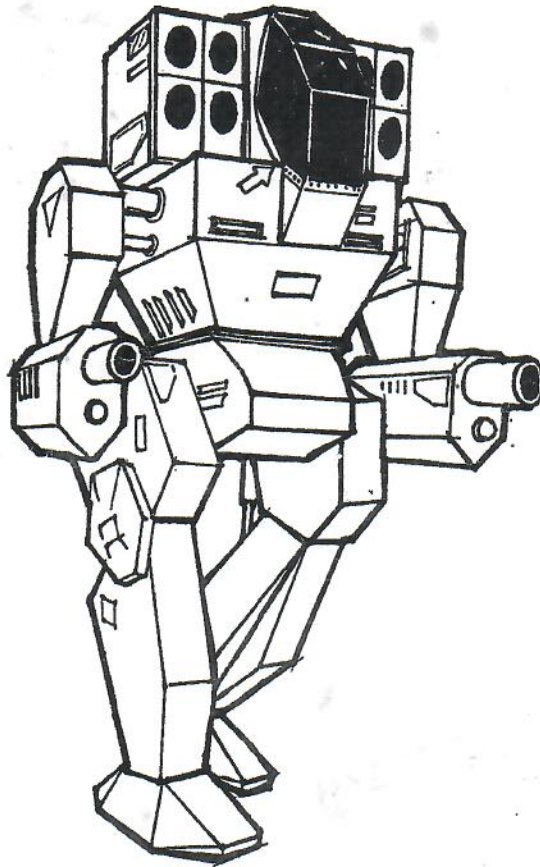# B.O.T.S.S.™

Battle Of The Solar System™

Operation Manual

JALECO

Designed by MP Game Technology, Inc.

JALECO   Notes and Warnings

FCC WARNING

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 generates, 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.
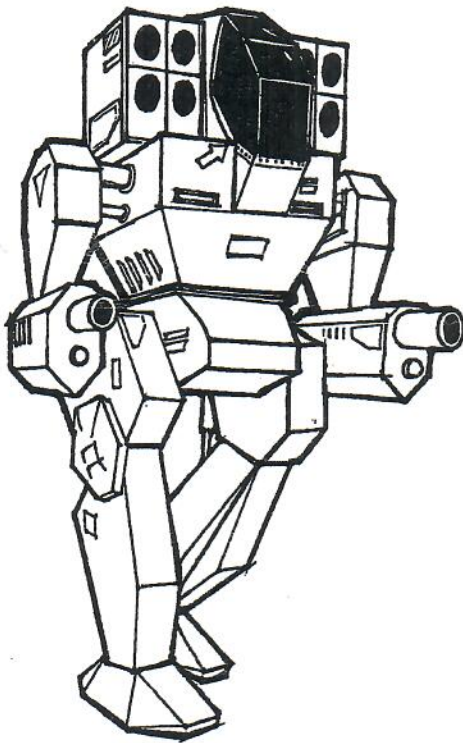
Non-Jaleco Parts

The use of non-Jaleco parts could compromise the safety of your game resulting in injury to you and the players. In addition, you may void the warranty if you substitute non-Jaleco parts in the game or modify any circuitry by installing kits or parts not supplied by Jaleco.

Contents

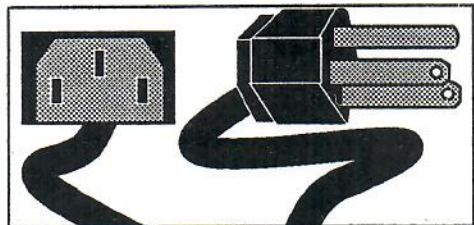**JALECO**

The Jaleco game you have purchased has been designed to meet the stringent standards of various safety agencies. However, transportation of the game may result in physical damage or other mechical compromise to components or connections, that could result in electrical shock or other injuries. Therefore, it is important that you check the following items:

Connections

Check **AC power** and **ground** connections. Failure to check these can result in a lethal electrical shock.

Printed Circuit board, **Video display**, and **Control** connections must also be checked to insure proper operation and safety.

AC Power

Verify that the game is wired for the proper AC voltage. To do that you must check **both** the Power supply voltage selection connectors and the AC voltage selection harness which is located just inside the lower rear access vent. For safe operation the game should be connected to a grounded three-wire outlet. Inspect the power cord for cuts or other physical damage before connecting it to the outlet.

Fuses

Never operate the game with fuses other than those specified on the power supply or in the parts list.

Repairs

Before attempting any repair disconnect the power to the game. If repair to the video display is attempted, be careful, high voltages continue to exsist on the display circuitry and the Cathode Ray Tube (CRT).

Set-up and Operation

To insure proper and safe operation of *B.O.T.S.S.* please check the items listed below before applying power. For additional safety item please review the **Safety Checklist** found in the beginning of this manual.

Connectors

Please check **all** connectors before attempting to apply power to the game. Transportation can result in physical damage or other mechanical compromise to various components of the game.

AC Power

Verify that the game is wired for the proper voltage. To insure that the game is wired for the proper voltage, you must check **both** the Power Supply voltage selection connectors and the AC transformer wiring which is established by the AC voltage selection harness located just inside the lower rear access vent. For safe operation the game should be connected to a grounded three-wire outlet. Inspect the power cord for cuts or other physical damage before connection to the outlet

monitor   lights
GND
LUG
Rear Monitor Platform

AC voltage
selection harness
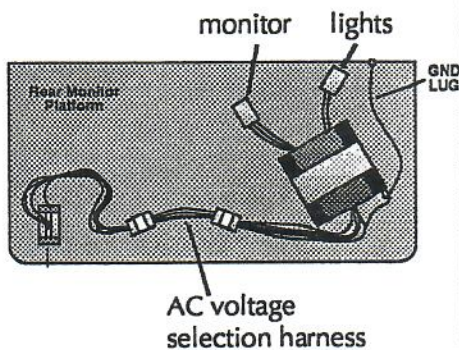
Power Supply

Verify that the power supply is wired for the correct voltage and that the correct fuses are installed. Check the harness connections to the supply to insure that they haven't come loose.
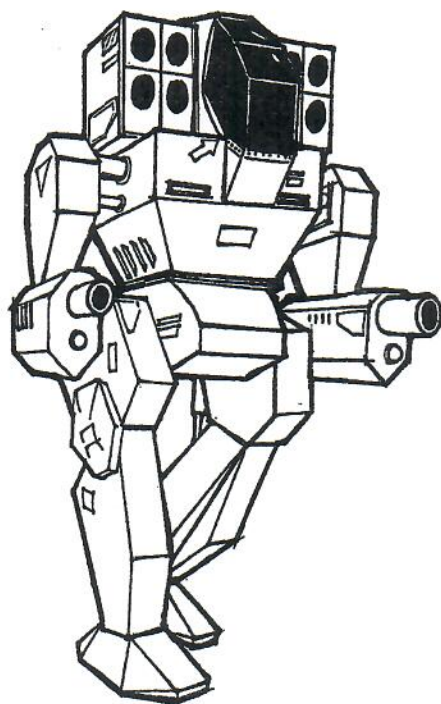
Control and Switch location

Power On/Off Switch

The power on/off switch is located on the bottom of the monitor support platform in the right rear of the game.

Volume Control

Access to the volume control is through the upper coin door. The control is on a bracket located on the coin door.

Self-Test Switch

The self-test switch is located to the right of the volume control on the utility bracket.

Coin Counter

The coin counter is located behind the lower coin door beneath the cash vault.

Monitor Control Board

B.O.T.S.S.™ has a separate monitor control board that contains the most commonly used monitor adjustment controls. This board allows the operator to adjust the monitor while standing in front of the game. To gain access to this control you must open the coin door.
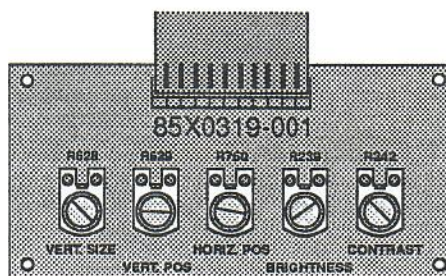
JALECO

Game Specifications

Operator Options

To check or change options enter self-test by turning the self-test switch on and selecting the **Coin Options** or **Game play options and Utilities** screens. Then select the desired sub-menu. To exit self-test turn the self-test switch off.

Height	72 inches
Width	34.5 inches
Depth	62 inches
Weight	445 lbs
Line Voltage	100 VAC +/- 10%
	115 VAC +/- 10%
	230 VAC +/- 10%
Operating Temperature	5° - 37° C (41° - 100° F)
Power Consumption	115 VAC, 260 watts (Typ)
Monitor	Wells-Gardner (K-8000)
DC Voltages	+ 5 VDC
	+12 VDC
	+15 VDC
	-15 VDC

B.O.T.S.S. Self-Test & Diagnostics Screens

The self-test mode is a series of screens (or "menus") that enables the operator to check game controls, view game statistics, and make adjustments to the pricing and difficulty. These menus are accessible by moving the self-test switch to the down position (either before power-up or during attract mode).

NOTE
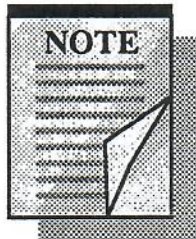
You may have to press the [START] button after moving the switch down during attract mode.

Main Menu

Coins Counted Since Reset: 829

Player Control Test
Diagnostic Tests
Collection Audit
Game Play Statistics
Game Play Options and Utilities
Coin Options
Set Clock or Calendar

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
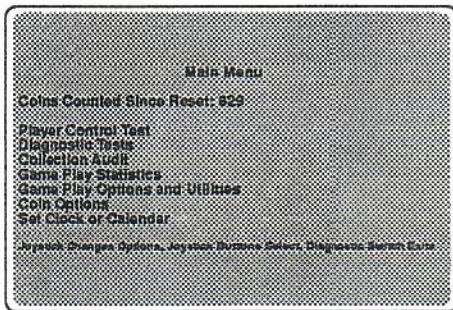
How To Use The Menus

The first operator menu is the "Main Menu". Beneath the "Coins Counted Since Reset" text is a group of seven options. The currently selected option is white, with the remaining options blue. To cycle among the options, move the joystick up or down. Press any button on the joystick to choose the currently selected option.

Underneath the choices of each menu is a brief explanation of the possible actions.

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Installation Check List

Operator Menus Summary

The following table summarizes the functions of *B.O.T.S.S.'* self-test menus. Items marked with a '❑' should be performed whenever the game is installed on location. Items marked with a '✓' may need to be adjusted, depending on the location.

How To Get Back To Attract Mode

You can instantly exit from any menu to attract mode by moving the self-test switch back to the up position.

Player Control Test

- ❑ Check coin and input switches.
- ❑ Recalibrate throttle limits.
- Check sound volume potentiometer.
- ❑ Check joystick operation/centering.

Diagnostic Tests

- ❑ Monitor test pattern display.
- ❑ Run sound board test.
- Last system error display.

Collection Audit

- View coin/time figures.
- View previous coin/time figures.
- View detailed "vend history".
- ❑ Clear coin/time figures.
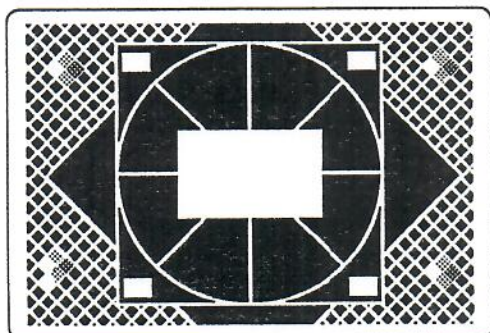- ❑ Clear vend history statistics.

Game Play Statistics

- View general play information.
- View tabulation of games played.
- ❑ Clear game play statistics.

Game Play Options and Utilities

- ✓ Adjust game difficulty setting.
- ✓ Set lives per credit.
- ✓ Set minimum sound volume.
- ❑ Restore factory coin and play settings.
- ❑ Reset high scores.
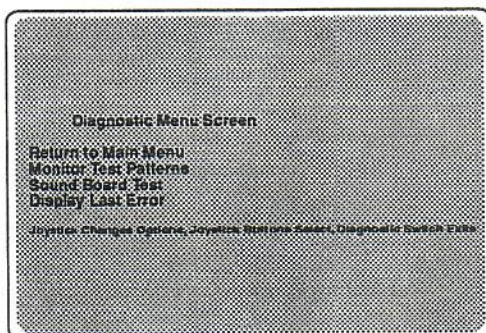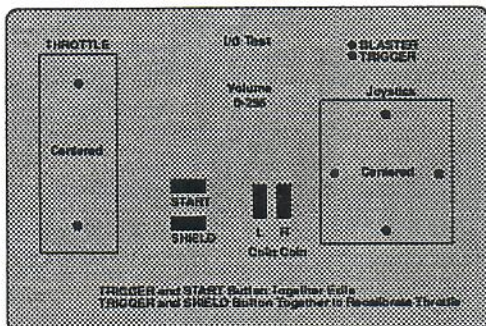
VOLUME
ADJUSTMENT

The Player Control Test

This screen presents the status of these I/O devices:

Throttle: Potentiometer value (with current limits).

Volume: Potentiometer value (ranges from 0 - 255).

Switches: State of panel, coin, and other switches.

Throttle: State of throttle switches

Joystick: State of joystick switches

The minimum volume level is controlled through software. If the lowest potentiometer setting is too loud for the location, you can adjust the minimum sound level from the Game Play Options and Utilities menu. The Silent Attract mode option may be accessed through the "Factory Utilities" menu.

The Diagnostic Menu Screens

The Diagnostic Menu features these options:

- **Monitor Test Patterns** — displays a grid pattern to assist in convergence, color, and linearity tests. Press the joystick trigger to return to the Diagnostic Menu.

Sound Board Test

Sound Board Status=OK

Use TRIGGER to Exit
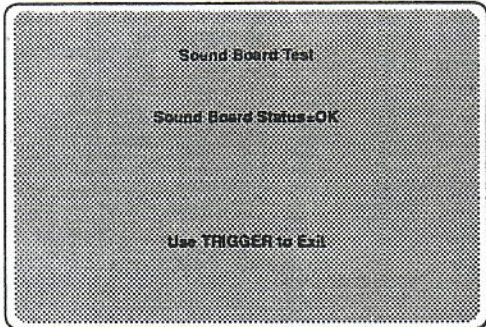
- **Sound Board Test** — runs the power-up diagnostics. Refer to the table on page 2.xx for error code explanation.

- **Display Last Error** — reports the specifics of the last system error. This information is stored in battery-backed memory.

The Collection Audit Menu

These screens provide a detailed summary of coin and time figures. The following options are available:

Collection Audit Screen

Number of Left Coins: 829
Number of Right Coins: 0
Total Number of Coins: 829
Total Collection in Dollars if Coins are Quarters: $207.25
Total Game Play Time: 07:42:54
Total Time on: 00:00:00
Total Time off: 00:00:00
Percent of Game Play Time to Total Time On: 0%
Average Elapsed Time Between Plays: 00:00:00

Show Saved Data From Previous Week
Save Collection Data for Comparison Next Week
Return to Main Menu

Push the START Button to Clear ALL Collection Data
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
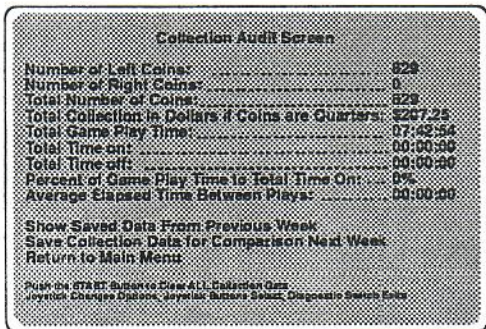
- **Show Saved Data From Previous Week** — displays operator-saved audit data (see the following option)

Last Weeks Collection Audit Screen

Number of Left Coins: 0
Number of Right Coins: 0
Total Number of Coins: 0
Total Collection in Dollars if Coins are Quarters: $0.00
Total Game Play Time: 00:00:00
Total Time on: 00:00:00
Percent of Game Play Time to Total Time On: 0%
Average Elapsed Time Between Plays: 00:00:00

Return to Current Week's Data
Return to Main Menu

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

- **Save Collection Data for Comparison Next Week** — replaces the saved audit numbers with the current figures.

CLEARING
AUDIT FIGURES
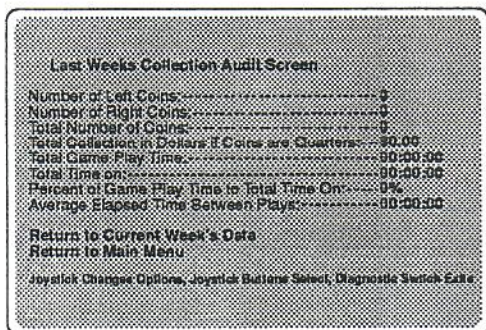
- Press the [START] button while viewing the Collection Audit Screen to clear the audit numbers. This action clears neither the Vend History figures nor the Game Play Statistics.

Game Play Statistics

Vend History

Games Played by Day and Hour

CLEARING
GAME PLAY
NUMBERS

The Game Play Statistics Screens

These screens display useful information on player buying patterns. The following functions are available:

- **Show Vend History** — lists games grouped by:
  - Single-Vend Games: no "refits" and no continues.
  - Refit Games: coin(s) used for bonus dollars.
  - Continued Games: credit(s) used to continue.

  Press the [START] button while viewing the Vend History screen to clear these statistics (these numbers are saved separately from the audit data).

  Press the joystick trigger to return to the Collection Audit Screen.

- **Games Played By Day and Hour** — displays the number of games played each day and hour. Press the joystick trigger to return to the Game Play Statistics Screen.

- Press the [START] button while viewing the Game Play Statistics Screen to clear the figures. This will also reset the "Coins Counted Since Last Reset" statistic in the Main Menu screen, and will clear the Games Played by Day and Hour table.

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Game Play Options and Utilities

Return to Main Menu
Set Game Difficulty
Set Starting Energy/Time
Set Continue Play Energy/Time
Set Refit Energy/Time Bonus
Set Minimum Volume Level
Set Factory Selected Options
Reset High Scores
Factory Utilities

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Set Game Difficulty

Current Difficulty Level is Medium (4)

Return to Main Menu
1 Low
2
3
4 Medium (Recommended Setting for Best Emings)
5
6
7 High
8
9
10 Max

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Set Starting Energy

Starting Time is For 100 secs

Return to Main Menu
110 secs
105 secs
100 secs
95 secs
90 secs
85 secs
80 secs
75 secs
70 secs

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Game Play Options & Utilities Menu

These menu items provide the following functions:
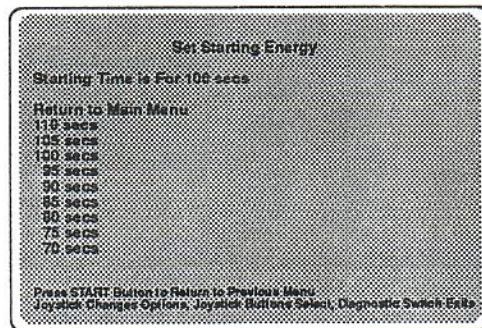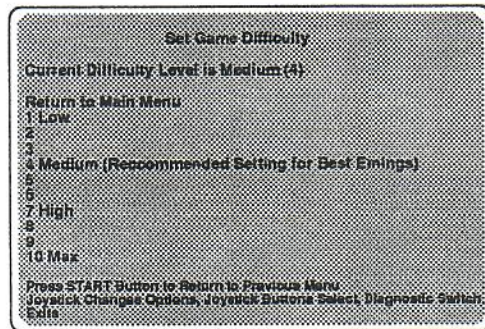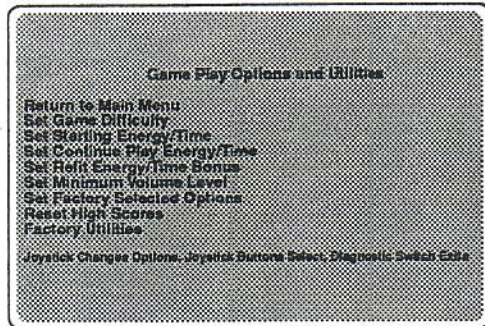
- **Set Game Difficulty** — enables adjustment of the game's overall difficulty to suit the location. The factory setting is 4 (Medium).

- **Set Starting Energy/Time**

```
                    Set Seconds For Continuation

Continue Play is for 50 Secs

Return to Main Menu
80 secs
75 secs
70 secs
65 secs
60 secs
55 secs
50 secs
45 secs
40 secs
Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
```

- **Set Seconds for Continue Play**

```
              Set Energy Gained from Refit Buy in.
              (Improved Buy in is 2 times This Value)

Refit Bonus Time is 30 secs

Return to Main Menu
50 secs
45 secs
40 secs
35 secs
30 secs
25 secs
20 secs
15 secs
10 secs
Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
```

- **Set Refit Energy/Time Bonus**

```
                    Set Minimum Volume Level

Current Minimum Volume Setting is 1
Return to Main Menu

1 Silent
2 Soft
3 Medium
4 Loud

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
```

- **Set Minimum Volume Level** — enables you to lower the minimum volume threshold. If the factory setting of 2 (Soft) is too loud, set the volume for 1 (silent), this will allow you **full** control of the volume level. To set the game for **silent attract** mode use the Factory Utilities menu.

NOTE
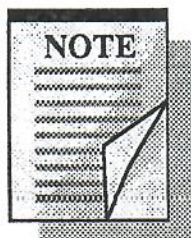
The Minimum Volume Level setting does not affect the loudest sound level attainable.

Game is Now Set For Factory Defaults

Use TRIGGER to Continue

- **Set Factory Selected Options** — restores the factory defaults on the above play settings and the coin options (see next page).

High Scores Will be Reset

Use TRIGGER to Continue

- **Reset High Scores** — resets the high scores listings to lower factory scores.

Factory Utilities

Return to Main Menu
Turn On Demo Mode
Turn Off Demo Mode
Silent Attract Mode

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits
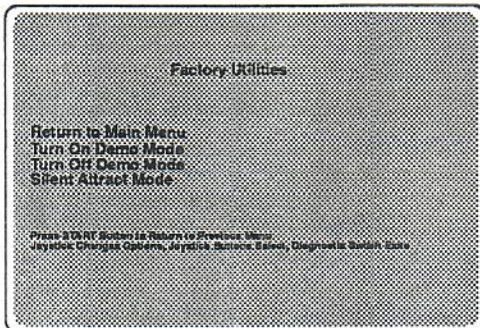
- **Factory Utilities** - Allows you to set the game for silent attract mode or to activate the sales demonstration mode. Demo mode allows a sales rep to quickly access the different worlds and to upgrade weapons frequently.
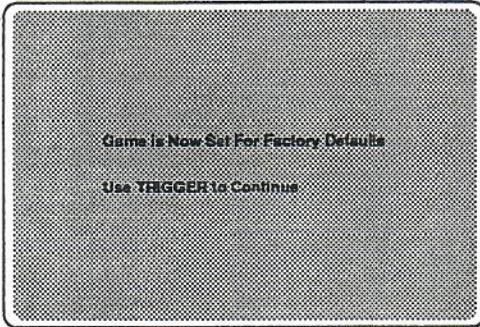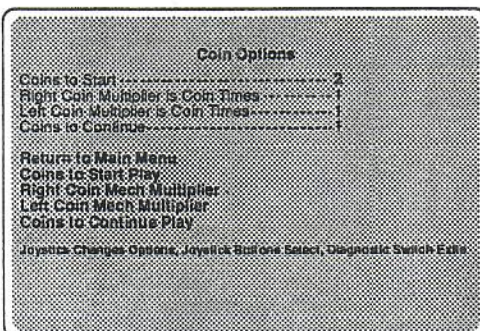
The Coin Options Menu

These menu items allow you to adjust the following options:

Coin Options

Coins to Start ----------------------------------- 2
Right Coin Multiplier is Coin Times ---------------- 1
Left Coin Multiplier is Coin Times ----------------- 1
Coins to Continue -------------------------------- 1

Return to Main Menu
Coins to Start Play
Right Coin Mech Multiplier
Left Coin Mech Multiplier
Coins to Continue Play

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

JALECO

Coins to Start Play

Number of Coins to Start is 2

Return to Main Menu
FREE PLAY
1 coin/1 credit
2 coins/1 credit
3 coins/1 credit
4 coins/1 credit
5 coins/1 credit
6 coins/1 credit
7 coins/1 credit
8 coins/1 credit

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Left Coin Mech Multiplier

Left Coin Multiplier is 1 coin counts as 1 coins

Return to Main Menu
1 coin counts as 1 coin
1 coin counts as 2 coins
1 coin counts as 3 coins
1 coin counts as 4 coins
1 coin counts as 5 coins
1 coin counts as 6 coins

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Coins to Continue Play

1 Coin(s) to Continue Play

Return to Main Menu
1 coin
2 coins
3 coins
4 coins
5 coins
6 coins

Press START Button to Return to Previous Menu
Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

Set Clock and Calendar

Return to Main Menu
Set Clock
Set Calendar

Joystick Changes Options, Joystick Buttons Select, Diagnostic Switch Exits

- **Coins to Start** — enables you to set the number of coins per credit from free play to 8. The factory setting is 2 coins.
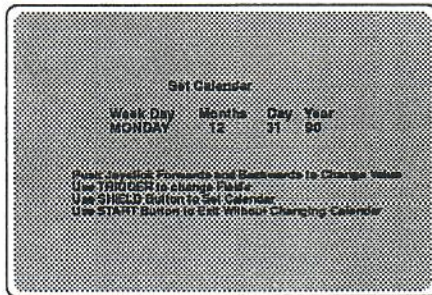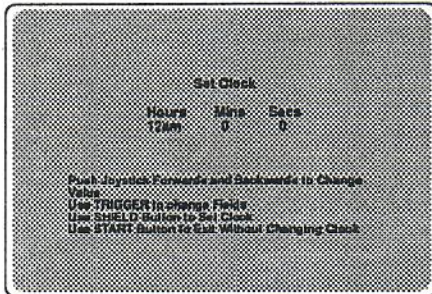
- **Right Coin Multiplier** — allows you to change the value of coins that pass through the right coin slot. Factory setting is 1 for 1.

- **Left Coin Multiplier** — allows you to change the value of coins that pass through the left coin slot. Factory setting is 1 for 1.

- **Coins to Continue Play** — enables you to set the number of coins required for the purchase of one additional plane (life). The factory setting is 1 coin.

The Set Clock and Calendar Menu

The battery-backed internal clock and calendar keeps accurate time whether or not the game is on (or even plugged in). Should the battery fail, or battery-backed memory become corrupted, the following items will enable you to reset the time-keeping:

JALECO

Set Clock

| Hours | Mins | Secs |
| 12AM | 0 | 0 |

Push Joystick Forwards and Backwards to Change Value.
Use TRIGGER to change Fields.
Use SHIELD Button to Set Clock.
Use START Button to Exit Without Changing Clock.

Set Calendar

| Week Day | Months | Day | Year |
| MONDAY | 12 | 31 | 90 |

Push Joystick Forwards and Backwards to Change Value.
Use TRIGGER to change Fields.
Use SHIELD Button to Set Calendar.
Use START Button to Exit Without Changing Calendar.

- **Set Clock** — select this item to check/reset the internal clock time. If the clock needs resetting, follow these steps:

  - Move the joystick up or down to change the hour setting.

  - Press the trigger when the hour is correct.

  - Continue this process for the minutes and seconds.

  Press the [SHIELD] button to set the clock to the new time, or press the [START] button to exit without changing the time.

- **Set Calendar** — choose this item to check/reset the internal calendar setting. If the calendar needs changing, follow these steps:

  - Move the joystick up or down to change the week day.

  - Press the trigger when the week day is correct.

  - Continue this process for the month, day, and year.

  Press the [SHIELD] button to store the new setting, or press the [START] button to exit without changing the calendar.

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Power-Up Diagnostics

Upon power-up, the firmware runs several tests to ensure each coprocessor is functional. The following table summarizes these tests:

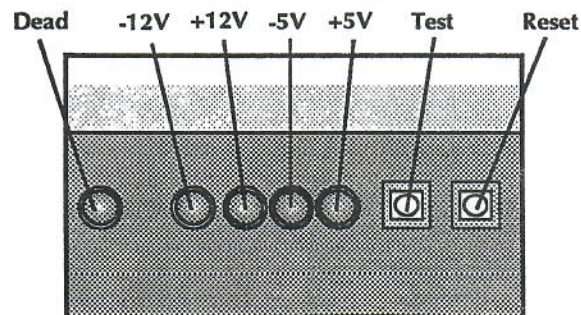|	
68000 sram	64k Static RAM
68000 rom checksums	512k EPROMs
68000 Shared memory	256k dual-port memory
Am29000 present	68000/29000 communication
Am29000 Shared memory	Access to host-board shared memory
MAC system	DrMath multiplier
Pipeline	DrMath 3-D graphics
TI Vram A	VGB video RAM
TI Vram B	VGB video RAM
TI Dram	VGB RAM
CLUT	VGB RAM
TI UART	VGB RS-232 interface
TI Eprom A	VGB EPROM U121, U124, U130, U133
TI Eprom B	VGB EPROM U97, U101, U108, U114

Download Note

The game's 3-D objects are stored in a compacted form on ten EPROMS. The software must "download" the 3-D objects into RAM before the game can be played (a process that takes around five minutes). To reset the game without having to wait through the download, press the reset switch on the Host board. This small switch is located on the upper-left of the outermost PCB.

Sound Board Diagnostics Test

The sound board runs through its self-test immediately after power-up. To verify the sound board status, run the Diagnostics-menu Sound Board test. If a component fails, an error code is returned describing the problem. The following table lists which components failed for each error code.

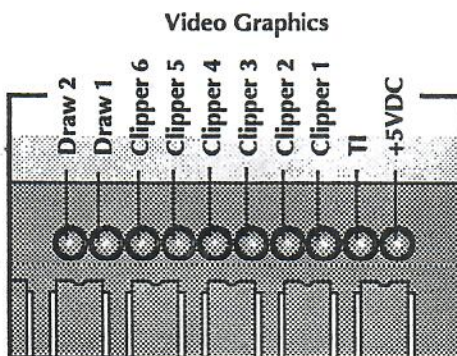| ERROR CODE	NEC7759	YM2151	ROM	RAM
65				bad
66			bad	
67			bad	bad
68		bad		
69		bad		bad
70		bad	bad	
71		bad	bad	bad
72	bad			
73	bad			bad
74	bad		bad	
75	bad		bad	bad
76	bad	bad		
77	bad		bad	bad
78	bad	bad	bad	
79	bad	bad	bad	bad

For Location of The Above Components See Page 2.15

Dead   -12V   +12V   -5V   +5V   Test   Reset

Sound Board

2.12

JALECO

Host Processor PCB

Power — Health LED Flashes

Host Processor PCB

OFF 1 2 3 4 5 6 7 8 ON

DR. Math

Power   Bus Error   Burst Acces LED Dimly Lit

Video Graphics

Draw 2 Draw 1 Clipper 6 Clipper 5 Clipper 4 Clipper 3 Clipper 2 Clipper 1 TI +5VDC
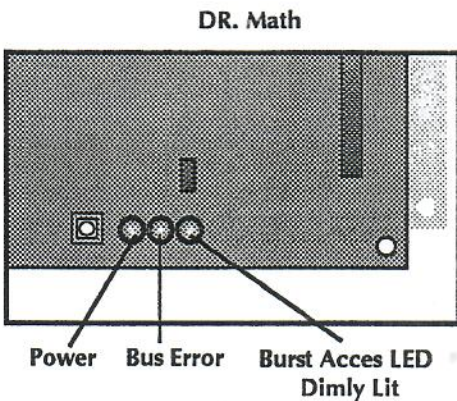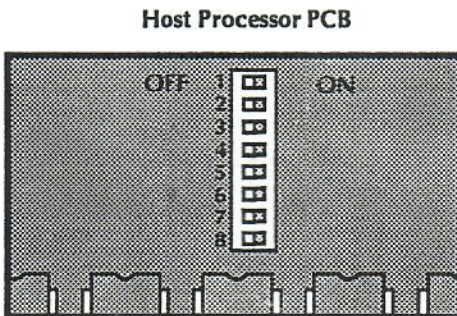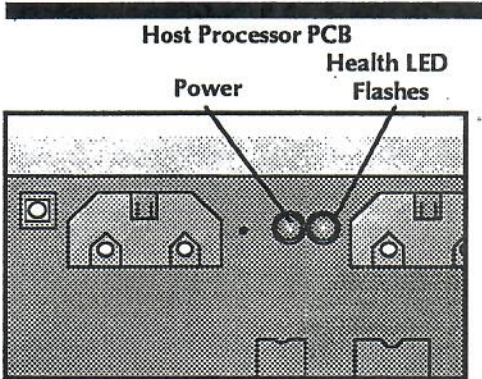
Health LEDs and Switch Settings

Host Processor Board Health LED

The Host Processor board has one health LED which toggles while running the game loop and attract loops. This light will not appear during system diagnostics and download.

Dip Switch settings: The Host Processor board has an 8-position DIP switch. **For normal game operation all switches should be set to the on position.** Other functional settings of this switch are as follows:

SW1 - Monitor mode. On system start-up the Host Processor will run its monitor program. This mode can be terminated only by resetting the machine. An RS-232 terminal is required to see the output of the Monitor.

SW3 - Manufacturing Tests.

SW4 - Burn-in Tests. The system performs looping burn-in tests.

SW5 - Dr. Math Monitor Mode. Setting this switch puts the Dr. Math board into its resident monitor. An RS-232 terminal must be connected to the Dr. Math board to see the output.
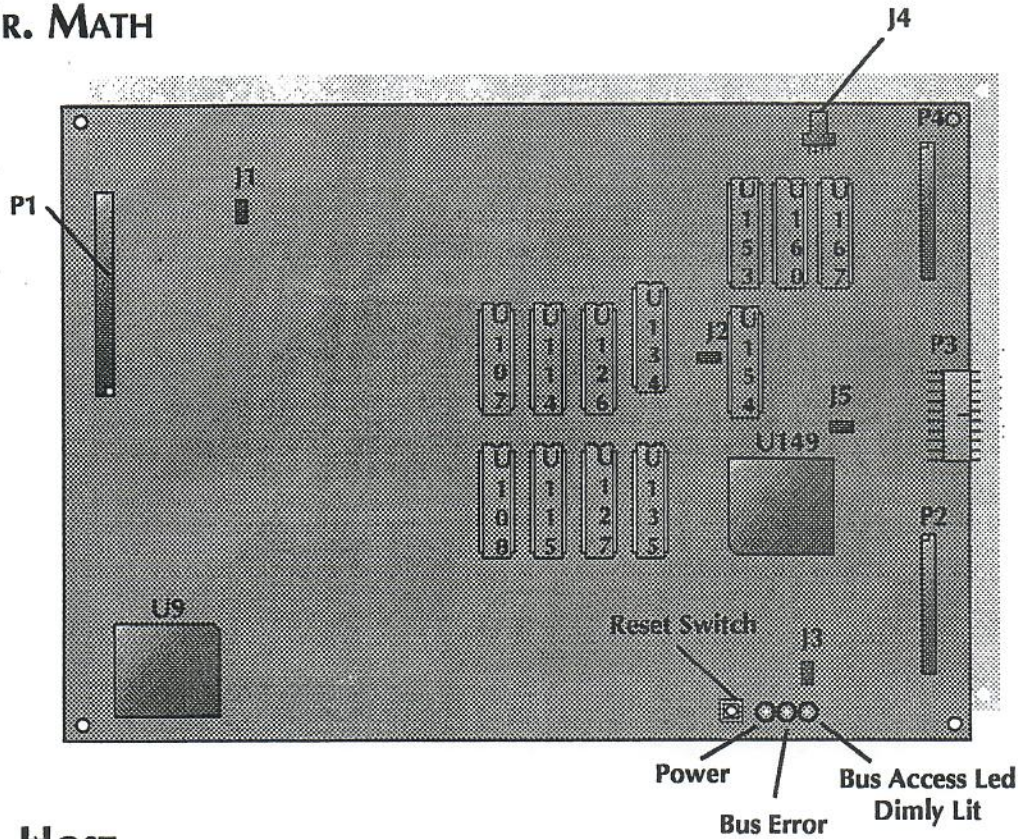
SW6 - Shared Memory Handshake Test.
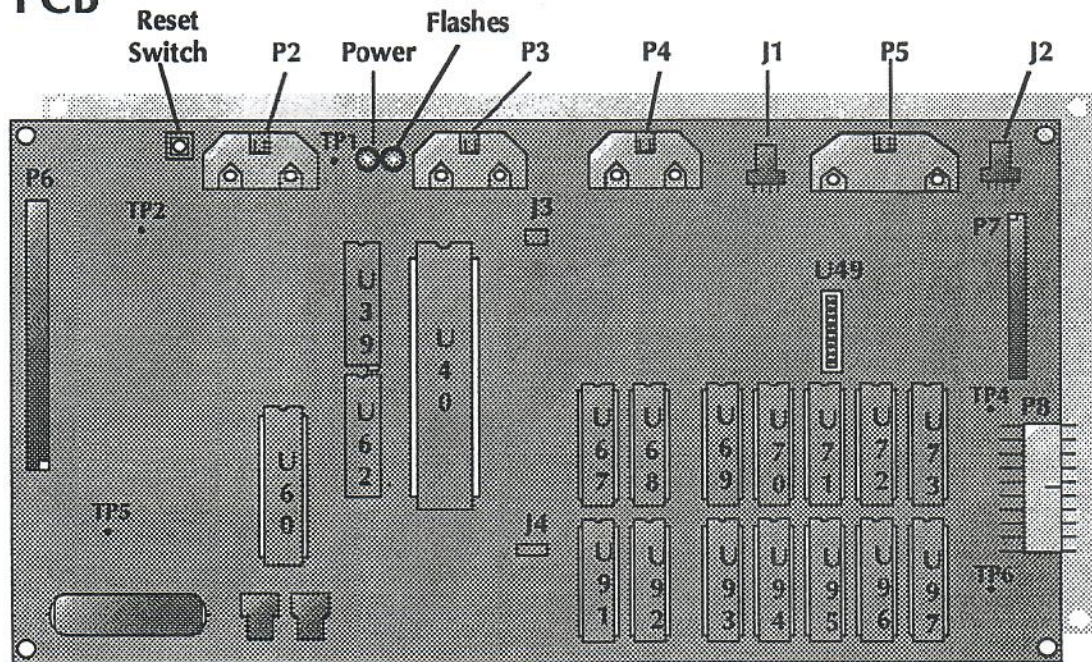
Video Graphics Health Lights

The Dr. Math board toggles the health lights on the Video Graphics board every time an End of Frame (EOF) is sent down the pipeline. A flashing EOF health toggle represents frame requests originating from the Host Processor and is considered a good thing. No flashing lights can indicate a clogged pipeline or a Dr. Math failure.
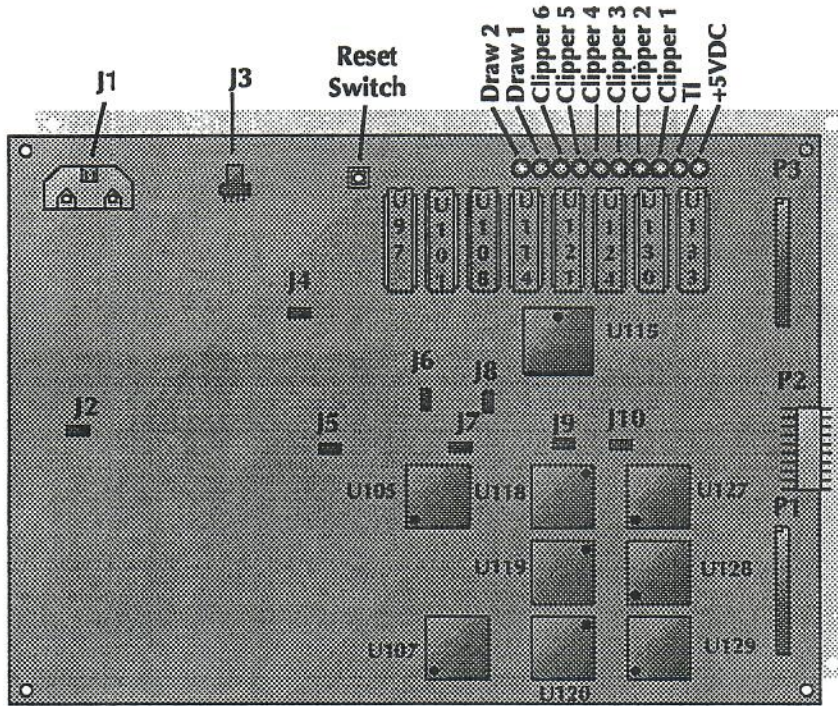
2.13

Major Component Location Diagram

DR. MATH

J4

P4

P1

J1

U153 U160 U167

U197 U114 U126 U134

J2

U154

P3

J5

U149

P2

U108 U115 U127 U135

U9

Reset Switch

J3

Power

Bus Error

Bus Access Led
Dimly Lit

HOST
PROCESSOR
PCB

Reset
Switch

P2

Flashes

Power

P3

P4

J1

P5

J2

TP1

P6

TP2

J3

P7

U39

U40

U49

TP4 P8

U62
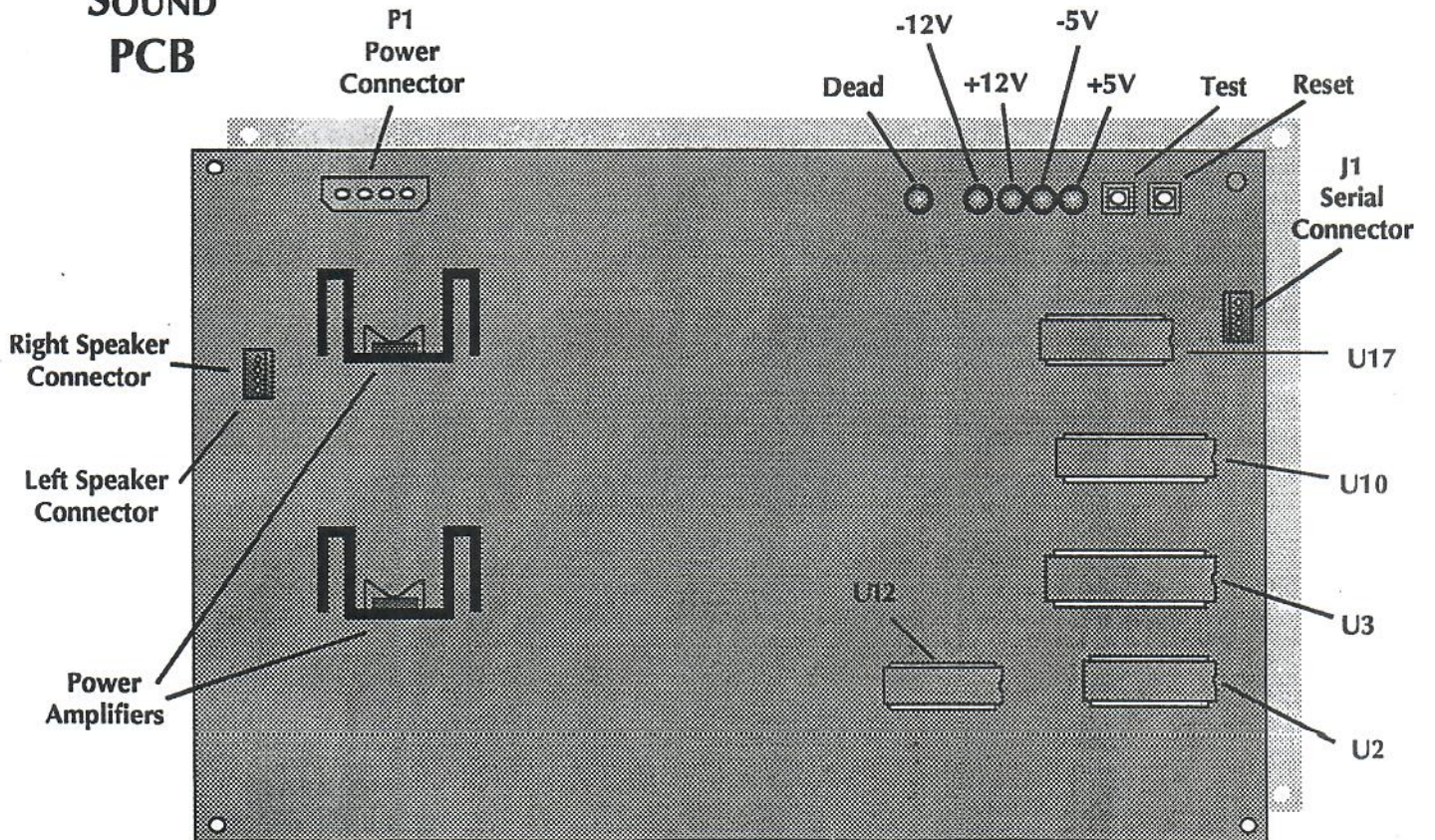
U67 U68 U69 U70 U71 U72 U73

TP5

U60

J4

U91 U92 U93 U94 U95 U96 U97

TP6

Major Component Location Diagram

VIDEO GRAPHIC PCB

J1 J3 Reset Switch

Draw 2 Draw 1 Clipper 6 Clipper 5 Clipper 4 Clipper 3 Clipper 2 Clipper 1 TI +5VDC

P3

U115

J4

J6 J8

P2

J2 J5 J7 J9 J10

P1

U105 U118 U127

U119 U128

U107 U129

U120

SOUND PCB

P1 Power Connector

Dead -12V +12V +5V -5V Test Reset

J1 Serial Connector

Right Speaker Connector

U17

Left Speaker Connector

U10

U12

U3

Power Amplifiers

U2

Major Component Location Diagram

P2 P3 P4 J1 P5 J2

P6

P7

P8

115 VAC 230 VAC

P7 +5vdc

P6 Com (GND)

P5 +15vdc
P4 -15vdc
P3 Com (GND)
P2 Com (GND)
P1 +12vdc

VR 1
(+5v Pot)

VR 2

+/- Sense (5v)

Major Component Location Diagram

Host Pcb

Video Graphics Pcb

DR. Math Pcb

Power Entry Fuse
5A SB

Power Back Plane Pcb

The Power Back
Plane Pcb should
remanin with the
game if you ever
exchange board sets.

GND

VDD