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The Pendulum PC

Dale K. Wagler

Southern Illinois University Carbondale

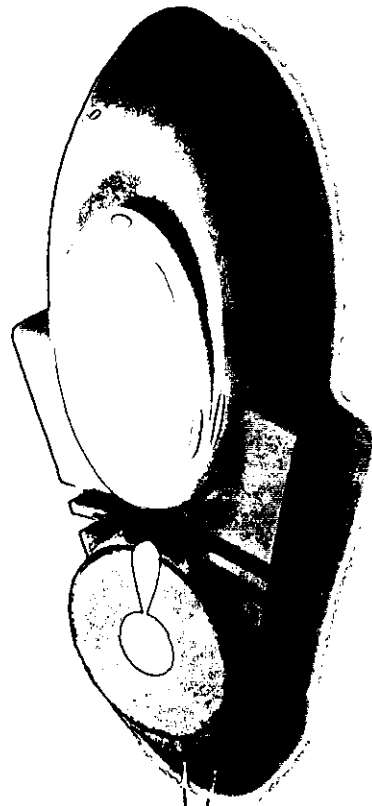
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The Pendulum PC

by: Dale K. Wagler

Design Brief

Concept: *Home Computer System*

Significance: To design a system by which modern computers can be easily upgraded or modified by novices, while setting a new standard for the aesthetic of desktop PCs.

Sponsor: Currently I have an agreement from Phil Hague at Joss Design to be my intellectual sponsor. I have not confirmed this relationship, however, as I am seeking a sponsor in the computer industry such as Dell Computers, Micron, Gateway, or Intel etc..

Phil Hague is the manager of industrial design at Joss. His phone number is 312.644.5677.

Primary Market: Home PC users who are purchasing a new PC, or those who are looking to an alternative to the "beige box"

Secondary Market: Educational institutions, businesses.

Design Brief *revised*

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Sponsor: *Having not recieved much response from Phil Hauge, I have secured the interest of Ron Smith of IBM. Ron is the manager of Industrial Design at IBM's product development facility and has been working in the area of computer design for 14 years.*

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Secondary Market: Educational institutions, businesses.

Dale K. Wagler
AD 489
2.9.99

ID Benchmark

User: In the home computer market, the end users of the following products are the same. People from age 18 and up, with a need for a computer's capabilities but with limited technical knowledge as to how they function. The end user wants to be able to turn the machine on and begin working on it. He/she also wants the computer to be capable of handling software applications, as they become more complex. The upgrading of a computer should be as simple, inexpensive, and intuitive as possible.

Product 1: Dell XPS R450

The Dell XPS R450 is the top end PC (IBM x86 compatible) system on the market for home/small office use. It comes setup with a 450MHz Pentium II processor, 128M of SDRAM (Synchronous Dedicated Random Access Memory), a 16M AGP (Accelerated Graphics Port) video card, 40X CD-ROM drive, an internal 3.5" floppy drive, 2 USB (Universal Serial Bus) ports, and a 320 voice digital sound card.



This is an extremely high-speed system, ideal for 3D applications, games, and business apps. Not as powerful for handling 3D geometry and rendering as a dedicated workstation, but can easily handle any personal/home office applications. These systems can also be configured, when ordering, with any number of changes. Every component listed above can be replaced with an alternate size/speed/quality one to meet a desired price-point. The above system with full Dolby surround digital speakers + subwoofer, with Dell's Comfort Keyboard, and standard Microsoft Intellimouse with no monitor costs \$2108.00 plus shipping and handling (about another \$152).

This system's high speed, and configurability, along with Dell's reputation for quality (It utilizes genuine Intel components) are it's greatest strengths. The system itself is fairly easy to set up as all the connections at the back of the tower (the box that contains the system components) are color-coded.

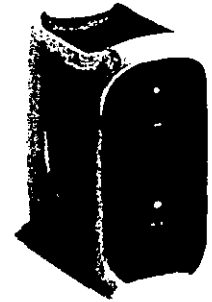
The need to use a phillips-head screwdriver to open the case, and the typical confusion associated with the inside of a computer are it's chief drawbacks concerning upgrades, and modification. Though the tower is well designed from an engineering/function point of view, it holds true to the same "beige-box" motif most PCs adhere to.

Like every computer I have found, the inside is typical computer industry standard. Though Intel has made the Pentium II processor a "module" component by encasing the processor and it's interface circuit board in a plastic cartridge, the rest of the internal components are connected via cables, and circuit cards

plugging directly into one-another. This adds to consumer hesitance in performing even the simplest upgrade tasks. In regard to the way the Dell is configured, it is typical of most every other PC with the exception that some systems, like those from Micron, offer a tool-less chassis (tower).

Product 2: Apple G3

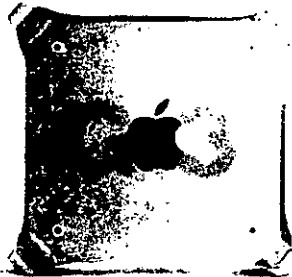
The Apple G3 computer is not a PC (IBM x86 derivative). It utilizes Apple's own motherboard, and processor architecture. Thus having a monopoly on their own market segment, they have been able to focus a great deal on the design of their products from a consumer point of view. The top of the line Apple product is the new G3 desktop. Aimed at the professional graphics market, it is more on par with the Dell PC than Apple's iMac line of home computers.



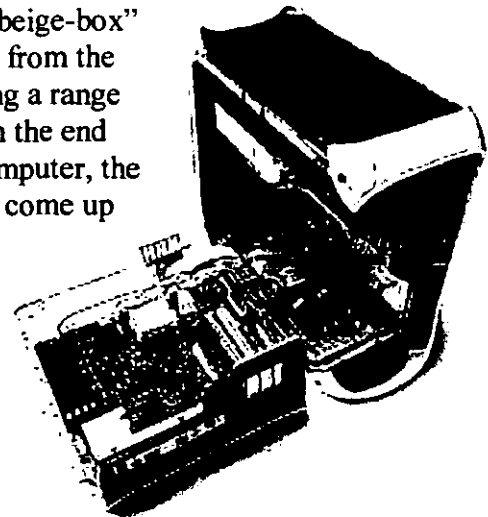
The G3 comes equipped with 64M RAM, a 6G hard-drive, a 24x CD-ROM, a built in 10/100BASE-T Ethernet connector (for LAN use), and has 2 USB ports, and 2 FireWire ports. This system, running a 300 MHz Processor, without a monitor, costs around \$1600.00.

Considered by many to be the ultimate graphics computer, Apple has a huge following. The fact that some applications are designed for, and run faster on, Apple systems is not a surprise. The recent near-collapse of Apple has

spurred a re-invention of the company's image. This was made obvious by the introduction of the iMac last year. Now with the redesign of their flagship computer, the G3, along the same scheme as the iMac, Apple is hoping to close the gap opened up by manufacturers developing the x86 series of computers. Although the above features, like the Dell, can also be upgraded, there is not as wide a variance to the options.



Where the new Macintosh G3 makes its mark is with its new design. Breaking away from the "beige-box" train of thought, the G3 takes its styling queues from the iMac, with a new translucent outer case covering a range of colored inner-cases, the G3 can be ordered in the end users favorite color. Besides being a stylish computer, the G3 has taken a step beyond tool-less cases, and come up with the concept of a very easy to access case. Now the side of the case drops completely open to lie flat on the desk while any upgrades, or modifications are made. This new feature makes it extremely popular with those people tasked to do these operations.



The shortcoming, however, is that the insides of the computer, though extremely easy to get to, are still intimidating to the user. A technician is still generally required to perform any tasks that involve opening the machine up. The Macintosh G3 processor line, like the PII, is mounted onto a circuit card allowing for easy installation, however, it is *not* contained in a plastic case, making it seem as foreboding as the rest of the computer's internals.

Summary:

The implementation of USB and FireWire, have made it easier than ever to add hardware components (external) to a computer system.

The USB port has data transfer rates that range from 1.5Mbps (megabytes per second), to 12Mbps. By comparison, the standard serial port, like the one a computer's mouse and printer plugs into, has a data rate of 230Kbps (kilobytes per second).

FireWire is a new technology, not yet incorporated in many desktop PCs. This new port, of which the G3 has two, has a data rate of 400Mbps. This can be extremely important when hooking up to external drives, and for spooling large files to a printing server. FireWire is already considered a standard for digital audio & video professionals who are working on Macintosh platforms due to its incredibly high bandwidth.

Another important technology is "Plug & Play", this was first introduced by Microsoft in its Windows 95 operating system, and has been refined in Windows 98 to work with USB and FireWire components. Plug & Play allows the user to remove and add components to a system while it is running. The system will automatically detect the new hardware and load the necessary drivers for it. This also applies to some internal components on PCs, however, as there is the recurring hesitance to open a computer, especially while it is running, few people ever do this.

Computer Experience Survey

Please answer the following questions to the best of *your* knowledge; do not ask for help, as your answers will affect the results of the survey.

Gender: Male Female (*circle one*)

Age: _____

1. What does "PC" stand for as related to computers?
2. What does "RAM" stand for?
3. What does "SCSI" stand for?
4. What type of computer(s) if any do you use/own at home? Check all that apply.
 - IBM / PC
 - Macintosh
 - UNIX i.e. SGI
 - Other _____
5. Have you made any internal modifications or upgrades to this machine?
 - Yes (*continue*)
 - No (*skip to Q.16*)
6. Did you perform this work yourself?
 - Yes (*continue*)
 - No (*skip to Q.11*)
7. What type(s) of changes did you make (*circle all that apply*)

Memory	Video/Sound Card	Processor
Hard Drive	Removable Drive	Other _____
8. What problems, if any did you encounter?
9. How long did this work take you?
10. What did you like about doing the work yourself? (*Please answer Q.19*)

11. What type of work was performed on your computer?

12. Why did you take your computer elsewhere to have work done?

13. What problems/misgivings if any did you encounter having your computer worked on by someone else?

14. What did you like about the experience?

15. How much (approximately) did this work cost? (Answer then skip to Q.18)

16. If you were to do any modifications to your computer would you do the work yourself?

17. Why or why not?

18. Would you be willing to be contacted for a follow-up interview?

- Yes (*Please answer Q.19*)
- No (*Thank you for your time, this concludes the survey.*)

19. Name

Phone #

Thank you for completing the survey, have a nice day!

Sincerely,

Dale Wagler IDSA

iid8@earthlink.net

Questions for Interview (End User)

What types of computer do you currently own/work on?

Do you do perform own upgrading / maintenance tasks?

What experiences have you had concerning upgrading, or maintaining that system?

What problems specifically have you come across?

What features concerning maintenance / upgrading do you find helpful, or easy to use?

How often have you had the need to open your computer?

Where do you take your computer for maintenance when you don't do it yourself?

What did you dislike about that experience?

What did you like about that experience?

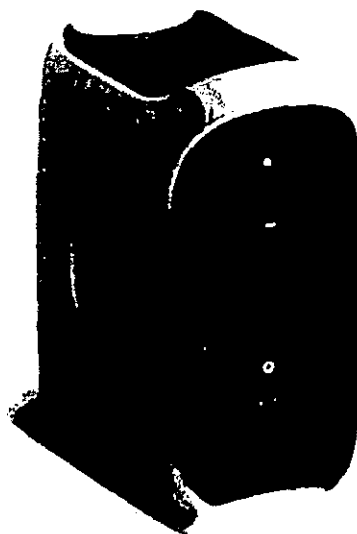


Research

The key to a successful project, is understanding the problem. That is where research comes in. Through research, the design begins to take shape. Before any drawings are done, images begin to develop in your mind as you understand the range and scope of which others have addressed the subject.

The knowledge gained from the following pages is instrumental in the development of a final solution.

The new Power Macintosh G3. Completely reinvented.



The original Power Macintosh G3 is a huge act to follow. In fact, it's the most successful Mac ever made. So when we set out to create its successor, we didn't just refine it. We completely reinvented it.

The new Power Macintosh G3 is built for speed. With its faster processors, cache and memory systems, it outperforms the fastest Pentium IIs in high-end PCs.* With its built-in ATI RAGE 128 graphics accelerator (a first for any computer), it runs 3-D graphics even faster than PCs decked out with the venerated Voodoo2 add-in card.

The ultimate open-door policy.



The new Power Macintosh G3 offers a revolutionary way to get to the revolutionary technology inside. The side panel effortlessly swings open, giving you instant access to every component—and making this the easiest-to-upgrade minitower in history. The side panel can also be locked shut, making it one of the hardest-to-pillage minitowers as well.

The new Power Macintosh G3 is as functional as it is breathtaking. In fact, it's composed of the same tough polycarbonate used in bulletproof glass. And four convenient handles make it easy to get a grip.



With up to a 400MHz PowerPC G3 processor, up to one megabyte of 150MHz-200MHz backside cache and a 100MHz system bus, the Power Macintosh G3 absolutely demolishes Pentium-based PCs in the classic BYTEmark showdown.* Making this the machine of choice for power Photoshop users.

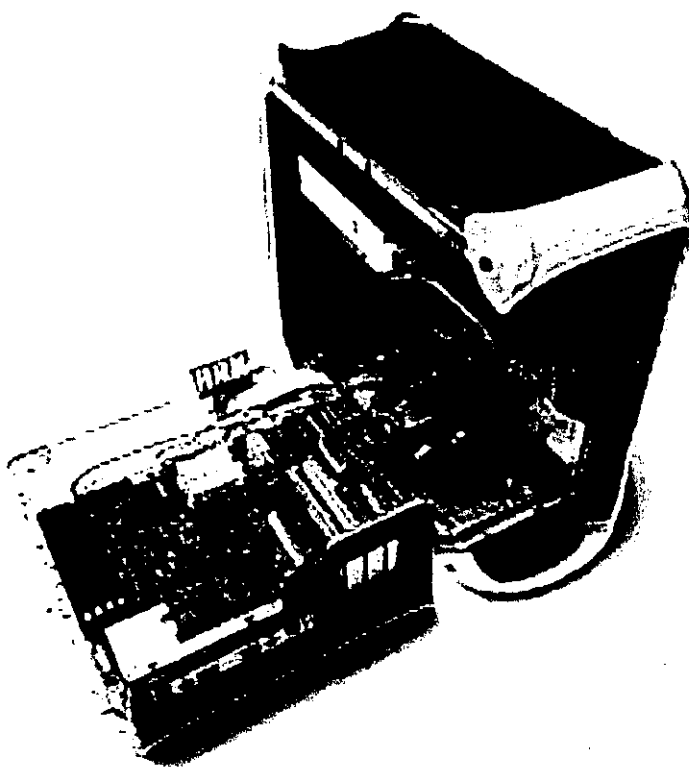
BYTEmark Integer Index Processor Scores

450MHz Pentium III

400MHz PowerPC G3



Satisfy your ever-growing lust for more memory. The Power Mac G3 can be configured with up to a full gigabyte of memory in four industry-standard PC100 SDRAM slots. Both speed (100MHz) and bandwidth (400Mbps) have been cranked up for your computing pleasure.





The Power Mac G3 has a dedicated internal modem slot. So you can put that optional 56K modem exactly where it belongs: inside your Mac.



The new Power Mac G3 has five internal drive bays, with built-in support for the new-generation

Ultra ATA drives. It can also be configured with Ultra2 SCSI drives spinning at up to 10,000 rpm. So in addition to your CD (or DVD) and Zip drives, you can have up to three drives holding up to 36GB each, and sock away over 100GB of storage internally. We're talking warehouses, not file cabinets.

The Power Mac G3 now has a total of four PCI slots: three 33MHz, 64-bit slots and one high-speed 66MHz, 32-bit slot for graphics. And with the system bus now running at 100MHz, the PCI slots communicate with the processor and memory a full 50% faster than their predecessors.



Work in the ultrafast lane? Every new Power Mac G3 now comes with

10/100BASE-T Ethernet built in (no expansion cards required). It's also the world's first personal computer offering optional gigabit Ethernet, for networking at near light speeds.



With USB (Universal Serial Bus) built in, adding things like keyboards, mice,

printers, scanners, cameras, joysticks and speakers (up to 127 devices total) is as easy as plugging them in. With 12Mbps throughput, USB is a whopping 30 times faster than the serial ports in previous Macs. (A third-party USB-to-serial port converter makes it easy to use your existing serial devices.)



Blazing-fast FireWire (400Mbps) is built into every new Power

Macintosh G3, allowing you to import video directly from digital camcorders with stunning quality. FireWire is also the faster, more convenient successor to SCSI for connecting to high-speed external devices - so you'll be able to take advantage of a new generation of superfast scanners, printers and disk drives.

next page >

*Based on BYTEmark integer index processor scores.

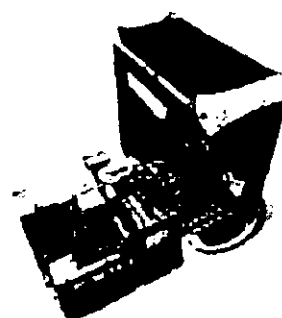
Power Macintosh G3


[Features](#)
[Tech Specs](#)
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The easy-open (but lockable) enclosure of the Power Macintosh G3 computer lets you easily add memory, storage or PCI cards. The computer comes with three available PCI slots and two Universal Serial Bus (USB) ports that support a wide variety of cards and accessories. And it features a fast FireWire bus designed especially for connecting digital cameras and other high-speed devices.

Consider the Possibilities

- 4 DIMM Slots
- Up to 1GB memory
- Two drive expansion bays
- Three available PCI slots
- Connectivity
 - Two 400-Mbps FireWire ports
 - Two 12-Mbps Universal Serial Bus (USB) ports
 - Apple Desktop Bus (ADB) port
 - Built-in 10/100BASE-T Ethernet connector
 - Optional internal 56K modem card



Build-to-order Options

In addition to choosing from among Apple's prebuilt systems, you can order a custom-configured computer from your local reseller or the online Apple Store. This allows you to select from among the options listed below. For up-to-date information about options and availability, visit the Apple Store.

- Processor: PowerPC running at 300, 350 or 400 MHz
- Memory: 64MB, 128MB, 256MB, 384MB, 512MB, 768MB or 1GB
- Hard disk drive: 6GB or 12GB Ultra ATA; 9GB 7,200-rpm Ultra2 LVD SCSI with single- or dual-channel SCSI card; two 9GB 10,000-rpm Ultra2 LVD SCSI with single- or dual-channel SCSI card

Related Products

- Apple displays
 - [Apple Studio Display \(15-inch\)](#); order no. M6356
 - [Apple Studio Display \(17-inch\)](#); order no. M6221
 - [Apple Studio Display \(21-inch\)](#); order no. M6204
- Third-party USB peripherals
 - [Imation SuperDisk](#) floppy disk drive
 - [Farallon iPrint LT](#) Adapter
 - [Kodak DC220](#) and [DC260](#) digital cameras

- 24x CD-ROM drive, or DVD-ROM drive with DVD-video playback
- SCSI card with cable that supports standard SCSI, Fast Wide SCSI and Ultra Wide SCSI (25-pin or 50-pin devices)
- 56K modem

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*Based on BYTEmark integer index processor scores.

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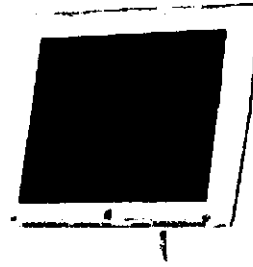
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Site Map	http://www.apple.com/find/index.html#sitemap
Search Tips	http://www.apple.com/find/searchtips.html
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Contact Us	http://www.apple.com/products/contact.html
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Apple Studio Display

Yes, you can have your desk back.

Introducing the Apple Studio Display, the 2.5-inch-thick flat-panel display that delivers beautiful visual performance and takes up a lot less desk. In fact, it's twice as bright as typical CRT-based displays. Your eyes will appreciate that. It's also easy to adjust for tilt and height. Your neck will appreciate that. Consider the Apple Studio Display your new window on the world.



Still cramped for space?

The alternate picture-frame stand takes up even less space on your desk.

Features

Tech Specs

Where to Buy

Big performance, tiny footprint.

The Apple Studio Display combines state-of-the-art digital imaging with superior software controls in an extraordinary flexible, responsive monitor.

Displaying full-screen video is a snap thanks to built-in composite and S-video connectors and audio input connectors.

Finally, the Apple Studio Display complies with strict

11111111 transistor (1T1T) active-matrix LCD technology delivers crisp, clear images and completely eliminates screen flicker. The wide (120° horizontal) viewing angle makes group viewing easy.

global 100% status for low power consumption, low emissions and recyclability.

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Search Tips	http://www.apple.com/find/searchtips.html
Index	http://www.apple.com/find/siteindex.html
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Universal Serial Bus

The Universal Serial Bus (USB) combines all of the advantages of a multiplatform standard—including decreased cost, increased compatibility, and a greater number of available peripherals—with the more specific advantages of a very Apple-like blend of advanced functionality and flair.

It's easy to use and powerful—and it works with numerous devices, including printers, digital cameras, game pads, joysticks, keyboards and mice, and storage devices.

Want to know more? The [USB products page](#) shows what's available. Macintosh computers with USB include [iMac](#) and [Power Macintosh G3](#).



It's Hot-Pluggable

USB peripherals deliver on the promise of plug and play convenience by eliminating the need to turn off or restart the computer when attaching a new peripheral. Users can connect USB peripherals whenever they need them. For example, a user engaged in producing a newsletter or illustrated report could easily swap out a digital camera for a printer—without any downtime.

Simple Installation

When a USB peripheral is first attached, the user installs a device driver by dragging its icon onto the System Folder or by running a simple installer application. This only needs to be done once and the device is then available, since USB supports dynamically loading drivers. Apple systems that feature USB, such as the [Power Macintosh G3](#) and the



[USB Fact Sheet \(130k\)](#)

Requires Adobe [Acrobat Reader](#)



[USB FAQs \(70k\)](#)

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Higher Performance

Improving on the performance of previous serial ports, USB offers data transfer rates much faster than the Apple Desktop Bus ports and traditional Apple serial ports.

Here Now

See a [listing](#) of USB products for Macintosh.

Also check out the Hardware category of the [Macintosh Products Guide](#) for the latest listing of Mac OS-compatible USB

Mac, also feature pre-installed USB drivers for certain devices, so no installation is necessary.

Easy Connections

USB connections require no terminators, memory addresses or ID numbers. They also use a new kind of cable—small, simple, inexpensive, and easy to attach. There's only one style of cable (USB A-B), with different connectors at each end, so they can't be plugged in incorrectly.

Greater Expandability

USB supports simultaneous connection of up to 127 devices by attaching peripherals through interconnected external hubs. When a computer's ports fill up, users simply attach a device called a hub, which provides additional ports (usually four or seven), and keep on plugging in more peripherals—and hubs—as needed.

Developer Info

Apple Developer Connection offers a [USB overview](#) for developers and [pre-release information](#) on writing Mac OS USB device drivers.

Additional Information

You'll find more information at the [USB organization site](#).



Performance Comparison. USB offers data transfer rates of up to 12 megabits per second, more than 1200 times faster than the 10 kilobits per second provided by Apple Desktop Bus ports (shown here as 1 pixel, though the speed actually scales to less than 1/3 pixel) and more than 50 times faster than the 230 kilobits per second of traditional Apple serial ports.

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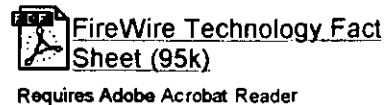
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FireWire

FireWire is one of the fastest peripheral standards ever developed, which makes it great for use with multimedia peripherals such as video camcorders and other high-speed devices like the latest hard disk drives and printers. New Power Macintosh G3 systems include two FireWire ports that operate at up to 400 megabits per second.



Already the interface of choice for digital audio and video, FireWire benefits include high speed, flexible connectivity and the ability to link as many as 63 devices.



[FireWire Technology Fact Sheet \(95k\)](#)

Requires Adobe [Acrobat Reader](#)

Want to know more? [The FireWire products page](#) shows a sampling of what's available.

Hot New Products

More than 50 FireWire peripherals are already shipping. At Macworld/SF in January, 1999, third parties announced 20 new FireWire products in every category from cameras and scanners to hard drives and audio mixers.

In addition to cameras and DV equipment, the array of FireWire products includes digital VCRs, home entertainment systems, music synthesizers, scanners and disk drives.

Revolutionary Video

FireWire-based Digital Video editing enables a revolution in desktop video production. The combination of low-cost, high-quality DV camcorders and built-in FireWire allows the creation of broadcast-quality video on Macintosh. Gone are the days of expensive video capture cards and workstations packed with high-end SCSI drives. The internal ATA boot drives on the Power Mac G3 are great for DV capture and editing.

FireWire Benefits

The FireWire advantage can be summed up in three words: speed, speed, and more speed—at 400Mbps, it's up to four times faster than the 100-Base-T Ethernet in the Power Macintosh G3, and 40 times faster than 10-Base-T Ethernet. Here are some other benefits:

- Supports up to 63 devices using cable lengths up to 14 feet.
- Hot-pluggable—you don't have to turn off a scanner or CD drive to connect or disconnect it, and you don't need to restart your computer.
- FireWire cables are a snap to connect—you don't need device IDs, jumpers, DIP switches, screws, latches or terminators.

Works with Macs and PCs

FireWire works with both Macs and PCs, which guarantees a wide range of FireWire-capable products at reasonable prices.

Get it Now

FireWire allows for video capture directly from both new DV camcorders with built-in FireWire ports, and from older analog-only equipment using A/V to FireWire converters. This means that all FireWire-based Macs are full-featured A/V machines that work with all existing audio/video gear, both analog and digital, when used with an AV converter box.

Order your FireWire-capable Power Macintosh G3 at the [Apple Store](#).

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FireWire products page	http://www.apple.com/firewire/firewireproducts.html
	http://www.apple.com/firewire/pdf/FireWireFS-b.pdf
Acrobat Reader	http://www.adobe.com/prodindex/acrobat/readstep.html
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Built with high performance and reliability in mind, the Dell Dimension XPS R series use the latest in technology to deliver the tremendous speed your high-end applications are craving.

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▽ 1 component selection may require changes to other system options. Please check below.

Dell Dimension XPS R MiniTower

Pentium®III processor, 450MHz with 512KB L2 Cache

Memory

- 64MB 100MHz SDRAM [subtract \$118]
- 96MB 100MHz SDRAM [subtract \$69]
- 128MB 100MHz SDRAM
- 256MB 100MHz SDRAM [add \$299]
- 384MB 100MHz SDRAM [add \$558]
- 64MB 100MHz SDRAM with ECC [subtract \$103]
- 128MB 100MHz SDRAM with ECC [add \$30]
- 256MB 100MHz SDRAM with ECC [add \$359]
- 384MB 100MHz SDRAM with ECC [add \$648]

Hard Drive HELP ME CHOOSE

- 8.4GB Ultra ATA Hard Drive [subtract \$196]
- 12.9GB Ultra ATA Hard Drive [subtract \$117]
- NEW 17.2GB Ultra ATA Hard Drive by Maxtor® [subtract \$28]
- 25.5GB Ultra ATA Hard Drive [add \$170]
- 22.6GB Ultra ATA Hard Drive (7200RPM) [add \$170]
- 12.9GB Ultra ATA Hard Drive (7200 RPM) [subtract \$59]
- 14.4GB Ultra ATA Hard Drive (7200 RPM)
- 9.1GB SCSI Ultra2/Wide [8ms, 7200RPM] [add \$381]

Monitor

- 17" (16.0" viewable, .26dp) Trinitron® 1000HS Monitor
- 19" (17.9" viewable, .26dp) 1200HS Monitor [add \$99]
- 19" (18.0" viewable, .26dp) Trinitron® P990 Monitor [add \$168]
- 21" (20.0" viewable, .26dp) M1110 Monitor [add \$307]
- 15" (15.0" viewable) Flat Panel 1500FP Monitor [add \$531]
- 21" (19.8" viewable, .26dp) Trinitron® 1600HS Monitor [add \$531]
- NEW 17" (16.0" viewable, .26dp) M780 Monitor [subtract \$109]
- 17"(17.0"viewable) Flat Panel 1700FP Display [add \$1471]

Need Help?

- ▷ Instructions on how and buy at our Stor away.

Security Con

- ▷ Visit our Store Sec steps Dell takes to information secure.

Know the Coc

Recognizing them w the system that's rig

? Help Me Cho
This icon sign of additional i you with your on the icon to on available c

▽ Compatibility

Options flagg require a che compatibility options. An k your configur rather only th needed.

Video Ready w/o Monitor [subtract \$328]

Video Card **HELP ME CHOOSE**

8MB ATI XPRT 98D 3D AGP Graphics Card [subtract \$58]

8MB STB nVidia 3D AGP Graphics Card for Windows 98 [subtract \$34]

16MB STB nVidia TNT 3D AGP Graphics Card

▼ Please review the following regarding your Video selection:

- Not available on the 4.8X DVD with Software Decoding

TV TUNER

STB PCI TV/FM Tuner Card [\$109]

DVD-ROM or CD-ROM Drive **HELP ME CHOOSE**

32X Max Variable CD-ROM Drive [subtract \$19]

40X Max Variable CD-ROM Drive

4.8X DVD ROM Drive and Decoder Card [add \$128]

4.8X DVD ROM Drive and Decoder Card with TV Out [add \$128]

4.8X DVD ROM Drive with Software Decoding [add \$49]

32X Max SCSI CD-ROM Drive [add \$31]

Sound Card **HELP ME CHOOSE**

NEW Turtle Beach Montego II A3D™ 320V Sound Card [add \$39]

Turtle Beach MontegoA3D™ 64V Sound Card

No Sound Requested [subtract \$29]

Speakers **HELP ME CHOOSE**

None [subtract \$75]

NEW Altec Lansing ADA880 Dolby Digital Speakers with Subwoofer [add \$178]

harman/kardon HK-195 Speakers [subtract \$50]

Altec Lansing ACS-295 Speakers with Subwoofer

Altec Lansing ACS-495 Surround Sound Speakers w/Subwoofer [add \$69]

No Speaker option [subtract \$75]

Modem **HELP ME CHOOSE**

All modems with Windows 98 Operating System include FREE 30-Day Trial offer ConnectDirect Internet Access

3Com® USRobotics V.90 Modem for no sound [add \$98]

3Com® USRobotics V.90 Modem for sound [add \$98]

3Com® USRobotics V.90 Modem for NT & no sound [add \$98]

3Com® USRobotics V.90 Modem for NT and sound [add \$98]

3Com® USRobotics V.90* PCI Telephony WinModem for Sound [add \$49]

3Com® USRobotics V.90* PCI Telephony WinModem , no sound [add \$49]

3Com® USRobotics V.90*.PCI Telephony WinModem, NT, Sound [add \$49]

3Com® USRobotics V.90* PCI Telephony WinModem,NT,no sound [add \$49]

No Modem Requested

Imega Zip Drives **HELP ME CHOOSE**

None [subtract \$79]

Imega Zip 100MB Internal Drive with One Cartridge

- Iomega Zip 100MB Internal Drive with One Cartridge for NT
- Iomega Zip 100MB Internal Drive with Two Cartridges [add \$20]
- Iomega Zip 100MB Internal Drive with Two Cartridges for NT [add \$20]

Iomega Zip Disk Packs **HELP ME CHOOSE**

- None
- 3-Pak of Iomega 100MB Zip Cartridges [add \$49]
- 10-Pak of Iomega 100MB Zip Cartridges [add \$119]

Operating System **HELP ME CHOOSE**

- Microsoft® Windows® 98
- Microsoft Windows NT with Internet Explorer 4.0 (CD-ROM) [add \$99]
- Microsoft Windows NT Workstation 4.0 (CD-ROM) [add \$99]

Bundled Software **HELP ME CHOOSE**

FREE MICROSOFT OFFICE 2000 Upgrade (OEM Ver.) - Buy a Dimension that's ordered between 1/1/99 and 6/28/99 with factory-installed MS Office 97 SBE or Office 97 Pro and receive this Free Upgrade in Summer 1999.

- Microsoft® Office 97 Professional Edition [add \$199]
- Microsoft® Office 97 Small Business Edition v2.0 with Bookshelf Basics 98
- Microsoft® Office 97 Small Business Edition v2.0 with Encarta 98

McAfee VirusScan 3.1 at no additional charge

McAfee VirusScan 3.1 (For Windows 98)

Keyboard

- QuietKey® Keyboard
- Dell Comfort Key Keyboard [add \$19]
- Windows Mechanical Keyboard [add \$25]

Mouse

- MS IntelliMouse®
- NEW Logitech MouseMan® Wheel (PS/2v) [add \$19]

Service **HELP ME CHOOSE**

- 3-Yr Limited Warranty, 1-Yr Next Bus. Day On-Site Service
- 3-Yr Limited Warranty, Premier 3-Yr Next Bus Day On-site Service [add \$99]

Network Card

- None [subtract \$50]
- 3Com® 3C905B 10/100 NIC
- 3Com® 3C900B TPC 10Mbit Combo NIC

Tape Drive

- None
- 10/20GB EIDE TR5 Tape Backup [add \$199]
- 10GB EIDE TR5 Tape Backup, WIN NT [add \$199]
- 10GB EIDE TR5 Tape Backup for SCSI Devices and WIN NT [add \$199]

Floppy Drive

1.44MB Floppy Drive

Printers **HELP ME CHOOSE**

[Click here for warranty information.](#)

- Epson Stylus 640 Color Printer (requires a printer cable) [\$179]
- HP OfficeJet710 Printer, fax & scanner w/ printer cable [\$499]
- HP DeskJet 695C (requires a printer cable) [\$199]
- HP LaserJet 1100se Printer (Includes a printer cable) [\$399]
- HP DeskJet 895Cse (requires a parallel or USB cable) [\$399]
- 10' USB cable [\$9]
- HP DeskJet 722C Color Printer. (requires a printer cable) [\$249]
- HP OfficeJet 600 Printer, fax & scanner w/printer cable [\$399]
- 10' IEEE Parallel Printer Cable [\$25]

Scanners HELP ME CHOOSE

[Click here](#) for warranty information.

- HP ScanJet 4100Cse: HP's most affordable color scanner (\$50 Rebate) [\$199]
- HP ScanJet 6200Cse: Advanced, flexible scanning. [\$399]

Software and Accessories HELP ME CHOOSE

[Click here](#) for warranty information.

- Intel LANDesk Administrator Manager Software v3.3 [\$49]
- Intel LANDesk Client Manager Software v3.3 [\$15]
- Norton SystemWorks v1.0 - (8 Norton titles combined in 1 suite) [\$76]
- QuickBooks 6.0 accounting software - now 50% off! [\$59]
- QuickBooks Pro 6.0 multiuser accounting software - now 50% off! [\$108]
- WinFax Pro 9.0 for 98 or NT [\$89]
- HP Surestore CD-Writer Plus 7200E [\$399]
- Fast Track Game Pack: Get on the gaming fast track [\$79]
- Learning Library Ages 4-6: Help give your preschooler a head start [\$79]
- Learning Library Ages 6-9: Help give your child's education a boost [\$79]
- Winfax Pro v9.0 for Win 98 & Win NT [\$89]
- PCAnywhere for Win98, Win NT & DOS Remote Single [\$108]

Power Protection HELP ME CHOOSE

[Click here](#) for warranty information.

- APC Surge Station Pro 8T2 Surge Protector: A must-have for any system [\$39]
- APC Back-UPS Office: Power back up for your system [\$99]
- APC Back-UPS 500VA [\$149]
- APC Back-UPS Pro 650 PnP: Premium power back up [\$289]

Digital Cameras HELP ME CHOOSE

[Click here](#) for warranty information on the DVC323 Digital Video Camera.

- Kodak DC210+ Digital Camera, Dell Edition [\$479]
- Kodak DVC323 Digital Video Camera [\$149]

Your Price*:

\$2,344

Personal Lease**:

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Sunday, February 07, 1999 10:53:00 PM CDT

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Preliminary Research Summary

1. Research already done includes the following:

Interviews with PC owners.

Interviews with computer professionals (system administrators) concerning future demands for ease of use.

Read articles concerning upcoming PC architecture and hardware.

Read extensive literature from PC manufacturers to establish what is currently available.

2. Further research to be done:

Detailed list of components to the PC structure.

Details as to the extent "plug & play" are likely to be taken in the near future.

Engineering concerns regarding interconnectivity of components.

Scope of increase in manufactured cost against lifetime value of system.

3. The following needs have been established:

Ease of initial setup.

Making the upgrade / modification of a PC easy and intuitive.

Prevent the machine from becoming obsolete as a whole (component replacement when technological advances dictate).

Utilize existing PC components (based on existing PC architecture).

Support for multiple device i.e. monitors, external drives etc.

Preliminary Research Summary ^{continued}

4. Prior/State of the art:

USB (Universal Serial Bus) makes it possible to add & remove components while computer is still running, also makes the installation of driver software unnecessary.

AGP (Accelerated Graphics Port) is a new internal bus that separates graphics demands from the rest of a systems function and processes them at a greater bandwidth.

Tool-less cases for computers, meaning they can be opened by hand without having to remove any screws or fasteners.

Increased cross-compatibility between this and the next generation processors, this is a recent trend that will help reduce the cost of future upgrades by allowing the use of current mother-boards with future processors (Intel, Cyrix, AMD).

5. Technology:

I need to find out the feasibility of separating systems components from both a manufacturability standpoint, and from that of electronic efficiency. This and other related information can be found both on the web and from my co-sponsor at IBM. He will provide much of the technical basis for feasibility proofs.



Sponsor Feedback, Part 1

2.9.99

Today was my first conference with Ron Smith of IBM. He received the second zip file of sketches (#s 1-20) and was eager to start making suggestions.

Ron talked about what he called the "out of box experience". This involves the integration of the system, and the packaging of the components. He mentioned that IBM once did a study where they color coded all the connections inside the computer chassis, then did a market survey to see how people responded. Apparently everyone thought it was a good idea until they were asked if they would pay an additional \$20.00 for the benefit. They would not!

Ron also discussed, at some length, the marketing importance of the design. He mentioned how the design should be positioned, from the start, in a market in which it can succeed.

We discussed the Aptiva split system, or "S" series, where the PC was separate from the drives. The drives sat in a pod on the desktop, and were cabled to the PC which could be kept out of the way. This system, however cool I thought it was, was not successful.

Lastly, we discussed the research techniques I should follow to help differentiate my design from existing products. His recommendation was to look at lots, and lots of web pages.

Subj: Re: Questions
Date: 3/1/99 1:37:23 PM Central Standard Time
From: designr@us.ibm.com
To: lid8@aol.com

Sorry for the lag in communication, I've been travelling.

Heat should only be a problem on the processor which generally requires forced air cooling. Sometimes even a dedicated fan blowing right on the processor. The other components on the logic card can be believably cooled with convection cooling. Removable media, CD, DVD 3.5 don't create significant heat. In the split system we sold a few years ago those drives were in a box of there own with some minor ventilation, but no fans. Some HDD's generate enough heat that we will put ventilation near by to take advantage of the forced air movement in the enclosure, but no special fans for them. But that is usually a commercial system with very fast seek drives that may run (spin) all of the time.

The .txt files will work. I will see if I can get some responses to you by next week. I have Lotus Word Pro loaded, and I just had Word 97 loaded. So your files will work OK in the future.

I will see if some connectors can be found for the models. That sort of stuff is usually around.

Just fax the drawings when you have them, e-mail and we can set up a call.

Ron Smith
IBM Corporate Strategic Design
B/656, Research Triangle Park, NC. 27709
Designr@US.IBM.Com
Vox919-254-9724
Fax919-254-0343

lid8@aol.com on 02/25/99 04:55:13 PM

To: Ron A Smith/Raleigh/IBM
cc:
Subject: Questions

Ron,
I was wondering how the .txt file worked out. Also, I have a question concerning heat. Could you tel me off the top of your head which components require heat consideration? Beyond the processor, I am not sure if other

components such as memory, drives, or even the mother board for that matter require more than vented airspace for their enclosures. If you could shed some light on that or suggest some source for information I would be most grateful.

On a different note, I will be ready to send you some preliminary thumbnails by next Thursday for you to look at and make comment on. Perhaps, next week, we can arrange a time to speak about them for the week after.

Lastly, and this may be a stretch, I was wondering if there is any way you can provide me with any connectors for use with my appearance model, and for reference while drawing. I am not looking for any whole, working parts, just the connectors for USB, FireWire, and old fashioned Serial ports. If you are unable to do that I completely understand, I just thought I would ask.

I look forward to speaking with you, and I appreciate your help.
Sincerely,
Dale K. Wagler IDSA
iid8@aol.com

----- Headers -----

Return-Path: <designr@us.ibm.com>

Received: from rty-yc05.mail.aol.com (rty-yc05.mail.aol.com [172.18.149.37]) by air-yc01.mail.aol.com (v56.26) with SMTP; Mon, 01 Mar 1999 14:37:23 -0500

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X-Lotus-FromDomain: IBMUS

To: iid8@aol.com

Message-ID: <85256727.006BBC2C.00@d54mta03.raleigh.ibm.com>

Date: Mon, 1 Mar 1999 14:36:42 -0500

Subject: Re: Questions

Mime-Version: 1.0

Content-type: text/plain; charset=us-ascii

Content-Disposition: inline

Dale K. Wagler

From: designr@us.ibm.com
Sent: Friday, March 05, 1999 4:26 PM
To: Dale K. Wagler
Subject: Re: Thumbnails

Dale, I got your sketches. There is no problem with "down load" when connected to a T1 trunk line. This will work fine for looking at your concept's progress. I looked at them briefly, and it reminds me to ask if you have heard of Non legacy PC that Intel has been promoting? It is a PC that would not use older PC cards, large connectors like parallel. It allows for a smaller more compact machine, and may be appropriate for your project. Have a look on Intel's site (url below) at some of the concepts. We did some for them, but they were in another show. It is not likely to be on the market soon because there are some good reasons to support much of the older stuff if you are a manufacturer. But for a design exploration it is much more interesting possibility.

Lets try to talk Monday. Give me a call around 12 noon, my time if possible. If you are not available send me a note with a time for Monday or Tuesday that you are around.....

<http://www.intel.com/pressroom/kits/events/9902idf/photos2.htm>

Ron Smith
IBM Corporate Strategic Design
B/656, Research Triangle Park, NC. 27709
Designr@US.IBM.Com
Vox919-254-9724
Fax919-254-0343

Sponsor Feedback, Part 2

3.9.99

Today was the second at length discussion with Ron Smith of IBM. He received the second zip file of sketches (#s 21-34) and we discussed them as well as the project for about 40 minutes.

Ron said to be specific in my problem statement, though he mentioned that it is easy to modify it later to suit the solution, this is not necessarily a good idea.

He also said to get away from the "beige box" as the iMac proved that people are looking for something different. Ron asked me if I had seen the PC Junior of the 80s, which I hadn't, so he described it, and how it might influence my design. It was a small box with the ability for cartridges to attach to it. Each cartridge was actually an additional component that would add to the system configuration. He mentioned that such a system was impractical if not impossible in today's market.

Ron warned that "modular" was a solution, not a problem statement, and advised me to look in other directions for my solution. Then recommended that I look at the non legacy PCs being developed by Intel and its partners. These computers are able to greatly reduce the size of the PC by doing away with the need to use expansion cards.

finally we discussed production specifications such as the number of units usually produced for a test run in the US market, and how fast the turnaround is in the industry on

Subj: **Something to read**
Date: 3/10/99 2:50:19 PM Central Standard Time
From: designr@us.ibm.com
To: lid8@aol.com

Dale, Based on our conversations re: the changing landscape of PCs, you should try this link to Business Week and read the Beyond PC article. It is primarily about pervasive computing, but it has an interesting perspective on future of traditional PC's, and may give you some ideas about what is important for buyers in the near future. It may help you to think more precisely about who you are making a design for.

<http://www.businessweek.com/datedtoc/1999/9910.htm>

Ron Smith
IBM Corporate Strategic Design
B/656, Research Triangle Park, NC. 27709
Designr@US.IBM.Com
Vox919-254-9724
Fax919-254-0343

----- Headers -----

Return-Path: <designr@us.ibm.com>
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From: designr@us.ibm.com
Received: from southrelay02.raleigh.ibm.com (southrelay02.raleigh.ibm.com [9.37.3.209]) by smtp7.ny.us.ibm.com (8.8.7/8.8.7) with ESMTP id PAA27708 for <lid8@aol.com>; Wed, 10 Mar 1999 15:49:45 -0500
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Received: by d54mta03.raleigh.ibm.com (Lotus SMTP MTA Internal build v4.6.2 (651.2 6-10-1998)) id 85256730.00726D48 ; Wed, 10 Mar 1999 15:49:50 -0500
X-Lotus-FromDomain: IBMUS
To: lid8@aol.com
Message-ID: <85256730.00726C56.00@d54mta03.raleigh.ibm.com>
Date: Wed, 10 Mar 1999 15:49:46 -0500
Subject: Something to read
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How many company mugs do your employees need?



Is the world random?
Does the universe
play with dice?



COVER STORY

Beyond the PC

Who wants to crunch numbers? What we need are appliances to do the job—and go online

It's the end of a long day of crime-fighting, and Dick Tracy is cold and hungry. After turning up the collar of his trench coat, Detective Tracy climbs into his sedan and asks the voice-activated navigational system to tell him the best route home. He arrives and plops down on the couch, and touches the ad on the screen of his picture phone for free delivery of the local diner's blue-plate special. Just then, Tess Trueheart E-mails good news from her wireless phone: The rotten Sal Monella has been nabbed for selling tainted hot dogs. Relieved, Tracy turns on the news--his TV automatically stores his favorite shows for convenient viewing. But he's quickly bored and climbs into bed to read. Moments later, the ultimate crime-stopper is fast asleep, his paperless electronic book cradled in his arms.

Sounds like another highfalutin vision of technology from the same gumshoe who gave us the high-tech wristwatch. But hold on. All of Tracy's gizmos are available today--from the Clarion Auto PC to the InfoGear iPhone to the electronic book from SoftBook Press. And they're just the edge of a digital tidal wave that will wash over the high-tech landscape, bringing us everything from gadgets straight out of a comic strip to Internet-connected versions of everyday products such as TVs, phones, and fax machines. "We're entering the consumer era of computing," says Donald A. Norman, co-founder of consultancy Nielsen Norman Group and a leading apostle of so-called information appliances--simple devices that do one or two jobs cheaply and well. "The products of the future will be for everyone."

That's a slap at the personal computer. But even Andy Grove and Bill Gates seem to know their companies' futures no longer depend solely on the PC. Intel Corp. (INTC) is putting its muscle behind new chips aimed at low-power gadgets and is even designing new appliances for the living room. And Gates, who believes more non-PC devices than PCs will be attached to the Internet within 10 years, has Microsoft Corp. (MSFT) creating software for easy-to-use products such as car navigation systems, set-top TV boxes, and electronic organizers.

Gates and Grove are right to think beyond the PC. The high-tech industry is on the cusp of a new era in computing in which digital smarts won't be tied up in a mainframe, minicomputer, or PC. Instead, computing will come in a vast array of devices aimed at practically every aspect of our daily lives. Unlike complex

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desktop PCs, these information appliances--following on the lead of 3Com Corp.'s (COMS) handheld Palm computer and Microsoft's WebTV--will be simple and convenient.

Think divergence instead of convergence. To become as ubiquitous as VCRs and microwave ovens, analysts say, information devices have to be much simpler than today's PCs. Rather than rolling more features into computers, newer devices need to be designed to perform only a few specific functions. After all, who needs a desktop PC that could land a spaceship on the moon if all they want to do is send E-mail? "The PC is so general-purpose that very few of us use more than 5% of its capability," admits Hewlett-Packard Chief Executive Lewis E. Platt.

Now, everybody from startup to industry giant is answering the call. The resulting scramble could turn high-tech's pecking order on its head. Until now, the PC was the only route to cyberspace--and PC makers had only to ride the Wintel standard based on Intel chips and Microsoft software to get in on the action. The future won't be so easy. Winning in the digital-appliance business will depend not on the latest geek-specs, like megahertz and gigabytes, but on identifying consumer needs--and satisfying them with products that hide their complexity.

LOST CAUSE. Indeed, after a 20-year tear, the PC--one of the world's fastest-growing products--is already coming down to earth. And swiftly. PC prices are plummeting, and unit sales aren't making up the difference. While PC shipments should grow 15% this year, that's down from the heady 35%-plus rates in the mid-1990s. And with prices falling, analysts expect PC revenue for the industry to grow at an anemic rate--less than 5%. Meanwhile, market researcher International Data Corp. says Net access is now 94% via the PC; but that number will fall to 64% in 2002, thanks to set-top boxes, Web phones, and palm-size computers. By 2002, more information appliances will be sold to consumers than PCs.

Gates's dream of putting a PC in every house may now be a lost cause. While 48% of U.S. homes now have a PC, analysts don't expect that to rise above 60% because information appliances will take on many of the jobs now handled by the PC. That means PC makers, for the first time, will have serious competition in cyberspace. And with the top five companies already selling more than 50% of all PCs, even stellar PC companies may have trouble posting the go-go gains of the past. Dell Computer (DELL) found that out on Feb. 16. That was when Wall Street pounded its stock after the company reported revenue for the fourth quarter ended Jan. 29 rose 38%, well below its typical 50%-plus clip.

Not that the PC will disappear as the on-ramp to the Information Highway. For people with home offices or school-age kids, the versatility of the PC is still hard to beat--especially with prices so low. "We're rapidly moving into the post-PC era," says Paul E. Horn, a senior vice-president and head of research for IBM. But "the PC isn't going to go away any more than the TV made radio

go away." Indeed, analysts expect PC unit sales growth to remain in the low double-digit range well into the next decade. "Consumers are pretty smart," says Steve Jobs, Apple Computer Inc.'s interim CEO. "If for an extra 10% they can get something that does so much more than some single-function device, they'll take it."

Of course, that doesn't mean Jobs and other PC pioneers are standing still. Apple (AAPL), which made a major step forward in ease of use with the introduction of its elegant iMac PC last year, is expected to unveil a slick-looking handheld Mac this spring. Meanwhile, Microsoft has spawned a new generation of handheld products via its Windows CE technology, including the new Jupiter design for mini-laptop PCs that run up to 12 hours on one charge. Vadem Inc.'s \$999 Clio, for instance, appeals to road warriors because the 3.2-pound device has a larger screen and is more comfortable for E-mail or Web browsing than 3Com's popular Palm.

What's going on? Most people don't believe there's a compelling reason to buy cutting-edge machines. After years of being swayed by claims that only the latest, most powerful machines will do, consumers are waking up to a new reality: Today's \$400 PCs are good enough for most tasks--especially connecting to the Net. Pushing the latest high-octane machine just isn't working. "People are realizing that whether you own a 300-Mhz PC or a 400-Mhz PC, it isn't going to change your life that much," says Alain Couder, CEO of Packard Bell NEC Inc. "That's scary for us. We need to get real."

Such an admission would have been considered high-tech heresy two years ago. But today, there's a dazzling new spurt of innovation in Silicon Valley. St. Paul Venture Capital, Flatiron Partners, and Matsushita Electric have earmarked \$140 million to invest in info-appliance companies. Nokia (NOK.A), Motorola (MOT), and at least five other phone makers are developing Web phones. And HP (HWP), IBM (IBM), Sun Microsystems (SUNW), and Sony (SNE), among others, are preparing a host of newfangled gadgets from palm-size scanners to the underlying chips and software that will power these devices. Meanwhile, scores of startups are spinning out whizzy new products ranging from a countertop Web browser for the kitchen that doubles as a TV and CD player, to a tiny gadget that health maintenance organizations will give chronically ill patients so doctors can check their vital stats online.

NO TOASTER. It's not just this slew of gee-whiz devices that will make information appliances commonplace. Mundane products already found in many homes will also get far smarter. Cameras, TVs, cell phones, and cable boxes are going digital, making it far easier to add new features that let them take on jobs now done by the PC--including Internet access. By next year, for instance, some fax machines will be made to work over the Net so you won't have to rack up long-distance charges to zip a letter to London. And cell-phone pioneer Qualcomm Inc. (QCOM) will add "microbrowsers" to its phones to allow them to read online data. Says Paul E. Jacobs, president of Qualcomm's cell-phone division: "People think cell phones are more like

toasters than they are like PCs--but that's wrong."

What's feeding this explosion of innovation? You guessed it. The Internet. Computer scientists have been predicting the advent of information appliances for more than a decade. But now, the Internet has become a truly social phenomenon, with oodles of new information and hundreds of innovative services added on a monthly basis. Consumers want information appliances "to access services on the Net," says Claude M. Leglise, who heads Intel's new home-products group. And more consumers are wondering if they really need a PC just to get wired. "I haven't felt any compulsion to buy a PC," says Robert Anderson, a nurse from West Palm Beach, Fla., who is completely satisfied surfing the Net with his WebTV--and not at all envious of PC-using friends.

Consumers like Anderson won't suffer from lack of alternatives to the PC. That's because software and chip technology has reached the point where it's possible to build inexpensive devices with enough memory, storage, and screen size to be useful. The explosion of information appliances will, in turn, boost the number of Net connections in the home. By 2002, predicts market watcher Jupiter Communications, 56% of U.S. homes will have a Net connection, up from 32% today. And more U.S. homes--13.9 million in 2002, vs. 1 million in 1998--will have faster Internet connections, according to IDC.

MORE CLICKSTREAM. Translation: More people will spend more time online. In today's PC-centric world, cybernauts spend up to 40 hours a month online, says Sky Dayton, chairman of Internet service provider EarthLink Network Inc. But by giving consumers the devices to log on to the Web more often and more conveniently--say, to check the local movie schedule or even buy a car--that could rise to 200 hours. "That kind of clickstream becomes incredibly valuable," Dayton says, referring to the number of Web sites consumers will visit or "click to" when online.

To reach the masses of tech-shy users, though, companies need cheaper and easier-to-use digital devices. That's driving a fundamental change in how products are conceived. Instead of designing cool boxes and hoping they find uses, companies are dreaming up services--and then building devices that can deliver them. What's more, these devices will let companies lock customers into their services--and harvest rich new revenues from advertisers and E-merchants.

Take Alcatel. The French phone giant spent a year surveying media and telephone companies before designing a phone that offers touch-screen Web access. They told Alcatel the phone had to show voice mail, E-mail, and faxes on one screen. The companies also wanted a laptop-style color screen rather than black and white. And to help telephone companies subsidize the \$500 price of the phone, Alcatel (ALA) drummed up support from E-commerce companies such as Yahoo! (YHOO), Amazon.com (AMZN), and others to buy links on the phone's startup screen. The argument: This placement could be as valuable as a spot on the Windows desktop. By 2002, Alcatel expects to have sold 1.5 million WebTouch phones, which will be offered to consumers for

around \$400 starting this September.

Online companies are just itching for ways to snag more users. Yahoo!, E*Trade (EGRP), and Sportsline.com, for example, are eyeing new ways to deliver their services, particularly to smart cell phones. Doing business in Denver? Your phone could give you the traffic conditions, or tell you whether there are seats available at the Nuggets game. GeoVector Corp., a four-person Silicon Valley startup, even makes software that would let you point your phone at a restaurant to gather whatever info has been posted on the local online Yellow Pages--say, a free glass of wine with the early-bird special.

Some online companies are doing more than scour the market for new devices: They're helping to create them. AT&T recently set up a lab in its Silicon Valley research and development center to build prototypes of new kinds of gizmos, including handheld devices that, among other things, could capture and play videos, or be controlled via voice. And online giant America Online Inc. (AOL) is working with partners--including Sun Microsystems--on new products tuned to its service. One possibility: a sub-\$300 set-top box based on Sun's JavaStation computer now sold to corporations, according to analysts. AOL plans to unveil these devices, part of its "AOL Anywhere" strategy, by this summer. "We're going to play a major role in this next generation of non-PC connected appliances," vows Barry Schuler, AOL's president for interactive services.

At stake is customer loyalty. Consider the experience of Tom Benton, 38, of Claverack, N.Y. His engagement to his fiancée in Mexico was straining his budget until he bought a device from Aplio Inc. that lets him make free phone calls over the Net. The device, conveniently located next to the phone in his kitchen, is a snap to use. "You just pick up the phone. It's natural," he says. Now, his monthly bill is back down to \$20 from a wallet-crunching \$200, and the marriage is on.

A KITCHEN BROWSER. It's stories like Benton's that inspired entrepreneur Bob Lamson to go back into the kitchen. Lamson, who made millions inventing a line of home breadmaking machines in the 1980s, has built a new gadget that merges a 9-inch TV, CD player, and a one-touch Web browser into a contraption that attaches to the bottom of a cabinet. His company, CMi Worldwide, will produce the black gizmo at a price of \$800, with an additional \$20 monthly fee for Internet service. There's also a \$1,500 to \$2,000 countertop version that looks just like a small TV, with a 12-inch screen. "More than 50% of [homemakers] are not PC-literate--and they're big shoppers," says Lamson, who has already signed up appliance maker Salton as a distributor. He's also talking with phone companies and online grocery service Peapod Inc. about supporting the gadget.

Kitchen gadgets and Web phone-screens won't be the only new cyber real estate. The TV, a fixture in 98% of U.S. homes, is an obvious candidate. Roel Pieper, Philips Electronics' (PHG) top digital exec, points out that Americans spend 3.6 billion hours a month in front of the TV, vs. 300 million for the PC.

"Capitalizing on digital TV is the next big thing in Silicon Valley," says Michael Ramsay, the CEO of set-top startup TiVo Inc., whose backers include billionaire Microsoft co-founder Paul G. Allen. General Motors Corp. (GM) is already working with TiVo to figure out how to deliver targeted ads.

Entrepreneurs and giants alike are tapping into a growing pool of chips and software aimed at info appliances. IBM, for example, has devised a disk drive half the size of a credit card that can hold 340 megabytes of data--enough to store 80 full-length books. The microdrive, due out this year, will cost approximately \$350, but IBM expects the price to fall below \$100 once volume picks up in a few years. Meanwhile, startup iReady Corp. has created "Internet-on-a-chip" technology that lets manufacturers add Net access to everything from fax machines to TVs for less than \$10. Seiko Epson Corp. is using the chip to make smart screens that can be dropped into fax machines or used as stand-alone Net browsers.

NO MORE HAMMERLOCK? Progress is also picking up in the critical area of software. Sun Microsystems Inc.'s elegant Jini software, unveiled on Jan. 23, could become the lingua franca for devices ranging from coffeemakers to supercomputers. With Jini, devices tell a network what they are--and what they can do. That way, an advertiser could create different versions of an Internet promotion--say, a full video for an interactive TV vs. a one-line headline for a handheld gizmo--knowing Jini-enabled devices would grab the right one.

Who's best positioned to make these cyberdreams come true? Intel and Microsoft are not sure bets. Indeed, no one company has all the pieces in place--yet. Startups tend to have ideas and technology but lack marketing and distribution muscle. Consumer-electronics companies are famously slow to adopt new technology and have to bridge decades-old divisions between product groups.

But today's high-tech powers may have the most at risk. Since info appliances require inexpensive, highly focused technology, Microsoft and Intel could have a tough time maintaining the high-margin hammerlock they enjoy with their current PC technologies. As for PC makers, they'll need to do more than rush to market zippy new models chock-full of state-of-the-art technology that consumers have to learn how to use. Says Philips' Pieper: "The PC companies move at a higher speed of innovation--and I'm not sure consumers like it. They'll have to slow down, and we'll have to speed up."

For now, all are focused on getting into the game--especially computer companies. Industry stalwarts such as National Semiconductor (NSM), disk-drive maker Quantum (QNTM), and modem and graphics board supplier Diamond Multimedia Systems, are investing heavily in information-appliance businesses. HP recently unveiled its Capshare handheld scanner, which by yearend will be able to wirelessly zip magazine articles through cyberspace. And Compaq Computer Corp. (CPO) says it aims to sell set-top boxes and Web phones.

A weak player in the PC era, Sony is scrambling so that it doesn't miss out on the post-PC age. The consumer-electronics giant is preparing a slew of innovative products, including a digital picture frame that displays 50 different color photos, and a 250-person software unit is working on smart home networks that will let your TV and stereo recognize you when you walk into the room--and fire up your favorite tunes or shows.

Not all of these novel products will be blockbusters. But there will be plenty enough hits to make cash registers ring. Consider Diamond Multimedia's Rio. The 2.4-ounce, pager-size gizmo can store and play songs downloaded to a PC in a format called MP3 that makes it feasible to download music of CD quality through the Web. It's like a tapeless Walkman, and Diamond ([DIMD](#)) has sold 250,000 of the \$199 units in just three months--and the Rio has become a major fad with music lovers. "It's a viral kind of thing," says Diamond CEO William J. Schroeder, who hopes to sell 750,000 Rios in 1999. "A year ago, I didn't even know what MP3 was!"

That's O.K. Because in the post-PC era, most consumers won't need to know--or care--how their information appliances work.

By Peter Burrows in San Mateo, Calif., with Andy Reinhardt in San Mateo, Heather Green in New York, and bureau reports

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COVER STORY

What 'Beyond the PC' Means for PC Makers

After years of being the shining star of high-tech products, the personal computer has suddenly become quite the whipping boy. At the TED9 high-tech gabfest in Monterey, Calif., from Feb. 17 to 20, for example, pundits such as *Wall Street Journal* technology columnist Walt Mossberg and MIT assistant professor Michael Hawley took turns pointing out the PC's many ills, all but relegating it to the trash-heap of digital history. "It's a product meant for office drudge work that fell off the back of a truck and landed in consumers' homes," said Hawley. "It's not fit for my mother to use. It's basically industrial waste."

That's harsh stuff, but consider this: Even some PC makers are getting a bit frustrated with their product's inherent problems. In fact, by the end of 1999, some pure PC players will have moved "beyond the PC" themselves. Startup eMachines, for example, plans to unveil a DVD player/PC hybrid called the eMedia, that's designed to be used in the living room for E-mail, Web browsing, and game playing on the Internet. Packard Bell NEC Inc. expects to have an entertainment-based product by yearend as well. And Compaq Computer Corp. plans to be selling wireless communications devices and set-top boxes in a year's time.

Why break out of the "Wintel" fold now? Because when it comes to generating profits, the tried and true Microsoft Windows-Intel processor model seems to be running out of gas -- at least for companies relying heavily on the sub-\$1,000 market that now represents half of U.S. consumer PC sales, according to ZD Market Intelligence. It's not just that margins are negligible on today's low-end models, where a \$500 machine might return only \$40 or so in profit. Given Intel's and Microsoft's near-total control of the technical standards, there's little PC makers can do to make their products stand out -- or to make easier-to-use machines that would appeal to a broader audience. "We're on the eve of a revolution in pervasive computing -- and the ease of use of the current PC will never get to where it needs to be," says Packard Bell NEC Chief Executive Alain Couder. Indeed, he recently asked his engineers to find a way to remove Windows from the PC and replace it with a simpler operating system. The response: Not economically feasible.

DRASTIC CUTS. The result of this profit squeeze has become dangerously apparent in recent days. On Feb. 19, Packard Bell NEC announced a 15,000-person layoff, along with news that its Packard Bell home-PC unit had lost more than \$1 billion over the past two years. On Feb 23, Acer America Inc.,

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after years of losses, said it would get out of unprofitable retail-store channel and sell only via the Internet. These moves followed Hitachi's Feb. 4 announcement that it would shut down its U.S. notebook subsidiary, Hitachi PC Corp.

Rather than downsize or surrender, some PC makers are taking a different tack. To break the cycle of falling prices and shrinking profits, they're adding services, which may draw new buyers -- and also produce revenue annuities for the PC companies. On Feb. 24, for instance, Gateway 2000 announced it would provide free Internet service to customers who buy a PC costing more than \$1,000. Other companies are expected to make similar moves. Compaq, for one, is trying all kinds of schemes to find a profit formula that adds up. On the one hand, it's experimenting with the so-called free PC model: It will sell 10,000 Presario home PCs to startup Free-PC Inc., which will "give" them to customers who agree to have online ads appear on the units 24-hours a day. But Compaq is also buying up software and E-commerce companies such as Shopping.com, with the goal of creating services and content that set it apart from the PC crowd.

One PC maker that appears unlikely to stray from the pure Wintel model is Dell Computer Corp. The Texas company has mastered the direct-order business and continues to squeeze great profits from conventional PCs. But even Dell may be feeling the heat from plunging PC prices: Revenue growth in its most recent quarter fell from historic 50%-plus levels to just 38%, prompting a shellacking on Wall Street on concerns over a slowdown.

In the end, high-volume PC producers, including even Dell, will have to follow the market-segmentation strategy of their patron saint (and master) Intel, which is trying to compensate for cheaper chips by selling more high-powered models used in corporate servers and engineering workstations. So far, that balancing act has helped keep Intel growing, even as PC prices plunge. For PC makers contemplating a plunge into ultracheap, low-margin information appliances, having a high-end server and workstation business could prove to be a crucial determinant of their continued success.

By Peter Burrows, in San Mateo, Calif.

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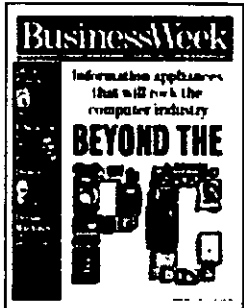
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The New Post-PC Products

Ready or not, here they come: Information appliances designed for all parts of your life. Read online news over the morning coffee with the **QUBIT WIRELESS WEB TABLET**, or check movie times from your **ALCATEL WEBTOUCH PHONE**. Road warriors can save magazine articles with their **HP CAPSHARE HANDHELD SCANNER**, send E-mail via newfangled cell phones like **INNOVATIVE GLOBAL SOLUTION'S NEOPOINT 1000** or **QUALCOMM'S PDQ PHONE**, or if in Japan, make calls through **NTT'S WRISTWATCH-SIZE CELL PHONE**. Granny can simplify her life with **3COM'S PALM ORGANIZER** or call up favorite snapshots on **SONY'S DIGITAL FRAME**. For entertainment **DIAMOND MULTIMEDIA'S RIO** lets you play music downloaded from the Internet, while **TIVO'S SET-TOP BOX** will automatically store your favorite shows. And if you prefer Jane Austen to Austin Powers, you can always curl up with an **E-BOOK** from **SOFTBOOK PRESS**.



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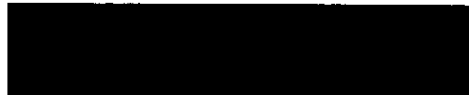
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COMPUTER STALWARTS

SUN MICROSYSTEMS

Its Java software is being used in everything from smart cards to smart washing machines. Now Sun's Jini software will let all those Java devices work together over the Internet.



MICROSOFT

The software king is out to dominate pastures beyond the PC as well. Its WebTV service has more than 700,000 subscribers, it's pushing Windows CE software into appliances, and it has unveiled a Jini-like technology called Universal Plug-and-Play.

HEWLETT-PACKARD



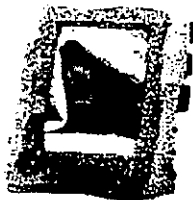
HP'S CAPSHARE HANDHELD SCANNER

The computer maker may finally be ready to put its vaunted

The Scramble for the Killer Information Appliance

CONSUMER-ELECTRONICS GIANTS

SONY



SONY DIGITAL PICTURE FRAME

This year it will deliver a batch of information-based devices, including smart picture frames, digital cameras, and handheld computers with slots for its Memory Stik modules. These gumstick-size modules can store E-mail, digital photos, etc. Sony also is working on home networks so digital camcorders/cameras, TVs, and other

STARTUPS

TIVO, REPLAY NETWORKS

Using traditional PC hard drives, both make "digital VCRs" that let you store your favorite shows to be watched when it's convenient. Replay's board of directors includes Netscape co-founder Marc Andreessen. TiVo has landed the first big licensee--TV maker Philips Electronics, which will introduce TiVo-based TV set-tops this year.

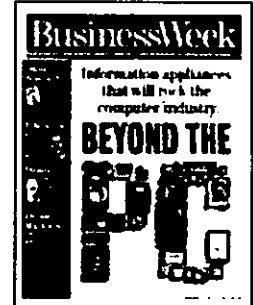
QUBIT TECHNOLOGY



QUBIT'S WEB TABLET

It has three appliances on the drawing board, including a \$350 tablet for checking E-mail and Web browsing. It works wirelessly when you're within 300 feet of its cradle.

APLIO



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technology and brand name to work. HP's Information Appliance Div. has unveiled the CapShare handheld scanner and the Jornada handheld PC. HP is working on other gizmos so mobile professionals can send and receive images, voice, and data over the Internet.

AOL

To give its 13 million subscribers easier access--and reach the PC-less masses--AOL is talking to makers of Internet phones, set-top boxes, and other gear about offering its service on such devices.

DIAMOND MULTIMEDIA



DIAMOND'S RIO PORTABLE MUSIC PLAYER

This maker of PC add-in cards is shifting investment to devices such as the \$199 Rio, which can store and play songs downloaded off the Internet.

QUANTUM, SEAGATE, AND WESTERN DIGITAL
The three disk-drive

devices can share info.

SHARP



It's making a \$150 pocket-size device called TelMail, which allows you to send and receive E-mail by holding it up to a phone.

PHILIPS

A leading maker of WebTV set-top boxes, it will manufacture a "digital VCR" set-top based on TiVo's technology later this year. It is considering adding wireless handheld displays so viewers can receive E-mail or info from the Net.

ITS \$199

Aplio/Phone gizmo lets you make long-distance calls free over the Internet. Next step: persuading phone makers to integrate the technology into their products.

IREADY, MICROTUNE

Chipmaker iReady, which has raised \$20.5 million, makes a browser-on-a-chip so information-appliance manufacturers can easily get their wares Net-ready. Microtune, which has raised \$22 million, makes a one-chip TV tuner that enables info appliances to handle video.

CMi WORLDWIDE



CMi'S ADVANTAGE 2000 KITCHEN APPLIANCE

Founded by an inventor of bread- and juice-makers, CMi is readying an appliance for the kitchen that surfs the Web and doubles as a TV and CD player. Different models, priced from \$800 to \$1,500, will be sold

<p>makers are targeting consumer appliances. Quantum drives are in TiVo's set-top box, Seagate was an early investor in WebTV, and Western Digital is working with Sony on home info appliances.</p>		<p>this summer via Macy's.</p> <p>SHAREWAVE, TUT SYSTEMS, 2-WIRE</p> <p>These startups are chasing the exploding home networking market. ShareWave and Tut sell technology to link PCs and other gizmos wirelessly or through phone lines. 2-Wire will sell a device to connect home networks to high-speed phone lines.</p>
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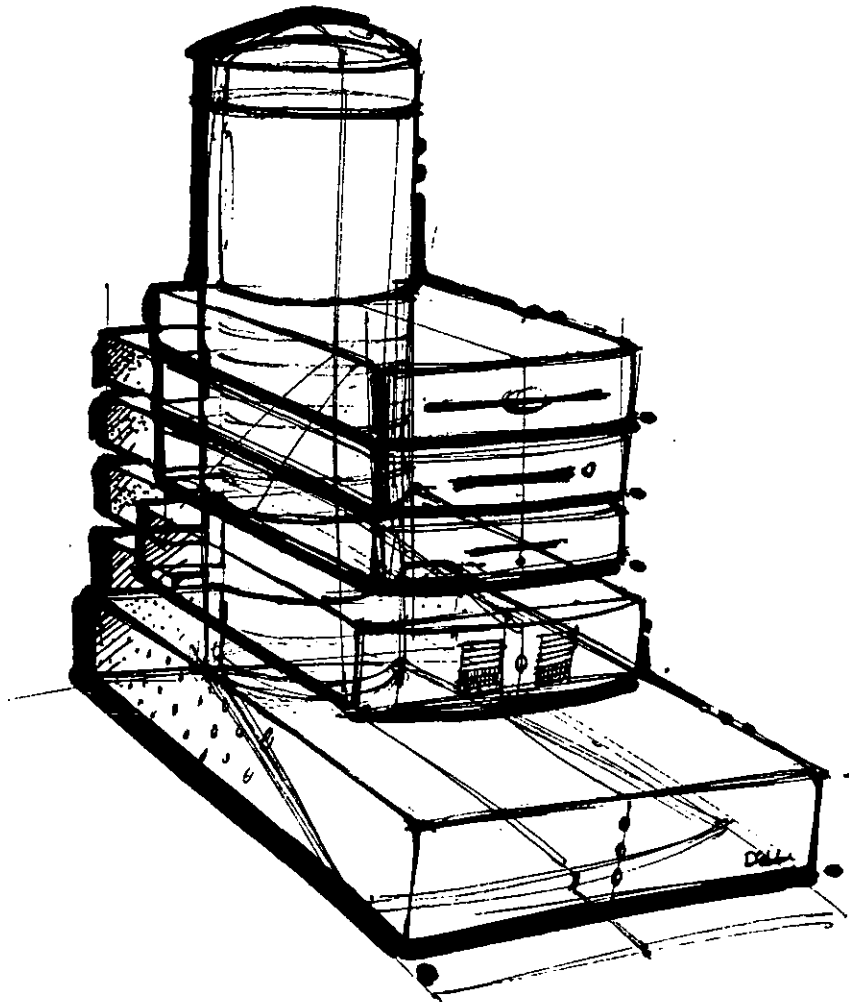
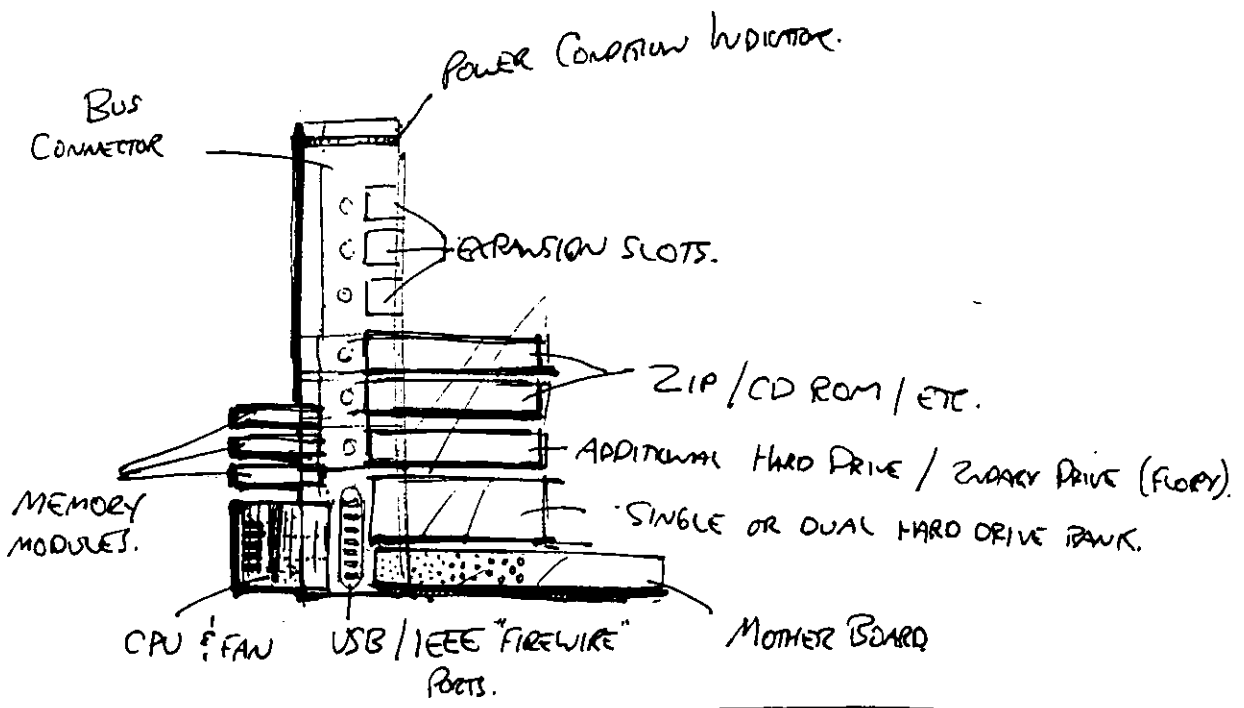
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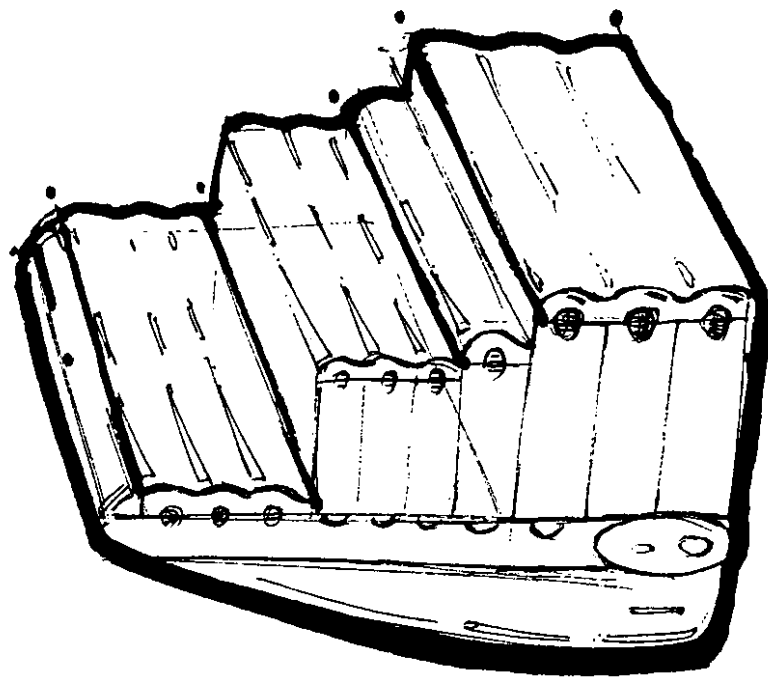


Sketch Development

The following pages show, in chronological order, the development of my project through the use of quick, freehand sketches. Though not highly detailed, it is extremely effective to work out solutions in this manner. By working quickly, it is possible to find forms that work, as well as solutions that simply aren't! These sketches eventually lead to my final solution.

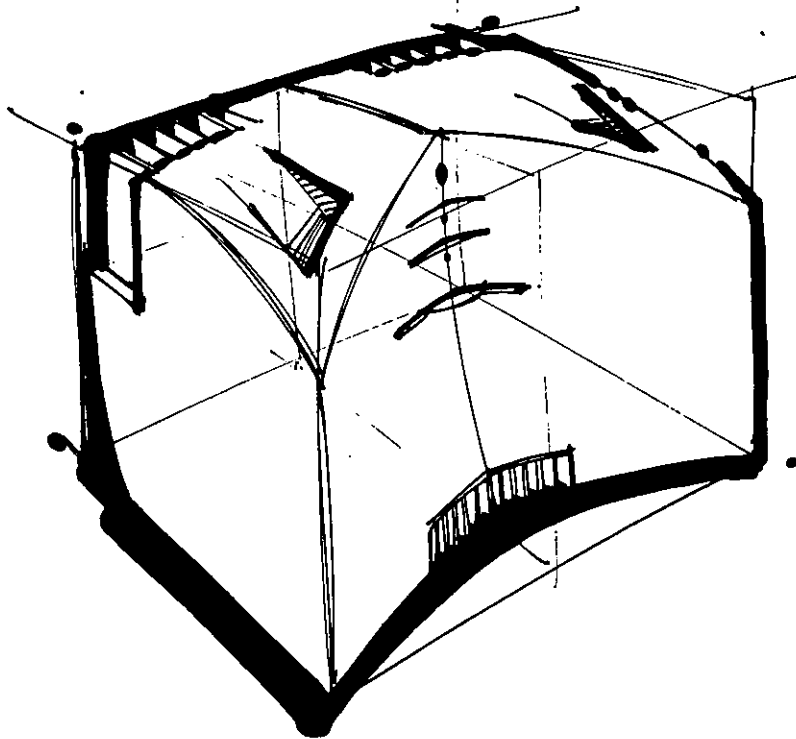


AIRHITCH.ORG / AIRFARE

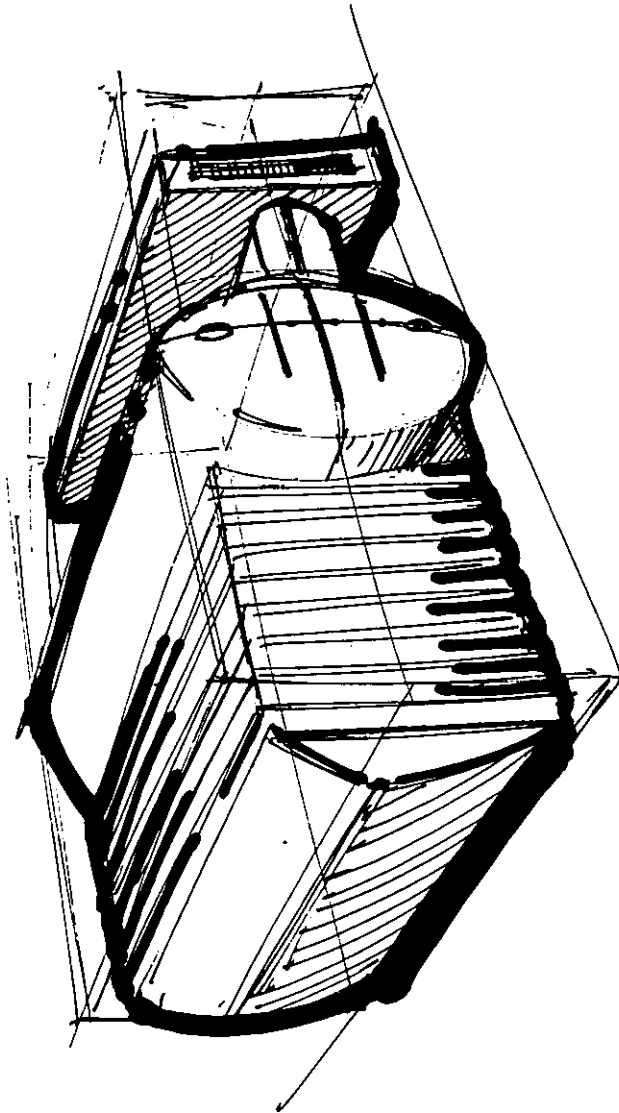


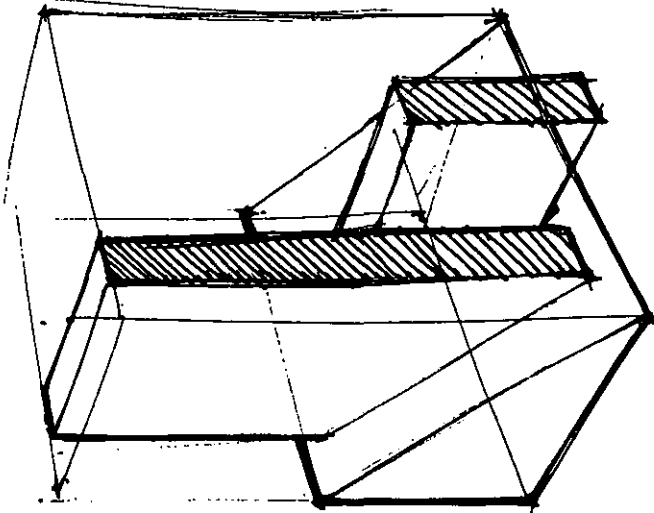
CALANDER FOR FUNDRAISER

ARRANGE BLOCKS.



J

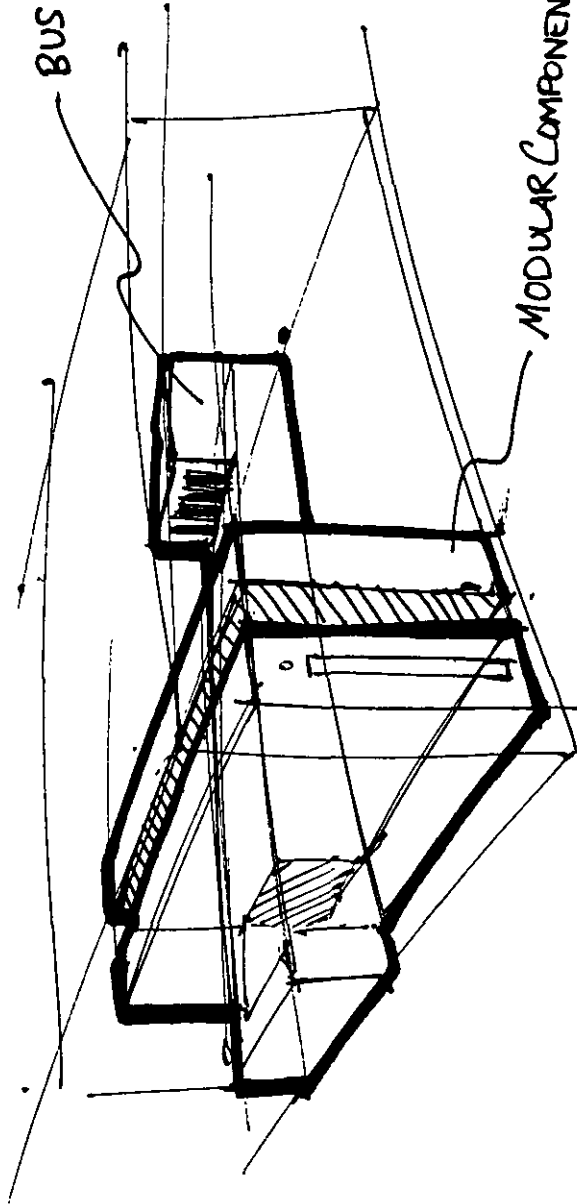




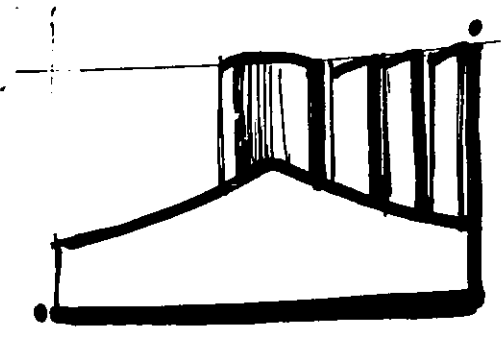
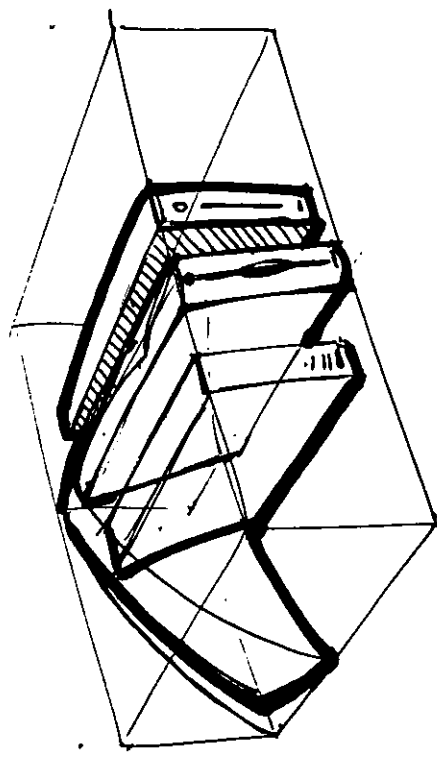
2.3.99

BUS BAR

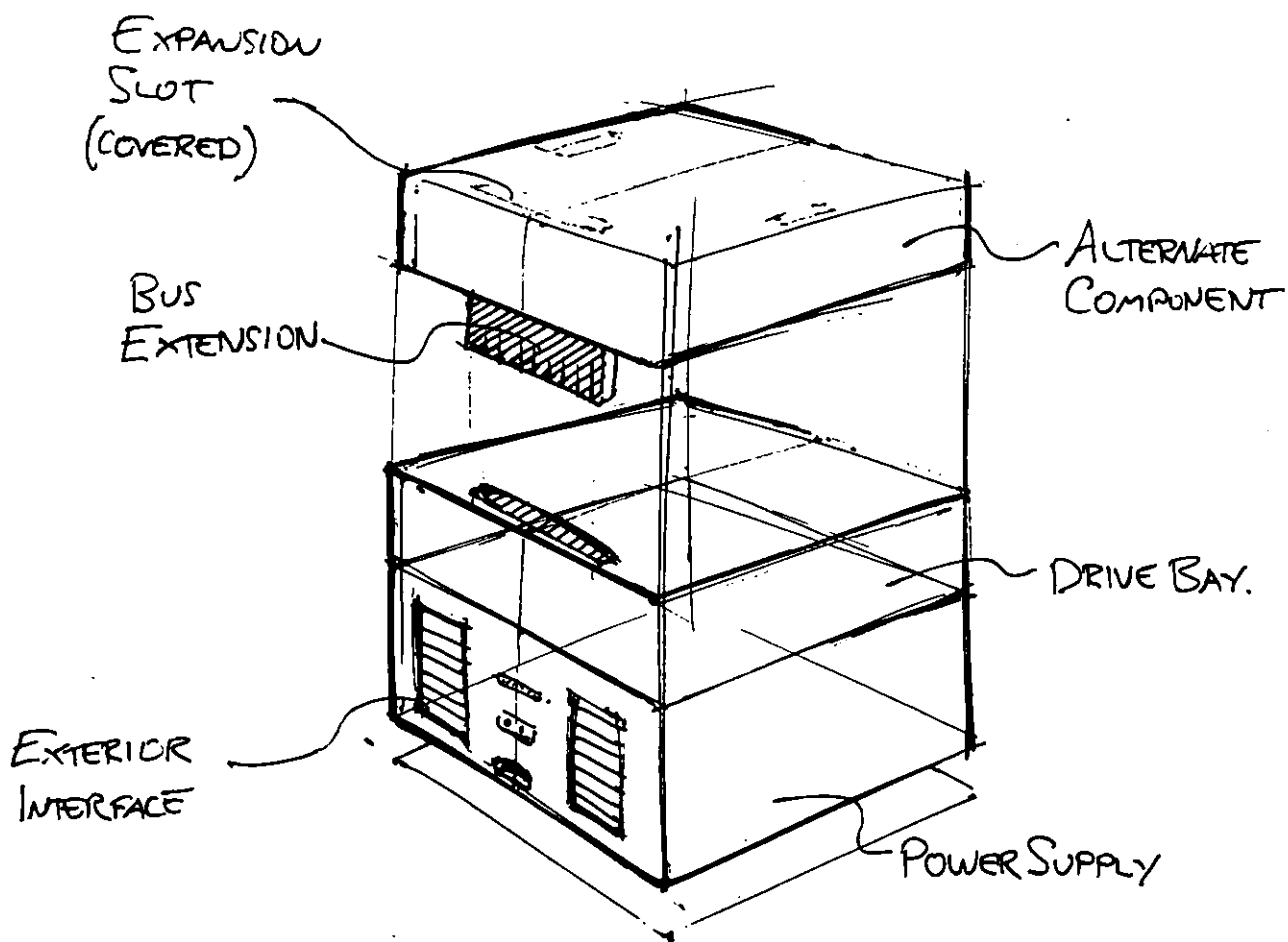
MODULAR COMPONENTS

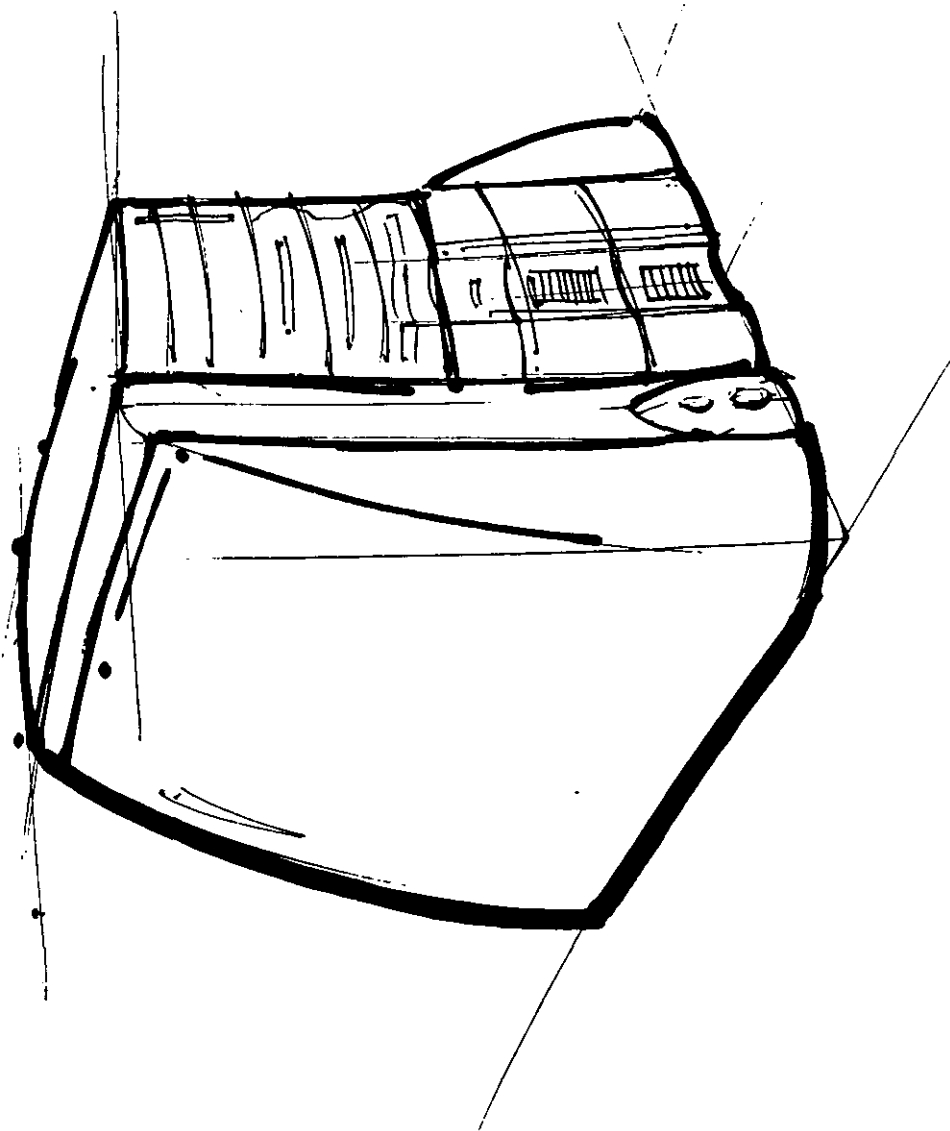


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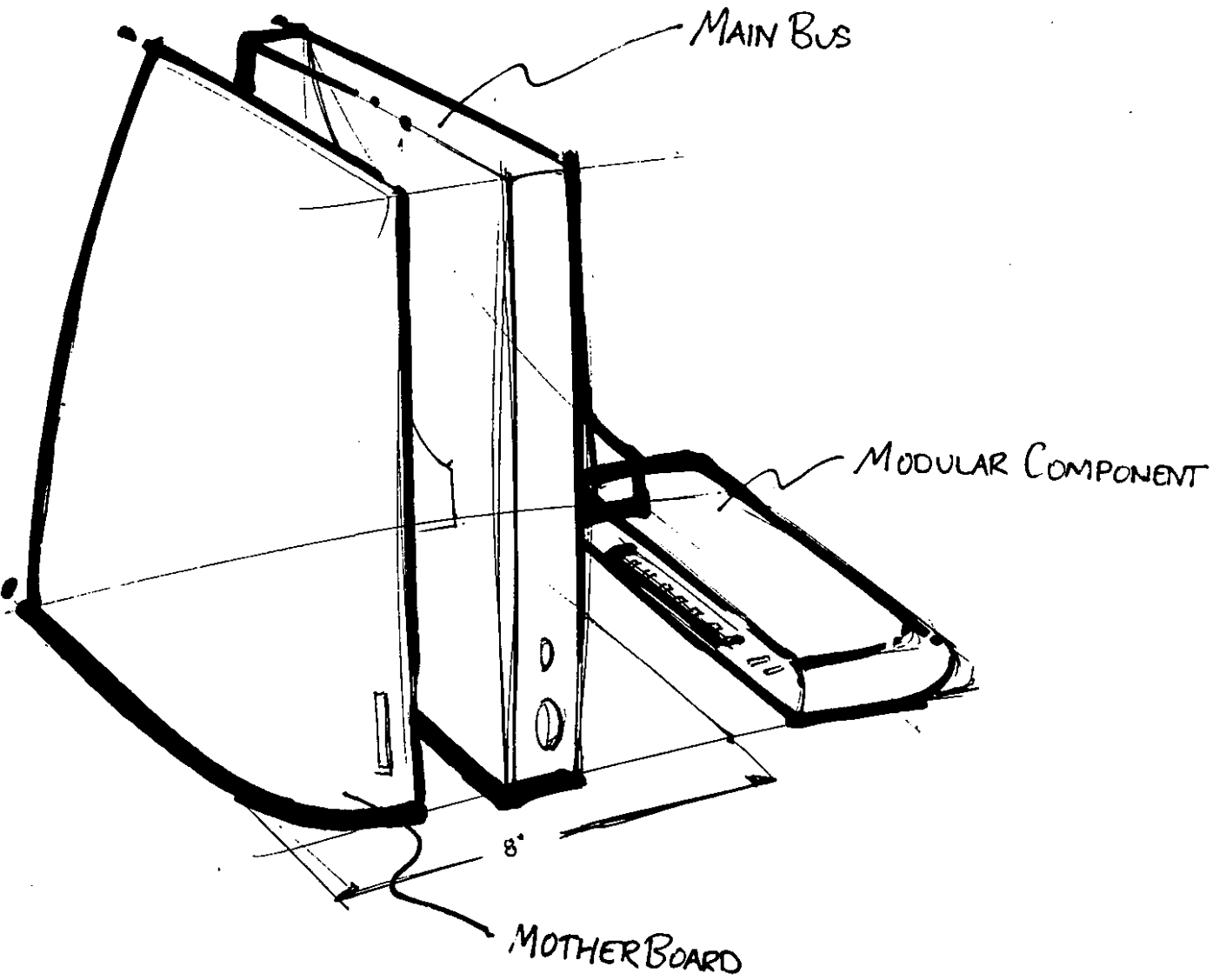


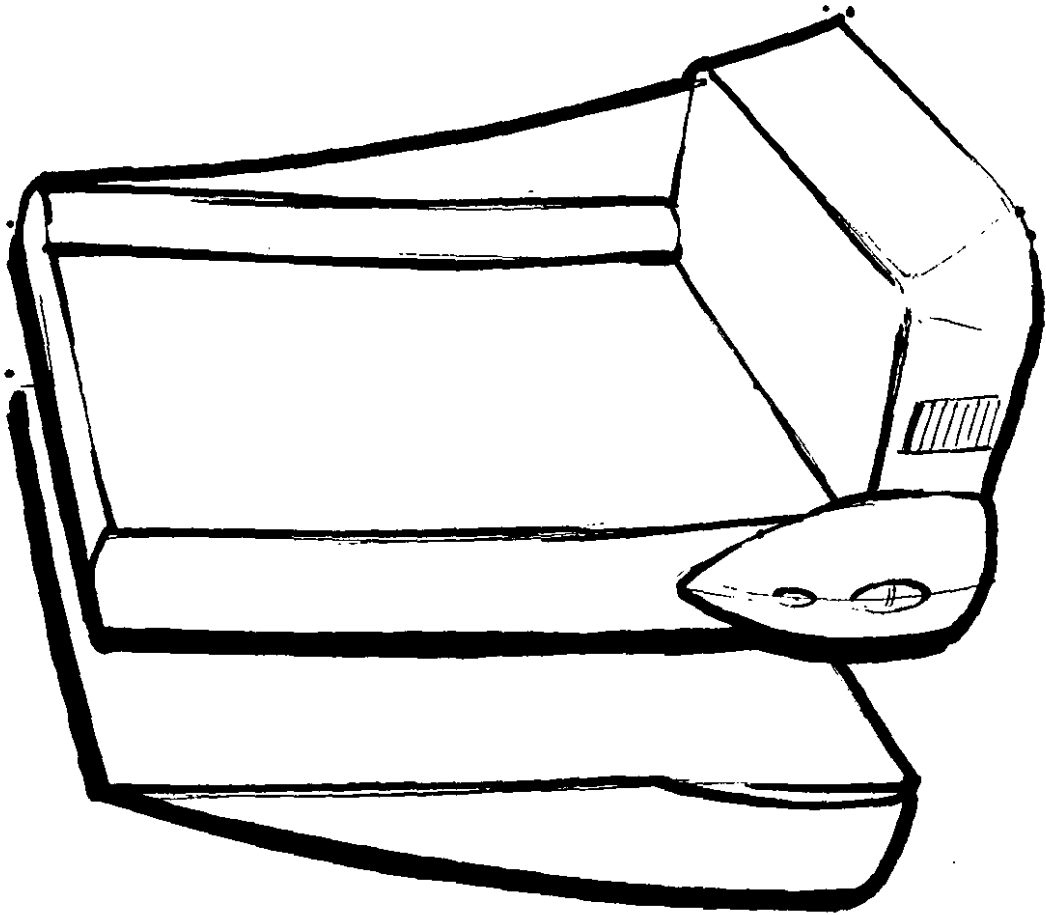
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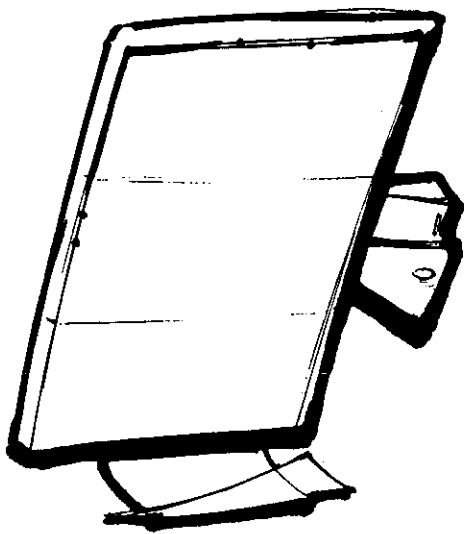
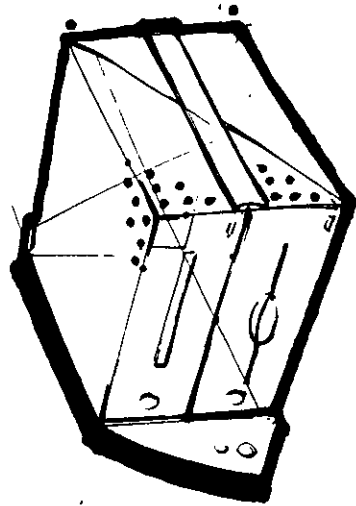
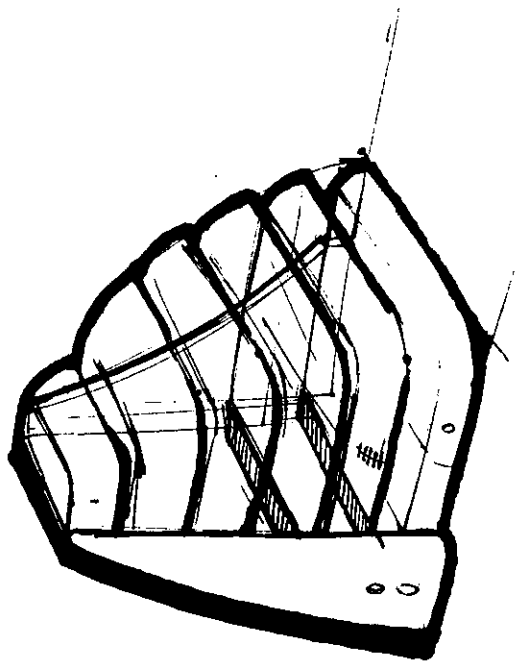




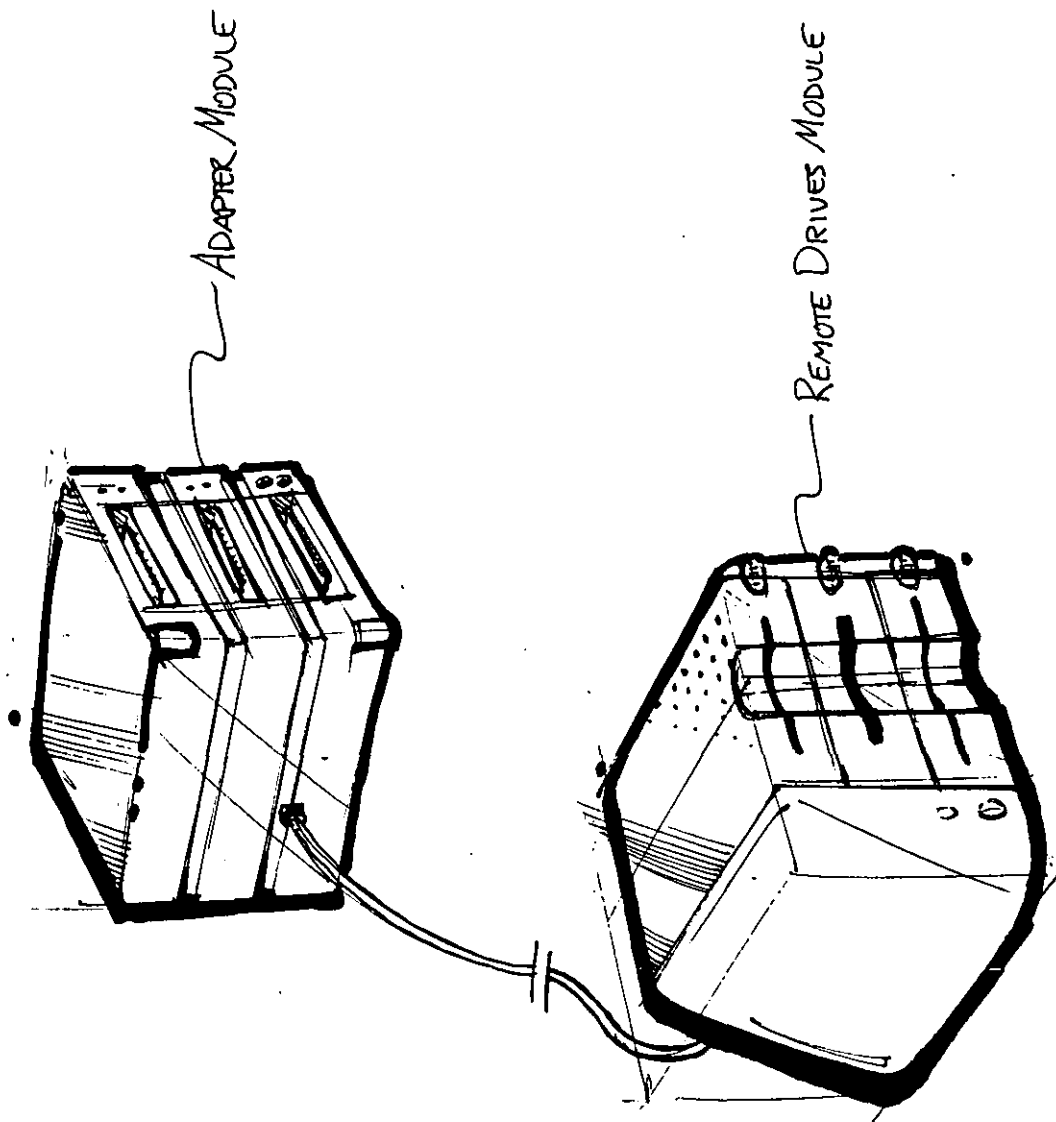
2.24

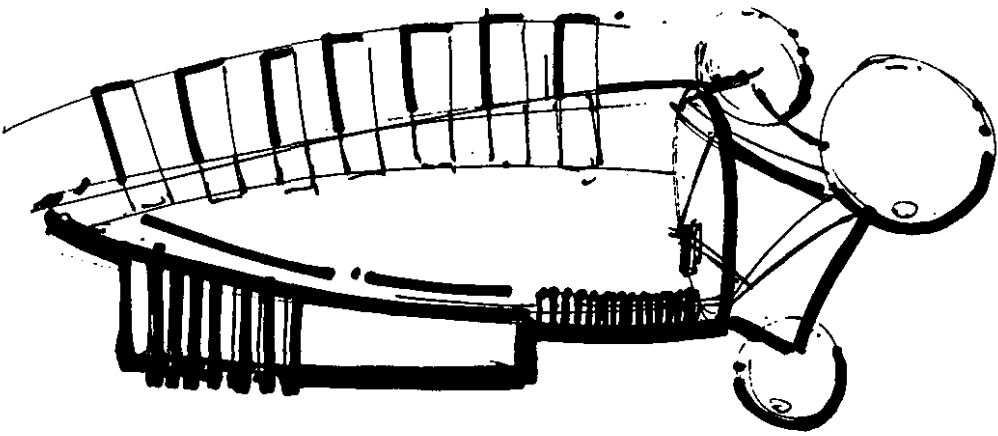






REMOTE UNIT ALLOWS
FOR MAIN COMPUTER TO
BE PLACED OUT OF
SIGHT, OR OUT OF
THE WAY.
THIS PROVIDES EASY
ACCESS TO DRIVES
WITH THE SMALLEST
POSSIBLE DESKTOP
FOOTPRINT.

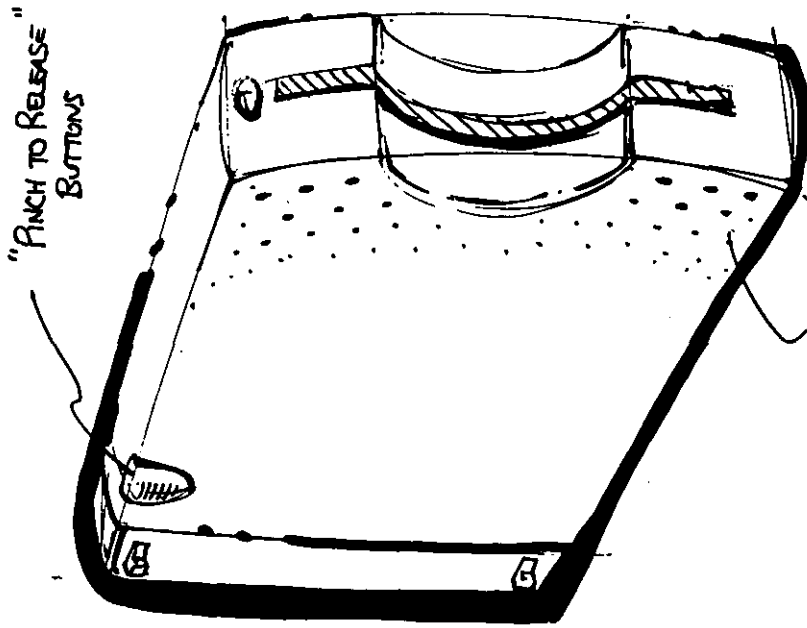




3.2.99

3.2.99

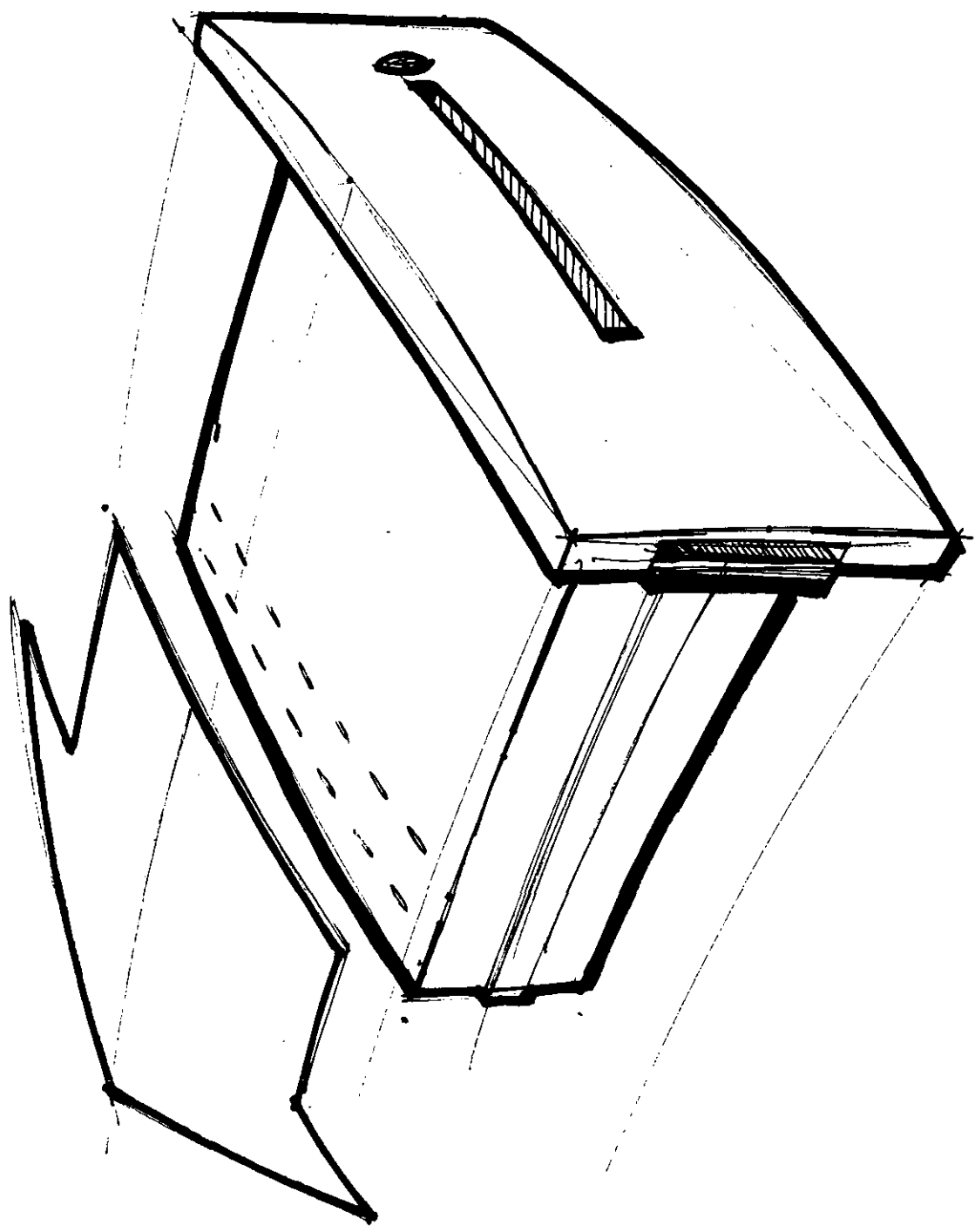
DRIVE MODULE:
3.5" / ZIP / SUPERDISK ...



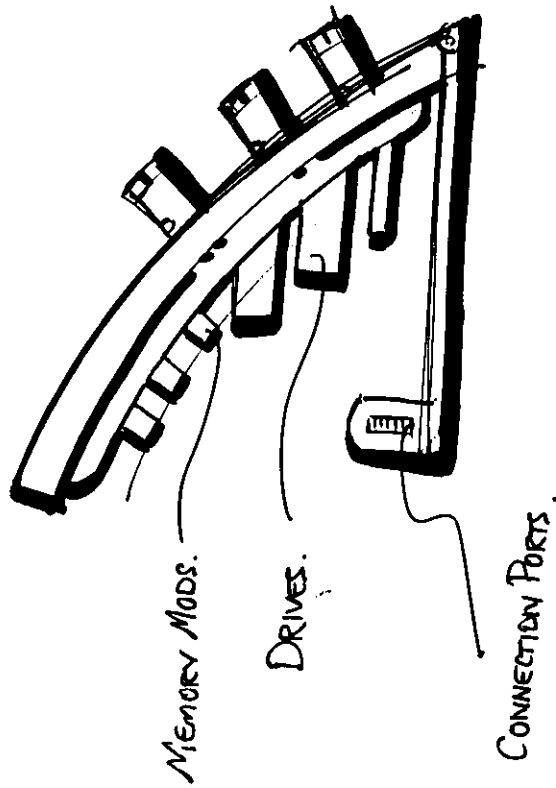
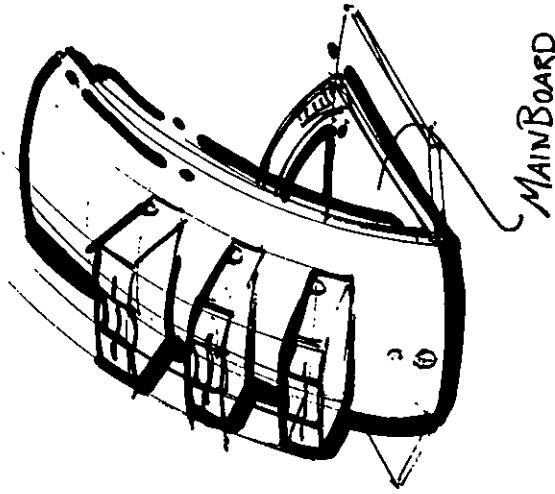
"PINCH TO RELEASE"
BUTTONS

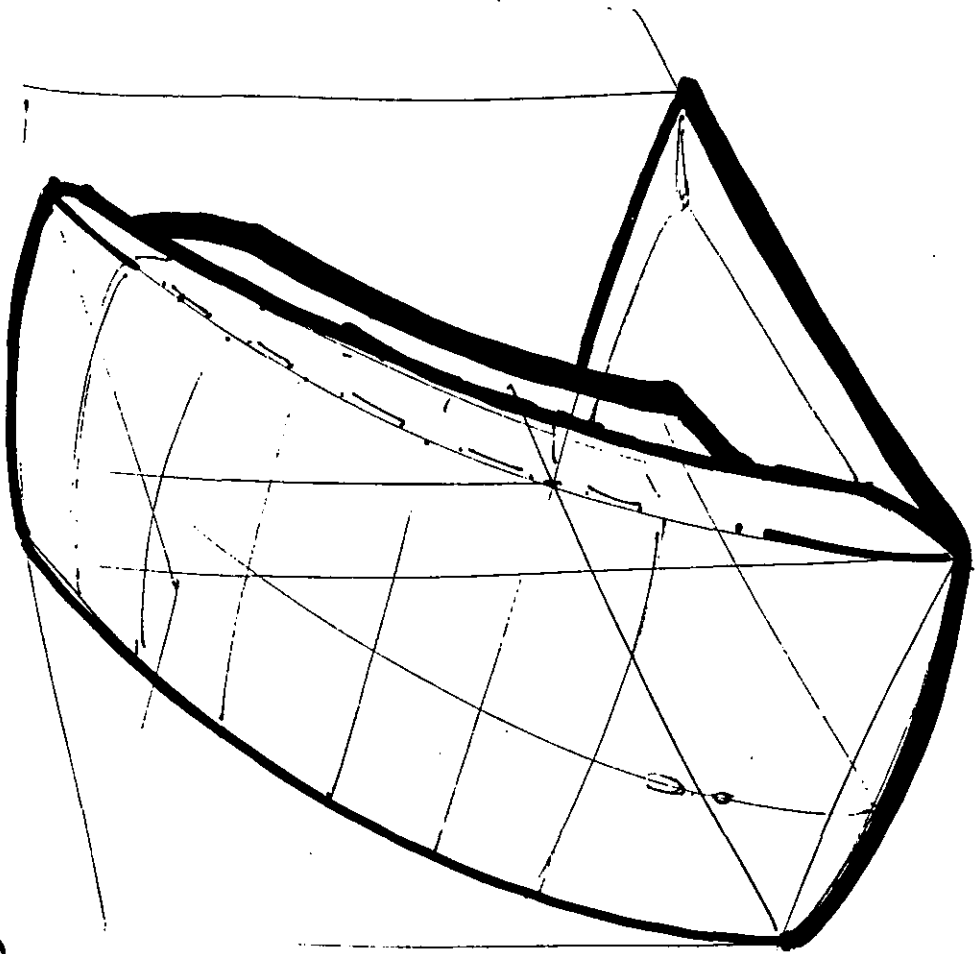
OPEN-AIR
VENTILATION

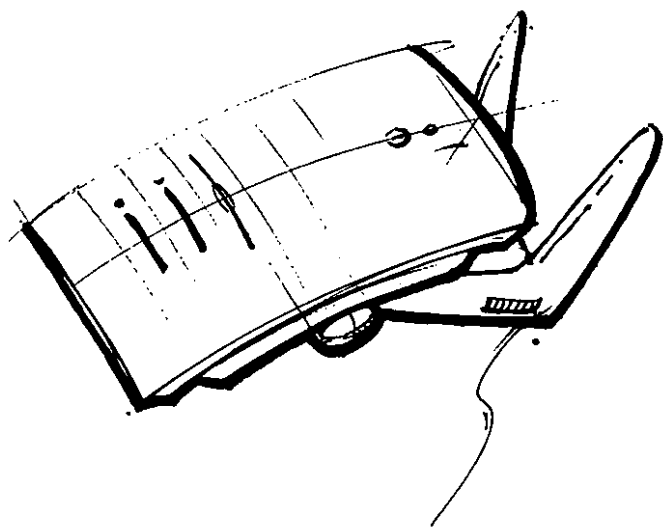
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3-2-99

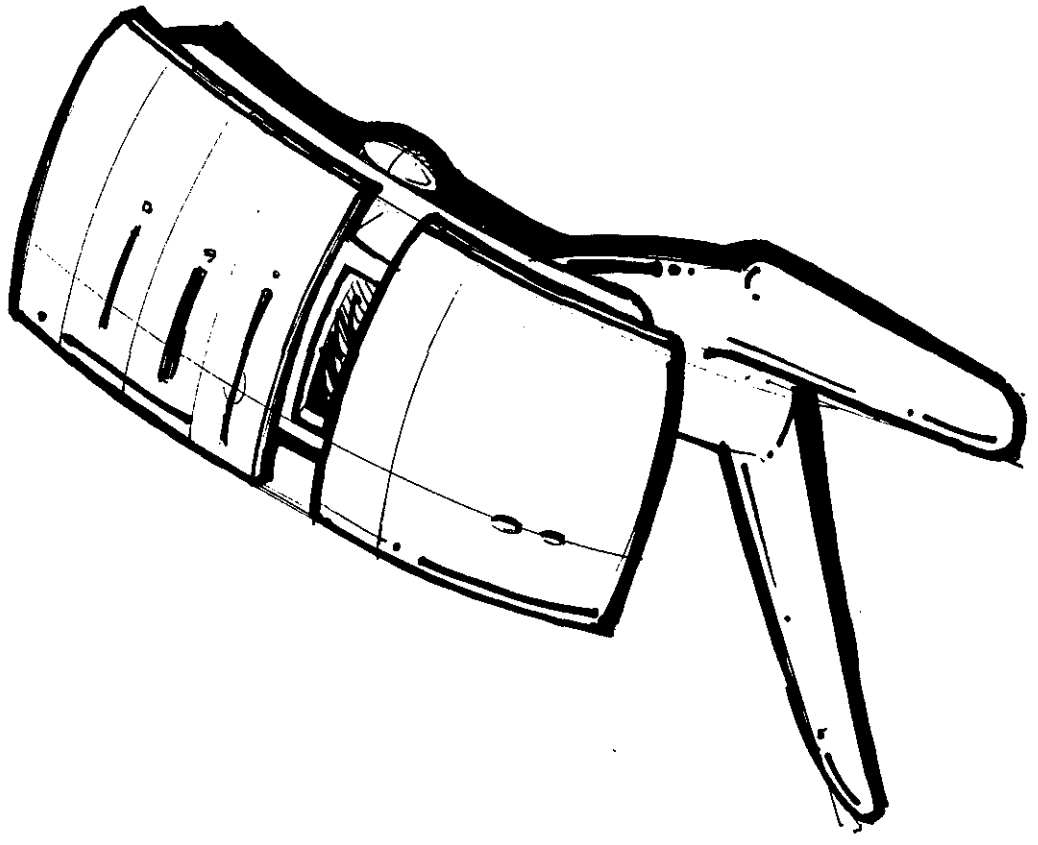




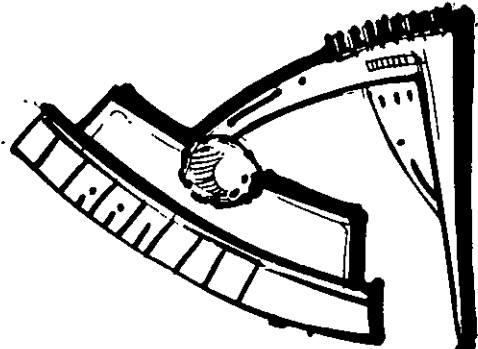
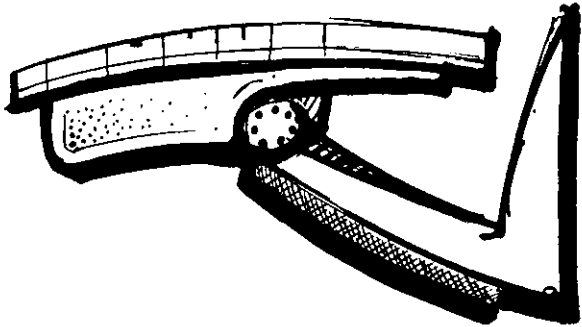


16.55

93.94

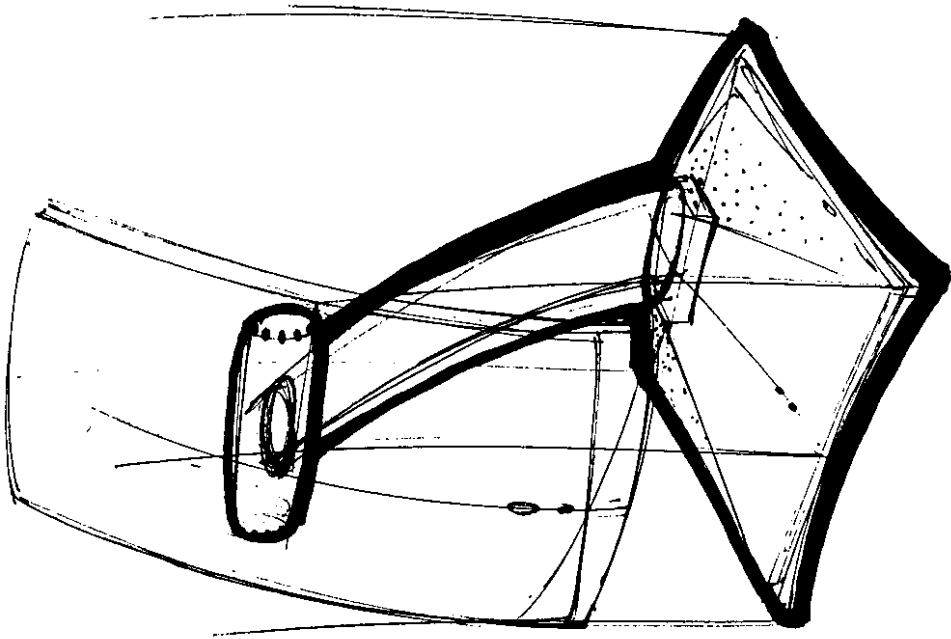


3.5.99
66.5.5

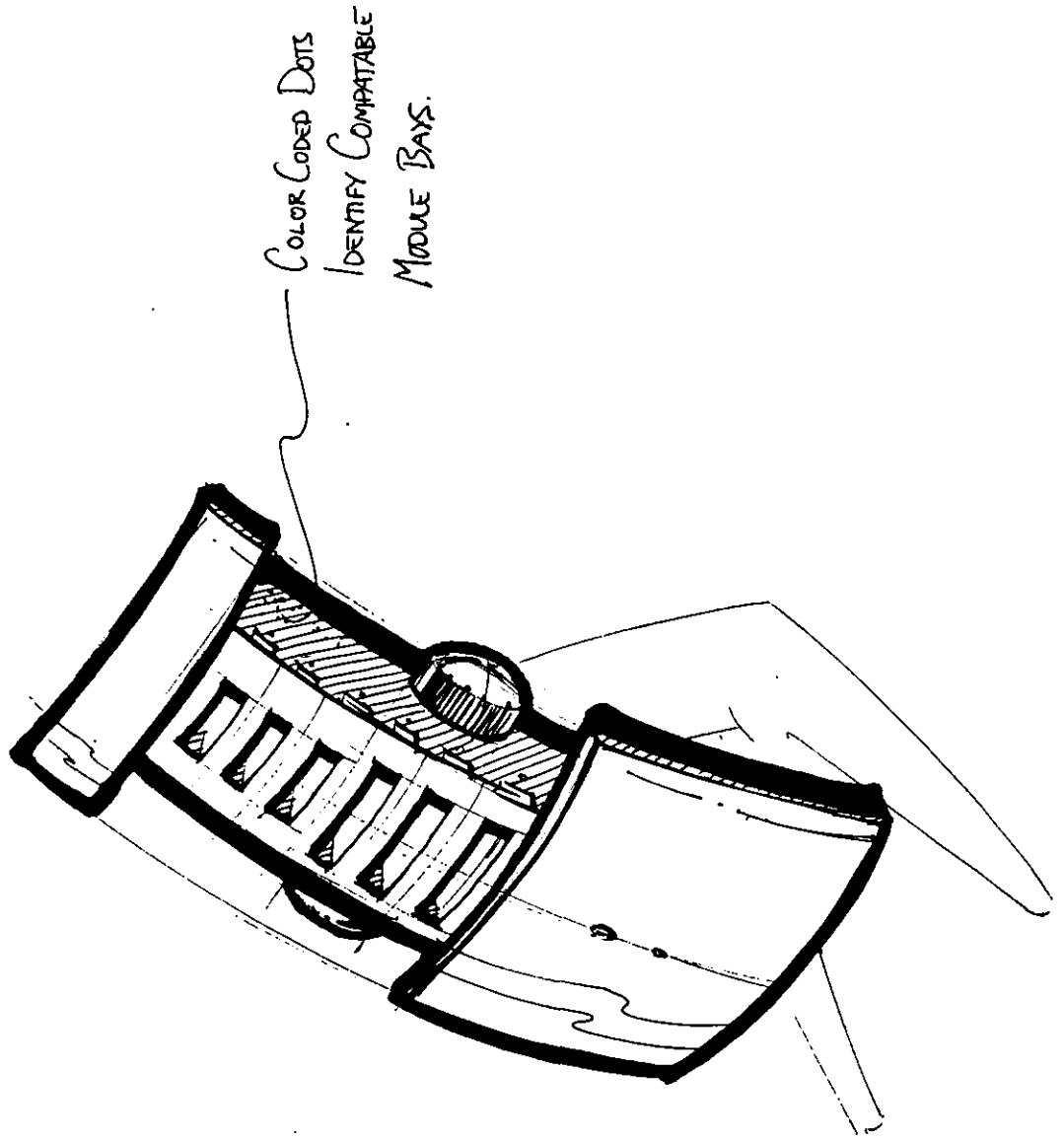




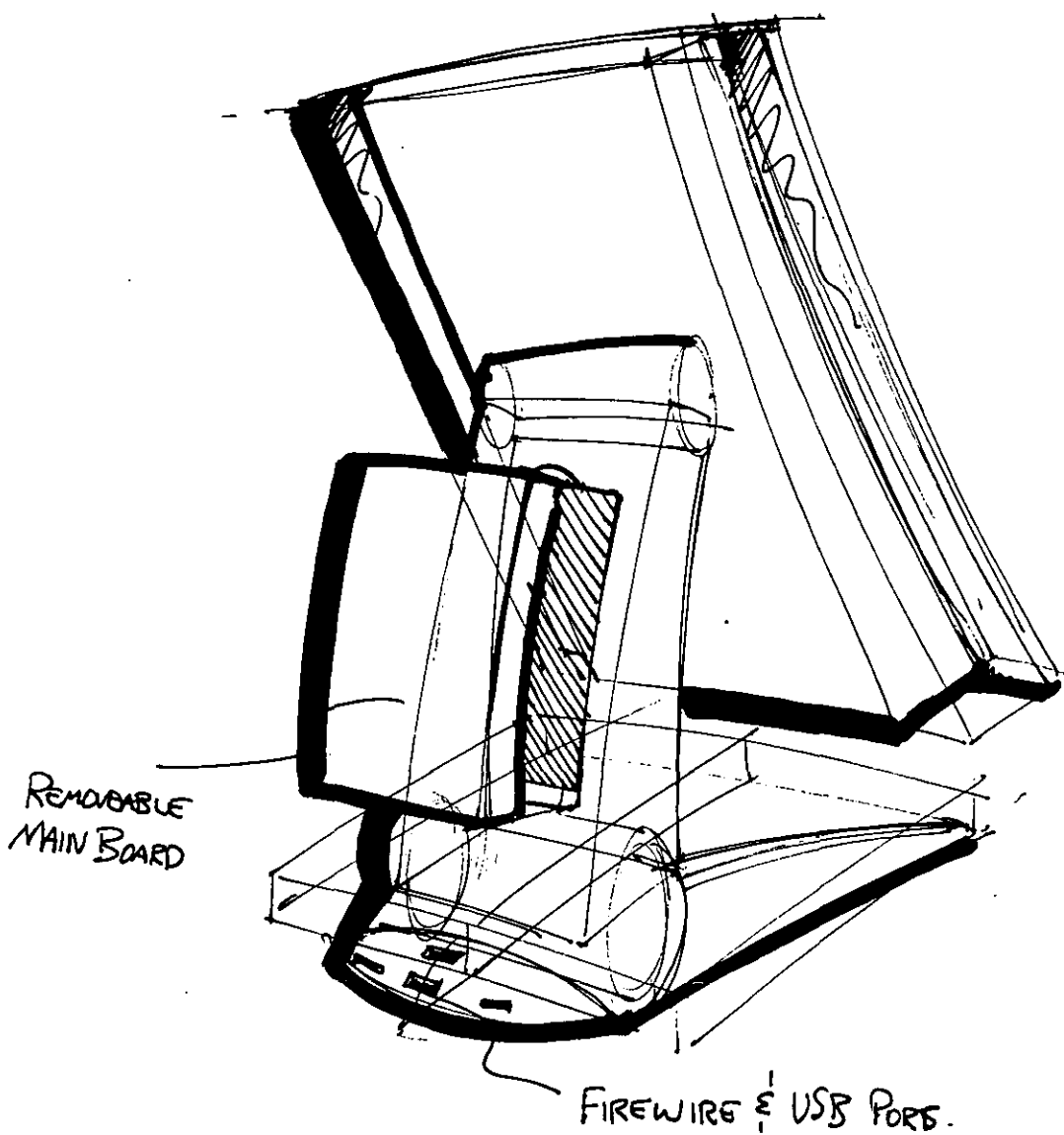
99
BASE ENCLOSURE WITH
MOTHERBOARD & PROCESSOR.



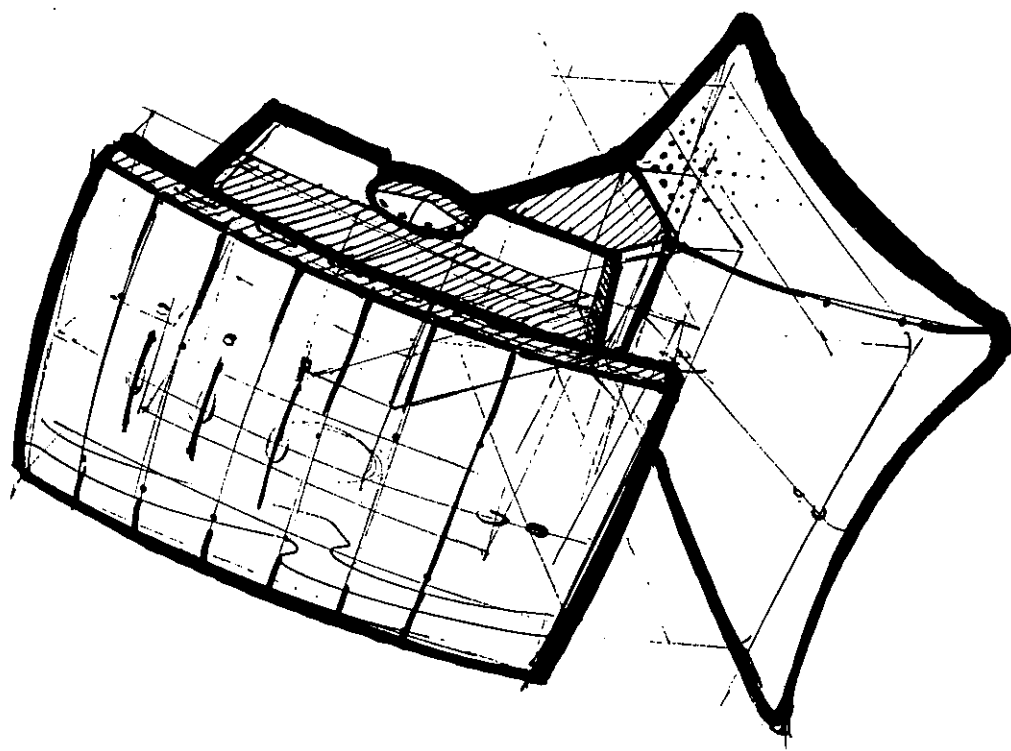
5.9
w/ ALL MODULER BAYS EXPOSED.

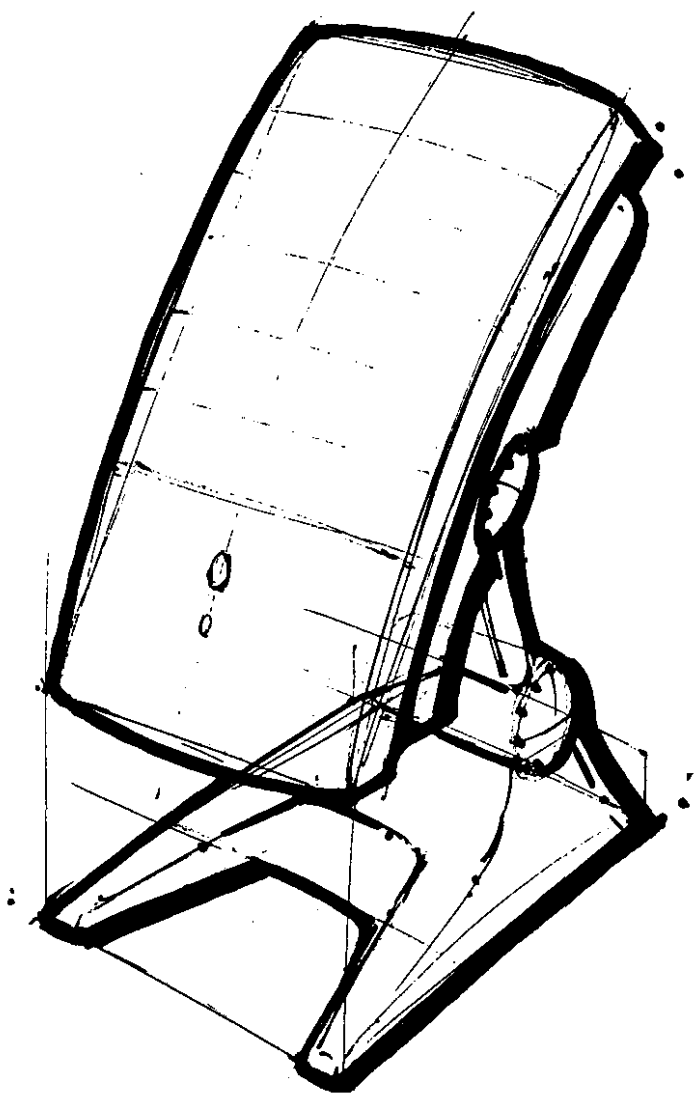


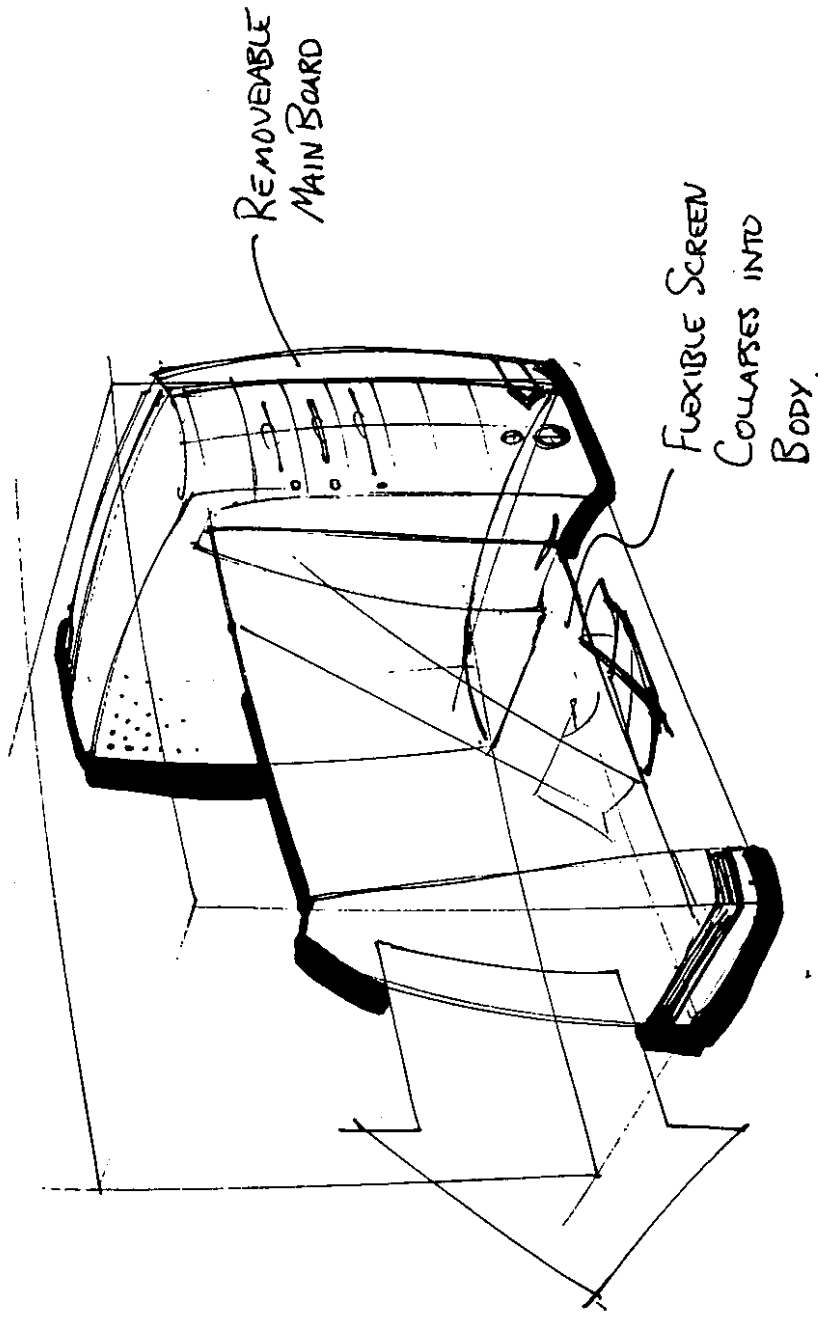
2.20.99



3.5.99

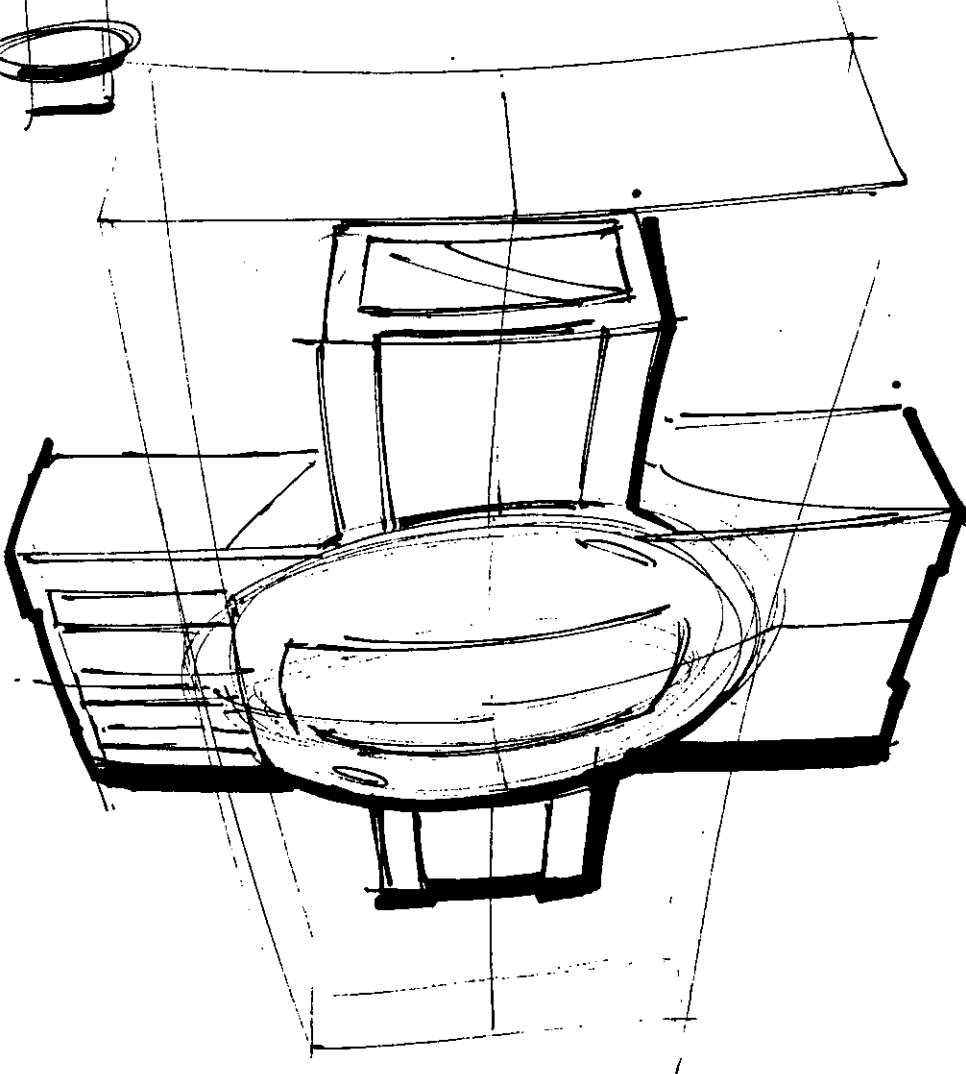
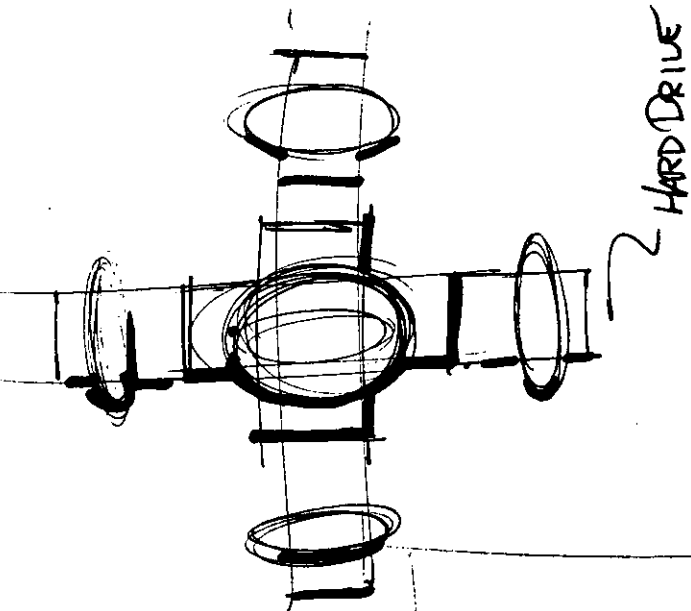




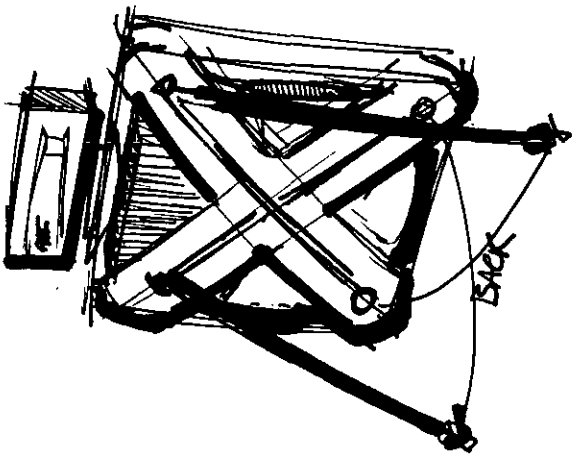


REMOVABLE
MAIN BOARD

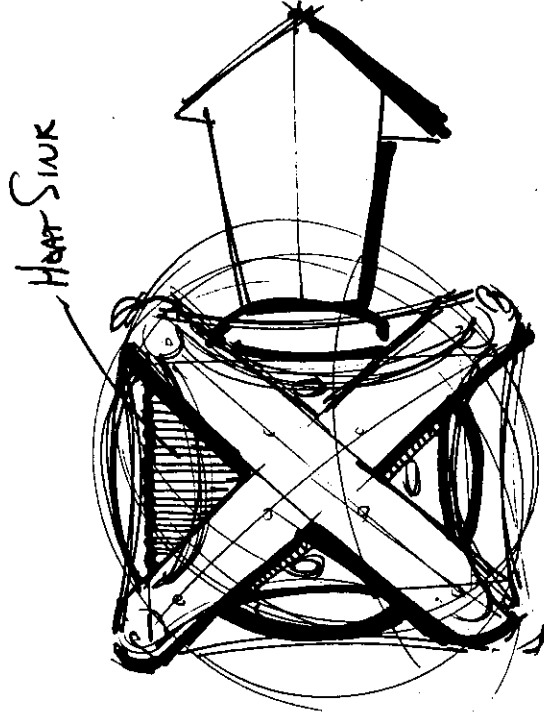
FLEXIBLE SCREEN
COLLAPSES INTO
BODY.



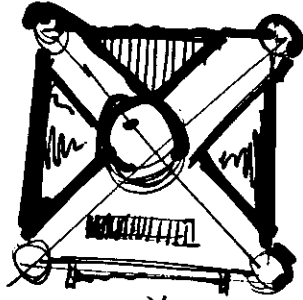
MAIN PC UNIT



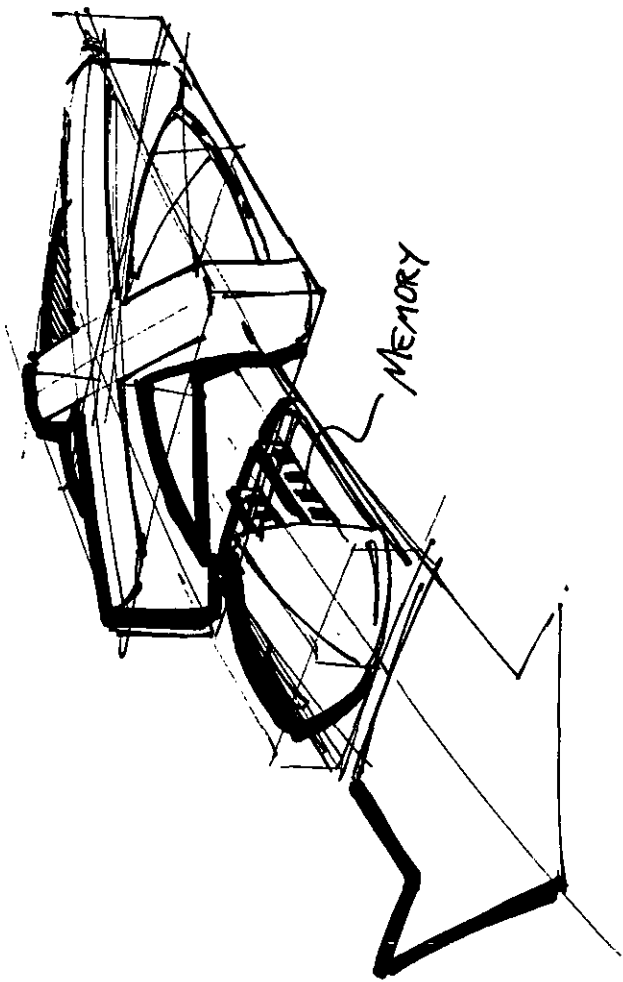
FOLDING LEGS.

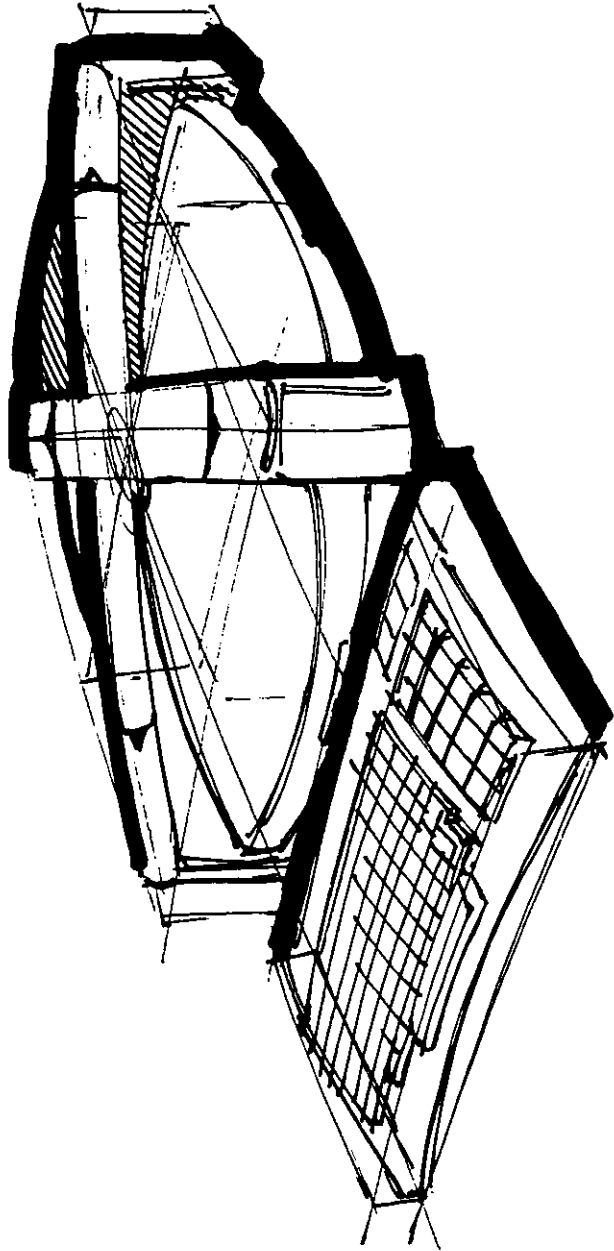


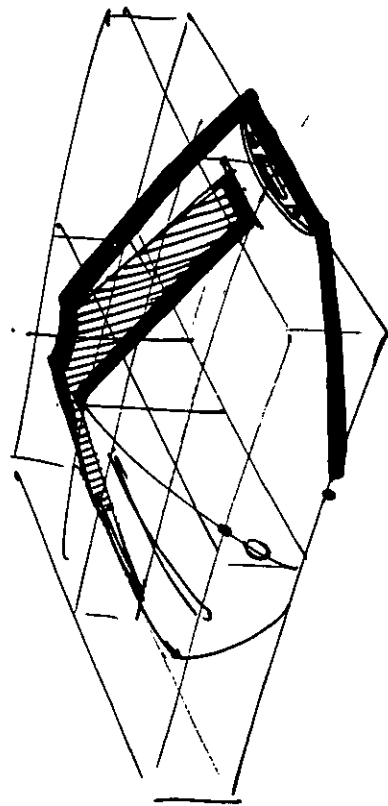
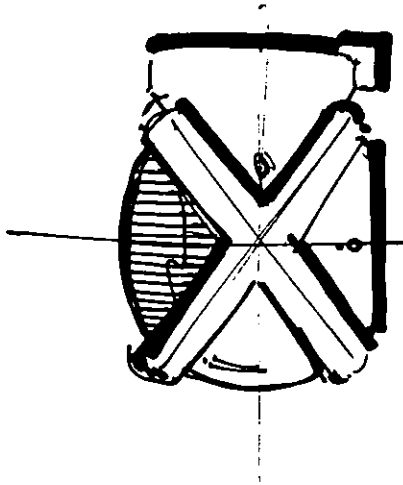
HEAT SINK



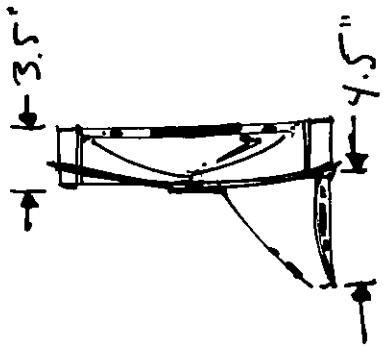
DRIVE UNIT

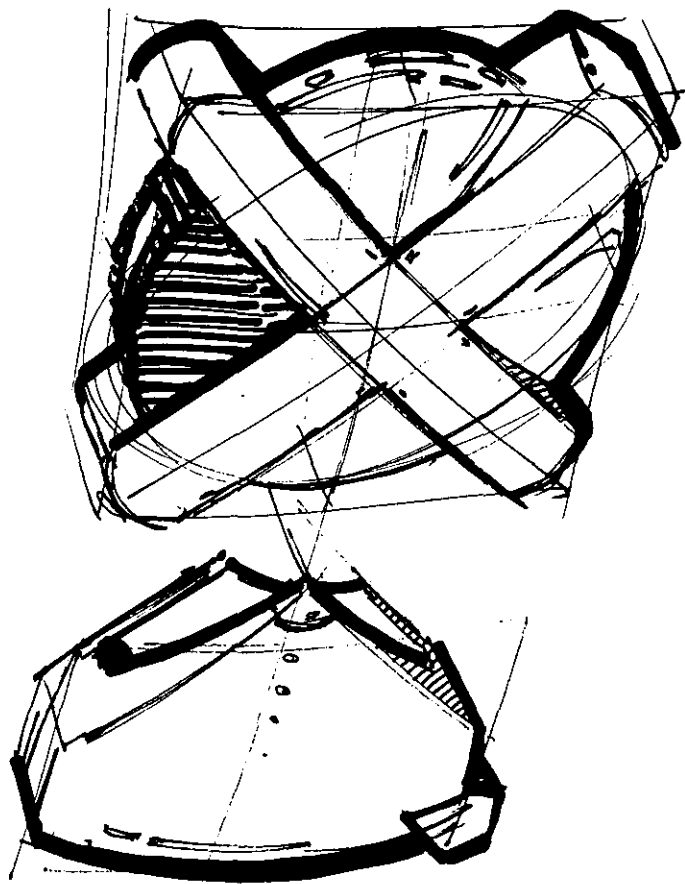


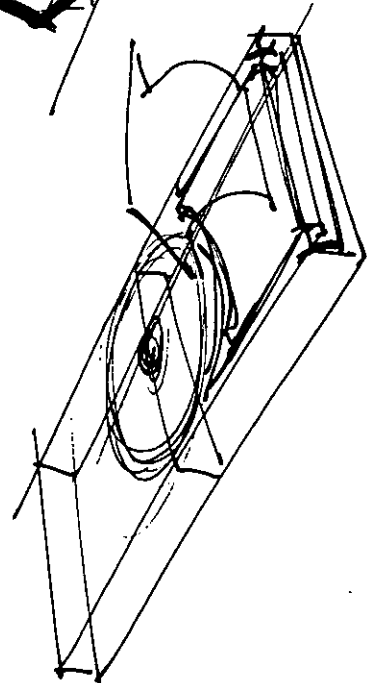
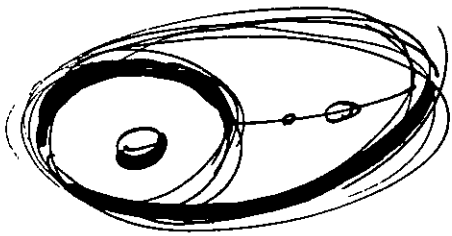
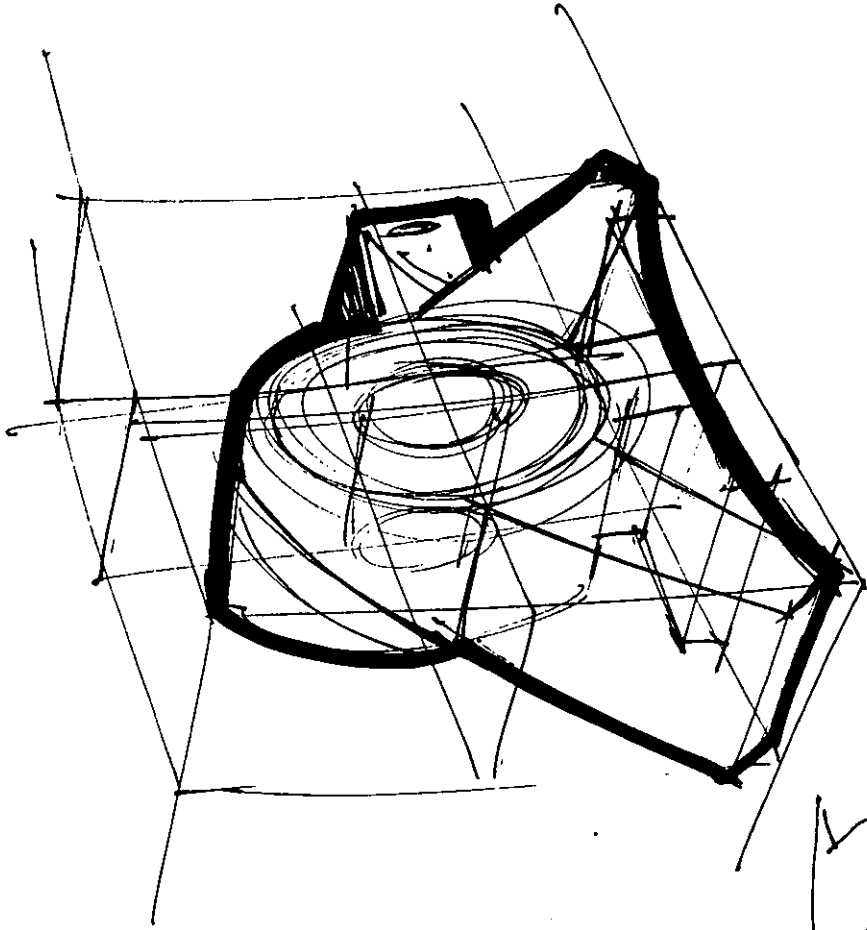
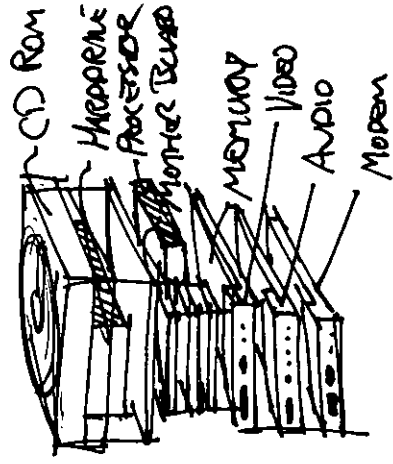




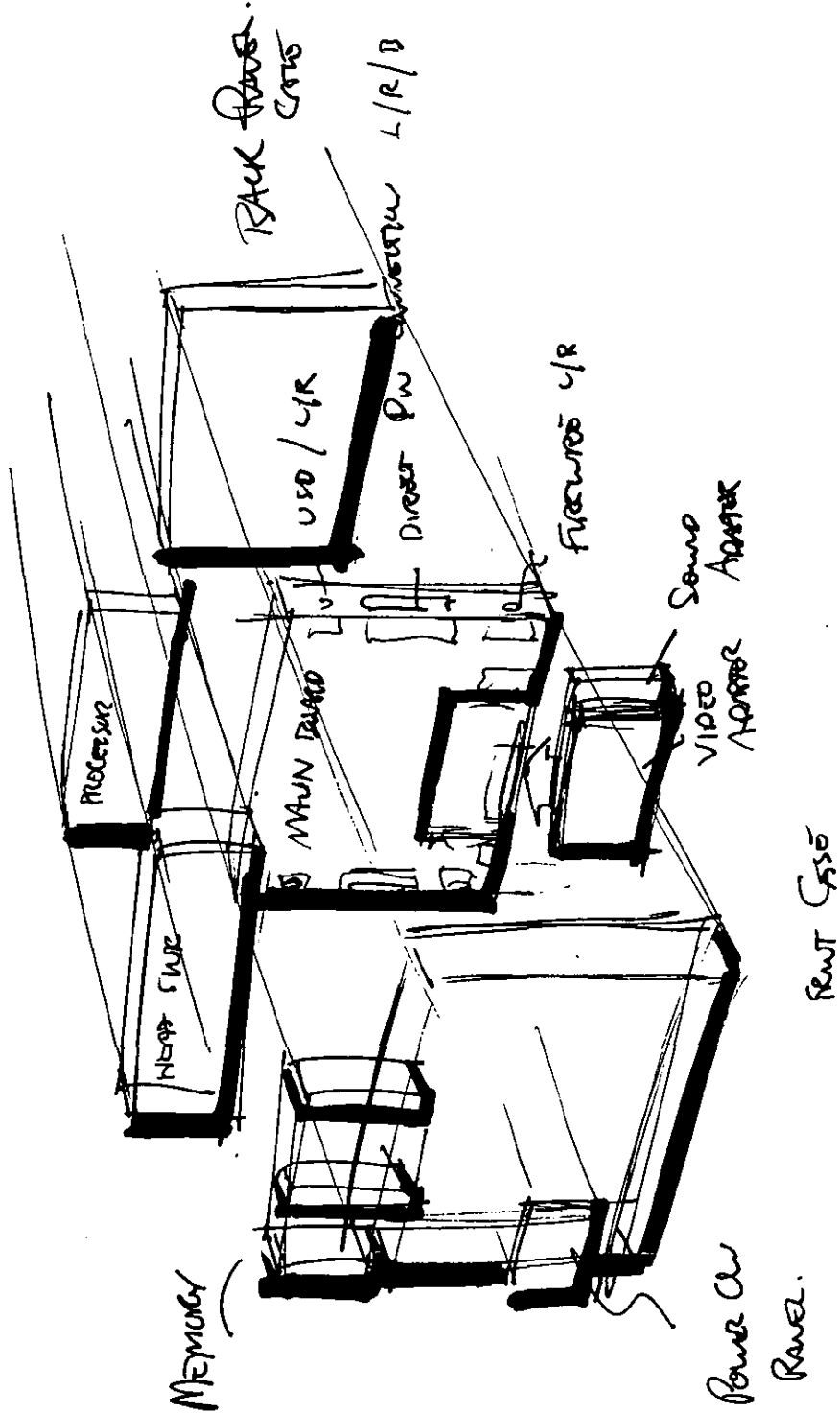
BASE UNIT



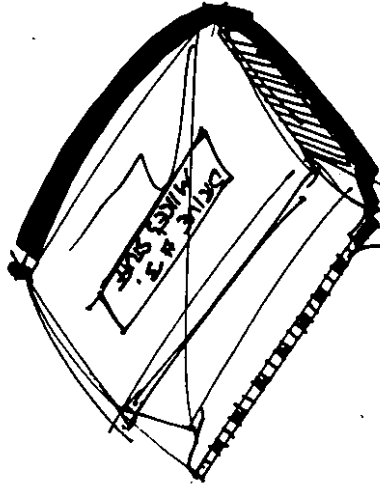




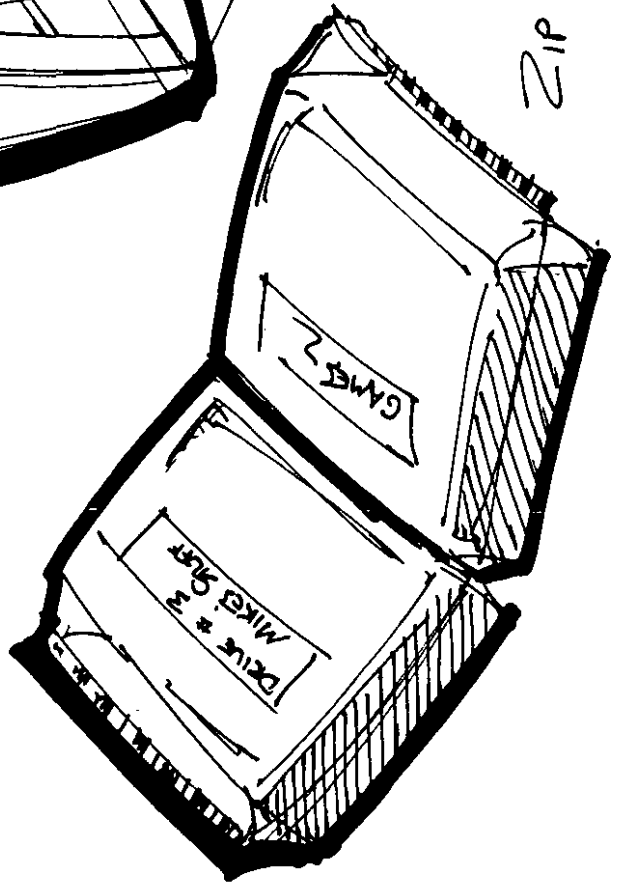
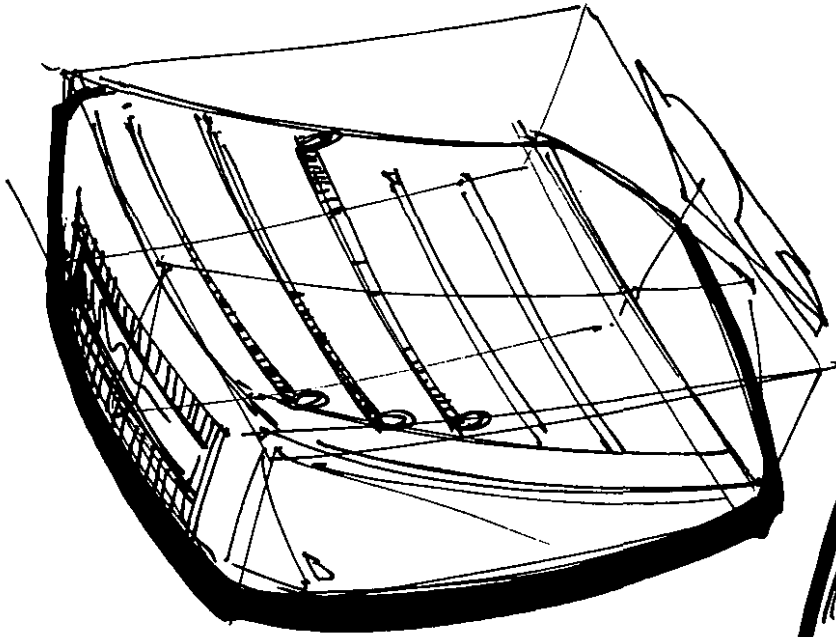
ARACUS II



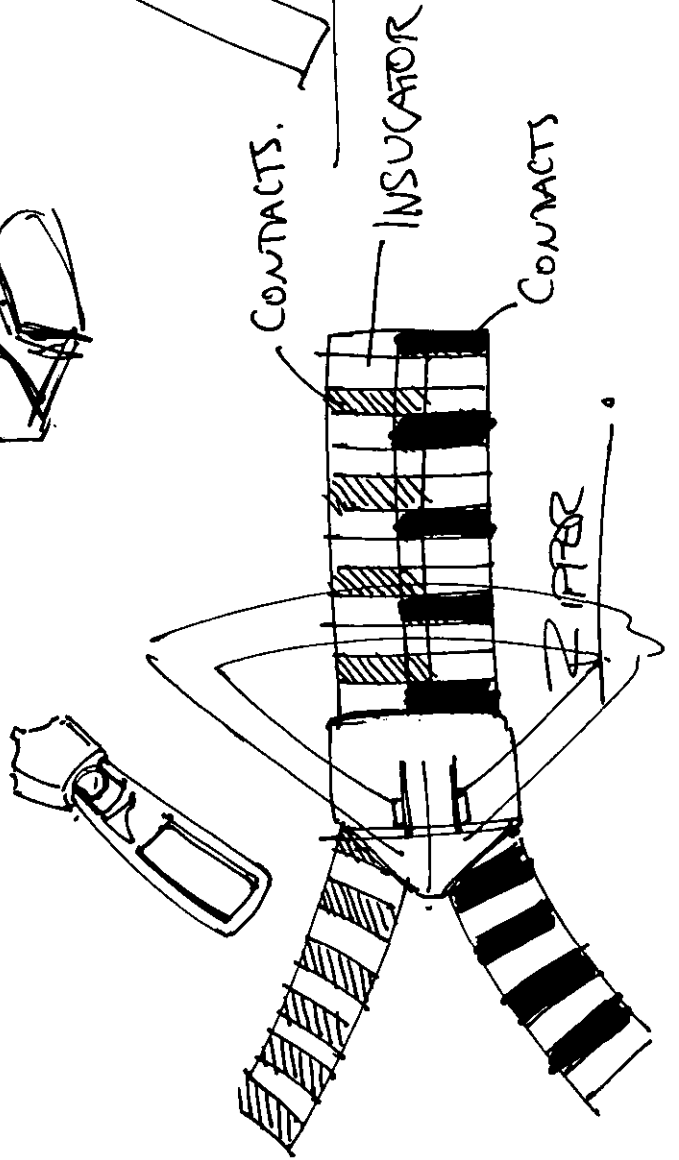
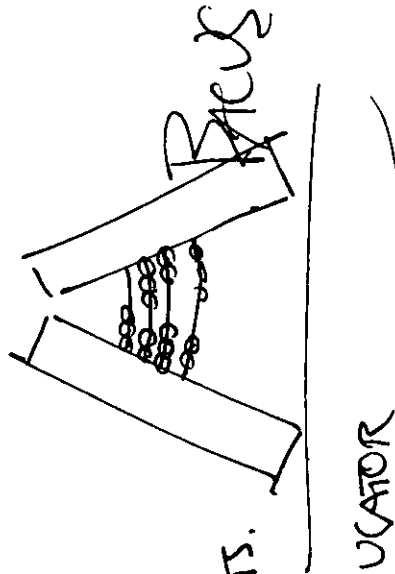
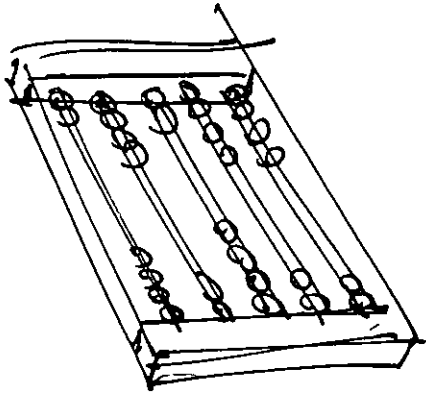
ZIPPER RACK
w/ POWER SUPPLY

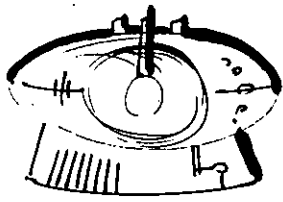


COMPONENTS ZIP ONTO
BUS.

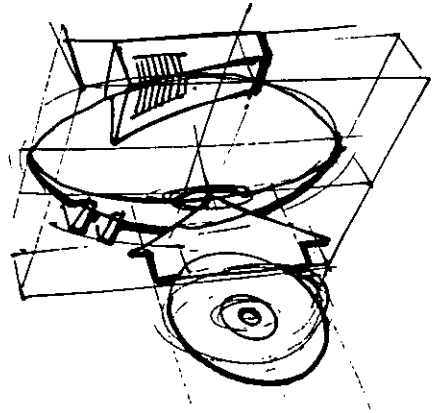
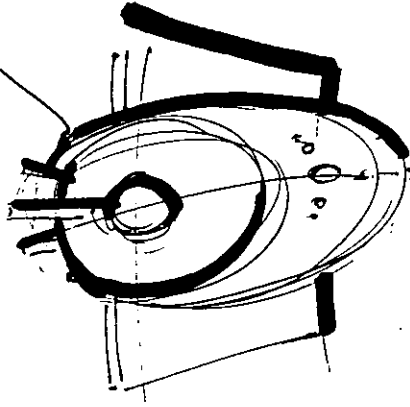


ZIP DRIVES TOGETHER TO
CREATE SLAVE DRIVES.



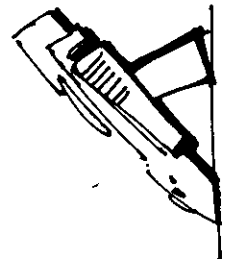
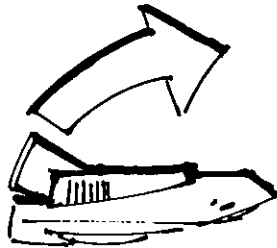
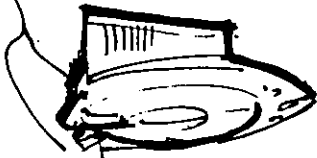


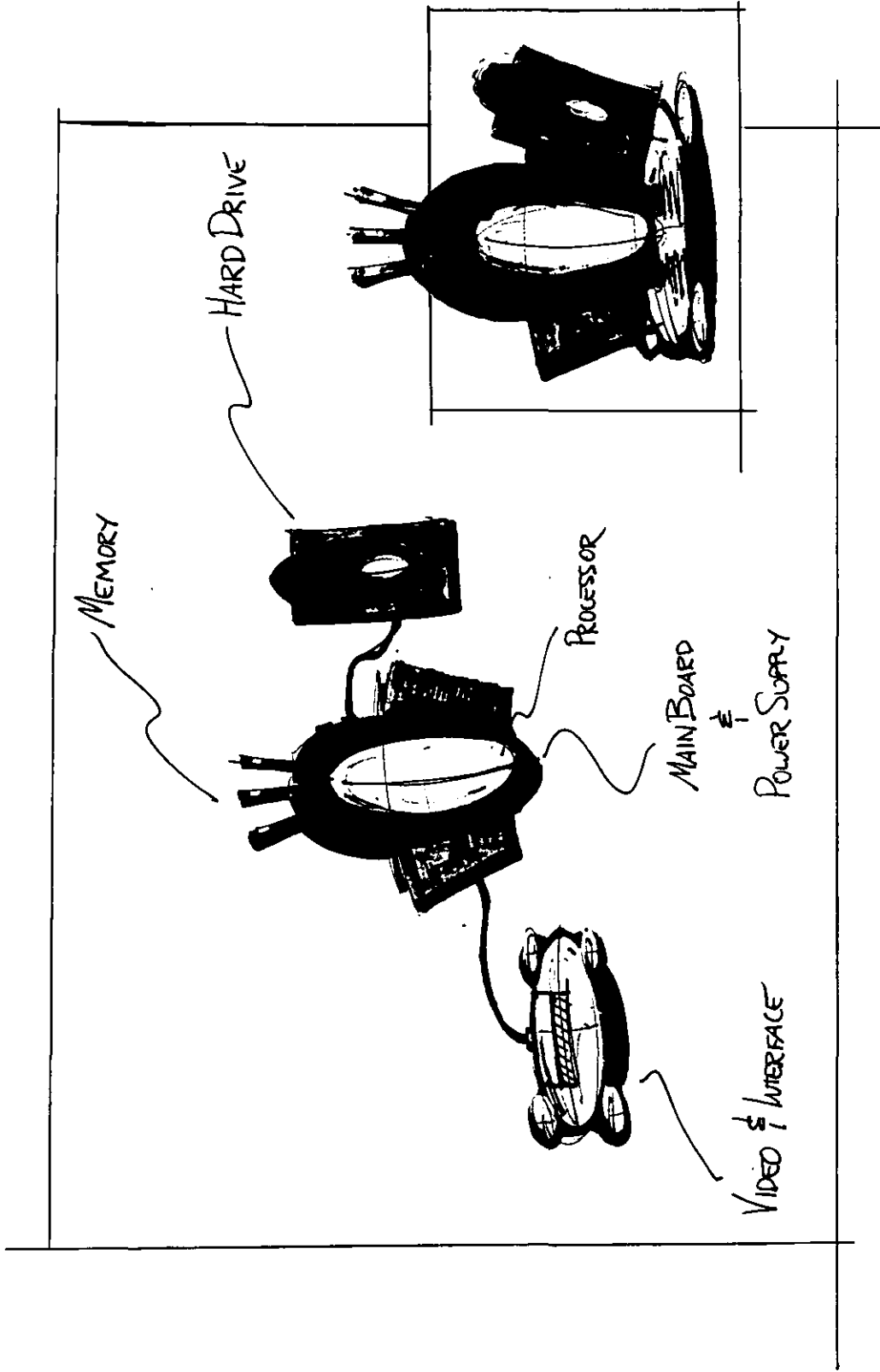
CPU.

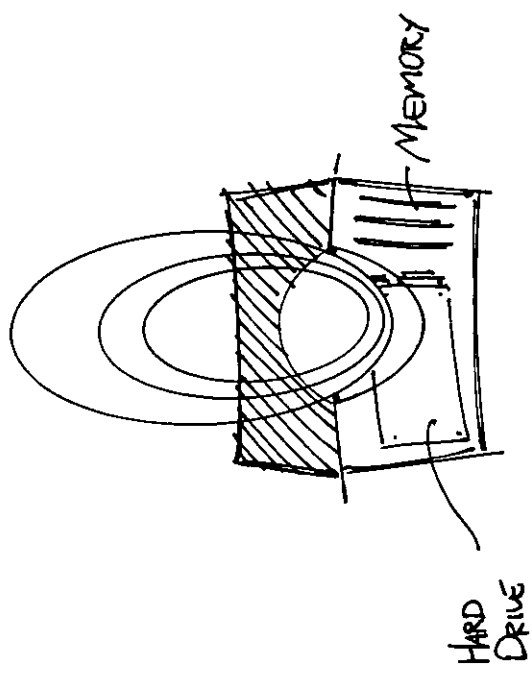
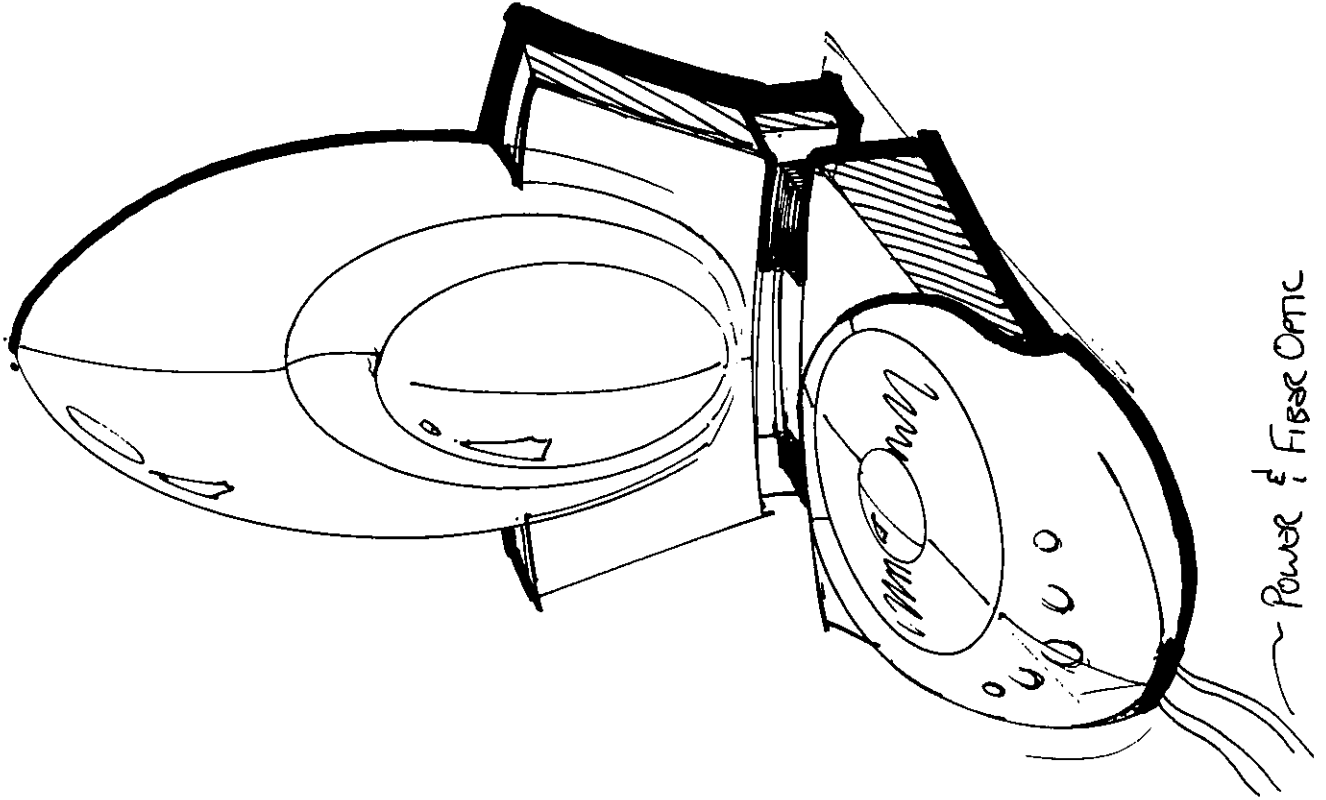
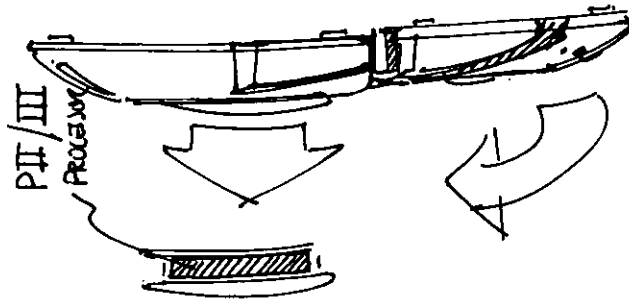


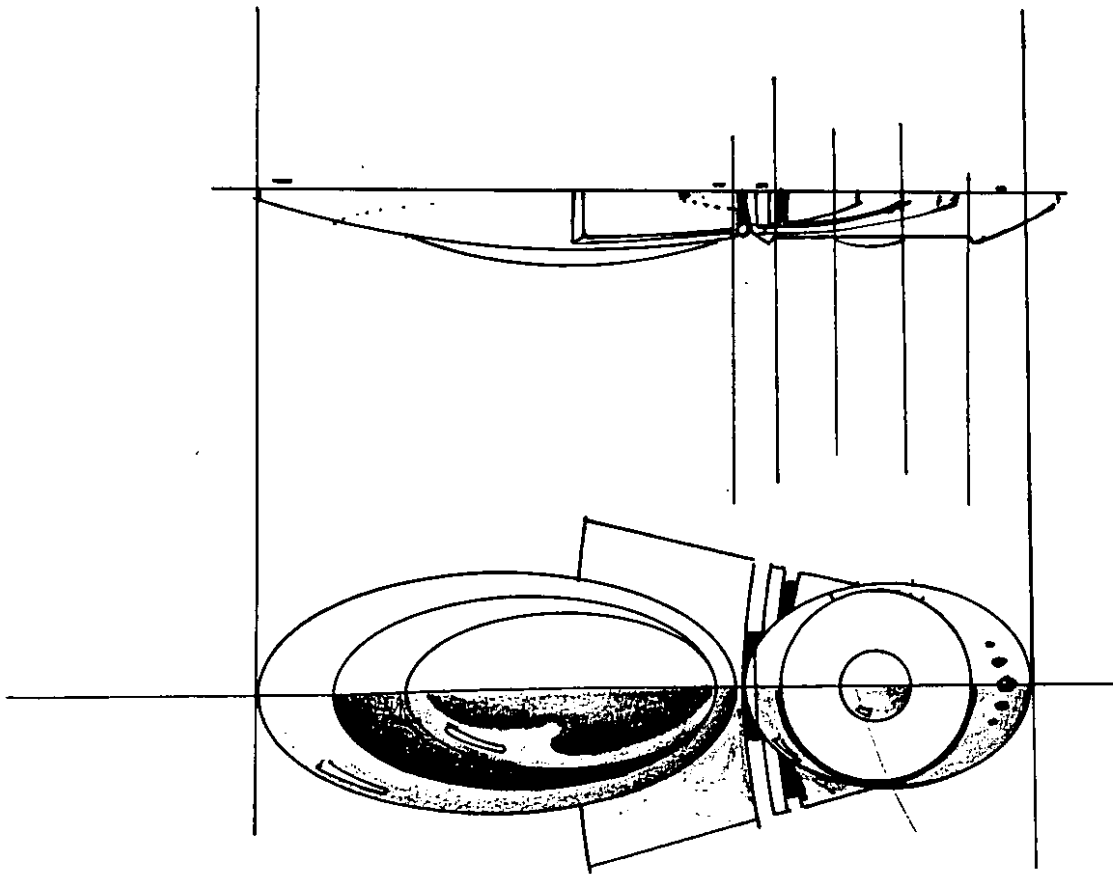
CD Rom

SWING-OUT
LEGS.











Final Images

The next two pages
show final images of
my appearance
model.

Built to scale, it gives
the relationship
between the
machine, the
desktop
environment, and
the most important
element, the end
user.

Final Images

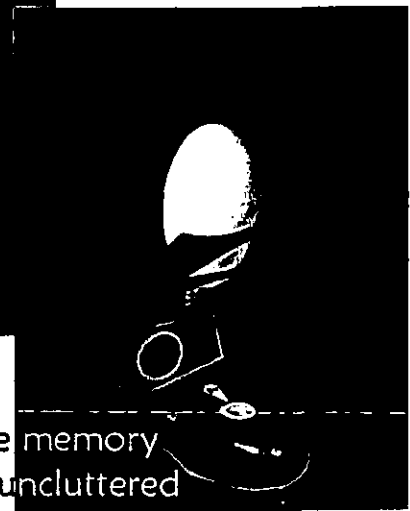
Processor Access



To access the hard drive & memory you simply lift the upper portion, and swing open the front panel.

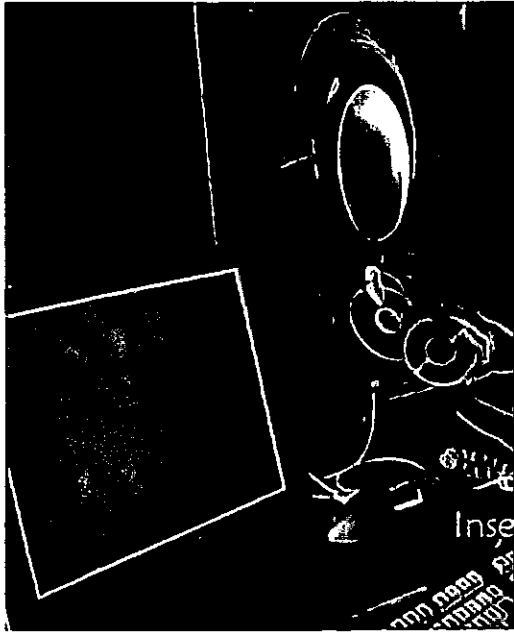


For desktop use, fold the DVD ROM 90 degrees to provide a stable footprint on a flat surface.



Access to the memory is easy, and uncluttered making upgrading a simple task.

Final Images



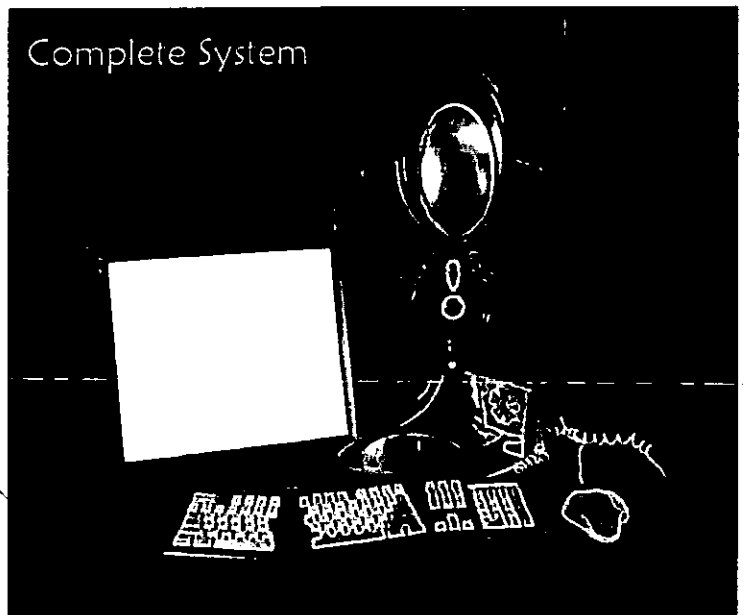
Inserting a CD



Front Quarter View



Profile View

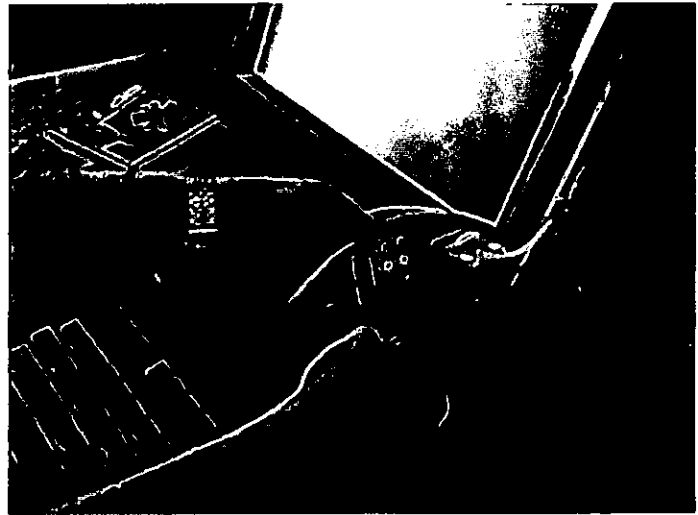


Complete System

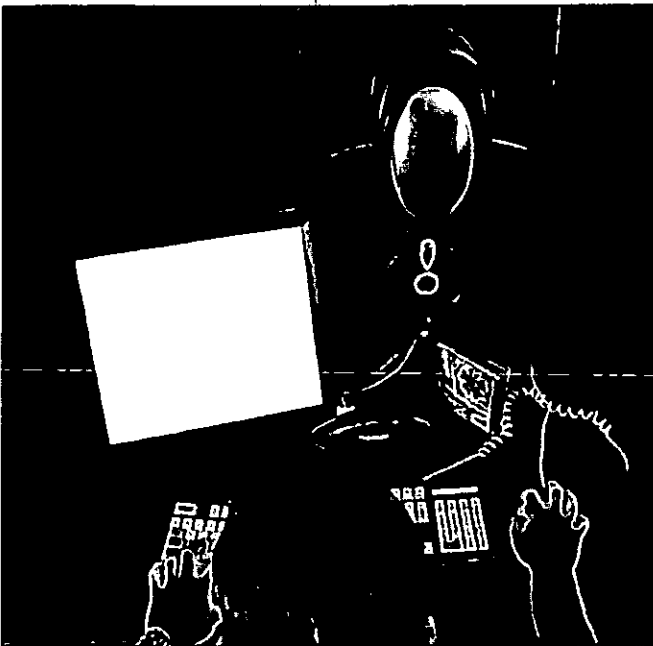
Final Images



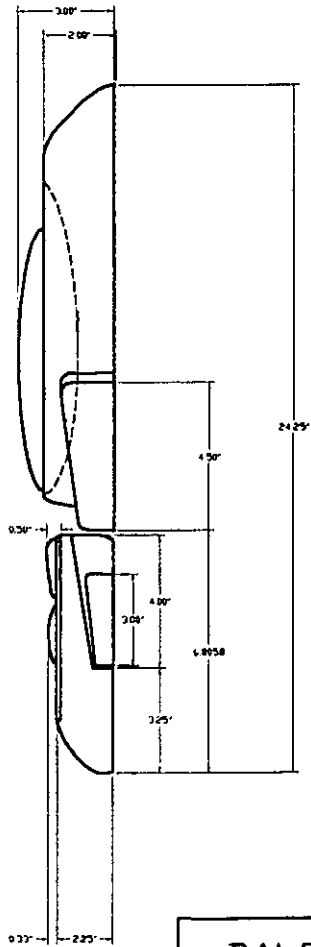
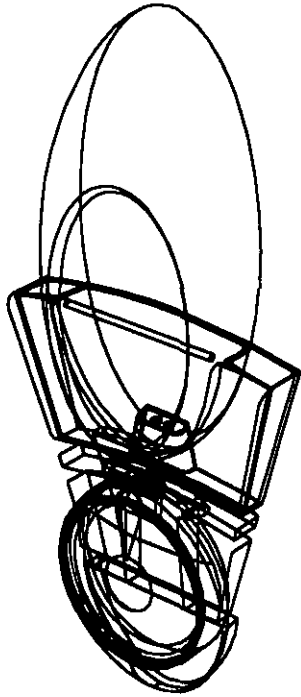
The System in Use



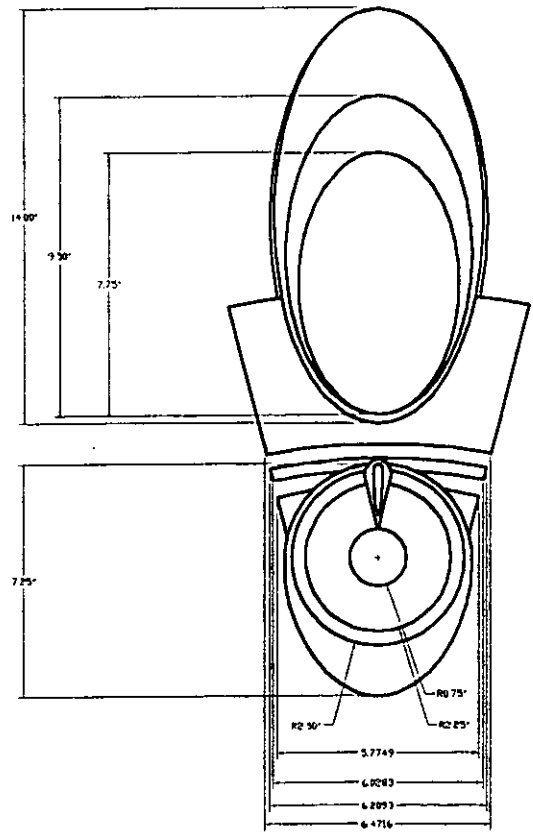
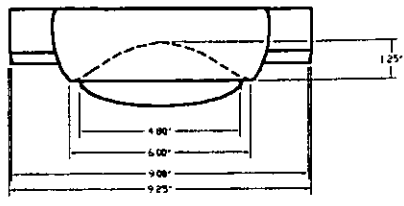
The Desktop Module



Overhead view



DALE K. WAGLER





Design Credo

As a designer it is my goal to create products that engage the consumer in an intuitive manner while adding to their enjoyment for whatever activities they are participating in. I will design with the utmost consideration for human interaction and comfort. I feel the only products that stand the test of time are those that people have found functional, comfortable and easy to use.

Environmental impact is also a concern that, as a designer, I feel the need to address. By incorporating biodegradable, or recyclable materials into design, it is possible to cut back the negative impact our mass consumption societies have made on the planet. Furthermore, I believe it is necessary for designers to constantly look into new materials and technologies in an effort to find better ways of performing the tasks of existing products.

Design, to me, is not just a matter of finding the best way of doing something, but making the product stand out amongst so many others. A truly good design will sell itself to today's educated consumers. People want products that not only work and interact with them well, but ones that say something about who they are.

Design should be about communication; whether it is to communicate the use of an item to its owner, or to communicate to others something about that person. Design is about helping make life more enjoyable. Good design does this at an affordable price.