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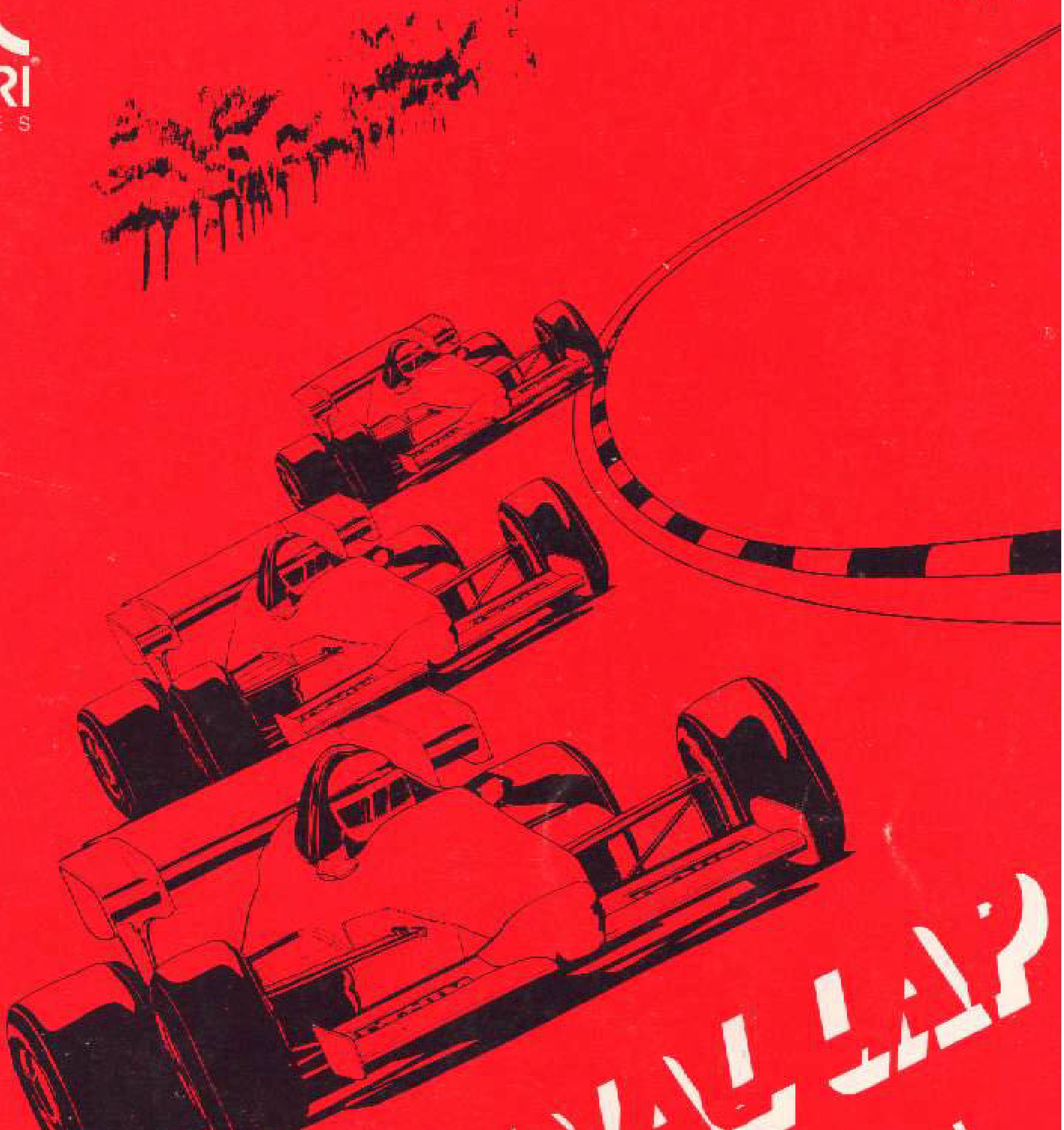


FINAL LAP

Operators Manual

with Illustrated Parts Lists and Schematics

Up Right

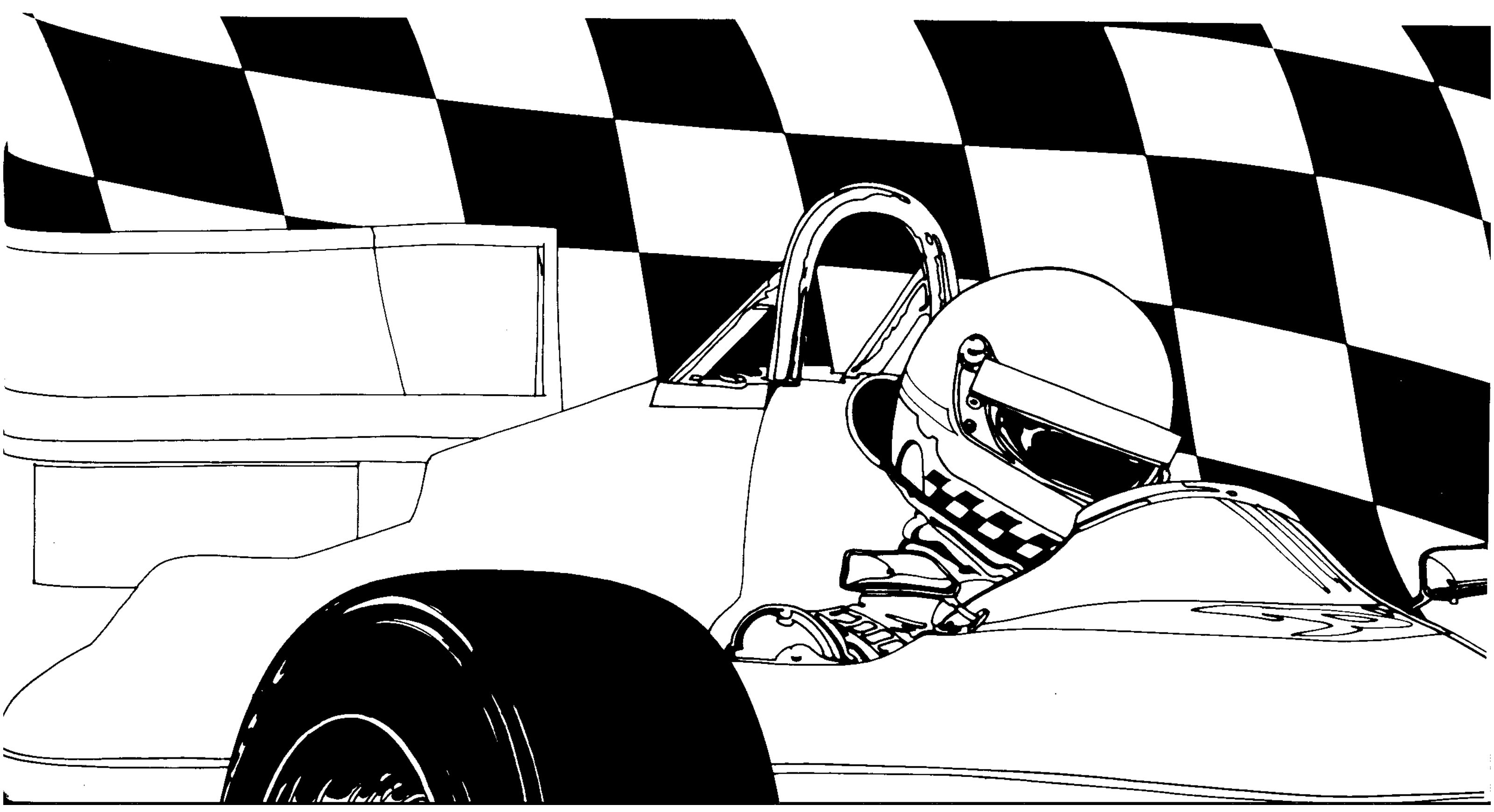
ATARI®
GAMES

Upright Model

Final Lap™

Operators Manual

with Illustrated Parts Lists



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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 ground wires in the game are properly connected as shown in the game wiring diagram.
- The power cord is properly plugged into a grounded three wire outlet.
- On games provided with an Electromagnetic Interference (EMI) ground cage, be sure the printed-circuit boards (PCBs) are properly installed in the EMI ground cage and that the end board is securely installed with **all** screws in place and tightened.

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

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Safety Summary

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

WARNING

Properly Ground the Game. Players may receive an electrical shock if this game is not properly grounded! To avoid electrical shock, do not plug in the game until it has been inspected and properly grounded. This game should be only be plugged into a grounded three-wire outlet. If you have only a two-wire outlet, we recommend you hire a licensed electrician to install a three-wire grounded outlet. If the control panel is not properly grounded, players may receive an electrical shock! After servicing any part on the control panel, check that the grounding wire is firmly secured to the inside of the control panel. After you have checked this, lock up the game.

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

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

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

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

Use the Proper Fuses. To avoid electrical shock, use replacement fuses which are specified 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. The connectors are keyed to fit only one way. If they do not slip on easily, do not force them. If you reverse a connector, it may damage your game and void your warranty.

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

ABOUT NOTES, CAUTIONS, AND WARNINGS

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

NOTE—A highlighted piece of information.

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

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

Chapter 1

Set-Up

How to Use This Manual

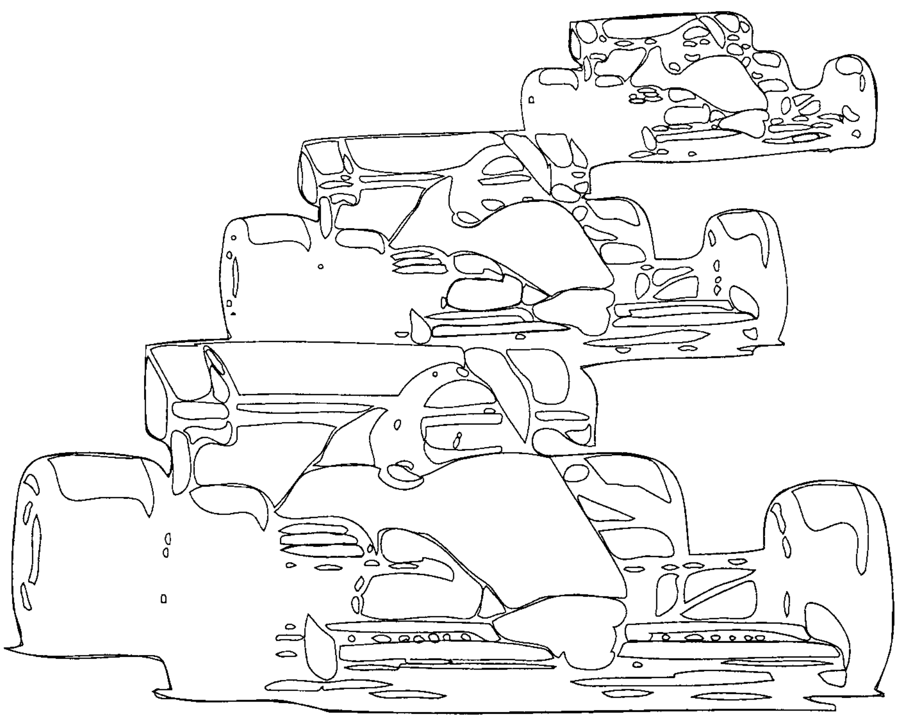
This manual is written for game operators and service personnel, and provides information for setting up, playing, testing, and maintaining your Final Lap™ Upright game.

The manual is divided into the following chapters:

- Chapter 1 contains set-up and game play information.
- Chapter 2 contains self-test procedures.
- Chapter 3 contains preventive maintenance and repair procedures.
- Chapter 4 contains illustrated part lists.

Wiring and schematic diagrams for the Final Lap Upright game circuitry are contained in the Schematic Package Supplement (SP-322) included with your game.

This chapter includes information required to set up and play your Final Lap Upright game. Read this chapter carefully before you turn on the game.



WARNING

This game must be levelled before anyone plays it. If it is not levelled, a player can pull the cabinet over on top of himself.

This cabinet should be connected to a grounded three-wire outlet only. If you have several cabinets, each one should be connected to its own separate grounded outlet.

If you have only two-wire outlets, we recommend that you hire a licensed electrician to install grounded outlets. Players can receive an electrical shock if the cabinet is not properly grounded.

WARNING

To avoid electrical shock, do not plug in the cabinet until you have inspected it. After you have inspected it, plug it in only to a grounded three-wire outlet.

Inspecting the Game

Please inspect your Final Lap Upright game carefully to ensure that the game is complete and was delivered to you in good condition.

Figure 4-1 shows the locations of the parts of the game. Table 1-1 lists space, power, and environmental requirements.

Inspect the game cabinet and seat assembly as follows:

1. Examine the exterior of the cabinet for dents, chips, or broken parts.
2. Unlock and open the lower service door. Unlock and open the coin doors. Inspect the interior of the cabinet as follows:
   a. Ensure that all plug-in connectors (on the cabinet harnesses) are firmly plugged in.
   (The connector bracket next to the EMI enclosure is for the car type selection. One of three connectors can be plugged into the connector bracket or none of them may be. For more information, see *Choosing the Car Type* in this chapter.)
   Do not force connectors together. The connectors are keyed so they fit only in the proper orientation. *A reversed edge connector can damage a printed-circuit board (PCB) and will void your warranty.*
   b. Ensure that all plug-in integrated circuits on each PCB are firmly plugged into their sockets.
   c. Inspect the power cord for any cuts or dents in the insulation.
   d. Inspect the power supply. Make sure that the correct fuses are installed. Check that the harness is plugged in correctly and that the fuse block cover is mounted in place. Check that the green ground wires are connected.
   e. Inspect other major sub-assemblies, such as the video display, printed-circuit boards (PCBs), and speaker. Make sure that they are mounted securely and that the ground wires are connected.

Table 1-1 Game Specifications

Characteristic	Specification
Power Consumption	150 V-A, 110 W RMS
Temperature	+5° to +50° C (+37° to +122° F)
Humidity	Not to exceed 95% relative
Line Voltage	102 to 132 VAC (U.S. games)
Width	49 in. (124.5 cm.)
Depth	33 in. (84 cm.)
Height	72 3/8 in. (184 cm.)
Weight	450 lbs. (204.5 kg.)

Installing the Attraction Sign

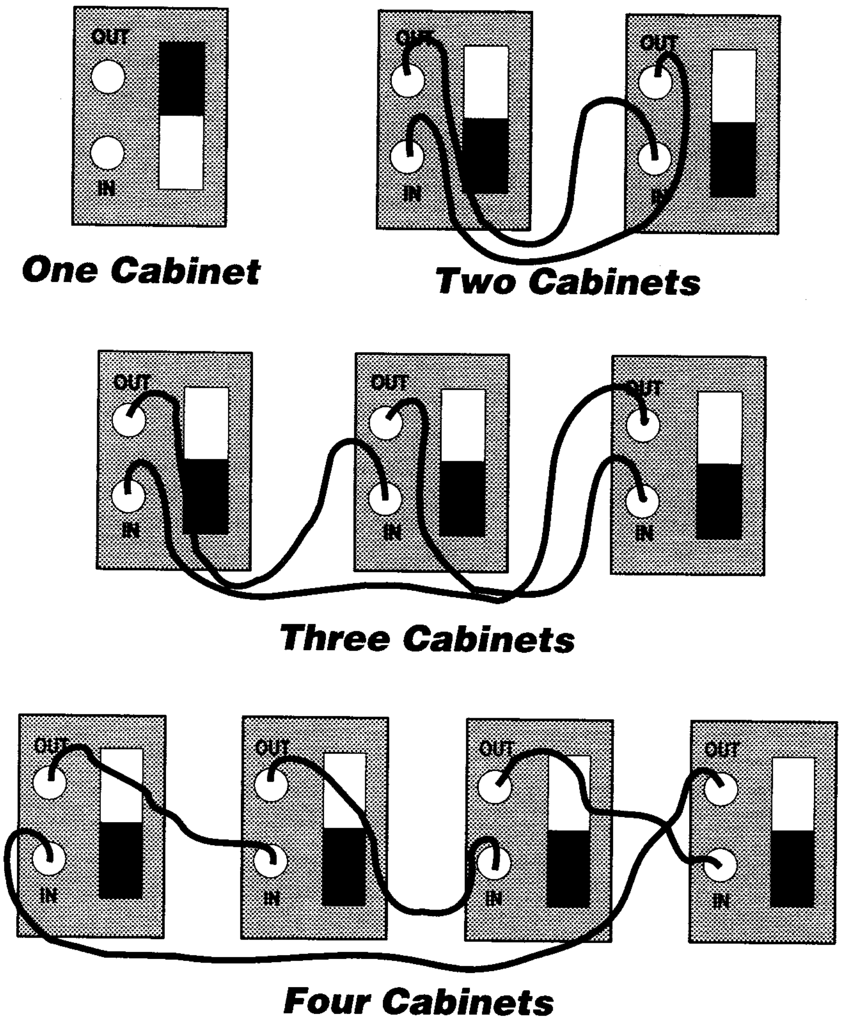
The attraction sign mounts on the top panel of the game. See Figure 4-1.

Put the attraction sign on top of the game and center it. The front edge should be behind the retainer. Peel off the covering on the tape on the bottom of the sign and press the tape down on the cabinet.

Connecting Cabinets

You can connect up to four cabinets together. Each cabinet is shipped with a 6-foot-long connecting cable. If you are connecting three or four cabinets together, you will need longer cables, which are available from Atari Games Customer Service. These cables are 10 feet long (part no. 150031-120) and 20 feet long (part no. 150031-240).

1. Turn off the game power to all the cabinets.
2. Find the Link PCB in the back of the game. Plug in the connecting cables as shown in Figure 1-1. Each cable must be connected from an input to an output.
3. Switch the connecting switch located on the Link PCB to the *down* position on all the cabinets that are linked together.



Connected Cabinets and Their Link PCBs

Choosing the Car Type

Each player can have one of four car types. These are selected by plugging in different connectors (included with the game) into the car-type connector bracket. The car-type connector bracket is next to the PCB enclosure and shown in Figure 1-4.

At the factory, one car-type connector is plugged into the car-type connector bracket and the other two connectors are attached to it by a tie wrap. In Figure 1-2 the car-type connectors are shown with the wires at the different locations.

The car types and colors with their corresponding connectors are shown in Table 1-2.

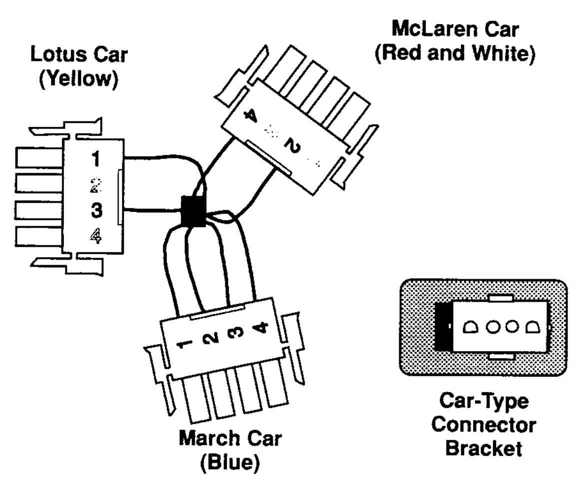


Figure 1-2 Car-Type Connectors

Table 1-2 Car-Type Connectors

Car Type	Color	Connector
March	Blue	Has wires at all 4 pins.
McLaren	Red and white	Has wires at pins 2 and 4.
Williams	White, blue, and yellow	**No** connector.
Lotus	Yellow	Has wires at pins 1 and 3.

Control and Switch Locations

The controls and switches are located on the utility panel behind the upper coin door and on the back of the game.

Power On/Off Switch

The power on/off switch is located at the bottom left of the cabinet. (See Figure 4-1.)

Volume Control

The volume controls are located on the self-test utility panel behind the upper coin door. (See Figure 1-3.) Each player has two volume controls which adjust the level of sound from two speakers over each video display.

Self-Test Switch

Each game has two self-test switches located on the utility panel behind the upper coin door. (See Figure 1-3.) The self-test switches are slide switches.

Each video display has its own self-test switch that selects the Self-Test Mode to check game operation. See Chapter 2 for a complete description of the self-test.

Auxiliary Credit Switches

Each game also has two auxiliary credit switches, next to the self-test switches on the utility panel. These are push button switches. Use either auxiliary credit switch to give a player coin credits.

These switches do not activate the coin counter when they are used. This may be helpful if you need to troubleshoot the player start circuitry.

Connection Switch

The connection switch is on the Link PCB (see Figure 1-2). This switch should be in the down position with connecting cables plugged in, if you have two or more cabinets connected together. For more information, read *Connecting Cabinets* in this chapter.

NOTE

*If you have one cabinet, be sure the Link PCB switch is in the **up** position. Otherwise the game will not function properly.*

Coin Counter

The two coin counters, one for each player, are located on the utility panel inside the upper coin door. The coin counter records the number of coins deposited.

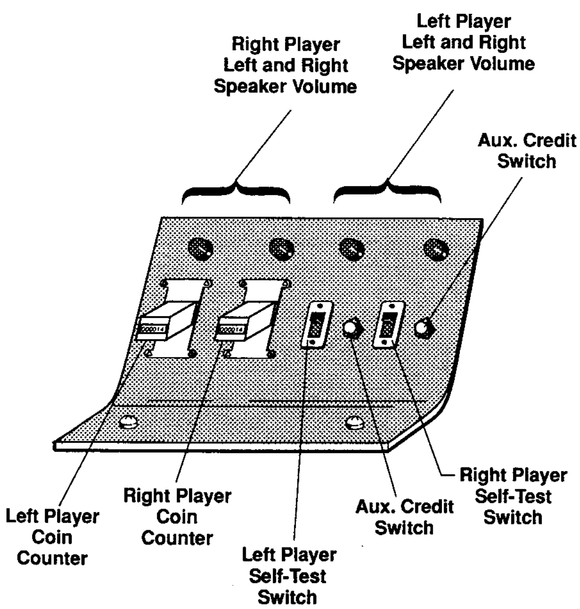


Figure 1-3 Utility Panel Controls

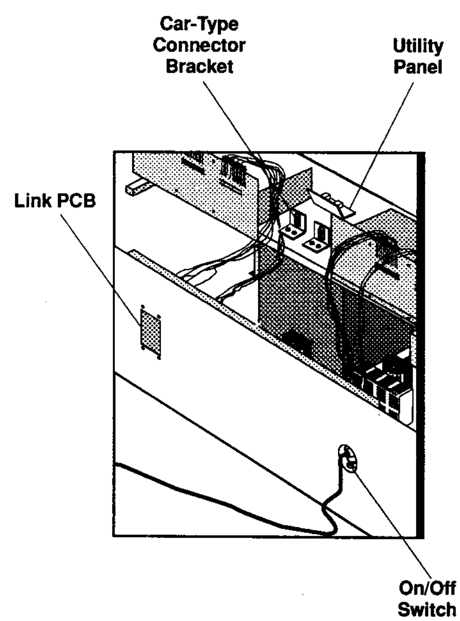


Figure 1-4 Other Game Control Locations

Setting the Coin and Game Options

The Final Lap Upright coin and game options are set in the Self-Test Mode. Refer to Chapter 2 for the recommended settings and the procedure for setting the options.

Game Play

This section of the manual describes the theme of the Final Lap Upright game and the game play features.

Introduction

Final Lap is the first linked game designed for the amusement industry. Originally created by Namco Limited of Japan, Final Lap Upright is a realistic racing game in the tradition of Pole Position.

Each Final Lap Upright unit is actually two games in one, with two separate video displays linked together for interactive play. Realistic player controls consist of a steering wheel with return-to-center steering, a high/low shifter, and a gas pedal. As many as four Final Lap Upright units can be linked together for unprecedented competition: Up to eight players can compete head-to-head.

Play Mode

Imagine yourself racing head-to-head against the player next to you. You see his car approaching in the rear-view mirror, and suddenly, he passes you on the inside, narrowly missing a road sign. You weave between the other competitive cars in hot pursuit. You are on his tail through the hairpin and pass him in the straightaway! The status screen tells you that you are now in first position. You pass the finish line before the time runs out and again get extended time, but the question still remains: can you complete the final lap?

To start the game, one or more players deposit coin(s) in the slot corresponding to their video display (e.g., the right player uses the right coin slot and the left player the left slot). The green light flashes, the green flag is waved and the race is on!

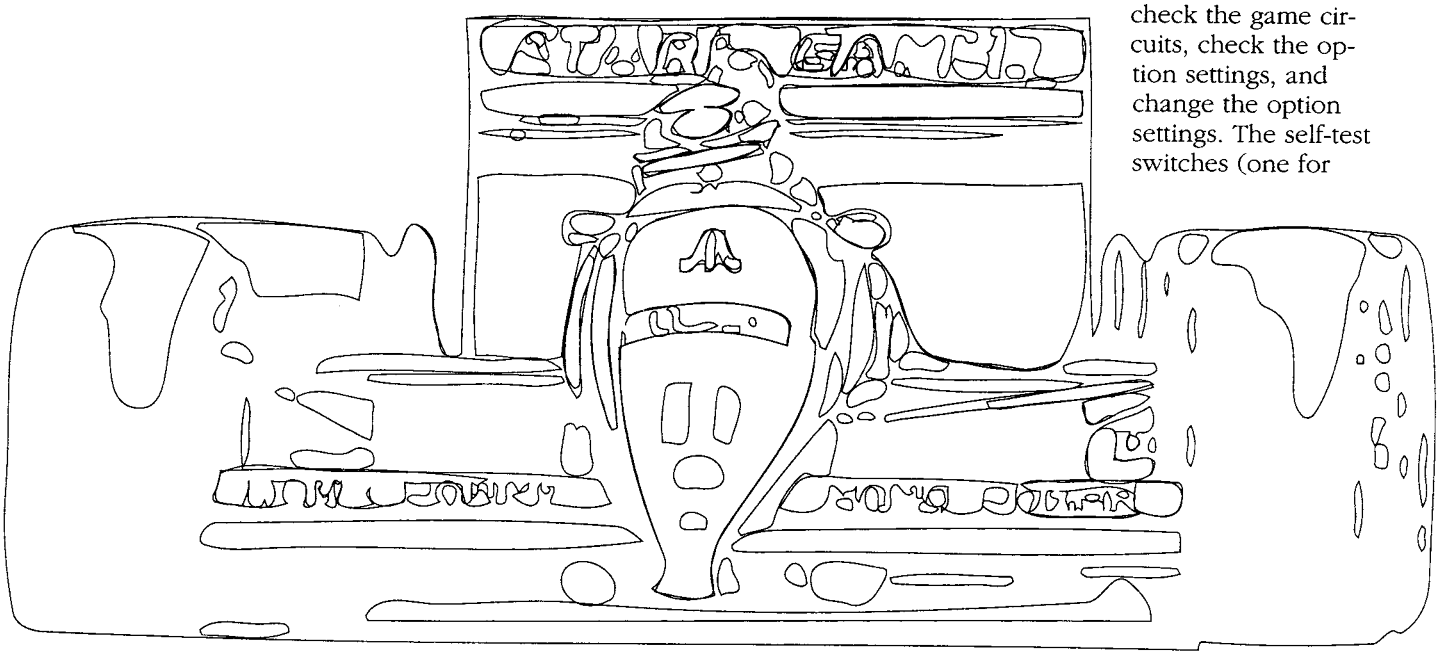
- To begin a head-to-head race, players must deposit coins within 16 seconds of each other.
- One player can compete against the clock or multiple players race can simultaneously on the same course.
- Each player has his own realistic first-person perspective of the track and sees his competitors' cars on his screen.
- New players can start a new game even if another race is in progress.
- As an incentive for multiple-player games, all players can continue for an extended time, as long as at least one player completes the lap within the time allowed on the computer clock shown in the center of the video display.
- Players who set the best lap time are rewarded with a bottle of champagne in the winner's circle.
- If a player's time is fast enough, the player can enter his initials on the high score table.

Chapter 2
Self-Test

The Final Lap™ Upright 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 through the sound system. No additional equipment is required.

We suggest that you perform a self-test at least once a day and when you first set up the game, connect additional cabinets, collect coins, or when you suspect game failure.

Use the self-test to check the game circuits, check the option settings, and change the option settings. The self-test switches (one for each display) are located on the utility panel behind the upper coin door. The self-test switches are the slide switches on the bottom of the utility panel.



When you turn off the self-test switch, the game returns to the attract mode. When you turn on the self-test switch, the self-test screen appears.

To move through the options and tests, press the gas pedal and change the gear shift from low to high. (You will hear a roar through the speakers when you change the gear shift.) The next option setting now flashes. To move to the next option or test, do the same procedure.

You can only move down the screen. When you reach the end of the list, you return to the Sound test.

To change a flashing option setting, move the gear shift from low to high. Do not press the gas pedal. Every time you move the gear shift, a new setting appears. Once you choose a new setting, you can return immediately to the attract mode, if you like.

RAM Test

This tests the game RAMs. If the game RAMs are working correctly, *OK* appears. If the screen shows anything besides *OK*, a qualified technician should check the game boards.

ROM Test

This tests the game ROMs. If the game ROMs are working correctly, *OK* appears. If the screen shows anything besides *OK*, a qualified technician should check the game boards.

Gas Pedal Test

GAS is the gas pedal test. Press the gas pedal, and the number to the right increases. Release the pedal, and the number decreases. If you are not pressing on the gas pedal, the number should be 00. If the number does not appear this way, then do the following:

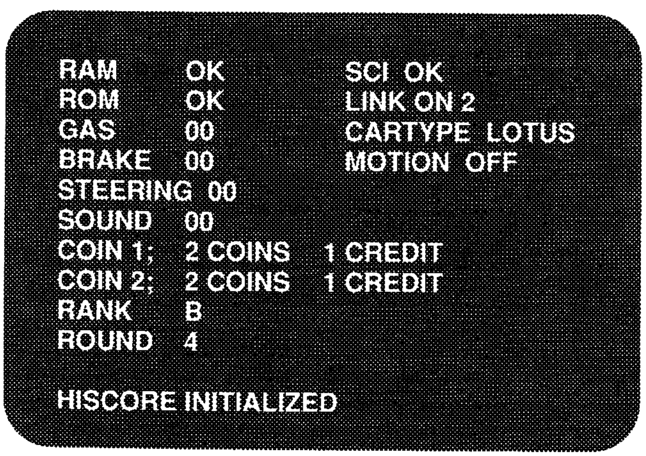


Figure 2-1 Self-Test Screen

1. Check to make sure the gas pedal is returning to the top of its mechanical range. If it does not, repair or replace the gas pedal.
2. Turn the self-test switch off and then on again.
3. The number should reset to zero.
4. If it does not, check the potentiometer on the gas pedal.

Brake Test

BRAKE does not apply to the Final Lap Upright game. It will show the same values as the gas test.

Steering Wheel Test

STEERING is the steering wheel test. When you turn the wheel to the left, the number increases. When you turn the wheel to the right, the number decreases. If you are not turning the steering wheel, the number should be 00 or FF. If the number does not appear this way, then do the following:

1. Check to make sure the steering wheel returns to the center. If it does not, repair the steering wheel.
2. Turn the self-test switch off and then on again.
3. The number should reset to zero.
4. If it does not, check the potentiometer on the steering wheel.

Sound Test

SOUND is the sound test. Cycle through the five sounds to test the audio circuitry.

Coin Options

The *COIN 1* option sets the coin option for each player. The *COIN 2* setting does not apply to this game.

You can choose 1 to 8 coins and 1 to 8 credits. The coin amounts and the credit amounts change independently of each other.

The recommended option setting is 2 coins for 1 credit.

NOTE

All players must have identical Coin 1 settings.

Difficulty Level

RANK is the difficulty level of the game. When you change the rank, you shorten or lengthen the game time.

NOTE

All players must have identical Rank settings.

The levels are:

- A (easy)
- B (medium)—recommended setting
- C (hard)
- D (difficult)

Number of Laps

ROUND is the number of laps each player is permitted to complete in each game. If one player completes a lap in less than the allotted time, then all players receive another lap.

NOTE

All players must have identical Round settings.

These are the settings for the number of rounds:

- 3
- 4 (recommended setting)
- 5
- 6

Communication Circuit Test

SCI, at the top right of the screen, indicates whether the Game PCB communications circuits are working correctly. *SCI ON* should be followed by four letters and numbers if the circuits are working correctly. If you see *SCI NG,* then a problem exists. Check the connecting cables to other games and the connectors.

Linked Games

LINK counts the number of game PCBs connected together (not the number of cabinets). LINK should always read *On.* If it reads *Off,* the switch on the Link PCB is in the wrong position. Check Figure 1-1, *Link PCBs on Connected Cabinets,* for the correct position of your switch.

If you have one cabinet, the number of linked games should be 2. If you have 3 cabinets connected, the link number should be 6. If you do not have the correct number of links, check the connections between your games.

Car Type

The *CAR TYPE* is the type and color of car that each player has. Each type of car has a different color. For more information about choosing the car type, see *Choosing the Car Type* in Chapter 1.

Motion Test

MOTION does not apply to the Final Lap Upright game. It should always read *Off.*

Test Pattern

When you turn off the self-test, you will briefly see a test pattern. Use this screen to check the convergence and the color balance of the video display. For more information, see your video display service manual.

Reset the High Score Table

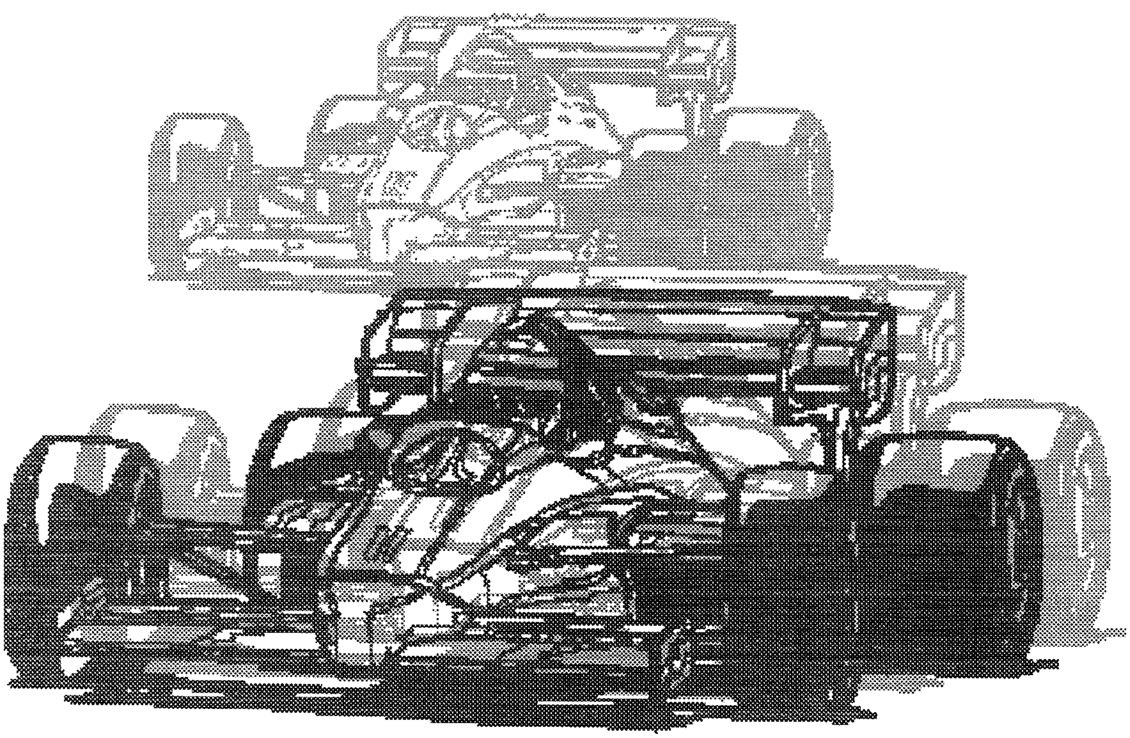
To reset the high score table, turn the steering wheel until the number 1F appears and change the gear shift to high. The words *HISCORE INITIALIZED* appear at the bottom of the self-test screen. The high score table now shows the default names and times.

Chapter 3

Maintenance

This chapter includes preventive maintenance and repair procedures for the Final Lap™ Upright game components that have the most use. To assure maximum trouble-free operation from this game, you should perform preventive maintenance described in this chapter.

Removal, disassembly, reassembly-assembly, and replacement procedures are provided for components that might need to be repaired. If a game part is mentioned, but not illustrated, refer to Chapter 4, Illustrated Parts Lists, for information.



Preventive Maintenance

Preventive maintenance includes cleaning, lubricating, and tightening hardware. Preventive maintenance should be performed regularly, so the game stays in top condition and major problems are avoided. Preventive maintenance tasks and intervals are shown in Table 3-1. More information about performing each task follows the table.

Maintaining Your Game

For the best performance from your Final Lap game, you should check and maintain your game according to the times and tasks shown in Table 3-1. How to check and maintain these items is explained further in this section. You may want to perform these tasks more often if the game is heavily used.

Opening the Control Panel

1. Remove the four tamperproof screws and washers in the front of the control panel.

NOTE

A hole is provided inside the upper coin door to store the tamperproof key wrench when it is not in use.

---

2. Open the control panel. See Figure 3-1.

Maintaining the Steering Wheel Assembly

This section explains how to maintain the steering wheel assembly on your Final Lap Upright game. For repair and replacement procedures, see *Repairs.*

Tightening the Screws on the Stop Brackets

1. When the control panel is open, the two stop brackets on the steering assembly face out. See Figure 3-2.
2. Make sure the four cross-recessed screws are tight. They should be torqued to 28 inch-pounds.
3. If a screw has fallen out, replace it immediately.

Tightening the Socket-Head Screw on the End of the Steering Shaft

1. Open the control panel.
2. Use a 3/16-inch Allen head wrench to tighten the screw on the end of the steering shaft. See Figure 3-2. Make sure it is torqued to 95 inch-pounds.

Tightening the Screws on the Spring Catch

The stop catch is mounted directly on the steering shaft, over the spring. The screws secure the spring

Table 3-1 Preventive Maintenance Items

Part	When to Check	What to Check and Maintain
Steering Wheel	Every 3 months	Does the steering wheel return to center? If it does not, repair it immediately.
		Turn the steering wheel as far as you can. Does it hit metal? Replace the O-rings on the stop.
		Open the control panel. Check the catches on the ends of the spring. Are they bent or broken? If so, replace the spring.
		Open the control panel and tighten these screws on the steering wheel: 4 cross-recessed screws on the stop brackets Screw on the end of the steering shaft 2 socket-head screws on the spring catch.
	Every 6 months	Lubricate the spring with Nyogel grease.
		Lubricate the bronze bearing on the case with light oil.
Gear Shift	Every 3 months	Check the gear shift for wear. If a rubber stop is wearing, turn the stop.
		Lubricate the shifter plate.
Pedal	Every 6 months	Check the springs to make sure they are not sprung and are returning the pedal to the top position. Replace if necessary.
		Lubricate the pin in the pedal link with lithium grease.
		Check the front and back rubber stops for wear.
Coin Mechanism	Every 3 months	Clean.
Interior Components	Every 6 months	Clean.

catch, which keeps the spring in tension. See Figure 3-2.

1. Open the control panel.
2. Turn the steering wheel so you can reach both the socket-head screws and the nuts on the spring catch.
3. Use a 5/64-inch Allen head wrench for socket-head screws and an 11/32-inch hex driver for nuts, and torque the screws to 28 inch-pounds.

Lubricating the Spring

1. Open the control panel.
2. The spring is inside the steering wheel housing. Lubricate the spring with Nyogel grease.

Lubricating the Bearing

To lubricate the steering assembly bearing you must take off the screw on the end of the steering wheel shaft, the gear on the shaft, the retaining ring, and the washer.

1. Take off the gear on the steering wheel shaft by removing the socket-head screw on the end of the shaft. See Figure 3-2.
2. Pry off the retaining ring. Cover the ring with a cloth while you pry it, so it doesn't fly off.
3. Take off the washer.
4. Put two drops of light oil on the top surface and inner surface of the bronze bearing.
5. Reassemble the steering wheel shaft.

Lubricating the Gear Shift Assembly

1. Open the control panel.
2. Grease the shifter plate with lithium grease. See Figure 3-4.
3. Check the round rubber bumpers for wear. If a bumper is worn, turn it.

Maintaining the Pedal Assembly

To maintain the pedal, grease the pin in the pedal link and check the springs and stops for wear.

Push the pedal down a few times to make sure it returns easily to the top position. If it does not return easily, probably the pin in the pedal link needs to be lubricated. If the pin is lubricated, check the springs at the rear of the pedal to make sure they are not sprung.

While you are looking at the pedal, also check the front and rear rubber stops for wear.

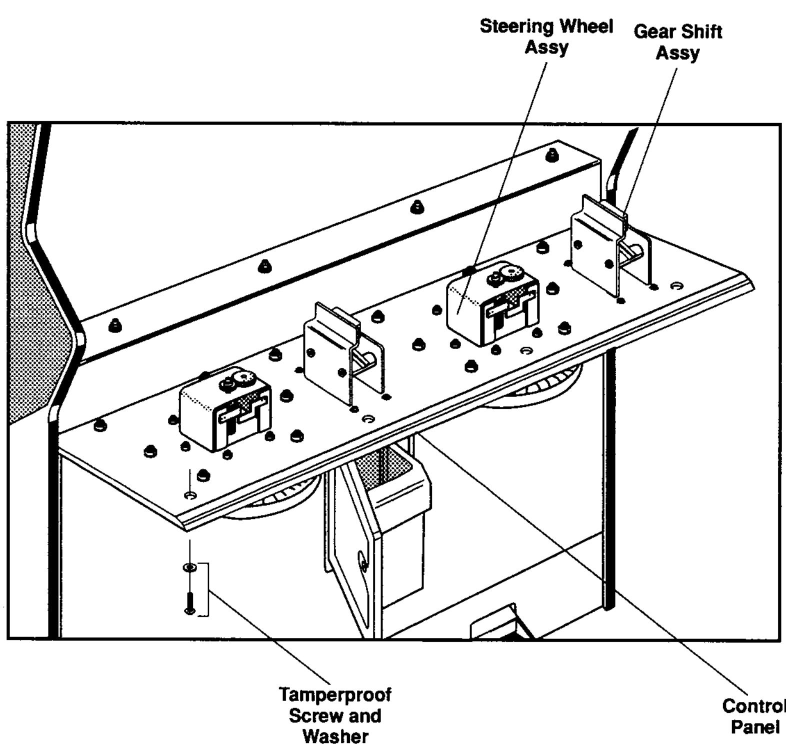


Figure 3-1 Opened Control Panel

Lubricating the Pin

1. Turn off the power to the game.
2. Disconnect the pedal wiring harness from the main harness.
3. Remove the four nuts that hold the pedal in the game. Use a 7/16-inch wrench.
4. Take the pedal out of the game.
5. On the left side of the pedal assembly at the bottom is a hole for lubricating the pin and the slot. Put lithium grease on the pin and in the slot. Push the pedal up and down to work the grease around to lubricate the slot.
6. Reinstall the pedal in the game and reconnect the harness.

Cleaning the Coin Mechanism

Use a soft-bristled brush to remove loose dust or foreign material from the coin mechanism. A toothbrush can be used to remove any stubborn build-up of residue in the coin path. After cleaning the coin mechanism, blow out all of the dust with compressed air.

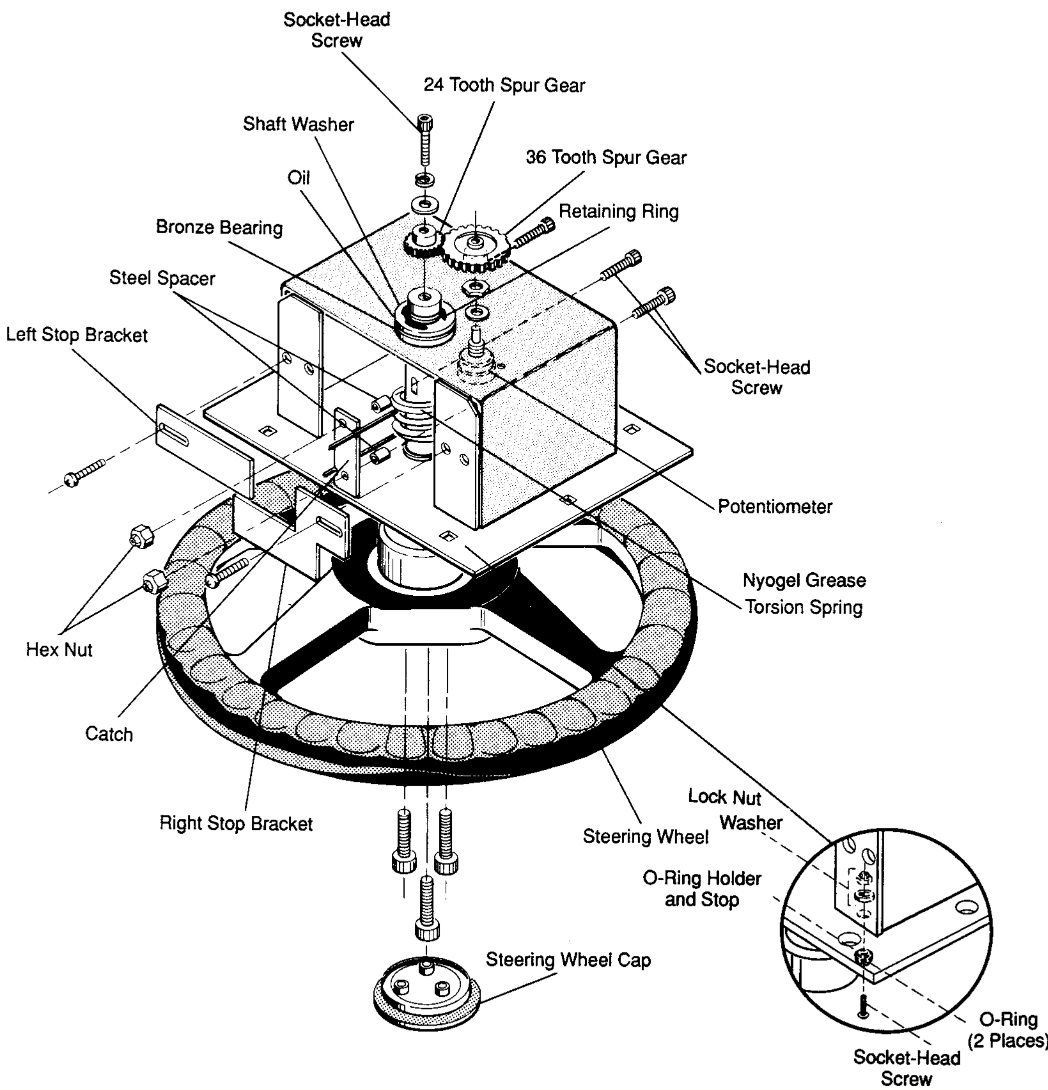


Figure 3-2 Maintaining the Steering Wheel Assembly

Cleaning the Interior Components

Perform the following procedure to clean the components inside the cabinet.

1. Open the rear access panel and display service panel.

WARNING

Turn off the game power, but do not unplug the power cord before cleaning inside the cabinet. The power cord provides a ground path for stray static voltages that can be present on the cleaning tools.

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2. Discharge the high voltage from the cathode-ray tube (CRT) before proceeding. The display assembly contains a circuit for discharging the high voltage to ground when power is removed. However, to make certain, always discharge the display as follows:
   a. Attach one end of a solid gauge wire to a well-insulated screwdriver or wooden handle.
   b. Attach the other end of the wire to an earth ground.
   c. Quickly touch the blade end of the screwdriver to the CRT anode by sliding it under the anode cap.
   d. Wait two minutes and repeat part c.
3. Use a vacuum cleaner with a soft long-bristled brush attachment or use a soft-bristled paint brush

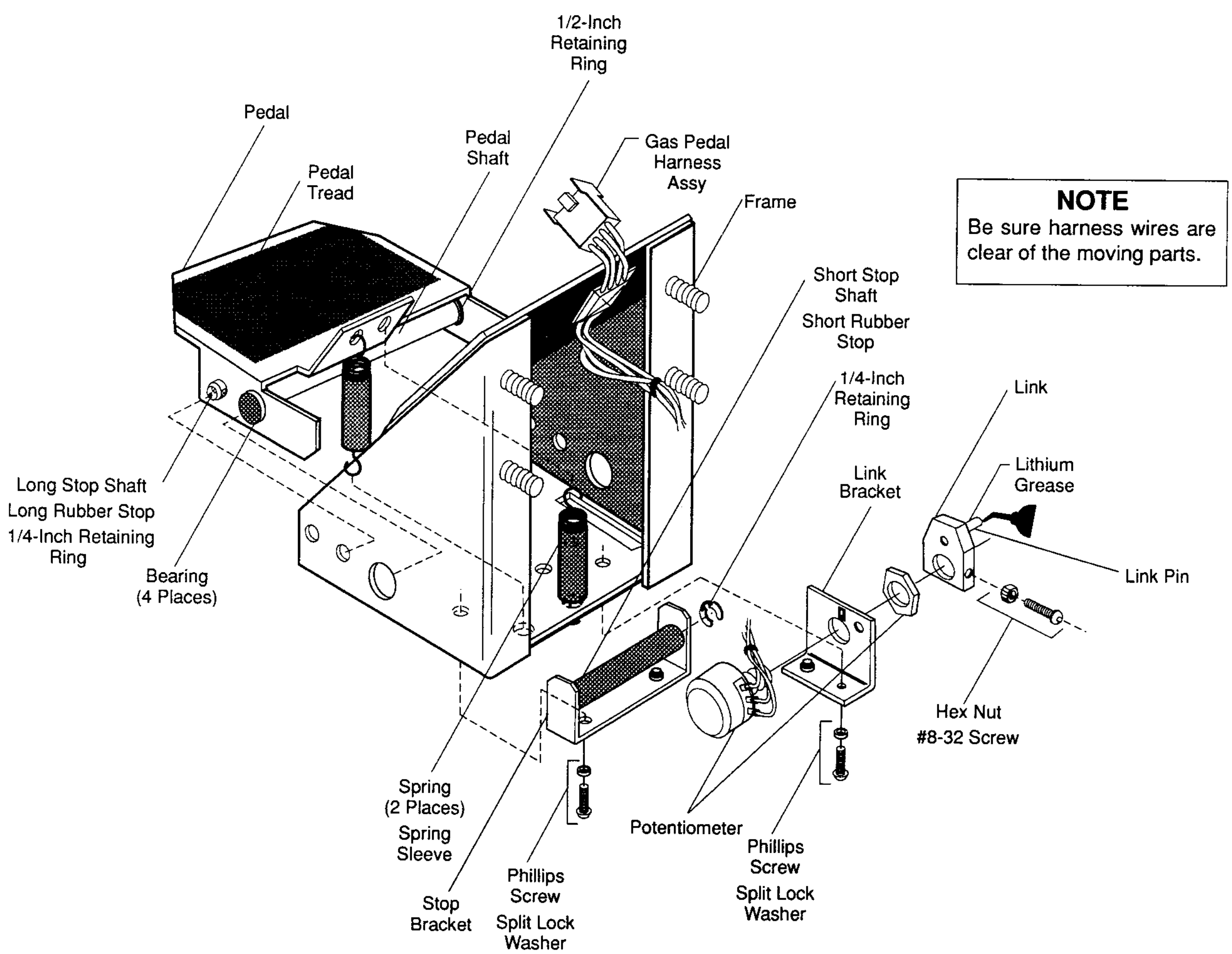
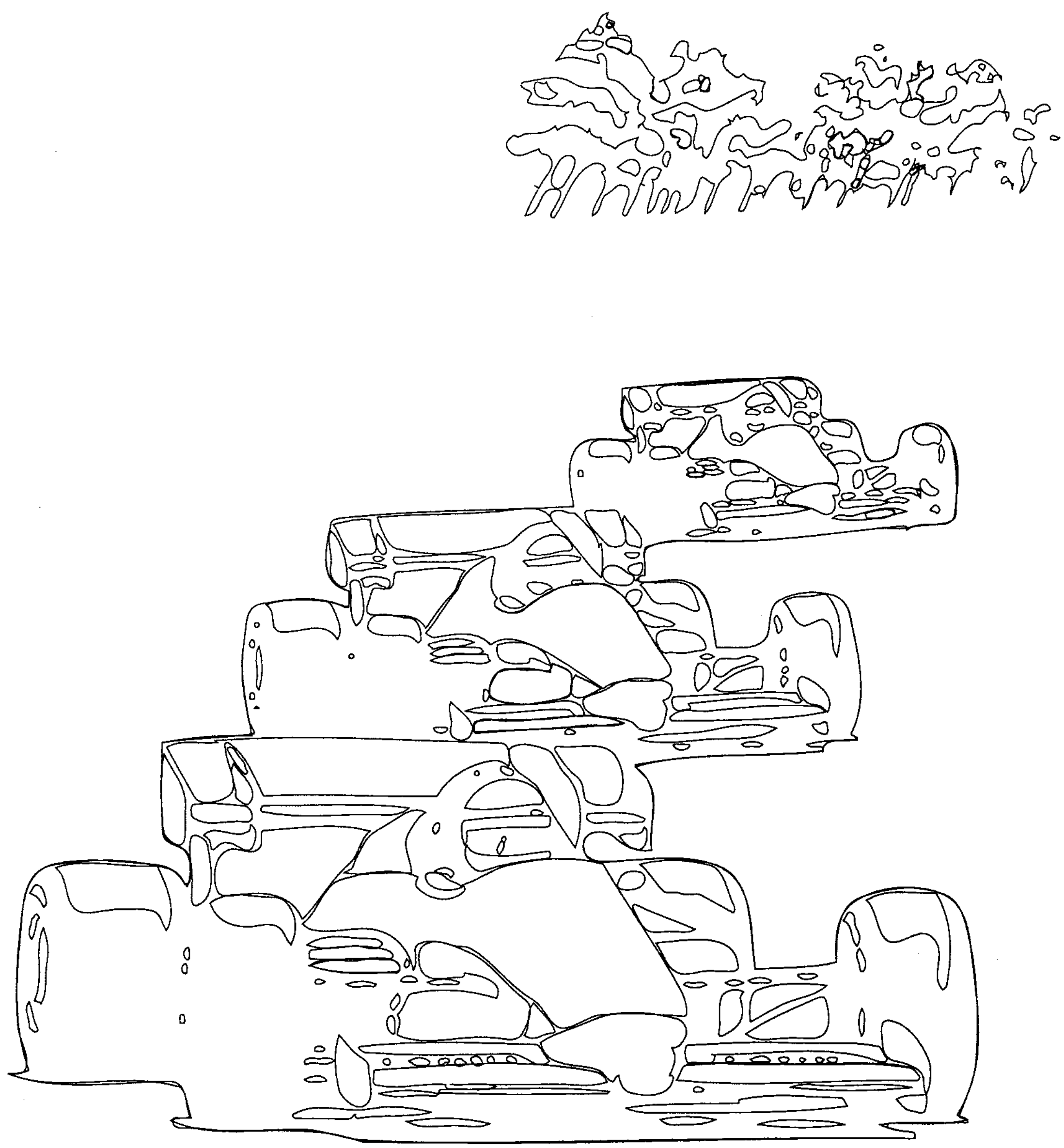


Figure 3-3 Maintaining the Pedal Assembly

to remove loose dirt and dust accumulated on the inside of the cabinet. Be sure to clean the electrical components thoroughly (power supplies, PCB assemblies, display, etc.).

CAUTION

Be extremely careful when cleaning the electrical components inside the cabinet. Avoid touching the electrical components with any solid object other than the soft bristles of the vacuum attachment or paint brush.



Repairs

Repairs include the removal, disassembly, reassembly-assembly, and replacement of game components. The following procedures are provided for components that may require repairs.

Use Table 3-2 to find the solution to problems you may be having with your Final Lap Upright game.

Replacing the O-Rings on the Steering Wheel Stop

If the steering wheel hits metal when it turns, the O-rings on the steering wheel stop must be replaced. See Figure 3-2.

1. Open the control panel.
2. Remove the steering wheel.
   a. Pry off the center steering wheel cover.
   b. Remove the three hex-head screws underneath the cover that hold the steering wheel on the steering wheel assembly. Take off the steering wheel.
3. Take off the nuts that hold the plastic dashboard in place. Use a 7/16-inch wrench.

The stop is located on the front of the steering wheel assembly and is held on by a nut inside the steering

Table 3-2 Game Troubleshooting

Problem	Solution
Steering Wheel	
Hits metal when it turns	Replace O-rings on the stop.
Spins freely	Replace stop and spring.
Does not return to center, but does not spin freely	Replace spring.
Fails the self-test	Check mechanical parts, then replace potentiometer.
Steering wheel is broken, but internal mechanism is undamaged.	Replace steering wheel.
Shifter	
No response from screen; no change in volume when shifter is moved	Replace the microswitch if other parts are in good condition.
Pedal	
Sticks	Grease pin on pedal link (described in *Preventive Maintenance)*.
Does not return	First grease pin, then check springs. Replace springs if necessary.
Fails the self-test	Check mechanical parts, then replace potentiometer.
At top or bottom of the movement, the pedal hits metal.	Replace rubber stops.
Video Display	
Any problem	Refer to video display service manual.
Speaker	
No sound	Make sure volume is turned up for each speaker. If the volume is turned up, do the following: Do the self-test. Check the wiring and the volume control potentiometer. Replace the defective speaker.
Non-Mechanical Problems	
Players cannot race together.	Check the switch on the link PCB to make sure it is in the right position. (This is described in Chapter 1.)
Players have the same color of cars.	With one or two cabinets linked, each player can have an individual color. With more that two cabinets linked, some players will have the same color cars. For more information, see Chapter 1, *Choosing the Car Type.*
Players do not receive the same number of laps, even though they are racing together.	Check that the ROUND setting in the self-test is the same for all players.

wheel assembly housing. Two O-rings are mounted on the stop. If one is broken or worn, replace both.

4. Slide the old O-rings off and slide the new O-rings on. Make sure the O-rings fit properly in the grooves on the stop.
5. Install the plastic dashboard.
6. Install the steering wheel. Install the three screws and tighten them to 95 inch-pounds.
7. Close the control panel.

If the Steering Wheel Does Not Return to the Center

If the steering wheel does not snap back to the center when you turn it, you may need to replace the stop and the spring. See Figure 3-2.

Replace the stop and the spring if you can spin the steering wheel in a complete circle.

Replace the spring if the steering wheel does not return to the center, but does not spin in a complete circle.

Replacing the Spring on the Steering Wheel Assembly

1. Open the control panel.
2. Loosen the screw on the end of the steering shaft. Take off small gear at the end of the steering shaft.
3. Pry off the retaining ring. Be careful when you pry it off, since it will fly off the shaft.
4. Remove the large washer below the retaining ring.
5. Take off both stop brackets by removing the cross-recessed screws holding the brackets on the case.
6. Take off the catch on the spring. Use 9/64-inch Allen wrench on the socket-head screws and an 11/32-inch hex driver on the Nyloc nuts. Remove the screws, nuts, spacers, and catch.
7. Pull the shaft out a small amount towards the steering wheel and remove the spring.
8. Grease the shaft with Nyogel, if necessary. Put on a new spring. The spring must be well lubricated with Nyogel grease.
9. Replace the washer and retaining ring.
10. Replace the catch. Make sure it holds the spring in tension.
11. Replace the gear and the socket-head screw on the

12. If you move the gear on the potentiometer shaft:
    a. Make sure the flat part of the potentiometer shaft lines up with the center terminal on the potentiometer.
    b. Now put the gear on the potentiometer. Make sure it completely meshes with the gear on the steering shaft and is the same height as the other gear.
    c. Check to be sure the potentiometer gear set screw is on flat part of potentiometer shaft and lines up with the center terminal on the potentiometer. Tighten the set screw.
13. When the gears mesh and are the same height, tighten the set screw on the gear on the potentiometer shaft.
14. Reassemble the steering shaft. If you do not need to replace the stop, close the control panel and install the tamperproof screws.

Replacing the Stop on the Steering Wheel Assembly

1. Open the control panel.
2. Remove the steering wheel.
    a. Pry off the center steering wheel cover.
    b. Remove the three hex-head screws underneath the cover that hold the steering wheel on the steering wheel assembly. Take off the steering wheel.
3. Take off the nuts that hold the plastic steering wheel cover in place. Use a 7/16-inch wrench.

The stop is located on the front of the steering wheel assembly and is held on by a nut inside the steering wheel assembly housing. See Figure 3-3. If the steering wheel can be turned in a complete circle, then the stop is probably sheared off in front.

4. Remove the nut that holds the stop on the inside of the steering wheel assembly. Use a 3/8-inch flat wrench. Insert the wrench through the back of the housing to get the nut off.
5. Put on a new stop. Tighten the nut to 47 inch-pounds.
6. Make sure the two O-rings are securely in the grooves.
7. Install the plastic dashboard.
8. Install the steering wheel. Put a drop of glue on each of the three screws before you install them.

Final Lap Video PCB Assembly
Parts List

Part No.	Description	Location
99-090445	Integrated Circuit, Custom 146	7F
	Resistors	
99-090193	Resistor, 1 K Ohm, ±5%, 1/4 W	
99-090332	Resistor, SIP, 1 K Ohm, 1/8 W	
99-090406	Resistor, 47 Ohm, 1/4 W	
99-090446	Resistor, SIP, 47 Ohm, 1/4 W	
	Capacitors	
99-090344	Capacitor, Electrolytic, 470 µf, 10V	
99-090447	Capacitor	

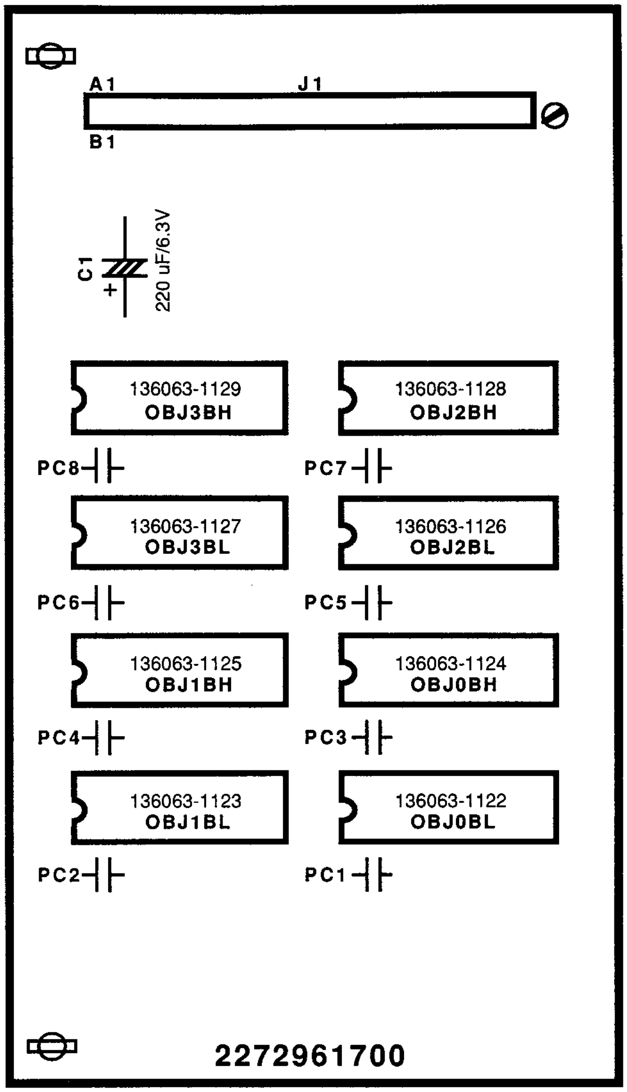


Figure 4-10 Final Lap Small ROM PCB Assembly 99-090452

Final Lap Small ROM PCB Assembly Parts List

Part No.	Description	Designator
99-090453	Capacitor, 220µF, 6.3V	C1
136063-1122	Integrated Circuit, ROM, Motion Object 0 BL	
136063-1123	Integrated Circuit, ROM, Motion Object 1 BL	
136063-1124	Integrated Circuit, ROM, Motion Object 0 BH	
136063-1125	Integrated Circuit, ROM, Motion Object 1 BH	
136063-1126	Integrated Circuit, ROM, Motion Object 2 BL	
136063-1127	Integrated Circuit, ROM, Motion Object 3 BL	
136063-1128	Integrated Circuit, ROM, Motion Object 2 BH	
136063-1129	Integrated Circuit, ROM, Motion Object 3 BH	
99-090416	Capacitor, Ceramic, 0.022 µF, 50 V	PC1-PC8

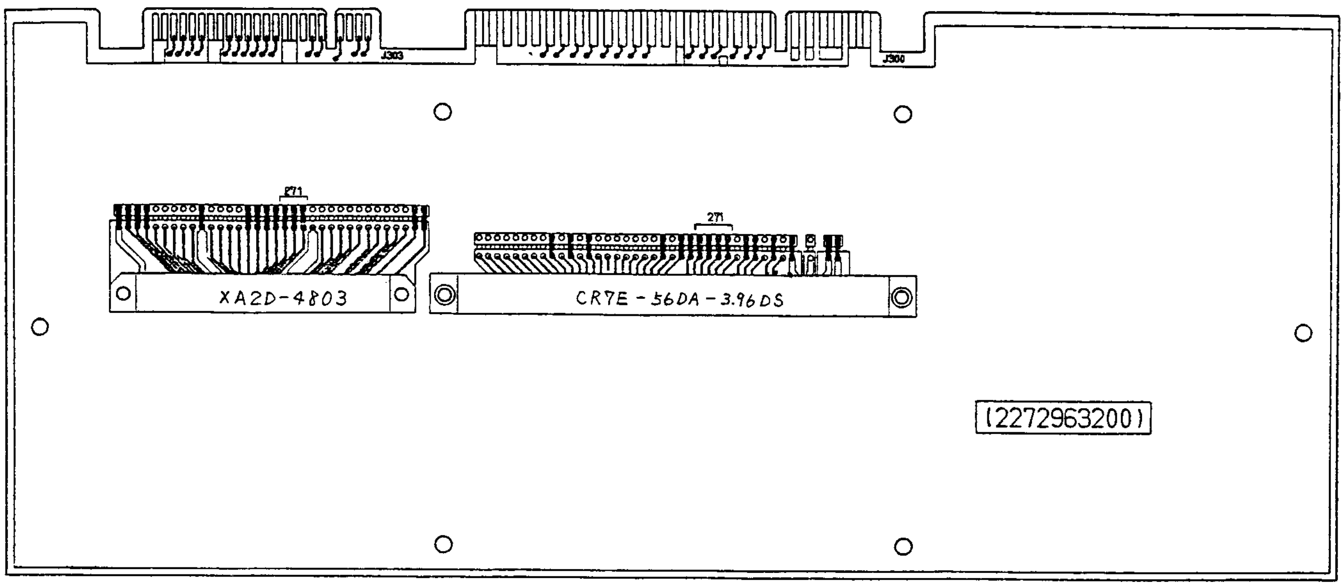


Figure 4-11 Final Lap EMI PCB Assembly
155027-001

Parts List

Part No.	Description
179174-056	Connector, Edge, 56 Ckt
99-090448	Filter, EMI, 270 pf, Ferrite
99-090449	Filter, EMI, 2200 pf, Ferrite

This assembly drawing was not available at press time. Contact your Atari Games Customer Service Office for a copy of this drawing.

Figure 4-12 Final Lap Link PCB Assembly 155028-001

Parts List

Part No.	Description
99-090450	Relay
99-090325	Diode, 1S1885
99-090451	Switch, Slide