The Looking Glass System

An integrated, portable video production studio for children

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Introduction

Television in modern society

Since the public discovered it some thirty years ago, television has had a profound impact on modern society. Through its electronic media people learn about values and ideas that affect the way they see themselves and others. Its ability to entertain in the home has created new lifestyles and changed the way people interact. It has altered the way people in industrialized societies communicate, relax and perceive the world around them.

The typical American will spend an average of three thousand continuous days of his life watching television. This works out to be about nine years worth of TV viewing time. Whether this time spent televiewing is wasted or not is arguable and will be examined in the *Analysis* section of this thesis. That this time is non-productive, uncreative time is undebatable. A television viewer is an essentially passive observer whose only interaction with the television is to change the channel or adjust the volume. Whether the viewer interacts with other viewers present is largely determined by the nature of the show being watched and the viewer themselves. The percentage of viewers who do interact while watching television has been determined to be about 40%.

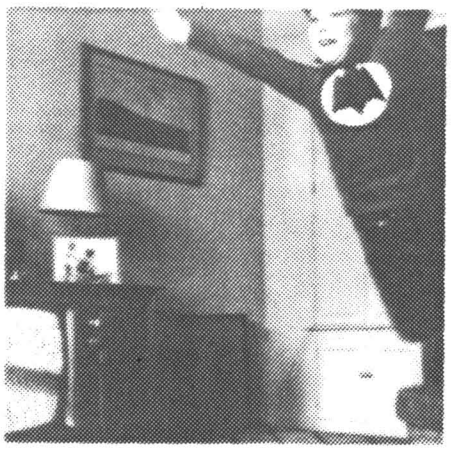
Television and child development

Numerous studies have been commissioned in past two decades to discover the effects that television has on the development of children. One of the more consistent findings is that the viewing of televised violence can lead to more aggressive behavior among children. The experts disagree as to how the viewing actually influences the behavior of the children, but all agree that there is a link between violence on TV and increased violence among children. This is one very concrete instance of the negative impact television can have on the development of children and in the larger perspective, the development of an industrialized society.

According to Jean Piaget, the respected developmental theorist of the 1950's, the growth of the child actually mimics the evolution of Man's intellect. As a child grows he moves from a first stage which consists entirely of sensory impressions to the fourth stage where the child, now an adolescent, can deal with abstract and spacial

concepts (this will be covered more thoroughly in the *History* section). The child does not necessarily move easily or naturally from one stage to the next and this is where education comes into play.

A key concept in education, especially creative education, is self-identification. This is the process where a child identifies with an object in his surrounding environment and thereby defines his own self. As the child begins to identify more and more things relating to himself, his definition and understanding of himself broadens and grows. A truly healthy child could be defined as one who knows who he is, who has a strong self-identity. This is very crucial for a child to move from one stage to the next.



Television affects children's self-image.

One of the most positive ways to encourage this process of self-identification seems to be to develop a child's creativity. More accurately, the child should be allowed to use their already developed creative ability. All children are highly creative and imaginative creatures but as they grow this ability is supressed and redirected. Through creative works the child uses materials in the environment around him to make something that is unique to himself. This is a recursive process: the child creates something unique to himself which in turn helps him define his uniqueness or 'selfness' which he gradually refines through more creative works. This could be thought of as a looking glass process. Creativity also allows an individual a way to express emotions and release supressed frustrations.

As was stated earlier, televiewing is an essentially noncreative activity and there is thought to be a definite negative impact on the development of childern with the watching of some type of programs on TV. While there are some highly beneficial programs such as Sesame Street available for younger viewers, a glance at the weekly *T.V. Guide* (which incidently, has the highest circulation of any publication) will indicate that such instructive and imaginative shows are the exception, not the rule. It has also been demonstrated that childern with poor self-confidence (a bad self-identity) are the group most likely to be drawn to televiewing as an escape from a world with which they are unable to cope. This is tragic because a vicious circle is initiated wherein the child watches television to escape the pressures of reality only to view the wholly false, exaggerated 'reality'

presented in modern television programs which leads the child to equally false and exaggerated expectations from the world around him. When these expectations are not met the child retreats further from a world he cannot understand. This could be seen as an antithesis of the creative process of self-identification, or a false looking glass process.

This harmful spiral is ususally only found among the group of childern who have a poor self image to begin with but that is not say that normal children are immune to it. To some extent all child viewers are suseptable to the false image that television is able to present. How they deal with this image depends on their own self-image and their ability to distinquish between what is real and what is imaginary. This ability develops as the child grows and is reinforced by real experiences in the world around them. Again, creative experiences help promote this interaction with their world.

It is an unfortunate fact that in highly industrial, technological societies the pace of living and adapting can create a very complex set of "stages" or roles which a child must learn to play to fit into their society. Barker (1968) estimated that a child in a small-town community or suburb in the United States must learn to act on seventeen separate stages while a child in a northern British city acts upon only a set of five stages. This multiplicity of roles that an American child must learn can only increase the difficulty of achieving an healthy, integrated self-image. With the continuing acceleration of technology, this difficulty will only increase unless some of this burgeoning technology is used to help the child establish a firm and stable image of himself at an early age.

Thesis proposal

With this goal in mind this thesis will propose an interactive video product or mini-system titled *The Looking Glass System*. The purpose of this product is to encourage children between the ages of nine to fifteen (or older) to use the video media in a creative manner by giving them the ability to produce skits or cartoons of their own creation or insert themselves into roles on a pre-made videodisc. Since there is an established fascination with, if not an addiction to, television among children in this age group it seems a logical

Through role-playing children learn about real life situations.

juncture to introduce a creative tool that they could use to create programs in which they play the star.

By creating their own programs the children will learn several important things. First, they will learn, or perhaps re-learn to use their imagination in creating roles and plots that they can perform in and discover how to present these plots and roles in an effective visual manner. Because most films will require more than one cast member, not to mention technical support, the children will also have to learn to work together to achieve a common goal.

Second, they will able to express thoughts and emotions through the roles they play that they might otherwise supress, allowing them to explore these feelings and thoughts under the pretense of 'make believe'. Through this exploration they will learn to look at themse ·es from different perspectives and see how they interact with others and the world around them. Also, they will learn to try on new roles that they will eventually have to assume later in life.

Third, through using this tool to create programs of their own design they will gain the technical knowledge of how real television shows are made and also gain insight into the true nature of television 'reality'. By performing and watching their own cops and robbers show they will come to realize that *Hill Street Blues* is only a fictionalized portrayal of real policemen played by actors who take off their costumes and make-up and go home at the end of the day. It will teach them to distinquish between reality and imagination by allowing them to duplicate the process used in making television programs.

Naturally, one cannot expect a ten-year old to become a Ingmar Bergman simply because he is given a camera and editing system that allows him to easily create his own films. It is for this reason that one of the modes of *The Looking Glass* allows the use of pre-recorded videodiscs into which a child could insert his cast of characters. A complete scenario or scenarios would be included on each disc encompassing a particular adventure or incident much the way home computer adventure games are packaged. By using matte overlays or actual pixel manipulation the young director could use filmed footage of himself and his cast and insert it into the pre-made video world. This world could just contain scenery on to which the

real characters are painted or live actors, cartoon creatures, or anything else imaginable could be included in the world for the inserted characters to react to. While this last instance of the children reacting to recorded characters introduces some problems such as scripting and staging there is sufficient technology right now to overcome these difficulties as will be discussed later.

The advantage of the pre-recorded discs is that the basic plot can already be established so inexperienced or younger users do not have to concern themselves with complexities of a beginning, middle and ending. They will just have to respond to set of circumstances and characters that ideally will have been designed to provoke thought and insight into situations that children might have problems with. The scenarios could be designed as wraparound Sesame Street environment.

The disadvantage of the pre-recorded discs is that they have to be very structured and consequently may restrict the child-actor's responses and actions. While the plot may have multiple paths depending on the child's reactions, much the way a player can follow different courses in the *Dragon's Lair* video game (which uses videodisc cartoons), only a finite number paths can be available for each scenario. Another problem with the recorded disc mode is that the action is not simultaneously live but a composite of live and recorded action. This problem could be solved by using life-size rear screen projection via the new generation of single-gun color video projectors to provide the child actors with cues.

In any case, the use of a recorded disc would be just be one mode of *The Looking Glass* sytem or perhaps an option since the cost of rear screen video projector might make the cost of the system prohibitive, even five to seven years from now. The primary mode of this system would be that of a videodisc recorder linked to a 'smart' camera-audio system that would allow children to record live-action sequences with a minimum of technical knowledge. The secondary mode would be the editing mode, which would allow the child director to quickly and easily arrange the shot scenes in the order desired and insert any special effects such as dissolves, fades, titles and perhaps even pans and zooms.

While the actual hardware of the system has not been researched in

detail the *Looking Glass* editor would probably be a videodisc reader/videotape recorder hybrid where the segments of the videodisc could be indexed by scenes, recalled immediately by the editor and then transferred to videotape in the desired sequence. There would also be various routines in the editor that would allow the user to insert the special effects mentioned above. To provide for the pre-recorded disc option the editor would have to be equipped for dual videodisc reading and simultaneous transfer to videotape so that the matte effects could be achieved.

Although there exists systems capable of pixel manipulation, that is, systems that can re-arrange and insert images by actually controlling the individual pixels on a video screen, these systems require a great deal of memory space and very sophisticated programs which would make them unfeasible for application to the *Looking Glass* system. However, given the present pace of technology in the computer and electronics field it might be reasonable to assume that there will be ways to perform very limited pixel manipulation at a reasonable cost five to seven years from now. While pixel manipulation is not necessary for this system to function, if the technology was available it would greatly enhance the versatility of the effects possible and smooth over some the problems that result from matting.

As was stated before, the design solution in terms the actual hardware has not been researched in depth since this part of the thesis is concerned primarily with the history and analysis of the problem at hand. Nevertheless, several constraints, objectives and directives can be put forth at this point to serve as guidelines for the problem solution.

Since this product or mini-system is to be used by children between the ages of nine and fifteen it must be easy to understand and operate- the graphics and form must indicate the purpose and function of each component. Since the camera and recorder must be portable to allow maximum flexibility, these components must be designed to meet the optimum range of anthropormetric standards for the 9 to 15-year old age group- component weight, distance between control surfaces and eye piece adjustments must be considered. The 9 to 15-year old age group tend to be somewhat clumsy since it is during this time that their bodies are rapidly

changing. Because of this the various components of the *Looking Glass* system must be able to withstand a certain amount of abuse that might result from falls or mishandling.

The editing/playback components of the system should be easily portable since once a film is made several showings at different locations, the participants homes perhaps, will probably be order. The various inter-connections between the components and the television that the recorded programs are played back on should be fairly simple and easy to make. Along the same line, the various functions- inserting disks, inserting tapes, etc.- should be fairly foolproof and resistant to mishandling. The editing software should be very easy to understand and manipulate (several languages already exist and will be noted in the *Analysis* section).

Because this system is for children it ought to look playful and toy-like. If it looks like a sleek, modern playback/record system children might be intimidated by it and decline to use it because it looks like it was made for "grown-ups". It ought to have interface capabilities that would allow it to be hooked up to a home computer or video game controller to increase the effects possible with it.

Summary

In summary, it can be said that in modern industrialized societies television has come to replace many forms of communication and interaction that exist in less advanced societies. As a result childern in these modern societies are growing up with artificial experiences in interaction and in some ways this is harmful to how they see themselves and their world. One of the reasons televiewing is detrimental to a child's development is because the majority of programs available on telesision do not promote any creativity and very little interaction. The creative process has already been identified as a very beneficial educational activity wherein a child learns to create things from the world around him and thereby increase his understanding and perception of his world and himself. This creative cycle has been labelled the process of self-identification.

Television watching in of itself is not a harmful activity for children but given the content of nearly all programs shown today it can be. Video is a very powerful and useful tool if used properly. Because of this there seems to be an opportunity to create a video system that will allow children to create their own programs and shows, hopefully encouraging their creativity and as result, help them build a realistic, healthy self-image which is essential to their continued development in an increasingly complex society.

History

The purpose of this section is to give a brief history of each development related to the problem being studied by this thesis, namely, the impact television has had on child development in modern societies and how new technology may aid the positive growth of children. The histories that will be examined are those of child education and development, the evolution of television as a mass media, and the development of present day video technology.

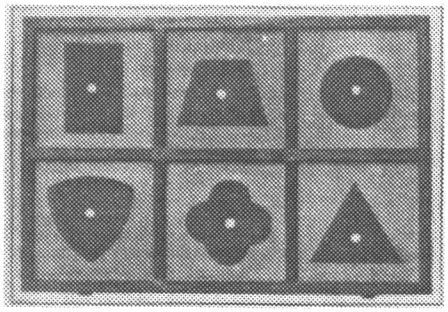
Child development and education: The Montessori Method

Dr. Maria Montessori was one of the earliest researchers of child education to actually formalize a method of teaching children. Between the years of 1901 and 1912 Dr. Montessori ran a school for retarded children. Through careful observation and experimentation, essentially working only with the children, she formulated a method of teaching with which she was able to educate the children to the intellectual level of normal twelve-year olds, a feat unheard of in that time. Soon after this sucess she became the directress of her own school and began teaching children of normal intelligence.

Dr. Montessori and student working with didactic materials.

Over the years she refined her method but her basic premise remained the same. She felt that the process of education is not controlled by the interpersonal relations of the teacher with the children and the children with the children but by the interaction of the children with didatic (literally- 'intended to provide instruction') materials provided by the school. Such materials should be the only objects of interest available to the children and they should be essentially left on their own while they handled the materials. A typical didatic lesson set was a series of wooden geometric cutouts that the child would have to fit into their corresponding holes. Since there was only one right way for the pieces to fit into the board, a teacher was not necessary to correct the child. The didatic material was said to be self-correcting. Her basic criteria for didatic materials was that they must be simple- not easy- inherently interesting, self-correcting, and thoroughly comprehensible to the teacher. Montessori's motto came to be "Things are the best teachers."

One of the examples she gave in her book *Spontaneous Activity in Education* was an instance where the children's classroom had all the tables and chairs bolted to the floor so they could not be overturned accidently by the children. She decided to have the bolts

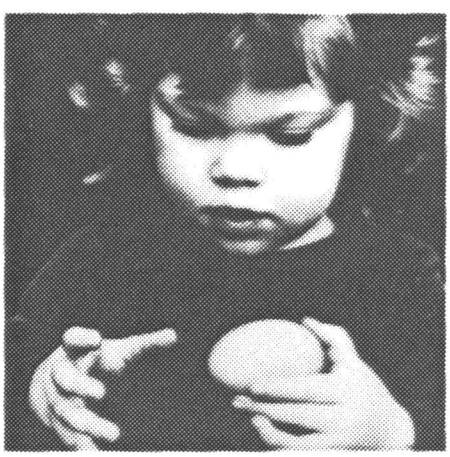


One of the didactic work boards. Pieces fit only one right way.

removed to allow the children to move the furniture at will. As a result tables and chairs were knocked over by the children who were not accustomed to moving carefully. However, within a few months the children had become practiced at moving gracefully and soon an overturned chair was a rarity. She used this example to illustrate the idea that unless a child is given the freedom to discover their abilities by interacting with objects in their environment, they never will really learn anything on their own.

Although there was an initial burst of interest in Montessori's method when she first published it at the beginning of the century, she soon came under attack by leading psychologists of the time. This was largely because her belief that children have a natural predisposition to learn was at odds with the prevailing belief that children must be conditioned to learn. Many years later, in the 1950's, however, her methods came into favor with the advent of teaching by induction or the "discovery method". This method of teaching was essentially the same as Montessori's and stated that induction from life itself is likely to be misleading so the key is to rigorously limit the materials provided to the child as well as the aid given to the child. The idea was to get the child to draw the right conclusions by providing the right clues. An interesting discovery made while using this method was that an overabundance of stimuli (or clues) retards the process of auto-education.

Creative education



A child learns from objects in his environment.

At about the same time that Dr. Montessori's methods became acceptable there was a movement started to introduce art classes into grade school curriculums which related to some of her basic ideas of education. The idea at the core of this movement was that art was beneficial for children because it allowed them to exercise their natural creativity and express themselves. This idea was further refined to say that creativity was a good thing for children because it encouraged children to look at the world around them and make things that are unique to themselves. Once this object is created by the child he can step back and identify his uniqueness or selfness in it. Thus he can define his self by the things he creates, at the same time expressing thoughts or emotions he trying to deal with.

TABLE 1.2

UNITS IN THE DEVELOPMENT OF INTELLIGENCE ACCORDING TO PIAGET

Sensorimotor Period—six stages	
Exercising the ready-made sensorimotor schemes	0-1 mo.
Primary circular reactions	1-4 mo.
Secondary circular reactions	4-8 mo.
Coordination of secondary schemes	8-12 mo.
Tertiary circular reactions	12-18 mo.
Invention of new means through mental combinations	18-24 mo.
Preoperational Period	2-7 yr.
Concrete Operations Period	7-11 yr.
Formal Operations Period	11-15 yr.

A breakdown of the Piagetean stages of development.

Piaget's theories

One of the main reasons these two movements occured at about the same time was the work of developmental psychologists during the early 1950's. One of the most notable psychologists of the time was Jean Piaget. He argued that children's thought develops as human thought developed through history. Contrary to the popular notion at the time, Piaget said that children are not little adults but require twelve years of growth before they are able think as adults.

He proposed that children must pass through three stages of thinking before they reach the fourth and final stage of adult thought. He said that in the first eighteen months of life the child's thoughts are sensory motor, that is, everything is movement and sensation- the child is unable to distinquish itself from its environment. The second stage, the pre-operational thought stage, extends from eighteen months to six or seven years old. In this stage the child cannot see anyone's point of view except his own and believes that his dreams are in the room with him and that everyone can see them. He lives exclusively in the present and is unable to reverse the order of events in his mind or retrace a cause and effect sequence. The concrete operations stage is the third stage that lasts from six to seven years old until about age twelve. During this stage a revolution takes place because now the child is able to reverse a cause and effect sequence by using his imagination to retrace the events. Although he can now use his imagination, he can only apply it to situations that are immediately before him. He cannot imagine and solve a hypothetical situation because he still lives essentially in the present. The fourth and final stage according to Piaget is formal operations stage which begins around the age of twelve. At this point the child now thinks as an adult and is able to deal with hypothetical situations. He still lives for the most part in the present but can live in the future and construct arguments of logic.

According to Piaget the main reason why children learn to accept points of view other than their own during the concrete operations stage is because through interaction with others and the world around them they find that many points of view are possible and that their view is not always correct. This hypothesis was and is accepted by educators and was one of the main reasons there was a resurgence of interest in the work of Montessori and a growing call

for creative art classes in school. Obviously there were others pressures and reasons for instituting such programs at the time but they do not really concern the focus of this thesis. Suffice it to say that Piaget's work was validated and accepted by most educators and the programs that they introduced were designed to promote this interaction among children and to educate them psychologically as well as academically.

Television

Coincidentally enough, at about the same time that Piaget was developing his theory that would give a new direction to education, a device was introduced to the public that would soon give a new direction to an entire culture. Television (which means literally 'viewed from afar') first became available in the early 1950's and soon, almost by exponential growth, was in 98% of all American homes by the early 1970's.

A common family scene since the 1950's.

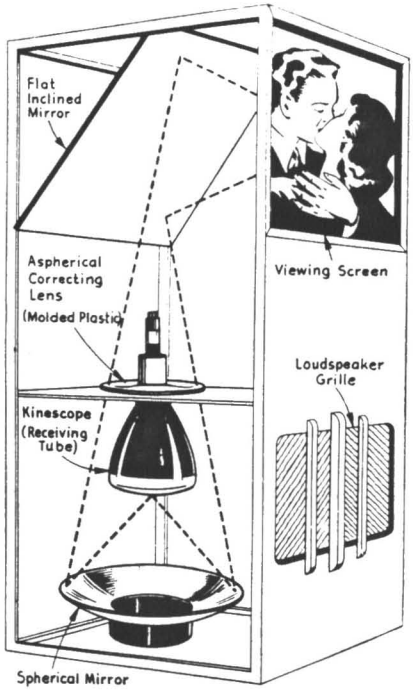
The first shows on television were basically televised radio programs invariably starring radio personalities. With a few additions, the television fare was the same as the radio fare. The standards were the talk/game show, the sitcom, the adventure show, the soap opera and the news. But within a decade, Radio, the reigning champion of the mass media was deposed by television. The reasons for this are fairly apparent- television technology was relatively cheap, especially to prosperous Americans, and it was a visual as well as a audio media which gave the viewer a greater sense of "being there".

Strangely enough, a glance at the program directory for last week will read pretty much the same as it did thirty years ago. The same types of shows that were popular then are popular now, allowing for the usual coming and goings of trends. What has changed is the standards and morals of the contents of the shows. An interesting thought is that these changes reflect the changing self-image of an entire society as it views itself in the mirror of its mass media-television. Regardless, these changes in values have brought about several interesting developments, one of the most important being public television.

Since it funded by the public, public networks does not need to run commercials to earn income and consquently does not have to bend

to the pressures of being 'popular' (i.e.-- conform to the standards of programming that attract the greatest number of viewers) but rather it can strive to show the best programs possible. Because it is not a commercial venture public TV can experiment with truly creative shows and seek to inform their viewers instead of merely entertaining them. Public television is an good example of potential possible with the television media.

As television grew more popular it attracted more money and more people willing to take chances to get more money. The media was explored (exploited?) and expanded ironically enough, by the group that initially saw the birth of television as an onimous sign- the movie companies. Most major production companies saw television as competition for their movies but soon realized that it provided a whole new market for their products. At first they sold the networks prints of old movies that were out of circulation (this was in the days before the infamous 're-releases') and then moved to actually producing new movies for television. In many cases the partnership between the network and the movie company became so cozy that the network was bought out by the cinematographer.



An early projection video unit.

There are several reasons why this happy relationship between two apparently competing medias was able to be struck. One of them is the basic nature of cinema viewing versus television viewing. When a person goes to a movie he is consciously or subconsciously agreeing to forget who he is in order to vicariously enjoy the film. Cinema is designed to achieve this- movies are viewed in dark, unfamiliar surroundings where the viewer remains anonymous, the screen is many times larger than life and a readily identifible stars are relied upon to play the roles in the film. Viewers are said to identify with the star by playing the star's role, hence forgetting who they themslves are.

Television viewing, on the other hand, occurs in a familiar setting, usually the viewer's own home, the screen is small, allowing for only the portrayal of a talking head and in most instances the same characters, not necessarily stars, appear week after week. As a result, the viewer does not lose his identity while televiewing but rather interacts with the characters. Studies have shown that as many as forty percent of television viewers actually answer a television character back (this is more prevalent with child viewers).

These basic differences in viewing modes, identity loss versus interaction can help explain how two seemingly competitive industries can exist harmoniously. The viewer who wishes to completely escape reality will pay five dollars to see a movie, a relatively cheap price to pay, where the viewer who wishes to just relax will flip on his television. While it may be said that there is some identitiy loss while viewing movies rerun on TV, this effect is essentially negated by the ever-present commercial break.

This agreeable status quo between movie companies and television networks was somewhat upset however in the late 1970's with the advent of large screen TV, cable networks, and most importantly, the video cassette recorder/player. These developments made it possible for the average viewer to either relax or escape at will, without having to pay five dollars depend on his choice. That is not to say that the movie companies were the only ones to be alarmed by these new technologies. Networks saw that cable channels offered a commercial-free format that appealed to many viewers and video recorders gave users the option of recording network programs and then editing the commercials during playback. Needless to say, this was a disturbing development since the lifesblood of any network (save for public television) is its commercial spots.

Other more recent technologies have appeared that while not actually competing with television, do and will affect the nature of television as a mass media. The home or personal computer which often interfaces with user's television has given viewers an option for using their sets completely independent of the networks. Additionally, users can link up with other PC operators and interact on a one-to-one basis, something impossible to do while televiewing. A variation on the home computer, the video game center, gives the same option while providing an interactive escape that is not possible with television or cinema viewing.

Analysis

While the genesis of modern child development theories and television is coincidental, the present day link between them is not. Much has been written on how television can and does affect the growing child, including a study commissioned by the government. By and large these studies have emphasized or focused on the negative impact of the programs children watch on TV without emphasizing a crucial fact- it is the programming that is detrimental, not television viewing. Of course, with this said one must also add that all things must taken in moderation. If a child watches sixty hours a week of Sesame Street and public television, even though they are informative and educational shows, it will have a negative influence on his development in society. In this section the thesis will attempt to analyze the problems related to televiewing and child development and look at possible technologies that could be used in the *Looking Glass System* solution.

Noble's *Childern in Front of the Small Screen*

The books researched for this thesis' analysis were mainly ones that dealt with child development and education, art in education, the importance of creativity in the development of the intellect, television's impact on society and child development, and various periodicals on recent developments in video and computer technologies. By far the most helpful book in this collection is Grant Noble's *Children in front of the small screen*. It is one book in series that examines the relationships between society and its mass medias and in it he sets down several ideas that were helpful in formalizing this thesis. For this reason the next several paragraphs will be devoted to a summary and discussion of these ideas and then these will be put in context of the *Looking Glass* concept.

Of the books read on television and its impact on society, this one was the only one that set out to argue in favor of television as a mass media. More accurately, it was the only one that did not deliberately set out to argue against television. It begins by asking why TV is so popular in modern societies. A distinction is first made between cinema viewing and televiewing, the latter type promoting face-to-face interaction, that is, the viewer actually talking back to the talking head on the TV screen forty percent of the time.

Two axioms are then set forth, the first being "that the self may be

viewed as a looking-glass, that it is via the reactions of others to ourselves that we establish identity." And the second is "that to live a harmonious life a person must come to know himself, must become realistically aware of both the faults and possibilites of his identity." Historically, he goes on to say, the way that the self became integrated and known was through its interaction with two social units: the family and the community or extended kin. A child grew up and spent his life with essentially the same people and through them he learned his strengths and weaknesses, likes and dislikes. He learned to see himself as who he was.

It is here he introduces his main premise for popularity and usefulness of television. In modern societies the community is often a changing and confusing social body, especially in large cities, and the family unit, as statistics will show, isn't what it used to be. How then can personalities seeking integration find an accurate and stable reflection in which to see themselves? Television provides a host of regularly appearing personalities going through familiar routines week after week. They can be seen in the viewer's own home and the talking head format almost duplicates face-to-face interaction. It doesn't seem reasonable to assume that the industrial revolution could erase Man's five thousand year old need for a stable social reflection. This might explain the reason why television is so popular in industrial societies.

Noble goes on to cite McLuhan's phrase "the global village" and then states: "The thesis presented here is that television, by exposing disparate individuals to the same familiar content, which is remarkably repetitive, does in part restore a village type of community." What follows is a list of a dozen comparisons between village life and city life and their relationship to television, all of which are valid.

Since Noble is a psychologist, much of the book is devoted to field testing various theories concerning whether a child recognizes a character or identifies with him, and whether or not another researcher's findings are valid or not. Many of the areas investigated dealt with how children interacted with the material they were exposed to on television and later in the book it was examined how children use the information gained from this interaction in the real world. One of the more important areas detailed was on mass media as an escape for children.

Noble says that while it is true that children use television as a way to escape a sometimes confusing reality it is also true that there is a positive aspect to televiewing, namely that through interaction with familiar characters children can learn about various societal roles and functions. Of course this is directly dependent of the types of programs watched. He also identified the groups of children most likely to use television as an escape. Children at eleven years old tend to watch more TV than fifteen year olds, presumably because the adolescent is more interested in the real changes happening around him and is more reality-oriented. He also stated that children who felt ill at ease with other children, lacked security, and were shy tended to watch more television than a child of the same age who did not have these difficulties. It was also found, by three different independent studies, that there is a strong relationship between how much a child believes a TV show to be real and how many friends he has. The fewer the number of friends the child had, the more likely he were to believe that the show was real.

The next area Noble dealt with was child development and televiewing. He relates televiewing to Piaget's theory on child development to explain how children react to TV programs. Prior to seven years old a child is not likely to recognize the same character in a different scene because they identify the character in relation to the setting in which they first see him. Since they live exclusively in the present they cannot follow the plot and see the sequence of cause and effect. Between the ages of seven and eleven years old, the concrete operations stage, however, the child learns to see plot developments and can retrace causual sequences as they occur. They can also begin to appreciate the underlying emotions and motives of characters in the show. Twelve-year olds, now in the formal operations stage, can trace plot and character development and recognize symbols and conflicts. This age group will also begin to move away from fantasy subjects towards more realistic material.

The next section of the book dealt with media definitions of real-life social, occupational and national roles. In it Noble says that in the village the all roles are visible to the child and he can see first-hand what each entails. In modern society, however, occupational and social roles are highly specailized and complex and there is no way for a child to view them all in real life so television is his first and sometimes only contact with people filling the many roles in his

society. This is also true of national roles and how children percieve foreigners that they have never met (which also affects any prejudices they may have or develop). This is one example of the enormous influence television can have over a child's development in society, and as Noble goes on to point out, in most instances television falls far short of presenting an accurate representation of the real world.

The next topic addressed was that of televised violence and agression in children. As was said earlier, most of the other research books on television dealt with this negative aspect of television almost exclusively. Noble examined the various studies and evaluated their validity and came up with this summary: 1) Only certain types of aggressive film have adverse effects on child viewers. Neither aggressive drive nor imitiation is prompted in all children by all aggressive films. 2) Stylistic aggression without sight of the victim may have cathartic effects in terms of more social interaction in more creative play after, rather than before, viewing. 3) Both realistic aggression and aggression filmed with sight of the victim seems to make children anxious. 4) Aggression filmed with sight of the victim may prime aggressive drive in the child viewere but aggressive feelings may not show themselves until the days after viewing. Reflecting film-related themes may in itself be cathartic. His conclusion was that while some types of filmed aggression could be detrimental- causing anxiety and aggression- other types of aggression may be beneficial by letting children cleanse themselves of aggressive tendencies vicariously.

Children can learn from watching themselves.

Field experiments

The rest of the book deals with televiewing and deviant behavior, the role of producers in keeping programming socially responsible, and an actual field study of TV viewing in a boy's boarding school. The comments in each section were informative but not relevant to this thesis so they will not be included. There was, however, an extremely interesting tailpiece titled *Excursions from theory* which proved to be very relevant to this thesis topic.

It begins "Almost certainly the next development in the (video) media will be to remove the mass audience and either offer cassette reordings of programmes which people can acquire and play back at

will, or truly local television stations will emerge. (This book was published in 1975) With local television it should become possible for people to see themselves in action on the small screen. Where in the past extended kin members had to tell individuals how they appeared to others, local television can provide this information in unambiguous form simply by showing people themselves." Noble and an associate then went to a depressed area of Dublin with a video recorder and performed the following experiment.

They asked twenty 8-year olds to draw a picture of themselves and a man or a woman. These drawings were used to assess the mental age of each child. The children were then asked to describe themselves by being prompted by "I am a..." until they ran out of descriptions. They were also prompted "In ten years I will..." until they ran out of descriptions. Half of the children were then chosen to be videotaped. They were taped on three sucessive afternoons while they ran around, dressed up in costumes, acted out weddings and engaged in other unstructured play. These children then viewed themselves on videotape. After this all the children were asked to draw self-portraits again and answer the same set of questions. The drawings of those children who saw themselves on tape potrayed themselves more accurately and in fact their mental age, reflected by the drawings, increased by one year. There was no change among those who were not videotaped.

While this all may seem obvious, the interesting results came from the new set of answers that the taped children gave. They were able to give more descriptions of themselves which implied that they were able to see themselves more objectively and accurately after being taped. The self became more of an object that could be critically evaluated. They were also able to give a longer list of "In ten years I will..." which seemed to show that they were better able to imagine what they would be like in the future by viewing themselves in the present. In short, by seeing themselves on videotape the children were able to see themselves in a purely objective mirror and begin to see who they were, physically as well self-wise.

By outlining Noble's book this thesis has hoped to show that there already exists a definite link between television and children growing up in a modern society. Television can be a powerful tool in helping children arrive at a complete self-image, while it may hinder

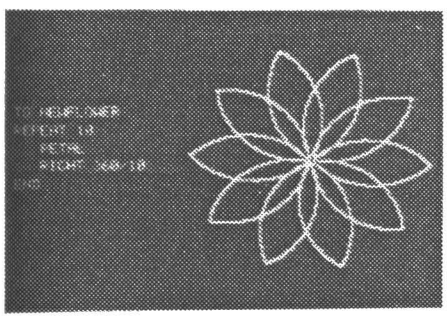
children's development if used thoughtlessly. His theory on the child's evolution of self is consistent with Piaget's theories of development as well as other researchers. It also fits well with creative education's notion of self-identification, the difference being that in one the child sees his reflection in people, and in the other he sees his reflection in creative works. It is reasonable to postulate that this is not an either/or proposition, but rather a combination of the two. The child sees himself reflected in both people and creative works, one does not exclude the other. This gives him an even broader range of experiences from which to draw an integrated self-image.

Technologies

In this section this thesis will not attempt to propose an actual design solution other than the one that was briefly outlined in the introduction. In concluding this thesis, the various technologies and applications that exist today will be surveyed in order to provide background for the rough sketch of a solution given in the introduction. It must be kept in mind that these technologies exist today and that the *Looking Glass* system is assumming technology available five to seven years from now.

Papert's LOGO environment

In his book *Mindstorms* Seymour Papert examines the role of the computer in the education of children. Interestingly enough he mentions the theories of Piaget in his first chapter and notes that "What an individual can learn, and how he learns it, depends on what models are available." He also makes the destinction in computer aided learning between the child being programmed by the computer and the computer being programmed by the child and, as the child programs, masters a new technology and becomes acquainted many of the basic principles of science. He states that it is possible to design computers so that learning to communicate with them is a natural process- like learning French by living in France. He also says that by learning to communicate with a computer the child will change his outlook on learning other things. It may be possible that a child can learn to talk mathematics.



A typical LOGO program, created by a child.

Where Papert is at odds with Piaget is that Piaget's theories stressed

The LOGO turtle, controlled by commands programmed by the children.

what a child can or cannot learn at given stages. Having taught hundreds of children to program, Papert can say that children can be taught to think in a logical manner regardless of whether they live only in the present or are unable to reverse operations. He then introduces concept of an "object-to-think-with" which a child learns to use to get around in a graphic LOGO environment (LOGO is a simple programming language for children). This "object-to-think-with" is called the Turtle and the child learns to manipulate it in the computer or real environment. In the computer environment the child can tell the Turtle to perform a variety of tasks and in doing so program the computer to accomplish something. Relating this to Piaget's theory of stages, Papert says that formal or abstract ideas are made concrete by the "the-object-to-think-with", the Turtle.

He says that Piaget was a theorist of the kind of learning that happens without deliberate teaching. Papert feels that the computer is an ideal tool for accomplishing this aim. Recalling Dr. Montessori's theories, the computer could be seen as the latest generation of didatic material. It also applies to the creative theory of self-identification where the computer is the creative medium and the programs or graphics made with it are the things that the child identifies with himself. The advantage is that the materials the child is using to express himself are more flexible and abstract, allowing for more creativity than might be possible with crayons and paper.

Programming by Rehearsal

Even though *Mindstorms* is a relatively recent book (1980), already the programming techniques set forth in the book are obselete. The most notable example of new programming techniques comes from the Xerox Palto Alto lab and is titled *Programming by Rehearsal*. This is an entire visual programming environment that allows non-programmers to create educational software.

As with the LOGOS environment the user learns to program visually and can actually see the program as it is run or rehearsed. The environment uses the rehearsal metaphor to describe how programming is accomplished and uses performers acting on stages and taking cues to set up the programs. There are five basic functions: Auditioning performers or things to be manipulated from a provided troupe; placing the chosen performers on the selected

stage; blocking out the production by moving and resizing the performers unitil they are in the right place on stage and the right size; rehearse the production showing each performer what to do with the cues provided by either the user (student) or other performers; and finally storing the completed production or program for recall by student or programmer for further modification.

The graphic presentation is especially useful for debugging since the performance can be seen as it unfolds. The manipulation of the hardware is very easy: a mouse is used featuring three buttons, one to *select* an object or performer from the screen, a *name* button for naming performers, and a *menu* button for calling up menus relating to performers and cues. These three buttons are used in conjunction with the keyboard, which provides character input from the programmer during rehearsals. Only the *select* button and keyboard are used by the student during an actual performance. The concrete representations of programming functions through the system's graphics are simple enough that a child would be able to compose short productions with minimal practice.

Computer/videodisc hybrids

As computer languages become more visual in an effort to enhance user-friendlieness and understandability, more mediums are being explored to provide the high-quality, fast-access visuals needed for computer graphics. One of the most promising hybrids is the personal computer/videodisc player system. These systems are able to control the sequence of image strings from the videodisc player based on input from the user and stored control data. Top of the line systems such as *Terak* ($20,000) give 256 simutaneous colors, 640 by 480 pixel resolution, windowing and the ability to overlay computer generated images on videodisc images. At a third the price there is a IBM PC compatable system with internal software that can give many of the same features without sacrificing too much picture quality. Japan Victor is selling a computer/videodisc component system complete with monitor for under $2000 that can manipulate video images and overlays of decent quality. A Graphover Interface is available for $9850 that can display windows, handle the switching of two players, and contains software that can simulate zooms, pans, and split-screens. There also already exists software that can edit and reassemble a movie on videodisc to form a game with multiple

This child is using a computerized laser-disc encyclopedia.

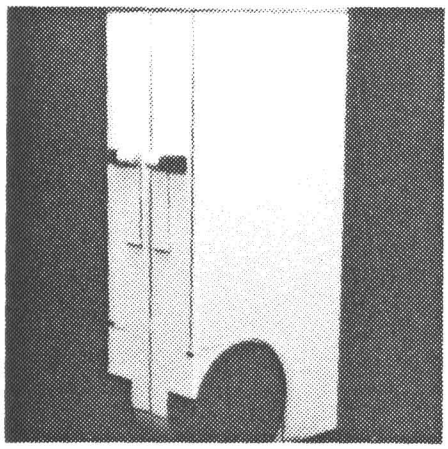
action paths that the a user must decide to take within a given time period.

What this above listing is supposed to show is that much of the technology for the *Looking Glass* system outlined in the introduction already exists and that it is reasonable to assume that the cost for this technology will continue to drop. Parents presently are willing to spend $1000 to $2000 on a personal computer to aid in their children's intellectual development. If the cost of the *Looking Glass* system could kept around $1000 it would be a viable product in the educational/entertainment market, assuming there is such a market 5-7 years from now. If the cost of the system is higher, it would adapt well to school/intstutional market.

Conclusion

One can see that among several related disciplines there exists several general agreements: children need to develop an accurate self-image in order grow as healthy social animals, they achieve this integration by obtaining information about themselves through interaction with others and objects in their environment, and they are able to learn through induction provided they are given the proper clues and tools. Further, although there is not widespread agreement, there is substantial bodies of research that show that children in modern societies are faced with more and more obstacles in their quest for integration and one of the major obstacles can be careless or prolonged television viewing. Paradoxically, televiewing can help child viewers to a certain extent by allowing them to interact with a familiar, stable community of TV personalities but it also hurts the children because the televised reality they interact with is disorted and can give them a false reflection of themselves and their world. This thesis was concieved in the hopes that the technology that brought this situation about can be used to provide childern with a tool to see the true nature of themselves and their society.

Solution



The Looking Glass System transport module.

As you can see by the previous section, this thesis encompasses two large and somewhat disparate fields: child development and televiewing. However, it is the overlap of these two activities that is the focus of the thesis. Child development in highly industrialized societies is the problem. Television is part of that problem. Television is also an extremely powerful tool that, if used in a thoughtful manner, can go a long way to alleviate many of the problems encountered by a child in a modern society. It is at this juncture between child development and televiewing that this thesis is aimed.

The solution, named the *Looking Glass System*, is a portable integrated video production studio that can be used by children as young as nine and as old as ninety. It is a very flexible and creative device that can be used to make anything from a cartoon to a music video to a full-length feature film. It can also be used to teach class lessons and provides a role playing environment for student-teacher, child/parent interaction.

This system allows a children to explore their world and learn about themselves and how they fit into a sometimes confusing society. The chosen medium is video because it is visual, familiar, easily manipulated and relatively cheap. I also feel that if children can make television programs in which they are the stars, it will motivate them to use the system in the future.

System overview

The *Looking Glass System* uses several different technologies in its operation. Beta tape is used to record performances while a laserdisc system is used to provide background, special effects, and supplemental role-playing characters. A touch screen computer controls the directing of live sequences and is used to edit taped material. A large screen video projector is used to provide scenery and playback finished pieces.

The system is composed of five separate modules that may be used independently, according to what mode the system is in. It may also be set up in different configurations, depending on how the system is to be used. The following sections will explain in detail the hardware, software, modes, and configurations of the *Looking Glass System*.

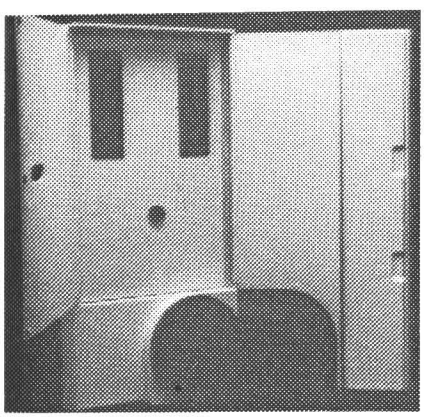
Hardware

The hardware of the *Looking Glass System* consists of two main modules and four sub-modules.

The two main modules are the projection module and the production module. Each module measures five feet high by two and a half feet wide by eight inches deep. They are constructed of injection molded structural foam and covered with a sprayed-on ABS plastic, matte-finish skin. Certain high stress areas such as hinges, support joists, and thin wall sections are reinforced by graphite composite members and aluminum ribs laid up in the molds prior to the injection of the foam. Specialty components like the bellows and projection screen are made of flexible plastic and/or rubber.

Contained in the production module are four sub-modules, the two light and sound modules, the camera, and the director's seat. The light/sound modules stand thirty-three inches tall by twelve inches wide by five inches deep. They are made of the same materials as the main modules and have molded in handles for carrying on location. The camera is six inches high, nine inches wide and one inch deep, with the lens protruding another inch and a half. The camera body is made of shock-resistant Lexan and contains coated tempered ground glass lenses to resist scratches. The director's seat is adjustable in height and the seat cushion is eighteen inches in diameter. It is made of plastic-skinned foam and the cushion is of dense foam rubber.

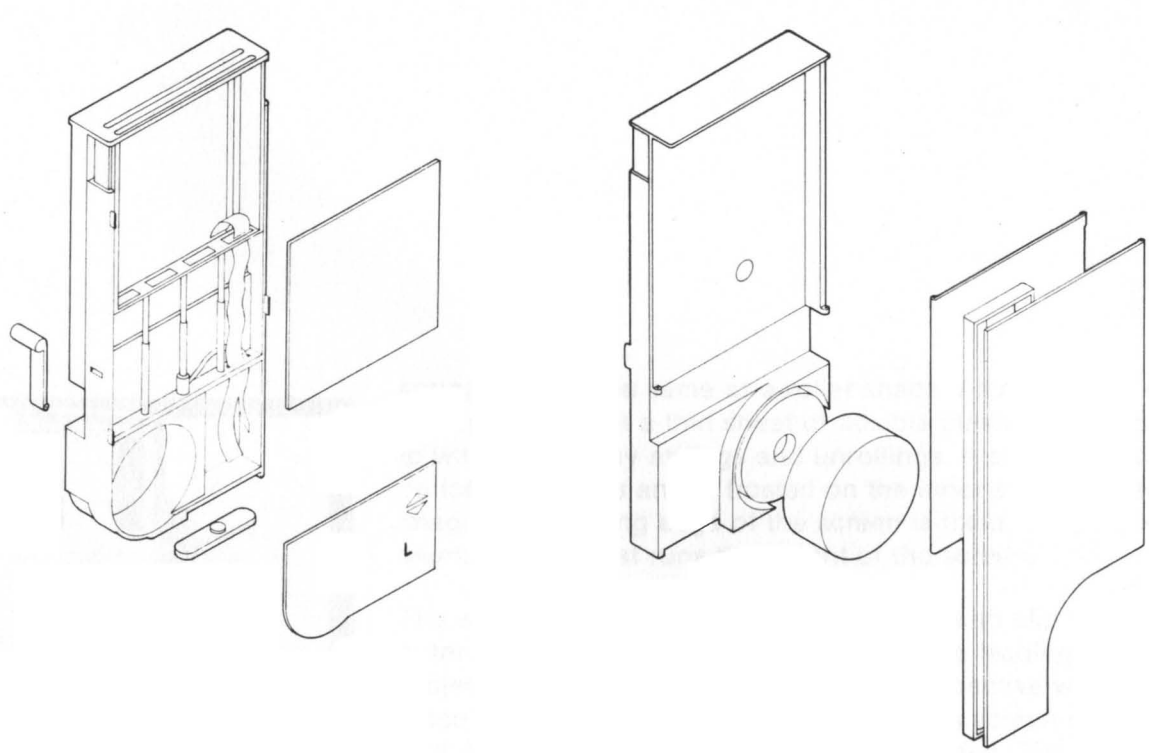
Projection module



The opened Projection module.

The projection module is the least complex of the two main modules. It actually consists of two pieces— the lower section contains the single wheel, the pivot stabilizing foot, the electrical connections and the height adjustment motor, bellows and controls. The upper part of the module, comprising about three quarters of the module, is a cabinet fitted with two door-like vertical wings that hinge outward and lock into position. Both upper and lower sections have removable inspection panels for the maintenance of the internal parts. The panels are held in place with allen-head bolts.

The cabinet contains a single-tube color video projector in the central portion. The image is transmitted via a single wide-angle, fixed-focus lens coupled to a 45^0 prism. The video tube and support

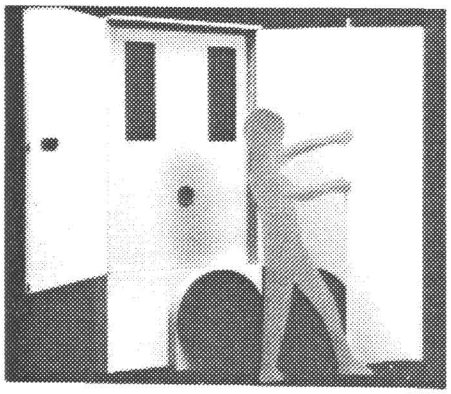


components are air-cooled by dual fans mounted in the top of the cabinet. Air is drawn in through slots next to height adjustment bellows and vented out of a grid on the top of the cabinet. There are no external controls for the video projector. An integral on/off switch is activated when the control cable is plugged into its receptacle at the bottom back of the module. This eliminates the possibility of the unit being accidently left on.

Also in the upper cabinet are a pair of column speakers, located above and on either side the projection lens. These allow the director to narrate scenes that appear on the projection screen or give voice to characters that are projected on the screen (this will be discussed more in the *Modes and Configurations* section).

The wings of the cabinet have dual position locking hinges, one position being closed, the other open (at 45^{0}). This is accomplished by a spring-loaded tab-and-slot arrangement on the lower end of each hinge. The hinge is released by momemtarily sliding the red control tab (located on the side of the cabinet) down and swinging the wing outward. When the second (open position) slot reaches the tab, the tab engages and the hinge locks. The wing is closed by reversing the operation.

The outer-most wing, the one that opens first, extends the entire length of the module except for a cut out space for the unit's wheel. This wing contains the rear-projection screen in a twin roller canister located along its longest edge. The rollers in the screen canister are



The projection screen is pulled from its storage canister.

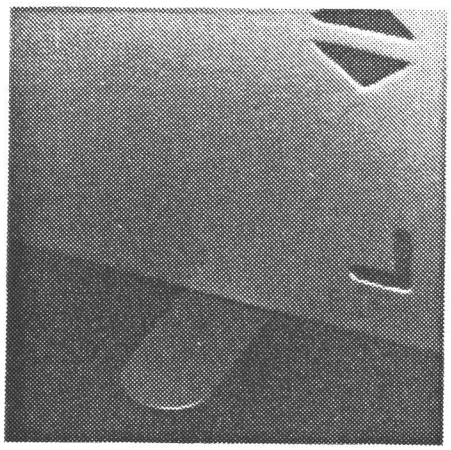
spring-loaded, the same as a roller shade. As mentioned earlier, the screen is made of a thin sheet of flexible plastic that is tough enough to withstand many rollings and unrollings. It also has excellent optical properties and is frosted on the inner side to reflect the video image. The leading edge of the screen is fixed to a small-diameter aluminum rod that runs the height of the screen.

The second wing is simply a hinged door with clip fixtures on its outer edge to grab the aluminum rod of the leading edge of the projection screen. For set up, after the respective wings are locked in place, the child grabs the rod and pulls the screen out of its canister until the edge of the opposite door is reached. The rod is then snapped into the clips on the door's edge. To store the screen, the rod is unclipped from the wing and the screen is allowed to retract into the canister.

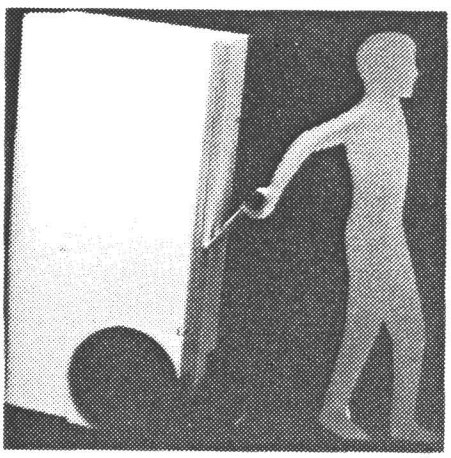
The height adjustment of the cabinet is controlled by a motor-driven screw located in the bottom part of the module. The cabinet can be elevated from its down position height of five feet to a fully up position height of six feet. The screen however, remains five feet high so there is a gap between the bottom of the screen and the floor which increases as the cabinet is raised. The controls for the height adjustment are located on the back of the module, below the bellows, and consist simply of two triangles, one pointing up, the other down. Sensors in the hinges detect when the wings are closed and automatically turn the height adjustment motor on to return the cabinet to the down position, if it isn't already down. This is so the projection module will be able to fit back on to the production module. All moving surfaces are covered to eliminate the possibility of pinched fingers and hands.

The bellows located on the back of cabinet above the wheeled lower portion conceal the height adjustment screw as well as protect the ribbon connectors that run from the bottom unit to the top cabinet. The bellows are a square acordion type and made of tough flexible plastic.

The module's wheel is a single piece made of aluminum and coated with textured, non-slip rubber. The unit's axle rides in a caged roller bearing located in an aluminum collar which in turn is molded into plastic of the base. The bearing is sealed and requires no lubrication.



The pivot foot stabilizes all independent modules.



The Transport module is easily moved.

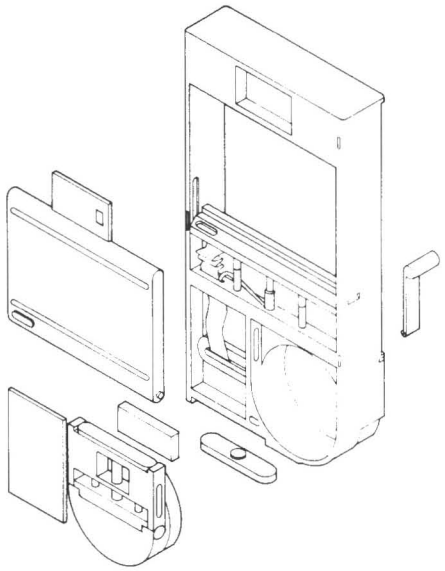
In the very bottom of the base is the pivot foot that stabilizes module during operation. It is made of a high-strength composite and mounted on damped torsion spring. When the module is wheeled to its location, while it is still tilted, the release button located on the back bottom of the module is pressed, allowing the foot to pivot into place. The module is then set on the ground and opened up for operation. To retract the foot, the module is tilted and the foot rotated back into its locked position.

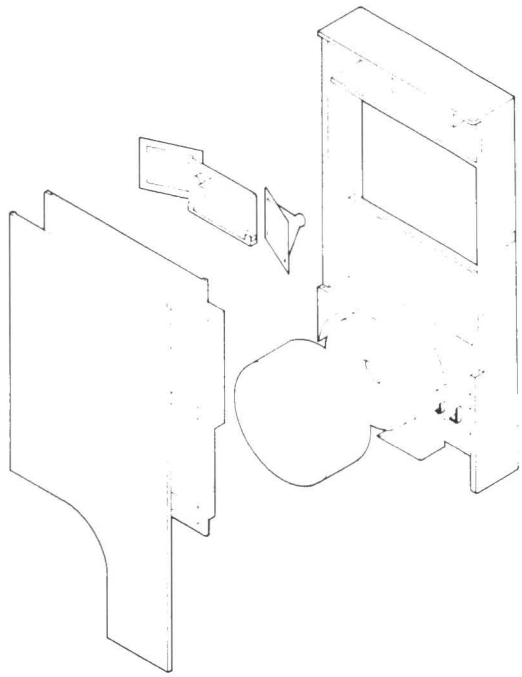
The rear-projection module also has a folding pull handle located on the side pillar above the wheel. It folds downward and has a two position locking hinge the same as the cabinet wings. The handle and hinge is made of high-strength aluminum and provides a means of tilting and moving the module from location to location.

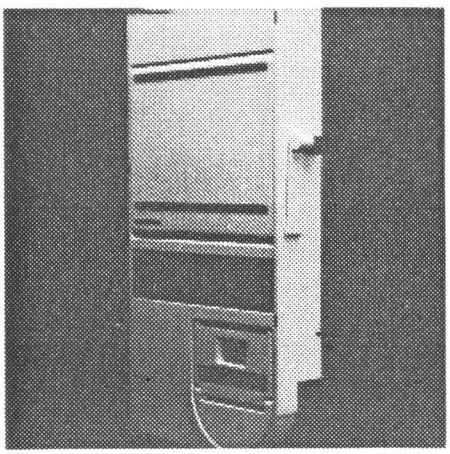
The entire projection module is able to join and lock to the production module by a system of three tabs and slots. The tabs protrude from the back of the projection module, two along the support pillar containing the folding handle— one at the top, one at the bottom— and one midway along the back of the opposite support pillar. Corresponding to these tabs are three slots on the support pillars of the production module. Joining and locking is accomplished by backing the production module to the joining surface of the projection module and fitting the two tabs into the two slots. The two modules are then pressed together, the remaining tab snapping into the single slot. The two units are now securely locked together. To release the modules, a release button— a spring-loaded plunger on the support pillar of the production module, located over tab slot, is pressed. The plunger pushes the tab finger away from the wall of the slot and allows the tab to slip out of the slot. The two halves are then wheeled away from each other and set up at there respective positions.

Production module

The production module is slightly more complex than the projection module. It contains five separate components: the director/editor terminal board, two light and sound modules, the camera, and the operator's seat. With the exception of the director/editor board, all the components can be removed from the production module. This allows for the maximum amount of flexibility for the system (of





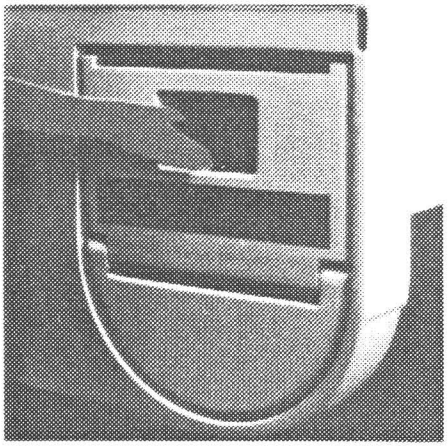


The Director's module in its storage mode.

course, the seat has to come out to be used). In addition, there is a retractable cable storage compartment located in the bottom section of the module.

The main frame of the production module holds the director/editor board between upper part of its support pillars. The lower edge of the board is a pivot which rides in a track recessed into the pillars. This track is what locates the board as it is adjusted up and down, there are no electrical connections made through this track. Instead, connections are made by swinging the board down into the operating position. In doing so, the bottom side of the board contacts the angled face of the horizontal support member and plugs into the receptacle located on the member. This automatically activates the board. The board is shut off when it is raised into the storage position.

The horizontal support member is also a movable piece but is connected to the lower base of production module by a pair of rods that slide in corresponding sleeves. Between the rods and sleeves is a motorized screw assembly identical to the height adjustment assembly in the projection module. In this way the horizontal support member is a floating piece, supported and controlled by the motorized screw. Running from the plug receptacle on top of the member, through the member and down into the interior of the production module are ribbon cables that connect the terminal board with the AC line contained in the base and that allow the director/editor board to talk to the other system components. These

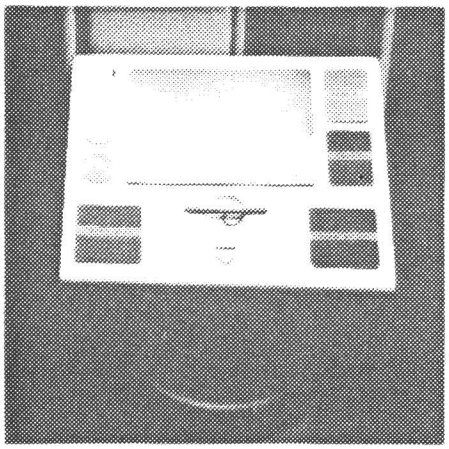


The seat clips securely into the base.

ribbon connectors are protected and concealed by a flexible bellow as on the projection module. The height adjustment controls for the director/editor board are located on the board itself and are identical to the controls on the projection module.

Immediately below the bellows and to the right of motor assembly is the storage compartment for the operator's seat. There are small tabs just below the lip of the compartment that allow the seat, which has matching grooves, to snap securely into the recess. In the center of the circular depression for the seat cushion is the securing cap for the wheel axle.

The seat itself consists of a flat vertical support section hinged to circular cushioned seat. The support section has its own pivoting stabilizer foot, similar to the projection module foot, and a bellows section containing a screw-type height adjustment. Instead of a motor, the screw is operated by hand via a recessed cylindrical handgrip in the support section's upper half. The seat hinge is a larger version of the two position locking hinge found on the projection module's wings. The release button is a large red disc in the center of the hinge.

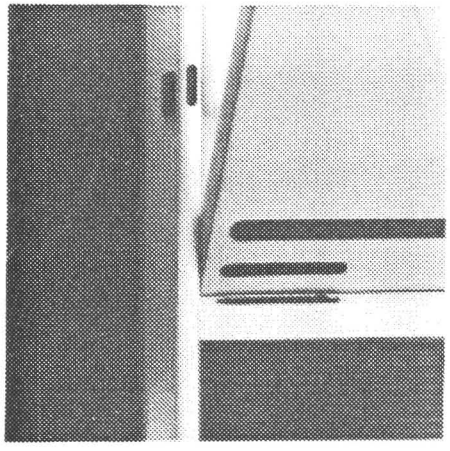


The director/editor terminal contains all production controls.

The production module is also equipped with the same pivot stablizer foot, locking push handle and single-piece aluminum wheel as the projection module. The difference, as stated earlier, is that the joining and locking fixtures are slots corresponding to the tabs on the projection module.

Director/editor terminal

The director/editor board contains the following components: a floppy disc drive, dual Beta tape ports, a laser disc port, a nineteen inch diagonal flat display screen, camera, lighting, and sound controls, a control wand, a one megabyte mini-computer, twin condenser microphones, height adjustment controls, and plug-in jacks for external components such as a printer or second computer or other *Looking Glass* systems. Each component is color-coded and identified with basic geometric shapes as well as labeled with its respective name. This is so the children can more easily identify the components. The components are arranged so that there is no left- or right-handed bias and the most used components are towards the

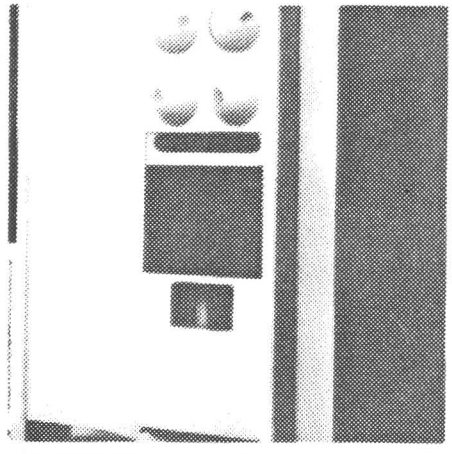


The terminal automatically turns on when lowered.

top of the terminal board while the least used are at the bottom of the board. When the board is down in the operating position it is at a fixed 25° angle which is a comfortable slant for a drawing board. This is ideal because virtually all terminal input is handled by the control wand as will be explained in the *Software* section. All other input is handled by the camera, lights, and sound dials. The unit is cooled by intake and exhaust vents located on the bottom surface on the board.

Production module cabinet

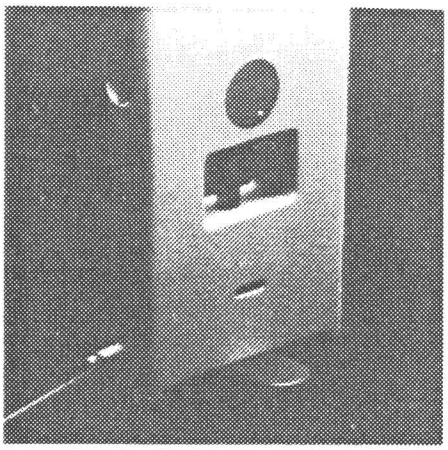
On the opposite face of the production module are a pair of vertically mounted wings similar to the wings on the projection module. The main difference between the two pairs is that the hinges on the production module lock in only one position (closed) and then swing open in small increments. The release and lock mechanism is the same but the hinges also have mated serrated surfaces which allows them to open and stay in any one position. The outer wing is shaped the same as the outer wing on the projection module but it does not contain a screen canister. Instead, there is one of the light/sound modules mounted on its inner surface. The other wing has a concave compartment molded into it to match the outer wing's light/sound module and has the second light/sound module mounted on its flat section. The modules are mounted on the wings the same way the two main modules lock together— two tabs protruding from the wings fit into slots on the top and bottom of the back of the light/sound modules. A red release button (plunger) located on top of the light/sound module is depressed to detach the module from the wing.



The light/sound modules can mount on Director's module or stand independently.

Light/sound modules

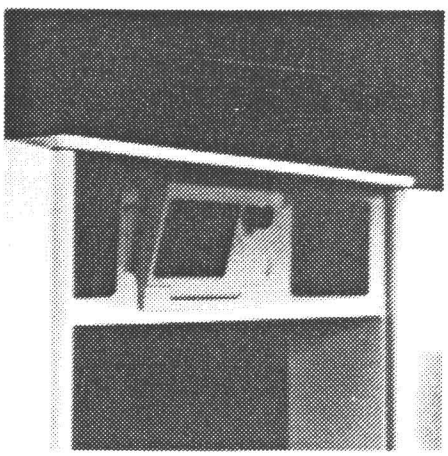
The light/sound modules contain four swivel lens on the top front portion of their cabinets. The lenses, arranged in a square, are mounted on hemispherical gimbles that allow for about a 30° cone of aiming. The top two lenses are focused for spot-lighting and the bottom two lenses are focused for fill-lighting. Behind each pair of lenses, within the cabinet of the light/sound module, is mounted a horizontal halogen-tungsten tube and a vented parabolic relector. Immediately below the two tubes are a pair of high-speed fans for cooling. Below the fans is the insulated microphone recess from



The light/sound module can be linked to Director's module or operate on batteries.

which the shotgun mike hinges out of. Below this compartment is the height adjustment assembly and bellows. Air is drawn from vents next to the bellows up through the cabinet and directed out of grids mounted on the top of the module.

The height adjustment for the light/sound modules is the same as the adjustment for the seat. A recessed adjustment handgrip is located in the base of each unit. Inside the base, below the handgrip are the batteries and ribbon connectors that feed the lights and microphone. On the side of the cabinet at the bottom is the external cable connections. While mounted on the wings the modules are linked to the director/editor board via cables from the base or the production module. On the back of the modules are manual controls. Each module is also equipped with a pivioting stabilizer foot. There are recessed cylindrical handles molded into the side of each unit for carrying. On top of one of the units is the mounting turntable for the camera for shooting on location.



The camera normally mounts in the upper cabinet of the Direcotor's terminal. Note flanking speakers.

Camera

The camera is a flat rectangle, rounded on its top edge, and has a single control button and a 2 inch diagonal view screen. All functions are automatic. The camera can be loaded with a Beta tape if it is separated from the production module and has its own batteries. The base of the camera contains a motorized hinge to allow for up and down movement while it is mounted in the recess of the production module or to the light/sound module's turntable. The base also contains a retractable electrical plug for mounting in the production module. This allows the camera to be controlled from the director/editor board as well as transmit an image and receive power. The lens is a motor-driven zoom.

In the top section of the production module is a recessed compartment that faces outward and is normally covered by the wings when they are closed. The camera is usually mounted in this compartment when the system is in the Full Studio Mode (this will be explained further in the section on *Modes and Configurations*). From this recess the camera can be directed up, down, and sideways and focused by commands from director/editor board. This also allows the terminal board to focus and zoom the camera and accept the video input for taping.

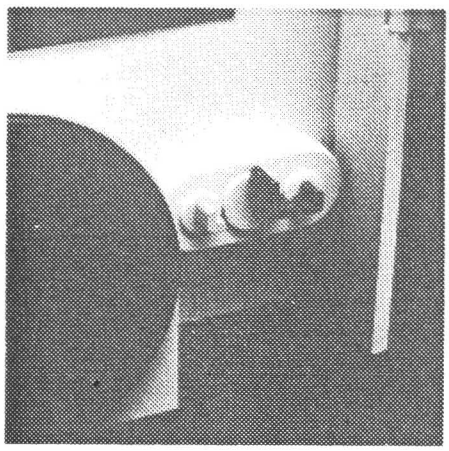
Speakers

This recessed compartment also contains two speakers, mounted on either side of the camera compartment. These allow the director to give directions to the performers and provide sound if the production module is being used in the playback mode.

Disc and tape storage

On the back of this upper camera and speaker compartment, above the director/editor board, is a spring-loaded hinged door which seals a small compartment used for disk and tape storage. The compartment is heat insulated and provides for the storage of the program disk, three memory disks, three laser disks, and four beta tapes.

Cables and connectors



The cable and connectors storage spools are located in the base of the Director's module.

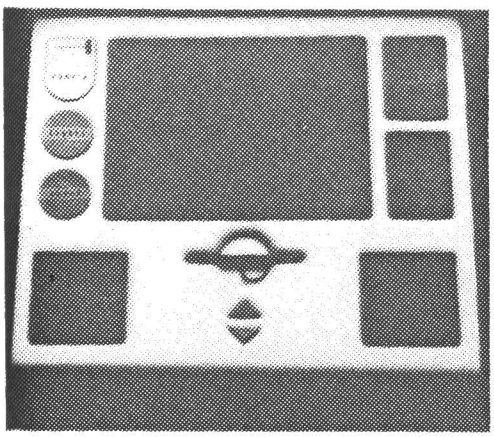
The cable/connector storage compartment is located at the bottom of production module, next to the wheel. It is permanently mounted in the production module and linked by ribbon connectors to the horizontal support member which in turn is linked to the director/editor board. The cable/connector compartment is a rounded oblong with three circular plates for each of the three connectors. The compartment contains three separate spring-loaded spools, each spool holding a cable. The connectors are color-coded and shaped to fit only one receptacle. The connectors are for the the light/sound modules one and two, and the video projector. Each spool holds twenty-five feet of cable and retracts independently into the module. The AC power cord retracts from inside the seat well.

Software

Aside from the hardware, one of the most crucial elements of the *Looking Glass System* system is the operating software. While many present-day, commercially available software packages were investigated for this thesis, it must be stated that I am neither a electrical engineer or a computer scientist so I can not accurately predict what will be on the market seven years from now. This section will, however, present the requirements of the system and, drawing on the software now available, project possibilities.

The software for the system falls into three categories— operating, directing, and editing. The following subsections will describe each type and show how the software will be used by the system.

Operating software



All input to the terminal is handled by the control wand.

The only hardware used for the user/software interface is the disk drive, the director/editor board's screen, and the control wand. Since the system is for children and absolute simplicity is desired and to avoid any lengthy user's manual, the system will have to tell the user how to program it. This means that some of the operating software will have to be hard-wired into the director/editor board. When the board is lowered into the operating position and automatically turns on (as described in the *Hardware* section), the screen will tell the user with simple step-by-step instructions and pictograms how to get and insert the program disk, program the system, and offer descriptions of the various modes available. All functions and commands are handled by the control wand which is touched to the director/editor board's screen for selection.

The program and memory disks are stored in the in the upper compartment described in the *Hardware* section. The disks are color-coded according to their function. Since red was chosen as the color of all the hardware control surfaces, the program disk is also red. The memory disks may be any other color or they may simply be numbered. All disks are 5¼ and insert into the disk drive from the top.

Programming

Programming the system is accomplished by inserting the program disk in the drive port and touching the control wand to the desired box displayed on the director/editor screen. The system will then be

programmed for whatever mode selected. Once the mode is achieved, the screen will show more instructions for removing the program disk and inserting a memory disk and list a menu of the options possible for that mode. The menu may be composed of words or pictograms or both. Menu selection is made by touching the control wand to the desired item.

Besides the operating software, there is the directing and the editing software which could actually be called modes of the system. Each main mode, directing and editing, is made up of a series of levels, from beginner to expert. This allows the younger or more inexperienced user to have access to a step-by-step series of instructions provided with examples and pictograms while intermediate or expert users can bypass having to look at time consuming instructions. Also, at the beginner level, more functions, such as lighting and sound levels, will be handled automatically by the system. Intermediate levels will have more control over production variables and expert levels will give full control to the user. Each mode level will be selected when the system is programmed.

Directing software

To begin explaining the directing software I must give a description of the five modes and configurations possible with the *Looking Glass System* (these modes and configurations will be described more in-depth in the next section). These modes are: 1) Full Studio, 2) Simple Studio, 3) Remote, 4) Edit, and 5) Playback.

The first three modes and the fifth mode are all actually sub-routines that make up the Directing Mode. They range from a very complex mode, Full Studio, to the very simple mode of Playback. With the exception of the Remote mode, they all use the director/editor board for real-time control.

Remote

For the Remote mode the camera is removed from the production module and mounted on one the light/sound modules. Prior to removing it from the production module the camera is programmed to perform according to one user level (beginner, intermediate,

expert). Then it is loaded with Beta tape and taken on location with the light/sound modules for recording. All directing that takes place after that is done by the user who points the camera.

Playback

The Playback mode simply uses one the Beta tape ports on the director/editor board to playback a completed tape. The output may be directed to either the looking glass viewing screen on the production module or to the projection module screen. Minimal directing software is used- tape function controls (fast forward, reverse, etc.) are the only thing displayed on the director/editor board's screen.

Simple Studio

In the Simple Studio mode, used to tape large performances, only the production module is used, without the projection module. All the elements of the production module are used except for the laserdisc port. The light/sound modules may be used while mounted on the production module's wings or they may be taken off the wings and located further away from the production module. The camera, however, must stay mounted in its upper recess. The looking glass screen is used to show the actors themselves as they perform.

As with all the modes, the Simple Studio mode has several experience levels. On the beginner level the light and sound levels are automatic with only the camera direction being controlled by the user. Camera direction is accomplished by using the control wand in several different ways. To move the camera up or down, the director draws a horizontal line across the director/editor screen, draws an arrow above or below the line pointing either up or down, and then, with the wand, touchs a command square that is constantly displayed in the upper right hand corner of the screen. The computer then moves the camera in the direction of the arrow until the drawn line becomes flush with the edge of the screen. Which edge becomes flush depends on which side of the line that arrow is drawn.

For example: If the director wanted to point the camera down, he

would draw a horizontal line on the screen where he wanted the top of the frame to be and then draw an arrow above line pointing downward. He would then touch the command square and wait for the camera to adjust. The speed at which the camera adjusts could be controlled for pan shots. Side to side movement would be handled in the same way except that the director would draw a vertical line and arrow.

Zooms and close-ups would be controlled by simply drawing a frame around the person or object that the director wishes to zero in on and touching the command square. The system would then focus and angle the camera until until the specified framing was achieved. Of course, the director may not always draw an exact 3:4 frame around their subject so the framing function is given frame height priority. That is, once the frame reaches the upper and lower horizontal lines drawn for the box, the system will assume the subject has been suitably framed. Normal framing is restored by touching the command square a second time. Again, the speed at which the frame adjustments are made can be set for zooms and close-ups.

Fades can be executed in the directing mode or the editing mode. In the directing mode the director simply draws a large F and a one digit number in the middle of his screen and touches the command square. The number tells the system how long the fade should take (i.e.- 1 is a one second fade). The system then automatically begins the fade and stays there until the command square is touched again, which causes the system to fade up at the same rate until the previous frame is restored. Fades and disolves are executed in a similar way in the editing mode and will be discussed in the next section.

These simple directorial movements- camera angle, zooms, pa..., and fades- are the basic capabilities of the software in the Simple Studio mode. However, these capabilities are only limited by the software used. More sophisticated movements such as keyhole disolves and rack-focuses (where specific elements in the frame are brought into and out of focus for dramatic effect) are also possible with the *Looking Glass System*. The expertise of the user will dictate the level of software and hence the complexity of directorial movements possible with the system. More sophisticated software

may be sold as add-on modules or included in the system.

In addition to controlling the camera via the terminal screen and wand in the Simple Studio mode, the director may also control text displayed on the looking glass screen. The text may be a script for the performers to read as they see themselves in the screen in which case the text would only appear on the view screen and not be recorded. The text may also be matted over the image the camera is recording so as to give subtitles to the performance.

In either case, the text input is handled the same way. The terminal screen computer would have internal software that would allow it to recognize simple block printing and translate it into uniform type which would then be stored. To try and insure as uniform as possible printing, when the text input mode is selected the screen will display horizontal lines of a specific width on to which the director must write his text with the control wand. As the lines are filled with text the screen will scroll up fresh lines until the complete text is inputed.

Once the text is stored it may be recalled at any time by writing 'text' and the file number on the terminal screen and touching the command square. If the teleprompter format is selected, the text is displayed on the terminal screen and the view screen but is not recorded and the text scrolls upward across the entire screen. If the subtitles format is selected, the text is displayed on the terminal screen only and is recorded. The text rolls from right to left across the bottom of the screen.

Full Studio

The Full Studio mode of the system uses all of the directing software available in the Simple Studio mode plus some additional software to control the projection module. The laserdisc port is also used because of the projection unit. The main software addition is programming that displays the videodisc controls and a branching program that allows for director-projector interaction (this aspect will be discribed further in the *Modes and Configurations* section).

The laserdisc port can only be used to give input to the projection module while using the directing software. The projection module would be used primarily for scenery and special effects. Most

laserdiscs, which would be bought separately under different title selections (outer space, wild west, etc.), would not need the branching software. To call up a scene off of a disc to be used for a background, the director would just write the track number of the scene, found in the disc's index, on the terminal screen and press the command square. If there were consecutive scene changes the director would write the index number and the time, in minutes and seconds, of how long the scene should be played.

Laserdiscs that would use the branching software would be set up in the Video Playhouse format. These discs would have a specific title and storyline such as "Bugs Bunny and Fire Safety" and would include a rough script for the director. The Video Playhouse format would put the control of the laserdisc in the hands of the system's computer which would only be told what direction the storyline should take.

This is where the branching software take over. A character would be introduced to the children performers via the projection screen. The character would outline the story or lesson and then pose a series of questions or tell the performers to do something. Depending on what the reaction of performers are (yes or no, do or don't) the director touches one of the response menu boxes windowed on his screen for the appropriate storyline change. The system will then jump to the selected response track and the story will continue with the character on the screen congratulating the children for doing well or explaining to them what they did wrong. This director-storyline performer-character interaction continues until the story is complete. Of course, the entire performance is taped.

In addition to store bought videodisc sceneries and special effects, the director may choose to tape his own scenes with the system's camera and then have the scenes played back on the projection screen during the performance via the second Beta tape port. The director may also create his own scenes with the cartoon and paint program while in the Edit mode and then play them back in the Directing mode through the second Beta port. As you can see, the creative possibilities are extensive.

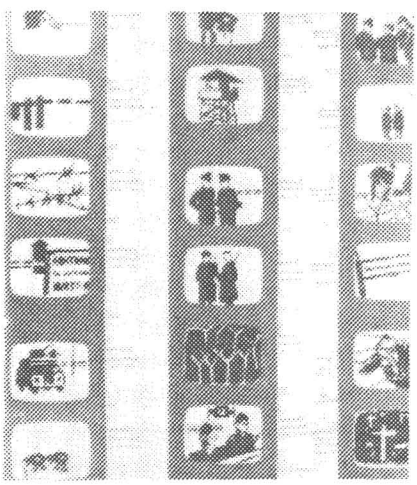
Editing Software

As mentioned earlier, the directing software may be used in several different system modes while editing software may only be used in one mode, the Edit mode. The Edit mode allows for only one operator at a time and uses only the director/editor terminal (and the operator's seat). The Edit mode is used for cutting raw footage, adding special effects, sequencing and enhancing shots, adding graphics, and creating scenery.

Many of the effects described in the directing software section are possible in the editing software, the difference being that the directing software is used "live" while the action is being taped. The editing software is used exclusively on material that has already been recorded. The Edit mode also has many effects that are not possible in the directing modes.

Nearly all elements of the director/editor terminal may be used while in the Edit mode. The number one Beta tape port is used to handle the previously recorded (raw) tape and the number two port holds the blank tape on to which the final version of the edited performance will be taped. The laserdisc port may be used to matte over (or under) the taped footage as well. The manual light and sound level disks can be used to adjust the recorded image's sound or lighting quality. The camera focus and angle adjustment cannot be used however since the frame focus has already been determined during the taping. The floppy disc port is used constantly to manage the editing software. And as in the directing mode, the control wand is used to handle all input into the terminal, except when the light and sound level wheels are used.

The editing software falls into four main categories: cutting, enhancing, graphics, and matting. The manipulations possible for each category range from the very simple, cutting raw footage, to the very complex, matting different effects over or under recorded scenes. Any of the four capabilities may mixed together to create the maximum amount of effects. As in the directing modes, the Edit mode has several experience levels which determine the degree of manipulation the editor can exercise.



Storyboards are the usual method of determining shot sequences.

Cutting

Using the cutting routine in the Edit mode is fairly easy. First the raw footage must be loaded into the number one Beta port and rewound to the beginning of the tape. Then the tape must be indexed, which is handled automatically by the system. To index the tape, the terminal simply plays the tape fast forward while imprinting a time code on it. When it reaches the end of the tape it automatically rewinds to the beginning and the tape is ready to be cut.

To cut scenes from the raw tape the editor views the footage via the terminal screen in normal or slow motion (controlled by the terminal). When the desired cut point is reached, the editor stops the tape by touching the command square and reads the index number that will be displayed in the upper left-hand corner. He then writes down that number on a windowed "scratch-pad" that appears on the screen when the tape is stopped. To continue the tape to the next cut point, the editor touches the command square again and continues viewing the raw footage.

To cut together all the selected segments the editor just lists all the index numbers from his scratch pad, assigns each number pair (the start and stop times) a sequence number, selects "load" from a displayed menu, and touches the command square. The system will then automatically search the tape in the number one port for the start/stop index numbers, keyed to the assigned sequence number (i.e.- 1 will tell the system to look for that segment first), and then record that segment on to the tape in the number two port. It will continue fetching and recording tape segments until it runs out of index numbers after which it will rewind both tapes. The tape in the number two port may then be viewed.

Enhancing

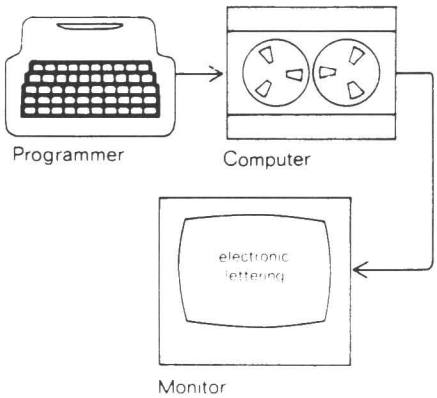
In some cases the editor may wish to manipulate the raw footage before cutting all the scenes on to a finished tape. This is where the enhancing routines come in. It allows the editor to do fades from one scene to another, complete fades, split-screens, reversals, and limited zooms and pans. These effects are controlled in the same way fades, zooms, and pans are controlled in the directing modes, with the control wand.

To use the enhancements a work tape must be inserted in the number two Beta port while raw tape remains in the number one port. The work tape is indexed in the same manner as the raw tape. The raw tape is then viewed on the terminal screen, manipulated and then recorded on the work tape. Then the work tape is inserted into the number one port and used to feed the enhanced footage on to the final tape.

If unenhanced footage is to be mixed with enhanced footage, the tapes must be constantly switched in and out of the number one port. Or, the enhanced footage could be appended to the raw footage tape so all scenes would be on one tape. The disadvantage with this scheme is that each time a scene is re-recorded, the quality of the image decreases. As a rule, an image should not be recorded more than twice to maintain relatively high quality.

Graphics

Computer generated graphics is another capability of the Edit mode which lets the editor add his own titles and credits to a tape as well as create symbols and drawings which could be used with the matting software. The graphics can be created on the terminal independent of the Beta drives and are stored either in the terminal buffer or on a floppy storage disc. Once given a file name they can be recalled at any time in the Edit *or* directing mode.



A keyboard is one way to create video text.

Titles and credits are created the same way text is created in the directing mode. Handwritten text is translated into type which the computer can store and manipulate. The text can be set in a variety of type styles and sizes and moved around on the terminal screen (via the wand) until the editor is satisfied with the layout. Once the titles/credits layout is set, the editor stores it on disc. He can then run the scene and text together to see how it will look. Once approved, the scene is fed to the blank tape with the titles/credits superimposed, creating the finished version. Subtitles would be handled the same way.

Graphic symbols, drawings and cartoons could be created, using internal paint and draw software, on the terminal screen with the control wand. This would allow the editor to create scenes and characters uniquely his own or embellish pre-recorded images. Text

or titles could be colored or modified to create a special effect like the Superman perspective titles. Entire cartoon productions could be made using optional animation software. The only limit would be the creativity of the user.

Once a graphic file was created and named it could be recalled in either the Edit or directing mode, the same as titles and credits. The file could intercut with recorded segments (either laserdisc or Beta tape), the graphics going directly from the file disc to the final tape, or superimposed on recorded segments as they are mixed on to the final tape. The graphics could also be used with the matting routine for composite, "music video" effects. Finally, the file could simply be used for background scenery while in the Full Studio mode.

Matting

The most complex level of editing software is the matting program. This level lets the editor interleave two or more different scenes or elements to give the illusion that all the elements are actually in the same frame. This technique was used extensively in the *Star Wars* epic as well as many other special effect extravaganzas. It is also used every night on the network news, primarily by the weatherman. There are mainly two kinds of mattes: an undermatte and an overmatte. The undermatte appears under or behind the elements it is matted with while the overmatte is superimposed on the elements in the frame.

To use an undermatte on a taped live-action sequence takes some preparation. When taping the sequence, whatever area the matte is supposed to fill in the finished version must blanked out with a bluescreen. A bluescreen is literally screen that reflects a shade of blue that does not register with the video camera, creating void or blank area in the frame. Later on this void can be filled with laserdisc images, computer graphics, or other taped sequences. This is the undermatte. The projection screen can be programmed to act as a bluescreen for backgrounds, and bluescreen material can be bought to cover specific elements in the frame so that the undermatte will only show through in small areas of the frame. This is a fairly sophisticated and time consuming technique but if handled correctly it can produce some high quality effects.

The overmatte is much easier to produce and does not require prior preparation. It is just a matter of superimposing images or effects (laser shots, explosions, etc.) over specific areas of a live action scene. In this case the live action becomes the undermatte. The images and effects could come off of a laserdisc or pre-recorded tape or be made-up computer graphics. The editor would simultaneously play the effect and the action sequence through the terminal screen, re-directing the effect with the wand until it superimposed on the action to his satisfaction. The overmatte would be stored in the terminal's image buffer until the final sequence was achieved and then fed on to the work tape at the same time the live action is recorded.

Diagnostic Software

Of course, as with any complex piece of electronics, the Looking Glass system must be able to diagnose its faults in order cut down on expensive toubleshooting. All of the major components of the system- the projection module, the camera, the light and sound modules and the director/editor board- would have built in sensors. In the event of a breakdown, diagnostic software would be used to read these sensors and pinpoint the faulty component. The software would also be used during regular servicing to detect trouble before it happens.

Summary

This overview of the Looking Glass system's operating, directing and editing software should give a good idea of the flexibility of the system and the wide range of applications for it, by children and adults. While at first glance the software and techniques may seem too complex for younger children it must be kept in mind that the system has beginning, intermediate and expert levels, allowing children (and adults) to go at their own speed. Not every routine must be used to produce a high quality video, and perhaps most of the time only the bare essentials will be called on. This description of the software is intended to give the potential of the system- what could be made with it.

Modes and Configurations

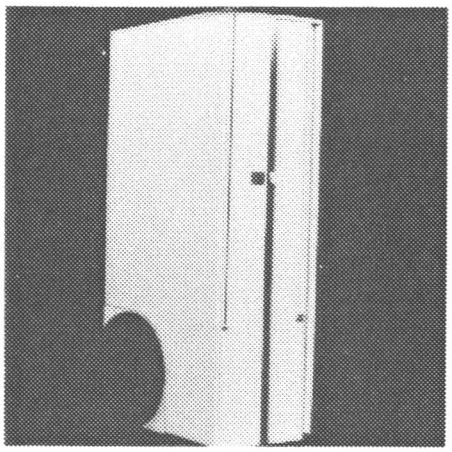
Some of the modes and configurations of the Looking Glass system have been described in general throughout the hardware and software sections since it was necessary to describe the purpose of the equipment as well as the form. Now that all the components and software have been described in detail it is time to talk about how the system fits together and operates.

There are six main modes of the system, each with a corresponding configuration. These modes, in order of complexity are as follows: set-up/storage, full studio, simple studio, remote, edit, and playback. The complexity of the configurations varies with the complexity of the modes. And since it is a modular system, the more complex the mode (the more modules being used) the greater the flexibility of the configuration.

Set-up/Storage

The set-up/storage mode of the Looking Glass system is the one mode in common with the other five modes because the system must be set-up before any of the other modes may be used and after any mode is used the system must be stored. And as the name of the mode implies, it is a dual mode. Once the *Looking Glass System* is wheeled to a site it is in the set-up mode. The main modules are split apart, wings are unfolded and components may be detached. After the production has been taped and edited the set-up mode is reversed and the system goes into the storage mode, with each component merging into the larger modules until the system is contained in the transport module, consisting of the clipped together production module and the projection module.

Since the set-up/storage mode is an all-encompassing, general mode that precedes or follows any of the other modes, and since every mode has unique configurations which will be detailed in the description of each mode, what follows here is an overview of how individual components and modules are set-up with very little discussion of configurations. This overview will also be brief since most of the set-up and storage procedures were covered in the *Hardware* section. Also, keep in mind that the storage mode is simply a reversal of the set-up mode.
The only set-up configuration that is the same for all five modes is the splitting of the transport module into the main module halves.

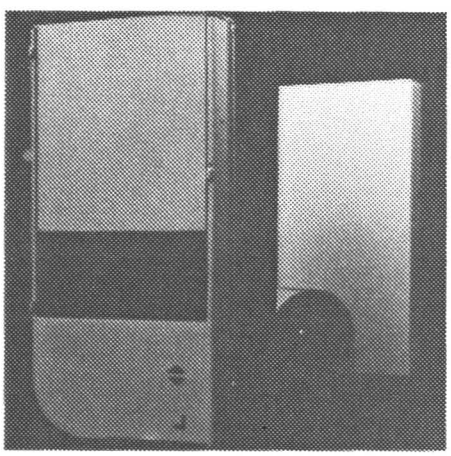


The Transport module is unlocked by pressing the large button on the side of the Director's module.

This is accomplished by folding and locking the pull handles up into their storage position and then depressing the red unlocking button located on the side of the module opposite the pull handle. This releases the locking tab and allows the two main modules to be split apart and rolled away from each other.

Once this step is completed the respective modules can unfold. For the projection module the set-up is fairly simple: the support foot is pivoted, the hinged wings are unlocked and unfolded, the screen is pulled out of its canister and clipped into place, and the unit is plugged in. The height of the module can then be adjusted to suit production needs. The set-up procedure for the production module is more involved.

After the support foot is pivoted on the production module the seat may pulled out of its storage compartment in the back of the module. The seat in turn may be unfolded and adjusted to proper height. Within the seat storage compartment is the AC power cord spool from which the cord can pulled and plugged into the nearest outlet. Then the terminal board can be swung down into the operating position and adjusted for a comfortable height. On the door-side of the module the wings can be opened and set to the desired angle and the light/sound modules plugged in. They may remain hung on the module's wings or set up on the ground, depending on the type of lighting the director wishes to achieve. The camera may be mounted on the appropriate light/sound module or left in its compartment, according to the configuration of the mode.



This is the normal configuration for the Full Studio mode.

Once all the components are in place the system can programmed for the desired mode. The disk storage compartment is located on the terminal side of the director/editor module at the top. The programming sequence is given in the *Software* section. With all the components set up in the configuration described above- projection module facing the production module and light/sound modules, and with the camera mounted in the *upper compartment*- any of the five operating modes may be programmed. However, depending on the mode, not all of equipment will be activated. For example: if the Full Studio mode was selected, all the components would be used. The Simple Studio mode would blank out the projection module. If the Edit mode was programmed, only the director/editor terminal would be active. The Playback mode would use everything but lights and

camera. The Remote mode could be selected but the camera would no longer transmit to the terminal and would have to be mounted on the light/sound module to be of any use.

As you can see from these examples, the maximum number of components allows for the maximum amount of flexibility. With suitable adapters multiple Looking Glass systems could linked together or additional cameras, lights, and projection screens could be added to increase the creative potential of the system(s). This should be kept in mind while reading the following sections on the five remaining modes.

Full Studio

The most complex of the *Looking Glass System's* operating modes is the Full Studio mode which uses all of the system components and offers the greatest amount of interaction between the system and users. The Full Studio mode, as the name implies, gives the performers and director a complete video production studio with which they can make anything from newscasts to music videos.

For this mode the production module is set up with the wheel-side of the module facing the wheel-side of the projection module. The optimum distance between the modules is fifteen feet but may be altered according to what the director wishes to achieve. For example: at fifteen feet the projection screen would fill the camera field for full-length scenery or special effects projections. At distances farther than that, the edge of the projection screen would be seen by the camera, but the screen could be concealed by real scenery, perhaps to give the illusion of a rainy night seen through a prop window. In any case, the maximum length of the projection screen cord is twenty-five feet.

There is one basic configuration for the Full Studio mode but the flexblility of the system allows for several modifications. For the basic Full Studio set-up the production module faces the projection module at a distance of fifteen feet. Once they are in position they can be unfolded as detailed in the Set-up/Storage section. In the basic configuration the light/sound modules stay clipped to the wings and the camera stays in its upper compartment. Once the

This is how a performance would look during the Full Studio mode.

projection unit and light/sound modules are plugged in, the system is ready for use.

As described earlier, the the Full Studio mode has several levels. In its simplest operation, the system could be used to tape children just standing in front of a static projected screen, introducing themselves, narrating, auditioning for a part or creating a bluescreen effect (the projected blue background does not tape, allowing another image to be dropped in behind the performer). The camera would remain fixed although it could be zoomed, the lighting and sound levels would be fixed and the projection screen would keep constant image. Director operation would be minimal. As in all Studio modes, the looking glass viewing screen would be active- the person being filmed could see him or herself.

The next studio level would have the added feature of moving scenery. Now anything from simple skits to full-length features could be produced with laserdisc segments providing the scenery and special effects. The illusion of motion could be introduced by having scenery that would roll from left to right (or vis a versa) while the performers walk in place. Similarly, driving a car or piloting an airplane, boat, submarine, or starship could be simulated, depending on what the script called for and what laserdisc was used. At this level lighting would become adjustable as would the brightness of the screen. The looking glass screen could become more active by using the text software to cue actor's dialogue and stage directions. The camera would remained fixed, allowing for zooms only. The director would have partial control over all the production equipment. He or she may also narrate by using the terminal board's microphone.

The most sophisticated level of the Full Studio mode, the Video Playhouse, allows the children to interact with the scenery and characters that are projected on to the screen. This is done be using a special laserdisc that contains a multipath storyline complete with several different edings. A typical plotline might be about fire safety narrated by Bugs Bunny and Daffy Duck. The cartoon characters would be projected along with scenery. Spaces would be built into the scenes to make room for the children's positions on stage. As the plot unfolded the cartoon character would address yes or no questions to the children based on information that was just shown

to them. Depending on the children's answers, the director, with a full menu slection windowed on his screen, would select appropriate branches that would cause Bugs and Daffy to either congratulate the participants if they're right or demonstrate the correct safety procedure if they are wrong. During the whole performance/presentation the children would watch themselves and the cartoon images in the looking glass screen as they were being taped. This would allow them to read any stage directions and it would make the performance seem to be happening "live", that is, the cartoons and the children were occupying the stage at the same time. The director interaction at this level would be fairly complex and require a director that was very familiar with the system and perhaps more mature. But by no means would an adult be necessary to run the system.

A less complex version of this mode would use a non-branching laserdisc. The disc would contain a fully scripted play or story with parts written in it for the child performers. The projected characters would say their lines, pause for the response, which would be on the looking glass view screen, and then continue. In this way the children could be the dwarves in *Snowhite* or friends of Luke Skywalker in *Star Wars*. Admittedly, this mode is very structured and doesn't allow much freedom for the actors but it would be an excellent way for them to learn about staging, timing, and dialogue.

Laserdiscs are not the only medium that the projection screen can use. Pre-recorded Beta tapes may be used which allows the children to tape their own scenes and characters for use in original features. The children can also create cartoons, graphics, and special effects in the Edit mode, tape them and then play the segments back in the Full Studio mode. This ability to use many different inputs gives the Full Studio mode a great deal of flexiblity.

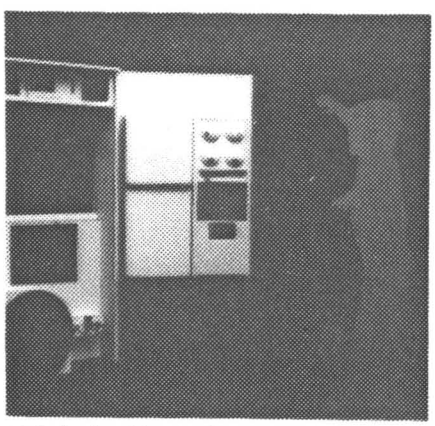
As mentioned at the beginning of this section, the basic Full Studio configuration can handle all of the above modes. There are some modifications that can be made to the basic configuration to enhance some of the modes. The light/sound modules can be taken off the director/editor module and set up at locations selcted by the director (but within the limit of the twenty-five foot power/control cords). The camera may be removed from its upper compartment and mounted on the light/sound module for differnt angle shots. And

finally, the projection screen can be moved into the background for combined real scenery and projected scenery shots.

Because the Full Studio uses all of Looking Glass system's equipment, it offers a great deal of flexibility and creativity. The different levels of operation minimize the mode's complexity, and lets inexperienced operators progress at their own pace and allows experts to experiment with sophisticated effects.

Simple Studio

The Simple Studio mode is second most complex mode of the *Looking Glass System*. Its performance and configuration is identical to the Full Studio mode except that it does not use the projection screen. This allows the director and performers to use real sets and props and frees them from the limitations of the fifteen foot stage set by the projection screen. This mode would be selected for more serious or informal productions such as a stage play or an ordinary classroom setting.



This is the Simple Studio configuration.

There are two configurations for the Simple Studio mode. In the first set up th camera and light/sound modules remain on the production module and the entire module faces whatever scene is to be filmed. The second configuration would have the light/sound modules standing independently and the camera mounted on one of the modules, giving more flexible camera movement. The camera would still transmit to the director/editor terminal via the light/sound module cord and would not be loaded with tape.

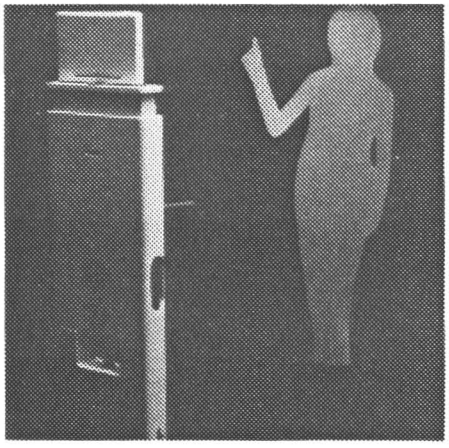
The software would operate the same as in the Full Studio mode except that there would be no output to the projection screen. The looking glass view screen and text software would stay active and the director's microphone and speakers would still work. The amount of involvement required from the director would range from minimal (starting and stopping the system) to moderate (controlling the camera, lights and sound).

The advantage of the Simple Studio mode over the Full Studio mode is that the Simple Studio is not as complex (as you may guess from the name) and therefore easier to use. It is also useful for a broader range of locations and settings and allows for real three dimensional

depth. The disadvantage is that scenery has to be constructed for elaborate performances. This is not bad in itself- set and prop construction is a useful skill- but sets would take time to make and aren't as flexible as scenery that can be instantly changed. In general, it is a good mode for very simple productions or very elaborate productions.

Remote

The next mode on the Looking Glass system's hierarchy is the Remote mode. The Remote mode is the simplest of the three filming modes and in a way, the most flexible. This mode allows one or two operators to tape footage outdoors and in places where the production module cannot go. Taping is just a matter of pointing and shooting, while lighting and sound levels can be automatically or manually adjusted.



A typical Remote mode configuration.

There is only one configuration for this mode- the camera mounts on the appropriate light/sound module and the light/sound module(s) (only the one light/sound module with the camera mounting turntable has to used) are taken off the production module. The module(s) are then taken to location and positioned according by the director. The units are then turned on and taping can begin. The modules can operate for four continuous hours after which they will shut down until recharged.

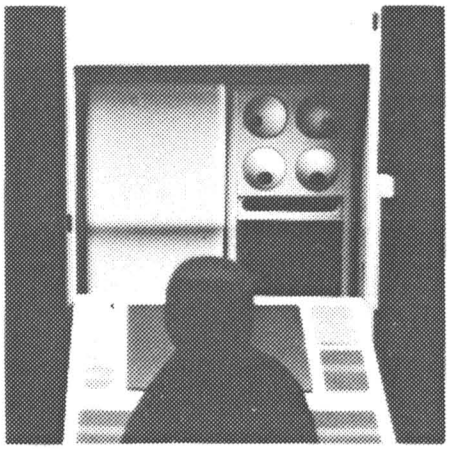
As mentioned in the *Software* section, the camera is programmed by the director/editor terminal while it is still in the production module. It is then loaded with Beta tape and mounted on the light/sound module. Once filming is completed, the tape is removed from the camera and either played back or edited. Camera direction is manually adusted up or down or side to side while on the module .Focusing and zooms are controlled by a thumbwheel on the side of the camera. A flat display screen on the back of the camera shows the director exactly what he or she is filming.

The light/sound are either controlled by the camera or by the director via the color coded discs on the back of each unit. Lighting levels would be determined by watching the display screen of the camera. Sound levels would have to be monitored through headphones plugged into camera light/sound module.

The advantage of the Remote mode is that it easily portable and simple to operate. It can be used for large outdoor shots like sporting events or tight interior shots like cooking instruction in a kitchen. But its simplicity doesn't allow for any performer aids like the looking glass view screen and text generation. It's kind of a seat-of-the pants operation but it gives the director and performers much more freedom in choosing where they want to shoot and how they want to shoot. It is also the best mode for collecting raw footage to be used in Full Studio or Edit mode.

Edit

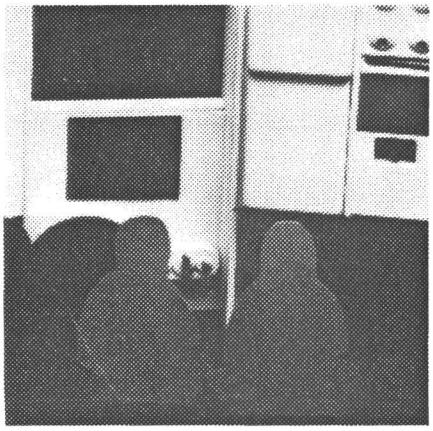
The Edit mode is the fourth operating mode of the *Looking Glass System* and the most important one for video productions. As any film-maker will tell you, the hardest part of making a movie is not so much shooting the film but editing it. The Edit mode lets the editor preview raw tape, decide how to sequence it, add text or special effects, and combine it on to one final tape. As described in the *Software* section, all these functions are handled by the director/editor terminal's control wand. There are also several levels of complexity in the software, letting beginners and experts achieve nearly the same results.



The Edit mode allows for only one user.

The Edit mode uses very little equipment and has only one configuration. Once the storage module is split apart, the production module can be wheeled away and the terminal board and seat unfolded. After the system has been programmed the editor can use the two disc drives, the laserdisc port, and the editing screen. When he is finished, he simply removes all the discs and tapes and folds the module back up again.

This mode of the Looking Glass system is the one that links the other four operating modes together (Full and Simple Studio, Remote, and Playback) by taking tape from any of first three modes and combining them for the fourth. And it combines the footage quickly and easily, at the same making fairly sophisticated effects possible. Unfortunately, the Edit mode only lets one person at time use it, but this is necessary since having two or more editors on a film is like having two or more artists working on painting.

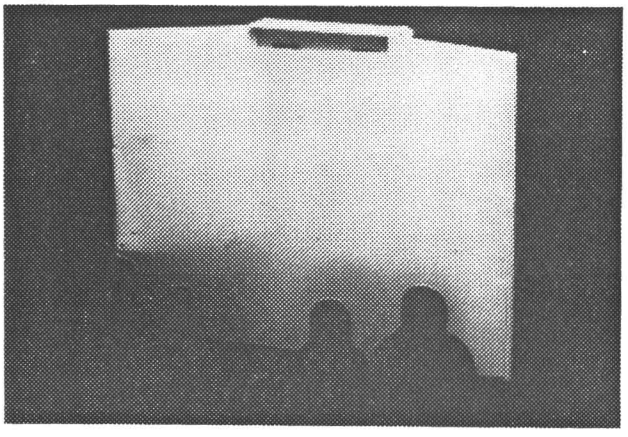


The Projection module can be used for playback to large audiences while the looking glass screen may be used for smaller audiences.

Playback

The sixth and final mode of the Looking Glass system is the Playback mode which is pretty self-explanatory. It lets the children playback the final result of all their hard work on the big projection screen or the smaller looking glass view screen for the benefit of an audience.

There are two configurations for the playback mode: For small audiences of one to five persons, the small looking glass screen on the production module can be used. The tape is played in the number one Beta tape port and sound is transmitted to the upper speakers. Of course, since the finished production is on Beta tape it could also be shown on any Beta player equipped television, but if none is availble the view screen would fill in. For larger audiences of six to twenty people, the projection screen could be used for playback. This would mean both main modules would have to set up, with the number two Beta port on the terminal board driving the projection screen, which would be plugged into the production module.



Conclusion

This thesis was conceived and designed with the basic goal of improving the quality of life in our modern societies. Technology is rapidly surpassing Man's ability to control or even understand it. More and more people are becoming confused and frustrated by the rapid changes taking place in their culture. The young, as so often is the case, are the biggest victims of this change and turmoil. Drug abuse, teen suicides and unwanted pregnancies are at levels unthinkable forty or fifty years ago. This is especially tragic because the greatest resource of any society, its entire future, is its young people. Someday these confused, nihilistic people will be running this world. What kind of a place will Earth be then?

Fortunately, children have the ability to learn and therefore the ability to change. This is their main advantage over adults. For this reason this thesis was aimed at children in the hopes that by helping the children of our society, society as a whole will benefit.

The first step in the creation of this thesis was to examine how children develop and what influences that development. As you might expect, many different people had many different theories about the development of children. The most valid ones agreed on several points which follow.

The child develops intellectually and emotionally through distinct stages, starting at birth and continuing until about twelve year's old. At this age the child has all the logical and deductive abilites of an adult but is lacking in experience and maturity. By this time the child's general personality and outlook is formulated.

The child does not move easily or naturally from one stage to another. In order to progress, the child must develop an image of himself that makes him unique from others around him. This is called the process of self-identification and is the cornerstone of a child's intellectual and emotional growth.

Children obtain information about themselves by seeing themselves in many cultural mirrors- their family and friends, their belongings and creations, and in modern societies, the mass media. By seeing their reflections in these mirrors they gradually refine their self-identity and thereby grow from one stage to the next. If they see a distorted image, their identity may become distorted.

Television is perhaps the most powerful of the mass medias because of its audio-visual format and pervasive presence. It can have a negative influence on a child's development by holding up a distorted or false mirror of the child's world. Unfortunately, one of the largest television audiences are children, watching between ten and thirty hours a week.

The problem with television is not the media, but the message. If Mr. T solves his problems with a rocket launcher, what's wrong with a child picking up a hand gun to solve his? Obviously, network television cannot be held accountable for all of the problems of young people in society, but it could go a long way to help solve some of them. But it doesn't.

This is the goal of the *Looking Glass System*- to use the video media in a positive way to help children develop an accurate and healthy self-image which in turn will allow them to develop into healthy adults. Since it is a very adaptive and flexible system, it lets the child operators use it many different ways. To a great extent, the possibilities of the system are limited only by the children's imagination. The multiple modes and configurations allow the operators to create anything from an animated cartoon to a full-length *Star Wars* epic.

By creating and starring in their own productions the children will learn several important things. They will see how they look and act in front of others and gain a more accurate image of themselves. They will taken on and perform roles in front of the camera that they may later take on in real life. They will learn to work together towards a common goal, at the same learning about the technical aspects of video production. And finally, by creating their own television shows they will realize the true nature of network television shows.

The video meduim is a very powerful and creative tool. The *Looking Glass System* was designed to embody all possibilities of this medium at the same time making it accessible to children. Once the power of video is in their hands the children can explore their environment and their emotions and discover the true nature of their world and themselves. Then they can truly begin to grow.

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