CHAMPIONSHIP SPRINT

ATARI
GAMES

New player can join in at any time.

Goal:

Beat all grey cars to continue play.
Each race equals 4 laps.

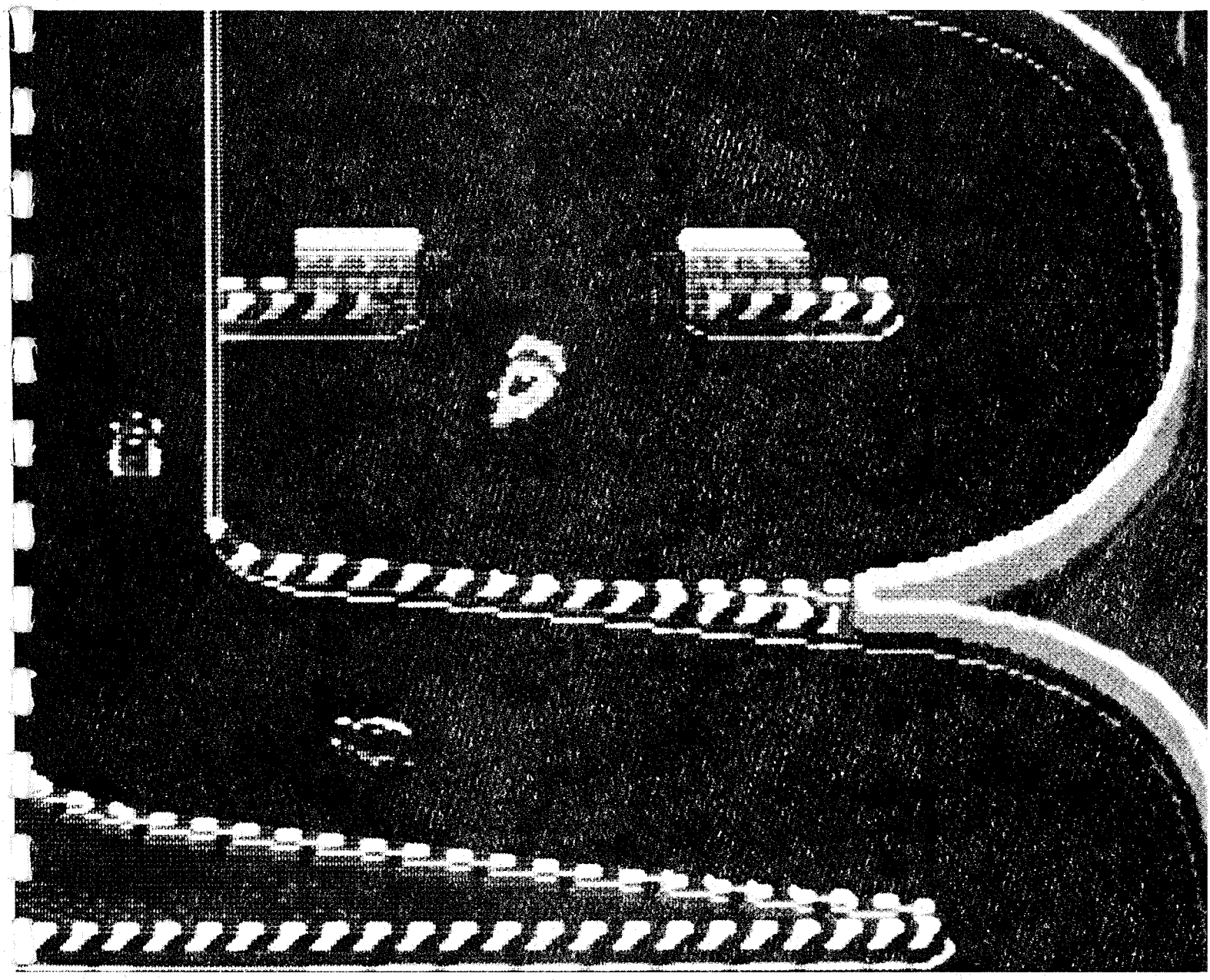
Tips:

Flashing lap number indicates the lead car.
Collect golden wrenches for special bonus.
Bonus wrench for best lap time.

TM-292
1st printing

ATARI
GAMES

Operators Manual with Illustrated Parts Lists



CHAMPIONSHIP SPRINT™

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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 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 (PCBs) are properly installed with the Electromagnetic Interference (EMI) ground plane.

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.

Table of Contents

1 Set-Up

How to Use This Manual 1-1
Inspecting the Game 1-2
Installation of Control Panel 1-3
Control and Switch Locations 1-3
Coin and Game Option Settings 1-3
Operating Modes 1-3
Game Play 1-5
Operator Hints 1-7

2 Self-Test

RAM/Interrupt/ROM Test 2-2
6502 Processor Test 2-2
Pedal Test 2-3
Calibration Procedure 2-4
Leta Test 2-4
Alphanumeric Test 2-4
Scrolling Playfield Test 2-5
Motion Object Test 2-5
Motion Object Height Test 2-5
Color Bar Test 2-6
Color Purity Test 2-6
Convergence Test 2-6
Accounting Information 2-6
Reset Saved Information Screen 2-7
Switch Settings 2-7

3 Maintenance

Preventive Maintenance 3-2

Preventive-Maintenance Intervals 3-2
Removing the Control Panel 3-2
Cleaning the Pushbutton Leaf Switches 3-2
Maintaining the Steering Wheel Controls 3-2
Cleaning the Coin Mechanism 3-3
Cleaning the Interior Components 3-3

Corrective Maintenance 3-5

Removing the Video Display 3-5
Removing the Steering Wheel 3-6
Disassembling the Steering Wheel 3-6
Reassembling the Steering Wheel 3-6
Removing the Foot Pedal Controls 3-6
Removing the Game PCBs 3-6
Removing the Fluorescent Light Assembly 3-8
Removing the Speakers 3-8

4 Troubleshooting

Troubleshooting Aids 4-2
Troubleshooting Techniques 4-2
Soldering Techniques 4-2
Troubleshooting Static-Sensitive Devices 4-3

5 Illustrated Parts List

See List of Illustrations that follows.

6 Kit Installation

Introduction 6-1
Kit Parts Inventory 6-3
Tools Required 6-3
Conversion Instructions 6-3
Reset the High Score Table and the Accounting Information 6-9

List of Illustrations

Figure 1-1	Removing Control Panel from Shipping Position	1-4
Figure 1-2	Control and Switch Locations	1-5
Figure 2-1	RAM Test Fails	2-2
Figure 2-2	Interrupt Test Fails	2-2
Figure 2-3	ROM Test Fails	2-2
Figure 2-4	Reset Retry	2-3
Figure 2-5	Communications Fails	2-3
Figure 2-6	Music/RAM/ROM Fails	2-3
Figure 2-7	Sound Output	2-3
Figure 2-8	Sound Status	2-4
Figure 2-9	Pedal Test Passes	2-4
Figure 2-10	Leta Test	2-4
Figure 2-11	Alphanumeric Test	2-5
Figure 2-12	Scrolling Playfield Test	2-5
Figure 2-13	Motion Object Test	2-5
Figure 2-14	Motion Object Height Test	2-6
Figure 2-15	Color Bar Test	2-6
Figure 2-16	Color Purity Test	2-6
Figure 2-17	Convergence Test	2-7
Figure 2-18	Accounting Information	2-7
Figure 2-19	Reset Saved Information Screen	2-7
Figure 2-20	Switch Settings	2-8
Figure 3-1	Control Panel Removal	3-3
Figure 3-2	Maintaining the Steering Wheel Controls	3-4
Figure 3-3	Video Display Removal	3-5
Figure 3-4	Game PCB Removal	3-7
Figure 3-5	Fluorescent Light Assembly Removal	3-9
Figure 3-6	Speaker Removal	3-9
Figure 4-1	Removing IC (Cut-Pin Method)	4-3
Figure 4-2	Removing IC Pins	4-3
Figure 4-3	Removing Solder from Plated-Through Holes	4-4
Figure 4-4	Removing Solder from Lead Connection Pads	4-4
Figure 5-1	Cabinet-Mounted Assemblies	5-2
Figure 5-2	Control Panel Assembly	5-5
Figure 5-3	Steering Wheel Control Assembly	5-6
Figure 5-4	Fluorescent Tube Assembly	5-8
Figure 5-5	Switching/Linear (S/L) Power Supply Assembly	5-10
Figure 5-6	Foot Pedal Assembly	5-12
Figure 5-7	Coin Acceptors, Inc. Coin Door Assembly	5-14
Figure 5-8	Printed-Circuit Board Mounting Hardware	5-18
Figure 5-9	Central Processing Unit PCB Assembly	5-20
Figure 5-10	Video PCB Assembly	5-28
Figure 5-11	Audio II PCB Assembly	5-36
Figure 6-1	Kit Part Locations	6-2
Figure 6-2	Attraction Film Replacement	6-3
Figure 6-3	Control Panel Replacement	6-4
Figure 6-4	Installing ICs into CPU PCB Assembly	6-7
Figure 6-5	Installing ICs into Video PCB Assembly	6-8

List of Tables

Table 1-1	Game Specifications	1-2
Table 1-2	Coin and Credit Option Settings	1-6
Table 1-3	Game Option Settings	1-6
Table 3-1	Recommended Preventive-Maintenance Intervals	3-2
Table 6-1	Kit Parts Inventory	6-3
Table 6-2	Integrated Circuits in Championship Sprint Conversion Kit	6-6

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 three-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 wire is firmly secured to 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 game's power supply is properly configured for the line voltage in your location.

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 electical 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 the CRT With Care. If you drop the 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.

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 on power lines using 50 Hz. Check the product identification label of your game for the line frequency required.

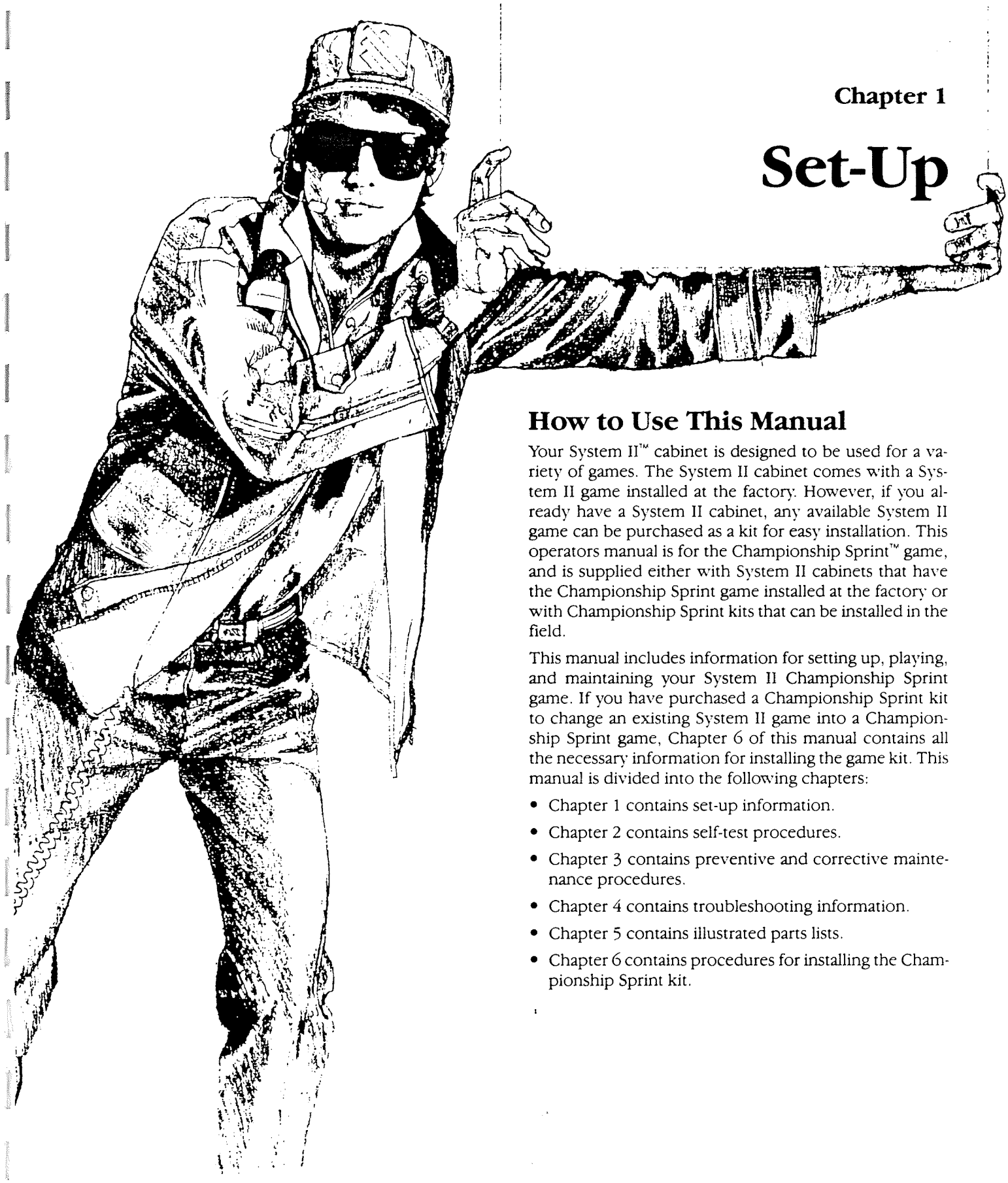
ABOUT NOTES, CAUTIONS, AND WARNINGS

In all 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 injured or killed if instructions are not followed. (The word *WARNING* is always surrounded by international warning symbols—triangles with exclamation marks inside of them.)



Chapter 1

Set-Up

How to Use This Manual

Your System II™ cabinet is designed to be used for a variety of games. The System II cabinet comes with a System II game installed at the factory. However, if you already have a System II cabinet, any available System II game can be purchased as a kit for easy installation. This operators manual is for the Championship Sprint™ game, and is supplied either with System II cabinets that have the Championship Sprint game installed at the factory or with Championship Sprint kits that can be installed in the field.

This manual includes information for setting up, playing, and maintaining your System II Championship Sprint game. If you have purchased a Championship Sprint kit to change an existing System II game into a Championship Sprint game, Chapter 6 of this manual contains all the necessary information for installing the game kit. This manual is divided into the following chapters:

- Chapter 1 contains set-up information.
- Chapter 2 contains self-test procedures.
- Chapter 3 contains preventive and corrective maintenance procedures.
- Chapter 4 contains troubleshooting information.
- Chapter 5 contains illustrated parts lists.
- Chapter 6 contains procedures for installing the Championship Sprint kit.

is mounted in place. Check that the green ground wire is connected.

e. Inspect other major sub-assemblies, such as the video display, printed-circuit boards (PCBs), speakers, and the fluorescent tube. Make sure they are mounted securely and that the green ground wires are connected.

Inspect the Championship Sprint kit as follows:

1. Verify that all of the Championship Sprint kit parts listed in Table 6-1 of this manual are included in your kit.
2. Examine the kit parts for dents, chips, or broken parts.

Installation of Control Panel

For packaging purposes, the Championship Sprint control panel is shipped inside the cabinet. The panel is mounted on a single metal bracket on the inside left side panel in the rear of the cabinet. (See Figure 1-1.) Perform the following procedure to remove the control panel from the cabinet.

1. Using a Phillips screwdriver, remove the two screws holding the metal bracket to the cabinet. Remove the control panel from inside the cabinet.
2. Using a 1/8-inch hex driver, remove the two screws and washers holding the metal bracket to the control panel. *Save this hardware.* Discard the bracket or remount it in the cabinet for future control panel storage.
3. Replace the existing control panel with the Championship Sprint control panel. Refer to Chapter 3, *Removing the Control Panel.*

Control and Switch Locations

Power On/Off Switch

The power on/off switch is located at the bottom rear of the cabinet. (See Figure 5-1.)

Volume Control

The volume control is located on the Audio II PCB behind the upper coin door. (See Figure 1-2.) The volume control adjusts the level of sound produced by the game.

Coin Counter

The coin counter is located on the inner cabinet wall opposite the upper coin door. The coin counter records the number of coins deposited.

Self-Test Switch

The self-test switch is located on the Audio II PCB behind the upper coin door. (See Figure 1-2.) The self-test switch selects the Self-Test Mode to check game operation. Refer to Chapter 2 for a complete description of self-test operation. (See Figure 1-2.)

Coin and Game Option Settings

The System II cabinet has two dual-in-line package (DIP) option switches located on the CPU printed circuit board (PCB).

- The option switch at location 6/7A is for selecting coin options.
- The option switch at location 5/6A is for selecting game options.

Set the coin and credit option settings, game option settings, and automatic high score reset setting by changing the settings of the DIP switches. Refer to Table 1-2 and Table 1-3 for the available options and default (recommended) settings.

To change these settings, first remove the thin film of plastic covering the option switch. Use a pen or a sharp-pointed instrument to slide the appropriate small buttons to different settings. Right is the *on position*, and left is the *off position*. The steering wheel controls and the pushbuttons are *not* used to change these settings.

Operating Modes

Championship Sprint has four operating modes: Attract, Play, High Score, and Self-Test.

Attract Mode

The Attract Mode begins either when the game is plugged in or after exiting the Play, High Score, or Self-Test Modes. The Attract Mode ends when the correct amount of coins or tokens are inserted and the start button(s) are pressed, or when the self-test switch is turned off. The Attract Mode continuously cycles through the following events:

- Title Page—The title *CHAMPIONSHIP SPRINT* is displayed on an explosion/checkerboard background.
- High Score Table—The top 30 scores are displayed. (Championship Sprint Racing Team). The top 3 scores are highlighted at the top of the screen.
- Demo Mode—The drone cars run two laps on each of the eight tracks,taking each checkered flag.

During the Attract Mode, if a whole new credit (not partial credits) is entered into the game through the coin mechanisms, a gong sound is played. The credit status and current coin mode are constantly displayed and updated throughout the Attract Mode.

Play Mode

Play mode begins when the correct credit is entered and the blue or red start button is pressed. Refer to *Game Play* for playing information.

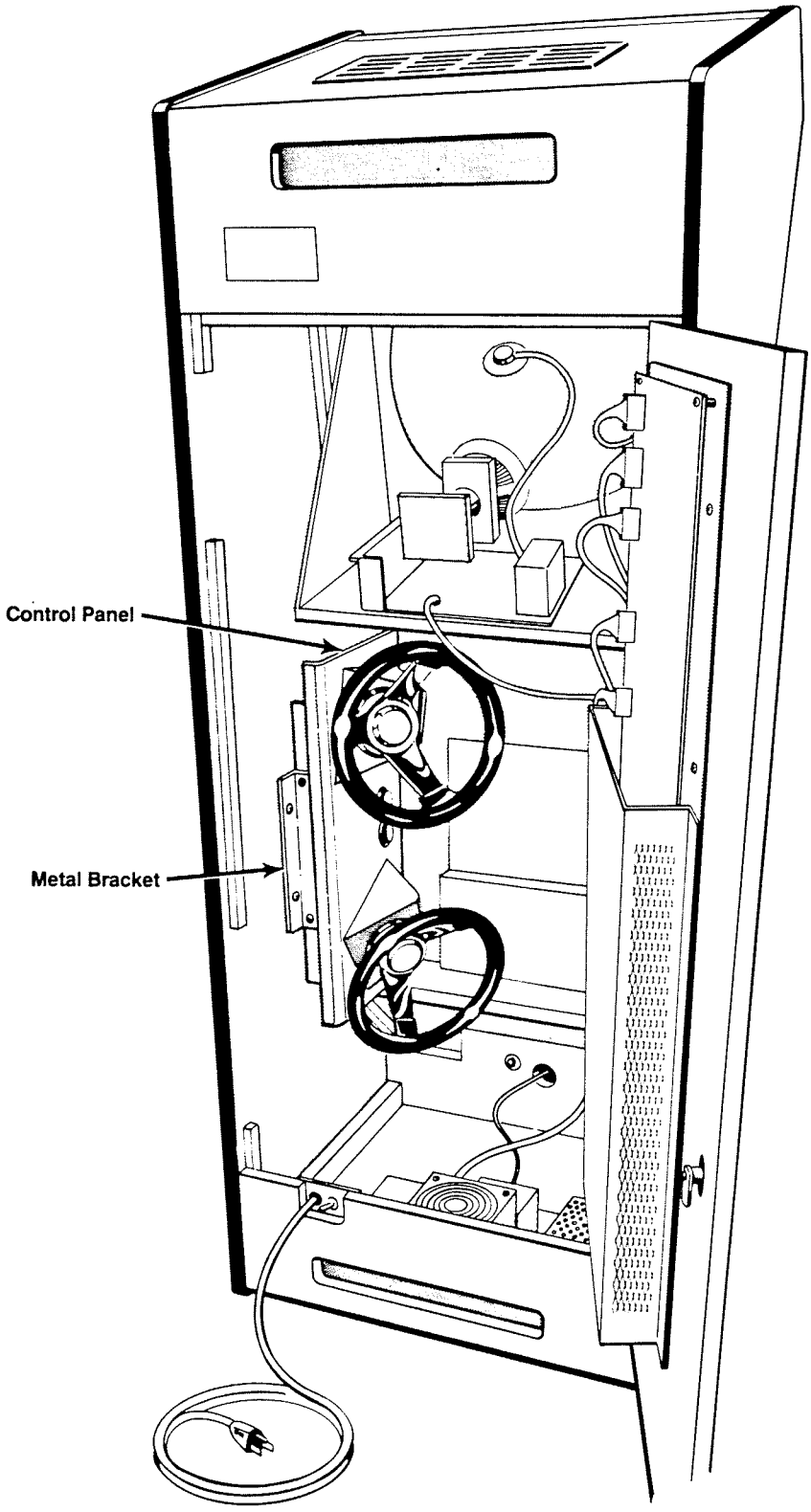


Figure 1-1 Removing Control Panel from Shipping Position

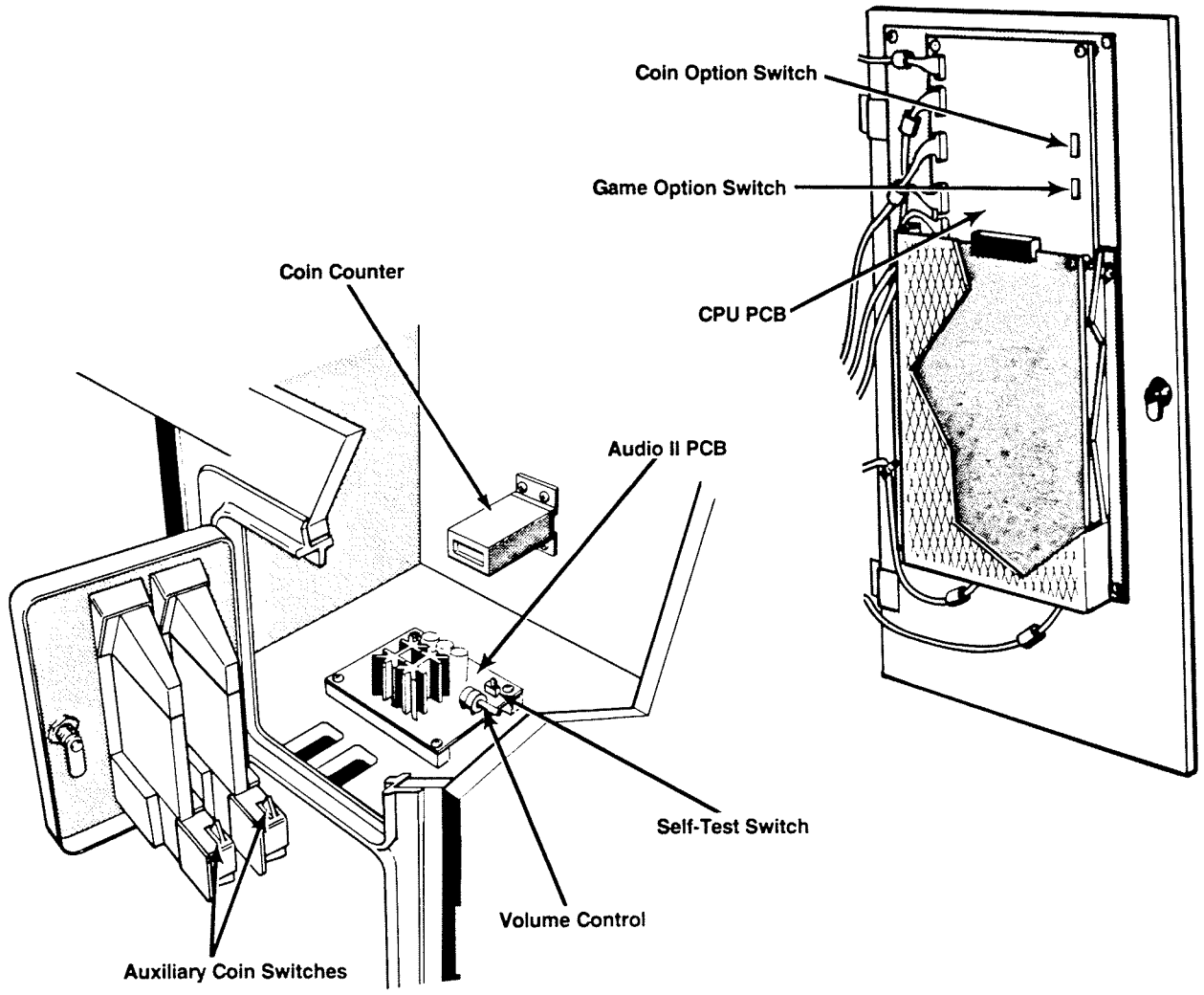


Figure 1-2 Control and Switch Locations

High Score Mode

In the High Score Mode, if a player's score is among the top 30, the player can enter the desired initials by turning the steering wheel to select the initial, and by pressing the start button or accelerator pedal to insert the initial.

Self-Test Mode

You can set the Championship Sprint game to the Self-Test Mode by turning on the self-test switch located on the Audio II PCB behind the upper coin door. Refer to Chapter 2 for detailed self-test information.

Game Play

The game play begins once players select a car by depositing coins into the proper coin slot. One coin slot is designated for each of the two player cars—blue, or red. The first player to press start is given the option to select one of eight unique starting tracks. A select screen displays all tracks. Players choose the desired starting track by using the steering wheel to indicate the desired track, and by pressing the accelerator pedal to start the game on the chosen track.

At the starting line, a green flag indicates the race is on. During the race, the lead player's lap number is flashing. A white flag appears when the last lap is on. At the finish line, a checkered flag awaits the winner. At the end of each heat, players go to the "Winner's Circle" where racing statistics show the players' rankings, their best lap times, and their average lap times. Players who beat the drone cars continue in the game by going on to the next heat. Each new heat takes place on a new track.

During each race, players compete to collect gold wrenches that appear randomly on each track. These wrenches are a key element in the game because players can trade them in for custom car features. Players can customize their cars to suit their driving skills with the following options:

Table 1-2 Coin and Credit Option Settings

Settings of 8-Toggle Switch on Championship Sprint CPU PCB (at 6/7A) 1	2	3	4	5	6	7	8	Option
								Coins Per Credit
						Off	Off	1 Coin 1 Credit ◄
						Off	On	2 Coins 1 Credit
						On	Off	3 Coins 1 Credit
						On	On	4 Coins 1 Credit
								All Coin Mechanisms
			Off	Off	Off			1 Coin Counts as 1 Coin ◄
			Off	Off	On			1 Coin Counts as 2 Coins
			Off	On	Off			1 Coin Counts as 3 Coins
			Off	On	On			1 Coin Counts as 4 Coins
			On	Off	Off			1 Coin Counts as 5 Coins
			On	Off	On			1 Coin Counts as 6 Coins
			On	On	Off			1 Coin Counts as 7 Coins
			On	On	On			1 Coin Counts as 8 Coins
								Bonus Adder
Off	Off	Off						No Bonus Adder ◄
Off	Off	On						2 Coins Give 1 Extra Coin
Off	On	Off						4 Coins Give 1 Extra Coin
Off	On	On						4 Coins Give 2 Extra Coins
On	Off	Off						5 Coins Give 1 Extra Coin
On	Off	On						3 Coins Give 1 Extra Coin
On	On	On						Free Play

◄ *Manufacturer's recommended settings*

Table 1-3 Game Option Settings

Settings of 8-Toggle Switch on Championship Sprint CPU PCB (at 5/6A) 1	2	3	4	5	6	7	8	Option
								Drone Difficulty
						Off	On	Easy
						Off	Off	Medium ◄
						On	Off	Medium Hard
						On	On	Hard
								Track Hazard Difficulty
				Off	On			Easy
				Off	Off			Medium ◄
				On	Off			Medium Hard
				On	On			Hard
								Number of Wrenches to Customize Car
		Off	On					2
		Off	Off					3 ◄
		On	Off					4
		On	On					5
								Automatic High Score Reset After 2000 Plays
Off								Yes ◄
On								No

◄ *Manufacturer's recommended settings*

Super Traction—gives players more maneuverability around sharp turns.

Turbo Acceleration—gets players off to a fast start at the beginning of the game or after they crash.

Higher Top Speed—helps players stay in the lead, only if they can handle the high speed. (Beginning players learn quickly that this feature should be used with more practice.)

Fast Chopper—increases the speed of the helicopter recovery sequence.

There are five levels of each of these features for a total of 20 custom car bonuses. After completing five levels of Fast Chopper, players are also given an unlimited option of *increased score*, to motivate more skillful players who can gradually acquire all 20 car bonuses. Operators can select the number of wrenches required for each car bonus. Championship Sprint is shipped on a 3-wrench-per-bonus setting.

These bonus wrenches also provide additional player incentives that result in higher earnings: Players get to keep acquired custom car features if they lose to a drone car, as long as they use the add-a-coin feature in the game. Also, bonus wrenches are awarded to new players who enter a game on the more difficult tracks. Additionally, a bonus wrench is awarded to each winning car that betters the existing "best lap time" for each track.

Championship Sprint has eight different tracks, each one introducing new challenges. Jump ramps, opening and closing gates, hidden short cuts, over/under passes, and banked turns all require special driving maneuvers. Throughout each heat, players are introduced to new track obstacles such as oil spills, twisters, traffic cones, and "poppers." Special bonus score pads also appear that players can run over for points. Players will crash whenever they hit a wall at high speeds. Each time they crash, they must wait for a recovery period, indicated by the rescue helicopter that comes on the screen.

To complete the driving experience, Championship Sprint has detailed animation and custom stereo music with realistic sound effects.

Operator Hints

Here are some pointers for maximizing earnings from your System II Championship Sprint game.

Maximizing Earnings

The key to maximum earnings is striking a midpoint on game times. Initially, game times should be short enough to allow higher player turnover. At the same time, game times must be long enough to give the player good value and ensure repeat play.

Championship Sprint has a comprehensive statistics and coin accounting package, which is described in greater detail in Chapter 2 of this manual. To find out whether or not your players are getting adequate value for their money, you should evaluate the following information.

NOTE

For your convenience, a pre-printed, tear-out statistics sheet is included at the back of this manual. Use this sheet to track your Championship Sprint game statistics.

Average Game Times/Average Time Between Coin Drop

Two statistics are crucial in evaluating the appropriate option settings on your Championship Sprint game. First, check the average game time which is shown in the Accounting Information screen in the Self-Test Mode. If the game is set at the factory-recommended settings, initial game times should average between 2:00 and 3:00. If this is not the case, you should then check the average time between coin drop, which can be calculated by two readings shown on the Accounting Information screen.

To calculate: divide the total play time by the total games: ((No. of hours played × 60 + minutes) ÷ total games) × 60 = seconds between coin drop. This number should range from 65 to 90 seconds.

If a high percentage of your average game times are under 90 seconds, and your average time between coin drop is under 50 seconds, the current game settings may be too difficult. You should consider changing the drone difficulty to the EASY setting. If game times are still too short after one or two weeks, try changing the track hazard difficulty to the EASY setting.

Conversely, if a high percentage of your average game times are over 3:30, and your average time between coin drop is over 100 seconds, the current game settings may be too easy. Try changing the drone difficulty and the track hazard difficulty options to the MEDIUM HARD setting.

NOTE

The previously mentioned recommendations are based on one coin per play, U.S. currency.

Game Sounds

Your System II cabinet with the Championship Sprint game uses more effective audio than previous games, which results in more player involvement and enjoyment. The System II games use advanced digital sound-generation techniques to create realistic musical instrument sounds (such as clarinets, harmonicas, drums, and violins). Although a player may not be consciously aware

of the music, it has a direct effect on the excitement and emotional experience of the game.

The Championship Sprint game creates ear-catching sound effects, which are designed to give feedback to make the player believe that the game is responding directly to his actions. To maximize the player's enjoyment of this enhanced audio and maximize your earnings, consider the following hints:

1. The game location should be a relatively dead acoustical environment. The goal is to minimize unnecessary sound reflection, so that the sounds from the Championship Sprint game won't be drowned out by the accumulation of other sounds that bounce around the room. Carpets help eliminate sound reflections from the floor. Acoustical tile is also useful, especially if you have low ceilings.
2. If you use an environmental sound system or a stereo, consider lowering its volume or perhaps even turning it off. In the days when video games just made harsh beeps and boops, a central sound system helped make up for the lack of drive and excitement in a game's sounds. But your Championship Sprint game is very musical, and a sound system interferes with the game's ability to interest players and draw bystanders.
3. Be concerned with the overall volume levels in arcade environments. The goal is to involve the players' emotions, not to damage their hearing. To a certain point, raising the game volume helps add to player excitement, but above that level it creates hearing fatigue and the high volume starts to drive players away. Rather than turning up the volume on the Championship Sprint games to cut through the background sound level, try lowering the volume of any neighboring games that have sounds which are not an attractive or important element. Careful placement of games and attention to unnecessary noise sources can also help increase the player's sense of game involvement and interaction.

Chapter 2

Self-Test

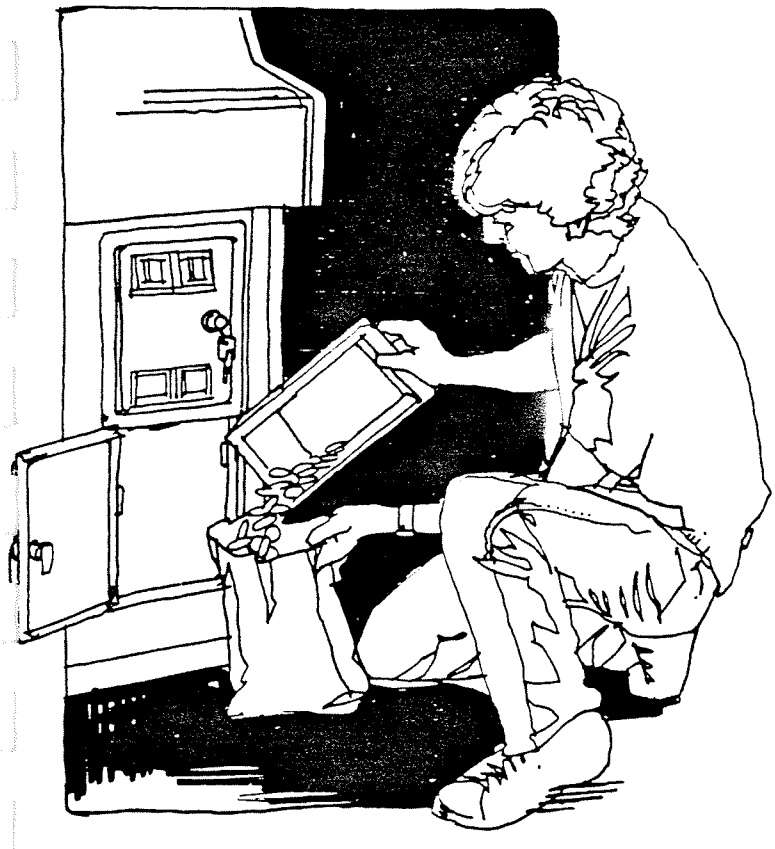
This game tests itself and provides visual and audible indications of the condition of the game circuitry and controls. Self-test information is displayed on the screen and sent through the sound system. No additional equipment is required.

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. Coin and game option settings are displayed in the Self-Test Mode.

Thirteen self-test screens provide a visual and audible check of the Championship Sprint™ game circuits. Refer to Chapter 1 for the self-test switch location.

The Self-Test Mode can be entered immediately after turning on the game power, either from the Play Mode or from the Attract Mode. If the self-test switch is turned on during the Play or the Attract Mode, the first display to appear is the 6502 Processor Test. By pressing the red start (right) button, the self-test advances to the Pedal Test. The self-test then advances from the Pedal Test to the end. The game power must be turned off, the self-test switch turned on, and the game power turned on again to start the self-test with the RAM/Interrupt/ROM Test.

The following self-test procedure is presented in the sequence in which the self-test screens appear when the self-test switch is turned on and *then* the game power is turned on. Turning off the self-test switch at any time during the self-test causes the game to return to the Attract Mode.



NOTE

During any of the self-tests, press the red start (or right) button to advance to the next screen.

RAM/Interrupt/ROM Test

The RAM/Interrupt/ROM Test screens are shown in Figures 2-1, 2-2, and 2-3. These screens display the failure information for the RAM, interrupt, and program ROM circuitry on the CPU and Video PCBs. If the RAM/Interrupt/ROM test passes, the display advances to the 6502 Processor Test.

The RAM test checks the condition of the T-11 microprocessor RAM, zero page RAM, motion object RAM, playfield RAM, alphanumeric RAM, and associated circuitry located on the Video PCB. If the RAM test fails, an error message gives the location of the failed RAM or associated circuitry on the Video PCB as shown in Figure 2-1.

If the zero-page RAM or associated circuitry fails, the screen turns red and the address location of the failed component flashes continuously to facilitate troubleshooting.

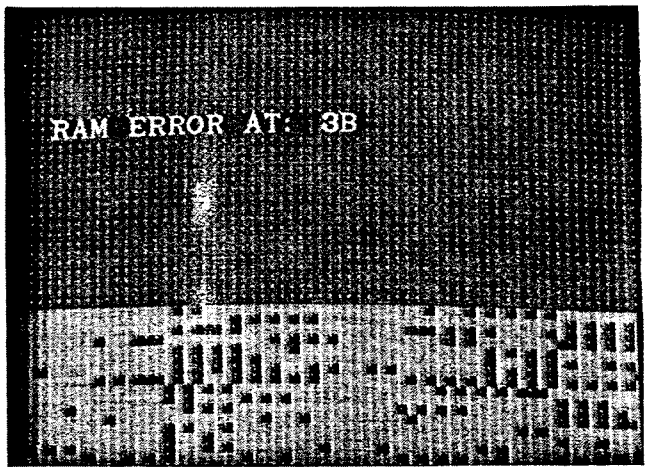


Figure 2-1 RAM Test Fails

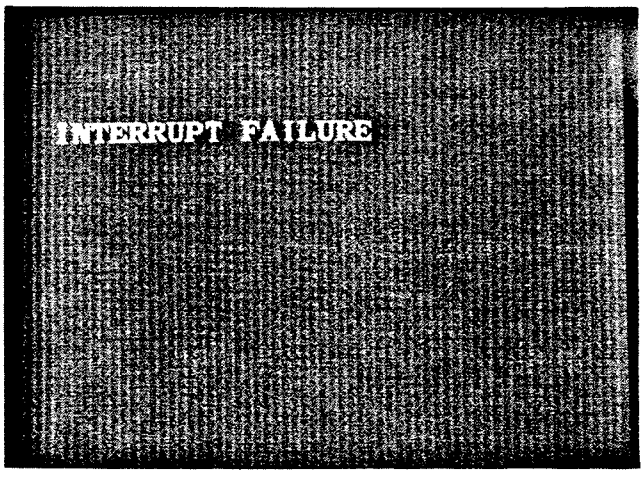


Figure 2-2 Interrupt Test Fails

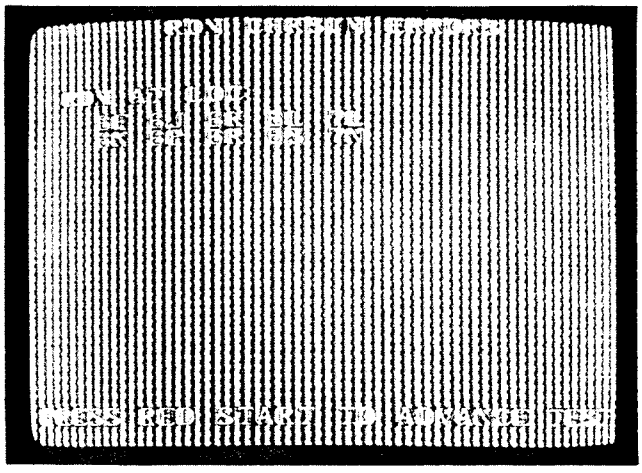


Figure 2-3 ROM Test Fails

After the RAM test passes, the interrupts on the CPU and Video PCB are checked. If the interrupt test fails, an error message as shown in Figure 2-2 can appear on a green screen, which indicates a possible vertical-blanking or interrupt-logic failure.

After the interrupt test passes, all eight of the program ROMs on the CPU PCB are tested for checksums. If the ROM test fails, an error message gives the location of the failed ROM or associated circuitry as shown in Figure 2-3.

6502 Processor Test

The 6502 Processor Test screen provides visual and audible information to indicate the condition of the 6502 sound microprocessor and associated circuitry. All functions of the sound microprocessor are checked including: RAM/ROM, interrupts, music synthesizer, and sound-effects processor. Basic communication between the T-11 (master) and the 6502 (slave) microprocessors is also checked.

The 6502 test starts with a reset/communications check that first resets the 6502 and then checks for proper response to start up protocol. This test checks the communications ports (T-11 to 6502 and 6502 to T-11), the 6502 reset circuit, and the general condition of the 6502.

If the 6502 circuitry does not respond properly to the reset, the system retries the reset procedure ten times. Then an error message and retry count number is displayed as shown in Figure 2-4.

If the 6502 circuitry fails to reset through all ten attempts, a communications error message is displayed as shown in Figure 2-5.

If the reset/communications check passes, then the condition of the 6502 microprocessor, RAM, ROM, interrupts, music (Yamaha) synthesizer, and associated circuitry is checked. If one or more of these circuits fails, an error message is displayed as shown in Figure 2-6.

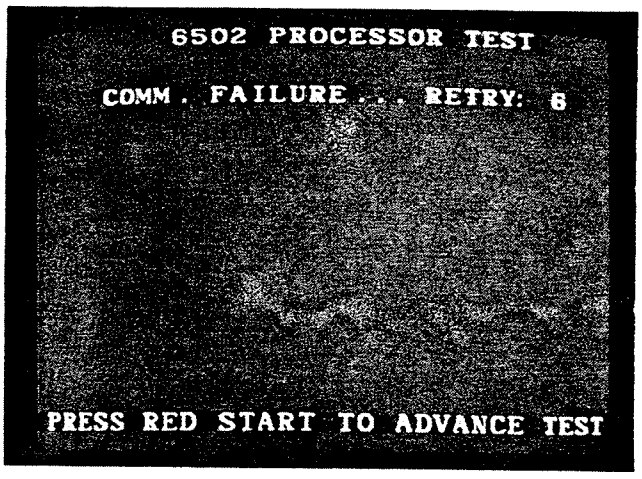


Figure 2-4 Reset Retry

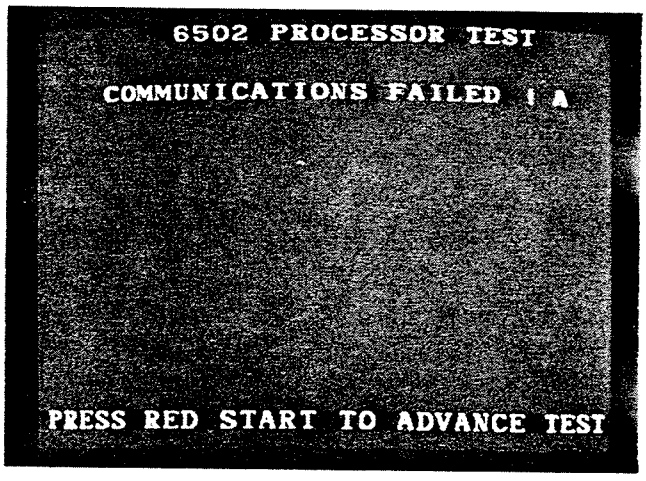


Figure 2-5 Communications Fails

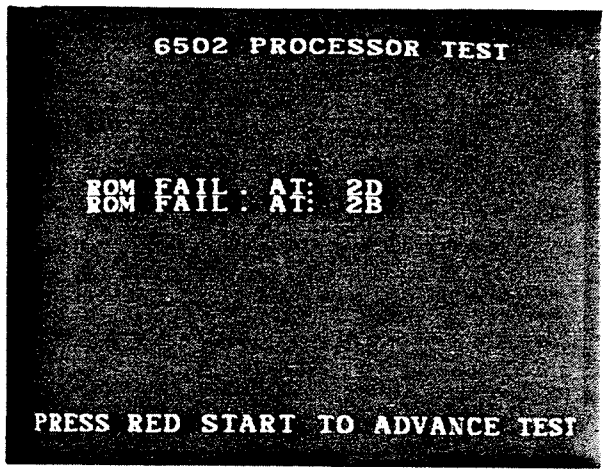


Figure 2-6 Music/RAM/ROM Fails

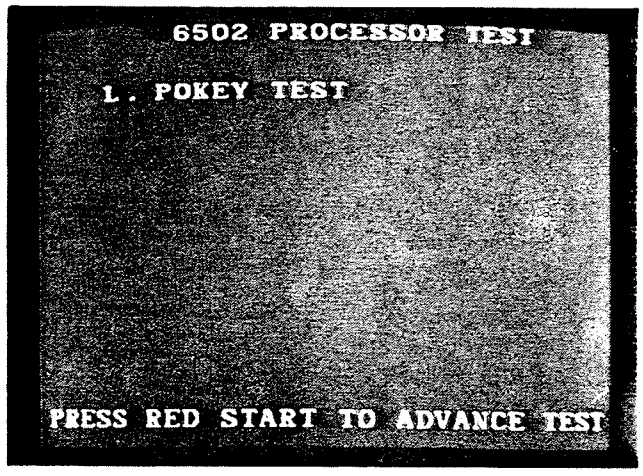


Figure 2-7 Sound Output

If the RAM, ROM, and music synthesizer check passes, then the music (Yamaha) synthesizer, and sound-effects generator (POKEY) sound outputs are checked. As each of these three tests is run, an appropriate message is displayed as shown in Figure 2-7.

- *YAMAHA TEST* consists of eight tones in a major scale that alternate between left and right sound channels (16 tones total).
- *L. POKEY TEST* consists of four tones in a major chord that come from the left sound channel.
- *R. POKEY TEST* consists of four tones in a major chord that come from the right sound channel.

After the three sound output tests are completed, the sound status messages are displayed as shown in Figure 2-8.

- *NUMBER OF SOUNDS* is the total number of sounds used in the Championship Sprint game.
- *CURRENT SOUND* is the current sound selected for playing.

Press the blue car button to select the sound numbers indicated by the *CURRENT SOUND* message shown in Figure 2-8. Turn the blue car steering wheel to sequence through the selected sounds.

The sound status screen also indicates the condition of the left and right coin switches. Press the left and right coin switches, and check the screen for a corresponding *LEFT COIN* and *RIGHT COIN* message. (See Figure 1-2 in Chapter 1 for the switch locations.)

Press the red start button to obtain the next screen.

Pedal Test

The Pedal Test screen is shown in Figure 2-9. This screen indicates the condition of the two foot pedal potentiometers, A/D converter, blue car switch, and associated cir-

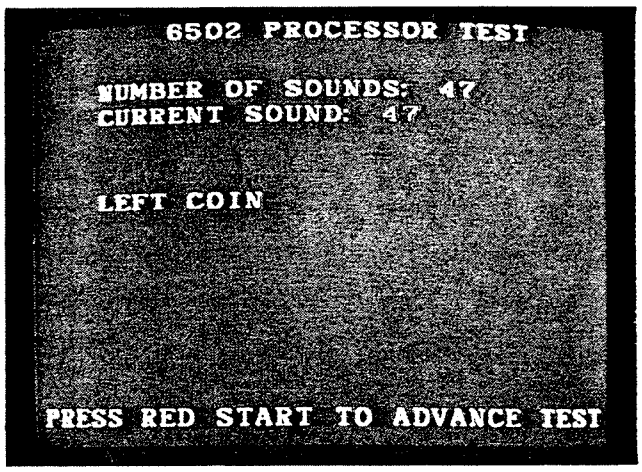


Figure 2-8 Sound Status

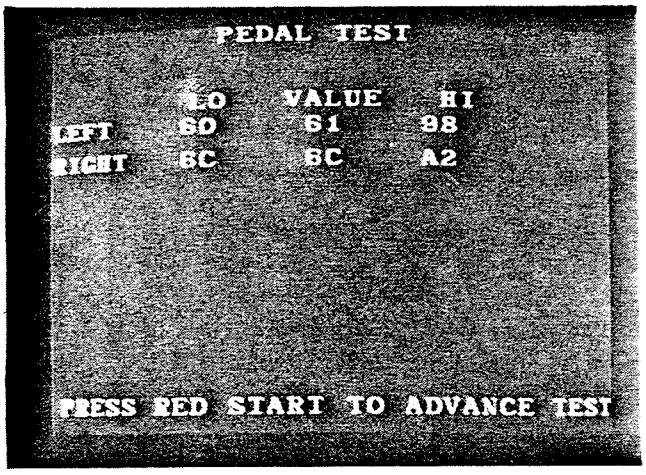


Figure 2-9 Pedal Test Passes

cuitry. (It is assumed that the red start switch works because it was used to advance to this screen.) The Pedal Test screen is also used to calibrate the foot pedal potentiometers.

Press the blue car button to obtain the Pedal Test screen shown in Figure 2-9.

If the range of the foot pedal potentiometers (low to high) is large enough, then the message *OK* is displayed next to the appropriate control range reading. If the range is too small, then the message *BAD* is displayed.

Calibration Procedure

The foot pedal controls are calibrated at the factory and should recalibrate themselves during game play. However, if the foot pedals do not respond correctly, calibrate each one as follows:

1. Press and hold down the blue car button. Press the red car button once.
2. While holding down the blue button, cycle each foot pedal to its extreme up and down positions. Check the display screen; each foot pedal range should read *OK*. Then release the blue car button. Press the red start button.

> **NOTE**
>
> After completing the calibration procedure, you *must* press the red start button to save the calibration. Pressing the button also advances the screen at this point.

3. If the pedal problem persists, check the physical alignment of each foot pedal potentiometer.

Leta Test

The Leta Test screen is shown in Figure 2-10. This screen indicates the condition of the steering wheel circuitry. Each wheel should display a zero value when the wheel is idle. Turning each wheel in either direction should change at least one of the zero values to a non-zero value.

Press the red start button to obtain the next screen.

Alphanumeric Test

The Alphanumeric Test screen is shown in Figure 2-11. This screen indicates the condition of the alphanumeric ROM, alphanumeric color palettes, and associated circuitry.

The displayed alphanumeric characters are in four rows, with the first row white, the second row red, the third row yellow, and the fourth row green. If not, then there may be a problem with the color palette select circuits.

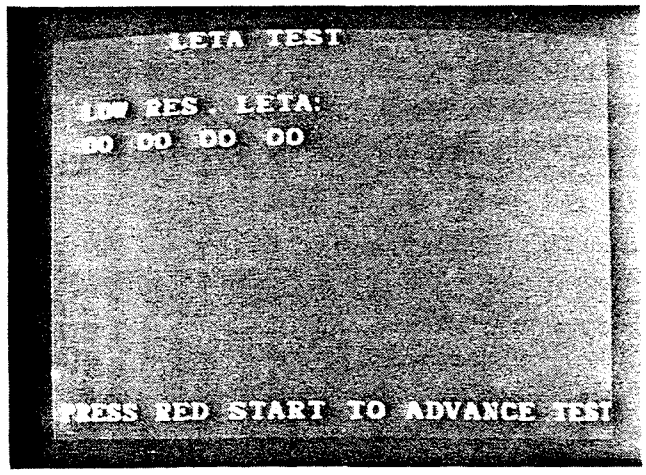


Figure 2-10 Leta Test

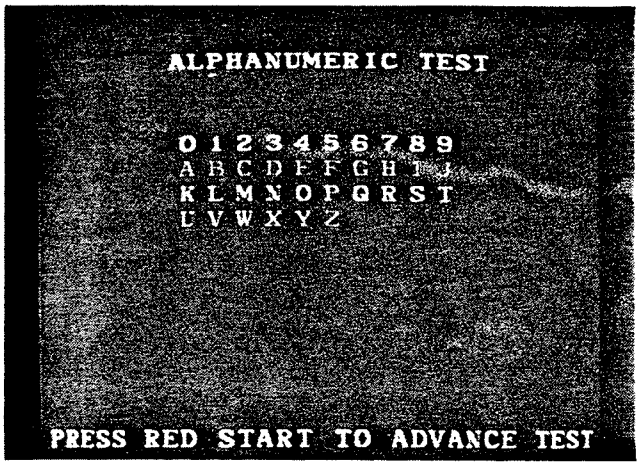


Figure 2-11 Alphanumeric Test

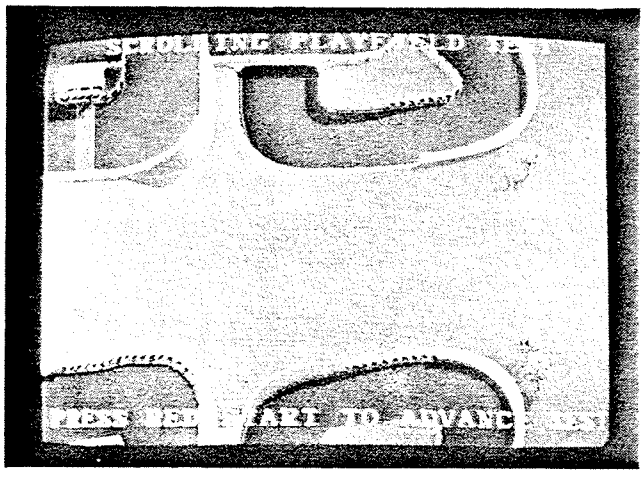


Figure 2-12 Scrolling Playfield Test

Press the red start button to obtain the next screen.

Scrolling Playfield Test

The Scrolling Playfield Test screen is shown in Figure 2-12. This screen indicates the condition of the playfield ROM, playfield display circuits, and playfield color palettes.

The display in Figure 2-12 shows a racetrack. Turn the blue car (left) steering wheel to control forward and backward scrolling. Turn the red car (right) steering wheel to control the right and left scrolling. Note that the display scrolls correspondingly.

Press the red start button to obtain the next screen.

Motion Object Test

The first Motion Object Test screen is shown in Figure 2-13. This test indicates the motion object horizontal and vertical display locations, motion-object color palettes, and the motion/playfield prioritizing logic circuit.

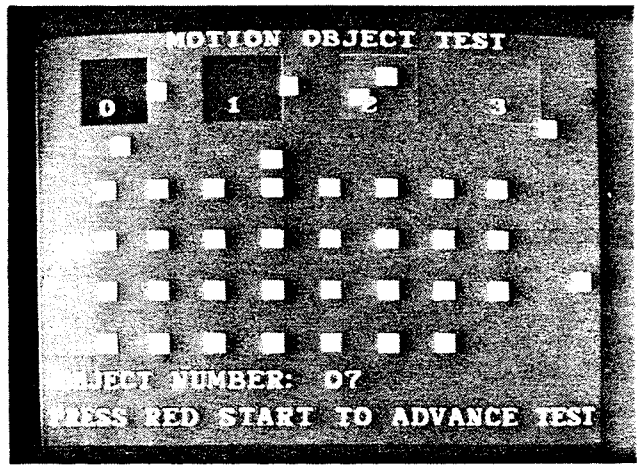


Figure 2-13 Motion Object Test

The Motion Object Test screen should show 39 motion objects and four colored boxes (numbered 0 through 3). The left two boxes (0 and 1) should be red, and the right two boxes (2 and 3) should be green. The motion objects should be colored (from left to right) blue, light blue, purple, and white. Any error in color can indicate a problem with the color palette select circuits.

Turn the red car steering wheel to control forward and backward scrolling, and the blue car steering wheel to control right and left scrolling. Note that the currently displayed motion object moves correspondingly. Move the motion object across the four colored boxes. Note that the motion object moves *behind* the red boxes and *in front of* the green boxes. Press the blue car button to select the next motion object and repeat the preceding procedure. This procedure checks the prioritizing logic circuitry.

Press the red start button to obtain the next screen.

Motion Object Height Test

The Motion Object Height Test screen is shown in Figure 2-14. This test indicates the motion object height circuit and the horizontal load disable circuit.

Each successive column of motion objects should be 16 pixels taller than the last. The top 16 pixels of each column should be the same. Each column should add a new 16×16 pixel stamp picture to the bottom and slide the previous one up by 16 pixels. Turn the blue car and the red car steering wheels to move the entire picture around on the screen. Press the blue car button to obtain a new set of motion objects.

Press the red start button to obtain the next screen.

N O T E S

Switching/Linear (SL) Power Supply Assembly Parts List

Part No.	Description
A042384-01	Line Filter Assembly
A043366-01	5 V Harness Assembly
A043367-xx	Jumper Assembly
46-2012002	250 V Slow-Blow 2 A Fuse
46-2013002	250 V Slow-Blow 3 A Fuse
72-HA4606S	#6-32 × 3/8-Inch Cross-Recessed Pan-Head Thread-Forming Screw
72-HA4806S	#8-32 × 3/8-Inch Cross-Recessed Pan-Head Thread-Forming Screw
034544-01	Fuse Block Cover
037640-01	Power Supply Warning Label
043396-01	Power Supply Chassis Base
043622-01	Power Supply Fuse Label
142042-001	Transformer
149003-xxx	5 V 10 A Switching Power Supply Assembly
176017-006	#M3 × 6 mm Stainless Steel Machine Screw
179225-2205	5-Position Fuse Block OR
79-3206	5-Position Fuse Block
179231-002	2-Position Terminal Block

Sierracin 5-Volt Power Supply Assembly A043785-04 A Parts List

Part No.	Description
99-207001	Chassis
99-207002	Strap, Small Black Cable
99-207003	Box, #172 Indestructible
99-207004	Assembly, PCB
99-207005	Diode, 100 V, 1 A, 1N4002
99-207006	Diode, 100 V, 3 A, Standard Recovery
99-207007	Thyristor, SCR, Sens Gate, 30 V, 4 A, TO220AB
99-207008	Diode, Zener, 6.2 V, 400 mW, 1N753A
99-207009	Regulator, 723 Standard DIP Voltage
99-207010	3055 Transistor, 75 W, NPN, SEL, TO-220
99-207011	2N2219A Transistor, NPN, TO-5
99-207012	Capacitor, Electrolytic, 220 Ω, 16 V, Radial
99-207013	Capacitor, Electrolytic, 10 kΩ, 16 V, Axial
99-207014	Capacitor, Poly Film, .0047 μF, 100 V
99-207015	Resistor, 100 Ω, ± 5%, ¼ W,
99-207016	Resistor, 1 kΩ, ± 5%, ¼ W
99-207017	Resistor, 1.5 kΩ ± 5%, ¼ W,
99-207018	Resistor, 4.7 kΩ ± 5%, ¼ W,
99-207019	Resistor, 820 Ω ± 5%, ¼ W,
99-207020	Potentiometer, 500 Ω, ± 20%, 2 W, Horizontal
99-207021	Resistor, Metal Oxide, .10 Ω, 2 W,
99-207022	Tie Mount, PCB, TM-35B-M
99-207023	Cable Strap, Medium Black
99-207024	Terminal, Swage Double Turret
99-207025	Terminal, Swage Double Turret
99-207026	Standoff, 4-40 × .200 Threaded
99-207027	Fabrication, 2.43 × 3.85 PCB
99-207028	Transformer

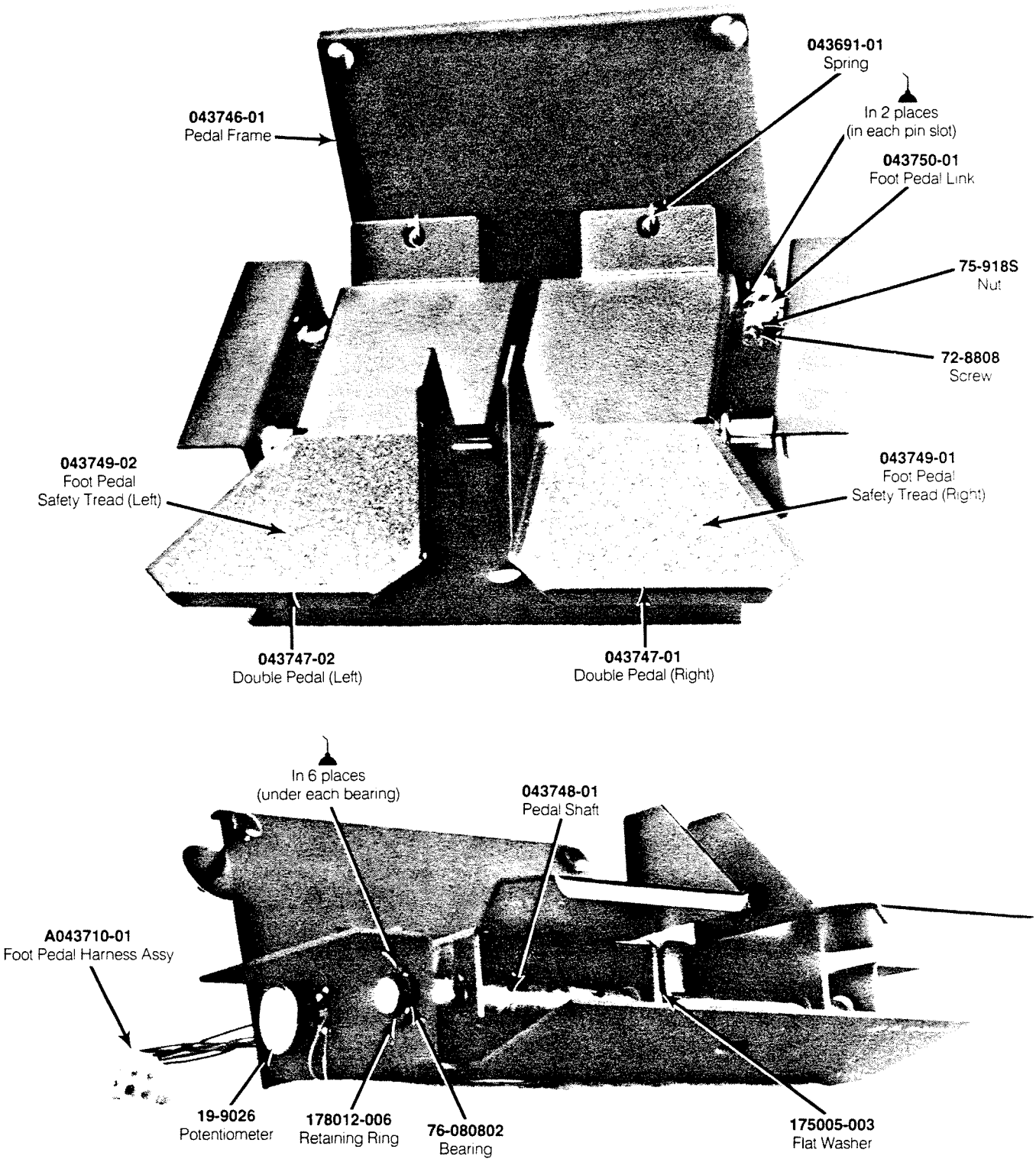


Figure 5-6 Foot Pedal Assembly
A043745-01 B

Foot Pedal Assembly
Parts List

Part No.	Description
A043710-01	Dual Foot Pedal Harness Assembly
19-9026	5 kΩ Potentiometer with Hex Nut and Lock Washer
72-8808	#8-32 × ½-Inch Hex Socket-Head Cap Screw
75-918S	#8-32 Steel Cadium Hex Machine Nut
76-080802	½-Inch I.D. × 1/8-Inch Bearing (Nyliner)
043691-01	Pedal Return Spring
043746-01	Pedal Frame
043747-01	Double Pedal (Right)
043747-02	Double Pedal (Left)
043748-01	Pedal Shaft
043749-01	Foot Pedal Safety Tread (Right)
043749-02	Foot Pedal Safety Tread (Left)
043750-01	Foot Pedal Link
107027-001	Multi-Use Lithium-Base Lubricant
175005-003	.60 Thick .505 I.D. 1.00 O.D. × ½-Inch Flat Washer
178012-006	½-Inch Diameter Shaft Retaining Ring

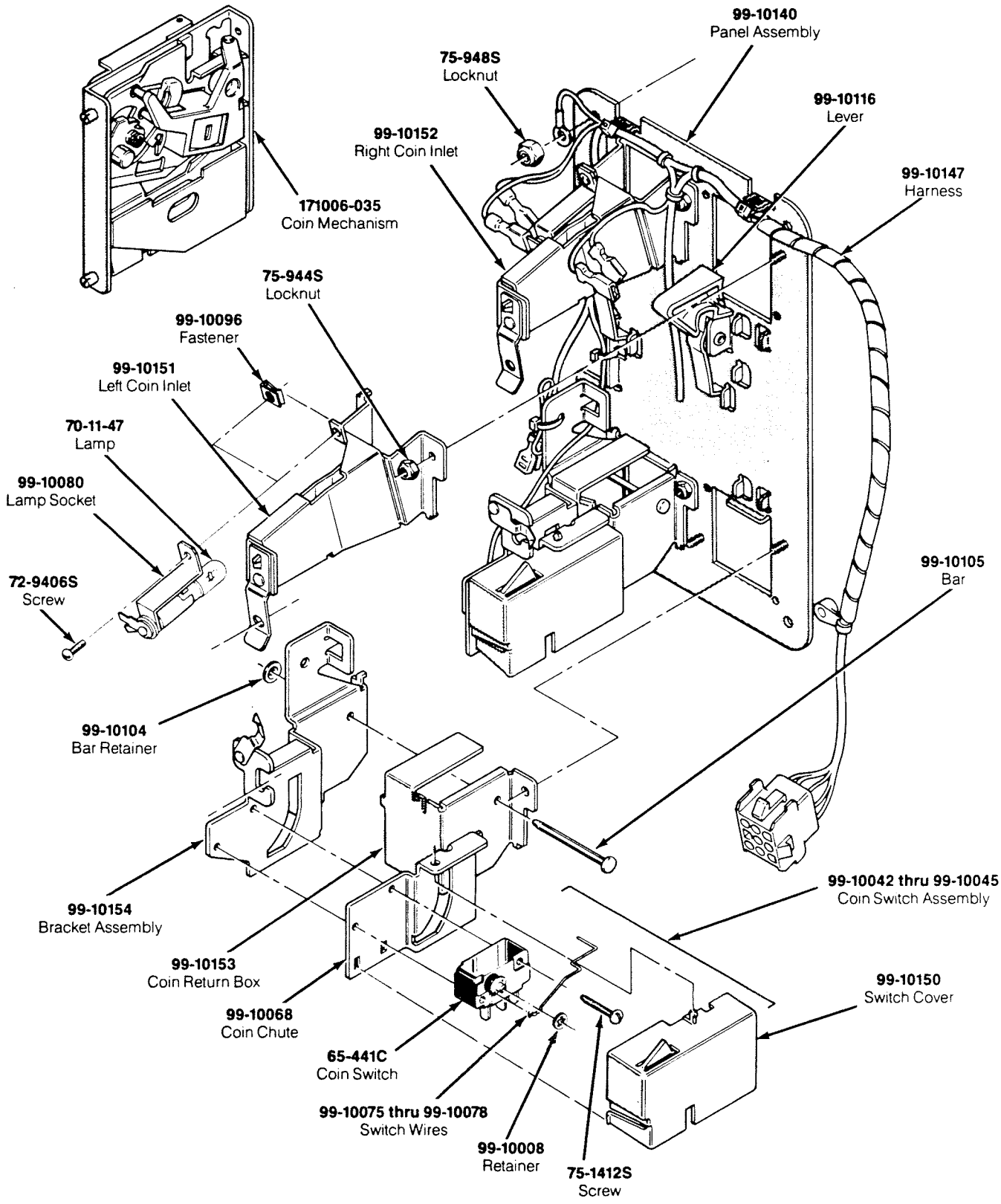
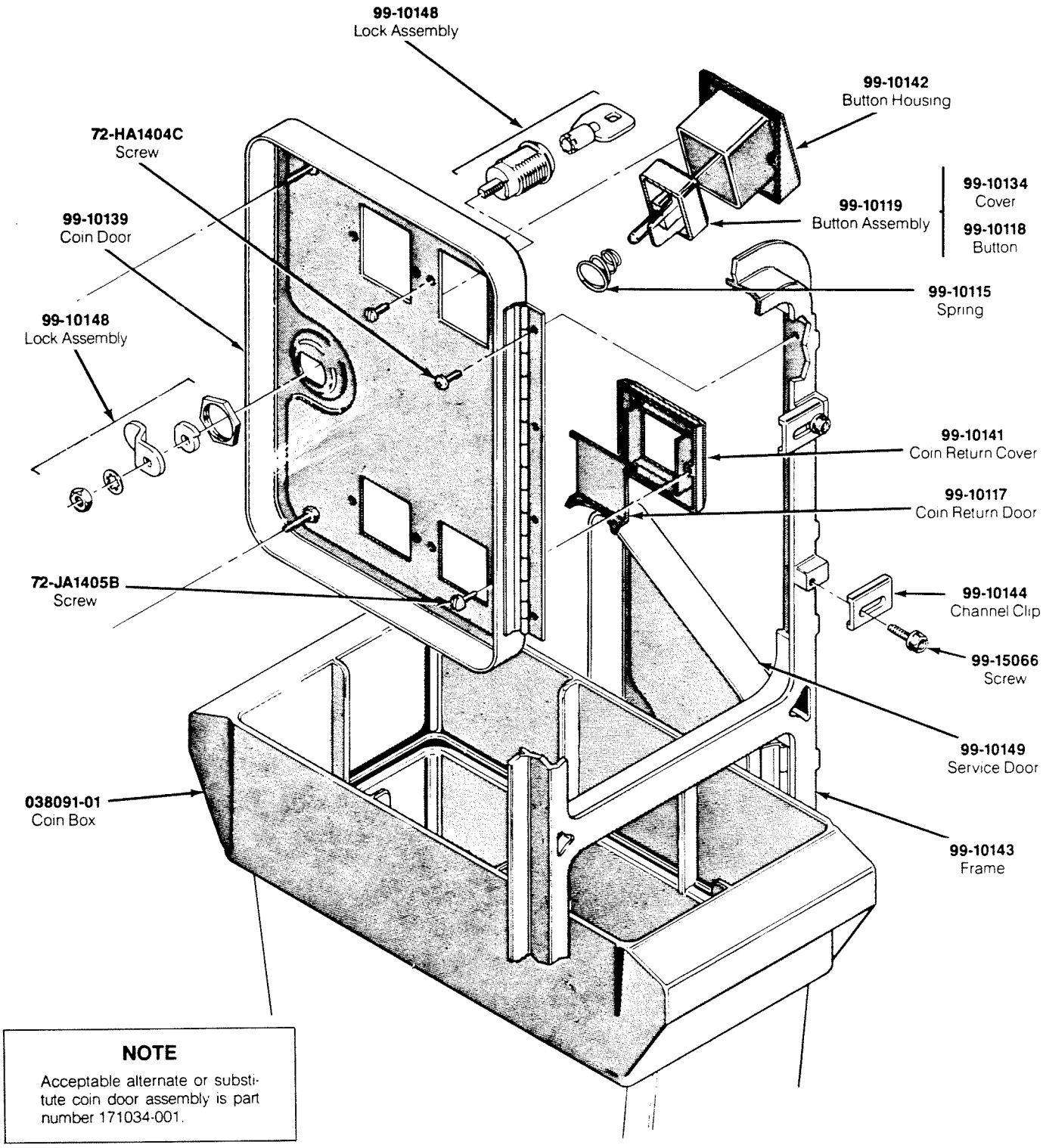


Figure 5-7 Coin Acceptors, Inc. Coin Door Assembly 171027-001 A



NOTE

Acceptable alternate or substitute coin door assembly is part number 171034-001.

Figure 5-7 Coin Acceptors, Inc. Coin Door Assembly, Continued
171027-001 A

Coin Acceptors, Inc. Coin Door Assembly Parts List

Part No.	Description
65-441C	Coin Switch
70-11-47	Miniature Bayonet Lamp
72-9406S	#4-40 x 3/8-Inch Truss-Head Screw
72-HA1404C	#4-40 x 1/4-Inch Pan-Head Screw
72-JA1405B	#4-40 x .31-Inch Pan-Head Screw
75-1412S	#4-40 x 3/4-Inch Pan-Head Screw
75-994S	#4-40 Locknut
99-10008	Retainer
99-10042	Coin Switch Assembly for Belgium 5 Fr and U.S. $.25
99-10043	Coin Switch Assembly for German 1 DM, Japanese 100 Yen, Swiss 1 Fr
99-10044	Coin Switch Assembly for German 2 DM, Italian 100 L, U.S. $1.00
99-10045	Coin Switch Assembly for Australian $.20, German 5 DM, British 10 P
99-10068	Coin Return Chute
99-10075	Switch Wire (included in coin switch assembly 99-10043)
99-10076	Switch Wire (included in coin switch assembly 99-10042)
99-10077	Switch Wire (included in coin switch assembly 99-10044)
99-10078	Switch Wire (included in coin switch assembly 99-10045)
99-10080	Lamp Socket
99-10081	Key Holder
99-10096	Fastener
99-10104	Bar Retainer
99-10105	Bar
99-10115	Spring
99-10116	Plastic Coin Return Lever
99-10117	Steel Coin Return Door
99-10118	Amber Coin Return Button
99-10119	Amber Coin Button for U.S. $.25
99-10134	Coin Button Cover
99-10139	Coin Door
99-10140	Coin Door Inner-Panel Assembly
99-10141	Die-Cast Coin Return Cover
99-10142	Die-Cast Button Housing
99-10143	Coin Door Frame
99-10144	Channel Clip
99-10147	Harness
99-10148	Lock Assembly
99-10149	Service Door
99-10150	Switch Cover
99-10151	Left Coin Inlet
99-10152	Right Coin Inlet
99-10153	Coin Return Box
99-10154	Bracket Assembly
99-15066	Screw for Clamp
171006-035	Metal Coin Mechanism for U.S. $.25

N O T E S

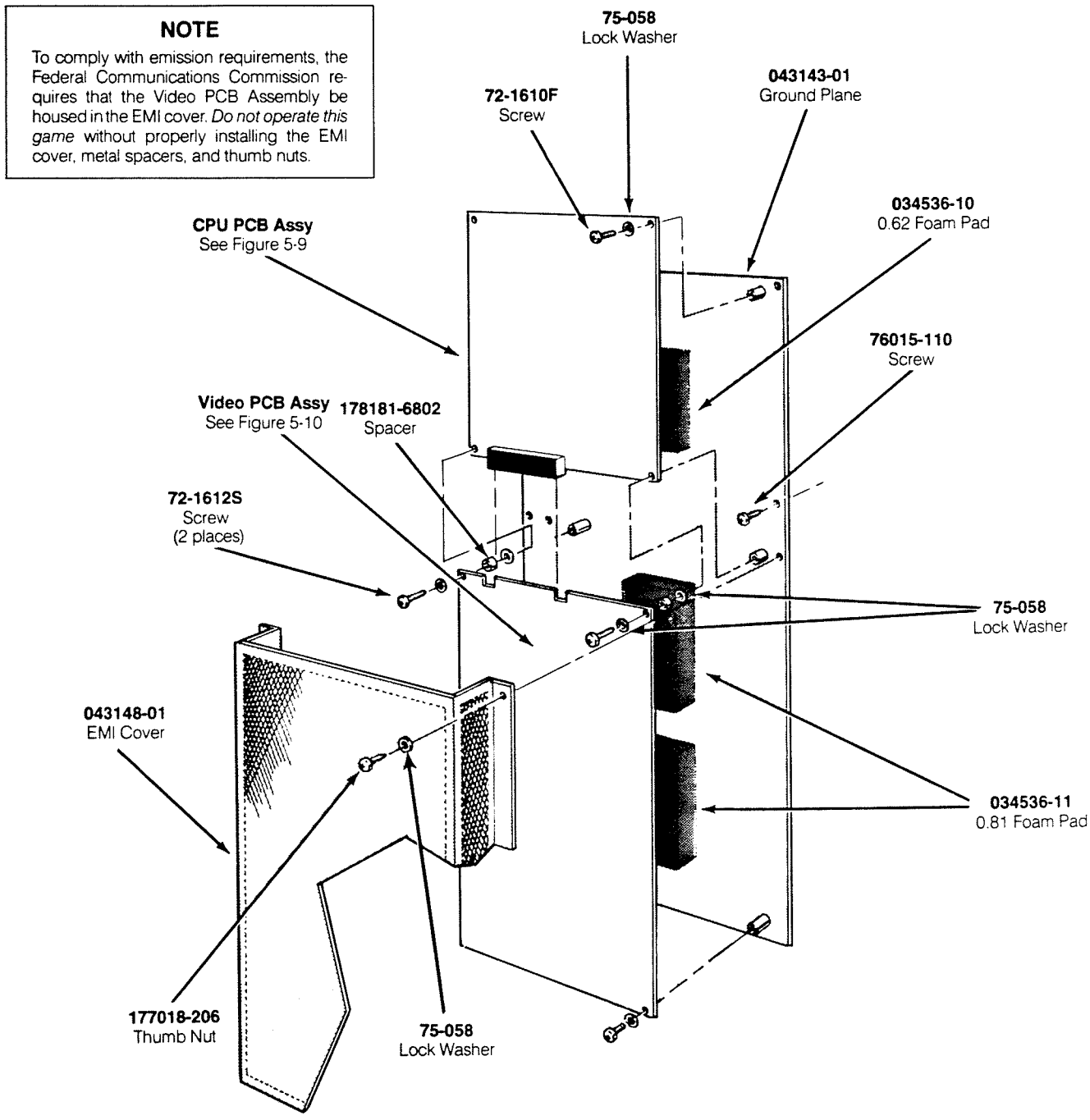


Figure 5-8 PCB Mounting Hardware

PCB Mounting Hardware
Parts List

Part No.	Description
A043734-01	Video PCB Assembly
A042735-01	CPU PCB Assembly
72-1610F	#6-32 x 5/8-Inch Pan-Head Screw
72-1612S	#6-32 x ¾-Inch Pan-Head Screw
75-058	#8 Internal Tooth Lock Washer
034536-10	0.62-Inch Foam Vibration Damper
034536-11	0.81-Inch Foam Vibration Damper
043544-01	Ground Plane
043148-01	EMI Cover
176015-110	10 x 5/8-Inch Cross-Recessed Pan-Head Screw
177018-206	#6-32 Knurled Brass Thumb Nut
178181-6802	Round Spacer

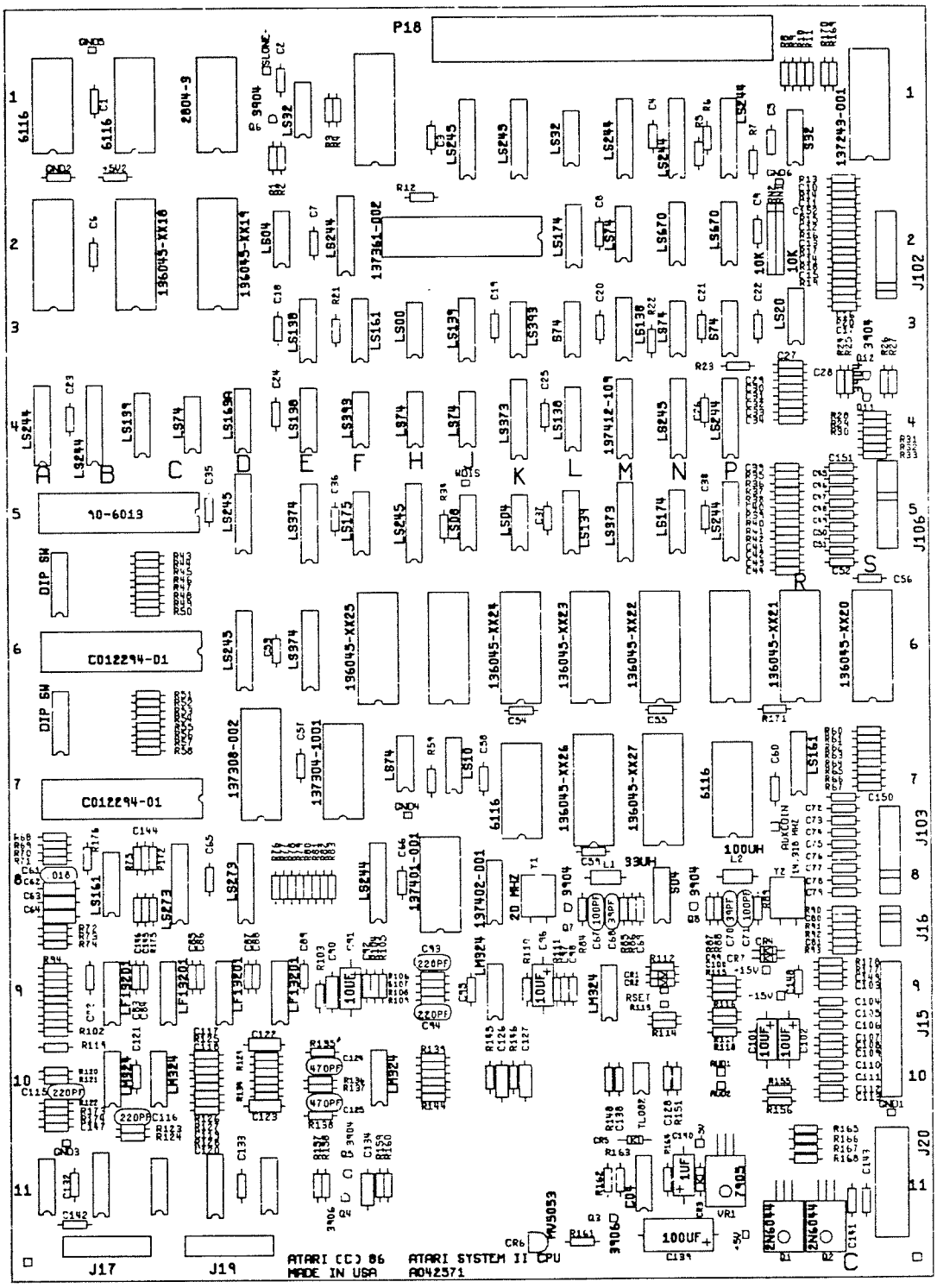


Figure 5-9 Central Processing Unit (CPU) PCB Assembly A043735-01 A

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Central Processing Unit (CPU) PCB Assembly
Parts List

Designator	Description	Part No.
	The following set of four ICs is used in the German Championship Sprint CPU PCB only:	
6F	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x225
6N	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x222
7L	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x226
7N	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x227
	Integrated Circuits	
1A	Integrated Circuit, Type-6116	137211-001
1B/C	Integrated Circuit, Type-6116	137211-001
1D	Integrated Circuit, Type-2804-3 EEPROM	137329-300
1E	Integrated Circuit, Type-74LS32	37-74LS32
1J	Integrated Circuit, Type-74LS245	37-74LS245
1K	Integrated Circuit, Type-74LS245	37-74LS245
1L	Integrated Circuit, Type-74LS32	37-74LS32
1M	Integrated Circuit, Type-74LS244	37-74LS244
1N	Integrated Circuit, Type-74LS244	37-74LS244
1P	Integrated Circuit, Type-74LS244	37-74LS244
1R	Integrated Circuit, Type-74S32	37-74S32
1S	Integrated Circuit, Type-ADC0809	137243-001
2B/C	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x118
2D	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x119
2D/E	Integrated Circuit, Type-74LS04	37-74LS04
2F	Integrated Circuit, Type-74LS244	37-74LS244
2J	Integrated Circuit, Type-T11 (DCT11-XA)	137361-002
2L	Integrated Circuit, Type-74LS174	37-74LS174
2M	Integrated Circuit, Type-74LS74	37-74LS74
2N	Integrated Circuit, Type-74LS670	37-74LS670
2P	Integrated Circuit, Type-74LS670	37-74LS670
3E	Integrated Circuit, Type-74LS138	137177-001
3F	Integrated Circuit, Type-74LS161	37-74LS161
3H	Integrated Circuit, Type-74LS00	37-74LS00
3J	Integrated Circuit, Type-74LS139	37-74LS139
3K	Integrated Circuit, Type-74LS393	37-74LS393
3L	Integrated Circuit, Type-74S74	37-74S74
3M	Integrated Circuit, Type-74LS138	137177-001
3N	Integrated Circuit, Type-74LS74	37-74LS74
3P	Integrated Circuit, Type-74S74	37-74S74
3R	Integrated Circuit, Type-74LS20	37-74LS20
4A	Integrated Circuit, Type-74LS244	37-74LS244
4A/B	Integrated Circuit, Type-74LS244	37-74LS244
4B/C	Integrated Circuit, Type-74LS139	37-74LS139
4C/D	Integrated Circuit, Type-74LS74	37-74LS74
4D	Integrated Circuit, Type-74LS163A	37-74LS163A
4E	Integrated Circuit, Type-74LS138	137177-001
4F	Integrated Circuit, Type-74LS393	37-74LS393
4H	Integrated Circuit, Type-74LS74	37-74LS74
4J	Integrated Circuit, Type-74LS74	37-74LS74

"x" in the part number denotes the revision level

Central Processing Unit (CPU) PCB Assembly
Parts List, Continued

Designator	Description	Part No.
4K	Integrated Circuit, Type-74LS373	37-74LS373
4L	Integrated Circuit, Type-74LS138	137177-001
4M	Integrated Circuit, SLAPSTIC	137412-109
4N	Integrated Circuit, Type-74LS245	37-74LS245
4P	Integrated Circuit, Type-74LS244	37-74LS244
5B	Integrated Circuit, Type-6502A	90-6013
5D	Integrated Circuit, Type-74LS245	37-74LS245
5E	Integrated Circuit, Type-74LS374	37-74LS374
5F	Integrated Circuit, Type-74LS175	37-74LS175
5H	Integrated Circuit, Type-74LS245	37-74LS245
5J	Integrated Circuit, Type-74LS08	37-74LS08
5K	Integrated Circuit, Type-74LS04	37-74LS04
5L	Integrated Circuit, Type-74LS139	37-74LS139
5M	Integrated Circuit, Type-74LS373	37-74LS373
5N	Integrated Circuit, Type-74LS174	37-74LS174
5P	Integrated Circuit, Type-74LS244	37-74LS244
6B	Integrated Circuit, POKEY	C012294-01
6D	Integrated Circuit, Type-74LS245	37-74LS245
6E	Integrated Circuit, Type-74LS374	37-74LS374
6F	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x125
6K	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x124
6L	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x123
6N	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x122
6R	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x121
6S	Integrated Circuit, EPROM, Type-27256, 300 ns	136045-x120
7B	Integrated Circuit, POKEY	C012294-01
7D	Integrated Circuit, Type-TMS5220C	137308-002
7F	Integrated Circuit, Leta	137304-1001
7H	Integrated Circuit, Type-74LS74	37-74LS74
7J	Integrated Circuit, Type-74LS10	37-74LS10
7K	Integrated Circuit, Type-6116	137211-001
7L	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x126
7N	Integrated Circuit, EPROM, Type-27128, 300 ns	136045-x127
7P	Integrated Circuit, Type-6116	137211-001
7R	Integrated Circuit, Type-74LS161	37-74LS161
8B	Integrated Circuit, Type-74LS161	37-74LS161
8C	Integrated Circuit, Type-74LS273	37-74LS273
8D	Integrated Circuit, Type-74LS273	37-74LS273
8F	Integrated Circuit, Type-74LS244	37-74LS244
8H/J	Integrated Circuit, Type-Y2151	137401-001
8J/K	Integrated Circuit, Type-YM3012	137402-001
8N	Integrated Circuit, Type-74S04	37-74S04
9B	Integrated Circuit, Type-LF13201	137352-001
9C	Integrated Circuit, Type-LF13201	137352-001
9D	Integrated Circuit, Type-LF13201	137352-001
9D/E	Integrated Circuit, Type-LF13201	137352-001

"x" in the part number denotes the revision level

Central Processing Unit (CPU) PCB Assembly Parts List, Continued

Designator	Description	Part No.
9J/K	Integrated Circuit, Type-LM324	37-LM324
9L/M	Integrated Circuit, Type-LM324	37-LM324
10B	Integrated Circuit, Type-LM324	37-LM324
10C	Integrated Circuit, Type-LM324	37-LM324
10F	Integrated Circuit, Type-LM324	37-LM324
10L/M	Integrated Circuit, Type-TLO82CP	37-TLO82CP
11M	Integrated Circuit, Type-74C04	137309-001
	Sockets	
	Socket, Medium-Insertion-Force, 16-Pin	79-42C16
	Socket, Medium-Insertion-Force, 20-Pin	79-42C20
	Socket, Medium-Insertion-Force, 24-Pin	79-42C24
	Socket, Medium-Insertion-Force, 28-Pin	79-42C28
	Socket, Medium-Insertion-Force, 40-Pin	79-42C40
	Capacitors	
C1–C60	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C31–C60	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C61	Capacitor, Ceramic, .018 μF, 50 V	122015-183
C62–C64	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C65	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C66	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C67	Capacitor, Mica, 100 pF, 100 V	128002-101
C68	Capacitor, Mica, 39 pF, 100 V	128002-390
C69	Capacitor, Ceramic, .1μF, 50 V	122002-104
C70	Capacitor, Mica, 39 pF, 100 V	128002-390
C71	Capacitor, Mica, 100 pF, 100 V	128002-101
C72–C79	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C80	Capacitor, Ceramic, .001 μF, 50 V	122002-102
C81	Capacitor, Ceramic, .001 μF, 50 V	122002-102
C82–C89	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C90	Capacitor, Ceramic, .22, 25 V	122004-224
C91	Capacitor, Tantalum, 10 μF, 20 V	29-046
C92	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C93	Capacitor, Mica, 220 pF, 100 V	128002-221
C94	Capacitor, Mica, 220 pF, 100 V	128002-221
C95	Capacitor, Ceramic, .0027 μF, 50 V	122015-272
C96	Capacitor, Tantalum, 10 μF, 20 V	29-046
C97	Capacitor, Ceramic, .0027 μF, 50 V	122015-272
C98–C100	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C101	Capacitor, Aluminum, 10 μF, 35 V	24-350106
C102	Capacitor, Aluminum, 10 μF, 35 V	24-350106
C103–C109	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C110	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C111	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C112	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C113	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C115	Capacitor, Mica, 220 pF, 100 V	128002-221

Central Processing Unit (CPU) PCB Assembly
Parts List, Continued

Designator	Description	Part No.
C116	Capacitor, Mica, 220 pF, 100 V	128002-221
C117	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C118	Capacitor, Ceramic, .001 μF, 50 V	122002-102
C119	Capacitor, Ceramic, .001 μF, 50 V	122002-102
C120	Capacitor, Ceramic, .01 μF, 25 V	122005-103
C121	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C122	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C123	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C124	Capacitor, Mica, 470 pF, 100 V	128002-471
C125	Capacitor, Mica, 470 pF, 100 V	128002-471
C126	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C127	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C128	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C132	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C133	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C134	Capacitor, Ceramic, .22 μF, 25 V	122004-224
C135	Capacitor, Aluminum, 470 μF, 25 V	24-250477
C136	Capacitor, Aluminum, 470 μF, 25 V	24-250477
C138	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C139	Capacitor, Aluminum, 100 μF, 35 V	24-350107
C140	Capacitor, Aluminum, 1 μF, 50 V	24-500105
C141	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C143	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C144	Capacitor, Ceramic, .0027 μF, 50 V	122015-272
C145	Capacitor, Ceramic, .0012 μF, 50 V	122015-122
C146	Capacitor, Ceramic, .0039 μF, 50 V	122015-392
C147	Capacitor, Ceramic, .0068 μF, 50 V	122015-682
C148	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C149–C152	Capacitor, Ceramic, .1 μF, 50 V	122002-104
	Diodes	
CR1–CR3	Diode, Type-1N100	31-1N100
CR4	Diode, Type-1N4001	31-1N4001
CR5	Diode, Type-1N4001	31-1N4001
CR6	Diode, Light-Emitting, Type-MV5053	38-MV5053
CR7	Diode, Type-1N4001	31-1N4001
	Connectors and Fasteners	
J15	Connector, Header, 17-Circuit, .100 ctr	179118-017
J16	Connector, Header, 5-Circuit, .100 ctr	179118-005
J20	Connector, Header, 9-Circuit, .156 ctr, pol	179014-009
J102, J103	Connector, Header, 11-Circuit, .100 ctr	179118-011
J106	Connector, Header, 11-Circuit, .100 ctr	179118-011
P18	Connector, Card Edge, 80-Circuit (40 × 2)	179221-180
Q1, Q2	Fastener, Nylon, Snap-in	81-4302
Q9, Q10	Fastener, Nylon, Snap-in	81-4302
VR1	Fastener, Nylon, Snap-In	81-4302
	Terminal, Fast-On Tab (Acceptable substitute is part number 020670-01)	179051-002

Central Processing Unit (CPU) PCB Assembly
Parts List, Continued

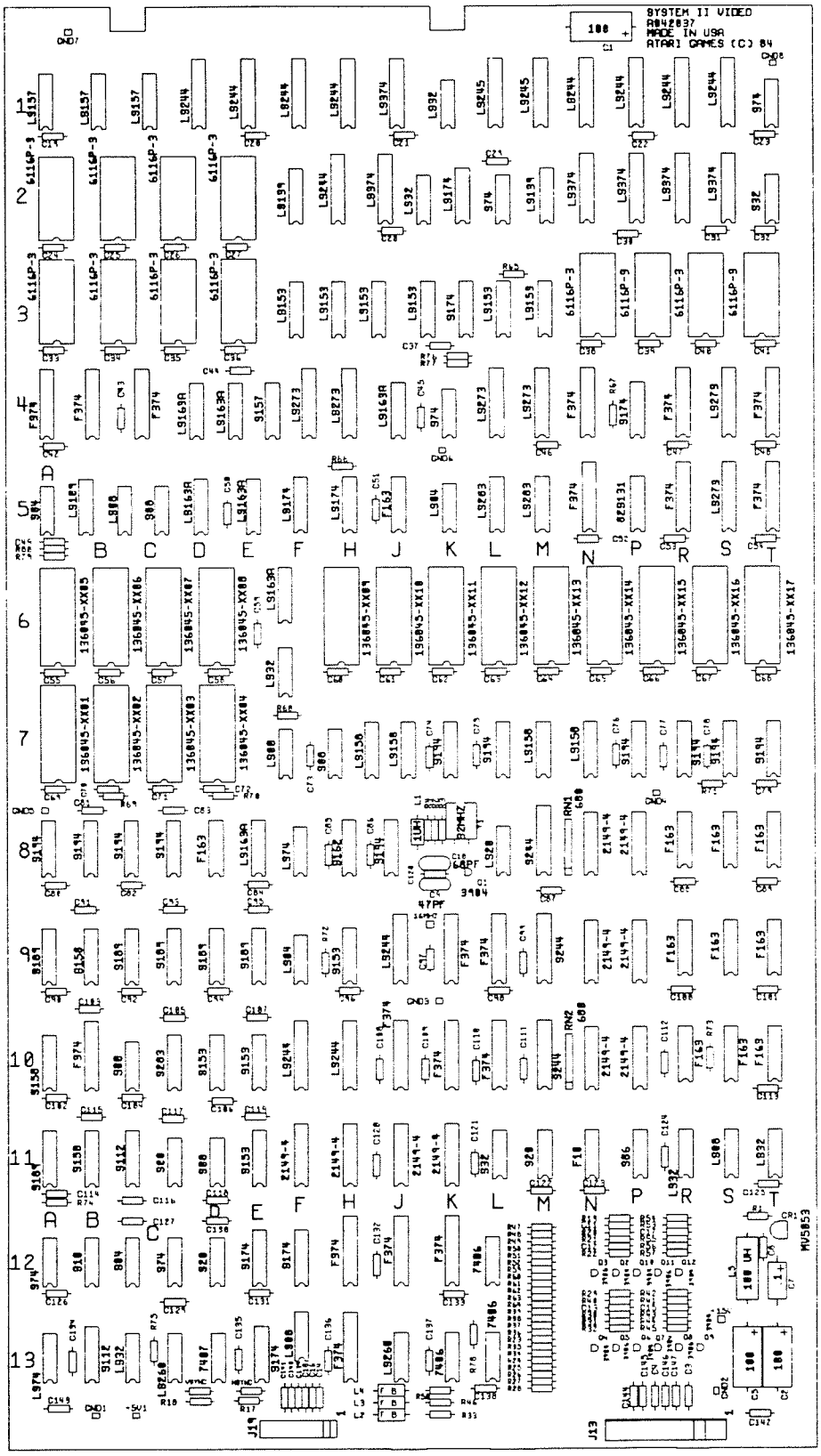
Designator	Description	Part No.
	Inductors	
L1	Inductor, 33 μH	141016-007
L2	Inductor, 100 μH	141002-001
	Transistors	
Q1, Q2	Transistor, 2N6044	34-2N6044
Q3, Q4	Transistor, 2N3906	33-2N3906
Q5–Q8	Transistor, 2N3904	34-2N3904
Q11, Q12	Transistor, 2N3904	34-2N3904
	Resistors	
R1, R2	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R3, R4	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R5–R7	Resistor, ¼ W, 220 Ω, ±5%	110000-221
R8–R11	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R12	Resistor, ¼ W, 470 Ω, ±5%	110000-471
R13–R20	Resistor, ¼ W, 100 Ω, ±5%	110000-101
R21–R23	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R24–R27	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R28–R33	Resistor, ¼ W, 470 Ω, ±5%	110000-471
R34	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R35	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R36	Resistor, ¼ W, 220 Ω, ±5%	110000-221
R37	Resistor, ¼ W, 220 Ω, ±5%	110000-221
R38–R42	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R43–R58	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R59	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R60–R67	Resistor, ¼ W, 3.3K Ω, ±5%	110000-332
R68	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R69	Resistor, ¼ W, 1.8K Ω, ±5%	110000-182
R70	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R71	Resistor, ¼ W, 5.6K Ω, ±5%	110000-562
R72–R74	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R75	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R76–R85	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R86	Resistor, ¼ W, 220 Ω, ±5%	110000-221
R87	Resistor, ¼ W, 220 Ω, ±5%	110000-221
R88, R89	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R90	Resistor, ¼ W, 100 Ω, ±5%	110000-101
R91	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R92	Resistor, ¼ W, 100 Ω, ±5%	110000-101
R93	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R94	Resistor, ¼ W, 22K Ω, ±5%	110000-223
R95	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R96	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R97	Resistor, ¼ W, 22K Ω, ±5%	110000-223
R98	Resistor, ¼ W, 47K Ω, ±5%	110000-473

Central Processing Unit (CPU) PCB Assembly Parts List, Continued

Designator	Description	Part No.
R99	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R100	Resistor, ¼ W, 22K Ω, ±5%	110000-223
R101	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R102	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R103	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R104, R105	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R106	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R107, R108	Resistor, ¼ W, 18K Ω, ±5%	110000-183
R109	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R110	Resistor, ¼ W, 390 Ω, ±5%	110000-391
R111	Resistor, ¼ W, 560 Ω, ±5%	110000-561
R112	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R113	Resistor, ¼ W, 5.6K Ω, ±5%	110000-562
R114	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R115, R116	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R117	Resistor, ¼ W, 470 Ω, ±5%	110000-471
R118	Resistor, ¼ W, 470 Ω, ±5%	110000-471
R119	Resistor, ¼ W, 470K Ω, ±5%	110000-474
R120–R124	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R125	Resistor, ¼ W, 2.2K Ω, ±5%	110000-222
R126, R127	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R128	Resistor, ¼ W, 2.2K Ω, ±5%	110000-222
R129	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R130	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R131–R133	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R134	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R135–R138	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R139	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R140	Resistor, ¼ W, 68K Ω, ±5%	110000-683
R141, R142	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R143	Resistor, ¼ W, 68K Ω, ±5%	110000-683
R144	Resistor, ¼ W, 47K Ω, ±5%	110000-473
R148, R151	Resistor, ¼ W, 100K Ω, ±5%	110000-104
R155, R156	Resistor, ¼ W, 470 Ω, ±5%	110000-471
R157	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R158, R159	Resistor, ¼ W, 3.3K Ω, ±5%	110000-332
R160	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R161	Resistor, ¼ W, 150 Ω, ±5%	110000-151
R162	Resistor, ¼ W, 10K Ω, ±5%	110000-103
R163	Resistor, ¼ W, 3.3K Ω, ±5%	110000-332
R164, R166	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R168	Resistor, ¼ W, 1K Ω, ±5%	110000-102
R169, R170	Resistor, ¼ W, 4.7K Ω, ±5%	110000-472
R171	Resistor, ¼ W, 270 Ω, ±5%	110000-271

Central Processing Unit (CPU) PCB Assembly
Parts List, Continued

Designator	Description	Part No.
R172	Resistor, ¼ W, 12 Ω, ± 5%	110000-123
R173	Resistor, ¼ W, 56 Ω, ± 5%	110000-563
R174	Resistor, ¼ W, 10K Ω, ± 5%	110000-103
R175	Resistor, ¼ W, 8.2 Ω, ± 5%	110000-822
R176	Resistor, ¼ W, 3.9K Ω, ± 5%	110000-392
R177	Resistor, ¼ W, 470 Ω, ± 5%	110000-471
R178	Resistor, ¼ W, 1K Ω, ± 5%	110000-102
R179	Resistor, ¼ W, 0 Ω, ± 5%	110005-001
RN1, RN2	Resistor Network, SIP, 10K × 8, 1/8 W	118002-103
	Miscellaneous	
VR1	Voltage Regulator, Type-7905	37-7905
Y1	Crystal, 20 MHz	144000-003
Y2	Crystal, 14.318 MHz	90-101
5/6A	Switch, 8-Position, DIP	160031-008
6/7A	Switch, 8-Position, DIP	160031-008



NOTE:
1. DO NOT INSTALL R3 AND C143.
2. MODIFICATIONS TO ASSEMBLIES USING 042038-01 REV A AND B PC BOARDS:
   - LIFT PIN 15 OF IC 9K.
   - ADD JUMPER BETWEEN 9K PAD 5 AND 9F PAD 1.
   - ADD JUMPER BETWEEN 9F PAD 2 AND 9K PAD 15.

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Figure 5-10 Video PCB Assembly A043734-01 A

Video PCB Assembly
Parts List

Designator	Description	Part No.
	Integrated Circuits	
1A	Type-74LS157 Integrated Circuit	37-74LS157
1B	Type-74LS157 Integrated Circuit	37-74LS157
1C	Type-74LS157 Integrated Circuit	37-74LS157
1D	Type-74LS244 Integrated Circuit	37-74LS244
1E	Type-74LS244 Integrated Circuit	37-74LS244
1F	Type-74LS244 Integrated Circuit	37-74LS244
1H	Type-74LS244 Integrated Circuit	37-74LS244
1J	Type-74LS374 Integrated Circuit	37-74LS374
1K	Type-74LS32 Integrated Circuit	37-74LS32
1L	Type-74LS245 Integrated Circuit	37-74LS245
1M	Type-74LS245 Integrated Circuit	37-74LS245
1N	Type-74LS244 Integrated Circuit	37-74LS244
1P	Type-74LS244 Integrated Circuit	37-74LS244
1R	Type-74LS244 Integrated Circuit	37-74LS244
1S	Type-74LS244 Integrated Circuit	37-74LS244
1T	Type-74S74 Integrated Circuit	37-74S74
2A	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
2B/C	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
2C/D	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
2E	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
2F	Type-74LS139 Integrated Circuit	37-74LS139
2H	Type-74LS244 Integrated Circuit	37-74LS244
2H/J	Type-74LS374 Integrated Circuit	37-74LS374
2J/K	Type-74LS32 Integrated Circuit	37-74LS32
2K/L	Type-74LS174 Integrated Circuit	37-74LS174
2L	Type-74S74 Integrated Circuit	37-74S74
2M	Type-74LS139 Integrated Circuit	37-74LS139
2N	Type-74LS374 Integrated Circuit	37-74LS374
2P	Type-74LS374 Integrated Circuit	37-74LS374
2R	Type-74LS374 Integrated Circuit	37-74LS374
2S	Type-74LS374 Integrated Circuit	37-74LS374
2T	Type-74S32 Integrated Circuit	37-74S32
3A	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3B/C	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3C/D	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3E	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3F	Type-74LS153 Integrated Circuit	37-74LS153
3H	Type-74LS153 Integrated Circuit	37-74LS153
3H/J	Type-74LS153 Integrated Circuit	37-74LS153
3J/K	Type-74LS153 Integrated Circuit	37-74LS153
3K/L	Type-74S174 Integrated Circuit	137209-001
3L	Type-74LS153 Integrated Circuit	37-74LS153
3M	Type-74LS153 Integrated Circuit	37-74LS153
3N	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3P/R	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
3R/S	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
3T	Type-6116P-3, 150 ns RAM Integrated Circuit	137211-001
4A	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
4B	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
4C	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
4D	Type-74LS163A Integrated Circuit	37-74LS163A
4E	Type-74LS163A Integrated Circuit	37-74LS163A
4E/F	Type-74S157 Integrated Circuit	37-74S157
4F	Type-74LS273 Integrated Circuit	37-74LS273
4H	Type-74LS273 Integrated Circuit	37-74LS273
4J	Type-74LS163A Integrated Circuit	37-74LS163A
4K	Type-74S74 Integrated Circuit	37-74S74
4L	Type-74LS273 Integrated Circuit	37-74LS273
4M	Type-74LS273 Integrated Circuit	37-74LS273
4N	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
4P	Type-74S174 Integrated Circuit	137209-001
4R	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
4S	Type-74LS273 Integrated Circuit	37-74LS273
4T	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
5A	Type-74S04 Integrated Circuit	37-74S04
5B	Type-74LS109 Integrated Circuit	37-74LS109
5B/C	Type-74LS08 Integrated Circuit	37-74LS08
5C/D	Type-74S08 Integrated Circuit	37-74S08
5D	Type-74LS163A Integrated Circuit	37-74LS163A
5E	Type-74LS163A Integrated Circuit	37-74LS163A
5F	Type-74LS174 Integrated Circuit	37-74LS174
5H	Type-74LS174 Integrated Circuit	37-74LS174
5J	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
5K	Type-74LS04 Integrated Circuit	37-74LS04
5L	Type-74LS283 Integrated Circuit	137204-001
5M	Type-74LS283 Integrated Circuit	137204-001
5N	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
5P	Type-82S131 Program PROM Integrated Circuit	136034-131
5R	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
5S	Type-74LS273 Integrated Circuit	37-74LS273
5T	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
6A	200 ns Type-27256 EPROM Integrated Circuit	136045-x105
6B	200 ns Type-27256 EPROM Integrated Circuit	136045-x106
6C	200 ns Type-27256 EPROM Integrated Circuit	136045-x107

"x" in the part number denotes the revision level

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
6D/E	200 ns Type-27256 EPROM Integrated Circuit	136045-x108
6E/F	Type-74LS163A Integrated Circuit	37-74LS163A
6/7E/F	Type-74LS32 Integrated Circuit	37-74LS32
6F/H	200 ns Type-27256 EPROM Integrated Circuit	136045-x109
6H/J	200 ns Type-27256 EPROM Integrated Circuit	136045-x110
6K	200 ns Type-27256 EPROM Integrated Circuit	136045-x111
6L	200 ns Type-27256 EPROM Integrated Circuit	136045-x112
6M	200 ns Type-27256 EPROM Integrated Circuit	136045-x113
6N	200 ns Type-27256 EPROM Integrated Circuit	136045-x114
6P/R	200 ns Type-27256 EPROM Integrated Circuit	136045-x115
6R/S	200 ns Type-27256 EPROM Integrated Circuit	136045-x116
6T	200 ns Type-27128 EPROM Integrated Circuit	136045-x117
7A	200 ns Type-27512 EPROM Integrated Circuit (Acceptable substitute is a 250 ns EPROM)	136045-x101
7B	200 ns Type-27256 EPROM Integrated Circuit	136045-x102
7C	200 ns Type-27256 EPROM Integrated Circuit	136045-x103
7D/E	200 ns Type-27512 EPROM Integrated Circuit (Acceptable substitute is a 250 ns EPROM)	136045-x104
7E/F	Type-74LS00 Integrated Circuit	37-74LS00
7F/H	Type-74S08 Integrated Circuit	37-74S08
7H/J	Type-74LS158 Integrated Circuit	137203-001
7J	Type-74LS158 Integrated Circuit	137203-001
7K	Type-74S194 Integrated Circuit	137424-001
7L	Type-74S194 Integrated Circuit	137424-001
7M	Type-74LS158 Integrated Circuit	137203-001
7N	Type-74LS158 Integrated Circuit	137203-001
7P	Type-74S194 Integrated Circuit	137424-001
7R	Type-74S194 Integrated Circuit	137424-001
7S	Type-74S194 Integrated Circuit	137424-001
7T	Type-74S194 Integrated Circuit	137424-001
8A	Type-74S194 Integrated Circuit	137424-001
8B	Type-74S194 Integrated Circuit	137424-001
8B/C	Type-74S194 Integrated Circuit	137424-001
8C/D	Type-74S194 Integrated Circuit	137424-001
8D	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
8E	Type-74LS163A Integrated Circuit	37-74LS163A
8F	Type-74LS74 Integrated Circuit	37-74LS74
8H	Type-74S162 Integrated Circuit	137342-001
8J	Type-74S194 Integrated Circuit	137424-001
8L	Type-74LS20 Integrated Circuit	37-74LS20
8M	Type-74S244 Integrated Circuit	137333-001
8N	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
8P	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
8R	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
8S	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001

"x" in the part number denotes the revision level

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
8T	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
9A	Type-74S189 Integrated Circuit	37-74S189
9B	Type-74S158 Integrated Circuit	137312-001
9B/C	Type-74S189 Integrated Circuit	37-74S189
9C/D	Type-74S189 Integrated Circuit	37-74S189
9D	Type-74S189 Integrated Circuit	37-74S189
9E	Type-74S189 Integrated Circuit	37-74S189
9F	Type-74LS04 Integrated Circuit	37-74LS04
9H	Type-74S153 Integrated Circuit	137207-001
9J	Type-74LS244 Integrated Circuit	37-74LS244
9K	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
9L	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
9M	Type-74S244 Integrated Circuit	137333-001
9N	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
9P	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
9R	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
9S	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
9T	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
10A	Type-74S158 Integrated Circuit	137312-001
10B	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
10B/C	Type-74S00 Integrated Circuit	37-74S00
10C/D	Type-74S283 Integrated Circuit	137241-001
10D	Type-74S153 Integrated Circuit	137207-001
10E	Type-74S153 Integrated Circuit	137207-001
10F	Type-74LS244 Integrated Circuit	37-74LS244
10H	Type-74LS244 Integrated Circuit	37-74LS244
10J	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
10K	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
10L	Type-74F374 Integrated Circuit (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
10M	Type-74S244 Integrated Circuit	137333-001
10N	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
10P	Type-2149, 35 ns Static RAM Integrated Circuit	137199-003
10R	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
10S	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
10T	Type-74F163 Integrated Circuit (Acceptable substitute is Type-74AS163N Integrated Circuit, part no. 137421-001)	137345-001
11A	Type-74S189 Integrated Circuit	37-74S189

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
11B	Type-74S158 Integrated Circuit	137312-001
11B/C	Type-74S112 Integrated Circuit	137334-001
11C/D	Type-74S00 Integrated Circuit	37-74S00
11D	Type-74S08 Integrated Circuit	37-74S08
11E	Type-74S153 Integrated Circuit	137207-001
11F	Type-2149, 45 ns Static RAM Integrated Circuit	137199-002
11H	Type-2149, 45 ns Static RAM Integrated Circuit	137199-002
11J	Type-2149, 45 ns Static RAM Integrated Circuit	137199-002
11K	Type-2149, 45 ns Static RAM Integrated Circuit	137199-002
11L	Integrated Circuit Type-74S32	37-74S32
11M	Integrated Circuit Type-74S20	137423-001
11N	Integrated Circuit Type-74F10	137428-001
11P	Integrated Circuit Type-74S86	137002-001
11R	Integrated Circuit Type-74LS32	37-74LS32
11S	Integrated Circuit Type-74LS08	37-74LS08
11T	Integrated Circuit Type-74LS32	37-74LS32
12A	Integrated Circuit Type-74S74	37-74S74
12B	Integrated Circuit Type-74S10	137236-001
12B/C	Integrated Circuit Type-74S04	37-74S04
12C/D	Integrated Circuit Type-74S74	37-74S74
12D	Integrated Circuit Type-74S20	137423-001
12E	Integrated Circuit Type-74S174	137209-001
12F	Integrated Circuit Type-74LS174	37-74LS174
12H	Integrated Circuit Type-74F374 (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
12J	Integrated Circuit Type-74F374 (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
12K	Integrated Circuit Type-74F374 (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
12L	Integrated Circuit Type-7406	37-7406
13A	Integrated Circuit Type-74LS74	37-74LS74
13B	Integrated Circuit Type-74S112	137334-001
13B/C	Integrated Circuit Type-74LS32	37-74LS32
13C/D	Integrated Circuit Type-74LS260	137332-001
13D	Integrated Circuit Type-7407	37-7407
13E	Integrated Circuit Type-74S174	137209-001
13F	Integrated Circuit Type-74LS08	37-74LS08
13H	Integrated Circuit Type-74F374 (Acceptable substitute is Type-74AS374N Integrated Circuit, part no. 137422-001)	137420-001
13J	Integrated Circuit Type-74LS260	137332-001
13K	Integrated Circuit Type-7406	37-7406
13L	Integrated Circuit Type-7406	37-7406
	Sockets	
	24-Contact, Medium-Insertion-Force IC Socket	79-42C24
	28-Contact, Medium-Insertion-Force IC Socket	79-42C28

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
	Capacitors	
C1	Capacitor, Aluminum, 100 μF, 35 V	24-350107
C2	Capacitor, Aluminum, 100 μF, 35 V	24-350107
C3	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C4	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C5	Capacitor, Aluminum, 100 μF, 35 V	24-350107
C7	Capacitor, Electrolytic, 1 μF, 50 V	24-500105
C8	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C9	Capacitor, Mica, 47 pF, 100 V	128002-470
C10	Capacitor, Mica, 68 pF, 100 V	128002-680
C11–C13	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C14	Capacitor, Ceramic, 100 pF, 100 V	122016-101
C15	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C16	Capacitor, Ceramic, 100 pF, 100 V	122016-101
C17	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C18	Capacitor, Ceramic, 100 pF, 100 V	122016-101
C19–C138	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C139–C141	Capacitor, Ceramic, .001 μF 50 V	122002-102
C142	Capacitor, Ceramic, .1 μF, 50 V	122002-104
C144–C147	Capacitor, Ceramic, .1 μF, 50 V	122002-104
	Connectors	
J13	Connector, Header, 11-Circuit, .156 ctr, pol	179014-011
J19	Connector, Header, Sq. Pin, 11-Circuit, .100 ctr	179118-011
	Ferrite Beads and Inductors	
L1	Inductor, 1 μH	141007-001
L2	Ferrite Bead	141003-005
L3	Ferrite Bead	141003-005
L4	Ferrite Bead	141003-005
L5	Inductor, 100 μH	141019-001
	Transistors	
Q1, Q2	Type-2N3904 Transistor	34-2N3904
Q3	Type-2N3906 Transistor	33-2N3906
Q4	Type-2N3904 Transistor	34-2N3904
Q5	Type-2N3906 Transistor	33-2N3906
Q6, Q7	Type-2N3904 Transistor	34-2N3904
Q8	Type-2N3906 Transistor	33-2N3906
Q9, Q10	Type-2N3904 Transistor	34-2N3904
Q11	Type-2N3906 Transistor	33-2N3906
Q12	Type-2N3904 Transistor	34-2N3904
	Resistors	
R1	150 Ω, ± 5%, ¼ W Resistor	110000-151
R2	10K Ω, ± 5%, ¼ W Resistor	110000-103
R4	68 Ω, ± 5%, ¼ W Resistor	110000-680
R17, R18	220 Ω, ± 5%, ¼ W Resistor	110000-221
R19	1K Ω, ± 5%, ¼ W Resistor	110000-102
R20	120 Ω, ± 5%, ¼ W Resistor	110000-121
R21, R22	180 Ω, ± 5%, ¼ W Resistor	110000-181
R23	220 Ω, ± 5%, ¼ W Resistor	110000-221
R24	470 Ω, ± 5%, ¼ W Resistor	110000-471
R25	1K Ω, ± 5%, ¼ W Resistor	110000-102
R26	2 Ω, ± 5%, ¼ W Resistor	110000-202
R27	150 Ω, ± 5%, ¼ W Resistor	110000-151

Video PCB Assembly
Parts List, Continued

Designator	Description	Part No.
R28	3.9K Ω, ±5%, ¼ W Resistor	110000-392
R29	390 Ω, ±5%, ¼ W Resistor	110000-391
R30	68 Ω, ±5%, ¼ W Resistor	110000-680
R31	470 Ω, ±5%, ¼ W Resistor	110000-471
R32	68 Ω, ±5%, ¼ W Resistor	110000-680
R33	10 Ω, ±5%, ¼ W Resistor	110000-100
R34	620 Ω, ±5%, ¼ W Resistor	110000-621
R35	1.2K Ω, ±5%, ¼ W Resistor	110000-122
R36	2.4K Ω, ±5%, ¼ W Resistor	110000-242
R37	5.1K Ω, ±5%, ¼ W Resistor	110000-512
R38	820 Ω, ±5%, ¼ W Resistor	110000-821
R39	10K Ω, ±5%, ¼ W Resistor	110000-103
R40, R41	160 Ω, ±5%, ¼ W Resistor	110000-161
R42	390 Ω, ±5%, ¼ W Resistor	110000-391
R43	68 Ω, ±5%, ¼ W Resistor	110000-680
R44	470 Ω, ±5%, ¼ W Resistor	110000-471
R45	68 Ω, ±5%, ¼ W Resistor	110000-680
R46	10 Ω, ±5%, ¼ W Resistor	110000-100
R47	620 Ω, ±5%, ¼ W Resistor	110000-621
R48	1.2K Ω, ±5%, ¼ W Resistor	110000-122
R49	2.4K Ω, ±5%, ¼ W Resistor	110000-242
R50	5.1K Ω, ±5%, ¼ W Resistor	110000-512
R51	820 Ω, ±5%, ¼ W Resistor	110000-821
R52	10K Ω, ±5%, ¼ W Resistor	110000-103
R53	160 Ω, ±5%, ¼ W Resistor	110000-161
R54	390 Ω, ±5%, ¼ W Resistor	110000-391
R55	68 Ω, ±5%, ¼ W Resistor	110000-680
R56	470 Ω, ±5%, ¼ W Resistor	110000-471
R57	68 Ω, ±5%, ¼ W Resistor	110000-680
R58	10 Ω, ±5%, ¼ W Resistor	110000-100
R59	620 Ω, ±5%, ¼ W Resistor	110000-621
R60	1.2K Ω, ±5%, ¼ W Resistor	110000-122
R61	2.4K Ω, ±5%, ¼ W Resistor	110000-242
R62	5.1K Ω, ±5%, ¼ W Resistor	110000-512
R63	820 Ω, ±5%, ¼ W Resistor	110000-821
R64	10K Ω, ±5%, ¼ W Resistor	110000-103
R65–R76	1K Ω, ±5%, ¼ W Resistor	110000-102
R77	0 Ω, ±5%, ¼ W, Resistor	110005-001
R78	220 Ω, ±5%, ¼ W Resistor	110000-221
R79	270 Ω, ±5%, ¼ W Resistor	110000-271
R80	270 Ω, ±5%, ¼ W Resistor	110000-271
RN1, RN2	680 Ω × 7 SIP Resistor Network	118007-681
HSYNC, VSYNC	0 Ω, ±5%, ¼ W, Resistor	110005-001
	Miscellaneous	
CR1	Diode, Light-Emitting, MV5053	38-MV5053
Y1	Crystal, 32 MHz	144003-002
	Terminal, Fast-On Tab (Acceptable subsitute is Test Point, part no. 020670-001)	179051-002

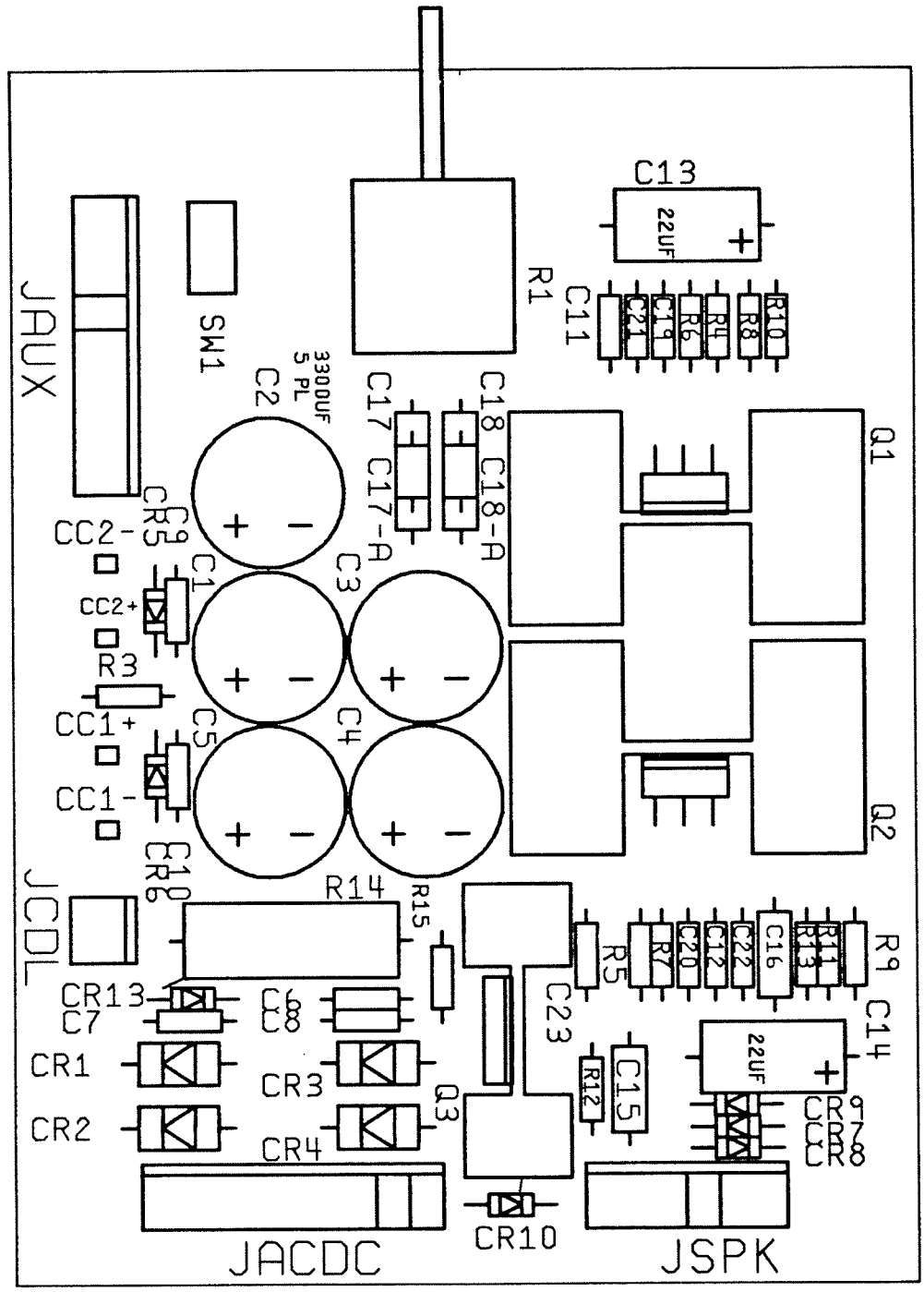


Figure 5-11 Audio II PCB Assembly
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Audio II PCB Assembly
Parts List

Designator	Description	Part No.
	Capacitors	
C1–C5	3300 μF, 25 V Radial Electrolytic Capacitor	123003-338
C6–C12	.1 μF, 50 V Ceramic Capacitor	122002-104
C13–C14	22 μF, 35 V Electrolytic Capacitor	24-350226
C15–C18	.22 μF, 25 V Ceramic Capacitor	122006-224
C19–C20	.001 μF, 50 V Ceramic Capacitor	122002-102
C21–C23	.1 μF, 50 V Ceramic Capacitor	122002-104
	Diodes	
CR1–CR4	Type-1N5401 Diode	31-1N5401
CR5–CR10	Type-1N4001 Diode	31-1N4001
CR13	Type-1N4002 Diode	31-1N4002
	Connectors	
JACDC	Key 2, 9 Ckt., .156-Inch Ctr. Header Connector	179213-009
JAUX	Key 6, 9 Ckt., .156-Inch Ctr. Header Connector	179213-009
JCDL	2 Ckt., .156-Inch Ctr. Header Connector	179213-002
JSPK	Key 3, 6 Ckt., .156-Inch Ctr. Header Connector	179213-006
	Integrated Circuits	
Q1–Q2	Type-TDA-2030 Amplifier	137301-001
Q3	Standup Type-7815 Integrated Circuit	37-7815
	Resistors	
R1	10 kΩ, Dual Horizontal Pot Resistor	119011-103
R3	10 Ω, ±5%, ¼ W Resistor	110000-100
R4–R7	22 kΩ, ±5%, ¼ W Resistor	110000-223
R8–R9	10 kΩ, ±5%, ¼ W Resistor	110000-103
R10–R11	1 kΩ, ±5%, ¼ W Resistor	110000-102
R12–R13	1 Ω, ±5%, ¼ W Resistor	110000-010
R14	0 Ω, ±5%, ¼ W Resistor	110005-001
	Miscellaneous	
SW1	SPDT Miniature Slide Self-Test Switch	69-004
TP28–TP29	#6-32 × 3/8-Inch Cross-Recessed Pan-Head Screw	72-1606S
TP28–TP29	#6-32 Nut/Washer Assembly	75-99516
TP28–TP29	Thermal Compound	78-16001
TP28–TP29	Type-TDA-230 Heat Sink	178190-032
TP101	#4-40 × 3/8-Inch Cross-Recessed Pan-Head Screw	72-1406S
TP101	#4-40 Nut/Washer Assembly	75-99514
TP101	Thermal Compound	78-16001
TP101	Type-7815 Heat Sink	178190-124
	Hot Melt Adhesive	106006-001
	Test Point	179051-001

NOTES

Chapter 6

Kit Installation

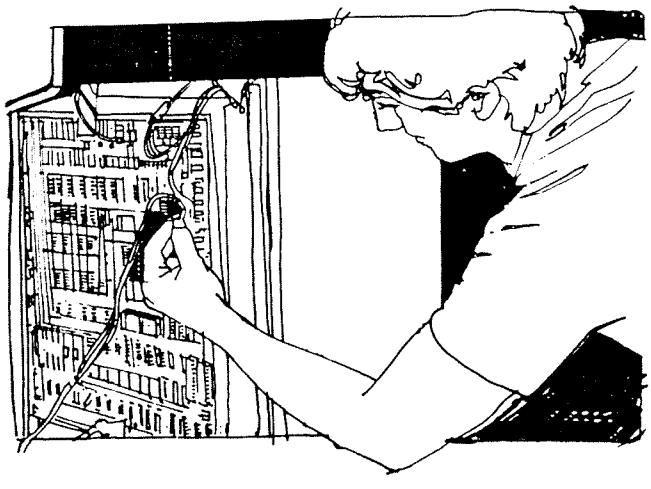
Your Championship Sprint™ game uses the System II™ cabinet designed to accept the necessary hardware to easily convert the cabinet into a variety of games. This chapter contains information that applies to those parts of your existing System II cabinet that are added or replaced to convert the cabinet to a Championship Sprint game. (See Figure 6-1.) The conversion instructions include: (1) replacing the attraction film, control panel, and some integrated circuits (ICs) on the game printed-circuit board (PCB); (2) installing the foot pedal assembly and the cabinet control harness assembly, and (3) cleaning the video display. See Figure 6-1 for the locations of the parts of the System II cabinet that are replaced, installed, and cleaned.

Wiring and schematic diagrams for the Championship Sprint game are contained in the Schematic Package Supplement (SP-292) included with your game.

System II Paperboy™ games located in the field were built with a different power supply, Audio PCB, and utility panel than the System II Championship Sprint games. Refer to Chapter 5, Illustrated Parts List, in the *Paperboy Operators Manual* (TM-275) for information regarding these components. The figure number in the manual and the part number for each of these components follow:

Figure No.	Part No.	Component
5-5	A037671-16	Linear Power Supply
5-6	A043146-01	Utility Panel
5-12	A043046-01	Regulator/Audio III PCB
Refer to CO-275-01 Supplement	A043785-xx	Sierracin 5-Volt Power Supply

For the wiring and schematic diagrams, refer to the *Paperboy Schematic Package Supplement* (SP-275) and the *Sierracin 5-Volt Power Supply Supplement* (CO-275-01).



NOTE

If you do not have the Paperboy manual or the supplements, use the form in the back of this manual to obtain a free copy.

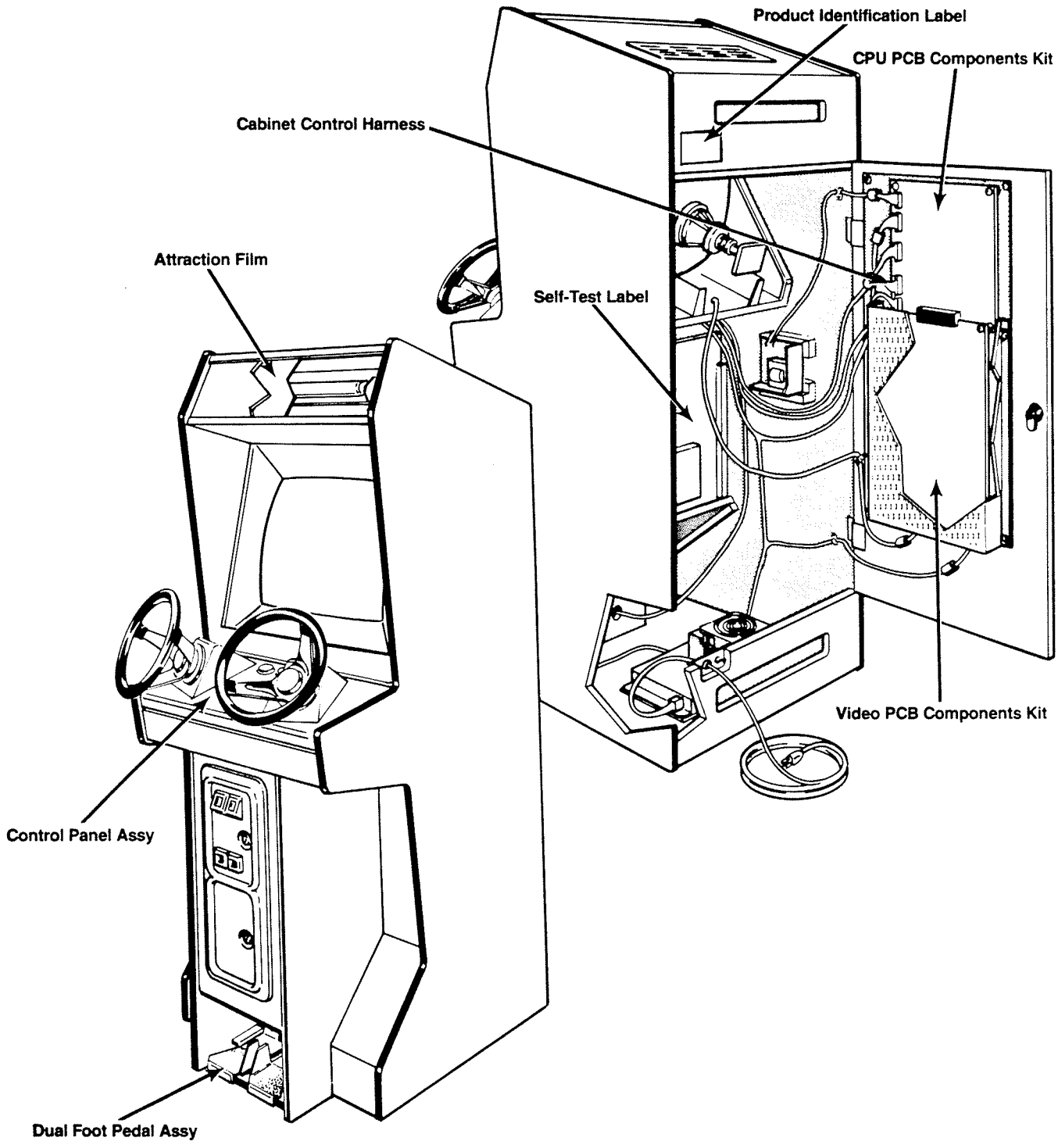


Figure 6-1 Kit Part Locations

Kit Parts Inventory

The assemblies listed in Table 6-1 are included in the Championship Sprint Conversion Kit. Refer to Chapter 5, Illustrated Parts List, for a description of the component parts comprising the control panel, foot pedals, CPU PCB assembly, and Video PCB assembly listed in Table 6-1.

Tools Required

The only tools required to perform a complete Championship Sprint conversion are a Phillips screwdriver, 1/8-inch hex driver, 7/16-inch nut driver, 9/16-inch open-end wrench, chip extractor tool, flat black paint, and Scotch tape (or stapler). (A 3/8-inch wrench is also required if your game has a vertically mounted video display.)

Conversion Instructions

Table 6-1 Championship Sprint Kit Parts Inventory A043726-xx

Part No.	Quantity	Description
A043692-02	1	Control Panel Assembly
A043708-01	1	Cabinet Control Harness Assembly
A043734-01	1	Video PCB Components Kit
A043735-01	1	CPU PCB Components Kit
A043745-01	1	Foot Pedal Assembly
175005-004	1	.406 I.D. x 1.25 O.D. Wide-Pattern Flat Washer
75-5524B	2	#1/4-20 x 1 ½-Inch Black Square-Neck Round-Head Carriage Bolt
75-7002	2	#1/4 Special Fender Flat Washer
75-99515	2	#1/4-20 Nut/Washer Assembly
75-99519	2	#3/8-16 Nut/Washer Assembly
038158-01	1	Product Identification Label (Non-UL)
043729-01	1	Attraction Film With Graphics
SP-292	1	Schematic Package Supplement
ST-292	1	Self-Test Label
TM-292	1	Operators Manual

⚠ WARNING ⚠

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

The following procedures are arranged in the sequence recommended for performing the game conversion. The parts of your cabinet that are affected by the conversion are removed first and then replaced by the new Championship Sprint kit parts.

NOTE

The following conversion should be performed by qualified service personnel.

Replace the Attraction Film

Perform the following procedure to remove/replace the existing attraction film with the Championship Sprint attraction film. (See Figure 6-2).

1. Turn off the game power.
2. Using a 1/8-inch hex driver, remove the three screws and washers holding the upper retainer to the top of the cabinet.
3. Grasp the top edge of the existing attraction film behind the attraction shield and slide it up to remove.

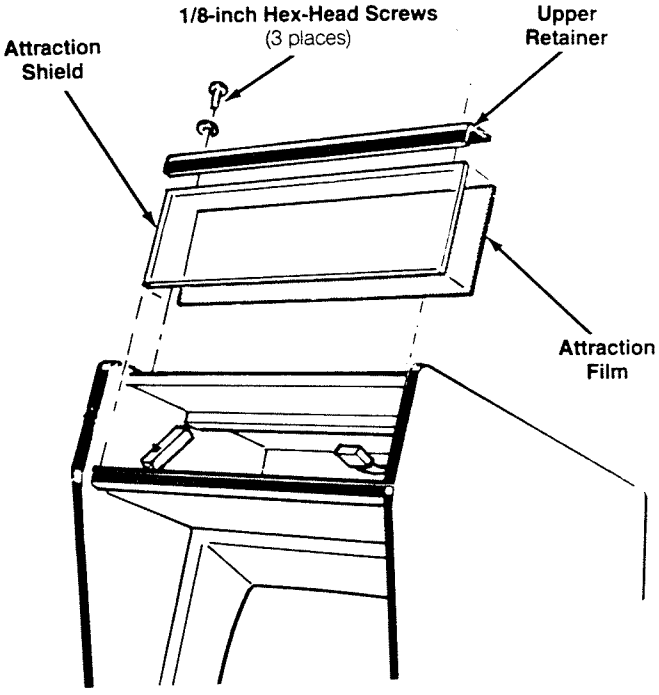


Figure 6-2 Attraction Film Replacement

4. Install the Championship Sprint attraction film. Make sure the film is fully inserted into the bottom slot.
5. Remount the upper retainer.

Replace the Control Panel

Perform the following procedure to remove/replace the existing control panel with the Championship Sprint control panel. (See Figure 6-3).

1. Using a 1/8-inch hex driver, loosen the two screws holding the lower retainer to the cabinet.
2. Unlock and open the coin door on the front of the cabinet.
3. Carefully reach up through the coin door opening and release the spring draw latches located under the control panel on both sides of the cabinet.
4. Using a 1/8-inch hex driver, remove the two screws and washers holding the front of the control panel to the cabinet.
5. Gently lift the front of the control panel until the front edge clears the cabinet.
6. Carefully slide the top edge of the control panel from under the lower retainer.
7. Lift the control panel from the cabinet just far enough to expose the control-panel harness connector.
8. Disconnect the player control harness connector and remove the control panel from the cabinet.
9. Install the Championship Sprint control panel in the reverse order of removal.

Install the Cabinet Control Harness

Perform the following procedure to install the cabinet control harness. (See Figure 6-1.)

1. Remove the existing control harness.
2. Plug the cabinet control harness connectors P102, P106, and P103 into the CPU PCB at J102, J106, and J103, matching keyed connectors with keyed PCB headers.
3. Route the harness along the existing cabinet harness and attach both together with two twist cable ties.
4. Plug the 12-position harness connector P24 into the control panel harness connector.
5. Plug the 6-position harness connector P25 into the foot pedal harness connector after the foot pedals have been installed.
6. Connect the two green ground wires to the corner mounting screw located at the edge of the switching/linear power supply chassis.
7. Mount the harness to the cabinet right side panel with screws at the screw-down tie-wrap locations.

Clean the Video Display Glass

Static electricity attracts dust to the video display glass and can cause the video image to grey out, making the

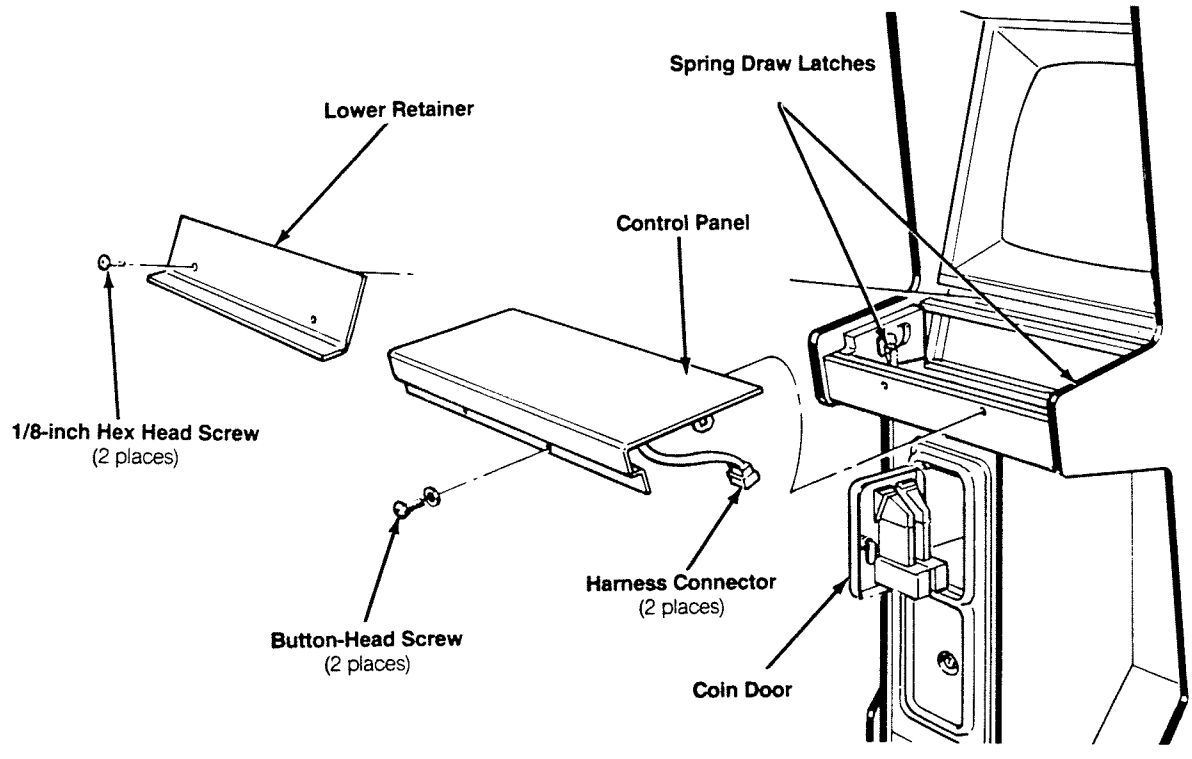


Figure 6-3 Control Panel Replacement

screen colors appear faded. In order to prevent this from happening, the video display glass must be cleaned. Perform the following procedure to clean the display glass.

1. Using a 1/8-inch hex driver, remove the two screws holding the lower retainer to the cabinet.
2. Grasp the display shield on the bottom edge and gently pull it out about one half inch from the cabinet.
3. Gently lower the display shield to free the top edge from under the speaker grille.
4. Using a glass cleaner, clean the display glass and the monitor screen. Be sure to avoid spraying the bezel.
5. Replace the display shield in the reverse order of removal.

Install the Foot Pedals

Dual foot pedals are used in the Championship Sprint game. Perform the following procedure to install the foot pedals.

1. Using a Phillips screwdriver, remove the four screws holding the pedestal front panel to the cabinet. Remove the front panel.
2. Using a Phillips screwdriver, remove the two screws from both mounting cleats inside the pedestal side panels. Remove the cleats.
3. Paint any unfinished surfaces within the pedestal enclosure with flat black paint.
4. After the paint has dried, insert the foot pedals into the pedestal enclosure opening. Be sure the foot pedal harness is inserted first into the rear enclosure wall opening. Then fasten the foot pedals to the rear enclosure wall with two carriage bolts. Be sure that the bottom of the adjustable glide protrudes through the hole at the front of the pedal frame.
5. Using a 9/16-inch open-end wrench, tighten the nut and washer of the glide. (The nut and washer are supplied in the kit.) From the rear of the cabinet, using a 7/16-inch nut driver, tighten the two nuts and washers of the bolts.
6. Connect the foot pedal harness to the cabinet control harness inside the rear of the cabinet.
7. Using the existing Phillips screws, mount the pedestal front panel and two cleats on the inner rear cabinet wall opposite the rear access panel for future use.

IC Kit

A new set of 28 integrated circuits (ICs) has been designed for your Championship Sprint Game PCBs. Table 6-2 lists the ICs and their locations on the CPU and the Video PCBs.

Location of Replacement ICs

The CPU PCB Assembly and the Video PCB Assembly showing the location of each IC to be added, deleted, or replaced are included in this manual. (See Figures 6-4 and 6-5.) Each IC location is marked with the letter A, D, or R.

A represents an EPROM to be added
D represents an EPROM to be deleted
R represents an EPROM to be replaced

Install the Game ICs

Perform the following procedure to install the new integrated circuits (ICs).

⚠ WARNING ⚠

To avoid electrical shock, unplug the game before performing the conversion procedures if you have not already done so.

1. Unlock and open the rear access panel.
2. Remove the four thumb nuts holding the EMI cover to the ground plane. (See Figure 3-4.)
3. Refer to the CPU PCB Assembly and Video PCB Assembly, and determine the location of the ICs to be replaced, added, and removed. (See Figures 6-4 and 6-5.)

NOTE

Slide a block of wood or similar device behind the PCBs to prevent the PCBs from bending excessively when installing the ICs.

4. Locate each IC to be replaced or removed, and remove each with a chip extractor tool.
5. For each replacement IC, align all of the pins on one side of the chip, and bend that row inward so that it is parallel to the other row. Carefully insert the chip into the proper socket on the game PCB, making sure the orientation notch faces the correct direction. (The notch differs on the CPU PCB and the Video PCB.)
6. Then locate each new IC to be added, and insert each in its correct socket.
7. Install the CPU PCB label (Atari part no. 043754-01) and the Video PCB label (Atari part no. 043753-01) on the respective PCBs.
8. Reinstall the EMI cover, and connect all the harness connectors.

Table 6-2 Integrated Circuits in Championship Sprint Conversion Kit

Designator	Description	Part No.
	ICs on Championship Sprint CPU PCB:	
	Basic Set of ICs:	
2B/C	300 ns Type-27128 EPROM Integrated Circuit	136045-x118
2D	300 ns Type-27128 EPROM Integrated Circuit	136045-x119
4M	SLAPSTIC Custom Integrated Circuit	137412-109
6K	300 ns Type-27256 EPROM Integrated Circuit	136045-x124
6L	300 ns Type-27256 EPROM Integrated Circuit	136045-x123
6R	300 ns Type-27256 EPROM Integrated Circuit	136045-x121
6S	300 ns Type-27256 EPROM Integrated Circuit	136045-x120
	U.S. Set of ICs:	
6F	300 ns Type-27256 EPROM Integrated Circuit	136045-x125
6N	300 ns Type-27256 EPROM Integrated Circuit	136045-x122
7L	300 ns Type-27128 EPROM Integrated Circuit	136045-x126
7N	300 ns Type-27128 EPROM Integrated Circuit	136045-x127
	German Set of ICs:	
6F	300 ns Type-27256 EPROM Integrated Circuit	136045-x225
6N	300 ns Type-27256 EPROM Integrated Circuit	136045-x222
7L	300 ns Type-27128 EPROM Integrated Circuit	136045-x226
7N	300 ns Type-27128 EPROM Integrated Circuit	136045-x227
	ICs on Championship Sprint Video PCB:	
6A	200 ns Type-27256 EPROM Integrated Circuit	136045-x105
6B	200 ns Type-27256 EPROM Integrated Circuit	136045-x106
6C	200 ns Type-27256 EPROM Integrated Circuit	136045-x107
6D/E	200 ns Type-27256 EPROM Integrated Circuit	136045-x108
6F/H	200 ns Type-27256 EPROM Integrated Circuit	136045-x109
6H/J	200 ns Type-27256 EPROM Integrated Circuit	136045-x110
6K	200 ns Type-27256 EPROM Integrated Circuit	136045-x111
6L	200 ns Type-27256 EPROM Integrated Circuit	136045-x112
6M	200 ns Type-27256 EPROM Integrated Circuit	136045-x113
6N	200 ns Type-27256 EPROM Integrated Circuit	136045-x114
6P/R	200 ns Type-27256 EPROM Integrated Circuit	136045-x115
6R/S	200 ns Type-27256 EPROM Integrated Circuit	136045-x116
6T	200 ns Type-27128 EPROM Integrated Circuit	136045-x117
7A	200 ns Type-27512 EPROM Integrated Circuit	136045-x101*
7B	200 ns Type-27256 EPROM Integrated Circuit	136045-x102
7C	200 ns Type-27256 EPROM Integrated Circuit	136045-x103
7D/E	200 ns Type-27512 EPROM Integrated Circuit	136045-x104*

**A 250 ns speed EPROM can be substituted if necessary*
"x" in the part number denotes the revision level

NOTE

Some of the IC sockets might be left empty since the System II game PCBs are designed to accommodate different ICs for a variety of games.

NOTE

The coin and credit option settings and the game option settings must be reset for the Championship Sprint kit conversion.

Reset the Coin and Credit and Game Option Settings

The settings are reset with the two dual-in-line package (DIP) switches at locations 6/7A and 5/6A on the CPU PCB. (See Figure 1-2.) Each set of DIP switches contains

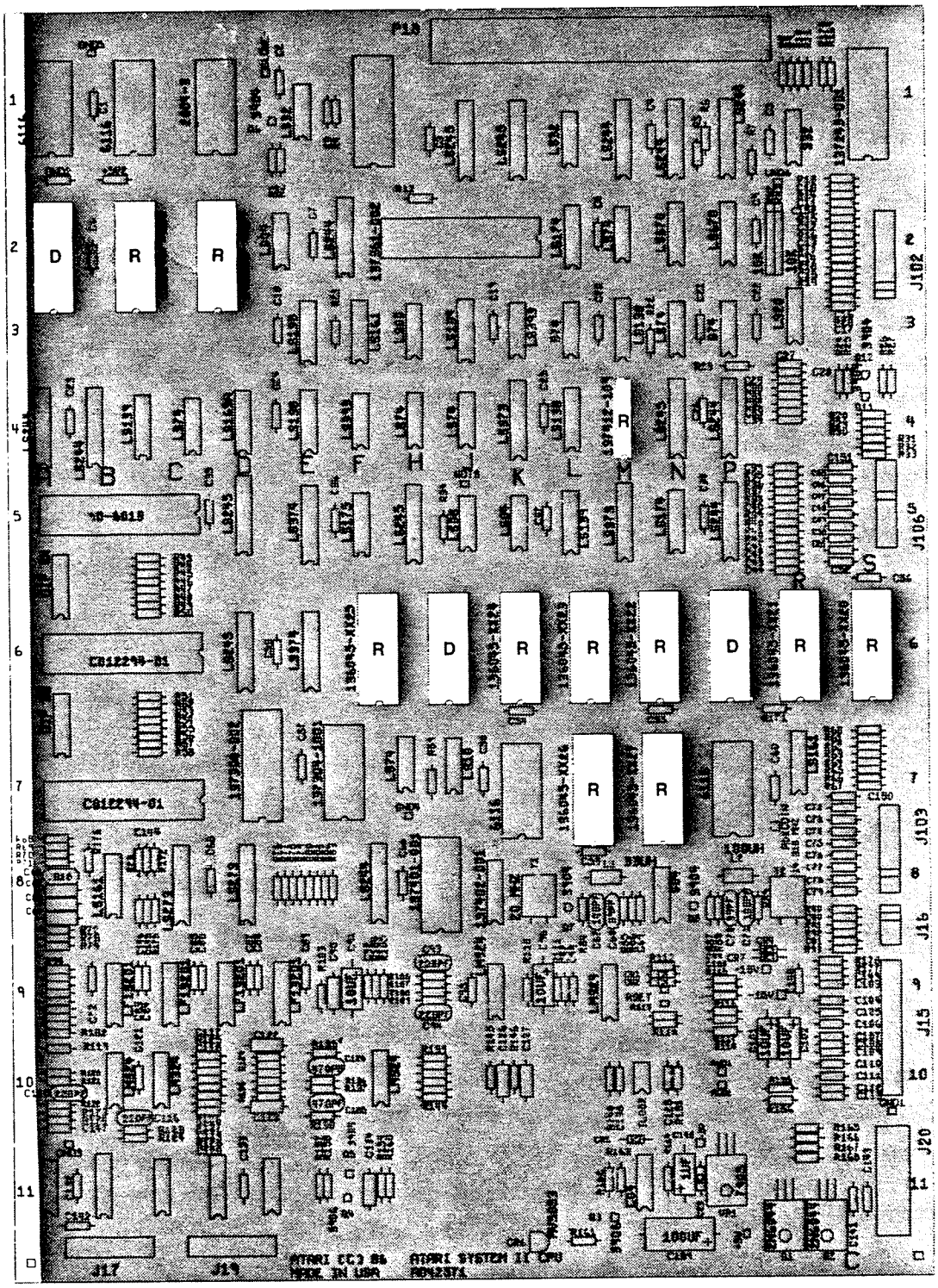


Figure 6-4 Installing ICs into CPU PCB Assembly

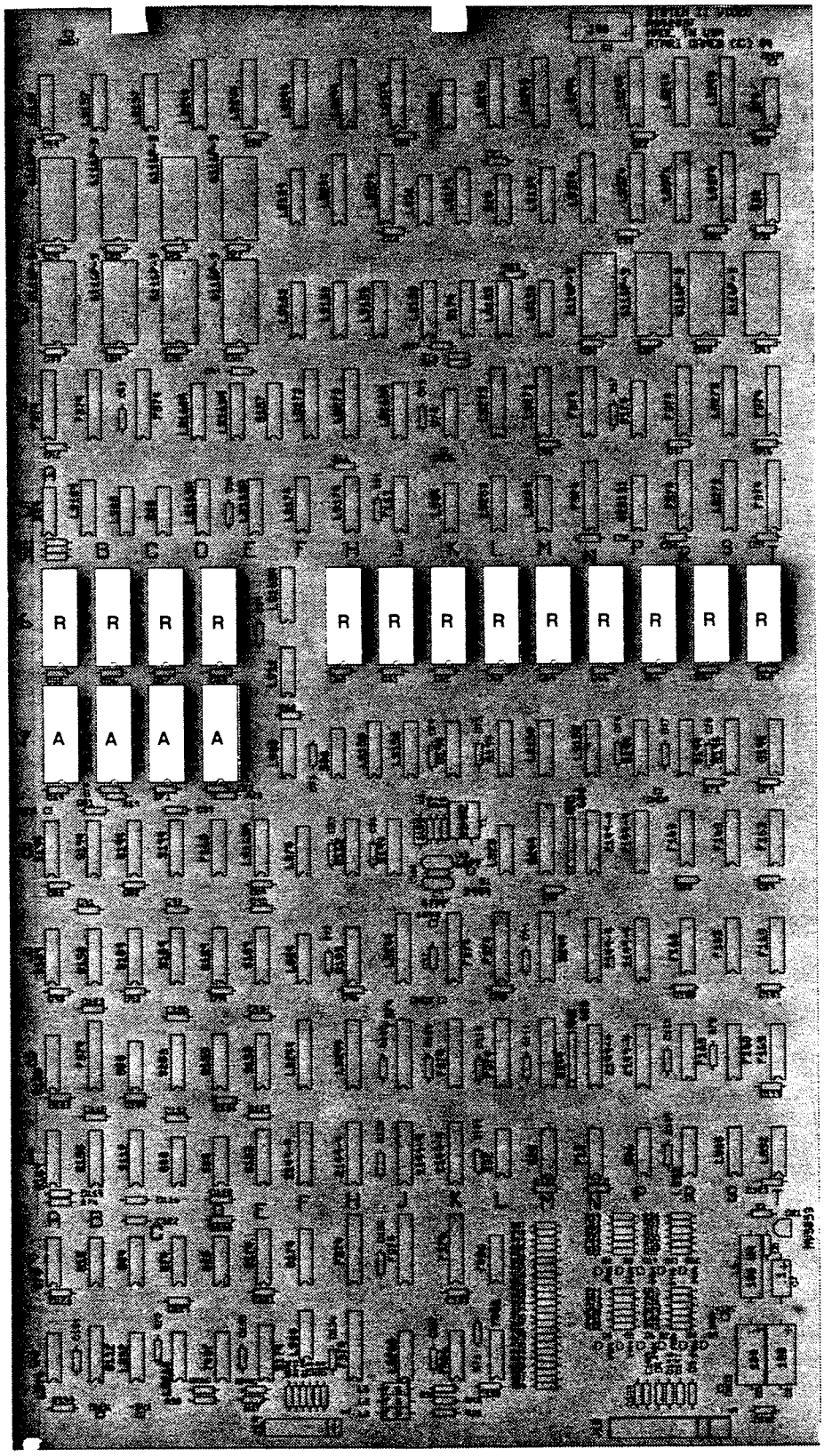


Figure 6-5 Installing ICs into Video PCB Assembly

eight switches. Perform the following procedure to reset the option settings.

1. Remove the thin film of plastic covering the option switch, if any remains.
2. Using a pen or sharp-pointed instrument, slide the appropriate small button to the left or *off* position. (The steering wheel controls and the pushbuttons are *not* used to change this setting.)

Refer to Tables 1-2 and 1-3 in this manual for the available options and default (recommended) settings.

Install the Self-Test Label

Staple or tape the Championship Sprint Self-Test Label to the inner rear cabinet wall opposite the rear access door.

Install the Product Identification Label

Perform the following procedure to install the Championship Sprint product identification label.

1. Remove the protective backing from the Championship Sprint product identification label.
2. Place the Championship Sprint product identification label over the existing product identification label on the back of the cabinet.

Inspect the Game

Before applying power, perform the following inspection procedure.

1. Carefully check that the Championship Sprint conversion kit parts have been properly installed. Check that all the ICs are inserted properly with the orientation notch facing the correct direction. (Inserting an IC backwards can destroy the IC.) Make sure that the control-panel harness connector is tightly connected to the cabinet control harness connector, and that the spring draw latches under the control panel are securely fastened.
2. Plug in the game power cord.
3. Perform the self-test procedure as given in Chapter 2. Be sure that all of the DIP switches on the CPU PCB have been properly set. Refer to Tables 1-2 and 1-3 in this manual for the available options and the default (recommended) settings.
4. Be sure to recalibrate each foot pedal. Refer to *Calibration Procedure* in Chapter 2.
5. Be sure to reset the high score table and the accounting information. Refer to the procedure in *Reset the High Score Table and the Accounting Information* later in this chapter.
6. Close and lock the rear access panel.

Reset the High Score Table and the Accounting Information

The high score table and the accounting information, or game statistics, must be reset after completing the conversion to ensure accurate game data. This information is displayed on the Accounting Information screen in the Self-Test Mode. (Refer to *Accounting Information* in Chapter 2.) Perform the following procedure to reset this information.

1. Enter the Self-Test Mode by turning on the self-test switch, and press the red start (right) button until the Accounting Information screen is displayed.
2. Rotate the left steering wheel to select *RESET HIGH SCORE TABLE*.
3. Press the blue car button to change the *NO* message to *YES*.
4. Press the red start button to reset the high score table. After a brief *PLEASE WAIT* message is displayed, the self-test automatically advances to the next screen.
5. Press the red start button until the Reset Saved Info Screen is displayed again. Rotate the left steering wheel to select *RESET ACCOUNTING INFO*.
6. Press the blue car button to change the *NO* message to *YES*.
7. Press the red start button to reset the accounting information. After a brief *PLEASE WAIT* message is displayed, the self-test automatically advances to the next screen.

N O T E S

Form to Obtain Free Paperboy™ Manual, Schematic Package Supplement, and/or 5V Sierracin Power Supply Supplement

System II™ Paperboy games located in the field were built with a different power supply, Audio PCB, and utility panel than most of the System II Championship Sprint™ games. The *Paperboy Operators Manual* (TM-275) has part number information on these components. The wiring and schematic diagrams are printed in the *Paperboy Schematic Package Supplement* (SP-275) and the *Sierracin 5-Volt Power Supply Supplement* (CO-275-01).

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Championship Sprint game kit serial no. _____

Game purchased from _____ State _____

Your phone no. (_____) _____

Please print!

Firm _____

Your name _____

Street _____

City _____ State _____ Zip _____

Tape This Edge

First Fold

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Second Fold

From: _____

_____

_____

_____

Location: _____

Championship Sprint™

Coin Information and Game Statistics

Date: _____

NOTE
Advance screens in the Self-Test Mode by pressing the red start (right) button.

Accounting Information

Left Coins	_____	Number of coins deposited in left coin mechanism	Total Games	_____	Total number of coins deposited in all coin mechanisms
Right Coins	_____	Number of coins deposited in right coin mechanism	Total Game Time	_____	Accumulated time of all 1- or 2-player games played in hours, minutes, and seconds
Add-A-Coins	_____	Total number of coins deposited in all coin mechanisms during add-a-coin mode only	Average Game Time	_____	Total game time divided by total games in hours, minutes, seconds
1 Player Heats	_____	Total number of heats/races run with 1 player only	Total On Time	_____	Total time in hours, minutes, and seconds that the game was turned on
2 Player Heats	_____	Total number of heats/races run with 2 players	Total Play Time	_____	Total time in hours, minutes, and seconds that the game was played

Reset Saved Info Screen

NOTE
Use this screen only to reset high score table and accounting information.

How to reset: select item to be reset with left steering wheel. Push blue car (left) button to toggle between Yes and No. Press red start button to reset selected tables.

Reset Accounting Info?	Yes	No
Reset High Score Table?	Yes	No

Game Times*

0:30	_____	3:00	_____	5:30	_____
1:00	_____	3:30	_____	6:00	_____
1:30	_____	4:00	_____	6:30	_____
2:00	_____	4:30	_____	7:00	_____
2:30	_____	5:00	_____	7:30	_____
				8:00 & Up	_____

*Note: It is possible for a limited number of players to play Championship Sprint for over eight minutes. Generally, this can occur during a 2-player game when one or two players lose frequently and continue using the add-a-coin feature. In locations where there are many highly skilled players, you should expect to see 3–7% of total games played at over eight minutes (after four weeks on location).

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.

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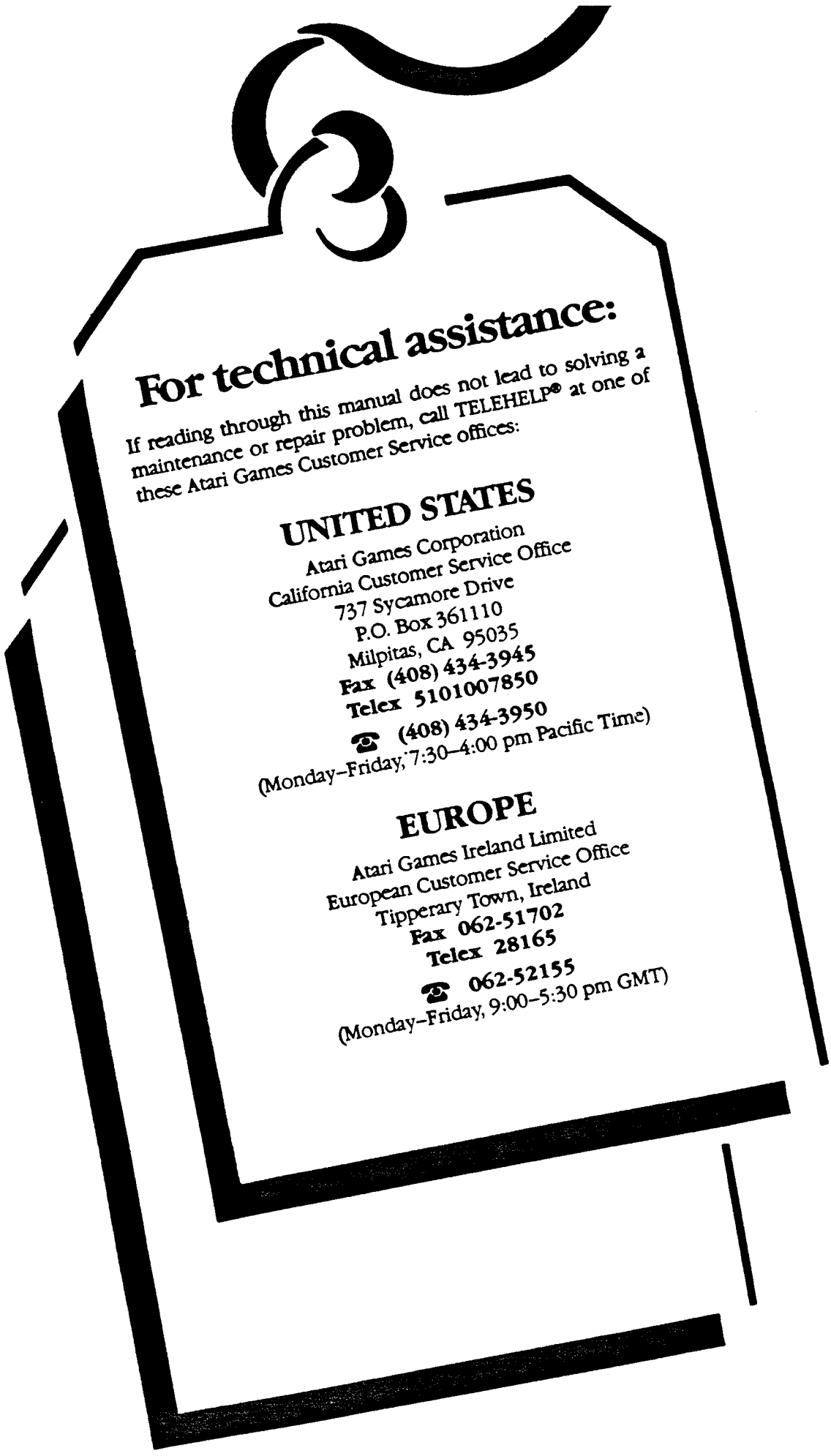
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