A Beginner's Guide to the AMIGA Personal Computer

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1 Introduction and Terminology

Congratulations! You own the most powerful home computer the world has yet to see. As with all things, with great power comes great responsibility. This guide will assist you in learning your way around this incredible computer. If you have been frightened about sitting down and playing with your Amiga, now is the time to do it. We will take you by the hand and lead you down the path to becoming an Amiga guru. This guide was intended for beginners and as such will probably bore those of you who have had an Amiga for a few years. If you are very familiar with some aspects of the Amiga, feel free to skip these parts of the guide. Learn at your own pace and don't get in a hurry. You will be knowledgeable soon enough! Happy computing!

1.1 Terminology

As with any profession, hobby, or pastime, personal computing has its own 'jargon' or 'lingo'; a language you must learn if you are to become an accepted part of this world. This section will teach you some of the specific terms regarding the Amiga computer. Many of these terms will be explained in more detail later on, so if they sound confusing, hopefully they won't when you are finished with this guide.

1.1.1 Basic System Terms - Workbench

ICON - A small picture displayed on the Workbench that represents a file. Usually double clicking it will cause it to be executed. There are several types representing several kinds of programs. They are DISK, TOOL, PROJECT, TRASHCAN, and DRAWER.

TITLE BAR - The dark bar on the top of the Workbench or on top of an opened window. Usually this contains the title of the window (drawer) and other pertinent information like free space left on the disk, etc.

GADGET - This button-like object usually appears as a box with a circular arrow on the left hand part of the box. Clicking this box usually changes its contents to something else; usually an option. Repeated clicking will 'toggle' through all the possible selections. Any interactive 'button' or screen area is often called a GADGET such as a SLIDER or SIZER.

REQUESTER - Almost every modern piece of Amiga software uses a REQUESTER of some sort. A requester usually does just that; requests something then asks you to click the OK gadget when ready. There is also a FILE REQUESTOR which is used to input a filename. With this requester, you can 'browse' through all your drives and devices and simply click the file to select.

TRASHCAN - This icon is a deposit for unwanted files. It is really just a special directory used to hold these files. When you 'throw away' files here, they are moved to this directory and kept until you physically DELETE them or select EMPTY TRASH from the WorkBench pull downs. If you really want to get rid of a file simply DELETE it instead of using the TRASHCAN since

the TRASHCAN will not free up any space by its use.

CLICK - Pressing a mouse button. LEFT CLICK means the left mouse button (usually used to select or highlight) and RIGHT CLICK means the right mouse button (usually used to activate the pull down menus on the Workbench or inside a program. Many items like the Workbench require a DOUBLE CLICK to activate something. When you see DOUBLE CLICK, it means click the left mouse button twice quickly on your selection.

DRAG - This is used to move icons around the screen, copy files, and deposit items in the TRASHCAN. To effect this, simply click your left mouse button and hold it down on the icon. The icon will then follow your pointer until you let it go. We'll examine this procedure more later.

TOGGLE - Like a light switch, many gadgets have a SELECTED or DES-ELECTED text. Some menu options can be turned off and on such as the BACKDROP on the Workbench pull down menus. These are sometimes denoted by a check mark or by highlighting the option in another color. In any event, this is called TOGGLING the command/option; changing it to its other value.

SLIDER - Sliders are used on the sides and bottoms of windows to show when there is more information available. They also allow you to scroll around the window to see this information. You may either DRAG the small filled box inside the slider to show the information or click in the slider area where the filled box ISN'T and the box will travel in that direction. To see this in effect, open you Workbench Icon and use the SIZER in the lower right hand corner of the window to SHRINK the window to a smaller size. When you are finished, the sliders will indicate that there are more icons to see.

SIZER - This allows you to size the window. This gadget is located at the bottom right of almost every window and can be DRAGGED to the proper size.

CLOSE WINDOW GADGET - The gadget located in the top left corner looks like a little box inside a box. This will close the current window. If you are in a SHELL, you may press CTRL-\ to close the window.

WINDOW TO BACK GADGET - Located in the top right corner of a window, it puts the current window BEHIND all the other windows so you may have access to them. It looks like two box overlapping each other. You may also use LEFT AMIGA-M to push a window back.

SHRINK WINDOW GADGET - This gadget is located to the immediate left of the WINDOW TO BACK GADGET. It will shrink or expand the window to its smallest size or original size respectively. It is a toggling gadget.

GRAPHICS MEMORY - Displayed on the title bar of the Workbench Screen (AmigaDOS 2.0+) shows the current amount of CHIP RAM you have remaining. You will notice that every time you open a window it takes a little bit of CHIP

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RAM away. When the window is closed, it gives it back. More on CHIP RAM later.

GUI - (letters are spoken aloud, not as 'gooey') Graphic User Interface. The technical term for an operating system that uses a mouse, windows, icons, and gadgets.

WORKBENCH - The program that manages your files and allows your interaction with them. Considered a GUI. This is the native Amiga operating mode but is NOT required for the Amiga to function. It is a small program located in your 'C' directory on your boot disk.

PULL DOWN MENUS - Commands you can select by holding down your right mouse button and moving the pointer to the title bar. While holding the mouse button down you may browse through the choices. If a command is highlighted with your pointer (denoted usually in inverse text), you may select it by simply releasing your button. Some items on the menus may be 'ghosted' or very light in color/dotted. These items will not be selectable. These are usually 'activated' when another condition exists, such as an icon being selected. To see an example of this, use you Workbench pull down menus and look under ICONS. Most of these commands will be ghosted. To see them unghosted, select an icon on the Workbench by clicking it once then go back and look at the pull down menu again. Most of them will be selectable now.

That concludes the basic Workbench terminology. Now let's move on to the more complicated side of the operating system.

1.1.2   Devices, Memory, And Disks

DEVICE - Anything you can send and/or receive information to/from such as disk drives, modems, printers, CD-ROM drives, digitizers, etc. Even the screen is considered a DEVICE, as is the keyboard. We will look at the most used devices later.

MEMORY - An area where the computer stores information. Some of it is available to you to use, some of it is for the computer only. Every computer (and nearly every modern day electronic device such as wrist watches and microwave ovens) has at least SOME memory. There are MANY different types on some systems, the Amiga is one of them.

ROM - Read Only Memory. This is memory that can only be read from but not written to. The actual computer operating system (called Kickstart since it is actually required to 'start' your system) is contained on a replaceable chip inside the computer. This ROM contains permanent information the system needs to run.

RAM - Random Access Memory. Memory that you can load programs, graphics, and sound into for the computer to use. It is volatile which means that when the computer is shut off (or rebooted using CTRL-LEFT AMIGA-RIGHT AMIGA) this memory is reset and (most of the time) lost. There are some ways

around that which we will look at later when we talk about viruses. There are several types of RAM using in the Amiga, each one with a different purpose.

RAM (Fast) - Fast RAM is used to store programs used by the central processor (the heart of the computer: a Motorola 68000 series). In most Amigas this is often 16-bit memory (more on that later) since the 68000 is a 16-bit processor. Sega uses the same chip in their Genesis game console and their Sega CD. If your machine is equipped with an accelerator (68020, 68030, or 68040 CPU) then you have a 32-bit processor which runs considerably faster that the 68000. This CPU requires (obviously) 32-bit Fast RAM to run at its optimum performance. If you only have 16-bit Fast RAM and a 32-bit processor, you machine may not seem as fast as it should, since the processor cannot operate at the speeds you paid for. 16-bit Fast RAM is occasionally called SLOW RAM. You can put up to eight megs on a 16-bit processor (with some exceptions) and pretty much unlimited (based on the weight of your pocketbook) on a 32-bit processor. This RAM can usually be added by sticking in a board or plugging in a box on the computer. In any event, the custom chips (more on that later) cannot use any form of FAST RAM for storage.

RAM (Chip) - Since the Amiga is the only true multitasking machine, it has several custom processors (or called the CUSTOM CHIPSET) to handle almost every function of the computer, leaving the CPU free to do the basic number crunching and program execution. These custom processors require their own memory to store their own programs in. The memory they are designed to use is called (appropriately enough) Chip RAM. In older Amigas it was set at 512K (one half a megabyte). Then, a modification came out to let you have one megabyte of Chip RAM. The latest Amigas have two megs of Chip RAM. Since all the graphics and sound are stored here, it is easy to see why 'the more the merrier' is quite true when it comes to Chip RAM. Chip RAM *CAN* be used by the CPU if no Fast RAM is available. But, this is not desired since Chip RAM is about 20% slower than the 16-bit Fast RAM. Chip RAM is very costly and difficult to add. It also has a little flaw in it called FRAGMENTATION. More on that later on.

DISK - A disk device (or drive) comes in many forms with lots of different names. All drives require a CONTROLLER to talk between them and the computer. The disk drive that is built in to all Amigas is a 3.5" Floppy disk drive. Note: Although the 3.5" disk casing is hard plastic, the actual media inside the casing is floppy so it is still considered a floppy disk. The computer has a built in floppy drive controller that will allow up to four floppy drives to be connected and accessed at one time. Hard Disk Drives actually use rigid plastic disks to store data on. These are hermetically sealed inside the case and you will probably never see what a platter (the disk itself) actually looks like. They hold a great deal more than their floppy counterparts and also require a controller to operate. Most Amigas do not have this controller built in so it must be purchased with the drive to use. A CD-ROM drive works the same way, basically. It also requires a controller but stores its information in little pits on the disc. These pits are of different depths which represent numbers that the computer can actually change into a program to run. All controlled devices need a software program 'patch' or device file to allow them to talk from the

controller to the computer. These are located in your DEVS directory on your Workbench Disk or hard drive partition. Floppy drives are denoted as DF0 - DF3 and hard drives are usually denoted as DH0 - DH?. The Amiga internal disk drives are all double density (with the exception of the A4000) and hold 880K of data when formatted. There are some utilities out there that will allow you to increase this number to 936K or so.

RAM DISK - This is a special device. It allocates your memory as a 'mini disk drive' to allow temporary storage of files and data. On your Workbench, you should see an icon that says RAM DISK or RAM. This is just like a disk drive and you can copy to, delete from, install programs to, and manipulate it just like the disk drive counterparts. Its capacity is limited to your total available memory (displayed on the title bar of your Workbench disk). It does not need to be 'formatted' to be used. It is ready as soon as you see its icon. WARNING! It uses RAM to hold what is in it so if you reset your computer, crash it, power failure occurs, etc. anything there will be LOST! There is a device you can create called a RAD which is like a RAM DISK but it will survive anything but turning the computer off (or power loss). You can crash it, reset it, etc. and it will still be there when your Workbench loads. More on the RAD later.

PRT - Printer device. You can specify which device to send a file to in most Amiga programs. For instance, if you are working on a database and you want to save it to the internal floppy drive, you might enter a filename called DF0:DATABASE. With the Amiga, you can send it right to the printer! Simply enter PRT:DATABASE and it will send the file to your printer! Since you sent your printer type in the PREFs (more later), all programs can make use of the special features of that printer.

SER - Serial device. This is the device that lets you talk to the serial port (used mostly by modems and printers). Like the PRT device you just need to use SER as the device name.

PAR - Parallel device. Talks to the parallel port. This is the most common port used by printers. Unless you are talking to another Amiga via a Parnet cable, the PRT would be better to use if you want to send something to the printer.

CON - Console device. The computer itself! If you send a file to the console device, it will display on your screen using your CON: device parameters.

If a lot of this doesn't make sense right now; be patient. Rome wasn't built in a day, nor was your Amiga. Give yourself some time to learn.

2 Amiga Internals

We have touched lightly on the internals of the Amiga computer in the last chapter. Now we are going to get a little deeper and a little more technical on what these things do. Let's take a look at the BASIC schematic of the Amiga showing the major chips. This represents the NON-AGA Amigas (A500, A1000,

A2000, A600)

VIDEO   INPUT/OUTPUT   SOUND

•SCHEMATIC DRAWN FOR CLARITY NOT FOR ACCURACY
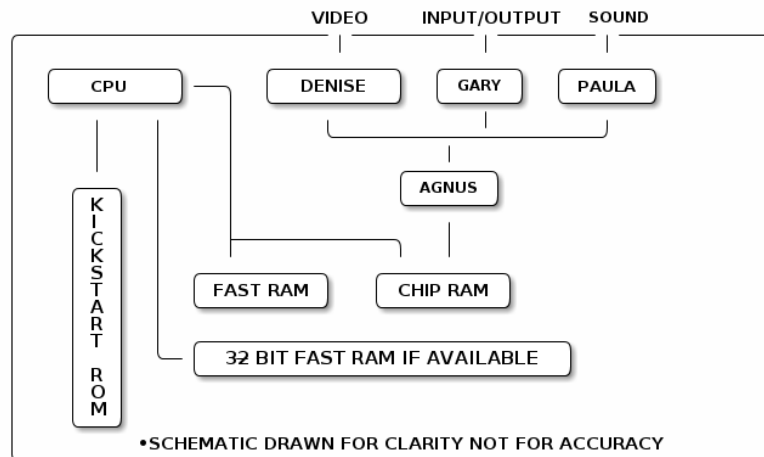
As you can see, there are some serious chips in this machine, capable of doing things that other platforms STILL cannot do. Let look at these in a little more depth.

CPU - As mentioned before, it is the 68000 family from Motorola. In non-accelerated Amigas, the CPU runs at a speed of 7.16 MHZ. Now that doesn't sound like a lot, I know. When you read about IBM PCs running at 66 MHZ, it sounds like you may be living in the Dark Ages with your Amiga. Not so. If you look at the schematic closely, very few functions are done by this 'slow' CPU. The video, audio, and input/output are all handled independently of the CPU. On these 66 MHZ Pcs, every function has to tear a chunk out of the CPU processing time. That is why a 'slow' Amiga can often outrun and outperform a PC of double or triple the MHZ (also called CLOCK SPEED). Imagine having a 50 MHZ Amiga! Wow! The CPU uses all three RAM banks for memory but the memory is used in this order: 32-bit Fast RAM, Fast RAM, and finally Chip RAM. That way, it always uses the fastest first and the most precious last. The CPU may also have a MATH COPROCESSOR which takes care of all the heavy duty math functions, leaving the CPU even more free of burden. When you get right down to it, the CPU does very little. On an information note, many of you are probably thinking "Well, if the CPU has nothing to do, how come most flight simulators run so SLOW on my Amiga?" Good question. Here is why. Most of these games are 'ported' over from the land of IBM Pcs where they have no custom chips. Therefore, all the routines depend strictly on CPU speed to operate. The programmers don't recode the game to make use of the graphics power of the Amiga and just rely on the CPU. So naturally a flight sim made to run good on a 33 MHZ PC isn't going to run worth beans on a 7 MHZ Amiga. Solution? Get a faster processor or get a flight sim that was written for the Amiga ON the Amiga (like F/A-18 Interceptor) and see how well it runs!

KICKSTART ROM - This is the 'brain' of the system. Without this chip,

you can't even get a screen up. This holds all the programs for making the system work; its internal functions. Kickstart use to be on disk (just like IBM PC people do it with COMMAND.COM and the IBMBIOS.SYS files) with the very first Amigas. Before you could even boot up Workbench you had to stick a disk in with the Kickstart information on it. The version of Kickstart was 1.1 through about 1.3. Then, they made the middle Amigas with the Kickstart on a ROM chip as it is now. They made it fairly easy to change out (amen). The 1.3.4 version was more or less the final 'old' Kickstart ROM. Then came the 2.0 ROMS which were pretty flaky and more or less beta. Some old A3000's had this beta ROM. It was soon fixed with 2.04 which is now pretty much the standard. With the addition of the PCMCIA slot and high density floppy drives to the Amiga, another update was needed so 2.05 was released. 2.05 is very unstable on old machines and should not be used with older A500s. The 2.05 is primarily for the A600 which has the PCMCIA slot.

DENISE - This is the graphic heart of the Amiga. It has some fantastic features not found on any other graphic processor anywhere. The most incredible feature of this chip is that it is already synchronized to everyday video signals like your TV and VCR! Video that comes out of the computer my be sent to your VCR and recorded with no specialized equipment. To do this on a PC would cost several hundred dollars EXTRA. Other features include a blitter mode and copper list. The blitter, simply put, is the ability to move portions of the screen around at unbelievable speeds. Great for animation. The copper lets you alter any individual line on the screen independent of the others. This is why you can open multiple screens with different resolutions at the same time. Of course, you can also exploit this for awesome special effects for games and video production. There are two incarnations of the DENISE chip. The original DENISE and the Super DENISE. The Super DENISE does very little more than give you an additional screen mode called Super Productivity Mode, which is 1280x400 resolution but only 4 colors. Really only good for business/productivity software.

GARY - This chip controls all the input/output of the system. Printers, disk drives, serial port, etc. This chip gives the computer the ability to REALLY multitask since you can output to the printer, access your hard drive, and copy two floppies at the same time WHILE YOU ARE DOWNLOADING WITH YOUR MODEM. Try that with ANY PC!

PAULA - This is the sound driver for the Amiga. As it is, you have 2 channel, 4 voice, hi-fi stereo sound with any Amiga computer. It is the standard. Some very clever programmers have hacked six, even 16 voices out of this chip. The sound coming out is with standard RCA type plugs which can attach to any stereo for unbelievable sound quality. Even with the new technology, PC computers don't have the fidelity that comes out of the Amiga.

AGNUS - This is the memory manager for the CHIPSET. To direct each chip to the right area of memory, the Agnus sits between the chips and Chip RAM. There are three incarnations of this chip. The original Agnus, the Fat Agnus, and the Fatter Agnus (also called Super Agnus by some). These chips decide how much Chip RAM your system CAN HAVE not necessarily actually

have. The original Agnus would only address 512K maximum. The Fat version accesses one meg, and the Super can address two megs. The Amiga 3000, 1200, 4000, and 600 have the Super Agnus chip in it. Only the first three actually have the full two megs of Chip RAM in it. The 600 can be expanded to make use of the extra Chip RAM. The other Amigas require a special board called the MegaChip 2000 to get two megs of Chip RAM. The 2000 has one meg of Chip RAM standard (Fat Agnus) and some newer 500s have the Fat Agnus also, but cannot access the memory without a special modification done to the motherboard. The most important part of the Fat Agnus and Super Agnus is the ability to switch to PAL video mode. This alone requires some explanation.

Europe uses a different type of power than we do here. They use 50 hz power instead of 60 hz like us. That means that their power cycle is slower. Thus, it takes their computer a little bit longer to update the screen display; it does it every 50th of a second versus every 60th of a second with ours. In other words they can draw more on the screen before it has to start over again. In layman's terms, they can display 256 lines on the screen versus 200 lines on ours. This can truly unsync the graphics and sound on games and in some cases cause them not to work at all if timing is critical to the program. By using a special program, we can change our screen displays into PAL (ours is called NTSC) mode so that we can use the wealth of European Software that is available to us. This reason alone is good enough to warrant upgrading this chip if you have the old original one.

FAST RAM - We discussed this in detail above so we will only touch on it here. Again, this is the memory that is used by the CPU to store programs and data and is NOT useable by the custom CHIPSET. It may be worth noting that when you add Fast RAM to the system autoconfigures it and it is immediately available. On PC computers, you are required to run a memory manager program to access the memory and even then it is difficult to arrange right.

CHIP RAM - This is a topic which we discussed earlier, so I won't recap all that information here. Instead, let's talk about the liabilities of Chip RAM. Aside from having very little of it to start off with (unless you own an AGA A1200 or A4000) and having it costly & difficult to upgrade, there is another problem called FRAGMENTATION. This can get sticky, but try to follow me on this one. Chip RAM is allocated in 'chunks' by the custom CHIPSET as it requires it. The DENISE chip may grab a 200K chunk to open up a screen. Think of Chip RAM as a whole pie; a one megabyte pie. When a chip needs some memory, it asks Agnus to allocate it a piece of pie. Agnus checks the pie to see if a big enough piece is available and then 'slices' a piece out and 'gives it' to the chip requesting it. When the chip is done with it, it gives it back in the same size it took it. Agnus 'puts the piece' back into the pie and it is available for the next request. Unfortunately, once the pie is 'sliced up' from all the requests, all that is remaining are thousands of 'little slices' of pie. Now, a chip requests for a large chunk of Chip RAM. Agnus checks each slice to see if it can cut a big enough piece out of it to meet the demand. After searching all the pieces, it could not find a big enough piece, so it tells the system that there is an OUT OF MEMORY error and denies the chip the memory, even though the 'pie pan' is full of pie slices! This is called fragmentation and it is one of the

leading 'cryptic' reasons why your Amiga will give you an OUT OF MEMORY error when your WorkBench shows you have plenty. The worst part of the deal is that the only way to defragment the memory is to reset the machine or turn it off then back on. There are a few programs out there that claim to 'force' a refragmentation of memory, but they are genuine hacks and not available commercially. While this problem sounds bad (and it is) and frequent (it isn't), there are a few things you can do to help reduce the frequency. If you are going to use a paint program, stick to one resolution if possible. Or if you know you will be needing to use multiple resolutions, use them in order highest to lowest. You may also reset your machine from time to time. The bottom line is, don't consciously worry about Chip RAM unless you start having problems with it. Most of us run one meg Chip RAM machines and very rarely have any problems with fragmentation. This paragraph was written to educate you on one of the idiosyncrasies of your machine; not to scare or worry you.

Of course, there are many more parts inside you computer like CIA chips (your floppy drive and mouse/joystick controllers) but most of them are beyond the scope of this guide. If you want to learn more about these parts, I would recommend contacting ABACUS books and getting one of their advanced guides.

3   Basic Amiga Capabilities

Now that we see all this cool hardware and awesome operating system, let's really talk about what you can do with it. Most people believe that the Amiga is a 'game machine' and not suitable for 'professional' applications. Au contraire monsieur, the Amiga is capable for EVERY COMPUTER NEED you may have. This chapter will explain why and recommend some programs to meet these needs.

First, let's talk about graphics, where the Amiga really excels. While newer PCs have a better resolution with 256 colors, the Amiga more than makes up for it with its special graphic modes and the Denise specialties we mentioned earlier. Here is a breakdown of the Amiga display resolutions:

Table 1: Graphics, * Requires a Super Denise chip.

Name	Size (in pixels)	Maximum Colors
Low Resolution	320x200	4096 (HAM)
Low Res Interlaced	320x400	4096 (HAM)
High Resolution	640x200	16
High Res Interlaced	640x400	16
*Super Productivity	1240x200	4
*Super Prod Interlace	1240x400	4

Please note that this is for Amigas up to AGA. The AGA Amigas have much better resolutions and colors, but since the majority of Amiga users reading this guide have these older systems, we will stick with this. To make things easier, let define a couple more terms. OCS is the old chipset. This means half meg Agnus and no Super Denise. ECS (enhanced chip set) is a one or two meg Agnus and a Super Denise. The only computer that comes with the ECS installed is the

A600. The AGA machines have their own AGA chipset. The ECS, of course, can be installed in any lesser Amiga.

The possible colors for a resolution depends on the mode you are operating in. In Low Res, you have 2, 4, 8, 16, and 32 colors plus access to 4096 color HAM (more on that later) as well as a special mode called Extra Half Brite (EHB) which allows for 64 colors in a special way. You may have 2, 4, 8, or 16 colors for High Resolution screens. Super Productivity Mode is used only for business applications requiring a huge screen since it only supports 4 colors.

Extra Half Brite is a special mode that makes 64 colors out of 32 colors. Here is how it works. The first 32 colors are definable and the second set of 32 colors are derived from the first 32 colors by dimming them to half as bright (thus the name). So now you have 64 colors out of 32. When you change a color, its 'half bright partner' is also changed.

HAM is very interesting indeed. It is also quite complicated. HAM stands for Hold And Modify and, as the name might imply, is not very good for animation. HAMs real power comes out when displaying photographic quality still images, such as people or a real life picture. HAM gives you 4096 colors on the screen versus the 256 colors of a PC. Granted, the resolution must be Low or Low Interlaced, but believe me color is more important than resolution when it comes to displaying images of this type. HAM is nothing more than a clever hardware 'hack' that wasn't even originally planned when the Amiga was designed. The biggest liability of HAM mode is a 'glitch' called HAM FRINGING. This is what you see on some HAM pictures if you try to modify them with a paint program. It is a color bleed, basically. The process is very detailed but let's just say that each pixel color is dependant on pixel's color to the left of it. So, if you change a pixel's color, it can effect up to three pixels to the right of it. This causes the 'bleed' effect you see. HAM is very neat but very restrictive, which is why most software does not use it, especially games which require a lot of action and movement. Most games use Low Res 32 or 64 colors for their display.

Using the Amiga for games is an excellent choice. The powerful graphic commands of the Denise (copper & blitter) give this machine the edge for fast hard core arcade games like Mortal Kombat. The ease of adding memory to the Amiga make it a good platform for in depth memory hungry simulation games too. The fact that every Amiga has a mouse and built-in inexpensive joystick adapters also make it cheap for games. The rich built- in sound chip generates arcade quality stereo soundtracks and sound effects as well as providing speech and digital sound capability. The fact that the video signal coming out of the computer can be sent straight to a TV puts it in good competition for console games like Sega and Nintendo. Although the Amiga was not originally designed for games, it certainly does a good job of playing them.

Productivity on the Amiga is also quite good, although in different ways than the PC. The PC has tons of productivity titles not even available on the Amiga, but the Amiga does have a few things that the PC doesn't and it can really swing the pendulum towards the Amiga if these things are what you need. The

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main advantages to productivity work on the Amiga is the true pre-emptive multitasking operating system. This operating system (OS) is by far the best OS on the home computer platform. PC users have Windows and OS/2, but the power of the Amiga OS has to be explained before you can really see the superiority of it.

First, it requires very little memory to run. Workbench itself is only 14K! The Amiga OS will run on an Amiga of only 256K! Try running Windows or OS/2 on any PC with less than 16 megabytes of memory and see how you like it! Since the OS is pre-emptive, you may actually assign a priority to each task that is running to insure that the processor gives it attention before any other task. For instance, if you were running a spreadsheet that was doing major calculations, you may set the task at a higher priority so that when you are writing a letter on your word processor (at the same time, of course), the CPU will give the spreadsheet the attention when it calls for it to do calculations. In this respect, if a task crashes, it can usually be suspended and allow you to finish up the work you are doing with other programs before you reboot to clear the crashed task.

The OS also has a ton of other little gems for productivity that set it aside from the other lesser OSs. Overall, the environment is incredibly simple and easy to learn as you will see in the tutorials. In WorkBench 2.1 and above you can do all sorts of things like read and write to IBM formatted disks (Double Density, of course) so you can take files to and from work and use them on the PC you may have there. Since the Amiga has productivity programs that will share data with IBM productivity, you can do a lot of work at home using the Amiga OS and then take the data back to work. Here is a quick list of popular PC programs and the Amiga programs that will exchange data with them.

Table 2: Working on IBM and Amiga

IBM Program	Amiga Programs
Word Perfect	Transwrite, WordsWorth, Word Perfect
Lotus 1-2-3	Professional Calc
dBase III, IV (.dbf)	Superbase Pro, SBase IV, dB Man

Of course, standard text (ASCII) files are fully moveable from platform to platform.

Another gem is the ability to set default preferences for major peripherals so you don't have to set them for individual programs. For instance, there is a PREFS editor for all version of AmigaDOS. From there, you can set the default printer type to use. Once it is set, all programs grab the printer driver from that preference instead of making you specify one inside the program. You can read this as NO MORE PROGRAMS THAT DON'T SUPPORT YOUR PRINTER! Once the driver is set, you no longer need to set it inside your programs. If you have a strange printer and a PC, you know the frustrations of getting an expensive piece of software that relies heavily on the printer only to find out that it doesn't support your printer. Then you spend your whole afternoon trying to find a driver that is CLOSE enough to get the printer working. Come

to find out that half of the special features you bought your printer for won't work with this other driver. Not a burden for us Amiga owners.

You can customize your Workbench to look and act exactly the way you want including colors, sound effects, backdrops, custom animated icons, screen resolution, even redefine the shape of your mouse pointer! All this is SUPER easy to do, too.

Now, how about video production? If you have ever wanted a hand in making movies, this computer will help you out. Since the video output is synchronized to normal video, you can make scrolling credits for your home movies, animate your own cartoon, or do wild special effects like morphing and 3D rendered animation like in seaQuest DSV. All done on your little 'game computer'. With an inexpensive hardware device you can 'scan' your pictures onto the screen and modify them. You can record 'mini-movies' and play them back. Scan in your business logo and alter it then print it back out to your laser printer. Grab a frame of your favorite TV show and put it as a backdrop on your Workbench. The sky is the limit and you already have most of what you need to get there; an Amiga. If you are seeking to become a video professional, you will have no doubt heard about the Video Toaster. This all in one card for the Amiga (only, I might add) will give you the power of a $100,000 television studio right in your house. seaQuest DSV and Babylon 5 are just two major programs that utilize the Toaster for their special effects. The Video Toaster costs under $2000 and is a real steal. It requires an A2000, A3000, or A4000 to work. With an cheap device called a GENLOCK, you can overlay computer graphics and live video like the weatherman and his map, or make your own 'Roger Rabbit' movie using your own Amiga generated cartoon characters with YOU as the star.

Personal software such as address books, calendar planners, CD databases, organizers, and much more are abundant in the Shareware realm of the Amiga. You can get great software for $5 or $10. Some of it you can get for FREE! You may never have to spend the cash on another high priced piece of software again!

4   Devices, Libraries, 'C' Directory, and Fonts

Now that you have seen the power of the Amiga computer, it is time to discover a little more about where it comes from and allow you to broaden your knowledge about your system. Anyone can use a computer, but it takes something special to REALLY understand what is happening inside.

As an Amiga owner, chances are you know twice as much about your system as most PC owners know about theirs. That is because the Amiga OS let's you get as deep as you want into the system without FORCING you to. You can operate an Amiga for years and never once open a Shell (more later) or learn anything about what I am about to share. But the more you know, the more power of your system you will get. There are a MASSIVE number of things you can do with your Amiga than what the Workbench will allow. In order to use this power, you need some knowledge to keep the power under control.

4.1 Devices

As we stated before, a DEVICE is a piece of hardware such as a modem, printer, or hard drive. Each device has a controller of some kind to allow it to talk to the computer. In order for the Amiga to talk to it, it requires a small program to tell it 'how' to talk. Think of this program as an 'interpreter'. This program is called a DEVICE DRIVER. The drivers can be recognized by the extension .DEVICE. The printer driver is called PRINTER.DEVICE, the serial port driver is called SERIAL.DEVICE, etc. Since these drivers are programs, they can be modified and updated by programmers to take advantage of new technology easier. Most drivers that are used are included with Workbench. Some special hardware such as CD-ROMs or video scanners, etc. may require that you use their special driver. Most of the time, though, the software that comes with the hardware will have an easy installation program that will do it all for you. As a new Power Amiga user, you need to know where these are. All the drivers are kept in a drawer called DEVS on your Workbench disk or partition. If you were to look in this directory, you would see lots of drivers for lots of different devices. For the most part, you will not even notice this drawer nor its contents and even more rarely will you ever have to interface with it.

4.2 Libraries

This is where you can get yourself into trouble. Not being knowledgeable in this area can cost you a lot of time and trouble. But, in a few minutes, you will hot to trot on libraries.

A LIBRARY is a program file. All your libraries are kept in a drawer called LIBS on your Workbench disk or partition. They cannot be run, per se, but are more like a RESOURCE for other programs to draw commonly used information out of. This makes programs smaller and more efficient. Take this example. You are a worker for a construction site. Now, you are building a house here and aren't exactly sure what you are going to be required to work on that particular job; it could depend on the weather, how long a job before takes, etc. You have to decide on something. What tools are you going to bring from your truck out to the actual site? Carpenter tools? Electrical tools? Plumbing tools? You don't really know. You could drag your whole toolbox out there just in case, or you could just get what you needed out of the truck when you required that particular type of tool. Your truck is right there and that way you don't have a lot of tools cluttering up the place.

This is the way libraries work. Let's say you write a program that might be required by the user to load up a picture and display it. Chances are he won't, but he might. Are you going to include the routines inside your program to load the picture? Well, you could, but there is a library out there that has the routines in it for you. All you have to do is call for it and it will do the job for you. If you want to do heavy math inside your program, you can call a different library to do it for you so you don't have to include a 'calculator' inside your program. That is why so many Amiga programs are so small; they use libraries to do most of the dirty work. Libraries are information common to lots of programs (math, graphics, input/output, etc).

So, why can these guys get you in trouble? Well, almost every big program out there has a couple of special libraries that it requires to run. Now once you've installed a lot of programs on your hard drive, you may have a HUGE LIBS directory (you should see mine) and some software uses the same special libraries such as the popular ARP.LIBRARY which is a very nice file requester routine. While the program may work fine on your hard drive, if you put it on a floppy and try to run it, it may not find that library and crash. Should you go on a LIBS drawer deleting spree, you may find that a lot of your programs (including Workbench) might not work any more. Another problem you might run into is when you install a new piece of software that contains an UPDATED version of an existing library. If the old library is overwritten, the program that used it before may not run anymore. This happens with a lot of 1.3 vs. 2.0 programs that use very different libraries with the same name. Be very careful about overwriting existing libraries with new ones.

You will also need to be familiar with this directory if you ever plan on trying to coax a non-hard drive installable program onto your hard drive. More about this later.

4.3 'C' DIRECTORY

Ah, the nerve center of your OS. If you are also a PC user, this drawer is comparable to the DOS directory in MS-DOS. Simply put, most of your Shell commands are here. Commands like copy, delete, dir, makedir, etc. are all found right here. Again, this is a directory that a regular user may never look at, but as a Power user, you will intimately learn about.

Next to your LIBS directory, this will probably be your biggest drawer in terms of number of files. Mine has over 300 files (commands) in it. After you computer on your Amiga for a few years you will build up a great collection of these little 'utilities'. Things like text viewers, picture viewers, file archivers, filename searchers, file converters, etc. can be stored here. The best part of this drawer is that the system will always check here for a command no matter where in the system you issue it. If you are on device DF1: and use the COPY command, the command will work because although it is not on the disk in DF1: it is in your 'C' directory. Take a look at this directory sometime and see how many goodies there are here. Like the LIBS directory, if you go chopping files away out of this drawer, things like your Workbench (and other programs) may not work anymore. This is another directory that you will utilize in learning to install non-installable software to your hard drive.

4.4 Fonts

Possibly one of the coolest things about your Amiga OS is the FONTS directory. This is a drawer of fonts that you can use inside of word processors, paint programs, and any other program that might support them. The fonts are stored in a strange format. It may not look like it from inside a well behaved thought out program, but if you looked at the directory you would see something like this:

```
TOPAZ       <DIR>
DIAMOND     <DIR>
topaz.font
diamond.font
```

The .font file is the font's identifier. This is what your paint program might look at to tell what fonts you have. The corresponding directories contain the actual fonts themselves and contain filenames that are numbers like 8, 16, 32, 48, etc. These numbers represent the point sizes of the font that are available 8 being small and 48 being large.

There are two major types of fonts; Bitmapped and CompuGraphic. Bitmapped are the ones we see above. They are limited to the exact sizes that are listed in the directory. Compugraphic fonts are what we call SCALABLE which means that they can be any size you desire them to be. Where as bitmapped fonts are drawn and saved, Compugraphic fonts are stored as mathematical functions that tell the computer HOW to draw them; size means nothing. It is similar to Postscript for those familiar with it. These fonts are bigger and take much longer to load, but the end result is worth it. If you try to manually scale a bitmapped font with your paint program, you will find it choppy and jagged. Compugraphic fonts look good no matter what size. Fonts are sort of like Libraries. They are called on demand instead of included inside the programs themselves. As you may have guessed, this directory is also pertinent to installing non-installable software to your hard drive.

5   Using The Workbench (v. 2.1)

Up to this point we have covered a lot of in depth stuff about your Amiga. Now let's go back to the easy stuff and take a break before we get into the intricacies of the Shell and the tutorials.

We talked a lot about the windows, icons, and using the mouse. The manual that came with your Amiga can explain most of the WorkBench to you. Instead of reviewing the same old stuff you probably know about already, I am going to take you through some of the lesser known things about the WorkBench. Things that even some of the veterans may not know about. Oh, one thing before we get started; this chapter will discuss Workbench V2.1 since it is probably the most widely used. Some things will work for V1.3 and V2.04 and MOST should work on V3.0.

Take a moment right now to look at your pull down menus on your Workbench. Notice the far right menu item that says TOOLS and the only command under it is RESETWB? That menu was put there for programmers who wanted to add their own menu items to the pull downs. You can utilize it for your own use! You can make menu items that will launch programs, copy disks, or anything you might want! There are several public domain programs like ToolsDaemon and Tool Manager that will help you do this. Each program has its own way of doing business so check the documentation that comes with the program to find out how to set things up. It is a lot easier than opening a hundred windows

to get to your favorite programs.

Being in the WorkBench environment is rather limited, but you can access a lot of power here all the same if you know what you are doing. As you know, not every file has an icon to activate it. What gives a file an icon is another tiny file called the .info file. This little file actually holds the graphic information that you see displayed on your WorkBench. It also holds the coordinates of where on the screen your icon is placed when displayed. As you may already know, you may change how the icon looks and how it looks when it is selected or clicked on. The program called ICON EDIT on your WorkBench disk or partition will help you do the deed. There are also several PD programs that will do it even better as ICON EDIT is pretty basic.

Any program that has an icon can be manipulated with the mouse on the Workbench by simply clicking once on the icon and using the pull down menus under ICONS to DELETE, RENAME, etc. Most programs, though, contain more than simply one program file. Most of them have many data files that go along with it. Many programmers are kind enough to put related files together in a single directory for ease of moving, deleting, etc. If for some reason this is not the case and you find yourself with a directory of twenty or thirty programs, here is a little trick you can do.

Although it is documented in the manual, many people don't think about it. You can make the Workbench show you ALL the files in a directory, not just the ones with icons. Once all the files are displayed, you can manipulate them in the standard way. Look on the WINDOWS pull down for a command that says SHOW FILES and select ALL. Now all the files in that window (drawer) are now visible with 'pseudo' icons. Play away! Another little known command is the ability to select multiple icons for the purpose of deleting, copying, etc. to save time. You will notice that you can only select one icon at a time. To rectify that problem, hold down your SHIFT key while selecting icons. You will be able to highlight as many as you want. Now, you can select delete or drag ALL the files to another drawer for copying. Pretty neat.

Another very basic function that goes unnoticed for the most part is the EX-ECUTE COMMAND menu item. With this option, you may send a command to DOS just like you were in a SHELL, but not actually open a SHELL window. This could be useful if you are very tight on memory or just wanted to do one single command and not spend the extra time opening a SHELL. When activated, it will open up a requester and you simply type in the command. It is a good way to open a SHELL from the WorkBench if you don't have another fast means to do so. This command would also be handy for those with removable media hard drives such the Syquest drive where they have to execute a DISKCHANGE command when they swap cartridges. This way is much easier than opening a SHELL and doing it.

Many people like to have custom programs running on the Workbench such as a clock, Tool Manager, a virus checker, etc. Now in the old AmigaDOS there was no real easy accommodation for this. If you wanted to do this, you would have to learn to use the SHELL (CLI back then). Now with 2.0 or better, you have

a neat little drawer called WBSTARTUP on your Workbench disk or partition. Any file you 'drop' or copy in there will automatically be executed for you when your Workbench loads up! So if you wanted VirusZ to run on startup, just drop the icon in this drawer and it will be done. A great tool for those who do not want to learn the ways of the SHELL.

In the tutorials coming up, we will discuss how to customize just about everything about your Workbench including colors, screen mode, even the pointer and the system beep. For now, experiment with your Workbench. Get comfortable with it. The AmigaDOS OS is the most advanced easy-to-use GUI out there. Enjoy every aspect of it!

6 Understanding The Shell

We have seen how powerful the Workbench is. With it, we can do just tons of things. But, the Workbench was designed to be easy and elegant; not omnipotent. While many functions can be done from it, there is a much more powerful (and therefore more dangerous) way around AmigaDOS: the SHELL.

The SHELL is a direct non-GUI method of commanding AmigaDOS. This interface (formerly called the CLI for COMMAND LINE INTERFACE) opens up on its own window and has no gadgets, icons, or pull down menus. If any of you have been unlucky enough to have owned or worked with PCs and MS-DOS in the past, you will feel right at home here. Many commands of MS-DOS and SHELL are similar or even the same. When SHELL is open, it will look like this:

```
Workbench:>_
```

Now you must physically type in commands to interface with the system. The label before the > character is the current volume (or device) name that you are 'in'. There are a number of basic commands and principles you are going to need to know to be safe with the SHELL. First, we need to look at a device's structure, so you know how to navigate around using the SHELL.

The Workbench is like a filing cabinet, right? Before you open any disks or drawers, it is like an unopened file cabinet. When you click open a disk icon you are opening one of the cabinet drawers. When you open a drawer (or directory) on that disk, it is like opening a file folder in that cabinet drawer. Then opening another drawer within that drawer is like opening a file in that file folder in the cabinet drawer, etc. This is called a DIRECTORY STRUCTURE or in the PC world a TREE. Here is a possible example of a "tree" using the Workbench disk as the 'file cabinet'.

```
WORKBENCH
        |— C
        |— DEVS
        |       |—DOS DRIVERS
        |       |—PRINTER DRIVERS
        |               |—STANDARD
        |               |—LASER
        |
        |—FONTS
        |       |—DIAMOND
        |       |—TOPAZ
        |       |—RUBY
        |       |—GARNET
        |
        |—LIBS
        |—S
        |—SYSTEM
        |—UTILITIES
        |       |—DISK
        |
        |—WBSTARTUP
```

All the names listed above represent directories (or drawers) and all have files
'under' them. Some you might see on the Workbench, but most of them you
won't (unless you select to show ALL files). In the SHELL, there is never
really anything 'hidden' from view. That is part of the power of the SHELL.
How you get from the 'current directory' to the directory you want to work
with is called the 'path'. For instance, if you wanted to see what files were
in the LASER directory, you would have to 'go' there first, then look or at
least tell the SHELL where you wanted to look. That is what the PATH is
for. A path should always be followed by a device name or designation is avoid
confusion. For instance, in our above example, the path to the LASER directory
is WORKBENCH:DEVS/PRINTER DEVICES/LASER or if your Workbench
disk is in the internal drive you could use DF0: in place of WORKBENCH.
Using device designations like DF0: is not only faster but if by some strange
chance you have two devices of the same name there is no question what device
you are working on.

Navigating around using SHELL in AmigaDOS 2.0+ is quite easy. Easier, in
fact, than with MS-DOS and much easier than with the old SHELL or CLI. To
'move' somewhere you need only type the path to move to. If you were in our
above example, you would need only type DEVS/PRINTER DRIVERS/LASER
to move to that directory. If you were on another device other than Workbench
or in a different directory on the Workbench disk, you would have to use the
full path including the device name (WORKBENCH:) preceding the path. You
may also want to navigate a single directory at a time. Here is what a sample
session might look like:

```
WORKBENCH:>devs

WORKBENCH:DEVS>printer drivers

WORKBENCH:DEVS/PRINTER DRIVERS>laser

WORKBENCH:DEVS/PRINTER DRIVERS/LASER>
```

or

```
WORKBENCH:>workbench:devs/printer drivers/laser
```

```
WORKBENCH:DEVS/PRINTER DRIVERS/LASER>
```

NOTE: If you are using V1.3 or lower of the OS, then you will need to precede the path with the command CD (for CHANGE DIRECTORY). It will also work for V2.0+ but it is optional. To move up one hierarchy one types "CD /".

Now you are in position to see what is in this directory. Now we are ready to look at file manipulation commands. Here we will touch on the most used commands in the SHELL. Each command will be followed by the parameters necessary to make it work. If the parameter is OPTIONAL it will be in brackets []. If required it will be in <>.

```
DIR [path]
```

- The most used command in the SHELL, this will display a list of all the directories and files in the specified path or the current directory if NOT specified. You can get a more expanded listing of the files by using LIST instead of directory.

```
COPY [from path]<files> [to path]
```

- This command will copy files from the 'from path' to the 'to path'. If no 'to path' is specified, the files will be copied to the CURRENT DIRECTORY. This command can use WILDCARDS, special symbols to tag multiple files: #? = All files without extensions #?.#? = All files ? = Replaces one character. Use the '?' when you have a number of files with mostly the same letters and just one or two that are different in the same location. For instance, if you had three files in the RAM DISK called ATRAIN1, ATRAIN2, and ATRAIN3, and you wanted to copy all of them to a floppy disk, here is the command:

```
COPY RAM:ATRAIN? DF0:
```

Feel free to experiment by copying multiple files to your ram disk then using the next command to delete them.

```
DELETE [path]<files>
```

- This will remove the files specified. You may also use the optional path to delete files in a directory you are not currently in. Example, to delete the files in the above example:

```
DELETE RAM:ATRAIN?
```

```
TYPE [path]<filename>
```

- This command will display the contents of a text file to the SHELL window. Make sure that you open up your SHELL window completely to see the maximum amount of text.

`MAKEDIR [path]<name>`

- Makes a directory called <name> at the specified path. It will NOT create an .info file so you will not be able to see it from the Workbench. If Workbench access is what you need, use CREATE DRAWER from the pull-downs menus on the Workbench.

`ED [path]<filename>`

- Starts the Amiga's built-in text editor. This is like a mini-wordprocessor. This will allow you to alter a text file and save it back again. Very useful in customizing your system. More on that later.

`AVAIL`

- Tells you lots of information about your system including how much memory you have/have left.

`CLS`

- Clear screen. While you can call this command directly, it is much more useful in a series of commands called a 'script' file. For MS-DOS users, this is called a BATCH file. We will talk more about scripts a little later.

`ASSIGN <device:> <device:>[path]`

- This is going to be one of your most used commands as you get deeper into the Amiga. This command will allow you to 'redirect' access of one device to another, allowing you to put files just about anywhere you want and still access them. For example, you have a Backgammon game on a floppy disk 'GAMMON'. You copy all the files into a directory on your hard drive so you can play it from there instead of the slower floppies. You put it on DH0: under the directory GAMES. So, you try and run the game and after it loads the main game it tries to load the data files required for play. Since the game KNEW it was on a disk called GAMMON, it tries to look at that disk for the files and give you a requester tell you to put the disk GAMMON back in any drive. Well, you could put the disk back in and let it load the data files, but that would be defeating the purpose. Instead, let's redirect the request to the directory on the HD where the game actually is. ASSIGN GAMMON: DH0:GAMES/

Now, all subsequent calls for the disk GAMMON will go to the right place. As you may have guessed, this is one of the main tricks for getting programs to work on the hard drive that were not intended to installed there.

That is enough SHELL information to get you started. There are literally

hundreds of commands you can execute from the SHELL and you could see them if you get a directory of the directory named 'C' on your Workbench partition. Or, look in your manual for more commands.

The SHELL is a powerful alternative to the Workbench. The SHELL and your 'C' directory are tightly interwoven and it is useful to add your own special commands to the system by copying the commands over to the 'C' directory so you may use them anywhere. Put all your compression programs like LHA and DMS here as well as your own text editors, icon editors, etc.

7   "Let's Do It" Tutorials

7.1   Formatting and Preparing Disks

This may seem like a trivial tutorial, but there are several things you can do to customize a newly formatted disk to suit your needs.

First, insert the disk to be formatted. An icon will appear telling you either the old disk name if it has been formatted before, or question marks if it was formatted for some other computer or not formatted at all. Click it once and select FORMAT DISK from the ICONS pull down menu. If you format it from the Workbench this way, you will not be given any custom options to set. If order to have some control over the formatting, select the FORMAT utility on your Workbench disk or partition. Select the drive to format. You will then be presented with a requester asking you some pertinent information like the disk name, whether you want a quick format, international mode, fast file system, and if you want a Trashcan icon attached.

International mode is something you will likely never need so leave that unselected. If you are using 2.0+ of AmigaDOS, you may format floppies in the FAST FILE SYSTEM which makes your floppies faster and hold slightly more data. Make sure that you do not intend to use this disk on a 1.3- version of the OS because it will not be able to read it. If you are not sure, do not select FFS. We already know that the Trashcan is worthless, so do not select that. If your disk has been formatted on your Amiga before and you KNOW that it is standard with NO errors you may select the quick format option. This does not erase the entire contents of the disk, just the bootblock and the directory track (track 40) where the names of the files are stored. This makes formatting very quick since it only has to format two tracks instead of 80. But, any errors or bad tracks on the disk will not be discovered this way. Also, disks that are non-standard DOS cannot be formatted quick. You can determine a non- standard DOS disk by the disk name when inserted and read from the Workbench. The name will read DF0:NDOS for example, depending on which drive you insert it in.

Now that you have all your options set, go ahead and begin the format. If you do not do a quick format, this can take a couple minutes. Any errors that occur will abort the format process. Should this occur, you have a couple of options. You can discard the diskette as it is probably bad. You may also elect

to use a program to 'tag' the bad blocks out of commission. This will allow you to use the disk to hold information, just not use the bad blocks. Obviously, this will effect the amount of space your disk can hold. It is a personal thing, but the right answer is to discard it. Chances are good that more bad blocks will develop quickly as you use it, since the media itself inside the disk is likely defective.

Now that you have a nice clean disk, you may want to tailor it up a little. First thing you might want to do is make the diskette bootable. To do that we need to issue one command from the SHELL or use EXECUTE COMMAND from the Workbench:

```
INSTALL DF0:
```

This command will INSTALL a bootblock on the disk's bootblock (track 0) track. Now, when you reboot your system, this disk will 'boot' up over your hard drive or any other devices. This bootblock contains information the OS need to know to start up the system using that disk.

Should you try and boot from this disk now, you would be dumped right to a SHELL prompt as soon as the disk booted. Since there is no 'C' directory, LIBS directory, DEVS directory, etc. there is really nothing you can do from this prompt.

We have discussed the file called STARTUP-SEQUENCE before (located in your 'S' directory) now it is time to apply it. If you have boot your system off this new disk, reboot using your Workbench disk or partition. We will need the utilities there to do this tutorial. Once booted, enter a SHELL. Insert your new diskette into DF0. Now make a new directory on the diskette called S.

```
MAKEDIR DF0:S
```

This will make a new directory for the STARTUP-SEQUENCE file. We will also need a C directory to hold some commands for us to use.

```
MAKEDIR DF0:C
```

```
Now let's copy over the commands that we need:
```

```
COPY C:TYPE DF0:C/
COPY C:LOADWB DF0:C/
COPY C:ECHO DF0:C/
COPY C:AVAIL DF0:C/
```

This will copy over the necessary four commands we are going to use to make your disk. All of these commands are 'stand alone' i.e. they do not require any libraries or devices to work. Notice how we copied files from the 'C' directory using C: as the device name? That only works with a few directories such as 'C', 'S', 'LIBS', and 'DEVS'. Basically, the system directories used by AmigaDOS.

Now that we have at least a FEW commands to work with, let's make the disk do something. From the SHELL we are going to make a STARTUP-SEQUENCE file in the 'S' directory of our new disk:

```
ED DF0:S/STARTUP-SEQUENCE
```

In a moment, ED will load and be ready for you to input text. ED is like a miniature word processor. If you are running V1.3- of the OS, ED is not very friendly. Consult your user's manual for more information on its commands.

Take a moment to look through the pull down menus. You will find that most Amiga programs that use pull downs keep common things in the same basic location. For example, most programs have the load and save options in the menu on the far left.

As we said before, the STARTUP-SEQUENCE is a script file. Basically, it is a text file with a list of individual commands. Let's enter the commands now into ED.

```
ECHO "HERE IS WHAT YOUR SYSTEM HAS AVAILABLE:"
AVAIL
TYPE S:WELCOME.TXT
LOADWB
```

Now, select to SAVE the document using the pull down menus. Your drive light will come on and in a moment, the file will be saved. Now we have a workable disk with one exception. Do you know what it is? Hint: Look in the text we entered for the STARTUP-SEQUENCE.

That's right. The command TYPE (which displays a text file) is looking for a file called WELCOME.TXT to display during the startup. Let's rectify that problem. Exit ED by using the appropriate pull down menu. Now, re-enter ED:

```
ED DF0:WELCOME.TXT
```

Once again, you will find yourself in ED with an empty screen. Enter some little message like:

```
NOW LOADING WORKBENCH...PLEASE WAIT
```

Save it as you did before. NOW your disk is ready for the test. Go ahead and boot it up and revel in the magic you just created!

Now that you are at a Workbench (and saw how fast it booted), you may wonder why it takes so long for your own Workbench to start up. A good question which is easily explained. In fact, you know yourself how to do it and already possess the knowledge to do it. How? Look at your Workbench disk's STARTUP-SEQUENCE file and see what IT does for a startup and you will understand why it takes so long. Use the TYPE command or even better, a new command called MORE.

```
MORE S:STARTUP-SEQUENCE
```

This will load up a 'text reader' which is slightly bigger than TYPE, but also gives you more options like pausing at each page, searching for text, etc.

In the next part, we will discuss customizing features like the pointer, icons, colors, and much much more.

7.2   Configuring Your Workbench and System

We have delved pretty deep into the workings of AmigaDOS by now. You have lots of knowledge of the basics. Now let's do some 'aesthetics'. There are a million or more things you can do to your Workbench environment to customize it. We are going to discuss some of the finer points. Those that make the most difference.

One of the easiest ways to customize your Workbench is through the incredible built-in preference utilities included with Workbench. This chapter will deal strictly with V2.0+, but there are similar things in 1.3-. In almost all of the preference utilities, you will be given the final option to SAVE, USE, or CANCEL the utility. SAVEing is permanent. The things you make changes to are more or less permanent (not for us, though!). If you select USE, the item will only be changed until the next re-boot. Therefore, you can 'try before you buy'. CANCEL of course, negates the changes you just made.

Colors. The first thing is to change the system colors. This is done through the PALETTE program in the PREFS drawer of your Workbench. It is pretty self explanatory once you get it running.

Pointer. You may change the appearance and colors of the pointer using the POINTER program in the PREFS drawer. Again, this is pretty self explanatory. Note: You cannot change the 'busy' pointer from this utility. A program called NICK-PREFS (widely available) will allow you to do this and some other really neat alteration to your Workbench.

Screen mode. You may change the Workbench to any legal resolution available including Low Res, Hi-Res, Interlace, and even Super Productivity as well as change the number of colors available to you to alter. Remember, though, that higher resolutions and more colors eat more memory and also tend to slow down the system.

System Beep. The utility called SOUND in your PREFS drawer will allow you to change what happens when your system gets a requester or error. You may make the screen flash, make a beep, or even put your own digitized sound sample there in place of the beep. My Workbench does a Butthead 'huh huh huh' laugh when I get an error.

You may also change the font that all the Workbench text uses to display drawer names, filenames, and much much more. All you have to do is go through the PREFS drawer and play with the utilities that are there. You can set the system

time and date here, change your printer drivers, set up your serial port for your modem, and tons more. If you are ever confused by one of the PREFS utilities, just CANCEL out of it and refer to the manual. Most of them are far too easy to use and can really change the way your system looks, acts, and functions. Make use of them and tailor your system like no loser IBM can.

Now that you have got your system JUST the way you want it, you might want to make a 'snapshot' of it to save in case of a disk crash or to copy these prefs to another bootable disk (like the one you just made). The magic is SO easy you may not believe it. There is a SINGLE file that keeps the magic. It is located in the DEVS directory and is called SYSTEM-CONFIGURATION. As you may have already guessed, you need only copy the file to the destination disk's DEVS directory and you will now have the same prefs as your normal Workbench disk. Enter a SHELL, insert your bootable disk made in the last tutorial into DF0. Now you should know what to do, but we'll go through it anyway.

```
MAKEDIR DF0:DEVS
COPY DEVS:SYSTEM-CONFIGURATION DF0:DEVS/
```

It is done! Re-boot using your new disk and you will see that all the preferences of your Workbench now reside on this new disk!

Now that we are on the subject of making copies of important files on your Workbench disk or partition, let's go a step further. If you are using a floppy version of Workbench, it is just plain smart to make a copy of it and use the copy. When you alter it, make a copy of the ALTERED version and leave the original Workbench disk alone. Now you will have two extra Workbench disks; one ORIGINAL and one of the altered. If you want to use the default preferences, you simply copy over the SYSTEM-CONFIGURATION file from the original to your copy of Workbench. If you disk crashes, you need only make a copy of the altered Workbench disk and use it.

If you use a hard drive, you have a bigger task ahead of you. You will no longer need the floppy disk of Workbench once it is installed on your system (of course you will keep it in case of a hard drive crash). But, with a hard drive, a new task comes to bear down. Making a backup of your system files.

It is important that the Workbench system has its own partition on your hard drive. I recommend a 10 meg partition if you have 40 or more megs of space. If you are using a 20 megabyte drive, you can get by with 5 megs or so. If you do not have your hard drive partitioned, you should. By having the drive 'cut' into several smaller pieces it is easier to group files, make backups, optimize, and more. Refer to your hard drive manual for more information on partitioning. You will find that as time goes on, your Workbench partition will grow like a weed. It is best to backup that partition every couple weeks or so using a special program to do so like Quarterback or Ami-Back (both commercial) or MRBackup (public domain). Most of these programs require one disk per meg of hard drive to back up so your Workbench partition would require about 10 floppies if full. I have had mine for a LONG time and haven't filled the whole

10 megs yet. You may also elect to use the SHELL to copy important files like the STARTUP-SEQUENCE and SYSTEM-CONFIGURATION and those important fonts, libraries (like the ARP.LIBRARY), and 'C' commands to a floppy. Believe me, it is much easier to use a HD backup program.

As you install programs to your hard drive, many of them will copy over necessary libraries, 'C' commands, fonts, etc. This is how your partition grows. When you remove a program from your hard drive, you often forget to remove these 'support' files (if you can even remember what they were!). As it stands, most of these support files can be used by you in other ways either through the SHELL ('C' commands), other programs (libraries), or word processing/graphics packages (fonts). Therefore, they are not really wasted space. Sometime, when you are bored, look through your Workbench directories and see just how much stuff is really in there!

7.3   Using PAL and NTSC; How to switch your system!

We discussed what PAL and NTSC are, now we need to look a little bit deeper into it.

First, how to change. The easiest way, overall, is to install a toggle switch into your machine to let you boot up in one of the two modes. Commodore was actual smart this time and built the capabilities into the FAT AGNUS chip. To make the system PAL, you need only ground out one of the pins on the chip. If you needed an NTSC machine, simply fail to make the alteration. This made it ten times easier to get the machines into Europe. Since this goes beyond the scope of a beginner's guide (any authorized dealer can make the adjustment as well as many Amiga hobbyist) we will skip this option for now. It may be nice to know that if you have an AGA Amiga (A1200, A4000) you may select to boot your system in PAL by holding down both mouse buttons when your machine boots. A special menu will come up and get you the option. If you are using V2.0/2.1, holding down the mouse buttons on bootup will allow you to disable certain drives or change the drive to boot from.

Now the other way is through the use of software. Note: You must have a FAT AGNUS or FATTER AGNUS to make this work. There are many popular programs to do this. First there are the 'C' commands written by Nico Francois called PAL and NTSC which will switch the system for you when you run the respective program from the SHELL or EXECUTE COMMAND menu item from the Workbench. There is another version of the command PAL which will change to PAL if run or NTSC if run with the left mouse button down. I prefer the latter of these two. Another way is through the use of special commands called PALBOOT and NOSPAL. These will write PAL bootblocks to diskettes so that when they boot, they change to PAL right away. One is for standard disks and the other is for non-standard disks like European Demos. I use NOSPAL a lot since it works on just about every demo I have and it will NOT kill the current bootblock (unless instructed to) but append itself to it. Invaluable. Oh, by the way, most of these programs can be found in PD collections or on most major BBSs that support the Amiga. Another little program from the old Amiga is PALCON which will change the system into PAL the next time you

reboot. This tends not to work with newer Amigas. The final way (and the best way in my opinion) is through the use of a program called DEGRADER. This little gem will not only control PAL/NTSC but will also allow you to fool the computer into thinking you have a different memory configuration than you do (no FAST RAM, a HALF MEG OF CHIP RAM) in order to allow older games to work right, turn off accelerator caches, change disk drive configurations, and more than I care to type. Needless to say, it is more valuable than words. It will survive reboots if required and can change the system IMMEDIATELY without resetting the machine.

I highly recommend picking up one or more of these excellent utilities for shifting your system into PAL, since most of the best Amiga stuff comes from Europe. If you can find someone to put that PAL switch in for you, fantastic. You will love it. Remember, with these programs you can further customize your own disks by adding one of the PAL commands to your 'C' directory and adding the command PAL in your disk's STARTUP-SEQUENCE. You can do this for Euro Demos/games that are not non-standard DOS.

7.4   File Manipulation Using DirWorks

Unless you have $60 laying around to buy Directory OPUS, then you are probably in possession of this fantastic program called DIR WORKS (DW). This utility is INVALUABLE to every Amiga user and is just as powerful as it's expensive cousin. DW will set you back $15 if you pay the man for his work and I highly do.

Since it is so configurable, yours may not even be close to mine. But, we will go over some of the basics to get you going.

Let's start with the pull downs. There are some that are very self explanatory. The configuration editor we will get into in a minute. The rest are pretty easy. A couple of things to draw your attention starts with the command DISK OPS or operations. Here is a nice fast way to copy and format disks. Now that you know the hard way to do it, now you can do it the easy way. DW will also allow you to format more that one disk at a time. Simply select the source drive (on top) and the destination drive (on bottom). You may select as many destination drives as needed/available. If you format a disk, it will format all the selected destination disks. If you DISKCOPY, it will copy the selected SOURCE disk to all the selected destination disks. The gadget that reads BLANK can be changed to a new name which will be the name of all disks formatted. Note: If you are using a newer OS, the INSTALL command (used to make a bootblock) will not write to the disk properly. Do this from the SHELL which is also an option on the pull downs.

As you can see, there is already a large arsenal of utilities here and we haven't even gotten around to the meat of the program yet. Let's talk about the two large windows on the screen.

These windows are where the functions take place; copying, moving, etc. Right now there may or may not be anything in them. Each window holds a directory.

To bring up a directory on the left window, click the left mouse button on a device under the window like DF0: or RAM:. The contents of that device will appear in the window, probably sorted alphabetically with subdirectories on top (probably in blue) and files underneath (in black). The files will have their size in bytes next to them. to bring up a directory in the other window, you may click the left mouse button on a device under THAT window, or click your RIGHT mouse button on a device under the LEFT window. You can use either set of device buttons to bring up the device in either window. Just remember to use the mouse button that correlates with the window you want to bring up if the device buttons aren't under the window. Play around with this concept for awhile until you are comfortable with it. Now bring up your Workbench device on the left window and the RAM device in the right. We are going to use them both.

You may enter a directory in one of the windows by simply double clicking the directory. In a moment you will see the contents of the new directory. There will be a little gadget window (probably underneath or above the main window) that will show you the window's current path. You can click in this gadget and enter a path manually to bring it up if you don't want to manoeuver around with the mouse. You can go back ONE directory by clicking the gadget labeled '*'. *To go back to the ROOT directory, simply click the device gadget again or keep clicking the*'' gadget.

DW is what some of us call an auto-launcher. In other words, DW determines what kind of file it is and automatically knows what to do with it. If it is a picture file (IFF/HAM) it will display it. If it is a digitized sound, it will play it. If it is a text file, it will display it. If it is a compressed/archived file like LHA, LZH, DMS, LZ, etc. it will show the contents of the archive or unarchive it to the destination directory. If it is a program, it will ask you if you want to run it. Pretty neat. This it does without ANY interaction from you except to double click the filename. Some functions, like unarchiving an LHA or DMS file require that you click the right mouse button on the filename. In any right button evolution, the output of the action is sent to the other directory highlighted in the other window, as is any other command such as copy, move, etc.

Let's practice a little bit. You should have your Workbench directory in one window and RAM in the other. Now, highlight a couple of files (or directories for that matter) and select COPY with the left mouse button. The directories (and their contents) and all the files you selected are copied to the other window! It is that simple. If you were to have selected MOVE the directories and files highlighted would've been copied then DELETED automatically. Be very careful with the MOVE and DELETE commands. If you had selected DELETE, then all the highlighted directories and files would've been deleted. Delete the directories and the files you just copied out of your RAM disk.

There are some other GREAT commands such as AdIcn which will add an icon to all the files selected. This will also add icons to the directories selected as well. EScpt which will execute a highlighted script file. PLAY will play all the highlighted sound samples. SHOW will show all the highlighted picture files.

LHA A will take all the highlighted files and directories and make them into a compressed archive (if you have LHA in your 'C' directory).

It is a very simple program that just takes a little getting used to. I have gone over the simple and the most powerful commands. Feel free to copy some files over to the RAM disk and experiment. If you are going to practice on disks, use the write protect tab to keep your data safe. This program is also widely available and should be part of your collection if it isn't already.

7.5   Virus Prevention and Information; Protect yourself

Possibly one of the most important parts of this guide (and the most interesting) is this chapter on virus prevention and information. Many people know what a virus is, but few know how they work and subsequently do not know how to stop them. We need to know a few things before we get into the depths of viruses.

Let's begin with a little history of viruses. Viruses have been around since the beginning of the personal computer age. There have been some truly vicious viruses created and for quite awhile, people lived in fear of trading software and downloading files from computer bulletin boards afraid they would be infected unknowing and losing their data. Soon, more people learned about them and developed programs designed to scan your system for viruses and remove them AFTER the damage was already done. Finally, they came up with ways of catching viruses in the act, since there is only a couple of ways they could spread.

Early viruses on the Amiga were relatively harmless. One of the first major viruses to hit this computer was the SCA (Swiss Crackers Association) Virus that, at a random point, would take over the computer and say "SOMETHING WONDERFUL HAS HAPPENED! YOUR AMIGA IS ALIVE AND HAS BEEN INFECTED WITH A VIRUS". It DID have the habit of destroying your bootblocks but that was the way it spread. It didn't erase your disks or trash your hard drive. Later on, when people started getting wise to the bootbloack virus, they invented a virus that attached themselves to any file you executed. Your files would grow each time you ran it, as it continued to tag another copy of the virus at the end. Some file viruses actually replaced the last part of the file with themselves. Some programs could survive, but most did not. Others followed, some called them TROJANS after the famous horse disguised army. These would do nothing until a given date (the programmer's birthday for instance) then do something ugly. In the late 80's a virus called MICHAELANGELO took the world by storm. On the famous artist's birthday, a picture of the man and a story popped up on the screen. While you were reading the text, the virus proceeded to erase your hard drive. Gruesome, eh? This was a PC virus, but it made USA TODAY and slapped the world in the face. Some people saw the virus a day early (their clocks had gained time over the years and they gained a day) and warned people. That day, thousands of people refused to turn on their computer. Even years later, people still left their computers off on that day. Other viruses are not so kind. An erased hard drive can be recovered (now) but a broken one can't. One virus tricked the computer

into thinking that your hard drive was bigger than it really was and send the hard drive in search of a track that didn't exist. After banging away for a couple of seconds searching for a phantom file, the hard drive would die. That is brutal, folks. Now let's get back to the present, more learned society.

First, the definition of a virus. Any program that is written to continue its life after the computer is shut off by replicating itself and is USUALLY created to damage or otherwise adversely effect the computer. There you have it. Better than a text book, eh? (grin) That sums it up, though. It HAS to be able to survive when the machine is turned off. We already know that a virus can live after a reboot. But, as any computer guru will tell you, a virus cannot survive if the computer is shut off. That is HALF true. If the virus has NOT yet begun to replicate, yes you can kill it this way. Most of the programmers that create viruses know this and make it replicate itself as soon as it enters the system. More about that in a minute. Just remember, there is no magic behind viruses. They are just programs coded by a programmer. Since they are coded, they can be identified BY that code. That is one way we can find and kill it; based on it's 'fingerprint'.

Now that we know WHAT it is, let's look at HOW they work. This is universal knowledge for ALL computers. Viruses work the same on all computers. Some just have more ways of getting the virus.

There are two major types of viruses but they replicate in different ways. These types are called Bootblock Viruses and Filelink Viruses. Each spreads a different way and survives a different way. The common element which makes it almost IMPOSSIBLE for viruses to infect protected machines it that the virus must patch itself into the OS in order to spread and/or survive. A bootblock virus must be able to tell when a disk has been inserted so it patches itself into the floppy device. The virus must be able to restart itself after a reboot, so it makes the reboot vectors (areas that are updated after a reboot) point to THEM to re-enable the virus in addition to restarting the system. You can be 100% protected as long as NO PROGRAM CHANGES THESE VECTORS! Modern day virus checkers check several times a second to see if these vectors have been altered. If so, it intercepts and tells you that the vectors have been altered and asks you if you want to clear them. A simple yes will stop the virus on the spot. Even an unrecognized virus cannot take your machine without you letting it. If it is recognized, the checker will kill it. Let's look at the causes and effects of both viruses.

Bootblock Viruses spread and live on the bootblocks of your diskettes. Remember we said that the bootblock could contain a small amount of code? Well, it is enough for a virus. Once you boot the disk, the virus enters memory and waits for you to reset the computer or insert another disk. When you do, it checks to see if another disk is in the drive. If it is, it copies itself to the bootblock, effectively destroying any other code that is there. If the program required a custom bootblock to load the disk (non-standard DOS disks require this), the disk is now completely worthless unless you have another copy somewhere. Thus, the chain goes on. Every disk inserted or booted gets infected. Even if you catch the virus in your machine it can still live on your disks. Once the

virus is caught, every disk SUSPECTED of containing it must be checked and cleaned. Fortunately, most of the modern day virus checkers will check every disk inserted while it is 'on duty'. The only real way that a virus can sneak back into the system is if you don't use the disk while the checker is running by booting off of it instead of the disk with the checker on it. Even after it is caught, chances are that the disk's bootblock is unrecoverable. The solution, though, is what they call a Bootblock Lab that let's you make copies of all your disk's bootblocks and restore them if you need them. Most bootblock viruses are easily caught once they enter the system, but can exist on your diskettes for a LONG time before you put them in while the checker is running (disks that are unusable from the Workbench, for example). I found a virus on a disk that was several YEARS old and never caught it. The reason is that in order for a checker to catch the virus BEFORE it enters memory, it must know what to look for on the bootblock. It must have a fingerprint to compare with. These are known as bootblock 'brains', files that contain what the viruses look like. When you insert a disk, the checker compares the bootblock with the brainfiles and if they match, the checker alerts you and asks if you want to dispose of it. Many times, the removal will destroy the bootblack, possibly rendering the disk inoperable, even if it was operable while the virus was there. Better this than spreading the virus. My problem was that at the time I got the disk, my checker's brain didn't have an image of that bootblock to compare with. Now, though, most checkers know what is a normal bootblock and what is a foreign one. If it doesn't recognize it, it tells you so and asks if you want to overwrite it with a normal one. If you do, and it was a non-standard DOS disk, say good-bye to the program. Some checkers are even smart enough that you can tell it to memorize an image of the bootblock and remember it so that next time you put it in, it doesn't cry over it. Neat eh?

The second type is called a Filelink Virus. This attacks a file directly and attaches itself either to the end or takes up enough room WITHIN the file to restart itself when the file is run. So, when you shut off the machine, then turn it back on (virus gone, eh?) and run the file, it is back on and ready to corrupt. Most viruses attach themselves to files that are DEFINITELY going to be run when the computer starts up (like, say, ANY file in your startup sequence?). Now, every time you run a file (or start your system), the virus attaches itself to it. Now you give a copy to a friend, put it on floppy, etc. and it gets away. You get the idea. Most of the time, these viruses are the ones that format your hard drive or put your system on the blink. They may also erode enough of your file away little by little so that it works for a couple of 'virus attachments' then dies mysteriously. The only way to catch this one without letting it into memory is to do a file scan on the disks that are suspected of containing a virus. Again, an image in the brain must be available for that virus to be identified and removed. In this case, the checker cannot say 'Unknown Bootblock' or in this case, 'Unknown file' because every file on your disk is different; not standard like bootblocks are supposed to be. That is why new viruses must be reported and analyzed right away so that the coders of the checkers can add the image to their 'brains'. Again, not to fear because even though your checker may not be up to date to identify the virus, it will stop it when it attempts to take control of your system.

As you can see, viruses are a very little threat if you have the right protection. Fortunately, unbelievable checkers are available right in the Shareware and PD field for little or no cost. The ones I recommend (in this order) are VirusZ II, VirusZ, and Virus Checker. For the most part, these are the full-featured big boys. They handle just about every virus known to man and are updated quite often. I use VirusZ II personally. Add this program to your system and place it in either your STARTUP-SEQUENCE or just drop a copy of it in your WBSTARTUP drawer and it will be run automatically at startup. It is protection you can't live without.

Other ways you can protect yourself include file scanning all new programs you get from BBSs or, if the disk is non- standard, put it in the drive while your checker is running. Do these BEFORE you run the program. Do the same with any files or disks brought to you from other suspectable sources. Urge your friends to use a checker. Encourage your local BBS to install software that checks incoming files for viruses. Then, leave the rest to the checker. Using these principles, I have remain virus free for years. You can too!

7.6 Installing programs to Hard Drive without an Installer

Some people might have gotten this guide for this section alone. Up until now, we have learned some MAJOR tricks of the trade and even lightly touched THIS topic a little bit. Now, you are going to learn the knowledge of years of experience in a few minutes. We are going to learn how to take those pesky, no hard- drive installer havin' programs and put them on the hard drive.

One of the very few things the PC world has over us is the fact that EVERY program released can be put on the hard drive. Not so in the Amiga world and I will tell you why. Most quality products come from Europe, a place where they have very little money for buying toys for their computers. This is the main reason they bought an Amiga to begin with. No sound cards, video cards, game cards, etc. to buy; it was all built in. Since most of the early Amigas didn't come with hard drives, very few could afford to buy them. Therefore, the market for hard drive installability was low. In addition to that, programmers found out that by rewriting the DOS system to their own specifications, they could get incredible loading speeds off of a diskette as well as compress the data immensely. Thus the non-standard DOS disk was born. The wait times for the game to load up levels, etc. were dramatically lessened. What the programmers also found out is that they could implement a whole new breed of copy protection with this system. Since they could encode the disks any way they wanted (and justify it with speed increase) they could also encode it so that copiers could not copy it. The only way it could be pirated was to decompress the disk, decode the disk, remove the protection checks, then release it to the world in a format that anyone could copy. (This is in violation of Copyright law and is therefore quite illegal but it is a way of getting your LEGAL one copy backup. Of course, it is for your own use and may not be lent out or use by anyone else). Anyway, this tended to increase the number of disks it occupied, but when you are not paying for the software, what difference does it make? Anyway, the system became so popular that almost all the game market adopted this standard. As we all know after reading the guide to this point, non-standard DOS disks cannot be run

from the hard drive. Some companies changed over to the PC- popular 'code word' protection that required the user to look up a word in the accompanying manual and type it in before the program would continue. Now, you could transfer these few programs over, but the majority of the world continues to use non-standard DOS. Some hackers/pirates have even created another way to not only copy the non-standard DOS disks but to allow you to install them on your hard drive. What they do is make an image of all the disks and load them all into your RAM to be executed. Sure it works and it is fast, but it also requires you have a meg of RAM for each disk it loads and you cannot cleanly break out of it back to your Workbench. Again, this is illegal if you don't own a purchased copy of the game. Still, it is an alternative to the lack of a hard drive installer.

Another problem also exists. The disks that ARE standard AmigaDOS disks but for some reason didn't include an installer and won't seem to run from the hard drive if you copy the files over manually. Ah, now here is something we can do something about.

Let's start with what we CANNOT do. We cannot take non- standard DOS disks to the hard drive. Period. End of discussion. Finis. The only option you have for running this kind of program is to get a copy of it from the Underworld of Pirates or hackers. Insert the first disk into the drive and if you get the old DF0:NDOS name, forget it.

Here is another 'no way' deal. If the disk is standard format and you can get a directory, look for a file with no name and a small size (or a size of zero bytes). If you see this phantom file, forget it. It is protected by a copy protection system that we cannot fix here. In this case, I recommend you buy one of the copier programs designed to take this kind of scheme off. The only one I KNOW of that will do this kind of work is a program called MAVERICK which is rumored to specialize in taking disks like this and making them hard drive installable. The one disk that comes to mind is the old Broderbund game STAR WARS. That had this exact protection scheme on it. Your only other option here, again, is to seek an unprotected copy from a pirate. It may or may not go on the hard drive.

Okay, now you are thinking "What the hell CAN I put on my hard drive??" Well, fortunately, most of the newer games that require more than one or two disks come with very friendly installers. Many that don't can still be easily copied over and forced to work. Here is the step by step guide for HD installation. Keep doing them in order until one of them works or until directed to skip to a different step. In order to make things more clear, we will say that the name of the game is called SINISTAR and it has three disks to it named SINI1, SINI2, and SINI3. It does NOT have a 'phantom file'.

1. Insert the first disk into the drive and open in up on your Workbench. Is there an icon for an INSTALL or INSTALLER? Use it and install the program following the on screen instructions. Stop here.

2. Enter a SHELL (or use DW) and look at the contents of disk 1. Is there a file that is called INSTALL or INSTALLER? If so, go to the SHELL

(if not already there) and go to the disk using the CD command or just typing the name of the drive (i.e. DF0:). Type EXECUTE INSTALL or EXECUTE <the filename>. Sometimes the programmer forget to add an icon to the installer or just forget to mention in the instructions that one exists. This is not uncommon. If not, continue.

3. Make a new directory on your hard drive for the program and make sure you add an icon using DW (or use the Workbench NEW DRAWER command). If you don't know how to do this yet, you had better go back and read some more! <grin> Now using DW, Workbench, or the SHELL, copy all the files and directories from all the disks into this one drawer. Put the disks away in a safe place; we won't need them anymore.

4. Open this new drawer. Is there an icon for the program there? If so, go on to the next step. If not, you must determine which file starts the program and add an icon to it. Guess how? CHECK THE 'S' directory for a STARTUP-SEQUENCE and see what it reads. If it contains more than one file, then copy the STARTUP-SEQUENCE into the directory with all the other files and directories. Use DW to add an icon to the newly placed STARTUP-SEQUENCE file. From Workbench, select the icon and use the pull down menus under ICONS and select INFORMATION. IN the gadget box marked DEFAULT TOOL put the text

    ```
    C:ICONX
    ```

    This will cause this icon to execute the file as a script, running all the commands in it. We discussed scripts earlier and the STARTUP-SEQUENCE is a script, after all. If the STARTUP- SEQUENCE only had a single command (filename), add an icon to that filename using DW. If the file you just added an icon to is a script (double click it from DW and see if it displays text) too, then you will have to change the DEFAULT TOOL as described above to C:ICONX so it will execute right.

    Click the icon (the one that existed or the new one you just created) it and see what happens. Follow the chart below based on what happens next:

    - Did you get an error from the Workbench that said THIS ICON HAS NO DEFAULT TOOLS? You didn't add the C:ICONX command to the icon properly. Recheck using the above paragraphs.

    - Does the program run properly? End here.

    - Did you get a requester saying INSERT <name> INTO ANY DRIVE? If so go to step 5.

    - Did an error message come up saying COULDN'T FIND <name> or MISSING FILE <name> or UNABLE TO OPEN FONT <name> or something similar? Go to step 6.

- Did the program just lock up and stop running with no explanation? Go to step 5.

5. You must try to ASSIGN the disks to the directory you made and copied the files to. We described how this works earlier in the guide, but using our example stated above, enter a SHELL and type these lines:

```
ASSIGN SINI1: <path of new directory>
ASSIGN SINI2: <path of new directory>
ASSIGN SINI3: <path of new directory>
```

Now go back to step 4 and try it again. If it all works, you need to type these lines before you run the program or you need to add them to your STARTUP-SEQUENCE or the USER-STARTUP file. We haven't mentioned this before, but the USER-STARTUP is also located in the S directory and most programs put their OWN ASSIGN commands here. It is a perfect place to put yours now since it is always executed on startup, too. This is a 2.0+ OS thing.

6. Are there directories required by the system in this new directory like C, S, DEVS, LIBS, FONTS, etc.? If so, copy all the files from these directories to their respective directories on YOUR workbench partition. The program probably needs a font, library, or command from one of these directories and it isn't finding it. Therefore, you need to copy those files to YOUR directories. Return to Step 4 and try it again. Should all go well, you are set. The program is ready to play! If it fails again for the same reason, try doing step 5. Should it still fail, there is one more thing to try.

7. If you have tried everything and are still getting a requester saying IN-SERT <name> INTO DRIVE DF0: (it is the DF0: that is important) then the device is hard coded into the program and an assign isn't going to take care of that. The program code will HAVE to be changed. You must use a HEX editor to change all occurrences of DF0 inside the program to something like NNN or JJJ or something other than a device name. Then, use the ASSIGN command as listed above:

```
ASSIGN NNN: <path>
```

There is a great program called KILLDFX from the MAVERICK copier disk. It is hard to find, but it does exactly what we just described automatically.

Well, there you have it. The Amiga in a nutshell. I hope that you have all gotten at least SOMETHING out of this guide and will continue to expand your knowledge with time and practice. There are several sources of knowledge that you can tap into. Here is a few of them:

- An Amiga User's Group. Locate these guys by hanging out in your nearest Amiga dealer shop or asking them if there is a support group. The guys in the shop can probably tell you exactly where to go.

- Your local Amiga BBS can help, too. If you cannot find one local (again, talk to your dealer), try calling a pay service like GEnie or Compuserve and getting information there. You can also call the Dark Unicorn Productions support BBS (Secret Service BBS) at (803) 766-2050 and there are lots of people on line there that can help you out.

- Get a copy of Amiga World or Amazing Amiga and order some self-help books on AmigaDOS or other specialty programs for the Amiga. There are also tutorial disks for AmigaDOS, DPaint IV, and many others that work in conjunction with the program and offer you help whenever you need it. Many back issues of AW or AA also will have tutorials and help columns. See if you can find some back issues at your local library.

Remember, have fun and feel free to experiment. Lots of this information was obtained through experimentation. Enjoy the best computer ever made!

8 Appendix

8.1 List of fun 1 disk games

Taken from English Amiga Board, up to post 82, 12 june 2016

Table 3: Suggested top list of best single disk games (number is count of votes)

	Game
11	Turrican II
9	Lotus II
8	Frontier
7	Speedball 2
6	Dyna Blaster (supports multiplayer)
5	Pang
5	Rainbow Islands
5	Rodland
4	Battle Squadron
4	Captive
4	Marble Madness
4	Stunt Car Racer
3	B.C. Kid
3	Dungeon Master
3	Hybris
3	James Pond 2 - Robocod
3	Midnight Resistance
3	Parasol Stars
3	SWIV
2	Faery Tale Adventure
2	Head Over Heels
2	IK+ aka International Karate +
2	Kick Off 2
2	Naughty Ones
2	New Zealand Story
2	North & South
2	Prince of Persia
2	Qwak
2	Starglider
2	Toki
1	Action Fighter
1	Another World
1	Arkanoid Revenge of Doh
1	Arnie
1	Bard's Tale II
1	Boulder Dash
1	Bubble Bobble
1	Buggy Boy

	Game
1	Carrier Command
1	CarVup
1	Deluxe Galaga
1	Ebonstar (supports multiplayer)
1	Elite
1	F/A-18 Interceptor
1	Firepower
1	Flood
1	Fuzzball
1	Giana Sisters
1	Golden Axe
1	Great Courts 2 aka Pro Tennis Tour 2
1	Interphase
1	Jimmy Whites 3D Snooker
1	Jumping Jackson
1	Kid Gloves
1	Megaball AGA
1	MegaBlast
1	Mercenary I: Escape from Targ + The Second City
1	Mercenary II: Damocles
1	Mercenary III: The Dion Crisis
1	Micro Machines
1	NZS
1	One on One
1	P.P Hammer
1	Pool
1	Populous
1	Projectyle
1	Rock´n Roll
1	Shanghai
1	Spell Bound
1	Spindizzy Worlds
1	Switchblade II
1	Technocop
1	Turrican
1	Uninvited
1	Warhead
1	Wizball
1	World Cup 90
1	X-Out
1	Yogi's Great Escape

8.2   List of 2-player games

From https://oagd.net/reports/multiplayer-games

Table 4: Suggested simultaneous two player games

Game	
'Allo 'Allo! Cartoon Fun!	amiga
1941: Counter Attack	arcade
1942	arcade
1943: The Battle of Midway	arcade
1944: The Loop Master	arcade
3D World Tennis	amiga
4D Sports Boxing	amiga
A Prehistoric Tale	amiga
AAARGH!	amiga
Ace Ball	amiga
Advanced Ski Simulator	amiga
Advantage Tennis	amiga
Aero Blasters	megadrive
Air Buster	megadrive
Alcatraz	amiga
Alien Breed	amiga
Alien Breed	amiga
Alien Breed 3D	amiga
Alien Breed 3D 2: The Killing Grounds	amiga

Game	
Alien Breed II: The Horror Continues	amiga
Alien Breed: Tower Assault	amiga
Alien Storm	amiga
Alien Syndrome	amiga
Allan Border's Cricket	amiga
Alpha Waves	amiga
Altered Beast	amiga
American Tag-Team Wrestling	amiga
Amiga Karate	amiga
Apidya	amiga
Art of Fighting	megadrive
Asgard Met Vikings	amiga
Atom Smasher	amiga
ATR: All Terrain Racing	amiga
ATR: All Terrain Racing Christmas Edition	amiga
Aunt Arctic Adventure	amiga
Aztec Challenge	amiga
Bad Company	amiga
Bad Dudes	amiga
Bad Dudes vs. Dragonninja	amiga
BadLands	amiga
Bagitman	amiga
Ballistix	amiga
Bangkok Knights	amiga
Banshee	amiga
Barbarian: The Ultimate Warrior	amiga
Battle for the Ashes	amiga
Battle Isle	amiga
Battle Squadron	amiga
Battletoads	amiga
Beach Volley	amiga
Beast Busters	amiga
Best of the Best: Championship Karate	amiga
Better Dead Than Alien!	amiga
Blastaball	amiga
Blasteroids	amiga
Block Shock: The Last Chance	amiga
Blood Money	amiga
Bloodwych	amiga
Bloodwych: The Extended Levels	amiga
Blue Max: Aces of the Great War	amiga
BMX Simulator	amiga
Body Blows Galactic	amiga
Bonanza Bros.	amiga
Botics	amiga
Bouncing Balls	amiga
Brain Artifice	amiga
Brain Man	amiga
Brands Hatch	amiga
Brian Lara's Cricket	amiga
Brian Lara's Cricket 96	amiga
Brides Of Dracula	amiga
Brutal Homicide	amiga
Brutal: Paws Of Fury	amiga
Bubble Bobble	amiga
Bump 'n' Burn	amiga
Byte Man	amiga
Cabal	amiga
Captain Fizz Meets The Blaster-Trons	amiga
Carcharodon: White Sharks	amiga
Center Court Tennis	amiga
Chambers of Shaolin	amiga
Chaos Engine, The	megadrive
Circus Attractions	amiga
CJ in the USA	amiga
CJ's Elephant Antics	amiga
Contra - Hard Corps	megadrive
Cool Croc Twins	amiga
Crack	amiga
Crack Down	amiga
Crazy Seasons	amiga
Croak 2	amiga

Game	
Croak!	amiga
CrossCheck	amiga
Cruncher Factory	amiga
Crying - Aseimei Sensou	megadrive
Cyberball	amiga
Cyberblast	amiga
Cyberzerk	amiga
Cyborg Justice	megadrive
Dal'X	amiga
Dalek Attack	amiga
Dangerous Streets	amiga
Dark Century	amiga
Datastorm	amiga
Days of Thunder	amiga
Death Mask	amiga
Death Sword	amiga
Death Trap	amiga
Deluxe Galaga	amiga
Die Siedler	amiga
Dino Wars	amiga
Dithell in Space	amiga
Ditris	amiga
Dizzy Panic	amiga
Dogs of War	amiga
Doman	amiga
Domination	amiga
Dominium	amiga
Donk - The Samurai Duck	amiga
Doody	amiga
Double Agent	amiga
Double Dragon	amiga
Double Dragon 3 - The Arcade Game	megadrive
Double Dragon 3: The Rosetta Stone	amiga
Double Dragon II: The Revenge	amiga
Double Dragon III - The Sacred Stones	nes
Double Dragon V - The Shadow Falls	megadrive
Double Dribble	amiga
Downfall	amiga
Dr. Mario	amiga
Draggy And Croco	amiga
Dynamite Düx	amiga
Dynasty Wars	amiga
Dynatech	amiga
E-Motion	amiga
E.T.'s Rugby League	amiga
Earl Weaver Baseball	amiga
Easy and Fun: Four in One	amiga
Elfmania	amiga
Embryo	amiga
Emerald Mine 3 Professional	amiga
Emerald Mines	cd32
Emetic Skimmer	amiga
Enemy: Tempest of Violence	amiga
England Championship Special	amiga
Escape from the Planet of the Robot Monsters	amiga
ESWAT	amiga
Eternal Champions	megadrive
Euro Soccer	amiga
European Championship 1992	amiga
European Football Champ	amiga
European Soccer Challenge	amiga
Extase	amiga
Extasy	amiga
Exterminator	amiga
Extreme Violence	amiga
F1 World Championship Edition	amiga
Face Off [Anco]	amiga
Falcon	amiga
Fast Break	amiga
Fears	amiga
Fighter Duel Pro	amiga
Fightin' Spirit	amiga

Game	
Fighting Soccer	amiga
Final Blow	amiga
Final Fight	amiga
Fire & Forget	amiga
Fire Power	amiga
Fist Fighter	amiga
Flip-it & Magnose: Water Carriers From Mars	amiga
FootMan	amiga
For President	amiga
Forgotten Worlds	amiga
Frenetic	amiga
Frog Feast	cd32
Fußball Total! AGA	amiga
Future Classics Collection	amiga
Future Tank	amiga
Galactic Invasion	amiga
Garrison II: The Legend Continues	amiga
Gary Lineker's Hot-Shot!	amiga
Gauntlet III: The Final Quest	amiga
Gazza II	amiga
Gazza's Super Soccer	amiga
GBA Championship Basketball: Two on Two	amiga
Gem Stone Legend	amiga
Gemini Wing	amiga
General Chaos	megadrive
GFL Championship Football	amiga
Gladiators	amiga
Gloom	amiga
Golden Axe	amiga
Golden Axe II	megadrive
Golden Axe III	megadrive
Golden Oldies: Volume 1	amiga
Gotcha [Kingsoft]	amiga
Graham Gooch World Class Cricket	amiga
Graham Gooch's Second Innings	amiga
Grand Prix 500 2	amiga
Gravity Force 2	amiga
Great Courts	amiga
Gridiron!	amiga
Gunstar Heroes	megadrive
HardBall II	amiga
HardBall!	amiga
Heart of the Dragon	amiga
Heavy Metal Heroes	amiga
Hell Raiser	amiga
Helter Skelter	amiga
Herzog Zwei	megadrive
Historyline 1914-1918	amiga
Hockey Pista	amiga
Holo Squash	amiga
Hot Rubber	amiga
Hotshot	amiga
Ian Botham's Cricket	amiga
Iceball	amiga
Ikari Warriors	amiga
International 3D Tennis	amiga
International Ice Hockey	amiga
International Karate +	amiga
International One Day Cricket	amiga
International Tennis	amiga
International Truck Racing	amiga
Iron Trackers	amiga
Italy 1990: Winners Edition (U.S. Gold)	amiga
ITS Cricket: International Test Series	amiga
Jaguar XJ220	amiga
Jahangir Khan's World Championship Squash	amiga
Joe & Mac: Caveman Ninja	amiga
John Madden American Football	amiga
Jouster 3	amiga
Jupiter's Mastermegadrive	amiga
Juuouki	megadrive
Kamikaze	amiga

Game	
Karate Master	amiga
Karting Grand Prix	amiga
Kick Off 96	amiga
Kikstart II	amiga
Killer Instinct	arcade
Killerball	amiga
Klax	amiga
Knights of the Sky	amiga
Labyrinth (Interactivision)	amiga
Lamborghini American Challenge	amiga
Last Duel: Inter Planet War 2012	amiga
Lemmings	amiga
Lethal Xcess	amiga
Light Racer	amiga
Limes & Napoleon	amiga
Line of Fire	amiga
Liverpool	amiga
Llamatron: 2112	amiga
Logo	amiga
Loopz	amiga
Lords of War	amiga
Lotus Esprit Turbo Challenge	amiga
Lotus III: The Ultimate Challenge	amiga
Lotus Trilogy	cd32
Lotus Turbo Challenge 2	amiga
Lupo Alberto	amiga
M.U.D.S.	amiga
Magic Marble	amiga
Manchester United	amiga
Manchester United: Premier League Champions	amiga
Manga Hot Numbers	amiga
Manix	amiga
Marathon	amiga
Marble Madness	amiga
Master Axe: The Genesis of MysterX	amiga
Matrix Marauders	amiga
Mega Twins	amiga
Megaroids	amiga
MegArts Hockey	amiga
Mercs	amiga
Metal Masters	amiga
Metal Slug	arcade
Metal Slug 2	arcade
Micro Machines	amiga
Micro Machines	megadrive
Midnight Resistance	amiga
Mikro Mortal Tennis	amiga
Mindbender	amiga
Mindbreaker	amiga
Minskies Furballs: The Abduction	amiga
Mortal Kombat	amiga
Mortal Kombat 3	arcade
Mortal Kombat 4	arcade
Mortal Kombat II	amiga
MOVE Streets of Rage 2	megadrive
Mutant League Football	megadrive
Mutant League Hockey	megadrive
My Funny Maze	amiga
NARC	amiga
Naughty Ones	amiga
New York Warriors	amiga
Ninja Gaiden	arcade
No Exit	amiga
North & South	amiga
O.B.Y. 1	amiga
Oh No! More Lemmings	amiga
Oktagon	amiga
One-On-One (Electronic Arts)	amiga
Ooops Up	amiga
Operation Combat II: By Land, Sea & Air	amiga
Operation Thunderbolt	amiga
Outlands	amiga

Game	
Overmegadrive [Infacto]	amiga
P.O.W.	amiga
P47 Thunderbolt	amiga
Pang	amiga
Panza Kick Boxing	amiga
Parachute Joust	amiga
Parasol Stars: The Story of Rainbow Islands II	amiga
Passing Shot	amiga
Pengo	amiga
Peter Beardsley's International Football	amiga
Phobia	amiga
Pipe Dream	amiga
Pipe Mania	amiga
Pipe Rider	amiga
Pit-Fighter	amiga
Pitstop II	c64
Pixie and Dixie	amiga
Plotting	amiga
Plutos	amiga
Pod	amiga
Pong	amiga
Popeye 3 - WrestleCrazy	amiga
Populous	amiga
Populous II: Trials of the Olympian Gods	amiga
Pot Panic	amiga
Powerdrome	amiga
Primal Rage	amiga
Pro Boxing Simulator	amiga
Pro Powerboat Simulator	amiga
Pro Tennis Simulator	amiga
Pro Tennis Tour	amiga
Probotector	megadrive
Protector (Virgin Mastertronic)	amiga
Psyborg	amiga
Psycho Squares Deluxe	amiga
Pulsator	amiga
Punisher, The	megadrive
Puzzle Bobble	arcade
Qattro	amiga
Qwak	amiga
R-Type Leo	arcade
R.B.I. Two Baseball	amiga
Radio Controlled Racer	amiga
Rallye Master	amiga
Rampart	amiga
RasterBike	amiga
Read & Rhyme	amiga
Rebellion	amiga
Return To Genesis	amiga
Revenge of the Mutant Camels	amiga
Rise of the Robots	amiga
Road Rash 3	megadrive
Road Rash II	megadrive
Roadwars	amiga
Rodland	amiga
Roller Coaster Rumbler	amiga
Rushhour	amiga
Salmon-Pink Max	amiga
Scramble Spirits	amiga
Second Samurai	amiga
Seconds Out	amiga
Sensible Soccer: European Champions	cd32
Sensible World Of Moon Soccer	amiga
Sexy Droids	amiga
Shadow Fighter	cd32
Shadow Fighter	amiga
Shadow Fighter [AGA]	amiga
Shadow Warriors	amiga
Shaq Fu	amiga
Shoot-'Em-Up Construction Kit (SEUCK)	amiga
Silk Worm	arcade
Silkworm	amiga

Game	
Skeleton Krew	amiga
Skull & Crossbones	amiga
Skyblaster	amiga
SkyChase	amiga
Slackskin & Flint	amiga
Sliders	amiga
Smash	amiga
Smash T.V.	amiga
Snow Bros. - Nick & Tom	megadrive
Soccer King	amiga
Soccer Superstars	amiga
Soldiers of Fortune	megadrive
Sonic & Knuckles	megadrive
Sonic Boom	amiga
Sonic Crackers	megadrive
Sonic Eraser	megadrive
Sonic the Hedgehog 2	megadrive
Sonic the Hedgehog 3	megadrive
Sooty & Sweep	amiga
Space Day	amiga
Space Fight	amiga
Space Gun	amiga
Space Wars	cdtv
Spatial Hypermegadrive	amiga
Speed!	amiga
Speedball	amiga
Speedball 2: Brutal Deluxe	amiga
Spherical	amiga
Sphericule	amiga
Spitting Image	amiga
Spy vs. Spy	amiga
Spy vs. Spy 2 - The Island Caper	amiga
Spy vs. Spy 3 - Arctic Antics	amiga
Star Control	amiga
Starush	amiga
Statix	amiga
Stormball	amiga
Street Fighter	amiga
Street Fighter Alpha 2	arcade
Street Fighter Alpha 3	arcade
Street Fighter Alpha: Warriors' Dreams	arcade
Street Fighter EX	arcade
Street Fighter EX 2	arcade
Street Fighter EX 2 Plus	arcade
Street Fighter II' - Special Champion Edition	megadrive
Street Fighter II' Plus - Champion Edition	megadrive
Street Fighter II: Champion Edition	arcade
Street Fighter II: Hyper Fighting	arcade
Street Fighter II: The World Warrior	arcade
Street Fighter II: The World Warrior	amiga
Street Fighter III 2nd Impact: Giant Attack	arcade
Street Fighter III 3rd Strike: Fight for the Future	arcade
Street Fighter III: New Generation	arcade
Street Sports Basketball	amiga
Streets of Rage	megadrive
Streets of Rage 2	megadrive
Streets of Rage 3	megadrive
Strider	arcade
Striker	cd32
Sub Rally	amiga
Super C	amiga
Super Cars II	amiga
Super Foul Egg	amiga
Super Loopz	amiga
Super Mario All-Stars	snes
Super Methane Bros	amiga
Super OsWALD	amiga
Super Skweek	amiga
Super Space Invaders	amiga
Super Street Fighter II	megadrive
Super Street Fighter II - The New Challengers	megadrive
Super Street Fighter II Turbo	amiga

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Game	
Super Street Fighter II: The New Challengers	amiga
Super Tetris	amiga
Super Twintris	amiga
Superbike Simulator	amiga
Superstar Ice Hockey	amiga
SWIV	amiga
T-ZerO	amiga
T2 - The Arcade Game	megadrive
T2: The Arcade Game	amiga
Taekwondo	amiga
Teenage Mutant Hero Turtles - The Hyperstone Heist	megadrive
Teenage Mutant Hero Turtles - Tournament Fighters	megadrive
Teenage Mutant Hero Turtles: The Coin-Op!	amiga
Teenage Mutant Ninja Turtles - Return of the Shredder	megadrive
Teenage Mutant Ninja Turtles - The Hyperstone Heist	megadrive
Teenage Mutant Ninja Turtles - Tournament Fighters	megadrive
TeleEpic	amiga
TeleGames	amiga
Tennis Champs	amiga
Tennis Cup	amiga
Tennis Cup II	amiga
Terminator 2 - Judgment Day	arcade
Tetrix	amiga
The Adventures of Batman & Robin	megadrive
The Blue and the Gray	amiga
The Blues Brothers	amiga
The Champ	amiga
The Chaos Engine	amiga
The Chaos Engine 2	amiga
The Deep	amiga
The Game of Harmony	amiga
The Karate Kid Part II	amiga
The King of Fighters '94	arcade
The King of Fighters '95	arcade
The King of Fighters '96	arcade
The King of Fighters '97	arcade
The King of Fighters '98	arcade
The King of Fighters '99	arcade
The King of Fighters 2000	arcade
The King of Fighters 2001	arcade
The King of Fighters 2002	arcade
The King of Fighters 2003	arcade
The Ninja Warriors	amiga
The Oath	amiga
The Power	amiga
The Real Ghostbusters	amiga
The Settlers	amiga
The Ultimate Ride	amiga
The Way Of The Little Dragon	amiga
Thomas the Tank Engine 2	amiga
Thunder Jaws	amiga
Tilt	amiga
Time Bandit	amiga
Time Lock	amiga
Tiny Troops	amiga
Tischtennis	amiga
ToeJam & Earl	megadrive
ToeJam & Earl in Panic auf Funkotron	megadrive
ToeJam & Earl in Panic on Funkotron	megadrive
Tom Landry Strategy Football	amiga
Tom Landry Strategy Football Deluxe Edition	amiga
Tommy Gun	amiga
Toobin'	amiga
Top Gear 2	amiga
Top Wrestling	amiga
Tornado	amiga
Tornado [AGA]	amiga
Total Carnage	amiga
Tracers	amiga
Transplant	amiga
Troddlers	amiga
Tron 5000	amiga

Game	
Tube Warriors	amiga
Tubular Worlds	amiga
Turbo	amiga
Turbo Trax [Microdeal]	amiga
Turn 'n' Burn	amiga
TV Sports Baseball	amiga
TV Sports Boxing	amiga
TV Sports Football	amiga
Twin Turbos	amiga
Two to One	amiga
U.N. Squadron	amiga
Ugh!	amiga
Ultimate Gloom	cd32
Ultimate Mortal Kombat 3	megadrive
Ultimate Mortal Kombat 3	arcade
Uridium 2	amiga
Vectorball	amiga
Venom . Spider-Man - Separation Anxiety	megadrive
Venom Wing	amiga
Victory Road: The Pathway to Fear	amiga
Viewpoint	megadrive
Vindicators	amiga
Virocop	amiga
Virtua Racing	megadrive
Volleyball Simulator	amiga
Vortex	amiga
Vroom Multi-Player	amiga
War Zone [Core Design]	amiga
Watchtower	amiga
Wayne Gretzky Hockey	amiga
Wayne Gretzky Hockey II	amiga
WeaponLord	megadrive
Wembley International Soccer	amiga
Wembley Rugby League	amiga
Wendetta 2175	cd32
Wheelspin	amiga
Wild Cup Soccer	amiga
Wild Wheels	amiga
Wipe Out	amiga
Wiz 'n' Liz	amiga
World Championship Soccer	amiga
World Class Rugby	amiga
World Class Rugby: Five Nations Edition	amiga
World Class Soccer (U.S. Gold)	amiga
World Cup USA 94	amiga
World of Illusion Starring Mickey Mouse and Donald Duck	megadrive
World Series Cricket	amiga
World Trophy Soccer	amiga
WWF European Rampage Tour	amiga
WWF Wrestle Mania	amiga
X-Men	megadrive
X-Men 2 - Clone Wars	megadrive
X-Out & Z-Out	cd32
X-ploit	amiga
Xenex	amiga
Xenophobe	amiga
XP8	amiga
Xybots	amiga
Yo! Joe!	amiga
Z-Out	amiga
Zargon	amiga
Zaxxon	amiga
Zero Gravity	amiga
Zombies	megadrive
Zombies Ate My Neighbors	megadrive
Zoom!	amiga
Zyconix	amiga

8.3 List of multiplayer games

From https://oagd.net/reports/multiplayer-games

Table 5: Games that allow more than 2 players

Game		
10 out of 10 Junior Essentials	1 - 4 (1)	amiga
10 out of 10 Maths Algebra	1 - 4 (1)	amiga
1497: Five Years After	1 - 4 (1)	amiga
1869	1 - 4 (1)	amiga
Action Service	1 - 12 (1)	amiga
Adrenalynn	1 - 4 (4)	amiga
Aerobiz Supersonic	1 - 4 (1)	megadrive
Air Management II - Koukuuou o Mezase	1 - 4 (1)	megadrive
American Gladiators	1 - 16 (1)	amiga
Animal Kingdom	1 - 4 (1)	amiga
Anstoss	1 - 4 (1)	amiga
Anstoss - World Cup Edition	1 - 4 (1)	amiga
Arcade Pool	1 - 8 (1)	amiga
Arcade Trivia Quiz	1 - 3 (1)	amiga
Archer MacLean's Pool	1 - 8 (1)	amiga
Arena (Psygnosis)	1 - 4 (1)	amiga
Arnhem: The 'Market Garden' Operation	1 - 3 (1)	amiga
ATR: All Terrain Racing	1 - 6 (2)	cd32
Bad Cat	1 - 4 (1)	amiga
Bandit Kings of Ancient China	1 - 7 (1)	amiga
Bar Games	1 - 4 (1)	amiga
Base Jumpers	1 - 4 (4)	amiga
Betrayal	1 - 4 (1)	amiga
Big Business	1 - 3 (1)	amiga
Big Sea	1 - 4 (1)	amiga
Black Gold (reLINE)	1 - 4 (1)	amiga
Blasteris	1 - 3 (3)	amiga
Bo Jackson Baseball	1 - (2)	amiga
Bobo	1 - 6 (1)	amiga
Body Blows	1 - 4 (2)	amiga
Body Blows Galactic [AGA]	1 - 4 (2)	amiga
Bomb'X	1 - 4 (4)	amiga
Booly	1 - 4 (1)	amiga
Brutal Football	1 - 8 (2)	amiga
Brutal Football: Brutal Sports Series	1 - 8 (2)	cd32
Bucky O'Hare	1 - 4 (4)	arcade
Buffalo Bill's Wild West Show	1 - 4 (1)	amiga
Bug Bomber	1 - 4 (4)	amiga
Bundesliga Manager	1 - 4 (1)	amiga
Bundesliga Manager Hattrick [AGA]	1 - 4 (1)	amiga
Bundesliga Manager Professional	1 - 4 (1)	amiga
California Games	1 - 8 (1)	amiga
California Games II	1 - 8 (1)	amiga
Camel Racer	1 - 6 (6)	cdtv
Capital Punishment	1 - 4 (2)	amiga
Carnage	1 - 4 (4)	amiga
Carton Rouge	1 - 4 (1)	amiga
Casino Roulette	1 - 8 (1)	amiga
Celica GT Rally	1 - 4 (1)	amiga
Century	1 - 4 (1)	amiga
Champion of the Raj	1 - 6 (1)	amiga
Championship Manager	1 - 4 (1)	amiga
Christoph Kolumbus [AGA]	1 - 4 (1)	amiga
Chuckie Egg	1 - 4 (1)	amiga
Circus Games	1 - 4 (1)	amiga
Club And Country	1 - 4 (1)	amiga
Club Football: The Manager	1 - 4 (1)	amiga
Clue: Master Detective	1 - 10 (1)	amiga
Cluedo: Master Detective	1 - 10 (1)	amiga
Colmena, La	1 - 6 (1)	amiga
Computer Scrabble	1 - 4 (1)	amiga
Corx	1 - 4 (2)	amiga
Cover Girl Strip Poker	1 - 3 (1)	cdtv
Craps Academy	1 - 4 (1)	amiga
Cribbage King & Gin King	1 - 4 (1)	amiga
Cyber Empires	1 - 5 (1)	amiga

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Game		
Daily Double Horse Racing	1 - 4 (1)	amiga
Das Haus	1 - 4 (1)	amiga
Delivery Agent	1 - 4 (1)	amiga
Der Patrizier	1 - 4 (1)	amiga
Detroit	1 - 4 (1)	amiga
Dingsda	1 - 4 (1)	amiga
Downhill Challenge	1 - 6 (1)	amiga
Dragon - The Bruce Lee Story	1 - 3 (3)	snes
Dragon Lord	1 - 3 (1)	amiga
Dragons Breath	1 - 3 (1)	amiga
Dribbling: Calcio Serie A 1992-93	1 - 18 (2)	amiga
Dyna Blaster	1 - 5 (5)	amiga
EbonStar	1 - 4 (4)	amiga
Eishockey Manager	1 - 4 (1)	amiga
Elysium	1 - 6 (1)	amiga
Emlyn Hughes International Soccer	1 - 8 (2)	amiga
Empire Soccer 94	1 - 8 (2)	amiga
Empire: Wargame of the Century	1 - 3 (1)	amiga
Energie-Manager	1 - 4 (1)	amiga
Eskadra	1 - 3 (3)	amiga
Eskimo Games	1 - 4 (4)	amiga
Evil Garden	1 - 4 (2)	amiga
Eye	1 - 4 (1)	amiga
Face-Off [Krisalis]	1 - 4 (2)	amiga
Faces: Tris III	1 - 10 (1)	amiga
Familien Duell	1 - 10 (1)	amiga
Fantasy Games	1 - 10 (1)	amiga
Fantasy Manager: The Computer Game	1 - 15 (1)	amiga
Fast Eddie's Pool and Billiards	1 - 4 (1)	amiga
Feudal Lords	1 - 4 (1)	amiga
Fiendish Freddy's Big Top o' Fun	1 - 5 (1)	amiga
FIFA International Soccer	1 - 8 (2)	amiga
First Person Pinball	1 - 4 (1)	amiga
Football Crazy	1 - 4 (1)	amiga
Football Glory	1 - 64 (2)	amiga
Football Masters	1 - 4 (1)	amiga
Formula One Challenge	1 - 4 (1)	amiga
Formula One Grand Prix	1 - 35 (1)	amiga
Franco Baresi World Cup Kick Off	1 - 8 (2)	amiga
Fugger	1 - 6 (1)	amiga
Full Contact	1 - 16 (2)	amiga
Full Metal Planete	1 - 4 (1)	amiga
Fußball Total!	1 - 64 (2)	amiga
Fussballmanager Gesellschaftsspiel	1 - 8 (1)	amiga
Future Basketball	1 - 8 (2)	amiga
Gangster Pursuit	1 - 6 (6)	cdtv
Garrison	1 - 5 (2)	amiga
Gauntlet II	1 - 4 (4)	amiga
Genesia	1 - 3 (1)	amiga
Genghis Khan	1 - 4 (1)	amiga
German Trucking	1 - 4 (1)	amiga
Global Trek	1 - 4 (1)	amiga
Glücksrad	1 - 3 (1)	amiga
Goal	1 - 32 (2)	amiga
Gold of the Americas	1 - 4 (1)	amiga
GP Tennis Manager	1 - 5 (1)	amiga
Grand Ouvert 2	1 - 3 (1)	amiga
Great Courts 2	1 - 4 (4)	amiga
Greens	1 - 4 (1)	amiga
Greg Norman's Ultimate Golf	1 - 4 (1)	amiga
Hanse	1 - 6 (1)	amiga
Hanse: Die Expedition	1 - 6 (1)	amiga
Harry's Balloons	1 - 6 (2)	amiga
HeroQuest	1 - 4 (1)	amiga
HeroQuest II: Legacy of Sorasil	1 - 4 (1)	cd32
HeroQuest: Return of the Witch Lord	1 - 4 (1)	amiga
Hired Guns	1 - 4 (4)	amiga
Hole-In-One Miniature Golf	1 - 4 (1)	amiga
Hot Rod	1 - 4 (4)	amiga
Indoor Sports: Volume 1	1 - 4 (2)	amiga
Indy Heat	1 - 3 (3)	amiga
Infection	1 - 4 (1)	amiga

Game		
International Golf	1 - 4 (1)	amiga
International Open Golf Championship	1 - 4 (1)	amiga
International Soccer (Zeppelin)	1 - 8 (2)	amiga
International Sports Challenge	1 - 4 (1)	amiga
Invest	1 - 4 (1)	amiga
Ivan "Ironman" Stewart's Super Off Road	1 - 3 (3)	amiga
Jetstrike [AGA]	1 - 8 (1)	amiga
Jocky Wilson's Darts Challenge	1 - 4 (1)	amiga
John Barnes European Football	1 - 8 (2)	amiga
Jumpman Junior	1 - 4 (1)	amiga
Kaiser	1 - 8 (1)	amiga
Karamalz Cup Eis Hockey	1 - 4 (2)	amiga
Kenny Dalglish Soccer Match	1 - 4 (2)	amiga
Kick Off	1 - 8 (2)	amiga
Kick Off 2	1 - 8 (2)	amiga
Kick Off 2: Return to Europe	1 - 8 (2)	amiga
Kick Off 2: The Final Whistle	1 - 4 (4)	amiga
Kick Off 3	1 - 4 (2)	amiga
Kick Off: Extra Time	1 - 8 (2)	amiga
Kingdoms of England	1 - 4 (1)	amiga
Kingdoms of Germany	1 - 6 (1)	amiga
Kingpin: Arcade Sports Bowling	1 - 6 (1)	amiga
Leader Board	1 - 4 (1)	amiga
Leader Board Tournament	1 - 4 (1)	amiga
Leatherneck	1 - 4 (4)	amiga
Lingo	1 - 4 (1)	amiga
Links	1 - 8 (1)	amiga
Lords of Chaos	1 - 4 (1)	amiga
Lords of the Realm	1 - 6 (1)	amiga
Lothar Matthäus	1 - 32 (2)	amiga
Lothar Matthäus Super Soccer	1 - 4 (2)	amiga
Mad Show	1 - 6 (1)	amiga
Mag!!!	1 - 4 (1)	amiga
Manager	1 - 6 (1)	amiga
Manchester United Europe	1 - 4 (4)	amiga
Manchester United: The Double	1 - 4 (2)	amiga
Masterblazer	1 - 8 (2)	amiga
Mau-Mau	1 - 3 (1)	amiga
MAX Rally	1 - 4 (4)	amiga
Mega Bomberman	1 - 4 (4)	megadrive
Micro Machines 2 - Turbo Tournament	1 - 8 (1 - 8)	megadrive
Micro Machines Military	1 - 8 (1 - 8)	megadrive
Micro Machines Turbo Tournament 96	1 - 8 (1 - 8)	megadrive
MicroProse Golf	1 - 4 (1)	amiga
MicroProse Soccer	1 - 16 (2)	amiga
Mike the Magic Dragon	1 - 4 (1)	amiga
Mini Golf	1 - 4 (1)	amiga
Mission Underground	1 - 8 (1)	amiga
Money Cascade Professional Fruit Machine	1 - 4 (1)	amiga
Monsters of Terror	1 - 4 (4)	amiga
Moonstone: A Hard Days Knight	1 - 4 (2)	amiga
MOVE Sonic The Hedgehog Spinball	1 - 4 (1)	megadrive
Multi Player Soccer Manager	1 - 8 (1)	amiga
Multi-Player Yahtzee	1 - 4 (1)	amiga
NBA Jam	1 - 4 (4)	megadrive
NBA Jam - Tournament Edition	1 - 4 (4)	megadrive
Nebulus 2	1 - 3 (1)	amiga
Nick Faldo's Championship Golf	1 - 4 (1)	amiga
Nitro	1 - 3 (3)	amiga
Nobunaga's Ambition	1 - 8 (1)	amiga
Obsession	1 - 8 (1)	amiga
Oil Barons	1 - 4	amiga
Oil Imperium	1 - 4 (1)	amiga
Olimpiada '96	1 - 4 (1)	amiga
Olympique de Marseille	1 - 32 (2)	amiga
Omar Sharif's Bridge	1 - 4 (1)	amiga
Omni-Play Horse Racing	1 - 4 (1)	amiga
On The Ball	1 - 4 (1)	amiga
On The Ball: World Cup Edition	1 - 4 (1)	amiga
On The Road	1 - 6 (1)	amiga
Oriental Games	1 - 15 (2)	amiga
Osiris	1 - 3 (1)	amiga

Game		
Outfall	1 - 8 (2)	amiga
Over the Net	1 - 4 (4)	amiga
Paragliding Simulation	1 - 4 (1)	amiga
PGA European Tour	1 - 4 (1)	amiga
PGA Tour Golf	1 - 4 (1)	amiga
Pictionary	1 - 4 (1)	amiga
Pinball Dreams	1 - 8 (1)	amiga
Pinball Fantasies	1 - 8 (1)	amiga
Pinball Hazard	1 - 5 (1)	amiga
Pinball Illusions	1 - 8 (1)	amiga
Pinball Mania	1 - 8 (1)	amiga
Pinball Wizard	1 - 4 (1)	amiga
Pizza Connection	1 - 8 (1)	amiga
Player Manager 2	1 - 4 (1)	amiga
Player Manager 2 Extra	1 - 4 (2)	amiga
Pole Walki	1 - 4 (1)	amiga
Ports of Call	1 - 4 (1)	amiga
Postman Pat	1 - 4 (1)	amiga
Power Pinball	1 - 4 (1)	amiga
Poweroids	1 - 4 (4)	amiga
Powerplay: The Game of the Gods	1 - 4 (1)	amiga
Preis Ist Heiß, Der	1 - 4 (1)	amiga
Premier Manager	1 - 4 (1)	amiga
Pro Tennis Tour 2	1 - 4 (4)	amiga
Projectyle	1 - 8 (3)	amiga
ProSoccer 2190	1 - 16 (2)	amiga
Pub Trivia Simulator	1 - 4 (1)	amiga
Rad Van Fortuin	1 - 3 (1)	amiga
Rally Cross Challenge	1 - 4 (4)	amiga
Rampage	1 - 3 (3)	amiga
Ramses	1 - 4 (1)	amiga
Reach for the Stars	1 - 4 (1)	amiga
Realm of the Trolls	1 - 8 (1)	amiga
Reeder, Der	1 - 4 (1)	amiga
Reederei	1 - 4 (1)	amiga
Reflexity: Pinball Challenge	1 - 4 (1)	amiga
Renaissance	1 - 4 (1)	amiga
Retee 2!	1 - 32 (2)	amiga
Retee!	1 - 8 (2)	amiga
Ringside	1 - 2 (2)	amiga
Rise of the West	1 - 8 (1)	amiga
Risk	1 - 6 (1)	amiga
Riskant!	1 - 3 (3)	amiga
RoboSport	1 - 4 (1)	amiga
Rock Star	1 - 3 (1)	amiga
Romance of the Three Kingdoms	1 - 8 (1)	amiga
Roue De La Fortune, La	1 - 3 (1)	amiga
Roulette-Royal	1 - 4 (1)	amiga
Rugby Coach	1 - 4 (1)	amiga
Rugby: The World Cup	1 - 16 (2)	amiga
Run the Gauntlet	1 - 3 (1)	amiga
Rüsselsheim	1 - 4 (1)	amiga
Ryder Cup: Johnnie Walker	1 - 4 (1)	amiga
Saint & Greavsie	1 - 4 (1)	amiga
Santa Paravia And Fiumaccio	1 - 6 (1)	amiga
Sat 1 Bingo	1 - 3 (1)	amiga
Scorched Tanks	1 - 4 (1)	amiga
Scrabble	1 - 4 (1)	amiga
Sensible Golf	1 - 72 (1)	amiga
Sensible Soccer: International Edition	1 - 32 (2)	amiga
Sensible World of Soccer	1 - 64 (2)	amiga
Sensible World of Soccer '95/'96	1 - 64 (2)	amiga
Sensible World of Soccer '96/'97	1 - 64 (2)	amiga
Sensible World of Soccer v1.1	1 - 64 (2)	amiga
Sierra Soccer: World Challenge Edition	1 - 8 (2)	amiga
Ski or Die	1 - 6 (2)	amiga
Skidmarks	1 - 4 (4)	amiga
Slam Tilt	1 - 8 (1)	amiga
Snakes and Ladders	1 - 4 (1)	amiga
Sneech	1 - 6 (6)	amiga
Software Manager	1 - 4 (1)	amiga
Sonic The Hedgehog Spinball	1 - 4 (1)	megadrive

Game		
Space Crusade	1 - 3 (1)	amiga
Spaceball	1 - 8 (2)	amiga
Spoils of War	1 - 4 (1)	amiga
Spot	1 - 4 (1)	amiga
Stable Masters	1 - 5 (1)	amiga
Star Trash	1 - 4 (1)	amiga
Starbyte Super Soccer	1 - 6 (1)	amiga
Steel Empire	1 - 5 (1)	amiga
Steigenberger Hotelmanager	1 - 4 (1)	amiga
Storm Across Europe	1 - 3 (1)	amiga
Street Racer	1 - 4 (2)	amiga
Street Racer	1 - 4 (2)	amiga
Strikes 'n' Spares	1 - 8 (1)	amiga
Strikes 'n' Spares Professional	1 - 8 (1)	amiga
Stunt Car Racer	1 - 8 (2)	amiga
Stunt Car Racer - The New Tracks	1 - 8 (2)	amiga
Stunt Track Racer	1 - 8 (2)	amiga
Sub Trade: Return to Irata	1 - 4 (4)	amiga
Subbuteo: The Computer Game	1 - 8 (1)	amiga
Summer Challenge	1 - 6 (1)	amiga
Summer Games	1 - 8 (1)	amiga
Summer Games II	1 - 8 (1)	amiga
Summer Olympiad	1 - 6 (1)	amiga
Summer Olympix	1 - 4 (1)	cd32
Super Bomber Man	1 - 4 (4)	snes
Super Gem'Z	1 - 4 (4)	amiga
Super Grand Prix	1 - 4 (4)	amiga
Super Scramble Simulator	1 - 6 (1)	amiga
Super Ski	1 - 6 (1)	amiga
Super Ski II	1 - 4 (1)	amiga
Super Skidmarks	1 - 4 (4)	amiga
Super Sport Challenge	1 - 4 (2)	amiga
Super TaeKwonDo Master	1 - 6 (2)	amiga
Super Tennis Champs	1 - 16 (4)	amiga
Swords of Twilight	1 - 3 (3)	amiga
Table Tennis Simulation	1 - 12 (2)	amiga
Tactical Manager	1 - 4 (1)	amiga
TaeKwonDo Master	1 - 6 (2)	amiga
Tanx n Stuff	1 - 4 (4)	amiga
Tecnoball	1 - 6 (1)	amiga
Tee Off!	1 - 4 (1)	amiga
Teenage Mutant Ninja Turtles	1 - 4 (4)	arcade
The Aquatic Games	1 - 4 (1)	amiga
The Aquatic Games Starring James Pond and the Aquabats	1 - 4 (1)	megadrive
The Ball Game	1 - 4 (1)	amiga
The Brain Blasters	1 - 3 (3)	amiga
The Carl Lewis Challenge	1 - 4 (1)	amiga
The Games: Summer Edition	1 - 8 (1)	amiga
The Games: Winter Edition	1 - 8 (1)	amiga
The Moochies	1 - 4 (4)	amiga
The Patrician	1 - 4 (1)	amiga
The Teller	1 - 3 (3)	amiga
Thomas the Tank Engine's Pinball	1 - 8 (1)	amiga
Tie-Break	1 - 16 (4)	amiga
Tip Off	1 - 4 (4)	amiga
Total Football	1 - 32 (2)	amiga
Traders	1 - 4 (4)	amiga
Transworld	1 - 4 (1)	amiga
TrianGo	1 - 4 (1)	amiga
Tritus	1 - 3 (3)	amiga
Trivia Game Show	1 - 6 (1)	amiga
Trivial Pursuit	1 - 6 (1)	cdtv
Trivial Pursuit: A New Beginning	1 - 6 (1)	amiga
Truckin On II	1 - 4 (1)	amiga
Trump Castle II: The Ultimate Casino Gambling Simulation	1 - 4 (4)	amiga
Twintris	1 - 9 (2)	amiga
Ultimate Body Blows	1 - 42 (2)	cd32
Ultimate Darts	1 - 8 (1)	amiga
Ultimate XTreme Racing	1 - 4 (4)	amiga
Unsensible Soccer	1 - 32 (2)	amiga
Vermeer	1 - 4 (1)	amiga
Vikings: Fields of Conquest	1 - 6 (1)	amiga

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Game		
Voyages of Discovery	1 - 4 (1)	amiga
Wacky Darts	1 - 8 (1)	amiga
Wall Street Wizard	1 - 6 (1)	amiga
Wall$treet	1 - 4 (1)	amiga
Warlords	1 - 8 (1)	amiga
Westphaser	1 - 6 (1)	amiga
Wetten Dass..?	1 - 4 (1)	amiga
Wingnuts	1 - 4 (4)	amiga
Winter Challenge: World Class Competition	1 - 6 (1)	amiga
Winter Games	1 - 8 (1)	amiga
Winter Olympiad 88	1 - 6 (1)	amiga
Winter Olympics	1 - 4 (1)	amiga
Winter Supersports 92	1 - 6 (1)	amiga
Winzer	1 - 4 (1)	amiga
Wiraż	1 - 4 (4)	amiga
World Circuit	1 - 35 (1)	amiga
World Class Leader Board	1 - 4 (1)	amiga
World Games	1 - 8 (1)	amiga
World Tour Golf	1 - 4 (1)	amiga
Worms	1 - 4 (1)	amiga
Worms: The Director's Cut	1 - 8 (1)	amiga
Wormsigns	1 - 12 (12)	amiga
XTreme Racing	1 - 4 (4)	amiga
Yuppi's Revenge	1 - 4 (1)	amiga
Zack!	1 - 8 (2)	amiga
Zany Golf	1 - 4 (1)	amiga
Zerberk	1 - 4 (4)	amiga