What are the Types of Xbox 360 Motherboards?

The Microsoft Corporation currently uses six types of motherboards on the Xbox 360 console. The easiest way to tell the difference between Xbox 360 motherboards is to look at the unit's amperage and voltage ratings, which are displayed on the Xbox 360 motherboard's chip. These numbers along with whether the unit has an HDMI cable determines the type of Xbox 360 motherboard that is inside the gaming console.

Xenon Motherboard

The Xenon motherboard was the first one used on the Xbox 360 at the time of launch. It used a 16.5 amp and 203 watt power supply, but had significant overheating and Red Ring of Death issues. Also, the Xenon model does not come with an HDMI connector in order to provide a higher quality video output for game play.

Zephyr Motherboard

The second motherboard to be used on the Xbox 360 was the Zephyr. It has the same power ratings as the Xenon, but has an HDMI connection. The Zephyr has similar overheating issues as the Xenon motherboard even though it has an extra GPU cooler not found in the Xenon.

Falcon Motherboard

The Falcon motherboard represented Microsoft's first major Xbox 360 motherboard redesign. The motherboard is rated at 175 watts, 12 V, and 14.2 amps and has a 65 nm CPU. The Falcon was first included with the Xbox 360 in late 2007 and has a larger CPU cooler and an HDMI connection.

Opus Motherboard

Microsoft only used Opus motherboards to replace Xenon motherboards that had failed. It was first issued in 2008 and has a 175 watt and 14.2 amp power rating. There is no HDMI output on the motherboard and it has a 65 nm CPU.

Jasper Motherboard

The Jasper motherboard was first released in late 2008. The easiest way to determine if an Xbox 360 has this motherboard installed is to check whether the chip has a 150 watt/12.1 Amp and 12 Volt power supply on the unit's rating. It also has a 65 nm GPU and 256 MB of internal flash memory.

Vejle Motherboard

The Vejle motherboard is installed in the Xbox 360 Slim model. It has a 45 nm system on chips rated to use 40% less power than other Xbox 360 motherboards.

Xbox 360 types (Xenon, Zephyr and FALCON)

Since November 2005 Microsoft has launch three type of xbox 360, Xenon, Zephyr and FALCON. The differences between these three types of xbox 360 are on GPU, CPU, Head sink (HSF) and Motherboard architecture.

Xbox 360 Xenon

The original Xbox 360 configuration used in the initial Premium and Core machines released in the end of November 2005. These are also know as the 3ROL (3 Rings of Light) machines because the GPU chip warps away from the motherboard because of excessive heat.

* IBM 90 nm CPU
* ATI 80 nm GPU and on-chip DRAM
* Small GPU cooler
* Standard CPU cooler


Xbox 360 Zephyr

Zephyr was the first revision with HDMI connector and fixed the RRoD problem cause by the inadequate GPU cooler. It was introduced with the Xbox 360 Elite in May 2007.

* Updated motherboard layout
* HDMI connector
* New 120 GB hard drive option
* Extended GPU cooler


Xbox 360 FALCON

All Xbox 360 Premium machines and Arcade machines manufactured August 2007 introduced the new 65 nm CPU accompanied with a new cooler and 55 nm GPU with the Zephyr cooler. The motherboard is based on Zephyr and this revisions requires fewer components for the new 65 nm CPU resulting in lower costs. Elite machines will eventually be updated when the initial stock is sold out. Xbox 360 packages with LOT number 0734 or higher will most likely be Falcon machines.

* IBM 65 nm CPU
* ATI 55 nm GPU

* Bigger and enhanced CPU cooler
* Fewer voltage regulators, capacitors and inductors


Xbox 360 hardware

The **hardware of the Xbox 360** includes several parts, both in the console itself and as separate pieces of kit, or accessories.

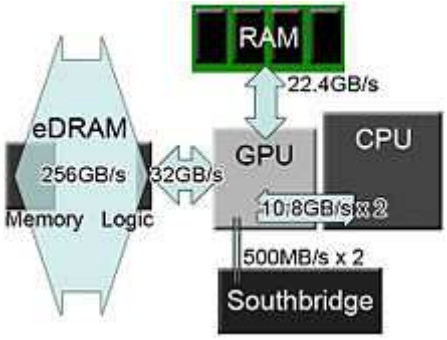
Central processing unit

The Xbox 360 takes a new approach to hardware compared to its predecessor. The XCPU, named **Xenon** at Microsoft and "Waternoose" at IBM, is a custom triple-core 64-bit PowerPC-based design by IBM. The CPU emphasizes high floating point performance through multiple FPU and SIMD vector processing units in each core. It has a theoretical peak performance of 115.2 gigaFLOPS and is capable of 9.6 billion dot products per second. Each core of the CPU is simultaneous multithreading capable and clocked at 3.2 GHz. However, to reduce CPU die size, complexity, cost, and power demands, the processor uses in-order execution in contrast to the Intel Coppermine128-based Pentium III used in Xbox which used more complex out-of-order execution. The original chip used a 90 nanometer process, although a newer 65 nanometer process SOI revision is currently in the market. A 21.6 GB/s front side bus, aggregated 10.8 GB/s upstream and downstream, connected Xenon with the graphics processor/northbridge. Xenon was equipped with a 1 MB Level 2 cache on-die running at half CPU clock speed. This cache is shared amongst the three CPU cores.[1] The CPU also contains ROM storing Microsoft private encrypted keys, used to decrypt game data. The heat sink implemented to cool the CPU is composed of aluminum fins with copper base heat pipes. The heat sink is cooled by two 70 millimeter fans at the back of the console. There are several types of fan used in the 360 from manufacturers Nidec, Sunon and Delta Electronics.

Graphics processing unit

While the first Xbox's graphics processing unit was produced by NVIDIA, the Xbox 360 had a chip designed by ATI called **Xenos**. The chip was developed under the name "C1" and "R500" was often used to refer to it.[2] The GPU package contains two separate silicon dies, each built on a 90 nm process with a clock speed of 500 MHz; the GPU proper, manufactured by TSMC and a 10 MB eDRAM daughter-die, manufactured by NEC. Thanks to the daughter die, the Xenos can do 4× FSAA, z-buffering, and alpha blending with no appreciable performance penalty on the GPU.[3] The GPU also houses additional capabilities typically separated into a motherboard chipset in PC systems, effectively replacing the northbridge chip. Due to the GPU frequently overheating in early motherboard models, Microsoft revised the GPU heat sink in order to better move heat away from the GPU die.

Memory and system bandwidth



Xbox 360 Bandwidth Diagram

The console features 512 MB of GDDR3 RAM clocked at 700 MHz with an effective transmission rate of 1.4 GHz on a 128-bit bus. The memory is shared by the CPU and the GPU via the unified memory architecture. This memory is produced by either Samsung or Qimonda.

The Xbox 360 has an extensive amount of bandwidth in comparison to its competition;[4] however this statistic includes the eDRAM logic to memory bandwidth, and not internal CPU bandwidths. The eDRAM internal logic to its internal memory bandwidth is 256 GB/s. The high bandwidth is used primarily for z-buffering, alpha blending, and antialiasing; it saves time and space on the GPU die. Between the eDRAM die and the GPU, data is transferred at 32 GB/s.[5] The memory interface bus has a bandwidth of 22.40 GB/s and the southbridge a bandwidth of 500 MB/s.

Audio and video

All games made for the Xbox 360 are required to support at least Dolby Digital 5.1 surround sound. The console works with over 256 audio channels and 320 independent decompression channels using 32-bit processing for audio, with support for 48 kHz 16-bit sound. Sound files for games are encoded using Microsoft's XMA audio format. An MPEG-2 decoder is included for DVD video playback. VC-1 or WMV is used for streaming video and other video is compressed using VC-1 at non-HD NTSC and PAL resolutions or WMV HD. The Xbox 360 also supports H.263 and H.264 MPEG-4 videos. Unlike the original Xbox, voice communication is handled by the console, not by the game code, allowing for cross-game communication. There is no voice echo to game players on the same console; voice only goes to remote consoles.

Initially there were no digital video outputs such as DVI or HDMI on the Xbox 360; instead, HD-quality output could only be produced over YP_BP_R component video (used by both the 3 RCA component cable and the Japanese D-terminal cable) and later VGA (via a software update). An HDMI port was introduced to the Xbox 360 by July 2007

with the introduction of the *Elite* model. All Xbox 360 SKU's currently manufactured feature an HDMI port. A wide array of SDTV and HDTV resolutions are supported by the console hardware;[6] up to 1080p after the October 2006 software upgrade.[7] While most games are rendered natively at 720p, the video from all games can be scaled by the hardware to whatever resolution the user has set in the console's settings; from 480i NTSC and 576i PAL all the way to 1080p HDTV.

DVD storage

Early production runs of the Xbox 360 are equipped with a 12x DVD drive, capable of a maximum read rate of 15.85 MB/s.[8] The original production DVD drives were manufactured by both LG and Toshiba. Beginning in November 2006, a new model the BenQ VAD6038 was introduced, which is said to run faster than the previous models and, in addition, is much quieter.[8][9] There is a new drive by LiteOn.[10]

Games are stored on standard dual-layer DVD-ROMs with 7.8 GB of usable space available for game content.[11] The option to apply a regional lockout to games is available to publishers, although DVD region codes are always enforced for movies. Microsoft has implemented methods to prevent hacking through the drive. Later drive models have the external debug triggering removed and black hard glue added to cover all the chip and controller pins.[12] The drive is able to read both DVD±R and DVD±RW in addition to being able to play DVD-Video out of the box, unlike its predecessor, which required the purchase of an add-on remote. The system is also capable of playing standard CDs along with CD-R/RW, CD-DA, CD-ROM XA, CD-Extra, WMA-CD, MP3 -CD, and JPEG Photo CD.[13] Some users reported problems with the disc drive, as when a user changes the console's orientation, the inserted disc may brush against the drive's pickup assembly and incur scratches to it.[14] The users manual advises against changing the console's position while there is a disc in the drive. Other users report experiencing disc scratching during normal horizontal usage.

Announced at CES 2006 and first publicly shown at E3 2006, an external HD DVD drive was released in North America on November 7, 2006 (for US$199.99) and in Japan on November 17, 2006 (for ¥19,800). In the UK, France and Germany, the HD DVD drive was released for €199.99/£129.99.[15] The HD DVD drive was bundled for a limited time with an Xbox 360 Universal Media Remote, as well as an HD DVD copy of Peter Jackson's *King Kong*.[15] The drive plays HD DVD movies, although all Xbox 360 games will remain on the DVD format.[16] Microsoft has no plans to include an internal HD DVD player in future Xbox 360 designs.[17] The drive connects to the Xbox 360 via USB and contains two integrated USB ports on the rear. Games can not be played on the HD DVD drive.

Microsoft has since discontinued the HD DVD add-on since the format was officially dropped by Toshiba. All remaining drives on store shelves have been drastically reduced in price by an average of US$50.00 to US$129.00 Some retailers have lowered it to as low as US$50.00 to clear it from their inventory.[18]

List of DVD drives

Manufacturer(s)	Model	Firmware version(s)	Notes
Toshiba-Samsung	TS-H943	MS25 MS28	
Hitachi-LG	GDR-3120L	0032 0036 0040 0046 0047 0058 0059 0078 0079FK	
	DL10N (Xbox 360 S)	0500AA	
Philips & BenQ Digital Solutions (AKA BenQ/Philips)	VAD6038	62430C 64930C 04421C	New FW after System Update 2.0.13146.0 version. (04421C)
	DG-16D2S	74850C 83850C v1 83850C v2 93450C 02510C	New FW after System Update 2.0.13146.0 version. (02510C)
Lite-On	DG-16D4S (Xbox 360 S)	9504 0225 0401 0272 1071 1214	New FW after System Update 2.0.13146.0 version. (9504 → 0272)
	DG-16D5S (Xbox	A445	

360 S)

Hard drive storage

Original style Xbox 360 hard drives

The Xbox 360 uses standard 2.5" SATA hard disk drives (HDDs) held within custom enclosures. These units have a custom connector to facilitate connection to the Xbox 360 and the drives themselves feature custom firmware (making stand-alone drives incompatible). The drives are detachable, making it possible to move data from one console to another, and to upgrade the size of drive on a console. The hard drives themselves are manufactured by various companies, including Fujitsu, Seagate, Samsung, Hitachi and Western Digital.

The original *Pro* configuration of the system came with a 20 GB hard drive, which was also available to purchase separately (for the *Core* model, and later the *Arcade* model, which did not include an HDD). This was upgraded to 60 GB in September 2008, and the 60 GB HDD was also made available at retail. In April 2007, Microsoft released the *Elite* console, which included a black 120 GB HDD; a grey 120 GB drive was also later made available at retail. In November 2009, Microsoft released the "Super Elite" console, as a bundle with the highly anticipated game Call of Duty: Modern Warfare 2. This console was like the typical black *Elite*, but with *Call of Duty* graphics added and for the first time included a 250 GB hard drive (which holds up to 228 GB of data after system information is stored). This was followed by various other 250 GB special/limited edition bundles. No standard (non-special edition) configuration of the original console ever included a 250 GB drive, but they were later made available at retail.

In June 2010, Microsoft announced a new version of the console, the Xbox 360 S, which used a new form factor for its 250 GB hard drives. As such, original style hard drives cannot be used in Xbox 360 S consoles, and vice versa, without modification. In June 2011, Microsoft announced a specially branded "Gear of War 3 Limited Collector's Edition" Xbox 360 S console to coincide with the launch of Gears of War 3. At 320 GB, the included hard drive is the largest available for/with any Xbox 360 model.[19]

Approximately 7 GB of a 60 GB drive is reserved for system use (4 GB of that portion is reserved for game title caching and other hard drive specific elements in games that support the hard drive, and an additional 2 GB is reserved for use by the Xbox 360

backwards-compatibility software). This leaves just under 54 GB of free space, rounded down to 53 GB in the dashboard, for saving game files, Xbox Live Arcade downloadable content, and media files (such as music and video). Similar figures apply to other hard drive sizes.

Other independent companies have manufactured 250 GB hard drives using hacked firmware since 2008. Many of these allegedly infringe trademarks of Microsoft, including the Microsoft logo, Xbox 360 logo, and the likeness of the removable hard drive design.[*citation needed*]

Networking

All versions of the Xbox 360 come with a built in 10/100 Ethernet network adapter. Proprietary USB WiFi 802.11n and 802.11g adapters can be purchased separately. The Xbox 360 S, or slim, has built in wireless N networking.

Motherboards

Microsoft avoids outright announcements of new motherboard production runs and their subsequent appearance in the market in part due to uneven distribution causing buyer's remorse and to prevent purchaser delay.[20] However, several major (and many minor) motherboard revisions are introduced in an attempt to build systems more cheaply (and thus increase profits), and to allow them to run cooler and on less power. Note that there is no clear divide between the appearance of motherboard revisions in retail. Due to individual stock production, distribution and rotation, it may become difficult to find specific versions.[21]

The initial motherboard version was known as "Xenon" and used a 203 W power supply. The "Zephyr" revision was largely the same aside from the addition of an HDMI port. "Falcon" incorporated a 65 nm CPU, new 80 nm GPU, and came packaged with a 175 W power supply. "Jasper" (released late August or early September 2008[22][23]) used both a 65 nm CPU and GPU, as well as 256 MB of flash memory on-board (this was to help run a then-recent Dashboard update. Without this internal memory, a hard drive or memory card was required). The power supply was also reduced to 150W in the "Jasper" revision. The power connector on the back of the system incorporated a "keying" system that will prevent plugging a lower-rated power supply into an older system.[24] Some stores used to exclusively carry units with the Jasper motherboard. A new motherboard version called "Vejle" has also been released into public in the form of the slim Xbox 360 S with a 45 nm integrated CPU, GPU, and eDRAM (i.e. all in the same chip package).[25]

List of revisions

Codename	CPU	GPU	HDMI	Power Supply	In Production	Date Released	Notes
Xenon	90 nm	90 nm	No	203 W	No	November 2005	Original release.
Zephyr	90 nm	90 nm	Yes	203 W	No	July 2007	Introduced HDMI port
Falcon	65 nm	90 nm	Yes	175 W	No	Late September 2007	Introduced 65 nm CPU. Power consumption lowered.
Opus	65 nm	90 nm	No	175 W	No	June 2008	Available as a replacement for Xenon motherboards which have been sent in to Microsoft repair centers.
Jasper	65 nm	65 nm	Yes	150 W	No	September 2008	Introduced 65 nm GPU. Introduced on-board flash based memory. Further reduced power consumption.
Vejle	45 nm (combined chip)[26]		Yes	135 W	Yes	May 2010	Motherboard redesign available exclusively in the Xbox 360 S.

Connectivity to accessories

An Xbox 360 Wireless Controller

The Xbox 360 features three USB 2.0 ports (two on the front, one on the back).[13] The new Xbox 360 S, however, has five USB 2.0 ports (two on the front, three in the back) along with a dedicated Kinect port. These are used for connection of accessories such as wired controllers, the wireless networking adapter, the Xbox Live Vision camera and USB storage devices. Although the number of wired controllers is limited by the number of ports, up to four may be used through the use of a USB hub.

The Xbox 360 also features wireless connectivity of accessories via a proprietary 2.4 GHz radio system. This is mainly used to connect the official wireless controllers, but is also used for other devices such as the wireless racing wheel and wireless headsets. With the exception of some rhythm game controllers, this wireless connectivity is limited to first-party Microsoft accessories.

The Xbox 360 can connect to Xbox Live over the internet through the built-in 100 megabit ethernet connector or an optional wireless network adapter. These can also be used to connect two consoles together directly for LAN play on supported games.

The console also has two front-mounted memory card slots for the system's proprietary Memory Unit. These can be used to transfer profile and game data from one Xbox 360 to another. Memory Units up to 512 MB are available from Microsoft. The "Arcade" model formerly came with a 256 MB Memory Unit, but with the Jasper motherboard revision of September 2008, the "Arcade" model began to include 256 MB of built-in flash memory. This was later increased to 512 MB.

The Universal Media Remote can be used to control several functions of the console, including the Windows Media Center functions if connected to the network. It communicates with the console via infrared through a receiver port on the front of the console.

All standard controllers for the system feature a 2.5 mm headset jack to allow the use of wired headsets for voice chatting. They also feature a custom USB connector, which is currently only used for connection of the chatpad keyboard accessory.

Various other accessories for the console exist, such as decorative faceplates to change the physical appearance of the console.

Physical appearance

The physical outline of the original style Xbox 360 is 310 mm × 80 mm × 268 mm (12 in × 3 in × 10 in; width × height × depth)[27] when placed horizontally and is similar in form factor to its predecessor. It is slightly slimmer in every dimension and is slightly concave, while the original Xbox was noticeably convex. It comes as standard in either black or white, with other colors available as special editions. It was designed by Astro Studios in cooperation with Hers Experimental Design Laboratory.[28] In June 2010 a redesign of the console, known as the Xbox 360 S,[29] was announced. This version of the console retains the same basic shape but is noticeably smaller and more angular than the original version. It comes as standard in either matte or glossy black; like its predecessor, other colors are available as special editions. The front of the console features a "ring of light", which displays 4 illuminated quadrants either in red or green (green only on the redesigned console). When the lights turn red, the console has encountered an error, with the number of sectors illuminated informing the user what category the error falls into. Since the redesign of the console removed the red LEDs, this error reporting system is no longer used. The original Xbox 360 weighs approximately 3.5 kg (7.7 lb),[27] about 350 grams lighter than the original Xbox. The console uses an external power supply with a 10 A/100–120 V or 5 A/220-230 V (AC) input and DC output rated at 203/175/150 W (depending on revision). An estimated 2 W of power are used while the console is in standby mode giving a yearly usage of approximately 17.5 kWh.[30] Saving the console size and weight, the power supply displaces 1300 cm^3.[31]