
SAFETY NOTICES

The following safety instructions apply to all game operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply. We recommend that you read this page before preparing your game for play.

CAUTION

LINKING GAMES: The linking feature does not work if the master game is off line, in diagnostic mode, or if AC power is not on. Linking only works if the master game is active and in normal game play mode.

TRANSPORTING THE GAME: This game contains glass and fragile electronic devices. Do not move this game with the power on. Avoid rough handling. Secure the game well during transport.

HANDLING ELECTRONIC DEVICES: This product uses complex electronic components that are very SENSITIVE to static electricity. The following precautions must be observed and followed:

- 1) Discharge any static electricity build up in your body by touching the safety ground stud of the power supply chassis. This is to be done BEFORE touching or handling the electronic assemblies.
- 2) Store the electronic assemblies in an anti-static area. Anti-static bags are to be used to store or transport the CPU assembly. Replace ground wires, shields, safety covers, etc. when service is complete.
- 3) 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.

ISOLATION TRANSFORMER: This video game system does not utilize an isolation transformer. No isolation exists between the cabinet AC system and the external AC line.

PROPERLY GROUND THE GAME: To avoid electrical shocks, do not plug in the game until it has been inspected and properly grounded. This game should only be plugged into a grounded **3-wire** outlet.

DISCONNECT POWER DURING REPAIRS: To avoid electrical shock, disconnect the game from the AC power **source before removing or repairing** any part of the game. Be sure to reconnect all ground wires.

PROPERLY ATTACH ALL CONNECTORS. Be sure that the connectors on each printed circuit board (PCB) are properly connected. If they do not slip on easily, do not force them. A reversed connector may damage your game and void the warranty. Connectors are keyed to fit specific pins on each board.

USE THE PROPER FUSE: To **avoid electrical** shock, all replacement fuses must match the original fuses in fuse type, voltage rating, and current rating.

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.

EPILEPSY WARNING

A very small portion of the population has a condition which may cause them to experience epileptic seizures or have 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.

OFFROAD CHALLENGE™

SINGLE SIT-IN STYLE CABINETS

SECTION ONE

Operation

NOTICE

Information in this manual is subject to change without notice. MIDWAY 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. Be sure to 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 _____

Setup Procedure

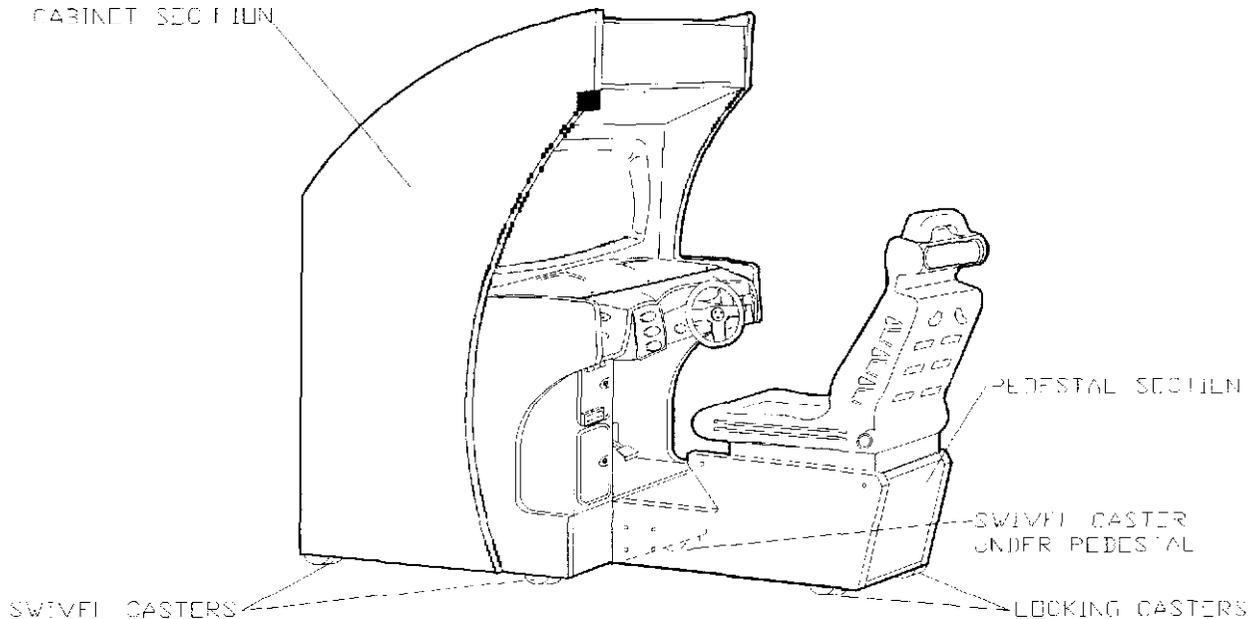
GAME LOCATION REQUIREMENTS		DIMENSIONS				
Power:	Domestic 115V @ 60 Hz, 4 Amps	SHIPPING	Width	Depth	Height	Weight
	Foreign 230V @ 50 Hz, 2 Amps	25" Game	32"	39"	74"	300 Lbs.
	Japan 100V @ 50 Hz, 4 Amps	31" Game	34"	53"	77"	570 Lbs.
Temperature:	320 F to 100°F	Pedestal	22"	36"	51"	125 Lbs.
	(0° c to 38° C)					
Humidity:	Not to exceed 95% relative.	ASSEMBLE	Width	Depth	Height	
		D				
		25" Game	30"	66"	75"	
		31" Game	32"	80"	79"	

INSTALLATION AND INSPECTION

- 1) Remove all items from shipping containers and set aside. Casters, levelers, and mounting hardware are packed with the pedestal section. Inspect the exterior of the cabinet for any signs of damage.
- 2) Remove the keys from the steering wheel. Unlock and open the coin and cash box doors. Electrical cords and spare parts are stored in the cash box.
- 3) Install one nut onto each leg leveler. Tilt as needed to locate four threaded holes under the cabinet and three under the pedestal. Install a leveler and nut into each hole. Do not tighten nuts at this time.

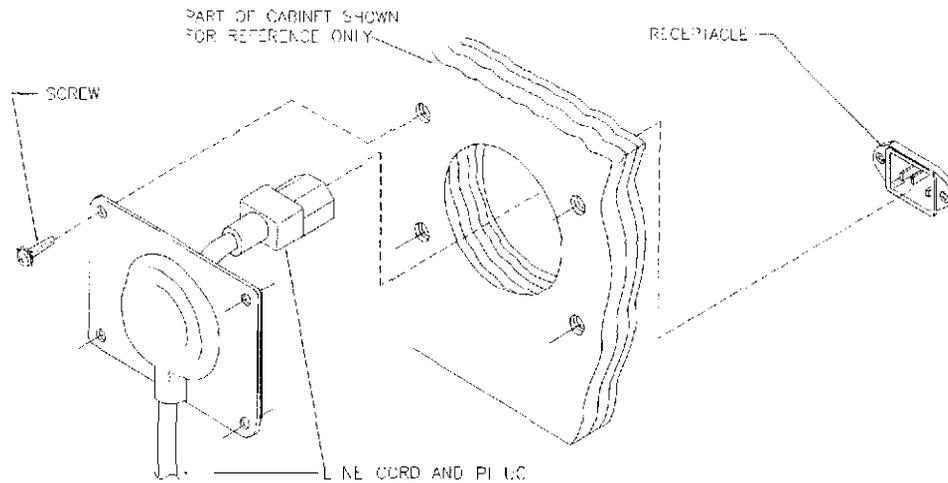
A WARNING
The cabinet is top heavy.

- 4) Locate the caster wheel assemblies. Lay cabinet on its back or side and attach one caster onto each group of threaded studs. The cabinet uses four swivel casters, one in each corner. Repeat this for the pedestal. The pedestal uses three casters, one swivel type in front and two locking type in back.

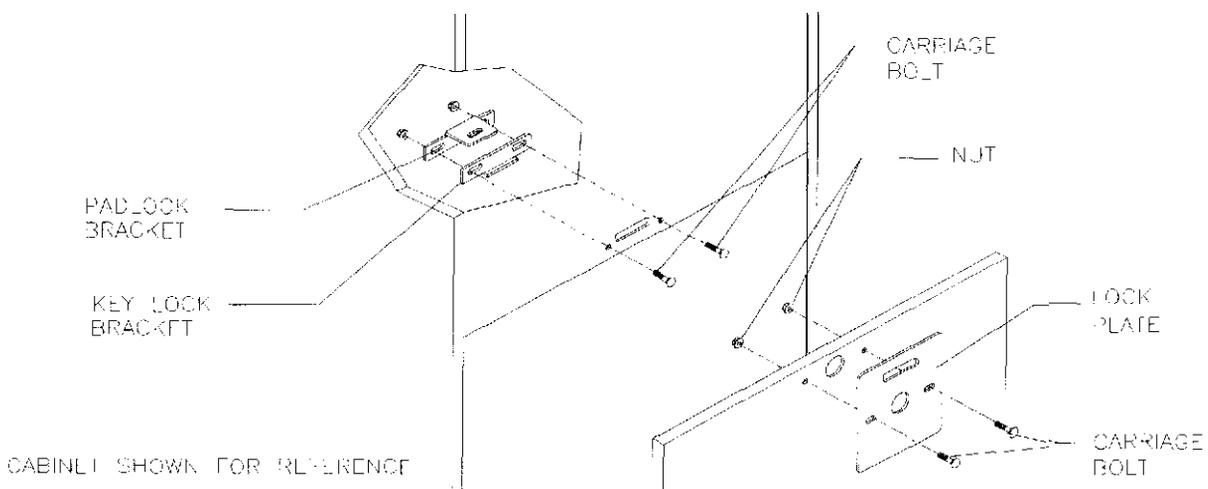


- 5) Stand cabinet upright and make certain it is in a stable position. Move the game to its intended location and level the cabinet. Distribute weight equally on each corner and tighten the leveler nuts.

- 6) Remove the rear door of cabinet. Inspect cabinet interior for any signs of damage. Check all major assemblies to assure that they are mounted securely.
- 7) Refer to the game's Cabinet Wiring Diagram (Section Three of this manual) and check to see that all cable connectors are correctly secured. Inspect for damaged connectors. Be sure **NOT TO FORCE CONNECTORS** and avoid making reversed connections.



- 8) The power cord is with the spare parts. Remove and save four screws from the line cord cover plate at the rear of the cabinet. Match the holes on the IEC plug with the prongs in the receptacle and push firmly to seat the line cord. Hold the cord flat against the cabinet and reinstall the cover plate (the indentation should point down so that the cord exits toward the bottom of the cabinet as illustrated).
- 9) Determine the value of your AC line voltage with a voltmeter. Check the fluorescent lamp assembly voltage rating and power supply line voltage switch to be sure each corresponds to your line voltage.

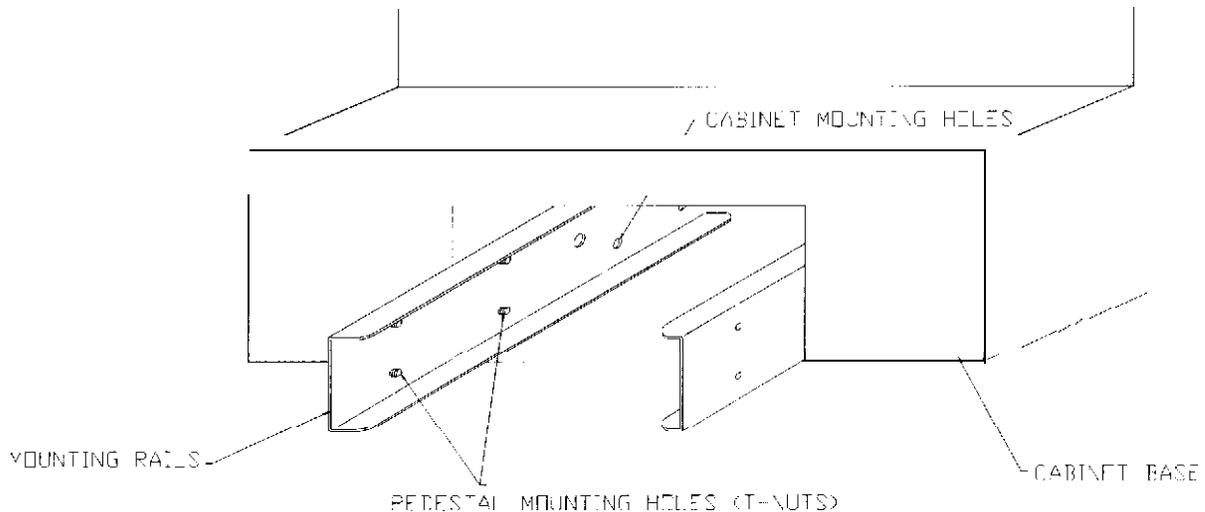


- 10) An extra padlock may be installed to secure the rear door. A hasp is located in the spare parts bag. Remove the two lock bracket nuts from inside the cabinet, above the rear door opening. Slide the hasp onto the bolts so that it protrudes from the hole in back of the cabinet, then reinstall the nuts.
- 11) Modify the lock plate at the top of the rear door. Remove the bolts and nuts from the lock plate, then rotate the plate so that the slot will be above the door. Reinstall the bolts and nuts and tighten firmly.

- 12) Reinstall the rear door onto the cabinet and close it. Lock the rear door and remove the key. If required, install the extra padlock through the hasp at this time. Install the screws at the top and sides of the rear door and tighten snugly. Close and lock the cash box and coin doors.

NOTE

Tamper resistant screws and matching wrench are provided with this game for additional security. Four tamper resistant screws and one wrench are located in the spare parts bag. If desired, replace the original screws with the tamper resistant screws. Tighten the screws firmly with the wrench.



- 13) The pedestal assembly mounting rails are shipped bolted to the inside of the cabinet. Remove all of the 1/4-20 hex-head bolts holding the rails. Pull the rails forward (see above diagram for proper placement) and reinstall the same bolts finger tight. Do not tighten these bolts at this time, as some movement is required in the mounting rails to align holes with pedestal assembly.
- 14) Align the opening in the pedestal with the ends of the rails. Slide the pedestal forward onto extended mounting rails and align the holes. Attach pedestal assembly using 1/4-20 tamper proof screws and large flat washers. A T27 wrench is included with the spare parts to tighten these screws firmly.
- 1.5) Plug the game into a grounded (3-terminal) AC wall outlet. Switch ON the game using the ON/OFF switch located on the upper left top of the cabinet. The game will power up and begin self-diagnostics. If no errors are found, the game will automatically enter its "attract" mode of operation.

MAINTENANCE

Viewing Glass

It is not necessary to switch off power to the game to clean the glass. Apply a mild glass cleaner to a clean cloth or sponge, then use this to wipe the viewing glass. **Do not apply cleaner directly on the glass!** Liquid could drip down into switch or control circuits and cause erratic game operation.

Controls and Cabinet

Use plastic-safe non-abrasive cleaners to avoid damage. Apply cleaner to a clean cloth or sponge, then use this to wipe the controls or cabinet. **Do not apply cleaner directly on controls or cabinet!**

SERVICING

We recommend that you read the SAFETY NOTICES section thoroughly before beginning service.

Always turn off power to game before servicing.

MARQUEE

Remove five hex-head wood screws that hold the marquee-retaining strip to the top of the cabinet. Remove the retaining strip. Lift the marquee glass out of the top grooves and set in a safe place.

WARNING

The marquee glass could fall out of the cabinet when the retaining strip is removed.

FLUORESCENT LAMP OR STARTER

Remove the marquee retaining strip, glass and artwork. Remove the fluorescent lamp locks. Grasp the tube, give it a quarter turn and pull it from its socket.. The starter also requires a quarter turn for removal or installation. Carefully place a new tube into the socket and rotate it a quarter turn to reinstall. Clean the tube to remove fingerprints and dust.

WARNING

If a fluorescent tube drops and it breaks, it will implode! Use care in handling.

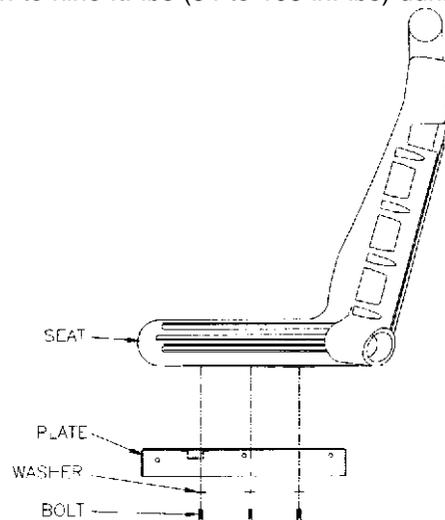
FLUORESCENT LIGHT ASSEMBLY

Remove the marquee retaining strip, glass and artwork. Disconnect the power cable from the fluorescent light assembly. Loosen but do not remove the screws fastening the assembly to the cabinet. Slide the assembly slightly forward to disengage the keyholes. Lift out the assembly.

SEAT

Use the T27 tamper proof wrench to remove three screws from each side of the seat mounting plate. Lift the seat and mounting plate assembly off the pedestal. Place the seat on its back, on a flat surface. Remove the six bolts under the mounting plate to separate the seat from the plate.

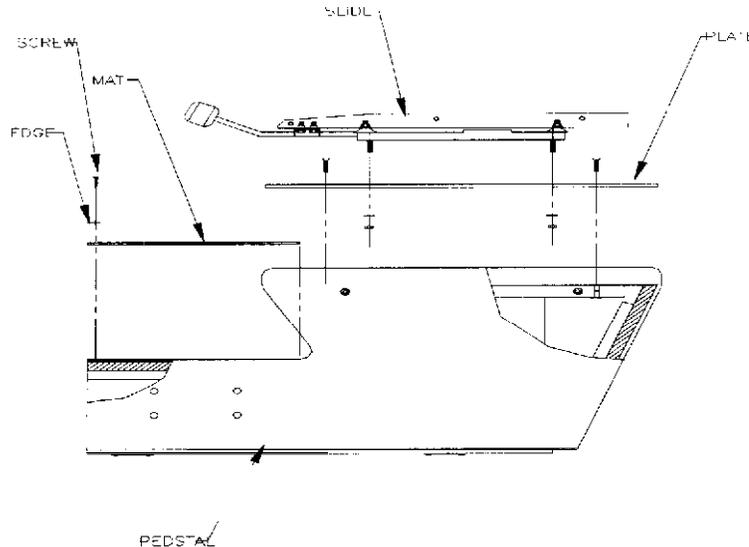
IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to seven to nine ft.-lbs (84 to 108 in.-lbs) during re-assembly.



. SEAT SLIDE ASSEMBLY

Use the T27 tamper proof wrench to remove three screws from each side of the seat mounting plate. Lift the seat and mounting plate off the pedestal assembly and set aside. Slide the seat assembly forward, and remove the two tamper proof torque screws from the metal panel on top of the pedestal assembly. Slide the seat back and remove the two front torque screws. Lift the metal panel out of the pedestal base and turn the unit over. Remove the four nuts holding the metal panel to the slide assembly. Set the metal panel aside and the slide assembly is exposed.

IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque each bolt to seven to nine ft.-lbs (84 to 108 in.-lbs) during re-assembly.



. SPEAKERS

NOTE: The speakers are magnetically shielded to prevent video monitor color impurity. Be sure that any replacement speakers are also magnetically shielded.

Upper (25" and 31" cabinets, two 5.25" full range): These speakers are under the marquee. Remove the marquee, glass and artwork. The speakers come out from the front of the cabinet. Be sure to disconnect the cabling and remove the nuts on the mounting screws before attempting to remove the speakers from the enclosure. Carefully reseal the seals upon completing any task in the speaker enclosure. Refer to the Cabinet Wiring Diagram for correct speaker polarity.

Lower (25" cabinet, one 6" woofer; 31" cabinet, one 6" woofer): The lower speaker is located near the gas and brake pedals. Unlock and remove the rear door. Disconnect the cables that go to the electronics rack assembly. Unscrew the rack and set it aside. Reach through the cabinet and disconnect the speaker cables. Remove the nuts on the mounting screws and pull the speaker out of the cabinet. Carefully reseal the seals when replacing the speaker.

. DASH BOARD

25" Cabinet: Use the T27 wrench to remove four tamper proof screws at the dashboard front corners. Pull the dashboard forward. Disconnect the wiring harness and ground strap. Before reinstalling the dashboard, ensure that harnesses and ground strap are reconnected.

31" Cabinet: Use the T27 wrench to remove seven tamper proof screws from the top cover. Lift the top cover off of the game cabinet. Remove four tamper proof screws from the front corners of the dashboard. Pull the dash forward. Disconnect the wiring harness and ground strap. Before reinstalling the dashboard, ensure that harnesses and ground strap are reconnected.

• VIEWING GLASS

25" Cabinet: Use the T27 wrench to remove four tamper proof screws at the dashboard front corners. Pull the dashboard forward enough to expose the bottom of the glass. Grasp the edge of the viewing glass at the notch. Slide the glass out of the side grooves and lift it off the cabinet.

31" Cabinet: Use the T27 wrench to remove seven tamper-proof screws from the top cover. Lift the top cover off of the game cabinet. Remove three 1/4-20 bolts from the viewing glass retaining bracket. Grasp the glass at the bottom. Slide it out of the side grooves and lift it off the cabinet.

• MONITOR BEZEL

25" **Cabinet:** Remove the dashboard and viewing glass. Grasp the monitor bezel at the bottom and lift it out of the groove. Remove the bezel from the cabinet.

31" Cabinet: Remove the top cover screws and the cover. Remove the bracket and the viewing glass. Grasp the bezel at the bottom and lift it out of the groove. Remove bezel from the cabinet.

• MONITOR

We recommend that you read the WARNINGS thoroughly before beginning this procedure.

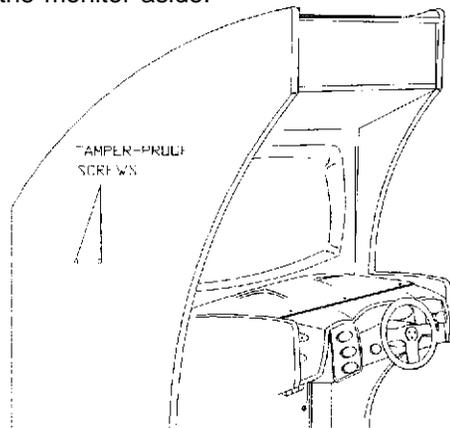
A CAUTION

THE VIDEO MONITOR IS 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.

25" Cabinet: Remove the dashboard, viewing glass, and monitor bezel. Disconnect the monitor from the wiring harness and ground wires. Remove four 1/4-20 flange nuts securing the monitor mounting flanges to the mounting panel. Pull the monitor carefully from the cabinet and set aside.

31" Cabinet: Remove the top cover, dashboard, viewing glass, and monitor bezel. Remove two T27 tamper-proof screws from the left and right sides of the cabinet as illustrated. Remove three 1/4-20 flange nuts located above the monitor. Tilt the monitor down from the top and pull it out of the cabinet. Set the monitor aside.



If a different monitor is to be installed, remove three 3/8-16 hex bolts from the bracket at the bottom of the monitor. Install this bracket and its bolts onto the bottom of the new monitor. Slide the bottom of the monitor into the cabinet and tilt it up from the top. Replace the flange nuts at the top of the monitor, and the screws on the outside of the cabinet.

VIEW BUTTONS OR THE SHIFTER

Use the T20 wrench to remove four tamper proof screws from the plate surrounding the buttons or the shifter. Pull the plate forward enough to expose the switches. Label and disconnect wires.

NOTE: This game has different switch wiring than previous games with these assemblies. Green wires connect to NC contacts. Incorrect connection will result in switch test failure.

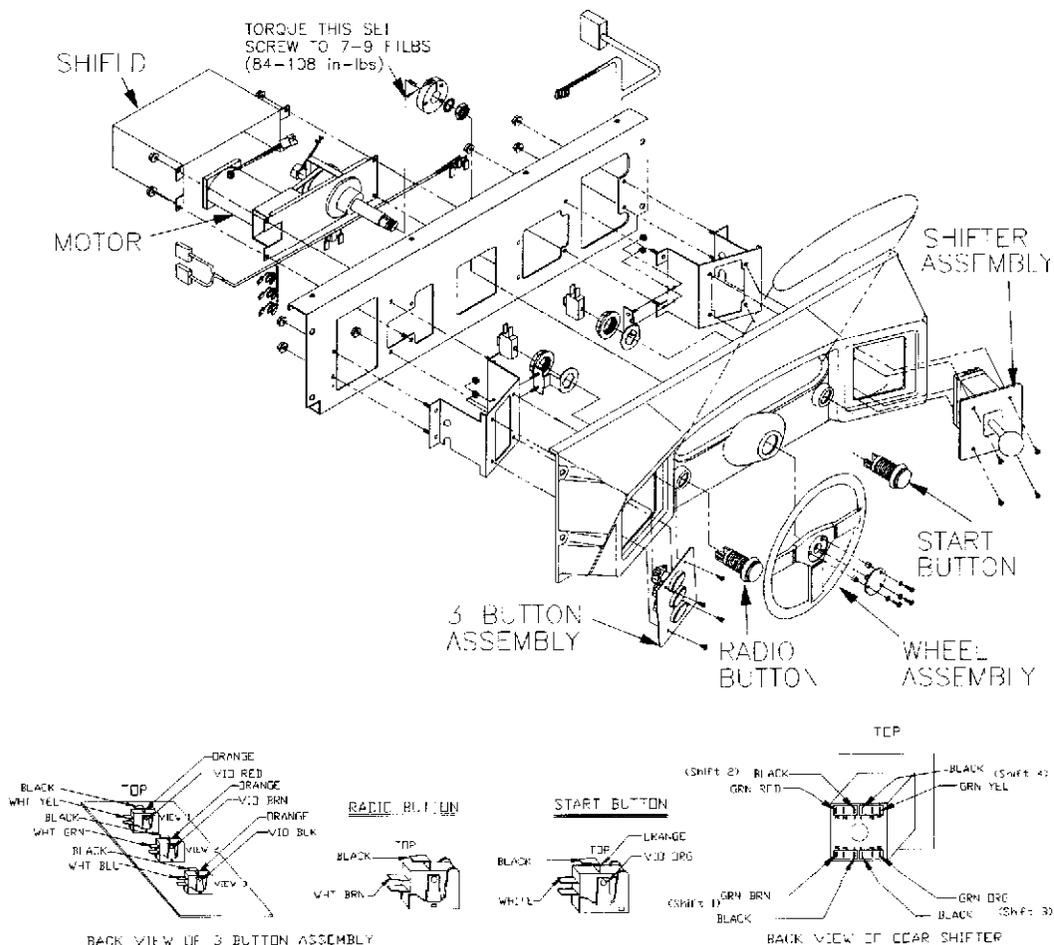
START AND RADIO BUTTONS

Use the T27 wrench to remove four tamper-proof dashboard corner screws. Pull the dashboard forward enough to expose the switches. Label and disconnect the wiring harness. Unscrew the switch mounting nut and pull the entire switch out from the front of the dash. Depress the snap locks to separate the switch assembly from pushbutton or to expose the light bulb.

WHEEL ASSEMBLY

Use the T27 wrench to remove four tamper proof dashboard corner screws. Pull the dashboard forward enough to expose and disconnect wires. Lift the dashboard off the cabinet and set aside. Remove three screws at the steering wheel center. Pull the wheel hoop off of the dashboard. Remove four X-20 flange nuts holding the shield, motor and shaft to the wheel assembly (shield not required on 31" cabinets). Slide the motor and the shaft off of the assembly.

IMPORTANT: Apply removable anaerobic adhesive thread lock (Loctite Blue 242 or equivalent) and torque set screw to seven to nine ft.-lbs (84 to 108 in.-lbs) if it was loosened (see illustration).



- **MEMORY**

The ROM (Read Only Memory) circuits contain the computer operating instructions for this game.

Switch off power to the game. Carefully note the position, then remove using a chip extraction tool.

To reinstall memory circuits, orient a chip over its socket and press firmly to seat pins. Do not **force**.

A CAUTION *Discharge any static electricity build up in your body by touching the power supply chassis. This is to be done BEFORE touching or handling the electronic assemblies.*

- **BATTERY**

Switch off power to the game. Carefully note the position, then gently lift the contact arm to release tension. Do not **bend the arm**. Slight finger pressure may be needed to pry the cell from its holder.

To reinstall the battery orient cell near its holder and slide it in under the contact arm. **Do not force**.

 **CAUTION** *Danger of explosion if battery is incorrectly replaced. 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 manufacturers packaging.*

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

- **POWER SUPPLY**

Switch off power to the game. Remove screws, then unlock and remove the rear door. Unplug the IEC A.C. connector from the rear of the supply and the DC. connector from the front. Remove two front and two rear screws from the supply, then lift it off of the power chassis. Note voltage setting.

To reinstall the power supply, set the voltage switch to the correct value. Set the supply on the power chassis and align the mounting holes. Install the four screws and the two power connectors.

- **WHEEL BOARD ASSEMBLY**

Switch off power to the game. Unlock and remove the rear door. Carefully note the orientation of the cables, Extract the harness and other cables from the board connectors. Remove the Wheel Board Assembly mounting screws. Lift the board out of the cabinet and set in a safe place.

- **CPU BOARD ASSEMBLY**

Switch off power to the game. Unlock and remove the rear door. Remove the RF Cage top to expose the CPU Board Assembly. Carefully note the orientation of the JAMMA connector and the other cables. Extract the harness and other cables from the board connectors. Remove CPU Board Assembly mounting screws. Lift the board out of the cabinet and set in a safe place. Anti-static bags and protective containers from new parts may be used for storage if not to be reinstalled immediately. Be certain to reinstall the RF Cage top so that it seals tightly against the RF Cage bottom.

- **PEDAL ASSEMBLY**

Switch off power to the game. Unlock and remove the rear door. Carefully note the orientation of the cables. Disconnect pedal assembly cable from wiring harness. Adjust the seat to the maximum rear position. Remove the four outer screws from the pedal plate. Pull the assembly forward enough to expose the ground wire. Disconnect ground wire and remove the pedal assembly from the cabinet.

- **COIN METER**

Switch off power to the game. Unlock the cash door and swing it open. Remove the cash tubs. The meter is located on a plate at the vault bottom. Remove the screws and lift the plate just enough to disconnect the meter wires from the harness. Record the meter count before testing or replacement.

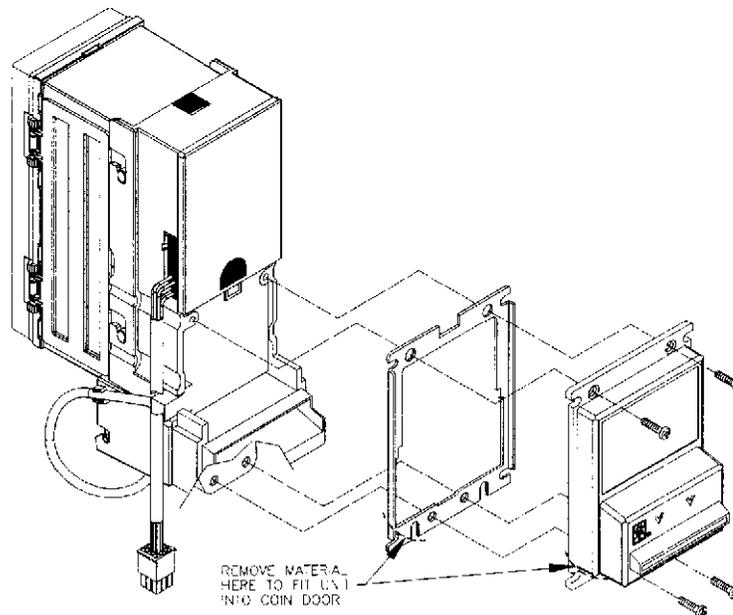
- **COIN MECHANISM**

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 mechanism seats fully in the holder upon reinstallation. Close and lock the **release** latch, then close the door. Turn on the game and change the mechanism setup, then test known good and bad coins to verify operation.

- **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 door label for additional information. Disassemble the validator and remove material to permit fit inside the coin door as illustrated, then reassemble the unit.



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. 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 correct. Reverse these steps to remove a validator for service or replacement.

Game Features

OFFROAD CHALLENGE is shipped configured as a one-player game. Cabinets may be linked to permit player competition. A lighted header option is available.

STARTING UP

Switch ON power to the game. The game begins the Start-up Tests. A “rug” pattern appears on the CRT screen. When the “rug” pattern ends, the screen shows a CPU Board map. Bad ICs are indicated in red, good ICs are in green. The software revision level is shown at the top of the screen.

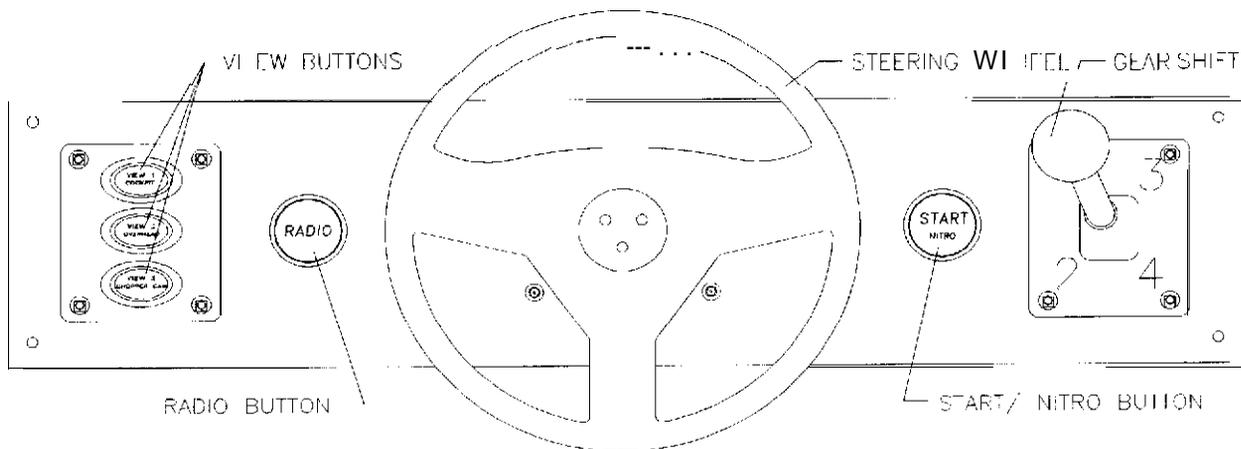
A machine status screen will appear for about ten seconds. This is a game network activity report. This screen is used to verify and troubleshoot connections between cabinets when they are linked.

NOTE: When an error is detected during the Start-up Tests, game start-up does not progress, and an error message appears on the screen. Record any messages before attempting to service the game.

Before the game starts, the “attract” screens endlessly cycle through scenes and sounds from typical races on each of the tracks. Insert the desired amount of coins or tokens and press start to begin.

PLAYER CONTROLS

- **Start/Nitro** button (green)
The start button begins game play or adds a sudden burst of power during a race.
- Radio button (orange)
The radio button allows the player to turn radio sounds on and off, and change stations.
- View 1 button (red)
This button shows the view from the cockpit of the vehicle. This is a normal driver view.
- View 2 button (white)
This button shows the view from directly above. The player can see the vehicle front.
- View 3 button (blue)
This button shows aerial view of a vehicle. This is what a helicopter camera would see.



PLAYER CONTROL LOCATIONS

Game Operation

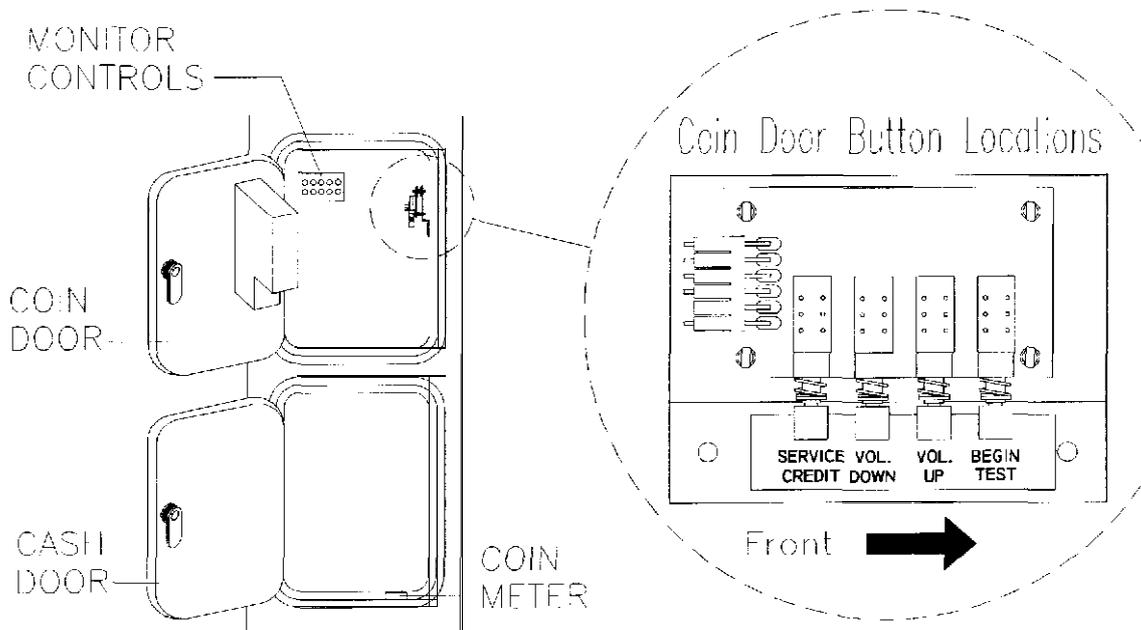
Access to the menu system for statistics, adjustments, or testing is secured by lock and key to prevent tampering. When the menu system is entered, on screen messages guide the operator through tasks.

CABINET SWITCHES

- The **ON/OFF SWITCH** is located on the top right side of the cabinet.
- The **MONITOR REMOTE ADJUSTMENTS** are located inside the coin vault. Use the monitor test screens with these controls to adjust the video image size, brightness, contrast, etc.
- The **SLAM TILT SWITCH** detects any forceful vibrations against the coin door. This eliminates pounding for free games. It is located on the inside of the coin door opening near the lock.
NOTE: The Slam switch is not present on DBV ready doors.

CONTROL BUTTONS

- The **TEST BUTTON** activates the game Menu System. Press the Test button to access the Main Menu and select individual diagnostics, audits, utilities, etc.
- The **VOLUME UP BUTTON** moves up through the menu selections or adjustment items and raises the sound level in game play. A distinct sound accompanies each activation of this button.
- The **VOLUME DOWN BUTTON** moves down through the menu selections or adjustment items or lowers the sound level in game play. A sound also accompanies each activation of this button.
- The **SERVICE CREDIT BUTTON** is used to allot credits without affecting the game's bookkeeping total. This button is also used to get out of a menu selection or return to the main menu.



OPERATOR CONTROL LOCATIONS

Menu System Operation

MENU SYSTEM

All Game Audits, Adjustments, and Diagnostics are options of the Main Menu. Each option, in turn, has its own menu, listing several choices that may be acted upon as desired.

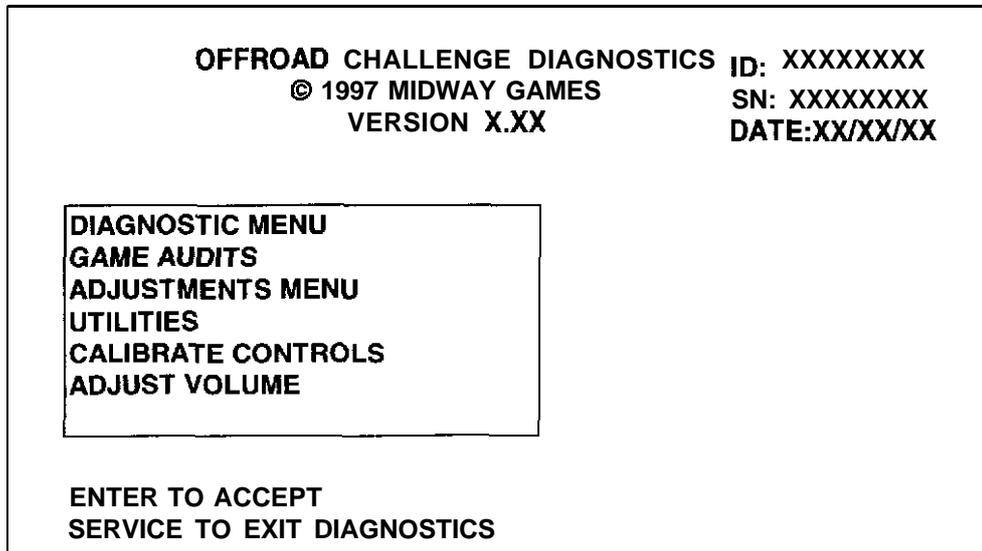
The same layout is used for all menu screens. Game versions are at the top of each screen. Choices are grouped in a box at the center of the menu. Active control functions are listed at the bottom.

Press the Test button to activate the Main Menu (shown below). Press the Volume Up or Volume Down buttons to move through the menu options. Notice that the options are highlighted, by turning red, in sequence. Press the Test button again to activate a **red highlighted option and go to the next menu level**.

NOTE: Only one highlighted option can be selected at a time.

To go back to game play mode, return to this menu screen and press the Service Credit button.

MAIN MENU



TYPICAL MAIN MENU SCREEN

The Game ID, Serial Number, and Date of Manufacture Block is present on most of the menu screens. These numbers will be helpful to factory personnel when referring to your game for parts or service.

DIAGNOSTIC MENU

To enter the Diagnostic Menu from the Main Menu, press the Volume Up or Volume Down button to highlight this option, then press the Test button to activate it. To exit Diagnostics at any time and return to the Main Menu, press the Service Credit button. (*NOTE: Burnin Test can not be halted from the menus*)

OFFROAD CHALLENGE DIAGNOSTICS
 © 1997 MIDWAY GAMES
 VERSION **X.XX**

SWITCH TEST
 DIP SWITCH TEST
 CPU BOARD TEST
 SOUND BOARD TEST
STEERING WHEEL TEST
 MONITOR TEST
BURNIN TEST
LAMP TEST

UP/DOWN TO SELECT
 ENTER TO ACTIVATE

DIAGNOSTIC MENU SCREEN

Switch Test

The Switch Test allows the operator to test the switches on the control panel and the coin door,

Select the Switch Test by pressing the Volume Up or Volume Down button to highlight the option, then press the Test button to activate it. Activate any switch on the control panel or coin door to cause the indicator on the screen to illuminate. Each illuminated square represents one completed switch circuit.

OFFROAD CHALLENGE DIAGNOSTICS
 © 1997 MIDWAY GAMES
 VERSION **X.XX**

	POT READING		CMOS VALUE		
	MIN	CENTER	MAX		
STEERING WHEEL	XXX		XX	XXX	XXX
GAS PEDAL	XX		XX		XX
BRAKE PEDAL	XX		XX		XX

VIEW 1
VIEW 2
VIEW 3
START
COIN 1
COIN 2
COIN 3
COIN 4
BILL
RADIO

SHIFT 1 SHIFT 3

 SHIFT 2 SHIFT 4

TEST
 VOLUME UP
 VOLUME DOWN
 SERVICE CREDIT

SERVICE TO EXIT

SWITCH TEST SCREEN

Dip Switch Test

The DIP Switch Test allows the operator to check the function of the 8-position DIP switches on the CPU Board. The operator can also change the setting of these switches and see immediate on screen results.

To enter the test, press the Volume Up or Volume Down *button* to highlight the DIP Switch Test, then press the Test button. The screen shows the current settings. Consult the table on the next page to determine if changes are required. The default switch positions are all OFF for standard operation.

A vertical bar next to the switch position column indicates that these switches have a common function.

OFFROAD CHALLENGE DIAGNOSTICS		
© 1997 MIDWAY GAMES		
VERSION X.XX		
DIP SWITCH TEST		
DIP SW2 U97		DIP SW3
1	OFF	
2	OFF	
3	OFF	LINK DISABLED
4	OFF	
5	OFF	ROAD KILL ENABLED
6	OFF	GIRLS ENABLED
7	OFF	N. C. SHIFTER
8	OFF	
SERVICE TO EXIT		

DIP SWITCH TEST SCREEN

Game Adjustments for Linked Operation

To avoid confusion, we recommend that all adjustments be set to identical values before games are linked. Games might operate correctly if this is not the case, with the following exceptions:

1. *Linked games must all have compatible software versions.* Newer versions may contain instructions that previous versions do not have, causing games to halt or reset at random. On-screen messages will indicate that different versions are in use when the linking feature is enabled in each game.
2. *The graphic effects and added attractions for the slave cabinets must be the same as the master.* All games must have these features enabled or all must have them disabled. Mixed roadkill or girl settings can cause the games to become unsynchronized during competition and lead to incorrect final results (i.e., two first place finishes with different times, collisions with unseen objects, etc.).
3. *The linking feature will override some of the individual software settings.* For instance, the game difficulty level is controlled by the master (#1), and all linked slaves will play at this same difficulty level. The difficulty level reported by the slave games may not match the setting of the master game.
4. *The highest ranking linked game will determine some software settings.* Adjustments such as bonus times will be controlled by the games in decreasing identification order. For example, if four games are linked, slave game #3 will always override game #4 but have no effect on games #1 or #2. This permits games to have different standards to help equalize players with different skill levels.

Dip Switch Settings

NOTE: AN game cabinets must have compatible software to link properly, Unlock the coin door and press the TEST button. The software version number is found on the main menu of the game diagnostics. It does not matter what version is installed as long as all version numbers are the same.

DIP Switch 2 Settings Table (U97)

Function	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Player Identifications								
Player 1	OFF	OFF						
Player 2	OFF	ON						
Player 3	ON	OFF						
Player 4	ON	ON						
Link Activity								
Disable			OFF					
Enable			ON					
Not Used								
No Effect				OFF				
No Effect				ON				
Graphic Effects								
Roadkill Present					OFF			
Roadkill Missing					ON			
Added Attractions								
Girls Present						OFF		
Girls Missing						ON		
Gear Shift Switch Position								
Normally Closed							OFF	
Normally Open							ON	
Not Used								
No Effect								OFF
No Effect								ON

LINKING NOTES:

- 1) Any game set up for player 1 is the master. This cabinet is usually located at the left of the group. Games set up for player 2, 3, or 4 will be slave units. The slaves are usually to the right of game #1.
- 2) For a 2-way link, the first game cabinet is the master (#1), the other game cabinet is the slave (#2). Switches #1 and #2 of U97 must be set for two linked games. One linking cable is required.

For a 3-way link, the first game is the master (#1), the second and third games are slaves (#2) and (#3). Switches #1 and #2 of U97 must be set for three linked games. Two cables are required.

For a 4-way link, the first game cabinet is the master (#1), the remaining games are slaves (#2, #3, #4). Switches #1 and #2 of U97 must be set for four linked games. Three linking cables are required.

- 1) The linking feature will not function for any game if the master game is not turned on and in normal game play mode. When this game is turned off, disconnected from the linking cable, or in any other mode of operation (offline, diagnostics, etc.), none of the games will be able to link.

The linking feature will function for all other games if a slave game is not turned on and in normal game play mode. When any slave is turned off, disconnected from the linking cable, or in any other mode of operation (offline, diagnostics, etc.), the remaining games will be able to link.

The linking feature will function for some games and not others if the link activity switches are not all enabled or the software version numbers are not all the same. The master game will not recognize other games with disabled linking or a different series of game link identity numbers.

DIP Switch 3 Settings Table

COIN MODE	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
USA	OFF							
GERMAN	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
FRENCH	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
CANADA	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
SWISS	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
ITALY	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
UK	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
SPAIN	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
AUSTRALIA	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
JAPAN	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
TAIWAN	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
AUSTRIA	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
BELGIUM	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
OTHER	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
GENERAL	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF

COINAGE NOTES:

There are many ways to select the types and quantities of currency recognized by the game.

- 1) The most common coin combinations for several countries are programmed into the game for you. These may be selected from the table when Standard Pricing is active (see Game Adjustments).
- 2) DIP switches may be changed with the power on. Set any switch, then check the screen to verify that the selection is enabled. Country switch settings have no effect if the CMOS Coin Settings are active.
- 3) Some European countries accept currency used in other countries. The most popular coin settings are found under the "other" selection.
- 4) Alternate settings are found under the "general" DIP switch setting.
- 5) Switches 6, 7, and 8 are not active. We recommend they be set to the factory default (OFF) positions.

CPU Board Test

The CPU Board Test (like the Start-up Test) allows the operator to check the game memory circuits.

Highlight the CPU Board test with the Volume Up or Volume Down buttons and press the Test button. When this test is activated, a “rug” pattern appears on the screen as the video circuits are tested. The **screen** then changes to show the layout of the RAM and ROM circuits on the CPU Board. The memory circuits are shown as gray with a white outline. During the test, ICs are good if they turn green; they are faulty if they turn red. The game automatically returns to the Diagnostic Menu after the test is completed.

Sound Board Test

The Sound Board Test allows listening to some of the sounds that are used in this game.

To enter the test, press the Volume Up or Volume Down button to highlight the Sound Board test, then press the Test button. Highlight “Tuna” for game radio stations or “Sound Effects” for game noises.

Press Volume Up to change the music selection. Press Volume Down to trigger a sound effect. Each additional push selects the next sound. Press Service Credit to exit to the Diagnostic Menu when finished.

Steering Wheel Test

The Steering Wheel Test allows the operator to check the directional movement of the steering wheel.

Before proceeding, make sure hands and any other objects are clear of the steering wheel. When this test is selected, the steering wheel will automatically rotate to the left. Follow the on screen instructions.

Highlight the Steering Wheel Test with the Volume Up or Volume Down button, then press the Test button to begin. The steering wheel turns to the left. Press the Test button and the wheel turns to the right. Press Test button again to center the steering wheel and return to the Diagnostic Menu.

Monitor Patterns

The Monitor Patterns Test provides a menu for testing the monitor.

Highlight the test with the Volume Up or Volume Down button and activate with the Test button. Continue pressing the Test button to cycle through the **test** screens and automatically return to the Main Menu.

The **RED, GREEN,** and BLUE SCREEN tests fill the monitor with solid color. Verify monitor color purity.

The COLOR BARS test fills the screen with 15 color bars in different shades to help with green, blue, and red level adjustments. Each color should appear sharp and clear. Check video brightness and contrast.

The CROSSHATCH PATTERNS test fills the screen with a grid and a series of dots. The grid and the dots should be clear. The dots should be round. Inspect monitor convergence, linearity, and screen size.

If any of the tests show a need for CRT adjustment, use the proper knobs on the Monitor Controls board.

Burnin Test

The Burnin Test continually repeats the CPU Board Test. Use this test to find intermittent CPU problems.

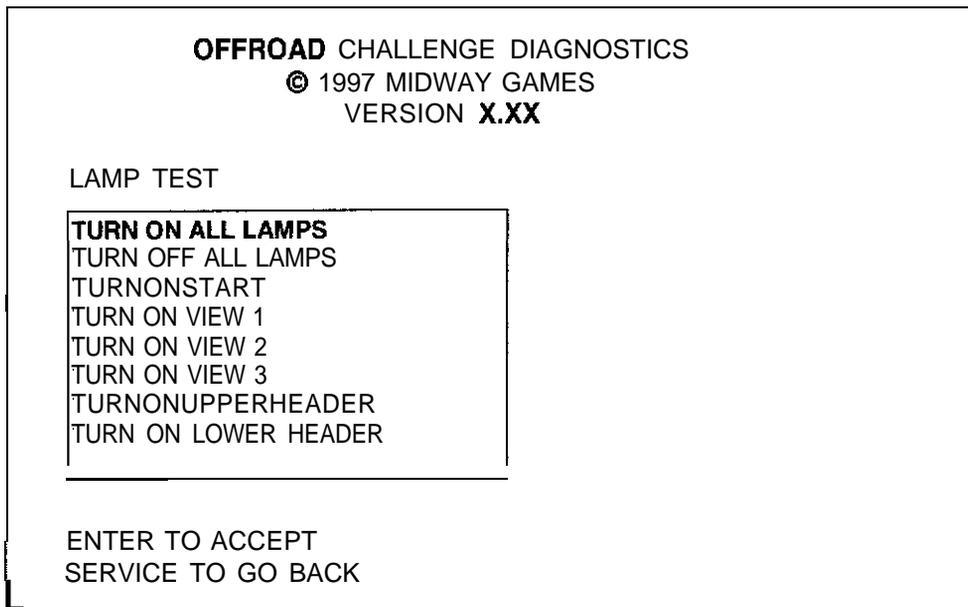
Press the Volume Up or Down Switch to highlight the Burnin Test then, press the Test button to activate. When the Burnin Test detects an error, the test stops and displays an error message on the screen.

Control buttons are ignored during burnin. To exit this test, switch the game OFF then back ON again.

Lamp Test

The Lamp Test illuminates the selected lamp(s).

To enter the test, press the Volume Up or Volume Down button to highlight the Lamp Test, then press the Test button. This test detects intermittent or faulty incandescent bulbs critical to game operation.



LAMP TEST SCREEN

LAMP TEST NOTES:

- 1) The RADIO button is not illuminated and requires no lamp test.
- 2) HEADER lamps are located on the lighted sign used with the Deluxe Linking Kit
- 3) Turning ON or OFF ALL LAMPS overrides the individual tests. Lamps automatically turn OFF at any time when this screen is exited by pressing the SERVICE button.

Press the Service Credit button to exit to the Diagnostic Menu

GAME AUDITS

To enter Game Audits from the Main Menu, press the Volume Up or Volume Down button to highlight the option, then press the Test button. To move between pages of the Game Audit Table, press the Volume Up or Volume Down button. Press the Service Credit button to return to the Main Menu from this screen.

The Game Audits Table displays the game play statistics. The left side of the table names the Audit item; the right side shows the amount of play. Record these statistics before any service or repairs are done.

USAGE STATISTICS I		PAGE 1
LEFT COIN		X
RIGHT COIN		X
THIRD COIN		X
FORTH COIN		X
BILL COUNT		X
SERVICE CREDITS		X
PAID CREDITS		X
FREE GAMES AWARDED		X
FREEPLAY CREDITS		X
VOLUME UP FOR NEXT PAGE		
SERVICE TO EXIT		

PAGE 1 OF AUDIT TABLE

USAGE STATISTICS II		PAGE 2
TOTAL PLAYS		X
TOTAL STARTS		X
TOTAL CONTINUES		X
EXPIRED RACES		X
CONTINUES ON EXPIRED RACES		X
CONTINUE PERCENTAGE		x.xx
FREERACEPERCENTAGE		x.xx
POWER ON TIME SECS		X
GAME TIME SECS		X
AVERAGE GAME TIME SECS		x.xx
AVERAGE TIME PER CREDIT SECS		x.xx
AVERAGE CREDITS PER GAME PLAY		x.xx
VOLUME UP FOR NEXT PAGE		
VOLUME DOWN FOR PREVIOUS PAGE		

PAGE 2 OF AUDIT TABLE

TRUCK STATISTICS		PAGE 3
TOYOTA SELECTED	X	
MINI-METAL SELECTED	X	
BAJA BUGGY SELECTED	X	
HEAVY-METAL SELECTED	X	
TOYOTA MONSTER SELECTED	X	
THUNDER BOLT SELECTED	X	
THE PUNISHER SELECTED	X	
THECRUSHERSELECTED	X	
TOYOTA WINS	X	
MINI-METAL WINS	X	
BAJA BUGGY WINS	X	
HEAVY-METAL WINS	X	
TOYOTA MONSTER WINS	X	
THUNDER BOLT WINS	X	X
THE PUNISHER WINS	X	
THE CRUSHER WINS	X	

VOLUME UP FOR NEXT PAGE
VOLUME DOWN FOR PREVIOUS PAGE

PAGE 3 OF AUDIT TABLE

TRACK STATISTICS I		PAGE 4
MOJAVE STARTS	X	
MOJAVE FINISHES	X	
MOJAVE FIRST PLACE FINISHES	X	
MOJAVE EXPIRED RACES		X
EL PASO STARTS	X	
EL PASO FINISHES	X	
EL PASO FIRST PLACE FINISHES	X	X
EL PASO EXPIRED RACES	X	
VEGAS STARTS	X	
VEGAS FINISHES	X	
VEGAS FIRST PLACE FINISHES	X	
VEGAS EXPIRED RACES	X	

VOLUME UP FOR NEXT PAGE
VOLUME DOWN FOR PREVIOUS PAGE

PAGE 4 OF AUDIT TABLE

TRACK STATISTICS II		PAGE 5
PIKES PEAK STARTS	X	
PIKES PEAK FINISHES	X	
PIKES PEAK FIRST PLACE FINISHES	X	
PIKES PEAK EXPIRED RACES		X
OL' SOUTH STARTS	X	
OL' SOUTH FINISHES	X	
OL' SOUTH FIRST PLACE FINISHES	X	
OL' SOUTH EXPIRED RACES	X	
BAJA STARTS	X	
BAJA FINISHES	X	
BAJA FIRST PLACE FINISHES		X
BAJA EXPIRED RACES	X	

VOLUME UP FOR NEXT PAGE
VOLUME DOWN FOR PREVIOUS PAGE

PAGE 5 OF AUDIT TABLE

PLAY STATISTICS		PAGE 6
UNLINKED PLAYS	X	
UNLINKED RACE STARTS		X
UNLINKED RACE CONTINUES		X
UNLINKED PCT. CONTINUES	X.XX	
UNLINKED FIRSTS		X
UNLINKED FIRST PLACE PCT.	X	
UNLINKED EXPIRED RACES	X	
UNLINKED GAME TIME SECS	X	

VOLUME UP FOR NEXT PAGE
VOLUME DOWN FOR PREVIOUS PAGE

PAGE 6 OF AUDIT TABLE

LINKED STATISTICS		PAGE 7
LINKED PLAYS	X	
LINKED RACE STARTS	X	
LINKED RACE CONTINUES	X	
LINKED PCT. CONTINUES		x.xx
LINKED FIRSTS	X	
LINKED FIRST PLACE PCT.		x.xx
LINKED EXPIRED RACES	X	
LINKED GAME TIME SECS	X.XX	
LOST LINKS	X	
LOST LINKED PLAYERS	X	
LINKED PLAYS TO TOTAL PLAYS PCT.		x.xx
LINKED 2 PLAYER PLAYS	X	
LINKED 3 PLAYER PLAYS	X	
LINKED 4 PLAYER PLAYS	X	
LINKED 2 PLAYER CONTINUES	X	
LINKED 3 PLAYER CONTINUES	X	
LINKED 4 PLAYER CONTINUES	X	
VOLUME UP FOR NEXT PAGE		
VOLUME DOWN FOR PREVIOUS PAGE		

PAGE 7 OF AUDIT TABLE

PLAYER BEHAVIOR		PAGE 8
AUTOMATIC SELECTED	X	
MANUAL SELECTED	X	
PLAYERSONLYRACES	X	
RADIO HITS	X	
VIEW 1 TIME	X	
VIEW 2 TIME	X	
VIEW 3 TIME	X	
SPEED SHOP CREDITS	X	
CASH BOUGHT (X 10000)	X	
CASH SPENT (X 10000)	X	
CASH UNUSED (X 10000)	X	
NITROS BOUGHT	X	
NITROS USED	X	
ACCEL BOUGHT	X	
SPEED BOUGHT	X	
SHOCKS BOUGHT		X
TIRES BOUGHT	X	
HIT VOLUME UP FOR NEXT PAGE		
HIT VOLUME DOWN FOR PREVIOUS PAGE		

PAGE 8 OF AUDIT TABLE

SYSTEM AUDITS		PAGE 9
CREDITS	X	
PARTIAL CREDITS		X
BONUS CREDITS	X	
BURNINS	X	
WATCHDOG RESETS	X	
SOFTWARE FAULT RESETS	X	
GAMES LOST IN PROGRESS	X	
GAME IN PROGRESS ON LAST RESET	X	
POWER ON SINCE RESET TIME IN SECS	X.XX	
GAME TIME SINCE RESET SECS	X.XX	
VOLUME UP FOR NEXT PAGE		
VOLUME DOWN FOR PREVIOUS PAGE		

ADJUSTMENT MENU

NOTE: Individual Game Adjustments are explained in more detail on the following pages.

Press the Volume Up or Volume Down button to highlight the Adjustments Menu option on the Main Menu, then press the Test button. Use these screens to optimize game performance and earnings.

The Adjustments Menu option allows the owner/operator to change the look and sound of the game. The Attract features can also be adjusted. The Game Pricing and Game Difficulty may also be customized. Free races may be awarded to encourage players. Free game player incentives may reduce earnings.

The Adjustments Menu offers several options. Press the Volume Up or Volume Down button to highlight an option, then press the Test button. The activated item provides a setting choice. Press the Volume Up or Volume Down button to change the current value. A typical confirmation box is shown below.

**SELECT THIS PRICING?
ARE YOU SURE?
YES NO
TEST TO ACCEPT
UP TO INCREASE
DOWN TO DECREASE**

Press the Volume Up or Volume Down button to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changes values and returns the previous values to memory.

**OFFROAD CHALLENGE DIAGNOSTICS
© 1997 MIDWAY GAMES
VERSION X.XX**

ADJUSTMENT MENU

STANDARD PRICING	YES
CUSTOM PRICING	NO
FREE PLAY	NO
FIRST PLACE AWARDS FREE RACE	YES
START TIME BONUS SECS	0
MULTI PLAYER FREE RACE	OFF
CHECKPOINT BONUS TIME SECS	0
CONTINUE CASH BONUS (X 10000)	6
ATTRACT MODE SOUNDS	ON
ATTRACT MODE THEME	ROVIN'
HIGH SCORE ENTRY	YES
MINIMUM VOLUME LEVEL	11
SPEED IN MPH OR KPH	MPH
SHOW GIRLS	YES
SHOW ROAD KILL	YES
GAME DIFFICULTY	6
MAXIMUM CREDITS	30

**ENTER TO ADJUST
SERVICE TO GO BACK**

GAME ADJUSTMENT MENU

GAME ADJUSTMENTS CONTINUED...

Standard Pricing

This allows the operator to choose any of the "Standard" selections for the Standard Pricing Table

Standard Pricing Table

Name	Settings Credit/Coin	Coin Chute 1	Coin Chute 2	Coin Chute 3	Coin Chute 4	Bill Changer
USA 1	1/3X25	.25	.25			\$1.00
USA 2	1/2X25	.25	.25			\$1.00
USA 3	1/4X25	.25	.25			\$1.00
USA 4	1/5X25	.25	.25			\$1.00
USA 5	1/6X25	.25	.25			\$1.00
USA 6	1/8X25	.25	.25			\$1.00
USA 7	1/8X25, 1/2X100, 3/500	.25	.25			\$1.00
USA 8	1/25, 3X25/START, 2X25 CONT	.25	.25			\$1.00
USA 9	1/25, 2X25/START, 1/25 CONT	.25	.25			\$1.00
USA 10	200/START, 150 CONT	.25	.25			\$1.00
USA 11	1/6X25, 4/500	.25	.25			\$1.00
USA 12	100/START, 3X25/CONT	.25	.25			\$1.00
GERMAN 1	1/3X1DM, 2/5DM	1DM	5DM			
GERMAN 2	1/1DM, 5/5DM	1DM	5DM			
GERMAN 3	1/2X1DM, 3/5DM	1DM	5DM			
GERMAN 4	ECA 2/5DM, 1/3X1DM ECA	1DM	2DM			
GERMAN 5	ECA 3/5DM, 1/2DM, 1/2X1DM ECA	1DM	2DM	5DM		
GERMAN 6	1/3X1DM, 2/5DM NO BONUS	1DM	5DM			
GERMAN 7	1/2X1DM, 3/5DM NO BONUS	1DM	5DM			
GERMAN 8	1/1DM, 6/5DM NO BONUS	1DM	5DM			
FRANCE 1	ECA 2/5F, 5/10F	1F	5F			
FRANCE 2	ECA 2/5F, 4/10F	1F	5F			
FRANCE 3	1/5F, 3/10F	10F	20F			
FRANCE 4	1/5F, 2/10F	10F	20F			
FRANCE 5	2/5F, 5/10F, 11/2 X 10F	10F	20F			
FRANCE 6	2/5F, 4/10F, 9/2 X 10F	5F	10F			
FRANCE 7	1/5F, 3/10F, 7/2 X 10F	5F	10F			
FRANCE 8	ECA 1/5F, 2/10F, 5/2 X 10F	1F	5F			
FRANCE 9	ECA 1/3 X 1F, 2/5F	1F	5F			
FRANCE 10	ECA 1/2 X 1F, 3/5F	1F	5F			
FRANCE 11	1/3 X 1F, 2/5F, 5/2 X 5F	5F	10F			
CANADA 1	1/2X25, 2/100	.25	\$1.00			
CANADA 2	1/4X25, 1/100	.25	\$1.00			
CANADA 3	1/4X25, 1/100, 3/2X100	.25	\$1.00			
SWISS 1	1/2X1F, 3/5F	1F	5F			
SWISS 2	1/1F, 5/5F	1F	5F			
SWISS 3	1/3X1F, 2/5F	1F	5F			
ITALY 1	1/500LIRE	500 LIRE	500 LIRE			
ITALY 2	1/2X500LIRE	500 LIRE	500 LIRE			
ITALY 3	1/4X500LIRE	500 LIRE	500 LIRE			
UK 1	2/100P, 1/50P, ECA	100P	50P	20P	10P	
ECA						
UK 2	1/100P, 1/2X50P, ECA	100P	50P	20P	10P	
ECA						
UK 3	1/3X20P, 1/50P	100P	50P			
SPAIN 1	1/100PESETA, 6/500PESETA	100P	500P			
SPAIN 2	3/2X100PESETA, 7/500PESETA	100P	500P			
SPAIN 3	100PESETA, 5/500PESETA	100P	500P			
SPAIN 4	1/2X100PESETA, 3/500PESETA	100P	500P			
SPAIN 5	2/100PESETA, 10/500PESETA	100P	500P			
SPAIN 6	ECA 1/100PESETA ECA	25P	100P	200P	500P	
AUSTRALIA 1	1/5X20, 1/100	.20	\$1.00			
AUSTRALIA 2	1/10X20, 1/2X100	.20	\$1.00			
AUSTRALIA 3	1/2X100	\$1.00	\$2.00			
AUSTRALIA 4	1/3X100	\$1.00	\$2.00			
JAPAN 1	1/1	100 YEN	100 YEN			
JAPAN 2	1/2	100 YEN	100YEN			
JAPAN 3	1/100 YEN, 3/500YEN	100 YEN	500YEN			
TAIWAN 1	1/10	NT 10	NT 10			
TAIWAN 2	2/2	.25	.25			
TAIWAN 3	2/1	1 COIN	1 COIN			
AUSTRIA 1	1/5 SCH, 2/10 SCH	5 SCHILLINGS	10 SCHILLINGS			
AUSTRIA 2	1/10 SCH, 3/20 SCH	10 SCHILLINGS	20 SCHILLINGS			
AUSTRIA 3	1/2 X5 SCH, 1/10 SCH	5 SCHILLINGS	10 SCHILLINGS			
AUSTRIA 4	1/2 X 10 SCH, 2/30 SCH	10 SCHILLING	20 SCHILLINGS			
BELGIUM 1	ECA 1/20BFR, 3/50BFR	5BFR	20BFR	50BFR		
BELGIUM 2	1/20BFR	20BFR	10BFR			
BELGIUM 3	1/20BFR	20BFR	20BFR			
SWEDEN	ECA 1/10KR	1KR	5KR	10KH		
FINLAND	1/5MARKKA	1 MARKKA	5 MARKKA	10 MARKKA		
NETHERLANDS 1	1/2.50HFI	2.50 HFI	2.50 HFI			
NETHERLANDS 2	1/1HFI, 3/2.50HFI	1HFI	2.50 HFI			
NORWAY	ECA 1/5 KRONE	5 KRONE	10 KRONE	20 KRONE		
DENMARK	ECA 1/5KRONE	1 KRONE	5 KRONE	10 KRONE	20 KRONE	
HUNGARY	1/4 X 20FORINT, 2/140 FORINT	20 FORINT	20 FORINT			
GENERAL 1	1/1 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 2	1/2 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 3	1/3 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 4	1/4 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 5	1/5 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 6	1/6 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 7	2/1 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS
GENERAL 8	3/1 COIN	1 COIN	1 COIN	1 COIN	4 COINS	4 COINS

GAME ADJUSTMENTS CONTINUED...

Custom Pricing

Custom Pricing allows the operator to install pricing other than that of the Standard Pricing Table. Custom Pricing also allows the operator to select the amount of credits required to start a game and the amount of credits required to continue a game. This option is adjusted from the Dip Switch Settings.

OFFROAD CHALLENGE DIAGNOSTICS © 1997 MIDWAY GAMES VERSION X.XX	
CUSTOM PRICING MENU	
FIRST CHUTE UNIT	1
SECOND CHUTE UNIT	1
THIRD CHUTE UNIT	4
FOURTH CHUTE UNIT	4
BILL CHANGER UNIT	4
UNITS PER CREDIT	3
UNITS FOR BONUS	0
MINIMUM UNITS	1
CREDITS TO START	1
CREDITS TO CONTINUE	1
UNITS FOR CASH	1
FIRST CHUTE COUNTER	1
SECOND CHUTE COUNTER	1
THIRD CHUTE COUNTER	4
FOURTH CHUTE COUNTER	4
BILL CHANGER COUNTER	4
SHOW FRACTION	YES
SELECT CUSTOMER PRICING	NO
ENTER TO ADJUST SERVICE TO GO BACK	

GAME ADJUSTMENT MENU

The following definitions are provided to better explain the adjustments in the custom pricing menu:

- Chute/Changer Unit: Coins and bills inserted accumulate units. This adjustment specifies the quantity of units given for each coin or bill in each chute ("unit" is an arbitrary term).
- Units per Credit: This number establishes the value of each credit for pricing calculations.
- Units for Bonus: Units awarded after a player has accumulated enough points for a bonus.
- Minimum Units: No credits will be awarded until this many coin or bill units have accumulated.
- Units for Cash: Units needed to collect cash for use in game play. Cash is needed for tires, etc.
- Chute/Changer Count: Determines how coin counter responds to inputs from coin chute or bill changer.
- Show Fractions: Fractional credits will be seen on the credits screen when YES is selected.
- Select Custom Pricing: Custom pricing is enabled when YES is selected. This overrides default settings.

GAME ADJUSTMENTS CONTINUED...

Free Play

This option selects free play. The setting choices for this adjustment are:

- YES
- NO
- Factory Setting: NO

First Place Awards Free Race

Awards a player a free game on first place finish. The setting choices for this adjustment are:

- YES
- NO
- Factory Setting: YES**

Multi Player **Free** Race

This selects the minimum number of players needed for a free race. The settings for this adjustment are:

- 2
- 3
- 4
- OFF
- Factory Setting: OFF

Start Time Bonus

This determines the initial time a player is given to finish a race. The setting range is:

- Maximum: **+20**
- Minimum: -20
- Factory Setting: 0

Checkpoint Bonus Time

This awards the player a time bonus for passing a checkpoint. The setting range is:

- Maximum: **+20**
- Minimum: -20
- Factory Setting: 0**

Continue Cash Bonus (X 10000)

This awards the player a cash bonus for continuing to race. The setting range is:

- Maximum: 20
- Minimum: 0
- Factory **Setting: 6**

Attract Mode Sound

This determines if the game will make sounds in the attract mode. The settings for this adjustment are:

- ON
- OFF
- Factory Setting: ON**

GAME ADJUSTMENTS CONTINUED...

Attract Mode Theme

This determines which tune will play in the attract mode. The settings for this adjustment are:

- (SEVERAL SELECTIONS ARE AVAILABLE)
- Factory Setting **ROVIN'**

High Score Entry

This determines if the game will allow High Score Entry and Display Table. The setting choices are:

- YES
- NO
- Factory Setting YES

Minimum Volume Level

This determines the minimum volume level of the game sounds. The setting range is:

- Maximum: 32
- Minimum: 0
- Factory Setting: 11

Speed in MPH or KPH

This determines speedometer setting in miles per hour or kilometers per hour. The setting choices are:

- MPH
- KPH
- Factory Setting MPH

Show Girls

This determines if "sexy" girls are seen at various points in the game. The setting choices are:

- YES
- NO
- Factory Setting YES

Show Road Kill

This determines if dead animals are shown in the game. The setting choices are:

- YES
- NO
- Factory Setting YES

Game Difficulty

This allows the operator to select the difficulty level of the game. The setting range is:

- Easiest: 0
- Hardest: 10
- Factory Setting: 5

Maximum Credits

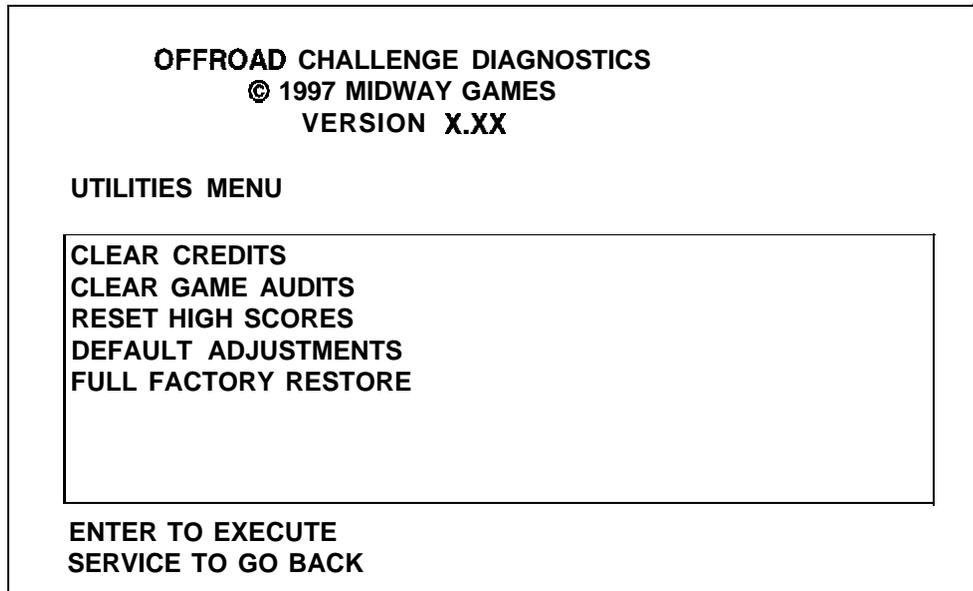
This determines the maximum number of credits stored (pre-pay or "coin-ups"). The setting range is:

- Maximum: 99
- Minimum: 10
- Factory Setting: 30

UTILITIES

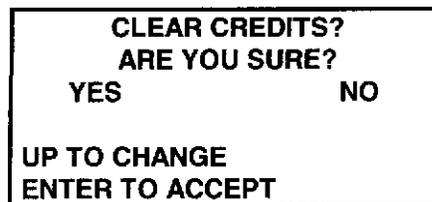
Press the Volume Up or Volume Down button to highlight the Utilities option on the Main Menu, then press the Test button. Press the Service button to return to the Main Menu from this screen.

The Utilities Menu allows operators to clear the game bookkeeping memory and to reset factory defaults.



UTILITIES MENU

The Utilities Menu offers several options. Press the Volume Up or Volume Down button to highlight an option, then press the Test button. The activated item provides a setting choice. Press the Volume Up or Volume Down button to change the current value. A typical confirmation box is shown below.



Press the Volume Up or Volume Down buttons to select YES or NO, then press the Test button to lock in the setting. Selecting NO cancels any changes values and returns the previous values to memory.

NOTE: Record the numbers before they are cleared. Once gone, these values can not be restored.

CLEAR CREDITS

Press Volume Up or Volume Down buttons to highlight the Clear Credits option on the Main Menu, then press the Test button. This returns all credit values to zero and removes credit amounts from memory.

CLEAR GAME AUDITS

Press Volume Up or Volume Down buttons to highlight the Clear Game Audits option on the Main Menu, then press the Test button. This returns all audit values to zero and removes totals from memory.

RESET HIGH SCORES

Press Volume Up or Volume Down buttons to highlight the Reset High Scores option on the Main Menu, then press the Test button. This deletes all high scores and removes player identities from memory.

DEFAULT ADJUSTMENTS

Press Volume Up or Volume Down buttons to highlight the Default Adjustments option on the Main Menu, then press the Test button. This sets the adjustments back to their original values.

FULL FACTORY RESTORE

Press Volume Up or Volume Down buttons to highlight the Full Factory Restore option on the Main Menu, then press the Test button. This returns every variable in the game to the original factory settings.

CALIBRATE CONTROLS

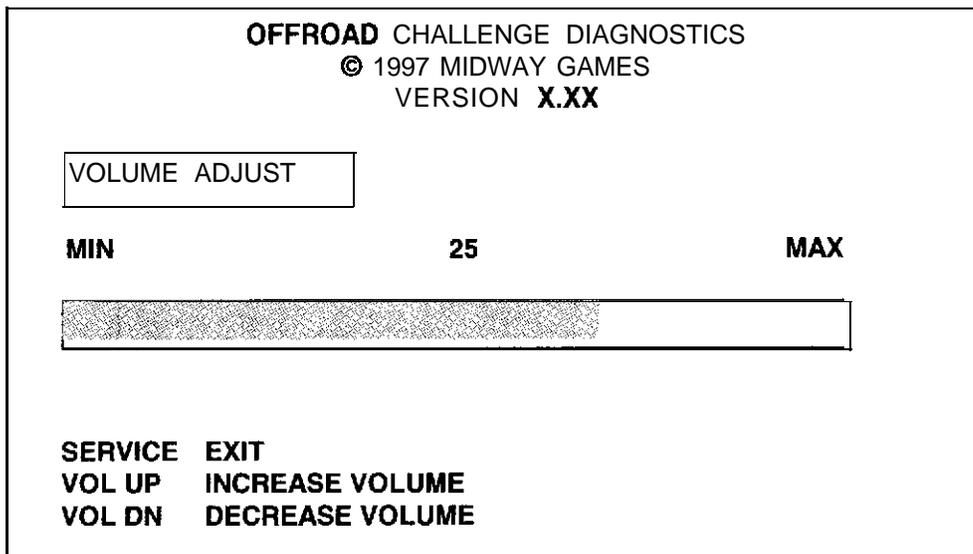
Press the Volume Up or Volume Down button to highlight the Calibrate Controls option on the Main Menu, then press the Test button. This test stores new maximum and minimum values for each of the controls.

Follow the on screen instructions: Remove hands and feet from all controls. Set the steering wheel to the center position, then press the Test button. Turn the steering wheel to the left-most position, then press the Test button. Turn the steering wheel to the right-most position, then press the Test button. Push the gas pedal to the maximum position, then press the Test button. Push the brake pedal to the maximum position, then press the Test button once again to complete the calibrations and return to the Main Menu.

ADJUST VOLUME

Press the Volume Up or Volume Down button to highlight the Adjust Volume option on the Main Menu, then press the Test button. Remember that minimum sound level is set under Game Adjustments.

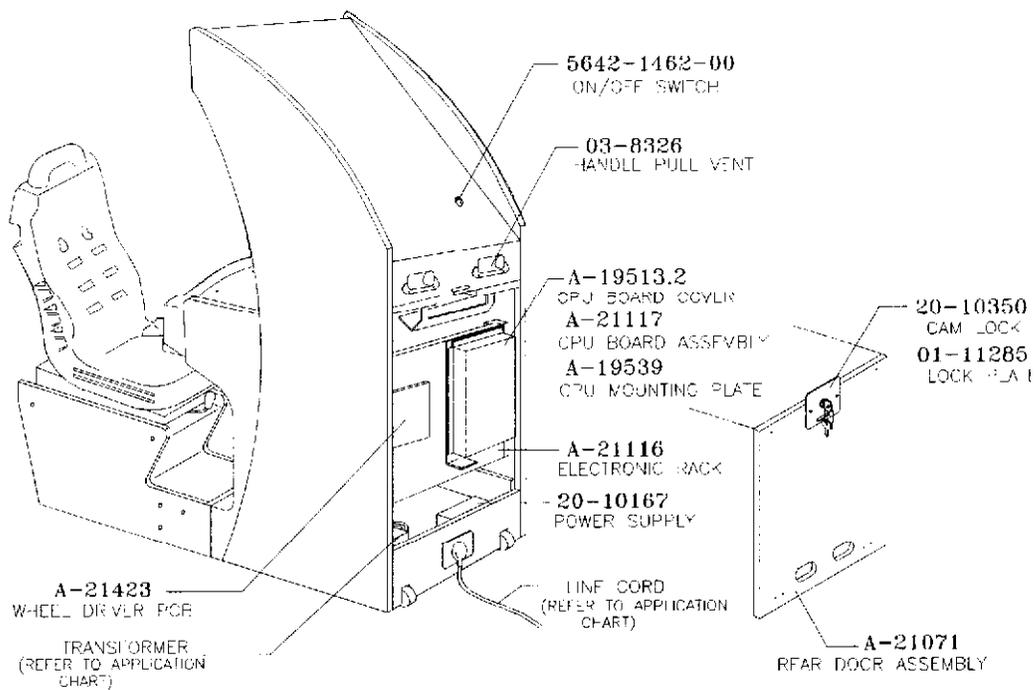
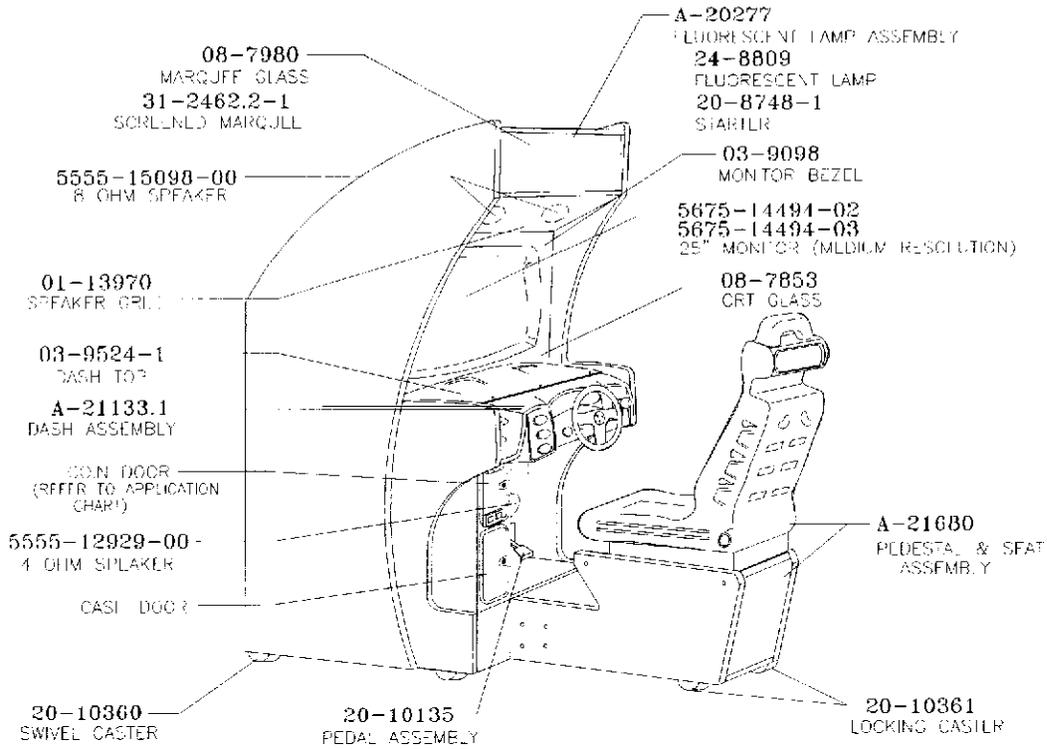
Press the Volume Up button to increase, or the Volume Down button to decrease the sound level of the game. Press the Test button to lock the volume level at the selected value and return to the Main Menu.



ADJUST VOLUME SCREEN

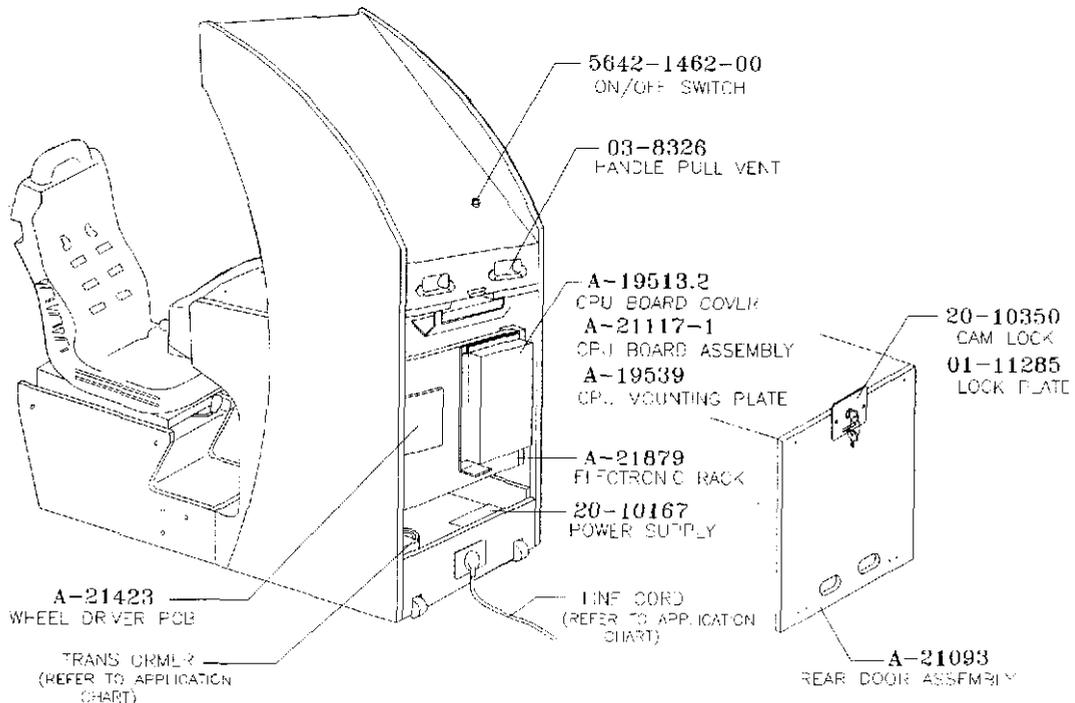
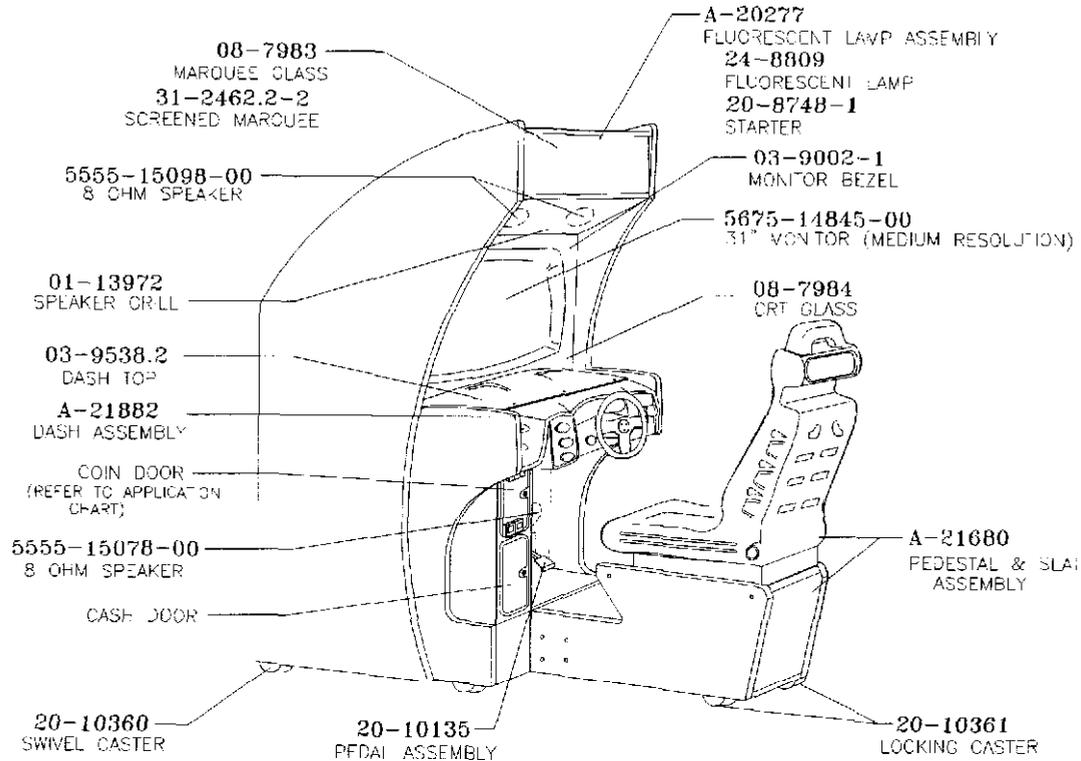
CABINET FRONT - VIEW 1

20030-C 25" Cabinet Assembly



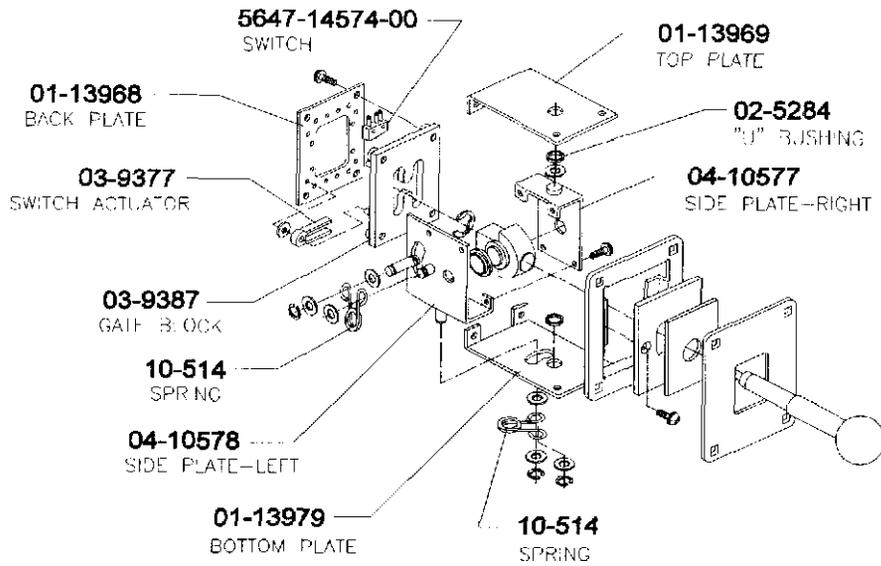
CABINET FRONT - VIEW 2

20034-c 31" Cabinet Assembly



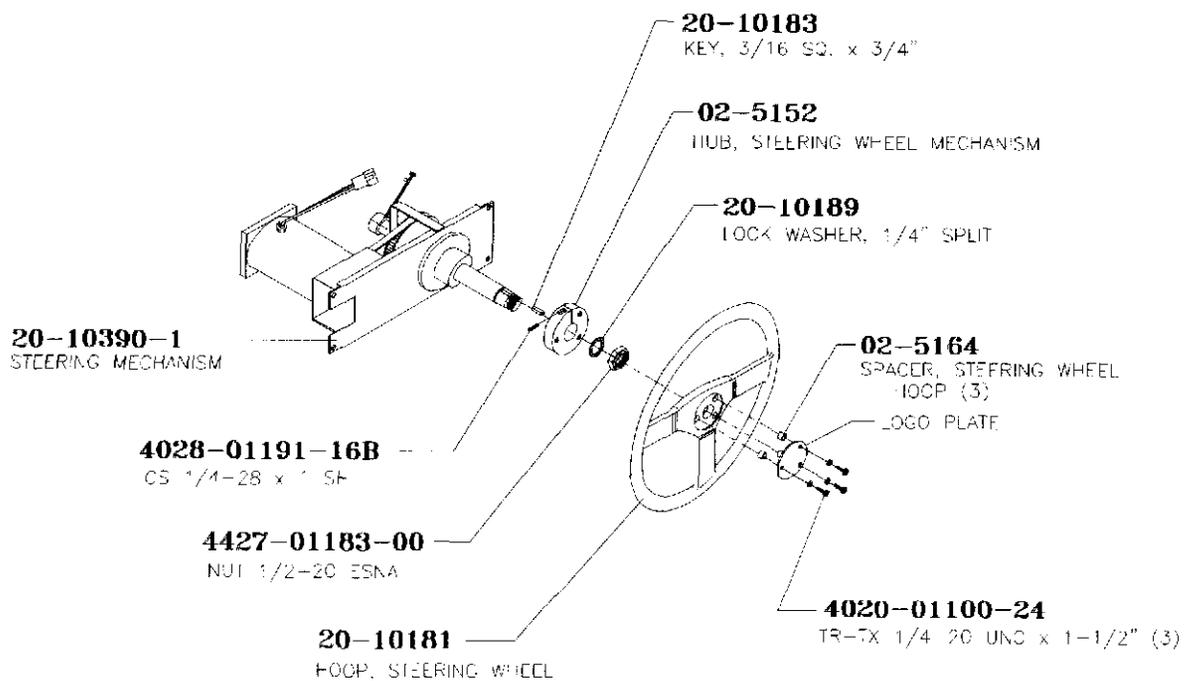
4-SPEED SHIFTER

20-10253.1

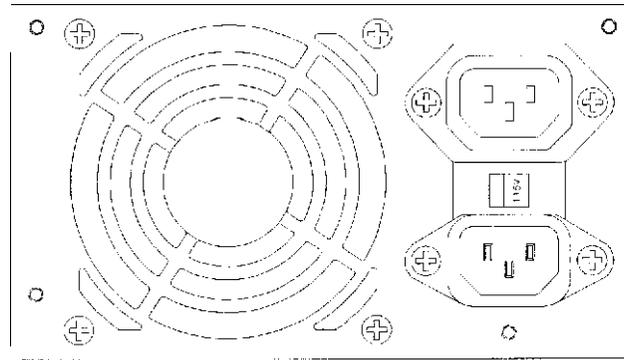


20-10390-1

STEERING MECHANISM AND ASSOCIATED PARTS



POWER SUPPLY 20-I 0167

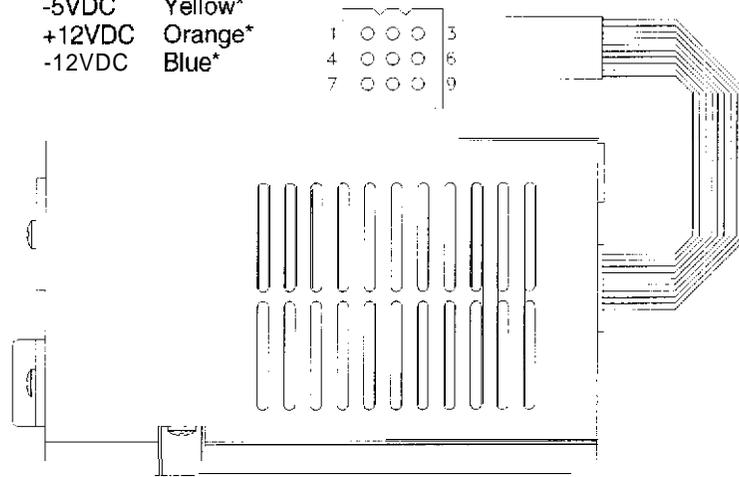


REAR VIEW

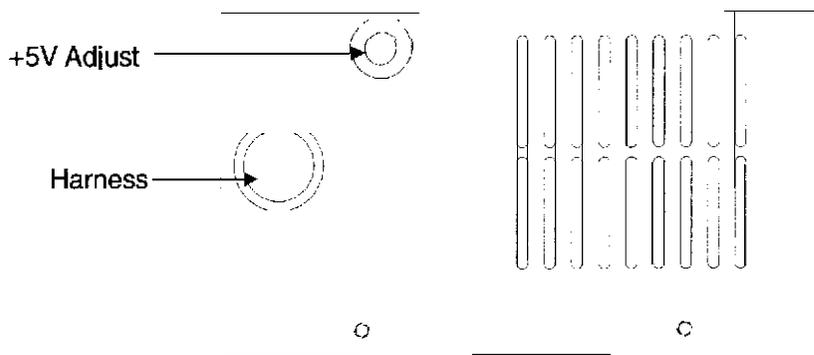
Connector Pin Designation

Pin #	Function	Wire Color
1, 2, 3	+5VDC	Red
4, 5, 6	Ground	Black
7	-5VDC	Yellow*
8	+12VDC	Orange*
9	-12VDC	Blue*

*Note: Many computer grade power supplies use yellow for +12V, blue for -5V, and white for -12V. This is acceptable as long as the pinout is correct.

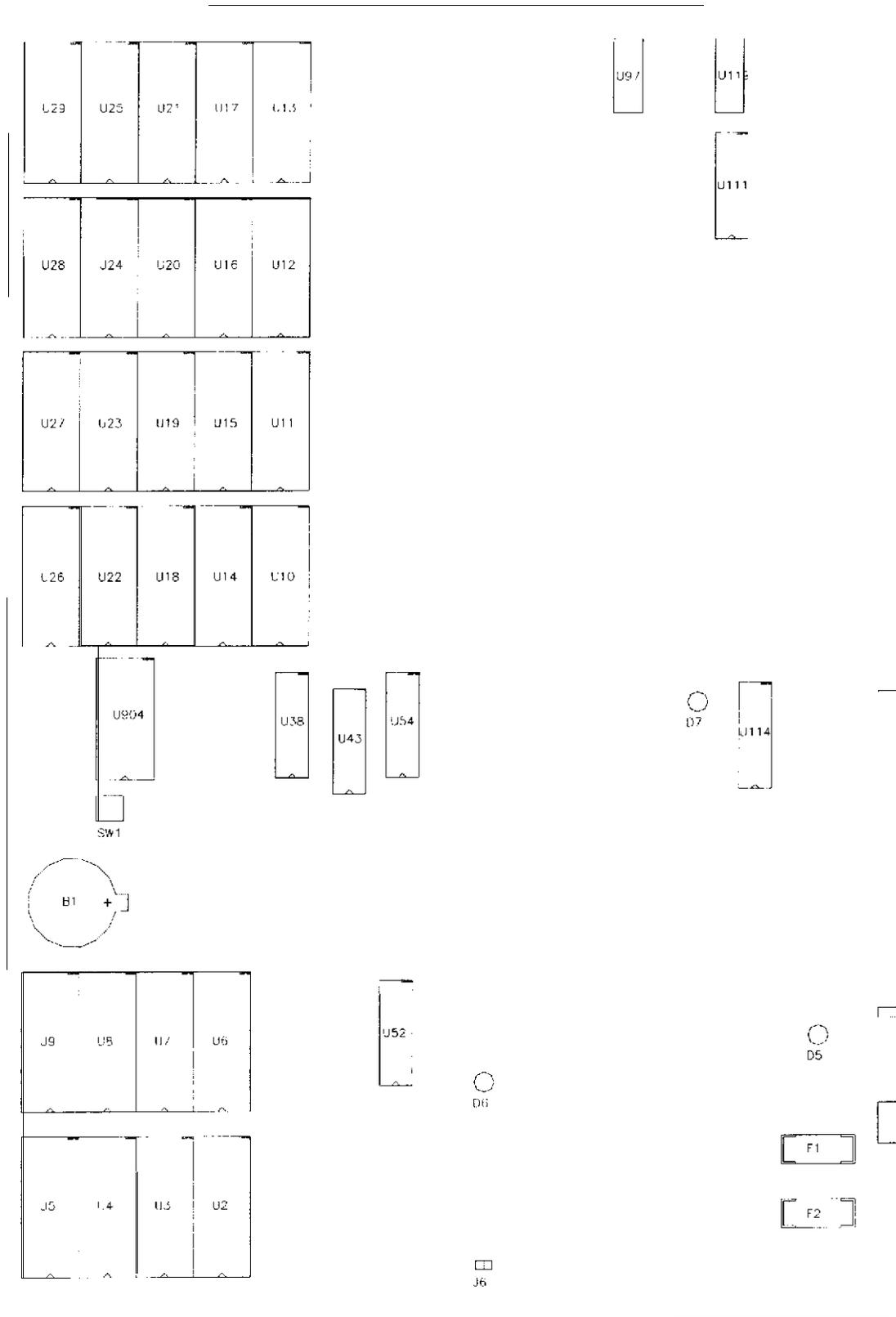


SIDE VIEW



FRONT VIEW

A-21 117 (25") and A-21 117-I (31") CPU Board Assembly

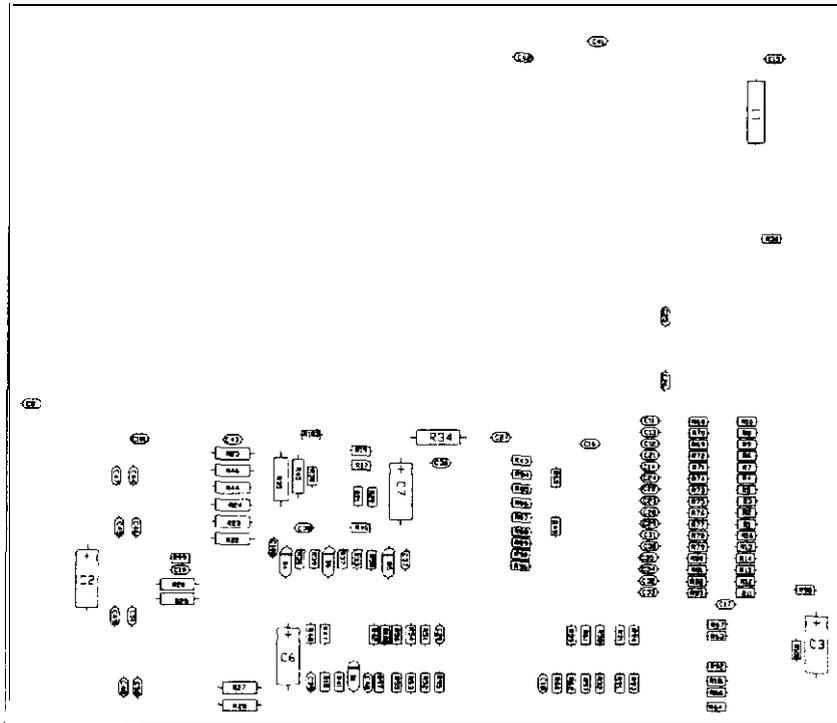
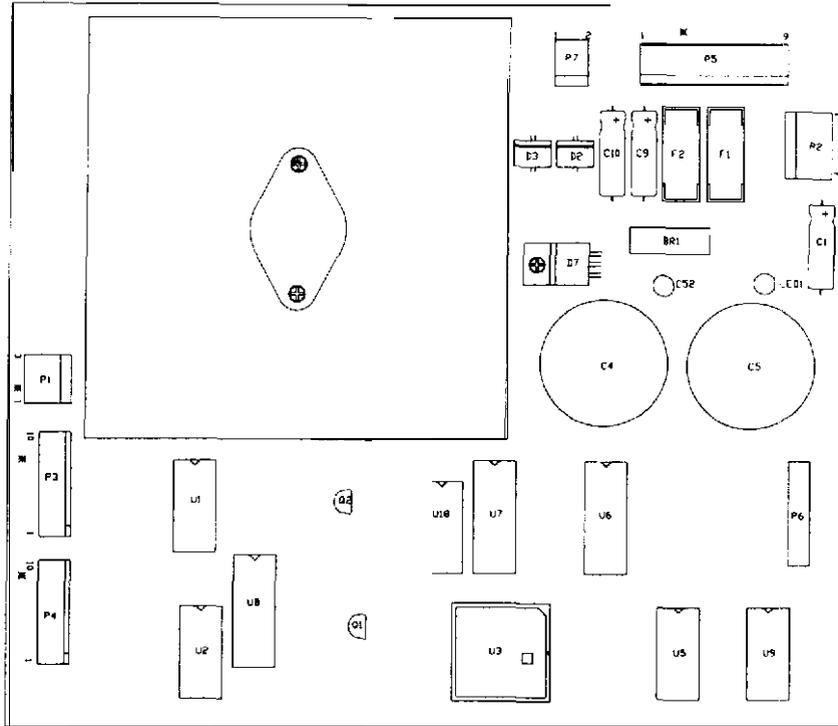


CPU BOARD ASSEMBLY

Field Replaceable Parts

DESIGNATION	PART NUMBER	FUNCTION	DESCRIPTION
B1	5880-I 1056-00	Memory Backup	3Volt Lithium Battery
F1, F2	5731-I 4468-00	Circuit Protection	3A 250V SB Fuse 5x20mm
u2	A-5343-20030-2	Sounds	EPROM Assembly
u3	A-5343-20030-3	Sounds	EPROM Assembly
u4	A-5343-20030-4	Sounds	EPROM Assembly
US	A-5343-20030-5	Sounds	EPROM Assembly
U6	A-5343-20030-6	Sounds	EPROM Assembly
u7	A-5343-20030-7	Sounds	EPROM Assembly
U8	A-5343-20030-8	Sounds	EPROM Assembly
U9	A-5343-20030-9	Sounds	EPROM Assembly
U10	A-5343-20030-10	Images	EPROM Assembly
U11	A-5343-20030-1 1	Images	EPROM Assembly
u12	A-5343-20030-1 2	images	EPROM Assembly
U13	A-5343-20030-1 3	images	EPROM Assembly
u14	A-5343-20030-1 4	Images	EPROM Assembly
u15	A-5343-20030-1 5	Images	EPROM Assembly
U16	A-5343-20030-1 6	Images	EPROM Assembly
u17	A-5343-20030-1 7	Images	EPROM Assembly
U18	A-5343-20030-1 8	Images	EPROM Assembly
U19	A-5343-20030-1 9	Images	EPROM Assembly
U20	A-5343-20030-20	Images	EPROM Assembly
U21	A-5343-20030-21	Images	EPROM Assembly
u22	A-5343-20030-22	Images	EPROM Assembly
U23	A-5343-20030-23	Images	EPROM Assembly
U24	A-5343-20030-24	Images	EPROM Assembly
U25	A-5343-20030-25	Images	EPROM Assembly
U904	A-21 880	Game Instructions	PIC Assembly (20030 only)
U904	A-21881	Game Instructions	PIC Assembly (20034 only)
J6	5882-13046-00	Jumper	Option connection

WHEEL DRIVER BOARD ASSEMBLY A-21 423



WHEEL DRIVER BOARD ASSEMBLY

A-21 423

PART NUMBER	DESIGNATOR	DESCRIPTION
A-21422		Wheel Driver Sub-Assembly
5340-12958-00	U9	IC 26LS31 Bal Drvr
5340-12959-00	U5	IC 26LS32
5311-14068-00	U7, U8	IC 74HC574 Octal D-Latch
5371-14070-00	U18	IC D/A converter 8 Bit
5370-12602-00	U1, U2	IC ULN 2064B
5370-14069-00	U4	IC LM12 Power Op Amp
5160-10269-00	Q2	Trans 2N390404 NPN
5100-13945-02	BR1	Bridge Diode SIP
5040-08986-00	C1	Capacitor. 100M, 10v, 20%
5040-12298-00	C9, C10	Capacitor. 100M, 40v
5040-13417-00	C4, C5	Capacitor, 10000MF, 35v
5791-10862-09	P5	Connector, 9HSTR Pin.156
5791-10862-02	P7	Connector, 2HSTR Sq. Pin .156
5791-10862-04	P2	Connector. 4HSTR Pin.156
5791-09437-00	P6	20HCN 2x10 ST
5791-12461-10	P3, P4	Connector. 10HSTR Sq. Pin .100
5070-14526-00	D2, D3	Diode MR7513.0A.
5671-13732-00	LED1	LED Dspl RED
5733-14113-00	F1, F2	Fuse Holder 5x20mm
5705-15102-00	" 4	Heat Sink
5701-14092-00	" 4	Thermal Pad
4006-01003-08	U4	MS 6-32 x 1/2"
4406-01128-00	" 4	Nut 6-32 KEPS
5070-15115-00	D7	Diode MUR1605
5281-12887-00	U6	IC 74LS541
5162-08976-00	Q1	Transistor
4004-01003-04	D7	screw, 4-40 x 1/4"
4404-01124-00	D7	Nut 4-40
5700-13173-00	U3	Socket
20-10345	U4	Teflon Tubing 1/4"
03-9129	U4	spacer
5791-10862-03	P1	Connector, 3-pin Header Sq. Pin .156
A-21436	U3	Wheel Driver Plfd Assembly
5731-14094-00	F1, F2	Fuse SE 4A 5x20mm
A-21422-A1		Wheel Driver Assy., Auto-Insert
5043-08980-00	C8, C15-C20, C25-C27, C36, C43	capacitor. .01M, 50v, 20%
5043-08996-00	C37, C38, C40-C42	Capacitor, .1µF, 50v, 20%
5048-12577-00	C39	capacitor, .47µF, 50v, 20%
5048-13375-00	C11-C14, C21-C24, C28-C35, C44-C51	capacitor, 100PF, 50v, 20%
5040-09343-00	C2, C3, C6, c7	Capacitor, 10µF, 16v, 20%
5070-08919-00	D1	Diode 1N4148 150MA
5010-13363-00	R65, R99-R101	Resistor, 100Ω, 1/8w, 5%
5010-13593-00	R17, R19-R21, R33, R38-R40, R51, R54, R102	Resistor, 10KΩ, 1/8w, 5%
5010-10271-00	R46	Resistor, 110KΩ, 1/4w, 5%
5010-13594-00	R18	Resistor, 1KΩ, 1/8w, 5%
5010-08931-00	R34, R35	Resistor, 1KΩ, 1/2w, 5%
5010-13372-00	R32	Resistor, 220Ω, 1/8w, 5%
5010-09999-00	R22-R29	Resistor, 2KΩ, 1/4w, 5%
5010-13364-00	R1-R16, R49, R55-R64 R66, R67, R91-R97	Resistor, 33Ω, 1/8w, 5%
5010-13365-00	R42, R43, R68-R90	Resistor, 4.7KΩ, 1/8w, 5%
5010-13366-00	R30, R31, R36, R50	Resistor, 470Ω, 1/8w, 5%
5010-09342-00	R45	Resistor, 36KΩ, 1/4w, 5%
5075-09135-00	D6	Zener Diode, 1N4740A, 10v, 1w
5075-14066-00	D4, D5	Zener Diode, 1N4744A, 15v, 1w
5556-14181-00	L1	Ferrite Bead
5048-11028-00	C101	Capacitor, 22PF, 20%
5010-15209-00	R103	Resistor, 30K, 1/8w, 5%

Other Parts Necessary

Power and Protection

A.C. Distribution Assembly	A-20278
A.C. Power Chassis	04-10103.1
A.C. Line Filter, 6A, 250V	5102-14240-00
Fuse Holder Panel	5733-12869-00
Fuse, 3A, 250V, SB	5731-10356-00

Cables

USA DBV Acceptor Cable	H-18136-1
AC Power "Y" Cable	H-I 9297
Main Harness (JAMMA) Cable	H-21 089.2
AC Distribution Cable	H-20279
Line Voltage Cable Assembly	A-21095.1
Upper Speaker Assembly Cable	H-19599
Fluorescent Lamp Cable	H-20330
Control Panel Cable	H-21090.1
Main Wiring Harness	H-21482.1
Gear Shift Cable	H-21124.1
Lower Speaker Assembly Cable	H-21128
Game Linking Cable	6797-I 451 I-00

Documents

Product Registration Card	169478.2
DBV Installation instructions	16-9637
Game Manual	16-20030-101
Product Safety Manual	16-10342.1

Tools

T-20 Torx key	20-9620
---------------	---------

TRANSFORMER APPLICATION CHART

Part Number		661 o-1 4927-00	5610-14928-01	5610-15275-00
Voltage & Country				
120 VAC	USA	.		
230 VAC	European		.	
100 VAC	Japan			■

LINE CORD APPLICATION CHART

Part Number \ Country	5850-13271-00	5850-13272-00	5850-13273-00	5850-13275-00	5850-13276-00	5850-13277-00	5850-13278-00
	USA	■					
UK			■				
Italy				■			
Japan							■
New Zealand						■	
Germany		■					
Spain		■					
Denmark		■					
Finland		■					
Holland		■					
Norway		■					
Switzerland					■		
Hungary		■					
Canada	■						
Austria		■					
France		■					
Australia						■	
Belgium		■					

JOIN DOOR APPLICATION CHART

Part Number \ Country	02	03	04	06	07	09	11	13	14	15	17	18	20	22	23	24	33
	USA																
UK (09-80000)																	
Italy									■								
Japan										■							
New Zealand											■						
Germany	■																
Spain													■				
Denmark						■											
Finland							■										
Holland								■									
Norway												■					
Switzerland														■			
Hungary															■		
Canada																■	
Austria	■																
France		■															
Australia				■													
Belgium					■												

JAMMA Chart

FUNCTION	WIRE COLOR	PIN	PIN	WIRE COLOR	FUNCTION	
Ground	Black	A	1	Black	Ground	
Ground	Black	B	2	Black	Ground	
+5VDC	Red	C	3	Red	+5VDC	
+5VDC	Red	D	4	Red	+5VDC	
-5VDC	Yellow	E	5	Yellow	-5VDC	
+12VDC	Orange	F	6	Orange	+12VDC	
	Key	H	7	Key		
	N/C	J	8	Brown	Coin Counter 1	
	N/C	K	9	N/C		
Speaker -, Upper	Brown-Gray	L	10	Red-Gray	Speaker +, Upper	
Speaker -, Lower	Brown-White	M	11	Red-White	Speaker +, Lower	
Video Green	Yellow-Green	N	12	Yellow-Red	Video Red	
Video Sync	Yellow-White	P	13	Yellow-Blue	Video Blue	
Service Credits	White-Gray	R	14	Yellow-Black	Video Ground	
Slam Tilt	Black-Green	S	15	Black-Blue	Test Switch	
Coin 2	Black-Red	T	16	Black-Brown	Coin 1	
	N/C	U	17	White	Start	
	N/C	V	18	N/C		
	N/C	W	19	White-Brown	Radio Switch	
	N/C	X	20	N/C		
	N/C	Y	21	N/C		
	N/C	Z	22	White-Yellow	View 1 Switch	
	N/C	a	23	White-Green	View 2 Switch	
	N/C	b	24	White-Blue	View 3 Switch	
	N/C	c	25	N/C		
	N/C	d	26	N/C		
	N/C	e	27	N/C		
Ground	Black	f	28	Black	Ground	
SOLDER SIDE				COMPONENT SIDE		

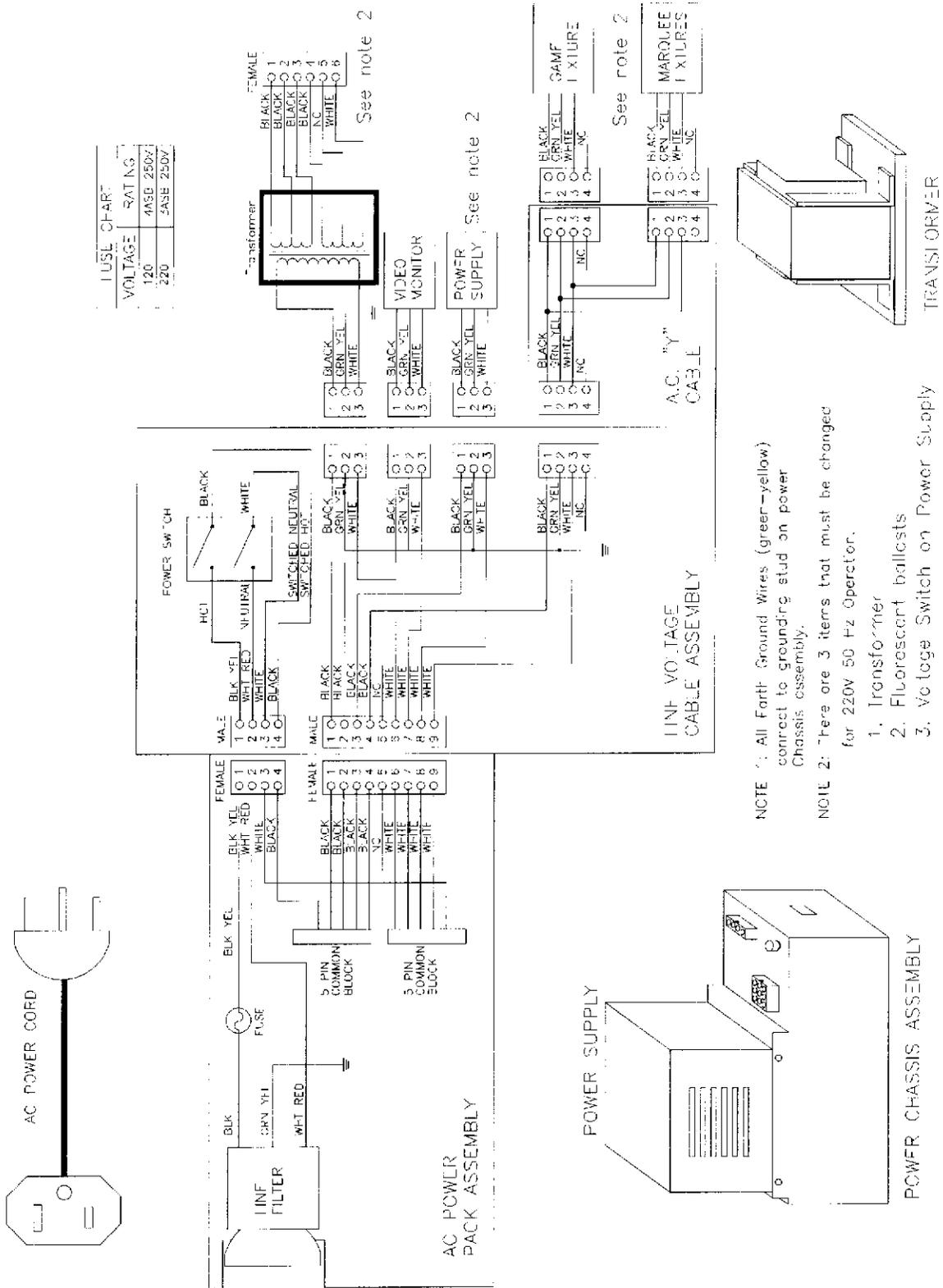
Dash Board wires **that** are not part of the Main **JAMMA** Harness.

- Start Lamp	Violet-Black	Green-Brown	Gear Shift 1
+ Start Lamp	Orange	Green-Red	Gear Shift 2
- View 1 Lamp	Violet-Brown	Green-Orange	Gear Shift 3
+ View 1 Lamp	Orange	Green-Yellow	Gear Shift 4
- View 2 Lamp	Violet Red	Black	Gear Ground
+ View 2 Lamp	Orange	Red	+5V Steering
- View 3 Lamp	Violet-Orange	Orange-Blue	Steering Position
+ View 3 Lamp	Orange	Black	Ground Steering
- Wheel Motor	Brown-White		
+ Wheel Motor	Brown		

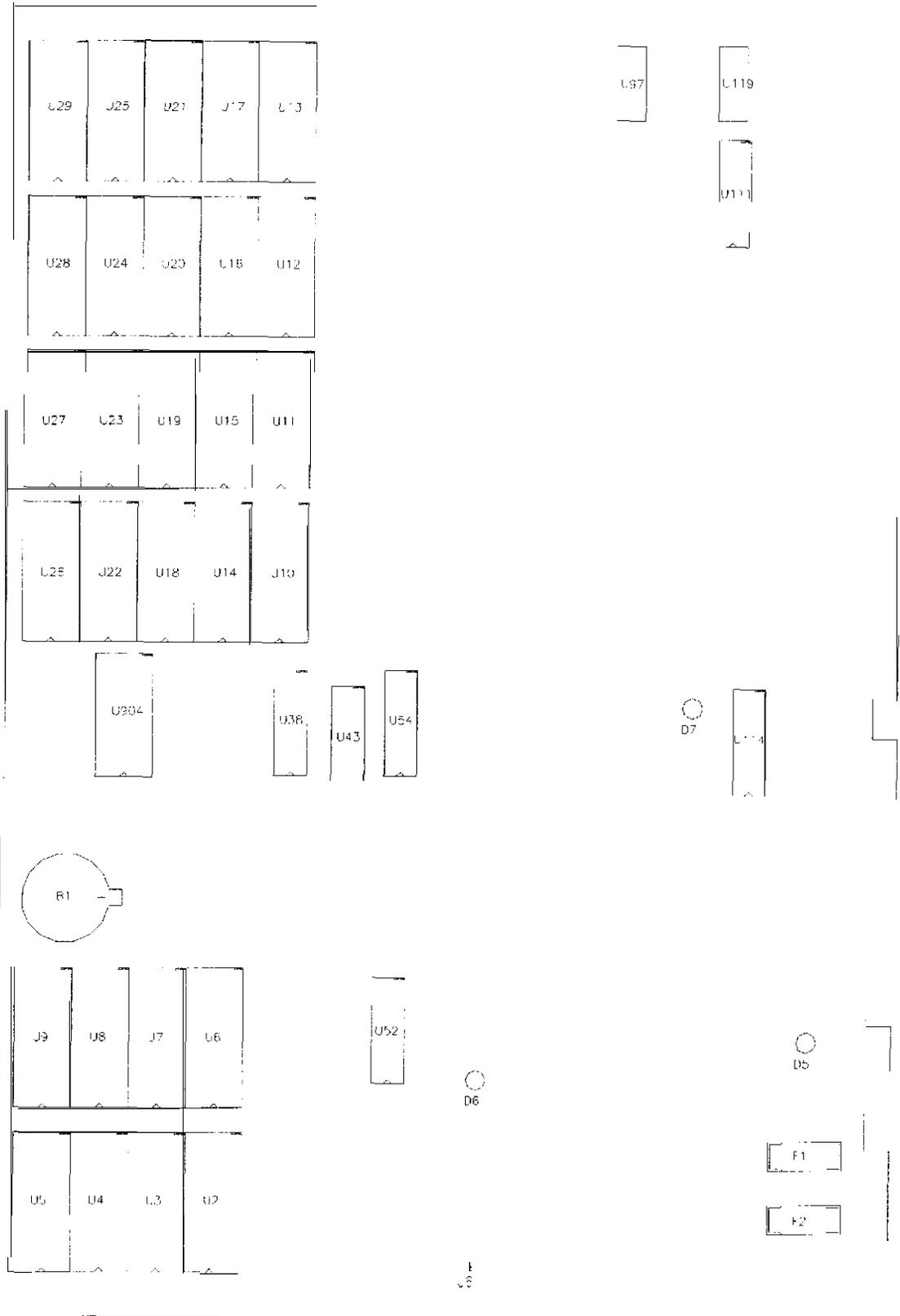
D.C. Power Source Voltage Limits

FUNCTION	RANGE LIMITS	ID	ID	RANGE LIMITS	FUNCTION
Digital Circuits	+4.90V to +5.10V	+5V	-5V	-4.75V to -5.25V	Audio, Lights
Audio, DBV	+11.5V to +12.5V	+12V	NOTE: +5V is adjustable at the Power Supply		

POWER WIRING DIAGRAM



CPU BOARD INDICATOR AND SWITCH LOCATIONS



CPU SWITCHES AND JUMPERS

DESIGNATION	LOCATION	FUNCTION	POSITIONS	STATE	MEANING
SW1	MIDDLE CENTER NEAR U41 & B1	WARM START RESET	1	OFF	NORMAL OPERATION
				ON	FORCED CPU RESET
SW2 (U97)	MIDDLE CENTER NEAR U20 & U94	SOFTWARE FEATURES	8	OFF	FACTORY DEFAULTS
				ON	USED FOR CUSTOM GAME OPERATION
SW3	MIDDLE CENTER NEAR U20 & U119	SOFTWARE COIN MODES	8	OFF	FACTORY DEFAULTS
				ON	USED FOR STANDARD CURRENCY SETTINGS
J6	BOTTOM CENTER NEAR HEATSINK	AUDIO AMP DISCONNECT	1	IN	NORMAL OPERATION
				OUT	NOT USED FOR GAME OPERATION

CPU BOARD LED INDICATOR STATUS CHART

DESIGNATION	LOCATION	FUNCTION	COLOR	STATE	MEANING
D5	RIGHT CENTER NEAR F1& JAMMA	+5 VDC POWER INDICATOR	RED	OFF	NO POWER
				ON	NORMAL OPERATION
				BLINKING	POWER FAULT CONDITION
D6	BOTTOM CENTER NEAR U62 & U63	SOUND ACTIVITY	RED	OFF	SOUND ROM FAILURE
				ON	NORMAL OPERATION
				BLINKING	RESET LOOP (NOTE 1)
D7	MIDDLE RIGHT NEAR U99 & U114	DIAGNOSTICS INDICATOR	RED	OFF	NORMAL OPERATION
				ON	PROCESSOR RESET
				BLINKING	FAULT CONDITION (NOTE 2)

NOTE 1: LED is off during a game reset. Must be on continuously during game play.

NOTE 2: LED blinks to indicate CPU error condition. Must be off continuously during game play.

- 1: Game appears completely non-functional.
 - A: Verify that the game power switch located on the top left rear of the game cabinet is turned on.
 - B: Verify that I.E.C. line cord connector is firmly and correctly seated into I.E.C. power entry module of the A.C. power chassis. If not, then gently but firmly insert the I.E.C. power cable completely into the mating receptacle of the A.C. power chassis.
 - C: Check and verify the A.C. line fuse on the A.C. power chassis is not blown. If the fuse is blown, replace it with an identical fuse of the proper voltage and current rating. Note that a spare fuse is provided with the spare parts bag located in the cash box. Replace this fuse when finished.
 - D: Check and verify that the correct A.C. line voltage is present at the outlet.
 - E: Ensure that cabinet A.C. cable 4-pin and 9-pin connectors are firmly and correctly mated with the corresponding connectors of the A.C. power chassis.

- 2: Marquee lamp is non-functional.
 - A: Check and verify that the fluorescent lamp is properly inserted into the lamp holders.
 - B: Check and verify that the lamp and starter pins are making good contact with the mating pins of their sockets, Install a new lamp if cracks or darkened ends are found. Clean the glass bulb.
 - C: Check and verify that the proper A.C. voltage is present at the power connector of the lamp assembly. If no A.C. power is present, then check the cabinet A.C. wiring from the A.C. power chassis up to the fluorescent lamp itself.
 - D: Check and verify that the starter and lamp are functional by replacing them with known working units.
 - E: Verify that the fluorescent lamp ballast is correct for the local A.C. line voltage and frequency. Check for continuity of both fluorescent lamp filaments, the starter, and the ballast.

- 3: Monitor appears non-functional.
 - A: Check and verify that the cabinet A.C. line voltage cable is firmly and properly connected to mating A.C. connector on monitor. A glow will be seen near the base of the CRT if there is voltage in the filament circuits (this indicates that some power is present on the monitor board).
 - B: Check and verify that the cabinet video signal cable connector is firmly and properly connected to the mating video signal input connector of the monitor.
 - C: Check and verify that the monitor remote adjustment board is properly installed and connected to the monitor chassis. Do not **operate a monitor without a remote adjustment board.**
 - D: Check the A.C. line fuse on the video monitor board.
 - E: Verify monitor is operating correctly by replacing with a known good unit.

4: Sound is non-functional.

- A: Check and verify the cabinet wiring is correct. Ensure that the speakers are properly connected to the audio out **wires** from the **JAMMA** connector. Refer to the cabinet wiring diagram for specific wiring information.
- B: Check and verify that the power supply are correct as listed in the table below.
- C: Check and verify that the above listed DC. voltages are present at the correct **JAMMA** connector pins. Refer to the cabinet wiring diagram for specific wiring information.
- D: Check and verify that the game volume has been turned up.
- E: Verify proper operation of game CPU assembly by replacing it with a known good game CPU assembly.

5: Video monitor appears non-functional.

- A: Check and verify that the **JAMMA** wire harness connector is firmly and properly seated to the mating **JAMMA PCB** edge connector.

**CAUTION: DO NOT REMOVE OR INSTALL
JAMMA CONNECTOR WHEN POWER IS TURNED
ON. DOING SO WILL DAMAGE THE GAME CPU
ASSEMBLY AND VOID THE WARRANTY.**

- B: Check and verify that the D.C. power supply voltages at the game CPU assembly are set as follows:

+5V:	+4.9V to +5.1V
+12V:	+11.5V to +12.5V
-5V:	-4.75V to -5.25V

The above voltages should be set when the game CPU assembly is connected and the game is powered on.

- c: Check and verify that the non **JAMMA** connectors are attached at the proper location and are firmly seated.
 - D: Verify that the game CPU assembly completes the power on self test sequence. Note any errors and/or failures during power on self test. The game CPU assembly should complete the power on diagnostics without error.
 - E: Check and verify that the game CPU DIP Switches are set properly. Review the switch configuration information from Section One.
- 6: The video screen exhibits complete loss of SYNC or consistent horizontal tearing.**
- A: This game uses a MEDIUM Resolution, 25Khz scan rate monitor. Ensure that any replacement monitor used is compatible with this requirement. Use of a standard video game LOW Resolution monitor will result in what appears to be horizontal tearing or complete loss of sync.
 - B: Ensure that all the cabinet ground wires are connected, especially at the video monitor chassis.

7: The audio sounds distorted, muffled or missing frequencies.

- A: This game uses true Stereo Sound, with a separate audio amplifier for right and left speakers. The audio outputs from the video PCB assembly are run directly from the **JAMMA** connector to separate speakers. Ensure that the cabinet wiring provides separate wiring (and not a common return) for each speaker.
- B: The audio amplifiers are designed to drive full range speakers, and not discrete woofer and tweeter speakers. Ensure that the speakers are FULL RANGE response (100 to 10,000 Hz) and are rated at a minimum of 25 Watts.
- C: Check that the speaker wiring is not reversed at one of the speakers. Weak low frequencies and a thin or hollow sound quality is a symptom of incorrectly phased speakers. This condition may not be detected by the SOUND TESTS, but it will be audible during normal game operation.
- D: Using the 2 Volt A.C. setting on a digital voltmeter, measure voltages at the speaker terminals. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.
- F: Verify that the speaker is operating properly by placing in a known good unit.

8: The game will execute the power on diagnostics, but not enter normal game play.

- A: Check and verify that the D.C. power supply voltages are within specification. Use the 2 Volt A.C. setting on a digital V.O.M. and verify that the supply voltages are stable and do not contain any ripple or noise.
- B: Check and verify that the video CPU assembly is correct for the game.

9: Game operates normally, but cabinet gets very warm after several hours of use.

- A: Check bottom and rear of cabinet for blocked air flow. Move game away from sources of heat.
- B: Turn OFF the game power. Apply high power vacuum cleaner to vent holes to remove dust.
- C: Unlock and remove the rear door. Ensure that all fans are connected and operating.

10: Error Messages appear on the screen. The game does not start and there is no audio.

- A: Check any assembly (RAM, ROM, Battery, etc.) identified in the Error **Message**.
- B: Call your authorized distributor for help with unresolved screen messages.