OPERATIONS MANUAL
PCM-FPVGA

NOTE: *This manual has been designed and created for use as part of the WinSystems' Technical Manuals CD and/or the WinSystems' website. If this manual or any portion of the manual is downloaded, copied or emailed, the links to additional information (i.e. software, cable drawings) will be inoperable.*

REVISION HISTORY
P/N 403-0234-000

ECO Number	Date Code	Rev Level
ORIGINATED	951212	C
95-125	951218	D
_____	960102	D1
00-08	082500	D2

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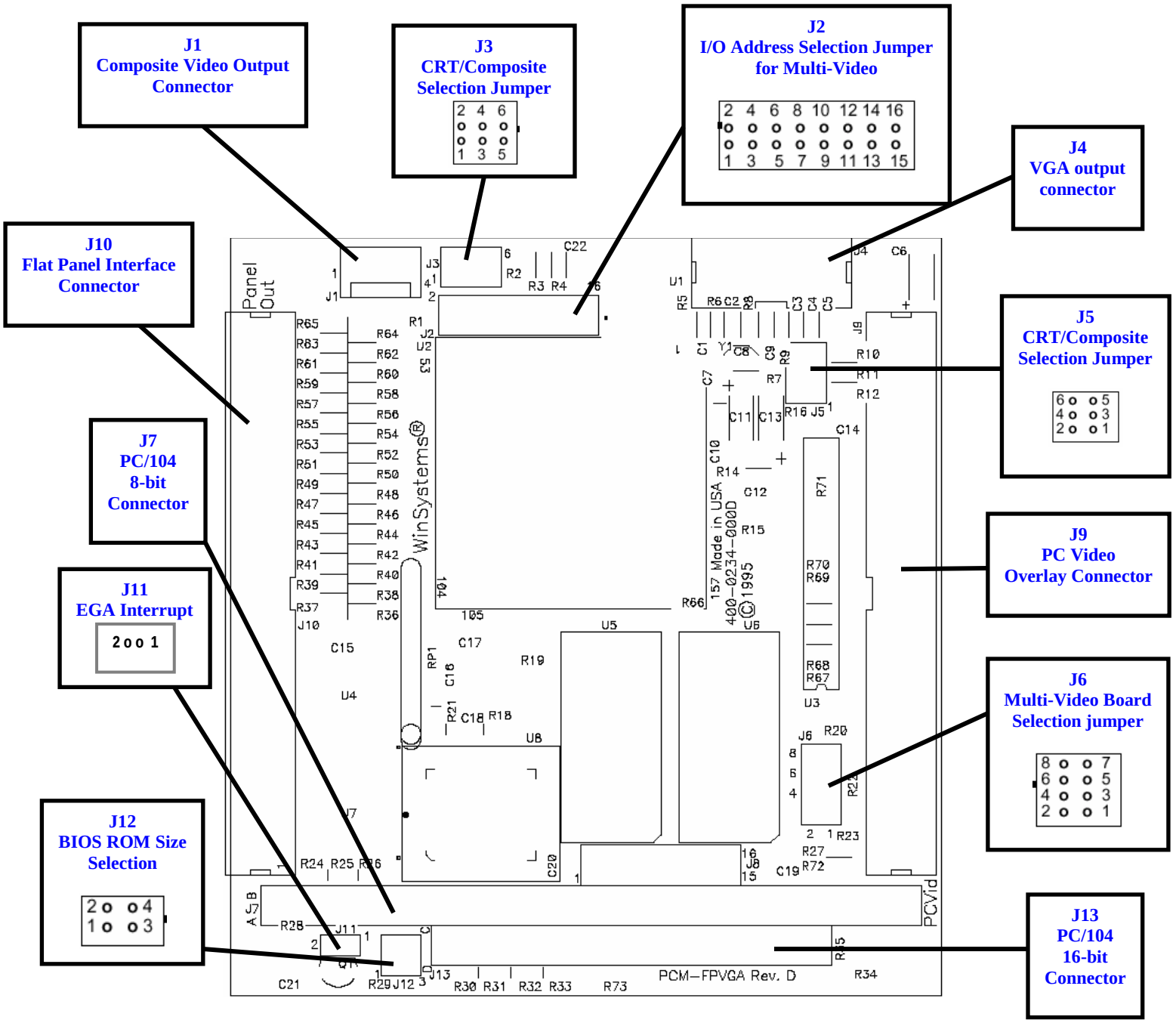
Visual Index – Quick Reference

For the convenience of the user, a copy of the Visual Index has been provided with direct links to connector and jumper configuration data.



1 General Information

1.1 Features

- PC/104 CRT/Flat Panel VGA Controller
- Uses C & T 65540 High Performance Video Controller
- Supports CRT outputs of up to 1024 X 768 with 256 colors
- Supports Flat Panel resolutions up to 1024 X 768
- High Performance zero wait-state writes
- Supports True-Color and Hi-color displays of up to 640 X 480
- Optional Multi-Video Support
- Optional NTSC Video output
- Optional PC Video overlay capability
- SMARTMAP intelligent color to gray scale conversion
- Full IBM VGA compatible
- Optional FPA adapter modules for Flat Panel use

1.2 General Description

The PCM-FPVGA is a third generation CRT/Flat Panel VGA controller module. It supports standard VGA CRT output as well as a variety of Flat Panel Displays using optional Flat Panel Adapter (FPA) modules. Other options include Multi-Video display capability, PC Video Input, and NTSC video output. The PCM-FPVGA uses the Chips and Technologies 6554X series of high performance VGA controllers. This CHIPS™ controller supports standard and Super-VGA modes as well as Color and Monochrome panels with 8, 9, 12, 15, 16, 18, and 24-bit data interfaces. WinSystems provides flat panel support for the PCM-FPVGA through a series of FPA (Flat Panel Adapter) modules. Contact your WinSystems Applications Engineer for the most current list of available FPAs and supported panels.

1.3 Specifications

1.3.1 Electrical

Bus interface : PC/104 16-bit or PC/104 8-Bit bus

VCC : +5V +-5% @ 300 mA w/CRT and 512KB video RAM

VCC1 : +12V +-5% FPA Modules Only

VCC2 : -12V +-5% FPA Modules Only

1.3.2 Mechanical

Dimensions : 3.6" X 3.8" X 0.6"

PC Board : FR4 Epoxy Glass with 4 signal layers and 2 power planes with screened component legend and plated through holes.

Jumpers : 0.025" square posts on 0.10" centers

CRT Interface : 10 Pin RN type IDH-10-LP

Panel Interface : 50 Pin RN type IDH-50-LP

PC Video Input : 50 Pin RN type IDH-50-LP

Composite Video output: Molex 4 Pin type 22-01-1043

1.3.3 Environmental

Operating Temperature : 0° to 70° C

Non-Condensing relative humidity : 5% to 95%

2 PCM-FPVGA TECHNICAL REFERENCE

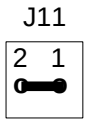
2.1 Introduction

The PCM-FPVGA is a fully IBM VGA compatible display module capable of CRT or Flat Panel output. Optional FPA (Flat Panel Adapter) modules allow for easy interface to a variety of color and monochrome Flat Panel displays. Details regarding interfacing to specific Flat Panels is not provided in this manual but should be referenced in the documentation accompanying the FPA module. Attempted connection to any flat panel not directly supported by a WinSystems FPA module is at the user's risk and extreme care should be exercised to avoid damaging or destroying the panel. To request assistance with the PCM-FPVGA or the WinSystems FPA modules contact the Technical Support Group at (817) 274-7553 between 8AM and 5PM Central Time. Technical support can also be requested via mail or by FAX at (817) 548-1358.

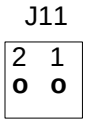
HAZARD WARNING: LCD panels can require a high voltage for the panel backlight. This high-frequency voltage can exceed 1000 volts and can present a shock hazard. Care should be taken when wiring or handling the inverter output. To avoid danger of shock and to avoid damaging fragile and expensive panels, make all connection changes with the power removed.

2.2 Interrupt Routing

To maintain compatibility with older EGA software a retrace interrupt (IRQ2) is available by placing a jumper on J11. This jumper block is shipped un-jumpered which is compatible with all modern VGA video modes.

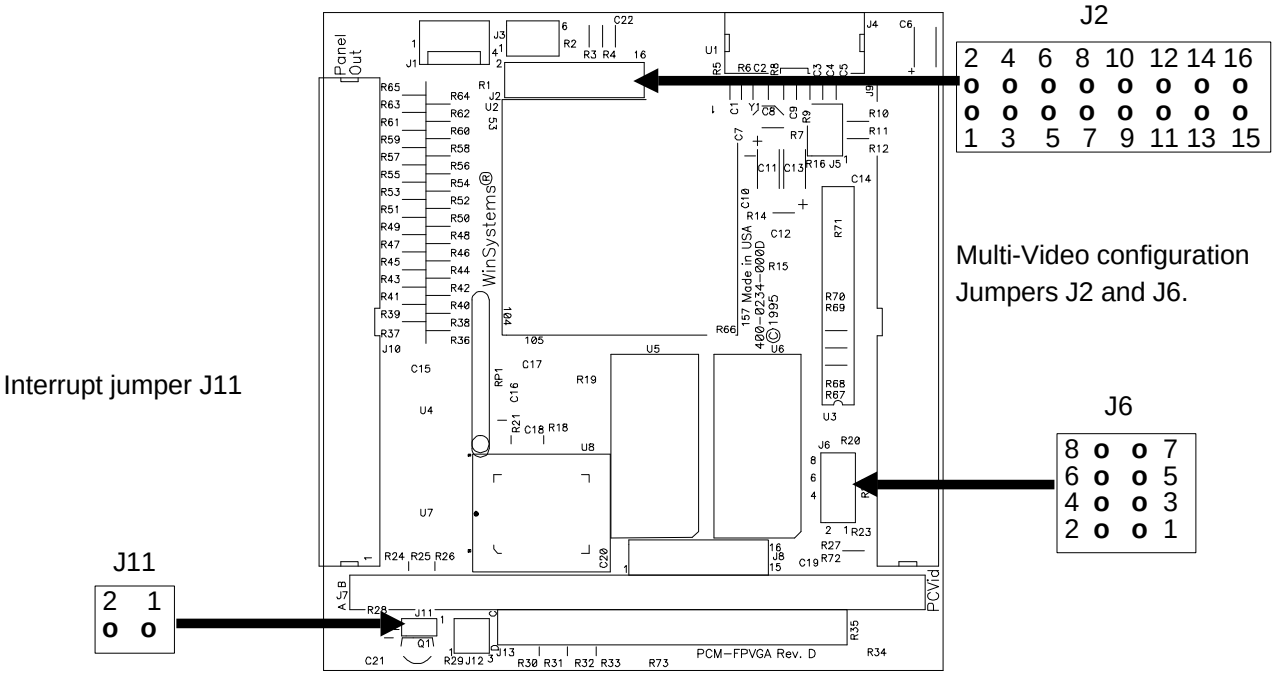


EGA Interrupt Enabled



EGA Interrupt Disabled

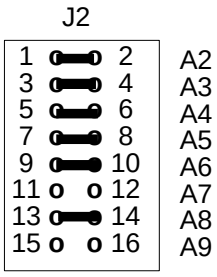
2.3 Multi-Video Configuration



2.3.1 I/O Address Select

When the multi-video option is populated, up to 15 PCM-FPVGA boards may be simultaneously installed and individually controlled by software. The I/O address of the board select register is controlled by the jumper block at J2. All boards installed must be set to the same I/O address. The address is selected as shown below :

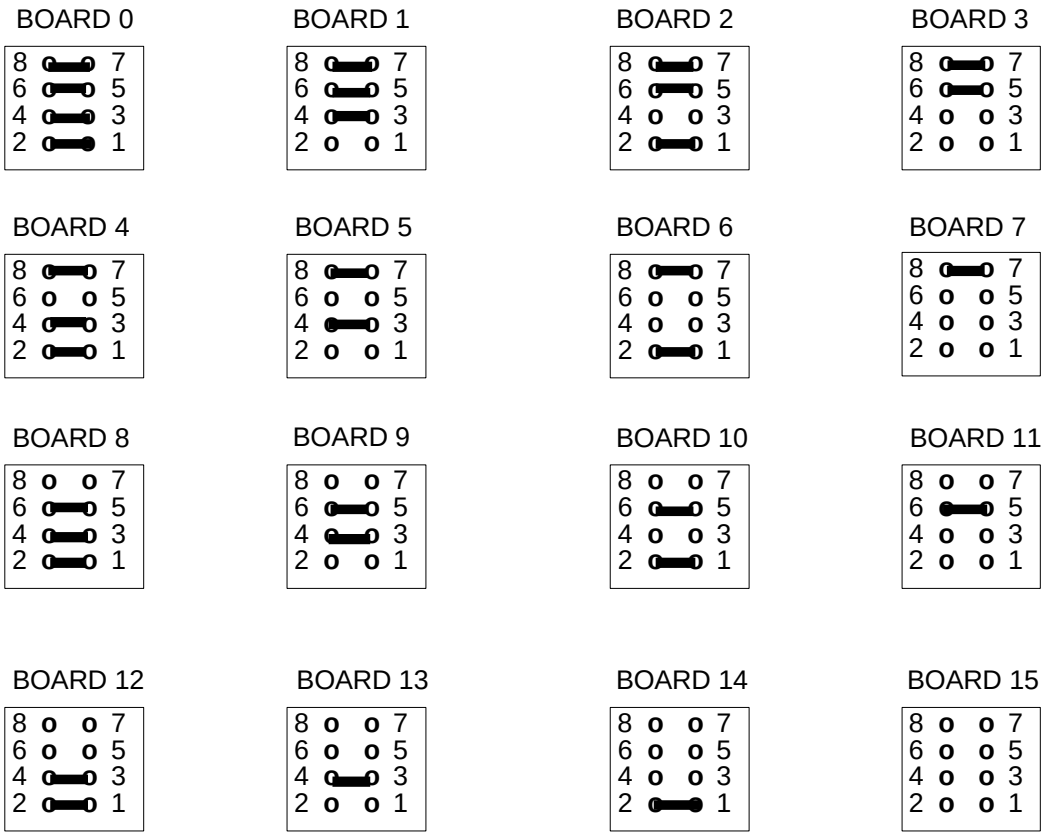
A jumper present = 0
No jumper = 1



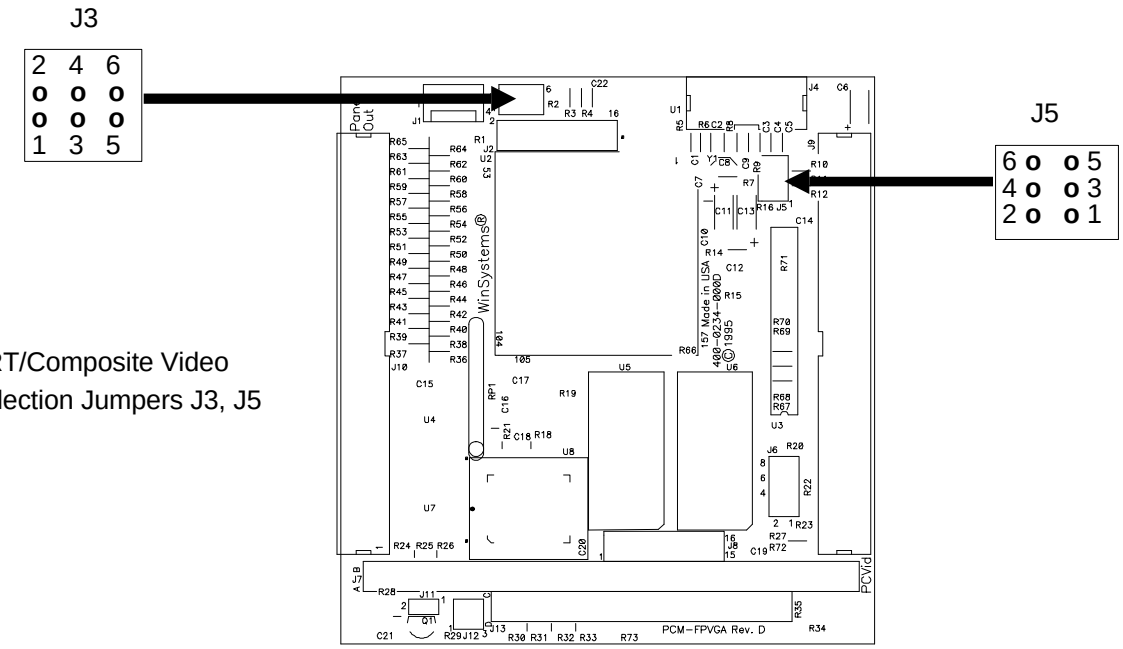
Sample Jumpering for 280H

2.3.2 Board ID Select

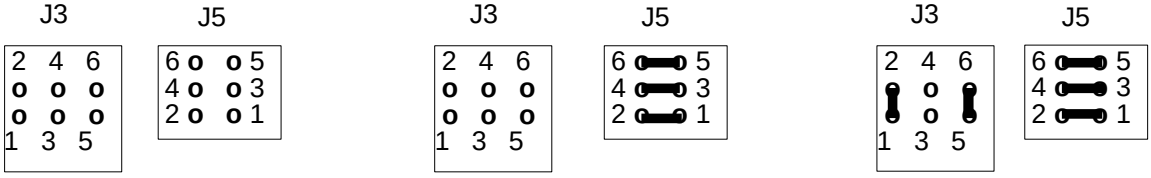
Up to 15 boards can be installed into a single system. Each board must be jumpered with a unique board ID number between 1 and 15. This board ID is selected with the jumper block at J6. When using only a single board, select board number 0 which totally disables the multi-board decoding and allows use of the board in a stand-alone manner. When multiple boards are used, ID numbers must be assigned beginning with 1 and proceeding sequentially. The jumpering detail for J6 is shown below :



2.4 CRT/Composite Video Output Selection



The PCM-FPVGA can be optionally equipped for composite video output from the J1 connector. This output or the CRT output must be selected by jumper blocks at J3 and J5 as shown below :

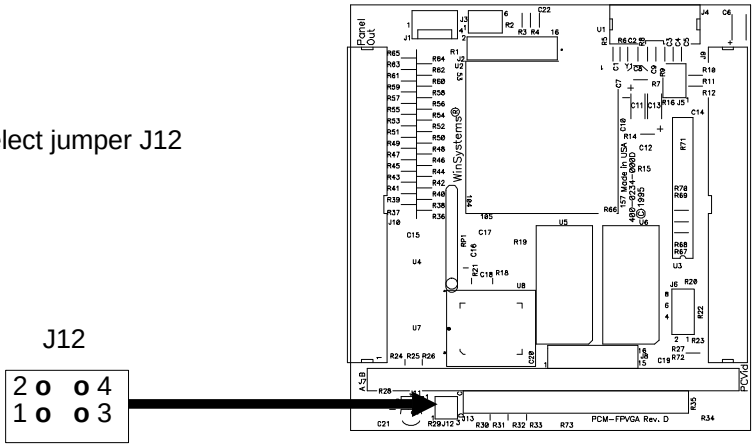


Composite video output is available in two basic formats. Composite or S-Video. The connector at J1 provides access to these signals as shown below :

NOTE : All of the composite video output modes require the use of a software driver to place the controller into the correct mode. At the time this manual was created this driver was not yet available from CHIPS™. Contact your WinSystems Applications Engineer to check on the status of this option if you need composite video support.

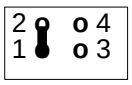
2.5 BIOS ROM Type Selection

BIOS ROM type select jumper J12



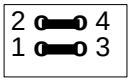
The PCM-FPVGA comes standard with a video BIOS expansion ROM populated at U8. Various ROM sizes can be used to support a variety of flat panel configurations each needing it's own BIOS image. The FPA adapter modules when connected to J10 automatically select the correct BIOS image for the Panel family the FPA supports. The factory will ordinarily configure the BIOS ROM for the size provided but the illustration below shows the proper jumpering for the supported ROM sizes.

J12



128K 27C010
256K 27C020
512K 27C040

J12



1M 27C080

2.6 CRT Output connection

The PCM-FPVGA supports connection to standard VGA monitors through the connector at J4. An adapter cable WinSystems part number CBL-207-1 is used to provide the more conventional 15-pin D-sub connector for monitor attachment. The pin definitions for the J4 connector are shown here :

J4

RED	1	2	GND
GREEN	3	4	GND
BLUE	5	6	GND
HSYNC	7	8	GND
VSYNC	9	10	GND

2.7 Flat Panel Output Connection

Connection to all flat panels is made via the 50-pin connector at J10. This connector is cabled to the appropriate FPA (Flat Panel Adapter) module which then breaks out the necessary cabling for attachment to the panel itself. The FPA module also supplies any special controls that may be needed for the panel. Refer to the FPA documentation for specific hook-up instructions. The pin definitions for the J10 connector are shown here.

J10

SW0	1	2		SW1
SW2	3	4		SW3
PC5	5	6		PC6
PC7	7	8		PC8
PC9	9	10		PC10
GND	11	12		GND
PC13	13	14		PC14
PC15	15	16		PC16
PC17	17	18		PC18
GND	19	20		GND
PC21	21	22		PC22
PC23	23	24		PC24
PC25	25	26		PC26
GND	27	28		GND
PC29	29	30		PC30
PC31	31	32		PC32
PC33	33	34		PC34
GND	35	36		GND
PC37	37	38		PC38
PC39	39	40		PC40
ENVCC	41	42		ENBKL
ENVEE	43	44		PC44
PC45	45	46		-12V
+12V	47	48		+12V
+5V	49	50		+5V

2.8 PC/104 Pin Definitions

The PC/104 bus is basically a redefinition of the popular ISA PC bus standard. Like the ISA bus, the PC/104 bus encompasses 1 or 2 connectors depending on whether 16-bit, 24-bit address support, or additional interrupt lines are required. The pin definitions for the primary and auxillary PC/104 connectors at J7 and J13 are shown here.

J7

GND	B1	o o	A1	-IOCHK
RESET	B2	o o	A2	SD7
+5V	B3	o o	A3	SD6
IRQ9	B4	o o	A4	SD5
-5V	B5	o o	A5	SD4
DRQ2	B6	o o	A6	SD3
-12V	B7	o o	A7	SD2
-SRDY	B8	o o	A8	SD1
+12V	B9	o o	A9	SD0
GND	B10	o o	A10	IOCHRDY
-SMEMW	B11	o o	A11	AEN
-SMEMR	B12	o o	A12	SA19
-IOW	B13	o o	A13	SA18
-IOR	B14	o o	A14	SA17
-DACK3	B15	o o	A15	SA16
DRQ3	B16	o o	A16	SA15
-DACK!	B17	o o	A17	SA14
DRQ1	B18	o o	A18	SA13
-REFRESH	B19	o o	A19	SA12
SYSCLK	B20	o o	A20	SA11
IRQ7	B21	o o	A21	SA10
IRQ6	B22	o o	A22	SA9
IRQ5	B23	o o	A23	SA8
IRQ4	B24	o o	A24	SA7
IRQ3	B25	o o	A25	SA6
-DACK2	B26	o o	A26	SA5
TC	B27	o o	A27	SA4
BALE	B28	o o	A28	SA3
+5V	B29	o o	A29	SA2
OSC	B30	o o	A30	SA1
GND	B31	o o	A31	SA0
GND	B32	o o	A32	GND

J13

GND	C0	o o	D0	GND
SBHE	C1	o o	D1	-MEMCS16
LA23	C2	o o	D2	-IOCS16
LA22	C3	o o	D3	IRQ10
LA21	C4	o o	D4	IRQ11
LA20	C5	o o	D5	IRQ12
LA19	C6	o o	D6	IRQ15
LA18	C7	o o	D7	IRQ14
LA17	C8	o o	D8	-DACK0
-MEMR	C9	o o	D9	DRQ0
-MEMW	C10	o o	D10	-DACK5
SD8	C11	o o	D11	DRQ5
SD9	C12	o o	D12	-DACK6
SD10	C13	o o	D13	DRQ6
SD11	C14	o o	D14	-DACK7
SD12	C15	o o	D15	DRQ7
SD13	C16	o o	D16	+5V
SD14	C17	o o	D17	-MASTER
SD15	C18	o o	D18	GND
KEY	C19	o o	D19	GND

2.9 PC Video Overlay Connector

The 50-pin connector at J9 may be used in the future to inject live video into the VGA output stream. This feature is not currently supported but the connector pin definitions are provided here for completeness.

J9

GND	1	2	N/C
GND	3	4	N/C
GND	5	6	VR7
GND	7	8	VR6
GND	9	10	VR5
VR1	11	12	VR4
AA9	13	14	VR3
GND	15	16	VR2
GND	17	18	VG7
GND	19	20	VG6
GND	21	22	VG5
VG1	23	24	VG4
VG0	25	26	VG3
GND	27	28	VG2
GND	29	30	VB7
GND	31	32	VB6
GND	33	34	VB5
ENBKL	35	36	VB4
VB0	37	38	VB3
GND	39	40	VB2
GND	41	42	HSYNC
N/C	43	44	VSYNC
GND	45	46	KEY
GND	47	48	PCLK
GND	49	50	N/C

2.10 Video Mode Tables

The PCM-FPVGA supports a number of standard and extended VGA modes. The following tables extracted from the CHIPS™ 65540/65545 databook show the video modes along with the required amount of RAM.

Standard Video Modes - VGA Standard

Mode # (HEX)	Display Mode	Colors	Text Display	Font Size	Pixel Resolution	Dot Clock (MHz)	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Video Memory	CRT CODE
0+, 1+	Text	16	40 X 25 40 X 25 40 X 25	9 X 16 8 X 14 8 X 8	360 X 400 320 X 350 320 X 200	28.322 25.175 25.175	31.5	70	256KB	A,B,C
2+, 3+	Text	16	80 X 25 80 X 25 80 X 25	9 X 16 8 X 14 8 X 8	720 X 400 640 X 350 640 X 200	28.322 25.175 25.175	31.5	70	256KB	A,B,C
4	Graphics	4	40 X 25	8 X 8	320 X 200	25.175	31.5	70	256KB	A,B,C
5	Graphics	4	40 X 25	8 X 8	320 X 200	15.175	31.5	70	256KB	A,B,C
6	Graphics	2	80 X 25	8 X 8	640 X 200	25.175	31.5	70	256KB	A,B,C
7+	Text	Mono	80 X 25 80 X 25 80 X 25	9 X 16 9 X 14 9 X 8	720 X 400 720 X 350 720 X 350	28.322	31.5	70	256KB	A,B,C
D	Planar	16	40 X 25	8 X 8	320 X 200	25.175	31.5	70	256KB	A,B,C
E	Planar	16	80 X 25	8 X 8	640 X 200	25.175	31.5	70	256KB	A,B,C
F	Planar	Mono	80 X 25	8 X 14	640 X 350	25.175	31.5	70	256KB	A,B,C
10	Planar	16	80 X 25	8 X 14	640 X 350	25.175	31.5	70	256KB	A,B,C
11	Planar	2	80 X 30	8 X 16	640 X 480	25.175	31.5	60	256KB	A,B,C
12	Planar	16	80 X 30	8 X 16	640 X 480	25.175	31.5	60	256KB	A,B,C
13	Packed Pixel	256	40 X 25	8 X 8	320 X 200	25.175	31.5	70	256KB	A,B,C

CRT CODES

A PS/2 Fixed frequency analog CRT monitor or equivalent (31.5/35.5 Khz Horizontal Frequency Specification)
B Multi-Frequency CRT Monitor (37.5 Khz minimum Horizontal Frequency Specification) (NEC MultiSync 3D or equivalent)
C Multi-Frequency High-Performance CRT Monitor (48.5 KHz minimum Horizontal Frequency Specification) (MultiSync 5D or equivalent)

Extended Resolution Video Modes

Mode # (HEX)	Display Mode	Colors	Text Display	Font Size	Pixel Resolution	Dot Clock (MHz)	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Video Memory	CRT CODE
20	4-Bit Linear	16	80 X 30	8 X 16	640 X 480	25.175	31.5	60	512KB	A,B,C
22	4-Bit Linear	16	100 X 37	8 X 16	800 X 600	40.00	37.5	60	512KB	B,C
24	4-Bit Linear	16	128 X 48	8 X 16	1024 X 768	65.00	48.5	60	512KB	C
24I						44.90	35.5	43	512KB	B,C
30	8-Bit Linear	256	80 X 30	8 X 16	640 X 480	25.175	31.5	60	512KB	A,B,C
32	8-Bit Linear	256	100 X 37	8 X 16	800 X 600	40.00	37.5	60	512KB	B,C
34	8-Bit Linear	256	128 X 48	8 X 16	1024 X 768	65.00	48.5	60	1MB	C
34I						44.90	35.5	43	1MB	B,C
40	15-Bit Linear	32K	80 X 30	8 X 16	640 X 480	50.350	31.5	60	1MB	A,B,C
41	16-Bit Linear	64K	80 X 30	8 X 16	640 X 480	50.350	31.5	60	1MB	A,B,C
50	24-Bit Linear	16M	80 X 30	8 X 16	640 X 480	65.00	27.1	51.6	1MB	B,C
60	Text	16	132 X 25	8 X 16	1056 X 400	40.00	30.5	68	256KB	A,B,C
61	Text	16	132 X 50	8 X 16	1056 X 400	40.00	30.5	68	256KB	A,B,C
6A, 70	Planar	16	100 X 37	8 X 16	800 X 600	40.00	38.0	60	256KB	B,C
72, 75	Planar	16	128 X 48	8 X 16	1024 X 768	65.00	48.5	60	512KB	C
72, 75I						44.90	35.5	43	512KB	B,C
78	Packed Pixel	16	80 X 25	8 X 16	640 X 400	25.175	31.5	70	256KB	A,B,C
79	Packed Pixel	256	80 X 30	8 X 16	640 X 480	25.175	31.5	60	512KB	A,B,C
7C	Packed Pixel	256	100 X 37	8 X 16	800 X 600	40.00	37.5	60	512KB	B,C
7E	Packed Pixel	256	128 X 48	8 X 16	1024 X 768	65.00	48.5	60	1MB	C
7EI						44.90	35.5	43	1MB	B,C

Support for the modes above is included directly in the BIOS. The “I” in the mode # column indicates “Interlaced”.

CRT CODES

High Refresh Video Modes

Mode # (HEX)	Display Mode	Colors	Text Display	Font Size	Pixel Resolution	Dot Clock (MHz)	Horizontal Frequency (KHz)	Vertical Frequency (Hz)	Video Memory	CRT CODE
12	Planar	16	80 X 30	8 X 16	640 X 480	31.50	37.5	75	256KB	B,C
30	8-Bit Linear	256	80 X 30	8 X 16	640 X 480	31.50	37.5	75	256KB	C
79	Packed Pixel	256	80 X 30	8 X 16	640 X 480	31.50	37.5	75	512KB	C
6A,70	Planar	16	100 X 37	8 X 16	800 X 600	49.50	46.90	75	512KB	C
32	8-Bit Linear	256	100 X 37	8 X 16	800 X 600	49.50	46.90	75	1MB	C
7C	Packed Pixel	256	100 X 37	8 X 16	800 X 600	49.50	46.90	75	1MB	C

Support for the modes above is included directly in the BIOS. The “I” in the mode # column indicates “Interlaced”.

CRT CODES

A PS/2 Fixed frequency analog CRT monitor or equivalent (31.5/35.5 Khz Horizontal Frequency Specification)
B Multi-Frequency CRT Monitor (37.5 Khz minimum Horizontal Frequency Specification) (NEC MultiSync 3D or equivalent)
C Multi-Frequency High-Performance CRT Monitor (48.5 KHz minimum Horizontal Frequency Specification) (MultiSync 5D or equivalent)

2.11 Connector/Jumper Summary

APPENDIX

Cable Drawings

Part Number	Description
CBL-207-1	15-pin Dsub VGA video adapter cable

Software

Provides VESA mode BIOS call support for C&T 65540/545	VESA.ZIP
Windows 98 & 2000	Not Required
Windows 3.1	w31333p.zip
Windows 95	w95500.zip
Windows NT 4.0	nt4129.zip
OS/2 3.0 & 4.0	os2422p.zip

Telephone: 817-274-7553 . . Fax: 817-548-1358
http://www.winsystems.com . . E-mail: info@winsystems.com

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1. Description and quantity of the product(s) to be returned including its serial number.
2. Reason for the return.
3. Invoice number and date of purchase (if available), and original purchase order number.
4. Name, address, telephone and FAX number of the person making the request.
5. Do not debit WinSystems for the repair. WinSystems does not authorize debits.

After the RMA number is issued, please return the products promptly. Make sure the RMA number is visible on the outside of the shipping package.

The customer must send the product freight prepaid and insured. The product must be enclosed in an anti-static bag to protect it from damage caused by static electricity. Each bag must be completely sealed. Packing material must separate each unit returned and placed as a cushion between the unit(s) and the sides and top of the shipping container. WinSystems is not responsible for any damage to the product due to inadequate packaging or static electricity.