

uVC[™]

User Documentation

Universal Video Converter (PC to Arcade)
Part Number 990-UVC-ADC-UCT-03B

Version 03B (Firmware v2.1)
Jul 23, 2005



Table of Contents

Table of Contents	2
!!! IMPORTANT NOTE !!!	3
Legal Statement	3
Package Contents	3
Overview	3
Board Image	4
Board Layout	5
Cooling	6
Power	6
Input Resolutions	6
Output Resolutions	7
DIP Switch Settings	8
LED Outputs	9
Logic Diagram	10
PCB Connectors	11
Trouble Shooting	12
Revision History	12
Contact Information	12

Universal
Video
Converter™

!!! IMPORTANT NOTE !!!

This documentation applies to the uVC for the combination of PCB version 02 and firmware version 2.1 ONLY. If you have a different version of the PCB or firmware, please refer to the relevant documentation (see 'Revision History' on page 12).

The pinouts for the video output (J7) were different in prototype PCBs (version 00). In all subsequent PCBs produced, the output video matches the **reverse** of the pinouts on most monitors (R,G,B,Gnd,Vsync,C/Hsync). The version of the PCB is given on the PCB serial number starting 990-uVCxxxxxx-xx; the last two digits after the final dash are the PCB version. If you have a uVC with PCB version 00, please note that you must swap the C/H Sync and Video Ground pins on the cable to your arcade monitor.

Legal Statement

The uVC PCB is copyright © & trademark ™ 2003-05 by UltraCade Technologies, All Rights Reserved. The uVC PCB and algorithms are Patent Pending. uVC is a trademark of UltraCade Technologies.

Package Contents

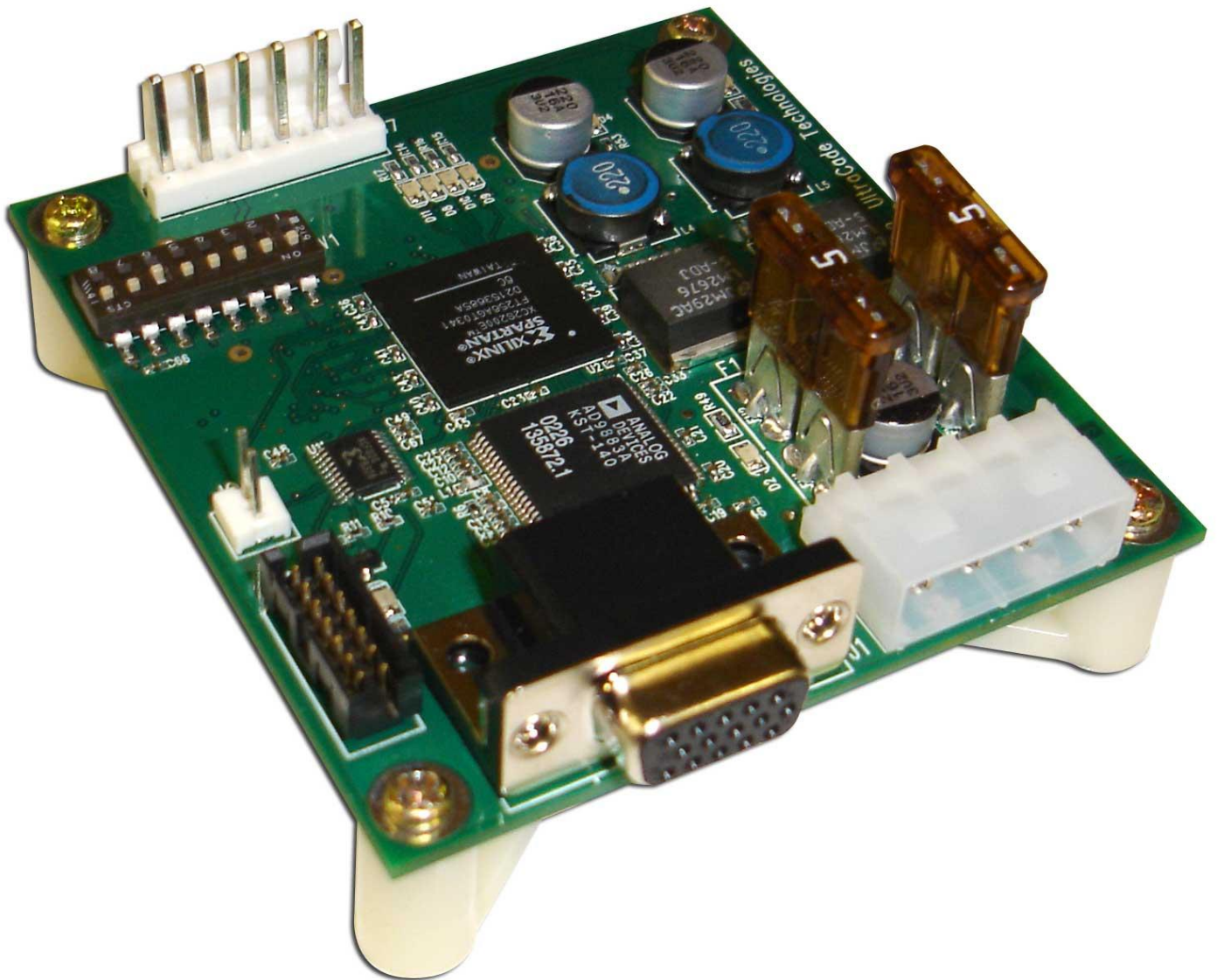
- User Documentation
- Video Cable (VGA) 3ft
- Power Extension Cable (HDD) 2ft
- uVC PCB
- Video Cable (Arcade Monitor) 4ft
- Free Gift Offer Card

Overview

The uVC video converter is part of UltraCade Technologies' portfolio of custom PCBs focused at the arcade market. For more information and a full list of current products, please go to www.ultracade.com.

The uVC is designed to be a very simple board to use, while being diverse enough to support an application area with many standards. The board has only one function, to allow the display of PC based games on older arcade style monitors. The board is an external device that requires no modification to the software running on the PC. It will handle one of three input resolutions (640x480, 800x600 or 1024x768) with a vertical refresh rate of 60Hz and output to one of two user selectable output modes (640x240@15.72KHz or 640x384@24.9KHz). The coin-op monitors are RGB non-interlaced and run at 60Hz. The input of the board is a DBH-15 VGA analog VGA connector and the output is a 156mil Molex connector with pins for R, G, B, Ground and Syncs.

Board Image



Board Layout

SW8 HV/C Sync
 Off = Separate H & V Sync
 On = Composite Sync

SW7 V Sync Polarity
 Off = Neg (composite Hi)
 On = Pos (composite Lo)

SW6 H Sync Polarity
 Off = Negative
 On = Positive

SW5:4 Input Resolution
 Off/Off = XGA
 Off/On = SVGA
 On/Off = VGA
 On/On = Auto Detect

SW3 Output Resolution
 Off = EGA
 On = CGA

SW2 Output Delay
 Off = 16 lines
 On = 8 lines

SW1 Splash Screen
 Off = Black (no splash)
 On = Splash when sync

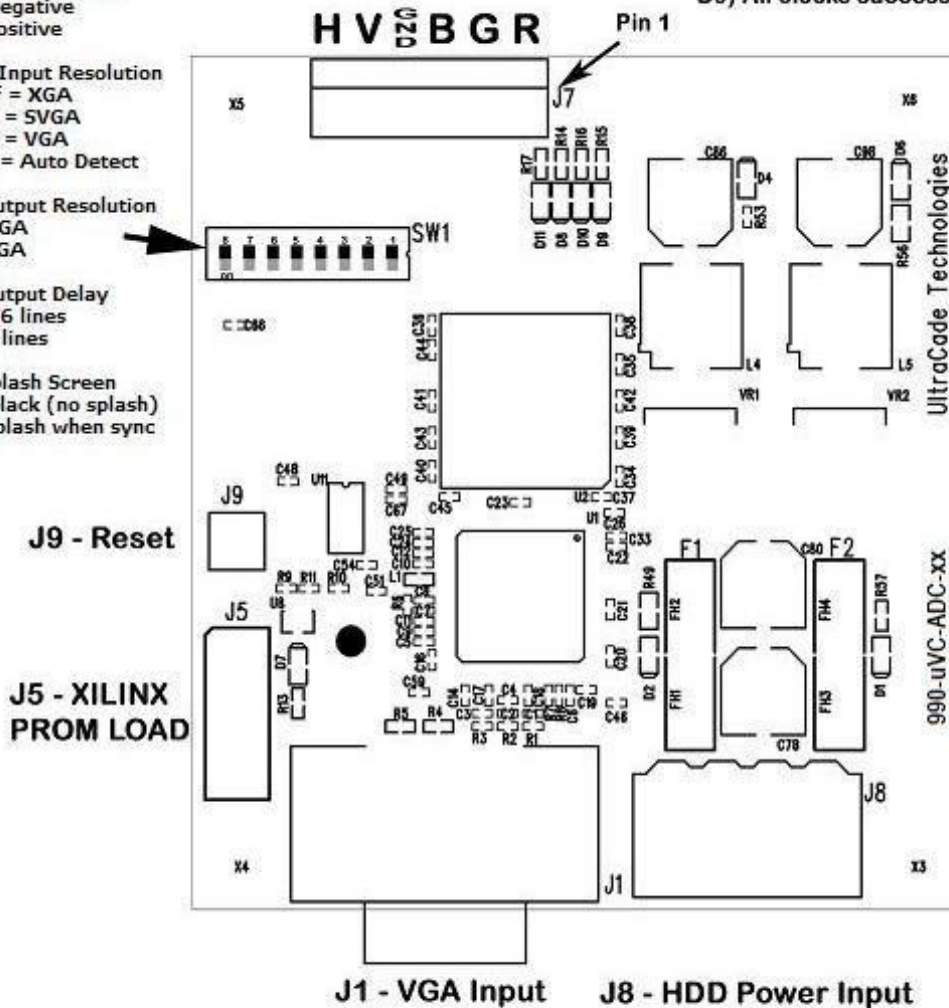
J7 - Video Output

- 1) R - Red
- 2) G - Green
- 3) B - Blue
- 4) GND - Video Ground
- 5) V - Vsync
- 6) H - Hsync / Composite

Status LEDs

D11 & D8 Input Resolution

- o 00: XGA
- o 01: SVGA
- o 10: VGA
- o 11: Input not Detected
- D10) ADC loaded successfully
- D9) All clocks successfully locked in FPGA



Cooling

The board and chips use passive cooling. No heat sinks or fans are required. The board can perform in an environment up to 60 degrees Celsius.

Power

The board has a standard PC Hard Drive power connector, which brings in +12vdc, +5vdc, and Ground. The board contains onboard power regulators which will take the +12vdc and convert it to 3.3v and 1.8v needed in the logic. The +5vdc is passed onto the onboard 5v components.

Input Resolutions

The uVC board supports multiple input resolutions

- Multiple PC VGA Input Formats

- Input Resolutions

- VGA: 640x480

- SVGA: 800x600

- XGA: 1024x768

- Input Frequency

- Vertical 60Hz

Universal
Video
Converter™

Output Resolutions

The uVC board supports multiple output resolutions

- Mode 1 - Low Resolution - CGA - (std resolution)
 - Horizontal Pixel Clock 73.626 ns
 - Horizontal Active Pixels 640 pixels 47.121 μ s
 - Horizontal Total Pixels 864 pixels 63.613 μ s
 - Horizontal Front Porch 64 pixels 4.712 μ s
 - Horizontal Sync Width 60 pixels 4.418 μ s
 - Horizontal Back Porch 100 pixels 7.363 μ s
 - Horizontal Scan Rate 15.72 KHz 63.613 μ s
 - Vertical Line Clock 63.613 μ s
 - Vertical Active Lines 240 lines 15.267 ms
 - Vertical Total Lines 262 lines 16.667 ms
 - Vertical Front Porch* 3 lines 0.318 ms
 - Vertical Sync Width 3 lines 0.191 ms
 - Vertical Back Porch 14 lines 0.891 ms
 - Vertical Refresh Rate 60 Hz 16.667 ms
- Mode 2 - Med Resolution - EGA
 - Horizontal Pixel Clock 50.080ns
 - Horizontal Active Pixels 640 pixels 32.051 μ s
 - Horizontal Total Pixels 800 pixels 40.064 μ s
 - Horizontal Front Porch 16 pixels 0.801 μ s
 - Horizontal Sync Width 80 pixels 4.006 μ s
 - Horizontal Back Porch 64 pixels 3.205 μ s
 - Horizontal Scan Rate 24.96 KHz 40.064 μ s
 - Vertical Line Clock 40.064 μ s
 - Vertical Active Lines 384 lines 15.385 ms
 - Vertical Total Lines 416 lines 16.667 ms
 - Vertical Front Porch* 5 lines 0.200 ms
 - Vertical Sync Width 5 lines 0.200 ms
 - Vertical Back Porch 22 lines 0.881 ms
 - Vertical Refresh Rate 60 Hz 16.667 ms

*Vertical Front Porch Timing is variable based on input frequency

DIP Switch Settings

8 – Sync Output Signal

- On = Composite
- *Off = HV Sync Separate

7 – Vertical Sync Polarity

- Separate Sync
 - *On = Positive
 - Off = Negative
- Composite Sync
 - *On = Always Low
 - Off = Always Hi

6 – Horizontal/Composite Sync Polarity

- *On = Positive
- Off = Negative

5:4 – Input Resolution

- *On/On = Auto Detect
- On/Off=VGA (640x480)
- Off/On=SVGA (800x600)
- Off/Off=XGA (1024x768)

3 – Output Display

- *On = Low Res (CGA) 15.75KHz
- Off = Med Res (EGA) 24.5KHz

2 – Output Delay Scan Lines (if tearing appears on the bottom of the screen, increase the delay lines, if the top of the screen is wrapped around to the bottom, decrease the delay lines)

- *On = 8
- Off = 16

1 – Splash Screen Display

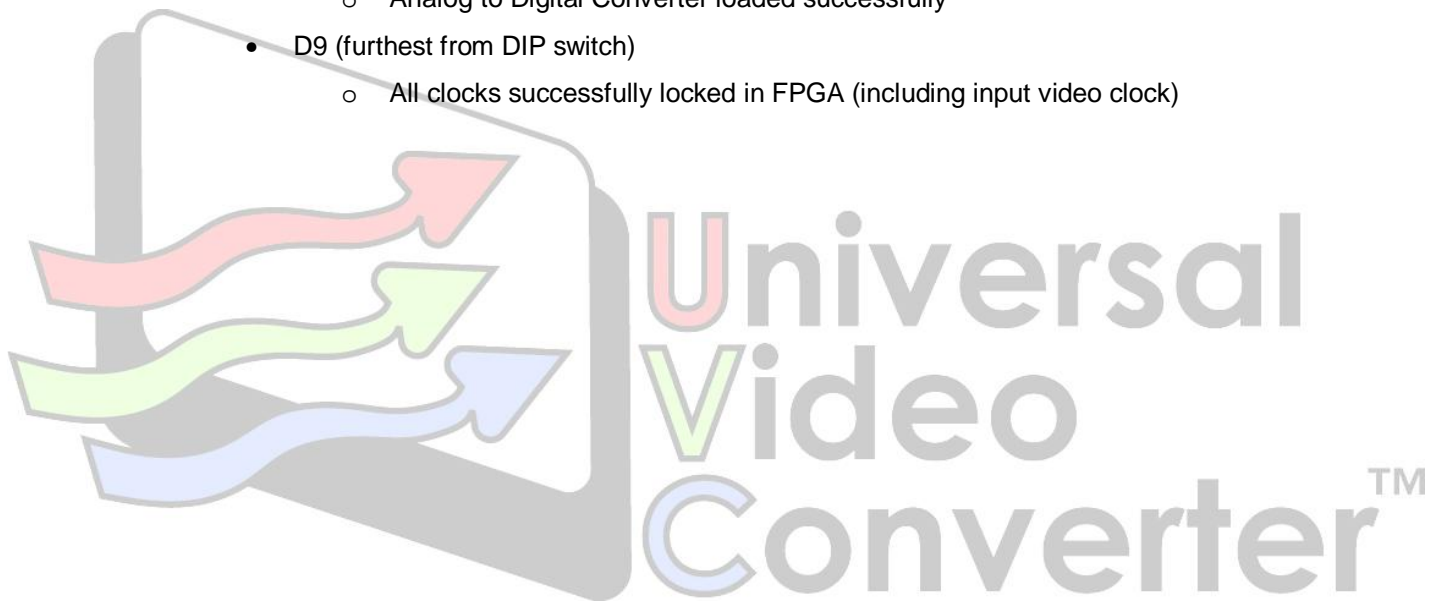
- *On = When the uVC is synchronizing, the splash screen is displayed
- Off = When the uVC is synchronizing, a black screen is displayed

*denotes default settings

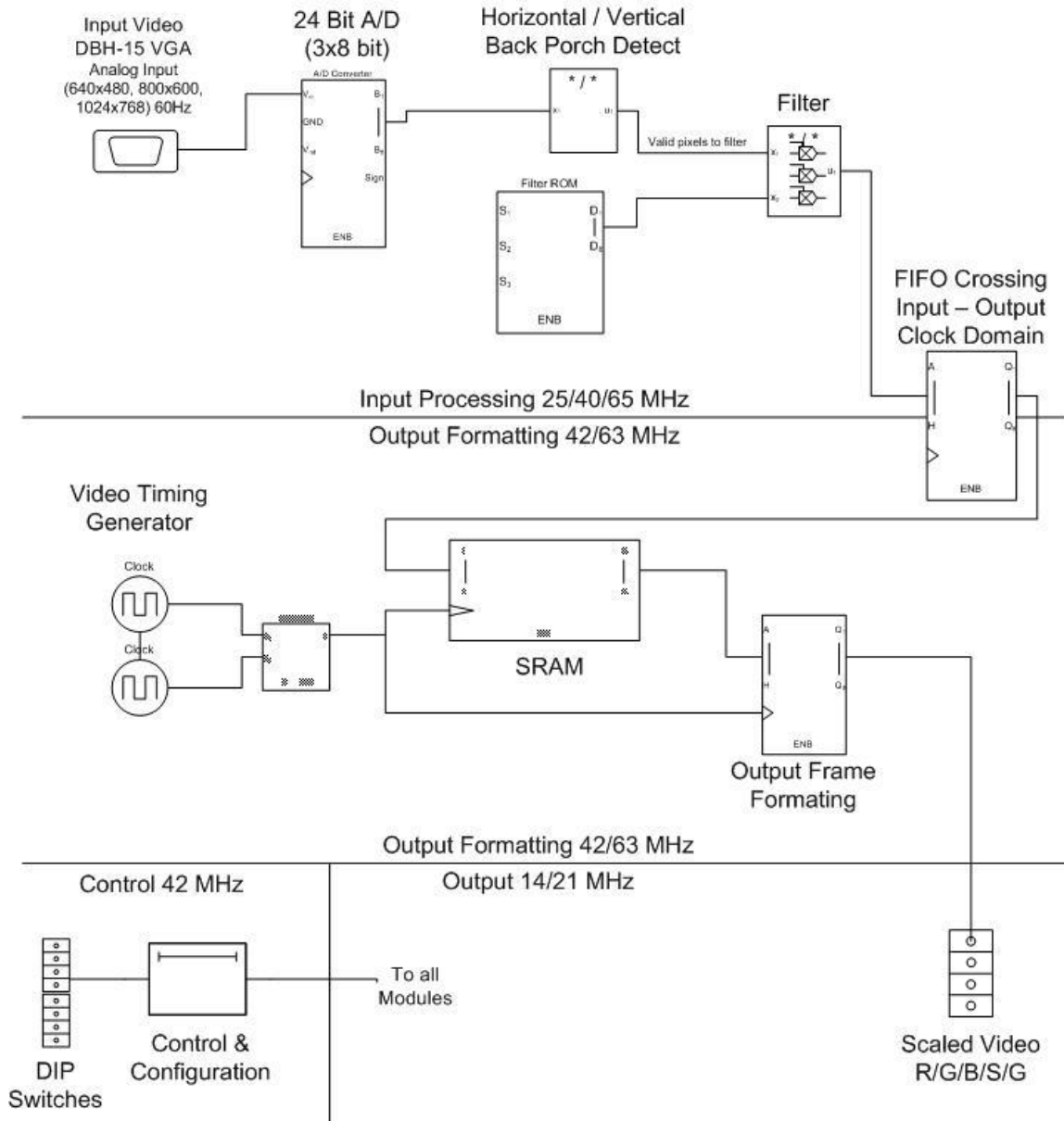
LED Outputs

There are four (4) LED's used for status display on board:

- D11 / D8 (closest to DIP switch)
 - Input resolution
 - 00: XGA (1024x768)
 - 01: SVGA (800x600)
 - 10: VGA (640x480)
 - 11: Input not Detected
- D10
 - Analog to Digital Converter loaded successfully
- D9 (furthest from DIP switch)
 - All clocks successfully locked in FPGA (including input video clock)



Logic Diagram



PCB Connectors

This section provides the part numbers and pin assignments for the mating connectors to all of the connectors on the PCB.

PCB Ref	PCB Connector Description	Required Mate Description	Parts Required	Supplier	Part Number	Inc. in packet
J1	Video input	Male, D-Sub 15-pin Standard PC video	Std PC video 3ft Extension Cable	UltraCade Assmann	115-VGA3MM-CBL AK322-2	yes no
J2	Manual Src Sel	<removed>	n/a	n/a	n/a	no
J3	Manual Out Sel	<removed>	n/a	n/a	n/a	no
J4	Debug Port	<removed>	n/a	n/a	n/a	no
J5	Debug Port	Factory use only	none	n/a	n/a	no
J6	Debug Select	<removed>	n/a	n/a	n/a	no
J7	Video output	Female, 6-pin 156mil header Pin1 - Red Pin2 - Green Pin3 - Blue Pin4 - Ground Pin5 - V-sync Pin6 - C/H-sync	1 x Custom-to std 4ft 1 x Custom straight 4ft OR 2 x Female housing 12 x Female terminal 6 x Wire	UltraCade UltraCade Molex Molex {any}	115-UVCMIR-CBL 115-UVCSTR-CBL 09-50-8061 08-50-0106 n/a	yes no no no no
J8	Power - PC HDD	Female PC HDD connector Pin1 - +12vdc Pin2 - Ground Pin3 - Ground Pin4 - +5vdc	1 x Extension 2ft OR 1 x Female housing 4 x Female terminal 4 x Wire 1 x Male housing 4 x Male terminal	UltraCade AMP AMP {any} AMP AMP	115-HDDPWR-CBL 1-480424-0 60617-1 n/a 1-480426-0 61618-1	yes no no no no no
J9	Reset switch	Female - 2-pin 100mil header Pin1 - Reset Pin2 - Ground	1 x Custom cable 2ft OR 1 x Female housing 2 x Female terminal	UltraCade Molex Molex	115-2WRESET-CBL 22-01-2027 08-50-0108	no no no

Trouble Shooting

The uVC should work right out of the box. If you are having trouble getting an image, refer to the section below that applies.

No image on the monitor at all:

- Verify that the PCB is powered (all 4 LEDs near the fuses illuminated)
- Verify that the PCB is running (at least one of the LEDs near the output Molex (J7) is illuminated)
- Verify that the splash screen is enabled with DIP switch 1
- Verify that the monitor is powered
- Verify that you have the proper video cable attached correctly to the monitor
NOTE: if you have a v00 or v01 PCB (firmware 1.xx), make sure that the H-sync and GND pins are correctly connected; they changed on the v02 PCBs and later (firmware 2.xx and later)

Monitor always displays the default “splash” screen

- Ensure the input has a vertical refresh rate of 60Hz
- Ensure the input is either VGA (640x480), SVGA (800x600) or XGA (1024x768)
- If the splash screen says there is no input detected, check there is actual input data

Image on the monitor keeps cycling:

- Verify that you have the proper output mode with DIP switch 3
- Change the sync signals from composite to separate (or vice versa) with DIP switch 8
- Change the sync signals from positive to negative (or vice versa) with DIP switches 6 and 7

Image on monitor is stable but top of screen is displayed on bottom, or bottom of screen is “torn”

- Change the input to output delay with DIP switch 2

Image is good, but intermittently goes back to the “splash” screen

- Some consoles have been found to have unstable synchronization; ensure you have v2.1 of the firmware or later (version is shown on splash screen)

Revision History

- Version 00A. PCB version 00. Firmware version 0.18:
 - 10/10/2003, DRF. Original version.
- Version 00B. PCB version 00. Firmware version 0.20:
 - 10/13/2003, DRF. Input Horizontal Timing. Addition of new DIP switch functions on chart. Correction to input resolution switch notes. Output Timing update. Power Update.



- Version 00C. PCB version 00. Firmware version 1.1:
 - 10/14/2003, DRF. Update to remove use of jumpers for mode selection. All settings via DIP switch. Addition of polarity selection for output H & V Syncs.
- Version 00D. PCB version 00. Firmware version 1.3:
 - 10/16/2003, DRF. Automatic input resolution detection. Fix tear on SVGA -> CGA.
- Version 00A. PCB version 00. Firmware version 1.81:
 - 11/6/2003, DRF. Updated logic diagram. Updated DIP switch settings. Added logo screen when switching modes or no input detected.
- Version 02A. PCB version 02. Firmware version 2.00:
 - 11/26/2003, DRF. Input and output resolution displayed while syncing. PCB updates include: unused LED removal; unused pads for non-stuffed parts removed; reset changed from button to 2-pin header; video output pins remapped to reverse of standard monitor input pins.
 - 12/14/2003, DRF. Added Troubleshooting Section.
 - 1/23/2004, DRF. Fixed J7 in document's wiring diagram.
- Version 03A. PCB version 03. Firmware version 2.04:
 - 7/01/2004, DT. PCB allows multiple clock footprints. Firmware has increased functionality.
- Version 03B. PCB version 03. Firmware version 2.1:
 - 5/11/2005, DT. Fix intermittent sync problems from some consoles and DIP switch 1 allows the splash screen to be disabled.
 - 7/23/2005, DT. User document reformatted to UltraCade standards.

Contact Information

UltraCade Technologies
1281 Wayne Avenue
San Jose, CA 95131
Ph: (408) 436-8885 Fax: (408) 715-6183
WEB: <http://www.ultracade.com> E-MAIL: support@ultracade.com

Document Number: 040-UVCMANU-UCT