MEDICAL ART IN CLOSED-CIRCUIT TELEVISION

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MEDICAL ART IN CLOSED-CIRCUIT TELEVISION

By

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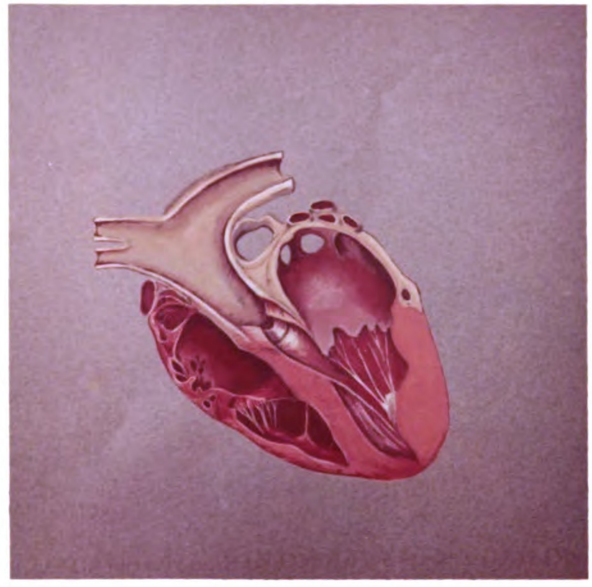
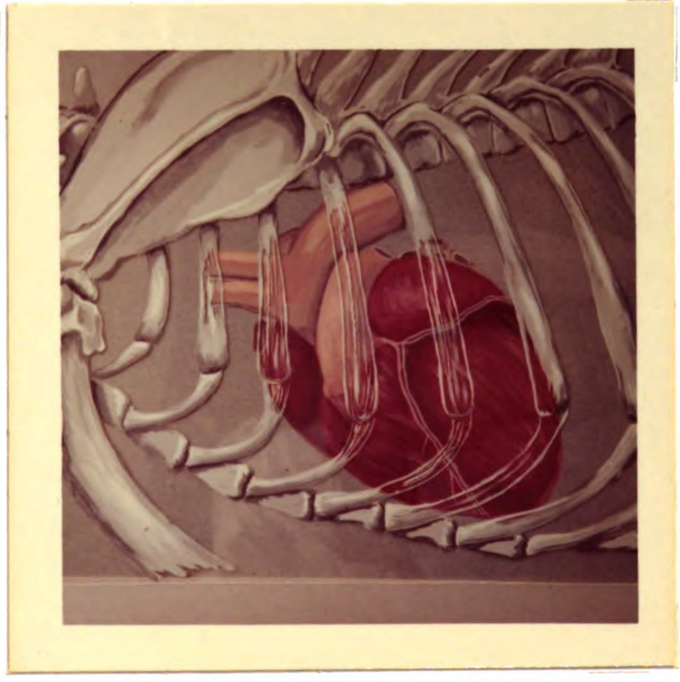
FRONTISPIECE





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INTRODUCTION

It is the author's premise that a portion of science education is based on a lecture-demonstration type of presentation. The television camera aids education because it is a visual plus verbal means of communication. This visual aspect shall be of prime consideration here.

Many times, in closed-circuit work, the most qualified person for giving advice to those who are actually going to use TV is the TV artist. This work has been prepared with a dual purpose; one: basic requirements of TV directed to the educator, and two: specific requirements concerned with art principles for the artist. Since both the educator and the artist are working with a single medium, the material directed to one should be of equal concern to the other.

Part I is of a general nature and lists some of the important facts concerning educational TV. A review of research which has been conducted recently by several institutions on the effectiveness of TV in education is also included.

Part II is concerned with the basic information necessary for the preparation of a televised lecture. The requirements placed upon one performing in front of a TV camera are also considered.

Part III deals with the techniques and methods for preparation of illustrative material and with the various

facilities normally available for the televising of visuals. The preparation of visual aids has been directed at the skilled artist and also the amateur who wishes to add interest and variety to his teaching skills. The ideas stated here are by no means complete, but it is hoped that they will offer a basis which can be modified to meet particular departmental needs.

PART I

EDUCATIONAL TV

A 1958 survey conducted by McKune (24), listed 117 institutions using TV facilities in educational programs, 53 of which are universities and 34 are colleges. It can be assumed that a good number of these are closed-circuit facilities. Kumata, 1956 (20), reported 66 institutions utilizing closed-circuit TV. With the number already using TV, it can be seen that there is a definite realization among educators of the potential which TV offers to the advancement of education.

Once a decision to use educational TV has been made, the instructor is faced with the problem of how his material can be presented to best advantage. In many cases a simple reference work dealing with aids to TV presentation might serve a useful purpose in preventing simple violations against the basic requirements of TV. It is hoped, therefore, that this summary of the ideas of the pioneers will aid others in their organization and use of educational television.

The one page monthly publication by RCA entitled RCA Educational TV News (28), which contains condensed information concerning available grants, recent advances, experimental findings, and pertinent literature will be of interest to those in educational TV.

CLOSED-CIRCUIT VS. OPEN-CIRCUIT TV

A major distinction between closed circuit and open circuit or broadcast television was stated in a 1956 publication by the American Dental Association (4). In closed-circuit television only those receivers which have a direct connection by cable to the origination point are capable of receiving the broadcast; broadcast television can be picked up by all set owners capable of tuning in on a station's operating channel. Kumata (20) also pointed out that most closed-circuit programs run 45 to 50 minutes, and some as long as 180 minutes in length; whereas most open broadcasts are 30 minutes long.

Educational programming on commercial TV stations, except for a few programs which are offered for university credit, will still have to be aimed primarily at entertainment first and education second. In closed circuit, however, the solitary aim is education. Thus devices to gain attention, over simplification, and viewer identification will be of a lesser importance in closed-circuit work.

Whether a program is prepared for open or closed-circuit television, there should be no difference in the effort put forth or the polish of the show (McKune, 22). Teachers may tend to become lazy simply because they are not going out "on the air". Nothing could be more detrimental to closed-circuit television.

ADVANTAGES OF TV

". . . the most important educational advance of the Century" (Bakal, 6), "Teaching by television appears to have raised the quality of education as well as the level of the learning process" (Vanhoose, 34). These statements attest to the benefits of TV in education and are true because of several advantages offered by a TV system.

Regardless of the seating arrangement, all students can have superior visibility similar to that from a front row seat, a feature never before feasible in education. This has been possible through the ability of the television camera to magnify and pin-point minute details. Woolsey, et al., (37) stated that black and white TV is suitable for teaching most subjects, and by the use of contrast enhancement, more details can be seen and emphasized than are visible to the naked eye. Also, the number of students per individual classroom can now be reduced to the desirably smaller group since one instructor can reach as many rooms as there are cable connections. Expensive and small scale demonstration materials previously impossible to present in individual classrooms, can now be viewed by all students through TV. And lastly, with more and better visual aids, student interest can be stimulated through simplification of ideas difficult to comprehend.

Ames (5) concluded that lessons are more carefully planned and, because they reach more students simultaneously, repetition is eliminated. A statement made in a recent book by Zworykin, et al., (38) summarized this idea: "A single well-planned demonstration on TV, clearly observed by an entire class, is of greater benefit to the students . . . than an indefinite succession of identical demonstrations to smaller groups."

In surgery classes, more students are now able to view a single operation without interference in the operating room. Because small areas stand out more clearly on the TV monitor screen than in actual life, a surgeon may at times find himself working directly from the TV screen.

The ability to teach more students at one time is also a definite advantage, but this objective should never be the only reason for using television instead of regular classroom instruction.

With the onset of color TV, many additional advantages can easily be realized. Thus far, the added expense of color has been a prohibitive factor for many institutions. However, institutions planning for TV installation or enlargement of present facilities should give considerable thought to planning larger facilities for the possible future installation of color equipment.

TV, black and white or color, is expensive, but when one considers its many advantages, it becomes a necessity and not an excessive expenditure.

STUDENT PERFORMANCE IN TELEVISED COURSES

Extensive literature is available on studies which have been conducted to determine the effectiveness of television instruction. The list of experimenters includes universities, the armed forces, high schools and grade schools. In most all cases, control classes receiving the same material under conventional conditions were used, and results were based upon student performance on comprehensive examinations. In all cases as reviewed by Kumata (20), the unanimous conclusion was that TV instruction proved to be at least as effective and sometimes more effective than conventional classroom instruction.

Several experiments such as those conducted at the U. S. Naval Academy recounted by Kumata (20) led to the conclusion that low-aptitude students did significantly better in TV courses than in non-TV course work. Recent tests at the University of Cincinnati, as reported by the Joint Council on Educational Television (19), found that students in a psychology TV course received "consistently higher grades" than did the non-TV class despite lower IQ tests of the TV group.

Greenmeyer, et al., (16) stated that these favorable results can be attributed in part to the "one-to-one

student-instructor relationship". Television reaches the student individually rather than as a group. As one student explained "I pay better attention now because the television teacher always seems to be looking me straight in the eye" (Bakal, 6).

Another possible reason for the excellent performance of students in TV classes is the more careful planning and presentation of lecture material. Extraneous material and wordiness are likely to be reduced, and major points will be given added impact through visual communication.

It can be concluded from findings thus far that the student does not suffer from a televised lecture and is very likely to gain a more definite impression of the material presented, as proved by many experiments in this area.

EFFECTIVENESS OF INTERCOMMUNICATION

Numerous studies have been conducted to determine the effectiveness of intercommunication between classroom and origination room by the use of one-way and two-way microphone hookups. Most results such as those at Pennsylvania State University indicate that a talk-back system does not improve the learning process. Through empirical studies, Carpenter and Greenhill (9) concluded that students generally liked to have the availability of communication with the instructor but test results showed

no significant difference in performance between those equipped with and those without a talk-back system.

Rock, et al., and Kanner, et al., as reported by Kumata (20), found that questions generally tended to be trivial and time consuming and could be eliminated by the instructor who did adequate preparation and anticipated possible questions. However, courses in which this was the conclusion were of a general nature. Those courses of a more technical or professional nature such as Anatomy and Physiology may find the use of a talk-back system an asset.

Because experiments thus far give conclusive evidence that intercommunication is not necessary for adequate student learning, discretion should be used in the employment of such a system. A substitute for intercommunication may be the use of ten minute discussion periods among the students in individual receiving rooms. In several TV courses conducted by Pennsylvania State University, as recorded by the American Council On Education (3), graduate assistants were employed to proctor such discussion periods. This method was found quite successful.

TV RECEIVERS IN CLASSROOM

Kumata (20) has reported several experiments which were conducted to determine the most desirable height of a television receiver in the classroom. The most common

average is 4½ to 6 feet from the floor, with the receiver slanted toward the viewers. However, height will be determined to a great extent by the size of room and by the seating arrangement. Where seats are staggered, the set will not have to be as elevated as for a straight row seating arrangement. The height of the classroom door will also dictate set height since it is advisable that sets be easily removed and replaced if technical difficulties should arise during a broadcast, i.e., a "stand-by" set can be held in reserve in case one in any of a number of receiving rooms should fail during a braodcast.

A 21 inch television receiver screen seems to be the most desirable size for two reasons: 1) it is a standard size for parts and has a lower initial cost than the 24 to 28 inch screen; 2) students are more accustomed to viewing from this size screen in the home. For this reason the student is more likely to find concentration easier and eye strain less.

At Pennsylvania State University, Carpenter and Greenhill (9) found that viewing was best and glare eliminated when TV receivers were placed on the window wall of a classroom. Shades were half drawn and viewing was with normal room light rather than in a darkened room.

In further studies at Pennsylvania State University concerning the number of students in a receiving room, it was found that there was no significant difference on

examination scores between classes of from 15 to 200 students. The number of students per TV receiver was not mentioned. However, students in smaller receiving rooms have expressed more favorable and fewer unfavorable comments toward televised instruction. One authority, as reported by Kumata (20), expressed the opinion that not more than 20 students should view from one receiver. On examination scores, also reported by Kumata (20), it was noted that the position of students in relation to the receiver made no significant difference.

Adams, et al., (1) have made a very interesting and complete report of experiments and experiences with television teaching at the college level, and include many of the same references noted here.

PART II

PLANNING A TV LECTURE

Any person qualified in the subject material under consideration for a TV course can make a good television presentation *if* he is aware of a few basic concepts. In order to be most effective, an instructor must have his material pre-planned and make his intentions known to the audience. Greenmeyer, *et al.*, (16) believe that the program technic method is best to employ when preparing a lecture for TV. This means having an introduction and conclusion well in mind and then integrating visual aids such as charts, photographs, films, etc. to their best advantage into the body of the program. According to Siepmann (32) a full script is of doubtful value for a television lecture. Use of a full script in closed-circuit work may tend to hinder the spontaneity of a program, an especially desirable feature of science presentations. Near the end of a lecture, care should be taken that the instructor does not unconsciously or otherwise give a closing remark and then continue talking for two or three minutes longer. Students in viewing rooms will have a tendency to become restless and conscious of the time and consequently lose interest.

It should be kept in mind that a well-planned TV presentation can reduce the teaching time by half that required for conventional classroom instruction while the preparation time is increased many-fold. For this reason, many institutions have given instructors using television two or more teaching hours credit per hour of television instruction. This should be the minimum allotment, and a four or five to one ratio would actually be more equitable.

Many times a major criticism of students toward closed-circuit televising is the amateur nature of a presentation. This hypercritical attitude results from the high quality commercial broadcasts which students are accustomed to viewing (Adult Education Association, 2). For this reason, once a course has been given on television, time in following years should be taken to iron out wrinkles such as adding to or using more effective visuals or changing the method of presentation to arouse greater student interest.

A comment by Novak (26) who had used television was: "When TV can improve a lecture, use it". A follow up to this statement would be, television can improve a lecture if the proper time is given to preparation and if original thought is given to the use of visual aids. The greatest advantage of TV is its ability to focus the student's attention on the visual details of a subject under discussion. Only when this unique feature is utilized will television be put to its maximum use in education.

REHEARSAL

Most closed-circuit programs will have more vitality if only a minimum of rehearsal time is used. The only necessary rehearsal is a run through of the visual materials with the cameraman so that he knows what they are like and when to expect them. Other than this, the timing and pacing of a show should be left up to the performer. The best preparation is to watch others perform on television and to learn from their mistakes.

THE UNEXPECTED

Television is unique in that there are no retakes, action is on the spot and spontaneous. Unfortunately scientific experiments will not always proceed as expected so it is at times advisable to take steps to insure the expected results.

Many unexpected happenings are a result of the intense heat produced by the brilliant lights necessary in a TV studio. Live specimens immersed in water may dry out due to evaporation. The points of grease pencils may melt under studio lights. Electrical apparatus such as that for electrolysis and electrophoresis may not always perform normally (Novak, 26). Since heat accelerates most physiological reactions, this should be taken into account when setting up an experiment in which temperature is a factor. When experiments are delicate and require good

laboratory conditions, it may be advisable to take movies of the experiment and insert the film strip in the television demonstration at the appropriate time.

Many more such experiences will occur and if one suspects that heat or some other studio situation may produce an unexpected result, it is advisable to run a test under actual studio conditions.

TECHNICAL SET-UP

The technical set-up, engineering, and layout of a closed-circuit television system are much too complicated for detailed analysis here. Those interested in the details of cost, types of equipment and new advances may refer to two sources, the RCA file of compiled information, "How to Plan for Educational Television" (28) and Zworykin, et al., (38).

It is quite possible to begin telecasting with a one-camera studio and to expand as finances will permit. However, Lewis (21) believes a two-camera TV studio is much more desirable because it permits a smooth transition between close-up shots for detail, long shots for orientation and permits fast switching between points of interest. The aim of educational television is to present programs of high quality. This can best be accomplished through a well equipped studio.

When viewers are made conscious of the TV camera, either by obvious movements of the performer to accommodate

the camera or the inability of a camera to get the desired picture, television is not being used to its true advantage. Therefore adequate equipment and capable personnel are necessary for a smooth-running show.

STUDIO ARRANGEMENT

"Studio" will refer to the origination place of a broadcast, whether it be a classroom, laboratory or ideally a TV studio. Simplicity should be the keynote of a program set, both in physical arrangement and in color. Colors as well as grays should correspond to values in the middle range of the gray scale (p. 30). Settings should also ring a note of familiarity to the student. If the lecture is on chemistry, care should be taken that the set has the arrangement of a laboratory setting (if studio arrangement rather than on-the-spot origination is used). It is also advisable to use the same basic setting for a series of telecasts in one course. Students will feel more "at home" and less likely to be distracted by the changing scenes.

Space is normally limited in the studio. This can be an asset rather than a liability when conducting a one-man show. Have visual demonstration materials arranged in order of presentation on a table and, if possible, have visuals such as charts, etc., placed on a flip chart stand or tacked to a bulletin board for easy manageability.

Additional comments concerning backing boards and chart stands are discussed on p. 54.

The TV camera has a tendency to magnify and can easily make a setting appear cluttered. For this reason, most demonstration materials should be out of camera range until needed and then removed from view as inconspicuously as possible when finished.

Consider a background as such--a place against which to display objects and persons.

ON CAMERA

The same basic concepts will apply to dress as discussed on page 44 with regard to color compatibility on black and white TV. They are basically to avoid drastic dark and light contrasts. Medium shades are most desirable. Avoid wearing white whenever possible, particularly white laboratory coats. Green, blue or beige coats are a preferable substitute for white in TV wear. Textured materials and small prints are acceptable but large patterns will be too "busy", that is, distracting on camera. Bell (7) cautioned against the use of shiny materials and metals which produce a glare under the studio lights. No special make-up will ordinarily be necessary for closed-circuit television.

The use of TV in surgery demonstrations is unique in that TV adjusts to the performer rather than the performer adjusting to the specifications of TV. According

to Rudolph (31), a principle objective of TV in surgery is to "cause as little interference as possible". For this reason, special consideration for the reflection from instruments is not required other than requesting the surgeon to be conscious of holding them at the angle of least reflection. Normally a stationary prefocused (remote control) overhead camera mounted in the center of a circle of lights is used. Green or other pastel colored drapes rather than white are helpful in reducing contrast for TV.

The major requirement for a relaxed and easy show is to be yourself. Television is a keen observer of artificiality. Speak to the TV camera in the same manner as in a face-to-face situation. The best visual in television is the instructor himself. "Mannerisms in a television performer are O.K., if they endear him to the audience. . ." (Joint Council on Educational Television, 19). Only when a particular mannerism will distract the audience should it be avoided. When working in front of a TV camera, assume sitting or standing positions which are most comfortable and most natural. A monitor, i.e., a TV receiver, will be located in the studio for viewing by the performer. Check this frequently during a program to see the type of picture being received by the audience, but do not make your movement obvious to the viewers.

Movement on camera should be easy and direct. Avoid excessive movements such as pacing back and forth, hand

gestures, and swaying which are annoying to the audience and difficult for the cameraman to follow. When a deliberate movement is to be made, give a verbal clue for the cameraman and director such as; "and over here we see", so that they will have an indication as to the direction of intended movement.

A red "tally light" located on the front of the camera will indicate which camera is on the air. If the tally light goes out, this indicates the other camera has taken over. When speaking directly to the audience, focus on the lens of the camera which is seeing you. There are usually four lenses on the front of the camera, so check ahead of time on the location of the lens which is in use. When a switch in cameras is made, lower the eyes in a natural manner and bring them to focus upon the camera in use (Siepmann, 32). Avoid at all cost being caught in a profile view speaking to the opposite camera.

Since in closed-circuit TV the performer paces his own show, most visual cues which are used in broadcast television are not necessary. Those cues used in commercial work are usually given by the floor director and are quite self explanatory, such as a slicing movement of the hand across the neck to indicate "cut"--the need of instantly winding up a show or going into another segment. In closed circuit, cues to tip a visual forward, or move in closer are given by the cameraman. When the cameraman raises his

arm upward with the index finger pointed, it means stand by to go on the air. When he points at you, it means you are on the air. Observe his motions but do not make the acknowledgment obvious to the audience.

A lavalier microphone, i.e. one hung about the neck, is perhaps the most common type used in lecture demonstration work. Whether this or other types such as overhead or boom microphones are used, the performer should speak in his normal voice. Vocabulary and speech patterns are left up to the individual's discretion.

DEMONSTRATION ON CAMERA

According to Bell (7) and McKune (23), when actively demonstrating objects on camera, play to the camera and not a person in the studio. Nothing should come between the camera and what it is supposed to see. Don't obscure a small object with your hand, use some type of pointer; and don't hold a small object in the hand when it can be avoided. The slightest degree of movement may move the object out of focus or move it completely off the viewing screen.

When pointing to objects on camera, if you must use a pencil, make sure it does not have a reflecting surface. A more desirable type of pointer to use, and one which can be easily made, consists of a stick of wood painted gray with a white arrow painted on the end; or in reverse

colors, depending upon the lightness or darkness of the background. If you are to be incorporated into the picture when pointing out or writing on an illustration, stand and work from the side so that the camera can view as much of the illustration as possible.

Three dimensional objects with deep recesses will appear on camera as having black holes which show no detail. When feasible, a simple solution for such problems is to touch up the cavity with a light color poster paint. The improvement on camera is amazing. A grease pencil is also helpful to mark desired lines etc. on objects with washable surfaces such as bones and glassware.

In long shots, a contrasting solid background will be necessary to show up objects. In close shots, the immediate background will be blurred and particular attention to clutter is unnecessary. However, a long shot is usually necessary before a close-up in order to give the viewer orientation to the subject matter.

Further comments concerned with demonstration on camera are discussed on pages 77-79 of Part III.

PART III

ART AND TV

". . . by putting more emphasis on the use of visual aids in connection with the use of TV cameras, it is becoming known that the learning process can be considerably improved" (Lewis, 21). This statement reflects the feelings of many today concerning the necessity of and need for good visual aids. The basic concepts of art on TV are presented here. Also many ideas are suggested in the hope that they can be used to improve the quality of art in TV, and to stress the need for adequate personnel in this field.

Many artists who have worked with TV have contributed their ideas on points which they consider most important concerning the preparation of art for TV. This paper is an attempt to correlate their ideas with those in use in the College of Veterinary Medicine at Michigan State University.

CRITERIA FOR SELECTING TV VISUALS

Visual communication is of utmost importance in television. Poole (27) commented, "If you can't show it, don't talk about it". The size of visual materials is unlimited; if an object can be seen under a microscope, it can be viewed on the screen. Size will only be a hindrance if

the object is too large to fit into the studio, and then film or photographs can be used. Major points to consider when selecting materials are:

1. Is it simple?

   Simplicity is the prime requisite for TV visual material. When visuals are to the point, the viewer will not be lost amongst the detail and will be able to grasp the main point under discussion.

2. Is it compatible for TV?

   A Vidicon camera tube normally used in closed-circuit work can be adjusted to tolerate greater degrees of contrast than the image orthicon tube. However, extreme dark-light contrast should still be avoided when possible.

3. Is it visually interesting?

   Artistic arrangement, interesting angles, attention-getting devices, and cartoons are examples which are useful in attracting the viewer's attention.

4. Does it convey the point?

   The main idea must be obvious and clearly presented, details must be kept as such; let them orient the viewer but not obscure the main scene.

5. Does it have action, or how can action be incorporated into it?

Means to incorporate action into a visual are discussed on pages 77-79.

6. Is it easily recognized?

A visual may be completely foreign to the average person, but is it obvious to the student acquainted with the particular subject matter. A long camera shot before close-ups will also aid in orientation.

HOW TV WORKS

Dupy (13) stated that Tele is a Greek word for "at a distance"; and vision, a derivative from the Latin Visio, meaning the "ability to see". The word was first coined by a French librarian in 1900 and has become the accepted term for the electrical transmission of pictures (Hubbell, 18).

In order to better understand the limitations placed upon one working with a TV system, a brief and non-technical description of picture transmission is offered.

Chester and Garrison (10) and Raynolds (30) described the TV camera as containing a photosensitive tube which is commonly known as the mosaic. Light entering through the camera lens induces electrical charges on the mosaic, many charges for light areas and fewer for dark areas. The charges are then removed from the mosaic in an orderly fashion by the electronic gun and transformed into electronic beams in the form of scan lines. Scan lines move from left to right and top to bottom and consist of two sets,

one interlaced by the other, to form a total of 525 scan lines in standard TV today, as compared to 60 lines used in the first TV back in 1928. The finest picture detail which can be resolved vertically is dependent upon the number of scan lines and the finest resolution horizontally is determined by the number of electronic impulses which are transmitted along a single scan line. Vidicon camera tubes, rather than the image orthicon tube of commercial work, are generally used in closed-system TV because of their simpler arrangement, lesser sensitivity to rough handling as well as considerably less initial and operating cost.

Thirty complete frames, i.e., 30 sets of 525 scan lines known as the frame frequency, are transmitted per second as compared to movie film with 24 frames per second. This faster frame frequency of TV reduces flicker. According to McMahan (25) and Reynolds (29), it is the "Persistence of Vision" factor which enables the human eye to see the series of stills as a completely resolved moving picture.

In the control room the electronic beam signal is strengthened by passing through amplifiers and sent out in the air, or through coaxial cable in the case of closed-system TV. Sound which has been picked up by a microphone in the studio is also sent out in a signal with the picture.

In the TV receiver, the two signals are picked up and a process similar to that in the camera tube is enacted in a reverse order to recreate a dark and light picture identical to that of the original.

PHOTOGRAPHING FROM A TV SCREEN

Since the reproduction of visual material on camera is of prime concern here, all photographs of illustrations, except those noted, have been taken directly from a TV screen. When photographing from a TV screen, it has been found that a slow shutter speed, 1/30 second, is necessary for good results. This is due primarily to the frame frequency of a TV system. If a fast shutter speed is used, the photograph may have a wavy appearance. The TV screen actually emits very little light, so best results are obtained by using a wide lens opening of f3.5 in a darkened room, and it may be necessary to take three or four shots of each scene to insure obtaining a suitable copy.

The photographs reproduced here were the best that could be obtained with the existing television and photographic equipment; however, they do not give as clear a picture quality as that seen on the live TV screen. Perhaps this is due in part to the double reproduction--TV and photography--of the original image.

GRAY SCALE

According to White (36), gray scale in television

terminology may be defined as "a series of tone variations from almost white to almost black". White and black are not considered a part of the gray scale but have been included in the illustration on page 30. There is some disagreement as to the number of gray tones which can be reproduced on television but eight gradations is a good mean with which to work. Number 2 and 3 on the gray scale give an off white on camera and number 8 and 9 a near black; therefore, visuals as well as all other material on television may be in dark and light grays and give the appearance of good contrast on camera without danger of glare.

The limitation placed on an artist in having to work in bold tones may be an aid rather than a hindrance because it forces the use of a simple and clear-cut technique, a point which cannot be over-stressed. Complicated and detailed illustrations serve no purpose in television. The longest period which any visual material is held on camera usually does not exceed three to four minutes--a period of time in which it is impossible for the viewer to examine thoroughly all minute details, comprehend the discussion, and take adequate notes. If an illustration can bring out one main point, it has served its purpose. Also, great detail will be lost if the illustration is reduced on camera. Some say that as much as 50% may also be lost in transmission. These factors further stress the need for simplicity in TV illustrations.

Successful drawings can be executed by using a light, a medium, and a dark shade such as numbers 3, 6, and 9 on the gray scale. Some experience is needed to train the eye to see tones as the television set will reproduce them. A good rule of thumb is that any two tones in apposition to each other must be at least two steps apart on the gray scale for suitable contrast. Although stress has been put on the use of gray values for TV, white and black will be needed at times to give an illustration punch. Use them sparingly and in relatively small areas. For this reason, numbers 1 and 10, white and black, have been included in the gray scale used here.

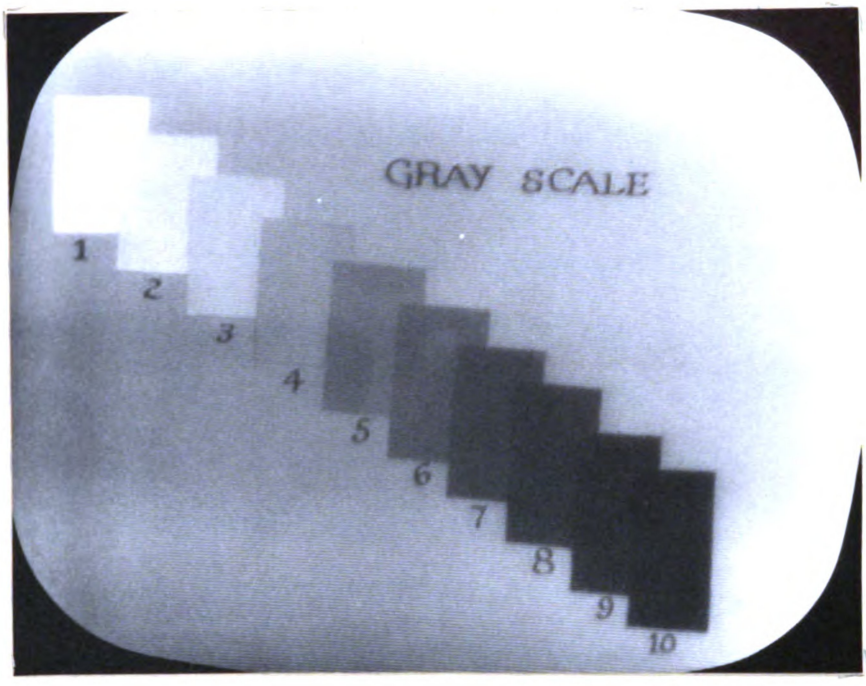
When a good balance between the darks and lights of an illustration is used, reproduction will be satisfactory regardless of technical variations. In closed-circuit television in particular, the electronic range may be raised or lowered to meet individual needs. That is, the gray scale may be raised in the case of low key dissection demonstration material so that all tones will appear one shade or more lighter on the gray scale. The reverse may also occur shen the majority of material is in a high key.

ELECTRONIC PHENOMENA

Because the electronic charges or dots of light in a TV tube cannot go from extreme light to extreme dark

GRAY SCALE

The photograph A of a gray scale was taken from a TV screen and is used to compare the rendition of tones with B which is a direct photograph of the visual. The television system from which all of the photographs were taken was adjusted so that the gray values televised approximately one step higher than normal on the gray scale. The paint swatches were prepared with black and white "Prang" tempera and mounted on a medium gray crescent board. Hand lettering was with India ink.



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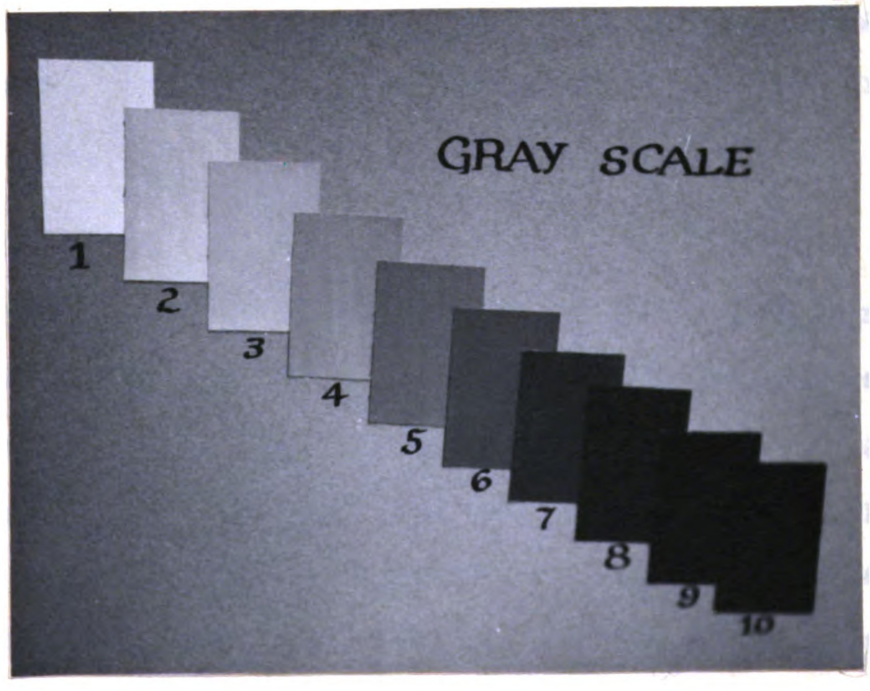


B

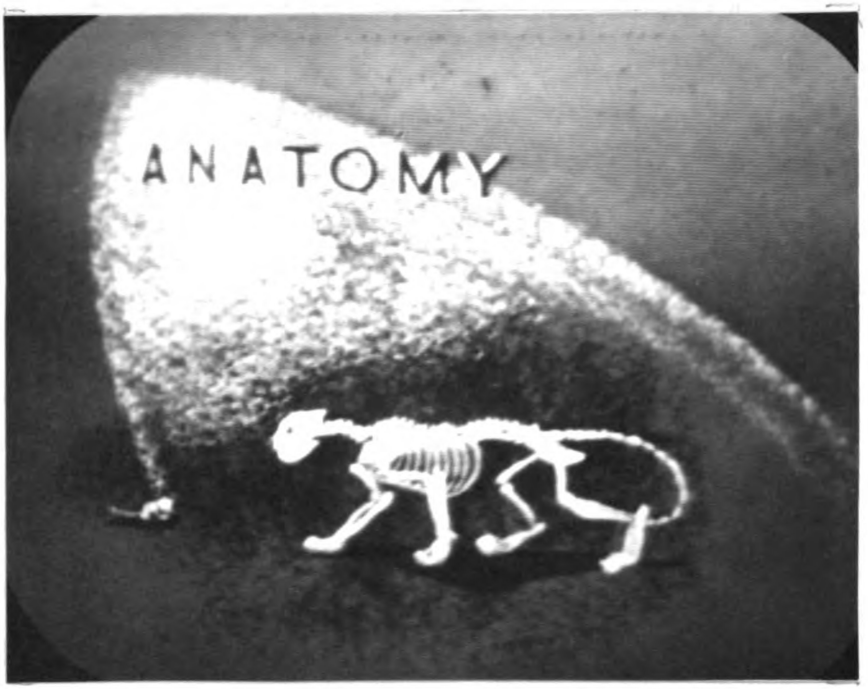
without passing through a series of grays, there are a few phenomena of which the TV artist should be aware. Fig. A., page 33, is an example of "streaking" or extension of a horizontal line beyond its termination point. Narrow horizontal lines, due to their approximation of a one scan line thickness will have a tendency to streak further than wider lines. Note also the "bloom" or glare of the white letters in Fig. B. Loss of detail will occur in areas that bloom on camera. Ghost and silhouette are terms used to describe a lighter vibration or halo around an extremely dark area which is against a light background. A very distressing thing for the TV engineer is a burn on the camera tube resulting from an object of too great contrast. This is essentially a persistence of a negative image upon the camera tube after the object has been removed from camera view.

PROPORTION

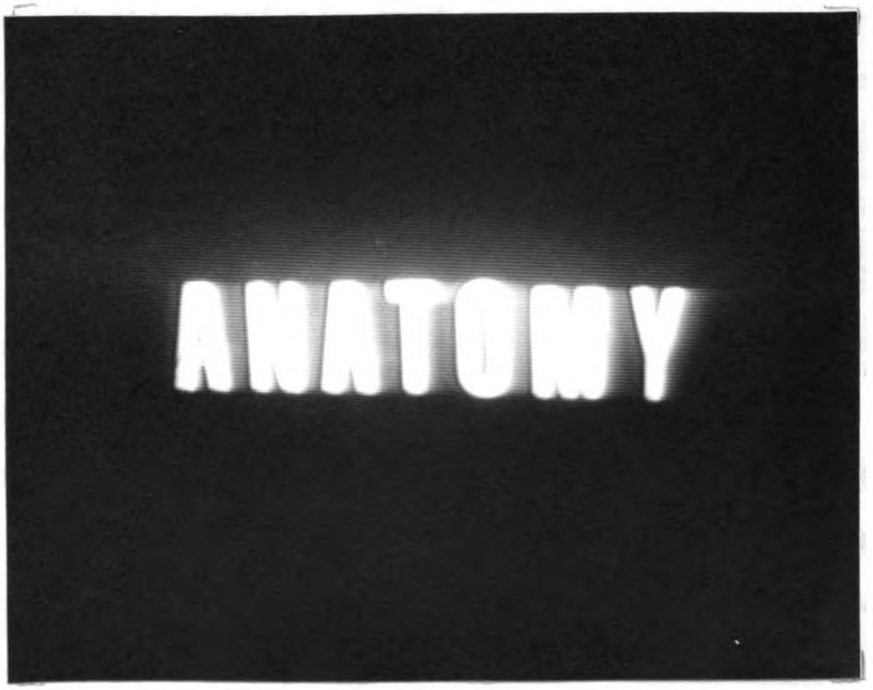
The size relationship of visuals for television is dictated by the proportions of the television camera tube: three vertical to four horizontal. Size of the original drawing is dependent upon the artist, subject, and particular studio and receiving conditions. In all cases, a larger board than the immediate working area is necessary as illustrated by the 11" x 14" card size in Fig. A and B, page 36. The middle zone labeled camera field is the area

ELECTRONIC PHENOMENA

Both photograph A and B were taken from the TV screen to illustrate undesirable effects produced by extreme contrast in a TV system. The illustrative material for both visuals was photographed and made into 2" x 2" transparency slides which were projected from the control room. Note the streaking of the cat's tail in Fig. A and the blur and streaking of the lettering in Fig. B.



A



B

which the cameraman sees through the TV camera. However, the actual working area is cut down again by the receiving sets so that the acute field is reduced by approximately one half that of the original card size.

The author has found that a 7" x 9½" working area is quite satisfactory in most cases. It has been found that it is often desirable to have the outside dimensions of the board larger than 11" x 14" for a working area of 7" x 9½". This allows for extra handling margin and a larger safety margin when the visual is placed on a stand for televising. Other dimensions may also be used, however, all visuals for a single broadcast or a series of broadcasts should be of the same outside dimensions. This facilitates handling by the cameramen and director.

It is understandable that not all visual material will lend itself to a 3 x 4 proportion, but care should be taken to use as much of the screen area as possible. When a visual has a long vertical axis, considerable reduction will be necessary on a full shot of the subject, and the desired effect may be completely lost.

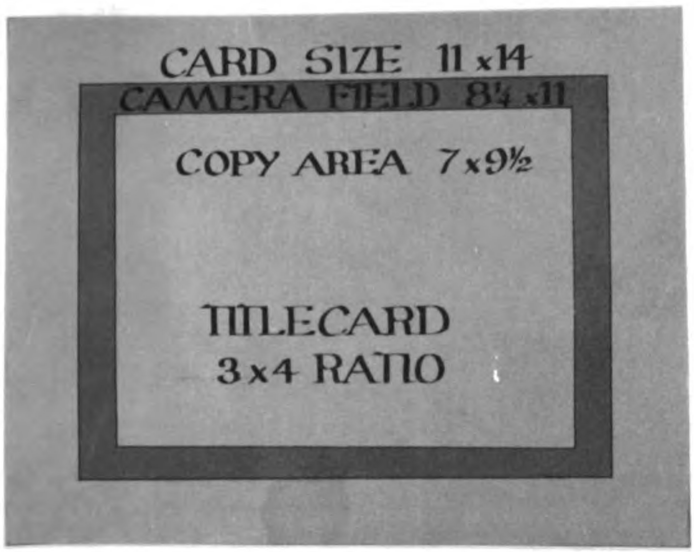
Figure C, page 36, illustrates the use of a mask in the preparation of visuals. The inside margin is in proportion to the camera field area. This particular one was cut from heavy board and calibrated to facilitate the centering of lettering and illustrative material. More elaborate masks are commercially available but an

VISUAL PROPORTIONS

The visual for Fig. A and B was prepared on a light blue board with a darker blue "Zip-a-tone"* paper used for the camera field area. Photograph B, taken from the TV screen, compares the rendition of blue on camera with A--a direct photo of the visual. Note the white value of a light blue on camera compared with the dark value of a deep blue.

Fig. C is a direct photograph to illustrate the use of a mask in preparing a TV visual.

* Manufactured by Para-Tone Co., Inc.; 512 Burlington Avenue, LaGrange, Illinois.


CARD SIZE 11 x 14
CAMERA FIELD 8¼ x 11
COPY AREA 7 x 9½
TITLECARD
3 x 4 RATIO

A


CARD SIZE 11 x 14
COPY AREA 7 x 9½
TITLECARD
3 x 4 RATIO

B

C

easily made one will serve the purpose. Note that an adequate safety margin is left between the drawing and mask.

LINE AND LETTER SIZE

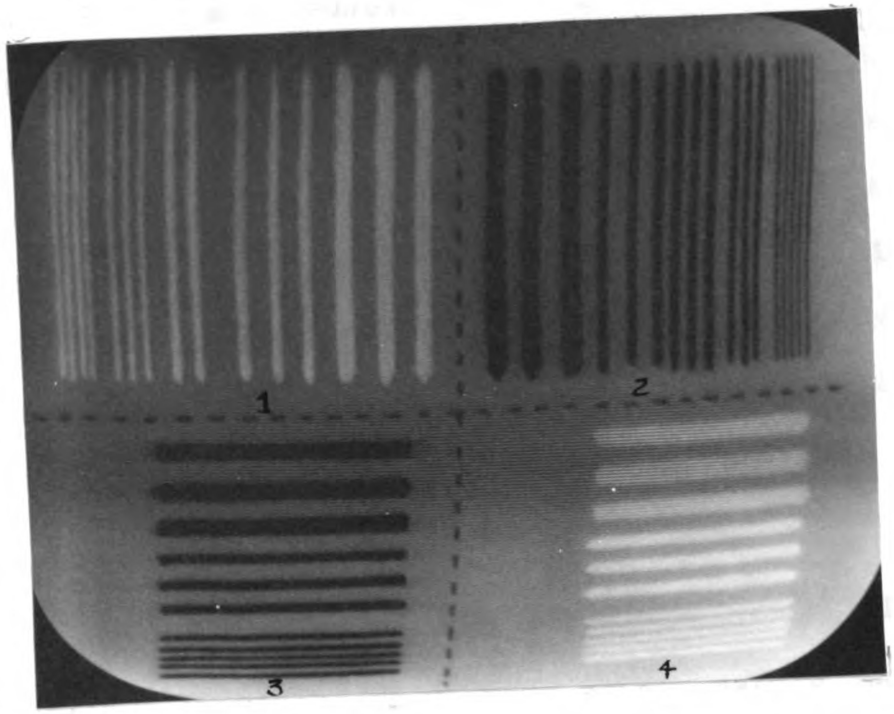
Width and space requirements for suitable line reproduction on TV are subject to many variables. The line widths as illustrated by Fig. A, page 39, were executed on a 11" x 14" card of 30% gray and are: block 1--white, block 2--dark gray, block 3--black and block 4--white. The middle sets of lines in each block are 1/8 " thickness and are reproduced satisfactorily for this size visual. Note that the white lines of the same width do not reproduce as well as the dark gray and black. A small degree of contrast will necessitate using a greater line width. Normally dotted lines do not show well. It is very difficult to give specific requirements for the size of line used in line drawings, charts, and maps. Familiarity with the subject matter and the TV camera will be necessary.

Lettering and type can be readable on the TV screen. However, discrimination in their use is necessary. It is very easy to dampen student interest by cluttering a screen with written material. As a general rule, type should be no less than 1/10 the size of the copy area. Fig. B, page 39, illustrates the use of various sizes and styles of type. Bold and clear type faces such as

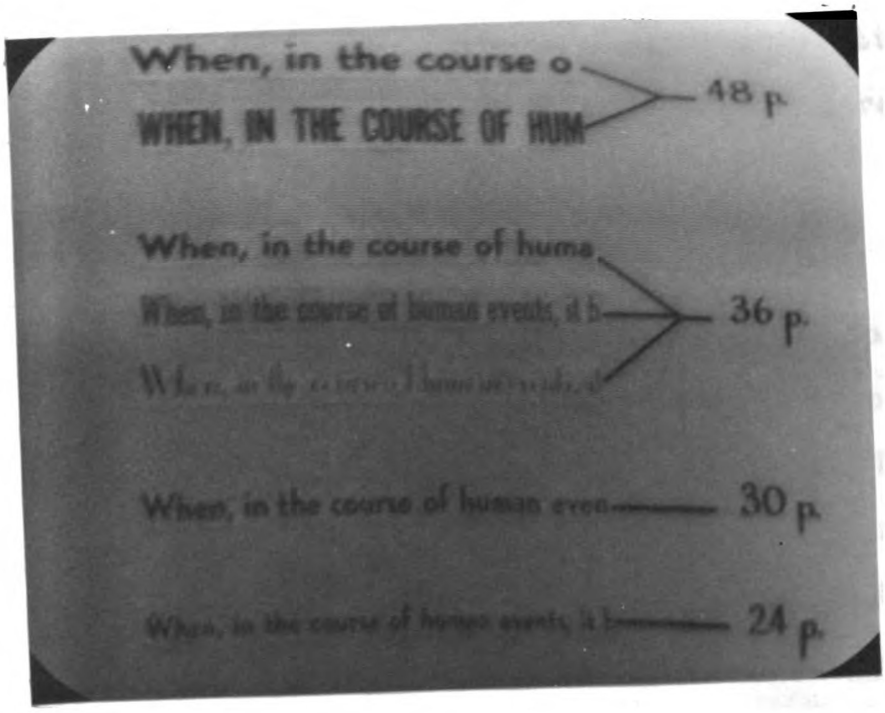
LINE AND LETTER SIZE

Fig. A demonstrates line widths on TV. The original working area was 7" x 9½", the background was a light gray and the line colors are: block 1--white, block 2--dark gray, block 3--black, and block 4--white. Vertical lines in blocks 1 and 2 measure 1/16" wide with 1/16" space, 1/16" wide with 1/8" space, 1/8" wide with 1/8" space, 1/8" wide with 1/4" space, and 1/4" wide with 1/4" space. The horizontal lines in blocks 3 and 4 measure 1/16" wide with 1/8" space, 1/8" wide with 1/4" space, and 1/4" wide with 1/4" space.

The visual for Fig. B was constructed from lines of type cut from a printer's book and mounted on light gray board. The paper around the type was painted in with a matching gray tempera. The lines and numbers were lettered with India ink.


1
2
3
4

A


When, in the course o
WHEN, IN THE COURSE OF HUM
48 p.
When, in the course of huma
36 p.
When, in the course of human even
30 p.
24 p.

B

Roman and Gothic are necessary for readability, lines 1, 2, and 3 of Fig. B, page 39. Generally, for an 11" x 14" card, type under 48 point is likely to blur. Larger cards will require proportionally larger type. Because of point size and thinness of style, all of the type below line four in Fig. B is illegible. For best results, long lines of type should be avoided and a liberal safety margin should be allowed.

HAND LETTERING

Hand lettering is also frequently used in TV. Due to the slight irregularity of hand work, letters should be 1/7 to 1/10 the height and 1/25 to 1/30 the width of the copy area. Letters and numbers should be separated by approximately a one stroke width. Commercial lettering sets are a good aid for producing clear and easily readable letters.

TYPEWRITTEN MATERIAL

Carpenter and Greenhill (9) recently conducted a survey concerning the readability of typewritten material on TV at Pennsylvania State University. According to student opinion, typewritten material was 92% readable and only 8% unreadable. The most frequent criticism concerning the use of typewritten material was that it was on camera for too short a time. This again brings out the major requirement for simplicity in the use of visual material on TV

plus the need for ample time on a visual for it to be comprehended. Extra time will also be needed because it is expected that students will be taking notes and not viewing for entertainment as in commercial broadcasts.

Fig. A, page 43, illustrates the use of typewritten material. Here again the height of letters should be 1/10 the size of the copy area, clear-cut, sharp, and preferably pica type. With a 1/10 height size and a 3 to 4 ratio limitation, a block of pica type will measure 1⅛" by 2" in dimension and contain five lines of type. Since the paper for typewritten material will be quite thin, it is necessary to tack or cement the paper to a stiff board if it is to be used directly on camera. Care should be taken that the paper is perfectly flat, the slightest ripple in the paper may cause a blur in that area due to the limited depth of focus under a high magnification lens.

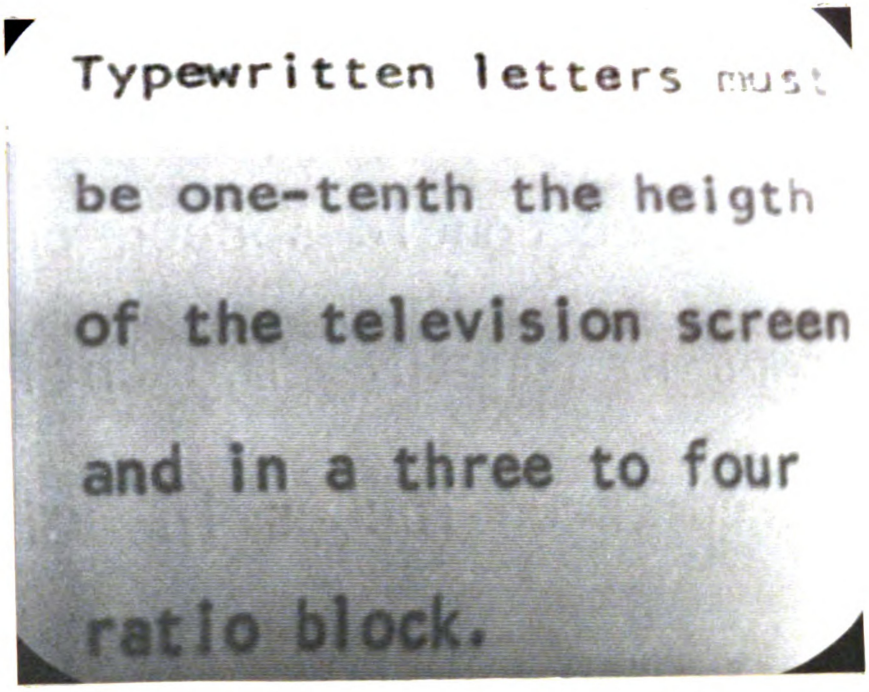
BLACKBOARD WRITING

Blackboard written material is another medium suitable for TV reproduction. When writing on a board during a TV presentation, execution should be deliberate and slow and in a 3 to 4 ratio block. Height and width requirements are the same as for hand lettering. Before broadcast time, it is often helpful to mark off hastily on the board 3 by 4 ratio blocks with a medium green hard chalk which will not show on camera. Soft yellow or white chalk on a green board will produce a good black and white picture on camera.

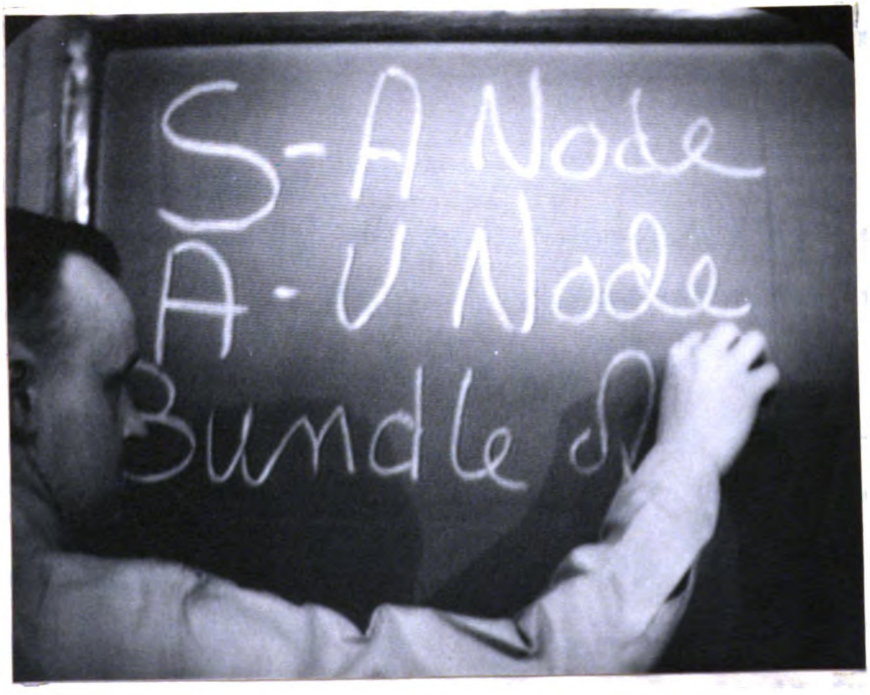
WRITING ON TV

Fig. A is an example of the magnification of typewritten letters on a TV screen. Pica type was used on a medium blue paper with the original block of type measuring 1½" x 2", height to width.

Fig. B shows an instructor writing on the blackboard while on camera. He is standing to one side to enable viewing of the writing and is confining the material to an approximate 3 x 4 ratio block which was outlined on the board before broadcast time with a medium green chalk; the blackboard is a dark green.


Typewritten letters must
be one-tenth the heigth
of the television screen
and in a three to four
ratio block.

A


S-A Node
A-V Node
Bundle

B

A word of warning concerning the use of any type of written material on TV--brevity is essential.

COLOR ON BLACK AND WHITE TV

When dealing with achromatic television, the question, "Why worry about color in black and white TV" is likely to arise. Color has several advantages. Colors produce better values of gray and offer a wider range of grays than a mixture of black and white. Colored drawings which are well prepared will serve as attractive live demonstration material as well as TV visuals. It is generally accepted that color drawings which are made compatible for black and white TV will produce satisfactory results on a color camera. Lastly, time-consuming illustrations, produced in grays, will become outdated with the installation of color TV.

Understandably, the introduction of color will complicate matters for the TV artist. The basic problem in using color on a black and white camera is that of translation to the gray scale. TV does not see color in the same values as does the human eye or the photographic camera. Fig. A, page 48, illustrates the difference in gray values perceived by the photographic camera as compared to that of Fig. B, same page, taken from the TV screen. Rendition of color in terms of the gray scale is further complicated by the type of lighting used in the studio

and by the individual TV camera being used. Therefore, all of the following facts concerning color in TV are generalizations. TV has many idiosyncrasies; for assurance of the desired results it is necessary to test one's work on camera.

Value in terms of the gray scale refers to the lightness or darkness of gray produced by a color. Hue is the classification of color, i.e. red, blue, green. Saturation is the vividness of a color. If something lacks saturation it would indicate that it is on the pastel side. Achromatic TV sees all colors in the same hue and is dependent upon a variation in value between hues for contrast.

The color wheel in the photographs on page 48 was prepared on a white ground rubbed with gray pastel to reduce glare. White was used in this particular instance to offer as true a comparison between the colors as possible. The circular margins were cut from a medium gray paper and the central circle was pure black for contrast relationship. Casein paints (Grumbracher)* were used for preparation of the color swatches and were as follows:

Primary
- Yellow----------Cadmium yellow light
- Red----------Cadmium red light
- Blue----------French Ultramarine blue

Secondary
- Orange----------Cadmium red light plus cadmium yellow medium
- Violet----------Rose red (Shiva) plus French Ultramarine blue
- Green----------Permanent green light

*Available at all art supply stores.

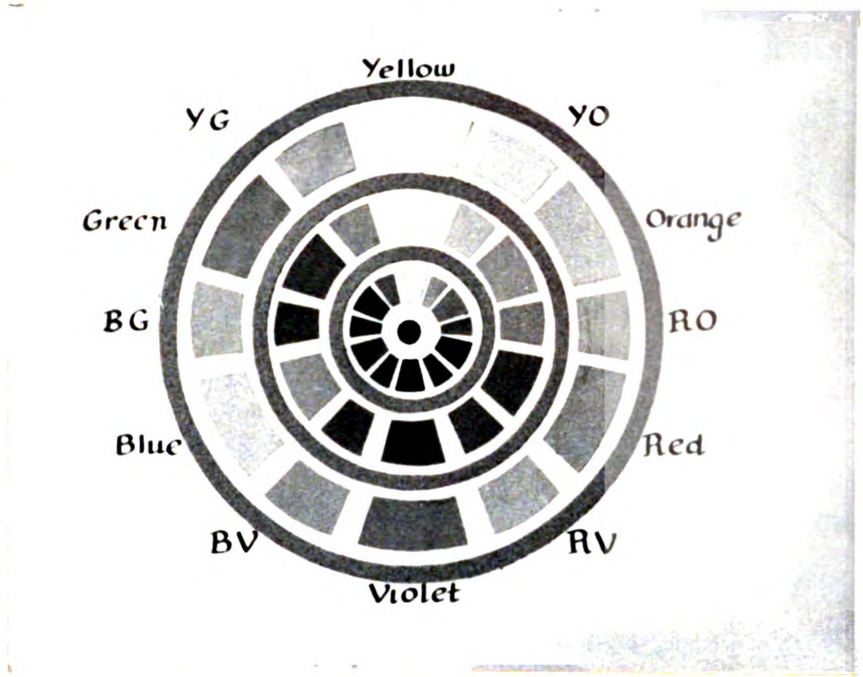
Tertiary colors are a mixture of their two adjoining hues on the color wheel.

The outer zone of the color wheel represents a light value, the middle zone a medium value (both diluted with white) and the inner zone the pure color. Black has not been added to any of the colors since it has a tendency to lower a color to about a #9 gray scale value. Yellow reproduces as the lightest hue on the color wheel. Light yellow should be used sparingly because it may produce the same problems as pure white. Violet produces the deepest value on the wheel and is suitable for use as a TV black. Pure black in an area of any size tends to absorb too much light and distort the quality of the entire picture. Pure red, blue and green (inner circle Fig. B, page 48) produce the same dark gray on TV. Note how the same blue washes out in photography, Fig. A. Light blue on TV produces a good white, the statement, "Wear a blue shirt on TV", is quite familiar to most people. Although pure green becomes a deep gray, it produces very soft tones when mixed with white or yellow.

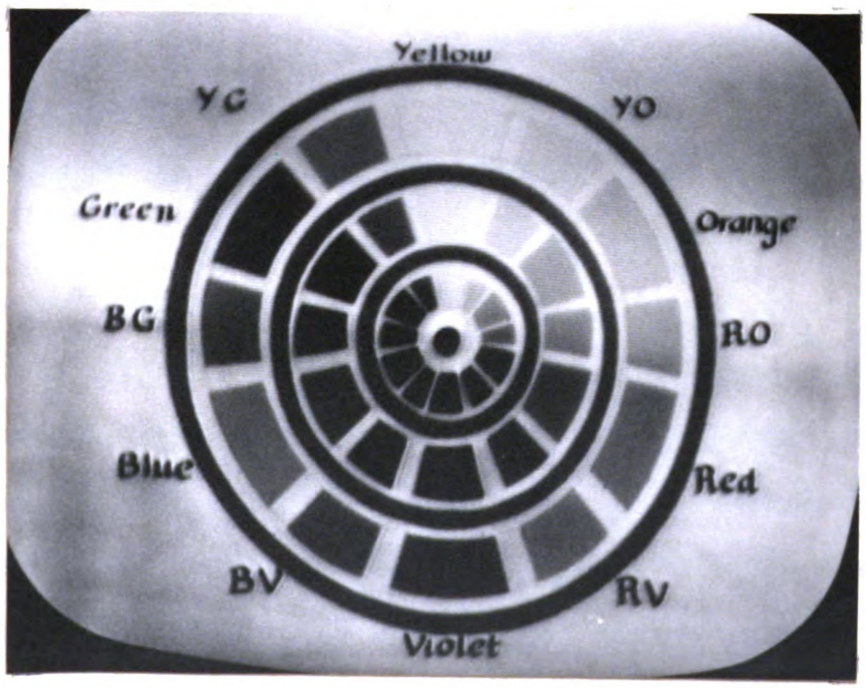
Some familiarity with the television camera will be required of the TV artist in order to use colors which will give the required contrast on camera. It is sometimes difficult to see that two colors of different hue and value will register an identical gray on TV. A similar rule as stated for the use of the gray scale can be applied

COLOR WHEEL

Fig. A, a direct photograph, is used to compare the variations in color rendition on panchromatic film with that of the TV camera, Fig. B.


Yellow
YG
YO
Green
Orange
BG
RO
Blue
Red
BV
RV
Violet

A


Yellow
YG
YO
Green
Orange
BG
RO
Blue
Red
BV
RV
Violet

B

to color. Two hues or values in apposition to each other should register at least two steps apart on the gray scale. Good contrast, as a rule, can be produced by using a dark and light hue or any tint thereof, such as yellow and red, yellow-orange and red-violet, orange and violet.

Those intending to work with color to any extent should consider making several color swatches, either with pigments or colored papers. According to the methods of Wade (35), test the samples on camera and mark them with their corresponding gray scale number. Intermediate plus or minus are often helpful. An example would be a yellow that registered #2 and a yellow-orange that registered #2+. Further comments and examples of color on black and white TV can be found on pages 74 and 76.

COLOR AND COLOR TV

Color TV is a medium which shows great promise. Presently, cost of color equipment is extremely high but already an experimental one-tube color camera has been made which is comparable in cost to the Vidicon camera tube used in most closed-circuit systems. Color cameras presently in use consist of three separate tubes; red, green and blue, and cost from $40,000 to $60,000. Many feel that within the next five years, color systems will replace black and white in closed-circuit television.

Little material has been published on color and its reproduction on color TV, however Conrath (11) has presented some interesting ideas on color TV. Those using color have relied on experiments and personal experience. Generally speaking, colored illustrations which reproduce well on black and white TV will be suitable for color TV. Some colors do give difficulty in reproducing accurately, such as turquoise and some shades of red. Goodwin (15) assumes that "good contrasting colors used with artistic judgment will work out well." Addition of black to a color may tend to kill it on camera. Backgrounds in color may offer more eye appeal but it is still sometimes easier to work on grays. Aside from the particulars of color TV, all the facts relative to black and white TV will apply.

The Frontispiece illustrates a colored visual which has served well as a black and white TV illustration, as a classroom demonstration and also in photographic reproduction for publications. Because of the inaccessibility of color TV equipment they were photographed directly.

PHOTOGRAPHS ON TV

Photographs used for direct televising should be a matte finish; ferrotype glossy prints will reflect light and cause glare. Photos measuring 7" x 9" and 8" x 10" with the top and bottom on the horizontal axis are in the 3 x 4 ratio of the TV camera. When photos are not of

the correct ratio, crop them to the correct size to insure televising of the essential area. Photos should be rather simple; complicated or detailed subjects will not televise well. Large areas of white may be toned down with a thin wash of medium yellow or light blue. When photographs are prepared especially for TV, light backgrounds may be grayed slightly by flashing the enlarger light on the paper during printing (Fig. B, page 66). It is advisable either to mount photos on a larger board for stand viewing or to tack them to a cork board. When hand-held, the slightest movement may move the image half off the viewing screen, particularly on a close-up shot.

FILM

Film strips are often helpful in bringing into the studio outside activities at relatively little expense. Most studios are equipped to handle either or both 16mm and 35mm movie film. Since various studios will have specific requirements, it is advisable to check these and also to preview the film. Black and white films are preferable for achromatic TV, but color may reproduce satisfactorily.

THIRTY FIVE MILLIMETER LANTERN SLIDES (2" x 2")

Most closed-circuit systems will have available in the control room a projector and Vidicon camera to take 2" x 2" transparency slides. Use of slide projection offers a smooth transition between still visuals and should

be employed when feasible. If visual materials are planned well in advance of broadcast time, it is a simple process to reproduce drawings, pictures, etc. photographically. The actual film area in a 2" x 2" slide will be approximately 1 1/8" x 7/8". Because this is not in a 3 x 4 ratio, viewing material should be well in the center and measure approximately 6/9" x 7/8" on the 2" x 2" slide. Cardboard binders for slides are not satisfactory in most setups, and in order to prevent dust and finger print damage, it is desirable to have the film bound in glass mounts.

Color is no deterrent for black and white TV. However all slides, particularly those used in a series, should have a background color of the same value on the gray scale. When large areas of background on one slide register a #6 gray and the next a #10 gray, picture quality will be reduced and major adjustment by the engineer in the control room will be required. Since both film strips and slides are run from the projection room, a verbal cue from the performer will aid in a smooth transition between the studio and projection room. Fig. A, page 56, shows a TV picture of a 2" x 2" color transparency slide.

BALOPTICAN*

A TV version of an opaque projector is the Baloptican (Hall, 17). Matte finished prints measuring 4" x 5"

*A trade name formed from the first letters of "Bausch and Lomb Optical projector".

which are termed balop or telop cards can be made from photographically reduced art work and used for projection purposes from the control room. This offers a fairly inexpensive and efficient method of reproducing still visuals.

REAR SCREEN PROJECTION

Rear screen projection is a device which permits projection from the rear onto a translucent screen. The particular advantage here is that a small photo can be magnified many times. Rear screens are good for use as a background but are not suitable for scientific subject matter in which one wishes to point out certain objects. Particularly if they are comparatively small, the objects will be blurred to the instructor and difficult to pin-point. However, to the viewers, objects will be quite obvious due to reduction by the TV camera, and according to Novak (26) such a situation could prove embarrassing to the educator.

CRAWL MACHINE

A simple device, the rotating drum or crawl machine, can add a touch of professional quality to a show. Wade (35) described it as consisting of a hand-cranked rotating drum upon which the visual material has been tacked. The camera focuses on the center of the copy area, and when the drum is rotated slowly the effect of a slow, even movement is achieved on the screen. This is essentially the process often used in commercial television for giving credits.

According to Poole (27) this is one instance where visuals will not be in a 3 to 4 ratio but rather on a long axis vertically.

BACKING BOARDS

Cork bulletin boards or a similar soft-surfaced board are often useful for tacking up visual materials such as maps or photos for televising. Poole (27) and McMahan (25) have found that adhesion or flannel boards are another device useful for displaying visual ideas. They are easily constructed by covering a board with flannel or felt. Cutout visuals backed with sandpaper will adhere to the rough surface. This method offers a means of putting attention-getting action into a demonstration.

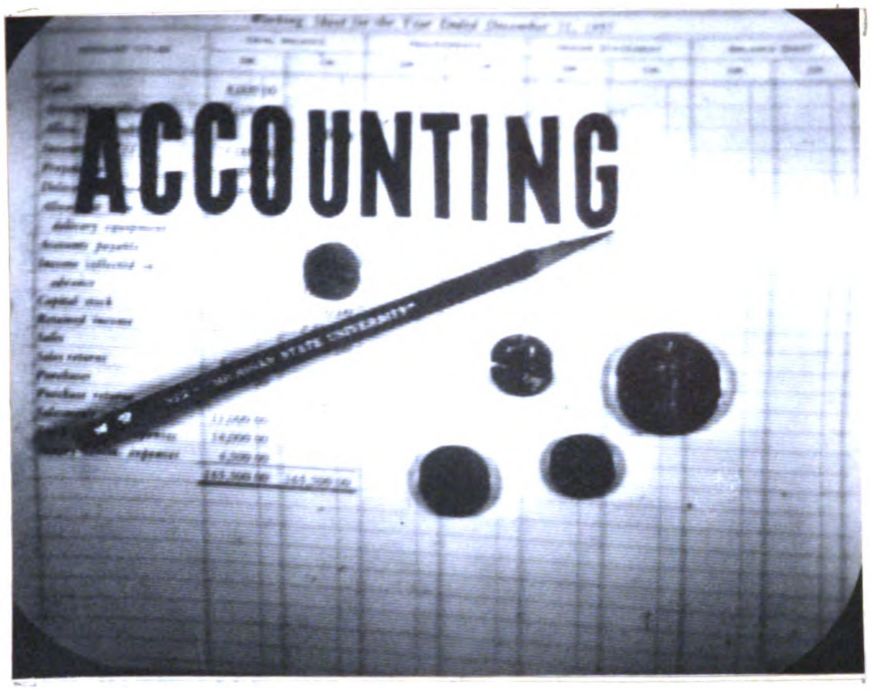
CHART STANDS

Fig. B, page 56, illustrates two types of stands suitable for holding illustrations. The flip stand rack (music rack type) is best because it is adjustable and will hold cards in a vertical position. Its name is derived from the fact that many times visuals in a series are flipped down, one upon the other, to give the appearance of instant change on camera. The table type lecture stand has a disadvantage in that visuals rest at an angle. Distortion of the picture may occur if the camera is not tilted to the same angle.

TV AIDS

Fig. A is a TV picture of a colored 2" x 2" slide. The original slide is in color and works well for black and white TV.

Fig. B illustrates two types of stands suitable for holding TV visuals. Note the angle of the table stand which may cause distortion of the visual if the TV camera is not tilted to the same angle as the stand.



A

B

TV MICROSCOPE

A combination of the microscope and TV camera will enable any number of viewers to observe and study a microscopic field simultaneously. The simplest method for viewing slides is to focus the 90mm lens of a TV camera on the eyepiece of the microscope. Bloom (8) and Zworykin, et al., (38) reported that special microscope mountings for the Vidicon camera and color TV camera are now available as well as specially built devices such as the flying-spot microscope.

BACKGROUND MATERIALS

Many types of background materials, boards, papers etc., are suitable for television purposes. Use of a particular type will be dictated by the medium used, individual studio requirements, and personal preference. Major considerations for any background material are: 1) the surface should be a matte finish--glossy surfaces will reflect light in the camera and distort the image; 2) the color of the surface should register between #2 and #9 on the gray scale. The degree of lightness or darkness will be dictated by the choice of values used in the illustration. For most work, a medium gray will be satisfactory and complementary to a drawing on camera. Darker gray backgrounds prove most useful when the subject material is executed in primarily light values.

A few of the more commonly used materials* are:

Crescent Melton Mount No. 1228, light-gray (28" x 44")	Heavy board, approximately #3 gray scale, surface suitable for all media.
Crescent Melton Mount No. 1235, copley gray (28" x 44")	Approximately #6 gray scale.
Charcoal paper	Charcoal, pastel, and chalk media.
Crescent TV Bristol Board No. 350, light gray	25-30% tone, suitable for all media.
Crescent TV Bristol Board No. 351, dark gray	45-50% tone.
Crescent Poster Board No. 650, 30% gray (22" x 28")	Suitable to most media, will show smudges and finger prints easily.
Crescent Poster Board No. 606, medium blue No. 603, seafoam green	Good for black and white TV
Strathmore Charcoal Paper (19" x 25") In grays and suitable colors	Chalk, pastels. Rather thin, will require a heavier backing.
Mi-Tianti Commercial Drawing Paper No. 431, medium gray	Opaque paints, pencil India ink. Fairly stiff paper.

The majority of the above mentioned surfaces are in gray tones, however, any suitable color may be used as a background surface. When dealing with the chromatic scale, the background surface must be of a color which will offer contrast to the hues and values on its surface. Deep reds reproduce as a very dark gray on camera and will

*Materials are available at most art supply stores.

give a dramatic effect to a light illustration. Pale greens and yellow greens are often used as a background color because of their soft light tones and pleasant color.

MATERIALS AND METHODS

Materials and methods for producing illustrative materials are many and varied, limited only by one's imagination and experience in the field. Principal media which can be used are brush or pen and India ink, opaque poster colors, transparent watercolor, artist's casein color, pastel and chalks, colored pencil and charcoal pencil. According to Wade (35) any "smooth technique" which carries the image well to the audience is generally suitable for TV.

Before discussion of illustrations employing some acceptable techniques, it is necessary to point out a few "scratchy" methods not suited for TV purposes. A rough technique when viewed from afar will appear smooth and realistic. However, with the use of close-up shots and magnification in TV, the "scratchy" methods as illustrated in Fig. A, page 62, are disturbing. This illustration gives a spotty appearance partially because of the rough techniques and partially because of the pebble surfaced matte board used as the working surface. Note in Fig. B how rough the close-up shot of the pastel rendering becomes. The illustration entitled "Ben-Day" is actually prepared

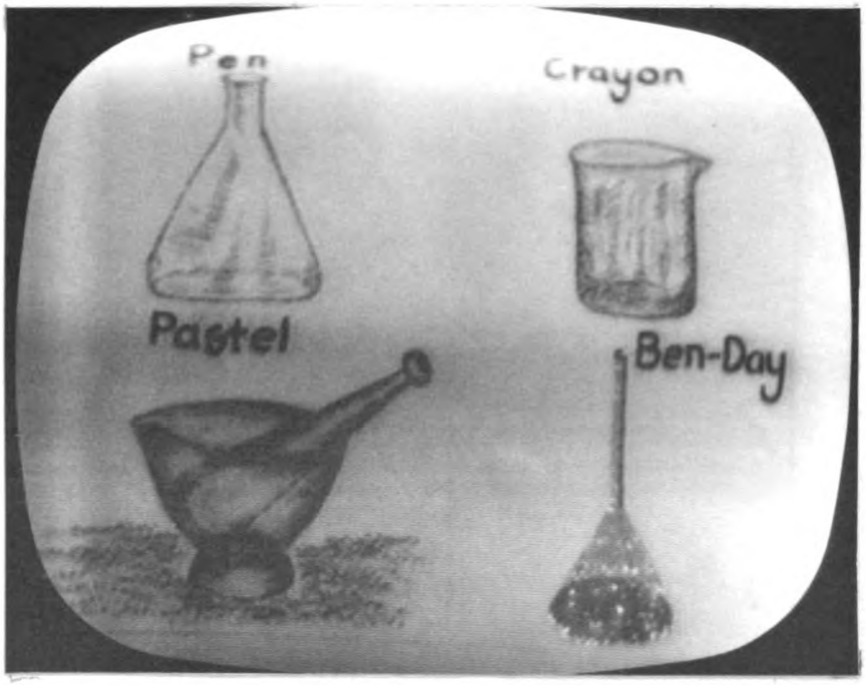
with a "Zip-A-Tone" paper but produces an effect similar to what a coarse "Ben-Day" screen may give. Hence, newspaper pictures or photographs of similar coarse printing are undesirable. Fig. B illustrates what may happen in a close-up shot of a coarse screen or pattern. "Zip-A-Tone" colored papers are also undesirable because of their highly reflective surfaces.

The following visuals illustrate the use of various techniques and their reproduction on camera. A discussion of the particular methods is included on the pages facing the photographs.

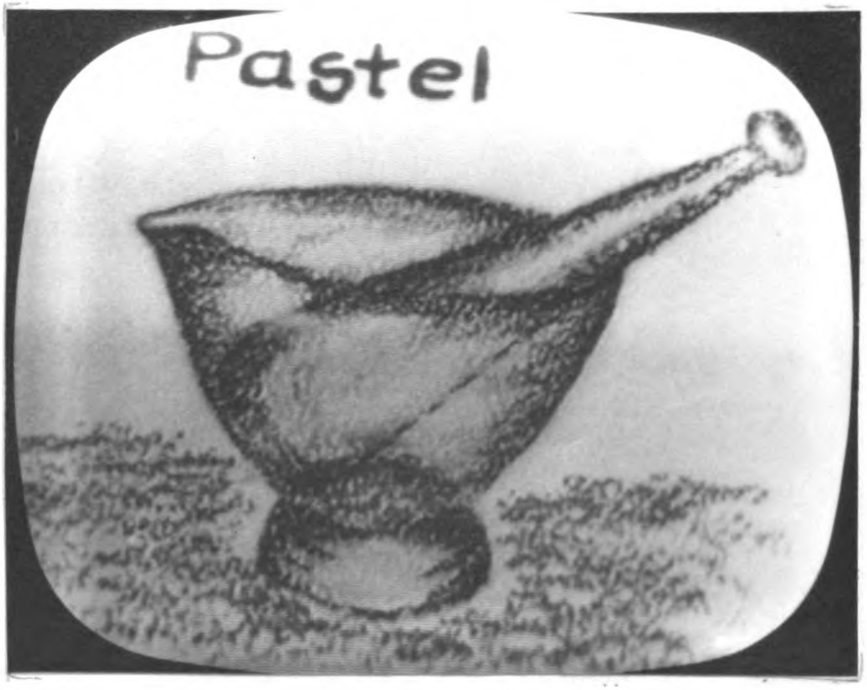
SCRATCHY TECHNIQUES

Fig. A illustrates scratchy techniques which are not well suited for TV, particularly tight shots. They were executed on a pebble surfaced beige matte board and are in India ink, black and yellow crayon, black and gray pastel, and India ink and black dotted "Zip-A-Tone" paper.

Fig. B is a close-up of the "pastel block", showing the coarse appearance of the drawing on a tight camera lens.



A



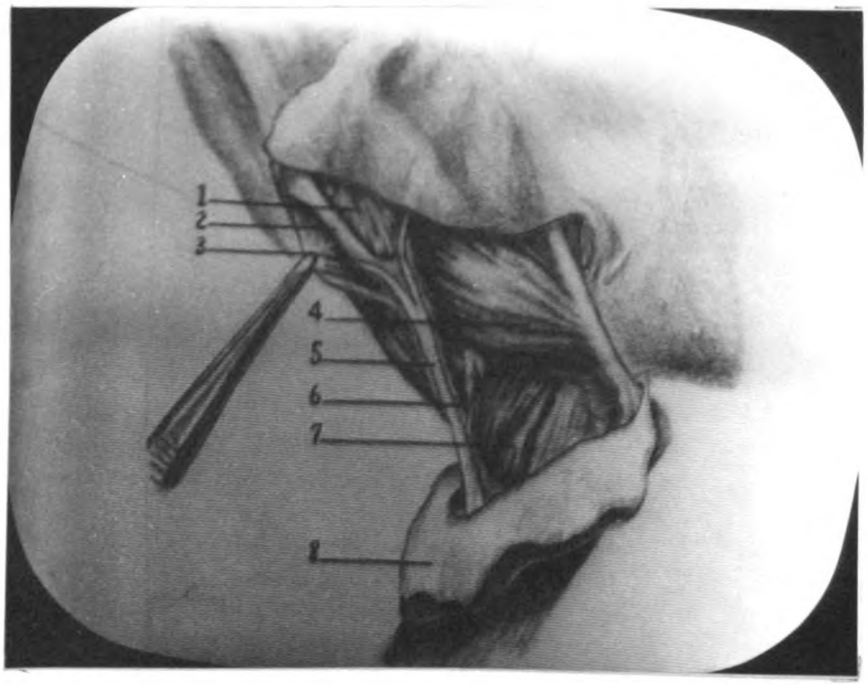
B

QUICK COPY METHOD

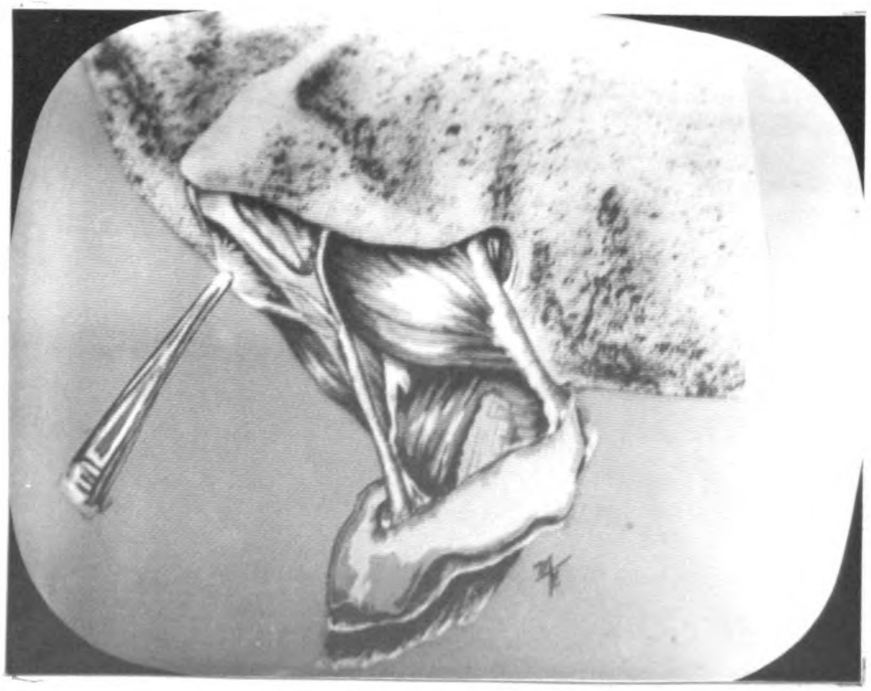
Fig. A is a photograph from the TV screen of an original drawing executed in black charcoal pencil on a white paper. Note the grainy quality and loss of detail due to sharp contrast.

Fig. B is a copy of the original drawing executed in gray values with tempera color. The copy was made on a "Contoura"* Photocopy machine and quickly touched up with paints. The off-white color of the photocopy paper eliminates sharp contrast from the background. Note the superior rendition of Fig. B over Fig. A.

*Contoura Photocopy Equipment, F. G. Ludwig, Inc., Old Saybrook, Conn.



A

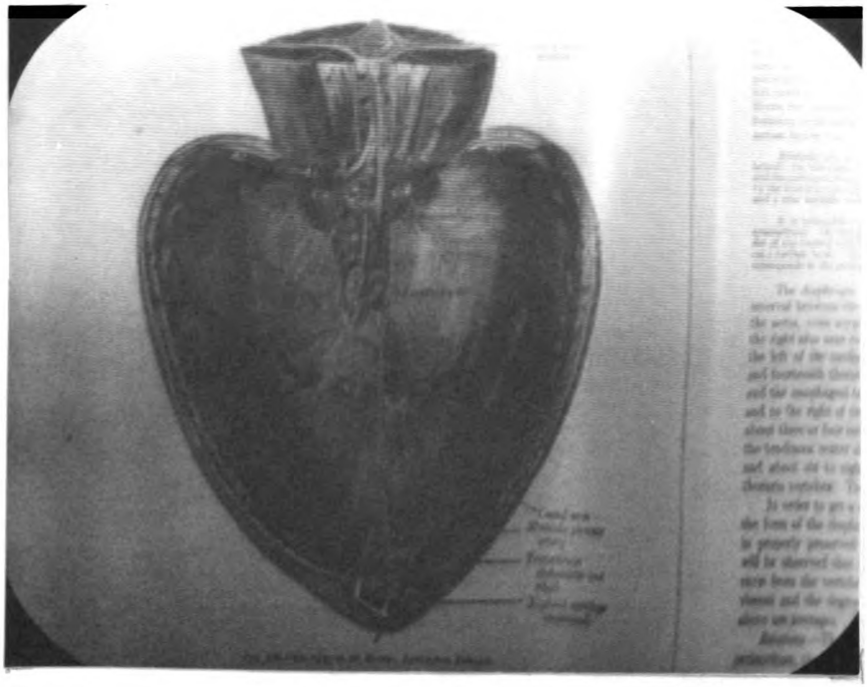


B

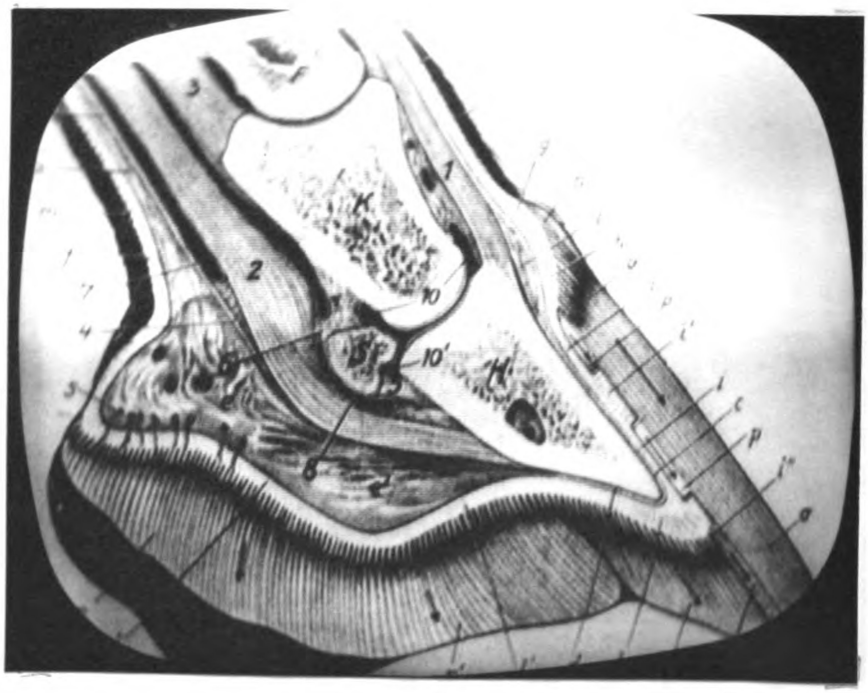
BOOK ILLUSTRATIONS ON TV

More often than not, direct use of a book illustration on TV will not produce satisfactory results. The usual white paper will often produce too great a contrast, and also a shiny surfaced paper may glare as shown in Fig. A. Book illustrations are also normally detailed, not always in correct proportion, and those which appear to have suitable contrast to the eye may reproduce too dark on TV, Fig. A. The illustrations on page 81 are reproduced in gray values from the original book illustration seen in Fig. A (Sisson and Grossman, 33). Note the superiority of the drawing over the book illustration.

Fig. B is a photographic copy taken from Ellenberger-Baum (14). The copy televises much better than the original due to a graying of the background by flashing of the enlarger light on the paper when printing. The ability to mount a photograph on a stiff backing is a further asset over the direct use of a book illustration.



A



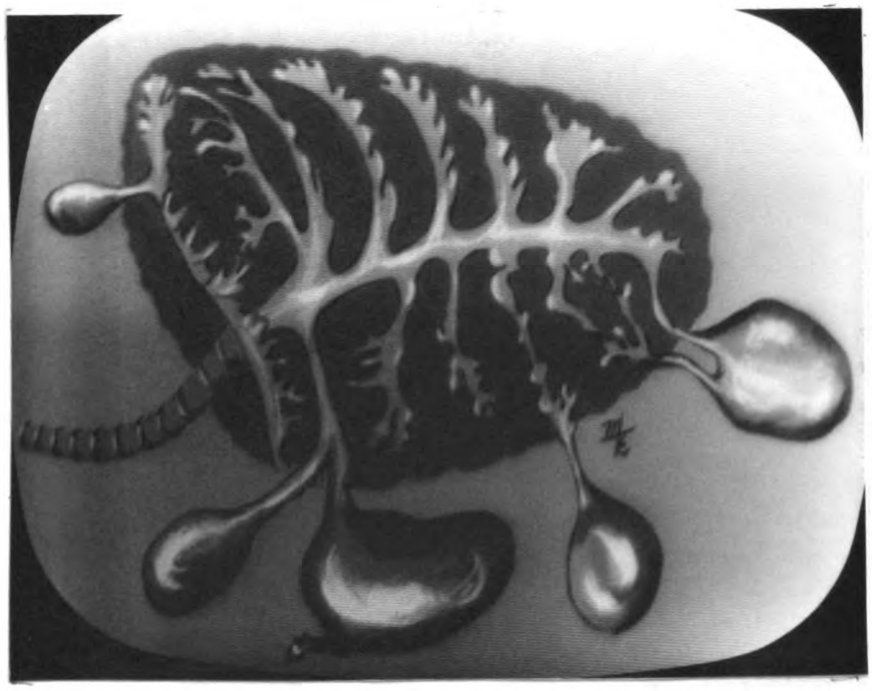
B

QUICK POSTER PAINT TECHNIQUE

The photocopy method illustrated on page 64 also proves useful as a quick method for reproducing book illustrations which are not suitable for TV use in their original form, Fig. A. Pertinent areas were emphasized while extraneous details were blocked out, and greater contrast in gray tones was added.

Fig. B illustrates the use of black, white and gray tempera paints on a light gray poster board. Only two shades of gray, a medium light and medium dark, were used plus a thin outlining of black and highlights of white. Use of a limited pallette will ensure suitable results on camera plus offering a fairly quick and pleasing technique.

A

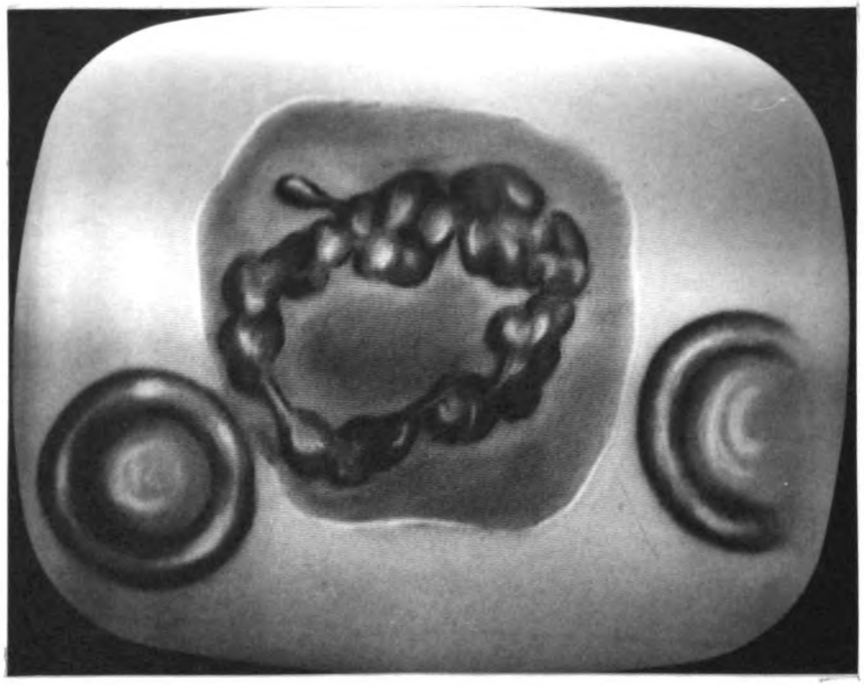


B

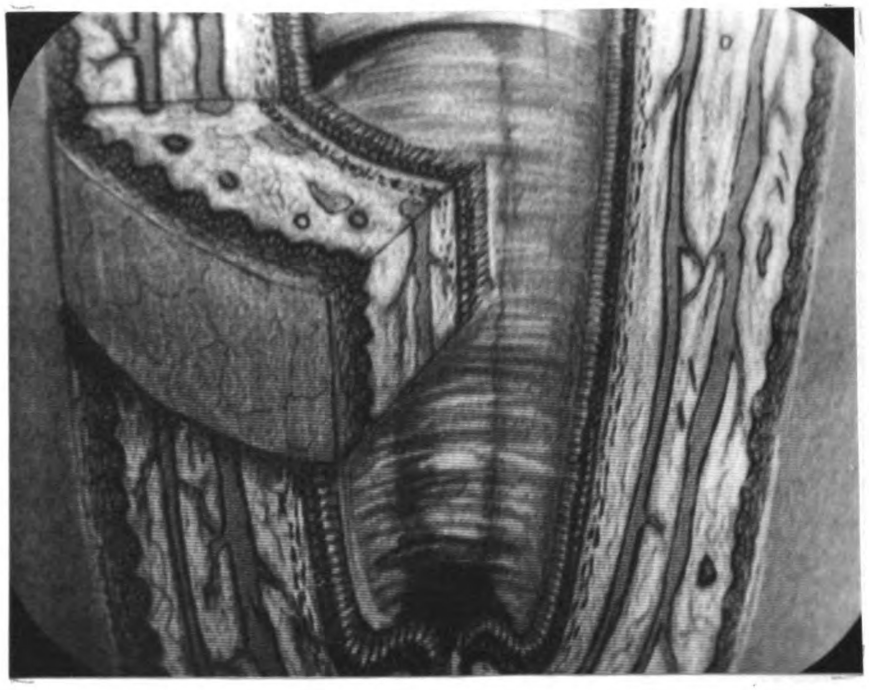
PASTEL AND PENCIL

The illustration for Fig. A was prepared on a medium gray crescent board and executed in rubbed gray pastels and charcoal pencil. Pastel is a suitable media for TV use when working on a smooth background. It is interesting to note that regular lead pencil will flare on camera whereas a charcoal pencil will not reflect light. Accents of white and black pastel were used for highlights and contrast. This illustration was prepared to show the size relationships of red blood cells and white blood cells plus the drumstick formation on the nucleus of the white blood cell (upper left portion of the central figure).

Fig. B was executed on medium gray "Mi-Tianti" paper. The deepest gray tones are India ink and the light and dark shading are with white and black colored pencil. Although an overall shot of this drawing on camera did not show details, close-up camera shots did bring out the cellular structure which was the main objective of the illustration. Drawing courtesy of Dr. Yahya Z. Abdelbaki.



A



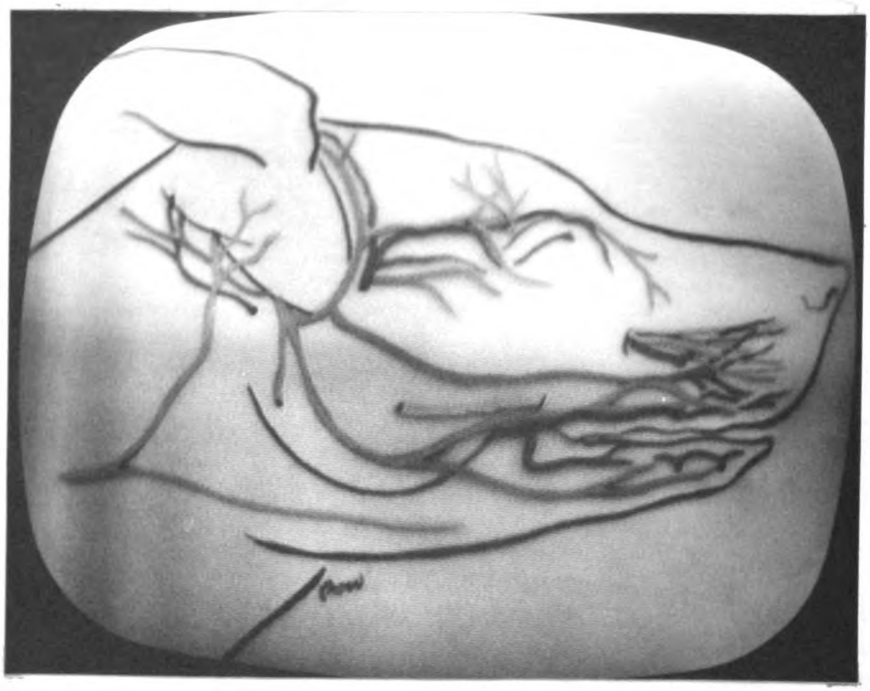
B

COLOR ON BLACK AND WHITE TV

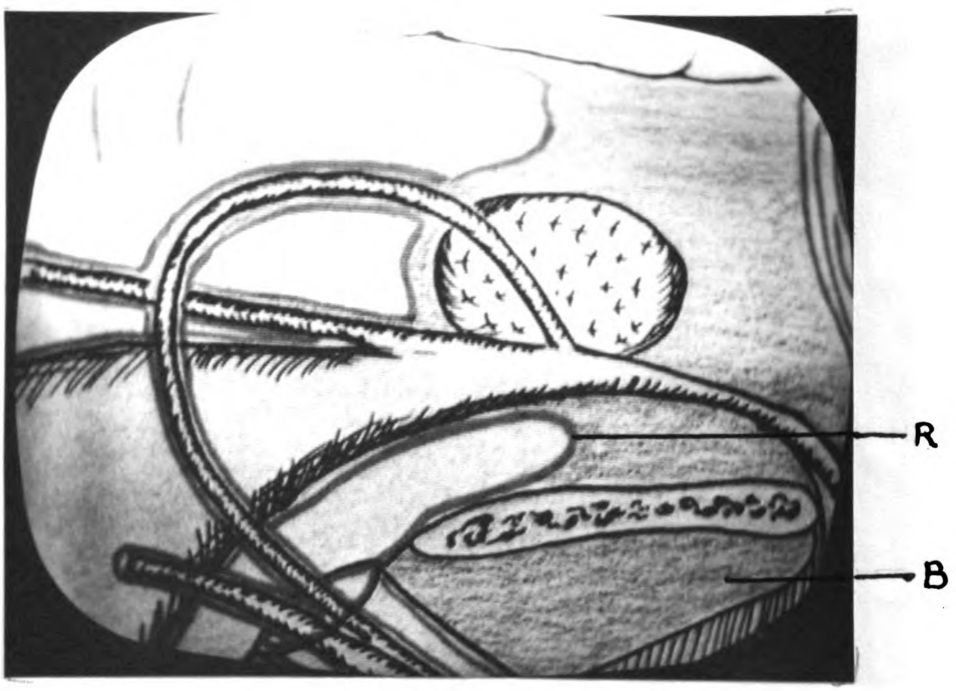
Background color for Fig. A was a light gray poster board with the outline of the dog head in dark gray tempera paint. The vessels shown on the head were executed on an overlay of frosted acetate, the darker vessels being a red ("Prang" #820 red) and the lighter ones a light green ("Prang" #826 green plus white). Color was employed here because the drawing was to be used for classroom demonstration as well as TV.

The illustration for Fig. B was executed on a medium gray board. India ink, colored "Magic Marker"* and colored pencil were used for the line work. Line R indicates the appearance of red "Magic Marker" on camera and the shaded area indicated by line B is a dark blue pencil.

*Manufactured by Speedry Products Inc.; 19-31 121st Richmond Hill, 18, Long Island, New York.



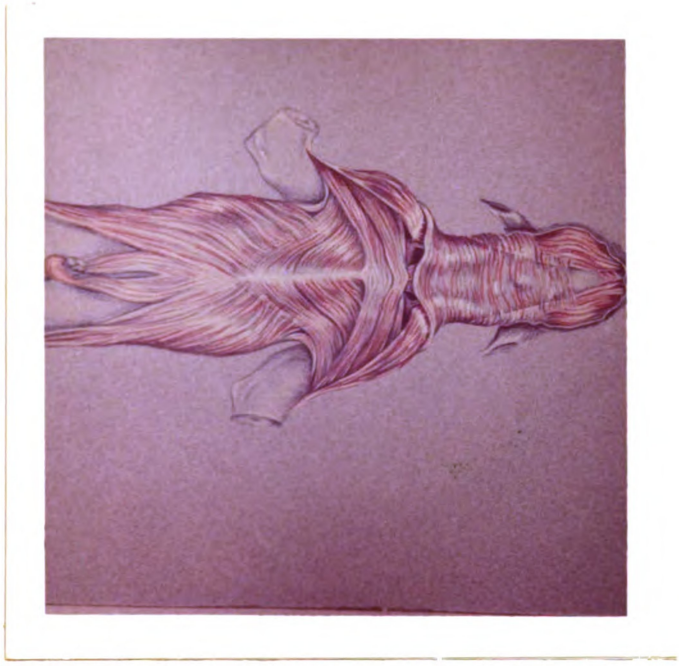
A



B

COLORED PENCIL RENDERINGS

Fig. B is a close-up shot on camera of the colored drawing in Fig. A. The original illustration was executed on a medium gray "Mi-Tianti" paper with colored pencil. Flesh tones were used for the highlights, reds for medium tones and deep blue and black for the dark accents. Although fine line work was used in these drawings, the overall effect gave desirable results. For classroom use, clear acetate was mounted in a frame to fit the drawings and labeled with a felt tip pen.



A

B

COLORED PENCIL RENDERINGS

Figures A and B, the original, and TV rendition respectively, illustrate a slightly different technique with colored pencil. Here the background color was used as a positive element within the drawing.

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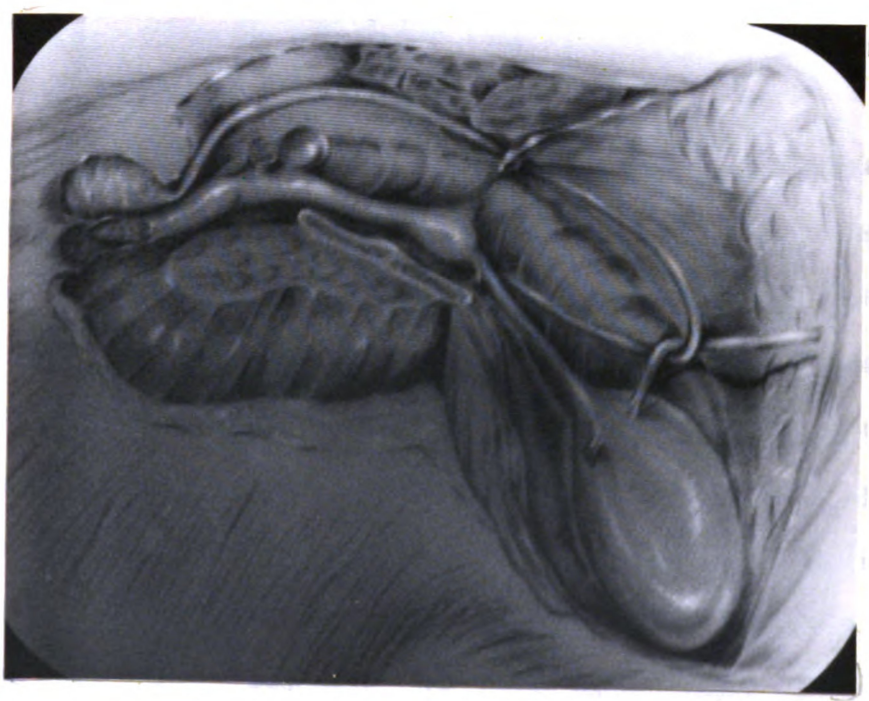
A



B

ANIMATION

The value of active animation of visual materials on camera cannot be overstressed. According to Poole (27), viewers retain the basic ideas longer if they see the construction of a drawing or visual rather than viewing a completed drawing. Animation can be incorporated into visuals in many ways and a few ideas are suggested here which can be modified to meet individual situations.

As discussed in the section on blackboard illustrations, page 41, a hard chalk such as a medium green on a dark green board can be used to sketch in the basic outline of a drawing. The instructor on camera can then quickly trace over these lines with soft chalk, even if he is not adept at art, and produce a quick and effective sketch of the point under discussion.

Tinted paper pads and charcoal paper may be used in a similar fashion. Since graphite lead has a tendency to glare on camera, use a hard charcoal pencil to sketch in the preliminary drawing. Chalks, charcoal, grease pencil, or felt tip pens make a good heavy line for use on camera.

Another method along the same line suggested by Diedrick (12) is to use a simple charcoal drawing on a gray charcoal paper coated with an acetate spray to preserve the surface. The "teacher" is then encouraged to use white chalk on the drawing to illustrate pertinent facts. The chalk lines may be removed for future use of the drawing.

Use of lettered pointers is a good method for adding action to a still visual. These may be removed and placed on an illustration by means of pins secured onto the illustration. The pins will be invisible on camera. Pointers with corresponding holes for the pins will allow for easy removal and placement. An illustration utilizing this method is shown on page 85. Circles of masking tape on the backs of movable parts will also permit adhesion and removal. Pins on the back of movable parts will penetrate easily into a background of styrofoam or similar porous materials.

Dupy (13) stated that one will need practice to insure the use of bold and definite lines when sketching for TV. Penciled-in sketches are best because they insure quick execution which will hold the viewers' attention. An effective camera shot is to have the camera come in for close-ups over the performer's shoulder. This permits long shots for identification and close-ups for detail.

Frosted acetate has many uses in TV. It will not glare like clear acetate on camera, and its rough surface is suitable for most media. Acetate ink (Higgins) will adhere to the surface easier than regular India ink. Although frosted acetate looks translucent to the eye, the camera will see it as a transparent material. The only loss of resolution of an illustration beneath the frosted acetate will be that due to the distance between

the acetate and the background surface. This loss of clarity will apply particularly to close shots where there is a limited depth of focus in the camera lens.

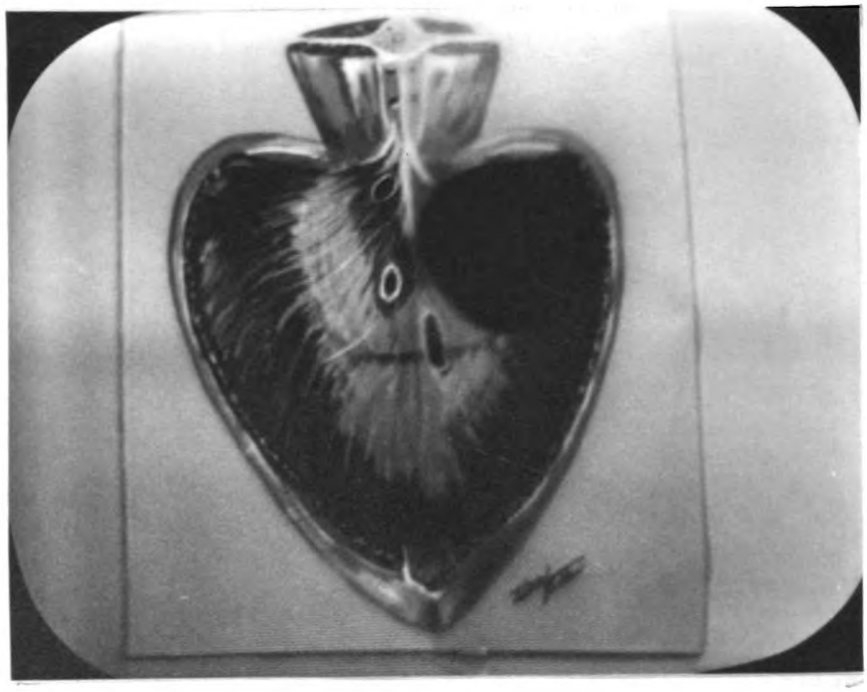
Fig. B, page 81, illustrates the use of a sheet of acetate over a drawing upon which an instructor is marking important points with a black grease pencil. The acetate sheet may be replaced for the next session or grease pencil markings may be removed with xylene, carbon tetrachloride, or turpentine. Strong soap and warm water will also remove the markings but will require more rubbing.

The following pages illustrate visuals which have movable parts or to which action can be added.

FROSTED ACETATE OVERLAYS

Fig. A illustrates the use of a half sheet of acetate on the right hand side of the drawing which contains the black circle used to illustrate the site of a diaphragmatic hernia. Acetate ink (Higgins) is useful when working on acetate surfaces.

Fig. B illustrates a second overlay containing vertical and horizontal lines to indicate the embryonic origins of parts of the diaphragm.



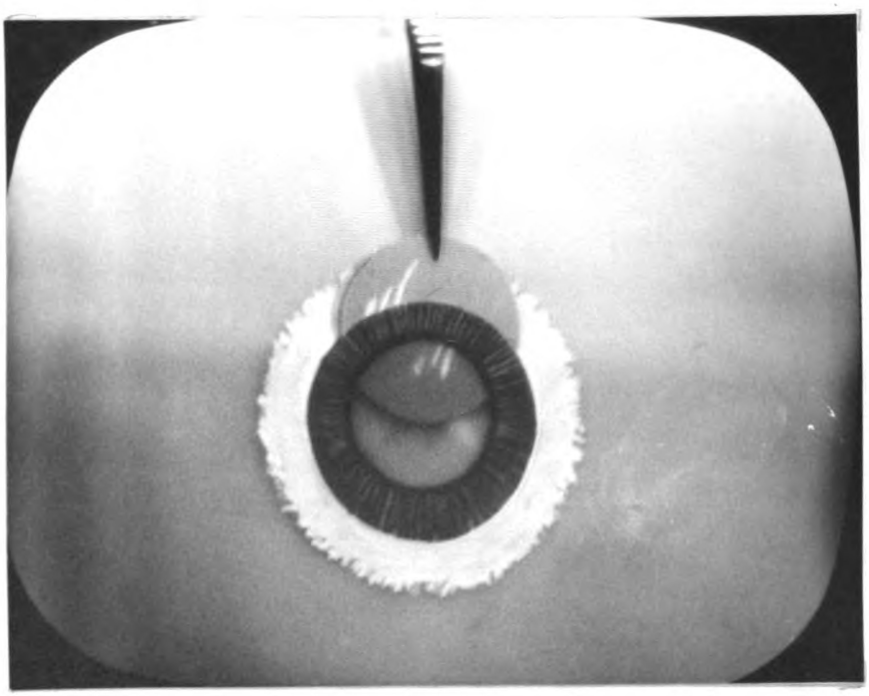
A

B

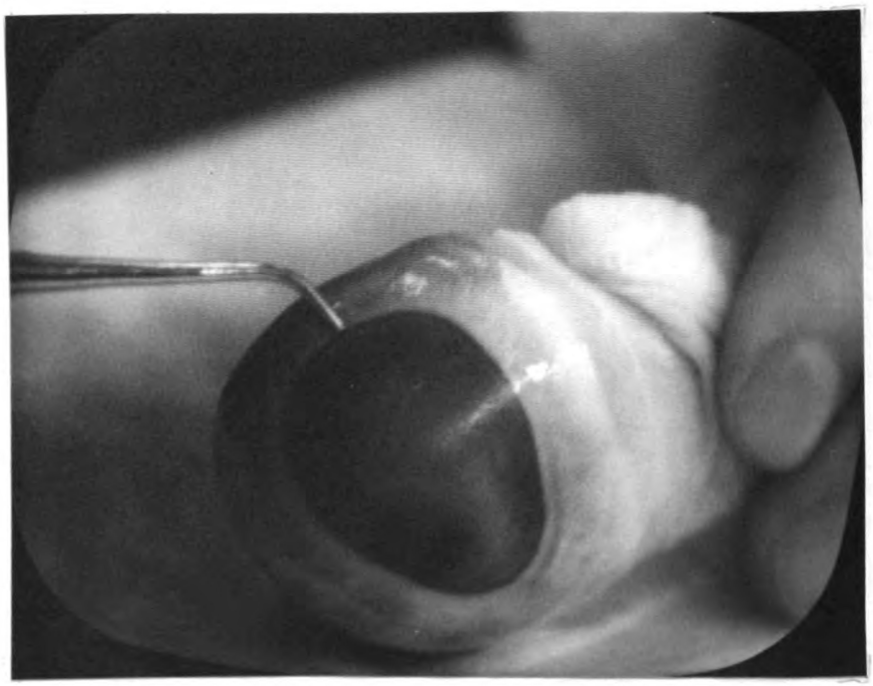
ACTION VISUALS

Fig. A is a visual illustrating the basic steps in a cataract operation. The sclera and iris are on two sheets of acetate with a removable circle of cardboard representing the lens attached to the background. The photograph shows the lecturer removing the lens as in an actual operation. A visual such as this is effective in demonstrating the steps in an operation while not requiring the extra time and materials necessary for the actual procedure.

Fig. B is a TV view of an eyeball which gives an indication of the usefulness of the TV camera as a magnifying device.



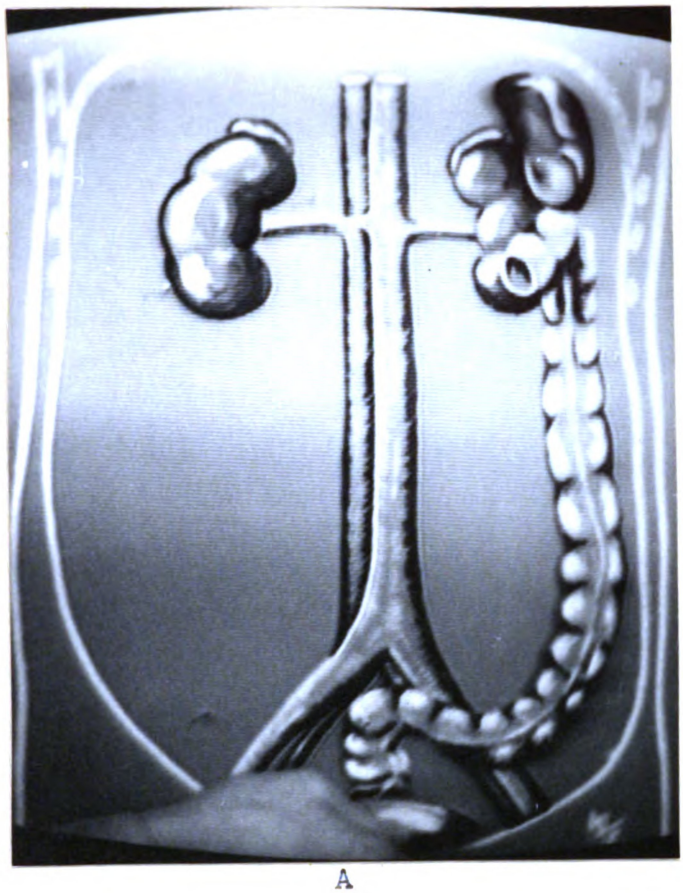
A



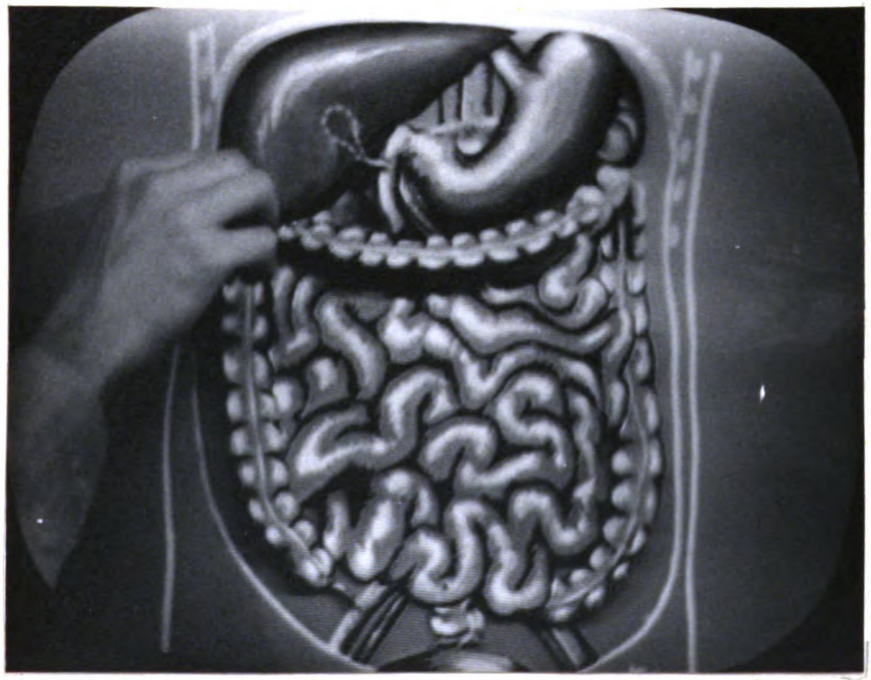
B

MOVABLE ELEMENTS IN A VISUAL

Another method for combining action into a visual which utilized removable parts is illustrated by Fig's. A and B. The background is a brilliant red and contains the major abdominal vessels, kidneys, adrenals and body outline. The remainder of the viscera are removable and attached onto pinheads which are secured to the background board.



A

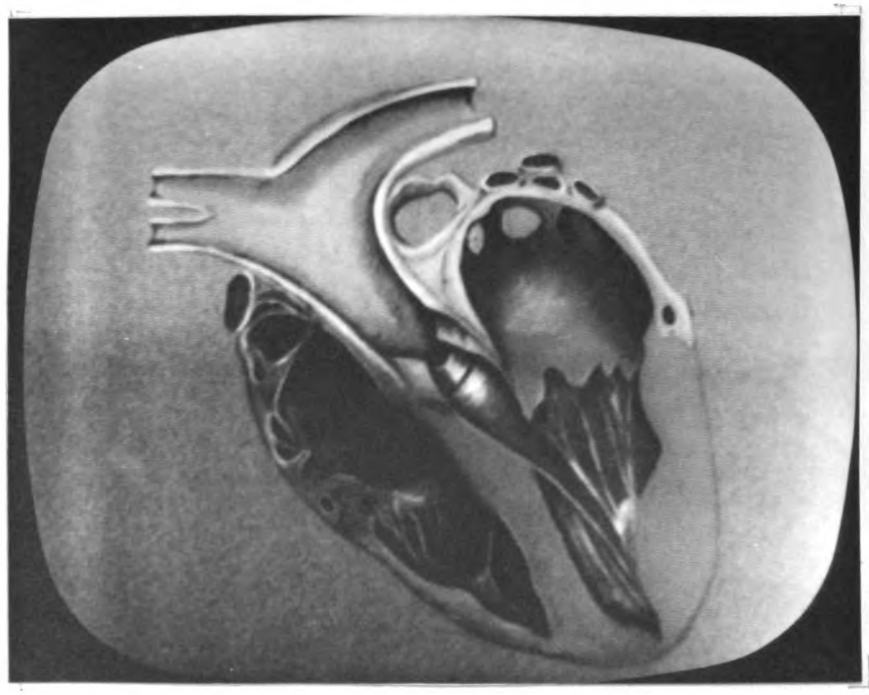


B

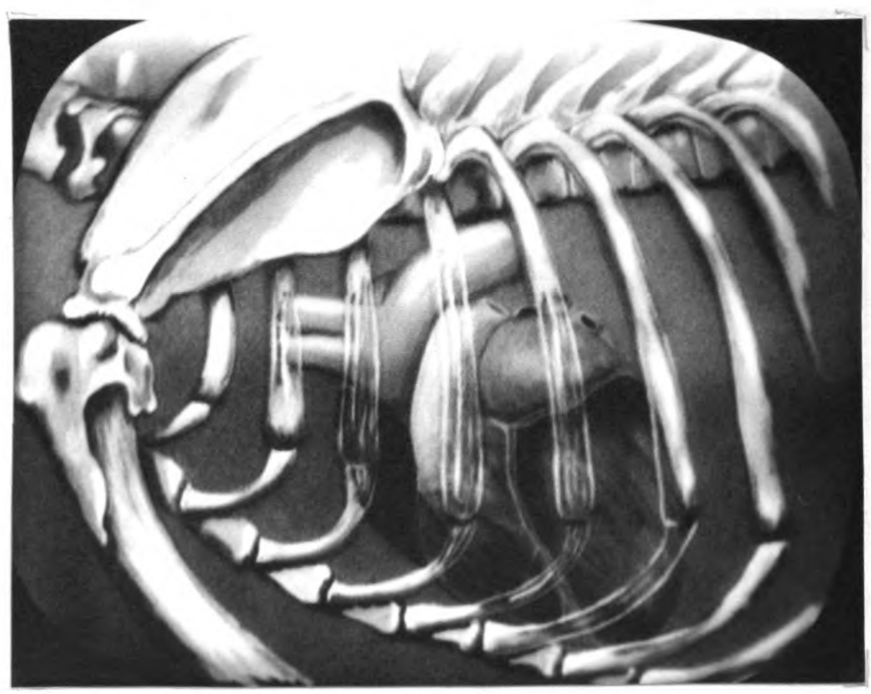
COLOR ON ACETATE OVERLAYS

The drawing in Fig. A is on a medium gray paper and is executed in opaque water paints. Fig. B is of the same drawing seen with two acetate overlays, the first a surface view of the heart and the second a view of the rib cage. Note the suitable rendition of the colors, (see Frontispiece) on the black and white TV screen. The drawings on the two acetate overlays were also done in water base paints but were mixed on a bar of soap to avoid creeping. Cardboard frames were used for the overlays to insure proper placement when using the visual.

Colored TV drawings, besides being suitable for color TV, give added eye appeal for use as live demonstration materials and color slide reproduction.



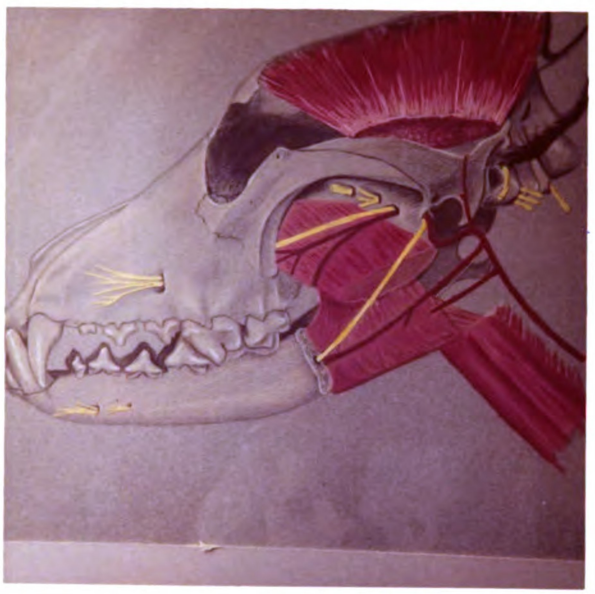
A



B

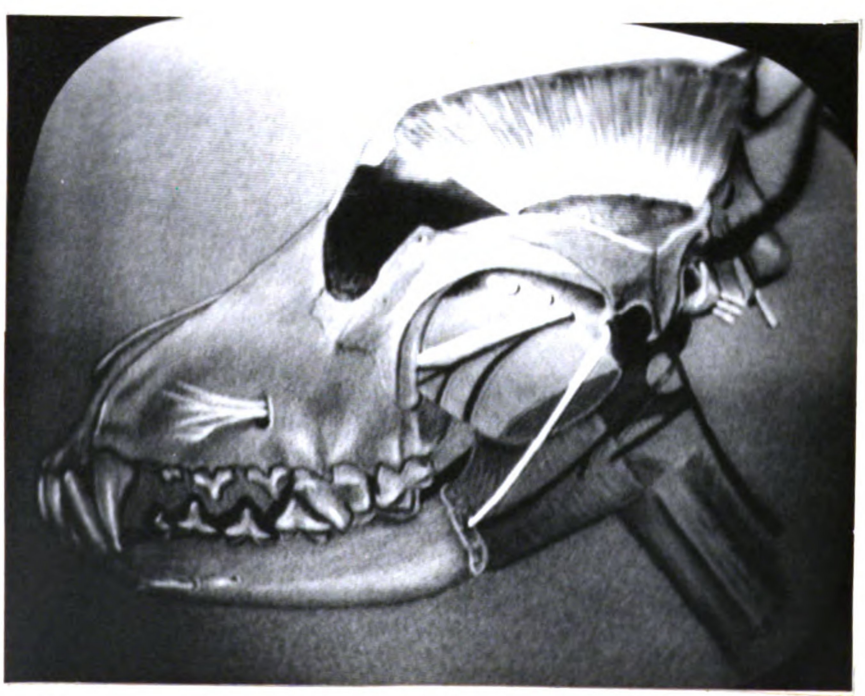
COLOR ON ACETATE OVERLAYS

These photographs are another example of color on acetate overlays in which the background drawing is colored pencil rather than paints (skull). Fig. B is a close-up photograph of the second acetate overlay to show the rather coarse technique used. Note the blending of the lines in the muscle area and color rendition in Fig. C which is from the TV screen.



A

B



C

SUMMARY

Examples of the several techniques used for producing visual aids, primarily for television courses in Anatomy at Michigan State University, have been given. Most of these methods, however, can be utilized to advantage in courses dealing with other subject matter. While some of the techniques were experimental, all have been used with good results in particular situations. In most cases, however, it will undoubtedly be advisable to concentrate on those methods which experience demonstrates to be of greatest utility for presenting the subject matter in any particular course. In all cases, stress has been placed upon the need for simplicity and adherence to the basic requirements for the production of visual aids for television, as outlined in the first part of this work.

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*(RCA), material received from Radio Corporation of America, frequently without positive identification of original source.

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DEC 9 '59

JUL 21 '64

NOV 27 '64

DEC 6 '65

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