

Hardware

COLLABORATORS

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Chapter 1

Hardware

1.1 Amiga® Hardware Reference Manual: Glossary

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1.2 Glossary / address

A byte-numbered memory location. The Zorro II bus is based on a 24-bit address, the Zorro III bus on a 32-bit address.

1.3 Glossary / Agnus

One of the three main Amiga custom chips. Contains the blitter, copper, and DMA circuitry.

1.4 Glossary / aliasing distortion

A side effect of sound sampling, where two additional frequencies are produced, distorting the sound output.

1.5 Glossary / Alt keys

Two keys on the keyboard to the left and right of the Amiga keys.

1.6 Glossary / Amiga keys

Two keys on the keyboard to the left and right of the space bar.

1.7 Glossary / AmigaDOS

The disk operating system (DOS) used by Amiga computers.

1.8 Glossary / amplitude

In audio applications, the voltage or current output expressed as volume from a sound speaker.

1.9 Glossary / amplitude modulation

In audio applications, a means of producing complex audio effects by using one audio channel to alter the amplitude of another.

1.10 Glossary / arbitration

The unambiguous selection of one request out of a number of possible simultaneous requests for a resource. There are two kinds of arbitration in a Zorro III system; bus arbitration and quick interrupt arbitration.

1.11 Glossary / asserted

The active state of a state, regardless of its logic sense.

1.12 Glossary / atomic cycle

A cycle or set of cycles that are uninterruptable, and thus treated as a unit; both Multiple Transfer and LOCKed cycles are considered atomic under the Zorro III bus.

1.13 Glossary / attach mode

1. With sprites, a mode in which a sprite uses two DMA channels for additional colors. 2. In sound production, combining two audio channels for frequency/amplitude modulation or for stereo sound.

1.14 Glossary / AUTOCONFIG(TM)

>From "automatic configuration," the Zorro bus specification for how software and hardware cooperate to permit PIC addresses to be set by software and PIC type information to be determined by software.

1.15 Glossary / automatic mode

1. With sprites, the normal mode in which the sprite DMA channel automatically retrieves and displays all of the data for a sprite. 2. In audio applications, the normal mode in which the audio DMA channels automatically retrieve sound data.

1.16 Glossary / backplane

The cage or motherboard subsection into which PICs are inserted. The Amiga 2000 and Amiga 3000 computers have integral backplanes, the Amiga 500 and Amiga 1000 computers require add-on backplane cages for Zorro II compatibility.

1.17 Glossary / barrel shifter

Blitter circuit that allows movement of images on pixel boundaries.

1.18 Glossary / baud rate

Rate of data transmission through a serial port.

1.19 Glossary / beam counters

Registers that keep track of the position of the video beam.

1.20 Glossary / bitmap

An image made up of pixels. A bitmap is a complete definition for a video display consisting of one or more bitplanes stored in memory.

1.21 Glossary / bitplane

A contiguous area of memory set aside for the video display and logically organized as if it were a rectangular shape. All displays consist of one or more bitplanes; each additional bitplane doubles the number of colors that can be displayed.

1.22 Glossary / bitplane animation

A means of animating the display by moving around blocks of playfield data with the blitter.

1.23 Glossary / blanking interval

Time period when the video beam is outside the display area.

1.24 Glossary / blitter

An Amiga coprocessor with its own DMA channel used for data copying and line drawing.

1.25 Glossary / burst

A short name for Multiple Transfer Cycle mode. Essentially, within one full Zorro III cycle there can be any number of Multiple Transfer Cycles. Each full cycle has a complete 32-bit address supplied and a complete 32-bit datum transferred. Each burst cycle supplies only the 8-bit page address, but transfers a complete 32-bit datum faster than the standard full cycle would allow.

1.26 Glossary / bus cycle

One complete bus transaction, indicated by the assertion of at least one cycle strobe. For any single bus cycle, there is one address, one data value, one data direction, and one cycle type in effect.

1.27 Glossary / bus hogging

When a bus master takes over the bus for an undue amount of time. The Zorro II bus leaves it completely up to the individual PIC to avoid bus hogging; the Zorro III bus schedules PICs with the bus controller to evenly distribute the bus load.

1.28 Glossary / bus starvation

When a master can't get access to the bus, it is said to be starved. On the Zorro II bus, two busy masters can completely starve a third master. Complete starvation is impossible on the Zorro III bus, though a bus hogging Zorro II card can cause similar symptoms.

1.29 Glossary / byte

A collection of eight signals into a logical group, and the smallest independently addressable quantity on the Zorro bus.

1.30 Glossary / Chip RAM

The area of memory accessible to the Amiga's custom chip set used for graphics and sound data. The amount of Chip RAM varies from 512K to 2 megabytes depending on the Amiga model. See Fast RAM.

1.31 Glossary / clear

1. To change a bit or flag to 0, its off or disabled state. Opposite of set. 2. To erase a screen or window display.

1.32 Glossary / clipping

When a portion of a sprite is outside the display window and thus is not visible.

1.33 Glossary / clock

A free running signal driven at a fixed frequency to the bus, used mainly for clocking state machines on Zorro II cards.

1.34 Glossary / collision

A means of detecting when sprites, playfields, or playfield objects attempt to overlap in the same pixel position or attempt to cross some pre-defined boundary.

1.35 Glossary / color descriptor words

Pairs of words that define each line of a sprite.

1.36 Glossary / color indirection

The method used by the Amiga for coloring individual pixels. For each pixel, a binary number is formed from corresponding bits in each bitplane which refers to one of the 32 color registers.

1.37 Glossary / color register

One of 32 hardware registers containing colors that you can define. In general, each color register can be set to one of 4,096 colors from the Amiga's palette.

1.38 Glossary / color table

The set of 32 color registers.

1.39 Glossary / Command Line Interface (Shell or CLI)

A means of communicating with a computer by typing commands at the keyboard. On the Amiga, this is called the Shell and, along with Workbench and ARexx, is one of the three built-in user interfaces. Before the Shell was available, this interface was called the CLI.

1.40 Glossary / composite video

A video signal, transmitted over a single coaxial cable, which includes both picture and sync information.

1.41 Glossary / controller

Hardware device, such as a mouse, joystick, or light pen, used to move the pointer or furnish other input to the system.

1.42 Glossary / coordinates

A pair of numbers shown in the form (x,y), where x is an offset from the left side of the display or display window and y is an offset from the top.

1.43 Glossary / copper

Display-synchronized coprocessor that resides on one of the Amiga custom chips and directs the graphics display.

1.44 Glossary / coprocessor

An extra processor that enhances system performance by doing a specialized task, such as graphics or math, very quickly. This frees the main processor to do other work. Every Amiga has at least three coprocessor chips named Paula, Agnus, and Denise to handle graphics and audio.

1.45 Glossary / cursor keys

The four keys with directional arrows on them (found below the Del and Help keys on the Amiga).

1.46 Glossary / cycle strobe

A bus signal that defines the boundary of a bus cycle; the Zorro II and Zorro III modes on a Zorro III bus each have their own cycle strobes. The current bus master always asserts the cycle strobes.

1.47 Glossary / data

The contents of a memory location. The main purpose of a bus cycle is to transfer data between two locations. The Zorro II bus is based on a 16-bit data path, the Zorro III bus is based on a 32-bit data path.

1.48 Glossary / data fetch

The number of words fetched for each line of the display.

1.49 Glossary / delay

In playfield horizontal scrolling, specifies how many pixels the picture will shift for each display field. Delay controls the speed of scrolling.

1.50 Glossary / Denise

One of the three main Amiga custom chips. Contains the circuitry for the color palette, sprites, and video output.

1.51 Glossary / depth

Number of bitplanes in a display. Each additional bitplane doubles the number of colors that can be displayed.

1.52 Glossary / device

A PIC; e.g., a Zorro bus master or bus slave.

1.53 Glossary / Digital-to-Analog Converter (DAC)

A device that converts a binary quantity to an analog level.

1.54 Glossary / Direct Memory Access (DMA)

.nh An arrangement that allows coprocessors or other system devices to read or write memory directly, without having to interrupt the main processor. Devices that have direct access to Zorro III slaves are said to have DMA capability. These devices are also called masters. .hy 14

1.55 Glossary / display field

One complete scanning of the video beam from top to bottom of the video display screen.

1.56 Glossary / display mode

One of the basic types of display; for example, high or low resolution, interlaced or non-interlaced, single or dual playfield.

1.57 Glossary / display time

The amount of time to produce one display field, approximately 1/60th of a second.

1.58 Glossary / display window

The portion of the bitmap selected for display. Also, the actual size of the on-screen display.

1.59 Glossary / DMA latency

This is the time between a bus request and a bus grant as seen by a PIC wishing to become bus master.

1.60 Glossary / dual-playfield mode

A display mode that allows you to manage two separate display memories, giving you two separately controllable displays at the same time.

1.61 Glossary / Enhanced Chip Set (ECS)

The upgraded versions of the Amiga's Agnus and Denise coprocessor chips. The ECS offers new display modes and expands the Amiga's graphic capabilities. Many of the benefits of the ECS are available only in conjunction with Release 2 of the operating system.

1.62 Glossary / equal-tempered scale

A musical scale in which the frequency of each tone is the 12th root of 2 higher than the tone below it. The equal-tempered scale is used in almost all musical styles.

1.63 Glossary / Exec

The Amiga system module which manages memory and performs other important low-level tasks.

1.64 Glossary / Fast RAM

General-purpose memory used for programs and data; as opposed to Chip RAM.

1.65 Glossary / font

A set of letters, numbers, and symbols sharing the same size and design.

1.66 Glossary / frequency

In audio applications, the number of times per second a waveform repeats.

1.67 Glossary / frequency modulation

In audio applications, a means of producing complex sounds by using one audio channel to affect the period of the waveform produced by another channel.

1.68 Glossary / genlock

An optional feature of the Amiga that allows you to combine an external video source with Amiga's graphic display.

1.69 Glossary / grant

The result of an arbitrated set of requests is a single grant; there are grants given for both the bus and quick interrupts.

1.70 Glossary / hidden cycles

Cycles that occur on the local bus of a system, but can't be seen by devices on the expansion bus.

1.71 Glossary / high

A signal driven to a logical +5V state is said to be high.

1.72 Glossary / high resolution (Hires)

A horizontal display mode in which 640 pixels are displayed across a horizontal line in a normal-sized display. On the Amiga a high resolution display is often called Hires.

1.73 Glossary / hold-and-modify (HAM)

A display mode that gives you extended color selection. Normally, the Amiga supports up to 32 different colors from a palette of 4,096. Hold-and-modify (HAM mode) allows all 4,096 colors on the screen at one time by placing some restrictions on which colors may be displayed near each other.

1.74 Glossary / interlace mode

A vertical display mode where 400 lines are displayed from top to bottom of the video display in a normal-size display.

1.75 Glossary / interrupt

An asynchronous line driven by a PIC to notify the CPU of some event, usually some hardware event governed by that PIC.

1.76 Glossary / joystick

A controller device with a handle that swings up, down, left, or right, used to position something on the screen.

1.77 Glossary / light pen

A controller device consisting of a stylus and tablet used for drawing something on the screen.

1.78 Glossary / local bus

The main system bus of an Amiga computer is called the local bus. In general, the main CPU, video chips, chip memory, and any other built-in resources are on the local bus. The bus controller sits on both the local and expansion buses and manages the communications between them.

1.79 Glossary / longword

Based on the Motorola conventions, a longword is equal to 4 bytes.

1.80 Glossary / low

A signal driven to a logical +0V state is said to be low.

1.81 Glossary / low resolution (Lores)

A horizontal display mode in which 320 pixels are displayed across a horizontal line in a normal-sized display. On the Amiga, a low resolution display is often called Lores.

1.82 Glossary / manual mode

Non-DMA output. In sprites, a mode in which each line of a sprite is written in a separate operation. In audio applications, a mode in which audio data words are written one at a time to the output channel.

1.83 Glossary / master

The device currently generating addresses for the expansion bus. There is only one master on the bus at a time, this being insured by the bus arbitration logic. The master also drives data on writes, the read, cycle, and data strobes, and several other signals.

1.84 Glossary / MIDI

A communications standard which allows electronic music devices to share information. MIDI stands for Musical Instrument Digital Interface and is endorsed by the majority of musical instrument manufacturers.

1.85 Glossary / microsecond (us)

One millionth of second (1/1,000,000).

1.86 Glossary / millisecond (ms)

One thousandth of second (1/1,000).

1.87 Glossary / minterm

One of eight possible logical combinations of data bits from three different data sources.

1.88 Glossary / modulo

A number defining which data in memory belongs on each horizontal line of the display. Refers to the number of bytes in memory between the last word on one horizontal line and the beginning of the first word on the next line.

1.89 Glossary / motherboard

The main system circuit board for any Amiga computer. Resources on the local bus of a machine are often called motherboard resources.

1.90 Glossary / mouse

A controller device that can be rolled around to move something on the screen; also has buttons to give other forms of input.

1.91 Glossary / multitasking

The ability to perform more than one operation, or task, at a time.

1.92 Glossary / nanosecond (ns)

One billionth of a second (1/1,000,000,000).

1.93 Glossary / negated

The inactive state of a signal, regardless of its logic sense.

1.94 Glossary / non-interlaced mode

A display mode in which 200 lines are displayed from top to bottom of the video display in a normal-sized display.

1.95 Glossary / NTSC

Short for National Television Standards Committee specification for composite video. NTSC is the standard used for video broadcasting in the US. Other video standards include PAL, used widely in Europe, and SECAM. When the Amiga is operating in an NTSC environment, the base crystal frequency is 28.63636 MHz.

1.96 Glossary / nybble

A collection of four bits; one half of a byte. AUTOCONFIG(TM) ROMs are physically nybble-wide.

1.97 Glossary / overscan area

The normally unused area surrounding a standard-size computer display. The overscan area is important in video applications.

1.98 Glossary / paddle controller

A game controller that uses a potentiometer (variable resistor) to position objects on the screen.

1.99 Glossary / PAL

Short for Phase Alternate Line. PAL is the video broadcast standard widely used in Europe. Although PAL is similar to the NTSC standard used in the US, the two systems are incompatible. Under PAL, the base Amiga crystal frequency is 28.37516 Mhz.

1.100 Glossary / parallel port

A connector on the back of the Amiga that allows extra equipment such as a printer to be attached. The parallel port transfers data one complete byte (8 bits) at a time, in contrast to the serial port which sends a single bit at a time.

1.101 Glossary / Paula

One of the three main Amiga custom chips, Paula contains audio, disk, and interrupt circuitry.

1.102 Glossary / PIC

Plug-In Card. Any Amiga expansion card is called a PIC for short.

1.103 Glossary / pitch

1. The quality of a sound expressed as its highness or lowness. 2. The number of characters printed in a horizontal inch.

1.104 Glossary / pixels

The dots of light that make up the Amiga screen display. A pixel is the smallest unit of display information for a given screen.

1.105 Glossary / playfield

The background for all the other display elements on the Amiga. Playfields provide the hardware-level logic for creating the Amiga's display.

1.106 Glossary / playfield object

Subsection of a playfield that is used in playfield animation.

1.107 Glossary / pointer register

Register that is continuously incremented to point to a series of memory locations.

1.108 Glossary / polarity

True or false state of a bit.

1.109 Glossary / potentiometer

An electrical analog device used to adjust some variable value.

1.110 Glossary / quantization noise

In audio applications, noise introduced by round-off errors when you are trying to reproduce a signal by approximation.

1.111 Glossary / RAM

Short for random access memory. RAM is the part of the Amiga's memory which can be used for data storage and is directly accessible by the CPU. RAM storage is volatile, meaning that data in RAM is lost when the Amiga is rebooted or turned off; as opposed to ROM memory which is permanent.

1.112 Glossary / raster

The area in memory that completely defines a bitmap display.

1.113 Glossary / read-only

Describes a register or memory area that can be read but not written.

1.114 Glossary / request

Asking for the use of some resource; the Zorro III bus has two kinds of requests, bus requests and quick interrupt requests.

1.115 Glossary / resolution

The number of pixels associated with a particular display mode. For example, a normal NTSC Hires screen has a resolution of 640 (horizontal) by 200 (vertical) pixels.

1.116 Glossary / ROM

Short for read-only memory. ROM is the part of the Amiga's memory which is permanent, or non-volatile. The Amiga's operating system is stored in ROM.

1.117 Glossary / sample

In audio applications, a single discrete data item which represents a waveform amplitude at a given instant. A group of samples taken over time is used to represent a waveform in the Amiga's memory.

1.118 Glossary / sampling rate

The number of samples played per second. Also used to mean the rate at which the samples were originally recorded.

1.119 Glossary / sampling period

The value that determines how many clock cycles it takes to play one data sample.

1.120 Glossary / scroll

.nh To move a playfield smoothly in a vertical or horizontal direction.

1.121 Glossary / SCSI

Acronym for Small Computer System Interface. SCSI is a standard interface protocol for connecting peripherals, especially hard disk drives and other mass storage devices, to computers.

.hy 14

1.122 Glossary / serial port

A connector on the back of the Amiga that allows extra equipment such as a printer to be attached. The serial port transfers data one single bit at a time in contrast to the parallel port which sends one complete byte (8 bits) at a time.

1.123 Glossary / set

To change a bit or flag to 1, its on or enabled state.; as opposed to clear.

1.124 Glossary / Shell

The command line interface used to send typed commands to the Amiga. One of the three user interfaces built into the Amiga.

1.125 Glossary / slave

The device currently responding to the address on the expansion bus. There is only one slave on the bus at a time; an error is signalled by the bus collision detect logic if multiple slaves respond to the same address. The slave also drives data on reads, the transfer acknowledge strobe, and several other signals.

1.126 Glossary / slot

A physical port on a Zorro backplane, which supplies independent /SLAVEn /BRn, and /BGn lines, chained /CFGINn and /CFGOUTn lines, and is mechanically manifested as a 100 pin single-piece connector.

1.127 Glossary / sprite

Easily movable graphics object that is produced by one of the eight sprite DMA channels and is independent of the playfield display.

1.128 Glossary / strobe address

An address you put out to the bus in order to cause some other action to take place; the actual data written or read is ignored.

1.129 Glossary / task

A software function spawned by a process. Each task is an operating system module or application program which is running and that has full control over its own virtual 68000 machine.

1.130 Glossary / termination

Circuitry attached to a bus signal in order to minimize annoying analog things like ringing, reflections, crosstalk, and possibly random logic conditions which can arise when a bus is undriven.

1.131 Glossary / timbre

The distinctive quality of a sound produced by its overtones.

1.132 Glossary / timeout

A bus cycle terminated by the bus controller instead of by a responding slave device. If no slave responds to a bus cycle within a reasonable time period, the bus controller will terminate the cycle to prevent lockup of the system.

1.133 Glossary / transparent

In graphics, a special color register definition that allows a background color to show through. Used in dual-playfield mode.

1.134 Glossary / tri-state

A signal driven to a high impedance condition is said to be tri-stated.

1.135 Glossary / UART

The circuit that controls the serial link to peripheral devices, short for Universal Asynchronous Receiver/Transmitter.

1.136 Glossary / video priority

Defines which graphic objects (playfields and sprites) are shown in the foreground and which objects are shown in the background when they occupy the same area of the display. Higher-priority objects appear in front of lower-priority objects.

1.137 Glossary / video display

Everything that appears on the screen of a video monitor or television.

1.138 Glossary / write-only

Describes a register that can be written to but cannot be read.

1.139 Glossary / word

Based on the Motorola conventions, a word is equal to 2 bytes.

1.140 Glossary / Zorro

The name given to the Amiga bus specification. "Zorro I" refers to the original design for A1000 backplane boxes, "Zorro II" refers to the modification to this specification used for the A2000 and compatible backplanes, and "Zorro III" refers to the Zorro II compatible bus specification first used in the Amiga 3000 computer.
