Ultra DMA Implementation Guide

Ultra Direct Memory Access 33

Ultra DMA is a high-speed data transfer feature that allows DMA commands to transfer data at 33.3 MB/s—double the current burst DMA transfer rate of 16.6 MB/s while using the standard 40-pin IDE interface cable.

Ultra DMA lets host computers send and retrieve data faster, removing the bottlenecks associated with data transfers—especially during sequential operations. Western Digital's WD Caviar hard drives that support Ultra DMA are able to transmit and receive data at higher rates resulting in greater performance.

In addition to speed improvements, Ultra DMA delivers new data integrity capabilities to the EIDE interface. Improved timing margins and the use of Cyclical Redundancy Check (CRC), a data transfer error detection code, help to ensure the integrity of transferred data.

Ultra DMA is also recognized as Ultra ATA and Fast ATA-2 and is endorsed by the industry's leading hard drive manufacturers, including Fujitsu, IBM, Maxtor, Quantum, Seagate, Toshiba, Western Digital, and others.

Elements Required to Use Ultra DMA

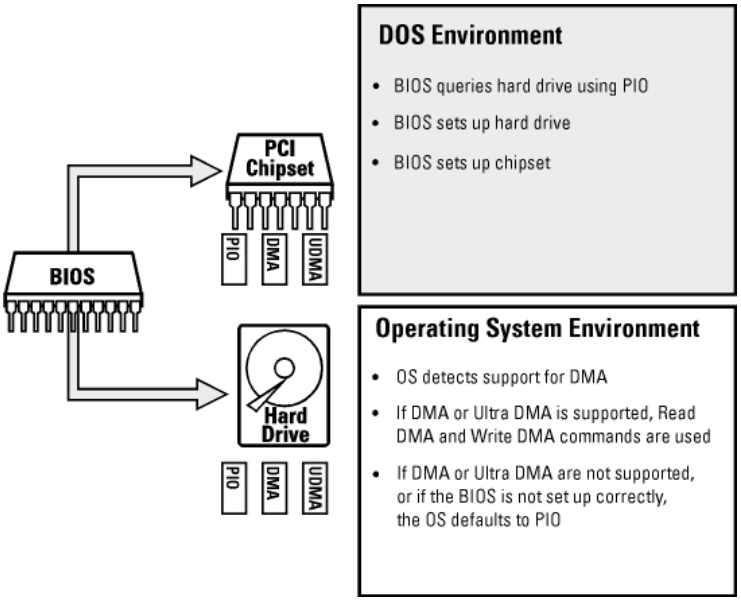
- Ultra DMA compatible hard drive.
- Ultra DMA compatible BIOS.
- Ultra DMA compatible logic on your system motherboard (partial listing).
  - Intel Pentium 430TX PCIset
  - Intel Pentium Pro 440LX AGPset
  - VIA/AMD: VIA VPX and VP/97 (also marketed as AMD-640)
  - Promise Ultra33 Controller
- Operating System device drivers. See table below.

Operating System	Supported	Comments
DOS	No	Ultra DMA not supported by DOS drivers.
Windows 95	Yes with upgrade	Not supported in retail release. Microsoft driver supports PIO only. Ultra DMA fully supported by upgrading to the latest **Intel** Bus Master DMA driver.
Windows 95 OEM SR2 (Rev B)	Yes with upgrade	Microsoft driver supports DMA only. CRC checking not supported with this driver. Ultra DMA fully supported by upgrading to the latest **Intel** Bus Master DMA driver or Microsoft QFE513.
Windows NT	Yes with upgrade	Not supported in retail release. Microsoft driver supports PIO only. Ultra DMA fully supported by upgrading to the latest **Intel** Bus Master DMA driver.
Windows 98	Yes	Standard Microsoft driver fully supports DMA and Ultra DMA.
OS/2 Warp 4.0	Yes with upgrade	Ultra DMA supported by upgrading to the latest **IBM** OS/2 Bus Master DMA driver.

Note: Contact Intel and IBM for the latest Bus Master DMA drivers.

Western Digital

Hard Drive / BIOS / Ultra DMA Interface



Ultra DMA Technology

Data Transfer Mode	Data Transfer Rate (max.)
PIO Mode 1	5.2 MB/s
PIO Mode 3	11.1 MB/s
PIO Mode 4	16.6 MB/s
Multi-word DMA Mode 2	16.6 MB/s
Ultra DMA Mode 2	33.3 MB/s

More Ultra DMA Information

1. Ultra DMA hard drives are backward compatible with existing EIDE/IDE hard drives, CD-ROM drives and host systems. Examples: 1) An Ultra DMA hard drive can be installed in a system that supports EIDE or IDE. 2) The latest motherboards that support Ultra DMA also support standard EIDE interfaces.
2. Ultra DMA supported hard drives and standard EIDE/IDE hard drives can be used in the same system.
3. The 40-pin interface cable used on Ultra DMA hard drives must be less than 18-inches in length.
4. Contact your system manufacturer to determine if your BIOS and motherboard support Ultra DMA. Some common manufacturers are listed below.

Common System Manufacturers	USA Phone Numbers
ACER	408-432-6200
AST	817-232-9824
Compaq	713-518-2000
Dell	512-338-4400
Digital	603-884-5111
Gateway 2000	605-232-2000
HP	208-323-2551
IBM	800-IBM4YOU
Micron	208-893-3434
NEC	415-528-6000
Packard Bell	801-579-0161

Known Issues

All new technologies present opportunities for short-term compatibility misalignments. The following information addresses our current areas of concern.

VIA Chipset

Background

There is a known issue involving a small shipment of Western Digital high-performance WD Caviar Ultra DMA hard drives and the VIA VPX and VP/97 (also marketed as AMD-640).

During the initiation phase of an Ultra DMA read data transfer, a series of commands are issued by the hard drive, the BIOS, and the VIA chipset. A deviation from standard protocol by the VIA VPX and VP/97 chipsets is causing the system and the hard drive to go out of synchronization, resulting in a system that does not respond or locks up.

Hard Drives Affected

The specific Western Digital hard drives affected have CCC:C1 firmware, were shipped between 9/10/97 and 10/8/97, with model numbers AC35100 and AC36400.

Solution

Current shipments of Western Digital hard drives are not affected by this VIA chipset issue. If using a Western Digital hard drive that has an issue with the VIA chipset, you must disable Ultra DMA.

Microsoft Driver

Background

The Windows 95 OEMSR2 device driver does not successfully recover from the CRC error and entry operations that can occur in Ultra DMA mode. The computer may hang with a blue screen error while the hard drive is being accessed.

Solution

The Microsoft QFE513 driver release corrects this issue and is now available to OEMs. Contact Microsoft technical support for additional information. The latest Intel Bus Master DMA driver supports Ultra DMA and the CRC error recovery process. If you have an Intel chipset, this solution is available to you. If you have a chipset other than Intel, contact your chipset manufacturer for the correct driver.

Windows 98 supports Ultra DMA and the CRC error recovery process.

For service and literature:

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