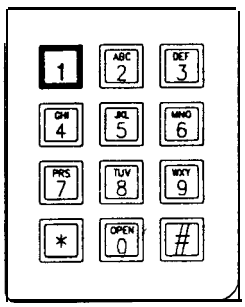
SAN FRANCISCO

RUSH 2049™



CHAPTER ONE

SAFETY, SPECIFICATIONS, INSPECTION & INSTALLATION



NOTICE: This manual is subject to change without notice. Atari reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods may warrant.

Fill out and mail in the Game Information Card. Include the game serial number from the label on the rear of the cabinet. For your records, write the game serial number in the manual.

SERIAL NUMBER _____

SAFETY INSTRUCTIONS

The following safety instructions apply to operators and service personnel. Read these instructions before preparing your game for play. Other safety instructions appear throughout this manual.

DEFINITIONS OF SAFETY TERMS

DANGER indicates imminent hazard. If you fail to avoid this hazard, it WILL cause death or serious injury.

WARNING indicates a potential hazard. If you fail to avoid this hazard, it COULD cause death or serious injury.

CAUTION indicates a potential hazard. If you fail to avoid this hazard, it MAY cause minor or moderate injury. CAUTION also alerts you about unsafe practices.

NOTICE indicates information of special importance.

	**WARNING: TRANSPORTING GAMES.** This game contains glass and fragile electronic devices. Use appropriate care when transporting this game. Avoid rough handling when moving the cabinet. Don't move this game with the power on.
	**WARNING: DISCONNECT POWER.** Always turn the power OFF and unplug the.game before attempting service or adjustments. Installing or repairing PC boards with power ON can damage components and void the warranty. Be sure that you securely install ground wires.
	**WARNING: GROUND GAMES.** Avoid electrical shocks! Don't plug in a game until you have inspected and properly grounded it. Only plug this game into a grounded, three-wire outlet. Don't use a "cheater" plug, or cut off the ground pin on the line cord.
	**WARNING: AVOID ELECTRICAL SHOCKS.** This video game system does not utilize an isolation transformer. Internal cabinet AC isn't isolated from the external AC line.
A 	**WARNING: HAZARD TO EPILEPTICS.** A very small portion of the population has a condition which may cause epileptic seizures or momentary loss of consciousness when viewing certain kinds of flashing lights or patterns that are present in our daily environment. These persons may experience seizures while watching some kinds of television pictures or playing certain video games. People who have not had any previous seizures may nonetheless have an undetected epileptic condition. If you or anyone in your family has experienced symptoms linked to an epileptic condition (e.g., seizures or loss of awareness), immediately consult your physician before using any video games. We recommend that parents observe their children while they play video games. If you or your child experience the following symptoms: dizziness, altered vision, eye or muscle twitching, involuntary movements, loss of awareness, disorientation, or convulsions, DISCONTINUE USE IMMEDIATELY and consult your physician.

	**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.
	**CAUTION: CHECK POWER SELECTOR, LAMP.** Set the 110/220VAC selector on the power supply for the correct line voltage. Check the selector setting before switching on the game. Verify that the fluorescent lamp assembly is correct for the local line voltage.
	**CAUTION: USE PROPER FUSE.** Avoid electrical shock! Replacement fuses must be of the same type as those they replace. Fuse voltage and current ratings must match ratings on the original fuse.
	**CAUTION: ATTACH CONNECTORS PROPERLY.** Be sure that printed circuit board (PCB) connectors mate properly. If connectors don't slip on easily, don't force them. A reversed connector may damage your game and void the warranty. Connector keys only allow a connector to fit one set of pins on a board.
	**CAUTION: USE CARE WHEN SHIPPING HARD DISKS.** The hard disk drive must be packed in an anti-static bag. When shipping the drive for repair or replacement, pack it in an approved container (P/N 08-8068). Never stack or drop hard disk drives.

PRODUCT SPECIFICATIONS

Operating Requirements

Location	*Electrical Power*
Domestic	120VAC @ 60Hz 4.0 Amps
Foreign	230VAC @ 50Hz 2.0 Amps
Japan	100VAC @ 50Hz 4.0 Amps

Temperature
32°F to 100°F (0°C to 38°C)

Humidity
Not to exceed 95% relative

Cabinet Statistics

Shipping Dimensions
Main Cabinet

Width	**37.5" (95 cm)**
Depth	**37.0" (94 cm)**
Height	**70.5" (179 cm)**

Shipping Dimensions
Seat/Pedestal

Width	**26.0" (66 cm)**
Depth	**33.0" (84 cm)**
Height	**52.0" (132 cm)**

Shipping Weight
All Cartons Boxed 475 lbs. (215 kg.)

Equipment Characteristics

Video Display Monitor
VGA Resolution RGB
27" (68.6 cm) CRT

Audio System
Digital 5-Speaker Sound
Two 3.5" (9 cm), Two 5.5" (14 cm), One 8" (20 cm)

Currency Acceptors
2 Coin Mechanisms, Coin Counter
Dollar Bill Validator Ready
Electronic Coin Acceptor Ready

Game Characteristics

Player Variables
1 to 8 players per race (with linking)
Choice of vehicle and course
High Score Recognition

Operator Variables
Coinage, Game Options, Difficulty, Force, Volume, Audits, Statistics

Diagnostics
Automatic Power-Up Self-Test
Manual, Multi-Level Menu System

PRODUCT CONFIGURATION

Stand-Alone Units

Each game is ready to play right out of the shipping carton. Use the game menu system to set player variables in advance, or you can accept the factory settings and leave the choices to the players.

Tandem Units

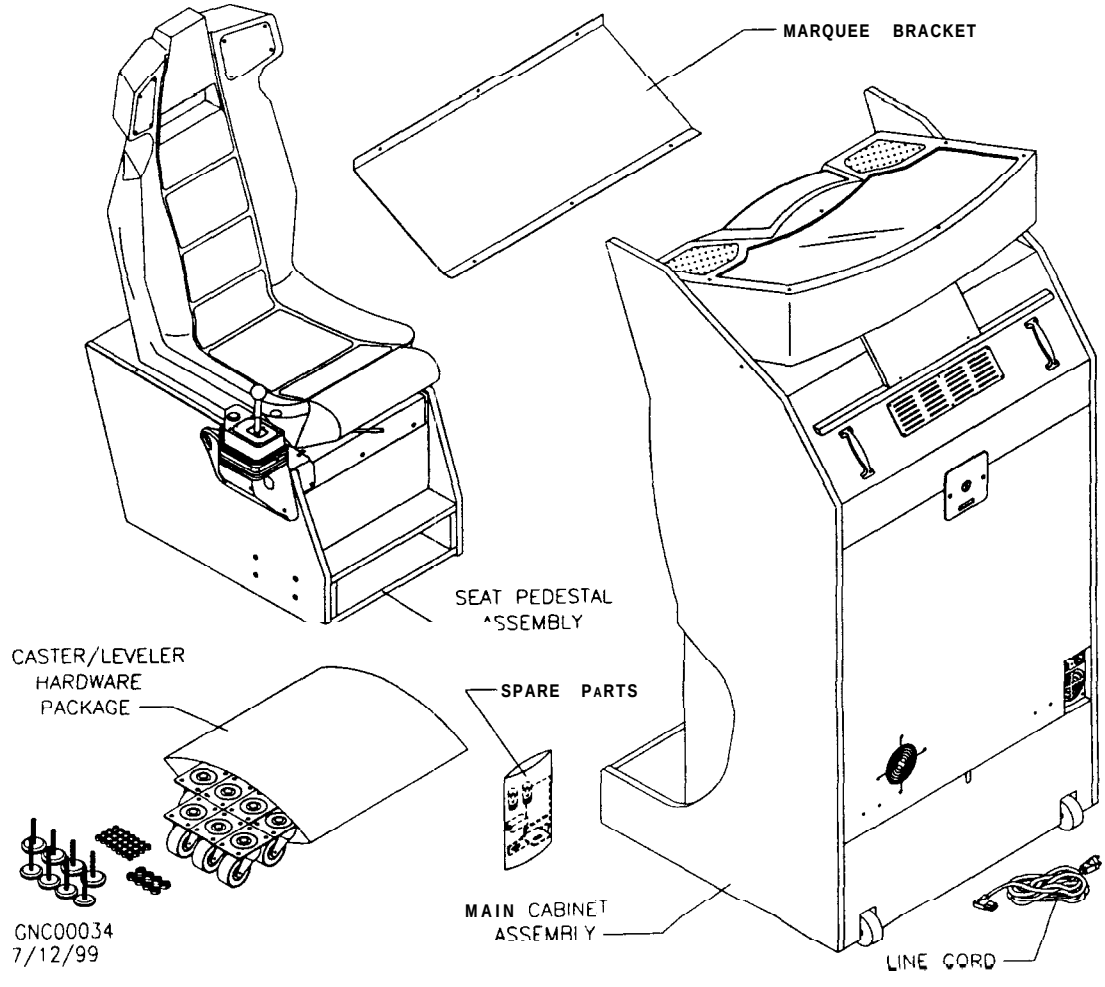
Linking allows players to compete against each other (on one course). Operator menus are the same as in stand-alone games. Linking cables to connect games are factory installed. Use the crossover couplers included in the spare parts to link two cabinets. Hardware is for attaching cabinets together is provided.

Cabinet Arrays

Use a local network to connect more cabinets together. Network hubs can interconnect up to eight games. Refer to the inside rear cover for more information about the optional Hub Linking Kit.

INSTALLATION & INSPECTION

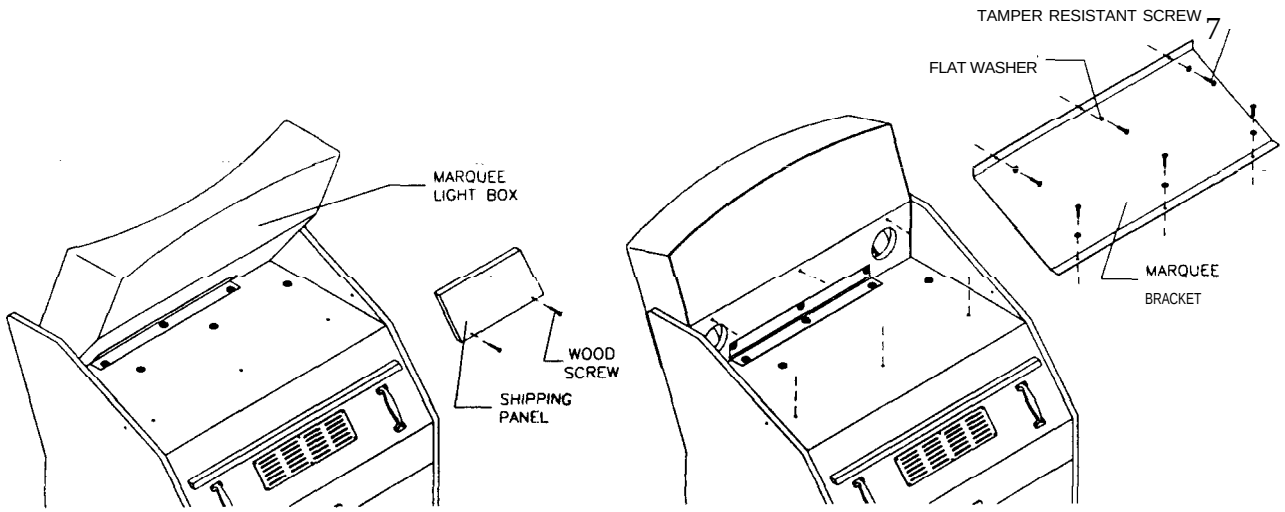
A !	**WARNING:** The cabinet is top-heavy. Use the handles when moving cabinets. Don't push against plastic parts. Don't raise the marquee light box until instructed to do so. Installation of the casters, leg levelers, and marquee bracket requires two individuals.



GAME UNPACKED AND READY FOR ASSEMBLY

[ ] 1. Remove and set aside items from the shipping containers. Remove all packing material. Inspect for damage. Check the main cabinet exterior, pedestal, shifter, and all of the seat surfaces.

[ ] 2. Remove the keys from the steering wheel. Unlock and open the coin and cash doors. Electrical cords, mechanical components, and game spare parts are packed inside the cash box.

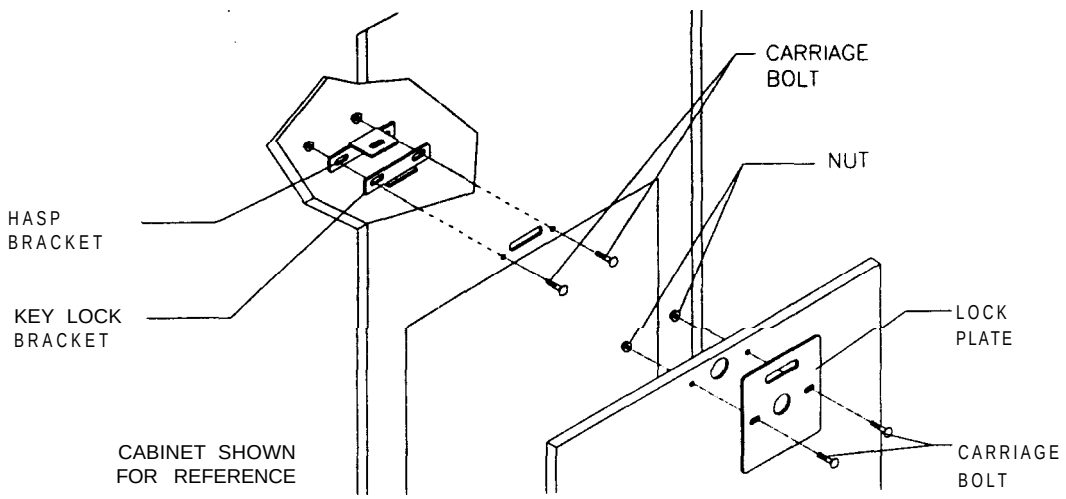


RAISE AND SECURE MARQUEE LIGHT BOX

⚠	WARNING: The marquee light box is not secure until the bracket has been installed. Keep tools and fingers away from the top of the cabinet to prevent damage. Have the second individual hold the box in place while completing the following steps.

[ ] 3. Slowly lift the rear of the marquee light box. Raise until the box rests upright on the main cabinet. Remove the screws and lift the shipping panel off the cabinet.

[ ] 4. Orient the marquee bracket over the top of the cabinet and the back of the light box. Align the holes. Install tamper resistant screws. Tighten each screw with the wrench from the spare parts. Remove the bracket and reinstall the panel **if** the light box must be lowered for cabinet relocation.



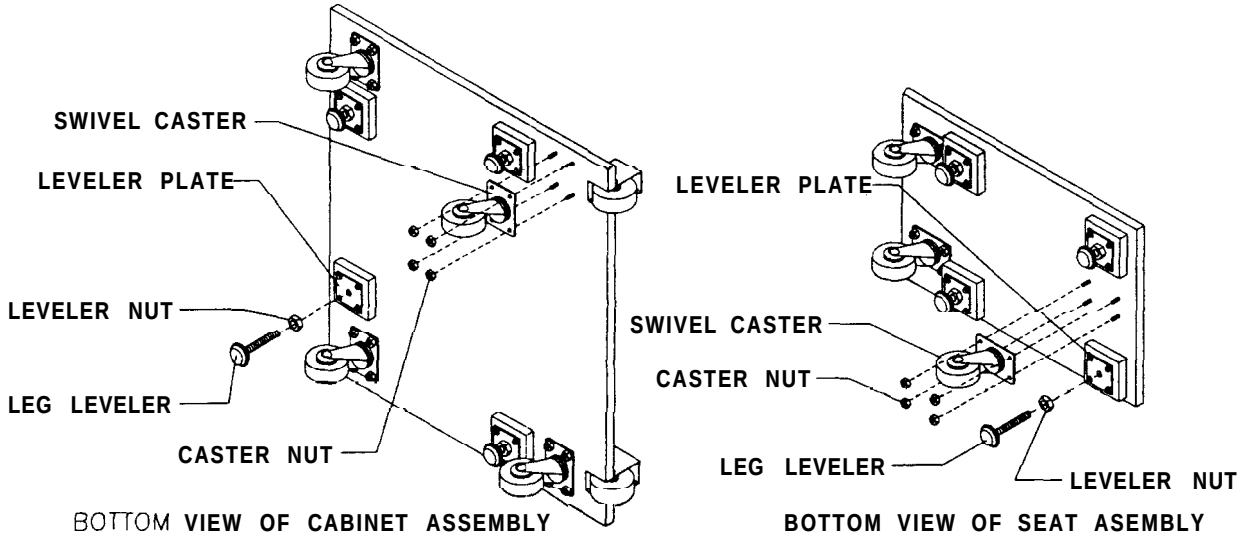
CABINET SECURITY MODIFICATIONS

[ ] 5. The hasp bracket is in the spare parts bag. Remove four screws from the sides of the cabinet rear door. Unlock and remove the rear door. Remove the two lock bracket nuts from inside the cabinet, above the rear door opening. Slide the hasp onto the bolts so that it protrudes from the hole in the back of the cabinet. Reinstall and tighten nuts.

[ ] 6. Locate the lock plate at the top of the rear door. Remove the bolts and nuts from the lock plate. Rotate the plate so that the slot will be above the door. Reinstall and tighten the bolts and nuts. Now you can install an extra padlock to secure the rear door.

[ ] 7. The main cabinet requires four swivel casters, one in each corner. Lay the cabinet on its back or prop up one side to allow caster mounting. Orient a caster plate over the threaded studs. Align the holes and seat the plate against the wood. Install a nut on each stud. Tighten each nut firmly.

[ ] 8. The main cabinet requires four leg levelers, one in each corner. Install one nut onto each leveler. Install one leveler and nut into the threaded hole in every ieveier plate. Do not tighten these nuts.



ATTACHMENT OF CASTERS AND LEVELERS

[ ] 9. The seat pedestal requires three swivel casters, one in each rear corner and one at the front center. Lay the pedestal on its side or prop up one side. Orient a caster plate over the threaded studs. Align the holes and seat the plate. Install a nut on each stud. Tighten each nut firmly.

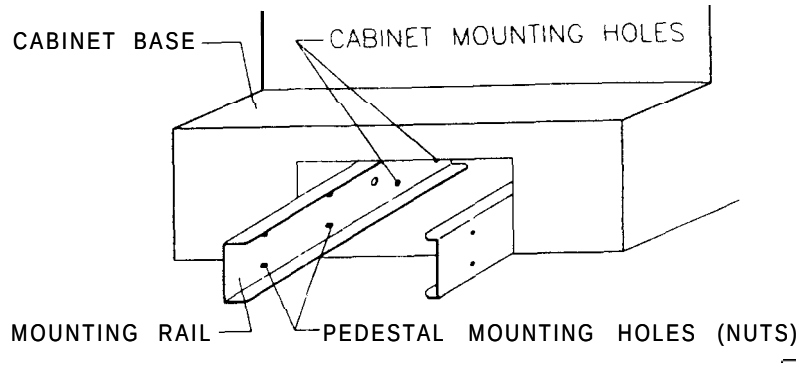
[ ] 10. The seat pedestal requires four leg levelers, one in each comer. Install one nut onto each leg leveler. Install a leveler with its nut into the threaded hole in each leveler plate. Do not tighten nuts.

[ ] 11. Roll the main cabinet to its intended location. Maintain clearance between the cabinet and walls, drapes, other games, etc. Lower each leg leveler until the cabinet is stable and level. Adjust the levelers to raise the wheels up off the floor. Distribute the cabinet's weight equally on each corner.

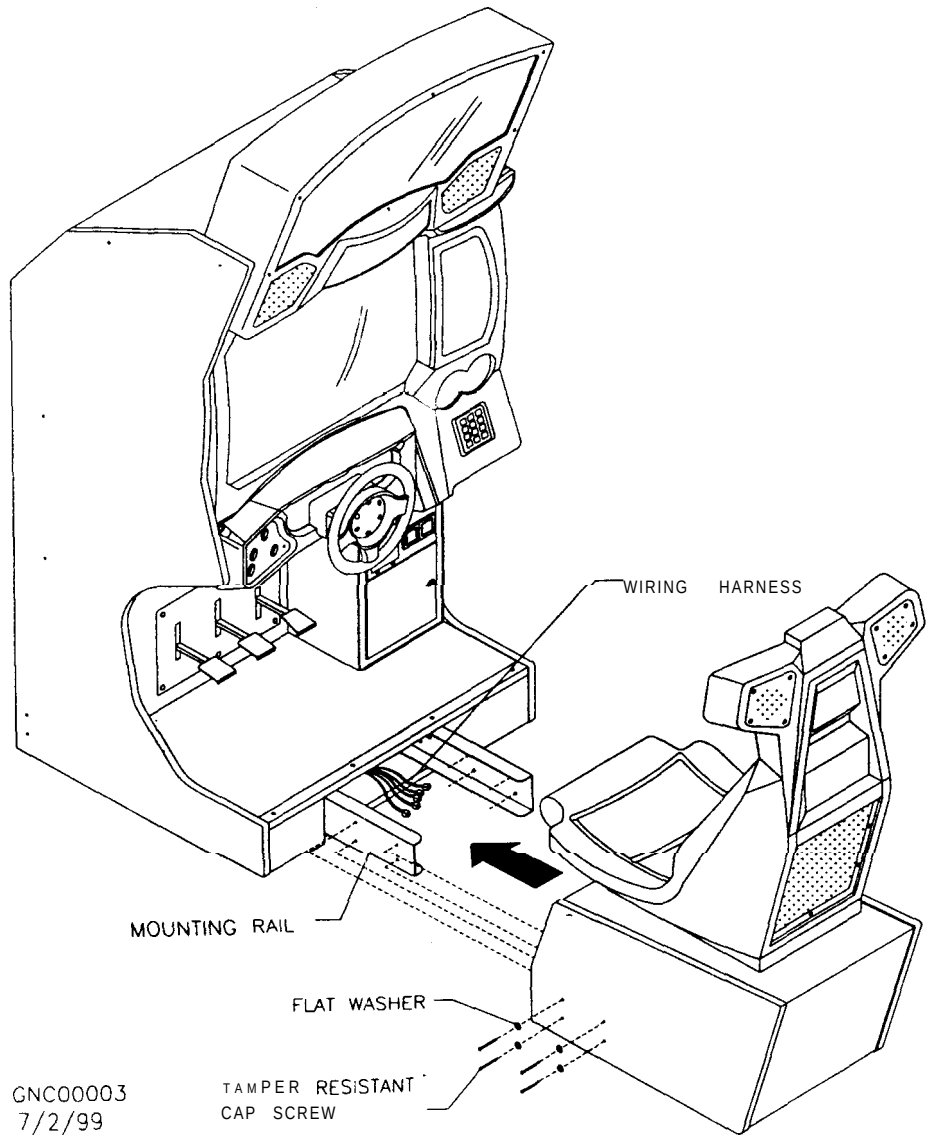
[ ] 12. The factory ships the pedestal mounting rails bolted inside the main cabinet. Remove the two front and two rear hex-head bolts that secure each rail. Pull the rails out, reverse them, and reinsert them. Align the holes and reinstall the bolts.

[ ] 13. Locate and expose the wiring harnesses inside the main cabinet and the seat pedestal. Roll the pedestal section up to the front of the cabinet. Leave enough space to attach the wiring harness. Mate each seat connector with its cabinet connector. Press the connectors firmly to seat contacts.

[ ] 14. Align the pedestal opening with the rail ends. Slide the pedestal forward onto extended mounting rails while guiding the wiring inside. Align the holes. Attach the pedestal using tamper-resistant screws and large flat washers from the spare parts bag. Tighten the screws firmly.

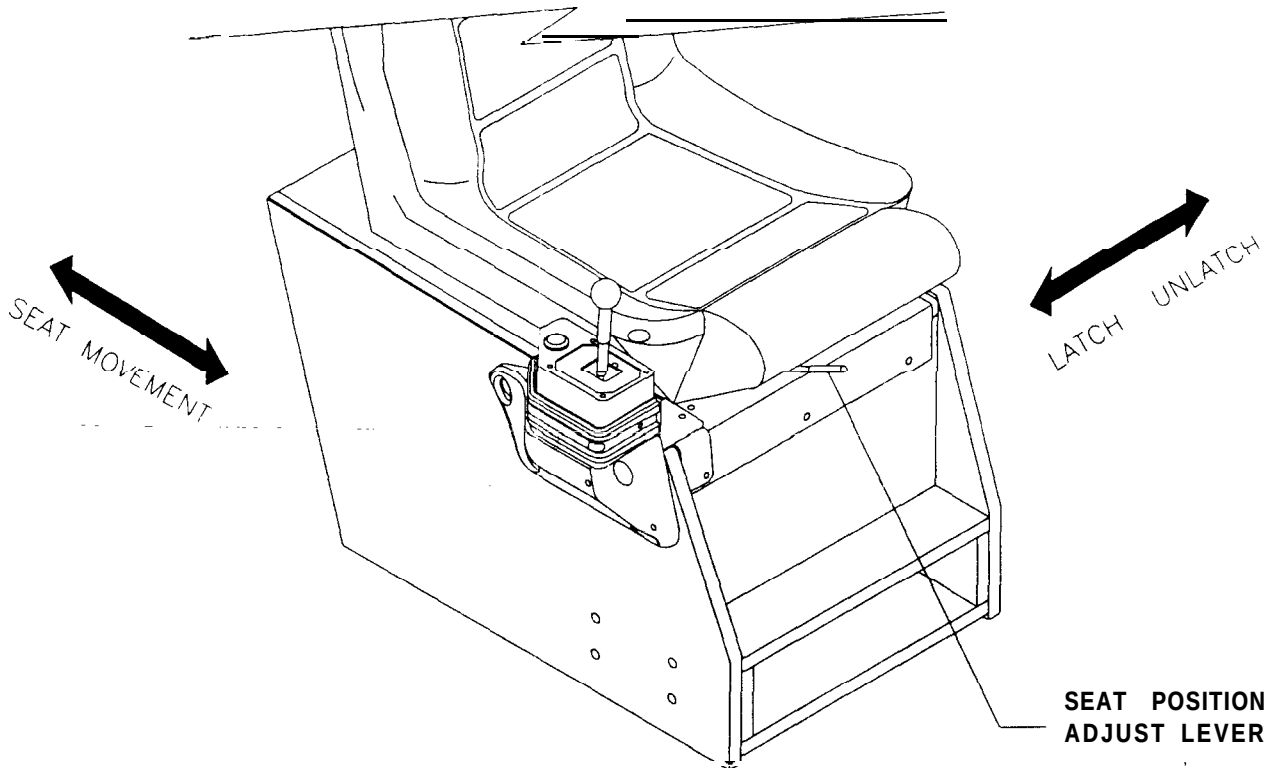


LOCATION OF PEDESTAL ASSEMBLY MOUNTING HOLES



CABINET AND PEDESTAL ASSEMBLY

	NOTICE: When you install the pedestal, carefully avoid pinching wires or connectors!



SEAT TRAVEL AND DETENT POSITIONS

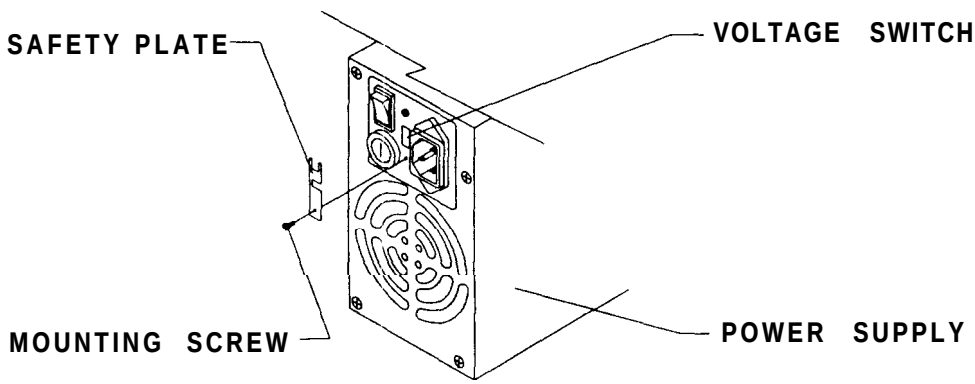
[ ] 15. Lower each seat pedestal leg leveler until the cabinet is stable and level. Adjust the levelers to raise the wheels up off the floor. Distribute the pedestal's weight equally on each leg leveler.

[ ] 16. Sit in the driver's seat. Use the seat position adjustment lever to change the seat position. The seat must move smoothly back and forth, locking securely into position when the lever is released.

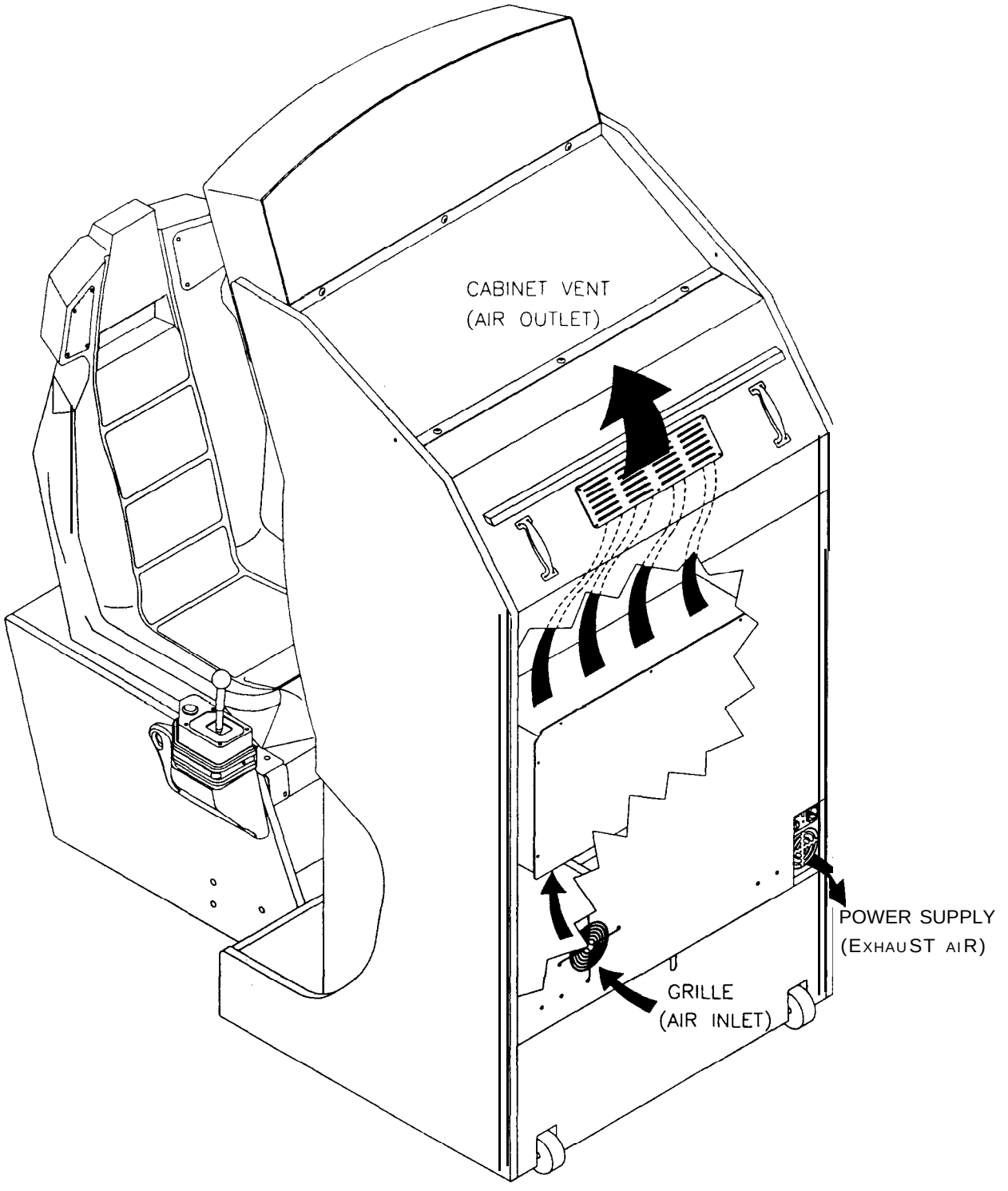
[ ] 17. Repeat the previous steps for additional cabinets. Refer to the array instructions on a following page. When all cabinets have been placed in final positions and bolted together, tighten the leveler nuts against the plates.

[ ] 18. To link cabinets (recommended), uncoil the linking cable and extend it out of each cabinet. Lay the cable in the **notch at the bottom center of** the door area. After you are satisfied with individual cabinet operation, go to the linking setup instructions page.

[ ] 19. Use a voltmeter to measure the AC line voltage. The power supply switch setting must match this voltage. If it is incorrect, remove the switch safety plate and change the voltage switch position.



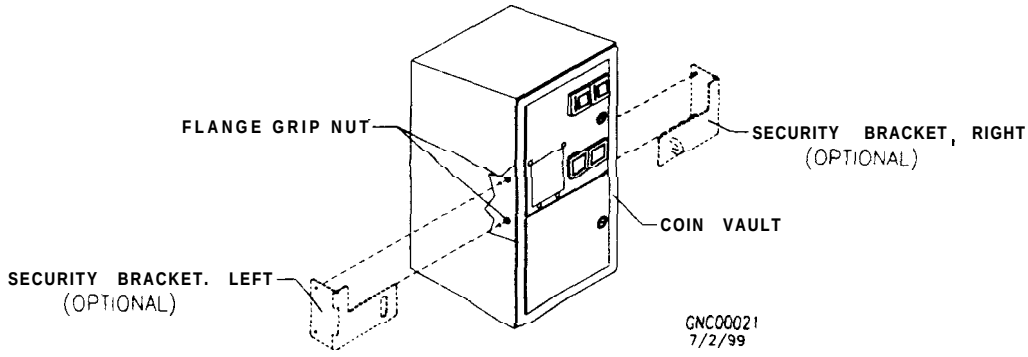
LINE VOLTAGE SWITCH ADJUSTMENT



CHECK CABINET **AIR** FLOW

[ ] 20. Check the cabinet to be certain that the cooling fan air paths are not blocked. The power supply has rear vents. The game electronics fan is mounted at the lower left corner of the enclosure directly behind the rear door air inlet. Keep manuals and other documents away from these areas.

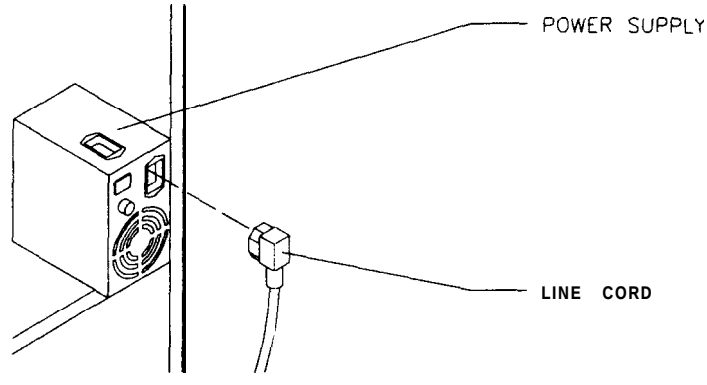
[ ] 21. Reinstall the rear door onto the cabinet. Lock the door and remove the key. Install the screws at the sides of the door. If the cabinet requires extra security, install a padlock now (not supplied).



SECURITY BRACKET INSTALLATION

[ ] 22. To install the optional coin security brackets, open the doors. Remove the cash tub. Remove the flange grip nuts. Insert the bolts through the brackets and into the vault. Install and tighten nuts.

[ ] 23. The power cord is with the spare parts. Match the holes on the IEC plug with the prongs in the receptacle on the power supply. Push the plug firmly to seat it.



LINE CORD INSTALLATION

[ ] 24. Plug the game into a grounded (three-terminal) AC wail outlet. The master switch is on the power supply. Turn the power on and verify that both fans function. The game will power up and begin self-diagnostics. If diagnostics find no errors, the game enters its Attract Mode of operation. (Attract Mode includes scenes and sounds from typical races, player's scores, messages, etc.).

[ ] 25. Open the coin door. The operator control switches are inside the coin vault on the outside wall. Press the TEST MODE button to enter the Menu System. The main menu screen appears.

[ ] 26. Select CONTROLS TEST at the Self Test Menu. Check that controls and lamps are functional.

[ ] 27. Select SOUND TESTS at the Self Test Menu. Verify operation of cabinet and seat speakers.

[ ] 28. Select MONITOR TESTS at the Self Test Menu. Verify colors, linearity, contrast, brightness, etc.

[ ] 29. Select DISK TESTS at the Self Test Menu. Run all the tests in order to verify drive operation,

[ ] 30. Select EXIT TO GAME at the Self Test Menu. The system should enter Attract Mode. Open the coin door and press the SERVICE CREDITS button a few times to allow game play.

[ ] 31. Press the gas pedal to select variables and begin play. Check steering, clutch, brake, gear shift. Listen to the audio while playing the game. Note sound irregularities (phase problems, no low frequencies, mono audio from stereo speakers, etc.).

[ ] 32. Change the volume and make adjustments as necessary. Close and lock all open doors.

CABINET ARRAY

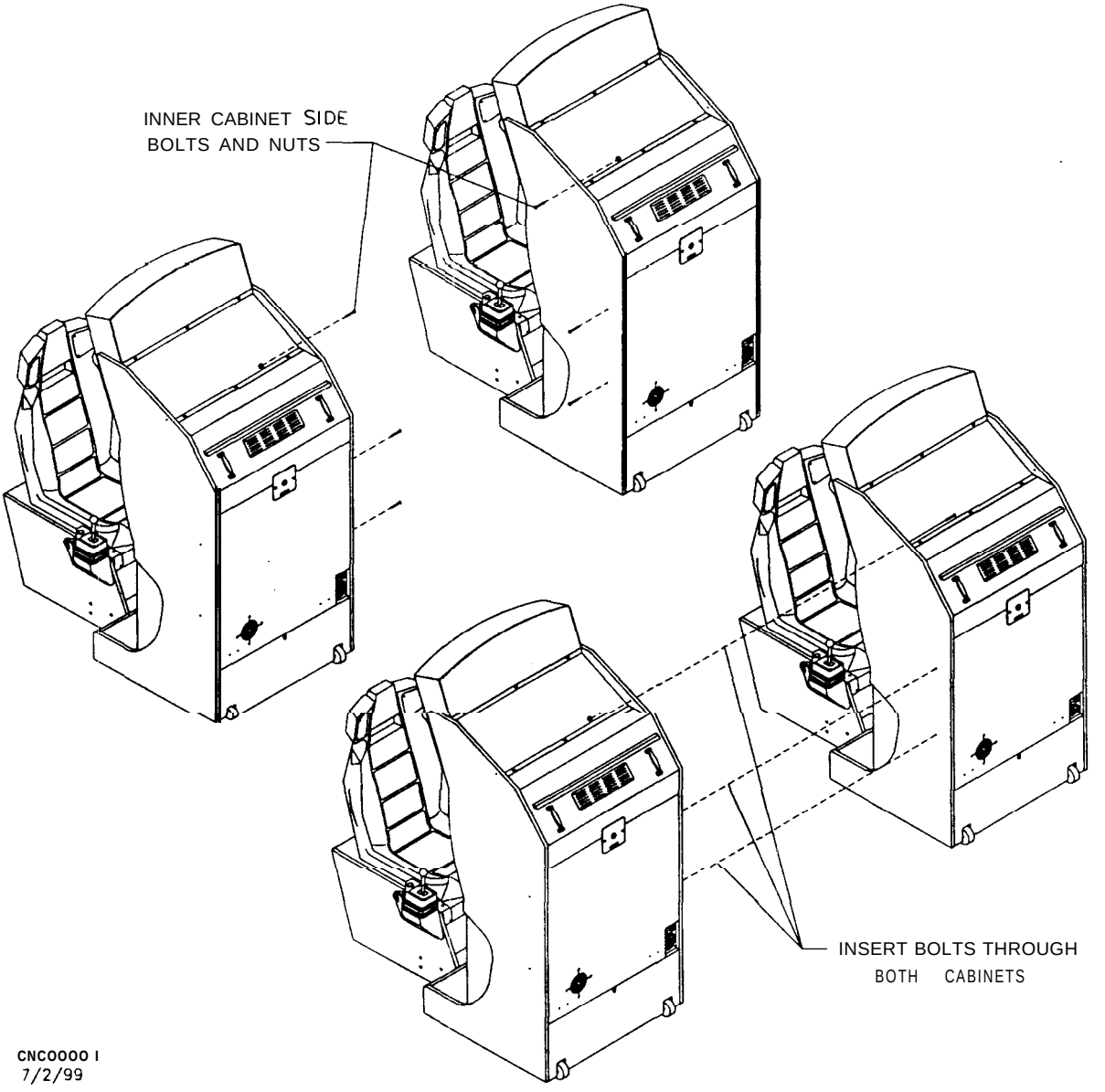
Multiple cabinets should be attached together to form a game array. Each cabinet comes with its own mounting hardware to mechanically connect the cabinets. See the following pages for linking instructions.

[ ] 1. Install the cabinet casters, leg levelers, seat pedestal, etc., as described on previous pages. Place the completed cabinets next to each other, leaving sufficient space to remove and install bolts.

[ ] 2. Unlock and remove the rear cabinet door. Remove three flat head carriage bolts on the inner sides of each cabinet, two along the rear of the adjacent sides, and one at the top center of the side. Retain three of the flange grip nuts. Place the six bolts and the remaining three nuts in the spare parts bag. Locate three longer carriage bolts from the spare parts.

[ ] 3. Move the cabinets next to one another. Adjust levelers until the sides are parallel and touching each other. Align the holes. Insert the long bolts through both cabinets. Install nuts and tighten.

[ ] 4. Repeat these steps for additional cabinets. Install and lock the rear doors.



BOLTING CABINETS TOGETHER TO FORM AN ARRAY

LINKING

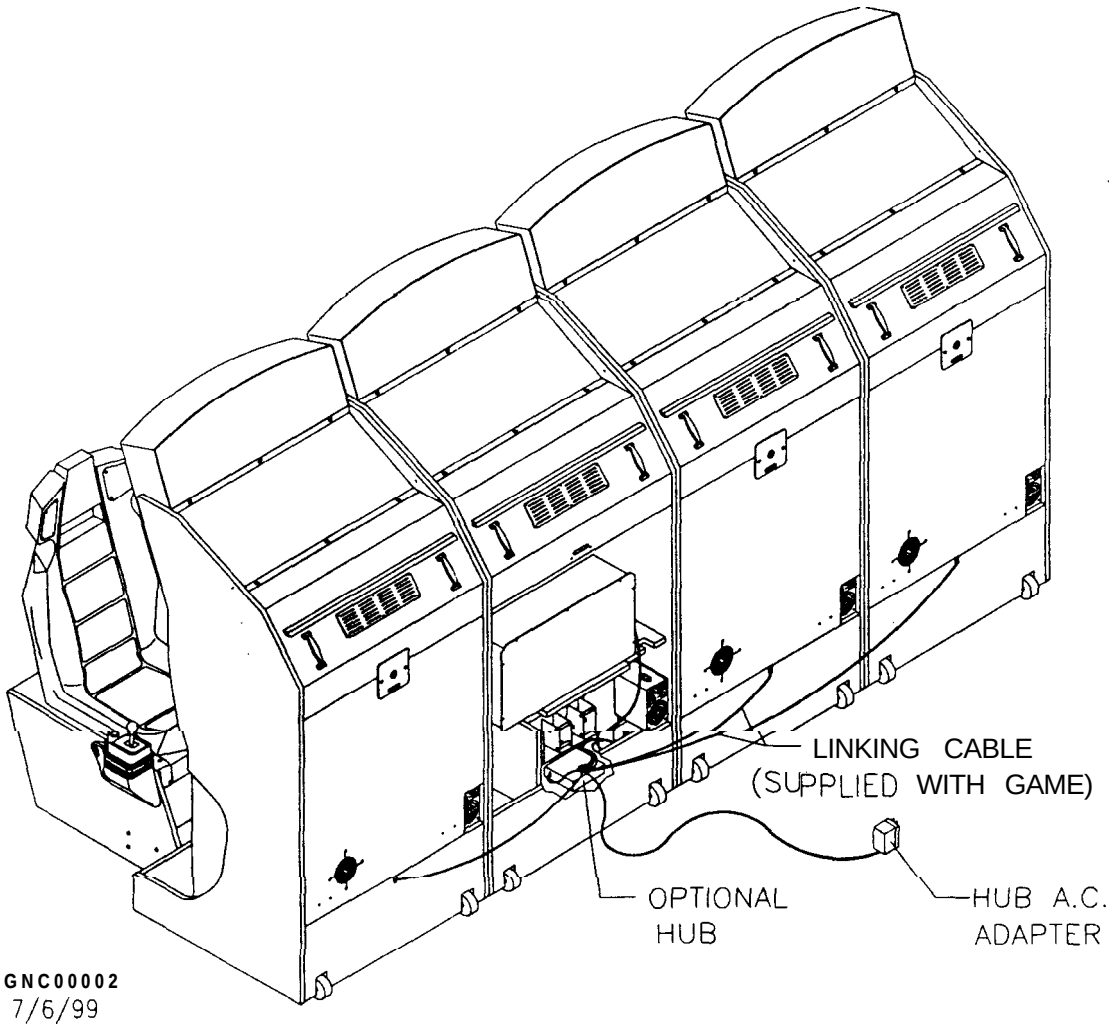
Connect games together electronically to permit simultaneous competition between players. The linking cables are factory installed in each cabinet. Crossover couplers are supplied in the spare parts. Once connected, games can operate individually (as before) or in linked mode as players desire.

Players quickly learn to associate joined cabinets with linked operation. If possible, attach the cabinets together to form an array. You may separate cabinets by up to 25 ft. (7.6m) if necessary.

A crossover coupler can *link only* two cabinets. Up to eight cabinets can be interconnected to form a Local Area Network (LAN). The optional Hub Link Kit is required to manage this network. The hub has circuitry to prevent errors from data collisions (several games sending data at the same time, etc.).

[ ] 1. Insert the free end of each linking cable into a receptacle in the crossover coupler. Press firmly to seat the contacts. The locking tab will snap into place when the plug mates properiy with tine jack.

[ ] 2. Place the connected coupler inside one of the cabinets. Place the coupler on the floor under the electronics. Retract any excess cable back into the cabinets so that it does not touch the floor.



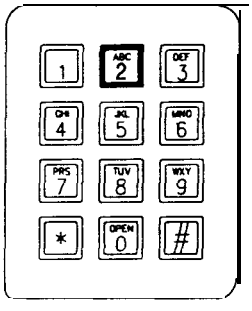
TYPICAL HUB INSTALLATION

[ ] 3. Use a hub to link more than two game cabinets. Active electronics permit the use of long cables, allowing remote hub location. The optional Hub Linking Kit has detailed instructions.

[ ] 4. Enter the menu system and set each linked cabinet to a different number (Cabinet 1, 2, 3, etc.).

SAN FRANCISCO

RUSH 2049™



CHAPTER TWO

FEATURES & OPERATION

NOTICE
Information in this manual is subject to change without notice. ATARI reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods may warrant.

Fill out and mail in the Game Registration card. Include the game serial number from the label on the rear of the cabinet. For your records, write the game serial number in the manual. SERIAL NUMBER _____

FEATURES

PREVIEW

In the Attract Mode, the game automatically cycles through scenes and sounds from typical races. Players are presented with laps from several different camera angles and spectator viewpoints. Use the Preview feature to see some of the fast grooves for curves and tunnels.

Tap the MUSIC button during any of these scenes to skip ahead to the next scene. Press and hold MUSIC for five seconds to continue a particular scene, best lines through curves, or to see copyright and team credits. Press any keypad button to see the "Join Team Rush" message. VIEW 1 displays 1999 contest rules (if available). VIEW 2 chooses between solo and linked high scores. VIEW 3 displays other track high scores. ABORT shows the time to beat to win a free race (only if this feature has been enabled). Press the GAS pedal to begin game play.

ENTRY

The first time player selection screen presents two choices. Select JOIN TEAM RUSH to register (first time entry), then enter the data requested on screen. Team Rush members need only enter their PIN; subsequent games allow members to select CONTINUE. PLAY allows driving without team membership.

Players use the keypad to enter their PIN code. Turn the steering wheel to enter driver name. Mistake? Press REVERSE to erase the last digit entered. The . key clears the entire entry (start over). Press # key save data and move on to the next item. Use the MUSIC button to cycle through alternate character sets.

RACE LENGTH

Several things affect the length of a race. Difficult tracks have more turns and speed changes between the start and finish lines. Each checkpoint requires a certain minimum speed to continue racing. Players pick up bonus time as each checkpoint is passed. Skilled players can earn extra laps before the race ends.

TRACKS

Each track requires a different skill level. Track 1 is for beginners, As advanced or expert tracks are chosen, the course difficulty increases. This forces players to maintain higher speeds and make fewer errors to continue racing. Each track sets the race at a different time of day (the expert track requires driving at night). The tracks also change as the race progresses just to increase the challenge.

Press the VIEW 1 button during track selection for mirror effect (left/right images reversed). VIEW 2 presents another chance to join Team Rush. REVERSE declines a linked race. MUSIC displays additional tracks for registered players (Track 4 is available after 30 cumulative miles, Track 5 appears at 50, etc.).

SOLO

Press and hold both REVERSE and ABORT at the race starting line to eliminate other cars from the track. This allows players to learn the track without interference from human or computer controlled cars. Solo races may also be used for qualification runs and time trials prior to linked race or tournament competition.

LINKS

If games have been connected together in a network, players can choose to accept a linked race. A JOIN IN message shows when this type of competition is possible. Other players will see the LINKING message when they begin their track and car selections.

CARS

Players choose from several basic car styles. Each car has different style and racing team colors. Winners quickly learn to choose the car best suited to each individual track. Each car may be customized.

During car selection, press the VIEW 1 button to change car colors. Press VIEW 3 to change car handling characteristics (more power, more spin out). Hold MUSIC and press VIEW 1 to eliminate catchup feature (catchup speeds up slow cars; this guarantees a close finish every time). Hold MUSIC and press VIEW 2 to remove the computer controlled drone cars from a race. Hold MUSIC and press VIEW 3 to adjust the steering response strength (changes road feel). Press REVERSE to add extra time to a selection screen.

SHIFTER

Players may choose between manual and automatic transmissions. Manual shifting usually produces better speed control, resulting in faster lap times. The operator may set all games to shift as automatic transmission type if players agreed or a particular style of competition requires this feature.

The previous button options from car selection (see CARS) remain in effect during shifter selection. Once again, press REVERSE if you need more time to make your selection.

SHORTCUTS

To keep things interesting, there are extra rewards for those brave enough to experiment. Drivers who don't stick to the marked course will find many alternate routes to the checkered flag. There are a number of side trips to take you over, under, around, and through the race course. Stunt drivers will find their efforts well worth the effort; the right combination of speed and direction can launch a car high into the air.

When a car is airborne, press the CLUTCH pedal to extend the length of your flight.

PHANTOM PHOTON OPTION

Players who elect to drive solo races with no drones will compete with ghost cars of previous high scoring Team Rush drivers. The Phantom Photon cars are virtual images; they cannot force the player's vehicle off the road or interact in any way during a race. Operator selections set the phantom car variables.

Each phantom car represents a different time to surpass. Beat the "Best Ever" car to set the new fastest track time. 'Best in Previous N Days" goal changes are based on operator settings in the Menu System. If free races are enabled, players simply cross the finish line ahead of the "Free" car to win a free race.

CONTESTS, AWARDS AND BONUSES

Players who join Team Rush are awarded a quantity of miles at the end of each race. These 'Frequent Driver Miles" accumulate until a player reaches a fixed value; when this quantity is surpassed, new features appear (new tracks, additional cars, etc.). Press the VIEW 1 button during attract scenes to display the 1999 contest rules (where permitted by international, federal, state, and local regulations).

Players who choose to compete in solo races will find gold Rush coins scattered along the race courses. Drive over these symbols to extend time, upgrade cars, etc.. There are 100 gold coins on each track.

Operators may choose to award high scoring drivers a free race. Drivers must beat the listed track time; each new record sets a new goal for every other player. The computer adjusts for the award percentages.

DISADVANTAGED DRIVERS

Broken leg? Too short to reach the pedals? Too young to grasp gas and brake operation? No problem. Five seconds after a race has started, the computer switches on and automatically applies full throttle. Players need only to pilot the car to participate. If you steer well, you can complete the course.

DAMAGE CONTROL

In the unlikely event that a player control malfunctions during a race (gas pedal stuck off, brake or clutch stuck on, shifter stuck in one gear, etc.), the computer compensates. Unless there is switch or sensor activity, the computer disables the affected control at the beginning of the race and permits the car to be driven. After five seconds of control failure, the gas is turned on, the brake or clutch is turned off, the gear shifts normally. Should the pedal or gear begin to function again, the computer releases its control.

If a fault is detected in only one gear, the computer compensates by choosing that gear when no other gear is selected. This achieves normal operation. If two or more gears do not function, the computer selects automatic transmission and changes gears for the driver (players can not select manual shifting).

When the condition remains in effect for more than three successive races, the fault is logged as an error condition. An on-screen indicator alerts the attendant or operator that inspection is required. The game always remains playable, so team members can continue to rack up miles until the problem is resolved.

OPERATOR ALERT SIGNAL

When the computer analyzes the error log and determines an on-going condition exists for more than three consecutive games, it activates a visual signal. The signal appears as a red dot in the lower left corner of the Attract screens (refer to Alert Mode under Game Operation on the following page). This alerts the operator or attendant that the game performance is compromised. The fault is detected well before scheduled routine maintenance occurs.

When the alert signal is seen, the operator must discover what error condition has been detected. After players have finished racing, unlock and open the coin door. Press and hold the TEST button to enter the Menu System. Select each test in order and activate it. One of the tests will find the error and display it.

When the error condition is resolved, the computer self-test routine detects that the game is again fully functional. The visual signal is removed from the screen to prevent false alerts.

PLAYER STATISTICS

This game stores individual data for registered team members on the hard disk drive. The information is duplicated on the hard disk drive of every linked cabinet. When a disk drive is replaced, the files will be duplicated on the new disk drive only after a team member plays a game on this cabinet. These redundant files prevent data loss and increase game reliability. The maximum number of stored records is 1024.

GAME OPERATION

INITIAL START UP

Switch ON power to the game. Automatic self-diagnostic tests verify and report the condition of the hard disk drive, memory, controls, etc. Messages display while the software is loading. Error messages remain until the ABORT button is pressed. If there are no errors, the game enters Attract Mode automatically.

NOTE: When faults are detected, the game halts and an error message may appear on the screen. Record any messages before attempting to service the game. Press ABORT to clear messages.

Before the game starts, the Attract screens endlessly cycle through scenes and sounds from typical games. Insert the desired amount of coins or tokens and press the GAS pedal to begin game play.

ATTRACT MODE

Before the game starts, the Attract screens show scenes and sounds from typical games. The attraction screens cycle endlessly until a player starts the game. Players may preview the game before starting.

During the Attract Mode, an advertisement periodically appears regarding contests and promotions. When the time limits for these events expire the details will disappear from the display (refer to Game Options).

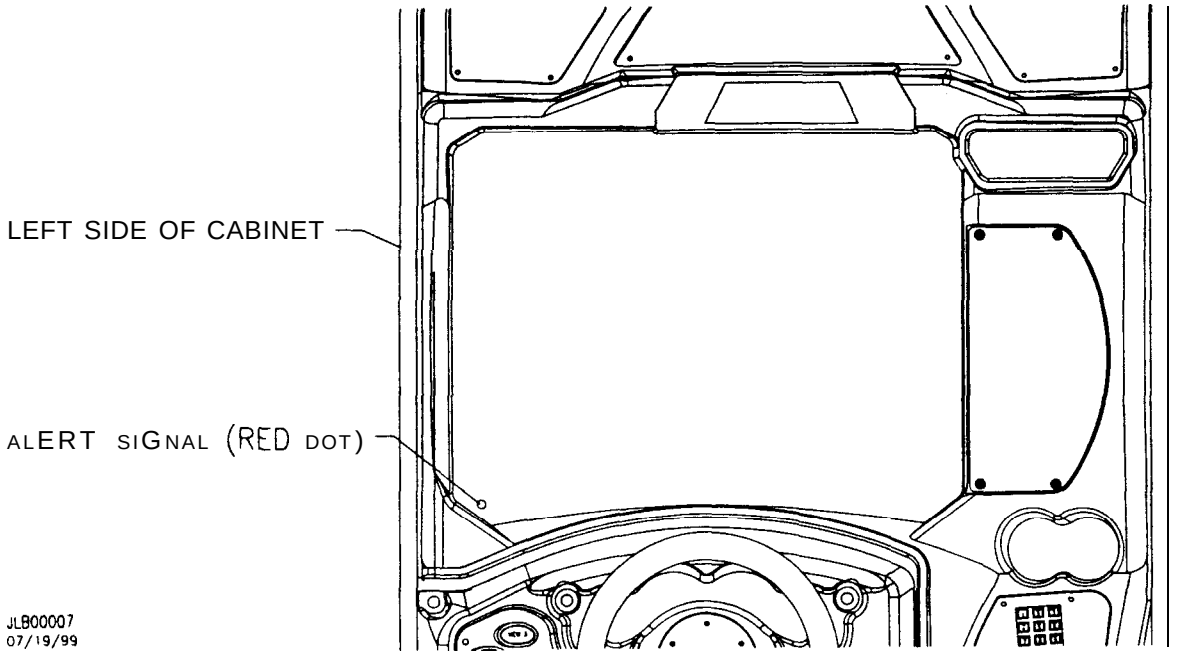
ALERT MODE

The Operator Alert Signal will appear at the lower left corner of the Attract screens if the computer veriiies a fault. When the cause has been corrected, the indicator automatically disappears from the screen

TEST MODE

The operator may enter the menu system at any time to analyze the game or adjust it if required.

NOTICE: Do not open the coin door and enter the Test Mode while games are linked. This may halt games in progress on other cabinets.



LOCATION OF OPERATOR ALERT SIGNAL

PLAYER CONTROLS

Player controls allow a driver to pilot the cars around the track. These controls mimic those found in a real car. Many of these controls are also used when setting up a custom car or entering player information.

VIEW 1 button permits players to see the course from the front of the car during the race.

VIEW 2 button allows players to see the roadway from inside the car (normal driver viewpoint),

VIEW 3 button gives the player an aerial view. Players see the whole area from above and behind the car.

MUSIC changes the tune volume during a race. Tap this button to change loudness or to turn sounds off.

ABORT button resumes immediate game play. The car lands back in the middle of the selected track.

REVERSE button changes the direction of wheel rotation. Press this button to back up the vehicle.

GEARSHIFT selects the best gear for acceleration, cruising, or deceleration (manual transmission only).

SEAT ADJUSTER pulls to the left to change seat position. Release the lever and rock the seat to lock it.

REAR VIEW MIRROR allows the driver to see who is behind him. The mirror cannot be adjusted.

LEADER LIGHT illuminates when the driver passes all other cars on the track. It indicates a front runner.

INFORMATION PANEL gives a brief description of the Team Rush entry procedure instructions.

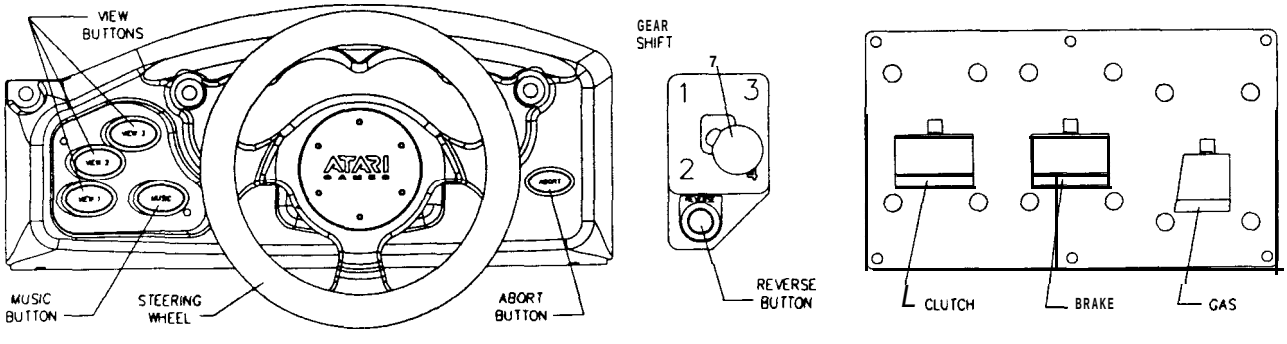
KEYPAD is used to enter a new or previous registered team member's Personal Identification Number.

GAS PEDAL controls the car acceleration. Full throttle occurs after five seconds if gas pedal is not used.

BRAKE PEDAL slows or stops the car. Heavy braking affects the players ability to steer the car quickly.

CLUTCH PEDAL permits fast gear changes. The clutch also adds distance when the car is airborne.

STEERING WHEEL aims the car during a race. The steering wheel provides road feedback to drivers.



PLAYER CONTROL LOCATIONS

OPERATOR CONTROLS

Operators have lock-and-key access to the menu system for statistics, adjustments, and testing to prevent tampering. On-screen messages guide the operator through menu options.

The ON/OFF SWITCH is located next to line cord on the power supply. The switch is on the cabinet rear.

The MONITOR REMOTE ADJUSTMENTS are located inside the coin vault. Use the monitor test screens along with these controls to adjust the video image size, brightness, contrast, etc.

The RESET SWITCH restarts the game during service. It does not change statistics or setup information. Press RESET to observe CPU indicators during startup. RESET is on the CPU Board Assembly.

The DIP SWITCHES are used to set the hardware variables for this game. These switches are located on the Sound I/O Board Assembly inside the electronics enclosure.

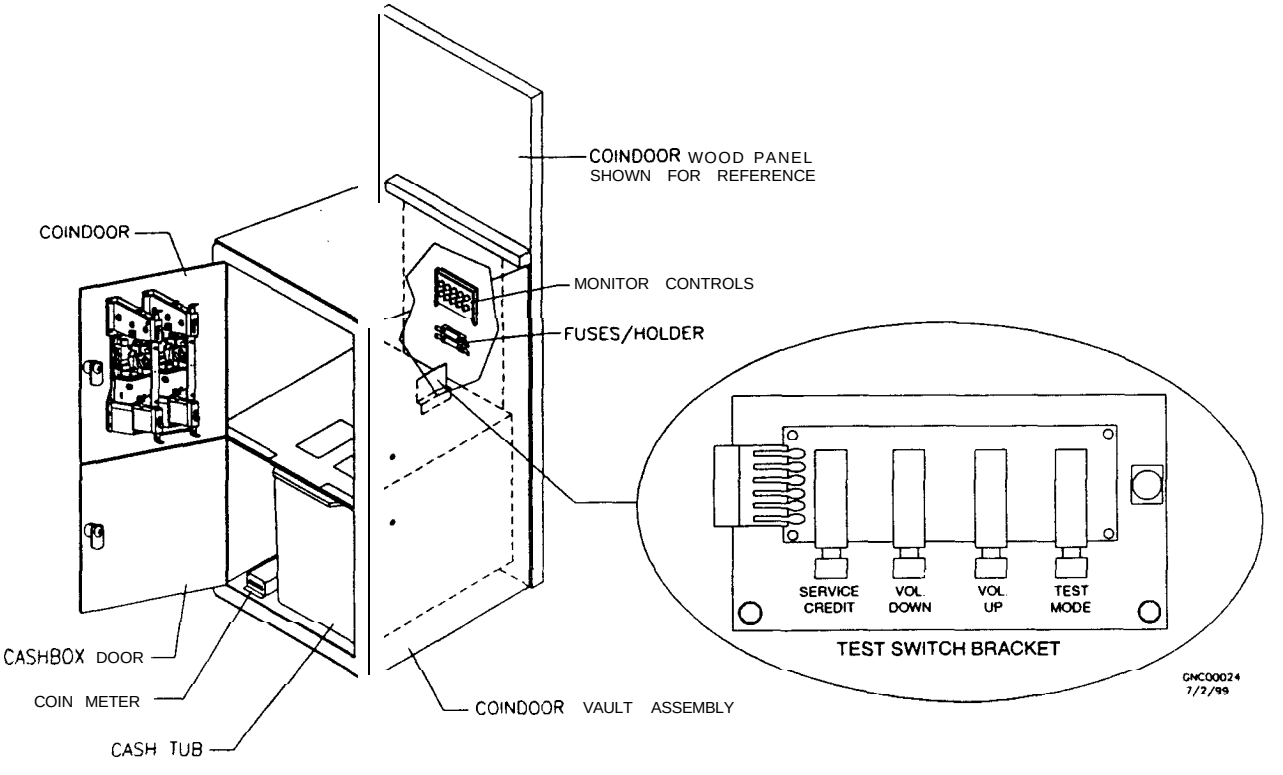
The TEST button activates the game SELF TEST menu system. Press the Test button to enter the Menu System and select individual diagnostics, audits, utilities, and other features.

The VOLUME UP button moves up through the menu selections or adjustment items and raises the sound level in game play. The VIEW and MUSIC buttons also move through the selections.

The VOLUME DOWN button moves down through the menu selections or adjustment items or lowers the sound level in game play. The VIEW and MUSIC buttons also move through the selections.

The SERVICE CREDIT button allots credits without affecting the game's bookkeeping total. Press this button to get out of a menu selection or return to the main menu.

The PLAYER CONTROLS are also used to move through the Menu System and start or end tests.



OPERATOR CONTROL LOCATIONS

POWER-ON SELF-TESTS

The Power-On Self-Tests let the game calibrate the player controls. Don't touch the wheel during the test.

These basic tests run automatically. They detect faults that would prevent proper game operation.



POWER-ON SELF-TESTS SCREEN

The Power-On Self-Test ***(POST)*** runs whenever you switch power off and on. The POST also runs whenever the processor resets. The POST prevents system calibration errors to critical player controls.

A successful self-test takes less than one minute to complete. Note down messages before proceeding to menus or game play. Players can override this screen, but may reduce performance.

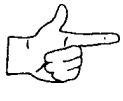
After the above screen appears, the system turns the steering wheel to each of its extremes. The screen indicates maximum and minimum position values. Dirt, debris, binding, or loose parts may cause this routine to detect errors. The calibration routine requires less than 10 seconds.

Don't touch the wheel or pedals during the automatic portion of this calibration routine. If the self-test has determined that the pedals are not set correctly, on-screen messages direct you to press and release each pedal to set travel limits. These new values will be stored in memory.

Steering wheel and pedal positions are checked for position and function. Messages appear on screen as each item is tested, along with detected errors. Diagnose errors more thoroughly by manual testing.

ABORT. Use the ABORT button to cancel the POST. Allow the tests to complete at least once before aborting. Pressing ABORT starts the game. Yet if faults exist, players may not be able to control the cars.

During service or repair, you may need to repeatedly disconnect and restore power. Each break in power causes these tests to rerun. After the first time, you may press ABORT to skip unwanted tests.

	**NOTICE: When the games are linked, the cabinet number error message may appear during or after the Power-On Tests screen. Select and set a unique cabinet number at each video game machine to eliminate this error.**

SERVICE REQUIRED TESTS

Each time the game returns to its Attract Mode the program checks the error log. If errors are found, the Operator Alert Signal will appear at the lower left corner of the Attract screens if the computer verifies a fault. The operator can inspect the game condition at a glance without entering the Menu System.

Once the red dot has appeared on screen, the operator must take action. Unlock and open the coin door. Press and hold the TEST button to enter the Menu System. Test the controls, monitor, sound, disk drive, etc. until the problem area can be determined. If the calibrate and repair routines do not resolve the problem, refer to the Troubleshooting Chapter for assistance. Make repairs or adjustments as necessary. When the cause has been corrected, the indicator automatically disappears from the screen.

SWITCHES AND JUMPERS

There are a number of hardware variables that can be changed to adapt the electronics to other uses. Jumpers determine which circuit paths are active, and DIP Switches select instructions.

Switches

The CPU Board push button switch S1 is near the larger heatsink. This switch resets the processor. This switch is used during service to restart the game without cycling the power off and on again.

There are two DIP Switch blocks (U13 and U17, near the center of the Sound I/O Board Assembly).'Each consists of eight individual switches. These switches are factory set for normal game operation.

NOTE: All instruction variables for this game are software selectable from the menu system. Each DIP Switch should be set to its OFF position (Factory default) for proper game operation.

Jumpers

Jumpers on the CPU Board match various system characteristics to optimize the memory circuits and video signals. These jumpers may require adjustment to accommodate future upgrades or service.

NOTE: The circuit paths are optimized at the factory during the final board test procedure. Each jumper should be left in its original position to avoid error messages or video sync problems.

ERRORS

The system detects errors at start up or during various diagnostic tests or operations and reports them on the screen. Some errors, such as minor disk data faults, are automatically repaired by the system. Other errors, such as player control calibration, are fixed by manually resetting the values in game memory. In most cases, the game will continue to operate with reduced performance after discovering minor errors.

Always record error messages before attempting to correct any problem. The USER MESSAGES report may store some additional temporary messages (refer to STATISTICS earlier in this section).

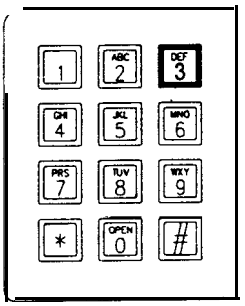
After recording the error messages, turn off the game's power, wait a few minutes, then turn the power back on again. Pay attention to the start-up screens and note any error messages during the Power On Tests. If possible, enter the SELF TEST MENU SYSTEM and run all of tests related to where the errors occurred. Record any new error messages and compare them to those previously recorded to determine whether the errors are random or continuous in nature.

NOTE: Do not ignore error messages even when the game can be forced to start and operate. Games with errors may generate reduced earnings due to poor performance.

NOTES

SAN FRANCISCO

RUSH 2049”’



CHAPTER THREE

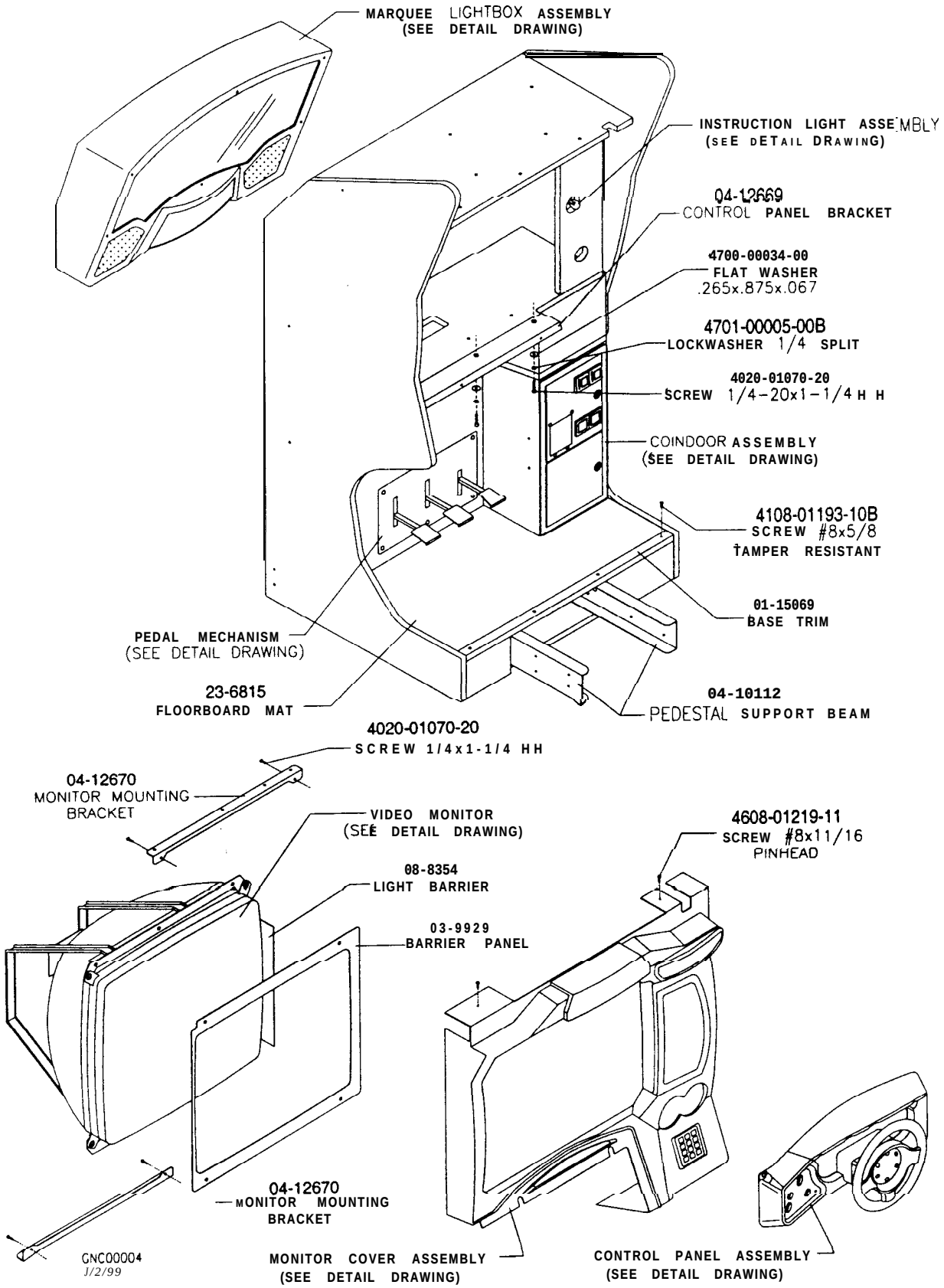
PARTS

Warning

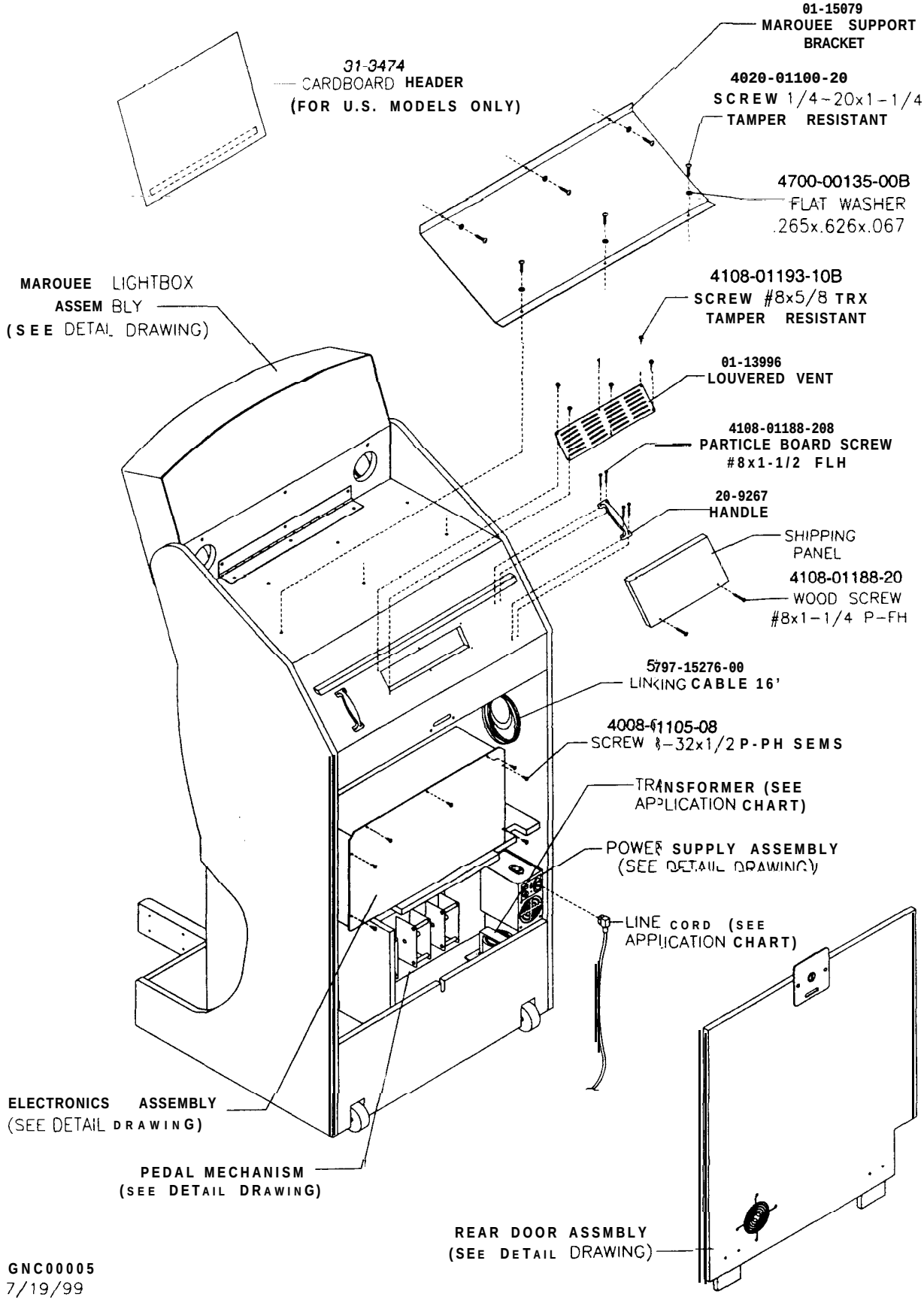
USE OF NON-ATARI PARTS OR CIRCUIT MODIFICATIONS MAY CAUSE SERIOUS INJURY OR EQUIPMENT DAMAGE! USE ONLY ATARI AUTHORIZED PARTS.

- For safety and reliability, substitute parts and modifications are not recommended.
- Substitute parts or modifications may void EMC directives or FCC type acceptance.

A-23188 MAIN CABINET ASSEMBLY
FRONT VIEW

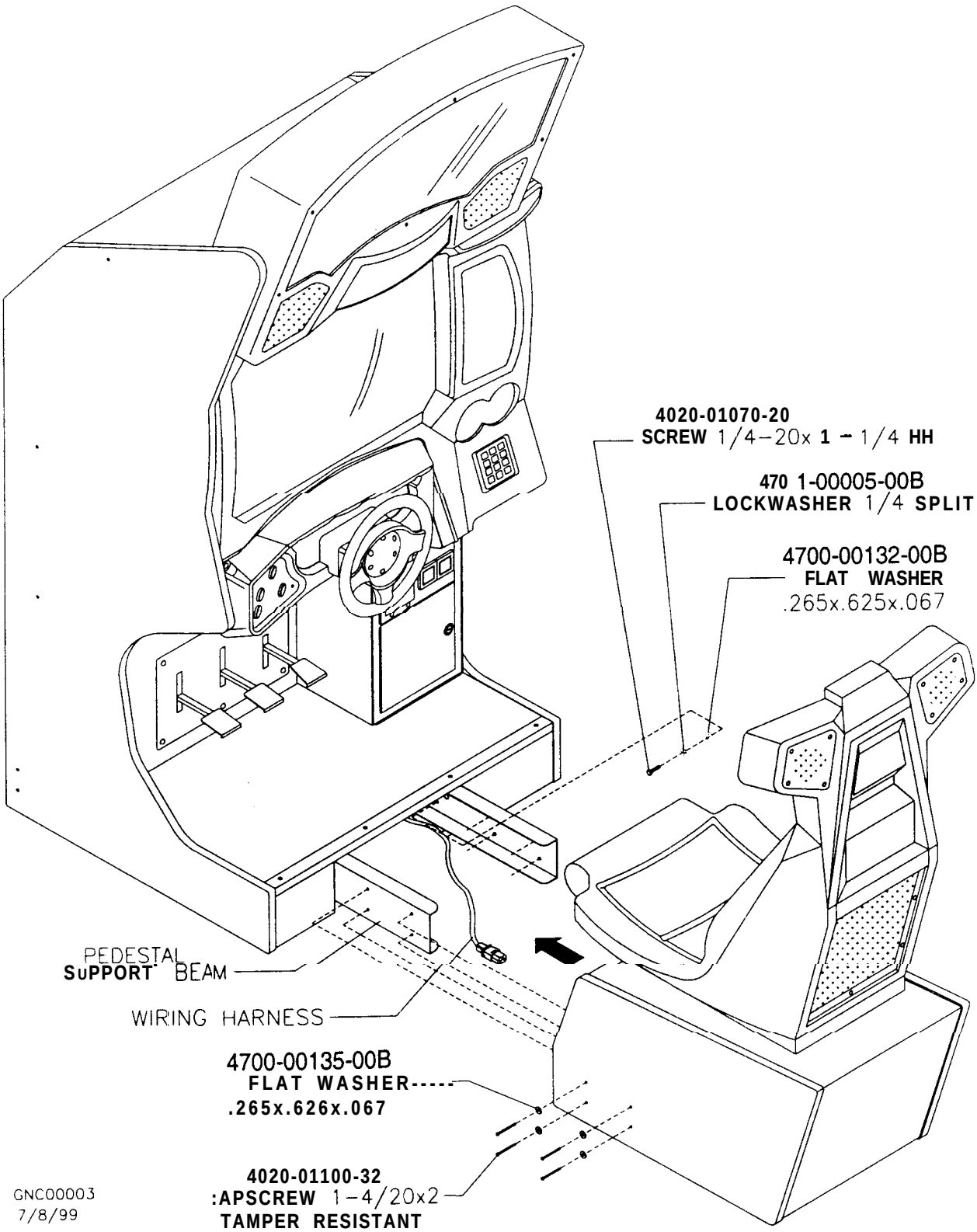


A-23188 MAIN CABINET ASSEMBLY
REAR VIEW

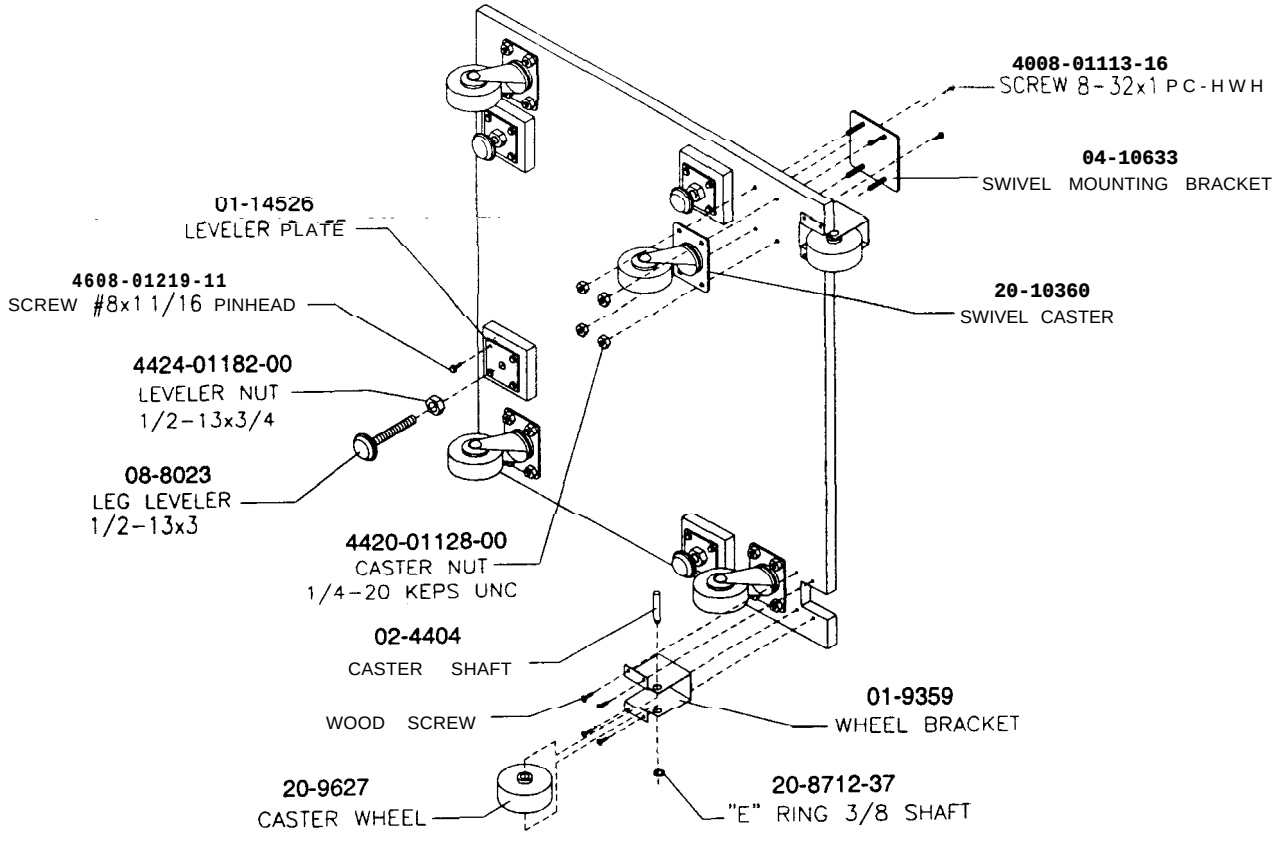


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7/19/99

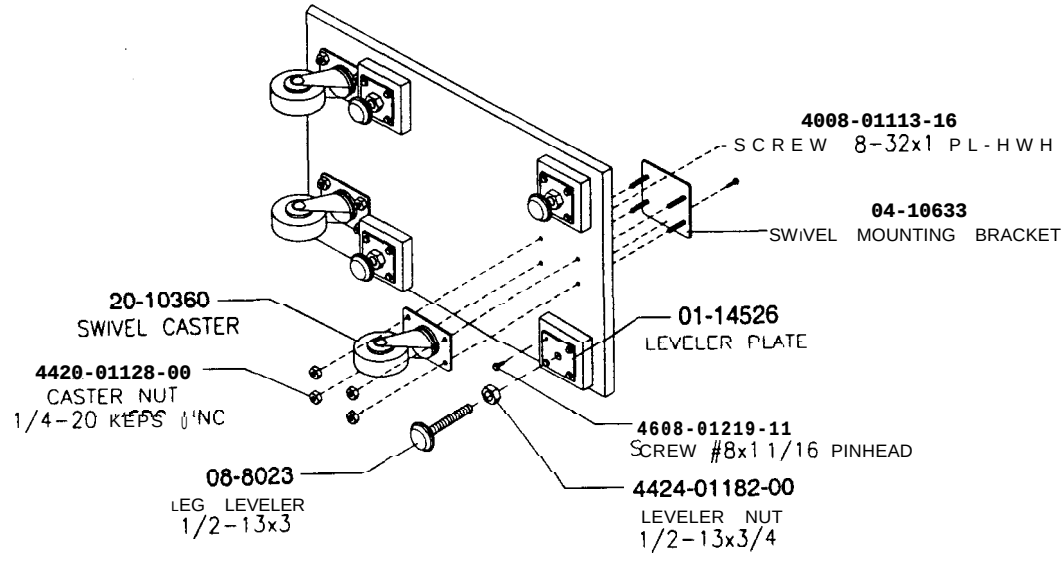
CABINET AND PEDESTAL ASSEMBLY
FRONT VIEW



CASTER AND LEVELER ASSEMBLIES
BOTTOM VIEW



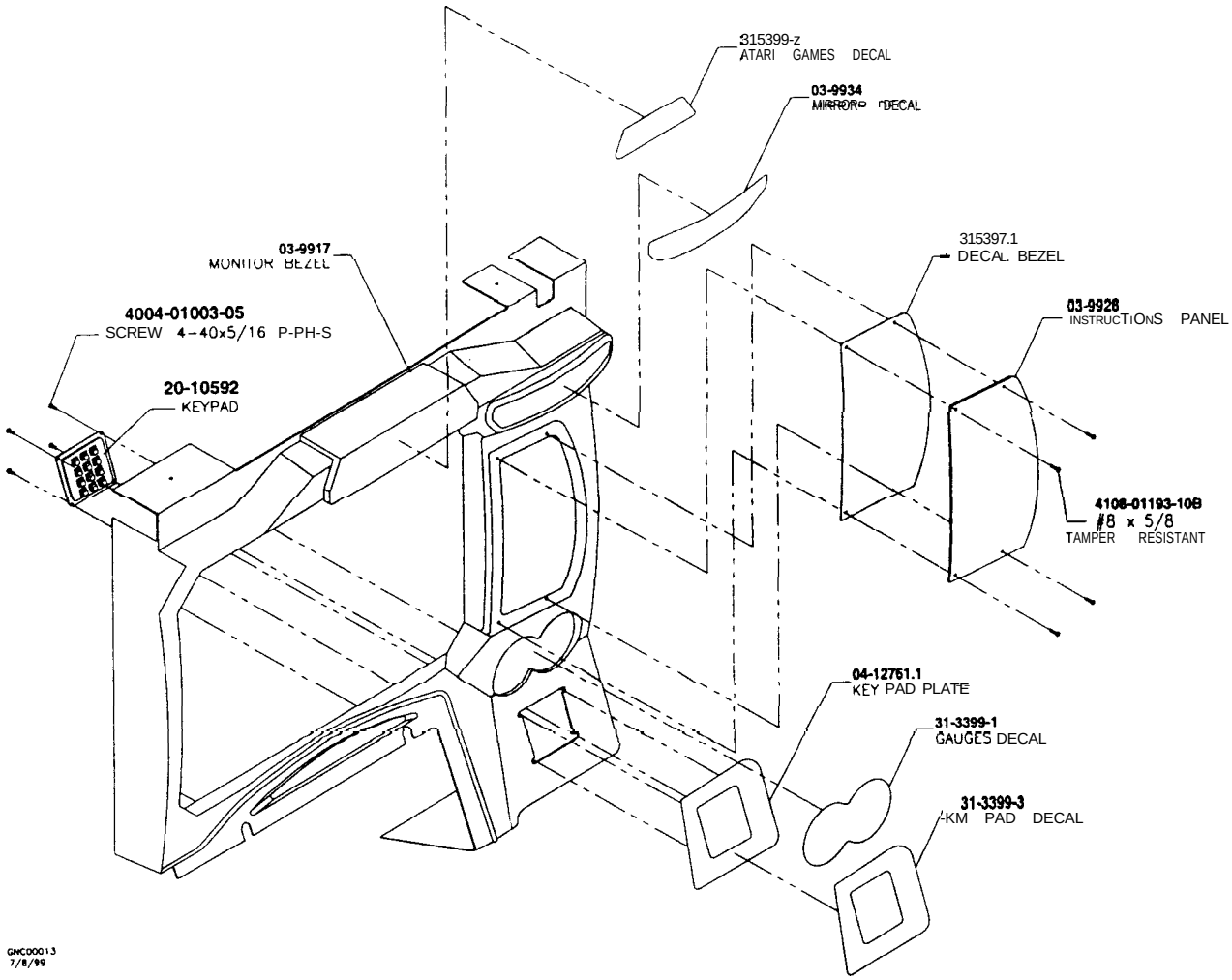
BOTTOM VIEW OF CABINET ASSEMBLY



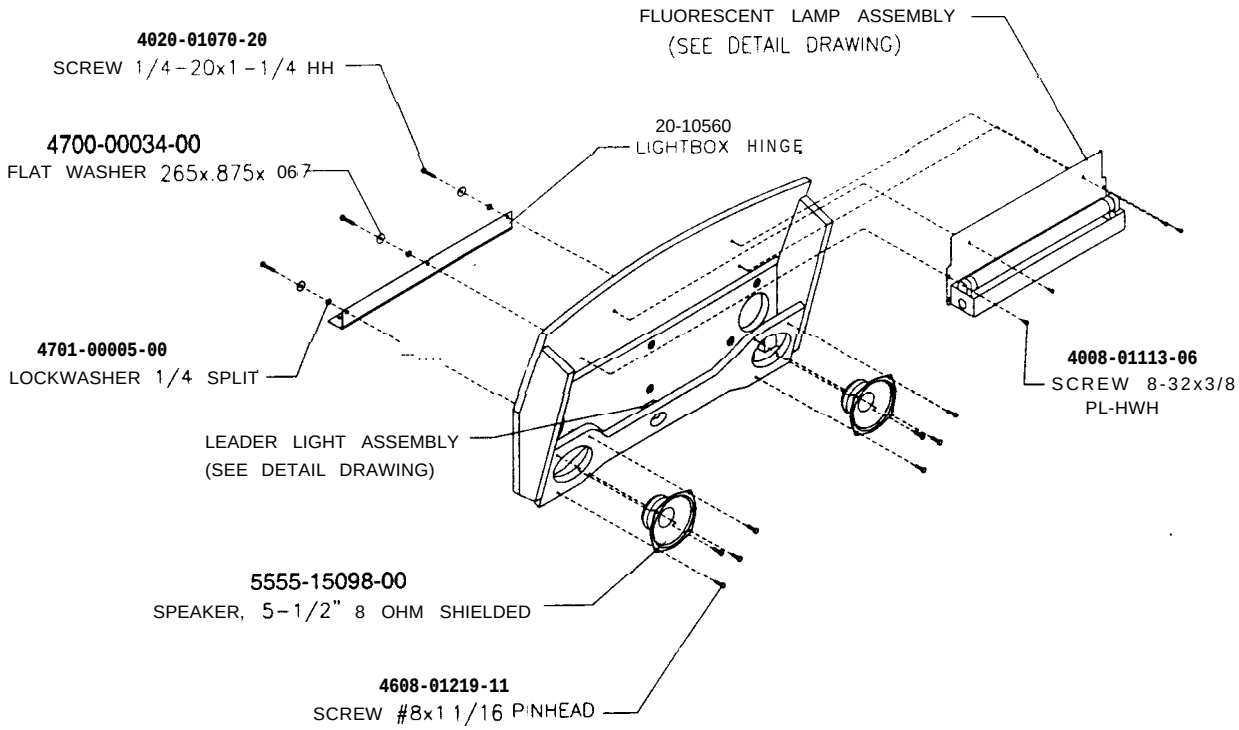
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7/8/99

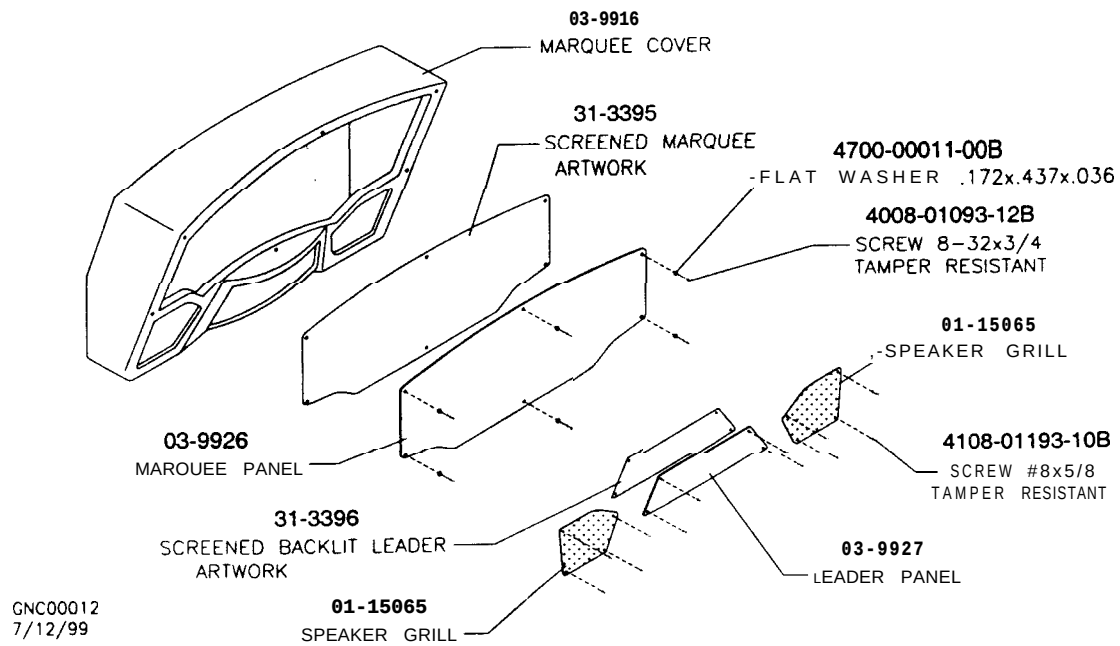
BOTTOM VIEW OF SEAT ASEMBLY

A-23191 MONITOR COVER ASSEMBLY
FRONT VIEW

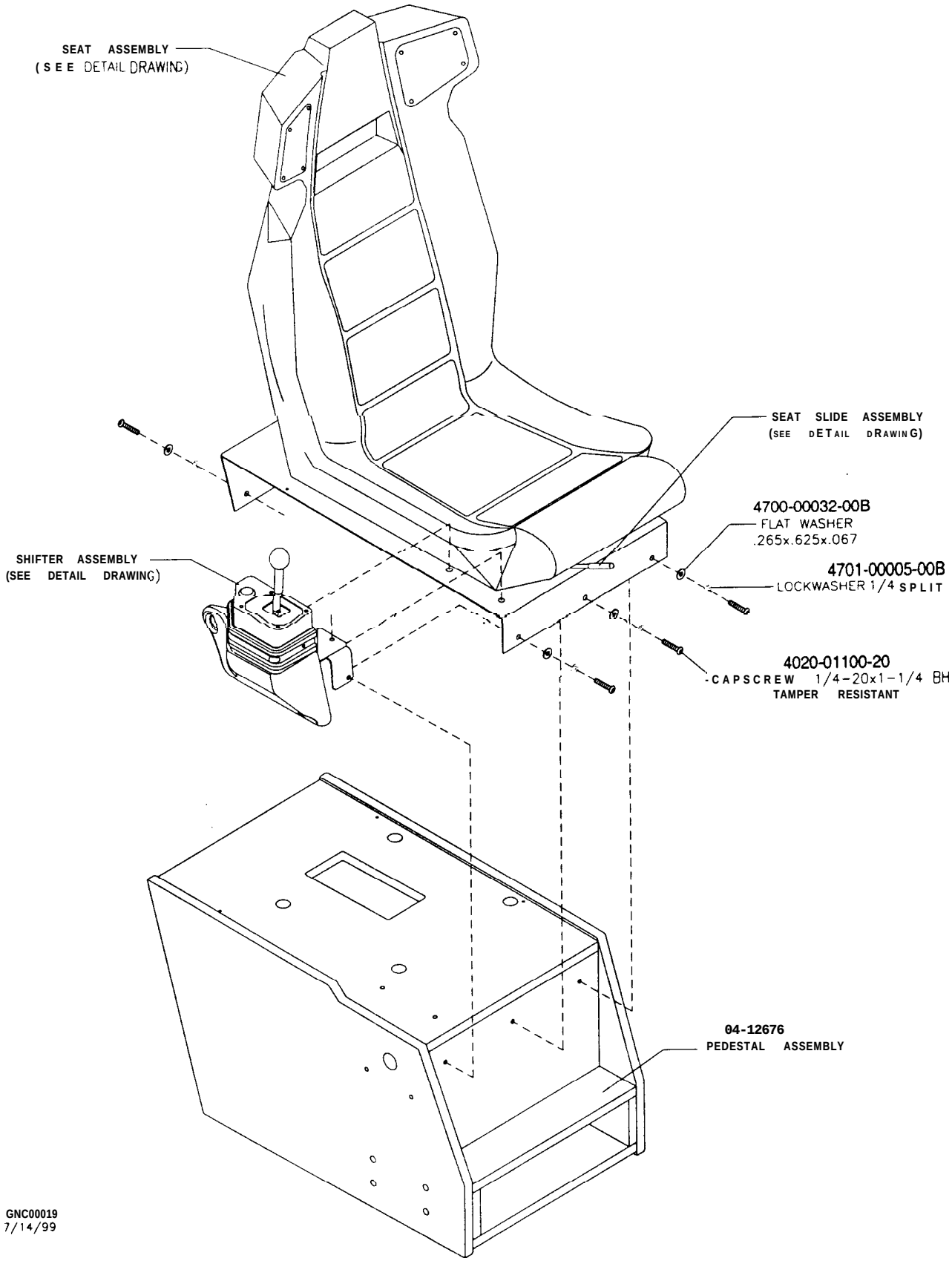


A-231 89 MARQUEE LIGHTBOX ASSEMBLY
FRONT VIEW



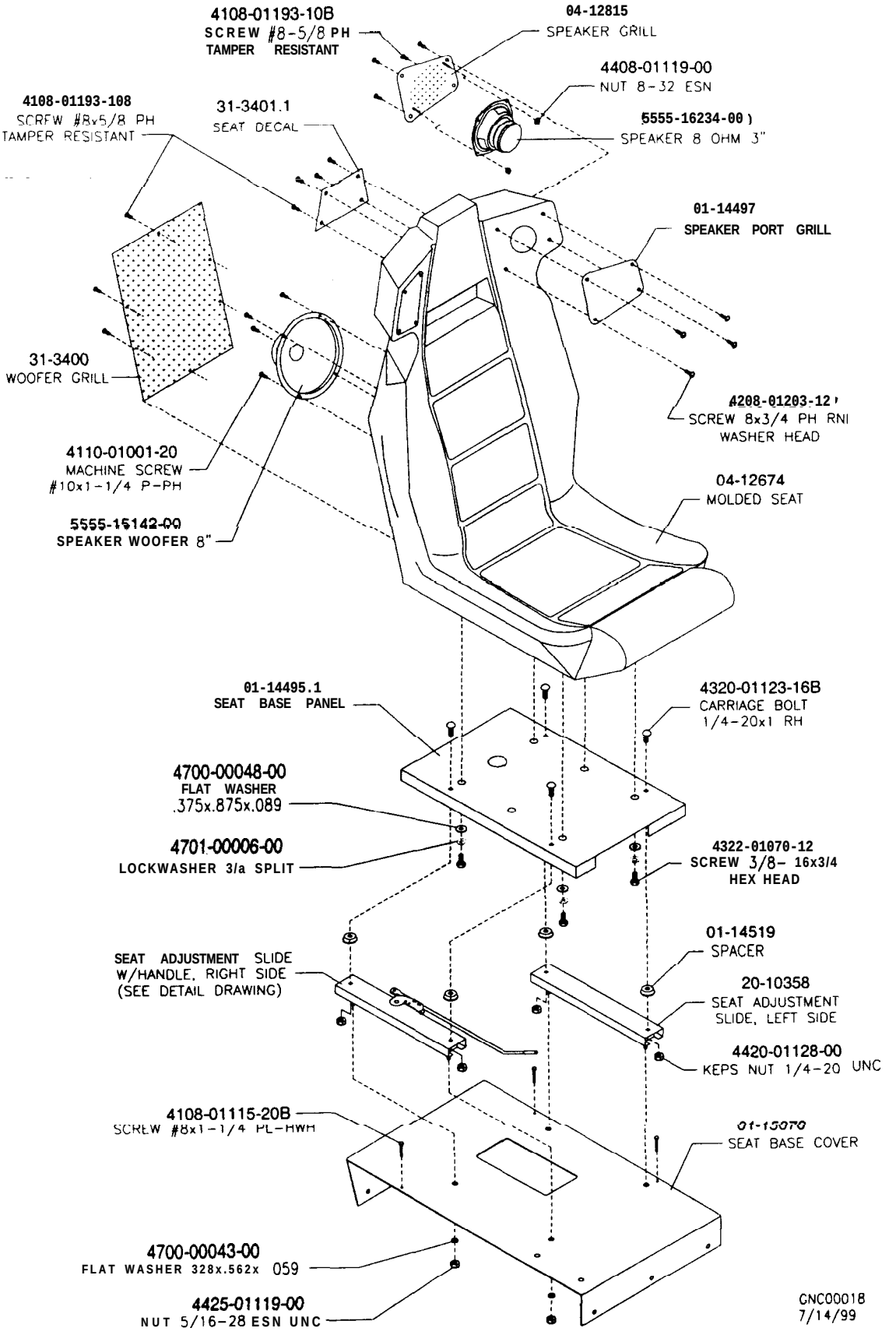


A-23199 SEAT PEDESTAL ASSEMBLY
FRONT VIEW

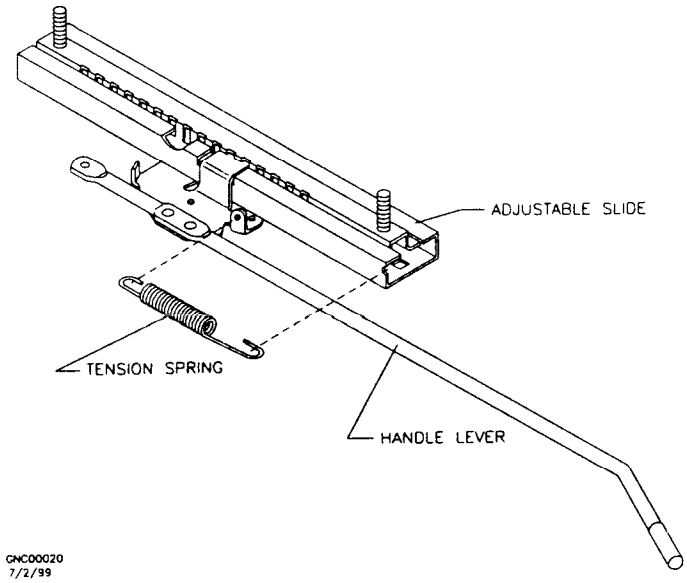


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7/14/99

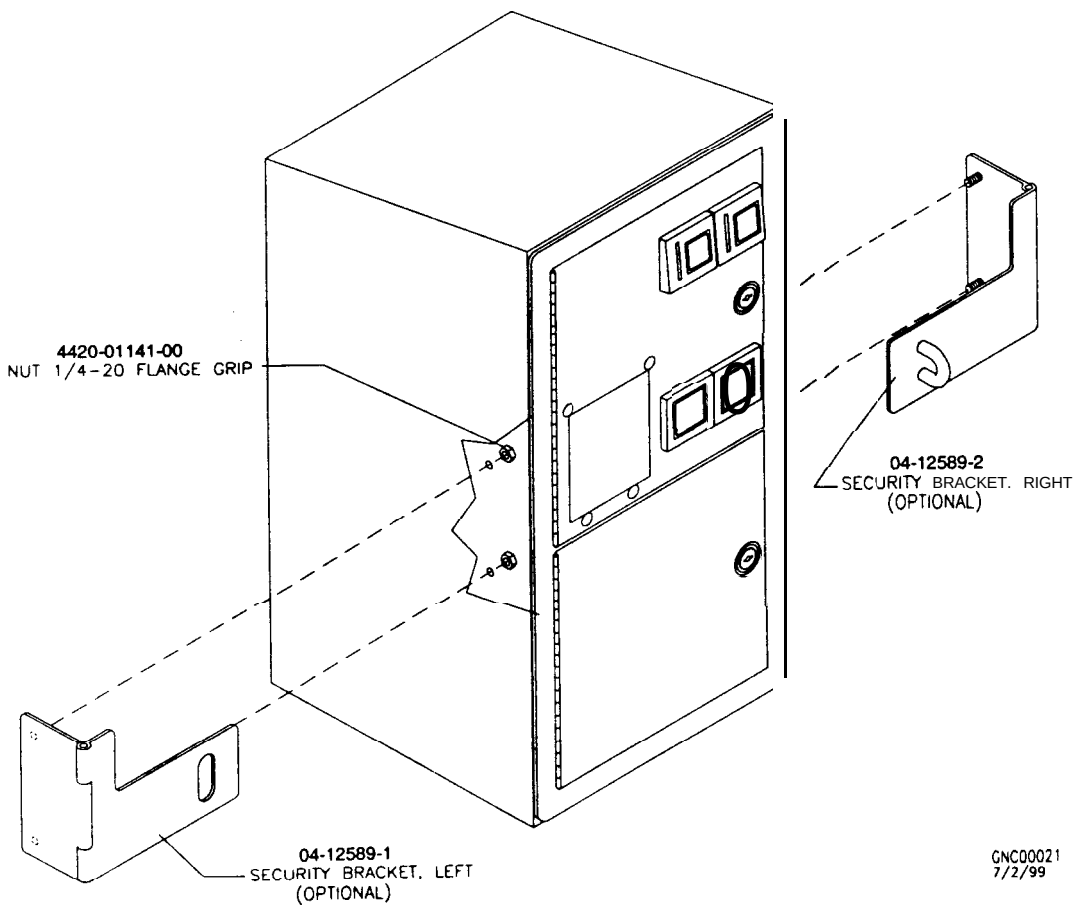
A-23200 SEAT ASSEMBLY
FRONT VIEW



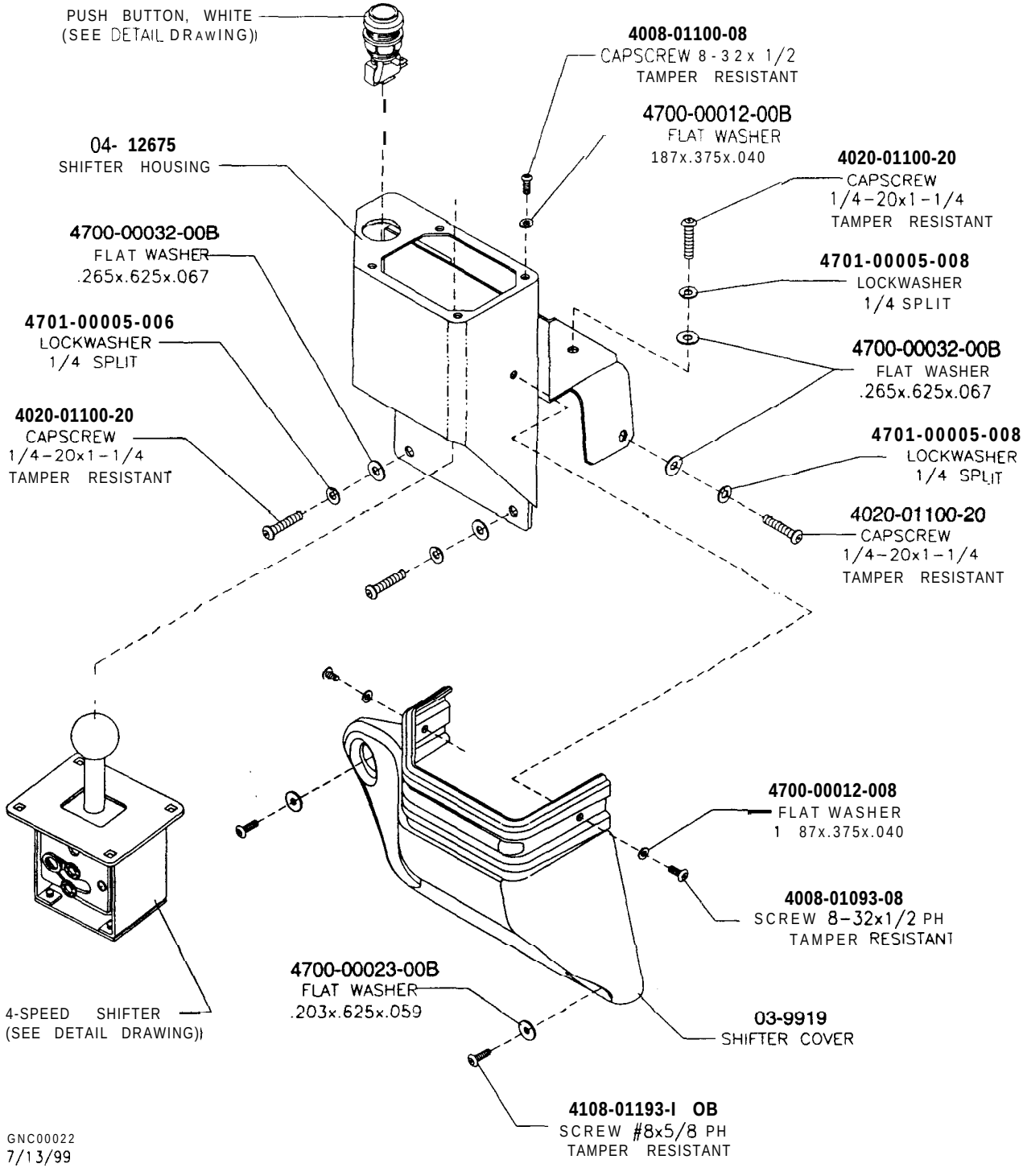
20-1 0357 SEAT ADJUSTER WITH HANDLE
FRONT VIEW



OPTIONAL COIN BOX SECURITY BRACKETS
FRONT VIEW

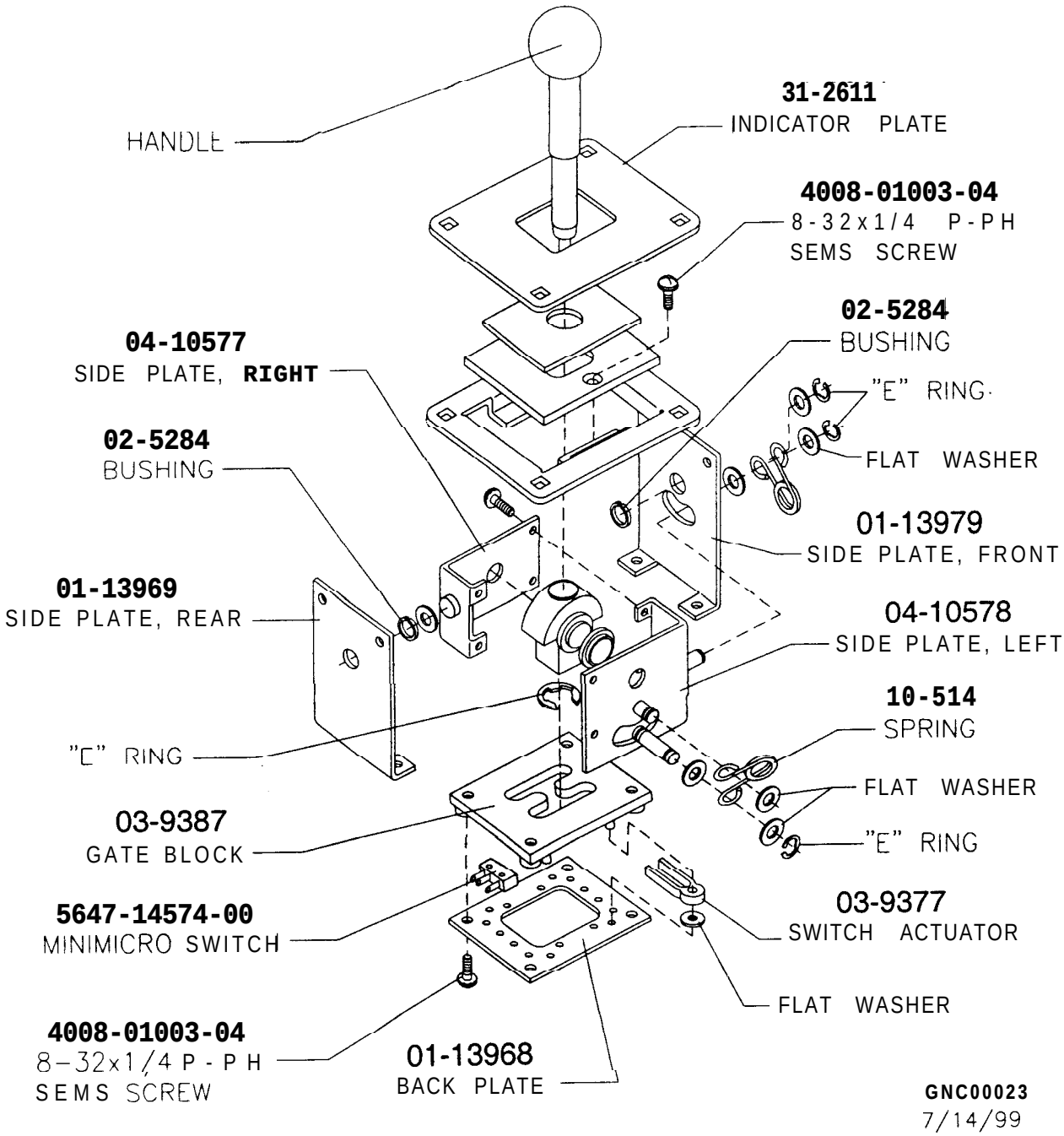


A-23202 SHIFTER ASSEMBLY
FRONT VIEW

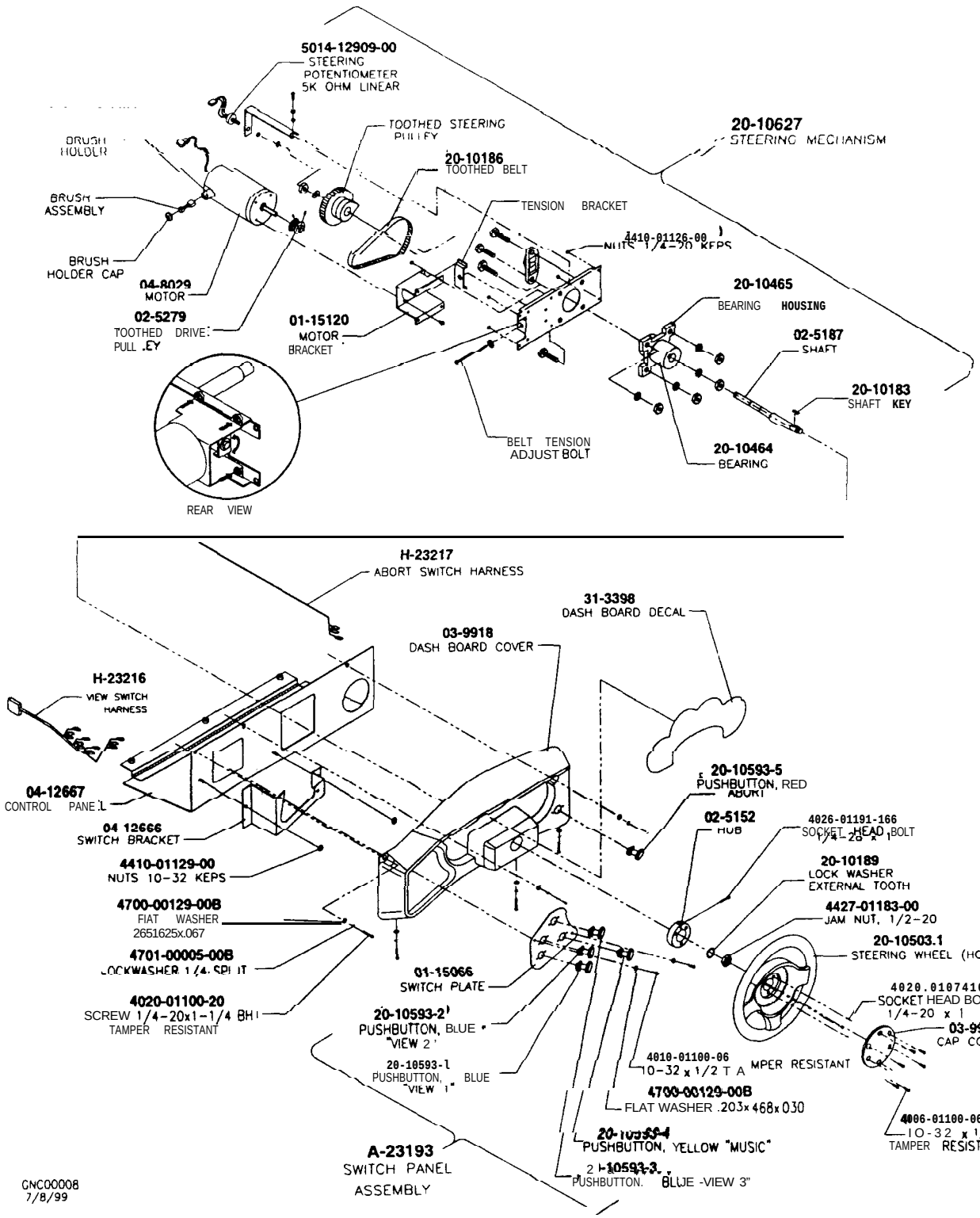


GNC00022
7/13/99

20-10369 4-SPEED SHIFTER
FRONT VIEW

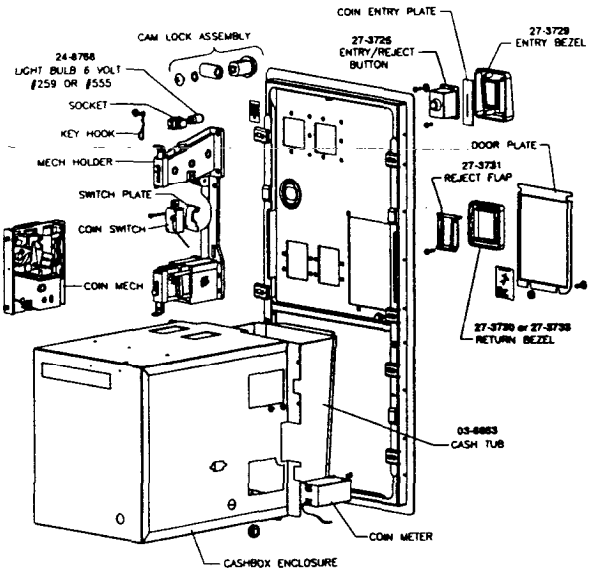


A-23192 DASH ASSEMBLY
FRONT VIEW

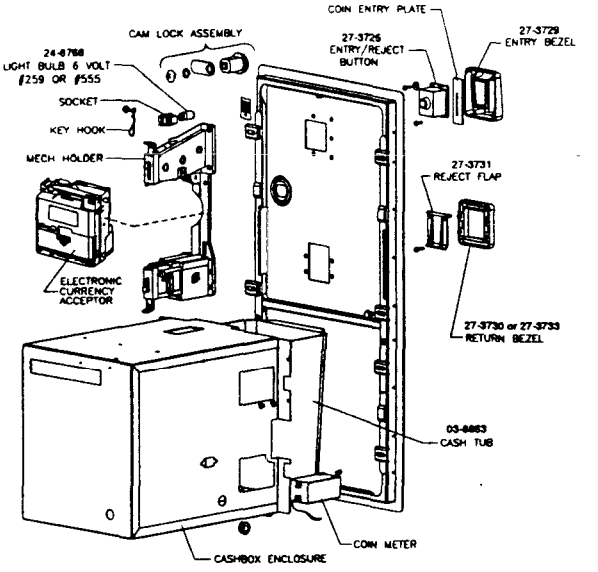


COIN DOOR ASSEMBLIES
(REFER TO APPLICATION CHART FOR PART NUMBERS

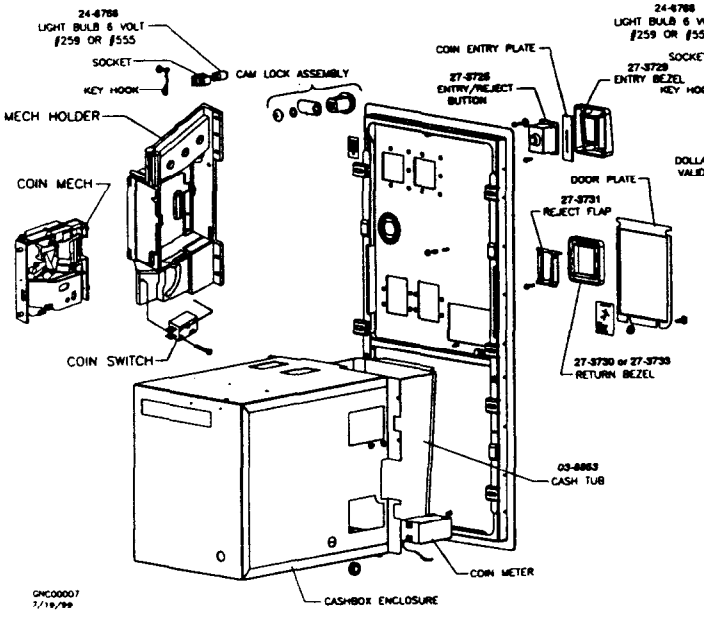
ELECTRO-MECHANICAL COIN DOOR ASSEMBLY



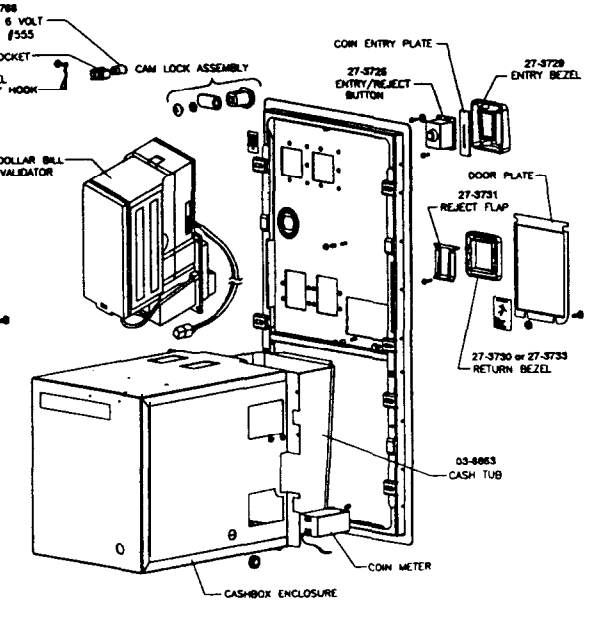
ELECTRONIC COIN DOOR ASSEMBLY



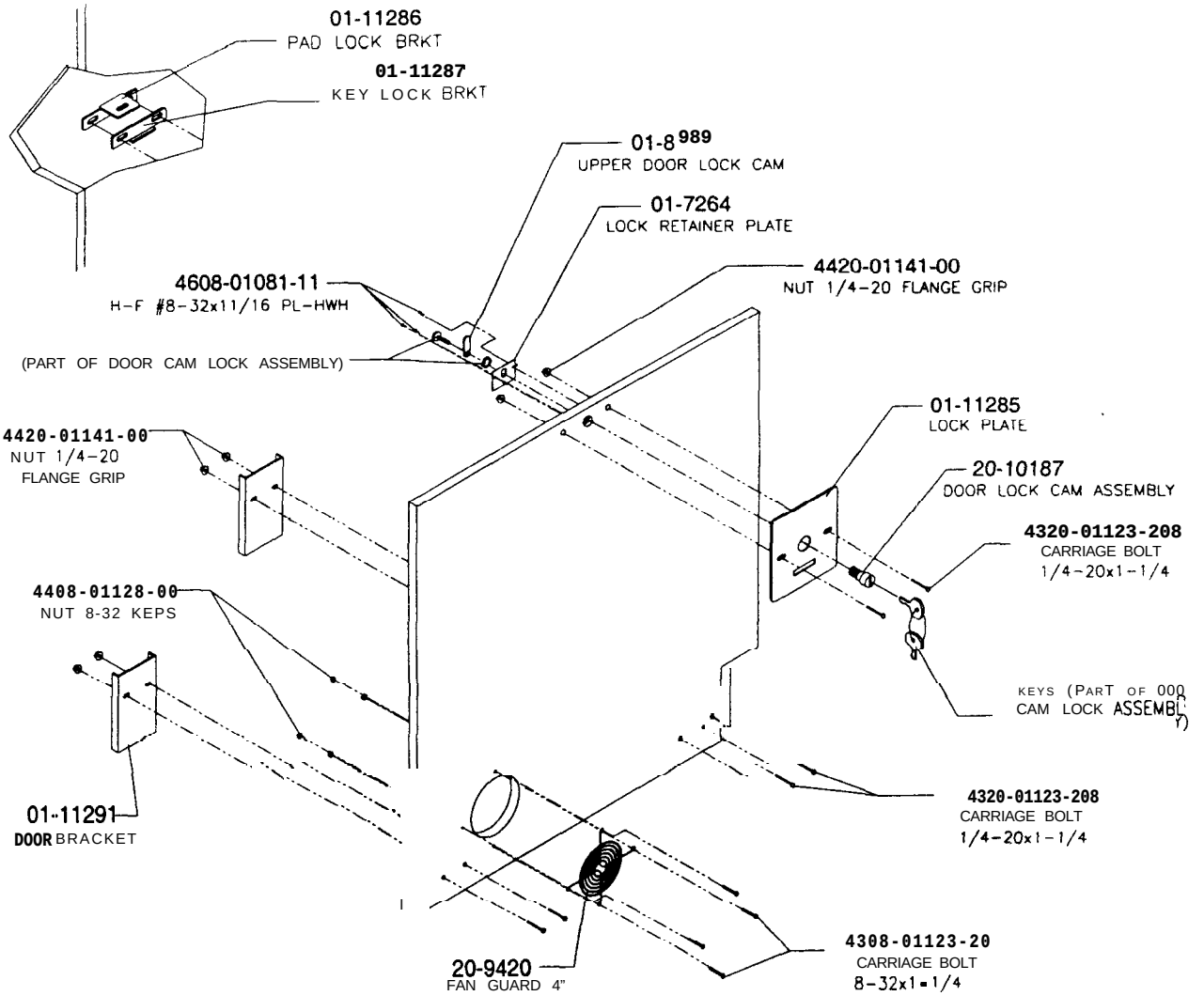
ALTERNATE ELECTRO-MECHANICAL ASSEMBLY



DOLLAR BIL **VALIDATOR** DOOR ASSEMBLY



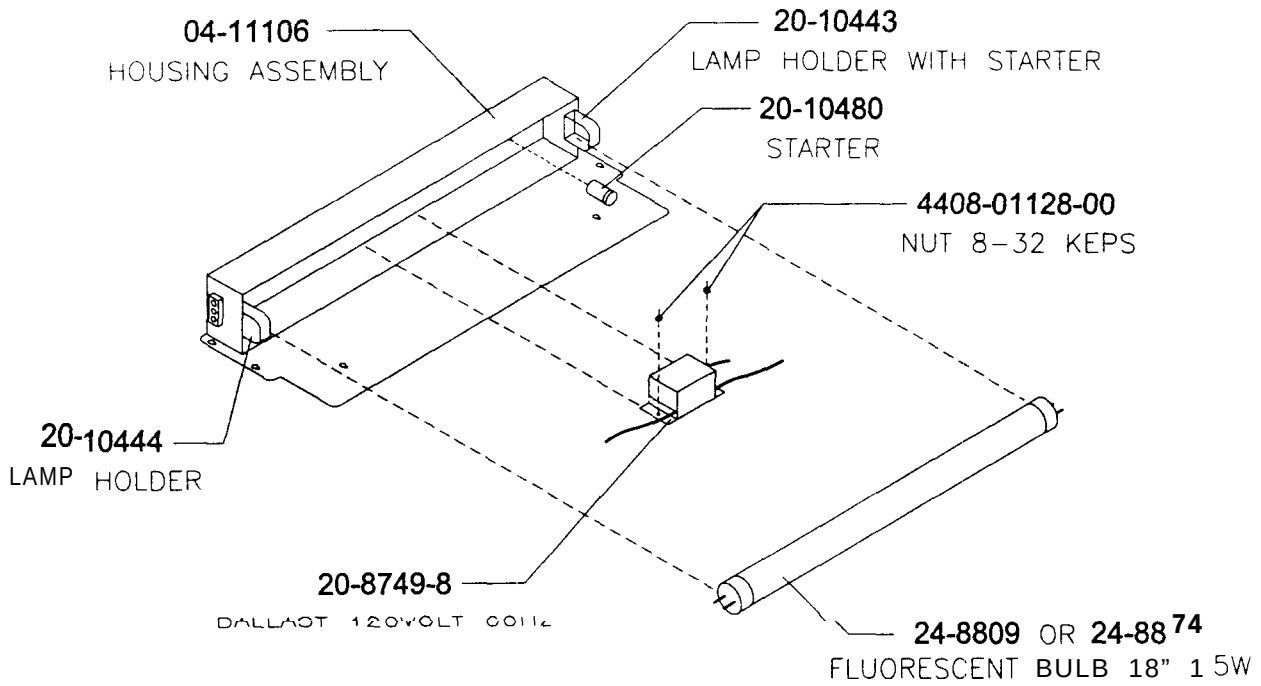
A-23196 REAR DOOR ASSEMBLY
REAR VIEW



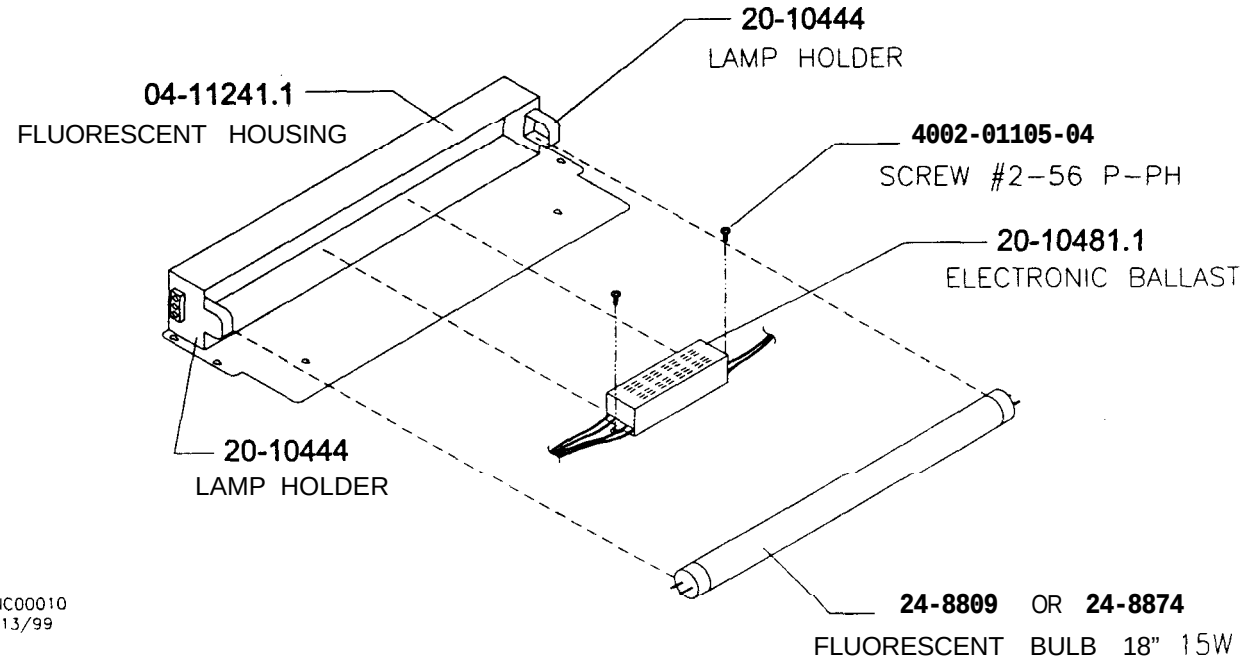
GNC00017
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FLUORESCENT LAMP ASSEMBLIES
FRONT VIEW

A-22365 FLUORESCENT LAMP ASSEMBLY (U.S./CANADA)



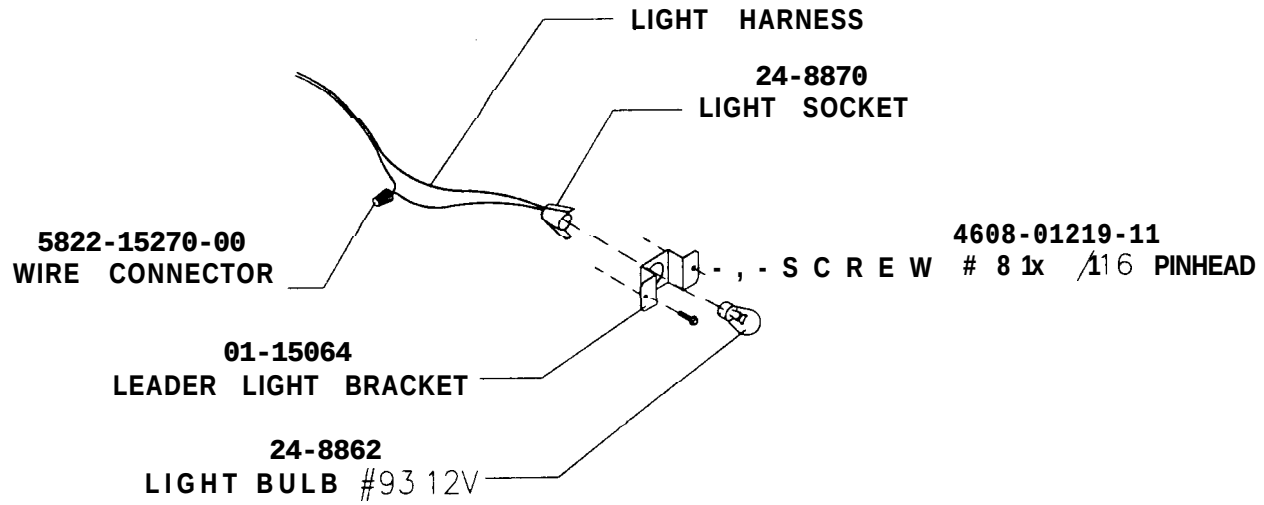
A-22506 FLUORESCENT LAMP ASSEMBLY (UNIVERSAL)



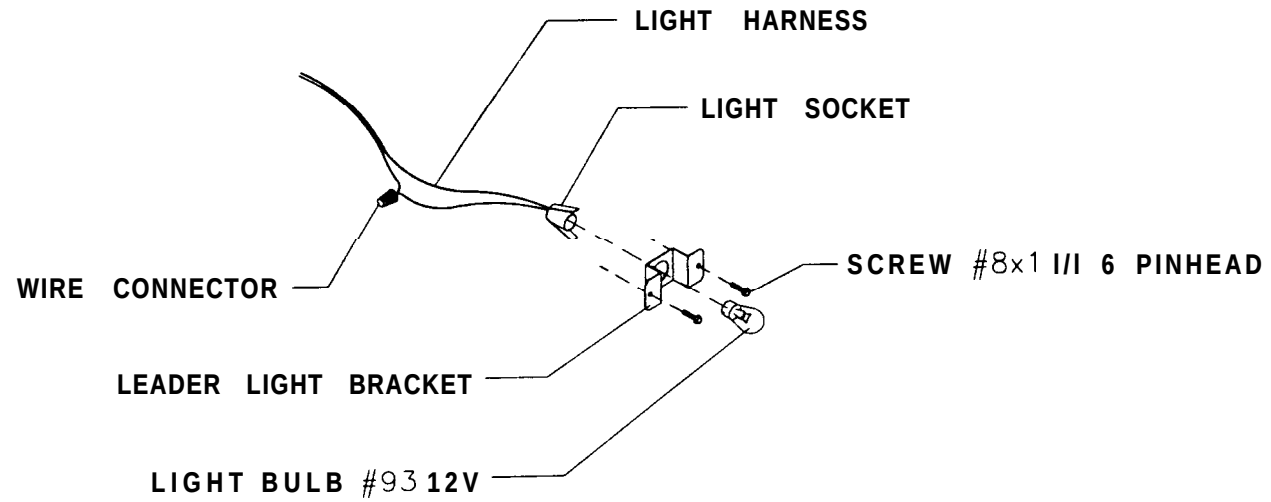
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7/13/99

INCANDESCENT LAMP ASSEMBLIES
FRONT VIEW

A-231 90
LEADER / INSTRUCTION LIGHT ASSEMBLY



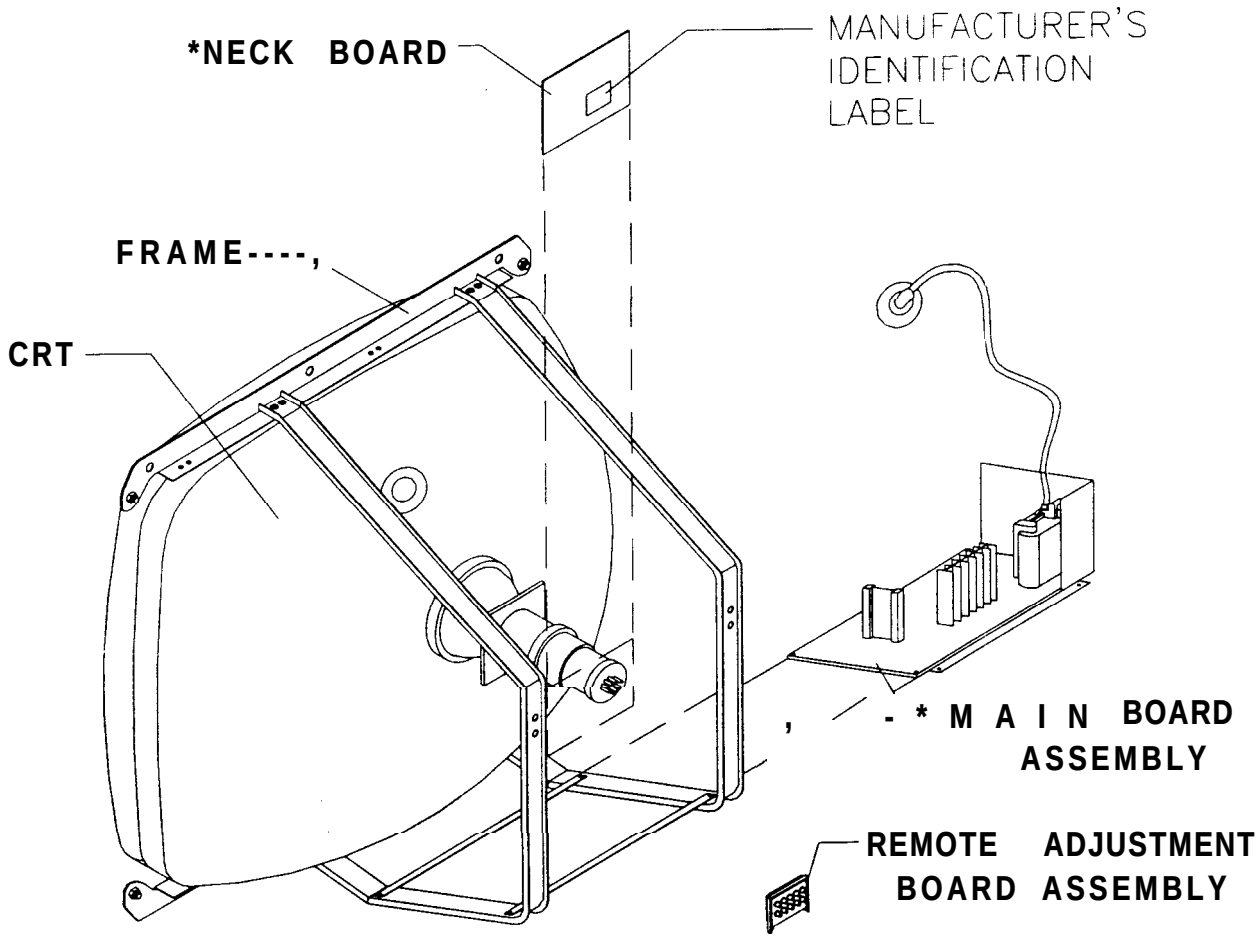
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7/19/99



GNCOOO 11
7/19/99

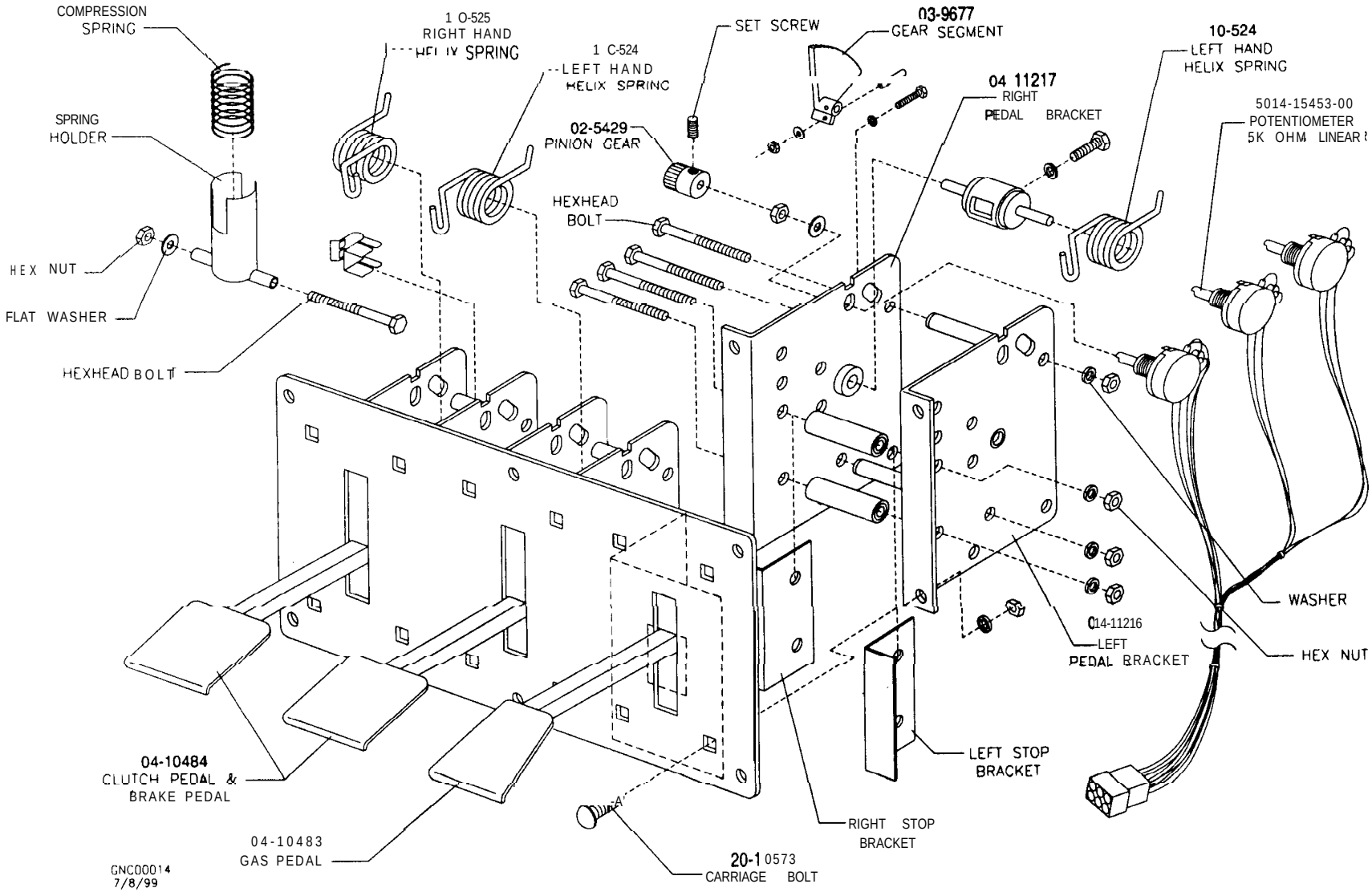
VIDEO MONITOR ASSEMBLY
REAR VIEW

5675-15968-00
VIDEO MONITOR
(NEOTECH **N T - 2 7 0 2)**



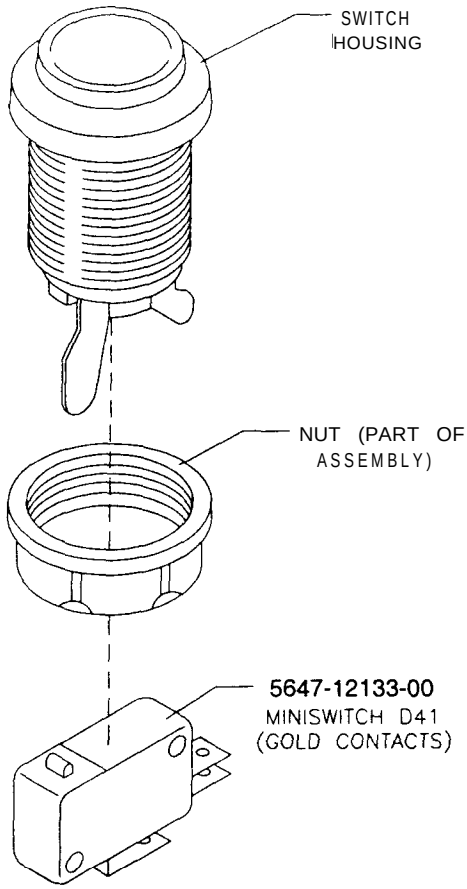
***THESE PARTS ARE AVAILABLE ONLY AS A SET — ORDER PART NO. 04-12785**

20-10356 3-PEDAL MECHANISM
FRONT VIEW

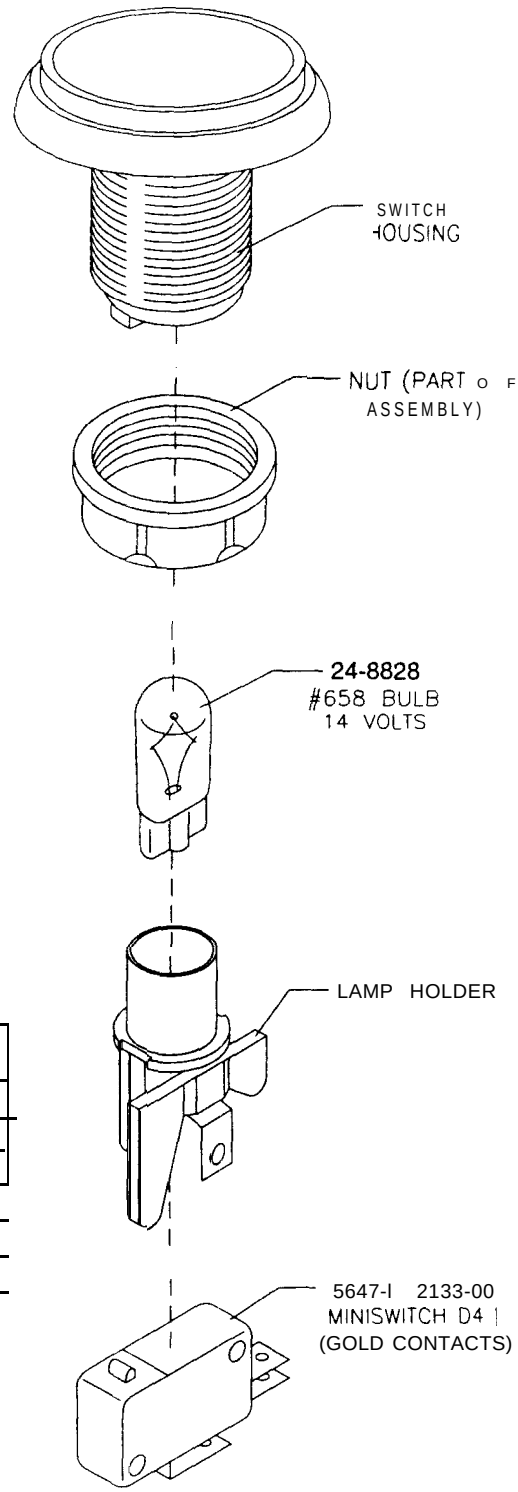


PUSHBUTTON ASSEMBLIES
(REFER TO APPLICATION CHART FOR PART NUMBERS

ROUND PUSHBUTTON
(REvERSE GEAR)



OVAL ILLUMINATED
(DASH BOARD)

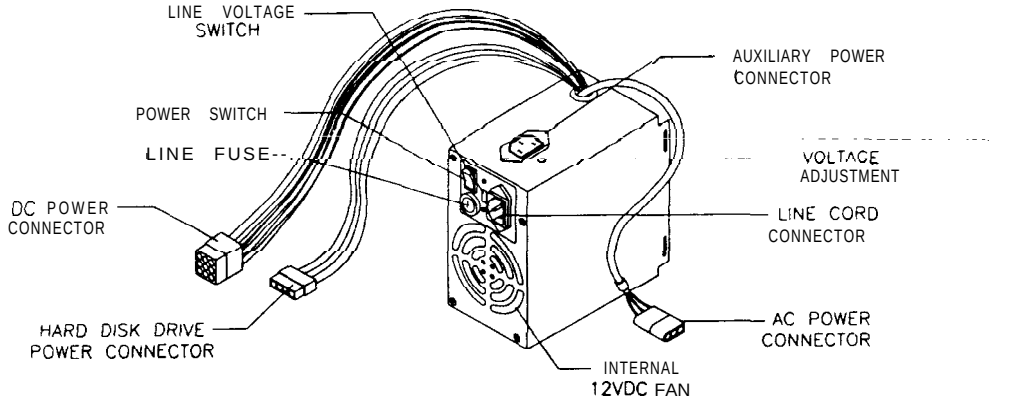


PART NUMBER	DESCRIPTION	COLOR	LEGEND
20-10208-2	ROUND PUSHBUTTON	WHITE	-
20-10593-I	OVAL ILLUMINATED PUSHBUTTON	BLUE	VIEW 1
20-10593-2	OVAL ILLUMINATED PUSHBUTTON	BLUE	VIEW 2
20-10593-3	OVAL ILLUMINATED PUSHBUTTON	BLUE	VIEW 3
20-10593-b	OVAL ILLUMINATED PUSHBUTTON	YELLOW	MUSIC
20-10593-5	OVAL ILLUMINATED PUSHBUTTON	RED	ABORT

GNC00015
7/7/99

POWER SUPPLY COMPONENTS
FRONT VIEW

SWITCHING POWER SUPPLY



A.C. AUXILIARY POWER CONNECTOR

PINS	FUNCTION	COLOR
1	LINE	BLACK
2	GROUND	GREEN
3	NEUTRAL	WHITE

D.C. MAIN POWER CONNECTOR

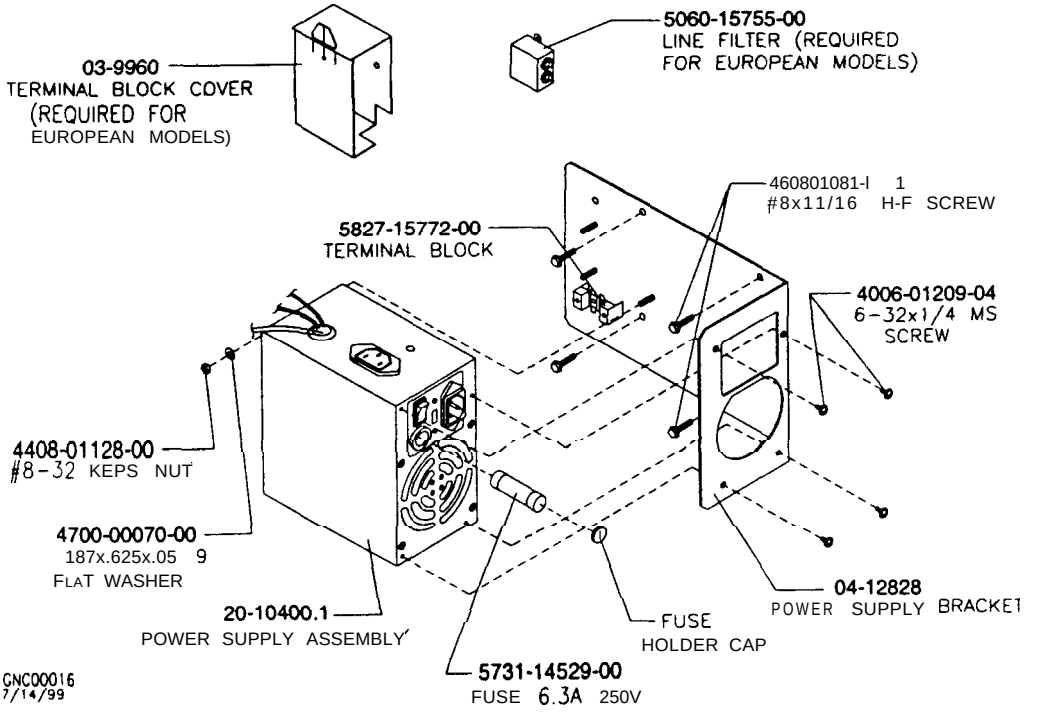
PINS	FUNCTION	COLOR
1,2,3	+5 V D C	RED
4,5,6	RETURN	BLACK
7	-5 VDC	BLUE
8	+12 VDC	YELLOW
9	-12 VDC	WHITE

HARD DISK DRIVE POWER CONNECTOR

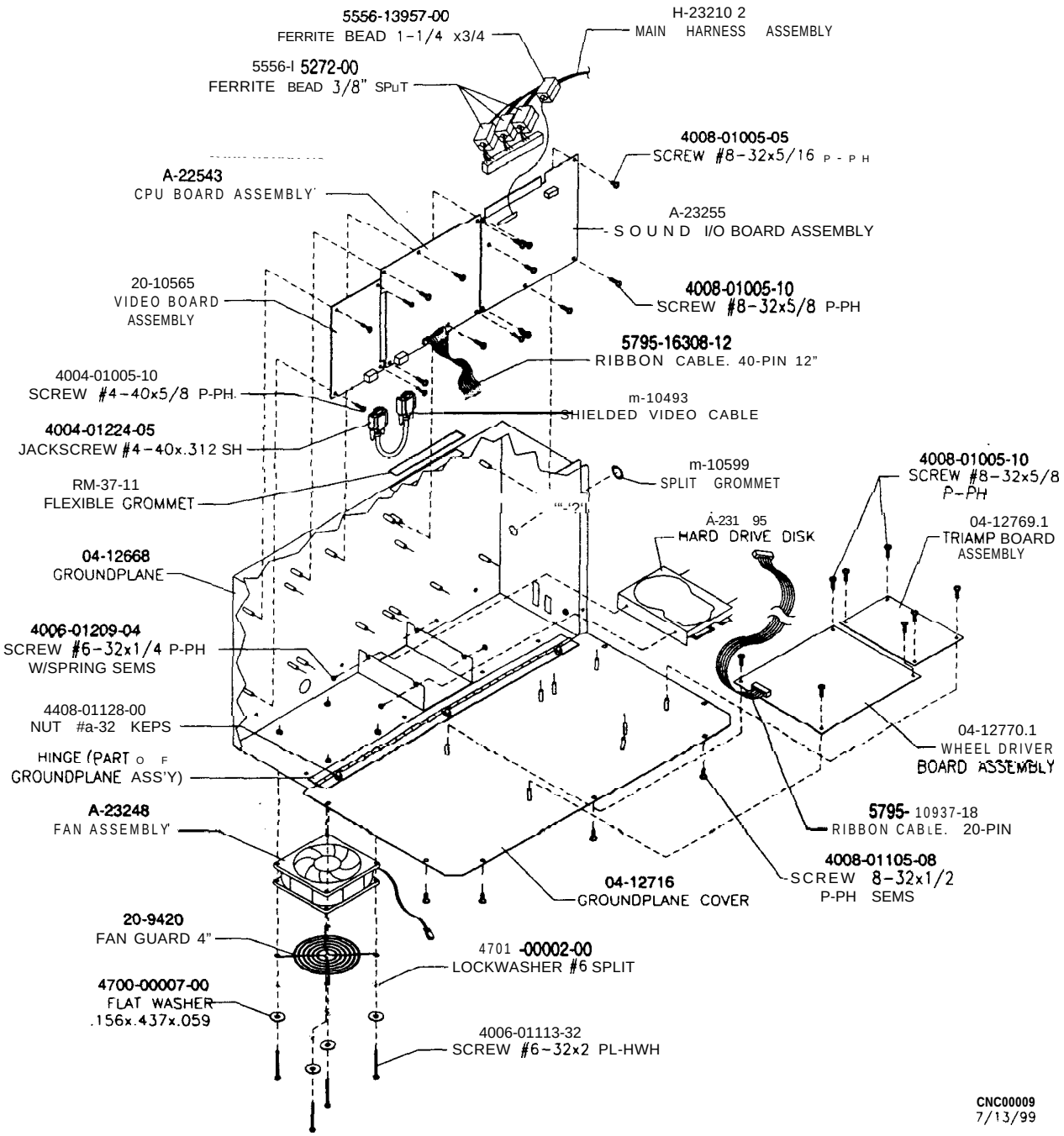
PINS	FUNCTION	COLOR
1	+5 VDC	RED
2,3	RETURN	BLACK
4	+12 VDC	YELLOW

NOTE: Many computer grade power supplies use alternate wire colors. This is acceptable as long as the pinout is correct.

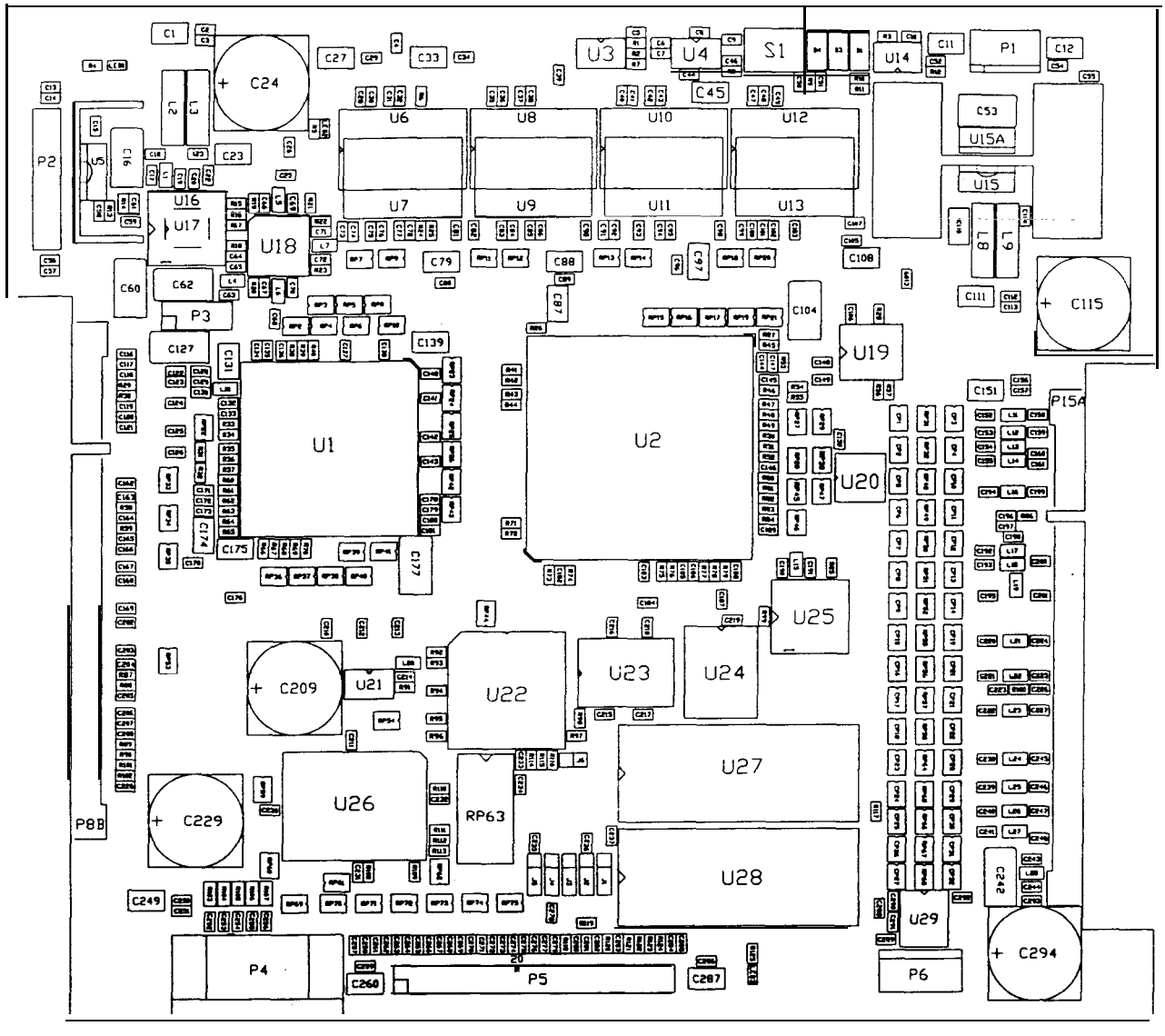
POWER SUPPLY ASSEMBLY



A-23194 ELECTRONICS ASSEMBLY
FRONT VIEW



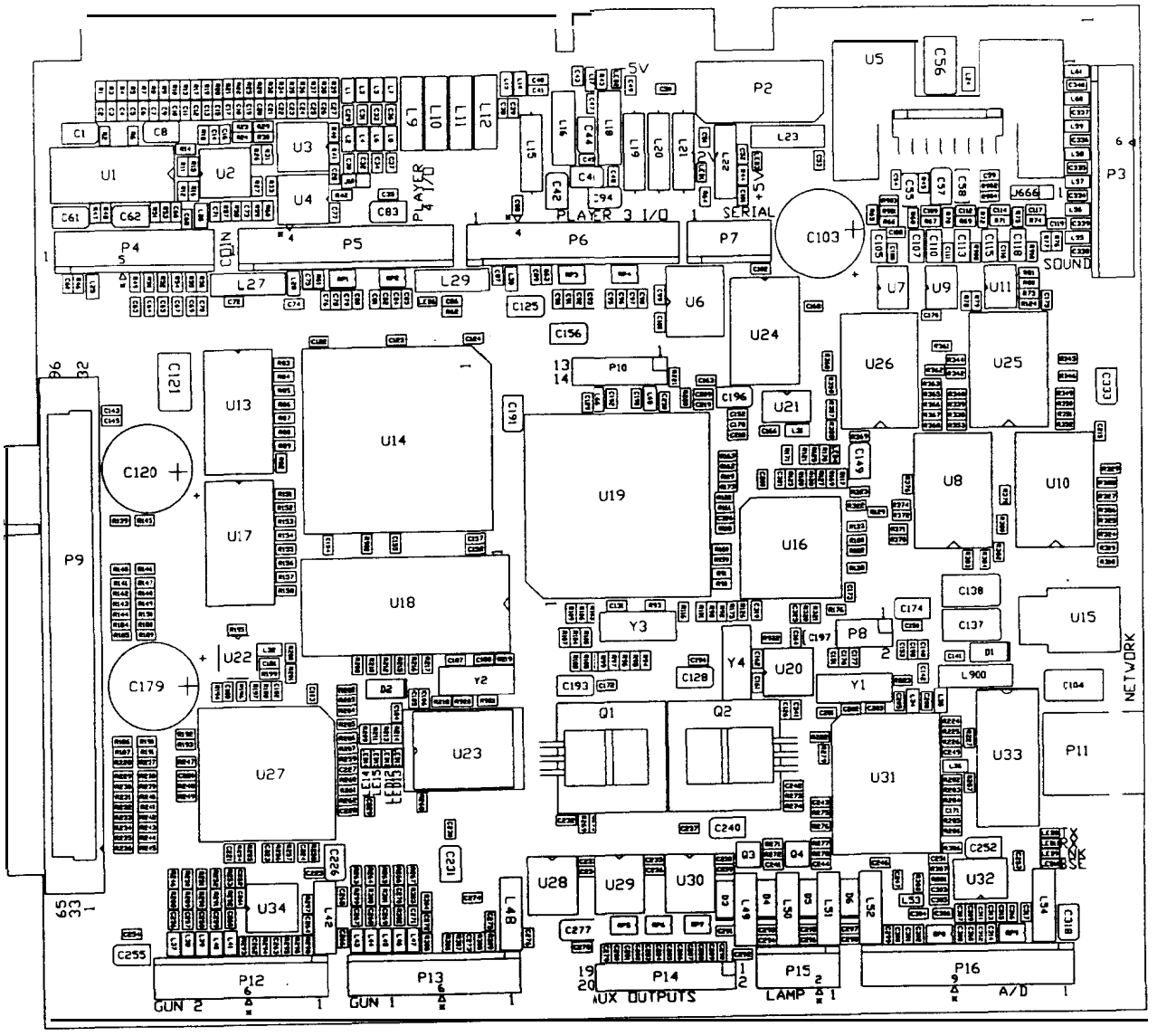
A-22543 CPU BOARD ASSEMBLY



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
u5	5250-I 6015-00	+2V Regulator	Voltage Regulator 2.5VDC
U15	5460-I 5671-00	+3V Regulator	Voltage Regulator 3.3 VDC
U19	A-2331 5	Bus Controller Configuration	Programmed Logic Device
u22	A-2291 2	CPU Configuration	Programmed Logic Device
U27	A-5343-30036-1	CPU Boot ROM	EPROM Assembly
U28	--	CPU Expansion ROM	EPROM Assembly (empty)

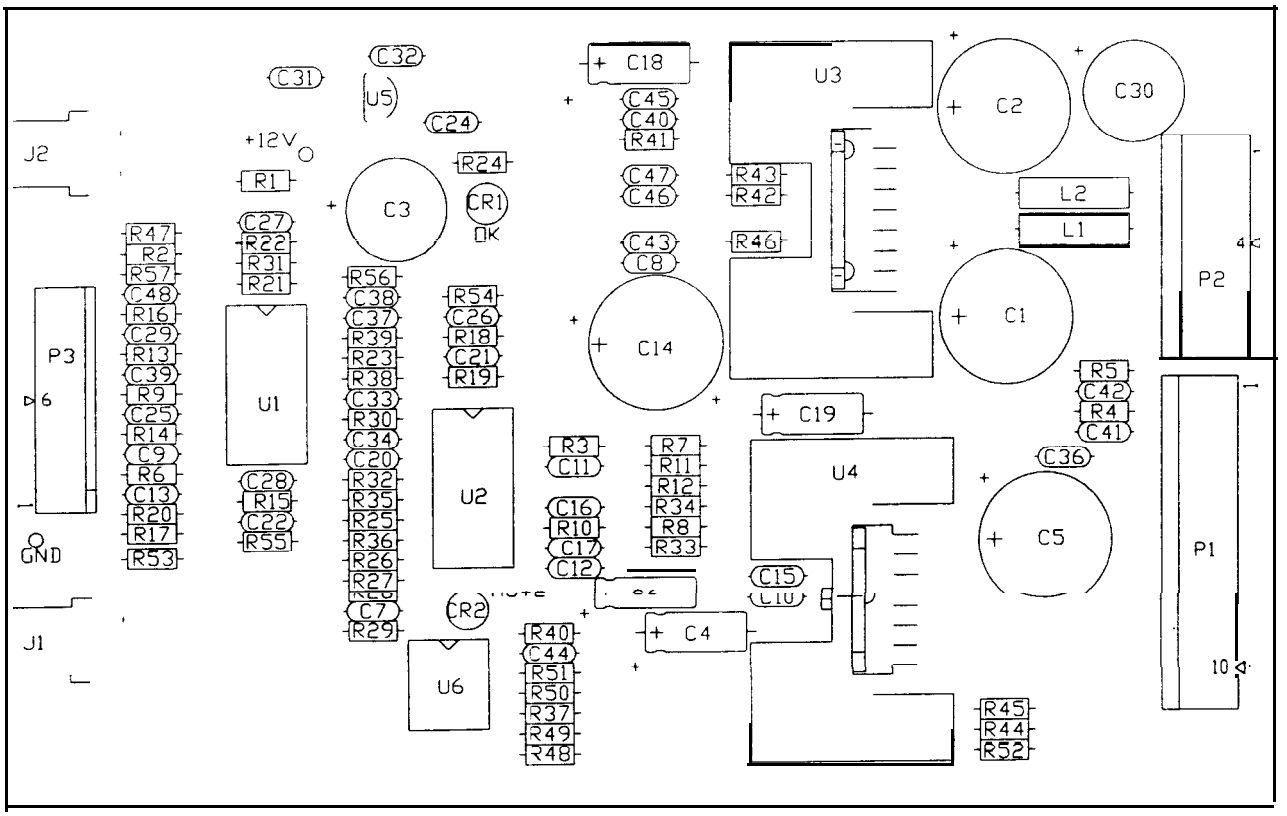
A-23255 SOUND I/O BOARD ASSEMBLY



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
Q1, Q2	5162-15259-00	NPN Transistor	TIP-120
U5	5370-15833-00	Audio Output Amplifier	TDA7375
U18	A-23073	PIC Assembly	EPROM Assembly
U23	5880-15774-00	Memory Backup	3V Lithium Battery

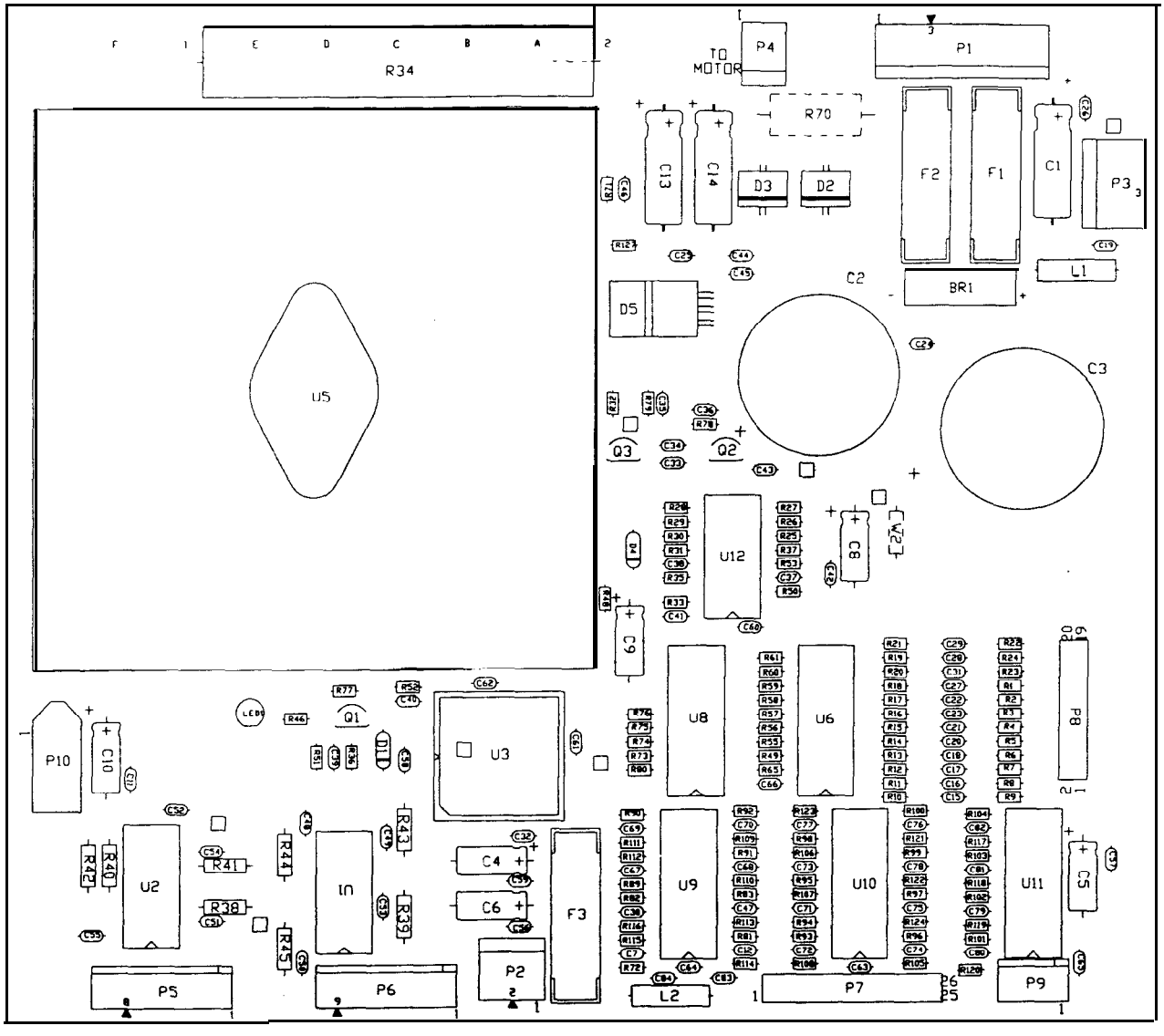
04-12769.1 TRIAMP BOARD ASSEMBLY



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
U1, u2	5370- 15163-00	Audio Amplifier	LM3403
u3	5370-I 5984-00	Audio Output Amplifier	TDA1560Q
u4	5370-I 5833-00	Audio Output Amplifier	TDA7375
u5	5250-I 3302-00	Voltage Regulator	LM78L05A
U6	5370-I 6254-00	Comparator	LM393N

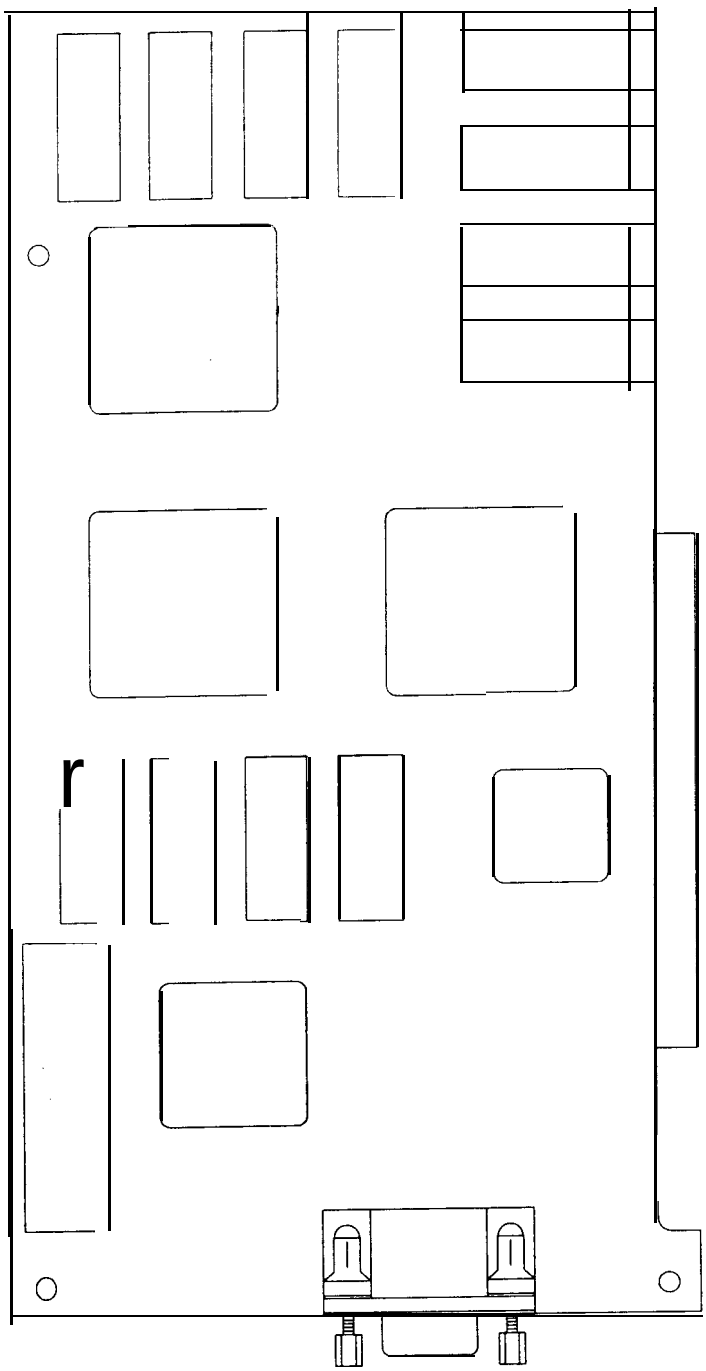
04-12769.1 WHEEL DRIVER BOARD ASSEMBLY



Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
BR1	5100-I 3945-01	Bridge Rectifier	4oov 6A SIP
D2, D3	5070-I 4526-00	Power Diode	MR751 400V 6A
F1, F2	5731-I 4094-00	Slow Blow Fuse	4A 125V 5x20mm
F3	5731-I 5627-00	Fast Blow Fuse	0.63A 250V 5x20mm
Q1	5162-08976-00	Darlington Transistor	2N6427 NPN
Q2	5250- 15624-00	+15V Regulator	LM78L15
Q3	5250-I 5625-00	-15V Regulator	LM79L15
Q4	----------	None	Not Used
U1, u2	5370-I 2602-00	Amplifier	ULN2064B
u5	5370-I 4069-00	Power Amplifier	LM12CLK

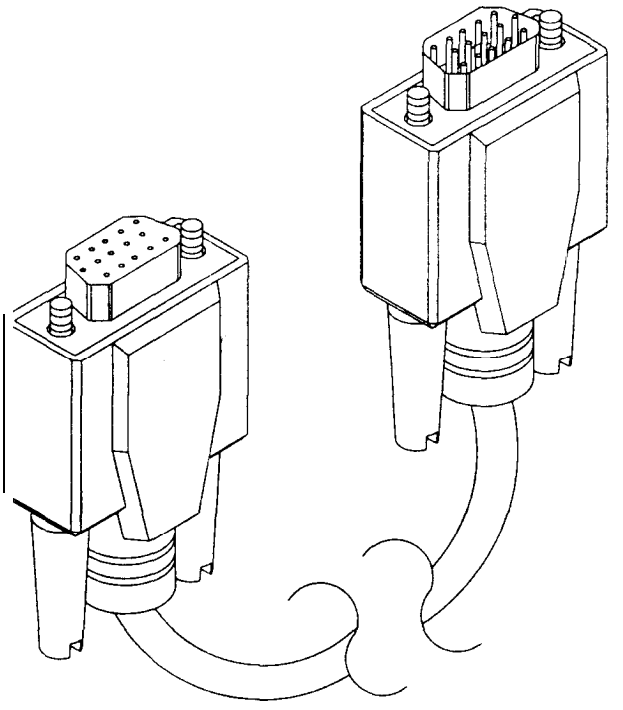
2040565 VIDEO CARD ASSEMBLY



Field Replaceable Parts

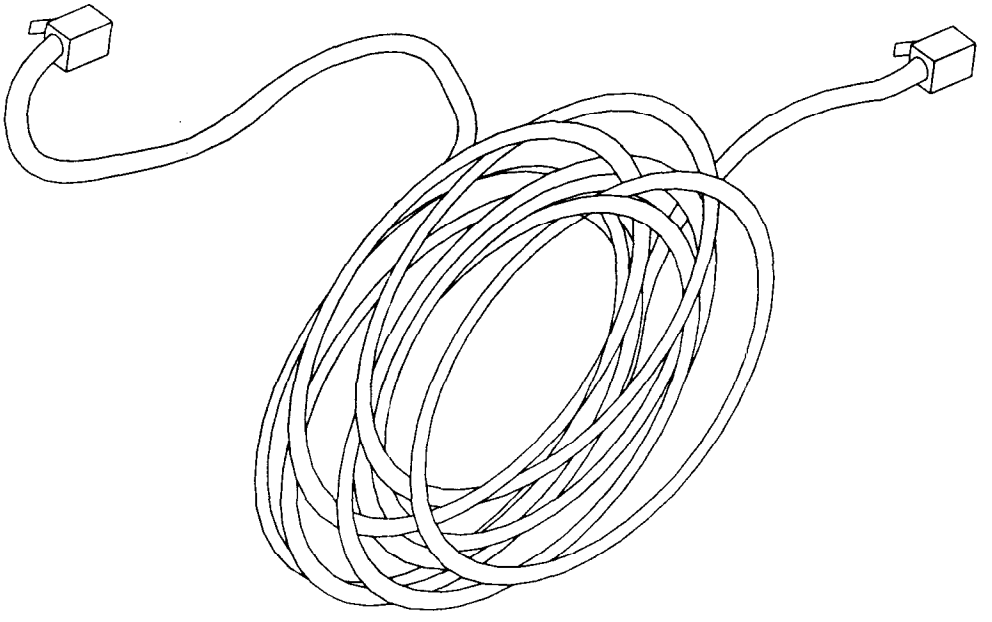
No field replaceable parts have been identified

Electronic Cable Assemblies



VIDEO COMMUNICATIONS CABLE (SHIELDED DB-15F TO DB-15M)

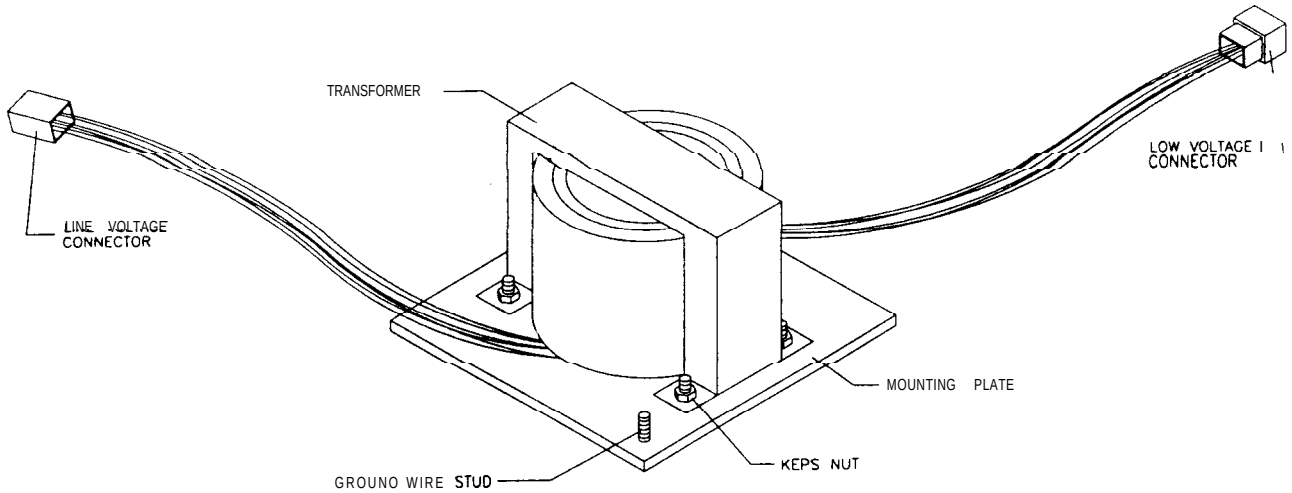
20-1 0493



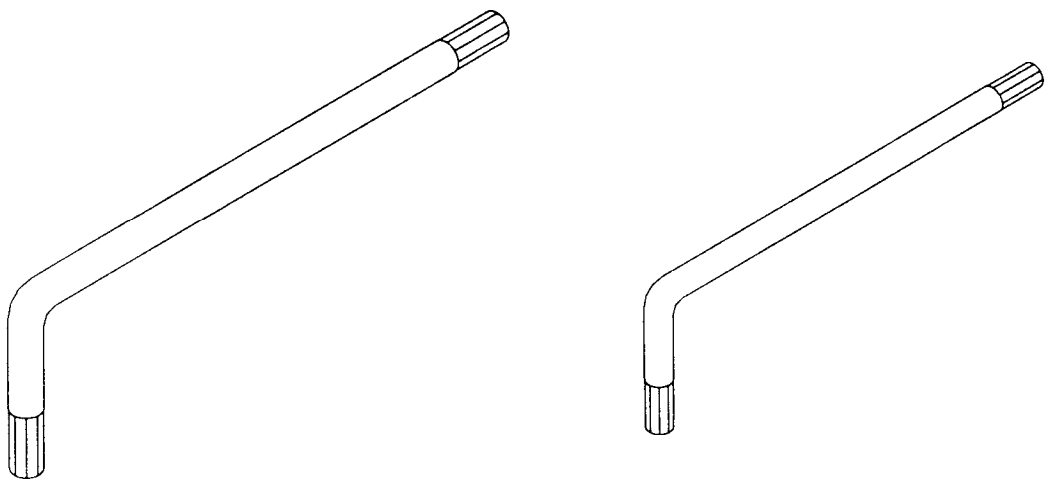
LINKING CABLE (UNSHIELDED TWISTED PAIR CATEGORY 5)

5797-I 5276-00

TRANSFORMER ASSEMBLY
(SEE APPLICATION TABLE FOR PART NUMBER



TAMPER RESISTANT WRENCHES
(REFER TO OTHER PARTS NECESSARY)



Other Parts Necessary

Protection	
Fuse, 1 A, 250V, FB, ¼ x 1%	5730-I 5278-00
Fuse, 2A, 250V, SB, ¼ x 1%	5731-08665-00
Fuse, 4A, 250V, SB, ¼ x 1%	5731-06314-00
Fuse, 0.63A, 250V, FB, 5 x 20 mm	573 1 ▪ 15627-00
Fuse, 4A, 250V, SB, 5 x 20 mm	5731-I 4094-00
Fuse, T6.3A, 250V, 5 x 20 mm	5731-I 4529-00
Bulb, #93, 12V, Incandescent	24-8862
Bulb, #161, 14V, Incandescent	24-8840

Cables	
AC Line Harness	H-22399
AC Power Harness	H-2321 1.1
Line Filter Harness	H-22393
Shifter Harness	H-2321 5
Sound Harness	H-23249
Circuit Board Harness	H-23230
Speaker and Light Harness	H-2321 2
Pedestal Harness	H-23213.1
Seat Speaker Harness	H-2321 4.1
Ground Braid	H-21 672
Main Wiring Harness	H-23210.1
View Switch Harness	H-2321 6
Abort Switch Harness	H-2321 7
Fluorescent Lamp Cable	H-21 492

Documents	
Video Product Safety Manual	16-I 0968
Game Information Card	16-I 0650
Game Manual	16-30036-I 01

Other Items	
T-20 Tamper-Resistant Wrench	20-9620
T-27 Tamper-Resistant Wrench	20-I 0140
Crossover Coupler	5796-I 5262-00

LINE CORD APPLICATION TABLE

Part Number / Country	5850-15521-00	5850-15521-01	5850-15521-02	5850-15521-03	5850-15521-04	5850-15521-05	5850-15521-06
Australia						■	
Austria			■				
Belgium			■				
Canada		■					
Denmark			■				
Finland			■				
France			■				
Germany			■				
Holland			■				
Hungary			■				
Italy	■						
Japan							■
New Zealand						■	
Norway			■				
Spain			■				
Switzerland					■		
UK				■			
USA		■					

TRANSFORMER APPLICATION & COIN DOOR APPLICATION TABLES

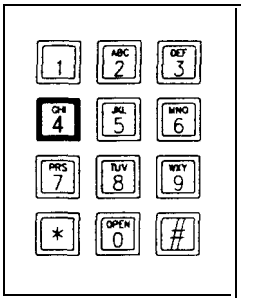
Part Number / Country	5610-14927-00	5610-15275-00	5610-14926-01		Part Number / Country	09-96026-33	09-96026-15	09-96027 (SEE NOTE)
Belgium			■		Belgium			■
Canada	■				Canada	■		
France			■		France			■
Germany			■		Germany			■
Holland			■		Holland			■
Italy			■		Italy			■
Japan		■			Japan		■	
Spain			■		Spain			■
Switzerland			■		Switzerland			■
UK			■		UK			■
USA	■				USA	■		

NOTE: These coin doors are used with 09-77000 Electronic Coin Acceptors. This device must be programmed for the desired type of currency. Contact your authorized distributor for assistance in programming the acceptor.

NOTES

SAN FRANCISCO

RUSH 2049’”



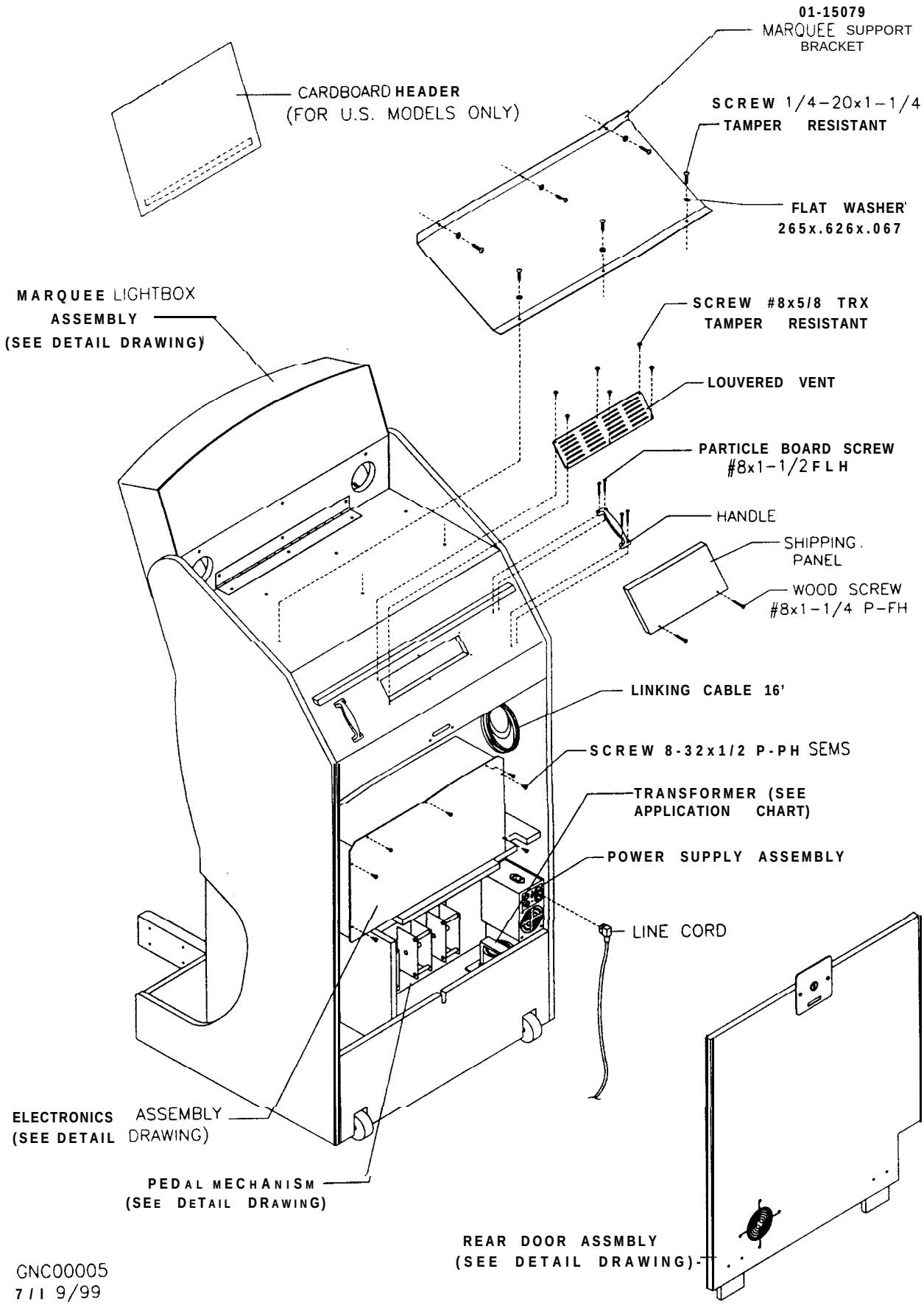
CHAPTER FOUR

SERVICE

NOTICE

Information in this manual is subject to change without notice. Atari reserves the right to make improvements in equipment function, design, or components as progress in engineering or manufacturing methods may warrant.

Fill out and mail in the Game Registration card. Include the game serial number from the label on the rear of the cabinet. For your records, write the game serial number in the manual. SERIAL NUMBER _____



GNC00005
7/1 9/99

SERVICE

Only qualified service personnel should perform maintenance and repairs. The product guidelines apply to all game operators and service personnel. There are specific notes, cautions, and warnings throughout this manual where they apply. Read the SAFETY pages thoroughly before beginning service.

This game uses complex electronic components that are very SENSITIVE to static electricity. Observe and follow these precautions prior to handling the game electronics:

1. **Ensure that the A.C. power to the game is turned OFF prior to servicing the electronics.**
2. **Discharge any static electricity build up in your body by touching the metal power supply chassis. Do this BEFORE touching or handling the electronic assemblies.**
3. **Store the electronic assemblies in an anti-static area. Use anti-static bags to store or transport the hard disk drive, the CPU Board Assembly, and all other electronics.**
4. **DO NOT remove or connect any electronic assemblies when the cabinet power *is ON.* Doing so will damage the electronic assemblies and void the warranty.**
5. **Always replace ground wires, shields, covers, etc., when maintenance or service Is completed.**

Coin Mechanism

Switch off power to the game. Unlock the coin door and swing it open. Unlatch and remove each coin mechanism separately to clean or replace with a different type. Ensure that the mechanism seats fully in the holder upon reinstallation. Close and lock the release latch, then close the door. Turn on the game. Enter the menu system to change mechanism setup. Test known good and bad coins to verify operation.

Coin Counter

Switch off power to the game. Unlock the cash door and swing it open. The meter is located at the lower left corner of the vault opening. Record the meter count before testing or replacement.

Locate the meter wires, Disconnect wiring at the connector. Remove two screws from the front bracket. Ensure that replacement has a diode across the terminals to protect the electronic meter driver circuits.

Monitor Cover Lights and Keypad

Switch off power to the game. Remove the screws and lift off the cover panel and artwork to expose the interior of the instruction light area. The lamp requires a quarter turn for removal.

Lower the dash and steering mechanism (following page). Remove the marquee bracket and tilt the light box back on top of the cabinet. Remove screws. Lift the monitor cover to service or remove the keypad.

Marquee Light Box

Switch off power to the game. Remove the screws and lift off the cover panel and artwork to expose the interior of the light box. The leader lamp, fluorescent lamp, and starter (if used) all require a quarter turn for removal. European models do not require a separate lamp starter.

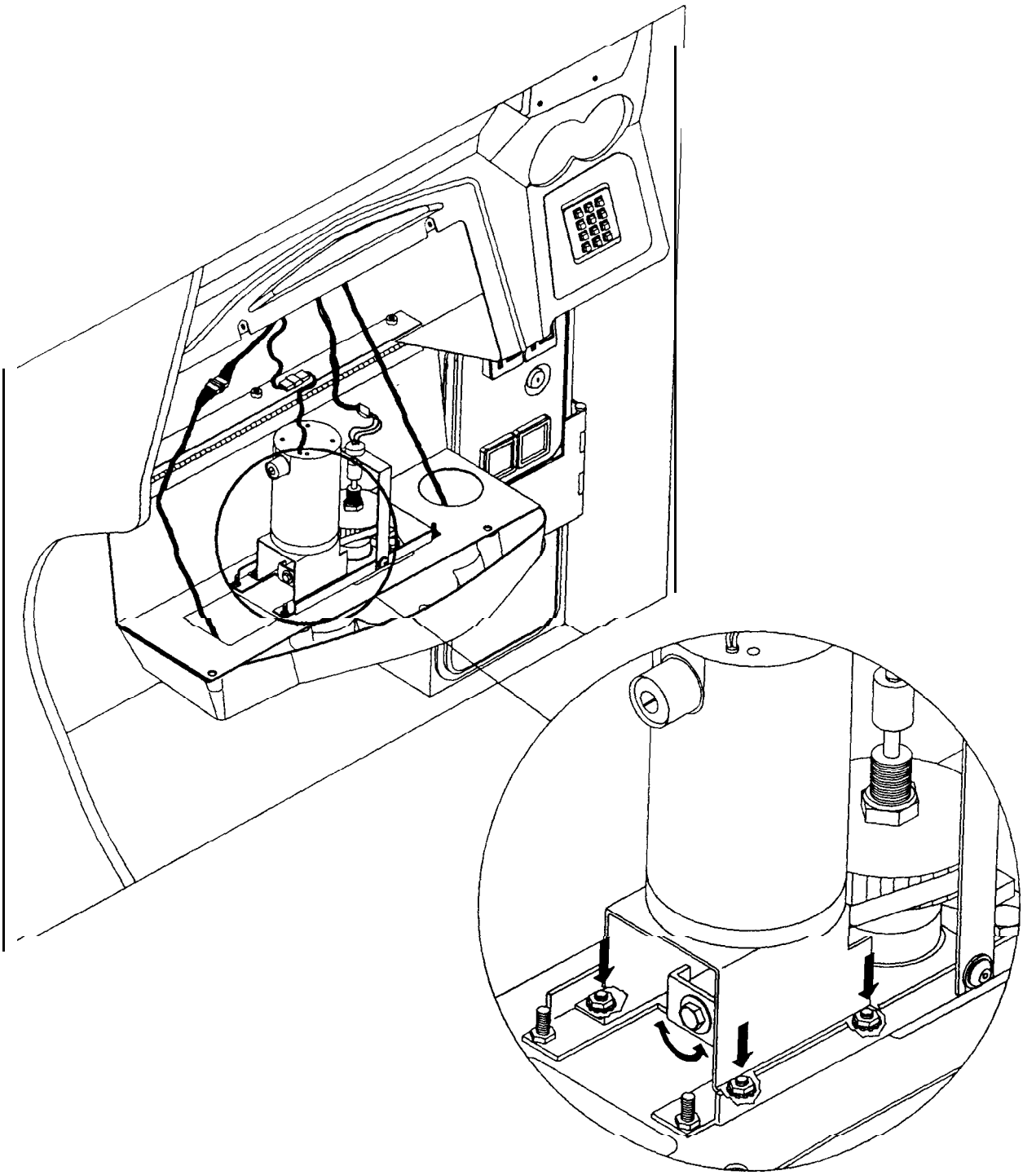
CAUTION ***THE VIDEO MONITOR IS VERY HEAVY, WITH MOST OF THE WEIGHT TOWARD THE FRONT OF THE ASSEMBLY. Be sure it is firmly supported as it is removed from the cabinet.***

The monitor does not require isolation from the A.C. line voltage in normal operation. However, when operating outside the cabinet or servicing the monitor on a test bench, YOU MUST ISOLATE THE MONITOR FROM LINE VOLTAGE WITH AN ISOLATION TRANSFORMER.

Monitor

Switch off power to the game. Lower the dashboard and remove the monitor cover as described previously. Remove the monitor bezel and the barrier panels. Remove the four flange nuts securing the monitor's mounting brackets to its mounting panel. Pull the monitor carefully from the cabinet. Set the monitor in a safe place. Clean the face of the CRT before reinstalling barrier panels and monitor cover.

The monitor used in this cabinet is VGA style. Other monitors may look as if they can be used as a replacement, but the CRT screen curvature is siightiy different. Only VGA style monitors will fit correctly against the monitor cover; other styles will not synchronize or seal up properly.



Dashboard and Steering Mechanism

Switch off power to the game. Support the steering wheel. Remove one screw from the upper left corner and two at the sides of the instrument cluster just above the steering wheel. Remove the support and lower the dash. Ensure that wires and cables are not pinched or caught in hinge when dash is reinstalled.

While the dashboard is lowered, inspect the motor, pulleys, and belt. Install a new belt if the existing one is broken or shows signs of wear. There are two nuts on each side of the motor mounting bracket. Loosen all four bracket nuts and rotate the tension adjustment bolt as necessary. Tighten this bolt until there is no belt deflection, then loosen it one full turn to provide correct tension. Tighten the motor bracket nuts.

Speakers

Switch off power to the game. The woofer is mounted behind a grille at the back of the drivers seat. The smaller full range speakers are mounted behind the seat headrest grilles. The larger full range speakers are mounted behind the grilles above the video monitor. Remove the screws and set the grille aside. Always remove the upper mounting screws first and replace them last to avoid damage to the speaker.

Remove the speakers from the enclosure and disconnect the wires. Mark each wire to ensure proper polarity. *Do not use excess force when removing or tightening mounting screws threaded into plastic.*

Gear Shift Assembly

Switch off power to the game. Remove shift plate mounting screws. Disconnect cables. Lift up and out.

Pedal Assembly

Switch off power to the game. Unlock and remove the rear door. Disconnect the pedal cable assembly from the wiring harness. Adjust the seat to the maximum rear position. Remove six outer mounting screws from the front perimeter of the pedal plate. Pull assembly toward seat until it clears the opening, then lift it up and away from the cabinet.

Power Supply

Switch off power to the game. Disconnect the line cord. Unlock and remove the rear door. Unplug the IEC AC. connector and the wiring harnesses from the top of the supply. Leave the terminal strip alone. Disconnect the D.C. power cable from the hard disk drive. Do not remove the supply mounting bracket or the line filter (found on European models only). Remove four front and two rear screws from the supply, then slide it out of the cabinet. Verify the line voltage switch setting before reinstalling the power supply.

Game Electronics

Switch off power to the game. Unlock and remove the rear door. Remove the screws and slowly swing the metal enclosure cover open. You may apply power with the cover open if necessary to observe the indicators. Disconnect cables and remove mounting screws to replace circuit boards. Anti-static bags and protective containers from new parts must be used to store the component if it is not reinstalled.

Sound I/O Board Assembly

Switch off power to the game. Unlock and open the rear door and the coin door. Remove the screws and slowly swing the metal enclosure cover open. Carefully note the orientation of the JAMMA connector and the other cables. Extract the harnesses from the board connectors. Remove six mounting screws and washers from the Sound I/O Board Assembly. Carefully remove the Sound I/O Board, rocking it gently to separate the PCI edge connector from the CPU Board Assembly. Lii the board up and off the posts. Upon reinstallation, tighten the screws starting at the center and working toward the outer edge. Use anti-static bags and protective containers from new parts to store the board if not reinstalled.

CPU Board Assembly

Switch off power to the game. Unlock and open the rear door and the coin door. Remove the screws and slowly swing the metal enclosure cover open. Carefully note the orientation of the JAMMA connector and the other cables. Extract the harnesses and the hard disk drive ribbon cable from their board connectors. Loosen screws and disconnect the VGA cable from the CPU Board connector. Remove the six mounting screws and washers from the Sound I/O Board Assembly. Carefully remove the Sound I/O Board, rocking it gently to separate the PCI edge connector from the CPU Board Assembly. Lift it up and out. Set the Sound Board aside. Remove six screws and washers holding the CPU Board Assembly to the enclosure. Carefully separate the CPU Board from the Video Card PCI connector, rocking it gently to separate the edge connector from the board. Upon reinstallation, tighten the screws of both the CPU Board Assembly and Sound I/O Board Assembly in order, starting at the centers and working toward the outer edges of the boards. Use anti-static bags and protective containers from new parts to store the board if not reinstalled.

Video Card Assembly

Switch off power to the game. Unlock and open the rear door and the coin door. Remove the screws and slowly swing the metal enclosure cover open. Carefully note the orientation of the JAMMA connector and the other cables. Extract the harnesses and the hard disk drive ribbon cable from their board connectors. Disconnect and remove the Sound I/O Board Assembly and the CPU Board Assembly and set them aside. Loosen the screws and disconnect the VGA cable from the Video Card output connector. Remove the Video Card. Use anti-static bags and protective containers to store the assembly if not reinstalled.

Triamp Board Assembly

Switch off power to the game. Unlock and open the rear door and the coin door. Remove the screws and slowly swing the metal enclosure cover open. Carefully note the orientation of the connector and the other cables. Extract the harnesses from the board connectors. Remove four mounting screws and washers from the Triamp Board Assembly. Lii the board up and off the posts. Handle the board by **a** heatsink. Use anti-static bags and protective containers from new parts to store the board if not reinstalled.

Wheel Driver Board Assembly

Switch off power to the game. Unlock and open the rear door and the coin door. Remove the screws and slowly swing the metal enclosure cover open. Carefully note the orientation of the connector and the other cables. Extract the harnesses from the board connectors. Leave the other end of the ribbon cable connected to the Sound I/O Board Assembly. Remove four mounting screws and washers from the Wheel Driver Board Assembly, Lift the board up and off the posts. Handle the board by the heatsink. Use anti-static bags and protective containers from new parts to store the board if not reinstalled.

Hard Disk Drive ***REMEMBER: HARD DISK DRIVES ARE FRAGILE***

A computer type Hard Disk Drive stores data for the video and action. Switch off power to the game. Unlock and remove the rear door. Unplug drive power and ribbon cable from the hard disk drive. Loosen four screws. Lift the hard disk drive up and out of the brackets. Remove the drive mounting screws.

To avoid risk of damage during installation, mount the hard disk drive in the brackets before connecting cables. Install the screws before mounting the hard disk drive in the brackets.

When the hard disk drive has been replaced, data from other linked games will be copied onto the new drive as soon as a registered driver plays one game. No files will transfer until the game has been played.

⚠ **CAUTION** ***Do not stack or drop hard disk drives. Use an anti-static bag and an approved shipping container to return the assembly to your distributor.***

Battery

A battery on the Sound I/O Board retains data in memory when the power is disrupted. To remove it, switch off power to the game. Unlock and remove the rear door. Remove the screws and slowly swing the metal enclosure cover open. The battery is on top of an integrated circuit near the center of the circuit board. Carefully note the battery position and polarity, then gently pry it loose at each end. The integrated circuit will remain attached to the board. Do not allow metal surfaces or tools to contact the exposed pins.

To reinstall the battery, orient cell over the integrated circuit. The battery is keyed to fit only one way. Do *not force.* Align the battery pins with the holes in the integrated circuit. Press until the battery snaps in.

Set the clock to the correct date and time after removing and replacing the battery. Contests and other events are controlled by the clock information.

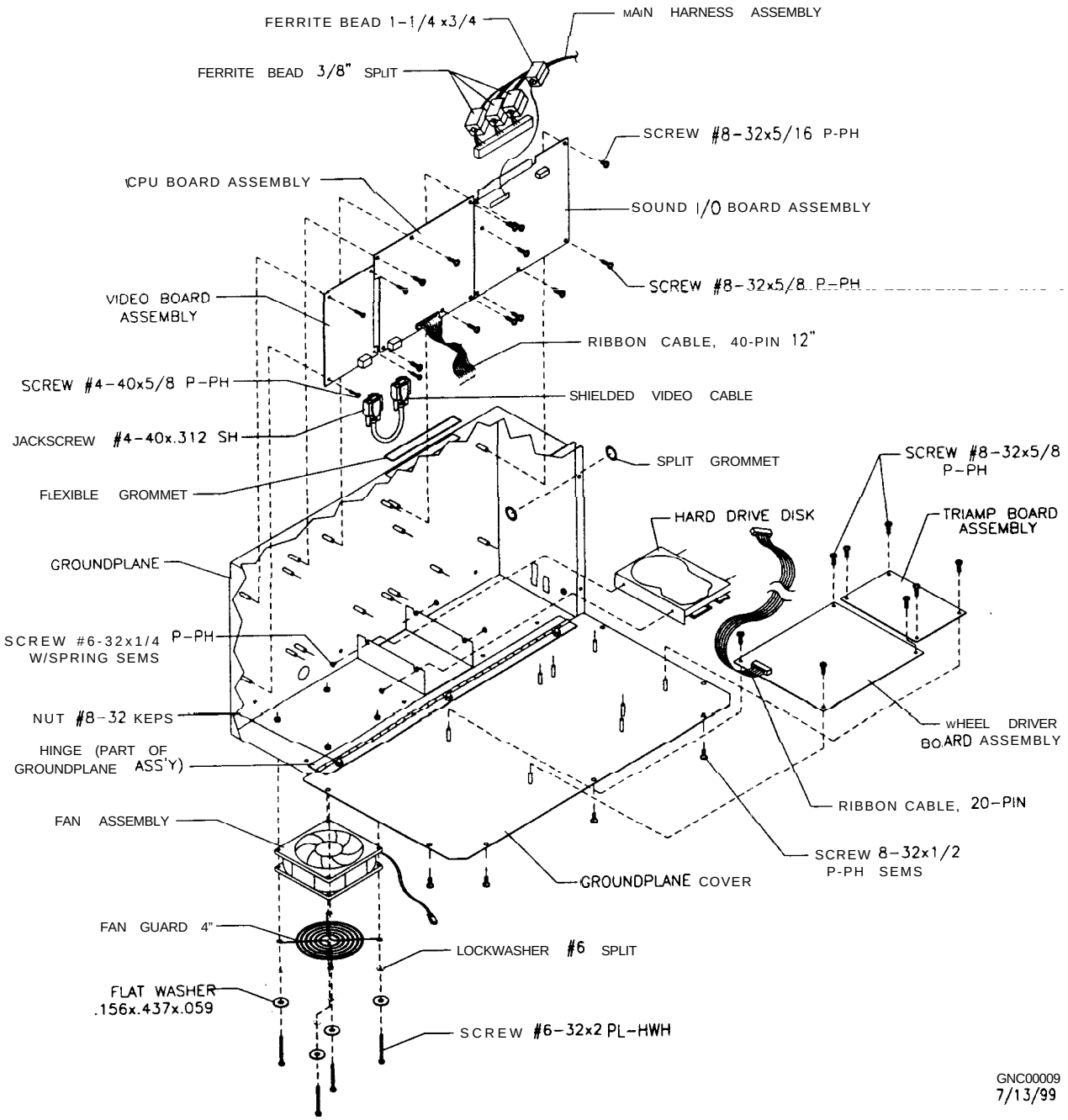




CAUTION

Danger of explosion if battery is incorrectly installed. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to instructions printed on the battery or the manufacturer's packaging.

NOTE: To avoid explosion, all replacement batteries must match the original in size, voltage rating, and composition. Manufacturer recommended equivalent types are acceptable. These batteries are designed for very long life. Do not attempt to recharge these batteries! Avoid direct shorts across the terminals or from terminals to ground. Remove them from their holders and store in a safe place until repairs have been completed. Dispose of used batteries according to the manufacturer's instructions.



Fan Assembly

Switch off power to the game. Remove the cabinet rear door. Remove the screws from the metal cover of the electronics assembly. To remove a fan, disconnect the power harness and remove the mounting screws. Note the fan orientation. Each fan has an arrow molded into its plastic case to indicate airflow direction. Be certain to reinstall the fans in the proper orientation to assure airflow over the circuit boards.

Dollar Bill Validator
(Use MARS AE2411 -U3 U.L. Recognized currency changer)

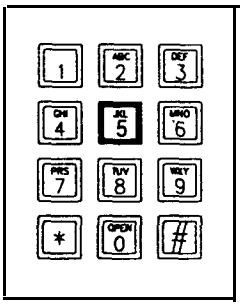
Dollar bill validators or other currency acceptors may be installed in games that were manufactured with the additional wiring connector. Switch off power to the game and unplug the A.C. line cord. Unlock the coin door and swing it open. Read the coin door label for additional information.

Remove nuts, spacers, and cover plate from the door. Change switch settings or make adjustments before mounting the unit. If the manufacturer has supplied an adapter plate, place it over the door cutout at this time. Install spacers on threaded studs, then align the validator mounting holes with the studs and seat the unit in the door opening. Install the nuts and tighten firmly. Attach the ground wire (green with yellow stripe) lug to the door ground stud next to the hinge. Mate the wiring harnesses and press to fully seat connectors. Route wires away from door edges and hinge. Inspect for proper bill chute alignment. Be certain that the dollar bill validator is set to produce long output pulse widths to avoid count errors. Reverse these steps to remove a validator for service or replacement.

Plug in the line cord and turn on the game. Change the mechanism setup and pricing, then test known good and bad bills to verify proper operation. Close and lock the coin door when the settings are correct.

SAN FRANCISCO

RUSH 2049’”



CHAPTER
FIVE

DIAGNOSTIC, AUDIT & ADJUSTMENT MENU SYSTEM



NOTICE: This manual is subject to change without notice. Atari reserves the right to improve equipment function, design, or components as progress warrants.

MENU SYSTEM

WHAT IS THE MENU SYSTEM?

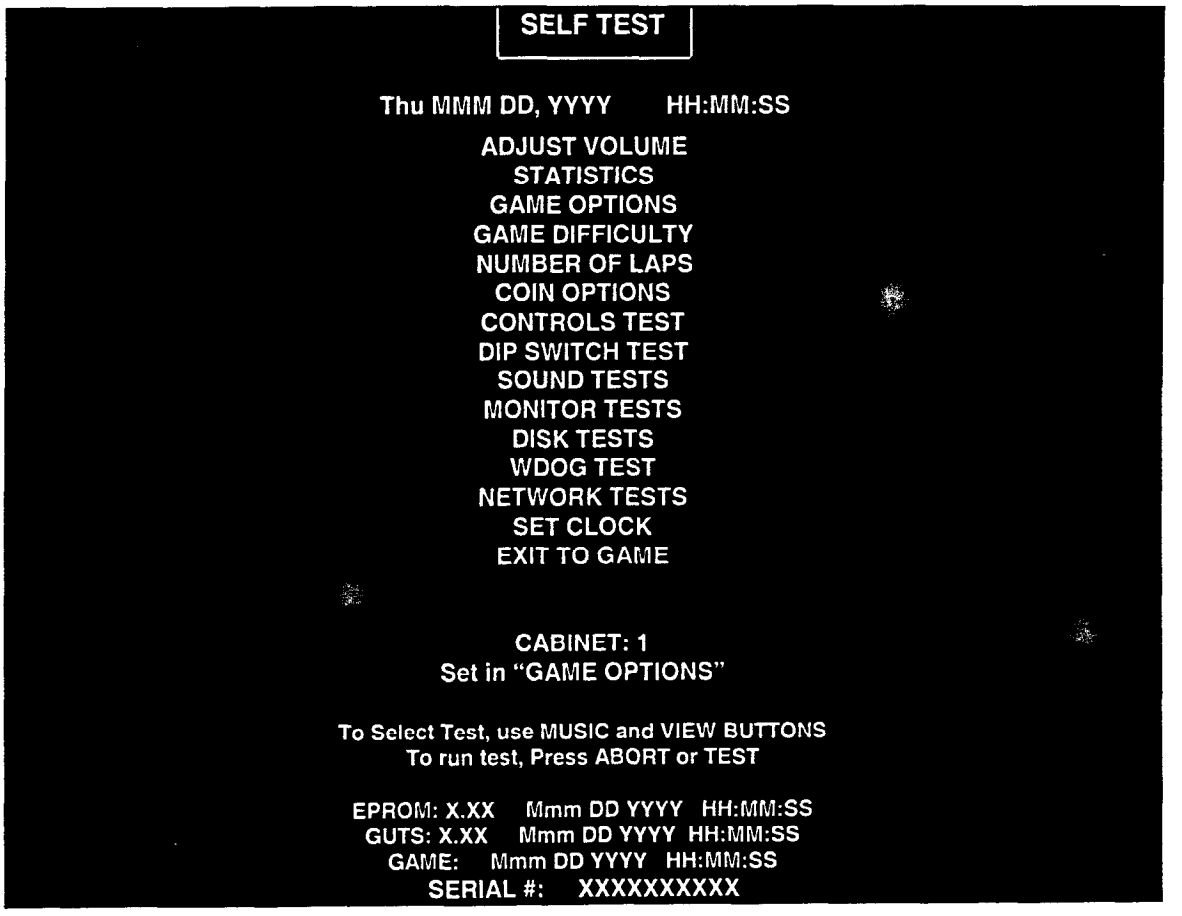
The game's *Menu* System is a series of auditing, game adjustment and diagnostic screens. You can easily access and apply these screens to optimize game performance. For instance.. .

- Use game audits screens to assess game performance.
- Use adjustment screens to help you to customize game performance. For instance, you can restore factory default game settings. You can also calibrate player controls for accuracy.
- Use diagnostic screens to verify proper equipment operation.

ACTIVATING THE MENU SYSTEM

Open the coin door. Find the TEST MODE switch inside. Press TEST MODE to invoke the Menu System. The game system responds by exiting Game Mode and entering Diagnostic Mode. The system runs a brief self-test, and then displays the Self-Test Menu. The Self-Test Menu is the opening screen of the Menu System.

Game audits, adjustments and diagnostics are line items on the Self-Test Menu. Selecting an item opens its submenu. Every submenu presents various options that you may act upon.



TYPICAL SELF-TEST MENU

MENU LAYOUT

Menus differ, but related information tends to occupy the same screen locations.

- The block at the top center of each screen displays the current menu title.
- Data (menu items, video signals, statistics, reports, etc.) appears in the center of the screen.
- Messages (explanations, control functions, revision levels) display at the bottom of the screen.

MENU NAVIGATION CONTROLS

Use VOLUME UP and VOLUME DOWN buttons to highlight an item on any menu. (These buttons are on a bracket inside the coin door.) You can only select one highlighted item at a time. To select a highlighted item, press the TEST MODE (rightmost) pushbutton inside the coin door. To return the game to play, first highlight EXIT TO GAME. Then press TEST MODE.

EQUIVALENT MENU NAVIGATION CONTROLS

In most cases, certain player panel buttons duplicate the functions of the diagnostic buttons. You may find menu navigation easier with the player panel buttons. Here are the player panel functions within the Menu System.. .

Player Panel Button	Function	Equivalent Diagnostic Switch
ABORT	•Run test •Invoke menu option	TEST MODE
MUSIC	On some menus.. . Move right	--
REVERSE	*Various functions, including.. .* •Save and exit •Fetch more statistics •Return to menu	SERVICE CREDITS *(for some functions)*
VIEW 1	*On some menus...* Move left	--
VIEW 2	Move down the menu	VOLUME DOWN
VIEW 3	Move up the menu	VOLUME UP

AUTOMATIC TESTS

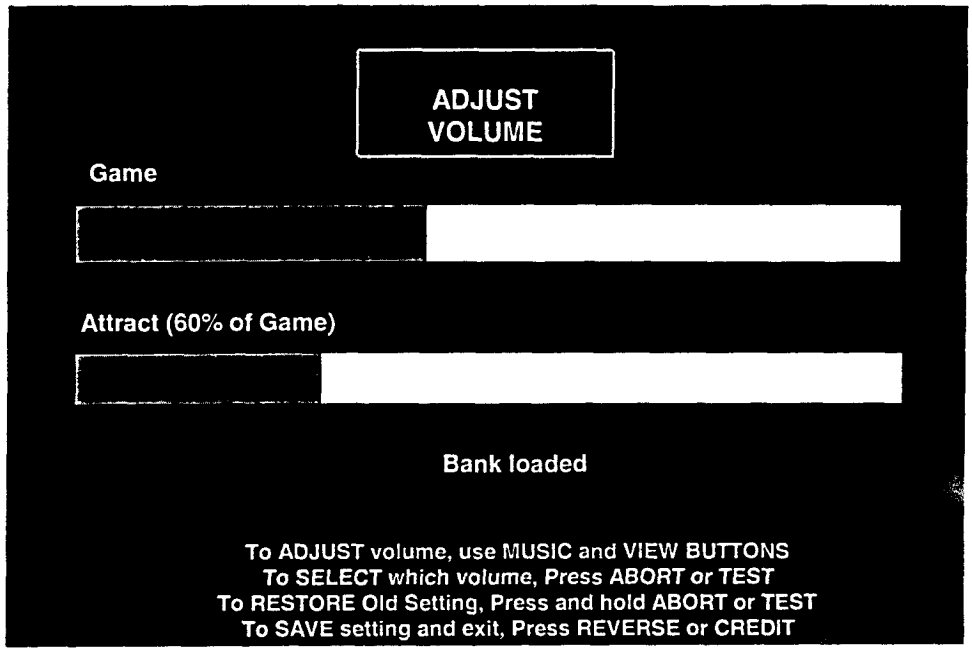
Whenever you open the Menu System, the Power-On Self-Test (POST) activates. This routine runs automatically. It can detect faults that cause game or Menu System malfunctions. The Power-On Self-Test usually takes less than a minute. The test doesn't display anything. Instead, the system boot loader indicates the software revision number and serial numbers. The system boot loader also displays a sound-loading message and other useful information.

ADJUST VOLUME

Select ADJUST VOLUME at the Self-Test Menu. The Adjust Volume Menu allows you to determine the sound and music levels of the game. Adjustments can be made in Test, Attract, and Game Modes.

You can adjust the volume level for either the Attract Mode or the Game Mode. Press MUSIC to choose Game Volume or VIEW **#2** for Attract Mode Volume. Press the VIEW **#1** button to lower the volume level or the VIEW **#3** button to raise the volume level. Music plays continuously while this screen is active.

You can adjust the game volume level without entering the Menu System. During Attract Mode or while a game is in process, open the coin door. Press the VOLUME UP and VOLUME DOWN diagnostic buttons.



ADJUST VOLUME MENU

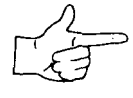
'Game' volume settings **allow** continuous adjustments between zero and maximum. The game will seem more realistic if the player experiences **high** volume sounds during play. (Performance cars aren't quiet.)

The 'Attract" volume adjusts continuously from zero (mute) to full (same as the 'Game' setting). For greater profits, turn up the volume to draw attention to this game.

The length of a graphic bar represents the current volume level. A long bar indicates a louder volume setting than does **a** short bar.

You can adjust "Attract" and "Game" volume levels to different values. You can't set the 'Attract" level higher than the level for game play. Reducing the "Game" level automatically reduces the "Attract" level. Reducing the "Attract" level won't effect the 'Game" volume.

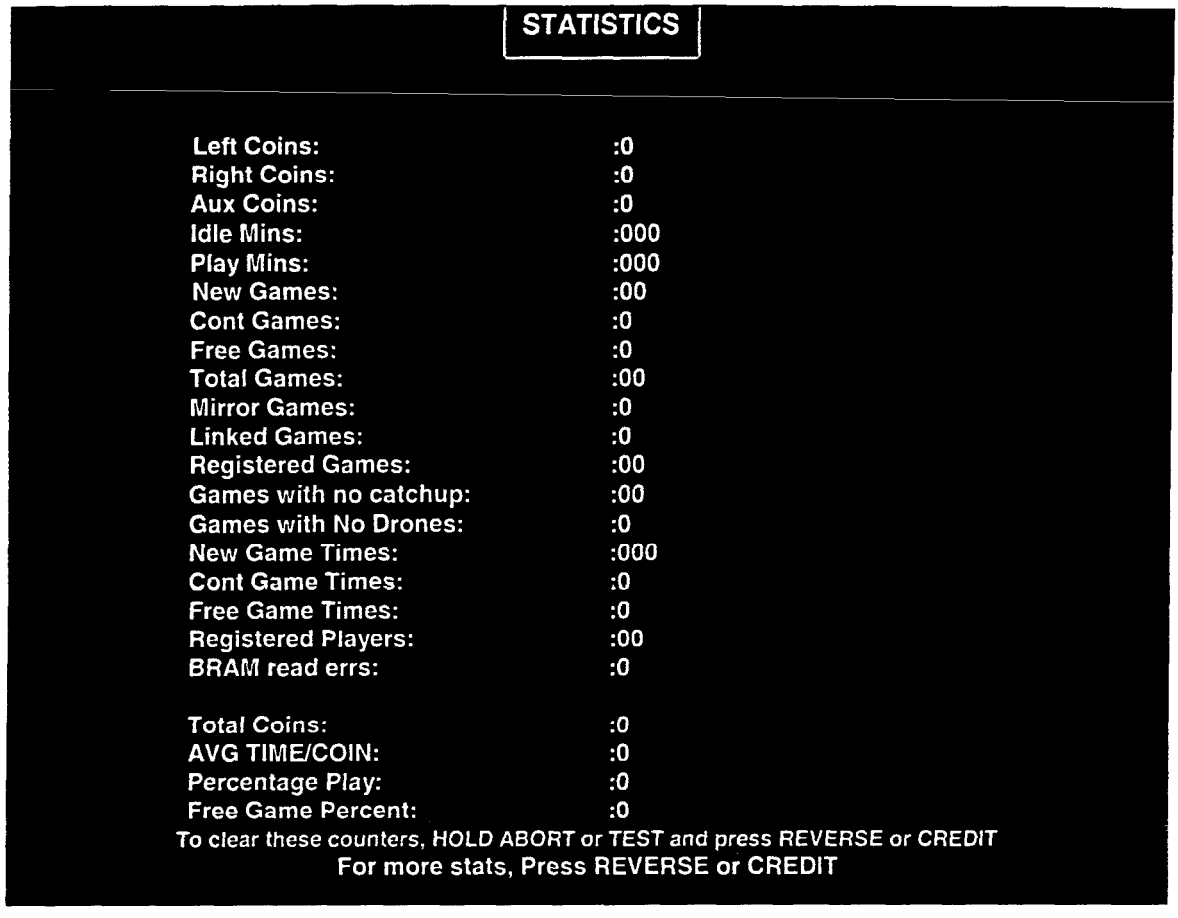
Press only the REVERSE button when you make volume adjustments. The ABORT button cancels settings on the screen and returns levels to previous screen values.



NOTICE: Volume adjustments affect the volume of sound tests as well as game play. **If** you set volume to minimum (zero), the speakers won't produce sounds during audio tests. Set volume levels to **a** high value when you check sound components. Return the levels to previous settings **after you** finish testing.

STATISTICS

Select STATISTICS at the Self-Test Menu. The Statistics Menu allows you to assess how often and how well the game is being played. In addition to the earnings, various game aspects are tracked to determine the player skill levels. The statistics may be reset to zero or allowed to increase after each viewing.



STATISTICS REPORT MENU

The illustration shows how the report screen will look after the game has been reset or is first turned on. Most of the statistics will increase in value as the game is played. It is normal for some values to remain at zero: for example, the Earned Games count won't change unless the cabinet has been set up for free games, and the **Error** count won't change if no errors have occurred.

Low counts in both coin and player statistics may indicate that the game is too difficult for the skill levels of the players at this location. High counts may result if Bonus or Winner Option menu items are in effect. The difficulty level and other play characteristics may be adjusted from the Game Options menu.

Press only the REVERSE button to view the additional game statistics. If the game has not been played before, or if the counters have been cleared, the additional statistics won't be present.

Note and record user messages. These messages can be useful in detecting intermittent conditions.

Record Statistics before servicing this game.

HISTOGRAMS

Select HISTOGRAMS at the Statistics Menu. Press REVERSE or CREDIT to enter the Histograms Menu. The Histograms Menu allows graphical analysis of statistics and visual comparisons between games. Histogram screens have no bar graphs until the system has enough data to plot.

Note and record user messages. These messages can be useful in detecting intermittent conditions. The USER MSGS screen will contain no messages until the system detects an error.

Record Statistics before servicing this game.

Press REVERSE and ABORT together to cancel any changes on the screen and clear all counters to zero. This deletes all Histograms and User Messages, so examine them before using this action.

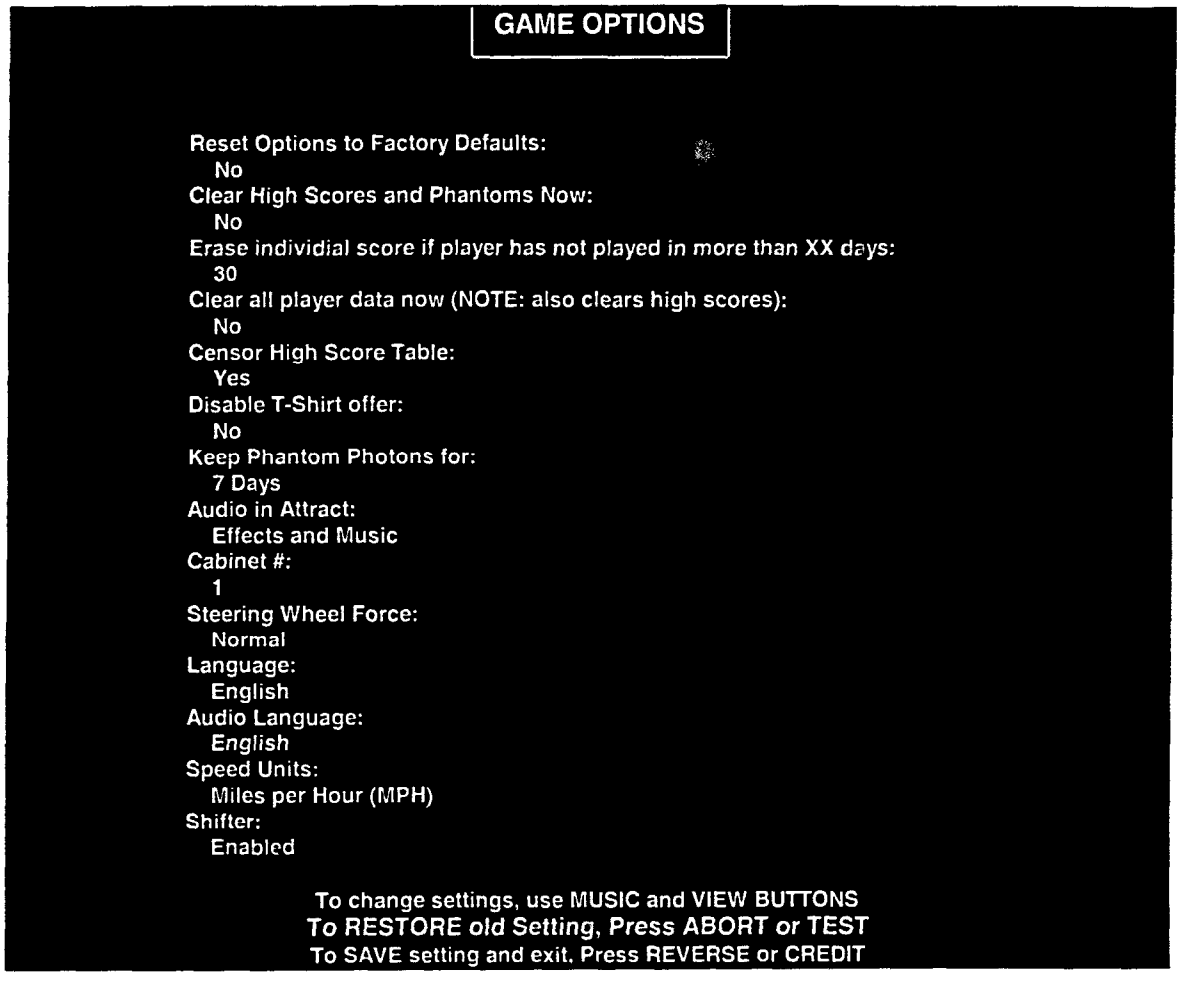


HISTOGRAM MENU

GAME OPTIONS

Select GAME OPTIONS at the Self-Test Menu. The Game Options Menu allows you to customize the game. Each of the variables will change some aspect of game appearance or play. Optimum settings cause high player interest and increase earnings.

Use the VIEW #2 and VIEW #3 buttons to select a menu item. Alter variables with the VIEW #1 and MUSIC buttons. You can change options, or reset them to factory default values after each viewing.



GAME OPTIONS MENU

The illustration shows how this screen will look with all of the factory default settings. Each press of the VIEW #1 or MUSIC buttons will advance a variable through its range of choices. Some items have *more* options than others. It is recommended that all of them be examined before one is selected.

You can judge the effects of these options by comparing statistics reports before and after changes. As players become more familiar with the game, you can add new features or increase difficulty.

To implement finked races, set each cabinet to a different cabinet number. The network uses the cabinet number to track individual vehicle positions during competition.

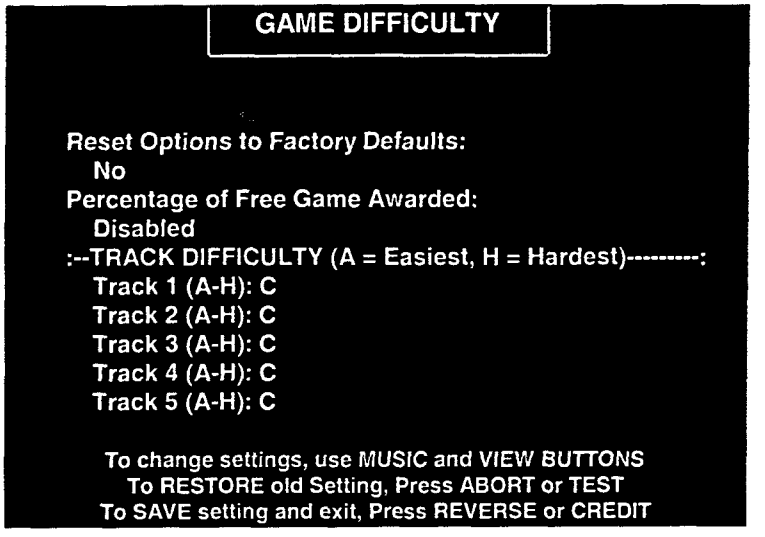
STEERING WHEEL FORCE sets the game default value. Players may elect to change this to their needs.

LANGUAGE changes the player information during game play. It doesn't change menus or tests.

GAME DIFFICULTY

Select GAME DIFFICULTY at the Self-Test Menu. The Game Difficulty Menu allows you to set track attributes. Each adjustment affects some aspect of game play. Optimum settings cause high player interest and increase earnings.

Use the VIEW #2 and VIEW #3 buttons to select a menu item. Alter variables with the VIEW #1 and MUSIC buttons. You can change options, or reset them to factory default values after each viewing.



GAME DIFFICULTY MENU

The illustration shows how this screen looks with factory default settings. Pressing the VIEW #1 or MUSIC buttons advances a variable through its choice range. Some items have a greater range of adjustment than others do. Examine each item before selecting one.

Judge option effects by comparing statistics reports before and after your changes. As players become more familiar with the game, you can add new features or increase difficulty.

Record track settings befoie servicing this game.

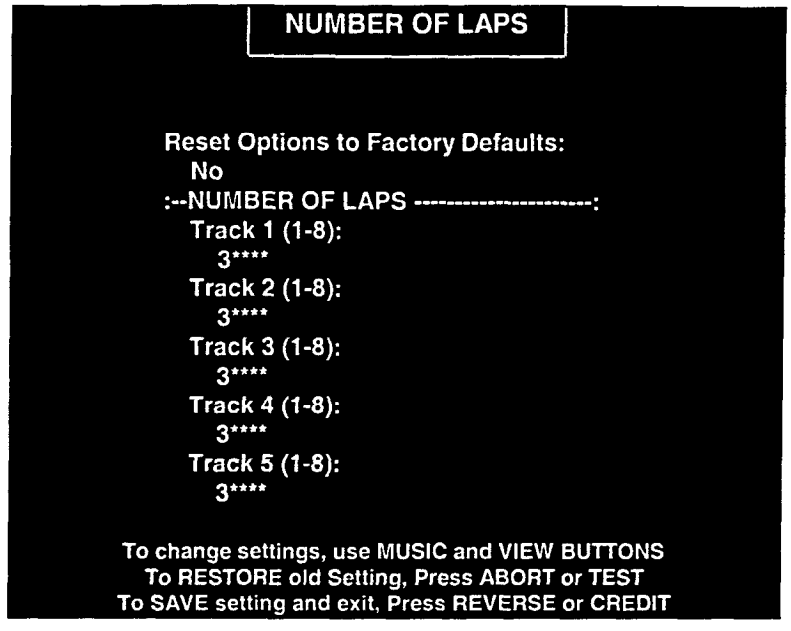
FREE GAME Use free game settings to reward winning players. The free game difficulty adjustment is separate from the other difficulty settings in the game. Free game player incentives may reduce earnings. Free game are awarded by beating a self-adjusting time on each track. As more free games are awarded, the time *is* lowered to make it more difficult to win the next free game. The Phantom Photon car with the word "Free" over it represents the time the driver must beat in order to get the free race.

TRACK DIFFICULTY determines how long each player can take to finish the course. Increasing the track difficulty reduces the qualifying time requirement between checkpoints. Cars must maintain a higher speed between checkpoints to stay in the running.

NUMBER OF LAPS

Select NUMBER OF LAPS at the Self-Test Menu. The Number of Laps Menu allows you to set the lap requirement for each track. Each of the variables will change some aspect of game play. Optimum settings cause high player interest and increase earnings.

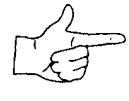
Use the VIEW #2 and VIEW #3 buttons to select a particular menu item. The VIEW #1 and MUSIC buttons are used to change variables. Options may be reset to factory default values or changed after each viewing.



LAP NUMBER MENU

The illustration shows how this screen looks with factory defauft settings. Each press of the VIEW #1 or MUSICS buttons will advance a variable through its range of choices. Some items have more range of adjustment than others. It is recommended that all of them be examined before one is selected.

Judge option effects by comparing statistics reports before and after your changes. As players become more familiar with the game, you can add new features or increase difficulty.

	**NOTICE:** Record lap settings before servicing this game.

NUMBER OF LAPS sets the total length of the race. Short races permit more players per hour on each game. When the skill levels rise, increase the number of laps as required to maintain player challenge.

COIN OPTIONS

Select COIN OPTIONS at the Self-Test Menu. Use the Coin Options Menu to set up coin mechanisms and select the game pricing. Factory default values can be considered standard.

Use the VIEW #2 and VIEW #3 buttons to select a particular menu item. The VIEW #1 and MUSIC buttons are used to change variables. Options may be reset to factory default values or changed after each viewing.



PRICING OPTIONS MENU

MECH SETUP MENU

Each press of the VIEW buttons advances a variable through its range of choices. Some items have more options than others. View all the options before selecting one.

PRICING OPTIONS

Custom priiing sets credits required to start and continue a game, rewards for quantity buy-in, etc. The other options will disappear if free play is selected.

MECH SETUP

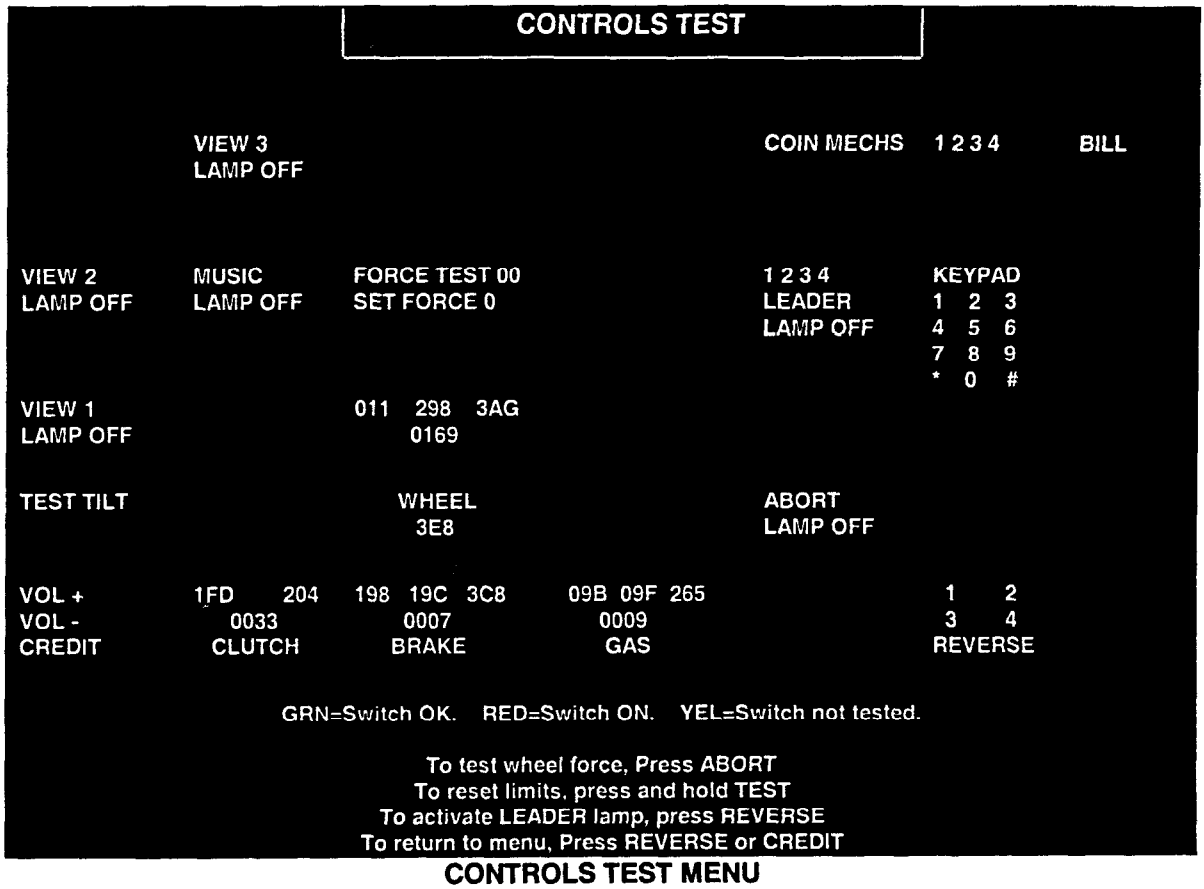
This screen permits you to add or remove coin or bill mechanisms. Although values are shown for all devices, changes to unused inputs have no effect if there is no such currency acceptor in game.

CONTROLS TEST

Select CONTROLS TEST at the Self-Test Menu. The Controls Test allows you to manually check each switch in the game.

NOTICE: Some switches (for example, TILT) may not be used with this game. Check the wiring diagram and the mech setup items.

Activate each switch and the screen indication changes state. Release the switch and the indicator returns to its previous condition. You can also test any combination of switches together.



CONTROLS TEST MENU

The screen depicts control names as they appear on the dash, gearshift, diagnostic switch bracket, etc. One by one, operate each control. Simultaneously observe the screen. A single menu indication should duplicate each state change in each control.

Use the Controls Test menu to verify crossed wires, intermittent conditions, and stuck switches.

Press and hold ABORT to test STEERING WHEEL force. During the test, restrain the wheel with one hand. Watch the display. The force should increase to maximum and decrease to minimum. Change directions and repeat the test.

Reset the pedal travel limits by pressing and holding TEST MODE. Press and release each pedal during the test. Digital indicator numbers change each time the computer detects each pedal's new position. The numbers turn green to indicate successful pedal calibration.

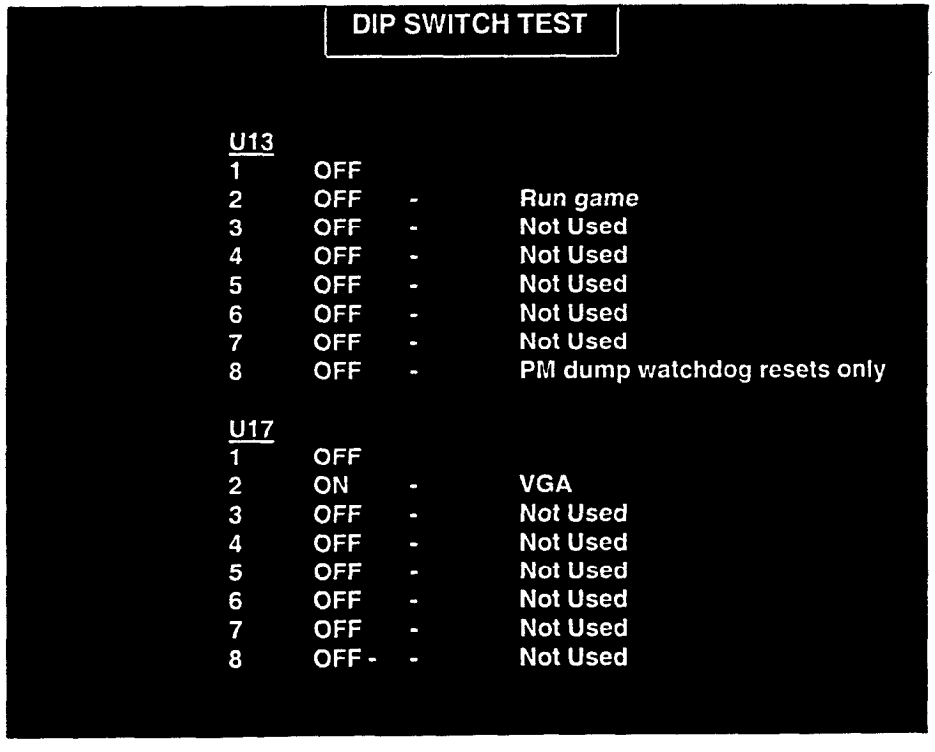
Note and record the Coin Counter reading before beginning the test to avoid subsequent count errors.

DIP SWITCH TEST

Select DIP SWITCH TEST at the Self-Test Menu. Two 8-position DIP switch banks reside on the Sound I/O Board. The DIP Switch Test Menu reports the positions of 16 switches in these banks.

	**NOTICE:** Don't change the positions of unused switches. Otherwise you may cause unpredictable, unstable or erratic operation.
	**NOTICE: Switch 1 of Bank U17 (monitor resolution) must remain off. Otherwise your VGA monitor won't be able to lock onto game sync.**

You can change DIP switch positions with power on. Set any switch. Then check the screen to verify that the new setting is selected. **Enable your changes by** exiting the Menu System and entering the game.



DIP-SWITCH TEST MENU, *SHOWING DEFAULT SETTINGS*

Refer to the DIP Switch Tables for assistance in choosing switch positions (* indicates factory defaults). To exit the DIP Switch Test, press any game button.

DIP SWITCH TABLES

DIP Switch U13	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Diagnostics vs. Game Mode								
Run Game	Off'	Off*						
Run Disk Version of Self-Test	Off	On						
Run EPROM Diagnostics	On	Off						
Run Interactive/Power-Up Diags	On	On						
Not Used			Off*	Off*	Off'	Off*	Off'	
Not Used			On	On	On	On	On	
PM Dump Behavior								
View Only Watchdog Resets								Off*
View All Resets								On

DIP Switch U17	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Monitor Resolution (Pixels)								
Standard, 512 x 256	Off	Off						
Medium, 512 x 384	Off*	On'						
VGA, 640 x 480	On'	Off*						
VGA *(again)*	On	On						
Not Used			off*	Off*	Off'	Off*	off*	off*
Not Used			On	On	On	On	On	On

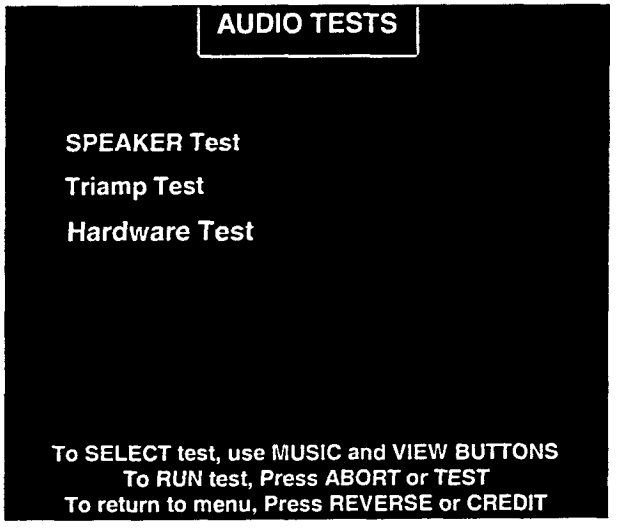
MONITOR RESOLUTION adjusts the video signal for older video monitors. If you set this switch incorrectly, the monitor develops two symptoms: It won't lock onto game video and its remote controls won't function normally. The factory default setting is VGA.

SOUND TESTS

Select SOUND TESTS at the Self-Test Menu. The Sound Test Menu verifies that audio components are connected and operate properly.

NOTICE: The level must be raised for the speakers to be heard. Check the volume setting before testing.

Use the VIEW #2 and VIEW #3 buttons to select a particular menu item. The VIEW #1 and MUSIC buttons are used to change variables. There are no custom settings or adjustable variables in these tests.



AUDIO TEST MENU

SPEAKER TEST sends alternating left and right voice sounds to the front and rear speakers. The voices should be clear and distinct from each other. Each voice must come from the location identified. Refer to the Adjust Volume Menu for help in increasing loudness for the speaker test.

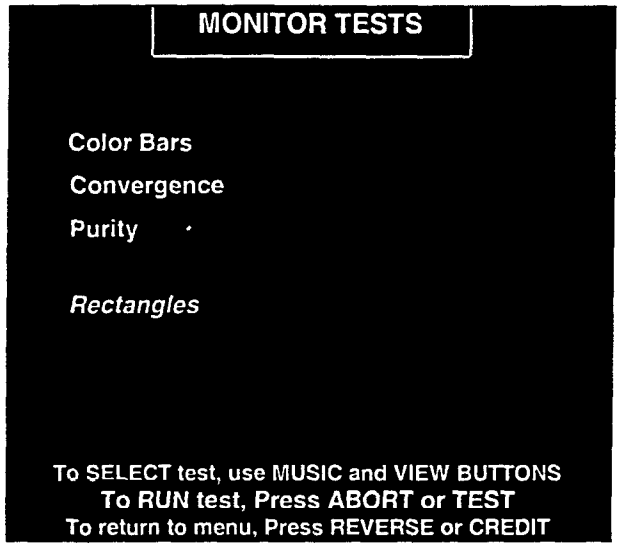
Use the Audio Speaker Test screen to verify crossed connections, incorrect phase, and distortion.

TRIAMP TEST verifies that the audio amplifier is connected to the game electronics.

MONITOR TESTS

Select MONITOR TESTS at the Self-Test Menu. The Monitor Test Menu provides patterns for **verifying** monitor performance or making adjustments.

Use the VIEW #2 and VIEW #3 buttons to select a particular menu *item.* The VIEW #1 and MUSIC buttons are used to change variables. There are no custom settings or adjustable variables in these tests.



MONITOR TESTS MENU

COLOR BARS fills the screen with colored stripes. Use the Color Bars screen to help you to optimize red, green, blue level adjustments. You can also use color bars during monitor brightness and contrast adjustments. Each color bar should appear sharp, clear, and distinct from bars on either side. Press the ABORT button two times to change the color of the screen border. Press REVERSE to exit.

CONVERGENCE tests fill the screen with a grid and a series of dots. Use the Convergence Tests while adjusting monitor convergence, linearity, and dynamic focus. The convergence grid and the dots should be all one color. Look for fringes or parallel images, which shouldn't appear. Color fringes in the center grid or dots indicates a need for static convergence. Color fringes at the edges of the screen indicates a need for dynamic convergence. **Also,** the lines should be straight and the dots round. Curved lines may indicate a need for side pincushion adjustments. Press the ABORT button two times to change the color of the screen grid lines. Press REVERSE to exit.

PURITY tests fill the screen with 100% of the chosen color at normal intensity. Use the Purity Tests while adjusting color purity. You can also use purity screens to check black level, intensity, blanking and degaussing. Each screen should be absolutely uniform from top to bottom and side to side. No retrace lines, color contamination or noise should be visible. Color screens contaminated with other colors indicate a need for degaussing or purity magnet adjustment. Press the ABORT button eight times to change the color of the screen. Press REVERSE to exit.

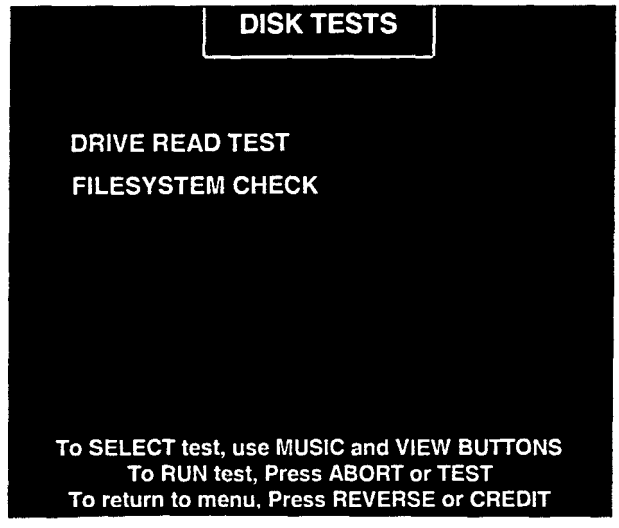
RECTANGLES tests display solid color boxes over a contrasting background screen. Use the Rectangles Tests while adjusting vertical height, horizontal width and raster linearity. Each rectangle should be centered, with all four sides visible. The sides of the background shouldn't be visible. Press the ABORT button twice to change the color of the screen. Press REVERSE to exit.

If any test reveals a need for adjustment, use the proper knobs on the Monitor Remote Controls board.

DISK TESTS

Select DISK TESTS at the Self-Test Menu. The Disk Test Menu allowsyou to check hard drive operation.

Use the VIEW #2 and VIEW #3 buttons to select a particular menu item. The VIEW #1 and MUSIC buttons are used to change variables. There are no custom settings or adjustable variables in these tests.



DRIVE TEST MENU

Hard Drive Connected
This test routine verifies the interface between the CPU Board and the hard drive itself. The processor requests disk information. Data can't be retrieved successfully if there is a problem.

Drive ID
Drive ID is an industry standard identification for hard drive type and capacity. This is a manufacturer hardware number. It doesn't identify the software or the game program on the drive.

Logical Sector Test
The Logical Sector Test reads and verifies the disk drive, sectors by sector. After checking each sectors status, the system compares data transfer speed to its acceptance limits.

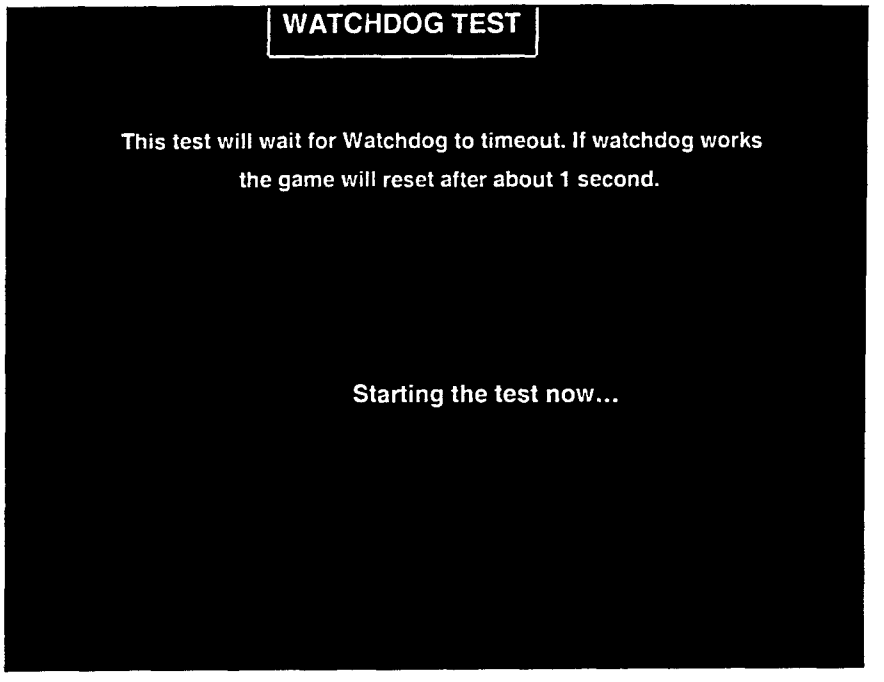
Tests Completed
These tests run over and over. The number increases each time the cycle repeats (some five minutes).

File System Check
The File System Check routine tests hard drive file data. If the system detects errors, it tries to repair them (some three minutes per cycle). The system reports error severity and whether game performance will suffer.

WATCHDOG TEST

Select WDOG TEST at the Self-Test Menu. The Watchdog Test Menu checks the watchdog timer circuit. In the event of a VGM system crash or loop, the watchdog resets the system. The system then performs its standard, power-on self-tests. If the system is okay, it reboots normally.

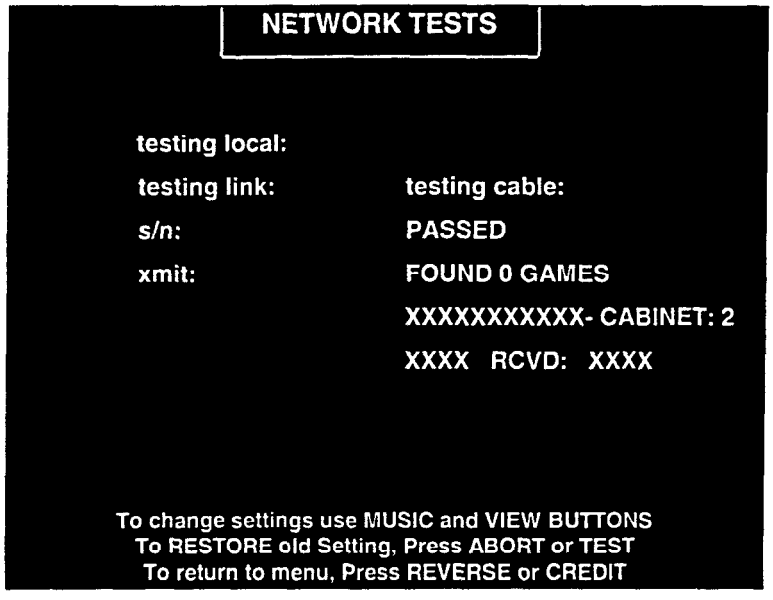
Use the VIEW #2 and VIEW #3 buttons to select a particular menu item. The VIEW #1 and MUSIC buttons are used to change variables. There are no custom settings or adjustable variables in these tests.



WATCHDOG TEST MENU

NETWORK TESTS

Select NETWORK TESTS at the Self-Test Menu. The Network Test Menu provides routines for verifying communication circuits of linked games. These tests don't include custom settings or adjustable variables.



NETWORK TESTS MENU

Several different options allow cabinets to be finked together for networked competition. This screen allows you to determine if the linking equipment is networking or not working. The results of these tests either confirm proper operation or indicate where the problem may be found.



NOTICE: This group of tests checks only system hardware (cables and communications circuits). Inspect for disconnected or broken cable, hubs, etc. Individual games are not affected by faults.

Testing Local

This test performs an internal check of the local communication circuits in the game cabinet. It doesn't test any cables, hubs, or the other game cabinets. An error message indicates CPU board difficulties.

Testing Cable

This verifies complete signal paths. **"??"** is a normal response to this test when the game is not linked. Linked games require all cabinets, couplers, hubs, etc. to be powered on and connected to report OK.

Testing Link

This sends data out from each active game and looks for responses. At least two cabinets must be networked properly to pass this test. Test results take longer to report as more games become active.

Cabinet ID

Linked games must exchange information back and forth on the network. This screen area shows each active linked cabinet and confirms data flow. Only one cabinet will transmit data, but all must receive it.

Xmit

This number is a running count of the data packets sent by the local game cabinet. Packet quantities increase continually until you exit this screen. This cabinet will always receive each packet it transmits.

Rcvd

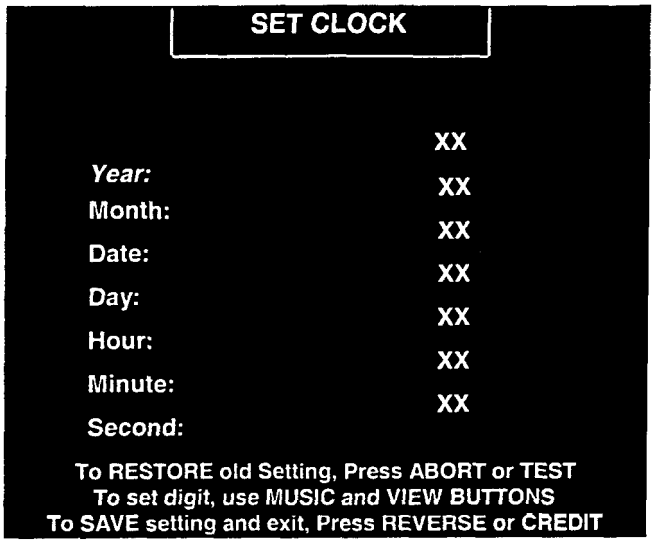
This number is a running count of data packets collected from the network. The count increases until you exit. Each linked cabinet must receive packets from the local cabinet or the communications network is faulty.

	NOTICE: This Network Test applies only to the local game cabinet (your present location). This cabinet is always listed first in the report. Other cabinets report data received, but only this cabinet report data transmitted.

SET CLOCK

Select SET CLOCK at the Self-Test Menu. The Set Clock Menu allows you to accurately enter the time and date. You must set the clock properly if the optional contest feature is to be accurate.

Use the VIEW #2 and VIEW #3 buttons to select a menu item. The VIEW #1 and MUSIC buttons are used to change the variabtes. There are no custom settings or factory default values for these items.



SET CLOCK MENU

The clock provides accurate time stamps for game statistics. The clock doesn't affect game operation.

Once set, the clock will run until the battery dies or service or some major fault disrupts circuits. Periodically examine the top lines of the SELF-TEST screen for the correct time and date.

Press REVERSE to save new information. The ABORT button returns items to the previous values.



NOTICE: The Self-Test Menu shows the time only when requested (not running time). Incorrect clock settings will affect contest announcements and other features.

Year. Two digits. Range 00 to 99.

Month. Two digits. Range 01 to 12.

Date. Two digits. Range 01 to 31.

Day. Only one digit. Range 1 to 7.

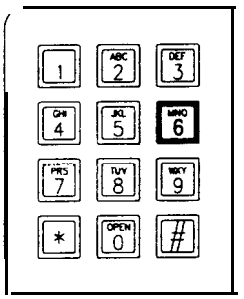
Hour. Two digits. Range 00 to 23.

Minute. Two digits. Range 00 to 59.

Second. Two digits. Range 00 to 59.

SAN FRANCISCO

RUSH 2049’”

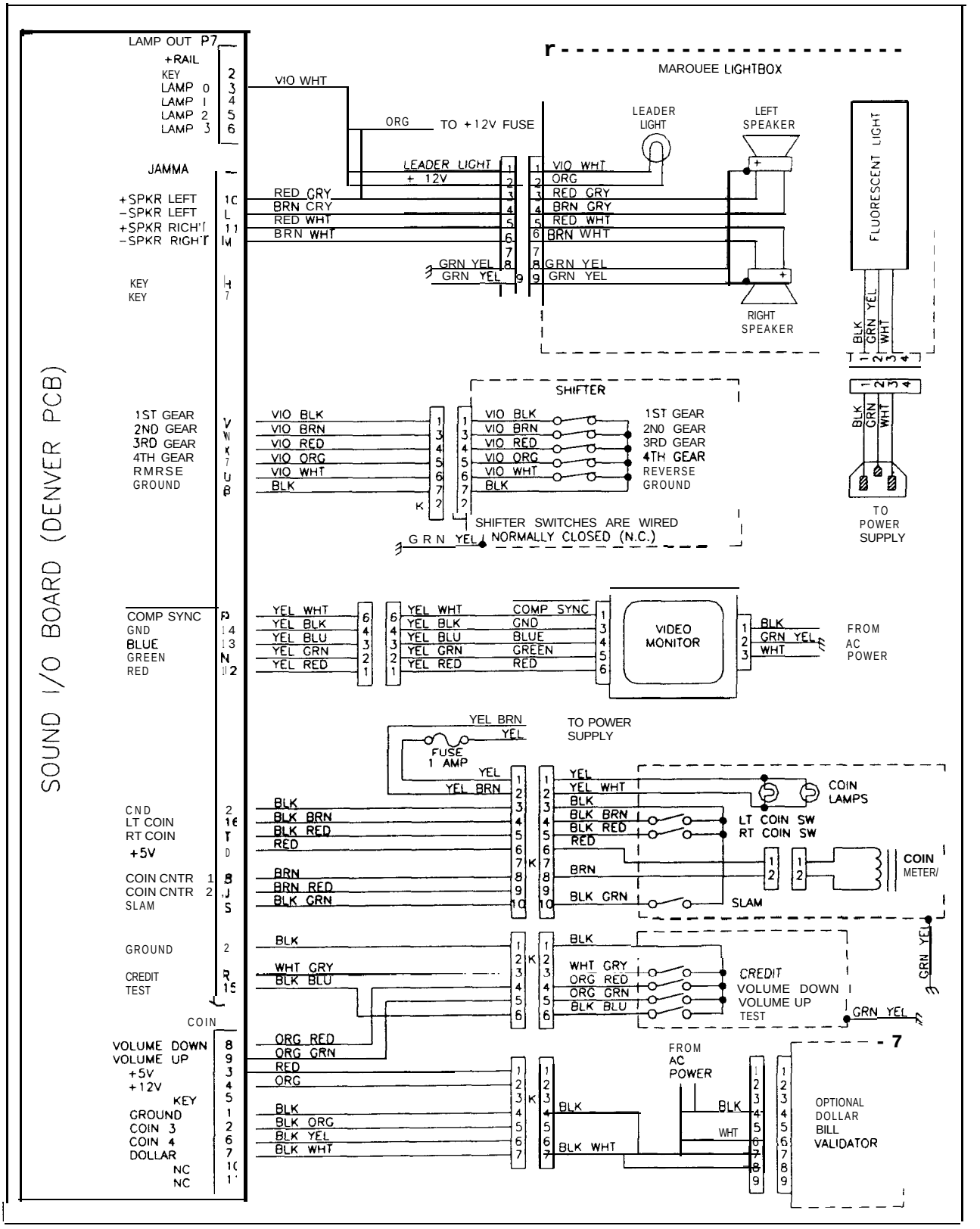


CHAPTER SIX

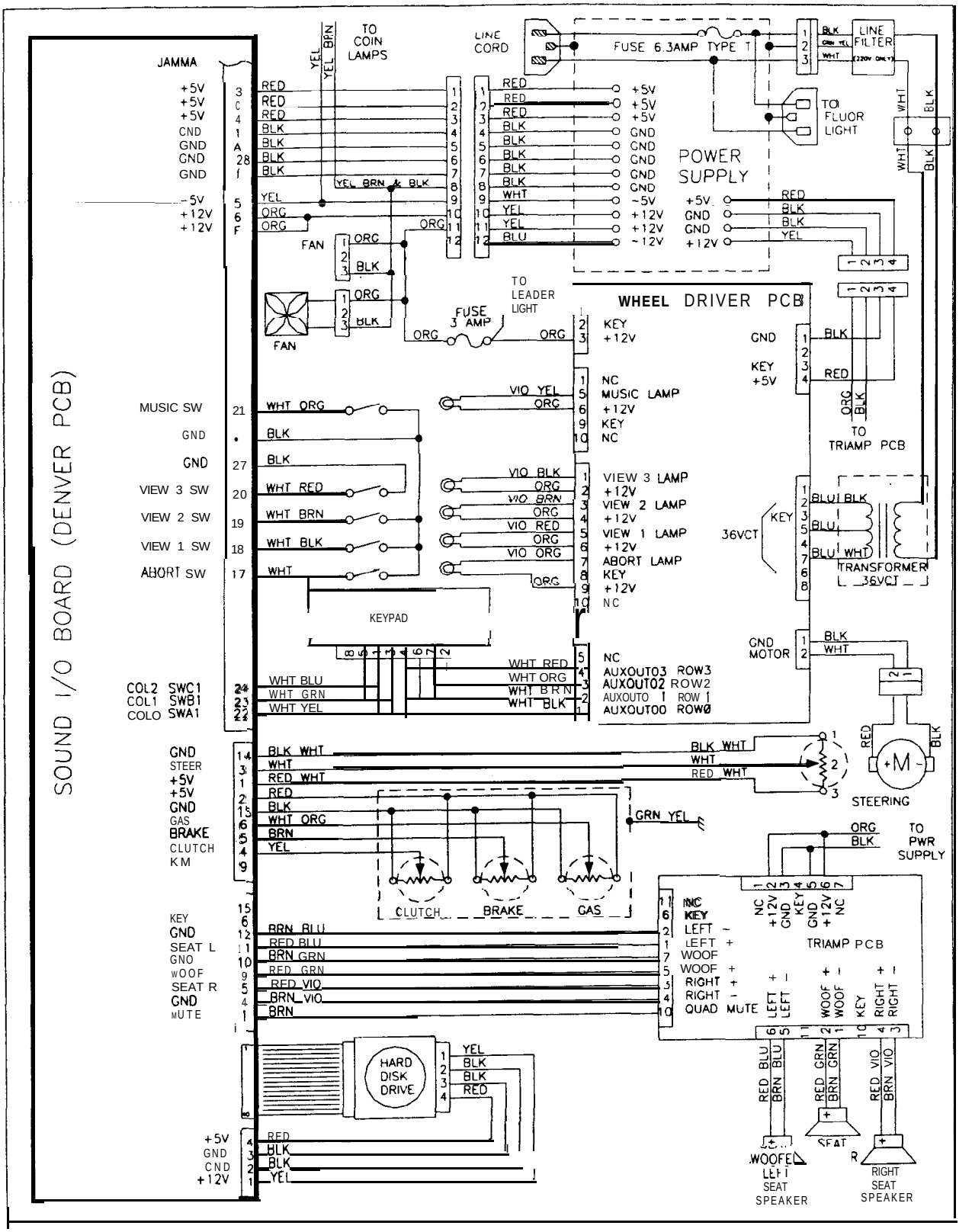
WIRING

Failure to reconnect all ground wires or replace metal shields and covers with each mounting screw installed and securely tightened may result in radio frequency Interference.

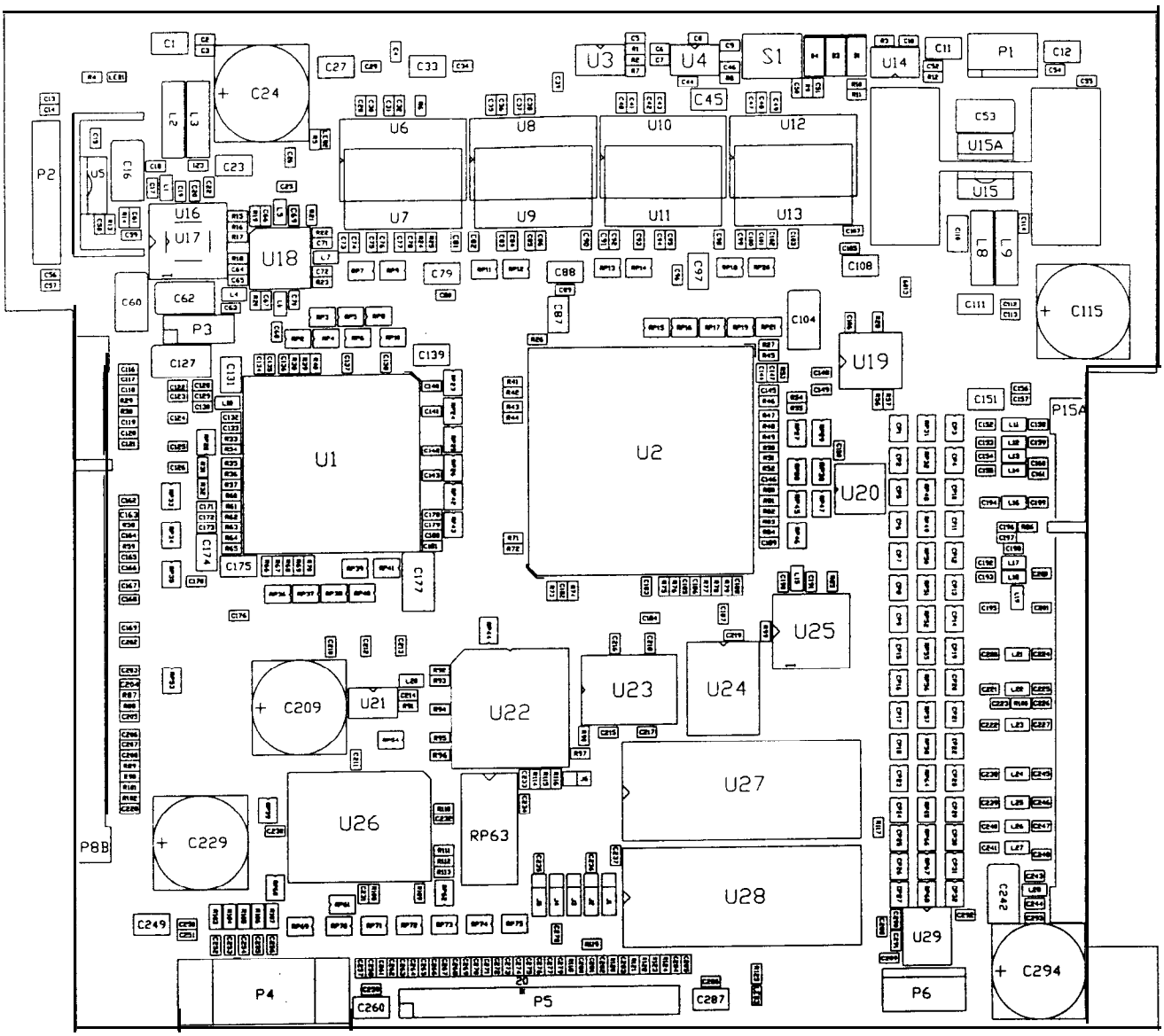
CABINET WIRING DIAGRAM 1



CABINET WIRING DIAGRAM 2



CPU BOARD ASSEMBLY



CPU ASSEMBLY SWITCH

DESIGNATION	LOCATION	FUNCTION	POSITIONS	STATE	MEANING
S1	**EDGE NEAR U4** AND U12	RESETS AND RESTARTS GAME	2	OFF	NORMAL OPERATION
				ON	FORCED RESET

NOTE: This switch resets the CPU Board without turning the power off at the power supply.

CPU BOARD ASSEMBLY
JUMPER POSITION CHART

DESIGNATION	LOCATION	FUNCTION	MEANING	POSITION	DEFAULT
J1 (NOTE 1)	NEAR U28 & CONNECTOR P5	CPU Boot ROM Type (U18)	EPROM	PINS 1 & 2	•
			Flash ROM	PINS 2 & 3	
J2 (NOTE 2)	NEAR U28 & CONNECTOR P5	CPU Boot ROM Size (U18)	1,2, or 4Mbit Flash ROM	PINS 1 & 2	•
			8Mbit Flash ROM	PINS 2 & 3	
J3 (NOTE 1)	NEAR U28 & CONNECTOR P5	CPU Boot ROM Type	EPROM	PINS 1 & 2	•
			Flash ROM	PINS 2 & 3	
J4 (NOTE 2)	NEAR U28 & CONNECTOR P5	CPU Boot ROM Size (U18)	2Mbit ROM	PINS 1 & 2	•
			1 Mbit ROM	PINS 2 & 3	
J5 (NOTE 3)	NEAR U28 & CONNECTOR P5	Expansion Boot ROM Size (U19)	4Mbit ROM	PINS 1 & 2	•
			8Mbit ROM	PINS 2 & 3	
J6	BETWEEN U22 & U27	Boot Program Location	Boot from CPU ROM	PINS 1 & 2	•
			Boot from DSIO ROM	PINS 2 & 3	

NOTES:

1. Set both jumpers J1 and J3 to EPROM or Flash ROM mode to use such devices.
2. These jumpers operate independently of one another.
3. This jumper is independent of the CPU boot ROM size selected.

CPU BOARD ASSEMBLY
LED INDICATOR STATUS CHART

DESIGNATION	LOCATION	FUNCTION	COLOR	STATE	MEANING
LED 1 (NOTE 1)	NEAR C1 & U5	3.3V CPU POWER INDICATOR	RED	OFF	INSUFFICIENT POWER
				ON	POWER O.K.
				BLINKING	POWER FAULT
LED 2 (NOTE 2)	NEAR C24 & U6	5v CPU POWER INDICATOR	RED	OFF	INSUFFICIENT POWER
				ON	POWER O.K.
				BLINKING	POWER FAULT
LED 3 (NOTE 3)	NEAR P5 & U28	HARD DISK DRIVE ACTIVITY	GREEN	OFF	NOT IN USE
				ON	LOCKED UP
				BLINKING	NORMAL DISK ACTIVITY
LED 4 (NOTE 4)	NEAR U22 & U26	CPU ACTIVITY INDICATOR	RED	OFF*	*SEE NOTE 4 BELOW
				ON*	
				BLINKING* SEQUENTIALLY	

NOTES:

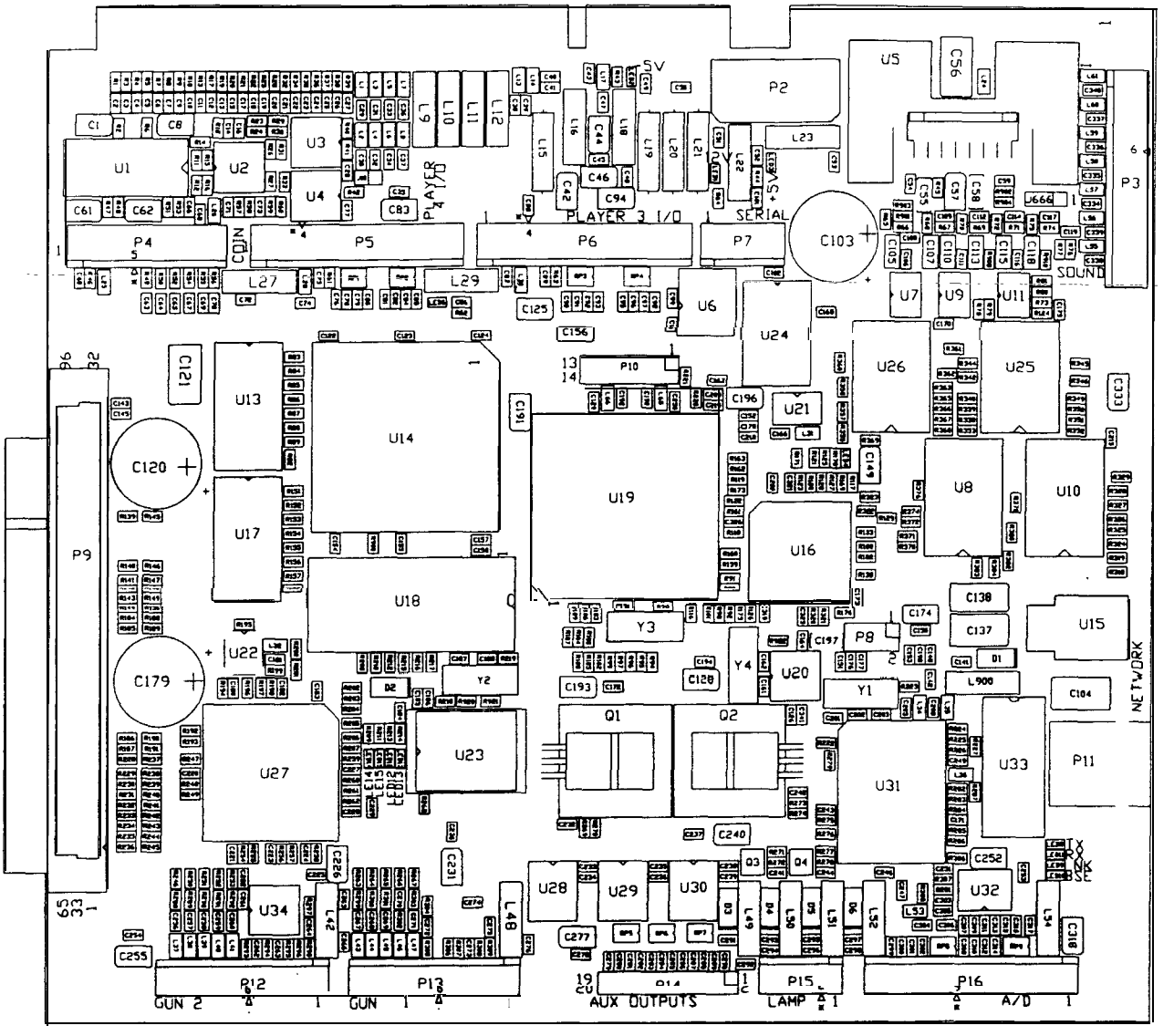
1. LED 1 monitors CPU power (+3.3 Volts). If this LED is off or blinking, investigate the processor circuits. If other LEDs are off or blinking at the same time, check the +5 Volt circuits or the game power supply.

2. LED 2 monitors CPU power (+5 Volts). If this LED is off or blinking, investigate the processor circuits. If other LEDs are off or blinking at the same time, check the +5 Volt circuits or the game power supply.

3. LED 3 flashes when the hard disk is operating during game play. It may light continuously during startup. If this LED is lighted continuously, there may be a fault with the hard disk drive, which may be locked up.

4. LED 4 initially indicates program start-up stages. It is a seven segment alpha-numeric display device. Under normal conditions, it displays a lowercase "b" or a sequentially blinking segments in an "O" pattern. During any of the self-test screens, it displays a "bouncing bar" resembling a hyphen ("-").

SOUND I/O BOARD ASSEMBLY

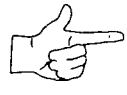


SOUND I/O BOARD ASSEMBLY
JUMPER POSITION CHART

DESIGNATION	LOCATION	FUNCTION	MEANING	POSITION	STATE
J1 (NOTE 1)	NEAR U9 & CRYSTAL Y3	GUN 1 I/O CONNECTOR P2	INPUT MODE	PINS 1 & 2	●
			OUTPUT MODE	PINS 2 & 3	
J2 (NOTE 3)	BETWEEN P16 & U35	VIDEO SYNC	NEGATIVE SYNC	PINS 1 & 2	●
			POSITIVE SYNC	PIN 1 ONLY	
J3 (NOTE 2)	BETWEEN P2 & U15	GUN 2 I/O CONNECTOR P4	INPUT MODE	PINS 1 & 2	●
			OUTPUT MODE	PINS 2 & 3	
J4 (NOTE 4)	NONE	NONE	NOT USED	NONE	---
J5 (NOTE 2)	BETWEEN P2 & U15	GUN 2 I/O CONNECTOR P4	INPUT MODE	PINS 1 & 2	●
			OUTPUT MODE	PINS 2 & 3	
J6 (NOTE 4)	NONE	NONE	NOT USED	NONE	▪▪▪
J7 (NOTE 4)	NONE	NONE	NOT USED	NONE	▪▪▪
J8 (NOTE 1)	BETWEEN P4 & U9	GUN 1 I/O CONNECTOR P2	INPUT MODE	PINS 1 & 2	●
			OUTPUT MODE	PINS 2 & 3	

NOTES:

1. Select the Gun 1 (P2) I/O port mode by setting both the J1 and J8 jumpers to input or output mode.
2. Select the Gun 2 (P4) I/O port mode by setting both the J3 and J5 jumpers to input or output mode.
3. Set the Video Sync Signal Polarity to Positive by setting the J2 jumper on pin 1 only. Do not remove.
4. These jumpers are not required for this game. They may not be present on the board assembly.



NOTICE: The manufacturer wants you to know that guns are not supplied with this game. Connectors are provided for other games that do have guns. We regret your disappointment.

DSIO BOARD ASSEMBLY
LED INDICATOR STATUS CHART

DESIGNATION	LOCATION	FUNCTION	COLOR	STATE	MEANING
LED 1 (NOTE 1)	NEAR U11	SIO BOARD ACTIVITY	GREEN	OFF	NO BOOT ROM
				ON	SIO BOARD LOCKED UP
				BLINKING	NORMAL OPERATION
LED 2 (NOTE 2)	NEAR U34 & CRYSTAL Y1	LINKING CONNECTOR STATUS	GREEN	OFF	NOT IN USE (NO GAME LINKING)
				ON	NORMAL LINKED OPERATION
				BLINKING	LINK FAULT
LED 3 (NOTE 3)	NEAR THE JAMMA CONNECTOR	-5V POWER INDICATOR	RED	OFF	NO POWER
				ON	NORMAL OPERATION
				BLINKING	POWER FAULT
LED 4 (NOTE 4)	NEAR U35 & CONNECTOR P14	+12V POWER INDICATOR	RED	OFF	NO POWER
				ON	NORMAL OPERATION
				BLINKING	POWER FAULT
LED 5 (NOTE 5)	NEAR CONNECTOR P23	+5V POWER INDICATOR	RED	OFF	NO POWER
				ON	NORMAL OPERATION
				BLINKING	POWER FAULT
LED 6 (NOTE 6)	NEAR U34 & CRYSTAL Y1	CPU LINKING ACTIVITY	RED	OFF	NOT IN USE
				ON	CPU LINKING IN PROGRESS
				BLINKING	NORMAL OPERATION
LED 7 (NOTE 7)	NEAR U34 & CRYSTAL Y1	LINKING TRANSMITTING DATA	RED	OFF	NOT IN USE (NO GAME LINKING)
				ON	SENDING DATA
				BLINKING	NORMAL OPERATION
LED 6 (NOTE 6)	NEAR U14 & CRYSTAL Y 1	AUDIO ACTIVITY	YELLOW	OFF	NO SOUND BOOT ROM
				ON	LOCKED UP
				BLINKING	NORMAL OPERATION

DSIO BOARD ASSEMBLY
LED INDICATOR STATUS CHART (CONTINUED)

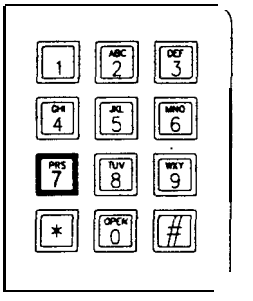
LED 9 (NOTE 9)	NEAR U34 & CRYSTAL Y1	LINKING RECEIVING DATA	YELLOW	OFF	NOT IN USE (NO GAME LINKING)
				ON	RECEIVING DATA
				BLINKING	NORMAL OPERATION
LED 10 (NOTE 10)	NEAR U44 & CRYSTAL Y2	AUDIO ACTIVITY	GREEN	OFF	NOT IN USE (NO AUDIO DATA)
				ON	RECEIVING DATA
				BLINKING	NORMAL OPERATION
LED 11 (NOTE 11)	NEAR U44 & CRYSTAL Y2	NONE	RED	OFF	NOT IN USE (NORMAL)
				ON	CIRCUIT FAULT
				BLINKING	CIRCUIT FAULT
LED 12 (NOTE 12)	NEAR U44 & CRYSTAL Y2	INTERRUPT ACTIVITY	YELLOW	OFF	NOT IN USE (NO INTERRUPTS)
				ON	RECEIVING DATA
				BLINKING	NORMAL OPERATION
LED 13 (NOTE 13)	NEAR U44 & CRYSTAL Y2	DISK ACTIVITY	YELLOW	OFF	NOT IN USE
				ON	PROCESSING DATA
				BLINKING	NORMAL OPERATION

NOTES:

1. Boot ROM is active in short bursts only during start up. May appear irregular after a switched reset.
2. Must be on continuously when linked. Intermittent wiring or hub problems could cause blinking.
3. Monitors a regulated power source. Must be on continuously at all times for correct operation.
4. Monitors a regulated power source. Must be on continuously at all times for correct operation.
5. Monitors a regulated power source. Must be on continuously at all times for correct operation.
6. Indicates packet activity occurring on the network. May appear continuous during heavy game play.
7. This cabinet is sending network packet data. May appear continuous during heavy game play.
8. Sound ROM is active in short bursts only during start up. May appear continuous during game play.
9. This cabinet is getting network packet data. May appear continuous during heavy game play.
10. Sound ROM is active in short bursts only during start up. May appear continuous during game play.
11. This indicator is not required for this game. It may not be present on the board assembly.
12. Indicates internal game electronics communication. May appear continuous during heavy game play.
13. Hard Disk Drive is active in short bursts only during play. May appear continuous at start up..

SAN FRANCISCO

RUSH 2049”



CHAPTER SEVEN

TROUBLESHOOTING

This game uses complex electronic components that are very SENSITIVE to static electricity. The following precautions must be observed and followed prior to handling the electronics.

1. **Ensure that the AC. power to the game is turned OFF prior to servicing the electronics.**
2. **Discharge any static electricity build up in your body by touching the safety ground stud of the power supply chassis while the line cord is connected to a properly grounded outlet.**
3. **Store the electronic assemblies in an anti-static area. Anti-static bags are to be used to store or transport the game CPU Board Assembly.**
4. **DO NOT remove or connect any electronic assemblies when the cabinet power is ON. Doing so will damage the electronic assemblies and void the warranty.**
5. **Always replace ground wires, shields, safety covers, etc. when maintenance or service is completed. Ensure that all ground and mounting screws are installed and tightened firmly.**

Coin Mechanism and Pricing Troubleshooting Table

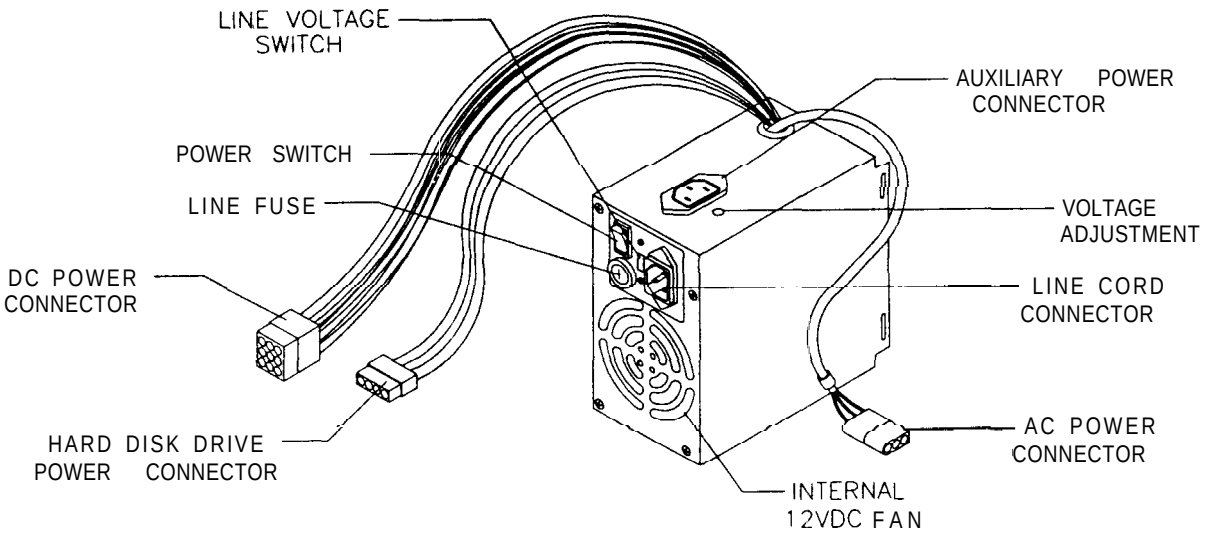
SYMPTOM	CAUSE	REQUIRED ACTION
• VGM accepts currency or tokens, but number of credits per coin or bill is incorrect.	Improper settings at Pricing Menu	From Coin Options Menu, choose PRICING OPTIONS MENU. Verify that units and credits are set correctly.
	Faulty wiring	1. Check that cabinet wiring is correct for this VGM. 2. Assure that coin meter and coin switches connect properly to control input wires.
• VGM won't accept currency or tokens. • VGM won't start. • Audio and video are present.	Improper currency	1. Unlock and open cash door. Empty cash box. Inspect revenue for counterfeit currency. 2. Check vault. Remove any items that block path from mechanism.
	Faulty coin mechanism	1. Unlock and open coin door. Check each mechanism for proper mounting. 2. Remove mechanism. 3. Clear currency path. 4. Reinstall mechanism and latch it. 5. Enter Menu System by pressing and holding TEST MODE switch inside coin door. From Self-Test Menu, choose CONTROLS TEST. Use tests to confirm operation of coin switches.
	Tilted coin mechanism or VGM	1. Verify that mechanism is level after doors close. 2. Repair or replace coin door if it is bent or damaged. 3. If necessary, adjust cabinet leg levelers to keep mechanisms vertical.
• Coin indicators don't light	Burned-out bulb	1. Burned-out bulbs mav , appear white or darkened. Check continuity with DVM. 2. Replace burned-out bulb with same type.
	Open fuse circuit	1. Check fuse continuity with DVM. 2. If fuse is blown, replace fuse with same type. 3. If fuse isn't blown, check wiring.



CAUTION: Don't 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.

VGM Startup Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
• VGM doesn't start. • VGM appears completely non-functional. • No audio • No illumination • No video display	Power problem	1. Check that VGM power switch is on. 2. Inspect electronics to see if fans are turning. If not: Is power supply connected to its power cable? Is power supply turned on? 3. Plug VGM into AC power outlet. Verify presence of AC line voltage.
	Improper line voltage switch setting	Turn off VGM power. Unplug AC line cord. Check line voltage switch. If necessary, set it to agree with local AC line voltage. Retest VGM.
	Open fuse	1. Turn off VGM power. Examine AC fuse on power supply. 2. Examine DC fuses inside coin door vault. 3. Replace faulty fuses with identically rated parts. 4. Turn on VGM power. If fuse opens again, check DC wiring harness and connectors.
	Faulty wiring	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 at power chassis. Press connector firmly to seat it. 2. Check other cables in same manner. 3. Assure that cabinet wiring harness connectors fully seat in corresponding power supply and board connectors. 4. Inspect wiring for breaks or damage.
	CPU Board problem	Turn off power for one minute and turn VGM on again. Power On Self-Test checks electronics.

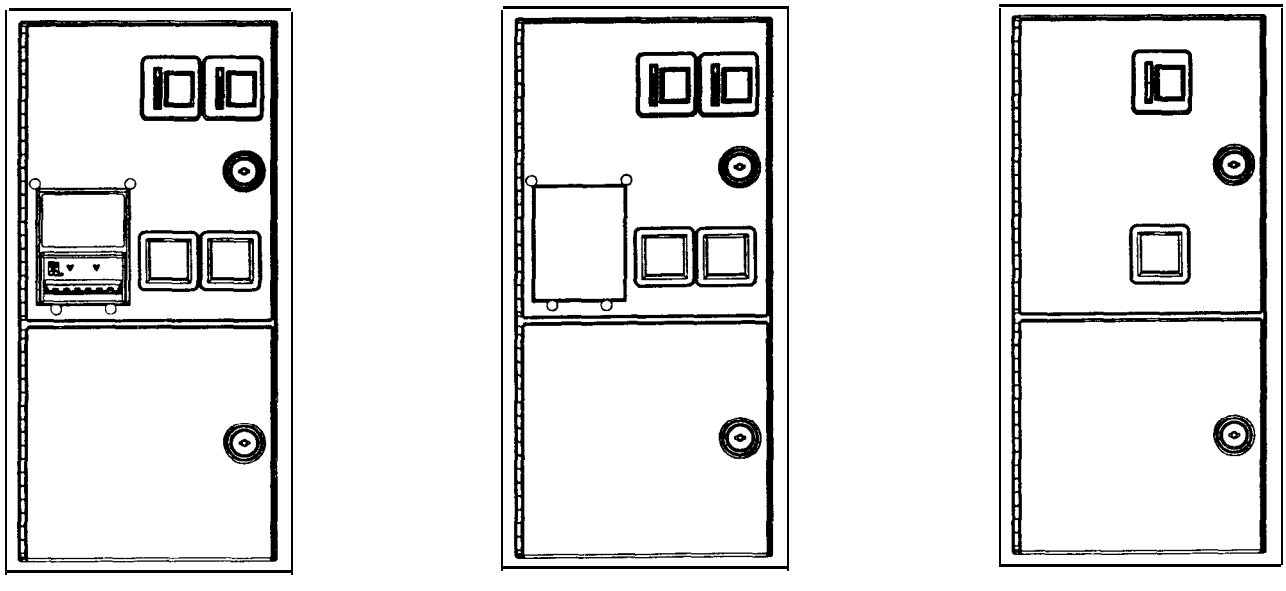


Power Supply and Line Cord

VGM Startup Troubleshooting Table, continued

SYMPTOM	CAUSE	REQUIRED ACTION
• VGM appears non-functional. • Currency acceptor price indicator is illuminated.	Power problem	1. Inspect circuit boards under low-light conditions. LEDs glow if processor circuits receive voltage. Fan should be turning. These indications prove presence of DC from power supply. Still, voltages or signals may not be normal. 2. Turn on VGM power. Using 20-volt DC setting on digital voltmeter, measure DC voltages at power connector pins. 3. Using 2-volt AC *setting* on digital voltmeter, measure same DC voltages as above. Any reading here indicates that supply voltages are unstable and may contain ripple or noise.
	Faulty wiring	Turn off VGM power. Assure that wiring harness connectors attach and fully seat onto mating board connectors.
	Improper jumper or DIP switch settings	Verify that circuit board jumpers are set as intended. Check DIP switch settings.
	Faulty circuit boards	1. Run power-up self-test sequence. Note errors or failures during tests. Compare LEDs with LED indicator status charts. Note discrepancies.

CAUTION: Don't remove or install any connector while power is turned on. Doing so will damage circuit boards or hard disk drive, and void warranty.

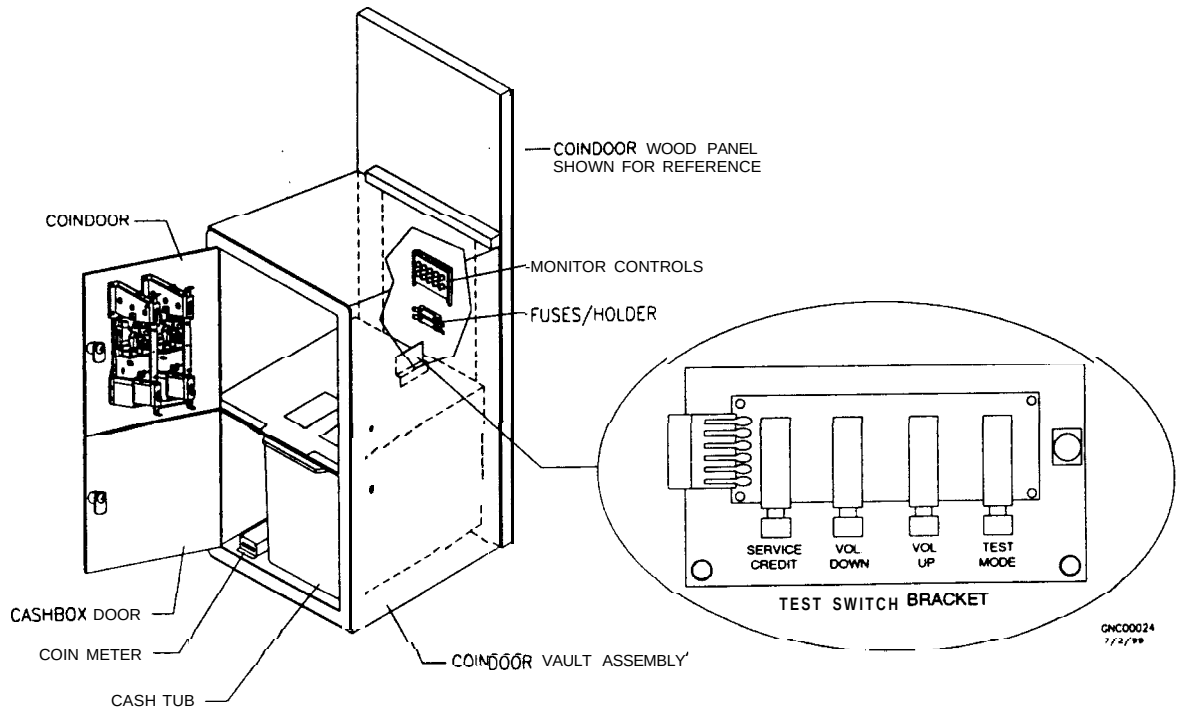


Front View of Coin Doors

VGM Startup Troubleshooting Table, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
• VGM doesn't start. • VGM accepts currency or tokens. • Audio and video are present.	Faulty coin mechanism	1. Unlock and open coin door. Check each currency acceptor to assure proper mounting. Verify that each release latch is closed and locked. Does mechanism accept and reject currency correctly? Test mechanism with good and bad coins. 2. Inspect to see if external acceptor indicators (Pricing, Flashing Arrows, etc.) are lit. 1. Verify that each acceptor operates properly by placing it in working VGM. Replace bad parts.
	Faulty switches	1. Enter Menu System by pressing and holding TEST MODE switch inside coin door. From Self-Test Menu, choose CONTROLS TEST. Use tests to confirm operation of each switch. 2. Assure that 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	1. Assure that no wires are caught in hinges, latches or switch contacts. 2. Check wiring continuity from circuit board connectors to acceptors.

NOTICE: Gearshift switches are wired for normally closed operation. The other switches are wired for normally open operation. Reconnect wires to proper switch terminals.



Interior View of Coin Door and Cash Door

Audio Troubleshooting Table

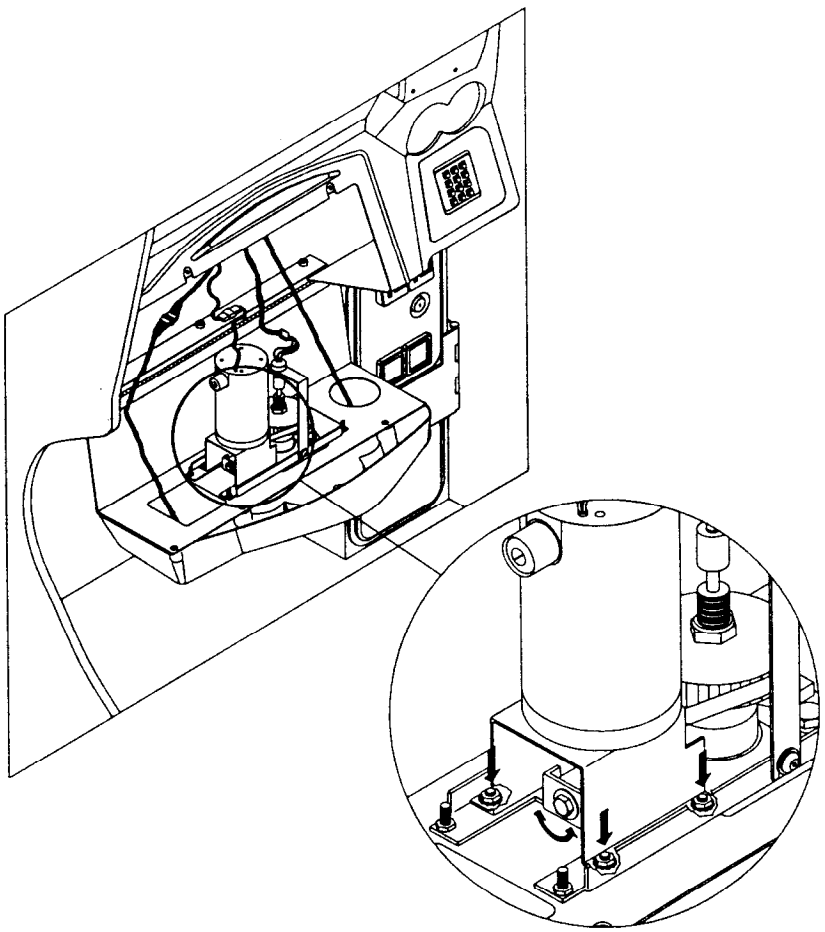
SYMPTOM	CAUSE	REQUIRED ACTION
. No audio . Video is present . VGM appears to operate normally	Improper volume setting	Enter Menu System by pressing and **holding** TEST MODE switch. From Self-Test (Main) Menu, choose ADJUST VOLUME. Check that Attract Music is on (enabled). Verify that all volume levels are set well above zero. If necessary, change levels to make VGM audible.
	Faulty wiring	Turn off VGM power. Assure that wiring harness connectors attach and fully seat onto mating board connectors. Verify that harness connects to circuit boards. 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 working VGM.
. Constant low hum from all speakers.	Faulty wiring	1. Check that cabinet wiring is correct for this VGM. 2. Verify that cabinet wiring provides separate wires (not common return) for each speaker. 3. Check connection of all cabinet ground wires.
	Faulty Sound I/O Board	1. Run power-up self-test sequence. Note errors that VGM finds during tests. Compare Sound I/O Board LEDs with LED indicator status charts. Note discrepancies. 2. Verify that Sound I/O Board operates by placing it in working VGM. Replace bad parts.
	Faulty power supply	Using 2 Volt AC setting on digital voltmeter, measure voltages at speaker terminals. Any reading indicates unstable supply that may contain ripple or noise.
. Audio is distorted, muffled or has missing frequencies.	Faulty or improper speaker	1. Turn off VGM power. Remove grilles and check speakers. Assure 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 connecting speaker in question to working VGM.
	Faulty wiring	Multiple-speaker installations: Check for reversed wires at one speaker. Weak low frequencies and thin or hollow sound quality is symptom of incorrectly phased speakers. Sound tests may not detect this condition, but you can hear it during VGM operation.
. Dead sound channel	Faulty speaker	1. From Self-Test Menu, choose SOUND TEST. Recheck speakers with audio signals provided by test. 2. Verify proper speaker operation by connecting speaker in question to working VGM.
	Faulty circuit board	Run power-up self-test sequence. Note errors that VGM finds during tests. Compare circuit board LEDs with LED indicator status charts. Note discrepancies.
	Faulty wiring	Verify that cabinet wiring is correct. Assure that all speakers connect to audio wires. Check for broken or shorted wires.

Link Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
. Can't connect VGMs together	Faulty wiring	1. Don't extend linking cables that come with VGM. 2. Install required crossover between VGM cabinets. Each coupler connects two cabinets (one pair). Don't use standard telephone *type couplers or wiring to link cabinets.* 3. Use only 10Base-T, Ethernet-type, Category 5, twisted-pair wiring for VGM data.
	Improperlinking hardware	Use required network hub for your local network. Hub Link Kit permits up to four cabinet connections. Cabinet array completion requires basic kit brackets and spacers.
. **VGM doesn't recognize other players in linking operation** . VGM functions normally by itself	Improper settings	1. Record any error messages that occur during self-test. 2. From Self-Test (Main) Menu, choose Adjustments Menu. Then select Linked Play Adjustments Menu. Assure that you've set LINKED PLAY to ON. 3. Be sure that each VGM has unique ID number.
	Power problem	If hub is in use, verify that power is applied. AC adapter wires are thin and easily damaged.
	Faulty wiring *(3 or more cabinets)*	1. Inspect hub indicator lights. Each active port should have illuminated indicator. If cable connects, and that position has no lit indicator, check for cable continuity from hub to cabinet. 2. Assure that no loose wires catch in hinges, doors, or under cabinet. 3. Verify that linking cable connects to Network Board at each VGM's computer. 4. Verify that each linking cable operates properly by placing it in working VGM.
. Some VGMs in group link properly, while others don't	Improper hub switch setting	1. Assure that switches on hub are set correctly according to Hub Link Kii instructions. (Networked cabinets don't require couplers. Hub has electronic crossover.) 2. Inspect hub indicator lights for link activity. See manufacturer's literature for diagnostics.
	Wrong software version	Verify that all linked cabinets use same software version. Otherwise, linked cabinets won't recognize each other. Contact your distributor.
	Faulty wiring *(2 cabinets)*	1. Insert crossover connections between coupled cabinets. Standard couplers appear identical to devices supplied with cabinets, but don't include internal crossover. Use only one coupler, not two. 2. Verify that each linking crossover coupler operates properly by placing it in working link between two cabinets.
	Faulty wiring *(3 or more cabinets)*	1. You used additional crossover connector and cable to extend VGM or hub link connection. Two crossovers cancel and cause same problem as no link crossover. 2. Connect cables directly to hub. Don't use crossover coupler and hub together in single network. 3. Separate communications wiring from other wiring. Wires that must cross should cross at right angles to limit noise pickup.

Player Control Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
• intermittent or completely non-functional player controls . VGM starts normally.	Faulty switches or lamps	1. Enter Menu System by pressing and **holding** TEST MODE switch inside coin door. From Self-Test Menu, choose CONTROLS TEST. Run tests to confirm switch operation. 2. Check for loose parts or wires caught in switch contacts. 3. Check continuity at each switch connection (Common to Normally Open or Common to Normally Closed). 4. Verify that control operates properly by placing it in working VGM. 5. Verify that dashboard switch light bulbs are type specified in parts listing. Other types light, but may produce too much heat. Eventually excess heat may cause switches to bind.
	Faulty switch wiring	1. Check for wires caught in door hinges, latches, or switch contacts. 2. Verify that harness connectors are attached and fully seated. 3. Assure that control switches connect property to control input wires. 4. Check that cabinet wiring is correct for this VGM.
• 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.



Adjust Belt Tightness

Player Control Troubleshooting Table, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
• Sloppy, unpredictable or ineffective steering • Video appears on screen • VGM starts normally	Blocked or faulty fan	th VGM power on, check airflow near each fan. Case cooling fans are intake fans. Power supply fan is exhaust fan. Assure that nothing blocks airflow.
	Faulty mechanical parts	Turn off VGM power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if your VGM has one) over motor. Inspect for faulty or worn belts, bearings, couplings, gears etc.
	Faulty Wheel Driver Board	1. Inspect Wheel Driver Board under low-light conditions. LEDs glow if motor driver circuits receive AC power from transformer. (Voltages or signals may or may not be normal.) 2. Examine fuses and cables on Wheel Driver Board. Replace bad fuses. Using digital voltmeter, verify AC voltage between each fuse holder and ground. You should measure approximately 25V. See Wiring Diagram. 3. Using 20 VAC setting on digital voltmeter, measure DC voltage at motor. Don't move *steering wheel, drive belt, or motor while making this measurement.* Any reading indicates unstable supply that may contain ripple or noise. 4. Verify proper operation of Wheel Driver Board by placing it in working VGM.
	Loose or worn drive belt	1. Turn off VGM power. Open dashboard. Support steering wheel and remove outer mounting screws. Remove metal shield (if your 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.
• No wheel feedback • Steering aims vehicle as expected	Improperly set feedback	1. From Self-Test Menu, select GAME OPTIONS. 2. Set feedback to match player requirements. Maximum force may be too extreme for very young or inexperienced customers.
	Faulty circuit	1. Examine fuses and cables on Wheel Driver Board. 2. Check cables and wiring between computer, interface, driver and motor. 3. Replace bad parts.
	Faulty motor	1. Turn off VGM power. Open dashboard. Support steering wheel and remove outer mounting screws. 2. Remove metal shield (if your VGM has one) over motor. 3. Unscrew caps. 4. Inspect motor brushes. Replace worn parts.

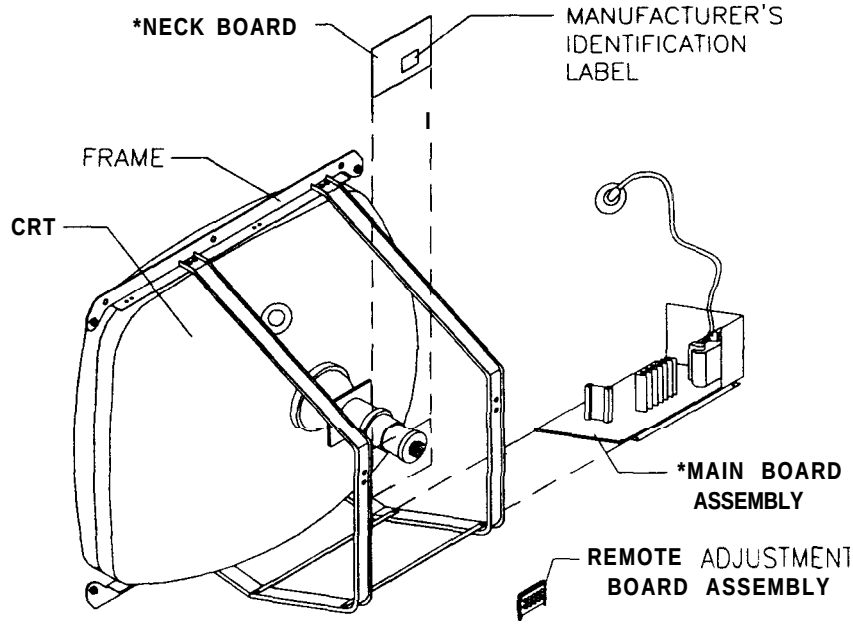


WARNING: The Wheel Driver Board heatsink, power resistors, and other components may be very hot. The DC Motor in the steering wheel may also be hot.

Video Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
• Monitor appears non-functional • Audio is present • VGM controls operate normally	Power problem	Verify connection of AC Power to video monitor. Inspect CRT neck in dim light. Glowing filament near CRT base proves that some monitor circuits receive power. Still, voltages or signals may not be normal.
	Faulty wiring	1. Turn off VGM power. Verify that video signal and Remote Adjustment Board connectors seat properly on Video Monitor Board. 2. Assure that video cables connect to circuit boards. 3. Assure that no wires are caught on chassis or mounting brackets.
	Improper monitor adjustments	Check that BRIGHTNESS (intensity) and CONTRAST are set above their minimum levels.
	Faulty monitor circuitry	1. Examine AC line fuse on Video Monitor Board. If fuse is faulty, replace it with identical fuse. 2. If fuse is good: Verify that video monitor operates correctly by placing it in working VGM. 3. If monitor is bad: Check monitor power supply. 4. If power supply is good: Check monitor horizontal output transistor and related circuitry.

	**WARNING: HIGH VOLTAGE.** 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, without reapplication *of power.*
	**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, *isolate the monitor from line* voltage *with an isolation transformer.*



Typical Monitor Components

Video Troubleshooting Table, continued

SYMPTOM	CAUSE	REQUIRED ACTION
• Game doesn't appear • No audio • Power-up self-test runs	Improper components	1. Verify that hard disk drive is correct for this VGM. Label on drive records manufacturer name, assembly number and program version. 2. Verify that circuit boards are correct for this VGM. Label on each board records manufacturer name, assembly number and hardware version. 3. Verify that ROM instruction set is correct for this VGM. VGM set only has one ROM. Label on ROM records assembly number and software version.
	Hard drive problems	1. Turn VGM on. Immediatelv look under hard drive. Hard Drive Activity LED flashes if drive is operating property. 2. Allow VGM to load normally. Note and record any error messages that occur during self-test. 3. Remove hard drive and install it in working VGM. If symptom recurs there, hard drive is faulty. Replace it.
• Blotches of color appear on screen	Picture tube aperture mask is magnetized	Remove diskettes from room. Demagnetize monitor with external degaussing coil. Take care not to magnetize neighboring VGMs. Monitor may be on or off for this procedure.
• 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	1. Turn on VGM. 2. Press and hold TEST MODE to enter Menu System. At Self-Test (Main) Menu, select Monitor Tests Menu. Run through Crosshatch, Red, Green and Blue screens to find clearest display of problem. 3. Display screen with greatest problem. 4. 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. 5. Display Crosshatch Screen. Touch UP adjustments while watching screen in mirror.
• Background of Attract Mode screens seems out of sync • Words on screen read OK	Someone set DIP switch for resolution ower than VGA	1. VGM only outputs VGA video. Press and hold TEST MODE to enter Menu System. At Self-Test (Main) Menu, select DIP Switch Test Menu. 2. Locate DIP switch bank U17 on the Sound I/O Board. 3. Turn on switch 1. 4. Turn off switch 2. 5. Reenter Attract Mode and check screens.



CAUTION: Don't operate the monitor without its Remote Adjustment Board.



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.

Video Troubleshooting Table, *continued*

SYMPTOM	CAUSE	REQUIRED ACTION
• 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 reconverge monitor. This procedure requires removing and repositioning yoke. Service bureau must follow instructions from monitor manufacturer.
. Video tears or rolls, or has black bar down middle of screen	Faulty wiring	1. Check connectors and cables for wiring continuity. Video cables connect graphics card to circuit boards, and then to video monitor. 2. Assure connection of all cabinet ground wires, especially at video monitor chassis.
	Faulty monitor circuitry	1. Verify that video monitor operates correctly by connecting it to working VGM. 2. Assure that video monitor is correct type for this VGM. Video monitors with wrong resolution can't lock sync.
	Improper sync signals	1. Check to see if Video Board puts out type of sync that your monitor requires. 2. Verify that jumpers are set correctly for monitor. 3. If necessary, add or remove video sync jumper at Sound I/O Board jumper block J10. With no pins connected (or pins 2 and 3 connected), board outputs positive sync. With pins 1 and 2 connected, board outputs negative sync.
	Electromagnetic fields	Move cabinet far away from machines, appliances, or competitors' VGMs.
• Missing colors	Faulty wiring	Check connectors and cables for wiring continuity from circuit boards to video monitor.
	Faulty monitor color drive circuitry	Verify that video monitor operates correctly by connecting it to working VGM.
• One color is dimmer or brfghter than others , Whites appear tinted everywhere on screen	Maladjusted color bias pots	1. Turn on VGM. 2. Enter Monitor Tests Menu. 3. Watch Color Bars screen in mirror. 4. Adjust three bias pots for best colors. (Most monitor neck boards include these pots.) 5. Also check White Screen. Touch up controls. 6. If whites still seem tinted, have service bureau rejuvenate picture tube.
• Picture is dim or faded	Maladjusted BRIGHTNESS pot or subnormal picture tube emission	1. 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. 2. If pots have no effect, have service bureau rejuvenate picture tube.
• Picture is too narrow	Maladjusted WIDTH pot	Enter Monitor Tests Menu. Watch Crosshatch Screen while adjusting WIDTH pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door.
, Picture is too short	Maladjusted HEIGHT pot or-damaged vertical circuit	1. Enter Monitor Tests Menu. Watch Crosshatch Screen while adjusting HEIGHT pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door. 2. If pot has no effect, service vertical output circuit.
• Picture seems shifted to one side	Maladjusted HORIZONTAL POSITION pot	Enter Monitor Tests Menu. Watch Crosshatch Screen while adjusting HORIZONTAL POSITION pot for best picture. You'll find this pot on Monitor Remote Control Board, behind coin door.
• Keystone-shaped picture	Shorted turns in yoke	1. Substitute working yoke. 2. Have service bureau converge monitor. 3. Retest monitor.

Software Update Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
• **Update didn't work** • After update procedure, screen reports lower than latest version	You skipped steps or performed them out of sequence.	turn update components to kit, reinstall original parts in cabinet, and try process again.
	You connected linked VGMs to cabinet being updated.	1. Network communication circuits may have prevented full update. Turn off power to all connected cabinets. 2. Perform update on one cabinet at time. If power is off, you need not disconnect linking cables.
	Installation error may have damaged device.	1. Inspect for bent or broken pins. 2. If you have another kit, try it. 3. Ask your distributor to check your floppy disk.
• **No Attract Mode screens** • **Board indicators illuminate, but screen is completely blank**	**Mismatched boot update version and hard drive.**	1. Once you've updated disk drive, CPU instructions must be at correct version to make use of new data stored on disk. Be certain that boot ROM device resides in proper socket.
	You may have installed devices in wrong sockets.	1. Install disk ROM. Only use upgrade socket for hard disk drive updates. During game play, upgrade socket must be empty. 2. Load ROM contents onto drive. 3. Remove ROM from game.



NOTICE: Someday, software updates for your VGM might become available. These upgrades may improve your VGM's performance or add new VGM features. Such upgrades tend to appear sometime after factory first releases VGM. Contact your distributor for information about updates.

Miscellaneous Problem Troubleshooting Table

SYMPTOM	CAUSE	REQUIRED ACTION
. Marquee lamp is intermittent or non-functional . VGM starts and plays normally	Faulty fluorescent tube	1. Remove fluorescent tube from its sockets. If you find cracks or darkened ends, install new lamp. Clean tube. 2. Check continuity of both fluorescent tube filaments. 3. Verify that fluorescent tube operates by placing it in working VGM.
	Faulty lamp fixture	1. Verify that lamp pins make good connection with socket contacts. 2. Check ballast for continuity.
	Faulty, wiring	Measure fluorescent lamp AC voltages. Check wiring and connector continuity from AC power chassis to lamp assembly.
. VGM operates normally . Cabinet becomes warm after several hours of use	Obstructed fan	1. Check bottom and rear of cabinet for blocked airflow. 2. Move VGM away from sources of heat. 3. Turn off VGM 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, including power supply fan.
. Error messages appear on screen	Faulty hardware	1. Check any assembly (RAM, ROM, Battery, etc.) identified in error messages. 2. Call your authorized distributor for help with unresolved screen messages.