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### A work center for the home

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ROCHESTER INSTITUTE OF TECHNOLOGY

A Thesis Submitted to the Faculty of  
The College of Fine and Applied Arts  
in Candidacy for the Degree of  
MASTER OF FINE ARTS

A Work Center For the Home  
By

Lauren McDermott

June 5, 1987

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## **Abstract**

This Thesis Report provides a review of the research, design development, and proposal for a work center for the home. Consideration is given to the special needs of the home worker, the design process, and product semantics. Included are illustrations of the visual development of the design and the preliminary design proposal. Criticism of the design and recommendations for future development are also presented.

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# Introduction

How can I tell the story of my thesis project? And how, at the same time can I best identify and illustrate the important aspects of the design of a consumer product, and present the information in an interesting, informative way? When I asked myself these questions I was beginning to identify a problem. I needed to design a solution. To the designer or the writer, the blank page, whether it is notebook paper, a drawing pad or a computer screen, represents the ultimate challenge. The ideas that will eventually be displayed on this page have been considered, and reworked several times in the designer's or writer's mind. The only difference between the two is that one develops those ideas visually, and the other verbally. Bringing these thoughts and images out of the mind and developing them on the page is an exciting and terrifying experience, demanding emotional, intellectual, and physical energy. A good design plan will allow this process of developing and presenting ideas to follow a logical route, resulting in an understandable, or readable final product. The design process is an individualized plan that requires identification of the problem, an outline of the needs and restraints inherent to the problem, the development and evaluation of alternative concepts, and the identification of a suitable solution.

To design this paper, I first identified my client and resources and formulated my objectives. I am the designer. You, the reader, are my client. My resources for developing the design of this paper are my own experience, the advice of my thesis advisors, and the writings of other authors in current periodicals and trade journals.

My objectives for the design are :

- \* Document the process of my thesis project, which involved the development of a design proposal for a portable and adaptable work center for the home,
- \* present my most current assumptions and questions about the process of design, and
- \* be simple and direct in presenting all of the information.

My next step was to prioritize the tasks involved in completing the paper, and compose a list of constraints that might be imposed on the design. I then began to translate the outlined needs and constraints into alternative design concepts, settling on the following design that I believe to be a suitable design for the task.

Each chapter, as identified in the table of contents, will be treated as a separate unit, with each one relating to but not relying on the others. The chapters can be read individually or in any order, depending on the readers interests or knowledge of the subject. The reader can choose to read just one chapter, or the entire thesis. The format will be one of review, identifying and analyzing the process of design. My thesis project, the development of a work center design for the home, will serve to illustrate my design process.

## Chapter One: Providing for the Home Worker

The way we work will change fundamentally in the coming years.<sup>1</sup> Just as the industrial revolution radically changed our methods of work in the factory, the current electronic revolution is changing the way we work in the office. Electronic communication is enabling us to do the work that once required close daily contact with our co-workers and managers, from remote locations such as satellite offices or our homes. According to estimates by Sarah Edwards, co-author of *Working from Home*, about 13 million people in the USA are currently working at home at least part-time.<sup>2</sup> Marvin Cetron, a futurist, predicts that "twenty-two percent of our population will work at home by the year 2000."<sup>3</sup> Although it is possible to recognize trends such as these, we can't possibly know what people will want to do in the future. "People's needs are neither rigidly fixed nor infinitely varied."<sup>4</sup> One thing is clear, however. We need the appropriate furniture to support us and our work, whether we choose to work in our homes or in a location away from home.

Designing specialized furniture for the information worker is not a new concept. Frank Lloyd Wright recognized the need for special task furniture when he designed the furniture for the Larkin Administration Building in Buffalo, New York, in 1904. His design for an armchair of painted

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<sup>1</sup>Katherine J. McCoy, "The Landscape of the Future: Speculations on the Post-Industrial Age," *Innovation*, Vol. 5 No. 2 (Spring 1986): 3.

<sup>2</sup>Paul Edwards and Sarah Edwards, *Working From Home*, (New York: Jeremy P. Tarcher, 1985), p. 13.

<sup>3</sup>Barbara Cornell, "Marvin Cetron Says He's Seen the Future and its High Tech Joy," *People Magazine*, January 1987, p. 87.

<sup>4</sup>Robert Sommer, *Personal Space The Behavioral Basis of Design*, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1969) p. 11.



steel and wood that rolled about on casters is a particularly good example. His "Tub Desk" and companion chair, designed for the Johnson Wax Building in Racine, Wisconsin, best shows Wright's concern for the needs of office workers. Much research into the types of work done in the cooperative office space followed. The traditional desk and credenza arrangement was beginning to be replaced by office furniture systems such as the action office, designed by George Nelson and Robert Propst for Herman Miller in 1954, which is still being produced in its updated version today. In 1981, plagued by his own question, "Why can't furniture fit like a suit?", Niels Diffrient began to work on the design of an adjustable individual work station. The result was the "Diffrient System" and the "Jefferson Lounge Chair" produced by the Sunar Hauserman Furniture Company.

The same attention given to the requirements of the office worker must be afforded to the individual requirements of the home worker. "Related ideas are frequently proposed for residential furniture," asserts John F. Pile, author of Modern Furniture. "Such units, while seemingly logical in concept, still suffer from excessive cost, and from a lack of flexibility and portability."<sup>5</sup> The furniture currently available for the work space at home is both inefficient and inappropriate. The consumer is given the choice of using existing products intended for other uses, such as roll top desks and extension tables, or installing corporate office work stations in their homes. These makeshift furniture solutions support modes of work that are neither desirable nor appropriate for the home. They do not consider the special requirements, or facilitate the special advantages of home work. Designs such as the "Jefferson Chair", while appropriate for use in some homes, tend to dictate both work style and interior design. The ideal is to have the furniture fit into the home and support existing work styles.

When we work at home we can take our shoes off, dress more

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<sup>5</sup>John F. Pile, Modern Furniture, (New York: John Wiley and Sons, 1979), p. 156.

comfortably than at the office, and assume any posture appropriate to the task. We are not constrained by what is thought of as proper behavior or stature. Residential furniture offers many options for achieving comfort in the home. We recline on sofas, outdoor lounge chairs, beds, the floor, and even on "recliners". We work while standing at the workbench in the basement, and at the counter in the kitchen. We sit on overstuffed and upright chairs, coffee tables, ottomans and the floor, using any available horizontal surface to support our papers, tools, and feet. Office furniture often dictates how we should work; residential furniture must accommodate us as we prefer to work.

When we work at home we don't need to be confined to a particular location in the house. We have the option of working in a secluded attic or in the family room. At the end of the day we can move from the east side of the house to the west side to enjoy the last bit of sunlight. We may need to work near the kitchen or baby's room to keep an eye on things. Joe Columbo, an Italian designer, experimented with multi-purpose, and portable furniture in the 1950's and 1960's. Through his innovative use of the new materials that were becoming available, he expanded the conceptual framework of furniture design. His designs for mobile furniture are just as appropriate for today's residential market.

Furniture for the home, especially if it is intended to help us with our varied tasks, must be adjustable to our individual statures and be adaptable to our unique work styles and the environment that we create in our homes. "All people are builders, creators, molders, and shapers of the environment; we are the environment."<sup>6</sup> As we do more varied work at home, residential furniture must be designed to fit in with and enhance our daily activities. Only then will we enjoy the benefits and comfort of this work.

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<sup>6</sup>Sommer, Personal Space, p. 7.

## Chapter Two: The Design Process

Product design, in the most general sense, is the creation of objects to aid people. As designers, we attempt to provide, with the aid of research, analysis, and intuition, the optimum solution possible at a given time and place. Both the physical, operational aspects and the visual effect of the product are important. At times during the design process, our intellectual or intuitive instincts may dominate. They can not, however, be thought of as exclusive traits. Our intellect forms the foundation of our intuition.

"Intuition is a synthesizing faculty that draws on our miscellaneous, random experience of life, supplemented by a body of knowledge deliberately developed and systematically structured."<sup>7</sup> The success of the final product relies heavily on our ability to know when to employ our intellectual and intuitive faculties during the design process.

The process of design is not, however, entirely predictable or linear. Industrial design is a process of thought, perception and judgment. We must begin with a plan, but be open to spontaneous diversions from the plan. Throughout the process we interact with the design, asking ourselves questions about form, color, texture, proportion, and appropriateness to the environment. As we answer these questions we must rely on our research, moral sense, and cultural perceptions. Discoveries made during the design process often lead to new areas of research changing what was originally a linear plan to a circular one.

We are confronted with design problems daily: toasters that burn both the toast and our fingers, cars doors that are difficult to climb through, buildings that are inaccessible to significant portions of the population, and

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<sup>7</sup>Hin Bredendieck, "Industrial Design: Art or Science?" Innovation, Vol. 3 No. 4 (Fall 1984) : 23.

tools that are both difficult and hazardous to use. Designers have the privilege and responsibility to solve these and other problems, to make things better. Occasionally we have the opportunity to orchestrate the entire design process, from the very early task of identifying the problem, through the development and production stages, to the evaluation and redesign of the product after it has been marketed. This chapter describes my design process during the development of a work center for the home, from the problem identification to the preliminary design proposal stage.

## **Project Objectives**

My initial project proposal was broad based and allowed me to explore many different directions early in the process. I had two primary objectives.

1. Expand on my original research, indicating that more people are now working at home than in the past<sup>8</sup>, by focusing on the furniture requirements of this work.
2. Develop a furniture product or system that encourages personalization through alteration, adaptation, or specification by the consumer.

I chose to explore the human desire to create a unique physical environment by altering products after purchase and requesting modifications before purchase. My approach would involve viewing design as a process that does not end with manufacturing, but continues throughout the existence of the product, involving the consumer and how he chooses to use the product.

## **Design Plan**

To begin, I generated a plan for the design process. The most crucial

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<sup>8</sup>Edwards, Working.

element of the plan was to take a system design approach. System design is often discussed in two overlapping ways.

1. The design of a collection of parts or products that work together as a group or "system".
2. The necessity of designing within a "system" considering how the product works within its environment.

I am referring to the second definition when I use the term "system design". I found it to be crucial to consider the prospective users, the tasks to be performed, and the user's environment before considering the actual product.

## Research

After outlining the project objectives and the design plan I began to prioritize tasks. First I looked at design solutions to similar problems. A common problem for the corporate office furniture specifier is the varied needs of those who work in the office. The solution lies in the successful combination of desks, storage units, wire handling, lighting, etc. to suit the client's needs exactly. The components that work best for this are modular in design. Modular components can be produced in large quantities, reducing manufacturing costs, and then stocked ready for assembly in a specified configuration. One problem with this is that specification of the necessary modules to create the ideal system can be difficult. At least one manufacturer is now supplying an electronic data base that illustrates the products and lists the features, price and options available from that manufacturer.<sup>9</sup> This type of electronic catalog allows the customer to make more suitable selections faster.

Another problem with modular systems is that the customer must

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<sup>9</sup>Terry VandeWater, "Software That Speaks Your Language," Herman Miller Magazine, (1986): 43.

make one large initial purchase of the necessary components for a complete system. The residential furniture buyer may not want to make that kind of financial commitment. The future holds great promise for the use of modular parts, however, especially when combined with the possibilities of rapid prototyping. Rapid prototyping greatly reduces the time elapsed from design concept to running prototype. Industrial designer, Joseph M. Ballay, states that "The emergence of techniques for 'rapid prototyping' is potentially one of the most powerful manufacturing developments. Consider that there might be a very fine line between rapid prototyping and rapid individualized production."<sup>10</sup> Rapid individualized production will make it possible for the individual consumer to order a tailor made work station and have it produced and delivered in a very short time. This will affect the types of products available and their marketing. Large scale manufacturing will be able to meet the needs of the individual. Providing adjustable and adaptable furniture products, however, is a timely alternative.

A multitask office system that is currently available is the Jefferson Chair, designed by Neils Diffrient. The Sunar Hauserman Furniture Company, with headquarters in Cleveland, Ohio, produces the system which has a "luxurious lounge chair with ottoman, adjustable table, lighting and a whole group of computer accessories for use in the home and the office. . .".<sup>11</sup> Diffrient made an informal survey of how people work, and realized that we have unique work habits, and seldom work in the "correct posture" position. Sunar Hauserman also produces the "Diffrient System". This office system incorporates adjustable height and angle work surfaces, and several accessories that "give you an ambient light column and task light,

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<sup>10</sup>Joseph M. Ballay, "The Rose and the Chip: Feeling Our Way Through the Information Age," Innovation, Vol. 5 No. 2 (Spring 1986) : 25.

<sup>11</sup>"Sunar Hauserman Takes a Curtain Call at Neocon 16." Leading Edge 10, (October 1986) : 53.

support for your telephone, your in-out baskets, or your copy stand. All of these accessories have their own track in the work tops. . ."<sup>12</sup> This adjustable and flexible system has many of the features desirable for the home work space. It is expensive, however, and it takes up a lot of space for what it does. For these reasons, I don't believe it is suitable for most homes. The Herman Miller furniture company in Zeeland, Michigan currently produces several office systems that offer flexibility at the time of installation and after. The "Steelframe" Storage System developed by John F. Pile for George Nelson, Co/Struc, a system of storage and work surfaces developed by Robert Propst for institutional use, and the "Action Office" also developed by Propst and Nelson.

After studying available office systems, I listed the constraints that would be imposed on the design. This list became a point of departure and provided guidance throughout the concept development stage. The constraints were primarily influenced by the user's environment.

- \* The product must fit into the prospective customers' home environments, which will vary tremendously.
- \* It should be compact and use space efficiently.
- \* The cost of the product must be modest, relative to the cost of other residential furniture.

## **Task Analysis**

It was important to consider the type of work that we do in the home, and the manner in which we approach it. Effective design requires the designer to consider a wide range of criteria that might influence the final solution. We stand to wash dishes, change babies, iron clothes, and sometimes to eat. We sit upright to play cards, type, write and talk on the telephone, we recline to watch television and read. The fact is, we do all of

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<sup>12</sup> Robert B. Cadwallader, "Furniture that Fits Like a Suit," Leading Edge 5 (June 1984) : 20.

these things, and more, in various postures. Some activities, such as casual conversation on the telephone, need no support furniture. A telephone and a wall to lean against are all that are necessary. Other activities, such as dining, are well supported by existing furniture designs. My intent was to provide support for activities that are not currently supported by available furniture, and to provide a logical alternative for some that are. I made the following observations while viewing people at work in their homes.

- \* Residential furniture offers little or no flexibility in meeting the anthropomorphic needs of multiple users. Users must often hunch over counters that are too low, and sit up to tables that are too high.
- \* Desks are usually located in a remote part of the house, requiring the users to make a special effort to position themselves in front of them to work. They often collect piles of bills, magazines and mail.
- \* Most residential furniture items are used for activities other than what they were designed for.

## **Design Objectives**

From my research and task analysis I was able to identify several design objectives. I determined that the product should:

- \* fit comfortably in any room of the house, both in appearance and physical size.
- \* accommodate tasks such as word processing, reading, writing, drawing, and the tools necessary for these tasks.
- \* accommodate various postures such as sitting upright, reclining, leaning forward and standing.
- \* be transportable, from room to room, floor to floor, and door to door.
- \* project an image of productivity, by looking and being efficient.



## **Concept Generation**

My next step was to begin translating the needs and constraints into design concepts. These concepts were actually a wide range of possible solutions to individual problems. I dealt with each problem independently, trying to exhaust the possibilities, before putting them together in a unified design.

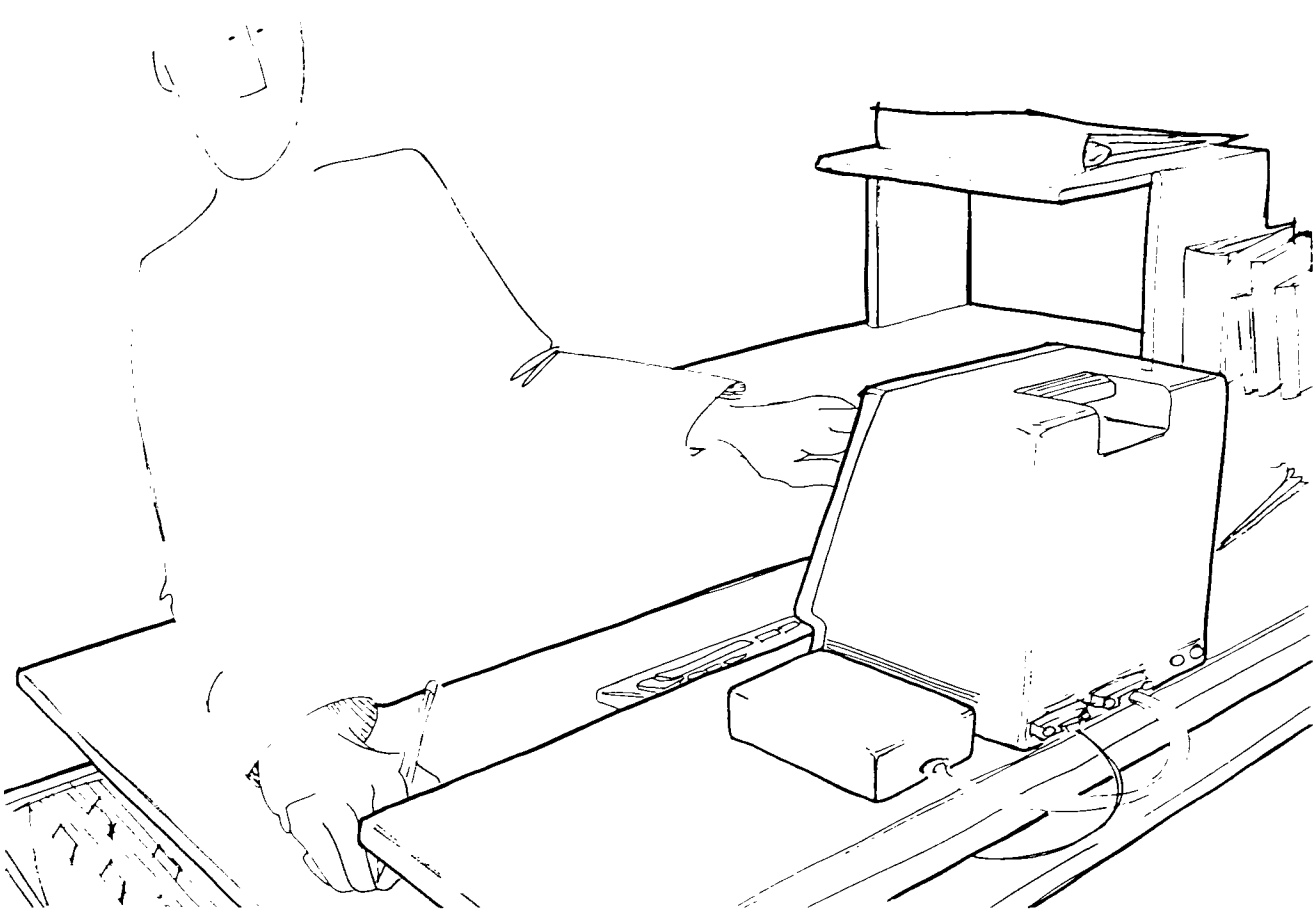


Figure 1

This preliminary study sketch was done to analyze the traditional work station. The user has dedicated an area of the home or office as a work space, and has equipped it with a desk, file storage, a chair, and other essential furniture. When located in the home, this area is often located away from the family activity areas, providing a quiet, private place to work, but limiting its use to "serious work" only.

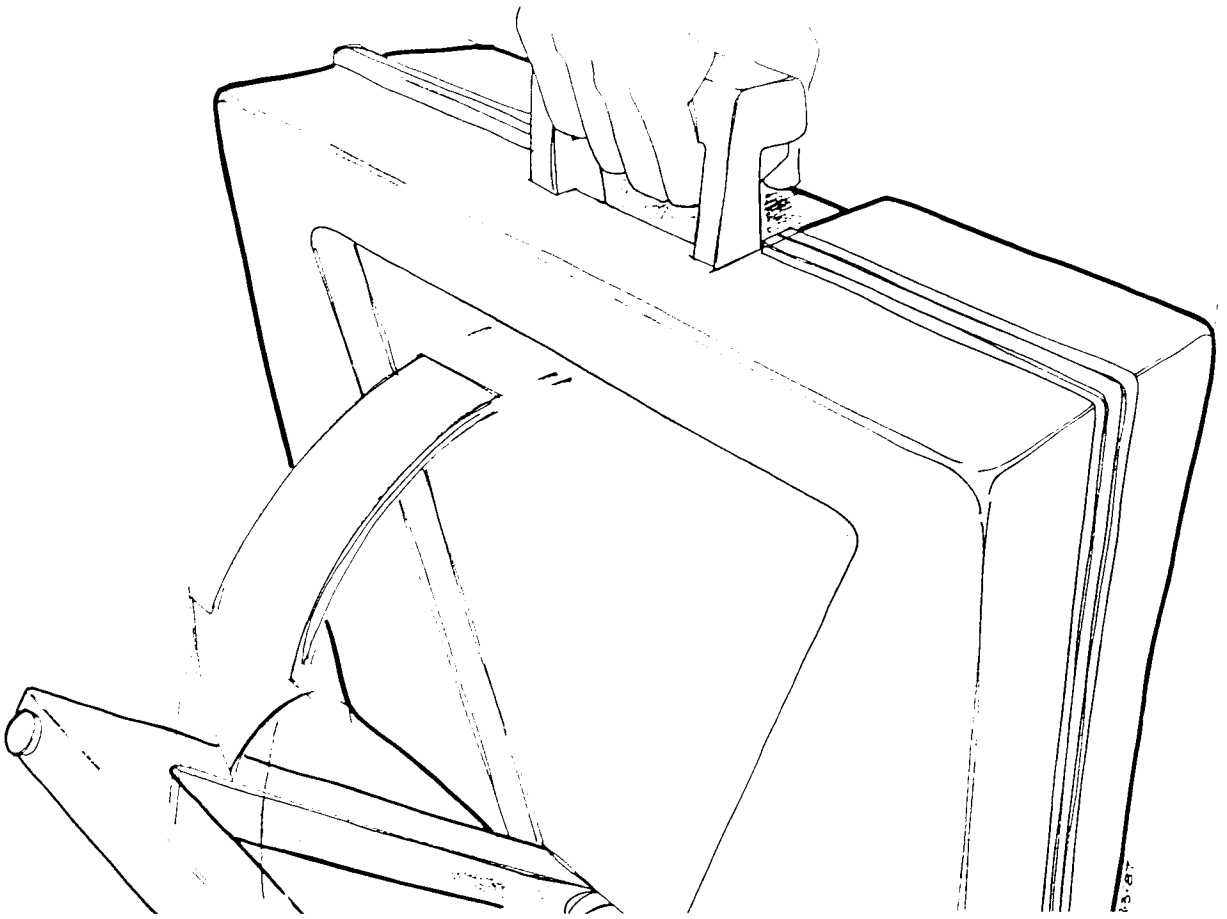


Figure 2

This highly portable work space can be transported from the home to the office. The fold out leg structure converts the briefcase into a desk.

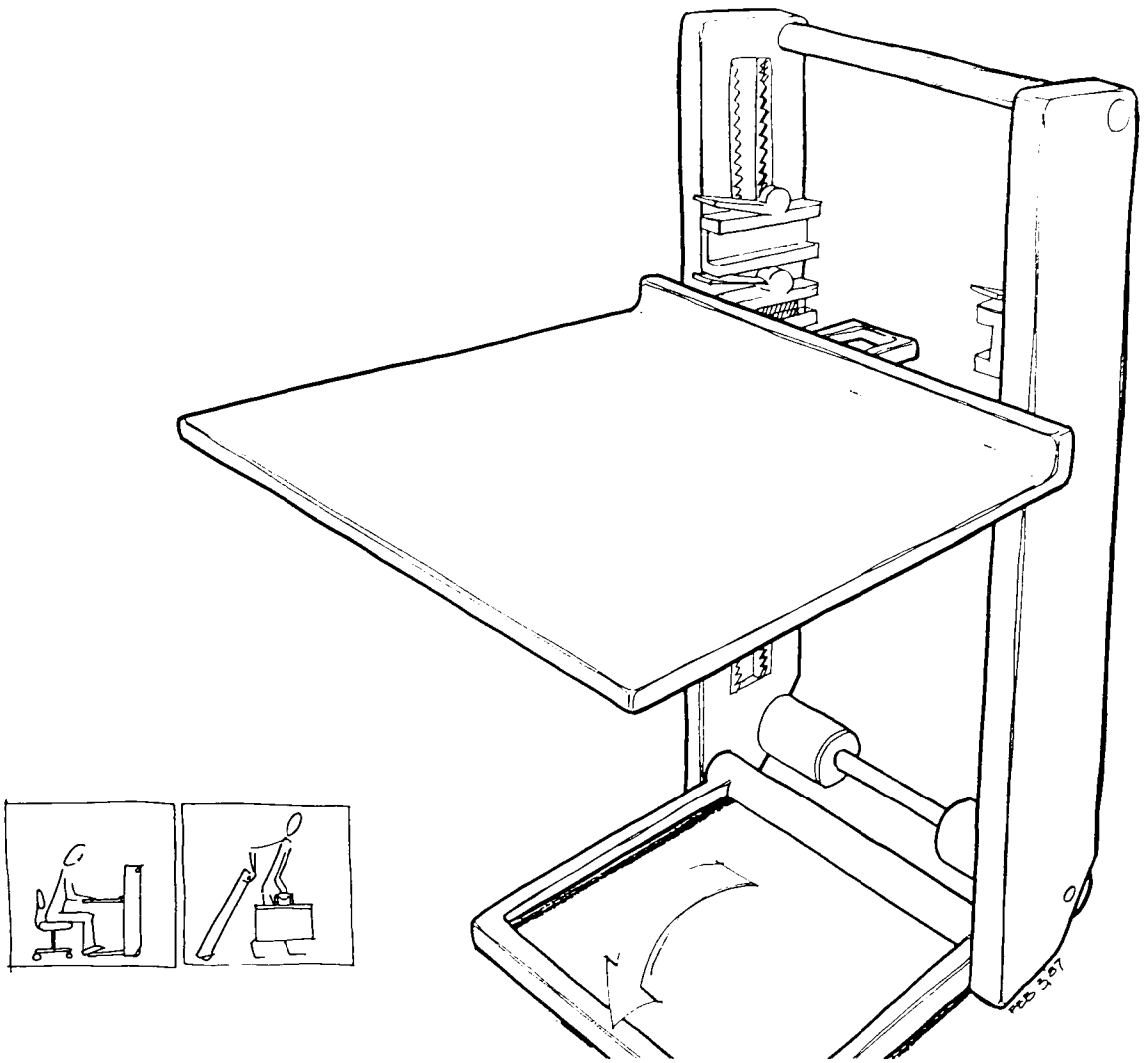


Figure 3

The stand of this work station accepts modular units designed for different types of work. Shown is the simple work surface module. Other options would include a clip in briefcase, drawing board, personal computer, and book holder for reading.

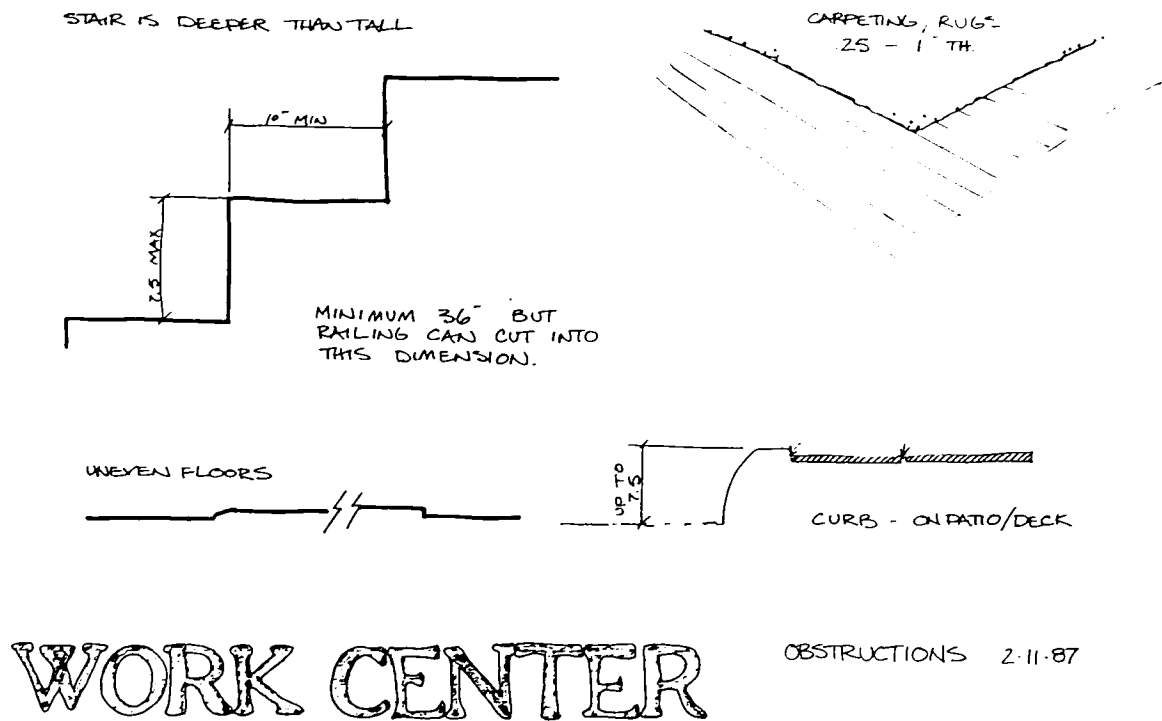
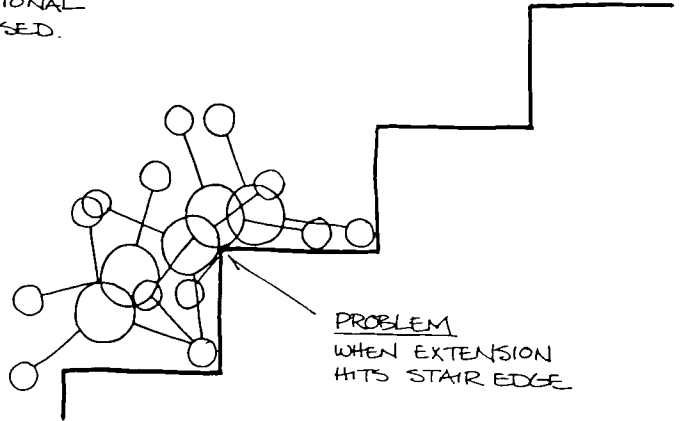
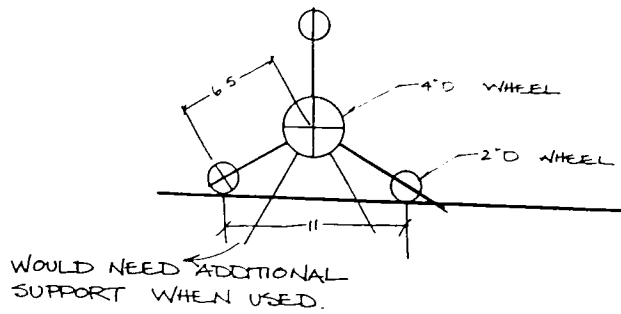


Figure 4

There are many obstacles in the home. A portable work station should be able to navigate these typical ones.



WORK CENTER

CLIMBING STAIRS 2.11.87

Figure 5

To eliminate the rough ride a piece of furniture must take when being taken up and down the stairs, I experimented with this concept. The design, consisting of one wheel at the center and three wheels extended on axles 6.5" from the center, provides a smoother ride, by climbing rather than rolling up the stairs

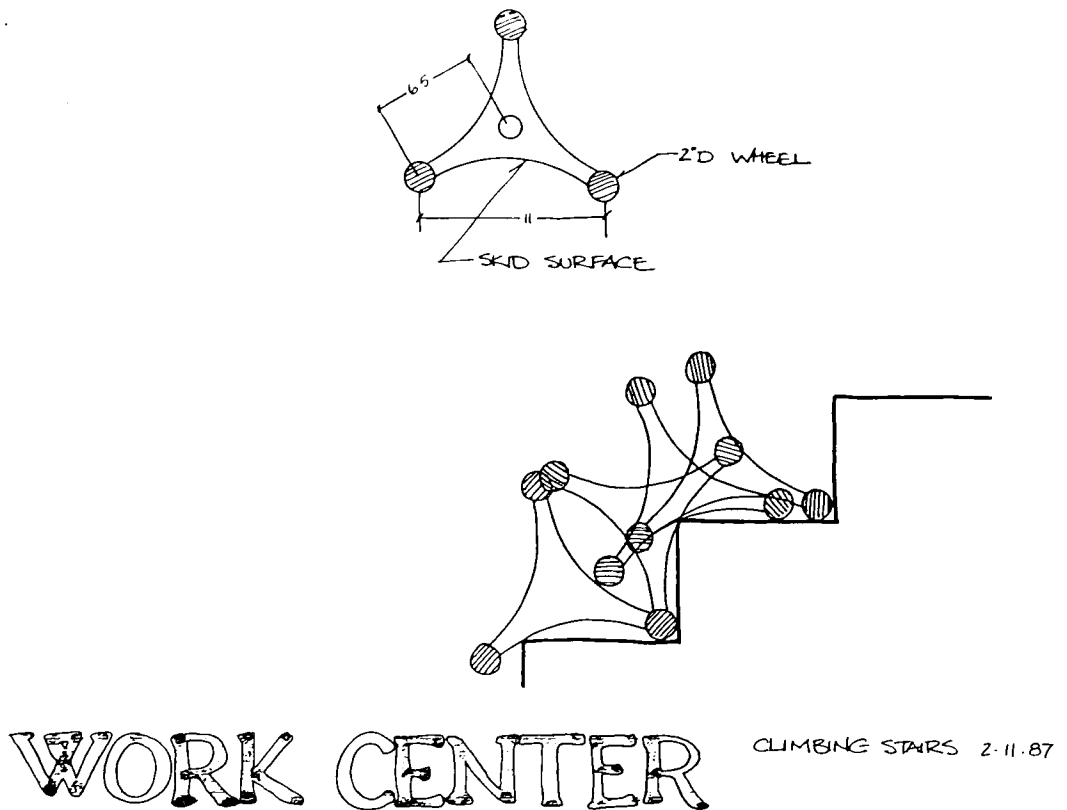


Figure 6

An alternative to the concept shown in figure #5, this design replaces the center wheel with a skid surface, providing an even smoother ride. The skids, however are only usable on carpeted stairs.

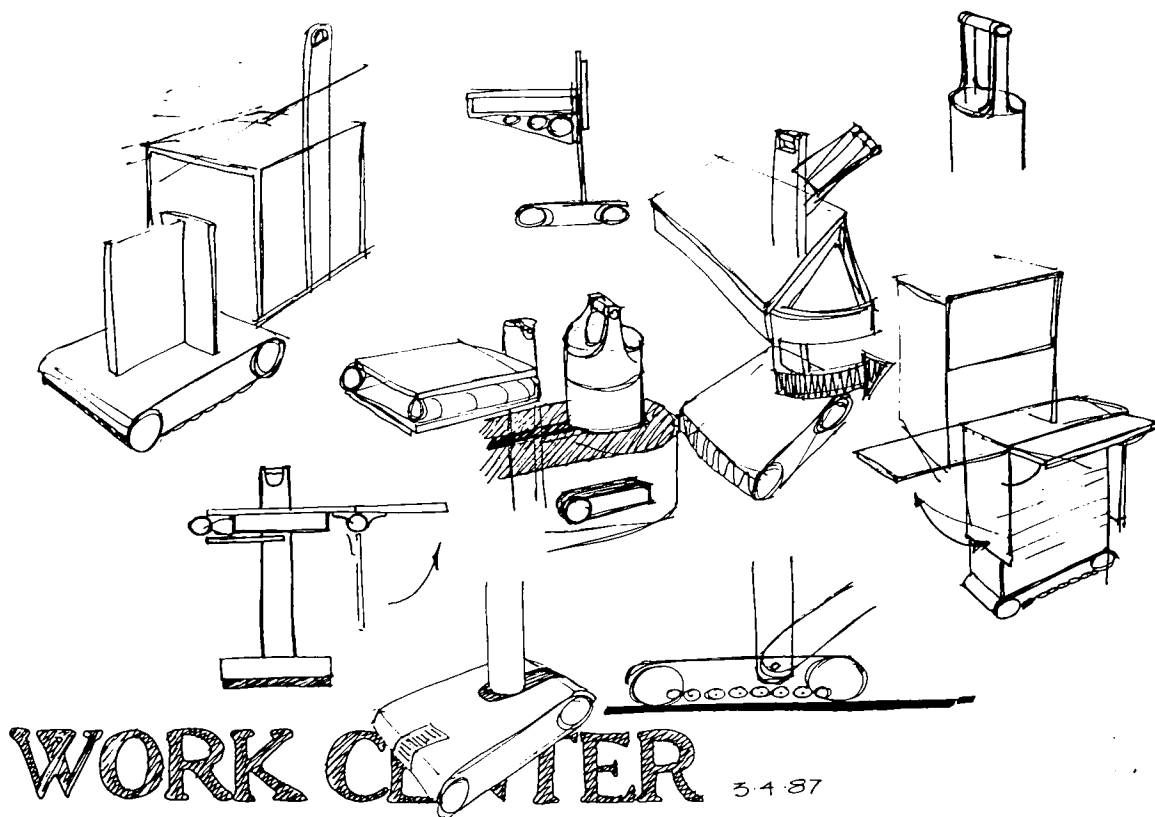


Figure 7

The series of thumbnail sketches shown in figures 7 and 8 show some very rough ideas for folding and transporting the work station.



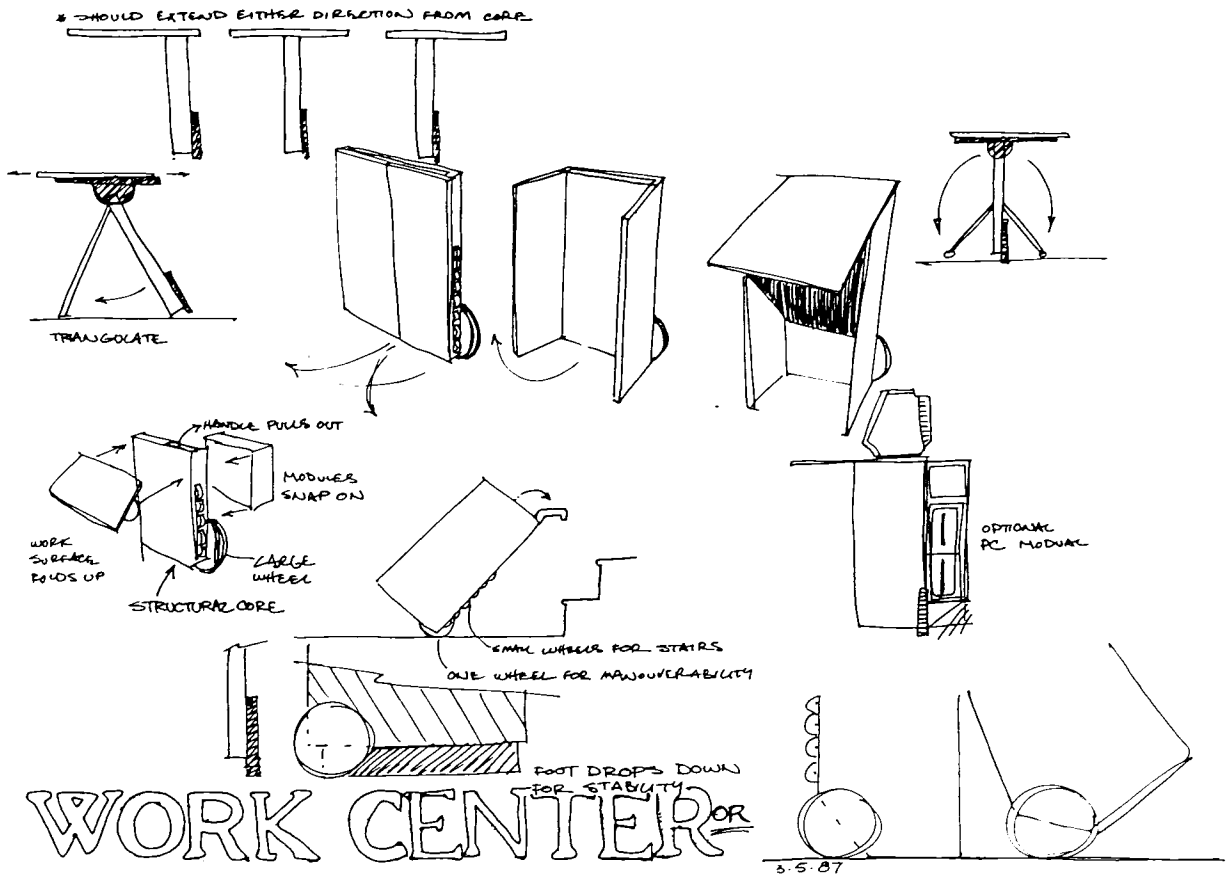


Figure 8

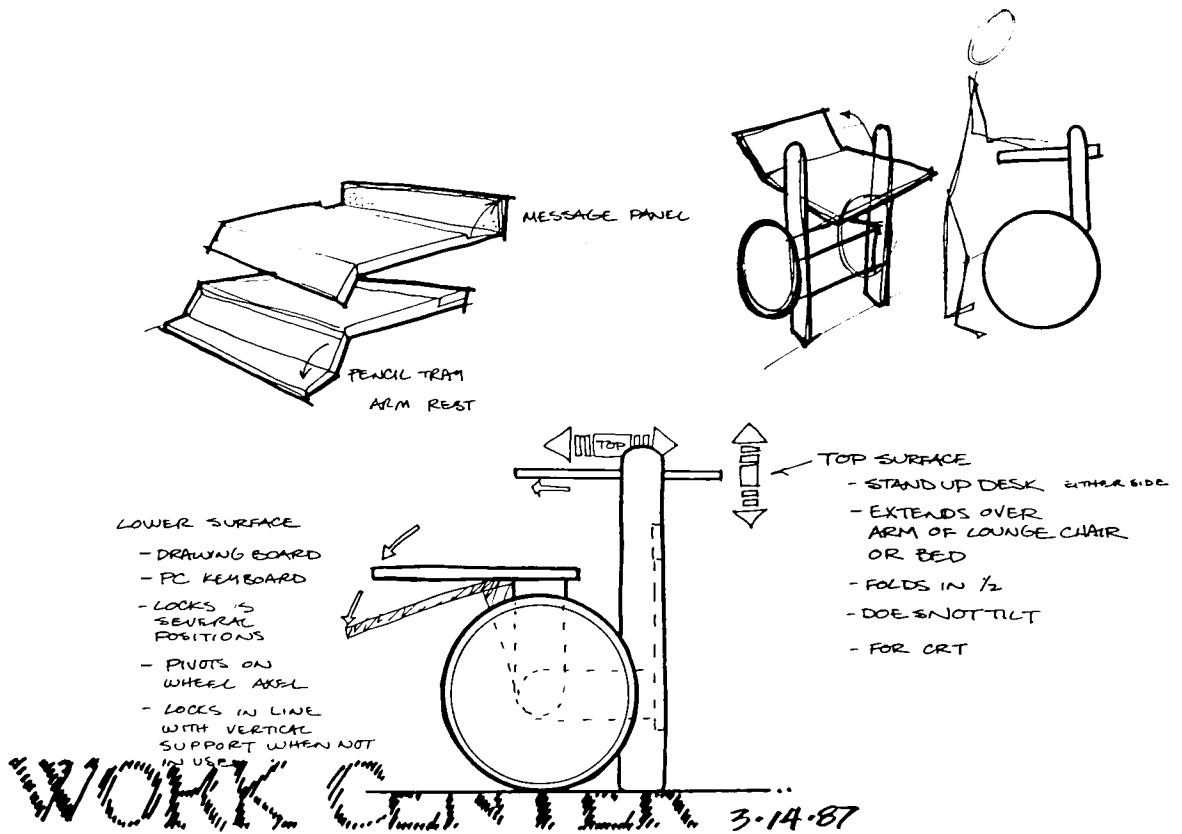


Figure 9

This form study combined several different concepts into one design. The oversized wheels make it easy to roll the unit over most obstructions. The surfaces are adjustable and fold up for transport.

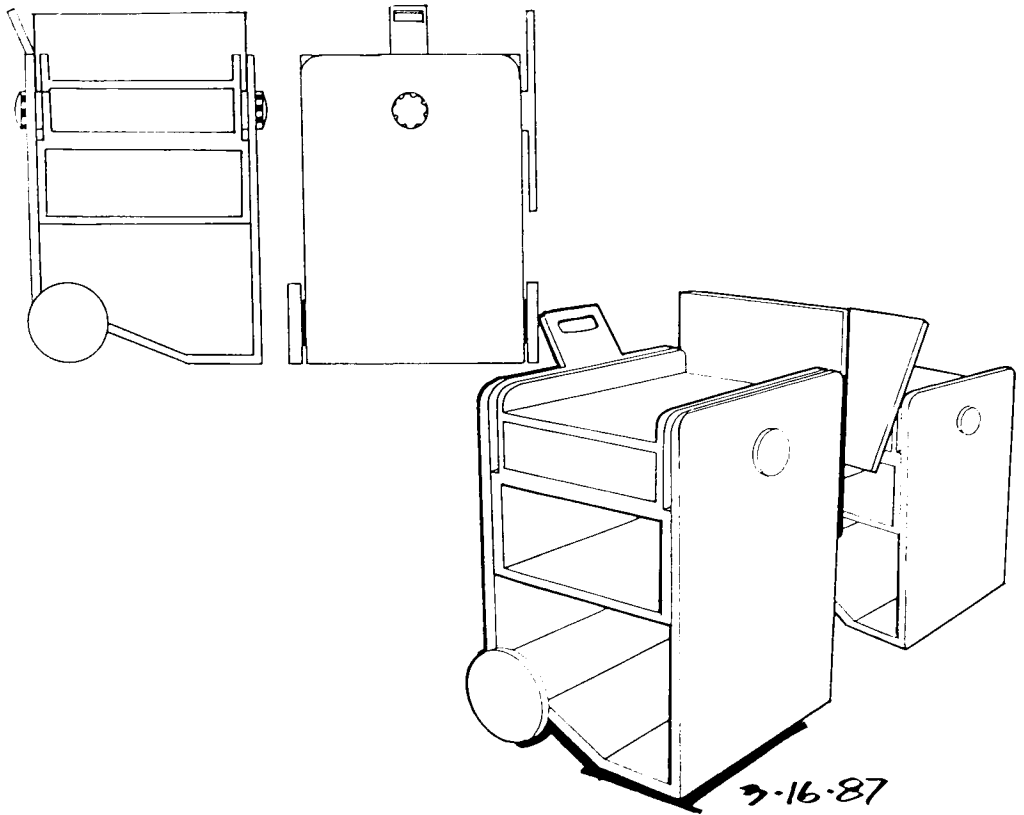


Figure 10

This design has a movable work surface that locks at any angle and stores vertically along one side. The location of the wheels makes it necessary to tip the unit to roll it, and makes the unit very stable when it is upright.

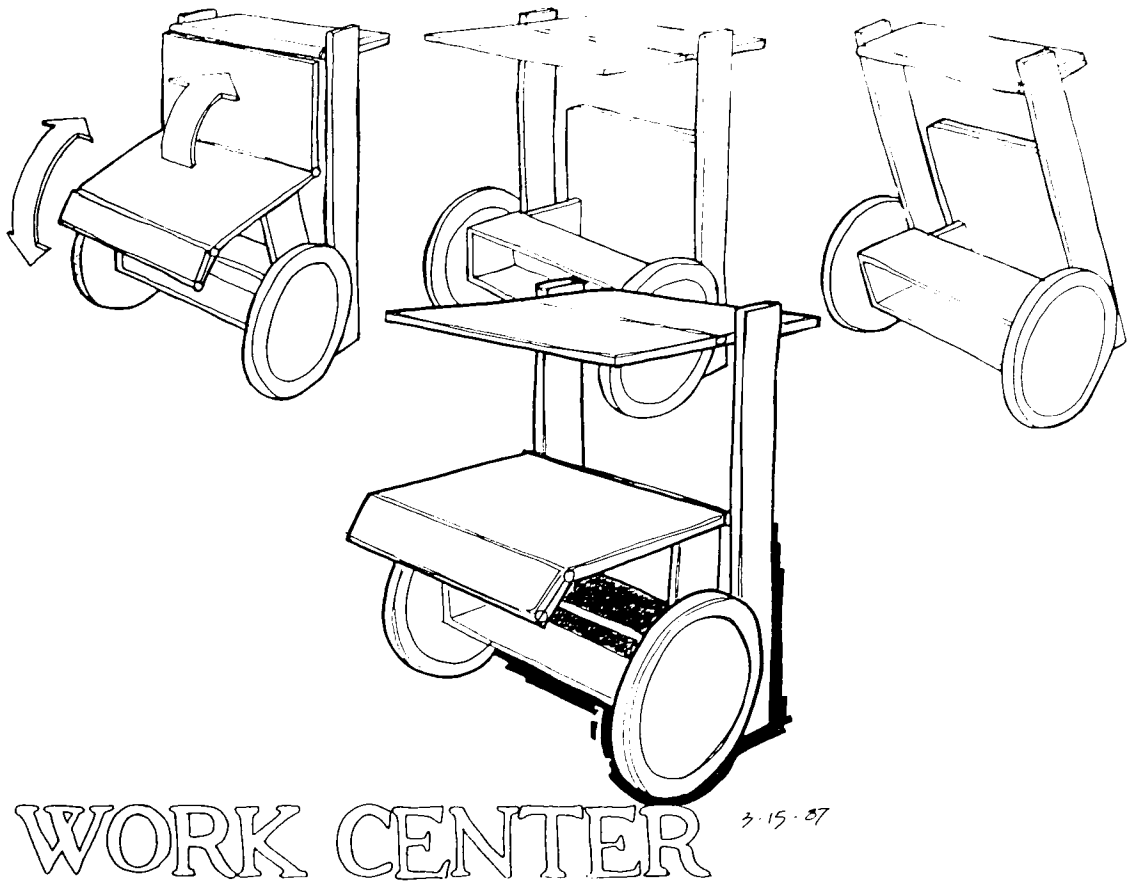


Figure 11

This design is similar to the one shown in figure 10, but has an additional work surface. Some storage area has been sacrificed to make the unit lighter and more versatile.

After evaluating the possible solutions that I developed in sketch form, I began to articulate the most promising and necessary solutions in three dimensions. I constructed two half scale mockups out of cardboard, foamboard, and styrofoam. It was possible, with the aid of these mockups, to evaluate the preliminary design based on my design objectives. Evaluation at this stage of the development was critical to ensure that the design would be suitable for the intended users, tasks and environments.

### **Mockup#1 (Figures 12, 13, and 14)**

#### **Features:**

1. The two surfaces adjust independently in height and angle.
2. The top surface is accessible from either the front or back.
3. The unit folds out flat for storage and transport.
4. There are wheels that roll on flat surfaces and a skid for transporting the unit up and down the stairs.

#### **Problems:**

1. The unit appears bulky when in use.
2. The lower surface is accessible from the front only.
3. The unit is awkward to handle when opened up for transport.
4. The work center can not be easily moved when it is set up.

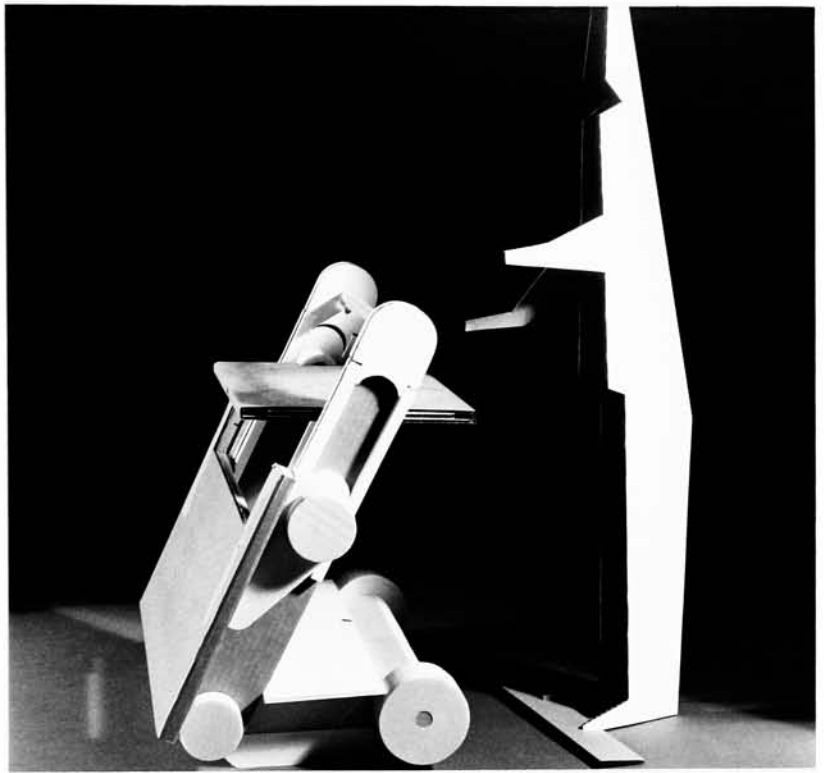


Figure 12

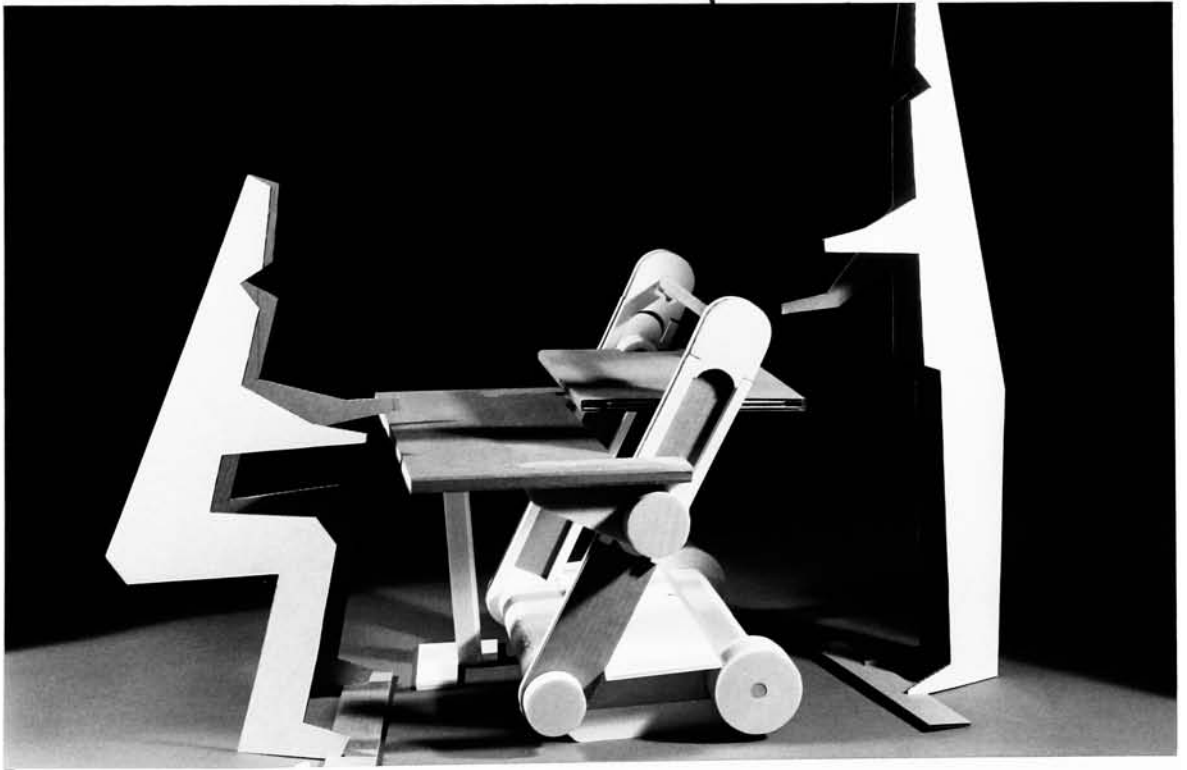


Figure 13

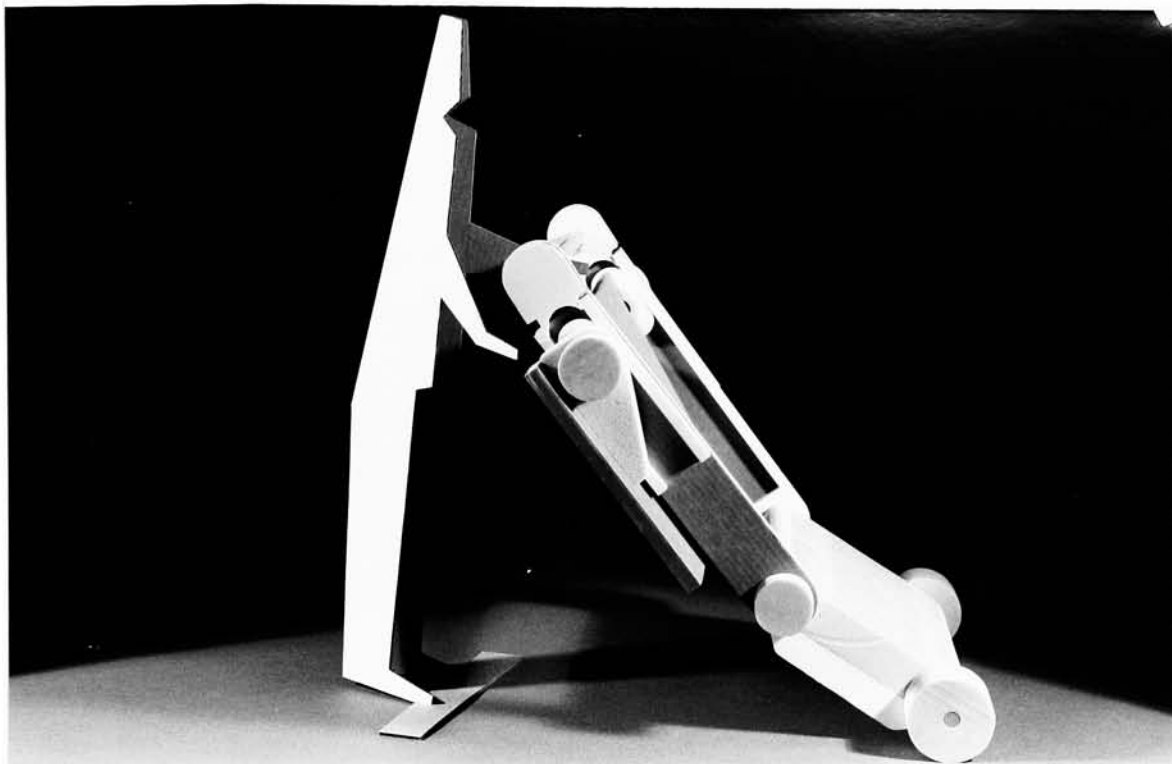


Figure 14

After studying the first mockup I made some improvements to the design. By adding split work surfaces that fold on either side, I made the unit accessible from both sides. Changing the location and direction of the wheels made the unit more maneuverable.

### **Mockup#2 (Figures 15, 16, and 17)**

#### **Features:**

1. The two surfaces adjust independently in height.
2. Each surface consists of two panels, making the unit accessible from either the front or back.
3. The unit folds up flat for storage and transport.
4. There are wheels that roll on flat surfaces, when the unit is tipped up, and a skid for transporting the unit up and down the stairs.

#### **Problems:**

- 1.The folding support mechanism is cumbersome and it gets in the way of the seated user's feet.
2. The work center can not be easily moved when it is set up.
3. When the top surface is adjusted to the top position it is 48" tall, which is taller than necessary.



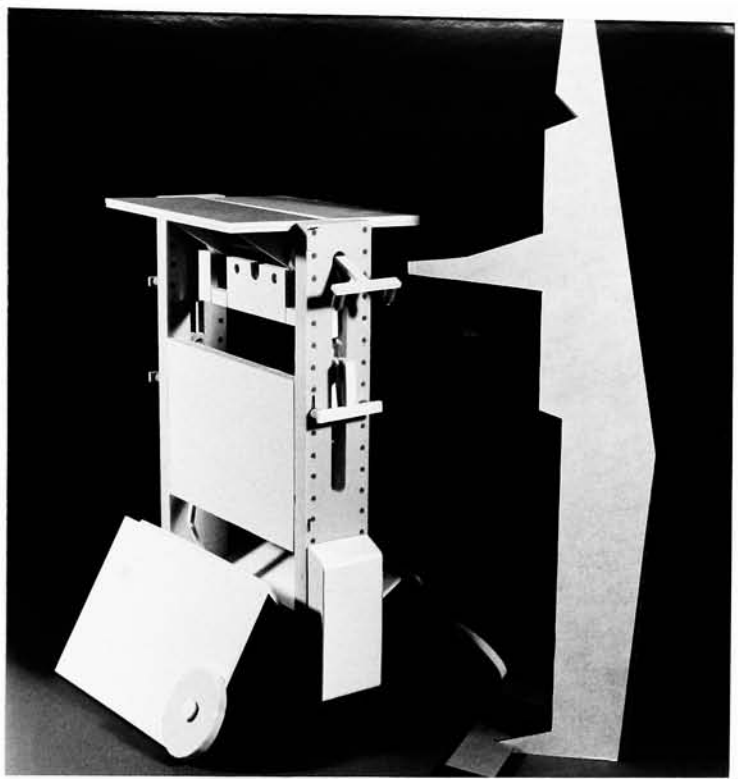


Figure 15

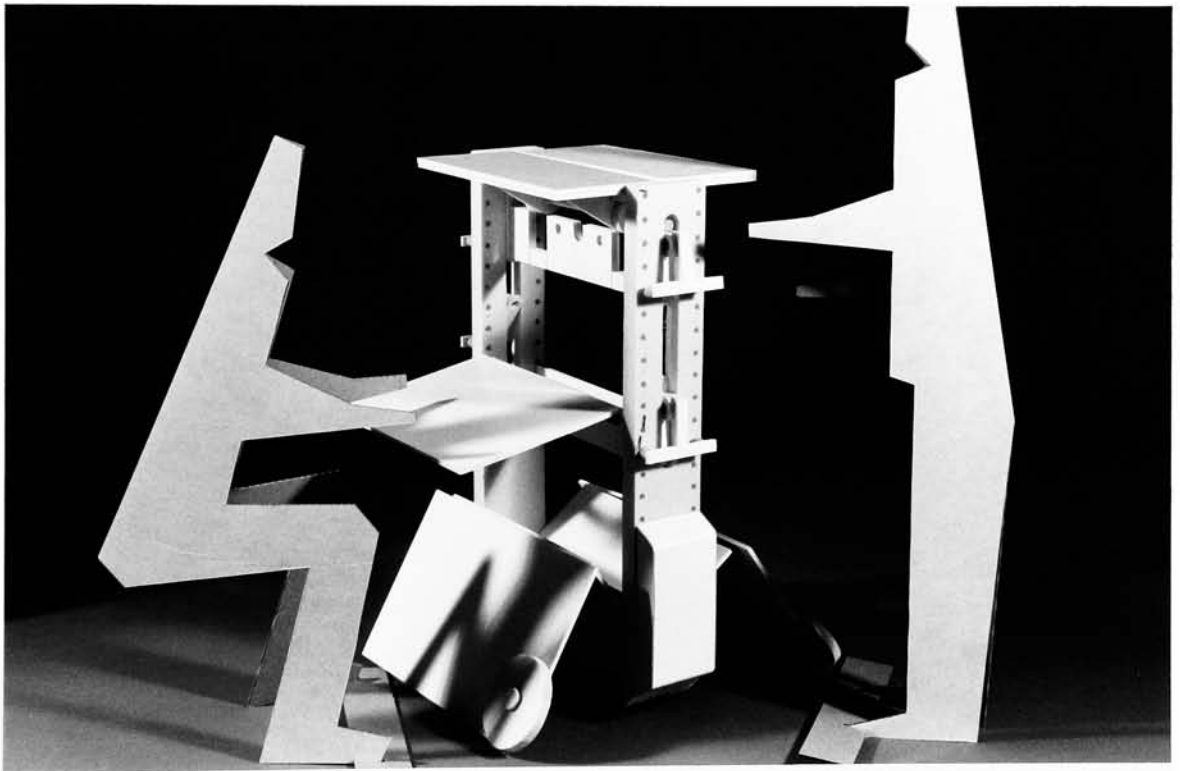


Figure 16

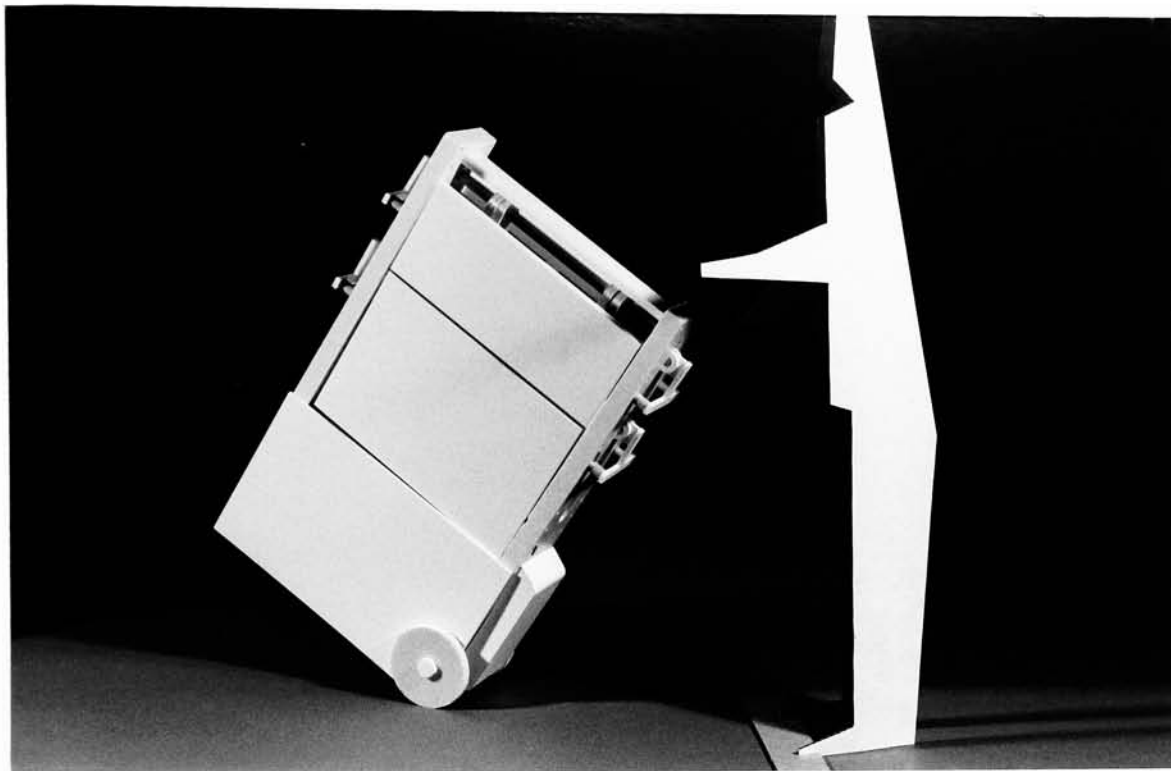


Figure 17

From these two mockup form studies I was able to make some final decisions about the overall form of the product. Several details were refined and production materials were chosen.

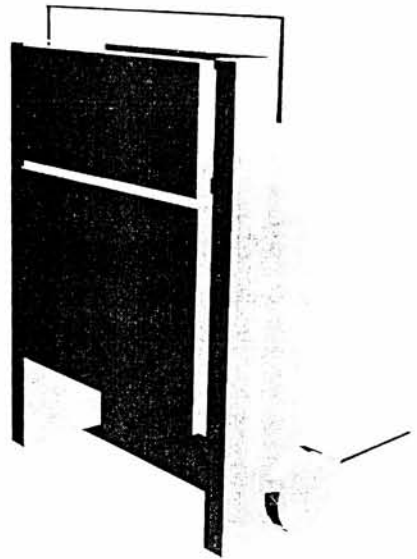
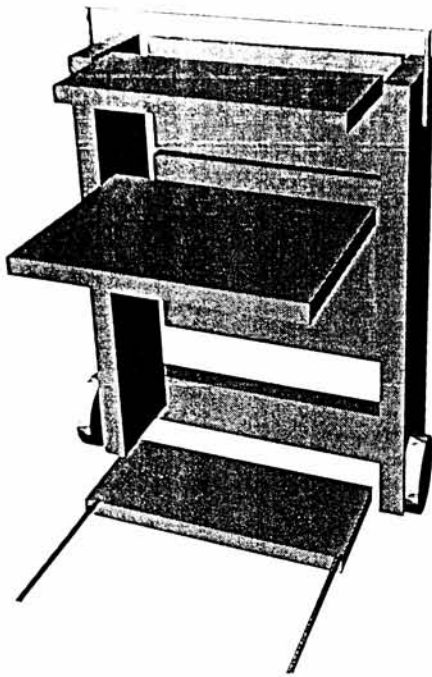
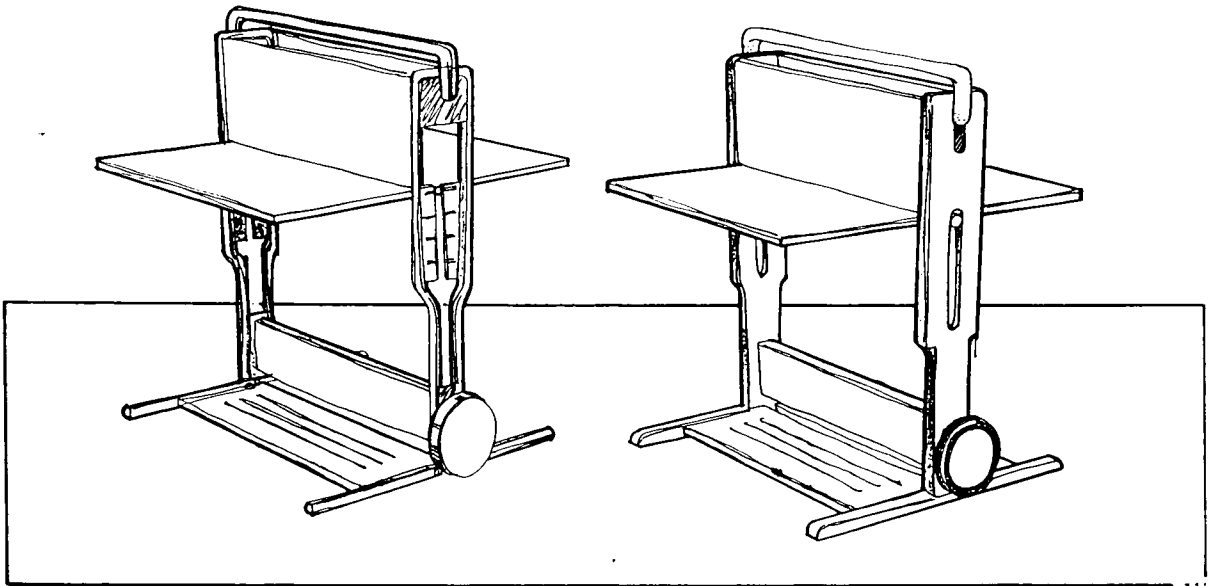


Figure 18

This form study was generated on the Macintosh computer, using three dimensional modelling software. The design consists of four work surfaces that fold up and down independently. The handle allows the unit to be easily maneuvered when tipped, but prevents the two top surfaces from combining to form one unobstructed surface.



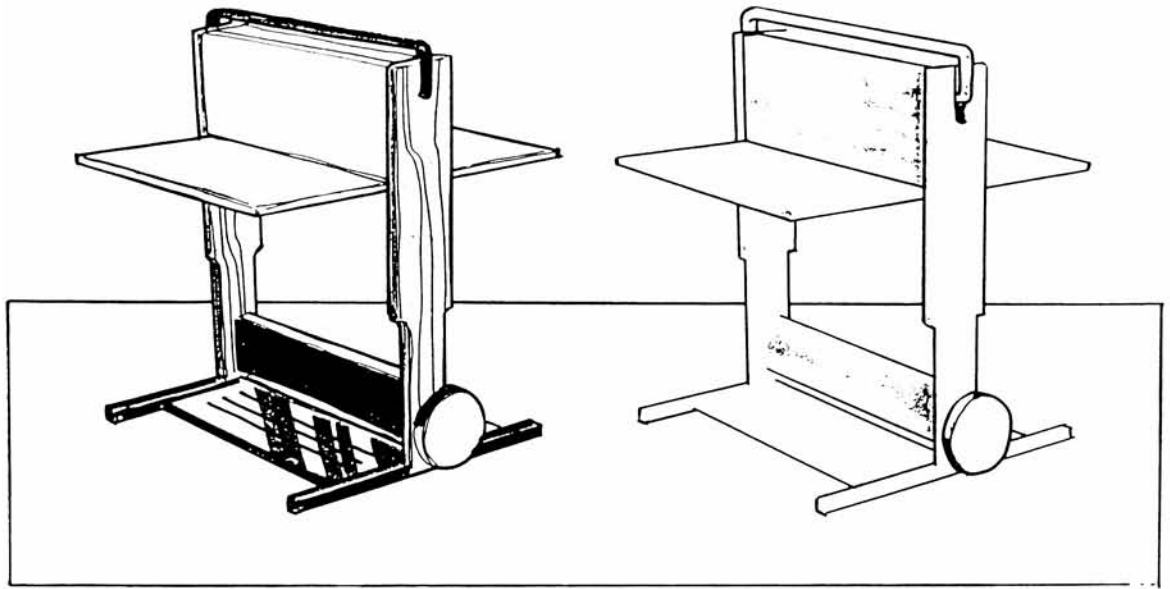
○ STRUCTURE: PAINTED TUBULAR STEEL  
○ SURFACES: PLASTIC LAMINATE

○ STRUCTURE: PAINTED WOOD  
○ SURFACES: PLASTIC LAMINATE

Figure 19

Different materials impose different restrictions on the design.

Shown here is the same basic form as it could be produced in tubular steel ( left ) or painted wood ( right ).



- STRUCTURE: WOOD, PAINTED STEEL
- SURFACES: PLASTIC LAMINATE

- STRUCTURE: INJ. MOLDED PLASTIC AND STEEL-PAINTED
- SURFACES: INJ. MOLDED PLASTIC

Figure 20

This sketch shows the work station as it would look when produced in solid wood ( left ), or plastic ( right ). Injection molded plastic offers the most design possibilities, but demands production in high quantities.

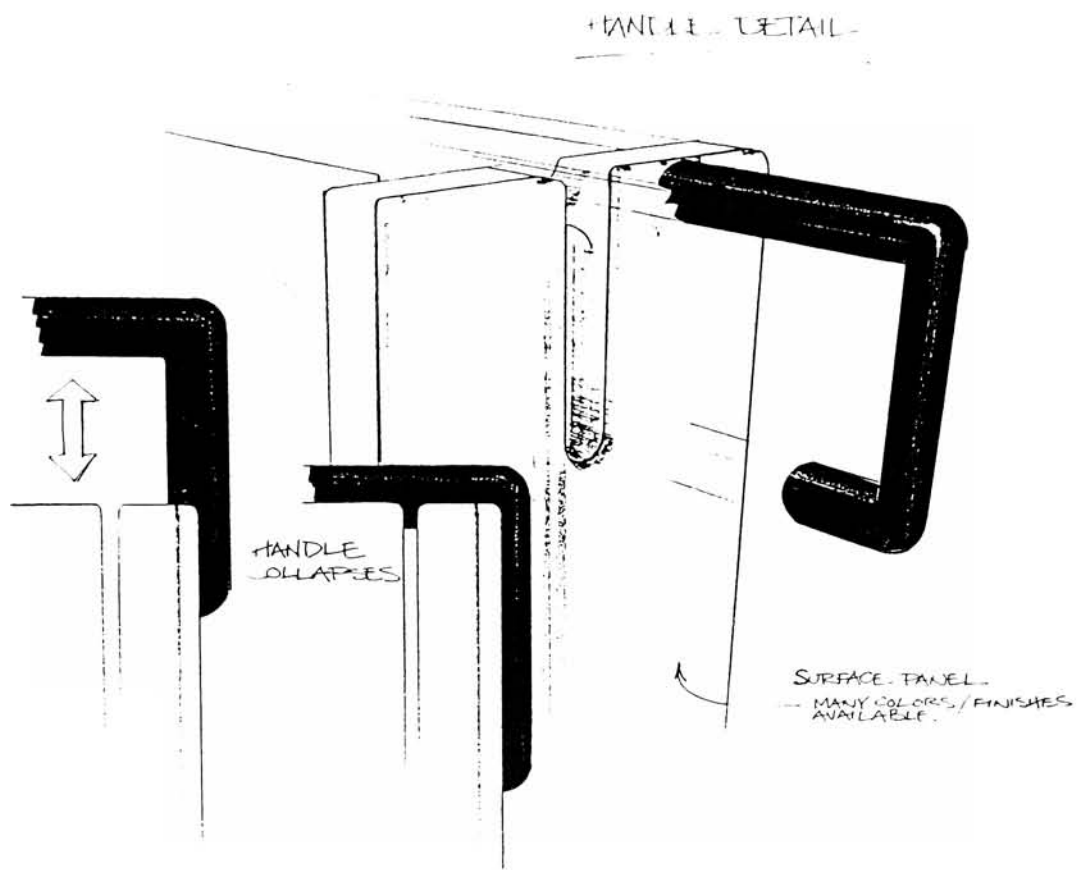


Figure 21

This sketch shows the development of the handle detail. The handle pulls up to be used and tucks into the frame when not in use. The top surfaces open up flush with the top of the handle, forming a smooth surface.

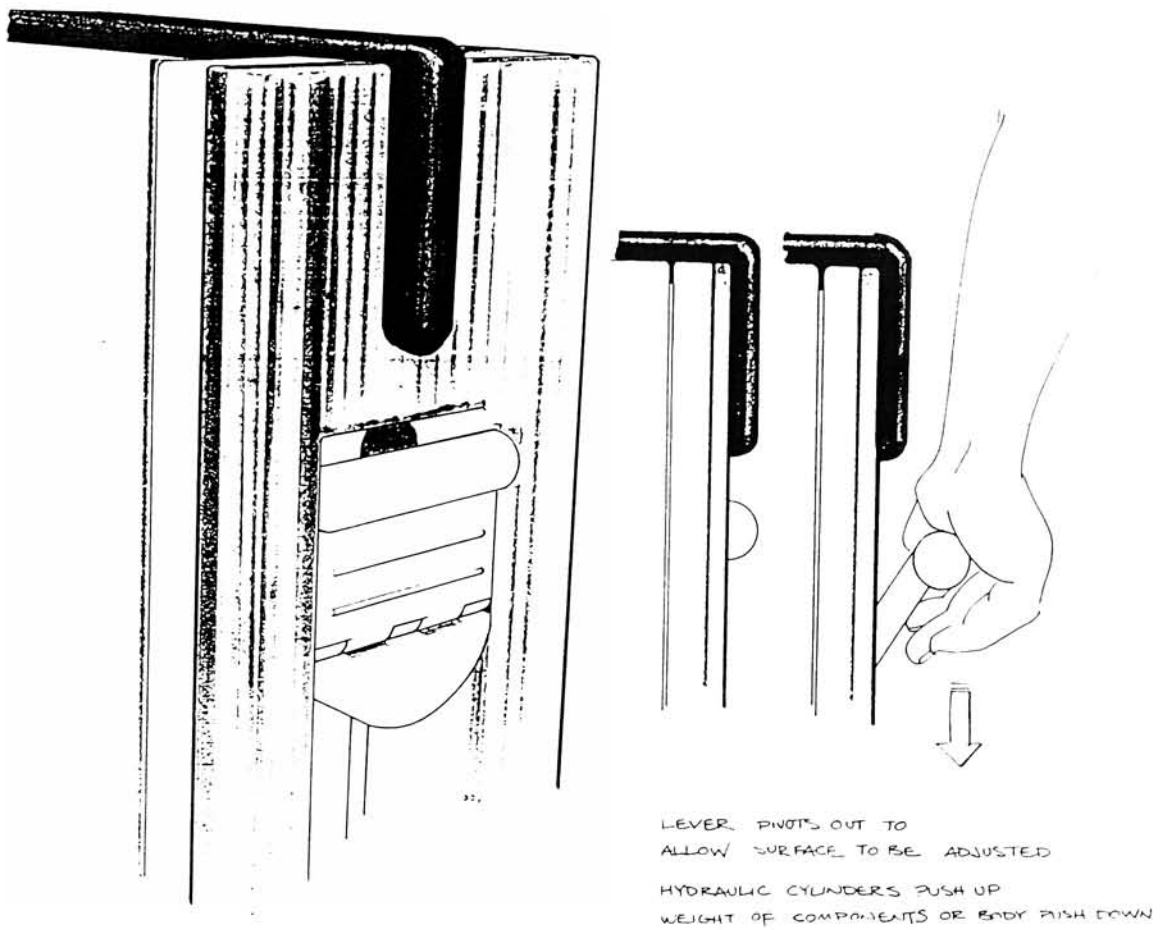


Figure 22

This sketch shows a height adjustment handle. The handles pivot out to release the pneumatic cylinders and fold in tight to the sides when not in use

## Design Proposal

The final design proposal, as illustrated in figures 23-33, was presented using a full scale articulating mockup, and exhibits the following features:

- \* The work center, when completely closed, balances in the upright position and can be tipped slightly to engage the wheels. The 9" diameter wheels allow the unit to roll up and over obstacles, such as carpets, irregular floors and stairs. The narrow profile allows it to be stored easily. ( see figure 24 )
- \* The user can pull down one or both support legs located on either side of the unit with his foot. ( see figure 25 ) The sliding panel is then pushed into the vertical structure to lock the support in place. The grooves allow the panel to be pulled out of this locked position, when collapsing the unit. ( see figure 29 )
- \* Each support leg contains two 1" ball bearing glides that allow the unit to be repositioned while it is set up.
- \* Once the supports are engaged, the bottom work surfaces can be raised independently to a position parallel to the floor. ( see figure 26 ) The locking mechanism automatically engages in the vertical or horizontal position, and is released when the handles are squeezed together with the fingers. ( see figure 27 ) Each of the bottom work surfaces are 24" wide by 19" deep, providing a surface measuring 24" by 38" when both are used. The surface will support most of the currently available personal computers.



- \* The top work surfaces fold up or down in the same way as the bottom ones. The top work surfaces are fixed at a height of 36" from the floor, and combine to form a 24" by 13" surface.
- \* The height of the bottom work surfaces can be adjusted from 26" to 30" from the floor in either the vertical or horizontal position. Tilting the levers located on the sides of the vertical members releases the two gas cylinders, pushing the work surface up. ( see figure 28 ) To lower the work surface, the user must push down on the levers.
- \* The handle pulls out for transporting the unit and collapses flush with the top work surfaces.
- \* The structural members will be made of injection molded ABS plastic. The outside panel of the vertical structural piece can be supplied in several colors and textures. The work surfaces have removable panels of either a cork-like material or white erasable marker board. The wheels have a urethane elastomer tire for quiet rolling, and the handles and levers have an elastomeric coating for a softer feel.



Figure 23

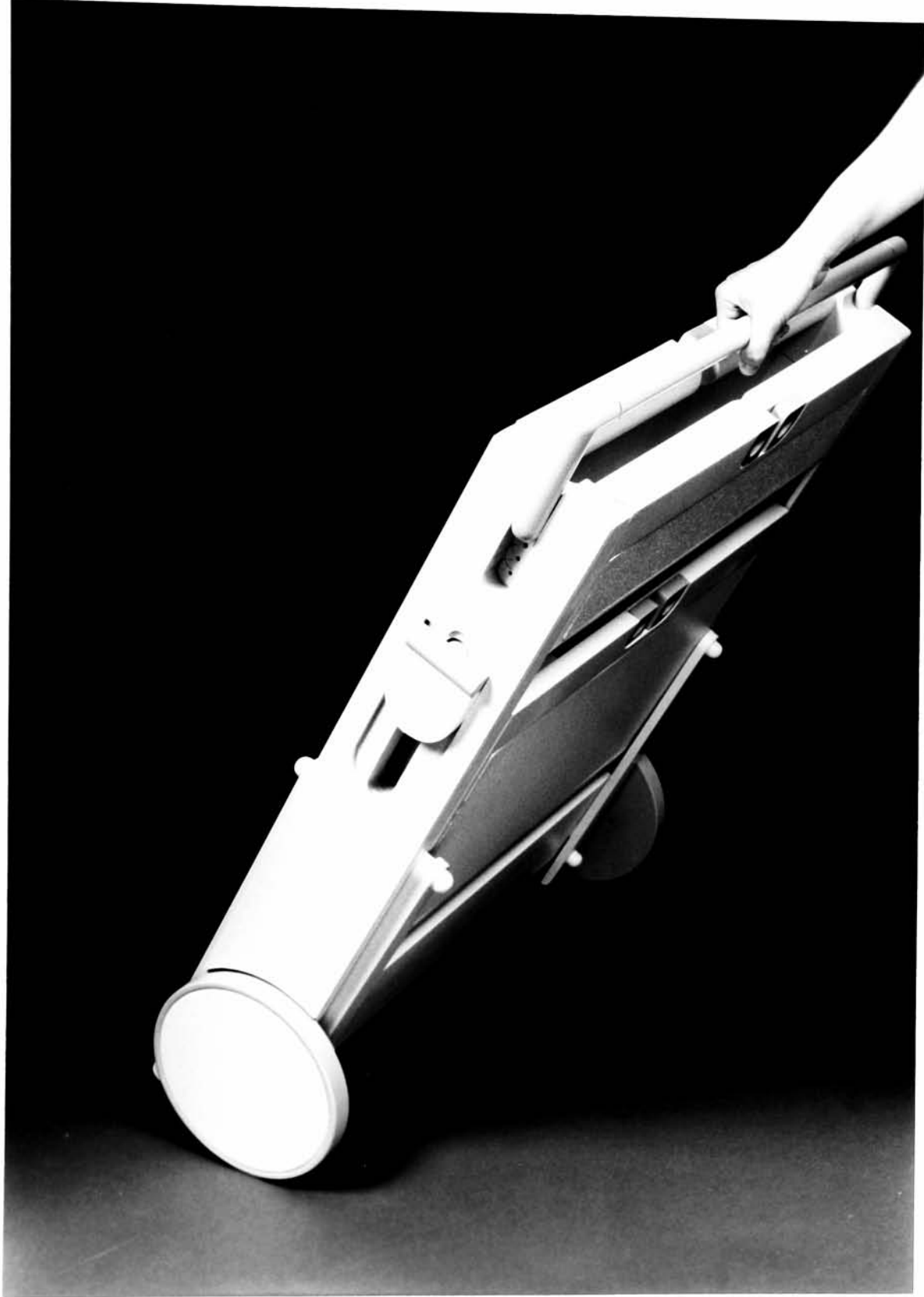


Figure 24

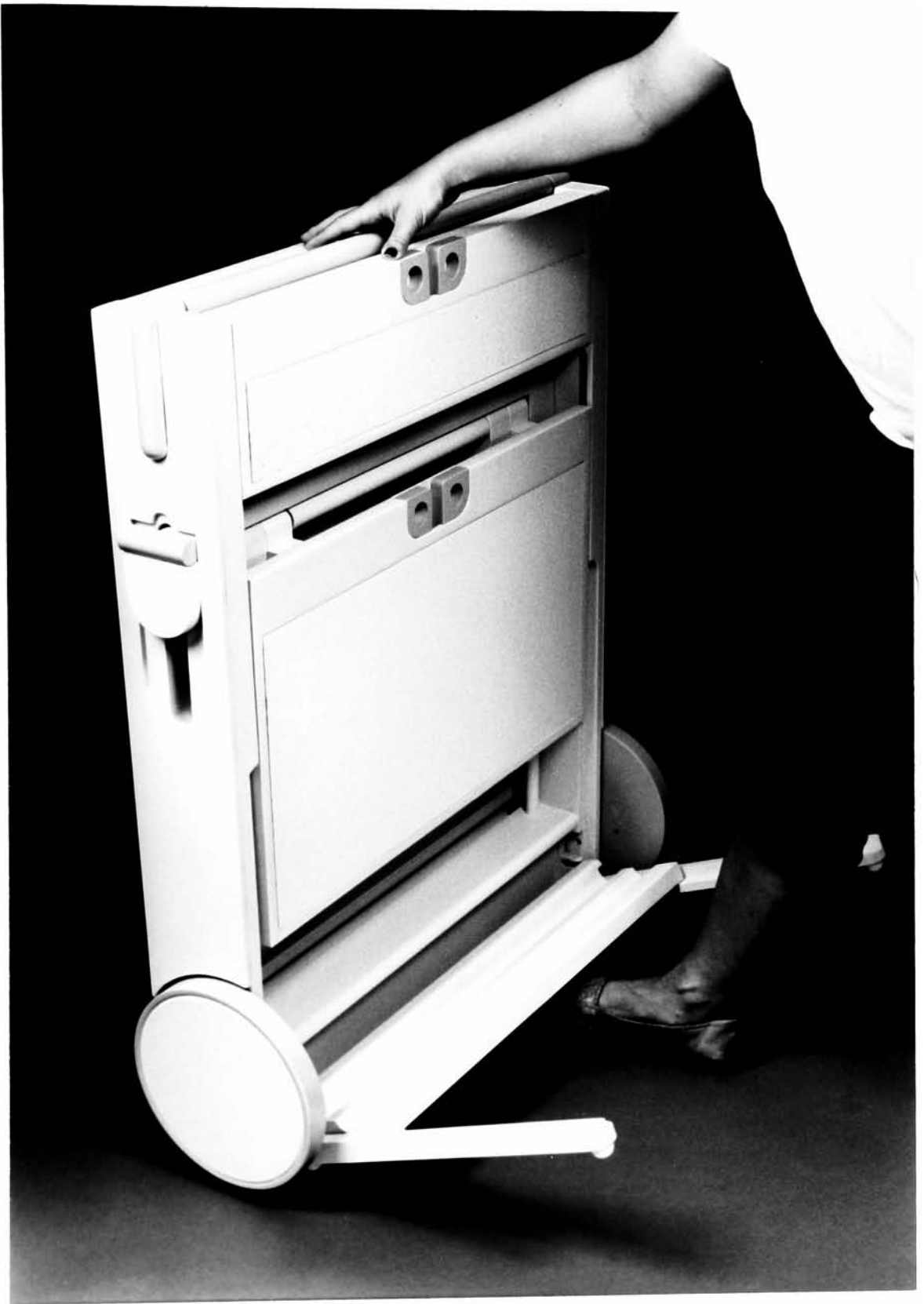


Figure 25



Figure 26



Figure 27

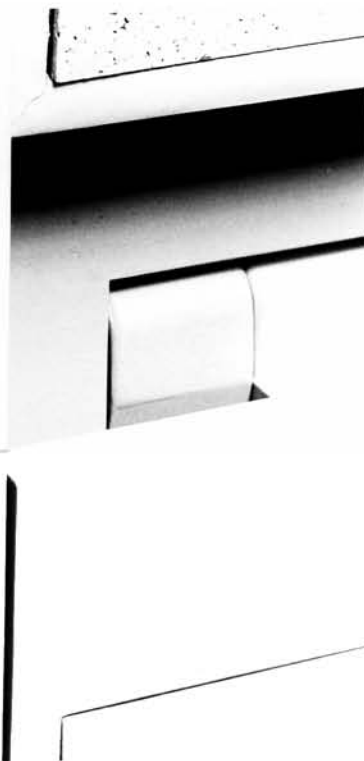


Figure 28

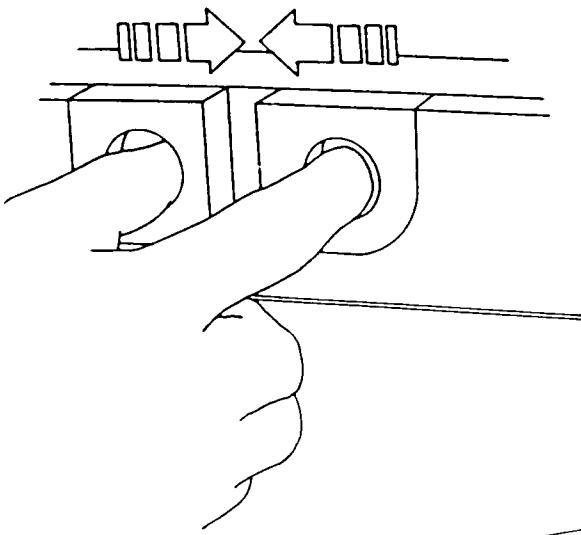
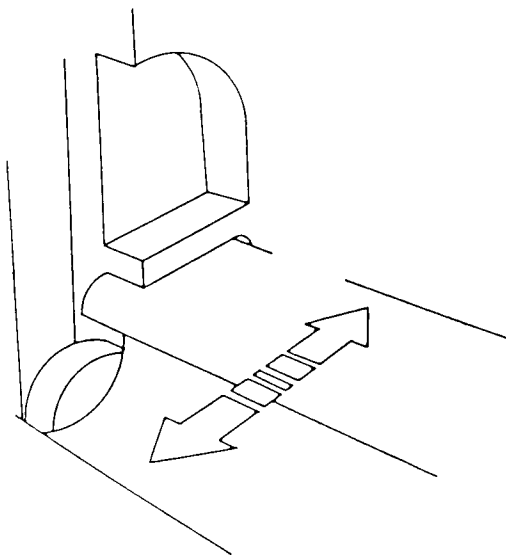
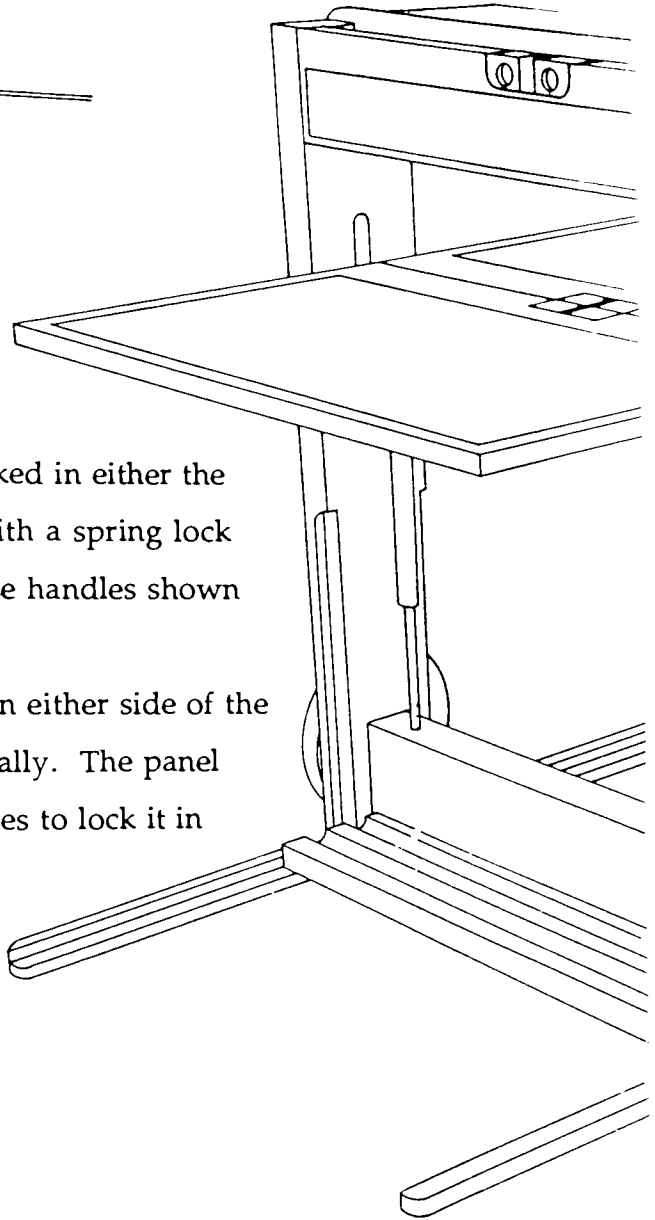


Figure 29

Each work surface is locked in either the horizontal or vertical position with a spring lock system, released with the squeeze handles shown above.

The two support units on either side of the work center fold down individually. The panel slides into the grooves in the sides to lock it in place, as shown below.



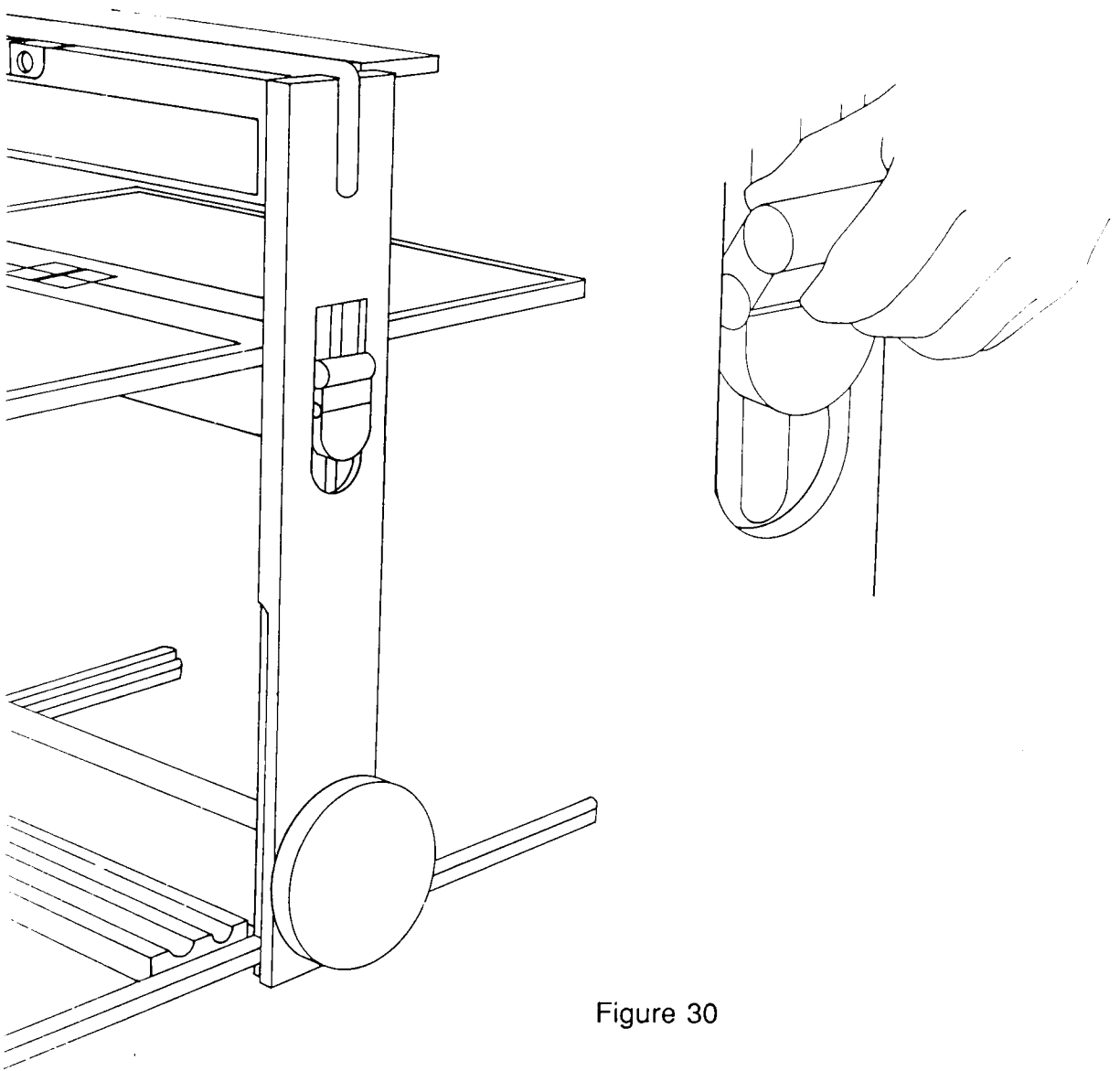


Figure 30

The bottom work surfaces adjust together in height from 26" to 30" from the floor. The handles on the sides are rotated out to release the pneumatic support cylinders, pushing the surfaces up. The handles also provide a convenient place to lean on to push the surfaces down.



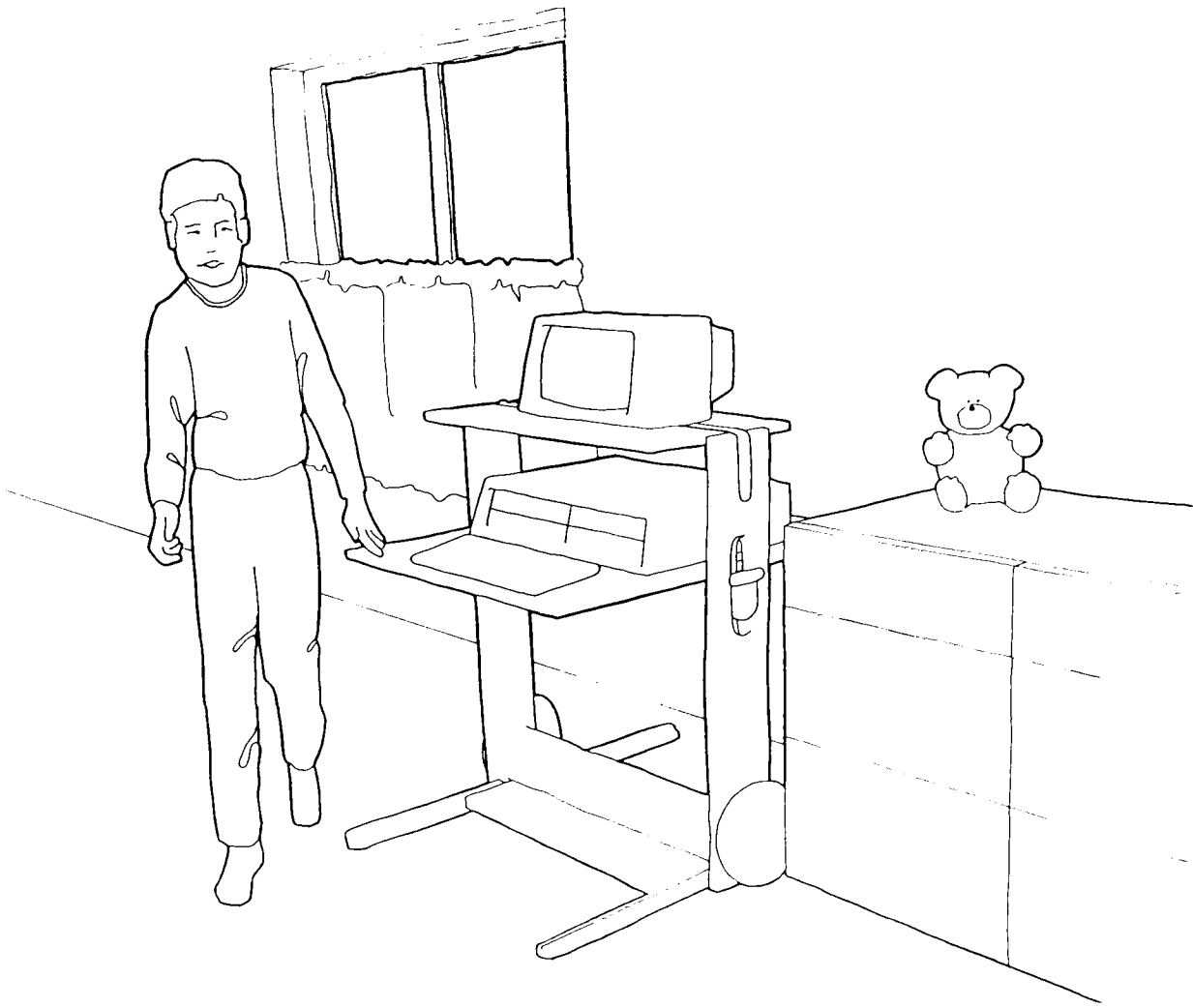


Figure 31

The work center can be used in any room of the house for many different tasks, as illustrated in figures 31, 32, and 33.

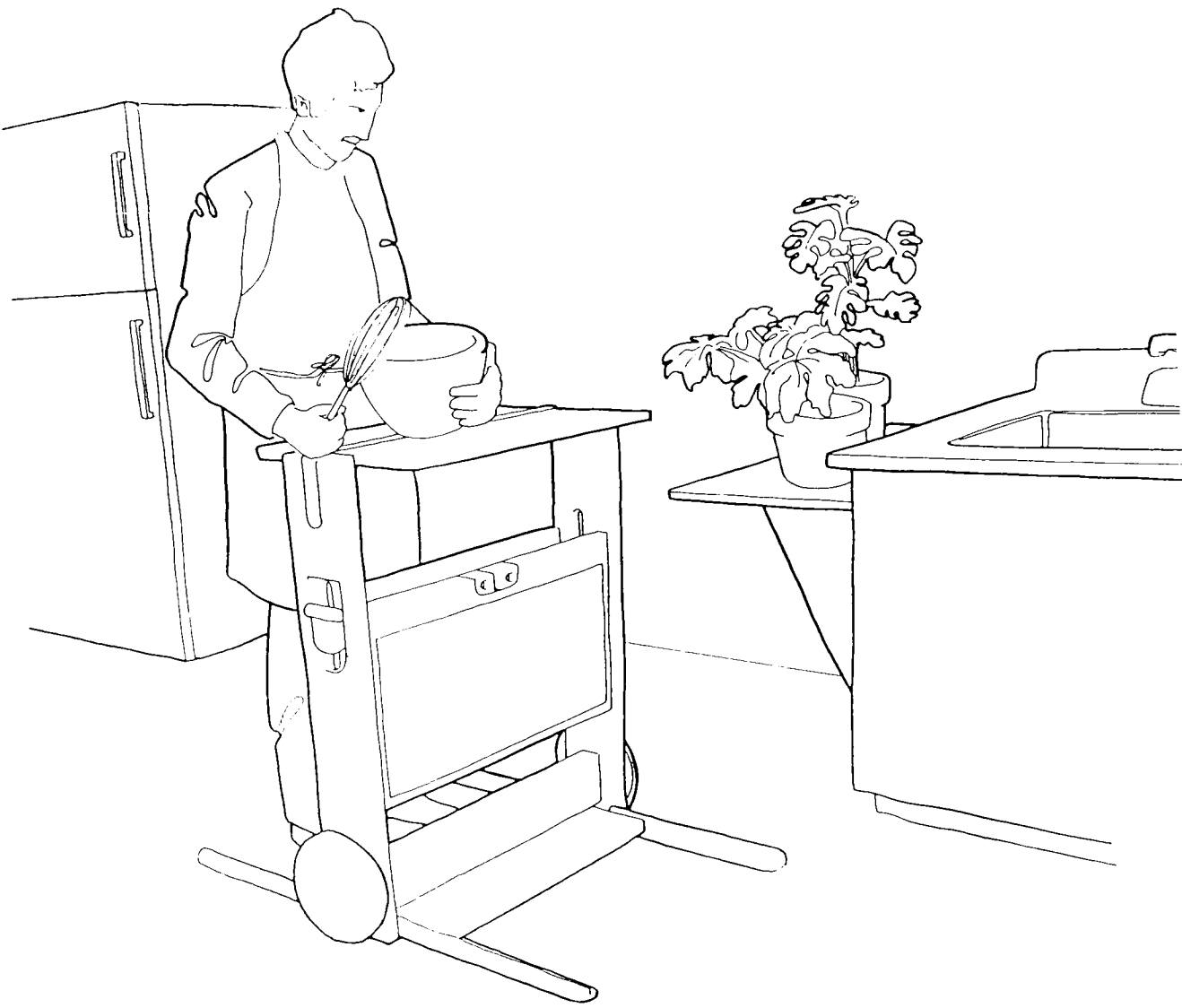


Figure 32

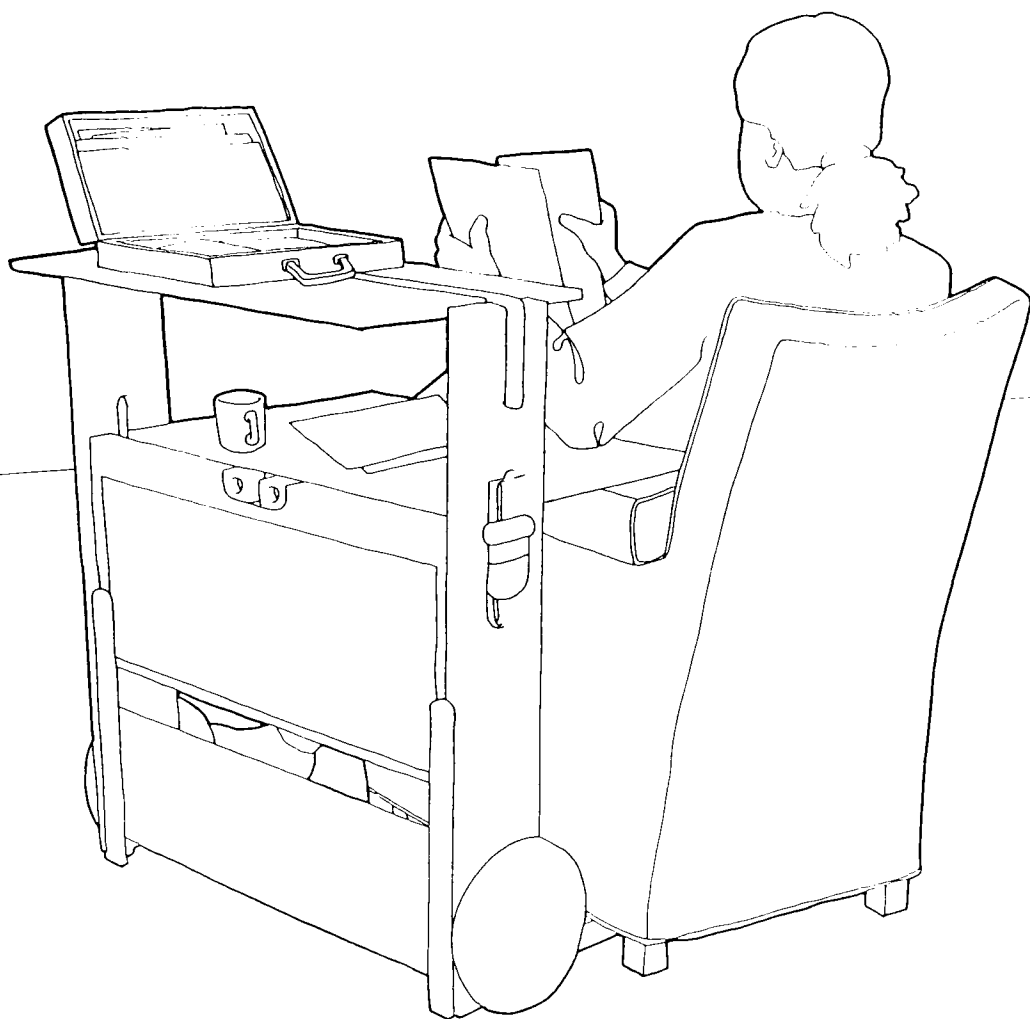


Figure 33

## **Conclusion**

Careful consideration of the process of design can help in the development of a product design that meets imposed constraints and is suited to the tasks to be performed. The system design approach, with its emphasis on the consideration of prospective users, the tasks to be performed and the product's environment, ensures that the product will be well suited to its users. The work center for the home, described in this paper, is just the beginning of what can be done to make the home worker more comfortable and efficient.

## Chapter Three: Product Semantics

Product designers can communicate information through form and color. Designers must explore the symbolic qualities of form and color, and use the resulting knowledge to improve the interaction between the product and the user. An object's form and color should express to the user how the product is to be used, and should also reflect the products relationship to its environment. " Product semantics is the study of the symbolic qualities of man-made forms in the context of their use and the application of this knowledge to industrial design."<sup>13</sup>

Symbolism is not new to design. Until recently, however, symbolism in design fell into the all encompassing category of "styling". The streamlined form, popular with product designers in the 1930's, was borrowed from aircraft forms, and adorned products as diverse as automobiles, toasters, radios and pencil sharpeners. The form suggested speed and efficiency, and reflected the society's fascination with flight and progress. Product semantics finds its roots in semiotics, a science which seeks to examine the varieties of signs and the way they function<sup>14</sup>.

When incorporated into the design of useful objects, product semantics can help to identify what the product is and how it is to be used. "Technological complexity demands that we make objects that teach people how to use them."<sup>15</sup> The application of product semantics to new product designs can contribute to the safety and efficiency of the products. In our ever changing technological society, we are constantly relearning. In product

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<sup>13</sup>Klaus Krippendorff and Reinhart Butter, "Product Semantics: Exploring the Symbolic Qualities of Form," Innovation, Vol.3 No.2, (1984) : 4.

<sup>14</sup>Donald J. Bush, "How Objects Speak: Product Semantics for the 1980's" in Proceedings of Interface 87, (California: Human Factors Society, 1987) p. 259.

<sup>15</sup>Edward Lucie Smith, quoted from lecture given at the "80's Style" Symposium, Rochester Institute of Technology, Rochester, New York. 2 April, 1987.

design, mechanisms and production methods often suggest forms for the product. Today, designers often work with microprocessing chips that don't suggest form. We have to invent forms. Product semantics can greatly decrease the consumer's learning time when trying to use these forms, by designing the product to be self explanatory. It is time to change the philosophy of "form follows function" to "form follows meaning". In this chapter, the terms used to discuss the application of product semantics, serve as chapter subheadings.

## **Environment and Association**

In the "work center for the home", illustrated in figures 23 - 33, the color and texture conforms to an accepted set of conventions, indicating that it is an appliance rather than a piece of furniture. This gives the product an individual meaning, related only to our previous associations with appliances, and removes it from other environmental influences. Once the work center is associated with other home appliances, it no longer needs to match the style of the other furniture in the same environment. This is particularly important for portable products.

## **Self Evidence and Transference**

Some product components are self evident due to their size, color or location on a product. Any mechanism, located at waist height on a closed door will be interpreted as a handle for unlatching the door, provided there is not another, more familiar mechanism present that looks like it could do the job. On the work center, treating all of the components that the user needs to activate in the same color and material, initiated a dialog between the product and the user, allowing the user to take information received from one component and apply it to another similar component. For example, if the

user realizes, from casual reference to its form, that the round bar on the top of the product is a handle and should be grasped, he can transfer this knowledge to the height adjustment handles on the side and to the handles that unlock the position of the work surfaces. This circular process can begin with any component that first becomes self evident to the user. Good design must provide effective information transfer.

## **Procedural Mapping**

Logical design can be enhanced with the application of product semantics. When completely closed, the work center will stand upright with no additional support. It is also relatively stable when the small top surfaces are opened to the horizontal position. The product is unstable and potentially hazardous if the bottom surfaces are opened without additional support. In this product the two supporting units, each consisting of two legs joined with a sliding panel, overlap the bottom work surface panels. This makes it necessary to open each supporting unit before opening the work surface panel that is behind it. This is a logical solution to a simple problem of balance. In order to indicate the proper procedure for collapsing the work center, the overlapping parts nest together where they overlap. The legs are formed to fit around the work surface panel, and the vertical support members are relieved to allow the leg to fit partially inside of it. The overlapping members dictate the opening procedure; the nesting detail indicates how it should close.

Product designers are becoming more aware of the importance of Product Semantics. More research is needed into the symbolic role of products. With the resulting information, we can develop a new language of universal forms. Furniture design in particular needs to be self evident. In his book, Personal Space, Robert Sommer states that "some people will accommodate themselves to anything, no matter how uncomfortable or

dysfunctional, either because they do not know how to improve the situation or believe that rules forbid them to alter the arrangement."<sup>16</sup> When we purchase a table or chair, we have an intended use. Once it is in our homes, however, the product suggests uses. It is up to the designer to insure that those implied uses are safe ones.

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<sup>16</sup>Sommer, Personal Space, p.10.



## Summary

The execution of my Thesis, the development of a work station for the home, has allowed me to explore areas of design methodology and product semantics, as well as product design. The conclusions and questions that evolved during this exploration have been presented in this Thesis Report. My study does not, however, complete the research into these areas of significant concern to industrial designers that is necessary.

The "Work Center For the Home" work station is currently in the preliminary design proposal stage. I have presented the design to my Thesis Advisors, to practicing industrial designers, and to fellow students. From their reactions to the design, and from my own, I am now able to offer the following criticisms.

- \* The proposed design, consisting of sixteen different primary components, with thirty one visible parts, is a complex product. During the concept development stage of the process, I was able to simplify the design, and reduce the number of parts. I can now take a closer look at the proposed design and simplify even more without compromising the features of the Work Center.
- \* The mockup shows a 1/8" radius on the vertical structural members of the Work Center. The work surfaces exhibit a much sharper edge. All of the components that need to be handled by the user are either round forms or forms with radiused corners, while the work surfaces that the user will sit up against or walk by are squared off. Although some of the contrasting forms were developed intentionally, to express function, more unity should be expressed in the shape of the

individual components. The work surfaces, for example, can have square corners on the top, to either side of the release handles, and have a large radius of three to four inches on the bottom two corners.

- \* There is no provision for wire handling. Although the work Center is designed to be portable, it may be set up for extended periods of time as a personal computer work station. The design allows for the necessary wires to be put down through the center. Each power cable from the components of the computer system would have to be plugged into a wall outlet. In addition, if the Work Center was repositioned, each cable would have to be removed and plugged into another wall outlet. The addition of a fused string of electrical outlets, and retractable power cable, to the base of the Work Center will solve this problem.

The Work Center fits the active , changing work styles of the home worker, by offering flexibility in meeting the anthropometric needs of its users, by being adaptable to different work postures, and by being portable. The four independent work surfaces can be used alone or in combinations to achieve the ideal work environment. The work Center does not dictate how a person should posture himself to work, but accommodates him as he prefers to work.

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