A SYNTHESIS OF VIDEO EFFECTS USED IN TELEVISION PROGRAMMING

Thesis for the Degree of M. A.

MICHIGAN STATE COLLEGE

Clio Wesley Lambert

1953

THESIS

This is to certify that the

thesis entitled

A Synthesis of Video Effects Used in Television Programming

presented by

C. Wesley Lambert

has been accepted towards fulfillment
of the requirements for

M.A. degree in Speech

Robert P. Crawford
Major professor

Date August 18, 1953

O-169

A SYNTHESIS OF VIDEO EFFECTS USED IN TELEVISION PROGRAMMING

By

Clio Wesley Lambert

A THESIS

Submitted to the School of Graduate Studies of Michigan
State College of Agriculture and Applied Science
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Speech,
Dramatics and Radio Education

1953

ACKNOWLEDGMENTS

The author wishes to express his sincere thanks to Dr. Robert P. Crawford for his guidance and unfailing interest in this investigation.

He is also greatly indebted to Professor Clair R. Tettemer for his constant supervision, inspiration, and valuable technical assistance.

Grateful acknowledgment is also due Dr. Max Nelson and Dr. Wilson B. Paul for their helpful suggestions and encouragement.

The author is also grateful to Mrs. Charles Cushman, whose sketches animate this study.

****
****
****
*****
***
*

DEDICATED

To my parents, who taught me the value of work and scholarly achievement; and to my wife whose patient understanding made this study possible.

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

CHAPTER PAGE

TABLE OF CONTENTS - Continued

LIST OF FIGURES

CHAPTER I

CHAPTER I

INTRODUCTION

A theatrical production is never staged without the use of some theatrical effects or conventional staging techniques. A motion picture is never filmed without the use of established cinematic effects and camera techniques. A radio program is never broadcast without the use of special aural effects. Likewise, a television production is never telecast without the use of many essential, special visual or video effects.[1]

In the theatre, the techniques of staging, lighting, and even the construction of the stage itself are automatically accepted by the audience as an inherent part of "going to the theatre." Fades, dissolves, and process shots are cinematic techniques, so skillfully executed in motion pictures that one is unaware of their presence. The selective use of sound effects and music in radio broadcasting plays an intrinsic part in the creation of appropriate aural pictures within the mind of the listener. The use of video effects is essential to television programming and has a fivefold purpose: (1) to effect transitions, (2) to reduce production costs, (3) to give animation and eye appeal, (4) to serve as identifying devices, and (5) for surprise or novelty purposes.[2]

---

1 Robert J. Wade, Designing for TV, (New York: Pellegrini and Cudahy, 1952) p.113.

2 Richard Hubbell, Television Programming and Production, (New York: Rinehart and Company, Inc., 1950) p. 122-3.

Although television in the beginning derived many of its production techniques from the theatre, the motion picture, and aural broadcasting, it is developing an individuality with qualities all its own.[3] The individuality or uniqueness of television is based on its immediacy, spontaneity, and intimacy.[4] In television's developmental process a great deal of time has been and is being spent by the production departments of the major television networks and stations in the creation and use of new production techniques or video effects which will; (1) add scope to television production, (2) give live shows the flexibility of film productions, (3) remove production limitations so that the program department will have a wider choice of material, and (4) keep the cost of production as low as possible.[5] To achieve these four goals the major networks and stations have established special research and developmental departments. However, the creation and use of established effects is the joint responsibility of numerous departments which must work in close co-ordination with each other, since nearly every video effect required a multiplicity of techniques and often the combined efforts of engineer, artist, specialist, and effects technician.[6]

---

3 Lenox R. Lohr, Television Broadcasting, (New York: McGraw-Hill Book Company, Inc., 1940) p. 52.

4 Edward Stasheff and Rudy Bretz, The Television Program, (New York: A. A. Wyn, Inc., 1951) p. 25.

5 E. Carlton Winckler, Personal Letter and Material to the Author November 7, 1952.

6 Wade, op. cit., p. 114.

But what about the small local television station with limited facilities, staff, and budget which is faced with the problem of producing local programs requiring the use of video effects? Where can it find the necessary information on the production and use of video effects? The station may secure assistance from the network. However, additional material and information is needed which is not found in any one publication. Many sources must be examined and investigated in order to secure certain basic information. A basic reference book on the production and use of video effects in television programming is needed. Such a source book would provide information not only for the small station operator, but also for the student and the trained professional who wants to investigate this new medium or to acquire essential knowledge on television production techniques.

Letters to the author from recognized authorities in the field seem to indicate the need for such a reference work. For example, "There is a dearth of material on the subject of special effects applicable to television."[7] The American Television Society, Incorporated replied: "Unfortunately we do not have the type of material you request."[8] Mr. Paul F. Wittlig, Director of New Effect Development at CBS-Television stated: "Although a number of articles have appeared in trade journals and magazines during the years on the subject, [video effects] I doubt

---

7 John W. Morrisey, Personal Letter to the Author, September 25, 1952.

8 Claude Barrere, Personal Letter to the Author, September 24, 1952.

if very much has been written in one place . . ."[9] Mr. James A. Glen, Manager, Television Staging Services for NBC, New York Division advised, ". . . that to my knowledge there is no published works on video special effects."[10]

I. THE PROBLEM

The purpose of this study, then, is to investigate and examine the available books, trade and popular magazines, technical and professional journals, and newspapers for information and pertinent data on the use and production of video effects in television programming and to synthesize this information into a reference work.

II. DEFINITION OF TERM USED

Video Effect. In this study, the term "video effect" shall embrace the broad definition given by Richard Hubbell in his book, Television Programming and Production, which states that video effects can be divided into two groups: ". . . electronic effects created within the television system itself and centered in the control room, . . . and effects which are created in front of the camera by various optical and mechanical devices."[11]

---

9 Paul F. Wittlig, Personal Letter and Material to the Author, November 10, 1952.

10 James A. Glenn, Personal Letter and Material to the Author, November 14, 1952.

11 Hubbell, op. cit., p. 122.

Video effects shall also be defined as:

> . . . various electrical and mechanical devices used to simulate meteorological or other natural phenomena and which are used to achieve scenic or dramatic effects impossible of actual or full-scale production in the television studio.[12]

Transition and titling effects achieved on processed slides and film or produced live in the television studio by the utilization of mechanical, electrical, and optical devices as well as the display of animated and graphic materials are encompassed within the author's definition of "video effects."[13]

Video. Video is Latin for "I see" and refers to the visual portion of television. It is usually used as a noun to denote sight broadcasting as opposed to sound broadcasting.[14]

Television. Television is the transmission and reproduction of a view, scene, object, image, or person by an electronic apparatus that converts the light energy received by it into electrical impulses in such a precise and organized manner that the electrical energy may be transmitted, and on being picked up by an appropriate receiver, reconverted into visable light rays which take the shape and form of the original view, scene, object, image or person.[15]

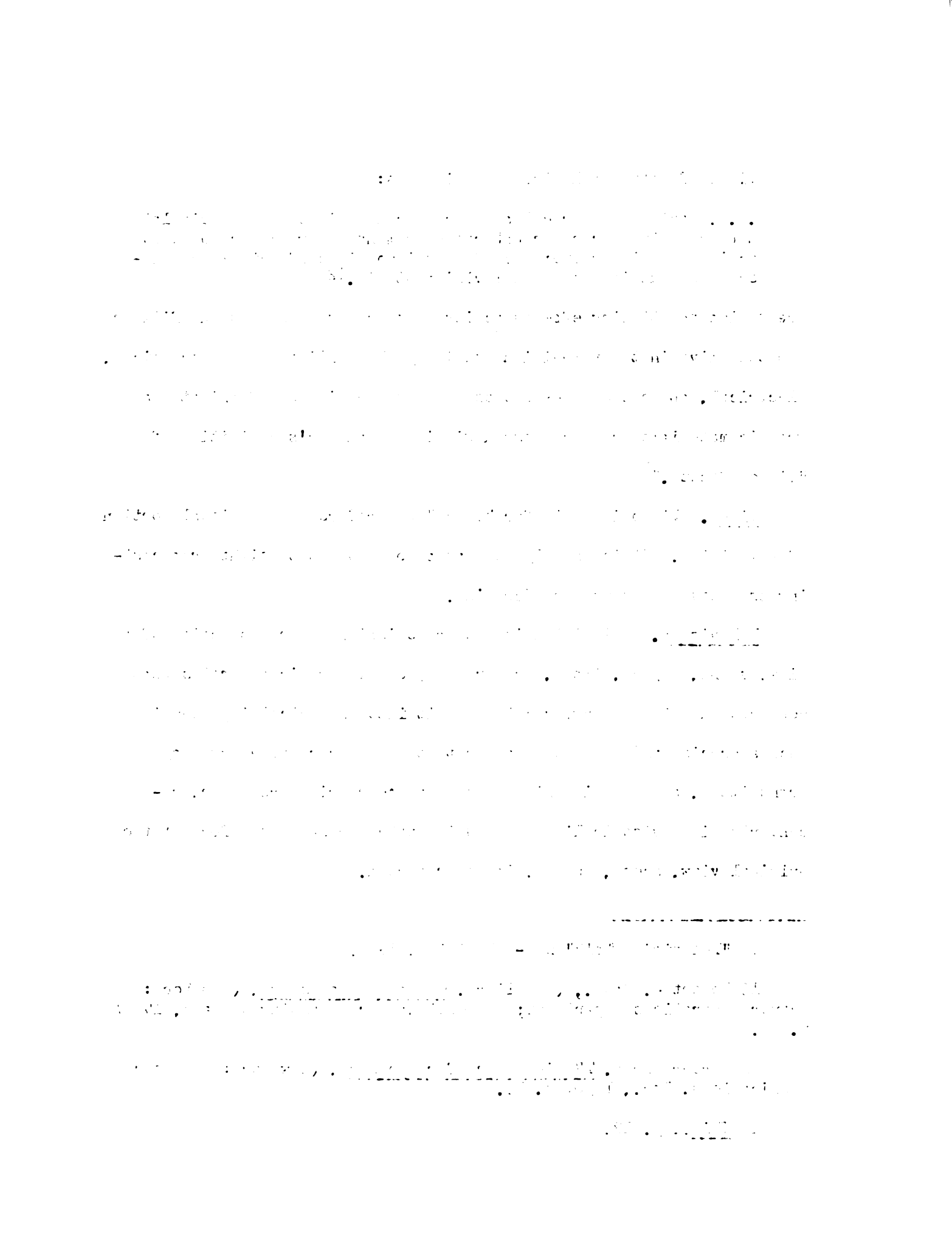
---

12 "Television Talk" NBC-Television, 1946.

13 Robert J. Wade., (Complier), Operation Backstage, (New York: Network Operations Department; The National Broadcasting Company, 1951) p. 54.

14 Herbert True, TV Dictionary for Sponsors, (New York: Sponsor Publications, Inc., 1950) p. 13.

15 Ibid., p. 12.



Synthesis. A synthesis is the combination and compilation of various sources and elements of thought into a unified whole.

III. PROCEDURE

To achieve this synthesis of video effects used in television programming, the author consulted available books, trade and popular magazines, technical and professional journals, and newspapers for published materials on the creation and use of video effects. Sources of current information were also investigated. The author visited television stations to observe and to talk with personnel about their use of video effects. Familiarity with the use of video effects was acquired by viewing television programs, and problems in the creation and use of the so-called standard effects were experienced by the author in the Television Development Studios of Michigan State College.

IV. ORGANIZATION OF THE THESIS

Grouping of Material. The resulting data was divided and grouped into four logical and related chapters. The basis for this particular grouping lies in the methodology employed in producing each video effect. For example, when the effect is produced within the electronic system, which is centered in the control room, it will be discussed in the chapter titled, "Electronic Effects." The successive chapters will discuss optical, mechanical-physical, and graphic-titling effects. This is a logical grouping since the latter chapters discuss effects which are produced in the studio before the live television cameras, that is,

video effects produced by optical attachments to, or devices which alter the light energy received by the camera; effects which recreate natural phenomena or employ the use of mechanical devices; and lastly, the chapter dealing with the production and use of titling effects, graphic displays, and animation devices.

In each chapter, the basic or simplest effect is discussed first, since many of the more complex effects are derived from a combination of techniques and devices. A definition of each video effect is given, along with a description of how it is achieved, constructed, or operated. A representative example or a general explanation of how the effect is currently being used in television programming is given. Conclusions are drawn from those effects which seem to be controversial, that is, for which there is no definite use, on effects of doubtful value, and effects upon which the authorities seem to disagree as to use and function. The individual synthesis of each video effect will comprise the body of this study.

Sketches. Sketches and diagrams are used to show the operational details of various selected video effects, or to further illustrate the written discussion and description or usage of the particular video effect. These sketches are included on pages immediately following the related descriptive material.

Conclusions. Chapter Six contains a summary of the study and conclusion reached by the author. Suggestions for additional studies or investigations will also be given.

Glossary. A glossary of term used which are applicable to this study will be included in the appendix.

CHAPTER II

CHAPTER II

ELECTRONIC EFFECTS

Electronic Effects which are created within the television system, centered in the control room, are readily accessible to the director for his frequent use. They are inherently a part of the television transmission system and are unique to the medium. In the control room, where the director can select from the individual camera monitors the particular picture which will be sent to the transmitter at any given instant, various methods are available to affect this picture selection. Significant advances are being made by the manufacturers of television equipment to improve and extend the scope and flexibility of these electronic effects. In this chapter, the author will discuss the basic theory and operation of the electronic effects available to the television director.

I. THE CUT

Definition. The word, "cut," is a term used in both the language of the film and of television. A "cut" is the instantaneous transition from one image or scene to another, and it is achieved by pressing a button (on the video switching panel) which electrically switches a new camera with its specific picture to the program line and at the same time it removes the former camera's picture from the program line. In actual studio practice the word "take" is used to indicate the cutting

operation, such as, "Take One, Take Three," meaning a cut to camera number one and then a cut to camera number three.

> Strictly speaking, we should call it "switching" instead of cutting. But the word "cut" has come to mean an instantaneous change of scene; and, since that is what we produce by pushing buttons, it is still correct to call the process cutting.[1]

Usage. The cut is the most common form of transition from one camera shot to another. The abrupt change or cut is the normal method by which the mind turns from one point of interest or visual attention to another, thus the normal method of carrying forward the attention of the viewer is by cutting from one shot to another.[2] The emotional reaction that a cut is capable of inducing should not be underestimated, since it can produce sudden shock if the change of visual image is too extreme. Ordinarily the recognition of this visual image and its shock or impact upon the mind of the viewer are almost instantaneous, thus if the director has selected his two images correctly an immediate association of ideas takes place in the mind of the viewer.

The cut should be used intelligently and for a definite purpose. Basically, the responsibility of the television director is to satisfy the viewer. The director must show the viewer what he wants to see, and since the motion picture has educated the viewer to expect close-ups of important action, he wants to see them at the proper time. The viewer

---

1 Rudy Bretz, "Television Cutting Techniques," Journal of the Society of Motion Picture and Television Engineers, 52:247 March, 1950.

2 Ernest Lindgren, The Art of the Film, (London: George Allen and Unwin Limited, 1949), p. 124.

also wants to look about him and to know where he is. He doesn't want to miss any of the action and he certainly doesn't want to be confused. Showing the viewer what he wants to see should definitely be a purpose of cutting.

a) Timing: The proper timing of the cut is one of the most important single factors in its effective use. The tempo of an entire production or scene can be varied greatly by the speed of cutting from one camera shot to another. By cutting rapidly, the tempo of the scene can be speeded up. "A solemn scene will sustain better with longer shots and less frequent cutting."[3]

The relative length of camera shots also has a definite emotional value. Every production and scene has its own emotional tone and rhythm. Cutting also establishes a rhythm of its own. Thus cutting can either enforce or destroy the inherent rhythm and emotional tone of the production. With proper cutting the two rhythms should harmonize.[4] For example, rapid cutting from one camera shot to another during a scene which is quiet and peaceful will appear jerky and abrupt to the viewer and give him an appreciable sense of discomfort. However, if the scene is inherently exciting, the viewer will instinctively demand cutting to match the rhythm and tempo of the scene. The viewer's mind tends to leap ahead to grasp another detail and therefore it is the responsibility

---

3 Richard Hubbell, Television Programming and Production, (New York: Rinehart and Company, Inc., 1950) p. 116.

4 Hoyland Bettinger, Television Techniques, (New York: Harper and Brothers, 1947) p. 50.

of the television director to anticipate these impulses and to execute the cut at just the right moment. If the cut occurs either too early or too late, the scene will lose the excitement which it should possess. "It is quite a mistake to suppose, however, that the speed of the cutting alone is sufficient to influence the spectator's [viewer's] emotions, as some writers appear to suggest."[5]

Rudy Bretz believes that, "Fast cutting is very rarely desirable in television, and hardly ever possible."[6] One runs out of camera shots too fast, since there are only two or three cameras and one has to allow time between the cuts or takes for the cameraman to line up the new shot.

> Furthermore, television doesn't call for the pace of the motion picture. The two media are different in this respect. Since the audience is watching reality in the case of television, it is content to let events take their own natural time.[7]

Cutting therefore, should enhance the production since the cuts or takes will be timed to enforce the rhythm of the scene and to provide the viewer with new information which his mind instinctively demands at the proper instant.

b) Action Cuts. Closely related to the timing, pacing, and rhythm involved in cutting is the principle of cutting on action. Cutting on action and reaction is just as important in television as it is in the film. The action cut is used to show the cause of the action, where and

---

5 Lindgren, op. cit., pp. 56-57.

6 Bretz, op. cit., p. 257.

7 Loc. cit.

how it started. It is also often desirable to show how the action concluded; therefore, after the action is well under way, but before the action is completed, a cut to the original shot may be made to show the viewers what really happened.[8] "There is nothing that will so disguise the fact that a cut has been made as a strong and positive action to carry across from one shot to the next."[9] The cut to an action shot should be made just after the action has begun but still in time to show why the cut was necessary. The cut will be made during the action itself, not just before or just after it because that would be unsatisfactory. "The moment of action is such a natural place to cut that it is possible to violate the other principles of good cutting and get away with it, as long as the cut is made on action."[10]

e) Reaction Cuts. Cutting is often motivated by the audience, since they will want to see someone's reaction to what has just been said or done. "One of the most powerful motivations for a cut is to have someone in the picture look outside the frame. Immediately the audience wants to see what he is looking at."[11] Reaction shots which are intended to show what happens to a particular actor after words are spoken by another are most effective. The cut to the subject is made a fraction of a second before the reaction occurs, so that the viewers

---

8 John H. Battison, Movies for TV, (New York: The Macmillan Company, 1950) p. 186.

9 Bretz, op. cit., pp. 252-253.

10 Loc. cit.

11 Bretz, op. cit., p. 254.

will see this facial transition of emotional tones. In reaction cutting, it is most important to be sure that the viewer is not confused by an abundance of angles and shots which are confusing to him because they present many apparently different viewpoints. The camera angles should be kept simple and straightforward and in line with the nature of the program content.

d) Variety Cuts. Cuts are often made for little or no apparent reason other than to change the angle or composition of the shot. These variety cuts are often necessary particularly if the image has a tendency to burn-in on the target[12] of the image orthicon pick-up tube. (The tendency to burn-in is present when the tube has logged considerable hours of continuous operation.) Cuts used merely for variety should be logical and help to carry out the action and purpose of the production. Variety cuts should not be confusing nor obtrusive to the viewer; hence, they should be planned as part of the total production if at all possible rather than being left to chance as is the case on many ad lib shows. Variety shots can actually be used to add movement to an otherwise static show, but excellent camera shots, angles, and movement cannot save a production if there is no inherent movement present in the script.

e) Intercutting. The cinematic technique of intercutting of extraneous shots for the purpose of contrast, irony, flashback, or comparison are also applicable to television.[13] Intercutting allows the

---

12 The "target" of the image orthicon is comparable to the "mosaic" of the iconoscope tube used in the film chain camera.

13 Bettinger, op. cit., pp. 50-51.

viewer to see both the action and the reaction to the action. The viewer is much more interested in the reaction of the wedding party than it is in what the minister is saying; hence, by intercutting we show the minister pronouncing them man and wife, the young couple, the brides' mother, the groom's aunt, and the spectators. Intercutting can be used to point up the crux of the situation by showing parallel or opposing bits of action.

f) Dramatic Cuts. The cut used for its purely psychological effect and inherent dramatic value should not be overlooked. "The sudden shock of a cut in a suspense scene following a period of low tension will inject a surprise element and lift the scene by its effect of shape contrast."[14] It is further pointed out that, "A sudden dramatic moment can be enhanced by sharp cuts."[15] Cuts can also be used as punctuation not only in dramatic sequences but in other productions as well. One must remember however, that it is the proper timing of the cut and the proper length of camera shot that will either enforce or destroy the effectiveness of such dramatic cutting.

g) Center of Interest Cuts. Another point to consider when cutting from one camera shot to another is the center of interest. The eye of the viewer has to adjust to each new shot and it may also be new in composition. It is,therefore, important that the relative position in the frame of the center of interest should be predominately the same in the new shot as it was in the previous camera shot. If this is not the case

---

14 Loc. cit.

15 Bretz, op. cit., p. 259.

the viewers' eyes will not only have to adjust to the new shot but will have to search momentarily for the center of interest upon which he wants to focus his attention.[16]

h) Audio Cuts. Cutting to the audio signal provides another interesting way of changing the camera shot or the picture composition. The phrasing of words will provide a natural place to cut, that is, cutting to voice. The cut may occur during the pause following a spoken phrase. However it is easier and smoother if the cut is made at the end of a sentence rather than in the middle of one. A cut at the change of thought helps to emphasize the transition from one idea to another.

Particularly in musical productions it is desirable to change the camera shots in keeping with the mood and tempo of the selection. The music is reinforced if the visual change follows the changes of tone color, chorus, and verse.[17] The cut will be made to correspond with the musical phrasing which forms a very compelling pattern for cutting. For example, in a popular song a cut could be made following the introduction, the verse, and the chorus. This would be the minimum of cuts possible. More cuts would be evident upon examination of the score, or by hearing the music.

Conclusion. Unfortunately there are so many demands upon the television director that he often doesn't have the time to consider the "how" and "why" of cutting. However, this is no excuse for cutting blindly

---

16 Ibid., p. 256.

17 Brets, op. cit., p. 260.

from one camera to another. If the director will try to visualize the program in terms of the viewer, remembering that his responsibility is to show the viewer what he wants to see, when he wants to see it, the director's cutting will have such a degree of smoothness that the viewer will be unaware of the fact that his visual attention is being directed from one picture to another.

II. FADES: IN AND OUT

Definition. The fade is accomplished electronically by controlling the "video gain" that is, the power or volume of the picture amplifier. A fade-in is achieved by increasing the video gain while the fade-out is the process of decreasing the gain of the picture to zero, thus leaving a blank or "black" television monitor screen.[18] Because of the electronic means of effecting it, the fade-out is called "going-to-black" or a "dissolve-to-black." The video gain control is located beneath the video switching panel and terminates above the panel in either a lever or control knob which is easily accessible to the production and engineering personnel as are the individual camera switching buttons which the author mentioned in the preceding section of this chapter.

Usage. The fade-in is usually used to begin the sequence of shots. Thus it indicates that something new is to follow. For example, the opening title of a program is usually faded-in. The fade-out brings a

---

18 Edward Stasheff and Rudy Bretz, The Television Program, (New York: A. A. Wyn, Inc., 1951) p. 59.

definite termination to the action and can be compared to the descending curtain which closes the action in the theatre.[19] Likewise the motion picture connotation of the fade-out is one of finality.[20] Therefore the last scene of a television dramatic production or the concluding sequence or section of a program should be faded-out. Although the monitor screen is black for only a brief period of time, there is a direct break or termination in the viewer's continuity of vision.[21]

> The "fade up-fade down" method of switching should be employed in much the same way a paragraph would be used in writing to indicate the completion of one thought and the introduction of a new one.[22]

The fade-in and fade-out are ordinarily used in combination and may be as long or as short as desired. At the beginning of a program, for example, there may be a gradual fade-out of the titles followed by a black screen for a few seconds, and then a fade-in of the first scene of the program sequence. However, it is sometimes desirable to follow a slow fade-out with a direct cut, thus employing its shock value. Sometimes a cut to black is indicated rather than a fade-out, especially when you want to end the scene suddenly and then follow it with a fade-in from black to the next sequence. The most dangerous aspect of using fade-outs in television is the length of the blank screen between the

---

19 Robert S. Greene, Television Writing, (New York: Harper and Brother, 1952) p. 95.

20 Bretz, op. cit., p. 263.

21 Greene, op. cit., p. 95.

22 William C. Eddy, Television: The Eyes of Tomorrow, (New York: Prentice-Hall, Inc., 1945) p. 204.

fade-out and the fade-in, since it may be too long. If the length of this blank screen is too long it will be more difficult to recapture the audience interest which drops rapidly when there is nothing on the screen.[23] The wait by the audience is not so bad, however, if music or sound carries through even though the screen is black. It is important, therefore, to keep the black screen at the bottom of the fade-out, fade-in as short as practicable.

The fade-out, fade-in may be used between any two scenes. Stasheff and Bretz[24] believe that the combination should be used especially to denote a lapse of time. Therefore it could be used when two scenes take place in the same set, or the fade-out, fade-in may be employed between two scenes in different sets where there is a definite lapse of time indicated in the script. Bretz specifies that the fade-out, fade-in should be used;

> . . . where there is a greater change in time or place than is usually indicated by a dissolve. A dissolve retains continuity; a fade-out-fade-in breaks the sequence.[25]

The speed of timing of the fade is also important since psychologically the fade moves the drama or program along at a slower pace than does the dissolve because the fade breaks the continuity of the program. "The duration of the fade depends entirely on the mood and subject matter of the scene at hand and may be from a split-second fade,

---

23 Bretz, op. cit., p. 264.

24 Stasheff and Bretz, op. cit., p. 59.

25 Bretz, op. cit., p. 264. (Dissolves will be discussed in the following section.)

which is almost a cut, to five or ten seconds but seldom longer."[26]

Other Methods. Other than the electronic method of achieving a fade-out, it may be accomplished in the studio with lights, which is, of course, a familiar stage technique. However, such fades in the studio are somewhat difficult to execute since a great many lights will have to be controlled. It is relatively easy to achieve when the subject happens to be lighted by only a few spotlights which can either be cut or dimmed.

A fade-out may also be affected by having the cameraman pan his camera off into a dark area of the setting, or having an actor walk directly into the camera lens, until his body blocks out all of the light. These are interesting variations, but it is much easier and often more practical if not as effective, to achieve the fade electronically in the control room.

Conclusion. The fade-out, fade-in is an electronic effect used to begin and terminate action. As a transitional device between scenes it is especially suited for indicating a lapse or passage of time between two scenes, although this connotation is not generally accepted. The fade-out, fade-in is best used as a paragraph is used in writing. The television director is cautioned against "going-to-black" repeatedly or remaining in "black" for extended periods, since he risks losing his audience.

---

26 Hubbell, op. cit., p. 116.

III. DISSOLVES

Definition. The dissolve is very closely related to the fade because it is in a sense a simultaneous fade-in, fade-out, since the picture from one camera is being faded out, as the picture from the up-coming camera is being faded in. The dissolve was originally a cinematic technique which has been adopted by television. Ernest Lindgren describes the cinematic dissolve:

> If a fade-out at the end of one shot is superimposed on a fade-in of equal length at the beginning of another shot, the result is the form of transition known as the dissolve or mix; as the first shot slowly disappears, the second gradually appears, and for a short space of time the two are merged together on the screen.[27]

While the cinematic dissolve is achieved optically, the television dissolve is immediately available as a standard effect upon the video switching panel. The dissolve is controlled manually by the same lever or control knob used in making fades, and is just what the name implies, one picture dissolving into another. Technically, it is achieved by decreasing the "video gain" of one camera as the "video gain" of the up-coming camera is increased. Visually the first picture becomes weaker while the second picture seems to appear under the first picture as it gradually becomes stronger while the first picture has now completely disappeared.[28] In the middle of the dissolve, there is a moment when both pictures will be of equal strength and both will be equally visible on the television screen.

---

27 Lindgren, op. cit., pp. 27-28.

28 Raymond Spottiswoode, A Grammar of the Film, (Los Angeles: University of California Press, 1950) p. 45.

Usage. A smooth, restful, easy transition is effected by the dissolve. Smoothness is its outstanding characteristic. "It does not break off the action and continuity as a fade-out does, although it may slow down the action to some extent if it is a very gradual dissolve."[29] The length of rhythm of the dissolve is flexible since it may be short or long. It may take less than half a second, which is practically a cut, or it may take as much as five or six seconds to execute the dissolve, and this speed depends upon the mood and tempo of the program. "A normal dissolve is from two to three seconds."[30] "Slow dissolves should not last over six seconds; that is very long."[31] Psychologically the effect of the dissolve is similar to dimming the lights in a stage play, without lowering the curtain.

Although a definite meaning has been associated with the cinematic dissolve, television has yet to evolve such a connotation. "The meaning of a dissolve in films is transition through space and time. You dissolve between sequences; to a later time or to another place, or both."[32] The film dissolve is created optically while the television dissolve is instantly accessible to the television director via the video switching panel. Since the dissolve is no harder to do than a cut and with no difference in cost there is a very free use of the television dissolve.

---

29 Hubbell, op. cit., p. 118.

30 Bettinger, op. cit., p. 52-53.

31 Battison, op. cit., p. 187.

32 Brets, op. cit., p. 263.

It may be used to go from a long shot to a medium shot, or to a close-up, that is, dissolving within the sequence which is common practice particularly in musical and variety shows. The television dissolve may also be used to connect two separate program units or sequences, such as a dissolve between the opening titles and the opening sequence of the program. A favorite use of the dissolve is to show a series of closely related photographs or objects in progression. The dissolve may be used to indicate a lapse of time or a change of place when used between two sequences. If it is used to indicate a lapse of time or a change of place, it indicates less of a change than does the fade-out, fade-in technique. The dissolve is often used in places where a cut would be preferable simply because the director wants to add variety to the sequence and chooses the dissolve as the manner of changing the camera angle. The result is a lack of connotation for the dissolve in television.

Conclusion. Since the dissolve is very easy to achieve via the video switching panel, there is a very free use of the television dissolve. The result is a lack of connotation for the television dissolve. Regardless of its meaning or lack of meaning the dissolve is extensively used in television productions. It seems probable, however, that a definite connotation will develop as various theories are exchanged and explored by those in the industry as television continues to expand and mature.

A. LAP DISSOLVE

Definition. Another variation of the dissolve, although closely related to the superimposure which will be discussed in section three of this chapter, is known as the lap dissolve. "A slower version of the dissolve is called the lap dissolve. Here the short superimposure of the two frames is extended for a longer period of time."[33] "The lap dissolve consists of fading in one image over another, holding it for a period of time, and then fading it out."[34] In cinematic terminology, "It is called a lap because the two pictures appear to overlap and appear one above the other."[35]

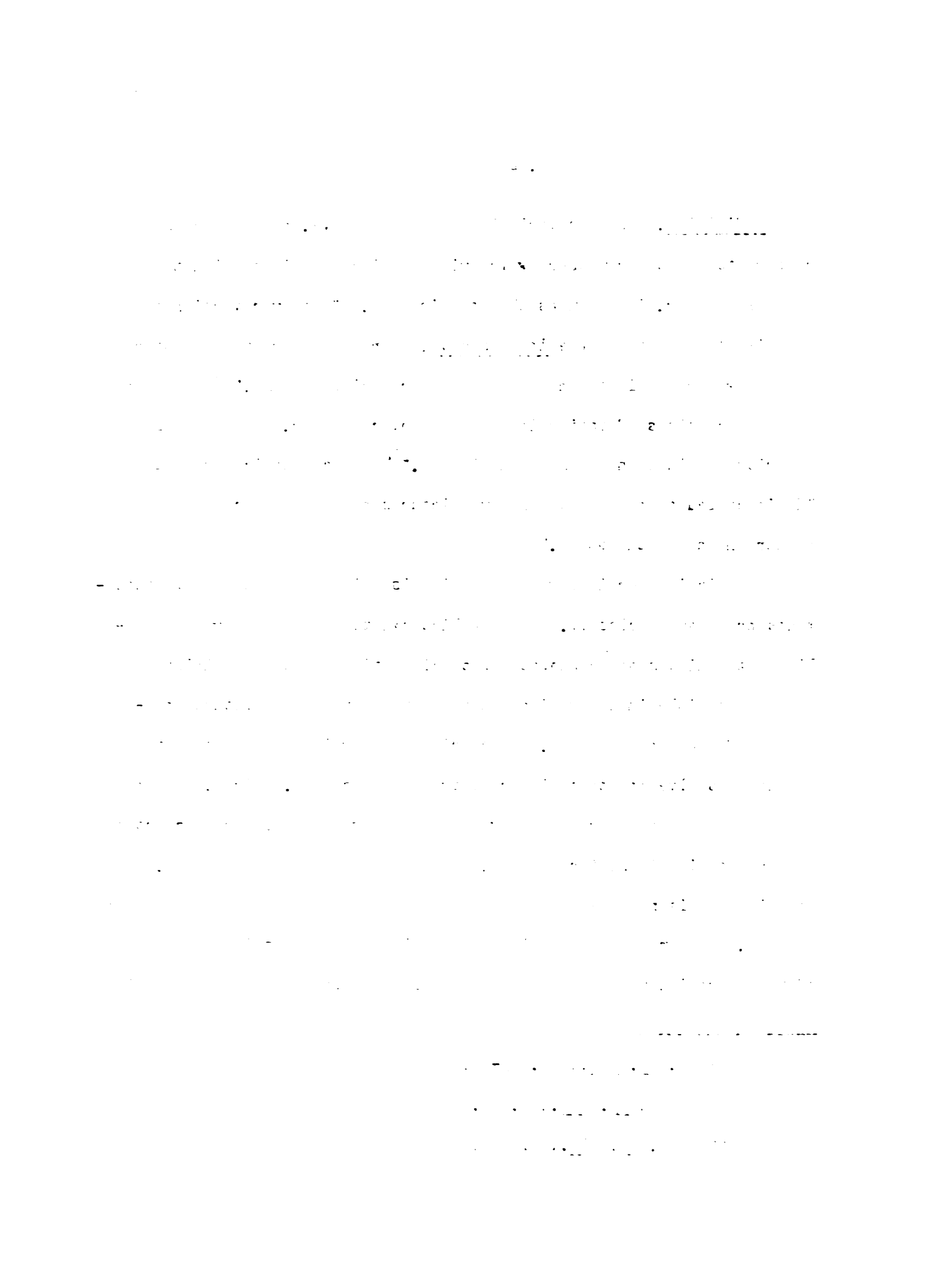
Conflicting terminology and meaning is evident when the above statements are examind closely. The conflict exists between the well established techniques and connotations of cinematic effects and similar effects possible in television but without the well established background of usage and meaning. To clarify the terminology it seems that the lap dissolve may take either of two forms or both. First, the lap dissolve may be an extremely slow dissolve between two cameras or program elements as is often, for example, executed between opening slides. The lap dissolve is not a superimposure because there is no static position; that is, the purposeful stopping of the dissolve process in the middle of the operation when both images would be of equal strength and remain

---

33 Greene, op. cit., pp. 13-14.

34 Bettinger, op. cit., p. 54.

35 Battison, op. cit., p. 187.



so for a period of time. The lap dissolve is also a transition between two cameras or two program elements, such is not the case with the superimposure. Secondly, applying the cinematic technique the lap dissolve introduces a second image which is above the first image, that is, located in the top half of the frame while the first image remains in the bottom portion of the screen. The overlapping of the pictures in the center of the frame provides the terminology, lap dissolve.

The terminology and effect are easily confused when one realizes that in television the technician can create with the superimposure, or with the recently developed special effects amplifier the effect of a cinematic lap dissolve instantaneously during the air show while the cinematic lap dissolve must be specially processed in the film laboratory. Television terminology is still flexible; therefore it is evident that the effect which a director would receive when he called for a lap dissolve in one particular studio would not necessarily be the identical effect he would receive if he asked for a lap dissolve in another television operation.

Usage. The lap dissolve is used in much the same way as a common dissolve. As a cinematic technique it is used to indicate thoughts, stream-of-consciousness sequences, and flashbacks. However it has already been stated that the television terminology and connotations of the lap dissolve have not been clarified, therefore it also follows that its usage is subject to variation from station to station.

B. MATCHED DISSOLVES

Definition. Still another variation of the dissolve is the matched dissolve. It is an interesting, useful, and generally pleasing device. "When the two pictures are similar in composition . . . we get what is known as a "Matched Dissolve".[36] "It consists of exactly matching the positioning of two similar or identical shapes, one on each camera, so that when the dissolve is made a metamorphosis appears to take place."[37]

Usage. The matched dissolve has a specific use since it can be used to show the transformation or metamorphosis occurring in an object or person.[38] Special care should be taken to assure that the new object will occupy exactly the same position as the old object. As a transition device, the matched dissolve can be used to achieve a smooth flashback. For example, the screen is filled with a big close-up of a woman's hand as she hangs an ornament on the Christmas tree. The viewer sees a hand that is withered, lined, old, and wrinkled, but gradually as the matched dissolve is executed the hand miraculously changes to a smooth, slender hand of a young girl attaching a similar ornament to a Christmas tree, and as the camera dollies back the young girl is revealed. The story continues as the woman relives a former Christmas.

The matched dissolve is the perfect transition device for use in the story of Dr. Jekyll and Mr. Hyde, since many transformations must

---

36 Stasheff and Bretz, op. cit., p. 59.

37 Bettinger, op. cit., p. 53.

38 Battison, op. cit., pp. 187-188.

take place, and if these can be accomplished on the screen for the viewer, the effect of the entire story will be greatly enhanced.

A frequent use of the matched dissolve is between a live picture in the studio or a photographic slide and a live performer in the studio, giving the effect of the photograph coming to life.

Another interesting illusion that may be achieved with the matched dissolve is the disappearing actor. Actors can vanish through a closed door by having two identical doors constructed, one on the set and the other to be picked-up by another camera. The actor approaches the closed door on the set, pausing as he comes face to face with the door but continues to simulate walking. As the actor approaches within a couple of steps of the door, a slow matched dissolve to the second door is executed and it will appear that the actor has disappeared through the closed door. Timing is the most critical aspect of this effect. If you want the actor to step through the closed door, another matched dissolve will be effected to show the actor emerging on the reverse side of the door which is located on the set.

IV. SUPERIMPOSURES

Definition. The effect of the superimposure in photography would be called a double exposure. The technique of the superimposure involves the simultaneous use of two cameras and the two associated pictures are blended together so that the image from one camera is imposed over the image of the other camera and both images go out on the air simultaneously as a single picture.[39] This effect is achieved by use of the dissolve

---

39 Stasheff and Bretz, op. cit., p. 60.

or fader control located on the video switching panel. Technically the video gain of one camera is decreased and simultaneously the video gain of the second camera is increased. When both signals reach half strength, or half-signal, the image from each camera will be equally visible upon the monitor screen. The "super" as it is called is achieved in much the same manner as a lap dissolve except the dissolve process is purposefully stopped when the two images are both visible on the screen and when they are usually of equal strength. The "super" can be switched onto the program line as a fixed "super" (double exposure) by using the cut technique, or the first half of the "super" may be on the air as the second half is faded-in to half-level which would simultaneously decrease the video gain of the first camera to half-level. The cameras must be lined up carefully on the subject and the lighting of the two images checked to insure sufficient contrast range and to make the super effective.

Usage. In television, the superimposure is easy and inexpensive to create, while in the motion picture a double exposure is a costly device usually made in the laboratory on the optical printer. Thus the use of the "super" is more frequent in television production. "Like salt in the soup, the superimposition is very effective when used with discretion, but ruinous when used too freely."[40] The "super" has many applications. Magical effects can be achieved in fantasy, since ghosts may be solid or transparent; dreams may materialize out of thin air; characters can vanish gradually or instantly.

---

40 Stasheff and Bretz, op. cit., p. 60.

The super is frequently used in title sequences as a live title card or slide superimposed over a live action shot from the studio or a film sequence. Commercially, it may be used to bring the sponsor's name or trademark to the screen over a picture from another camera. Fruit or vegetables may be shown in the can by putting the contents in a celluloid container the same size as the original tin, and shooting this filled container against a black or dark grey background. The filled celluloid can is "supered" with the shot of the outside of the particular can from the grocer's shelf, thus we see the label on the outside of the can and gradually its contents are revealed to us.[41]

Dramatically, the super can be used to enhance the action by the creation of illusions. Here are several examples. As a man reads a letter from his girl, you see the letter in a close-up and gradually the girl's face appears over the lines of the letter. Her face may fade-out or there may be a cut to a third camera. A pretty girl is placed on a black covered platform in front of a black background where she goes through the motions of walking. This image may be supered over a photographic or film image of a landscape. If care is taken, the figure of the girl will seem to be walking in the sky above the landscape, however, the pictures must be carefully chosen and the live action carefully rehearsed since perspective is an extremely important consideration in this effect.

---

41 J. A. Lucas and Beverly Dudley, Making Your Photographs Effective, (New York: McGraw-Hill Book Company, Inc., 1940) pp. 325-326.

X-Ray pictures can be simulated by careful use of the superimposure and the procedure is much the same as the one employed to reveal the contents of the cans on the grocer's shelf.

Although the use of the super can be used effectively in a dramatic sequence, the director should be sure that he has a good purpose for using it. Supering one object over another, for example, can often clarify a difficult point especially in showing the operation of complex mechanisms, and it will save endless and confused cutting from one object to another or back and forth between two objects.[42] The director must remember to use the super with discretion and avoid its frequent use which not only destroys its effectiveness, but reveals the directors lack of imagination.

V. THE DEFOCUS

Definition. The defocus or transition focus effect is achieved by operating the focus control on the camera which moves the image orthicon pick-up tube back and forth inside the camera, through the focal point of the lens, thus causing the image to go in and out of focus. To the viewer, the object on the screen gradually blurs as it goes out of focus becoming indistinct and unrecognizable. If the shot is to be changed, a fast dissolve or cut is made to the second camera, equally out of focus, and as the cameraman adjusts his focus control the screen regains its sharpness revealing either the same or a new object. The defocus

---

42 Lynn Poole, Science via Television, (Baltimore: The John Hopkins Press, 1950) pp. 147-148.

is a trick variation of the standard dissolve, since it retains the continuity of action, a property of the dissolve, without an abrupt change from one scene to another.[43] Thus, the defocus permits a transition or change of shots while maintaining a strong picture relationship between the two scenes.

The defocus requires co-ordination between director and cameraman. Here are the steps a director must use in achieving the defocus-transition effect. (1) Ready the next camera which is to be used and instruct the cameraman to hold on the shot but to defocus his camera. (2) Watch the Program line monitor for the exact moment when the defocus should occur as indicated by the action and the script. (3) When this point is reached in the action, instruct the on-the-air cameraman to gradually defocus his camera until the picture becomes completely indistinct. (4) If there is a change of scene, cut or rapidly dissolve to the second camera which was previously readied (out of focus) and direct the cameraman to gradually bring his camera into sharp focus upon the new scene. Of course, the audience isn't aware of this change from one camera to another which enhances the effect.

Usage. The defocus should be used sparingly, thus restricting its use to special effects.

> This device is used effectively for a flashback, for example, when we defocus a close-up on the face of the person who is describing the flashback scene and come into focus on the subject he is talking about. Similarly, the defocus may be used

---

43 Hubbell, op. cit., p. 118.

> to indicate a person's thoughts, a daydream, or an actual dream. The sleeper's face grows indistinct and the dream appears as a blur, growing gradually clearer.[44]

The defocus-transition can suggest the passage of time in a highly visual and interesting manner. In a science program, for example, the defocus transition may be used to indicate the passage of time in an experiment or the creation of a new physical element.[45] The defocus-transition is simple to achieve and visually interesting, but it should not be over-used.

VI. WIPES

Definition. The wipe, another cinematic technique which has been adapted for television use, is achieved electronically. Cinematic wipes which are produced in the film processing laboratory are available in a great variety of patterns for use by the movie makers.

> The simplest form of wipe consists of a horizontal, vertical or diagonal line of division, sharp or blurred, which passes across the screen, eliminating the first shot and revealing the second . . . . The line can rotate fan-wise on a fixed point; it can take the form of a star bursting in the middle of the first shot to reveal the second; or the shot can suddenly be made to appear to rotate, like a picture post-card to reveal the second shot on its reverse side.[46]

The simplest is the horizontal wipe which is easily produced by the television electronic system and is therefore the most commonly used. Wipes may be identified as left, right, upward, or downward according to their

---

44 Stasheff and Bretz, op. cit., p. 198.

45 Poole, op. cit., p. 151.

46 Lindgren, op. cit., p. 28.

starting-point or direction.[47] Television wipes can be achieved optically by the use of mirrors, shutters and masks in front of the camera. However, electronic wipes seem to be preferred since they are more flexible and dependable while their use may release at least one additional studio camera for other assignments.

The electronic wipe requires special switching amplifiers and associated equipment. In some equipment the wipes can be accomplished at controlled speeds by means of their electrical circuits.[48] All major television manufacturers have special equipment available for the production of electronic wipes.

Usage. "No standard connotation was ever found for the wipe in motion pictures."[49] In television, wipes are used in titling sequences and afford a novel variation when two or more titles are to be shown in sequence, since the first picture can be "wiped" off the screen in any direction as the second picture slides into the frame behind it. If the material to be wiped is reading material, the wipe should move from top to bottom.[50] If the titling is produced on film, a greater variety of wipes may be employed, but this is a costly laboratory process when compared to the relative small cost of slides and live graphics which may be used with the electronic wipe to produce the same results.

---

47 Spottiswoode, op. cit., p. 45.

48 E. M. Gore, "Video Special Effects System," Television Engineering 1:14-6, 28, October, 1950.

49 Bretz, op. cit., p. 267.

50 Eddy, op. cit., p. 199-200.

The wipe may be used in dramatic programs, as well as, in other types of television presentations as a transition device between various segments of the program. In a dramatic program, for example, a flash-back sequence could be set off from the other scenes of the program by using a left-to-right wipe at the beginning and a right-to-left wipe at the close of the sequence. For commercials, the wipe offers a novel way of displaying the sponsors products, since a wipe could be executed between products or groups of products. If the progress of the horizontal wipe is stopped when the dividing line is in the center of the screen, we have a split-screen effect which will be discussed later in this chapter and also in the chapter on optical effects.

VII. REVERSE POLARITY

Definition. The effect of reverse polarity is a highly practical by-product of the television system. The television camera can view either a negative or a positive image and reproduce it either as a negative or positive picture. Normally a positive image or photograph is televised by the camera and is reproduced on the monitor screen as a positive picture. A positive picture is one in which the objects which are normally dark or black are reproduced as black: the portions of the picture which are normally light or white are reproduced as white. The negative picture is the reverse of this process, that is, what is normally dark or black is reproduced as white.

The standard set-up for television cameras is to view a positive image and reproduce it as a positive picture, or to view a negative

image and reproduce it as a negative picture. However, this process may be reversed so that the camera will reproduce a positive picture when it views a negative image or reproduces a negative picture when it views a positive image. A simple switch located on the camera can be operated by the cameraman to achieve the effect of reverse polarity.

Usage. Reverse polarity is especially useful when applied to slides and films. The laberatory processing time may be reduced and the negative slide or film may be used, and when reproduced on the television system it will appear as a positive picture.[51] However, better quality is obtained if positive slides and films are used in the normal manner.

Reverse polarity can be used in the studio to achieve effects during program presentations. For example, costumes may be changed from black to white and gradually back to normal again by use of the reverse polarity feature of the studio cameras.[52] It can also produce ghost effects when used in connection with the superimposure. However, its most useful areas seems to be confined to slides and films.

VIII. REVERSE VERTICAL SCANNING

Definition. The object to be televised is transmitted by the lens system of the camera to the target of the image orthicon pick-up tube where it is picked up by the electron beam which scans the back of the target line by line. Normally the scanning process is from left to

---

51 Hubbell, op. cit., p. 120.

52 "Magic Carpenters," Time, 57:62, May 21, 1951.

right and from top to bottom. However, this scanning sequence may be altered to produce special effects. Reverse vertical scanning, then, occurs when the scanning is from left to right and from bottom to top. The result is an up-side down picture. Reverse vertical scanning is not standard equipment, but with minor modification the studio cameras may be equipped with a simple switch which can be operated by the cameraman to reverse the vertical scanning.

Usage. The Old Indian Rope trick is a good example of how reverse vertical scanning may be used. The viewer will see the Indian performer raise his hands over a basket, gesture meaningfully, and gradually a rope will rise out of the basket in the best oriental fashion. Actually, two baskets are employed, one on the set and the second one hung from the studio grid. At the appropriate moment, a cut is made to a close-up of the second basket which is shot on a camera using reverse vertical scanning. The Indian performer raises his hands to the second basket and gestures mysteriously as the rope is actually lowered down through the basket.[53] When the effect is finished, a cut returns the viewer to the original setting complete with the Indian performer, and his magical basket. (See Figure 1.)

Another use of reverse vertical scanning may be employed in a photography sequence in order to show what the photographer sees on the ground glass plate at the back of his portrait camera. When the photographer covers his head with the black cloth to look at his subject

---

53 Paul F. Wittlig, Personnel Correspondence of the Author, November 10, 1952.

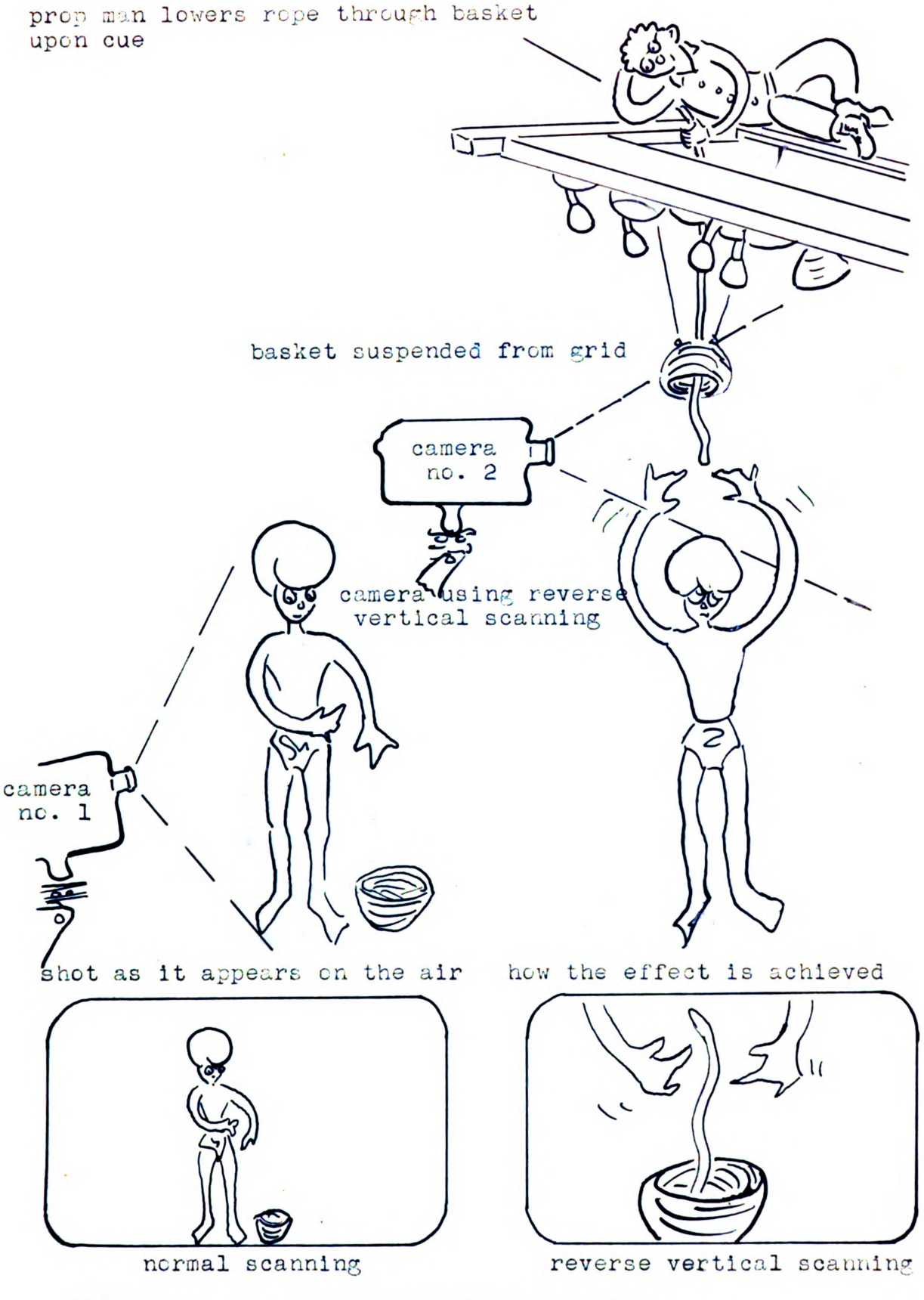


FIGURE NO. 1 - REVERSE VERTICAL SCANNING

through his camera, a cut is made to another television camera using reverse vertical scanning and which is focused on the photographer's subject. The viewer will see an up-side down, close-up picture of the subject, supposedly what the photographer is seeing. The cameraman may vary his focus control or move his camera to correspond with the script and what the photographer is supposed to be seeing and doing. The shot on the television camera using reverse vertical scanning must be carefully executed since it must correspond to the relative position and angle of the photographic camera, thus giving an authentic picture of what the photographer would actually be seeing on the ground glass of his camera.

Reverse vertical scanning can be used in combination with other devices to achieve unusual pictorial effects. An up-side down world can be achieved by shooting the scene with a camera using reverse vertical scanning. A lighting fixture placed on the floor will appear to be hanging from the ceiling as will the performer who seems to be walking around on the ceiling of the room. The furnishing of the room can be on a background projection slide, which will be discussed in the following chapter, thus presenting no problems of falling furniture.[54]

Overhead shots may be achieved by the use of a mirror angled at 45 degrees with the camera shooting into the mirror. By use of the reverse vertical scanning switch, the viewer will see the performers literally hanging by their heels from the ceiling. Science fiction

---

54 Ibid.

stories afford other uses for reverse vertical scanning helping to achieve the seemingly impossible.

The ingenuity of the production staff will find many and varied uses for reverse vertical scanning all designed to conserve time, budget, space, and yet provide the near impossible for the television viewer.

IX. REVERSE HORIZONTAL SCANNING

Definition. Normally the scanning process is from left to right and from top to bottom. However, this scanning sequence may be altered to produce special effects as the author discussed in a preceding section of this chapter. Reverse horizontal scanning occurs when the scanning is from top to bottom and from right to left. The result is a picture which is reversed across the horizontal axis. Normally in television when a performer views his image in the studio monitor, he'll observe that the image of himself is different than it is when he views himself in a mirror. An image like that produced by a mirror will be the result of reverse horizontal scanning. When the performer looks at himself in the studio monitor (while he is being televised by a camera using reverse horizontal scanning), he will observe that his image looks exactly like his image looks when he is standing in front of a mirror. That is, the left hand of the image in the studio monitor, as in the mirror reflection is actually the performer's right hand. Reverse horizontal scanning is not standard equipment, but with minor modifications the studio cameras may be equipped with the device.

Usage. The most obvious use of this device would be to display the dual personalities of an individual. For example, identical twins could be achieved out of thin air. They could become so enraged at each other that they would pace off and engage in a duel to the death. To achieve this effect, the performer would be shot on two separate cameras, one using reverse horizontal scanning so that the performer can face himself and even shake hands with himself if necessary. Half of the frame on each camera is not being utilized since the cameramen must compose their picture so that the performer will occupy the left hand side of the frame. When reverse horizontal scanning is employed on the one camera the performer will move to the right side of the frame. Thus, we have both sides of the frame now filled with the same performer. The signals from the two cameras could be combined in a superimposure, but this would mean that each camera signal would be at half-level, which is an undesirable feature since both pictures should be at full strength if the sequence is to be effective. If special effects amplifiers are available, the signals would be combined in such a manner that the right half of the signal from one camera would be blanked out and the left half of the signal from the other camera would be blanked out; the two signals would then be combined in a single signal or picture. Each half of the total signal or picture when produced by the special effects amplifier can be individually controlled, giving complete flexibility to the possibilities of reverse horizontal scanning when used to show the duality of one personality. (See Figure 2.)

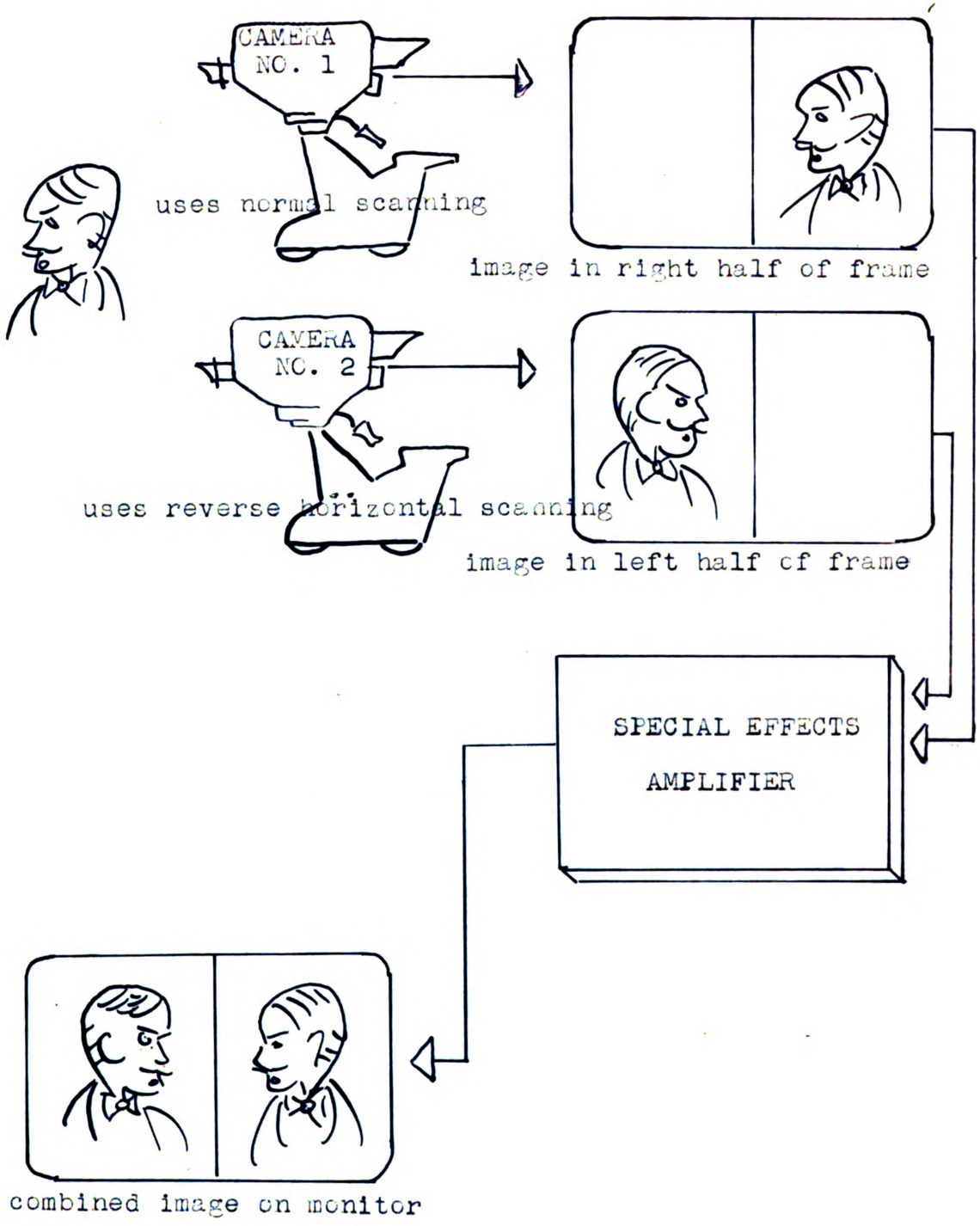


FIGURE NO. 2 - REVERSE HORIZONTAL SCANNING

Other uses of reverse horizontal scanning present themselves in creating illusions. When used in combination with other devices and effects, unusual pictures may be achieved. Science fiction and mystery thrillers present opportunities to use this effect in helping to achieve the impossible. The usefulness of this effect is limited only by the electronic equipment and the imagination and ingenuity of production personnel.

X. SPECIAL EFFECTS

A. RIPPLING WATER

Definition. The effect of rippling water can now be added to any scene electronically without the presence of water in the studio. The effect of rippling water is achieved by adding low frequence modulation to the picture picked-up by the studio camera as it goes through the video switching panel and thus to the program line.[55]

Usage. CBS-Television has recently developed this method to provide shows with rippling water and thus remove the many production limitations which were present when actual water had to be used in the studio.[56] Extensive studio preparation for such scenes as wishing wells and dock areas are no longer necessary with this new electronic effect of rippling water.

---

55 Ibid.

56.E. Carlton Winckler, Personal letter and material to the Author, November 7, 1952.

The use of low frequency modulation can also be used to cause various forms of picture distortion which may be used in dream, flash-back, and similar transition sequence. These various forms of picture distortion may be combined with other effects and especially with the defocus technique to produce very interesting visual transition devices.

B. RAIN

Definition. E. Carlton Winckler, production manager of the CBS Television network reported at the American Association of Advertising Agencies 1952 Eastern Annual Conference that:

> Another headache of television has been scenes requiring rain. Because of the extended rehearsal periods, what appears to be a small shower on the air performance often resulted in a first class, dangerous flood in the studio. Electronic means have been developed by CBS-TV whereby a convincing shower or even a cloudburst can be affected with no water at all.[57]

The data on the production of this effect is held by CBS Television and has not been made available in printed form.

C. SPLIT SCREEN

Definition. The split screen is actually what the name implies since the screen is split or divided in half vertically with a different picture on each half of the screen. The split screen can be achieved electronically or optically or it may be a combination of both methods. In this section the author will treat the split screen as an electronic effect. For additional information consult the chapter on Optical Effects.

---

57 Ibid.

The split screen is closely related to the wipe, since when the movement of a horizontal wipe, from left to right, is stopped so that the frame is equally divided, a split screen results. The wipe is often used as a starting point of a split screen. For example, a man begins a telephone conversation and from one side of the screen a wipe will begin and proceed half way across the screen revealing the person at the other end of the line. When the telephone call is completed the wipe will reverse and leave the original shot upon the screen. However, the split screen may be switched directly to the program line without using the wipe as a starting point. In this type of split screen, as with the wipe, special electronic amplifiers must be employed. These special effects amplifiers are manufactured by all of the major television equipment companies.

To achieve the split-screen effect the director will select the pictures from the two cameras which are to be combined in the split screen and the video control engineer or switcher will perform the manual operation of combining the two images electronically to produce the single split screen image or signal, which is then fed to the program line.

> By changing the pulse, he can blank out the right half of the picture from one camera. A reverse pulse blanks out the left half from the other camera. Then he [video control-engineer] merges the result and sends out half an image from each camera, so that the audience sees two scenes at once.[58]

---

58 Richard F. Dempewolff, "Mystery Men of the Television Screen," Popular Mechanics, 93:80-6, 258, May 1950.

Each half of the signal is at full strength when it is combined to form the split screen. The camera shots must be carefully lined up so that half of each frame may be blanked out to make room for the half frame from the other camera. (See Figure 3.)

A superimposure may be used to achieve a split screen. However, the effect achieved may not be as satisfactory as a split screen produced by the special effects amplifiers, because the cameras require more careful alignment, the background or setting must be specially treated, and the signal from each camera will be reduced to half level or strength before it is combined into the total split screen effect which will lack sharpness and definition. In using the superimposure technique, the two cameras must shoot the objects against a neutral background. One cameraman will frame the specific object in the left-hand side of his screen while the second cameraman frames his object in the right-hand side of his screen. When the two shots are properly aligned, a superimposure is executed and the two objects will appear in their respective halves of the screen.

Usage. The split screen has many useful applications. It is particularly useful in dramatic programs involving telephone conversations, simultaneous action, or in a montage effect which serves to condense time, or by connecting unrelated pictures together in a logical sequence to form strong pictorial relationships which will induce a certain emotional feeling in the viewer. The split screen may be used for its novel effect in variety and musical programs. A singer could sing duets with herself. Other interesting possibilities are evident.

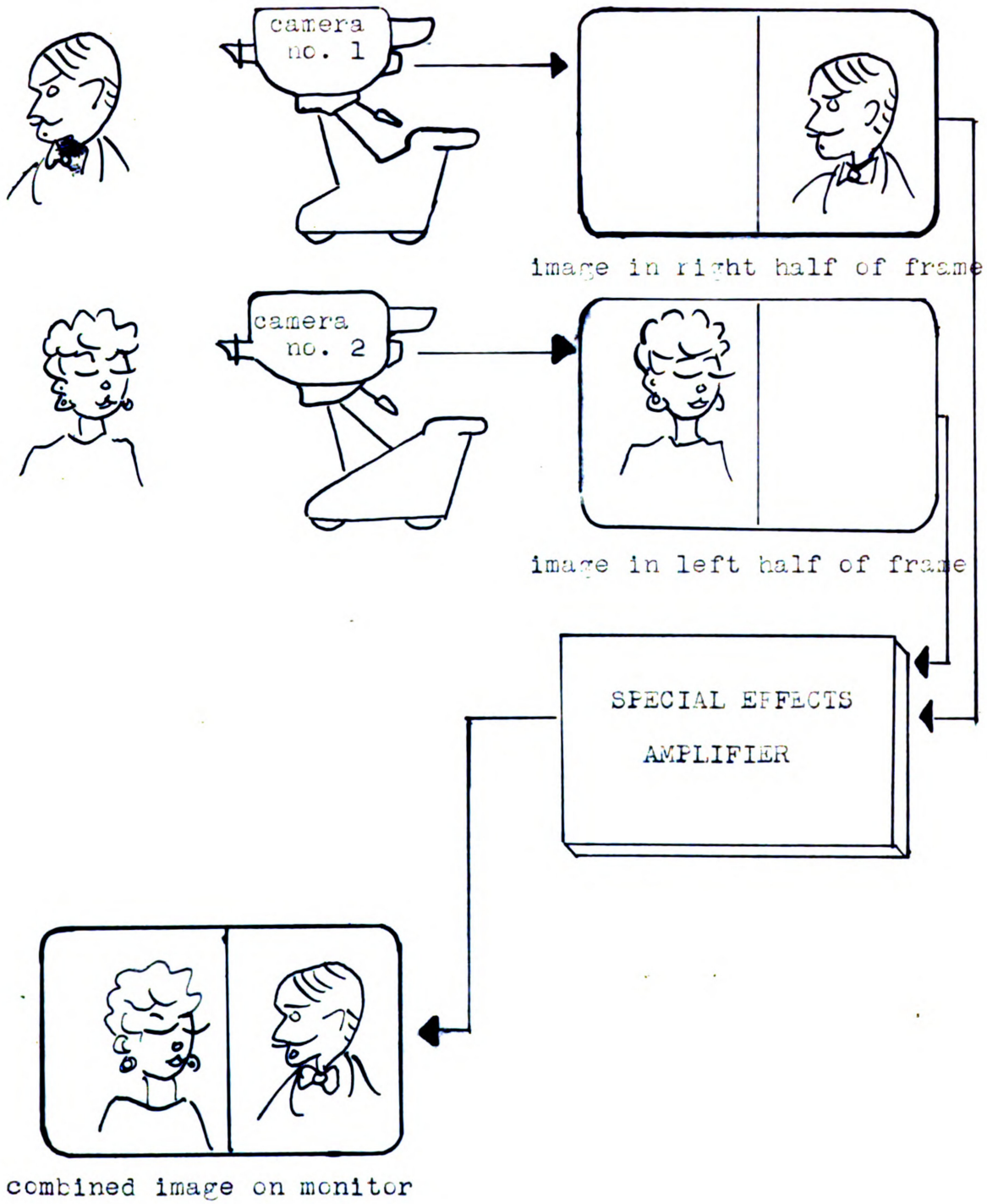


FIGURE NO. 3 - SPLIT SCREEN

Interview or discussion programs involving participants from widely separated cities could be televised without the participants having to be present at the originating studio. Because the split screen would allow a person in New York to talk with another person in Chicago both visible on the screen, several cities could be tied together on such party line set-ups; however, central control is necessary. The split screen has other applications when used to display commercial products or to prepare commercial sequences. It should not be overused although its novelty effect may have a hypnotic effect upon the unimaginative director.

D. KEYED INSERTION AND MATTING

Definition. Another important electronic production tool which has increased the scope of television programming is the keyed insertion or matting[59] device. Terminology needs some clarification at this point. It seems that the term "Keyed Insertion" used by DuMont and the term "Matting" as used by CBS are synonymous, since the basic theory of operation and the results produced are similar.

To describe this effect, here is a simple example. The viewer will see a simple subject, such as a man walking in front of a large mansion, not realising that it is a live studio shot. To achieve this effect within the studio, the man would be shot on one camera and the picture of the house would come from a card televised by another studio camera,

---

59 Camera Mats are discussed in Chapter III, Section VII.

or from a slide or film. The shot of the man would be "keyed or matted in" and the composite shot of the man looking at the house would be complete. (See Figure 4.) Actually, a slot or hole is cut electronically in the background picture and then the simple subject is inserted into the hole which had been cut for it.[60] The subject is free to move about within the shot and within the prespective limits of the background picture. The script may call for the man to walk toward the house which is relatively easy to achieve. The man stands in one place simulating a walk or better yet uses a treadmill while the studio camera dollies in on the background shot of the house. The illusion is complete since the viewer believes the man to be approaching the house.

By "keying" the main video signal, simple subjects or shapes picked up by a studio camera may be inserted into the main signal source. The characteristic waveform of the simple subject or shape is applied to the main picture signal via suitable clipping and blanking circuits, so as to provide an electronic cut-out the exact shape of the simple subject. Then the simple subject is "matted" into the space provided. A composite picture results and appears on the master moniter. RCA gives this technical description of the process:

> . . . The two pictures are not superposed, but occupy adjacent areas independently. The boundary line between these adjacent areas is determined by a masking signal from a third source of television signals. This third source may be a television camera-field, studio, film, or flying spot--or it may be a generator of synthetic signals. This source produces a signal by televising a black-and-white scene having the required boundary contour separating the black and white areas, or it

---

60 "TV's Cost-cutting Gadgets," Sponsor, Vol. 6 #19, September 22, 1952.

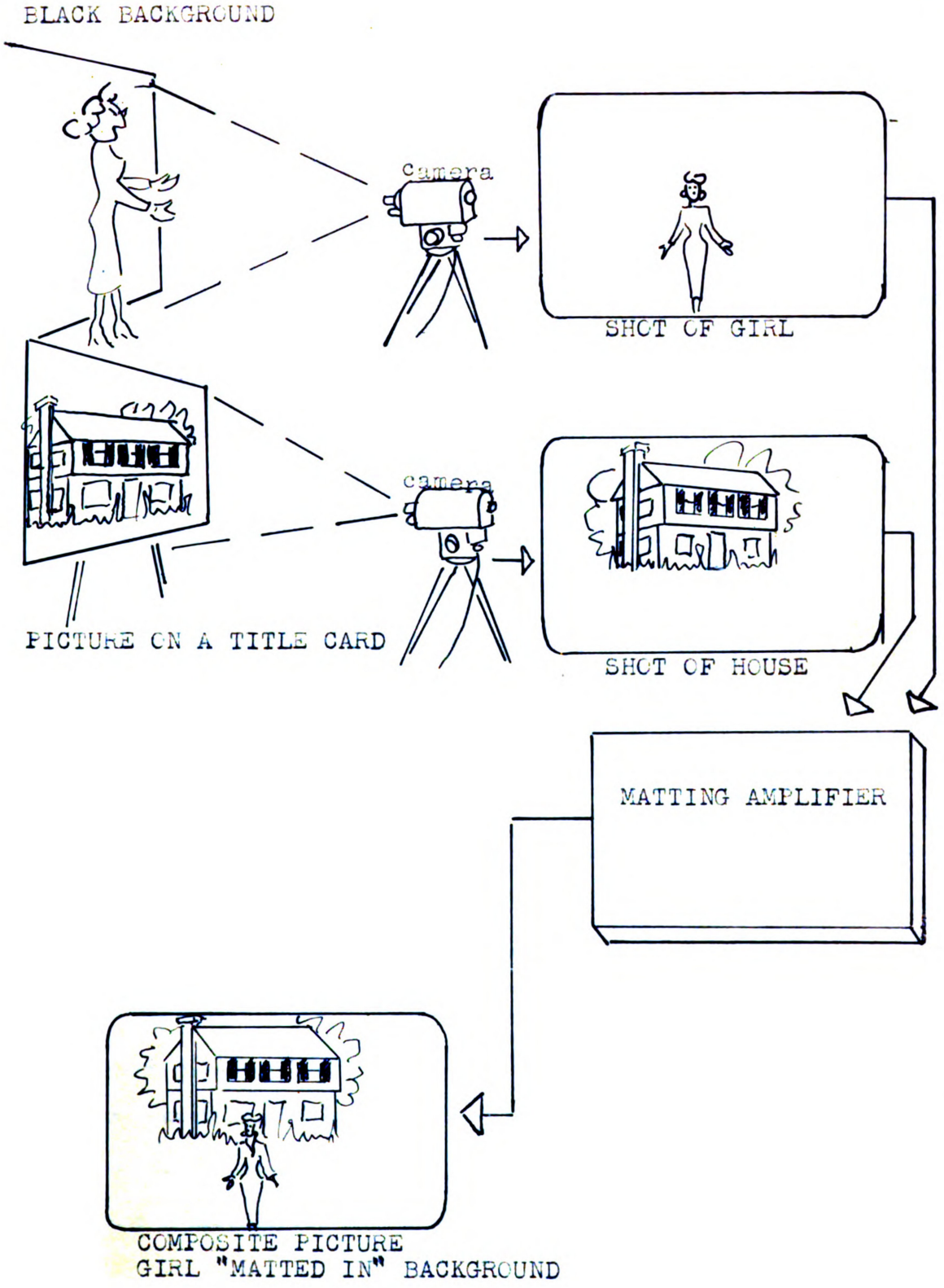


FIGURE NO. 4 - KEYED INSERTION OR MATTING

> produces a synthetic signal of similar character. In other words, the masking signal consists of a series of sharp transitions from black to white, or vice versa, at time intervals determined by the required boundary. When a television camera is used to produce the masking signal, motion of the boundary line may be accomplished by moving the black-and-white pattern, or by panning or tilting the camera across the scene. The masking signal is used to operate two electronic switching circuits which are in the channels carrying the two picture signals to be mixed. When the masking sources scans black, one picture signal is transmitted, and when it scans white, the other signal is transmitted.[61]

The keying signal may be supplied by a live studio camera televising a man, or another simple subject a flying spot camera or scanner which views a geometric design or shape, or finally by a special amplifier which generates a synthetic signal.

When the keying signal is supplied by a studio camera televising a man, it not only supplies the keying signal which forms the cut-out in the main signal, or background picture, but it also supplies the subject to be inserted in the cut-out. When using the flying spot camera or scanner, it will supply the keying signal and appropriate geometric mask which forms the cut-out in the main signal or background picture. (See Figure 5.) The background picture comes from a live studio camera, a slide or a film and the insert shot which may also come from a live studio camera, a slide, or a film will take the shape of the geometric mask used in the scanner. Then the composite picture is ready to be switched to the program line. The number of shapes and outlines available for use in the flying spot scanner is almost unlimited.

---

61 James H. Keachie, Personal letter and material to the Author, October 10, 1952.

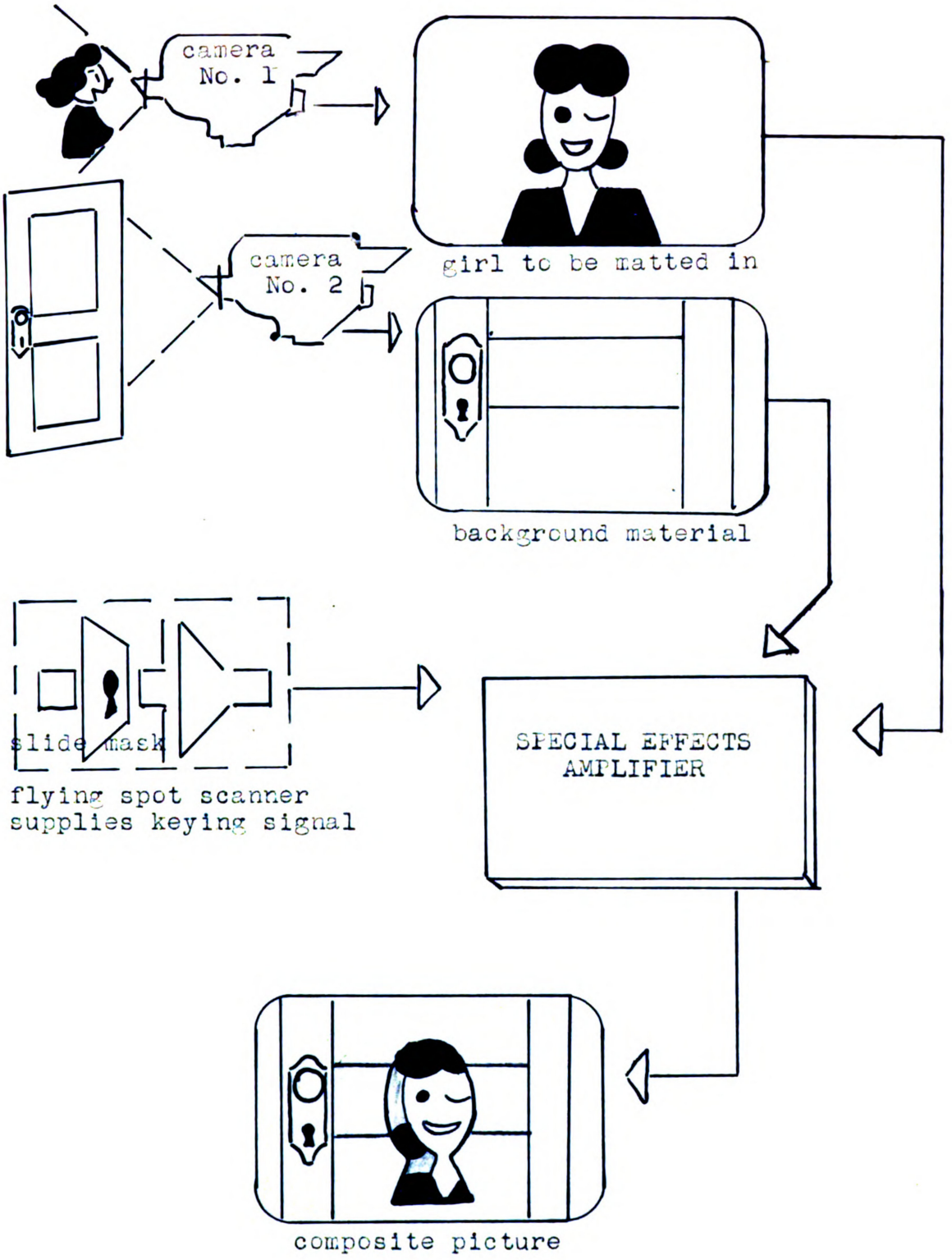


FIGURE NO. 5 - KEYED INSERTION OR MATTING-WITH KEYING MASK

Usage. The author has already indicated some of the several uses of the keyed insert or matting effect. E. Carlton Winckler, Production Manager for CBS Television relates that the keyed insertion or matting--

> . . . device can duplicate on a live television program practically anything that motion pictures can do with traveling mattes. With this handy gadget people may travel on flying carpets, tiny live salesmen may wander through refrigerators pointing out the salable features, or whole ballets may be performed on the piano top. Even the famour invisible man technique becomes entirely practical for live television with the Matting Amplifier. Live actors may appear in tiny model sets or walk up the stairs in a photograph.[62]

If the station can afford this special electronic equipment, the programming facilities will be greatly expanded. To justify the initial cost the many and varied effects possible should be used intelligently and not just for the sake of creating an interesting effect.

---

62 Winckler, op. cit.

CHAPTER III

CHAPTER III

OPTICAL EFFECTS

Optical Effects are those effects produced by instruments designed to shape or fashion the light rays received by the lens system of the television camera. The lens system, in turn focuses the light rays upon the target of the image orthicon pick-up tube where the radiant energy (light energy), is changed into electrical energy. These instruments may be incorporated in, or attached to the lens system, or they may employ their own lens system to control the light rays received by the television camera. These instruments may distort, multiply, block, magnify, or change the direction of the light rays to create the optical effects. Other effects are created by optical illusion.

In this chapter, the author will discuss the use of prisms, distortion lenses, mirrors, shadow boxes, periscopes, front and rear projection, forced perspective, silhouettes, mats, miniatures, dioramas, slides, and film loops as a means of creating optical effects.

I. OPTICAL DISTORTION

Definition. Optical distortion of the television image occurs when the parallel light rays are bent or refracted before they reach the target of the image orthicon pick-up tube. This distortion may occur in the lens system or before the light rays enter the lens system of the camera. The simple prism, concave, and convex mirrors, concave, and convex lenses, and a combination of these optical elements are employed

to produce various optical distortions of the television image.

Usage. Distortion effects add visual interest and variety to perhaps an otherwise static picture. They also may have a very practical value since special problems of the set designer, for example, may be solved by using a distortion device. Scenery shot on a camera using a distortion device would appear crooked, thus the scenery used could be stock scenery units and eliminate the problem of costly scenery construction.

A. LENSES

Television cameras are normally equipped with four lenses mounted on a turret which is turned manually by the camera operater or electrically by a motor. A normal compliment of lenses would include these sizes: 50mm, 90mm, 135mm, and 6 1/2" or 8 1/2". A wide angle or 35mm lens is often used for special purposes. Extremely narrow angle or tele-photo lens are also applicable in special situations such as football games or where a close-up shot of a small image is required but which must be televised from a considerable distance.

The normal or basic lens, that is one comparable to the human eye, for the television camera is a 50mm lens. Optical distortion of the image by the lens is present in wide angle and tele-photo lenses due to the inherent characteristics in their construction. However, this property of distortion can be used to a good advantage if one is aware of its presence and understands how it is used to enhance the television picture.

The shorter, 35mm, or "wide angle" lens give a wider field of vision and introduces a particular type of optical distortion. Wide angle lenses exaggerate perspective, and increase the sense of distance or depth in a shot. If a finger or hand is moved toward the lens, it will be distorted into a huge finger or fist and will appear to be larger than anything else in the picture.[1] In a small studio the wide angle lens is very useful, since the camera can show a large chorus and yet be only a few feet away from the performers. Scenery skillfully executed with painted perspective can be further distorted by the wide angle lens to show an extensive hallway when televised, actually it only occupies a few feet in the television studio.

The "narrow angle" or close-up lens such as the 8 1/2" also gives a form of distortion to the image. The 8 1/2" lens will show an image with a spatial relationship different from what would be received by the human eye. Images in different planes will appear to be in the same plane of action. The close-up lens decreases the sense of distance by magnifying the image thus causing the distortion in spatial relationships. The narrow angle or longer lens will also magnify the details of the image.[2]

Lenses can be specially constructed to distort the image received by the camera. Distortion lenses are available which will produce a thin elongated image or a fat distended image. Multiple images are also

---

1 Richard Hubbell, Television Programming and Production, (New York: Rinehart and Company, Inc., 1950) p. 62-3.

2 Loc. cit.

possible. These special lenses are available for use on television cameras; however, their use is limited to the particular distortion sequence.

B. MIRRORS

The use of convex and concave mirrors to distort a reflected image is common to all who have entered a "Fun House." Convex mirrors will elongate and narrow the reflected image while a concave mirror will shorten and distend the reflected image. Complex mirrors are sometimes constructed in which various sections of the total mirror are treated independently as convex and concave mirrors, so that the reflected image will be correspondingly distended and elongated. The size and shape of the mirror's reflecting surface will determine the distortion produced. These mirrors may be used separately, or they may be combined with the prism and the lens to achieve the desired effect. A thorough knowledge of optics and frequent experimentation on-camera will reveal numerous practical effects which can be utilized by the enterprising director.

C. PRISMS

Prisms may be used to produce distortion effects. Depending upon the number, size, and relative position of the prism, a variety of effects are possible. The prism may also be used in conjunction with mirrors and lenses to produce additional effects. For example, the entire image or scene will appear crooked, as the result of mounting

a simple prism directly on the lens of a television camera.[3] The amount of distortion is controlled by using prisms of varying size and thickness, and by the way in which they are mounted on the lens. A tiny prism mounted in the center of the lens and a prism large enough to cover the entire front surface of the lens will produce varying degrees of crookedness. The prism mounted directly on the lens will also reverse the image across either the horizontal or vertical axis depending upon its mounting. (See Figure 6.) It is normally mounted so that the image will be reversed across the horizontal axis; therefore, the cameraman should be particularly careful in panning, since he will have to interpolate the commands of the director. That is, when the director wants him to pan left the cameraman must pan right to enclose within the frame the desired subject matter.[4] The prism may be used to assist the set designer, since scenery shot on a camera using such a prism mounting would be crooked; however if the walls of the set were constructed crooked, the prism would straighten them out. A crooked man can walk a crooked mile very easily via television with the addition of a prism to the appropriate camera lens.

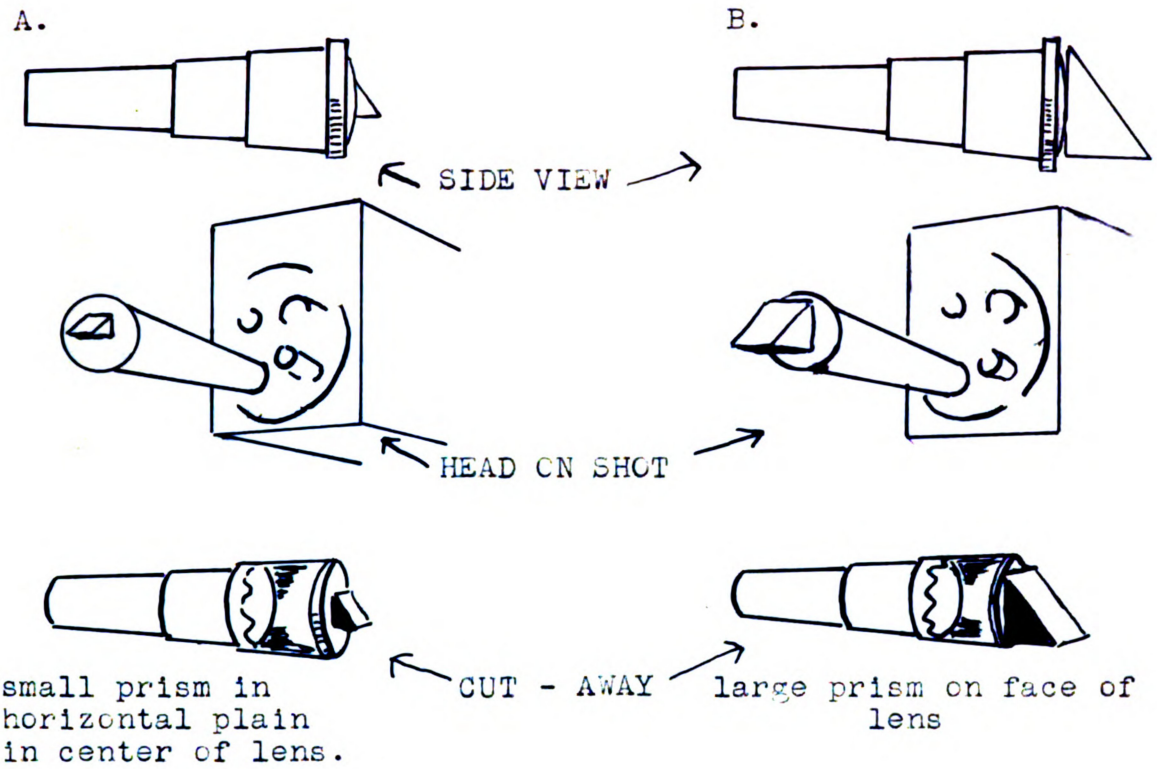
D. TILTED IMAGE

Where it is desirable to tilt the entire picture or just an actor, a combination of prisms and mirrors may be used in a light proof box

---

3 Richard F. Dempewolff, "Mystery Men of the Television Screen," Popular Mechanics, 93:80-6, 258, May, 1950.

4 Ibid., p. 85.



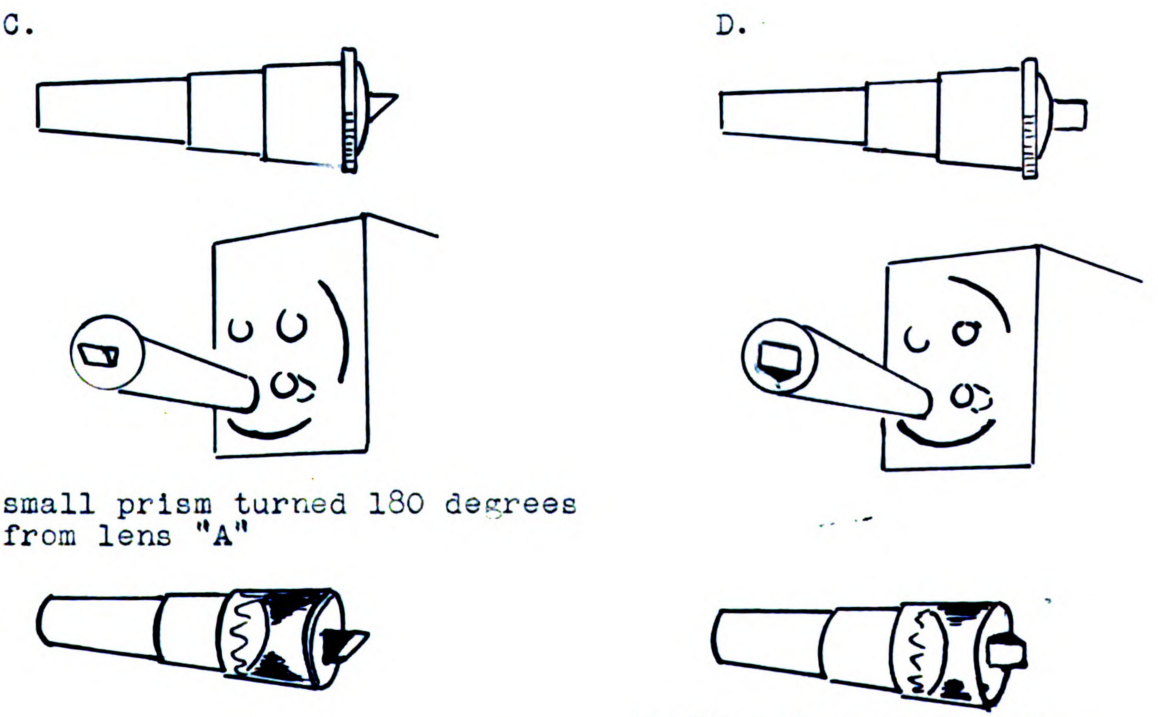


FIGURE NO. 6 - PRISMS MOUNTED ON LENSES

attached in front of the camera lens. By adjusting the prisms, the entire scene may be tilted or even inverted. Of course, tilted acters shot on one camera may be combined with level scenery shot on another camera by using the special effects amplifier.[5] The tilting device may be constructed according to specification obtained from the television networks or may be purchased from optical or camera accessories suppliers.

E. MULTIPLE IMAGE

The multiple image is another interesting optical effect. It may consist of one stationary figure with identical figures revolving around the central figure. This is produced by a prism attachment over the lens of the camera which contains as many prismatic surfaces as the desired number of individual images. As it is slowly revolved by turning a handle, the pictures focused by the prisms onto the target of the camera pick-up tube also rotate around the central image.[6] These prism attachments may be purchased, but their price is often beyond the budget limits of a particular show or station operation.

Multiple reproduction can also be achieved by using the multi-faceted glass plate of a photo-electric exposure meter. The disk should be mounted over a circular hole in a piece of cardboard. The disk mounted in the cardboard frame should be held between the television

---

5 "Guide to Television Special Effects," Tele-Tech, Caldwell-Clements, Inc. Part II, April, 1952. Consult Chapter II, Sec. X, Part D for information on the Special Effects Amplifier.

6 Loc. cit.

target

camera and the subject with the camera focused on the disk. Each of the miniature lenses of the disk will produce a separate image and the disk may be rotated, thus rotating all of the miniature images.[7]

Another method of achieving the multiple image effect is to use a plastic building brick or block. A plastic block which is ribbed on each side and one which will come apart in the middle should be selected. The block should be separated into halves and the ribbing reversed so that those in the back are at right angles to those in the front. The multiplier is placed on a stand in front of and between the camera and the talent. The camera is focused on the plastic block which will produce as many images as there are sections in the block.[8] (See Figure 7.)

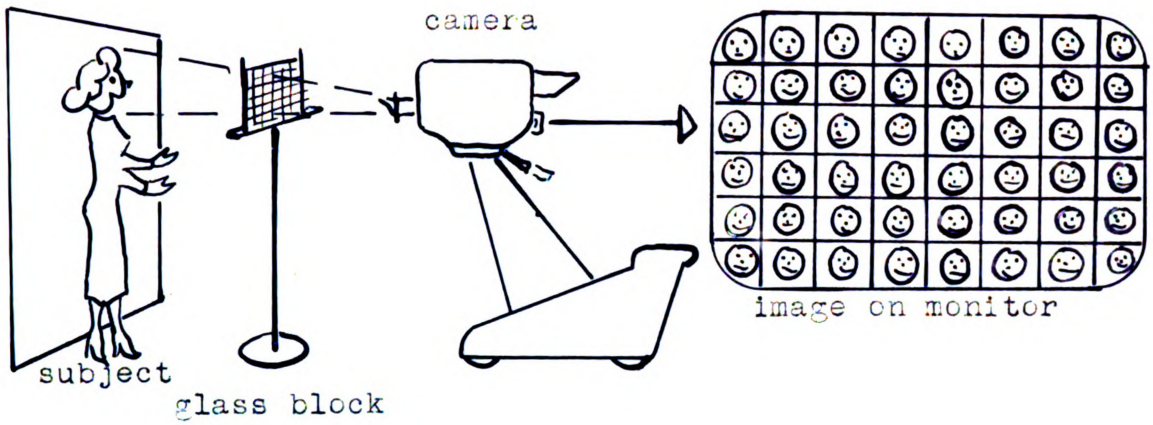
F. OTHER EFFECTS

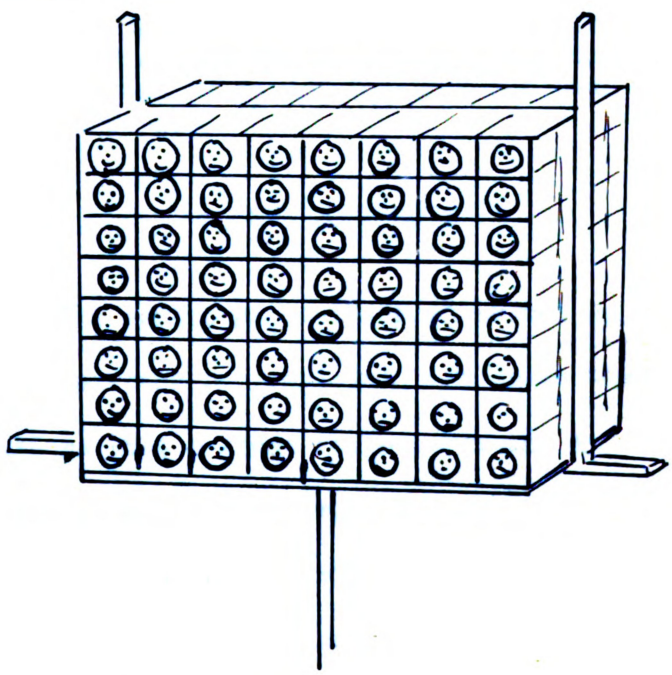
Some very interesting effects may be produced by simple and inexpensive methods which depend only upon the ingenuity of the production personnel for their inception. Smearing vaseline on the camera lens can produce an interesting distortion and blurring effect. Shooting a scene through a bowl of jiggling jello can achieve the effect of glittering scenery without expensive construction. Various colors of jello may be used, however, one must be careful when using the dark colors since they tend to be opaque.

---

7 J. A. Lucas, and Beverly Dudley, Making Your Photographs Effective, (New York: McGraw-Hill Book Co., Inc., 1940) p. 385.

8 Arthur R. Railton, "They Fool You Every Night," Popular Mechanics, 96:144-150, October, 1951.





CLOSE UP OF A GLASS BLOCK

FIGURE NO. 7 - MULTIPLE IMAGE USING GLASS BLOCK

II. MIRRORS

The use of mirrors in television production has many applications. Effects and tricks done with mirrors are more than just stories; they are real. Mirror shots allow the viewer to see two things at once, or afford him a better view of an object when there is absolutely no other way for the camera to look at it.

> Mirror shots are used to pick up action from unusual angles or from points at which it might be impractical or expensive to place a camera, such as on an elevation for down-shots or in a trap or pit for up-shots.[9]

A. THE PERISCOPE

Definition. The periscope is the most common application of mirrors. Two front surfaced mirrors are employed, one above the other, about five or six feet apart so that a large scale periscope is formed. The two mirrors may be interconnected so that when the lower mirror is adjusted, the upper mirror will also be adjusted to the proper angle in order to expose the greatest picture area for pick-up by the television camera. Angles around forty-five degrees are the most often used. The actual mirrors themselves are thirty by forty inches or larger. Of course, they are framed and back-braced. They are mounted within a rack or assembled on makeshift equipment in the studio. The rack or frame mount is the most practical since the mirrors must often be set up during on-the-air

---

9 Robert J. Wade, Designing for Television, (New York: Pellegrini and Cudahy, 1952) p. 116.

operation and then removed immediately. Space restriction and the limitations of time often limit the number and scope of mirror shots which may be used during a particular program or in a particular studio. (See Figure 8.)

> Standard practice [at NBC-TV] involves the use of a metal or wooden stand approximately 9' high with a 3' by 4' mirror at the top and a 30" by 40" mirror at camera height. Both mirrors rotate freely and may be locked at any angle. For a down-shot the top mirror is adjusted to reflect portions of a scene from its high point into the lower mirror from which the camera picks up this secondary reflection. This, if in a dramatic show a producer wished to include a shot of an escaped convict hiding on a rooftop as "seen" by another character from a higher building or window, the designer builds the scene practically on the studio floor--possibly forcing all perspective lines of chimneys and gables upward--and the double mirror, whose top unit is nine or more feet in the air serves to increase the illusion.[10]

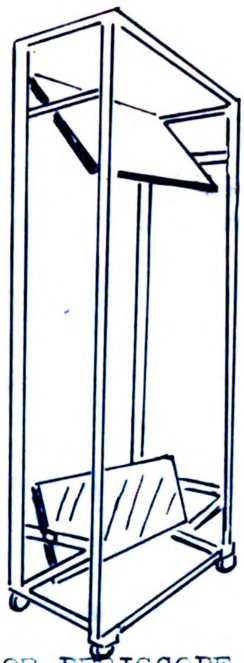
Usage. One use of the periscope device has already been described. Another use of the periscope would be to show the potter's wheel in action. Since the potter must stand in front of the wheel as it is turning, shots from above would be helpful in showing how the object on the potter's wheel is being formed. Hospital scenes involving operations can easily be simulated with the use of the periscope set-up. The device is adaptable for use in musical programs to add variety or to give an overhead shot of the dancers. In effect, the use of the periscope is a low cost camera crane.

A small periscope can actually be constructed which will mount on the front of a camera. Such a small periscope can be used to achieve either the bird's eye view of the worm's eye view of things.

---

10 Ibid., p. 116.

SUBJECT



MIRROR PERISCOPE

CAMERAMAN

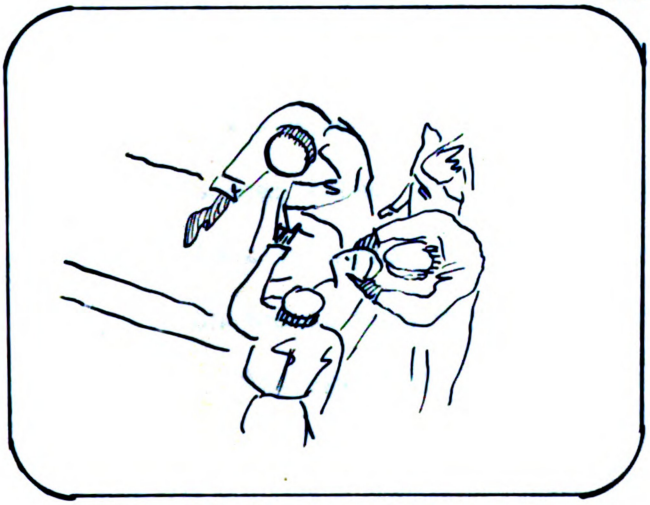


IMAGE ON MONITOR

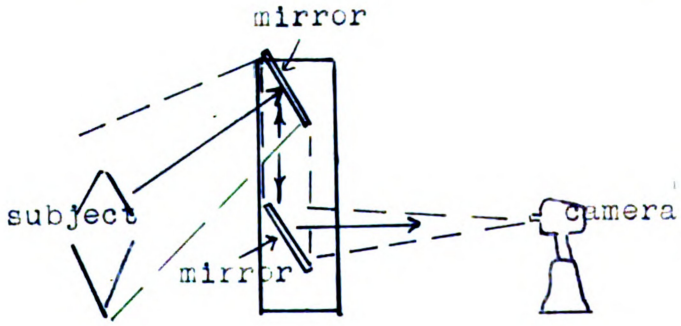


FIGURE NO. 8 - PERISCOPE

One large mirror may also find many uses around the television studio. For example, a mirror could be mounted on the wall in front of talent, and when tilted at the proper angle, the camera would see a two thirds profile of the talent, and at the same time would see the work which the talent is demonstrating, since both will be reflected in the mirror.

B. SPLIT SCREEN

Definition. A split-screen occurs when the television screen is divided vertically, thus two images from two separate sources occupy the same frame simultaneously, one image in each half of the frame. This effect should not be confused with the superimposure where two separate images are present but superimposed over each other. Methods of achieving the split screen electronically were discussed in chapter two.[11] The split screen effect may also be achieved by the use of mirrors. The periscope idea is employed. This time on a horizontal plane. The two scenes which are to make up the split screen are set-up side by side in the studio. The camera is aimed at the left-hand scene, but half of the lens field is bisected by the edge of the mirror which reflects the right-hand scene into the camera lens. In this case, mirrors without metal edges or framing must be used.[12] The optical distance of the camera from the scene and the mirror is critical since both halves of

---

11 Electronic Split Screen is discussed in Chapter II, Section X, Part C.

12 Dempewolff, op. cit., p. 81.

the picture must be in optical focus. That is, the direct distance from the left-hand scene to the camera lens must equal the distance from the right-hand scene which is measured from its center of interest to the first mirror, from the first mirror to the second, and from the second mirror to the camera lens. The angle of field or beam of the different lenses must also be taken into account; however, this is not critical unless a wide angle lens is being used. The position of the camera must be carefully determined so that it will not overshoot the mirror. (See Figure 9.) This type of split screen must be set-up very carefully during the rehearsal period to assure its smooth operation on-the-air. Camera and mirror positions must be marked, and the cameraman familiarized with the pick-up problems.

This optical method of achieving the split screen was employed by CBS-Television before they developed their special effects amplifier. The results are similar, but the split screen effect is easier to achieve electronically; however, when electronic equipment is limited, this optical method may be the only answer to a production problem.

Usage. The most common usage of the split-screen is to show both persons engaged in a telephone conversation on the screen at the same time. Additional usage of the effect are available in chapter three where the author discussed the electronic split-screen.

C. TWO-WAY MIRRORS

Definition. In the first place, a two-way mirror will reflect an image of the subject standing in front of it. Secondly, if the light

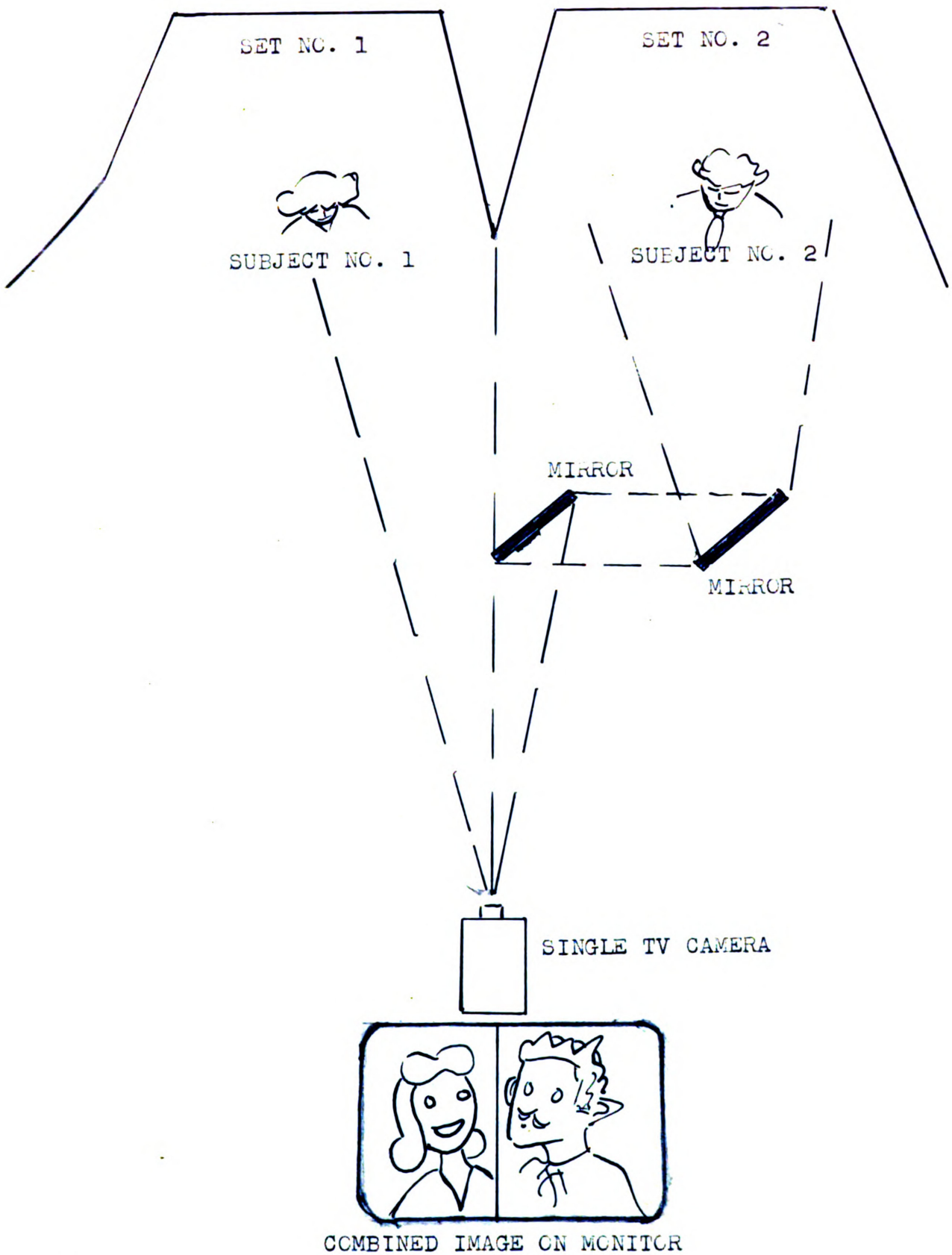


FIGURE NO. 9 - OPTICAL SPLIT SCREEN WITH MIRRORS

energy is increased back of the mirror, a second subject will be revealed behind the mirror. The first image is produced by reflection in the standard method. The second image is produced by transmission, that is, merely allowing the first subject to look through the mirror at the second subject behind the mirror.

Usage. Two-way mirrors have several interesting applications in television production. The two-way mirror is useful in a dressing table sequence, for example, to bring in the face of a loved one whom the young lady is currently dreaming about. The young girl is seated in front of the dressing table looking at herself in the mirror and dreaming of her one love. The light intensity on the face of her lover who is behind the mirror is gradually increased, and his face will be visible through the mirror.[13] The light intensity may be reduced in front of the mirror, but generally it isn't necessary if the light intensity from behind the mirror is sufficient. (See Figure 10.)

Another application of the two-way mirror would be in a shaving sequence. The man is shaving in front of a two-way mirror. First, the camera looks over his shoulder at his reflection in the mirror. Next, the camera looks at him from the side. Then, a switch to the camera behind the mirror is made to obtain a direct shot through the mirror of the man's face. The camera and the television screen may then appear to be the mirror, or the camera shot may be wide enough to include the frame of the two-way mirror revealing to the viewer that he is looking through the mirror at the subject.

---

13 Railton, op. cit., p. 149.

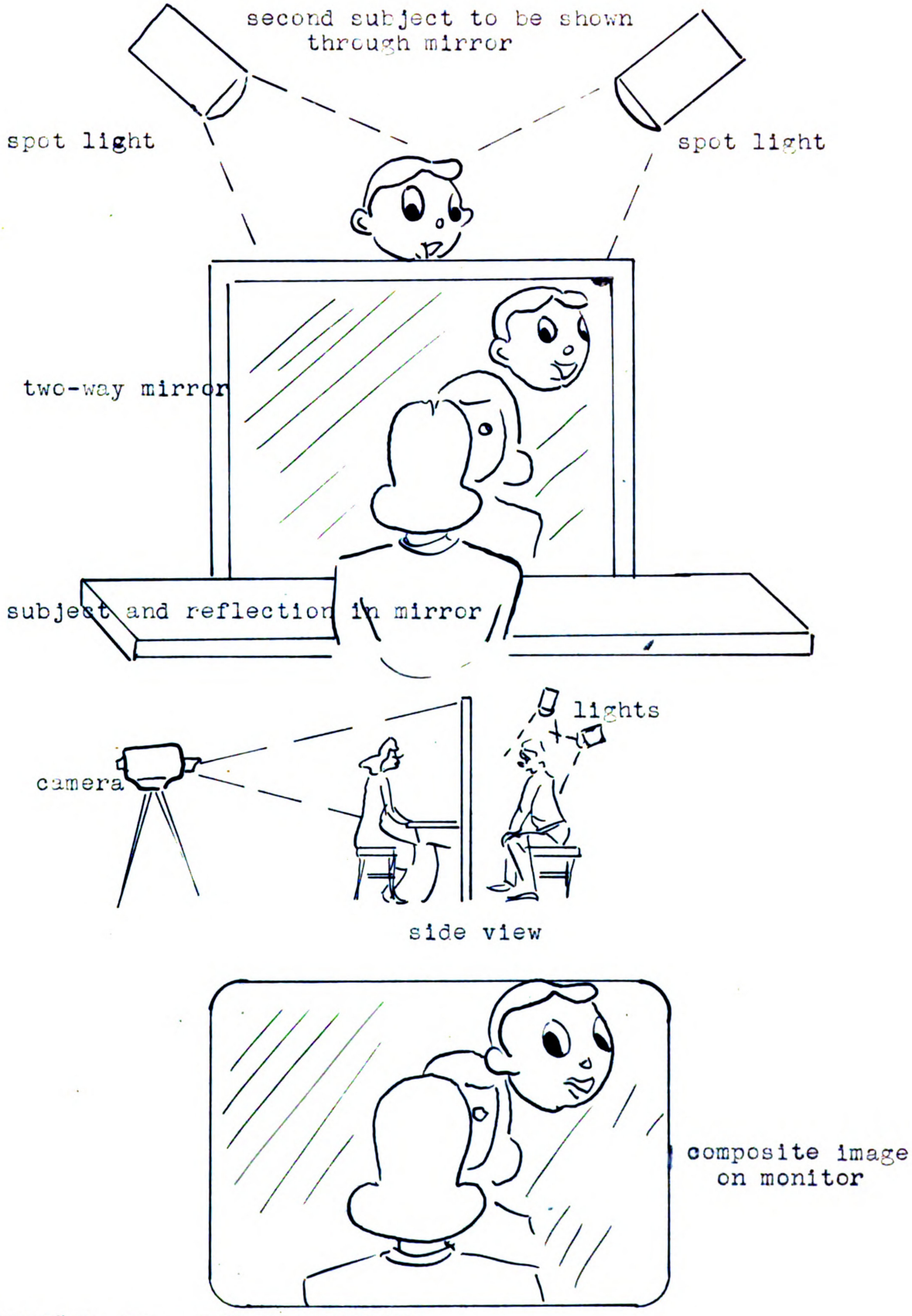


FIGURE NO. 10 - TWO WAY MIRRORS

D. SHADOW BOX

Definition. The shadow box makes use of the dual ability of the two-way or "half-silvered" mirror, since the mirror can either reflect or transmit images.[14] Scenes can fade in and out as illumination is applied to the front, or to the rear of the individual mirrors. Richard Hubbell describes the shadow box in these words.

> This type of device has several stages, each of which can accommodate flat or three-dimensional objects such as moving title cards, puppets, animated maps, product displays, and even close-up shots of live actors. Each stage is separately lighted and controlled by standard dimmers. A simple system of two-way mirrors is used to connect them visually and make possible dissolves, cuts, fades and superimposures within the box itself. Only one camera is needed to make the pick-up.[15]

The shadow box usually has three stages. The first stage is in a direct line with the camera but behind a half-silvered mirror set at a forty-five degree angle to the camera. Above and parallel to the first stage is the second, with its two-way mirror which is at a forty-five degree angle placed directly above the first mirror. At right angles to the first stage is the third. The image from the third stage must pass through the two-way mirror for the second stage and be reflected into the camera by the first stage mirror.[16] (See Figure 11.)

---

14 Hoyland Bettinger, Television Techniques, (New York: Harper and Brothers, 1947) p. 58.

15 Hubbell, op. cit., p. 123-4.

16 Thomas H. Hitchinson, Here is Television, (Rev. Ed., New York: Hastings House, 1950) p. 252.

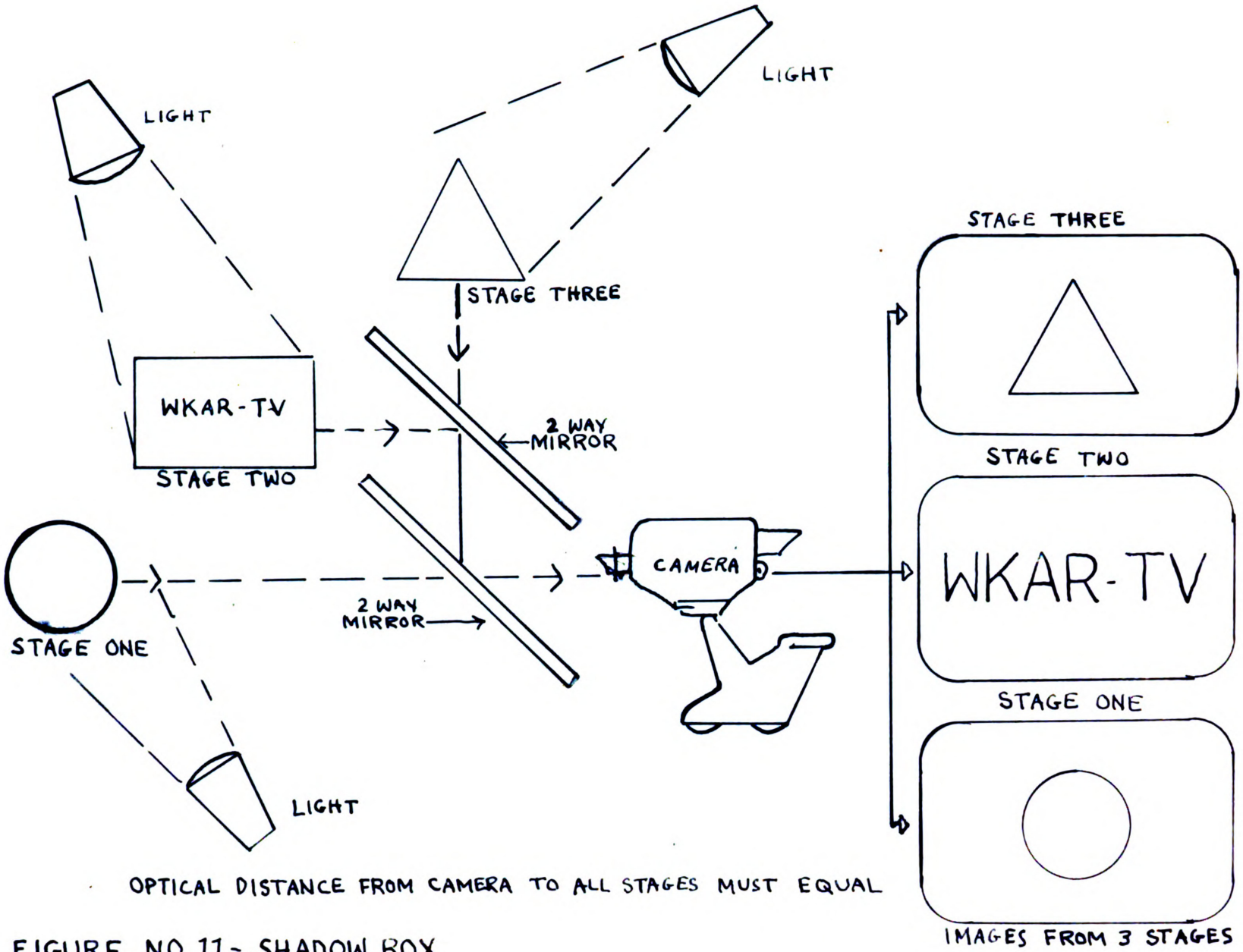


FIGURE NO. 11 - SHADOW BOX

The optical distance must be the same from all three stages to the camera if each stage is to be in focus. The optical distance is measured from the image, direct to the camera, or via the appropriate reflecting or transmitting mirror.

Lighting is extremely important since it determines which image will be transmitted to the camera. Controllable lights are essential to smooth, effective, operation of the shadow box. When the lights behind the two-way mirrors are off, the mirrors behave normally; that is, they reflect the image. If the lights behind the mirrors, (which lights a particular stage) are on, the mirror will transmit the image from that particular stage to the camera.[17] In other words, when the lower stage or stage one is illuminated, the camera sees through the two-way mirror. When it is not illuminated, the mirror reflects views from the other stages. If stage two is now illuminated, the image from stage two will be reflected by the two-way mirror down to the first two-way mirror (located between the first stage and the camera) which in turn reflects the image into the camera. When the third stage (which is at right angles to the first stage) is lighted, the image is transmitted through the upper two-way mirror and is then reflected by the mirror at the first stage into the camera.[18] If two stages are illuminated at once, two different images will reach the camera. By decreasing the illumination on either stage, its image will gradually fade out behind the image from

---

17 Louis A. Spesa, Television Primer of Production and Direction, (New York: McGraw-Hill Book Company, Inc., 1947) p. 77-9.

18 Hubbell, op. cit., p. 123-4.

the other stage. By decreasing the illumination on one stage as the light intensity is increased on another, an optical dissolve will be effected. Superimposures are also possible with the shadow box. Optical fades are simple to achieve, or a direct cut may be made by switching on and off the lights for the various stages.

Usage. Optical fades, dissolves, superimposures, and cuts are all possible; thus the shadow-box will do the work of several expensive cameras and special effects amplifiers. The shadow box is particularly useful in titling definition, since it can provide a smooth "open" and "close" with flexibility and variety requiring the use of only one studio camera. However, several persons may be required to change the materials in each stage of the shadow box and to control the illumination during its use on-the-air. When electronic equipment is limited or unavailable, the shadow box and the optical effects which it can produce at low cost are particularly advantageous in television production.

III. KALEIDOSCOPE

Definition. The kaleidoscope is an optical device in which bits of colored glass in a rotating tube are shown by reflection to be in continually changing symmetrical patterns. It usually employs a small objective lens on one end of the tube, while the colored glass within its rotatable tube is located at the other end of the light-proof enclosure.

Usage.

> Interesting abstract effects may be obtained by kaleidoscopes, used either as part of a shadow box or as a separate camera attachment. In monochrome television the effectiveness of a

> kaleidoscope is largely limited to brief novelty purposes or to transitions from scene to scene as a substitute for a dissolve.[19]

The dime store variety of kaleidoscope can be very useful or larger ones may be constructed especially for use in front of the television cameras.

IV. VIDEO-CAST

Definition. The video-cast or visual-cast is an adaptation to television of the Vu-Graph (trade-name) used by many instructors to project visual material and information onto a blackboard or screen. The Vu-Graph consists of a powerful light source and reflector which reflects and concentrates the light energy on a transparent square. The light energy is picked up by a lens system mounted above the transparent surface transmitting the energy to an adjustable mirror which reflects the light rays onto the blackboard or screen. The operator works upon the transparent surface where he can write, draw, sketch, or point out details in drawings already made on an acetate sheet or cellophane roll. Acetate sheets or cells may be added, one above the other, to achieve an overlay or animation effect, or they may be used to create a build-up of information via diagrams. The picture is projected onto the screen where it is picked up by a television camera, or in some cases the image may be focused on the mosiac of an iconoscope pick-up tube. The image orthicon camera can also pick up the image direct from the reflecting mirror of the Vu-Graph. (See Figure 12.)

---

19 Ibid., p. 124.

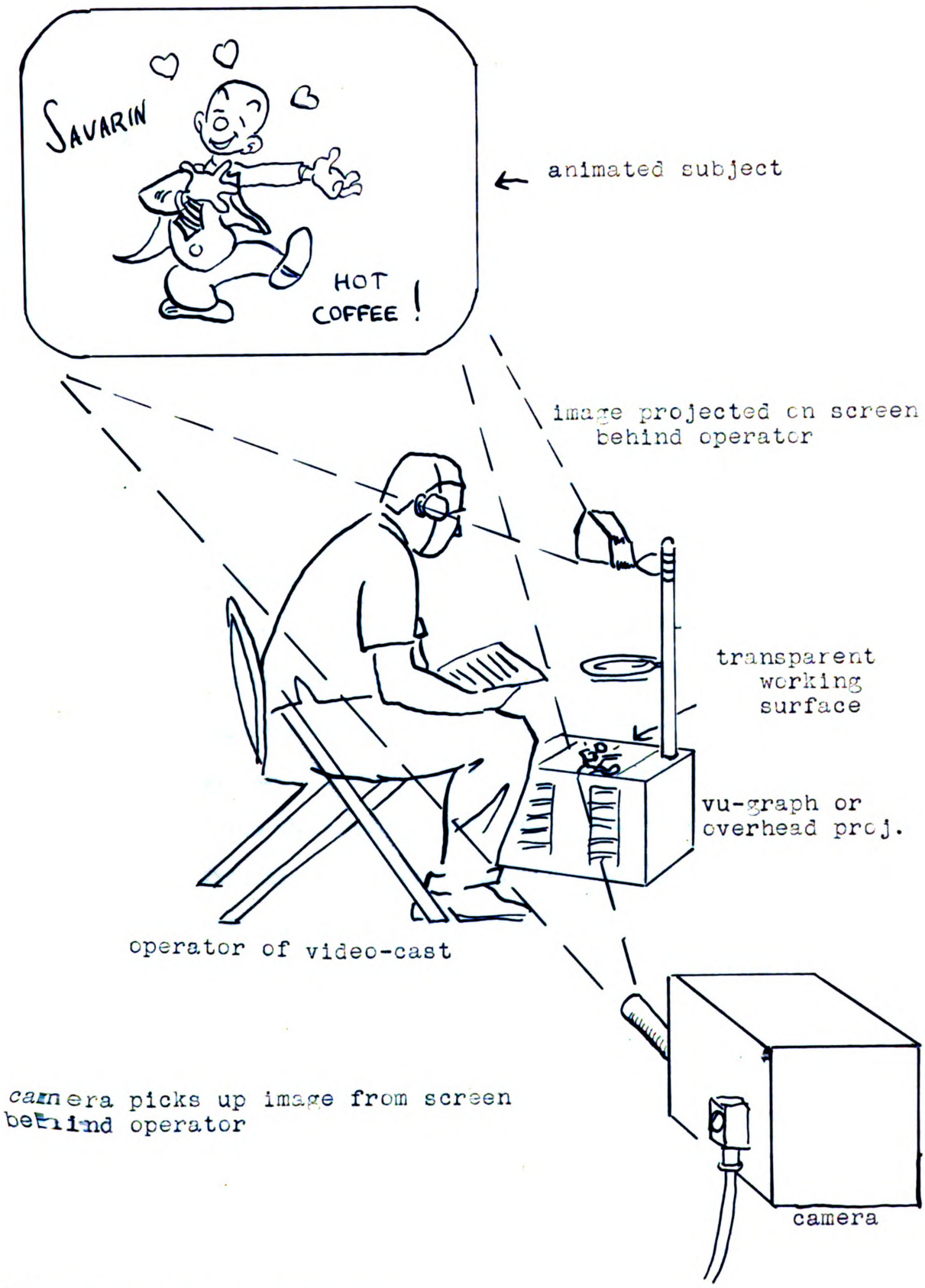


FIGURE NO. 12 - VIDEO-CAST

The techniques of the video-cast were developed by Tom Howell and Milton Rogin who now are under exclusive contract to the National Broadcasting Company.[20]

The television adaptation of the Vu-Graph, which is called the video-cast or visual-cast, works in this fashion. A cartoon, for example, is drawn with a stylus on specially treated black cellophane film which is supported upon the transparent working surface. As the stylus point penetrates and removes the black coating, light rushes through the now transparent portion of the film. As the picture is drawn, it is immediately projected line by line onto the screen where it is picked up by the television camera. Either a black or white drawing may result, black drawings on clear cellophane film or white drawings upon the specially treated black cellophane film. However, it is more effective and more mysterious to use the black film since the audience will only be able to see the drawing itself rather than the artist's hand. Both types of film are available from the manufacturers, the Besler VU-Graph Company.

Usage. This device was first used extensively during the political conventions in the summer of 1952. It was used to show voting totals at the bottom of the screen and it also provided animated drawings during some of the demonstrations upon the floor of the convention.[21]

The visual-cast can provide low cost animation since working like an overlay, the individual sheets of acetate film, each containing one

---

20 "TV's Cost-Cutting Gadgets" Sponsor, Vol. VI No. 19, (22 September, 1952) p. 36-7, 60-6.

21 Variety, (New York), July 9, 1952.

or more elements of the entire drawing, are placed one on top of the other until the finished drawing results. By reverse process, using the black or opaque film, a particular area of the drawing may not be transmitted until the black mask is removed. Thus, turning back each sheet will reveal a part of the drawing heretofore concealed. The use of such simple animation seems to be applicable to children's shows and perhaps adaptable to some types of musical programs.

The visual-cast is one of the devices capable of putting live writing on the screen in a continuous fashion. The cellophane roll may be advanced as the operator writes, or the message may be written out beforehand and then slowly moved across the television screen by rolling the cellophane from the right-hand to the left-hand roll.

Talk programs could make use of the visual-cast particularly if the talent wished to produce writing, sketches, or drawings. The visual-cast seems to be applicable to a wide variety programs particularly informational type programs which require visual information. The visual-cast can be used directly by the talent on the set, or it can be operated by a special effects technician in another part of the studio.

Careful attention should be given to preparing material for use on the video-cast since the transparent working surface is not in the 3 x 4 aspect ratio required by the television system. Problems in picking up the image from the screen may present a hurdle, since the image is projected over the shoulder of the operator onto the screen. If the size of the projected image is kept small and if the operator remains seated, the problem can be minimized or even eliminated.

V. FRONT PROJECTION

The front projection of certain conventional effects has long been a practice in the theatre. The same devices have been successfully applied to television production although they have their limitations. Front projection means that the scenic element is projected onto a screen which is behind the actors. Thus the projection equipment is located out in front of the screen, which may hinder camera movement. Actors may also interfer with the projected image since they perform in front of the screen.

A. LINNEBACH PROJECTOR

Definition. The Linnebach projector consists of a powerful, concentrated light source, a large glass slide upon which is painted the scene or design to be projected and a suitable housing and mounting. No lens system is used. Because of the great magnification, the design painted on the glass must be clear and sharp. Compensation for linear distortion must be made if the projector is mounted anywhere other than directly in front of the neutral background.[22] In operation, the projecter is usually mounted at a point over the actor's heads and well up out of camera range. The size of the projected image is dependent upon the size of the original slide and the distance of the projector from the screen.

---

22 Theodore Fuchs, Stage Lighting, (Boston: Little, Brown and Company, 1929) p. 198.

Usage. The Linnebach projector may be used to project still slides upon a neutral background providing a projected setting for the action of the production. Several problems are encountered, such as the position of the projector, the factor of distortion, and the fact that present studio lighting tends to wash out the projected image. Further experimentation seems to be indicated before front projection will be successful on any large scale in television production.

B. SCIOPTICON PROJECTOR

Definition. The Sciopticon is an adaptation of the spotlight, and consists of a light source, its housing, a second condenser lens, an effects holder with its mechanism for revolving the effects disc, and finally the objective lens for magnifying, focusing, and projecting the image of the painted disc onto the back drop, or cyclorama.[23] The scieptiaon is located out in front of the background and is usually mounted at a point over the actor's heads and well up out of camera range.

Usage. The effects projector is more useful than the Linnebach projector since it affords more control of the light energy and of the projected image. It is useful in creating motion effects, such as flames, clouds, snow, or waves. However, it is also used to project "stills" such as tree leaves or similar cut-outs. When motion is required, the image is painted on a circular disc. A noticeable repetition of pattern will result when the speed of the revolving disc is too fast. This

---

23 Ibid., p. 193.

repetition is often objectionable in television. In practice, a plain slide is used in the scieopticon rather than the circular disc; however, since the image is projected downwards or laterally at necessarily sharp angles, linear distortion will result. The art work on the slide must therefore be corrected by intentional linear distortion at the time the art work is painted on the slide.

Conclusion. The value of front projection devices lies in their ability to project "still" images on neutral-toned scenery, thus creating inexpensive backgrounds. The major limitation or problem under present televising conditions is the tendency of the front and top lighting to wash out the projected image.[24] Further experimentation seems to be indicated before front projection will be successfully applied to television production.

VI. REAR PROJECTION

Definition. Rear projection, or the "process shot" as it is called in film production, is familiar to every cinema critic, and is easily recognized in taxi, train, and carriage sequences. For example, we see a receding street through the back window of a taxi, with other automobiles and taxis apparently keeping pace, slowing down with the traffic, stopping for a light, or passing the mock-up taxi. Actually, the mock-up taxi does not move from the studio floor. The scene which the viewer

---

24 Robert J. Wade, compiler, Operation Backstage, (New York: Network Operations Department, the National Broadcasting Company, 1951) p. 72.

sees through the rear window of the mock-up is projected onto a screen which is placed behind the rear window of the taxi.

The principle of projecting a scene onto a screen from the rear and having actors emote in front of it while the camera grinds away is old stuff to movie companies. These rear-view projection techniques have been borrowed for use in television production, and during recent months the techniques have been improved to such an extent that the use of rear projection is a real money saver.[25] Extensive research and experimentation by the major television networks have developed the potentials of rear projection. Since light is the element which activates the camera target, the networks have found that images projected on a translucent screen in different values of light and dark is normally better subject matter than painted drops and flats. These projected images, especially those of exterior scenes, have much higher quality and provide greater illusion of reality than conventional scenery or photo enlargements when viewed on the television system.[26]

Usage. In rear-screen projection, a specially manufactured projector either for slides or for films, projects an enlarged image onto the back surface of a translucent, cellulose acetate screen in front of which the live scene is acted. The television camera picks up the combined picture. The standard sizes of the screens vary from five by seven feet to eighteen by twenty-four feet. The nine by twelve feet screen seems

---

25 Sponser, op. cit.

26 Wade, op. cit., p. 70.

to be the most often used.[27] In practice, studio scenery masks the heavy wooden frame surrounding the screen and with suitable arrangement of the scenic units and selection of properties the scene will achieve a more convincing and realistic atmosphere. It is suggested that four elements are needed to achieve this realism; (1) the projector, (2) the screen to receive the projected background, (3) the middle-ground, and (4) the foreground. The projector is between fifteen and eighteen feet behind the screen and the distance between the translucent screen and the middle ground scenic element has to be at least four or five feet.[28] Simple scenic units or properties can supply the middle and foreground elements. (See Figure 13.) An archway may supply the middle ground while a leafy tree branch can occupy the foreground.

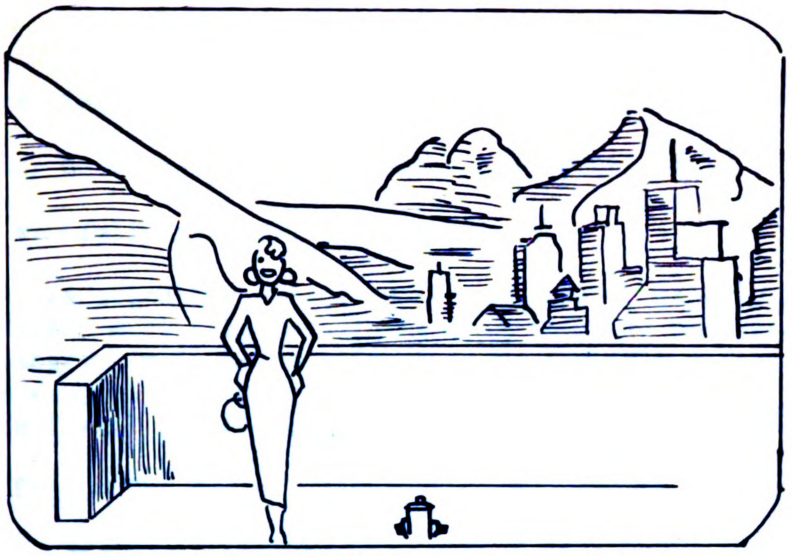
a) Slides. The rear-screen slide projector is manufactured expressly for the purpose, a Beede or Trans-Lux (or equivalent) and projects an enlarged image from a four by five inch transparent slide. The transparent slide, with an outside dimension of four by five inches, with no masking area and no binding tape, is used in the projector. The slide should be rather high in contrast and with the emulsion printed on one side of a single glass sheet.[29] A panoramic slide may be employed to provide a moving background. The panoramic slide which may be as long as twenty-four inches is moved automatically through the projector at various

---

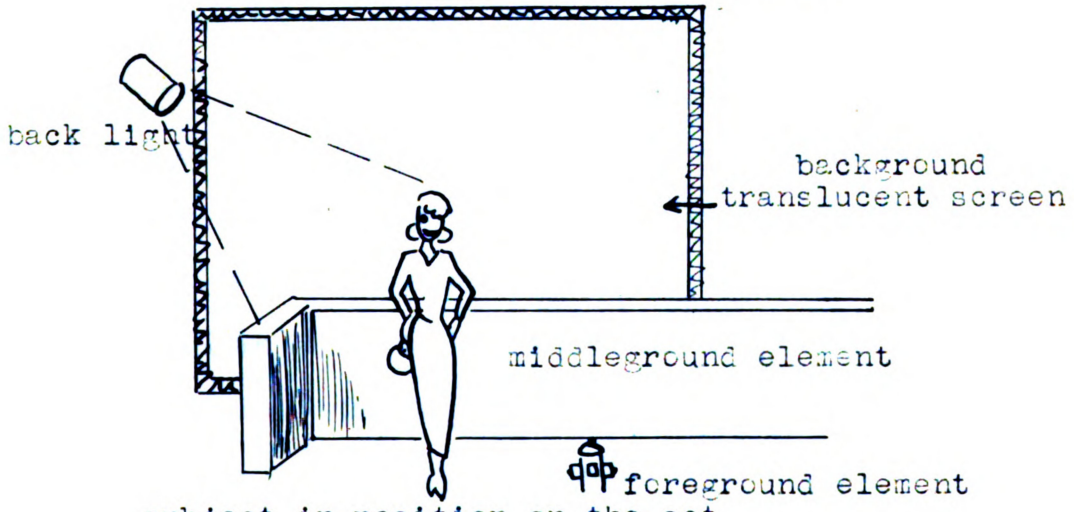
27 Wade, Designing for TV, op. cit., p. 120.

28 Paul F. Wittlig, Letter and Material to the Author, November 10, 1952.

29 Wade, Operation Backstage, op. cit., p. 56.



Composite picture on monitor



subject in position on the set

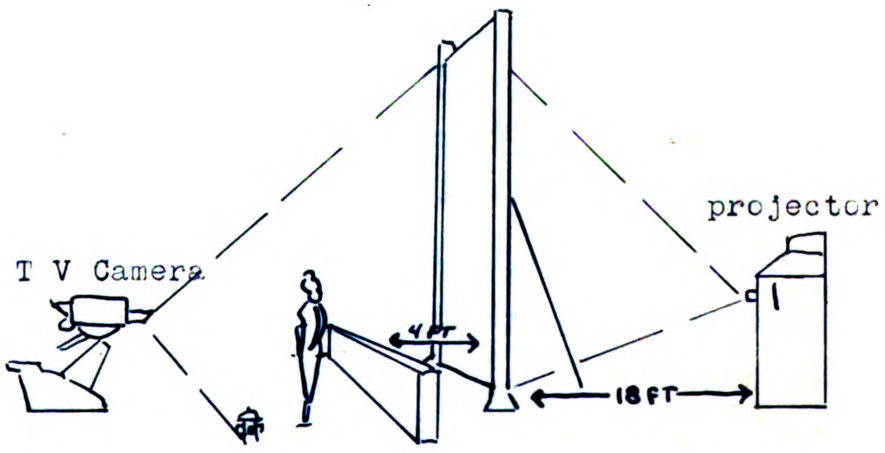


FIGURE NO. 13 - REAR PROJECTION - WITH SLIDE

speeds ranging from a few minutes to half an hour. Rear-projection slides may be developed from clear, sharp photographs of actual scenes or from carefully rendered wash drawings.

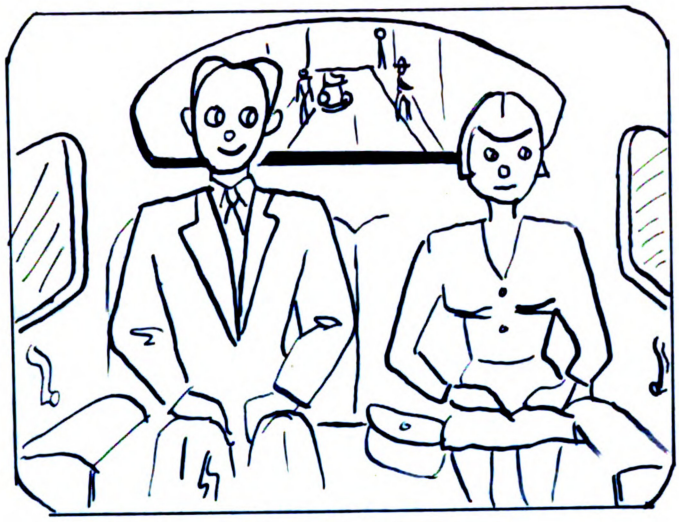
> In selecting originals for projection materials, the designer must make certain that perspective and scale in the photograph will be relatively correct within a few inches when the subject matter is enlarged some 25 times. The perspective itself will not be modified by enlargement; . . .[30]

b) Film. The use of film on the rear projection screen permits realistic backing within the confines of the studio but allows movement to be added to the scenes. This technique is used extensively in motion picture production, and it is also applicable to television production. A special television motion picture projector is substituted for the background slide projector and the familiar scenes from trains, boats, cars, and other moving objects can be televised under controlled condition. (See Figure 14.) The production of science fiction material is made possible by the use of properly selected and edited film clips or special film made for that particular program. The film background is combined with the live program elements in front of the rear projection screen when it is picked up by the television camera.

c) Limitations. There are, of course, restrictions to the utilization of rear screen projection. The restricted size of some television studios is a definite limitation since adequate space is necessary behind the screen for the satisfactory performance of the projectors. Direct front shots of the rear projection are excellent, but angle shots of the

---

30 Wade, Designing for TV, op. cit., p. 120.



Combined image on monitor

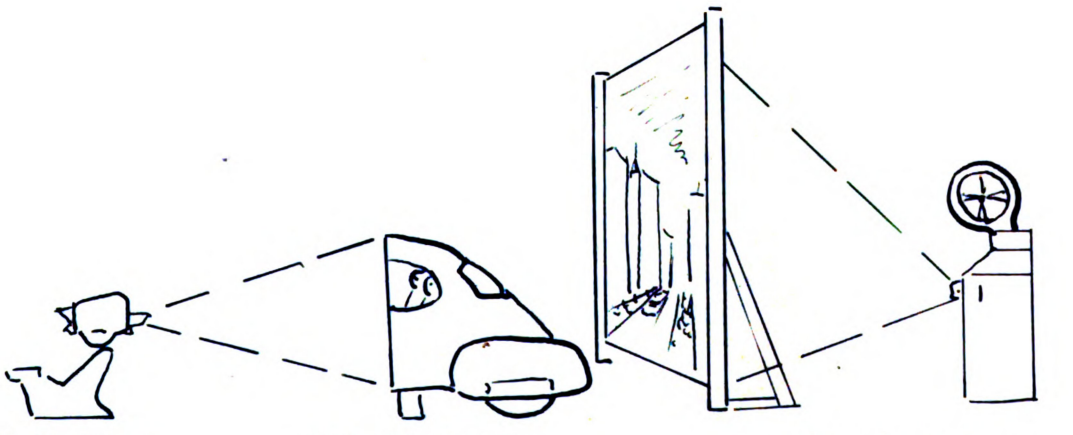


FIGURE NO. 14 - REAR PROJECTION - process shot with car

screen are likely to be dark or distorted especially if the angle exceeds forty-five degrees from the perpendicular. The masking around the screen is essential as is the use of middle and foreground scenic elements if any degree of realism or believability is to result. The lighting problems incidental to rear projection must be thoroughly understood since the importance of proper lighting cannot be overemphasized. Front lighting, for example, unless carefully controlled as to direction and intensity, can wash out the projected image. Of course, actors' shadows should not be cast upon the projected background especially if the background scene is theoretically miles from the acting area.

d) Advantages. In discussing the use of rear-screen projection Robert J. Wade, Executive Coordinator of Production Development, NBC-Television pointed out:

> Used with common sense and artistry, the rear-projection process can be adapted to many purposes: elaborate exterior or interior backings behind doors, windows or other openings, special effects, scenic vignettes or atmospheric phenomena of an apparently static nature such as rainbows, views of the moon, clouds, and stars. Or the projected slides can themselves be employed as settings, particularly for variety, vaudeville or other programs consisting of short episodic scenes. . . .
>
> In dramatic and other realistically staged programs rear-projected images of course are most valuable in suggesting vistas which seem to extend beyond the physical limitations of the sound stages.[31]

The use of rear projection to facilitate television production will continue to be perfected. The small station may find that rear-screen projection is the answer to many of its production problems especially when its operating budget and personnel is limited.

---

31 Ibid., p. 120.

> . . . . In a medium like television, in which all production techniques are ephemeral, the projecting of images on a receptive screen that requires no rebuilding, reassembling or repainting after each usage should have a very promising future.[32]

VII. FORCED PERSPECTIVE

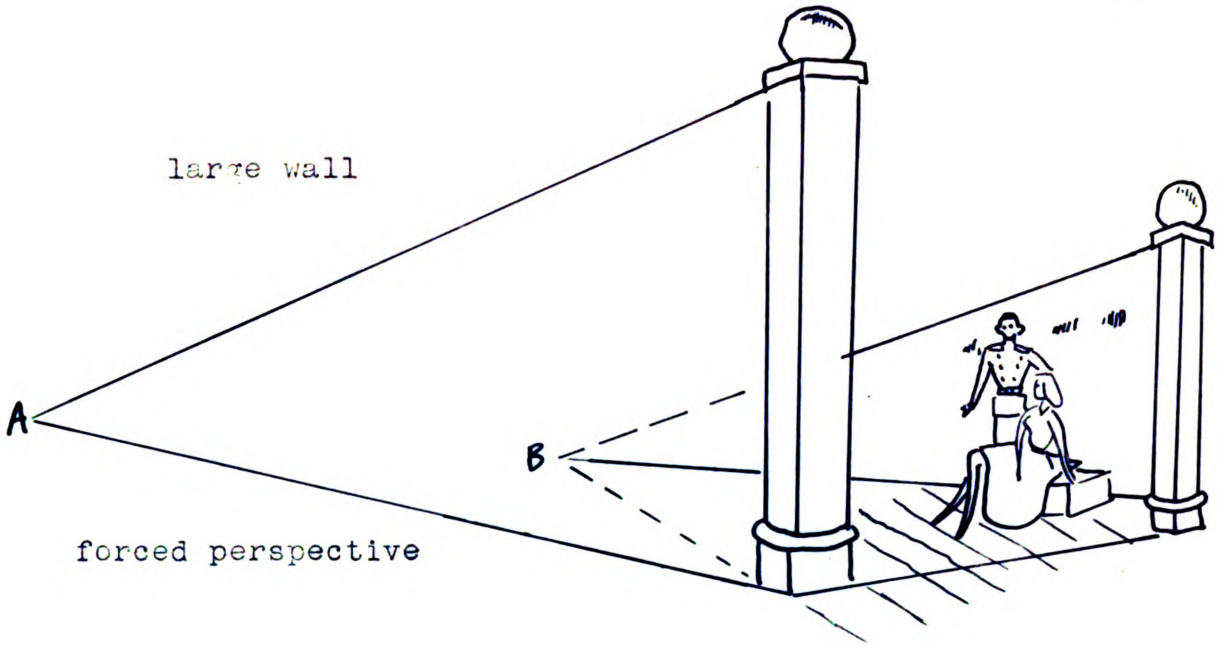
Definition. The use of forced perspective has long been a tool of the scenic designer. False or forced perspective serves a very useful purpose in both the theatre and in television design. In forced perspective, the receding lines of architectural details are forced to a false vanishing point upon the horizon line which produces the illusion of greater depth.[33] (See Figure 15.) The actual vanishing point would be several feet behind the scenic unit or back-drop.

Usage. This optical illusion, on the small stage or in the small television studio, enables the production of programs which call for sets depicting large expansive areas. Scenery is flat, and the use of forced perspective is one method of adding three dimensional qualities. In many television studios, designers have been required to specialize in forced perspective because of small studio size and the limited space available for each set. With forced perspective, a space as big as an apartment kitchenette may become an endless department store. The use of set pieces such as appropriate movable columns placed on the studio floor can serve to emphasize the converging line of columns already

---

32 Ibid., p. 123.

33 Ibid., p. 76.



POINT "A" IS ACTUAL VANISHING POINT.

POINT "B" IS FALSE OR FORCED VANISHING POINT.

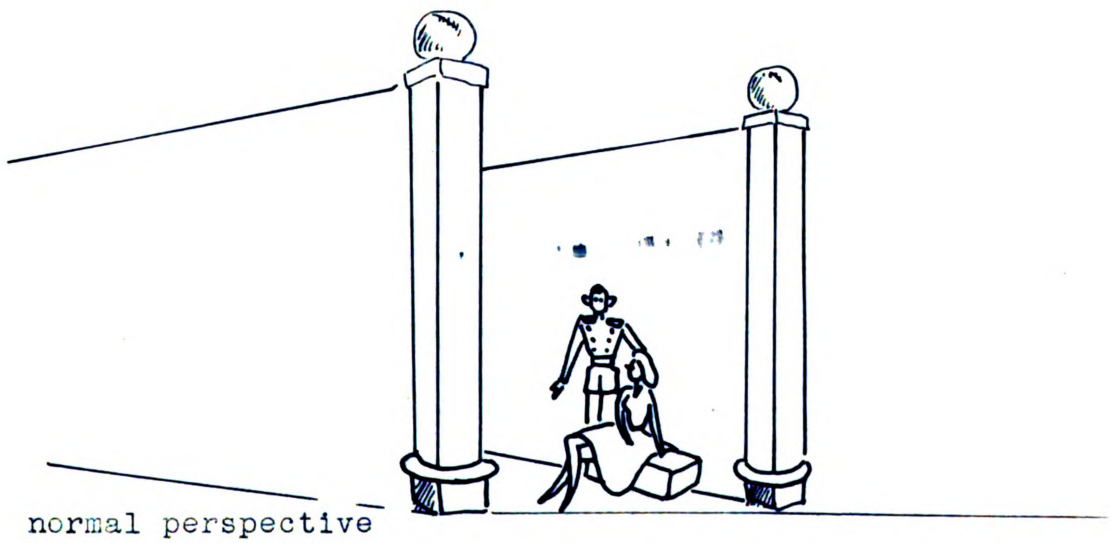


FIGURE NO. 15 - FORCED PERSPECTIVE

painted in forced perspective on the backdrop.[34] The use of the "wide-angle" lens in conjunction with scenery employing forced perspective will further enhance the illusion of depth and spaciousness.

VIII. MATS AND GOBOS

Definition. The use of mats[35] or "gobos" have been successfully employed by film makers for many years. In television:

> Mats are single or multiple plane cut-outs, about 30" by 40" usually representing a scene in perspective, that are placed between the camera and live-action with the result that such action appears to be actually inside or just beyond the area of the painted miniature, which thus gains scale in relation to the size of the human figure.[36]

These "gobo" masks or mats are usually developed on illustration board or they may be cut from plywood. The actual opening, of course, depends upon the subject matter to be shot through the cut-out. Apertures should conform to the three by four aspect ratio of the television system, especially if dolly shots are to be employed in connection with the mat.[37] The portion of the scene carried on the mat is executed in miniature, but the remainder of the scene is constructed in full scale scenery at the point where the performers must appear. The camera picks up the art work on the mat and shoots through the opening to pick up the live action

---

34 "TV-Extravaganza" Life, 28:83-6, June 12, 1950.

35 Also spelled "matte" which is a derivative of mat. The "matte" spelling is used in cinematic circles.

36 Wade, Operation Backstage, op. cit., p. 70.

37 Ibid., p. 56.

between the mat and the actual scenery. Normally the mats are supported in front of the camera in a simple H-shaped frame, the top portion being grooved to accept the 30" by 40" gobo mask. Of course, the "gobo" may be held by a studio technician, but this is unsatisfactory when a sequence lasts for more than a few seconds.[38] (See Figure 16.)

Usage. Mats and "gobos" may be used to achieve expansive, extravagant, and exotic scenes with economy of space, set construction and budget. Mats may be developed from photographs enlarged to mat size and used with a rear projection of the same photo. For example:

> . . . In a recently produced Christmas program, a designer, in staging a short choral sequence, rear-projected a photograph of the interior of a Gothic church, taken from the nave and including distant stained glass windows. Before this projected image he placed the chorus and picked up the total scene by shooting through a cut-out photographic mat of typically ribbed arches, enlarged from another picture of the same interior.[39]

The mat or "gobo" need not be expensive or elaborate to be effective. For example, when a camera shoots through such fragmentary set-pieces as trellis, flower arbors, cob-webs, iron grill-work, crystal candelabra, or the leaves of a tree, visual quality is added to the setting by these or similar gobos and the interesting composition may be used to heighten the dramatic impact.[40]

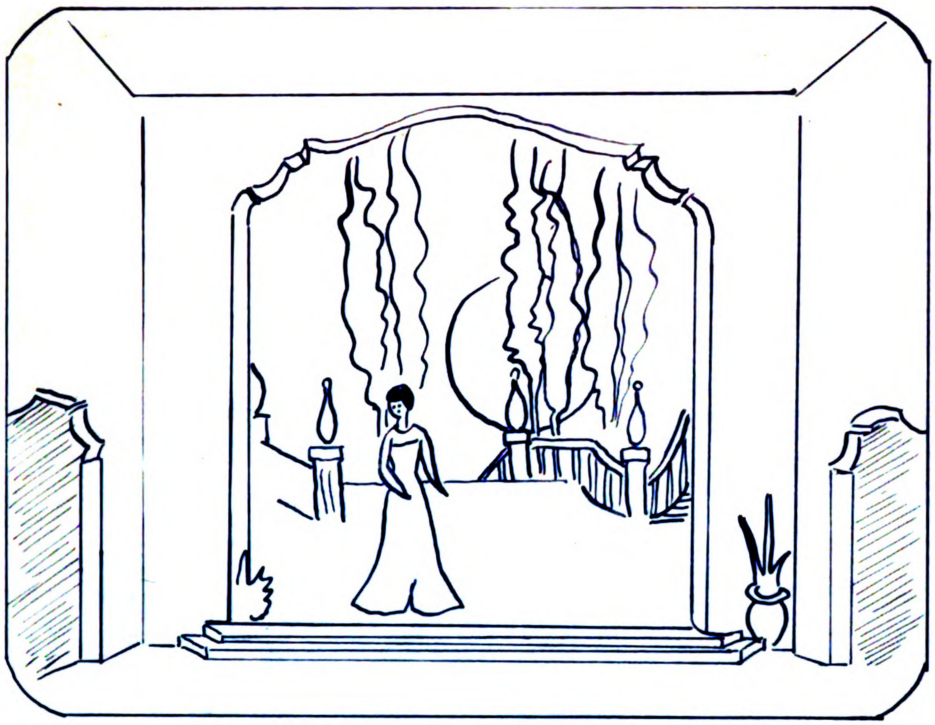
Simple "gobos" or cut-outs can be used not only in front of the camera but may also be used in front of lighting instrument to produce simple projected backgrounds.

---

38 Wade, Designing for TV, op. cit., p. 114-6.

39 Ibid., p. 114.

40 M. Mann, "Television's Five Ring Circus," Popular Science, 157: 110-6, October 1950.



Composite image on monitor

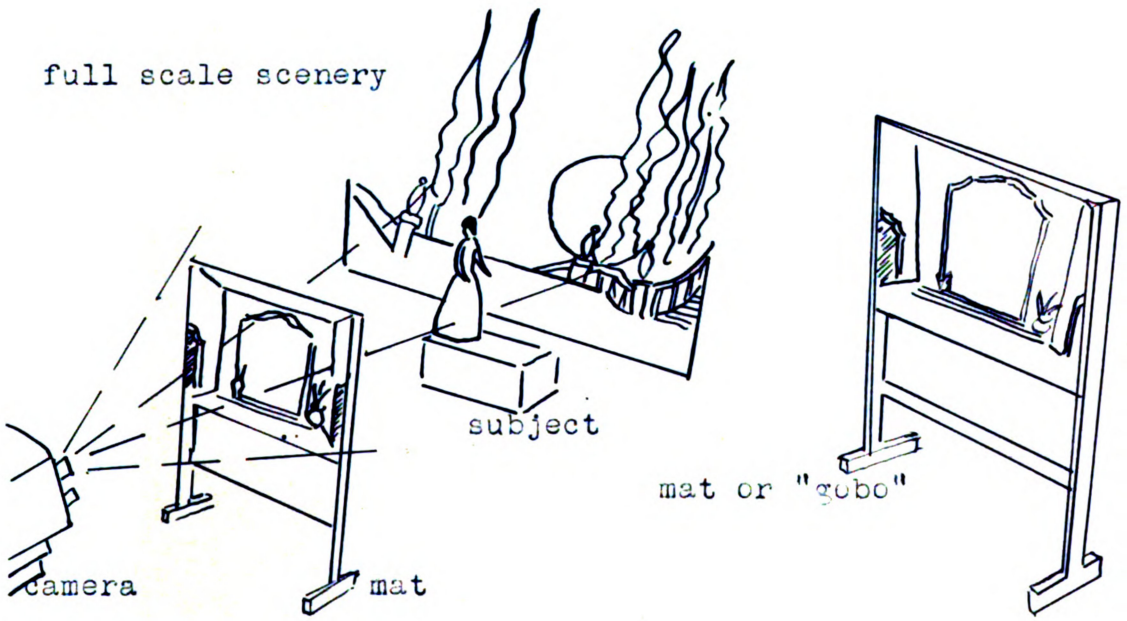
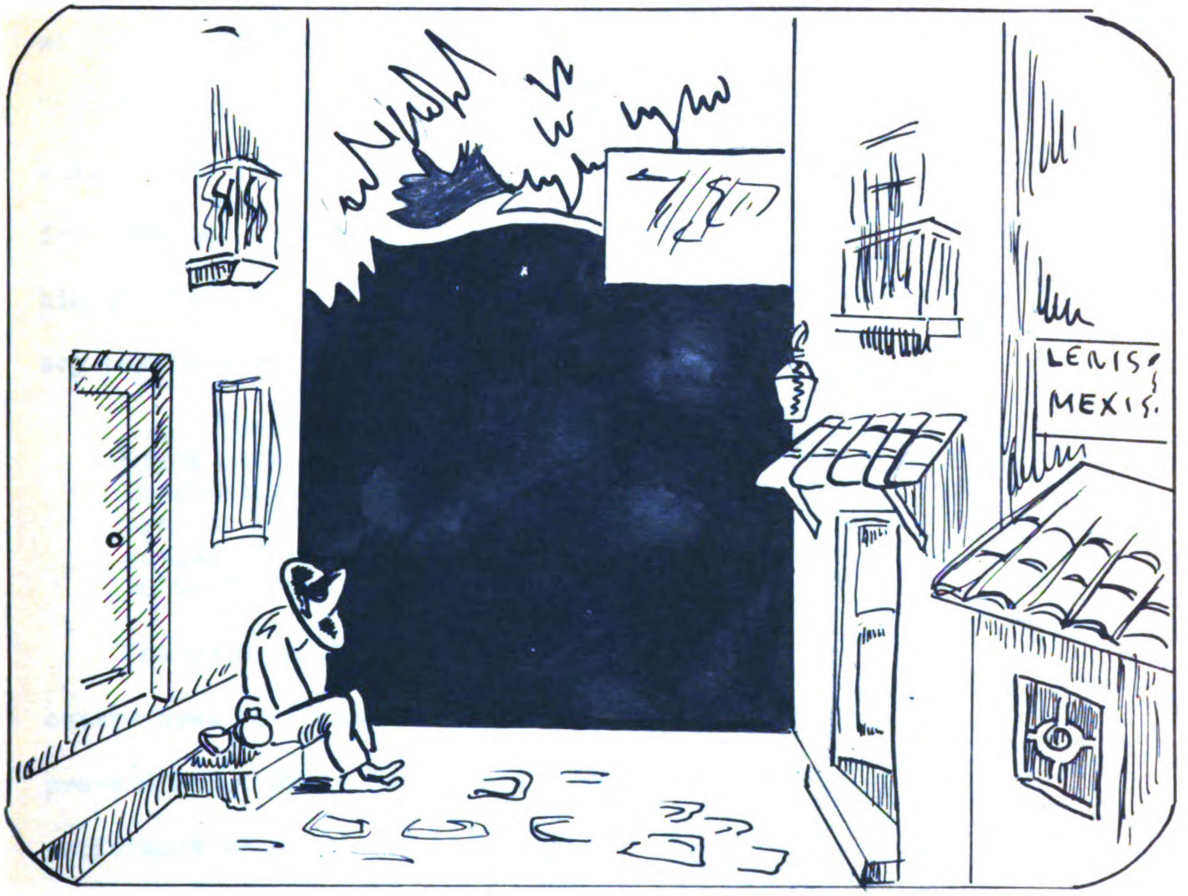


FIGURE NO. 16(A) - T V CAMERA MAT OR "GOBO"



CAMERA SHOOTS THROUGH CUT-OUT IN MAT OR "GOBO" - TO PICK UP LIVE ACTION ON FULL SCALE SET.

FIGRUE NO. 16(B) - CAMERA MAT DRAWN ON TITLE CARD

The mat is very useful in musical programs where stylization rather than realism sets the scene. The foreground is likely to appear too painty when the mat is employed in a realistic dramatic show.[41]

a) Scenescope. A development of the mat shot is the "Scenescope" which is coupled directly to the front of the camera. The complex models of the scenescope, boxlike or tubular, contains a slot for a transparency, opaque slide, or cut-out, a controllable light source, mirrors and lenses, film systems, and cooling systems.[42] It is able, for example, to show an auto in front of the actor and a house behind him without having the actor's body show through the auto and without any physical scenery in the studio.[43]

> . . . The elementary type is merely a refinement of the cardboard mat: the camera shoots through the chamber picking up information from a 4" by 5" card or slide which is partly cut away or blocked out to permit the shot to include live action against full scale settings normally placed at a distance of 20 to 30 feet from a camera using a 6 1/2" or 8 1/2" lens.[44]

The major problem in the use of mat shots lies in the fact that one camera must be freed from operation so that it may be lined up with the pre-set mat. Since the special lighting of the mat itself and of the performers is a process that requires care and precision the camera may be out of action for a longer period of time than is practical. The

---

41 Wade, op. cit., p. 114.

42 Ibid., p. 116.

43 "New Devices Fake Scenes: Scenescope?" Life, 30:67-8, February 26, 1951.

44 Wade, op. cit., p. 116.

solution of this problem seems to be the use of a special effects camera as standard studio equipment which would handle all of the special effects shots. The addition of a fourth or fifth camera to concentrate on special effects might be an expensive solution, but it would free the producer of many worried moments and allow him to use more scope and flexibility in his production.

IX. SILHOUETTES

Definition. The television silhouette is no different than a common silhouette which consists of a dark image or black shadow outlined against a lighter background.

The silhouette effect can be achieved with the use of a translucent screen mounted in a frame usually nine by twelve feet which is masked by scenic units or drapes and with a single light source directed toward the back of the screen. A thin, cotton, seamless fabric, tinted light blue is recommended for the screen, but plastic screens are available which have a higher coefficient of translucency. A rear projection screen may be used if nothing else is available. The actors and/or objects should work close to the back of the screen for realistic effects.[45]

Shadows are effective and can be achieved either by the lighting or by the distance of the performer behind the screen.

Usage. The use of silhouettes present an artistic treatment for both realistic and stylized settings. Ordinarily only one light source is used behind the screen, however, the use of more than one light source

---

45 Wade, op. cit., p. 118.

or changing the position of the single light source can provide interesting distortion effects. Lighting is the key to good silhouettes, therefore, proper and adequate control of the lighting is essential if the desired effect is to be achieved. The common tendency is to overlight when, for example, a thousand watts of illumination is usually enough light on the back of the translucent screen. Simplicity in lighting is necessary since the important features of a silhouette are the form and outline of the figure or object. The lighting must emphasize these important features. The use of scenery to provide interesting silhouettes is very practical since it does not require painting. But once again, the emphasis is upon the form and outline of the scenery when it is viewed in silhouette.

A small silhouette screen may be used for animated effects, for titling, or for the purpose of introducing production numbers. The animation of animals to be used on a children's program could be executed in silhouette very effectively. A distant shot of an elephant, for example, could be faked by using a cut-out elephant with hinged legs and other movable parts. It would actually walk along a narrow track behind the silhoutte screen as the effects-man operates the control strings.[46]

As in the use of other effects, the limitation of silhouettes depends upon the ingenuity of the production staff and the time, space, and budget which may be made available for the experimentation and development of the desired effect.

---

46 Railton, op. cit., p. 150.

X. MINIATURES AND DIORAMAS

Definition. The miniature setting is the realistic representation of a live object executed on a very small scale. For example, a distant view of a town or building actually looks like a small model; therefore, a miniature when televised cannot be distinguished from the full-scale subject. Contrary to their name, miniatures can be of any size, They should be large enough to depict the detail necessary in fulfilling the script and technical production requirements and small enough to fit within the restricted floor space of most television stations.[47]

Miniatures are often referred to as diorama. Dioramas usually employ three-dimensional construction and/or the perspective treatment of large areas such as, a city, or harbor, where a miniature would show a single house or ship in detail.

a) Construction. Miniatures and dioramas do not require expensive materials--thick cardboard, plywood, plaster of Paris, balsa wood, papier-mache', thin metal and glue are the basic elements, but they do involve construction time and labor with much painstaking hand craftsmanship by carpenters, scenic artists, and specialists.[48] The factors which contribute to the successful televising of miniatures are scale and detail, perspective, motion, color, and lighting.

If a miniature set is to be convincing, it must be realistic, and if it is to be realistic it must be constructed with attention to scale

---

47 William C. Eddy, Television: They Eyes of Tomorrow. (New York: Prentice-Hall, Inc., 1945) p. 212-3.

48 John F. Royal, Television Production Problems, (New York: McGraw-Hill Book Company, Inc., 1948) p. 90-1.

and detail.[49] The scale must be rendered precisely or the television system will show the miniature up for what it is, a fake. Generally, exteriors are more illusive than interiors because the viewer cannot easily compare the relative size of details in the exterior miniature.[50] The scale of the miniature or diorama is the starting point for construction, and it is determined by the requirements of the miniature as opposed to the restrictions and limitations of the particular television operation.

Perspective is also important in creating the proper effect, and since miniatures are usually televised at short distances, it is often necessary to construct the miniature in forced perspective.

It takes more than carefully rendered scale and detail of a miniature or diorama to make it effective on-the-air. Unless movement is introduced, the results will be only slightly more effective than those obtained from a two-dimensional drawing. Motion tends to eliminate the impression of artificiality and should be carefully considered in the planning and construction of a miniature of diorama. A swaying tree, smoke from a chimney, lighted windows, fog, wind, rain, snow, or even an artificial cloud shadow will give the required effect and efface the two-dimensional, inanimate feeling.[51] If the miniature is devoid of motion and is to be seen by the viewer only as a long-establish-shot

---

49 Bettinger, op. cit., p. 56-7.

50 Wade, op. cit., p. 118-9.

51 Eddy, op. cit., p. 216.

the

and/or on a one-time basis, a good piece of art work will be just as effective.[52] A retouched photograph, a two-dimensional drawing, or a painted illustration could and should be substituted with more satisfactory results and with infinitely less work and expense.

Despite the need for detail, scale, perspective, and motion, the miniature should be lighted softly. If the lighting is too harsh, employing intense high-light and high contrast, the desired illusion of realism and naturalness will be destroyed.[53] The light should come from one direction and from a single light source if at all possible. All shadows should fall in the same direction unless the scene is foggy, or murky with no apparent sun.

The choice of lens used in shooting a miniature is another important factor to consider if the desired effect is to be achieved. A narrow-angle lens will allow the camera to shoot the scene from a distance and still provide the necessary illusion of reality even when the miniature is small in size but represents quite a large area in real life.[54] A wide-angle lens will allow the camera to shoot the scene at close range but with an illusion of space due to the optical distortion of the lens. The optical distortion introduced by using the wide-angle lens is often objectionable; however.

---

52 Bettinger, op. cit., p. 56-7.

53 Arthur Rowan, "Miniatures in Motion Picture Production" American Cinematographer, 33:386-7, 400-2, September 1952.

54 John H. Battison, Movies for TV, (New York: The Macmillan Company, 1950) p. 342-4.

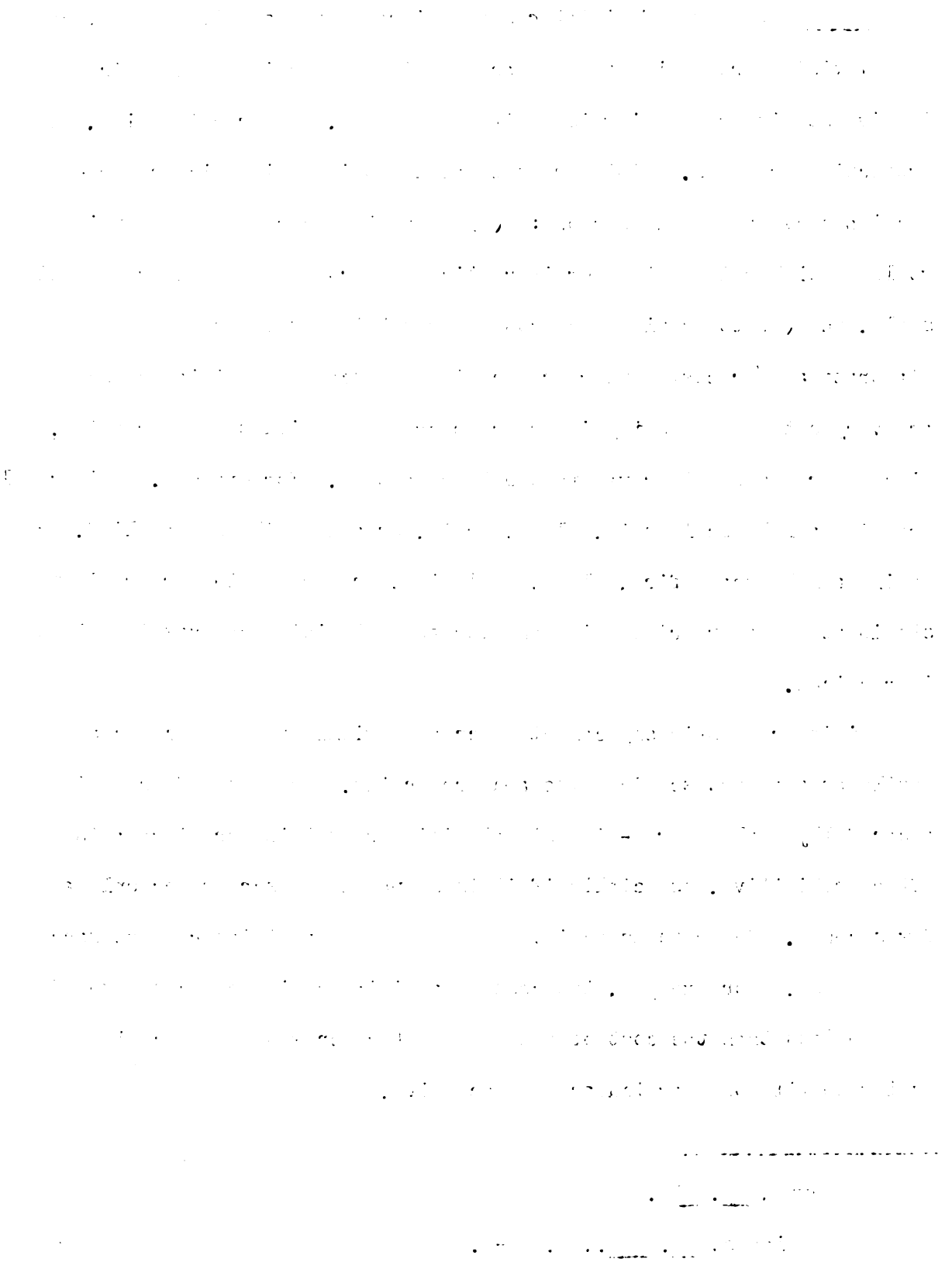
Usage. The use of miniatures and dioramas are equally as applicable to television production as they are to film production, but their use in live studio programming is limited by budget, construction time, and production problems. Miniature sets at least in motion picture production serve a twofold purpose: (1) to achieve certain scenes which would be either impossible or impractical to produce or photograph full scale, and (2) to provide backgrounds or settings which would be too elaborate and/or costly to reproduce in full scale.[55] Miniature scenes are very often a necessity in order to create the illusion of reality, since there is no other way to shoot the action. For example, deliberately crashing a full scale ship, plane, train, or automobile off a cliff, or making a full scale fire, flood, explosion, or tornado to perform in the studio at the appropriate time and for the television cameras is slightly impractical.

Miniatures obviously cannot be created within a few hours or as easily as standard scenic units and properties. The cost of producing a carefully scaled three-dimensional miniature setting or diorama is often prohibitive, especially if it is shown on the screen for only a few seconds. The results achieved by the use of a miniature must warrant the expense. For example, the cost of a miniature in some cases would be much less than the cost of a motion picture crew out on location trying to film the particular sequence live.[56]

---

55 Rowan, op. cit.

56 Bettinger, op. cit., p. 56-7.



The use of miniatures to establish the scene or locale at the beginning of a scene is common practice. The television camera looking at the miniature may give a bird's-eye view of a city, harbor, etc., or show the outside of a particular house. The camera may dolly-in on the front door of the miniature house, for example, then a cut or dissolve is made to the full scale door on the set and the action of the scene begins.

Miniatures may also be employed as camera mats with the actors appearing behind the cut-out portions of the miniature and in front of the full scale background. Perspective problems are evident since the live actors must be compatible with the scale of the background and with the scale of the miniature. This problem is a knotty one and best solved by constructing the miniature first, setting it up in front of the unpainted scenery and viewing the whole through an optical view-finder using the predetermined camera lens and from the approximate camera position. After establishing the relative position of the camera, the miniature and the actors, the full scale background may be first sketched and then painted in, within the area viewed through the optical view-finder.[57] The distances and positions of the various elements should be carefully noted so that they can be duplicated when shooting the scene on-the-air.

The use of miniatures and dioramas offers unlimited scope for the production of scenes whose nature and size forbid actual reproduction

---

57 Wade, op. cit., p. 118-9.

the

in the studio. However, the results achieved must warrant the total cost spent in budget and time to achieve the effect.

XI. SLIDES AND BALOPTICANS

Definition. Slides are an indispensible part of everyday operation at any television station. Slides provide graphic material in a condensed form which is easy to handle and inexpensive to produce. Station identification, program identification and information, commercial sales messages, pictures of prominent people in the news, and original art work are just a few of the services provided by slides and baloptiocons.

a) Slides. The 2" by 2" slide is the most commonly used type and is processed from 35mm film. All art work or information that is to be used on the slides must, of course, conform to the 3 by 4 aspect ratio of the television system. The 2" by 2" slide has an aperture of 23mm by 33mm and a copy area of 22mm by 29mm or approximately 3/4" by 1 1/8".[58] Specially built 2" by 2" slide projectors are used to project the image onto the mosiac of the iconoscope pick-up tube which is used in the film-chain camera.

b) Balops. The "balop" derives its name from the type of projector used to transfer the information from the 4" by 5" opaque slide to the film-chain camera. It is called a baloptican projector. The transmission field of the opaque 4" by 5" card is approximately 3" by 4" with a copy area of 2 1/2" by 3 1/2".[59] The baloptican is a reflector type projector

---

58 Wade, Operation Backstage, op. cit., p. 56.

59 Wade, Designing for TV, op. cit., p. 152.

which transfers the graphic material from the 4" by 5" card placed beneath the mirror system which is set at the proper angle to reflect the image through the lens and focus it upon the mosiac of the iconoscope pick-up tube used in the film-chain camera.[60]

Usage. Slides are indispensible in television station operation. The use of slides is more practical and less expensive than the use of live title cards in the studio where they must be picked up by a live studio camera. The cost of operating the film-chain is considerably less than the cost of operating a live studio camera. The iconoscope pick-up tube is less sensitive than the image orthicon tube used in the studio camera as it is not subject to burning-in problems which develop with the image orthicon when exposed to the same image for an extended period of time.

Many stations reduce program titles and commercials from title cards to 35mm film which is processed into transparencies and then bound up into the 2" by 2" slide. The slides are projected by a 2" by 2" projector into the film-chain camera and the picture is switched to the program line via the regular video switching panel. The images from two projectors may be received into one film-chain and by controlling the light source of each 2" by 2" projector, a cut or dissolve may be effected between the two slides. If two film-chain cameras are available, a slide projector may be used on both cameras, and the switching between slides will then be achieved on the regular video switching panel.

---

60 Spesa, op. cit., p. 74.

Another type of 2" by 2" projector employs a circular drum with slides mounted in sequence around the circumference. The director, by operating a control button on the video switching panel, can rotate the drum showing each slide in the proper sequence. This projector presents some problems especially if the slides are loaded out of sequence or the projectionist forgets to re-orient the slides from the opening to the closing sequence.

A recent development consists of a dual 2" by 2" projector designed to operate into a single film-chain camera. Cuts and dissolves are possible from its self-contained controls or it may be remotely controlled from the video switching panel.

Care should be observed by the projectionist, making sure that each slide is clean, that is, free from dust, dirt, and finger prints. Each slide should be inspected before it is placed in the projector for use on-the-air. Dirty, or crooked slides indicate an operation which hasn't learned the merits of showmanship.

Simple animation may be achieved on the baloptican by using a strip 4" high and as long as necessary with the necessary information mounted upon it. The strip is fed through the balopticon from one side to the other thus providing graphic material which follows in sequence.

The trend seems to indicate that most stations will use the 2" by 2" slide because the projector is less bulky and the slide itself is inexpensive to produce, to handle, and to file.

XII. FILMSTRIPS

Definition. Graphic material, titles, pictures, or art work can be photographed on the individual frames of 35mm film.[61] When developed and processed, this strip of film, which may contain any number of pictures or frames, is threaded into a projector specially designed for use in television production. The image will be projected into a film-chain camera. At the appropriate moment, a new picture or frame may be brought down into the aperture of the projector in 1/200th of a second.[62] Control is either direct, or it may be remotely controlled from the video switching panel.

Usage. Some television stations use these 35mm film strips in lieu of, or in conjunction with standard 2" by 2" slides. The film strip is particularly suited for use as a standard open of a show where the pictures are the same week after week or program after program. Another advantage is that all of the graphic material or pictures to be used on a specific program may be combined on one film strip.

There are limitations in the use of film strips, however. For example, it may be necessary to use a picture that occurs in the middle of the filmstrip. This necessitates either running off the unwanted picture or cutting out the particular frame wanted and binding it up into a slide which may be prohibited by station or agency policy. Perhaps the program content has been changed and some of the pictures on the filmstrip

---

61 Graphic production is contained in Chapter V.

62 Wade, op. cit., p. 152.

have been eliminated from the script; however, they still remain on the filmstrip, where they must be skipped during the air performance. The time consumed in getting the correct picture up on the monitor is all important since the director may need the next picture before the ones in between can be skipped. The filmstrip is also subject to dirt, fingerprints, and scratches which is not usually the case when the individual pictures are bound up into slides.

Slides are more flexible since they may be arranged in any order even if pictures have been eliminated or the sequence of the program content or title slides have been changed.

XIII. FILM, FILM CLIPS AND LOOPS

The use of film both 35mm and 16mm in television programming and production is extensive. Feature films on both 35mm and 16mm are used by many stations. The 16mm kinescope recordings of networks and syndicated programs and the specially produced 16mm films are familiar to most stations since these films provide a significant part of their television service. Stations may use the kinescope recording when they are not directly connected to the network via coaxial cable or micro-wave relay and/or when they are a member of more than one television network, or when they are an independent station. Film commercials produced by advertising agencies for national and/or local sponsors are used throughout the television industry.

It is not the purpose of this study to discuss the technical aspects of film production for television but only to point out that the use of

film is universal. It is not only used as program content and for commercials but also as an adjunct to television production.

A. FILM CLIPS

Definition. In the production of all types of television programs certain scenes or visual material cannot economically, physically, or effectively be produced as live studio action. Exterior sequences, showing farming methods or the out-of-door, full-scale background treatment required for a dramatic show are frequently shot locally on either 35mm or 16mm motion picture film, or rented from stock film libraries. This film is later interpolated into the live action produced within the studio.[63] This type of production aid is usually referred to as a film clip. Any number of scenes may be joined together with appropriate space between and then inserted at the desired time into the spaces provided in the script and between studio action sequences.

Usage. Film clips may be used to bridge the space between various scenes of a dramatic program, thus allowing time for actors to make a costume change or for the stage hands to change the scenery. The viewer is not aware of this stoppage of live studio action because he sees the actors strolling down Fifth Avenue or in some other appropriate action. The film clip may be used in all types of informational programs. Of course, it is better suited to some than it is to others. For example, in an agricultural program the film clip may show the viewer a

---

63 Wade, op. cit., p. 126.

wheat-combine working in the field, which would certainly be impossible in the studio. The film clip may be used to demonstrate various techniques in athletics with the film clips edited from the film of the actual play by play.

Use of the film clip adds variety and interest to the program as well as providing material which cannot be duplicated in live studio production.

B. FILM LOOPS

Definition. Film loops are a continuous film clip. The film loop may be of any length, if it can be handled adequately by the projector, but usually it is about three feet in length. It is formed by splicing the two ends of the desired piece of film together, thus forming a continuous loop. After the loop is threaded into the projector and the projector started the film will run continuously waiting to be switched into the program at the desired time.[64]

Usage. The film loop usually consists of a background which will be used behind other program elements ordinarily in a superimposure. The film loop is particularly useful in producing backgrounds for titles since the film may be switched into the program line at any point in the loop since an appropriate background is always available.

The limitation of the film loop seems to be in its length. The shorter the loop the more repetition of background and if the background

---

64 Judy Dupuy, Television Show Business, (Schenectady, New York: General Electric; Maque Company, 1945) p. 26.

tends to be dominate, the repetition will be quickly noticed by the viewer. A repetitious background will draw attention to itself, thus distracting the viewer from the important visual element. Therefore, the film loop should be made as long as practicable, the background should be subdued, or the loop used for only a few seconds.

CHAPTER IV

CHAPTER IV

MECHANICAL-PHYSICAL EFFECTS

Mechanical-Physical Effects are created in the studio by manually operated contrivances designed to control, utilize, or simulate natural and man-made phenomena. Simple mechanical devices like a mouse trap, or piece of wood spinning in front of a spotlight may be used to break a china vase at the appropriate moment or to create telephone-pole shadows whisking past train windows. The creation of natural phenomenon such as, rain, dust, fog, stars, or cobwebs virtually requires the work of a specialist. These effects may be used in conjunction with the picture from another studio camera or they may be used for their own inherent effect. A transition between scenes or sequences may also be provided by these effects. Since the use of snow, or smoke is often necessary, particularly in a dramatic scene, mechanical-physical effects are an essential adjunct to the adequate staging and production of television programs. In this chapter, the author, will discuss the creation and use of selected mechanical-physical effects.

I. SUBJECTIVE-CAMERA

Definition. "Subjective-Camera" occurs when the camera ceases to be an inanimate object, that is, a technical piece of electronic gear and becomes an animate object. The camera becomes a person, for example, and the scene is revealed to the viewer through the eyes of this person.

In other words, the camera becomes a character in a commercial or a dramatic scene.

Usage. The subjective-camera effect is a particularly interesting visual effect, although its use is somewhat limited. One limitation is the amount of time required in perfecting such an effect. The viewer is another limiting factor since the effect must be accepted and understood by him if it is to be effective. Therefore the viewer must be orientated either before or during the use of the effect.

Here are two examples of how the subjective-camera was used in actual production. In a baseball sequence the camera became the pitcher. The viewer saw the pitched ball on its way to the catcher and could follow its zig-zag, or cork-screw course. The viewer could also witness the perplexed look on the batter's face and the contented expression of the catcher.[1] A commercial message provides the second illustration in which the camera became the salesman for the sponsor's Harvester cigars. The viewer heard the camera's voice, saw the camera's hand hold the cigar, strike the match, light the cigar, and then saw the exhaled puff of smoke. Actually it took three men to accomplish this effect; the cameraman, a second man to be the voice and hands, and still another man to help hold the cigar and to do the puffing.[2]

It is evident that this effect has interesting potentialities not only in novelty scenes but also in serious dramatic scenes. However, it

---

1 Arthur R. Railton, "They Fool You Every Night," Popular Mechanics, 96:14-150, October, 1951.

2 "Cigar Smoking Camera Acts in TV Show" Popular Science, 158:106, February, 1951.

is further evident that it takes a great deal of cooperation and co-ordination on the part of the performers. A great deal of imagination, much careful planning, and painstaking rehearsals by the director are needed to achieve an effective use of the subjective-camera.

II. LENS BLOCKING

Definition. Lens blocking consists of decreasing the amount of light energy which enters the lens. This is accomplished physically by placing an object in front of the lens thus blocking the admittance of light energy.

Usage. Lens blocking is useful as a physical transition device between scenes. For example, an actor may finish delivering his line and walk directly toward the camera, blocking the lens with his body. He is moving so quickly toward the lens that his costume will go out of focus and thus an indistinguishable blur will fill the screen. Lens blocking may be achieved by having the camera pan with the actors as they leave the set at the end of a scene only to have a pillar, hanging, some other object, or piece of scenery block the exit. Generally the pillar, or hanging is a part of the basic set and the movement and business of the actors has been carefully planned and rehearsed so that at just the correct moment the camera will move past a solid object, thus blocking out the view of the actors and terminating the scene.[3]

---

3 Edward Stasheff, and Rudy Bretz, The Television Program, (New York: A. A. Wyn, Inc., 1951) p. 198-9.

Lens blocking may be an interesting way to begin and close a program. The personality would stand directly in front of the camera blocking the lens with his back and would move on cue to his position on the set thus opening the program. To close the program, he would move toward the camera, blocking the lens with his chest and shoulder.

In musical and variety programs, dance sequences lend themselves particularly to the technique of lens blocking. The camera may be out of focus on the principle dancer located in the middle of the dance group and as the camera dollies back, the dancer and his group will come into focus and the dance sequence will begin. Or the principle dancer may employ the lens blocking technique and by moving rapidly away from the camera, he will reveal not only himself but the group of dancers. The sequence may be closed by having the dancers join hands and move toward the camera in a double file. At the camera the dancers will split, one going to the right of the camera, the other to the left leaving the principle dancer who would come directly toward the camera blocking out the lens.

A. DIAPHRAGM

Definition. A ring, or plate pierced with a circular and central aperture readily adjustable for size is an iris diaphragm. By operating a lever on the side of the diaphragm, the central aperture may be increased or decreased in size, thus allowing more or less light energy to reach the lens of the television camera.

Usage. The iris diaphragm is useful as a lens blocking device. Mounted on an H-shaped frame in front of the camera and between the scene to be televised, the diaphragm can be operated by an effects technician to open or close the scene. (See Figure 17.) Depending upon the effect desired, the camera may either focus upon the diaphragm itself, or beyond the diaphragm upon the subsequent scene to be televised. If the camera focus is upon the diaphragm, the diaphragm will be visible when the aperture is completely closed. The diaphragm will serve as a circular frame for the action of the scene when the aperture in the diaphragm is opened. However, if the camera is focused upon the scene to be televised, the diaphragm should be fairly close to the camera. The diaphragm, then, serves only as a blocking device, when the aperture is closed. Nor does the diaphragm frame or in any way interfere with the image being picked up by the camera when the aperture is opened.

B. LENS TUBE

Definition. A partically closed tube which is slipped over the camera lens to block out the passage of light. The tube is constructed from black cardboard. The circular portion which closes the end of the tube may be partially cut out, that is, a quarter, an eighth, or a half of the circular section may be removed.

Usage. This device is useful when "special effects amplifiers" are not available. By use of the lens blocking tube, portions of the image may be physically blocked from entering the camera lens. For example, when two pictures are combined in a superimposure only the desirable

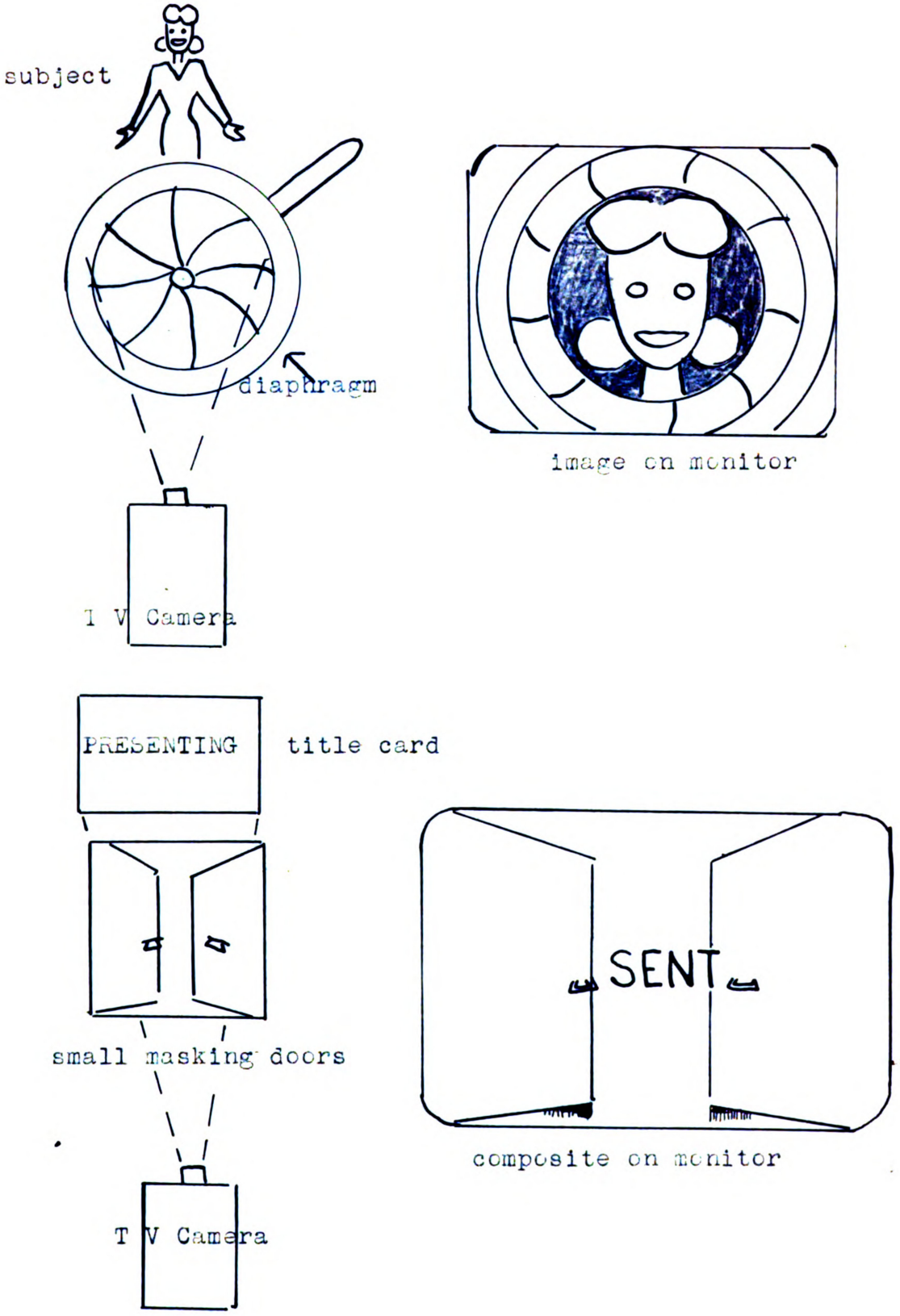


FIGURE NO. 17 - LENS BLOCKING

portions of the image may be visible. Three-quarters of the lens on one camera is blocked. The image, a girl's face, occupies the remaining quarter of the frame. The superimposure is executed and the girl's face will appear in the appropriate corner of the combined picture.

Conclusions. This type of lens blocking is rather crude and often very unreliable. However, it is more practical on recent cameras, where a lens blocking or filter holder is built-in directly behind the camera lens but in front of the image orthicon pick-up tube.

Lens blocking devices need not be elaborate. Simplicity and visual interest seem to be compatible. For example, a cap or stole held in front of the camera lens by a model when removed and placed around her shoulders will afford an interesting open to a fashion sequence.

Other types of lens blocking devices may be constructed. Small miniature doors, built in the aspect ratio, which open either toward or away from the camera to reveal a scene or title card beyond are effective lens blocking devices.

III. LIGHTS AND FILTERS

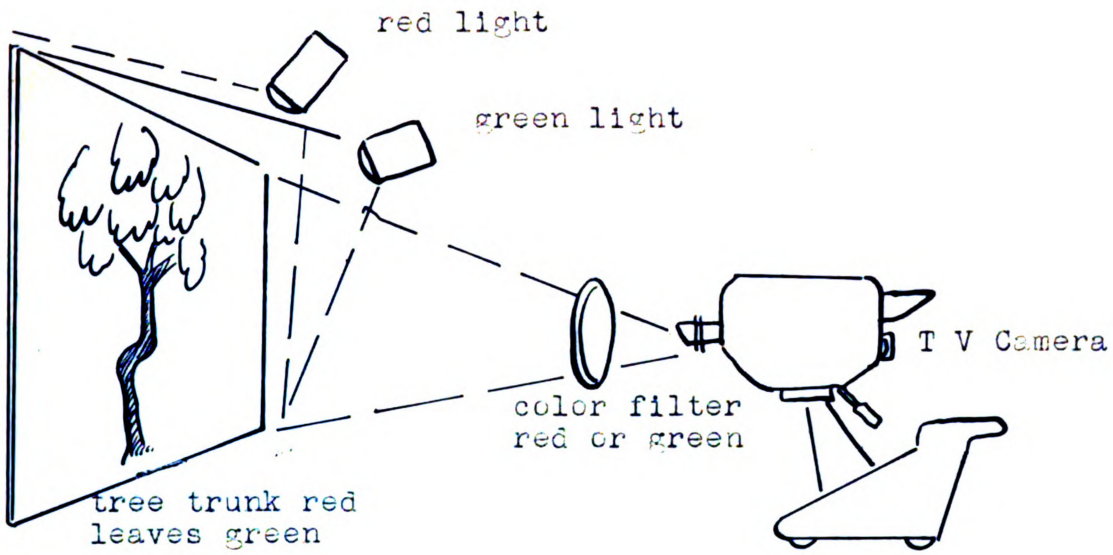
Definition. Multiple settings, costume, and make-up changes may be achieved by the use of appropriate filters over the camera lens in conjunction with settings which have been executed in corresponding color combinations. The settings may also be lit by corresponding colored light sources.

Usage. The use of this effect has numerous applications, since it may be used to produce trick effects with scenery, costumes, or make-up,

as well as, practical scenic, costume, and make-up changes. Although the use of various combinations of colored pigments, light and filters will be discussed in the following paragraphs of this section, it must be pointed out that the camera pick-up tube responds to, and reproduces these colors in shades of grey. Even though colors are used to effect a scenic change, the two scenes will be reproduced on-the-screen in various shades of grey.

A very practical application of this effect would be the transformation of a winter scene containing a barren tree and landscape into a lush, green spring scene. To achieve this transformation, the tree trunk and branches are executed in shades of red while the leaves, foliage and other necessary bits of the landscape are rendered in shades of green. When a red light source is used in combination with a red filter over the camera lens, only the tree trunk, branches, and other items of the landscape which have been rendered in shades of red will be visible. However, if green light is used in conjunction with a green filter over the camera lens, only the green elements of the scene will be visible. If both the green and red light are used and the red and green filters are removed from the camera lens, the lush spring scene will be visible, the tree being complete with trunk, branches, and leaves. (See Figure 18.)

The use of colored lights in the television studio, however, has practical limitations. Producing colored light in the television studio in sufficient quantities and with flexible control requires expensive lighting equipment, more standard lighting instruments, and more technicians to operate the equipment. A more practical solution is to light



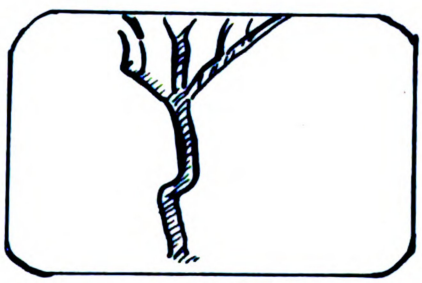


image on monitor when
red light & filter is used

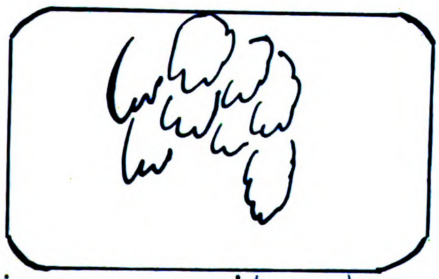


image on monitor when
green light & filter is used

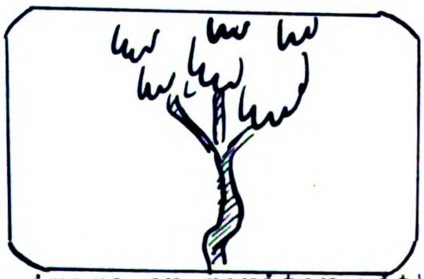
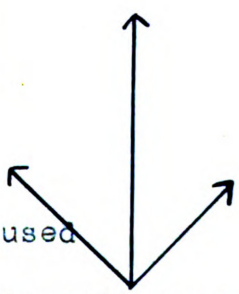


image on monitor with-
out light and filters.



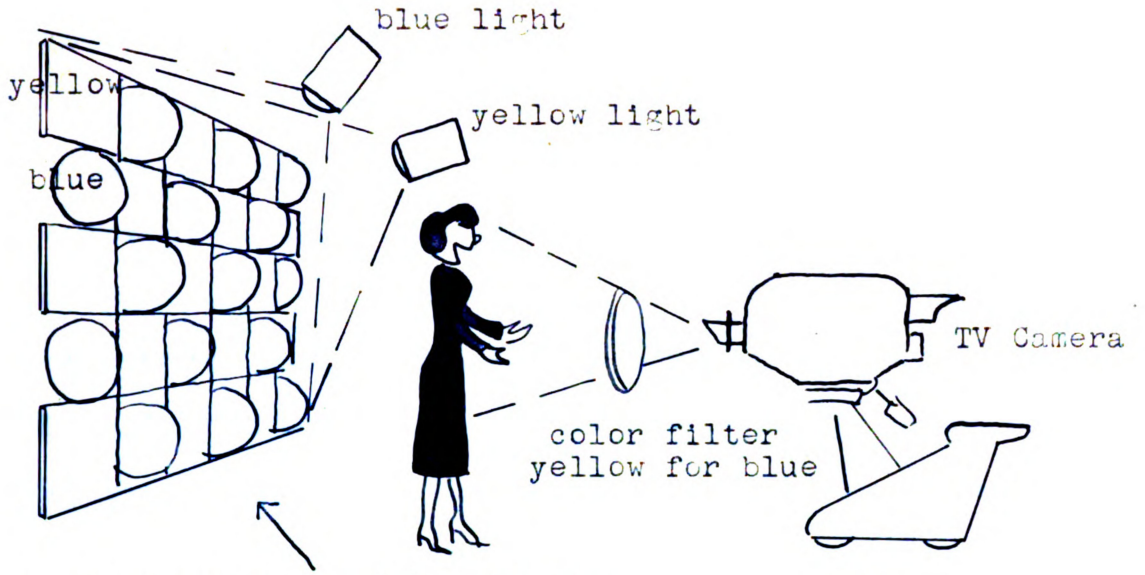
alternative scenery

FIGURE NO. 18 - LIGHTS AND FILTERS

the setting in the standard manner with incandescent and fluorescent lighting instruments and to use color filters over the camera lens. The filters will allow only a certain color or combination of colors to pass through it into the camera. A red filter, for example, will transmit only the red light rays into the camera. Using the filters is much easier than producing large quantities of colored light and the effects achieved by use of the filters over the camera lens are more reliable.

Standardized filters are available from the Eastman Kodak Company. Although, interesting filters may be made from theatrical lighting gelatine purchased from the Brigham Gelatine Company, Small pieces of the gelatine may be mounted between two pieces of glass and placed in front of the camera lens. By careful testing, a scale of color responses for each particular color of gelatine can be established.

Standard filters or gelatine filters may be used over the camera lens to create scenic, costume, or make-up effects. For example, a novelty background may be designed consisting of alternate squares and circles which are painted with a primary color and its compliment. The background is lit normally but a filter is used over the camera lens. One of the appropriate filters will produce a background consisting of light and dark squares. (See Figure 19.) The other filter will produce circles upon a neutral background. If no filters are used, the background will consist of a pattern of alternate circles and squares. Therefore, three different backgrounds are possible from the basic background and are produced by the use of an appropriate color filter placed



(background seen depends on light and filter used)

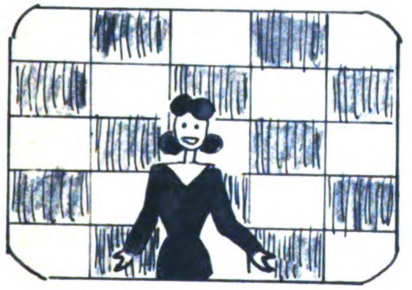


image on monitor when
yellow filter is used

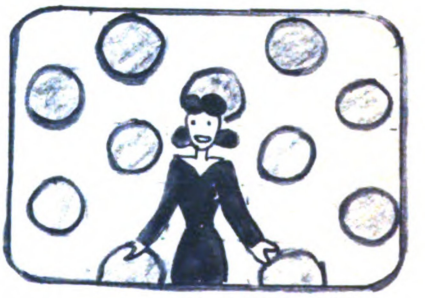


image on monitor when
blue filter is used

FIGURE NO. 19 - LIGHTS AND FILTERS

over the camera lens.[4]

A make-up change can be created in this fashion. An actor's face is made up with the normal or standard base, but the aging lines and shadows are applied in shades of red make-up. The cameras are all equipped with red filters which, will blend the liner and shadow into the actor's face. As such, he will appear in the full bloom of youth. During a brief transition, the filters are removed from the camera lens and when the next scene unfolds, the actor will appear to have aged. Since red, especially dark red, comes out black when the image is reproduced in shades of grey, the actor will have dark lines and shadows.

Conclusion. The use of colored filters mounted in front of the camera lens and the effects which can be achieved by their use is still in the experimental and developmental stage. Some of the networks have been using the filters to achieve make-up changes. It seems that further careful experimentation will standardize the variables in the use of filters mounted before the camera lens and make their use an exceedingly practical device in television production.

A. BLACK LIGHT

Definition. "Black Light" is the term applied to ultra-violet light which exists below the visible color spectrum of light. Fluorescent materials or paint have been designed which are sensitive to ultra-violet light, hence all visible light may be absent, but the fluorescent

---

4 "Guide to Television Special Effects," Tele-Tech, Caldwell-Clements, Inc., Part II, April, 1952.

materials will be visible when ultra-violet or "black light" is shown upon it.

Usage. The "black light" effect has many applications both in the theatrical and in the display world. "Black light" may also be applied to television. A drop or background may be painted in both ordinary and fluorescent paint. Under normal lighting the design painted with the ordinary paint will be visible. When the visible lights are extinguished and the "black light" projectors are turned on, the design painted with fluorescent paint will be visible. Thus two designs are possible on a single background. Costume changes may also be effected in a similar manner.[5]

The use of this effect in television will probably be confined to a few special and trick effects as has been the case in the theatrical world.

B. NON-BLACK AREA IMAGES

Definition. If an actor is dressed all in black, except for the area or areas which are to be televised, and performs in front of a dull black background, only the non-black areas will be picked up by the television camera.[6] The non-black area image may then be the head and hands of a person, for example. (See Figure 20.) Other objects may also be treated in a similar fashion. It should be pointed out that proper

---

5 Ibid.

6 Ibid.

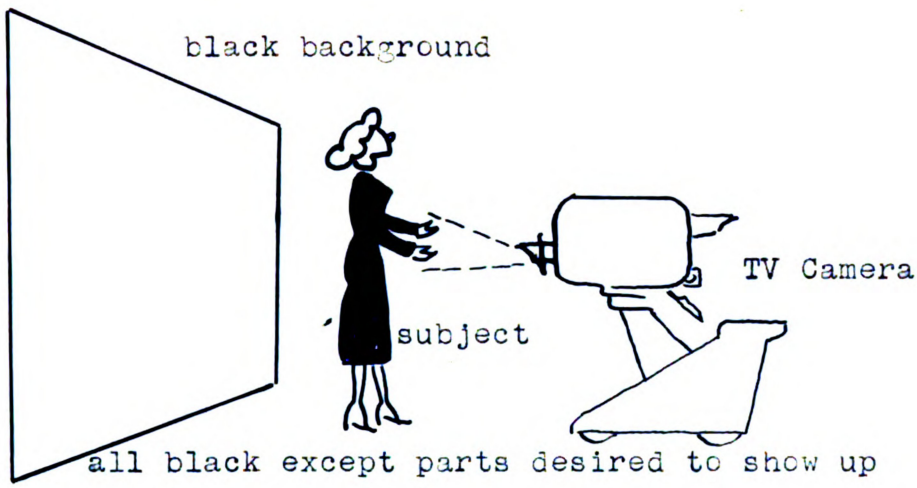


image on monitor

FIGURE NO. 20 - NON-BLACK IMAGE

shading of the picture by the video engineers will increase the effectiveness of the non-black area image.

Usage. Non-black area images may be used for ghost effect, invisible men, and other similar trick effects. They may be used in a superimposure combining the ghost, for example, with the shot from another camera.

IV. MECHANICAL DEVICES

Specially constructed mechanical devices are used to achieve various effects. They may be used to effect transitions between scenes or to furnish additional information to the viewer. In this section several of these mechanical "gimmicks" will be described. Although the data is limited it should suggest further possibilities and perhaps the reader will construct other mechanical devices especially suited to his needs.

A. TWIRLER

Definition. The "twirler" is a circular piece of plywood about 18" in diameter that is attached to a variable speed motor or geared hand crank and rotated with its flat circular surface facing toward the camera.[7] A simpler model can be built by attaching a length of broom handle to the back in the center of the circular piece of plywood, so that the device may be rotated by hand.[8] A spiral pattern may be painted or drawn on

---

7 Robert J. Wade, Designing for TV, (New York: Pellegrini and Cudahy, 1952) p. 150.

8 Lynn Poole, Science via Television, (Baltimore: The John Hopkins Press, 1950) p. 54.

the circular surface of the "twirler." Or the circular surface may be left plain, so that, titles, photographs, or other objects may be attached to the surface with tacks, masking tape, staples, or other suitable means. (See Figure 21.)

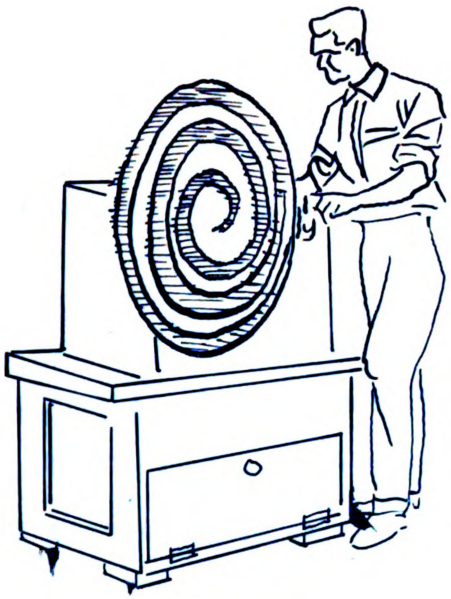
Usage. The "twirler" is used to whirl objects into a close-up as though they were coming toward the camera from a distance. The device may be moved toward the camera, or the camera may dolly toward the twirler. The camera dolly provides the smoother and more effective way of achieving the effect. The "twirler" is rotated and as the camera dollies in on the spinning object, the "twirler" is gradually slowed down so that, by the time the camera dolly is complete, the "twirler" is also stopped with the picture or object framed in a close-up, preferably right side up.[9] It is extremely important that the picture or title appear right side up on the screen since the impact of the effect will be lost immediately if the title is up-side down.

When the spiral pattern attachment is used on the "twirler" the speed may remain constant or it may be varied, depending upon the effect desired. The camera is usually stationary. The camera is focused upon the spiral pattern as the disc begins to rotate, and as the rotation becomes faster the camera may be de-focused to produce a blurred, dizzy effect.[10] Pictures from other camera sources can be superimposed over the spinning spiral to produce interesting transition effects. Although the spiral pattern may be used by itself.

---

9 Loc. cit.

10 Wade, op. cit.



man operating twirler

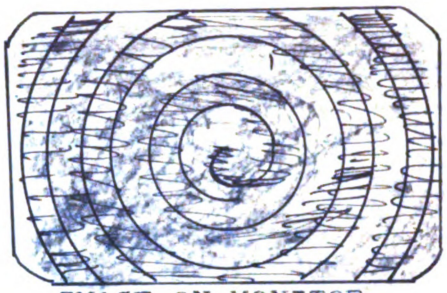
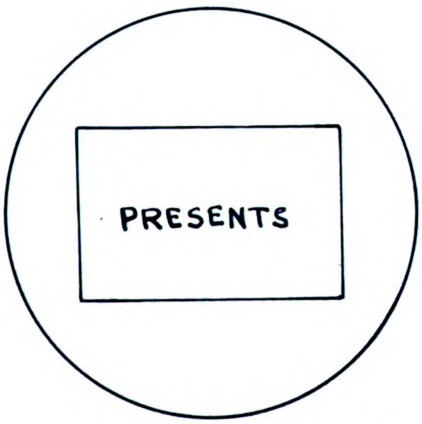
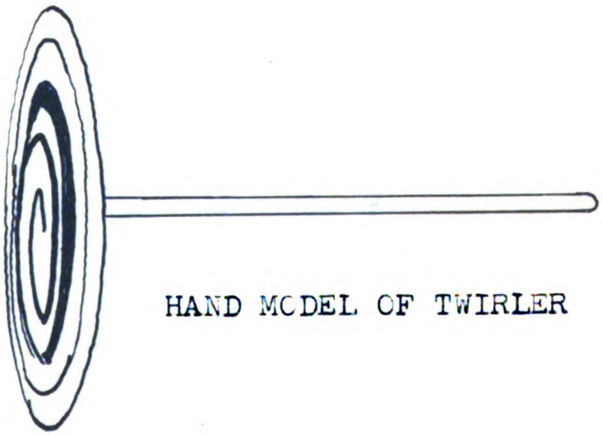


IMAGE ON MONITOR
GIVES BLURRED EFFECT



title card mounted
on plain twirler



HAND MODEL OF TWIRLER

FIGURE NO. 21 - TWIRLER

The "twirler" is designed to attract attention and to hold the visual interest of the viewer. However, care should be exercised in the use of the "twirler" in its several forms, since its impact is so strong that over-use will quickly dissipate its advantages.

B. GLOCCAMORRA

Definition. The "gloccamorra" is a device that is used to create the effect of a moving train by casting light and dark shadows across the faces of the passengers as the stationary train in the studio rears across the countryside. The "gloccamorra" is a plywood wheel with four S-shaped, curved openings, spaced around the radius of the wheel. The device is mounted on the front of a studio spotlight which is aimed at the railroad-coach set. The "gloccamorra" may be rotated by hand or by a small motor. The speed of the train is largely determined by the rotation speed of the "gloccamorra" since the faster the train, the faster the "gloccamorra" will spin. The effect of a telephone pole or tree shadow whisking by the train window is achieved each time one of the S-shaped openings passes the spotlight lens and the light snakes across the set.[11]

Usage. The "gloccamorra" effect can be used to create the perfect imitation of a train rearing along the rails. (See Figure 22.) Of course, appropriate sound effects must be added by the audio technicians.

The use of the "Gloccamorra" can be combined with rear-screen projection to make the effect of the train still more realistic. The viewer

---

11 Richard F. Dempewolff, "Mystery Men of the Television Screen," Popular Mechanics, 93:80-6, 258, May, 1950.

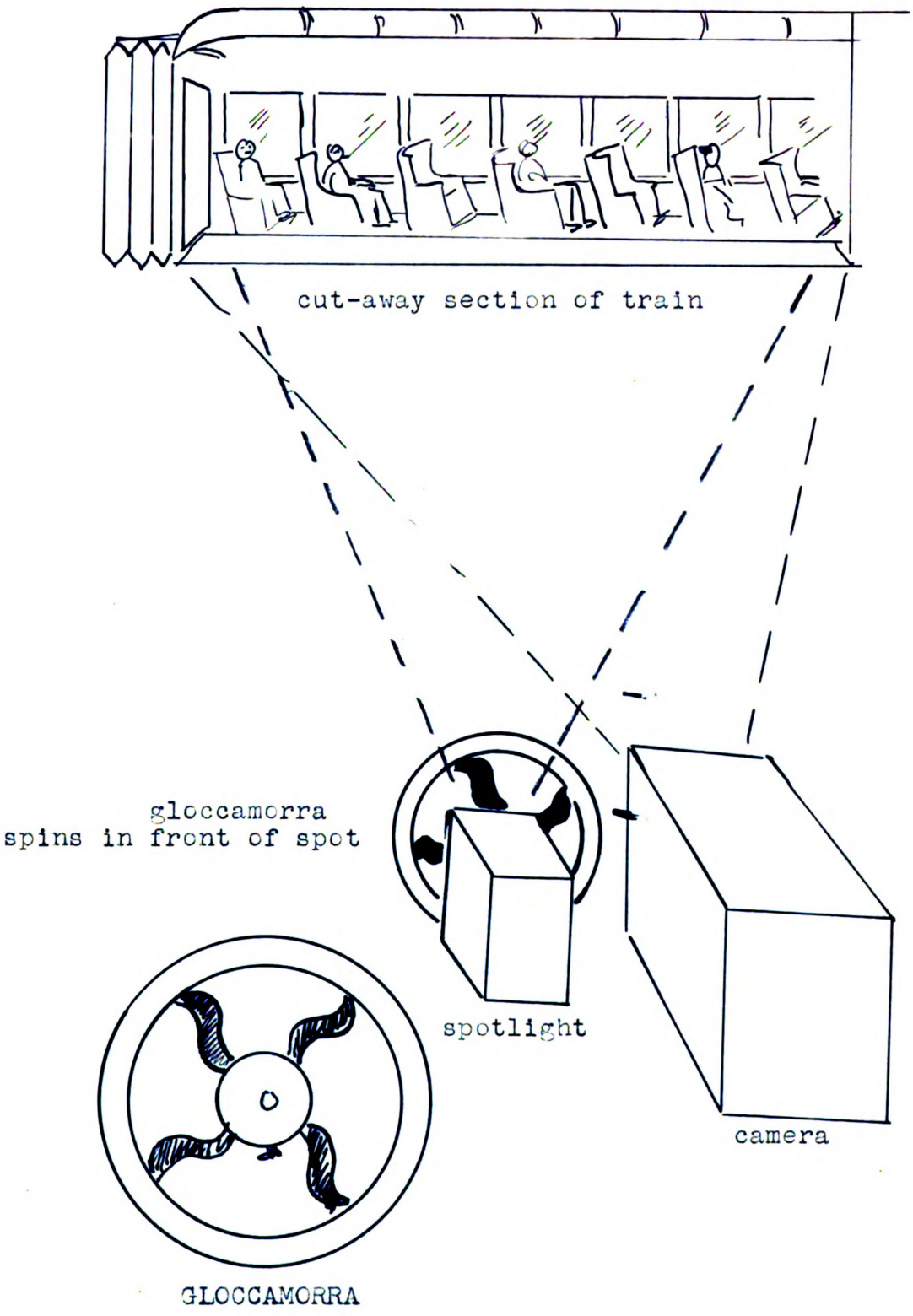


FIGURE NO. 22 - GLOCCAMORRA

would see the passengers on the train, the scenery whisking by the windows, as well as the light and dark shadows cast upon the passengers' faces by the "gloccamorra."

The "gloccamorra" effect may also be used in an automobile-interior sequence, but it must usually be supplemented with rear-screen projection. When used with the automobile-interior sequence, the rotation or speed of the "gloccamorra" would be very irregular and not nearly as fast as the speed required for the train sequence.

V. NATURAL PHENOMENA

Introduction. Every day occurrences, such as, rain, snow, ice, fog, dust, etc., which are taken for granted in nature but which present problems when they become an essential element in a realistic television production, will be discussed in this section. The author will give a description of various ways in which the desired effect may be created or achieved. Examples of usage will be employed in the descriptions given. However, the uses given are by no means the only ones, since each production will dictate its own particular needs and modify the usage.

A. WATER

a) Rivers. Rivers necessitate the use of water in the studio. Shallow wooden troughs are constructed in various sizes and shapes to hold the water. Metal troughs may be used rather than wooden ones; however, the metal troughs are often more expensive to construct and their shapes and sizes cannot be as easily re-made or adapted for various uses.

The wooden troughs must be lined with water-proof canvas which can be painted to resemble the bottom of a creek or other similar river bed. Each downstream trough must be constructed to retain a water level of an inch or so lower than the preceding trough. Thus, a realistic flow of water can be created as the water flows from one trough to the next. Of course, it will be necessary to install a pump to transfer the water from the bottom to the top of the studio river. Rocks, branches, grass, etc., must be added to conceal the troughs and to complete the realistic setting.[12]

If a scene, such as a warf or pier is to be viewed from the river, a large trough can be constructed to cover the entire floor of the set. Caution should be exercised, since making the trough too large will make it difficult to handle, especially if it has to be moved with water in it. Again, only an inch or two, at the most, of water is required to create the desired effect. Such items as oil, soap, sticks, cigarette butts, sweeping compound, and a little paint may be added to the water to create river front scum. A small fan blowing on the water can create the necessary surface movement and ripple. The use of too large a fan should be avoided.

b) Waves. Ocean waves often present a problem, although they may be needed for only a few seconds. The trick is to not only get the correct movement, but to create the proper appearance. Laundry blueing will help to impart the desired color, soap chips or washing detergent whipped into

---

12 Railton, op. cit.

the water will help form the necessary bubbles. Powdered chalk will give the waves that foamy look when they break. A deeper trough will be needed for the creation of the waves. The construction of the trough varies depending upon the requirements of the script. For example, it may be built to hold sand at one end so that the waves can break upon a simulated beach. The bottom of the trough should be constructed in steps with the shallowest step nearest the beach. In the deep end of the trough a board or paddle, approximately the width of the trough, with holes bored in it should be rigged, so that it can be used to move the water toward the beach. As the water is forced against the steps in the bottom of the trough, the waves will break on the surface of the water. Of course, the operator of the paddle, the paddle, and the outlines of the trough should not be included in the camera shot. Hence, a close-up lens should be used in shooting this effect and also so that the waves will be magnified as they break upon the beach. (See Figure 23.)

c) Reflection.[13] Effective reflections from a pool can be obtained by filling a wooden trough with a few inches of clear water and shooting the reflection of the actors as they look down into the water. It should be noted that the reflections will be upside down. The actors are televised by pointing the camera at their reflection in the water. The water has to be perfectly smooth for the reflections to be effective. Ripples can be created by wiggling the fingers in the water outside of camera range, and the ripples may continue to grow in size until the image

---

13 Consult Chapter II Section X, Part A and Section VIII for methods of creating electronic water reflections.

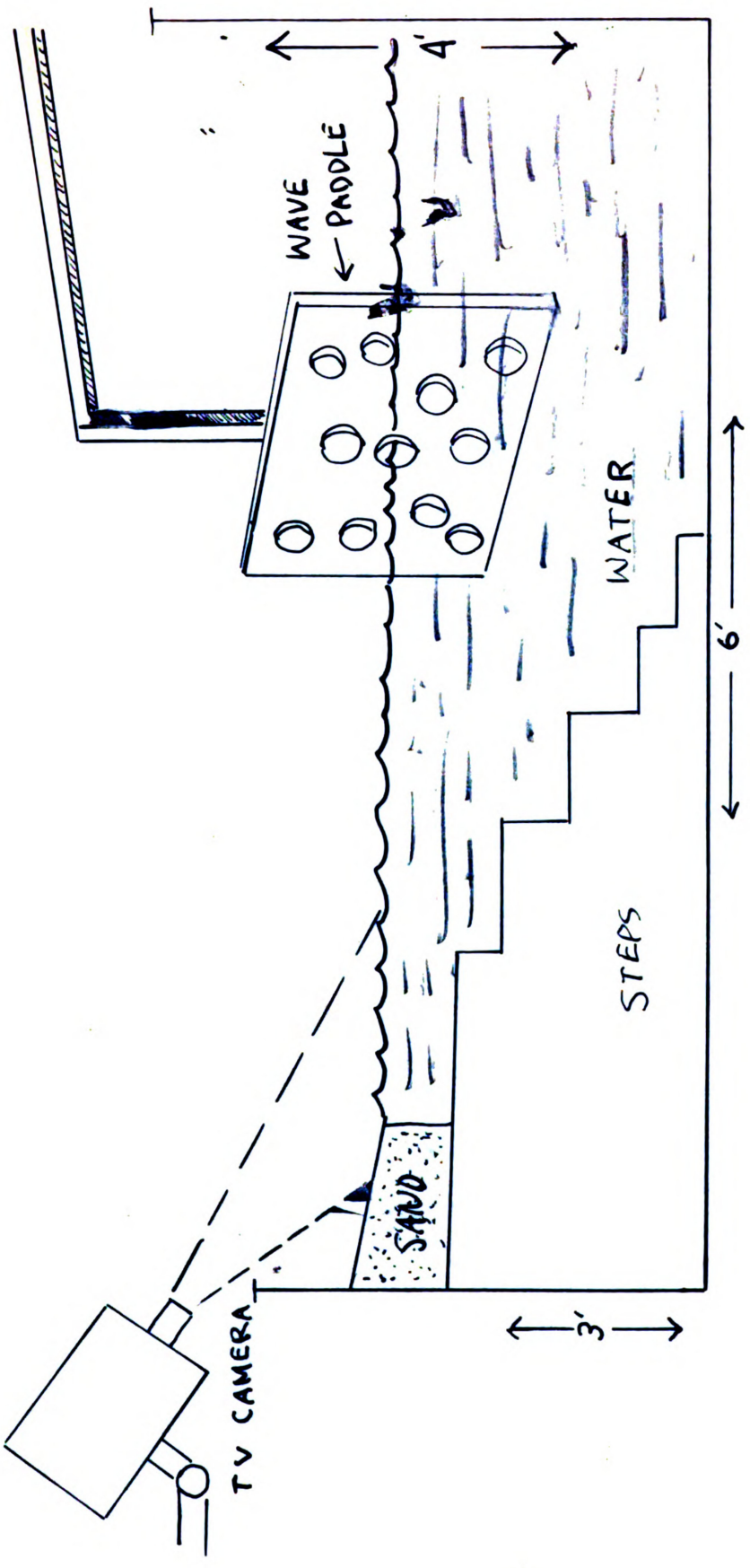


FIGURE NO. 23 - WAVE BOX

becomes sufficiently distorted to achieve an effective closing of the scene.[14]

A small reflection pool could be used for an effective transition device. Snowflakes, rain, cherry blossoms, leaves, or other objects could fall on the surface of the reflection pool to denote a change of season, of time, or of place.[15]

d) Underwater. Underwater effects are interesting to achieve and are satisfying visually. The scene is set with a background painted to resemble the bottom of the ocean, for example. Here the dancers will perform their elaborate underwater ballet. Before the camera is placed a thin glass tank containing the water, appropriate fish, and underwater flora. The tank should be set so that it completely covers the field of movement through which the camera will be shooting. (See Figure 24.) Sufficient depth of focus must be maintained because not only the dancers, but the fish in the tank must be in focus. The effect produced will be that of the dancers performing their ballet underwater, among the fish and other underwater flora.[16]

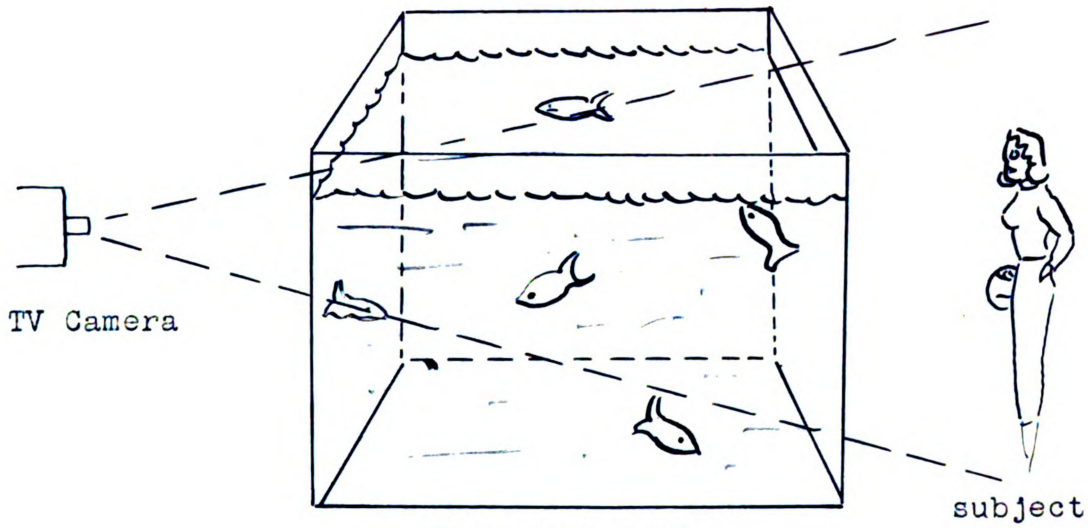
The underwater effect may also be achieved by using two cameras. One camera will shoot the dancers, and the other camera will take the shot of the glass tank or gold fish bowl which is placed in front of a black

---

14 M. Mann, "Television's Five Ring Circus," Popular Science, 157:110-6, October, 1950.

15 Stasheff and Bretz, op. cit., p. 204.

16 John H. Battison, Movies for TV, (New York: The Macmillan Company, 1950) p. 341-2.



composite on monitor

FIGURE NO. 24 - UNDERWATER

background. The two camera shots will be superimposed and the fish and the dancers will appear to be in the same picture.[17]

Another way to achieve the underwater effect would be to take film footage of a swimmer performing underwater. The film would be shown on the film chain camera, and the picture superimposed over a live studio camera's shot of the water and fish contained in the glass tank or in a gold fish bowl. If desirable, the gold fish bowl itself could be visible in the picture thus confining the swimmer to the life of a gold-fish. Perspective must be carefully controlled, since the size of the swimmer and the relative size of the fish are important if the proper effect is to be achieved.[18]

e) Rain.[19] For perfect rain making, a set of pipes are extended over the entire set, behind windows and doors and with a special spray in front of the camera lens to ensure that the camera will really have some rain to photograph. Such is the procedure in movie production.[20] In television production, however, water on the set and in the studio is very undesirable and presents many problems and limitations in production. The procedure is then to simulate rather than trying to produce perfect rain in the television studio.

---

17 Thomas H. Hutchinson, Here is Television, Rev. Ed. (New York: Hasting House, 1950) p. 247-8.

18 Dempewolff, op. cit.

19 The production of electronic rain is discussed in Chapter II, Section X, Part B.

20 Battison, op. cit., p. 347.

Rain can be simulated by picking up the water coming from a sprinkling can and superimposing this picture over a picture being picked up by a second camera of the live action which is taking place on the set.[21]

Rain can also be produced by another simple method. A motor or hand driven drum is covered with black, sparkling emery cloth. When the drum is spinning at the correct speed before a live studio camera, a realistic rain effect will be produced. (See Figure 25.) This rain effect can then be superimposed over a picture taken from another camera.[22]

Creating rain in a miniature setting provides an interesting job for a special effects technician. Shaking pulverized mica through a wire screening will do the trick. As the light plays upon the falling mica, it gives the effect of falling rain. Flitter dust, which is powdered tinsel, may also be used. Of course, if the sound of the rain must be heard, it is supplied from a record by the audio engineer.[23]

Rain falling upon water is easily and effectively achieved by throwing rice into the pool of water. Such a rain sequence is very realistic because the rice will hit the water just like actual rain drops. However, the effect must not be overdone because the audience may easily see through the deception, especially if the effects technician is careless and the rice does not hit the water but is visible to the camera.[24]

---

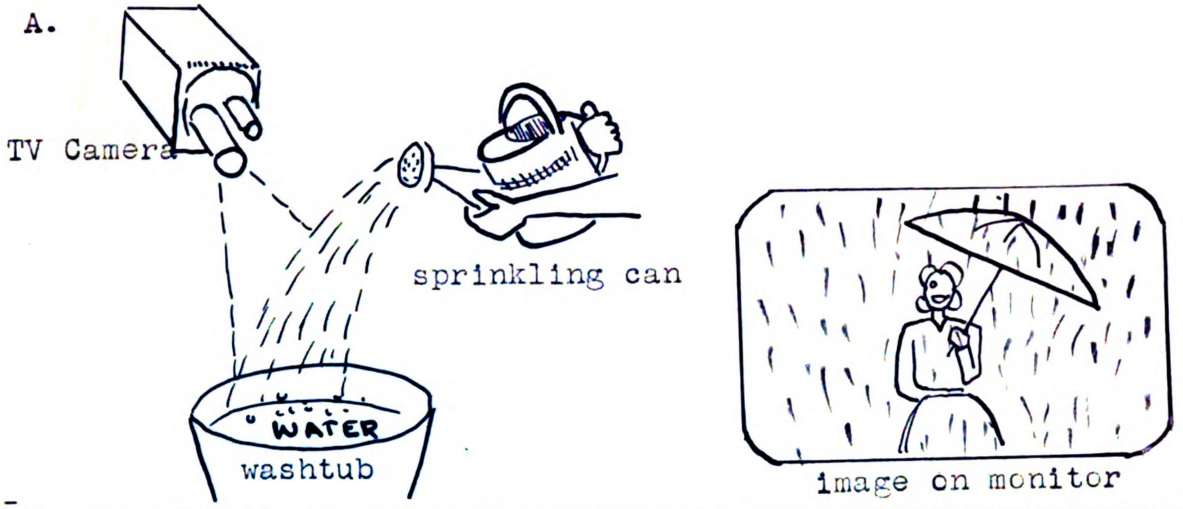
21 Mann, op. cit.

22 "TV's Cost-Cutting Gadgets" Sponsor, Vol. VI, No. 19, September 22, 1952, p. 36-7, 60-6.

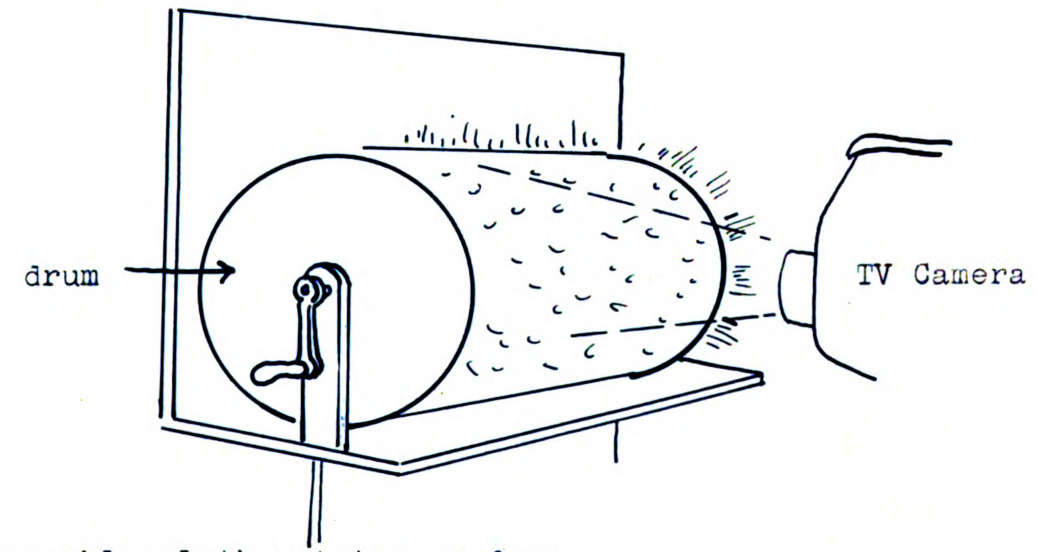
23 William C. Eddy, Television: The Eyes of Tomorrow, (New York: Prentice-Hall, Inc. 1945) p. 223.

24 Sponsor, op. cit.

A.



B.



C.

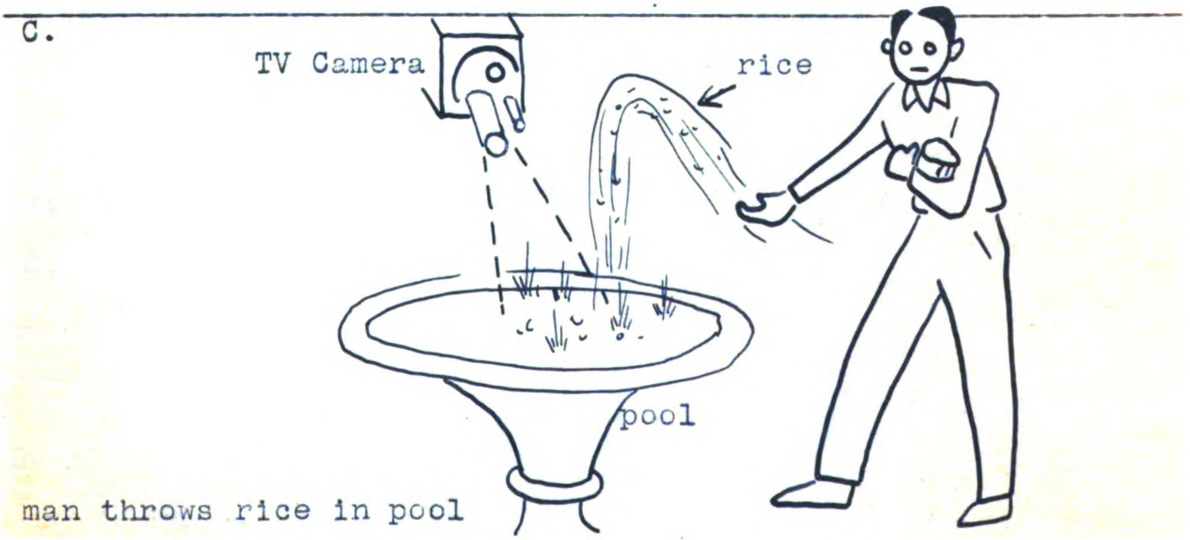


FIGURE NO. 25 - RAIN

f) Wet Effects. Dew on flowers and shrubs can be obtained by spraying them with water in which a few drops of ink has been dissolved. Glycerine sprayed on properties will give a wet appearance. It should be used full strength and allowed to dry. Damp walls may be suggested by spraying thin varnish over the background coat of paint. Or a pint of animal glue to a quart of water sprayed over the background will darken the area as well as produce the shiny surface which is characteristic of a wet surface.[25]

g) Steam. Steam can be produced effectively simply by placing dry-ice in hot water. The amount of steam produced may be controlled by using various amounts of dry-ice. A steam cup of coffee is easily produced in this manner. It should be remembered, however that dry-ice burns, and gloves should be worn when handling it in large quantities.

B. SNOW

In film production, snow is produced by large fans which silently and gently waft large quantities of soggy, and bleached cornflakes onto the set. Cornflakes were found to be better than anything except real snow. The cornflakes are soaked to remove the crispness which would certainly make an unrealistic noise if trodden on.[26] This technique may also be applied to television production. However, the fan must be a silent one.

---

25 Melvin R. White, Beginning Television Production, (Minneapolis: Burgess Publishing Company, 1953) p. 58.

26 Battison, op. cit., p. 348.

Another way to effect a snowfall for an entire set would be to construct a basket-like container from muslin or sheeting by splitting it into ribbons and suspending it double thickness between two battens above the set. Lines can be rigged to the battens so that the battens may be raised or lowered. The basket-like container is filled with white confetti and by shaking or oscillating the battens with the lines, a record snowfall may be achieved. Depending upon the method and speed of oscillation, the effects technician can produce anything from a few flakes to a genuine blizzard.[27]

A similar method may be employed to achieve snowfall on a miniature setting. However, the snow should, of necessity, be of much finer consistency than the confetti used on the full scale set.

Synthetic snowstorms may also be achieved by shooting through a tank of water containing the flaky white chemical employed in children's snowstorm globes. A superimposure would incorporate the snow with the appropriate picture.[28]

When snow on the ground is required, confetti or corn flakes may be used, however, powdered gypsum, marble dust, or dairy salt produces a more realistic effect. The dairy salt can be stacked, shaped, and finally sprayed with water to give the effect of frozen snow.[29]

---

27 Eddy, op. cit., p. 225.

28 Richard Hubbell, Television Programming and Production, (2nd Edition Revised; New York: Rinehart and Company, Inc., 1950) p. 124.

29 White, op. cit., p. 57.

C. FROSTY WINDOWS

Frosty winter windows may be achieved at any time of the year for the benefit of the television viewer by spraying the window panes with a mixture of stale beer and epsom salts. A common fly or bug sprayer is used to make the application.[30]

A commercial snow, which is marketed at Christmas time and which is designed for the specific purpose of putting a snowy, flaky frost on the windows or upon the Christmas tree, is excellent for use in television production.

D. FOG

Fog is difficult to produce and control within the studio. It must not be so thick as to obscure the vision of the camera, nor can it be injurious or harmful to the actors who must work in it. Film productions employ fog produced by spraying Nujol oil through a very fine nozzle. It is about the closest known representation of real fog, since it can be moved around by fans in billowing clouds, and when it settles on the actor's faces, it gives them that shiny, damp look so peculiar to a foggy night. Nujol oil, however, is very expensive and the smaller film companies prefer to use something cheaper. Fog filters are also possible, but the resulting picture does not look realistic since the fog does not move around as it should. A fog filter can be made very inexpensively from a piece of white material which has a finely woven mesh. The filter

---

30 Dempewolff, op. cit., p. 83.

is placed close to the lens so that the camera can actually see through the mesh or weave of the cloth. Enough light must be shown upon the filter to make the scene hazy and indefinite.[31]

Some authorities believe that in television, unless the fog is created optically by a filter in front of the camera lens similar to the filter just described, that the effect will always seem to be somewhat of a experiment.[32]

Fog can be created in the television studio by fanning steam across dry-ice. A special box can be constructed to hold the fan, the pails of hot water or live steam jet, and the trays of dry-ice. The elements should be so arranged that the fan will blow across the top of the pails of hot water, pick up the steam, blow it over the tray of dry-ice, and out into the studio.[33]

A dense vapor sometimes suitable for fog can be produced by exposing a few drops of titaniumtetrachloride to the air.[34] A fan should be used to move the vapor about the studio.

Another method of producing fog for television is by combining a mixture of titanium chloride and castor oil with carbon dioxide produced by dry-ice in a pan of water. A thick and billowy cloud of fog will

---

31 Battison, op. cit., p. 346.

32 Stasheff and Bretz, op. cit., p. 269.

33 Dempewolff, op. cit., p. 83.

34 William Hodapp, The Television Manual, (New York: Farrar, Straus, and Young, 1953) p. 152.

result which can be easily blown around the set with the aid of a small electric fan. The effect should be constructed in a shallow wooden box with the tray of water and dry-ice in the bottom. (See Figure 26.) The mixture of titanium chloride and caster oil are sprayed into the box with a powered paint sprayer, or hand fly-sprayer, and the fog will come out the slot on the other side of the box.[35]

E. SMOKE

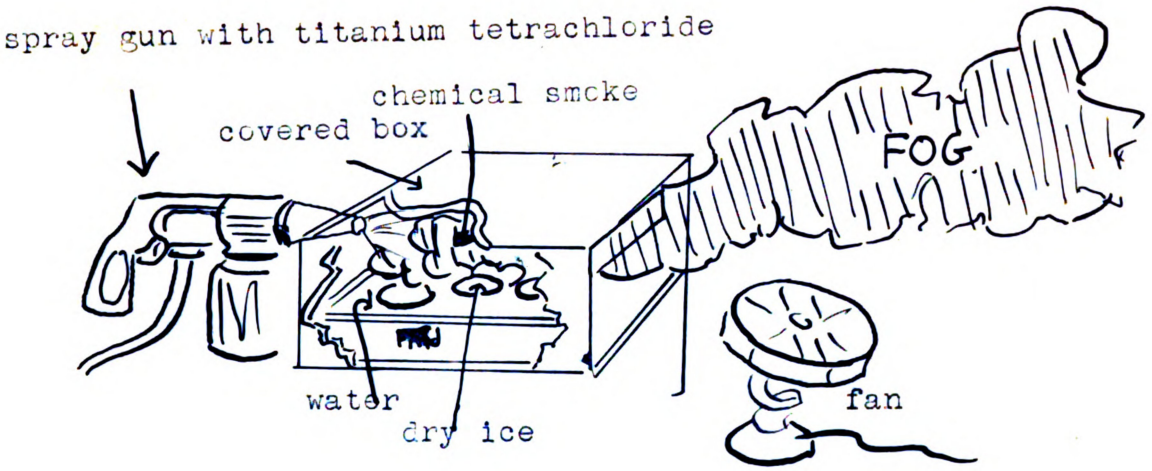
Smoke presents a problem similar to that of making fog, since too much smoke will fill up the studio and too little will be invisible. Asthmas powder has been used with good results. It is a vegetable preparation which must be burned in a special burner. The asthma powder will give off a thick cloud of whitish-yellow smoke. The smoke is somewhat difficult to control at first, but a little practice will produce the desired results. Powdered charcoal, sprinkled on the burner after it is ignited will produce black smoke with equally satisfactory results.[36]

War surplus smoke bombs or pots can be utilized to a good advantage, since they will produce large quantities of thick smoke. Caution should be exercised, however, because too much smoke may be injurious to the actors and crew, as well as, to the ventilating system.

---

35 H. W. Secor, "Television 'Sight Effects" Radio-Electronics p. 34-6, February, 1950.

36 Eddy, op. cit., p. 226.



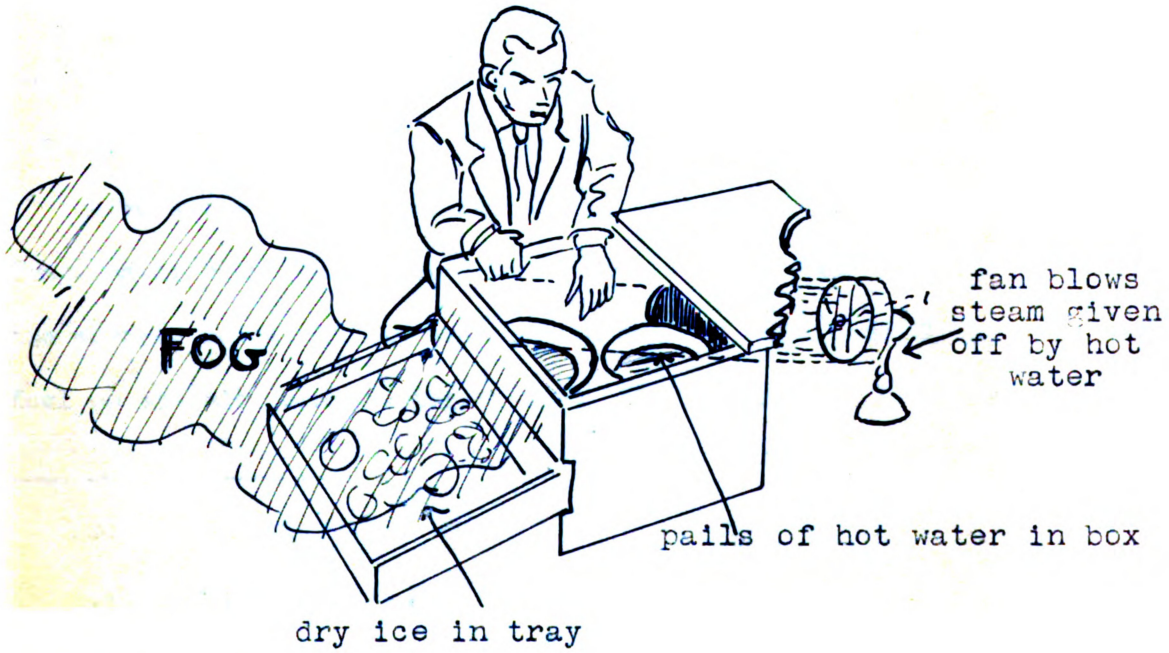


FIGURE NO. 26 - FOG

A fairly dense smoke may be produced by exposing a few drops of titanium tetrachloride to the air.[37] It may be blown about the set with a small noiseless electric fan. Keep it away from human eyes, and the fumes should not be inhaled. Handle it with an eye dropper. Titanium tetrachloride is particularly good for simulating the smoke given off by the logs in a fireplace sequence.

One pound of saltpeter may be dissolved in water, that is, one part saltpeter to three parts of water. Rags should be dipped into this mixture, allowed to dry, and then lighted; a fairly thick smoke will be produced as the rag burns. The rag should be burnt on a non-inflamable surface. Heavier smoke may be produced by using several rags, piled one on top of the other.[38]

A delicate white smoke can be produced from magnesium ribbon or powder. It is quite effective and is cheap. The ribbon or powder must be burned in a metal container and the smoke can be directed and moved to the desired location by using a small electric fan.[39] Necessary safety precautions should be taken in handling this inflammable material.

Live steam can be used for smoke; however, it does not last very long and is very unpleasant for the actors. Too much steam will ruin the scenery unless it has been waterproofed. Even a small quantity will foul up the air-conditioning system. The handling of live steam in the

---

37 Hodapp, op. cit.

38 White, op. cit., p. 57.

39 Battison, op. cit., p. 346.

studio is also dangerous and burns are frequent.[40]

If only a small amount of smoke or steam is required dry-ice in a container of hot water, or melted by a stream of hot steam will probably produce enough white vapor to do the job. The vapor does not last too long, but it is toxic when used in especially large quantities. Ordinarily the carbon dioxide gas produced by dry-ice will hang to the floor. A small electric fan can be used to move the gas about the set.

A CO_2 fire extinguisher can also be used to produce a column of smoke or steam such as might come out of the smoke stack of a train. The effect achieved by using a CO_2 extinguisher is excellent, but the white cloud is soon gone. The extinguisher can be used directly in front of the camera; that is, the camera can shoot through the vapor. Used in this manner, the effect will last for several minutes if the control valve of the extinguisher is adjusted properly.

F. FIRE AND FLAMES

Using live fire in the studio is dangerous and may in some cases even be prohibited. If fire is prohibited, film footage of flames may be used satisfactorily by superimposing the flames over the appropriate shot taken by a live studio camera. If it is necessary to show live fire in the studio, paper can be burned in a large metal container before the camera. These flames may be superimposed over the scene shot on

---

40 Loc. cit.

another camera. A mat shot[41] could be employed, that is, the metal container could be located directly in front of the camera, and the camera could shoot through the flames to pick up the action on the set. The metal container and the necessary effects technicians would be just out of the camera range.[42]

Canned heat or sterno can often be employed. Small pieces of wood, paper, cellophane, and other similar material should be added to the sterno can so that the flames will have more character, that is, contain more red flames rather than the characteristic blue flame of sterno. (See Figure 27.) The sterno can is easy to handle and may be mounted below the camera lens just out of range so that the flames will leap up into view. If the mounting is secured to the front of the camera, the movement of the camera will not be restricted as it shoots through the flames to pick up the setting.

Fire may also be created by igniting lycopodium dust which is burned in a special burner.[43] Once again, the mat shot technique may be employed, with the camera shooting the action through the fire and flames. or the flames may be shot on one camera, the setting shot on another camera, and the two combined in a superimposure.

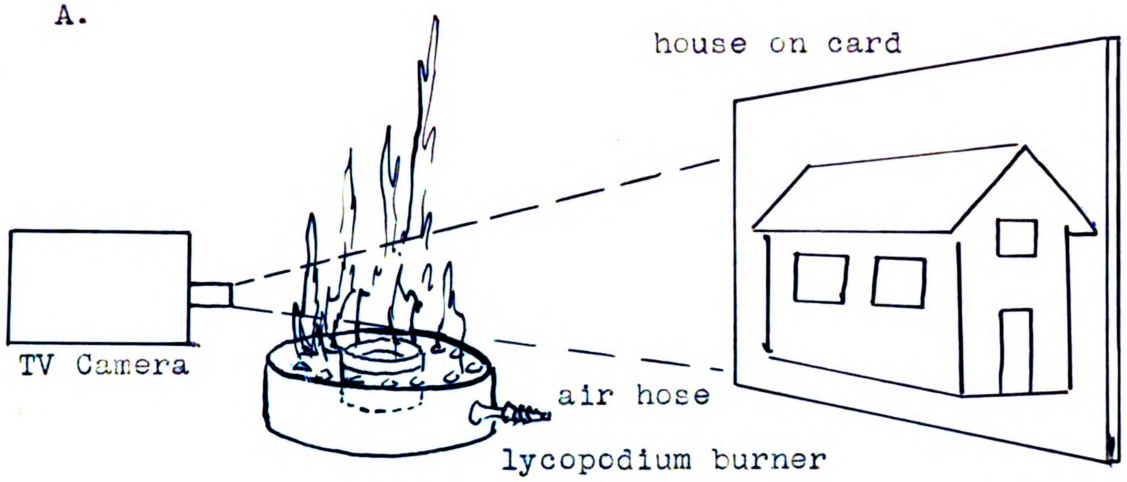
---

41 See Chapter III, Section VIII for information on the use of the camera mat.

42 Louis A. Sposa, Television Primer of Production and Direction, (New York: McGraw-Hill Book Company, Inc., 1947) p. 77.

43 Eddy, op. cit., p. 225.

A.



composite on monitor

B.

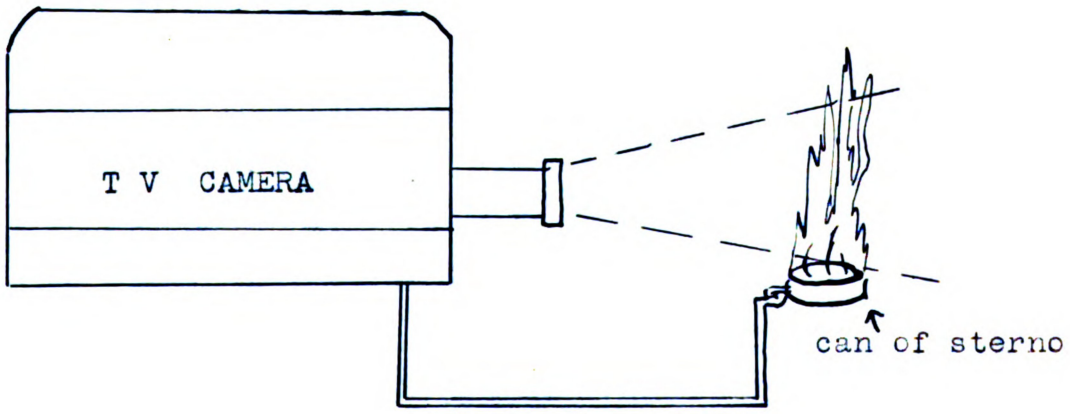


FIGURE NO. 27 - FIRE

The illusion of a flickering camp fire, fireplace, or other similar fire and the shadows that they cast can be created by the use of a few strips of paper or cloth, a small electric fan, and a suitable light source. The crepe paper or cloth strips about one-half an inch wide and of varying lengths can be scotch taped to the wire-guard on the front of the electric fan which should be mounted face up. A suitable light source which can be masked properly should be mounted so that the light rays from it will shine only on the paper strips when the device is in operation. (See Figure 28.) The campfire logs may be built up around this basic unit to mask the fan, light source, and paper strips from the camera, if the entire camp fire is to be shown. When the device is in operation, the paper strips, blown out by the fan will interrupt the light rays, causing flickering shadows to be cast upon the faces and bodies of the actors seated around the campfire. A similar device can be used in front of a spotlight to create the flickering fire effect. The cloth strips about an inch and a half wide would be attached to a wooden handle, and the effects technician would manipulate it in front of the spotlight.[44]

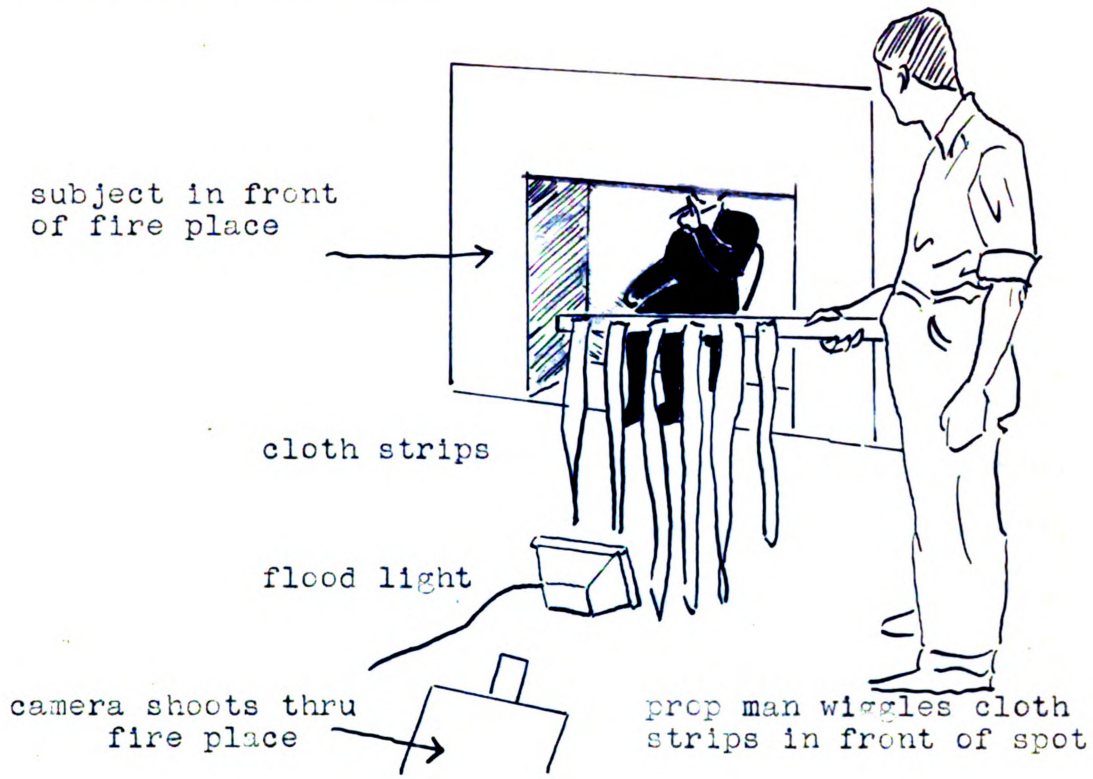
G. DUST

A few handfuls of flour tossed into the air will create the illusion of flying dust. The flour-dust will settle slowly, and realistically to the ground. The flour may be tossed into the scene from the camera

---

44 Dempewolff, op. cit., p. 83.

A.
LIGHT AND CLOTH STRIPS



B. FAN METHOD

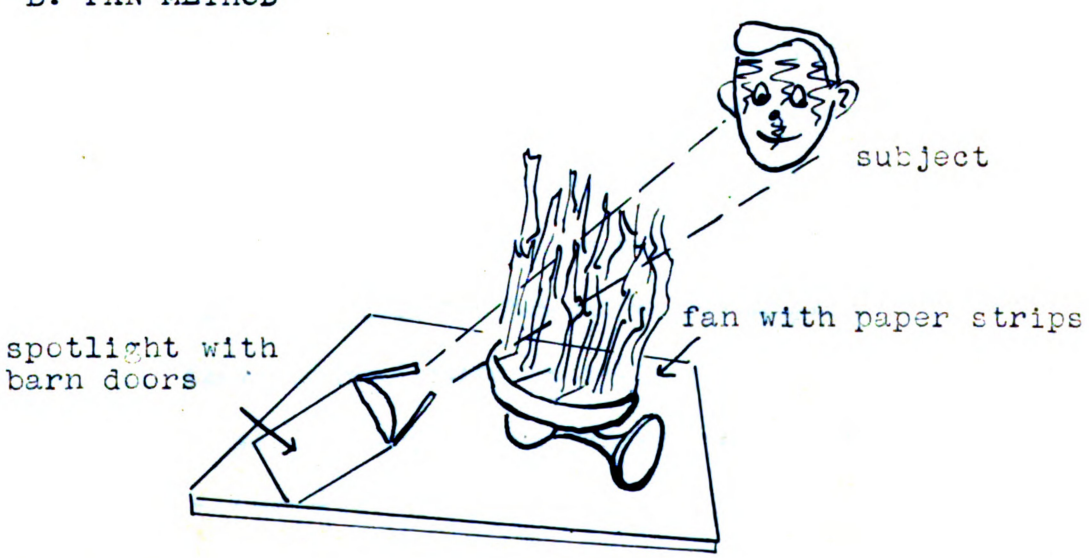


FIGURE NO. 28 - FIRE PRODUCED BY LIGHT AND CLOTH STRIPS

position or from any other spot which will give the desired effect as required by the action and the script.[45]

Flying dust, such as would be kicked up by a bullet hitting a rock or wall, could be rigged with the use of a common spring mouse trap. If a large hole is to be blown out of the rock or wall by the bullet, the mouse trap is buried and the hole is filled with broken plaster, fine powder, small stone chips, and finally sealed with paper and painted to resemble the wall or rock. A long trip-wire leading off the set to release the spring trap is all that is needed to activate the device.[46] If the bullet hole is a small one, the mouse trap can be mounted so that the spring lever will knock the plug out of the bullet hole when the trap is sprung. The effect is very realistic, especially when the hero is showered with dust and plaster which is supposedly knocked out of the wall above his head by a bullet from the villain's gun.

H. CLOUDS

The front projection or rear projection of clouds and cloud effects may be frequently called for. The creation of three dimensional clouds may seldom be necessary, but when called for, present a very real problem to create. Satisfactory results have been obtained by the use of glass-wool batts which have been fluffed out to the proper proportions. These clouds are then suspended above the setting. The use of spun-glass is also recommended. Cotton, however, is very unsatisfactory because

---

45 Ibid., p. 81.

46 Eddy, op. cit., p. 226-7.

unfortunately it looks just like cotton. The glass-wool and spun-glass are highly reflective, and thus they respond to good lighting which is extremely important in producing realistic cloud effects.[47]

For small nebulous clouds in front of the camera, dry-ice dropped into a dish of water will give off enough carbon dioxide to produce small rolling clouds through which the camera may shoot. A small electric fan may be employed to blow the vapor in front of the camera. The effect is also heightened if the camera is slightly out of focus.[48]

I. STARS

Realistic-looking twinkling stars can also be produced. Many tiny holes are punched in two pieces of black cardboard. The two pieces of cardboard are held back to back in front of a spotlight. By wiggling the back piece of cardboard the light will shine through alternating holes in the front cardboard.[49] The camera is focused upon the front cardboard.

A more elaborate way of creating the twinkling star effect would be to punch many tiny holes in the bottom of a cardboard box which has been painted black on the inside. A circular piece of cardboard with irregular wide-slits cut out of the circle is attached to the front of a spotlight. The spotlight is shown upon the back of the cardboard box and when the wheel is revolved slowly, the camera looking into the blackened box, will pick up the twinkling stars. Light passing through the revolving

---

47 Eddy, op. cit., p. 222.

48 Poole, op. cit., p. 55.

49 Mann, op. cit.

wheel will cause the stars to sparkle intermittently through the holes punched in the bottom of the box.[50]

J. COBWEBS

Cobwebs can be created in corners and on various objects to give the setting that unused, old, haunted look. The cobwebs are generally sprayed on. Liquid latex, and various plastic solutions are used to produce the extremely natural looking cobwebs.[51] Stiff rubber cement can be used to good effect if liquid latex and application equipment is not available.[52]

Dusting the entire set, as well as, the cobwebs with talcum powder will provide the set with the appearance of antiquity.[53]

K. GRASS AND TREES

Artificial grass which is used for display purposes may be used equally well in television production. If such artificial grass is unavailable, it can be made from various types of mohair or other deep-pile fabrics. The material may either be dyed green or the surface shellaced and then dusted with green lint or velvet dust.[54] Both methods produce

---

50 Poole, op. cit., p. 56.

51 Eddy, op. cit., p. 225.

52 Battison, op. cit., p. 348.

53 Eddy, op. cit.

54 Eddy, op. cit., p. 222.

satisfactory grass. In miniature construction, finely woven, deep-pile turkish toweling which has been dyed to resemble grass can be utilized.

When trees are necessary on the set, they may be rear-projected if they appear in the background, or they may be constructed of set pieces in the middle or foreground. However, if an illusion of towering trees and dense jungle is required in the foreground, it can best be achieved by the construction of a camera mat.[55] Small trees and shrubs can be arranged close to the camera lens and shooting through this apparent undergrowth to pick up the actors in the background will achieve the desired effect.[56] The actors may seem dwarfed by the trees in front of them, depending upon the construction and location of the camera mat to fulfill the requirements of the action.

The quick-sprouting tree, which every magician owns, is operated, of course, by a spring releasing device. Such a tree can be used in television for its trick effect.

VI. MAN-MADE PHENOMENA

Introduction. In this section, the author will discuss such man-made phenomena as explosions, crashes, and flying arrows. A description of various ways in which the desired effect may be created or achieved will be given. Although there are more effects which could be discussed, the description will be limited to those effects on which production

---

55 See Chapter III, Section VIII, for use of Camera Mat.

56 Battison, op. cit., p. 342.

materials and data has been made available. A magician's supply store can provide the answers to many effects and should be consulted for advise as well as for material assistance.

A. EXPLOSIONS

Explosions are usually engineered with flash powder and smoke bombs, supplemented of course, by the use of sound effects.[57] Lycopodium dust suspended in the air and ignited will produce a safe and convincing explosion.[58] Theatrical flash pots, which when ignited emit a flash and then a cloud of white smoke are excellent for complex explosions. The amount of flash powder or the size of the flash pot to be used will depend upon the size of the explosion required. Necessary safety precautions should be taken when handling inflammable and explosive materials in the studio. Metal containers should be used in transporting the explosive material about the set and it should also be set off within a metal enclosure. Smoke bombs can be used to give the lingering smoke necessary in certain types of explosions. Of course, the scenic artists must provide the accompaning destruction.

An ordinary photo-flash bulb can be rigged to create minor explosions. Or a number of flash bulbs may be wired together to produce various sizes of explosions.

When the flash powder is used it may be ignited in the following manner. Inside of a metal box about two feet square and six inches deep

---

57 Dempewolff, op. cit.

58 Hodapp, op. cit., p. 152.

with a heavy metal screen over the top is placed an ordinary household surface mount socket. The wires from this socket lead to a switch off the set and then to a regular 110 volt electrical outlet. A three-ampere fuse plug is screwed into the socket. The transparent window is removed and flash powder is poured into the fuse. The flash powder is ignited by the short circuit which occurs when the control switch is closed.[59] The amount of flash powder used may be varied until the desired effect is produced. Experimentation with this effect before air-time is an absolute must. All details should be worked out several days in advance of final rehearsals.

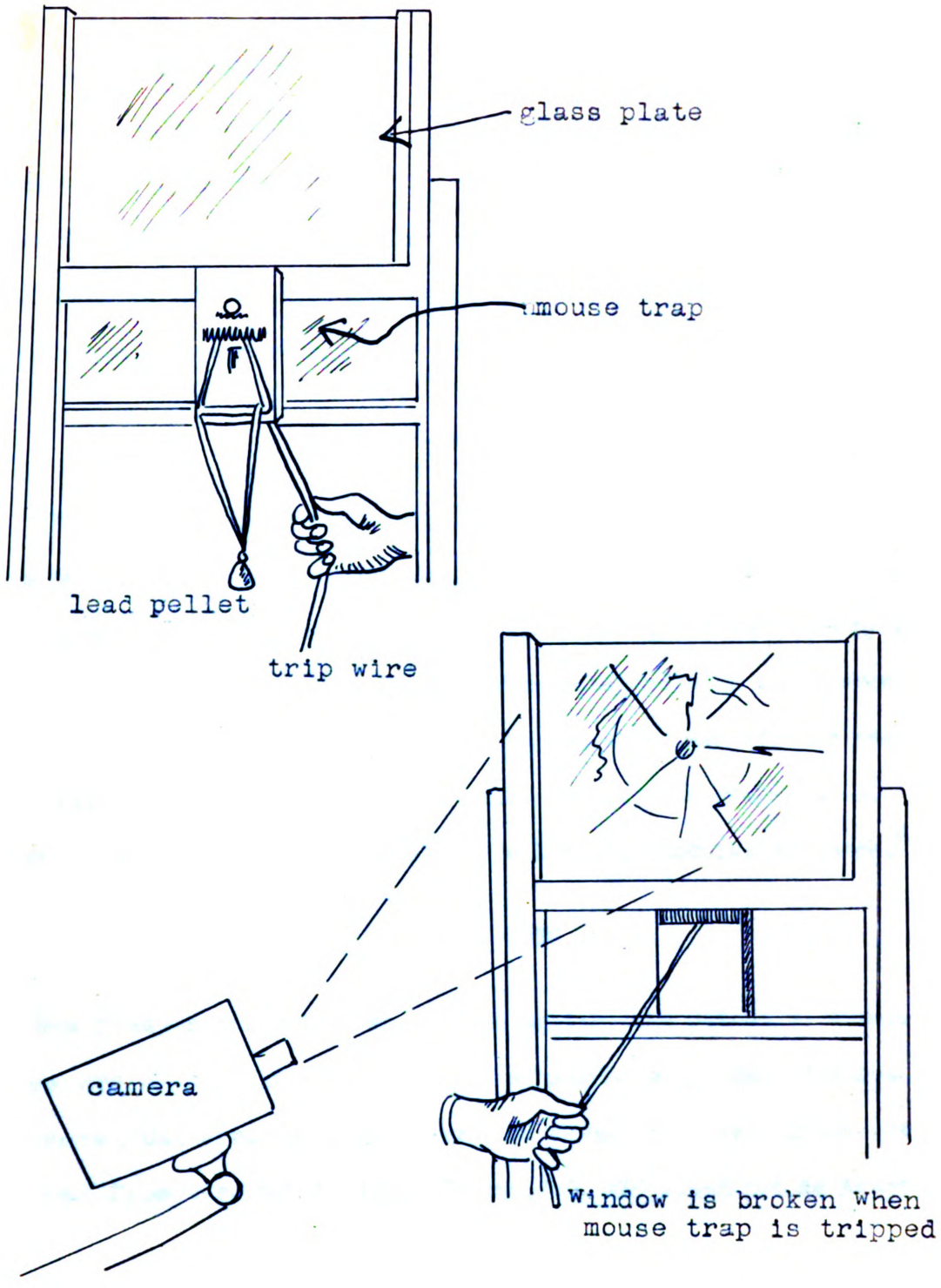
B. GLASS CRASHES

The breaking of a window, mirror, lamps, jars, or of a gun target can be achieved by the use of a spring type mouse trap. The mouse trap may be adapted so that it will throw a lead pellet at a window pane, which has previously been cut to make it shatter in a pre-arranged pattern.[60] The mouse trap is no respector of property, and various sizes of mouse traps can be employed to knock off the appropriate object, be it lamp, vase, or jar. (See Figure 29.) The lead pellet is attached to the snapper arm of the mouse trap with a short length of heavy black thread or a stiff piece of wire depending upon the location of the camera and the requirements of the job. Of course, the mouse trap must not be visible to the camera.

---

59 White, op. cit., p. 58-9.

60 Eddy, op. cit., p. 227.



IGURE NO. 29 - MOUSE TRAP DEVISE

A shooting gallery trick is a good example of the tricks possible by use of a simple mouse trap. The camera is looking from behind the target towards the customer. He aims the rifle, fires, and the target smashes to bits as though hit by the bullet. Of course, the mouse trap did the trick with a large nut soldered to the snapper. When the trap was tripped, the arm swung up to smash the target.[61]

C. ARROWS

Flying arrows thud into trees beside the hero, but they do not come from the bow of an expert marksman. Instead, the arrows thuds into the tree in reverse. The arrow or arrows are held inside the tree by an elastic, and they pop out so rapidly when released that the viewer would be sure that they came from a bow. A hollow arrow may also be used which would slide along a taut length of piano wire to its destination. Such a device could be used for a William Tell apple shooting sequence.[62]

D. GUN FLASHES

Gun flashes are often required in mystery and detective dramas. The flashes are made by using small pills of magnesium powder in which a resistance fuse wire has been imbedded. When the control wires are energized from a switch located off the set, the flash can be accurately timed with the action of the play. When packed tightly as well as when loose, the magnesium powder is highly explosive and should be handled

---

61 Railton, op. cit., p. 145.

62 Ibid., p. 149.

with extreme caution. All safety regulations in regard to its use should be carefully followed.[63] The flash should never occur directly in front of the camera lens, since it will damage the sensitive image orthicon pick-up tube.

It is rumored that an electronic gun flash is being used experimentally by one of the networks.

E. ACETYLENE TORCH

An acetylene torch which would be used in a burglary, crash, or accident sequence can be easily simulated with a Fourth of July sparkler.[64] The continuous sparkler is fed out of a rubber tube, so that only the burning end is visible. Two fingers over the end of the rubber tube can accomplish the feeding process, since the yet-to-burn portion of the sparkler is still cold. The burned end of the sparkler can be pushed into the hole which the torch is cutting, so that it will not be visible to the camera.

F. BUBBLES

Bubbles can be manufactured that will take the place of expensive balloons or plastic bubbles. These bubbles could be used for lavish dance sequences, or to fill a bath tub during a bathing scene. The magic formula is detergent, plus green soap, plus glycerine, plus coloring.

---

63. Eddy, op. cit., p. 225.

64 Dempewolff, op. cit.

This mixture is stirred and then pumped full of air. In less than ten seconds there will be plenty of tough, elastic bubbles, as large as four feet in diameter.[65]

Conclusions. Man-made phenomenon will continue to plague the television director with production problems. The simplest method of solving the problems is for the producer-director to eliminate the effects by making significant script changes. If a particular effect is repeatedly called for, a team of production assistants, or effects personnel, will be put to work solving the problem. When the effect is finally created on-the-air, the ingenious effects technicians turn their attention to the creation of another effect. The first effect is not forgotten. It has a way of being remembered and passed on, but the secret of creating an effect does not often become published material.

---

65 Ibid.

CHAPTER V

CHAPTER V

GRAPHIC AND TITLING EFFECTS

Graphic and Titling Effects are devices and techniques employed to present visual information to the television viewer. More specifically, graphic and titling effects are those effects which employ the use of graphic arts and the presentation of this graphic material by using suitable titling and display devices. These effects are generally presented in the studio before live studio cameras. Graphic materials are used during programs to present essential visual information to the viewer. When displayed via appropriate titling devices, the graphic materials are used to provide beginning and closing titles and also to effect suitable transitions between program sequences. The graphic materials which are usually picked up by a live studio camera may be combined with the pictures from other signal sources to produce more elaborate or complex effects. Graphic and titling effects are an essential part of television programming and are required in the day to day operation of a television station.

I. PREPARATION OF GRAPHICS AND TITLING

A majority of the graphic material which is prepared for telecast is rendered in the 3:4 aspect ratio. Therefore all title cards should conform to this ratio. The individual station should standardize various sizes of cards to be used in their particular operation for the rendering of graphic materials. The following sizes are used in the industry and

are recommended: 9" by 12"; 11" by 14"; 12" by 16"; 14" by 18"; 15" by 20"; 20" by 30"; 30" by 40"; and 36" by 48". Some sizes will be found to be more advantageous than others, but day to day usage will help the station to determine the proper sizes for use in their particular operation.

If the station uses a baloptican projector some of the graphic work will be done directly on the 4" by 5" "balop" card. However, the material is often rendered on 11" by 14" title cards, for example, and then reduced photographically to the 4" by 5" size. Two by two inch transparencies for use in slide projectors are also reduced photographically from a standard size title card.

At present since television is monochromatic, that is, producing an image in shades of gray, never pure white or pure black, graphic material must be rendered in shades of gray or in colors that will reproduce the desired gray shade, The Eastman Kodak Gray Scale, their published materials on its use, and the Eastman Color Separation Guides provide the most useful and complete reference data on the gray scale.[1] The Eastman Kodak Gray Scale contains ten steps from black to white; however, it is generally admitted that the television system will produce only 8 or 9 values or steps of gray ranging from near-black to off white.[2] To check gray scale response, swatches of the specific color are placed along side

---

1 Melvin R. White, Beginning Television Production, (Minneapolis: Burgess Publishing Company, 1953) p. 4.

2 Robert J. Wade, Designing for TV, (New York: Pellegrini and Cudahy, 1952) p. 45.

of the standard gray scale and both are viewed on camera under normal lighting conditions. The gray shade produced by the color swatch is compared and matched up with the appropriate gray on the standard gray scale. A gray scale number is then assigned to that particular color. Often it is helpful to add a plus or minus to the number, so that the color of pigment, cloth, illustration board, or chalk will have a more accurate gray scale number.

When using either material rendered in shades of gray or material rendered in color, there should be from three to five (3 to 5) steps or values between the background and the object or lettering.[3] Extreme contrast should be avoided, such as, white letters on a black background except when the material is to be used in a superimposure where high contrast is desirable. High contrast or a wide range or number of steps between the lightest portions of the image and the darkest portion of the background will cause the image to ghost or bloom. This quality of "blooming" is common when master-of-ceremonies wear white shirts with black tuxedoes. Lighting can help to eliminate "bloom", but controlling the contrast is much more satisfactory. Excessive contrast will also cause the image to burn-in on the target of the image orthicon pick-up tube especially if the tube has logged considerable hours of usage, that is, beyond 250 to 500 hours.

---

3 Clair R. Tettemer and Harold Niven, "Production Standards for Television Recordings" (Unpublished Study, Ohio State University, 1952).

The graphics should employ a variety of backgrounds to add interest and texture to the display of visual information. Generally graded and tinted illustration or mat board is satisfactory.[4] A mat surface is preferred to a glossy or shiny one, since the mat finish will usually take the color media or ink much better than a slick surface. When viewed on camera, the mat surface will be more satisfactory since it will absorb or disfuse the light which strikes it, rather than reflecting the light directly into the camera lens causing a burn or flare to occur. Clay coat poster board is available in many tints and colors and has been found to be excellent for all types of graphic work.

Opaque water colors, casein (in tubes), transparent watercolors, and combination of these with other types of pigments, inks and dyes are the most generally used color media.[5] The color media should also be checked for gray scale response and an accurate record made, so that, proper contrast between the lettering and the background may be maintained.

Various methods or processes are used to produce suitable titles economically and in sufficient quantities to supply the daily needs of the average television station. Hand lettered cards, although applicable to certain types of productions, generally cost too much in time and labor to be the standard method of titling.

Emboss-o-graph lettering is satisfactory and can be used to present a wide style of titles. The emboss-o-graph consists of metal type over

---

4 Wade, op. cit., p. 155.

5 Ibid.

which is placed a lettering sheet, colored paper which is to become the letters, with the gummed surface facing up. The background illustration board is placed on top and the type is pressed against the background, cutting through the lettering sheet and pressing the letters into the illustration board. The emboss-o-graph will provide fairly inexpensive titles. The initial cost of the machine may be prohibitive, however, for the small station operation. The device is limited since it requires considerable time to set-up the type and process the title card. There is also a limit to the size of card which may be handled effectively on the emboss-o-graph. Another feature which is most undesirable is that the letters tend to peel off especially if the title card receives rough handling in the studio. However, if the cards are handled carefully, they may be used live in the studio or they may be photographed and reduced to 2" by 2" transparencies for use in the slide projectors.

Another printing device used for the production of window and price-card work by department stores can be adapted to television purposes. This device is similar to a proof-press and uses regular standard all-metal type, which is set and locked in a form, face up. The type is inked with a hand roller and the impression is pulled off by exerting pressure from the top onto the background illustration board or paper. The cost of such a press is moderate. However, copies require frequent retouching and title artists generally do not feel that this proof press is suitable or adequate especially for fast production work.[6]

---

6 Ibid., p. 161.

The most effective printing device is the "hot-press," since it may be operated by inexperienced personnel and still produce acceptable titles. The hot-press employs regular, standard, all-metal type from 24 point to 72 point. The type is set in a special stick, pre-heated and locked in the press where the temperature is increased slightly. When the proper temperature is reached, the type is brought down upon a plastic ribbon which lies between the type and the background title card. The plastic ribbon is melted and bonded to the cardboard, illustration, photograph, or other title background. Additional copies of the title can be made simply by advancing the plastic ribbon and re-pressing on another background. The 4" by 5" "balop" cards may actually be printed directly with 36 point to 48 point type. The hot press will print over any flat surface; thus titles may be printed directly over artwork, textured papers, photographs, or transparent acetate sheets or "cells." The hot press can be used to fake newspaper mastheads, headlines, advertisement, fictitious books, prescription blanks, small sale cards, labels, price tags, name plates, forms, and letterheads.[7]

It has already been mentioned that the photographic process plays an important part in providing 2" by 2" slide transparencies for transmission over the television system. Pictures from various sources can be utilized by themselves or they may provide suitable backgrounds for titling.

---

7 Ibid., 163-4.

The titling can be executed directly on the face or surface of the picture, or it may be rendered on an acetate "cell" and placed over the picture for processing. The acetate "cell" method is particularly useful when producing a series of title cards all with the same background picture. Various sizes and styles of three-dimensional plaster or cardboard letters are very useful in preparing titling for 2" by 2" slides. However, the letters may be used live on camera if they will adhere to the background.

On all title cards whether they are reproduced live or photographically reduced to slides, the graphic material is confined within a specified area. Titling and artwork must be confined to this copy area which leaves an ample margin so that the camera may frame the title properly without shooting off the card also allowing for the individual variations in receiving set adjustments and masking. There is also a limit to the size of letters and the amount of lettering which may be used on a title card. Regardless of the original card size, the picture which the viewer sees is always the size of his receiving screen.[8] Readability of the visual information is essential; hence, the lettering must be of the proper size and the number of characters kept to a minimum.

For television work, Battison believes, that three lines of type should be the maximum with not more than twenty characters on each line including all punctuation. For the major titles such as the name of the production, the number of characters should be limited to ten or less

---

8 Thomas H. Hutchinson, Here is Television, (Rev. Ed., New York: Hastings House, 1950) p. 250.

per line.[9] When the number of lines and characters are reduced, the size of type may be increased. "Five lines of about twenty letters each is roughly the present capacity of a receiver," reports Hutchinson.[10]

Here are some recommended minimum type sizes to be used with the various sizes of title cards. The actual copy area or masking area of the title card is also given. For a card 14" by 18" with a usable copy area of 9 1/2" by 11" a minimum type size of 96 points or one inch should be used. On a 12" by 16" title card with a masking area of 8" by 10", the minimum type size should be 72 points or three-quarters of an inch. (See Figure 31.) A 11" by 14" card with a copy area of 7" by 9 1/2" should use a minimum type size of 64 points. (See Figure 30.) On a 9" by 12" card with a masked copy area of 6" by 7 1/2" the minimum type size should be one-half an inch or 48 points.[11] Of course, the type size may be increased if the number of lines and characters is decreased.

Variety is introduced into titles by the use of various styles of type. Visual interest is stimulated and the viewer is kept alert by the use of interesting titles. If the same style of lettering is used for every program, program individuality and character will be absent. The program will also acquire a monotony only akin perhaps to the monotony of the entire station operation. Graphics, especially titling, should not be elaborate, but should be simple, bold, and easy to read. The

---

9 John H. Battison, Movies for TV, (New York: The Macmillan Company, 1950) p. 206-7.

10 Hutchinson, op. cit., p. 250.

11 Tettemer and Niven, op. cit.

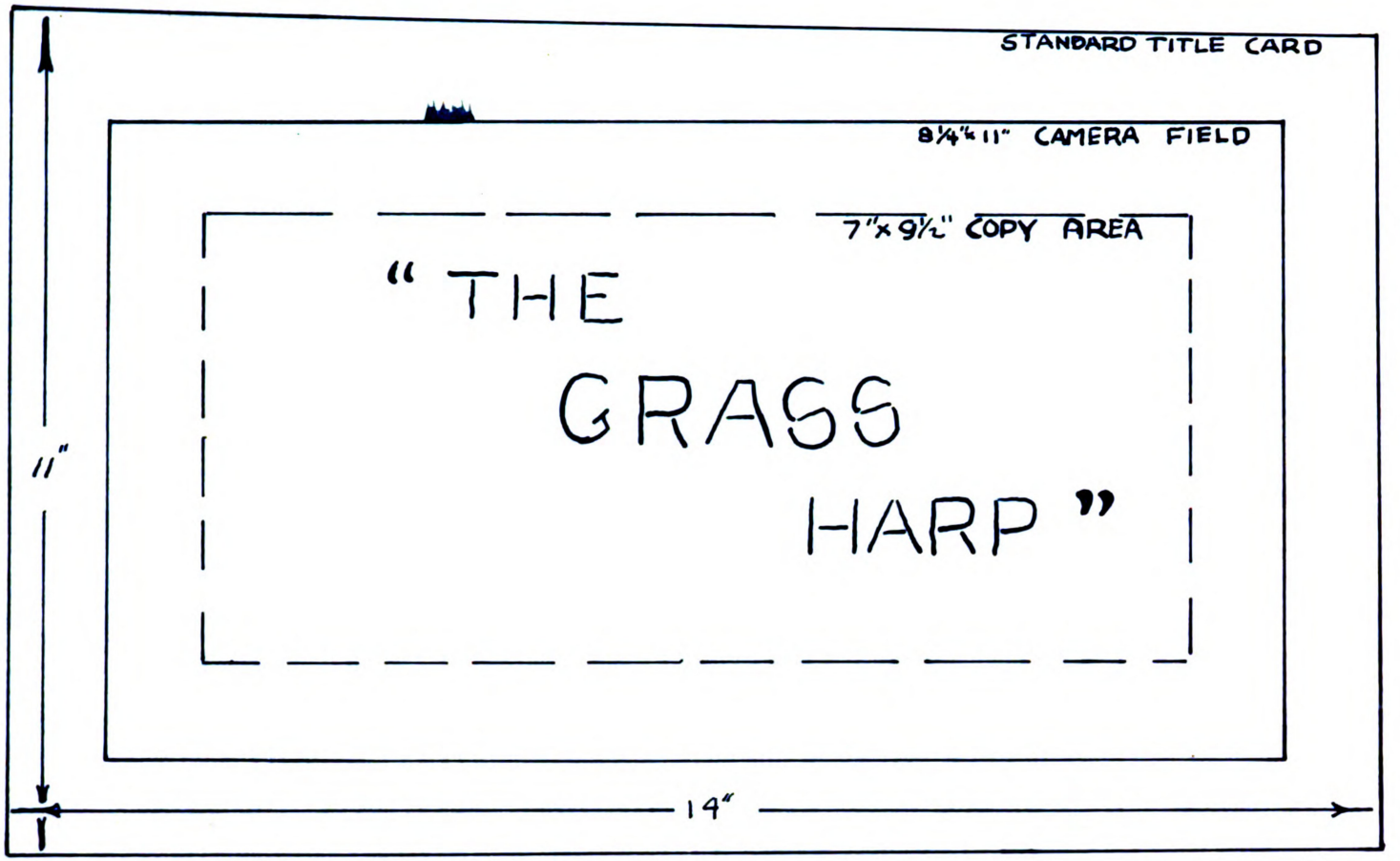


FIGURE NO 30 - 11x14 TITLE CARD WITH USABLE COPY AREA

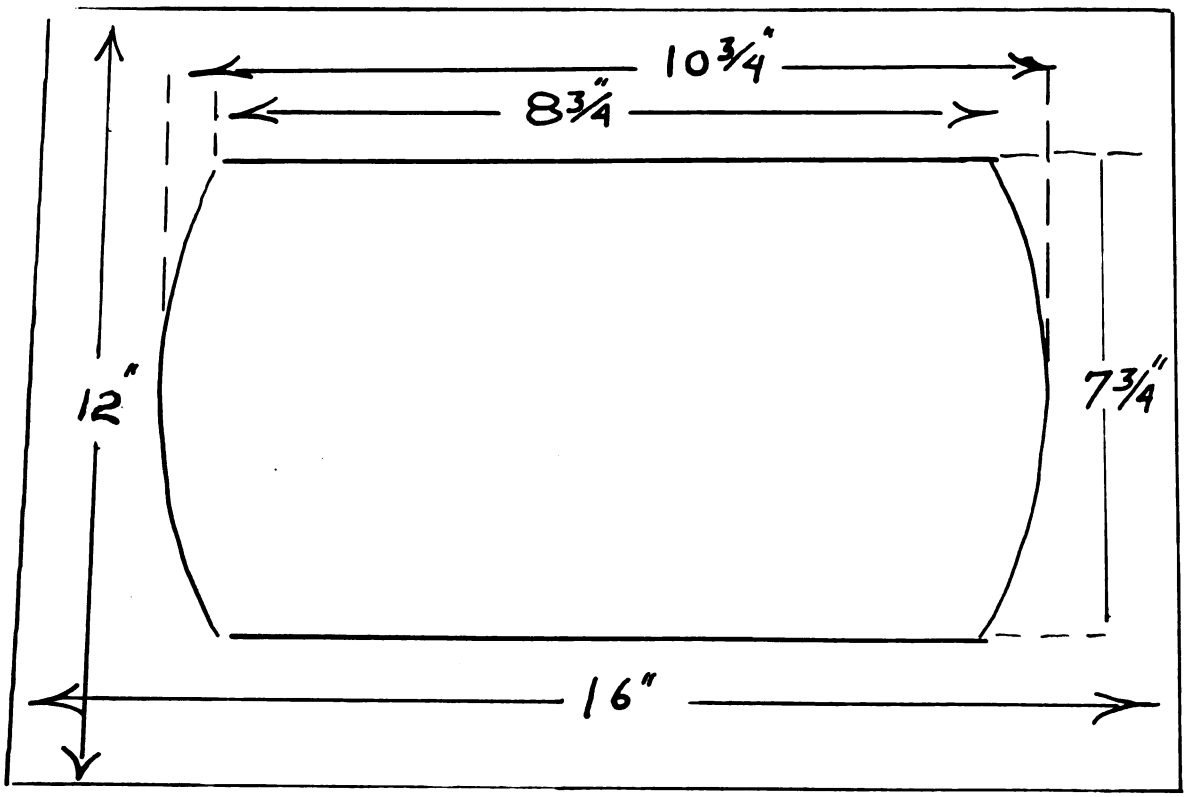


FIGURE NO. 31 - 12 by 16 TITLE CARD WITH USAGE COPY AREA

selection of lettering for a particular program should conform to the program content. The style of type selected should suggest the nature of the program. The titles for a Shakesperian drama, for example, could be hand lettered in modified Old English. In selecting type fonts, the style and type of productions which will be presented by the particular station should be considered. Only the most desirable and useful fonts should be purchased. The following suggestions are offered as to the fonts best suited for use in television production.

Two broad classifications are condensed and non-condensed type. Condensed type consists of narrow letters spaced closely together. It is used when material must be crowded to get it all on the page. Although the letters may be used with non-condensed spacing, the condensed type is still difficult to read even under ideal conditions. Therefore, the use of condensed type is not recommended. Non-condensed type is generally preferred for use in the production of television graphics.[12]

Five thicknesses of type are generally available in the various styles: light, medium, bold, extra bold, and ultra bold. The best reproduction on the television system is provided by medium, bold, and extra bold. The light thickness of type is not recommended. It is difficult to read because the fine lines are lost in the television transmission system. The ultra bold is also difficult to read since the open spaces in the letters are very small and the letters may appear as a solid block. Open, italic, and script letters are not recommended

---

12 Ibid.

for general use, although with extreme care they may be used in special cases. Any size of type face may be used, however, if a large enough letter is selected.[13]

The graphics department should begin with a limited number of type fonts and continue to add new styles and sizes until a sufficient variety is stocked to serve the many needs of the station operation. At first, a half-dozen fonts of condensed Gothic, Vogue, Caslon, and Brush in various sizes will provide a sufficient variety for conventional title work.[14] Additional fonts of Twentieth Century Medium, Stencil, Broadway, Bodini Bold, Radiant Medium, Flash, and Stylescript will prove useful.[15]

The effective use of graphics and titling should not be overlooked since they are essential to television production and closely linked with the power of the visual image. The visual pictures received by the viewer especially graphics and titles indicate to him the character and personality of the station. Type is expressive; therefore art directors and production personnel should make full use of its ability to suggest, to imply, and to indicate.[16] Titling and type used wisely will add to the effectiveness of the simplest program because both are important factors in exposition. Titles and type can establish a mood and conjure up for even those viewers with limited imagination some associations

---

13 Ibid.

14 Wade, op. cit., p. 164.

15 Tettemer and Niven, op. cit.

16 Wade, op. cit., p. 164.

and impressions. It should be remembered that what the viewer sees on his television screen is all important.

II. TITLE CARDS

Definition: Any artwork or graphic material which is rendered on a card smaller than 36" by 48" and which is not scenery, is usually referred to as a "title card." The title card provides all types of information from hand lettered and printed titles, cartoons, graphs, and mounted pictures, to diagrams and sketches. The material is generally placed on the card or chosen so that it will conform to the 3:4 aspect ratio of the television system. The title card generally speaking provides static information to the viewer.

Usage. Title cards are used to display all types of information before the live studio cameras. One of the most common uses is to provide opening and closing titles and credit lines for various programs. Some directors prefer to present all titles and graphics through the film chain camera by using slides, balops, or film. When presented in this fashion, they may be easily previewed and conveniently combined into the television program. Reducing the title cards photographically to slides removes title stands, easels, and necessary display devices from the studio which is often desirable, especially when the studio is small. Using slides also frees the studio camera so that it may concentrate upon the program content. However, title cards picked up live in the studio have several advantages. For example, last minute changes in credit lines or in program content material can easily be rendered on the title

cards and inserted into the program. The necessary time required to produce a slide of the graphic material may not be available. This is often the case and the director may have a combination of slide titles from the film chain camera and somelive titles from a studio camera to combine into the title sequence of the program. Other directors prefer to have all of the visual material associated with a particular program concentrated in the studio. They will insist on using live titles, that is, titles picked up by a live studio camera.[17] Although the studio is often cluttered with display devices, the director can concentrate his attention upon achieving the desired effect by using studio facilities and can forget about interjecting film or slides into the program.

Title cards are usually presented to a stationary camera. They may be displayed in a wide variety of styles. Some of the more common methods and techniques of displaying title cards will be discussed. Also various means are employed to effedt the change from one title card to the next. The card is often just simply removed from the camera field. This is a simple but effective way of adding movement to an otherwise statis picture and it does create and stimulate visual interest in the viewer.

If only one card is to be shown, it may be set up on an easel in front of any available studio camera. Metal or wooden sheet music racks and stands are often used with a considerable degree of success. The music rack should be sturdy, rugged, adjustable as to height, and if the display surface can be tilted, additional flexibility will be achieved.

---

17 Wade, op. cit., p. 152.

The cameraman should focus and frame the material in the center of his viewing scope and the outside edges of the card should be lost, that is, not visible on the air.

If more than one card is to be presented in a continuous manner, there are several ways of achieving the presentation. The cards may be stacked in alternating sequence on easels in front of two studio cameras. The titles are changed by switching from camera to camera. While one of the cameras is showing the picture on the air, the title card in front of the second camera is changed, and when the new card is properly lined-up, a cut or dissolve is made to the second camera. This process continues until all of the cards have been shown. This process requires the use of two valuable studio cameras, when the same effect could be achieved satisfactorily with the use of only one camera.

The title cards may be stacked on one easel in front of a single camera and the cards pulled away one by one. They may be removed from the frame in any fashion. Usually they are either pulled out vertically or horizontally. Or the cards may be stacked, and the first card tilted forward, toward the camera, displaying the second card behind the first. Actually the card is tilted forward and let fall. Care should be exercised by the operator so that each card will fall smoothly and at the same speed. Too much force behind the card will tend to make the bottom edge of the card flop up into the picture after it has supposedly dropped out of sight.

Title cards may be put into the picture, that is, the camera views the first card and additional cards are placed in front of the previous cards until the final title is reached.

A. TITLE FRAME

A box-like title frame may be built to hold the particular size of title cards used. Grooves spaced approximately a half-inch apart can be cut along the top and bottom of the structure. Title cards are guided by these grooves and may be slipped in and out of the device, horizontally. Another title frame may be constructed so that the cards may be removed vertically from in front of the camera. The two frames may be combined in a complex device in which cards may be removed in an alternate horizontal and vertical sequence. The title frame may be built with any combination of horizontal and vertical sections. The moderate cost of construction is exceeded by the devices' frequent use and its effectiveness on the air. A suitable arrangement would be to have space for five or six cards which may be removed vertically, followed by the same number of spaces for the cards which are to be removed horizontally.

B. FLIP CARDS

Flip title cards are punched at the top and fitted with small grommets. (The width of the top margin of the card may have to be increased to take care of these holes and to insure that they do not appear in the picture.) The cards are then suspended on rings, ordinarily an oversized

notebook ring-binder which is mounted on a display board.[18] The location of the rings upon the display board is critical and should be so arranged that when the card drops or is flipped, it will fall smoothly and rest against the back of the display board. Since the cards are allowed to build up as they drop, one after the other, the cameraman may have to adjust his focus to bring the latter cards into sharp focus. If this device is constructed properly title cards will drop into frame and hang motionless before the camera. (See Figure 32.) The cost of constructing a flip title stand is moderate. Some limitations in the use of flip titles will be presented especially if floors, and camera mounting are not level. One of the problems encountered frequently is the fact that letters on the title cards are not centered properly. This can be traced to improper construction of the display device, bad centering on the card which seldom happens, or an unlevel floor upon which the title stand sits or upon which the camera is operating. Moving the title stand to another location can often solve the problem.

C. MASK CARDS

Masking devices may be placed in front of title cards. A decorative mask with a cut-out or aperture in the center of the mask is called a "cartouche." Ordinarily the aperture in the "cartouche" must be in the 3:4 television aspect ratio. Grooves behind the "cartouche" card hold

---

18 Robert J. Wade, Operations Backstage, (New York: Network Operations Department, NBC Television, 1951) p. 54.

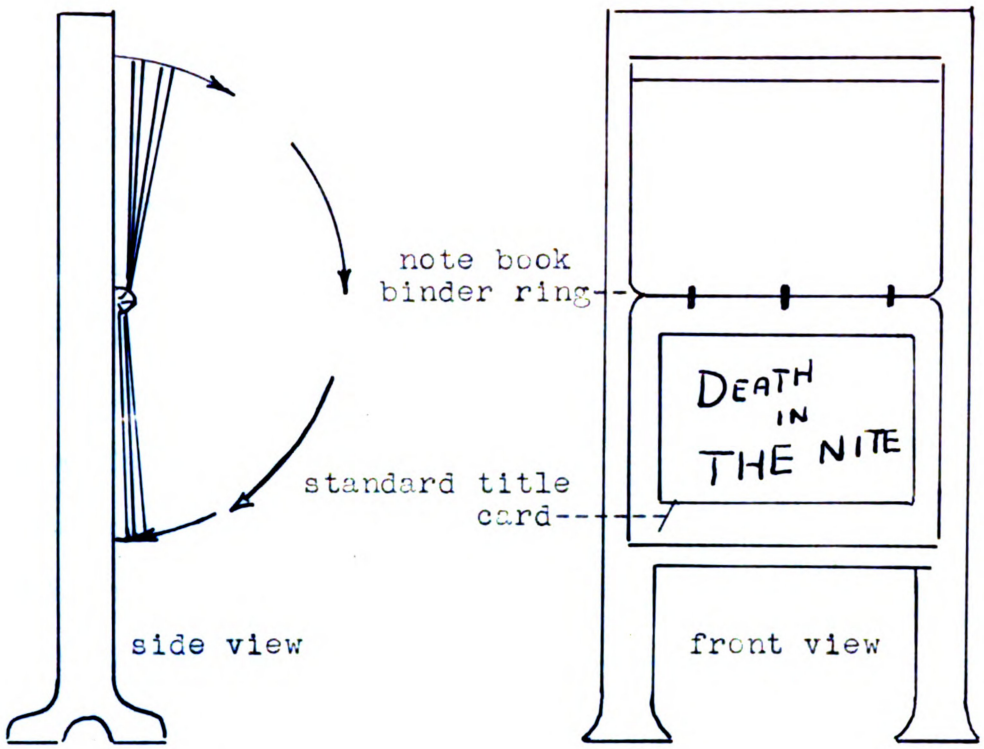


FIGURE NO. 32 - FLIP CARD STAND

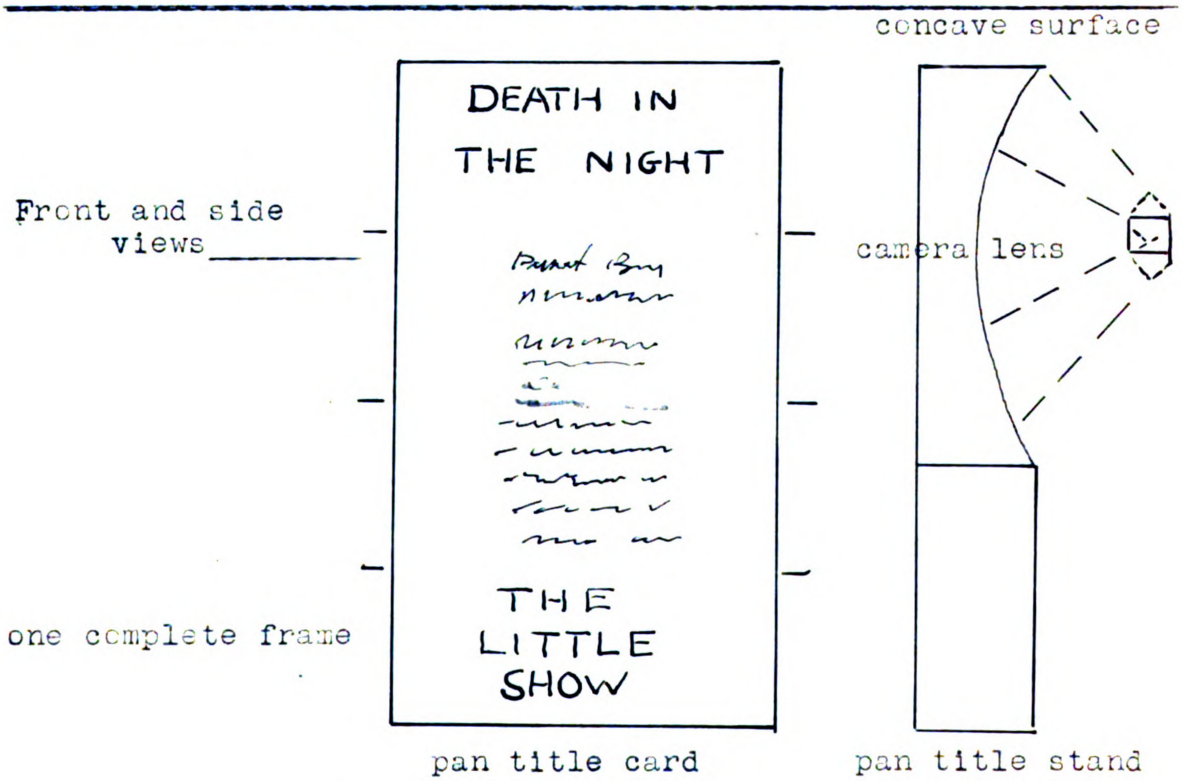


FIGURE NO. 33 - VERTICAL PAN TITLE CARD

the additional title cards.[19] The construction of such a device has already been discussed in this section. With masking devices the visual interest is stimulated by the three-dimensional effect of the titles which appear behind the cut-out.

Another type of masking device is the proscenium arch of a miniature stage. A miniature stage with a decorative proscenium may be used to display main titles and credits. The cards may be hand lettered or printing and appear as "drops" behind the proscenium. On cue, these miniature title card "drops" rise to reveal additional titles. Of course, the entire device should be built with the 3:4 television aspect ratio in mind, so that, standard size title cards may be employed.[20]

Sometimes it is even desirable to have the final "drop" rise to reveal the live actors and the beginning action of the drama through the miniature proscenium. To achieve this "mat shot" it is essential that the miniature stage and the full scale setting be in the correct perspective and that all related information be rendered in the aspect ratio.[21]

D. PAN CARDS

A title card may be extended in length either vertically or horizontally, so that, the camera can "pan" the card to pick up the visual information. Movement of the title is introduced as the camera pans

---

19 Ibid.

20 Ibid., p. 55.

21 See Chapter III, Section VIII for information on using the "mat shot" technique.

the stationary card. The movement of the camera creates the feeling that the titles are moving. The pan is normally from left to right or from top to bottom.

When a limited amount of program titles or credits are to be shown, they may be rendered on a pan card. The first and last items on the card should be surrounded with suitable margins, so that the camera can frame the beginning and closing titles without including any of the other information which is on the card. That is, the beginning and closing frame should have standard masking areas around the title, in order that the pan may begin with a complete frame and end with a complete frame. The pan card should conform to the aspect ratio except in the vertical or horizontal plane which has been extended.

There is a limit to the amount of visual information which the camera may pan on a flat surface without introducing optical distortion. This optical distortion of the lettering occurs at the top and bottom of a vertical pan card and on the extreme right and left ends of a horizontal pan card. Therefore, the pan cards should not be too long. If a great many program credits lines are required, it is better to use a "roll drum" device which will be discussed in the following section.

Optical distortion on a long pan card may be corrected by deliberately distorting the lettering on the card in the extreme frames. When viewed on camera the lettering is distorted into proper alignment and appears straight. A special stand may be constructed to hold the pan card and thus eliminate the problem of optical distortion. The pan title stand has a slightly concaved surface, so that the optical distance

from the camera lens to the surface of the card will be constant, thus eliminating the optical distortion. (See Figure 33, page 174).

Pan cards provide another means of presenting visual information during the course of live studio presentations. There are those who feel that a "roll drum" is more practical. This is certainly true when extensive copy must be presented. However, if a standard open and close is used for a program series, they may be permanently painted on canvas-covered plywood or poster board. Such materials are more durable when used extensively than the heavy paper used on the "roll drum."

The cost of the pan card is somewhat less than the cost of individual title cards. The cost of a permanent pan card is perhaps more than the cost of individual title cards but if built properly should last the life of the program series. It is somewhat easier to work with poster board, and canvas-covered plywood than it is to apply titles to the heavy paper used on the "roll drum." The cost of building the special stand to hold the pan card is moderate. The cost may be further reduced if other titling devices are incorporated into other usable sides of the pan card stand.

III. MOVING TITLE DEVICES

Definition. A crawl drum, an endless belt, and the scroll-roll are all devices designed to present a moving title before the stationary studio camera and to the television viewer. The titles and credits are printed or hand lettered on long strips of heavy paper, canvas, or transparent acetate film. Three-dimensional plaster or cardboard letters may

also be used on some of the devices. The device must be built to present titles that conform to the television aspect ratio of 3:4. The moving title devices are operated by a direct ratio hand crank, geared hand crank, or by a variable speed motor.

Usage. Moving title devices serve a very useful purpose in television production. They stimulate and increase visual interest by introducing movement into basically static information. The television viewer has been conditioned to expect moving titles by exposure to cinematic techniques. At the close of a program, the moving title device provides a convenient and flexible method of presenting program credits. The speed of presentation may be controlled to correspond to the amount of time available, since program content may run over or under its allotted time. When a great deal of written information must be presented in a short period of time, the moving title is the only answer.

The use of film in the presentation of moving titles is the ideal method, since control of many factors is achieved. However, the film occupies a definite period of time and its speed cannot be varied to conform with existing conditions. Copy changes are also more easily made when live titling devices are used in the studio. The cost of making a film title is excessive when suitable live titling devices are available. The live moving title devices should be carefully constructed, so that they will do their assigned job efficiently and effectively. Improvements in moving title devices are constantly being made in order to improve the quality of the visual presentation.

A. CRAWL DRUM

A long, vertical title sheet, mounted on a drum which revolves slowly in front of the camera is called a "crawl" title.[22] The drum varies in diameter from 18 to 36 inches and its width on the circumference is determined by the size of titles which are going to be used. It may be 14 inches wide to accept the 11" by 14" title material, for example. Smaller title sheets may also be utilized. (See Figure 34.)

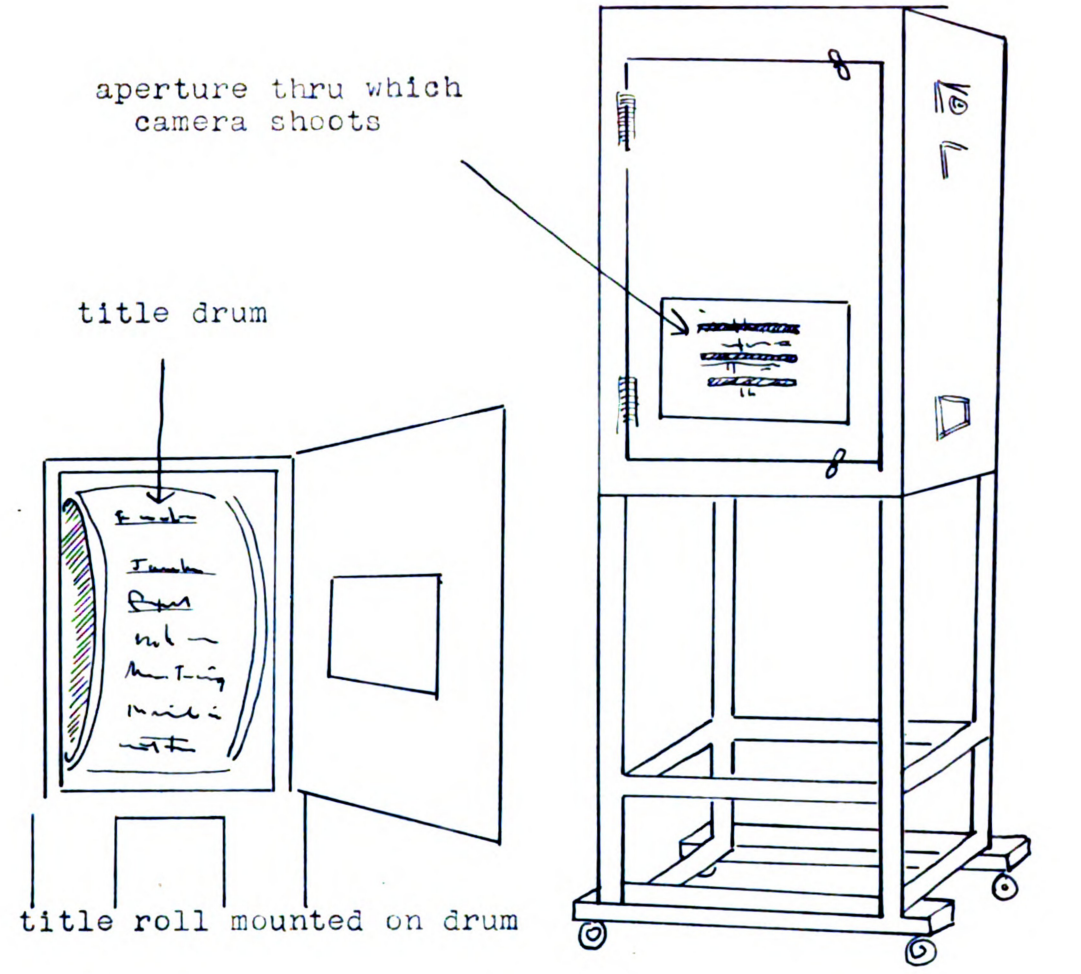
Masking devices may be used in front of the "crawl" drum, or the camera may be focused directly upon the convex surface of the drum. If a decorative mask or frame aperture is used in front of the "crawl" drum, the cameraman will include part of the decorative mask in his picture. The size of the mask is dependent upon the over-all size of the titles used. For example, a satisfactory size of a decorative mask would use an aperture of 7 1/2" by 10" with an actual camera field of 6" by 8" on the title material and the copy area would be approximately 5" by 6".[23]

The "crawl" drum is probably the most reliable form of presenting moving titles. The endless belt, and the scroll-roll each have their particular disadvantages which will be discussed in the following parts of this section. "Crawl" drums are considered to be standard equipment in most stations; however, their construction varies from station to station and may be a factor in their reliability. The drum must rotate

---

22 Edward Stasheff and Rudy Bretz, The Television Program, (New York: A. A. Wyn, Inc., 1951) p. 268.

23 Wade, op. cit., p. 54.



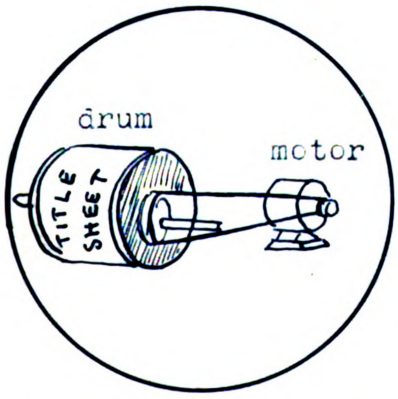


FIGURE NO. 34 - ROLL OR CRAWL DRUM

freely, and play from side to side must be non-existent. The construction must be solid, and rugged since the drum will be moved from studio to studio, and yet when placed in operation must give a faultless performance. It may be equipped with rollers. If so, it should be heavy enough to remain fixed and steady or a brake should be used to keep it in position during operation. The entire drum may be enclosed in a box, with only the titles visible through the masking aperture, or the construction may be open with provisions for changeable masking devices.

B. ENDLESS BELT

The endless belt is a device for the presentation of three-dimensional titles. An endless belt goes around and over two rollers. The front roller is usually smaller than the back one, so that there is a gradual incline from front to back. The three-dimensional plaster or cardboard letters are mounted in an upright position on the endless belt. The camera is focused on the top of the rear roller, in such a manner that when the endless belt is started, the titles will come up from the back and into the center of the picture picked up by the studio camera. The titles will then move toward the camera and gradually disappear out of the bottom of the frame. The endless belt may also be operated in the opposite direction. The titles would come up into the bottom of the picture frame, out of focus, continue up the incline, and when they reached the top the letters would be in sharp focus. The letters would then drop out of sight as they go over the back of the roller. (See Figure 35). A neutral or decorative curved background should be used

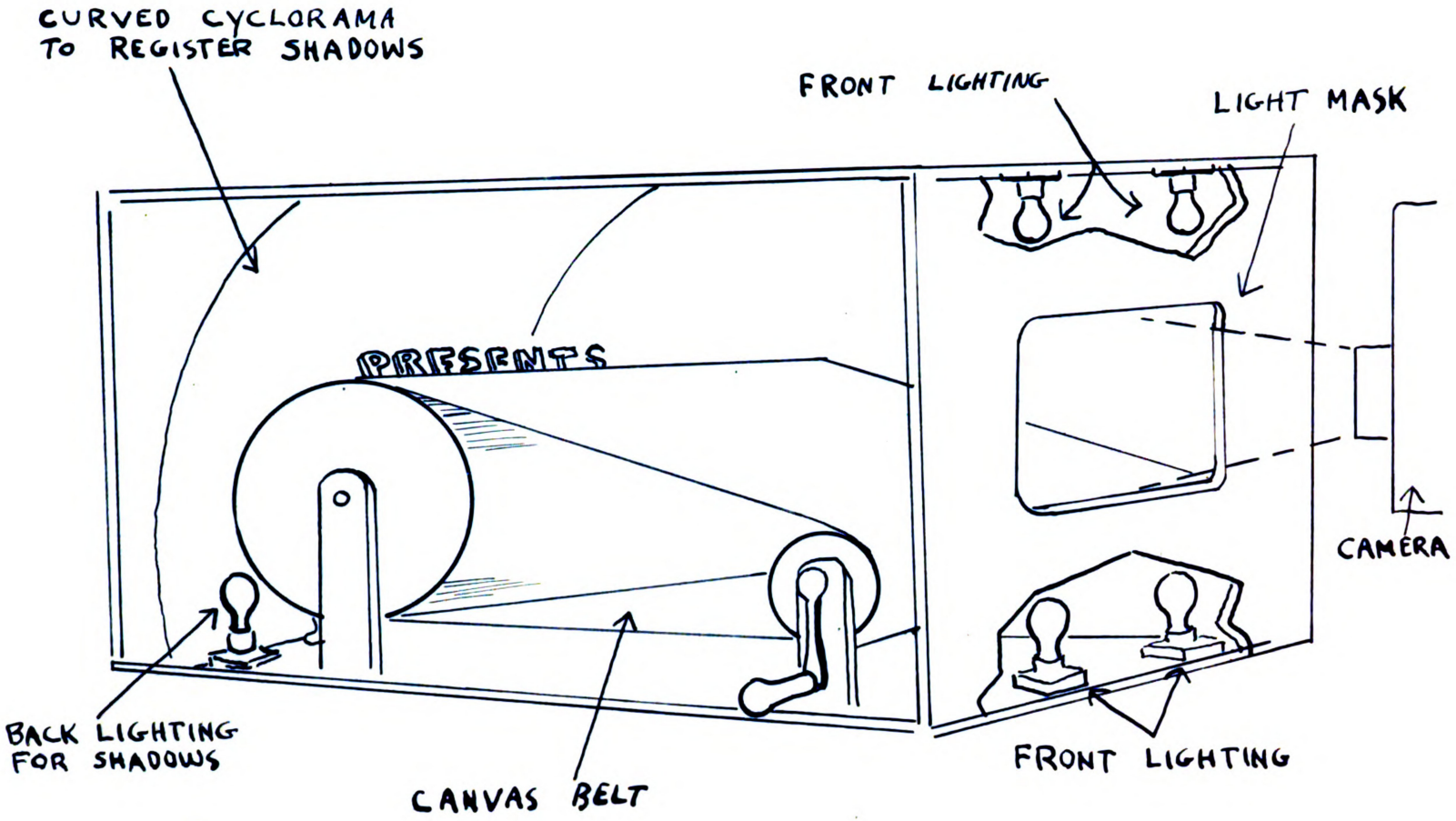


FIGURE NO. 35 - ENDLESS BELT - WITH 3-D LETTERS

behind the rear roller. With appropriate lighting the letters will cast interesting shadows upon the neutral background.[24]

The endless belt is useful in presenting small, three-dimensional objects as well as three-dimensional titles. The three-dimensional quality is very desirable but the amount of titling is limited by the size of device, that is, the length of the endless belt.[25] A considerable amount of time is involved in mounting the letters on the traveling belt, although the effect achieved usually warrants spending this amount of time in preparing the device. Troubles may also be encountered in securing the letters to the belt. Animal and fish glue may be used satisfactorily. The major disadvantage of this device is the limitation upon the amount of titling which may be presented. The device should be constructed so that the belt may be removed, thus allowing the use of additional title belts, each designed for a particular program. The device may be built for a moderate price. The canvas belt and the plaster letters are also relatively inexpensive.

A variation of this device would be a drum upon whose surface the three-dimensional letters could be affixed. The drum could be slotted to receive the letters providing a convenient way of mounting the letters with proper spacing between the lines. A drum with a soft porous surface could be used so that letters with pins in their base could be

---

24 William C. Eddy, Television: The Eyes of Tomorrow, (New York: Prentice Hall, Inc. 1945) p. 201.

25 Ibid.

stuck on the surface very easily. Once again the amount of titling is limited. The circumference of the drum will, in relationship to the size of the letters used, determine the amount of titling which may be mounted on the surface of the drum.

C. SCROLL-ROLL

The scroll-roll title device, or endless roll-up as it is sometimes called, consists of two rollers, one at the top and one at the bottom of a vertical frame approximately four feet high with an endless or continuous piece of canvas, heavy paper, cloth, or transparent acetate film moving between the two rollers.[26] More information may be presented if the belt is scroll-like, that is, if the material is stored on one roller and moved to the other roller when the titles are displayed on camera. The rollers should be large, so that the belt will move smoother and tension problems will be reduced. A plywood tension plate should be used behind the scroll-belt. The tension plate should be free-floating and press against the back of the scroll-belt with a constant pressure. The plywood tension plate will also provide a flat, firm surface upon which the camera may focus. (See Figure 36.) A decorative mask may be used in front of the scroll-belt.[27]

---

26 Maynard A. Speece, A. F. Skelsi, and K. M. Gaspin, "Visual Aids" A Report on United States Department of Agriculture's Television Research Project, Section II Visual Aids, Radio and Television Service, Office of Information, United States Department of Agriculture 19, p. 6.

27 Ibid.

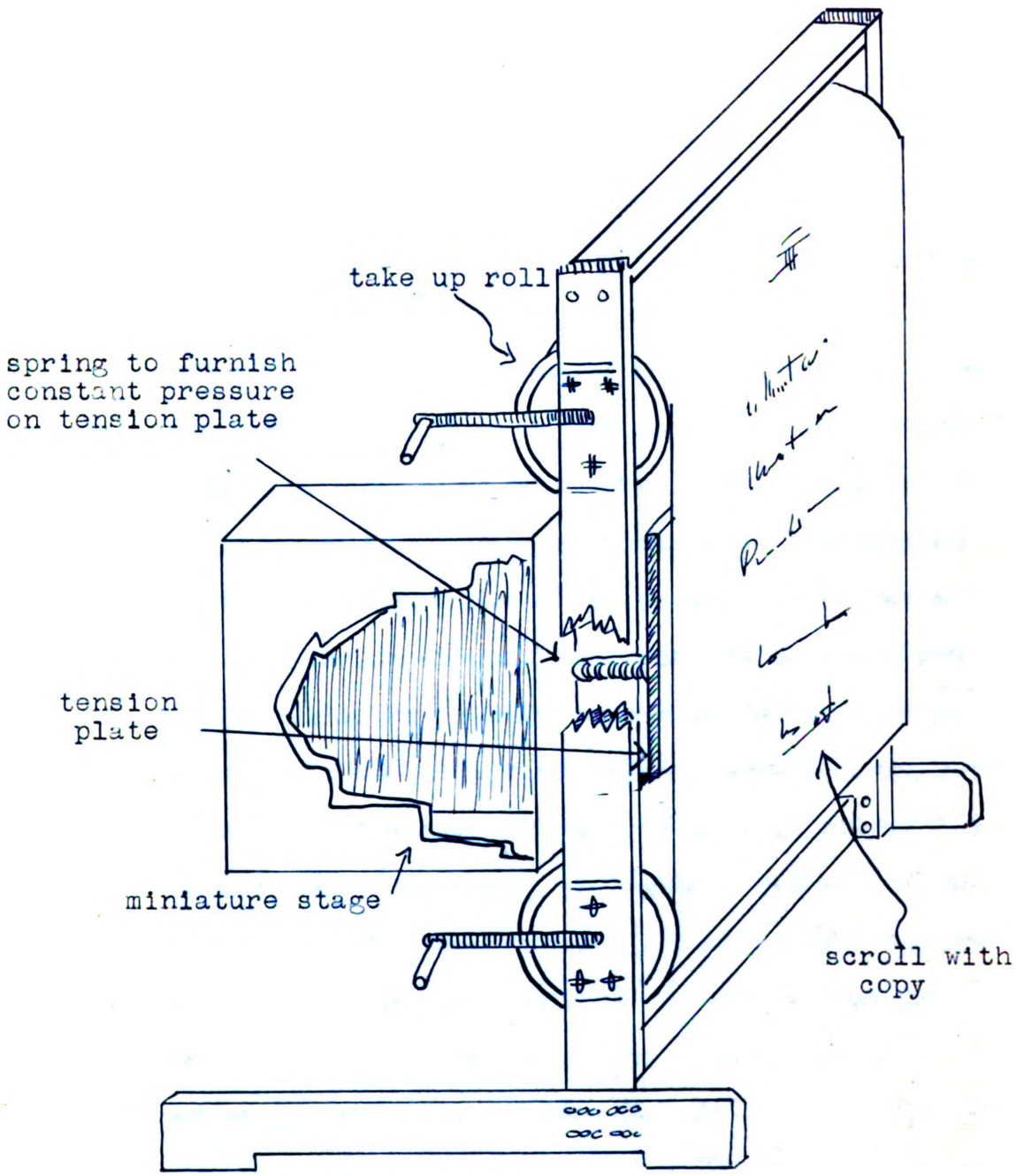


FIGURE NO. 36 - SCROLL - ROLL TITLING DEVICE

In constructing this device the television aspect ratio should be considered. A convenient size would use a belt from 12 to 16 inches wide. Additional flexibility of the device may be achieved with the addition of a miniature stage behind the scroll-belt. A transparent belt is utilized to combine the titles with a suitable background. Silhouette titles would also be very practical with this device if both front and back illumination is provided.

The scroll-roll is particularly useful in the presentation of extensive copy required in a title or in a synopsis. The major limitation of the device is in maintaining proper tension and a smooth roll. Therefore, the size of the rollers and the operation of the tension plate are critical factors in the construction of this device. If the device is constructed with the miniature stage, its flexibility and usefulness will be increased. The titles for a fashion program may be presented on the transparent scroll-belt with appropriate fashion accessories displayed in the background. An interesting visual transition for a dramatic program can be achieved with this device. For example, the copy on the transparent scroll-belt will bridge the time, while a significant program motif is displayed in the miniature stage behind the copy material. When the transparency is used, lighting problems will be encountered. It is therefore best to light the miniature stage and let the light spill out through the transparent acetate film upon which the letters are written.

The scroll-roll titling device will add variety to the ways in which a station may present live titles. If the device is carefully

constructed, it may prove as useful as the "crawl" title drum. The cost of construction depends upon the size, but generally it is moderate.

D. PRODUCTS DRUM

A moving cylinder or drum about 30" wide and varying in diameter from 18" to 36" may be used to display small commercial products which are mounted upon its convex surface. The drum rotates in front of a stationary camera bringing the various products into view. Smooth operation is assured with a geared hand crank or variable speed motor.[28]

The products drum is useful in animating or giving movement to static displays. It will show all sorts of small three-dimensional objects, such as cigarettes, breakfast cereals, soap, shirts, ties, and small household appliances. The display may be arranged in such a way that the products will spell out the name of the sponsor, the program, or other suitable words. (See Figure 37.)

The effectiveness of the products drum is limited by the size of the object which may be affixed to its surface. Problems in attaching the various products to the drum may present problems. However, product boxes are usually displayed empty, or if the object is too heavy or bulky to be used, a cardboard facsimile is often used. The graphics department can usually produce such a facsimile within a few hours. The cost of the drum is within the means of most stations. Stations which present many live commercials during the operational day will find the products drum useful in adding variety to their methods of commercial presentations.

---

28 Wade, op. cit., p. 63.

FIGURE NO. 37 - PRODUCTS DRUM

IV. ZOOMS

Definition. The process by which a small title, or object rapidly approaches the camera, becoming larger and larger until it is framed in a close-up, is called a "zoom". The zoom may be achieved in several different ways. The easiest method is by using a Zoomar lens. This is a special lens whose focal length may be varied by the cameraman, thereby bringing the image into a close-up. This type of lens is used extensively in special events and sports coverage.

A box-like frame, about four feet long, may be built which will support, on a metal sliding track, a title card holder of approximately 20" by 30". The camera is located at one end of this zoom device while the title card and holder is rapidly moved toward the camera. The smoothness of this movement is very important. The cameraman may focus on the card as it is moving toward him, or he may choose to adjust his focus so that the title card will move into focus as it comes into the close-up. Experimentation will determine the correct camera lens, the correct size of the letter, or object, and the correct size of the title or background card. The smoothness of the zoom greatly determines its effectiveness.

A third way to effect a zoom is to use a 35mm lens and to dolly the camera in on the object. The size of the original object and the desired size of the close-up image on the monitor will determine the length of the dolly-in. With this technique a small emblem may be used which is completely undistinguishable in the long shot but will fill the frame in a close-up when the zoom is completed.

Usage. The use of the zoom technique for emphasis of an idea, object, or title is excellent practice. Visual interest of the viewer is definitely stimulated as his attention is sharply focused upon the desired title, object, or detail. The effectiveness of the zoom lies in its visual impact upon the viewer. The zoom should be used with discretion so that the impact of the technique is not destroyed. However, it may be used purely for its novel effect. Over-use is something to guard against.

V. TURNTABLES

Definition. The basic turntable is a circular, revolving table which will move at varied speeds either by the use of a geared hand crank or a variable speed motor. The diameter of the tables varies from 12 to 48 inches.[29] The height of the turntable should be variable, from approximately five feet to about two feet above the floor.

Usage. The turntable is another device used to introduce movement into static material. The television camera remains in a stationary position and the turntable brings the objects into view.

Products of various sizes and descriptions may be displayed to the viewer by using the revolving turntable. It serves equally well in displaying packages, shoes, appliances, dishes of food, or in exhibiting the successive series of a particular manufacturing process. The items or objects are generally placed around the edge of the turntable and

---

29 Wade, op. cit., p. 63.

each in turn passes before the camera. Depending upon the position of the camera in relationship to the turntable, various effects may be achieved. The camera may shoot down on the turntable, for example, or the camera shot may be on a level with the turntable. (See Figure 38.)

A circular background may be placed in the middle of the turntable and various objects displayed before it. Models of the latest cars could be shown in front of a scenic background, for example. Or the circular background could be draped with cloth. Books displayed on end in front of such a background would be effective. It would be a suitable display for a library program on current books and magazines. Program titles may also be effected in this manner.

Small revolving turntables may be purchased; however, these are not always suitable since they may not be heavy enough in their construction or afford the variation in speed that is necessary. A turntable can be built for a relatively low cost, although the variable speed motor may be hard to acquire.

A. REVOLVING STAGE

A revolving stage with six or eight small triangular stages may be utilized in conjunction with the turntable. The stage will be hexagonal or octagonal in shape. The size will depend upon the number of stages employed and upon the size of title cards used by the station. The proscenium arch of each stage should be grooved to hold title cards.[30] (See Figure 39.)

---

30 Speese, op. cit., p. 6.

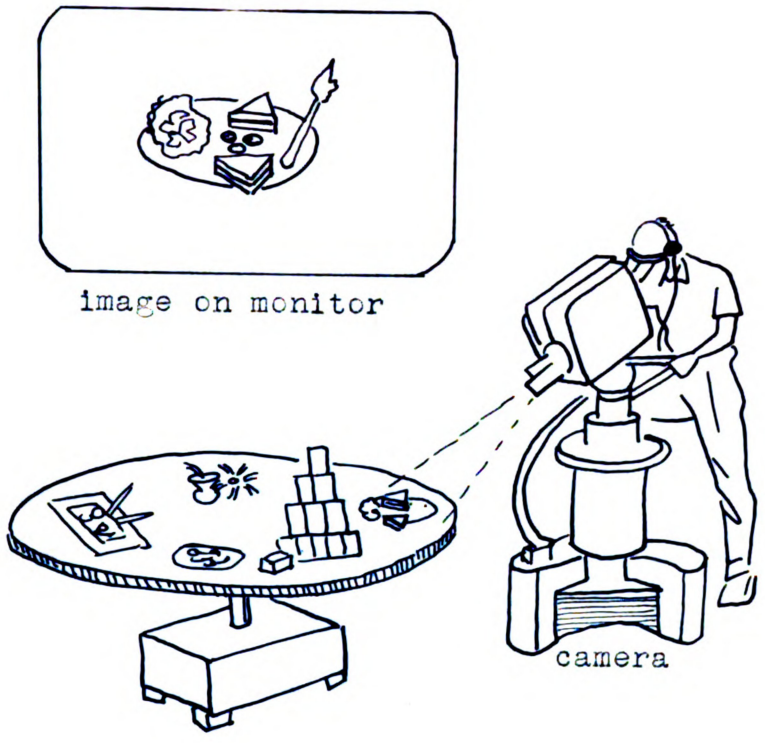


FIGURE NO. 38 - TURN TABLE

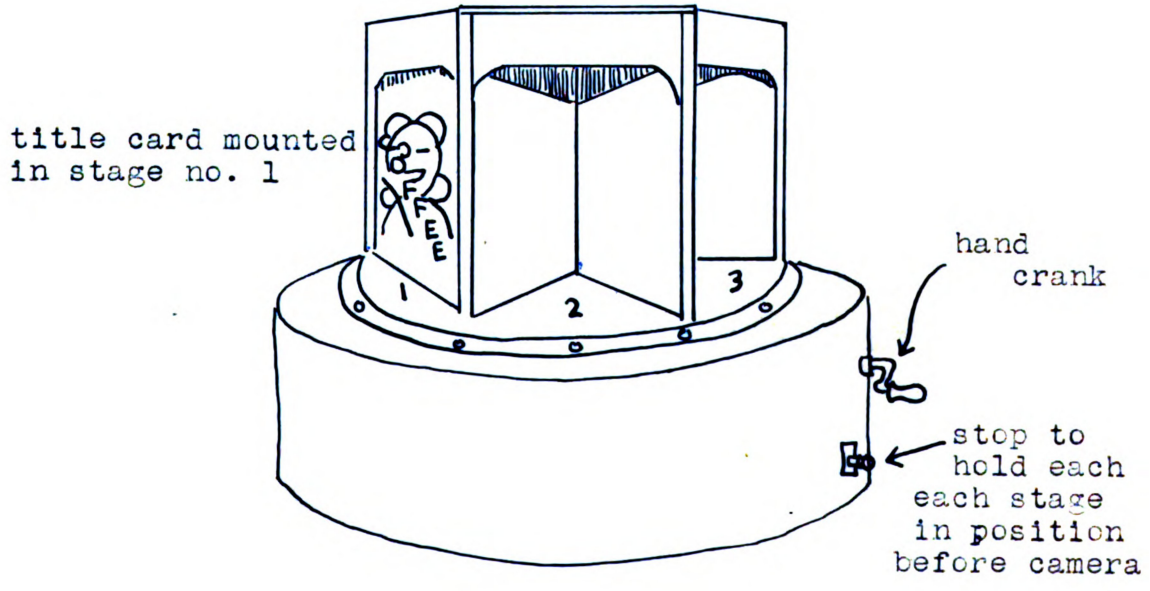


FIGURE NO. 39 - MINIATURE STAGE

This miniature revolving stage can be used to display models and small objects. Background scenery may be utilized to provide a miniature setting. The device may also be used to show portions of a products story. As a titling device it has several uses. Front surface title cards may be used as well as mounted pictures and other graphics. Transparencies may be utilized to display titles lettered on the acetate cell before suitable background scenery within the stage. Objects and title cards may be removed from the stages after they have been shown on the air and replaced with other title cards or scenes.

One of the major advantages of this device is its flexibility in the presentation of visual material. It can show two-dimensional material, that is, title cards, or it can show three-dimensional objects and materials within the miniature stages. One of its disadvantages is the fact that each stage must be stopped in the same position each time in front of the camera lens. This is somewhat difficult to achieve unless some type of mechanical stop is used. A pull-out pin attached to a spring can be used to stop each stage at the proper position, but it must be released each time the stage is revolved.

The cost of building the revolving stage is greater than the cost of building some of the simpler titling and display devices. Lighting of the small stages individually will further increase the cost. However, if the device is constructed to serve a variety of purposes it will warrant the cost.

VI. SPECIAL TITLING DEVICES

There are many simple objects which may be employed as titling devices. Any object that is unusual or will catch the attention of the viewer should be considered. The cost of the device is seldom related to its effectiveness on the air. Often the cheapest and simplest device is the most effective.

The "Lucky Strike Hit Parade" has consistently presented novel, and interesting titles in the staging of the hit songs on their weekly program. They employ simple ideas and devices to achieve their titling. The titling is generally appropriate and in keeping with the staging of the song. The titling "gimmick" must fit into the particular program sequence or it will call attention to itself and distract from the intended point of visual interest.

Here are some suggestions on possible titling devices. A miniature clothes line may be used, with program titles and credits printed on the clothes.[31] A multiple sign post with its many directional signs pointing to different cities may be used as a novel introduction to a travel program. The sign post titles could be so arranged that they would spell out the title of the program.[32] A toy train with program titles or sponsor slogans painted on the individual cars presents an interesting moving title display. A theatre program, a football program, a newspaper,

---

31 Hutchinson, op. cit., p. 252.

32 Battison, op. cit., p. 208.

real or faked, a simulated book with faked cover, a restaurant menu, baby building blocks, and many other similar objects may be utilized for titling.

Hardware and variety stores will provide many of these special titling effects or at least furnish some ideas which may be worked out in the station shop. The production staff of a station should be alert to the possibilities of the simple devices which can be picked up in a dime store and they should frequently check the stores for new merchandise.

VII. PROGRAM VISUAL AIDS

Visual aids for use on television programs do not differ greatly from classroom visual aids. The essential difference is in their preparation. A visual aid which has been used satisfactorily in the classroom can be easily adapted for television usage. Any visual aid must be carefully thought out and prepared if it is to be effective. The major advantage in using visual aids in television production as opposed to their use in the classroom is the fact that the television camera can concentrate the attention of the viewer upon the visual material. In the television presentation all viewers will be able to see the visual aid with equal clarity and the camera can provide a close-up of significant parts on sections to provide further emphasis and clarity to the visual material.

Action or the suggestion of motion, that is, animation, realism, familiarity, immediacy, simplicity, availability, convenience in use,

and cost, are the major factors which are used in determining the effectiveness of visual aids for television.[33]

In preparation of the visual aids for television, all of the factors considered in Section I of this chapter should be reviewed. Beyond those suggestions, all lines and figures should be bold enough so that they may easily be seen in wide-angle shots as well as in close-ups. The visual aid should be simple in design rather than complete and complex. All fine detail should be eliminated.[34] Simplicity is the basic essential for all visual aids.

A. ADHESION BOARDS

Definition. There are two types of adhesion boards in general usage, the flannelgraph and the magnetic board. The flannelgraph consists of a plywood board covered with high quality flannel cloth upon which cut-outs of heavy cardboard, backed with flannel or strips of sandpaper will adhere. Since the flannelgraph should be built in the television aspect ratio, a three-quarter inch plywood board, 36" by 48" is a convenient size. The plywood board is fairly heavy so that it will be rigid when placed upon display easel and will form a solid backing for the flannel. The flannel cloth is stretched tightly over the wooden frame to form a smooth surface and is tacked down on the reverse side of the board. Since the cut-outs depend upon surface contact to stay

---

33 Speese, op. cit., p. 9.

34 Tettemer and Niven, op. cit.

"put", they should be handled carefully so that they will not become bent.[35] Once the nap is worn off the flannel, the cut-out will no longer stick to the board. The flannel cloth may be renewed by brushing with a stiff brush or new cloth may be purchased.

The magnetic adhesion board may be of two types. One employs small rectangular magnets which adhere to a metal board. The other type of board has a magnetized backing, so that cut-outs and other objects, backed with a metal strip, will adhere to the board.[36] Only metal objects which contain iron will adhere to the magnetized board. Only flat material may be used on the metal back board since small magnets are used to hold the material to it. However, the small magnets may be embedded in the base of an object so that it will adhere to the metal back board.

Usage. Adhesion boards are extremely flexible and may be used in the presentation of a wide variety of visual program material. Economic material, furniture arrangements, kitchen planning, artistic drawing, and letters of the alphabet, as well as commercial messages may be displayed by using the flannelgraph or magnetic board. Football plays can be demonstrated with the flannelgraph, or a sports announcer can use it to display the scores of the major football games. The size of the cut-out for use on the flannelgraph varies. Large cut-outs often present problems since they tend to slide off the flannelgraph, but if enough sandpaper is placed on the back of the cut-out and the board is tilted

---

35 Speese, op. cit., p. 4-5.

36 Ibid., p. 5.

back at the top, good results should be achieved. The use of the flannelgraph provides a cheap but interesting method of presenting factual information, a visual story, or stimulating visual interest in static information.

The magnetic board is more expensive than the flannelgraph, but it is more dependable and creates more interest. Small three-dimensional objects may be used and since the magnetic pull of the board is comparatively strong, objects may be pitched from a distance and yet cling to the board. Also, since the magnetic board has a stronger pull than the flannelgraph, it will support more weight.[37]

B. OVERHEAD PROJECTOR

Definition. The overhead projector or Vu-Graph projects an image onto a screen behind the operator. The image has been picked up by a lens system from a flat transparent surface upon which the operator works. The usual size of this transparent surface is 7" by 7", but additional lenses and accessories are available which adapt the device for 3 1/4" by 4" slides, 35mm filmstrips, or 2" by 2" slides.[38]

Usage. One of the particular advantages of the overhead projector is that the operator can work upon the transparent surface and just by glancing up, look directly at the camera. He never has to turn his back to a camera such as is the case if a blackboard were used. Another

---

37 Ibid.

38 Ibid., p. 7.

advantage of the Vu-Graph or overhead projector is the fact that the operator, by using a pencil can point out important features in a slide upon the transparent surface, and this definitive movement will be projected upon the screen behind him where it is picked up by a television camera. Pointing to the material directly on the slide is much easier than pointing to the material on the screen. Visual interest is also stimulated since pointing to the material directly on the slide introduces a form of animation.

The material for use on the Vu-Graph may be prepared on a black opaque plastic film which produces white letters. This material is particularly good when used to produce magical drawings. On the black, opaque, plastic film the operator may sketch or cartoon with a stylus the image being projected as he proceeds. The hand of the operator is not visible on the screen and the image appears as if by magic. This form of simple animation is excellent in presenting a visual story.[39]

A cellophane roll is also provided. Writing, figures, drawing, or sketches are done on the cellophane roll with a grease pencil. The material is projected dark upon a light screen. Information may be placed upon the cellophane roll before the program, and the roll can be advanced from one frame to the next during the air performance. The operator can draw, or write as he talks and when the frame is filled with information and he has finished talking about it, the cellophane roll is advanced to a clean spot and the operator continues.

---

39 Consult Chapter III, Section IV, for additional information.

Transparent acetate sheets or "cells" may also be used on the Vu-Graph. Grease pencil or special colored inks are used to place the information upon these "cells". The acetate transparencies may be placed on top of each other to achieve simple animation effects. The cumulative stages in the construction of a building, for example, may be shown. The initial transparency may show the foundation, and the second "cell," which is placed upon the first, will show the walls of the building. This process would continue until the complete building is shown. By starting with the simplest element, a build-up or overlay of "cells" will visualize a complex process, effectively, accurately, and interestingly.[40]

This overlay process may also be used with the black opaque plastic film. A strip-tease effect is created as the various sheets or "cells" are removed and more and more information is displayed to the viewer.

When colored ink and grease pencil are used in preparing the "cells", appropriate color filters over the camera lens may be used to block out certain elements of the picture from the viewer. As the filters are removed, additional features of the composite drawing will be visible to the television viewer. The details of this operation should be carefully worked out with the station, and they should be perfected during the rehearsal periods.

On the informational type of program, the overhead projector is extremely useful in the presentation of visual material which is adaptable

---

40 M. Mann, "Television's Five Ring Circus," Popular Science, 157:110-6, October 1950.

to use on a transparent slide, "cell", or lends itself to visualization on the cellophane roll. The projector may be operated by the talent; that is, the projector and screen are a part of the setting. Or the projector may be operated by another person off the set. When the latter method is used, only the projected picture will be visible to the viewer.

The cost of the Vu-Graph is comparable with the cost of other projectors. If the overhead projector is used extensively by a skillful operator to produce live graphics, it is well worth the cost.

C. LIVE GRAPHICS

Definition. Live graphics generally refer to any writing, sketching, cartooning, drawing, or similar activity which is originated by the performer as he is being televised for the viewer.

Usage. In the information type program, the use of live graphics increase the effectiveness of the program content. The use of live graphics stimulates the visual interest of the viewer, because he sees something actually being created. The demonstration is a form of live graphic, having been used successfully for many years in classroom teaching. Using the graphic arts to clinch important points and to help describe or present difficult or complex ideas is an excellent television technique.

Some of the material used in presenting live graphics are: chalk on blackboards, grease pencil on pappr or plastic, colored crayon on sketch paper, charcoal on paper, and paint on paper. Experimentation

will determine the best colors to be used. The gray scale responses of all color media and backgrounds should be checked by the station. Often a list of acceptable materials with indicated contrasts between media and background, is available from the television station. If the station has not checked the gray scale responses of material to be used in live graphic presentations, they should be checked in the rehearsal period. Section I of this chapter should be reviewed for the information on the preparation of graphics for television broadcasting.

D. FERRIER-GRAPH

Definition. The "ferrier-graph" employs the principle of the comic valentine where a string is pulled or a tab is moved to animate the valentine. Simple animation of the valentine results as the eyes of the image, for example, are caused to roll by moving a tab. The "ferrier-graph" may have as many as three or four tabs which when pulled in the proper sequence will animate the idea. The "ferrier-graph" is particularly suited to television since the tabs are operated off-camera with only the resultant action being seen by the camera and the television viewer.[41]

Usage. The "ferrier-graph" is used to add movement or simple animation to a static idea. The impact of the visual message is increased by adding simple animation. Generally there is an appropriate basic background drawing, and as the story is related, the cut-out of an object

---

41 Speese, op. cit., p. 11-2.

will be inserted through a slit in the basic drawing. A tree may grow, for example, when a certain amount of fertilizer is added to the soil. The growth of the tree could be animated with the "ferrier-graph" technique. The "ferrier-graph" may be rendered in any size, but a standard title card size would be the most convenient.

Simple animation of ideas by use of the "ferrier-graph" technique is most effective. The major advantages of the device are its inexpensiveness, the easy availability of material, and the small amount of time required in the preparation of the device.[42]

E. PULL-TAB AND STRIP-TEASE CARDS

Definition. Pull-tab or strip-tease cards use the principle of a sliding panel which is pulled to reveal additional information behind the panel. A cut-out is usually present in the information card. This is backed-up with the pull-tab which uses the same background color so that the cut-out portion of the information card is not visible on camera. In other words, except for the lettered information on the initial card, it appears perfectly plain on camera. When the pull-tab is pulled or slid out from behind the cut-out, however, additional information is revealed written on the pull-tab itself or located on another card behind the cut-out and the pull-tab.

With the strip-tease card, masking tape or paper may be used to cover certain particular pieces of information. At the appropriate time,

---

42 Ibid.

the masking strip is "stripped" off, revealing the visual information which had been hidden from view. The same effect can be achieved by using cards of the same background color in front of the title card. By removing each card in a left to right manner, and in sequence, a strip-tease is effected, and the viewer sees lines of print appear across the supposedly blank card.

Usage. The pull-tab and the strip-tease can be used to give movement and animation to static information. If the visual information is not revealed until the appropriate time, the impact of such information is greater. Visual interest is stimulated since the viewer wants to see what is going to happen. Also the viewer will retain the information longer, since his attention has been focused on various details as they were revealed to him, rather than seeing and trying to comprehend them all at once.

The pull-tab technique may be used in showing a bar graph of population increases, for example. The space occupied by the bar of the graph is cut-out. Behind this cut-out is placed a movable slider or pull-tab, one-half painted the same color as the background of the information card, the other half painted a contrasting color since it will form the color of the bars on the graph. When the camera first sees the graph card, no bars are visible, but as the population information is given, the slider or pull-tab is pulled, so that the bars on the graph become visible and continue to increase in length until they fill the whole bar with color. (See Figure 40.)

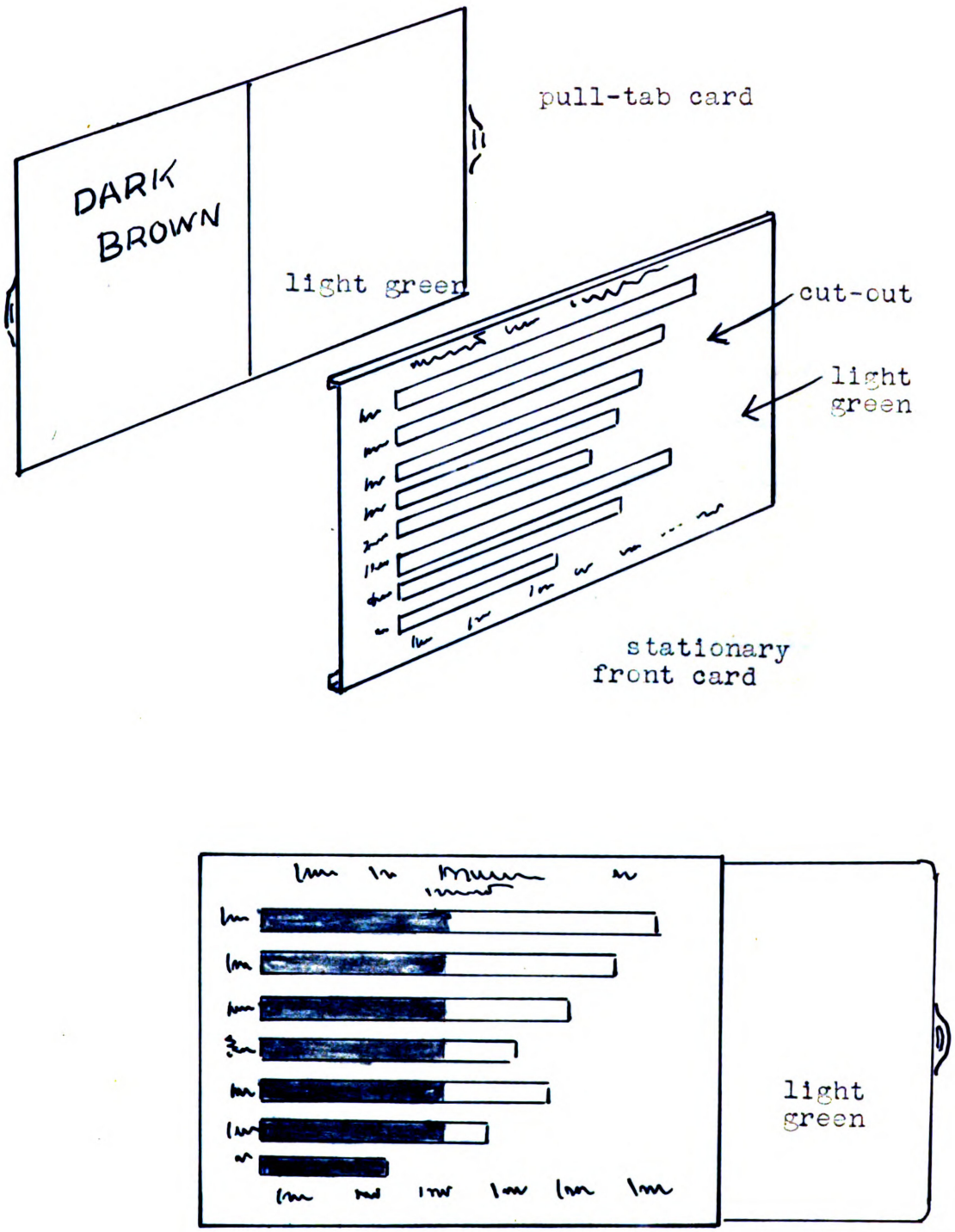


FIGURE NO. 40 - PULL-TAB CARD

The pull-tab or strip-tease technique may be used in question and answer sessions. For example, the picture of a person is shown and at the appropriate instant his name will appear below the picture when the pull-tab is removed.

The pull-tab and strip-tease devices are easily constructed. Their cost is slightly more than the cost of a standard title card. To be effective they must be carefully constructed so that they will operate smoothly. However, their effectiveness on the air warrants the time and effort spent in their conception, construction, and in their use.

F. MODELS

Definition. Models are an exact reproduction or cut-away view of an actual object, rendered in a scale which may either be larger or smaller than the scale of the original object. A model of a large object which has been rendered on a very small scale is usually called a miniature.

Usage. The construction and use of miniatures and dioramas was discussed in Chapter III. However, something more should be said about the specific use of models in television production. A model should be used when any of these factors are present: (1) when the real object is too large or non-portable, (2) when the real-life object is not available, (3) when the real object does not reveal the information which is to be emphasized, and (4) when the real object is perishable or difficult to obtain at a given time.[43]

---

43 Ibid. p. 15.

Most models may be displayed on a table. The height of the table will depend upon the size of the model. The camera should be able to look at the model from all angles. It should be remembered that the apparent scale of the model can be altered by the camera so that the model will appear full scale on the television screen. Objects which are not in the same scale should not be used with or located near the model if a sense of realism is wanted.

The construction of models is comparatively expensive and is usually prohibitive for the local television station. However, most schools have numerous models of the human eye, the ear, the torso, and the head, to name a few. Many models are available and may be borrowed from manufacturers. They have been built as advertising pieces but their use is generally not objectionable on the television system.

Children's toys are very useful as inexpensive models. Many of these toys have moving parts which stimulates more visual interest. Toy trucks, cars, dolls, and model buildings are among the list of children's toys which may be utilized.[44] Often the toys must be repainted, however, to obtain the best contrast for reproduction on the television system.

In the presentation of visual material via television, the model, outside of the actual object, will stimulate more interest and make the program more informative and employable than any other visual aid. Therefore, models should be utilized whenever practicable.

---

44 Ibid.

G. ANIMATION

Definition. Mechanical and graphic devices which produce or impart by various means life, or seeming movement, to static and inanimate objects are called animation devices. Almost everyone is familiar with cinematic animation, since most motion picture theatres show animated short subjects or cartoons. Animation is best produced on film. However, there are certain mechanical and graphic techniques adaptable to live titling and for use in television production. Most of these live animation devices are used in the studio. The majority of these animations effects are easy to construct and their cost is nominal.

a) Overhead Projector. The use of the Vu-Graph or overhead projector has already been discussed in part "B" of this section. However, it may be again stated that the Vu-Graph provides an inexpensive method of animation when it is used by skilled artists. The possibilities of the overhead projector as an animation device are still being explored.

b) Books. Books which are used as titling devices or to present a story line in a particular program may be easily animated. A regular or over-sized book may be used. A hand that appears in the picture to turn the pages, one by one, before the television camera, is a form of animation. Program titles may be displayed on the cover and credits on successive pages of the book. Used as a titling device, a technique often employed in the motion picture, the viewer sees the book and its title which is incidentally the title of the series or particular program. The book is opened, either mechanically or a hand introduced into the

picture, turns the pages. After the opening titles and credits, the viewer may see a portion of the printed story as the narrator begins to tell the story. A dissolve to the live studio action is executed and the story is revealed. At the close of the story, the viewer is returned to the book, this time to the final pages. The cast credits and other necessary information is presented before the cover is closed and the program is ended. (See Figure 41.)

The individual pages of an over-sized book may be attached to wires or levers which are extended beneath the table upon which the book is mounted. When the corresponding wires are pulled or manipulated, the individual pages of the book will turn.[45]

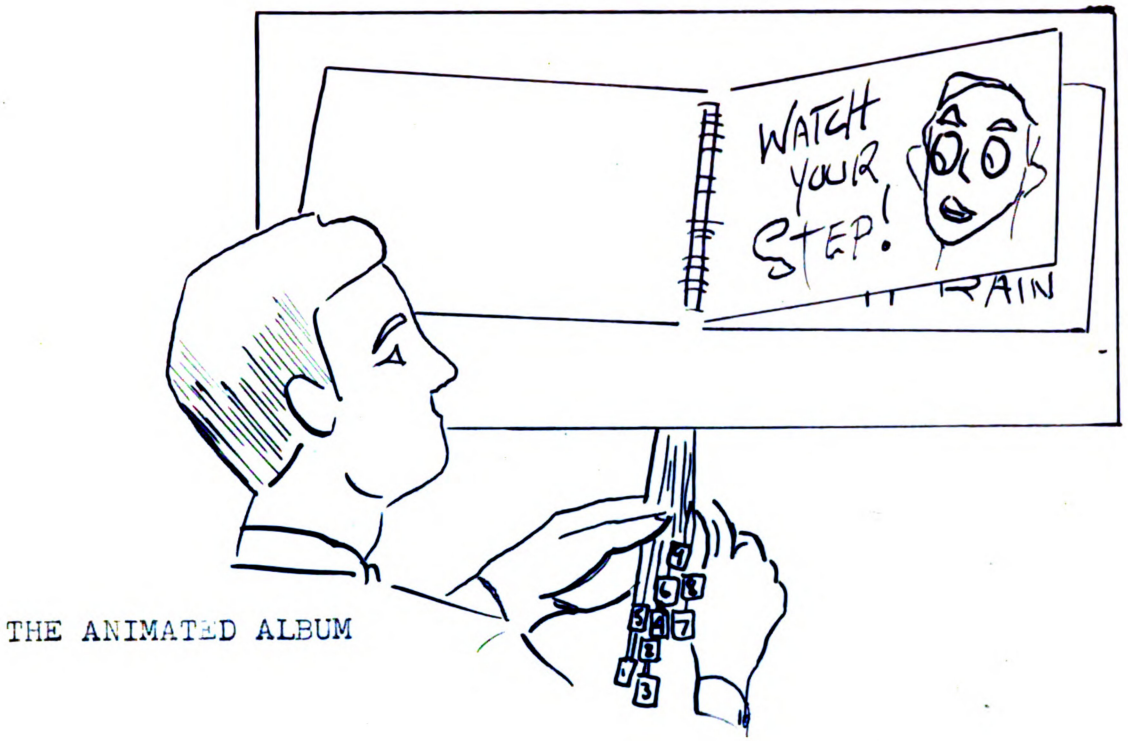
c) Magnets. Magnets are very useful in the animation of title cards, graphs, and cartoons. For example, a magnet may be placed behind a title card and its magnetic strength will hold a small metal arrow, bounding ball, or other object to the surface of the title card. When the magnet is carefully moved through a series of pre-determined positions on the back of the card, the bouncing ball, or arrow will perform on the front surface of the title card.

Graphs may be animated by using an appropriate symbol or object which will move either up or down, on the front of the card, to correspond with the graph line, when a magnet is moved on the rear of the card.

The various parts of a simple cartoon may be successfully animated by using small, but powerful magnets. The cartoon of a boy's and girl's

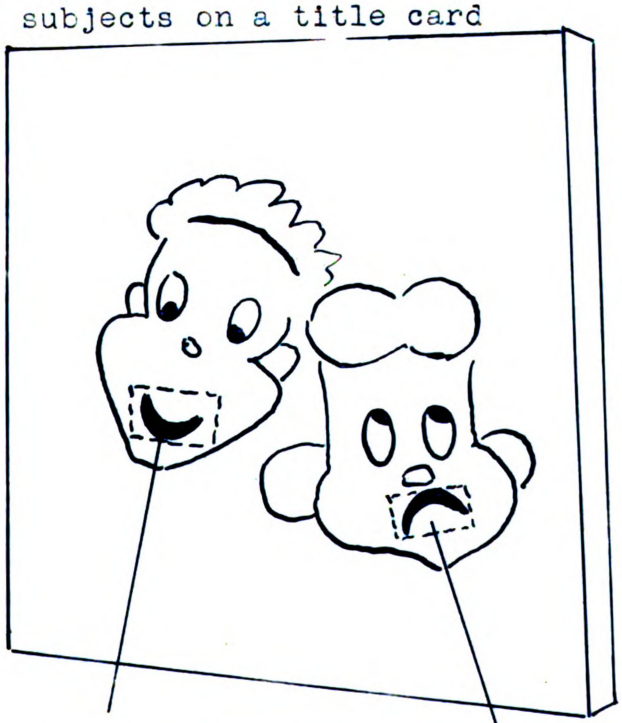
---

45 Louis Sposa, Television Primer of Production and Direction, (New York: McGraw-Hill Book Company, Inc., 1947) p. 73.



THE ANIMATED ALBUM

subjects on a title card



magnet

by moving magnet mouths are animated

cresent shaped mouths are made of iron

FIGURE NO. 41 - ANIMATION. Book and magnetic cartoon

face may be animated by having the corners of the mouth turn up or down. The cartoon uses a metal mouth which is attached to the title card with a piece of black thread. It is turned either up or down depending upon the placement of the magnet on the back side of the cartoon. (See Figure 41) Eyes may roll or a tongue may move when the corresponding magnet is operated behind the cartoon. This type of animation device is very easy to construct. The magnets may be obtained from a novelty store and the metal parts which are moved in the animation may be cut from sheet metal or tin cans.

d) Maps and Charts. Graphs, maps, and charts may be animated in several ways. One animation device uses a graph or chart that is drawn on a piece of transluscent paper. The paper, which can be ordinary tracing paper, should be in the television aspect ratio and mounted in a frame. This frame can be incorporated into the set so that a man may stand behind the graph or chart without being seen by the television camera. To effect the animation, the artist in one complete stroke paints a black line on the reverse side of the paper. Since the paper is translucent, the viewer sees the line begin and continue to the end. It may be necessary to have a small light source behind the translucent paper screen to further illuminate the graph line. The amount of light permitted to shine through the translucent paper should be carefully controlled.[46]

---

46 Arthur R. Railton, "They Fool You Every Night," (Popular Mechanics, 96:144-150, October, 1951) p. 150.

Another interesting way to effect a graph line is to apply a saturated solution of potassium nitrate, which has a small amount of gum added, to the graph line. The line should be rather thick and the paper rather thin. When the solution dries, the graph line will be invisible. At the appropriate moment the camera is focused upon the translucent piece of thin paper and a lighted cigarette is applied to the starting point of the graph. A rapid spark of fire will follow along the line and trace out the rising and falling line of the graph. The solution may also be used to write invisible words which suddenly appear on a translucent screen. When letters are written, caution should be used in tracing, because if the letters are completely closed, the centers will fall out when they are burned.[47]

a) Pull-aways. The pull-away device is similar in construction and operation to the "pull-tab" and "strip tease" devices discussed in part "E" of this section. It may be useful to point out that the pull-aways take many forms. For example, a drawing is rendered on transparent paper which is mounted on a backing of bristol board, heavy cardboard, or plywood. This backing contains appropriate designs which have been cut-out. The pull-away slider is mounted on the backing so that it covers the cut-out. A 250-watt spotlight is directed on the back of the backing. When the pull-away is removed, the title message, design, graph line, or other material will appear on the front of the title card as the light shines through the transparent paper. Transparent water

---

47 Battison, op. cit., p. 217.

colors should be used lightly over the areas on the drawing through which the light will be projected.[48]

f) Other devices. Other devices which provide animated material for use in television programming are numerous and varied. Such devices as clockfaces with hands that turn, speedometers, temperature, indicators, windshield wipers, gauges, elevator indicators, and calender pages which turn are animation devices which are essential to the production of many television programs.[49] Their construction and execution is fairly simple and routine. The use of the device and the effect which is desired will determine the manner in which the device must be constructed. Imagination and ingenuity are two assets which are extremely helpful in creating these simple but effective animation devices.

Conclusions. It is difficult to determine what effects are pure animation, since graphic and titling devices may have multiple uses. The definition applied to live animation in television production is rather broad and embraces a variety of devices which are difficult to catagorize. Hence, the devices described under "animation" are only a few of the effects which are possible. It is hoped, however, that the devices discussed will give the reader some ideas which he can expand and utilize in his particular situation. Many of the titling and graphic devices discussed in this chapter are designed to add movement and life and to stimulate visual interest in static material, but strictly speaking they are not animation devices. Film is still the perfect medium for the presentation of simple and complex animation.

---

48 Wade, Designing for TV, op. cit., 149-50.

49 Wade, op. cit., p. 150.

CHAPTER VI

CHAPTER VI

CONCLUSIONS

Because of the tremendous number of new television stations, both commercial and educational, and with a corresponding emphasis upon small local station operation, there is an increasing need for information on the use and production of video effects in television programming. This study was undertaken to provide basic information about video effects for the student of television production and for the trained professional, whether educator, station manager, or production manager who wants to broaden his sphere of knowledge in this particular area and to provide him with readily accessible reference material. As far as is known this is the first time that such an extensive body of information on the production and use of video effects has been compiled into one volume.

From the numerous sources of published material which the author examined, pertinent data on the production and use of video effects was selected. Sources of current information were also investigated. The author visited television stations to observe operations and to talk with the station personnel about their use of video effects. The viewing of many television programs gave the author a familiarity with many current uses of video effects in television production. Problems in the creation and use of some of the basic effects were experienced by the author in the Television Development Studios at Michigan State College.

This body of information was organized and presented in four chapters. The basis for this particular organization lay in the methodology employed to produce each effect. For example, when the effects were produced within the television electronic system, they were discussed in the chapter titled, "Electronic Effects." The three successive chapters dealt with the production and use of optical, mechanical-physical, and graphic-titling effects.

In each chapter the simplest effect was discussed first since many of the more complex effects are derived from a combination of effects and techniques. A description of each effect was given along with information on how it is constructed or created. A representative example of how the particular video effect is used in television production was given where specific information was available. If the data was limited, only a general explanation of how the effect is used in television programming was given. The conclusions and suggestions in this chapter are drawn from the data presented in the previous chapters of this study. The most practical and applicable effects for use by the small station, that is, the basic video effects, will be pointed out in the following conclusions.

Electronic effects are an inherent part of the television transmission system. Electronic effects are production tools which the director may use very easily, since the basic electronic effects can be produced at the flick of a switch. The use of cuts, fades, dissolves, and superimposures are possible even in small station operations, since a simple video switching unit is included in the basic equipment set-up.

The use of "Reverse Vertical or Horizontal Scanning," however, presents additional problems for the small station since equipment must be adapted in order to achieve these effects. Also the creation of a "Split Screen, Horizontal Wipe," or "Keyed Insertion" are not essential when the television station is engaged in limited live studio production. However, if the budget is adequate and the production requirements are extensive, the small television station could purchase the additional and special electronic equipment necessary to expand their production facilities. It should be pointed out that electronic effects will continue to be explored, especially by the major television networks, since they give a flexibility and scope to television production techniques which is desirable. As a result of this experimentation new electronic devices will be created and present effects will continue to be improved and perfected. Also as a result of this experimentation the small local station may eventually be able to purchase special effects equipment which is at present rather prohibitive in cost.

The newly-organized, small television station may not need to use many of the devices or effects discussed in the "Optical Effects" chapter. However, the small station will rely heavily upon the use of slides and film, which many constitute the major portion of its program material. In limited studio production, the following optical devices will probably be the most useful: "Forced Perspective, Silhouettes, Camera Mats," and the "Mirror Periscope." Forced perspective may have limited use, but it can be particularly useful to the small television station which has

limited studio space. For example, by using forced perspective in rendering the scenery and by employing a wide-angle lens on the camera, a few feet of studio space may be turned into a spacious art gallery. The "Camera Mat" when used effectively will provide an adequate substitute for the expensive electronic matting or keyed insertion amplifier. Use of the camera mat will help the station to produce expansive and elaborate settings with a minimum amount of full-scale scenery present in the studio. The most useful optical device is the "Mirror Periscope" which will allow the studio camera to achieve a variety of overhead and down-angle shots which would only be possible by the use of an expensive and bulky camera crane. Many other opportunities for the use of the periscope will be experienced by the average small station. Without adequate operating space in the studio, "Rear Screen Projection" is impossible, even though it could be used extensively and to a good advantage by most stations. The information on the construction and use of "Miniatures and Dioramas", although not frequently used even in network operations, will be valuable when such a television setting must be created.

The extensive production and use of "Mechanical-Physical Effects" will not be required of the small television station. The creation of natural phenomena will find only limited usage; however, basic information on the production of rain, snow, hail, dust, and other natural phenomena is included. The technician may find it necessary to adapt the information to the particular effect which he desires to create. The natural phenomena effects discussed are operative, and most of them

may be easily motified to meet special requirements. "Lens Blocking" and lens blocking devices may be found very useful by the small station which desires to add variety and sparkle to its productions with the use of a simple technique. The "Mechanical-Physical Effects" chapter is not complete in all details since much necessary data is lacking. However, basic information is provided which should stimulate ideas for the production of additional effects, as well as giving information on the production of specific effects.

Probably the most useful single chapter in this study will be the chapter dealing with "Graphic and Titling Effects," since all television stations, regardless of size, must be concerned with this specific area. A great deal of visual information is graphic in nature and its presentation in the most suitable fashion is desirable. Therefore, the author in the "Graphic and Titling Effects" chapter outlined the basic requirements of good titling, discussed the various titling devices which may be used in the television studio, and described various types of program visual aids and how they could be utilized on the air. Although the small station may not have its own graphics department, basic information contained in the discussion on the "Preparation of Graphic and Titling" will help the station to establish standards for the graphic materials which are used by them but produced by outside agencies. The use of titling and display devices in the studio gives the station more flexibility of operation as well as a variety of methods in the presentation of visual materials. "Program Visual Aids," such as graphs, models,

and animated cartoons will be found useful in the presentation of the simplest "talk program." There is a somewhat limited amount of information on the construction and use of certain graphic and titling devices. However, it is believed that sufficient basic information has been provided so that the individual or station can create the effects described as well as creating new effects for his special purposes.

In conclusion, this study, although somewhat extensive in its conception and scope, contains only basic information which the author believes essential for individuals and stations who are engaged in television production. The creation and effective usage of the many video effects discussed in this study as well as the new effects which will continue to be devised are dependent upon the ingenuity, imagination, and hard work of a production team. It is hoped that this study will provide the student or individual who is interested in television production techniques and the small station operator with a better understanding of the possibilities inherent in the creation and use of video effects in television programming.

Suggestions for Future Research:

It has been pointed out that this study is a basic one; therefore, much additional research is possible in many specific areas which have been discussed only briefly in this study.

1. Films on the production of various video effects would be most valuable as a television training and teaching aid.

2. A film on the use of program visual aids would be very valuable to the specialist who finds himself faced with presenting his complex

information to the television viewer.

3. Additional investigation into the creation of natural phenomena would be interesting and particularly helpful in the production of dramatic programs.

4. Further investigation into the standards for the production of graphic materials would provide information which is vital to every television station, since most stations have worked out their own particular standards.

5. Further investigation should be made into the creation and use of live animation devices applicable to television production.

6. Additional information on simple mechanical devices which may be used to effect visual transitions between scenes of a dramatic program would provide an interesting study.

7. A study of the psychological and emotional reactions of the viewer to the basic electronic effects, that is, cuts, fades, dissolves, etc., would provide valuable data for the television director.

8. A study of the reactions by the viewer to various effects would provide information which would give more exact information to directors, and would be extremely helpful in their use of effects.

9. A central consultation service operated by the major networks and designed to supply information on the production and use of standard and newly developed video effects would be extremely useful, not only to the stations of the network but also to the small independent station, or to an individual interested in video effects.

10. A service to educational stations providing up-to-date information on video effects which are especially applicable to educational programs would be desirable. Such a service could be handled by the United States Department of Agriculture, or the United States Office of Education.

The reader of this study may also wish to pursue individual investigation into particular areas of his interest which have been stimulated by suggestions contained in this compilation.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Battison, John H., Movies for TV, New York: The Macmillan Company, 1950, 376 pp.

Bettinger, Hoyland, Television Techniques, New York: Harper and Brothers, 1947, 237 pp.

Bolen, Murray, Fundamentals of Television, Hollywood: Hollywood Radio Publishers, Inc., 1950, 270 pp.

DeForest, Lee, Television Today and Tomorrow, New York: The Dial Press, 1942, 361 pp.

Dunlop, O. E., Jr., The Future of Television, New York: Harper and Brothers, 1942, 194 pp.

Dupuy, Judy, Television Show Business, New York: General Electric Maqua Company, 1945, 246 pp.

Eddy, W. C., Television: The Eyes of Tomorrow, New York: Prentice-Hall, Inc., 1945, 330 pp.

Fink, Donald S., ed., 2 Television Engineering, New York: McGraw-Hill Book Co., 1952, 721 pp.

Fuchs, Theodore, Stage Lighting, Boston: Little, Brown and Co., 1929, 247 pp.

Gable, L. S. H., The Miracle of Television, Chicago: Wilcox and Follett Co., 1949, 151 pp.

Giraud, C. and G. R. Garrison, Radio and Television, New York: Appleton-Century-Crofts, Inc., 1950, 550 pp.

Gorham, Maurice, "Television" Medium of the Future, London: Percival Marshall, 1949, 142 pp.

Greene, Robert S., Television Writing, New York: Harper and Brothers, 1952, 276 pp.

Hodapp, William, The Television Manual, New York: Farrar, Straus and Young, 1953, 296 pp.

Hubbell, Richard, Television Programming and Production, ed. 2, revised, New York: Rinehard and Company, Inc., 1950, 240 pp.

Hubbell, Richard, Television Programming and Production, New York: Murray Hill Books, Inc., 1945, 207 pp.

Hutchinson, T. H., Here is Television, rev. ed., New York: Hastings House, 1950, 368 pp.

Jones, C. R., Your Career in Motion Pictures, Radio and Television, New York: Sheridan House, 1949, 255 pp.

Kaufman, W. I. and R. S. Coldozin, Your Career in Television, New York Merlin Press, Inc., 1950, 206 pp.

Kiver, Milton S., Television Simplified, ed. 3., rev., New York: D. Van Nostrand Co., Inc., 1950, 513 pp.

Lindgren, Ernest, The Art of the Film, London: George Allen and Unwin, Ltd., 1949, 242 pp.

Lohr, Lenox R., Television Broadcasting, New York: McGraw-Hill Book Co., Inc., 1940, 274 pp.

Lucas, J. A. and Beverly Dudley, Making Your Photographs Effective, New York: McGraw-Hill Book Co., Inc., 1940, 385 pp.

Lutz, E. G., The Motion Picture Cameraman, New York: C. Scribner's Sons, 1927, 248 pp.

Offenhauser, W. H., Jr., 16 Mm. Sound Motion Pictures, New York: Interscience Publishers, Inc., 1949, 550 pp.

Ranson, J. and Richard Park, Opportunities In Television, New York: Grosset and Dunlap, 1950, 128 pp.

Royal, J. F. Television Production Problems, New York: McGraw-Hill Book Co., Inc., 1948, 179 pp.

Scherga, M. G. and Joseph H. Roche, Video Handbook, New York: William F. Boyce, 1949, 103 pp.

Shayan, R. L., TV and Our Children, New York: Longmans Green, 1951, 94 pp.

Southwell, John, Getting a Job in Television, New York: McGraw-Hill Book Co., Inc., 1947, 120 pp.

Sposa, L. A. Television Primer of Production and Direction, New York: McGraw-Hill Book Co., Inc., 1947, 237 pp.

Spottiswoode, Raymond, A Grammar of the Film, Los Angeles: University of California Press, 1950, 328 pp.

Spottiswoode, Raymond, Film and Its Technique, Los Angeles: University of California Press, 1952, 516 pp.

Stasheff, Edward and Rudy Bretz, The Television Program, New York: A. A. Wyn, Inc., 1951, 355 pp.

True, Herbert, TV Dictionary for Sponsors, New York: Sponsor Publication, Inc., 1950, 15 pp.

Turnbull, R. B., Radio and Television Sound Effects, New York: Rinehart and Co., 1951, 226 pp.

Tyler, K. S., Telecasting and Color, New York: Harcourt, Brace and Co., 1946, 213 pp.

Wade, R. J., Designing for TV, New York: Pelligrini and Cudahy, 1952, 216 pp.

Wade, R. J., Operation Backstage, New York: Network Operation Department: The National Broadcasting Co., 1951, 79 pp.

Weiss, Margaret R., The TV Writers' Guide, New York: Pellegrini and Cudahy, 1952, 153 pp.

White, Melvin R., Beginning Television Production, Minneapolis: Burgess Publishing Co., 1953, 107 pp.

Unpublished Materials

Bluem, A. W., "A Descriptive Analysis of Television Dramatic Production Techniques", Unpublished M. A. Thesis, Ohio State University, 1950.

Fox, Jack J. "An Analysis of the Methods Used in the Production of Three Informational Films for Television," Unpublished M. A. Thesis, Michigan State College, 1952, 210 numb. leaves.

Jones, Kenneth, Jr., "A Survey of Television", Unpublished M. A. Thesis, Leland Standford Junior University, 1949.

Orth, R. G.,"A Handbook of Television Directors and Actors Participating in Studio Productions," Unpublished M. A. Thesis, University of Denver, 1950.

Shafter, E. M. Jr., "A Study of the Working Tools of Television" Unpublished M. A. Thesis, Wayne University, 1950.

Tettemer, Clair R. and Harold Niven, "Production Standards for Television Recordings" Unpublished Study, Ohio State University, 1952.

Periodicals

Ace, Goodman, "Odd Thoughts About Old Things", Saturday Review of Literature, 26 (May) 1951, 34:31-2.

Alicoate, Jack, "The 1952 Radio Annual", Radio-Television Daily, Vol. 15, 1330 pp.

"Background Settings for Big Town" New Yorker, 10 (March 1951) pp. 24-25.

Battison, J. H. "Titles for TV", Movie Makers, June 1951, Vol. 6, #37, p. 14.

"Big Screen", Life, 21 (May 1951) pp. 39-40.

Boone, A. R., "Workshoppers' Tricks Tickle TV Audience", Popular Science, March, 1951, pp. 173-175.

Bretz, Rudy, "Television Cutting Techniques", Journal of the Society of Motion Picture and Television Engineers, March, 1950, Vol. 53, #3, pp. 247-267.

"1952 Broadcasting Yearbook", Broadcasting-Telecasting, 1952, pp. 486.

"Cigar Smoking Camera Acts in TV Show", Popular Science, February, 1951, p. 106.

"Come of Age", Time, 25 (February 1952) p. 78.

Crocker, B. B., "Captions that Clock", Movie Makers, November, 1951, p. 17.

Dempewolff, R. F., "Mystery Men of the Television Screen", Popular Mechanics, May, 1950, pp. 80-86.

"Film Handling in TV Stations", Tele-Tech, March, 1952, p. 59.

Freedley, V. "Producing for TV", Theatre Arts, February 1951, pp. 48-49.

Friedman, F. "Movie Wizards Create Unknown Worlds", Popular Photography, December, 1951, pp. 135-36.

Gore, E. M., "Video Special Effects System", Television Engineering, October, 1950, pp. 14-16.

"Guide to Television Special Effects", Tele-Tech, April 1952, p. 31-37.

Hart, W., "Directing for TV", Theatre Arts, February, 1951, p. 51.

Hautzinger, J. "Take Your Tithing Easy", Movie Makers, October, 1952, p. 27.

Hockman, L. "Unique Ghost Effects", Popular Photography, December, 1951, p. 187.

Horne, H. V. "Chicago Touch", Theatre Arts, July 1951, pp. 36-39.

Horne, H. V. "To See or Not to See on TV Review of Seasons Shows", Theatre Arts, April, 1952, pp. 44-45.

Hunter, M. "Stage Director in TV", Theatre Arts, May 1949, pp. 46-47.

"Idea Man", Newsweek, 7 (April, 1952) p. 60.

Leve, S. "Blueprint for Television Design", Theatre Arts, February, 1952, p. 38.

"Magic Carpenters", Time, 21(May, 1951) p. 62.

Mann, M. "Television's Five Ring Circus", Popular Science, October, 1950, pp. 110-116.

Miner, W. "Training For Television", The Quarterly Journal of Speech, October 1950, pp. 351-354.

Monro, C. R., "Flying Spot Camera, Type TK-3A", Broadcast News, September-October, 1950, pp. 17-21.

"New Developments in Telecommunications", Tele-Tech, February, 1952, pp. 56-57.

"New Devices Fakes Scenes: Scenescope", Life, 26(February, 1951), pp. 67-68.

Ohler, Arch., "Windy Kilocycles; Chicago Experiments", Theatre Arts, July, 1951, p. 36.

"Place to Experiment: Your Lucky Strike Theatre", Time 13(February, 1950) p. 44.

Railton, A. R., "They Fool You Every Night", Popular Mechanics, October, 1951, pp. 144-150.

Rowan, A., "Miniatures in Motion Picture Production", American Cinematographer, September, 1952, pp. 386-387, 400-402,

"Search for the Gimmick", Time, 17 (December, 1951) p. 61.

Secor, H. W., "Television 'Sight Effects'", Radio-Electronics, February, 1950, pp. 34-36.

"Spell it out: Fireside Theatre", Time, 11(December, 1950), p. 53.

"Television Borrows Movies' Tricks", Popular Mechanics, August, 1950, p. 123.

"TV's Cost-Cutting Gadgets", Sponsor, 22(September, 1952), pp. 36-37, 60-66.

"TV-Extravanganza", Life, 12(June, 1950), pp. 83-86.

Wade, R. J. "The Television Scene", Theatre Arts, August, 1950, pp. 36-37.

Documents

Speese, M. A., A. F. Skelsi and K. M. Gaspin, "Visual Aids". A Report on United States Department of Agriculture's Television Research Project, Section II, Visual Aids, Radio and Television Service--Office of Information, United States Department of Agriculture.

Newspapers

Variety, New York, July 9, 1953.

APPENDIX

GLOSSARY

Animations:
Mechanical devices which in various ways impart seeming movement to inanimate subjects.

Aspect ratio:
Proportional relationship of the width of the picture to the height of the picture; in motion pictures and television 4 to 3.

Background:
Any material, set, drape, drop, etc., used behind actors or other foreground subjects.

Background projection:
The projection of a scene on a translucent screen to be used as a background for a studio set.

Balopticon:
An optical device in which an image of a lighted piece of opaque copy may be projected by reflection into the television film camera.

Camera:
A unit containing the optical system and light sensitive pick-up tube which transforms the visual image into electrical impulses.

Camera field angle:
An angle of divergence from a parallel line inscribed by the borders of the camera picture at various distances from the lens.

Camera Terms:
CU: Close-up (of person's face or detail of an object); LS: Long-shot; MS: Medium shot; BCU: big close up; 2-shot: group of two people; 3-shot: group of three people.

Close-up shot:
Very narrow angle picture, i.e., head shot of person.

Credits:
Listing of actors, singers, dancers, designers, technicians, directors, et al., in titles preceding or directly following the program. Credits are also given to suppliers under certain circumstances.

Diorama:
A miniature setting usually employing free perspective in its execution, and used as a means of establishing large locations, impossible of construction in the studio. In actual practice, small local areas of such a diorama may be produced in actual size to accommodate actors.

Dissolve:
In television, the act of electronically fading out a broadcast image and fading in a new image simultaneously.

Dolly in:
To move in from far for close-up by means of a camera mounted on a perambulator.

Electron gun:
A system of metallic cylinders arranged in the narrow ends of both the camera and receiver tubes in which the electron beam used for scanning the image before the television camera, and for reproducing it in the television receiver, is formed.

Fade in:
To bring up the television image electronically so that it appears gradually.

Fade-out:
The gradual elimination of picture information on the "screen" by electronic means, that is to black out television image electronically so that it disappears gradually.

Film strip:
A sequence of several 35mm frames shown individually.

Filters:
Lens filters used to eliminate or reduce a portion of light spectrum.

Flip:
Art work on cardboard. (Always in the 3 by 4 aspect ratio). Designed to flip over on stand to provide titles or credits.

Frame:
A single complete picture.

Free perspective:
The deliberate falsification of normal perspective in the painting and/or construction of television (or stage) settings in order to achieve a (seemingly) greater depth or distance.

Ghost:
An unwanted secondary image of the transmitted picture appearing on the receiver kinescope caused by a reflection or several reflections of the transmitted signal.

Gizmo:
Generic term. In television, anything for which a technical designation is lacking or has been forgotten by the speaker.

Gobo:
A dark mat used to shield camera from lights.

Iconoscope:
A camera pickup tube used in the RCA television system, consisting essentially of an electron gun and photo-sensitive mosaic plate enclosed in an evacuated envelope.

Image-orth:
(Abbreviation of image-orthicon) the standard studio and field camera tube developed by RCA which is extremely sensitive to light. It replaced the iconoscope broadening the scope of the TV camera.

Line:
A single scanning line across the picture containing highlights, shadows and halftones. 525-line definition is the standard for television.

Live talent:
Television broadcast of animated or live subjects.

Live titles:
Titling material which is photographed directly by television cameras in the studio rather than supplied from slides or film.

Mat shot:
A camera shot taken through an opening in a small opaque piece of copy, the information on which corresponds in some manner to the actual full-scale background.

Microwave:
Special high-frequency relay unit used to transmit the video signal from point to point, that is, remote to station, or from station to transmitter.

35mm:
Standard motion picture size film.

16mm:
Small size (generally home movie) film.

Miniature:
A small scaled setting or display usually used to establish a locale; a maquette. (See: special effects)

Mosaic:
A large number of photo-sensitive elements covering the mica plate in the television camera tube which is backed by continuous conducting surface (signal plate). Its counterpart in a film camera is the photo-sensitive emulsion of the film.

Narrow angle lens:
Lens with narrow angle of projections; i.e., picks up small portion of set at a given distance.

On-the-air:
Program in process.

Optical lens:
The lens focusing the image of the scene to be televised on the light-sensitive plate of the camera tube.

Electronic view finder:
The device on a television camera which allows the cameraman to frame and focus accurately the desired portion of the scene to be televised.

Pan:
To follow action to the right and left or up and down with the camera; to move camera across a scene--e.g., "pan left" or "pan right."

Picture:
The image telecast, but usually used with reference to the image as subject matter with form and content.

Production facilities:
All the physical and material requirements of a television program including scenic design, construction and execution, painting, art work, wardrobe, make-up, properties, titling an special effects, both visual and sound.

Projector:
A motion picture or slide projector.

Roll it:
A cue to start the film projector.

Scanning:
The process of electronic analysis of the optical image, focused upon the mosaic of an iconoscope or the target of the image-orthicon by means of a moving electron beam, into a series of parallel horizontal lines traced from left to right in sequence from top to bottom in the manner of reading a page of print.

Shadowgraph:
The device of showing characters and decoration in silhouette by allowing light from a single source to cast realistic or stylized shadows on a translucent screen, usually made of cellulose acetate or equal.

Signal:
Any transmission of electronic waves.

Slide:
Usually a title or picture on a single 35mm film frame projected into camera.

Special effects:
Miniatures, dioramas, and various electrical and mechanical devices used to simulate meteorological or other natural phenomena and which are used to achieve scenic or dramatic effects impossible of actual or full scale production in the television studio.

Split Screen:
One half of picture from one camera and one half of picture from another camera combined together in a composite picture.

Superimposure:
Two images simultaneously picked up by two different cameras and electronically mixed on the face of a Kinescope tube in such a manner that both images are visible.

Switch or cut:
To switch from one camera to another. A change of camera angles.

Synthetic distortion:
Painting technique utilized to impart seeming irregularity to lines and surfaces which are actually smooth and rectilinear.

Telecast:
A television broadcast.

Telephoto lens:
Lens of very narrow angle used to provide large size images at extreme distances.

Televiewer:
A member of the television audience.

Televise:
To transmit pictures electronically by means of television equipment.

Television:
The transmission and reproduction of a view or scene, especially a view of persons or objects, by any device or apparatus that converts light rays into electrical impulses in such a way that they may be transmitted and then reconverted by a receiver into visible light rays forming a picture.

Texture:
A feeling of depth and irregularity imparted to a plain surface through the use of paint or other decorative techniques.

Tight:
A camera shot that is restricted in area and that includes only essential information.

Tilting:
A vertical movement of the camera.

Title artist:
Artist or draftsman who prepares titles, cards, signs, title backgrounds, maps, special displays, slides, etc.

Title Backgrounds:
Illustrative material, either drawings or photographs, usually indicative of some characteristic scene or idea over which lettering is hand-drawn or imprinted.

Titles:
Specifically, typographical matter integrated with program material to provide necessary or supplementary information, including the name of program, geographical locale, period, names of characters, credits to actors, producers, and sponsors. Generally, typographical or illustrative matter such as small backgrounds, photographs, cartoons, and flat displays used in both the program and commercial portions of the program.

Transparency:
Illustrative or written material executed on a transparent surface through which background material of various types may be seen as the transparency is photographed by the television camera.

Video:
Pertaining to the television broadcast of images; sometimes used as a noun to designate sight broadcasting as opposed to sound broadcasting.

Video signal:
That portion of the output of the television camera which is the electrical counterpart of the scene televised. (Also called picture signal).

Wide angle lens:
Lens having wide angle of view, i.e., picks up broad area of set at a short distance.

Wipe:
A line traveling across the picture, which wipes one image off replacing it with a new image.

Zoomar Lens:
Special lens which can produce dollying effect without moving the camera. Has a focal length of 5 to 22 inches.