Personal System/2 XGA Display Adapter/A Technical Reference

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Personal System/2
XGA Display Adapter/A
Technical Reference

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Preface

This manual describes the IBM* PS/2* XGA Display Adapter/A.

Related Publications

- *IBM Personal System/2 XGA Display Adapter/A Hardware Maintenance Reference Supplement*
- *IBM Personal System/2 XGA Display Adapter/A Hardware Maintenance Service Supplement*
- *IBM Personal System/2 XGA Display Adapter/A Installation Instructions*
- *IBM Personal System/2 XGA Device Drivers Installation Instructions*
- *IBM Personal System/2 XGA Adapter Interface Technical Reference*
- *IBM Personal System/2 Hardware Interface Technical Reference.*

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The XGA Display Adapter/A

Introduction

The IBM* Personal System/2* XGA Display Adapter/A is a PS/2* display adapter for Micro Channel* architecture system units with an 80386, 80386SX, or 80486 processor.

Video Graphics Array (VGA) and Extended Graphics Array (XGA) are standard terms for specific types of video subsystem.

The XGA Display Adapter/A features VGA function and Extended Graphics function.

This document covers the aspects of the XGA video subsystem that are specific to the XGA Display Adapter/A implementation. Refer to the *IBM PS/2 Hardware Interface Technical Reference* (video subsystem section) for details of the hardware interface, modes and functions supported by this adapter. The XGA Display Adapter/A is a Type 2 video subsystem.

The XGA Display Adapter/A has 512KB (KB equals 1024 bytes) of video random access memory (VRAM). It can be upgraded to 1MB (MB equals 1,048,576 bytes) by installing the IBM PS/2 Video Memory Expansion Option.

In some countries the XGA Display Adapter/A is supplied with 1MB of video memory installed. It has a maximum resolution of 1024 x 768 pels with 256 colors when 1MB of video memory is installed.

The adapter can be used as the base video subsystem for system units without an integrated display adapter, or as an additional display adapter. It can be installed in any 16-bit or 32-bit slot, except the Auxiliary Video extension slot.

In VGA mode, the XGA Display Adapter/A supplies digital video data to the Auxiliary Video Extension Connector (AVEC), when installed in the Base Video extension slot.

Multiple XGA Display Adapter/A's may coexist in one system unit.

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Multiple Adapters

A maximum of six XGA Display Adapter/A's (five in systems with an XGA video subsystem on the system board) may coexist in one system unit. Each occurrence of an XGA Display Adapter/A is referred to as an "instance."

Instances of XGA are addressed at different memory locations, allowing application software to control each instance independently.

Only one video subsystem should be enabled in VGA mode, because the VGA has no capability for multiple instances.

Each XGA Display Adapter/A uses a read-only memory (ROM) to hold the self-test and bring-up code for the adapter. With multiple instances, only one ROM is called to run the tests on all the XGA adapters installed.

8514/A Display Adapter Compatibility

The XGA Display Adapter/A is not hardware register compatible with the IBM PS/2 Display Adapter 8514/A, and applications that access the registers directly will not run.

A DOS Adapter Interface (AI) is supplied with the XGA Display Adapter/A. This allows DOS applications that use the 8514/A AI to run. The AI is described in the *XGA Adapter Interface Technical Reference*.

Device Drivers

Device drivers are supplied with the XGA Display Adapter/A. See the *IBM Personal System/2 XGA Device Drivers Installation Instructions* for more information.

Specifications

The following figure shows the power requirements for each version of the XGA Display Adapter/A.

XGA Display Adapter/A	amps	watts	volts
512KB of VRAM	1.6	8.0	+5.0
1MB of VRAM	1.9	9.5	+5.0

Figure 1. XGA Display Adapter/A Power Requirements

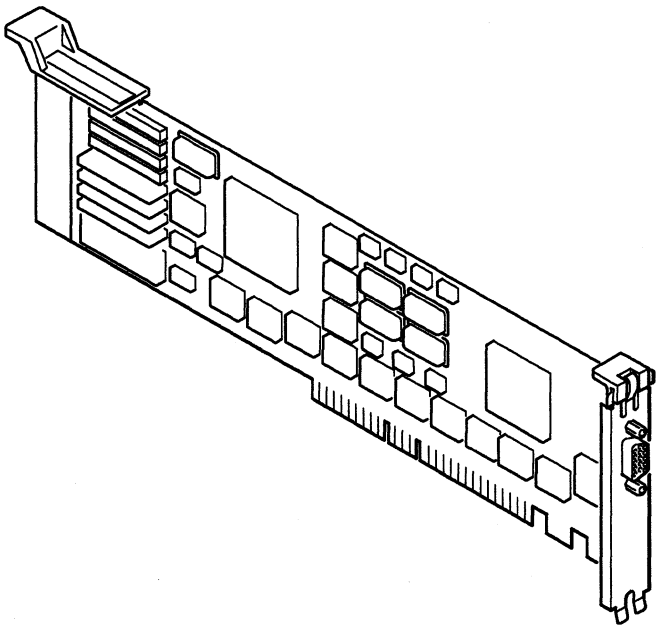


Figure 2. XGA Display Adapter/A (512KB)

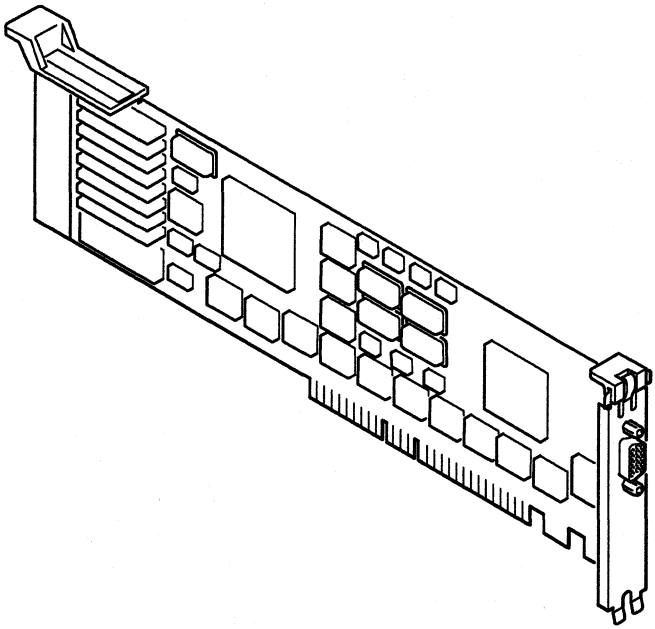


Figure 3. XGA Display Adapter/A (1MB)

Extension Slots

The XGA Display Adapter/A is a 32/16-bit PS/2 adapter featuring a Base Video Extension Connector (BVEC). It can be inserted into any 16-bit or 32-bit slot in a Micro Channel architecture system unit, except for the Auxiliary Video extension slot.

The following figure shows the **types** of slots available in PS/2 system units.

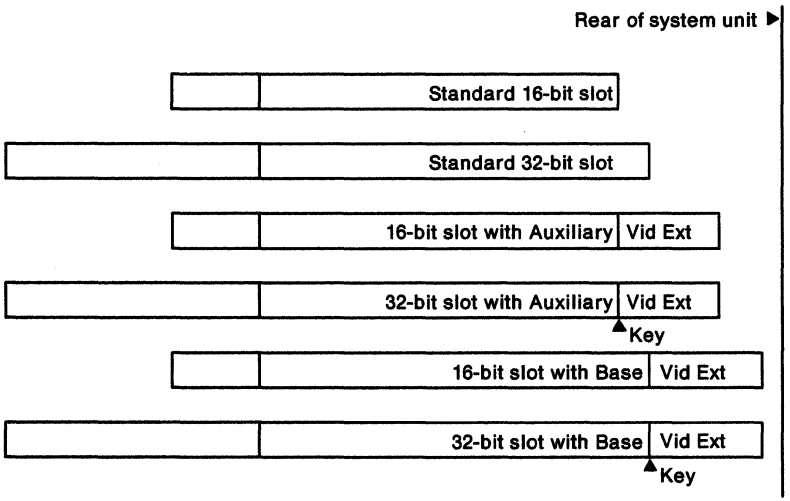


Figure 4. Extension Slot Types

The Auxiliary and Base Video extensions have similar functions and connections, but differ physically.

Note: The XGA Display Adapter/A **does not fit** into the Auxiliary Video extension slot.

Only system units without an integrated video subsystem have a Base Video extension slot.

With the XGA Display Adapter/A installed in the Base Video extension slot, and enabled in VGA mode, digital video is supplied to the AVEC. This allows pixel data, pixel clocks, synchronizing signals, and blanking signals to be supplied to adapters that previously received VGA video data from the integrated video subsystem.

When the XGA Display Adapter/A is in Extended Graphics mode, the pixel data, pixel clock, and blanking signal lines are set to high impedance, and the synchronizing signals run as set by the Extended Graphics mode. In this condition the Auxiliary Video extension cannot display Extended Graphics video.

In system units without an integrated video subsystem where the XGA Display Adapter/A is not installed in the Base Video extension slot, digital video data is not supplied to the Auxiliary Video extension slot. The XGA Display Adapter/A must be moved to the Base Video extension slot if this function is required.

32/16-bit Micro Channel Interface

An XGA Display Adapter/A in a 16-bit or 32-bit slot is automatically configured to work in that slot, and adjusts its use of the Micro Channel appropriately.

A 32-bit slot gives performance advantages over a 16-bit slot. A 32-bit slot should be used if available.

Default VGA

In system units with integrated video, if a display is attached to the display connector, it is the default VGA display. Otherwise, the first XGA Display Adapter/A (in numerical slot order) with a display attached is the default VGA. All other XGA Display Adapter/A's in the system unit are configured into Extended Graphics mode.

In system units without integrated video, an XGA Display Adapter/A in the Base Video extension slot with a display attached is the default VGA. If a display is not attached under these conditions, or an XGA Display Adapter/A is not installed in the Base Video extension, then the first XGA Display Adapter/A in the system with a display attached is the default VGA. All other XGA Display Adapter/A's in the system unit are configured into Extended Graphics mode.

If, during the self-test and bring-up routine, an active VGA adapter is detected that the XGA Display Adapter/A does not recognize, then all XGA Display Adapter/A's are configured into Extended Graphics mode.

Note: Contact your IBM Authorized Dealer or Marketing Representative if the default VGA is not suitable for your application.

Display Support

The display interface is compatible, physically and electrically, with the existing PS/2 display interface. It supports all of the existing 8514/A modes.

Display Characteristics

In Extended Graphics mode the XGA Display Adapter/A supports 1024 x 768 or 640 x 480 pel displays, with the appropriate display attached.

Display Connector

There is one display connector on the rear of the adapter.

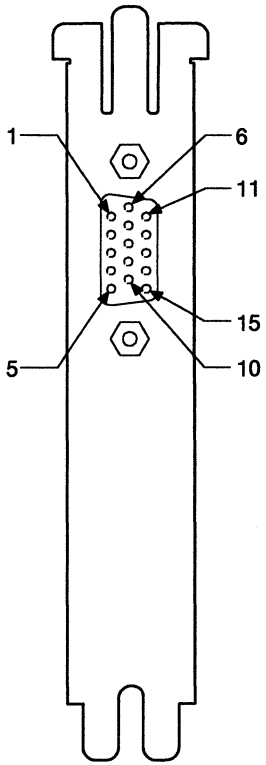


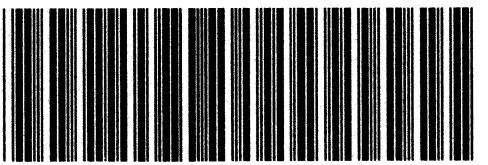
Figure 5. Display Connector

Display Connector Signals

The D-type connector carries the analog video signals and synchronization signals (TTL levels) to the display.

Pin	Color Mode	Monochrome Mode
1	Red video	Reserved
2	Green video	Video
3	Blue video	Reserved
4	Display ID 2	Display ID 2
5	Self-test	Self-test
6	Red ground	Reserved
7	Green ground	Video ground
8	Blue ground	Reserved
9	No pin	No pin
10	Digital ground	Digital ground
11	Display ID 0	Display ID 0
12	Display ID 1	Display ID 1
13	External Hsync	External Hsync
14	External Vsync	External Vsync
15	Display ID 3	Display ID 3

Figure 6. Display Connector Signals



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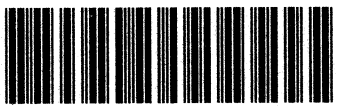

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