

Operation, Maintenance and  
Service Manual Complete with Illustrated Parts Lists

TM-193  
1st printing

TM

# COCKTAIL

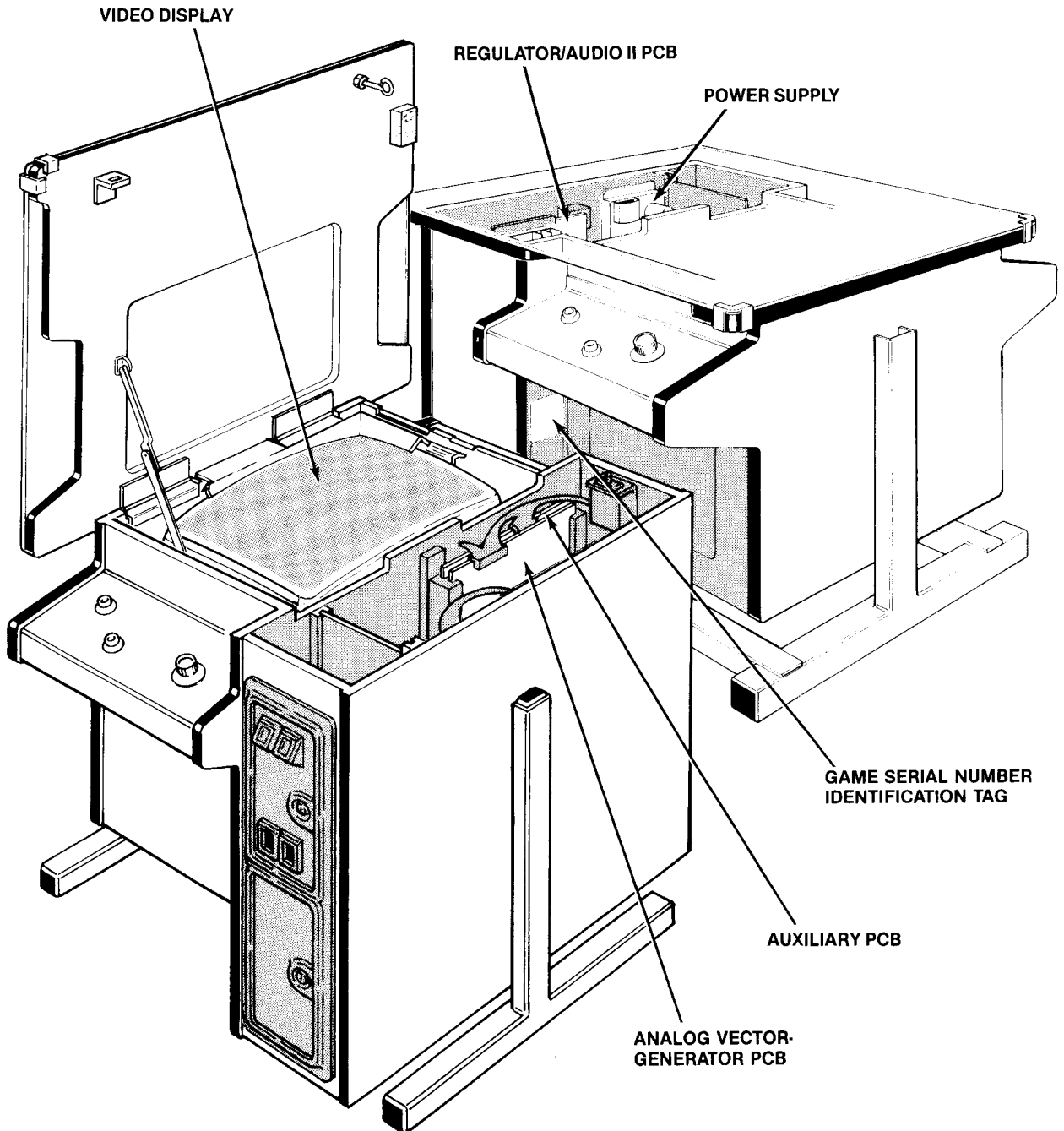
# TEMPLES

INTRODUCING ATARI'S FIRST  
COLOR  
X-Y  
GAME



## GAME SERIAL NUMBER LOCATION

Your game's serial number is stamped on a label on the outside of the game. The same number is also stamped on the chassis of the video display, Regulator/Audio II PCB, and the Tempest™ Analog Vector-Generator PCB and Auxiliary PCB. Please mention this number whenever calling your distributor for service.



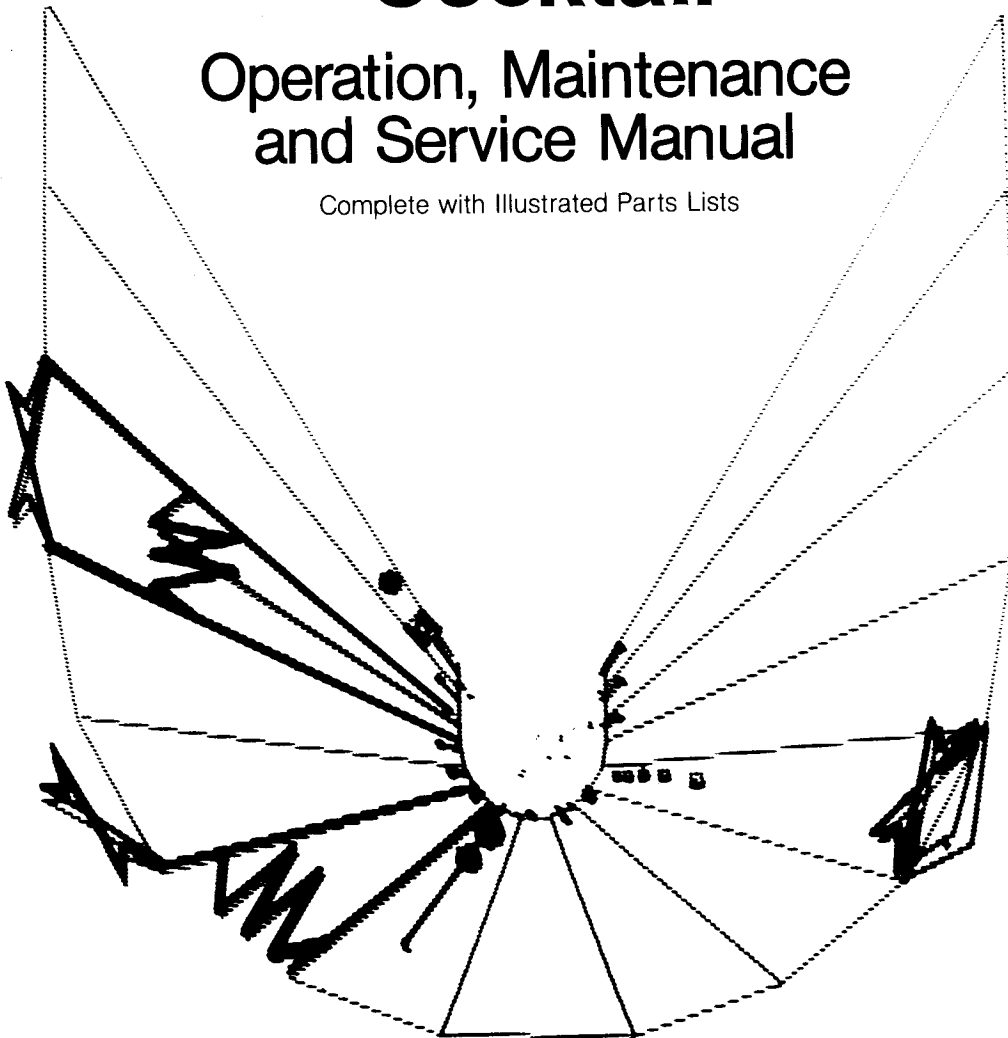
Introducing Atari's *First* Color X-Y Video Game...

**TEMPLE** **ATARI**™

## Cocktail

### Operation, Maintenance and Service Manual

Complete with Illustrated Parts Lists



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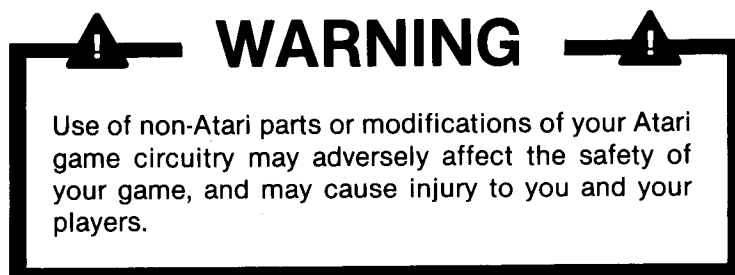
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# Notice Regarding Non-Atari Parts



Atari, Inc.'s warranty (printed on the inside back cover of this manual) may be voided, if you do any of the following:

- 1.) you substitute non-Atari parts in your coin-operated game, or
- 2.) you 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 your warranty, but any such alteration may also adversely affect the safety of your game, and may cause injury to you and your players.

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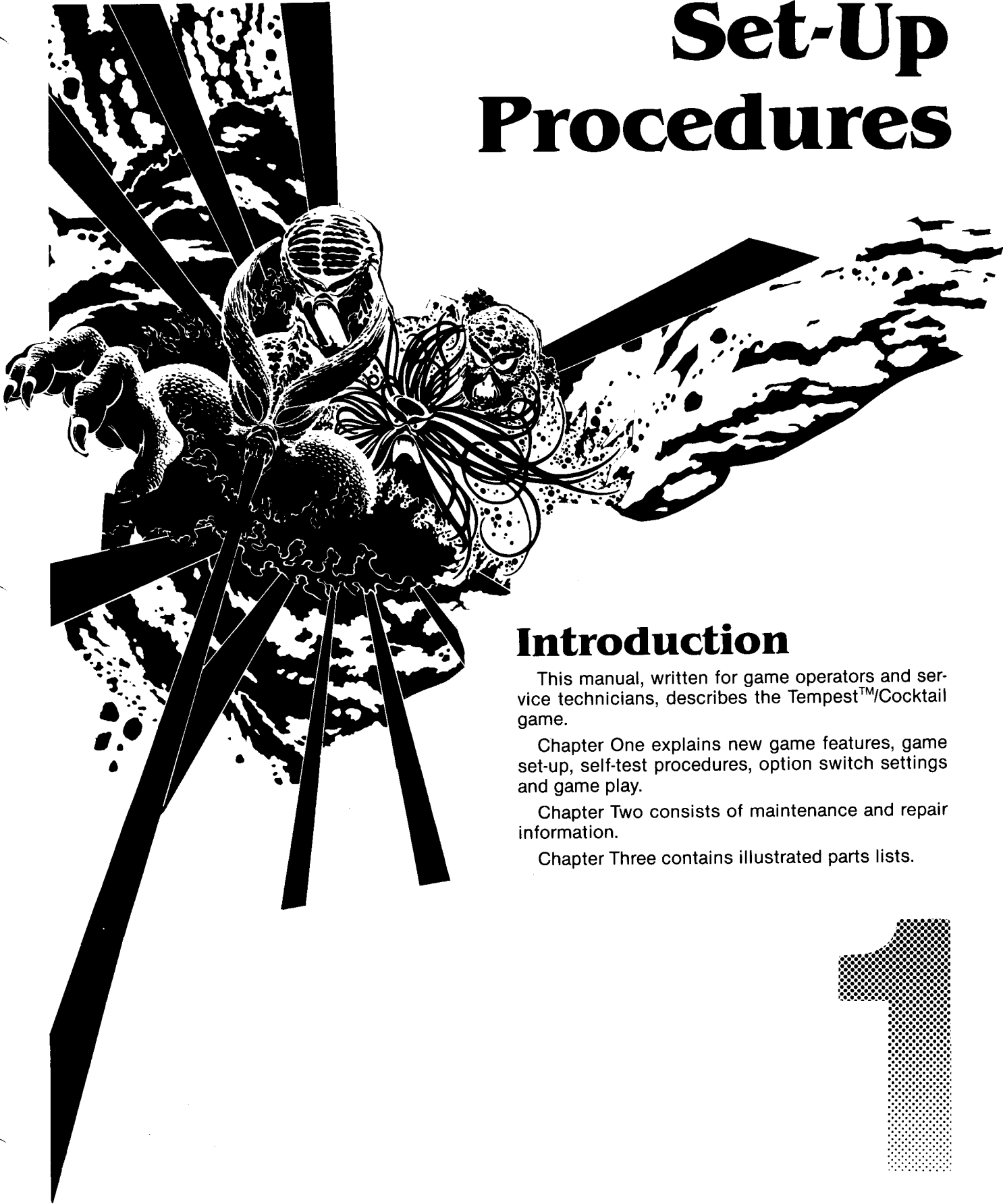
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# Set-Up Procedures



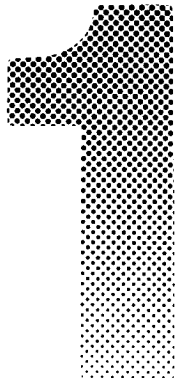
## Introduction

This manual, written for game operators and service technicians, describes the Tempest™/Cocktail game.

Chapter One explains new game features, game set-up, self-test procedures, option switch settings and game play.

Chapter Two consists of maintenance and repair information.

Chapter Three contains illustrated parts lists.





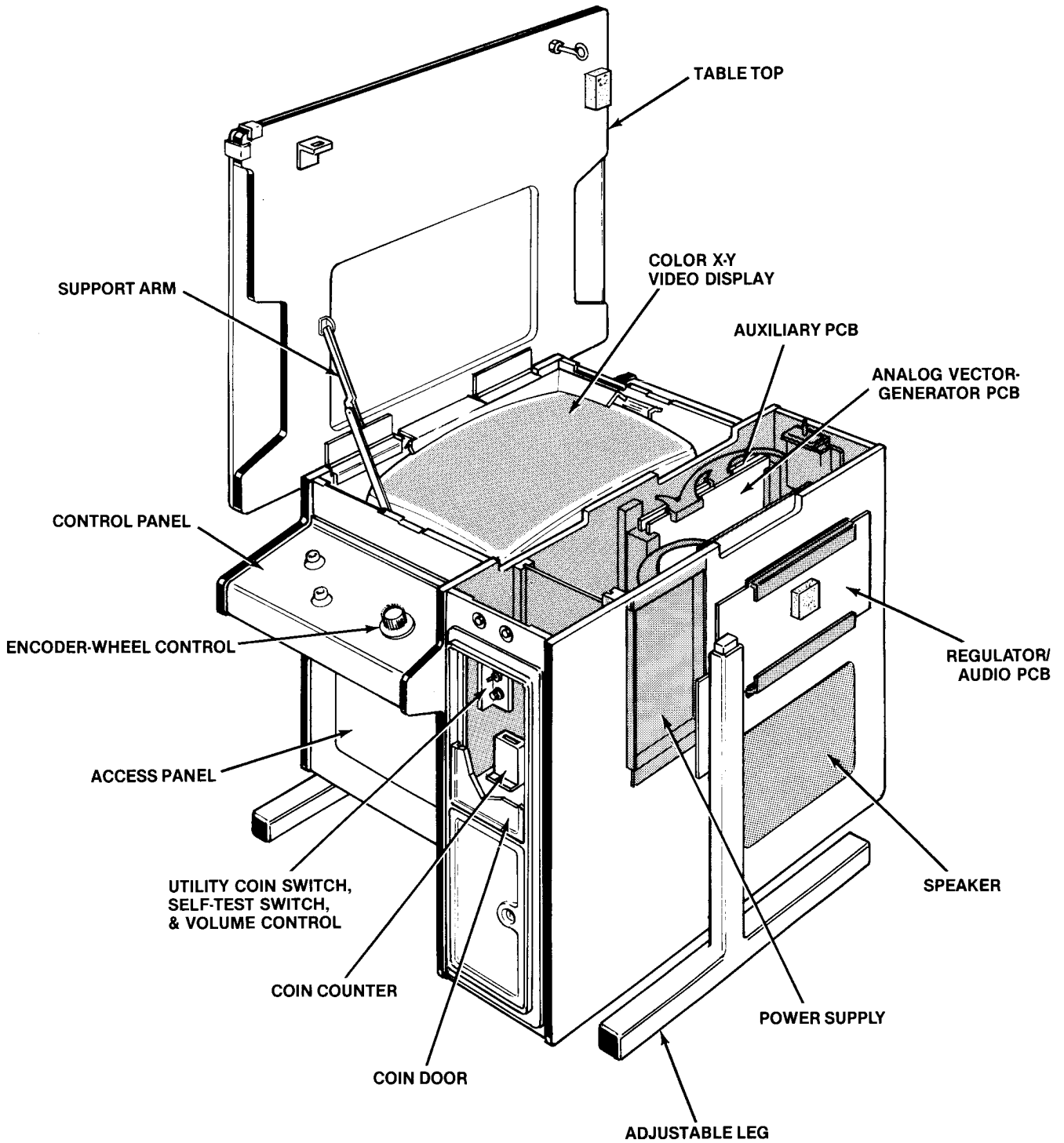


Figure 1 Overview of Game

## A. New Features

The Tempest™/Cocktail game has five new features. Even if you are familiar with Atari games, you should note these important differences. The new features are:

- **Color X-Y Video Display and Game Printed-Circuit Boards (PCBs).** Tempest is Atari's *first* color X-Y game. The color X-Y video display produces a great number of colors in varying intensities. Atari's X-Y game circuitry has been redesigned for a color video display.
- **Game Play.** Atari introduces *Skill-Step™*, and 99 levels of play on 16 different playfields. A demonstration mode allows you to accelerate through 98 levels of play. In addition, a special switch setting lets you freeze the game action (see *Section H, Game Play*).
- **Encoder Wheel.** This new control has a compact, simplified design which makes servicing easy. This control's circuitry is contained on a single PCB. The very smooth action is designed for greater player accuracy.
- **Coin Door.** This game has Atari's new vertical-mounted coin door. It allows full access for servicing the coin acceptors and other electrical parts, yet provides security for the cash. Therefore, the two doors are separately keyed.
- **Cabinet Design.** This newly designed cocktail cabinet places most of the game components in one compartment. The Analog Vector-Generator (AVG) and Auxiliary PCBs are mounted back-to-back and separated by plastic standoffs. In addition, the adjustable legs provide cabinet stability with two cocktail-table height settings and a third setting which allows a player to stand while playing the game.

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



### WARNING: SHOCK HAZARD

Connect this game only to a grounded 3-wire outlet. If you have only a 2-wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. **Players may receive an electric shock if this game is not properly grounded!**

## B. Opening the Game Cabinet

### 1. Opening the Table Top

- To open the game cabinet, unlock and open the coin door. Reach inside and open the luggage-style latch located on the cabinet wall to your right. Next, unlock the lock at one end of the game, located immediately below the table top (see Figure 1).
- Carefully lift the table top until the support arm locks into place. **Do not jam the table top at the end of its upward swing.**

### 2. Access Panel

- To remove the access panel, unlock it and pull it away from the game cabinet.

### 3. Closing the Table Top

- To close the cabinet, stand opposite the hinged end of the cabinet and grasp the table top with your right hand.
- With your left hand, press the button at the middle of the support arm and pull the support arm out towards the left.
- **Gently** lower the table top to the closed position.
- Lock the key lock. Then reach inside the coin door and close the luggage-style latch. Lock the coin door.

## C. Game Inspection

Please inspect your game carefully to insure 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. Unlock and open the table top and access panel; inspect the interior of the game as follows:
  - 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.**

- Check that all plug-in integrated circuits on the game PCBs are firmly seated in their sockets.
- Check that the plastic standoffs are in place, holding the PCBs away from each other.
- Check the power cord for any cuts or dents in the insulation.

- Check all major subassemblies such as the power supply, control panel and video display for secure mounting.

## D. Game Installation

### WARNING

To avoid possible unpleasant electrical shock, do not touch internal parts of the video display with your hands or with metal objects held in your hands!

- Note the location of the game's serial number—it is printed on the special label under the control panel on the outside of the game cabinet. Verify that the serial numbers on the Tempest™ Analog Vector-Generator PCB, Tempest Auxiliary PCB, Regulator/Audio II PCB, power supply and video display are all identical. 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.

### Figure 2 Installation Requirements

Power	250 watts maximum
Temperature	0 to 38°C (32 to 100°F)
Humidity	Not over 95% relative
Space Required	72 × 95 cm (28½ × 37½ in.)
Game Height	68 to 104 cm (27 to 41 in.)

### 1. Voltage Selection

The power supply used in this game operates on the line voltage of almost any country in the world. The power supply comes with one, two or three colored voltage selection plugs.

#### Line Voltage Range

- 90-110 VAC (100)
- 105-135 VAC (120)\*
- 200-240 VAC (220)
- 220-260 VAC (240)

\*This is the *only* plug provided on the North American power supply.

#### Voltage Selection Plug Color

- Violet
- Yellow\*
- Blue
- Brown

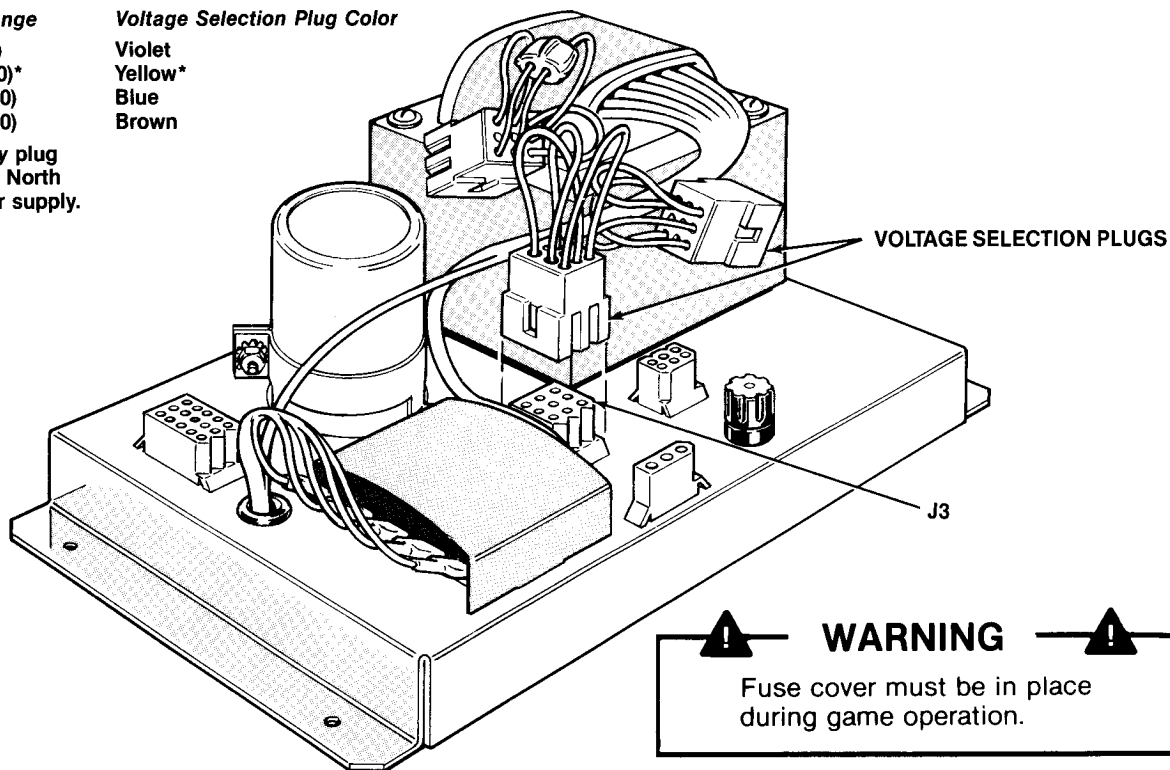
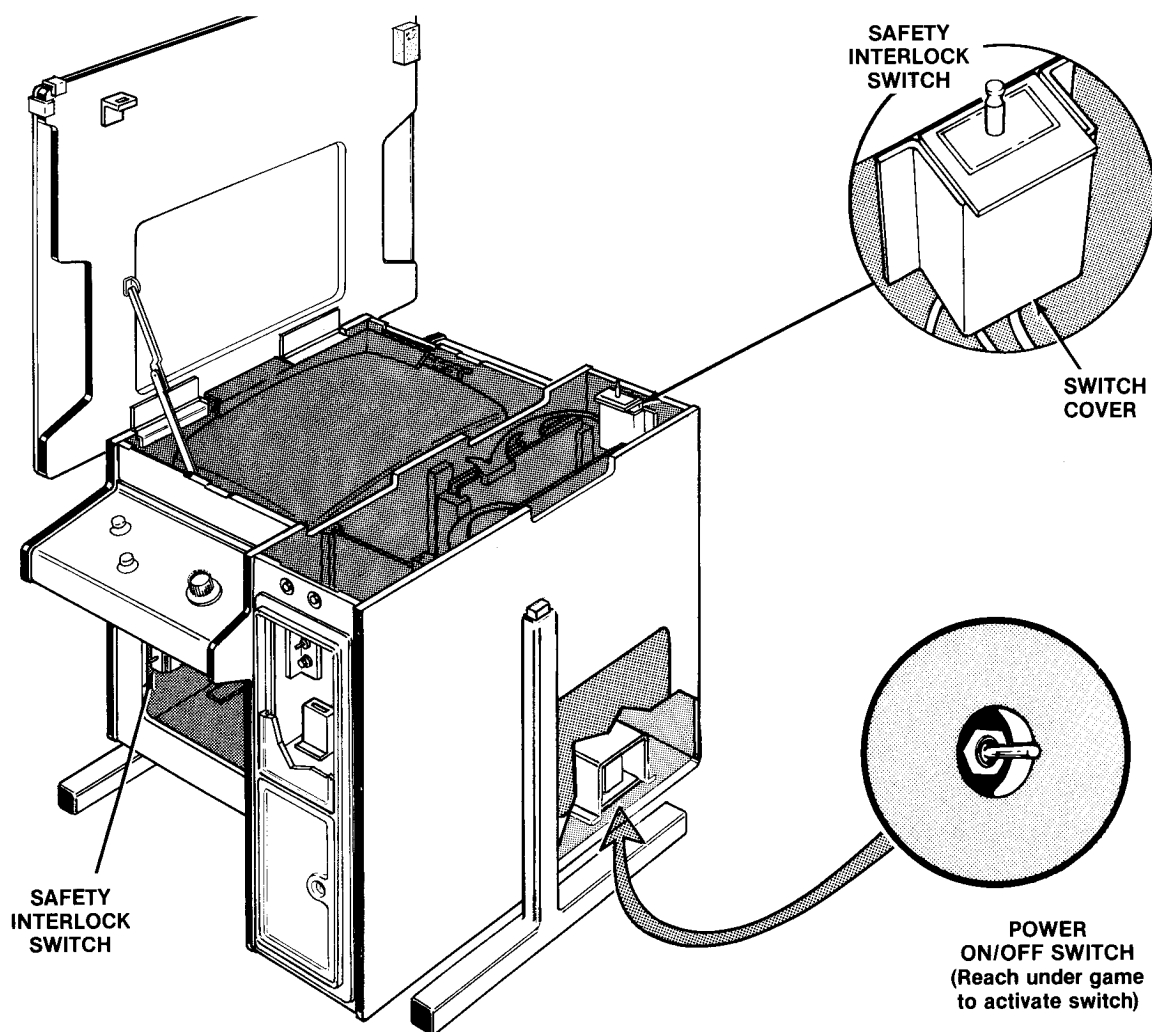


Figure 3 International Voltage Plug Selection



**Figure 4 Interlock and Power On/Off Switches**

Before plugging in your game, make sure that the voltage selection plug(s) on the power supply is correct for your location's line voltage. Check the wire color on the plug and see if it is correct per Figure 3.

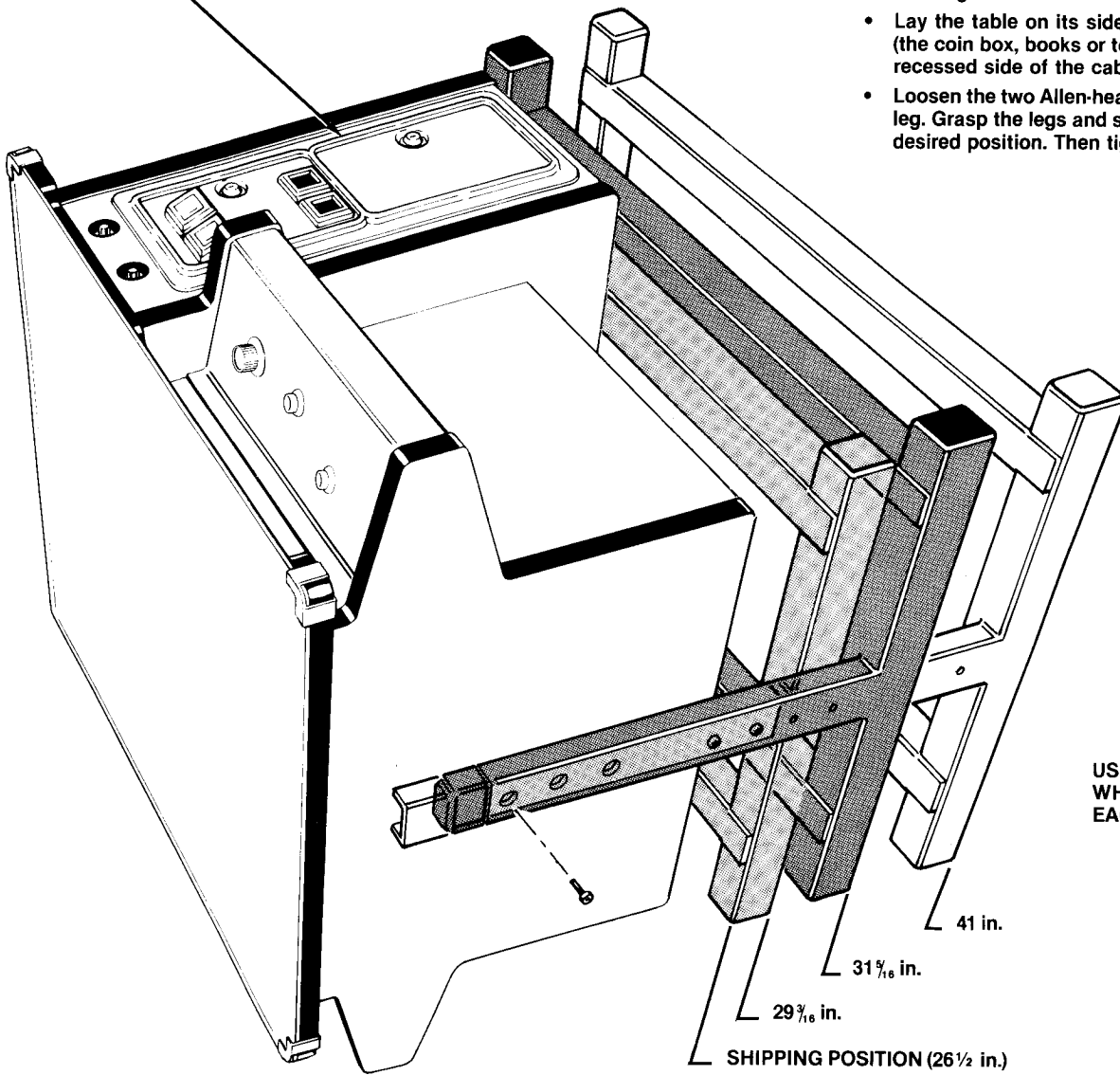
## 2. Interlock and Power On/Off Switches

To minimize the hazard of electrical shock while working on the inside of the game cabinet, two interlock switches have been installed (see Figure 4). One is located under the table top and the other is behind the access panel. This switch removes all AC line power from the game circuitry when the panel is opened.

Check for proper operation of the interlock switch by performing the following steps:

- Be sure the table top and access panel are closed.
- Plug the AC line power cord into an AC outlet.
- Set the power on/off switch to the "on" position. Within 30 seconds the video display should display a picture.
- Slowly open the table top. The video display picture should disappear when the top is lifted approximately 2½ cm (1 inch). Close and lock the table top.
- Slowly open the access panel. The video display picture should disappear when the panel is opened approximately 2.5 cm (1 inch). Close and lock this panel.
- If the results of the preceding step are satisfactory, the interlock switches are operating properly. If the video display picture doesn't go off as described, check to see if the interlock switch is broken from its mounting or stuck in the "on" position.

REMOVE COIN BOX



- Remove or empty the coin box. Loose coins may slide out of the coin box and into the game cabinet.
- Lay the table on its side. Place a support (the coin box, books or tool box) under the recessed side of the cabinet.
- Loosen the two Allen-head screws on each leg. Grasp the legs and slide them into the desired position. Then tighten the screws.

Figure 5 Adjusting the Table Legs

## E. Adjusting the Table Legs

This cocktail-table game is designed for four adjustable heights—68, 74, 80 or 104 cm (27, 29 <sup>7</sup>/<sub>16</sub>, 31 <sup>1</sup>/<sub>16</sub> or 41 inches). To adjust the table height, refer to Figure 5.

### NOTE

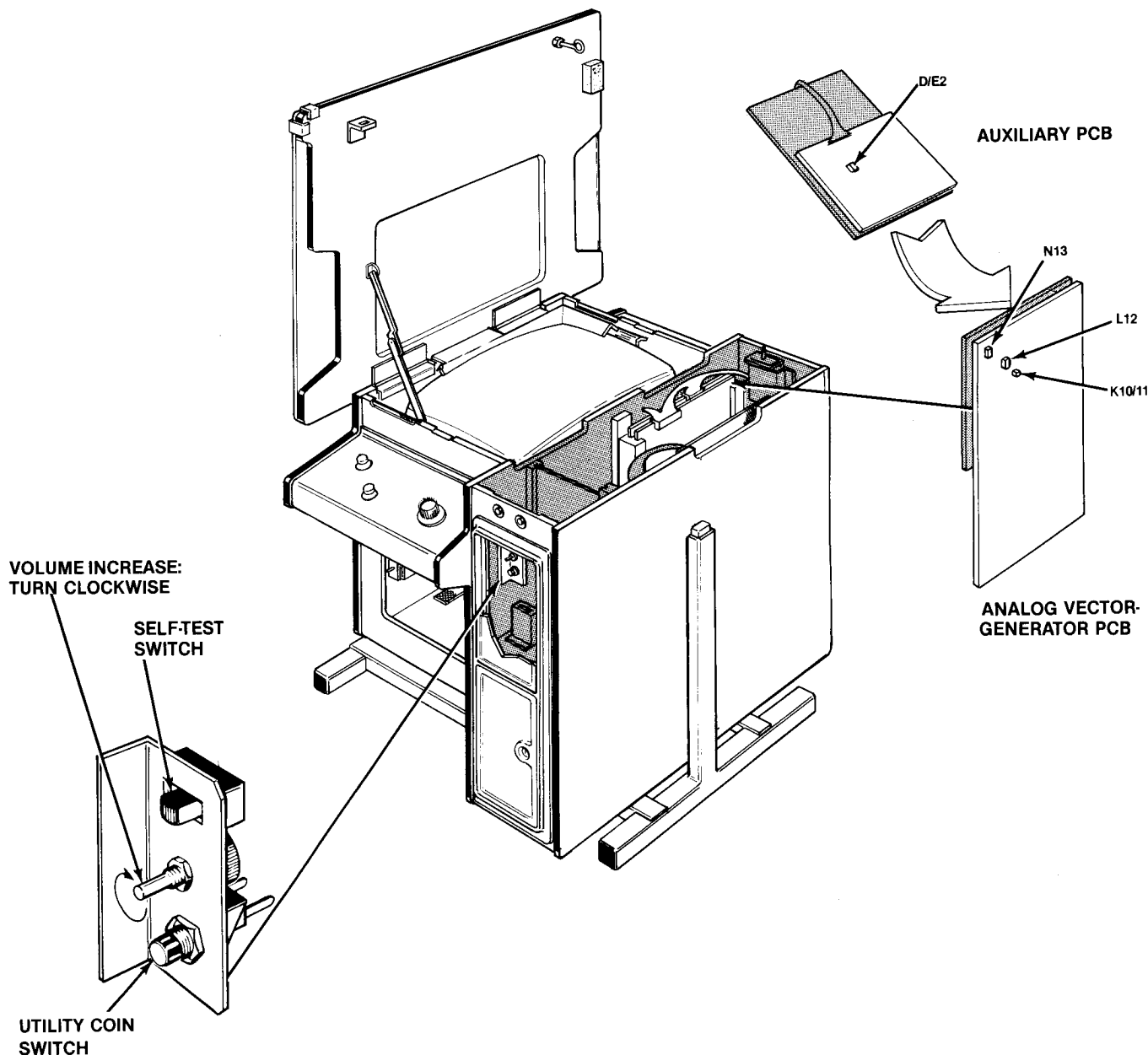
To ensure cabinet strength, you **must** use two screws when attaching each table leg. Using only one screw may result in damage to the cabinet wall when you move the cabinet across the floor.

## F. Self-Test Procedure

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

Part 1 of the self-test procedure includes a display of the operator-selectable game options, and game time and high score table information. Part 2 includes ROM and RAM, control panel and display information.

We suggest you run the self-test procedure any time you collect money from the game or any time you change the game's options. Refer to Figure 6 for location of the self-test switch and option switches. To run the self-test, follow the instructions outlined in Figure 7.

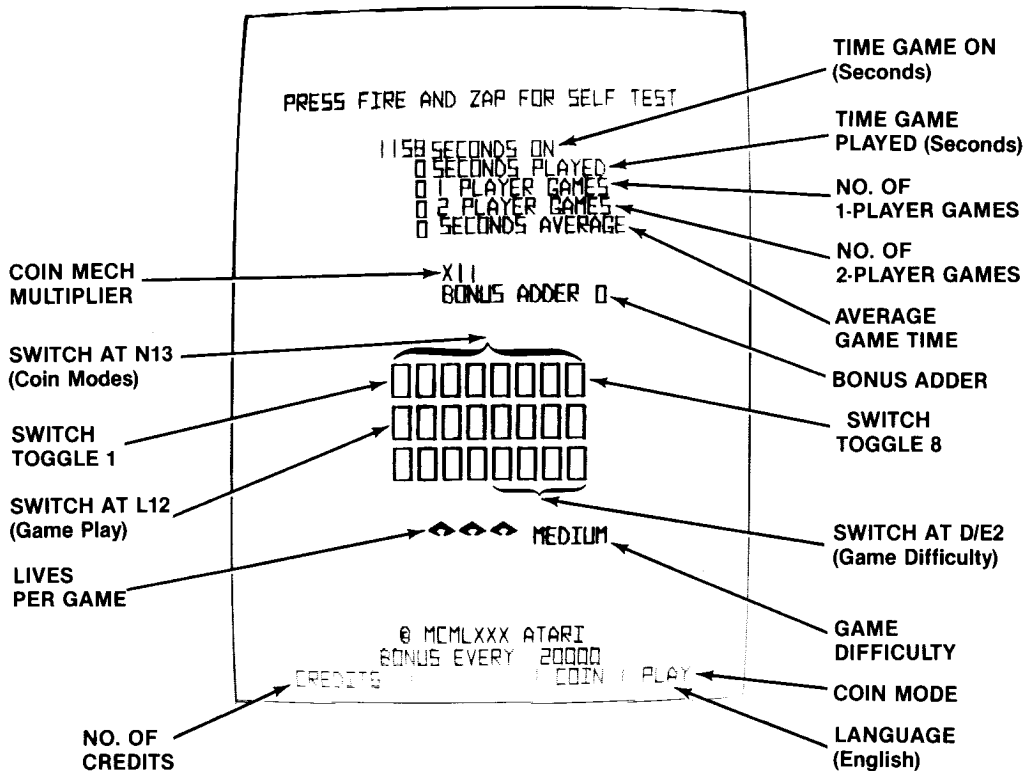


**Figure 6 Location of Self-Test Switch, Volume Control and Option Switches**

## Figure 7 Self-Test Procedure Part 1

The information below is displayed on the screen if you set the self-test switch to **on** during the attract mode. Look at the displayed numbers for *SECONDS ON* and *SECONDS PLAYED*. If these numbers run together vertically, make adjustments to the X-BIP and Y-BIP potentiometers on the game PCB.

To go to Self-Test Part 2, rotate the control knob until the message *PRESS FIRE AND ZAP FOR SELF-TEST* appears on the video display. Then press both FIRE and SUPERZAP. To end the operator information display, set self-test switch to **off**.



### Operator Information Display

#### To erase High Score Table:

1. Turn control knob until top line reads *PRESS FIRE AND START 2 TO ZERO SCORES*.
2. Press both FIRE and START 2.
3. The word *ERASING* appears and blinks on the screen until the entire table is erased. **Wait until the word *ERASING* disappears** before continuing with other tests.

#### To erase Game Times:

1. Turn control knob until top line reads *PRESS FIRE AND START 1 TO ZERO TIMES*.
2. Press both FIRE and START 1.
3. The word *ERASING* appears and blinks on the screen until the entire table is erased. **Wait until the word *ERASING* disappears** before continuing with other tests.

[Self-test is continued on next page]

## Figure 7 Self-Test Procedure Part 2

Instruction	Test Passes	Test Fails
1. Set self-test switch to on. Press RESET on the PCB, or turn power off and on again.	After about 5 seconds, the video displays the picture below. No sounds are produced.	<b>RAM FAILURE</b> is indicated by a sequence of 1 to 12 tones and an <i>R</i> displayed in top half of screen. You will hear a short low tone and see a short flash on the LED start pushbutton for each good RAM chip, and a long high tone accompanied by a long pulse on the start pushbutton for a failing RAM chip. The test stops with the first failing RAM. To restart the sequence, press RESET on the PCB, or power game to off, then to on again. Identify the bad RAM chip with the table below. Example: four short low tones followed by a long high tone indicates failure of RAM at location M3.

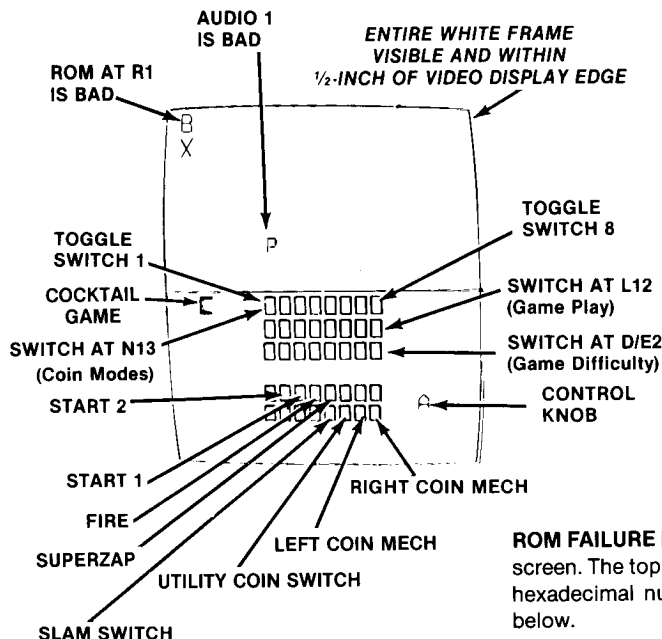


PHOTO ABOVE SHOWS AN EXAMPLE ONLY

**NOTE**

Press Start 1: Screen flips to player 1 and readout is for player 1 control switches.  
 Press Start 2: Screen flips to player 2 and readout is for player 2 control switches.

Long High Tone	Bad RAM Chip Location on Analog Vector-Gen'r. PCB
1st	R2
2nd	P2
3rd	R4
4th	P4
5th	M3
6th	M4
7th	L3
8th	L4
9th	K3
10th	K4
11th	J3
12th	J4

**ROM FAILURE** is indicated by a vertical pair of hexadecimal numbers on the top of the screen. The top number indicates the location of the failing ROM(s). Ignore the bottom hexadecimal number in the pair. Identify the bad ROM with the table immediately below.

Displayed No.	Bad ROM Chip Location	PCB Location
B	R1	
A	P1	
9	M/N1	
8	L/M1	
7	K1	Analog Vector-Generator PCB
6	J1	
5	H1	
4	F1	
3	E1	
2	D1	
1	R3	
0	N/P3*	

**EAROM, Audio and Math Box Failure** are indicated by a single letter in the center of the display. Identify the failure with the table below.

Displayed Letter	Failure	PCB Location
E	EAROM	C3 (Aux. PCB)
P	Audio 1	B/C2 (Aux. PCB)
Q	Audio 2	C/D2 (Aux. PCB)
R	RAM	See RAM test above
M	Math Box**	

\* If this ROM is bad, you will hear a continuous low tone, and the program may be unable to display a screen image.

\*\* Math-box failure is explained in TM-195, Tempest Troubleshooting Guide.

[Self-test is continued on next page]



## Figure 7 Self-Test Procedure Part 2, continued

Instruction	Test Passes	Test Fails
2. Activate start, fire, Superzap, SLAM, and coin switches.*	As switch activates, you'll hear a beep and 0 changes to 1 on the screen.	You will not hear a beep and 0 will remain on the screen for the defective switch.
3. Rotate encoder wheel clockwise and counterclockwise.	The right hexadecimal number on the screen will increase with counter clockwise motion, and decrease with clockwise motion.	Incorrect progression of numbers indicates encoder wheel harness wires were connected incorrectly. No number change indicates encoder wheel is bad or harness wires are loose.
4. Observe the white frame around the outside of the screen.	Each frame corner should be within 1/2-inch of each video display bezel corner.	Consult Tempest™ Drawing Package to adjust video pots.
5. Activate SLAM switch.	A white cross hatch pattern appears. A character set appears at the bottom of the screen.	If display is not centered and symmetrical on the video display, adjust video pots (see Tempest Drawing Package) on the main PCB. If character set is incorrect, check Vector ROMs (see Troubleshooting Guide).
6. Activate SLAM switch.	Horizontal and vertical lines cross in the center of the screen displaying a large "plus" sign. Audio I/O 1 and 2 alternate to produce four tones.	No sound indicates failure of an audio amplifier and/or the custom audio chip(s).
7. Activate SLAM switch.	Tests purple, cyan, yellow, white, green, blue, and red for color and intensity. Displays seven groups of vertical lines, each with right line the brightest and left line the dimmest.	Use this pattern for tracking adjustments (see the Color X-Y Display Manual).
8. Activate SLAM switch.	A checkerboard pattern touches the sides and corners of the video display. Rotate the control knob to change color.	Use this pattern for purity and convergence adjustments (see Color X-Y Display Manual).
9. Activate SLAM switch.	A white frame is displayed on the screen.	
10. When satisfied with test, set self-test switch to <b>off</b> position.		

\* Activate coin switches by inserting at least one coin in each coin slot. You will not trip the coin counters as long as you are in self-test.

# G. Option Switch Settings

## 1. Bonus Play Feature

Tempest™/Cocktail offers a bonus play for certain combinations of coins inserted. This bonus feature is operator-selectable, meaning you may choose to offer it or not.

Figures 8, 9 and 10 provide "\$" symbols indicating Atari's recommended settings. All toggles are preset in the "on" position as per these recommendations. However, you may change the settings to suit your individual needs.

With your game set at 25¢ per play, players who deposit four successive quarters, then press the start button, can receive a bonus play. Therefore, players can receive 5 plays for \$1.00.

### Figure 8 Game Option Settings

To change toggle positions on the switch assemblies, you need not remove the game PCB. The switches are accessible when the Tempest™ Analog Vector-Generator PCB is mounted in place. To change positions on the Auxiliary PCB you need to remove both PCBs from the game.

When changing the options, verify proper results on the video display by performing the self-test. Note that changing an option on any of the following eight toggles will **not** cause an immediate change on the video display screen during the attract mode.

**Settings of 8-Toggle Switch on Tempest Analog Vector-Generator PCB (at L12)**

1	2	3	4	5	6	7	8	Option
							On	1-credit minimum \$
							Off	2-credit minimum
					On	On		English \$
					On	Off		French
					Off	On		German
					Off	Off		Spanish
								Bonus life granted at every:
		On	On	Off				10,000 points
		On	On	On				20,000 points \$
		On	Off	On				30,000 points
		On	Off	Off				40,000 points
		Off	On	On				50,000 points
		Off	On	Off				60,000 points
		Off	Off	On				70,000 points
		Off	Off	Off				No bonus life
Off	Off							2 lives per game
On	On							3 lives per game \$
On	Off							4 lives per game
Off	On							5 lives per game

**Settings of 4-Toggle Switch on Auxiliary PCB (at D/E2).**

		Off	Off					Game difficulty*
		Off	On					Medium \$
		On	Off					Easy
		On	On					Hard
								Medium
								Starting Level:
								1, 3, 5, 7 or 9 \$
								1, 3, 5, 7, 9 or 11 if current high score
								300,000-499,999
								1, 3, 5, 7, 9, 11 or 13 if current high score
								500,000-699,999
								1, 3, 5, 7, 9, 11, 13 or 15 if current high score
								more than 700,000

\$ Manufacturer's suggested settings

\* Easy—Enemies move slower and one less enemy shot on the screen at one time.

Hard—One more enemy, enemies move faster and 1-4 more enemy shots on the screen at one time.

For pricing for "credits," see Figure 9.

Changing toggles 1-5 erases the high score table.

This bonus feature encourages players to insert more money than just the minimum 25¢ required for one game. Various other bonuses are also available (see Figure 9).

## 2. Coin Mechanism Multipliers

This game has a new vertical-mounted coin door with a separate coin-box entrance; it has two mechanisms. The Tempest™ game PCBs identify the different coin mechanisms in a certain pattern.

The basic unit of measurement is 25¢ or 1 DM, which equals a multiplier of  $\times 1$ . Therefore, if you have a 2 DM/1DM coin door, you will probably want to set the left and right option-switch multipliers at  $\times 2/\times 1$ .

You can set these multipliers with toggles 4 through 6 on the Tempest™ Analog Vector-Generator PCB switch assembly at location N13. For exact settings of these toggles, refer to Figure 9.

## 3. Examples of Game Price Settings


Figure 9 explains the game price settings, giving six examples of the most common U.S. situations. The toggles mentioned in Figure 9 are all in the switch at location N13; they **only** relate to game price, coin mech multipliers, and bonus plays.

### Figure 9 Game Price Settings

The table below contains the switch settings for options relating to game price, coin mechanism multipliers (German coin doors), bonus play, demonstration and freeze mode.

The Demonstration Mode allows you to choose any level (1-81) in the ready-to-play mode and accelerate through as many as 99 levels without having to kill the enemies. The Demonstration-Freeze Mode\*\* allows you to stop the action. The score is zeroed at the end of the game in this mode.

Set the toggles per the table below for the Demonstration Mode. Next, rotate the control knob. You may choose level 1 through 81 during the ready-to-play mode. Press either START button to accelerate through the tubes. Press the FIRE button to clear the spikes at the bottom of the tube. To freeze play, set switch 1 to off.

Toggle Settings of 8-Toggle Switch on Tempest Analog Vector-Generator PCB (at N13)								Option
1	2	3	4	5	6	7	8	
							Off	Free play
							On	1 coin* for 2 credits
							Off	1 coin* for 1 credit \$
							On	2 coins* for 1 credit
				On	On			Right coin mech $\times 1$ \$
				On	Off			Right coin mech $\times 4$
				Off	On			Right coin mech $\times 5$
				Off	Off			Right coin mech $\times 6$
			On					Left coin mech $\times 1$ \$
			Off					Left coin mech $\times 2$
On	On	On						No bonus coins \$
On	On	Off						For every 2 coins inserted, game logic adds 1 more coin*
On	Off	On						For every 4 coins inserted, game logic adds 1 more coin*
On	Off	Off						For every 4 coins inserted, game logic adds 2 more coins*
Off	On	On						For every 5 coins inserted, game logic adds 1 more coin*
Off	On	Off						For every 3 coins inserted, game logic adds 1 more coin*
<b>Demonstration and Freeze Mode**</b> 								
On	Off					Off	On	Demonstration Mode
Off	Off					Off	On	Demonstration-Freeze Mode

\$ Manufacturer's suggested settings

\* In the U.S., a "coin" is defined as 25¢. In Germany a "coin" is 1 DM.

\*\* If you press RESET during this mode, game will lock up. To recover, set switch 1 to on.

To achieve bonus plays, all coins must be inserted before pressing start button.

## Figure 9 Game Price Settings, continued

The white block below contains Atari's suggested settings. All numbers 1 thru 8 are toggle settings on the 8-toggle switch at location N13, on the Tempest™ Analog Vector-Generator PCB.

Circled numbers refer to game pricing labels you should use with each situation (labels are below). Use the label no. 6 (indicated with ⑥) only if you set toggle 8 at PCB switch assembly L12 to off.

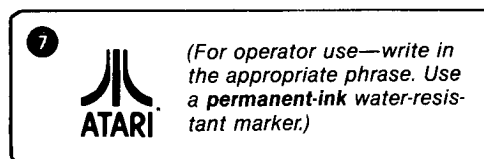
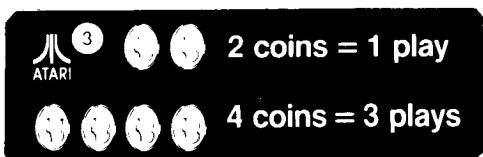
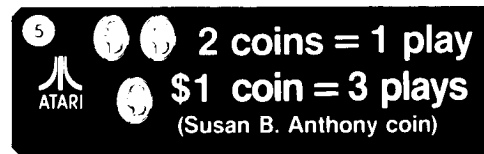
### 50¢ PER CREDIT:

25¢/25¢ Mechanisms	No bonus				Bonus \$1.00 = 3 plays				Bonus \$.75 = 2 plays \$1.00 = 3 plays			
	1	2	3	4	1	2	3	4	1	2	3	4
①	On	On	On	On	On	Off	Off	On	On	On	Off	On
	5	6	7	8	5	6	7	8	5	6	7	8
	On	On	On	Off	On	On	On	Off	On	On	On	Off

### 25¢ PER CREDIT:

25¢/25¢ Mechanisms	No bonus				Bonus \$.50 = 3 plays				Bonus \$1.00 5 plays			
	1	2	3	4	1	2	3	4	1	2	3	4
②	On	On	On	On	On	On	Off	On	On	Off	On	On
	5	6	7	8	5	6	7	8	5	6	7	8
	On	On	On	On	On	On	On	On	On	On	On	On

### Game Pricing Labels:



## Figure 10 Coin Counter Option Settings

[These toggles determine which coin mechanisms activate which counters]

Toggle Settings of 4-Toggle Switch on Analog Vector-Generator PCB (K10/11)				Two coin acceptors in the coin door:
4	3	2	1	
		On	Off	Both acceptors activate all coin counters simultaneously.
Not Used	Not Used	Off	On	Both acceptors activate 2 counters separately. \$\$
Not Used	Not Used	Off	Off	Both acceptors activate 2 counters separately.
		On	On	Both acceptors activate all coin counters simultaneously. \$

\$ Manufacturer's suggested settings for games with one coin counter.

\$\$ Manufacturer's suggested settings for games with two coin counters.

## H. Game Play



Atari's Tempest™/Cocktail game is a one- or two-player game with a color X-Y or vector-generator video display. This new display, with its 3-color guns and higher voltage, has the same technology that was used in Atari's black-and-white X-Y displays. However, the screen now displays dazzling color and unique visual effects in a spectacular three-dimensional video display.

Tempest™/Cocktail introduces additional new features:

- Skill-Step™ with 99 skill levels of play
- Operator-information display
- Demonstration mode with freeze

**Skill-Step™** allows a player to start a game at the same level as was previously achieved (he must start the next game within 30 seconds), without having to start over at the beginning levels. Therefore, skillful players continue to be challenged while less experienced players try to master higher levels. The **99 skill levels** of play include 16 different playfields and 6 different targets.

The **Operator-Information Display** is a special sequence in the self-test mode displaying game-time information: number of seconds the game has been

on and been played and the average game time. This display lists the number of one- and two-player games played, option switch settings, number of lives, level of difficulty, bonus levels, credits, and game pricing information. In this mode, you may clear the special "permanent" memory by erasing the high-score table or game-time information. The word *ERASING* appears on the screen during either of these processes.

The **Demonstration Mode** allows you to accelerate through 98 tubes by blasting down the tube toward the far rim without having to kill the enemies. Also, you can **freeze** game action so you can enjoy the dazzling effects of your journey through the tubes.

In addition to these new features, Tempest™/Cocktail has five possible modes of operation: attract, ready-to-play, play, high score initial 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 (if you enter Part 1 all credits are retained; enter Part 2 and all credits are cancelled). Wait at least eight seconds after a game has been played before entering self-test or turning off the power. Otherwise, you may erase the high score table.

## 1. Attract Mode

The attract mode begins when power is applied to the game, after a play or high score initial mode, or after self-test. This mode is continuous and is only interrupted when a game is paid for and accepted, or when in self-test. In the attract mode, the video displays one of three possible pictures.

One of the pictures is the high score display which lasts for 12 seconds. The score(s) from the last game is at the top of the screen. Following is the highest score and player's initials. The top eight scores and their matching initials appear in the center of the screen. The ranking (from 1 to 99) for the last player(s) appears under the high score table.

© *MCMLXXX ATARI* appears three lines from the bottom of the screen. Next, if the 2-game option is selected, *BONUS EVERY 20,000* alternates with *2 CREDIT MINIMUM*. Credits and game price appear on the bottom line of the screen.

Finally, at the top of the screen, the words *INSERT COINS* and *GAME OVER* alternate if there are no game credits. The words *PRESS START* and *GAME OVER* alternate if there are game credits.

A second picture, lasting for 12 seconds, is the *TEMPEST* logo. In this sequence, a multicolored square shrinks toward the center of the screen where a very small *TEMPEST* logo appears. The word *TEMPEST* enlarges in multiple images and changes color. In addition, © *MCMLXXX ATARI* appears on the lower half of the screen.

The next picture, lasting from 5 to 60 seconds, shows the last game score, the highest score and its initials, and the words *PRESS START* or *INSERT COINS* alternating with *GAME OVER* at the top of the screen. Credits, game price, and bonus-life information are at the bottom of the screen. In the center of the screen, the picture duplicates a typical game-play sequence with the computer controlling the shooter.

The shooter rotates on the end of the tubelike surface that is nearest to the player. Enemies land on the end of the tube that is farthest away from the player and climb toward the shooter. The shooter fires down the tube at the approaching enemies. This scene ends when either the shooter gets shot or spiked or when the shooter kills all the enemies and blasts through the tube into space and lands on the next playfield.

If a player has credits and spins the control-panel knob, the attract mode ends and the words *PRESS START* appear in the center of the screen. Above this is the score from the last game and the highest score and its initials. Below the words *PRESS START* are credits, game price and bonus life information.

If you select the 2-credit minimum option and a player inserts enough money for one credit, the messages *INSERT COINS* and *2 CREDIT MINIMUM* appear in the center of the screen until sufficient coins are inserted for game play.





## 2. Ready-to-Play Mode

This mode begins when sufficient coins are accepted for a game. Each player rates himself by rotating the control knob. The knob moves a square which frames the level he wishes to select. The surface shape and bonus points for that level are also shown on the screen.

Bonus point incentive encourages play at a higher level, once that level has been reached. For example, starting at level one and playing through level nine awards 34,000 points. Starting at level nine and playing through that level awards 59,000 points. If a player reaches a higher level, he may continue to play near that level by pressing start before the attract mode is over. For example, if a player ended his last game in level 20, he may choose level 1, 3, 5, 7, 9, 11, 13, 15, or 17.

The ready-to-play mode ends when any pushbutton is pressed or 10 seconds elapse.

## 3. Play Mode

In the play mode, a player-controlled, yellow claw-like shooter moves around on a three-dimensional tubelike playfield. The shooter rotates on the end of the tube that is nearest to the player. Enemies land on the end of the tube that is farthest away from the player to climb toward and attack the shooter. The shooter fires down the tube at the approaching enemies.

When a player kills all the enemies on a tube, he blasts through the tube, flies through space, lands on a new tubelike playfield, and fights the enemies on that playfield. A player scores points by shooting

enemies and by blasting through the tube to a new level. The player loses a life when killed by the enemy. The game is over when all the player's lives are gone.

All action occurs on one of sixteen suspended tubelike **playfields**. The three-dimensional tube surfaces are viewed from the top, so the view of the first playfield (a circle) is like looking into a well. Each playfield is made of 16 rails which connect the nearest to the farthest rim. The playfield color changes every 16 levels: level 1 is blue, level 17-red, level 33-yellow, level 49-cyan, 65-invisible and 81-green.

In addition, other events cause playfield color variation. The shooter causes the two rails on which it sits to change color. Superzap causes the playfield to flash as enemies are zapped. Playfield rails flash rainbow colors when a player earns a bonus life. Pulsar enemies cause sections of the nearest rim to disappear, and during the pulse phase, adjacent rails to flash.

The player's shooter is controlled by rotating the control-panel knob. The shooter moves around on the nearest rim of the tubelike playfield. The ends of the shooter always touch two adjacent rails. The rails on which the shooter sit change color (yellow in levels 1-16) which gives a flashlight effect and helps the player see the enemies in his lane.

A player shoots by pressing the fire button: tap it for one or two shots or press it for all eight shots. A shot is extinguished when it hits an enemy, after it passes the far rim or after it plows a certain distance into an enemy spike. A shot is renewed after it is extinguished so there may be a maximum of eight shots on the screen at one time.

A player may use two superzaps per level. A first superzap kills all enemies on the playfield at the time of firing. A second superzap randomly kills one enemy on the playfield. The superzap does not affect enemy shots, spikes or enemies not yet landed on the playfield. Superzap is recharged when the player blasts to a new level.

The following hints will help in game play:

- Players should work their way up through the levels to become familiar with game play. Drop down a level if play is too difficult.
- Experienced players should start at highest level possible for maximum points.
- On a new playfield shoot at enemy dots at far rim.
- Shoot the flipper at the top as soon as it starts to flip.
- Use long spikes to reclaim shots and kill enemies (at the top) approaching you from adjacent lanes.
- Avoid shooting fuseball-tankers near the top, since emerging fuseballs usually zip up to the top and kill you.

- Use Superzap right before last enemy reaches the top for a few extra points.







#### 4. High Score Initial Mode

This mode begins when a player has one of the eight top scores. First, there is a fireworks display. Next, the high score table appears. Finally, a player enters his initials directly into the table following the instructions at the bottom of the screen. The initials and score are highlighted in a special color. You may bypass this mode by pressing the start button.

All but the three highest scores are erased whenever you enter the self-test mode, or press the RESET button on the game PCB, or turn off the power. This resetting replaces the five lowest scores with fictitious scores and initials.

If you change game options, lives per game, bonus level or difficulty, or if you erase the special "permanent" memory, the high score table is replaced with eight fictitious scores and initials. Therefore, the table will always be displayed on the screen, possibly consisting of one or more real scores and players' initials.

## Enemies in the Tempest™/Cocktail Game

Enemy	Description	First Level Appears	Points for Kill
Flipper 	Originates at far rim and rides up two rails. Flips in the tube and on near rim. Kills player by flipping onto shooter or by shooting him. Player kills flipper by shooting when it is in the tube or when it is "standing" up. Or use Superzap.	1	150
Tanker 	Originates at far rim or from a spiker. Rides between rails. Carries one or two flippers, fuseballs, or pulsars and expels these when shot or near rim. Kills player by shooting him. Player kills by shooting tanker in the tube. Or use Superzap.	3	100
Spiker 	Originates at far rim. Rides up between rails on spike which it builds. Kills player by shooting him. Player kills by shooting it. Or use Superzap.	4	50
Spike 	Originates at far rim and builds up toward near rim. Kills player on contact. Player kills by shooting one or more times.	4	1-3
Fuseball 	Originates at far rim or from Tanker. Quickly rides on one rail, jumps to next rail and seeks out shooter. Kills player on contact. Player kills by shooting when fuseball is jumping between rails. Or use Superzap.	11	250, 500, 750
Pulsar 	Originates at far rim or from Tanker. Rides up and down on two rails. Flips in the tube and on near rim and seeks out shooter. Kills if player is on same rails when it pulses, flips onto or shoots player. Player kills by shooting pulsar in the tube. Or use Superzap.	17	200





# Maintenance and Repair

All games require certain maintenance to keep them in good working order. Clean, properly maintained games will attract players and earn more profits.

The most important maintenance item is running the self-test every time you collect money from the coin box. Just looking at a game will not tell you if the encoder wheel, light-emitting-diode switches or leaf switches are broken, or if LEDs have burned out. The self-test will inform you of any of these possible problems.

Second, you should regularly clean the outside of the game and the coin mechanisms. In addition, you will need to regularly clean the leaf switch contacts—or lubricate the encoder wheel: for details see this chapter.

# 2

## A. Cleaning

The exterior of the game cabinet and the metal and acrylic surfaces may be cleaned with any non-abrasive household cleaner. If desired, special coin machine cleaners that leave no residue can be obtained from your distributor.

The large table top is made of tempered glass and should be scratch-resistant. If cleaned without abrasive substances, you should hardly ever have to replace it.

## B. Fuse Replacement

This game contains six fuses—all on the power supply assembly (not including the video display fuses). Replace fuses only with the same type as listed in Figure 25 of this manual. See the color X-Y display manual, TM-183, for the display fuse data.

## C. The Control Panel

Prior to repairing or replacing any switch or the encoder wheel on the control panel, unplug the game. Next, open the game top as described in *Chapter 1, Section B, Opening the Game Cabinet*.

Remove the two sets of button-head screws and lock washers at the top edge of the control panel. Once this hardware is removed, tilt the control panel toward you.

After servicing the start switches or any components on the control panels, **be sure you reconnect the harness wires to the proper termination points**, as shown in Figure 12.

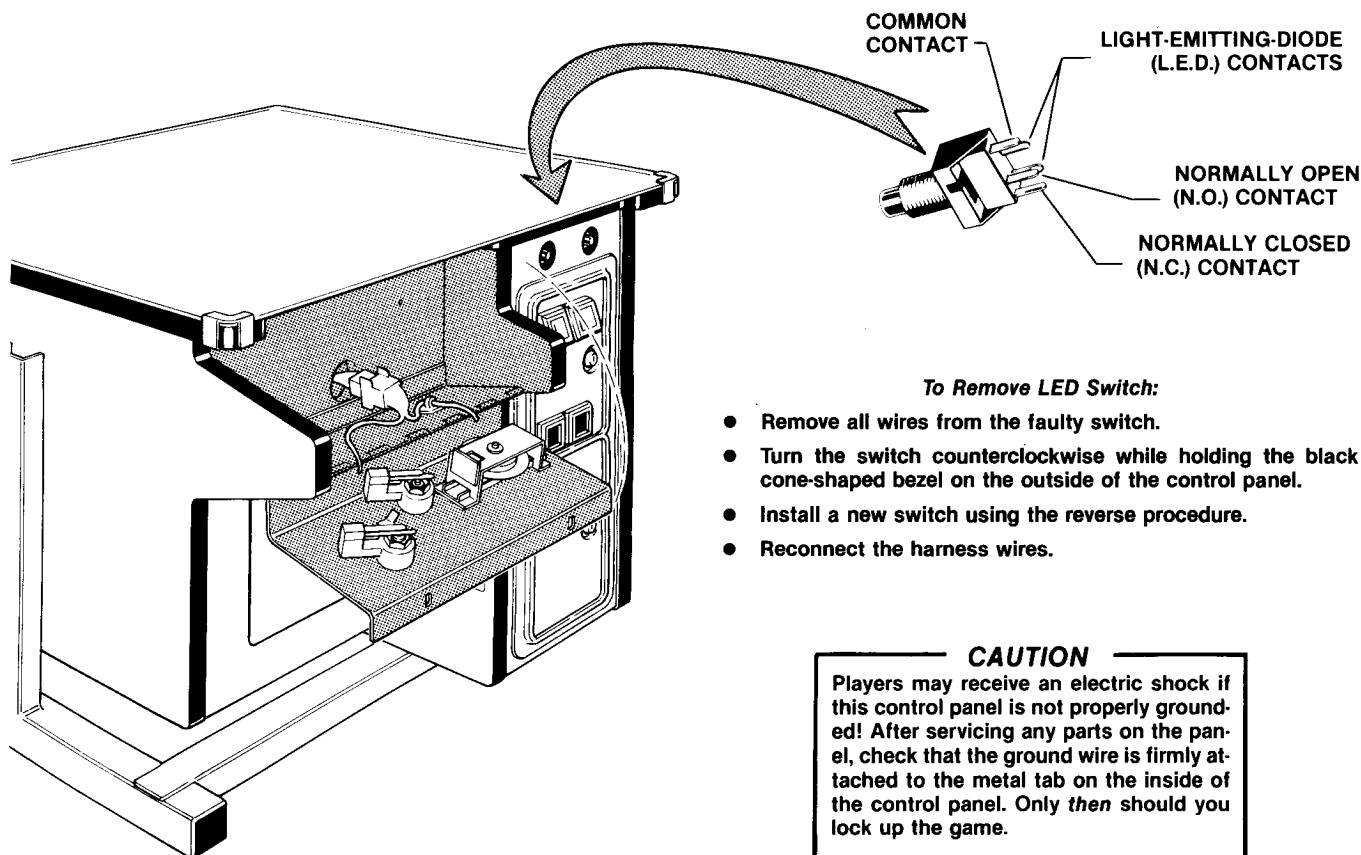


Figure 11 Opening the Control Panel and Replacing Switches

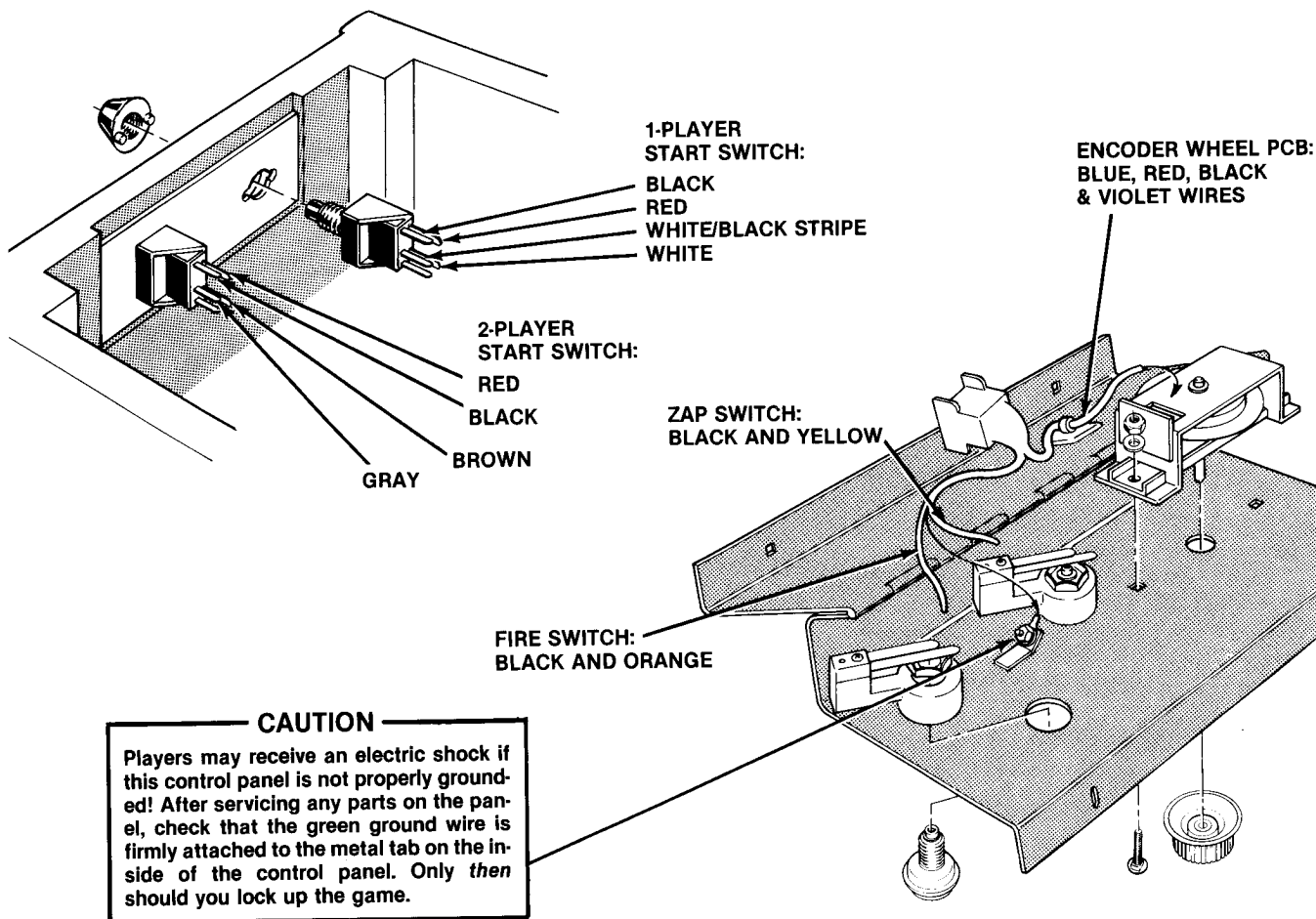


Figure 12 Control Panel Wiring

## 1. Leaf Switch Replacement

### NOTE

Adjust switches for a narrow gap. When a switch button is depressed, the resulting wiping action of the contacts provides a self-cleaning feature.

The leaf switches operate on 5 volts at a very low current. Therefore, pitting of these switches would be extremely rare. Probably the only reason that pitting would occur is very high-humidity.

**Don't burnish the switch contacts.** To clean the cross-bar contacts, **wipe them with a non-abrasive surface.** A business card works very well.

To replace a leaf switch, remove the screw with a Phillips-head screwdriver.

If the black button needs to be replaced, turn the stamped nut with a wrench in a counterclockwise direction, as seen from the inside of the control

panel. The black ring on the outside of the control panel should not spin, due to its design.

## 2. LED Start-Switch Replacement

The light-emitting diode (LED) switches near the control panel have a very low failure rate. In case a switch should ever be suspect, first test it per the description that follows. To replace the switch, refer to Figure 11.

- Remove the wires from the suspected switch.
- Set multimeter to ohms scale. Set ohms scale to  $R \times 1$ , then zero the meter.
- Connect multimeter leads to appropriate LED switch contacts (see Figure 11 for designation of switch contacts and meter lead placement).
- 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 LED switch as outlined in the figure.

Disassemble in the order indicated. (Circled numbers match the steps described below.)

Close the control panel. Remove the two set screws in the control knob.  
Open the control panel. Unplug the four-pin harness connector. Remove the carriage bolts that hold the encoder wheel frame to the control panel.

**To Lubricate:**

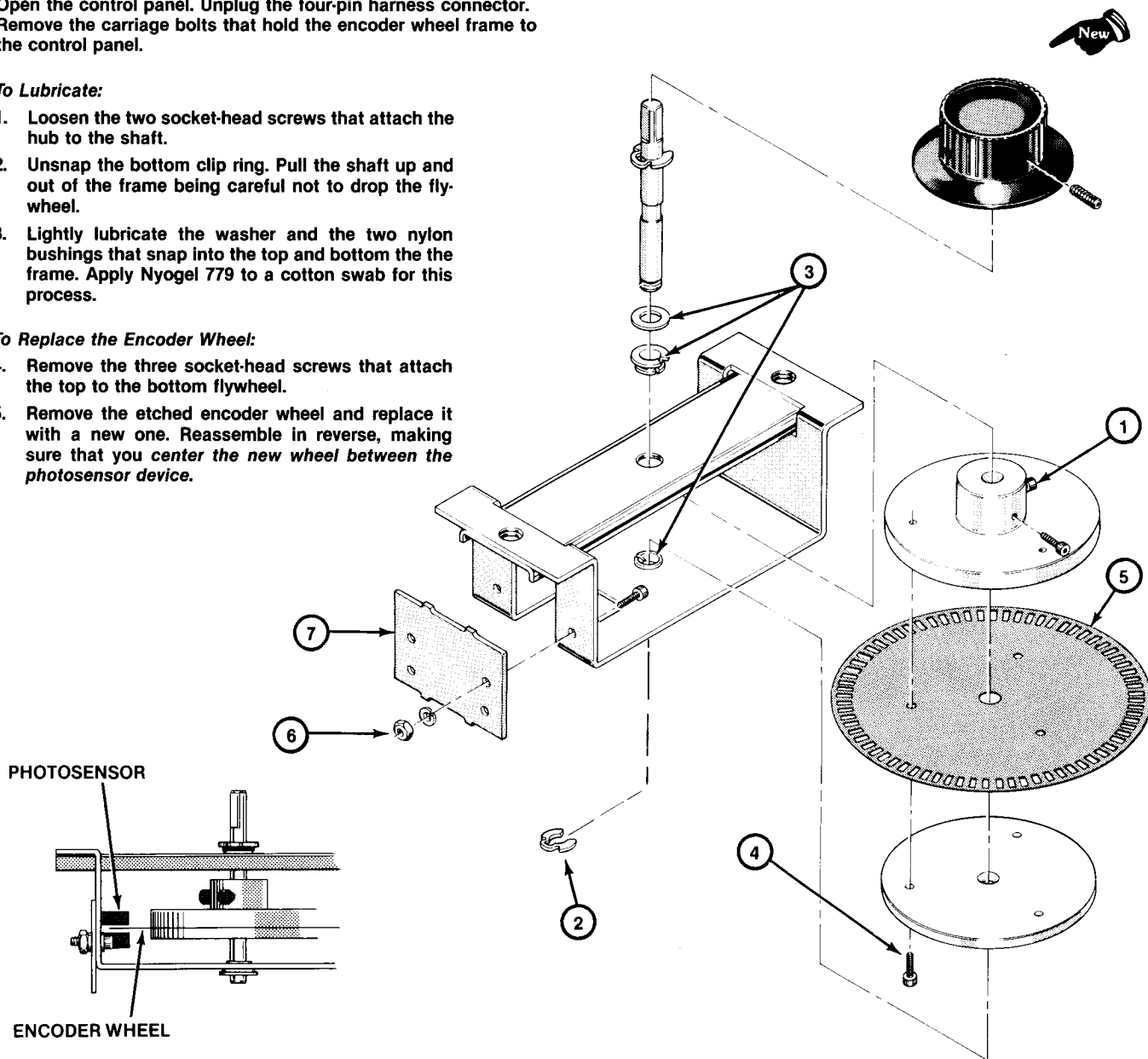
1. Loosen the two socket-head screws that attach the hub to the shaft.
2. Unsnap the bottom clip ring. Pull the shaft up and out of the frame being careful not to drop the flywheel.
3. Lightly lubricate the washer and the two nylon bushings that snap into the top and bottom the the frame. Apply Nyogel 779 to a cotton swab for this process.

**To Replace the Encoder Wheel:**

4. Remove the three socket-head screws that attach the top to the bottom flywheel.
5. Remove the etched encoder wheel and replace it with a new one. Reassemble in reverse, making sure that you center the new wheel between the photosensor device.

**To Replace the Coupler PCB:**

6. Remove the two socket-head screws, lock washers and hex nuts that hold the coupler PCB to the frame.
7. Remove the coupler PCB and repair as needed.



**Figure 13 Encoder Wheel Maintenance and Repair**

**3. Encoder Wheel Maintenance and Repair**

The encoder-wheel control requires lubrication of its bushings approximately every 10,000 credits and as you deem necessary. To lubricate or repair the control, remove the control from the control panel and disassemble it as illustrated in Figure 13.

For lubrication, use only Nyogel 779 lubricant (Atari part no. 178027-001) on the two bushings of the encoder-wheel control.

For further instructions on how to replace the coupler PCB or the encoder wheel, see Figure 13.

## D. Video Display Removal

The following procedure should be performed by a qualified service technician.

### ⚠ WARNING ⚠

#### **Shock Hazard**

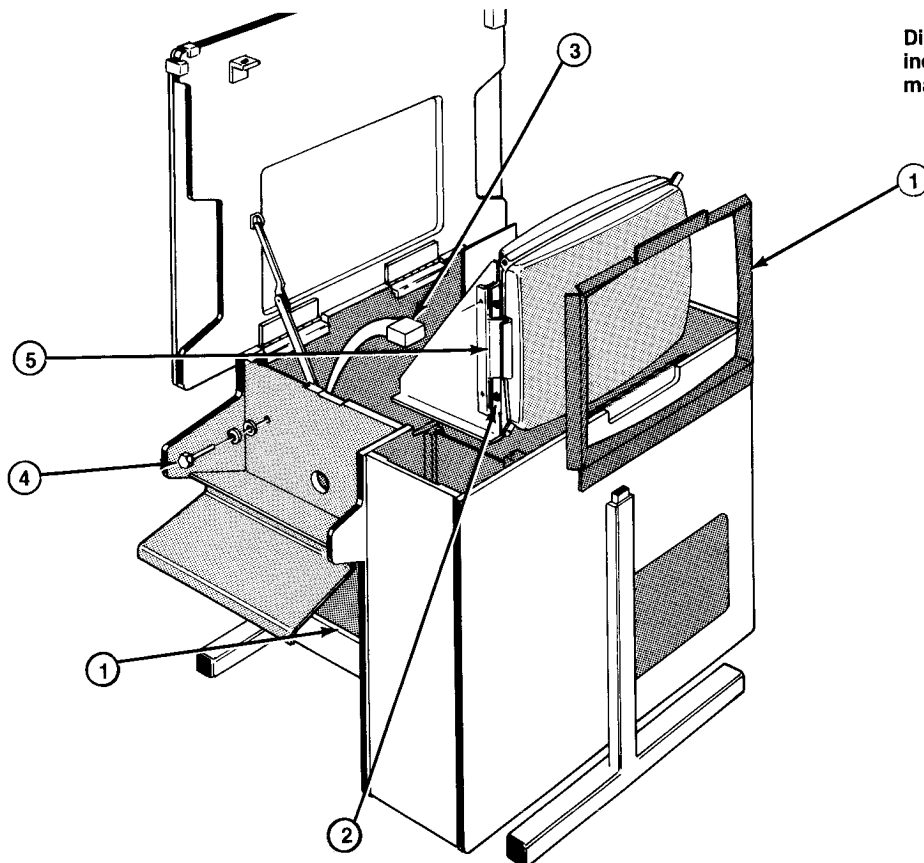
High voltages may exist in any television or display, even with power disconnected. Use extreme caution and do not touch electrical parts of the display yoke area with your hands or with metal objects in your hands!

#### **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 the color X-Y video display, refer to Figure 14, and follow steps 1 thru 5.

1. **Be sure the game is unplugged from its wall outlet!** Unlock and open the table top and access panel. Remove the display bezel.
2. Slightly loosen the four hex nuts that attach the display frame to the display handles.
3. Reach through the access panel opening and unplug the 15-pin video display connector underneath the display.
4. Open both control panels (see *Section C, The Control Panel*). Remove the two hex-head screws, flat and lock washers on *each* control panel. This hardware attaches the video display to the cabinet.
5. Grasp the two video display handles and carefully lift the video display assembly up and out the cabinet. After servicing, reassemble in reverse order.



Disassemble in the order indicated. (Circled numbers match the steps above.)

Figure 14 Video Display Removal

## E. Printed-Circuit Board Removal

You may wish to remove the game printed-circuit boards (PCBs) or the Regulator/Audio II PCB for service or inspection. To do this, refer to Figure 15 and proceed as follows:

### 1. Game PCB Removal

- Unlock and open the table top.
- Remove the beaded nylon tie-wraps that secure the edge connectors at the top of the PCBs. Next, remove the two edge connectors.
- Remove the Phillips-head screw that attaches the PCB mounting bracket to the cabinet.
- Remove the PCBs from the game by carefully sliding them straight up out of the wood PCB retainers. Be careful not to twist the boards, as this may loosen connections or components. Replace or repair as required.
- After servicing, reinstall the PCBs, making sure that the edge connectors are properly plugged in. Note that the connectors 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 will void the warranty.

- Check that the operation of the game is correct by **performing the self-test**. This is especially important with any game when you replace a PCB.

### 2. Regulator/Audio II PCB Removal

- Unlock and open the table top.
- Remove the five plug-in connectors on the Regulator/Audio II PCB. Note that all of these connectors are keyed for proper orientation.
- Remove the Phillips-head screw and flat fiber washers that are used to attach the PCB to the wood block on the cabinet wall.
- Grasp the plastic retainer at the top of the PCB and gently lift it up to release the top of the PCB from the retainer.
- Carefully, remove the PCB by pulling it up and out of the bottom plastic retainer.
- After servicing, reinstall the PCB, making sure that it fits into the grooves of the plastic PCB retainers.



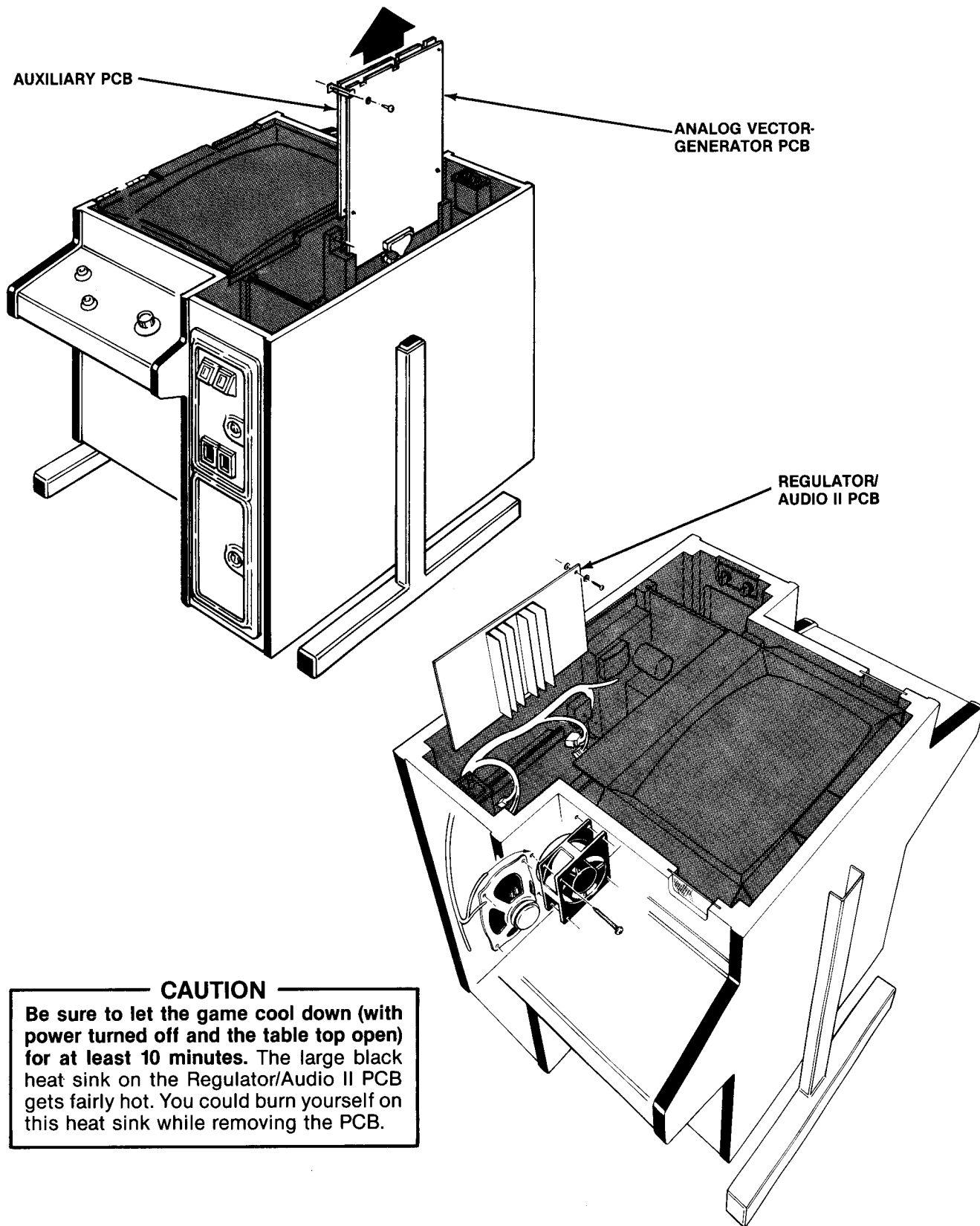
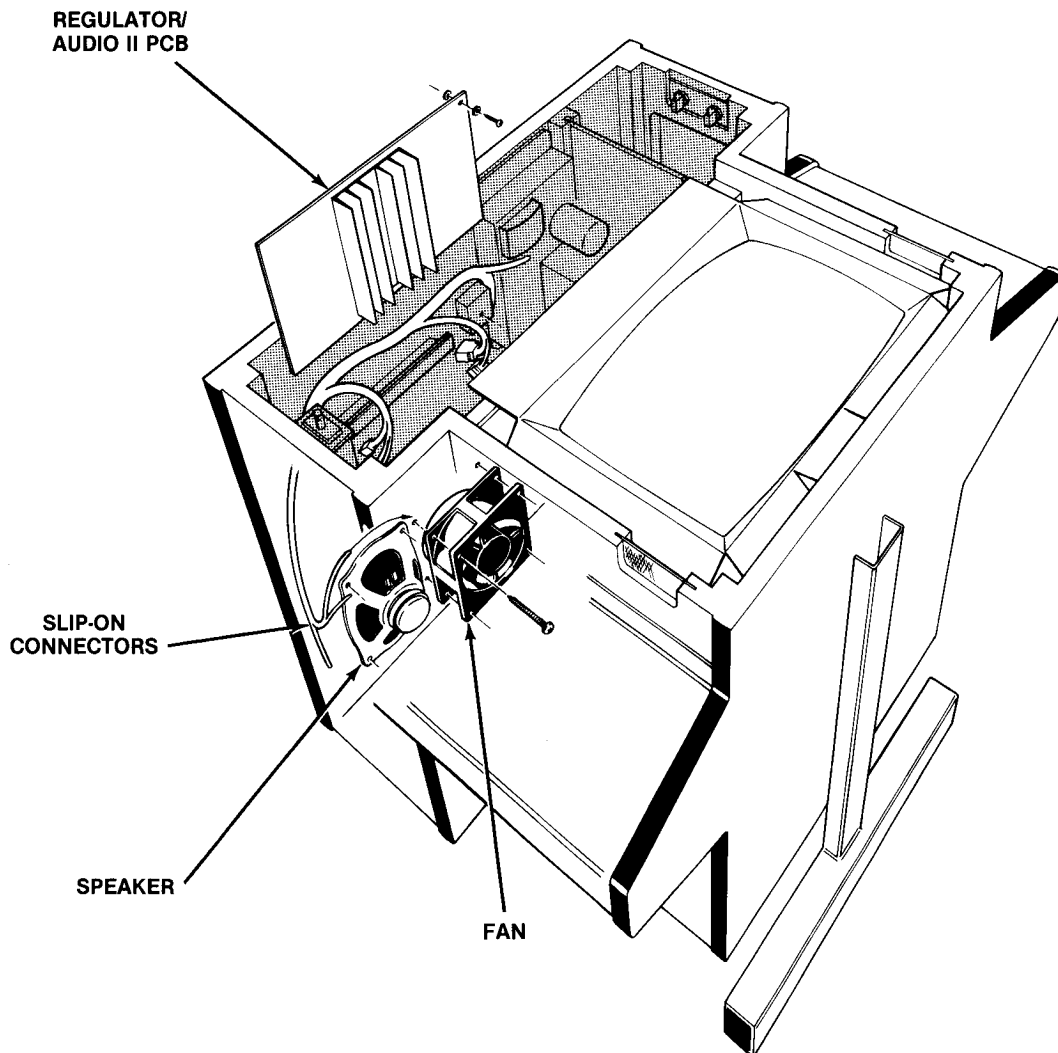


Figure 15 Printed-Circuit Board Removal



**Figure 16 Speaker and Fan Removal**

## F. Speaker and Fan Removal

If the speaker or fan need to be replaced, follow these instructions and refer to Figure 16.

Unlock and open the table top. Remove the Regulator/Audio II PCB located above the speaker and fan. To remove the speaker, unplug both speaker-wire connectors. Use a short-handled Phillips screwdriver to remove the screws that attach the speaker to the cabinet wall. Repair or replace the speaker as required.

To remove the fan, unplug both fan-wire connectors. Use a short-handled Phillips screwdriver to remove the screws that attach the fan to the cabinet wall. Repair or replace the fan as required.

### CAUTION

**Be sure to let the game cool down (with power turned off and the table top open) for at least 10 minutes.** The large black heat sink on the Regulator/Audio II PCB gets fairly hot, and you could burn yourself on this heat sink while removing the speaker or fan.



## G. Game Operation

With this manual you received three large sheets that contain the wiring and schematic diagrams for the Tempest™/Cocktail game. Sheet 1, Side A, includes information that shows the arrangement of these diagrams. These diagrams explain the functions of the circuits and define inputs and outputs.

In addition, you received the Tempest Troubleshooting Guide, which includes information on signature analysis, CAT Box tests and the memory map.

Atari's Tempest/Cocktail is a microprocessor-controlled game. The microprocessor is contained on the game PCB. The game PCB receives switch inputs from the control panel and coin door. These inputs are processed by the game PCBs and output to the video display, Regulator/Audio II PCB, and control panel.

The color X-Y display receives signals for the X and Y axes and three color intensity signals (red, green and blue). Since the location of the beam in the display is controlled by the X- and Y-axis outputs of the game PCB, the game PCB does not contain a standard sync circuit. The X- and Y-axis inputs to the display step in increments of approximately 760

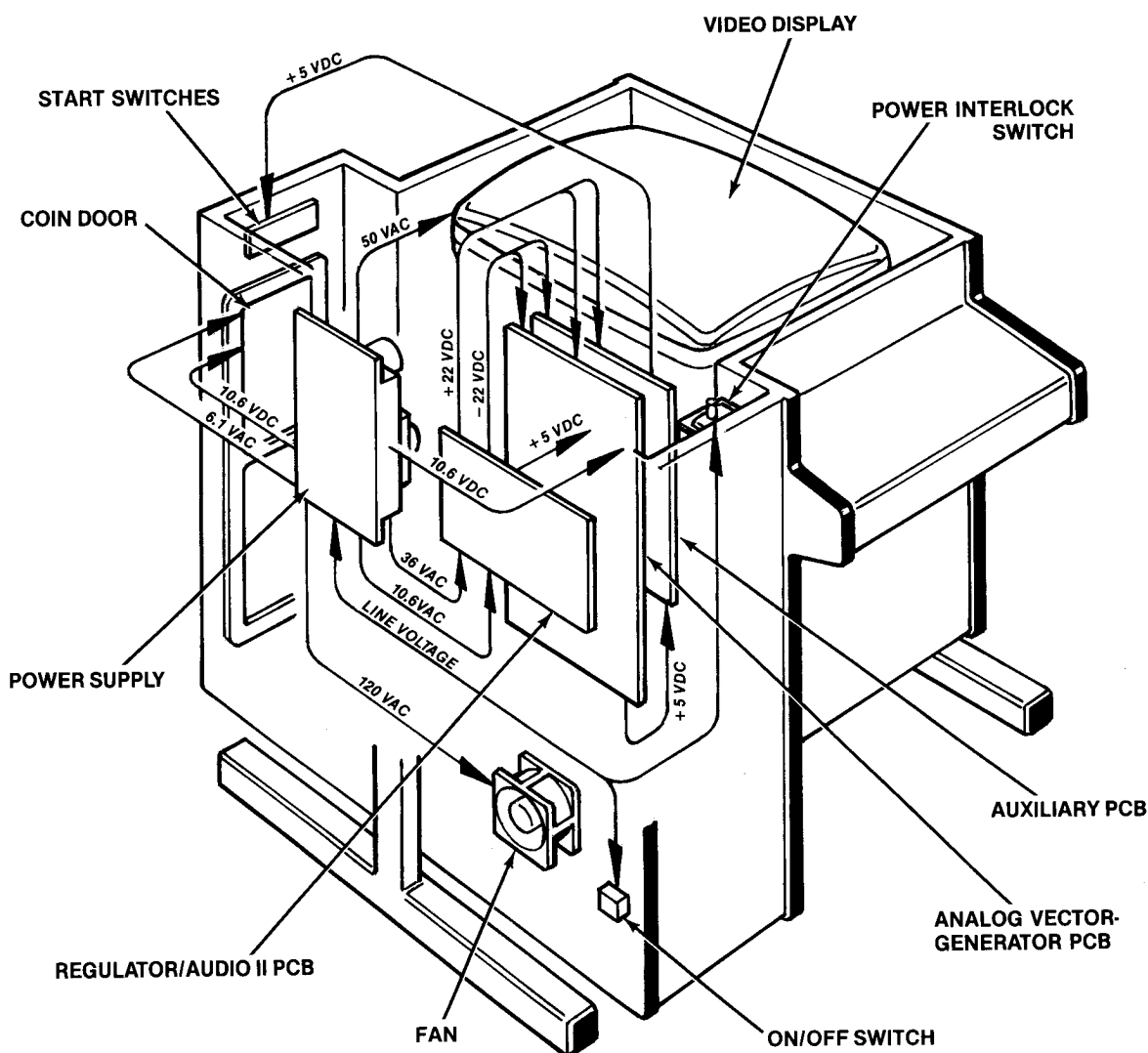


Figure 17 Power Distribution

steps for the X (horizontal) axis, and approximately 1000 steps for the Y (vertical) axis. The three intensity signals control the brightness of the three electron guns (red, green and blue).

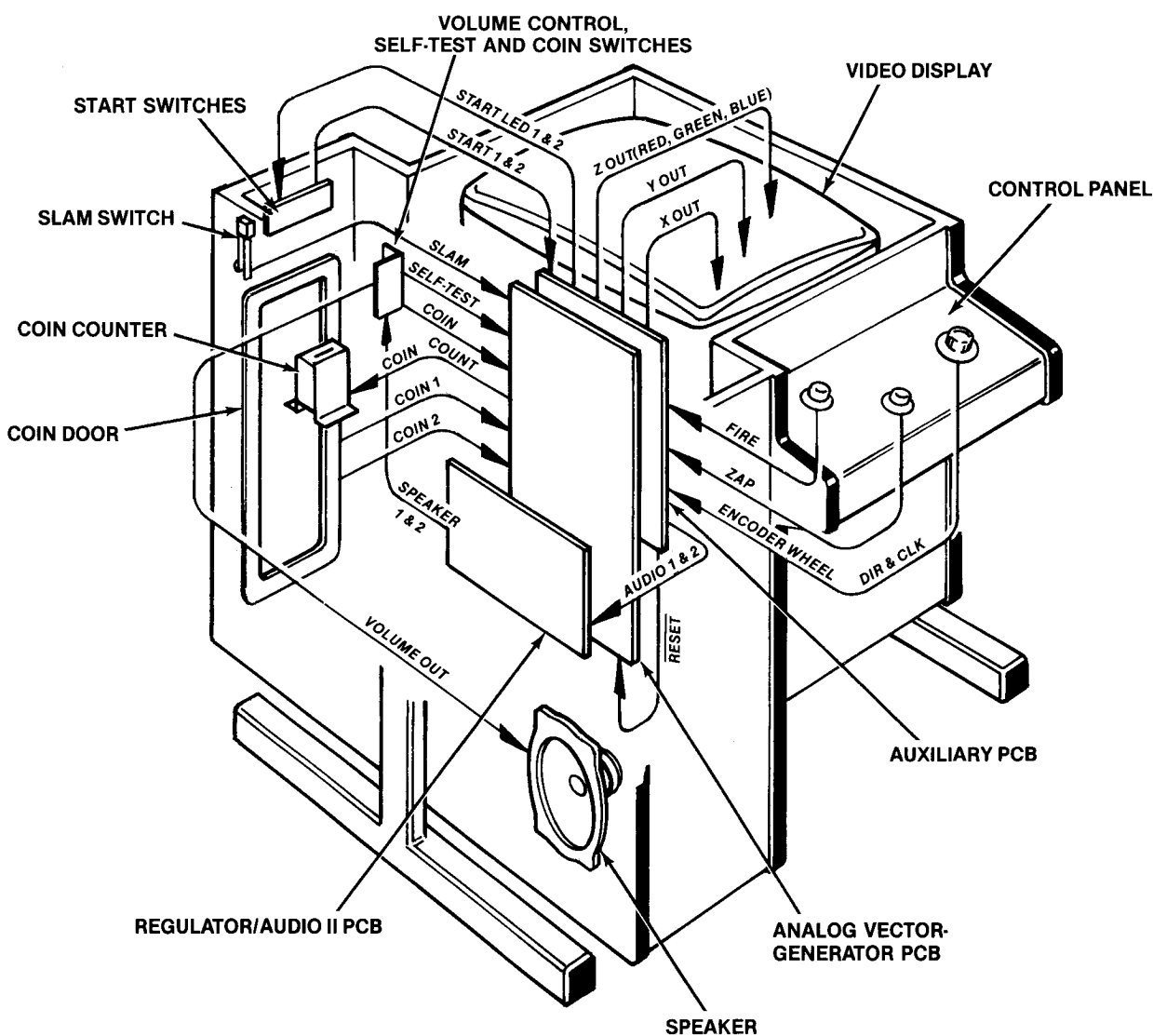
The Regulator/Audio II PCB has three functions: 1) it regulates the voltages from the power supply to  $\pm 5$  VDC, 2) it rectifies and filters  $\pm 22$  VDC, and 3) it amplifies the audio output from the Auxiliary PCB.

Specifically, the +5 VDC from the Regulator/Audio II PCB provides most logic power to the Analog Vector-Generator and Auxiliary PCBs:  $\pm 22$  VDC is regulated on the Analog Vector-Generator PCB to produce  $\pm 15$ ; and +22VDC provides power for the audio output of the Auxiliary PCB. The audio output

from the Regulator/Audio II PCB directly drives the game speaker and is controlled by the volume control, mounted inside the coin door on the utility switch panel.


The power supply is the source of all voltages in the game. These voltages are protected by five fuses in the fuse block on the power supply chassis. The primary winding of the power supply transformer is protected by the cartridge-type fuse in the power supply chassis.

Figure 17 illustrates the distribution of power in this game. Figure 18 illustrates the distribution of signals.



**Figure 18 Signal Distribution**

# Illustrated Parts Lists



This chapter provides the necessary information for you to order replacement parts for this game. Please note that, for simplicity, **common hardware has been deleted** from most of these parts lists. This includes screws, nuts, washers, bolts, etc.

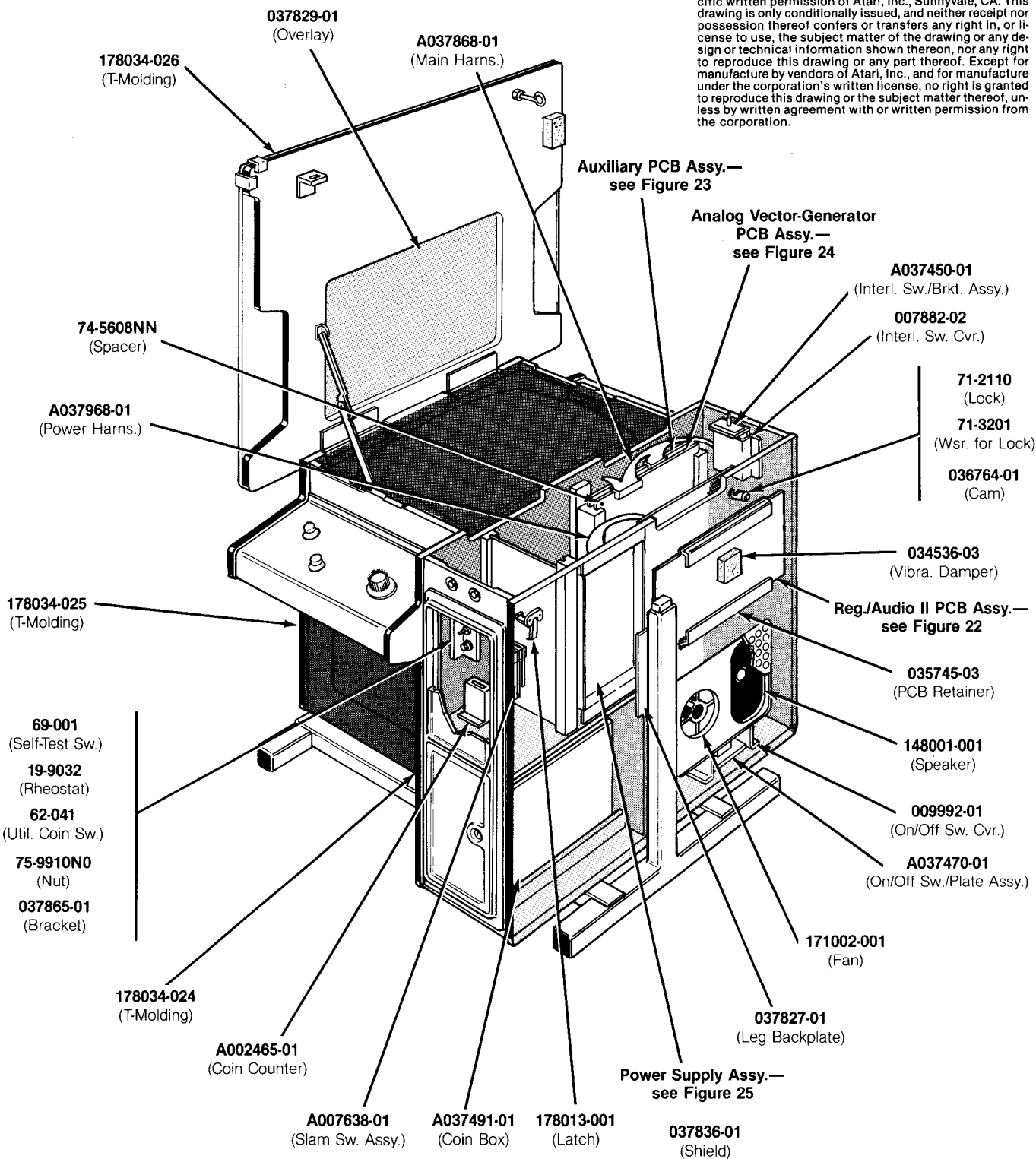
The parts lists are arranged in alphanumeric order. For example, all "A-" prefix numbers come first. Following these are numbers in sequence evaluated up to the hyphen, namely 00- through 99-, then 000598- through approximately 190000-.

When ordering parts from your distributor, 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 on page vi for your convenience.

# 3

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**Figure 19 Cabinet-Mounted Assemblies**  
**A037900-xx A**

Schematics, Self-Test Label & Manuals—  
see parts list on following page

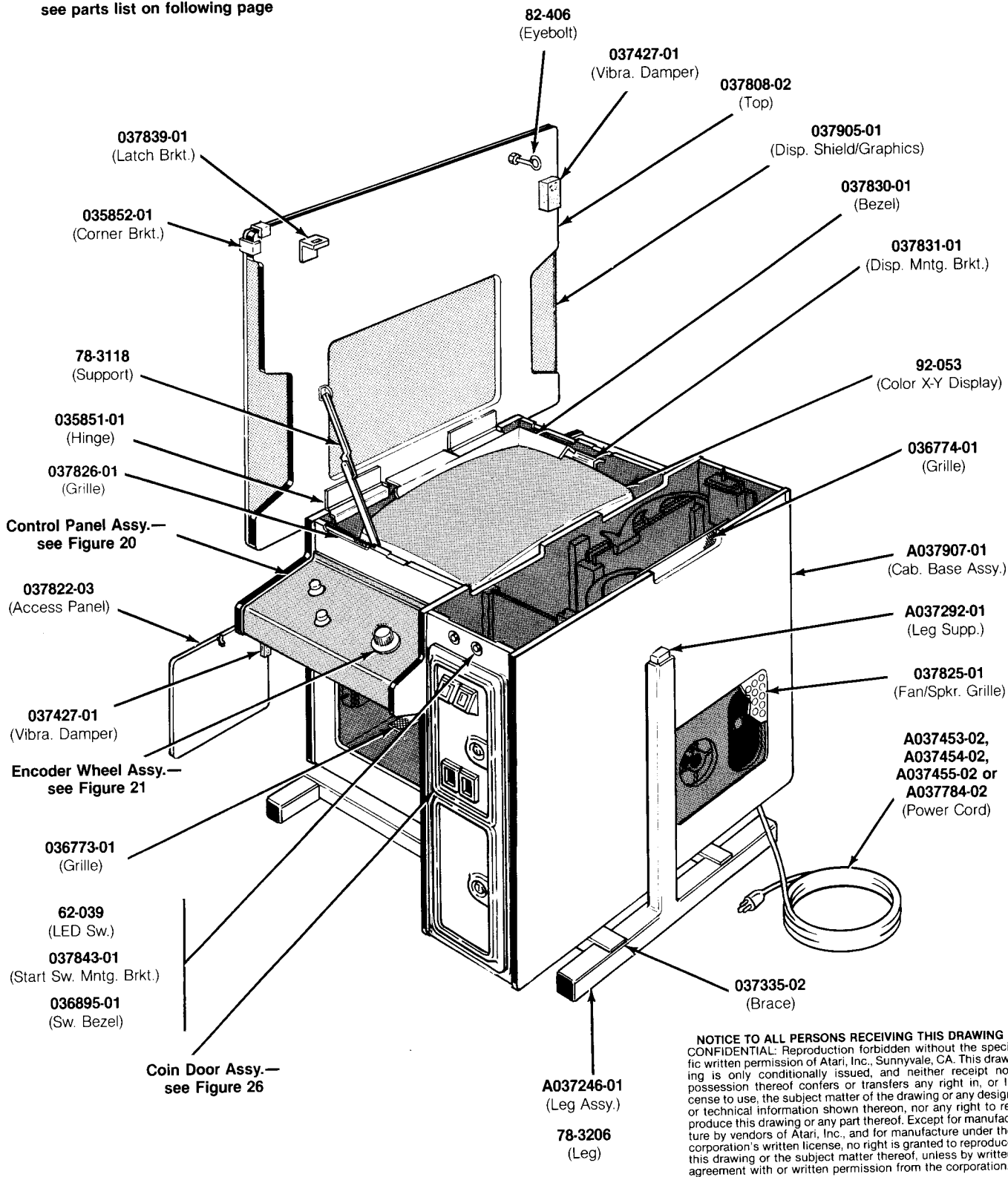


Figure 19 Cabinet-Mounted Assemblies  
A037900-xx A

## Figure 19 Cabinet-Mounted Assemblies, continued Parts List

Part No.	Description
A002465-01	Coin Counter
A007638-01	Slam Switch Assembly
A037246-01	Leg Assembly <i>(includes leg, 2 adjustable feet and 2 endcaps)</i>
A037292-01	Leg Support Assembly <i>(includes 2 panel nuts and endcap)</i>
A037450-01	Interlock Switch/Bracket Assembly
A037453-02	Strain-Relief Power Cord <i>(U.S. and Canada)</i>
A037454-02	Strain-Relief Power Cord <i>(Austria, Belgium, Chile, Denmark, Finland, France, Germany, Greece, Indonesia, Italy, Netherlands, Norway, Spain, Sweden, and Uruguay)</i>
A037455-02	Strain-Relief Power Cord <i>(Australia and New Zealand)</i>
A037470-01	Power On/Off Switch/Mounting Plate Assembly
A037491-01	Coin Box
A037784-02	Strain-Relief Power Cord Assembly <i>(United Kingdom, Ireland, Lebanon, Saudi Arabia, India, Hong Kong, Singapore, Egypt, Nigeria, Republic of South Africa, Zimbabwe)</i>
A037868-01	Main Harness Assembly
A037907-01	Cabinet Base Assembly <i>(includes leg backplates and PCB retainers, but not the access panel)</i>
A037968-01	Power Harness Assembly
A037851-01	Printed-Circuit Board Interconnector

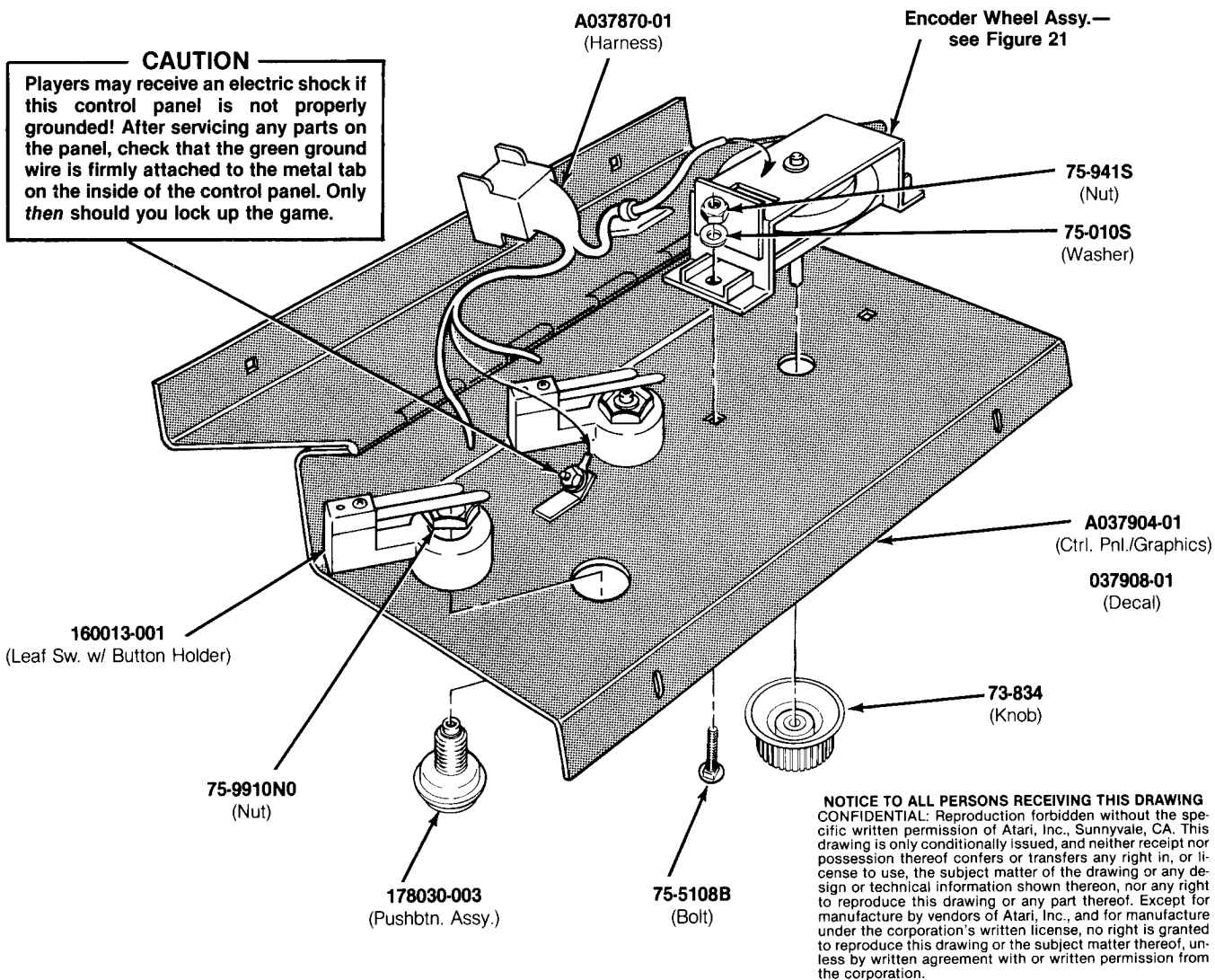
*The following seven items are the technical information supplements to this game:*

DP-193-01, -02, -03	Tempest™/Cocktail Schematic Drawings <i>(Sheets 1, 2, 3)</i>
ST-193	Tempest/Cocktail Label with Self-Test Procedure and Option Switch Settings
TM-183	Service Manual for 19-Inch Wells Gardner Color X-Y Display
TM-193	Tempest/Cocktail Operation, Maintenance and Service Manual
TM-195	Tempest Troubleshooting Guide
19-9032	50 Ohm, 12½W Wire-Wound Rheostat <i>(for volume control)</i>
62-039	STDP Momentary-Contact LED Start Switch
62-041	SPDT Momentary-Contact Pushbutton Utility Coin Switch
69-001	DPDT Self-Test Switch
71-2110	Panel Cartridge Lock Mechanism <i>(for access panel and table top)</i>
71-3201	¾-Inch Anchor Washer for Table-Top Lock
74-5608NN	#6 Spacer for Mounting Game Printed Circuit Boards
75-07017	Washer for Mounting PCBs
75-9910N0	#½-11 Steel Stamped Nut <i>(for utility coin switch)</i>
78-24012	5-Inch Beaded Nylon Tie Wrap
78-3118	Hinged Table-Top Support
78-3206	Cabinet-Leveling Leg
82-406	#¼-20 × 2-Inch Eyebolt with ¾-Inch Threads
92-053	19-Inch Wells-Gardner Color X-Y Display
007882-02	Interlock Switch Cover
009992-01	On/Off Switch Cover
034536-03	Foam Vibration Damper <i>(for PCBs)</i>
035745-03	10-Inch Plastic PCB Retainer
035851-01	Table-Top Hinge
035852-01	Corner Bracket for Table Top
036764-01	Hook-Type Cam <i>(for table-top lock)</i>
036773-01	Cabinet Base Grille
036774-01	Upper End-Panel Grille
036895-01	Black Molded Switch Bezel
037335-02	Leg Brace
037427-01	Foam Vibration Damper <i>(for table top and access panel)</i>
037808-02	Wood Table Top
037822-03	Access Panel <i>(does not include lock)</i>

*[Continued on next page]*

## Figure 19 Cabinet-Mounted Assemblies, continued Parts List

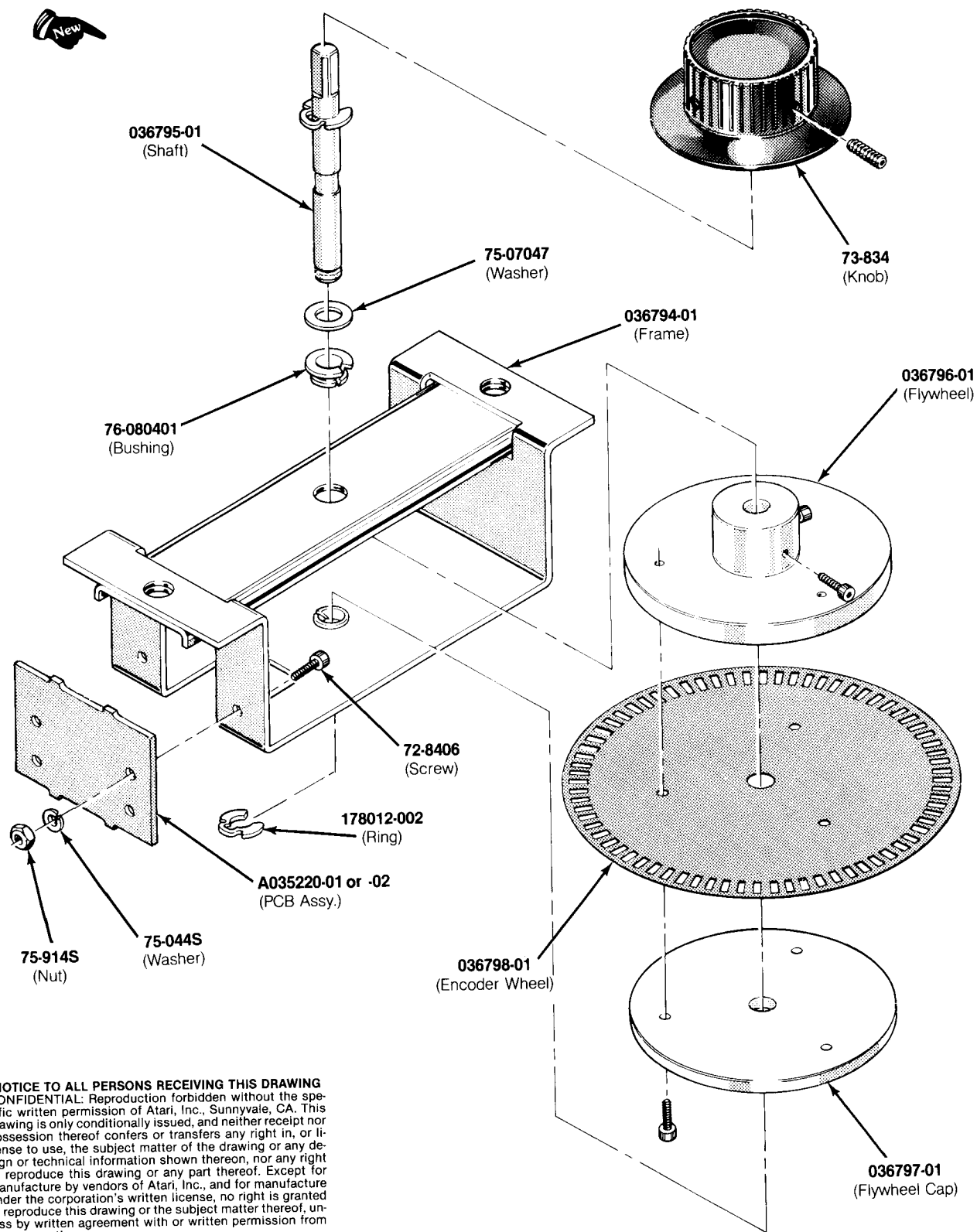
<i>Part No.</i>	<i>Description</i>
037825-01	Fan/Speaker Grille
037826-01	Slip-in Cabinet Grille
037827-01	Leg Backplate
037829-01	Display Overlay
037830-01	Display Bezel
037831-01	Display Mounting Bracket
037836-01	Metal Shield for Power Supply
037839-01	Spring Draw Latch Bracket
037843-01	Start Switch Mounting Bracket
037865-01	Bracket for Volume Control, Self-Test Switch and Coin Counter
037905-01	Display Shield with Graphics
148001-001	6 × 9-Inch, 4-Ohm, 15W Oval High-Fidelity Speaker
171002-001	110V Cooling Fan
178013-001	Spring Draw Latch
178034-024	3/4-Inch Black Plastic T-Molding <i>(for center cabinet base)</i>
178034-025	25/32-Inch Black Plastic T-Molding <i>(for cabinet ends)</i>
178034-026	13/16-Inch Black Plastic T-Molding <i>(for table top)</i>



**Figure 20 Control Panel Assembly  
 A037901-01 A  
 Parts List**

Part No.	Description
A037904-01	Control Panel with Graphics
A037870-01	Control-Panel Harness
73-834	Control Knob with Skirt
75-010S	#10 Flat Washer
75-941S	#10-24 Polymer Hex Nut
75-5108B	#10-24 × 1/2-Inch Carriage Bolt
75-9910N0	#8-11 Steel Stamped Nut
037908-01	Control Panel Graphics Decal
037911-01	Control Panel
160013-001	Leaf Switch and Button Holder (leaf switch only is part no. 160012-001)
178030-003	Pushbutton Assembly





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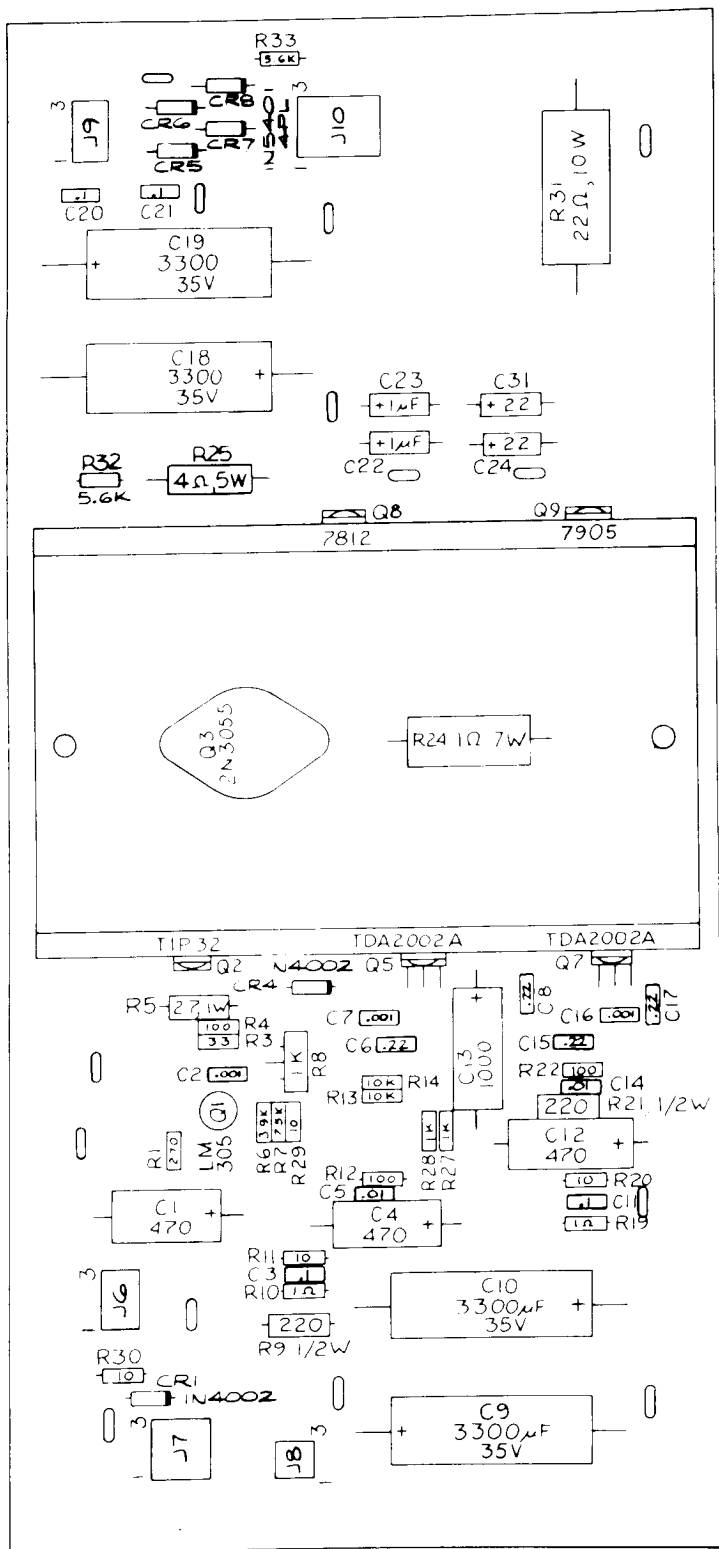
**Figure 21 Encoder Wheel Assembly**  
**A037781-01 A**

## Figure 21 Encoder Wheel Assembly Parts List

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<i>Part No.</i>	<i>Description</i>
A035220-02	Coupler PCB Assembly
A036096-01	Harness Assembly
72-8406	#4-40 × ⅜-Inch Hex Socket-Head Cap Alloy Steel Machine Screw
73-834	Control Knob
75-044S	#4 Zinc-Plated Steel Split-Lock Washer
75-07047	Nylon Washer
75-914S	#4 Hex Socket-Head Cap Steel Machine Nut
76-080401	Dual Shoulder Radial Polymer Bushing
036794-01	Frame
036795-01	Shaft
036796-01	Top Flywheel
036797-01	Bottom Flywheel Cap
036798-01	Etched Encoder Wheel
178012-002	“Klip-Ring” Retaining Ring
178027-001	Nyogel 779 Lubricant

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**Figure 22 Regulator/Audio II PCB Assembly**  
**A035435-02 E**

## Figure 22 Regulator/Audio II PCB Assembly Parts List

Part No.	Description (Reference Designations and Locations in Bold)
12-52P7	2.7 Ohm, $\pm 5\%$ , 1W Resistor (R5)
16-54P0	4 Ohm, $\pm 5\%$ , 5W Wirewound Resistor (R25)
19-100P1015	.1 Ohm, $\pm 3\%$ , 7W Wirewound Resistor (R24)
19-315102	1K Ohm Vertical PCB-Mounting Cermet Trimpot (R8)
24-250108	1000 $\mu\text{f}$ Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor (C13)
24-250477	470 $\mu\text{f}$ Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor (C1, 4, 12)
24-350226	22 $\mu\text{f}$ Aluminum Electrolytic Fixed Axial-Lead 35V Capacitor (C24, 31)
24-350338	3300 $\mu\text{f}$ Aluminum Electrolytic Fixed Axial-Lead 35V Capacitor (C9, 10, 18, 19)
24-500105	1 $\mu\text{f}$ Aluminum Electrolytic Fixed Axial-Lead 50V Capacitor (C22, 23)
29-088	.1 $\mu\text{f}$ Ceramic-Disc 25V Radial-Lead Capacitor (C3, 11, 20, 21)
31-1N4002	100V 1-Amp. Silicon Rectifier Type 1N4002 Diode (CR1, 4)
31-1N5401	100V 3-Amp. Silicon Rectifier Type 1N5401 Diode (CR5c8)
33-TIP32	PNP Power Transistor, Type TIP32 (Q2)
34-2N3055	NPN Silicon Transistor, Type 2N3055 (Q3)
37-LM305	5V Linear Voltage Regulator (Q1)
37-7812	+ 12V Voltage Regulator, Type 7812 (Q8)
37-7905	- 5V Voltage Regulator, Type 7905 (Q9)
72-1608C	#6-32 $\times$ 1/2-Inch Cross-Recessed Pan-Head Corrosion-Resistant Steel Machine Screw
72-6606S	#6 $\times$ 3/8-Inch Pan-Head Thread-Forming Cross-Recessed Type-AB Zinc-Plated-Steel Screw (Q8)
75-F60405	#6-32 $\times$ 1/4-Inch Binder-Head Nylon Screw (Q5, 7)
75-99516	#6-32 Nut/Washer Assembly
78-16008	Thermally Conductive Compound (Q3)
78-16014	Thermally Conductive Silicon Insulator (Q2, 9)
79-58306	6-Position Connector Receptacle (J6, 9)
79-58308	9-Position Connector Receptacle (J7)
79-58346	12-Position Connector Receptacle (J10)
79-58354	4-Position Connector Receptacle (J8)
020670-01	Test Point
034531-01	Heat Sink
100015-103	.01 $\mu\text{f}$ Ceramic-Disc 25V Radial-Lead Capacitor (C5, C14)
110000-010	1 Ohm, $\pm 5\%$ , 1/4W Resistor (R10, 19)
110000-100	10 Ohm, $\pm 5\%$ , 1/4W Resistor (R11, 20, 29, 30)
110000-101	100 Ohm, $\pm 5\%$ , 1/4W Resistor (R4, 12, 22)
110000-102	1K Ohm, $\pm 5\%$ , 1/4W Resistor (R27, 28)
110000-103	10K Ohm, $\pm 5\%$ , 1/4W Resistor (R13, 14)
110000-271	270 Ohm, $\pm 5\%$ , 1/4W Resistor (R1)
110000-330	33 Ohm, $\pm 5\%$ , 1/4W Resistor (R3)
110000-392	3.9K Ohm, $\pm 5\%$ , 1/4W Resistor (R6)
110000-562	5.6K Ohm, $\pm 5\%$ , 1/4W Resistor (R32, 33)
110000-752	7.5K Ohm, $\pm 5\%$ , 1/4W Resistor (R7)
110001-221	220 Ohm, $\pm 5\%$ , 1/2W Resistor (R9, 21)
116000-220	22 Ohm, $\pm 5\%$ , 10W Wirewound Resistor (R31)
122002-102	.001 $\mu\text{f}$ Ceramic-Disc Minimum 25V Radial-Lead Capacitor (C2, 7, 16)
122004-224	.22 $\mu\text{f}$ Ceramic-Disc 25V Capacitor (C6, 8, 15, 17)
137151-002	Type TDA2002A 8W Linear Audio Amplifier Integrated Circuit (Q5, 7)



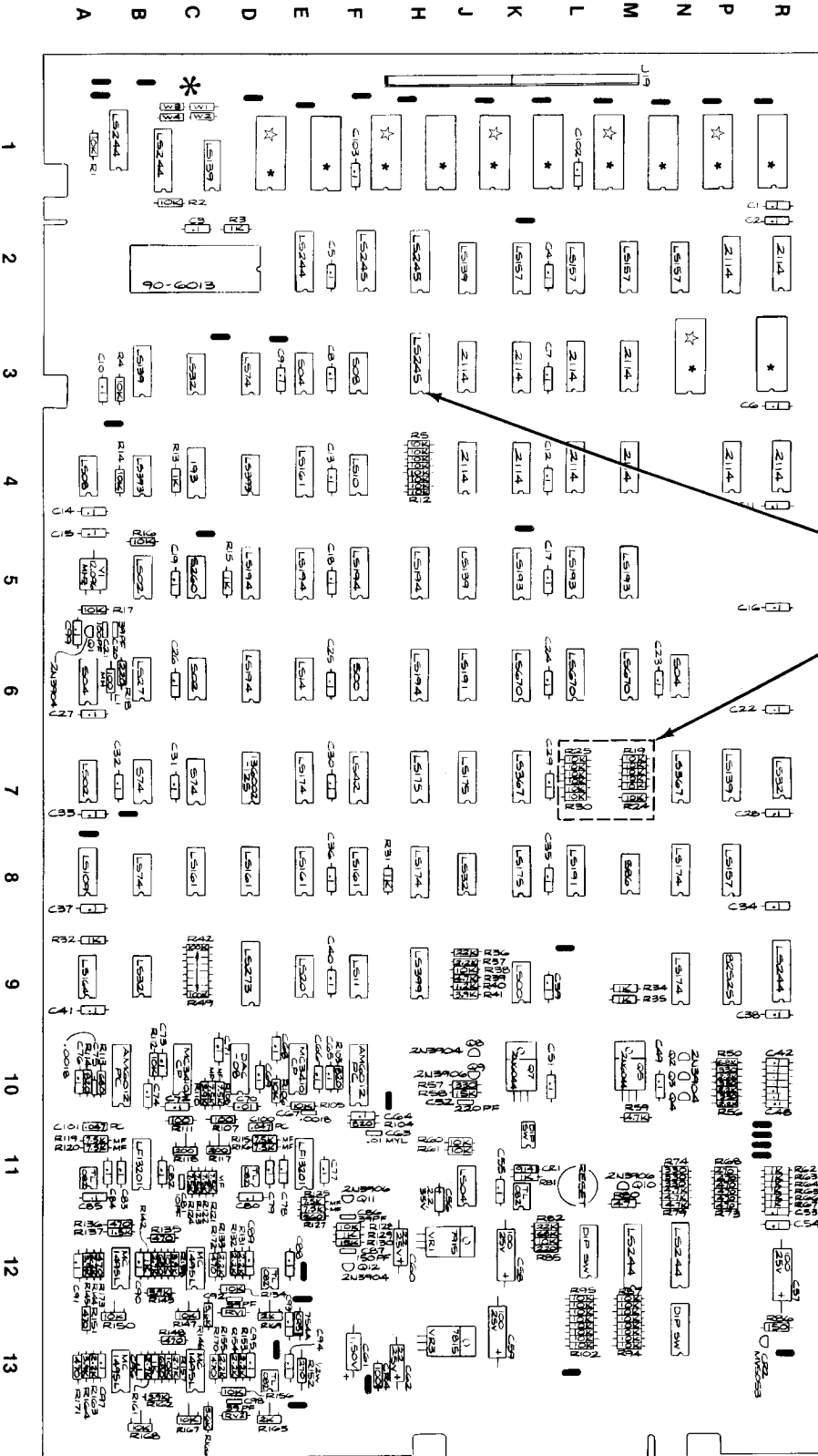
## Figure 23 Tempest™ Auxiliary PCB Assembly Parts List

Part No.	Description (Reference Designations and Locations in Bold)
C012294-01	Audio I/O N-Channel MOS/LSI Custom Chip <b>(B/C2, C/D2)</b>
21-101153	.015 $\mu$ f, $\pm$ 10%, Radial-Lead Epoxy-Dipped 100V Mylar Capacitor <b>(C9, 10)</b>
24-250107	100 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor <b>(C56)</b>
24-250476	47 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor <b>(C13)</b>
24-250477	470 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor <b>(C37, 38)</b>
24-500105	1 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 50V Capacitor <b>(C31, 32, 45-47)</b>
24-500476	47 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 50V Capacitor <b>(C19-21)</b>
29-088	.1 $\mu$ f Ceramic-Disc Radial-Lead 25V Capacitor <b>(C1-8, 11, 12, 14, 15, 17, 18, 22-30, 33-36, 39-44, 49-55)</b>
31-1N100	100V Type-1N100 Switching Diode <b>(CR3, 4)</b>
37-LM324	Type-LM324 Integrated Circuit <b>(K3, K6)</b>
37-4584B	Type-4584B Integrated Circuit <b>(E6)</b>
37-74109	Type-74109 Integrated Circuit <b>(A2)</b>
37-74LS00	Type-74LS00 Integrated Circuit <b>(D4)</b>
37-74LS02	Type-74LS02 Integrated Circuit <b>(J4)</b>
37-74LS10	Type-74LS10 Integrated Circuit <b>(C5)</b>
37-74LS14	Type-74LS14 Integrated Circuit <b>(F4)</b>
37-74LS32	Type-74LS32 Integrated Circuit <b>(C4)</b>
37-74LS74	Type-74LS74 Integrated Circuit <b>(C6, D5)</b>
37-74LS139	Type-74LS139 Integrated Circuit <b>(B4, B5)</b>
37-74LS157	Type-74LS157 Integrated Circuit <b>(D6)</b>
37-74LS161	Type-74LS161 Integrated Circuit <b>(C1, D1)</b>
37-74LS174	Type-74LS174 Integrated Circuit <b>(A3, H4)</b>
37-74LS175	Type-74LS175 Integrated Circuit <b>(J3)</b>
37-74LS191	Type-74LS191 Integrated Circuit <b>(A4)</b>
37-74LS244	Type-74LS244 Integrated Circuit <b>(E3, H3)</b>
37-74LS374	Type-74LS374 Integrated Circuit <b>(B1, F3)</b>
37-74S08	Type-74S08 Integrated Circuit <b>(E4)</b>
38-MV5053	Type-MV5053 Red Light-Emitting Diode <b>(CR1)</b>
66-114P1T	4-Station, Single-Throw, Dual-Inline-Package Bit Switch <b>(D/E2)</b>
79-42C16	16-Contact Medium-Insertion-Force Integrated Circuit Socket <b>(A1, E1, F1, H1, J1, K1, L1)</b>
79-42C22	22-Contact Medium-Insertion-Force Integrated Circuit Socket <b>(C3)</b>
79-42C40	40-Contact Medium-Insertion-Force Integrated Circuit Socket <b>(B/C2, C/D2, E2, F/H2, J2, K/L2)</b>
110000-102	1K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R1, 5, 7, 41, 45, 53-58, 64, 66-70)</b>
110000-103	10K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R3, 4, 8-26, 36, 48-52)</b>
110000-104	100K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R35, 37, 38)</b>
110000-151	150 Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R2, 30, 31)</b>
110000-221	220 Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R65)</b>
110000-223	22K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R34)</b>
110000-332	3.3K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R39, 40, 46, 47)</b>
110000-334	330K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R32, 33)</b>
110000-471	470 Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R42-44, 59-63)</b>
110000-472	4.7K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R29)</b>
110000-473	47K Ohm, $\pm$ 5%, 1/4 W Resistor <b>(R6, 28)</b>
110001-102	1K Ohm, $\pm$ 5%, 1/2 W Resistor <b>(R27)</b>

[Continued on next page]

## Figure 23 Tempest™ Auxiliary PCB Assembly, continued Parts List

<i>Part No.</i>	<i>Description (Reference Designations and Locations in Bold)</i>
122005-103	.01 $\mu$ f Ceramic-Disc 25V Radial-Lead Capacitor <b>(C16)</b>
128002-102	1000 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C48)</b>
131003-001	Type-1N5257B Zener Diode <b>(CR2)</b>
136002-126	Programmable Read-Only Memory <b>(A1)</b>
136002-127	Programmable Read-Only Memory <b>(E1)</b>
136002-128	Programmable Read-Only Memory <b>(F1)</b>
136002-129	Programmable Read-Only Memory <b>(H1)</b>
136002-130	Programmable Read-Only Memory <b>(J1)</b>
136002-131	Programmable Read-Only Memory <b>(K1)</b>
136002-132	Programmable Read-Only Memory <b>(L1)</b>
137002-001	Type-74S86 Integrated Circuit <b>(E5)</b>
137003-001	Type-74S03 Integrated Circuit <b>(F5)</b>
137004-001	Transistor Array <b>(E2, F/H2, J2, K/L2)</b>
137161-001	Read-Only Memory ER2055 <b>(C3)</b> <i>Note: If you replace this part, you must erase this ROM before locking up the game. See Figure 6, Self-Test Procedure, in this manual for instructions. If you do not erase the ROM, the self-test will show the ROM to be "defective" by displaying the letter E on the screen.</i>
179014-012	12-Pin Polarized PCB Header <b>(J16, J17)</b>
179051-001	Test Point



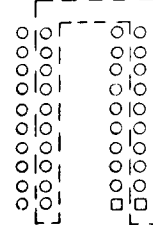
\*-01 & -02 PCB assemblies have the following 16K ROMs loaded at the positions indicated. (Second versions, such as "-113," indicate acceptable substitutes.)

- 136002-101 or -113: D1
- 136002-102 or -114: E1
- 136002-103 or -115: F1
- 136002-104 or -116: H1
- 136002-105 or -117: J1
- 136002-106 or -118: K1
- 136002-107 or -119: L/M1
- 136002-108 or -120: M/N1
- 136002-109 or -121: P1
- 136002-110 or -122: R1
- 136002-111 or -123: N/P3
- 136002-112 or -124: R3

\*-03 & -04 PCB assemblies have the following 32K ROMs loaded at the positions indicated:

- 136002-133: D1
- 136002-134: F1
- 136002-135: J1
- 136002-136: L/M1
- 136002-137: P1
- 136002-138: N/P3

Install R19-30 when using 74LS170.



**DETAIL**  
Use IC pads enclosed with dotted lines when inserting 74LS245. The other pads are for inserting an 8304B at locations F2, H2, and H3.

\* Install W3 and W4 for -01, -02 PCB assemblies  
Install W1 and W2 for -03, -04 PCB assemblies

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Figure 24 Tempest™ Analog Vector-Generator PCB Assembly A037383-01 thru -04 C



## Figure 24 Tempest™ Analog Vector-Generator PCB Assembly, continued Parts List

Part No.	Description (Reference Designations and Locations in Bold)
19-315103	10K Vertical PCB-Mounting Cermet Trimpot (R147, 150, 167, 168)
19-315201	200 Ohm Vertical PCB-Mounting Cermet Trimpot (R117, 118)
19-315202	2K Ohm Vertical PCB-Mounting Cermet Trimpot (R165, 169)
21-101103	.01 $\mu$ f, $\pm$ 10%, Radial-Lead Epoxy-Dipped 100V Mylar Capacitor (For -02 & -04 PCB assy. only: C63)
24-250266	22 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor (For -01 & -02 PCB assy. only: C60, C62)
24-250107	100 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 25V Capacitor (C57-59)
24-500105	1 $\mu$ f Aluminum Electrolytic Fixed Axial-Lead 50V Capacitor (C61)
27-102182	.0018 pf, $\pm$ 10%, Radial-Lead Ceramic-Disc 1000V Capacitor (For -01 & -03 PCB assy. only: C67. For -02 & -04 PCB assy. only: C75)
29-006	1 $\mu$ f, $\pm$ 10%, 35V Tantalum Capacitor (For -03 & -04 PCB assy. only: C60)
29-088	.1 $\mu$ f Ceramic-Disc 25V Radial-Lead Capacitor (C1-19, 22-49, 51, 53-55, 69, 71, 77-80, 82-85, 88-91, 93-97, 99, 102, 103. Also, for -01 & -03 PCB assy. only: C66, 68, 72, 73. For -02 & -04 PCB assy. only: C64, 65, 74, 76)
31-1N100	100V Type-1N100 Switching Diode (CR4)
31-1N914	75V Type-1N914 Switching Diode (CR1)
33-2N3906	Type-2N3906 PCB Switching and Amplifying Transistor (Q9-11)
34-2N3904	Type-2N3904 NPN 60V 1-Watt Transistor (Q1-4, 8, 12)
34-2N6044	Type-2N6044 Darlington NPN Transistor (Q5, 7)
37-TL082CP	Type-TL082 Integrated Circuit (A11, D11, D/E12, D/E13, K11)
37-1495	Type-MC1495L Integrated Circuit (A/B12, A/B13, C12, C13)
37-13201	Type-LF13201 Integrated Circuit (B11, E11)
37-74LS00	Type-74LS00 Integrated Circuit (K9)
37-74LS02	Type-74LS02 Integrated Circuit (A7, B5)
37-74LS04	Type-74LS04 Integrated Circuit (J11)
37-74LS08	Type-74LS08 Integrated Circuit (A4)
37-74LS10	Type-74LS10 Integrated Circuit (F4)
37-74LS14	Type-74LS14 Integrated Circuit (E6)
37-74LS20	Type-74LS20 Integrated Circuit (E9)
37-74LS27	Type-74LS27 Integrated Circuit (B6)
37-74LS32	Type-74LS32 Integrated Circuit (C3, J8, B9, R7)
37-74LS42	Type-74LS42 Integrated Circuit (F7)
37-74LS74	Type-74LS74 Integrated Circuit (B8, D3)
37-74LS109	Type-74LS109 Integrated Circuit (A8)
37-74LS139	Type-74LS139 Integrated Circuit (B3, C1, J2, J5, P7)
37-74LS157	Type-74LS157 Integrated Circuit (K2, L2, M2, N2, P8)
37-74LS161	Type-74LS161 Integrated Circuit (E4, C8, D8, E8, F8)
37-74LS164	Type-74LS164 Integrated Circuit (A9)
37-74LS174	Type-74LS174 Integrated Circuit (E7, H8, N8, N9)
37-74LS175	Type-74LS175 Integrated Circuit (H7, J7, K8)
37-74LS191	Type-74LS191 Integrated Circuit (J6, L8)
37-74LS193	Type-74LS193 Integrated Circuit (K5, L5, M5)
37-74LS194	Type-74LS194 Integrated Circuit (D5, D6, E5, F5, H5, H6)
37-74LS244	Type-74LS244 Integrated Circuit (A/B1, B/C1, E2, M12, N12, R9)
37-74LS245	Type-74LS245 Integrated Circuit (F2, H2, H3) Acceptable substitute is part no. 37-8304B.
37-74LS273	Type-74LS273 Integrated Circuit (D9)
37-74LS367	Type-74LS367 Integrated Circuit (K7, N7)
37-74LS393	Type-74LS393 Integrated Circuit (B4, D4)

[Continued on next page]

## Figure 24 Tempest™ Analog Vector-Generator PCB Assembly, continued Parts List

Part No.	Description (Reference Designations and Locations in Bold)
37-74LS399	Type-74LS399 Integrated Circuit (H9)
37-74LS670	Type-74LS670 Integrated Circuit (K6, L6, M6) <i>Acceptable substitute is part no. 37-74LS170.</i>
37-74S00	Type-74S00 Integrated Circuit (F6)
37-74S02	Type-74S02 Integrated Circuit (C6)
37-74S04	Type-74S04 Integrated Circuit (A6, E3, N6)
37-74S08	Type-74S08 Integrated Circuit (F3)
37-74S74	Type-74S74 Integrated Circuit (B7, C7)
37-74S260	Type-74S260 Integrated Circuit (C5)
37-74193	Type-74193 Integrated Circuit (C4)
37-7815	+ 15V Voltage Regulator (VR3)
37-7915	- 15V Voltage Regulator (VR1)
38-MV5053	Type-MV5053 Light-Emitting Diode (CR2)
41-3003	100 uH, ± 10%, Hot-Molded Plastic Fixed R.F. Choke (L1) <i>Acceptable substitute is part no. 141002-001.</i>
62-001	SPST Momentary Pushbutton Switch (Reset)
66-114P1T	4-Station Single-Throw, Dual-Inline-Package Bit Switch (K10/11)
66-118P1T	8-Station Single-Throw, Dual-Inline-Package Bit Switch (L12, N13)
78-13003	General Electric RTV #108 Sealing Compound
79-42C16	16-Contact Medium-Insertion-Force Integrated Circuit Socket (D7)
79-42C24	24-Contact Medium-Insertion-Force Integrated Circuit Socket (D1, E1, F1, H1, J1, K1, L/M1, M/N1, P1, R1, N/P3, R3)
79-42C40	40-Contact Medium-Insertion-Force Integrated Circuit Socket (C2)
81-4302	Nylon Snap-In Fastener
90-6013	Microprocessor (C2)
90-7005	Random-Access Memory (P9)
90-7033	Random-Access Memory (J3, J4, K3, K4, L3, L4, M3, M4, P2, P4, R2, R4)
99-130430	Voltage-Dependent Resistor (RV1, 2) <i>Acceptable substitute is part no. 110004-001.</i>
020670-01	Test Point
110000-101	100 Ohm, ± 5%, ¼ W Resistor (R107, 111)
110000-102	1K Ohm, ± 5%, ¼ W Resistor (R3, 13, 15, 31, 32, 34, 35, 62-67, 81, 129, 142, 160)
110000-103	10K Ohm, ± 5%, ¼ W Resistor (R1, 2, 4-12, 14, 16, 17, 38, 60, 61, 84, 87-102, 128, 134, 139, 156, 158. <i>Also, for -01 &amp; -03 PCB assy. only: 105, 106, 112.</i> ) <i>Also, for any PCB assy. if you are using part no. 37-74LS170 in locations K6, L3, M6: R19-30)</i>
110000-104	100K Ohm, ± 5%, ¼ W Resistor (R42-49)
110000-122	1.2K Ohm, ± 5%, ¼ W Resistor (R40)
110000-151	150 Ohm, ± 5%, ¼ W Resistor (R86)
110000-152	1.5K Ohm, ± 5%, ¼ W Resistor (R137)
110000-153	15K Ohm, ± 5%, ¼ W Resistor (R58, R130)
110000-221	220 Ohm, ± 5%, ¼ W Resistor (R18, 85)
110000-222	2.2K Ohm, ± 5%, ¼ W Resistor (R37, 52, 54, 56, 131-133, 144, 153-155, 163)
110000-223	22K Ohm, ± 5%, ¼ W Resistor (R36, 82)
110000-272	2.7K Ohm, ± 5%, ¼ W Resistor (R141, 157, 161)
110000-331	330 Ohm, ± 5%, ¼ W Resistor (R51, 53, 55, 57, 74-76)
110000-392	3.9K Ohm, ± 5%, ¼ W Resistor (R41, 110, 138, 143, 145, 162, 164)
110000-470	47 Ohm, ± 5%, ¼ W Resistor (R80)
110000-471	470 Ohm, ± 5%, ¼ W Resistor (R68-73, 135, 136, 148, 151, 170, 173)
110000-472	4.7K Ohm, ± 5%, ¼ W Resistor (R39, 59, 77-79)

[Continued on next page]

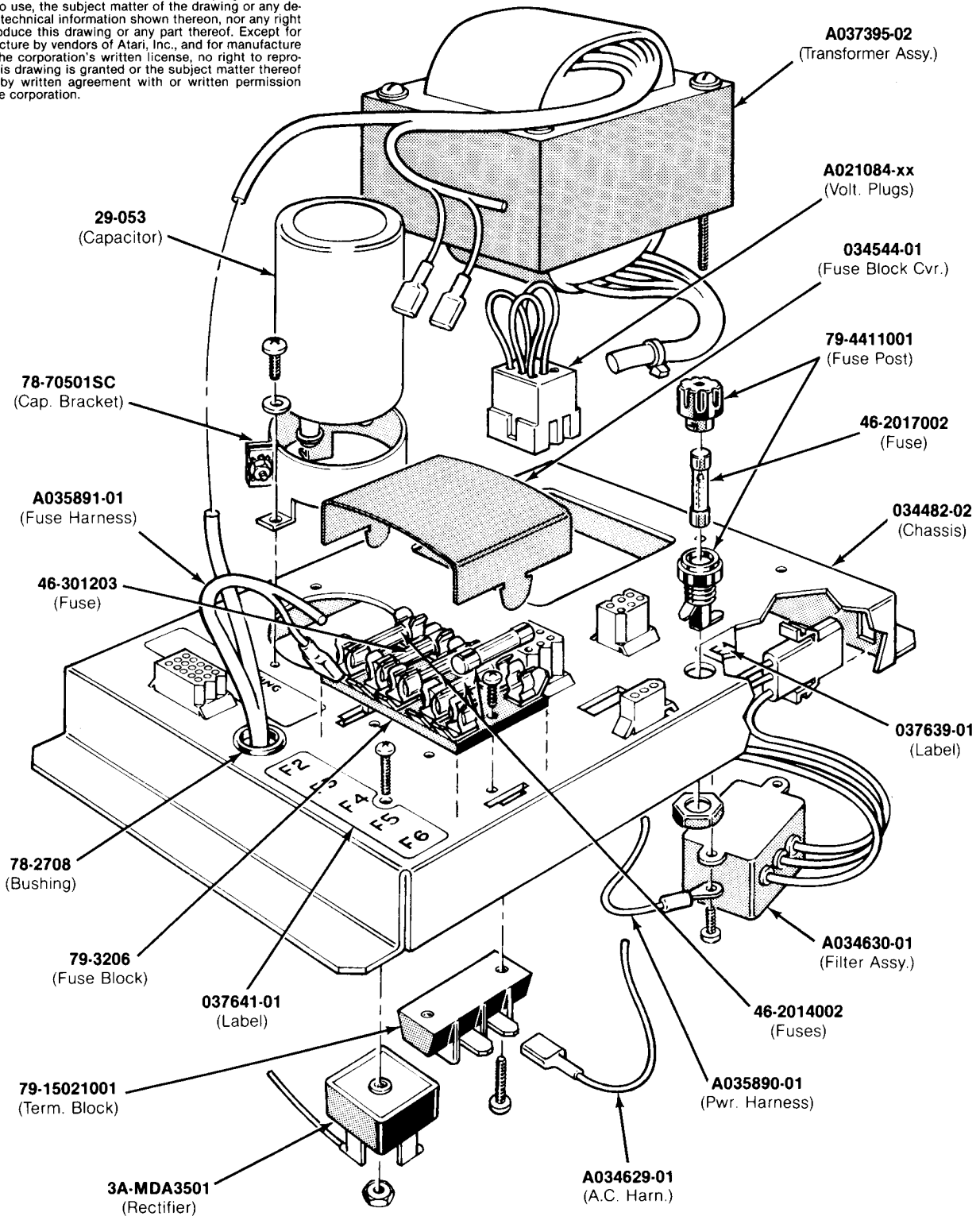
## Figure 24 Tempest™ Analog Vector-Generator PCB Assembly, continued Parts List

Part No.	Description (Reference Designations and Locations in Bold)
110000-561	560 Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(R127)</b>
110000-562	5.6K Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(R146, 166)</b>
110000-681	680 Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(R140, 159)</b> . Also, for -02 & -04 PCB assy. only: R113
110000-682	6.8K Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(R50)</b>
110000-683	68K Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(R83)</b>
110000-821	820 Ohm, $\pm 5\%$ , $\frac{1}{4}$ W Resistor <b>(For -02 &amp; -04 PCB assy. only: R103, 104, 114)</b>
110001-271	270 Ohm, $\pm 5\%$ , $\frac{1}{2}$ W Resistor <b>(R152)</b>
110003-752	7.5K Ohm, $\pm 1\%$ , $\frac{1}{8}$ W Resistor <b>(R108, 109, 115, 116, 119-126)</b>
110005-001	0 Ohm Jumper <b>(For -01 &amp; -02 PCB assy. only: W3, 4. For -03 &amp; -04 PCB assy. only: W1, 2)</b> Acceptable substitute is 24-gauge wire.
121007-473	.047 $\mu$ f, $\pm 10\%$ , Radial-Lead Epoxy-Dipped 50V Polycarbonate Capacitor <b>(C100, 101)</b> Acceptable substitute is part no. 121006-473.
122000-225	2.2 $\mu$ f, $\pm 10\%$ , 35V Tantalum Capacitor <b>(C56)</b>
122005-103	.01 $\mu$ f Ceramic-Disc 25V Radial-Lead Capacitor <b>(C70)</b>
128002-100	10 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C81)</b>
128002-101	100 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C21)</b>
128002-151	150 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C87)</b>
128002-221	220 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C52)</b>
128002-390	39 pf Radial-Lead Epoxy-Dipped 100V Mica Capacitor <b>(C20, 86, 92, 98)</b>
131002-001	6.8V, 400 mW, $\pm 5\%$ , Zener Diode <b>(CR5)</b>
136002-101	Programmable Read-Only Memory <b>(D1)</b> Acceptable substitute is part no. 136002-113.
136002-102	Programmable Read-Only Memory <b>(E1)</b> Acceptable substitute is part no. 136002-114.
136002-103	Programmable Read-Only Memory <b>(F1)</b> Acceptable substitute is part no. 136002-115.
136002-104	Programmable Read-Only Memory <b>(H1)</b> Acceptable substitute is part no. 136002-116.
136002-105	Programmable Read-Only Memory <b>(J1)</b> Acceptable substitute is part no. 136002-117.
136002-106	Programmable Read-Only Memory <b>(K1)</b> Acceptable substitute is part no. 136002-118.
136002-107	Programmable Read-Only Memory <b>(L/M1)</b> Acceptable substitute is part no. 136002-119.
136002-108	Programmable Read-Only Memory <b>(M/N1)</b> Acceptable substitute is part no. 136002-120.
136002-109	Programmable Read-Only Memory <b>(P1)</b> Acceptable substitute is part no. 136002-121.
136002-110	Programmable Read-Only Memory <b>(R1)</b> Acceptable substitute is part no. 136002-122.
136002-111	Programmable Read-Only Memory <b>(N/P3)</b> Acceptable substitute is part no. 136002-123.
136002-112	Programmable Read-Only Memory <b>(R3)</b> Acceptable substitute is part no. 136002-124.
136002-125	Programmable Read-Only Memory <b>(D7)</b>
136002-133	Programmable Read-Only Memory <b>(D1)</b>
136002-134	Programmable Read-Only Memory <b>(F1)</b>
136002-135	Programmable Read-Only Memory <b>(J1)</b>
136002-136	Programmable Read-Only Memory <b>(L/M1)</b>
136002-137	Programmable Read-Only Memory <b>(P1)</b>
136002-138	Programmable Read-Only Memory <b>(N/P3)</b>
137002-001	Type-74S86 Integrated Circuit <b>(M8)</b>
137149-001	Type-74LS11 Integrated Circuit <b>(F9)</b>
137158-002	Type AM6012PC 12-Bit Digital-to-Analog Converter <b>(For -02 &amp; -04 PCB assy. only: A10, F10)</b> Acceptable substitute is part no. 137150-001.
137159-001	Type DAC-08CN 8-Bit Digital-to-Analog Converter <b>(D10)</b>
137160-003	Type MC3410 10-Bit Digital-to-Analog Converter <b>(For -01 &amp; -02 PCB assy. only: B10, E10)</b> Acceptable substitute is part no. 137160-004.
144000-001	12.096 MHz, $\pm .005\%$ , Crystal <b>(Y1)</b> Acceptable substitute is part no. 90-102.
179014-012	12-Pin Polarized PCB Header <b>(J19)</b>

Used on -01, -02 PCB assemblies only

Used on -03, -04 PCB assemblies only

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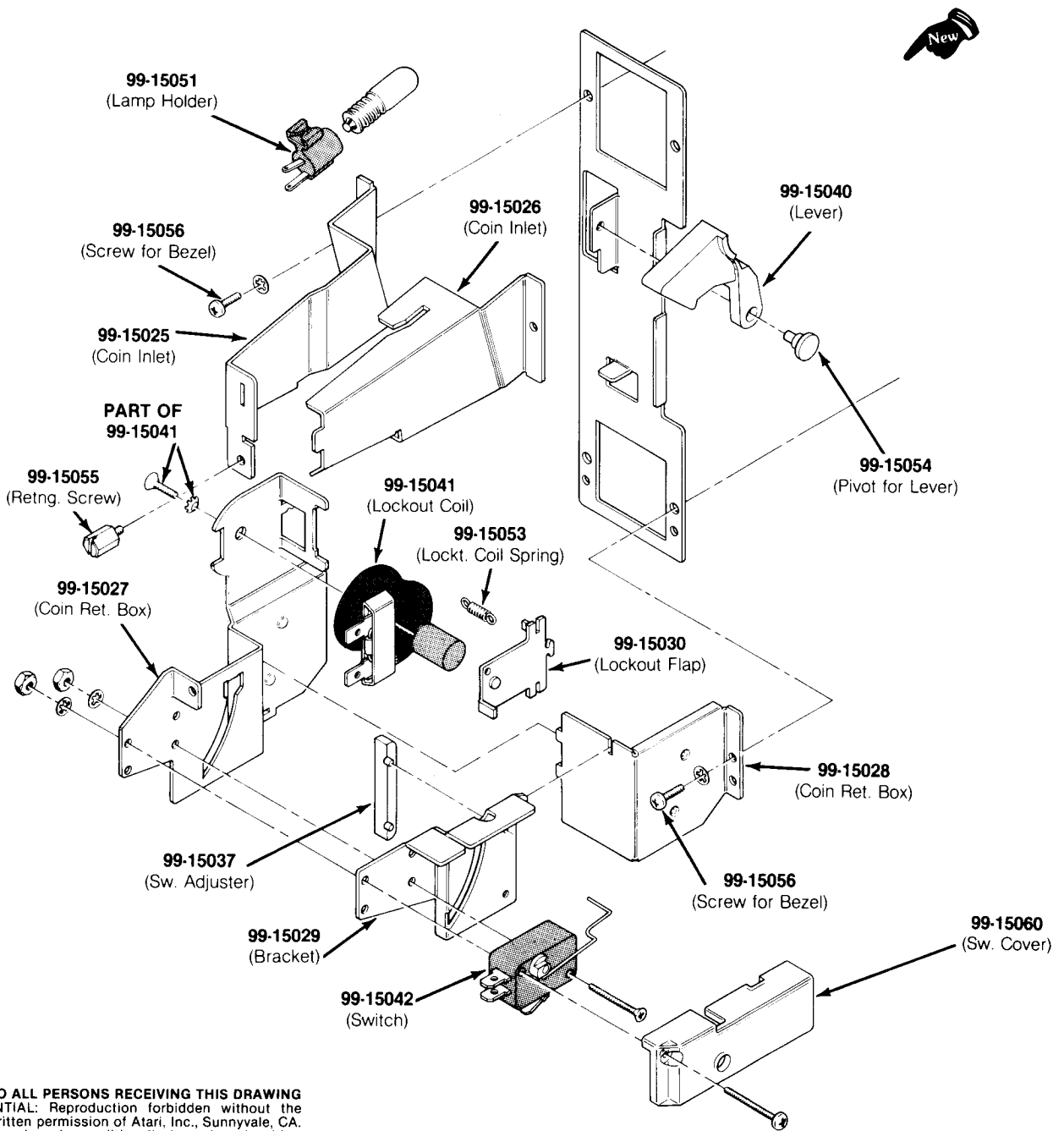


**Figure 25 Shielded Color X-Y Power Supply Assembly**  
**A037875-xx A**

## Figure 25 Shielded Color X-Y Power Supply Assembly Parts List

Part No.	Description (Reference Designations in Bold)
A021084-01	Voltage Plug for 100V ( <i>violet</i> )
A021084-02	Voltage Plug for 120V ( <i>yellow</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> )
A035890-01	Power Harness Assembly
A035891-01	Fuse Harness Assembly
A037395-02	Color X-Y Transformer Assembly ( <b>T1</b> )
29-053	27,000 $\mu$ f 15 VDC 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 $\times$ $\frac{5}{64}$ -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
037639-01	Label for Fuse Value ( <b>F1</b> )
037641-01	Label for Fuse Values ( <b>F2-F6</b> )

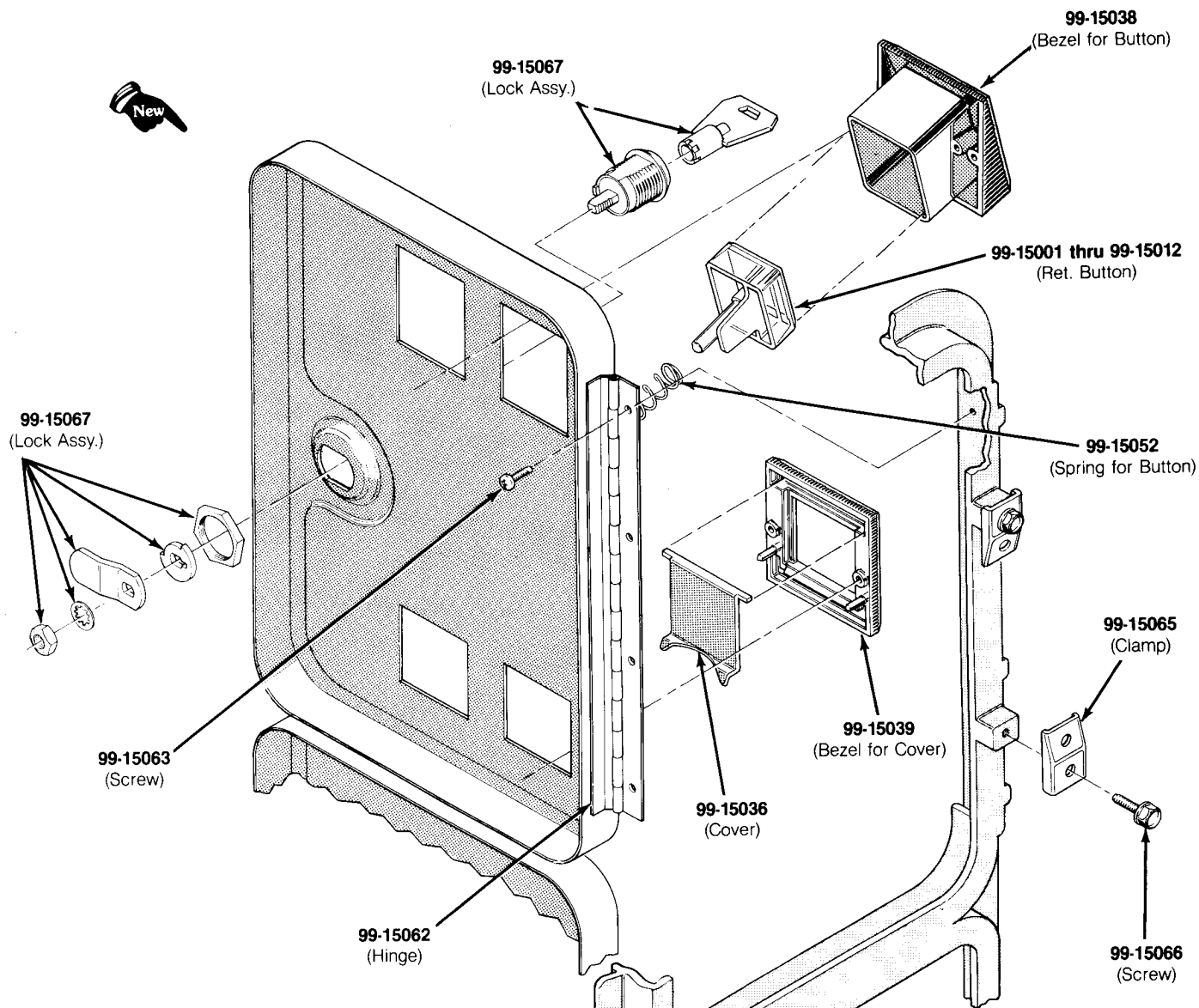
A037875-01 power supply assembly has 120V plug  
A037875-02 has the 100V, 220V and 240V plugs  
A037875-03 has the 220V and 240V plugs



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**A037542-01**  
 (Harness-not shown)

**Figure 26 Vertical-Mounted Coin Door**  
**A037619-xx B**



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- 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

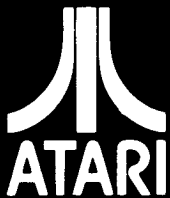
- A037619-15 — French 2 Fr/1 Fr Coin Door
- A037619-16 — Swedish 1 Kr/1 Kr Coin Door
- A037619-17 — Spanish 25 Pts/25 Pts Coin Door
- A037619-18 — Italian 100 L/100 L Coin Door
- A037619-19 — Hong Kong \$1/\$1 Coin Door
- A037619-20 — Japanese 100Y/100Y Coin Door

**Figure 26 Vertical-Mounted Coin Door**  
**A037619-xx B**

## Figure 26 Vertical-Mounted Coin Door, continued Parts List

<i>Part No.</i>	<i>Description</i>
A037542-01	Harness Assembly
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
99-15012	Coin Return Button with U.S. 50¢ (2 × 25¢) Price 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 (U.S. 25¢)
99-15036	Coin Return Cover
99-15037	Switch Adjuster
99-15038	Bezel for Coin Return Button
99-15039	Bezel for Coin Return Cover
99-15040	Coin Return Lever
99-15041	Lockout Coil
99-15042	Coin Switch for U.S. 25¢
99-15051	Lamp Holder
99-15052	Spring for Coin Return Button
99-15053	Spring for Lockout Coil
99-15054	Pivot for Coin Return Lever
99-15055	Retaining Screw
99-15056	Screw for Both Bezels
99-15060	Switch Cover
99-15062	Hinge
99-15063	Screw for Hinge
99-15065	Clamp for Frame
99-15066	Screw for Clamp
99-15067	Lock Assembly





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