

3. If the product is covered under the five-year Boca Research, Inc. Limited Warranty there will be no charge for parts and labor required to make the repair. Be sure to include your receipt as proof of purchase for all warranty repairs.
4. If the product is not covered under the five-year Boca Research, Inc. Limited Warranty there will be a fixed charge of \$75 for each item returned.
5. Certain parts (such as dealer installed RAM chips) will not be covered under the Boca Research, Inc. Limited Warranty. Dealer installed parts are warranted by the dealer. Parts which you have installed yourself are covered only by the supplier's warranties. In these cases, Boca Research, Inc. can identify which parts are defective, but will not replace such parts until specific written authorization is received from you. The cost of parts and labor involved in making such repairs will be billed to you C.O.D.
6. When sending a board to Boca Research, Inc. for repairs, please be sure to include a brief but inclusive description of the problem, the VL-Bus SuperX board, the VL-Bus SuperX manual, your return street address (for UPS purposes), phone number, and the RMA number mentioned above. Products returned to Boca Research without manuals and will be replaced without manuals. Package the product securely in a container equivalent to the original packaging, and insure the package to protect against loss or damage during transit. Shipping charges must be prepaid; C.O.D. shipments will not be accepted. Please use the address below for all correspondence:

Boca Research, Inc.
RMA Department - RMA # _____
6413 Congress Avenue / Suite 130
Boca Raton, FL 33487-2841

7. If the repairs performed on your board were covered by the warranty, Boca Research, Inc. will return it prepaid via UPS. If you prefer Federal Express delivery, please provide your Federal Express account number. Shipping costs for items not covered by the warranty will be billed C.O.D.

Appendix C: Technical Specifications

Connector Information

The following table shows the pin-out assignments for the DB15 video cable connectors.

IMPORTANT:

The VL-Bus SuperX uses the same 15-pin (DB15) cable available from monitor manufacturers to interface with IBM PS/2 computers. Using an incorrect cable could cause damage to the monitor and/or adapter. Note: some monitor manufacturers use slightly different naming conventions for the signal while retaining the same pin functionality. Do not be concerned. All that is required is PS/2 functionality.

Signal	Pin
Red	1
Green	2
Blue	3
Monitor ID bit 2	4
Ground	5
Ground	6
Ground	7
Ground	8
Ground	9
Not Used	10
Monitor ID bit 0	11
Monitor ID bit 1	12
Horizontal Sync	13
Vertical Sync	14
Monitor ID bit 3	15

Pin-Out Assignments for the DB15 Video Cable Connector

Technical Specifications

- 1MB DRAM of on-board memory
- Supports up to 24-bit per pixel color
- Compatible with VGA color, analog monochrome monitors, and multiple frequency monitors
- 15-pin analog connector
- Power: 1A @ 5V
- 6.2" x 3.2"

Video Modes

Resolution	SVGAXL2 (2MB)	SVGAXL1 (1MB)
1280x1024	Up to 256 colors	Up to 16 colors
1024x768	Up to 64K colors	Up to 256 colors
800x600	Up to 64K colors	Up to 64 colors
640x480	Up to 16M colors	Up to 16M colors

VESA Standard VGA Pass Through Connector Specification

A 26-pin header stake connector is provided which maintains pin to pin compatibility with IBM's feature connector as shown in the table on the next page. Pin 26 is NOT present and the corresponding receptacle is plugged to ensure proper polarization.

26-pin stake connector pinout:

Signal	Vesa Pin	IBM Feature Connector
Pixel Data 0	1	y1
Pixel Data 1	2	y2
Pixel Data 2	3	y3
Pixel Data 3	4	y4
Pixel Data 4	5	y5
Pixel Data 5	6	y6
Pixel Data 6	7	y7
Pixel Data 7	8	y8
Pixel clock	9	y9
Blanking	10	y10
Horz. Sync	11	y11
Vert. Sync	12	y12
ground	13	y13
ground	14	z1
ground	15	z2
ground	16	z3
Enable External Pixel Data (1)	17	z4
Enable External Sync (2)	18	z5
Enable External Pixel Clock (3)	19	z6
not used	20	z7
ground	21	z8
ground	22	z9
ground	23	z10
ground	24	z11
not used	25	z12
(clipped)	26	z13

- (1) A low enables feature connector pixel data input to the RAMDAC.
 (2) A low enables feature connector sync and blanking inputs.
 (3) A low enables feature connector pixel clock input.

For additional information see the Auxiliary Video Connector description in the *IBM PS/2 Hardware Technical Reference Manual*.

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

This unit was tested with ferrite sleeves on the monitor cables. Ferrite sleeves must be used on the monitor cables.

Shielded cables are required between the computer and the monitor with the shield properly grounded. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CHANGES OR MODIFICATIONS TO THIS EQUIPMENT NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID YOUR AUTHORITY TO OPERATE THE EQUIPMENT.

Glossary

24-bit. The number of bits which represent each pixel, or point on the screen. An 8-bit per pixel card can generate 256 colors; 24 bits per pixel yields 16.8 million colors.

8514. An IBM color monitor capable of resolutions of 720x400 non-interlaced with a refresh rate of 70KHz; 640x480 non-interlaced at 60KHz; or 1024x768 interlaced at 43.58 KHz. All of these resolutions are in 256 colors.

Analog Monitor. A monitor which uses an analog signal. Analog monitors can display an infinite number of shades for each primary color.

Autoswitch. The ability of a display adapter to automatically determine the display standard required by your software and to take action accordingly.

BIOS. Basic Input Output System. Provides fundamental services required for the operation of a computer. Permanently present in the machine, these routines are generally stored in ROM (Read Only Memory). The system board contains a ROM BIOS to support all of its standard functions. The VL-Bus SuperX also has a BIOS for display features.

Bit Block Transfer. A method of holding a block of graphics, such as Windows dialogue box, in memory so that it can be moved and redrawn quickly by memory-to-memory operations.

CGA. Color Graphics Adapter. Medium resolution IBM graphics standard capable of displaying 640 x 200 pixels in 2 colors, or 320 x 200 pixels in 4 colors.

Color Monitor. Any CGA, EGA, VGA color, or multiple frequency monitor.

Digital Monitor. Monitor which receives discrete binary signals. Digital monitors do not have as wide a range of color choices as analog types; digital EGA monitors can display just 64 colors.

DRAM. Dynamic RAM. RAM is random access memory.

ECD. Enhanced Color Display. An EGA specification. TTL monitor capable of displaying video signals with horizontal scan frequencies of 15.750KHz (CGA) or 21.850KHz (EGA) only.

EGA. Enhanced Graphics Adapter. High resolution IBM graphics standard capable of displaying 640 x 350 pixels in 16 colors out of a palette of 64 colors.

EGA Monitor. Any monitor capable of displaying both EGA and CGA standard modes. This includes ECD and multiple frequency monitors.

Extended EGA. Offered by proprietary chip sets on non-IBM adapter cards with 640 x 480 resolution or better.

Feature Connector. Used by graphics adapters to give compatibility with VGA text and graphics codes for use with multi-media applications.

GUI. Graphical User Interface.

Flicker. The wavering or unsteady image on some monitors. A major cause can be a low refresh rate.

Hardware Graphics Cursor. Provides a faster method of displaying/moving a cursor (GUI arrow) on the screen. The video adapter's main chipset controls this function which resides in system memory, as opposed to slower handling by the application software.

HGC. Hercules Graphics Card. Compatible with MDA, but also capable of displaying 720 x 348 pixels in a 4-bank graphics mode.

Hi-res. Short for High Resolution, this term should be only applied to a minimum of 640 x 350 resolution and above.

Horizontal Scan Rate. The frequency in KHz (kilohertz) at which the monitor is scanned in a horizontal direction; high horizontal scan rates produce higher resolution. The EGA horizontal scan rate is 21.8 KHz, while the extended EGA horizontal scan rate is 30.1 KHz.

Interlaced. A method of scanning a screen which results in alternate lines being drawn with each full pass of the electron beam. The resulting display is less stable than a flicker-free non-interlaced display.

MDA. Monochrome Display Adapter. Early IBM Video display board designed for use with IBM monochrome text standard.

Monochrome Monitor. A TTL monitor which can display only 2 colors (generally green/black or amber/black).

Multiple Frequency Monitor. Monitor capable of displaying video signals over a wide range of horizontal scan frequencies. This may include a horizontal capture range from 5.5KHz to 35KHz or wider. Examples of monitors in this class are the NEC MultiSync and the Sony Multiscan. The Multiscan has a wide horizontal scan capture range which enables it to display monochrome signals.

Palette. The range of colors from which you can select the actual colors that the video adapter will display simultaneously.

Pixel. A single dot on the CRT display. This word is derived from the words 'picture' and 'element'.

RAMDAC. RAM Digital to Analog Converter.

Refresh Rate. Also called Vertical Scan Rate, the speed at which the screen is repainted. Typically, color displays must be refreshed at 60 times per second. Usually, the faster the refresh rate, the less flicker a monitor has (normally defined in Hz).

Register Level Compatibility. Complete compatibility to the hardware level.

RGB Monitor. Red/Green/Blue. A CGA compatible monitor limited to a 15.750KHz horizontal scan rate.

Scan rate. The frequency in Hertz (Hz) at which the monitor is scanned horizontally. Generally, the higher the scan rate, the higher the resolution.

VL-Bus SuperX VGA

TSR. Terminate and Stay Resident. A program that remains in memory after it has been loaded.

TTL. Transistor-Transistor Logic; a fast, reasonable-cost type of integrated circuit used in some monitors.

TTL Monitor. Video and synchronization signals (all digital) are on separate lines and have TTL compatible voltage levels.

VESA. Video Electronics Standards Association.

VGA. (Video Graphics Array) Analog graphics standard introduced with the IBM PS/2 series. Backwards compatible with EGA at the BIOS level, but provides higher resolutions. Supports a maximum resolution of 640 x 480 pixels in 16 colors out of a palette of 262,144 colors.

Suggested Reference Works

The following works provide additional technical information and advanced programming techniques for VGA graphics:

- *VESA VL-Bus SuperX Standard #VS900602 Revision A*, Video Electronics Standards Association, June 1990.
 - *IBM Personal System/2 Technical Reference for the Model 50/60 or 80*.
 - *Programmer's Guide to the EGA and VGA Cards*, Richard F. Ferraro, Addison-Wesley Publishing Company, 1988.
 - *Programmer's Guide to the EGA/VGA*, George Sutty and Steven Blair, Brady Books, 1988.
 - *Programmer's Guide to PC & PS/2 Video Systems*, Richard Wilton, Microsoft Press, 1987.
 - *Guide to Features, Phoenix View VGA-Compatible BIOS*, Phoenix Technologies, Ltd., 1990.
 - *Technical Reference Manual, Phoenix View VGA-Compatible BIOS*, Phoenix Technologies, Ltd., 1990.
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Limited Warranty

Boca Research, Inc. (BRI) warrants to the original buyer of this BRI product that the hardware is free of defects in materials and workmanship for a period of five years from the date of purchase from BRI or an authorized dealer. Should the VL-Bus SuperX fail to be in good working order at any time during the five-year period, BRI, will at its option, repair or replace this product at no additional charge, provided the part or product has not been abused, misused, repaired, or modified.

VL-Bus SuperX boards which require the Limited Warranty service during the warranty period should be delivered to the nearest authorized dealer or sent to BRI (see address in Appendix C: Servicing Your Boca Product) with proof of purchase the Return Merchandise Authorization (RMA) number provided by BRI Technical Support. Refer to Appendix C. Replacement parts or complete VL-Bus SuperX boards will be furnished on an exchange basis only. Replaced parts and/or VL-Bus SuperX boards become the property of BRI.

If the returned VL-Bus SuperX is sent by mail, the purchaser agrees to prepay shipping charges, insure the VL-Bus SuperX or assume the risk of loss or damage which may occur in transit, and to use a shipping container equivalent to the original packaging. ALL EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE FOR THE VL-Bus SuperX ARE LIMITED IN DURATION TO THE ABOVE FIVE-YEAR PERIOD. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

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This warranty gives you specific legal rights, and you have other rights which may vary from state to state.

VL-Bus SuperX VGA

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1. The use of VL-Bus SuperX software will be limited to computers that contain the VL-Bus SuperX board.
2. Any reproductions of the VL-Bus SuperX software are also subject to this agreement.
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4. Should a change in ownership occur, these three conditions MUST be met:
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 - the new owner must abide by the terms presented in this agreement.
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