TELEVISION

PRIMER OF

PRODUCTION

AND

DIRECTION

TELEVISION PRIMER

OF

Production and Direction

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PRODUCTION AND DIRECTION

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The quality of the materials used in the manufacture of this book is governed by continued postwar shortages.

To

MY WIFE HELEN

whose patience and understanding
have made the writing of
this book possible

PREFACE

TELEVISION!

No word has ever been so filled with magic. Youngsters in school dream big dreams of futures in the field, as actors, as writers, as daring field cameramen, as powerful producers, or as station executives. Advertising officials fancy television as the final charge in saturating the market with their clients' merchandise. Educators visualize magnificent advances in the general knowledge level as television grips and molds the mentalities of our people. Idealists long for television to serve as the champion of society, eradicating interracial, international, and interreligious misunderstanding. It will fill the voids in our lives even more effectively than does radio. Years of anticipation have whetted the appetites of our people for television. Its name is magic.

As with all things of magic, television has been surrounded with an aura of mystery and unreality. Strange powers have been attributed to it and strange conceptions of it have become prevalent. All this is perfectly understandable, but it is a peculiarly unhealthy atmosphere for the growth of a well-grounded, intelligently controlled, socially constructive, and economically sound industry. Only widely disseminated facts and blunt, unromantic, unvarnished truths can correct this situation. Everyone concerned with television, from the transmitter manufacturer to the purchaser of an inexpensive receiver, should know and understand television as it is; not as a glamorized, furbelowed, distorted fantasy, but simply as a medium of electronic circuits, ideas, entertainment, and service.

The attainment of this knowledge is not a simple matter. It can be accomplished only by the combined efforts of broad-

casters and manufacturers, distributors and television organizations.

It is the author's sincere hope that this volume can contribute its bit toward the substitution of practical, tangible information about television for the false impressions and prettified facts that have become so regrettably prevalent. It is only by replacing beclouded impressions of the medium with facts that can be retranslated into advancement of television that the magic inherent in television can ever truly be realized.

For permission to use photographs, copyright material, and sketches, the author is indebted to the Allen B. DuMont Laboratories, Inc., Television Station WABD, National Broadcasting Company, Columbia Broadcasting Company, Philco Television, Western Electric Company, American Optical Company, American Telephone and Telegraph Company, General Electric Company, Station WRGB, Radio Corporation of America, Walter H. Baker Company, Robert Emory, Robert Bright, Mole Richardson Company, Young and Rubicam, Inc., William Esty and Company, Inc., Ruthrauff & Ryan, Inc., United States Rubber Company, Newell-Emmett Company, Bruno-New York, Robert F. Jamieson, Kliegl Bros., Larry Colwell, Chas. M. Storm Co., Inc., Anderson Davis and Platte, and Al Paul Lefton, Inc.

LOUIS A. SPOSA

NEW YORK, N. Y.,
April, 1947.

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1. Television—What Is It?

TELEVISION is the broadcasting of visual images by electronics. Common usage also calls for this visual image to be broadcast synchronously with sound.

Despite the generally accepted conflict between the "artistic" selectors of these images and the "practical" engineers who accomplish the broadcasting, it is important that everyone on the team effecting the broadcast have a well-rounded knowledge of both the methods and the considerations in selecting program material and the technical facilities and techniques required for its transmission.

Therefore, let's step back and take a long-range view of television. Later we'll have opportunities to examine many of its elements with more thoroughness.

We have a camera picking up an image, breaking it down into dots like those of a half-tone engraving, and sending out sets of these dots so fast that the eye can't detect the changing of the images. We have a control room and a transmitter in which the pictures are corrected for minor defects, strengthened, and sent out into the air. Then a television receiver antenna intercepts the broadcast and sends it down to the receiver, where it is strengthened and the many thousands of dots into which the picture has been broken down are recreated, in the same order in which they were picked up, and thrown against the television receiver screen for the entertainment of the audience.

The camera is one of two or more in the television studio. Against a setting appropriate for the show, the properties

and characters are arranged so as to make for a storytelling picture of pleasing composition. Lights of various sorts define the people and properties of the picture so that they are shown through black-and-white high lights and shadows. A camera lens focuses the image on a sensitive plate inside the camera. The image may also be projected directly onto this plate from stills, slides, or movies.

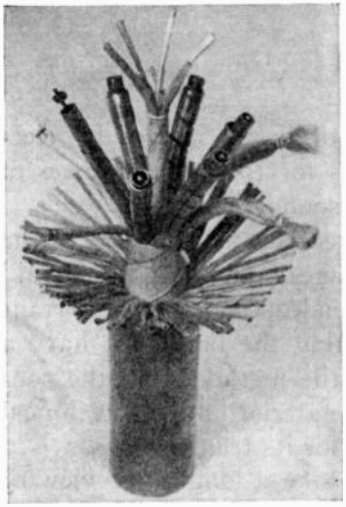


FIG. 1.—Section of coaxial cable. A view of one section of the coaxial cable which is being used to carry television programs by means of the long-distance network between Washington and New York. These six copper tubes make it possible to transmit television images of hundreds of telephone conversations. (*American Telephone and Telegraph Company, New York.*)

This sensitive plate is part of a system that breaks the image being televised down into a number of tiny units, gives each an electrical equivalent according to its degree of brightness or darkness, and sends the electrical signals in neat, orderly procession out into the ether and to the home receivers.

Two types of networks for sending these signals for long distances are available to television. One is of coaxial cable, a special type of electrical cable capable of transmitting the television signals. Many of the links of a nation-wide coaxial cable network have already been laid, and the principal metropolitan areas of the country will soon be linked together in this manner. The other type of network is that of relay stations. Unaided, the television signal cannot travel the many hundreds of miles that standard radio broadcasts traverse. It goes only a few miles beyond the point where a line di-

rectly from the transmitter antenna forms a tangent with the earth. After this point, the signal loses much of its predictability. Into this category fall both the early version of relay stations with amplifiers and rebroadcasting antennae

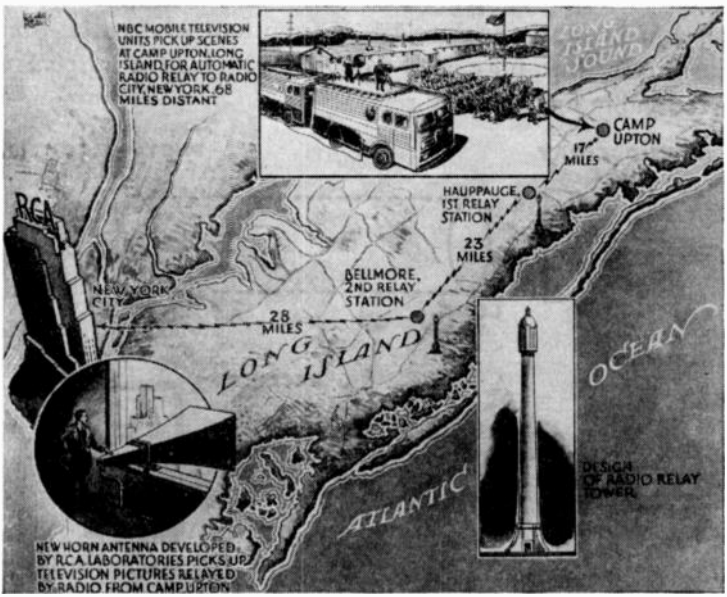


FIG. 2.—A new radio relay system, by means of which television pictures can be transmitted between widely separated cities, was demonstrated recently by the Radio Corporation of America for members of the Federal Communication Commission. The system, developed by RCA Laboratories, works automatically. It makes possible the establishment of intercity television networks similar in effect to those used in sound broadcasting.

located at approximately 50-mile intervals and the fanciful "stratovision," which envisions planes flying in the substratosphere in a slow figure 8 while broadcasting the television signal relayed from a signal tower on the ground or from other planes hundreds of miles away.

A new development, called photovision, whereby pictures and sound can be transmitted from one point to another over

a light beam instead of radio waves, was recently demonstrated by its inventor, Dr. Allen B. DuMont.

According to Dr. T. T. Goldsmith, director of research of the Allen B. DuMont Laboratories, Inc., this development not only simplifies the problem of transmitting television programs in short-range relay, as from football field to main transmitter, but may also be used in place of expensive coaxial cable for intercity relays.

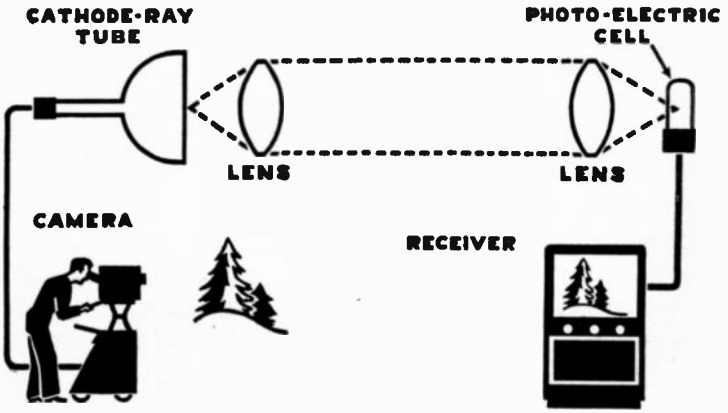


FIG. 3.—Photovision.

The transmitter or sending device is a cathode-ray tube designed so light can be varied 5 million times a second. As the picture signal varies, the intensity of this cathode-ray tube, a sensitive photoelectric cell which acts as a receiver, picks up this energy and converts the fluctuation of light into electric signals.

The system operates in light or darkness and without interference from static or other interference inherent in radio. It will transmit color pictures as well as black-and-white images.

In addition to the tremendous money saving to television broadcasters resulting from transmission of programs on

light waves instead of coaxial cable, photovision has another marked advantage. A television image loses about 40 per cent of its definition or sharpness when it is transmitted by coaxial cable; this loss will be greatly reduced by the new system.

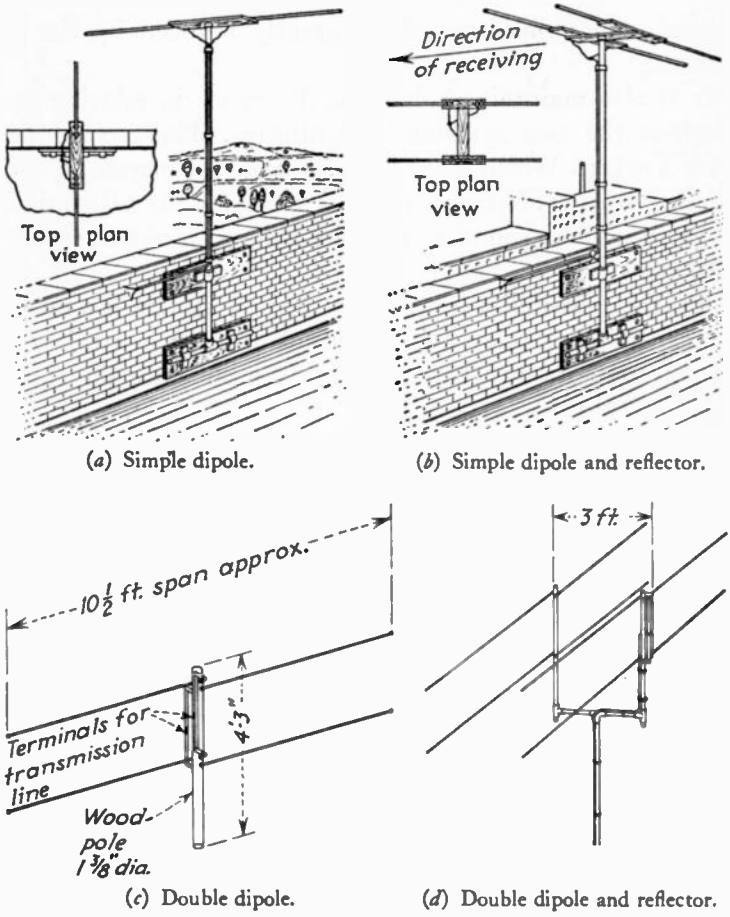
It is also maintained that the difference in relative costs between the two systems is significant. The coaxial from New York to Washington costs millions to install. A series of relay stations between the two cities for the transmission of pictures and sound over light beams would not exceed $30,000.

Another possibility inherent in the new system is a method of transmitting television programs from a central transmitter to motion-picture theaters for showing on theater video screens.

Whichever type of network eventually captures public favor—and many operators seem to advocate a combination of two with the selection for any particular region depending on topographical conditions—television networks linking major metropolitan areas throughout the country are fully assured.

At the end of its course, and at selected intervals along the way, the television signal is rebroadcast. The dipole receiver antenna intercepts the signals and sends them down to an amplifier in the receiver. The strengthened signals are then fed to an electron gun, which sends a beam traveling in the exact pattern as that of the beam in the camera pickup tube, against the face of a cathode-ray tube, the face being coated with a thin layer of fluorescent material. As comparatively strong impulses strike the screen, bright dots of light form. As weaker ones occur, only a dim dot can be seen or it may be evidenced only by a gap in time and the course of the beam, which would correspond to deep black. The miracle of this glass vacuum receiving tube with its flat-faced screen

and its long, funnel-shaped body is the basic point of tele. vision reception. However, some television receivers employ



(*a*) Simple dipole. (*b*) Simple dipole and reflector.

(*c*) Double dipole. (*d*) Double dipole and reflector.

FIG. 4.—Antenna types.

a comparatively small, high-intensity receiving tube along with a projection system for throwing the image onto a large screen. These may range from the Schmidt optical system,

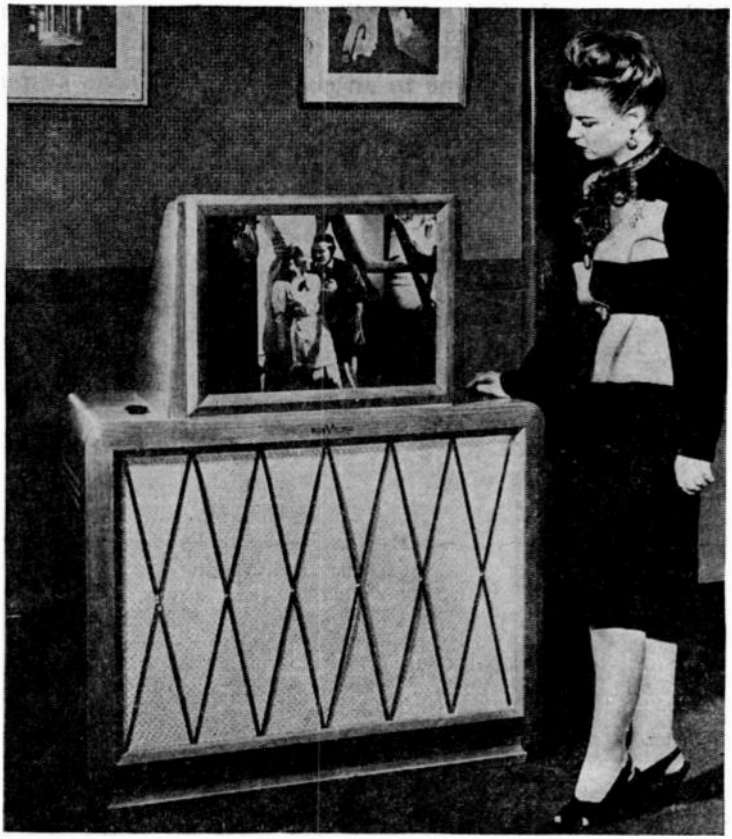


FIG. 5.—RCA improved home television receiver. Shown here is an improved engineering development model home television receiver built by the RCA Victor Division of the Radio Corporation of America. It provides large-screen television for the home, with bright, clear, high-definition pictures about the size of a standard newspaper. This type of home television receiver projects moving images on a built-in screen by means of a unique projection system employing a spherical mirror and a molded plastic aspherical lens. The system was developed by RCA before the Second World War. Also incorporated in the new receiver is an automatic control system which virtually eliminates picture distortion caused by noise interference. (*RCA Victor Division, Radio Corporation of America, Camden, N. J.*)

which uses a spherical mirror like the inside of a globe and an aspherical lens, to throw the picture onto a newspaper-sized screen for the home to an elaborate projection system

FIG. 6.—"Westminster": DuMont's deluxe model teleset which provides a large clear picture (18½ by 13 in.). In this cabinet, of flame-grain mahogany, is the television unit, mechanically controlled, as well as AM, FM, short-wave radios, record player and changer, home recording facilities, and, in some models, album space. (*Allen B. DuMont Laboratories, Inc.*)

for projecting the images onto the screens of motion-picture theaters. Unquestionably the most brilliant and undistorted high-definition picture, however, is the directly viewed one. Direct-view screens range from 5 to 20 in. in diameter.

On these screens are seen a kaleidoscopic series of programs. Fashions and news, sports and drama, opera and commercials, movies and interviews—programs of this sort are

originating locally and in stations linked to the one serving the communities of the audiences. Politics and bargains, art and comedy, the sports, news, features, ads, reviews, and other services of the newspaper are now translated into an oral and moving visual medium accomplishing tremendous things in the homes. Interests are created and shifted. Furniture is displaced to make room for the television set and to permit easier viewing of the screen. Shopping habits are altered with the television-offered merchandise being ordered by phone in greater volume daily. A new center of family interest in the home is created, combating boredom and tensions. No matter from which aspect you consider television, its alterations in our manner of living are tremendous.

As a means of communication, television is unparalleled. It has the entertainment of the movies, the newsworthiness of the papers, the immediacy of radio, the scope and visual appeal of the theater, the community-welding power of the town hall—a set of composite powers that readily explain the feverish scramble for television licenses that followed the determination of allocations by the Federal Communications Commission. The hundreds of applicants were staking out claims in tomorrow, protecting past investments in newspapers, radio stations, and other agencies that might possibly suffer from the competition of television, seeking the power, prestige, and potential profits in television that are history in radio. No communications agency of the past and none becoming defined in the immediate future can hope to compete with television in stature and importance.

But to consider broadcast television as the only phase of television of any great significance would be a serious error. In fact, it's entirely possible that broadcast television will prove, in time, to cover only about half of the potentialities of the medium.

Department stores will use their own intrastore television

systems directly wiring large-screen receivers or monitors strategically located throughout the store to a studio console in one part of the store. Thus merchandise shown to the cameras in the studio can be shown simultaneously to shoppers in various departments, to passers-by viewing the windows, to customers in the store's waiting rooms, and possibly to the audiences of a store-operated teletheater. This type of television requires no broadcast license and is therefore free from the complications of securing Federal authority to operate it. It can increase the average total sales per customer, stimulate traffic to the less crowded departments of the store, and, by featuring immediately available items, it can even out the flow of patronage during the day and place stocks or special bargains on the market immediately.

This phase of television will require many of the personnel and techniques of broadcast television. Programing will be just as essential in intrastore systems as in broadcasts; films supplied by manufacturers of many products sold by the store will be an element of the programing; make-up, costuming, scripts, sets, properties, timing, and other functions of the broadcasting program department apply here just as well; and the technical facilities, with the single major exception of the transmitter proper, are very similar to those of the television broadcast station. Many jobs and programing techniques in television will result from the expansion of intrastore television.

Industrial television is another little-known but very important aspect of the video art. It consists largely of placing the television camera as an observer wherever it would be dangerous, inconvenient, uncomfortable, impractical, or otherwise inadvisable to place a human observer, or where it is essential for comparative observations to be maintained by a single expert. Its purposes are for industrial safety and

time and motion study observation, as in testing the comparative efficiency of workers using yellow work benches and those using blue ones, or benches of different heights, or different types of illumination, or mastering a new production line-up. It can be used to watch gauges and records in gas-filled rooms, or in areas that are uncomfortably warm or where there is danger of explosion. The television camera can be sent beneath the ocean for marine exploration, thus saving divers hours under water and decreasing the danger they must face. It can serve as eyes far ahead of the engineer when the train comes to a sharp bend in the track; after all, the gap between radar and television is surprisingly small. In a bank, television can be used to permit the cashier in his cage to compare a signature with that held before a camera in the bank's vaults, and the camera above the cashier's cage can permit easy recognition of all visitors.

Industrial television will soon be a major industry, functioning pretty much apart from broadcast television, yet certainly sufficiently important as an affiliated field to arrest the attention of broadcasters for the reciprocal benefits that can be derived from the two fields.

Theater television is still another type of program using comparable equipment and techniques. This, too, is assured as a major entertainment industry. World Series seats are hard to get. Many who would like to attend cannot get out of town to see the event. The heavyweight boxing match may have become so overrun by scalpers that you would not buy a ticket if you could. Though you might be willing to pay a $1 to catch a certain new Eugene O'Neill play, you wouldn't go to New York and pay $4.40 several weeks in advance to see it. These are just a few of the sources from which theater television will derive its revenue.

Physically, equipment for this type of television will consist of television cameras and suitable lighting installed in the

various arenas where the competitions to be televised are to be held, legitimate theaters and other coverage centers. Programs picked up in this manner will be sent by cable to receivers at the site of the projection. The programs will then either be projected directly onto the screen or be filmed off the face of the television screen, edited briefly after special short-time processing, and then projected from film within a very few minutes after the program pickup.

Theaters all over the country will be linked to the centers from which the programs originate. Many will be regular motion-picture theaters, which will use these special programs as substitutes for the regular bills. These will also, in all probability, use a televised newsreel for greater immediacy of coverage. Nor is it unlikely that programs will be sent by television rather than as rolls of film in cans to the theaters of the nation before very many years have passed.

And so television rises as a colossus involving broadcasting, intrastore installations, industrial applications, and theater hookups—to discuss only a few of the applications that the field will find in the future or has already found today. The estimates that it will develop into a multibillion-dollar industry have already captured general acceptance as their vindication has begun. Television is on its way toward an importance that we can see only dimly today.

Fortunately, we can initiate our links with the medium with knowledge now explored and available.

2. The Television System

THE TELEVISION studio is a place unlike any other in the world. Lights and properties, flats, and technical equipment are distributed in what looks like premeditated chaos. Costumed and made-up actors step carefully over long, black, snakelike coaxial cables trailing from cameras. Uniformed members of the camera crews ride herd on cameras, lights, microphone booms, and cables, trailing their earphone cords behind them.

From a big dark-glass window the all-seeing eyes of producers and directors, production assistants, and control-room technicians study the floor arrangements and the images that cameras and lights produce on the control-room monitors, and masterful voices instruct everyone in the studio in the correction of deficiencies in the pictures they produce.

Audiences watch, fascinated by the miracle medium. Sponsors and advertising agency officials keep a critical eye peeled for high points and flaws in their productions. Artists and make-up experts, script writers and video effects men, property handlers and talent representatives hover about their handiwork proudly or anxiously. There is a helter-skelter feeling about it all, yet the entire procedure is the result of long, careful planning, and it is all founded in systematic arrangements.

We have already taken a hasty glance at the role of the camera in the television system. In the next chapter we shall explore its functions and operation more thoroughly. For our

purposes here, though, we need only recognize that the camera operator, most skilled and responsible member of the crew handling floor equipment, has the responsibility of recording a sharp, well-composed, properly focused image which exactly conforms to the needs of the script at any

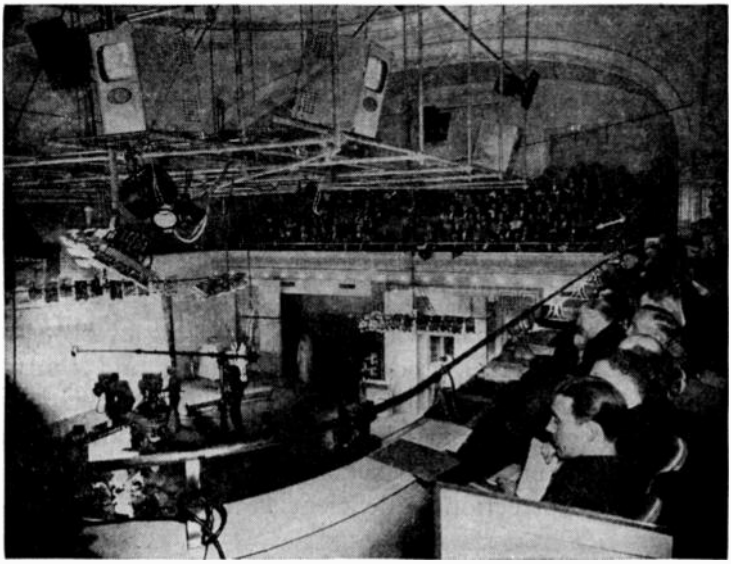


FIG. 7.—Bird's-eye view of the main DuMont-John Wanamaker studio. (*Allen B. DuMont Laboratories, Inc.*)

given point and which meets the requirements of the director and producer.

On the larger cameras—those mounted on the elaborate dollies as distinct from the small cameras that the operator simply pushes around the floor of the studio—a second studio crew member, the floor assistant, is needed to push the dolly to the desired position and, in some cases, to work its controls calling for greater elevation or a lower angle. This crew member is in a particularly advantageous posi-

tion to study the operation of the cameraman and eventually to advance to that position.

Protruding from the rear of the television camera and running to the control room is a heavy rubber casing.

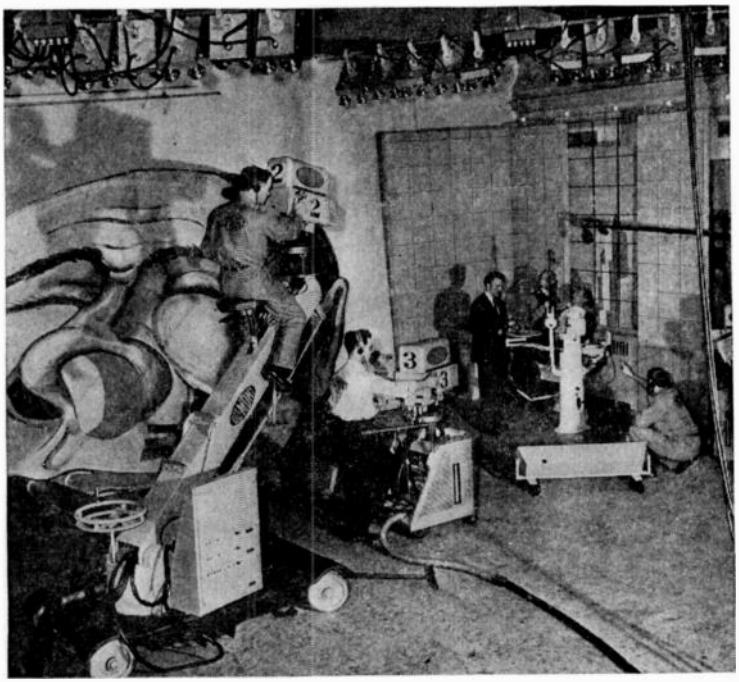


FIG. 8.—New DuMont boom and camera. (*Allen B. DuMont Laboratories, Inc.*)

Through the center of this casing pass nine individual cables to the control room. Because of the rapid speed of the electronic impulses—2 to 5 million cycles per second—ordinary wire cables are not used because, owing to the high frequency of the electrical current, some would escape the cable and be absorbed by the ground or other conductors near by. To prevent this loss, various types of special cable are used.

These cables, called coaxial, prevent excessive losses of power in transmitting current from one point to another.

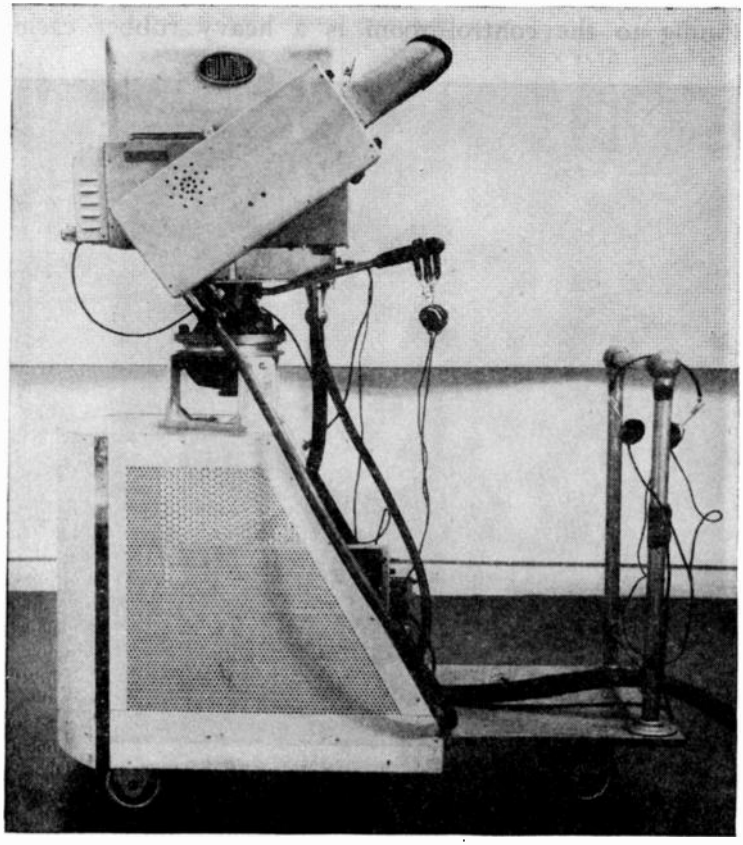


FIG. 9.—Fast mobile-type dolly and camera. (*Allen B. DuMont Laboratories, Inc.*)

These coaxial cables are constructed in various ways, but all serve the same purpose. One method of construction is to insulate the conductor from the outer sheath by beads of glass, porcelain, or other insulating material. Fabric is used as the insulating material in another method. A third method

insulates the conductor from the sheath by a special plastic compound. Coaxial cables, like all wires, require proper handling lest excessive flexing cause them to become weakened and to break. Everyone in and around the television

FIG. 10.—Bathed in light, this modern American living room was the setting for the final episode of Cornell Woolrich's "The Black Angel," produced in four parts over NBC's television station WNBT. (*NBC Television, WNBT, New York*).

studio soon learns that one of the cardinal mistakes he can make is to step on these cables or to roll heavy objects over them.

The starting post on the camera crew is that of studio assistant, whose responsibilities include maintenance and guardianship of the cables, pulling them backward and out of the camera's way when it is time to shift the camera to a new position, feeding them at the proper speed when the camera is dollying in for a close-up, keeping them from

becoming tangled with other cables, earphone wires, or other studio obstructions, standing by for emergencies, and, if possible, helping with other incidental duties around the studio.

Lights of various brilliances and types are another basic element of the equipment with which the programing experts work in television. These include incandescent and fluorescent, carbon arc, and mercury vapor and almost everything else that gives off illumination. Part of the program planning calls for the proper placement of these lights so that the set, costumes, and properties are helped to tell their story. Another part calls for the preplanned shifting of lights to get the effect of certain movements or dramatic points. For this, banks of lights may be switched or rheostated on or studio assistants may have to roll certain lights on stands into the desired position during the course of the program.

This studio assistant's responsibilities are great and an essential complement to the work of the studio artists, costumers, video effects experts, and make-up men. As television advances as an art, increasing importance is placed on the work and contributions of lighting experts. Some are already earning the hard-to-get title of artist.

Another important member of the camera crew in studio operations is the microphone boom operator. His job calls for the dipping of the microphone on the end of a mechanical apparatus, something like a fishpole with a telescoping facility and a counterbalance, into the desired spot so that it can pick up sound and still remain out of the picture. These sound technicians also aid in concealing microphones in the various scenes so that long-range views of the subjects will be possible without fading sound. They fade out voices by slowly swinging their microphones away, when it is not considered feasible for the fade to be handled in the control booth, and they help take care of the sound equipment.

Although the order of progression from post to post varies in the various television studios, it generally begins with the studio assistants and advances to microphone boom operator, camera operator, studio manager, and then production assistant. As television becomes increasingly established as an industry and art form, the tendency toward training and

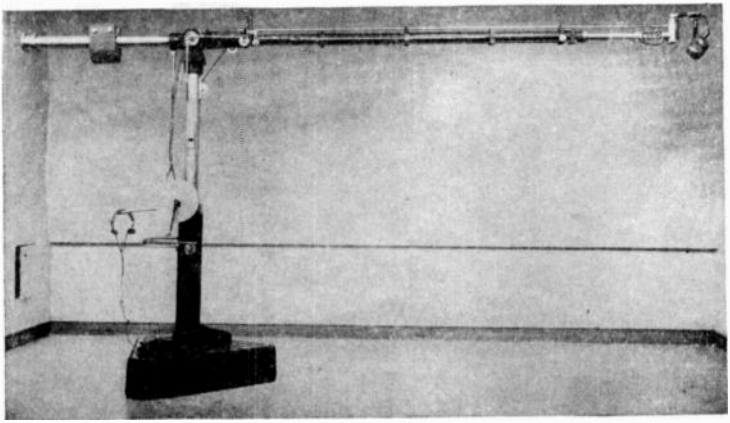


FIG. 11.—Telescopic microphone boom. (*Designed by Robert F. Jamieson. Allen B. DuMont Laboratories, Inc.*)

keeping experts as sound, lighting, or camera technicians is growing.

Chief of the camera crew is the studio manager, who has had considerable experience in all the jobs on the crew. His main duty is to coordinate all studio activity, movement of equipment, and stage settings. He also signals the actors when to begin certain lines, when to speed up their delivery, slow down, increase their voice volume, or move to certain positions. He stands by to aid any of the crew members who are having difficulty with their equipment, and he aids in the training of technical personnel. He is, in effect, the crew foreman.

Other workers in the studio are responsible for the painting of flats, the construction of properties and video effects, the changing of scenes, and other physical jobs, but these are usually related to the scenic design department which we shall discuss later.

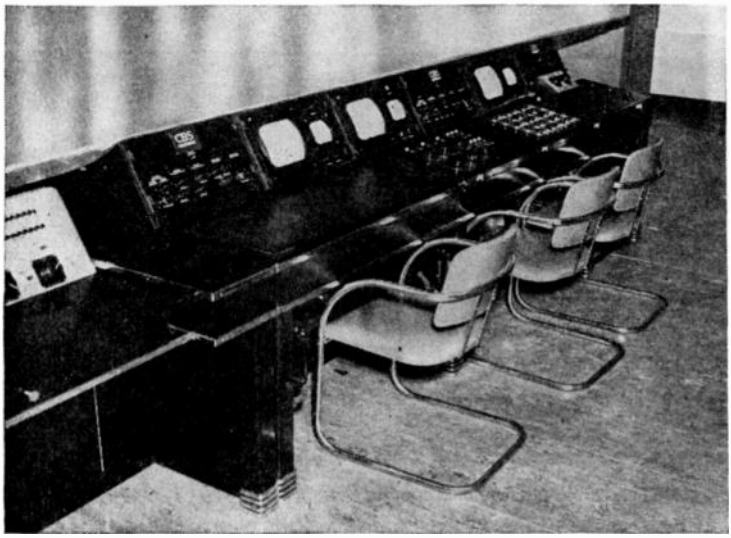


FIG. 12.—The control board at WCBW. (*Columbia Broadcasting System, Inc.*)

Now let us trail that coaxial cable into the control room and see who is running this activity in the studio. One end of the cable is wired to the camera. The other end enters through the wall into the studio control room, which contains the camera monitors, on-the-air pictures, sound controls, turntables, and communications equipment, for addressing everyone in the studio through a public address system, for instructing crews through a microphone-to-earphones connection, and for intercommunication with master control, transmitter, offices, projection room, and other studio control rooms of the station.

The cables are wired to television monitors, one monitor for each camera in the studio. These monitors, which look like television receiver screens underlined by knobs, dials, and switches, permit the production officials to see the picture being picked up by the television camera at all times.

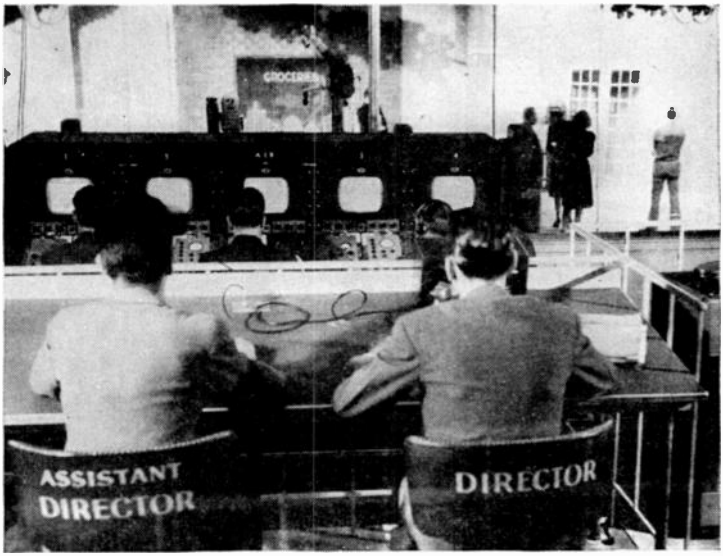


FIG. 13.—Studio "A" control room. (*Allen B. DuMont Laboratories, Inc.*)

At the proper place in the script, and when the picture meets the director's satisfaction, he orders that camera switched on. Meanwhile the other camera, or cameras, get ready for its, or their, next shot. The image being broadcast, which may be either that picked up by a single camera or a blend of images, is viewed on an extra monitor, called the "output" monitor.

Seated at the operating console are one or more shading operators and a production assistant who switches the cameras at the instruction of the director. In some television

stations these operators at the control console are called "video switches" or "production assistants," while in others they are called "technical directors," but all perform the same function.

FIG. 14.—A close-up picture of the interior of NBC Television's control room. Sitting at the controls in the left-hand side of the picture are (left) audio engineer and (right) video engineer. Behind them are (left) technical director who is in direct communication with all the technicians and engineers on the floor and (right) producer-director who is in charge of the entire production. (*NBC Television, WNBT, New York.*)

The director watches the control panel's row of television monitors, one screen for each camera in the studio to show at all times what images that camera is picking up, and one additional monitor to show the picture being broadcast. Images are piped directly into the control room from their cameras by coaxial cable. The production assistant relays the director's instructions to cameramen, addressing the studio crew via a control-room microphone and the crew's

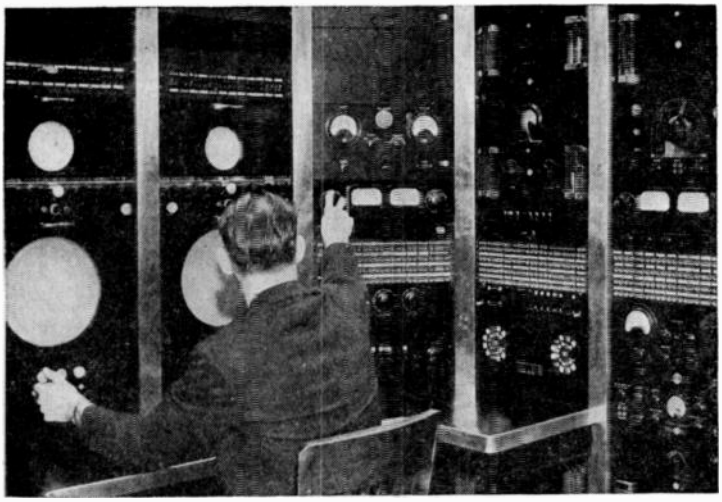


FIG. 15.—A portion of the control board of NBC television station WNBT in the Empire State tower, New York City. (*National Broadcasting Company, Inc.*)

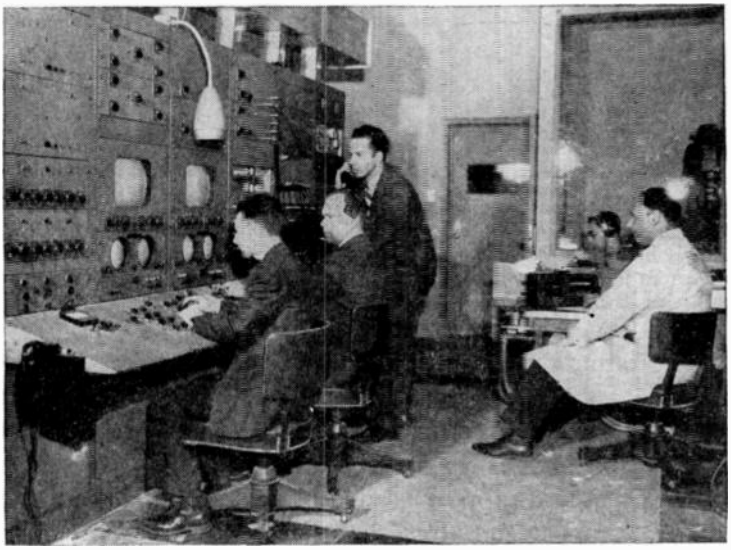


FIG. 16.—Master control at WABD. (*Allen B. DuMont Laboratories, Inc.*)

headsets. Thus the director is "given" whatever compositions or shots he calls for throughout the show. While one camera is picking up the picture that is being telecast, the others are being relocated for their next shots.

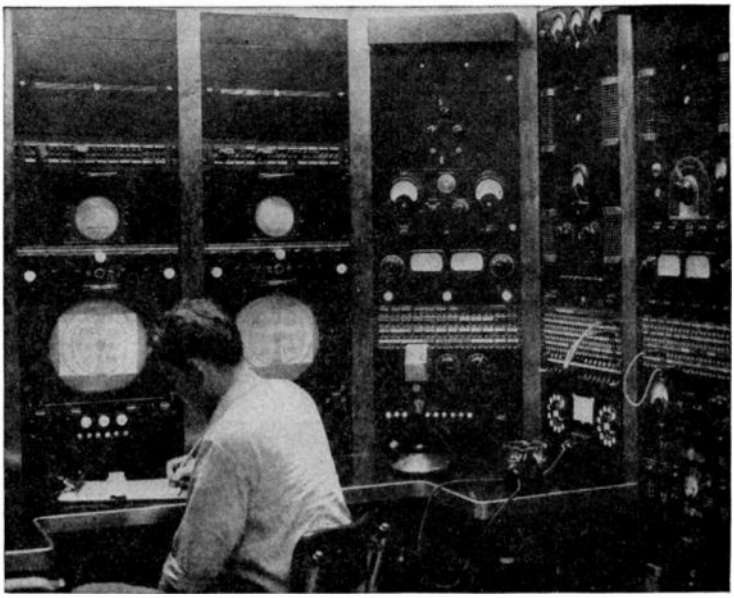


FIG. 17.—Television transmitting room. On the eighty-fifth floor of the Empire State Building in New York City is WNBT's high-voltage transmitting room, and it is here that the sync-generator makes electronic television possible. The test pattern is broadcast half an hour before show time to give the control men and listeners a chance to focus their sets.

The production assistant handles such trick effects as fades and dissolves of overlapping images by adjusting the picture or pictures on the screen to the desired light level, washing them out by increasing the amount of light on the screen, causing them to disappear gradually by darkening the screen.

The "shading generator," another portion of the control console, is operated by a video shading operator who manip-

ulates a series of knobs that even out the tones of the picture where the pickup tube has caused them to develop dark portions.

The sound engineer is the other principal technician in the control room. His duties are to "ride gain" (control the vol-

FIG. 18.—WABD transmitter at 515 Madison Ave., New York City. (*Allen B. DuMont Laboratories, Inc.*)

ume) on the studio microphones or turn control knobs so that the noise level is within the limits that can be broadcast, to spin records and music cues as requested by the director, and to instruct microphone boom operators when their microphones are picking up sound faultily.

When the picture leaves the studio control room, it is sent by coaxial cable to the station's master control where the output of all studios affiliated with the station and the

motion-picture pickup camera is monitored. If any corrective is necessary in picture quality, the master control operator notifies the studio control operator by the station

FIG. 19.—WABD antenna and tower at 515 Madison Ave., New York City. Crossarms on antenna is the video (picture) portion of the antenna and the donut on top is the audio (sound) portion of the antenna. (*Allen B. DuMont Laboratories, Inc.*)

intercommunication or telephone system. Shading of motion-picture film is also often handled by a shading operator stationed in master control.

At this control center, the output of live and motion-picture studios (sometimes termed "telecine departments") is switched on cue so that a continuous stream of broadcast

material is maintained throughout the time the station is on the air.

The images being televised then travel from the master control to the transmitter which strengthens and amplifies the series of signals into which the picture is broken and sends them through a coaxial cable to the antenna and out into the ether to be picked up by the receiver in the home.

3. The Camera

STARTING block for the signal as it traverses the complicated television signal is the television camera. No function is more important in the structure of the television program than that of the cameraman, for no matter how much of a genius the director may be, he cannot produce a successful show unless the cameramen are expert and know their lenses, depth of focus, composition, and equipment.

Seconds are allowed to shift the camera's location completely and get a well-composed, sharply focused picture on the screen. The director must get his instructions to the cameraman quickly and briefly and be able to rely implicitly on his instinctive response to instructions. For example, #1 camera has a medium long shot of a living-room set and the director wants to get #2 camera on a close-up of a person coming through the doorway. His instruction to the cameraman through the production assistant is "Number 2, man coming through door. Get bust shot." That is all the instruction a good cameraman needs to get the shot the director wants.

Then, as the person comes through the door, the director says to the production assistant, "Take 2." The production assistant pushes a button and #2 camera is on the air. Now it is necessary to relocate #1 camera.

The director, again through the production assistant, conveys a brief order to No. 1 cameraman. This time it is "Number 1, get a two-shot of that couple on the settee." Here again a good cameraman knows what the director

wants. Thus, throughout the entire production, a director can relocate his cameras with a minimum of instructions to cameramen and remain free to follow his script closely and to make sure he gets every shot as originally planned.

The television camera plays and will continue to play an important part in remote pickups and field work, such as sporting events, parades, political rallies, civic dedications, and other visual newsworthy developments in the field. On very short notice, the mobile units can be sent to cover any important event. Upon arrival, the camera can be set up in a few minutes and a picture relayed to the main transmitter and sent out to the viewing public.

In studio productions and field coverages, the cameraman and his television camera bring the world's important events to the home and make every home with a teleset a theater and every person in it an armchair traveler.

Because of its great importance to the pictures that make television, the camera justifies a more intensive examination than does most technical equipment. If the prospective producer-director, actor, writer, or other participant in the program realizes the function, operation, potentialities, and limitations of the television camera, he can utilize it to the greatest advantage.

The cameras are divided, basically, into two types. One may not even have a lens. This camera is used for the projection of slides or movies directly onto its "mosaic," which we shall explain in greater detail later. Since it is a comparatively simple type of equipment and requires few adjustments, we may by-pass this type and consider the studio cameras and those used for remote pickups.

These television cameras may be mounted on a push dolly which the operator propels about the studio manually, or they may be on a boom dolly, an instrument manned automatically by the operator or manually by a studio assistant

for the purpose of elevating or lowering a boom or arm on which both operator and camera are mounted.

The television camera is similar in many ways to the movie or photographer's camera. It has a lens which focuses the image on a sensitive plate. It has a focusing adjustment to

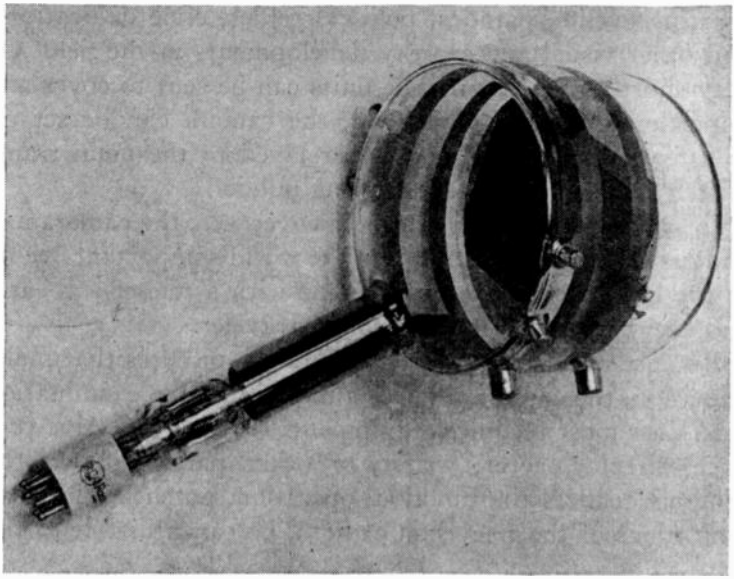


FIG. 20.—1850-A iconoscope. (*Radio Corporation of America.*)

make the image sharp and a view finder to check the content of the picture and its composition. We come to the basic difference between the two types of cameras in the sensitive plate. This plate, termed the "mosaic," is mounted inside a vacuum tube shaped something like a deep saucepan in the case of the iconoscope (the pickup tube used for most studio programs) and more cylindrical in shape for the orthicon and image orthicon tubes (the pickup tubes used where lighting conditions are less favorable).

If you examine this plate very closely, you will find it is a piece of mica, 3.62 by 4.81 in. in size, with its surface pebbled with hundreds of thousands of tiny bumps. The bumps are, in effect, very tiny photoelectric cells, each individually insulated from the others. Collectively, they make up the mosaic. When an image is focused on the mosaic, each cell

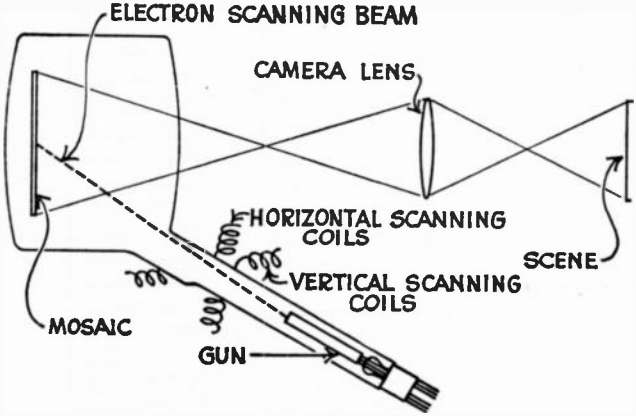


FIG. 21.

becomes electrically charged. A bright light produces a comparatively strong charge; a dim light, a weaker one. Thus, the light and shadow that compose the image are translated into strong or weak electrical charges. These are retained a while by the cells.

An electron beam sweeps back and forth across the mosaic during program pickup periods and travels in a horizontal push-pull pattern across the mosaic much as the eye scans a printed page. Whenever the electron beam passes over one of the bumps (equivalent to the silver halide particles in a photographic emulsion), it releases the stored-up charge. These charges are then amplified or strengthened and broad-

cast by the station facilities. The electron beam travels over 525 horizontal lines 30 times a second, giving television 30 frames or complete pictures every second. Actually the process is accomplished by the beam traversing every other line 60 times a second, these half-frames being termed "fields,"

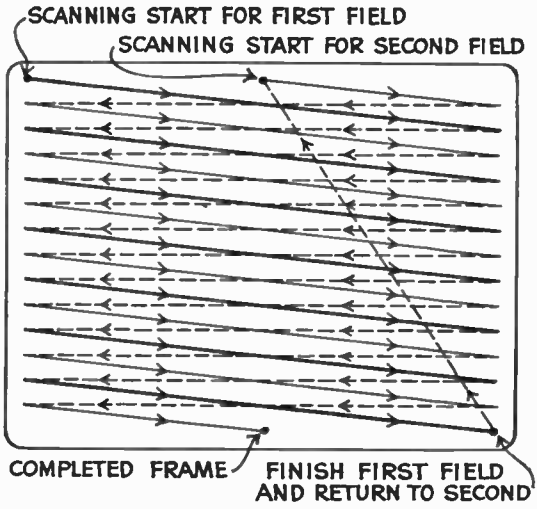


FIG. 22.—Diagram showing scanning of the mosaic.

and the process of picking up the alternate lines being termed "interlaced scanning."

The tiny impulses are marched off the face of the mosaic in uniform order, strengthened, and broadcast in that order. Then the television receiver antenna intercepts the signals and sends them down to the receiver circuit in the same pattern. At the end of this circuit is another electron beam in the vacuum cathode-ray tube which is the television receiver and the beam carries the impulses in the same order in which they were picked up to the face of the fluorescent-coated receiver screen. There the strong impulses cause bright dots to form on the screen and the weaker impulses

cause weak light or none at all to appear. The course of the electrical impulses picked up from the mosaic is completed here.

The image pickup system also provides for signals to indicate the end of each line and the end of each frame and to steer the electron beam to its next pickup point. Skilled technicians seated before control monitors also correct the average light level of the images to make certain that distortion is brought to a minimum and that the image is properly shaded. This prevents patches of light or shadow from marring the picture.

Getting back to the camera, we find that on the left of it is the view finder. Allen B. DuMont Laboratories, Inc., makes and uses one that works electronically, equivalent to a tiny television receiver with a screen 5 in. in diameter. These finders are hooded, much as the old stereopticons, so that no outside light can enter and dim the operator's view of the image. Other manufacturers make optical finders which are usually either wire-frame or twin-lens types, identical in principle with many of the still photographic cameras.

Focusing is handled manually on the television cameras in general use today, although automatic focusing devices such as are used in the more expensive still cameras may well be adopted by television soon. The focusing may be handled by a chain-driven focus lever on the right of the camera which, when pushed forward or pulled back, moves the lens from or toward the mosaic. Other cameras have knurled knobs at the ends of the handles which protrude backward from the base of the cameras. These cameras are focused by turning the knobs.

Trailing behind the cameras are long, black snakelike coaxial cables, larger in diameter than garden hoses. In planning camera movement where more than one camera is

involved, it is important to chart the camera assignments so that they do not cross over each other's cables lest the cables be damaged or the cameras robbed of mobility.

The Image Orthicon

Throughout television's early period, the telecasters struggled with the vast amounts of light required to make impressions on the comparatively insensitive iconoscopes. They labored with make-up and corrective set designing and costuming to overcome the burdens imposed on productions by the color-value distortions of the iconoscope. They learned to squeeze and force big information into small sets to compensate for the bulk and ponderousness of television's early cameras. And, they prayed with all the fervor of primitive rain makers for a camera to come down the pike which would make programing less of a technical convulsion and more of an obedient means of artistic, clear expression.

Although such a camera has not yet arrived and has not even been scheduled so far, its forerunner has appeared with such dramatic impact, in contrast to the older television cameras, that one expert was heard to remark facetiously, "That thing'll pick up a picture at 1,000 paces by the light of a lighted cigar!" This camera is the image orthicon, introduced in late 1945 by the Radio Corporation of America.

Advantages that RCA attributes to the image orthicon include "(1) ability to extend the range of operations to practically all scenes of visual interest, particularly those under low lighting conditions; (2) improved sensitivity, permitting greater depth of field and inclusion of background that might otherwise be blurred (through use of smaller lens aperture on the camera); (3) improved stability which protects images from interference due to exploding photo flash bulbs and other sudden bursts of brilliant light (ruinous to the mosaic of the iconoscope); (4) smaller size of tube, facili-

tating use of telephoto lens; (5) type of design that lends itself to use in lightweight, portable television camera equipment; (6) improved gain control system that provides unvarying transmission, despite wide fluctuations of light and shadow."

Operation of the image orthicon is considerably different from that of the iconoscope. The lens of this more sensitive type of pickup tube focuses light reflected by the subject

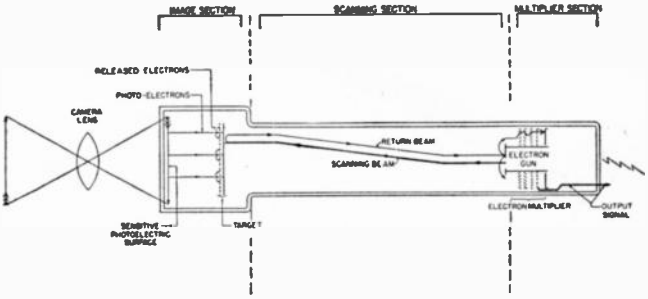


FIG. 23.—RCA image orthicon tube.

onto the face of a tube that emits electrons from each of many thousands of tiny cells on which the light falls in proportion to the amount of light falling on it. These electrons flow from the back of the sensitive photoelectric surface, perpendicularly to that surface, to a "target." A positively charged grid behind the photosensitive face and the fact that the electrons travel in an electromagnetic field control this direction and the velocity of the electrons.

As the flying electrons strike the target, they knock a larger number of electrons off the target face, creating, in effect, a pattern of remaining electrons equivalent to a visual photographic negative, created in positive electrons. An electron gun in the base of the tube scans the back of the target much as that in the iconoscope scans the mosaic, but the electrons making up this beam are slowed down so that

they stop just short of the target and are returned to the base of the tube except when they approach a portion of the target carrying a positive charge. At these points, the beam deposits enough electrons on the back of the target to

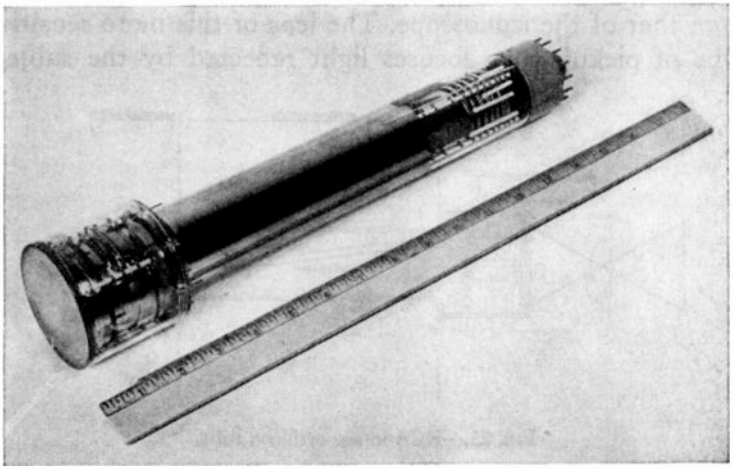


FIG. 24.—RCA's new supersensitive television camera "eye." Destined to solve many of the major difficulties of illumination in television programing, this new television camera "eye," known as the RCA image orthicon, makes possible round-the-clock television coverage of news and special events. Until now a war secret, it will be incorporated in the new portable supersensitive television camera to be manufactured by the RCA Victor division. The image orthicon was shown for the first time in a press demonstration at the NBC studio. It picks up scenes in candle-light and darkness and paves the way for practical television program production in small towns and cities.

neutralize this positive charge. These gaps in the returning beam's charges are the darker portions of the picture; where the beam has its full power, it can create a light portion of the picture, since it is the returning beam that is amplified, broadcast, intercepted on the receiver antenna, and hurled against the fluorescent face of the television receiver screen. In the image orthicon tube is an electron multiplier section, in which the electron beam on its return trip strikes a series

of dynodes where each electron releases a number of additional electrons so that, by the time the signal has passed through the series, it is greatly strengthened.

The image orthicon looks like a big flashlight 15 in. long and 2 in. in diameter save for a head 3 in. long and 3 in. in diameter. In this head, the "image section," the photoelectric current is amplified; it has the sensitive photoelectric surface as its face, the target as its back. Most of the pickup tube's length is required for the passage of the scanning beam and the return beam. The third, or base, section is for the electron multiplier. It is in this section that the image orthicon attains its great sensitivity, its ability to transmit a comparatively strong signal from comparatively weakly illuminated subjects.

This camera can record images illuminated by candlelight, the light of a match, or infrared rays, and it is infinitely more easily transported to scenes of news events than the iconoscope, yet its utility today seems confined primarily to these remote events, since the tube does not have the degree of definition needed or expected of carefully planned studio work. Its ability to pick up the closing periods of prolonged baseball and football games after the sun has begun to set and to "see" in the auditoriums, concert halls, and indoor stadiums assures it a valued and continued role in television.

Yet, the truly sensitive studio camera with the ability to work in moderate illumination, with generous depth of focus and high mobility, and in extreme variations of lighting *without* loss of detail remains a development to be expected in the future. With the advent of the image orthicon, that future seems far less remote than before.

Lenses Carve the Program

No matter what type of camera is being used to cover the television pickup, its lens is one of the dictators of what will

appear on the receiver screens. The lens determines how wide an area may be covered by the camera at one time and thus dictates the width of the set and how widely the actors may be spaced in order to fall within the limitations of the pickup equipment. It also indicates how brilliant the light may be (in conjunction with the type of pickup equipment) and how deep may be the portion of the televised scene that is held in sharp or even recognizable focus. This, in turn, influences the director in placing his actors. If it is necessary to give dominance to one and the depth of focus is great, the dominant actor may be near the camera, the secondary one(s) farther from it. If the depth of focus is limited, the director will have to resort to distinctive costuming, placement of the actor in relation to the background, or composition of the picture (one actor in one corner of the scene balancing a group in the opposite corner, for example). Another power given the director by knowledge of the capacities of his lenses is that derived from selective focusing. Knowing that the lens has an insufficiently short depth of focus to record the actors in the foreground and the sets in the rear may cause him so to design the sets that they are extremely foreshortened and use strong perspective lines rather than actual depth to convey their impressions. Or it may cause him to use certain properties in the same plane as the actors rather than having them as painted portions of the set. Selective focusing lets one actor be seen sharply while others in a plane considerably closer to or farther from the camera are made indistinct. It can concentrate on an actor's hand near the camera and leave his face and figure indistinct. Applications of this lens knowledge to the actual program are endless in number and variety. A skilled director will be master of many.

The "lens stops" are usually engraved on the metal portion of the lens ring. They are indicated with a small "*f*." A

lens speed is rated by its widest stop, such as $f/2.7$ or $f/3.5$ for fast lenses or $f/16$ or $f/22$ for comparatively slow ones. The smaller the number of the lens stop, the wider is the aperture. The wider the aperture, the more light it lets into the camera. Also, the wider the aperture, the shorter is the camera's depth of focus.

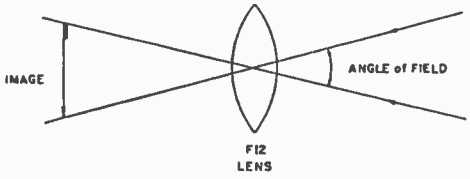


FIG. 25.

The focal length of the lens is indicated by a capital *F*. This represents the distance between the optical center of the lens and the plane at which objects at infinite distance are focused sharply by the lens. The shorter the focal length of a lens, the wider is its angle of field (the area being "picked up" by the lens).

A lens with a short focal length, even though it has a wide angle of field, should not be confused with a wide-angle lens.

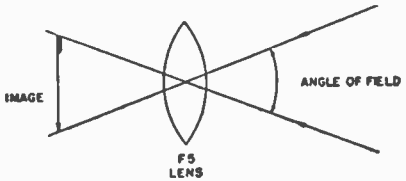


FIG. 26.

Fast ($f/1.9$ or $f/2.5$) lenses with short focal length (5½, 6, or 6¼ in.) may have fields anywhere from 50 to 70 deg.; wide-angle lenses will have fields from 75 to 140 deg. Their construction makes these lenses slow, seldom faster than $f/8$ to $f/32$, although their focal lengths are very short. Their slow speeds make them impractical for television work today.

Depth of field, the distance between the nearest object to the lens that is in focus *A* and the farthest object from the lens in focus *B* when the lens is focused on a given point *C*, is one of the most important considerations in planning camera movement and position during program rehearsal (Fig. 27).

When planning depth of field, remember that at a given aperture and distance between lens and subject, the shorter the focal length of the lens, the greater the depth of the field.

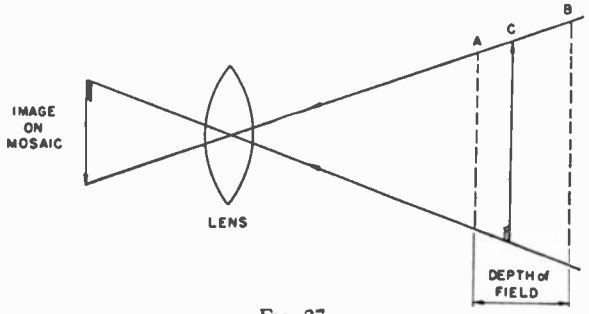


FIG. 27.

In short, you get a greater depth of field with a 6-in. lens at *f*/2.5, 10 ft. from the subject, than you would from an 8-in. lens stopped down to *f*/2.5, 10 ft. from the subject. The field angle would be wider with the shorter lens and the object smaller.

Depth of focus is similar to depth of field, it being the distance between the nearest image to the lens that is in focus *A* and the farthest image from the lens in focus *B* when the lens is focused on a given point *C*. But depth of focus refers to the range within the camera and affects the positioning of the pickup tube, whereas depth of field refers to the portion of the subject being televised which may be recorded at one time by the camera (Fig. 28).

In focusing a camera on a given subject, set, or stage, the lens should be focused on a point one-third the distance

between the limit of the depth of field closest to the lens and that farthest from it. This is because the field *A* in focus on the near side of the object on which the lens is focused is about half as deep as *B* in the far side (Fig. 29).

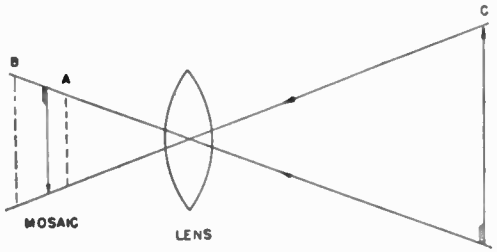


FIG. 28.

If the lens does not cover the depth of field required, the director must use one of three corrective measures: (1) move the camera back, (2) use a lens of shorter focal length, or (3) shut the aperture down if the light volume available permits.

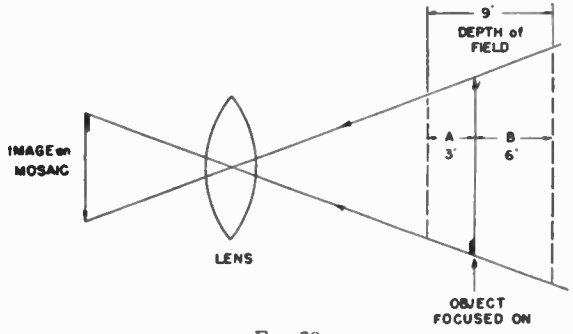


FIG. 29.

Experience has shown the advisability of focusing on the eyes of a principal character being recorded in close-up save when the program calls for specific emphasis on some other object, such as merchandise being demonstrated or a clue

to a murder mystery. When signs or placards are brought into focus, they must be perpendicular to the axis of the

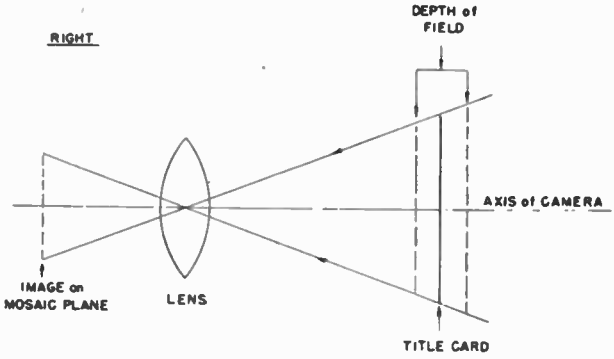


FIG. 30.

camera, otherwise there is danger of either the top or bottom being out of focus (Figs. 30 and 31).

The following formula and table will greatly aid the director or producer in ascertaining the width of field at various distances from subject to be televised.

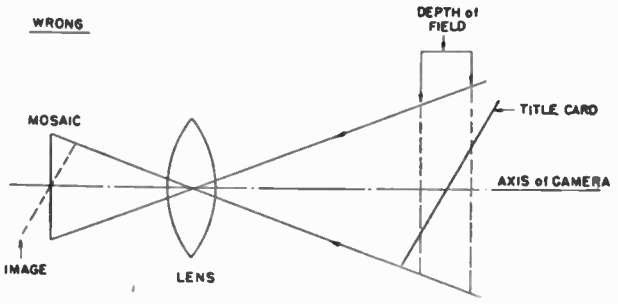


FIG. 31.

As stated earlier in this chapter, the mosaic is 3.62 in. high and 4.81 in. wide and for all practical purposes is referred to as a 4 to 3 ratio (Fig. 32). Therefore, to find the

width of the field, using a 6-in. focal length lens 10 ft. from the subject, the formula would be as follows: The focal length (6 in.) is to the mosaic (4.81 in.) as the distance from the lens to the subject is to X, or

$$\frac{\text{Focal length}}{\text{Mosaic}} = \frac{\text{distance from lens to subject}}{X \text{ (width of field)}} = ?$$

$$\frac{6 \text{ in.}}{4.81 \text{ in.}} = \frac{10 \text{ ft. or } 120 \text{ in.}}{X} = 96 \text{ in., or } 8 \text{ ft.}$$

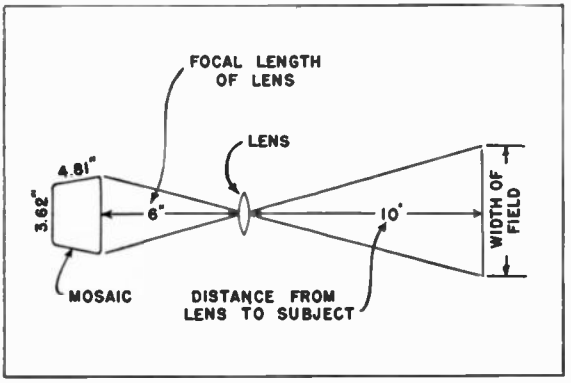


FIG. 32.

Knowing that the width of field at 10 ft. or 120 in. is 8 ft., we can easily figure out the height of the field. We know that the mosaic is three-fourths as high as it is wide, so three-fourths of the width of the field is ¾ of 8 ft., or 6 ft.

The accompanying charts have been computed for width of field at various distances from the 6-in. to the 10-in. focal length lens.

Care of Lenses

Like any fine instrument, a lens requires careful handling. When not in use the lens should be protected with a cap.

Computation of Width of Field

Using 6- to 10-in. focal length lens

Focal lengths, 6 in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 7″	3′ 2″	4′ 10″	6′ 5″	8′	9′ 7″	11′ 3″	12′ 9″	14′ 5″	16′	17′ 7″	19′ 2″	20′ 9″	22′ 5″	24′
Focal length, 6¼ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 6″	3′ 1″	4′ 7″	6′ 1″	7′ 8″	9′ 1″	10′ 9″	12′ 4″	13′ 10″	15′ 5″	16′ 11″	18′ 6″	20′	21 6″	23′ 1″
Focal length, 6½ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 6″	3′	4′ 5″	5′ 10″	7′ 5″	8′ 10″	10′ 4″	11′ 10″	13′ 4″	14′ 10″	16′ 4″	17′ 9″	19′ 3″	20′ 9″	22′ 3″
Focal length, 6¾ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 6″	2′ 9″	4′ 3″	5′ 8″	7′ 1″	8′ 7″	10′	11′ 4″	12′ 10″	14′ 4″	15′ 9″	17′ 1″	18′ 6″	20′	21′ 5″
Focal length, 7 in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 5″	2′ 9″	4′ 1″	5′ 6″	6′ 11″	8′ 3″	9′ 7″	11′	12′ 5″	13′ 9″	15′ 1″	16′ 6″	17′ 11″	19′ 4″	20′ 7″
Focal length, 7¼ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 4″	2′ 8″	4′	5′ 4″	6′ 7″	8′	9′ 3″	10′ 6″	11′ 10″	13′ 2″	14′ 6″	15′ 10″	17′ 2″	18′ 6″	19′ 9″
Focal length, 7½ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 3″	2′ 6″	3′ 10″	5′ 2″	6′ 5″	7′ 8″	9′	10′ 3″	11′ 7″	12′ 10″	14′ 8″	15′ 4″	16′ 8″	18′	19′ 3″
Focal length, 7¾ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′ 3″	2′ 6″	3′ 8″	5′	6′ 3″	7′ 6″	8′ 8″	10′	11′ 3″	12′ 5″	13′ 7″	14′ 10″	16′ 1″	17′ 4″	18′ 7″

COMPUTATION OF WIDTH OF FIELD.—(*Continued*)

Focal length, 8 in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′2″	2′ 5″	3′ 7″	4′ 9″	6′	7′ 2″	8′ 5″	9′ 7″	10′ 9″	12′	13′ 2″	14′ 5″	15′ 7″	16′ 9″	18′
Focal length, 8¼ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′2″	2′ 4″	3′ 6″	4′ 8″	5′10″	7′	8′ 2″	9′ 4″	10′ 6″	11′ 8″	12′10″	14′	15′ 2″	16′ 4″	17′6″
Focal length, 8½ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′1″	2′ 3″	3′ 4″	4′ 6″	5′ 7″	6′ 9″	7′10″	9′	10′ 1″	11′ 3″	12′ 4″	13′ 6″	14′ 8″	15′10″	17′
Focal length, 8¾ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′1″	2′ 2″	3′ 3″	4′ 5″	5′ 6″	6′ 7″	7′ 8″	8′ 9″	9′10″	11′	12′ 1″	13′ 2″	14′ 3″	15′ 4″	16′6″
Focal length, 9 in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′	2′ 1″	3′ 2″	4′ 3″	5′ 4″	6′ 5″	7′ 6″	8′ 7″	9′ 8″	10′ 9″	11′10″	12′11″	13′11″	15′	16′ 1″
Focal length, 9¼ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′	2′ 1″	3′ 1″	4′ 2″	5′ 3″	6′ 3″	7′ 3″	8′ 4″	9′ 4″	10′ 5″	11′ 5″	12′ 6″	13′ 6″	14′ 7″	15′7″
Focal length, 9½ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28	30′
Width of field	1′	2′	3′	4′	5′	6′ 1″	7′ 1″	8′ 1″	9′ 1″	10′ 1″	11′ 2″	12′ 2″	13′ 2″	14′ 2″	15′2″
Focal length, 9¾ in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′	2′	3′	4′	4′11″	5′11″	6′11″	7′10″	8′10″	9′10″	10′10″	11′ 9″	12′ 9″	13′ 9″	14′9″
Focal length, 10 in.:															
Distance from lens to subject	2′	4′	6′	8′	10′	12′	14′	16′	18′	20′	22′	24′	26′	28′	30′
Width of field	1′	1′11″	2′11″	3′10″	4′10″	5′ 9″	6′ 9″	7′ 8″	8′ 8″	9′ 7″	10′ 7″	11′ 6″	12′ 6″	13′ 5″	14′5″

When the lens needs to be cleaned the cleaning must be done with special care. Dust may be removed from the surface of the lens with a soft camel's-hair brush. If greasy film or fingerprints collect on the glass, they may be wiped off very gently with lens tissue. Rubbing the glass must always be carefully avoided. Never rub the fingers over the surface of a lens in an attempt to remove dust or greasy fingerprints. The glass surface is comparatively soft and even if it is rubbed with a very soft cloth that is dusty, as dust nearly always contains silica, the polish of the lens may be destroyed and its efficiency very seriously reduced. Nothing but a special lens tissue should be allowed to touch the surface of the glass.

Basic information for the programing agency that is beginning work in television concerns what types of lenses are available and which should be used. Proper use of this information can prevent errors and give the programing personnel tools that will make a mediocre program coverage distinguished.

4. Lighting for Television

PICTURE quality and definition, composition and mood are largely created by the lighting in a television studio. Visual appeal of the program is closely associated with the degree of artistry and perception with which the illumination is placed.

The basic light in television arrangements is the over-all floodlighting, which is usually so well diffused that it does not reveal its location with telltale hard-edged shadows. The brilliance necessary for this lighting depends on the sensitivity of the camera primarily, and to a lesser degree on the demands of the subject and the quality of the transmitting facilities. At this writing, with the iconoscope as the principal television studio camera, the intensity of general illumination required is extremely high, at least 500 and often around 1,000 foot-candles!

This much brilliance when engendered by incandescent light has been found to result in a tremendous amount of heat, a factor which has caused great discomfort to casts and which has spoiled many a program in which, say, wax crayons or candles were visible. Recently, however, developments in heat-resisting glass by the American Optical Company have made it possible to shield the actors from the hot rays of incandescent lamps by dissipating 90 per cent of the heat without shutting off an appreciable amount of light.

The early incandescent lighting for television was in the form of banks of six 300-watt mushroom-type lamps mounted on a swivel head which could be locked in place. These swivel heads were attached to a grid in the ceiling of the studio and

the lighting directed at such an angle that it covered the area being televised that night. Other studios mounted the banks of lights on a crane which could be aimed in different

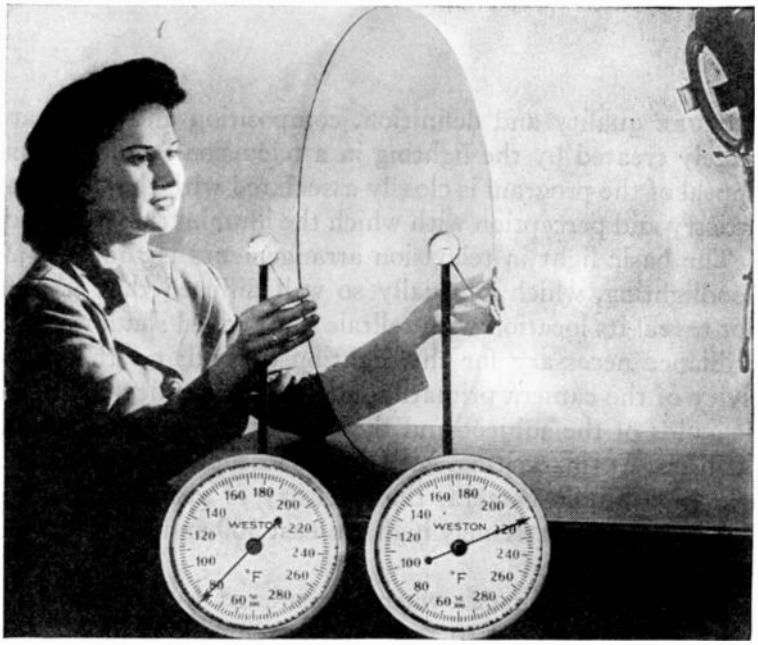


FIG. 33.—The new American Optical Company glass can be used as a heat screen in spotlights and floodlights to protect movie and television actors from scorching heat generated by the powerful lights. Approximately 90 per cent of the present almost unendurable heat is absorbed by the glass. This picture demonstrates how the glass absorbs heat emitted by the floodlight (upper right). Thermometer placed before the glass registers 220°F., whereas the temperature behind the heat-absorbing glass registers only 80°F. (*American Optical Company.*)

directions and tilted by rope or cable controls along the studio wall.

Later these lamps were replaced by 150-watt incandescent ones with pyrex lenses on the front. This General Electric development was made with two types of lenses: one clear

for spotlighting, the other with a mass of glass bumps over its surface for floodlighting. Even with these lamps the degree of basic lighting demanded by the iconoscope camera is so high that low lighting spots, pinpoints, and other types of spotlighting that model features and detail are used with

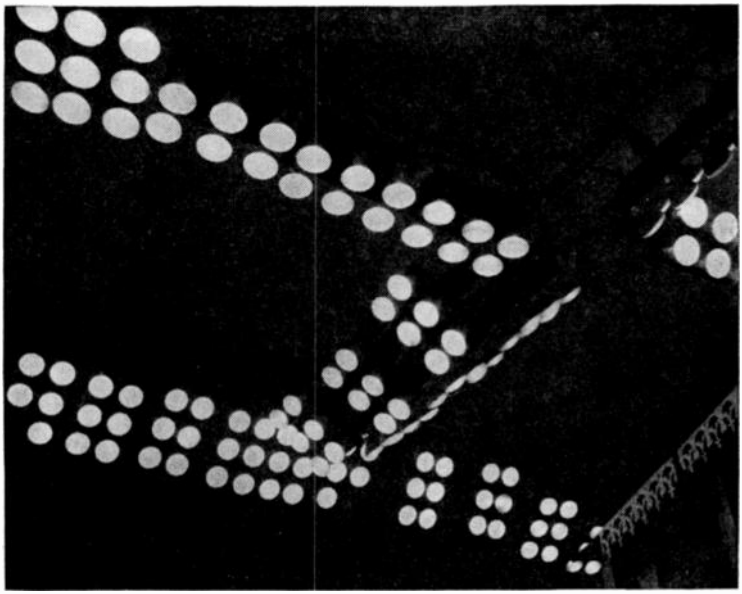


FIG. 34.—Incandescent lighting at WABD. (*Allen B. DuMont Laboratories, Inc.*)

very little effect and success. Light tricks are practically impossible, and the technicians in the control room have to be called on to lower the lighting on the picture electronically to simulate night scenes.

In motion pictures, each set is individually lighted to give well-planned results and, after that set has been used, the next set is made ready. In contrast television demands continuous performance, so all sets must be lighted at once for all types of shots to be taken. This, too, handicaps the tele-

vision programing agencies working with present-day studio cameras in attaining the artistic effects they desire through lighting.

The writhing of television studios to esçape the handicap of heat from incandescent lighting at the required light level has brought them to try many other types of illumination.

FIG. 35.—Fluorescent and Duarc lighting at WCBW. (*Columbia Broadcasting System, Inc.*)

One type was fluorescent light, with long tubes mounted in parallel rows as banks of light. This was much cooler than the incandescents, but fluorescent lamps generate a small amount of illumination and have to be used in huge quantities, almost as a solid ceiling for the stage. Even in quantities it is necessary to place them so close to the heads of the actors that freedom of camera movement is impaired and the compositions possible are severely limited.

More successful as a type of television illumination, though

not entirely satisfactory, are the water-cooled mercury-vapor lamps. These were developed by the General Electric Company and were given their most thorough test at that company's Schenectady television station WRGB. The fact that

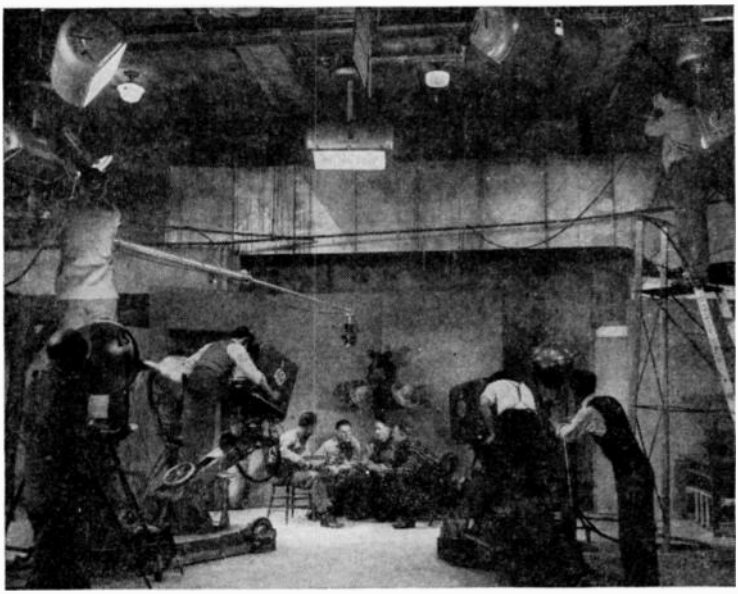


FIG. 36.—Mercury-vapor water-cooled ceiling lights in use in studio of WRGB, General Electric's television station. Floor lamp of same variety is visible, too. (*General Electric Company.*)

each lamp is cooled in a water jacket reduces the temperature to a comfortable level. The daylight level of these lamps is also in their favor and they are not so bulky as the fluorescent lamps in proportions to the foot-candles of light they yield. They are large, however, and are impeded in flexibility by the need for keeping a hose attached to each light. In the past these jackets have often broken, resulting in water running into the studio. The installation problem is not a simple one.

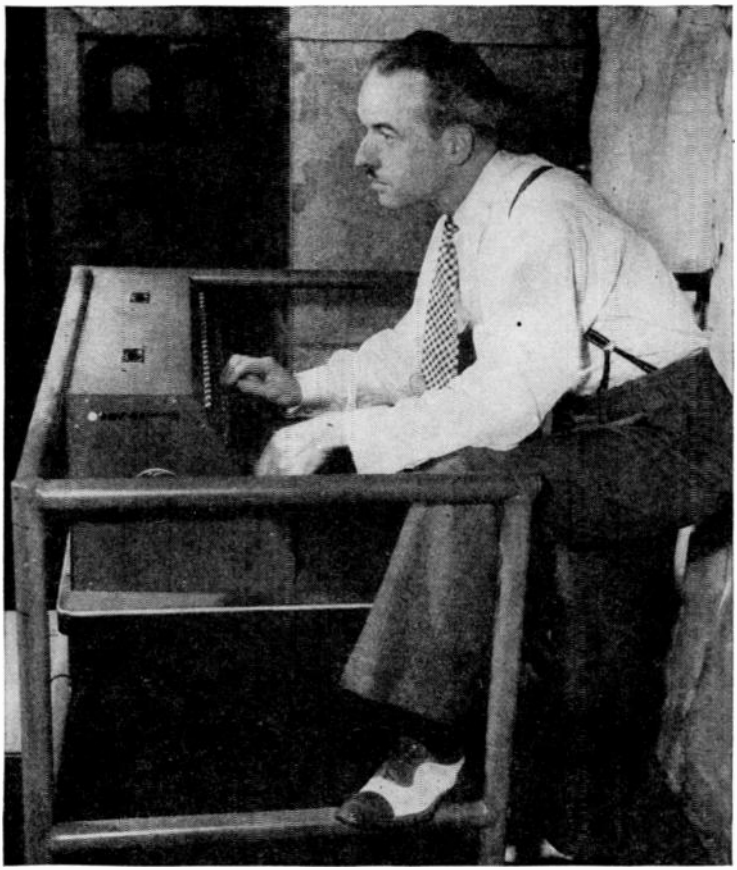


FIG. 37.—Light bridge in studio of WRGB, General Electric's television station. From here by means of push buttons, the ceiling mercury-vapor lamps are turned off or on, tipped or tilted in any preferred position. (*General Electric Company.*)

Another type of general illumination for the television studio is the self-feeding carbon arc lamp. Most thoroughly

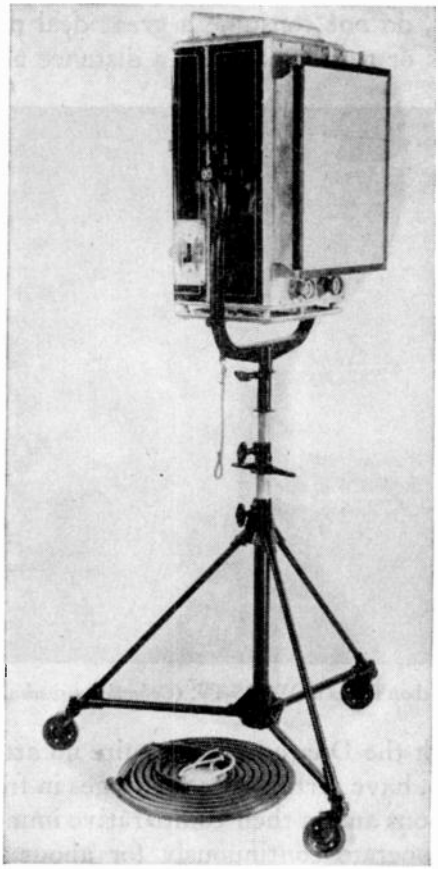


FIG. 38.—M-R Type 40 Duarc lamp. (*Mole-Richardson Company.*)

tested of these for television is the Duarc lamp, manufactured by the Mole-Richardson Company of Hollywood. This two-purpose lamp can be used overhead or on the floor, a result of its self-feeding feature. The lamps have feeding mechan-

isms operated by silent motors, which maintain the spacing of the carbons correctly throughout their period of use. Duarcs have approximately daylight quality, operate on direct current, do not consume a great deal of power, and may be struck or turned on from a distance automatically.

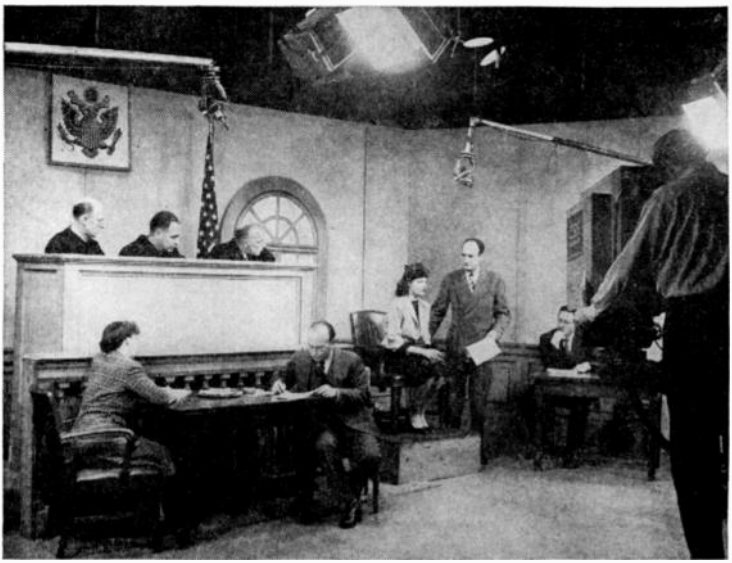


FIG. 39.—Duarc carbon lights at WCBS-TV. (*Columbia Broadcasting System, Inc.*)

Even though the Duarc lamps require no attendant operator, they, too, have certain disadvantages in frequent dressing of the carbons and in their comparative immobility. Even though they operate continuously for about 1½ hr., this operation time will have to be expanded to make them practical for full-schedule television, and the need for redressing them at regular intervals will require frequent lowering of the lamps to within the operators' reach or climbing to them for servicing.

For the definition of actors and the attainment of high

lights brighter than the general illumination, few special television lights have been developed. Most television studios use the same lights as those in the theater, photographic studios, and the movies for this purpose: kliegs, spotlights, or even banks of Birdseye lamps mounted on floor stands. The lightweight Salzman lamps with reflectors are also used freely in television stations because of their flexibility.

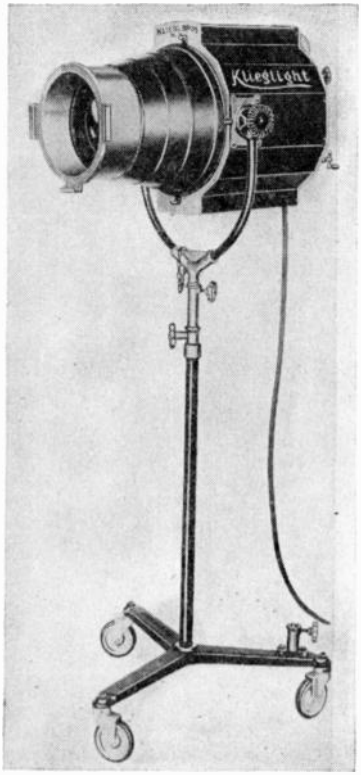


FIG. 40.—Super-Klieglight #1168-CR. (*Kliegl Bros.*)

The hard edges on the shadows of incandescent spotlights and their glare are principal objections to their general use. By coupling them with cooler lamps, such as mercury vapors or Duarcs, the heat factor is brought down to a tolerable level.

Floor lighting in television is as important as footlights in the theater for lighting the faces of the performers. But, unlike the footlights in a theater, the floor lights in the television studio must be mobile so that they can be moved out of the way and not deprive the cameras of their mobility and flexibility.

One of the principal factors that have deterred lighting manufacturers and television stations from more extensive exploration of illumination of the sets—admittedly one of

the most poorly handled phases of television—is the imminence of new types of more sensitive pickup tubes for

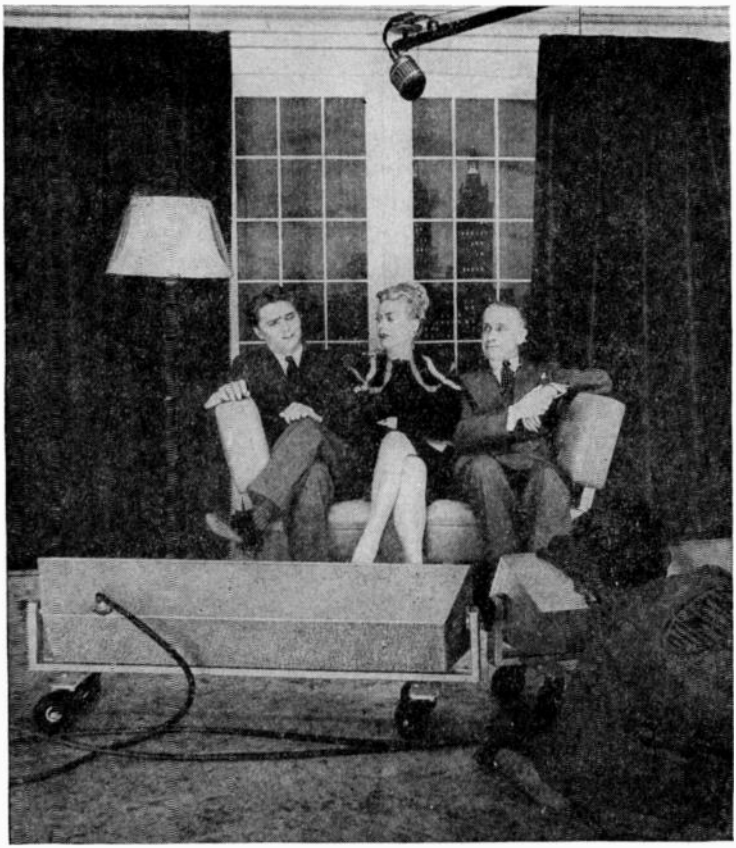


FIG. 41.—Mobile incandescent floor lights at WABD. (*Allen B. DuMont Laboratories, Inc.*)

studio use somewhat comparable to those used in field work. When those tubes are developed, television lighting will become greatly simplified since the contrasts can then be more subtle and the over-all illumination would be a pre-

solved problem, lighting equipment could be lighter in weight and more compact, and art directors and program producers could attain plastic, story-telling effects with shading, emphasis, definition, and tone—today impossible or, at best, extremely difficult.

Today, television lighting is a challenge requiring the utmost in ingenuity despite necessary compromises. Tomorrow it will become an art executed with far more obedient materials.

5. Scenic Design

No function in television requires a more constant resourcefulness than that of the scenic designer. Set designs, properties, video effects (television's optical equivalent of radio's aural trickery), titles, credit cards, and often even lighting arrangements fall into his province.

The materials with which the television artist works are as varied as those of his imagination. Large "flats," surfaces from 3 to 6 ft. wide and from 8 to 15 ft. high (depending on the ceiling height of the studio) so designed that they may be joined together easily to make almost any size of area desired, are his basic canvases. On these areas, casein or glue-based paints, in tones ranging from white to nearly black, are used to create backgrounds that appear to be three-dimensional. Paints that can cover previous layers of paint opaquely with a single coat are preferred for economy of flats and time.

Through extensive experimentation, the artists in television have developed the ability to make almost any kind of background desired by using black and white paints. Open windows looking out upon limitless landscapes, fireplaces, framed pictures, and almost anything else that might logically be on, along, or near a wall have been convincingly "built" in paints by these adroit artists. When studio lighting is so brilliant that it washes out or tones down natural shadows of wall objects, permanent ineradicable shadows are created in dark tones on the flats.

Part of the success of these art techniques is contingent

upon the cooperation of the entire production crew. Should the camera be brought into sharp focus on the objects drawn on the flats, or should a shadow be thrown on an ostensibly open window and fall on the sky or distant horizon, the artifice is exposed.

Sets in television differ sharply from most people's conceptions of those for either the theater or the motion picture. In television, the set can be suggested by but a small area to convey the proper atmosphere. A frilly vanity table covered with expensive-looking luxury objects may suggest the boudoir of a wealthy woman. A crude wooden sink, detailed with hand pump and homely, old-fashioned household articles, may be all the set necessary to give the impression of an eighteenth-century farmhouse. By thus indicating, rather than fully creating, sets, it is possible to have numerous, apparently unrelated ones adjacent to each other in the television studio. Again we translate television's greater articulation in close-ups to an asset which conserves space and expanse and which conveys the suggestion of scenes with great efficiency.

Certain characteristics of the television camera must be taken into consideration when designing studio atmosphere for a production. The tendency of all cameras, television or photographic, to distort by enlarging the portions of objects very close to the lens can be used as a valuable aid. If sweeping, overhanging eaves are called for, this effect can be gained by designing comparatively short overhangs with extreme tapering from an enlarged front to a relatively thin area away from the camera. Thus the entire eave may be kept in sharp focus without apparent foreshortening.

Skilled television artists make it a point to know the type of camera and lens to be used in recording each scene on which they are working. They acquaint themselves with the area included in a shot, the angle from which it is viewed, the

likelihood of sharp or diffused focus on different portions of the sets, and the need for contrast in tone between, say, a character's hair or costume and the portion directly behind him. Excellent practice for the television artist is to observe objects and sets through an electronic view finder. This permits him to see or visualize subjects as both the camera and the audience see them and protects him from many errors of placement and shading of colors and lighting. The experienced artist also makes a point of knowing approximately the color of the costumes of the principal characters so that he can plan settings accordingly.

Because of the tremendous importance given the visual portion of television programs, the artist is frequently fully as essential to the proper interpretation of a program as is the director or producer. In fact, one major advertising agency, which has hung up a creditable record in television production, uses its art director as the key figure in its television department.

This does not mean that the artist may dominate the picture appearing on the television screen. In fact, one of the best measures of the quality of television art is the ability of the artist to keep his effects subtle and subdued. No matter how important is the role that the background is required to play in a telecast, it should have the effect of being more felt than seen and should be subjugated in its relationship to characters and action in the production.

Let us see how the television artist goes about his work.

He is called into consultation early in the formation of a production. Scripts are distributed to the various officials participating in the program and are examined by each from his particular standpoint. The artist visualizes the action from the script, checks points in question with the writer and the producer, breaks down the script to a minimum number of sets, and determines how many will require long shots to

set the locale and how many can be handled by suggestion through close-ups. The long shots are then divided into two basic categories: those which must be in full scale and those which may be accomplished through miniatures.

Next the artist makes up rough black-and-white sketches of the various scenes required, placing characters in the scenes and possibly indicating preferred lighting arrangements. If the scenes are too numerous or too costly, it may be necessary for the scripter to write around the troublesome portion or, more likely, for the artist to employ additional ingenuity to sidestep the difficulty. Once the rough sketches are approved by the station or agency art director and the producer, more detailed ones may be executed or production charts may be based on the roughs.

The studio floor plan is charted to space sets so that camera shifts are handled without cables becoming tangled and characters may move from one set to another in the allotted time. The necessary facilities are then ordered by the artist. This is a responsibility of no minor importance. The scenic designer, for example, must have extensive knowledge of period design so that sets and properties can be properly integrated. A large percentage of television dramatic shows are set in period background, and properties must be authentic to give the show veracity.

Owing to the tendency of the television camera to make things look larger than they are, it is advisable to "overdress" a set by adding clocks, candlesticks, hand properties, and pictures that would not ordinarily be there. A blank wall would make a delicate Georgian set interior look like a cheap restaurant.

Since the full-scale set is expensive and space-filling, the artist frequently resorts to the use of miniatures to convey the impressions of locales. In one WABD program about a cathedral, Robert Bright, the station art director, ordered a

miniature of the exterior of a bombed cathedral. It was a small set, less than 3½ ft. across, yet it gave the impression of a full-sized exterior view so effectively that many members

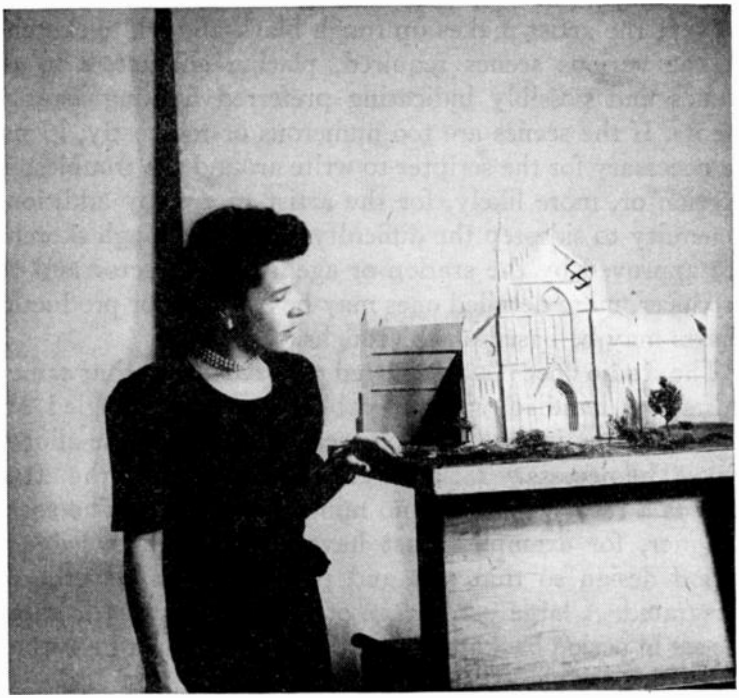


FIG. 42.—For "The Cathedral," set designer Bob Bright used this miniature to establish locale and serve as a long shot of the exterior. Title cards were faded in and out, superimposed on this scene as an ingenious timesaver in opening the performance. Note particularly the doorway of the miniature cathedral.

of the audience thought a filmstrip had been included in that portion of the program.

Moss and dark sponges simulated foliage in this set. Layers of heavy cardboard represented the different surfaces of the building. The miniature was more easily illuminated than a full-scale structure would be. To effect a bridge in the pro-

gram between this miniature and a full-scale portion, one of the doors of the cathedral was shown at a freak angle, as though it hung by one hinge. A full-size door of the exact proportions of the miniature was constructed in the studio.

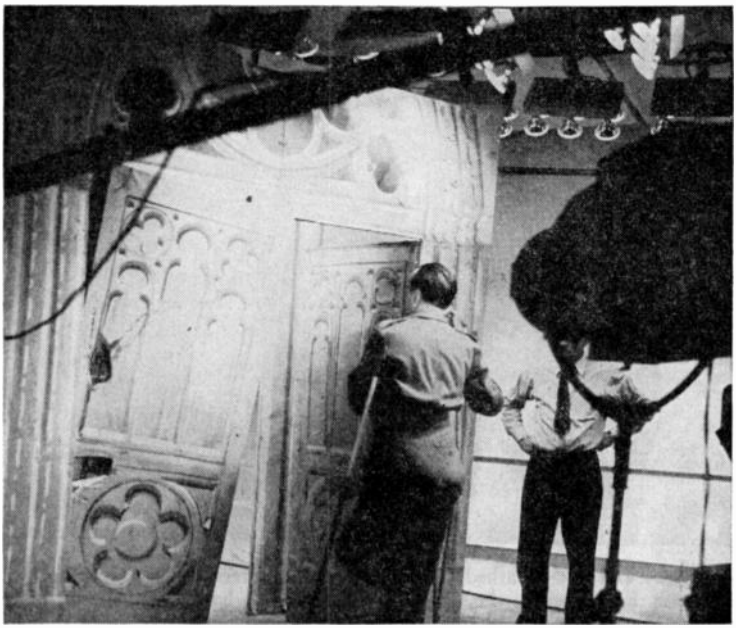


FIG. 43.—Writer-producer George Lowther ordered cameramen to close up on the door of the miniature cathedral. The image was exactly superimposed on this full-scale doorway. After the television camera had followed the actor through the entrance, this set was separated at the center and removed, allowing cameras greater freedom of movement for the remainder of the production.

While one camera moved in from a long shot to a close-up of the miniature door, the other recorded the full-size door. When the two pictures corresponded exactly to each other, the switch was made from the miniature to the large set absolutely imperceptibly and the action continued from there. The camera trained on the full-scale door while one

of the characters walked through it and followed the character to the cathedral interior scene. Then the door was removed to give freer play to the cameras recording the inside of the church, as suggested by a couple of benches, an altar, and a stained-glass window behind it. Incidentally, to obtain

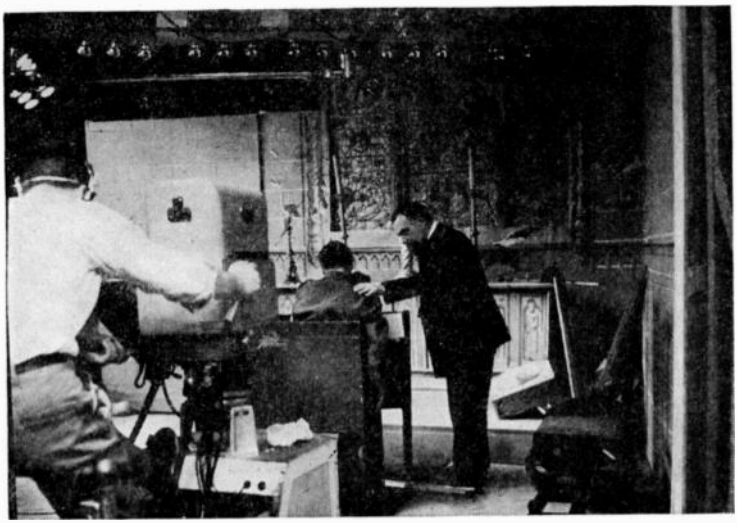


FIG. 44.—Inside the cathedral, the soldier encounters a vicar (Lowther) who points out that, much as the soldier has suffered, Christ endured more. Simple settings suggested cathedral interior and allowed for telling the story primarily in close-ups. "Stained glass" windows were drawn by Bob Bright on tracing paper.

the effect of a stained-glass window, the artist used a fine grade of tracing paper that has many of the properties of ground glass. It has a large number of reflecting surfaces which cause diffusion, and it concealed the nature and number of sources of illumination behind it. Typical stained-glass images were painted on the front of the paper, which gave a wholly believable effect, when the lights were gradually brightened to represent sunrise.

Light paints with shadows fully as effectively as the artist

paints with his brush. This can either further or negate the ends sought by the artist in his original conception of design. Unfortunately he cannot be the sole arbiter of the placement of lighting, since often it is necessary to flatter an actor with a certain type of illumination or the plot may require a given

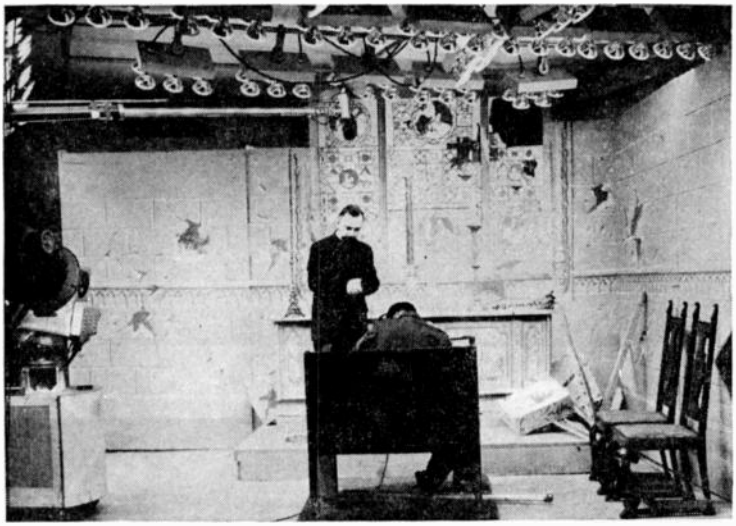


FIG. 45.—For climactic scene of "The Cathedral," a rheostated light behind the windqw was slowly turned on, simulating Easter sunrise. Final shot showed the soldier's glance finding and focusing on crown of thorns before the altar.

treatment. Yet lighting can frequently be entrusted to the direction of the artist almost completely. When this can be done, the effect is almost invariably improved. By throwing a hard, shadow-casting light on those portions of the set which are truly three-dimensional, the authenticity of the whole arrangement is strengthened. Similarly, painted portions that are supposed to be three-dimensional art can be protected from exposure by the use of soft, diffused lighting or by illumination that throws them into a shadowed, subordinate position.

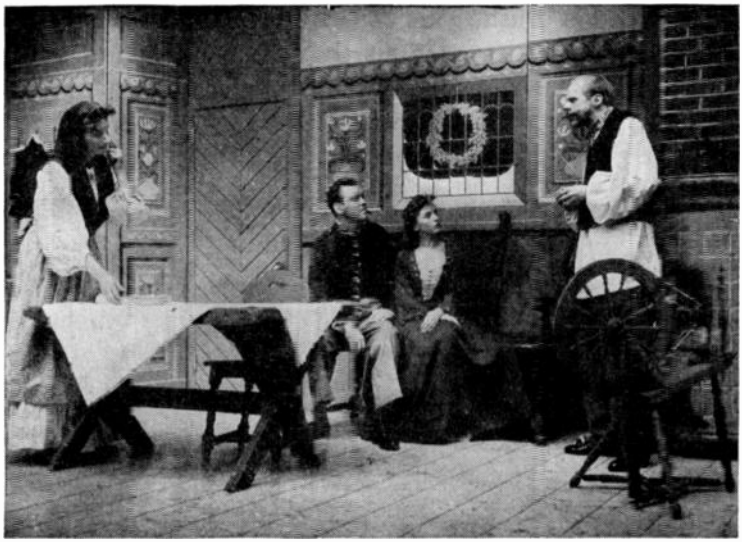


FIG. 46.

FIG. 47.

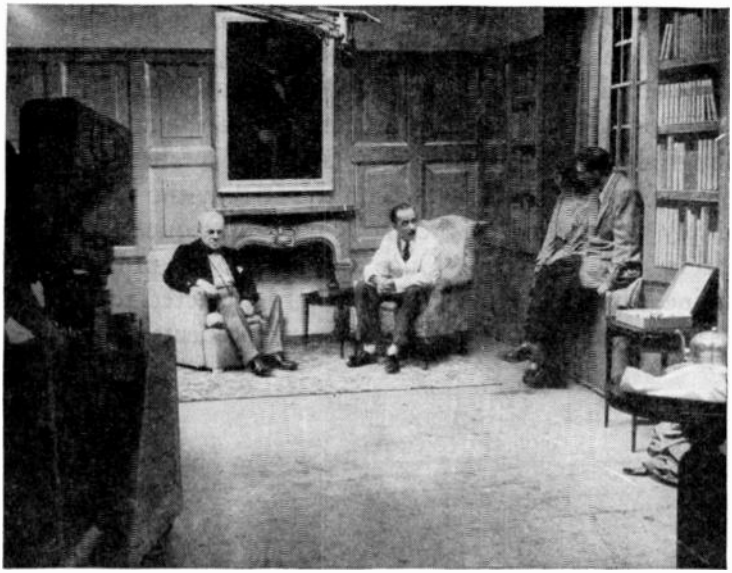


FIG. 48.

FIG. 49.

The artist's participation in a television program does not end until the final broadcast. Even during the dress rehearsals, he studies the program on the screen and seeks out ways of improving the sets. In time, he masters the medium fully enough so that he can predict with almost infallible accuracy how the sets will come across on the screen, and he can even comply with some of the more fanciful requests of script writers and producers. Once this degree of proficiency is attained, he finds himself increasingly attracted to the most intriguing phase of television art—video effects.

6. Titles and Video Effects

THE RADIO program begins with an introduction of its product and its stars in an effort to weld them together. The movies begin with a few reels of screen credits and title cards. Television programs begin with something close to a blend of these two.

Whatever information the producer deems necessary to begin the program attractively and appropriately is presented visually against an oral or musical background. These "titles" or "show credits" usually include the name of the program, the stars, the author if it is a drama, the sponsor and his products, and occasionally a nod toward the advertising agency or package programing agency that produced the show.

Many producers have expressed themselves, with various degrees of heat, on the subject of eradicating title cards completely. They may be partly successful but, as long as television time is lumped into units of regular intervals and as long as programs have autonomy, some means of indicating the break between shows and of introducing the program is absolutely essential.

In the cases of the more elaborate programs, these means may be tricky movie sequences with the letters whirling into place, the product and the star cavorting onto view in a welter of the various credits, striking artistic and mechanical gadgetry, or the frightening *montages* that some newsreels employ.

The unpretentious, local program and many of the more

general programs will confine themselves to title cards that may be peeled off a stand in front of a single camera or shown alternately on two cameras with the aid of fades or lap dissolves. At any rate, title cards are the most practical method of introducing most programs visually.

Because the ratio of the mosaic's height to its width is 4 to 3, that same ratio must be employed in planning all material to be televised, including the title cards.

Because different shades of gray are less likely to conflict with each other than a jet black or a pure white (in which case the background color would predominate and run into the color of the lettering), dark gray letters on a light gray card, or vice versa, are most effective for television. These letters are read best when the elements are not too contrasty. The hairline elements or the tiny serifs may well be lost to the eye when block letters or script of uniform line width is shown in contrast.

Smallness of size is another barrier to successful presentation of title-card information. It should be readable with speed and ease, even when the observer is using a very small television screen. Therefore, on a 15- by 20-in. title card, the letters should not be made smaller than ¾ in. for good, legible transmission. It is also well to keep all lettering from within 2 in. of the edge on cards of this size. This allows for differences in the way people adjust their television receivers. Sometimes the sets are tuned so that the pictures are so wide that the card edges are hidden behind the mask on the front of the receiver.

Television broadcasters have fallen into the habit of not using straight lines near the edges of title cards. This is a concession to the owners of the older television sets, cathode-ray tubes which sometimes caused distortion of straight lines when they were shown on the shoulders or curved edges of the screens.

Another method of presenting titles and credits is by animation. This may be accomplished in many ways. One method is to put the titles on a continuous roller. On cue from the director, the roller is started and passed in front

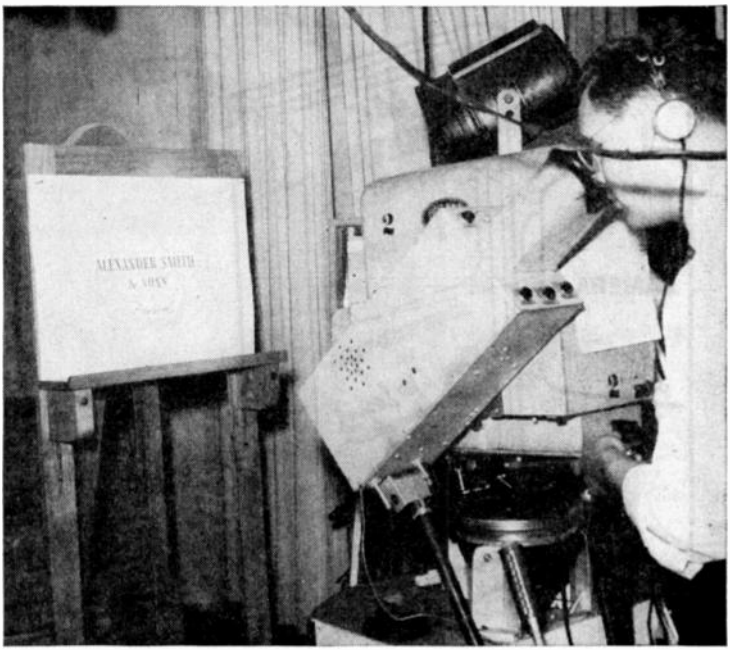


FIG. 50.—Title card mounted on an easel. (*Anderson-Davis-Platt.*)

of the television camera. This roller is something like a roller towel in construction. It consists of a paper or cloth surface mounted at the top and bottom on horizontal cylinders. On this surface may be painted or attached the material desired for the program's introduction. On cue from the director, the top roller is started and the message passes in front of the television lens.

A comparable effect is obtained by the use of a revolving

drum mounted horizontally. The titles pass in front of the lens and revolve out of focus as the next phase of title information comes into focus.

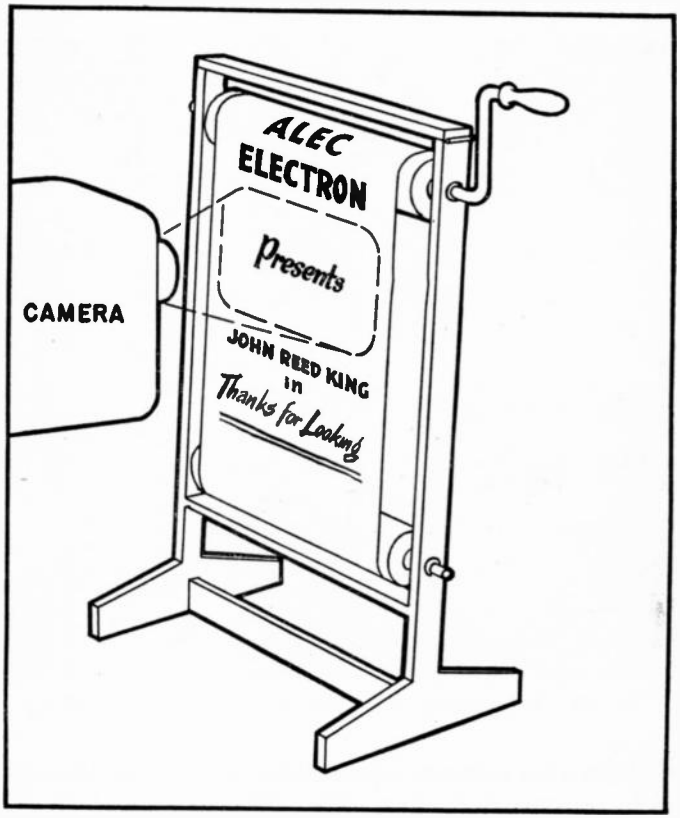


FIG. 51.—Roller title machine.

Titles may also be painted on the cover and pages of a magazine mounted on stiff cardboard. These pages can be turned by a hand appearing in the picture, or they can be wired in such a way that by pulling the wires, the pages

appear to turn by themselves. For this system, a word of caution: Don't use it too close to the camera lest the pages be out of focus most of the time.

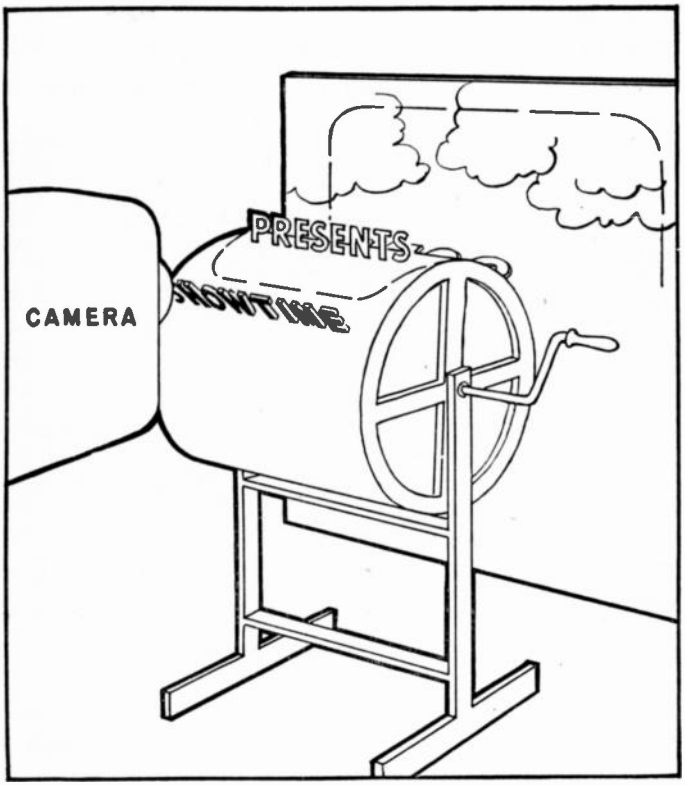


FIG. 52.—Revolving drum titler.

One of the most successful titling systems, a device that can often be used for video effects too, is the Balopticon. This is a reflector-projector which can throw the material on the surface of any opaque object onto the television mosaic. Thus, the titles may be drawn and lettered on a long, thin

strip of cardboard and the cardboard slowly fed through one side of the Balopticon and out the other. As the lettered material passes beneath a mirror set at the proper angle, it is reflected through the lens with all the clarity of an image on a transparency.

By use of two Balopticons, alternately fading them in and out, an even more satisfactory titling is attained than when

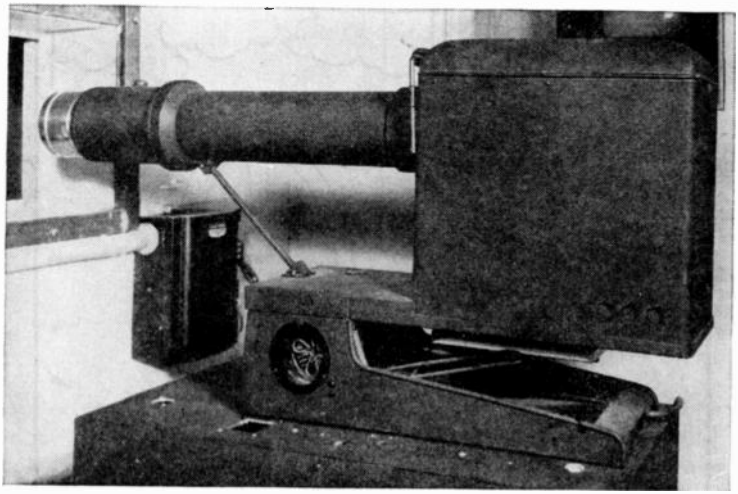


FIG. 53.—Balopticon used for projecting opaque objects.

two studio cameras operate alternately, since the material is constantly in the same plane as it passes through the Balopticon and the studio cameras are in position for the live portions of the program.

One television station uses the Balopticons for striking video effects, too. A scene showing the passage of a fleet over the ocean may be wanted for a transition or to set the locale. By having a reasonably well-detailed sketch or photograph of a number of boats on the horizon or sailing in the ocean, the illustration mounted on a long, thin strip of cardboard,

and by slowing passing this image through the Balopticon, convincing visual impressions of the fleet's passage may be conveyed. Similarly panoramic scenes of many types may be worked into the television program.

The Balopticon comes in many models to take subjects of various sizes. Most popular for television is one capable of handling for projecting subjects up to 6 by 6⅜ in. in their entirety. Considerable margin is usually allowed for easier handling of these images. The principle use of the Balopticon, however, is in titling.

These are just a few of the forms in which titles and credits can be shown to the television audience. Producers have imaginations that rival amateur movie makers when it comes to titling. One used a miniature series of billboards past which the camera panned. Another used letters of colored plastic against a clear background. This was in front of a goldfish bowl and utilized refraction to attain striking effects. Oftentimes the titles set the pace and pattern of the show to follow and convert their role of "necessary evil" to one more pleasantly acceptable.

The craftsmanship of the studio handy men is often called upon for the creation of three-dimensional titles. When this is necessary, the chances are that it is being diverted from the very exciting phase of television termed "video effects." This is the optical equivalent of sound effects.

By use of miniatures, transparent mirrors, double exposures, and countless other devices, the television programers can work magic that would shame the most talented of the prestidigitator brethren. Because of the very scope and variety of this phase of television and the need for fresh creativeness to solve every problem, our best approach to this subject is the citing of a series of examples.

In the play "Submarine," by George Lowther, the script called for the seams of the submarine to crack and water to

seep in. As a climax, the seams were to split and water was to cascade in, drowning the Nazi officer and his heroic victim. The problem was met by building a long, narrow box over the top of the set, on a swivel, so that it could hold eight 5-gal. buckets filled with water. A trough was installed beneath the set to catch the water and prevent the studio from becoming flooded. On an adjoining set, a large fish tank filled with water stood ready for a close-up. Into this tank ran a piece of copper tubing with holes punched in its sides and its end sealed. The tubing conducted air from an airbrush motor (which doubled as the sound of the submarine engines) into the bank so that it could serve as a source of agitation. Small bits of matchwood and other debris were put in the tank to add realism.

The proper point in the play was reached. The water was permitted to trickle down the side of the submarine while a hose trickle indicated the leak. Then, as the camera was racked gradually in and out of focus, to give a "going-under" effect, the 40 gal. of water were dumped on the actors, driving them to their knees. There was a quick lap dissolve and the submarine faded away, leaving only the bits of debris floating in the turbulent fish-tank ocean.

Another puzzling video effect was recently accomplished by a producer doing an undersea ballet. A fish bowl containing four or five goldfish and some seaweed was placed in front of one camera while a ballet dancer performed in front of a second camera. In the broadcast, the two images were superimposed and it looked as though the mermaid were dancing among the fish beneath the sea.

Actors' thoughts can be made to appear visibly on the television screen. In front of the camera is placed a large, dark card with the actor's thoughts printed across the top in light gray letters. A second camera, with sufficient headroom so that the letters can appear over the actor's head, is

set on the main section. Upon cue from the director, the first camera's image is superimposed over that of the second, making the words fade in and out above the actor's head. In this manner a long shot of one twin was recorded by one camera while a close-up of her sister was used by the second in such a manner that the pictures combined to give the impression that a girl was talking to a miniature of herself. By shading the miniature down, she could easily depict her twin's conscience.

Properly handled video effects with fire can be useful in the programs, too. Once it was necessary to show the living room of an old mansion in flames. In front of one camera a large metal pail filled with paper was placed. On cue from the director, the paper was lighted and its televised image superimposed over that of the living room picked up by a second camera. The living room seemed to be ablaze. A television fire dance sequence once used the same trick. The image of a ring of pipe cleaners soaked in gasoline and lighted was superimposed over that of a dancing girl.

The illusions of semitransparent mirrors have their television applications, too. So long as the images being recorded by the lens are equidistant from the lens, they will remain equally in focus. By placing different objects on their proper stages, they can be assembled into one composite picture.

The accompanying diagram indicates how these stages operate. Stages I, II, and III may be shown full when the lights before them are turned on and the lights before their respective semitransparent mirrors are turned off or dimmed. When lights behind the semitransparent mirrors are off, the mirrors behave normally, reflecting images. If the light to the rear of the mirror is on and the one in front is off, the mirror does not intercept the image.

If stage III is to show, only light 3 is on; the others are

out. Mirror *A* is thus rendered transparent. Lights on stages I and III are out and light 2 is on when stage II is needed. Mirrors *B* and *A* pass the image on to the camera. Similarly,

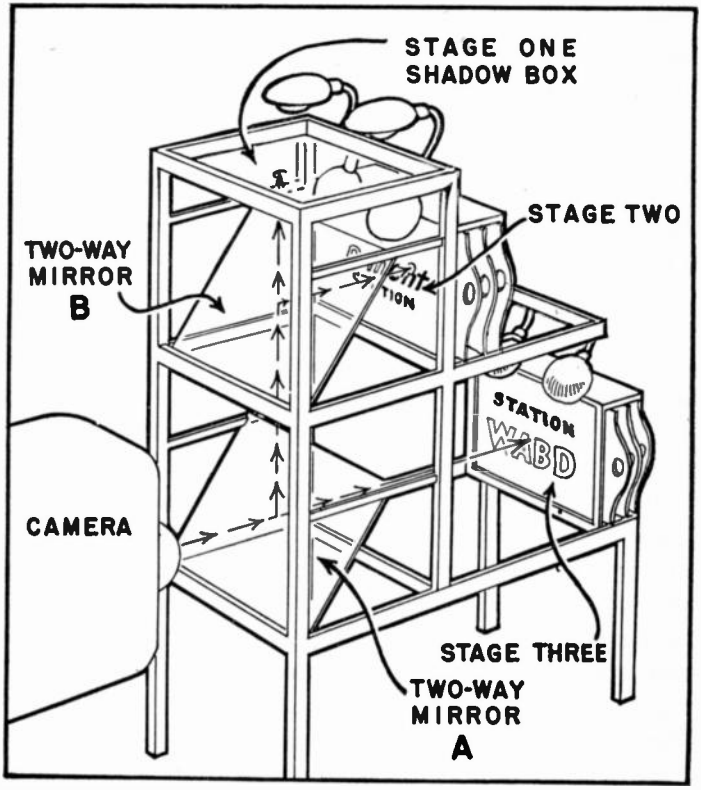


FIG. 54.—Semitransparent mirror titler.

mirror *B* is transparent and mirror *A* reflects the image into the camera lens when stage I is desired. By blending the images before the different stages, unusual effects can be obtained and by rheostating the lights down, fades and lap dissolves can be accomplished on a single camera.

Note that the distances from I to *A* to lens, from II to *B* to *A* to lens, and from III to lens are identical. Stage I shows images in reverse, so lettering and other evidences of illusion must be watched carefully here. Stage II and III reach the camera without reversal. By dimming lights, on occasion, all sorts of blends of the images may be created. The close-up of a bicycle wheel turning may be superimposed on a nature panorama or movie. A girl's face may haunt the bachelor counting his money. A whirling disk superimposed in the face of a character may visualize what's happening after that last snifter. Revolving drums, still pictures, film clips, live action—almost anything the director wishes—may be used in such a system, provided the stages are large enough to accommodate them.

Simpler versions of this video effect can be used to animate "live" maps, show directions of weather currents, or graph developments in markets, population, housing, or other topics that may be clarified with visualized statistics.

Studio fog, snow, rain, and other weather conditions will be created for television much as they are for the movies. When a more sensitive studio pickup tube is developed, allowing the volume of studio lighting to be reduced sufficiently, such standard movie effects as the rear projection of the passing scene in the "windows" of a train, cab, or other vehicle interior, or projection of a still scene from a slide against a large screen behind principal characters, will be borrowed freely from the movies for television.

Miniatures are another television video effect that the movies use. In television we may use a long view of a forest in miniature. Then we dolly the camera in to a close-up of a single tree and fade or switch the picture to a full-scale tree trunk picked up by a second camera. Thus, we set the locale for the scene with a minimum of space and expense.

When two or more separate images are picked up by differ-

ent cameras and blended together on the screen, control-room assistance is needed in the accomplishment of video effects. The same source of aid is called on for lap dissolves, fades, and cuts.

When cutting from one camera to another, the output or amount of signal picked up from the cameras is the maximum amount of strength available. When a director wants to lap-dissolve from one camera to another or have an image being picked up by one camera fade out while being picked up as the other camera fades in, he orders a lap dissolve set up. This is accomplished by turning down the "pot" (or strength of the image being picked up) of the camera not on the air to zero and then pushing the lap-dissolve button, which permits pickup from the two cameras rather than just one. On cue the lap is accomplished by bringing up the incoming picture from 0 to 100 and bringing the departing picture down from 100 to 0, performing both acts at an equal pace, so that the total output of both cameras is never more than 100.

A superimposition is accomplished in exactly the same manner except that, instead of fading down to 0 on one camera and up to 100 on the other, one image is faded down to 50, or half strength while the second fades up to 50 and is held in that position for the duration of the superimposition.

We shall find applications of this technique in the chapter on commercials.

With puppets and table tops, turntables, and illusions, the television studio's scope is tremendously widened. The contribution of video effect to television is tremendous. As the two arts—video effect design and television—develop side by side, each will benefit and improve the stature and quality of the other.

7. Costuming

COSTUMING for television is a comparatively unexplored art. In its early youth, experimentation was conducted with relatively insensitive cameras, and the principal programing efforts were expended on mastery of mechanics, scripts, video effects, and sets. Today, however, costuming and accessories are rapidly rising to their proper position in program planning. A surprisingly large proportion of the television audience is composed of women, many of whom are ever on the alert for new developments or flaws in apparel.

There are many factors in television apart from the dictates of the program itself that must affect costume selection. Here are a few.

The television screen in the home is much smaller than that in the motion-picture theater. Just as in planning individual shots pains must be taken to avoid getting too detailed or "busy" a picture, and care must be employed in selecting costumes so that their significance may be instantaneously and easily conveyed. If a pattern is desired in the fabrics, it should be bold, not a tiny, confusing design which is likely to televise in muddled gray tones. A minimum of gadgetry, frills, and jewelry is advisable except when the character is slated for an overdressed role. Veils, feathers, ruching, and other ornaments on hats may well detract from otherwise good television costuming.

Clean, simple lines are the most effective designs for the television stylist to use. Long, attractive gloves, gowns with dramatic silhouette lines, and hats that rely on sweep and

striking outline for eye-compelling qualities arrest and hold the attention of the television audience. Care must be taken,

FIG. 55.—Scene from recent fashion show produced by Ruthrauff & Ryan. Note how extreme care was used in selecting costumes with contrasting colors. (*Ruthrauff & Ryan.*)

though, to avoid deviating too far from the standards in costume of the members of the television audience. It is important that the audience identify itself with the characters appearing on television or at least sympathize with

those characters in order that a bridge of full understanding may be established.

Colors are very tricky. A white dress with pink stripes may appear completely white because pink registers as extremely light on the television screen. A heroine in a pretty pale-blue dress might well appear on the television screen to be wearing somber garb of medium gray. Black and white are also pitfall-laden in television costuming. A dull-finished white crepe under brilliant studio lights could blend into a shapeless bright area confusing to the eye unless extreme care is taken to assure attractive draping of the costume and complementary lighting so that the lines of the costume may be clearly delineated. Black's unparalleled ability to absorb light makes it the least suitable color for television costuming except when it is used in high-gloss fabrics. Particular care must be taken to avoid black where the character is to be televised for any substantial part of his performance in medium shots. At this writing, at least, when black meets the edge of the television frame a phenomenon inherent in television causes "flare." This consists of an irregular portion of a supposedly black area reversing to white near the juncture of the black subject and the edge of the television screen. Grays, blues, or browns are generally more suitable colors for men appearing on television than are black or navy.

With the advent of more sensitive cameras, finer gradations and more highly detailed pictures, fabrics have risen tremendously in importance here. Texture contrasts can be employed with effectiveness second only to that of color contrast. The burly hero can be made to look more rugged and manly with the aid of bulky tweed suits. The *provocateuse* can become even more slinkily seductive in black satin. Designers can utilize the contrast between smooth- and rough-textured fabrics to lend plasticity to costumes even where monochrome is called for.

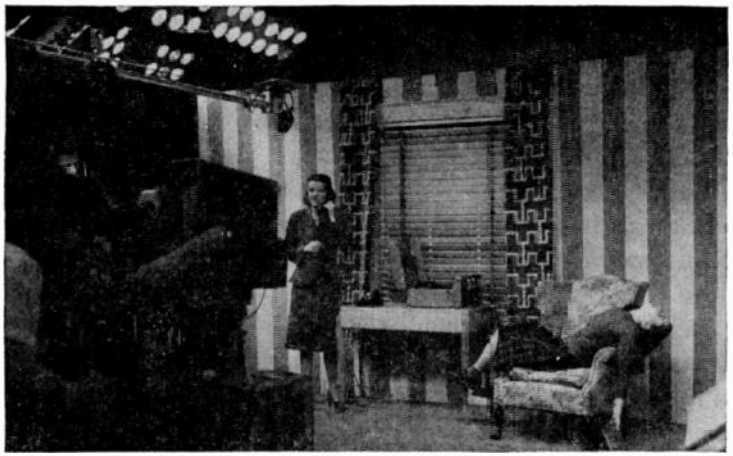


FIG. 56.—Because television utilizes numerous close-ups, costumes for the medium should follow the types of personalities depicted with exactness. At left, Betty Furness, depicting a typical contemporary girl, wears attractive, conservative street clothes. For such roles, television costuming is usually less lavish and costly than that for feature motion pictures.

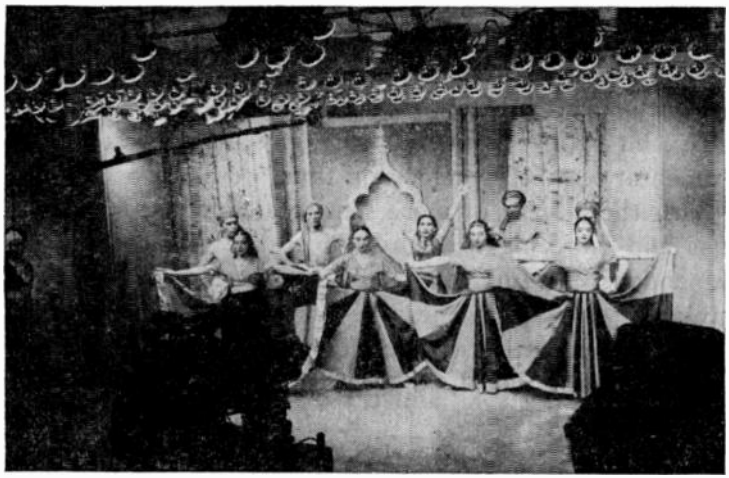


FIG. 57.—It's in the world of fantasy that television costuming is given its greatest freedom. These dancers are from La Meri's dance portrayal of "Scheherazade."

Again, integration with an entirely different department in television is necessary to attain the most effective results from costuming. If flat, over-all lighting were employed to illuminate costumes in which carefully evolved texture

FIG. 58.—Because of the potency of television as a medium for demonstrating fashions, the television audience is probably more aware of costuming than is that of any other entertainment medium. Madame Eta's demonstration of how costumes may be fashioned on the model brought a particularly enthusiastic audience response.

played an important part, all benefits of that texture would be lost. The designer must know what type of lighting will be utilized on his subject in order to evolve fully satisfactory results. "Catch lighting," which projects light rays across the fabric perpendicularly to the line of vision, is most useful in delineating these textures.

The fact that television invades the privacy of the home and is witnessed, collectively, by entire families of all types

makes it imperative that designers exercise the best possible taste in creating costumes. The garb, or lack of it, suitable for a Broadway musical would be subject to severe censure if it were brought into the home on the television receiver.

FIG. 59.—Conover Cover Girl Lucky Saunders models the finished version of the wedding gown started in the preceding illustration. Much of the effectiveness of costuming is attained through the model's ability to wear the outfits properly.

Attractive, wholesome styles, possibly even a little on the conservative side, are most desirable in television.

Frequently the practical considerations of a production will also affect costume design. It is seldom in a television production, that principal characters are away from the camera for any long period of time. It is no rarity for actors to be expected to change costumes in a minute or less. Deep armholes, loose cuffs, simple fasteners and zippers where possible rather than buttons, snaps or, worst of all, hooks and eyes—these are priceless expediters of quick costume

FIG. 60.—The luminous high lights captured by the lustrous fabric in Beatrice Kraft's costume lent a glamorous tone to her performance and accentuated movement. Duller white fabrics tend to look like shapeless masses unless lighting of the performer is very carefully handled.

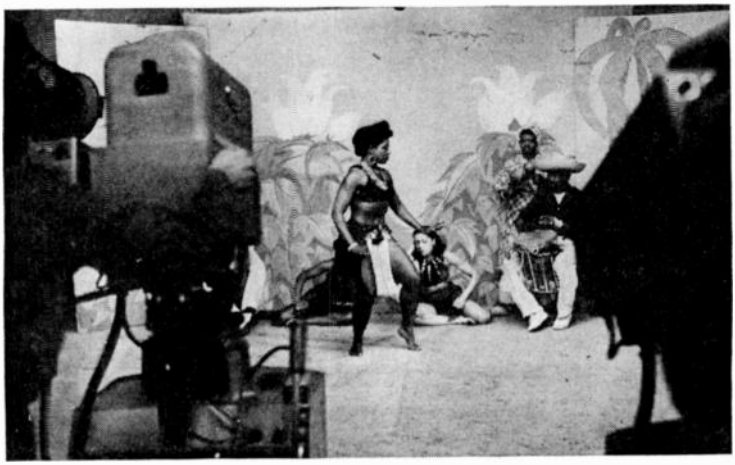


FIG. 61.—The authentic native costumes of Pearl Primus and her fellow dancers contributed to the validity and emotional impact of their performance. In these two cases, as in many others, artists employ the costumes of other media—the theater, night clubs, and concert halls—for television with no loss of effectiveness.

FIGS. 62 and 63.—Costumes for Bob Emery's production of Susan Glaspell's "Trifles" were selected to lend authenticity to the period and region depicted and also to contrast with the strongly patterned background. For this latter factor, solid colors and bold, definite patterns in the fabrics were utilized.

changes. Ease in donning or doffing outer wear is even more mandatory when such action is to take place as a portion of the actual broadcast. Every television producer who has experienced the horrors of a hat that would not go on just right, a sleeve that could not be found, or a coat buckle that jammed when smooth action was called for will sound a hearty "Amen!" to this.

Occasionally a few simple changes in accessories will give the effect of a complete switch in costume. In the opening scene an actress can be wearing a dark dress and gloves; put a flower in her hair, and add a bright bolero, belt, or scarf to her getup to give the illusion of an entirely different outfit. For economy's sake, the designer might well ask each actress for suggestions about changing costumes with accessories, using accessories from her own wardrobe.

Unquestionably, many of these accessories, whether chosen for effect or expediency, will strike responsive chords in the buying habits of the television audience. Hollywood, by displaying new wrinkles in style as worn by actors familiar to motion-picture audiences, has virtually become the fashion dictator of the country.

Tomorrow, that role may fall to television.

8. Make-up

MAKE-UP for television is closer to motion-picture make-up than to that for the theater. Modern television cameras are sufficiently sensitive to record even the most minute facial detail. Couple this with the fact that television relies heavily on close-ups in order that it may convey simple, powerful visual messages and you can see how obvious falsity in make-up could well destroy the carefully created illusions of an entire production.

The various types of lights and cameras used in television call for some variance in the way the medium interprets color values. When incandescent lights are used with iconoscope tubes, red tends to go much lighter on the television screen than it does, say, in photography, which records it as either dark gray or black. Blue, on the other hand, tends to go considerably darker than the light or middle gray that photography accords it.

Another factor that calls for some deviation from the standardized colors as used in street make-up is the brilliant lighting common to television studios. This tends to lighten the tone of the actor's make-up at least one or two shades.

For a typical make-up application on an actress, then, the foundation should be approximately a sun-tan shade. If the role calls for a darker than normal complexion, the foundation should be at least two shades darker. This actress will use a lipstick containing some blue rather than a pure red or red orange. Maroon, brown, magenta, fuchsia, or even a light blue or pale green can be used to gain the tonal effect

of street lip make-up. The same color values, of course, hold true for nail polish.

Another highly effective use of the ability of blue to strengthen and emphasize facial detail is behind the outer

FIG. 64.—The ingenue in television uses less obvious make-up than for the stage. Barbara Hillebrand accentuates her outer lashes, shades her upper lids lightly, defines her lips with lipstick containing some blue tone, applied with a brush, and uses a dark shade of street make-up for her television roles. Particular attention is paid by television actresses to keeping their hair natural-looking and attractive.

corners of the upper eyelashes. This enlarges the appearance of the eye, accentuates the length of the lashes, and helps lend attractive contour to the upper face. If false eyelashes are worn, telltale close-ups will reveal the cosmetic deception unless the lashes are trimmed to much nearer an approximation of human eyelashes than is prevalent in most theatrical make-up work. The lower lid seldom requires more than

subtle penciling in order to be televised attractively. Mascara and pencil may be either brown, black, or blue.

If the natural eyebrow line is being followed, mascara is excellent for strengthening the brow. Short, light feather

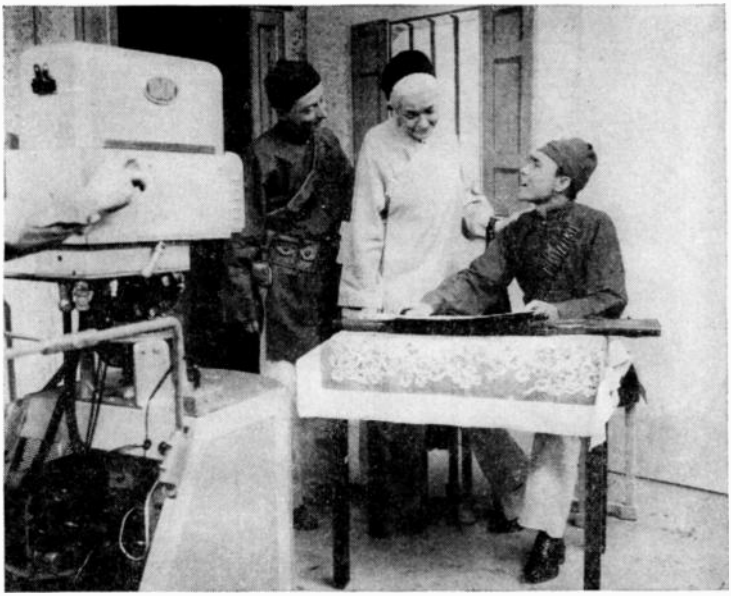


FIG. 65.—Skilled women character actresses such as Margarita Orlova (center) prefer to use little facial make-up so that their expressions aren't masked. Madame Orlova merely added color to the "care lines" of her face for this role as an heroic woman leader of Chinese guerrillas.

strokes with a well-sharpened brown, blue, or black pencil are best for modifying the eyebrow lines.

The pencil may also be used discreetly to strengthen or modify the hair line. A widow's peak, thinning front hair, or slightly deeper sideburns may all be filled in with feather strokes of the sharp pencil. Oily materials are valuable in making up hair for television. The many brilliant lights in the television studio reflected by glossy hair give it an

attractive luster. Dull hair takes on an unhealthy-looking matte appearance. For straight roles, neatness in the hair-do is of primary importance. As in the movies, television must idealize its characters in order that they may impart the significance of their roles most effectively. Hair lacquer may often be called upon for down- as well as up-swept hair to protect the all-important neatness of the character.

False-hair pieces, moustaches, beards, sideburns, wigs, chignons, or switches should be, preferably, of real hair and made by professional wigmakers. Crepe hair, because of its dull finish and tendency to curl unevenly, is easily detected by the television camera. Should it be used, the utmost care is necessary to apply it in tiny patches, building it up much as a roof is shingled. It should be trimmed carefully so that it blends perfectly in length with the actor's hair and the color must be practically identical.

Corrective make-up may be used where the modification in contour is not too extreme. The massive, bulbous noses and the red fright wigs of the theater are repulsive to the television audience. Subtle building-up of features with facial putty or specially molded rubber parts—these features being carefully blended to match skin tone by use of full facial make-up—is far more suitable to the video medium.

Minor corrections can be made in facial contours by the careful use of light and dark shading. An irregular nose may be corrected by applying a thin, straight high light down the center and shading it off on both sides with well-blended darker foundation coloring. A long nose may be "shortened" by applying dark make-up to the tip. A nose is "widened" with a broad high light down the center. A high light of very light foundation color may be applied to the chin to help compensate for a receding tendency here, or to the cheeks to lend contour where it may be lacking. A shadow of dark foundation may shorten and beautify a too sharp or too long

chin, or it may be applied to the hollows of the cheeks to accentuate high cheekbones and slenderize the face.

Where light and shadows are employed to modify apparent facial contours, it is essential that make-up artists, lighting technicians, cameramen, and director collaborate most

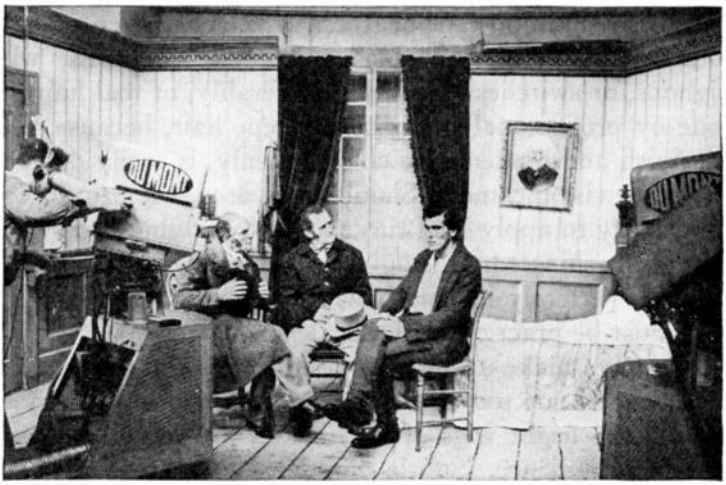


FIG. 66.—Apart from adjustment of their hair to conform to the period, men seldom require much make-up for television. These actors in Poe's "The Telltale Heart" used no facial make-up except dark foundation powder. Men usually reserve their more elaborate make-ups for television for extreme character roles.

closely. Otherwise, the illusion may be shattered by light "filling in" the darkened areas, a camera recording contours that were corrected by shading, in telltale profile, or by the director's calling for movement of the character which will reveal the make-up artist's deception.

Foundation colors generally have very oily surfaces. Lights are easily reflected by the oils to the detriment of the actor's appearance and the effectiveness of the performance. Neutral powder should be dusted over and lightly pressed into the foundation to kill unwanted reflections. Oftentimes

veteran television make-up artists employ olive oil to attain deliberate high lights. The perspiration of the laborer or the boxer may thus be created, or the heroine's lips be made more moistly kissable, the powder falling into the brows

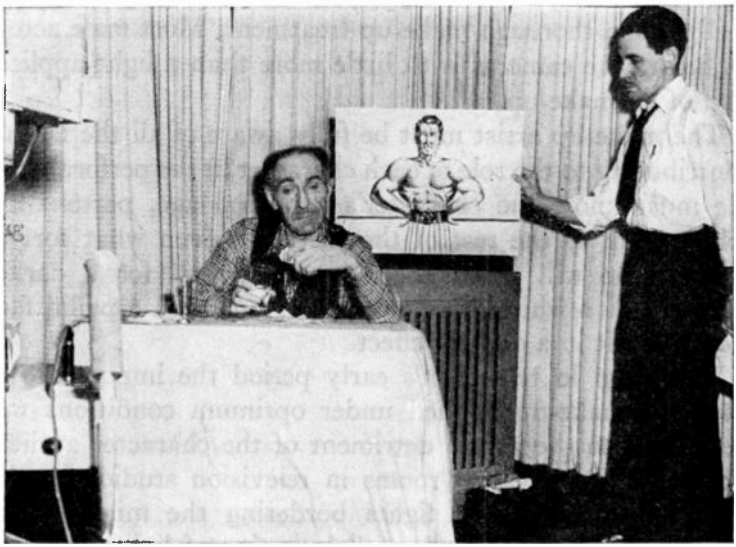


FIG. 67.—Milton Heyman, one of television's most experienced character actors, simply let his beard grow for two days before essaying this role. He depicts the sparkling radio gymnast who orders his audience out of bed early in the morning and through a brisk routine of exercises. Comedy make-up for television is less extreme than that for other mediums.

counteracted, or facial characteristics necessary to the plot accentuated.

The very intimacy of television as a device for conveying visual impressions makes it important that those impressions have the utmost validity. Should a full make-up be used on the face of a character, the corresponding tones must also be applied to all of that character's visible skin, throat, neck, hands, wrists, and other areas that the costume does not cover.

Complete make-up on men being televised is seldom necessary. Usually their skins are dark enough to appear tonally satisfactory on television, and it is important that character lines be retained in most cases to further the naturalness of television interpretations. Juveniles are the only men normally given thorough make-up treatment. Most male actors go before the cameras with little more than a light application of lip make-up.

The make-up artist must be fully aware of all the factors contributing to the role of each character in the performance. He must know the character's supposed age, personality, relationship to the rest of the cast, and even what sort of costume he will wear. Light costumes call for a darker make-up as a white dress or tropical suit with a pallid face would result in a ghostly effect.

Too often in television's early period the importance of excellent make-up applied under optimum conditions was neglected, to the severe detriment of the character authenticity. Today, dressing rooms in television studios usually have extremely bright lights bordering the mirrors of a make-up table so that the full intensity of lighting in the studio may be reasonably simulated. Television producers, stations, and actors recognize the essentiality of the make-up artist, complete with well-equipped kits and fully adequate facilities for excellent productions.

9. Microphones, Sound, and Sound Effects

WHEN talking pictures first astounded America, their novelty was so great that the visual part of the movies was sadly neglected. Television is in some danger of reversing that process as radio-trained producers and directors first explore the novel visual medium. Yet we already have the excellent examples of fine movies that use lack of sound to point up certain portions of the script, or subtle music and other sound effects to create a mood.

There are two broadcasts for each television performance. One is visual, the other is aural. If proper attention is given to each and the blend is satisfactory, the program may succeed. Glaring faults in either can nullify the advantages of the other. Therefore, sound viewed from the fresh perspective of television, justifies close, careful attention.

There are all sorts of microphones, ranging from some no larger than a plum to big ones designed to capture sound over a large area of the studio. It is not necessary for the director to speak knowingly of all these microphones and their involved physical construction, but it is important that he know their ability to capture sound from one direction or many.

In a television production, there is a great amount of activity with the moving of cameras, microphone booms, spotlights, cables, casts traipsing on and off the sets, and the technicians moving about. This activity raises quite a hubbub

which, were the wrong microphone used or the wrong adjustments made, would be an unwelcome part of the broadcast.

Selection of the proper microphones for the broadcast is only one of the considerations in their use. Another equally important one is assuring their invisibility.

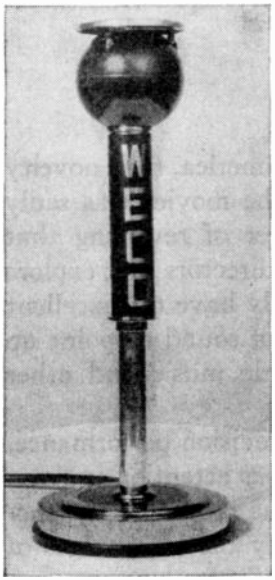


FIG. 68.—630 type "eight-ball" microphone. The new nondirectional microphone–table-mounting type. (*Western Electric Company.*)

The illusion of reality and the appeal of a well-composed picture would be shattered were a microphone to be visible on the receiver screen. For this reason, the microphone boom suspends the "mike" over the heads of the performers as the action changes and they move about the sets or as the dialogue drifts from one actor to another. The mike boom must be kept out of the picture, yet it should be as close to the performers as possible to avoid picking up extraneous sound. This is the delicate balance that must be maintained at all times by these microphones during broadcasts.

Little wonder, then, that the producers and set designers take considerable pleasure in cleverly concealing microphones on the sets. One may be in a bouquet of flowers. One may be in the base of a lamp or ash tray. There may be a small "eight-ball" microphone (spherical, black, directional microphones about the size of an eight ball) concealed behind a chair, a flat, or an actor. Sound pickup may be switched to any one of these "planted" microphones or to any number of them in the studio.

The two types of microphones most commonly used are

the *dynamic*, or moving-coil, type, and the *velocity*, or ribbon, type.

The former operates by the changing air pressures created by different sounds. It contains an almost membranously thin duralumin diaphragm to which is attached a coil of aluminum ribbon. When sounds create air pressures that move the diaphragm, the diaphragm moves the coil. This coil is in a magnetic field electrically created within the microphone. Motion in the magnetic field induces a voltage in the coil that is proportional to the velocity with which it moves. Thus sounds are translated to electrical currents that can be amplified and broadcast. Because the change of pressure in the diaphragm causes these microphones to work, they are called "pressure-activated" microphones.

There are many types of dynamic microphones, some unidirectional (capable of being activated by sound coming from only one direction) and some nondirectional (activated by sound from any direction). We shall not attempt to describe them all—their principles are about the same—but the accompanying illustrations will give an indication of their variety.

The velocity, or ribbon-type, microphone is without a diaphragm. The moving element in it is a thin, metallic ribbon suspended between the poles of a magnet, so constructed that it does not impede the passage of sound waves through the microphone. Sound waves reaching the ribbon vibrate it within the magnetic field set up by the magnet. Because the ribbon is suspended in free space, sound reaching this ribbon from the direction of its edges has little or no effect on it, but the sound that strikes the ribbon's surface activates it quite readily.

One microphone popular with television technicians is the cardioid type. Its popularity stems from its near universality. By adjustments on the back of it, it can be made nondirec-

tional, unidirectional, or bidirectional. These positions are designated by the letters *C* (cardioid) for the unidirectional response, *D* (dynamic) for the nondirectional response, and *R* (ribbon) for bidirectional.

FIG. 69.—Western Electric's new cardioid microphone (639A) with table mounting. This type may be used without the table mounting and suspended on overhead microphone boom. (*Western Electric Company.*)

These microphones pick up sound which is translated into frequency modulation, the standard type of sound broadcast accompanying televised images. This was chosen because of its superiority for sound transmission. Among the advantages of FM over AM (amplitude modulation) used by standard broadcast stations are

FM has a higher signal-to-noise ratio, which makes this form of sound transmission more noise-free.

It permits the transmitting of sound frequencies too high to be picked up by AM, the harmonics and overtones that lend beauty and color to sound transmission.

Only in FM can a wide dynamic range be utilized. Thus, the full range of a complete symphony orchestra can be transmitted with no compression of the frequency range.

Since the television picture utilizes the higher frequencies, it is a simpler engineering problem to develop a receiver in which the sound will operate in the same frequency spectrum.

Television has borrowed freely from other mediums, particularly radio, in its sound broadcasting techniques. It is in

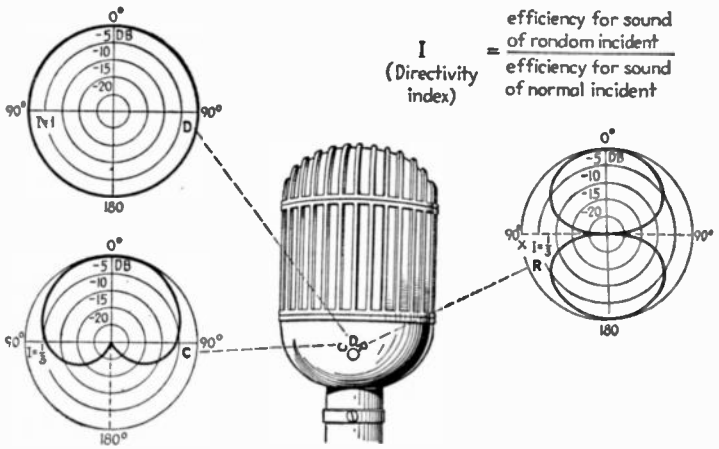


FIG. 70.—Western Electric chart showing directional characteristics of the cardioid microphone at the various settings of the adjustment screw on the rear. (*Western Electric Company.*)

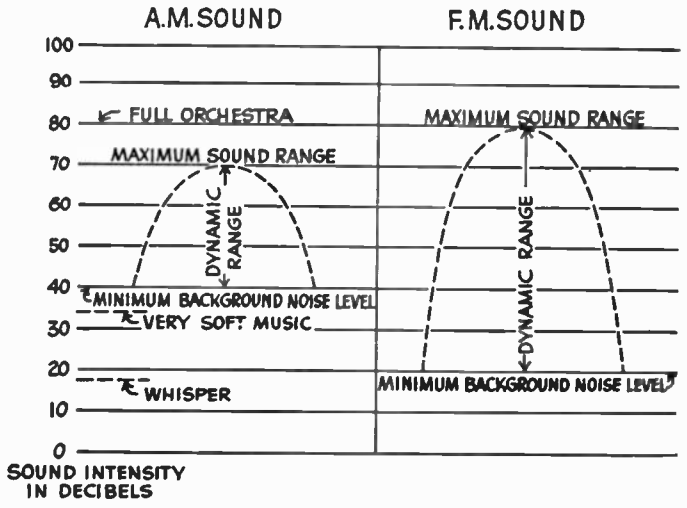


FIG. 71.—Comparison chart showing maximum range for AM and FM sound.

approximately equal debt to radio and the movies for its sound effects. These convincing aural impressions are of many types: manual, recorded, vocal, and musical.

Manual effects are created in the studio by hand. Some sound effects are accomplished more validly when handled manually than from recordings. Such effects as gunshots, off-stage doors closing, footsteps, knocking, rattling of chains, and the like are instantaneous in nature. Since they must be synchronized so finely with the action, they can be produced more quickly and accurately by hand than by recordings. It takes just an instant too long for the sound-effects engineer to spot and synchronize them on records.

Very believable sound effects can be created manually with ease. All that is necessary to create an off-stage gunshot is to strike a leather seat or stool with a flat stick. To get the effect of a horse's hoofs on a hard road, a pair of coconut shells are struck together. If it is to be a dirt road or turf, two plumber's suction cups thumped against the chest will do the trick. The crackle of a bundle of twisted cellophane before an off-stage mike gives a very realistic effect of a large fire. Dropping a series of wooden pegs repeatedly on a table creates sounds like a marching army.

These are but a few of the many sound effects that can be created manually.

Recorded effects, albums of which are among the most amazing phases of radio broadcasting today, are already playing an important part in television broadcasting. These are secured by capturing the sounds of the actual incidents or origins to be conveyed, as the babble of voices in a store, the sound of car motors starting, running, slowing down, and stopping, or the noise of a battle. These effect records are played by the studio sound engineer on consoles equipped with two or three turntables, hooked up to loud-speakers that feed the sound to the studio microphones. Each turn-

table has a volume control. Thus, the effect of cross fades can be accomplished by dimming the volume on one turntable and increasing the volume on another in approximately equal proportion. Thus, subtle blendings and dramatic

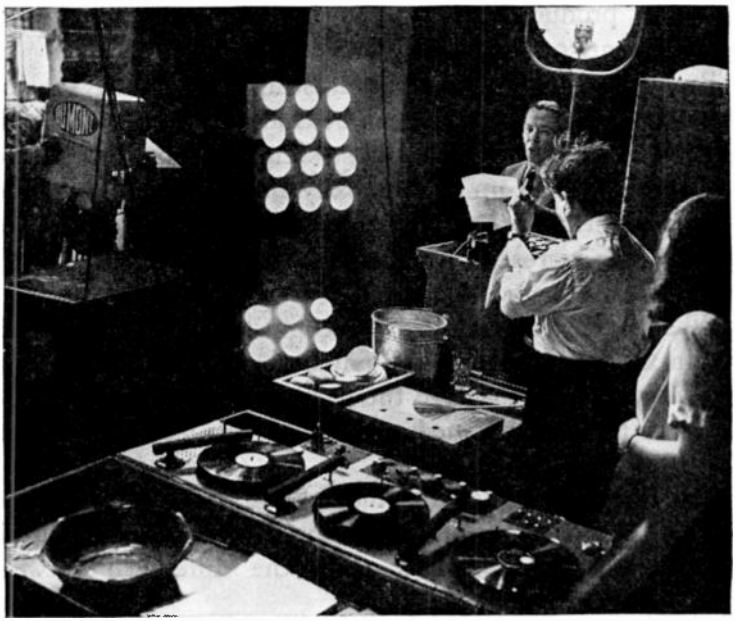


FIG. 72.—Photo from the Super Suds show "Here's How" showing the sound-effects man and equipment at work. (*Wm. Esty Company.*)

sound effects can be achieved as sound matches the course of visual activity.

Most stations have elaborate sound-effects libraries with records of railroad trains, boat whistles, fanfares, autos, airplanes, fire trucks, machinery, animals, and an aural kaleidoscope of imagination-stretching proportions.

Vocal effects are created in the studio by the actors or by vocal sound-effects experts. Howling mobs, babies crying,

animals, and bird calls are just a few of the many effects that can be achieved vocally in the studio. Some vocal sound-effects specialists can, on cue from the director, reproduce animal and bird calls by the hundreds.

Musical effects are the most subtle and haunting of them all when produced orchestrally by imaginative orchestral arrangements or by musical transcriptions.

By accent and rhythm, interesting and telling musical effects, a mediocre telecast can be changed to one with spell-binding dramatic impact. Ghost scenes become more effective when backed up with ghostly music. Dramatic scenes have more grip on their audiences when built up with music. Love scenes increase in tenderness when appropriate music is played under the dialogue.

When and where to use these musical sound effects lie within the scope of each individual director's feeling, understanding, and approach to the particular program that he is about to handle, seasoned, of course, with his knowledge of music.

Stodginess and lack of imagination in selecting sound effects can wreck a program. Intelligence and daring in making the selection can mean the difference between mediocrity and brilliance.

10. Motion-picture Film in Television

BECAUSE both are visual, television has often been compared as an entertainment medium to the movies. They do have much in common: a dependence on the eye's ability to retain impressions, an ability to control mood by the brilliance or dimness of the picture, and the need for holding the optical attention of an audience in order to put across a message.

But more important is the need for using film in many television programs.

To the armchair adventurer in his home the televised movie can bring the jungles of Africa, the frozen North, South Sea Island adventure, and experiences on the high seas. To the student it can bring historic world events of today or yesterday, visual lectures on chemistry, aviation, history, geography, and many other academic subjects. Or the film can be made a part of an otherwise live studio program, such as the opening and closing signatures of a production.

Already many spot announcements, corresponding to those used in radio, have been put on motion-picture film for television use. In the near future, well-planned agency distribution will make it possible for millions of televiewers to see the actual products displayed on the television screen from film. These film spots will be purchased by the advertising agency in much the same manner that radio spot announcements are purchased today.

The advantages of film over live presentation of many television commercials are instantly apparent. The car manufacturer wishes to show to prospects the rugged terrain over which his car has been driven to test its shock resistance. Then he would like the prospects to see inside the motor and watch the parts in action, both at normal speed and in slow motion. He may wish to show the family happily entering their new car and driving along a pleasant countryside. He cannot expect the live camera in the studio or in the field to do the job of presenting this sort of commercial that can be done by a movie camera and a good editor. This is only one of many applications of movies to commercials.

Short pieces of motion-picture film, called "clips," can be used to supply outdoor scenes for some of the studio productions. In a recent telecast, a railroad club-car set was used and the actor and actress were on set sipping cocktails while a sound-effect record played the clicking of the rails. On a verbal cue from the actress, commenting about the beautiful countryside, the production assistant in the control room flipped on the motion-picture film. The viewer in his home had the feeling of riding on a train and watching the fast-moving countryside. It lent conviction to the play and permitted a bridge between sets.

Later on in the same production, the train pulled into the station and, on cue, motion-picture film was again used to show the train at the station, people getting off, two persons getting into a taxicab, and the taxi ride through town. The car pulled up to the curb, the two people got out, walked up to the front door, and rang the bell. On the ringing of the doorbell, the studio was flipped on and the audience saw, on the screen, the interior of a living room and the maid going to answer the door.

Let us watch film clips lend validity to another program. The scene opens on motion-picture film showing a German

submarine riding below the surface of the ocean. Then the studio is flipped on and the scene is the captain's quarter on the submarine. There is some dialogue and then a sailor announces that an American ship has been sighted. The captain rises, looks into a periscope, and now motion-picture film is cued to show an American hospital ship cruising along. Spliced to this film is another showing a torpedo leaving the submarine and blowing up the ship, then the rescue of a few passengers. The scene then again becomes live as the action continues in the captain's quarters and the rescued survivors are questioned.

These are just two of the many ways in which motion-picture film clips can be used to build a television production. A director can use film of this sort to great advantage. The films may be rented from any of the numerous film libraries in larger cities on 16- or 35-mm. film.

Film clips have many advantages. They heighten the believability of the program, permit changes of sets, costume, rests for the actors, and bridges between scenes, establish the locale in a way that no amount of dialogue can equal, and often are the least expensive way of attaining an effect. They can even be used for intricate scenes where action is critical and can stand editing.

Feature films can also be shown on television, of course. These are of all sorts, ranging from educational shorts and brief cartoon sequences to full-length Hollywood productions. These are particularly welcome to the broadcaster or programer when studio space is at a premium and it is necessary to make elaborate set changes. When properly selected, they also make superb television fare.

The best films for television are those which are not too heavily loaded with "busy" long shots. Because of the smaller size of the television screen as compared with that of the theater, the close-up is desirable as the basic part of the

motion picture for television. Long shots should, as far as possible, be restricted in their use to the setting of locale.

There is a tendency, especially among the older cameras, for a flare to form where a heavy black portion of an image meets the edge of a picture. This is more apparent in live programs, where figures of actors wearing dark clothing sometimes become gray at the outer edges where they leave the frame, than in movies that are televised. Yet, it is common, sound practice to give preference to those movies in high key rather than in low key when selecting them for television.

Without the mass psychology of the motion-picture theater, many experts advocate a slightly faster pacing of the picked-up program when it is to be used on television than when it is for theater use, but this suggestion is debatable since much depends on the nature of the material being shown and the circumstances under which it is viewed.

It is important, when shooting movies especially for television, that they be made at sound speed (24 frames per second) whether sound is used on the film or not. The reason for this lies in the fact that the film passes through an intricate television film projector which translates the 24 frames per second of movies to the 30 frames (or 60 pulses) per second of television. If the film were shot at 16, 32, or 64 frames per second, it would not be in synchronization with the transmitted picture and would cause a flicker and a black bar to appear on the television screen.

To eliminate this bar and to synchronize the picture, a special shutter is built on the television movie projector. This shutter is so constructed that it scans the first frame of the film twice and the second frame three times, alternating between two and three scannings thereafter so that, in the 24 frames, 12 are scanned twice, which is 24 times, and 12 are scanned three times, or 36 scannings. Since 24 and 36

equal 60 scannings, the film is put in synchronization with the 60 pulses of the transmitter.

The picture is projected onto an iconoscope similar to the one used in the television camera. This iconoscope and its necessary power supply are mounted in a cabinet in front

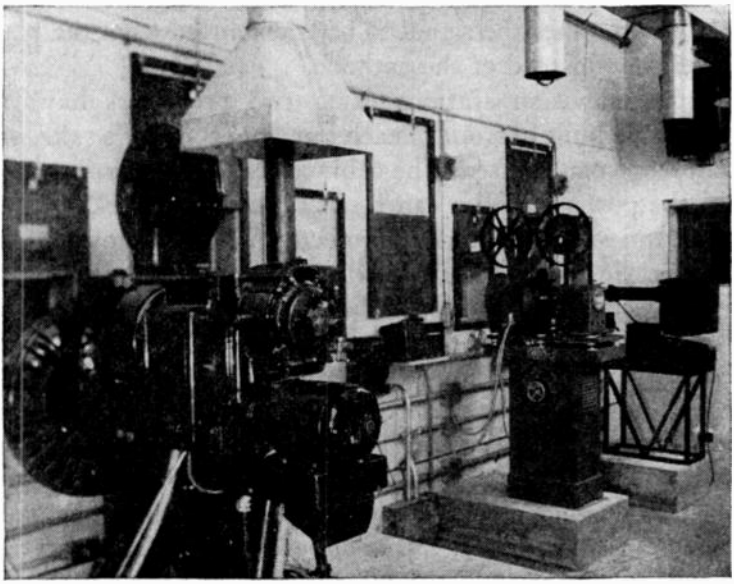


FIG. 73.—Projection room at WABD showing 16- and 35-mm. projectors and Balopticon. (*Allen B. DuMont Laboratories, Inc.*)

of the movie projector so that the projected light from the film falls on the mosaic in the iconoscope.

The standard motion-picture projector holds about 22 min. of film. Therefore, if a full-length feature is used, two film projectors are necessary. With the present television system, either negative or positive prints can be used. The iconoscope normally picks up the black and white of the positive film and transmits these images as a black-and-white television picture. By performing the comparatively

simple feat that engineers describe as "taking the signal out of the cathode of the video amplifier," the whites appear white and the blacks appear black.

To use negative film in which the white appears black and the black appears white, a rotary switch on the amplifier is turned to "shift the phase on the video amplifier 180 deg." This, then, takes the signal to be transmitted from the plate of the tube instead of the cathode.

Some television stations using two projectors have an iconoscope built in front of each but, for economy's sake, one iconoscope can be used. The cabinet housing, the iconoscope, and the power supplies can be mounted on a track so that, at the end of the film on one projector, it can be shoved along the track in front of the second projector.

Television will very probably give birth to a mass of professional motion-picture photographers who will be very similar to newsreel photographers in their activities, save that they will be more concerned with local events than are most newsreel cinematographers. Filmed field events will be used when activity takes place outside the pickup range of the station, when an occurrence of importance is taking place while something else is being broadcast which the station officials feel does not justify interruption, and when activities take place during the hours when the television audience is negligible, say between midnight and early morning. The films, in this latter case, could be broadcast the following noon or even the following evening. They have the additional advantage of permitting time for careful editing.

Motion-picture film is expected to prove a boon to smaller television stations. Stations not located in large talent areas like New York, Chicago, and Hollywood may have trouble getting big-time talent. If they are compelled to oppose local competition with network affiliations that offer their audience such talent, their principal ally in presenting comparable

name and talent program material is the motion-picture film. By agreement and contrast with larger stations using this talent or by utilizing the services of specialists in television film, the studio shows can be put on film and shipped or flown to these smaller stations.

One other phase of television using film is that based on filming the image off the face of the television screen. A special process has been developed for recording the images appearing on the screen during broadcasts. This entails a brilliant screen and a special camera so synchronized that it can record at the required frames per second. Such films are invaluable for records of programs, for quick processing and projection so that large audiences can review the shows, and for recording the broadcast on film for rebroadcast at a later time or from other stations.

Predictions about the percentage of film as compared to live programs that will be shown on television in the future vary between 20 and 60 per cent. However, we can be certain that, as our mastery of films for television grows, this percentage has every reason to be among the finest of television programs.

11. Scripts

BLUEPRINT of the television production, without which it could not be built satisfactorily, is the television script. After years of development, television script writing is now emerging as an independent art with its own practitioners and techniques.

The most important step in television script writing is the transfer of thinking from words to pictures.

If the program is developed from a series of pictures, visual impressions on which is superimposed sound (dialogue, music, sound effects), its chances of being effective television are multiplied. Yet, even this alone does not equip the writer for his new medium. To this visual matter must be annexed knowledge of the limitations and leeway in possibilities resulting from the scope of the equipment. If the camera is incapable of taking in a given width without reducing the figures to too small a size, the writer doesn't call for people on opposite sides of the room to be in the same picture.

The writer isn't tailoring his material to fit a theater full of people as does the movie expert; he is writing for small family units. Therefore, the script needn't try for the particular type of polish that controls mass reaction in an audience. The simple homey virtues of the radio shows will be transferred to a large extent directly to television. The audience is not sophisticated. It wants genuine people to be doing genuine, everyday tasks in a heroic manner in its drama. The comedy must not be too broad; the audience is

a wholesome family group. The variety act may not capture top honors in the entertainment trade mediums, but it must entertain. This is a new type of audience in which the visual characteristics of the movie and the family-type characteristics of radio must be integrated.

The physical size of the screen controls, to some extent, the nature of the script. Long shots may be called for to set locale, but these are in constant danger of creating some confusion because of the large number of television sets with screens 10 in. or under in diameter which sold at the outbreak of television set sales. Small screens are most effective in showing simple, clean-lined pictures. It is not necessary to catch the tableau of a roomful of people being chastised by our hero. He is shown talking in close-up and showing a piece of damning evidence that will clear him of the charges hurled against him. Then the camera pans slowly around the room, letting the audience study the faces of the people whom the hero is addressing. We can see fear, hate, stupidity, relief—whatever expression is called for in the characters—in close-up. If necessary, after showing each face, we can switch to a detail shot helping define his reaction: a drink slipping out of one's hand, the hands of another tearing a handkerchief, a clenched fist, a hand darting for a knife or gun. There are action and drama, story progress, and attention control in these close-ups when they are properly used and the television audience gets the message, no matter how small the screen on its receiver.

Timing is just as essential in television as in radio. If the program is part of a network series, the local station may have sold the following time unit to a local sponsor and he'll need the air cleared for that next broadcast. Because of the many elements incorporated into the television script, it is considerably more difficult to close a program "on the nose" than with other mediums. Titling, commercials, story, and

close of the program must all be rehearsed and re-rehearsed until they take the exact amount of time allotted. The writer must try to prepare his script exactly to length and have some portion of the program that can be expanded, compressed, or deleted in the rehearsals in order to compensate for the changes called for by the director or producer or by the delivery evolved by the cast. This sort of cushion can be in a movie sequence showing the passing scene from a car window or some other such locale-setter or in a replaceable part of the script body. It must not be obvious, though. It is difficult enough to hold the audience's attention throughout the program without expecting the observers to remain docile through a prolonged time pad.

Even those television programs which are substantially spontaneous will require some script writing for the introduction, the close, the commercial, and certain portions of the program, such as an explanation of how the quiz program works or how the guests interviewed are selected.

Let's look at a cross section of the programs that a script writer may be called upon to undertake:

Drama
- Adaptations
- Commercial skits
- Vignettes
- Comedy
- Serials

Variety
- Gags
- Character introductions
- Song introductions
- Commentary
- Bridges between entertainment and commercial parts of the shows

Sports

- Season's record of individual players and teams
- Biographies of coaches
- Records of the sport, its history, and anecdotes about it
- Commercials
- Introduction of the broadcast and standard close

Women's Programs

- Fashion commentary and sketches permitting the showing of fashions without their becoming stilted
- Domestic science demonstrations
  - Cooking lessons
  - Sewing and remodeling tips
  - Buying training
  - Washing, cleaning, and spot-removing tips
  - Interior decorating methods
  - Table setting, gift shopping, etc.
- Child training instruction in the form of sketches and demonstrations, cartoons, and commentaries

Juvenile Programs

- Adventure, interviews, skits, and films
- Art and music appreciation for youngsters
- Children's talent auditions
- Dramatic sketches for young people
- Girls' fashion shows, usually linked with a visual program such as suggested party games
- School forums, debates, and televised "bull sessions"

Commercials

- Demonstrations
- Sketches
- Institutional programs
- Label, trade-mark, name, and package dramatization

This list represents far from a complete line-up of the scripts the writer for television may be called upon to undertake. It will serve to indicate the variety and heterogeneousness of the tasks that may fall to the agency or station television script writer.

In all these scripts, the basic problems are very similar.

1. Scripts should be conceived as visual material illustrated with words.

2. They should be prepared with the capacities of broadcast equipment in mind and the impossible never asked.

3. They should be directed to the small family unit, not the mass audience of the theater.

4. They should be prepared so that the images on the screen are simple and well defined.

5. They should be as carefully timed as radio programs.

There are many forms in which these scripts may be prepared, the different broadcasters and advertising agencies having their preferred systems. In general, the script must be so prepared that sight and sound impressions are indicated simultaneously. A technique employed by the Columbia Broadcasting System uses four columns on the script: Audio, Text, Floor and Sound, and Video. Here is an excerpt from William Faulkner's "Two Soldiers" as adapted to television and presented on CBS station WCBW, New York, now known as WCBS—TV.

SAMPLE PAGE — NOT TO BE BROADCAST
TELEVISION VERSION OF "TWO SOLDIERS"

By William Faulkner

(Produced on Station WCBS—TV, N. Y.)

Audio	*Text*	*Floor and Sound*	*Video*
	PETE: You been behind as long as I can remember.		TAKE #1 PREVIEW CH. 3 (CABIN)
	PAW: Mind your tongue, Pete.		
	MAW: Don't fight with him now.		
	PETE: Anyway, I'm goin'. I got to.		
	BOY: Of course he's got to.		
	MAW: You hush your mouth. Nobody's talkin' to you. Go and get me a bucket of water, that's what you can do.		
FADE IN HARMONICA	(*Harmonica over Balopticon*)	CUE IN HARMONICA MAW CHANGE APRON PAW AND PETE OUT PETE INTO NIGHTSHIRT BOY INTO B3	FADE OUT #1 FADE IN CH. #3
FADE OUT HARMONICA (NARRATION B3 DIALOGUE B2)	(*Maw pantomime with laundry*)	CUT HARMONICA CUE MAW CUE BOY	FADE OUT CH. #3 FADE IN #1
	BOY: All the next days Maw was getting Pete ready to go. She washed and mended . . . one more night I jest couldn't 'a' stood it. So I thought maybe I might take my shoes and drop them out the window and then I could climb out like I used to watch Pete do when he was jest seventeen and Pap held that he was too		TAKE #1 PREVIEW CH. 3 (DARK ROAD) READY #3 ON 4

Audio	*Text*	*Floor and Sound*	*Video*
	young yet to be tomcattin' around at night, and I could go to the barn and get my slingshot and knife. I thought I could do it . . . and then I did it. (*He rises*)		FADE OUT #1 AND RELEASE FADE IN CH. 3 PREVIEW #2 (SIGNPOST)
HARMONICA UNDER	It wasn't cold, it was jest durn confounded dark, and that highway was stretched out (*Dissolve*) in front of me, with nobody usin' it . . . twice as far, like a man does when he lays down. (*Dissolve*)	CUE HARMONICA CUE BOY	
FADE TO NIGHT SOUNDS NARRATION B2			DISSOLVE (SIGNPOST) PREVIEW CH. 3 (DARK TOWN)
		BOY TO B2 CUT HARMONICA PULL 2 CUE BOY	DISSOLVE TO 3 LIGHT UP SLOWLY
NIGHT SOUNDS OUT	Daybreak was jest startin' when I walked . . .		

Other stations, such as WABD in New York, prefer programs based on two columns of information, one for video, the other for audio. The televersion of "The Singapore Spider" at the close of this chapter is a representative script of that sort.

In a survey of television programing agencies, the question, "How can a writer enter the field of television?" was asked. The consensus of their answers follows:

First, become acquainted with the medium. See as many programs as possible from within the studio and, if possible, from the control room. Study broadcasts on the home receiver and try to envision them as television scripts. Read books, trade publications, magazine publications, and other material on television. Observe plays, movies, sporting events, exhibitions, and demonstrations as potential television material. Think in terms of television, and you'll soon be talking and writing in these terms.

Then try writing television programs. Mix them up, vary them, experiment and polish until you're proud of the work. Then submit the finest of your examples to the proper agencies after first securing from them a release form to protect them against crank lawsuits. This form, although generally conceded to be unfair to the writer, is the only way the stations or agencies have yet found to protect themselves. After a satisfactory business relationship has been established between broadcaster or agency and writer, the form is dropped because it is just as distasteful to the purchaser of scripts as to the writer. A typical form of this sort follows:

City
Date

To (Station or Agency)

In return for your agreement to consider my idea, summarized or characterized below, about a television technique, program, or method, I am submitting my idea to you today, with the understanding that you are wholly free to determine questions of priority and originality in connection with any identical or substantially similar ideas or suggestions. For payment in the event of use, I agree to rely on your own sense of fairness and honesty.

(Signed) _____

Brief summary of characteristics of idea:

Assets in selling the script are professional characterization and writing skill, the ability to present a first-rate show which doesn't entail extreme expense in settings, costumes, and properties and which calls for few characters—certainly, for few characters to appear before the television camera at any one time.

Scripts may be offered to either the broadcasters or the advertising agencies for prices that have not as yet received any tangible pattern. Some sustaining programs put on experimental stations by amateur groups have brought their authors surprisingly little revenue if any at all; sometimes

as little as $15. At the other extreme is a particularly lavish program presented by a network that paid its author $350 for a half-hour script when the audience was still only a few thousand. As the audiences grow and the market becomes a richer one, television scripts should bring their authors between $100 and $500 for the most part. This, however, is substantially conjecture. Union pressures and precedents and the competitive market may cause the prices to be considerably different from these.

The soundest procedure for getting your script into the hands of the purchasers with speed and favorable consideration assured is to use an accredited agent or an intermediary who is well known and well acquainted in television. These television-wise representatives can get quick decisions and a little higher prices for authors than would be offered ordinarily for the work of a comparative unknown. The 10 per cent that is ordinarily charged for such services is well earned in view of the fact that the agent usually suggests changes in the script that greatly enhance its chances of acceptance and he often gets at least 10 per cent more than the writer could attract on his own.

If you prefer to work alone though, you had best develop your own script market. First step in this direction would be to secure a list of all television broadcast stations and network headquarters. Such lists, prepared annually, are published in the *Radio Daily*, *Broadcasting*, *Television*, *Televisor*, and other annuals sponsored by periodicals in the broadcast field. The program managers or heads of script departments of these various stations would be the proper persons to whom scripts should be addressed. For the most part it is best for the author to submit an outline or digest of the script in the form of a letter rather than send the full manuscript in "cold." The invitation to send the script would indicate that the missionary work of the letter was properly

accomplished; a discouraging note from the script authority might save the writer from wasting many long hours.

For the names of advertising agencies purchasing television scripts, the writer's best bet is to consult one of the standard reference sources to advertising agencies, such as "Standard Advertising Register" or "McKittrick," and conduct a survey of the principal agencies listed as purchasing radio and television time. From time to time the advertising business papers, such as *Printer's Ink* or *Tide* or *Advertising Age*, may publish lists of such agencies, or they may be published in the radio-television annuals.

It would be well to remember that, despite the artistic satisfaction which the writer may derive from the more theatrical types of television programs, such as "The Singapore Spider," which follows, most television scripts are not of this type. Most are straight announcements or interesting visualizations of the commercial made familiar and unpopular by radio.

The free-lance approach is unquestionably the simplest route for the writer into television. By becoming established as a free lance, he can command a much more substantial salary than he could get otherwise, and he can develop a gradual mastery of his medium through these scripts without burning any other economic bridges behind him.

Let us look at a few examples of scripting for television. These examples can do a much more satisfactory job of telling you how it is done than can simple descriptions.

EXAMPLE 1

WEDNESDAYS AT NINE

Produced for Lever Brothers by Ruthrauff & Ryan

Directed by Ted Huston

Video	*Audio*
¾—ON TURNTABLE	MURRAY: Wednesday—is Lever Brothers time! (*Spry song*)
SWITCH TO CLOSE-UP OF MURRAY	MURRAY: Hi, everybody! Big night tonight. It's Lever Brothers first television anniversary! Yep, our "Wednesdays at Nine" show is exactly one year old tonight—and come to help us celebrate the big event is that famous and beloved star of radio—Aunt Jenny!
SWITCH TO SHOT OF BOTH MURRAY AND JENNY	JENNY: Good evenin', folks! MURRAY: (*To audience*) Aunt Jenny's come all the way from Littleton to tell us one of of her wonderful real-life stories just like she does every morning at eleven-thirty over radio station WABC. What's your story for tonight, Aunt Jenny? JENNY: It's a special story for Thanksgiving, Pat dear. MURRAY: Which reminds me—how about a couple of helpful hints on Thanksgiving dinner, Aunt Jenny?
SWITCH TO LONG SHOT OF JENNY AND PAT BEHIND TABLE WHICH HAS JAR OF SPRY, CHICKEN IN ROASTING PAN, BOWL OF MELTED SPRY, BRUSH, ETC.	JENNY: *Turkey's* out of the question for most of us this year. But here's how (*Starts brushing*) to make roast *chicken* so delectably tender and juicy and golden brown, your folks won't even *miss* the traditional bird!
CLOSE-UP ON CHICKEN AND JENNY'S HANDS, WORKING	MURRAY: Isn't that easy, folks? Simply brush with melted Spry! Now cover with a white cloth (*Wait for action*) and brush with more melted Spry. This makes your bird wonderfully crisp and brown outside—tender and juicy within. Roast in a moderate oven . . . about 350 degrees Fahrenheit . . . allowing 20 to 25 minutes per pound . . . and get this: *No basting necessary.*

FIG. 74.—Aunt Jennie showing Pat Murray how to prepare a chicken with Spry. (*Ruthrauff & Ryan.*)

Video	*Audio*
	JENNY: That's right . . . but do turn during the latter part of the roasting in order to brown your bird uniformly all over. When it comes out of the oven, remove the cloth.
	MURRAY: (*In fast*) And the skewers and threads of course.
	JENNY: Garnish with parsley . . . and get set for *compliments!*
SWITCH TO CLOSE-UP OF ROAST CHICKEN ON PLATTER ON PIANO BENCH COVERED WITH WHITE CLOTH	MURRAY: (*Wait 'til picture has a chance to register with audience*) MMMMmmmmm . . . that looks so good it's all I can do not to tear off a drumstick. (*Reaching hand into picture as if to do same*)
SWITCH TO CLOSE-UP OF AUNT JENNY AND MURRAY	JENNY: Better save your appetite, Pat. I've got a special surprise for you a little later on.
	MURRAY: You have? *What?*
	JENNY: Never you mind! Right now, I'd better be gettin' on with my *story!* (*Right into camera*) Folks, this story *could* have happened most any day in most any home in America—but it actually did happen last Thanksgiving . . . in the Allens' modest home in Littleton. Mrs. Allen is especially trying to set the dinner table (*Fade*) in spite of her husband, the Professor.

FIG. 75.—Madam Lyolene adjusts frock while Betty Furness looks on during the Sanforized show "Fashions—Coming and Becoming" on WABD. (*Young & Rubicam.*)

EXAMPLE 2

EXCERPTS FROM SANFORIZED SHOW,
"FASHIONS — COMING AND BECOMING"

Produced for Sanforized by Young and Rubicam

Directed by Wes McKee

Video	*Audio*
INTRO FILM CAPTION CAMERA LONG SHOT GIRL AS SHE WALKS ON. GIRL IS FAIRLY PLUMP, EXTREMELY BADLY DRESSED. ONLY EVERYTHING IS WRONG. GIRL WALKS TO CENTER STAGE, CURTSIES, AND RECITES IN A GRAMMAR-SCHOOL GRADUATING-CLASS MANNER	GIRL: Hickory, dickory, dock! I ran up this frock. I pinned it and sewed it, Basted and gored it. I'm the pin-up girl of my block.

Video	*Audio*
GIRL CURTSIES AGAIN	NANCY: (*Off-stage voice imitating sing-song rhythm*) And I'm the voice of the turtle. Yock, yock!
GIRL LOOKS TOWARD SIDE OF STAGE VOICE COMES FROM	GIRL: Pleased to meet you, Voice. Oh—Miss Dixon. (*Girl looks*)
	NANCY: Glad to meet you, Miss Pin-up. Would you mind revolving slowly for the customers out front?
GIRL REVOLVES UNTIL BETTY SPEAKS AGAIN	NANCY: All right, dear, hold everything. Help is coming. Mother is sending Madame Lyolene out there to help.
	GIRL: Madame who?
	NANCY: Madame Lyolene—a very, very famous dressmaker and designer. Had her own couture house in Paris for twenty years and has been over here for five years designing and teaching.
	GIRL: Ou-la-la!
	NANCY: Oui—oui!
MADAME ENTERS. LOOKS GIRL OVER. TOUCHES HERE AND THERE. GIRL LOOKS AND REACTS IN AN INCREDULOUS MANNER	GIRL: O.K. Bring her on. Anything for Sanforized.

EXAMPLE 3

EXCERPT FROM "PRODUCTS FOR WAR AND PEACE"

Station:	WABD, New York	Presented by United States Rubber Company
Date:	July 12, 1945	Produced by Charles J. Durban
Time:	8:00–8:30 P.M.	Assistant producer—Richard Hackenger
Title:	Products for War and Peace	Written and Directed by John Hewlett

Video	*Audio*
CAMERA OPENS ON COVER OF MAGAZINE. HOLD COVER 10 SEC. COVER BEARS INSCRIPTION: "TELEVISION MAGAZINE OF THE AIR." TURN PAGES WHICH READ: IN THIS ISSUE "PRODUCTS FOR WAR AND PEACE" PRESENTED BY UNITED STATES RUBBER COMPANY NOW IN ITS 102d YEAR OF SERVING THROUGH SCIENCE	

Video	*Audio*
DISSOLVE TO AL HENDERSON	HENDERSON: Good evening, ladies and gentlemen, and thanks for turning once again the pages of the Television Magazine of the Air. Tonight the United States Rubber Company brings you the ninth issue of this weekly publication, made possible by the miracle of electronics. We have coming up—in a moment or two—an episode of the sea and the hardy men who have challenged it in olden and modern times. Men have always challenged the sea, and men ever have gone down to the sea in ships. The sea captured the imagination of Conrad. It stirred the genius of Melville. Shakespeare felt its spell. He, too, gave it immortality. Men have lost their lives in fighting the sea. Davy Jones' locker is an old story to millions of souls who lie asleep in its deep. The albatross and the superstitions of it are traditional. The Phoenicians and the Vikings and the men who have sailed all the seven seas have fought the mountains of boisterous oceans, and have come home alive, or have died in battle with the wet, salt foe. In awe and in superstition with small weapons, men have fought the oceans of the globe from time immemorial. But today science has provided the modern mariner with new weapons to fight and conquer the sea. Let's take a look at contrasts of the old and the new. Here's the first one.
DISSOLVE TO STORM AT SEA. TWO MEN IN RAGS ON FLOATING HATCH. ONE IS LOOKING UP INTO THE SUN WITH BLANK, GLASSY EYES. THE OLDER MAN IS ROLLING AND GROANING	SKIPPER: Water . . . water.

FIG. 76.—Studio manager Frank Bunette and studio assistant Barry Shear create a realistic storm (for the United States Rubber Company's recent telecast "Products for War and Peace") in the studio at WABD. (*United States Rubber Company.*)

Video	*Audio*
THE YOUNGER MAN ROUSES HIMSELF. HIS MOUTH IS THICK AND HIS LIPS ARE SWOLLEN	YOUNG MAN: A good skipper. A brave man. He sure pulled us out of this. But—water? What kind of water? Would you ever think it would happen to me? And my first trip out. Water, water everywhere, and not a drop to drink.
GROANS	SKIPPER: Poor lad. We're going to die, boy.
	YOUNG MAN: Die? We're not going to die. I come from trout-fishing country. Let's catch a fish.
ROUSES HIMSELF	SKIPPER: You're delirious. It's too late.
COMES TO LIFE	YOUNG MAN: You don't know what I mean. Let's go fishing, I tell you—let's go fishing!
LETHARGIC	SKIPPER: How?
	YOUNG MAN: Sock me in the jaw.
	SKIPPER: I know you're crazy now. You're a good lad; you're young enough to be my own son, and I don't want to see you suffer. Roll off the raft—and go to heaven.

FIG. 77.—How to wash a wool blanket from the Super Suds show "Here's How." (*Wm. Esty Co.*)

EXAMPLE 4

HOW TO WASH WOOL BLANKETS
EXCERPT FROM THE SHOW "HERE'S HOW"

Produced by William Esty Co. for Super Suds

Directed by Kendall Foster

[Video, sound, and cues as required]

Audio

NARRATOR: Now you know what I meant when I said it would be better to wait and buy your household furnishings. What's a home without a wife? and speaking of her, I suggest you call her back. This next little item is right down her street. Woolens are hard to come by and she knows they have to be taken care of and "Here's How."

(*Winnie, a young wife, is making ready a blanket. She is sniffling as her mother enters*)

MOTHER: What's the matter, Winnie?

WINNIE: (*Sniffles*) Nothing.

MOTHER: (*Puts her arm around her*) Is it about John? (*No answer*) Oh, going to wash your woolen baby blanket? (*Winnie nods. Mother feels the water with finger*

but pulls it away quickly) That water is too hot for wool. Better add some cold. (*Winnie does so*) Now feel it.

WINNIE: (*Feels water*) That's hardly even warm. It won't make lots of suds.

MOTHER: That's the way it ought to be for woolen blankets—90 to 100—just tepid. Have you got Super Suds? If you have, don't worry. You'll get loads of rich creamy suds.

WINNIE: Yes, I have it here. How much Super Suds should I use?

MOTHER: I always use one quarter cup for a baby blanket. Wool needs about twice as much as cotton. That's another good reason for using Super Suds. It's mild on your hands and woolens need mild soap. (*Winnie puts it in, sniffling as she does*) What happened this morning 'tween you and Harry?

WINNIE: (*Hesitates, then blurts out*) He's mean to me!

MOTHER: Mean?

WINNIE: Today's our third wedding anniversary and,

MOTHER: Did something happen?

WINNIE: That's it—nothing at all happened. (*Swishing suds around in the water*) Is that all right?

MOTHER: You ought to have about four inches of suds before you start.

WINNIE: (*Measures it with hand*) I have—just four inches—Hm! That was fast!

MOTHER: Then go ahead. You'll find that the suds of Super Suds will last a long time. Now what's this about Harry?

WINNIE: He didn't even remember what day it was. When I asked him, he thought it was ground-hog day. (*Angrily throws blanket in tub*)

MOTHER: Careful, dear.

WINNIE: And when I suggested we celebrate—that we kill a chicken for dinner—you know what he said?

MOTHER: What?

WINNIE: He said, why should we punish a chicken for something that happened three years ago? Ugh! (*She starts to rub violently*)

MOTHER: Wait a minute. (*Winnie stops*) Don't take it out on the poor blanket. Besides it isn't necessary. Super Suds is a dirt getter. Let it do the work. Here, let me show you. Soak it well. (*Does so*) But don't ever twist or rub a wool blanket. Harsh rubbing naps.

These examples are but a few of the many types of script that free-lance writers may be called upon to do.

Producers and directors can obtain a wealth of good dramatic material available for television from various publishers and copyright owners upon payment of a small royalty fee.

As an example, through the courtesy of the Walter H. Baker Company, Boston, we are reprinting a complete copyrighted dramatic script, adapted for television by Mr. Bob

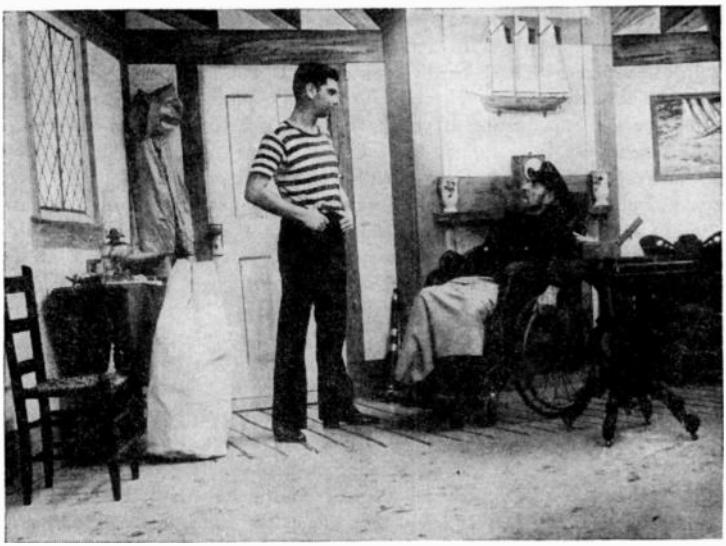


FIG. 78.—Scene from "The Singapore Spider."

Emery, titled "The Singapore Spider," complete with all production cues.

THE SINGAPORE SPIDER

With Milton C. Herman as Hook Harridew

Produced and directed by Bob Emery

Video	*Audio*
CAMERA #1	[ANNOUNCER:] Good evening, friends. Welcome to the regular Wednesday evening television presented by WOR on WABD. For three weeks now we have offered old-time plays at the WOR Brownstone Theater . . . but tonight our show is going to be different. Draw up a chair and sit right on the edge of it, and you'll see the distinguished American actor of stage and screen, Mr. Milton Herman, as Captain Hook Harridew, the man who finally died from a
GET CAMERA #2 ON SEALED BOOK	
SET UP LAP DISSOLVE STAND BY TO ROLL SOUND EFFECTS AND MUSIC	

Video	*Audio*
	fatal wound sent him from Singapore. So get set and let us see what the keeper of the "Sealed Book" has in store for us.
ROLL SOUND EFFECT (GONG)———	[*Music*] *Sinister motif. Gong*
DISSOLVE TO #2 AND ROLL MUSIC———	[*Lap*] *dissolve to sealed book. Hand comes into picture and brushes the dust off and unseals the book. Then opens page and we read* "The Singapore Spider"
BRING MUSIC UP FULL GET #1 ON MEDIUM LONG SHOT OF SET	
FADE MUSIC UNDER AND CUE ANNOUNCER	[ANN:] "The Singapore Spider"
BRING UP MUSIC———	[*Biz.*] *Hand comes in and turns page and we read*
SET UP LAP	*Title Page. Jason Harridew's veined hand grasped the edge of his wheel chair as he swung around toward the table.*
FADE MUSIC UNDER AND CUE ANNOUNCER	[ANN:] Jason Harridew's veined hand grasped the edge of his wheel chair as he swung around toward the table.

PRODUCTION NOTE: *As we read and as announcer talks, we lap-dissolve to set. Man in wheel chair.*

CUE ACTION	
DISSOLVE TO #1 AND FADE MUSIC OUT—	[JASON:] (*Wheels around. Biz with money box*) Sarah! Sarah! Sarah!
GET #2 ON A CLOSE TWO-SHOT	SARAH: (*Off*) Coming . . . coming. (*She enters, glares at him*) Well . . . what is it?
	JASON: (*Tapping money box*) You know what's in here? Money . . . money. (*He opens box, takes out a package of bills, waves it*) Money $75,000. Lovely, ain't it? (*She looks at it*) [Ha, ha.] Feel it. Go ahead . . . feel it. Might as well as be gawkin' at it so . . . 75,000 one-dollar bills . . . all that's left of the Harridew fortune.
TAKE #2———	
GET #1 IN FOR A MEDIUM TWO-SHOT	
	SARAH: What d'ye do it for? I s'pose I shouldn't have asked ye that.
TAKE #1———	[JASON:] Why not? You're a pokin', ferretin' old busybody. I don't know why I have ye keep house for me . . . and ye wondering why I took it out 'a the bank. (*Takes package of bills*) Sweat and blood on every one of them, an' there ain't a Harridew worth a cent of it. Sarah, how much did you hear at the keyhole when Hiram was here?

Video	*Audio*
TAKE #2	[SARAH:] Nothin', I was doin' my work.
	JASON: You lie. Well, I hope the sight of all the remaining Harridews gave you more pleasure than they did me.
GET #1 BACK FOR SHOT OF JASON AND TABLE	SARAH: A fine way you treated your own flesh and blood. Gettin' 'em to come here, an' then turnin' them out.
	JASON: Bunch of snivelers, settin' here beggin' me to give 'em some of my money. They think 'cause I'm tied down to this infernal wheel chair that they got the best of me. Well they ain't. I showed 'em that money just to show 'em I ain't afraid of 'em. Sarah, you think $75,000 is enough money to . . . er . . . kill a man for?
	SARAH: You're talking crazy.
#2 HOLD	JASON: I wonder, I wonder.
GET #1 ON CLOSE-UP OF JASON	SARAH: Put all that money away.
	JASON: Worries you too, does it? Ha, ha.
	SARAH: Why should it? 'Tain't mine.
	JASON: Not yet.
	SARAH: You . . . you don't mean you're going to leave it all to me?
TAKE #1	[JASON:] I ain't goin' to leave it to anybody in this town, but there's a heap of folks, my own relatives, figgerin' to take it away from me, that's why I made it easy for them. I turned it into cash and I'm gonn'a keep it all right in this house (*Points*) in my sea chest.
TAKE #2	[SARAH:] Captain Harridew, that's tempting fate.
HOLD #1	JASON: Ain't nobody gonn'a kill me except . . .
	SARAH: (*Quickly*) Aha . . . then there is someone you're afraid of!
	JASON: There was a man. But, then he's at the other end of the world . . . and there ain't none in this town to do it and *Tom Bishop's in Singapore*.
	SARAH: You're a hard, twisted old man. You hate everybody, and you ain't got a friend in the world. You seem to take *pleasure* in hurting people.

Video	*Audio*
	JASON: I do . . . ha . . . great pleasure.
	SARAH: And when ye die, no one will be sorry.
TAKE #1	[JASON:] You will, Sarah. 'Cause I ain't gonn'a leave you the Harridew money, and when I die, your week's pay will be cut off forever . . . ha . . . ha . . . and then what will your drunkin' husband . . .
TAKE #2	[SARAH:] (*Furious*) My husband's name is Jim Meggs.
	JASON: Is it now? I never heard him called nothin' but "Rumsoak" here in Northport . . . Rumsoak.
	SARAH: He's as good as any of your family.
	JASON: He sure is . . . and that ain't sayin' much. (*Biz. Sarah puts on hat. Gets ready to go*)
	JASON: Where are you goin' this time of day?
	SARAH: I got errands to do, down to the village. (*Biz. Sarah starts for door. Captain does a fake heart attack. She turns and sees him. He feigns death. She comes back [and examines him] and then goes to money box, picks up money. He sees her and shouts*)
TAKE #1	
GET #2 BACK FOR LONG MEDIUM SHOT —PAN TO DOOR	JASON: Sarah! (*She drops money*) Ha, ha, ha. Sarah, you failed me in the little test I gave you. I might have left you the money if you hadn't done that, but you'll never get it now to give to old Rumsoak. Nobody'll get this money . . . nobody. I'm gonn'a burn it . . . every last cent. Burn it! There won't even be a cent left for my burial. The town will have to take care of me . . . and I'll die a natural death. There ain't one of you . . . nowheres . . . got nerve enough to kill me.
TAKE #2	[*Sound.*] *Knock on door. Sarah looks at door. Harridew wheels in his chair to face door. Knock again. Then door opens and sailor comes in. Hold picture.*
FOLLOW ACTION TO THE DOOR	
GET #1 ON CLOSE TWO-SHOT	
	JASON: Humph, you're a Harridew, by yer manners. My nephew Matt. I cal'late. Sarah, you may go tend to your errands. The Harridews are itching to insult each

Video	*Audio*
	other. (*She makes slow exit with basket, closes door. Men face each other*)
TAKE #1	[JASON:] Well, Matthew, you're home, I see. No doubt you're rich from your roaming. You must have met up with some one you could bamboozle, in all your travels. What, have you forgotten the language, or are ye struck with delight at the sight of me so
GET #2 ON CLOSE-UP OF JASON	that you're speechless? (*Biz with wheel chair*) How was Singapore, lad?
	MATT: You mean, how was he? In Singapore, you mean? You . . . you . . .
	JASON: Go on, lad. Ha, ha . . . say it.
	MATT: You devil . . . God help you!
	JASON: Yes, God help ye, Matt, if that's the best ye can do.
	MATT: I saw him, do you understand? I saw him . . . rotting in Singapore.
	JASON: Ha, ha! Many rot in Singapore.
	MATT: You know who I mean.
	JASON: Do I now? You've a youngster's gift for presumption.
	MATT: Don't be a hypocrite . . . you old . . .
TAKE #2	[JASON:] (*Biz with hook*) I've a mind to give ye a taste of the hook. (*Biz*) I've always been aboveboard in my badness. That's why there's a lot worse living than me . . . and a lot of them are dead. Dead because they didn't get out of the way of this hook (*Biz.*) fast enough. And you . . . you young swab, don't get the idea that just because I'm hitched to this chair, I can't still take care of myself. Yes, sir, there's a lot worse living in this world than me.
TAKE #1	[MATT:] You'd have to go a long way to find them.
	JASON: Some of them were right here this afternoon, all by the name of Harridew. Holy faces . . . stinging hearts.
	MATT: Maybe . . . but *they* never left one of their own race stranded and helpless in Singapore, to rot among heathen dogs . . .

Video	*Audio*
	at least they ain't guilty of that . . . you . . . you . . .
	JASON: Ha, ha . . . devil, yes . . . but not (*Biz with hook*) hypocrite. Well, go on, say something. You're a mite slow with your tongue, now. When I was your age . . .
	MATT: Listen, and stop your mocking. He's there . . . now . . . in Singapore, I tell you.
	JASON: Who?
	MATT: Tom . . . Tom Bishop.
	JASON: Aye, Tom Bishop, my old mate . . . Tom . . . I expect he is and will be till he dies.
	MATT: You've had your revenge on him. He's not a white man any more. He's nothing. They're booting him around in oriental dives, the filthy natives, lascar sailors, the scum of the seven seas, and Tom Bishop is getting trod beneath their feet.
	JASON: Ha, ha, ha! Good . . . good.
	MATT: You won't say so when you hear the curse Tom Bishop has sent you.
TAKE #2	[JASON:] Ah, then. Maybe Tom has a bit of spunk after all. . . . 'Twas for cowardice, I flung him off the Lucy twenty years ago and left him in Singapore. I'll have no man walking my deck with yellow in his heart. (*Biz with wheel chair*) Ha, ha, ha! Tell me his curse, nephew. He has . . . say it softly, 'twill sound the more terrible. Ha, ha!
HOLD #1	
TAKE #1	[MATT:] Before he came to know me, he laid it on me because I was a Harridew.
	JASON: 'Twas a fine name when the old man was alive. Matt, your father was a true Harridew.
	MATT: Well, I'm not . . . thank God.
	JASON: I wonder . . .
	MATT: Do you think I'd fancy being like you?
	JASON: You've many years before you, Matt. Many years to do things.
HOLD #2	MATT: I'll sail the seas no more. The sea will have no chance to bend me as it has you. Tom Bishop's curse will never fall on me.

Video	*Audio*
	JASON: Aye, the curse again. Trifles seem to trouble ye, nephew. Perhaps you're like the rest of those yellow Harridews.
	MATT: If you weren't so old . . .
TAKE #2	JASON: (*Biz with hook*) [Try] a fight with me would you, nephew? There's many a man that's limped off to his grave with his innards gone. I was great for this (*Biz with hook on Matt*). Ha, ha! So ye would fight, eh? Ha, ha!
TAKE #1	[MATT:] Don't try your bullyragging with me, old man. I'm used to fighting young men . . . and strong . . . not burnt-out shells like you . . . with the ghosts of old crimes looking out of their eyes. (*Biz with hook. They hold picture*) Ah, I've no time to be wasting it with talking to you, nor no mind to be listening to your talk. I've got a question of more importance to ask someone else, who lives not three doors away.
GET #2 BACK FOR MEDIUM TWO-SHOT	
	JASON: Aye, that would be Josie White, eh, lad?
	MATT: Maybe, and if the answer is "yes," I'll come back and have a last word with ye . . . and it won't be a pleasant one.
TAKE #2 AND PAN TOWARD DOOR	JASON: Good luck with yer courtin', lad. If you're a real Harridew, you'll not take "no" for an answer, but . . . ye'll *choke* a "yes" out of her. Ha, ha, ha!
HOLD #2	[MATT] (*Starts for the door*)
TAKE #1	JASON: A moment, lad. Ye impress me. [Come here.] You're the only Harridew since the old man who's stood up to me. I
HOLD #2	think ye've got red blood in yer veins. I'm not much for pretty speeches, Matt. (*Biz, money box*) You're not yellow, Matt. Here's a gift for you and Josie . . . from the last of the Harridew fortune . . . $75,000.
	MATT: The Harridew fortune, eh? Money you gained by rottenness and treachery, and the blood of men like Tom Bishop. I don't want it. (*Biz. He tosses it back into box*)
TAKE #2	[JASON:] Here . . . before you run to your
HOLD #1	lady . . . tell me . . . Tom Bishop's curse?

Video	*Audio*
TAKE #1	MATT: (*He walks to Jason, stands before* [*him*]) He called on God to make your death swift and soon . . . and that all the pain and torture he has suffered at your hands for the last twenty years . . . be yours . . . *just before you die.*
GET #2 ON SEALED BOOK	JASON: (*Take*) Hm . . . quite a speech for Tom . . . and . . . er . . . no other message, lad?
SET UP LAP DISSOLVE	MATT: Oh, yes . . . and I don't like it. (*Biz. He goes to duffle bag, opens it*)
STAND BY TO ROLL MUSIC AND SOUND EFFECTS	JASON: And what is it?
	MATT: You'll see soon enough. It's a present from Tom Bishop. (*He takes out box*) There's leaves and a sort of creeping thing inside. You see he's left a hole or two for air. Here take it, I want it about me no more . . . and with it goes his wish for a speedy and awful death.
	JASON: Ha, ha, ha! (*Opens box so that we see spider*) A Singapore spider!
ROLL SOUND EFFECT	[*Sound.*] *Chinese gong.*
ROLL MUSIC AND BRING UP FULL	[*Music.*] *Sinister.*
FADE MUSIC UNDER AND LAP TO #2	[*Lap*] *to sealed book. It is closed. Man's hand is on it. Announcer speaks.*
CUE ANNOUNCER	[ANN.:] From the port of forgotten men in the Malay states has come a messenger of death, a Singapore spider, the most deadly of all, with eight eyes. This horror can attack from any angle and its bite brings death with excruciating pain. Let us find out from the "Sealed Book" just how Captain Harridew proposes to dispose of his unwelcome gift from across the sea.
GET #1 ON C.U. OF JASON	
SET UP LAP DISSOLVE	
OPEN BOOK	[*Hand*] *opens "Sealed Book" and we read as announcer speaks.*
CUE ANNOUNCER	[ANN.:] Old Harridew sat hunched in his wheel chair, his hate-warped brain trying to find some way out.
BRING MUSIC UP FULL AND OUT	[*Music*] *out*
DISSOLVE TO #1	[*Lap*] *to actor on set*
CUE THE ACTION	JASON: (*Biz. Looking at spider*) Leaves and a creeping thing inside. That would be Tom

Video	*Audio*
	Bishop's way for revenge, but I haven't been Captain Hook Harridew for twenty years for nothing. I'll not let Tom Bishop get the best of me . . . ha, ha . . . not yet . . . and I'll keep the spider. It's a handy
GET #2 ON MEDIUM LONG SHOT TO COVER SARAH'S ENTRANCE	weapon to have around. Now, let's see. (*Biz. He sees money box, goes to table. With his hook he lifts the spider out into the box*) Ha, ha, ha! Guard well the Harridew fortune. Tom Bishop never thought when he sent you to me, that I'd have you working for me . . . guarding my money. Ha, ha, ha, ha! Thankee, Tom . . . thankee.
TAKE #2	[SARAH:] (*Enters. Basket. Biz with shawl*) Well, was yer caller a Harridew?
GET #1 BACK FOR MEDIUM TWO-SHOT	JASON: Yes, my nephew, Matt. He's a real Harridew too.
	SARAH: Humph . . . notice he didn't stay long.
	JASON: His bag's still there. He's gone over to see Josie White.
	SARAH: If he's the young lad that used to go with her, he's been gone a long while. (*Picks up groceries . . . starts out . . . sees money*)
TAKE #1	[JASON:] Ha, ha! Yes, Sarah, it's still here, $75,000 of it . . . and it's going to stay right in this house.
HOLD #2	SARAH: Not interested. I been shoppin' and I bought some thread. A man like you, with $75,000 in cash right in the house, and won't even buy himself a decent suit.
	JASON: That's why I got the $75,000.
	SARAH: I'd think you'd want somethin' decent to be laid out in.
	JASON: I ain't dead yet and I don't cal'late to be right away.
TAKE #2	[SARAH:] You never can tell. (*Starts away*)
HOLD #1	JASON: Not a blasted one of the Harridews in Northport got nerve enough . . . (*Biz. He wheels over to table, opens money box, peers in*) Ha, ha! guard it well. Ha, ha! (*Biz. He wheels away from table, calls*) Sarah . . . Sarah . . . Sarah!

Video	*Audio*
	SARAH: (*Off*) I'm comin'. (*Enters*) For pity's sake . . . what d'ye think I am? A slave? (*Sees money box*)
TAKE #1	[JASON:] You're a nosey old woman.
	SARAH: Well, what do ye want?
	JASON: Got my supper ready?
	SARAH: Did you call me in here just to ask me that? Certainly, it's ready. It's on the kitchen table . . . right now.
HOLD #2	JASON: All right. (*Biz. He wheels by the table, stops, puts his hand on money box, looks at her*) Now listen carefully, I'm goin' to the kitchen to have my supper and I don't want to be bothered . . . keep out . . . do you understand? And, Sarah, I'd advise ye not to be pryin' into that money box . . . d'ye hear? I'd advise ye not to, because tomorrow, I'm gonn'a burn every dollar of it . . . $75,000. I'm gonn'a burn it bill by bill. (*He wheels away, turns and says*) Sarah, before ye go home, see that my mendin's done and leave me alone in the kitchen . . . never mind the dishes tonight. [*He*] *wheels and exits*)
TAKE #2	
FOLLOW THE ACTION	SARAH: (*She waits. Goes over to money box, then to kitchen door to listen, then to lamp, to window. Signals back to money box. Waits. Sound. Soft knock on door*)
GET #1 ON CLOSE TWO-SHOT OF SARAH AND JIM	
TAKE #1	[SARAH:] (*Opens door. In comes Jim*) Got it?
	JIM: Yeah. (*Taps pocket*)
	SARAH: Shh . . . talk low . . . the old man's got sharp ears.
GET #2 ON CLOSE-UP OF SARAH	JIM: Where is he?
	SARAH: He's in the kitchen, having supper. He'll be there a couple of hours.
	JIM: The old man's as strong as a devil. Seen him snap a feller's arm once . . . snapped it just like a twig. 'Twas all busted and hangin' down . . . no, sir . . . he ain't no one to fool with . . . besides Sarah . . . I need a drink.

Video	*Audio*
TAKE #2	[SARAH:] Fool, now's our chance, I tell you. We can get it over with and be home in twenty minutes, that's my usual time to get home. Then we light all the lights for anyone to see and make a phone call or two. I got it all planned, Jim.
HOLD #1	
TAKE #1	[JIM:] How much did you say the old man's money came to?
HOLD #2	SARAH: Seventy-five thousand dollars and it's all in that box there.
	JIM: 'Tain't worth killin' fer.
	SARAH: It ain't, eh? Jim Meggs, you'n me won't ever see that much money again in our whole lives. It's ours for the taking.
	JIM: I know . . . but killin'. . . .
	SARAH: Ye're afraid . . . Rumsoak.
	JIM: Yeah . . . but killin' a man. . . .
TAKE #2	[SARAH:] Listen to me, ye fool. Do you know what he's going to do with that money tomorrow? Right before my very eyes? He's going to *burn* it . . . every dollar of it, and *laugh* at me while he's doing it. (*Biz. with hands*) I want to be shet of that laugh.
HOLD #1	
TAKE #1	[JIM:] Tell me somethin', Sarah. I may be a fool and a rumsoak, but I got brains enough to know that people will notice us spending all that money.
GET #2 ON MEDIUM LONG SHOT TO FOLLOW ACTION TO DOOR	SARAH: We'll not spend a cent of it for a long time. We're going to bury it deep in the garden, back of the house, and let it stay there until everything blows over . . . and even then we'll spend it in dribs and drabs.
	JIM: Sounds all right!
	SARAH: Where is it?
	JIM: Here. (*He produces large wrench or lead pipe from overalls*) But honest, Sarah, I can't do it. I gotta get out of here . . . I need a drink. ([*Starts*] *to exit*)
TAKE #2	
GET #1 ON CLOSE-UP OF SPIDER IN BOX AND SET UP DISSOLVE	SARAH: Jim Meggs . . . you're a rumsoaked coward all right . . . but I don't cal'late to be done out of that money. All right, we'll go home now . . . but I'll come back and do it myself. Only the money'll be
DISSOLVE TO #1 ON SPIDER IN THE BOX	

Video	*Audio*
DOLLY BACK ON #1 TO PICK UP MATT'S ENTRANCE	mine . . . and when you want some for a drink. . . . (*She pushes him out of the door*) Get along . . . I'll come back after I've made the phone calls. (*They exit*)
CUE ACTION	[*Biz.*] *Door opens. Matt enters*
GET #2 ON MEDIUM TWO-SHOT OF MATT AND JOSIE	MATT: What are you afraid of Josie? Come on in.
	JOSIE: (*Enters*) The place smells so cold. It's like the old man was around everywhere.
STAND BY FOR SOUND EFFECT OF SNORE	MATT: He is around here somewhere . . . and he's left icicles behind him cold as a dead man's hand.
	JOSIE: Oh, Matt, why do we have to come here and face him?
TAKE #2	[MATT:] We don't have to . . . but I wanted the satisfaction of telling him that after I burst into your house and shouted point blank at you "Marry me," you said "yes." That's what I want to tell him.
GET #1 ON CLOSE-UP OF JOSIE	
ROLL SOUND	[*Sound.*] *Snore, off.*
TAKE #1	[*Take.*] *Josie with scared expression.*
TAKE #2	MATT: It's just the old man snoring.
	JOSIE: It sounded like someone moaning.
	MATT: No, it's the old man. He always keeps everyone in the house awake.
GET #1 ON MONEY BOX	JOSIE: Come away, Matt. I'm afraid here.
	MATT: Without a last word to the old man? That's what I came back for, to tell him that I'm done with the Harridews and (*Squeezes her*) done with the sea. But if you're afraid, Josie, we'll go. (*He picks up duffel bag, throws it on his shoulders, and passes the table. As he stands here, cut to money box*)
TAKE #1	[MATT:] Here's his money box. He wanted me to take it. It's blood money. He can have it. Come on, Josie, let's go.
GET #2 ON SEALED BOOK	
STAND BY TO ROLL MUSIC	
SET UP LAP DISSOLVE	*Camera is held on money box, and we see spider free to come out, as cover is left open.*
LAP TO #2	[*Lap*] *to sealed book closed. Hand on it.*
ROLL MUSIC	
FADE MUSIC UNDER AND CUE ANNOUNCER	[ANN.:] (*Off camera*) Slowly the web of retribution tightens around the old man, from his own flesh and blood at home . . . and
GET #1 ON MEDIUM SHOT OF JASON IN CHAIR	

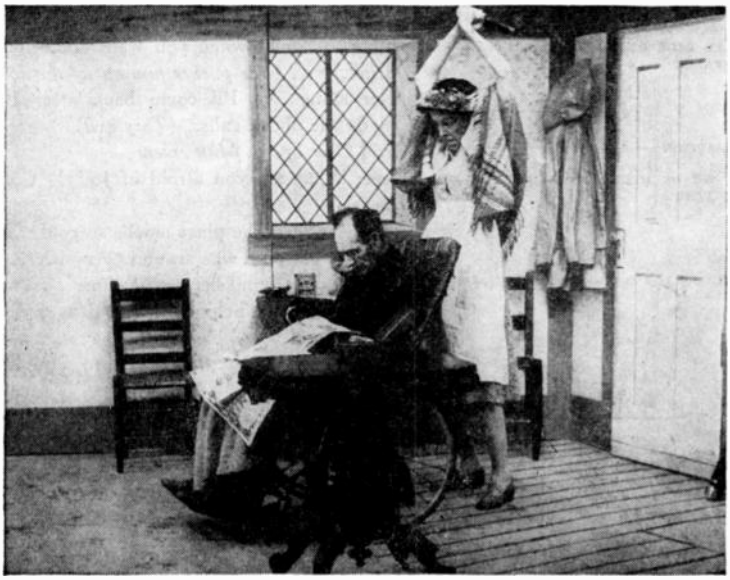


FIG. 79.—Scene from "The Singapore Spider."

Video	*Audio*
SET UP LAP	from across the sea comes the accumulated hate of twenty years. Let us see what happens when we reopen the sealed book.
OPEN BOOK	[*Camera*] *Hand opens book as announcer says*
CUE ANNOUNCER	[ANN.:] Later that evening Captain Jason Harridew wheeled himself into the parlor to read the evening paper.
LAP TO #1 FADE OUT MUSIC	[*Lap*] *to scene*

PRODUCTION NOTE: *The final scene is all pantomime. Must be followed carefully with camera.*

HOLD #2 ON SEALED BOOK	*Biz. Harridew, seemingly sleeping, paper spread over his lap with the right hand (hook) stuck into it. After awhile Mrs. Sarah Meggs steals carefully into room, looks around, takes out a large wrench, and starts to raise it. She notices a funny position about the old man. She touches his shoulder, his head falls. His*
READY MUSIC	
FOLLOW ACTION CLOSE ON #1	
SET UP LAP	

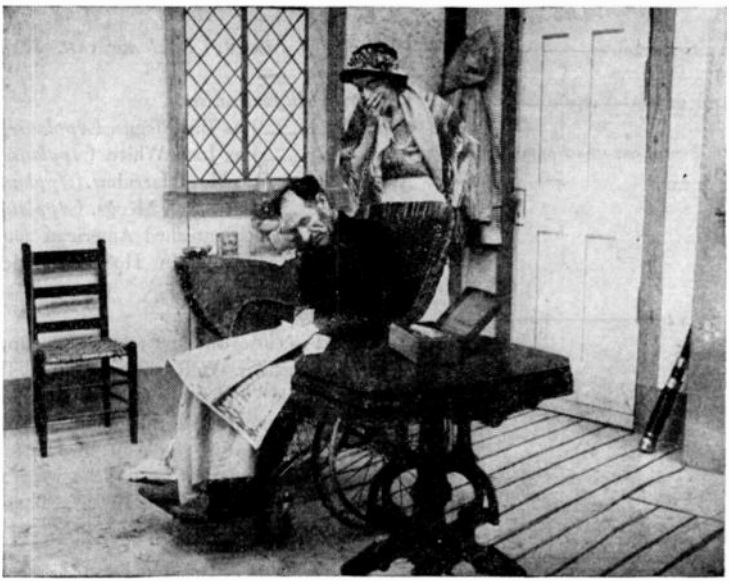


FIG. 80.—Scene from "The Singapore Spider."

Video	*Audio*
DOLLY IN TO SPIDER ON HAND	*right hand slips off his lap, taking the newspaper with it and revealing the spider on his left hand.*

PRODUCTION NOTE: *We must work close. And as she touches his head, we must pan down to the hand and dolly in for the last shot.*

LAP TO BOOK AND BRING UP MUSIC———	[*Lap*] *to sealed book. Open. We read as announcer speaks.*
FADE MUSIC UNDER AND CUE ANNOUNCER	[ANN.:] The vengeance of Tom Bishop had reached from Singapore to New England and
READY SOUND EFFECT	his curse had been fulfilled . . . a swift and painful death for Captain Hook Harridew (*Hand turns page now*) from the bite of a Singapore spider.
ROLL SOUND EFFECT———————	[*Sound.*] *Gong.*
ROLL MUSIC———————————	[*Music.*] *Sinister.*
GET #1 ON CAST	*Hand turns page . . . "The End." Hand*
SET UP LAP	*closes book. Replaces seal.*

Video	*Audio*
CUE ANNOUNCER	[ANN.:] *Off camera. Meet our cast. Sound. Applause.*
LAP TO #1	[*Picture.*] *All four on set.*
	ANN.: (_____) as Jim Meggs. (*Applause*)
GET 2 ON CLOSE-UP OF ANNOUNCER	ANN.: (_____) as Josie White. (*Applause*)
SET UP LAP	ANN.: (_____) as Matt Harridew. (*Applause*)
	ANN.: (_____) as Sarah Meggs. (*Applause*)
	ANN.: and the distinguished American actor, (_____), as Captain Hook Harridew. (*Applause*)
LAP TO #2	[*Lap*] *to announcer on set.*
	ANN.: And so closes the first television adaptation of a regular WOR radio feature, "The Sealed Book." Hope you liked it. Next Wednesday evening at this same time, we will again present at the WOR Brownstone Theater a fine play of yesteryear, when we present (_____) in "The Bells." Thanks for looking and
FADE TO BLACK	[Good night!]

12. Commercials

TELEVISION has been embraced with hungry eagerness by advertisers who recognize how nearly they've come to reaching the saturation point in sales through older advertising mediums. Obviously the comparatively fresh selling power of television contributes to this warm welcome. Experiments with the new medium are backing up early predictions that television's selling power would be approximately ten times that of radio. In fact, no medium of advertising except commercial films can do a comparably effective job of demonstrating a sponsor's products, and commercial films can be taken into homes only in widespread quantities through television.

The value of television in commercials is readily demonstrated. In spite of all the well-chosen words used to describe a package offered by a sponsor, the familiarity developed in the television home audience for that product is infinitely greater. A mending tape demonstrated in the early commercial days of television, with plenty of close-ups of the package, caused many a salesperson in New York to hear voices saying, "Why, there's Press-On mending tape. I saw it on television the other night."

Television commercials make the package, label, and trade-mark familiar, show the consumer how the product can be used to give greatest satisfaction, demonstrate the institutional values of the organization making the product, point out outstanding characteristics of the brand merchandise, and envision the satisfaction of its users.

Radio has, for years, been most forceful in its commercial presentations. Sometimes, when strong selling copy was forced into the beginning and end of the scripts and also brought in to point up the climax of the dramatic presentations, indignant audiences stirred up quite a ruckus about the commercials. Television advertisers, already cautious about adhering to the taboos of radio, have given every indication of planning commercials with more grace and subtlety. Visual commercials, already more powerful than those on radio, would be simply too much if they were overemphasized.

Among types of commercials that have been found successful are the dramatized ones, films, and gadgety ones. Let's examine a few of these in action:

The dramatized commercial used by Chesterfield cigarettes on WABD proved conclusively that the audience enjoys this type of presentation. It opened with a homesick soldier standing at the rail of a ship. While he's standing there dreaming of home, the ship's captain comes along and tries to cheer him up. The captain takes out of his pocket a package of Chesterfields and offers the boy one. The boy sees that it is the last one in the pack and refuses it, whereupon the captain insists that he take it as he always carries an extra pack, for he would never be without his Chesterfields. The captain reaches into his pocket and takes out another pack, and the camera dollies in close on it as it's being opened. Then they both stand at the rail smoking and talking. As the boy tells the captain his troubles, the camera dollies in on his hand on the rail holding the cigarette with the smoke curling up and, as the picture becomes blurred from the smoke, the picture is dissolved to another scene.

The American Central Manufacturing Company, makers of American kitchens, were able to give the television audience a half-hour of entertainment, demonstrating its

product the while. This was accomplished through the use of a half-hour comedy, "The Queen Was in the Kitchen," starring Allen Prescott as off-stage commentator. We saw the tribulations of a young man who had forgotten his wife's anniversary, the problems she had in her kitchen, and the

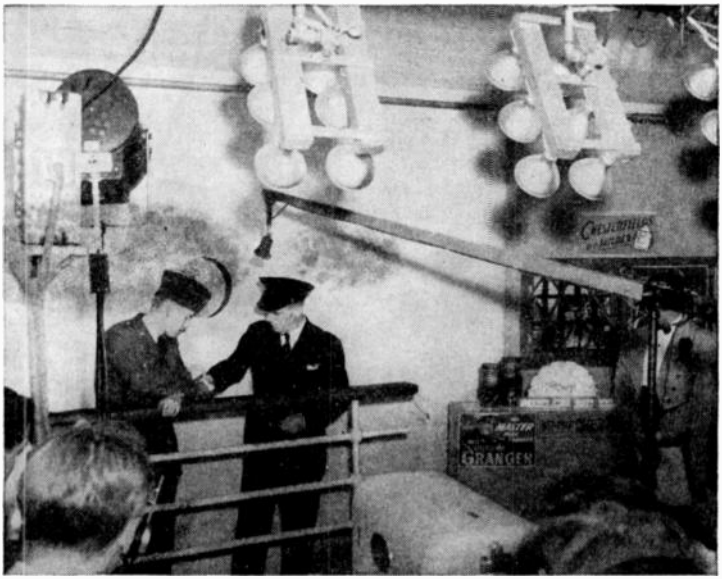


FIG. 81.—Dramatized Chesterfield commercial. (*Newell-Emmett Co.*)

difficulties created by a mayhem-minded youngster from next door. Throughout the playlet, the kitchen facilities showed in gleaming whiteness and did a subtle selling job, especially since the script called for the wife to demonstrate the use of the various facilities offered by the American kitchens. A very brief commercial introduced into the script was all that was needed to tie the whole production in with many potential sales.

Often the dramatized commercial can get its message

across with a sense of humor. Lifebuoy shaving cream, in a commercial prepared by Ruthrauff & Ryan, once showed a man shaving before a "mirror." Suddenly the man cut himself and the "reflection" proceeded to reprimand him,

FIG. 82.—"The Queen Was in the Kitchen," produced for American Kitchens by Bruno-New York. (*Bruno-New York.*)

"When you cut yourself, I bleed too!" After a harangue about the proper selection of shaving cream, the image handed the shaver a tube of the cream through the frame of the mirror and they continued their shave in happy synchronization.

Against a musical background a young man was endeavoring to propose to a girl. A cleverly superimposed image made the thought, "Oh, oh, B.O." appear over her head. This was effected by the placement of two cameras so that the

letters could appear in the upper part of the picture without going out of the frame or covering part of the couple's features. She withdrew from him. Then the idea struck him (a lamp was shown above his head), he bathed with Lifebuoy soap and, at the end of the program, she got her deodorized man.

Still another commercial for Lifebuoy: A girl wasn't as popular as she wanted to be. The camera closed up on her face, showing her looking disconsolate. Suddenly a miniature of her appeared. This was her conscience advising her to bathe more often. The miniature, about as tall as the girl's head, gave her the necessary advice, then faded away and, we presume, the girl was ever so much more sanitary after that. The trick superimposition effect was gained through the use of twins!

These dramatized commercials are among the most exploratory in the early period of television, and those done for Lever Brothers by Ruthrauff & Ryan were very well received even in television's earliest infancy.

Commercials on film will continue to soar in popularity as television justifies greater expense in commercials and requires even greater precision. The cartoon type of commercial, presenting simple, sharply defined lines and an amusing, not too long message is one of the most effective in the medium. Botany Fabrics did much to popularize the company's trade-mark of a wooly lamb in giving weather reports on television on both the National Broadcasting System and the DuMont television stations in the early commercial period. Another early cartoon character that earned favor for a product was the little dog-and-boy team in the one-minute cartoon commercials for Canada Dry's carbonated beverage, Zippy Spur. Cluett, Peabody & Co. always opened and closed their program for Sanforized fabrics (produced by Young & Rubicam) with a short commercial film clip

showing what happens to a Betty Boop sort of character when she forgets to purchase Sanforized clothes.

Full-length commercial films, showing the manufacture of airplanes, automobiles, rubber, gasoline, and hundreds of other products have already been pioneered for television and, when handled in a professional manner by competent cinematographers and in line with the restrictions and requirements of television films, they make excellent institutional programs. Steamship companies, travel agencies, and bus lines are other companies that will undoubtedly resort to films of a modified travelogue sort for the basis of their commercial programs.

The gadgetry commercials are the video effects men's field days. A puppet, called on to serve as master of ceremonies of the program, will, in all probability, resemble the product of the sponsor or his trade-mark. A girl may be shown dramatizing the fact that a little Rinso goes a long way. She proceeds to pull the clothing that, the commercial says, she just washed from a magic Rinso box and "extracts" vast heaps of washed linens and clothing. The trick is that the box is hollow-bottomed and is placed over a hole in the table. An assistant pushes the quantity of washed fabric up through the bottom of this hole. Turntables, fantasy figures, and visual trickery of all sorts add an air of novelty and pleasant bewilderment to the commercials so that they don't lose their freshness.

Among the most effective of them all are the commercials that don't try too hard. They let audiences watch fashions in an easygoing sort of skit, see an automobile as the background to a conversation between neighbors, enjoy a program in which the packaged product is shown on the screen without its being forced to their attention. The accompanying pictures (83 to 93) show some of the types of commercials that television has used effectively in the sponsor's best

interests and still without imposing on the credulity or good nature of the audience.

The first step in planning the television commercial is the selection of those product characteristics which are visual

FIG. 83.

and aid in selling. If an important selling point is not necessarily visual, such as "$40,000,000 was spent on these cosmetics last year," and the sponsor considers it important enough to use in the teleselling campaign, moving graphs, comparative charts, or picture-graphs will be called in to help. If the store address, the street intersection, the brand name, or the trade-mark is to be put across, title cards may be superimposed against the background of these in the opening and closing of the program. The link must first be established between audience and product.

FIG. 84.

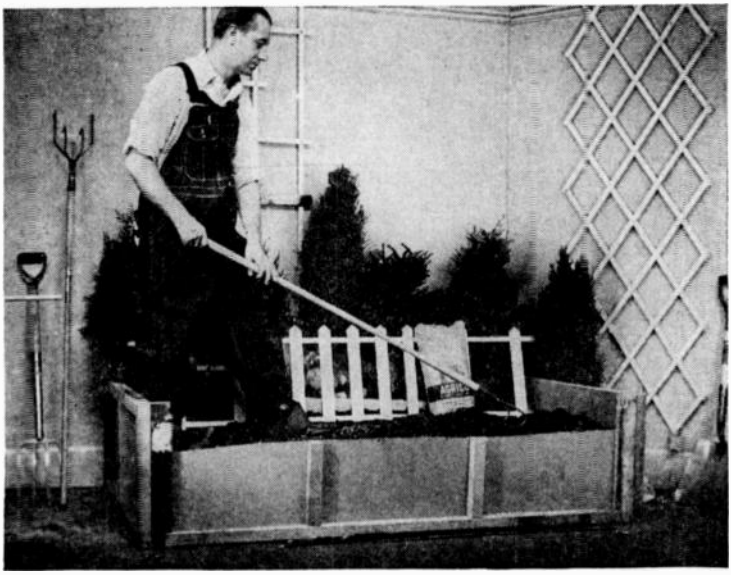


FIG. 85.

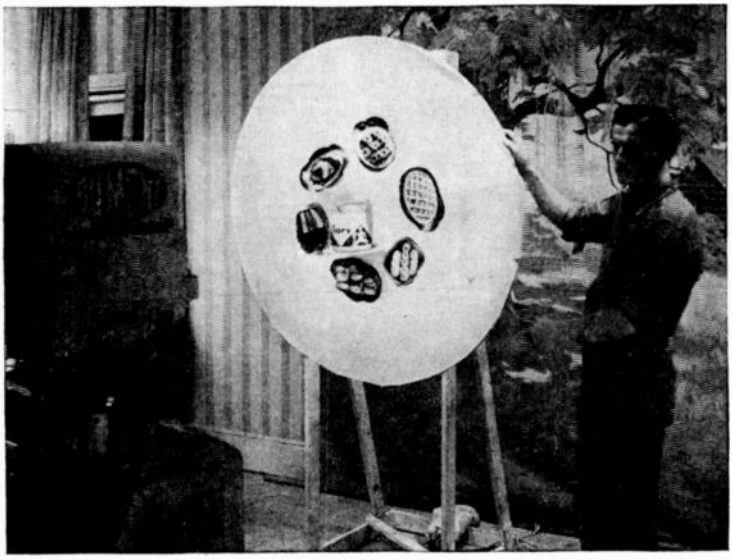


FIG. 86.

FIG. 87.

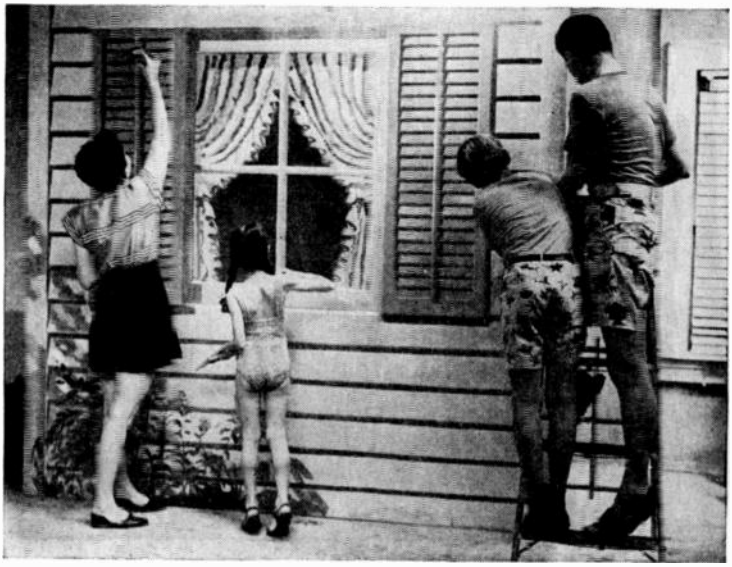


FIG. 88. (*Sanforized Clothes.*).

The department-store demonstrator would probably be rather good on television, provided her sincerity could be increased. She is accustomed to *showing*, not telling, the merits of her product, and that's teleselling technique. A product must be shown so effectively that customers will go

FIG. 89.

to their phones to place orders for the goods or, completely presold on the merchandise by television, will instinctively reach for the product on the retailers' shelves.

The length of the television commercial is surprisingly flexible. A whole message may be put across with the single flash of a picture and a word or so. Or it may be the meat of a full-hour show run seven days a week. The only yardstick for length is "How long is needed to get the message across?" counterbalanced with "How long does it hold the audience's attention?"

The principal disadvantage of the television commercial over advertisements in newspapers and magazines is its lack of reference value. You can't turn back in television to check

Fig. 90.

the address of a store, the name of a product, or the price of a bargain offer. The message must be put across so well that it lodges firmly in the observer's mind. Clarity and repetition, both visual and verbal, with any mental anchors that fit the subject, such as a tune for the store slogan, a hard-to-forget connotation for the brand name, or a battle cry that

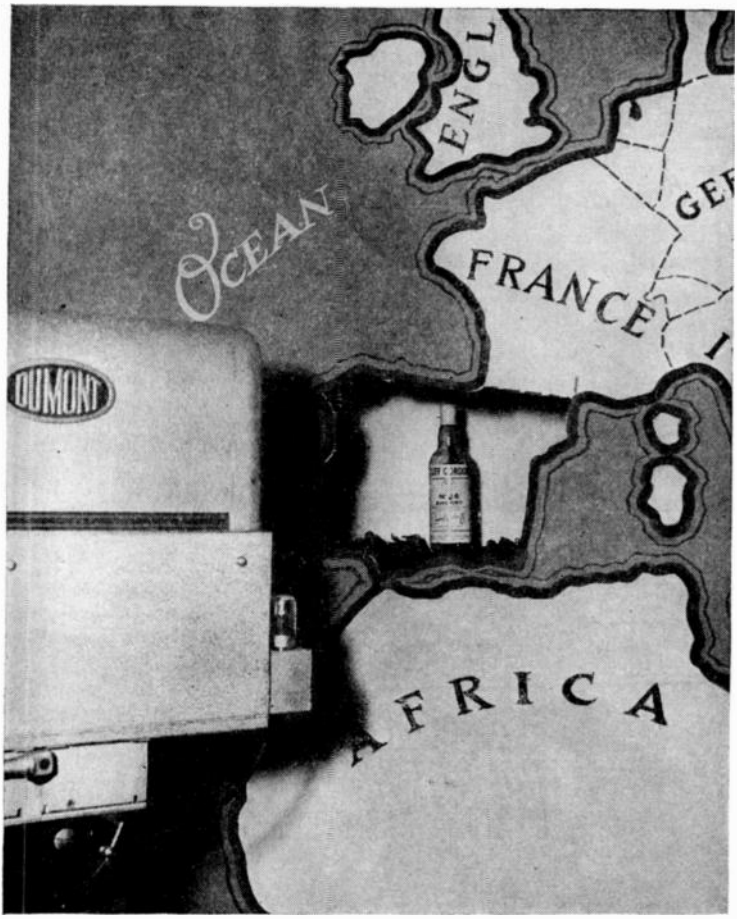


FIG. 91.

FIG. 92.

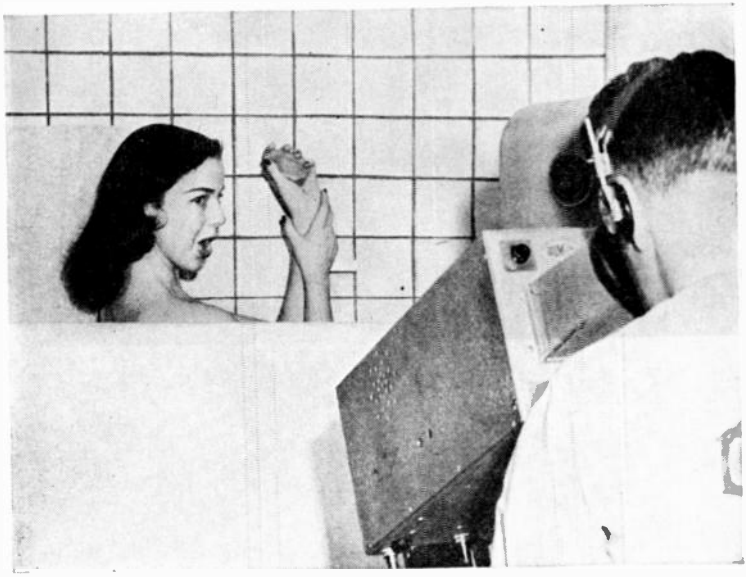


FIG. 93. (*Lifebuoy Soap.*)

links the trade-mark with the quality, satisfaction, or the particular use that the product enjoys—these are essential to the television commercial for its greatest effectiveness and constitute a device for offsetting its lack of reference value.

The preparation of a commercial with dignity and effectiveness is an important phase of television's advancement. To the extent that these commercials are developed, television will find economic justification and audience sympathy. If either the necessary restraint and good taste or the selling power is lost, an important chunk of television's strength has gone.

13. Production and Direction

Two KEY executives are involved in every studio program. Top man is the producer. His chief aide, oftentimes the man who must carry the principal burden of the show, is the director. These two can make or break a show by the degree to which they understand their materials, television, the actors, and the program objective.

Their responsibilities are limitless. Together they must evolve the program format, secure suitable scripts, cast the show properly, and cajole and bully the officials in charge of each department in order to obtain the most effective art, costuming, video effects, camera work, and lighting.

The producer is in command of all production details of the performance. The selection of the script, cast, and costumes; the maintenance of agency and station relations; the art work and commercials—all are under his jurisdiction. His job is to assemble all the component parts of a television program and whip them together into the best possible broadcast.

Some of his myriad duties may be allocated to the director. An expert in his field, he directs actors, camera work, lighting and video effects, to integrate a well-balanced entertainment. Inevitably, the preponderance of production details falls upon the director who must be on his toes at all times to see that everything goes off smoothly.

Sometimes both of these important roles are taken over by one man, the producer-director. He creates the program idea, convinces an agency or station of its merit, puts the

show together, directs it, and, occasionally even, doubles or triples as the script writer. In this position, he has all the program strings under one control. This is a decided advantage. However, he also has the disadvantage of being personally responsible for all production and direction headaches.

It is impossible to put too much care and time into the selection of the script. This is the skeleton, the basic foundation on which the show rests. If too elaborate or too involved a script is chosen, the chances are excellent that the show will stumble or wobble somewhere down the line, save when it is in the most inveterate of hands. If the show is too simple, static results may follow.

Choosing a script for a television production should take considerable thought. The size of the television studio, the number of actors in the cast, the length of the show and the commercials, the number of scenes necessary, and the cost of the entire production should be seriously considered. If it is produced in a small studio, only a script with one or two scenes should be used. If a larger studio is available, more scenes can be allowed. If a complicated script is chosen before a studio is assigned, the producer may find that he does not have enough room for all the scenes or that the scenes are too crowded and the actors too confined.

Regardless of the size of the studio, the neophyte producer will find it is advisable to keep the number of scenes down to a minimum. A good script can be much more effective and have more dramatic impact with one or two scenes than a poor script with four or five scenes.

Here are a few suggestions by which the script may be measured.

Can it be produced with the number of cameras and the amount of studio space available for the show?

Does it do the job—advertising, educational, entertainment, cultural, or whatever—it sets out to do?

Can it be clearly and powerfully executed in the space and time allotted for the show?

Does it have enough action to hold audience attention from the beginning to the very end of the program?

If the answers to all of these questions are in the affirmative, the chances are excellent that the show will go over and that flaws in the script can be written out of the program.

In no way, though, can a good script alone assure the success of a show, for no sooner is the script selected than the producer and director are confronted with another and a very serious bugaboo: the casting. Unlike in radio broadcasting, where the heroine can be fat, forty, and frowsy but with a voice that is lovely to listen to, in television the heroine must combine both aural and visual allure. Nor does television permit the forty-five-year-old juvenile, the bulky, balding hero, or the schoolboy octogenarian that radio may employ.

Casting for television is similar to that for the theater or the movies. A producer, who knows his job and has money enough in his budget to buy the actors he wants, will consider all available talent that may fit the role. Care should be taken that the actors are quick readers and can memorize new scripts week after week without wasting valuable rehearsal periods. The stock company veteran, the skilled radio ad-libber, the motion-picture professional—these seasoned troupers give strength and balance to a performance through their ability to impart confidence and technique to younger performers and their reliability in case of a muffed cue or technical difficulty. It is axiomatic in television that the more time and care spent in casting, the less is necessary in rehearsal; and the more time and care spent in rehearsal, the smoother the performance.

Now that the script and cast have been chosen, much preparation is necessary before the first studio rehearsal.

Copies of the approved script are mimeographed or multigraphed and distributed to all the cast, station program manager, key members of the camera crew and technical personnel of the station, art director, and everyone else having an active part of any importance in the production. The more participants who know the show, the better the chances of all departments functioning perfectly. These copies should be distributed well in advance of the first rehearsal so that everyone may be familiar with the show and the actors know their lines when they appear for the rehearsal.

The next step is consultation with the art director to discuss the sets necessary. The television artist is a specialist in his field and he knows color, costumes, periods, sets, and the limitations of the television equipment. The producer explains the play to him and requests sketches of all sets for approval. The earlier these sketches are ordered and approved, the more time the artist has for planning the details of the finished settings and executing them with professional skill, freshness, and originality.

The more fully the sets and properties are worked out from the original rough sketches, the less time and money lost in alterations of the full-scale finished art work.

Rehearsals fall into two categories: line rehearsals and camera rehearsals. Television studios charge by the hour for camera rehearsals, that entail the use of the full studio crews, or else they allot a limited number of hours of camera rehearsal along with the sale of a given amount of station time. In either case, economy of camera rehearsal time is good business, and considerable line rehearsal before actual studio work is undertaken is good, sound economy.

The director, between line rehearsals, can consult with the production assistant or the technical director assigned by the television station to aid him with the intricacies of

television. The two plot out camera angles and shots on paper, work out any special lighting effects required by the sets and the action, and evolve a blueprint of how the script, cast, and sets can be interpreted by lighting and cameras.

The experienced director appears at the studio well in advance of actual rehearsal time and holds a session with the studio cameramen and technicians. He is on hand to answer any questions they might have and is open to their suggestions concerning camera shots, action, actors' movements, close-ups, compositional ideas, and how sound and pictures are to be combined. The more eagerly he accepts the suggestions of veteran crew members, the better will he derive benefit from their experience. Frequently, they can interject fresh, effective, professional touches to the show that improve its gloss immeasurably.

These conferences also help to cut down on camera rehearsal time or make the allotted time more valuable for polishing the details of the production. They make it possible for the camera, microphone, and lighting technicians to go through the early run-throughs with a minimum of time out for explanations and a smooth integration of the dramatic and technical phases of the show.

Radio broadcasts almost invariably finish on time. This art has been perfected through years of radio experience and because time is the merchandise of the medium. Television, too, deals in time units, but here it is necessary to plan shows with even more care than in radio because speeded-up delivery coupled with speeded-up action would be ludicrous, and a lag in action could cause disastrous loss of audience attention. Actors and writers must be drilled repeatedly in the exact timing that television requires. Here are three simple rules to follow in timing a show and getting it off the air "on the nose":

1. Make sure that there is available, as part of the show,

some feature or device flexible enough to stretch or condense it if the time does not seem to fit perfectly.

2. Always go on the air with as close to the exact amount of show you need as it is possible for you to evolve; never with more than you could possibly fit into the allotted time.

3. Make sure that your addition or subtraction of all timing of units is accurate.

The television director should equip himself with a good stop watch. Constant use of it will make the timing of a show a habit which becomes almost a reflex action. The instant the rehearsal starts, he automatically starts his watch. If something delays the show for a while, he instinctively stops the watch.

After several rehearsals, when the director and producer are agreed that no more changes are to be made in the script and camera shots, it is time to mark the timing on the script. There is no rigid rule for such marking, but 30-sec. intervals are usually employed satisfactorily. Anything more exact than this would entail excessive cluttering of the script.

Along with timing a sense of pace is essential to good direction. Unless a director keeps a watchful eye on the cast, the tempo of the drama may speed up, the actors may waste too much time with the stage business, recite their lines too fast or too slowly, or do any of various things that change the pace of the production.

Comedy requires a different pace than drama. It is faster, less leisurely. There should be no slow, careful evolution of a psychological process if humor is to be controlled. Moods are conveyed with pace as well as words and pictures.

Changes in the speed of characters' actions and in verbal delivery are not the only pace controls at the director's disposal. By frequent shifts of camera positions or of subjects being recorded by the cameras, he can also affect the timing of his shows. An emotional device at his disposal is the light

volume of the picture being broadcast. Light, bright pictures are cheerful. Heavy, deeply shadowed, somber ones are more forbidding. Sound, too, is a weapon with which the director can assail the emotions and intelligence of his audience, particularly the use of subtly blended background music or startling crashes of unexpected music at climactic moments.

During camera rehearsals, the director works from the control room and gives his instructions to the production assistant who repeats them over a microphone at the control panel. Members of the station crew wear earphones to receive these cues without interfering with program sound.

The director must be very alert during rehearsals and when on the air for, while he is directing action before the camera currently being used, he is also setting up the composition for the other camera or cameras. For example, when #1 camera is on, he is busy arranging the scene for #2 camera; adjusting the camera, lighting, position of the cast, sound, shading of light control volume, and any other details that require change.

When the show reaches the place in the script designated for #2 camera, he gives the cue, "Take 2." While directing #2 camera in action, the director proceeds to set up the scene for the next camera to be used. He may call for the focusing to be more selective, as a sharp fore-, middle-, or background; he might want the image on the camera faded slowly to black, the light volume of the picture increased, or any other last-minute adjustments.

In the control booth he uses verbal orders as reins by which to control the image shown on the output monitor, or the screen showing the picture being broadcast, as well as the sound accompanying the image. It is the director's cue that instructs the sound engineer in the control booth when he is to pick up sound from a different microphone in the studio, when to fade sound up or down, when to start a given

record turning for a sound effect, music, or other aural parts of the program, and when to kill sound.

To speed up matters and to avoid confusion, directors usually employ brief, staccato cues. The following are some of the terms commonly used in television studios.

CAMERA:

Take one, two or three—Each camera in the studio is numbered. This instruction is to the production assistant to begin broadcasting the image picked up by the designated camera.

Dolly in—Move camera in for close-up.

Dolly back—Move camera back for required shot.

Pan left or right—Point camera to side in specified direction.

Tilt up or down—Tilt camera up or down. (Also called "pan up" or "pan down" in some television studios.)

Blow up—Move in for maximum close-up to fill as much of television screen as possible without image distortion.

Give me a two-, three-, or four-shot—This cue does not refer to the number of any camera, but means a shot of the number of people stipulated. For example, in a cast of four the director might say, "Give me a two-shot of the narrator and the guest."

Set up for a lap—Get ready for a lap dissolve.

Lap—Proceed with lap dissolve.

Hold—Camera to remain in position until cued to move.

MUSIC:

Stand by to roll music—Start audio turntable.

Roll music—Start record and fade in sound.

Bring up sound—Bring sound in more loudly.

Fade music out—Fade sound out gradually.

Fade music under—Fade music under dialogue and hold.

FILM:

Stand by for film—Warning to film room to ready the projector for film showing.

Roll film—Start the film rolling. Usually a leader or some innocuous subject matter is used to start the film so that the projector has reached its proper speed for the "Take film" cue.

Take film—Switch the picture being broadcast in the studio to that being projected from the film.

Film clip—Short piece of motion-picture film used as filler or bridge.

Because of the sensitivity of studio microphones, it is necessary to give actors visual cues during a broadcast. This

is accomplished by use of large, printed cards or by hand signals. Some of the standard cards are

Stand in closer
Talk louder
Five minutes to go
Two minutes to go
One minute to go

The accompanying illustrations (Figs. 94 to 100) show some of the accepted hand signals used during broadcasts to control

Fig. 94.

Fig. 95.

action. Many of these are familiar sign language to radio veterans but, in television, these signs are not given from a comfortable control booth. Instead, they are carried out by the nimble-footed manager who is constantly on the move to attract attention of the actors when necessary.

While the director is unifying acting talent, cameras, lights, and sound into a smoothly blended show, the producer is attending to his myriad duties. He submits scripts to the station well in advance of program time for approval. This allows the station ample time to check compliance with FCC

and station rules, send out program schedules, and enlist assistance of station officials who can aid in formation of the

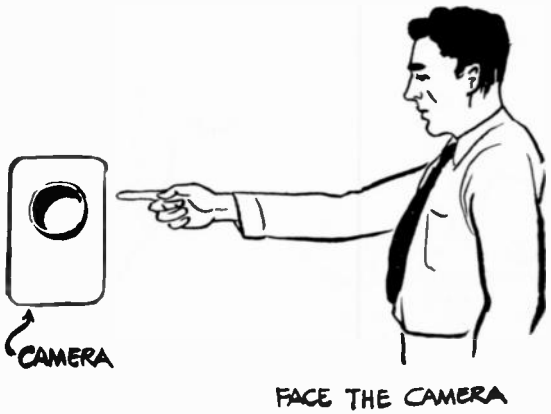


FIG. 96.

show. Cooperation in allocating broadcast tickets for fair distribution among various broadcasters and the proper care and return of props are also expected of the producer.

FIG. 97.

Television calls for essentially the same sort of relationship between the producer and the agency that radio requires. The agency is responsible to the sponsor for the way his

FIG. 98.

FIG. 99.

money is being spent. It can, therefore, dictate how the show is to convey the sponsor's message, be it educational, institutional, or straight sales. Tact, intelligence, salesmanship,

FIG. 100.

and full understanding of the agency's problems should characterize the relationship between the producers and the agency.

Similarly the sponsor is, understandably enough, concerned with the presentation of his product by television in the most flattering and persuasive light possible. Punchy, effective, inoffensive commercials coupled with strong audience-holding body portions of the program are the producer's principal obligation to the sponsor. He is usually most careful to fulfill this obligation to the very best of his ability. The repetitiveness of his pay check hinges on it.

The producer is the keyman in television production. On him rests the responsibility for the success or the failure of a program.

The director is the principal creative figure in the executive end of television production. He is responsible for the perfection and artistic integrity of the show.

On the caliber of men and women who assume these posts rests the acceptance of television by the world.

14. Programing

THE TELEVISION broadcaster is a beleaguered man, constantly forced to select from the various types of program material available to him. Film, studio, near-by news, and network programs vie for station time. From these types of shows, the broadcaster must select a program schedule that (1) serves the station's economic needs, (2) meets Federal requirements, (3) minimizes the various pressures brought to bear on the station, (4) renders a valid community service, and (5) conforms to the physical facilities of the station. The task is ramified and difficult.

Some factors that influence the broadcaster's programing decisions follow:

Audience measurement reports corresponding to the Hooper, Crosley, and Nielsen surveys in radio. Television stations originally conducted these surveys privately using postage-paid postcards rather than coincidental surveys (phone or television receiver checks during actual broadcasts). Later established radio-audience measuring companies began analyzing television program response.

Letters sent to the station by members of the television audience. These give more detailed reasons for preferences but they are less reliable as indicators than the audience survey. Often an actor's friends or a quirk in a single program may stimulate letter response artificially. There is also the eccentric element which habitually writes, lowering the average trustworthiness of the mails as a program-planning aid.

Organizations often send delegations or petitions to stations in favor of certain programs or types of programs. They range from business organizations to civic and church groups and, because of their power in the community, the broadcaster must grant them serious consideration, even when the requests are extraordinary.

Advertisers may choose to use their time for certain types of programs that may sharply influence the percentage of broadcasting time devoted to those programs.

News developments, always important to hold television audiences and frequently unpredictable, pop up unexpectedly and throw the schedule out of kilter. Then newsreel cameramen from the station or remote pickup crews cover the developments much as radio did its war news. Because of the tremendous audience appeal of this type of program, it is expected to commandeer an increasingly higher percentage of the daytime broadcast period as the stations increase their news pickup facilities.

Station facilities, particularly in the cases of the smaller stations, may force the broadcaster to compromise. Although he may wish more studio programs, for example, he may have to use more film or remote coverage to keep the studio clear for rehearsal, particularly in the case of the more ambitious dramatic productions.

The programing agency, then, must keep a well-planned chart of scheduled programs, stand-by programs (usually films), rehearsal schedules, personnel assignments, news developments, film release dates, network broadcasts, and plans for music, art, script, make-up, costume, and other associated assignments.

Before they are subdivided, four principal types of programs are available to the station: remote pickups, network shows, motion pictures, and live studio programs.

Let us examine these four suits in the programing deck more carefully.

Remote Pickups

Probably the most exciting television, if not the most artistic, will be the remote pickups of news and sporting events. Although this phase of television has been used in broadcasts since 1939, the really immediate coverage of sports and news developments has been a rarity because of the involvement of setting up the cumbersome equipment used in the early days of television. One organization at first would not plan remote programs except when they represented at least an hour's programing in one place, such as at a baseball game, a boxing arena, or other prolonged activity. Now the organization plans to cover 30- and 15-min. programs and, when more completely self-contained equipment is installed in a van, including, if possible, a portable power supply, even shorter program material will be covered.

Cruising cars or small trucks carrying remote pickup equipment will cover the human interest events of our daily lives and the front-page news activities as they occur. Should the audience be small at the time of the event—say, in the early morning hours—the program can be recorded on film either on the site or off the face of a receiving tube in the station, and the film broadcast when the audience is larger.

The problems in setting up equipment for remote pickups are the securing of a power supply, the attainment of a suitable vantage point for televising the event, and the placement of the broadcast antenna in line of sight so that the signal can be relayed to the main transmitter, or the wire linking of the pickup equipment with the transmitter so that the signal can be sent to the station for rebroadcast. For this latter technique, coaxial cable is used for long distances;

telephone lines can be used for short transmissions. Because conventional telephone lines, as used in chain radio broadcasting, will pass only a maximum of 8,000 cycles per second and television transmission along the line requires 2½ to 3

FIG. 101.—Mobile unit of Philco television station WPTZ, Philadelphia, ready at all times to transport the remote pickup television cameras and equipment to the scene to be televised. (*Philco Corporation.*)

million cycles per second, a number of special amplifiers, repeaters, and equalizers are used to permit the extended high-frequency response in the line. This method of transmission is good for only short distances even with these aids because of the high loss of signal in the line. Coaxial cable is used over longer line transmission because it has a lower loss per unit length and requires fewer amplifiers and repeaters than do the telephone lines.

The field pickups or remotes may be either indoors or

outdoors. For isolated locations, parades, fires, riots, and other activities in unpredictable locations, the entire mobile unit including two or more cameras, power supplies, transmitter, and antenna, mounted in a large truck or van, is

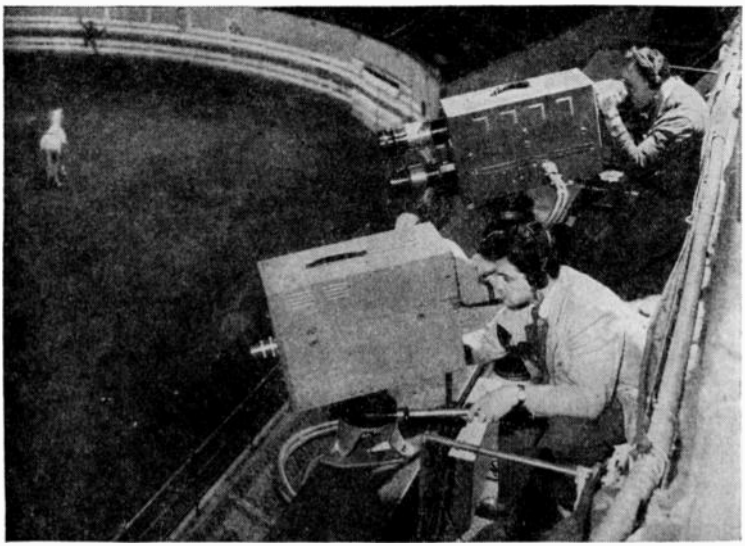


FIG. 102.—Scenes from Madison Square Garden are picked up by RCA's new supersensitive television camera (foreground) and by a conventional camera to demonstrate the advantage of the new development in providing greater depth of perception and clearer views under imperfect lighting conditions. (*Radio Corporation of America.*)

dispatched to the scene. Cameras atop the van pick up the picture which is relayed by a high-frequency transmitter using a directional antenna to a relay receiver installed at the station. The relay receiver is usually placed near the master control board which is used to monitor the incoming signal and feed it to the main transmitter.

Telecasting from fixed positions such as fight arenas, ball parks, and theaters can be accomplished without trucks by installing semipermanent equipment at these various loca-

tions and sending the picture and sound to the main transmitter along telephone lines.

Placement of the television cameras is probably the most difficult and exacting decision to be made by the remote

FIG. 103.—Close-up of the Philco television booth at Shibe Park, at the football game of the Philadelphia Eagles (professional) and Villanova College have been picked up by Philco and relayed to the main transmitter at Wyndmoor for rebroadcasting over Station WPTZ. (*Philco Corporation.*)

pickup crew. It should, of course, be at a spot near the greatest point of interest, but considerations of power supply, line of sight to the main transmitter, accessibility, and importance of getting into action immediately may influence this decision.

The start-finish line is ideal for the race-track coverage, for example. One camera should be able to pick up the excitement of the spectators around the starting line and catch

the start and finish of the race. This same camera with a telephoto lens, or a second camera mounted high, should be able to follow the horses around the track. The traditional 50-yard-line spot is best for the key camera in a football

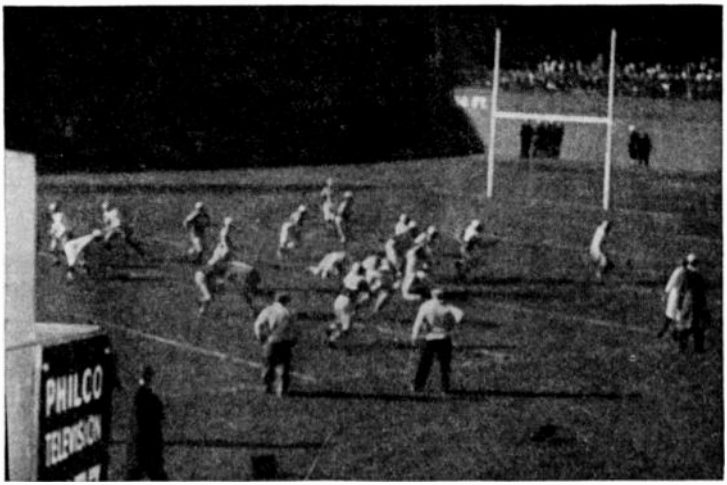


FIG. 104.—Philco telecast of the Philadelphia Eagles and Brooklyn football game from Shibe Park in Philadelphia which was relayed to the main transmitter at Wyndmoor and rebroadcast to viewers in the Philadelphia area by Station WPTZ. (*Philco Corporation.*)

game coverage, but other cameras near the two goals stand excellent chances of recording the most exciting seconds of the game. The same applies to hockey, tennis, basketball, or any other game covering both sides of a field. One camera in the center, if there is just one camera available, one camera covering each half if two cameras are available, and one camera at either end and one in the center if there are three seem to be the soundest placement tactics.

In boxing, it is advisable to set up the camera so as to be able to pick up the fighters in their corners as well as in the center of the ring. Sometimes fights are covered by the

cameraman's focusing his camera on the center of the ring, taping the focus lever in place, and then concentrating solely on following action.

Remote equipment will prove of particular value to the small stations of the future since they will free the studios for rehearsal and still present the audience a sound and attractive set of programs including sporting events, plays in near-by theaters, man-on-the-street programs, civic events, and many other community activities which are likely to hold audiences to the station.

Network Systems

In a short time, television stations will be springing up all over the country. They will be wide-spaced, sudden, and, in many cases, at first independent of each other. Then later, bit by bit, links will form and the whole will integrate into an unparalleled, gigantic industry and medium of entertainment.

These links will be formed in various ways, either by coaxial cable, ground or aerial relay stations, or stratovision. The most likely and certainly the most developed is a combination of the two former types.

The American Telephone and Telegraph Company has laid thousands of miles of coaxial cable in its program to link the various metropolitan areas of the country together. This cable is being rented to broadcasters and networks. Relays are integrated with the cables in those regions where topographical conditions make the relay the most practical method of covering distance. Although signals have been transmitted for a greater distance, relays are seldom spaced farther apart than 30 to 50 miles so that the signal strength and clarity are not jeopardized. The relay station picks up the signal, amplifies it, and rebroadcasts it toward the next relay or broadcast station.

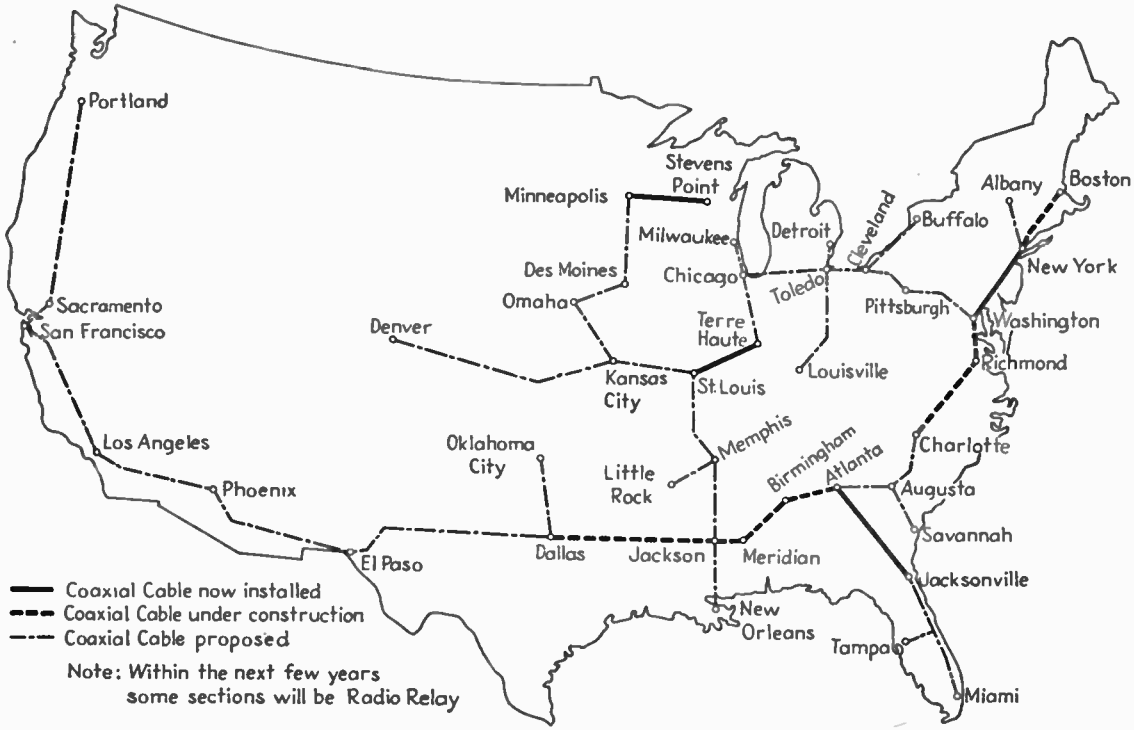


FIG. 105.—A network of coaxial cable is now being installed throughout the United States along various routes between the main cities of the country. Although this coaxial cable is primarily constructed to take care of many long-distance telephone conversations, it is also possible to send a television signal over these facilities.

A possible method in relays is the aerial type which corresponds to the radar equipment used along the coasts of the United States during the Second World War. These are captive balloons rigidly anchored so they cannot turn in space. They are kept at different levels under 10,000 ft. The radar tests during the war showed the balloons capable of remaining aloft for as long as a year and to be comparatively safe from weather hazards. They will extend the coverage of the relays considerably beyond that of ground relays since the television signal can be transmitted somewhat beyond the point where a line from the transmitting antenna forms a tangent with the earth.

Stratovision is the ultimate in antenna altitudes that has been advocated at this writing. It would have a gigantic plane carrying FM and television transmitters flying above a ground point such as the television station in a slow constant figure 8. This would take place at approximately 30,000 ft. The project has been evolved by the Glenn L. Martin Aircraft Corporation and Westinghouse. Television engineers of these companies estimate the coverage possible from such a system at approximately four times that of the ground transmitter. With 14 such planes, they feel that stratovision could cover 78 per cent of the country.

These are the ways in which programs of the networks may be brought into the station. What they may be is hard to predict. Certainly they will include the more lavish broadcasts originating on the West coast and in New York and other principal talent centers. They will also encompass news events of national importance. Yet the network programs for television, like those for radio, will include some material that is not necessarily of strong local interest or in the local broadcaster's interests to pick up. His judgment tempered by public service and economic considerations is of particular importance in determining how best to affiliate

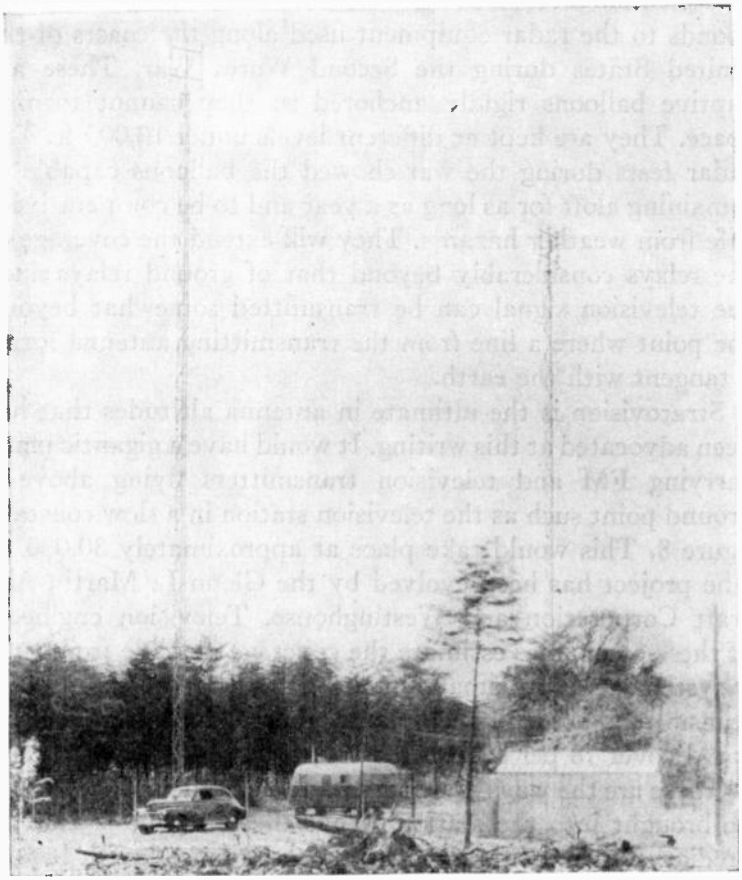


FIG. 106.—Two 100-ft. antenna towers, each with a 24-dipole array, are used for receiving and transmitting signals at the Arlington, Va., relay station, first link in the new multiple-relay television network. The left antenna tower has the 24-dipole receiving array; the right-hand tower, the transmitting array which relays the signal to the next booster station. The transmitting and monitory equipment are in the trailer (center). Video signal generator and stand-by gasoline-driven power generator are in the steel building (right). (*Philco Corporation.*)

with the national hookups. Already the major broadcasting networks of radio are starting intensive drives to tie in with local television stations throughout the country. Newcomers to the network picture are also arising. At first there will undoubtedly be a wild scramble for post positions in the network picture, but eventually television, like radio, will simmer down to a few key national hookup organizations with many small ones of a more local nature hanging on through their regional advantages.

Motion Pictures

The small, independent television station will stand particularly to benefit from the motion-picture film features. Films are the one type of "name" talent that they can secure to compete with the prominent personalities that the major networks will line up for top program spots. Furthermore no scenic work, performers, stage hands, technical crews, producers, and writers are needed for the television presentation of films—significant factors to the budget-conscious television bosses. These economic advantages of films for television can be realized only if films are made available to the medium for comparatively low costs. Should the costs of films remain as high as they have while Hollywood has been their wellspring, live programs with film bridges and occasional film-clip inserts may still prove the less costly of the program types.

The motion-picture companies, under pressure from motion-picture exhibitors, will not release full-length features, shorts, or newsreels for use on television. The exhibitors felt that they would be getting second crack at the audience if the home teleset owner saw the same programs, and not without justification. However, as television receivers become more numerous, the television audience is quickly expanding to where it can justify the production of films especially for

television. This will be a welcome relief from television's early period when broadcasters were forced to rent film 5 to 15 years old from the various film-rental libraries.

One type of film program that stands an excellent chance of rising to considerable popularity is a film made by recording the image from the face of a television receiver tube. This permits independent stations to exchange programs not of an immediate nature without network hookups, and it lets the affiliates of networks space their programs in accordance with their time zones, since affiliated with the filming process is a speedy type of film development which allows complete processing in an unbelievably short time. These audio-video transcriptions are also of great value to the producer and station management in studying the programs analytically and in supplementing the station transmitter's logbook. The films are taken by especially built 16-mm. motion-picture cameras from the face of a line-monitor television screen.

Live Studio Shows

Television's spearhead and the chance to do the closest thing to a theatrical job of programing are in the live studio program. Here a variety of subjects from fashions to educational features to variety shows to serious opera hold sway. The biggest bugaboo in the live studio presentations is rehearsal time. Experience has shown that an average of 6 hr. of rehearsal time is required for a 1-hr. show. Some shows require a great deal more rehearsal than others. Rehearsal time depends on the type of show presented.

Most difficult of all to produce and probably the most satisfying are full dramatic productions. These require every bit of rehearsal time possible for smooth operation, and they need complete studio crews throughout studio rehearsal periods. There are so many people involved in these produc-

tions and the chance for error is so great that rehearsals are of vital necessity to make certain everybody knows his job well.

Valuable time and money can be saved if the producer and director hold cast line rehearsals outside the studio and abstain from calling for studio time until the lines are all down pat. Stage business, too, can be rehearsed outside the studio if the producers and director train the casts to work closely together (a concession to the comparatively narrow angle of most television camera lenses). Knowing the physical size of the studio, the program officials can mark off a corresponding area and take into consideration the range of the camera. By proceeding in this manner, they will find the 3 hr. of studio rehearsal time normally allotted for a ½-hr. show can be devoted primarily to camera shots and angles.

Similarly the fashions and operas, ballets and musical comedies, the variety shows and the newscasts can have their own specialized care in planning as programing develops into a less haphazard art. Experts will arise, experts in handling the various types of program with smooth, professional control. Even those television shows which have been fairly simple to produce, such as audience participation programs, news, interviews, travel, and similar types will find fresh, new programing techniques that, like the most ambitious dramatic shows, require skilled and careful studio production.

Programing, the welding of remote, network, film, and live programs into an integrated, well-balanced audience bill of fare, is an art, a challenge, and a problem on which a broadcaster's success may very well hinge. Should he do this job properly, many mistakes can be offset. Should he fail in it, many a brilliant coup in other departments will have been wiped out.

There is no accounting for the shifting tides of popular taste, but one authoritative survey of recent date showed the following types of programs, in order of popularity:

Sports
Variety shows
Drama
News
Musicals
Quiz shows
Movies
Comedy
Fashions
Forums
Homemaking

At any rate, the list serves as a taking-off point!

15. Television's Future

In this vitaminized, atomic, robot-mastering, technologically jet-propelled era, any guesses as to television's future need tempering and conservatism rather than untrammeled imagination to keep them in line with scientifically in-sight truths. For this reason, we shall by-pass such conjectures as the possibility of beaming a television signal to the moon and having it bounce back to cover an entire face of the earth or the programs conveying sight, sound, smell, taste, and tactual impressions. The remaining field of television's future is certainly broad enough!

Consider networks, for example. National networks are already in sight. The overland networks possible to South and Central America are scientifically if not economically practicable today. It was possible to lay the Atlantic cable many years ago to reach Europe. Television cable may very conceivably be brought down sufficiently in cost to be laid in a comparable manner and, with the present explorations in scrambling program material so that several sets of signals may be sent by a single wire simultaneously, a single cable might well mean full-scale, wide-service communication across the ocean via television. Floating relay stations, anchors to which high-flying captive balloons are held, offer another scientifically practicable method of spanning the ocean with television signals. Others may derive from stratovision experiments, mastery of unexplored reaches of the spectrum, or new developments in highly directional transmission. Whichever system wins out, it is almost certain

that international television across the ocean is a development barely a decade away.

That will mean international standards, international languages, international programing hookups, and international thinking. During the recent war, we developed a tremendous capacity for international cooperation. Television's mightiest role in our civilization may be the translation of that wartime necessity to a peacetime guard against war's imminence.

Electronic color television pictures, produced by all-electronic means, were demonstrated publicly for the first time October 30, 1946, by Radio Corporation of America, at RCA Laboratories.

The demonstration, revealing a revolutionary development in radio science, proved that flickerless, all-electronic color television is practical without rotating disks or other moving parts.

This new system, the engineers explained, is a complete departure from mechanical color, which has been shown in various forms since 1925. In announcing this important advance, RCA officials pointed out that the time period estimated by their engineers in December, 1945, when they said five years would be required to bring any color system to the present status of black-and-white television, still holds.

It was further disclosed that a simple, inexpensive radio-frequency converter makes it possible to introduce this all-electronic color television system without causing obsolescence of black-and-white television receivers.

A new color-slide television camera, developed by RCA and used in the demonstration, produces signals from 35-mm. Kodachrome slides. Transmission of the picture on the slide is achieved in natural colors when a light beam from a kinescope is focused through the slide and separated into

component colors by a system of mirrors and photoelectric cells.

Each of the three transmitted images—red, blue, and green—is of the same number of lines, that is, 525; also remaining the same are the horizontal scanning rate and the picture repetition rate of 30 pictures a second as in present commercial television broadcasting.

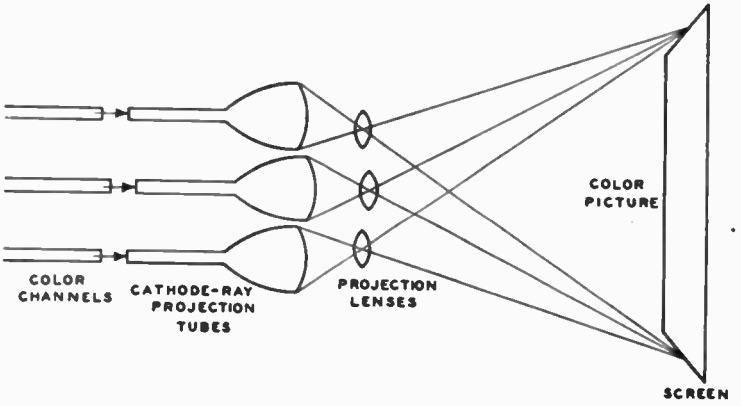


FIG. 107.—Diagram of optical system in RCA all-electronic color television receiver.

The receiving set is equipped with three 3-in. kinescopes, which separately receive the signals representing red, blue, and green. This trio of kinescopes is called a Trinoscope. From it the three color images are optically projected into a brilliant composite picture which appears on a 15- by 20-in. screen in natural color, free from any flicker, color fringes, or breakup of color.

By this new advance in television, *simultaneous* color transmission is made possible, instead of *sequential* transmission (as used in the mechanical system) color by color.

Since the electrical characteristics and all the standards of the green image—including the synchronizing pulses—are identical with those of the present black-and-white stand-

ards, any broadcasts from color stations using the electronic simultaneous system can be received clearly on black-and-

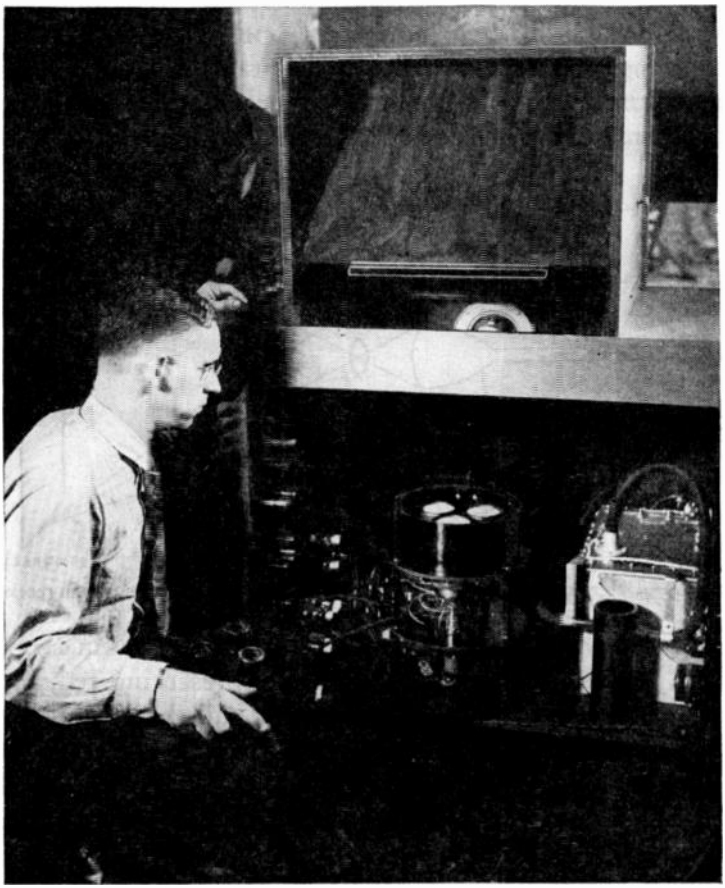


FIG. 108.—Rear view of new RCA all-electronic color television receiver.

white receivers by the addition of the easily installed radio-frequency converter. No modifications whatever are required inside the set.

This converter will enable present-day television sets to receive color programs and reproduce them in black and

white, even when transmitted on ultrahigh frequencies. Thus existing receivers will not be made obsolete by the introduction of color at some future date. On the contrary, their usefulness will be extended. For example, if a football game is broadcast by a color transmitter, the owner of a black-and-white receiver can see it in black and white. Even one of the first television sets introduced by RCA at the time of the World's Fair in 1939 can be adapted to tune in the electronic color pictures in black and white.

Likewise, it will be possible for electronic color television sets to receive the broadcasts of black-and-white stations. Furthermore, when electronic color television is established as a broadcasting service, the black-and-white receivers will be able to reproduce the color broadcasts in monochrome. Engineers explained that this cannot be done with any known system of mechanical color.

Officials of RCA pointed out that a station owner can begin with a black-and-white broadcast service. He may operate a monochrome transmitter on low frequencies and also an electronic color transmitter on ultrahigh frequencies, using the signal of the color camera to operate both transmitters. With such a dual arrangement, the problem of obsolescence for the broadcaster as well as the viewer is reduced to a minimum. In fact, the broadcaster would thereby be able to render service in both black and white and color from the same station.

Color television will carry with it many corollary developments. There will be advances in the processing of color movies so that they may be developed and made ready more quickly and copied with speed and ease, possibly through an additive color-printing process in which three or four thin transparencies of the colors now used in color photography may be combined, much as they are in the carbro printing of today's still photography. There will be new developments in thin, transparent make-up colors that will be invisible

cosmetic work even to the critical close-up. There will be fuller knowledge of textures, colors, reflection, and refraction in the art of costuming. There will be more skilled use of the coated lens and the coated television projectors to avoid unwanted reflections, hazes, and color aberrations. There will be a new art of thinking on the part of script writers, art directors, producers, and directors. They will have to advance their recently acquired knowledge about thinking not in words but in pictures and action to *colored* pictures and action. It will not be easy. We shall have garish, raucous use of color, promiscuous emphasis, and the other horrors that arose in the early days of color photography and movies with us again for—we hope—only a short while.

Three-dimensional television, while treading on the borderline of the fanciful, is not a scientific impracticality. In fact, the three-dimensional 35-mm. slides that are so recently in vogue offer only one of the many possible approaches to three-dimensional television. There have been screens evolved of thousands of fine vertical cylindrical columns on which are projected two separate pictures so that the two eyes of the observer see slightly different images. The vertical distortion of these screens may be solved by work now going on with a mosaic of domes on the screen and parabolic projectors throwing images onto their surfaces seen by the eye. The two-colored system of the early movie days may well pop up again as a television novelty also, particularly in view of the work done by some manufacturers in two-colored electronic television.

Technically, the potential of television is vast. Socially, politically, and economically, its future is very nearly immeasurable!

Radio's contributions to recent political campaigns added a new and powerful weapon to the politicians' arsenal in fighting for votes. Television's contribution may well dwarf

that of radio! When you see the speaker, see the sincerity or artifice, homeliness or handsomeness, intelligence or cunning or moral strength or flabbiness in his features—political campaigns won't long be what they used to be!

Entertainment will take new standards. Whole families will be enjoying their television programs, and increasing discretion will be employed about the use of material generally conceded to be in bad taste. The burlesque type of joke will be an almost certain device whereby the broadcaster can lose his audience if not his license. On the other hand, television may well develop a more adult approach to programing where the subjects are of an adult nature. It may wage a powerful drive against certain social flaws through the punch of pictures combined with sound. Child labor may be shown in its ugliest and most objectionable manifestations, and the social good resulting from the resultant revulsion may well accrue to the credit of television and its audience. Similarly, poll taxes, lynching, usury, certain medical practices, penal systems, educational systems, housing conditions in the slums, sanitation systems in poorer communities, and crooked political shenanigans wherever they may crop up—all of these may be spotlighted and constricted, if not erased, by the power of television.

Entertainment for simple enjoyment will become a larger, if not as extravagantly paid, industry than the cinema and vaudeville combined could have made it. Even if networks attain generous size and if filmed programs are widely distributed, the local stations throughout the country will become reservoirs and proving grounds for local talent as well as a constant source of inspiration to local audiences to develop talents and join in the glamour that is television. Unprecedented masses of writing and designing and performing and producing will form around the nuclei of the television stations and even the television systems built in

department stores. They will be constantly revolving, these masses, so that some go to the larger producing areas and some back to the smaller stations in a free and mutually beneficial interchange of ideas and talents.

The family will find television a source of amusement in the evening particularly, but throughout the day certain special types of programs will draw the family to the telesets. The World Series will hold Dad's and Bud's attention even if there *is* a business conference or a game with the Washington School Tigers scheduled for that afternoon. Mother's going to catch the latest showings from Paris, Hollywood, New York, and other fashion points despite that contract game date. And Sis will forgo the coke date with the girls where that cute new soda clerk works to see the latest performance of Frankie or Van or whoever tomorrow's heroes may be. And in the evening, television will weld the families into more cohesive wholes. The art of the programers, actors, and writers is great, certainly great enough to find well-balanced fare and common meeting ground for the family with a mixture of food for thought and food for fun, of information wanted by each individual and of information needed by all. There will be the commercial plugs, of course, and even though they will be muted and in better taste because of the greater selling potency of television, they will be criticized and joked about too, but television, like radio, will still hold audiences both because of and despite them.

The home will look different after television becomes comfortable in it. There will be a redistribution of room importance with the room with the set (assuming there is one) taking on a new-found importance. Concealed sets with only the face of the tube appearing in the wall will be using up waste space under the stairs or where air pockets are left in the joining of two rooms, and many homes will have just such a space left for the installation of television sets in the

future. Those which will have telesets carefully blended in design with the furniture will find the telesets moved to a second level of the room so that more people can enjoy the program simultaneously and platforms or sunken living rooms will be particularly rife in the television-set districts.

The fashion dictators of tomorrow won't be the movie sirens or the featured fabric drapers and cutters of the big city salons. They will be quiet, friendly girls and ladies who are guests in hundreds of thousands of homes by way of television. The well-designed, good, dramatic lines of their outfits will create demands for those fashions even though the performer was there not to sell dresses but to hold discourse on the merits of a certain church or politician or hair-do.

Education tomorrow will be a wide departure from that of the "McGuffey's Reader" days. Instead of schoolbooks, schoolrooms, and schoolmarms as the source, site, and inspiration of learning, the visual education work of warborn experience will be brought to the students via television in combination with movies, depending on the generality or specialization of the information to be conveyed. Not obscure teachers, but principal leaders in the various fields of knowledge can impart their findings to students throughout the country—directly. The sense of immediacy of education will serve as a goad to acquisition of background and the vital reality of the learning will far transcend the lifeless, droning drudgery to which many students are exposed, particularly in the grade or grammar schools of less enlightened communities.

We shall have news and scientific findings, provocation to think and provocation to smile, facts from around the world, and feelings of all peoples as a part of tomorrow's television.

Its potential is limitless. How we explore and exploit that potential is one of society's greatest challenges.

APPENDIX

TEXT OF RULES GOVERNING TELEVISION

Issued by the Federal Communications Commission, November 29, 1945

Sections 4.201 through 4.281 of FCC Rules and Regulations are repealed, and the following is substituted.

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3.639 Use of Common Antenna Site.
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RULES RELATING TO EQUIPMENT

3.651 Transmitter Power.
3.652 Frequency Monitors.
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3.683 Logs, by Whom Kept.
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3.685 Correction of Logs.
3.686 Rough Logs.
3.687 Station Identification.
3.688 Mechanical Reproductions.
3.689 Sponsored Programs, Announcement of.
3.690 Broadcasts by Candidates for Public Office.
(a) Legally Qualified Candidate.
(b) General Requirements.
(c) Rates and Practices.
(d) Inspection of Records.
3.691 Rebroadcast.

Subpart D—Rules Governing Television Broadcast Stations

Classification of Television Stations and Allocation of Frequencies

Sec. 3.601 *Numerical Designation of Television Channels.*—The channels or frequency bands set forth below are available for television broadcast stations.

Channel No.	Megacycles	Channel No.	Megacycles
1	44–50	7	174–180
2	54–60	8	180–186
3	60–66	9	186–192
4	66–72	10	192–198
5	76–82	11	198–204
6	82–88	12	204–210
		13	210–216

Sec. 3.602 *Sharing of Television Channels.*—Channels 2 through 5 and 7 through 13 are available for assignment to radio services other than television upon a showing that no mutual interference will result.

Sec. 3.603 *Community Stations.*—(a) A Community station is designed primarily for rendering service to the smaller metropolitan districts or principal cities. Television channel No. 1 is assigned exclusively for Community stations. Channels 2 to 13, inclusive, can also be used for Community stations provided such use complies with Section 3.606.

(b) The power of a Community station may not exceed an effective radiated peak power of 1 kilowatt. The maximum antenna height for such stations shall be 500 feet above the average terrain as determined by methods prescribed in the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

(c) The main studio of a Community station shall be located in the city or town served and the transmitter shall be located as near the center of the city as practicable.

Sec. 3.604 *Metropolitan Stations.*—Metropolitan stations may be assigned to television channels 2 through 13, inclusive. They are designed primarily to render service to a single metropolitan district or a principal city and to the rural area surrounding such metropolitan district or principal city.

(b) Metropolitan stations are limited to a maximum of 50 kilowatts effective radiated peak power with antenna having a height of 500 feet above the average terrain, as determined by the methods prescribed in Standards of Good Engineering Practice Concerning Television Broadcast Stations. Where higher antenna heights are available, they should be used but in such cases the Commission may authorize less than 50 kilowatts effective radiated peak power so that the coverage (within the 5000 uv/m contour) shall be substantially similar to that which would be provided by 50 kilowatts effective radiated peak power and a 500-foot antenna. Where it is shown that an antenna height of 500 feet is not available, the Commission may authorize the use of a lower height antenna but will not permit an increase in

radiated power in excess of 50 kilowatts. The service area of Metropolitan stations will not be protected beyond the 5000 uv/m contour and such stations will be located in such a manner as to insure, insofar as possible, a maximum of television service to all listeners, whether urban or rural.

(b) The main studio for Metropolitan stations shall be located in the city or metropolitan district with which the station is associated and the transmitter should be located so as to provide the maximum service to the city or metropolitan district served.

Sec. 3.605 *Rural Stations.*—(a) Licensees of Metropolitan stations or applicants who desire to qualify as licensees of Rural stations must make a special showing to the Commission that they propose to serve an area more extensive than that served by a Metropolitan station and that the additional area proposed to be served is predominantly rural in character. In addition, a showing must be made that such use of the channel will not cause objectionable interference to other television stations or prevent the assignment of other television stations where there is reasonable evidence of the probability of such station being located in the future.

(b) Channels 2 through 13 are available for assignment to Rural stations. The service area of Rural stations will be determined by the Commission.

(c) The main studio of Rural stations shall be located within the 500 uv/m contour.

Sec. 3.606 *Table Showing Allocation of Television Channels to Metropolitan Districts in the United States.*—(a) The table [pages 215 to 219] sets fort the channels which are available for the areas indicated. The table will be revised from time to time depending upon the demand for television stations which may exist in the various cities. Where it is desired to use a different channel in any such area, or to use one of the channels in another area conflicting therewith, it must be shown that public interest, convenience, or necessity will be better served thereby than by the allocation set forth in the table.

(b) Only the first 140 metropolitan districts are listed in the table on pages 215 to 219. Stations in other metropolitan or city areas not listed in the table will not be assigned closer than 150 miles on the same channel or 75 miles on adjacent channels, except upon an adequate showing that public interest, convenience or necessity would be better served thereby or that by using lower power or by other means equivalent protection is provided.

(c) Persons desiring to enter into a voluntary sharing arrangement of a television channel may file application therefor with the Commission pursuant to the provisions of Section 3.661 (c).

Rules Governing Administrative Procedure

Sec. 3.611 *Application for Television Stations.*—Each applicant for a construction permit for a new television broadcast station, change in facilities of any existing television broadcast station, or television station license or modification of license shall file with the Commission in Washington, D. C., three copies of appli-

cations on the appropriate form designated by the Commission and a like number of exhibits and other papers incorporated therein and made a part thereof. Only the original copy need be sworn to. If the application is for a construction permit for a new television station, Form FCC No. 330 should be filed; for a television station licensee, Form FCC No. 331 should be filed; and for modification of a television station license or for change in facilities of an existing television station, Form FCC No. 333 should be filed.

Sec. 3.612 *Full Disclosures.*—Each application shall contain full and complete disclosures with regard to the real party or parties in interest, and their legal, technical, financial, and other qualifications, and as to all matters and things required to be disclosed by the application forms.

Sec. 3.613. *Installation or Removal of Apparatus.*—Applications for construction permit or modification thereof, involving removal of existing transmitting apparatus and/or installation of new transmitting apparatus, shall be filed at least 60 days prior to the contemplated removal and/or installation.

Sec. 3.614 *Period of Construction.*—Each construction permit will specify a maximum of 60 days from the date of granting thereof as the time within which construction of the station shall begin, and a maximum of six months thereafter as the time within which construction shall be completed and the station ready for operation, unless otherwise determined by the Commission upon proper showing in any particular case.

Sec. 3.615 *Forfeiture of Construction Permits: Extension of Time.*—(a) A construction permit shall be automatically forfeited if the station is not ready for operation within the time specified therein or within such further time as the Commission may have allowed for completion, and a notation of the forfeiture of any construction permit under this provision will be placed in the records of the Commission as of the expiration date.

(b) An application (Form FCC No. 701) for extension of time within which to construct a station shall be filed at least thirty days prior to the expiration date of such permit if the facts supporting such application for extension are known to the applicant in time to permit such filing. In other cases such applications will be accepted upon a showing satisfactory to the Commission of sufficient reasons for filing within less than thirty days prior to the expiration date. Such applications will be granted upon a specific and detailed showing that the failure to complete was due to causes not under the control of the grantee, or upon a specific and detailed showing of other matters sufficient to justify the extension.

Sec. 3.616 *Equipment Tests and Proof of Performance.*—(a) Upon completion of construction of a television station in exact accordance with the terms of the construction permit, the technical provisions of the application therefor and the rules and regulations and standards of good engineering practice governing television stations and prior to filing of application for license, the permittee is authorized to test the equipment for a period not to exceed 90 days: *Provided*, that the inspector in charge of the district in which the station is located and the Commission are notified two days in advance of the beginning of tests.

(b) The Commission may notify the permittee to conduct no tests or may cancel, suspend, or change the date of beginning for the period of such tests as and when such action may appear to be in the public interest, convenience and necessity.

(c) Within the 90-day period prescribed by this section for equipment tests, field intensity measurements in accordance with the methods prescribed in the Standards of Good Engineering Practice Concerning Television Broadcast Stations shall be submitted to the Commission. The Commission may grant extensions of time upon showing of reasonable need therefor.

Sec. 3.617 *Program Tests.*—(a) When construction and equipment tests are completed in exact accordance with the terms of the construction permit, the technical provisions of the application therefor, and the rules and regulations and standards of good engineering practice governing television stations, and after an application for station license has been filed with the Commission showing the equipment to be in satisfactory operating condition, the permittee is authorized to conduct program tests in exact accordance with the terms of the construction permit for a period not to exceed 30 days: *Provided*, that the inspector in charge of the district in which the station is located and the Commission are notified two days in advance of the beginning of such tests.

(b) The Commission reserves the right to cancel such tests or suspend, or change the date of beginning for the period of such tests as and when such action may appear to be in the public interest, convenience, and necessity by notifying the permittee.

(c) The authorization for tests embodied in this section or Section 3.616 shall not be construed as constituting a license to operate but as a necessary part of the construction.

Sec. 3.618 *Normal License Period.*—All television broadcast station licenses will be issued so as to expire at the hour of 3 a.m. E.S.T. and will be issued for a normal license period of one year.

Sec. 3.619 *License, Simultaneous Modification and Renewal.*—When an application is granted by the Commission necessitating the issuance of a modified license less than 60 days prior to the expiration date of the license sought to be modified, and an application for renewal of said license is granted subsequent or prior thereto (but within 30 days of expiration of the present license) the modified license as well as the renewal license shall be issued to conform to the combined action of the Commission.

Sec. 3.620 *Renewal of License.*—(a) Unless otherwise directed by the Commission, each application for renewal of a television station license shall be filed at least 60 days prior to the expiration date of the license sought to be renewed (Form FCC No. 311). No application for renewal of license of a television broadcast station will be considered unless there is on file with the Commission the information currently required by Sections 1.301–1.304, reference to which by date and file number shall be included in the application.

(b) Whenever the Commission regards an application for a renewal of a television station license as essential to the proper conduct of a hearing or investigation

and specifically directs that it be filed by a date certain, such application shall be filed within the time thus specified. If the licensee fails to file such application within the prescribed time, the hearing or investigation shall proceed as if such renewal application had been received.

Sec. 3.621 *Temporary Extension of Station Licenses.*—Where there is pending before the Commission any application, investigation, or proceeding which, after hearing, might lead to or make necessary the modification of, revocation of, or the refusal to renew an existing television license, the Commission may, in its discretion, grant a temporary extension of such license: *Provided, however*, that no such temporary extension shall be construed as a finding by the Commission that the operation of any radio station thereunder will serve public interest, convenience, and necessity beyond the express terms of such temporary extension of license: *And provided further*, that such temporary extension of license will in no wise affect or limit the action of the Commission with respect to any pending application or proceeding.

Sec. 3.622 *Repetitious Applications.*—(a) Where an applicant has been afforded an opportunity to be heard with respect to a particular application for a new television broadcast station, or for change of existing service or facilities, and the Commission has, after hearing or default, denied the application or dismissed it with prejudice, the Commission will not consider another application for a station of the same class to serve in whole or in part the same area, by the same applicant or by his successor or assignee, or on behalf of or for the benefit of the original parties in interest, until after the lapse of 12 months from the effective date of the Commission's order.

(b) Where an appeal has been taken from the action of the Commission in denying a particular application, another application for the same class of broadcast station and for the same area, in whole or in part, filed by the same applicant or by his successor or assignee, or on behalf or for the benefit of the original parties in interest, will not be considered until the final disposition of such appeal.

Sec. 3.623 *Assignment or Transfer of Control.*—(a) Voluntary: Application for consent to voluntary assignment of a television station construction permit or license or for consent to voluntary transfer of control of a corporation holding a television station construction permit or license shall be filed with the Commission on Form FCC No. 314 (assignment of license) or Form FCC No. 315 (transfer of control) at least 60 days prior to the contemplated effective date of assignment of transfer of control.

(b) Involuntary: In the event of the death or legal disability of a permittee or licensee, or a member of a partnership, or a person directly or indirectly in control of a corporation, which is a permittee or licensee:

(1) the Commission shall be notified in writing promptly of the occurrence of such death or legal disability, and

(2) within thirty days after the occurrence of such death or legal disability, application on Form FCC No. 314 or 315 shall be filed for consent to involuntary assignment of such television station permit or license or for involuntary transfer

of control of such corporation to a person or entity legally qualified to succeed to the foregoing interests under the laws of the place having jurisdiction over the estate involved.

Rules Relating to Licensing Policies

Sec. 3.631 *Exclusive Affiliation of Station.*—No license shall be granted to a television broadcast station having any contract, arrangement, or understanding, express or implied with a network organization [1] under which the station is prevented or hindered from, or penalized for, broadcasting the programs of any other network organization.

Sec. 3.632 *Territorial Exclusivity.*—No license shall be granted to a television broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which prevents or hinders another broadcast station serving substantially the same area from broadcasting the network's programs not taken by the former station, or which prevents or hinders another broadcast station serving a substantially different area from broadcasting any program of the network organization. This regulation shall not be construed to prohibit any contract, arrangement, or understanding between a station and a network organization pursuant to which the station is granted the first call in its primary service area upon the programs of the network organization.

Sec. 3.633 *Term of Affiliation.*—No license shall be granted to a television broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which provides, by original terms, provisions for renewal, or otherwise for the affiliation of the station with the network organization for a period longer than two years: *Provided*, that a contract, arrangement, or understanding for a period up to two years, may be entered into within six months prior to the commencement of such period.

Sec. 3.634 *Option Time.*—No license shall be granted to a television broadcast station which options [2] for network programs any time subject to call on less than 56 days' notice, or more time than a total of three hours [3] within each of four

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[1] The term "network organization" as used herein includes national and regional network organizations. See Chapter VII, J, of Report on Chain Broadcasting.

[2] As used in this section, an option is any contract, arrangement, or understanding, express or implied, between a station and a network organization which prevents or hinders the station from scheduling programs before the network agrees to utilize the time during which such programs are scheduled, or which requires the station to clear time already scheduled when the network organization seeks to utilize the time.

[3] All time options permitted under this section must be specified clock hours, expressed in terms of any time system set forth in the contract agreed upon by the station and network organization. Shifts from daylight saving to standard time or vice versa may or may not shift the specified hours correspondingly as agreed by the station and network organization.

segments of the broadcast day, as herein described. The broadcast day is divided into four segments, as follows: 8 a.m. to 1 p.m.; 1 p.m. to 6 p.m.; 6 p.m. to 11 p.m.; 11 p.m. to 8 a.m.[4] Such options may not be exclusive as against other network organizations and may not prevent or hinder the station from optioning or selling any or all of the time covered by the option, or other time, to other network organizations.

Sec. 3.635 *Right to Reject Programs.*—No license shall be granted to a television broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization which (a) with respect to programs offered pursuant to an affiliation contract, prevents or hinders the station from rejecting or refusing network programs which the station reasonably believes to be unsatisfactory or unsuitable; or which (b) with respect to network programs so offered or already contracted for, prevents the station from rejecting or refusing any program which, in its opinion, is contrary to the public interest, or from substituting a program of outstanding local or national importance.

Sec. 3.636 *Network Ownership of Stations.*—No license shall be granted to a network organization, or to any person directly or indirectly controlled by or under common control[5] of a network organization, for a television broadcast station in any locality where the existing television broadcast stations are so few or of such unequal desirability (in terms of coverage, power, frequency, or other related matters) that competition would be substantially restrained by such licensing.

Sec. 3.637 *Dual Network Operation.*—No license shall be issued to a television broadcast station affiliated with a network organization which maintains more than one network of television broadcast stations: *Provided*, that this regulation shall not be applicable if such networks are not operated simultaneously, or if there is no substantial overlap in the territory served by the group of stations comprising each such network.

Sec. 3.638 *Control by Networks of Station Rates.*—No license shall be granted to a television broadcast station having any contract, arrangement, or understanding, express or implied, with a network organization under which the station is prevented or hindered from, or penalized for, fixing or altering its rates for the sale of broadcast time for other than the network's programs.

Sec. 3.639 *Use of Common Antenna Site.*—No television license or renewal of a television license will be granted to any person who owns, leases, or controls a particular site which is peculiarly suitable for television broadcasting in a particular area and (1) which is not available for use by other television licensees; and (2) no other comparable site is available in the area; and (3) where the exclusive use of

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[4] These segments are to be determined for each station in terms of local time at the location of the station but may remain constant throughout the year regardless of shifts from standard to daylight saving time or vice versa.

[5] The word "control" as used herein is not limited to full control but includes such a measure of control as would substantially affect the availability of the station to other networks.

such site by the applicant or licensee would unduly limit the number of television stations that can be authorized in a particular area or would unduly restrict competition among television stations.

Sec. 3.640 *Multiple Ownership.*—(a) No person (including all persons under common control) [6] shall, directly or indirectly, own, operate, or control more than one television broadcast station that would serve substantially the same service area as another television broadcast station owned, operated, or controlled by such person.

(b) No person (including all persons under common control) shall, directly or indirectly, own, operate, or control more than one television broadcast station, except upon a showing (1) that such ownership, operation, or control would foster competition among television broadcast stations or provide a television broadcasting service distinct and separate from existing services, and (2) that such ownership, operation, or control would not result in the concentration of control of television broadcasting facilities in a manner inconsistent with public interest, convenience, or necessity: *Provided, however,* that the Commission will consider the ownership, operation, or control of more than five television broadcast stations to constitute the concentration of control of television broadcasting facilities in a manner inconsistent with public interest, convenience, or necessity.

Rules Relating to Equipment

Sec. 3.651 *Transmitter Power.*—The rated power and operating power range of transmitters shall be in accordance with the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Sec. 3.652 *Frequency Monitors.*—The licenses of each television broadcast station shall have in operation at the transmitters frequency monitors independent of the frequency control of the transmitters.

Sec. 3.653 *Modulation Monitors.*—The licenses of each television broadcast station shall have in operation at the transmitter a modulation monitor for the aural transmitter. There shall also be sufficient monitoring equipment for the visual signal to determine that the signal complies with the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Sec. 3.654 *Required Transmitter Performance.*—The construction, installation, operation, and performance of the television broadcast transmitter system shall be in accordance with the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Sec. 3.655 *Auxiliary Transmitter.*—Upon showing that a need exists for the use of auxiliary transmitters in addition to the regular transmitters of a television station, a license therefor may be issued provided that:

(a) Auxiliary transmitters may be installed either at the same location as the main transmitters or at another location.

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[6] The word "control" as used herein is not limited to majority stock ownership, but includes actual working control in whatever manner exercised.

(b) A licensed operator shall be in control whenever auxiliary transmitters are placed in operation.

(c) The auxiliary transmitters shall be maintained so that they may be put into immediate operation at any time for the following purposes:

(1) The transmission of the regular programs upon the failure of the main transmitters.

(2) The transmission of regular programs during maintenance or modification [7] work on the main transmitters, necessitating discontinuance of its operation for a period not to exceed five days.

(3) Upon request by a duly authorized representative of the Commission.

(d) The auxiliary transmitter shall be tested at least once each week to determine that it is in proper operating condition and that it is adjusted to the proper frequency, except that in case of operation in accordance with paragraph (c) of this section during any week, the test in that week may be omitted provided the operation under paragraph (c) is satisfactory. A record shall be kept of the time and result of each test operating under paragraph (c).

(e) The auxiliary transmitter shall be equipped with satisfactory control equipment which will enable the maintenance of the frequency emitted by the station within the limits prescribed by these regulations.

(f) The operating power of an auxiliary transmitter may be less than the authorized power of the main transmitters, but in no event shall it be greater than such power.

Sec. 3.656 *Alternate Main Transmitters.*—The licensee of a television broadcast station may be licensed for alternate main transmitters provided that a technical need for such alternate transmitters is shown and that the following conditions are met:

(a) Both transmitters are located at the same place.

(b) Both transmitters shall have the same power rating.

(c) Both transmitters shall meet the construction, installation, operation, and performance requirements of the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Sec. 3.657 *Changes in Equipment and Antenna System.*—Licensees of television broadcast stations shall observe the following provisions with regard to changes in equipment and antenna system:

(a) No changes in equipment shall be made:

(1) That would result in the emission of signals outside of the authorized channel.

(2) That would result in the external performance of the transmitter being in disagreement with that prescribed in the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

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[7] This includes the equipment changes which may be made without authority as set forth elsewhere in the Rules and Regulations and the Standards of Good Engineering Practice or as authorized by the Commission by letter or by construction permit. Where such operation is required for periods in excess of five days, request therefor shall be in accordance with Section 1.365.

(b) Specific authority, upon filing formal application (Form FCC No. 333) therefor, is required for a change in service area or for any of the following changes:

(1) Changes involving an increase or decrease in the power rating of the transmitters.

(2) A replacement of the transmitters as a whole.

(3) Change in the location of the transmitting antenna.

(4) Change in antenna system, including transmission line.

(5) Change in location of main studio, if it is proposed to move the main studio to a different city from that specified in the license.

(6) Change in the power delivered to the antenna.

(7) Change in frequency control and/or modulation system.

(c) Specific authority, upon filing *informal* request therefor, is required for a change in the indicating instruments installed to measure transmitter power output, except by instruments of the same maximum scale reading and accuracy.

(d) Other changes, except as above provided for in this section or in Standards of Good Engineering Practice Concerning Television Broadcast Stations prescribed by the Commission may be made at any time without the authority of the Commission, provided that the Commission shall be promptly notified thereof and such changes shall be shown in the next application for renewal of license.

Rules Relating to Technical Operation

Sec. 3.661 *Time of Operation.*—(a) All television broadcast stations will be licensed for unlimited time operation. Each licensed television station shall maintain a regular program operating schedule of not less than two hours in any given broadcast day, and it shall render not less than 28 hours program service per week. In an emergency, however, when due to causes beyond the control of a licensee, it becomes impossible to continue operation, the station may cease operation for a period not to exceed 10 days, provided that the Commission and the Inspector in Charge of the radio district in which the station is located shall be notified in writing immediately after the emergency develops.

(b) The aural transmitter of a television broadcast station shall not be operated separately from the visual transmitter except for experimental or test purposes, and for purposes incidental to or connected with the operation of the visual transmitter.

(c) Persons desiring to enter into a voluntary sharing arrangement of a television channel may file application therefor with the Commission. Copies of the time-sharing agreement should be filed with the application.

Sec. 3.662 *Experimental Operation.*—Television broadcast stations may conduct technical experimentation directed to the improvement of technical phases of operation and for such purposes may utilize a signal other than the standard television signal subject to the following conditions:

(a) That the licensee complies with the provisions of section 3.661 with regard to the minimum number of hours of transmission with a standard television signal.

(b) That no transmissions are radiated outside of the authorized channel and subject to the condition that no interference is caused to the transmissions of a standard television signal by other television broadcast stations.

(c) No charges either direct or indirect shall be made by the licensee of a television broadcast station for the production or transmission of programs when conducting technical experimentation.

Sec. 3.663 *Station Inspection.*—The licensee of any television broadcast station shall make the station available for inspection by representatives of the Commission at any reasonable hour.

Sec. 3.664 *Station License, Posting of.*—The original of each station license shall be posted in the transmitter room.

Sec. 3.665 *Operator Requirements.*—One or more licensed radio-telephone first-class operators shall be on duty at the place where the transmitting apparatus of each station is located and in actual charge thereof whenever it is being operated. The original license (Form FCC No. 759) of each station operator shall be posted at the place where he is on duty. The licensed operator on duty and in charge of a television broadcast transmitter may, at the discretion of the licensee, be employed for other duties or for the operation of another station or stations in accordance with the class of operator's license which he holds and by the rules and regulations governing such stations. However, such duties shall in no wise interfere with the operation of the broadcast transmitter.

Sec. 3.666 *Operating Power, How Determined.*—The operating power, and the requirements for maintenance thereof, of each television broadcast station shall be determined by the methods prescribed in the Standards of Good Engineering Practice Concerning Television Broadcast Stations.

Sec. 3.667 *Modulation.*—The percentage of modulation of the aural transmissions shall be maintained as high as possible consistent with good quality of transmission and good broadcast practice and in no case less than 85 per cent nor more than 100 per cent on peaks of frequent recurrence during any selection which normally is transmitted at the highest level of the program under consideration.

Sec. 3.668 *Frequency Toleration.*—The operating frequencies of the aural and visual transmitters of a television broadcast station shall be maintained within .002 per cent of the assigned frequencies.

Sec. 3.669 *Inspection of Tower Lights and Associated Control Equipment.*—The licensee of any television station which has an antenna or antenna-supporting structure(s) required to be illuminated pursuant to the provisions of section 303(q) of the Communications Act of 1934, as amended:

(a) Shall make a visual observation of the tower lights at least once each 24 hours to insure that all such lights are functioning properly as required.

(b) Shall report immediately by telephone or telegraph to the nearest Airways Communication Station or office of the Civil Aeronautics Administration any observed failure of the tower lights, not corrected within 30 minutes, regardless of the cause of such failure. Further notification by telephone or telegraph shall be given immediately upon resumption of the required illumination.

(c) Shall inspect at intervals of at least once each three months all flashing or rotating beacons and automatic lighting control devices to insure that such apparatus is functioning properly as required.

Other Rules Relating to Operation

Sec. 3.681 *Logs.*—The licensee of each television station shall maintain program and operating logs and shall require entries to be made as follows:

(a) In the program log:

(1) An entry of the time each station identification announcement (call letters and location) is made.

(2) An entry briefly describing each program broadcast, such as "music," "drama," "speech," etc., together with the name or title thereof and the sponsor's name, with the time of the beginning and ending of the complete program. If a mechanical reproduction, either video or audio, is used, the entry shall show the exact nature thereof, and the time it is announced as a mechanical reproduction. If a speech is made by a political candidate, the name and political affiliations of such speaker shall be entered.

(3) An entry showing that each sponsored program broadcast has been announced as sponsored, paid for, or furnished by the sponsor.

(4) An entry showing, for each program of network origin, the name of the network originating the program.

(b) In the operating log:

(1) An entry of the time the station begins to supply power to the antenna, and the time it stops.

(2) An entry of the time the program begins and ends.

(3) An entry of each interruption to the carrier wave, its cause, and duration.

(4) An entry of the following each 30 minutes:

(i) Operating constants of last radio stage of the aural transmitter (total plate current and plate voltage).

(ii) Transmission line current or voltage of both transmitters.

(iii) Frequency monitor reading.

(5) Log of experimental operation during experimental period (if regular operation is maintained during this period, the above logs shall be kept).

(i) A log must be kept of all operation during the experimental period. If the entries required above are not applicable thereto, then the entries shall be made so as to fully describe the operation.

(c) Where an antenna or antenna-supporting structure(s) is required to be illuminated, the licensee shall make entries in the radio station log appropriate to the requirements of section 3.669 as follows:

(1) The time the tower lights are turned on and off if manually controlled.

(2) The time the daily visual observation of the tower lights was made.

(3) In the event of any observed failure of a tower light:

(i) Nature of such failure.

(ii) Time the failure was observed.

(iii) Time and nature of the adjustments, repairs or replacements made.

(iv) Airways Communication Station (CAA) notified of the failure of any tower light not corrected within 30 minutes and the time such notice was given.

(v) Time notice was given to the Airways Communication Station (CAA) that the required illumination was resumed.

(4) Upon completion of the periodic inspection required at least once each three months:

(i) The date of the inspection and the condition of all tower lights and associated tower lighting control devices.

(ii) Any adjustments, replacements or repairs made to insure compliance with the lighting requirements.

Sec. 3.682. *Logs, Retention of.*—Logs of television broadcast stations shall be retained by the licensee for a period of two years. However, logs incident to or involved in any claim or complaint of which the licensee has notice shall be retained by the licensee until such claim or complaint has been fully satisfied or until the same has been barred by statute limiting the time for the filing of suits upon such claims.

Sec. 3.683 *Logs, by Whom Kept.*—Each log shall be kept by the person or persons competent to do so, having actual knowledge of the facts required, who shall sign the log when starting duty and again when going off duty. The logs shall be made available upon request by an authorized representative of the Commission.

Sec. 3.684 *Log Form.*—The log shall be kept in an orderly manner, in suitable form, and in such detail that the data required for the particular class of station concerned are readily available. Key letters or abbreviations may be used if proper meaning or explanation is contained elsewhere in the log.

Sec. 3.685 *Correction of Logs.*—No log or portion thereof shall be erased, obliterated, or willfully destroyed within the period of retention provided by the rules. Any necessary correction may be made only by the person originating the entry who shall strike out the erroneous portion, initial the correction made, and indicate the date of correction.

Sec. 3.686 *Rough Logs.*—Rough logs may be transcribed into condensed form, but in such case the original log or memoranda and all portions thereof shall be preserved and made a part of the complete log.

Sec. 3.687 *Station Identification.*—(a) A licensee of a television broadcast station small make station identification announcement (call letters and location), at the beginning and ending of each time of operation and during operation on the hour. The announcement at the beginning and ending of each time operation shall be by both aural and video means. Other announcements may be by either aural or video means.

(b) Identification announcements during operation need not be made when to make such announcement would interrupt a single consecutive speech, play, religious service, symphony concert, or any type of production. In such cases the identification announcement shall be made at the first interruption of the entertainment continuity and at the conclusion thereof.

Sec. 3.688 *Mechanical Reproductions.*—(a) Each program which consists in whole or in part of one or more mechanical reproductions, either video or audio, shall be accompanied by an appropriate announcement to that effect either at the beginning or end of such reproduction or at the beginning or end of the program in which such reproduction is used. No such announcement shall be required where a mechanical reproduction is used for background music, sound effects, station identification, program identification (theme music of short duration) or identification of sponsorship of the program proper.

(b) The exact form of identifying announcement is not prescribed, but the language shall be clear and in terms commonly used and understood. The licensee shall not attempt affirmatively to create the impression that any program being broadcast by mechanical reproduction consists of live talent.

Sec. 3.689 *Sponsored Programs, Announcement of.*—(a) In the case of each program for the broadcasting of which money, services, or other valuable consideration is either directly or indirectly paid or promised to, or charged or received by, any radio broadcast station, the station broadcasting such program shall make, or cause to be made, an appropriate announcement that the program is sponsored, paid for, or furnished, either in whole or in part.

(b) In the case of any political program or any program involving the discussion of public controversial issues for which any films, records, transcription, talent, scripts, or other material or services of any kind are furnished, either directly or indirectly, to a station as an inducement to the broadcasting of such program, an announcement shall be made both at the beginning and conclusion of such program on which such material or services are used that such films, records, transcriptions, talent, scripts, or other material or services have been furnished to such station in connection with the broadcasting of such program; *provided, however*, that only one such announcement need be made in the case of any such program of five minutes' duration or less, which announcement may be made either at the beginning or conclusion of the program.

(c) The announcement required by this section shall fully and fairly disclose the true identity of the person or persons by whom or in whose behalf such payment is made or promised, or from whom or in whose behalf such services or other valuable consideration is received, or by whom the material or services referred to in subsection (b) hereof are furnished. Where an agent or other person contracts or otherwise makes arrangements with a station on behalf of another, and such fact is known to the station, the announcement shall disclose the identity of the person or persons in whose behalf such agent is acting instead of the name of such agent.

(d) In the case of any program, other than a program advertising commercial products or services, which is sponsored, paid for or furnished, either in whole or in part, or for which material or services referred to in subsection (b) hereof are furnished, by a corporation, committee, association or other unincorporated group the announcement required by this section shall disclose the name of such corporation, committee, association or other unincorporated group. In each such case the station shall require that a list of the chief executive officers or members of the

executive committee or of the board of directors of the corporation, committee, association or other unincorporated group shall be made available for public inspection at one of the television broadcast stations carrying the program.

(e) In the case of programs advertising commercial products or services, an announcement stating the sponsor's corporate or trade name or the name of the sponsor's product, shall be deemed sufficient for the purposes of this section and only one such announcement need be made at any time during the course of the program.

Sec. 3.690 *Broadcasts by Candidates for Public Office.*—(a) *Legally qualified candidate.*—A "legally qualified candidate" means any person who has publicly announced that he is a candidate for nomination by a convention of a political party or for nomination or election in a primary, special, or general election, municipal, county, state or national, and who meets the qualifications prescribed by the applicable laws to hold the office for which he is a candidate, so that he may be voted for by the electorate directly or by means of delegates or electors and who

(1) has qualified for a place on the ballot or

(2) is eligible under the applicable law to be voted for by sticker, by writing in his name on the ballot, or other method, and (i) has been duly nominated by a political party which is commonly known and regarded as such, or (ii) makes a substantial showing that he is a bona fide candidate for nomination or office, as the case may be.

(b) *General Requirements.*—No station licensee is required to permit the use of its facilities by any legally qualified candidate for public office, but if any licensee shall permit any such candidate to use its facilities, it shall afford equal opportunities to all other such candidates for that office to use such facilities; *provided*, that such licensee shall have no power of censorship over the material broadcast by any such candidate.

(c) *Rates and Practices.*—The rates, if any, charged all such candidates for the same office shall be uniform and shall not be rebated by any means, directly or indirectly; no licensee shall make any discrimination in charges, practices, regulations, facilities, or services for or in connection with the service rendered pursuant to these rules, or make or give any preference to any candidate for public office or subject any such candidate to any prejudice or disadvantage; nor shall any licensee make any contract or other agreement which shall have the effect of permitting any legally qualified candidate for any public office to broadcast to the exclusion of other legally qualified candidates for the same public office.

(d) *Inspection of Records.*—Every licensee shall keep and permit public inspection of a complete record of all requests for broadcast time made by or on behalf of candidates for public office, together with an appropriate notation showing the disposition made by the licensee of such requests, and the charges made, if any, if request is granted.

Sec. 3.691 *Rebroadcast.*—(a) The term "rebroadcast" means reception by radio of the program [8] of a radio station, and the simultaneous or subsequent retrans-

[8] As used in this section, program includes any complete program or part thereof.

mission of such program by a broadcast station. The broadcasting of a program relayed by a relay broadcast station or studio transmitter link is not considered a rebroadcast.

(b) The licensee of a television broadcast station may, without further authority of the Commission, rebroadcast the program of a United States television broadcast station, provided the Commission is notified of the call letters of each station rebroadcast and the licensee certifies that express authority has been received from the licensee of the station originating the program.[9]

(c) No licensee of a television broadcast station shall rebroadcast the program of any United States radio station not designated in (b) above without written authority having first been obtained from the Commission upon application (informal) accompanied by written consent or certification of consent of the licensee of the station originating the program.[10]

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[9] The notice and certification of consent shall be given within three (3) days of any single rebroadcast, but in case of the regular practice of rebroadcasting certain programs of a television broadcast station several times during a license period, notice and certification of consent shall be given for the ensuing license period with the application for renewal of license, or at the beginning of such rebroadcast practice if begun during a license period.

[10] By Order No. 82, dated and effective June 24, 1941, until further order of the Commission, section 3.691(d) is suspended only insofar as it requires prior written authority of the Commission for the rebroadcasting of programs originated for that express purpose by the United States government radio stations.

Table Showing Allocation of Television Channels

To Metropolitan Districts in the U. S.

Note: All channel numbers refer to Metropolitan stations except those in parentheses, which refer to community stations. Total number of stations assignable is indicated by total number of channels unless there is channel sharing, or unless community stations can be added where no conflict occurs.

Metropolitan district (U. S. Census 1940)	Sales rank	Population	Channel numbers
Akron	35	349,705	11
Albany Schenectady Troy	23	431,575	2, 4, 7, 9, 11
Allentown Bethlehem Easton	43	325,142	(8)
Altoona	111	114,094	9
Amarillo	136	53,463	2, 4, 5, 7
Asheville	132	76,324	5, 7, 12
Atlanta	25	442,294	2, 5, 8, 11
Atlantic City	83	100,096	(8)
Augusta, Ga.	135	87,809	6, 12
Austin	106	106,193	8, 10, 12
Baltimore	13	1,046,692	2, 11, 13
Beaumont Port Arthur	90	138,608	3, 6, 8, 10
Binghamton	75	145,156	12
Birmingham	42	407,851	4, 9, 13
Boston	5	2.350,514	2, 4, 7, 9, 13
Bridgeport, Conn.	53	216,621	(1)
Buffalo Niagara	14	857,719	4, 7, 9, 13
Canton, O.	63	200,352	(1)
Cedar Rapids	115	73,219	7, 11
Charleston, S. C.	127	98,711	7, 10, 13
Charleston, W. Va.	88	136,332	7, 11, 13
Charlotte	99	112,986	3, 9, 11
Chattanooga	76	193,215	3, 6, 10, 12
Chicago	2	4,499,126	2, 4, 5, 7, 9, 11, 13

TABLE SHOWING ALLOCATION OF TELEVISION CHANNELS (*Continued*)

Metropolitan district (U. S. Census 1940)	Sales rank	Population	Channel numbers
Cincinnati	16	789,309	2, 4, 7, 11
Cleveland	9	1,214,943	2, 4, 5, 7, 9
Columbia	117	89,555	2, 4, 8
Columbus, Ga.	133	92,478	3, 12
Columbus, O.	29	365,796	3, 6, 8, 10
Corpus Christi	121	70,677	3, 6, 8, 10
Dallas	27	376,548	4, 8, 12
Davenport, Rock Island, Moline	67	174,995	2, 4, 5, 9
Dayton	44	271,513	5, 13
Decatur	122	65,764	2
Denver	26	384,372	2, 4, 5, 7, 9
Des Moines	59	183,973	2, 4, 5, 9
Detroit	6	2.295,867	2, 4, 5, 7, 9
Duluth-Superior	72	157,098	3, 6, 8, 10
Durham	139	69,683	4, 7
El Paso	105	115,801	2, 4, 5, 7
Erie	95	134,039	12
Evansville, Ind.	93	141,614	2, 11
Fall River, New Bedford	55	272,648	(1)
Flint	64	188,554	11
Fort Wayne	81	134,385	2, 4, 7, 9
Fort Worth	51	207,677	2, 5, 10
Fresno	79	97,504	2, 4, 5, 7
Galveston	131	71,677	9, 11, 13
Grand Rapids	57	209,873	7, 9
Greensboro	130	73,055	2, 10
Hamilton, Middletown	110	112,686	9
Harrisburg	70	173,367	8
Hartford, New Britain	20	502,193	8, 10
Houston	21	510,397	2, 4, 5, 7

TABLE SHOWING ALLOCATION OF TELEVISION CHANNELS (*Continued*)

Metropolitan district (U. S. Census 1940)	Sales rank	Population	Channel numbers
Huntington, W. Va. Ashland, Ky.	92	170,979	5
Indianapolis	24	455,357	3, 6, 8, 10, 12
Jackson	128	88,003	2, 4, 5, 7
Jacksonville	66	195,619	2, 4, 6, 8
Johnstown, Pa.	100	151,781	13
Kalamazoo	112	77,213	3
Kansas City, Mo. Kansas City, Kans.	17	634,093	2, 4, 5, 9
Knoxville	87	151,829	2, 4, 8, 11
Lancaster	91	132,027	(4)
Lansing	94	110,356	6
Lincoln	109	88,191	10, 12
Little Rock	98	126,724	3, 6, 8, 10
Los Angeles	3	2,904,596	2, 4, 5, 7, 9, 11, 13
Louisville	33	434,408	7, 9
Lowell Lawrence Haverhill	45	334,969	6
Macon	137	74,830	4, 7, 10
Madison	101	78,349	9
Manchester	118	81,932	(1)
Memphis	37	332,477	2, 4, 5, 7, 9
Miami	38	250,537	2, 4, 5, 7
Milwaukee	15	790,336	3, 6, 8, 10
Minneapolis St. Paul	11	911,077	2, 4, 5, 7, 9
Mobile	119	144,906	3, 5, 9, 11
Montgomery	126	93,697	6, 10
Nashville	56	241,769	4, 5, 7, 9
New Haven	39	308,228	(6)
New Orleans	31	540,030	2, 4, 6, 7, 10
New York Northeastern New Jersey	1	11,690,520	2, 4, 5, 7, 9, 11, 13
Norfolk Portsmouth Newport News	47	330,396	4, 7, 11, 13

TABLE SHOWING ALLOCATION OF TELEVISION CHANNELS (*Continued*)

Metropolitan district (U. S. Census 1940)	Sales rank	Population	Channel numbers
Oklahoma City	52	221,229	2, 4, 5, 9
Omaha Council Bluffs	40	287,269	3, 6, 7
Peoria	69	162,566	3, 6, 12
Philadelphia	4	2.898,644	3, 6, 10, 12
Phoenix	84	121,828	2, 4, 5, 7
Pittsburgh	8	1,994,060	3, 6, 8, 10
Portland, Maine	89	106,566	3, 8
Portland, Oreg.	22	406,406	3, 6, 8, 10, 12
Providence, R. I.	18	711,500	11
Pueblo	140	62,039	3, 6, 8, 10
Racine Kenosha	97	135,075	(1)
Reading	73	175,355	(5)
Richmond	48	245,674	3, 6, 8, 10
Roanoke	104	110,593	5, 9, 12
Rochester	28	411,970	2, 6, 11
Rockford	102	105,259	12
Sacramento	54	158,999	3, 6, 10
Saginaw Bay City	77	153,388	3, 8, 13
St. Joseph	129	86,991	13
St. Louis	10	1,367,977	4, 5, 7, 9, 13
Salt Lake City	58	204,488	2, 4, 5, 7, 9
San Antonio	50	319,010	2, 4, 5, 7, 9
San Diego	49	256,268	3, 6, 8, 10
San Francisco Oakland	7	1.428,525	2, 4, 5, 7, 9, 11
San Jose	78	129,367	13
Savannah	114	117,970	3, 5, 9, 11
Scranton Wilkes-Barre	30	629,581	11, (1)
Seattle	19	452,639	2, 5, 7, 11
Shreveport	96	112,225	2, 4, 6, 8
Sioux City	107	87,791	4, 9, 11, 13

TABLE SHOWING ALLOCATION OF TELEVISION CHANNELS (*Continued*)

Metropolitan district (U. S. Census 1940)	Sales rank	Population	Channel numbers
South Bend	80	147,022	(1)
Spokane	71	141,370	2, 4, 5, 7, 9
Springfield, Ill.	103	89,484	8, 10
Springfield, Mass.	32	394,623	3, (1)
Holyoke			
Springfield, Mo.	134	70,514	2, 4, 5, 9
Springfield, O.	125	77,406	(1)
Stockton	108	79,337	8
Syracuse	46	258,352	5, 8, 10
Tacoma	74	156,018	4, 9, 13
Tampa	61	208,693	2, 4, 5, 7
St. Petersburg			
Terre Haute	116	83,370	4
Toledo	34	341,663	13
Topeka	123	77,749	7, 11
Trenton	60	200,128	(1)
Tulsa	65	188,562	3, 6, 8, 10
Utica	68	197,128	3, 13
Rome			
Waco	138	71,114	3, 6, 9, 11
Washington	12	907,816	4, 5, 7, 9
Waterbury	85	144,822	12
Waterloo	120	67,050	3, 6, 13
Wheeling	82	196,340	12
Wichita	86	127,308	2, 4, 5, 9
Wilmington	62	188,974	(7)
Winston-Salem	124	109,833	6, 8
Worcester	41	306,194	5
York	113	92,627	(1)
Youngstown	36	372,428	13

RECOMMENDED READING

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GLOSSARY OF TELEVISION TERMS

Angle Shot: A camera shot taken from any position except straight on the scene.

Antenna: A radiation used in the transmission of radio frequencies.

Aspect Ratio: The numerical ratio of the frame width to the frame height, 4:3.

Audio: From the Latin, meaning "To hear."

Background: Any material, sets, flats, drops, drapes, etc., used behind actors or other foreground subjects.

Background Sound: In the back of the main source of sound, such as background music.

Blanking Pulse: Employed to extinguish the cathode-ray beam on the retrace, so that it is not visible to the television audience. Only the forward slope of the "saws" are employed in sequential scanning, the retrace being extinguished.

Blow-up: Photo enlargement of written, printed, or pictorial materials, in order that they may be effectively photographed and transmitted through television.

Boom: A mechanical contrivance for suspending a microphone.

Booster: (*See* Relay Station)

Break: Time out or break in rehearsal.

Brightness Control: Control knob on the receiver which varies the amount of illumination of the reproduced image.

Camera: A unit containing a light-sensitive pickup tube which transforms the visual image into electrical impulses.

Camera Light: Pilot light on cameras indicating which camera is on the air.

Cans: Headphones worn by the studio personnel.

Carrier Waves: The radio waves over which television impulses are sent. In television two waves are used: one for sound and one for sight.

Cathode: An element in the vacuum tube which emits electrons when its temperature is raised. The surface of the cathode is coated with barium and strontium oxides to increase the emissivity.

Cathode-Ray Screen: The fluorescent coating on the face of the cathode ray.

Cathode-Ray Tube: A vacuum tube for converting electrical energy into corresponding light energy.

Centering Control: Knobs on television receiver for properly framing the picture on the television screen.

Channel: A band of frequencies or wave lengths sufficient to permit its use for communication. The width of the channel depends upon the type of transmission.

Close-up: Usually a bust, head shot, or any narrow-angle picture.

Coaxial Cable: Specially constructed cable which permits high video frequencies with relatively low loss of power in the transmission of the television signal.

Contrast: The brightness relationship between the various elements of a television picture.

Contrast Control: A knob on the television receiver for adjusting the range between the high lights and shadows in the picture.

Cue Light: (*See* Camera Light)

Direct-view Receiver: A type of television receiver in which the picture is viewed directly on the face of the cathode-ray tube.

Disk: A recording.

Dissolve: The overlapping of an image produced by one camera over that of another, and the gradual elimination of the first image.

Dolly: A mobile truck on which the camera is mounted.

Dolly Shot: A shot taken while camera is in motion.

Electron Gun: That part of the cathode-ray tube where the emitted electrons are focused, accelerated, and directed toward the fluorescent screen. As the name implies, the electron gun projects electrons toward the screen of the tube.

Fade-in: The gradual appearance of the screen image from black to full visibility.

Fade-out: The reverse of fade-in. The gradual disappearance of the image from full visibility to black.

Field Pickup: The transmission of out-of-studio events by mobile unit cameras.

Film Pickup: The electronic transmission of motion pictures by means of television.

Film Studio: A studio equipped with special projection equipment for television motion-picture film.

Focusing Control: A knob on the receiver for bringing the picture into sharper definition.

Frame: A single complete picture containing 525 lines.

Frame Frequency: The number of times per second the complete frame is scanned.

Frequency: The number of cycles in an alternating recurrent wave which pass a given point in one second.

Frequency Modulation: A system of radio signaling whereby the frequency of the carrier is varied in accordance with the modulating audio frequency rather than the amplitude of the carrier, as in the amplitude modulation. The use of FM reduces noise and distortion.

Full Shot: (*See* Long Shot)

Ghost: An unwanted image appearing in the television picture as a result of signal reflection.

Gobo: A light-deflecting fin used to direct light in the studio and protect the camera lens from glare.

Iconoscope (Ike): A cathode-ray camera pickup tube developed by RCA.

Image Orthicon: A supersensitive camera tube developed by RCA capable of picking up scenes in semidarkness.

Inky: An incandescent lamp.

Interference: Disturbance of reception caused by undesired signals.

Interlacing: The technique used in scanning each 525-line definition picture in two sets of alternate lines to eliminate flicker.

Key Light: Over-all general illumination.

Kill Lights: To put out lights in studio.

Kilocycles: When used as a unit of frequency, 1,000 cycles per second.

Kinescope: Trade name of cathode-ray tube developed by RCA.

Lap Dissolve: Cross fading of one scene over another.

Line Amplifier: Amplifier that supplies signal to a transmission line.

Linearity Control: A control used to correct the linearity of a horizontal or vertical saw in a television system, thereby providing picture linearity, *i.e.*, the assurance that all objects in the image are in proper proportion and perspective.

Long Shot: A full view of the set including full-length view of actors.

Medium Close-up: A shot that cuts off the players just above the knees.

Medium Shot: A shot halfway between a long shot and a close-up.

Megacycles: When used as a unit of frequency, 1,000,000 cycles per second.

Miniatures: Any small models of houses, cities, automobiles, buildings, etc., used for shooting at close range, to create the impression of full scale.

16 mm.: Small-size (home movie) film.

35 mm.: Standard motion-picture size film.

Mobile Unit: Field television equipment mounted in trucks.

Modulation: The process in radio transmission whereby intelligence at audio frequencies is made to vary a radio-frequency carrier in accordance with the amplitude frequency, or phase of the audio frequency used to affect modulation.

Monitor: To review production of cathode-ray tube.

Mosaic: The photo-sensitive plate mounted in the iconoscope.

Multiple Relay: More than one relay station.

Narrow-angle Lens: Lens with narrow angle of projection used for close-up camera work.

Noise: An unwanted signal picked up by the television receiver, such as short wave or diathermy.

On the Air: Program is in progress.

Out Sync.: When the television image on a receiver screen is seen to "roll" either vertically or horizontally, it is the result of the receiver circuits being out of synchronization with the transmitted signals.

Panning: Short for "panorama." Sweeping of the scene by moving the camera from one side to another.

Pedestal: The direct-current level upon which the video signal is constructed, hence the term "pedestal." The direct-current pedestal amplitude determines the average brightness of a scene.

Picture: The image telecast.

Pipe: Telephone.

P.L.: Private line (telephone).

Platter: A recording.

Portable: Suit-case size pieces of television equipment used for field work.

Projection-type Receiver: A television receiver using optical projection onto a large screen.

Projector: A slide or motion-picture projector.

Properties: All furnishings and materials used to dress a set.

Relay Point: The location of a relay transmitter.

Relay Station: Usually a high-frequency transmitter located some distance from the main transmitter to relay its signal to a more distant point.

Return Trace: The trace of the scanning beam of the cathode-ray tube in returning from the bottom to the top of the picture.

Roll Film: Cue to start film projector.

Saw Tooth: A saw-tooth wave is, as the name implies, an alternating-current wave which has the shape of a saw tooth. Usually the flat of the wave against time indicates a smoothly inclined forward slope until a maximum is reached, then a quick, steep fly back. It is used for purposes of horizontal and vertical deflection.

Scanning: The process of analyzing successfully according to a predetermined method, the light values of picture elements constituting the total picture area.

Set Up: To install a set or scene in the studio.

Scanning Line: A single continuous narrow beam which is determined by the process of scanning.

Signal: A transmission of electronic waves.

Slide: A title or picture on a single frame of 35-mm. film projected into the camera.

Spots: Spotlights.

Stand By: Cue that the program is about to go on the air.

Station Break: Station identification at a specific time as required by the FCC.

Stretch: Stretch the action, and stall for time.

Superimposition: The bending or overlapping of the image produced on one camera with the image from another camera. Sometimes called *montage*.

Strike: To remove a set or scene from studio.

Take or Switch: To change from one camera to another.

Telecast: A television broadcast.

Televiewer: A member of the television audience.

Test Pattern: A specially made schematic design transmitted for the purpose of correcting the focus and tuning of the image on the television screen.

Video: From the Latin, meaning "To see."

Wide-angle Lens: A lens with a wide angle of projection, used to pick up a large portion of the set at a short distance.

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