An Alphabetical Guide to Motion Picture, Television, and Videotape Production
Eli L. Levitan

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Society of Motion Picture and Television Engineers
Society of Photographic Scientists and Engineers
Academy of Television Arts and Sciences
National Visual Presentation Association
International Alliance of Theatrical Stage Employees
Florida Education Commission; Miami-Dade Junior College

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*To those talented and dedicated people with whom I have had the pleasure
of working, or whose paths have crossed mine during my 36 years
in the industry, my sincere thanks.*

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How is the invisible man photographed? And how are the various props in that same motion picture series made to move without visible help? How are artificial fog, mist, snow, and rain effects produced? And cobwebs or dust? How are night scenes filmed in broad daylight?

On the commercial side, the provocative effects are intended to be less subtle. How, for example, do you pour a cup and a half of coffee? Who taught margarine to twist? And cigarettes to march?

How can a driver get from one place to another without a car? How can a car get from one place to another without a driver? How is a car driven over water? And, how do they get the man into the driver's seat, and what was he doing up in the air in the first place?

The answers to these questions are to be found in the carefully guarded books in which most motion picture technicians make periodic entries and notations. The accumulated information covering every phase of production, in time, becomes a personal and permanent record of processes and techniques, film types and exposure tables, editing notes and optical data. Some of these jottings are referred to constantly. Others, by comparison, are entered and forgotten. Many notations are made possible only after long periods of painstaking experimentation and research.

The editors and author, after much discussion, agreed that the reader would best be served by arranging this information in alphabetical order. This type of arrangement, it was felt, would enable a researcher to locate information pertaining to a specific subject quickly.
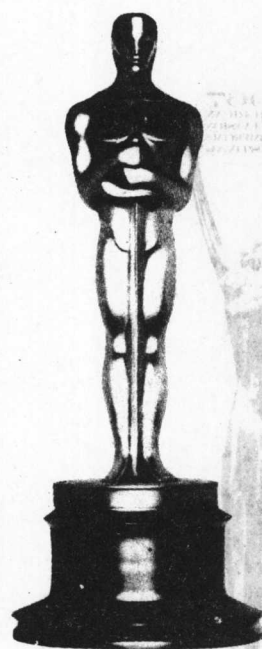
The coveted Oscar, an award presented annually by the Academy of Motion Picture Arts and Sciences to deserving performers and technicians on both sides of the camera.

The Emmy, presented by the Academy of Television Arts and Sciences, to those whose contributions merit similar recognition.
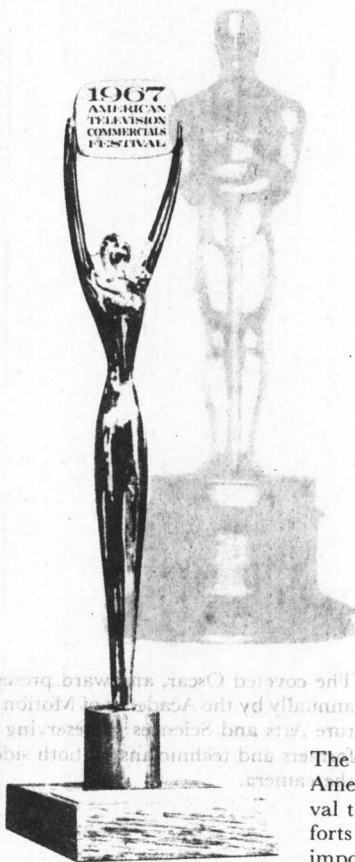
The Clio, awarded by the Directors of the American Television Commercials Festival to those creative personnel whose efforts follow the words ". . . and now, an important message. . . ."

As a ready reference, the information and the subject matter in the pages that follow provide the professional, as well as the amateur, with an immediate answer to almost any question on the subject of motion picture, television, and videotape production and the equipment used in each of these mediums. With technical terminology held to a minimum, the descriptions and explanations of processes and techniques should also serve as a guide for the achievement of known effects as well as for the creation of new ones.

Similarly, the text and illustrative material can be expected to influence the future efforts of commercial film producers and advertising agency creative groups. Used as a guide, the material within these covers should make their search for and subsequent achievement of new and eye-arresting effects a great deal easier. Generally, the description of the more frequently used processes and techniques should provide the interested reader with an informative behind-the-scenes look at motion picture, television, and videotape production.

The descriptions and explanations of the processes and techniques in the pages that follow place the emphasis on the essential information needed for their practical application rather than on the superficial and more technical aspects of the processes and techniques themselves. Tables and other statistical information, where they are deemed necessary, accompany the text and eliminate the need for additional research. In many instances, background information relative to some aspect of production or the development of a technique is included in order to provide a more complete picture of that specific area of production.

The film clips and photographs that are used to supplement the text illustrate the practical applications of the various processes and techniques and are taken from theatrical as well as commercial film and videotape productions. They serve as graphic examples that illustrate the imagination and creative effort that today, as in the future, remain an important part of all motion picture, television, and videotape production.

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introduction

The word photography is formed from a combination of two Greek words, meaning "light" and "write." It is defined as the process or art of producing images on sensitized surfaces by the chemical action of light or of other forms of radiant energy.

A camera is the photographic apparatus in which sensitive plates or film are exposed, the image being formed by means of a lens. The lens, in turn, is a transparent substance, usually glass, that makes possible the convergence of light rays and their subsequent exposure on the sensitized surface of the film in the camera.

Chronologically, the principles of the camera had been described, rather indefinitely, by a gentleman named Alhazen as early as 1100 A.D. Roger Bacon, about a century and a half later, was a little more definite in his description. A short time after Leonardo da Vinci's death in 1519, the first detailed explanations and drawings of a camera were discovered in one of his many unpublished manuscripts. Approximately thirty-five years later, another Italian, Giovanni Battista della Porta, built the first crude working model. During the next three hundred years, many other models were designed, developed and, in time, forgotten. In 1834, Fox Talbot, an Englishman, began a long series of experiments and developed the Calotype process, the first practical method for obtaining a picture and rendering it permanent.

A scientific study analyzing the movements of people and objects was made by Peter Mark Roget of England in 1824. His article, "The Persistence of Vision with Regard to Moving Objects," was directly responsible for the development of the Zoetrope and other

devices for viewing a series of pictures. It also helped disprove the theory that the hand was, in fact, quicker than the eye.

The eye, that amazing organ that makes visual perception possible, needs but a mere quarter of a second to record an image and transmit it to the brain for registration and interpretation. This information led to the reasoning that if two images were recorded within the same quarter of a second, they would be superimposed, thereby creating the illusion of motion. The inevitable search for a method or process that could make "still" pictures move followed. Scores of patents were issued for cameras, projection devices, and other mechanisms designed for that specific purpose.

In early viewing devices, two disks were mounted on a common rotating shaft. The pictures or drawings, arranged in sequence, were mounted on one disk. The viewer looked through slots in the second disk. By 1853, the magic lantern was added to the disk thereby making it possible to project the pictures upon a screen or any other available flat surface.

The combination of picture and light source influenced the development of other projection devices such as the Phenakistoscope, Daedaleum, Phasmatrope, Pantoptikon, Eidoloscope, Vitascope, Theatrograph, Cinematograph, and Kinetoscope. The Kinetograph, a camera that weighed almost a ton, was one of Thomas Edison's early contributions and complemented the Kinetoscope, a peep show arrangement that consisted of a magnifying lens and a light source. Between those two items, lengths of film ran continuously. The Cinematograph that preceeded Edison's Kinetoscope was a rather ingenious and versatile device that served as a camera, a film printing machine and, with a few minor adjustments, as a projector.

Edison had been able to solve all photographic and projection problems as they arose. In order to demonstrate the effectiveness of his new product, motion pictures, Edison also discovered that he would first have to produce them. The Wizard of Menlo Park accepted the challenge reluctantly. A nearby barn, with the roof and doors removed, became the first semipermanent motion picture studio.

Oddly, Edison's experience as a producer led him, at one time, to make the rather pessimistic observation—"exhibitions to large audiences would too rapidly exhaust the novelty of the pictures." Fortunately the inventor's pessimism was not shared by other film producers.

An Edison cameraman, Edwin S. Porter, introduced the "story" to the motion picture industry in 1903 with "The Life of an American Fireman." A more ambitious production followed. The first full reeler, "The Great Train Robbery," was shown at a nickelodeon in Pittsburgh in November of 1905.

Some film producers, during the industry's formative stages, were

interested in the motion picture as a means of expression and as another form of artistic endeavor. The more practical among the pioneers were completely optimistic. The motion picture, these enthusiasts felt, would become *the* means of mass communication, hurdle all language barriers, and, in time, provide entertainment for millions. The more curious contented themselves with researching. All, however, were interested in winning audience acceptance for their collective product.

The search for new and better filming techniques began early and gathered momentum quickly. One of the searchers was George Melies, a Frenchman with insatiable curiosity—and a camera. Melies was also a magician, a fact that undoubtedly influenced his efforts as a cinematographer and, in turn, the future of the entire industry.

Fades, dissolves, double-exposure effects, and matte shots were used by him for the first time. The year? 1896. And, although the quality of the print could be described as amateurish, his film presentations were completely professional, even when measured by today's standards. The fact that Melies was a magician did not (fortunately) set the pattern or dictate the requirements for future motion picture technicians and production personnel.

Oddly enough, before 1927, the motion picture industry was self-sufficient and could function without the aid of electrical science. Its equipment and processes were either mechanical, optical, or chemical. In 1927, however, the industry found its voice, made itself heard and became dependent, for the first time, upon electronics. No one, at that time, could have predicted that the voice, or *sound track,* would some day be used to extol the virtues of a headache remedy or urge listeners to "leave the driving to us." This development, however, was only a part of the continuing search for the new technique and unusual illusory effect that paralleled the growth of the motion picture industry.

Today, as an art form or means of expression, the motion picture enjoys a rather secure and enviable position in the world of entertainment. Similarly, the educational, scientific, documentary, industrial, or commercial film presentation, each designed to fill a specific need in its own particular field, is highly regarded as educator, goodwill ambassador, and supersalesman. In reaching this lofty status, producers, directors, and technicians have used every available motion picture process and technique to create visual effects that capture and hold the interest of the audience.

With that goal foremost in mind, the mere telling of a story on film has been just about abandoned by professional filmmakers. Even scientific films, whose technical subject matter is usually interesting in itself and needs little if any dramatizing, merit the same amount of consideration as does the high-budget production designed specifically for entertainment purposes.

In the hands or under the guidance of a creative and imaginative director or film editor, the uneventful and commonplace scene, as well as the simple demonstration staged for commercial purposes, is transformed into a dramatic, eye-arresting film offering.

Normal actions are either speeded up, slowed down, or reversed while specially prepared musical scores and mood lighting help ease the viewer into a desired mental attitude. Or visual interest is heightened by the introduction of exciting illusory effects through high-speed and time-lapse photography, stop-motion effects, or a combination of techniques, including animation. If necessary, day can literally be turned into night while the unbelievable is given an air of authenticity. All these processes and techniques, collectively, have helped put all types of film productions into the entertainment category.

The mysterious driving force that prevents individuals from sitting back contentedly and resting on previously gained laurels is, perhaps, more in evidence in the motion picture industry than in almost any other field of endeavor. Personal recognition, public acceptance and the general awareness that the originator of a new and different technique could only hope to keep production processes secret for a relatively short period of time are the major motivating forces behind the continuing scramble for the novel and unusual effect.

The fact that the industry hires a hall each year for the purpose of honoring its deserving personnel is incentive enough for the most sophisticated. The Oscars, Emmys, and Clios awarded at these affairs, for group as well as for individual effort and achievement on both sides of the camera, supply the necessary initiative for future endeavor. Congratulatory messages fade, and the gold statuettes lose their luster quickly. Uneasy lies the head that wears the crown. The search for the new technique and unusual illusory effect goes on—and on.

acknowledgments

If one picture is, in fact, worth a thousand words, the nice people listed below have certainly helped make our task easier, the book thinner, and the editors happier. We are extremely grateful for the photographs and illustrative material made available by them.

Agfa-Gevaert, Inc.
American Oil Co.
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Ampex Corp.
Animation Equipment Corp.
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Bach Auricon, Inc.
P. Ballantine & Sons
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Canon Cameras
Capital Film Laboratories, Inc.
Cinema Beaulieu
Clairol
Color Service Co. Inc.
ColorTran Industries, Inc.

Compton Advertising Co.
Creative Opticals, Inc.
Dancer, Fitzgerald, Sample, Inc.
Andre Debrie Manufacturing Co.
Walt Disney Productions
Doiflex Cameras
Doyle, Dane, Bernbach, Inc.
DuKane Corp.
E. I. duPont de Nemours & Co. Inc.
Eastman Kodak Co.
Eclair Corp. of America
Wm. Esty Co.
Max Factor & Co.
Fairchild Cameras,
Max Fleischer Studios
Flight Research, Inc.
Foote, Cone & Belding, Adv't'g.
Gamma Scientific, Inc.
General Aniline & Film Corp.
General Electric Corp.
General Film Laboratories
General Foods Corp.

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contents

A

A-B composite system (videotape) Also called **linelock** and **inter-sync**. An electronic process that is used for combining the picture information recorded on two different reels of tape in order to produce a composite effect on a third reel.

In principle, the process is similar to the checkerboard method of preparing A & B rolls used by a film editor. Odd-numbered scenes are spliced together on one roll, with corresponding lengths of blank leader between them that match the length of the even-numbered scenes on the B roll. During the mixing process, the two reels are fed through a switching console and blended electronically, each scene in turn, to produce the final composite tape. See Figure A-1 and A & B ROLLS.

A & B editing—film A method of editing and subsequently printing the picture information from two separate rolls of 16mm film to produce a composite print.

Arranged and spliced together by the film editor in checkerboard fashion, the picture information in each roll, the A and the B, is reexposed by the laboratory on raw stock, thus producing a composite on one length of film.

Assuming that each scene in a motion picture is numbered consecutively, all the odd-numbered scenes are spliced into roll A and the even-numbered scenes into roll B. Each scene on the roll is separated from the next scene on the same roll by a length of black, opaque leader film equal to the number of frames in the scenes on the B

Checkerboard technique

Tail   Head

A

B

Method of making
splices invisible

A

B

Dissolves

Tail |←20 frames→| |←20 frames→| Head

A

|←——40 frames——→| |←——40 frames——→|

B

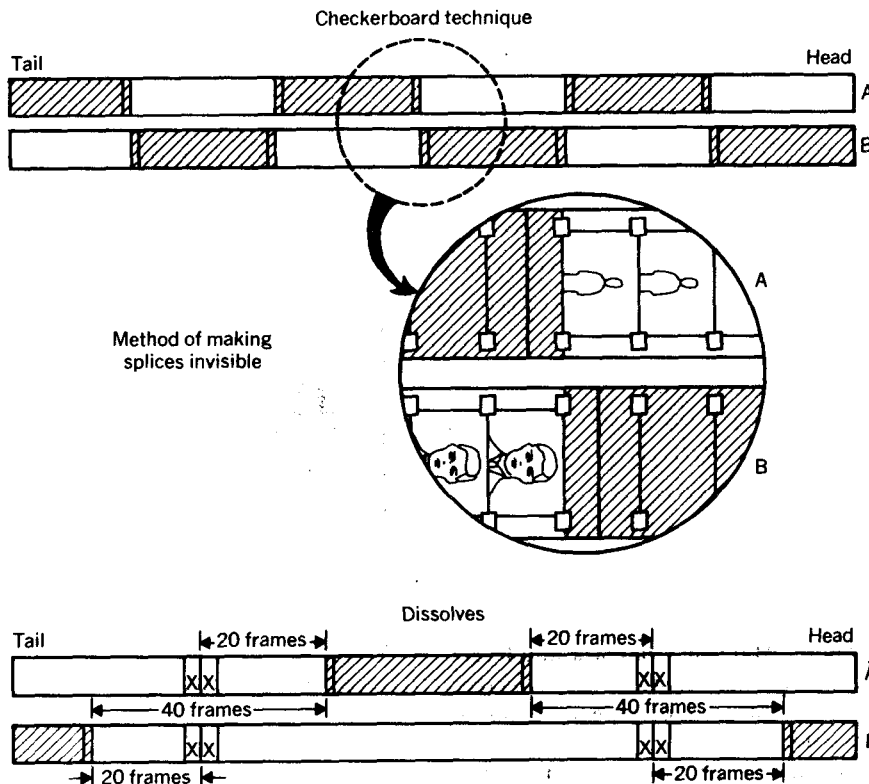→| 20 frames |← |←20 frames→|

**Fig. A-1   Standards for preparation of original 16mm A & B
rolls. (Color Service Co., Inc.)**

Invisible splices: In order to make 16mm splices in-
visible, it is recommended that the A & B rolls be
prepared using the "checkerboard" technique. This
technique is accomplished by alternating the scenes
back and forth on the A & B rolls. The splices
should be made in a splicer that makes one of the
cuts on the frame line and the other cut in the
picture area. When splicing the scene to black
leader, the scene should be placed in the splicer in
such a manner that the scraped portion and visible
cut of the splice occur only in the black leader.

After splicing the head of the scene in this manner,
you will note that in order to correctly make the
splice at the tail of the scene, it will be necessary
to turn the scene around in the splicer.

Double- or single-perforated leaders: It is recommended
that only double-perforated leader be used when all
the original is double-perforated. When some or all
of the original is single-perforated, the use of single-
perforated black leader is recommended to prevent
possible future damage to the original. The perfora-
tions in the black leader should, of course, be on
the same edge as the perforations in the original.

roll. During the laboratory printing process, scene 1 on the A roll
is printed first. Scene 2, on the B roll, is exposed in turn on the raw
stock used for the purpose.

Transitional effects such as fades and cross-dissolves can be added
during the printing process by the laboratory. The standard method
used by the film editor to indicate effects, generally, is shown in
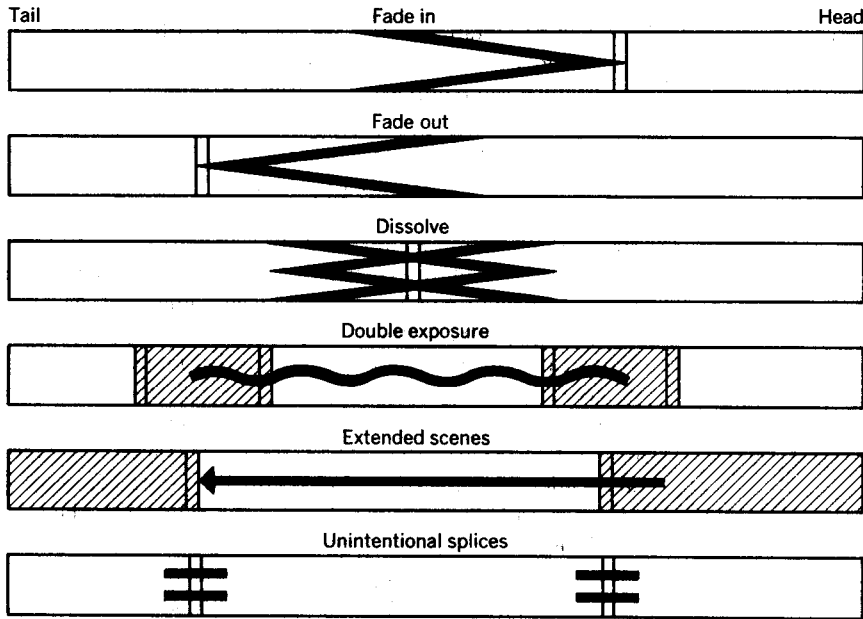Figure A-2.

Tail   Fade in   Head

Fade out

Dissolve

Double exposure

Extended scenes

Unintentional splices

Fig. A-2   Method of marking work prints to indicate effects. (Color Service Co., Inc.)

Recommendations of the Committee on Preprint Preparation of the Association of Cinema Laboratories, Inc.:

Fade-in: A fade-in should be marked by two straight lines forming a long V. These two lines run diagonally for the length of the effect from the edges of the film and converge at the center of the frame at the scene change.

Fade-out: The fade-out should be the reverse of the fade-in, the lines extending for the length of the effect and meeting at the center of the frame at the scene change to indicate where the screen will be totally dark.

Dissolve: A dissolve is in actual practice a fade-in of one scene superimposed over a fade-out of another scene. To indicate a dissolve on the work print, the markings should be the same as those used for a fade-in and a fade-out, but they should in this case overlap each other. The midpoint of both markings should occur at the splice in the work print, and the markings should extend an equal distance into both scenes.

Double exposures: Double exposures, superimposed titles, etc., should be indicated by cutting into the background scene of the work print a few inches of edge-numbered work print of the new superimposed

scene, to indicate where the double exposure begins. Several inches of the superimposed scene should then be cut in to indicate the end of the double exposure. These two pieces should be connected together by a wavy line.

To ensure proper matching, it is essential that one of these small pieces of work print be edge-numbered or identified in some way.

Extended scenes: Scenes to be extended in matching that are indicated in the work print by leader should be marked with a long arrow, the shaft of which is drawn through the leader, and the head of which comes up to the last frame of the leader to indicate the length of the extension.

Unintentional splices: Splices occurring in the work print that are to be disregarded in matching should be indicated by two short parallel straight lines drawn through the splice and at right angles to it. This would mean that the scene is not to be cut at that point.

Note: It is suggested that markings on the work print be made with a yellow grease pencil. This color is recommended because it shows up well on both color and black and white. If any cues are made on the work print for recording or mixing, it is suggested that a red grease pencil be used.