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in Candidacy for the Degree of

MASTER OF FINE ARTS

Versatile Power Supply

By

Ian W. Cunningham

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Approvals

Chief Adviser: Doug Cleminshaw

Date: 1999 JUN 17

Associate Adviser: Craig McArt

Date: JUNE 15, 1999

Associate Adviser: Bob Kahute

Date: JUNE 15, 99

Chairperson: Charles Lewis

Date: JUNE 15, 99

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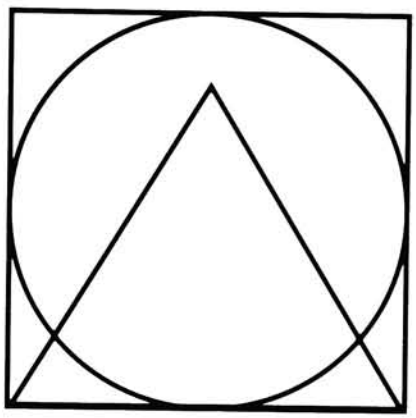


Tetherless

Table of Contents

Tetherless is a concept for the elimination of constraints from electrical power delivery systems. Three separate solutions are presented in a progression of increasing technology. Each stage is able to address and refine more than the previous one through foreseeable technological advancements.

The main objective of the concept is to provide the user with a more flexible, adaptable, and versatile interior environment. The solutions allow control by the individual, not the system, of how and where electricity is to be used.

The problems and constraints of existing systems can be broken down into three categories. First is the limitation of *logistics*. We are bound by fixed outlets or receptacles which offer little or no adjustability to suit the needs of a variety of users and applications. Second is *function*. The interfaces with current equipment tend to be awkward, cumbersome and pose safety concessions. Today's products also neglect to address communication as an essential component of a globally oriented society. Thirdly is the sensitivity to *aesthetic detail*. Present systems have been carelessly expanded with little regard to visual consequence. This has desensitized the public which accepts this clutter as necessary.

Tetherless poses questions to the established systems of products and interface hardware. Solutions are proposed based on current and foreseeable technology within the existing framework of power grid generation.

As a graduate student of industrial design faced with the overwhelming possibilities involved with choosing a thesis topic several factors directed my decision.

I wanted to evaluate and reinterpret a product or system that had been ignored or overlooked.

The topic needed to be something that everyone could identify with and appreciate.

The solutions needed to be realistic, based on fact not a purely conceptual theory.

The topic and points of address had to be something that I felt strongly about.

Many possibilities for thesis topics were explored. Some that were considered were: a physical fitness training tool, a modular storage/transport and display system, a portable golf practice station, a gas stove top, and a lightning shelter. Each of these however lacked something from the aforementioned essential characteristics. Although each was worthy on its own they simply did not fulfill my vision of a *thesis project*.

Finally the decision was made based upon the one aspect of my daily life that presented me with the most limitations and constraints. That being the established interfaces of product, user, and power supply.

The initial concept for *Tetherless* sprang forth from a woodworking project that I was considering. The idea involved alternative joinery techniques for a knock down shelving system. In considering the potential uses for the shelves I began addressing the problem of wire management. The concept quickly snowballed from simply imbedding outlets in a discrete manner to wishing for a shelf surface that would actually supply power itself. The notion was to utilize points of contact that already exist (i.e. through the feet of a stereo or the base of a lamp) for the connections of power and communications.

The possibility of not being bound by an outlet was intriguing. Ultimately this solo brainstorming session brought me to the point of wanting a wireless transmission of power, and all of the opportunities for product innovations associated with it.

Convinced that I had found my topic, the next step was to prepare the project plan and schedule (see Appendix) and submit the concept for approval to my committee. At this time I designed and implemented a format for standard letterhead, envelopes, presentation boards, sketch documentation, scheduling and meeting notes.

The research phase began with visits to local retailers and suppliers of electrical distribution and control products, systems and services. Information and catalogs were gathered on a variety of topics:

- wire management systems
- electrical components and fittings
- industrial, commercial, and residential devices
- photo electric switches
- centralized electrical control systems
- central lighting control
- track and recessed lighting
- occupancy sensors

These resources along with interviews with sales people and technicians gave a good sense of the existing market. Most efforts were in the direction of cosmetic cover-ups and wire management systems. The only real efforts involved with improving the user/product interface were track lighting and portable outlet centers.
(Empire 1994)(Maynards 1994)(NU Horizons 1994)
(Rero 1994)

Not content with the level of available products, I wrote and/or called directly the manufacturers. I questioned the engineering and research and development departments on what they felt was the future of electrical supply and use. Response for the most part was the same: our existing conductor based system is the foreseeable future. Research on topics like wireless or large scale microwave transmission of electricity is simply not

promising enough to cause a major rethinking of how we distribute and use the power form.
(Echelon 1994) (Hubbel 1994) (Leviton 1994)
(Lightolier 1994) (Lutron 1994) (Moore 1994)
(Peruse 1994) (Struthers-Dunn 1994) (Thomas 1994)

I also spoke to power generation facilities like Rochester Gas & Electric(RG&E) and New York State Electric & Gas. Their impressions were much the same as the manufacturers. However, at RG&E they did allow me to explore their resource library. Here I found information on other sources such as The Department of Energy, Empire State Electric Energy Research Corporation (ESEERCO), NASA, and Electric Power Research Institute (EPRI). These are the agencies that do some of the most forward thinking and research on power generation and delivery. I was some what disappointed to find that these organizations also reiterated the message that I had grown accustomed to hearing. They were all very optimistic about alternative sources but their views on the delivery system remained the same. There was talk of research towards electric vehicles, HVAC, lighting, hydro & wind generation, demand-side planning, and other efficiency related projects.
(Costello 1994)
(Electric Power Research Institute 1991)
(Empire State Electric 1994)
(US Department of Energy 1993)

When pushed to speculate on on the potential for new delivery systems the notion of microwave transmission did arise. The overwhelming consensus was that this

technology was only suitable for satellite systems where the dangerous microwave emissions pose no threat to any living creature.

These findings established the format from which I would begin to refine the concept. With this elimination of potential for a wireless system I would concentrate on solutions that were based on the conductor-based power grid.

At this point I began to digest the mass of information I had accumulated, and began to make decisions about what were essential points to address. My first inclinations were towards a centralized control of our interior environments. As a consumer I felt I should address every aspect of my life that electricity touched (this soon proved too ambitious). I began to focus on the initial point of interface between user and power (the outlet). This seemed a logical starting point After consideration, it seemed to present limitless potential for the product designer when presented with a new format from which to draw electricity. Hence the decision was made that the thesis topic in its most simplified form would be a reinterpretation of the familiar wall outlet.

In considering these possibilities it became clear that I was interested in addressing more than just one usage scenario or level of technology. The concept evolved through lists of desired features and functions with a categorization of elements and attributes into three separate solutions of low, medium, and high technology: Initial, Next Step, and Quantum Leap.

Initial: This step would be equipment or tool like, based on the adjustability of track lighting but directed towards the inflexibility of the wall outlet.

Next Step: The system maintains the same principals of adjustable outlets. It becomes less like hardware and more a semi-permanently installed system that would supply both power and and communications lines through a network.

Quantum Leap: Here the system would become an integral part of any structure where power and communications are supplied through virtually any interior surface, (i.e. walls, floors ceilings).

Confident that the first two concepts were technologically feasible, I was unsure of the third. I sought the help from the RIT Electrical Engineering Department for technical advice. I interviewed professor Bob Spina, who proved very helpful. I first posed the question of what he saw as the next big step in the fields of power generation and delivery, more specifically suggesting the possibility of a wireless transmission. He agreed with my previous consultants and was very dubious of this potential. He too felt that the most aggressive research and development was being conducted in effort to increase performance and efficiency. (Spina 1994)

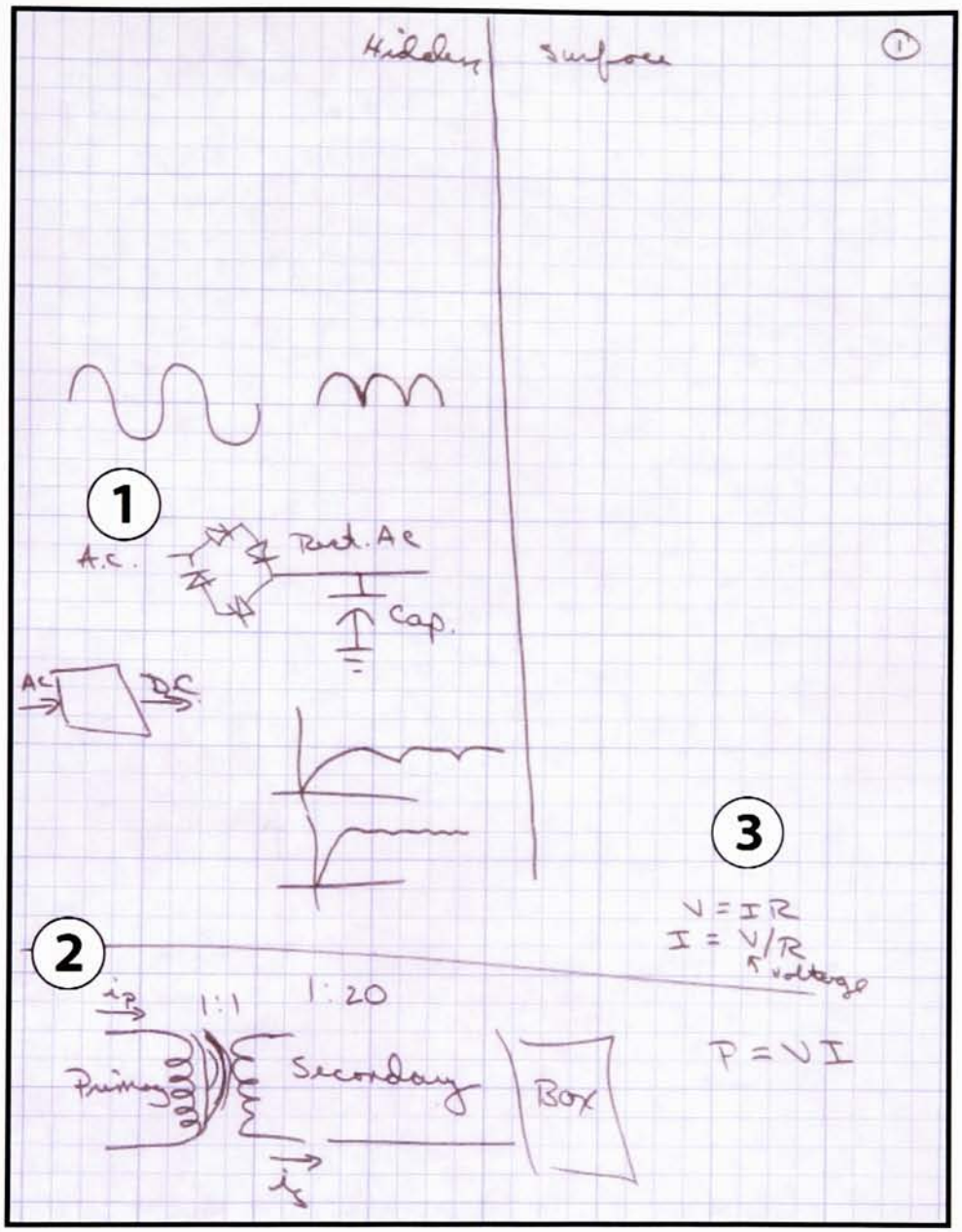
On my next visit with professor Spina I explained my concepts. I described a scenario of placing a lamp (or any electrically powered appliance) on a flat surface and by simply making contact with the surface the lamp could be secured and supplied with the necessary voltage. He said that essentially what I was describing was establishing a transformer in a 1:1 ratio where an electromagnetic field is created between the surface (supplier) and product (user). This would generate an electromagnetic bond sufficient enough to "attach" the product and supply it with standard 110v.

In subsequent visits we would talk more of the specific hardware requirements and current limitations, as well as the addition of communications capabilities (Notes from these meetings appear in the next chapter). These details were not the most important factor but rather that we had developed a theoretical model that was explainable by existing standards. There were of course the obvious considerations for skeptics like cost, efficiency, and safety. However these were not an issue to me. The first two concepts would address these real world constraints and could satisfy them. This third concept was reserved for a more forward thinking ideal where the potential of the system would open up whole new worlds for the designer and engineer to explore.

It is important to note where these solutions came from. They are the result of my contemplations and perceptions based upon my experiences as an observer and participant of daily routines, duties and efforts. Their scope is too broad to be attributed to any one lesson or observation. They are the thoughts and intuition of my life's experiences.

Through a series of meetings with Professor Robert Spina of RIT's Electrical Engineering Department we were able to develop a theoretical model for the basis of *Tetherless*. The following chapter illustrates Professor Spina's actual notes taken during these meetings.

Along with patience and enthusiasm for the project Professor Spina also exhibited a willingness to give mini crash courses in the field of electrical engineering and supplied me with an introductory textbook. This enabled me to have a basic yet thorough understanding of the scenarios we were generating.
(Boylestad 1987)



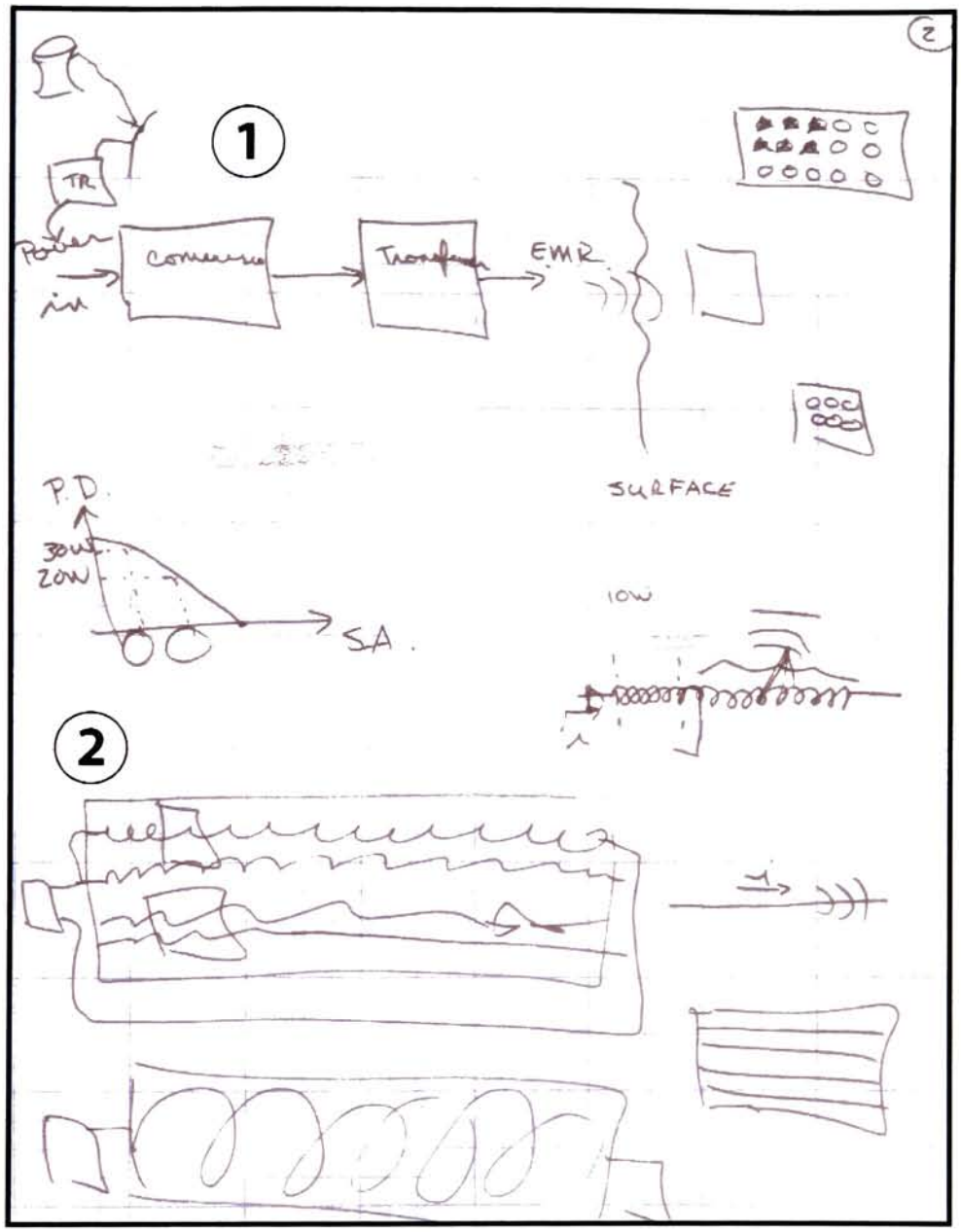
Sheet 1: Professor Spina's Notes

1) Standard AC/DC conversion with bridge rectifier and capacitor defined.

2) Diagram of a transformer illustrating the concept of a power plane (primary) and consumer product (secondary). This system would require ferrule* windings in a specific ratio to each other that is sufficient to provide the power and electro magnetic connection. The consumer products could have adjustable bases as to allow proper orientation to the plane for efficient circuitry

3)Illustration of the physical relationships between power (P), current (I), resistance (R), and voltage (V).

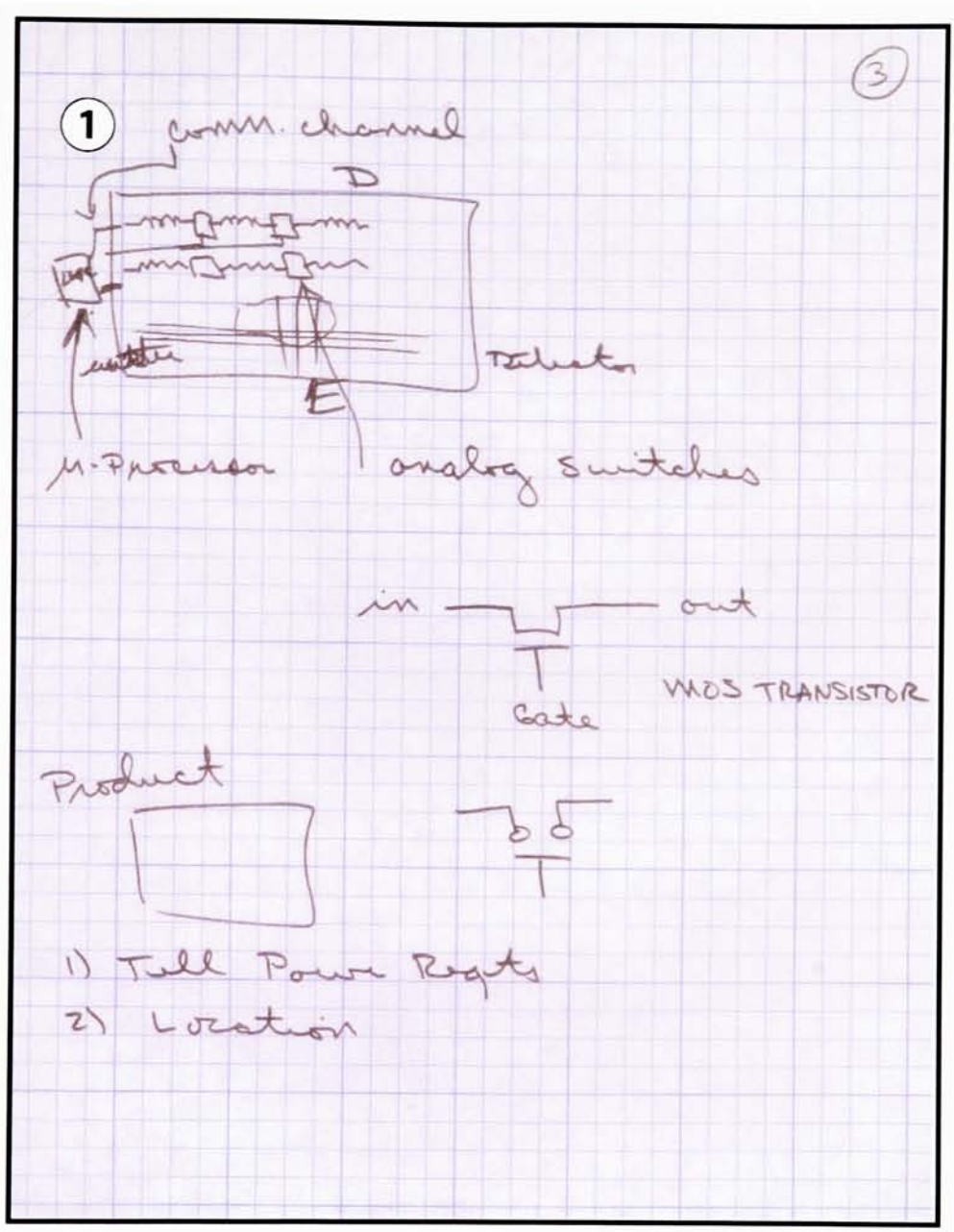
* A "ferrule" winding refers to the manner in which a conductive material of foil or wire is wound in an electric motor or transformer. The word originally refered to the small metal ring on the end of a tool handle that kept the wood from splitting (as with a broom).



Sheet 2: Professor Spina's Notes

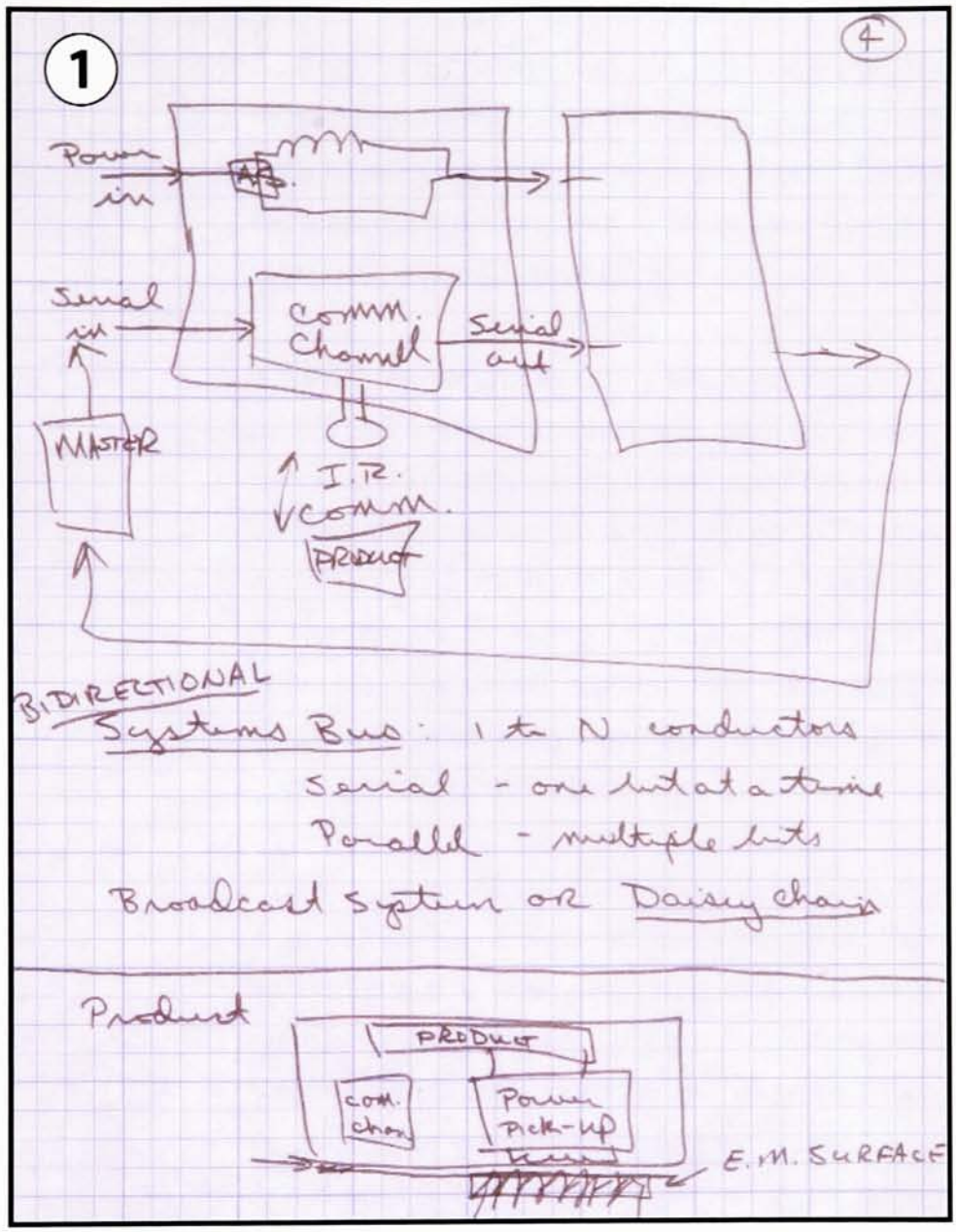
1) A map of the power trail from supplier to our model.

2) A diagram of the initial model that did not address pinpoint delivery of power to a specific product, but rather relied on constant power supply through the entire plane.



Sheet 3: Professor Spina's Notes

1) Development of the concept for a smart power plane with an outer surface communications layer and a sub surface power layer. This scenario utilizes analog switches (MOS Transistor) to direct power to the specific product that has requested current. A simple processor or programmable chip would allow customization and control of all products in use throughout the system.



Sheet 4: Professor Spina's Notes

1) A flow chart of the hardware needs of the model incorporating communications channels.

Once I was comfortable with the concepts it was time to develop a personality for each. I would first begin with identifying specific applications and functions for each product. Second would come the physical appearance and form of each.

This process began again by simply compiling lists of individual traits, characteristics, attributes, uses and functions. With the essentials mapped out and verified all that remained was to develop forms. The shapes both expressed and fulfilled the needs of functionality as well as suggested a family or series. Since the products and concepts were developed simultaneously, with only degrees of technology separating them, I felt their appearances should relate.

The simple geometric lines serve to increase the comprehension of each product's function. This generic appearance also serves as a starting point. Their outward simplicity suggests that they are merely the seeds from which new products could grow. They are more suggestive of what could spring forth from the concepts and should not be necessarily taken as literal expressions of the end product. They serve as visual aids and place holders to inspire the viewers imagination.

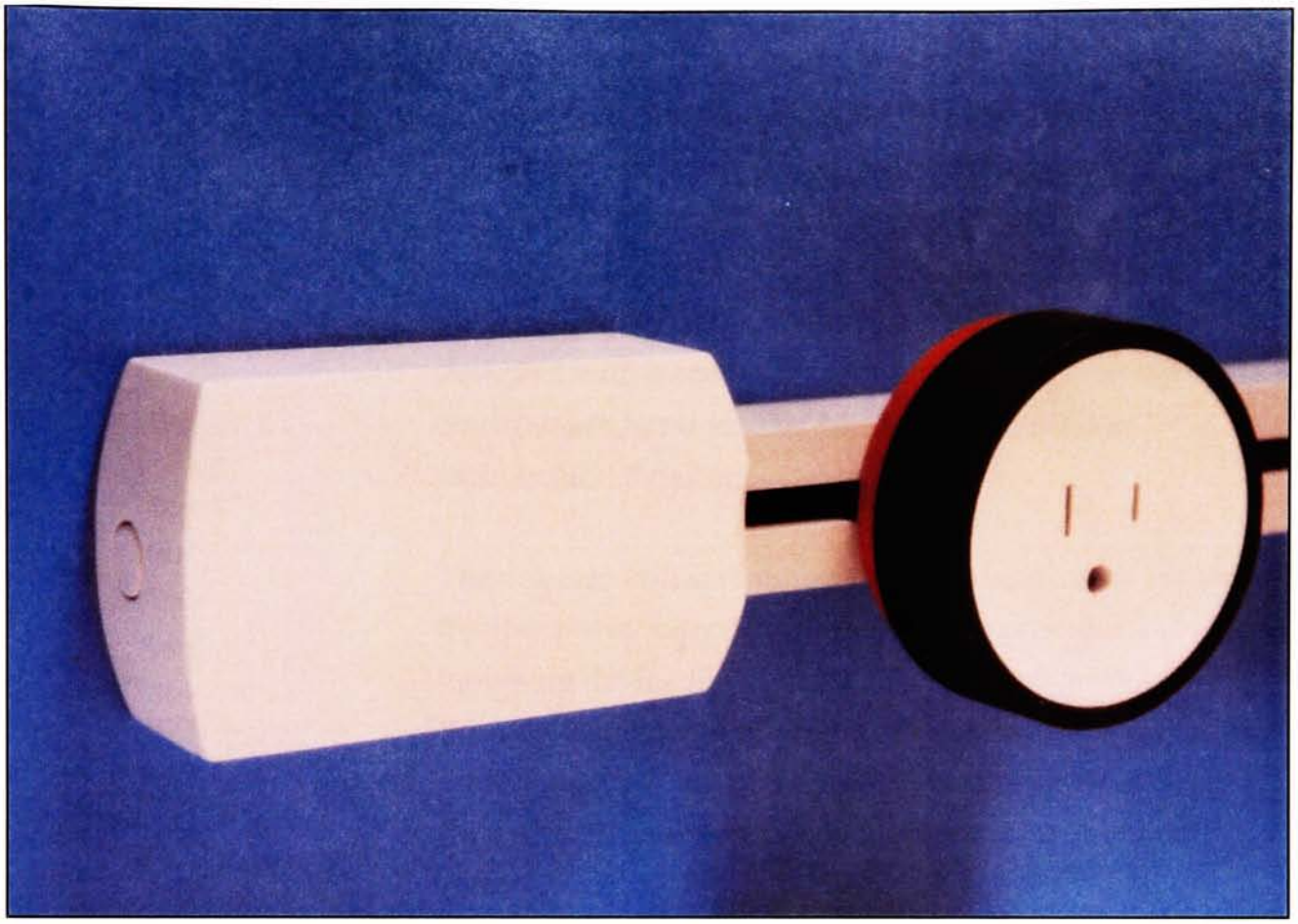
The repositionable node or outlet is designed to be compatible with existing straight blade electric plugs. Its aim is to allow the user to position an outlet where desired.

The track is based on lighting systems and would be available in expandable segments that would allow any length coverage and configuration. Developed with existing structures in mind the repositionable node would allow for a quick and easy retro fit for any environment.

What sets this product apart from existing track systems, besides the obvious addition of outlets, is an element of safety. Instead of the entire inner track being *alive* with current in which any object inserted may draw power (whether intended or not). The electricity is only delivered to the pinpoint location that the "authorized" node is inserted into. This is accomplished via a smart system of analog switches that direct current from a sub-layer of the track through an outer communications channel to the desired node. This method creates a tamper-safe track appropriate for use at any accessible level.

The foremost advantage of the repositionable node is the adaptability provided to different users. The ability to place the tracks at any level or angle on any two dimensional surface makes for universal access. This aspect also allows for outlets to be positioned in and around fixed or variable objects creating a three dimensional power grid. Walls, furniture and fixtures are no longer hindrances to power accessibility.

The portable nature of the product allows the customization of non-permanent installations such as a rental property. This versatility gives users the freedom to reconfigure their living or work environment to suit their changing needs or desires. This type of flexibility offers options for change to static environments. Shared work stations such as kitchens, baths, offices or production lines with multiple users and frequent turnover in appliance, tool or lighting requirements could benefit greatly from such a system. In addition, fluctuations and changes in work type or load can be expanded or contracted to in order to meet demands.



The repositionable node with it's end cap and single track.

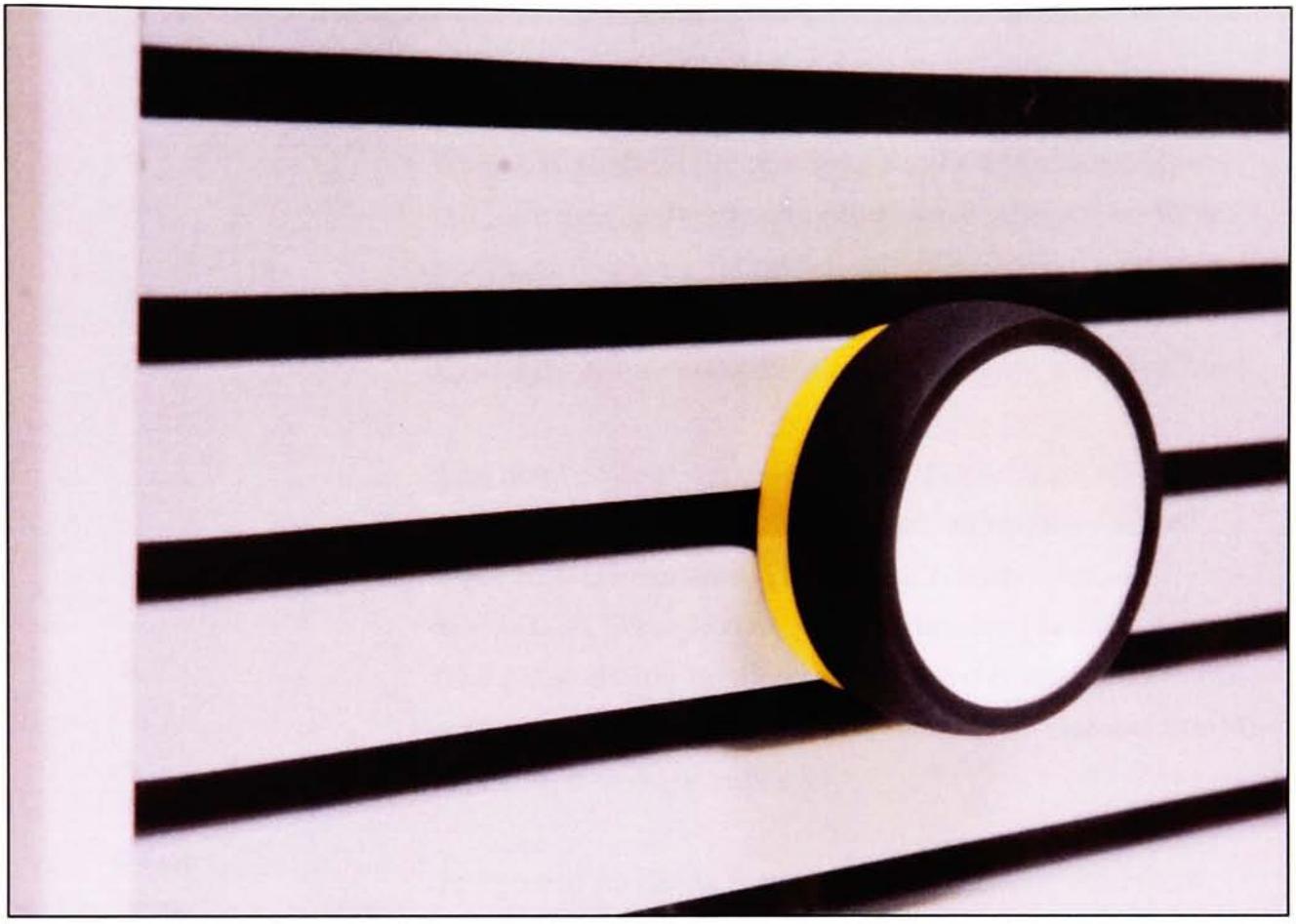
The progression to the peripheral band maintains the functional benefits of the repositionable node, but enhances the function of the system by incorporating communications technologies and redefining the plug/receptacle relationship. The peripheral band is designed with more permanent installations and new construction in mind. The band could be used in architectural detailing.

The concept utilizes multiple tracks which allow for the flexible positioning of outlets, but also provides a mounting device for a family of integrated products. With the attachment of product to the band not only is power supplied, but pathways are established for the free flow of information between all products within the system.

The establishment of a power line communications network allows products to be interconnected simply by being plugged into the band. This aspect has great implications on both home and work applications. Personal computers, phones, faxes, audio and video equipment would all be able to speak to one another without additional hardwiring. It creates in effect, a smart home or office.

These products would be introduced to a new vertical format redefining the manner in which they would be required to appear or perform. Low profile, high visibility wall mounts and space saving configurations would present opportunity for intriguing new interpretations of product for the designer to explore.

The bands are intended for permanent installations They would be available in a multitude of styles, configurations, and colors. They could be incorporated into architectural detailing like baseboards, wainscots, chair rails or mouldings with the opportunity to be expressed or concealed as desired.



The Peripheral Band with its multiple tracks and ball & socket plug/receptacle.

The ultimate progression to the power plane maintains the same goals as the previous stages while simplifying the interface and increasing options. Users are no longer confined to a specific outlet, rather he or she is presented with entire two dimensional surfaces that have the ability to supply power and communication lines with precision.

The power plane makes the jump from an accent product or architectural detail to the actual substrate of a wall, floor or work surface. The format changes from a predefined linear layout to an expansive planar surface. The plane would be made up of a two layer tile network with an outer broadband communications channel and an inner high-voltage sublayer.

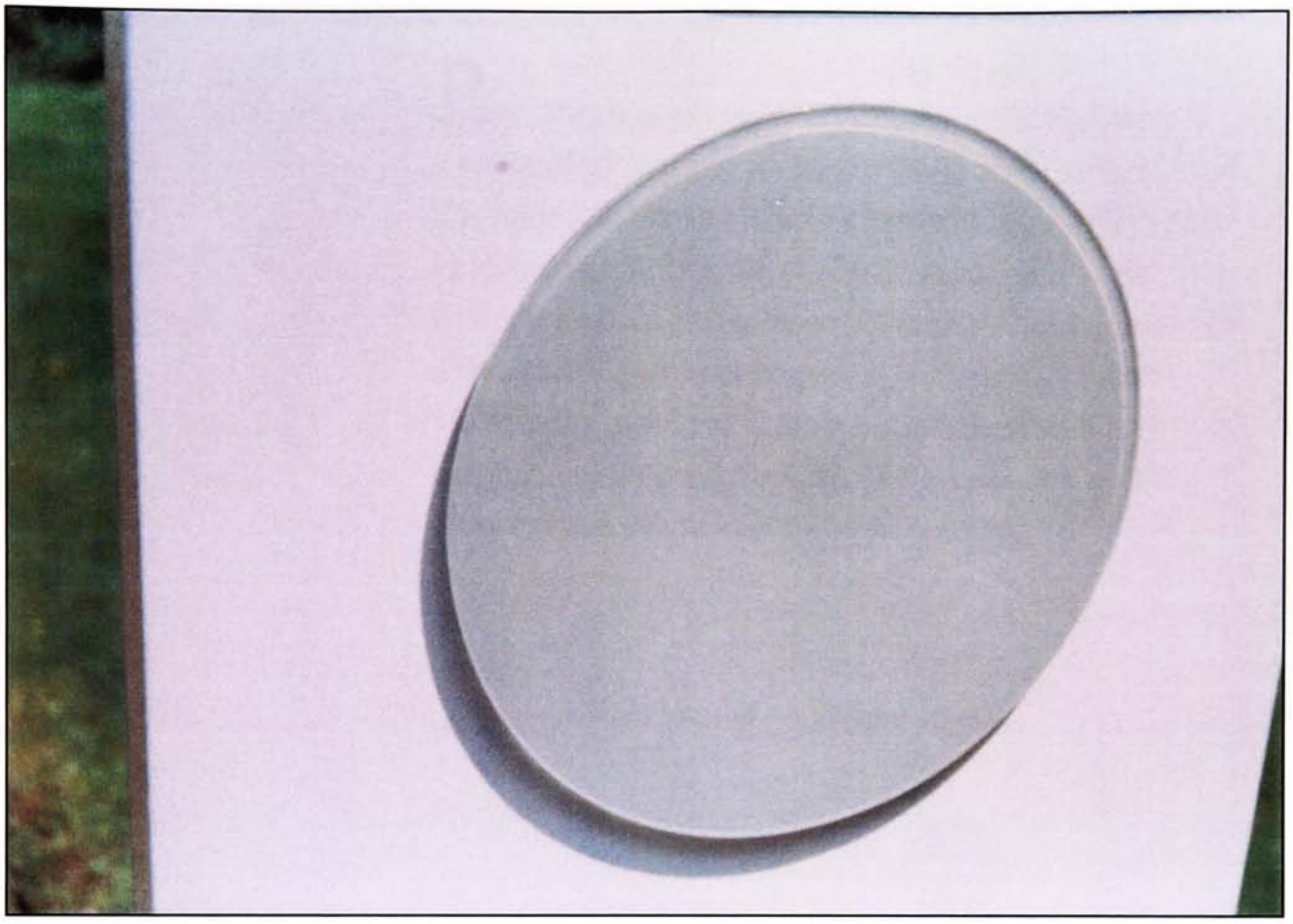
Integrated products would actually affix (much like a suction cup) to a horizontal or vertical surface by means of vacuum chambers that would require no power to maintain. This system was chosen over the electromagnetic bond based on the reliability of today's power grid. Insulated electric current would be delivered solely to the attached product via microwave connections.

This format is as close to a *tetherless* (unconstrained) solution as present technology can explain. It provides the illusion of a wireless transmission of electricity within existing conductor dependent systems.

The power plane offers a seamless integration of product and power supply. Workstations or living areas where space and efficiency are highly valued commodities would benefit greatly.

In kitchens, products could be stored *and* used where needed simply by being set down on a counter top or placed on a wall. Entertainment equipment could be freed from a horizontal format no longer tied to cabinets, patch cords, or gravity. Lighting fixtures would be extremely adaptive in this format. Any product could be easily rearranged or transported to alternate locations providing the user with multiple usage scenarios. It would be as easy as moving magnets on a refrigerator.

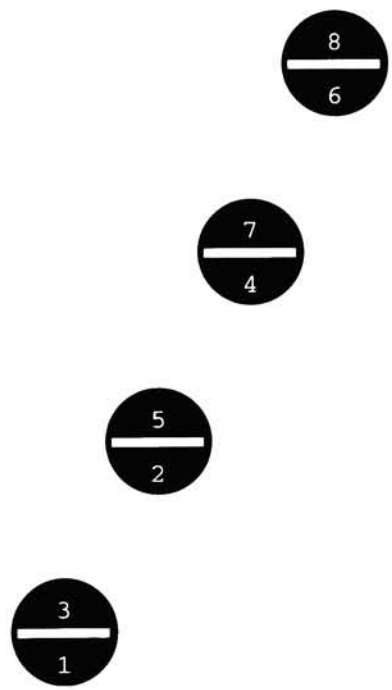
The possibilities for new interpretations of product within this system is most intriguing. Anything that comes in contact with a flat surface has the potential to become an electrically supplied product. Environments and entire buildings could be created with all wall, floor, and ceiling surfaces capable of supplying power and mounting product without hardware. Furniture could become freestanding workstations with fully on-line power and communications capabilities. All electrical activity could be monitored and controlled via a single processing station.

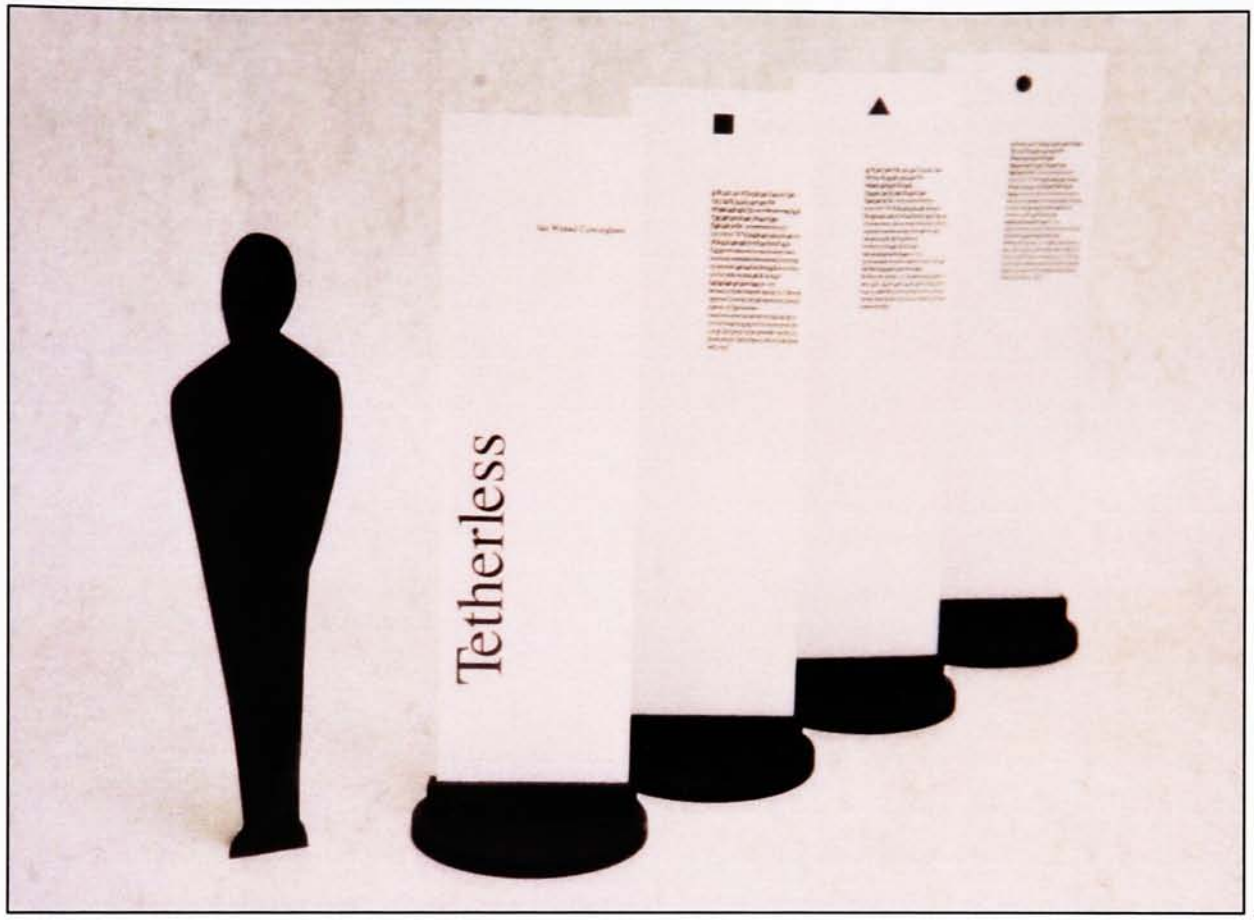


The limitless surface of
the Power Plane.

Presenting a conceptual project amongst fine art in a small gallery is difficult. In the spirit of the project I did not want to be constrained by the existing gallery space. I elected to build my display that would in a sense develop its own environment. To this effect I decided on a freestanding system consisting of four monoliths. These units provided wall space for display of both graphic and model materials. The layout creates three mini-environments, one for each solution.

Plan View of the Display Panels

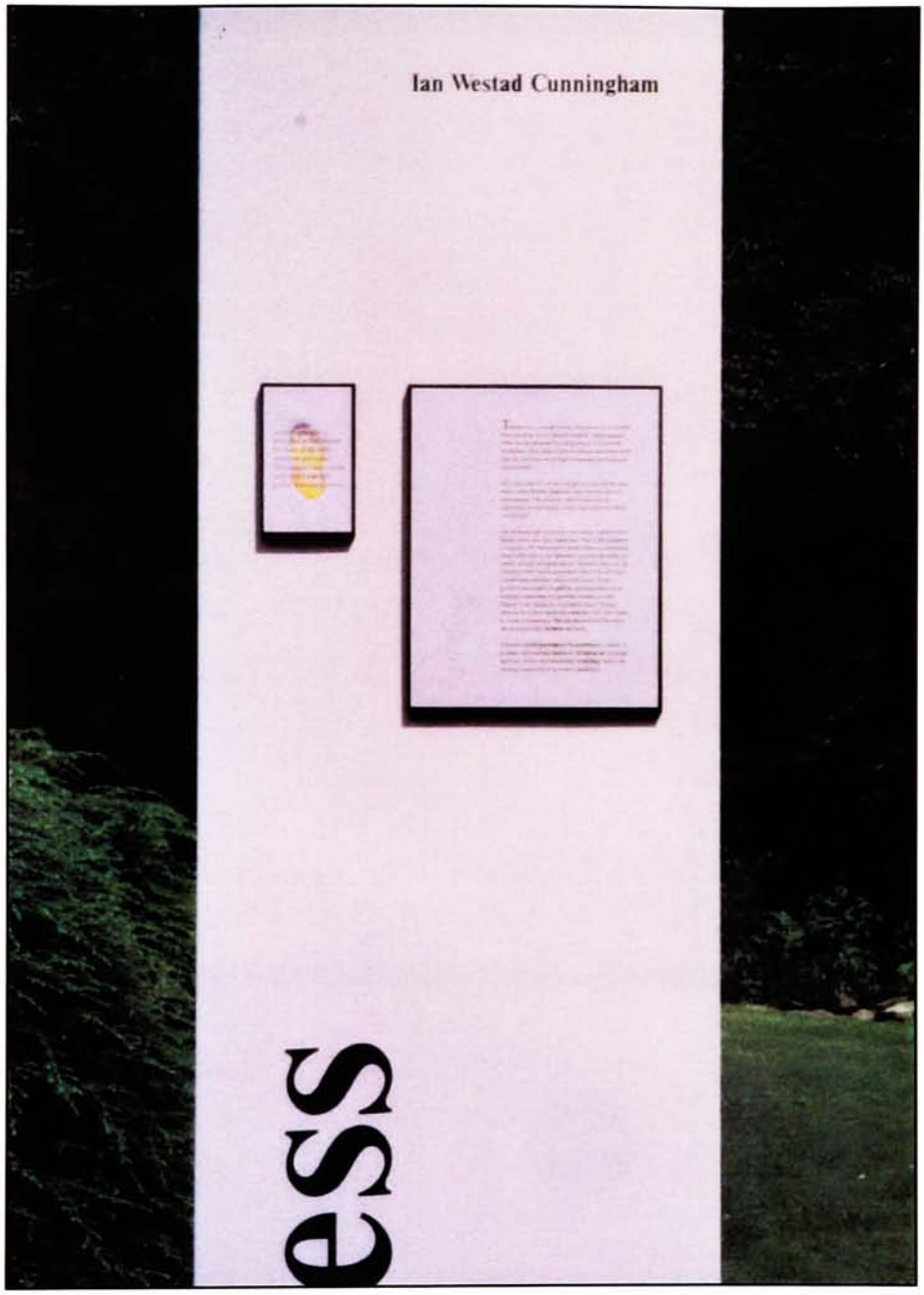




A one-eighth scale mock up was created to develop the format and proportions. (laser print, illustration board, wood)

The front sides of the display. The format alludes to stacked pages of a document as well as providing for an interactive "visit".

The back sides of the display. The units are hollow core doors attached to medium density fiberboard bases via wooden baseboards. The bases provide a heavy anchor for support and were painted black. The doors provide a light but stable substrate from which to attach models and informational text. The fronts of the doors were painted white to symbolize refined thought, while the backs were left raw to represent development and potential. The edges were left unfinished to suggest that the panels were cut away sections of interior walls. A black and white theme was used throughout the project to convey my formal perception of a *thesis*.



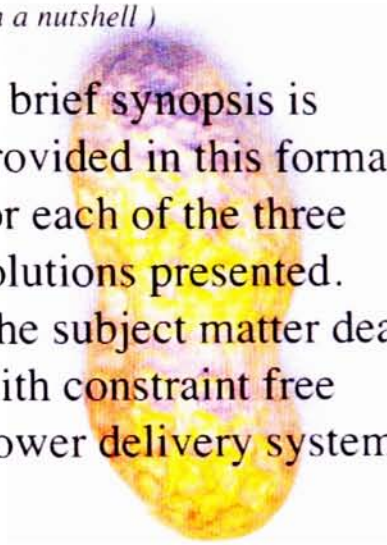
Side One • Introduction

A) A brief synopsis of the project for the casual gallery viewer. These small tags appear on the front side of each panel.The image is that of a peanut, signifying " in a nutshell". (Output from a Canon laser copier, created in Adobe Photoshop and QuarkXpress and mounted on black foamcore.)

B) The introductory preface outlines and overviews the topic and points of address for *Tetherless*. (Output from 300dpi laser writer and mounted on black foamcore.)

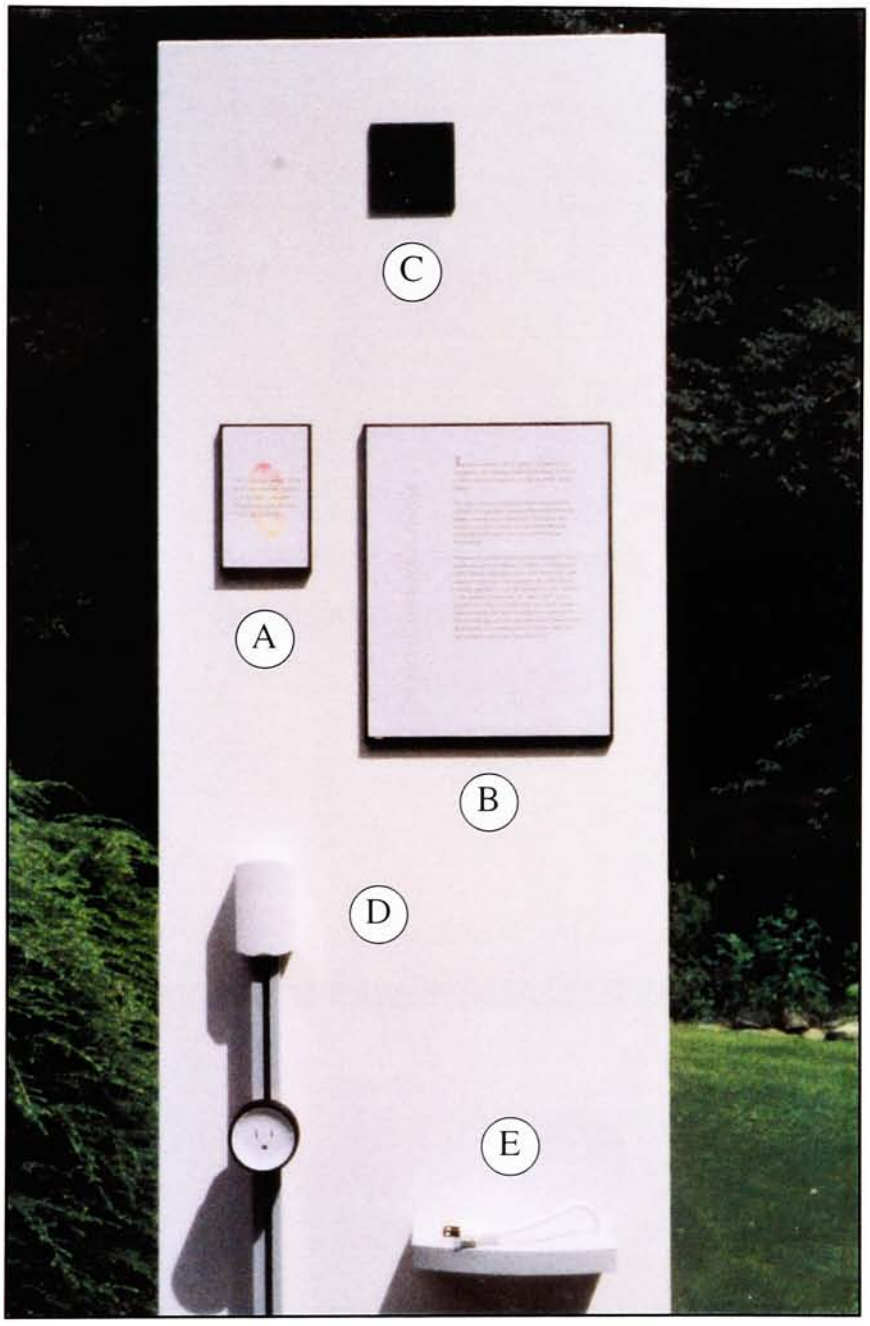
C) Vinyl letters (Custom set and cut at Bob's, Rochester, NY)

(in a nutshell)



A brief synopsis is provided in this format for each of the three solutions presented. The subject matter deals with constraint free power delivery systems.

1



Side Two • The Repositionable Node

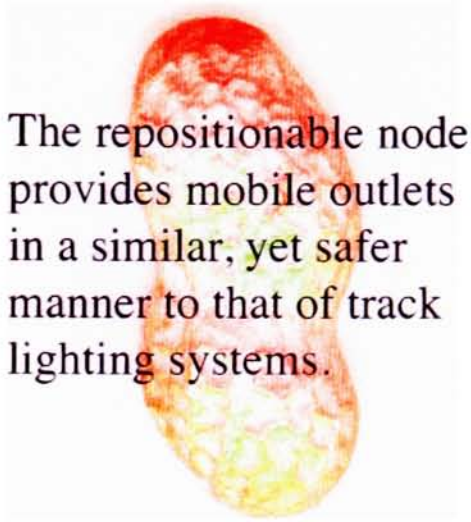
A) Panel synopsis

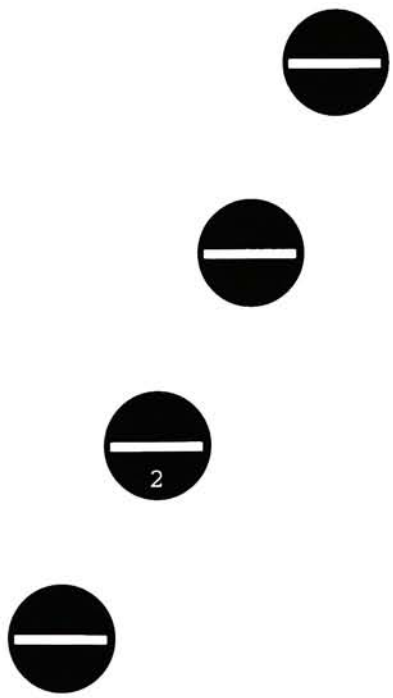
B) Repositionable Node (RN) Background Statement

C) The RN Symbol, pure geometric shapes were chosen to symbolize each product for the clean, rational, no-nonsense forms. (Styrene painted black)

D) The RN Model

E) A standard straight blade plug is displayed on a low profile shelf to establish a format and illustrate the familiarity of the RN's uses.


The repositionable node provides mobile outlets in a similar, yet safer manner to that of track lighting systems.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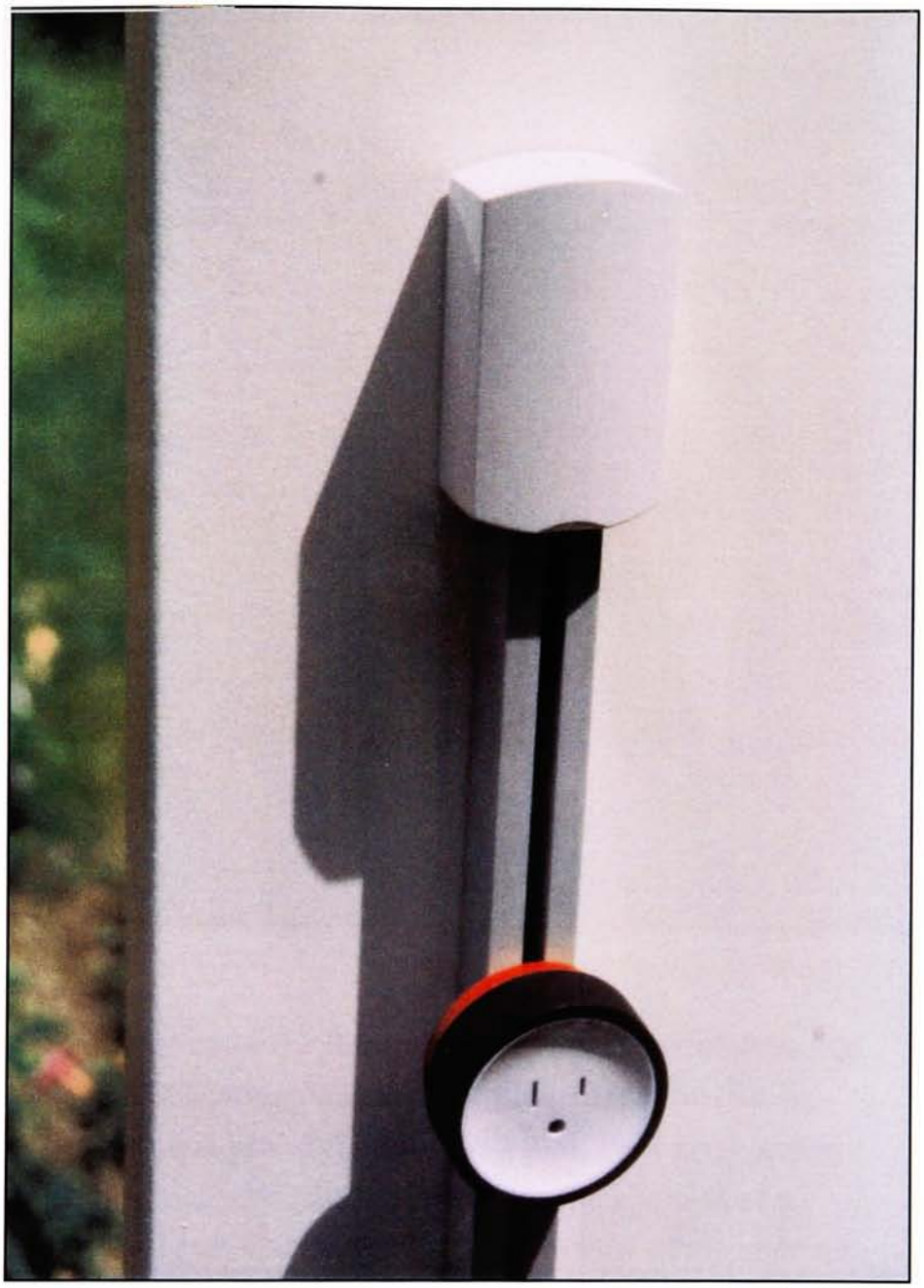
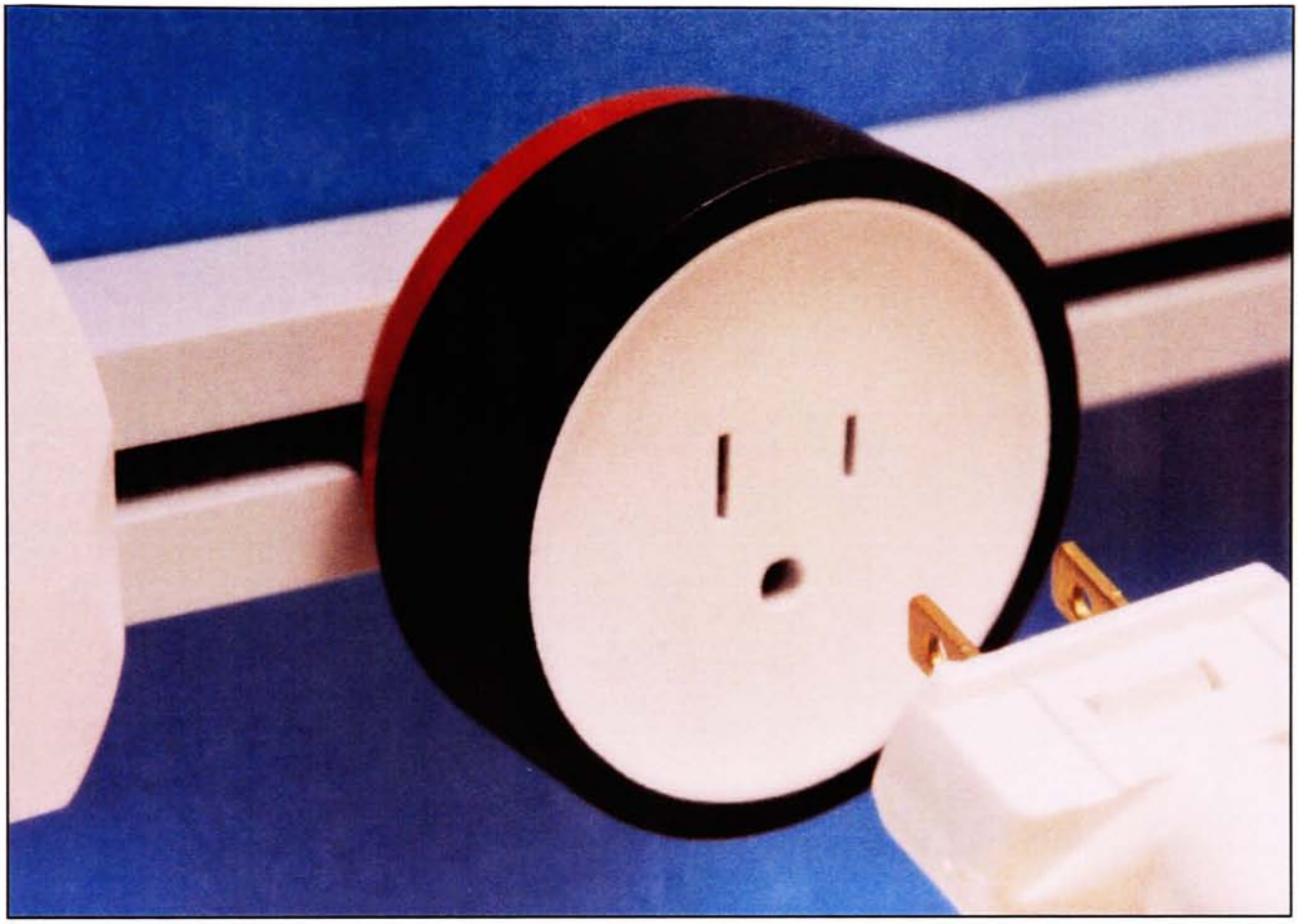
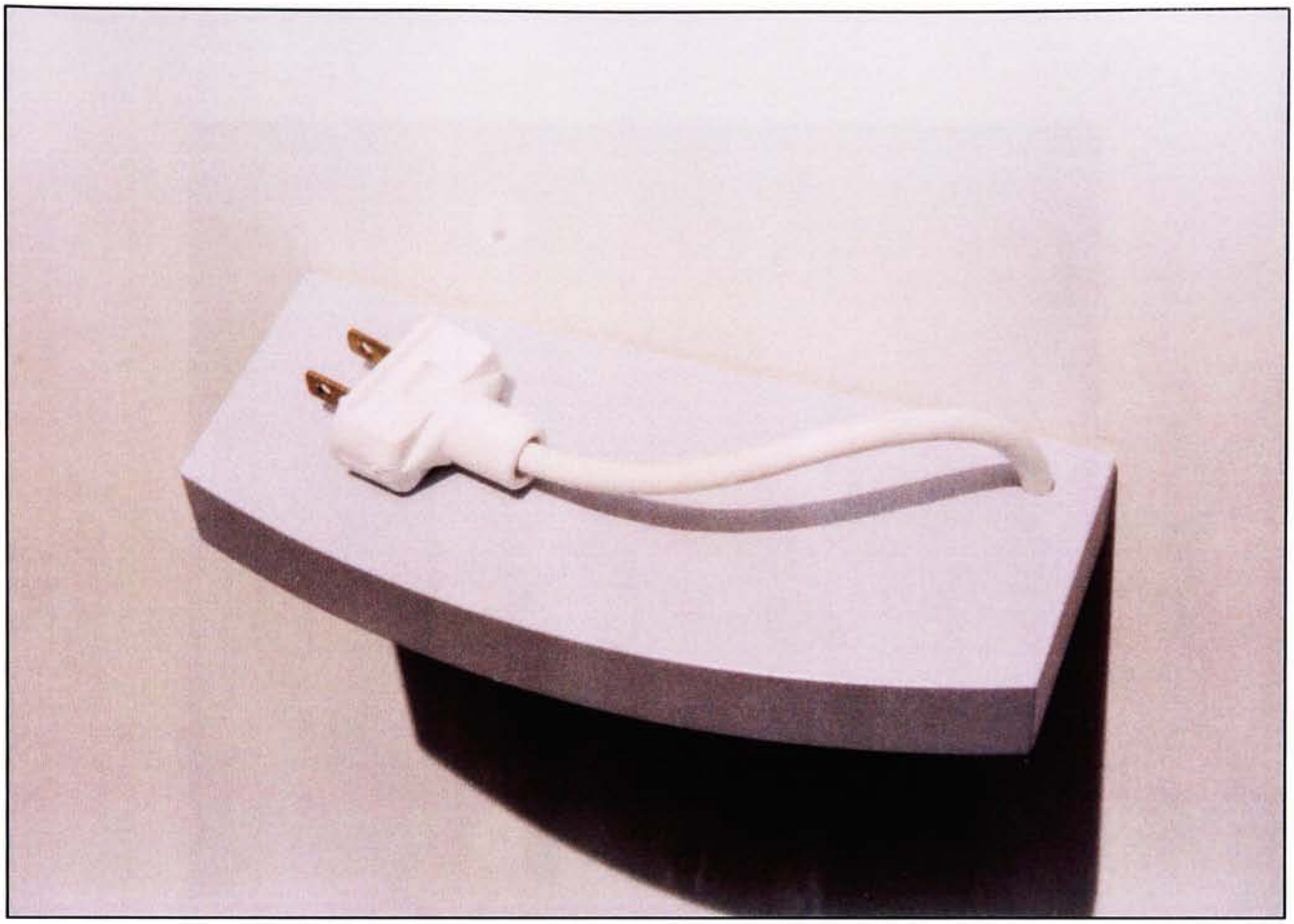


Similar to track lighting the Repositionable node allows outlets to be more flexible.

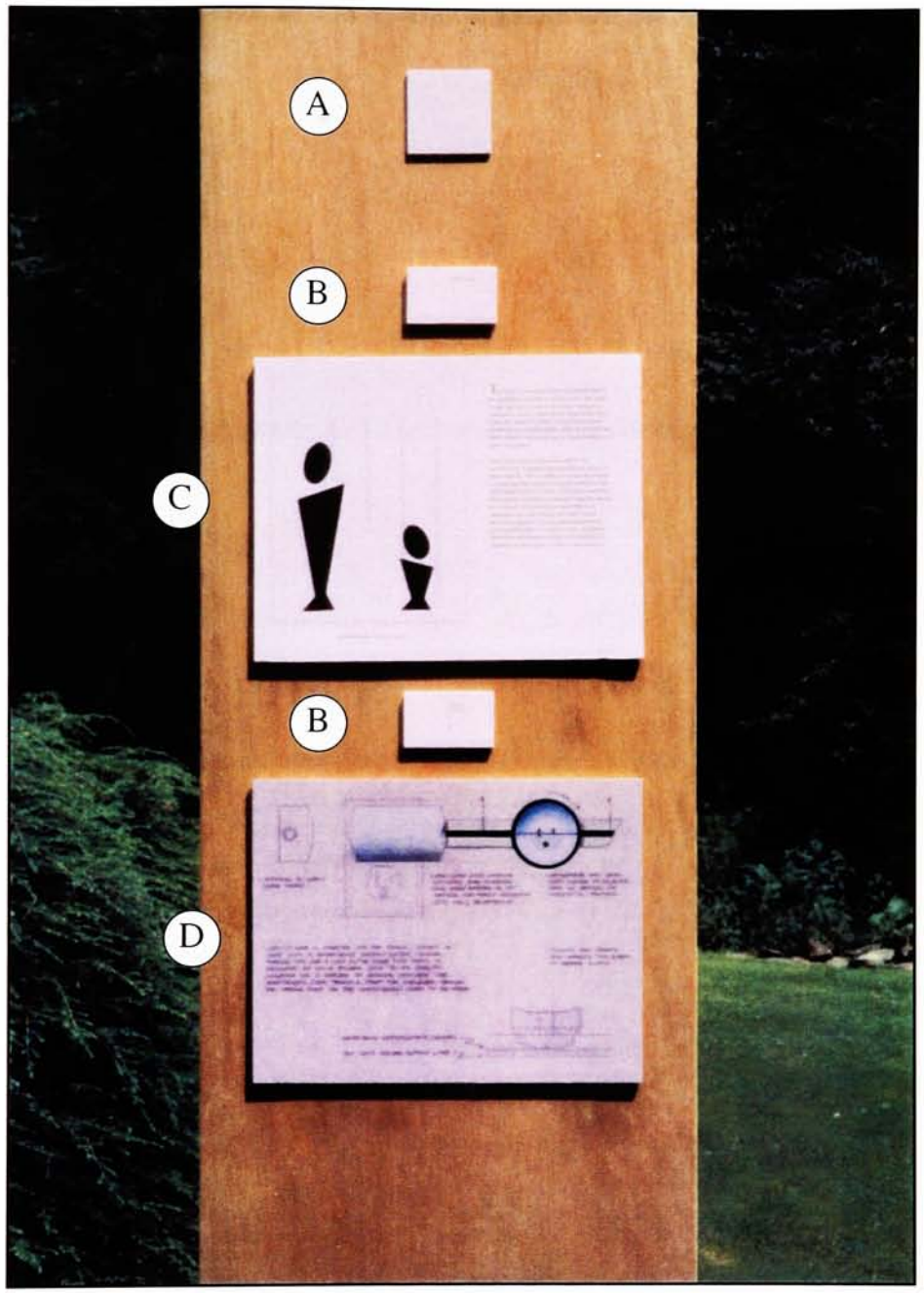


A close up of the Repositionable Node model showing the relationship to a standard plug. Here you can see color used as a communication tool. First is the generic black and white theme. Second is the addition of a neutral grey for the track. This allows a subtle contrast while suggesting that the product might in fact be any color. The red mounting plate is an example of the limited use of bright color in the project. It adds a splash of visual interest but more importantly it identifies the product. Primary colors are used on each of the three concepts to portray a simple and pure personality, similar to the use of geometric shapes as logos.

(Machined and turned polycarbonate, poplar, cast polyester putty, and lacquer spray paints.)



The corresponding power tap is displayed on a low-profile shelf.



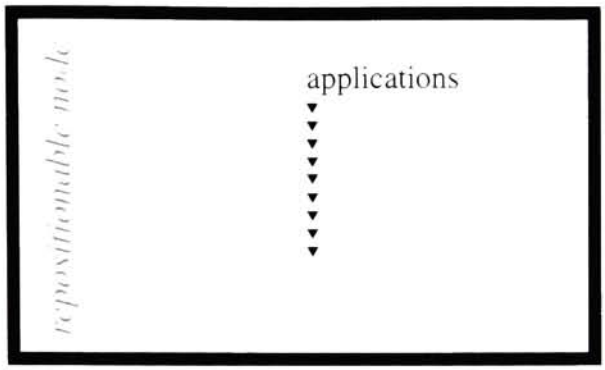
Side Three • The Repositionable Node

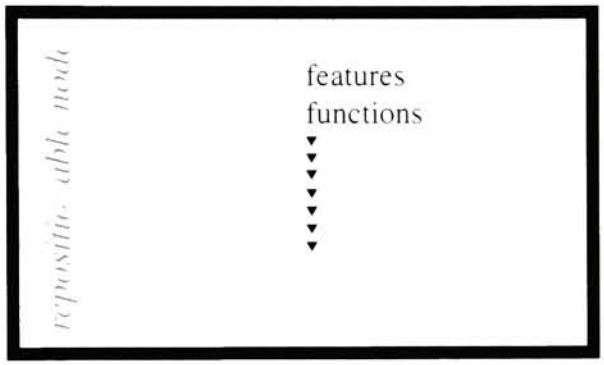
A) The RN Symbol (Styrene painted white)

B) Labels (Output from 600dpi laser writer, mounted on foamcore.)

C) Application Board: Illustrates the products uses and advantages (300dpi laser print with original cut and pasted images.)

D)Features/Functions Board: Illustration of the what's,where's, and how's of the RN. (blueline print with marker and colored pencil rendering.)


representable node
applications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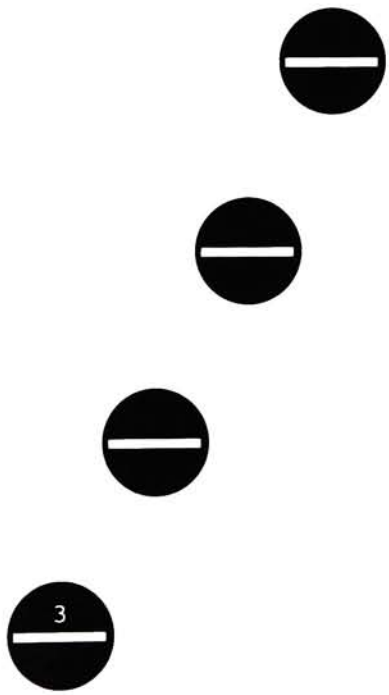
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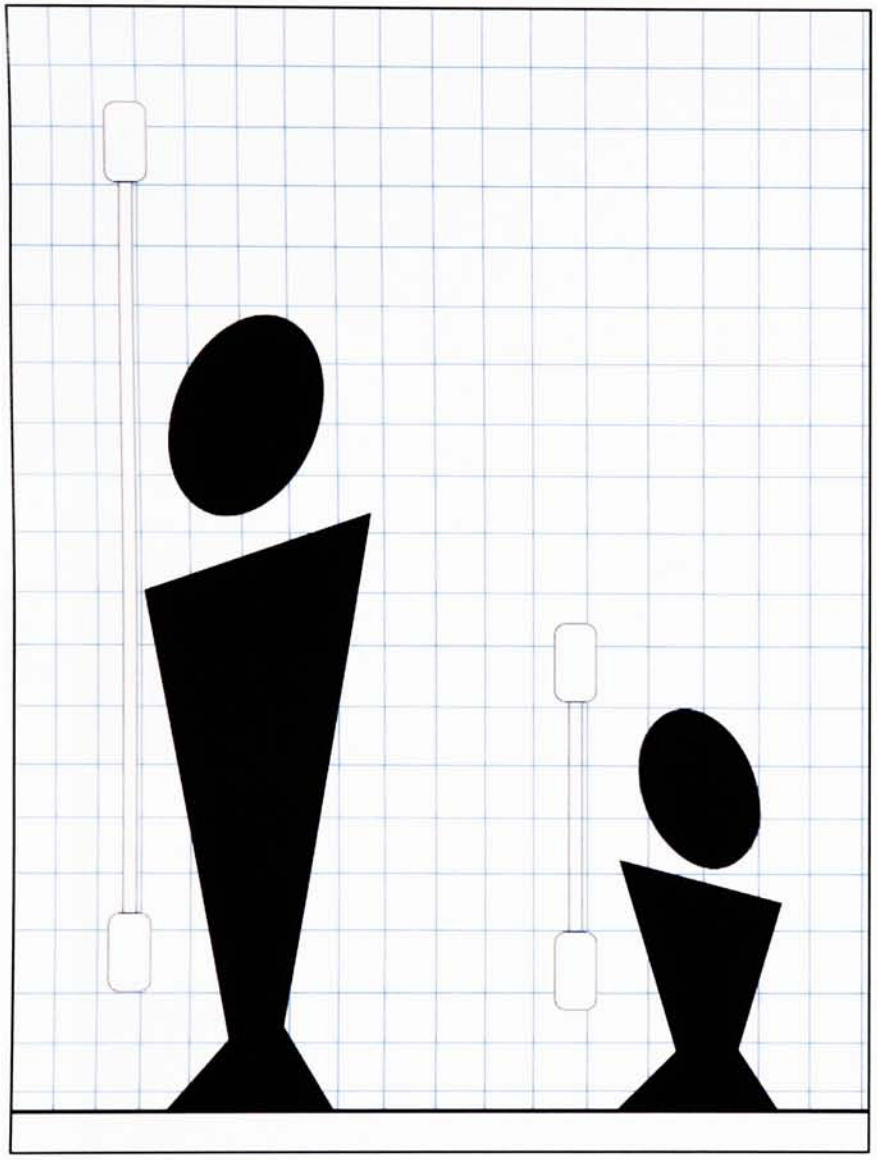
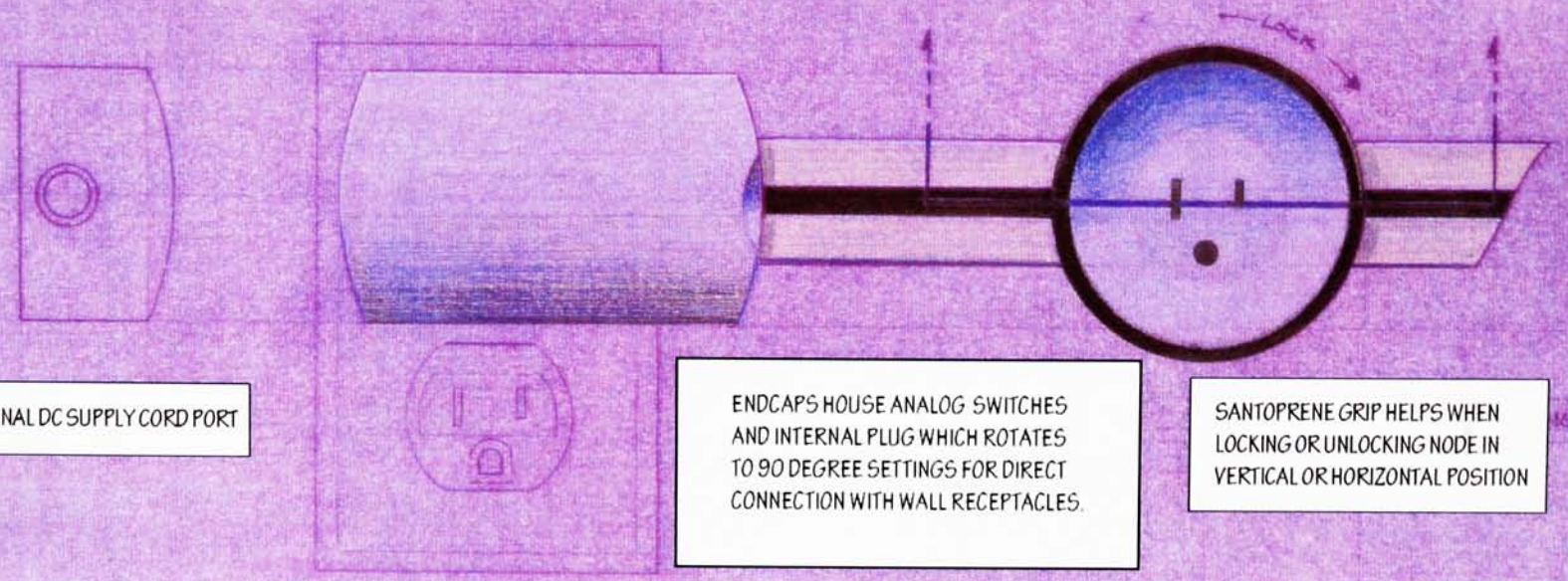


*Outlets that **bend** to meet their user.*

The foremost advantage of the repositionable node is the adaptability provided to different users. The ability to place the tracks at any level or angle on any two dimensional surface makes for universal access. This aspect also allows for outlets to be positioned in and around fixed or variable objects within an environment. Walls, furniture and fixtures are no longer hindrances to power accessibility.

The portable nature of the product allows the customization of nonpermanent installations such as a rental property. This versatility gives users the freedom to reconfigure their living or work environments to suit their changing needs or desires. This type of flexibility offers options for change to static environments. Shared work stations such as kitchens, baths, offices, or production lines with multiple users and frequent turnover in appliance, tool, or lighting requirements could benefit greatly from such a system. In addition, fluctuations and changes in work type or load can be expanded or contracted to in order to meet demands.



OPTIONAL DC SUPPLY CORD PORT

ENDCAPS HOUSE ANALOG SWITCHES AND INTERNAL PLUG WHICH ROTATES TO 90 DEGREE SETTINGS FOR DIRECT CONNECTION WITH WALL RECEPTACLES.

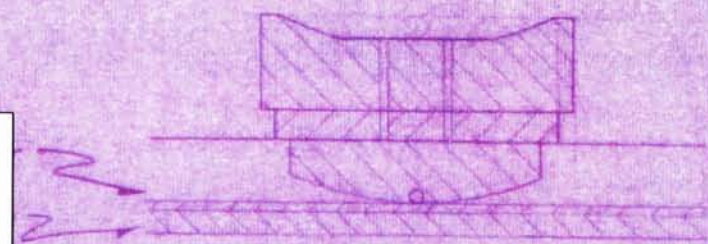
SANTOPRENE GRIP HELPS WHEN LOCKING OR UNLOCKING NODE IN VERTICAL OR HORIZONTAL POSITION

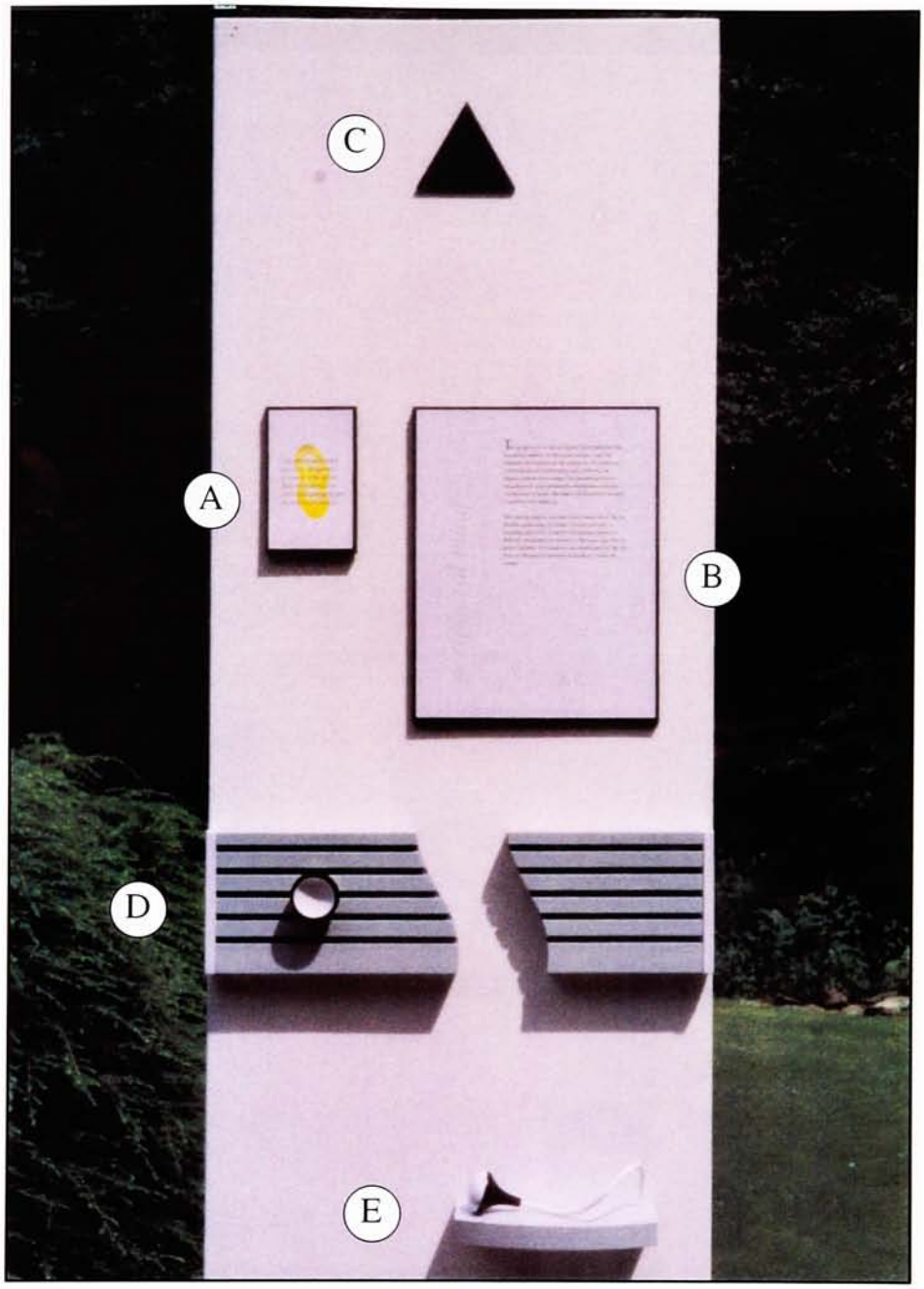
WHEN A NODE IS INSERTED INTO THE TRACK, CONTACT IS MADE WITH A BROADBAND COMMUNICATION CHANNEL. THROUGH THIS LINE A CHIP IN THE NODE PUTS FORTH A REQUEST TO HAVE POWER SENT TO ITS SPECIFIC LOCATION VIA A SERIES OF ANALOG SWITCHES. THE ELECTRICITY THE TRAVELS FROM THE SUBLAYER THROUGH THE PRECISE POINT ON THE COMMUNICATION LAYER TO THE NODE.

CONCAVE FACE ORIENTS AND DIRECTS PLUG BLADES TO PROPER SLOTS

BROADBAND COMMUNICATION CHANNEL .....

120 VOLT POWER SUPPLY LINE .....





Side Four • The Peripheral Band

A) Panel synopsis

B) Peripheral Band (PB) Background Statement

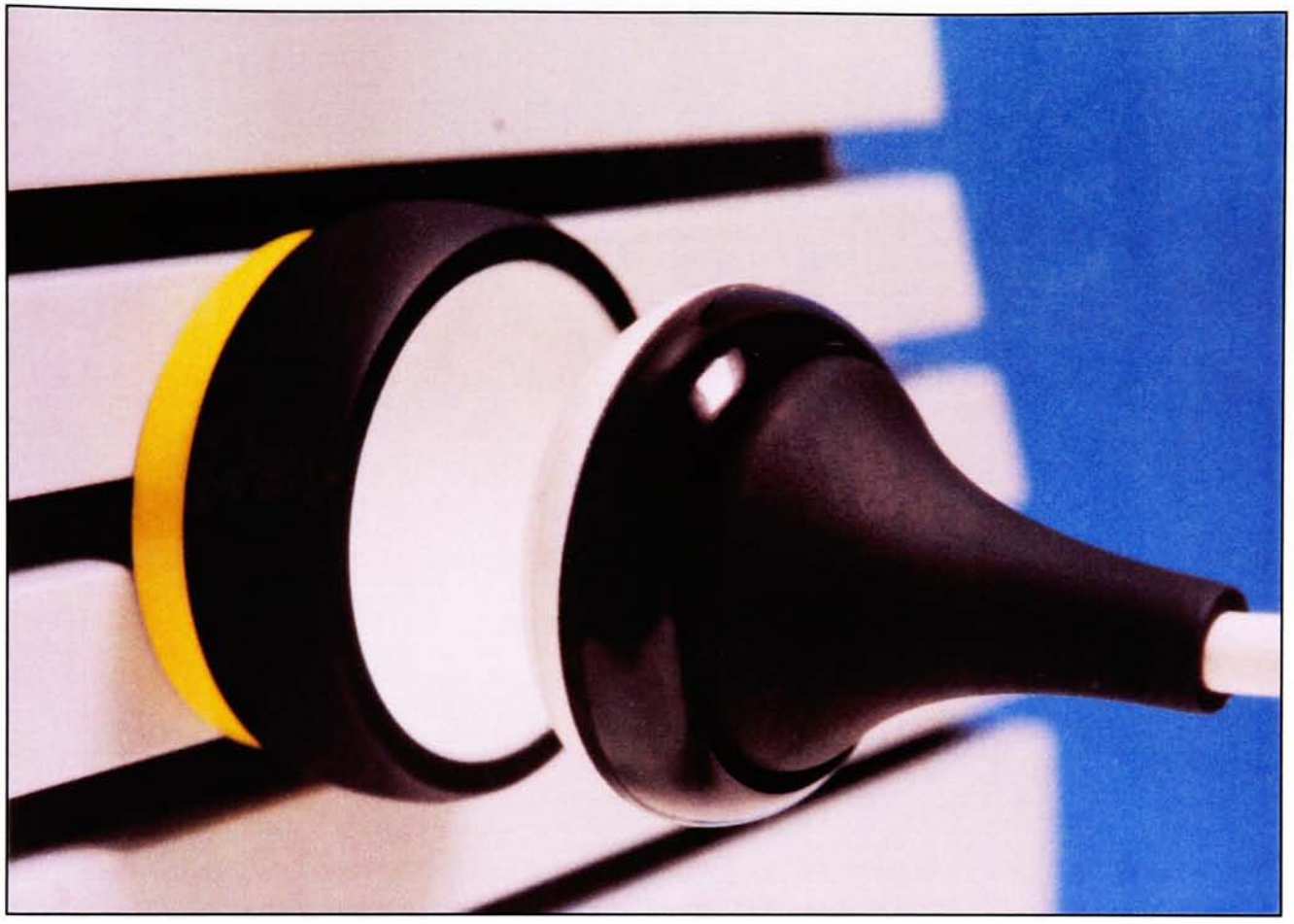
C) The PB Symbol: The progression from the square to the triangle represents an outward simplification of form four to three sides while the inward, in this case mathematical, basis becomes more complex.

D) The PB Model

E) The PB's plug is displayed on a shelf in the same manner as the RN. This helps the viewer to visualize the comparison to existing straight blade plugs.

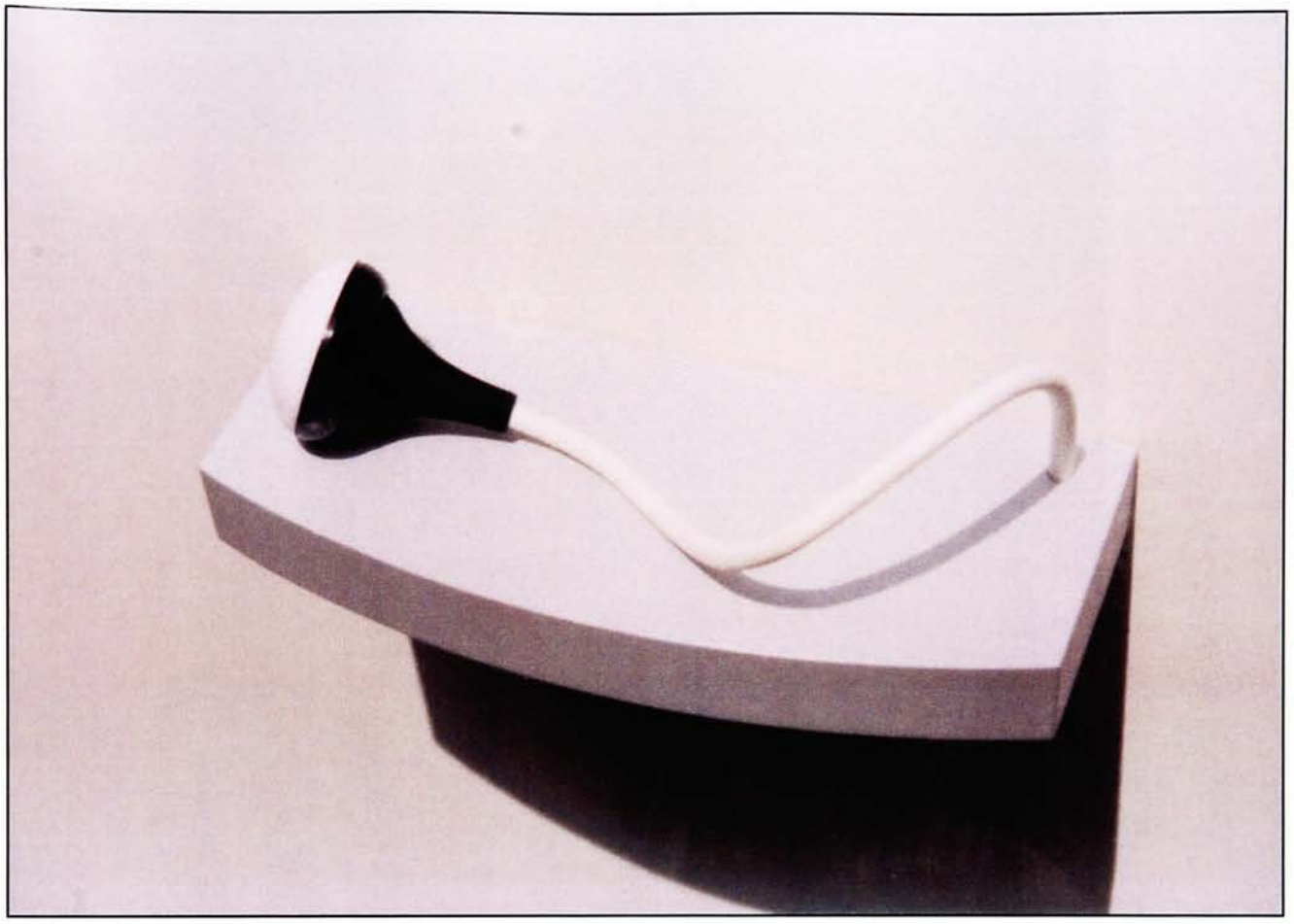
The peripheral band provides integrated products with power and communication lines incorporated into architectural details.

The Peripheral Band would utilize multiple tracks incorporated into architectural details.

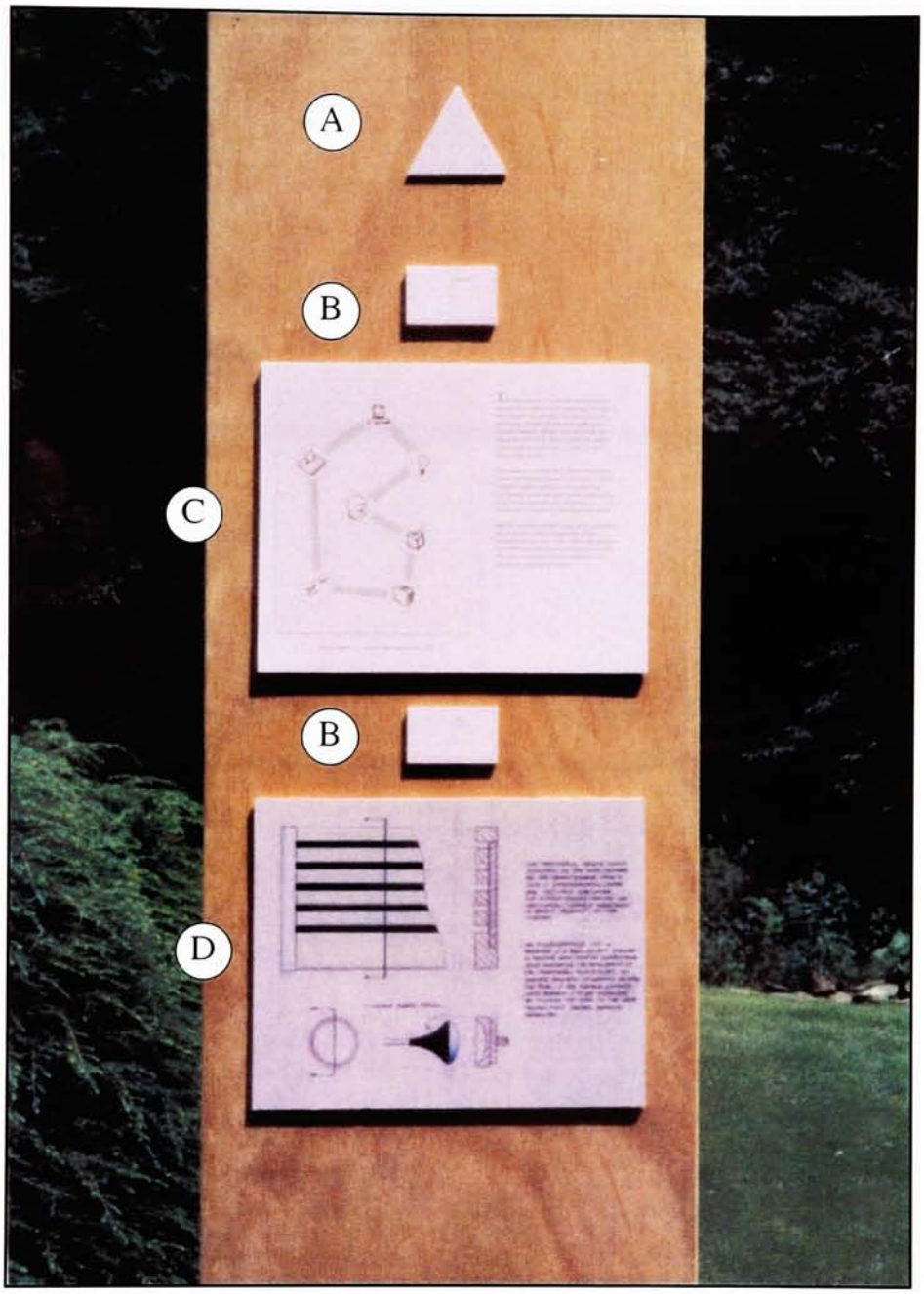


A close up of the PB model showing the revised outlet. The color themes are maintained with the PB, here yellow was used as the identifying primary color.

(Machined and turned polycarbonate, poplar, polycarbonate rod, and lacquer spray paints.)



The power tap eliminates the easily damaged and awkward blades of conventional plugs.



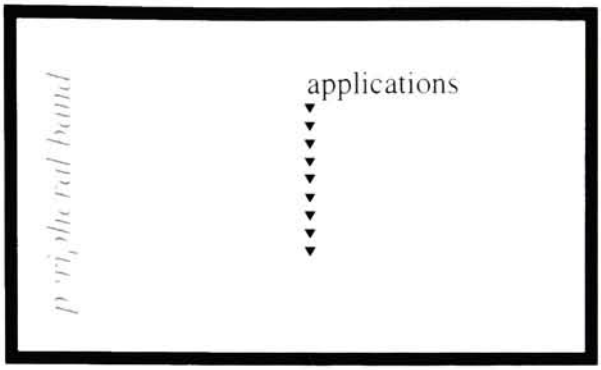
Side Five • The Peripheral Band

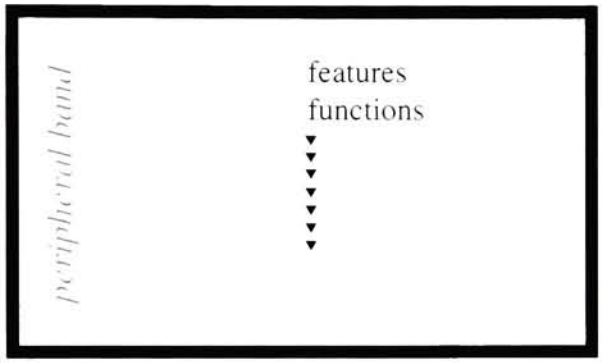
A) The PB Symbol

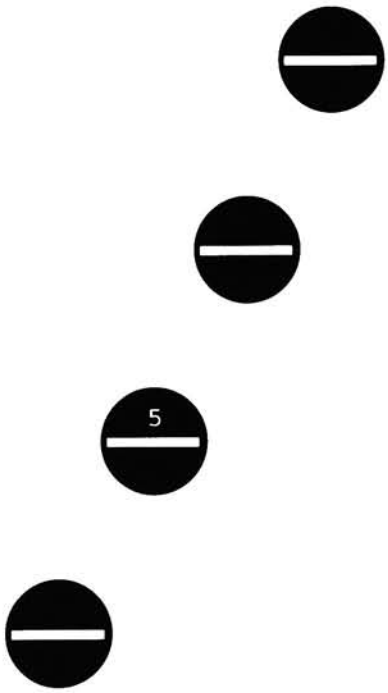
B) Labels

C) Application Board: Illustrates how products like a phone, fax, computer, light, audio/video equipment or appliance would connect to the band and interconnect to each other.

D)Features/Functions Board


peripheral band
applications


peripheral band
features
functions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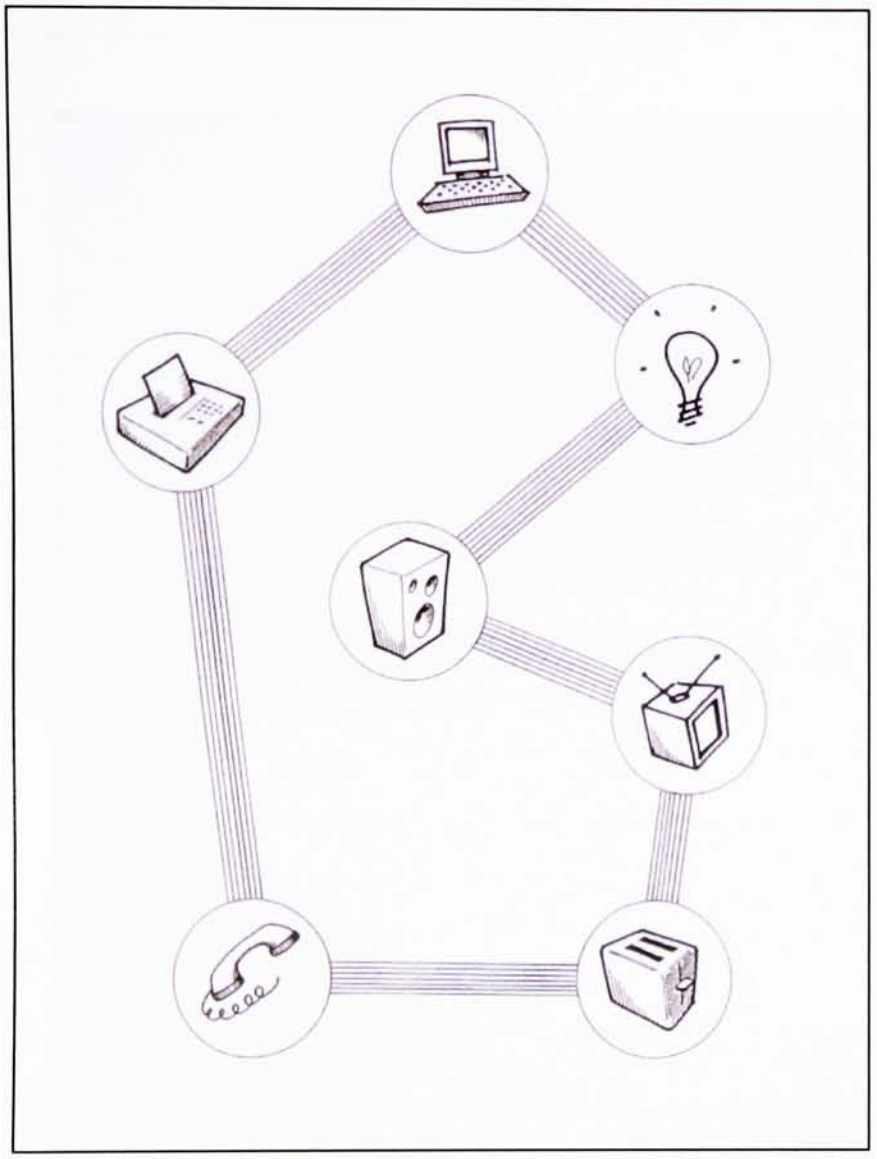
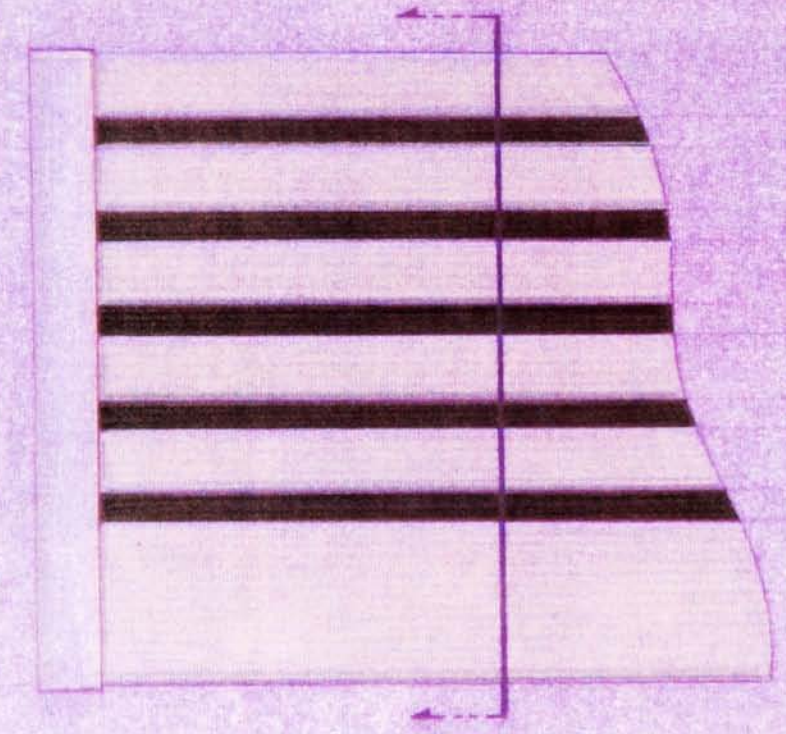


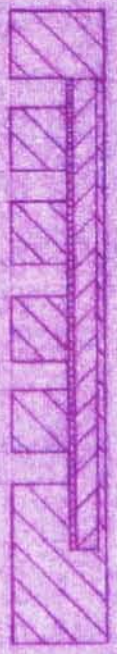
*Products **connect** to the band and **interconnect** to each other.*

The establishment of a powerline communications network allows products to be interconnected simply by being plugged into the band. This aspect has great implications on both home and work applications. Personal computers, phones, faxes, audio and video equipment would all be able to speak to one another without additional hardwiring. It creates, in effect, a smart home or office.

These products would be introduced to a new vertical format, redefining the manner in which they would be required to appear or perform. Low profile, high visibility wall mounts and space saving configurations would present opportunity for intriguing new interpretations of product for the designer to explore.

Since the bands are intended for permanent installations, they would be available in a multitude of styles, configurations, and colors. They could be incorporated into architectural detailing like baseboards, wainscots, chair rails, or mouldings with the opportunity to be expressed or concealed as desired.

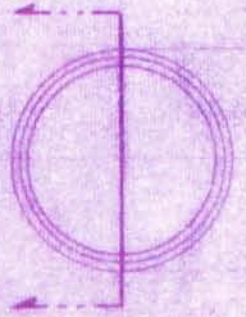


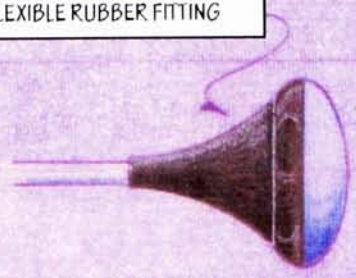


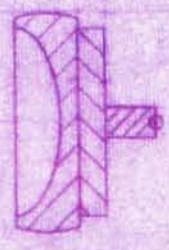
THE PERIPHERAL BAND'S TRACKS FUNCTION IN THE SAME MANNER AS THE REPOSITIONABLE NODE'S WITH A COMMUNICATIONS LAYER AND 120 VOLT SUBLAYER. THE MULTIPLE TRACKS PROVIDE THE ADDITIONAL SUPPORT NECESSARY TO MOUNT PRODUCTS TO THE SYSTEM.

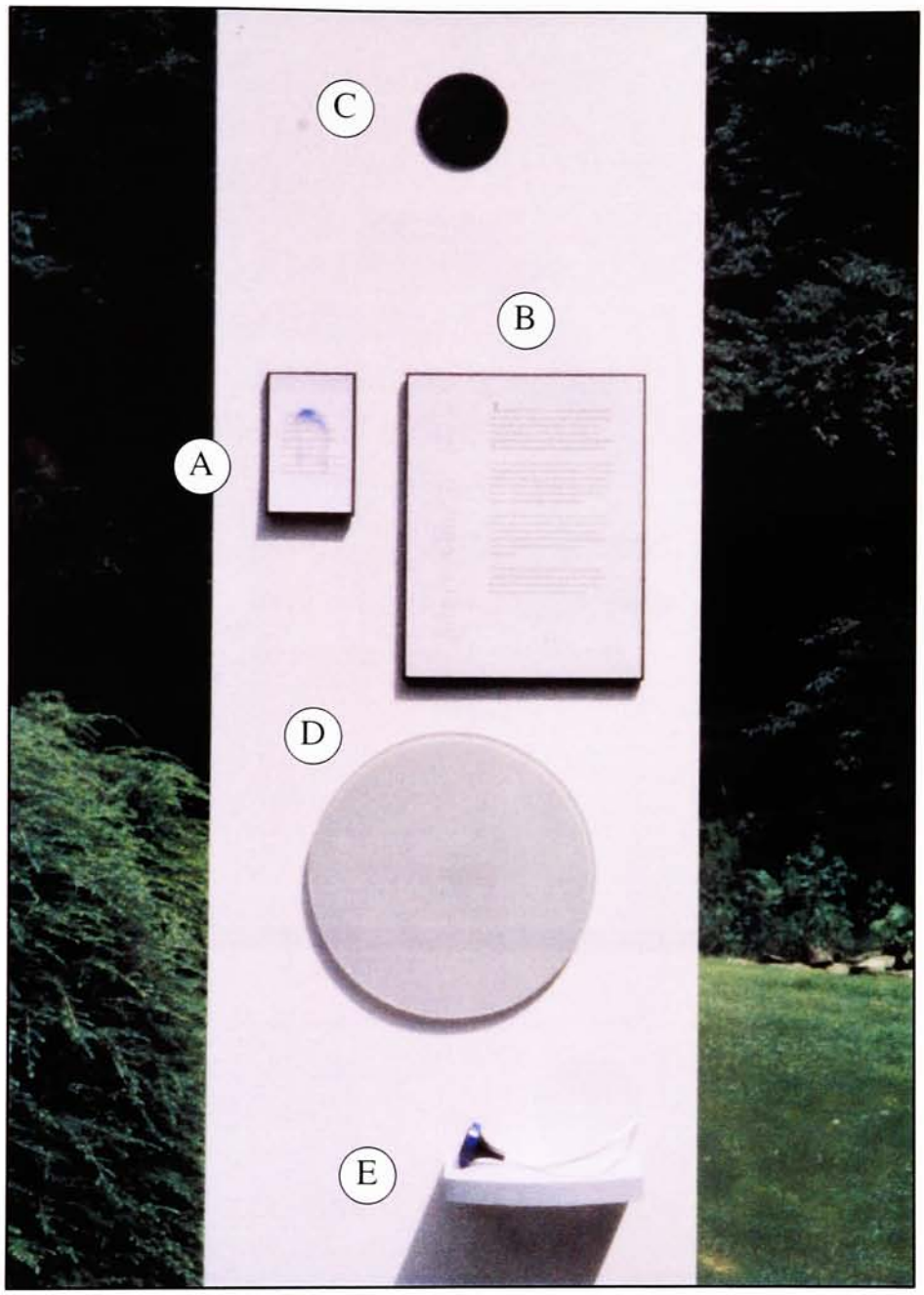
THE PLUG /RECEPTACLE UNIT IS PRESENTED IN A BALL AND SOCKET FORMAT TO PROMOTE EASY, INTUITIVE CONNECTIONS WHILE MAINTAINING THE FAMILIARITY OF THE TRADITIONAL PLUG/OUTLET. AN ELECTRO MAGNETIC CONNECTION SECURES THE PLUG. IT HAS FLEXIBLE CONTACTS WHICH ENABLE IT TO BE EXTRACTED BY PULLING THE CORD IN THE SAME FASHION THAT ABUSES EXISTING PRODUCTS.

FLEXIBLE RUBBER FITTING









Side Six • The Power Plane

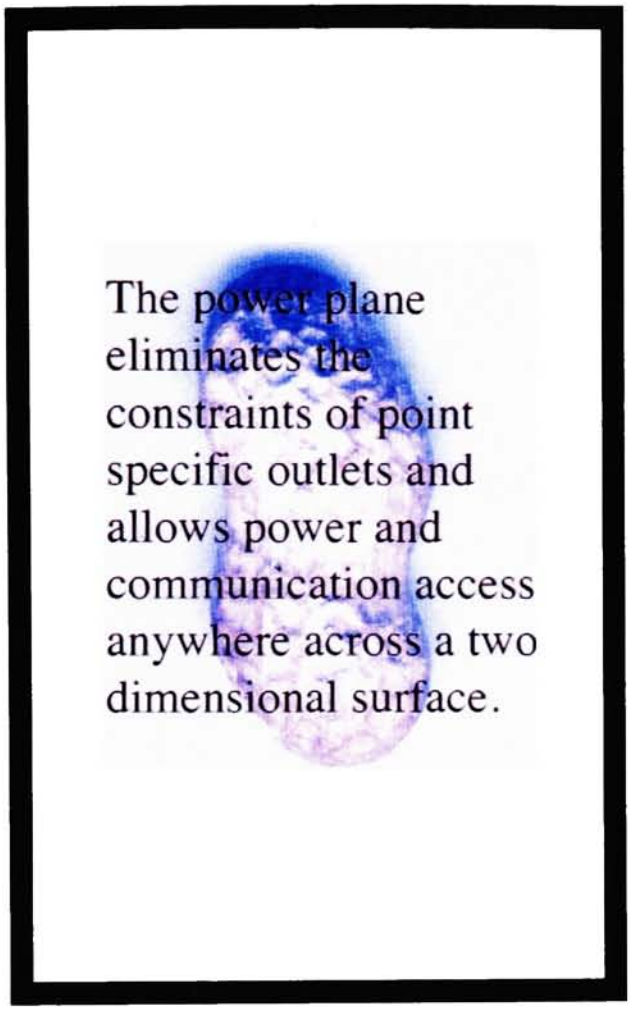
A) Panel synopsis

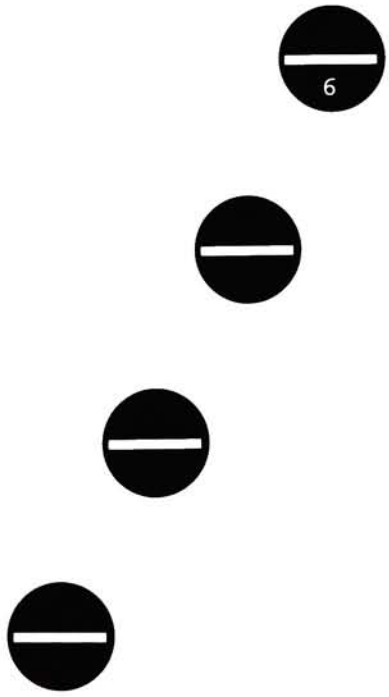
B) Power Plane (PP) Background

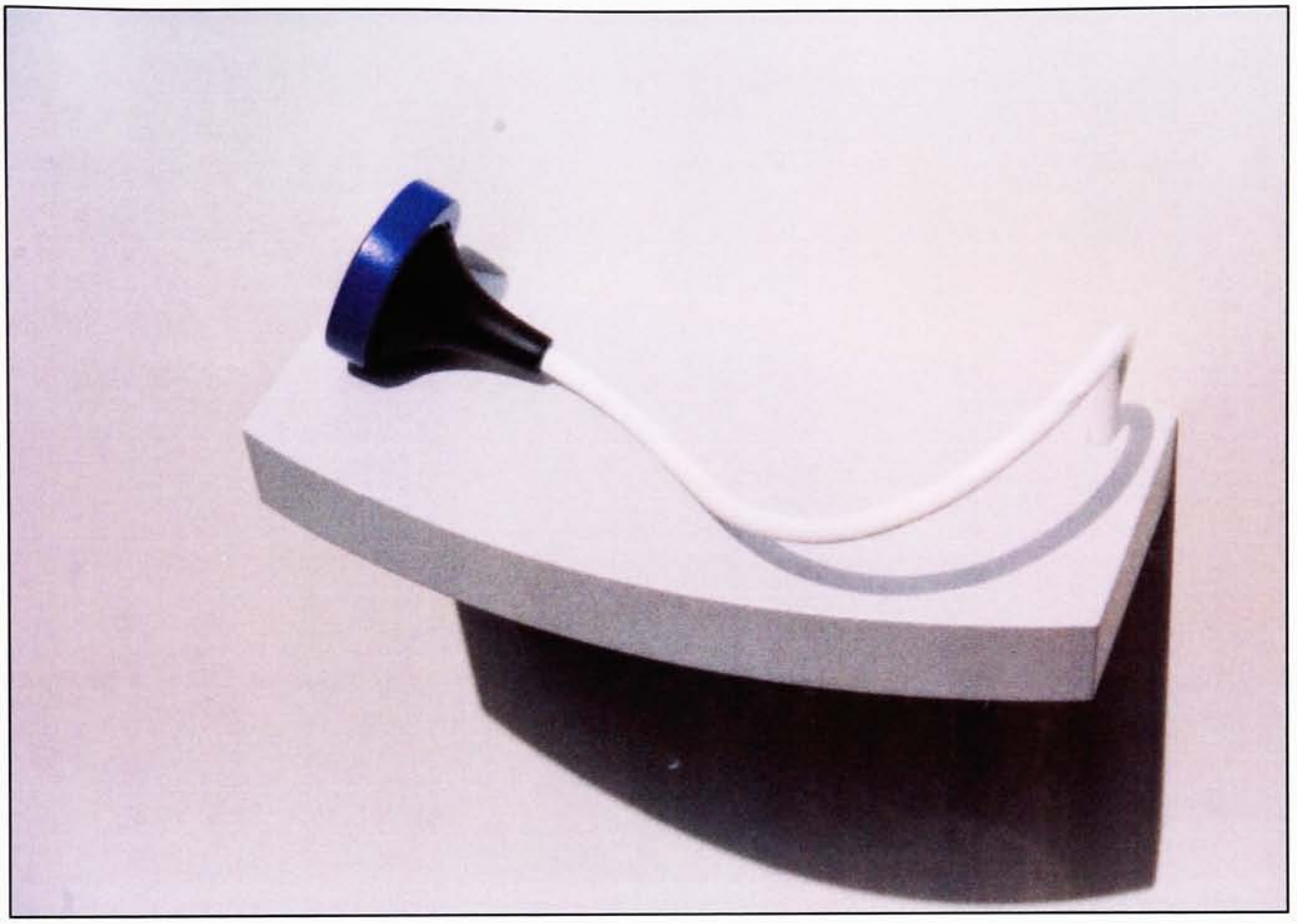
C) The PP Symbol: The final progression to the continuous form of a circle represents an elimination of all sides, walls, or constraints.

D) The PP Model

E) The PP's plug


The power plane eliminates the constraints of point specific outlets and allows power and communication access anywhere across a two dimensional surface.

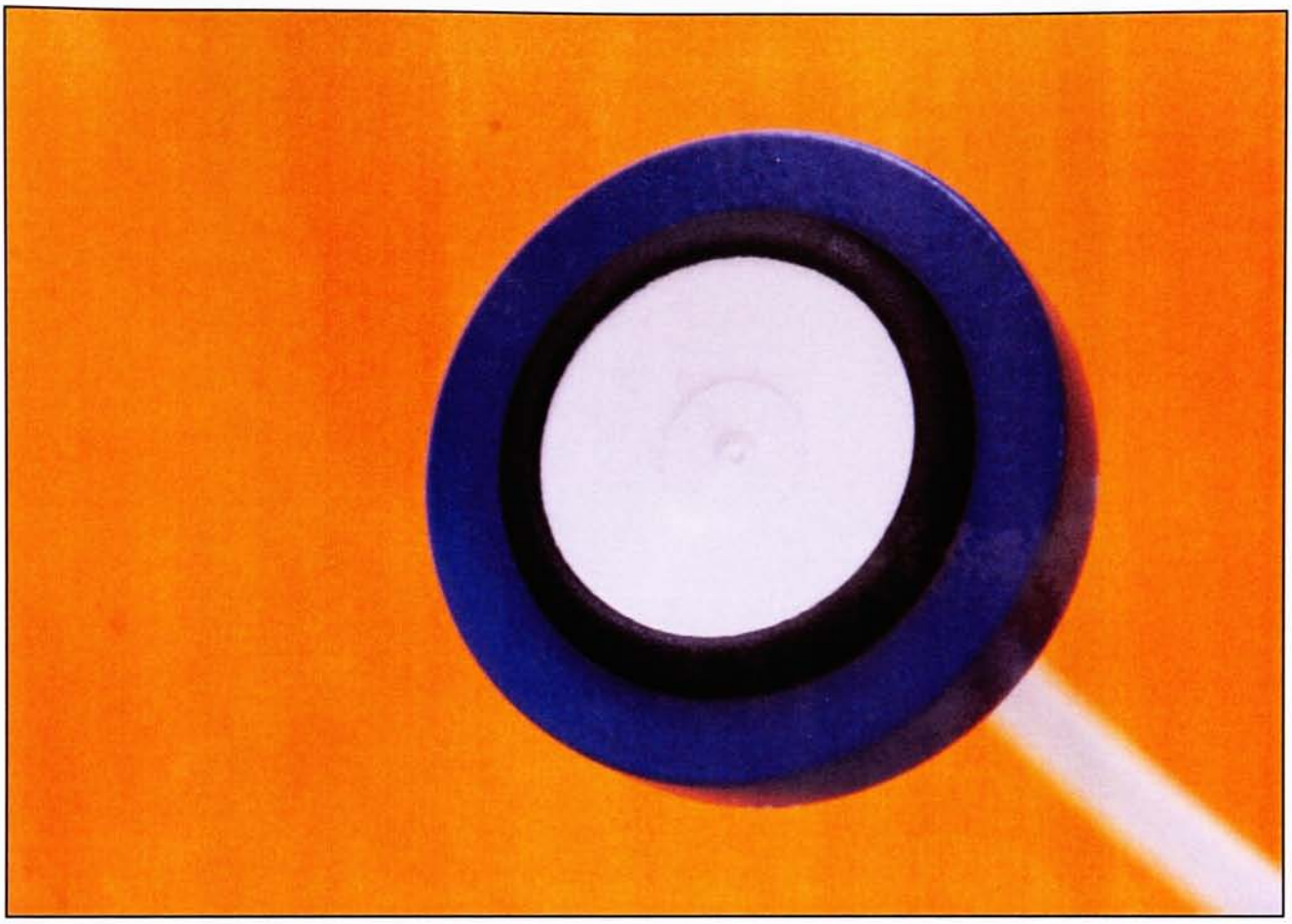

6



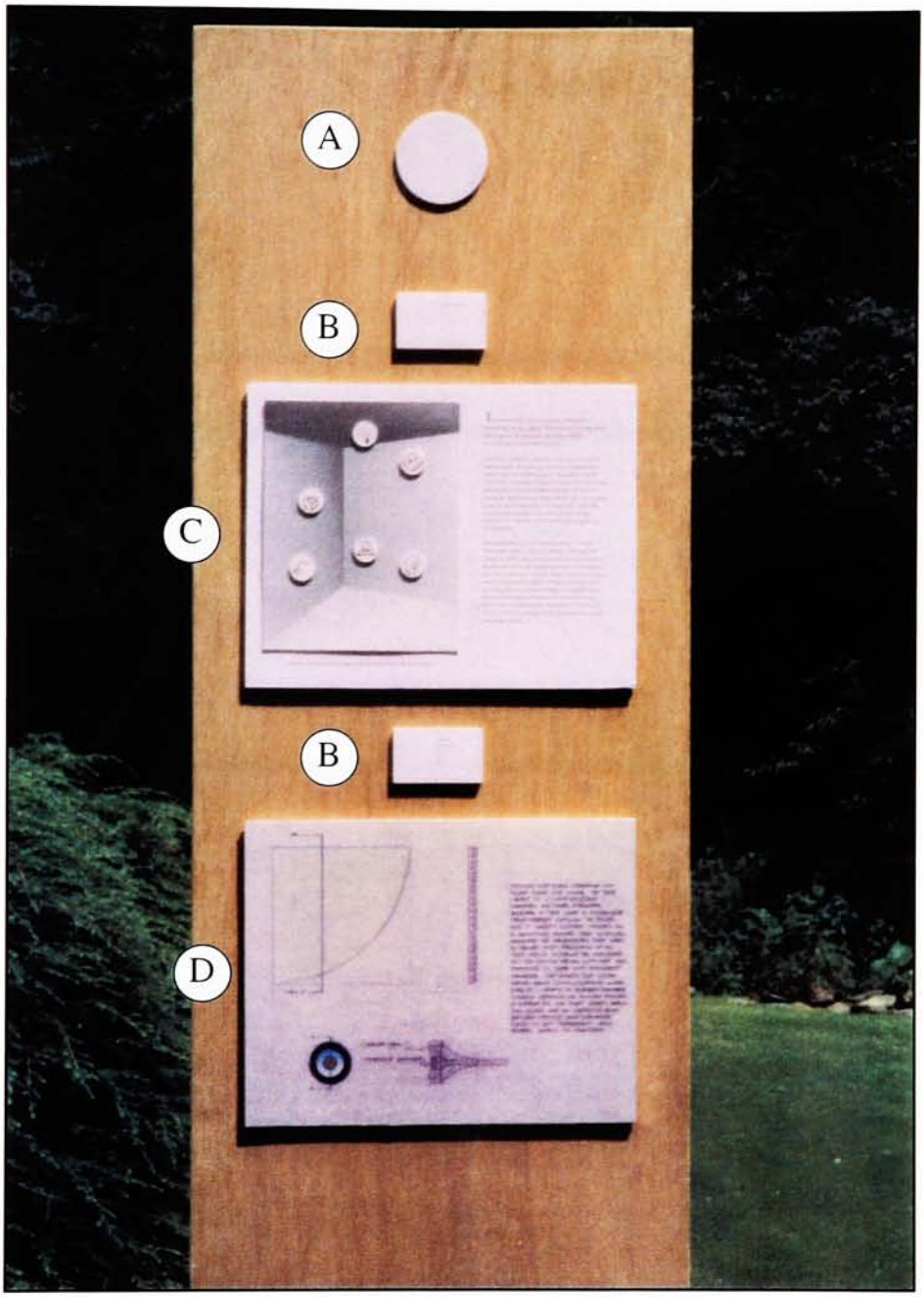
The power tap affixes via a vacuum seal anywhere on the 2-D receptacle surface.

A close up of the PP model showing the power tap plugged on the grid. Once again color themes are maintained, this time with blue as the primary identifier. The round polycarbonate disk represents the tile network which in reality could be any size or orientation of a two dimensional plane.

(Machined and turned polycarbonate, polycarbonate rod, and lacquer spray paints.)



Both power and communications lines pass through the same connections.



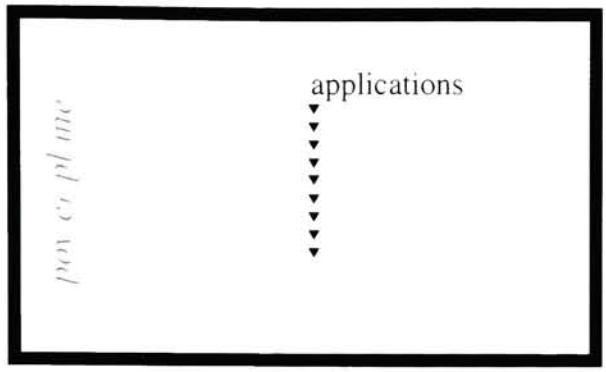
Side Seven • The Power Plane

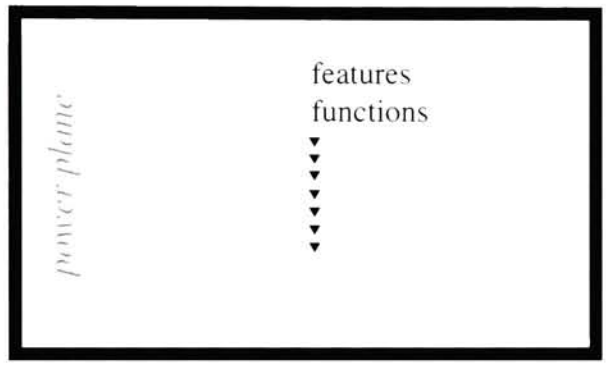
A) The PP Symbol

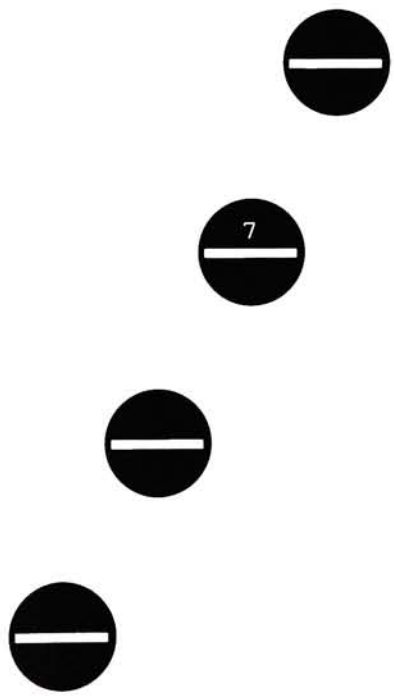
B) Labels

C) Application Board: utilizes a magnetic board with the product icons mounted to steel washers. This is intended to allow the viewer to interact with the project and illustrate that products introduced to this system could be moved about as simply as "moving magnets on your refrigerator".

D) Features/Functions Board


applications
power plane


features
functions
power plane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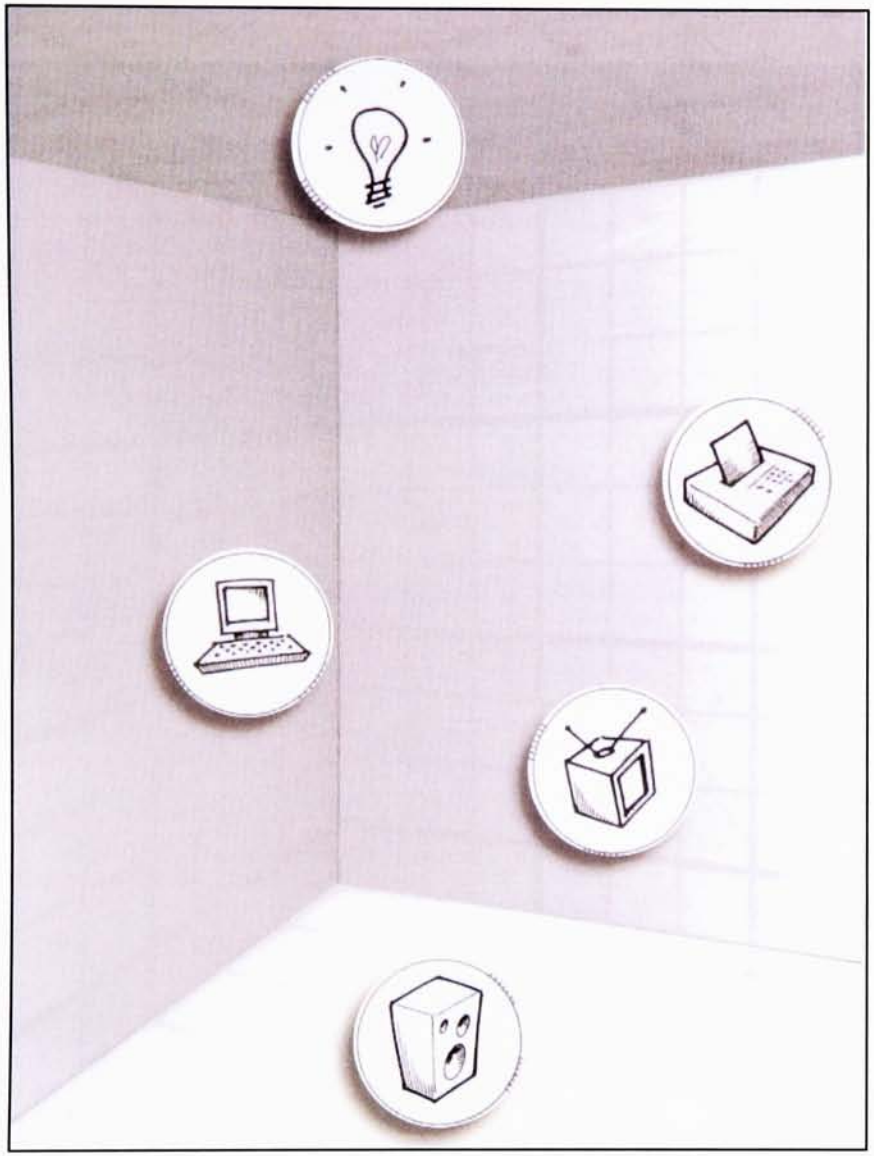
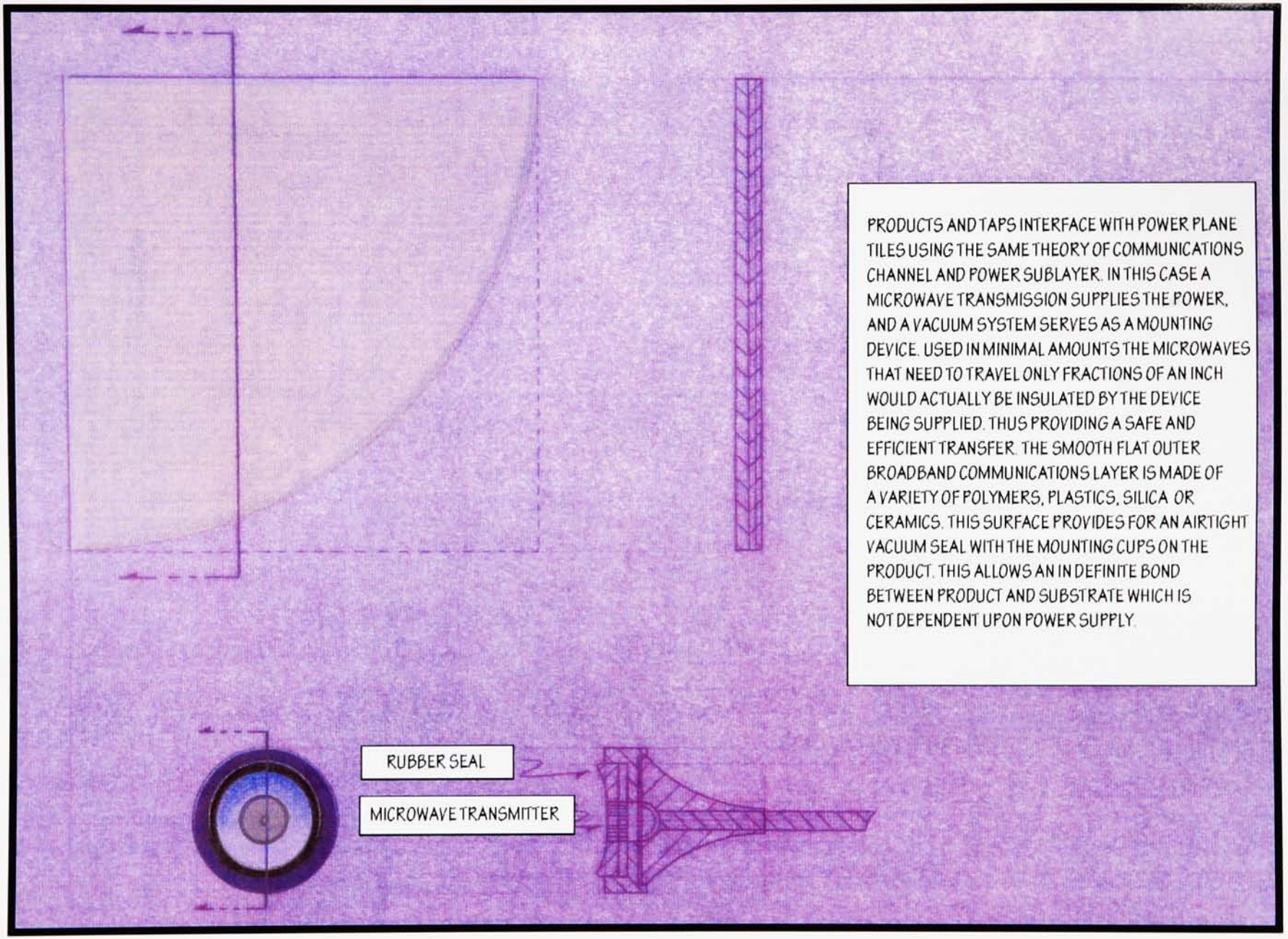


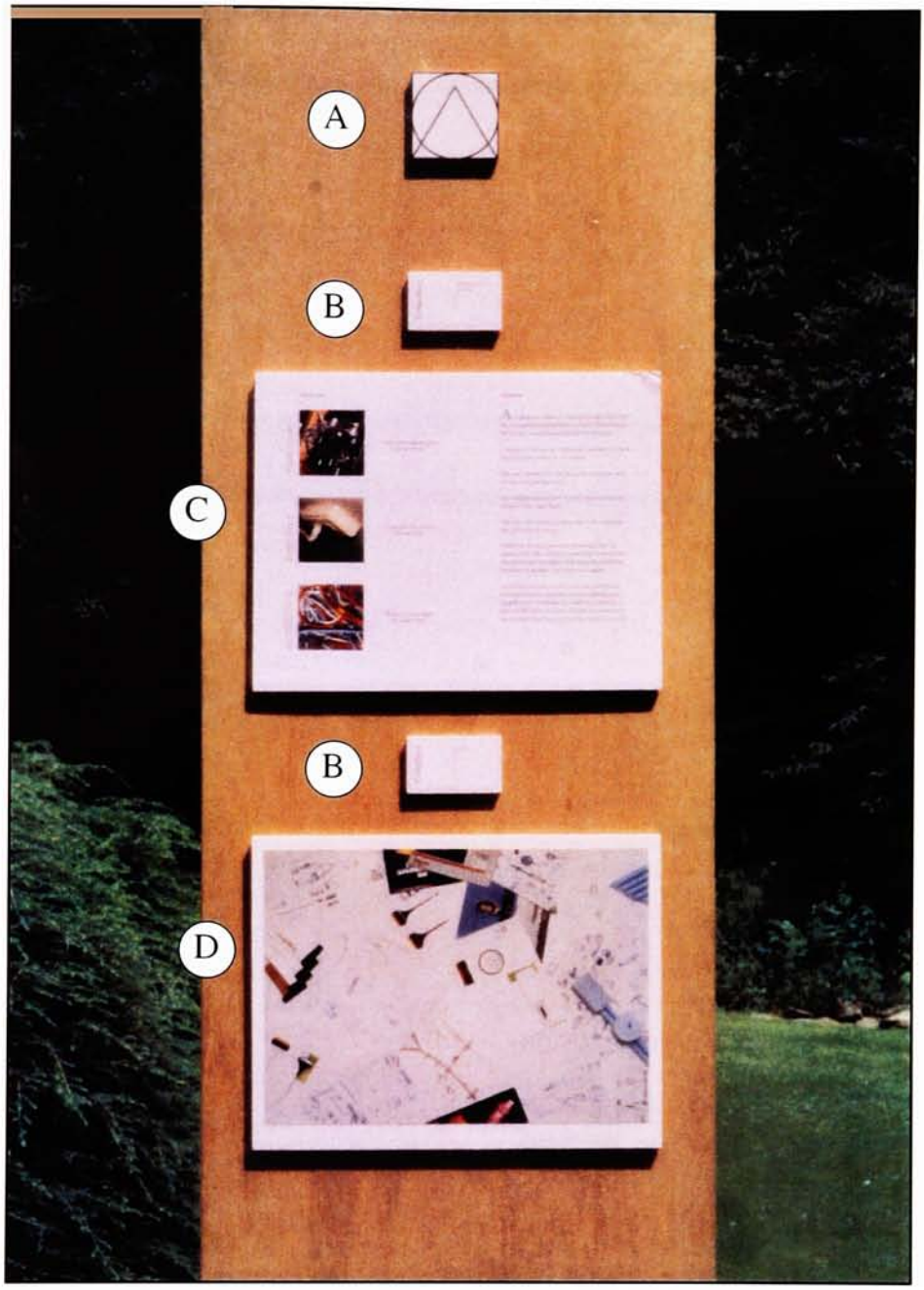
*Products reconfigure to meet **your** needs and desires, much like these magnets*

The power plane offers a seamless integration of product and power supply. Workstations or living areas where space and efficiency are highly valued commodities would benefit greatly.

In kitchens, products could be stored *and* used where needed simply by being set down on a counter top or placed on a wall. Entertainment equipment could be freed from a horizontal format no longer tied to cabinets, patch cords, or gravity. Lighting fixtures would be extremely adaptive in a format such as this. Any product could be easily rearranged or transported to alternate locations providing the user with multiple usage scenarios. It would be as easy as moving magnets on a refrigerator.

The possibilities for new interpretations of product within this system are most intriguing. Anything that comes in contact with a flat surface has the potential to become an electrically supplied product. Environments and entire buildings could be created with all wall, floor, and ceiling surfaces capable of supplying power and mounting product without hardware. Furniture could become freestanding workstations with fully on line power and communications capabilities. All electrical activity could be monitored and controlled via a single processing station.


PRODUCTS AND TAPS INTERFACE WITH POWER PLANE TILES USING THE SAME THEORY OF COMMUNICATIONS CHANNEL AND POWER SUBLAYER. IN THIS CASE A MICROWAVE TRANSMISSION SUPPLIES THE POWER, AND A VACUUM SYSTEM SERVES AS A MOUNTING DEVICE. USED IN MINIMAL AMOUNTS THE MICROWAVES THAT NEED TO TRAVEL ONLY FRACTIONS OF AN INCH WOULD ACTUALLY BE INSULATED BY THE DEVICE BEING SUPPLIED. THUS PROVIDING A SAFE AND EFFICIENT TRANSFER. THE SMOOTH FLAT OUTER BROADBAND COMMUNICATIONS LAYER IS MADE OF A VARIETY OF POLYMERS, PLASTICS, SILICA OR CERAMICS. THIS SURFACE PROVIDES FOR AN AIRTIGHT VACUUM SEAL WITH THE MOUNTING CUPS ON THE PRODUCT. THIS ALLOWS AN IN DEFINITE BOND BETWEEN PRODUCT AND SUBSTRATE WHICH IS NOT DEPENDENT UPON POWER SUPPLY.
RUBBER SEAL
MICROWAVE TRANSMITTER



Side Eight • Conclusion

A) The *Tetherless* Symbol: A combination of all three product symbols (300dpi laserprint mounted on foamcore.)

B) Labels

C) Motivations/Intentions Board: Photographs of the functional, logistical, and aesthetic limitations of existing products which motivated me to develop the solutions. Also included is a basic summary of what I was trying to achieve.

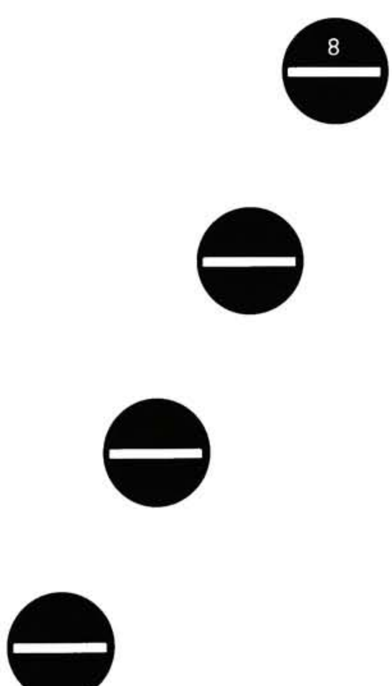
D) Process Photo: A photo of sketches, foam studies, literature, and models that represents the physical process involved with the development of *Tetherless*. This was to show the gallery audience the artistic expression and passion involved with the design process

Tetherless

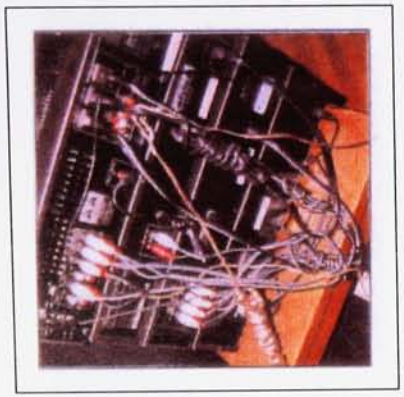
process

Tetherless

motivations
intentions



function

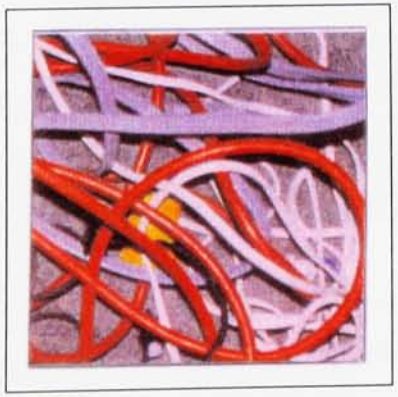


" Why does it take two *hours* to set up a stereo? "

logistics

" It shouldn't be so *hard* to reach an outlet! "

aesthetics



" We have become *numb* to this visual clutter."

As a graduate student of industrial design faced with the overwhelming possibilities involved with choosing a thesis topic several factors directed my decision.

I wanted to evaluate and reinterpret a product or system that had been ignored or overlooked.

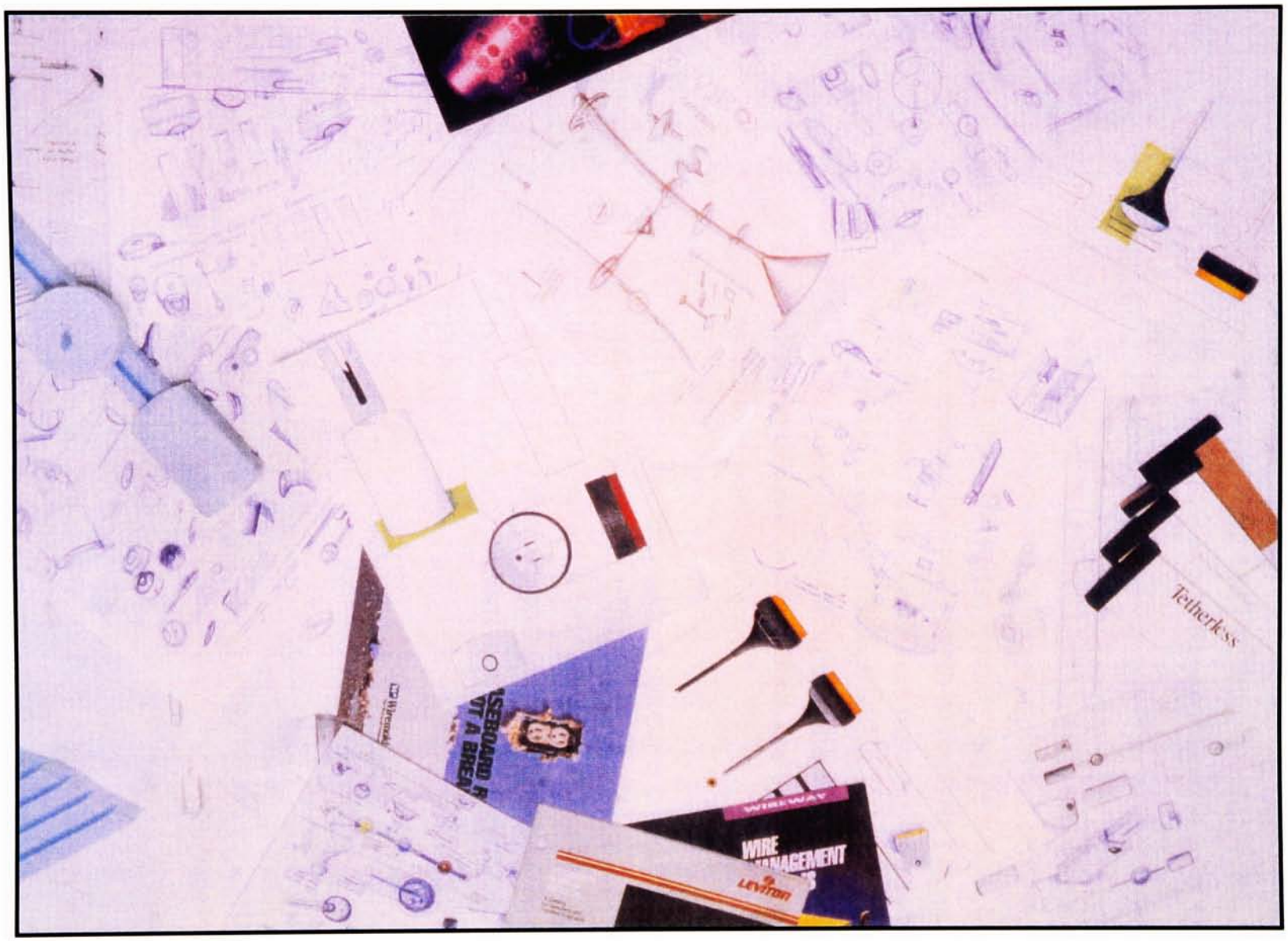
The topic needed to be something that everyone could identify with and appreciate.

The solutions needed to be realistic, based on fact not a purely conceptual theory.

The topic and points of address had to be something that I felt strongly about.

Finally the decision was made based upon the one aspect of my daily life that presented me with the most limitations and constraints. That being the established interfaces of product, user, and power supply.

Technology provides us with such vast possibilities, it demands that we question existing establishments regardless of how ingrained or endowed. My hope is that you the viewer will now consider the potential of the concepts I have presented as they apply to *your* life.



This photo is just a glimpse at the hundreds of sketches, notes, noodles and thumbnails that were the development process.

Technology provides us with such vast possibilities, it demands that we question existing establishments, regardless of how engrained or endowed in order to move forward.

Through out this thesis I have viewed the solutions as doorways to new and better living through product development. The true industrial design solutions to these scenarios are really yet to be resolved. I have merely hinted at the possibilities for new product within a system such as this. Through advancements in science and technology, new platforms continually develop and allow the designer great freedoms and broader scope in which to develop product.

My hope is that the reader of this paper or those who viewed the gallery installation gained some insight and have a new level of understanding for the value and service of the design profession by envisioning the potential for new products or systems within their own lives.

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Ian Westad Cunningham

Thesis

contents

proposal

The purpose of this thesis is to develop a system of product and power supply which is more easily operated, convenient, versatile, adaptable, and productive. Research into the nature, capabilities, and limitations of electricity will lead to solutions being developed through personal interviews, human factors data, materials and process information, sketch packages, renderings, photos, mock-ups, scale models, and computer analysis. A final resolution will be presented in both design and theory.

Phase I

concept

The concept addresses a system for the delivery of electrical power. It is intended as a functional and aesthetic re-evaluation of existing outlet and track systems.

The product consists of expandable units that create a two dimensional network of repositionable outlets or *nodes*. These nodes not only serve to supply power as a traditional outlet would, but also serve as mounting devices for a family of integrated products. These inter connected nodes provide pathways for the free flow of information between all products in the system.

These elements must all come together so that the system becomes a positive design element in an environment, rather than a constraint to be worked around or hidden. The end result should then celebrate the versatility of electricity instead of minimizing it.

Phase II

investigation

I will need to have a thorough understanding of the nature of electricity before designing a product system based on it. This research period is intended to determine the potential and limitations of electricity. The resource of the technical institute with its faculty, students, and libraries will be a main source of information. Outside agencies such a electronics manufacturers and laboratories will also be consulted. This time will be spent researching previous, existing and next generation products as well as related technologies.

Phase III: 1 December 1993 *to* 31 December 1993

Differential Day: 12.15.*

* A Differential Day is a time out period at the midpoint of each phase where objectives and alternative directions are reviewed. This is a safety measure to avoid tunnel vision or close mindedness.

applications

Specific problems and applications will be defined. Research from Phase I will be applied to the concept and proposal in order to determine the physical and conceptual function of the system. Forecasted applications include traditional power supply and the integration of products such as lighting fixtures, entertainment systems, household appliances, and office equipment.

Phase IV: 1 January 1994 *to* 1 February 1994

Differential Day: 1.12

interface

How the products and system communicate both internally with each other and externally with the user will be addressed. Functions, controls, human factors data, perception, and intuition will be key factors in this phase.

Phase V: 1 February 1994 *to* 15 February 1994

Differential Day: 2/9

form

From all previous phases, information and aesthetics will be combined to develop three dimensional solutions. The notion that the system is to be an interactive part of an environment, much more expressive of function and role, is a determining factor in the ultimate appearance.

Phase VI: 16 February 1994 *to* 16 March 1994

Differential Day: 3:2

presentation

The gallery display and communication of ideas to the general public will be addressed. The construction of models, presentation boards, and information graphics is expected. Installation will occur between 22nd and 24th of April.

Phase VII: 17 March 1844 *to* 24 April 1844

Differential Day: 46

written word

All information and images will be compiled and presented in the outlined format of the Graduate Studies Handbook.

Phase VIII: Summer/Fall 1994