



# INSTRUCTION MANUAL


including procedures for...

- operation
- auditing
- adjustment
- diagnostics

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Chicago, IL 60618  
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## ROM SUMMARY

<u>IC</u>	<u>DESCRIPTION</u>	<u>TYPE</u>	<u>NUMBER</u>	<u>LOC.</u>	<u>BOARD</u>	<u>PART NO.</u>
STAR RIDER	PROM, 16Kx8	27128	1	U4	ROM	A-5341-10607
STAR RIDER	PROM, 16Kx8	27128	2	U19	ROM	A-5341-10608
STAR RIDER	PROM, 16Kx8	27128	3	U5	ROM	A-5341-10609
STAR RIDER	PROM, 16Kx8	27128	4	U20	ROM	A-5341-10610
STAR RIDER	PROM, 16Kx8	27128	5	U6	ROM	A-5341-10611
STAR RIDER	PROM, 16Kx8	27128	6	U21	ROM	A-5341-10612
STAR RIDER	PROM, 16Kx8	27128	7	U7	ROM	A-5341-10613
STAR RIDER	PROM, 16Kx8	27128	8	U22	ROM	A-5341-10614
STAR RIDER	PROM, 16Kx8	27128	9	U8	ROM	A-5341-10615
STAR RIDER	PROM, 16Kx8	27128	10	U23	ROM	A-5341-10616
STAR RIDER	PROM, 16Kx8	27128	11	U9	ROM	A-5341-10617
STAR RIDER	PROM, 16Kx8	27128	12	U24	ROM	A-5341-10618
STAR RIDER	PROM, 16Kx8	27128	13	U10	ROM	A-5341-10619
STAR RIDER	PROM, 16Kx8	27128	14	U25	ROM	A-5341-10620
STAR RIDER	PROM, 16Kx8	27128	15	U11	ROM	A-5341-10621
STAR RIDER	PROM, 16Kx8	27128	16	U26	ROM	A-5341-10622
STAR RIDER	PROM, 16Kx8	27128	17	U12	ROM	A-5341-10623
STAR RIDER	PROM, 16Kx8	27128	18	U27	ROM	A-5341-10624
STAR RIDER	PROM, 16Kx8	27128	19	U13	ROM	A-5341-10625
Text	PROM, 8Kx8	2764	25	U46	ROM	A-5343-10658
STAR RIDER	PROM, 4Kx8	2732	26	U3	PIF	A-5343-10636
Translation	PROM, 1Kx4	7122	none	U10, U11	VGG	A-5282-10595
Horizontal	PROM, 512x8	6349	none	U74	VGG	A-5282-10637
Clock ROM	PROM, 32x8	82S123	none	U114	VGG	A-5282-10295
Sound	PROM, 8Kx8	2764	27	U11	Sound	A-5343-10663
STAR RIDER	PROM, 16Kx8	27128	30	U8	CPU	A-5343-10652
STAR RIDER	PROM, 16Kx8	27128	31	U15	CPU	A-5343-10653
STAR RIDER	PROM, 16Kx8	27128	32	U26	CPU	A-5343-10654
STAR RIDER	PROM, 8Kx8	2764	34	U45	CPU	A-5343-10656
STAR RIDER	PROM, 8Kx8	2764	35	U52	CPU	A-5343-10657

## NOTICE

TO ORDER REPLACEMENT ROMS from your authorized WILLIAMS distributor, specify (1) part number shown above, (2) ROM-label color, (3) REV level (number) on the label, and (4) which game the ROM is used in.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been certified to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of 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 is likely to cause interference in which case the user at his own expense will be required to correct the interference.

CAUTION

THE TRIMMER POTS in this game have been peaked at the factory and require special equipment to realign. Refer servicing that may involve these trimmers (especially those on the NTSC board) to qualified personnel at your authorized WILLIAMS distributor.

CAUTION

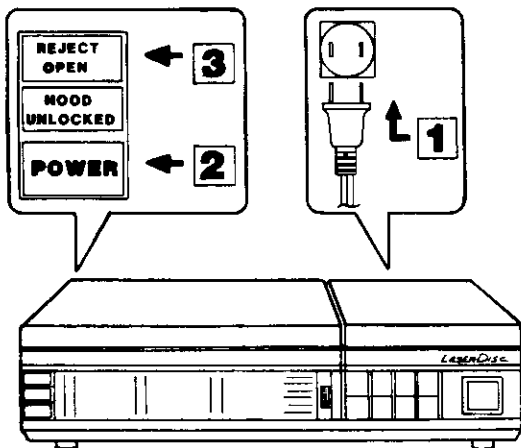
ALWAYS REPLACE THE SHIPPING SCREW and lens cap on your videodisc player before you move or ship the player. Failure to replace the shipping screw will result in expensive damage to the slider assembly. Unprotected lenses may become dirty or damaged in transit. The player might not operate if the lens is dirty or damaged.

NOTICE

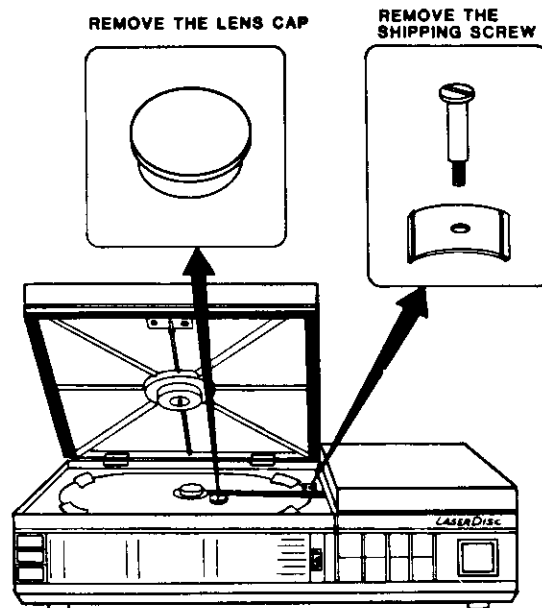
LENS-CLEANING PROCEDURE. Roll a piece of lens tissue over the top of a cotton swab. Use FREON TFC<sup>®</sup> (registered trademark of Dow Chemical Corporation) on the swab and clean the lens with circular motions. Never clean more than one lens with a single tissue.

Setting Up Your Videodisc Player

1. Open the game's back panel.
2. Remove the cardboard shipping-pad between the videodisc player and the game's front cabinet wall. Save this pad (part no. 08-7417) for future moving or shipping.
3. Remove the two bolts at the rear of the player-mounting board. Save these bolts for step 16.
4. Gently slide out the player-mounting board.
5. Turn game power ON.
6. Press the REJECT button to unlock the top of the videodisc unit. Open the top. (NOTE: The top will not open if the game is OFF or unplugged from the power connector.)
7. Remove the shipping screw and bracket from the disc compartment. Save this for use whenever you move the game.
8. Remove the lens cap. Save this for use during future shipping.



How to open the hood



Shipping screw and lens cap removal

9. Inspect the videodisc for fingerprints or scratches.
10. Clean the disc (if necessary) with glass cleaner and a lintless piece of cloth. See the instructions on the disc label. (MAINTENANCE TIP: repeat the cleaning at least once a week. NEVER use solvents on the disc.)
11. Handling the disc by its edge and center hole ONLY, place the disc onto the player. If one side of the disc seems more scratchfree than the other, place the better side down. This side will be played. Save the disc sleeve for use during future shipping.
12. Close the lid on the player. (NOTE: The disc won't rotate unless the lid is securely closed.)
13. Turn game power OFF.
14. Connect the following cables between the player and the game's PC boards:
  - // 26-pin ribbon cable to the PIF board
  - // audio cable to the sound board (The red RCA-connector should come from the RIGHT/2 disc-player output.)
  - // video cable to the NTSC/RGB board
  - // player power-cord to the outlet on the power-transformer chassis
15. Slide the player back in the game.
16. Secure the player-mounting board with the two bolts from step 3.
17. Replace the game's back panel.

## Power Turn-On

### WARNING

THREE-WIRE PLUG. This game must be plugged into a properly-grounded outlet to prevent shock hazard and to assure proper game operation. DO NOT use a "cheater" plug to defeat the ground pin on the power cord, and DO NOT cut off the ground pin.

WHEN THE GAME IS FIRST TURNED ON general illumination should light and a moment later the disc should spin up (increase its RPMs toward operating speed).

1. After disc speed stabilizes a series of colors will sweep across and fill the screen. Each color will replace the last.
2. Next a scanning "rug pattern" indicating the RAM test should appear on the screen.
3. This will be followed by a ROM test: The CPU board and the ROM board are depicted on the CRT. Each ROM chip is shown. As test results are determined, the ROMs turn green if they're good or red if they're bad. Gray ROMs aren't used in this game.
4. Finally a red moire-pattern with four sections will fill the entire screen.

IN A CORRECTLY-RUNNING GAME tests will be followed by the message "INITIAL CHECKS INDICATE ALL SYSTEMS GO". If failure messages come up on the screen instead, refer to An Outline Of Built-In Test Procedures.

## Game Operation

### GAME START

INSERT COINS. The game allocates an adjustable number of credits per coin and displays this number on the CRT. At factory settings, when one credit is displayed, pressing TURBO initiates a game.

### PLAYER CONTROLS

NOTE: All player controls utilize accurate, durable opto-interrupter technology.

//STEERING is achieved with fully-functional motorcycle-style handlebars.

//YOUR THROTTLE is built into your right handlebar-grip.

//CUT IN YOUR TURBO! Watch the road open up as your horsepower soars!

//STOP ON A DIME! Your left fingers control the most-effective brakes ever imagined.

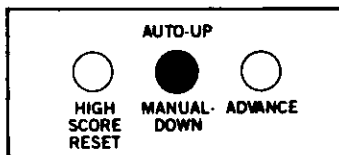
GAME PLAY

A STAR RIDER CYCLE is designed for speed and distance. It's built to race over roads that suddenly pitch straight up and lead to horizons that haunt and tempt. Through the fantasy worlds of Cubitania, Hexagonia, Crystallia, Stalactia and others...each one setting a more challenging course than the last!

FORCE FIELDS KEEP THE PLAYER ON TRACK as he races against four able opponents: Thunderbolt, Sidewinder, Red Hawk and Gold Rider. Each race starts and finishes in the Cosmodrome, where the robofficial announces the player's race results.

Bookkeeping Totals

BOOKKEEPING TOTALS SHOW YOU AT A GLANCE if game settings are bringing you a satisfactory return on your investment! Only games by WILLIAMS ELECTRONICS have this feature. Think of it as a unique way to keep your STAR RIDER game the leader of the pack when it comes to earnings...location after location, week in and week out!



Diagnostic Button Switches

ENTERING BOOKKEEPING MODE. Inside the coin door is a bracket with three button switches. Set the AUTO-UP/MANUAL-DOWN (center) switch to AUTO-UP. Press the ADVANCE switch to display BOOKKEEPING TOTALS on the screen. Now check those totals. Here's what to look for...

BOOKKEEPING TOTALS

LEFT SLOT COINS	432
CENTER SLOT COINS	0
RIGHT SLOT COINS	398
TOTAL UNITS PAID	830
TOTAL BUY-INS	204
TOTAL GAMES PLAYED	517
TOTAL UNITS PLAYED	517
TOTAL HEATS ATTEMPTED	689
TOTAL HEATS ACHIEVED	172
TOTAL TIME IN MINUTES	107
AVERAGE TIME PER UNIT	2:13

Bookkeeping screen

AVERAGE TIME PER UNIT: TWO MINUTES. Your most important figure on the BOOKKEEPING TOTALS screen is AVERAGE TIME PER UNIT. You'll want to pay special attention to this figure every day for this reason: Thorough field and factory research has shown that two-minute games both satisfy players and also keep the money flowing.

If games aren't running about two minutes long, then collections probably aren't at their peak. You'll want to tailor your game to your game-playing public. It's easy. But only WILLIAMS games let you do it!

GAME ADJUSTMENTS

BUY-IN TIME IN SECS	7	DIFFICULTY OF PLAY	5
HIGH SCORE ALLOWED	YES	LETTERS FOR HIGHEST SCORE	3
PRICING SELECTION	3	RESTORE FACTORY SETTINGS	NO
LEFT SLOT UNITS	1	CLEAR BOOKKEEPING TOTALS	NO
CENTER SLOT UNITS	4	HIGH SCORE TABLE RESET	NO
RIGHT SLOT UNITS	1	AUTO CYCLE	NO
UNITS FOR START CREDIT	2	SET ATTRACT MODE MESSAGE	NO
UNITS FOR BONUS CREDIT	0	SET HIGHEST SCORE NAME	NO
MINIMUM FOR ANY CREDIT	0	2ND PLACE GO TO NEXT HEAT	YES
UNITS FOR BUY-IN CREDIT	2		

USE 'TURBO' TO SELECT ADJUSTMENT  
USE 'STEERING' TO CHANGE ADJUSTMENT  
PRESS ADVANCE TO EXIT

Adjustments screen showing factory settings

Exclusive Game Adjustments

1. Inside the coin door is a bracket with three button switches. Set the AUTO-UP/MANUAL-DOWN (center) switch to AUTO-UP. Press the ADVANCE switch twice to display GAME ADJUSTMENTS on the screen.
2. With the AUTO-UP/MANUAL-DOWN switch set to AUTO-UP press the ADVANCE switch twice. The GAME ADJUSTMENTS screen will come up.
3. Move the cursor beside the desired adjustment by using TURBO.
4. STEER to alter the value of any adjustment listed on the screen.

Now for the multiple-choice section! Choose one or more:

//USE THE TURBO AND STEERING CONTROLS to choose the appropriate difficulty level (0 = easiest or extra liberal, 5 = average, 9 = hardest or extra conservative).

//Use the TURBO control to select 2ND PLACE GO TO NEXT HEAT. For longer play, use the handlebars (STEERING) to enter NO for this adjustment. For shorter play, use the handlebars to enter YES.

//SELECT GAME PRICING with standard or custom settings. See Definitions of Pricing Terms later in this chapter.

//PUT YOUR OWN SLOGAN ON THE SCREEN! Another WILLIAMS exclusive! Here's how: (1) With the AUTO-UP/MANUAL-DOWN switch set to AUTO-UP, press ADVANCE twice so that the GAME ADJUSTMENTS screen comes up. (2) Use TURBO to position the arrow beside SET ATTRACT MODE MESSAGE. (3) STEER to display YES. (4) Press ADVANCE to bring up the ATTRACT MODE MESSAGE screen. (5) Now enter up to two lines of 25 characters by following the instructions on the screen. (6) Once a message is entered, press ADVANCE to restore Game-Over Mode.

Will your message fit on the screen? Try it here first...

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Pricing Table

Coin-Door Mechanism	Games/Price	Pricing Selection	Left Slot Units	Center Slot Units	Right Slot Units	Units For Start Credit	Units Req'd For Bonus Credit	Min. Units For Any Credit
Twin Quarter	●1/50¢, 2/\$1	3	1	4	1	2	0	0
Quarter,	1/50¢, 3/\$1, 4/\$1.25	0	3	12	3	4	15	0
Dollar	●1/\$1	5	1	4	1	4	0	0
Quarter	1/50¢, 3/\$1, 7/\$2	0	12	48	12	14	96	24
1DM, 5DM	●2/1DM, 12/5DM	0	12	0	2	2	0	0
	●1/1DM, 6/5DM	2	6	0	1	1	0	0
1 Franc,	●1/2F, 3/5F only	4	1	16	6	2	0	0
5 Franc								
25-Cent,	●1/25¢, 4/1G	6	1	0	4	1	0	0
1 Guilder	1/25¢, 5/1G	0	1	0	4	1	4	0
5 Franc,	●1/5F, 2/10F	7	1	0	2	1	0	0
10 Franc	●1/10F	8	1	0	2	2	0	0
1 Franc,	●2/1F, 5/2F	2	6	0	1	1	0	0
2 Franc								
100 Lire,	●1/200 Lire	8	1	0	2	2	0	0
200 Lire								
Twin Coin	●1/4 Coins	5	1	4	1	4	0	0
	1/2 Coins, 3/4 Coins	1	1	4	1	2	4	0
	1/3 Coins, 2/5 Coins	0	2	0	2	5	0	0
	●1/2, 3/5	4	1	16	6	2	0	0
1-Unit,	1/1, 5/5	0	1	0	5	1	0	0
5-Unit	1/3, 2/5	0	2	0	10	5	0	0
Any	●Free Play	9	0	0	0	0	0	0

Game Pricing

PRICING SELECTION allows a shorthand method of setting the pricing functions. If a number from one to nine is entered into the PRICING SELECTION function, a corresponding standard setting (shown in the pricing table above) will be entered into the game. The rest of the pricing functions are automatically set for that standard.

FOR CUSTOM SETTINGS first set PRICING SELECTION to zero. Then set the remaining values according to the pricing table.

THE GAMES : PRICE RATIO TO START A GAME is equivalent to the ratio X : VS

where:

X = SLOT UNITS

V = COIN VALUE

S = UNITS FOR START CREDIT

For example at factory settings with quarter chutes the variables produce 1 : 25x2 or one starting-game for 50¢.

THE GAMES : PRICE RATIO TO BUY IN is equivalent to the ratio X : VB

where:

B = UNITS FOR BUY-IN CREDIT (other variables as above)

For example, at factory settings the variables produce 1 : 25x2 or one buy-in game for 50¢.



## Diagnostic-Mode Tests

SET THE AUTO-UP/MANUAL-DOWN SWITCH to the MANUAL-DOWN position and press ADVANCE. The game is now in its Diagnostic Mode and a ROM test is performed. With ROM test results present on the CRT display, set the AUTO-UP/MANUAL-DOWN switch to the AUTO-UP position. Enter subsequent tests by pressing ADVANCE once more for each test. After the last test, Game-Over Mode commences.

AUTO-CYCLE MODE permits continuous ROM, RAM and CMOS RAM tests to detect failures that only appear after numerous checksum comparisons. Auto-Cycle Mode also repeatedly performs the four-part DISC TEST. If an error is detected Auto-Cycle Mode is aborted and a failure message is displayed on the CRT. (One Exception: STEP DISC-failures don't abort Auto-Cycle Mode.)

1. Open the coin door. It must remain open for AUTO CYCLE.
2. Display GAME ADJUSTMENTS.
3. Move the cursor to AUTO CYCLE.
4. STEER to display YES.
5. Press ADVANCE.
6. To enter Game-Over Mode turn the game off and on.

## An Outline Of Built-In Test Procedures

### I. Power-Up Tests

#### A. VGG test

1. colored screens
2. no color or missing scanlines: adjust or replace VGG board

#### B. RAM test

1. rug pattern as on other games using the WILLIAMS system
2. bad RAM is indicated on the CPU-board LED-indicator by an error code
  - a) code between 100 and 199 (eg., 1-3-1) for VGG-board RAMS
  - b) code between 600 and 699 (eg., 6-0-2) for CPU-board RAMS

#### C. ROM test

1. CRT depicts ROM board and CPU board with their plug-in ROMS
  - a) green chips are good
  - b) red chips are bad
  - c) gray chips are not used in this game
2. bad ROM is indicated on the CPU-board LED-indicator by an error code between 200 and 299 (eg., 2-1-1)
3. test has been passed when ALL SYSTEMS GO appears on the screen

#### D. CMOS-data test

1. checksums are compared
  - a) if CMOS fails test FACTORY SETTINGS RESTORED appears

#### E. PIF test

1. moire pattern with four quadrants
2. performs four resets
3. red moire indicates PIF's successful completion of all four

### II. Diagnostic-Mode Tests

#### A. ROM test (as above)

#### B. RAM test (as above)

#### C. CMOS-RAM test

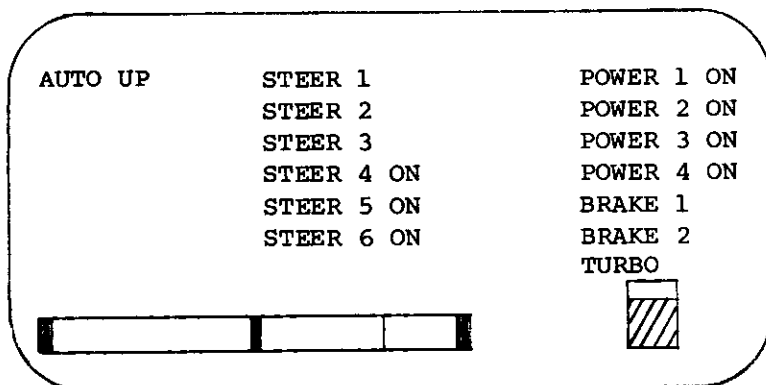
1. error is displayed on CRT and LED readout on CPU board
2. If CMOS RAM is bad, error code 3 will appear on LED readout

D. sound test

1. sound-lines 1-8 are tested
2. bad sound-lines are indicated on the screen
3. Use AUTO-UP to cycle through all the sounds and MANUAL-DOWN to continuously test one sound-line

E. switch test

1. for most switches, the name of the switch is shown when that switch is closed
2. for STEER, POWER, BRAKE and TURBO, there's a different system because these controls involve several switches
  - a) switch being made is shown by number (eg., STEER 1 ON or POWER 1 ON)
  - b) it's also shown by position on a bar graph
3. screen format and explanation:



- all STEER, POWER, BRAKE and TURBO switches are optos
- horizontal graph: line moves left or right of center as each STEER-opto is blocked
- vertical graph: fills in as more POWER-switches close

F. disc test

1. this is actually an examination of intra-system communications
  - a) checks operation of PIF (processor interface) board
2. consists of four subtests
  - a) successes and failures of each are displayed on the screen
  - b) in addition, an amber square shows which subtest is being performed
3. what to expect
  - a) expect a 1% to 10% failure-rate on the STEP DISC subtest (if greater, clean disc and lens)
  - b) failures in the RESET RESPONSE or WALKING BIT TEST probably represent a hardware failure
4. screen format and explanation:

DISC TEST		
TEST	SUCCESS	FAILURE
RESET RESPONSE	■ 3	0
WALKING BIT TEST	4	0
SEARCH TO	29	1
STEP DISC	6	1

- amber ■ square shows test in progress
- simulates warm start
- tests PIAs on PIF board
- checks to see if PIF can find a frame
- checks to see if PIF can step disc

G. DISC SEARCH-test

1. includes manual search-test and manual step-test
2. use MANUAL-DOWN to view expanded (game) video
3. use AUTO-UP to view normal (disc) video
4. stepping below 0 or above 32,000 will cause error message
5. eliminate error message by turning game off and on
  - a) or by advancing through diagnostics and reentering manual step-test

- H. crosshatch pattern (top screen only)
  - 1. aids technician in converging monitor
- I. purity screens
  - 1. solid red, green and blue screens
  - 2. for monitor adjustments and for checking color RAMs
    - a) tainted colors: degauss screen and adjust purity magnets
    - b) missing colors or vertical lines: possible color-RAM error
- J. color bars
  - 1. for monitor adjustments and for checking color RAMs
    - a) adjust color drives and cutoffs, screen and black-level controls for proper colors
    - b) missing colors or wrong colors: possible color-RAM error
    - c) adjust player to match hue of of top bars (from player) to hue of bottom bars (from VGG board)
    - d) disc and VGG bars don't line up perfectly due to delay in NTSC board

PIF-Board Error Codes

These error codes appear on the CPU-board LED display when diagnostic procedures locate a malfunction in the game. Using the codes will help you zero in on the general problem.

NOTICE

(1) The disc player must be turned on and connected to the PIF board. Bad cables will produce the same symptoms as bad boards.

(2) A dirty disc or lens may prevent the player from coming up to speed (a condition referred to as spin-up/spin-down).

CODE	USUAL CAUSE
0501	(1) shipping screw or lens cap not removed from player; (2) dirty disc or no disc on player; (3) player top unlocked; (4) ribbon cable or power disconnected from player
0502	disc not up to speed or player failure: clean lens, disc
0503	disc, player or PIF (see 0501)
0504	disc not up to speed or player failure: clean lens, disc
0505	bad disc, bad player or bad VGG board
0506	dirty or damaged disc: perform SEARCH-TEST; try other side of disc
0507	disc, player or PIF (see 0501): perform DISC TEST
0508	disc, player or PIF (see 0501): perform DISC TEST
0509	disc, player or PIF (see 0501): perform SEARCH TEST
0510	PIF: try disc test or replace PIF board
0511	bit 0 stuck low: replace CPU board or PIF board
0512	bit 1 stuck low: replace CPU board or PIF board
0513	bit 2 stuck low: replace CPU board or PIF board
0514	bit 3 stuck low: replace CPU board or PIF board
0515	bit 4 stuck low: replace CPU board or PIF board
0516	bit 5 stuck low: replace CPU board or PIF board
0517	bit 6 stuck low: replace CPU board or PIF board
0518	bit 7 stuck low: replace CPU board or PIF board
0519	(test not used)
0520	disc, player or PIF (see 0501)
0521	disc, player or PIF (see 0501)

Sound-Board Error Codes

Sound-board error messages may also appear on the CPU-board LED display. They can be used in conjunction with the sound-board diagnostic button to help you localize sound problems.

<u>CODE</u>	<u>USUAL CAUSE</u>	<u>MISSING SOUND</u>
400	bad sound-board or cables	(no sound)
401	sound-line #1 stuck low	rising swept-tone
402	sound-line #2 stuck low	typewriter
403	sound-line #3 stuck low	high-pitched ping
404	sound-line #4 stuck low	carriage return
405	sound-line #5 stuck low	crash or explosion
406	sound-line #6 stuck low	high-pitched peep
407	sound-line #7 stuck low	turbo whoosh
408	sound-line #8 stuck low	coin sound: siren

STAR RIDER Circuitboards

<u>PART NO.</u>	<u>DESCRIPTION</u>
C-9928	PIF PC-board
C-9994	throttle opto PC-board
C-9995	steering opto PC-board
C-9996	brake opto PC-board
D-10069	heatsink assembly
D-10070	power supply PC-board
D-9837	NTSC/RGB PC-board
D-9922	CPU PC-board
D-9924	VGG PC-board
D-9926	ROM PC-board
D-9930	EXP PC-board
D-9941	sound PC-board

NOTICE

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