ATARI

The NHLPA & NHL Present

WAYNE GRETZKY'S 3D HOCKEY

NHLPA

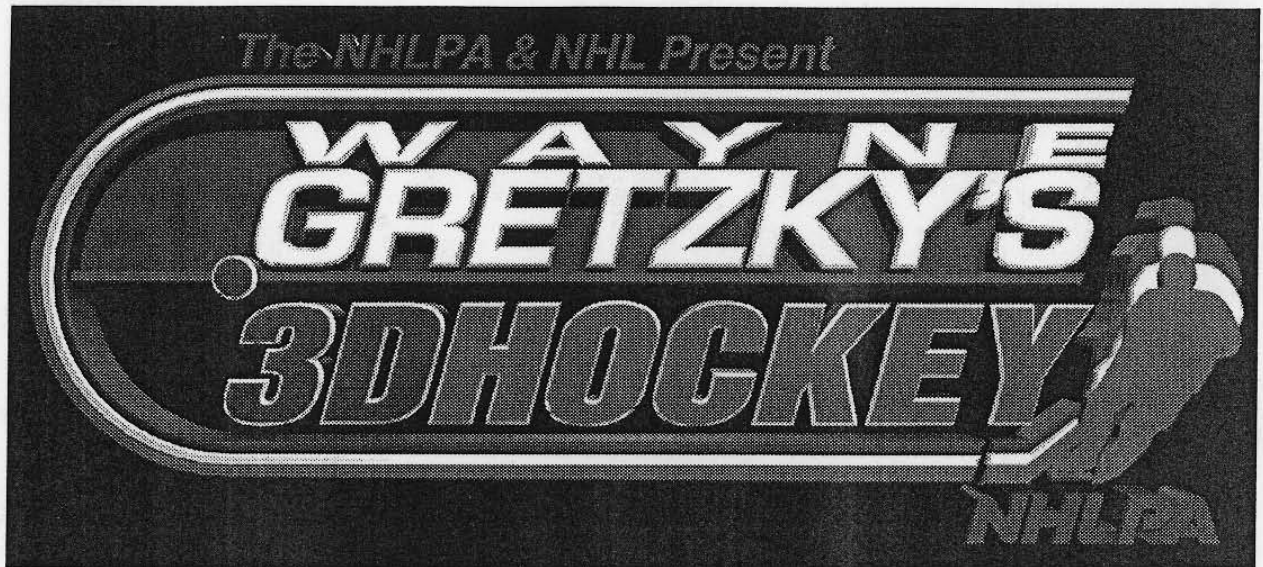## KIT OPERATION MANUAL
Operation & Adjustments • Testing & Problem Diagnosis
Parts Information • Wiring Diagrams

NHLPA™

ATARI GAMES CORPORATION
675 SYCAMORE DRIVE
MILPITAS, CALIFORNIA 95035

WARNINGS & NOTICES

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 FCC type acceptance.
* Use only authorized components and parts. Failure to do so will void warranty and may result in incorrect and/or unsafe operation.
* This game is protected by federal copyright, trademark and patent laws. Unauthorized modifications may be illegal under federal law. This also applies to ATARI logos, designs, publications and assemblies. Moreover, facsimiles of ATARI equipment (or any feature thereof) may be illegal under federal law, regardless of whether or not such facsimiles are manufactured with ATARI components.

WARNING

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generated, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Prevent shock hazard and assure proper game operation. Only plug this game into a properly grounded outlet. Do not use a cheater plug to defeat the power cord's grounding pin. Do not cut off the ground pin.

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.

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FOR SERVICE: CALL YOUR AUTHORIZED ATARI DISTRIBUTOR.

WAYNE GRETZKY'S
3D HOCKEY
™

Information current at time of release.

Fill out and mail in game Registration card. Be sure to include the game serial number. For your records, write the game serial number in the manual.

Serial Number _____

Atari Games Corp. reserves the rights to make modifications and improvements to its products. The specifications and parts identified in this manual are subject to change without notice.

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WAYNE GRETZKY'S
3D HOCKEY   ™

**SECTION
ONE**

INSTALLATION

SAFETY NOTICES

The following safety instructions apply to all kit operators and service personnel. Specific warnings and cautions will be found throughout this manual where they apply. We recommend that you read this page and also all of Section 1, before preparing your kit for play.

⚠ CAUTION

HARD DRIVE. The hard drive cable must be packed in an anti-static bag and the disk drive assembly must be packed in an approved shipping container (p/n 08-7981.1) in order to be sent in for repair or replacement. The hard drive must be removed from the game cabinet and packed into an approved shipping container <u>BEFORE</u> the game cabinet is moved to a new location.

HANDLING ELECTRONIC DEVICES: This kit uses complex electronic components that are SENSITIVE to static electricity. The following precautions must be observed and followed prior to handling any of the electronics that make up this game.

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 safety ground stud of the power supply chassis. This must be done BEFORE touching or handling the electronic assemblies.
3) Store the electronic assemblies in an anti-static area. Anti-static bags are to be used to store the kit CPU assembly. Use the same bag to save the old CPU assembly after the new unit is installed.
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.

FAN. The fan must be connected to a fused 12V power source. Keep wires clear of moving fan blades.

MONITOR. This kit is not intended for use with X-Y monitors. Suitable monitors have horizontally mounted CRTs and raster electronics with inputs for RGB video and <u>COMPOSITE NEGATIVE SYNC.</u>

COIN MECHANISMS. Be sure to clean and test your game coin mechanisms with known currency. Servicing of these mechanisms is crucial to your game's earning potential and operation.

COIN METERS. Coin meters are not provided with this kit. Wiring information is provided as a convenience to the operator. Existing meters may be used provided their operation is verified.

DISCONNECT POWER DURING INSTALLATION OR REPAIRS. Always turn your game OFF and unplug it before attempting to service or install your kit. Installing or repairing PC boards with power ON can damage components and void the warranty. Be sure that all ground wires are installed securely.

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. Do not use a "cheater" plug or cut off the ground pin on the line cord.

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

HANDLE FLUORESCENT TUBE AND CRT WITH CARE. If you drop a fluorescent tube or a CRT and it breaks, it will implode! Shattered glass can fly eight feet or more from the implosion.

WIRING. This kit uses as much of the existing wiring as possible. To avoid errors in operation, verify that the wiring is an exact match with the diagrams after the conversion is completed.

SALVAGED PARTS. Parts salvaged from old games are required to complete your kit. These salvaged parts must operate perfectly; otherwise, the converted game cannot perform properly or safely. Always repair circuit board malfunctions and cabinet damage before conversion is attempted.

POWER SUPPLY. Be sure the power supply from your old game is capable of +5Vdc at 5A, -5Vdc at 1A, and +12Vdc at 2A. All power supply voltages are ±5% under load. These operating voltages are necessary for the kit. Your power supply must be FCC approved.

PRODUCT SPECIFICATIONS

Game Characteristics

Player Variables	*Operator Variables*	*Diagnostics*
1 to 4 players per game	Coinage, Play Mode,	Automatic Power-Up Self-Test
Choice of Team and Position	Difficulty, Volume,	Manual Multi-Level Menu System
High Score Recognition	Audits, Statistics	

NOTICE - FCC COMPLIANCE

INSTALLATION OF THIS KIT INTO ANY EXISTING PRODUCT DOES NOT GUARANTEE COMPLIANCE WITH FCC REQUIREMENTS. YOU ARE SOLELY RESPONSIBLE FOR FCC COMPLIANCE FOR INSTALLATIONS IN OTHER PRODUCTS. ANY EXISTING FCC COMPLIANCE STICKER MUST BE REMOVED AND A NEW STICKER SHOULD NOT BE INSTALLED ON THE CONVERTED PRODUCT UNTIL YOU HAVE VERIFIED FCC COMPLIANCE.

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.

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ATTENTION

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. All connectors are keyed to fit specific pins on each board.*

INSPECTION

Unpack the materials from the carton and inspect for obvious signs of damage. Use this checklist to be sure the kit is complete. You must supply the remainder of the materials required for this conversion.

	Part Number	Item	Quantity
[ ]	A-21144	3D Hockey Programmed Disk Drive	1
[ ]	A-20356	Disk Drive Mounting Spacers	4
[ ]	A-21057	3D Hockey CPU Board Assembly	1
[ ]	A-21068	Fan Assembly	1
[ ]	H-17192	Control Panel Cable	1....(to connect Player 3 and 4 Controls)
[ ]	03-8338-1	¼ inch PCB mounting spacers	11 (to mount 3D Hockey CPU Assembly)
[ ]	03-9378	Fan Grill	1 (to protect Fan blades)
[ ]	03-9388-10	Plastic Push Rivet	4 (to attach Grill to Fan Assembly)
[ ]	03-9532	Fan Mounting Bracket with Guard	1 (to attach Fan Assembly to Cabinet)
[ ]	08-7981.1	Disk Drive Shipping Container	1 (to protect Hard Disk Drive Assembly)
[ ]	16-8587-825	FBI Warning Label	1
[ ]	16-9478.2	Registration Card	1
[ ]	16-9922.1	Epilepsy Warning Label	1
[ ]	16-10076	Hard Disk Drive Assembly Sheet	1
[ ]	16-10077	Electronic Device Caution Sheet	1
[ ]	16-10080	Hard Disk Drive Installation Sheet	1
[ ]	16-10087	Control Panel Installation Sheet	1
[ ]	16-10151	Control Panel Template	1 (to mark new Player Control hole layout)
[ ]	20-9620	T-20 Tamper Resist Wrench	1 (to mount Control Panel Overlay)
[ ]	20-9978-1	Red 8-way Joystick	1 (new Player 3 Direction Control)
[ ]	20-9978-3	Blue 8-way Joystick	1 (new Player 1 Direction Control)
[ ]	20-9978-4	Green 8-way Joystick	1 (new Player 4 Direction Control)
[ ]	20-9978-5	Yellow 8-way Joystick	1 (new Player 2 Direction Control)
[ ]	20-10209-1	Red Long Shaft Push Buttons	4 (new Player 3 Feature Controls)
[ ]	20-10209-3	Blue Long Shaft Push Buttons	4 (new Player 1 Feature Controls)
[ ]	20-10209-4	Green Long Shaft Push Buttons	4 (new Player 4 Feature Controls)
[ ]	20-10209-5	Yellow Long Shaft Push Buttons	4 (new Player 2 Feature Controls)
[ ]	20-10260	3D Camera View Push Button	1 (new Player Feature Control)
[ ]	31-1789	Clear Overlay	1 (to protect Control Panel)
[ ]	31-2475.1-2	3D Hockey Kit Marquee	1 (to identify game)
[ ]	31-2476	Instruction Card-Game Operation	1 (to specify game rules)
[ ]	31-2480	Cabinet Side Panel Decal	2 (to cover existing cabinet markings)
[ ]	31-2481	Control Panel Decal	1 (to cover existing panel markings)
[ ]	31-2482	Control Panel Decal	1 (to identify Player Controls)
[ ]	4004-01005-06	ms #4-40 x 3/8 inch Philips screws	2 (to mount fan assembly)
[ ]	4108-01193-10B	torx head tamper resistant screws	10 (to attach clear overlay to control panel)
[ ]	4308-01123-24B	ms #8-32 x 1-1/2 inch bolts	16 (to attach joysticks to control panel)
[ ]	4408-01128-00	ms #8-32 nuts	16 (to attach joysticks to control panel)

CONVERTING A TYPICAL VIDEO GAME CABINET

Recommended tools and supplies

[ ] black semi-gloss paint
[ ] electric drill and wood drill bit set
[ ] screwdrivers
[ ] liquid soap (dishwashing detergent)
[ ] grease pencil or marker
[ ] nut drivers or socket wrench set
[ ] 180 grit sandpaper or electric sander
[ ] wood filler material (putty, glue, board, etc.)
[ ] black electrical tape
[ ] small screw assortment
[ ] razor knife
[ ] squeegee or soft sponge
[ ] soldering iron and solder
[ ] wire cutters
[ ] pliers
[ ] hole saw or equivalent

CABINET MODIFICATIONS

1. Verify the operation of the existing game before making any changes to the cabinet. Pay special attention to those components that will be used again after conversion is completed (Power Supply, Video Monitor, Currency Acceptors, Wiring Harnesses, Cabinet Locks, Lighted Marquee, etc.).

2. Switch off power to the game. Disconnect the line cord from the A.C. power. Clear the work area. For cabinets with wood grain sides, remove the old decals and artwork. Clean off all glue residue. For other games, protect the non-wood items (marquee, monitor, coin door, brackets, line cord, etc.). Evenly cover the cabinet with black paint. Allow the paint to dry completely before continuing.

3. Pencil a line roughly at the top of the previous graphic. Lightly moisten the cabinet with soapy water. Remove the backing and apply the decal. Start at the top and work down. After the decal is in place, smooth it outwards, taking care to squeeze out air bubbles. If you can not remove an air bubble, pop it with a knife or pin and smooth it down. Allow at least 12 hours for the adhesive in the decal to set.

4. Remove the existing marquee from the game cabinet and install the new kit marquee in its place. Check the lamp and install a new one if cracks or darkened ends are found, even if it still lights at the time of inspection. Clean the marquee glass before reinstalling it in the game.

5. Remove the viewing glass and set it in a safe place. Clean the CRT and the bezel. Apply the player moves and the game play instruction decals to the bottom front of the monitor bezel. Place the Epilepsy Warning label on the top front of the monitor bezel. Be sure that the decals and labels do not obstruct the viewing area. Clean the viewing glass before reinstalling it in the game.

6. Remove and save the screws at the top and sides of the rear door. Unlock the rear door, then lift it off the cabinet and set it aside.

7. Locate the control panel latches or fasteners and free the control panel from its normal position. If there is no wiring harness connector, label each of the wires before disconnecting it from the Player Controls. Once the wires are disconnected, remove the control panel from the game cabinet. Save the mounting brackets and hardware for reinstallation after the control panel has been modified.

CONTROL PANEL MODIFICATIONS

1. Remove the control panel buttons and joysticks from the existing control panel. Remove the panel covering and any artwork from the previous game. Remove any hinges or mounting brackets.

2. Fill the existing control panel holes with wood, putty, glue or other suitable material. Allow adequate time for materials to dry, then sand or file the control panel to a flat surface on both sides.

3. Place the template on top of the repaired panel. Orient it to center the controls and tape it in place. Cut new holes for the joysticks and the control panel buttons. Remove template and deburr all holes.

4. This game uses a large lighted push button to select the different 3D Camera views. Because this button is not used in all games, its position is not marked on the universal control panel template. Locate this push button mounting hole at the top center of the panel where it can be reached by any of the four players. Be certain that the mounted button will not interfere with the control panel brackets, cabinet supports, or other buttons and joysticks when you cut this hole. Using the button mounting nut as a guide, counterbore the hole from the back side of the panel. Drill clearance holes for the alignment pins on the rear surface of the push button housing. Sand and deburr these holes.
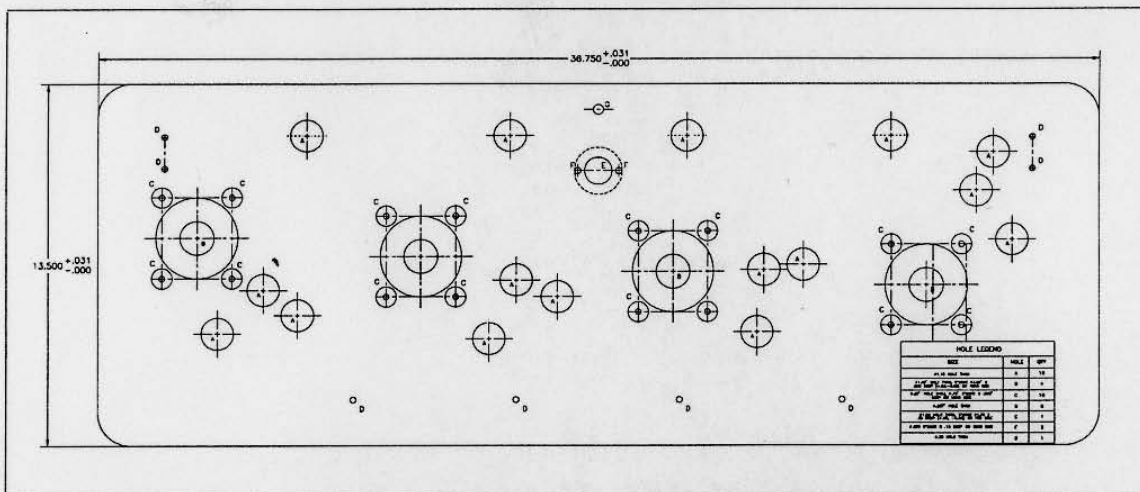
CONTROL PANEL TEMPLATE

5. Remove the backing and apply the overlay to the panel. Start at the top and work down. After the overlay is in place, smooth it outwards, taking care to squeeze out air bubbles. If you can not remove an air bubble, pop it with a knife or pin and smooth it down. Allow the adhesive in the overlay to set.

6. Use a sharp knife to trim the edges and to cut the holes for the control panel buttons and joysticks. Position the stickers next to the appropriate hole locations.

7. Group the Player Controls by color: Player 1 - blue, Player 2 - yellow, Player 3 - red, Player 4 - green. The controls must be disassembled for panel mounting. Install one player control group at a time.

8. Separate a switch from its push-button. Bend the large prong away from the switch just enough to slide the switch off of the housing. Unscrew the nut from the housing. Insert the push-button housing through a switch hole from the front side of the control panel. Screw the nut finger tight onto the switch housing from the back of the panel. Snap the switch back onto the housing.

9. Repeat this step for each button of the same color. Continue until all button groups are mounted.

10. The 3D Camera button mounts in the top center hole. Remove the switch and unscrew the nut as with the other buttons. Orient the button so that the printing can be read when the control panel is installed on the cabinet. Seat the button alignment pins in the clearance holes and tighten the nut. Snap the switch back onto the housing. Ensure that the switch terminals are properly oriented.

11. Disassemble a joystick for mounting. Invert the joystick and remove the "E"-ring from the shaft. Remove the handle and the plastic ring (large washer) from the joystick base. *Be sure that the bushings remain in the base.* Place the top of the joystick base against the bottom of the control panel and align the mounting holes. Use the 8-32 bolts and the 8-32 nuts to attach the base to the underside of the control panel. Slide the plastic ring around the shaft so that the rough side is next to the shaft knob handle. Slide the shaft through the control panel and base. Replace the "E"-ring.

12. Repeat this step for each of the other joysticks. Continue until all joysticks are mounted.

13. Rotate the buttons so that the switch terminals are properly oriented and tighten the nuts firmly.

14. The completed control panel should now resemble the illustration below .

Blue 8-way Joystick
20-9978-3

Blue Pushbutton Switch
20-10209-3

Yellow 8-way Joystick
20-9978-5

Yellow Pushbutton Switch
20-10209-5

Red 8-way Joystick
20-9978-1

Red Pushbutton Switch
20-10209-1

Green 8-way Joystick
20-9978-4

Green Pushbutton Switch
20-10209-4

Hinge

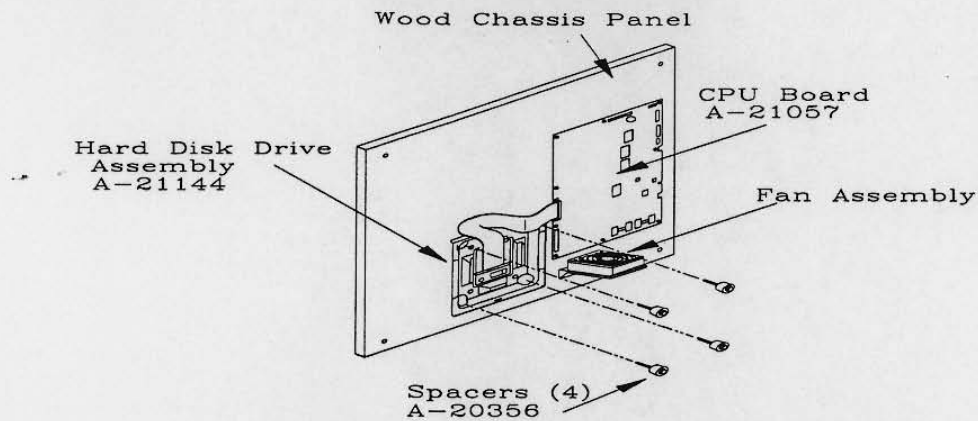3D Pushbutton
Switch
20-10260
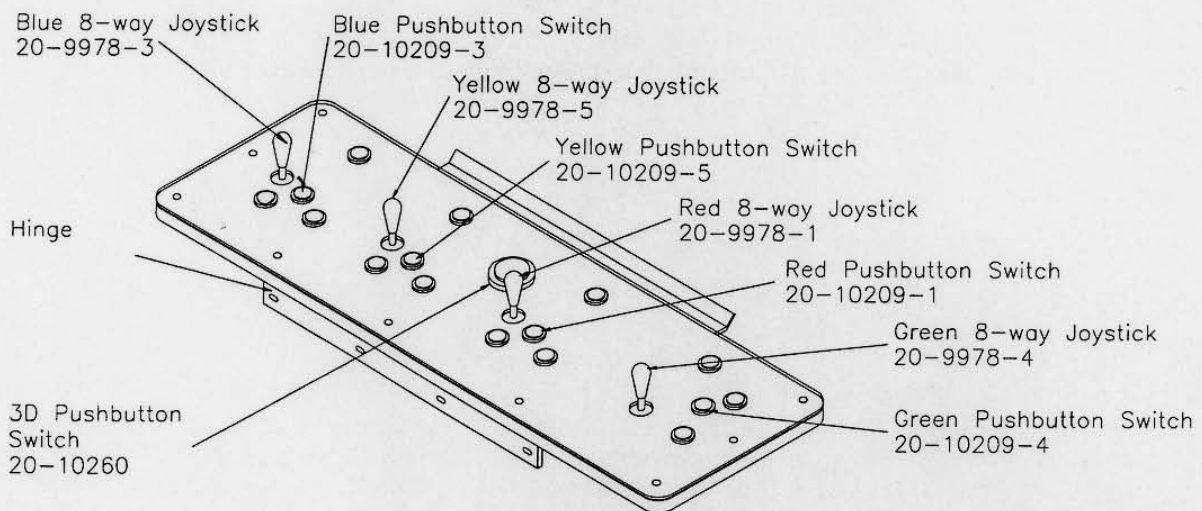
COMPLETED CONTROL PANEL

15. Install the modified control panel onto the modified cabinet using the existing mounting hardware.

GAME ELECTRONICS INSTALLATION

The Hard Disk Drive Assembly is fragile. Avoid rough handling. Do not drop the Hard Disk Drive. The Hard Disk Drive electronic components are static sensitive. Prepare an anti-static work area and ground yourself before removing the Drive Assembly from its protective shipping container.

Do not connect any cable to the CPU Board Assembly or Power Supply with the power turned on. Doing so while the power is turned on may damage the game and void your warranty.

1. Be certain that the power is switched off and the cord is disconnected from the A.C. line voltage. Carefully disconnect the cables on each printed circuit board in the game. Remove the existing printed circuit board set and the disk drive (if present) and set aside. Anti-static bags and protective containers from the new components may be used to store these items after conversion is complete.

2. Remove the new CPU Board Assembly from its protective bag and place it in the cabinet where the previous electronics were located. Orient the board so that the long edges are vertical and the large heatsinks are at the bottom. Ensure that there will be adequate space nearby for the cooling fan and the Hard Disk Drive Assembly. Use the board itself as a template to mark mounting hole locations.

3. If necessary, drill pilot holes for mounting screws. Use the ¼ inch PCB mounting spacers supplied in the kit and your own screws to secure the CPU board to the cabinet. *Do not use excessive force.*

4. Remove the Hard Disk Drive Assembly from its container and place it in the cabinet next to the CPU Board Assembly. *Do not remove the anti-static bag from the ribbon cable connector at this time.* Orient the drive so that it is parallel to the board and the cable is at the top. Ensure that the cable end will reach the CPU connector. Use the drive as a template to mark mounting hole locations.

5. Insert one Disk Drive Mounting Spacer into each of the four holes in the Hard Disk Drive enclosure. Drill holes and use your own screws to secure the spacers and the Hard Disk Drive to the cabinet.

6. Remove the anti-static bag from the Disk Drive ribbon cable. Lift the ribbon cable and place it on top of the circuit board so that the end is directly over the CPU Board disk drive connector. *Be sure the striped edge of the ribbon cable is nearest connector pin 1.* Press firmly on both ends of the connector to seat it fully on the board.

7. Place the Fan Assembly on a flat surface with the blades facing up. Lay the Fan Grill on top of the Fan and align the mounting holes. Attach the grill using four plastic push rivets supplied in the kit.

8. Orient the Fan under the CPU so that the air stream will flow over the center of the board assembly. Use the fan mounting bracket as a template to mark mounting hole locations.

9. Drill holes and install the completed fan using two ms #4-40 x 3/8 screws supplied in the kit. Be sure that the fan is aimed so that air flows upward across the CPU Board Assembly and not away from it. The fan must be operating when the CPU board has power applied to it.

10. The completed game electronics installation should now resemble the sample illustration.

Wood Chassis Panel

CPU Board
A—21057

Hard Disk Drive
Assembly
A—21144

Fan Assembly

Spacers (4)
A—20356

CABINET WIRING

NOTE: The operator must install a JAMMA wiring harness, or use the JAMMA cable from the existing game. Inspect the existing cabinet wiring and compare it with the new Cabinet Wiring Diagram. Most games already have a JAMMA wiring harness which is compatible with the conversion kit. If the connectors in your cabinet do not fit onto the CPU Board or the wire colors do not match the JAMMA Chart, contact your authorized distributor for assistance with this problem.

CAUTION
Properly insulate any unused wires, within the JAMMA cable, especially the red, yellow, and orange wires. This is a fully wired JAMMA cable. Many of the wires will not be used for this kit. These wires have been installed so that you can use this cable for future kits.

1. Connect the JAMMA cable to the CPU Board Assembly. This cable contains the wires for the Player 1 and Player 2 controls, the 3D Camera button, the speakers, the coin door, the video monitor, and the power supply. Using the Cabinet Wiring Diagram as a reference, connect the wires to the control panel. Player 1 has white-'color stripe' wires, except for Start button 1 which has a solid white wire. Player 2 has violet-'color stripe' wires. Verify the continuity of each wire in the JAMMA cable.

2. Connect the new Control Panel cable to J9 and J10 on the CPU Board. This cable contains wires for the Player 3 and Player 4 controls. Using the Cabinet Wiring Diagram as a reference, connect the wires to the control panel. Player 3 has blue-'color stripe' wires, except for Burst button 1 which has a solid blue wire. Player 2 has violet-'color stripe' wires. Verify the continuity of each wire in the Control Panel cable. Route the cable along side of the existing JAMMA cable and secure it.

3. Connect the fan to a source of 12 volt power. Ensure that these connections are well insulated.

4. Connect any ground wires loosened or removed in previous steps (control panel, coin door, etc.).

5. Place the FBI Warning Label next to the CPU board. Be sure the label is completely visible.

6. Plug the line cord into a source of A.C. power and turn it on. Verify that fan direction is correct.

7. The game will power up and begin self diagnostics. If no errors are found, the game will automatically enter its "attract" mode. Refer to Troubleshooting (Section Four) if problems occur.

8. Close and lock the coin door. Replace the rear cabinet door. Allow the system to operate for several hours before attempting any game changes. Refer to Operation (Section Two) for adjustment steps.

NOTES

WAYNE GRETZKY'S
3D HOCKEY ™

SECTION
TWO

OPERATION

GAME OPERATION

STARTING UP

Each time the game is first turned on or power is restored, it begins executing code out of the boot ROM. These self-diagnostic tests automatically verify and report condition of the hardware and the disk drive. If any of the individual tests fails, then an error message will be displayed for each test. The message will be displayed for 30 seconds or until any button is pressed. If any one test fails, then at the end of the entire sequence, a message will be displayed stating how many tests passed and how many failed.

* If no buttons are pressed, the system will quickly complete all tests then load and run the game.
* Press any START button to skip the boot ROM tests and immediately run the game without diagnostics.
* Press and hold the coin door TEST button to skip the boot ROM tests and activate the Menu System.

Once all Power-up tests have been passed, the game goes into its "attract mode". Scenes and sounds from a typical game are alternated with previous high scores in an endless pattern until game play starts.

Insert currency to start the game. Players select teams and other game variables. Play begins after a countdown period is completed. The game will progress until time is exhausted. If no more play is required, the game automatically returns to the "attract mode".

PLAYER CONTROLS   (NOTE: Use joystick and button combinations to discover secret moves.)
The functions of the player controls change as the game switches from Offense to Defense.

♦ **3-D Button**
The 3-D button gives the players the ability to view the play area from different camera angles. The camera positions are similar to those frequently used in televised games.

♦ **START Button**
This button allow players to begin or continue play.
This same button is used during service to select items from the menu.

♦ **SHOOT/BLOCK Button**
The SHOOT button fires the puck at the goal. This is an Offense move.
This same button blocks a shot or a pass. This is a Defense move.

♦ **PASS/STEAL Button**
The PASS button sends the puck to a teammate. This is an Offense move.
This same button steals the puck from the opponent. This is a Defense move.

♦ **BURST Button**
The BURST button gives the active character a sudden rush of speed.

♦ **JOYSTICKS**
Each player has a joystick to control the movements of an on-screen character.
The joystick has the same functions for Offense or Defense moves.

OPERATOR CONTROLS

CABINET SWITCHES

♦ **Power Switch**
The **Power Switch** turns off the game during service. It does not reset the game variables.

♦ **Slam Tilt Switch**
The **Slam Tilt** switch prevents game abuses such as pounding to obtain free games.

CONTROL SWITCHES

♦ **Volume Down and Volume Up Buttons**
The **Volume Down** and **Volume Up** push-button switches increase or decrease game sound levels. Press either button briefly to make minor changes. Press and hold a button to make major changes.

NOTE
The Attract Mode volume is controlled independently of the Game Mode volume.
For greater profits, adjust your volume levels to a loud setting to draw attention to this game.

♦ **Begin Test Button**
The **Begin Test** push-button switch enters the menu system. Press the Begin Test button briefly to run the automatic tests. Press and hold the Test button to get to any of the menu selections.

♦ **Service Credit Button**
The **Service Credit** push-button switch allots credits without changing the game's bookkeeping total.

NOTE
The coin door must be open to reach the control switches.
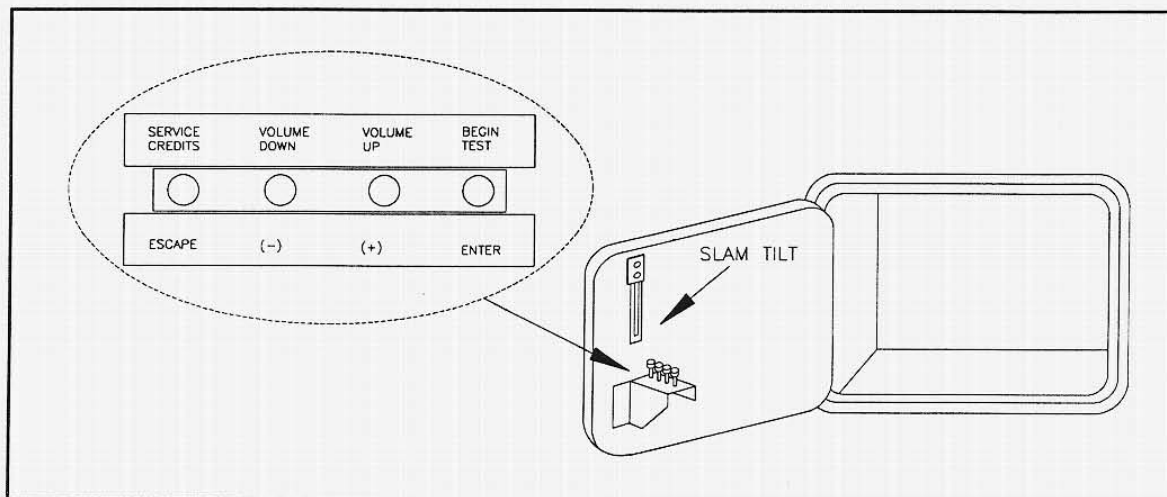
CONTROL SWITCH LOCATIONS

MENU SYSTEM
SYSTEM OVERVIEW
Game variables and diagnostics are presented in a series of on-screen menus. The Main Menu screen allows the operator to view information, make changes, or verify equipment operation. Each Sub Menu screen displays one specific group of choices. The Detail Menu presents data or runs the required test. You must be at the Detail Menu level to detect errors, make changes, or activate tests. Both the operator controls and the player controls are used to move through the menus and start or stop particular routines.

Each time the game is switched from normal play mode to the menu system and back, the self-diagnostic routine is activated. These basic tests run automatically; their purpose is to detect those faults which would prevent the game or the menu system from operating properly. Messages appear on the screen as each item is run, along with any errors detected. A successful self-test usually takes less than one minute to complete. Write down any messages before proceeding to the menus or game play.

Initializing Hardware...
msg: Loading Game...
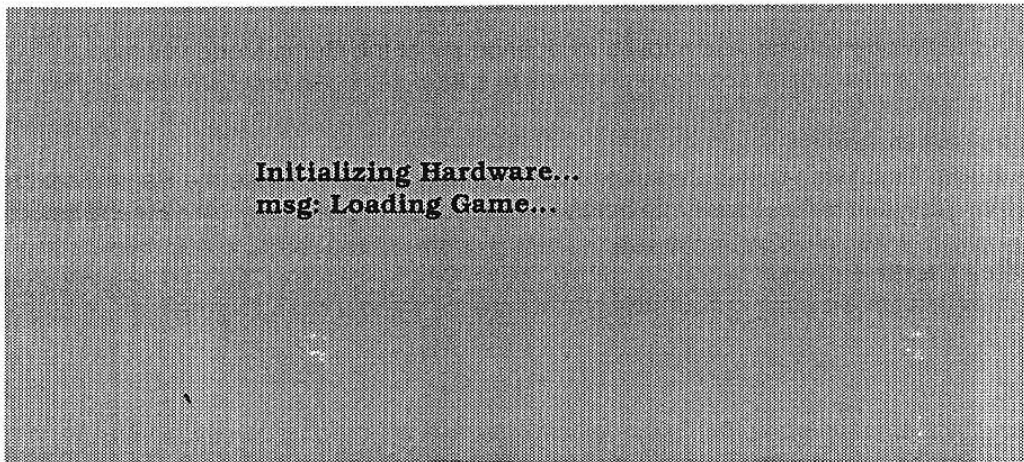
SELF TEST SCREEN

SCREEN LAYOUT
Each menu screen is different, but the material presented stays in the same physical location each time.
    The color bar at the top center of each screen displays the current menu title.
    The center of the screen is used for data (menu items, video signals, statistics, reports, etc.)
    The bottom of the screen is reserved for messages (control functions, revision levels, etc.)

ORGANIZATION
The menu system must be activated manually. It must also be deactivated manually to play the game.

Main Menu screen items fall into two categories: options and tests.
    Option items permit the operator to audit the game and customize or return to factory defaults.
    Tests are useful to verify proper operation of the equipment one assembly at a time.

Sub Menu screen items offer the operator choices within a category. Some items have no Sub Menu while others may have more than one. You can get back to the previous menu or go on to the next menu.

Detail Menu screen items contain specific information. The operator must interact with the system to get results or to make changes. There is always a way to go back to the previous menus from this screen.

Use Player 1 or 2 joysticks to highlight an item on any menu. *Only one highlighted item can be selected at a time.* Press the indicated button to select a highlighted item. To return the game to normal, use either of these joysticks to select EXIT TO GAME, then press any action button.

VOLUME ADJUSTMENT

The Volume Adjust feature allows the operator to determine the sound and music level of the game.

The volume level can be adjusted for either the Attract Mode or the Game. Press the Volume Up button to raise the volume level and the Volume Down button to lower the volume level. Player joysticks 1 or 2 can also be used to change the volume level. Music is available continuously while this screen is active.

```
                          ADJUST VOLUME

  Game
  **************************************************************************
  **************************************************************************
  **************************************************************************


  Attract (100% of Game)
  **************************************************************************
  **************************************************************************
  **************************************************************************




             to ADJUST volume, Use Joystick
             to RESTORE old setting, Press START
             to SAVE setting and exit, Press SHOOT
```
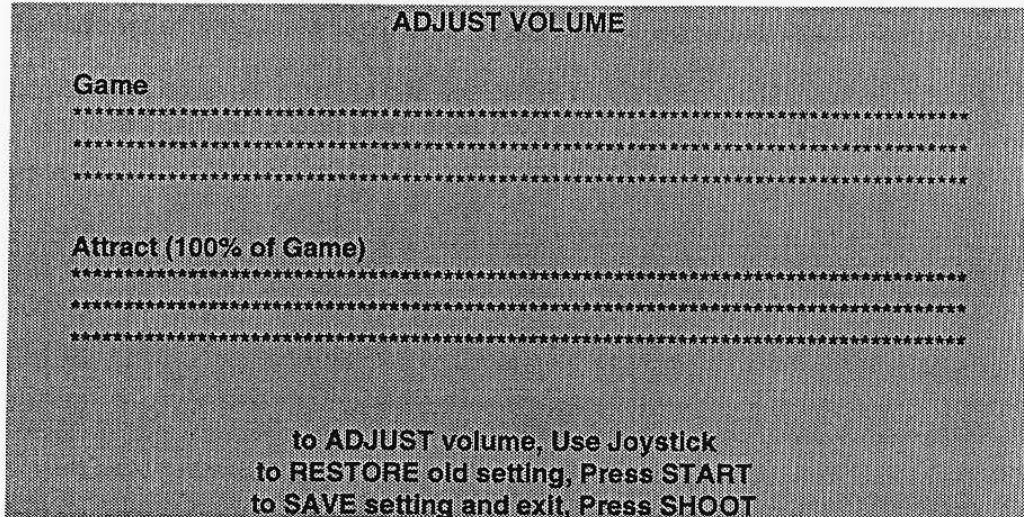
VOLUME ADJUSTMENT MENU SCREEN

The current volume level is represented by the length of a bar made of asterisks. A longer bar indicates a higher volume setting than a short bar. The factory default for both volume levels is 50%.

Note that the "Attract" and "Game" volume levels may be adjusted to different values, but the "Attract" level cannot be set higher than the level chosen for normal game play. If the "Game" level is lowered, it will automatically lower the "Attract" level. Lowering the "Attract" level will not effect the "Game" setting.

We recommend high volume levels to draw maximum player attention and increase your earnings.

Be certain to press the SHOOT button when any volume adjustments are made. The START button will cancel any settings on the screen and return both levels to the factory default values.

These adjustments affect the volume of the tests as well as the game play. If the volume levels are set to minimum (zero), there will be no sound from the speakers during the audio tests. We recommend that the volume levels be set to a moderately high value each time the sound portion of the game is checked. The levels may be returned to their previous settings after the tests have been completed.

STATISTICS

The Statistics report allows the operator to assess how well the game is being played. In addition to the earnings, various game aspects are tracked to determine the players skill levels.

Use Player 1 or 2 joysticks to select a particular statistic. Joysticks are also used to view the range of choices and change values. Statistics may be reset to zero or allowed to increase after each viewing.

Be certain to press the SHOOT button to view the additional game statistics not shown on the initial screen list. We recommend that all game statistics be examined before any changes are made.

The START button will cancel any settings on the screen and return to the factory set default values. Press and hold START and SHOOT together for ten seconds to clear all statistics counters.

STATISTICS			
Left Coins	:0	Overtime Periods	:0
Right Coins	:0	Team Play	:0
Aux Coins	:0	Head to Head	:0
Idle Mins	:0	Fights	:0
1 Player Mins	:0	Cross Checks	:0
2 Player Mins	:0	Hooks	:0
3 Player Mins	:0	Trips	:0
4 Player Mins	:0	Other Checks	:0
New Games	:0	Error Count	:0
Kid Records	:0		
Team Records	:0		
Continues	:0	Total Coins	:0
Discounted Conts	:0	AVG Time/Coin	0.00
Free Conts	:0	Percentage Play	0.00
1 Player Periods	:0		
2 Player Periods	:0		
3 Player Periods	:0		
4 Player Periods	:0		
Total Periods	:0		
1 Player Games	:0		
2 Player Games	:0		
3 Player Games	:0		
4 Player Games	:0		
Total Games	:0		

STATISTICS REPORT MENU SCREEN

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 Aux Coins count will not change unless an additional Currency Acceptor has been installed in the game, and the Fights count will not change if the Fighting variable is set to OFF.

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. We recommend the factory default as an ideal starting point for most players. Difficulty level and other play characteristics may be changed from the Game Options menu.

We recommend that the Statistics be recorded before any service or repairs are done on this game.

The USER MSGS screen will contain no messages until the system detects an error.

GAME OPTIONS

These adjustments allow the operator 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 Player 1 or 2 joysticks to select a particular game option. Joysticks are also used to view the range of choices and change values. Options may be reset to factory defaults or changed after each viewing.

Be certain to use the joysticks to view the additional game options not shown on the initial screen list. We recommend that all game optionss be examined before any changes are made.

The START button will cancel any settings on the screen and return to the factory set default values. Press and hold the SHOOT button to save any changes and return the the main menu.

```
                        GAME OPTIONS

        Difficulty:
                Easy
        Game Time:
                Normal
        Copy Stats:
                No
        Game Mode:
                Arcade
        Default Camera:
                CAM 1
        Head Size:
                NORMAL/NORMAL
        Colored Helmuts:
                YES
        Division Win Bonus:
                FREE GAME
        Number of Joysticks:
                FOUR
        Fighting:
                ON
        Language:
                ENGLISH
```
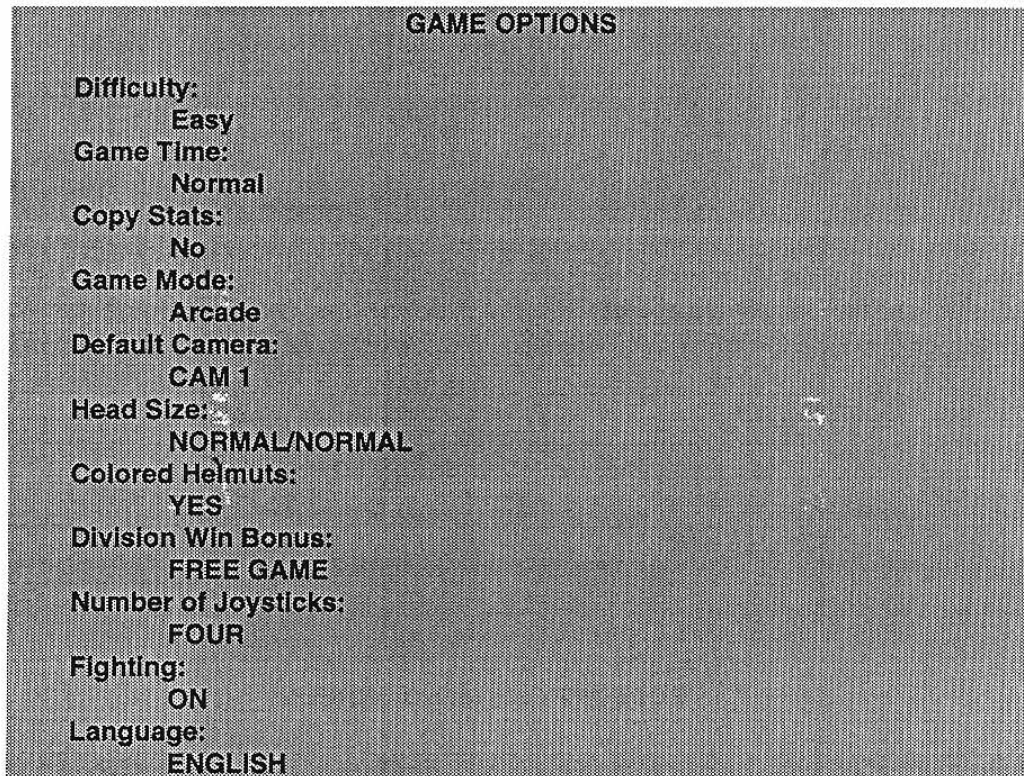
GAME OPTIONS MENU SCREEN

The illustration shows how this screen will look with all of the factory default settings. Each move of the joystick will advance a variable through its range of choices. Some items have more options than others. We recommend that all of them be viewed before one is selected.

The effects of these options can be judged by comparing statistics reports before and after changes were made. As players become more familiar with the game, new features or increased difficulty will make the game challenging and continue to generate interest.

Note that the COPY STATS option does not affect game play in any way. It allows the operator to record the current statistics into the game backup memory so that this data may be restored after repairs.

Selection of a different Language changes the player information presented on the screen during game play. It does not change any of the menu screens or tests.

COIN OPTIONS
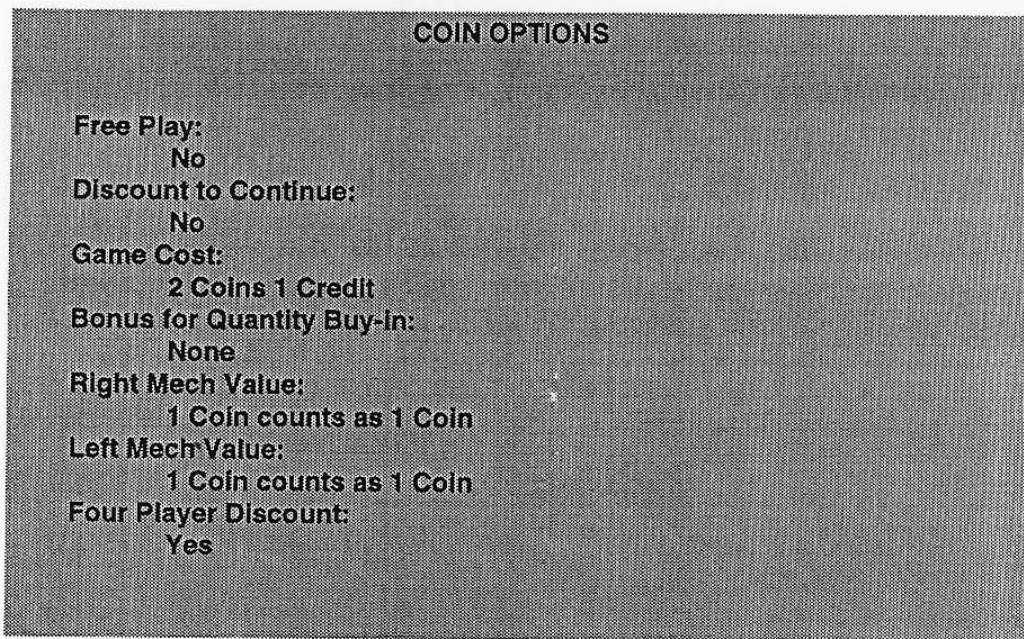
The Coin Options are used to set the pricing of the games. Factory default values can be considered standard. Custom pricing allows the operator to select the number of credits to start a game, the credits required to continue a game, credits rewarded for quantity buy-in, etc.

Use Player 1 or 2 joysticks to select a particular game option. Joysticks are also used to view the range of choices and change values. Options may be reset to factory defaults or changed after each viewing.

We recommend that all coin options be examined before any changes are made.

The START button will cancel any settings on the screen and return to the factory set default values. Press and hold the SHOOT button to save any changes and return the the main menu.

```
                    COIN OPTIONS


    Free Play:
            No
    Discount to Continue:
            No
    Game Cost:
            2 Coins 1 Credit
    Bonus for Quantity Buy-in:
            None
    Right Mech Value:
            1 Coin counts as 1 Coin
    Left Mech Value:
            1 Coin counts as 1 Coin
    Four Player Discount:
            Yes
```

COIN OPTIONS MENU SCREEN

The illustration shows how this screen will look with all of the factory default settings. Each move of the joystick will advance a variable through its range of choices. Some items have more options than others. We recommend that all of them be viewed before one is selected.

Bonus for Quantity Buy-in and Four Player Discount options are provided to encourage more multi-player games. Both options allow additional periods of game play as an incentive for more players.

The operator must use the joysticks to select the number of credits required for Quantity Buy-in Bonus. This value may require periodic adjustment as the players become more skilled at playing the game.

The joysticks are also used to activate the Four Player Discount. This selection automatically extends the game into a third period as a reward for having the maximum number of players in one game.
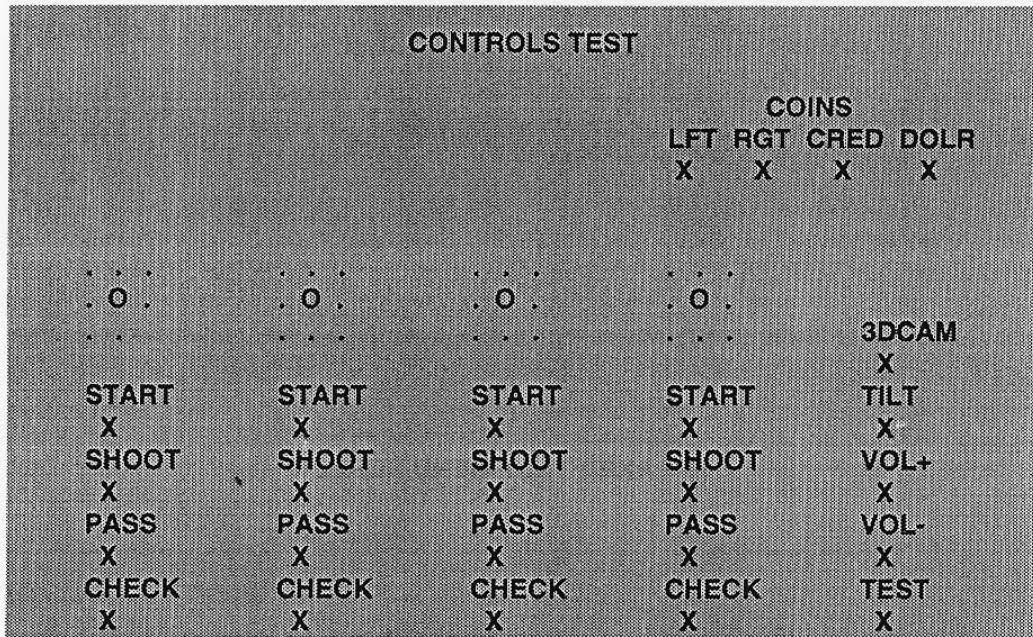
CONTROLS TEST

These tests allow the operator to manually check each switch in the game.

NOTE
Some switches may not be used with this game. Check the wiring diagram before testing.

Use Player 1 or 2 joysticks to select the Controls Test. Press the START button to begin the test. Actvate each switch and the indicator on the screen changes state. Release the switch and the indicator returns to its previous normally open or closed condition. Switches may be tested in any combination.

Press and hold the SHOOT button until the Controls Test ends to return to the main menu.

```
                           CONTROLS TEST

                                         COINS
                                   LFT  RGT  CRED  DOLR
                                    X    X    X     X


    . O .        . O .        . O .        . O .
                                                        3DCAM
                                                          X
    START        START        START        START        TILT
      X            X            X            X            X
    SHOOT        SHOOT        SHOOT        SHOOT         VOL+
      X            X            X            X            X
    PASS         PASS         PASS         PASS          VOL-
      X            X            X            X            X
    CHECK        CHECK        CHECK        CHECK         TEST
      X            X            X            X            X
```

CONTROLS TEST MENU SCREEN

PLAYER CONTROLS are shown on the screen in the same positions as on the cabinet control panel. Each switch change should be exactly duplicated by a single indication on the menu screen.

BURST buttons are incorrectly shown on the test screen as CHECK. The test results are still valid.

The Player Controls Tests are used to verify crossed wires, intermittent conditions, and stuck switches.

OPERATOR CONTROLS are shown on the screen just as they are found on the coin door bracket. Each switch change should be exactly duplicated by a single indication on the menu screen.

The Operator Controls Tests are used to verify crossed wires, intermittent conditions, and stuck switches.

The Coin and Cabinet Switches are shown on the screen without regard for their actual game location. Each switch change should be exactly duplicated by a single indication on the menu screen.

These Switch Tests are used to verify crossed wires, intermittent conditions, and stuck switches.
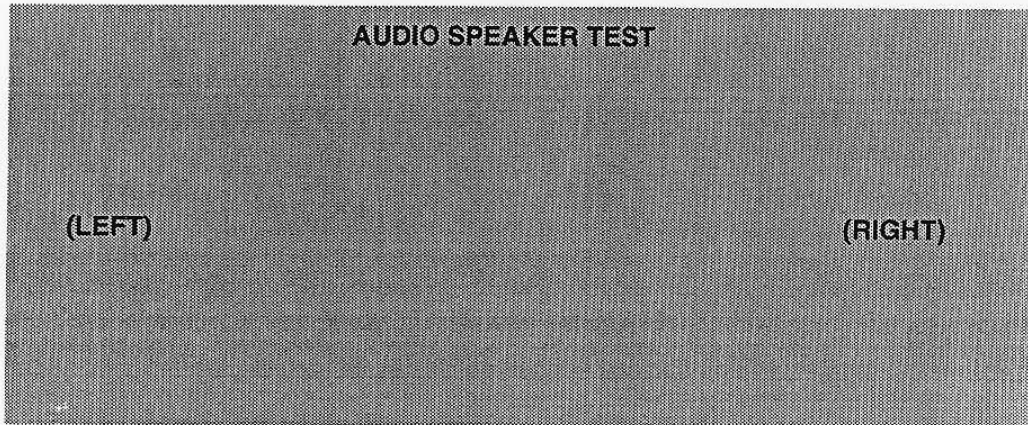
SOUND TESTS

These tests verify that the audio components are connected and operating properly.
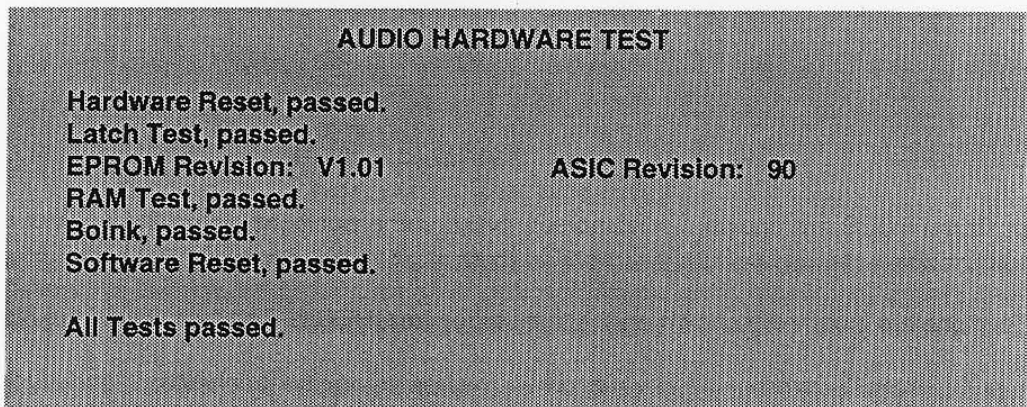
<u>NOTE</u>

The level must be turned up for the speakers to be heard. Check the volume setting before testing.

Use Player 1 or 2 joysticks to select the Sound Test. Use the joysticks to choose either Audio Test. Press the START button to begin. There are no custom settings or adjustable variables in these tests.

Press and hold the SHOOT button until the Sound Tests end to return to the main menu.

```
                        AUDIO SPEAKER TEST




   (LEFT)                                              (RIGHT)



```

SPEAKER TEST MENU SCREEN

```
                        AUDIO HARDWARE TEST

   Hardware Reset, passed.
   Latch Test, passed.
   EPROM Revision:  V1.01              ASIC Revision:  90
   RAM Test, passed.
   Boink, passed.
   Software Reset, passed.

   All Tests passed.
```

HARDWARE TEST MENU SCREEN

AUDIO SPEAKER TEST sends alternating left and right voice sounds to the individual speakers. The voices should be clear and distinct from each other. Each voice must come from the location identified.

The Audio Speaker Test screen is used to verify crossed connections, incorrect phase, and distortion.

AUDIO HARDWARE TESTS are a series of diagnostic routines which analyze the digital sound circuits. The results of the tests will be reported as pass or fail messages; sounds may also accompany the tests.

The Audio Hardware Tests are useful in locating digital circuit difficulties, especially when there are no sounds from the speakers. These tests detect sound memory and digital-to-analog conversion problems.
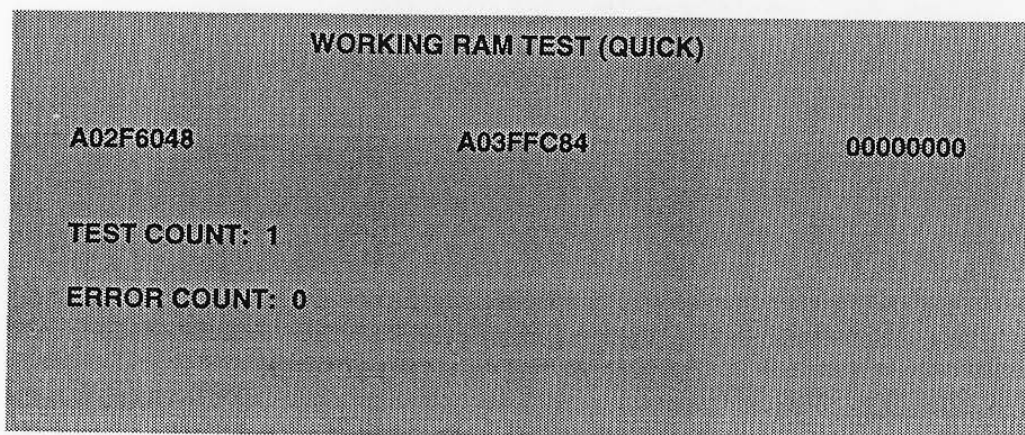
MEMORY TESTS

The Memory Tests allow the operator to verify some of the functions of the CPU Board Assembly RAM.
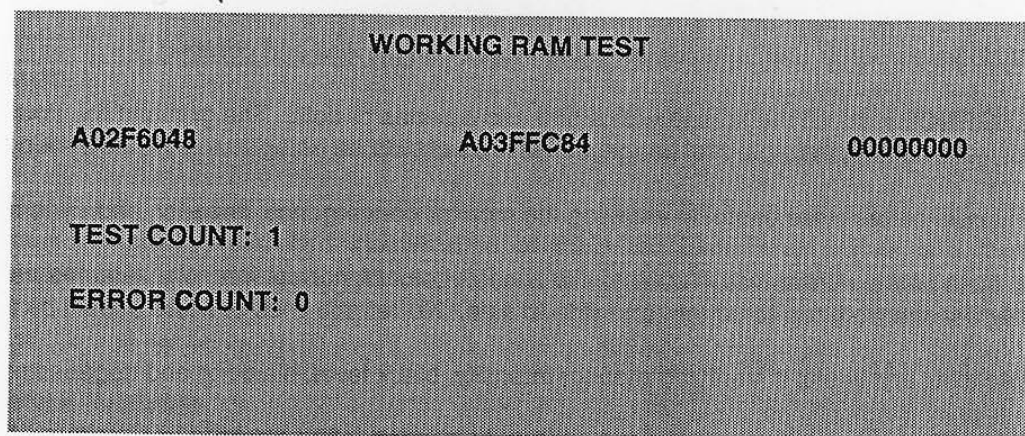
NOTE

These tests detect system errors, not actual game errors. The game program is on the Hard Disk Drive.

Use Player 1 or 2 joysticks to select the Memory Tests. Use the joysticks to choose Quick or Full Test. Press the START button to begin. There are no custom settings or adjustable variables in these tests.

Press and hold the SHOOT button until the Memory Tests end to return to the main menu.

```
                WORKING RAM TEST (QUICK)


    A02F6048                    A03FFC84                    00000000



    TEST COUNT:  1

    ERROR COUNT:  0
```

QUICK RAM TEST MENU SCREEN

```
                WORKING RAM TEST


    A02F6048                    A03FFC84                    00000000



    TEST COUNT:  1

    ERROR COUNT:  0
```

FULL RAM TEST MENU SCREEN

WORKING RAM (QUICK) performs a fast check of the storage area for the game variables.
The results of the test will be reported as pass or fail messages; error messages may be included.

WORKING RAM (FULL) performs a more thorough check of the storage area for the game variables.
The results of the test will be reported as pass or fail messages; error messages may be included.

Both tests will terminate automatically and return to the menu, but the full test takes longer to complete.

MONITOR TESTS

The Monitor Tests provide patterns for verifying the monitor performance or making adjustments.

Use Player 1 or 2 joysticks to select this test from the Main Menu, then press the START button to activate it. Once the Monitor Tests menu is on screen, use the joysticks to select an option, and the START button to begin it. Press and hold the SHOOT button to return to the main menu.

MONITOR TESTS

COLOR BARS
CONVERGENCE
PURITY
RECTANGLES
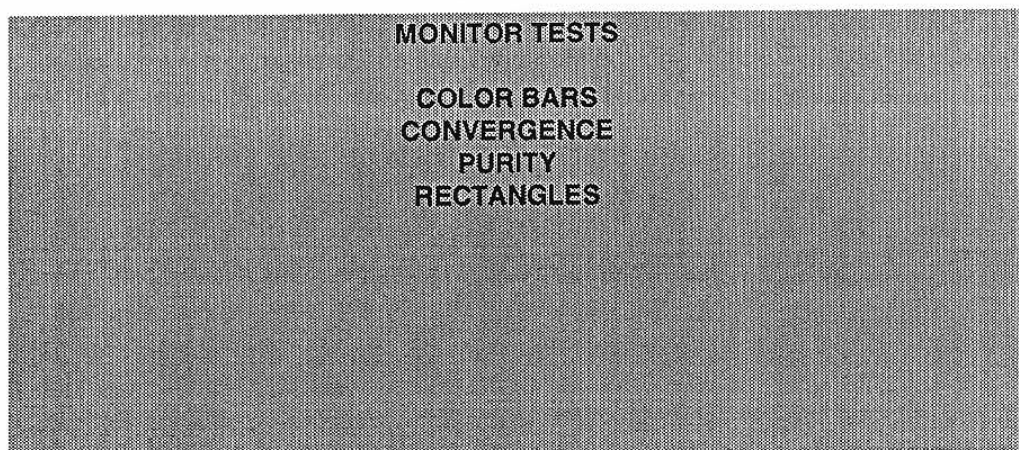
MONITOR TESTS MENU SCREEN

COLOR BARS fills the screen with shades of colors to verify red, green, blue and white level dynamic adjustments. Each color bar should appear sharp, clear, and distinct from bars on either side.

The Color Bars screen is useful in adjusting the monitor brightness and contrast.

CONVERGENCE tests fill the screen with a grid and a series of dots. The grid and the dots should be all one color, with no fringes or parallel images. The lines should be straight and the dots round.

The Convergence tests are useful in verifying the monitor convergence, linearity, and dynamic focus.

PURITY tests fill the screen with 100% of the chosen color at normal intensity. Each screen should be absolutely uniform from top to bottom and side to side. No retrace lines or noise should be visible.

The Purity tests are useful in verifying monitor intensity, black level, blanking and degaussing.

RECTANGLES tests display solid color boxes over a contrasting background screen. The rectangle should be centered with all four sides visible. The sides of the background should not be visible.
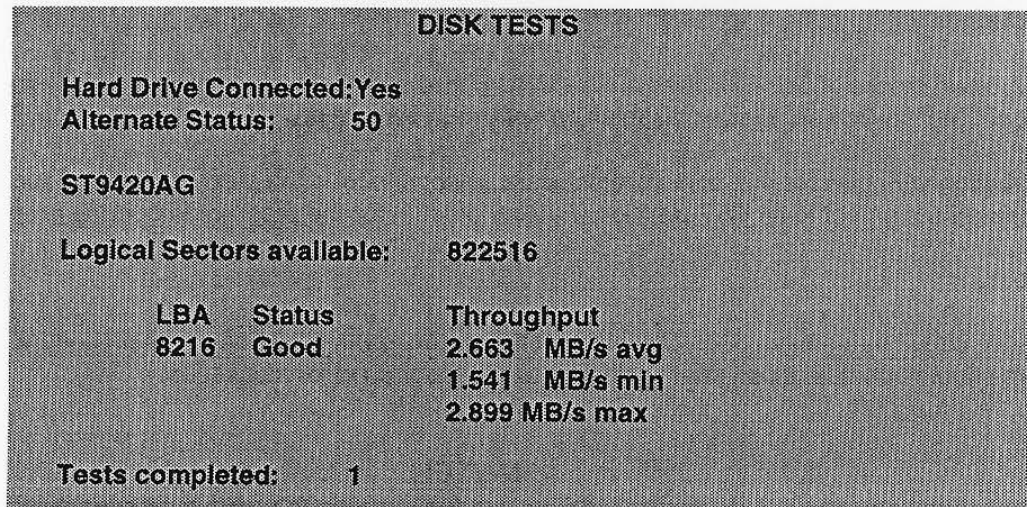
The Rectangles tests are useful in verifying scan size and screen uniformity.

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

DISK TESTS

The Disk Tests allow the operator to verify the functions of the Hard Disk Drive Assembly.

These tests run automatically. Press and hold the SHOOT button to return to the main menu.

```
                          DISK TESTS

    Hard Drive Connected:Yes
    Alternate Status:        50

    ST9420AG

    Logical Sectors available:      822516

        LBA    Status        Throughput
        8216   Good          2.663   MB/s avg
                             1.541   MB/s min
                             2.899 MB/s max

    Tests completed:       1
```

DISK TESTS MENU SCREEN

Hard Drive Connected
This test routine verifies the interface between the CPU Board Assembly and the Hard Disk Drive itself. The processor requests disk information. Data cannot be retrieved successfully if there is a problem.

The results of the test will be reported as pass or fail messages; error messages may be included.

Alternate Status

The results of the test will be reported as pass or fail messages; error messages may be included.

Drive ID
This line gives an industry standard identification of the Hard Disk Drive. This is a manufacturer hardware number only; it will not identify the software or the game program stored on the drive assembly.

The results of the test will be reported as an alpha-numeric number.

Logical Sectors Available
This line reports the number of data storage areas found on the hard disk. This number is a result of the disk format which determines how information will be placed on the disk.

The results of the test will be reported as a number.

Sector Test
This test will perform a sector by sector read/verify test on the disk drive. As the status of each block of sectors is checked, the speed of the data transfer is compared to its acceptance limits.

The results of the test will be reported as pass or fail messages; error messages may be included.

Tests Completed.
These test run as a series of endless repetitions. The number increases each time the cycle repeats.

DIP SWITCHES AND JUMPERS

The CPU Board has a number of hardware variables which can be changed to adapt this assembly to other uses. Jumpers determine which circuit paths are active, and DIP switches select instructions.

DIP Switches

There are two blocks of DIP Switches on this CPU Board set. Each block consists of ten individual switches. Each switch enables or disables one program instruction.

All instruction variables for this game are software selectable from the menu system. Each of the DIP Switches should be set to its OFF position (Factory default) for the program to operate properly.

Jumpers

The active circuit paths have been optimized at the factory during the board test procedure. Each of the jumpers should be left in its original position to avoid program error messages.

NOTES

_____

_____

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WAYNE GRETZKY'S
3D HOCKEY ™

SECTION
THREE

WIRING

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	N/C	H	7	N/C	Key
Coin Counter 2	Brown-Red	J	8	Brown	Coin Counter 1
Not Used	N/C	K	9	N/C	Not Used
Speaker -, Left	Brown-Gray	L	10	Red-Gray	Speaker +, Left
Speaker -, Right	Brown-White	M	11	Red-White	Speaker +, Right
Video Green	Green	N	12	Red	Video Red
Video Sync	White	P	13	Brown	Video Blue
Service Credits	White-Gray	R	14	Shield	Video Ground
Slam Tilt	Black-Green	S	15	Black-Blue	Test
Coin 2	Black-Red	T	16	Black-Brown	Coin 1
2 Start	Violet-White	U	17	White	1 Start
2 Up	Violet-Black	V	18	White-Black	1 Up
2 Down	Violet-Brown	W	19	White-Brown	1 Down
2 Left	Violet-Red	X	20	White-Red	1 Left
2 Right	Violet-Orange	Y	21	White-Orange	1 Right
2 Shoot/Block	Violet-Yellow	Z	22	White-Yellow	1 Shoot/Block
2 Pass/Steal	Violet-Green	a	23	White-Green	1 Pass/Steal
2 Burst/Turbo	Violet-Blue	b	24	White-Blue	1 Burst/Turbo
Not Used	Violet	c	25	White-Violet	3D Cam View
Not Used	N/C	d	26	N/C	Not Used
Not Used	N/C	e	27	N/C	Not Used
Ground	Black	f	28	Black	Ground
SOLDER SIDE				**COMPONENT SIDE**	

Control Panel wires that are not part of the Main JAMMA Harness.

4 Start	Grey-White	6	6	Blue-White	3 Start
4 Up	Grey-Black	7	7	Blue-Black	3 Up
4 Down	Grey-Brown	8	8	Blue-Brown	3 Down
4 Left	Grey-Red	9	9	Blue-Red	3 Left
4 Right	Grey-Orange	10	10	Blue-Orange	3 Right
4 Shoot/Block	Grey-Yellow	11	11	Blue-Yellow	3 Shoot/Block
4 Pass/Steal	Grey-Green	12	12	Blue-Green	3 Pass/Steal
4 Burst/Turbo	Grey-Blue	13	13	Blue	3 Burst/Turbo
Not Used	Grey-Violet	14	14	Blue-Violet	Not Used

D.C. Power Source Voltage Limits

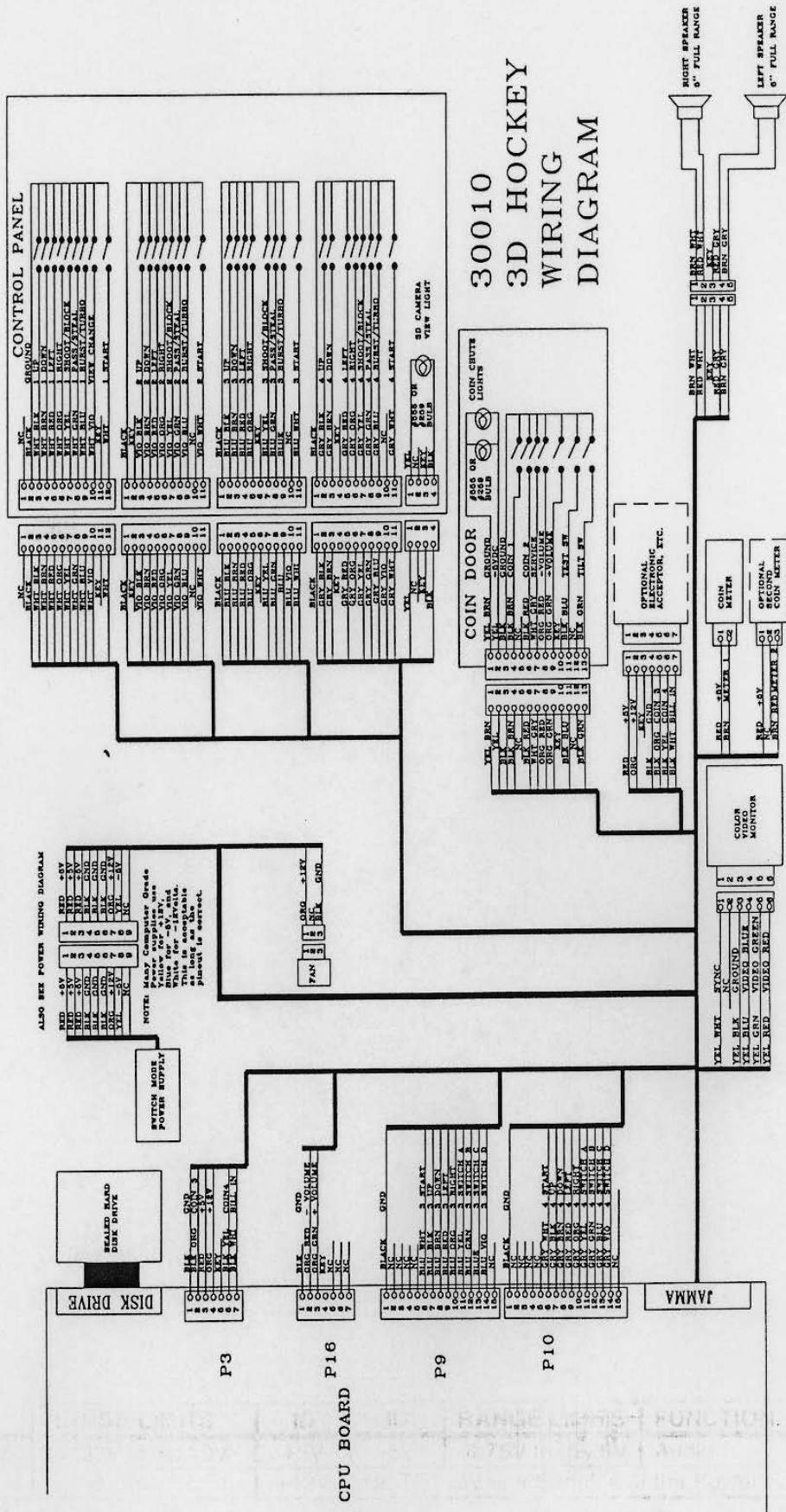| FUNCTION	RANGE LIMITS	ID	ID	RANGE LIMITS	FUNCTION
CPU, Drive, etc.	+4.90V to +5.10V	+5V	-5V	-4.75V to -5.25V	Audio
Audio	+11.5V to +12.5V	+12V	NOTE: +5V is adjustable at the Power Supply		

POWER WIRING DIAGRAM
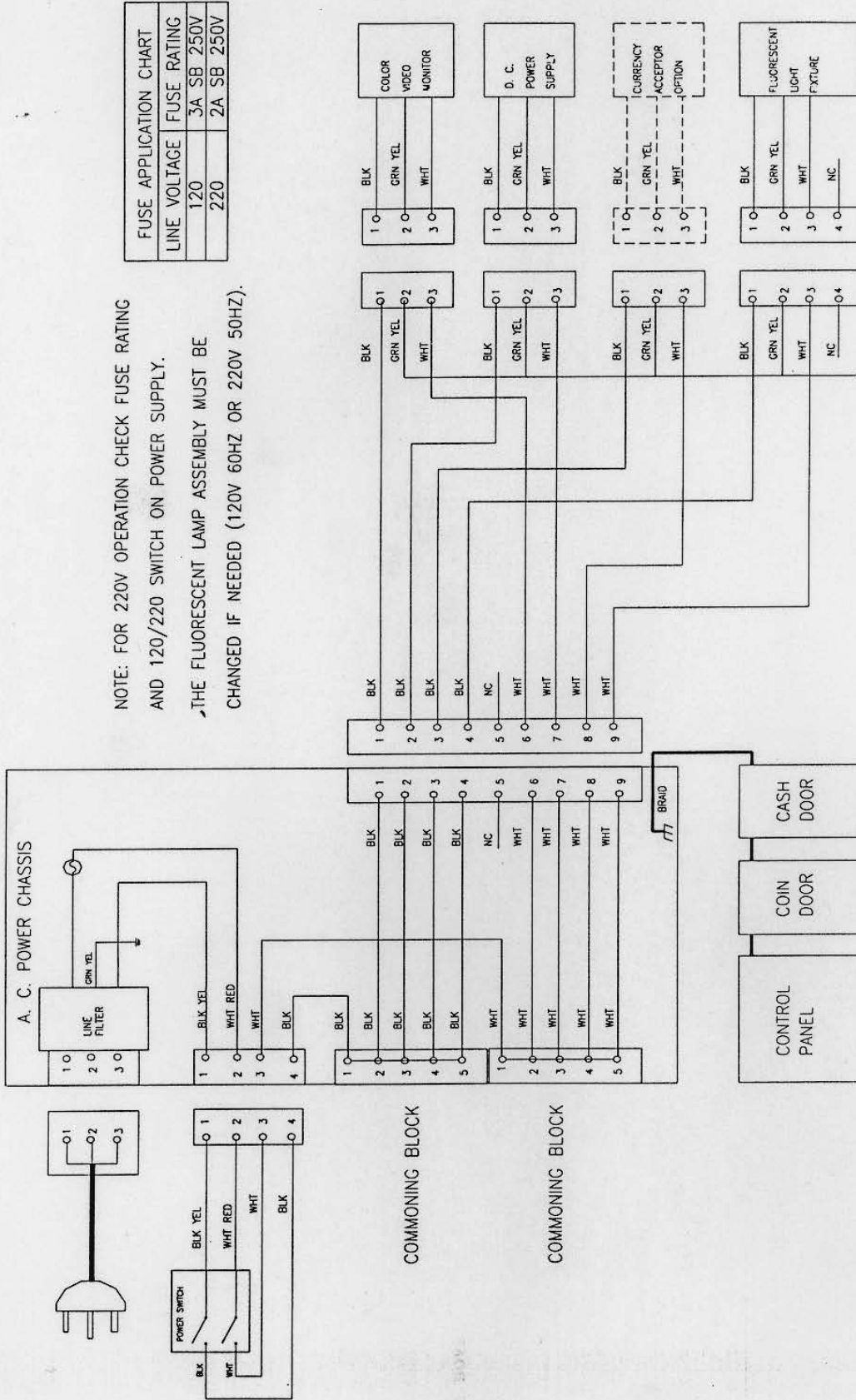
FUSE APPLICATION CHART	
LINE VOLTAGE	FUSE RATING
120	3A SB 250V
220	2A SB 250V

NOTE: FOR 220V OPERATION CHECK FUSE RATING
AND 120/220 SWITCH ON POWER SUPPLY.

THE FLUORESCENT LAMP ASSEMBLY MUST BE
CHANGED IF NEEDED (120V 60HZ OR 220V 50HZ).

COLOR VIDEO MONITOR

D. C. POWER SUPPLY

CURRENCY ACCEPTOR OPTION

FLUORESCENT LIGHT FIXTURE

A. C. POWER CHASSIS

LINE FILTER

POWER SWITCH

COMMONING BLOCK

COMMONING BLOCK

CONTROL PANEL

COIN DOOR

CASH DOOR

BRAID

BLK GRN YEL WHT NC

3-3

CABINET WIRING DIAGRAM

CONTROL PANEL

**30010
3D HOCKEY
WIRING
DIAGRAM**

WAYNE GRETZKY'S
3D HOCKEY ™

TROUBLESHOOTING

GAME DOES NOT START

1. Game appears completely non-functional; no audio, no illumination, no video display.

A: Check that the Power Switch has been turned ON (top left rear cornerof the game cabinet).

B: Turn OFF the game power. Unplug the A.C. line cord. Unlock and remove the cabinet rear door. The Power Supply Line Voltage Switch must be set to agree with the local A.C. line voltage.

C: Remove the Line Cord Cover Plate. Test the line cord, power plug and I.E.C. connector for breaks or damage. Verify the continuity of each wire in the cord. Fully seat the I.E.C. connector into the mating receptacle of the cabinet. Replace the cover plate and all four screws.

D: Ensure that cabinet wiring harness connectors are fully seated in the corresponding A.C. Power Chassis Assembly connectors (refer to Power Wiring Diagram, Section Three).

E: Examine the A.C. Line Fuse on the A.C. Power Chassis. If the fuse is faulty, replace it with an identical fuse from the spare parts bag. Replace the spare fuse when repairs are complete.

F: Fully seat the A.C. plug in the outlet. Verify that A.C. line voltage is present. Turn the game power ON. Check the D.C. wiring harness and connectors if the breaker opens the circuit again.

2: Video game appears non-functional, but currency acceptor price indicator is illuminated.

A: Unlock and open the coin door. Inspect the CPU Board Assembly under low light level conditions. A glow will be seen from the Light Emitting Diodes if there is voltage in the processor circuits. This does not mean that voltages or signals are as they should be, but it does indicate that the CPU Board is receiving some D.C. power from the Power Supply.

B: Turn OFF the game power. Unlock, open and remove the rear door. Inspect the CPU Board Assembly. Ensure that the JAMMA Wire Harness connector is attached and fully seated onto the mating board connector. Check the other wiring harness connectors in the same way.

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

C: Verify that the game CPU DIP Switches are set as intended. Refer to the Switch Configuration Chart (Section One) for variables and default settings.

D: Turn ON the game power. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the Power connector pins. Adjust the +5V source if it is necessary. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information and voltage limits.

E: Using the 2 Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.

F: Verify that the game runs and completes the power-up self-test sequence without any errors. Note errors and/or failures found during these tests.

G: Enter the game Menu System by pressing and holding the BEGIN TEST switch inside the coin door. From the SELECT TEST menu, choose the MONITOR TESTS (refer to Section One for additional details). Use this set of tests to check the operation of each screen used in the game.

GAME CAN NOT BE PLAYED

1. **Game will not accept currency or tokens and cannot be started. Audio and video are present.**

    A: Unlock and open the cash door. Empty the cash box. Inspect the revenue for any counterfeit currency. Check the vault and remove any items that block the path from the mechanism.

    B: Unlock and open the coin door. Check each Acceptor by hand to ensure proper mounting. Remove the mechanism and clear the currency path. Reinstall the mechanism and latch it.

    C: Verify that the mechanism is level when the doors are closed. Repair or replace the coin door if it is bent or damaged. Adjust the cabinet leg levelers if necessary to keep mechanisms vertical.

2. **Game accepts currency or tokens, but does not start. Audio and video are present.**

    A: Unlock and open the coin door. Check each Acceptor by hand to ensure proper mounting. Verify that each of the release latches is in the closed and locked position. Test known good and bad coins to see if the mechanism accepts and rejects the currency correctly.

    B: Ensure that no loose parts or wires are caught in the hinges, latches, or switch contacts.

    C: Inspect to see if the external Acceptor indicators (Pricing, Flashing Arrows, etc.) are illuminated. Check connectors and cables for wiring continuity from CPU Board connectors to the Acceptors.

    D: Enter the game Menu System by pressing and holding the BEGIN TEST switch inside the coin door. From the SELECT TEST menu, choose the CONTROLS TEST (refer to Section One for additional details). Use these tests to confirm the operation of each switch used in the game.

    E: Check for continuity in each of the suspect switch connections (Common to Normally Open or Common to Normally Closed). Replace faulty switches (bent levers, broken actuators, etc.).

    F: Verify that each Acceptor is operating properly by placing it in a known good unit.

3. **Player controls are intermittant or completely non-functional. Game starts normally.**

    A: Unlock and open the coin door. Enter the game Menu System by pressing and holding the BEGIN TEST switch inside the coin door. From the SELECT TEST menu, choose the CONTROLS TEST (refer to Section One for additional details). Use these tests to confirm the operation of each switch used in the game.

    B: Reach through the coin door and unlatch the control panel. Grip the joysticks and carefully tilt the panel back on its hinge. Ensure that no loose parts or wires are caught in the hinges, latches, or switch contacts. Verify that the harness connectors are attached and fully seated.

    C: Check tha the cabinet wiring is correct for this game. Ensure that the controls are properly connected to the control input wires from P11, P12, and the JAMMA connector. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information.

    D: Verify continuity in each of the switch connections (Common to Normally Open or Common to Normally Closed). Ensure that the control is operating properly by placing in a known good unit.

AUDIO PROBLEMS

1: Audio is non-functional, but video is present and game appears to operate normally.

A: Unlock and open the coin door. Enter the game Menu System by pressing and holding the BEGIN TEST switch inside the coin door. From the SELECT TEST menu, choose ADJUST VOLUME (refer to Section One for additional details). Verify that the attract and game volume levels have not been set at Zero. Change the levels if necessary to make the game audible.

B: Follow the on-screen instructions to return to the first menu. From the SELECT TEST menu, choose SOUND TESTS. Use these tests to confirm the operation of each speaker in the cabinet.

C: Turn OFF the game power. Open the marquee and remove the glass. Inspect the speakers and harness. Ensure that no loose parts or wires are caught in speaker cones, terminals, mounting screws, or stuck to the magnets.

D: Verify correct cabinet wiring for this game. Ensure that the speakers are properly connected to the audio output wires from the JAMMA connector. Verify speaker continuity. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information.

E: Turn ON the game power. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the Power connector pins. Verify the +5V, -5V and +12V sources. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information and voltage limits.

F: Using the 2 Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading here indicates that the supply voltages are unstable and may contain ripple or noise.

G: Verify proper operation of game CPU Board Assembly by placing it in a known good game.

2: The audio is distorted, muffled or missing frequencies. A constant low hum may be present.

A: Unlock and open the coin door. Enter the game Menu System by pressing and holding the BEGIN TEST switch inside the coin door. From the SELECT TEST menu, choose SOUND TESTS. These tests will verify some of the functions of the audio circuits in this game.

B: Turn OFF the game power. Open the marquee and check the speakers. This game uses coaxial speakers, not discrete woofer and tweeter units. Ensure that each speaker is FULL RANGE (100 to 10,000 Hz response) and rated for at least 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 will not be detected by the SOUND TESTS, but it will be audible during normal game operation.

D: Check that the cabinet wiring is correct for this game. Verify that the cabinet wiring provides separate wires (not a common return) for each speaker. Ensure that all cabinet ground wires are connected. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information.

E: 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.

VIDEO PROBLEMS

1. Monitor appears non-functional, but audio is present and controls operate as expected.

A: Unlock and open the rear door. Verify that A.C. Power is connected to the Video Monitor. Inspect the neck of the CRT under low light level conditions. A glow will be seen near the CRT base if there is voltage in the filament circuits. This does not mean that other voltages or signals are as they should be, but it does indicate that some of the monitor circuits are receiving power.

B: Turn OFF the game power. Verify that the Video Signal and the Remote Adjustment Board connectors are fully seated on the Video Monitor Board Assembly. Check the other monitor connectors in the same way.

C: Examine the A.C. line fuse on the Video Monitor Board Assembly. If the fuse is faulty, replace it with an identical fuse of the proper voltage and current rating.

D: Ensure that no loose parts or wires are caught on the chassis or the mounting brackets.

E: Check that the brightness (intensity) and contrast have not been set to their minimum levels.

F: Verify that the Video Monitor is operating correctly by placing it in a known good unit.

2: The power-up self-test will run, but the game does not appear. No audio is present.

A: Note and record any error messages that occur during self-test. Open the coin door. Press and hold the BEGIN TEST switch to enter the menu system. From the SELECT TESTS menu, choose DISK TESTS. These tests will verify some of the Hard Disk Drive functions in this game.

B: Turn OFF the game power. Unlock and remove the rear door. Inspect the CPU Board Assembly. Ensure that the Hard Disk DRIVE Assembly ribbon cable connector is fully seated into the mating shrouded connector on th CPU Board. Verify that all hard drive mounting screws are installed.

CAUTION: DO NOT REMOVE OR INSTALL ANY CONNECTOR WHEN POWER IS TURNED ON. THIS WILL DAMAGE THE CPU BOARD OR HARD DISK DRIVE AND VOID THE WARRANTY.

C: Check that the Hard Disk Drive Assembly is the correct part for this game. Each Hard Disk Drive is labeled with the assembly number and the software version. Refer to Parts (Section Two).

D: Verify that the ROM instruction set is correct for this game. There is more than one ROM in a game set. Each ROM circuit is labeled with the assembly number and the software version.

E: Verify that the CPU Board Assembly is correct for this game. Each CPU Board is marked with the manufacturer name, assembly number and the hardware version.

F: Turn ON the game power. Using the 20 Volt D.C. setting on a digital voltmeter, measure D.C. voltages present at the Power connector pins. Verify the +5V source if it is adjustable. Refer to the Cabinet Wiring Diagram (Section Three) for specific wiring information and voltage limits.

G: Using the 2 Volt A.C. setting on a digital voltmeter, measure the same D.C. voltages as above. Any reading indicates that the supply voltages are unstable and may contain ripple or noise.

H: Compare CPU Board Light Emitting Diode states with the CPU Indicator Chart (Section Three).

3. **Monitor will not lock onto the signal and provide a stable picture, colors are missing, etc.**

   A: Check connectors and cables for wiring continuity from the CPU Board to the Video Monitor.

   B: Ensure that the Video Monitor Assembly is correct for this game. Use of video monitors with different resolution will result in what appears to be horizontal tearing or complete loss of sync.

   C: Verify that the Video Monitor is operating correctly by placing it in a known good unit.

4: **Game operates normally, but video picture wavers or rolls, has dark bars, uneven colors, etc.**

   A: Check connectors and cables for wiring continuity from the CPU Board to the Video Monitor.

   B: Ensure that all the cabinet ground wires are connected, especially at the Video Monitor Chassis.

   C: Move the cabinet farther away from machines, appliances, other games, etc. Very strong electrical or magnetic fields are emitted from some equipment when it is operating normally.

   D: Verify that the Video Monitor is operating correctly by placing it in a known good unit.

MISCELLANEOUS

1: **Marquee lamp is intermittant or non-functional. Game starts and plays normally.**

   A: Open the marquee and remove the glass. Remove the plastic lamp locks and the fluorescent tube from the holders. Install a new lamp if cracks or darkened ends are found. Clean the tube.

   B: Verify that the lamp and starter pins are making good connection with their socket contacts.

   C: Measure the Fluorescent Lamp Assembly A.C. voltages (Power Wiring Diagram, Section Three). Check wiring and connector continuity from the A.C. Power Chassis to the Lamp Assembly.

   D: Ensure that the Fluorescent Lamp Ballast is rated for the local A.C. line voltage and frequency.

   E: Check for continuity of both fluorescent lamp filaments, the starter, and the ballast. One at a time, verify that the lamp, starter, and ballast operate by placing each in a known good unit.

2. **Game operates normally, but fan is noticeably noisy.**

   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 the fan is connected to wiring harness.

3. **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 Messasge.

   B: Call your authorized distributor for help with unresolved screen messages.

NOTES