

# FRICITION CONVERSION KIT



## CONVERSION KIT MANUAL VERSION: 1.0.1

### **CAUTION:**

- The specifications of this product are subject to change without notice.
- The content of this game, hardware devices and design are protected under each federal law concerning patent, copyright and other intellectual properties.
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## SAFETY INSTRUCTIONS

Safety instructions apply to all operators and service personnel. Read these instructions before attempting to convert an arcade cabinet with the Friction Conversion Kit. Other safety instructions are outlined throughout the manual.

### **TRANSPORTING THE VIDEO ARCADE MACHINE (VAM)**

The Video Arcade Machine (VAM) is composed of fragile glass and electronic components. Use appropriate care and avoid rough handling when transporting the VAM.

### **DISCONNECT POWER**

**ALWAYS** turn the **POWER OFF** and disconnect the **POWER CABLE** when servicing the VAM. Installing or servicing electrical components with the **POWER ON** can potentially damage them.

### **AVOID ELECTRIC SHOCK**

To help prevent electric shock, plug the VAM into a properly grounded power source. Power cables are equipped with 3-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from the power cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.

### **CHECK POWER SELECTOR SWITCH**

Ensure that the power selector switch on the back of the computer is set to match the AC power in use at your location:

- **115 volts / 60Hz** in most of North and South America and some Far Eastern countries such as Japan, South Korea and Taiwan
- **230 volts / 50Hz** in most of Europe, the Middle East and the Far East

### **CHECK PC INTERNAL COMPONENTS**

During shipping, the PC internal components may have become loose. Check that all components such as the video card, CPU fan and memory sticks are securely attached.

### **HANDLE THE PC WITH CARE**

The PC contains sensitive electrical components such as a video card and hard drive. Avoid rough handling of the PC. Call technical support before attempting to service the PC internal components.

### **WARNING:**

Friction Game Studios LLC and Coast to Coast Entertainment assume no liability for any damages or injuries incurred while installing or maintaining the unit. As such, only qualified service personnel should perform any installation and maintenance.

### **ENVIRONMENTAL CONDITIONS**

Friction is intended for indoor use only. Be sure to keep the cabinet dry and maintain operating temperatures of **10-40 °C** or **50-104 °F**

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## SECTION 1: INTRODUCTION

Please read this manual carefully before you begin the installation process. The conversion procedure should be performed only by an experienced technician. Since cabinet styles vary widely, the steps outlined in this manual should be used as general guidelines for the conversion procedure. Your steps may vary especially if you are converting a non-shooting game. Please read all instructions before beginning the conversion and follow all precautions outlined in this document.

### **1.1 CONVERSION REQUIREMENTS**

For a successful conversion, the cabinet must have the following in working condition:

- existing wiring harness
- AC power distribution
- +5/+12 VDC power supply
- left and right audio speakers
- VGA, EGA (medium resolution) or CGA (low resolution) CRT monitor
- control panel with 2 working start buttons and enough room to mount 2 light guns
- 2 working coin mechs

Please ensure that all of the above are in good working order as this will ensure a successful Friction Conversion Kit installation.

### **1.2 REQUIRED TOOLS**

- Phillips screw driver
- Drill
- Wire snips
- Assorted cable ties and/or clips for securing wires
- Depending on modifications needed, you may need the following Drill Bits: 7/32", 1/4", 1-1/8", 1-1/2"

## SECTION 2: INSTALLATION PROCEDURE

### 2.1 CLEAN CABINET AND REMOVE OLD HARDWARE

- [1] Turn **POWER OFF** and disconnect the AC power cord
- [2] Remove old boards from the cabinet. Keep the existing **wiring harness** and **power supply (+5, +12 Volt DC switching)**
- [3] Ensure that the interior of the cabinet is free of loose debris and exposed wiring

### 2.2 INSTALL AC POWER STRIP

- [1] Route your existing cabinet power cord to the inside of the cabinet and connect it to a power strip (not included in the kit)
- [2] Route the power cord from the power strip out of the cabinet. This will now be the cabinet power cord
- [3] Secure the power strip inside the cabinet using either two screw-mounted cable ties or a strip of adhesive Velcro.

### 2.3 CONTROL PANEL MODIFICATIONS

- [1] Remove the existing guns from the control panel if they are present. Use the guns provided with the kit.
- [2] If guns are not present with the cabinet drill holes to mount the guns and holsters included in the kit
- [3] If the control panel does not have buttons, drill a hole in a central location of the control panel for the Player 1 and Player 2 start buttons
- [4] Install the new Player 1 and Player 2 Start buttons and micro switches, and connect them to the control panel
- [5] Secure the cabinet end of the gun / hose assembly to the cabinet with three carriage bolts.
- [6] Secure the gun holsters to the control panel one on each side, right and left



Figure 1. Start Button Connections



Figure 2. Installed Control Panel



**Figure 3. Gun Mounting Plates Attached**

## **2.4 INSTALL THE PC**

The computer comes with the Friction software pre-installed. When the PC is powered up the system will automatically load and begin playing the game.

- [1] Place the computer so that you can reach the rear computer panel through the back door of the arcade cabinet.
- [2] If possible place the computer against a side wall and ensure that the power supply at the back of the computer is not obscured. If necessary, you can place packing foam under and at the side of the computer for extra protection
- [3] If necessary secure the computer using L brackets and/or using a mounting strap with two #10 x 3/4" wood screws with fender washers. Do **NOT** screw fasteners into the computer.

## 2.5 INSTALL THE CRTGUN PCB AND WIRE CONNECTIONS

The CRTGUN PCB handles the input from the optical guns, player start buttons, coin mechs as well as providing a sound amplifier for the arcade cabinet speakers.

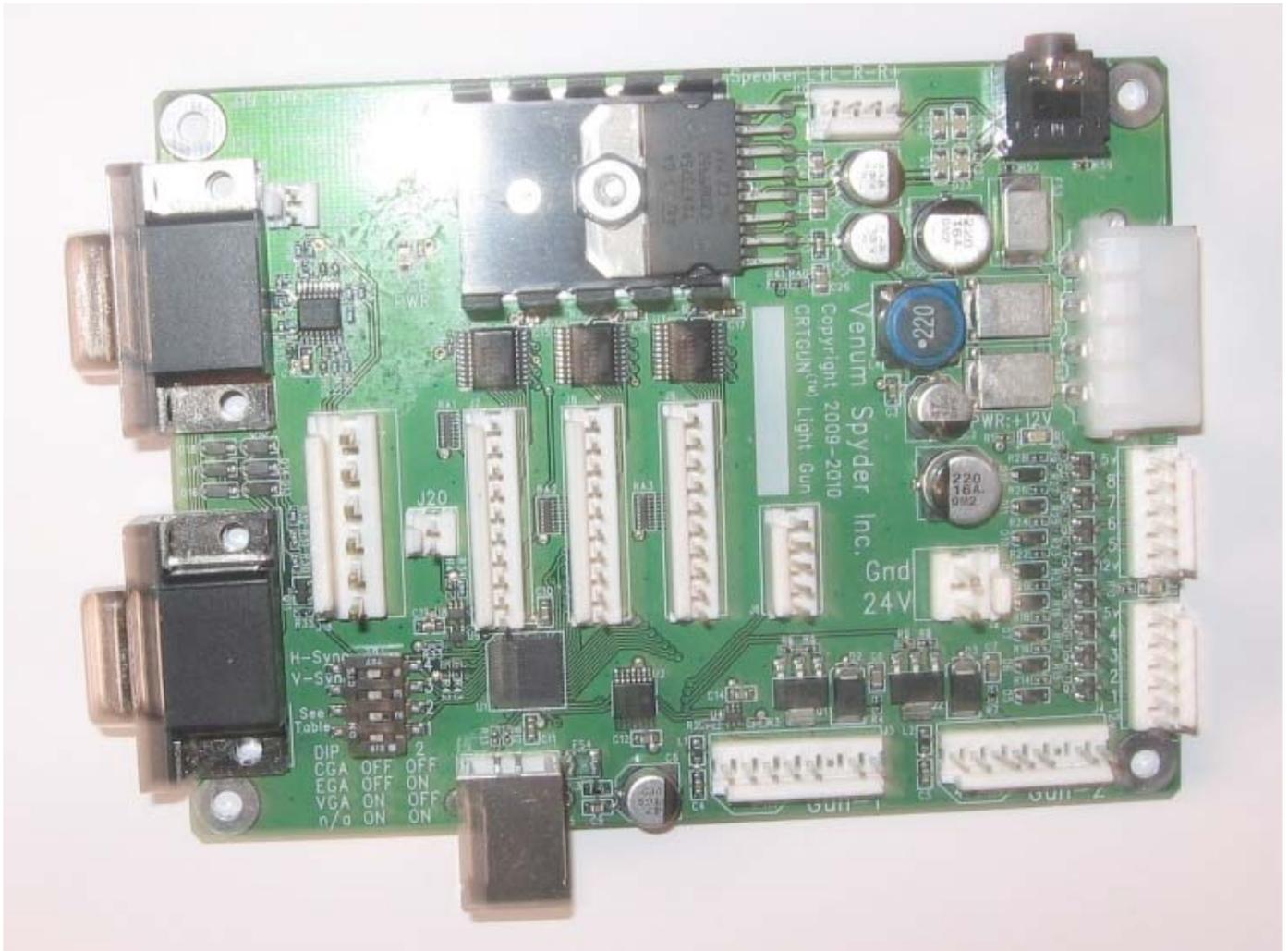
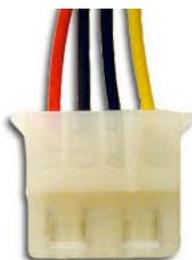


Figure 4. CRTGUN PC I/O Board

[1] The PCB uses **+5 and +12 VDC** power to run the sound amplifier. You can power the PCB by using the cabinet's VDC power supply or by connecting to the computer's internal power supply through a 4-pin power connector. A 4-pin PC Power Connector (**pictured below**) extension cable is included with the kit.



Red -- +5V  
 Black -- GROUND  
 Black -- GROUND  
 Yellow -- +12V

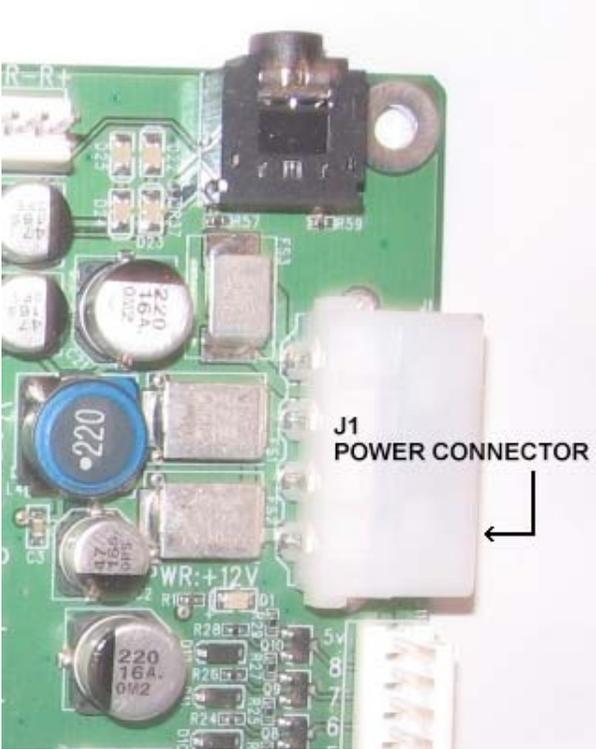


Figure 5. J1 4-Pin Power Connector

[2] Set the Video Mode DIP switch on the PCB to match your monitor, as shown in the table below:

DISPLAY RESOLUTION	DIPSW1	DIPSW2
VGA (640x480)	ON	OFF
EGA (512x384)	OFF	ON
CGA (320x240)	OFF	OFF

Instructions are also etched on the board describing how to set the switches.

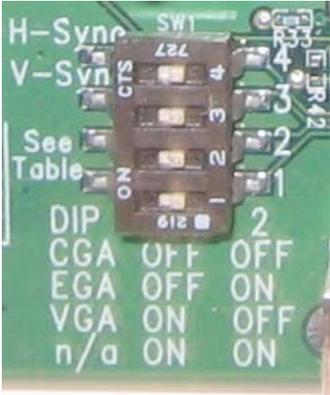
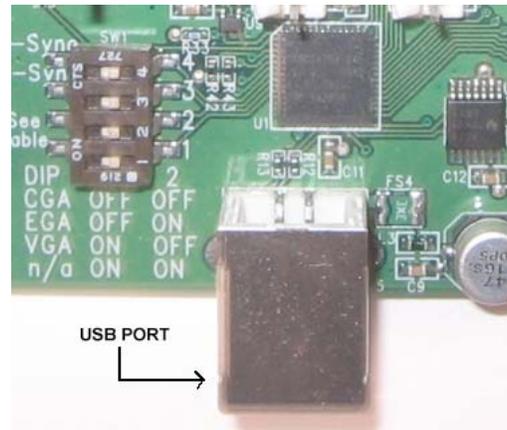


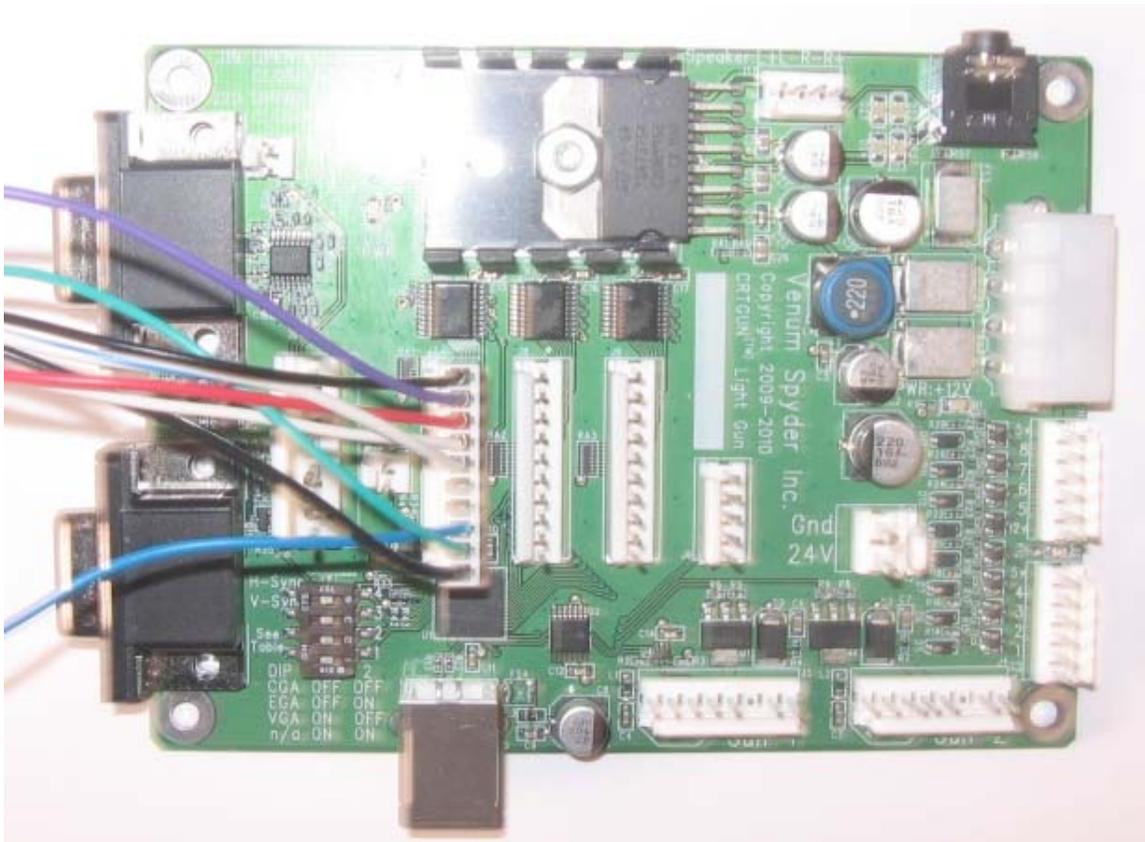
Figure 6. Video Jumper DIP switch

- [3] Find a good location in the cabinet to mount the CRTGUN PCB. Make sure that the PCB is placed such that the wiring harness can be properly connected to the components in the arcade cabinet. Ensure that the CRTGUN PCB is not exposed to excessive heat.
- [4] Connect the included USB cable to the CRTGUN PCB. Connect the other end of the cable to an available USB port at the back of the computer.



**Figure 7. USB PORT**

- [5] Attach the 10 pin Molex connector included in the kit to **J7** on the I/O board. This handles the input of the player start buttons, the test button as well as the coin mechs. Refer to the image below to locate where to attach the button wiring harness.



The image below describes the pin layout of the 10 pin Molex connector.



Figure 8. 10 Pin Molex connector pin layout

- [6] Connect Gun 1 to pins 1-4 J3 – Gun--1 of the CRTGUN PCB
- [7] Connect Gun 2 to pins 1-4 J4 – Gun—2 of the CRTGUN PCB

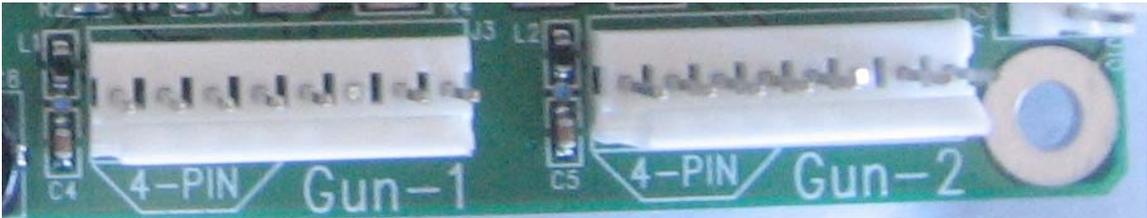


Figure 9. J3-J4 Gun pins



Figure 10. Guns Connected to CRTGUN PCB

[8] Connect the 3.5 mm audio cable from the **Green** audio out port on the computer to **J16 – Audio-In** on the CRTGUN PCB.

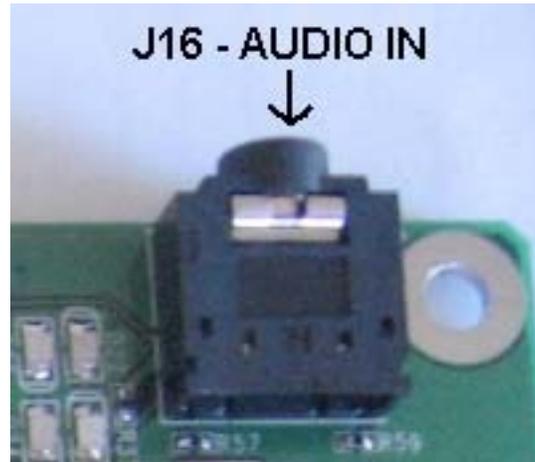


Figure 11. J16 – AUDIO IN on CRTGUN PCB

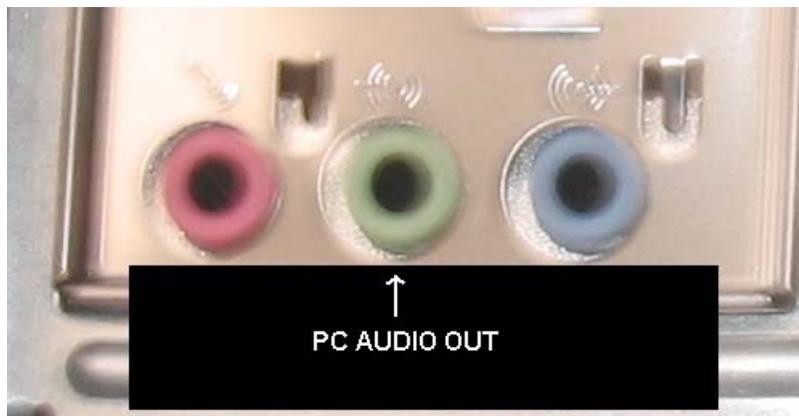


Figure 12. PC Green AUDIO OUT Port

[9] Connect the 4 pin speaker harness to **J17** on the CRTGUN PCB. The pins on the I/O board PCB are labeled **Speaker: L+ L- R- R+**



Figure 13. J17 Speaker Pinouts

[10] Connect the video monitors to the CRTGUN PCB as well as the PC VGA port on the back of the computer.

For **VGA** monitors perform the following steps:

- Connect the included VGA cable to from the computer **VGA Port** to **J13 – Video In**
- Take the VGA monitor cable and connect it to **J12 – Video Out**
- Please refer to the images below to locate the VGA ports on the PC and I/O PCB board

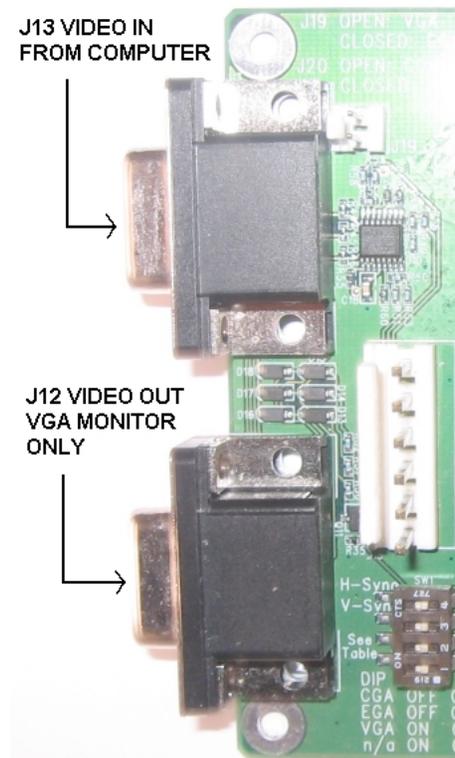


Figure 14. VGA ports on CRTGUN PCB



Figure 15. PC VGA Port

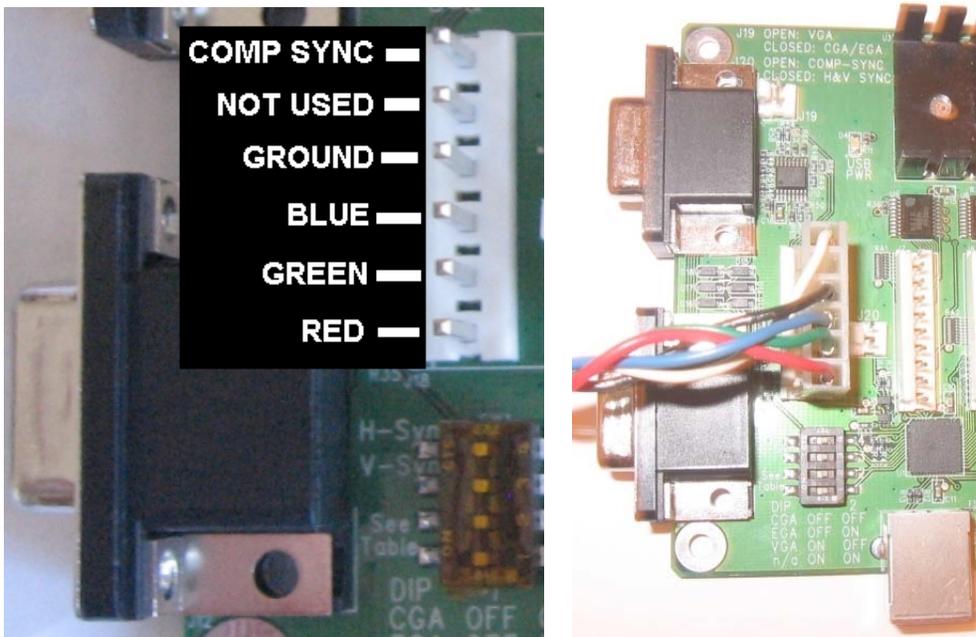
For **CGA \ EGA** monitors perform the following steps:

- Connect the included VGA cable to from the computer **VGA Port** to **J13 – Video In** (Refer to **Figure 14** and **Figure 15** above)
- Place a jumper on **J19**, this provides video amplification to the VGA signal coming in from the PC



**Figure 16. J19 Jumper Location**

- Connect the video signals from the CGA\EGA monitor to **J18** on the CRTGUN PCB board. The video signal pinouts are outlined in the image below.



**Figure 17. CGA\EGA video pinout and connections**



- [4] Play a game in both single player and two player modes to verify that the game is functioning properly.
- [5] Select **GAME SETTINGS**, **COIN SETTINGS**, and **CLOCK SETTINGS** from the **OPERATOR CONSOLE** to set time, volume, pricing and game play related features.

### SECTION 3: OPERATOR CONSOLE

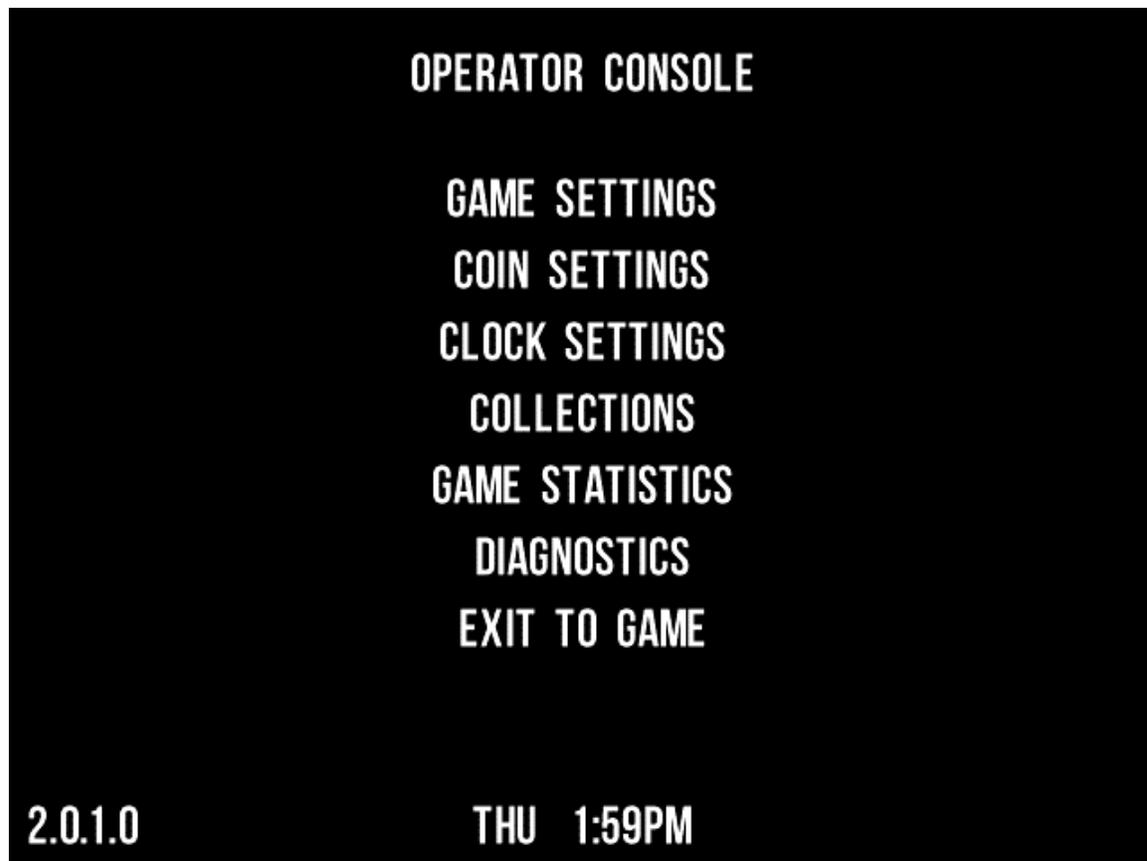
To access the operator menu press the **Test Button**

#### **MENU NAVIGATION**

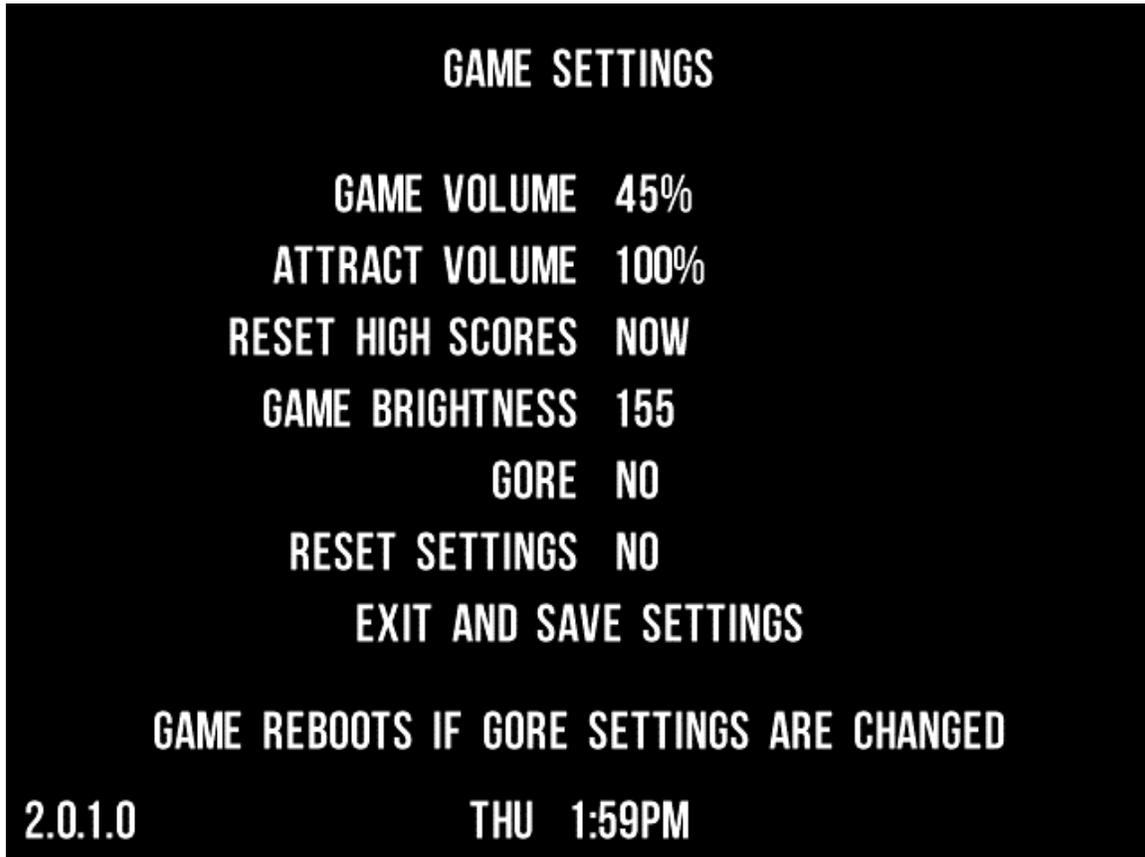
<b>BUTTON</b>	<b>ACTION</b>
Test Button	Cycle Through Menu Options
Player 1 \ Player 2 Buttons	Select/Change Menu Option

#### SECTION 3.1: MAIN MENU

The **MAIN MENU** appears once the **Test Button** is pressed



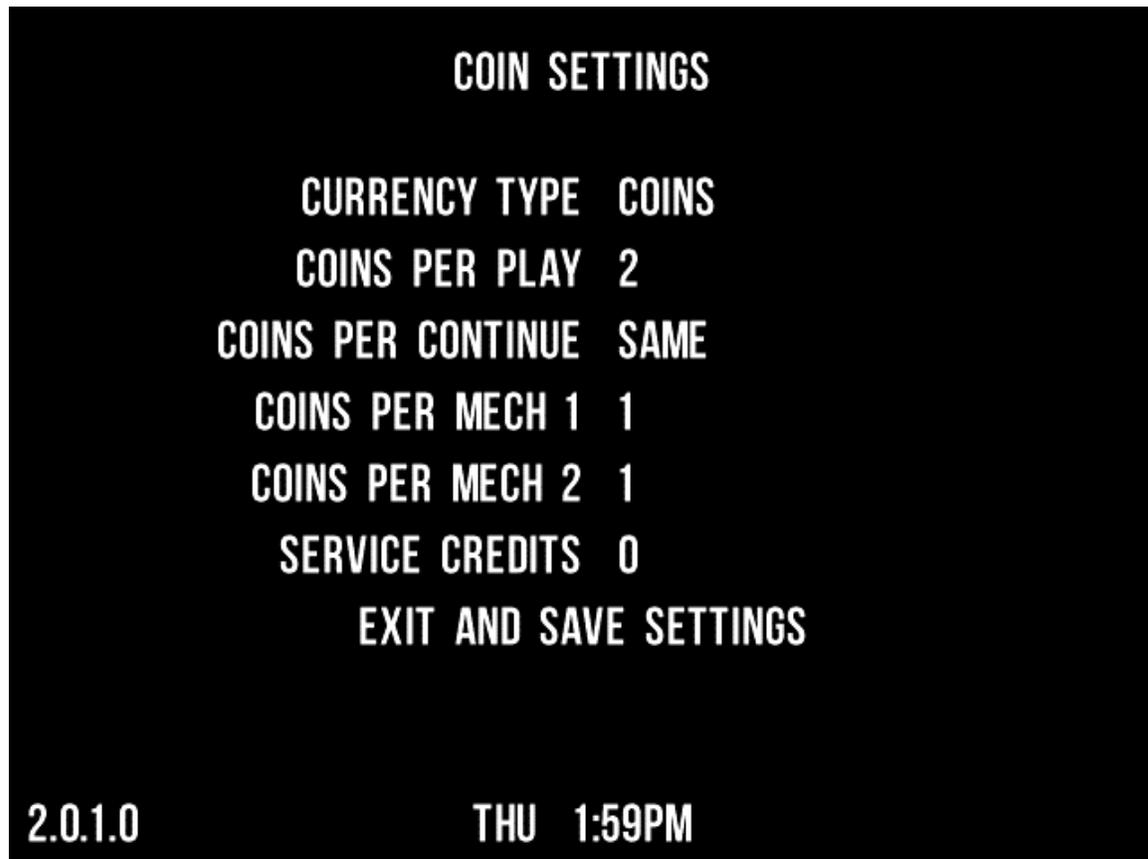
Press the **Test Button** to cycle through the menu options.  
Press the **Player 1** or **Player 2 Button** to select a specific menu option.

**SECTION 3.2: GAME SETTINGS**

<b>MENU</b>	<b>DESCRIPTION</b>
GAME VOLUME	In game volume
ATTRACT VOLUME	Attract mode volume
RESET HIGH SCORES	Select high scores reset option
GAME BRIGHTNESS	Change in game screen brightness
GORE	Gore setting (Game reboots if changed)
RESET SETTINGS	Reset game settings to factory defaults
EXIT AND SAVE SETTINGS	Exit to Main Menu

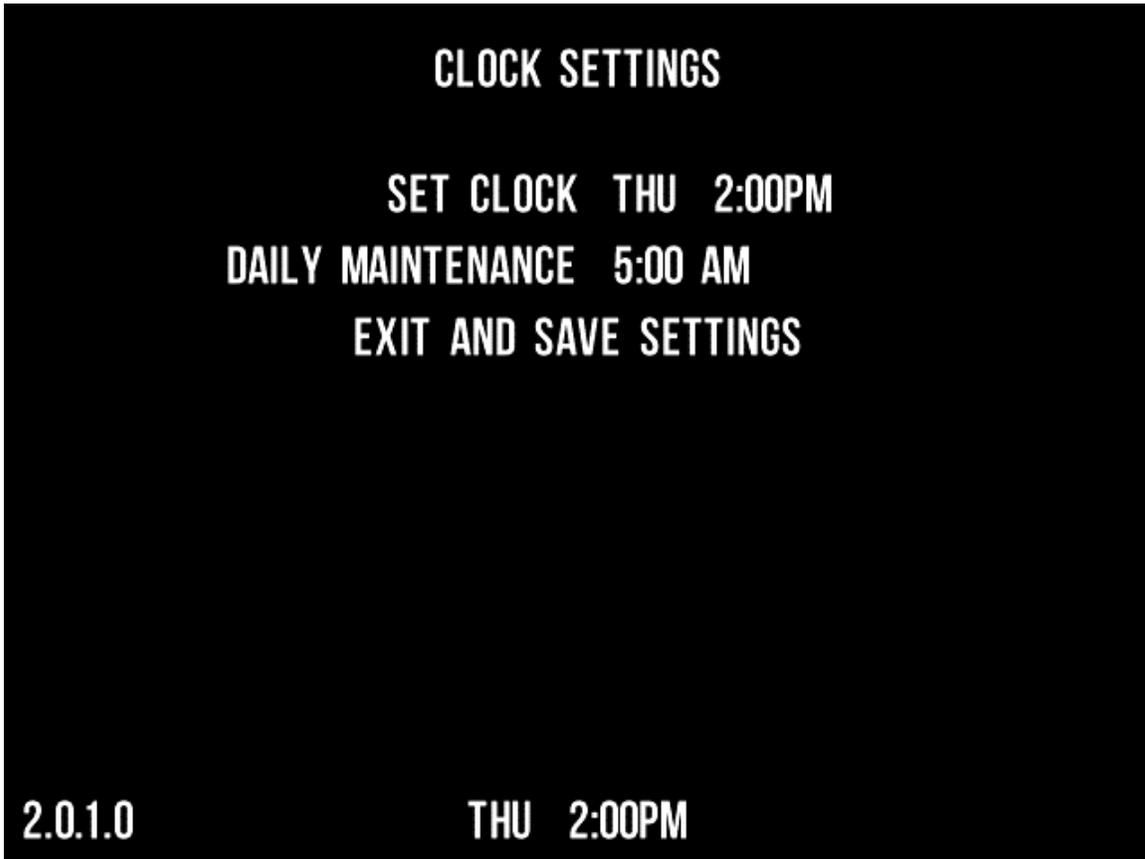
**NOTE:**

If **GORE** settings are changed the machine will auto reboot in order for settings to take effect

**SECTION 3.3: COIN SETTINGS**

MENU	DESCRIPTION
CURRENCY TYPE	COIN, CARD or GENERIC CREDIT
COINS PER PLAY	Number of coins to play the game (0 for <b>FREE PLAY</b> )
COINS PER CONTINUE	Number of coins to continue
COINS PER MECH 1	Coin ticks per coin drop on MECH 1
COINS PER MECH 2	Coin ticks per coin drop on MECH 2
SERVICE CREDITS	Operator service credits
EXIT AND SAVE SETTINGS	Exit to MAIN MENU and save settings

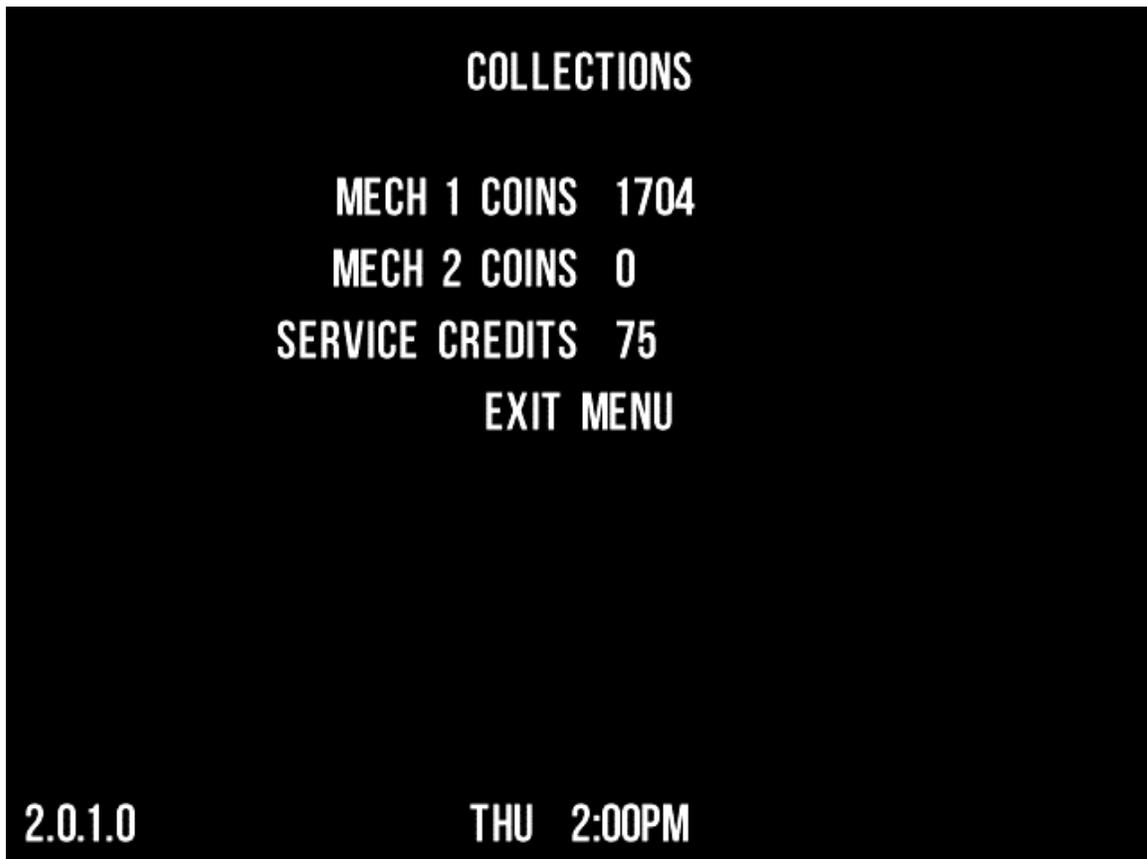
**SECTION 3.4: CLOCK SETTINGS**



<b>MENU</b>	<b>DESCRIPTION</b>
SET CLOCK	Set day and system time
DAILY MAINTENANCE	Set daily maintenance time
EXIT AND SAVE SETTINGS	Exit to MAIN MENU and save settings

**NOTE:**

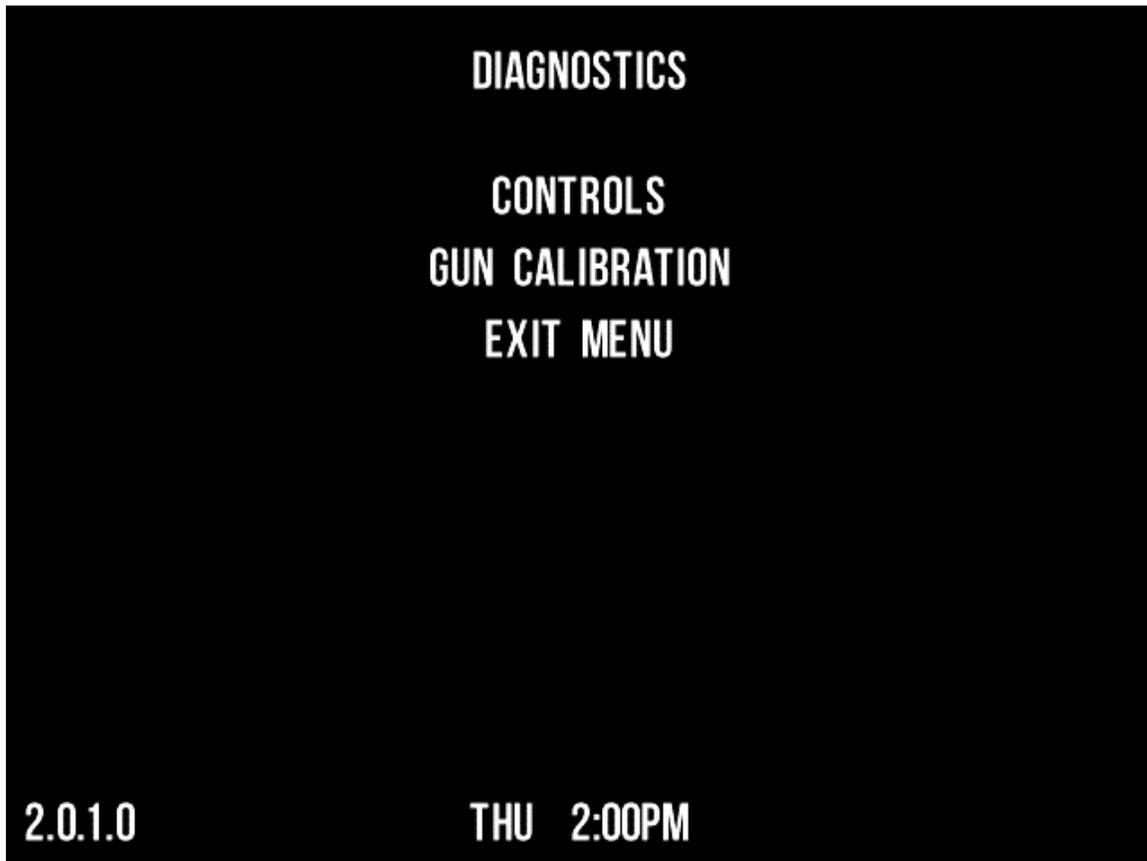
Setting the **DAILY MAINTENANCE** time will reboot the system at the selected time. For this to happen the game must be running in attract mode for a couple of minutes after the daily maintenance time is reached. If the game is being played during the daily maintenance time, the system will reboot once the game is finished and has gone back to running attract mode for several minutes. This feature can also be disabled so as to not have the game reboot at a specific time.

**SECTION 3.5: COLLECTIONS**

<b>MENU</b>	<b>DESCRIPTION</b>
MECH 1 COINS	Number of coins dropped in MECH 1
MECH 2 COINS	Number of coins dropped in MECH 2
SERVICE CREDITS	Total number of service credits given out
EXIT MENU	Exit to MAIN MENU

**SECTION 3.6: GAME STATISTICS**

<b>MENU</b>	<b>DESCRIPTION</b>
TOTAL STARTS	Total times the system has been powered up
TOTAL PLAYS	Total times the game has been played
TOTAL CONTINUES	Total times the game has been continued
AVERAGE PLAY TIME	Average play time
RESET STATISTICS	Reset game statistics
EXIT AND SAVE SETTINGS	Save settings and exit to MAIN MENU

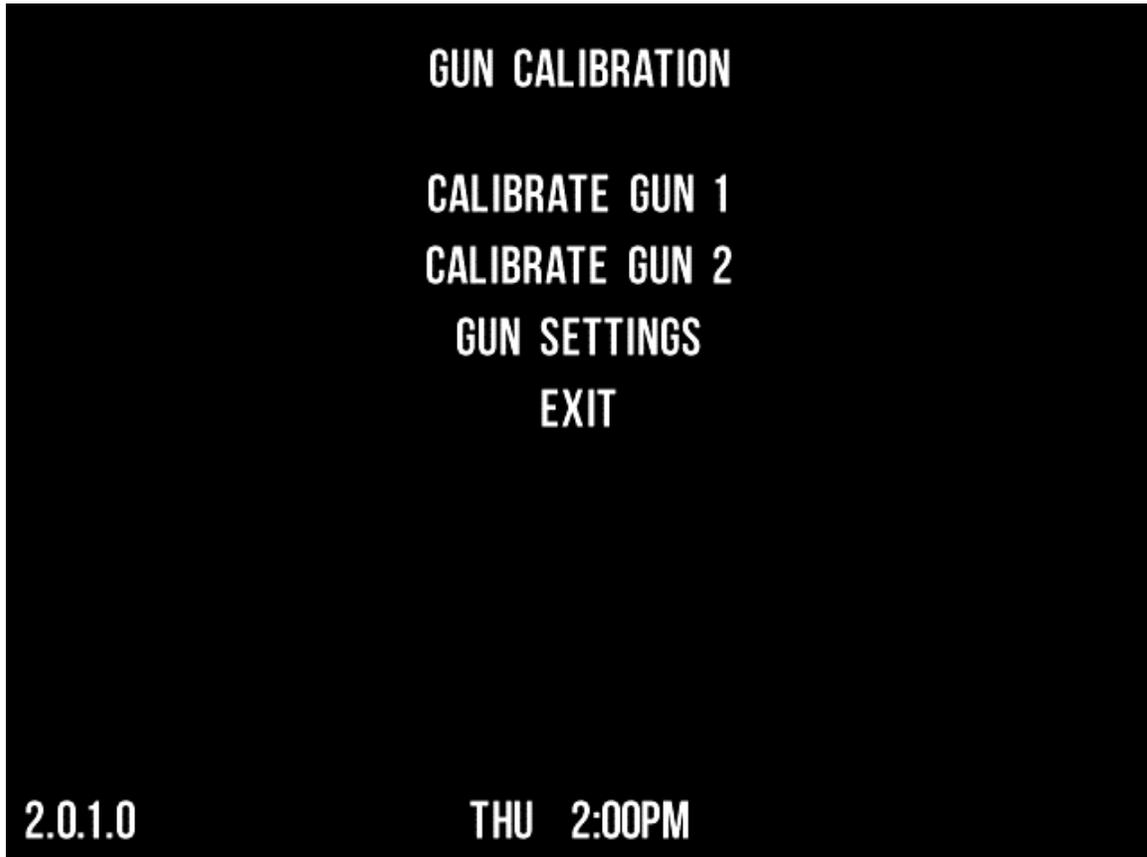
**SECTION 3.7: DIAGNOSTICS**

MENU	DESCRIPTION
CONTROLS	Controls sub menu
GUN CALIBRATION	Gun calibration sub menu
EXIT MENU	Exit to main menu

**SECTION 3.7.1: CONTROLS**

Use the CONTROLS diagnostic menu to ensure proper operation of arcade cabinet input devices.

<b>MENU</b>	<b>DESCRIPTION</b>
GUN 1 TRIGGER	Gun 1 trigger status
GUN 2 TRIGGER	Gun 2 trigger status
COIN 1	Coin Mech 1 status
COIN 2	Coin Mech 2 status
START BUTTON 1	Player 1 start button status
START BUTTON 2	Player 2 start button status
EXIT MENU	Exit to DIAGNOSTICS screen

**SECTION 3.7.2: GUN CALIBRATION**

<b>MENU</b>	<b>DESCRIPTION</b>
CALIBRATE GUN 1	Calibrate gun 1
CALIBRATE GUN 2	Calibrate gun 2
GUN SETTINGS	Global gun settings
EXIT	Exit to DIAGNOSTICS menu

**SECTION 3.8: GUN CALIBRATION**

Each gun can be calibrated individually by making the appropriate selection in the **GUN CALIBRATION** menu. Once a selection is made, the operator is taken to a screen where the current calibration of the optical gun can be tested.



The operator can exit the screen at any time by pressing either of the player **START** buttons. To calibrate the gun, the operator needs to pull the trigger on the gun while the barrel is directly facing the screen.

A series of screens will appear with a target that the operator must aim at. Place the barrel of the gun directly facing each of the targets and pull the trigger. The images below show the 3 different targets that must be aimed at in order to properly calibrate the light gun.

PLACE GUN ON TARGET DIRECTLY FACING THE SCREEN  
AND PULL TRIGGER TO CALIBRATE



PLACE GUN ON TARGET DIRECTLY FACING THE SCREEN  
AND PULL TRIGGER TO CALIBRATE



PLACE GUN ON TARGET DIRECTLY FACING THE SCREEN  
AND PULL TRIGGER TO CALIBRATE



PULL TRIGGER TO RE-CALIBRATE GUN 1  
PULL TRIGGER WITH GUN FACING OFF SCREEN TO EXIT  
(X, Y) 245 261



Once all 3 targets are displayed, a screen will appear where the operator can confirm that the guns are calibrated properly. The operator can leave this screen by aiming away from the screen and pulling the trigger, or by pressing any of the player **START** buttons.

## SECTION 4: TROUBLE SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Two images on monitor	CGA monitor is running in VGA mode	Check jumper on CRTGUN PCB and set them to CGA mode
Video is blurry or too bright and washed out	J19 video jumper not installed on CGA/EGA monitor	For CGA and EGA monitors, install a jumper on J19 of the CRTGUN PCB
Picture color is poor	Color needs adjustment	Use the monitor remote control board to adjust red, green, and blue color settings
Picture geometry is misaligned	Geometry needs adjustment	Use the monitor remote control board to adjust the picture height and width and other geometry
Poor picture	Monitor connected to wrong port	The monitor must be connected to the VGA port on the video card, <b>NOT</b> to the video port in the computer motherboard. Ensure that the monitor video cable is connected to the VGA port located below the audio connectors.
	Settings need adjustment	Use the monitor remote control board to adjust the monitor
"No Signal" message	Video cable not secure	Check and secure the video connector
	PC not turned ON	Turn ON power to the PC
No picture on monitor	Power problem	Check the AC power connection to the monitor. You can verify that the monitor has power by looking for a small glow in the neck of the CRT.
	Loose or faulty video cable	Verify that the video cable is firmly connected from the monitor.
	Loose or faulty video card	When the computer boots up, it performs a PC self diagnostic test. If you hear 3 beeps from the computer, this indicates a problem with the video card. If the video card is faulty, contact Technical Support.
No video and no audio  [Note: The game takes about 2-3 minutes to boot]	No power to computer	Verify the computer is ON by the LED on the front of the computer. Verify the line voltage switch on the back of the computer is set to the correct voltage for your area: 115V or 230V. Make sure the

		AC power cord is firmly connected to the computer
	Corrupted software	Reload the software. If you continue to have problems, you may have a faulty hard drive.
	Faulty hard drive	If you continue to have problems after you reload the software, you may have a faulty hard drive. Contact Technical Support
No audio	Volume set too low	Enter the operator menu to ensure the game volume is set high enough.
	Faulty wiring	Turn off the game. Verify that all the audio wires are firmly connected to the speakers and CRTGUN PCB. Verify that each wire is connected to the correct port. Verify that no wires are frayed or improperly shorting to ground.
	Blown speakers	Remove the grills and inspect each speaker for visible damage
	Faulty audio amp on CRTGUN PCB	To verify audio is working at the computer, connect stereo headphones to the computer audio port. You can test the PCB by connecting it in another cabinet
	No power to CRTGUN PCB	Check the +5/+12 VDC connection to the PCB
Buttons and Guns do not work	Faulty wiring	Disconnect the cabinet from AC power. Verify that all wires are firmly connected to each button and the CRTGUN PCB. Verify that no wires are frayed or improperly shorting to ground.
	Faulty CRTGUN PCB	Make sure that all connections to the PCB are secure.
	Faulty USB cable	Replace USB cable. Try a different computer USB port.
One or both guns do not work	Faulty wiring	Disconnect the cabinet from AC power. Verify that all wires are firmly connected from the gun to the CRTGUN PCB. Verify that no wires are frayed or improperly shorting to ground
	Faulty USB cable	Replace USB cable. Try a different computer USB port.
	Bad trigger switch	Replace trigger switch.
	Faulty CRTGUN PCB	Make sure that all connections

		to the PCB are secure. Test with known good PCB.
Guns do not aim properly	Guns out of calibration	Calibrate guns from Operator Menu
Erratic gun performance or gunfire does not register	Monitor glass dirty or poorly adjusted	Clean the glass display shield and monitor. Adjust monitor so picture is sharp with good contrast and color.
	Dirty or damaged lens in the gun	Clean or replace the lens in the gun barrel
	Damaged cables	Inspect the gun cables and replace if necessary

**Warning:** Do not connect or disconnect any cables or connectors on this game with the power on. This could potentially damage the game.

## **SECTION 5: PARTS**

<b>PART DESCRIPTION</b>	<b>PART NUMBER</b>
POWER CABLE	CBL-0001-00
FOXCONN COMPUTER CASE	CPU-0001-00
INTEL PENTIUM 2.8GHZ DUAL CORE (E5500)	CPU-0002-00
G41D3 MOTHERBOARD (BIOSTAR)	CPU-0003-00
NVIDIA GT210 512MB DDR3	CPU-0004-00
160GB HARD DRIVE (7200 RPM)	CPU-0005-00
2 GB RAM (1333)	CPU-0006-00
350W POWER SUPPLY	CPU-0007-00
FRONT MARQUEE GRAPHIC	GRA-0001-00
CRTGUN PC I/O BOARD	CPU-0008-00
BUTTON WIRING HARNESS	CBL-0002-00
SPEAKER WIRING HARNESS	CBL-0003-00
CRTGUN PC I/O BOARD POWER WIRING HARNESS	CBL-0004-00
AUDIO CABLE	CBL-0005-00
USB CABLE	CBL-0006-00
VGA CABLE	CBL-0007-00
CGA/EGA JUMPER	CON-0001-00
GUN ASSEMBLY	ELC-0001-00
HOLSTER	ELC-0002-00
FRICTION KIT DVD	DVD-0001-00
FRICTION KIT DOCUMENTATION	GRA-0002-00
USB HDD RECOVERY FLASH DRIVE	CPU-0009-00

## SECTION 6: HARD DRIVE RECOVERY

**NOTE:** Friction is shipped with a recovery USB flash disk. Hard drives can occasionally fail for various reasons. Please follow the procedures outlined below if a disk failure should occur. Use extreme care and follow all safety procedures outlined in this manual when attempting to restore the computer hard drive. Avoid rough handling of the PC components and the USB flash disk

The following symptoms may indicate a possible failed hard drive:

- The game fails to finish loading
- A BIOS boot error message is displayed when the game is powered on or reset
- Erratic game play and/or attract mode

### HARD DRIVE RECOVERY PROCEDURE

- [1] Turn the game **OFF**
- [2] Connect the USB recovery flash drive to an available USB port on the back of the PC
- [3] Connect a keyboard to the PS/2 port or to an available USB port. The keyboard will be used to set the BIOS settings to boot from the flash drive.

**Note:** If you are connected to a CGA\EGA monitor please follow the **SPECIAL INSTRUCTIONS FOR CGA\EGA MONITORS** in Section 7.

- [4] Turn the game **ON**
- [5] Press the **DEL** key during boot to open the BIOS (CMOS) Setup Utility.
- [6] In the **Main** menu make sure that **Floppy A** is **Disabled**
- [7] Ensure that **Chipset => South Bridge Chipset Configuration => USB 2.0 Controller** is **Enabled**
- [8] Check that the following USB BIOS settings are set:

**Advanced => USB configuration => Legacy USB Support** is **Enabled**  
**Advanced => USB configuration => USB Controller Mode** is set to **Hi Speed**  
**Advanced => USB Configuration => USB Mass Storage Device Configuration => Emulation Type** is set to **Hard Disk**

- [9] In **Boot => Hard Disk Drives** ensure that the **USB flash drive** is first on the list (use the "-" or "+" keys to change the settings)
- [10] In **Boot Device Priority => 1st Boot Device** ensure the **USB flash drive** is the first boot device. (use the "-" or "+" keys to change the settings)
- [11] Press **F10** to exit and save your settings. Select **Ok** when prompted to save your settings.

The machine will now boot into the flash drive. At this time the screen will turn off and/or no signal detected is shown if you are connected to a CRT VGA monitor. This is normal behavior as the **Windows Pre-Installation OS** is setting a video mode that is not supported by most Arcade VGA CRT monitors.

Eventually a windows loading screen appears with a command prompt. A command will appear called **wpeinit** that initializes the system. Please note that it may take several minutes to get to this screen and for the command to complete. The drive is formatted next and the new image installed on the target device. The computer will auto shutoff when the USB flash drive is done imaging the hard drive. At this point you can remove the USB flash drive and keyboard and turn the machine back on. The system will now boot into the game.

## SECTION 7: BIOS

**NOTE:** The Friction Conversion Kit is shipped with the correct BIOS settings. Any changes made to the BIOS other than what is described below may adversely affect the game.

### **SPECIAL INSTRUCTIONS FOR CGA/EGA MONITORS**

If the game uses a CGA or EGA monitor, you will need to hook up an external VGA monitor in order to set the BIOS.

Perform the following steps to connect a VGA monitor to the game (A computer monitor will also work):

[1] Turn OFF the computer

[2] Disconnect the VGA cable from the back of the computer and connect the external VGA monitor cable to the same port.

[3] Proceed to set the BIOS settings as described in the following section.

**Note:** If you don't see an image after powering ON, make sure the external monitor is connected to a power source and turned on, and the VGA cable is connected directly from the external monitor to the computer's VGA port.

### **STEPS TO SET THE BIOS**

[1] Turn OFF the computer

[2] Connect a keyboard to the PS/2 port or to an available USB port

[3] Power ON the monitor and the game

[4] Press the **DEL** key during boot to open the BIOS (CMOS) Setup Utility.

[5] In the **Main** menu make sure that **Floppy A** is **Disabled**

[6] Use the arrow keys to navigate to the **Advanced** menu option

[7] Select the **Super IO Configuration** menu item

[8] Change the **Restore on AC Power Loss** option to **Power On**

[9] Press the '**F10**' key and save your configuration changes

## SECTION 8: JAMMA PINOUT

SOLDER SIDE		
GND	A	
GND	B	
+5V	C	
+5V	D	
-5V	E	
+12V	F	
KEY	H	
COIN COUNTER 2	J	
COIN LOCKOUT 2	K	
L SPEAKER -	L	
R SPEAKER -	M	
VIDEO GREEN	N	
VIDEO SYNC	P	
SERVICE	R	
TILT	S	
COIN 2	T	
PLAYER 2 START	U	
PLAYER 2 UP	V	
PLAYER 2 DOWN	W	
PLAYER 2 LEFT	X	
PLAYER 2 RIGHT	Y	
PLAYER 2 BUTTON 1	Z	
PLAYER 2 BUTTON 2	Aa	
PLAYER 2 BUTTON 3	Ab	
PLAYER 2 BUTTON 4	Ac	
NOT USED	Ad	
GND	Ae	
GND	Af	

COMPONENT SIDE		
GND	1	
GND	2	
+5V	3	
+5V	4	
-5V	5	
+12V	6	
KEY	7	
COIN COUNTER 1	8	
COIN LOCKOUT 1	9	
L SPEAKER +	10	
R SPEAKER +	11	
VIDEO RED	12	
VIDEO BLUE	13	
VIDEO GND	14	
TEST	15	
COIN 1	16	
PLAYER 1 START	17	
PLAYER 1 UP	18	
PLAYER 1 DOWN	19	
PLAYER 1 LEFT	20	
PLAYER 1 RIGHT	21	
PLAYER 1 BUTTON 1	22	
PLAYER 1 BUTTON 2	23	
PLAYER 1 BUTTON 3	24	
PLAYER 1 BUTTON 4	25	
NOT USED	26	
GND	27	
GND	28	

## SECTION 9: TECHNICAL SUPPORT

Technical support is provided for the FRICTION conversion kit. Please refer to the **Trouble Shooting Guide** to see if your problem can be resolved there. Otherwise, please contact our **Parts and Service** department.

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