

**Conversion Instructions  
for  
Missile Command™  
to  
Crystal Castles™**



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**Conversion Instructions  
for  
Missile Command™  
to  
Crystal Castles™**



## Conversion Instructions

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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 this 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 implode! Shattered glass can fly six feet or more from the implosion.

**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.

## TABLE OF CONTENTS

Introduction . . . . .	1
Kit Parts Inventory . . . . .	1
Tools Required . . . . .	2
Conversion Instructions . . . . .	3
A. Remove the Control Panel, Attraction Panel, & Display Shield. . . . .	3
B. Disconnect the Main Harness & Remove the Game PCBs. . . . .	6
C. Install the PCB Mounting Panels . . . . .	6
D. Apply the Side-Panel Decals . . . . .	6
E. Install the EMI Cage and Printed-Circuit Boards . . . . .	10
F. Install the Crystal Castles Main Harness. . . . .	10
G. Modify the Coin Door. . . . .	10
H. Modify the Speaker/Attraction Panel . . . . .	13
I. Assemble the Control Panel. . . . .	13
J. Install the Attraction Panel, Display Shield, & Control Panel . . . . .	16
K. Install the Crystal Castles Labels. . . . .	17
L. Inspect the Game. . . . .	17
M. Self-Test . . . . .	17
N. Setting the Option Switches . . . . .	17
O. Crystal Castles Schematics. . . . .	17

## LIST OF ILLUSTRATIONS

Figure 1	Removing the Control Panel, Attraction Panel, and Display Shield. . . . .	4
Figure 2	Removing the PCBs and Cleating . . . . .	5
Figure 3	Installing the PCB Mounting Panels and EMI Cage. . . . .	7
Figure 4	Apply the Side-Panel Decals. . . . .	9
Figure 5	Installing the Printed-Circuit Boards. . . . .	11
Figure 6	Installing the Harness . . . . .	12
Figure 7	Modifying the Attraction Panel/Speaker . . . . .	14
Figure 8	Crystal Castles Control Panel (with Parts List). . . . .	15

## LIST OF TABLES

Table 1	Kit Parts . . . . .	1
Table 2	Tools Required. . . . .	2

## INTRODUCTION

This document includes the instructions necessary for changing your upright Missile Command® game into a Crystal Castles™ game. The instructions include: (1) replacing the control panel, attraction panel, and display shield; (2) replacing the main wiring harness, game printed-circuit board (PCB), and remounting the Regulator/Audio PCB; and (3) applying new side panel decals. The procedures are organized to accomplish the change in the most efficient manner.

A Crystal Castles instruction manual and schematic package is included with the kit. Keep your Missile Command instruction manual and schematic package for information pertaining to those parts of the game that are not modified by this conversion.

### NOTE

Do not discard this document after the conversion is completed. Keep this document as a supplement to the Crystal Castles operators manual.

## KIT PARTS INVENTORY

Check the contents of the Crystal Castles Conversion Kit before proceeding with the conversion. The parts included in the kit are listed in Table 1.

Table 1 Kit Parts  
A042330-01

Part No.	Description
A040721-01	Crystal Castles EMI Shield PCB and Game PCB Assembly
A042342-01	Main Harness Assembly
A042331-01	Control Panel Assembly (see Figure 8 and accompanying parts list)
A042561-01	EMI Cage and Guides Assembly
034536-02	1/2-Inch Foam Pad (placed between mounting panel and Regulator/Audio PCB)
035402-01	Crystal Castles Attraction Panel
038086-01	Shock Warning Label
038158-03	Product Identification Label
039450-01	FCC Compliance Label
042305-01	Left Side-Panel Decal (optional)
042305-02	Right Side-Panel Decal (optional)
042334-01	Crystal Castles Attraction Panel Decal

Table 1 Kit Parts, continued  
A042330-01

Part No.	Description
042336-01	Video Display Shield
042338-02	Regulator/Audio PCB Mounting Panel
042339-02	EMI Cage Mounting Panel
042341-91	Main Wiring Diagram
042410-01	Crystal Castles Kit Label
175004-708	#8 Flat Fiber Washer (for mounting Regulator/Audio PCB)
176015-112	#10 x 3/4-Inch Cross-Recessed Pan-Head Screw (for harness and PCBs)
176020-220	#8 x 1 1/4-Inch Cross-Recessed Screw (for PCB mounting panels)
179002-001	16-22 AWG Tap-Splice Connector
08-0302356	Crystal Castles Poster
75-050B	#10 Lock Washer (for mounting panel)
75-010F	#10 Flat Washer (for PCBs)
75-99511	#10-24 Nut/Washer Assembly (for speakers)
82-8116B	#10-24 x 1-Inch Button-Head Screw (for speakers)
TM-241	Crystal Castles Operators Manual
TM-266	Crystal Castles Installation Instructions
SP-241	Crystal Castles Schematic Package
ST-241	Crystal Castles Self-Test Chart

TOOLS REQUIRED

The tools listed in Table 2 are required to perform a complete conversion.

Table 2 Tools Required

Tool	Purpose
Phillips-Head Screwdriver	Remove and install harness and PCBs
Hammer	Remove PCB cleats and foam pads
Flat-Tipped Screwdriver	Remove PCB cleats and foam pads
Pliers	Removing tie wraps and installing tap-splice connectors
7/16-inch Wrench	Remove and install the control panel
1/8-Inch Allen Wrench	Remove and install retainers
4-Quart Pail & Sponge	Install decal graphics
Squeegee	Install decal graphics
X-ACTO™ Knife	Install decal graphics
Electric Drill w/ 1/4" Bit	Modify speaker/attraction panel
Brayer (or burnisher)	Installing attraction panel decal



CONVERSION INSTRUCTIONS

## WARNING

To avoid electrical shock, unplug the game before performing the conversion procedures.

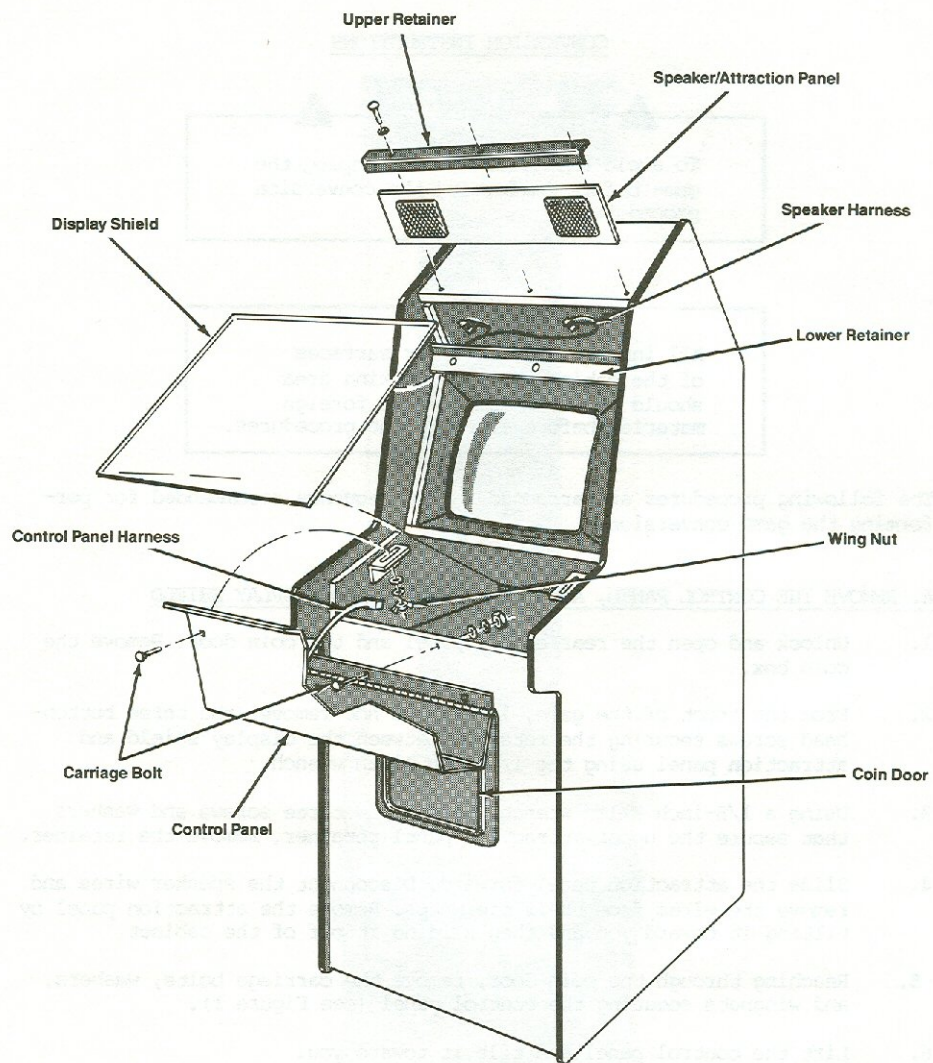
## NOTE

All interior and exterior surfaces of the cabinet and the working area should be clean and free of foreign material before starting the procedures.

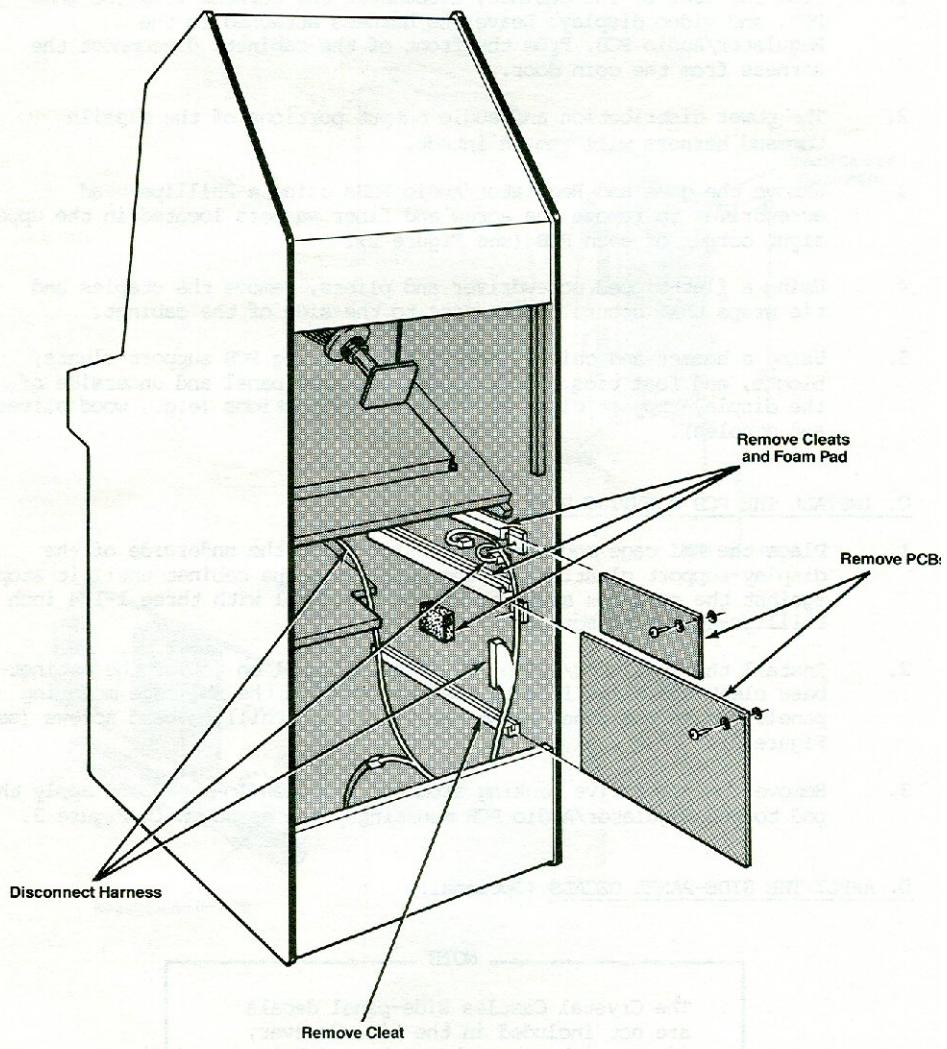
The following procedures are arranged in the sequence recommended for performing the game conversion.

A. REMOVE THE CONTROL PANEL, ATTRACTION PANEL, AND DISPLAY SHIELD

1. Unlock and open the rear access panel and the coin door. Remove the coin box.
2. From the front of the game, loosen (do not remove) the three button-head screws securing the retainer between the display shield and attraction panel using the 1/8-inch Allen wrench.
3. Using a 1/8-inch Allen wrench, remove the three screws and washers that secure the upper attraction panel retainer. Remove the retainer.
4. Slide the attraction panel forward. Disconnect the speaker wires and remove the wires from their tie wraps. Remove the attraction panel by tilting it toward you and then sliding it off of the cabinet.
5. Reaching through the coin door, remove the carriage bolts, washers, and wingnuts securing the control panel (see Figure 1).
6. Lift the control panel and tilt it toward you.
7. Remove the display shields by sliding them off of the support cleats.
8. Disconnect the control-panel harness. Using a 7/16-inch wrench, remove the nuts, washers, and carriage bolts that secure the control panel. Remove the control panel. Save the hardware for installing the Crystal Castles control panel.



**Figure 1 Removing the Control Panel, Attraction Panel, and Display Shield**



**Figure 2 Removing the PCBs, Main Harness, and Cleats**

B. DISCONNECT THE HARNESS AND REMOVE THE PRINTED-CIRCUIT BOARDS

1. From the rear of the cabinet, disconnect the harness from the game PCB, and video display. Leave the harness attached to the Regulator/Audio PCB. From the front of the cabinet, disconnect the harness from the coin door.
2. The power distribution and audio output portions of the Missile Command harness will remain intact.
3. Remove the game and Regulator/Audio PCBs using a Phillips-head screwdriver to remove the screw and fiber washers located in the upper right corner of each PCB (see Figure 2).
4. Using a flat-tipped screwdriver and pliers, remove the staples and tie wraps that secure the harness to the side of the cabinet.
5. Using a hammer and chisel, remove all existing PCB support cleats, blocks, and foam pads. Make certain the side panel and underside of the display-support cleat are free of obstructions (e.g., wood slivers and staples).

C. INSTALL THE PCB MOUNTING PANELS

1. Place the EMI cage mounting panel flush with the underside of the display-support cleat. Slide the panel into the cabinet until it stops against the coin-box support. Secure the panel with three 1-1/4 inch Phillips-head wood screws.
2. Install the Regulator/Audio PCB mounting panel on top of the cabinet-base cleat and align it with the rear edge of the EMI cage mounting panel. Secure the panel using two 1-1/4 inch Phillips-head screws (see Figure 3).
3. Remove the protective backing from the 1/2-inch foam pad and apply the pad to the Regulator/Audio PCB mounting panel as shown in Figure 3.

D. APPLY THE SIDE-PANEL DECALS (Optional)

## NOTE

The Crystal Castles side-panel decals are not included in the kit. However, if you wish to purchase these decals, use the order form provided at the back of this document.

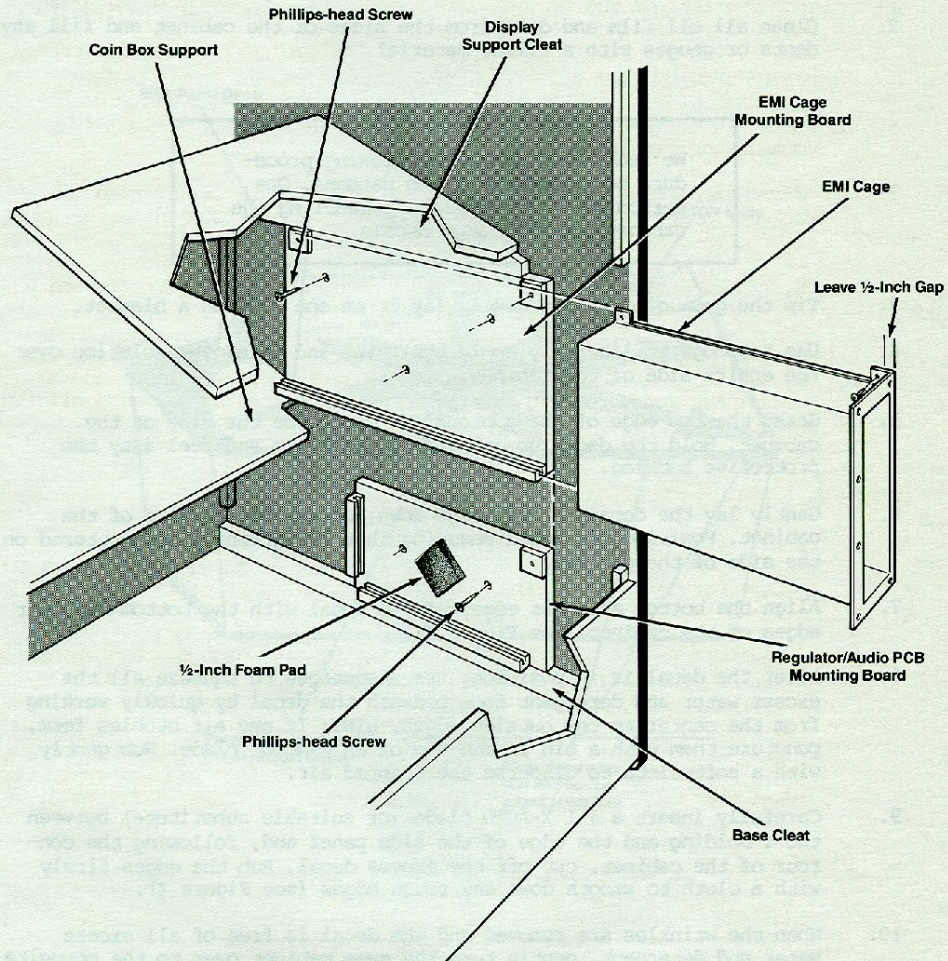


Figure 3 Installing the PCB Mounting Panels and EMI Cage

1. Mix a normal solution of any liquid dishwashing detergent and approximately three quarts of water in a bucket.
2. Clean all oil film and dust from the sides of the cabinet and fill any dents or gouges with a filler material.

## NOTE

We recommend that the following procedure be performed by two persons. One person may have difficulty handling the cabinet and the large decals.

3. Tip the game cabinet and gently lay it on one side on a blanket.
4. Use a sponge to liberally apply the water and detergent solution over the entire side of the cabinet.
5. Grasp the top edge of the appropriate decal for the side of the cabinet. Hold the decal up and off of the floor and peel away the protective backing.
6. Gently lay the decal, sticky side down, on the wet surface of the cabinet. Position the decal ensuring that the graphics are centered on the side of the cabinet.
7. Align the bottom and rear edges of the decal with the bottom and rear edges of the cabinet (see Figure 4).
8. After the decal is in position, use a squeegee to squeeze all the excess water and detergent from beneath the decal by quickly working from the center to the outside edges. HINT: If any air bubbles form, puncture them with a pin or the tip of an X-ACTO™ blade. Rub gently with a soft cloth to disperse the trapped air.
9. Carefully insert a #11 X-ACTO blade (or suitable substitute) between the T-molding and the edge of the side panel and, following the contour of the cabinet, cut off the excess decal. Rub the edges firmly with a cloth to smooth down any rough edges (see Figure 4).
10. When the wrinkles are removed and the decal is free of all excess water and detergent, gently turn the game cabinet over to the opposite side. Be careful to avoid damaging the freshly applied decal.
11. Repeat steps 4 through 9 for the remaining decal.
12. Carefully raise the cabinet to the upright position.
13. Use a lint-free cloth to wipe off any excess water and detergent from inside and outside of the cabinet. Allow time to dry before proceeding.

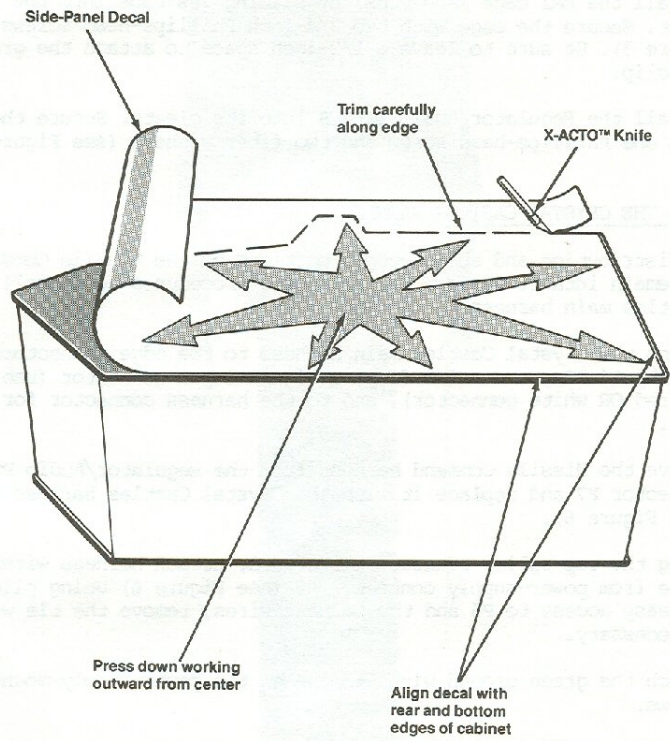


Figure 4 Applying the Side-Panel Decals

#### E. INSTALL THE EMI CAGE AND PRINTED CIRCUIT BOARDS

The Crystal Castles game PCB is shipped inside of the EMI cage with the EMI Shield PCB attached. No assembly is required.

1. Install the EMI cage (and PCBs) by sliding its tabs into the lower cleat. Secure the cage with two 3/4-inch Phillips-head screws (see Figure 3). Be sure to leave a 1/2-inch space to attach the grounding clip.
2. Install the Regulator/Audio II PCB into its cleats. Secure the PCB with one Phillips-head screw and two fiber washers (see Figure 5).

#### F. INSTALL THE CRYSTAL CASTLES HARNESS

The power distribution and audio output portions of the Missile Command harness will remain intact. Perform the following procedures to install the Crystal Castles main harness.

1. Attach the Crystal Castles main harness to the edge connectors of the EMI Shield PCB, the video display signal input connector (use either the red OR white connector), and to the harness connector for the coin door.
2. Remove the Missile Command harness from the Regulator/Audio PCB at connector P7 and replace it with the Crystal Castles harness connector (see Figure 6).
3. Using the tap-splice connectors provided, attach harness wires to those from power-supply connector P5 (see Figure 6) using pliers. For easy access to P5 and the harness wires, remove the tie wraps as necessary.
4. Attach the green ground wires to one of the power-supply mounting screws.
5. Attach the ground clip to the EMI cage.
6. Secure the harness to the cabinet using the nylon tie wraps and 3/4-inch Phillips-head screws (see Figure 6). Wrap the portions of the harness not used around the harness secure to the cabinet.

#### G. MODIFY THE COIN DOOR

The Crystal Castles harness has no provision for coin-lockout coils (part number 99-1004, see illustration in Missile Command manual). Remove or disable the coin-lockout coils if they exist in your game.



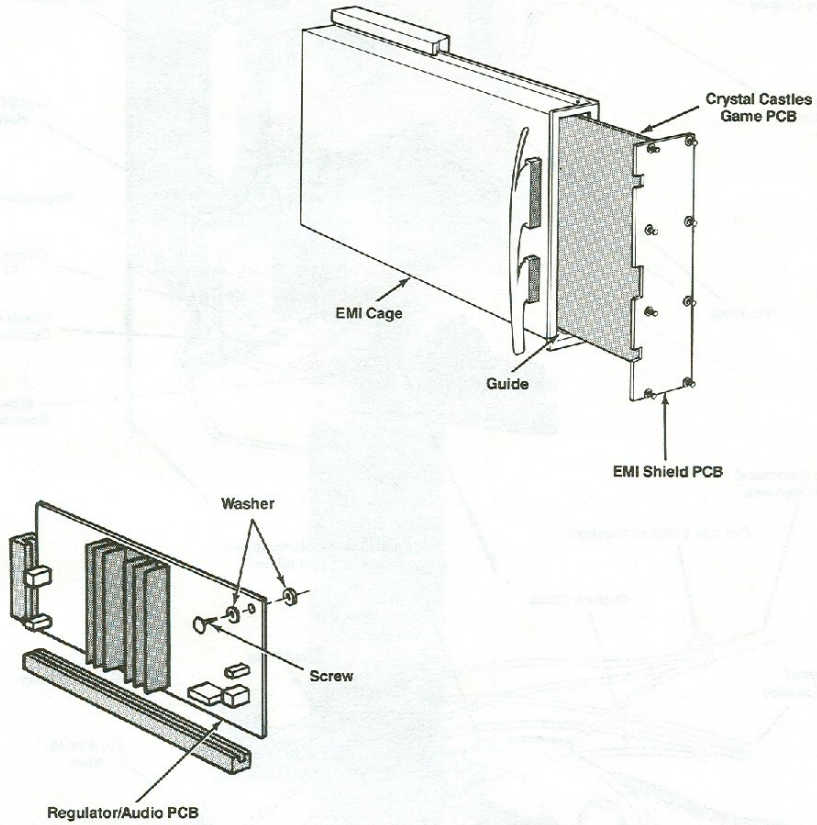


Figure 5 Installing the Printed-Circuit Boards

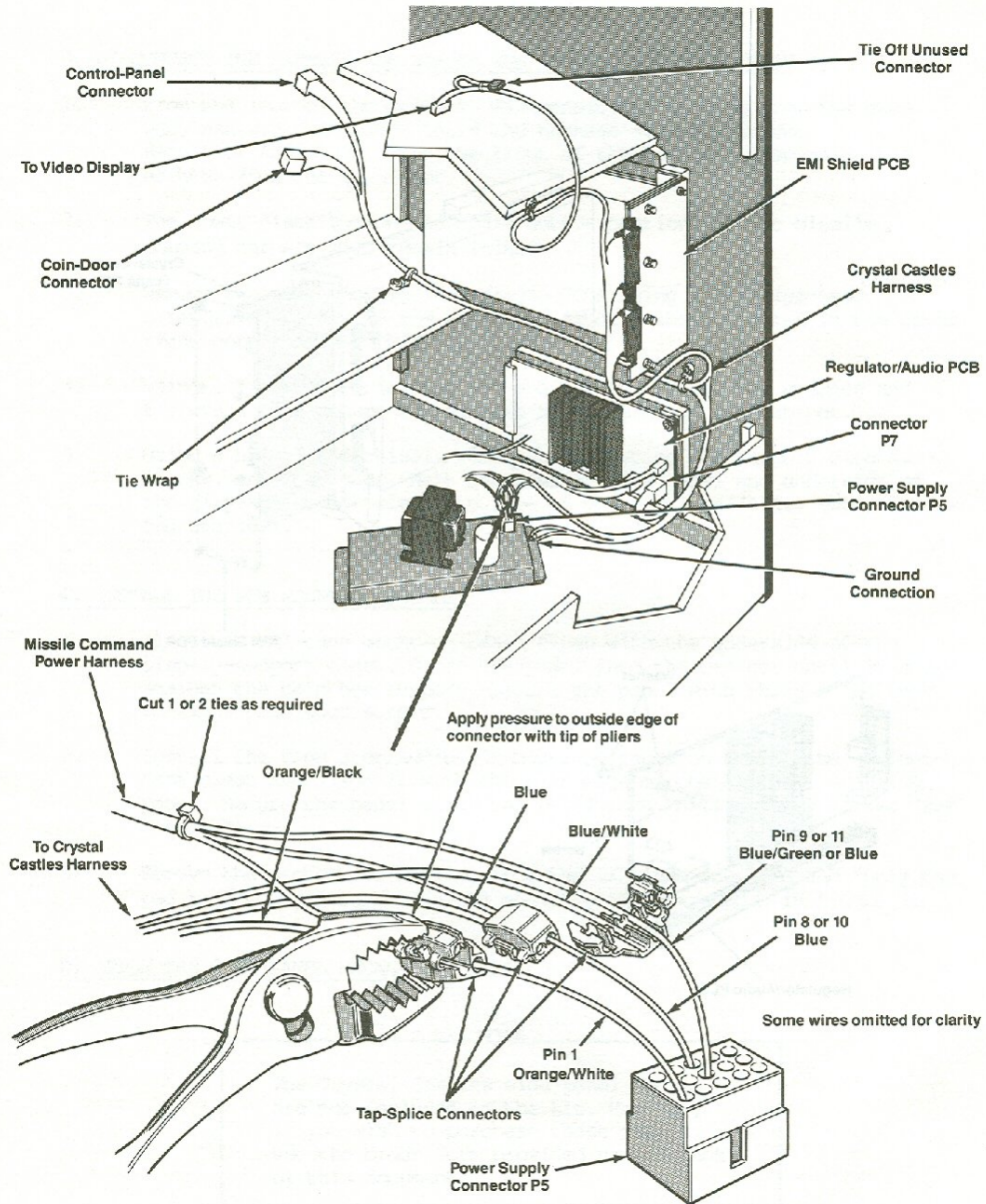


Figure 6 Installing the Harness

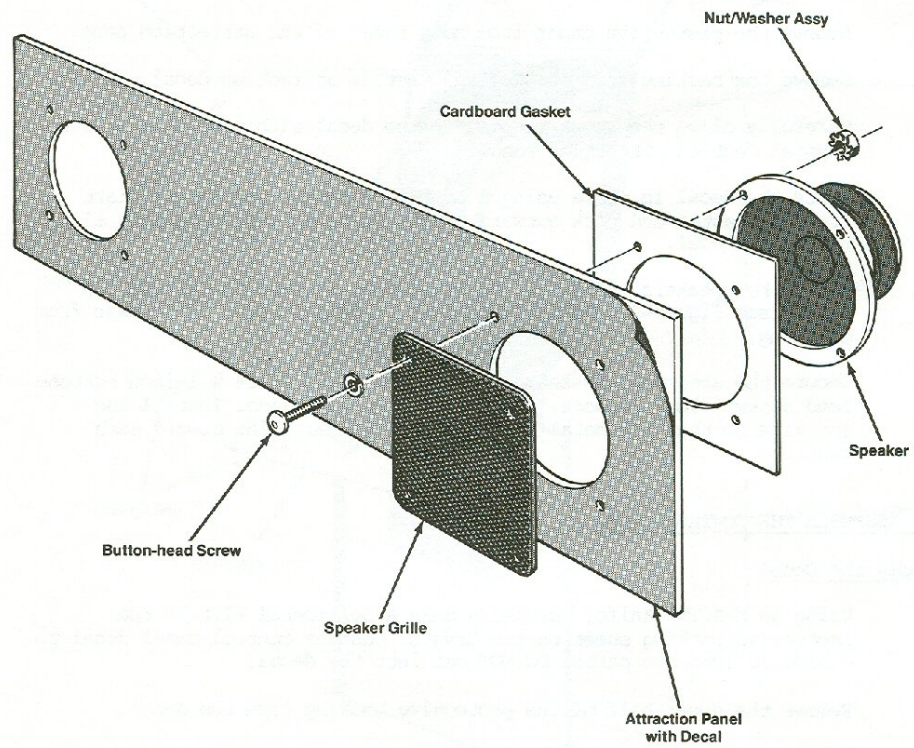
#### H. MODIFY THE SPEAKER/ATTRACTION PANEL

1. Using pliers or a flat-tipped screwdriver, remove the staples securing the speakers to the wood blocks.
2. Using an electric drill with a 1/4-inch drill bit, drill out the rivets holding the speakers and grilles to the attraction panel. Discard the old panel and the wood-block spacers. Save the cardboard gaskets, speakers, and speaker grilles for reuse.
3. Remove the protective paper from both sides of the attraction panel.
4. Remove the backing from the Crystal Castles attraction decal.
5. Carefully align the speaker holes in the decal with the holes in the Crystal Castles attraction panel.
6. Press the decal in place using a brayer or smooth burnisher. Start from the center and work outward to the edges to avoid trapping air under the decal.
7. Mount the speakers, gaskets, and speaker grilles to the attraction panel (see Figure 7). Turn the grilles over to conceal any damage from drilling.
8. Secure the speakers, gaskets, and grilles using 10-24 x 1-inch button-head screws, lock washers, and nut/washer assemblies. Install the speakers so that the metal tabs on each speaker point toward each other.

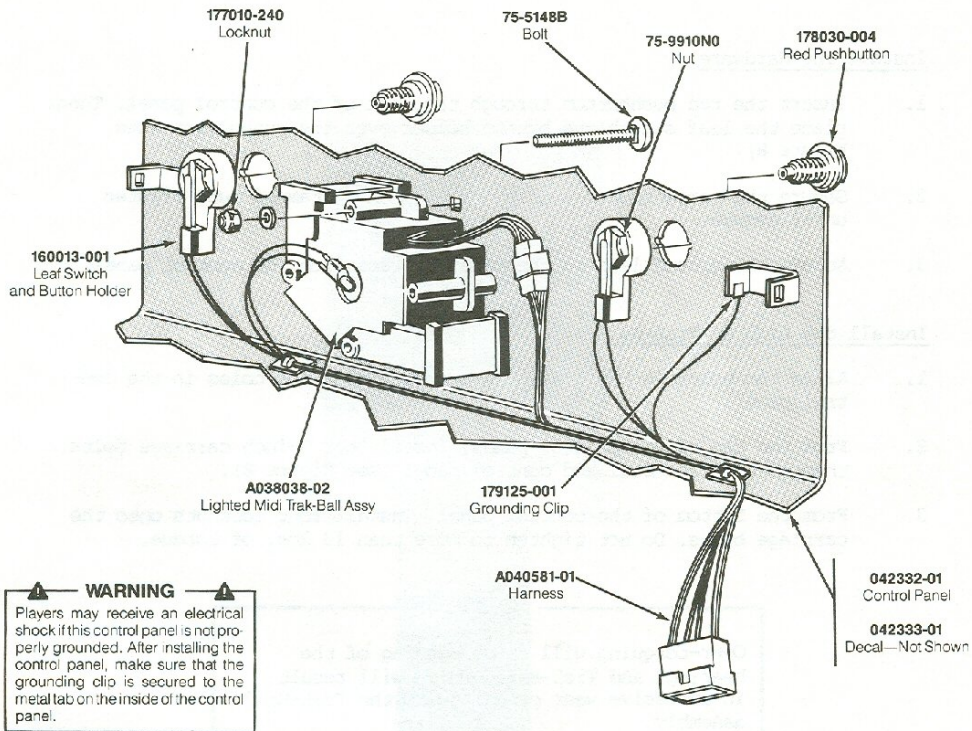
#### I. ASSEMBLE THE CONTROL PANEL

##### Apply the Decal

1. Using an X-ACTO<sup>®</sup> knife, carefully make a horizontal slit in the protective backing sheet on the Crystal Castles control-panel decal to divide it into two parts. DO NOT cut into the decal.
2. Remove the upper half of the protective backing from the decal.
3. Carefully position the Crystal Castles decal so that the holes in the decal align with the holes in the control panel.
4. Using the palm of your hand, press the decal firmly against the control panel. You will need to wrap the decal around the control panel.
5. Remove the bottom half of the protective backing sheet from the decal and repeat step 4.



**Figure 7 Assembling the Speakers and Attraction Panel**



**Figure 8 Crystal Castles Control Panel Assembly  
A042331-01 A**

Parts List

Part No.	Description
A038038-02	Lighted Midi Trak Ball™ Assembly
A040581-01	Control Panel Harness Assembly
042332-01	Control Panel
042333-01	Control Panel Decal
160013-001	Leaf Switch with Button Holder
177010-240	#10-24 Hex Locknut
178030-004	Red Pushbutton Assembly
179125-001	Grounding Clip
75-5148B	10-24 x 3-Inch Black Carriage Bolt
75-9910N0	5/8-11 Stamped Nut
78-6900402	1/4 x 1/8-Inch Thick Black Foam Tape

Install the Hardware

1. Insert the red pushbutton through the back of the control panel. Then place the leaf switch and button holder over the pushbutton (see Figure 8).
2. Secure the parts together using the 5/8-inch stamped nut. Tighten until secure.
3. Attach the ground lead to the metal extrusion on the control panel.

Install the Lighted Trak-Ball™

1. Align the holes in the Trak-Ball assembly with the holes in the control panel.
2. From the top of the control panel, insert four 3-inch carriage bolts through the Trak-Ball and control panel (see Figure 8).
3. From the bottom of the control panel, install four locknuts onto the carriage bolts. Do not tighten to more than 18 lbs. of torque.

## CAUTION

Over-torquing will cause binding of the bearings and Trak-Ball, which will result in excessive wear or damage to the Trak-Ball assembly.

J. INSTALL THE ATTRACTION PANEL, DISPLAY SHIELD, AND CONTROL PANEL

1. Attach the speaker wires to the speaker tabs.
2. Using a 1/8-inch allen wrench, mount the attraction panel to the cabinet with the upper retainer, three screws, and washers (see Figure 1).
3. Install the Crystal Castles control panel with three carriage bolts, washers, and nuts. Place the foam strip (included in the kit) on the edge of the control panel that touches the display shield. Attach the harness connector to the Crystal Castles harness.
4. Peel the protective paper off of the Crystal Castles display shield. Install the Crystal Castles display shield.
5. Close the control panel and using a 7/16-inch wrench, secure it with the carriage bolts, fender washers, and wing nuts.
6. Using a 1/8-inch allen wrench, tighten the button-head screws that secure the lower attraction panel retainer.

K. INSTALL THE CRYSTAL CASTLES LABELS

1. Do not remove or cover the existing labels on your game.
2. Remove the protective backing from the Product ID label, FCC label, and shock warning label included in the Crystal Castles kit.
3. Apply the three labels to the back of the game cabinet directly above the rear access panel.

L. INSPECT THE GAME

1. Before applying power, inspect the game to ensure that all procedures have been completed correctly.
2. Check that all hardware is firmly attached and that the harness is properly and firmly connected. Make sure all ground wires are attached.
3. Make sure the cabinet and components are free of dust and debris.
4. Plug in the game power cord and turn on the power switch.
5. If the screen is jumpy or scrolls, remove the Crystal Castles harness connector you installed into the video display signal input connector, and replace it with the other connector from the Crystal Castles harness that was not used.

M. SELF-TEST

1. Staple or tape the Crystal Castles self-test chart on the inside of the rear access panel.
2. Perform the self-test procedure as described in Chapter 2 of the Crystal Castles Operators Manual.

N. SET THE OPTION SWITCHES

Verify that the option switches are set to the desired play options for your location. Refer to the Crystal Castles operators manual for option switch location and setting information.

O. CRYSTAL CASTLES SCHEMATICS

The Crystal Castles Schematic Package is provided for the game circuitry. However, save the power supply and display schematics from the schematic set originally provided for your Missile Command game.

## To Receive a Free Set of Multi-Color Side-Panel Decals

The multi-color side-panel decals for your Crystal Castles™ Conversion Kit were not included when the kit was shipped to you. However, if you want a set, mail this letter to Atari Customer Service and they will send you these decals at no charge, while supplies last. No postage stamp is necessary if mailed in the U.S.A.

The part numbers of the decals are: Left—042305-01, and right—042305-02.

Game Serial No. that was shipped with your kit \_\_\_\_\_

Name \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Area Code \_\_\_\_\_ Phone \_\_\_\_\_

Distributor  Operator  Other \_\_\_\_\_



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**P.O. Box 906**  
**Milpitas, California 95035**

Second Fold

From: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Kit Warranty

Seller warrants that its electronic parts supplied in this kit are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

If the electronic parts supplied in this kit fail to conform to this warranty, Seller's sole liability shall be, at its option, to repair, replace, or credit Buyer's account for such electronic parts which are returned to Seller during said warranty period, provided:

- (a) Seller is promptly notified in writing upon discovery by Buyer that said products are defective;
- (b) Such products are returned prepaid to Seller's plant; and
- (c) Seller's examination of said products discloses to Seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation, or improper testing.

In no event shall Seller be liable for loss of profits, loss of use, incidental or consequential damages.

*Except for any express warranty set forth in a written contract between Seller and Buyer which contract supersedes the terms herein, this warranty is expressed in lieu of all other warranties expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the Seller's part, and it neither assumes nor authorizes any other person to assume for the Seller any other liabilities in connection with the sale of products by Seller.*

The use of any non-Atari parts may void your warranty, according to the terms of the warranty. The use of any non-Atari parts may also adversely affect the safety of your game and cause injury to you and others. Be very cautious in using non-Atari-supplied components with our games, in order to ensure your safety.

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