CRYSTAL CASTLES™

Switch Locations

Auxiliary Coin Switch

Coin Counter

Self-Test Switch

Volume Control
To increase, turn clockwise.

Game PCB

R8 OFF
4-1
ON

Switch Locations

Setting the Coin Counter Switch

The illustration above shows the location of the dual-inline-package (DIP) switch on the game printed-circuit board (PCB). Toggle 1 of this switch is the only switch that is used. When set to the ON position, the left and right coin counter outputs of the game PCB are paralleled together. Therefore, any coin received from the right or left coin inputs will be counted on one counter connected to either the left or right coin-counter output. The US-built games have one coin counter. Therefore, on US-built games, toggle 1 of the switch should be set to ON.

When toggle 1 is set to OFF, a second coin counter must be connected to the unconnected coin counter output. For Ireland-built games, the second coin counter is standard. Therefore, on Ireland-built games, toggle 1 of the switch should be set to OFF.

Self-Test

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.

Table 1 RAM Failure Tone Sequence

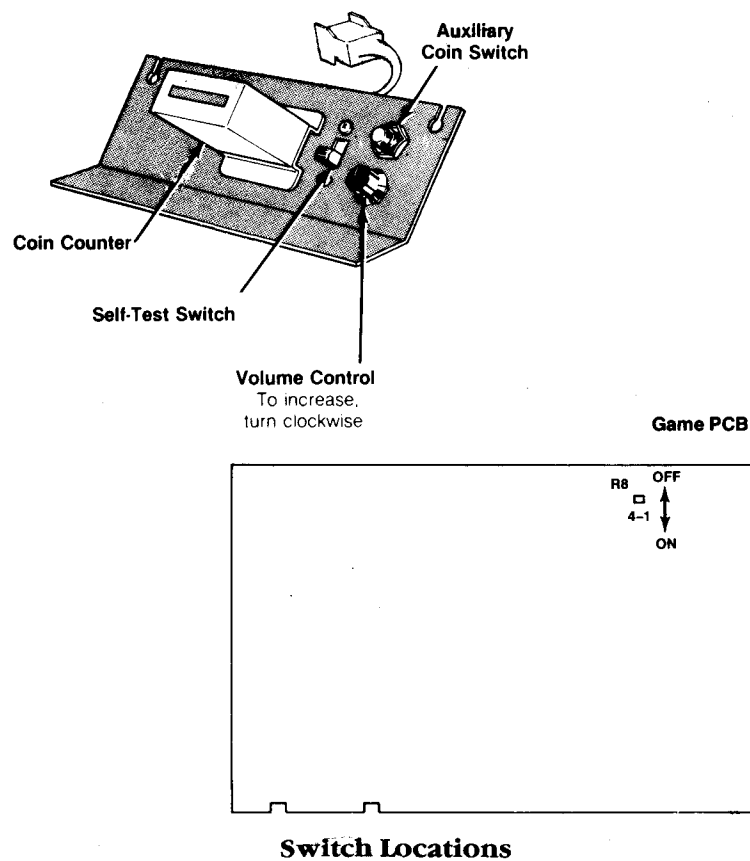|			Tone Sequence				
1	2	3	4	5	6	7	PCB Location
High	Low	Low	Low	Low	Low	Low	RAM at 4E
High	High	Low	Low	Low	Low	Low	RAM at 4F
High	High	High	Low	Low	Low	Low	RAM at 4H
High	High	High	High	Low	Low	Low	RAM at 4J
High	High	High	High	High	Low	Low	RAM at 6B
High	High	High	High	High	High	Low	RAM at 6D

Entering Self-Test

To enter the self-test mode, set the self-test switch on the utility panel to the ON (up) position. The game tests the custom Input/Output (I/O) integrated circuits (ICs), the random-access memory (RAM), the bit-mode circuitry, the electronically erasable read-only memory (EEROM), and the read-only memory (ROM). Figure 1 shows the resulting video display if these tests pass. The custom I/O test is the only test not shown on the video display. If this test passes, you will hear sounds that range from a low frequency to a high frequency.
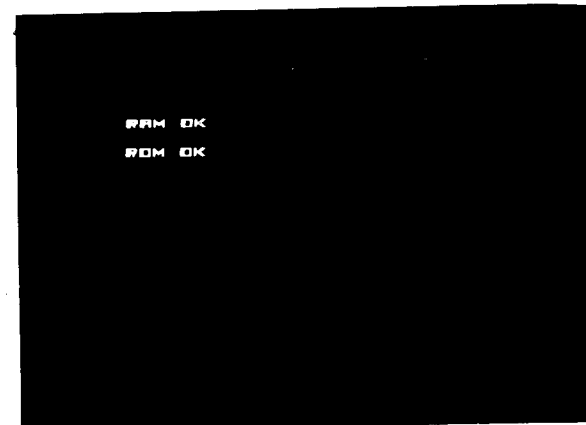
RAM OK
ROM OK

Figure 1 Test Passes Video Display

If the RAM fails, a sequence of seven "beep" sounds will be emitted from the game speakers, followed by a pause, then the sounds will be repeated. Table 1 identifies the failing RAM for the emitted sounds. In this table, the "High" indicates high tones from the game speaker and the "Low" indicates low tones.

If the bit-mode circuitry fails, a sequence of "beep" sounds will be emitted as follows: High, low, high, low, low, low, low.

If the EEROM fails, the video display will identify the failed IC as shown in Figure 2. The display will indicate a failed IC at either location 4A or 4B.
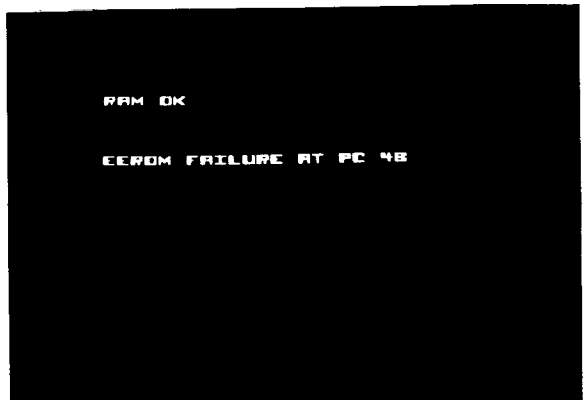
RAM OK

EEROM FAILURE AT PC 4B

Figure 2 EEROM Failure Video Display

If a ROM fails, the video display will be as shown in Figure 3. In this figure, integrated circuit 1L has failed. The correct checksums are as follows: checksum 01 for 1K, 02 for 1L, 03 for 1N, 04 for 1H, and 05 for 1F. Checksums of any other value indicate a failure for that IC.
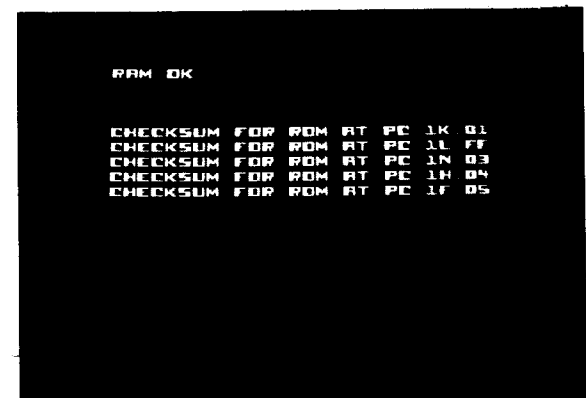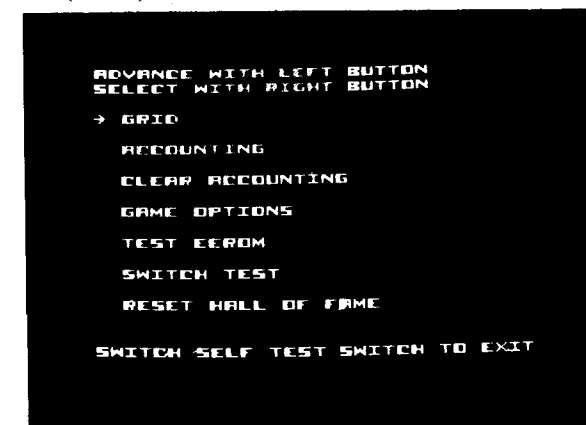
RAM OK

CHECKSUM FOR ROM AT PC 1K 01
CHECKSUM FOR ROM AT PC 1L FF
CHECKSUM FOR ROM AT PC 1N 03
CHECKSUM FOR ROM AT PC 1H 04
CHECKSUM FOR ROM AT PC 1F 05

Figure 3 ROM Failure Video Display

Self-Test Main Menu

If all initial self-tests pass, the main menu will be displayed as shown in Figure 4. This menu allows you to select from seven different items. As indicated at the bottom of the display, set the self-test switch to off (down) to exit from self-test.

ADVANCE WITH LEFT BUTTON
SELECT WITH RIGHT BUTTON
→ GRID
ACCOUNTING
CLEAR ACCOUNTING
GAME OPTIONS
TEST EEROM
SWITCH TEST
RESET HALL OF FAME

SWITCH SELF TEST SWITCH TO EXIT

Figure 4 Self-Test Main Menu Video Display

Grid Display

The grid display shown in Figure 5 is used for adjusting the video display. When properly adjusted, the grid should be white on a black background. The corners of the grid should just barely go off the corners of the display.
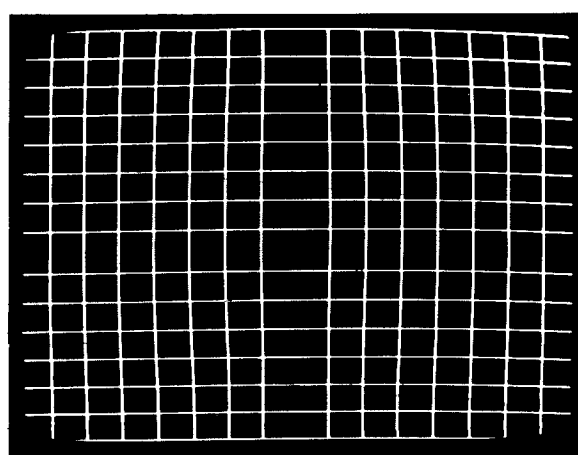
Figure 5 Grid Video Display

Accounting Display

The accounting display shown in Figure 6 is used for displaying historical information about the game. The photograph shown in Figure 6 was taken of an engineering prototype game. Therefore, in our example, no coins are shown for the left mechanism and only two coins for the right mechanism; but 46 coin credits are shown for the auxiliary coin switch. Ordinarily, the coin information is never cleared unless the EEROM are changed or damaged. Thus, this information may be compared with the information from the mechanical coin counter(s) for determining the accuracy of the mechanical coin counters.

The most important information shown on the accounting display is the average game time. This time should be *between 2 and 3 minutes*. The display in Figure 6 is a good example of optimum game time. A histogram of game time is shown at the bottom of the screen.
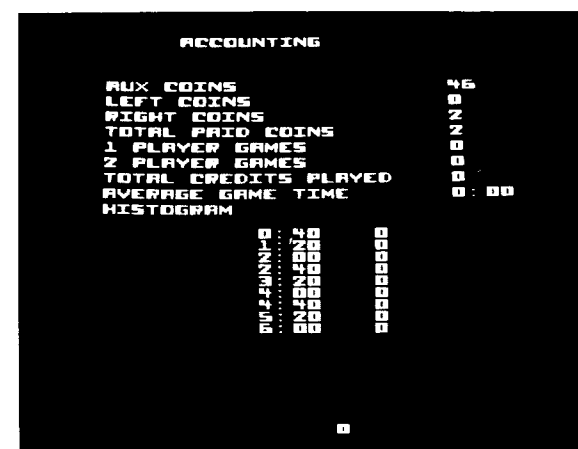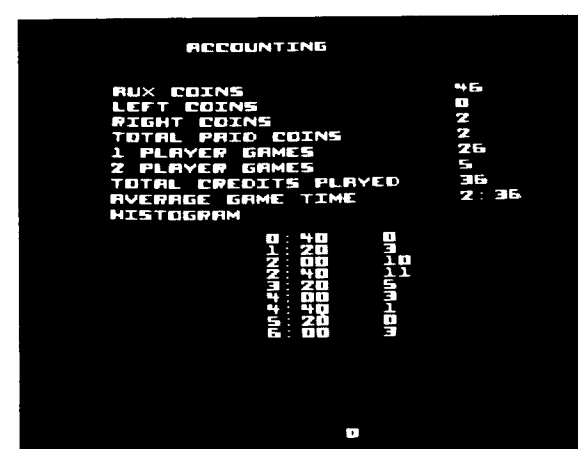
ACCOUNTING

AUX COINS   46
LEFT COINS   0
RIGHT COINS   2
TOTAL PAID COINS   2
1 PLAYER GAMES   2
2 PLAYER GAMES   0
TOTAL CREDITS PLAYED 0
AVERAGE GAME TIME   0:00
HISTOGRAM

Figure 6 Accounting Video Display

Clear Accounting Display

The clear accounting video display is shown in Figure 7. Note that the coin information is never cleared.

ACCOUNTING

AUX COINS   46
LEFT COINS   0
RIGHT COINS   2
TOTAL PAID COINS   2
1 PLAYER GAMES   26
2 PLAYER GAMES   5
TOTAL CREDITS PLAYED 36
AVERAGE GAME TIME   2:36
HISTOGRAM

Figure 7 Clear Accounting Video Display

Game Options Menu

The manufacturer's recommended game options are shown in Figure 8. To move the arrow that points to each selectable option, press the left JUMP button. To change the option, press the right JUMP button. All available options are as follows:

COIN VALUE. The coin-value option determines the number of coins entering the left or right coin mechanisms, required to play one game. The values available are ½, 1, or 2. For game demonstrations, the FREE PLAY option is also available.

LEFT MECH VALUE. The available left mechanism values are 1 or 2. The chosen value multiplies the coins received in this mechanism by that value. When set to 1, a coin dropped into the left coin mechanism of the coin door has the value of 1 coin. When set to 2, a coin dropped into this mechanism has the value of 2.

RIGHT MECH VALUE. The available right mechanism values are 1, 4, 5, or 6. The chosen value multiplies the coins received in this mechanism by that value. This option makes it possible to receive coins with a higher denomination than the left mechanism.

GAME DIFFICULTY. This option allows you to increase or decrease the difficulty of the game, thus increasing or decreasing the average game time. When used with the accounting display, you may tune the game for the optimum game time of 2 minutes and 30 seconds by setting this option to EASY, MEDIUM, HARD, or HARDEST.

STARTING LIVES. This option allows you to increase the number of lives per game from 3 to 5. The available options are 3, 4, and 5. Using this option along with the accounting display will allow you to tune the game for an optimum average game time of 2 minutes and 30 seconds.

EXTRA LIVES. This option allows you to award bonus lives for every 70,000 points scored. The available options are YES and NO. Using this option along with the accounting display will allow you to tune the game for the optimum average game time of 2 minutes and 30 seconds.

RESTORE FACTORY OPTIONS. This option allows you to restore the options to those retained in the game program memory. These factory-recommended options are shown in Figure 8.

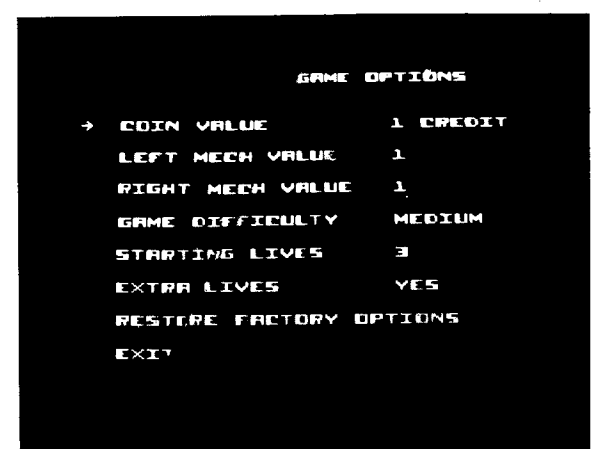**EXIT.** This is not an option, but the way back to the main menu.

GAME OPTIONS

→ COIN VALUE   1 CREDIT
LEFT MECH VALUE   1
RIGHT MECH VALUE   1
GAME DIFFICULTY   MEDIUM
STARTING LIVES   3
EXTRA LIVES   YES
RESTORE FACTORY OPTIONS
EXIT

Figure 8 Game Options Video Display

Test EEROM Display

If the EEROM test passes, the results of the test are shown in Figure 9. If either EEROM integrated circuit 4A or 4B fails, the failed IC will be displayed as shown in Figure 2. However, the message RAM OK will not be displayed.

TEST OK

Figure 9 EEROM Test OK Video Display

Switch Test Display

In the switch test, the left, right, and auxiliary coin switches; the left and right JUMP switches; and the Midi Trak-Ball are tested. When each switch is activated, the location of that switch appears on the display. In Figure 10 all switches are activated. When the left JUMP switch is pressed, the motion-object pictures change from one group to another. When the right JUMP switch is pressed, the motion-object pictures change within that group of pictures.

The Midi Trak-Ball is tested by rotating the ball vertically and horizontally. The hexadecimal number by the words HOR and VERT increase from 00 through FF, or decrease from FF through 00, as the ball is rotated. Likewise, the numbers beside the words GREEN and BLUE increase from 0 to 7. The GREEN numbers increase or decrease with a horizontal motion of the Midi Trak-Ball. The BLUE numbers increase or decrease with a vertical movement of the control. Also, the colors of the color bar at the bottom of the display change shades of green when the ball is rotated horizontally and shades of blue when moved vertically.
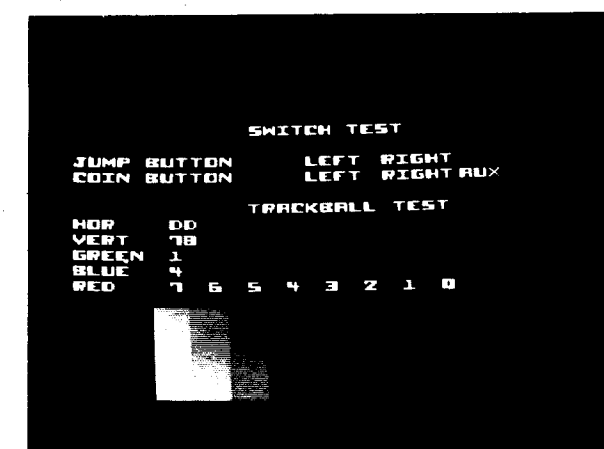
SWITCH TEST

JUMP BUTTON   LEFT RIGHT
COIN BUTTON   LEFT RIGHT AUX

HOR   00   TRACKBALL TEST
VERT 78
GREEN 1
BLUE 4
RED   7 6 5 4 3 2 1 0

Figure 10 Switch Test Video Display

Reset Hall-of-Fame

When you select this from the main menu, the entire hall-of-fame table is reset to initials and scores that are within the program memory. The scores in this table range from 27,000 to 30,000 points. We suggest you reset these after any changes are made to the options that may affect the average game time.

Important Note to Operators

If the operators manual was not included in this game when you unpacked it, contact your distributor to get a free copy. All Atari manuals for coin-operated games also include complete illustrated parts lists.

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