

CRUIS'N EXOTICA

TM

CHAPTER SIX

TROUBLESHOOTING




CAUTION

This Video Game Machine (VGM) uses complex electronic components that are *very sensitive to static electricity*. Observe the following precautions before handling electronic assemblies. Failure to do so may void your warranty and could damage electronic assemblies.

- ◆ Before servicing electronics, turn off AC power to the VGM. Wait for capacitors to discharge.
- ◆ Before touching or handling electronic assemblies, discharge static electricity on your body. To discharge static, begin by connecting the line cord to a properly grounded outlet, but do not turn on the power! Next, touch the safety ground stud of the power supply chassis.
- ◆ Store electronic assemblies in an anti-static area. Use anti-static bags to store or transport circuit boards. Transport the hard drive in original shipping container.
- ◆ Do not remove or connect electronic assemblies when power to cabinet is switched on. Otherwise, you'll damage electronic assemblies and void the warranty.
- ◆ Replace ground wires, shields, safety covers, etc. upon completion of maintenance or service. Install and firmly tighten all ground and mounting screws.

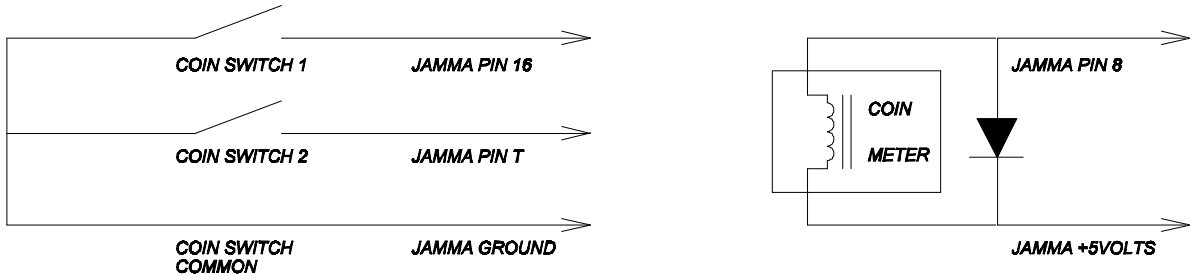
Coin Mechanism and Pricing Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> Video Game Machine (VGM) accepts currency or tokens, but number of credits per coin or bill is incorrect. 	Improper settings at Pricing Menu	<ol style="list-style-type: none"> Press and hold TEST MODE switch inside coin door to enter Menu System. Select SWITCH TEST from Diagnostics menu. Conduct test to confirm operation of game switches. Select either the STANDARD or CUSTOM PRICING MENU from Game Adjustments Menu. Verify units and credits are set correctly.
	Faulty wiring	<ol style="list-style-type: none"> Confirm cabinet wiring is correct for this game. Assure coin meter and coin switches connect properly to control input wires.
<ul style="list-style-type: none"> VGM will not accept currency or tokens. VGM will not enter play mode. Audio and video are present. 	Improper currency	<ol style="list-style-type: none"> Unlock and open cash door. Empty cash box and inspect revenue for counterfeit currency. Check vault. Remove any items that block path from mechanism.
	Faulty coin mechanism	<ol style="list-style-type: none"> Unlock and open coin door. Check each mechanism for proper mounting. Remove mechanism. Clear currency path. Reinstall mechanism and close latch.
	Tilted coin mechanism or game	<ol style="list-style-type: none"> Verify mechanism is level after doors close. Repair or replace coin door if it is bent or damaged. If necessary, adjust cabinet leg levelers to keep mechanisms level.
<ul style="list-style-type: none"> Coin indicators do not light 	Burned-out bulb	<ol style="list-style-type: none"> Burned-out bulbs may appear white or darkened. Check continuity with digital voltmeter. Replace burned-out bulb with an identically rated part.
	Open fuse circuit	<ol style="list-style-type: none"> Check fuse continuity with digital voltmeter. If fuse is blown, replace fuse with an identically rated part. If fuse isn't blown, check wiring.

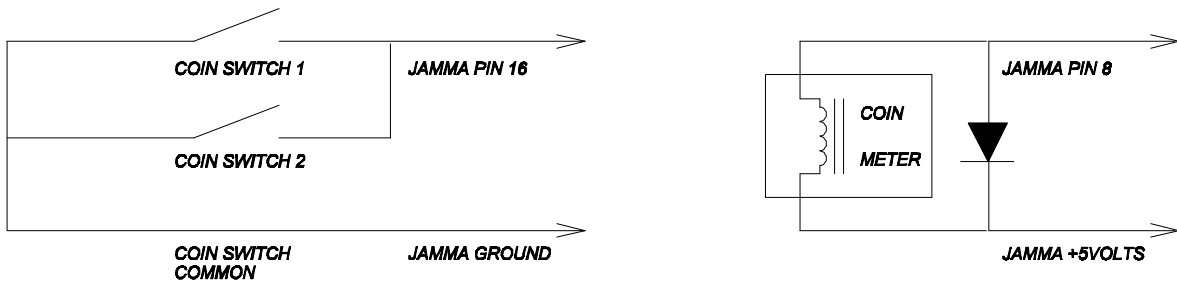
	<p>CAUTION Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or hard disk drive and void the warranty.</p>
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Coin Switch and Meter Wiring

FACTORY STANDARD

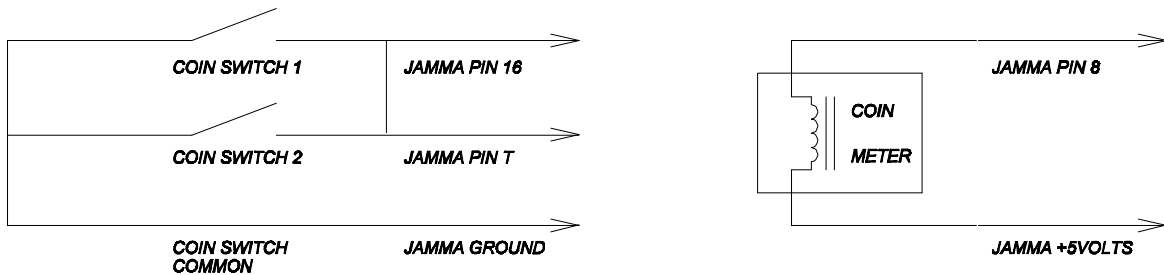


OPTIONAL WIRING



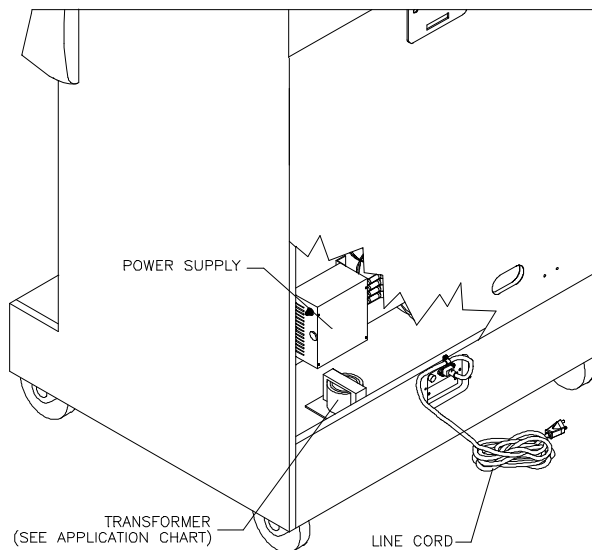
INCORRECT WIRING

A connection between JAMMA coin input pins will cause twice the desired credits for each coin inserted. A coin meter with a defective or missing diode may eventually damage driver circuits on the CPU Board.



Startup Troubleshooting Table

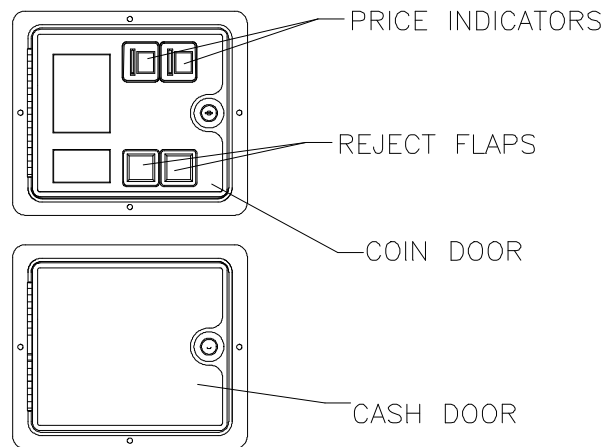
SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Video Game Machine (VGM) does not start. • VGM appears completely non-functional. • No audio • No illumination • No video display 	Power problem	<ol style="list-style-type: none"> 1. Check power is switched on. 2. Make sure fans are turning. If not: Is the power supply connected to its power cable? Is power supply turned on? 3. Plug cord into AC power outlet. Verify presence of AC line voltage.
	Improper line voltage switch setting	Turn off power. Unplug AC line cord. Check line voltage switch. If necessary, set it to agree with local AC line voltage. Retest game.
	Open fuse	<ol style="list-style-type: none"> 1. Turn off power. Examine AC fuse on power chassis. 2. Examine DC fuses on cabinet wall or electronic equipment shelf. 3. Replace faulty fuses with identically rated parts. 4. Turn on game power. If fuse opens again, check DC wiring harness and connectors.
	Faulty wiring	<ol style="list-style-type: none"> 1. Remove line cord. Test line cord, power plug, and IEC connector for breaks or damage. Verify continuity of each wire in cord. Install cord on power chassis. Press connector firmly to seat it. 2. Assure that cabinet wiring harness connectors fully seat in corresponding power supply and board connectors. 3. Inspect wiring for breaks or damage.



Location of Power Supply and Line Cord

Startup Troubleshooting, *continued*

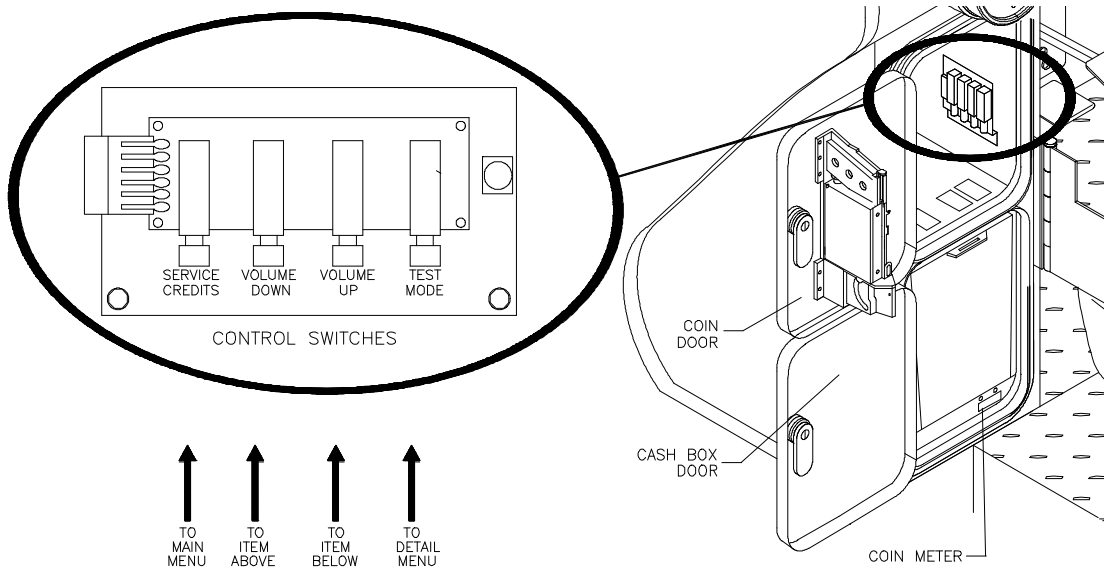
SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Video Game Machine (VGM) appears non-functional. • Currency acceptor price indicator is illuminated. 	Power problem	<ol style="list-style-type: none"> 1. Inspect circuit boards under low-light conditions. The LED's glow and the fan turns when processor circuits receive voltage and indicate presence of DC from power supply. However, voltages or signals may not be normal. 2. Turn on power. Set the digital voltmeter to the 20-volt DC setting and measure DC voltages at power connector pins. Adjust the +5V source if necessary. Refer to the Cabinet Wiring Diagram for specific wiring information and voltage limits. 3. Set the digital voltmeter to the 2-volt AC setting and measure DC voltages at power connector pins. Any reading here indicates that supply voltages are unstable and may contain ripple or noise.
	Faulty wiring	Turn off power. Check wiring harness connectors attach and fully seat onto mating board connectors. Verify harness connects to CPU Board. Check other connectors in same way.
	Improper DIP switch settings	Check DIP switch settings.
	Faulty circuit boards	<ol style="list-style-type: none"> 1. Run power-up self-test sequence. Note errors or failures during test. Compare LED's with LED indicator status charts. Note discrepancies. 2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select MONITOR TEST from Diagnostics Menu. Conduct test to confirm operation of each screen used in the game.



Typical Front View of Coin Door

Startup Troubleshooting, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Video Game Machine (VGM) does not start. • VGM accepts currency or tokens. • Audio and video are present. 	Faulty coin mechanism	<ol style="list-style-type: none"> 1. Unlock and open coin door. Check each currency acceptor to assure proper mounting. Verify each release latch is closed and locked. 2. Test mechanism with good and bad coins to see if mechanism accepts and rejects currency correctly. 3. Inspect to see if external acceptor indicators (Pricing, Flashing Arrows, etc.) are lit. 4. Verify each acceptor operates properly by placing it in working game. Replace bad parts.
	Faulty switches	<ol style="list-style-type: none"> 1. Press and hold the TEST MODE switch inside coin door to enter Menu System. Select SWITCH TESTS from the Diagnostics Menu. Conduct test to confirm operation of each switch. 2. Assure no loose parts or wires are caught in switch contacts. 3. Check for continuity in each suspect switch connection (Common to Normally Open or Common to Normally Closed). 4. Replace faulty switches (bent levers, broken actuators, etc.).
	Faulty wiring	<ol style="list-style-type: none"> 1. Assure no wires are caught in hinges, latches or switch contacts. 2. Check wiring continuity from circuit board connectors to acceptors.



Interior View of Coin Door

Linking Problem Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> Cannot connect multiple Video Game Machines (VGMs) together 	Faulty wiring	<ol style="list-style-type: none"> Do not extend linking cables supplied with VGM. Install required crossover between cabinets. Each coupler connects two VGMs (one pair). Do not use standard telephone type couplers or wiring for linking. Use only 10 Base-T, Ethernet-type, Category 5, twisted-pair wiring.
	Improper linking hardware	Use required network hub for your local network. A Hub Link Kit permits up to eight VGM connections. Array completion requires basic kit brackets and spacers.
<ul style="list-style-type: none"> VGM does not recognize other players in linking operation VGM functions normally by itself 	Improper settings	<ol style="list-style-type: none"> Record any error messages that occur during self-test. From the Diagnostic Menu select DIP SWITCH TEST. Confirm the link is enabled. Be sure that each VGM has a unique ID number. Select LINKING TEST from the Diagnostic menu. Run tests for each linked VGM.
	Power problem	Verify the hub receives power. AC adapter wires are thin and easily damaged.
	Faulty wiring (3 or more VGMs)	<ol style="list-style-type: none"> Inspect hub indicator lights. Illuminated indicator lights for each active port light up if the cable(s) are properly connected. Check for cable continuity from hub to VGM for each indicator that failed to light. Assure no loose wires are caught in hinges, doors or under cabinet. Verify linking cable connects to CPU Board for each game. Verify each linking cable operates properly by placing it in working game.




CAUTION

Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or hard disk drive and void the warranty.

Linking Problem Troubleshooting, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> Some Video Game Machines (VGMs) in group link properly, while others do not 	Improper hub switch setting	<ol style="list-style-type: none"> Assure switches on hub are set according to Hub Link Kit instructions. (VGMs on a network do not require couplers. Hub has electronic crossover.) Inspect hub indicator lights for link activity. See manufacturer's literature for diagnostics.
	Wrong software version	Verify all linked VGMs use same version of software. Error message "VERSION MISMATCH" will appear if you try to link different versions. Contact your distributor.
	Faulty wiring (2 VGMs)	<ol style="list-style-type: none"> Insert only the supplied crossover connection between coupled VGMs. Standard couplers appear identical to devices supplied with games, but do not include an internal crossover. Verify each linking crossover coupler operates properly by placing it in a working link between two VGMs.
	Faulty wiring (3 or more VGMs)	<ol style="list-style-type: none"> Use an additional crossover connector and cable to extend game or hub link connection. Two crossovers cancel each other out and results in same problem as no link crossover. Connect cables directly to hub. Do not use a crossover coupler and hub together in single network. Separate communications wiring from other wiring. Wires that must cross can only cross at right angles to limit noise pickup.

	<p>CAUTION Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or hard disk drive and void the warranty.</p>
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Player Control Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Intermittent or completely non-functional player controls • Video Game Machine (VGM) starts normally. 	Faulty switches or lamps	<ol style="list-style-type: none"> 1. Press and hold TEST MODE switch inside coin door to enter Menu System. Select SWITCH TEST from Diagnostic Menu. Conduct tests to confirm switch operation. 2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select LAMP TEST from Diagnostic Menu. Conduct tests to confirm lamp operation. 3. Check for loose parts or wires caught in switch contacts. 4. Check continuity at each switch connection (Common to Normally Open or Common to Normally Closed). 5. Verify player control operates properly by placing it in working VGM. 6. Verify light bulbs used for dashboard switches are type specified in parts listing. Other types will light, but may produce too much heat. Excess heat may cause switches to bind.
	Faulty switch wiring	<ol style="list-style-type: none"> 1. Check for wires caught in door hinges, latches, or switch contacts. 2. Verify harness connectors are attached and fully seated. 3. Assure control switches connect properly to control input wires. 4. Check cabinet wiring is correct for this VGM.
<ul style="list-style-type: none"> • Steering pulls to one side 	Faulty Wheel Driver Board	Find power amp on Wheel Driver Board's large heatsink. Test and replace bad part or board.
<ul style="list-style-type: none"> • No wheel feedback • Steering aims vehicle as expected 	Improperly set feedback	<ol style="list-style-type: none"> 1. Select STEERING WHEEL TEST on the Diagnostics Menu. 2. Set feedback to match player requirements. Maximum force may be too extreme for very young or inexperienced customers.
	Faulty circuit	<ol style="list-style-type: none"> 1. Examine fuses and cables on Wheel Driver Board. 2. Check cables and wiring between CPU board, wheel driver and motor. 3. Check resistance of motor series resistors. 4. Replace bad parts.
	Faulty motor	<ol style="list-style-type: none"> 1. Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws. 2. Remove metal shield (if VGM has one) over motor. 3. Unscrew caps. 4. Inspect motor brushes. Replace worn parts.

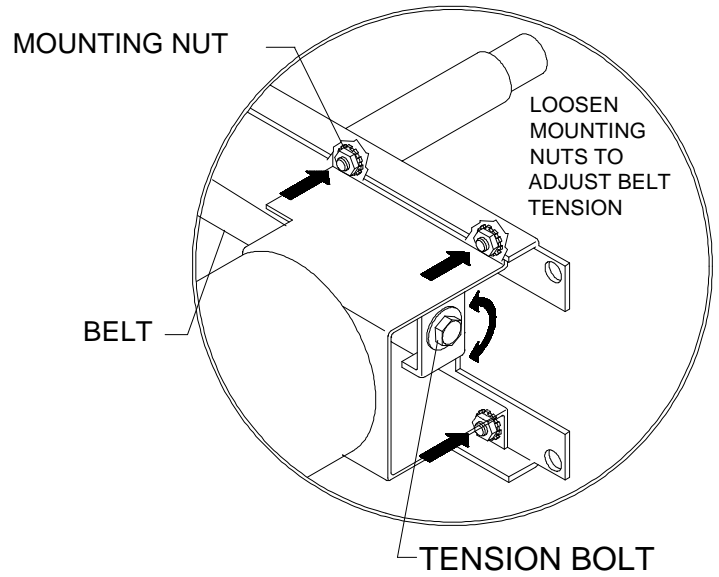
Player Control Troubleshooting, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Sloppy, unpredictable or ineffective steering • Video is present • Video Game Machine (VGM) operates normally 	Blocked or faulty fan	Fan located on power supply functions as an exhaust fan. With power on, check airflow near each fan to assure that nothing blocks airflow.
	Faulty mechanical parts	Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if VGM has one) over motor. Inspect for faulty or worn belts, bearings, couplings, gears, etc.
	Faulty Wheel Driver Board	<ol style="list-style-type: none"> 1. Inspect Wheel Driver Board under low-light conditions. To indicate presence of AC from the transformer the LED's glow when voltage is received. However, voltages or signals may not be normal. 2. Examine fuses and cables on Wheel Driver Board. Replace bad fuses. Use digital voltmeter to verify AC voltage between each fuse holder and ground. You should measure approximately 25V. See Wiring Diagram. 3. Use the 20-VAC setting on digital voltmeter to measure DC voltage at motor. Do not move steering wheel, drive belt, or motor while making this measurement. Any reading indicates unstable supply that may contain ripple or noise. 4. Select the STEERING WHEEL TEST from the Diagnostic Menu. Follow on-screen instructions to verify operation of the wheel motor and steering position sensor. 5. Verify proper operation of Wheel Driver Board by placing it in working VGM.
	Loose or worn drive belt	<ol style="list-style-type: none"> 1. Turn off power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if VGM has one) over motor. Inspect for faulty or worn belts, bearings, couplings, gears, etc. 2. If drive belt isn't worn or damaged, check its tightness.
<ul style="list-style-type: none"> • Inability to make a transmission selection. • Video Game Machine (VGM) operates normally. 	Improper DIP Switch setting(s)	<ol style="list-style-type: none"> 1. From the Diagnostics Menu, choose DIP SWITCH TEST. Make sure DIP 1, SW 1 is set to the OFF position.

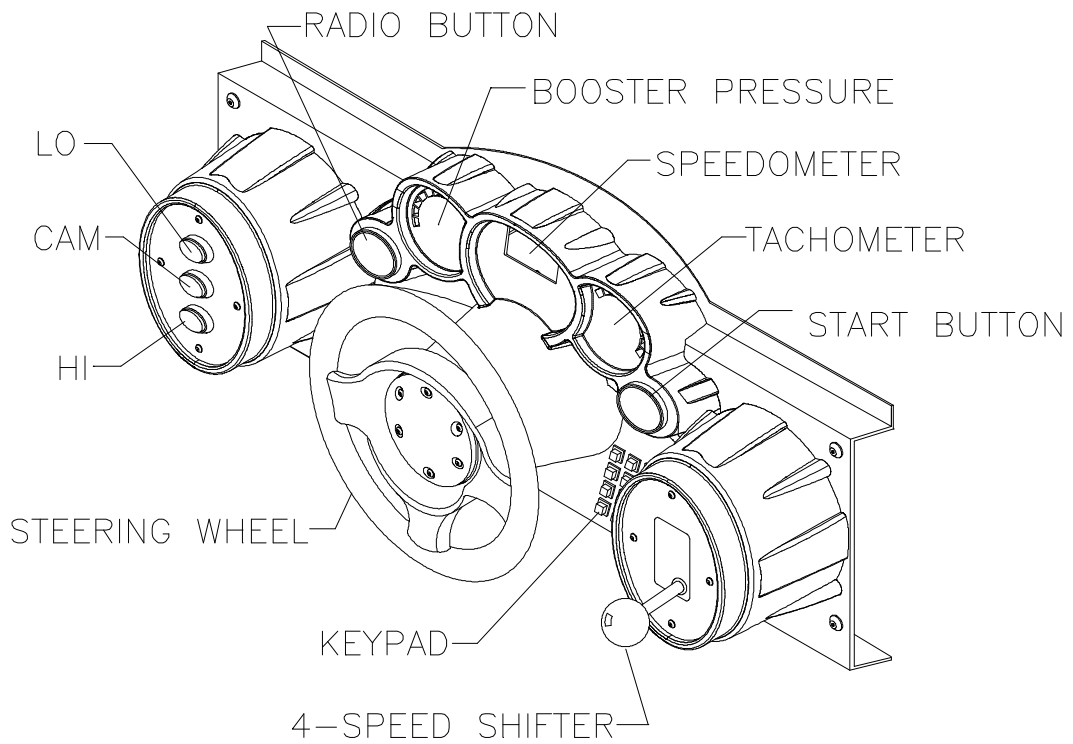


WARNING

The Wheel Driver Board heatsink, power resistors, and other components may be very hot. The DC Motor in the steering wheel may also be hot.




How to Adjust Belt Tightness





Player Panel Controls

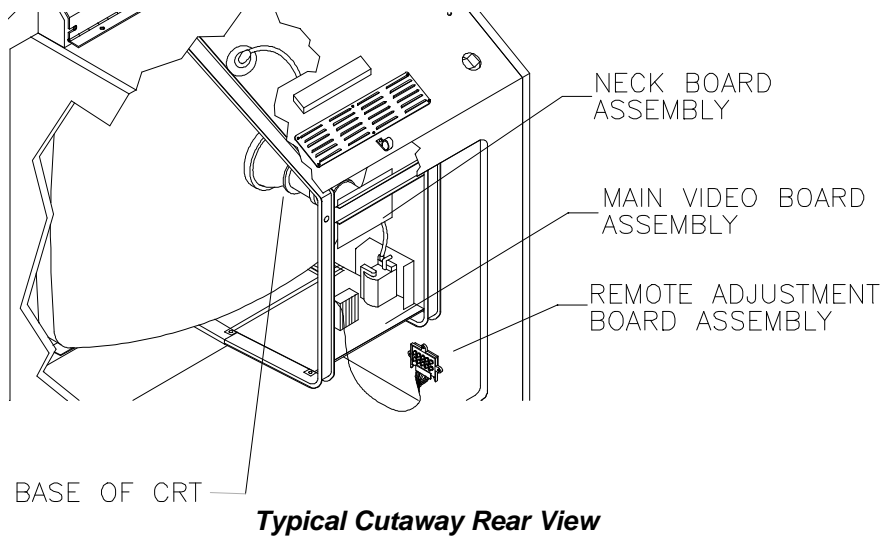
Video Troubleshooting Table


SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Monitor appears non-functional • Audio is present • Video Game Machine (VGM) controls operate normally 	Power problem	Verify connection of AC Power to video monitor. Inspect neck of CRT in dim light. Glowing filament near CRT base confirms monitor circuits receive power. However, voltages or signals may not be normal.
	Faulty wiring	<ol style="list-style-type: none"> 1. Turn off game power. Verify that video signal and Remote Adjustment Board connectors seat properly on Video Monitor Board. 2. Assure that no wires are caught on chassis or mounting brackets.
	Improper monitor adjustments	Check BRIGHTNESS (intensity) and CONTRAST are set above their minimum levels.
	Faulty monitor circuitry	<ol style="list-style-type: none"> 1. Examine AC line fuse on Video Monitor Board. If fuse is faulty, replace it with an identically rated fuse. 2. If the fuse is good, verify video monitor operates correctly by placing it in a working VGM. 3. If monitor is bad; Check monitor power supply. 4. If the power supply is good, Check monitor horizontal output transistor and related circuitry.
<ul style="list-style-type: none"> • Graphic images from game do not appear • No audio • Power-up self-test runs 	Improper components	<ol style="list-style-type: none"> 1. Verify circuit boards are correct for this game. Labels on each board record manufacturers' name, assembly number and hardware version. 2. Verify ROM instruction set is correct for this game. Game set includes more than one ROM. Label on each ROM records assembly number and software version.
	Faulty Circuit Board	<ol style="list-style-type: none"> 1. Allow game to load normally. Note and record any error messages that occur during self-test. 2. Press and hold TEST MODE switch inside coin door to enter Menu System. Select Diagnostic Menu from the Main Menu. Then select CPU BOARD TEST. Conduct this test to check operation of critical components. 3. Turn off power. Inspect CPU Board to ensure JAMMA cable connector is fully seated onto the mating edge connector of the CPU. Check all other cable connectors for correct alignment and continuity. 4. Compare activity of LED's on CPU with the CPU Indicator Chart.
	Power Problems	<ol style="list-style-type: none"> 1. Turn on Power. Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V source if it is adjustable. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits. 2. Use 2-Volt AC setting on digital voltmeter to measure DC voltages at Power Connector pins. Any reading indicates the supply voltages are unstable and may contain ripple or noise.


	<p>CAUTION Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or ROM's and void the warranty.</p>
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	<p>WARNING: HIGH VOLTAGE. Video Game Machine (VGM) monitors generate and store potentially lethal high voltages. Avoid touching any part of the monitor until power has been off for some time. A picture tube can maintain a hazardous charge for up to several days. Only qualified technicians should service monitors. Turn off the power, unplug the VGM and discharge the CRT before attempting service. Even properly discharged tubes can revert to a highly charged state, <i>without reapplication of power.</i></p>
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	<p>WARNING In normal operation, the monitor doesn't require isolation from AC line voltage. During bench servicing, you may need to operate the monitor outside the cabinet. If you do, <i>isolate the monitor from line voltage with an isolation transformer.</i></p>
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	<p>CAUTION Do not operate the monitor without its Remote Adjustment Board.</p>
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	<p>WARNING: HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion.</p>
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Video Troubleshooting, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> White areas at screen edges appear tinged with color Dots at screen edges appear ovoid or cylindrical 	Picture tube dynamic convergence is out of alignment	Have service bureau dynamically re-converge monitor. This procedure requires removing and repositioning yoke. Service bureau must follow instructions from monitor manufacturer.
<ul style="list-style-type: none"> Video images tear or roll, or have black bar down middle of screen 	Faulty wiring	<ol style="list-style-type: none"> Check connectors and cables for wiring continuity. Video cables connect circuit boards to video monitor. Assure connection of all cabinet ground wires, especially at video monitor chassis.
	Faulty monitor circuitry	<ol style="list-style-type: none"> Verify video monitor operates correctly by connecting it to working Video Game Machine (VGM). Assure video monitor is correct type for this game. Video monitors with wrong resolution can't lock sync.
	Improper sync signals	<ol style="list-style-type: none"> Check to see if Video Board puts out type of sync that your monitor requires. Verify jumpers are set correctly for monitor.
	Electromagnetic fields	Move cabinet far away from machines, appliances, or competitors' video games.
<ul style="list-style-type: none"> Missing colors 	Faulty wiring	Check connectors and cables for wiring continuity from circuit boards to video monitor.
	Faulty monitor color drive circuitry	Verify video monitor operates correctly by connecting it to working Video Game Machine (VGM).
<ul style="list-style-type: none"> One color is dimmer or brighter than others Whites appear tinted everywhere on screen 	Maladjusted color bias pots	<ol style="list-style-type: none"> Turn on Video Game Machine (VGM). From Diagnostic Menu select MONITOR TEST. Watch Color Bars screen in mirror. Adjust three bias pots for best colors. (Most monitor neck boards include these pots.) Check White Screen. Touch up controls. If whites still seem tinted, have service bureau rejuvenate picture tube.
<ul style="list-style-type: none"> Picture is dim or faded 	Maladjusted BRIGHTNESS pot or subnormal picture tube emission	<ol style="list-style-type: none"> From Diagnostic Menu select MONITOR TEST. Watch Color Bars screen. Adjust BRIGHTNESS and CONTRAST pots for greatest number of grays. You'll find these pots on Monitor Remote Control Board, behind coin door. If pots have no effect, have service bureau rejuvenate picture tube.

Video Troubleshooting, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> Picture is too narrow 	Maladjusted WIDTH pot	From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting WIDTH pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door.
<ul style="list-style-type: none"> Picture is too short 	Maladjusted HEIGHT pot or damaged vertical circuit	<ol style="list-style-type: none"> From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting HEIGHT pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door. If pot has no effect, service vertical output circuit.
<ul style="list-style-type: none"> Picture seems shifted to one side 	Maladjusted HORIZONTAL POSITION pot	From Diagnostic Menu select MONITOR TEST. Watch Crosshatch Screen while adjusting HORIZONTAL POSITION pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door.
<ul style="list-style-type: none"> Keystone-shaped picture 	Shorted turns in yoke	<ol style="list-style-type: none"> Substitute working yoke. Have service bureau converge monitor. Retest monitor.
<ul style="list-style-type: none"> Blotches of color appear on screen 	Picture tube aperture mask is magnetized	Demagnetize monitor with external degaussing coil. Take care not to magnetize neighboring games. Monitor may be left on or off during this procedure.
<ul style="list-style-type: none"> White areas in center of screen appear tinged with color Object edges have fringe of one or more colors 	Picture tube purity or static convergence is out of alignment	<ol style="list-style-type: none"> Turn on Video Game Machine (VGM). Press and hold TEST MODE to enter Menu System. Select Diagnostic Menu from the Main Menu. Select MONITOR TEST. Perform tests for Crosshatch, Red, Green and Blue screens to find clearest display of problem. Display screen with the most severe problem. Display Crosshatch Screen. Locate purity and static convergence ring magnets on back of monitor neck. Watch screen in mirror. Adjust magnets to minimize problem. Follow instructions from monitor manufacturer. Display Crosshatch Screen. Touch up adjustments while watching screen in mirror.



CAUTION

Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or hard disk drive and void the warranty.

Audio Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • No audio • Video is present • Video Game Machine (VGM) appears to operate normally 	Improper volume setting	Press and hold TEST MODE switch inside coin door to enter Menu System. Select VOLUME MENU from the Main Menu. Make sure the Attract Music is on (enabled). Verify all volume levels are set well above zero. If necessary, change levels to make game audible.
	Faulty wiring	Turn off power. Assure wiring harness connectors attach and fully seat onto mating board connectors. Verify harness connects to CPU Board. Check audio cable connectors in same way.
	Faulty or obstructed speaker	Remove grilles and inspect speakers. Free speaker cones, terminals, mounting screws and magnets of loose parts or wires.
	Faulty Audio Board	Verify proper operation of Audio Board by placing it in a working VGM.
	Power Problems	Use 20-volt DC setting on digital voltmeter to measure DC voltages present at Power connector pins. Verify +5V, -5V and +12V sources. Refer to Cabinet Wiring Diagram for specific wiring information and voltage limits.
<ul style="list-style-type: none"> • Audio is distorted, muffled or has missing frequencies. 	Faulty or improper speaker	<ol style="list-style-type: none"> 1. Turn off power. Remove grilles and check speakers. Verify that speakers are full range (100 to 10,000 Hz response) and rated for at least 20 watts. Woofers must be rated for at least 40 watts. 2. Verify proper speaker operation by placing speaker in question in a working VGM.
	Faulty wiring	Multiple-speaker installations: Check for reversed wires at one speaker. Weak or low frequencies and thin or hollow sound quality are symptom of incorrectly phased speakers. Sound tests may not detect this condition, but you can hear it during operation.
	Improper Setting	Press and hold TEST MODE switch inside coin door to enter Menu System. Select SOUND TEST from Diagnostics Menu. Increase volume as required. This test will verify some audio circuit functions.

Audio Problems, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> Dead sound channel 	Faulty speaker	<ol style="list-style-type: none"> From Diagnostics Menu, choose SOUND TEST. Recheck speakers with audio signals provided by test. Verify proper speaker operation by connecting speaker in question to working Video Game Machine (VGM).
	Faulty circuit board	Run power-up self-test sequence. Note errors found during tests. Compare CPU Board LED's with LED Indicator Status Charts. Note discrepancies.
<ul style="list-style-type: none"> Constant low hum from all speakers. 	Faulty wiring	<ol style="list-style-type: none"> Check cabinet wiring is correct. Verify cabinet wiring provides separate wires (not common return) for each speaker. Check connection of all cabinet ground wires.
	Faulty power supply	Use 2-Volt AC setting on digital voltmeter to measure voltages at speaker terminals. Any reading indicates unstable supply that may contain ripple or noise.



CAUTION

Do not remove or install any connector when power is turned on. Installation under power will damage the circuit boards or hard disk drive and void the warranty.

Miscellaneous Problem Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
<ul style="list-style-type: none"> • Marquee lamp is intermittent or non-functional • Video Game Machine (VGM) starts and plays normally 	Faulty fluorescent tube	<ol style="list-style-type: none"> 1. Remove fluorescent tube from sockets. If you find cracks or darkened ends, install new lamp. Clean tube. 2. Check continuity of both fluorescent tube filaments. 3. Check lamp ballast is rated for local AC line voltage and frequency. 4. Verify fluorescent tube operates by placing it in working VGM.
	Faulty lamp fixture	<ol style="list-style-type: none"> 1. Verify lamp pins make good connection with socket contacts. 2. Check the ballast and/or starter are working properly.
	Faulty wiring	Measure fluorescent lamp AC voltages. Check wiring and connector continuity from AC power chassis to lamp assembly.
<ul style="list-style-type: none"> • VGM operates normally • Cabinet becomes warm after several hours of use 	Obstructed fan	<ol style="list-style-type: none"> 1. Check bottom and rear of cabinet for blocked airflow. 2. Move VGM away from sources of heat. 3. Turn off power. Remove dust from vent holes with high-power vacuum cleaner.
	Faulty wiring	Check fan wiring and connectors.
	Faulty fan	Check operation of all fans.
<ul style="list-style-type: none"> • Error messages appear on screen 	Faulty hardware	<ol style="list-style-type: none"> 1. Check any assembly (RAM, ROM, Battery, etc.) identified in error messages. 2. Call your authorized distributor for help with unresolved screen messages.