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Notice Regarding Non-ATARI Parts

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Use of non-ATARI parts or modifications of any ATARI® game circuitry may adversely affect the safety of your game, and may cause injury to you and your players.

You may void the game warranty (printed on the inside back cover of this manual) if you do any of the following:

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- Modify or alter any circuits in the game by using kits or parts not supplied by Atari.

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- All green ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three-wire outlet.
- The game printed-circuit boards (PCB) are properly installed within the Electromagnetic Interference (EMI) cage.
- The EMI Shield PCB is properly installed and connected in series with the game PCB harness.
- All filter capacitors required on the EMI Shield PCB are properly soldered in place.

If you are still unable to solve the interference problem, please contact ATARI Customer Service. See the inside front cover of this manual for service in your area.
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Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply.

⚠️ WARNING ⚠️

**Properly Ground the Game.** Players may receive an electrical shock if the game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into 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 electrical shock if the control panel is not properly grounded! After servicing any parts on the control panel, check that the grounding clip is firmly secured to the metal tab on the inside of the control panel. Only then should you lock up the game.

**AC Power Connection.** Before connecting the game to the AC power source, verify that the proper voltage-selection plug is installed on the game's power supply.

**Disconnect Power During Repairs.** To avoid electrical shock, disconnect the game from the AC power source before removing or repairing any part of the game. When removing or repairing the video display, extra precautions must be taken to avoid electrical shock because high voltages may exist within the display circuitry and cathode ray tube (CRT) even after power has been disconnected. Do not touch internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing this area of the game. To discharge the CRT: Attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Momentarily touch the free end of the grounded jumper to the CRT anode by sliding it under the anode cap. Wait two minutes and discharge the anode again.

**Use Only ATARI Parts.** To maintain the safety integrity of your ATARI game, do not use non-ATARI parts when repairing the game. Use of non-ATARI parts or other modifications to the game circuitry may adversely affect the safety of your game, and injure you or your players.

**Handle Fluorescent Tube and CRT With Care.** If you drop a fluorescent tube or CRT and it breaks, it may imperfect: shattered glass can fly sixty feet or more from the explosion.

**Use the Proper Fuses.** To avoid electrical shock, use replacement fuses which are specified in the parts list for this game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating. In addition, the fuse cover must be in place during game operation.

**CAUTION**

**Properly Attach All Connectors.** Make sure that the connectors on each printed-circuit board (PCB) are properly plugged in. Note that they are keyed to fit only one way. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty.

**Ensure the Proper AC Line Frequency.** Video games manufactured for operation on 60 Hz line power (i.e., United States) must not be operated in countries with 50 Hz line power (i.e., Europe). The fluorescent light ballast transformer will overheat, causing a potential fire hazard if 60 Hz games are operated off power lines using 50 Hz. Check the product identification label of your game for the line frequency required.
How to Use This Manual

This manual, written for game operators and service technicians, describes your new ATARI game.

Chapter 1 contains a game overview, game specifications, inspection procedures, switch locations, option information, and a description of game play.

Chapter 2 contains self-test procedures.

Chapter 3 contains maintenance and repair procedures.

Chapter 4 contains illustrated parts lists. Notes in this chapter refer you to other places in the manual for more detailed information.

Schematic diagrams of the game circuitry are included as a supplement (SP-251) to this manual.

Chapter 1
Game Overview

The player is an Interface Robot (#1984) in rebellion against Big Brother and his Evil Eyes in I, ROBOT. Players will enter another world where they must face off against Big Brother on different terrains, trying to shoot through a protective shield and advance to the pyramid where Big Brother's Evil Eye can actually be shot and destroyed. I, ROBOT provides players with exciting challenges as they attempt to lead a rebellion against the control of Big Brother.

New Features

I. ROBOT has several new features:

- **Changing Perspective.** By pressing the start pushbutton while in Game Play, players can change their viewpoint on the playfield. It takes them from an overhead view of the entire terrain to a ground-level view, where shooting the enemy is worth more points.

- **3-Dimensional Graphics.** All objects in I, ROBOT are really three-dimensional.

- **Doodle City.** By entering the Transporter, players can go to Doodle City. The players can manipulate the I, ROBOT graphics in an infinite variety of shapes, colors, and patterns.

- **Hall-Effect Joystick.** This new analog joystick provides a faster and smoother response for the player.

All major parts of the game are illustrated in Figure 1.1.

Inspecting the Game

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

1. Examine the exterior of the game cabinet for dents, chips, or broken parts.

2. Remove the screws from the body rear access panel. Unlock and open this panel and the coin door. Inspect the interior of the game as follows:
   
   a. Ensure that all plug-in connectors (on the game harnesses) are firmly plugged in. Replug any connectors found unplugged. Do not force connectors together. The connectors are keyed so they only fit in the proper orientation. A reversed edge connector may damage a printed-circuit board (PCB) and will void your warranty.

   b. Ensure that all plug-in integrated circuits on each PCB are firmly plugged into their sockets.

   c. Remove the tie-wrap that secures the coiled power cord inside the cabinet. Inspect the power cord for any cuts or tears in the insulation. Repair or replace as required. Place the square strain-relief plate in the wood slot at the bottom of the rear panel opening.

   d. Inspect the power supply. Make sure the harness is plugged in correctly.

   e. Inspect other major subassemblies, such as the control panel, video display, EMI cage, and each PCB. Make sure they are mounted securely and that the green ground wires are connected.

f. Plug the game into a grounded 3-wire outlet. Perform a self-test as described in Chapter 2.

<table>
<thead>
<tr>
<th>Table 1-1 Installation Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristic</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Power Consumption</td>
</tr>
<tr>
<td>Temperature</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
<tr>
<td>Line Voltage</td>
</tr>
<tr>
<td>Width</td>
</tr>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>Height</td>
</tr>
</tbody>
</table>

Joystick Centering

Electrical centering for the joystick is quickly accomplished by moving the joystick to all four extreme edges. Electrical centering is also accomplished during normal gameplay, but may take a few seconds to optimize.
Switch Locations

Power On/Off Switch
The power on/off switch is located on the back of the cabinet on the lower left side (see Figure 1-1).

Utility Panel Switches
The volume control, coin counter(s), self-test switch, and auxiliary coin switch are on the utility panel. The utility panel is located inside the upper coin door (see Figure 1-1). The volume control adjusts the level of sound produced by the game. The coin counter(s) records the number of coins entered into the game. The self-test switch initiates the self-test mode. The auxiliary coin switch creates the game without activating a coin counter. See Figures 1-2 and 4-4 for details of these switches.

Option Switches
Two dual-inline package (DIP) switches are located on the Central Processing Unit (CPU) PCB at locations 3J and 5E (see Figure 1-2). Use these 8-toggle switches to select different bonus, pricing, and play options.

Selecting the Options
Settings of the option switches are explained in Tables 1-2 and 1-3. Options preset at the factory are shown by the ▲ symbol. However, you may change the settings to suit your individual needs.

Table 1-2 Switch Settings for Bonus Interval and Play Options

<table>
<thead>
<tr>
<th>Settings of 8-toggle switch on CPU PCB (at location 5E)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bonus Life Intervals</td>
</tr>
<tr>
<td>On On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Off Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20,000 ▲</td>
</tr>
<tr>
<td>Off On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30,000</td>
</tr>
<tr>
<td>Off On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bonus Lives Per Coin</td>
</tr>
<tr>
<td>Off On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 Lives</td>
</tr>
<tr>
<td>Off Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 Lives</td>
</tr>
<tr>
<td>On On</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Lives ▲</td>
</tr>
<tr>
<td>On Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 Lives</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Minimum Game Time Option</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90 Second Minimum Game Time on Level 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Lives (Limited Game Time) ▲</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium Difficulty Level ▲</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Easy Difficulty Level</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Demonstration Mode On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Demonstration Mode Off ▲</td>
</tr>
<tr>
<td>On Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Doodle City for 2 Minutes 10 Seconds ▲</td>
</tr>
<tr>
<td>Off</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Doodle City for 3 Minutes 5 Seconds</td>
</tr>
</tbody>
</table>

▲Manufacturer's recommended settings for American-made games.
Table 1-3  Switch Settings for Coin & Credit Options and Bonus Adder

<table>
<thead>
<tr>
<th>Settings of 8-Toggle Switch on CPU PCB (at location 3f)</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 On Off  Off On</td>
<td>Right Coin Mechanism</td>
</tr>
<tr>
<td>2 On Off  Off On</td>
<td>1 Coin for 1 Coin Unit</td>
</tr>
<tr>
<td>3 On Off  Off On</td>
<td>1 Coin for 4 Coin Units</td>
</tr>
<tr>
<td>4 On Off  Off On</td>
<td>1 Coin for 5 Coin Units</td>
</tr>
<tr>
<td>5 On Off  Off On</td>
<td>1 Coin for 6 Coin Units</td>
</tr>
<tr>
<td>6 On Off  Off On</td>
<td>Left Coin Mechanism</td>
</tr>
<tr>
<td>7 On Off  Off On</td>
<td>1 Coin Unit for 1 Credit</td>
</tr>
<tr>
<td>8 On Off  Off On</td>
<td>1 Coin Unit for 2 Credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coins Per Credit</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Off  On Off</td>
<td>1 Coin for 1 Credit</td>
</tr>
<tr>
<td>On Off  On Off</td>
<td>2 Coins for 1 Credit</td>
</tr>
<tr>
<td>Off On  Off On</td>
<td>3 Coins for 1 Credit</td>
</tr>
<tr>
<td>Off Off  On Off</td>
<td>4 Coins for 1 Credit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bonus Adder</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>On On  On Off</td>
<td>No Bonus</td>
</tr>
<tr>
<td>On Off  On Off</td>
<td>2 Coin Units for 1 Credit</td>
</tr>
<tr>
<td>Off On  Off On</td>
<td>3 Coin Units for 1 Credit</td>
</tr>
<tr>
<td>Off Off  On Off</td>
<td>4 Coin Units for 1 Credit</td>
</tr>
<tr>
<td>Off Off  Off Off</td>
<td>5 Coin Units for 1 Credit</td>
</tr>
<tr>
<td>On Off  Off Off</td>
<td>4 Coin Units for 2 Credits</td>
</tr>
<tr>
<td>Off Off  Off Off</td>
<td>No Bonus</td>
</tr>
<tr>
<td>Off Off  Off Off</td>
<td>Free Play</td>
</tr>
</tbody>
</table>

<Manufacturer's recommended settings for American-made games.

Game Play

At the completion of each space wave, the Robot lands on another geometric terrain, where once again he must face another Evil Eye.

Every third terrain contains a red pyramid which the Robot must enter after destroying the Evil Eye. Once inside the pyramid, the Robot has one chance to collect as many of the jewels as he can before he is destroyed. If the Robot is destroyed while inside the pyramid, he is immediately thrown back into space. The player must get through three more terrains, and destroy three more Evil Eyes before he has another chance to get the jewels inside of the pyramid.

Hints for Game Play

- The player can advance to higher play levels while inside the Transporter.
- Objects to be destroyed for points include a buzz saw, a soccer ball, a small ball dropped by a bird, the polygons, and a rolling log.
- The player can achieve a bonus for shooting all of the tetrahedrons in a space wave. The player can also achieve bonus points by spelling I ROBOT by shooting the letters as they appear sequentially in space waves.
- The player must shoot the polygons with SEVEN shots in order to destroy them and achieve points.

I, ROBOT begins with the interface Robot facing off against the Evil Eye. The player has to collect all of the red squares on the playfield in order to destroy the shield that protects the Evil Eye and enter the pyramid. The Robot can only jump to the red squares when the Evil Eye is not watching (i.e., yellow or green). If the Evil Eye is red, it will detect the Robot jumping and destroy him. At the acquisition of each red square, the protective shield is weakened. When the Robot has obtained all of the red squares, the shield is automatically destroyed and the Robot can get into the pyramid and destroy the Evil Eye.

After the destruction of the Evil Eye, the Robot travels through a space wave where the player must either shoot and destroy or avoid the objects flying towards him.
Self-Test Procedure

This game will test itself and provide data to show that the game circuitry and controls are operating properly. Self-test data is presented visually on the video display and audibly through the speakers. No additional equipment is required.

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

Chapter 2
Self-Test Displays
Ten self-test displays provide a visual check of the following:
• Game accounting and option-switch information.
• Read-only memory (ROM) and random-access memory (RAM) circuit operation.
• Joystick and switch operation.
• Sound-generator circuit operation.
• Matchbox circuit operation.
• The Dot-, vector-, and polygon-generator circuit operation.
• Character-generator circuit operation.
• Display operation.

When the self-test switch (located on the utility panel behind the coin door) is turned on, the game enters the SelfTest Mode. The following self-test displays are arranged in the sequence in which they occur after the self-test switch is turned on. After Screen 10—Size and Generating, the sequence starts over with Screen 2—Hardware and Switch Test. Turn the self-test switch off then on again to obtain Screen 1—Accounting and Options.

Screen 1—Accounting and Options
The Accounting and Options screen, as shown in Figure 2-1, displays the accounting information and the option settings. The totals in the Accounting section of Screen 1 are those accumulated since the game was first turned on or last reset.

![Accounting and Options Screen](image)

The following information is displayed in the Accounting section of Screen 1:
• AUX COINS shows the number of free coins selected by the auxiliary coin switch in the normal play mode.
• PAID COINS shows the total number of coins inserted into both game coin mechanisms.
• GAMES PLAYED shows the total number of free and paid games played. The number of Doodle City games played appears as D-XXXX on the same line. Add the Doodle City number to the number on the left to obtain the total games played.
• AVG GAME TIME shows the average time, in minutes and seconds, of all the games played.
• TOTAL GAME TIME shows the total time, in hours, minutes, and seconds, of all the games played.
• TOTAL TIME ON shows the total time, in hours, minutes, and seconds, the game has been on.

Resetting the Accounting Information. The accounting information can be reset by simultaneously holding the FIRE button down and pushing the joystick forward.

Resetting the High Scores. We suggest that you reset the high-score table after any changes are made to the options that may affect the average game time. The high-score table displayed in the Attract Mode can be reset by simultaneously pressing the FIRE and Start 2 buttons.

Changing the Options. The Options section of Screen 1 shows the current option-switch settings. The options can be changed by resetting the option switches located on the central-processing unit (CPU) printed-circuit board (PCB). Refer to Chapter 1 for option-switch information. Simultaneously press the Start 1 and 2 buttons to obtain Screen 2.

Screen 2—Hardware and Switch Test
Screen 2 is divided into two sections: Hardware Test and Switch Test. The Hardware Test section is divided into two segments that show the condition of the ROM and RAM circuits. If the hardware test passes, the message ROM OK will appear in the top segment and RAM OK will appear in the bottom segment as shown in Figure 2-2.

If the ROM test fails, the top segment of the Hardware Test section will give the location of the ROM circuit that failed; the bottom segment will be blank as shown in Figure 2-3. If the RAM test fails, the bottom segment will show the following error message:

**NOTE**
An oscilloscope sync pulse is available to aid in troubleshooting the matchbox and video processor circuits. Perform the procedures described in the following description for the MB ERRORS XX and VP WONT STOP messages.
Figure 2-2  Hardware Test—Passes

Figure 2-3  Hardware Test—Fails

- **BAD ROM** indicates that the custom sound IC at location 4E on the CPU PCB has failed.
- **NOIRQS** indicates that the interrupt-request circuit on the CPU PCB has failed.
- **VP WONT STOP** indicates that the video processor circuit on the Video PCB has failed.

To aid in troubleshooting the video processor circuit with an oscilloscope, press the Start 1 button to obtain Screen 7–Dot, Vector, and Polygon Test. Perform the procedure described under Screen 7–Dot, Vector, and Polygon test.
- **NO VBLANK** indicates that the vertical-blanking circuit on the Video PCB has failed.
- **BAD RAM** followed by a descriptor, an address, and a bit pattern (e.g., **CO 2010 WXX RYY**) indicates that there is a bad address (2010) or bit pattern (WXX RYY) at the RAM indicated by the descriptor (CO). **WXX** is the bit pattern written to address 2010 and **RYY** is the bit pattern read from address 2010. An error message with two descriptors and addresses (e.g., **BAD RAM MA 2001 CO 2010**) indicates that the two addresses are shorted together. Refer to Table 2-1 to locate the RAMs identified by the descriptor. The RAM locations in Table 2-1 are listed in the order in which they are tested.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W0</td>
<td>2A, 2B, 3A, 3B (CPU PCB)</td>
<td>Working RAM (800–FFF page 0, 0–7FF unread)</td>
</tr>
<tr>
<td>W1</td>
<td>2A, 2B, 3A, 3B (CPU PCB)</td>
<td>Working RAM (800–FFF page 1)</td>
</tr>
<tr>
<td>W2</td>
<td>2A, 2B, 3A, 3B (CPU PCB)</td>
<td>Working RAM (800–FFF page 2)</td>
</tr>
<tr>
<td>MA</td>
<td>1N, 1P, 2N, 2P (CPU PCB)</td>
<td>Math RAM (communication with mathbox)</td>
</tr>
<tr>
<td>C0</td>
<td>1C, 1D (Video PCB)</td>
<td>Communication RAM 0 (communication with video processor)</td>
</tr>
<tr>
<td>CI</td>
<td>2C, 2D (Video PCB)</td>
<td>Communication RAM 1 (communication with video processor)</td>
</tr>
<tr>
<td>AL</td>
<td>2M, 2N (CPU PCB)</td>
<td>Alphanumeric RAM</td>
</tr>
</tbody>
</table>

The Switch Test section of Screen 2 shows the condition of the joystick, dual-inline package (DIP) option, coin, start, and FIRE switches. The X- and Y-hexadecimal numbers show the horizontal and vertical range of the joystick control. The joystick is electrically centered and checked for the proper horizontal and vertical range in Screen 4–Joystick Test 2.
The DIP option-switch settings at location 5F on the CPU PCB are shown by the top group of eight digits on the right side of the screen. The bottom group of eight digits show the settings of the option switches at location 3J on the CPU PCB. The digits begin with switch 1 on the left and are numbered sequentially to switch 8 on the right (a 0 indicates that the switch is off, a 1 indicates that the switch is on).

The coin, start, and FIRE switch readouts change color as each switch is pressed to indicate proper operation. Press the Start 1 button to obtain Screen 3.

**Screen 3—Joystick Test 1**

The Joystick Test 1 screen, as shown in Figure 2-4, displays the condition of the joystick. Press the FIRE button to start the test. The messages **WAIT WHILE TEST OCCURS** and **DO NOT TOUCH JOYSTICK** will appear. The test is completed after 10 seconds. If the test passes, the message **GOOD STABILITY** will appear and the display will automatically proceed to Screen 4—Joystick Test 2.

If the test fails, the message **BAD STABILITY** will appear to indicate an unstable joystick circuit. If desired, press the Start 2 button to obtain Screen 4.

![Figure 2-4 Joystick Test 1](image)

**Screen 4—Joystick Test 2**

The Joystick Test 2 screen, as shown in Figure 2-5, is used to electrically center the joystick and verify that the control range is within acceptable limits. The message **BAD VERTICAL/HORIZONTAL CENTER** indicates a faulty joystick or associated circuitry. Repair the fault before proceeding with this test.

Move the joystick around its extreme outside mechanical limits and check that the flashing box draws a continuous dotted frame around the outside of the yellow box. Move the joystick and completely fill in the area inside the dotted frame with dots. Check that the dot pattern is continuous and uniform without gaps.

Press the FIRE button to go back to Screen 3—Joystick Test 1, or press the Start 1 button to obtain Screen 5.

![Figure 2-5 Joystick Test 2](image)

**Screen 5—Sound Test**

The Sound Test screen, as shown in Figure 2-6, is used to verify that the sound microprocessor and associated circuitry is operating properly. Use the joystick to select the sounds (not all are used during game play). Press the FIRE button to start the sound.

Press the Start 1 button to obtain Screen 6.

![Figure 2-6 Sound Test](image)
To aid in troubleshooting the video processor, the video processor can be pulsed to provide an oscilloscope sync signal. Press the Start 2 button to pulse the video processor. Connect the oscilloscope sync input to pin 12 on the integrated circuit at location #14 on the video PCB. Press the FIRE button to stop the pulse mode.

Press the Start 1 button to obtain Screen 8.

<table>
<thead>
<tr>
<th>WHITE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td></td>
</tr>
<tr>
<td>ORANGE</td>
<td></td>
</tr>
<tr>
<td>YELLOW</td>
<td></td>
</tr>
<tr>
<td>GREEN</td>
<td></td>
</tr>
<tr>
<td>CYAN</td>
<td></td>
</tr>
<tr>
<td>BLUE</td>
<td></td>
</tr>
<tr>
<td>PURPLE</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2-9 Color Bars

Screen 8—Color Bars
The Color Bars screen, as shown in Figure 2-9, is used to verify that the video circuits are operating properly and the display is adjusted for the appropriate colors. The display should contain eight distinct horizontal rows of color bars with eight different shade segments in each color bar. Examine the Color Bars display for the following characteristics:

- The eight color bars (from top to bottom) should be white, red, orange, yellow, green, cyan, blue, and purple. Each color bar should contain eight separate segments of progressively lighter shades of the same color.
- All of the color bars should have the same relative intensity.

If the preceding display characteristics are not correct, refer to the Display Manual for the appropriate adjustment procedure or to determine the possible cause of failure. Press the Start 1 button to obtain Screen 9.

Figure 2-8 Dot, Vector, and Polygon Test

Screen 7—Dot, Vector, and Polygon Test
The Dot, Vector, and Polygon Test screen, as shown in Figure 2-8, is used to verify that the dot-, vector-, and polygon-generator circuits are operating properly. Press the FIRE button to select a dot, vector, or polygon display.

Figure 2-7 Alphanumeric

Screen 6—Alphanumeric
The Alphanumeric screen, as shown in Figure 2-7, is used to verify that the alphanumeric character-generator circuits are operating properly.

Press the Start 1 button to obtain Screen 7.
Screen 9—Grid Pattern
The Grid Pattern screen, as shown in Figure 2-10, is used to verify that the display linearity and convergence are properly adjusted. Examine the grid pattern for the following characteristics:

- Grid lines should exhibit no pincushioning or barrel- ing and the lines should be straight within \( \frac{1}{8} \) inch.
- Convergence should not exceed 2.0 mm.

![Figure 2-10 Grid Pattern](image)

**Figure 2-10 Grid Pattern**

If the display characteristics are not within limits, refer to the Display Manual for the linearity and convergence adjustment procedures or to determine the possible cause of failure.

Press the Start 1 button to obtain Screen 10.

Screen 10—Size and Centering
The Size and Centering screen, as shown in Figure 2-11, is used to verify that the screen size and centering is within acceptable limits. The displayed frame should be within \( \frac{1}{4} \) inch from the edges of the screen on all four sides. If not, refer to the Display Manual for the size and centering adjustment procedures.

![Figure 2-11 Size and Centering](image)

**NOTE**

Press the Start 1 button after Screen 10—Size and Centering, to repeat the self-test sequence beginning with Screen 2—Hardware and Switch Test. If desired, turn the self-test switch off then on again to obtain Screen 1 Accounting and Options. Do not move the joystick when turning the self-test switch off or on.
Maintenance

This chapter includes preventive and corrective maintenance procedures for the Hall-Effect joystick control and the Start and FIRE pushbutton switches. To assure maximum trouble-free operation from these controls, Atari recommends that periodic preventive maintenance be performed as described in this chapter. If the controls require removal or replacement, refer to the Corrective Maintenance section of this chapter for the recommended procedures.

References are made to Chapter 4 Illustrated Parts Lists to aid in locating the parts that are mentioned, but not illustrated, in the following maintenance procedures.

Chapter 3
Preventive Maintenance

Preventive maintenance includes cleaning, lubricating, and tightening the securing hardware. For maximum trouble-free operation, preventive maintenance should be performed at the intervals specified in Table 3-1.

<table>
<thead>
<tr>
<th>Control</th>
<th>Maintenance Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joystick Control</td>
<td>Lubricate joystick and tightening hardware at least every four months.</td>
</tr>
<tr>
<td>FIRE Switches</td>
<td>Clean switch contacts and tighten securing hardware at least every four months.</td>
</tr>
<tr>
<td>Start Switches</td>
<td>Tighten securing hardware at least every six months.</td>
</tr>
</tbody>
</table>

**WARNING**

To avoid possible electrical shock, unplug the game power before performing any preventive maintenance procedures.

Removing the Control Panel

Perform the following procedure to remove the control panel from the cabinet (see Figure 4-2).

1. Turn the game power off.
2. Open the coin door.
3. Reach up through the coin door opening and release the two spring draw latches located under the control panel on either side of the game cabinet.
4. Grasp the front edge of the control panel and lift just far enough to expose the control-panel harness connector.
5. Disconnect the control-panel harness connector and remove the control panel from the cabinet.
6. Replace the control panel in the reverse order of removal.

Cleaning the FIRE Switches

Perform the following procedure to clean the FIRE switch contacts and tighten the securing hardware.

1. Remove the control panel as previously described.
2. Using a 3/4-inch hex driver tighten the four nuts securing the joystick assembly to the adjustable mounting plate (see Figure 4-2).
3. Using a Phillips screwdriver tighten the four screws securing the adjustable mounting plate to the control-panel brackets (see Figure 4-2).
4. Disconnect the four-pin connector from the Hall-Effect printed-circuit board (PCB).
5. Using a Phillips screwdriver remove the two screws securing the PCB to the Hall-Effect positioner plate.
6. Using a ¼-inch hex driver remove the four screws securing the lower Hall-Effect housing and positioner plate to the upper housing assembly.
7. Remove the actuator and the X/Y direction slides.
8. Apply a small amount of lithium-base grease (part no. 107027-001) to the actuator and X/Y direction slides as shown in Figure 3-1.
9. Apply a small amount of lithium-base grease to the plunger, pivot ball, and actuator ball on the joystick shaft as shown in Figure 3-1. Press the joystick control knob down to compress the spring and expose the contact surfaces of the pivot ball and plunger.
10. Reassemble the joystick as described under Reassembling the Joystick Control in the Corrective Maintenance section of this chapter.

Lubricating the Joystick Control

Perform the following procedure to lubricate the joystick control and tighten the securing hardware (see Figures 3-1 and 4-2).

Tightening the Start Switches

The start switch contacts are sealed inside the switch housing and do not require cleaning. Tighten the start switches by firmly holding the black cone-shaped bushing on the front of the control panel while turning the switch housing clockwise.
Corrective Maintenance

Corrective maintenance consists of removal, disassembly, reassembly, and replacement of the joystick control, and the Start and FIRE switches.

⚠️ WARNING ⚠️
To avoid possible electrical shock, unplug the game before performing any corrective maintenance procedures.

Removing the Joystick Control

Perform the following procedure to remove the joystick control from the control panel (see Figure 4-2). Refer to Disassembling the Joystick Control for detailed disassembly procedures.

1. Remove the control panel as described in the Preventive Maintenance section of this chapter.
2. Disconnect the four-pin connector from the Hall-Effect PCB.
3. Using a ¼-inch hex driver remove the four nuts securing the joystick control to the adjustable mounting plate.
4. Carefully lift the joystick control from the adjustable mounting plate.
5. Replace the joystick control in the reverse order of removal.

Disassembling the Joystick Control

Perform the following procedure to disassemble the joystick control (see Figure 3-1). If necessary, remove the joystick control from the cabinet as previously described.

1. Using a Phillips screwdriver remove the two screws securing the Hall-Effect PCB to the positioner plate.
2. Using a ¼-inch hex driver remove the four screws securing the Hall-Effect positioner plate and lower Hall-Effect housing to the upper housing assembly.
3. Separate the lower housing and the positioner plate from the upper housing assembly.
4. Remove the actuator and the X/Y direction slides.
5. Gently press the magnets out of the clips in the X/Y direction slides. Do not drop the magnets.

NOTE
The following steps describe the procedure for disassembling the upper housing assembly.

6. Using a metal punch remove the 0.086-inch roll pin securing the actuator ball to the shaft.
7. Using a metal punch remove the ¼-inch roll pin securing the pivot ball to the shaft.
8. Slide the shaft out of the housing and remove the plunger and spring from the shaft.
9. Reassemble the joystick control as described in the following procedure.

Reassembling the Joystick Control

Perform the following procedure to reassemble the joystick control (see Figure 3-1).

NOTE
If the upper housing assembly was not previously disassembled, proceed to step 11.

1. Slide the disc onto the ball-handle shaft.
2. With the close-wound coils toward the end of the shaft, slide the spring onto the ball-handle shaft.
3. With the bell-shaped end toward the end of the shaft, slide the plunger onto the ball-handle shaft and over the spring.
4. Slide the end of the ball-handle shaft through the top of the lower Hall-Effect housing.
5. Slide the pivot ball onto the ball-handle shaft and align the hole in the shaft (nearest the lower housing) with the hole in the pivot ball.
6. Using a metal punch insert the ¼-inch roll pin through the pivot ball and the ball-handle shaft.
7. With the beveled edge toward the pivot ball, slide the actuator ball onto the end of the ball-handle shaft.
8. Align the hole in the actuator ball with the hole in the end of the ball-handle shaft.

9. Using a metal punch insert the 0.086-inch roll pin through the actuator ball and the ball-handle shaft.

10. Lift the disc, tilt the ball-handle to one side, and apply a small amount of lithium-base grease (part no. 107027-001) to the contact area between the plunger and the upper housing as shown in Figure 3-1.

11. Place the lower Hall-Effect housing over the ball-handle shaft and align the four screw holes in the upper housing with those in the lower housing.

12. With the marked end of the magnet toward the + embossed on the Hall-Effect X-direction slide, insert the magnet into the slide clip.

13. Apply a small amount of lithium-base grease to the two tab pins and the four corners of the X-direction slide as shown in Figure 3-1.

14. Place the X-direction slide on the lower Hall-Effect housing. Make sure the two tab pins are aligned with the housing slots and that the magnet is facing the small □ embossed in the outside edge of the housing.

15. With the marked end of the magnet toward the + embossed on the Hall-Effect Y-direction slide, insert the magnet into the slide clip.

16. Apply a small amount of lithium-base grease to the two tabs and edges of the Y-direction slide and to both sides of the actuator as shown in Figure 3-1.

17. With the magnet facing the small △ embossed on the edge of the lower housing, place the Y-direction slide on top of the X-direction slide.

18. With the beveled hole toward the lower housing, place the actuator over the ball-handle shaft and through the center of the X- and Y-direction slides. Make certain the actuator is inserted through both slides so that the end of the ball-handle shaft is flush with the end of the actuator.

19. Gently place the Hall-Effect positioner plate over the slides so that the magnets and two tabs on the Y-direction slide are aligned with the corresponding slots in the positioner plate. Adjust the positioner plate until the four screw holes are aligned with those in the lower housing.

20. Insert the four 2½-inch self-tapping screws into the four screw holes in the positioner plate.

21. Using a ¼-inch hex driver tighten the four screws to 15 in-lbs ± 2 in-lbs. Check that the ball-handle returns freely to the centered position.

22. Check that the two Hall-Effect sensors on the Hall-Effect PCB are perpendicular to the PCB. Place the PCB on the positioner plate so that the sensors are positioned in front of the two magnets installed in the slides.

23. Using a Phillips screwdriver tighten the two ¼-inch self-tapping screws securing the Hall-Effect PCB to the positioner plate.

Removing the Start Switches

Perform the following procedure to remove the start switches from the control panel (see Figure 4-2).

1. Remove the control panel from the cabinet as described in the Preventive Maintenance section of this chapter.

2. Disconnect the wires from the start switch terminals.

3. Firmly hold the black cone-shaped bushing located on the outside of the control panel and turn the switch housing on the inside of the control panel counterclockwise.

4. Replace the start switches in the reverse order of removal. Refer to Figure 4-2 for the proper wire connections.

Removing the FIRE Switches

Perform the following procedure to remove the FIRE leaf-switch contacts and pushbutton assembly from the control panel (see Figure 4-2).

1. Remove the control panel from the cabinet as described in the Preventive Maintenance section of this chapter.

2. Disconnect the wires from the leaf-switch terminals.

3. Using a Phillips screwdriver remove the screw securing the leaf-switch contacts to the pushbutton assembly.

4. Using a ½-inch open-end wrench remove the stamped nut that secures the pushbutton assembly to the control panel.

5. Replace the leaf-switch contacts and pushbutton assembly in the reverse order of removal.
Lubricate with lithium-base lubricant (part no. 107027-001)

Figure 3.1 Lubricating, Disassembling, and Reassembling the Hall-Effect Joystick
Illustrated Parts Lists

This chapter provides information you need to order parts for your game. Common hardware (screws, nuts, washers, etc.) has been deleted from most of the parts lists. However, a parts list is included for the hardware to mount the printed-circuit boards (PCB) to the cabinet.

The PCB parts lists are arranged in alphabetical order by component. Each component subsection is arranged alphanumerically by reference designator.

Other parts lists are arranged alphanumerically by Atari part number. In these parts lists, 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 201000.

When ordering parts, please give the part number, part name, number of this manual, and serial number of your game. This will aid in filling your order rapidly and correctly. We hope the results will be less downtime and more profit from your game.

The Atari Customer Service numbers are listed on the inside front cover of this manual.

Chapter 4
Figure 4-1 Cabinet-Mounted Assemblies
A042600-xx A
Figure 4-1 Cabinet-Mounted Assemblies, continued

A041600-xx
# Cabinet-Mounted Assemblies

## Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>US-Built Cabinet</strong></td>
</tr>
<tr>
<td>A042601-01</td>
<td>Cabinet Assembly—consists of</td>
</tr>
<tr>
<td>A041606-01</td>
<td>Pedestal Assembly</td>
</tr>
<tr>
<td>A041607-01</td>
<td>Head Assembly</td>
</tr>
<tr>
<td>A042602-01</td>
<td>Body Assembly</td>
</tr>
<tr>
<td></td>
<td><strong>Ireland-Built Cabinet</strong></td>
</tr>
<tr>
<td>A042601-02</td>
<td>Cabinet Assembly—consists of</td>
</tr>
<tr>
<td>A041606-01</td>
<td>Pedestal Assembly</td>
</tr>
<tr>
<td>A041607-01</td>
<td>Head Assembly</td>
</tr>
<tr>
<td>A042602-01</td>
<td>Body Assembly</td>
</tr>
<tr>
<td></td>
<td><strong>US- and Ireland-Built Cabinets</strong></td>
</tr>
<tr>
<td>A038074-07</td>
<td>Switching Power Supply (see service manual TM-261)</td>
</tr>
<tr>
<td>A040586-01</td>
<td>Strain-Relief Power Cord</td>
</tr>
<tr>
<td>A040587-01</td>
<td>Power On/Off Switch, Harness, and Mounting Plate Assembly</td>
</tr>
<tr>
<td>A038099-01</td>
<td>RTI Panel Assembly</td>
</tr>
<tr>
<td>A042606-01</td>
<td>Rear Access Panel Assembly for Pedestal—consists of</td>
</tr>
<tr>
<td>A038888-01</td>
<td>Lock (Acceptable substitute is part no. A038881-03)</td>
</tr>
<tr>
<td>041025-02</td>
<td>Rear Access Panel</td>
</tr>
<tr>
<td>037332-01</td>
<td>Ventilation Grille</td>
</tr>
<tr>
<td>A042625-01</td>
<td>Main Harness</td>
</tr>
<tr>
<td>A042027-01</td>
<td>Power Harness</td>
</tr>
<tr>
<td>78-3201</td>
<td>Adjustable Glide</td>
</tr>
<tr>
<td>78-0300-0102</td>
<td>Vinyl Foam Single-Coated Adhesive Tape 1/4-Inch Wide x 5/8-Inch Thick (36 inches required; used along top and bottom edge of display shield—not shown)</td>
</tr>
</tbody>
</table>

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

- **TM-251**: I, ROBOT Operators Manual with Illustrated Parts Lists
- **SP-251**: I, ROBOT Schematic Package
- **ST-251**: 1, ROBOT Label with SelfTest Procedure and Option Switch Settings
- **TM-160**: Service Manual for 19-Inch Electrohome Display (Display not shown—use with part no. 92-049)
- **TM-210**: Service Manual for 19-Inch Disc-O Display (Display shown in illustration—use with part no. 139003-106)
- **TM-220**: Service Manual for 19-Inch Matsushita Display (Display not shown—use with part no. 159003-1004)
- **006008-04**: Display Shield Extruded Plastic Molding
- **009992-01**: On/Off Switch Cover
- **034556-09**: 1-Inch Thick Foam Pad (located between the Power Supply PCB and the cabinet wall)
- **036130-01**: Lower Speaker Grille
- **038091-01**: Molded Coin Box
- **038070-01**: Coin Box Enclosure (not shown)
- **041550-01**: Left Speaker Grille (metal extrusion)
- **041550-02**: Right Speaker Grille (metal extrusion)
- **041240-01**: Rear Access Panel for Head Assembly
- **041250-01**: Display Shield Lower Retainer
- **041955-01**: Attraction Panel
- **041259-01**: Semi-Rigid Attraction Film with Graphics (not shown)

(continued on next page)
Cabinet-Mounted Assemblies
Parts List, continued

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>041261-01</td>
<td>Video Display Bezel</td>
</tr>
<tr>
<td>041630-02</td>
<td>Rear Access Panel for Body Assembly (includes lock)</td>
</tr>
<tr>
<td>041647-01</td>
<td>Display Shield</td>
</tr>
<tr>
<td>041649-01</td>
<td>Left Corner Extrusion</td>
</tr>
<tr>
<td>041649-02</td>
<td>Right Corner Extrusion</td>
</tr>
<tr>
<td>042008-01</td>
<td>Cover Plate</td>
</tr>
<tr>
<td>148004-002</td>
<td>5-Inch, 4-Ohm, 6-Ounce Shielded High-Fidelity Speaker (located below control panel)</td>
</tr>
<tr>
<td>17063-001</td>
<td>110 V, 60 Hz Exhaust Fan</td>
</tr>
<tr>
<td>178013-001</td>
<td>Spring-Draw Latch (not shown)</td>
</tr>
<tr>
<td>178034-024</td>
<td>¾-Inch Black Plastic T-Molding (21 inches required on front of pedestal base; 168 inches required on the side panels of the head assembly; 104 inches required on the side panels of the body assembly; 94 inches required on the front panel of the body assembly)</td>
</tr>
<tr>
<td>178093-001</td>
<td>Guard for Fan Blade</td>
</tr>
<tr>
<td>179125-001</td>
<td>Grounding Clip on Main Harness (not shown)</td>
</tr>
</tbody>
</table>
Figure 4-2 Control Panel Assembly
A042603-01

WARNING
Players may receive an electrical shock if this control panel is not properly grounded! After servicing any parts on the panel, make sure that the grounding clip is secured to the metal tab on the inside of the control panel.
### Figure 4-2 Control Panel Assembly, continued

#### Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A040935-01</td>
<td>Hall-Effect Joystick Assembly</td>
</tr>
<tr>
<td>A042620-01</td>
<td>Control Harness Assembly</td>
</tr>
<tr>
<td>033127-01</td>
<td>Black Molded Switch Bezel</td>
</tr>
<tr>
<td>042582-01</td>
<td>Formed Control Panel</td>
</tr>
<tr>
<td>042609-01</td>
<td>Formed Panel Plate</td>
</tr>
<tr>
<td>042610-01</td>
<td>Adjustable Mounting Bracket</td>
</tr>
<tr>
<td>042613-01</td>
<td>Player-Option Decal</td>
</tr>
<tr>
<td>042614-01</td>
<td>Left Decal</td>
</tr>
<tr>
<td>042614-02</td>
<td>Right Decal</td>
</tr>
<tr>
<td>042615-01</td>
<td>Center Decal</td>
</tr>
<tr>
<td>160013-001</td>
<td>Leaf Switch with Button Holder</td>
</tr>
<tr>
<td>178030-003</td>
<td>Black Pushbutton Assembly</td>
</tr>
<tr>
<td>179125-001</td>
<td>Grounding Clip</td>
</tr>
<tr>
<td>62-039</td>
<td>SPDT Momentary Pushbutton Start Switch with Red LED</td>
</tr>
<tr>
<td>72-1012F</td>
<td>#10-32 x 3/4-Inch Cross-Recessed Machine Screw</td>
</tr>
<tr>
<td>75-010S</td>
<td>#10 Flat Washer</td>
</tr>
<tr>
<td>75-0405</td>
<td>#10 Split-Lock Washer</td>
</tr>
<tr>
<td>75-9418</td>
<td>#10-24 HCS Locknut</td>
</tr>
<tr>
<td>75-512B</td>
<td>#10-24 x 3/4-Inch Black Carriage Bolt</td>
</tr>
<tr>
<td>75-9910N0</td>
<td>3/8-Inch x 11 Stamped Nut</td>
</tr>
<tr>
<td>75-9910W0</td>
<td>3/16-32 Stamped Nut</td>
</tr>
</tbody>
</table>
Figure 4-3  Hall-Effect Joystick Assembly
A040935-01  A
# Hall-Effect Joystick Assembly
## Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A040341-01</td>
<td>Hall-Effect Printed Circuit Board</td>
</tr>
<tr>
<td>A040932-01</td>
<td>Upper Housing Joystick Assembly—includes</td>
</tr>
<tr>
<td>039712-01</td>
<td>Plunger</td>
</tr>
<tr>
<td>039713-01</td>
<td>Disc</td>
</tr>
<tr>
<td>039716-01</td>
<td>Pivot Ball</td>
</tr>
<tr>
<td>039722-01</td>
<td>Upper Housing</td>
</tr>
<tr>
<td>040304-01</td>
<td>Joystick Ball Handle</td>
</tr>
<tr>
<td>040693-01</td>
<td>Actuator Ball</td>
</tr>
<tr>
<td>040705-01</td>
<td>Compression Plunger Spring</td>
</tr>
<tr>
<td>73-20509</td>
<td>0.086 × 3/32-Inch Roll Pin</td>
</tr>
<tr>
<td>73-20814</td>
<td>3/32 × 3/32-Inch Roll Pin</td>
</tr>
<tr>
<td>039711.xx</td>
<td>Positioner Hall-Effect Plate</td>
</tr>
<tr>
<td>039715-01</td>
<td>Actuator</td>
</tr>
<tr>
<td>039718-01</td>
<td>Y-Direction Slide</td>
</tr>
<tr>
<td>039720-01</td>
<td>X-Direction Slide</td>
</tr>
<tr>
<td>039721-01</td>
<td>Lower Microswitch Housing</td>
</tr>
<tr>
<td>041283-01</td>
<td>0.125 × 0.625 Magnet</td>
</tr>
<tr>
<td>176002-140</td>
<td>#8-16 × 2 3/8-Inch Hex Head Self-Tapping Screw</td>
</tr>
<tr>
<td>176030-140</td>
<td>#4-20 × 3/4-Inch Pan Head Self-Tapping Screw</td>
</tr>
</tbody>
</table>
### Part No.
### Description

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A002465-01</td>
<td>6 V Coin Counter</td>
</tr>
<tr>
<td>A038004-01</td>
<td>Utility Panel Harness</td>
</tr>
<tr>
<td>19-9032</td>
<td>Volume Control</td>
</tr>
<tr>
<td>62-041</td>
<td>SPDT Momentary-Contact Pushbutton Auxiliary Coin Switch with Black Cap</td>
</tr>
<tr>
<td>60-001</td>
<td>EFR3C Self Test Switch</td>
</tr>
<tr>
<td>75-916S</td>
<td>#6-32 Hexagon Machine Nut</td>
</tr>
<tr>
<td>75-9910W0</td>
<td>1/4-32 Stamped Nut</td>
</tr>
<tr>
<td>038003-01</td>
<td>Utility Panel</td>
</tr>
<tr>
<td>176018-002</td>
<td>#6-32 x 1/2-Inch Thread Forming Pan-Head Screw</td>
</tr>
<tr>
<td>178070-001</td>
<td>Volume Control Knob</td>
</tr>
<tr>
<td>179125-001</td>
<td>Grounding Clip</td>
</tr>
</tbody>
</table>

**NOTE**

Only the Ireland-Bilt cabinet has two coin counters.

**WARNING**

Before removing or repairing the utility panel, turn the game off. Players may receive an electrical shock if the utility panel is not properly grounded. After servicing any parts on the panel, make sure that the ground wire is firmly attached to the back of the coin counter.

**Figure 4-4 Utility Panel Assembly**

A038002-01 H

Parts List
### Figure 4-5  Fluorescent Tube and Speaker Assembly

**A041320-01  A**

**Parts List**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A005493-01</td>
<td>Fluorescent Tube Harness Assembly</td>
</tr>
<tr>
<td>A037540-01</td>
<td>Ground Wire with Grounding Clip</td>
</tr>
<tr>
<td>A041342-01</td>
<td>Speaker Harness Assembly</td>
</tr>
<tr>
<td>70-304</td>
<td>38-Inch, 15-Watt, Cool White Fluorescent Tube</td>
</tr>
<tr>
<td>79-561816P</td>
<td>Spring-Connector Wire Nut for 16- to 18-Gauge Wires</td>
</tr>
<tr>
<td>99-11003</td>
<td>Fluorescent Tube Starter</td>
</tr>
<tr>
<td>99-11006</td>
<td>Fluorescent Tube Locking Tab (consists of two pieces)</td>
</tr>
<tr>
<td>99-11009</td>
<td>Starter Socket</td>
</tr>
<tr>
<td>037469-01</td>
<td>Steel Tube Bracket</td>
</tr>
<tr>
<td>041241-02</td>
<td>Wood Mounting Panel</td>
</tr>
<tr>
<td>041252-01</td>
<td>Speaker Mounting Grille/Bracket</td>
</tr>
<tr>
<td>041325-01</td>
<td>Ballast Shield</td>
</tr>
<tr>
<td>142028-001</td>
<td>60 Hz, 118 V Ballast Transformer</td>
</tr>
<tr>
<td>148006-002</td>
<td>5-Inch Diameter, 5 W, 4 Ohm, Shielded Speaker</td>
</tr>
<tr>
<td>179035-001</td>
<td>2-Pin Fluorescent Tube Holder</td>
</tr>
<tr>
<td>179125-001</td>
<td>Grounding Clip (Acceptable substitute is part no. 179174-010)</td>
</tr>
</tbody>
</table>

**NOTE**
To ensure that the fluorescent tube starts, make sure the ground wire is firmly attached to both the ballast transformer and the steel tube bracket.
Figure 4-6  Coin Controls, Inc. Coin Door Assembly

171034-xxx  A
Figure 4-6 Coin Controls, Inc. Coin Door Assembly, continued
171034-xxx A
# Coin Controls, Inc. Coin Door Assembly
## Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A03597-01</td>
<td>Harness Assembly (Ireland-built cabinet only)</td>
</tr>
<tr>
<td>A037542-01</td>
<td>Harness Assembly</td>
</tr>
<tr>
<td>72-14140</td>
<td>#4-40 x $\frac{3}{4}$ Inch Cross-Recessed Pan-Head Steel Machine Screw</td>
</tr>
<tr>
<td>75-656</td>
<td>#6 Internal-Both Zinc-Plated Steel Lock Washer</td>
</tr>
<tr>
<td>75-9145</td>
<td>#4-40 Steel Machine Hex Nut</td>
</tr>
<tr>
<td>75-37140</td>
<td>#4-40 x $\frac{3}{8}$ Inch #2 Zinc Electrode Plated Cross-Recessed Flat-Head Machine Screw</td>
</tr>
<tr>
<td>99-15001</td>
<td>Coin Return Button with U.S. 25-Cent Price Plate</td>
</tr>
<tr>
<td>99-15002</td>
<td>Coin Return Button with U.S. $1 Price Plate</td>
</tr>
<tr>
<td>99-15003</td>
<td>Coin Return Button with German 2 DM Price Plate</td>
</tr>
<tr>
<td>99-15004</td>
<td>Coin Return Button with German 5 DM Price Plate</td>
</tr>
<tr>
<td>99-15005</td>
<td>Coin Return Button with German 10 DM Price Plate</td>
</tr>
<tr>
<td>99-15006</td>
<td>Coin Return Button with Belgian 5 Fr Price Plate</td>
</tr>
<tr>
<td>99-15007</td>
<td>Coin Return Button with French 1 Fr Price Plate</td>
</tr>
<tr>
<td>99-15008</td>
<td>Coin Return Button with Japanese 100 Yen Price Plate</td>
</tr>
<tr>
<td>99-15009</td>
<td>Coin Return Button with British 10 Pence Price Plate</td>
</tr>
<tr>
<td>99-15010</td>
<td>Coin Return Button with Australian 20-Cent Price Plate</td>
</tr>
<tr>
<td>99-15011</td>
<td>Coin Return Button with Italian 100 Lire Price Plate</td>
</tr>
<tr>
<td>99-15025</td>
<td>Left Half of Coin Inlet</td>
</tr>
<tr>
<td>99-15026</td>
<td>Right Half of Coin Inlet</td>
</tr>
<tr>
<td>99-15027</td>
<td>Side Plate of Coin Return Box</td>
</tr>
<tr>
<td>99-15028</td>
<td>Base Plate of Coin Return Box</td>
</tr>
<tr>
<td>99-15029</td>
<td>Switch Bracket</td>
</tr>
<tr>
<td>99-15036</td>
<td>Metal Coin Return Cover</td>
</tr>
<tr>
<td>99-15038</td>
<td>Bezel for Coin Return Button</td>
</tr>
<tr>
<td>99-15059</td>
<td>Bezel  for Coin Return Button</td>
</tr>
<tr>
<td>99-15042</td>
<td>Coin Switch for U.S. 25 Cents</td>
</tr>
<tr>
<td>99-15052</td>
<td>Spring for Coin Return Button</td>
</tr>
<tr>
<td>99-15055</td>
<td>Retaining Screw</td>
</tr>
<tr>
<td>99-15056</td>
<td>#4-40 x $\frac{3}{8}$ Inch Cross-Recessed Pan-Head Steel Machine Screw</td>
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<tr>
<td>99-15060</td>
<td>Switch Cover</td>
</tr>
<tr>
<td>99-15063</td>
<td>Screw for Hinge</td>
</tr>
<tr>
<td>99-15066</td>
<td>Screw for Clamp</td>
</tr>
<tr>
<td>99-15067</td>
<td>Lock Assembly</td>
</tr>
<tr>
<td>99-15070</td>
<td>Doors and Frame</td>
</tr>
<tr>
<td>99-15071</td>
<td>Clamp for Frame</td>
</tr>
<tr>
<td>99-15072</td>
<td>Door Frame</td>
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<tr>
<td>99-15075</td>
<td>Upper Door</td>
</tr>
<tr>
<td>99-15074</td>
<td>Lower Door</td>
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<td>99-15075</td>
<td>Switch Adjuster</td>
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<tr>
<td>99-15083</td>
<td>Base Plate—includes:</td>
</tr>
<tr>
<td>99-15040</td>
<td>Lever</td>
</tr>
<tr>
<td>99-15074</td>
<td>Pivot for Lever</td>
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<tr>
<td>03809-01</td>
<td>Coin Box—not included in assembly (Acceptable substitute is part no. A037491-01)</td>
</tr>
<tr>
<td>170000-001</td>
<td>6 V Miniature Wedge-Base Incandescent Lamp</td>
</tr>
<tr>
<td>1110005-005</td>
<td>Metal Coin Reel Assembly</td>
</tr>
<tr>
<td>171050-001</td>
<td>Dual Entry Face Plate</td>
</tr>
<tr>
<td>179044-001</td>
<td>Lamp Base</td>
</tr>
</tbody>
</table>
Figure 4-7 Coin Acceptors, Inc. Coin Door Assembly
171027-001 A
Figure 4-7 Coin Acceptors, Inc. Coin Door Assembly, continued
# Coin Acceptors, Inc. Coin Door Assembly Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>65-441C</td>
<td>Coin Switch</td>
</tr>
<tr>
<td>70-11-47</td>
<td>Miniature Bayonet Lamp</td>
</tr>
<tr>
<td>72-94066</td>
<td>#4-40 x 3/8-Inch Truss-Head Screw</td>
</tr>
<tr>
<td>72-HA1404C</td>
<td>#4-40 x 3/4-Inch Pan-Head Screw</td>
</tr>
<tr>
<td>72-JA1405B</td>
<td>#4-40 x 3/8-Inch Pan-Head Screw</td>
</tr>
<tr>
<td>75-1412S</td>
<td>#4-40 x 3/4-Inch Pan-Head Screw</td>
</tr>
<tr>
<td>73-2445</td>
<td>#4-40 Locknut</td>
</tr>
<tr>
<td>99-10008</td>
<td>Retainer</td>
</tr>
<tr>
<td>99-10042</td>
<td>Coin Switch Assembly for Belgian 5 Fr and U.S. $.25</td>
</tr>
<tr>
<td>99-10043</td>
<td>Coin Switch Assembly for German 1 DM, Japanese 100 Yen, Swiss 1 Fr</td>
</tr>
<tr>
<td>99-10044</td>
<td>Coin Switch Assembly for German 2 DM, Italian 100 L, U.S. $1.00</td>
</tr>
<tr>
<td>99-10045</td>
<td>Coin Switch Assembly for Australian $.20, German 5 DM, British 10 P</td>
</tr>
<tr>
<td>99-10068</td>
<td>Coin Return Chute</td>
</tr>
<tr>
<td>99-10073</td>
<td>Switch Wire (included in coin switch assembly 99-10043)</td>
</tr>
<tr>
<td>99-10076</td>
<td>Switch Wire (included in coin switch assembly 99-10042)</td>
</tr>
<tr>
<td>99-10077</td>
<td>Switch Wire (included in coin switch assembly 99-10044)</td>
</tr>
<tr>
<td>99-10078</td>
<td>Switch Wire (included in coin switch assembly 99-10045)</td>
</tr>
<tr>
<td>99-10080</td>
<td>Lamp Socket</td>
</tr>
<tr>
<td>99-10081</td>
<td>Key Holder</td>
</tr>
<tr>
<td>99-10096</td>
<td>Fastener</td>
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<td>99-10104</td>
<td>Bar retainer</td>
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<tr>
<td>99-10105</td>
<td>Bar</td>
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<tr>
<td>99-10115</td>
<td>Spring</td>
</tr>
<tr>
<td>99-10116</td>
<td>Plastic Coin Return Lever</td>
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<tr>
<td>99-10117</td>
<td>Steel Coin Return Door</td>
</tr>
<tr>
<td>99-10118</td>
<td>Amber Coin Return Button</td>
</tr>
<tr>
<td>99-10119</td>
<td>Amber Coin Button for U.S. $.25</td>
</tr>
<tr>
<td>99-10144</td>
<td>Coin Button Cover</td>
</tr>
<tr>
<td>99-10139</td>
<td>Coin Door</td>
</tr>
<tr>
<td>99-10140</td>
<td>Coin Door Inner-Panel Assembly</td>
</tr>
<tr>
<td>99-10141</td>
<td>Die-Cast Coin Return Cover</td>
</tr>
<tr>
<td>99-10142</td>
<td>DIE-Cast Button Housing</td>
</tr>
<tr>
<td>99-10143</td>
<td>Coin Door Frame</td>
</tr>
<tr>
<td>99-10144</td>
<td>Channel Clip</td>
</tr>
<tr>
<td>99-10145</td>
<td>Cam</td>
</tr>
<tr>
<td>99-10147</td>
<td>Harness</td>
</tr>
<tr>
<td>99-10148</td>
<td>Lock Assembly</td>
</tr>
<tr>
<td>99-10149</td>
<td>Service Door</td>
</tr>
<tr>
<td>99-10150</td>
<td>Switch Cover</td>
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<tr>
<td>99-10151</td>
<td>Left Coin Inlet</td>
</tr>
<tr>
<td>99-10152</td>
<td>Right Coin Inlet</td>
</tr>
<tr>
<td>99-10153</td>
<td>Coin Return Box</td>
</tr>
<tr>
<td>99-10154</td>
<td>Bracket Assembly</td>
</tr>
<tr>
<td>99-15006</td>
<td>Screw for Clamp</td>
</tr>
<tr>
<td>038091-01</td>
<td>Coin Box</td>
</tr>
<tr>
<td>111004055</td>
<td>Metal Coin Mechanism for U.S. $.25</td>
</tr>
<tr>
<td>177010-238</td>
<td>#8-32 Hex Locknut</td>
</tr>
</tbody>
</table>
NOTE
For US-built games, the FCC requires that the game printed-circuit boards be housed in the EMI cage with the EMI Shield PCB attached.

Figure 4-8 Printed-Circuit Board Mounting Hardware (US & Ireland)
### Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A042561-02</td>
<td>EMI Cage Assembly</td>
</tr>
<tr>
<td>A042562-01</td>
<td>EMI Shield and Dual Printed-Circuit Board Assembly</td>
</tr>
<tr>
<td>A037667-02</td>
<td>EMI Shield Printed-Circuit Board Assembly</td>
</tr>
<tr>
<td>179125-001</td>
<td>Grounding Clip</td>
</tr>
<tr>
<td>178045-442</td>
<td>Snap-In Fastener</td>
</tr>
<tr>
<td>179044-242</td>
<td>Groundnut</td>
</tr>
<tr>
<td>175000-221</td>
<td>Plastic Washer</td>
</tr>
<tr>
<td>037873-01</td>
<td>Printed-Circuit Board Spacer</td>
</tr>
<tr>
<td>72-1604F</td>
<td>#6-32 x 1/4-Inch Cross-Recessed Steel Screw</td>
</tr>
<tr>
<td>72-1404F</td>
<td>#4-40 x 1/4-Inch Cross-Recessed Steel Screw</td>
</tr>
<tr>
<td>175005-706</td>
<td>#6 Fiber Washer</td>
</tr>
<tr>
<td>74-5008NN</td>
<td>#6 x 1/2-Inch Spacer</td>
</tr>
<tr>
<td>75-99516</td>
<td>#6-32 Nut/Washer Assembly</td>
</tr>
<tr>
<td>72-1620S</td>
<td>#6-32 x 1/4-Inch Cross-Recessed Pan-Head Steel Screw</td>
</tr>
<tr>
<td>041646-01</td>
<td>Printed-Circuit Board Mounting Bracket</td>
</tr>
<tr>
<td>034536-02</td>
<td>1/2-Inch Foam Pad</td>
</tr>
</tbody>
</table>

#### US-Built Games

- A042561-02
- A042562-01
- A037667-02
- 179125-001
- 178045-442
- 179044-242
- 175000-221
- 037873-01
- 72-1604F
- 72-1404F
- 175005-706
- 74-5008NN
- 75-99516
- 72-1620S
- 041646-01
- 034536-02

#### Ireland-Built Games

- #6 Fiber Washer
- #6 x 1/2-Inch Spacer
- #6-32 Nut/Washer Assembly
- #6-32 x 1/4-Inch Cross-Recessed Pan-Head Steel Screw
- Printed-Circuit Board Mounting Bracket
- 1/2-Inch Foam Pad

#### US- and Ireland-Built Games

- A042565-21
- A039568-21
- A039871-01
- A038074-07
- 176015-112
- 175004-708
- 034536-09

---

Figure 4-8 Printed-Circuit Board Mounting Hardware (Ireland), continued
Figure 4-9  I, ROBOT CPU PCB Assembly
A039568-21  A
Figure 4-9 I, ROBOT CPU PCB Assembly, continued
Λ039568 21 A
# I. ROBOT CPU PCB Assembly

## Parts List

<table>
<thead>
<tr>
<th>Designator</th>
<th>Description</th>
<th>Part No.</th>
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<td><strong>Capacitors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>0.1 µF, 25 V, Ceramic Capacitor</td>
<td>122006-104</td>
</tr>
<tr>
<td>C2</td>
<td>0.01 µF, 25 V, Ceramic Capacitor</td>
<td>122009-109</td>
</tr>
<tr>
<td>C3–C7</td>
<td>0.1 µF, 25 V, Ceramic Capacitor</td>
<td>122006-104</td>
</tr>
<tr>
<td>C8, C9</td>
<td>0.22 µF, 25 V, Ceramic Capacitor</td>
<td>122006-224</td>
</tr>
<tr>
<td>C10–C20</td>
<td>0.1 µF, 25 V, Ceramic Capacitor</td>
<td>122006-104</td>
</tr>
<tr>
<td>C31</td>
<td>0.47 µF, 50 V, Electrolytic Capacitor</td>
<td>122006-224</td>
</tr>
<tr>
<td>C32, C33</td>
<td>100 µF, 50 V, Electrolytic Capacitor</td>
<td>124001-107</td>
</tr>
<tr>
<td>C34–C109</td>
<td>0.1 µF, 25 V, Ceramic Capacitor</td>
<td>122006-104</td>
</tr>
<tr>
<td><strong>Diodes</strong></td>
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<tr>
<td>CR1</td>
<td>Type-IN758 Diode</td>
<td>32-IN758</td>
</tr>
<tr>
<td>CR2</td>
<td>Type-MV5053 Diode</td>
<td>38-MV5053</td>
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<td><strong>Electronically Programmable Read-Only Memories</strong></td>
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<tr>
<td>1A</td>
<td>Type-27128-4 EPROM Integrated Circuit</td>
<td>135629-105</td>
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<tr>
<td>1B</td>
<td>Type-27128-4 EPROM Integrated Circuit</td>
<td>135629-109</td>
</tr>
<tr>
<td>1C/D</td>
<td>Type-27128-4 EPROM Integrated Circuit</td>
<td>135629-107</td>
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<td>1D/E</td>
<td>Type-2764-4 EPROM Integrated Circuit</td>
<td>135629-108</td>
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<td>1E/F</td>
<td>Type-27120-4 EPROM Integrated Circuit</td>
<td>135629-109</td>
</tr>
<tr>
<td>1F/K</td>
<td>Type-2764-2 EPROM Integrated Circuit</td>
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I, ROBOT CPU PCB Assembly
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### I, ROBOT CPU PCB Assembly
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**Programmable Read-Only Memories (PROM)**

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**Read-Only Memories (ROM)**

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### Resistors

### Sockets

- IN, IP: 24-Pin Medium Insertion-Force Socket
- 2A, 2D: 24-Pin Medium Insertion-Force Socket
- 3A, 3B: 24-Pin Medium Insertion-Force Socket
- 2N, 2P: 24-Pin Medium Insertion-Force Socket

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#### Transistors

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Figure 4-10  I, ROBOT Video PCB Assembly, continued
A042603-21  A
# I. ROBOT Video PCB Assembly
## Parts List

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### Illustrated Parts Lists

#### I, ROBOT Video PCB Assembly

**Parts List, continued**

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#### Read-Only and Random-Access Memories

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#### Transistors

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<td>100 Ω, ±5%, 1/4 W Resistor</td>
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<td>220 Ω, ±5%, 1/4 W Resistor</td>
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<td>1 kΩ, ±5%, 1/4 W Resistor</td>
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<td>R60-R62</td>
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<td>R67-R69</td>
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<td>R70</td>
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**Resistors**

**Decoupling Capacitors**

**Inductors**

**Miscellaneous**

L1-L3 1 μH Inductor | 141007-001
Y1 20 MHz Crystal | 144000-003
Figure 4-11 EMI Shield PCB Assembly
A037667-02  B
### FMI Shield PCB Assembly

#### Parts List

<table>
<thead>
<tr>
<th>Designator</th>
<th>Description</th>
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<td>P20</td>
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