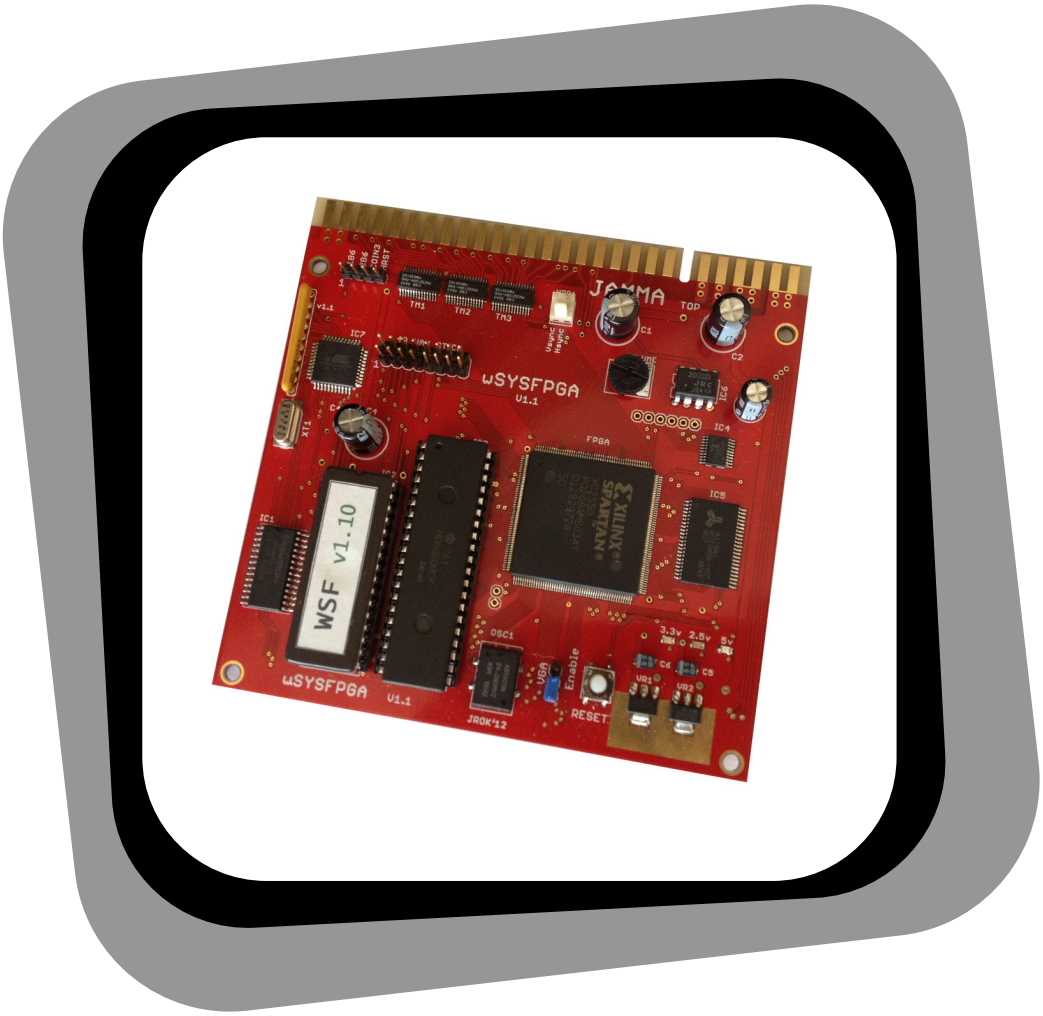
System FPGA



wSF - System FPGA

Setup Guide revision 2.1
For v1.1 boardset hardware

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Board Requirements

Connectors

The board uses a standard JAMMA connector, with player one and two buttons 4 & 5 being used in the ‘Standard’ input mode.

A ‘multi-WMS’ mode is available where only player one & two buttons 1 through 3 are required.

Refer to “Button Map Scheme” in the setup menu.

The Three pin headers on the board are used for additional inputs and outputs.

2 pin = Video Sync output
4 pin = Additional inputs
16 pin = (2 x 8)* = external soundboard and 49 way joystick connector
* only 8 pins are required for 49-way joystick support

See the section “Button and Video Sync Headers” for pin connections.

Mating connector types are:

2 position = molex kk 0.1” 22-01-3027 or TE Connectivity/AMP CST-100 0.1” 770602-2
4 position = molex kk 0.1” 22-01-3047 or TE Connectivity/AMP CST-100 0.1” 770602-4

16 position (2 x 8)* = molex 90143-0016 or FCI 65043-029LF

*single row 8 position for 49-way joystick = molex 90123-0108 or FCI 65039-029LF

Voltage & Current

The board requires **only** 5v regulated DC power. Maximum current draw is 400mA when using a 4ohm speaker at maximum volume. A minimum of 500mA power supply should be used to ensure stable operation.

If long runs of cabling are used significant voltage drop may occur, ensure the power supply is adjusted to provide a reliable 5v at the edge connector of the board.

A voltage at the edge connector of the board under 4.75v will cause the board to suspend and remain in reset mode.

Power Requirements

5v DC regulated
400mA

Setup Menu

The option setup menu can be accessed from either the Main Menu, if “SETUP” is enabled, or at boot time by two methods.

If the SETUP menu is **disabled** use either of the following methods to get to menu.

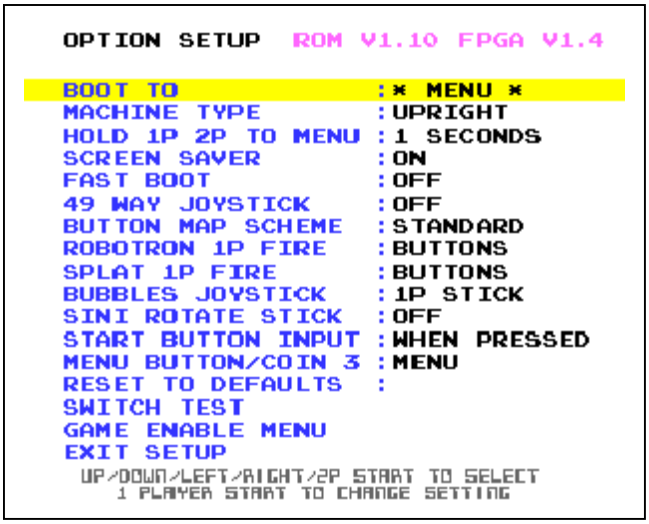
- Press and hold 1P start and 2P start together & power on the machine or press RESET on the board.
- Hold down the “SERVICE” (Advance) switch & power on the machine or press RESET on the board.

Controls

2 Player Start (2P Start) is used to move down through each option, or using the joystick inputs up/down/left/right.

1 Player Start (1P Start) is used to change a setting, or step through the available values.

NOTE: the 49 way stick can not be used to move through the menu options !



BOOT TO

Select the game the machine should boot to when powered on. Default is the game menu.

MACHINE TYPE

cocktail Enables the 2 player inputs and screen flipping for cocktail tables.
This mode is only supported for Defender, Stargate, Robotron & Bubbles.

Upright Standard Machine

HOLD 1P + 2P TO MENU

1/2/4 Number of seconds that holding down 1P & 2P start button together will jump back to the game main menu.
OFF Disables the option to jump to then main menu when holding 1P + 2P start buttons.

NOTE: Even if "boot to" is set to a specific game holding 1P + 2P Start will jump back to the main menu unless this option is set to "OFF"

SCREEN SAVER

ON/OFF
If no buttons are pressed on the game select screen for 10 minutes the screen saver will automatically kick in. When in screen saver mode any button press will restart the menu.

The screen save does not start when in the setup or game enabled menu.

FAST BOOT

Enable fast startup of games.

ON The self test of each game is disabled. There will be no 'rug pattern' or initial test message.
OFF Standard power on self test is run when a game is selected.

49 WAY JOYSTICK

Enable 49 way joystick through expansion pin header.

ON 49 way joystick support for a stick connected to the pin header on the board.
OFF Standard 8 way joystick input is translated into a 49 way joystick input.

NOTE: This option is ONLY available for Sinistar & Blaster.

BUTTON MAP SCHEME

STANDARD Mapping uses player inputs and buttons 1 through 6. Refer to "***JAMMA Button Mappings***"
MULTI-WMS Both 1P and 2P buttons 1 through 3 are used for inputs. Refer to "***MULTI-WMS Button Mappings***"

NOTE:
For Cocktail Mode only ***STANDARD*** mapping should be used.
Splat 2 player mode is NOT supported in ***MULTI-WMS*** mode

ROBOTRON 1P FIRE

Inputs used for firing direction.

Buttons Inputs for buttons 1 through 4 are used for firing directions and should be connected to a joystick
2P Joysticks The JAMMA player 2 joystick is used for the firing directions.

NOTE: In cocktail mode this should be set to Buttons.

SPLAT 1P FIRE

Inputs used for firing direction.

Buttons Inputs for buttons 1 through 4 are used for firing directions and should be connected to a joystick
2P Joysticks The JAMMA player 2 joystick is used for the firing directions.

NOTE: For true two player support the Buttons mode should be used and second pair of joysticks is required for player 2.

BUBBLES JOYSTICK

1P STICK / 2P STICK
Select which joystick should be used for control in Bubbles.

SINI ROTATE STICK

Rotates the joystick 90 degrees for Sinistar in both 49way and 8way mode. This allows sinister controls to be used when playing in a horizontal cabinet.

NOTE: When playing in a horizontal cabinet the screen will be sideways. Sinistar still requires a vertically mounted monitor to play correctly.

*****This feature is only available with FPGA version 1.1 or later.

START BUTTON INPUT

Controls how the 1P and 2P start buttons operate after a game is selected. This feature is only available with FPGA version 1.2 or later.

- **WHEN PRESSED:**
  The input for 1P and 2P start are passed directly into the game.

- **ON RELEASE:**
  1P and 2P inputs are only passed as "ON" into the game for ¼ of a second AFTER the button is released.

In this mode the 1P and 2P start inputs DO NOT REGISTER AS PRESSED WHEN THE BUTTON IS HELD DOWN.

The purpose of this setting is that is allows 1P and 2P buttons to be held down, to jump back to the main menu, without a new game starting.

MENU BUTTON/COIN 3

The "menu" button can be configured as a third coin input for 'Center Coin'.

MENU Grounding the input will force a return to the main selection menu when button is grounded.
It is an alternative way to get to the menu other than hold 1P & 2P Start buttons.

COIN3 The input functions as 'Center Coin', this feature is for early version of Defender which featured a 3rd 'Center Coin' input.

*****This feature is only available with FPGA version 1.3 or later

RESET TO DEFAULTS

Hold down the 1P start button for approximately 2 seconds to clear the boot menu NVRAM settings back to the defaults.

NOTE: This does not reset the individual game settings.

SWITCH TEST

Shows status of all switched inputs. With FPGA version 1.1 and above a ROM checksum test can also be carried out from this screen.

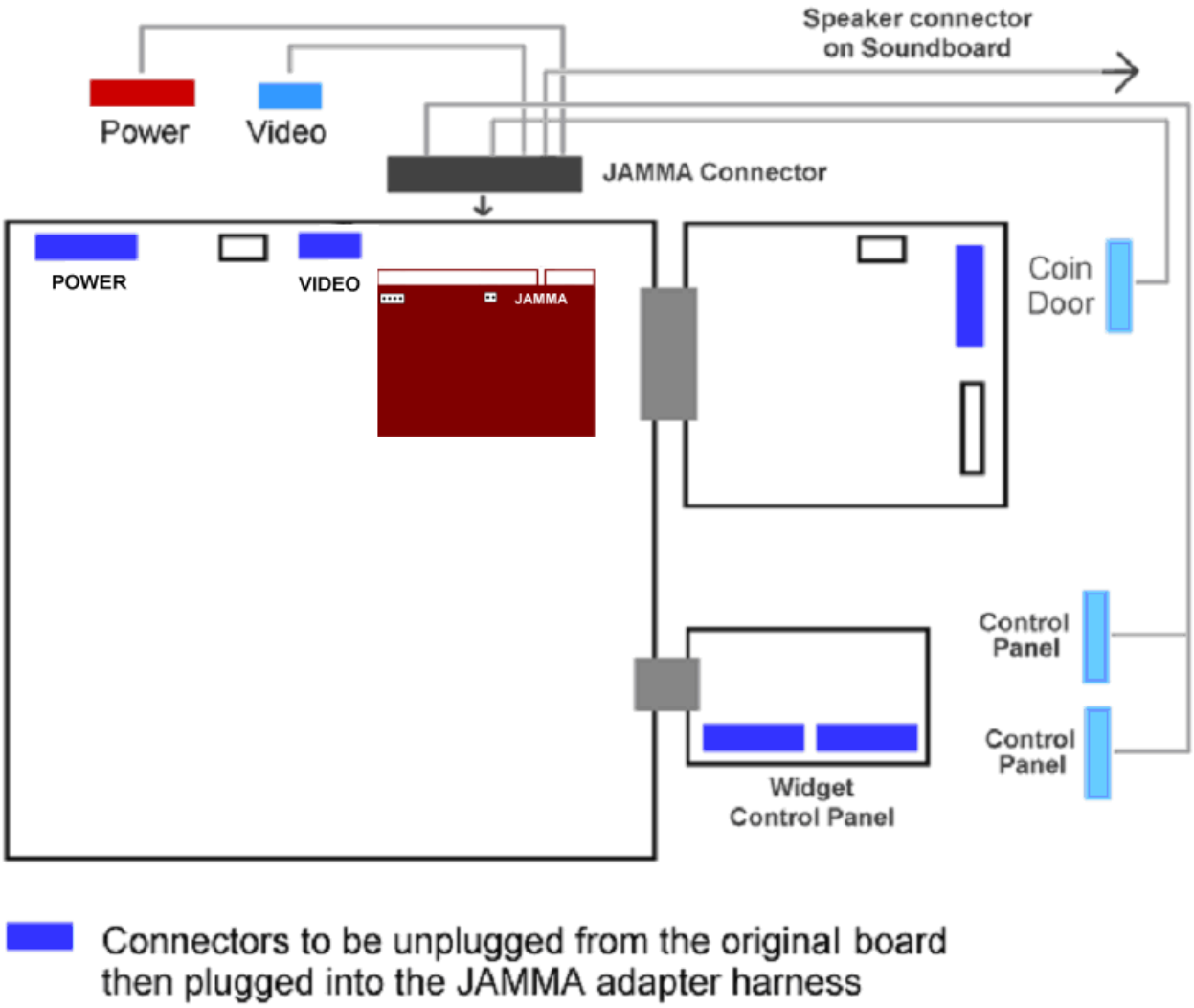
GAME ENABLE MENU

Turn on or OFF which games appear on the game selection main menu.

JAMMA to Original Harness Adapter

The connectors for Power, Video, Coin Door and Controls should be plugged into the keyed connectors of the original cabinet harness.

Use the diagram to locate the plugs which should be removed from the original boards. Power, Video, Coin Door, Widget/Control Panel



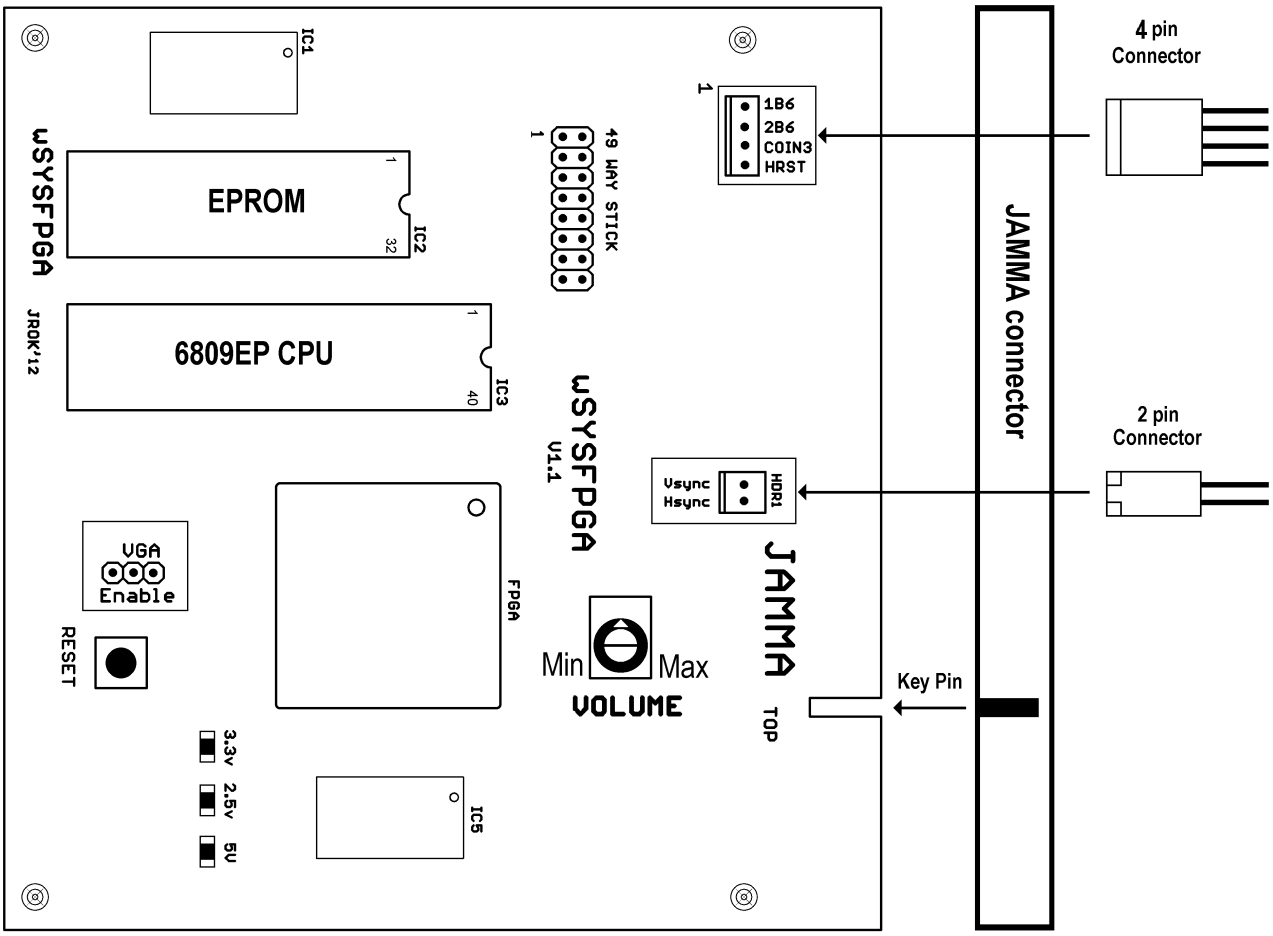
Use the two mounting feet to secure the board over the top of the original gameboard, note the location of the two mounting screws.

The video header on the original board will be blocked by the WSF board. Be sure to remove the video connector plug first.

Button and Video Sync Headers

Two pin headers are also required for wiring the board to an original harness.

2 pin plug = required for the Horizontal and Vertical Sync
4 pin plug = required for the “high-score-reset” input and button 6 for Stargate.



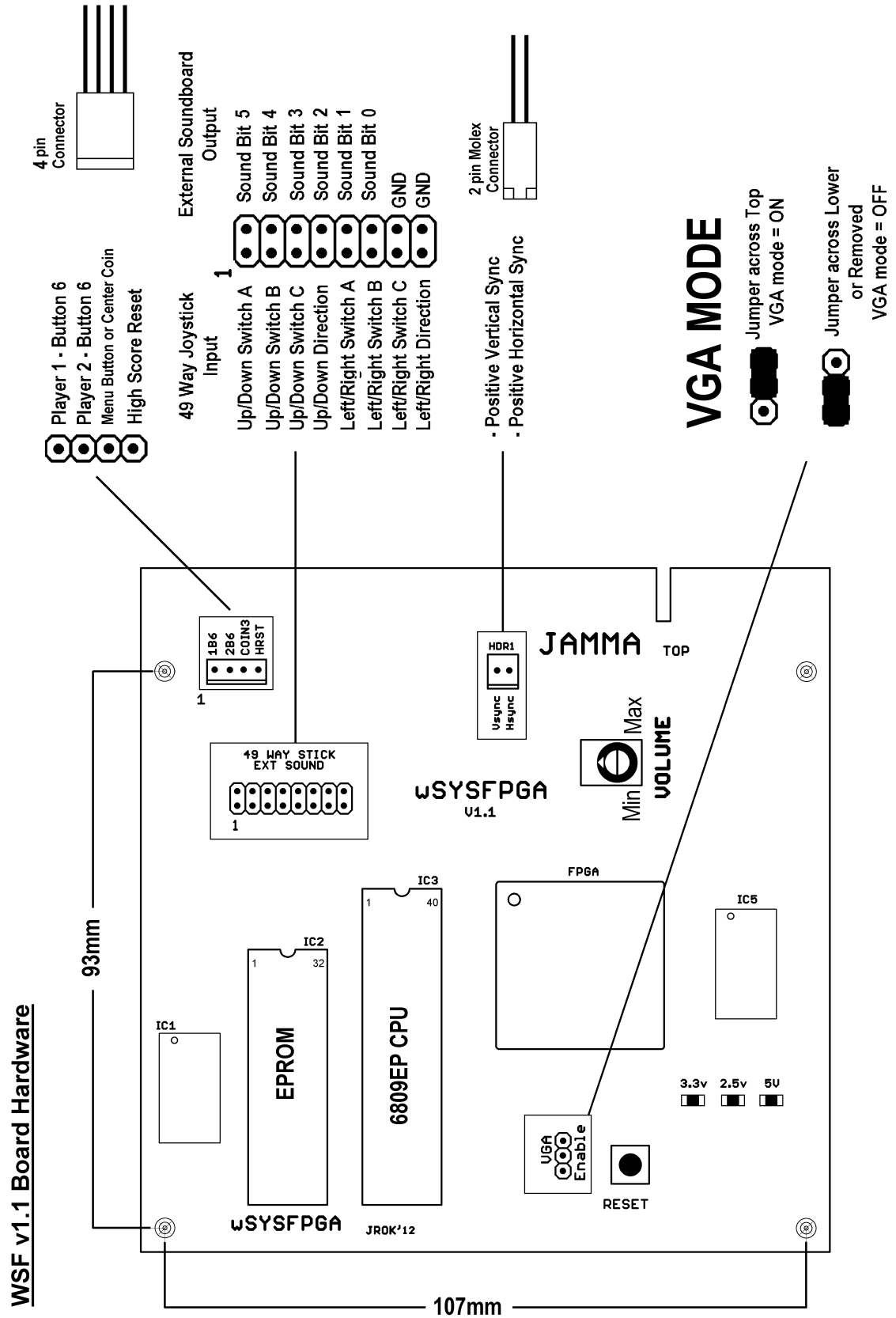
NOTE: Ensure the VGA enable is OFF when used in an original cabinet !

NOTE: Ensure the Keying Pin on the JAMMA adapter lines up with the board. **Do NOT use an unkeyed JAMMA adapter.**

WARNING

Plugging in an un-keyed JAMMA adapter the wrong way around could damage or DESTROY the board !

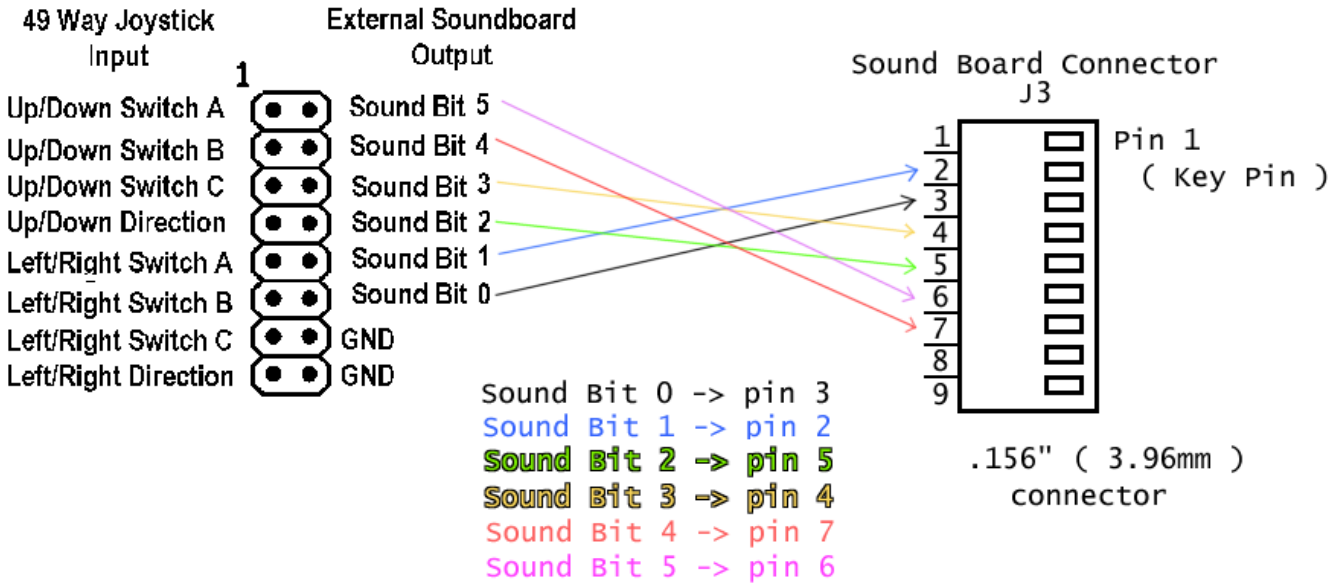
SYSFPGA v1.1 Board Layout & Connectors



External Soundboard Wiring

If an external soundboard is used the “EXT SOUND” header must be wired as in the diagram and connected to J3 on the external soundboard.

Use of an external soundboard will work with only one specific game, the soundboard will have sound ROM specific to a single game.



JAMMA Button Mapping

As each game uses different button mapping these tables shows which button controls the input for each game. The mappings are for the "**STANDARD**" input mode which can support Cocktail mode games:

Joystick controls are consistent across ALL games for up-down-left-right. Except for Defender/Stargate which do not use left & right and Joust which does not use Up/Down.

In Cocktail mode player 2 buttons are used as inputs for a second player, only for games which support cocktail play Defender, Stargate, Robotron.

Player 1 Button Inputs

Player 1 Button	Defender	Stargate	Robotron	Joust	Bubbles	Splat	Blaster	Sinistar
			BUTTONS Setting			**BUTTONS Setting**		
1	P1 Fire	P1 Fire	P1 Fire Up			P1 Throw Up	Thust 2	
2	P1 Thrust	P1 Thrust	P1 Fire Down			P1 Throw down	Thust 1	Fire
3	P1 Reverse	P1 Reverse	P1 Fire Left	P1 Flap		P1 Throw Left		
4	P1 Smartbomb	P1 Smartbomb	P1 Fire Right	P2 Flap		P1 Throw Right	Fire	Sinibomb
5	P1 Hyperspace	P1 Hyperspace						

Player 2 Button Inputs

Player 2 Button	Defender	Stargate	Robotron	Joust	Bubbles	Splat	Blaster	Sinistar
1	P2 Fire*	P2 Fire*	P2 Fire Up*			P2 Throw Up		
2	P2 Thrust*	P2 Thrust*	P2 Fire Down*			P2 Throw down		
3	P2 Reverse*	P2 Reverse*	P2 Fire Left*	P2 Flap		P2 Throw Left		
4	*P2 Smartbomb	*P2 Smartbomb	P2 Fire Right*			P2 Throw Right		
5	*P2 Hyperspace	*P2 Hyperspace						

Additional Buttons Header

Buttons used on the 4 Pin expansion header.

		Defender	Stargate
1	P1 Button 6		P1 Invisio
2	P2 Button 6		*P2 Invisio
3	Main Menu	Main Menu	Main Menu
4	High Score Reset	High Score Reset	High Score Reset

*buttons used only in cocktail mode

Multi-WMS JAMMA Button Mapping

When the option “BUTTON MAP SCHEME” is set to MULTI-WMS mode only JAMMA buttons Player 1 button 1 to button 3 and Player 2 button 1 to button 3 are used.

The mapping is shown in the following two tables.

Player 1 Buttons

JAMMA Player 1	DEFENDER	STARGATE	ROBOTRON	JOUST	BUBBLES	SPLAT	BLASTER	SINISTAR
Button 1	Reverse	Reverse		P1 Flap				
Button 2	Hyperspace	Hyperspace						
Button 3		Inviso					Blast	Sini Bomb

Player 2 Buttons

JAMMA Player 2	DEFENDER	STARGATE	ROBOTRON	JOUST	BUBBLES	SPLAT	BLASTER	SINISTAR
Button 1	Thrust	Thrust					Thrust	
Button 2	Fire	Fire						
Button 3	Smartbomb	Smartbomb		P2 Flap			Blast	Fire

NOTE:

DO NOT use multi-WMS mode for cocktail mode games.

Dual player mode in Splat is NOT supported in Multi-WMS mode.

Revision History

FPGA Revisions

0.0 - BETA release
1.0 - Initial release
1.1 - Sinistar joystick rotation option
1.2 - Start button ‘pressed/released’ option
1.3 - Menu or Center Coin option
1.4 - Additional game support v1.1 board hardware.
1.5 - Part # revision no functional changes - XC2S100 boards only

BOOT ROM Revisions

1.05 Initial Release (FPGA 1.0)
1.06 Sinistar Joystick rotation (FPGA 1.1)
1.07 Start Button option (FPGA 1.2)
1.08 Center Coin or Menu Button support (FPGA 1.3)
Screen saver enabled even when JAMMA Test input (Auto-Up) is in the ‘On’ position
1.09 Joust game checksum patch (FPGA 1.3)
1.10 v1.1 board hardware
Defender white ROM, Sinistar AMOA (FPGA 1.4 only)

Notes:

BOOT ROM functionality is tied to a FPGA version for support of the menu features. Using a later ROM revision with an earlier FPGA version will not enable new features.

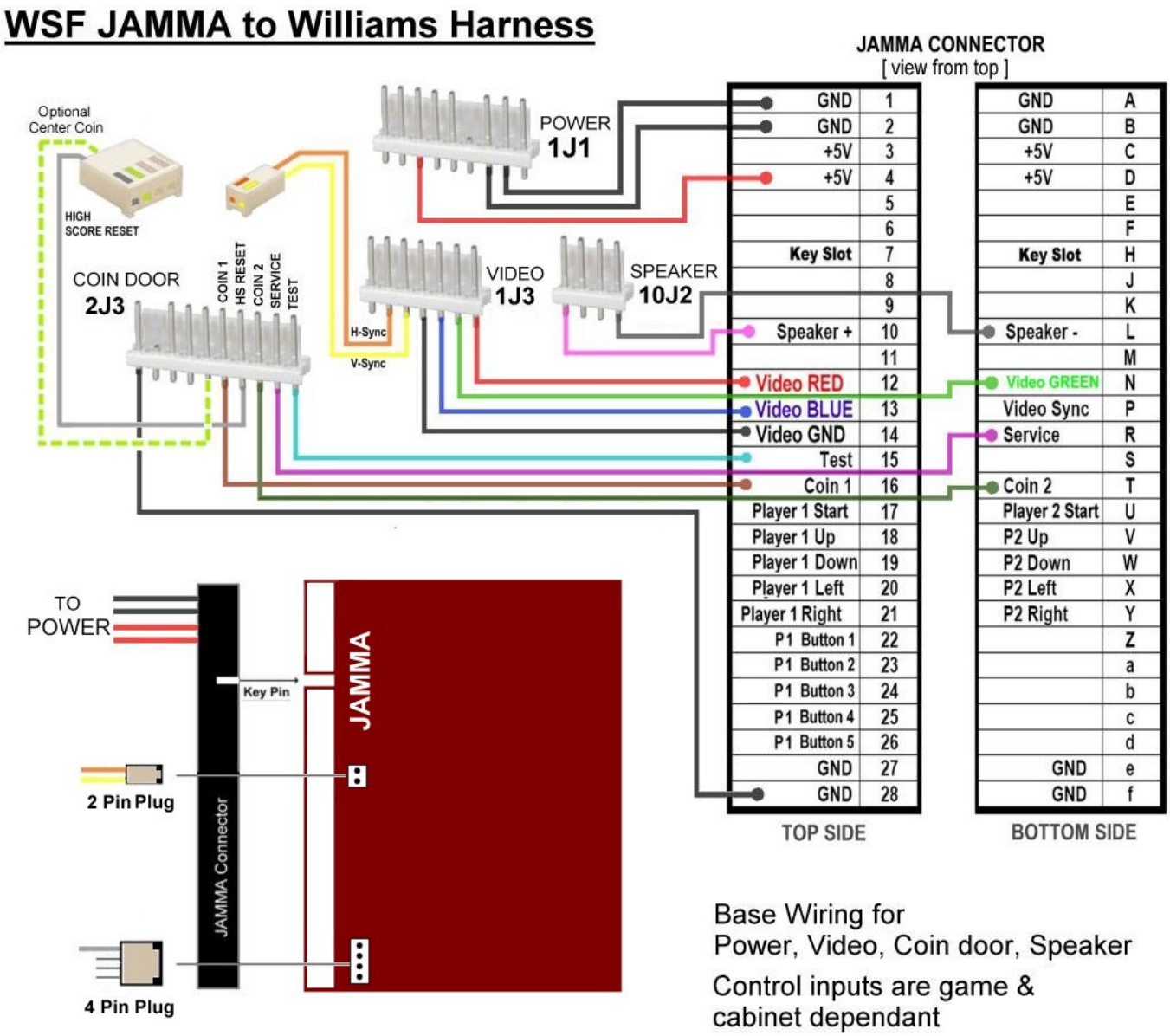
Newer ROM versions are backwards compatible with older FPGA revisions. However newer features will not be available to older FPGA versions.

Using V1.10 ROM in earlier FPGA version will disable unsupported features.

JAMMA Wiring Examples

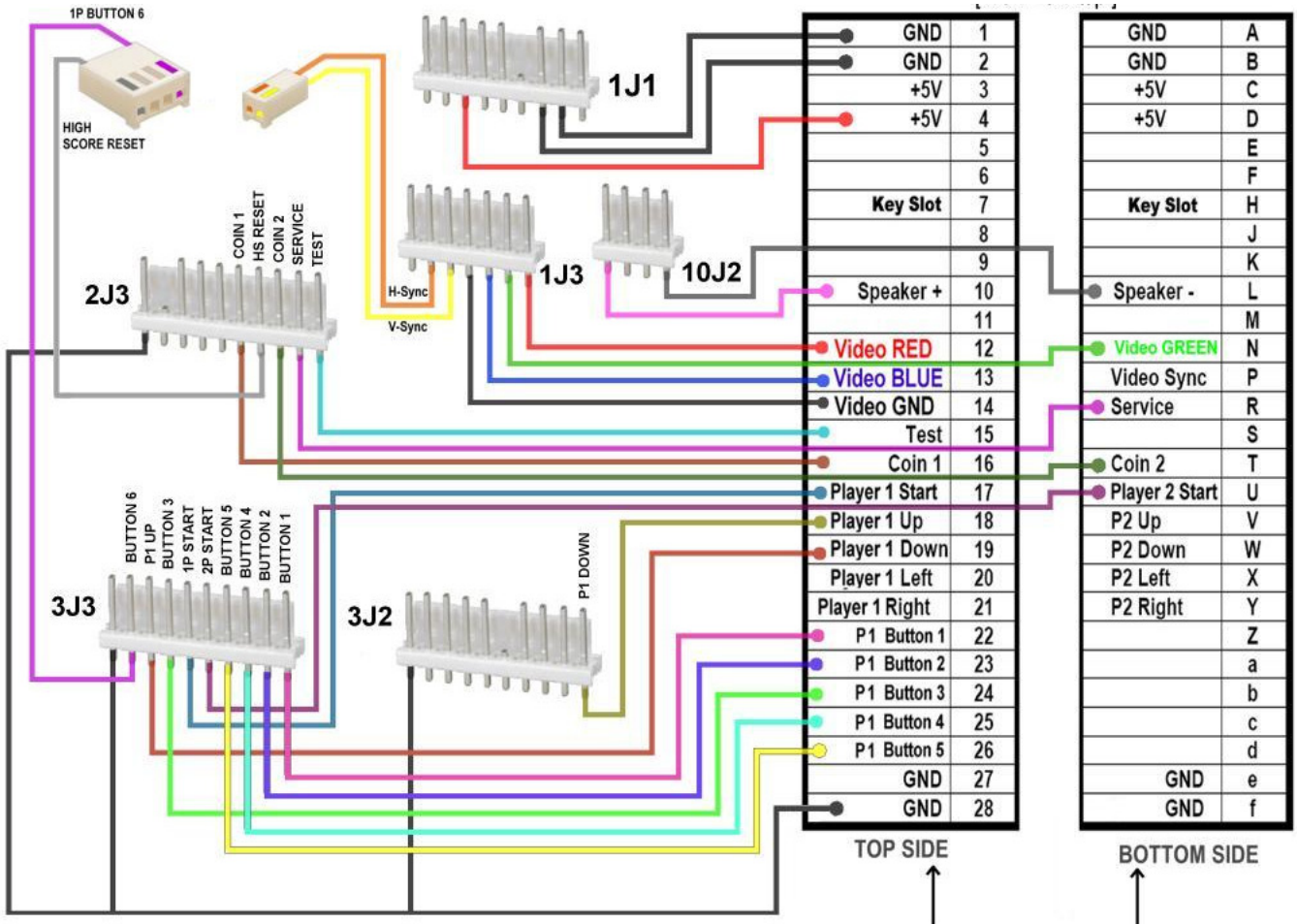
Base Wiring

Base wiring for a JAMMA board to original harness for Power, Video, Speaker and Coin Door.

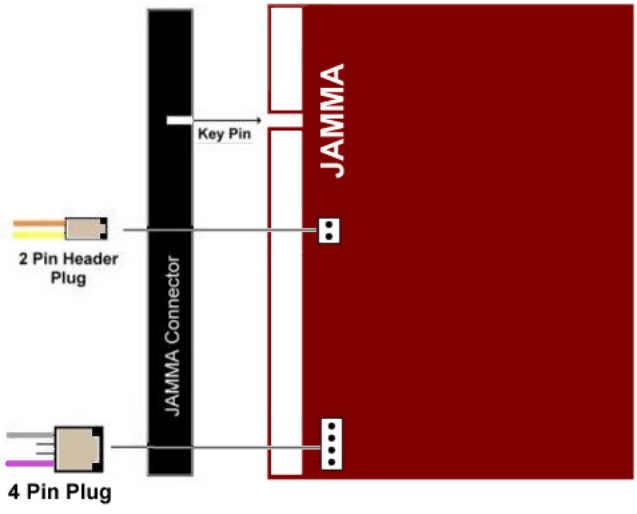


Control wiring would be separate and based on the game to be run.

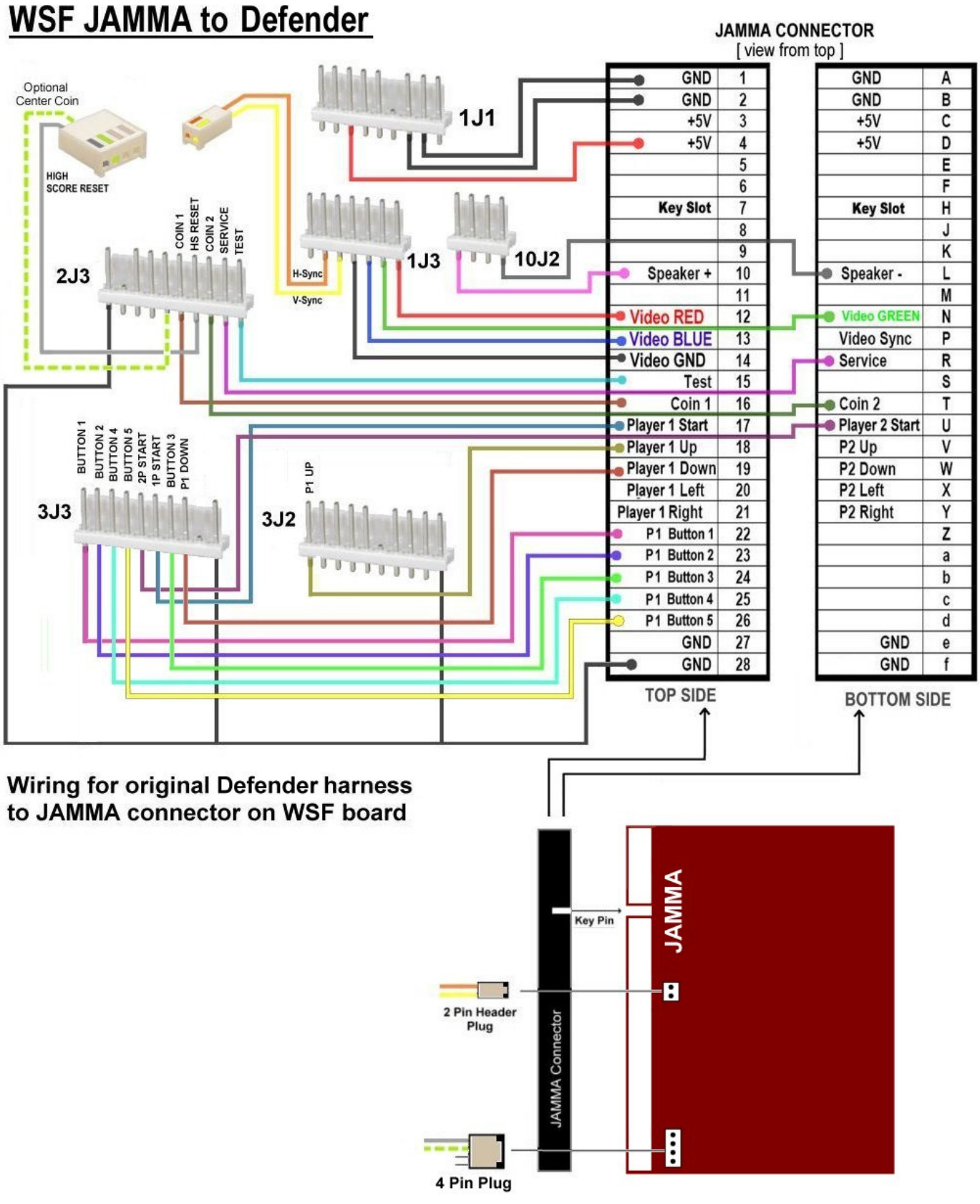
Stargate



Wiring for original stargate harness to JAMMA connector on WSF board

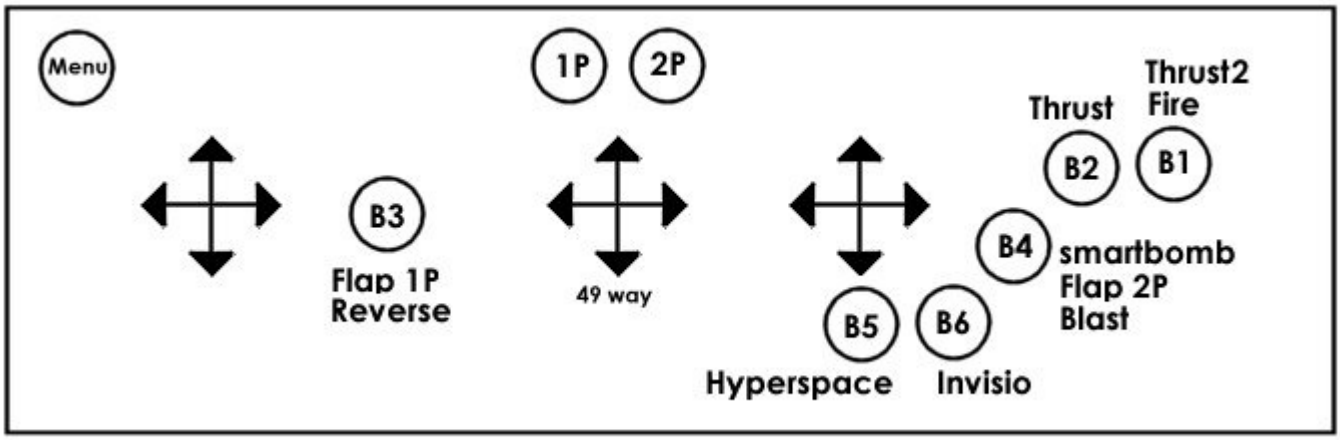


Defender


WSF JAMMA to Defender
JAMMA CONNECTOR
[view from top]
Optional
Center Coin
HIGH
SCORE RESET
1J1
1J3
10J2
2J3
COIN 1
HS RESET
COIN 2
SERVICE
TEST
H-Sync
V-Sync
3J3
BUTTON 1
BUTTON 2
BUTTON 4
BUTTON 5
2P START
1P START
BUTTON 3
P1 DOWN
3J2
P1 UP
GND 1
GND 2
+5V 3
+5V 4
Key Slot 7
Speaker + 10
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
P1 Button 1 22
P1 Button 2 23
P1 Button 3 24
P1 Button 4 25
P1 Button 5 26
GND 27
GND 28
GND A
GND B
+5V C
+5V D
Key Slot H
Speaker - L
Video GREEN N
Video Sync P
Service R
Coin 2 T
Player 2 Start U
P2 Up V
P2 Down W
P2 Left X
P2 Right Y
GND e
GND f
TOP SIDE
BOTTOM SIDE
Wiring for original Defender harness
to JAMMA connector on WSF board
Key Pin
JAMMA
JAMMA Connector
2 Pin Header
Plug
4 Pin Plug

Panel Button & Joystick Layout

For a multi-game panel the following layout could be used. The input mode would have to be set to standard and both Robotron and Splat would be set to Player 2 joystick input (“P2 Joystick”).



Note: This arrangement would not support Splat simultaneous Two Player mode. An additional two joysticks would need to be added.