN 1**

**RAM failure** may be indicated by a blank screen or by garbage on the screen. It may also be indicated by or the word *RAM* and a number displayed at the top of the screen. The RAM and its location are listed as follows:

Screen Display	RAM chip location on game PCB
RAM 0	E11, E12
RAM 1	J10, J11
RAM 2	D14
RAM 3	E16

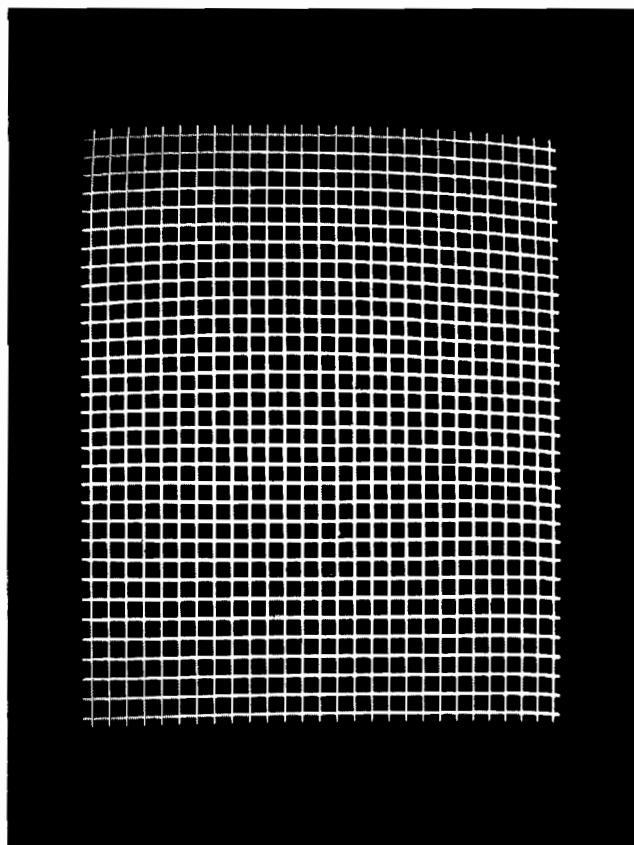
ROM failure is indicated by the word *ROM* and a number displayed at the top of the screen. The bad ROM and its location are listed as follows:

Screen display	ROM chip location on game PCB
ROM 1	D16
ROM 2	D17
ROM 3	C14
ROM 4	C16
ROM 5	C17
ROM 6	A14
ROM 7	A16
ROM 8	A17

**SWITCH failure** is indicated by the associated *0* not changing to a *1* on the screen when the switch is activated. Troubleshoot using the information in *Chapter 3, Section B*, and game schematics.

**SOUND failure** is indicated by no sound. Check the volume control levels on the utility panel, or troubleshoot using the game schematics.

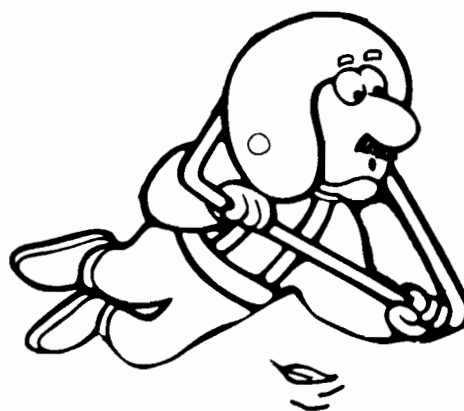
To go to screen 2, simultaneously press start 1 and start 2 switches.



**Figure 2-3 Self-Test Screen 2**

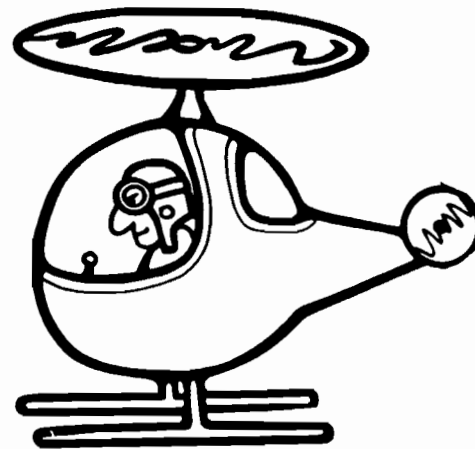
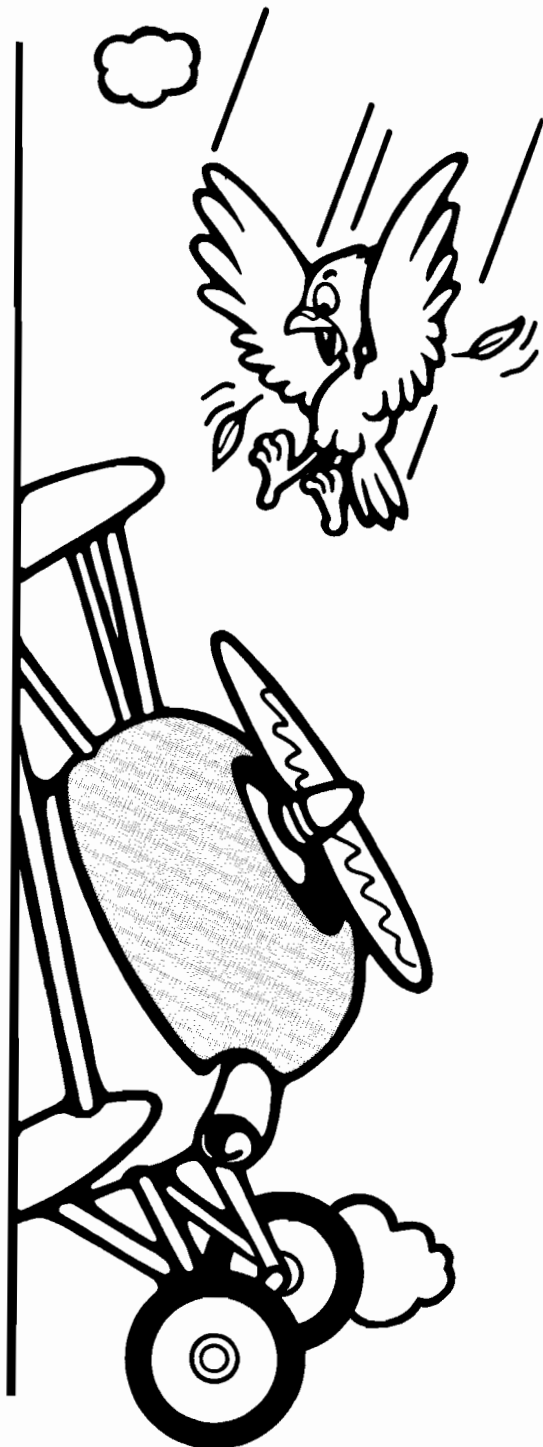
**SCREEN 2**

A white crosshatch pattern appears on the screen (see *Figure 2-3*). Use this pattern for convergence (see the raster-scan video display manual).





# Maintenance, Repair and Parts



This chapter details maintenance and repair information, and provides information you need to order parts for your Fast Freddie game. Please note that **common hardware has been deleted** from most of the parts lists. This includes screws, nuts, washers, bolts, etc.

The parts lists are arranged in alphanumeric order. For example, all "A-" prefix numbers come first. Following these are numbers in sequence evaluated up to the hyphen, namely 00- thru 99-, then 000598- thru approximately 190000-.

When ordering parts, please give the part number, part name, applicable figure number of this manual, and serial number of your game. This will help to avoid confusion and mistakes in your order. We hope the results will be less downtime and more profit from your game.

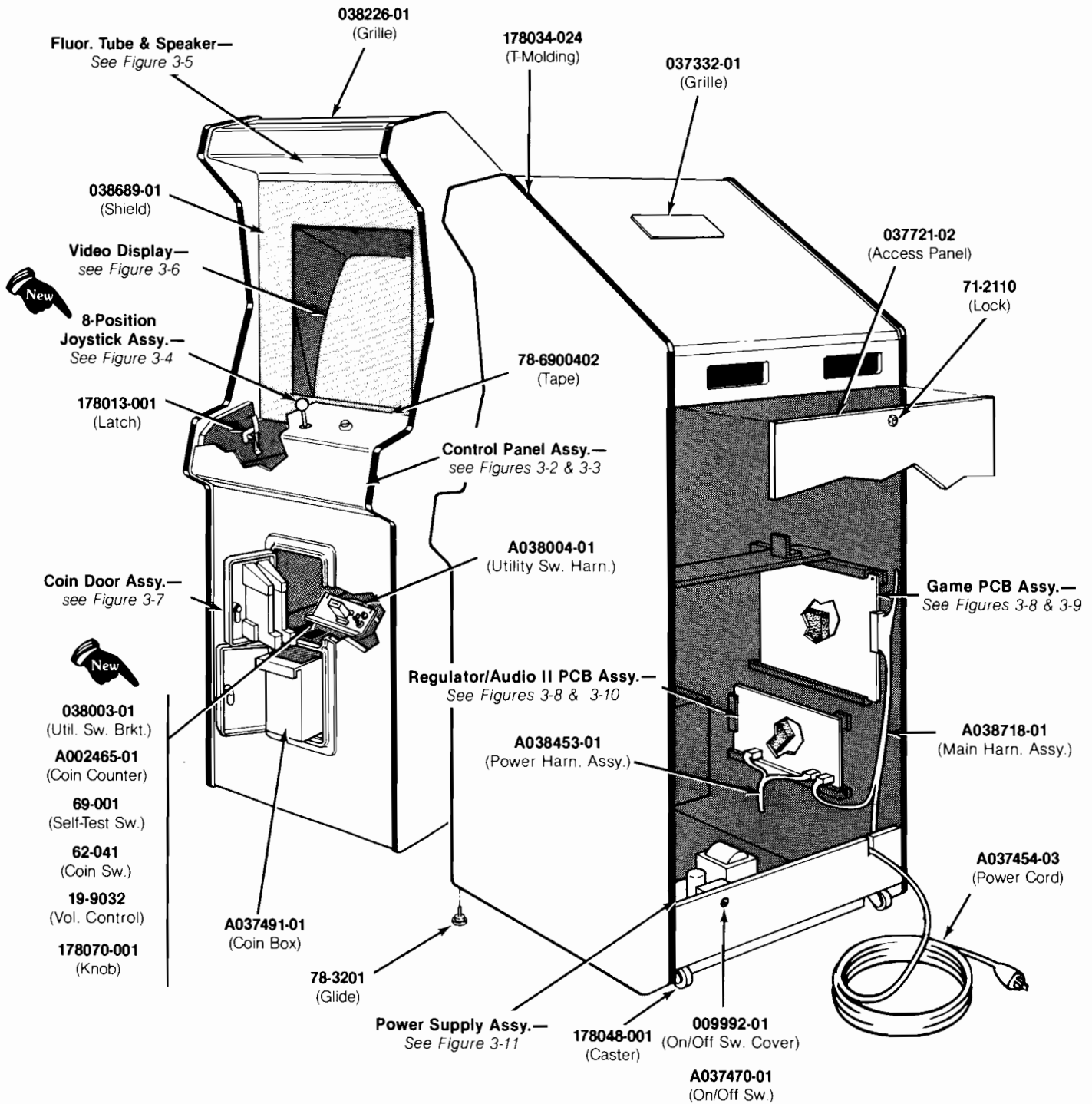
Atari Customer Service numbers are listed in the front of this manual for your convenience.



Chapter

3

# A. Cabinet-Mounted Assemblies



**Figure 3-1 Cabinet-Mounted Assemblies**  
Ireland-Built Cabinet **A038677-01 & -02 A**



### Figure 3-1 Cabinet-Mounted Assemblies, continued Ireland-Built Cabinet Parts List

Part No.	Description
A002465-01	Coin Counter
A037454-03	Strain-Relief Power Cord <i>(Austria, Belgium, Chile, Denmark, Finland, France, Germany, Greece, Indonesia, Italy, Netherlands, Norway, Spain, Sweden, and Uruguay)</i>
A037470-01	Power On/Off Switch and Mounting Plate Assembly
A037491-01	Coin Box
A038004-01	Harness for Volume Control/Self-Test Switch/Coin Counter Assembly
A038453-01	Power Harness Assembly
A038678-01	Cabinet Assembly <i>(includes wood-grained side panels, glides, and PCB retainers, but not the rear access panel)</i>
A038678-02	Cabinet Assembly <i>(includes graphics on side panels, glides, and PCB retainers, but not the rear access panel)</i>
A038718-01	Main Harness Assembly
<i>The following four items are the technical information supplements to this game:</i>	
SP-208	Fast Freddie™ Schematic Package
ST-208-01	Fast Freddie Label with Self-Test Procedure and Option Switch Settings
TM-160	Service Manual for 19-Inch Electrohome Color Raster-Scan Display <i>Substitute TM-201 when using part no. 92-055, 19-Inch Wells Gardner Display.</i>
TM-208	Fast Freddie Operation, Maintenance and Service Manual
19-9032	Volume Control
62-041	SPDT Momentary-Contact Pushbutton Utility Coin Switch with Black Cap
69-001	DPDT Self-Test Switch
71-2110	Lock Mechanism <i>(for rear access panel)</i>
78-3201	Adjustable Glide
78-6900402	Vinyl Foam Single-Coated-Adhesive Tape, ¼-Inch Wide x ⅛-Inch Thick
009992-01	On/Off Switch Cover
037721-02	Rear Access Panel <i>(does not include lock)</i>
037332-01	Ventilation Grille <i>(located on cabinet top)</i>
038003-01	Utility Switch Bracket for Volume Control, Self-Test Switch, Coin Switch, and Coin Counter
038226-01	Upper Cabinet Grille
038689-01	Video Display Shield with Graphics
038691-01	Side Panel Decal <i>(not shown in illustration)</i>
178013-001	Spring Draw Latch
178034-024	¾-Inch Black Plastic T-Molding
178048-001	2-Inch Rigid Caster
178070-001	Volume Control Knob



## B. The Control Panel



### WARNING

Prior to removing or repairing any switch on the control panel, **unplug the game.**

#### To Open the Control Panel:

1. Open the coin door. Reach up through the opening and release the spring-draw latches. They are on the cabinet side walls at each end of the control panel.
2. Lift up on the control panel at the top edge, and tilt it toward you. The control panel edge next to the display shield has foam tape applied to it. The tape cushions the shield and prevents liquids from entering the cabinet interior. Make sure this tape is in good condition.

#### Leaf Switch Repair:

- Adjust the leaf switches for a narrow gap. When a switch button is depressed, the resulting wiping action of the cross-bar contacts provides a self-cleaning feature. **Don't burnish the contacts.** To clean them, use electrical contact cleaner.
- To replace a leaf switch, remove the screw with a Phillips-head screwdriver.
- To replace the switch button, turn the stamped nut with a wrench in a counterclockwise direction, as seen from the inside of the control panel. The ring on the outside of the control panel should not spin, due to its design.
- Reinstall the switch. Reconnect the harness wires as shown in the *Schematic Package, Game Wiring Diagram*. Make certain the right colors go to the right tabs on the switch.

#### Start-Switch Replacement:

These switches have a very low failure rate. If a switch should ever be suspect, first test it using the directions that follow.

#### To Test Switch:

- Remove the wires from the suspected switch.
- Attach the leads of an ohmmeter to normally open and common contacts.
- Check contacts (push and release the switch button) for closed and open continuity.
- If the contacts do not operate sharply or always remain closed or open, then replace the switch.

#### To Replace Switch:

- Remove all wires from the faulty switch.
- Turn the switch counterclockwise while holding the black cone-shaped bushing on the outside of the control panel.
- Install a new switch using the reverse procedure.
- Reconnect the harness wires as shown.

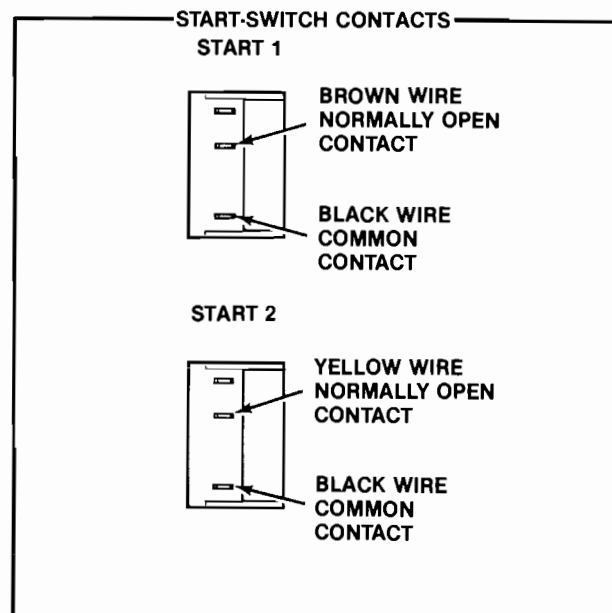
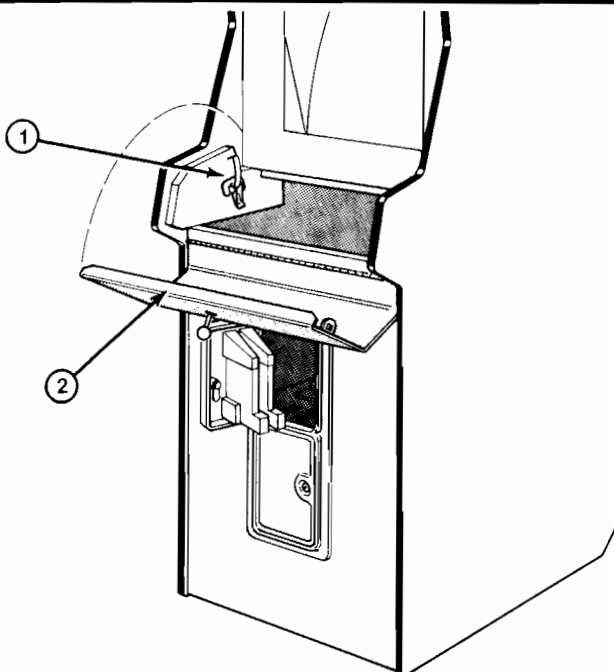
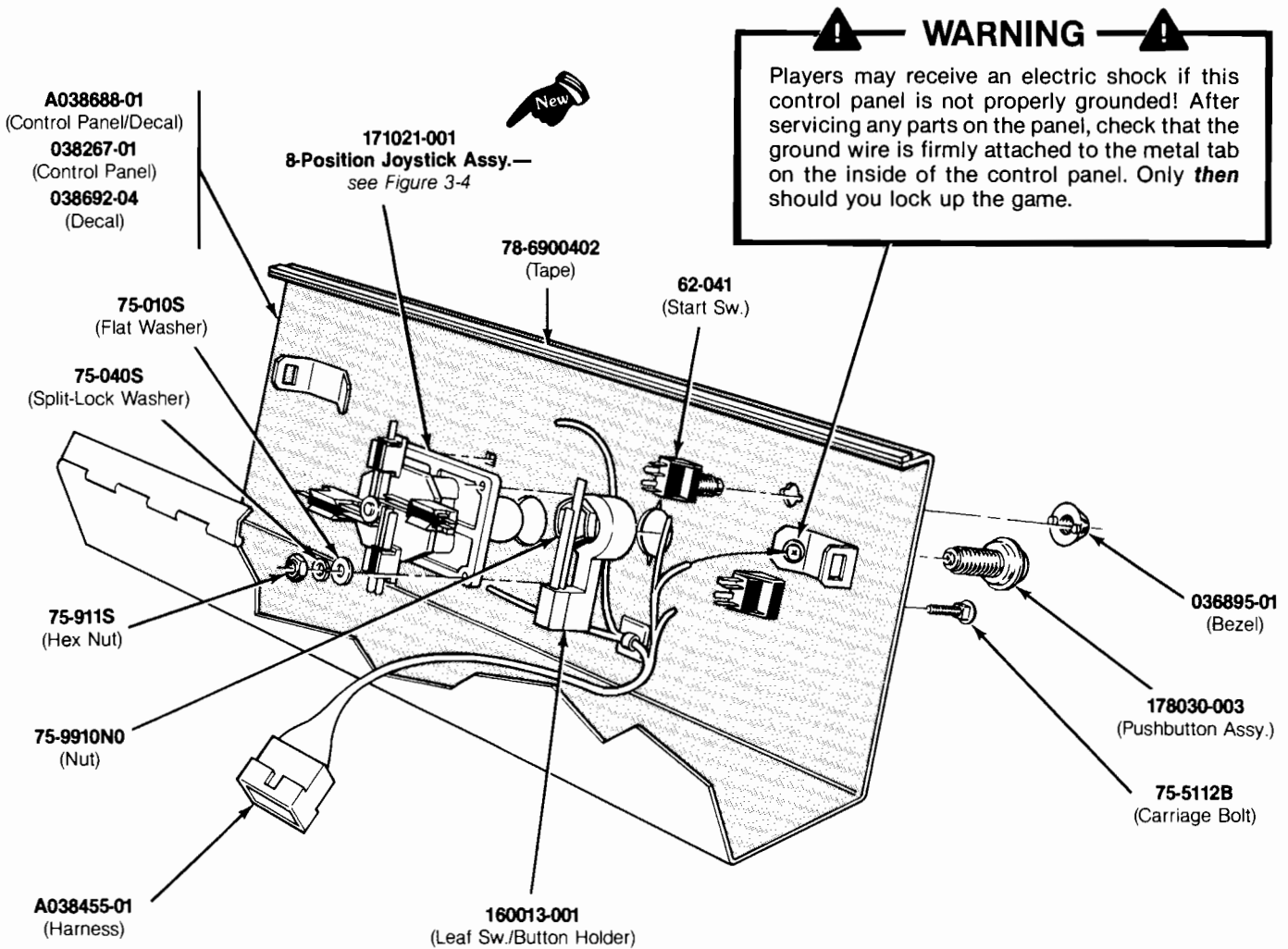


Figure 3-2 The Control Panel



**Figure 3-3 Control Panel Assembly  
Ireland-Built Cabinet A038678-01 A  
Parts List**

Part No.	Description
A038455-01	Control Panel Harness Assembly
A038688-01	Control Panel with Decal
62-041	SPDT Momentary Pushbutton Start Switch
75-010S	#10 Flat Washer
75-040S	#10 Split-Lock Washer
75-5112B	#10-24 x 3/4-Inch Black Carriage Bolt
75-911S	#10-24 Hex Nut
75-9910N0	#5/8-11 Steel Stamped Nut
78-6900402	Vinyl Foam Single-Coated-Adhesive Tape, 1/4-Inch Wide x 1/8-Inch Thick (24 in. required)
038267-01	Control Panel
038692-04	Control Panel Decal
036895-01	Black Molded Switch Bezel
160013-001	Leaf Switch and Button Holder (Leaf switch only is part no. 160012-001)
171021-001	8-Position Joystick Assembly
178030-003	Black Pushbutton Assembly

**WARNING**

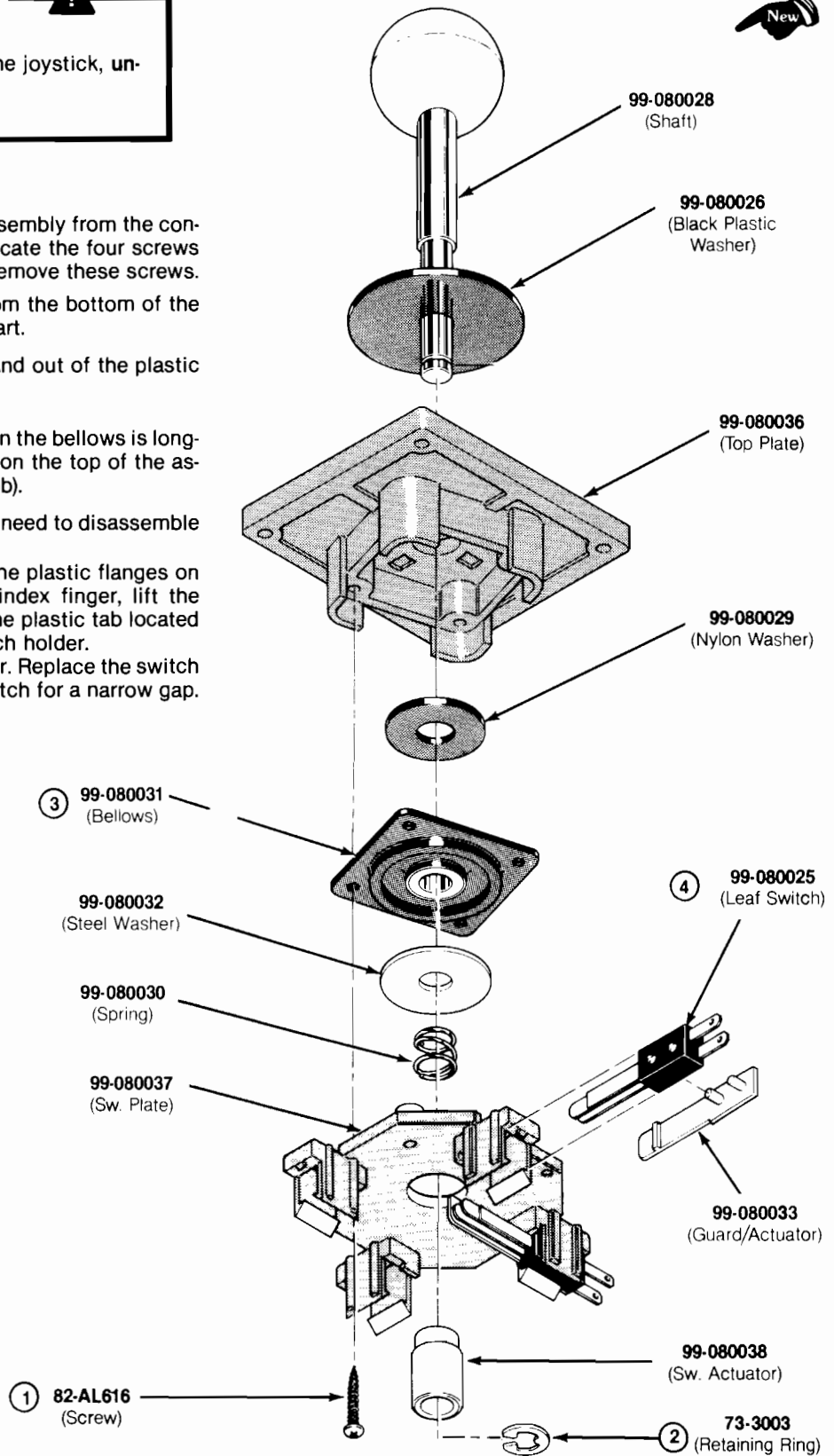
Prior to removing or repairing the joystick, unplug the game.



**To Repair the Joystick:**

1. First remove the entire joystick assembly from the control panel (see *Figure 3-3*). Now locate the four screws in the plastic joystick frame and remove these screws.
2. Next remove the retaining ring from the bottom of the shaft. The assembly will come apart.
3. To replace the *bellows*, pry it up and out of the plastic frame.
  - Reassemble in reverse order.
  - Note that the inner raised ring on the bellows is longer on one side. This side goes on the top of the assembly (toward the control knob).
4. To replace a *leaf switch*, you don't need to disassemble the joystick.
  - Using your thumbs, pry apart the plastic flanges on the switch holder. With your index finger, lift the switch up so that it will clear the plastic tab located on the outside end of the switch holder.
  - Slide the switch out of its holder. Replace the switch in reverse order. Adjust the switch for a narrow gap.

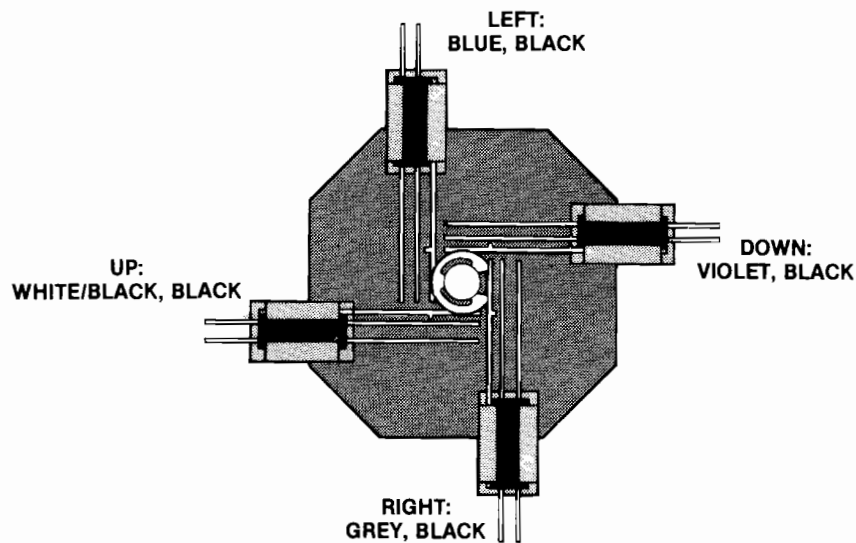
Disassemble in the order indicated. (Circled numbers match the numbered instructions.)



**Figure 3-4 8-Position Joystick Assembly**  
171021-001

**To Adjust the Joystick:**

1. Make sure that each leaf switch is firmly seated in its holder. There is a small gray plastic tab on the outside end of the switch holder. The black plastic part of each leaf switch must be in front of this tab.
2. Check that all four leaf switches can be activated by watching the switch blades as you move the joystick handle up, down, left and right.
3. Test the four diagonal positions. In each diagonal position, two leaf switches should close. Switches should continue bending slightly after making contact.
4. Adjust each switch for narrow gap.
  - Push the joystick handle away from the switch for easier servicing.
  - Use a pair of needle-nose pliers or a switch adjustment tool to bend each double set of blades in toward the center. Make the bend where the double set of blades comes out of the black plastic part of the switch.
5. Recheck the switch action. The switches must move independently for right, left, up, down and diagonal motion of the joystick.

**JOYSTICK—  
TOP REAR VIEW**

**Figure 3-4 8-Position Joystick Assembly, continued  
Parts List**

<i>Part No.</i>	<i>Description</i>
73-3003	Retaining Ring
82-AL616	#6 x 1-Inch Cross-Recessed Pan-Head Type BT Tapping Steel Screw
99-080025	Leaf Switch
99-080026	2-Inch Black Plastic Washer
99-080028	Metal Shaft
99-080029	Nylon Washer
99-080030	Spring
99-080031	Bellows
99-080032	Flat Steel Washer
99-080033	Plastic Guard/Actuator
99-080036	Top Plate
99-080037	Switch Mounting Plate
99-080038	Nylon Switch Actuator
171021-001	Joystick Assembly

## C. Fluorescent Tube and Speaker



### WARNING



Prior to removing or repairing the speaker or fluorescent tube, **unplug the game.**

If you drop a fluorescent tube and it breaks, *it will implode!* Shattered glass can fly 6 feet or more from the implosion. Use care when replacing any fluorescent tube.

#### To Remove the Tube and Speaker Board:

1. From the back of the game, unlock and open the rear access panel. The tube and speaker harness has a 5-pin connector. Unplug this connector.
2. Open the control panel (see *Figure 3-2, The Control Panel*).
3. From the top front of the game, remove the five button-head screws that secure the upper cabinet grille to the cabinet. Lift the grille up and away from the cabinet. Be careful glass display shield doesn't fall forward.
4. Lift the display shield up and out of the cabinet.
5. Slide the baffle board that is underneath the fluorescent tube out the front of the cabinet.

6. Remove the screws that secure the tube and speaker board to the cabinet. Slide this board up and out of the cabinet.

#### To Replace Fluorescent Tube:

7. Remove the Y-lead connectors at each end of the fluorescent tube.
8. Slightly rotate the tube up or down, and carefully remove it from its clamps. Replace it with a new tube. Do not snap the tube in vigorously—*you may break it, causing an implosion!* Replace the Y-lead connectors. Reinstall the tube and speaker board, baffle board, shield, grille, and reconnect the harness. Close and lock the control panel and the rear access panel.

#### To Replace The Speaker:

9. Unplug the two plug-in connectors on the back of the speaker.
10. Remove the hardware that attaches the speaker to the board. Replace the speaker and reinstall the hardware and two plug-in connectors. Reinstall the tube and speaker board, baffle board, shield, grille, and reconnect the harness. Close and lock the control panel and the rear access panel.

Disassemble in the order indicated. (Circled numbers match the numbered instructions.)

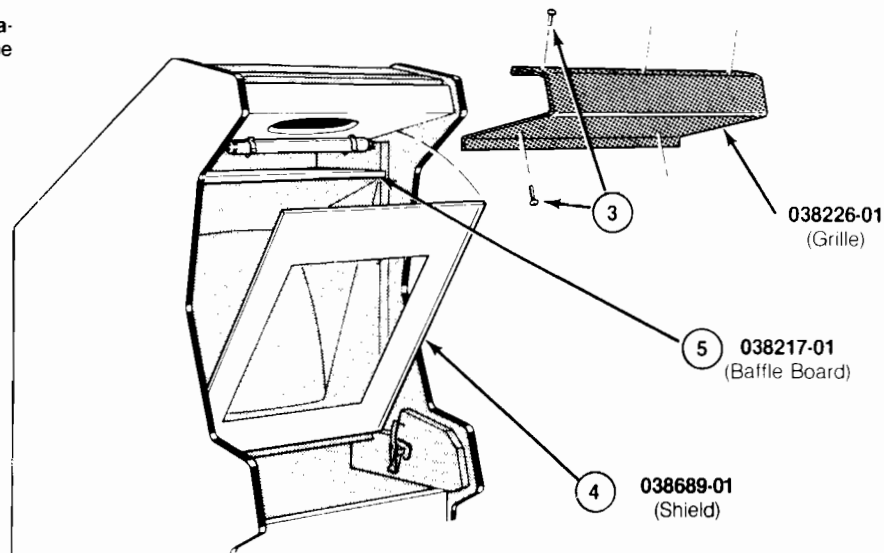
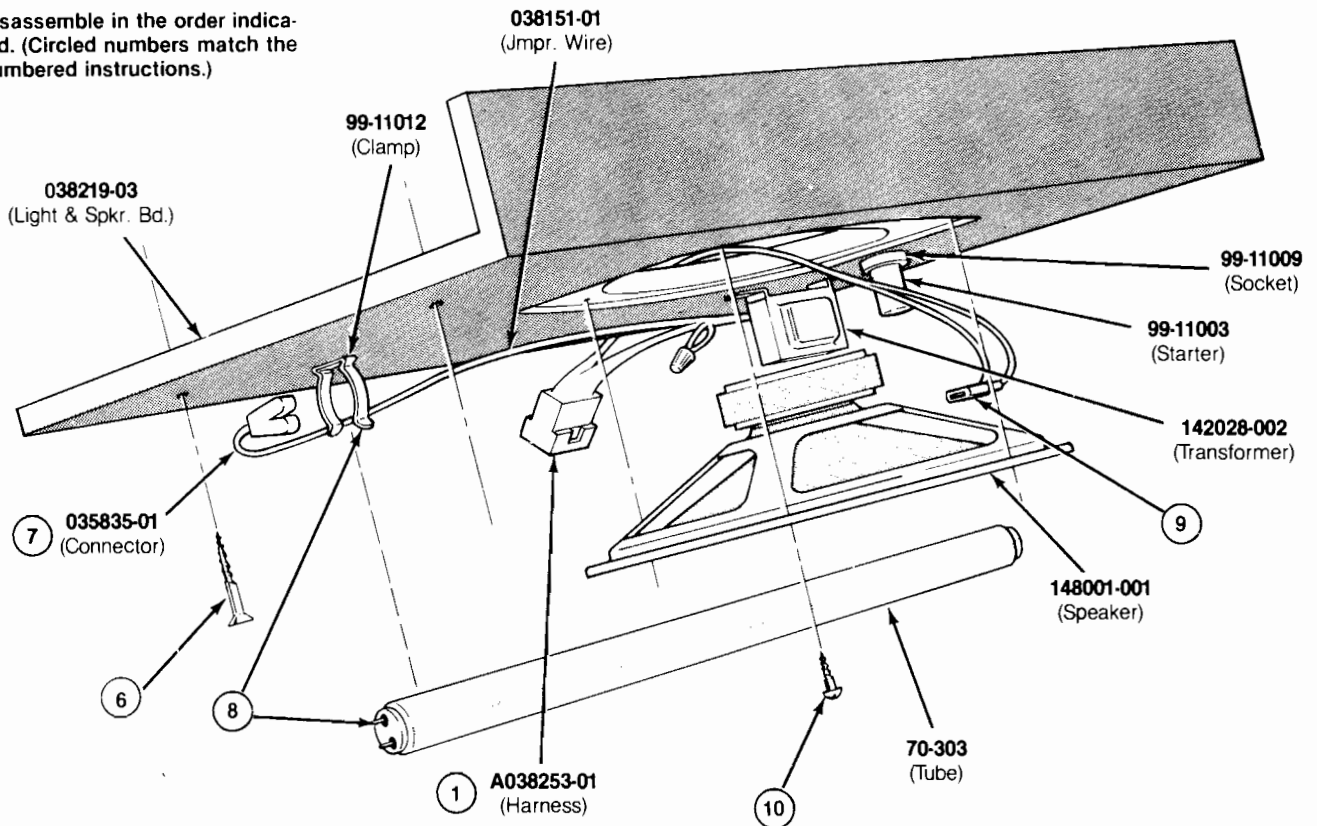


Figure 3-5 Fluorescent Tube and Speaker

Disassemble in the order indicated. (Circled numbers match the numbered instructions.)



### NOTE

To ensure that the fluorescent tube starts, make sure the ground wire is firmly attached to the transformer.

**Figure 3-5 Fluorescent Tube and Speaker, continued**  
**Ireland-Built Cabinet A038228-01 A**  
**Parts List**

Part No.	Description
A038253-01	Tube and Speaker Harness Assembly
70-303*	18-Inch, 1-Inch Diameter, 15W Cool White Fluorescent Tube
99-11003	Fluorescent Tube Starter
99-11009	Starter Socket
99-11012*	1½-Inch Fluorescent Tube Clamp
035835-01	12-Inch Y-Lead Connector
038151-01	Jumper Wire
038217-01	Baffle Board
038219-03	Tube and Speaker Board
038226-01	Cabinet Grille
038689-01	Display Shield
142028-002	50 Hz 118V Ballast Transformer
148001-001	6 × 9-Inch 4-Ohm 15W Oval High-Fidelity Speaker

\* Acceptable substitutes are part numbers 70-304 (tube) and 99-11011 (clamp). They must be used together.

# D. Video Display

**! WARNING !**

**Shock Hazard**

The following procedure should only be performed by a *qualified service technician*. Prior to removing or repairing the video display, **unplug the game**. As an extra precaution, we highly recommend you *discharge the high voltage* from the picture tube.

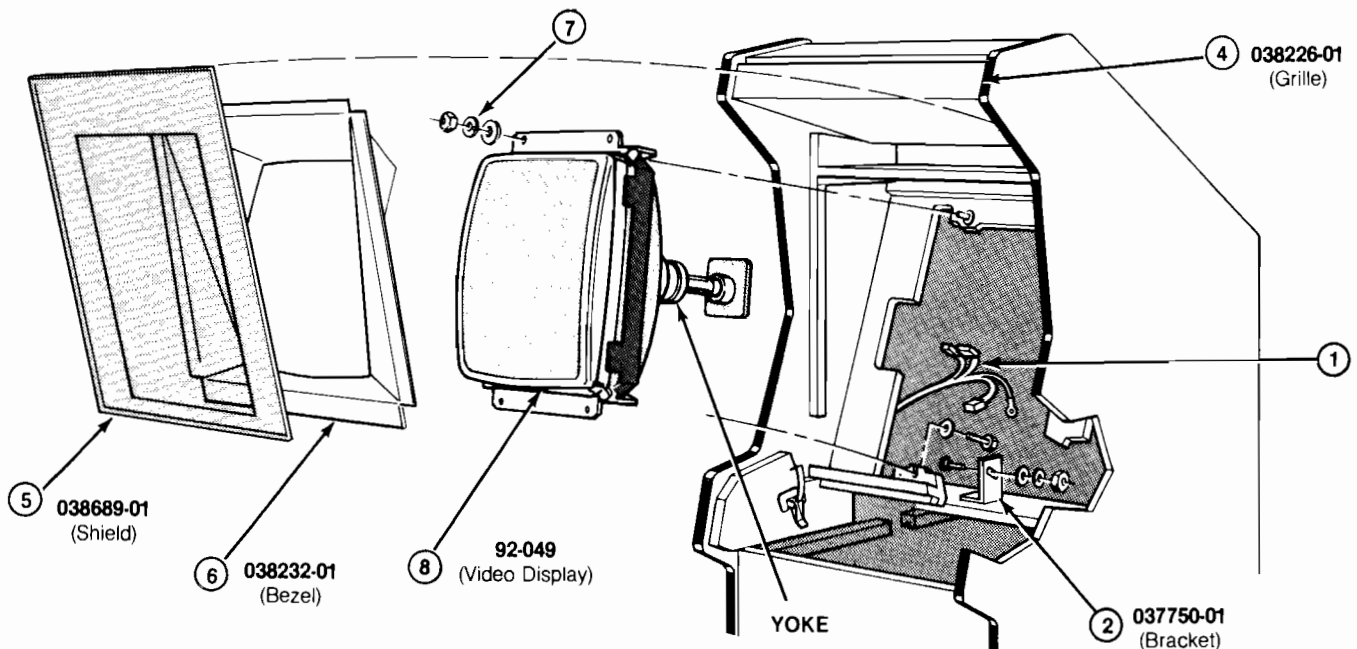
High voltages may exist in any video display, even with power disconnected. Use extreme caution and do not touch electrical parts of the display yoke area with your hands or with metal objects in your hands!

**Implosion Hazard**

If you drop the display and the picture tube breaks, *it will implode!* Shattered glass and the yoke can fly 6 feet or more from the implosion. Use care when replacing any display.

### To Remove Video Display:

1. Open the rear access panel and unplug the three display harness connectors and disconnect the green ground wire.
2. The rear of the display chassis is attached to a mounting bracket. Remove the hardware that secures the chassis to this bracket.
3. Open the control panel (see *Figure 3-2*).
4. Remove the 5 button-head screws that secure the upper cabinet grille to the cabinet (see *Figure 3-5*). Lift the grille up and away from the cabinet.
5. Lift the video display shield up and out of the cabinet.
6. Carefully remove the cardboard bezel.
7. Remove the four sets of hardware that secure the display chassis to the wood frame.
8. Carefully remove the display through the front of the cabinet. After servicing the display, reinstall in reverse order.



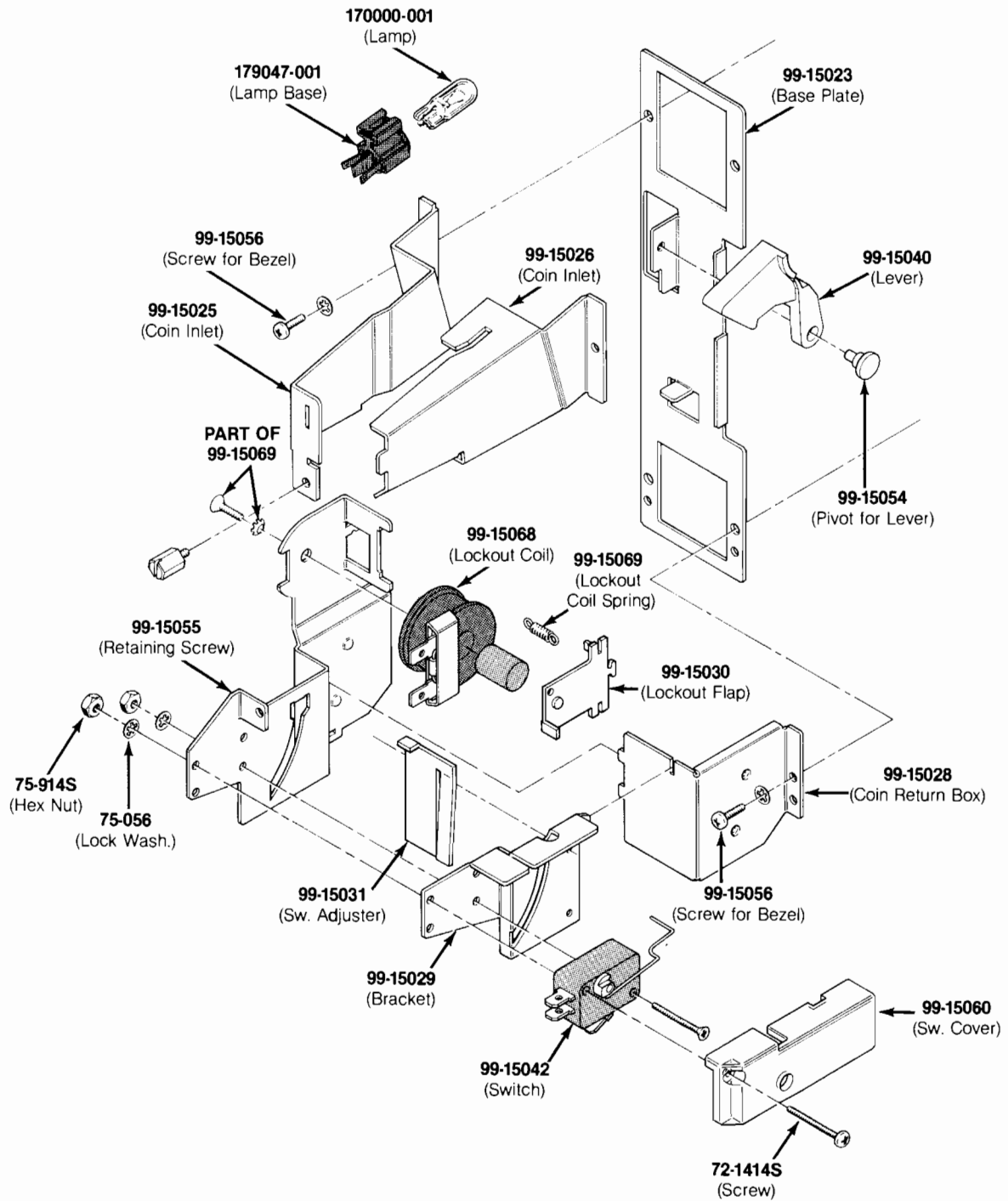
Disassemble in the order indicated. (Circled numbers match the numbered instructions.)

**Figure 3-6 Video Display, continued  
Ireland-Built Cabinet  
Parts List**

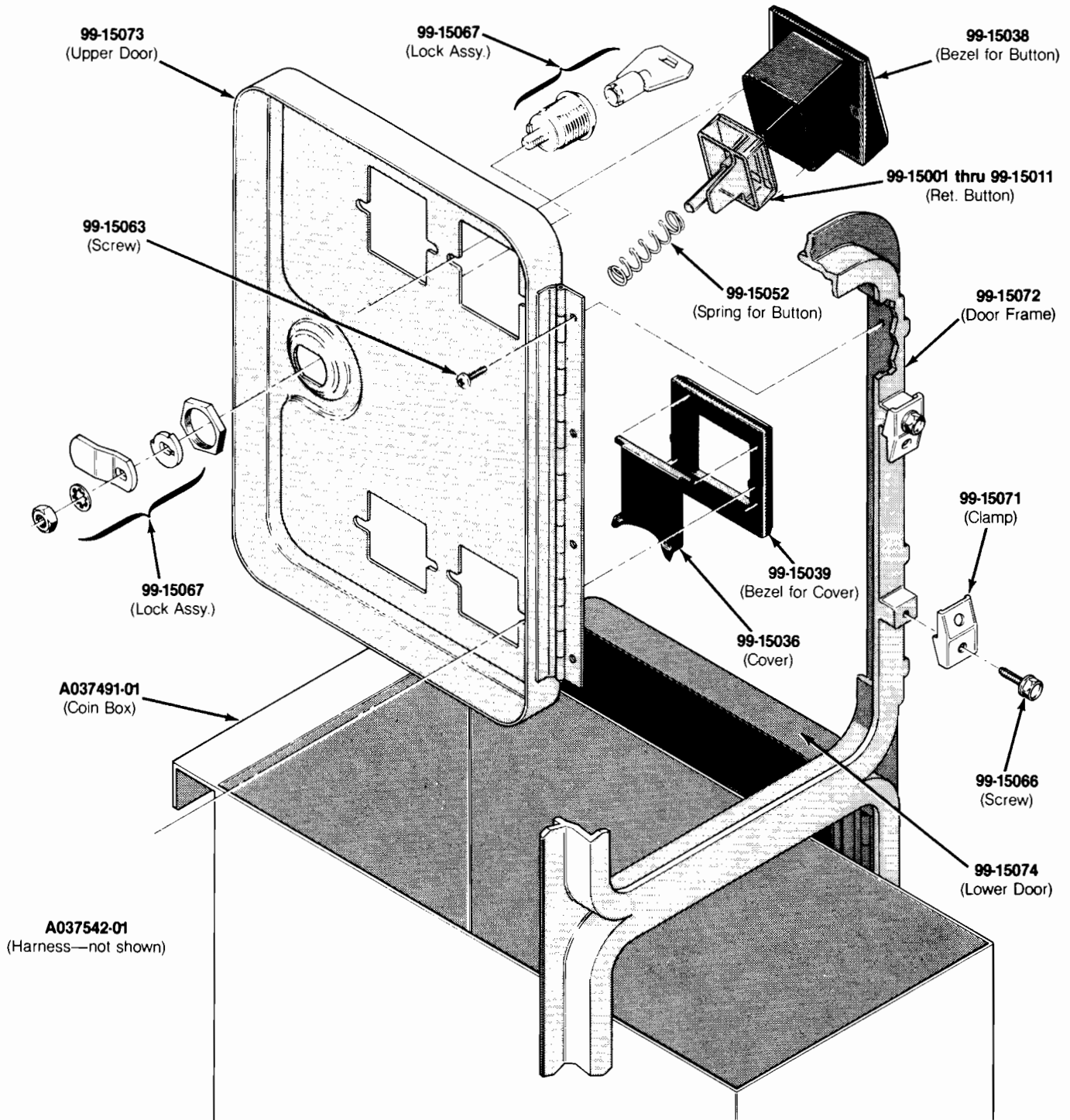
Part No.	Description
92-049	19-Inch Electrohome Color Raster-Scan Video Display (Acceptable substitute is part no. 92-055—use with TM-201)
037750-01	Display Mounting Bracket
038226-01	Upper Cabinet Grille
038232-01	Display Bezel
038689-01	Display Shield with Graphics



# E. Coin Door



**Figure 3-7 Vertically Mounted Coin Door  
A037619-xx D**



- A037619-01 — U.S. 25¢/25¢ Coin Door
- A037619-02 — U.S. 50¢/50¢ Coin Door
- A037619-03 — Canadian 25¢/25¢ Coin Door
- A037619-04 — British 10 P/10 P Coin Door
- A037619-05 — British 10 P/50 P Coin Door
- A037619-06 — British 20 P/50 P Coin Door
- A037619-07 — Australian 20¢/20¢ Coin Door

- A037619-08 — German 1 DM/1 DM Coin Door
- A037619-09 — German 2 DM/1 DM Coin Door
- A037619-10 — German 2 DM/5 DM Coin Door
- A037619-11 — German 1 DM/5 DM Coin Door
- A037619-12 — 5 Fr/5 Fr Coin Door
- A037619-13 — Swiss 1 Fr/1 Fr Coin Door
- A037619-14 — French 1 Fr/1 Fr Coin Door

- A037619-15 — French 2 Fr/1 Fr Coin Door
- A037619-16 — Swedish 1 Kr/1 Kr Coin Door
- A037619-17 — Spanish 25 Pts/25 Pts Coin Door
- A037619-18 — Italian 100 L/100 L Coin Door
- A037619-19 — Hong Kong \$1/\$1 Coin Door
- A037619-20 — Japanese 100Y/100Y Coin Door

**Figure 3-7 Vertically Mounted Coin Door, continued**

### Figure 3-7 Vertically Mounted Coin Door, continued Parts List

Part No.	Description
A037491-01	Coin Box <i>(Not included in assembly)</i>
A037542-01	Harness Assembly
72-1414S	#4-40 × 7/8-Inch Cross-Recessed Pan-Head Steel Machine Screw
75-056	#6 Internal-Tooth Zinc-Plated Steel Lock Washer
75-914S	#4-40 Steel Machine Hex Nut
75-3414S	#4-40 × 7/8-Inch 82° Cross-Recessed Flat-Head Steel Machine Screw
99-15001	Coin Return Button with U.S. 25¢ Price Plate
99-15002	Coin Return Button with U.S. \$1 Price Plate
99-15003	Coin Return Button with German 1 DM Price Plate
99-15004	Coin Return Button with German 2 DM Price Plate
99-15005	Coin Return Button with German 5 DM Price Plate
99-15006	Coin Return Button with Belgian 5 Fr Price Plate
99-15007	Coin Return Button with French 1 Fr Price Plate
99-15008	Coin Return Button with Japanese 100 Yen Price Plate
99-15009	Coin Return Button with British 10 Pence Price Plate
99-15010	Coin Return Button with Australian 20¢ Price Plate
99-15011	Coin Return Button with Italian 100 Lire Price Plate
99-15023	Base Plate
99-15025	Left Half of Coin Inlet
99-15026	Right Half of Coin Inlet
99-15027	Side Plate of Coin Return Box
99-15028	Base Plate of Coin Return Box
99-15029	Switch Bracket
99-15030	Flap for Lockout Coil <i>(U.S. 25¢)</i>
99-15031	Switch Adjuster
99-15036	Metal Coin Return Cover
99-15038	Bezel for Coin Return Button
99-15039	Metal Bezel for Coin Return Cover
99-15040	Coin Return Lever
99-15042	Coin Switch for U.S. 25¢
99-15052	Spring for Coin Return Button
99-15054	Pivot for Coin Return Lever
99-15055	Retaining Screw
99-15056	#4-40 × 5/16-Inch Cross-Recessed Pan-Head Steel Machine Screw
99-15060	Switch Cover
99-15063	Screw for Hinge
99-15066	Screw for Clamp
99-15067	Lock Assembly
99-15068	Lockout Coil
99-15069	Spring for Lockout Coil
99-15070	Doors and Frame
99-15071	Clamp for Frame
99-15072	Door Frame
99-15073	Upper Door
99-15074	Lower Door
170000-001	6.3V Miniature Wedge-Base Incandescent Lamp
171006-035	Metal Coin Mechanism
179047-001	Lamp Base

## F. Printed-Circuit Boards

**WARNING**  
 Prior to removing or repairing any printed-circuit board, **unplug the game.**

### To Remove Printed-Circuit Boards:

1. Open the rear access panel.
2. Locate the hardware that secures the PCB to the cabinet, and remove this hardware. (Each PCB has one screw and two spacers to secure it.)
3. If you are removing the game board, unplug the edge connector. If you are removing the Regulator/Audio II PCB, disconnect the four small harness connectors on this board.
4. Carefully remove the PCB from its retainers. Be careful not to twist the boards, as this may loosen connections or components. Repair as required.
5. Reinstall the PCB, making sure that the connectors are properly plugged in. Note that they are keyed to fit only one way, so if they don't slip on easily, don't force them. **A reversed connector will probably damage your game and void the warranty.**
6. Replace the hardware that secures the PCB to the cabinet wall. Close and lock the rear access panel.
7. Check that the operation of the game is correct by performing the self-test. This is very important when you repair a PCB. Unless you are a qualified technician, **do not turn any knob on a PCB.**

Remove in the order indicated.  
 (Circled numbers match the numbered instructions.)

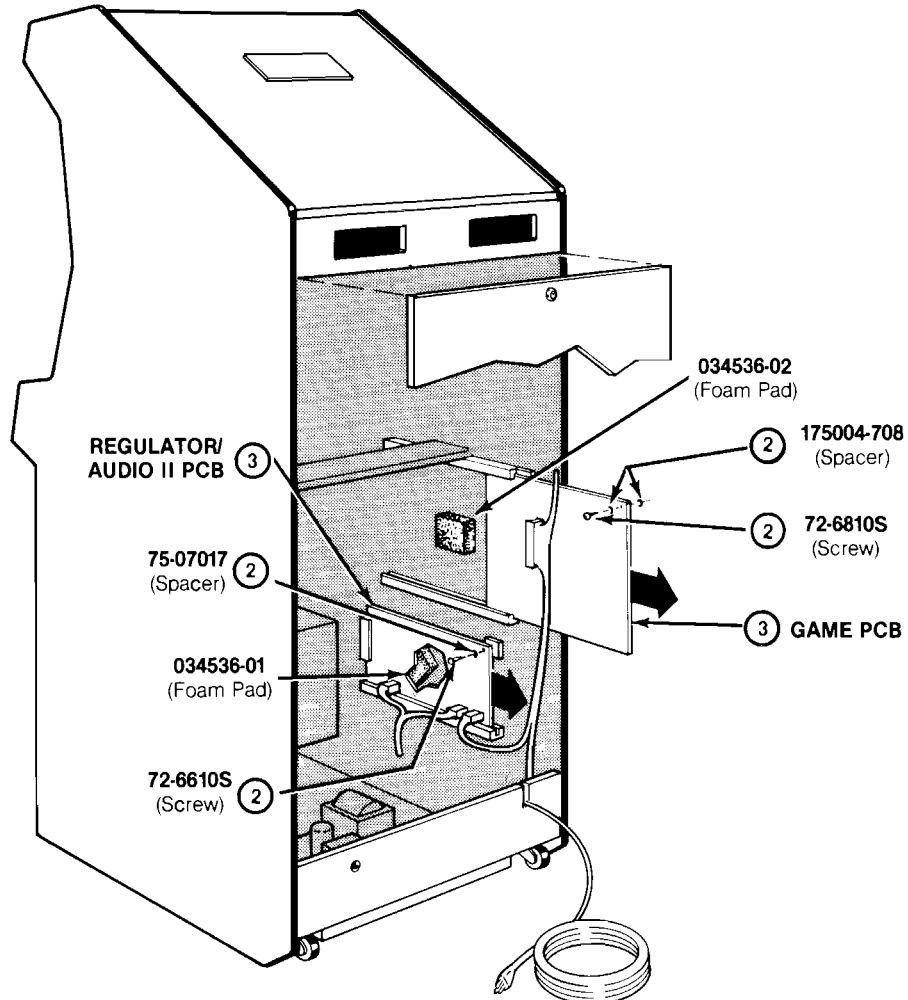
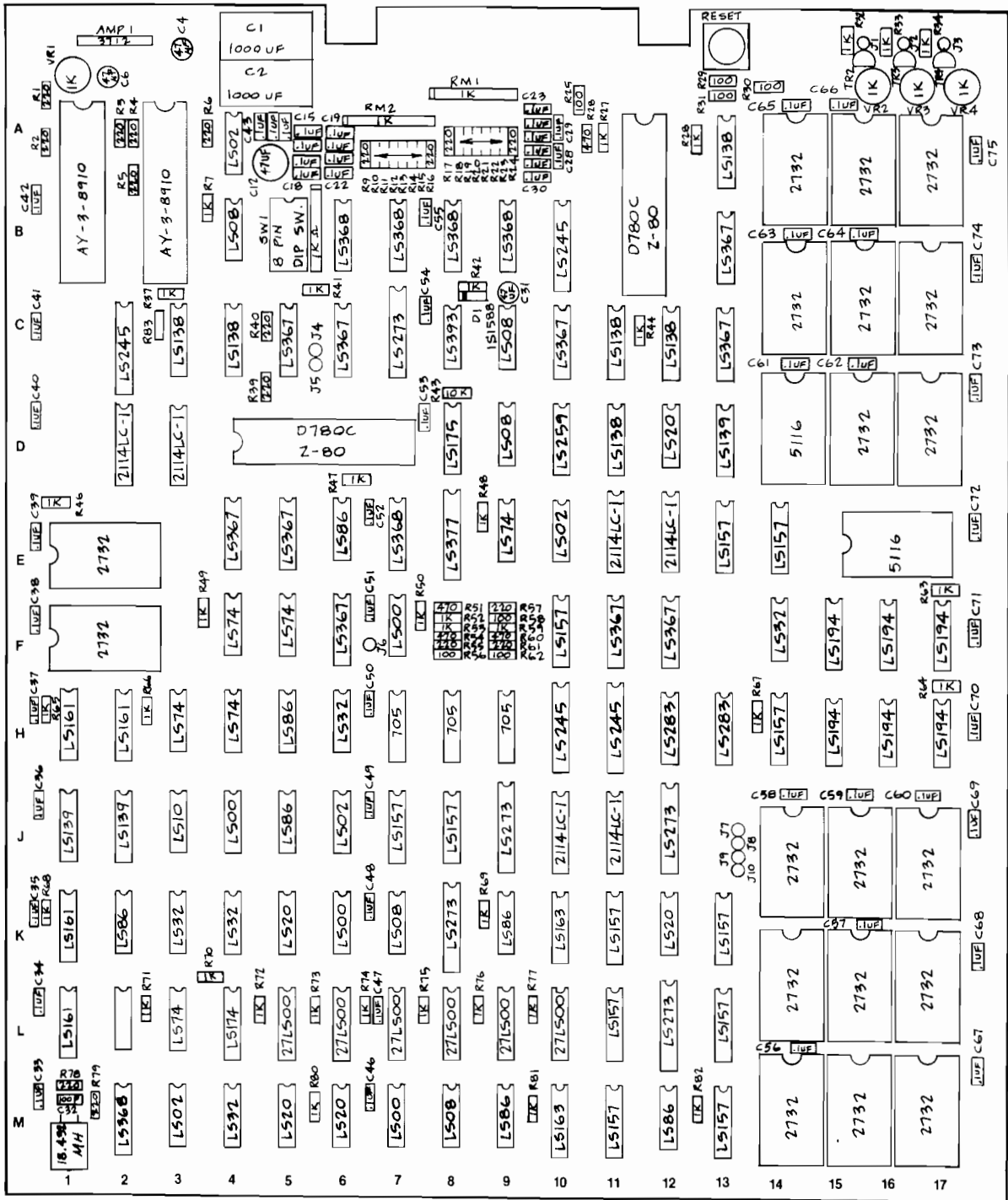


Figure 3-8 Printed-Circuit Board Removal



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**Figure 3-9 Fast Freddie PCB Assembly**  
 171026-001

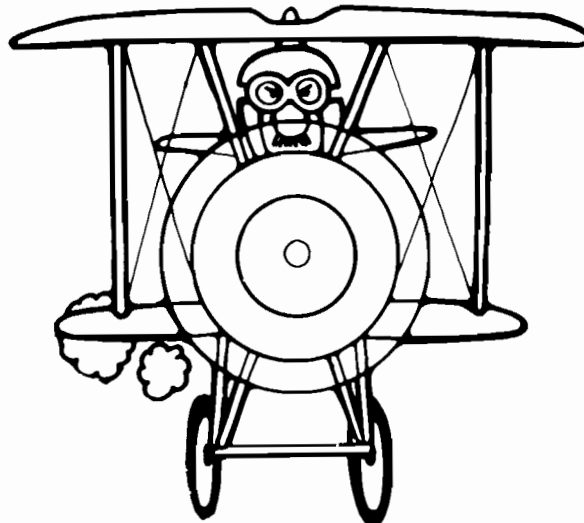
### Figure 3-9 Fast Freddie PCB Assembly, continued Parts List

Part No.	Description (Reference Designations and Locations in Bold)
24-250108	1000 $\mu$ F, $\pm$ 20%, 16V (min) Axial Aluminum Electrolytic Capacitor ( <b>C1, 2</b> )
31-1N914	75V Type-1N914 Switching Diode ( <b>D1-3</b> )
37-7408	Type-7408 Integrated Circuit ( <b>C9</b> )
37-74LS00	Type-74LS00 Integrated Circuit ( <b>F7, J4, K6, M7</b> )
37-74LS02	Type-74LS02 Integrated Circuit ( <b>A4, E10, J6, M3</b> )
37-74LS08	Type-74LS08 Integrated Circuit ( <b>B4, D9, K7, M8</b> )
37-74LS10	Type-74LS10 Integrated Circuit ( <b>J3</b> )
37-74LS20	Type-74LS20 Integrated Circuit ( <b>D12, K5, K12, M5, M6</b> )
37-74LS32	Type-74LS32 Integrated Circuit ( <b>F14, H6, K3, K4, M4</b> )
37-74LS74	Type-74LS74 Integrated Circuit ( <b>E9, F4, F5, H3, H4, L3</b> )
37-74LS86	Type-74LS86 Integrated Circuit ( <b>E6, H5, J5, K2, K9, M9, M12</b> )
37-74LS139	Type-74LS139 Integrated Circuit ( <b>D13, J2, J3</b> )
37-74LS157	Type-74LS157 Integrated Circuit ( <b>E13, E14, F10, H14, J7, J8, K11, K13, L11, L13, M11, M13</b> )
37-74LS161	Type-74LS161 Integrated Circuit ( <b>H1, H2, K1, L1</b> )
37-74LS163	Type-74LS163 Integrated Circuit ( <b>K10, M10</b> )
37-74LS174	Type-74LS174 Integrated Circuit ( <b>L4</b> )
37-74LS175	Type-74LS175 Integrated Circuit ( <b>D8</b> )
37-74LS194	Type-74LS194 Integrated Circuit ( <b>F15-17, H15-17</b> )
37-74LS245	Type-74LS245 Integrated Circuit ( <b>B10, C2, H10, H11</b> )
37-74LS259	Type-74LS259 Integrated Circuit ( <b>D10</b> )
37-74LS273	Type-74LS273 Integrated Circuit ( <b>C7, J9, J12, K8, L12</b> )
37-74LS367	Type-74LS367 Integrated Circuit ( <b>B13, C5, C6, C10, C13, E4, E5, F11, F12</b> )
37-74LS377	Type-74LS377 Integrated Circuit ( <b>E8</b> )
37-74LS393	Type-74LS393 Integrated Circuit ( <b>C8</b> )
62-001	SPST Momentary Pushbutton Switch ( <b>A13</b> )
66-118PIT	8-Station, SPST, Dual-Inline-Package Switch ( <b>B5</b> )
79-42C16	16-Contact Medium-Insertion-Force Integrated Circuit Socket ( <b>H7-9</b> )
79-42C24	24-Contact Medium-Insertion-Force Integrated Circuit Socket ( <b>A14, A16, A17, C14, C16, C17, D16, D17, E1, F1, J14, J16, J17, L14, L16, L17, M14, M16, M17</b> )
79-42C40	40-Contact Medium-Insertion-Force Integrated Circuit Socket ( <b>B11-12, D5-7</b> )
90-7036	Random-Access Memory ( <b>D2, D3, E11, E12, J10, J11</b> )
110000-101	100 Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R25, 29, 29-31, 56, 58, 62</b> )
110000-102	1K Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R52, 53, 59, All Pull-Up Resistors</b> )
110000-103	10K Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R43</b> )
110000-221	220 Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R9-24, 39, 40, 55, 57, 61, 78, 79</b> )
110000-224	220K Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R1-6</b> )
110000-471	470 Ohm, $\pm$ 5%, 1/4W Resistor ( <b>R26, 51, 54, 60</b> )
118001-102	1K Ohm, 8-Element, 9-Pin, Single-Inline Package Resistor Network ( <b>RM1-3</b> )
119003-102	1K Ohm, $\pm$ 20%, Horizontal Trim Pot ( <b>VR1-4</b> )
121015-104	0.1 $\mu$ F, $\pm$ 10%, Radial-Lead Ceramic Capacitor ( <b>C10, 11, 15-30, All Bypass Capacitors</b> )
121020-101	100 pF, $\pm$ 5%, Radial-Lead Mica Capacitor ( <b>C32</b> )
123004-470	47 $\mu$ F, $\pm$ 20%, 16V (min) Aluminum Electrolytic Capacitor ( <b>C4, 6, 31</b> )
123004-471	470 $\mu$ F, $\pm$ 20%, 16V (min) Aluminum Electrolytic Capacitor ( <b>C12</b> )
133011-001	50V, 400mW NPN Transistor ( <b>TR2-4</b> )
136009-101	Programmable Read-Only Memory 1 ( <b>D16</b> )

[Continued on next page]

**Figure 3-9 Fast Freddie PCB Assembly, continued  
Parts List**

<i>Part No.</i>	<i>Description (Reference Designations and Locations in Bold)</i>
136009-102	Programmable Read-Only Memory 2 ( <b>D17</b> )
136009-103	Programmable Read-Only Memory 3 ( <b>C14</b> )
136009-104	Programmable Read-Only Memory 4 ( <b>C16</b> )
136009-105	Programmable Read-Only Memory 5 ( <b>C17</b> )
136009-106	Programmable Read-Only Memory 6 ( <b>A14</b> )
136009-107	Programmable Read-Only Memory 7 ( <b>A16</b> )
136009-108	Programmable Read-Only Memory 8 ( <b>A17</b> )
136009-109	Programmable Read-Only Memory 9 ( <b>E1</b> )
136009-110	Programmable Read-Only Memory 10 ( <b>F1</b> )
136009-111	Programmable Read-Only Memory 11 ( <b>M17</b> )
136009-112	Programmable Read-Only Memory 12 ( <b>M16</b> )
136009-113	Programmable Read-Only Memory 13 ( <b>M14</b> )
136009-114	Programmable Read-Only Memory 14 ( <b>L17</b> )
136009-115	Programmable Read-Only Memory 15 ( <b>L16</b> )
136009-116	Programmable Read-Only Memory 16 ( <b>L14</b> )
136009-117	Programmable Read-Only Memory 17 ( <b>J17</b> )
136009-118	Programmable Read-Only Memory 18 ( <b>J16</b> )
136009-119	Programmable Read-Only Memory 19 ( <b>J14</b> )
136009-120	Programmable Read-Only Memory ( <b>H7</b> )
136009-121	Programmable Read-Only Memory ( <b>H8</b> )
136009-122	Programmable Read-Only Memory ( <b>H9</b> )
137168-001	Type-74LS368 Integrated Circuit ( <b>B6-9, E7, F6, M2</b> )
137169-001	Type-74LS107 Integrated Circuit ( <b>L2</b> )
137170-001	Random-Access Memory ( <b>L5-10</b> )
137177-001	Type-74LS138 Integrated Circuit ( <b>A13, C3, C4, C11, C12, D11</b> )
137194-001	Z80 Microprocessor ( <b>D5-7, B11, B12</b> )
137204-001	Type-74LS283 Integrated Circuit ( <b>H12, H13</b> )
137222-001	Type GI AY3-8910 Sound Integrated Circuit ( <b>B1, B3</b> )
137234-001	Audio Amplifier Integrated Circuit ( <b>AMP1</b> )
137211-001	2Kx8 Static Random-Access Memory ( <b>D14</b> )
137235-001	Custom Chip ( <b>E16, 17</b> )
144000-002	18.432 MHz Crystal ( <b>M1</b> )







### Figure 3-10 Regulator/Audio II PCB Assembly Parts List

Part No.	Description (Reference Designations and Locations in Bold)
19-100P1015	0.1 Ohm, $\pm 3\%$ , 7W Wirewound Resistor <b>(R24)</b>
19-315102	1K Ohm Vertical PCB-Mounting Cermet Trimpot <b>(R8)</b> <i>Acceptable substitute is part no. 119002-102.</i>
24-250108	1000 $\mu\text{F}$ 25V Aluminum Electrolytic Fixed Axial-Lead Capacitor <b>(C13)</b>
24-250477	470 $\mu\text{F}$ 25V Aluminum Electrolytic Fixed Axial-Lead Capacitor <b>(C1)</b>
24-350226	22 $\mu\text{F}$ 35V Aluminum Electrolytic Fixed Axial-Lead Capacitor <b>(C24, 31)</b>
24-350338	3300 $\mu\text{F}$ 35V Aluminum Electrolytic Fixed Axial-Lead Capacitor <b>(C18, 19)</b>
24-500105	1 $\mu\text{F}$ 50V Aluminum Electrolytic Fixed Axial-Lead Capacitor <b>(C22, 23)</b>
29-088	0.1 $\mu\text{F}$ 50V Ceramic-Disc Axial-Lead Capacitor <b>(C20, 21)</b>
31-1N4002	Type-1N4002 100V 1-Amp. Silicon Rectifier Diode <b>(CR1, 4)</b>
31-1N5401	Type-1N5401 100V 3-Amp. Silicon Rectifier Diode <b>(CR5-8)</b>
33-TIP32	Type-TIP32 PNP Power Transistor <b>(Q2)</b>
34-2N3055	Type-2N3055 NPN Silicon Transistor <b>(Q3)</b>
37-LM305	5V Linear Voltage Regulator <b>(Q1)</b>
37-7812	Type-7812 +12V Voltage Regulator <b>(Q8)</b>
37-7905	Type-7905 -5V Voltage Regulator <b>(Q9)</b>
72-1608C	#6-32 $\times$ 1/2-Inch Cross-Recessed Pan-Head Corrosion-Resistant Steel Machine Screw
72-6810S	#8 $\times$ 3/4-Inch Phillips-Head Wood Screw <i>(for mounting PCB to cabinet)</i>
75-F60405	#6-32 $\times$ 1/4-Inch Binder-Head Nylon Screw
75-99516	#6-32 Nut/Washer Assembly
78-16014	Thermally Conductive Silicon Insulator <b>(Q2, 9)</b>
79-58306	6-Position Connector Receptacle <b>(J6, 9)</b>
79-58308	9-Position Connector Receptacle <b>(J7)</b>
79-58346	12-Position Connector Receptacle <b>(J10)</b>
034531-01	Heat Sink
034536-02	Foam Vibration Damper <i>(goes between PCB and cabinet wall)</i>
110000-100	10 Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R29, 30)</b>
110000-101	100 Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R4)</b>
110000-271	270 Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R1)</b>
110000-330	33 Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R3)</b>
110000-392	3.9K Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R6)</b>
110000-562	5.6K Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R32, 33)</b>
110000-752	7.5K Ohm, $\pm 5\%$ , 1/4W Resistor <b>(R7)</b>
110009-027	2.7 Ohm, $\pm 5\%$ , 1W Resistor <b>(R5)</b>
116000-220	22 Ohm, $\pm 5\%$ , 10W Wirewound Resistor <b>(R31)</b>
116001-040	4 Ohm, $\pm 5\%$ , 5W Wirewound Resistor <b>(R25)</b>
122002-102	.001 $\mu\text{F}$ 50V Ceramic-Disc Axial-Lead Capacitor <b>(C2)</b>
122004-224	.22 $\mu\text{F}$ 25V (min.) Ceramic-Disc Axial-Lead Capacitor <b>(C8)</b>
175004-708	Fiber Spacer <i>(for mounting PCB to cabinet)</i>
179051-001	Test Point <i>(Acceptable substitute is part no. 020670-01)</i>

# G. Power Supply Assembly

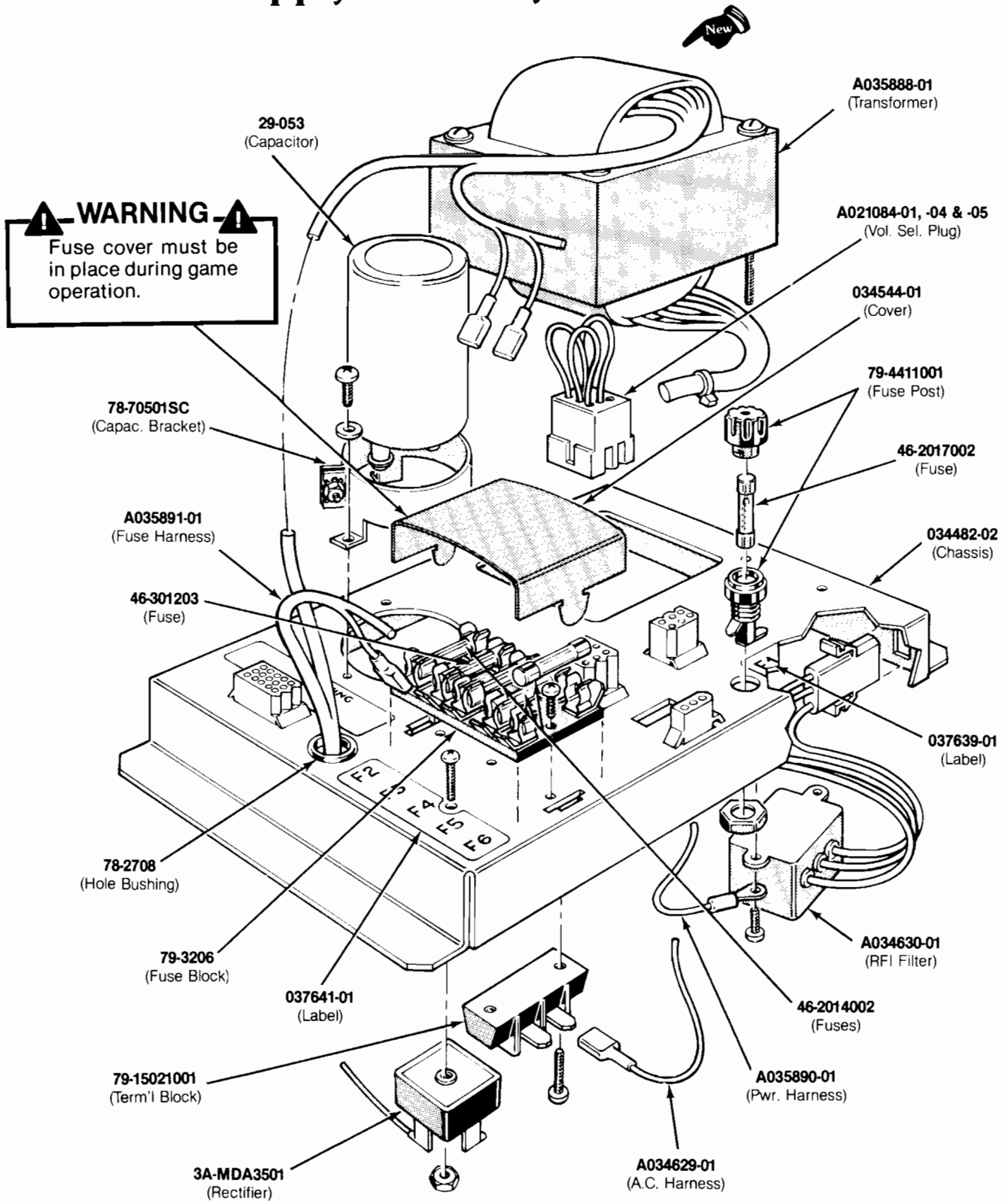


Figure 3-11 Power Supply Assembly  
A037671-02 C

### Figure 3-11 Power Supply Assembly, continued Parts List

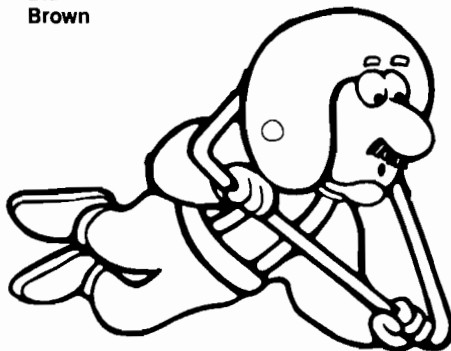
Part No.	Description (Reference Designations in Bold)
A021084-01	Voltage Plug for 100V ( <i>violet</i> )
A021084-04	Voltage Plug for 220V ( <i>blue</i> )
A021084-05	Voltage Plug for 240V ( <i>brown</i> )
A034629-01	A.C. Harness Assembly
A034630-01	RFI Filter Assembly ( <b>FL1</b> )
A035888-01	Transformer Assembly ( <b>T1</b> ) <i>Acceptable substitute is part no. A035888-02</i>
A035890-01	Power Harness Assembly
A035891-01	Fuse Harness Assembly
A037671-02	Power Supply Assembly
29-053	27,000 $\mu$ F 15V DC Electrolytic Capacitor ( <b>C1</b> )
3A-MDA3501	Bridge Rectifier, Type MDA 3501 ( <b>CR1</b> )
46-2014002	4-Amp. 250V 3AG Slow-Blow Glass Cartridge-Type Fuse ( <b>F2, F4-F6</b> )
46-2017002	7-Amp. 250V 3AG Slow-Blow Glass Cartridge-Type Fuse ( <b>F1</b> )
46-301203	20-Amp. 32V 3AG Slow-Blow Glass Cartridge-Type Fuse ( <b>F3</b> )
78-2708	Nylon Type 6/6 Hole Bushing with $\frac{5}{8}$ -Inch Inside Diameter $\times$ $\frac{55}{64}$ -Inch Outside Diameter $\times$ $\frac{1}{4}$ -Inch Thick
78-70501SC	2-Inch Diameter Capacitor Mounting Bracket
79-15021001	2-Circuit Single-Row Terminal Block
79-3206	5-Position 3AG Fuse Block with $\frac{1}{4}$ -Inch Quick-Disconnect Terminals
79-4411001	Panel-Mounting Non-Indicating 3AG Cartridge-Type Fuse Post
034482-02	Power Supply Chassis
034544-01	Fuse Block Cover
037243-01	Metal Base Plate ( <i>goes under the power supply—not shown in illustration</i> )
037639-01	Label for Fuse Value ( <b>F1</b> )
037641-01	Label for Fuse Values ( <b>F2-F6</b> )

#### Line Voltage Range

90-110 VAC (100)  
200-240 VAC (220)  
220-260 VAC (240)

#### Voltage Selection Plug Wire Color

Violet  
Blue  
Brown





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