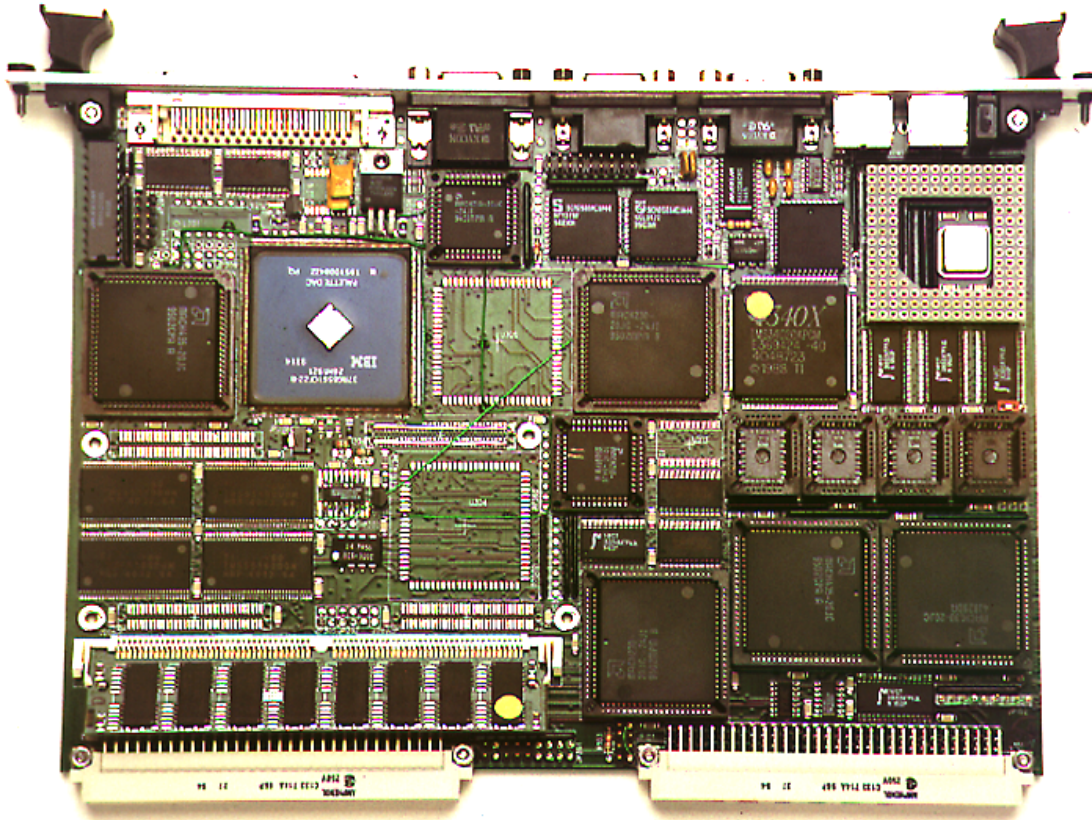


# Rastergraf

# VCL-V

**High Resolution  
Intelligent  
VMEbus Graphics Controller**



## Features

- Intelligent graphics accelerator
- optional TMS34082 FPU co-processor
- Up to 16 MB display memory
- Up to 32 MB processor memory
- Supports displays up to 1600 x 1200 at 24 bits/pixel
- True 8-bit overlay with independent color map
- On-board X Server available
- Two PS/2 ports and four RS-232 ports
- Suitable for non-VGA/Windows systems

# The VCL-V

The Rastergraf VCL-V is a 6U single board 34020-based graphics display controller for VMEbus computers.

Using a common "baseboard" design, the VCL-V is configured for 24-bit true color (**VCL-V/24**) or 8-bit (**VCL-V/8**) by installing a unique VRAM daughterboard. The VCL-V includes an 8-bit overlay. The overlay screen can remain static while the primary scrolls (or vice versa).

The 40 MHz TMS 34020 32-bit Graphics System Processor draws random points at a 10 Megapixel per second rate, and normal pixel, pattern fills, and vector generation at up to 40 Mpix/sec rate. Hardware acceleration features include color and writemask registers, VFILL, and VBLT, and can give up to a 160 Mpix/sec drawing rate on a block write (8 bit/pixel).

An optional 32-bit input port on P2 allows the 34020 to directly copy data from the port into memory at about 20 Mbytes/sec.

The 34020 can receive interrupts from the VMEbus, serial I/O, and vertical sync. It controls the video timing, supporting almost any screen resolution from 256 pixels to 2048 pixels, at 30 to 70 Hz vertical and 15.7 to 100 KHz horizontal refresh rates.

Standard display formats range from 640 x 480 to 1600 x 1280. Interlaced and non-interlaced formats are supported. A PLL clock generator allows the user to change the pixel clock.

The VCL-V supports binary vertical zoom (1,2,4,8,16), non-inter-

ger horizontal zoom (by virtue of the PLL pixel clock), horizontal pan and vertical smooth scroll.

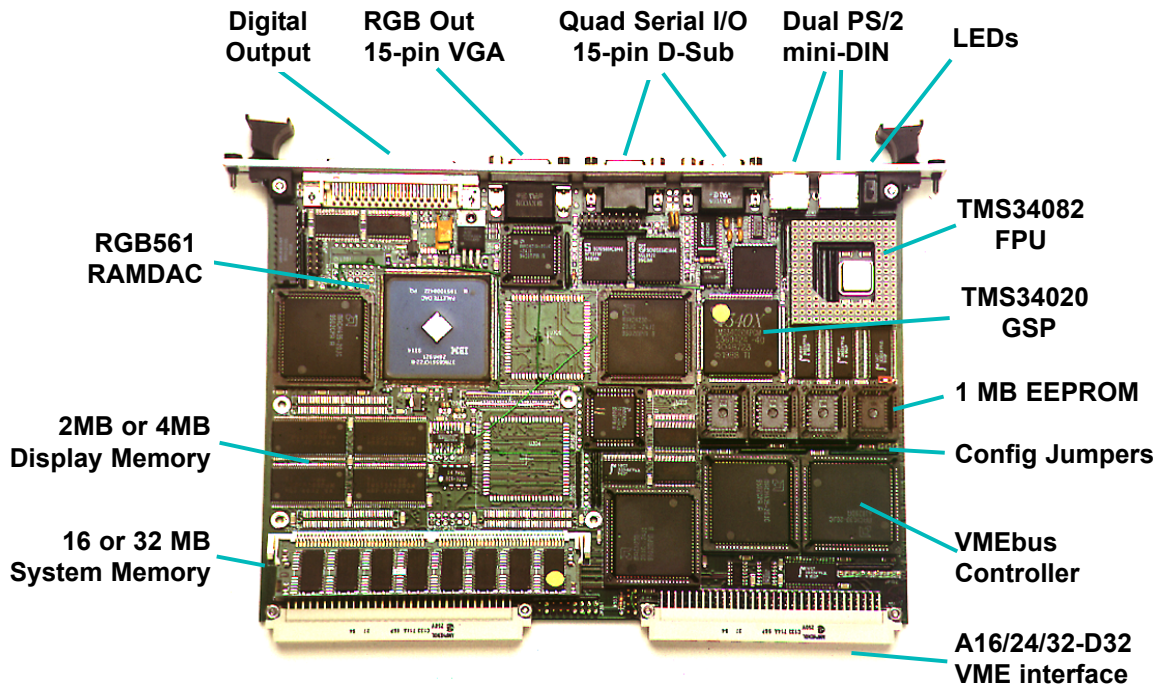
The display memory uses VRAMs which gives about 95% availability to the 34020 and host processors. Memory size ranges up to 4Mpix for the VCL-V/24 and up to 8Mpix for the VCL-V/8.

The video output is generated by an IBM RGB561 RAMDAC, which supports simultaneous analog and digital output. It includes a graphics cursor with a 64 x 64 x 2 bit map and can blank any bit plane. It translates the primary, overlay, and 2-bit cursor pixels into 24-bit color values (8 bits each of red, green, and blue). The output can be passed through a 10-bit/color Gamma correction table. The analog red, green, and blue signals from the color map are connected to a standard RGB monitor.

The digital output port supports LCD, EL, and plasma flat panels up to 1280 x 1024 resolution. Pixel output is either two 12-bit (4 bits each RGB) or one 24-bit (8 bits each RGB) per clock. The digital output is supplied on a 68 pin mini-D connector on the front panel. Sequenced 5 and 12 volt power is also supplied.

The front panel has four RS-232 serial ports (for touchscreen, trackball, mouse, console, etc.), and two PS/2 (PC compatible) ports. Mini-DIN (PS/2) and DB-9 type connectors are used.

Please note that the VCL-V is not supported under Windows and is not VGA compatible.



## VCL-V Features

- Complete intelligent graphics controller on a single PMC
- 24-bit true color (VCL-V/24) and 8-bit (VCL-V/8) versions
- High performance TMS34020 32-bit graphics processor
- Optional 34082 FPU coprocessor
- 16 or 32 MB of 34020 system memory
- VRAM/Hardware Pixel Acceleration
- Independent Overlay and Primary screen positioning
- Analog output up to 2048 x 1536, digital up to 1280 x 1024
- Display memory up to 4Mpix @24 bpp and 8Mpix for 8 bpp
- 10-bit gamma correction
- Hardware scroll, pan, and zoom, 2-bit graphics cursor
- 4 serial ports + 2 PS/2 (PC) ports
- 1-2 MB Flash PROM
- Optional high speed 32-bit port
- Can run autonomous X Server, Graphics Package, or other customer-supplied code.

# VCL-V Technical Overview

The VCL-V is designed as an autonomous subsystem with links to the PMC bus. Using the intelligence of the onboard TMS34020, programs as sophisticated as X Windows can be run on-board with a minimum of support from the host CPU. The local 1 MB flash is sufficient to store an entire server, including some local fonts, or, alternatively, the CLP graphics library package and SmartPTERM, the terminal emulator.

The VCL-V has a four register block in A16 space (only) which contains the Control Status Register (CSR), Line Address Register (LAR), A32 Extended Address Register (XAR), A16/A24 Data Buffer Address Register (DBAR), and Interrupt Vector Address Register. The 16-bit LAR selects device registers (34020, color map, serial I/O) or a part of VCL-V memory for access through the 1 KB line buffer in A16 or A24 space. Memory can also be accessed through a 64 MB window in A32 space. The 34020 can interrupt the VMEbus

Byte order can be swapped in hardware. Memory ranges are expanded to 4 KB (line buffer) and 256 MB (A32 space) for byte, word, and long word swapped spaces.

The VCL-V uses the 40 MHz TMS 34020 Graphics Processor, which has a complete instruction set 32-bit CPU, vector and pixel functions, writemask register, and programmable video timing. Optional 34082 Floating Point Unit greatly improves floating point performance.

34020 system memory includes 1-2 MB of 32-bit wide Flash EEPROM, suitable for direct program execution, 16 or 32 MB of 0-wait-state DRAM for programs and off-screen data, 4 Kb of serial EEPROM for power-up parameter storage.

Display memory for the VCL-V/24 ranges up to 4Mpix and uses a VMEM24 daughterboard. Primary pixel size is 24 bits and overlay is 8 bits. Display memory for the VCL-V/8 ranges up to 8M pixels and uses a VMEM8 daughter board for sizes of more than 2M addressable pixels. Primary pixel size is 8 bits and overlay is 8 bits.

Hardware Scroll, Pan, and Zoom is supported as single line (smooth scroll), pan is programmable on 4 pixel boundaries, and zoom (vertical: 1,2,4,8,16). Overlay and Primary displays can be independently panned and scrolled.

The IBM RGB561 Analog and Digital color map includes a 2 bit 64 x 64 bit map/crosshair cursor, 10-bit DACs and 10-bit Gamma correction table. Interlaced and noninterlaced displays are supported.

The VCL-V/8 uses the RGB561 as an 18-bit in (8 bit overlay, 8 bit primary, 2 bit cursor) 24-bit out (8 bits each red, green, blue) look-up table.

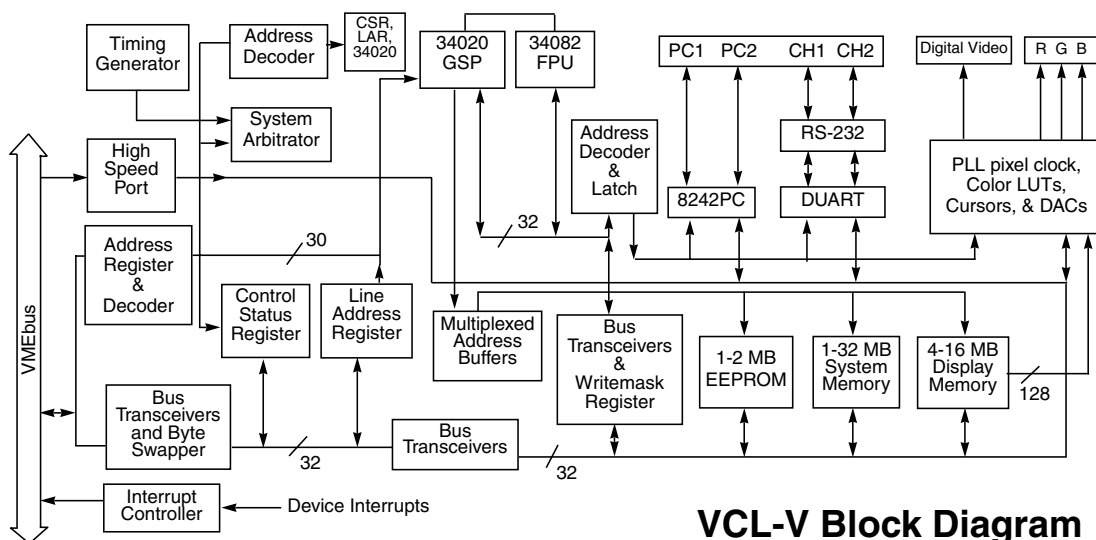
The VCL-V/24 uses the RGB561 as a 34-bit in (8 bit overlay, 24 bit primary, 2 bit cursor) 24-bit out (8 bits each red, green, blue) look-up table.

Digital output can be configured to output one 24-bit RGB pixel or two 12-bit RGB pixels. The two pixel mode is compatible with high resolution flat panels. The pixel value can also be mapped to one 8-bit gray-scale pixel, two 4-bit gray scale pixels, or eight 1-bit pixels.

An optional 32-bit input port enables the 34020 to copy data from the port and copy it into any memory. Connects to VMEbus P2 rows A and C user I/O pins.

The VCL-V has two PS/2 (PC) compatible ports with TTL data/clock composite ports contained in an Intel 8242PC. It also has four RS-232 serial channels, contained in two SCN2681 DUARTs. Each channel has a 4 byte receive FIFO and programmable baud rates up to 38.4 Kbaud. Each DUART also has a timer/counters and control bits drive 3 status LEDs on the front panel.

Console - female DB-9 with RX, TX, CTS, RTS, and ground. CTS and RTS can be reassigned to make another serial port. Primary and Secondary Serial Ports can be used for serial type PC mouse, trackball, and/or touchscreen.



## VCL-V Software

Software support is available for Unix and most real time operating systems and includes:

- + **X Windows X11R6 Server** is board based for best performance. Includes extensions for overlays, multiple input devices, direct access to display memory, and fast vector generation.
- + **CLP Graphics Subroutine Package** provides low overhead access to the VCL-V through calling sequences to an on-board subroutine set.
- + **C compiler toolset** for user written 34020 applications.

- + **SmartPTERM** - is an **Open Firmware Monitor and BIST System**. It is a Flash-based auto-booting monitor that provides Built In Self Test (BIST), front panel LED diagnostics, and can boot to **PTERM** (a simple *vi* compatible terminal emulator), **CLP**, or **PX Windows** ROM images (included). **SmartPTERM** can store and modify initialization tables and configuration data in the VCL-V's Serial EEPROM.

# VCL-V Product Specifications

<b>Graphics Controller</b>	T1 TMS34020-40
<b>Maximum Dot Clock</b>	170 MHz
<b>Horizontal Scan Rates</b>	31.5 to 115 KHz
<b>Display Resolution</b>	1600 x 1200 (max.)
<b>Display Colors</b>	256 from 24-bit (16.7M color) LUT
<b>Memory Configuration</b>	
<b>Display memory</b>	2MB or 4MB VRAM
<b>System memory</b>	16MB or 32 MB DRAM
<b>32-bit Flash memory</b>	1MB or 2MB
<b>Serial EEPROM</b>	4Kb
<b>Analog Monitor Support</b>	Multi-frequency (VGA type) or composite-RGB, interlaced or non-interlaced. Sync-On-Green is software selectable.
<b>Composite Video/Sync Signal</b>	1 Volt peak to peak, consisting of: 660 mV Reference White 54 mV Reference Black 286 mV Sync (Sync on Green)
<b>Flatpanel Support</b>	Digital output, vertical and horizontal sync, clock, and blanking.
<b>VMEbus compatibility</b>	Slave only, A16, A24 , A32, D8(E0), D16, D32, VME block transfer
<b>Bus Loading</b>	One bus load
<b>AS to DTACK</b>	300 ns typical
<b>VCL-V VMEbus Addresses:</b>	
<b>CSR/LAR (A16 only)</b>	FFFFC000-FFFFC00F (jumper select)
<b>Line Buffer (A16/A24)</b>	FFFF8000-FFFF83FF (s/w select)
<b>Full Access (A32)</b>	A0000000 (s/w select)
<b>Interrupt Vector (D08)</b>	100 (s/w select)
<b>Front Panel Connections</b>	
<b>Analog Output Connector</b>	15-pin VGA
<b>Digital Video Connector</b>	68-pin 3M N10268-52E2VC Mini-D ribbon connector with dual 12/single 24-bit digital output, HSYNC, VSYNC, clock, blanking, sequenced +12 and +5 volts.
<b>PS/2 Port Connectors</b>	PC compatible mini-DIN
<b>“Console” RS-232 Connector</b>	female DB-9 with RX, TX, CTS, RTS, and ground. CTS/RTS can be strapped to support a second RX/TX serial port.
<b>“Mouse” RS-232 Connector</b>	male DB-9 for serial type PC mouse, trackball, and/or touchscreen.
<b>Software Support</b>	Linux/XFree86 and VxWorks DDX CLP Graphics for VxWorks Flash-based SmartP_TERM, CLP, and PX Windows Server options are available.
<b>Multiple Display Support</b>	Multiple VCL-V boards may be added to a single system.
<b>VCL-V Maintenance Features</b>	Red, Amber, and Green LEDs can be used for diagnostics by customer software.  The RGB561 can report valid monitor connections.
<b>Environment</b>	
<b>Operating temperature</b>	0°C to +70°C
<b>Storage temperature</b>	-55°C to +85°C
<b>Humidity</b>	10% - 90% non-condensing  <b>Ruggedized version available</b>
<b>Module Size</b>	6U (160 mm x 233 mm)
<b>Power Requirements</b>	5V +/- 5%, 2.5 A typical

# Display Resolutions

Resolution	Vertical Scan Rate		Primary/Overlay
	Unix and RTOS		
	Format	Frequency	
640 x 480	VGA	60 Hz 75 Hz	both
800 x 600	SVGA	60 Hz 75 Hz	both
1024 x 768	UVGA	60 Hz 75 Hz	both
1152 x 864	Sun	60 Hz 75 Hz	both
1280 x 1024	SXGA	60 Hz 75 Hz	both
1600 x 1200	UXGA	60 Hz	Primary only

## Ordering Information

### VCL-V

The VCL-V includes 40 MHz TMS 34020 Graphics Processor, 16-32 MB 34020 memory, hardware pan, scroll, and zoom, 2-bit cursor, and analog and (optional) digital output, 4 RS-232 serial ports and 2 PS/2 ports.

**Note:** digital display cannot exceed 1280 x 1024.

VCL-V Model	Typical Display	34020 Memory	X Compatible	1 MB Flash	FPU	VMEM Module
VCL-V/8/X10	1024 x 768	4 MB	yes	opt	optional	no
VCL-V/8/X12	1280 x 1024	16 MB	yes	opt	optional	no
VCL-V/8/X16	1600 x 1280	16 MB	yes	opt	optional	VMEM8
VCL-V/24/X16	1600 x 1280	32 MB	yes	opt	yes	VMEM24

### Software:

Unix and VxWorks CLP and PxWindows drivers are available. Please contact the factory for more information.

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