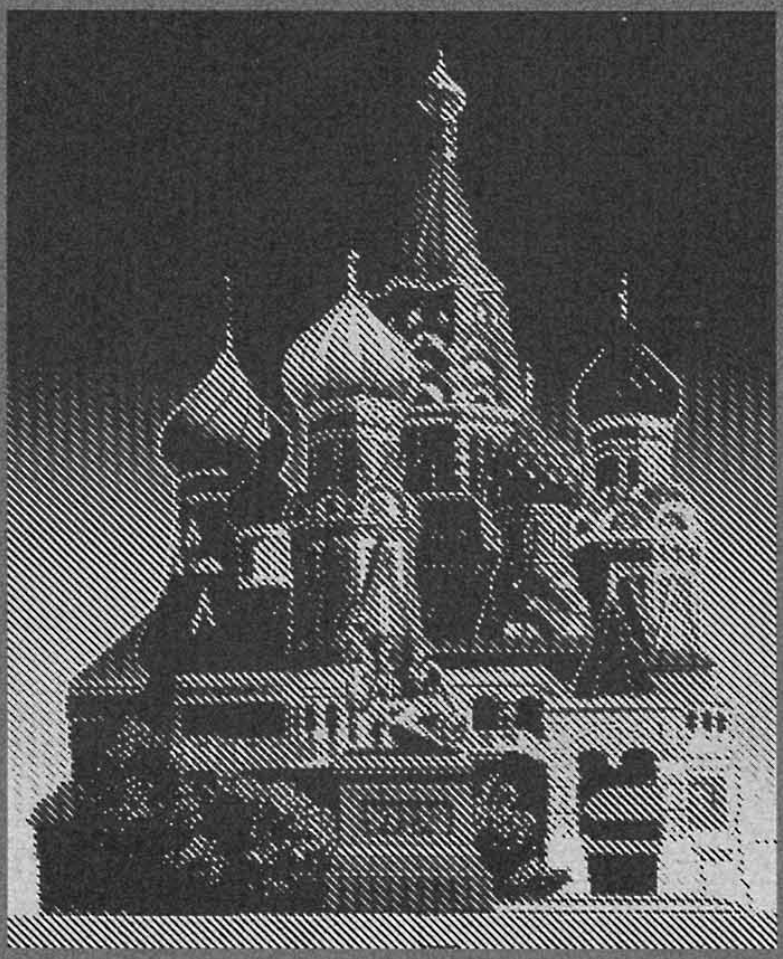
TM-328
1st printing

ATARI®
GAMES

TETRIS™

Kit Installation Instructions



For technical assistance:

If reading through this manual does not lead to solving your game maintenance or repair problem, call TELE-HELP® at one of these Atari Games Customer Service offices:

UNITED STATES

Atari Games Corporation
California Customer Service Office
737 Sycamore Drive
P.O. Box 361110
Milpitas, CA 95035
Fax (408) 434-3945
Telex 5101007850
✆ (408) 434-3950
(Monday–Friday, 7:30 a.m.–4:00 p.m. Pacific time)

EUROPE

Atari Games Ireland Limited
European Customer Service Office
Tipperary Town, Ireland
Fax 062-51702
Telex 70665
✆ 062-52155
(Monday–Friday, 9:00 a.m.–5:30 p.m. GMT)

TETRIS™

Corrections/Clarifications to Tetris* Kit Installation Instructions

When installing the Tetris parts onto the control panel, please follow these instructions (they replace the instructions on page 1-3 — Control Panel):

1. Unpack the control panel cover (part no. 046507-01) and control panel decal (part no. 046505-01). Measure the size required and cut the control panel decal and cover to fit the existing control panel.
2. Determine the location of the player pushbuttons and joysticks on the control panel. (See Figure 1-2.)
3. Cut holes in the control panel and cover to locate the buttons, joysticks, and mounting screws, Note: You can use the new cover to protect unused holes in the control panel.
4. Install the control panel decal onto the control panel. Cut the appropriate holes in the decal.
5. Install the button labels on the control panel decal. (See Figure 1-2.)
6. Install the instruction label (part no. 046506-01) on the control panel decal. (See Figure 1-2.)
7. Mount the control panel cover on the control panel using the bolts and nuts provided.
8. Install the red player control buttons (part no. 178237-001) for the left player. (See Figure 1-2.)
9. Install the blue player control buttons (part no. 178237-005) for the right player. (See Figure 1-2.)

When installing the harness in the cabinet:

PLAYER 1 controls are on the *left* side of the cabinet, and PLAYER 2 controls are on the *right* side of the cabinet.

Be sure to connect the Y/GN wire to the N.O. terminals of both of the ROTATE button switches for player 2 (right player). Similarly, connect the W/GN wire to the N.O. terminals of both of the ROTATE button switches for player 1 (left player). Connect the common terminals of the switches to one of the BK/W wires.

After the installation is complete:

Some game cabinets with switching power supplies exhibit video noise interference. If your cabinet produces this effect, try installing a .1 µF, 50 volt (or greater) ceramic capacitor between the earth ground and logic ground terminals on the switching power supply.

If you need technical assistance, call your distributor or Atari Games Customer Service at (408) 434-3950.

ATARI GAMES

Atari Games Customer Service • 675 Sycamore Drive • P.O. Box 361110 • Milpitas, California 95035

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TETRIS™

Installing the Joysticks in Your Control Panel

Since the Tetris game uses just the left, right, and down positions, your joysticks may be shipped with *three* microswitches each, not four.

If your joysticks have only three microswitches mounted, make sure the side without the microswitch is closest to the player after the joystick is installed.

If you need technical assistance, call your distributor or Atari Games Customer Service at one of the following locations:

United States: (408) 434-3950
Atari Games Corporation
737 Sycamore Drive
Milpitas, CA 95035
(Monday–Friday, 7:30 a.m.–4:00 p.m. Pacific time)

OR

Europe: 062-52155
Atari Games Ireland Limited
Tipperary Town, Ireland
(Monday–Friday, 9:00 a.m.–5:30 p.m. GMT)

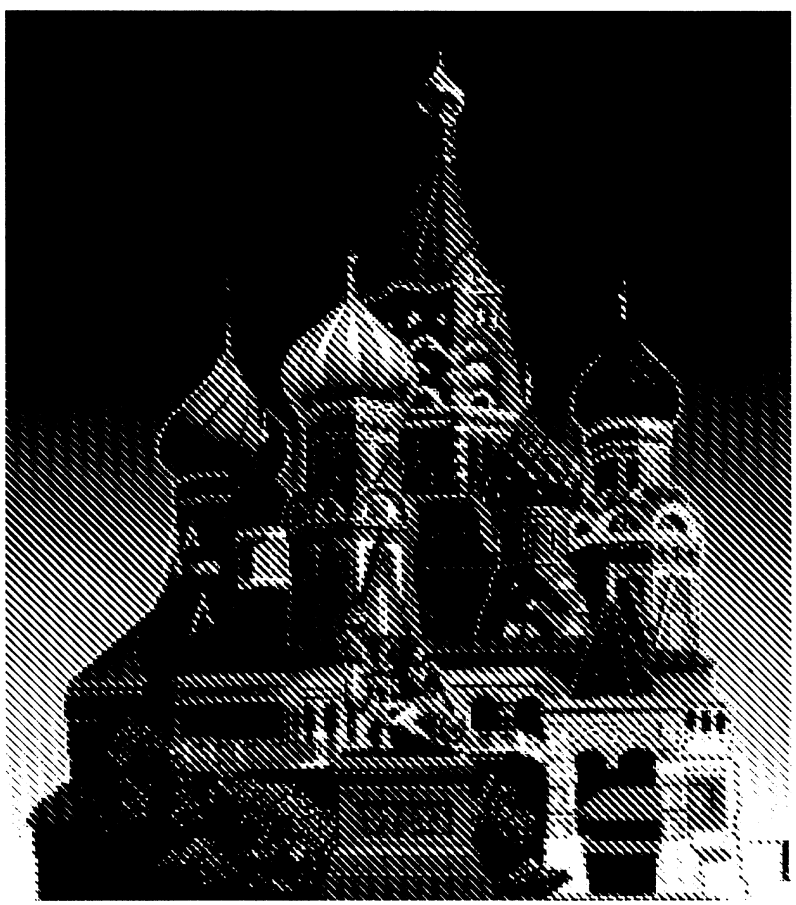
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ATARI®
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TETRIS™

Kit Installation Instructions



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In addition, the Act provides for payment of statutory damages of up to $50,000 per infringing transaction in certain cases. Infringers may also have to pay costs and attorneys' fees and face an imprisonment of up to five years as well as fines of up to $250,000 in the case of individuals and up to $500,000 in the case of corporations.

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Illustration: Mary Ohanessian Sumner



Notice Regarding Non-Atari® Parts

WARNING

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:

- Substitute non-Atari parts in the game.
- Modify or alter any circuits in the game by using kits or parts *not* supplied by Atari Games Corporation.

NOTE

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area or modification to this equipment is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference. If you suspect interference from an Atari game at your location, check the following:

- All 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.
- On games provided with an Electromagnetic Interference (EMI) ground cage, be sure that the game printed-circuit boards (PCBs) are properly installed on the EMI ground cage and that the end board is securely installed with **all** screws in place and tightened.

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

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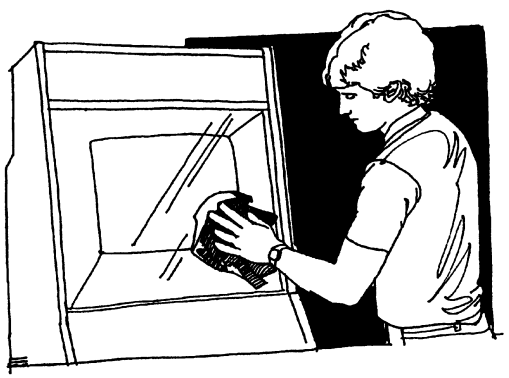
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Safety Summary

The following safety precautions apply to all game operators and service personnel. Specific warnings and cautions will be found in this manual whenever 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 three-wire outlet. If you have only a two-wire outlet, we recommend you hire a licensed electrician to install a three-wire grounded outlet. If the control panel is not properly grounded, players may receive an electrical shock! After servicing any part on the control panel, check that the grounding wire is firmly secured to the inside of the control panel. After you have checked this, lock up the game.

AC Power Connection. Before you plug in the game, be sure that the game's power supply can accept the AC line voltage in your location. The line voltage requirements are listed in the first chapter of this manual.

Disconnect Power During Repairs. To avoid electrical shock, disconnect the game from the AC power before removing or repairing any part of the game. If you remove or repair the video display, be very careful to avoid electrical shock. High voltages continue to exist even after power is disconnected in the display circuitry and the cathode-ray tube (CRT). Do not touch the internal parts of the display with your hands or with metal objects! Always discharge the high voltage from the CRT before servicing it. Do this after you disconnect it from the power source. First, attach one end of a large, well-insulated, 18-gauge jumper wire to ground. Then momentarily touch the free end of the grounded jumper wire to the CRT anode by sliding the wire under the anode cap. Wait two minutes and do this again.



Use Only Atari Parts. To maintain the safety of your Atari game, use only Atari parts when you repair it. Using non-Atari parts or modifying the game circuitry may be dangerous, and could injure you and your players.

Handle the CRT With Care. If you drop the CRT and it breaks, it may implode! Shattered glass from the implosion can fly six feet or more.

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified for your original game. Replacement fuses must match those replaced in fuse type, voltage rating, and current rating.

CAUTION

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

Ensure the Proper AC Line Frequency. Video games manufactured for operation on 60 Hz line power (used in the United States) must not be operated in countries with 50 Hz line power (used in Europe). If a 60 Hz machine operates on 50 Hz line power, the fluorescent line ballast transformer will overheat and cause a potential fire hazard. Check the product identification label on your machine for the line frequency required.

ABOUT NOTES, CAUTIONS, AND WARNINGS

In Atari publications, notes, cautions, and warnings have the following meaning:

NOTE — A highlighted piece of information.

CAUTION — Equipment and/or parts can be damaged or destroyed if instructions are not followed. You will void the warranty on Atari printed-circuit boards, parts thereon, and video displays if equipment or parts are damaged or destroyed due to failure of following instructions.

WARNING — Players and/or technicians can be killed or injured if instructions are not followed.

Chapter 1

Installation

How to Use This Manual

This manual is written for those who have knowledge of electricity and technical expertise in video games, such as game operators and service personnel. It provides information for installing, testing, and troubleshooting the Tetris™ kit.

The manual is divided into the following chapters:

- Chapter 1 describes the installation procedure and the Tetris game play.
- Chapter 2 contains self-test procedures.
- Chapter 3 contains troubleshooting procedures.

Chapter 1 provides the information required to install the Tetris kit. Carefully read the information in this chapter before attempting to convert any game.

WARNING

To avoid electrical shock, unplug the video game cabinet during the conversion. After inspection, plug it only into a grounded 3-wire outlet.

JAMMA Cabinet Requirements

This section describes the requirements for installing the Tetris kit into a Japan Amusement Machinery Manufacturers' Association (JAMMA)-compatible cabinet:

- **Speaker:** 8 ohms 10 watts
- **On/Off Switch:** 6 amp (or greater) 120 VAC
- **Coin Door:** Dual coin acceptors
- **Coin Meter:** +5 VDC or +12 VDC
- **Power Cord:** Three-conductor with ground

CAUTION

Do not unplug or plug in the Tetris game printed-circuit board (PCB) edge connector while the power is on. You could seriously damage the PCB.

Power Supply Requirements

General requirements:

- +5 VDC ± 0.25V @ 2.0 amps
- +12 VDC ± 0.5V @ 1.0 amp

CAUTION

Regarding switching power supplies: Tetris uses much less current from the 5V power supply than most video games. Not all switching power supplies will stay in regulation with such a low current (approximately 1 amp). ***Before plugging in the Tetris game PCB,*** *make sure your switching power supply will stay in regulation with only a 1 amp load. Otherwise, the switcher may produce a voltage greater than 5V and seriously damage the game PCB.*

Video Display Requirements

- Color RGB monitor
- Video input 1V to 3V peak-to-peak positive polarity
- Sync TTL positive polarity separate horizontal and vertical, or negative polarity composite sync
- Horizontal frequency 15.750 KHz
- Vertical frequency 60 Hz
- Horizontal mounting
- Recommended size: 19 inch

Installation Precautions

During installation:

1. Be sure to unplug power while working on the service cabinet.
2. Be sure all connections and harness routing are secure.
3. Make sure all grounding connections are secure and properly affixed.

Tools Required

- Drill with 3/32 inch, 1/4 inch, and 7/16 inch drill bits
- 1/4 inch plex bit
- 1/4 inch plex hole saw
- Hole cutter 1-3/16 inch
- Phillips screwdriver
- Flat blade screwdriver
- Small flat blade screwdriver
- Socket set
- Wire cutters and strippers
- Straight edge
- Putty knife
- Sandpaper
- Paint
- Squeegee
- X-ACTO™ knife
- Wood patch
- Fast-ons (if installing a new JAMMA harness)

Preparing the Existing Game for Conversion

1. Turn off power to the game.
2. Remove the old PCB and game harness (if not JAMMA).
3. Remove all control panel decals, labels, and controls.
4. Remove any side decals from the cabinet. If your cabinet has woodgrain sides, remove the old graphics and adhesive (you can remove adhesive with lacquer thinner).
5. Remove the video display plexiglass, display bezel, attraction shield, and marquee, if any.
6. Paint the cabinet, if required.
7. Wipe down and vacuum the cabinet as necessary.

Inspecting the Kit

Verify each component with the kit parts list provided in Table 1-1. If any part is missing or damaged, please contact your distributor and provide the following information:

1. Tetris kit serial number
2. Part number and description of any missing or damaged parts
3. Date received

Table 1-1 Tetris Kit Parts List
A046500-01 B

Part No.	Description
A044809-01	Tetris Main PCB Assy. Replaceable parts on this board and their locations are:
136066-1100	Tetris Program ROM IC at 45F
136066-1101	Tetris Graphics ROM IC at 35A
137329-450	EAROM IC at 65F
137412-101	SLAPSTIC IC at 40F
137430-001	POKEY IC at 35H, 35J (2)
137535-006	RAM IC at 40B
137577-001	6502A Microprocessor IC at 80E
A046501-01	Assy, JAMMA Harness
046502-01	Bezel, Display
046511-01	Label, Bezel
046511-02	Label, Bezel
046503-01	Film, Attraction w/ Graphics
046504-01	Shield, Attraction
046505-01	Decal, Control Panel
046506-01	Label, Instruction
046507-01	Cover, Control Panel
046508-01	Decal, Side Panel (2)
038158-01	Label, Product I.D.
039450-01	Label, FCC
TM-328	Instructions, Tetris Kit Installation
171089-101	Joystick, 4-Position, 1.25" Blk Knob (2)
178237-001	Button Assy, Red (2)
178237-005	Button Assy, Blue (2)
160044-001	Microswitch, Snap-Action, w/ Gold Contacts (4)
178000-002	Bag, Anti-Static, Air Cap
102020-001	Film, Barrier, Air Cap
178265-001	Standoff, L-Style, Nylon (4)
72-6612	Screw, Type AB, Cross-Recessed, #6 x 3/4" Lg. (4)
75-5116B	Bolt, Carriage, Blk, #10-24 x 1" Lg. (12)
177010-240	Nut, Poly Lock, #10-24 (12)
178114-032	Tape, Polypropylene, Clear, 2" Wide

Note: All parts are a quantity of 1 each, except where noted in parentheses.

Installing the Kit Parts

Display Bezel

1. Find the display bezel (part no. 046502-01). Measure the size of the existing display bezel or the required size to fit and cut the cardboard display bezel to size. (See Figure 1-1.)
2. Place the bezel labels (part nos. 046511-01 and 046511-02) in the lower left and lower right corners, respectively, of the display bezel. (See Figure 1-1.)

Product ID and FCC Label

- Place the Tetris product ID (part no. 038158-01) and FCC label (part no. 039450-01) on the back of the cabinet.

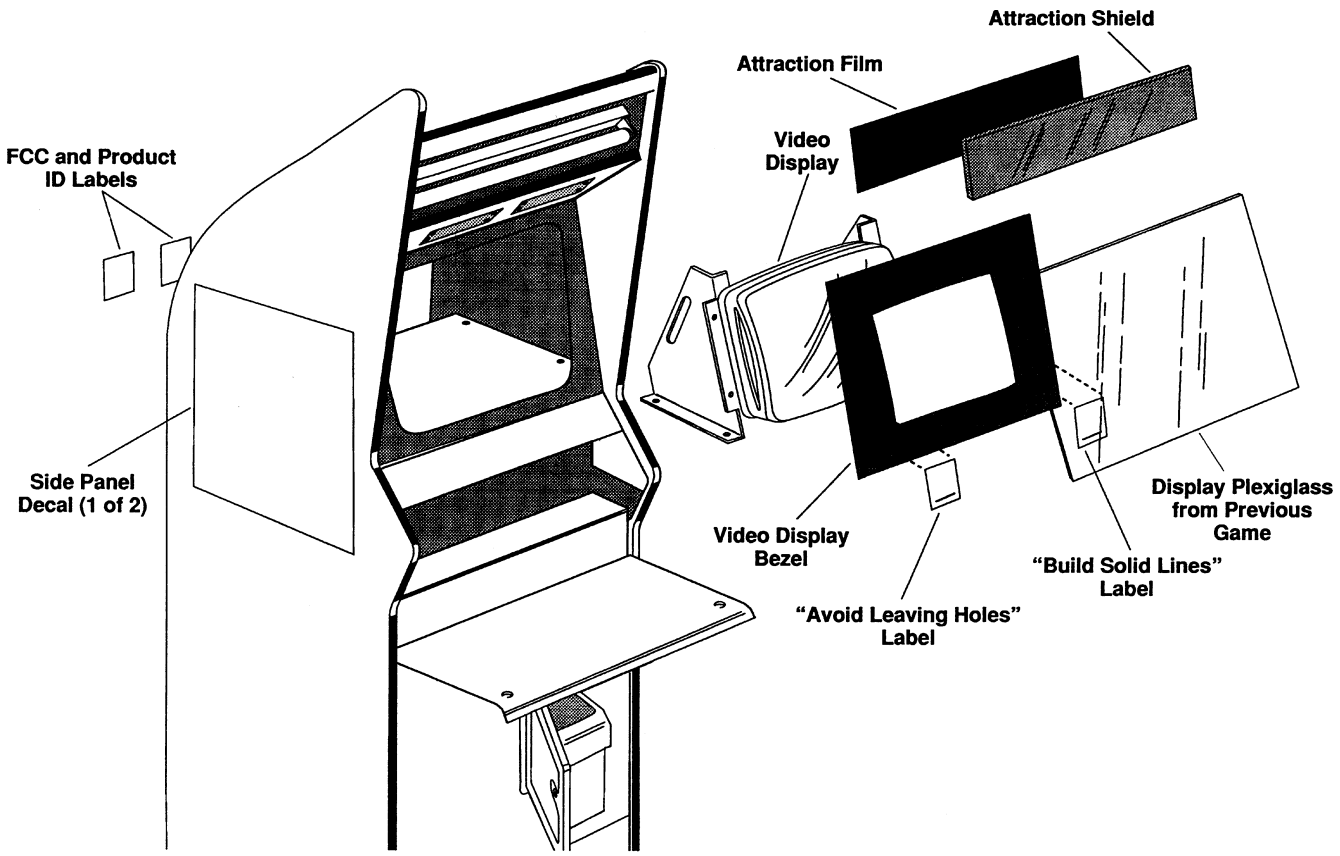


Figure 1-1 Installing the Tetris Kit

Side Decals

- Find the side panel decals (part no. 046508-01). Wet the left and right side panels of the cabinet with slightly soapy water. Then position the decals as desired. Remove any wrinkles in the artwork using a squeegee.

Attraction Shield

- Find the attraction shield (part no. 046504-01) and the attraction film (part no. 046503-01). Measure the size of the existing shield or required size to fit and trim both parts to size. Install them on the cabinet as shown in Figure 1-1.

Control Panel

1. Unpack the control panel cover (part no. 046507-01) and control panel decal (part no. 046505-01). Measure the size required and cut the control panel decal and cover to fit the existing control panel.
2. Determine the location of the player pushbuttons and joysticks on the control panel. (See Figure 1-2.)
3. Cut holes in the control panel, overlay, and cover to locate the buttons and joysticks.
4. Install the button labels on the control panel. (See Figure 1-2.)
5. Install the instruction label (part no. 046506-01) on the control panel. (See Figure 1-2.)
6. Cut holes into the cover to match the holes cut into the control panel. Then trim as required to protect the control panel overlay and labels. (See Figure 1-2.) **Note:** You can use the new cover to protect unused holes in the control panel.
7. Mount the control panel cover on the control panel.
8. Install the red player control buttons (part no. 178237-001) for the left player. (See Figure 1-2.)
9. Install the blue player control buttons (part no. 178237-005) for the right player. (See Figure 1-2.)



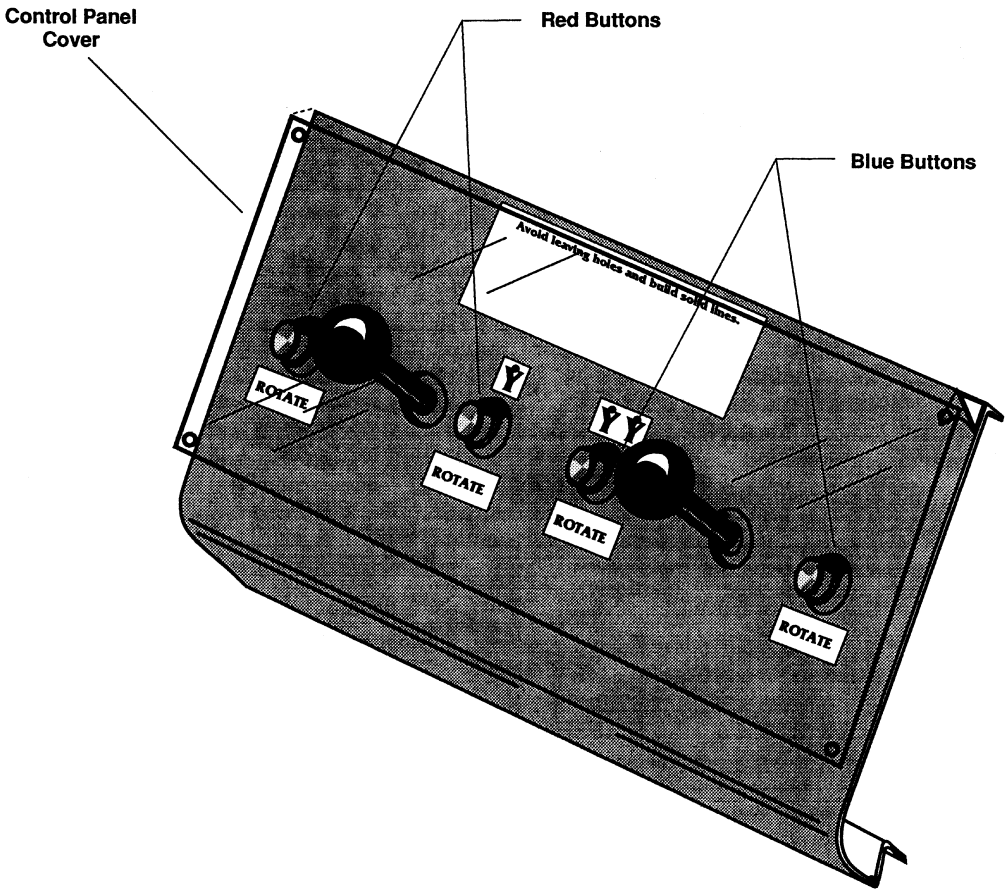


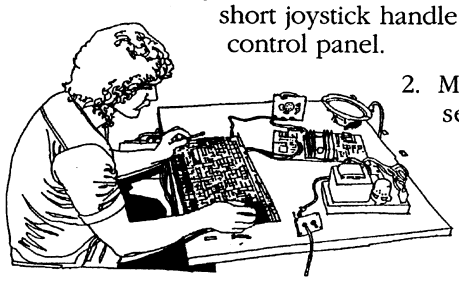
Figure 1-2 Converting the Control Panel

NOTE

After buttons are securely placed and tightened on the control panel, you can place a small amount of clear RTV silicon on two or three areas of the locknut to keep the buttons from being unscrewed from the top.

Joysticks

1. Unpack the joysticks (part no. 171089-101). Perform final assembly of the joysticks using the documentation included with them. Use the long joystick handle if you have a wooden control panel and the short joystick handle if you have a metal control panel.



2. Mount the joystick assembly base on the control panel by securing it with the following parts:
   - 10-24 x 1 inch carriage bolt (part no. 75-5116B)
   - 10-24 poly locknut (part no. 177010-240)

General Harness Installation

Skip to *Grounding the Cabinet* if your cabinet is already equipped with a JAMMA harness.

1. Find the JAMMA harness (part no. A046501-01) and install it.
2. Refer to Table 1-2, *JAMMA Pin Assignments,* for wiring information.
3. Connect the JAMMA harness to existing component harnessing. You can do this using crimp splices or by butt soldering. (The following describes the butt soldering technique.)

CAUTION

Make sure that the wire inputs are connected correctly to the JAMMA connector.

Table 1-2 JAMMA Pin Assignments

Solder Side			*Component Side*		
Color	**Signal**	**Pin**	**Pin**	**Signal**	**Color**
18-Gauge (Power) Wires					
BN	+V RTN ①	A	1	+V RTN ①	BN
BN	+V RTN ①	B	2	+V RTN ①	BN
R	+5V ②	C	3	+5V ②	R
R	+5V ②	D	4	+5V ②	R
OR	–5V *NC*	E	5	–5V *NC*	OR
Y	+12V ③	F	6	+12V ③	Y
Non-Power Wires					
	KEY	H	7	KEY	
V/W	COIN CTR 2 ④	J	8	COIN CTR 1 ④	BU/W
		K	9	COIN LOCK-OUT	
W *(TP)*	SPKR –	L	10	SPKR +	BN *(TP)*
	AUDIO GND	M	11	AUDIO +	
GN	GREEN ⑤	N	12	RED ⑤	R
BN	SYNC ⑤	P	13	BLUE ⑤	BU
GY	SERVICE SW *NC*	R	14	VIDEO GND ⑤	BK
		S	15	SELF-TEST ⑥	W
OR	COIN 2 ⑦	T	16	COIN 1 ⑦	Y
Y/BK	START 2 *NC*	U	17	START 1 *NC*	W/BK
Y/BN	UP 2 *NC*	V	18	UP 1 *NC*	W/BN
Y/R	DOWN 2 ⑧	W	19	DOWN 1 ⑧	W/R
Y/OR	LEFT 2 ⑧	X	20	LEFT 1 ⑧	W/OR
Y/W	RIGHT 2 ⑧	Y	21	RIGHT 1 ⑧	W/Y
Y/GN	ROTATE 2 ⑧	Z	22	ROTATE 1 ⑧	W/GN
Y/BU	SWITCH B2 *NC*	a	23	SWITCH B1 *NC*	W/BU
Y/V	SWITCH C2 *NC*	b	24	SWITCH C1 *NC*	W/V
		c	25		
		d	26		
BK/W	GND ⑨	e	27	GND ⑨	BK/W
BK/W	GND ⑨	f	28	GND ⑨	BK/W

NC means no connection required for Tetris. *(TP)* means twisted pair.

① Two of these four (*large* BN) wires must go to the 5V Return (GND) terminal on the power supply. The other two must go to the 12V RTN (GND) terminal of the power supply.

② At least two of these four wires must go to the 5V terminal on the power supply. One wire should go to the positive sense terminal on the power supply, if it exists. Shrink-tube the ends of unused wires to prevent shorting.

③ Both of these wires must go to the +12V terminal of the power supply.

④ These wires should go to the negative side of the coin counter(s). The positive side of the coin counter(s) should go to the +5V or +12V terminal of the power supply, depending on whether the coin counter is a 5V or 12V counter. *Note: Do not use 24V counters.*

⑤ These five wires attach to the video display (see Table 3-1).

⑥ A self-test switch is located at 50J on the PCB. If you want an external self-test switch, first make sure the switch on the PCB is off. Then connect this wire to the N.O. terminal on the external self-test switch. Connect the common terminal of the self-test switch to one of the BK/W wires (GND).

⑦ Connect these wires to the N.O. terminals of the two coin switches. Connect one of the BK/W wires to the common terminals of the coin switches.

⑧ Connect these wires to the N.O. terminals of the control switches. Connect the common terminals of the switches to one of the BK/W wires.

⑨ You must connect one of these four wires to the negative sense terminal of the power supply (if it exists). The other three wires should be used for the switch common terminals as described in notes 6, 7, and 8.

4. Try using the existing connectors. Cut the original wire approximately 3 inches from the original connector. Strip off about one-half inch of the insulation.
5. Slip the shrink tubing over the wire you just stripped.
6. Solder the new wire designated for that position to the original wire you just stripped.

WARNING

Do not simply tie the wires together. This can cause nagging intermittent problems through loose connections, oxidation, or both, or a fire in the electrical system.

---

7. Slide shrink tubing down over the soldered wire. Melt shrink tubing around all uninsulated in-line wire connections. Do not use electrical tape. It can unravel and cause problems with the electrical system.
8. Use wire tie wraps and secure the cable to the cabinet where it seems necessary.

Connecting Power Wires

1. Connect the wires that are designated for your power supply. You will need a supply of +5V and +12V. The new game may not require all of the voltages used in the original game. Tie off any unused wires.
2. You will notice that there is more than one wire for each voltage. You must double up some wires as called out in the footnotes of Table 1-2. This will help to ensure that you do not overload the edge connector and cause it to burn.

Connecting Video Display Wires

Connect the wires designated for the RED, GREEN, and BLUE video guns along with the sync and ground wires.

NOTE

JAMMA provides only negative composite sync. Most video displays accept negative composite or separate positive sync. If your video display requires separate positive sync, see page 3-1 of this manual or call TELEHELP at Atari Games Customer Service.

Connecting Speaker Wires

Find the two wires (twisted pair) that are designated for the speaker and hook them up.

Connecting Coin Door Wires

1. Connect the designated wires to the coin switches and meter.
2. Connect the door lamps to the appropriate voltage on the power supply. Some games have separate power supply outputs for the coin door lamps.
3. Be sure to clean and lubricate the old coin mechanisms.

Grounding the Cabinet

Find the ground lead (green) of the 115V input power line. Connect this lead in daisy-chain fashion to the coin door, control panel, video display, and power supply. *This is a safety requirement for the players' protection.* This AC ground must be of #18 AWG wire or larger.

Cabinet System Checkout

Do the following *before* plugging in the Game PCB:

1. Apply power to the game, and check for the following voltages. If any voltage is incorrect, remove power and correct the problem before proceeding any further.
   - +5 volts on pins 3, 4, C, and D of the 56-pin PCB connector
   - +12 volts on pins F and 6 of the 56-pin PCB connector
2. Check that the display has power by observing the glow of the filament inside the neck of the picture tube.
3. Check that the attraction shield lamp has power.
4. Check that the system ON/OFF switch functions properly. Now *turn off* the power to the game.

Tetris Printed-Circuit Board Installation

1. Find the Tetris Game PCB (part no. A044809-01) and install it inside the cabinet. Use the nylon standoffs to secure the PCB through its mounting feet.
2. Connect the 56-pin connector to the PCB with the label on the same side as the components on the PCB. The connector is keyed for proper orientation. Table 1-2 shows the JAMMA pin assignments.
3. Apply power to the game. Check that the Game PCB functions. If a video picture is not present, refer to Chapter 3, *Troubleshooting,* for suggestions on what to do.

Testing After Power-Up

The Tetris kit tests itself and provides visual and audible indications of the condition of the game circuitry and controls. Self-test information is displayed on the

screen and through the sound system. No additional equipment is required.

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

The self-test screens provide information about the game circuits and controls. Refer to Chapter 2 for information on all of the available self tests.

Adjusting the Video Display

You can make the following adjustments to the video display:

- Adjust horizontal and vertical hold until picture does not flip or tear
- Adjust horizontal and vertical centering until picture is centered on the screen
- Adjust horizontal and vertical size until all four corners are just visible on the screen
- Adjust brightness so that all color bars are visible but the background is not

Setting the Coin and Game Options

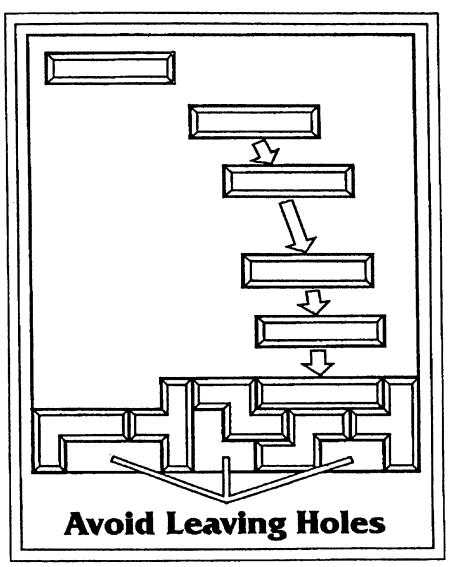
The Tetris coin and game options are set during the Self-Test. Chapter 2 describes the recommended settings and the procedure for setting the options.

Game Play

Tetris is a one-player or simultaneous two-player game of skill which can best be described as a "puzzle in motion".

The player uses a joystick and a button to move and rotate descending geometric blocks. The object is to fit block pieces together to build horizontal rows as solid as possible. With the completion of a row, the entire line disappears and any pieces above it drop one row. The intensity increases as the pieces are stacked higher and higher. If the pieces are stacked to the top of the screen, the game ends.

At the start of each game, the player(s) can select one of three starting difficulties. Bonus points are awarded for starting at higher levels. New game challenges are also added. At the medium starting difficulty, there is a "handicap" feature which adds stacked pieces at the start of the game. At the highest starting difficulty, randomly generated blocks appear during the game, adding a touch of the unknown.



To complete a round, players must meet the given quota of lines for that round. The quota increases with each round, and the number of rounds is unlimited.

For double scoring, players can pull down on the joystick to increase the speed of the falling piece.

If a one-player game is started, a second player can join in at any time. A game continuation option is also included.

Game play is broken up into groups of three rounds each with a different line quota necessary to complete that round.

First group of rounds (easy difficulty): Players play standard Tetris.

Second group of rounds (medium difficulty): Each round starts with a pattern already in the playing area.

Third group of rounds (hard difficulty): A single block is randomly added to the existing puzzle every 8, 5, or 3 pieces dropped.

Fourth group of rounds: The program moves all of the pieces up one line and adds an incomplete line of blocks at the bottom of the playing area every 8, 5, or 3 pieces dropped.

Fifth group of rounds: Is similar to the second group, except that the starting patterns are different.

Sixth group of rounds: Also starts with patterns. These patterns are made up of the initials of the 1st, 2nd, and 3rd high-score entries.

Seventh group of rounds: Is a combination of groups 2 and 3; that is, they have the same starting patterns as group 2 and the program randomly adds a single block.

Eighth group of rounds: Is a combination of groups 2 and 4; that is, they have the same starting patterns as group 2, and the software randomly adds lines to the bottom of the playing area.

Ninth group of rounds: Is a combination of groups 3 and 4. The software adds both a random single block and a line at the bottom. The game then wraps back to use groups 6, 7, 8, and 9.

Tetris™ Game Statistics

Location: _____

Date: _____

Accounting Information		*Minutes:Seconds*	
LEFT COINS	_____	0:00-0:15	_____
RIGHT COINS	_____	0:15-0:30	_____
2 PLYR STARTS	_____	0:30-0:45	_____
EASY STARTS	_____	0:45-1:00	_____
MEDIUM STARTS	_____	1:00-1:15	_____
HARD STARTS	_____	1:15-1:30	_____
CONTINUES	_____	1:30-1:45	_____
0 PLY TIME	_____	1:45-2:00	_____
1 PLY TIME	_____	2:00-2:15	_____
2 PLY TIME	_____	2:!5-2:30	_____
AVG. GAME TIME	_____	2:30-2:45	_____
		2:45-3:00	_____
		3:00-3:15	_____
		3:15-3:30	_____
		3:30-3:45	_____
		3:45-4:00	_____
		4:00-4:15	_____
		4:15-4:30	_____
		4:30-4:45	_____
		4:45-5:00	_____
		5:00-5:15	_____
		5:15-5:30	_____
		5:30-5:45	_____
		6:00-12:00	_____
		12:00+	_____

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© 1988 Atari Games Corp. All rights reserved. Original concept, design, and program by Alexey Pazhitnov and Vadim Gerasimov, respectively.

Chapter 2

Self-Test

The Tetris™ kit performs a series of self-tests that provide visual and audible indications of the condition of the game. Self-test information is displayed on the screen and through the sound system. No additional equipment is required.

To start the self-test, turn on the self-test switch located at 50J on the Tetris Game PCB. (The power to the game can be turned on before or afterwards.)

To end the self-test and return to the Attract mode, turn off the self-test switch.

RAM Test

The first test performed is the RAM test. It tests the processor RAM and color RAM. The test takes about three seconds.

If there is no problem with the RAM, self-test automatically continues with the ROM test (see the next section called *ROM Test*).

An error in the processor RAM (located at 40B) is indicated in one of two ways:

1. The message *0 OR 1 BAD* and some numbers are displayed near the top of the screen, and you should hear a series of rapidly repeating short tones. The self-test is halted and restarted from the beginning. The numbers should help you locate the fault: the first number is the address of the RAM location that had the error, the second number is the bit pattern of the error. You must correct this fault in order for the self-test to continue.
2. The message *RAM AT 40B BAD* is displayed, and you should hear a long tone.

The message *RAM AT 30F BAD* and two long tones indicate an error in the color RAM (located at 30F on the Tetris Game PCB).

At this point, you can go back and perform the entire RAM test again by pushing the player 1 joystick to the left.

To go on to the ROM test, press the player 1 start button.

ROM Test

If there are no errors in ROM, the self-test automatically continues on with the switch test. If the ROM test fails, the message *ROM AT 45F BAD xx* is displayed (where *x x* is the checksum of the ROM). To move on to the next test, press the player 1 start button.

Switch Test

The switch test checks the condition of the player controls and other inputs to the game board. The inputs checked are:

SELFTEST	PLAYER 2 LEFT
VBLANK	PLAYER 2 RIGHT
SPARE1	PLAYER 2 DOWN
SPARE2	PLAYER 2 ROTATE-START
FREEZE STEP	PLAYER 1 LEFT
FREEZE	PLAYER 1 RIGHT
LEFT COIN	PLAYER 1 DOWN
RIGHT COIN	PLAYER 1 ROTATE-START

Operate the joystick and button(s) for the right player first, and then the left player. Check that the appropriate messages are highlighted. Be sure to turn off *FREEZE* and *FREEZE STEP* (DIP switches 3 and 4 at location 50H) or your game will not perform correctly. *SPARE1* and *SPARE2* correspond to DIP switches 1 and 2, respectively, but are not used by this game. Also check for the proper operation of the *LEFT COIN* and *RIGHT COIN* switches. The *SELFTEST* and *VBLANK* messages will always be highlighted.

To go on to the next test, press the player 1 start button.

Statistics Screen

This screen provides current game statistics and the game time histogram. To record all the information displayed in this screen, make photocopies of the statistics sheet printed on the previous page of this manual.

The **statistics** are shown in the upper left area of the screen:

- *L COIN* shows the number of coins deposited in the left coin mechanism.
- *R COIN* shows the number of coins deposited in the right coin mechanism.
- *2 PLYR* shows the number of games that were started as a 2-player game.
- *EASY* shows the number of players who started the game at the easy level.
- *MED* shows the number of players who started the game at the medium level.
- *HARD* shows the number of players who started the game at the hard level.
- *ADD-CN* shows the number of players that continued their game (add-a-coin).
- *OP MIN* shows the minutes of idle time.
- *1P MIN* shows the minutes played as a 1-player game.

- *2P MIN* shows the minutes played as a 2-player game.
- *AVG* shows the average game time in minutes and seconds.

The **game time histogram** is shown in the middle of the screen. The histogram shows the length of games played in 15-second increments, except as indicated.

All statistical information is accumulated from the last time the statistics were reset. To reset the statistics, hold the player 1 joystick to the right, the player 2 joystick to the left, and press the player 2 start button. The message *WORKING* appears for about 6 seconds and then the screen will be redrawn with all values zeroed.

To go on to the next test, press the player 1 start button.

Coin Options

The coin options screen indicates the current coin option settings and is used to change those settings.

Push the player 1 joystick left or right to select which option to change. Push the player 2 joystick left or right to change the values of the selected option. Note that the factory default of each option is highlighted in green.

- *COIN MODE* indicates the current cost of each game.
- The *RIGHT* and *LEFT MECH MULTIPLIER* options each allow you to set various coin denominations.
- *BONUS ADDER* is used to vary coin denominations or reward players who insert more than one coin at a time. The option of *Free Play* is also included as one of the *BONUS ADDER* selections.

To cancel the coin option changes and restore the original settings, press the player 2 start button.

NOTE

If you replace the EEROM at location 65F or if a hardware problem occurs, the coin options change to the default (green) settings.

Press the player 1 start button to set the game for the options selected and go on to the next screen. Exiting from the coin options screen by turning off the self-test switch will **not** set the game for the selected coin options.

Game Options

The game options screen indicates the current game option settings and is used to change those settings. Push the player 1 joystick left or right to select which option to change, and push the player 2 joystick left or right to change the value of the selected option. Note that the factory default of each option is highlighted in green.

- *DIFFICULTY* controls the overall difficulty level of the game.
- *ATTRACT MUSIC* controls whether or not music is played during the Attract mode (once every 10 minutes).
- *AUTO HIGH-SCORE-TABLE RESET* automatically resets the high-score table after 2000 games if no player has achieved a high score in the last 200 games.

To cancel the game option changes and restore the original settings, press the player 2 start button.

Press the player 1 start button to set the selected options and go on to the next screen. Exiting from the game options screen by turning off the self-test switch will **not** set the selected game options.

EEROM Reset Options

The EEROM reset options screen is used to clear or set certain areas of the EEROM (nonvolatile memory). Move the player 1 joystick left or right to move the red box to the desired option. Note that the factory default of each option is highlighted in green.

- *RESET HIGH-SCORE TABLE* sets the High-Score Table entries to the defaults stored in ROM.
- *SET OPTIONS TO FACTORY DEFAULTS* sets the coin and game options to the factory defaults stored in ROM.
- *INITIALIZE EEROM* initializes the data in EEROM. You should *only* use this when you have replaced the EEROM device located at 65F because this clears all accounting information.

To cancel the EEROM reset options and restore the original settings, press the player 2 start button.

Press the player 1 start button to perform the selected resets and go on to the next screen. It may take up to eight seconds to perform the requested resets. If you exit from the EEROM reset screen by turning off the self-test switch, *none* of the reset options will be performed.

Video Display Tests

You can use the following tests to adjust the video display:

- Screen Pattern Tests

  Move the player 1 joystick left or right to select among the convergence, color purity, and several other screen patterns. Press the player 2 start button to change colors within each pattern.
- Color Test
- 256-Color Test

To move from one test to the next, press the player 1 start button.

Audio Test

The audio test indicates the condition of the music and sound-effects circuits.

SOUND NUMBER indicates the sound selected by moving the player 2 joystick left (decrements number) or right (increments number). To hear the sound, press the player 2 start button one or more times. Pulling the player 2 joystick down (towards you) silences the audio.

Pressing the player 1 start button returns to the Switch Test portion of the self-test.

Chapter 3

Troubleshooting

This chapter includes troubleshooting procedures for the Tetris™ kit.

Video Display Sync Problems

Some video displays cannot use the composite negative sync that is on the JAMMA connector. Tetris includes a standard Atari video connector (located at 15K) that provides separate positive sync. Refer to Table 3-1 and make the appropriate connections for your video display.

Horizontal Shifting

If you cannot center the video display horizontally, you can cause more horizontal shifting by removing R2 and adding a low-resistance resistor (less than 100Ω), or a wire in one of the locations marked R1 or R4 (but not both).

In Case of Difficulty...

No Raster/No Video

- Check the AC power cord.
- Check the line fuse.
- Check the monitor brightness.

Table 3-1 Atari Video Connector Pin Assignments

Pin	Signal
1	Red
2	GND
3	Key (no connection required)
4	Green
5	GND
6	Blue
7	GND
8	GND
9	Negative composite sync
10	Positive V sync
11	Positive H sync

- Check the power switch.
- Check all solder connections on the line filter and transformer.
- Check that the 56-pin PCB connector is properly attached.

Raster/No Video

- Check all PCB to monitor connections.
- Check the power supply voltage on the PCB.

No Video/Game Sounds Can Be Heard

- Check monitor brightness.
- Check all PCB-to-monitor connections.

Incorrect Colors

- Monitor needs degaussing.
- Check for proper wiring between the PCB and monitor.
- Check monitor adjustments and adjust, if necessary.

Wavy Picture

- Check that the monitor ground is properly connected to the monitor.
- Be certain sync inputs are properly connected to the monitor.
- Check the horizontal hold adjustment.

Vertical Roll/Horizontal Roll/Horizontal Tear

- Check the horizontal and/or vertical adjustments.
- Check for proper wiring of sync from the PCB to the monitor.

Picture Upside Down

- Switch the horizontal and/or vertical yoke wires of the monitor.

No Sound

- Check the volume control adjustment.
- Check for proper voltage on the PCB edge connector.
- Check the wiring from the PCB to the speaker.
- Check the speaker for low resistance (approximately 8Ω) between the + and – tabs.

Bad Sound

- Check the wiring to the speaker for bad solder connections.
- Check the sound with another speaker.

No Switch Input

- Check the ground connections to the switches.
- Check the wiring between the PCB and switches for proper connection.
- Check the switches with an ohmmeter to verify proper operation.

Switch Operates Incorrect Function

- Check the wiring between the PCB and switches for proper orientation.
- Check the wiring for shorts between switch inputs.

Coin Meter Doesn't Function

- Check the wiring to the coin meter.
- Check that +5V to +12V is on the + side of the meter.

Warranty

Seller warrants that its printed-circuit boards and parts thereon are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller warrants that its video displays and laser-video disc players (in games supplied with displays and video-disc players) are free from defects in material and workmanship under normal use and service for a period of thirty (30) days from date of shipment. None of the Seller's other products or parts thereof are warranted.

If the products described in this manual 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 products 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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