FUNDAMENTALS

of

TELEVISION

By

Murray Bolen

Fundamentals of TELEVISION

by

MURRAY BOLEN

HOLLYWOOD RADIO PUBLISHERS, Inc.
HOLLYWOOD, CALIF.

First Edition

PRINTED IN THE UNITED STATES OF AMERICA

Dedicated

to my sweetheart Millie
who, besides being a wonderful wife
and Mother, took the time to type this.

with love

Murray.

ACKNOWLEDGMENTS

The author gratefully acknowledges the wonderful cooperation and assistance offered by the Radio Corporation of America, the National Broadcasting Company and Station KNBH, the Columbia Broadcasting System and Station KTTV, Paramount Television Production, Inc. and Station KTLA, Station KLAC-TV, the Philco Corporation, Five Star Productions of Hollywood, George Burtt and Advertising Consultants, Harry Lubke of Station KTSL, and Stokey-Ebert Productions, in assembling what is contained herein and for supplying photographs and material which made the assembly possible.

I am indebted also for permission to quote Mr. Hal E. Roach Jr., Mr. Donn Tatum, Mr. Mike Stokey, Mr. Hal Sawyer, Mr. Harry McMahan, Mr. Tom Hutchinson and Mr. Phil Booth.

A special thanks too, to Gordon Wright of KTLA and R. Alan McCormack of Station KCBS, and to my dear friend Maristan Chapman, who patiently read and re-read the pages that follow.

All points of view expressed and the interpretations of fact and attitude given herein are the author's own, unless otherwise indicated.

M. B.

CONTENTS

PART THREE

BUSINESSS ASPECTS OF TV

INTRODUCTION

Television has come "around the corner." It's here with such a clatter that it will no doubt remain to become one of our greatest entertainment mediums. In this book there is enlightenment for station owner, performer, engineer, and the miscellaneous curious souls—including the bulk of mankind—whose interest is in listening-viewing television.

Just as food cannot be digested without mastication, so ideas cannot be assimilated without having been thought over and understood. The author devoutly hopes that the reader will find herein enough thought-provoking information to give him the urge for further research and thought. Television is a pretty complex affair when one considers it in all facets. So, in these following pages, we have made an effort to be lucid, brief, informative, and interesting. We have tried to avoid technical terms that may be omitted without damage to the real meanings. We have tried to give enough to make ourselves clear, and, at the same time, not to become boring with detail.

Television cannot become mastered by the reading of this book. However, you will find sufficient information here to equip yourself for a good start in this great new entertainment medium. At least, you will have some conception of "what-goes-on" and be rewarded by a clearer outlook into the whole intriguing business.

History is repeating itself. Within this generation, we have seen the rise of radio broadcasting as an entertainment medium and as an industry. We have every reason to believe that television will follow its path. Everyone shares a responsibility in the future; but this responsibility can materialize into a constructive effort only if we understand the basic facts.

The writer hopes that such an understanding will be the reward for whatever effort is imposed on the reader.

M. B.

Chapter I

IN THE BEGINNING

A diligent search of all available sources does not disclose the exact date that someone, or anyone, contributed anything tangible to what we now call television. We do know that for ages people dreamed and talked of seeing things through the air from remote places. Quotations of such thinkings may be found even in the Bible.

What this writer believes to be the first recorded development that bears on television transmission and reception under the system as we do it today was contributed by a scientist named Becquerel in the year 1839. His discovery did not lead directly to television, nor was anything done in the direction of television then; but he discovered the *electro-chemical effect of light.* As nearly as we know, Becquerel made no use of this discovery, or, if he did, its use was not recorded for posterity.

In 1873 a telegraph operator named May observed an electrical effect while using some resistors which were made of the metal selenium. May noticed that, when the sun shone on the resistors, a photo-electric effect could be observed by the erratic and unstable behavior of his instruments. This erratic effect was tracked down and found to be caused by the fact that the resistors, when exposed to the sun, measured an actual change in resistance value. It was thus that an announcement was recorded that the mineral selenium, was surely electro-chemically active under light.

For several years to follow, numerous scientists put forth assorted schemes that speculated with the idea of transmitting distant scenes by electricity, using the electrical action

of selenium as a basis for transmission. In 1877 Senlecq proposed a rather crude scheme for television using what we now call a "mosaic", plus the selenium, as a basis. Too, a German named Nipkow took out a patent in 1884 which brought to light the "scanning disc" in conjunction with a cell employing selenium. His scanning disc consisted of a round metal disc with a series of holes so arranged that, starting from the outside edge, they traveled in an eccentric circle path until this path ended 48 holes later and an inch nearer the center of the disc. His receiver, although ingenious, was lacking in amplification. So no real results were obtained.

The cathode-ray tube actually came into being as early as 1859, when laboratory tests and experiments were made by discharging an electrical charge in a vacuum. In that year, a scientist gave the name "cathode-ray" to the discharge from the cathode element of a vacuum tube when a high value of electrical energy was applied to another element also in the vacuum. It was later demonstrated that this discharge produced fluorescence of the glass walls of the tube upon impact. This fluorescence was due to bombardment by particles of electricity, which by 1890 were termed "electrons." The original tube was developed by Braun and Wehnelt, and in 1897 was revamped by Braun alone and called, after him, the Braun tube. The revamping brought about some control of the electron stream and made it visible at the point of impact if the stream was directed up the tube and struck a mica screen which was coated with fluorescent material.

In 1905 Wehnelt again contributed by adding a device to the cathode element of the tube which focused the beam to a narrower stream and increased the emission of electrons even though much lower voltage was applied to the plate element. This also gave greater brilliance to the fluorescent spot and greatly increased the reflection sensitivity of the tube.

In 1907 a patent was asked for and granted to one Boris Rosing for a system of television. This system made use of the fact that, due to some experiments made by Ryan, an electron beam could be deflected and bent by the use of magnetic coils placed around the neck of a cathode-ray tube.

Rosing's system transmitted the pulses of the photocell tube as others had done, and he used two mirrored drums, revolving at right angles to one another, to "scan" the image in place of the former scanning disc. When received, these pulses were used to charge, electrically, two plates in the cathode tube. These fluctuating charges caused the electron beam of the tube to be deflected away from an aperture placed in front in more or less amounts. Thus, the effect to the eye examining the aperture was a variation in light and shade corresponding to the original scene.

Satisfactory results in the way of a good, readable picture were never attained with this apparatus; but it was the first real ingenious application of the cathode tube to television. It failed only because there was, as yet, no way of amplifying signals.

Not long after this, in 1911, Campbell Swinton conceived the idea of a system whereby a cathode tube was used at each end—one to transmit the picture and the other to receive it. His system was so basically like the one which we use today that it deserves special mention when chronicling events in television even though it was not made real use of until years later.

Swinton conceived a mosaic screen made up of photoelectric elements which were to be part of a specially constructed cathode ray tube. The image to be transmitted was to be projected on the mosaic through a lens, and the back of the mosaic was to be scanned by a beam of cathode-ray electrons controlled by the currents from two alternating current generators. The beam in the receiver tube was synchronized, or kept in step with that in the transmitter, by

means of deflecting coils connected to the same generators as the transmitter, and a wire connector carried the photo-electric currents for modulating the receiver beam.

Again, because there was no such thing as the present amplifying vacuum tube later to be developed by Dr. Lee DeForest, this great conception was never tried in practice. At least, no results are recorded.

In all experiments thus far, no transmission had been attempted through the air. Tests were all made with the signal being transported by a direct connector or conductor. In short, there was as yet no radio. So we must pause here in picture development to record the other portion of television as we know it today.

Experiments in wireless had been going on since 1887. A German physicist, Heinrich Hertz, was finding out how to propel an electromagnetic wave through the air by the use of a spark gap and coils. Because of Hertz, Guglielmo Marconi, a half-Italian, half-Irish youth, in 1896 took out wireless patents in England, and, with British backing, he formed the first great company for wireless signaling, and by 1899 was really in business.

Meantime "ham" (amateur) operators were springing up and signaling around the country by use of the spark gap and Marconi principles. By 1904, we begin to hear from Dr. Lee DeForest in this field, until by 1910, he was experimenting with voice transmission by wireless. Actually, in 1906, a more or less amateur operator, Reginald Fessenden, a Canadian, startled hams and commercial operators by sending out human voice and sounds of musical instruments over the air.

The public paid very little, if any, attention to all this until 1912. In that year the use of wireless failed to save the passengers aboard the *Titanic* when it rammed an iceberg in the Atlantic. From that time, governments here and abroad aided the development of intercommunication by wire-

less although there was considerable big-business bickering for routes and control.

By the end of World War I, the advent of the vacuum tube was creating a change in the method of transmission of wireless signaling. The tube was made to oscillate and, thus, emit a "carrier" wave. When controlled by a key, this wave could be broken into the dots and dashes of the Morse code. This type, also, had sundry other important advantages over the spark and arc type wave. Emphasis must be put upon the fact that Dr. Lee DeForest and others were, at the same time, uncovering ways and means to "modulate" the carrier generated by the vacuum tube with a signal or pulse, including voice.

So it was that the Westinghouse experimental station 8XK started broadcasting test music and voice and in 1921-22 became KDKA, a commercial broadcasting station.

The carrier system of broadcasting provided a roadway on which any signal could be imposed as modulation. So here we have the other part of present day TV—the method to transport the picture through the air.

The next developments in television considered chronologically, take us to 1924 and back to the scanning disc and other mechanical devices. In this year, two men, each working independently, succeeded in transmitting to a receiver a crude picture that was at least viewable. These two men were J. L. Baird of England and C. F. Jenkins of the U. S. Neither one contributed anything startlingly new to the art, but their experiments did cause a flurry of research, experiments, and some progress for the next several years. Most all experiments were improvements of the mechanical devices mentioned earlier. The holes in the scanning discs were replaced by lenses and mirrors. Variations in methods of scanning were tried with rotating drums of mirrors and lenses. All methods remained in the mechanical category and stayed that way. By 1931, the best that could be had

was a picture which consisted of only 60 lines and 20 pictures per second. This made a "poor detail" picture with lots of flicker present.

Meantime, Dr. Lee DeForest, along with his wireless experiments, had come up with the vacuum tube triode which could be used to strengthen electrical impulses and build up the weak output of a received signal to a point where it was much easier to make it perform. In short, it was possible to *amplify* a signal electronically. This had a tendency to turn the laboratory experimenters' thoughts back again to previous experiments with cathode-ray tube systems which had failed for the lack of amplifiers.

By 1933, Philo Farnsworth working in San Francisco, and Zworykin of RCA each came up with methods of transmitting and receiving a TV picture by all electronic methods. Actually in 1931, the Don Lee System in Hollywood went on the air on a one hour-per-day, six-days-a-week basis employing all electronic systems. Their transmitter, engineered by Harry L. Lubke a former associate of Farnsworth, put out a picture of some 300 lines at 20 frames and claims the distinction of being the country's first television station.

Meantime, such notables as Ives of AT&T, Alexanderson of G.E., Goldsmith of RCA, and Goldmark of CBS were making improvements in the laboratory. By 1935, a standard for transmission was 441 lines—which figure was raised in 1940 to 525 lines at 30 frames. This is the standard today.

RCA and Farnsworth settled their differences in court, and this left the receiving set manufacturers with something definite in the way of a standard to go by. Finally in 1939, TV emerged from the laboratory stage, and NBC went on the air with a regular schedule of programming. The bulky receiving disc and equipment had been discarded. Electronic-principle receivers were manufactured and sold, and the general public began to take an interest—even though receivers

were quite expensive. Cartoon pictures, March of Time, and an occasional live drama were the viewer's fare. Lubke, in California with W6XAO, the experimental Don Lee station, used serial films interspersed with Easter services, Rose Parade, and first wrestling and boxing pick-ups to maintain his schedule.

As Dumont and other stations got on the air, an occasional sponsor, looking well into the future, put in a little money to try TV as an advertising medium. Such far-sighted people as Lever Brothers Company, for instance, released program material with one of their soaps dramatized in a "commercial" to the viewing public. It is very doubtful that they received a commensurate amount of advertising for their dollar—for receivers were few and far between. The action was, then, mostly institutional on the sponsor's part and continued even through World War II, which intervened to put further technical and commercial advancement at practically a standstill. Manufacturers put all their resources into the development of radar and other electronic equipment for war use. Considerable experimentation went on in all laboratories in the general field, however, and, as a result of this research, we emerged from the war ready to develop television broadcasting as we now know it at a rapid pace.

Manufacturers who had been making electronic war machines were rapidly geared to switch over to the manufacture of receivers, cathode-ray tubes, sensitive circuits in special amplifiers, and other television equipment. Receivers could be put out on an assembly line basis, and through knowledge gained in radar, guided missles, and ultra-high frequency experimentation during the war, transmitters were re-designed for more efficient circuits and antennas.

Only one other development had to be settled to bring us up to date. Dr. Peter Goldmark, of the Columbia Broadcasting System, had been experimenting extensively with television in color, and CBS applied to the Federal Communications Commission for permission to transmit TV in color.

They further suggested that color transmission be made the standard for all picture transmission. Obviously, this point had to be settled; for adoption of color at this time meant that, for the most part, receivers already existent would become obsolete immediately. The situation was thoroughly explored by a Radio Technical Planning Board in 1944, and their findings were confirmed by the FCC in January of 1945, at which time they ruled that color TV would be put on the shelf until such time as the knowledge of the art indicated that the public was ready to absorb it. In other words, they implied that we had better get completely developed in black and white transmission before tackling color. We will dwell more on this in the very last chapter of this book as we take a squint "in the crystal ball".

Chapter II

TRANSMITTING TELEVISION

The transmission of the television program is very closely allied to radio. This is natural because, as we have seen in Chapter I, the radio carrier wave is the means of transportation for an audible signal. It is, likewise, the method of transportation for "video" or picture information, which is broadcast in the form of a composite signal.

Under any such system, a signal originates by impressing the diaphram of a microphone with sound, or it originates by creating a pulse signal. At any rate, the originated signal is amplified by a series of vacuum-tube amplifiers and sent over a good quality telephone line ("loop"), or other conductor, to the transmitter. It is then further amplified to such a strength that, when it is impinged upon the carrier wave being generated by the transmitter, it is potent enough to swing or otherwise change the character of the carrier so that the carrier will be "modulated".

Television transmission differs from radio transmission in-as-much as it requires the use of not one but two transmitters to transmit the complete television program. One transmitter carries the audio (voice) portion of the program, and the other carries the video (picture) portion. These two transmitters work as a closely allied team, and the audio transmitter functions very much the same as does our normal radio broadcasting transmitter except that the modulation principle employed in television sound is referred to as "FM" —or frequency modulation.

The video transmitter functions exactly the way a normal radio broadcast transmitter does even to employing "AM"—

amplitude modulation—but presents a much more complex problem than either radio transmission or television sound transmission.

The complexities arise mainly from the fact that in picture transmissions a very broad band of frequencies must be released, three to four MEGacycles for the picture as against a mere 200 KILOcycles for the sound. Also, for picture transmission, several elements or components must be added to the picture information so that it can be unscrambled and reassembled at the receiver end to become a picture.

The camera, where the original pulse to be transmitted originates, views the scene with a lens and a camera tube (to be described later) and divides the scene or object viewed into thousands of elements. The camera components convert the amount of light in each element into an equivalent electrical potential, or pulse. The sequence in which the elements are selected, or scanned, is determined by an electronic timing circuit which is associated with the camera controls. The resulting video signal is then amplified and combined in the video line amplifier with synchronizing pulses supplied by the timing circuit. The combined signal now contains all components necessary to reconstruct the original scene or picture when it is picked up by the receiver, which makes use of somewhat analagous electronic circuits. This composite signal, which now contains the camera information plus sync pulses and blanking, is further amplified as with sound transmission to such a strength that it can properly modulate the carrier wave of the video transmitter. When impinged on the carrier, it is ready for transmission, via a transmission line, to the antenna where it is radiated for pick-up by receivers within range.

TRANSMISSION CHANNELS

The design of the transmitter's antenna is of paramount importance in every way. This is because of the frequency spectrum (channels) in which TV transmitters must operate,

and, secondarily, because of the properties of propagated waves at these frequencies.

The principal property of a wave generated for transmission in the television spectrum that presents a problem to the engineer is that at these frequencies a wave will reflect, or bounce, *but it will not bend.* This means one thing: that a transmission antenna must be designed to propel its wave along a straight line that is a "line-of-sight" to the receiver. Also, it must propel this wave as far as possible in all directions.

Therefore to increase the range of a transmitter it is essential that the antenna be erected at a site where hills, buildings, and other intervening objects are not in line-of-sight and at as great a height above electrical ground and surrounding terrain as possible. Signals cannot be transmitted reliably beyond the horizon. A receiver which is somewhat beyond the line-of-sight may receive a signal, but it is probable that it will receive a reflected or bounced signal that will give a "ghost," or secondary image, to the receiver. This condition will be covered further in Chapter VI on TV RECEIVERS.

The full design of a transmission antenna is a technical matter for the consideration of engineers. Nevertheless, a little of what is involved may be set down, since it will concern everyone who is a receiver owner, layman, or professional. Consider, for instance, the matter of dimension.

The dimension of the antenna depends on the channel in which the transmitter will operate and can be computed by anyone with simple algebra in one simple formula.

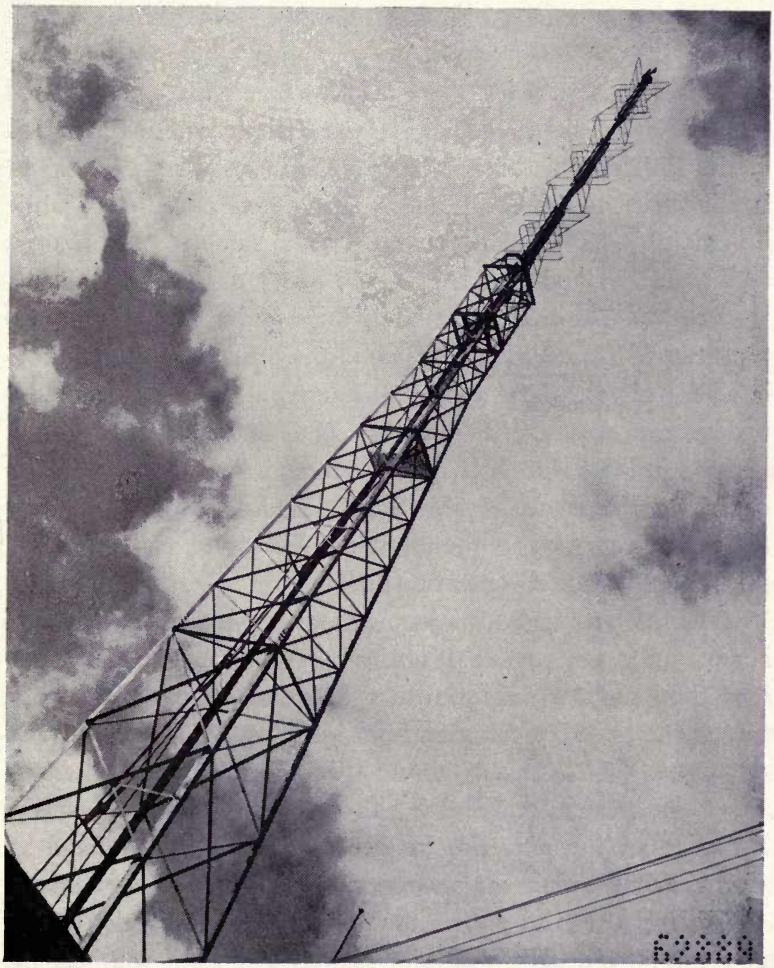
As of July 1945 the Federal Communications Commission established thirteen TV bands, or channels, for the purpose of commercial telecasting. A single one of these channels is six times as wide as the entire band which appears on your regular AM radio. Six of these channels, each six megacycles wide, fall between 44 and 88 megacycles. Seven others, in another frequency spectrum, fall between 172 and 216 megacycles. For reference, here is a complete table of these channels:

Channel Number	Frequency in megacycles	1/4 wave antenna length in inches
1	44-50 mc	60 in.
2	54-60 mc	49 in.
3	60-66 mc	44 in.
4	66-72 mc	40 in.
5	76-82 mc	35 in.
6	82-88 mc	33 in.

Channel Number	Frequency in megacycles	1/4 wave antenna length in inches
HIGH SPECTRUM		
7	174-180	15 3/4 in.
8	180-186	15 1/4 in.
9	186-192	14 3/4 in.
10	192-198	14 1/4 in.
11	198-204	13 3/4 in.
12	204-210	13 1/2 in.
13	210-216	13 1/4 in.

All antennae, for transmitting or for receiving, are designed to use elements which are each a quarter-wave in physical length. Engineers have found that an antenna assembled in any one of several forms, but basicly made from metal elements each of which are measured to be a quarter-wave-length long, can be conveniently "fed" with co-axial line. This makes for greater efficiency, and a maximum transfer of energy from transmitter to antenna. In addition such an antenna will give a greater *"gain," i.e.,* more impetus, to the propagated wave. Such antennae are called "arrays" and are variously termed as stacked arrays, turnstile antennae, etc. Most present day TV transmitters employ some such array because the use of it is equivalent to raising the wattage power of the transmitter which feeds it. In other words,

the user reaps the benefit of a stronger signal in a given area without the expense of buying higher powered gear for the transmitter itself. Furthermore, transmitter gear is very expensive.



Courtesy RCA

Television super turnstile antenna mounted on a steel tower is a dual purpose transmitting antenna designed for simultaneous radiation of both sound and picture signals of a television transmitter in the 54-216 band. If a three section antenna is used with a 5-kw transmitter, the equivalent radiated power will be well over 20 kilowatts.

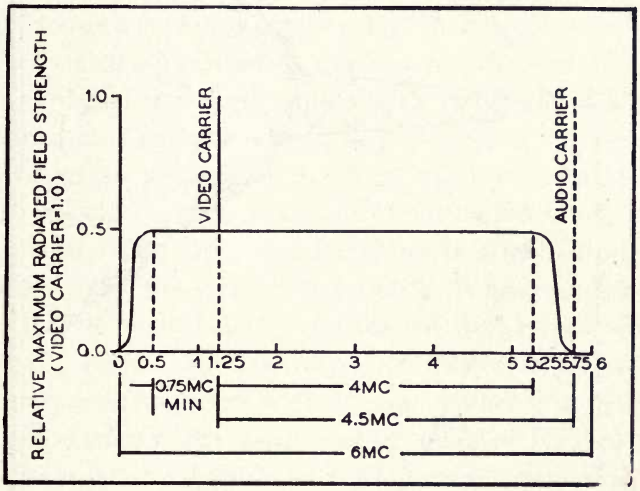
As has been noted, the reliable coverage area of a TV transmitter is governed by the line of sight. It is, therefore, evident that the Federal Communications Commission may allocate several transmitters to operate on the same channel. However, this may be done only when locations of transmitters are sufficiently removed from each other so that their line-of-sight paths, or reflected paths, do not over-lap or interfere. To avoid this possibility in areas where cities are located close together, alternate channels are assigned. Thus it is that in the Philadelphia-New York area, for instance, New York is allocated channels 2, 4, and 5 in the lower spectrum, while Philadelphia has channels 3 and 6. The same is true in areas such as Hollywood, San Diego, and Santa Barbara, California.

Besides, within each channel, there must be operated two transmitters—one FM for voice and the other amplitude modulated for picture. The allocated channel allows six megacycles of spectrum in which to do this. The space, however, is not divided up half and half. The sound transmitter actually occupies only .25 mc. of this width. This leaves the balance for the transmission of the much more complex picture signal, plus a little channel separation space.

The human ear can distinguish only a relatively small number of cycles per second. Probably never more than ten to fifteen thousand and rarely over eight or nine c.p.s. Therefore, there is no need for the sound portion of a TV signal to transmit more. So .25 mc. is ample space for the sound channel. The video carrier occupies the balance, or 5.75 megacycles. For a reader with engineering tendencies, the chart on page 15 diagrams the set-up for one channel six megacycles wide.

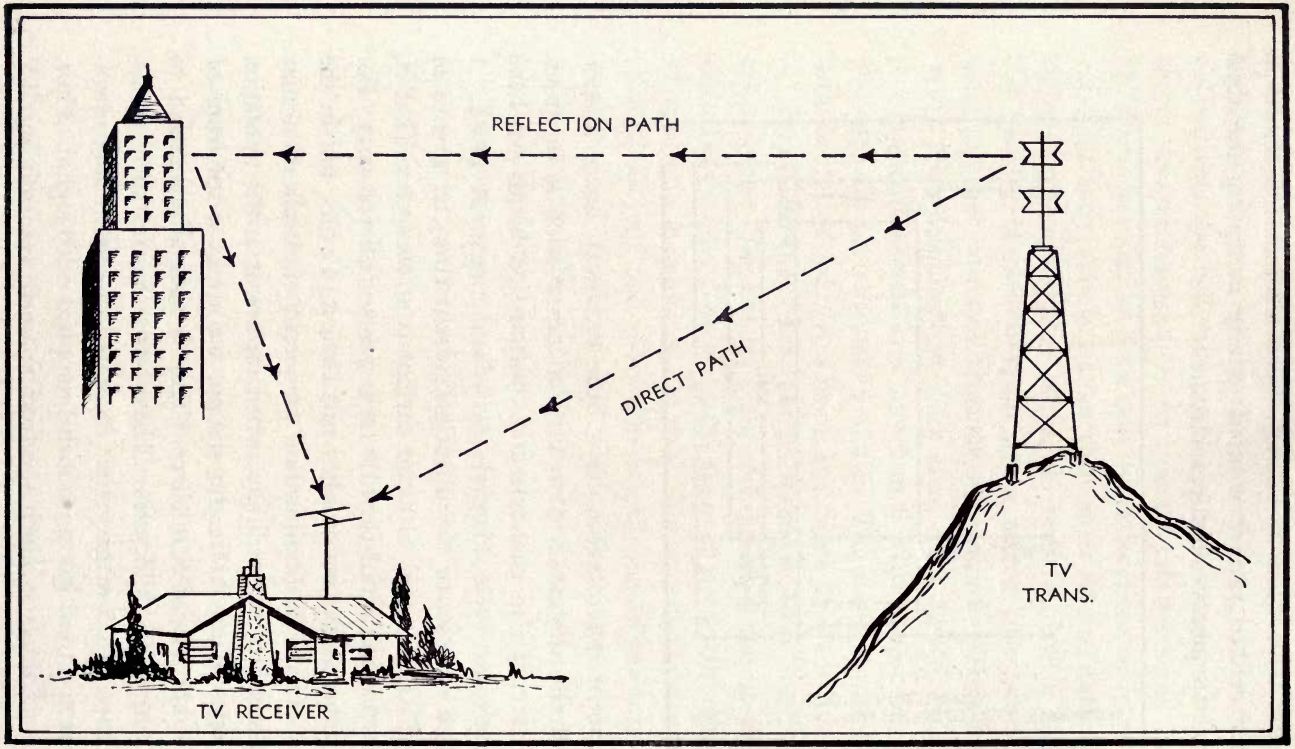
This figure also shows that the transmitted video signal does not have equally wide side bands. The band width of the lower side band and carrier is only 1.25 mc.; the band width of the upper side band and carrier is 4.5 mc. The suppression of one side band is known as vestigial side-band transmission, and this type of transmission permits the use of a

video signal of wider frequency. Such transmission results in a better defined picture without greatly increasing the total required frequency band per channel.



Some of the foregoing is a little technical, hence a summary of this discussion of television transmission is in order.

In referring to channels and transmission bands we have used the terms cycle, kilocycle (kc), and megacycle (mc). A cycle is a reversal of the direction current flows in a wire or in space. Our normal 110 volt current is at 60 cycles. That is, it reverses direction of flow 60 times per second (60 cps). For radio transmission we amplify this basic 110 volts, but in the process of power amplification frequency multiplication may also take place. Accordingly, when we arrive at the operation frequencies of an AM radio station, we are at a spectrum of 500,000 cps. to 1,500,000 cps. This is normally referred to as 500 to 1,500 kilocycles. These same figures then are .5 megacycles to 1.5 megacycles. As stated, it requires six megacycles of spectrum to transmit the complex video signal. Thus, it takes six times as much spectrum space to transmit one TV signal as is occupied by every AM broadcasting station in the



"GHOST" RECEPTION

A picture will be received at the home when "direct path" signal is received. A secondary, or "ghost" picture may be seen when "reflection path" signal gets here a little later.

United States collectively. That is why we must transmit TV in a spectrum where more space (frequencies) is available. That is why we are in the so-called ultra-high spectrum; we need six million cycles to get each television picture, together with its companion sound, from studio to home.

We have also referred to the bounce effect of our wave at these frequencies. As a propagated wave is sent out by the transmitter in a straight line, it may bounce, or be deflected, by an object in its path—a building, a hill, a mountain, or what is known to engineers as the Kennelly-heavy side layer, or "E" layer. This last reflective object is a theoretical layer that exists above the surface of the earth. It has accounted for some assorted phenomena in the way of distant reception of signals, including TV. The height of this layer varies from day to day, in fact, from hour to hour. When a transmitted wave encounters it, the wave may be reflected back to earth and be received at a distance from the transmitter that depends on the angle of incidence of the wave to the layer.

The layer may move with changes in temperature or for any number of unknown reasons; but engineers have concluded that it is responsible for a TV signal released in London being received in New York City on occasion and, again, a signal released in New York being picked up in Indianapolis.

Incidentally, it is worth noting that many radar principles developed during World War II depend on this bounce-back effect. Also, a signal has been successfully shot to the moon, bounced back, and received here. It is quite possible that we may soon make use of this characteristic more than we do today. But that is in the realm of the future for this rapidly expanding business, television. We will cover more about this bounce effect in a Chapter on TV reception.

Chapter III

CREATING THE PICTURE

If you think we are attacking our project a little backwards, you are right. Thus far, we have dealt with the transmission of a picture without having originated a picture to transmit. So now lets slide down the co-axial cable or the relay link and get on the ground—more specifically, to the control room from whence a picture, by one means or another, is sent to the transmitter.

In Chapter II we simply indicated that a picture to be transmitted in the form of energy was further amplified at the transmitter and sent to the antenna riding on the carrier. This dismissed a very important part of the overall operation very quickly indeed. How do we get the picture from the studio or other pick-up point to the transmitter? With this in mind, you will recall that the transmitter site must be at as high an elevation as possible for best transmission. This often dictates that the site is at a relatively inaccessible spot, far removed from the point where the picture originates. In AM radio broadcasting, this inaccessibility presents no difficulty because the telephone company will put in a pair of wires (program loop) which will satisfactorily carry the program between studio and transmitter. A telephone wire as we know it is not capable of carrying the wide band of frequencies we require for our picture except over relatively short distances. It will however carry our sound portion very nicely. The picture, on the other hand, is another story.

In Los Angeles, California, for instance, all of the seven television stations have their transmitters located atop Mt.

Wilson. This mountain peak is some 5,000 feet high and has the great advantage of looking down upon a great, sprawling community. It is therefore in line-of-sight of communities as far away as San Diego, 75 or more air-line miles to the south, and Santa Barbara, 90 air-line miles away. The only disadvantage to this fine location is that it is at least 30 airline miles from the heart of Los Angeles and Hollywood. Since most program material originates in town, we get back to our question: "How do we get the picture to the transmitter?"

There are three ways that this may be done. One is to link the transmitters to their studios with co-axial cable, and another is to use a specially-tuned telephone loop, supplied by the telephone company, which will pass a 3.5 mc. frequency over the 30 mile length. A third is to link them by a channel called a micro-wave link.

As to number one, the co-axial cables have not yet been constructed from city to mountain for various reasons of enginering practicability (and may never be). However several Los Angeles area stations make use of the tuned telephone company loop as an alternate for number three, the microwave link. The links work very well, and retain an additional advantage in the way of mobility. Even though the studio be linked to transmitter with co-ax or loop, it would still be impossible for such a line to be available to every point of origination such as skating rink and boxing arena. So, since microwave equipment is necessary when a station wishes to indulge in mobile or remote pick-ups, it is often used continuously as a studio-transmitter link.

CO-AXIAL CABLE

Plenty of material is available elsewhere on "co-ax". For our purposes we will not go into it too deeply. On the other hand, it should be mentioned that it is exceedingly useful—indeed indispensable for connecting together the studio units

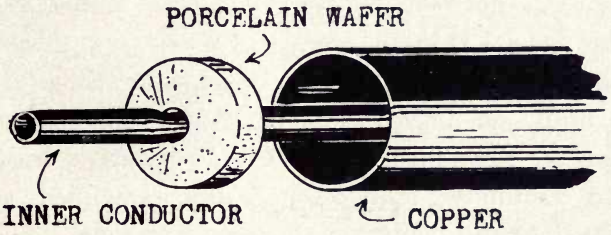
necessary for camera chains and can be made in either flexible or non-flexible form.

Coaxial line is the subject of considerable publicity at present due to the fact that, when the American Telephone and Telegraph Company finish construction of such a cable across the entire United States, it will then be possible to originate programs at either extremity of it and to release programs simultaneously from any station which is tapped on to it. This is what is referred to as a network—a TV network—and is in prospect in the immediate future.

It is an electrical engineering fact that a wire will offer a resistance to the flow of current along it. This resistance is in the form of *inductance,* a characteristic of an electrical circuit that tends to resist any change in the value of current. Counteracting this impeding force is an opposing characteristic of alternating current circuits called *capacity.* When the capacitance of a circuit is of such a value that it exactly counteracts the inductance of the circuit, a condition is attained whereby we have a complete circuit for transmission that offers a minimum opposition to current flow. This is what we are after in transmitting a TV signal since the wide band of frequencies are relatively hard to generate, and we do not wish to dissipate any of them by putting them into a resistive circuit.

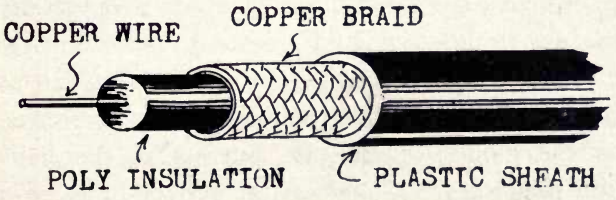
In practice then, to make such a transmission line, two conductors are arranged so that they are constantly in parallel and are kept so for their entire length. Their distance apart, and their physical dimension or proportion to one another, determine the proper amounts of resistance and capacity that will be present. "Co-ax" is then what the name implies—two conductors with a common axis. They are therefore always parallel. The inner conductor is supported rigidly and kept insulated from the outer conductor by means of wafers which look very much like the Life Saver candies. These insulators, which are made of porcelain, copalene, or other insulating

material, are spaced along the entire length of the line at such a distance apart that the parallel of the two lines cannot be disturbed. In this rigid type "co-ax," the insulators are normally three to five inches apart and both conductors, one inside the other, are made of copper tubing, the diameters of which maintain a ratio of approximately three-to-one to each other.



RIGID CO-AX

Another type of "co-ax" line, which we use in studios to connect units together, is flexible. In this case the insulation used to maintain the parallel of the two conductors is of plastic derivation and solidly encases the inner conductor. Over the plastic insulation is placed the outer conductor in the form of copper braid. The whole is encased in a plastic outer covering. This makes a durable, flexible transmission line, which is only slightly less efficient than the rigid type. The rigid type is generally slightly under an inch in diameter and is used to connect transmitter to antenna. The flexible type is normally less than a half inch in overall diameter.



FLEXIBLE CO-AX

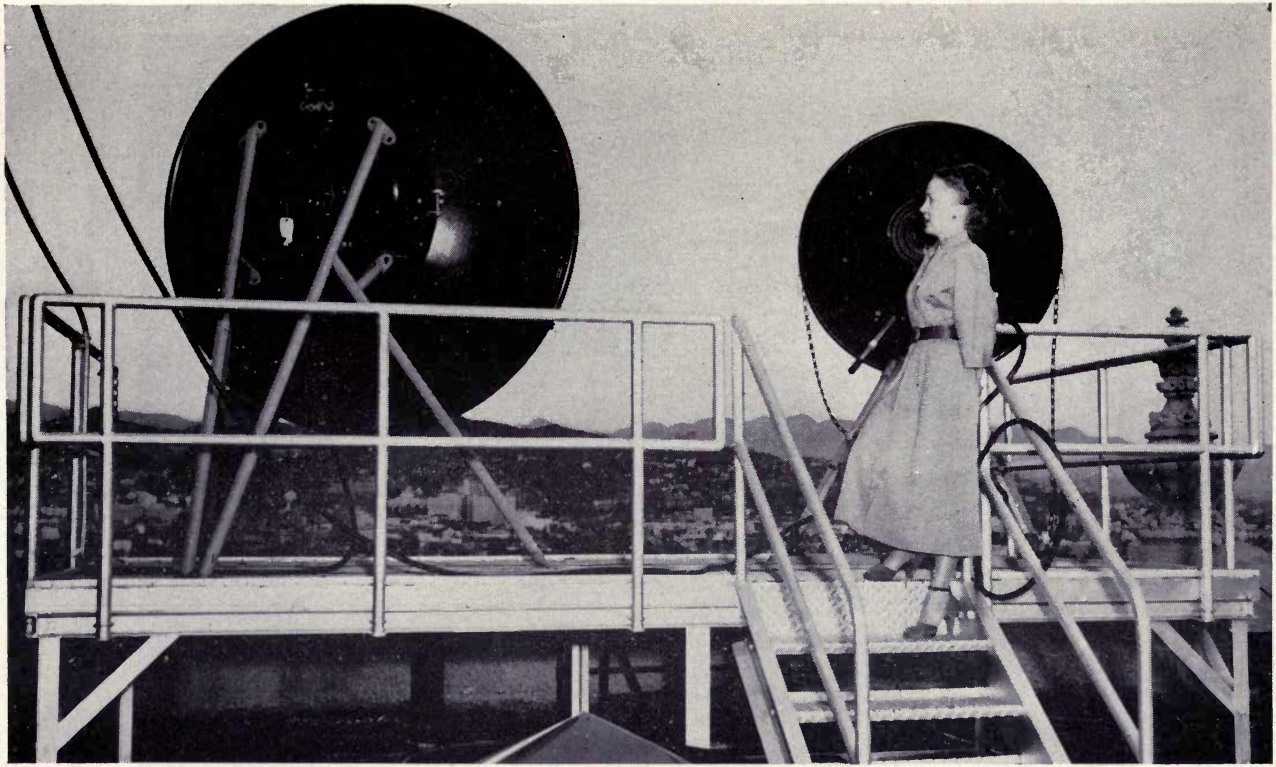
THE MICROWAVE LINK

Now let us consider the alternate to the coaxial transmission line for "piping" our program picture to the transmitter, the microwave link.

Basically, this is another transmitter-receiver circuit. The FCC, in addition to allocating the thirteen commercial channels to television, has also allocated some additional spectrum, such as the 900 megacycle band and others, for the servicing of the thirteen normal channels. In these spectrums, the operating stations may operate their relay stations, mobile units, and microwave links. Hence, in Los Angeles, programs are forwarded to Mt. Wilson through a small low-powered transmitter, received at Wilson, amplified, and retransmitted to the public on the proper channel. The low-powered transmitter is actually a television transmitter working on a frequency within one of the allocated service spectrums—the 900 megacycle band, or the ultra-high band near 7000 megacycles.

The picture pulse, or signal, comes from the camera over flexible co-ax to the microwave transmitter which is hooked to a parabolic antenna beamed toward Mt. Wilson. Obviously, this parabolic reflector must be in line-of-sight from Mt. Wilson at all times, else the picture will not be properly received there for retransmission. The receiver on the mountain is hooked to a similar parabolic reflector focused on the microwave transmitter below.

The main studio for each of the telecasting stations in the Los Angeles area has this transmitter-receiver operating at all times to carry studio-originated programs; and then when it is necessary to pick up a program from a ball park, for instance, operators at Mt. Wilson have only to focus a receiver parabola on the mobile transmitter antenna at the ball park, check the signal from it, and, at the proper time, switch the output of this receiver into the transmitter. A program is, for



PERMANENT MICRO-WAVE PROGRAM LINK

These parabolic reflectors are constantly pointed toward Mt. Wilson from KTTV-CBS, Hollywood, to carry program to the transmitter. Cables are flexible co-ax from studio control downstairs.

instance, originating at the ball park. If the station wants to change the locale and televise part of the program in a studio, it may do so, on pre-arranged cue. The program may resume by simply connecting to the output of the proper receiver at Mt. Wilson.

Micro-wave receiver, located in the black hub behind the parabola, used in relay links.

THE MOBILE UNIT

The remote pick-up is a very interesting and exciting operation. As mentioned, the mobile unit may transmit programs at any time and from any location that will put its parabolic antenna in line-of-sight of the receiving parabola. This makes the remote pick-up a very facile operation, and the public event pick-up a commonplace on TV. Of course, a picture transmission must be accompanied by a sound release. A telephone loop carries the sound to the sound transmitter. Therefore, a mobile unit does not start transmission of a picture where there is no termination of a telephone loop. However under emergency conditions an additional microwave link can be utilized to carry audio to the transmitter. The loop must be "ordered in," and the telephone company will install it on previous order.

Although practices vary in different localities, a typical operation for a mobile unit may run about as follows:

A telecast, for example, is to originate at Wrigley Field, a baseball park in Los Angeles. A telephone loop from the park to studio master control is ordered installed. Master control "patches" it in (connects it) to the Mt. Wilson-studio loop.

Several hours before telecast time the mobile crew gets busy. Taking their truck, which is equipped with a microwave transmitter, amplifiers, power supplies, viewers, microphones, cue circuits, at least two camera chains, a few hundred feet of "co-ax" line and telephone line, as well as other gadgets, the crew sets out for the park. A minimum crew is five although this number is variable. Crewmen are two camera men, a switcher (who may also double as technical supervisor), a director (who may double as switcher), and an announcer. Other assistants may do such jobs as hook-up work.

The truck is parked in a court at the grandstand where it is unobstructively alined with Mt. Wilson. The cameras

Courtesy RCA

This studio on wheels contains monitoring, control and power supply units for field pick-up as seen in operating position through rear windows. Microwave relay transmitter and field camera may be mounted on top when desirable.

are unloaded and taken to chosen spots in the grandstand. Normally one location is at low level between first base and home, and another is on an upper level just off third base. Coaxial cables to carry the picture to the truck are strung from cameras to truck, and, in addition to these, a telephone line to carry instructions over a cue circuit is installed. Cables which will carry the power to operate the cameras must be strung, although often all wires are in the same main cable as the "co-ax" line.

Meantime, the microphone is attached to the termination of the telephone loop at the announcer's position behind home plate, and a "co-ax" line is run from the truck to carry the picture to the announcer's viewer-monitor beside him. Telephone lines are also strung to connect the announcer's cue circuit head phones.

Back at the truck a cable is strung to a previously checked 110 volt AC source that is capable of carrying the "load" to get the power to run the entire rig. The parabolic reflector is set atop the truck or on the grandstand roof and focused on Mt. Wilson. The switcher and the engineer now energize the amplifiers and all connecting equipment with the AC source. After a "warm-up" period they are ready for tests. Instructions go out to the camermen over the cue circuit to start picking up picture. If everything is working properly, a picture from camera one will show up on the switcher's monitor screen, the picture having been piped along the "co-ax" from the camera. Switching to camera two simply by pushing a button, the test is repeated to see that camera two is operating properly. All instructions are given to cameramen through the cue circuit phones which each wears.

The microwave transmitter, having been energized meantime, starts transmitting picture to the receiver on Mt. Wilson. The operator in the truck may talk directly to the engineer on Wilson by making use of the telephone loop later used by the announcer. In some instances they may converse over

an extra telephone line called an "order wire." Switcher now sends test signals from the cameras into the microwave link, and, when Mt. Wilson reports that reception is of usable quality and strength, real program transmission is ready. Perhaps some correction is necessary in the focusing of the parabola at the ball park, for the beam which the transmitter sends is not very wide.

Courtesy RCA

MICROWAVE "DISH"

This microwave antenna is the highly directional reflector type. The cylindrical unit at the back of the parabola may house either link transmitter or receiver. The hook shaped wave guide "pours" the video signal into the center of the reflector amplifying the output 9000 times.

Incidentally, you cannot receive this microwave signal on your ordinary TV receiver. Besides not being able to tune it to the proper frequency, you are probably out of the beam.

If tests are satisfactory, and everyone is in his place, the director listens in (monitors) on the order wire for the "go ahead," or "on the air," verbal cue from the main studio. When this order comes the director forwards it along the cue

circuit to the announcer and the cameramen. The announcer does his introductory, and both cameramen start roving their cameras for presentable pictures.

It is well to point out here that the director or switcher in the truck is operating "blind." All he can see of the baseball game is in the image in front of him—one picture from each camera. A third picture which appears on a

Courtesy C.B.S.

MEL ALLEN, famed sports announcer, covers a football game telecast with his "spotter" (right) and his No. 1 camera.

At the Ball Game

Cameraman gets picture from high above home plate as announcer (extreme right) describes action. Note 8 inch spare lens for the camera, (extreme lower left).

viewer is whichever picture he has switched into the microwave link for telecasting, the "on the air" picture.

The inside of our truck is not too roomy. The director, the switcher, and the shader sit side by side, where each see all the viewing screens. The switcher will press buttons at the command of the director and put "on-the-air" whichever picture is desired. He is wearing on one ear, an earphone-microphone combination (headset) over which he can get instructions from studio "Master Control". In addition, he wears on the other ear a headset which ties in to the cue circuit for communication with cameramen and others.

The switcher, then, besides manipulating controls to keep the chosen picture on the air, gets a double ear-ful of chatter from all sources during a telecast. He is a busy young man.

The shader must examine continuously the picture from each camera and see to it that every picture has equal light and shade. The viewing equipment for doing this is in a rack immediately in front of the operating threesome. The portable units, which slip-fit into place in the truck, take up any remaining room there may be available inside the truck.

Thus we have a completely equipped control room, with all necessary apparatus and personnel, jammed into the mobile unit.

N. B.—Although all the people working on this type of telecast are important, each one working as a member of a team, the cameraman is probably the key man in the whole operation. The material which he sends to the truck picture-wise must be what the viewer at home wants most to see. He must not miss an important play. If the director misses something important which may have been described by the announcer, he asks one camera or the other to give it to him and asks the announcer to clear up the point verbally.

If there is a commercial announcement or a sponsor's message to be inserted into this telecast, a lot more teamwork is involved—especially since the program material is

CBS Prepares For Remote Telecast of Pasadena Rose Parade

Last minute check of cameras and equipment before famous New Years Day event. Viewing equipment set-up is in house along the way. Truck, parked outside, transmits picture to Mt. Wilson via micro-wave link.

coming from a remote point from the studio. At a verbal cue over the order wire from the studio, the truck switcher shuts off picture going into his transmitter. At the same time, on Mt. Wilson, the engineer there makes a switch so that he is feeding the receiver which picks up the studio into his transmitter. The studio then proceeds to send over its link whatever picture and voice are necessary for the commercial message. When finished the process goes in reverse. The Mt. Wilson engineer switches back to the ballpark link receiver. The truck switcher or director gives verbal "go ahead" to announcer and cameramen, and feeding program from the park is resumed.

It must be emphasized that procedures vary at different stations and under other conditions. However, what is outlined in the foregoing is basicly what happens under present day televising procedures and practices. Obviously, it is all an operation where perfect synchronization and cooperation are absolutely mandatory. Teamwork is essential in all departments.

When the hypothetical baseball game has finished, the announcer has given his summary, the cameramen have flashed the viewer pictures of the departing fans and the scoreboard—then the director-switcher informs the studio that everything is wound up and that the studio can take it away. Mt. Wilson then does the switch to the studio link and proceeds with program material from the studio. Meantime, the whole set-up at the ballpark is torn down. All equipment is stored away in the truck. Everything is ready to return to the studio, and activity resumes at that point.

Chapter IV

THE STUDIO AND ITS FACILITIES

As you see, we are still proceeding a bit backwards. So far, we've transmitted a picture from several places of origination and piped it, by two methods, to the transmitter. But we still haven't actually gone through the process of picture origination. So here at home base, the studio, we go one step nearer the camera which starts the whole business.

SIZE

We shall not attempt to give any formula for the design of a television studio. The art has not yet developed sufficiently to be able to do so. Specifications are little more than broadly standardized. We shall, however, dwell on the specific problems which bear directly on how a studio shall be laid out and the general trend of present day planning.

Most television stations start with studios donated by radio; yet as production devices develop, programs become more popular, and more and more equipment is needed, it becomes increasingly evident that the limitations of a regular radio studio are too confining. There isn't enough space to operate—much less to store all necessary flats, props, and machinery. So the first step in graduating from the radio studio start is tackling the problem of space. The trend is toward movie studio proportions. The ABC network in Hollywood is revamping the old Vitagraph Picture Studio, with all its big sound stages, dressing rooms, audience studios, prop rooms, and lighting equipment. CBS, both in New York and Hollywood, has plans that call for studios of large size. One concern has a design which calls for a kind of revolving-stage, which, in their estimation, will cut down the

space needed because their "sets" will not need to be end to end along a wall space but will be instead in the center of the work area where they may be "worked around." Indeed, there is no standardization.

Indications are that the ideal studio will have a space for the production of a live show within it approximately one and one-half times long as it is wide. Don Lee in Hollywood (KTSL) has a very fine studio that is 60x100 feet. One of CBS' New York studios is 60x90 feet. In both cases other smaller studios are also available; for all work cannot be done in one studio, no matter how large. The entire space that is necessary for operation is considerably more than 60x100—since there must be room for the control room, a film projection room, an announcing booth, an effects room, a client's viewing booth, and storage space.

The ceiling height is important. The microphone boom is about 20 feet long and requires height in order to be maneuvered into a position where it will pick up sound and still stay out of the picture on a long shot. It is often helpful to be able to "fly" stage set flats or even an entire set. This requires height. Provision must be made for anchorage of the numerous overhead lights that will be necessary to light studio scenes in a position where they will be outside the picture the camera will pick up. This requires height. The Don Lee Hollywood station has solved this light problem nicely by using movie sound stage technique. They anchor light sources to a railing which runs along a catwalk anchored to the studio walls.

An available ceiling height of approximately 35 feet seems necessary in at least one portion of any large studio. Small studios, in which only close shooting will be done on an intimate set, can get along with a ceiling height of 14 feet to 18 feet since this height will accommodate a normal size stage flat.

It will suffice to say, in conclusion, that an ideal studio

has a main floor 60x100 feet. Forty of the 100 foot length shall have a ceiling at least 35 feet high. The area above this 40 feet shall have a catwalk around it for light anchorage and handling and shall have the accoutrements necessary to fly all or part of a set anchored to its ceiling.

ACOUSTICS

We must not lose sight of the fact that all this studio lay-out must take care of sound transmission origination as well as picture, nor can we dismiss sound problems in TV by saying that they have been already solved in radio. In TV problems arise which are very different from those in radio.

In radio much has been done to keep the sound of music or voice within the limits of their actual characters. Acoustical design of wall shapes and acoustical treatment of walls, ceilings, and floors have done a great deal towards rejecting unwanted sounds, reflected or bounced sounds, and a tendency of a studio room to become "over bright" if left to its own devices.

However, such safeguards get all or partially destroyed in the TV studio. This stems from the fact that, even though the whole studio is acoustically treated by the best known methods, we now introduce flats and other reflective surfaces into the area. Also, in TV, a microphone is normally much farther removed from the source of the sound than it is in radio. This causes engineers to raise the "gain"—open up—a microphone so that the unwanted characteristics which have previously been overcome begin to be heard again. In radio this condition is not so prominent because a performer, when speaking, can be very close to a microphone. Thus, the engineer can lower the gain of the mike and still get plenty of voice from the speaker, yet the unwanted sound will not be amplified so much. In TV, on the other hand, it is desirable to keep the mike out of the picture in most instances. Owing to that fact, the extent of intimacy between speaker and mike is curtailed.

The general tendency at this time is, accordingly, to construct a studio that is so acoustically treated by basic design, wall and ceiling padding, and sound-deadening paint, that it is as dead as possible. This borrows again from the movie sound stage; for there the stages are designed with attention given to ceiling padding and treatment in order to reduce reverberations which would exist if the reflective ceiling were bare. The introduction of flats into our TV studio will make it "live" or "bright." In addition, most studio floors are covered with linoleum because of the necessity of wheeling cameras, booms, and other equipment over them constantly. Where the bounce effect of sound does not give too many unwanted reflections from the floor, it may be used to brighten the effect. Where the reflection from floor surface is too great, the area under the mike may be padded by the use of a rug for the set as long as the rug prop is suited to the locale.

One other problem of acoustics exists in a modern studio. This arises from the fact that the lights used to light a scene generate a great deal of heat and make necessary ample air conditioning apparatus. This means that ducts or channels must open into the studio to carry the cooled air. These ducts, often in addition to reverberating the sound, can pipe in additional sounds from other places surrounding the studio, from another studio, or from the machinery that runs the system. Since this is true, it is essential that the air ducts be either acoustically treated or constructed of non-sound-conducting material and that fans or other mechanical parts be noiseless.

STUDIO AUDIENCE VIEWING

It is becoming increasingly evident that, whether the program personnel likes it or not, more and more of the television audience want to see the program performed in person at the studio. It is a fact that this propensity of radio fans to sit in a theatre studio and watch their favorites perform, has led to many empty aspirin boxes among producers, directors, and other program people. It follows that some pro-

vision need be made whereby the public may be admitted to see first hand what goes on. It is impossible simply to seat the audience in chairs on the studio floor space because people would be trampling on the various camera cables, mike cables and light wires that are part of the equipment. Sometimes, when the audience is small it is admitted in the studio working area, but indications are that more and more people will be beating down the doors to get in as they do at radio studios. Under these circumstances, television studios are beginning to build theatres that will accommodate a comfortably-seated audience, and still have a working area comparable to a theatre stage.

Where smaller studios are involved and it is still necessary to handle a few people who wish to see "in the flesh", current practice is to construct, in one studio wall, a "viewing room". This can be as large as is convenient. This room may have a glass window which is sound-proof to the scene of action, or it may be open to the studio so that the performers may make use of the audience as in a quiz show. It will make necessary the installation of loud speakers so that the sound gets a boost as in radio studios, and will also make necessary the installation of a large viewer screen so that the audience may see the live action in the studio as well as that which is being transmitted.

There is an additional advantage to having such a viewing room as an adjunct to the studio. Most sponsors, especially at this stage of TV development, are anxious to see what happens when their commercial message is produced for release. It is essential that the station owner take good care of the sponsor, for his money is very necessary to the operation of a station. The viewing room then, even when no audience is admitted, is useful as a "clients booth." Besides giving the sponsor an excellent view of the production and the picture, it keeps the sponsor from interfering with those who are trying to do a good job for him. For these reasons the

ideal studio has a good viewing room — either glassed or open — completely equipped with comfortable seats, speakers, and viewers.

FILM PROJECTION BOOTH

Furthermore, a complete studio set-up must include a booth to house the equipment for the release of film programs. Ideally, this booth is located within sight, through a window, of both the main studio and the control room. A great percentage of the time it is in operation the film camera-chain will be releasing the program directly to the transmitter. The film projection booth has two rooms in it; it is soundproof; and it has a window through which one can see the studio and the control room. The room which contains the film and the projector-camera device (film chain) must, by fire law regulation, be fire proof. The other room contains viewing facilities, film shading control panels, and a telephone connected with the control room and studio (interphone). From these rooms many hours of program for any TV station will emanate in the form of kinescoped programs and straight motion picture entertainment film.

THE BRAIN

The nerve center of any TV station studio is the CONTROL ROOM. Tom Hutchinson, in his book on television, says that a control room is "a combination of the control room of a radio station, the shooting stage of a motion picture lot, the film cutting room, the preview room, and the first night of a Broadway opening."

The bedlam of activity which takes place in the control room, moreover, places it in the madhouse category. The control booth is, in fact, a very busy center.

From here the director directs his show. From here the switcher drops his cameras onto the program channel. From here the sound channel is adjusted to the proper levels and piped along to the sound transmitter. From here the

Courtesy CBS

Typical Control Room

Director is seated left, and switcher on his right. Back center is audio engineer with shader, right, seated in front of camera viewers, previewer, and "on the air" viewer. Each man is wearing earphones and microphone to give and receive instruction.

cameraman gets his directions. From here the orders go out for music, cue-ins, film-cut-ins. From here the show is governed and guided.

At first sight the control room has a crazy-house appearance like the crazy-houses, which are full of mirrors, in carnivals. This is because the viewing and previewing monitor screens are placed side by side in front of the operating positions; and each of these screens has a picture on it. In any extensive operation, such as the production of a live show, many such screens are necessary. Each screen is a kinescope —a cathode ray tube the face of which is the viewing screen. Each segment of the program is viewed and previewed separately just as in the mobile truck, so the control booth has a viewing screen for each camera at all times. Also, there is a viewer for the picture that is on the air and a previewer for any other element such as a film slide, a remote picture, a monoscope pattern, or station identification slide. In the control room are also the necessary amplifiers to operate the kinescopes and to amplify the signal for transmission over co-axial or microwave link to the transmitter. There is a complete control panel for the sound monitor and loud speakers and "pots" as in an AM radio station.

Even as the design of the whole studio is not yet standardized, the control booth is not built on any certain pattern. There is, to be sure, much more uniformity in the arrangement of television control booths than in other departments. The booth is, for instance, usually located several feet above the floor so that the personnel may have a view of the entire studio through the sound-proof window. The floor is tiered in order that a director may be seated behind his other working teammates and still have full view of all the monitor screens. (See Page 40.) From this position he must also be able to see all that is going on on the stage.

The physical dimensions of the control room will depend on the studio that it must service. However, the average

working crew in a booth is five persons. There must be all equipment previously mentioned plus switching panels and interphone and talkback apparatus inside it. So it seems advisable to design a control room large enough to hold the equipment and still leave each technician an unobstructed view of the studio performance.

Practices vary, but normally, a control room is set up so that video engineer, audio engineer, picture shader, and switcher sit facing the window and looking out into the studio. Underneath the window, and facing them, are the aforementioned viewing and previewing screens. Underneath these are the controls with which each man will be concerned during the program. All these are built in as a unit in present-day installations. Seated behind and on a raised dais are the director and producer and the assistant director.

The video engineer, director, and shader, watch each picture as it is "readied." It is the shader's duty to see that each picture used is perfection in regard to shadings of light, lack of highlights, or "blooms," and that shading remains constant from camera to camera and from scene to scene.

The switcher in the control room performs as the switcher in the mobile truck at the ball game did. It is his duty to switch from camera to camera at the direction of the director. He must make other manipulations such as super-imposed effects, fades, and lap-dissolves, also. He has the necessary controls in front of him to perform these functions as required by the director. Incidentally, this switching fellow is variously called a video engineer, a switching engineer, or a technical director. As in most operations in TV, nomenclature for personnel is only approaching standardization.

The activities of each member of this control room crew will be reviewed in a subsequent chapter. The next discussion develops the part the camera plays. So may we get back into the studio, and take a look at the business that sets everything in motion, the camera.

Chapter V

THE TELEVISION CAMERA

We have finally traveled backward enough to get to the source of what we transmitted in Chapter II, the picture. The creator of the picture is the camera. Let's examine this electronic device to see what makes it tick.

The basic job, as mentioned earlier, to be done in the transmission of a TV picture, revolves about the use of some instrument or instruments which are capable of breaking a picture into individual elements, and transmiting them in sequence, for reassembling at the receiver. The camera is such an instrument.

Good examples of pictures reproduced by the assembling of individual elements may be found on every page of this book where a picture, or cut, appears. If you will examine any one of them under a magnifying glass, you will find that they are composed of thousands of evenly spaced dots. The size of the individual dots determines the shading of the picture. Large dots produce dark areas, and smaller dots make light areas. If you view the assembled dots with the naked eye, or from a distance, they cannot be seen individually but blend together and appear as a complete picture. The detail of the picture improves in direct proportion to the number of dots used.

Now when many pictures presenting a sequence of closely related actions are rapidly presented to the eye, the illusion of motion is obtained. So a picture in which motion *appears* to take place can be constructed and presented to the eye. Certainly this is a *motion picture.* The cartoon, or drawn character, type of picture, such as those produced by

Walt Disney and others in the motion picture field are excellent examples. Any motion picture, in fact, is an example, because it presents a series of "still" pictures in "frames" which are presented to the eye at a rapid rate.

Television pictures are similar to motion pictures in that they too are made up of elements and frames and they depend on the retentiveness of the eye to give the illusion of motion. Unlike the motion picture, however, all the elements of the TV picture cannot be transmitted simultaneously, but they must be transmitted individually and in a definite sequence so that a receiver can reassemble them and give the same relative light value as originally represented. The method by which these elements are transmitted and received in their correct sequence is called *Scanning.* Since the scanning process will come up again when we look inside a receiver, we will briefly explain the process here.

SCANNING

As we mentioned in Chapter I, an early method of scanning a television picture was a mechanical one employing a device called a scanning disc. This disc, generally, was about a foot in diameter and had in it, arranged in an eccentric circle starting at the outside edge and working toward center, a series of small holes—usually 48 in number—and spaced approximately a half inch apart. Behind this disc, which was revolved rapidly by motor, was a photocell—a device capable of translating light variation into corresponding electrical variations. Naturally, the revolving disc with its eccentric circles of holes, when viewed from front, gave the eye a series of dots which varied in shade many times per second to give the illusion of a picture. This mechanical device for scanning had many drawbacks not the least of which was the difficulty of getting a disc at the receiving end to revolve absolutely in perfect synchronization—or in step with—the transmitting disc. But it did break the picture into many individual elements.

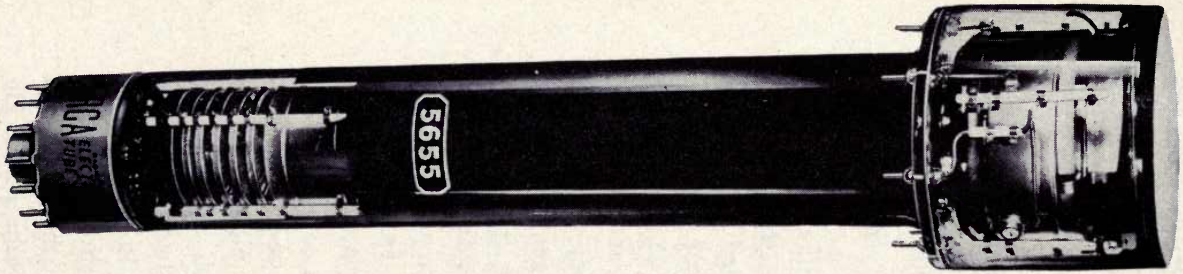
Now this basic scheme as performed by the disc for breaking the picture into individual elements is still used, but the method has been replaced by the electronic "gun" in the camera tube contained in our television camera. This camera tube is called the *Iconoscope.*

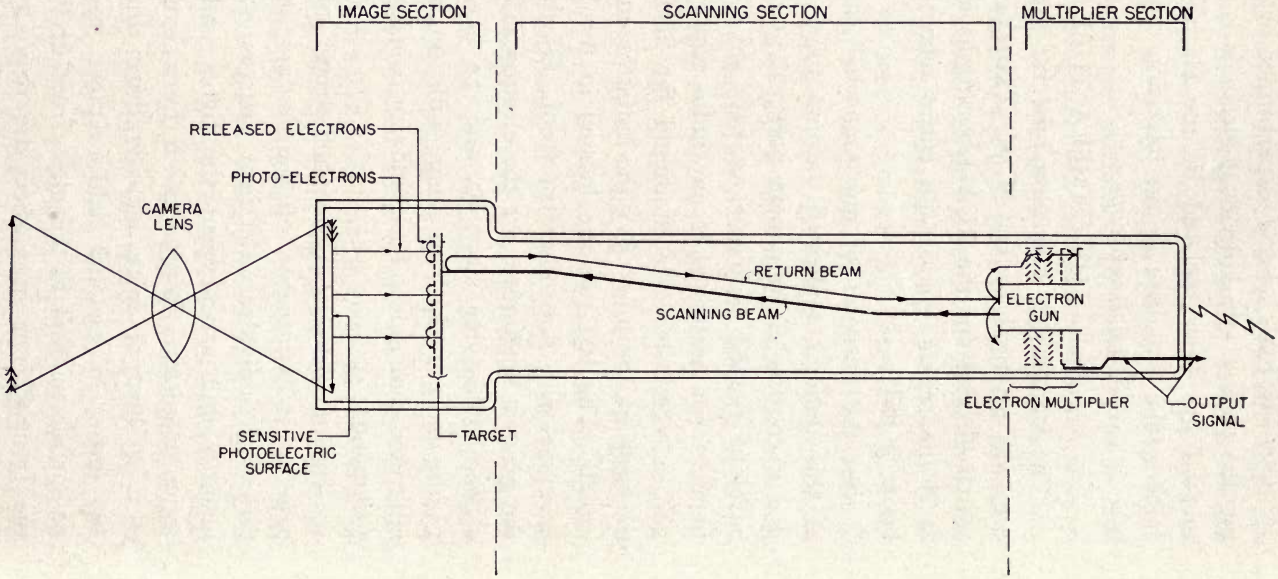
THE CAMERA TUBE

The iconoscope, a vacuum tube for use as the television eye, was invented by Dr. V. K. Zworykin, an associate research director for the RCA laboratories in Princeton, N. J. It is the seeing eye of the entire television system as we know it today.

For the purposes of our somewhat simplified discussion of this rather complicated vacuum tube, we shall consider that it consists of four main parts, all enclosed in the glass envelope shaped as shown on page 46. These are: (1) a filament (or heater, as in any radio tube); (2) the electron gun, a metal sleeve built around the heater and located in the neck of the tube; (3) the collector anode; and (4) the mosaic. The last two are located in the larger part of the envelope with the mosaic in front. Of these four elements the greatest performers are the electron gun, which generates a beam of moving electrons, and the mosaic, on which the picture is focused. The image falls on the front, and the electron beam moves back and forth across its back surface (scanning).

The mosaic acts as the photoelectric cell of the old disc system. It is capable of transmuting the picture into a series of individual electrical charges which duplicate in quantity and arrangement the lights and shadows of the scene or picture focused on it by a lens. In construction it is a sheet of mica, actually three thin sheets of mica, 3x4 inches in size and held in place inside the tube with its surface parallel to the glass front of the tube itself. On the front of one mica sheet are deposited in manufacture millions of tiny globules of a silver salt called Caesium





THE RCA IMAGE ORTHICON PICK-UP TUBE

silver oxide. The back of the mica is coated with colloidal graphite, a conductor which is directly connected to the output of the tube externally.

The silver compound has the property of being sensitive when exposed to light. In fact, the globules will give up a negative electrical charge in exact proportion to the illumination falling upon them. Thus, we have a plate whereon the electrical charge distribution is the same as that of the light in the image focused upon it. It remains now to dissect this electrical image in some orderly fashion. To do this we will return to our scanning process and employ the electron gun.

Scanning begins just as you read a page in this book. The eye is focused to the upper left of the printing on the page, and you read along toward the right until the end of the line. Then the eye returns to page left and picks up the next line down, and so on until the end of the page.

Just so do we guide the beam of electrons generated by the electron gun across the surface of the mosaic, which now contains an electrical image of our picture. We do the guiding electronically and magnetically by the use of a coil placed around the neck of the tube. Magnetic action causes the beam to "sweep" across the mosaic in the left to right manner outlined. Thus the beam examines each globule on the mosaic for the "information" it contains.

This electron beam is made up of a stream of particles of negative electricity, and, as it sweeps across each silver globule, each electron of the silver tends to choose one of the negative electrons of the beam to replace the one which it gave up when light from the image fell upon it. Thus there is a constant change from balance to unbalance in the electrical characteristic of the mosaic. Because of the condenser action between the silver on the one side, and the graphite on the other, this change in electrical characteristic becomes the pulse output of our camera tube. It is,

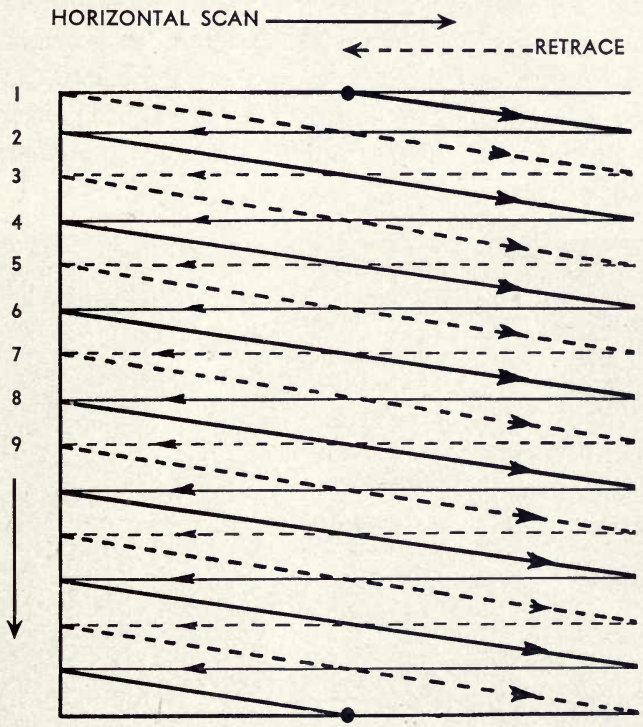
then, the pulse that contains our picture information and as such, progresses through the camera amplifier, through the co-ax to the control room, over the link to the transmitter, where it is further amplified, has a sync pulse and a blanking pulse added to it, and is the modulation signal impinged upon the carrier wave for transmission.

Many details of the foregoing process have been omitted in this treatment. Also several terms such as *sync* and *blanking pulse* have been used without explanation. The reader of engineering bent is referred to *Principles of Television Engineering* by Donald G. Fink (McGraw-Hill) where the remaining details will be found such as interlace scanning, timing and synchronizing pulses, blanking pulses, and a meticulous description of the composite video signal and its production.

One more thing before we leave the scanning business, however, may prove interesting. That is the speed with which scanning, or examination of the picture, takes place. The process must necessarily proceed at a very rapid rate. The eye must still retain the impression of the first element scanned while the last element (right hand bottom) of the picture is being scanned. This necessary time limit is 1/30th of a second or less. If the scanning progresses from top to bottom within this time, the viewer will see the picture "all at once." In actual practice, the picture is scanned twice within this time. This results in interlace scanning. The 1/30th second time is chosen for engineering reasons that originate in the fact that all normal alternating current is at 60 cycles per second. Half of this value, 1/30th, is very convenient timing.

It has been officially established and set up as a standard that television in the United States shall scan 525 rows, or "lines," per frame. Each line contains four to five hundred picture elements. So if a complete picture is transmitted in 1/30th of a second, then 30x525, or 15,750 lines, are sent

each second. If a picture is seven inches wide, then 7x15,750, or 110,250, inches are scanned per second. Simple arithmetic tells us that this is a rate greater than a mile per second. So you can realize the high velocity of the scanning process.



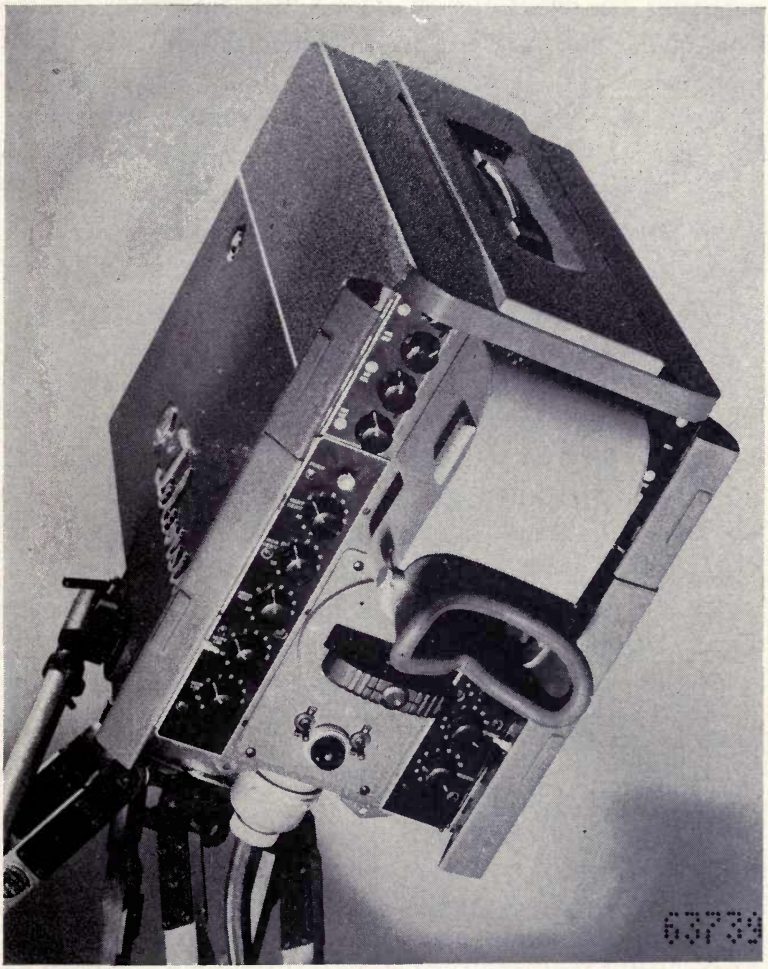
HORIZONTAL SCANNING

PHYSICAL ASPECTS

The general appearance of a TV camera may be seen in the photographs. The camera itself, without its tripod pedestal, is a metal box approximately 18 inches high by 10 inches wide by two feet long. On its front is a turret which contains lenses of varying focal lengths. The turret may be rotated to choose the desired lens. This is done from the rear, manually, by the cameraman. On the back is a viewing finder through which the cameraman may view,

electronically, the picture he is picking up. Also on the back, arranged in rows along each side vertically, are numerous controls and adjustments which control the electronic focus of the ike, the gain of the line amplifier, and other necessary adjustments. On most present day cameras, the cameraman views his picture on the face of a kinescope contained inside the box. This is normally a five inch cathode ray tube which will give the operator a faithful electronic picture of his scene on the face of the tube, approximately 3x4 inches in size.

EARLIER STUDIO CAMERA & PEDESTAL



REAR OF RCA IMAGE ORTHICON CAMERA

Other devices are usually incorporated on the outside of the camera such as a gun-sight viewer or perhaps a frosted glass viewer such as is used in the reflex type of still photo camera. These are necessary at times to the cameraman because, when his face is buried in the electronic viewing protector, his entire vision is limited to the field of the lens in use and, thus, he is unable to catch action which might be

important but which is outside his field of vision on the kinescope. This is especially important in the pick-up of sporting events.

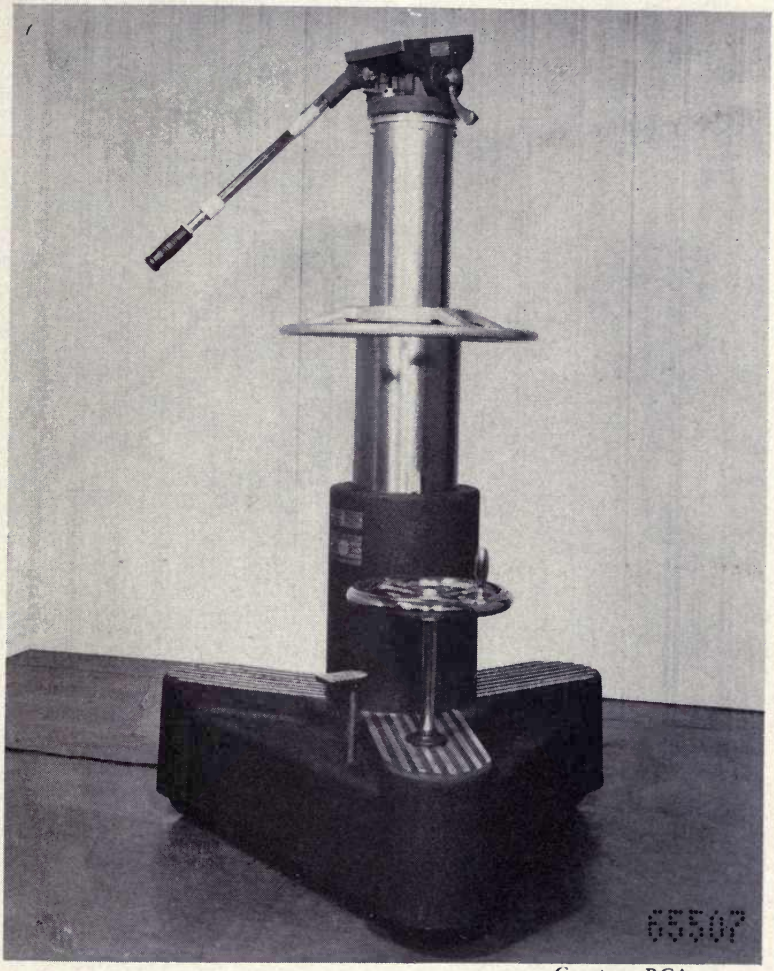
Inside the box is the iconoscope or orthicon, the viewing kinescope, the low level amplifiers for amplifying the tube output signal, and tubes concerned with the generation of sweep voltages. Also inside, naturally, are the nether ends of the assorted controls, potentiometers, and rheostats which appear as knobs on the outside rear of the camera.

The camera is relatively heavy and is never carried around during the pick-up of a picture. In the field, it is supported on a tripod whose "head" is so designed that the camera may be rotated in a horizontal plane (panned) or pointed up and down at any desired angle. In the studio the camera is mounted on a heavy "dolly"—an undercarriage designed with all studio movement problems in mind.

Some pedestals are motor, or hydraulic-operated; i.e., the camera mounted on the head may be moved up and down by pressing a button or pedal. Others may be moved either manually or by motor from place to place in the studio. The cameraman must still do all panning and other necessary pointing of the camera manually. However, the operation of the modern pedestal dollies is so smooth that, with care, the camera may pick up pictures while the whole business is in motion. Some dolly type pedestals are more complex than others. For instance one kind may have a crane arrangement mounted on the base pedestal. This type is used when it is desired to make a picture pick-up from an elevated position. It has the advantage that it can quickly be moved again to a normal position as in the picture on Page 54. This last type dolly is rather expensive as we shall learn later.

CABLES

No matter whether you are picking up pictures in the field or in the studio, the camera is always limited as to



Courtesy RCA

STUDIO CAMERA PEDESTAL WITH FRICTION HEAD

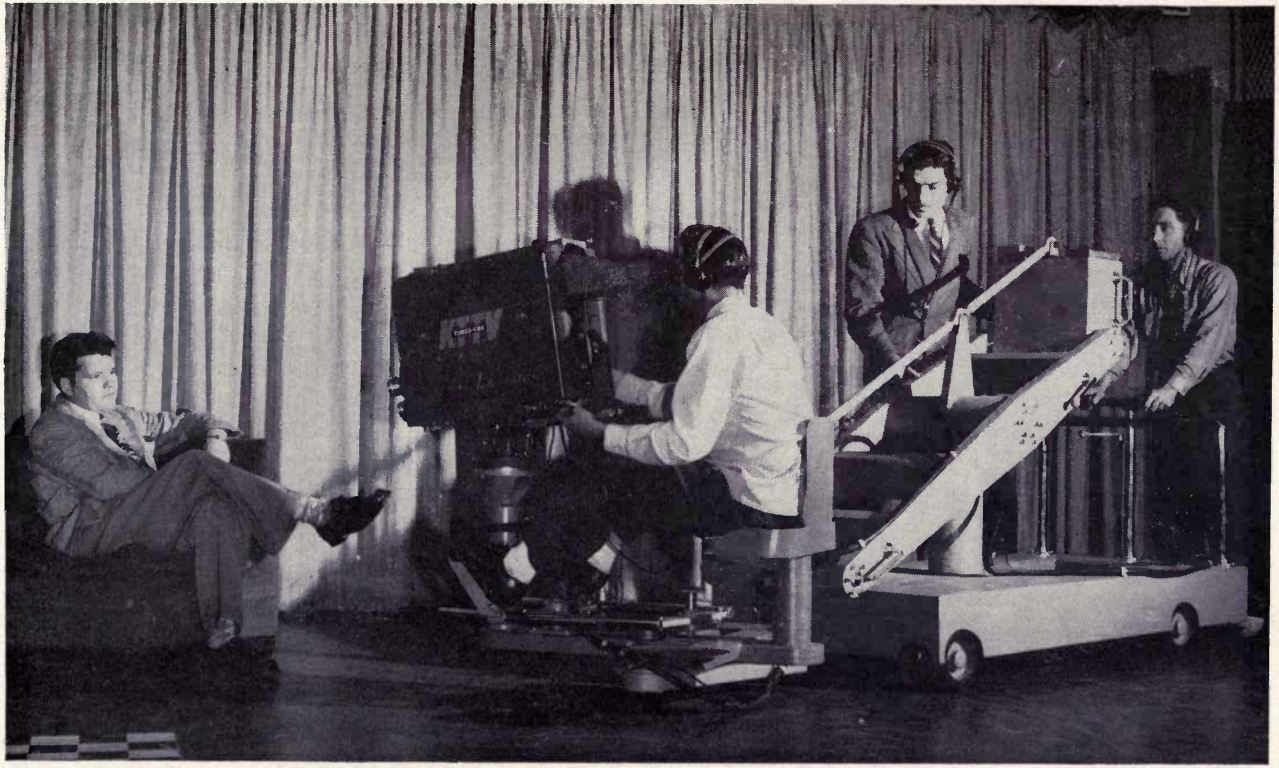
where it may go by the length of the cables which must be attached to it. We spoke of this cable when we were at the baseball park. In the studio, each camera has a cable which terminates in the control room. The cable contains, as in the field, a transmission line of flexible co-ax, and the necessary AC lines to energize the amplifiers, plus a line for communication with the control room (cue circuit). In

Courtesy CBS

STUDIO DOLLY PEDESTAL IN USE AT KTTV HOLLYWOOD

Stacked objects low center are counter-balance weights to be varied with weight of the cameraman.

all, the cable in the studio is about an inch in diameter. This presents another problem in that no camera dolly must be allowed to run over the cable of its own or any other camera. Such an action could cut the cable or, by squashing, impair the efficiency of the co-ax carrying the camera's signal.



KTTV Dolly and Camera in Action

Counterbalance weights are now at center-right. Cameraman, viewing, may "pan" left or right by depressing foot pedals. Other ***dolly movement is manual.***

So, in the studio, the necessary presence of cables limits the mobility of the camera. Moreover, because of movement restrictions, more than one camera is necessary for any studio program to be successfully carried out.

CAMERA LENSES

Most cameras have a turret in front that carries three or four lenses of varying focal lengths. This is especially true of cameras used for outside pick-ups, such as sporting events. A camera is much more versatile, obviously, if it is so equipped.

A normal lens component for a studio camera has the turret contain a 50, a 90, a 135, and an 8½. A field camera turret is more likely to have a 135, an 8½, a 13, and a 17. The figures given are used as names for the lenses by all personnel, and are derived from the physical dimensions of the various lenses. 50, 90, and 135 are millimeters, and denote the actual diameter of the lens in each case. After that, 8½, 13, and 17 (or larger), are in inches, and denote the physical length of the lens assembly.

In the studio, a 50 will give the longest shot, a 90 or a 135 will give a medium closeup, and an 8½ a real tight closeup. In the field, a 135 is the longest shot, with the 8½, 13, and 17 giving progressively closer shots in that order. After 8½, the sizes are all actually what are known as telephoto lenses—depending on the camera's distance from the subject being televised.

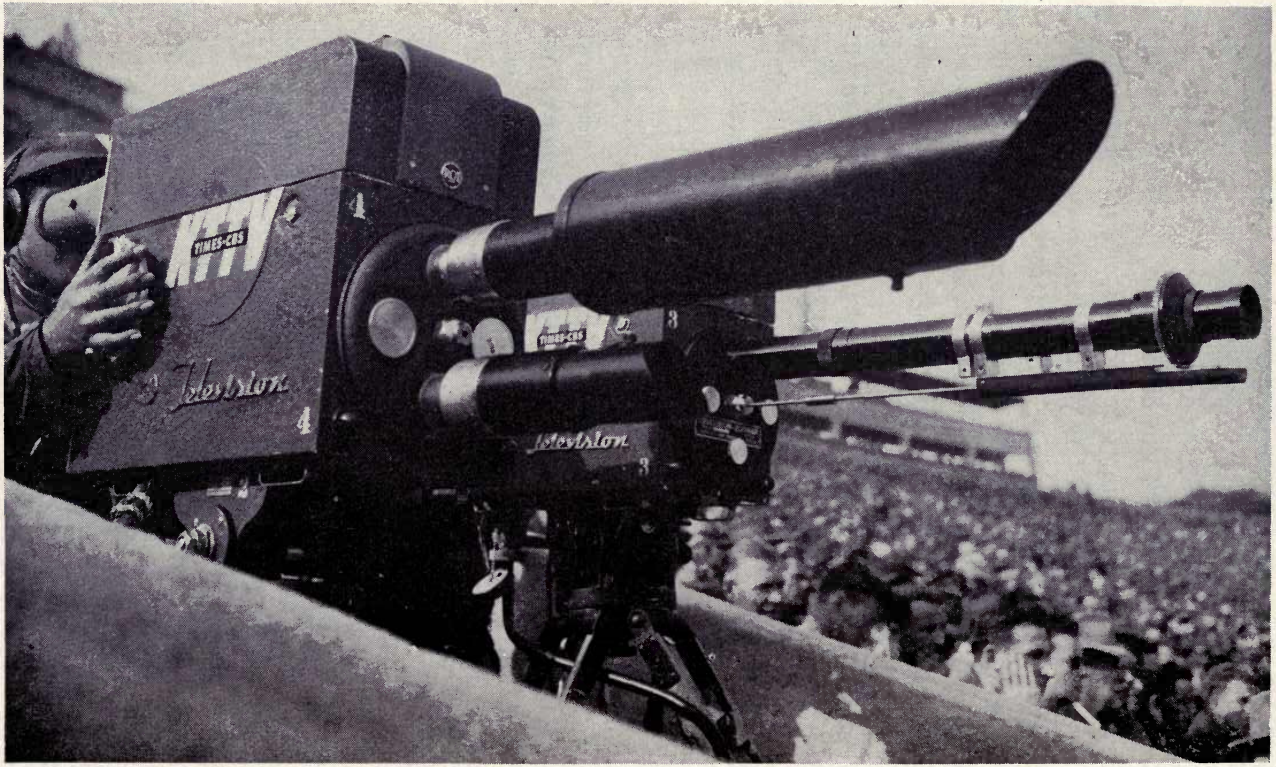
All lenses in TV are considerably larger than those used in motion picture work. This is necessary because the lens must throw on the mosaic of the camera tube an image big enough to cover it (3 x 4 inches). This brings up the "Depth of Focus"—a question problem TV has in common with motion pictures. The further away from an object or scene any lens is, the greater the depth of focus will be. In TV, however, we like the intimacy of being able to fill the

viewer's screen with a closeup. So we move in on an object. What happens is, then, that the front edge of our object is in focus, and the back edge is out of focus. This is undesirable, for the out-of-focus distortion is more pronounced in TV than in motion pictures due to the comparatively small size of the viewer's screen. As yet no one has come up with a solution to this problem in television lenses.

One late development is a television lens called the Zoomar lens. This expensive piece of equipment has proved itself invaluable in the pick-up of such things as football and baseball games. Its finest characteristic is that it is so constructed that a camera operator does not have to move his lens turret to go from a distant shot to a closeup. He may follow a ball or a player continuously and still stay in focus all the way. This is a big step in the right direction.

MR. CAMERAMAN

May we repeat what we said earlier when we were at the ballpark? The most important cog in the teamwork wheel for getting a good picture to the viewer's receiver, is the cameraman. He probably contributes more to the success or failure of a given picture than any other member of the team. This is true because he is the man that guides the examining eye of the camera over a scene and comes to rest on a picture that has certain composition known to be interesting, in focus, and well lighted. So he must have an artistic sense and the sense of a showman. He must also possess the skill to manipulate his camera mechanically. That is no small order. Still, for all that, he has help. He is a member of a team. In the studio, he has the constant voice of either the director or the technical director in his earphones to tell him what lens to use and where his next position will be. He has a light man whose duty is to arrange the lights until his scene is lighted to his satisfaction. When production is extensive, he has the help of the director in



Televising With the Zoomar Lens

Two cameramen set up at the famed "Rose Bowl Game." Big black hooded lens is telescopic. Below it, on same camera, is a shorter telescopic lens. Longest lens on camera right is the famous ZOOMAR lens.

rehearsal to help him take his positions so that the composition of his picture will bring out the best values. As in other parts of the TV operation, however, he cannot always have everything arranged just to his liking. He cannot always have just the right amount of light or just the right angles to shoot from. Then is the time his ability as a showman and his general ingenuity will help him to exhibit an alternate, a substitute, or to *ad lib* a picture that will satisfy the desires of the director and bring about the effect wanted.

Out in the field, of course, a cameraman may use his natural capability to the utmost. When fast, unrehearsed action is going on, he must be his own judge of what is important to transmit, what the composition of his picture shall be, and how he shall get it.

At any rate, it is his duty to deliver to the switcher or director—and thus to the viewer at home—the best possible picture of what the viewer wants to see most. To do this, he must think fast and act fast at all times. He must be constantly on his toes.

Chapter VI

THE RECEIVER

Perhaps we are still proceeding in reverse since the contents of this chapter are closely tied to Chapter II on transmission. However, because the receiver is the other end of what goes out the transmitter's antenna, it seems necessary that we complete the cycle by describing the receiving end.

The receiver is the part of television with which any reader of this book will be the most familiar since it is the part that sits in your living room or den and brings the outside world to you in the form of pictures and sound. In order that this instrument will not be just a picture with a bunch of knobs attached to it, we shall now try to explain the processes of video reception.

A television picture, when received, will be only as good in quality as the amount of received signal will warrant. There is no apparatus which will make up for a loss of received energy in the receiving antenna. The amount of energy that even the best antenna can possibly pick up to energize the receiver circuits is very small indeed. It is so small that normal measurement of it is in millionths of a volt at the input of the receiver. The first thing a good receiver must have then, is a good and efficient antenna.

Broadly, the receiving antenna may be said to have four major properties: polarization, radiation angle, impedance, and directivity. An additional property lies in the overall design, but this property exists as the end result of the other four.

Polarization is the position of the antenna with respect to the earth or ground. The radiation angle is the angle

above horizontal at which the antenna radiates, or receives the most signal. As covered in Chapter II, TV transmission is line-of-sight transmission. Therefore, radiation of signal at low angles is necessary in order to avoid losses that would result from high angle radiation, which would merely dissipate our energy out into space. Just so, it is desirable to use an antenna at the receiver end designed for reception of low-angle signals. Also, this antenna shall be as high from the ground and surrounding objects as conveniently possible.

Impedance, as the word implies, is similar to the resistance offered to current flow, which we spoke of in Chapter V, when dealing with co-axial cable. Engineers define impedance technically as the ratio of the current to the voltage at any point along an antenna. An antenna then is said to have a *characteristic impedance*—which value is variable depending on design. An antenna one-half wavelength long, entirely removed from the ground or surrounding objects, has been found to have a characteristic impedance of 72 Ohms at its center—Ohms being the electrical unit for measuring resistance. This becomes important as we shall see in a moment.

Directivity is the inherent property of an antenna assembly which governs its proclivity for receiving the most signal when its face is directed toward the energy source—in television reception, the transmitter. It will receive less signal "off the ends," and a single half-wave antenna is naturally bi-directional.

If reception from but one direction is desired, as it is in most cases, an additional element is added to the antenna assembly. This element is called a reflector and is just what the name implies. It is another half-wave antenna, cut to a dimension 5% longer than the values outlined in the table on page 12, and assembled parallel to the antenna at a distance measured to be one-quarter wave-

length behind it. This element is not physically connected to the antenna proper. It has two advantages: it will pick up energy on its own and bounce or reflect it back to the antenna itself, thus increasing the energy fed to the receiver; it will reject energy coming into the antenna from the other direction which might cause "ghost," or secondary images.

GHOSTS

We may as well treat the troublesome "ghost" business right now. It has to do with line-of-sight and with the property of ultra-high frequencies to reflect or bounce. If your receiver antenna is in the clear, in line-of-sight of the transmitter, and properly oriented or directed, it is still possible for you to be bothered with a ghost. In highly congested areas such as New York City, where there are many high buildings, it is perfectly possible to receive a very strong direct signal, and at the same time to receive a reflected signal that reaches your receiver over a path that takes it from transmitter to tall building surface to receiving antenna. Inasmuch as the direct signal and the reflected signal travel over separate paths which differ in length, their arrival at the receiving antenna has a slight time difference —the reflected signal being slightly delayed in arrival. This late arrival will give you another image on your receiver screen. It may be as strong as the original, or it may be just a shadowy outline, depending on the strengh of the signal. It may be black or white, depending on its polarization, and may be difficult to eliminate. This is up to your installation man. He will so orient your antenna and place the necessary reflector as to sufficiently build up the direct signal and, at the same time, tear down the reflected signal to the point where "Mr. Ghost goes West" into oblivion.

The radio comic, Jack Paar, was bothered with "ghosts." Jack's home is so located in the Hollywood Hills that he is just on the "fringe" of being out of line-of-sight of Mt.

Wilson, where all Los Angeles TV transmitters are located. Also, directly behind his house in the opposite direction are several rather high hills.

When the receiving antenna at his home was well elevated atop his house and properly oriented toward Mt. Wilson, he received a very strong signal indeed. However, he also received three other signals of almost equal intensity giving him four images on his screen. This made his picture of no use for viewing.

After extensive experimenting with service men and friends, he was able to get a satisfactory ghostless signal by violating all normal rules for antenna installation. His antenna actually ended five feet off the ground, and it was ten degrees off the direction of Mt. Wilson. In this position the antenna was found to be out of the reflection paths. Moreover, it left enough line-of-sight signal so that a booster, an extra amplifier installed in front of his receiver, brought in enough energy to give him a picture. Whereupon, he may be considered the exception that proves the rule.

SIGNAL TRANSMISSION TO THE RECEIVER

Just as we used co-axial cable to transfer energy from the transmitter to the antenna in Chapter II, so we need to transmit the energy from receiving antenna to receiver. This is done, with a minimum of loss, by a transmission line which commonly takes the form of so-called "open-wire" line or of the co-axial line previously described. Which type of line is used varies with the installation, the antenna, and the design of receiving circuit contained in the input terminals of the receiver.

As we said, a half-wave antenna has a characteristic impedance in free space of 72 Ohms at center. There will be a minimum loss in transfer from antenna to receiver if the transmission line matches this antenna in impedance. There is manufactured such a co-axial line—a co-ax with a char-

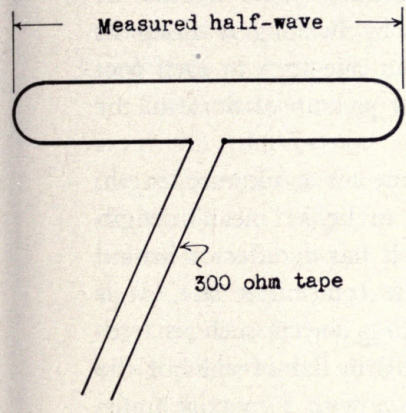
acteristic impedance of 72 Ohms. However, it is essential that the impedance of the receiver input match the others, i.e., it shall also be 72 Ohms. Then the whole system will offer a minimum of resistance to the incoming signal and will give the receiver a good start with a maximum of energy to go to work on.

Also in common use today is the 300 Ohm "ribbon" transmission line. This open-wire line is so constructed by spacing two wires parallel to one another that its characteristic impedance is measured at 300 Ohms. Many present day receivers are so built that their input also has this 300 Ohm characteristic. All that remains, then, to have a perfectly matched system, is to have an antenna which offers this impedance. Such an antenna is a variation of the plain halfwave antenna and is called the "folded dipole."

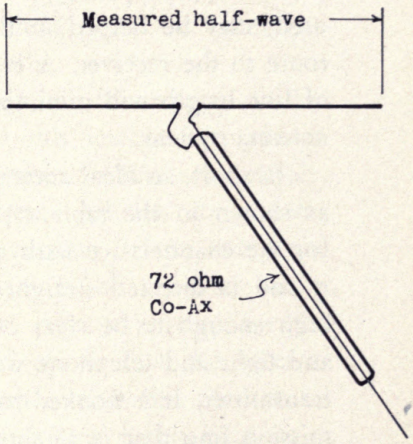
As may be seen on page 65, this folded dipole resembles the slide of a trombone and, when the folding is accomplished at a measured distance apart with a tubing of measured size, the characteristic impedance has been found to be 300 Ohms at the center.

There are ways and means of inserting "matching stubs" into an antenna-line-receiver set-up so that impedance variations may be had that will match a 72 Ohm antenna to a 300 Ohm line or receiver, and vice versa. However, that may be confusing things too much. More than this may as well be left to the installation or service man.

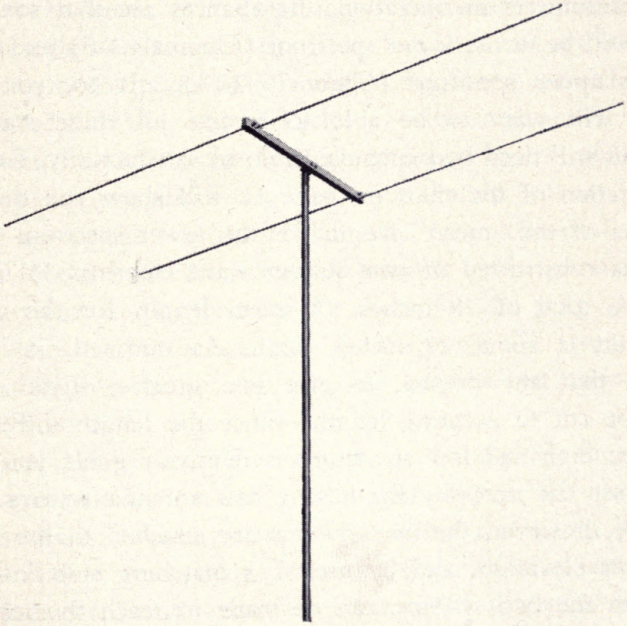
Of the two types of transmission lines in current use, each has certain other advantages—depending on the locale of the receiver installation. If your receiver is situated in such a locality that you are subject to man-made noise interference, such as those generated by the ignition systems of passing automobiles, it is advantageous to use co-axial transmission line. The outer sheath of this line is normally "grounded," and such grounding will keep unwanted outside noises from being picked up by the transmission line



DIPOLE ANTENNA



FOLDED DIPOLE



DIPOLE RECEIVING ANTENNA WITH REFLECTOR

and thus getting into your receiver to interfere with the picture. The open wire line, in localities where it must be used, may be helped in this respect by twisting it along its route to the receiver. A twist of about one turn to each foot of line length will minimize this stray pick-up of noise to the antenna system.

In short, an ideal antenna is a dipole cut to accurate length, as shown in the table on page 12, to be a "mean" length for the channels we wish to receive. It has a reflector behind it and is directed straight toward the transmitter site. It is high enough to be clear of surrounding objects such as trees and light and telephone wires and still in line-of-sight of the transmitter. It is hooked to the receiver with a co-axial transmission line that is as short as possible.

There is a final point to consider regarding the antenna, namely, if you are located in an area where there are several TV transmitters in operation, the chances are that some of these will be in the lower spectrum (Channels 1-6) and some in the upper spectrum (Channels 7-13). If so, you naturally will want to be able to receive all these stations, and you will need two antennæ to do so satisfactorily. Further consultation of the chart on page 12 will show you that an antenna of the "mean" length for the lower spectrum is an antenna constructed of two quarter wave elements 35 inches long—a total of 70 inches. A mean length for the upper spectrum is about 27 inches total. As outlined, it is essential that an antenna, to give you greatest signal gain, must be cut to accurate length. Since the length difference between high and low spectrums is relatively great, you may easily see the necessity for having *two* antenna systems. In practice, however, the two systems are attached to the same pole for elevation, and by use of a matching stub inserted between the two systems, can be made to reach the receiver via the same transmission line. So there is no real problem in this matter. Your service man will know best how to treat it.

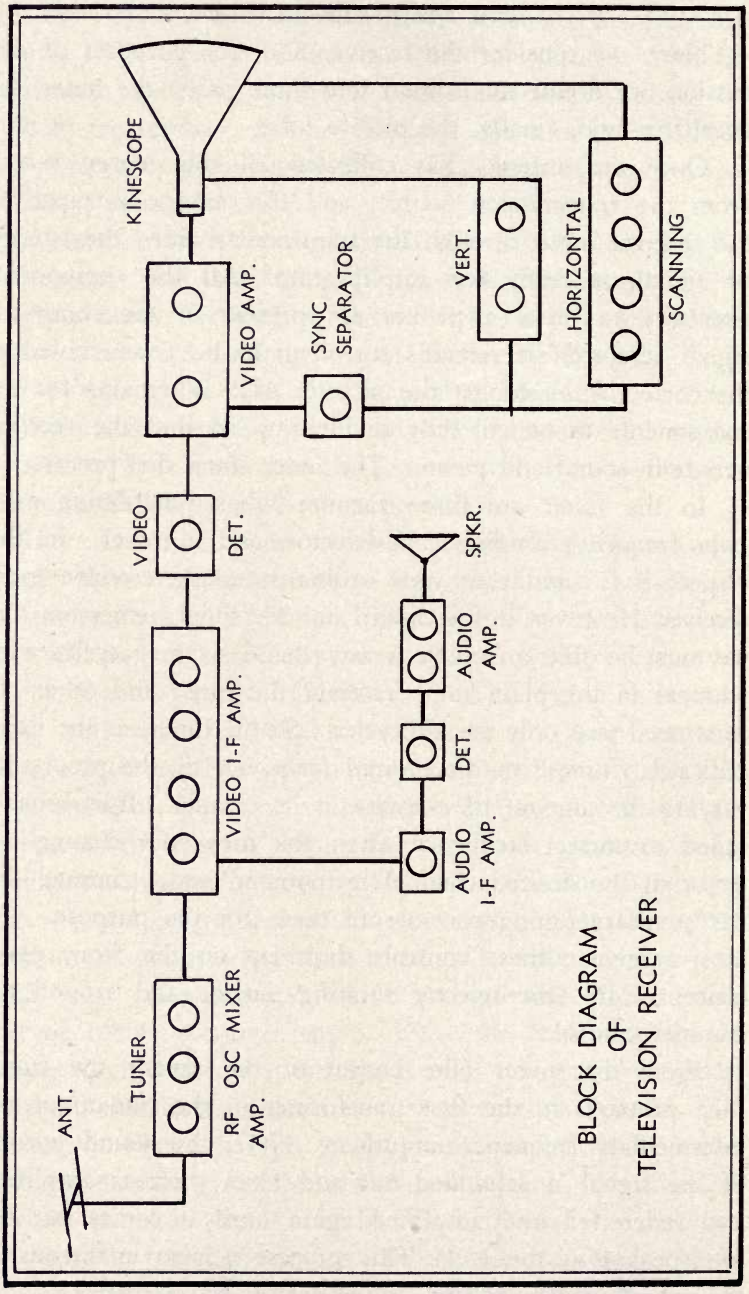
THE RECEIVER ITSELF

Next, we consider the receiver and, for purposes of discussion, we divide this subject into three parts: the tuner, the amplifier, and, finally, the picture tube.

Once the antenna has collected all the energy it can from the transmission source, and this energy is piped to the receiver input through the transmission line—the energy, or signal, is ready for amplification. All the components necessary to make a picture are present in the composite signal received. It remains for them to be re-assembled in the correct order to get the picture. Also it remains for the components to be correctly divided up so that the receiver gets both sound and picture. The tuner starts this process.

In the tuner are three vacuum tubes functioning as a radio-frequency amplifier, a detector, and a mixer. In this respect it is similar to your ordinary superheterodyne radio receiver. However, in the case of our TV tuner, remember that we must be able to receive a wave band six megacycles wide whereas in the plain radio receiver the tuner and other circuits need pass only ten kilocycles. So the tuner, as the name indicates, "tunes" to the desired frequency by the process of varying the amount of capacity in its circuits. It is broadly tuned to correct frequency when you turn your channel selector to the desired channel by number, and "trimmed" by the auxiliary tuning control put there for the purpose. On most receivers, these controls show up on the front panel concentrically—the selector rotating outside and around the trimmer control.

From the mixer (the output of the tuner) the signal then proceeds to the first transformer in the line-up of the intermediate frequency amplifiers. Here, the sound portion of the signal is separated out and from there is amplified and redetected and amplified again until it comes out the loudspeaker at the end. This process is also analagous to the operation of a normal "super-het" radio receiver.



BLOCK DIAGRAM OF TELEVISION RECEIVER

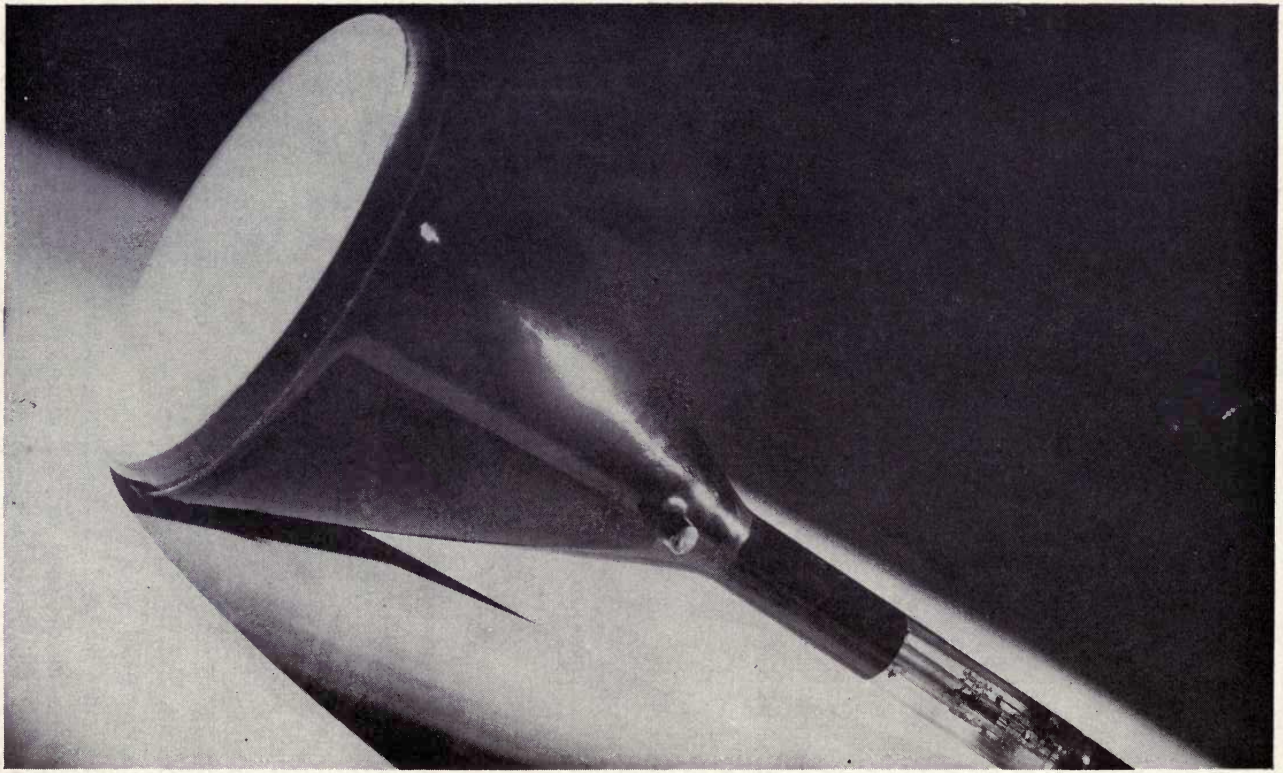
The picture portion of the signal also travels through an I-F amplifier of its own and at the end, is redetected, and amplified, and the resultant signal is impinged upon the grid anode of the picture tube for resolution into a picture. Remember that here, too, the I-F amplifier must be able to pass a wide band of frequencies. However, the basic function is just the same as in the radio receiver or in the sound channel of the TV receiver. During the process whereby we have passed the signal along through the receiver circuits, we have made use of the tuned circuits and the successive stages of amplification to strengthen and build up the original signal to thousands of times its original strength. No characteristic of the original composite signal must be lost in this amplification process except that along the line we have separated from it the transmitted synchronizing pulses and sent them to their special circuit in the receiver so that they can later "trigger" our receiver scanning and keep things in step with the transmitted signal. We are now ready to get a picture to come up on our viewing screen.

THE KINESCOPE

The screen on which our picture will appear is the face of a cathode-ray tube, variously called viewer, screen, or more properly, kinescope. Certainly, it is by far the most interesting part of a TV receiver.

It is very similar in construction to the iconoscope camera tube. And well it should be, for it is its duty to reassemble, by means similar to transmission, the picture that the ike tore down into elements and sent to us. As a matter of fact, the ike and the kinescope are so similar that, under proper circumstances, and in the proper electrical circuit, a viewing tube may be used to transmit a picture of sorts.

The inside face of the kinescope is coated with a deposit of willemite, or phosphor salts, which has the property of fluorescing under the impact of an electronic beam. As



THE CATHODE-RAY VACUUM TUBE — OR KINESCOPE

with the iconoscope, an electron beam is generated by the gun located in the neck of the tube and is the high velocity, concentrated bombardment beam which sweeps back and forth across the phosphor-coated front surface, or screen. This scanning action, controlled by the transmitted sync pulse to be in step with the analagous action we described in the iconoscope, causes the screen to fluoresce in regular sequence, starting at the upper left of the picture screen and proceeding to the bottom—only to return and do it all again at a very high rate of speed. As before, the persistence of vision of the eye lasts throughout the scanning so that the fluorescent light so produced by a series of 525 lines of light makes us delineate the overall effect as picture.

The separate elements of the picture that were transmitted by the camera vary according to the light and dark makeup of the picture. The resolution of these elements at the receiver will then vary according to light and dark components, for the signal controls the grid structure within the kinescope which will allow only corresponding amounts of the electron beam to hit the fluorescent screen. We can control the amount of total energy that is going to the grid by regulating the "gain" of the video amplifier in the receiver. This is called a "contrast" control and appears as a knob on all receivers. Further, we can control the brightness of the picture on the screen by holding down the overall flow of electrons through the gun. This is done by use of a control which impinges on the kinescope grid a "bias," or restricting voltage. This control appears on the front of all TV receivers and is called simply a "brightness" control.

In physical size the kinescope is manufactured in several dimensions. There are cathode-ray tubes as small as one inch in diameter. There are a two inch, a three, a five, a seven, a ten, a twelve, a fifteen, a sixteen, and even a few twenties. However, the manufacture of the tubes of larger diameter presents a considerable problem. The cathode-ray

tube must be at a high vacuum. When a glass envelope gets larger, there is obviously more pressure from the outside. (The figure to go by is 14 pounds pressure per square inch where the inside is vacuum). It is obvious then, that as we go up in size, we very soon reach a limit where anything larger becomes impractical. The tube would become dangerous, for with such pressure it would "implode" with such force as to powder the glass. Then too, there must be several glass-to-metal seals on a tube in order to bring the inside electrodes to the outside for electrical connection. These seals become more difficult at higher pressures. Indeed, one manufacturer claims that under present current processes often 60% of the glass envelopes must be rejected in the making of larger tubes for one reason or another.

So a practical limit has been more or less established at this time to be approximately a 16 inch kinescope. The 16 inch set combines glass and metal so that the side walls of the bulb portion are made of metal, and the face and stem are glass. This cuts down the weight of the tube as well as making it more rugged and less dangerous to handle. It also allows for manufacture of a near flat screen surface. This flat surface is a distinct advantage to the viewer.

The most popular-sized tubes now in use are the three inch, the five, the seven, the ten, the twelve, and the sixteen. The three and five inch are used in small "portable" receivers and also as the kinescope in the projection type receiver, which we will speak of in a moment. The ten inch is probably the most popular of all since it is of convenient size for any home, and a set containing one meets with more popular demand because its cost is much less than the twelve, fifteen, or sixteen inch sizes.

There is another limitation to the practicable size of a viewing tube. There has been much discussion on this point, but it is a fact that, when you blow up a photograph, after a certain norm is reached, the "grain" or other imperfec-

tions start to show up to a progressively greater degree. So it is with the reproduced TV image. The more you blow it up in size, the more visible become the imperfections.

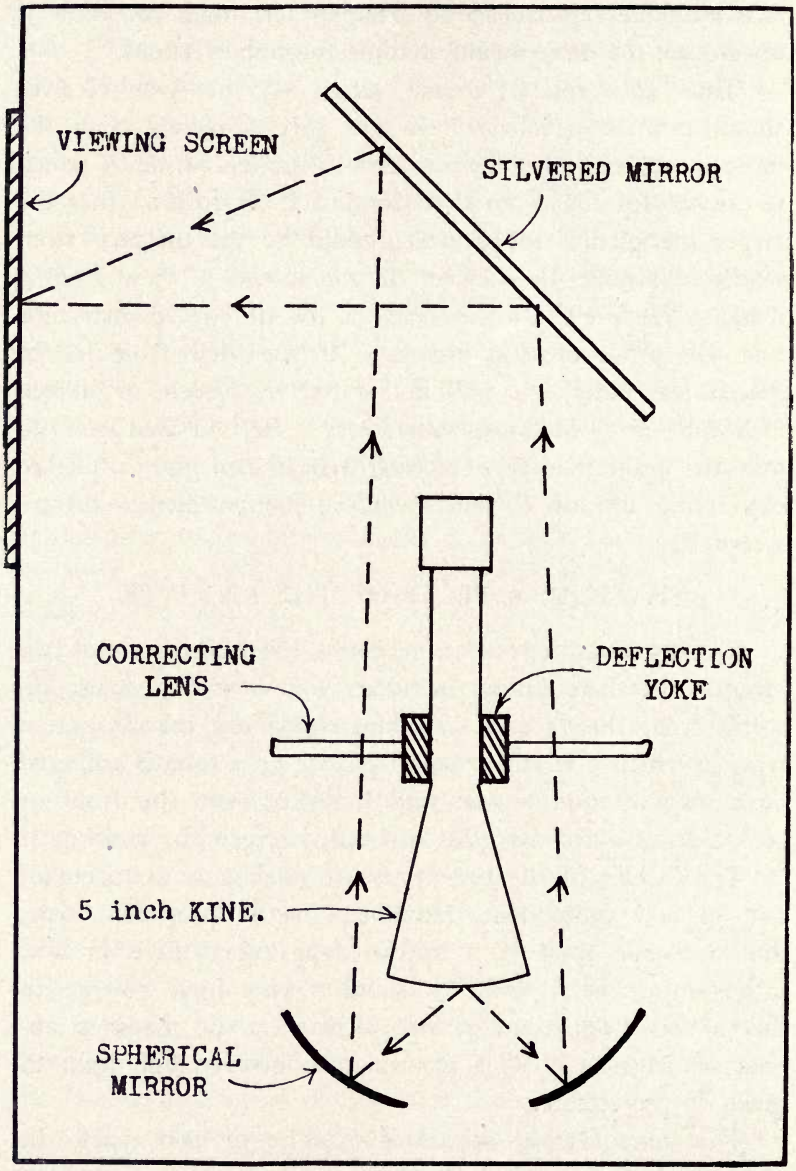
Thus, as a rule of thumb, let us say that your receiver should contain a tube which will give a picture with the most detail and clarity when viewed from a distance which is normal for the room that contains it. It follows that the larger the picture the greater should be the distance from which it is normally viewed. If you intend to view from a distance from eight to ten feet, a ten or twelve inch tube size will prove most satisfactory. If you view from ten to fifteen feet away, you will find a twelve, fifteen, or sixteen inch tube size the most satisfactory. Beyond that you go into the projection type receiver which can give a picture of varying size up to and including motion picture theatre screen size.

PHYSICAL ASPECTS OF THE RECEIVER

Broadly then, television receivers break down into two groups—the direct-vision, in which you view the picture directly from the face of the kinescope, and the projection type, in which a relatively small picture on a tube is enlarged by a magnification process and projected onto the front or back side of a frosted glass or beaded screen for viewing.

The insides of the two types are analagous as to circuit and general component. However, in the projection type, the kinescope used is a special type tube, three or five inches in diameter, built to stand a very high voltage so that a very bright and intense picture can be made to appear on its screen. This picture must give enough light to make it projectable.

The magnification apparatus may be of two types. In one, a spherical, high reflection mirror, which reflects upward the picture put in its optical center by the tube, is used. Then the image passes through an aspherical correct-



PROJECTION RECEIVER

ing lens (made of plastic) which brings the reflected light beam into sharp focus on an inclined mirror above. This mirror reflects the image—this time outward onto a screen.

On page 74 you will find a detailed drawing of a projection type receiver with all the basic elements clearly labeled.

In another type of projection, the "hot" image which appears on the special small kinescope, is projected directly onto a translucent screen by an apparatus similar to motion picture or steriоptican projection. The basic system is called the modified Schmidt projector. The extremely large screen projector works on this basic principle, and with modifications, has been used by those who have indulged in extensive experimentation with large-screen television for motion picture theatres.

For the home, however, the direct-view receiver is very satisfactory if you choose a set that will give you a right size picture for the viewing room. The smaller types, are made in artistic cabinets to set on a table top. Others, more elaborate and expensive, contain assorted combinations such as a record player turn-table and an FM-AM radio besides the television set you may choose. The cabinets are fine pieces of furniture and may be had in practically any design you wish. If you do not now own a TV receiver and are intersted enough in TV to read this book, don't delay. Get one now. The receiver you buy today will be good for several years and, in all probability, will not in the foreseeable future become entirely obsolete.

CONTROLS

The front controls which are on modern receivers vary in number with different makes. Some receivers bring all necessary controls to the front panel, and others bring a minimum number to the front to appear as knobs and put

the remainder on the rear of the chassis. Wherever they are, they are all labeled.

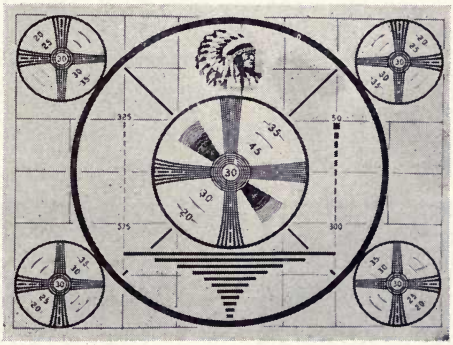
Supposing that your installation man has put your machine in proper operation originally, here is a brief summary of the proper method for tuning any receiver:

1. Turn the BRIGHTNESS and CONTRAST controls fully counter clockwise.
2. Turn the OFF-ON-VOLUME control approximately half way clockwise.
3. Allow a warm-up period of twenty to thirty seconds.
4. Turn CHANNEL SELECTOR switch to the desired channel by number.
5. Tune the SOUND TRIMMER for best quality of sound.
6. Turn BRIGHTNESS control slowly clockwise until screen is barely lighted.
7. Turn CONTRAST control clockwise until a picture appears on the screen that has light and dark areas that give pleasing contrast.
8. If picture is flipping past up and down, adjust VERTICAL HOLD until picture "locks in." If picture is shot across with a fancy, streaky figuration, adjust HORIZONTAL HOLD until picture locks.
9. Adjust FOCUS control for greatest picture clarity. This control is more often than not on the chassis rear and need be rarely moved.
10. Readjust BRIGHTNESS and CONTRAST controls as seems necessary. They will need readjustment after your set has been in operation for fifteen minutes or so.
11. Readjust VOLUME control for most pleasant sound.

The foregoing may look like a formidable set of operations when set down as a list. However, you will find the whole business extremely simple. Indeed, the author's own

six year old youngster, after being directed only once, tunes the receiver alone with absolute perfection.

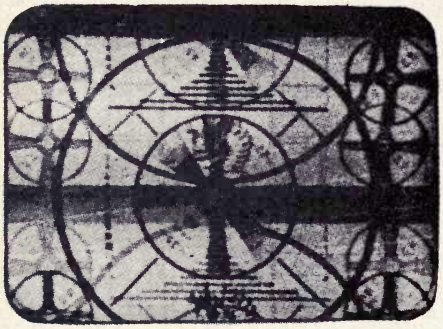
The monoscope pattern (see cut) appears on the screen of your receiver for several hours each day. In most localities, where there are one or more TV stations, it is common practice to transmit this pattern for test purposes. This is of great benefit to the home viewer as well as to the engineering staff of the station, for a careful examination of a received pattern signal tells the engineer or service man many things. In addition, even the average viewer may use it as a check to verify the fact that his receiver is in proper working adjustment.



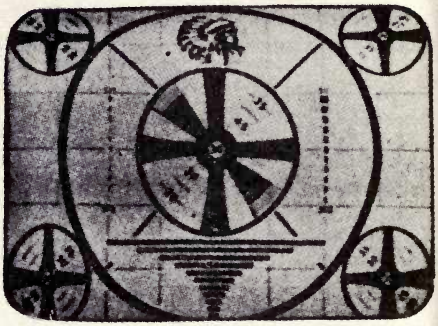
MONOSCOPE PATTERNS

The monoscope pattern itself originates on the face of a specially constructed cathode ray tube. The design which you see is accurately laid out so that it will always be transmitted exactly the same. It is etched, or processed, on the mosaic of the tube. The lines which fan out as wedges from the center high are a mathematical distance apart within the different wedges. The entire pattern is perfectly symmetrical and should be so received if your receiver is working properly. All circles should appear as being perfectly round. If they do not, then the "linearity"

RECEIVER TROUBLES

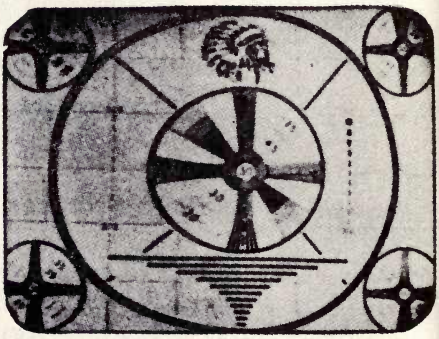


Vertical sync (lock) maladjusted



Vertical linearity maladjusted —outside interference (left)

Horizontal sync (lock) maladjusted



Horizontal linearity out of adjustment

(either vertical or horizontal) is out of adjustment. Controls for these are on the rear of the receiver and under normal conditions should not be tampered with by a layman.

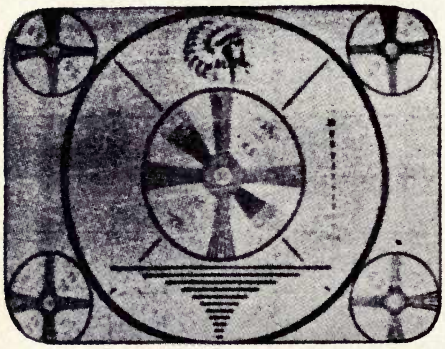
Horizontal width control and vertical height controls are also located on the rear of the receiver. Their maladjustment may be noted by careful scrutiny of the pattern. (See cuts.)

To the right of the vertical wedge in the pattern, you will see the figures 35 and 45. These figures refer to the vertical wedge to their left and the horizontal wedge to their right (3 o'clock). Corresponding to these figures, on the same radius, you will notice a white dot within the wedges. If you can clearly distinguish a separation of the lines in the wedges toward the hub as far as the first dot, it means that your receiver is "resolving" 350 lines (35 with zero added). If lines are clear to the next dot, 400; and to the next, 450 (45 with zero added). In practice, good resolution to 300 lines (to 30 dot in figures at 7 o'clock in the pattern) is ample to give you an excellent picture. In fact, few commercial receivers will accurately resolve above 350 lines even if the transmitter is transmitting that many.

Other observed effects are mostly for the engineer or service man, with the exception of the Indian head which appears at the top. A good receiver check is to notice the clarity with which you can distinguish the feathers in the Indian's headdress. Indeed, you may adjust your FOCUS control until you see the feathers with the greatest clarity and then know that your receiver is in the best possible focal adjustment.

The trailing black or white tails following the small wedges which appear in a vertical line at either side of the inner circle, tells the service man how your receiver is handling the wide band of frequencies of the signal. The

RECEIVER TROUBLES



Diathermy machine interference

Focus control out of adjustment

same is true for tails or whiskers on the wider horizontal black lines near the bottom center of the pattern.

That's about all for the receiver at this session. As a parting suggestion, if you do not have any technical knowledge, it is best that you confine your "tinkering" tendencies to the adjustments that are on the front of the receiver only. Do not continually vary even these adjustments, for more than often the transmitting station is having a little trouble—there is some irregularity in signal transmission, or you have some temporary local interference. So if you wait a minute or so before you pounce on your receiver and start twisting control knobs, the chances are that the picture will straighten out. Fading conditions sometimes make a difference to the illumination of the screen tube, too. So a little patience is indicated.

Anyway, it's about time we arrived at the part of TV that will give the viewer many hours of wonderful enjoyment in front of his set—the program. Everything we've covered before bears on that objective.

PART TWO

THE PROGRAM

CHAPTER VII

STUDIO PRACTICE

In this second part of our look at television, we shall go through the motions of getting together the program material for live televising and work on the net end—the job of getting to the viewer's screen the best possible entertainment. We shall go about this by looking at all the problems from several angles and through the eyes of several of the participants.

Anyone who attempts to diagram all the activity that takes place or all the problems that must be overcome in the successful production of a live television show "sticks his neck 'way out." This is because the problems vary with every live presentation, and the methods used to overcome these problems vary within the working parts of every station.

Bearing this in mind, we shall try to keep within the average procedures and follow through only those activities and problems that are the most basic which are encountered under present day practices. To do this with the greatest facility, let us first set down a few of the colloquialisms which so far have become the language of television around the studio. This list is in no wise complete, and some of the terms have been used and defined in previous chapters. More of them appear in the glossary. However these will serve to acquaint the uninitiated with general studio parlance.

STUDIO TERMINOLOGY

"TV"—(TEEVEE)

the broad term for the television industry generally.

"TELECAST"—

a program that is broadcast by sight and sound.

"PICTURE CHANNEL"—

the chain of apparatus which feeds the picture to the transmitter. (Also used by engineers to designate the the transmitter's actual wave-length—six megacycles removed from the "audio channel.")

"AUDIO CHANNEL"—

apparatus used to provide the voice portion of a telecast to the transmitter. (Again, engineers use the term to designate the wave-length of the voice transmitter, which is six megacycles removed from the "picture channel.")

"VIDEO"—

the picture portion of the telecast generally. Roughly video means picture. The terms are used interchangeably. Thus "video channel"—picture channel. "Video amplifier"—picture amplifier.

"SCREEN"—

the face of the vacuum tube on which a picture is received and viewed.

"VIEWER"—

one of a television audience, or, technically in the studio, the vacuum tube or screen on which the engineering personnel watch and monitor the picture.

"CAMERA"—

the instrument which picks up the picture and transmutes it to radio pulse energy. At present cameras are of two types: Iconoscope and Image Orthicon.

"ICONOSCOPE" OR "IKE"—

the picture-making tube contained in the camera. Ike

has become a TV colloquialism used when referring to cameras generally.

"ORTHICON"—

another type of picture-making tube contained in certain cameras.

Note: The Iconoscope type is the older type of the two camera tubes and much more light is necessary when working in front of one of these than when working in front of the newer Image Orthicon. The latter is capable of picking up the necessary "information" when the subject is under only "cold light."

"INFORMATION"—

the composite make-up of a picture after transmutation by the camera.

"COLD LIGHT"—

stage or subject light often produced by the use of so-called "daylite lamps." In other words, much less light than that produced by the banks of incandescent lights which are necessary when a camera is of the Iconoscope type.

Note: The big difference lies in the heat generated by the two systems. The incandescent lamp banks generate a great deal of heat. Cold light cuts this heat down to a much more comfortable working temperature. See "studio lighting."

It is also well to know that the older type Ike, which demands the greater amount of light, actually produces the smoother, better defined picture to the viewer than does the newer Orthicon.

"KINESCOPED"—

(From "kinescope," which is the engineering term for a TV viewing tube.) The process involved when a TV show is filmed for re-televising—a TV electrical transcription. The process consists of doing a live show as normally for TV, and at the time of presentation it is photographed by

movie camera off the face of the viewing tube. Program is then on film.

"FILM CHAIN"—

the apparatus used for the televising of motion picture film. Apparatus consists of a motion picture projector which is closely linked to an Iconoscope camera so that the projector throws the movie film image directly on the mosaic of the camera Ike.

"SLIDE"—

a still picture on film projected on the Ike much as movie film is projected.

"FILM CLIP"—

a small portion of movie film used as part of any live program.

"BOOM"—

crane-like apparatus used to move the microphone to its proper position for sound pick-up during a telecast.

"CUE-CIRCUIT"—

a telephone hook-up on which several members of a TV crew may hear directions given to them during the telecast.

"SWITCHER"—

control room man who changes from camera to camera at the behest of the director. His choice of "shot" determines which picture will be released on the air when more than one camera is being used.

"MIXER"—

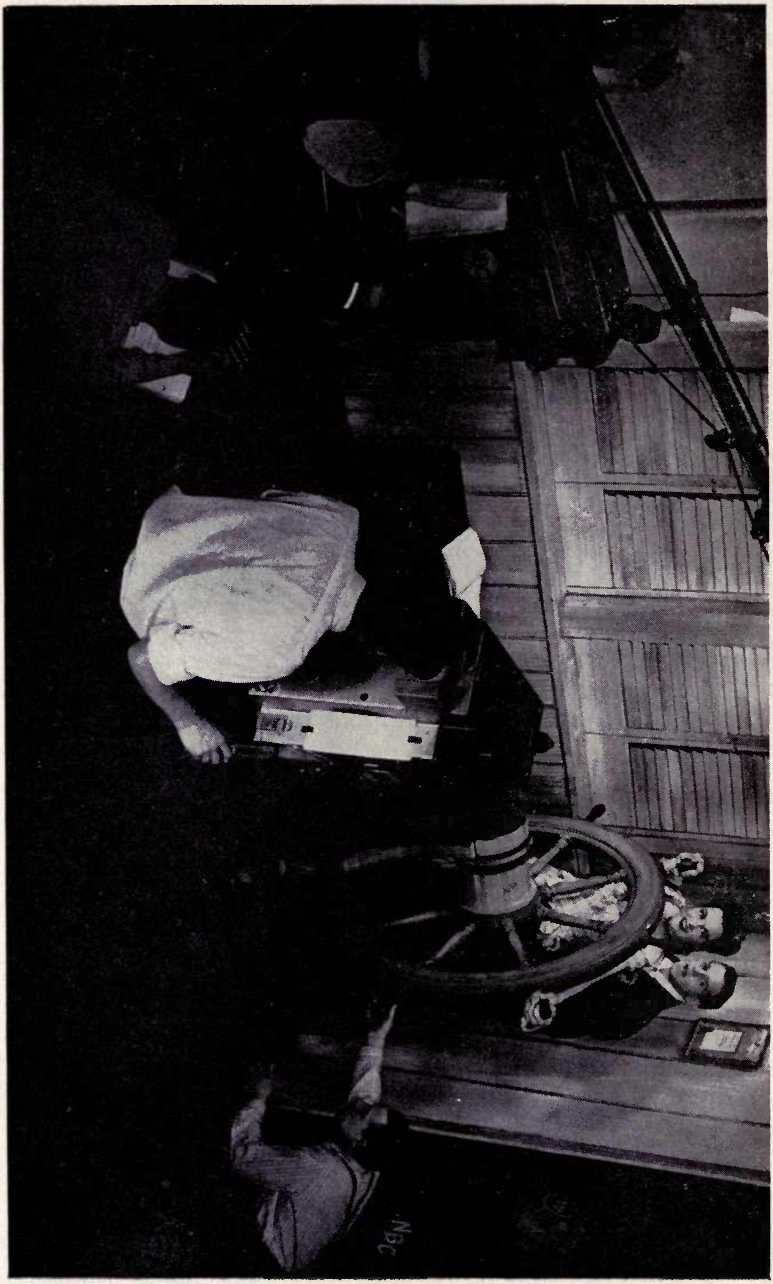
sound engineer who monitors the sound channel the same as in normal radio.

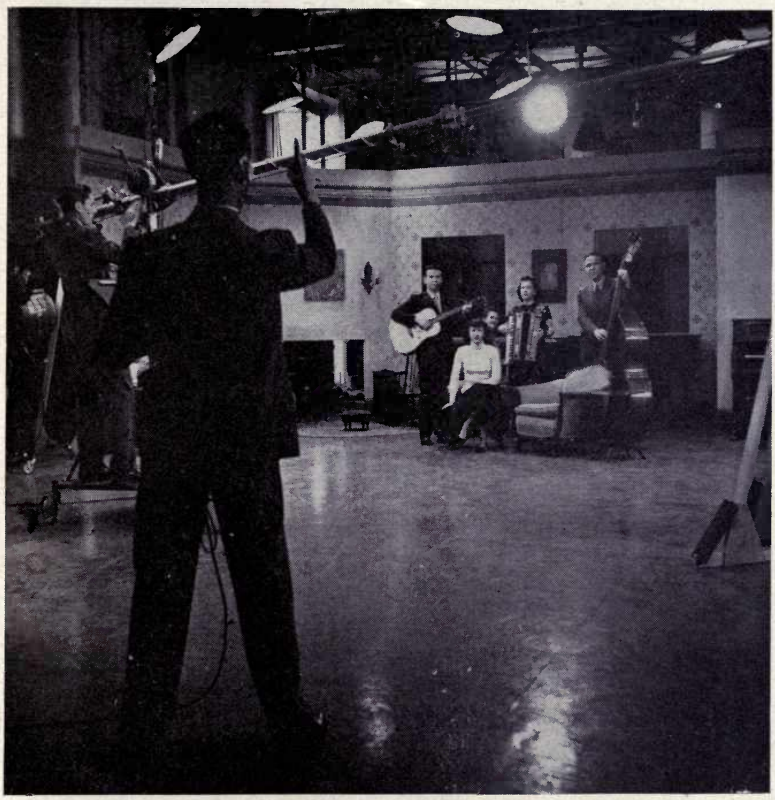
"SHOT"—

one continuous sequence or segment of action on the same camera with the same lens. (i.e., "close shot" . . . "long shot").

"FOCUS"—

means the same as it does with any photo camera.


NBC



Studio camera bears down on singing group as mike boom, top, left, picks up sound.

However, in TV focus is accomplished electrically within the camera as well as with the lens, which is in front of the camera tube.

"DUBBING"—

the process by which sound is recorded on a sound track so that a film, when televised, releases sound and picture in perfect synchronization.

"SYNC"—

abbreviation for synchronization used above. "In step with." (Thus "sync the sound" . . . keep it in step

TEXAS RANGERS GET HOT

Courtesy CBS

with the picture.) Also used as an engineering term as explained in Chapter III.

"BLIND"—

process involved when a show is controlled, described, or switched while personnel other than the cameraman watch it only on their viewers.

"FLOOR MANAGER"—

a man who, during live telecasts, is in charge of all operations on the stage.

"VIDEO ENGINEER"—

control room man who, under some set-ups, gives all directions to the cameraman over the cue circuit during a telecast.

"LIVE"—

refers to a telecast performed in person. (As opposed to kinescoped or transcribed.)

"PROPS"—

the necessary articles used to set a complete stage for a live telecast. Tables, chairs, divans, lamps, etc.

"SET"—

prop arrangements made to simulate a given locale on the stage.

"BLOCK OUT"—

to diagram for each and all participants in a telecast each position, camera movement, actor movement and placement necessary to the presentation of a live television show.

"AM RADIO"—

actual translation, "Amplitude Modulation Radio." General usage of the term, however, has come simply to refer to standard radio broadcasting as it now exists.

"FM"—

actual translation, "Frequency Modulation." An engineering term which describes the type of radio wave emission from a transmitter. Its general use, however,

connotes the broad group of radio stations whose transmitters can be heard only at a distance which is in line-of-sight, and whose wave-lengths lie in a higher broadcasting spectrum than our standard AM radio. The audio transmitter in TV uses AM. The video uses FM transmission.

Note: For other terminology refer to the glossary.

It is easy to see from the foregoing that TV has garnered its terms from the other entertainment mediums and has added some of its own that originate from engineering terms. Thus, it is a combination "slanguage," composed of terms from AM radio, motion pictures, the legitimate stage, and the engineer. A thorough knowledge of these terms will enable even the most uninitiated to understand a TV conversation and to follow a studio direction or instruction.

FACILITIES FOR A SHOW

To get a live show of any portent on the air it is necessary to assemble within the studio a great variety of implements. First, a technical crew (NBC has set as a basic operating crew nine men) is necessary. There must be a script, and there must be an acting and supervisory personnel in accordance with the show's scope and complications. There must be art work, stage sets, and props, perhaps film clips and slides. There must be microphones, cameras, and adequate lighting facilities. Of these, we have not yet touched upon two which are very important: art work and lighting.

ART

The most rudimentary type of art work necessary for any television presentation is the "title card." To the viewer this is a simple screen full of words which may contain the call letters of the station, a telephone number of a sponsor, or the names of the players in a drama. However, the prep-

aration of such cards is not as simple as might be imagined. Several methods are in current use.

In one method an artist paints or draws the necessary lettering on a card in plain, legible letters. The card may be any size larger than 7x10 inches, but in that proportion. It is preferably a flat gray in color because gray has been found to give off the least refractive spurious light to which the camera is most susceptible.

The artist will confine his total lettering space to 7x10 inches, and he will artistically space his letters so that the overall effect will be attractive to the viewer as he sees it fill his screen at home. The wording on the card shall be as readable and interesting as the ingenuity of the director and writer will allow. The artist will "bleed off" to the edges to allow the cameraman to frame the title without bothersome edges.

Once prepared, the card is put in front of a camera lens by one of several means. It may be hung in sequence with other title cards on a title board which will allow the cards to flip, one at a time, down into perfect position for a camera moved close upon it and in fixed focus; or, as a variation, it may be placed in sequence with others on a rolling drum which, when rotated either manually or by motor, brings each title card into camera view.

A variation of this method of title preparation is to use a large, flat area which is covered with a cloth similar to pool table covering. The letters are pinned into position on this surface in proper sequence by making use of a short pin which is molded into the back of each letter. Letters must be arranged to stay within a proper area for coverage by a camera. They are made of clay or plastic and are plain yet artistic in design. They may be white or black in color, depending on the color of the background cloth.

Once the title so displayed has been shown to the audience via the camera, it may be quickly disassembled and be

replaced by letters and words for the next necessary title. If time is limited while the show is on, the various titles may be set up one at a time long before the show, photographed on a 35 mm camera film, developed, and at program time be projected into the film camera chain as slides. Obviously, care must be taken when they are photographed so that they will be properly lighted and will appear in a perspective that will fill the viewer's screen when they are shown.

Variations of these methods will suggest themselves to the reader. A great deal of experimentation is constantly going on to find new and ingenious methods for displaying titles of all kinds. Moving titles are used extensively.

In this procedure, the wordage is lettered on a translucent sheet which is rolled in front of the camera lens by a mechanical means, much like the ordinary camera rolls its film from spool to spool across the lens area. The titles may be read by the viewer as they pass through a framing structure which has been superimposed betwen the camera and the translucent roll. The roll may be lighted from the rear or from the front—depending on the overall effect the director wishes. There are as many variations as there are people with ideas and ingenuity.

One of the later devices so far developed is a gadget which operates as a robot. In the use of this clever mechanical device, program narration is recorded on an ordinary electrical transcription, so common in radio. At the time of recording, there is also recorded a "pulse," or tone pip which is inaudible to the ear—but which has sufficient strength and composition to energize, upon being piped to it, a motor-driven film slide projector. Thus, in presentation, it is necessary only to play the recording into the sound channel, and to have the projector working into the film camera chain. Wire from the sound amplifier transports the pulse pip to a relay which, when tripped by the pulse, turns

on the power to the electric motor. The motor will revolve just enough to throw the next slide or picture into position and then shut off automatically. It will stay so until the next pulse comes through and then will, of course, repeat the operation.

This device has several advantages: First, it makes it possible for a program to be prepared well ahead of air time. Next, it makes sure once and for all that the released picture or title is in absolute sync with the voice narration. Also, it may be prepared outside and thus not tie up scarce studio facilities. In actual presentation the program will require only a minimum of studio personnel.

Other clever gadgets are constantly being added to the mechanics of television, and such a device as just described may, in a short time, be looked back upon as a device as elemental as the scanning disc. Such is the progress of TV.

LIGHTING

The subject of lighting could well occupy a chapter, and more, by itself, if we went into it thoroughly from top to bottom. However, for our purposes, we shall here dwell only on the practical application in studio operation.

We mentioned earlier that the Ike or Orthicon tube in a camera is sensitive to variations of light. That's the basic part of our picture elements—light and shadow. But camera tubes are only sensitive to a point. We mean that the present day camera tube requires that a great deal of illumination fall on its image material in order to function. An immense amount of experimentation is going on constantly from two directions: first the engineers are striving to develop a camera tube that will be more sensitive and give the required electronic variation under conditions of much less light, and, second, the lighting engineers are striving to develop light that will give greater illumination and still not amplify the undesirables such as generated heat.

The image orthicon camera tube is the latest development from the electronic laboratory. It will give a picture under conditions of less light than will the earlier iconoscope. However, said pictures have been found in practice to give a slightly "grainier" image than the ike, which needs more light.

The lighting engineers have so far experimented with all the sources of light which we now know. These sources are: the filament or incandescent light bulb, the fluorescent lamp, the "Alpine" or mercury-vapor type, and the carbon arc.

Of these sources the most common now in use is the incandescent lamp although it is often used in conjunction with some of the other existing types. In several of the pictures contained in this book, you will see banks of these incandescents placed throughout studio sets. They hang from overhead and are brought to bear on the scene from the side and from the front at studio floor level. Our problem is to get, from these, an even amount of intense light and to spread it throughout the specific set or locale, keep the lights from getting in the way of the cameras and actors, and still remain at a constant level, or key. The use of great amounts of light in a studio, which will give the video engineers a good picture, is referred to as "high-key" lighting. Thus, we must maintain the key and still combine the tricks which have been developed throughout the years by stage and motion picture stage lighting.

It sounds rather simple to light a set. But in practice, the fault with incandescents is that they generate heat in proportion to the light they generate. It has been found that the TV camera will give its best picture when the light used on the set is of an intensity that will nearly bake an actor who must work under it for any amount of time. Although this condition is rapidly being remedied, it is still necessary to find other, or additional, sources of light that will

allow us to reduce the incandescent intensity and still maintain the key. This brings into use two other types of light mentioned above: the mercury vapor lamp and the arc light.

The mercury vapor lamp has the advantage of generating a high level of illumination in the form of a bluish light which does not radiate nearly the amount of heat experienced in the use of incandescents. Its radiated light, however, is somewhat diffused in character; also, the lamp is so constructed that the high-pressure mercury-filled tube which is the source must be operated with circulating water constantly moving around its jacket. This last makes installation of a large number of mercury vapor lamps complicated, disturbs their maneuverability, and tends to make their use for entire lighting impractical. They are, however, very useful as permanent installations in studio ceilings, and their use allows the lighting engineers to cut down the number of incandescents used so that the actor feels that he is working under cold-light.

The arc light has long been in use on motion picture sets, and it is good used in conjunction with incandescents in studio lighting. It is extremely useful, for instance, in lighting a single subject or person who is seated at a piano, or perhaps a desk. The character of the light it gives off is somewhat irregular in that it has a tendency to sputter a bit. Too, it is sometimes noisy in operation and requires additional manpower on set to maneuver it. But its usefulness is not to be doubted when such use is indulged in advisedly.

The fluorescent lamp source has only one advantage: it is cold light. Aside from that, most of its properties are disadvantages. The light radiation from such a source is so small in comparison to other types that it becomes rather impractical. Physical size of an installation of enough fluorescents to do much good prohibits their use in any but

permanent and special installations. They are the subject of many experiments going on at the present time however, and it is only reasonable to suppose that in the near future, sufficient strides will be made in their development to warrant their use on a larger scale.

Experimenters are going ahead with a variation of subject studio lighting in which a small bank of incandescent lamps are installed on the front of each camera. They are mounted directly over the lens turret and are surrounded on four sides by small light masks that keep light given off from splattering around indiscriminately and at the same time will light a subject that is directly in focus of the camera lens. Normally, six bulbs are used, and they are especially useful when it is expedient to dolly-in on the subject for a close-up. No matter where the subject is within the overall set, it is thus possible to single him out, come in to close-up, and be sure that there will be ample light on him to give a good quality picture. However, since this subject is already lighted by the overall lighting of the set, we may overlight him by the use of the camera lights and thus change the key of the lighting to the confusion of the video engineer. That brings up our next subject.

LIGHT CONTROL

As you know, we have in the control room a shading engineer. He has at his command the necessary controls to adjust the brightness of a picture after it leaves a camera so that the viewer will experience no variation in his light levels at home as the studio switches from picture to picture. However, the shader's work may be eased and made even more effective if he is working in close collusion with a lighting engineer. There are limits to what a shader can do on his own, and he must be aided in not overstepping these limits by the activities of the man who controls the lights. For instance, in the last case above where we left

a camera with lights attached moving in for a closeup, the lighting key will increase to a point where the shader must cut down his picture brightness overmuch. It is then essential that the intensity of the light from the camera lamps, and even the overall light on the set be brought down to such a level that the shader again has full control of his picture. In addition, the effect of this dimming of overall lighting and a heightening of the light on the one subject in a closeup will be to bring out the immediacy of the subject and thus give the illusion that he is all alone on the set. All this must be done without materially changing the previously existing lighting key.

As practice, then, things are set up for control as they are at KLAC-TV in Los Angeles, where considerable experimentation has been done. A console, built on noiseless casters, has in it, rheostat controls which can, by the movement of a lever, dim any light or group of lights desired. Each circuit of lamps may be set up separately to be dimmed or brightened, or they may be "ganged" to work several sets simultaneously. The lights on the front of any or each camera can be separately controlled so that, when a camera dollies in for closeup, the operator at the console will slowly dim the overhead bank and slowly brighten the camera lights. He wears earphones through which he can hear from the shader in the control room, who will tell him if he is dimming too much or too fast and will tell him when he has reached such a level that he, the shader, can handle any further necessary changes with his controls.

The light control must be so placed within the studio that the operator, standing behind the console, has a good view of the lighted set and is still not in the way of other equipment. His cables must not interfere with camera movement, or get into the picture, but his usefulness in getting a satisfactorily lighted picture is great.

LIGHTING EXPERIMENTING AT KLAC-TV, HOLLYWOOD

There must, of course, be other controls for lights besides this special effects console. Many of the overhead light banks must be mounted on the studio ceiling in order that they may be rotated and brought to bear on different parts of the studio floor space. This is accomplished by making them rotatable manually by the pulling of ropes or wires off stage or by motor control from the control room. Current applications of these procedures vary, but, at any rate, the object is to give an even light to the set without permitting certain portions to be overlighted to a point where "hot-spots," or hialations, will put undesirable flares in the viewer's picture. The camera men and the control booth must be the judges of a properly lighted set, and many are the headaches that go between the trial start and the finished product. The lighting problem for TV studios is far from solved, but future developments will surely lick the remaining troublesome problems the same as experimentation has licked others.

OTHER STUDIO CONSIDERATIONS

There are other points to be considered which are equally as important as art work and lighting as television studio aids. Among these are cameras, microphones, actors, directors, films, and props. Since Chapter V was dedicated to cameras, and the foregoing discussion in the present chapter took up art work and lighting, microphones, actors, directors, films, and props remain to be covered. With this end in view, the following discourse will treat the matter of microphones.

It is pretty easy to be carried away and forget the audio portion of our show because much is already known of the radio broadcasting of voice whereas video is an innovation. Nevertheless, the microphone is still the little piece of machinery that sends to the viewer of our picture the necessary explanatory sounds. The "mike," in many types of TV programs, never appears in the picture, yet it must always

MOST COMMON "MIKES" NOW IN USE

THE 88A AND 44B

be there. To bring this about, it is necessary to suspend the mike in such a way that is readily and quickly movable to any position necessary for it to pick up the voice in a drama or quiz and still not be seen. The studio machinery necessary to bring this about is the *boom.*

The boom, pictured on page 87, is a heavy pedestal, mounted on silent casters, or rollers, which has attached to it an adjustable long arm. The arm may be lengthened or shortened by the operator (boom man), and cables run out along the arm which enable the operator to turn the mike in any direction at will. This arm can be stretched out to a length of thirty feet. It must bring the mike into range for the proper pick-up of the actors' or announcer's voices without being seen. The pedestal must be placed where, like the light console, it is not in the way of the cameras and camera cables. Like the cameras and console, it must have a trailing cable to pipe the sound to the sound engineer in the control room. Also, the boom man must have a cue-circuit line to feed his earphones so that he may get instruction and direction from the control room at all times —or perchance be able to hear what he is picking up himself.

Almost everyone is familiar with the better-known types of microphones. It is not particularly necessary in television to use mikes that are much, if any, different from those used in radio. Their basic job is the same as it is in radio. Types in common usage include the RCA types 44 BX, 77D, and 88A. All are well suited to high quality pick-up work. The first two types named are superlative for studio use. They are bi-directional and have an excellent frequency response to suit the FM sound channel characteristics. Their pick-up pattern is peculiarly suited to TV where there is motion that makes a wide pattern desirable. The 88A is principally suited to remote and outdoor or field pick-up

since it is rugged in construction, small in size, and easy to handle if, for example, an interviewer must continually carry it.

Certain other types are also in use for various special types of telecasts. These include the cardioid, the eight ball, and the salt shaker type. Of these last three, the latter two may pick up sound from any direction. The cardioid may be adjusted to pick up sound only in a narrow pattern off its front. This is sometimes useful when undesirable reflections in a studio, or backside noises, become bothersome on a remote pick-up such as a parade, football game, or dance band.

As we go to press a new type of mike is beginning to gain favor. Known as an *Altec,* it is very small (a little larger than a dime) and has excellent characteristics. It is so inconspicuous that it can be allowed inside a TV picture and never be noticed by the viewer.

Chapter VIII

THE ANNOUNCER IN TELEVISION

The announcer enjoys approximately the same stature in television as he does in radio. More to the point, in TV he becomes surpassingly important because sight is added to sound. Part of the time he will be "on stage," and part of the time he will be the off-stage voice he is on radio.

Most announcers who get into TV were formerly affiliated with radio. Consequently the present discussion will proceed on the assumption that the TV announcer has either had radio experience or has studied voice and speech enough . . . enough to know the fundamentals of announcing such as proper breath control and articulation. Likewise, it will be assumed that he is familiar with general studio practices.

As in radio, announcers fall into two classifications: staff, and free-lance. Staff means that he is hired by the television station itself for general duties around the station on a regular schedule. The free-lance announcer is usually hired by the sponsor, or his representative, for one or more specific duties.

THE STAFF ANNOUNCER

The staff announcer will be expected to handle, and presumably appear in, many programs of wide variation and character. His facility and versatility is tested to the utmost in this capacity. If he is a beginner, rigid application to his varied duties will soon indicate for what portion of them he has the greatest flair and will ultimately lead to higher specialization for him. His success lies in thorough, diligent application to each duty assigned him, no matter how trivial.

The duty day may start with a news telecast. Probably parts of this are on slides. Thus, the announcer narrates from previously prepared copy, pointing out important points in the picture, and naming personages or places appearing therein. Radio rules for the announcer hold here. He should be familiar with his copy before going on, having rehearsed it so that there is no unsureness of "fluffing" of difficult phrases or names. He should read naturally and intelligently and in an important, unbiased manner. He should not "bear down" overmuch, but, rather, maintain the reportorial style.

Now it is quite possible and probable that there will be an item of importance in the news for which there is no picture ready to send to the video channel. At this point it is normal practice to switch to the studio camera and pick up the announcer himself doing his copy. This procedure has been previously set up for this point in the presentation, and the announcer is in position, seated at a table with his copy; and he has been "lighted" (properly covered with light) so that he will make a satisfactory picture for camera pick-up. The boom man has maneuvered the mike so that it will not show in the picture but will get the voice properly. If this spot in the news has been memorized, the announcer will make the listener-viewer feel that he is speaking directly to him. The news-caster's mannerisms, either personal or studied, either help or hinder in "putting over" both the announcer's message and his personality.

When this item is over, the next news picture will appear on the monitor screen, and the announcer may return to the reading of his copy. If he is in a position where he cannot see the monitor picture, the control room will give him his next cue via "talk back" or by cue-circuit phones if he is able to return them to his ears.

The staff announcer's next duty may be station identification as in radio. The picture will probably be a slide of

the station's call letters. The control room will cue when to say, "This is KVBH, The Pomona Television Corporation station, Channel Six, Pomona."

This may be followed by a time signal as in AM radio or perhaps a commercial "plug" such as a slide showing Curvex watches. When this comes up on the screen, the announcer reads the commercial copy that goes with it.

Not all the announcements, narration, or commercials will have "copy" written for them. A staff announcer is sometimes called upon to *ad lib* his remarks. Here his innate versatility helps him. If possible, the announcer arms himself with facts, figures, and details the article, program, or event he has to *ad lib.* His notes may be carried on a card in his pocket. This way, when he is not in the picture, he may consult them and thus refresh himself on salient points so that his "copy", or general remarks on the subject, will have a better flow and better pacing.

Being natural, not forced in any way, is, together with one other point, probably the announcer's greatest asset in television. Not only must he sound natural, he must look natural. The other point, closely allied, is: he must sound friendly and look friendly.

A great many remote programs must be ad libbed by a staff announcer. If he is presiding for a dance band from a club, a common type of remote, whether or not he appears in the picture, he should not try to *ad lib* "over-cute" remarks. He starts his *ad libs* knowing what he is going to say. Above all, when announcing a musical program, he does not indulge in being a "title-gagger," an announcer who makes up his remarks to stem from the title of the selection about to be played. This is the surest sign of a novice.

Whether or not he has ever been a radio announcer, the prospective TV announcer needs to practice reading every day Keeping in mind all the rules or instructions which he knows for the proper projection and production of speech,

he should choose a news item from a newspaper, or any of the commercial copy which appears later in this chapter, and read aloud in front of a mirror. He should stand so close that he sees only his face and shoulders. This simulates a closeup. From time to time, the television announcer should check his facial expression. He wants to look friendly and pleasant.

If the announcer has a conspicuous Adam's apple, he should try tricks to make it less noticeable. A jumpy Adam's apple on the screen can bring hilarious laughter and thus destroy the sincerity or perhaps the punch of the "copy" at just the wrong time. Correct breathing and facial control will give good word articulation and will leave the throat region all in order. Generally, if a speaker breathes correctly, he has no Adam's apple trouble.

The announcer on television needs to notice his best "angles"—the directions from which he looks best. Everyone has them. Teeth are a point in view. If they are far apart in front or crooked, a little dental work is in order.

These may sound like trivial points, but they assume large proportions in front of the examining eye of the camera.

As the reader comes to the concluding words of his practice copy, he ought to note the expression on his face as he says the last word and then hold that expression for a count of five. In practice, he will at first find it difficult to keep from looking just a bit self-conscious, or he will look away, or take on a slightly "blank" look during the brief moment after he has finished the copy and the time it takes to shut down or switch the camera. It is often a brief moment of indecision on his part, but he must not show it. It could spoil the effect of whatever message he has just concluded. So he must hold his expression.

Ad libbing in front of a full length mirror is another

good exercise. Pretend that you are interviewing someone. Focal points include: general stance, carriage, natural appearance, and hands. In regard to the latter, it is important that the announcer does not make too many gestures with them. Above all, in a gesture, he should not move the hands and arms directly toward the camera (i.e., straight into the mirror). This habit will ruin a cameraman because hands, on closeup, will look larger and get out of focus. General practice is for the performer to hold the hands and arms easily at his sides. If he wants to move, raising an arm to put a hand casually in his coat pocket is all right if he does not leave a thumb protruding. He is trying to look natural and at ease.

The staff announcer is certain to be called upon to participate in a "live" dramatic show. Here it is exceedingly important that he familiarize himself with the entire show. Not only will such familiarity help his own part on the show, but it will help others. It will enhance his value to the operation; and such willingness to be of help to those with whom he works is a paramount requisite for the staff man.

When he first receives his script, he looks through it noting his own appearances, stage directions, and whether or not he is on camera. This will tell him if he must commit his "sides" to memory. Then he marks all his appearances, on mike alone, or on camera, or both together. If these are not clear, it is doubly important that he be very attentive when the producer or director of the show gathers everyone together for a *blocking out* session. (For a complete description of a blocking out session, see Chapter X).

At all rehearsals which follow, as a staff man, he should assist the director in charge. Since he is not on stage at all time (he is probably on less than any other member of the cast), it is well if he makes mental note of places where things get into a "jam". There are a million and one things that require a double check or an assist. One caution is for

LIVE TV SHOW IN CAMERA REHEARSAL

Boom man maneuvers mike; all cameras train on full set as last rehearsal gets under way. Note banks of hot lights extreme right and left. Cameras are Image Orthicon type.

him not to overstep normal bounds in so doing, for if he does, he could get in the way or confuse the directions given by those in charge. The net end desired is that the presentation be as smooth and flawless as possible and reflect credit to the station.

THE DRAMATIZED COMMERCIAL

The dramatized commercial in TV is exactly what the name implies. It is the sponsor's message performed in the way that will most impress the viewers. Since the airing of the sponsor's message is what sustains the coffers of the station, it is the staff announcer's most important duty.

On the following several pages appear photostats and copies of actual dramatized and live commercials. Put yourself in the part labeled announcer and try to act your part. Make every movement count. Each movement should have a purpose—to point up salient points and important commercial advantages of the stove. In practice your director, of course, will help you with your movements. In reciting the copy, bear in mind that the mike is probably six feet above you, so project your voice accordingly.

This copy was performed by Hal Sawyer, announcer, and Miss Harrise Brin, actress, at station KTLA, Los Angeles. We are indebted to KTLA and to the Advertising and Sales Consultants Agency for the use of this copy. M. C. U. means medium close-up. L. S. is long shot, and C. U. is closeup.

This type of commercial may be done inside a dramatic show, as a break in a picture, or may be a "spot" commercial in itself. It is a mixture of slides, narration, and live action. The action is natural to fit the wordage, and the dialogue of plain facts about the product, make it an interesting and easy-to-do commercial.

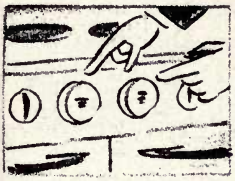
Example two of a dramatized commercial is an excerpt from the script of a two-hour show on station KTLA, Los

ADVERTISING and SALES CONSULTANTS AGENCY

SUITE 303 - PARK VIEW BLDG. • 2404 W. SEVENTH • LOS ANGELES 5, CALIFORNIA

Station KTLA — Program: "Shopping at Home"
COPY: Western Stove Company, Inc. — Date: Dec., 21, 1948; 7:00 p.m.

	VIDEO	AUDIO
	1. M.C.U. Hal & Harrise underneath wreath at fireplace. He talks directly to camera. Dissolve to:	1. HAL: If you do a lot of entertaining, or have a large family, here is an ideal Christmas present for Mom.
	2. L.S. of 6-burner range--ribbon & card "TO MOM FROM SANTA" Good Housekeeping Seal on wall. Cut to:	2. HARRISE: A Western-Holly Continental fully automatic gas range --and just look--six burners! Isn't it a beauty!
	3. C.U. of card "TO MOM FROM SANTA" Dissolve to:	3. HAL: Beauty that is more than skin deep.
	4. L.S. Hal loosens knot. Ribbon & card fall off.	4. HAL: Wait till you see what's inside! Besides the super cooking capacity that six burners, instead of just four, provide--this Western-Holly Continental also has two baking ovens.



5. C.U. Hal points to both oven temperature control knobs.

Dissolve to:

5. HAL: Both ovens have exact oven temperature control. Take a look at these twin super baking ovens.

6. Harrise opens right range door; Hal opens left range door.

Dissolve to:

6. HAL: Just a touch of the fingers opens the oven doors. The tension is always equal on both sides--the doors will never stick, never warp.

7. M.C.U. Right oven open; Hal & Harrise squatting next to it. Throw floor bank in to light interior of oven.

Pan to:

7. HARRISE: My, but the oven looks huge!

HAL: It is big--actually 18 inches wide inside--large enough for the largest turkey you can buy.

8. M.C.U. Harrise squatting near oven, whisking inside with hanky.

Pan to:

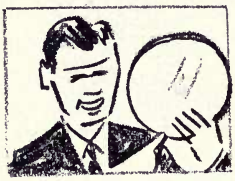
8. HARRISE: I love these rounded corners.

9. M.C.U. Hal & Harrise close oven doors. Hal picks up Pyrex unit.

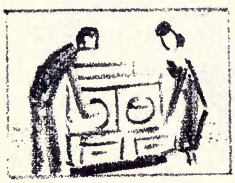
9. HARRISE: These round oven windows thrill me! Think of watching your baking or roasting without even opening the oven door.

9. (Continued)

Dissolve to:



10. C.U. Hal & Pyrex window.



11. Harrise & Hal open broilers. Hal slides out broiler pan slightly, slides it back.

12. L.S. Both close broiler doors & rise.

Cut to:

9. (Continued)

HAL: Don't confuse these brand new windows with any you've seen before. These exclusive Western-Holly windows can't fog or discolor.

10. HAL: You see, Harrise, these windows are made of double Pyrex glass, hermetically sealed at the edges with a vacuum between. It took many years of research to develop these windows. That's why Western-Holly waited until they were perfected.

HARRISE: And they look so smart!

11. HAL: Now to get back to super cooking capacity. This Western-Holly Continental adds twin broilers to the cooking capacity furnished by six burners and twin baking ovens.

12. HARRISE: These broilers glide out so easily!

HAL: That's why Western-Holly calls them "Modern-Way Glide-Out Broilers.

13. M.C.U. Hal & Harrise & range top. Angle high enough to show all six burners.

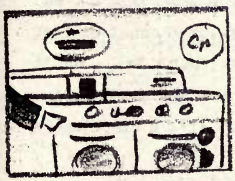
Dissolve to:

13. HARRISE: I can't imagine why anyone would put up with old-fashioned spider grates--when you can get Western-Holly's exclusive Tempa-Plates.

14. C.U. Hal turning back to stove.

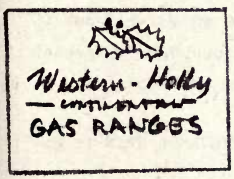
Dissolve to:

14. HAL: They're made of steel--not cast iron--porcelain enameled --top and bottom.



15. C.U. of range control panel. Good Housekeeping & CP Seals show in b.g. Pan to Hal's hand pointing to automatic clock. Show blue ribbon.

15. HAL: All Western-Holly gas ranges have passed the most rigorous tests of the nation's leading laboratories. For example, they have been awarded the Good Housekeeping Seal of Approval. Also this CP --Certified Performance--Seal appears on only the finest gas ranges. In addition, this Western-Holly includes such features as an automatic cooking clock.



Cut to:

16. Slide: Western-Holly logotype.

16. ANNOUNCER: Order your Western-Holly Continental now! It can be installed before Christmas. More than two thousand outstanding dealers in Southern California feature the Continental. Identify it by the "Mark of Excellence" blue ribbon.

CINCH PRODUCTS INC.

TELEVISION KTLA - November 24.

LOCATION	FACILITIES	ANNOUNCER:
REMOTE	PARADE	ANNCR: Cinch cake mix is presenting the annual Hollywood Parade...with beautiful floats, beautiful girls, and fun galore. For a word from our sponsor, let's see what's doing at the studio.
STUDIO (Approx. 9:00)	CUT	
	MEDIUM SHOT ON TABLE. FOUR PACKAGES (NO CAKES).	ANNCR: (DIALOGUE FOLLOWS THE PANTOMIME ACTION) While our Parade has stopped momentarily, let's talk about Cinch cake mix. You know it's a cinch to make...add water, mix, and bake. Yes! There are four delicious flavors of Cinch Cake Mix--Golden, White, Spice, and Devil's Fudge. Say, look at those cakes. There's a birthday cake . . . and there's a holiday cake. . . . Hey, cut me a piece . . . a big piece . . . careful . . . Ah! Is that for me? Thanks. Hey...you can't do that to me. . . . Oh, you liked it, huh? Well, don't eat it all. We'll all be down to the studio after the parade for a slice. But...it's a Cinch there won't be any left.
	DISSOLVE TO 4 IDENTICAL PKGS WITH CAKES IN FRONT.	
	DOLLY IN ON ONE CAKE. C.U.HAND WITH KNIFE	
	KNIFE CUTS CAKE, TAKES OUT SLICE.	
	CAMERA FOLLOWS TO FACE AS ACTOR TAKES BITE.	
	ACTOR SMILES AND BROAD WINK OF EYE.	
	FINGERS GIVE RADIO OK SIGN.	
	CUT	
REMOTE	PARADE	ANNCR: (CONTINUE AD LIB OF PARADE TILL APPROX. 9:30...THEN WORD CUE TO STUDIO)
STUDIO (Approx. 9:00)	KITCHEN DOOR. BOY COMES IN DOOR. HE IS SINGING "IRISH EYES ARE SMILING"	CUE IN MOOD MUSIC...HOLD AND FADE AS BOY COMES IN.
	BRING TO C.U. BOY STOPS SHORT AS HE SPIES CAKE ON TABLE.	ANNCR: Ever know a boy or a girl who didn't like cake? Oh, brother, they're a cinch to find it no matter where you hide it. Might as well put it on a kitchen table. For instance, here's Michael O'Reilly as he heads for the kitchen.....
	PAN TO C. U. OF CAKE WITH CAMERA 2 M.C.U. OF BOY AS LOOKS AROUND, TIPTOES OVER, HESITATES, LOOKS AGAIN.	
	TAKES OUT PIECE OF CAKE, BITES--PUTS PIECE DOWN, REARRANGES CAKE, GOES OUT SMILING AND EATING.	MICHAEL: (ON SPYING CAKE WHISTLES) This is going to be a Cinch!
	CUT	MICHAEL: (AFTER BITE) It IS a Cinch!
REMOTE	PARADE	ANNCR: CONTINUE PARADE TILL 9:45 APPROX.

Angeles. The announcer in this case is at a remote point, *ad libbing* a description of a parade. He can, however, see what picture is being transmitted at all times in his monitor-viewer. Thus, when he is participating in the commercial as indicated, he is doing it "blind." This is a common type of presentation. (See page 114.)

Notice in this last commercial, in speech one, how important it is that the announcer's words be perfectly "synced" with the picture which is appearing on his viewer. He must say "birthday cake," when the camera picks it up, and he must time his "Hey, cut me a piece," to be with the action which shows the knife appearing and starting to cut.

The mood music cue need not concern the announcer. That is done from the control room from a transcription, and the announcer will hear it fade down in his cue-circuit earphones.

THE FREELANCE ANNOUNCER

Thus far we have dealt only with the staff announcer. The freelance announcer is hired by a specific sponsor or his advertising agency to do a specific job on a specific show. Almost invariably freelance status is arrived at by having grubbed through several months, or even years, of duties as a staff man. That is why it is well that the staff man perform each duty to the best of his ability. Each completed chore will add to the fund of his experience, which by cumulative action, will ultimately bring him into the stature of a thoroughly experienced announcer. The duties of the free-lance man actually become less than those of the staff man, and the remuneration is greater. However, there is more pressure and more actual importance attached to the free-lance commercial announcer's duties. All things considered, the freelance will earn every bit of extra remuneration that he realizes.

Hal Sawyer, freelance announcer pictured previously, who

Announcer Hal Sawyer and Actress Brin presenting the comn ercial used as Example 1. Mr. Sawyer is a freelance announcer at KTLA, Los Angeles.

does many shows per week at stations in the Los Angeles area, has this to say:

"I believe that TV is most certainly *not* the medium for any man with limited background. What I mean is that it is essential that he be well grounded in AM radio. His greatest asset, after AM radio experience, is an absolutely limitless talent for *ad lib.*

"A successful announcer is a man with a picture in his mind. He describes this picture, putting the greatest stress on the details of the picture which are least prominent. TV makes a narrator out of him, a narrator whose mind picture must be the same as the one which appears on the viewer's screen. He cannot be just a reader. He must be a man with a picture in his mind."

IN THE LIMELIGHT

Earlier we said that physical characteristics are important to the announcer. To say that the image is important is an understatement. Actually the external form of the television performer is as important to him as it is to the motion picture star.

Let's consider several things, then, to see how either a beginner or a professional, by a little careful attention to detail in appearance, may materially help himself along the video path.

DRESS

A good rule of thumb for the announcer is to dress plainly and in a dignified manner. He is coming into people's living rooms, and he should act and dress accordingly. Above all, he must not offend. He wants these people to see and hear his message.

Dressing in rather light-weight clothes minimizes the effects of hot light. Colors are important. Blue and black are all right for normal use since they will rarely, under light, be overly reflective for the camera to handle. Greens

and browns are still better. Blue, grey, or yellow shirts are better than white. Figured or patterned ties are good. A sport jacket with slacks, neither too violent, are in good order for certain types of telecasts in which the wearer appears in the picture. Plaid patterns in jackets, especially a plaid which has regular vertical and horizontal lines in the pattern, show up very well and can be used when the program is of an informal nature.

Garments need to be well-pressed. A wrinkled coat or pants appear exaggerated on TV since the lighting casts a shadow from the wrinkle, making clothes look messy.

One should not wear large or bright jewelry. Such articles reflect light. A wristwatch with a strap of non-reflecting material like leather is all right.

As aforementioned, an announcer is a dignified reporter in many instances. If, then, he is to appear in the picture, and he must walk in, he should do so in a manner befitting his position. Proper carriage, besides improving appearance, will enhance breathing and thus assure easier breath control for the smooth delivery of a message. If the camera switches to the announcer and finds him seated at a table (as when doing a newscast), he should keep his coat from wrinkling at the neck so that he will not have a hunched-over appearance to the viewer. The coat wrinkling here will look doubly untidy to the viewer because the chances are, that while the broadcaster is seated, the cameras will use a closeup of him.

PHYSICAL APPEARANCE

It is in the closeups that physical characteristics come in for very close scrutiny by the camera and consequently by the viewer. Ears, mouth, eyes, teeth, hair, and beard are really open to public inspection. Therefore, one wants to look his best. He must not twist the mouth or tongue any more than is necessary for the good pronunciation and enunciation of words. Being freshly shaved improves appearances.

This is especially true for those with the "blue" or "blue-black" type beards. Television cameras have a remarkable proclivity for over-emphasizing this characteristic.

Teeth are important to appearance. They are white, and they reflect light. They are very much in evidence in a closeup. It is indicated, then, that they should be properly taken care of by your dentist, even to having front teeth capped, if necessary, so that flaws and faults are not distinguishable to an alert viewer.

If ears happen to be especially large, or not too close to the head, a little extra precaution should be taken to see that the barber leaves the hair a little fuller on the sides. Ears can pick up a lot of light. Of course, hair should be neatly combed. If the man on television hasn't any to comb, he may get a hair piece. Many of Hollywood's big stars do.

If eyes are deep-set, lighting will have to be more on the full face and perhaps from underneath.

If proper breathing does not render a bobbing Adam's apple less palpable, a slightly higher shirt collar may help to conceal this mutable member.

MAKEUP

The less makeup used the better. However, some is necessary and very beneficial to one's appearance. A light "pancake" make-up is usually sufficient to take away the "bluebeard" look. A little eyebrow touching up will help the definition of eyes, and a little lip makeup for close shots is good. This will all be done by people who know how at the studio; so the performer should not try to do it himself until instructed. Among other things that he may not know about makeup is the fact that lip rouge, for most TV, is nearly brown, not red.

BRIEFLY NOTED

A quick summary which concerns the announcer in television is as follows:

Personal appearance is as important to him as it is to a movie star.

He must be well groomed and dressed in good taste.

A good understanding or a thorough working knowledge of AM radio is valuable to him. He should have talent for *ad libbing.*

Reading aloud in front of a mirror frequently is good practice.

The announcer on television wins his audience by his friendliness of voice and expressions.

Chapter IX

THE ACTOR IN TELEVISION

Current practices in presenting live telecasts using actors do not seem to indicate that there will be any let down in quality or any radical alterations in already accepted standards of acting as it is practiced in the profession. True, there are certain tricks of the trade which will need altering depending on what branch of the entertainment field the TV actor comes from. But in general, values are the same; purposes remain the same; and procedures are the same except as they are altered by mechanical elements.

For instance, if an actor turns to television acting from the stage, he is pretty well equipped. On the stage he must learn relatively long "sides." In TV he may do the same. On the stage he propels the plot by action as well as by voice; the same is true in video. By and large, it seems that to make the transition, *tempering* his normal acting habits is indicated.

On the stage gestures are important. To get them over clearly to a theatre full of people, the actor must exaggerate them a bit. He is so experienced that he knows just the right amount to over-act so that a gesture will *appear* to an audience some distance from him perfectly natural. Actors who overstep this fine line habitually are referred to as "hams."

Again, in the matter of voice projection on the stage, the actor has become practiced in the exact amount of voice to use so that he will be heard in the rear of the house and still get the right effect from the delivery of his lines in

the fourth row. In TV, the 4th row is the microphone. So is the rear of the house.

Television alters these two important parts of the stage actor's characteristics. It tempers them. The television actor must remember at all times that his audience is no farther away from him than the lense of the nearest camera. He must also bear in mind, until it has become second nature, that he is not performing in a theatre. He is performing in the viewer's living room. There is opportunity for a wise-crack here, for some could say that he is also performing in the nearest bistro. However, most of his audience is at home. This fact brings a new intimacy between actor and audience that does not exist on the stage to any comparable extent. A gesture calculated to lay 'em in the aisles in the theatre will appear so overdone in the intimacy of the home that a viewer is pretty apt to stop viewing.

By the same token, the ear of the audience is no further removed from the actor when he is on TV than the dangling microphone. So some modulating of the voice as to shadings and volume is indicated. As a matter of fact, the best experience a stage actor can have in order successfully to switch from stage to TV is plain radio experience. Radio experience will indicate to him what effects he can get with voice alone in portraying his part, and it will make him adept in "microphone technique."

On the stage, the live audience can certainly furnish the actor with the necessary spark that keeps him on "pace," or right on the beam. If he is a comedian, or playing a comedy part, surely there is no substitute for that old audience reaction of laughter at a funny line or gesture. In radio, then, as well as in television, the actor gets practice and learns how to stay on pace and not lose his sense of timing of delivery—but without the reactions of the physical audience to help guide him. A few performances under these circumstances are usually sufficient to give the intelligent actor

the "feel" of the audience without their being present, and such a feel then becomes second nature as he becomes seasoned in TV.

Television actors are already getting used to the fact they cannot overlap so many jobs per day as they did in radio. In the cities which are radio production centers, actors habitually run from one "call" to another. The rehearsal schedules are so short that a competent performer can make two or three different radio shows per day in many instances. This is very fine indeed for the actor who, under union rules governed by the American Federation of Radio Artists (AFRA), receives pay which shall never be less otherwise than certain prescribed minimums. Also, if he be in such great demand that he works several shows per day, the chances are that he is an "over-scale" player and, thus, gets a good monetary return for his talents.

But, as we say. this actor must get used to the fact that such coverage of several shows is relatively impossible in television. Also, AFRA, along with other guilds and unions, has established no governing minimum fees or rules for payment of rehearsal time for TV. So a radio actor must be prepared to accept a lesser return when he switches to TV. TV stations, however, are approaching the radio scale in cases where the TV program is a "commercial," or sponsored show, that will be fair and equitable for station and performer. In the meantime, the radio actor is accepting all TV work he can get in order that he may sooner establish himself in the industry and gain experience which will serve him well later on.

If an actor enters television from radio, he has much to learn. It is granted that he is presumably well versed in tricks of voice and can expertly propel a plot or portray a character with voice effects. But, unless he has had either movie or stage experience along with the radio, he has more than a modicum of new experience coming his way.

In radio, he has probably never had to commit a part to memory. He has not had to give much heed to what gestures he indulged in while before the mike. He has always been able to deliver his lines from a position that suited him best; and if he could not hear himself above the noise of an orchestra or a sound effect, he could cup his hand around his ear so that he could. Obviously, this is not possible in television when the actor is on camera. He, therefore, possibly has a few mannerisms or tricks to "undo"—as well as tricks of portrayal by action to accumulate as he enters television from radio.

If a radio actor, no matter how accomplished he may be, is trying TV and has had no experience on the stage or in motion pictures, our most earnest advice is that he accumulate some of this experience—even by going to a school or coach—before trying it. The fact is that the busy television director does not have time to teach "acting" to a performer. Time is of the essence. A director is sure to cast people that he knows are familiar with normal stage procedure, for such a casting will save him time and aspirin in preparing his show for telecasting. As we have indicated previously, the medium is so complicated in presentation that rehearsal time is better spent in getting lighting, camera, and mike positions, as well as other details in order rather than pausing while an actor learns how to walk to a chair and sit down or how NOT to make a gesture. A little coaching and study will enlighten the uninitiated actor so that his first television appearance will at least not let him appear as a complete amateur.

Probably the best equipped actor for television is the experienced motion picture actor. However, he, too, has a few things to learn, or perhaps "unlearn," before he can be called an accomplished television performer. One thing arises because, in the movies, an actor needs to commit to memory

only a few sides at a time. Since pictures are invariably shot in a series of sequences, he needs be familiar only with his lines in a particular sequence at any one time. He will have ample time in between shots in which he appears to learn his dialogue perfectly for his next sequence. At least he will be able to brush up on lines and perfect anything which previous study of the side may have left undone. In TV this situation rarely exists. If his part is of any import, an actor, once on, is on for the entire presentation just as he is on the stage. And it is relatively impossible to "prompt" him, for the everpresent mike is right there to pick up and broadcast any attempt at an off-stage prompt.

Also, in motion picture work the actor has the advantage that, should he "blow" or fluff a speech or line, it is a simple matter to stop the cameras and do it again. Movie scenes are many times shot again and again to get just the right values from an actor's lines or actions, and the crew keep shooting until they get a good and satisfactory "take." Such is obviously not the case in television, however. The motion picture actor on TV must inure himself to the fact that THIS IS IT. Once he goes on, he only gets one try at it, and this must be his best one.

It seems that the ideal television actor is one who has had at least a smattering of experience in stage and radio, or radio and pictures, or pictures and stage—with the basic understanding of the profession gained by thorough experience in at least one of the three. If an actor is endowed with ordinary good horse sense, a few appearances in front of the TV camera will give him the confidence he might lack at the beginning. If he is good at taking directions, he may become an "old-timer" very quickly indeed.

RULES OF THUMB

It is to be hoped that any reader who has aspirations to be a TV thespian will also read our previous chapter di-

rected toward the announcer, for many of the tips contained therein hold for the actor as well. (Additional tips are contained in Chapter X.)

When the actor is handed a script, it is possible that it will be sufficiently in advance so that he may appear at first rehearsal with his sides memorized. This will greatly simplify things all around. For from there on, he may concentrate on the action as directed and greatly enhance his value to the director. All along, we have stressed the fact that TV is teamwork. It is true here. All actions must be so fitted into the actions of the rest of the cast that the individual actor is well balanced with the others to the end that the show may have an overall flow and evenness of presentation both on video and audio. The actor should keep voice levels well within bounds established by the director for the whole show. He should not try to be a standout. That will mark him as a novice. At each rehearsal "run-through," he must suit the action to the word exactly the same every time. That way, the cameraman will know precisely what to expect so that he can keep his camera in proper position. The boom man will know where to have his mike for the proper pick-up of voice when you deliver lines. You help him; he helps you.

It is well to keep in mind that you cannot, due to "depth-of-focus," play the entire stage on which you appear. Now reminding you of this is part of the director's job. Since you are very intimate with the viewers' screen, close-ups or at least medium close-ups make up most of the shots. The closer up the shot the less the depth of focus is. In fact, on a real close-up, in or out of focus may be only a matter of a few inches. Don't, then, make hand gestures *toward* the camera. Your hand will be out of focus if you do. Make them to your stage right or left. Help the director and cameraman by confining your action to a narrow space—at best three to four feet in depth—when cameras are working on you

medium or close up. Of course, at different times, you are certain to be picked up in an "orientation" shot. This will be a shot to acquaint the viewer with the whole setting and will be done with a camera at a greater distance from the set. Then your playing area will become much deeper, your field of action less restricted. In the presentation of a play or sketch, there are very few such shots, however, since they make the figures of the performers quite small on the screen, thus destroying the illusion of intimacy between actor and audience.

It is possible for the actor to tell which camera is working on him at all times. Each studio camera has on its top or its under side a small signal light. When the switcher in the control room uses the picture from a camera, the red "button" signal light will be activated the instant he switches to this camera. This prevents your playing to the wrong camera, and a little actual experience will teach you not to be caught napping. You will catch the twinkle of the signal light as soon as there is a change in cameras and will be geared to slant your actions toward a new camera without a sudden turn or jump that would make the change noticeable to the viewer. Such finesse will come only with actual practice on real live telecasts.

Do not allow the pressure of being on the air to influence you into any "ad lib" actions or changes of position. The cameraman is expecting you to be exactly where you were during the camera rehearsal when you deliver any certain line or lines. Nothing can so throw a program out of gear as an unexpected, unrehearsed movement on set. If you must move due to some emergency, make the movement so that it will group you closer to the rest of the action rather than remove you farther from it. Due to lens and camera limitations, you will play your scenes much closer to the rest of the cast than you would on the stage or in the motion pictures.

WORKING GROUP

Actor, announcer and appraiser place items for camera to scrutinize on program "What's It Worth?"

DRESS AND MAKEUP

The iconoscope camera has a few peculiarities in its reactions to different colors, which we did not cover when we described the camera earlier. It may be well to enlarge on this point for the benefit of the actor who wishes to appear as a natural human being on the viewer's screen.

The camera tube, as we now know it, is extra sensitive to the reds of the color spectrum. Some cameras are more reactive than others depending on the actual operating characteristics of the tube itself. It has been found that a little brown, or blue, mixed with red will allow the lips to appear dark and not unnatural. Hence, lip rouge is generally not red but brown. If ordinary lip rouge is used, the camera reaction will make the lips appear white to the viewer. This same camera reaction will make a dyed redhead appear on the picture as a blonde. On the other hand, a natural redhead, in normal light, will appear as a brunette.

So it is indicated that a brownish cast lip rouge should be used although powdering down the lips and no lip rouge at all will also do. The rest of the face should be coated with a light "pancake" makeup with which every actor is familiar. Use no cheek rouge over this. However, the face may be highlighted by the judicious use of a grey or white "liner" makeup and blue eyeshadow. Mascara for the lashes is perfectly acceptable if applied lightly and will give character to facial expressions if properly used.

Makeup is as important in TV for men as it is for women. The blue-black-bearded look is often difficult for the men to overcome. Shaving before telecast time is important if you are one who has a tendency to have such a beard. The pancake base will eradicate what is left. In cases where appearance is of short duration, application of "panchro" powder only will serve all purposes.

In regard to dress, the actor seldom has to worry about the right materials and colors to choose since the studio or

the director of the show usually take care of the costumes. However, in cases where you appear in your own wardrobe, the same basic rules apply as we outlined to the announcer. Fabrics that are very light-reflective are not good. They make hialations and spot effects for the camera. For instance, if you must appear in tails or tux, make sure that the lapels are made of a dull material rather than the more common satin. Both are black but satin reflects light very easily, and the net effect to the viewer's eye is a dark halo effect which follows the shape of the lapel, and extends out from each edge all the way around for several inches. In addition, the lapel itself may at times appear white.

For the actress, if a costume calls for white, choose a dress that is "off-white," not a flat white but one leaning toward the yellows or greys, or you may even choose a red dress. A red dress will appear white where as a truly white dress may not appear white at all and will surely do some undesirable tricks to the picture. For both men and women, light wools are very good, in practically any pattern, although plaids are especially good. Wear them when you can within the limits of sensible requirements of the script. We say "light" wools for the reason given to the announcer. The heat of the studio, even when the ventilating system is doing its best to flood you with refrigerated air, many times is still more than enough to make you wish for a Palm Beach weight in dress or suit.

THE SPECIALIZED ACTOR

A new kind of actor is in the process of development. He is the television actor—or actress. So far, we have presupposed acting experience in one of the other show business mediums. Although those who have pre-television acting experience enter TV with the maximum chance for success, the door is not closed to the young, the uninitiated, and the newcomer. On the contrary, television needs the spontaneity, imagination, and the enthusiasm of the courageous who walk

in where "angels fear to tread." In many localities television is still not on the air. When they do go on, they will need personnel of every kind that are "game" to experiment. This is the golden opportunity for the young and uninitiated thespian. Everyone around you will be experimenting, too; so do not be afraid of what you do. Since being natural and appearing natural is good anyhow, just try to be yourself. By acting natural, you put your best foot forward and give the greatest help to your colleagues, who are learning, too. As you try techniques of presenting material to a camera, you will all learn together. The actor can emerge from early experimenting with a mastery of technique which, in comparison with the actor experienced in other mediums, will make him seem like an old timer in the specialized field of television.

Chapter X

THE DIRECTOR IN TELEVISION

Mr. Full-charge, in the preparation and presentation of a live television show, is the director. Sometimes he is called the producer. In him is vested the full responsibility for the proper presentation of the telecast entertainment in every detail.

It goes without saying that he is the man of all work. He must be, in this order, a diplomatic genius, an actor of sorts, a writer, film-cutter, a top-sergeant, a partial engineer, and a man of artistic temperament. In addition, he must have a speaking acquaintance with lights of all kinds, know a smattering about camera lenses, and he must own a stop watch.

You will notice that the prime requisite is diplomacy. This is based on the fact that the success of TV depends on teamwork. Certainly it take a diplomatic genius to coordinate and keep together the large team that works with the director. The spark of enthusiasm can mean the difference between an ordinary show and a first-rate production. Never was a field of endeavor so wide open for one who can really work with people, can make accurate snap decisions, and can organize, as the field of television program direction is. Furthermore, if a man be fortunately endowed with a feel or a real knowledge of the arts associated with TV, he will find here the outlet through which he may reap the tremendous satisfaction that comes from being able to see thinking materialize into tangible results through work.

STAFF OR FREELANCE

The director's myriad problems start with the selection, or assignment, of the program. Will it be a musical, a variety, a quiz, a news, a remote, a drama, or a puppet show? As in radio, directors fall into two general classes: the staff director and the freelance director. What show or type of show you are assigned or choose will depend on whether you are staff or freelance. At this moment most directors in the industry are staff men. This is primarily due to the fact that those directors who are not directly affiliated with the staff of a station do not have enough practical experience to warrant their walking into a control room and taking over. As the art becomes more specialized, more commercial, and more familiar, there will doubtless be more freelance producers. It is reasonable to suppose that TV will follow, by and large, the pattern established by radio in the matter of freelance as against staff directors.

TV workmen become teams—units who function at their best together. They know each other's habits, terminology, and general thinking. It is natural then that the smoothest functioning of such a unit will come when its head-man, the director, is familiar with his team, and they with him. A director is only as good as his team—no matter how talented he may be. So diplomacy is an essential attribute for a director. His team will function better for and with him when it is directed so that each one feels his part is as important to the operation as the other's and that his contribution is necessary to the success of the program. Unless a freelance director is able to work often enough with the same crew, the staff director has a decided advantage over him. Networks, and some independent stations, are just now making hard and fast rules that a director who is not a staff man will not be allowed to function on the stations facilities. However, we may suppose that as we progress and more experience is gained, staff men may become freelance men who

will be consulted directly by clients and advertising agencies. A station would be foolhardy indeed to keep an experienced man from being in charge of his program personally.

FIRST PROBLEMS FIRST

When a director is handed his script for a show, no matter what type of show it is, he must first size it up with an eye to determining whether the available facilities will allow him to do it as it is set down on the paper. Whether every scene, or sequence, or unit is workable "as is" will depend mostly on the experience of the writer who wrote the script. A writer, whom we'll examine later on, to be good, must be a man who gets his values from action and dialogue, but does not lose sight of the practicability and feasibility of his ideas. If the writer has over-stepped his bounds, then it is up to the director to suggest, re-vamp, adapt, and otherwise change the content so that it is possible to do the script within the limits of the available cameras, sets, studio space, and personnel. Many a good stage play is impossible for TV presentation because of these physical limitations. Perhaps it needs so many different stage sets that it isn't practical for reasons of cost or space. If a scene, or several scenes, were "cut" from the script to make it physically possible for presentation, it would perhaps ruin the plot to a point where the loss would make presentation inadvisable. Everything must be considered when the director makes this first decision.

Suppose that the show is of a variety nature. As such, it will contain vaudeville acts, musicians, an MC, and possibly a dramatic sketch. It must have several sets, artwork for cards and slides, backdrops of an assorted nature for the various vaudeville acts. It must have an orchestral set-up that will be right for sound pick-up. Whether to have the band remain off-stage or on is also decided by the director.

All these things, and other details, you, as director, must

sit down and think through in every detail. Once you have done that and presumably listed everything in writing, and have everything blocked out in your own mind, you are ready for a session with your crew.

You should consider first those operations that will take the most time in preparation. Probably number one is the design, construction, and proper painting of the necessary sets and backdrops. You will endeavor to make use of such sets and drops as may be already in the storeroom. Some of these, after being renovated and adapted, will be perfectly useable and satisfactory. Then some sets may need to be made to order. You will have a session with your art personnel and lay out the copy for them, explaining its content and general flavor. Your artist will contribute plenty to you, and his ideas, once he understands your desires, should be solicited. Then your prop man will want to know what will be required from his department so that he may start accumulating the assortment of lamps, curtains, furniture, etc. Check your list of these things carefully, and turn over to him an itemized and accurate list.

Next in line is your musical director. He must be told his rehearsal schedule, what acts he will play for, what key any singers will want for their songs, and for which ones he must prepare the accompaniment arrangements. He must know the names of published music that will be aired so that either he, or you as a director, will take care of "music clearance" (permission of publisher to use). You are now ready for a session with the rest of your cast and studio crew.

BLOCKING OUT

If you have properly prepared yourself thus far, you have marked your script with probable camera positions in accordance with indicated action for each of the acts. You have blocked it out. If you are unfamiliar with these acts, as you may be when you have simply been handed a certain more or less well-known vaudeville act, it is doubly

Courtesy CBS

JACK BENNY'S ROCHESTER

Rochester rehearses dance routine in front of stage set. Microphone, of course, will not be seen in the viewer's picture.

important that every unit of the cast be present at this first session. In addition, there will be present the video engineer, head camera man, studio manager, stage manager, and boom man, if possible. If the orchestra is to appear in the picture, the musical director should also be present.

With each person equipped with a copy of the full script of the show, you turn through it page by page and acquaint studio manager and cameraman with your planned positions as you have blocked them out. At this time, if cameraman or video engineer see an impracticability in your designated direction, they will call attention to it, and discussion will bring about a revamping of position that will get the desired effect and still make operation practical. The same goes for the vaudeville acts. If, for instance, an act has a finish which you do not know about that requires closeup, or perhaps full stage, coverage, you will talk about it now and arrange camera and microphone placement accordingly. The general idea is to get all hands in a workable position as near as you can conceive it from looking at the script or talking over the act. Plenty of these original blockings are going to be changed by the time you hit the air for reasons that will arise in camera rehearsal. But get every problem worked through to the best of your judgment at this session. This goes for the dramatic skit, too; so your actors must mark their positions and movement for dialogue in accordance with the camera movements decided upon.

FIRST REHEARSAL

Since the show is of a variety nature, the first rehearsal is probably held outside the studio proper and with the members of the cast of the dramatic sketch. The time of this rehearsal you have set so that the actors have had time to learn their sides since being handed the script. You will devoutly hope that they have also suited the action to the word and will be able to make their on-stage movements on cue with the directions indicated in the script.

There is no camera, stage set, or props for this rehearsal. Rehearsal is carried on with the set marked off on the floor, or otherwise indicated. Substitute props are used if they are very necessary to setting the action. The main concern here

JACK BENNY AND HIS HILLBILLIES AT FIRST REHEARSAL

Courtesy CBS

Note Jack's as yet unlearned script in his left coat pocket. Costumes will come later.

is to get your actors thoroughly acquainted with their lines so that their delivery is smooth and, at the same time, to acquaint them with the exact area their movements, or "business," will encompass while performing. Drill them through the entire sketch again and again, under the limits of the time you have available, until each one knows his part as well as possible. If your cast is capable and well cast, this rehearsal may bring to light some additional business or dialogue which may greatly benefit the sketch. If so, you must alter camera positions and directions accordingly and see that they are contained in the revised script you will give the crew concerned when you get to camera rehearsal.

The first rehearsal for the remainder of your cast may also be done somewhere other than the show studio. No cameras will be present, but you must have sufficient space to set up your orchestra in position comparable to where they will be on show day, and you must still have space to run through the vaudeville acts within what will be their stage space. At this rehearsal you probably learn more than you give—for it is here that, while the acts go through their business, you find out what are the highlights of the acts that you must catch with the camera. You must be extra alert here, for the acts are probably doing a routine that they know thoroughly and have been doing for some time. So it is up to you to use your best snap judgment on what shots you can and will use and to note them for inclusion in your revised script while the acts go through their routine only once or twice. Aside from the fact that a performer in such an act is not too happy about going through his act again and again, too much time spent on this rehearsal is too expensive. You are holding a full orchestra employed on a time basis according to union rule. You have several acts to rehearse, and it all becomes very expensive should you hold them over the stated rehearsal time.

Having incorporated all of your notes into the first script and sent it for re-typing or re-mimeographing, you are closing in on the important part.

CAMERA AND DRESS REHEARSAL

Camera rehearsal is held as close to telecast time as possible—certainly on the day of the show's airing if it is at all possible. With a variety show it will be most convenient to assemble all hands early on the morning of show day. As you walk into the studio this morning, things are really taking shape. The results of your thinking all along the way are in tangible evidence. The sets, painted and constructed according to your order, are in place, or they are rapidly being put there. Props are assembled as you have asked. All acts, actors for the sketch, an announcer, the orchestra, stage men, and cameramen are present and ready to whip the show into final shape under your direction.

You enter the control room, take your place at the elevated desk over-looking studio and viewing kinescopes, don your earphone, which allows you to hear the stage manager, and hang around your neck the little microphone that will allow you to talk to your cameramen, and place a nice, new, revised script in front of you—complete with pencils to alter it.

From now on, it would be handy to have two heads. But, since most of us only have one, we set that one to the task at hand. Good procedure takes the show through from top to bottom; that is, set up the opening of the show first. Instruct camera one to give you his shot of the billboard, or credit cards, or whatever is the show's opening. Cue your announcer for his narration that may go with it. If announcer follows the showing of the credit or title cards, instruct camera two to line him up for the shot. View this coming up shot on the monitor board to see that it is in focus, and well "framed"—has the correct composition. When titles are through, or have been completely

shown as indicated by your script, you will say "take . . . two" or, perhaps, "dissolve one . . . take . . . two."

This is the cue for the switcher, seated in front of, and just below you, to do as you have said. He will then manipulate his dissolve control, which will diffuse the picture and fade it to oblivion, and punch a button which will place the output of camera two on the main video channel. The dots in the foregoing words of the director indicate a pause of short duration which act as "ready" cues for the switcher. In other words, you say "take" and wait about the time it would take to count the dots, and then say "two." Switcher will then complete the desired change on the very instant you say "two."

Now, while you are watching camera one and your script, readying camera two, and giving the necessary orders, it is quite possible that you will want some music. For instance, while the credits and titles are on the screen, some musical "backing" would give a nice effect to the viewer-listener. If you had that other head, it could be giving the necessary cue to start the orchestra, telling the studio monitor man when his level suits, and when to fade the music for the entrance of the announcer's voice while all the picture switching was going on. Lacking the other head, you can here prove that you blocked out your script correctly by having head one say "fade sound," just before you say "take . . . two." This means that you do have time to cover all bases so that each member of your team gets his instruction. By going through this routine once or twice, each man will learn his function so that, tonight on the air, you will not have to say "fade sound." The audio engineer will have his script so marked that he will do it at the proper time without a verbal cue from you. In this way, a few of your duties may be relegated to other members of your crew who can be depended upon to do it just as rehearsed.

With titles, credits, and announcer's preamble or bill-

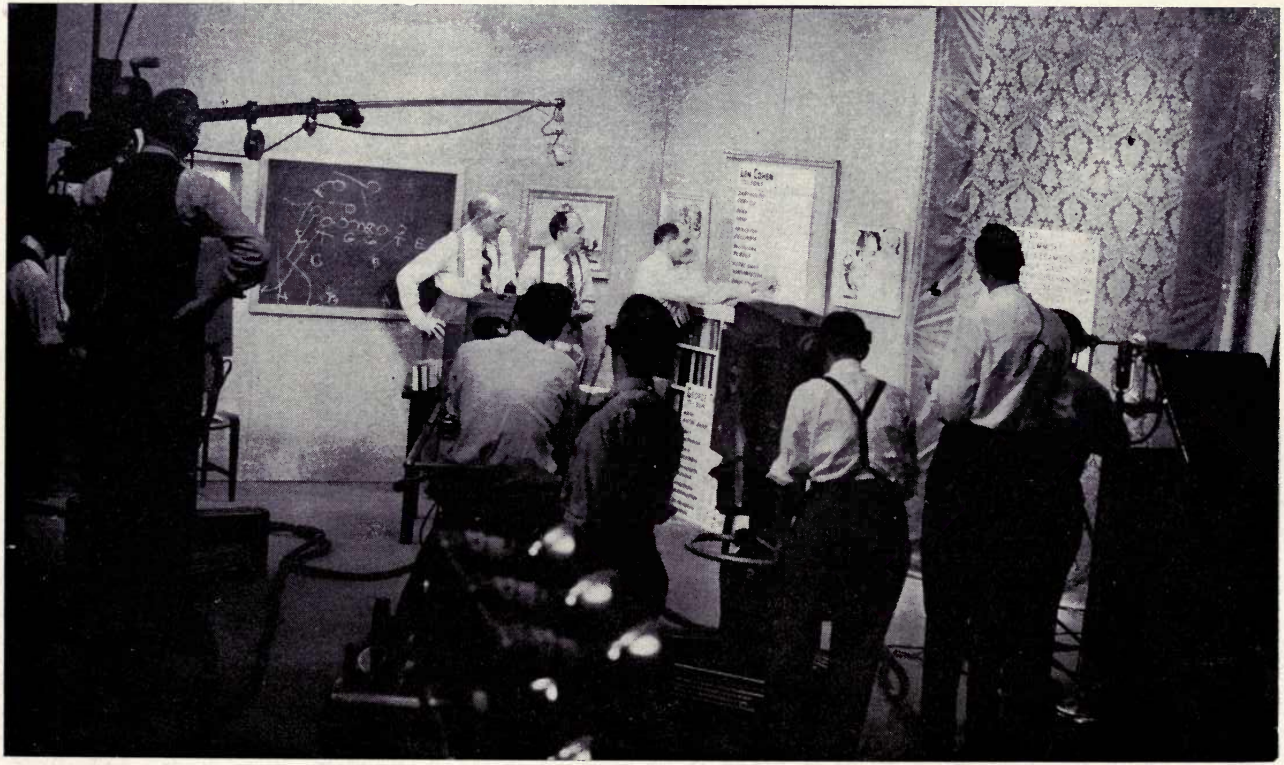
board over, you are ready for the opening act. The actors have been standing in position while the announcer did his bit on camera. Also, while he was doing it, you have asked camera one to ready the shot on camera one. You have viewed it to check that it is all right, and, as the announcer finishes and introduces the first act, you watch your script so that, when he says his last words, you will again cue switcher by saying "take . . . one."

This is a sample of the way it will work all the way through. You must be constantly previewing your next camerashot, giving the switcher and cameramen their necessary cues, watching dialogue on your script, and giving necessary verbal cues to boom man and audio mixer. To be sure, this is a problem which all adds up to a seemingly impossible study in concentration, but it can be done and is being done everyday.

At this rehearsal time, as you move along through your show, you will find that you have learned the show as well as, or even better than, your cast. You may find that you will know from memory every line of dialogue and every lyric to a song. Such is the concentration necessary for a production as pretentious as this one. By the time you have rehearsed down to the sketch, you can probably be operating without looking at your script except to double check each actual word-cue for a switch. This rehearsal is not alone for your actors, crew, and cast. It is for you. And you learn more than anyone else of the group. You may find that a shot from camera one on the actors in your sketch is not nearly as good as you thought it would be and that a shot or angle that camera two can give you will be much better. Try it to see whether routining the shots this way will upset your carefully blocked out sequence. Follow it through, and, if such a change is feasible, pencil the necessary cues into your script for use when the show is on the air.

In your sketch is probably the most work. Your action has been so rehearsed previously that the picture you give the viewer will be interesting and attention-holding. If it is necessary to hold a static close-up too long (no static picture will hold viewer interest longer than twenty seconds), insert an additional bit of action to break it up. This may require an extra camera switch or maybe a medium close-up instead of the close-up so that the action can be seen and still allow camera two time to be maneuvered into position for his next shot. This is all a matter of judgment—snap judgment. It's as if you were being a film cutter, discarding this, choosing that. You must rely on your experience and draw from every part of your background to give you this snap judgment that will give the viewer a smooth bit of entertainment. A couple of times through a doubtful sequence of dialogue in camera rehearsal will give you assurance that the routining you finally set upon is the best under the circumstances. Once you have set it, notify everyone concerned what the final change is.

In rehearsing your sketch, you must take cognizance of your lighting effects too. Possibly your sets as designed and painted turned out to be not enough in contrast to a particular costume or a particular piece of furniture. Solicit the judgment of your light man. He may be able to alter the lighting to overcome this effect. The video engineer must be the judge of the proper lighting for his cameras to get an acceptable picture, and you must be the judge of the effectiveness of the finished product. Lights must never be placed so that they will make a shadow of the mike boom viewable. Yet, the mike must be right in there for your dialogue to be properly reproduced. So you may settle on a compromise. You may move the mike or camera a little and get along without a light from some desired spot. Cheerful acceptance of the physical limitations of apparatus is indicated. Make the best of it.



Courtesy NBC

SPORTS SHOW IN DRESS REHEARSAL

With sketch rehearsed to your satisfaction within the limitations of time allowed to get it into shape, you move along to the finish of your show. Closing titles are readied by the time the last act has concluded the entertainment portion, and you have checked to be sure the right cards are in the right place by looking at the previewing monitor screen. If the camera assigned to this pickup is not giving you as good composition as the opening titles, you may ask the cameraman if that was the way he picked up the opening. If he wishes to answer "yes" (remember that he cannot talk back to you through the cue circuit), he will waggle his camera up and down to tell you so. Of course this may be done only when the camera is being previewed and not when he is on the air. But often cameramen use the "wagging" business to give a yes or no to a director or the control room. Anyway, you make the necessary resets or repositionings so that the closing credits and titles will correspond to the general appearance of the opening, cue your switcher, music, and announcer, and bring the whole thing up to finish.

TIMING

It is to be hoped that the rehearsal thus far has not absorbed all the time available for complete rehearsal, and that enough remains that you may now have a complete run-through rehearsal from top to bottom without a stop, in other words, a dress rehearsal. So you give the cast and crew a "break" and a "call-back" in possibly one hour. Meantime, you have work to do. This concerns one element of your show operation that we have not even mentioned thus far—timing.

If you as director have an assistant, or at least a secretary-script girl, this assistant has been active with a stop watch all during your rehearsal and has noted the time consumed by each unit or element of your show as you ran through it the last time. Adding these unit figures will give

the total time your show will run while on the air, providing due allowance is made for applause or "stretch" because of audience laughter or reaction.

As it is in radio, television programming is calculated to run in even and accurate segments of air time. There is some differentiation in thinking and practice, but normally programs are divided into fifteen minutes, half-hour, or hour segments, as in radio. (Some stations believe that twenty minute segments are better because of normal running time of existing film reels. Two reels run twenty minutes. So programs should be twenty, forty, or sixty minutes in length.)

At any rate, let us assume that the program is a half hour show. This means we have actually 29 minutes and thirty seconds of air time available to us. We must fill it with program, and we must not run over it. We must be "on the nose" for time. We are going to get an accurate running time on our show during dress rehearsal when our cast assembles again, but we will be way ahead, and save a later mad-house "cutting session" if we go into dress rehearsal with our show cut as near to time as possible.

CUTTING

So, while the cast takes its break, your assistant furnishes you with figures that give an approximate running time. In a show such as this, it is probable that these figures will indicate that you are five minutes "over." Something, or some elements, must be trimmed or cut so that we can jam our entertainment into the 29 minutes and thirty seconds and still give the viewer a smooth production. In deciding what to cut, you must consider each element of your show. The vaudeville acts are doing set routines—routines that they have been doing exactly that way for a long time. It is therefore improbable that they can conveniently make any cut to save you time that will not ruin an act so carefully routined. Besides, it is not too diplomatic in this situation to ask an act to cut what is their established stock in trade. So look

elsewhere. Probably a single vocalist can cut a chorus of a song. This will save a minute and fifteen seconds. Perhaps one sequence of the sketch can go "out" if you add a line or two to a speech lower down so that you do not lose story thread. This will save another two minutes. Perhaps a title card can be eliminated in an opening and closing. This will save a minute. That's a total of four minutes and fifteen seconds. This is near enough to the five minute cut you want to go into dress rehearsal.

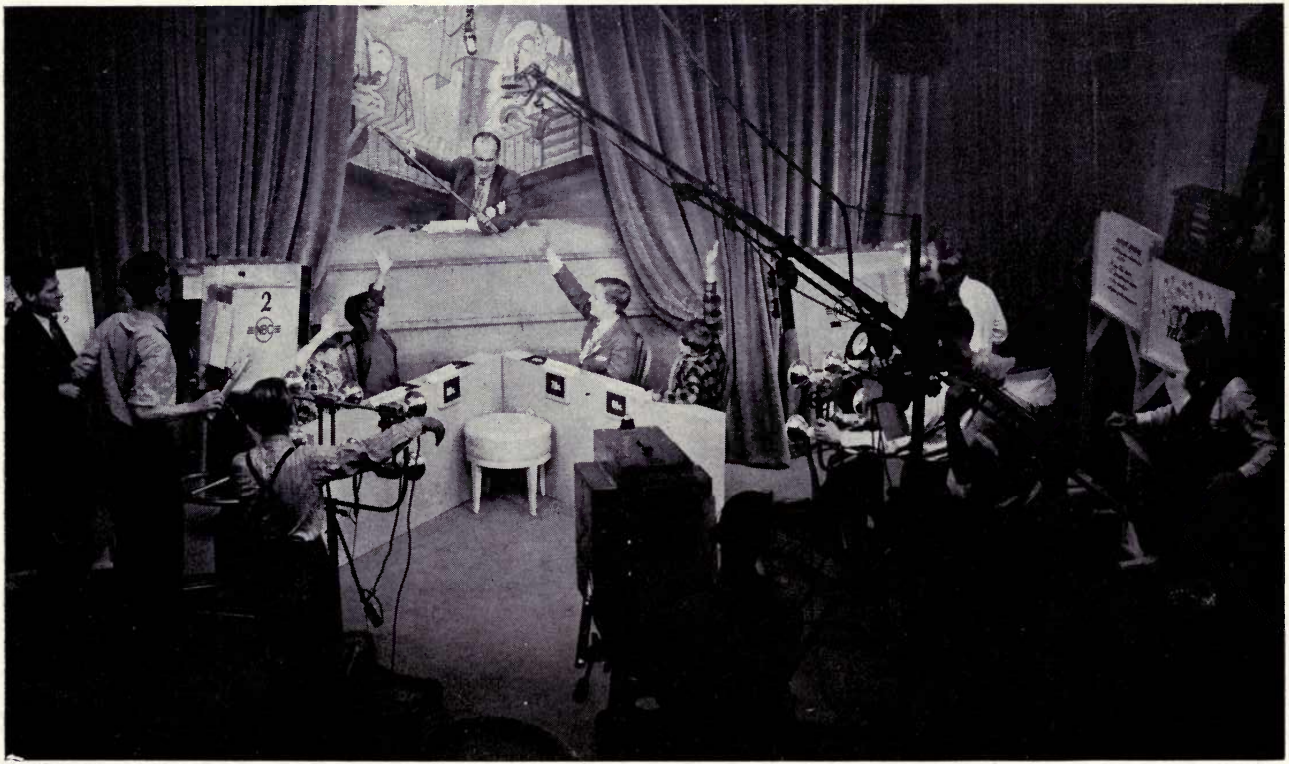
You now examine script to see what happens to your blocked out camera positions and other placement if you do make these cuts. Probably they are all workable since you picked the cuts to come where no great camera movement was necessary.

Work out all changes, making the necessary markings in your script to correspond. Your assistant, or secretary, should make the necessary and corresponding changes in the scripts of audio engineer, video engineer, and floor manager, as well as in the scripts of any other of crew who will have scripts during the telecast.

READY FOR DRESS

By this time, your cast is presumably returning along with the crew. First order of business upon taking up again is to talk through each cut or change you have made with each one concerned. Musical director must make the necessary cut in music and try it through with the vocalist to make sure it works well that way. Sketch cast quickly run through the dialogue with the cut segment omitted to see that they have it in mind. The cameramen will work along with them to make sure that your re-routining will not cross up their position or make necessary any movement that is unworkable. You are now ready for dress.

You now start the rehearsal which will be exactly like what will go on the air. Every cue, position, lighting effect, cos-



Courtesy NBC

QUIZ SHOW ON THE AIR

tume, prop, and procedure must be indulged in or used as you have previously rehearsed it. This time you will go from top to bottom without a stop. For the first time, now, the director gets a real "feel" of his show. Details have been ironed out; you know your procedures; and you can think now and then as you go along of the general effect and atmosphere of your show. Does the flow of programming as it passes before your eyes on the viewer have light and shade, high spots, effective plot spots, that all add up to real entertainment values? All your careful planning and resultant work of all concerned bears fruit here to lift the assorted elements you have assembled into a breezy, well paced, well done piece of entertainment. If you get a feel here and there that there is a "sag" in the entertainment values, make a quick note to fix after dress. Also make marginal notes on your script of places where things are most likely to get into a possible jam. Perhaps a prop man does not have quite enough time to remove a certain prop or object from the scene in betwen shots. Perhaps the boom man does not have sufficient time to make a quick swing to another part of the set without getting in the picture with his mike. Note these down for remedial action after dress, and, when the final title is run, hold your cast until these points have been checked and whatever remedy needed is set with all concerned. Dismiss cast and crew with a call back to be "on-stage" and ready to go a half-hour before air time. You're as ready as you'll ever be.

CURTAIN TIME

With everyone given time out to relax and unravel a little, you all reassemble approximately a half-hour ahead of show time. Everything gets a quick double check. Actors' make-up is examined under lights before camera, and costumes checked. Props are put in place for the first scenes. All cameras are given a trial to make sure they are operating properly. Sound channel is tried, and voice levels are checked

for proper volume with the sound engineer and his level indicator. You call for "places," and each one concerned takes his or her place for the opening shot with camera one focused on the opening title and credit cards as rehearsed. Comes the pre-arranged cue from the preceeding program, and you're off!

From here on for the next thirty minutes, you are in the lap of the gods. You have taken every possible precaution. You and your crew and cast know everything that must be done and said. But just the same, anything can happen, and quite often does, in spite of all this careful preparation. You must simply rely on the fact that you and your cast are so well drilled and so familiar with the whole thing that they, and you, will automatically do the right thing in case there is a "slip" somewhere. About the worst thing that could happen is a camera failure or a microphone failure—in that order. If a camera fails, you must do your best to *ad lib* your shots with whatever cameras you have remaining until the disabled one can be put into operation again. If a mike fails, you must do your best in cueing, perhaps holding applause longer than usual, to kill a little time until the dead one can be replaced.

All your crew is on the alert for things of this kind, and you may expect to get the fastest possible remedy. Just do whatever seems best to aid the other fellow. We do not mean to suggest that such major catastrophies are normal. But they can, and do, happen. We devoutly hope that your production will go exactly as rehearsed—with the only differences between dress and show performances being the lift that an audience gives to your performers. That is what will make your program a standout, providing all the carefully set mechanics go as rehearsed, and, when the final title has been aired, and you are signed off, and have mopped a perspiring brow, tied your tie, and put on your coat, you can congratulate each and every member of your entire crew

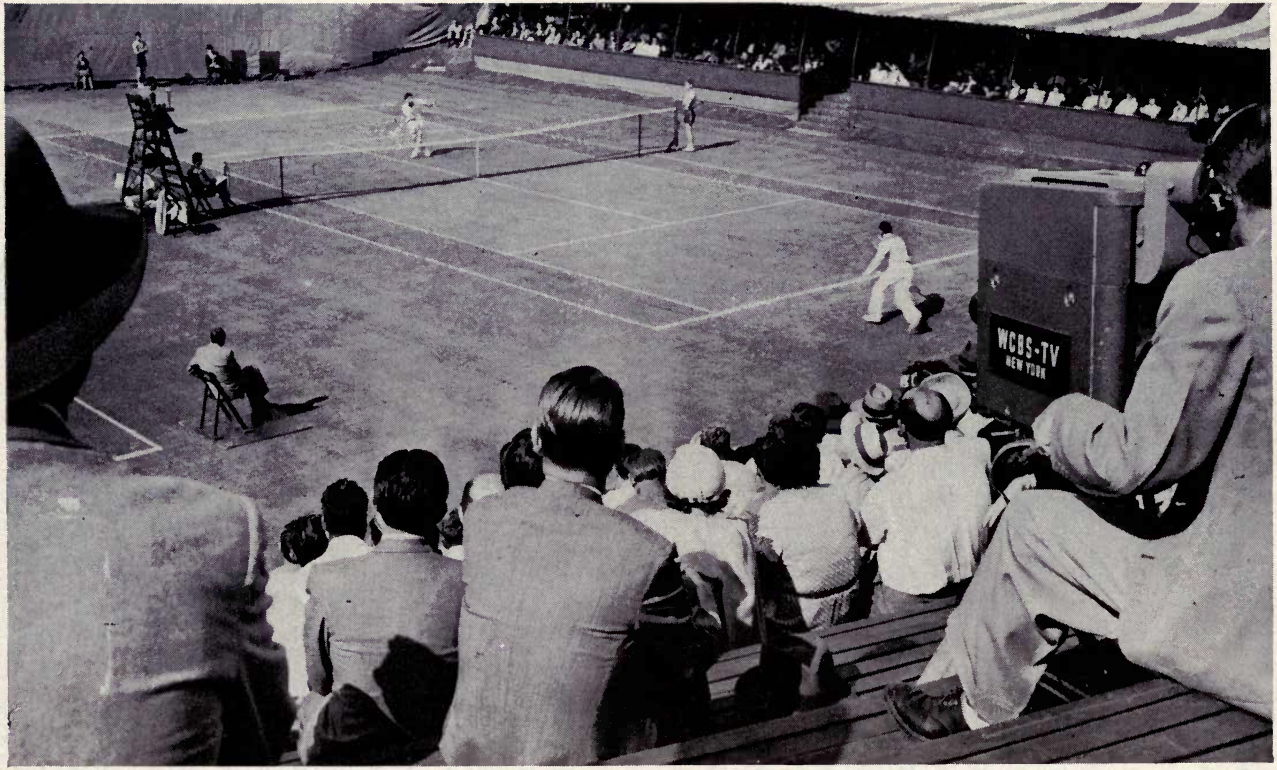
on a job well done. You, as director, get your lift from the success of everything that happened "out front," and there is no greater satisfaction than a big show well done.

OTHER CONSIDERATIONS

The variety show we have just been through is as tough an assignment as a director can get, barring one other possible type show—drama. Drama is harder only because of the demands of longer hours of rehearsal, greater casting problems, and the necessity of more intricate camera manipulating. Straight drama possibly demands from the director a little more thorough basic understanding of the affiliated arts than any other type of program. To do drama he must be an instinctive showman besides possessing all the other qualities which we outlined at the beginning of the chapter. In practically any other type of show we could mention, the director can garner from his associates sufficient knowledge to overcome a lack of experience. The quiz show, the forum type show, the interview show, or any *ad lib* show—including sports remotes—are child's play for a director when compared to drama.

It is not our intent, either, to indicate that the production and direction of a variety or drama show is an insurmountable task. The dramatic director's seat is a hot one, but for every drama or big variety show that a staff director will do, he will do eight or ten of the simpler studio or remote shows. This takes off a lot of the pressure, and every small or easy show that you do adds to your fund of experience that will serve you in good stead when you are responsible for the more important ones. Practice and experience will give you the confidence that will relax you to the point where you will not have the ulcers that are supposed to go along with the heavy pressure of big show responsibility in radio.

A staff director, like the staff announcer, is of the most value to a station when he can do a variety of things and



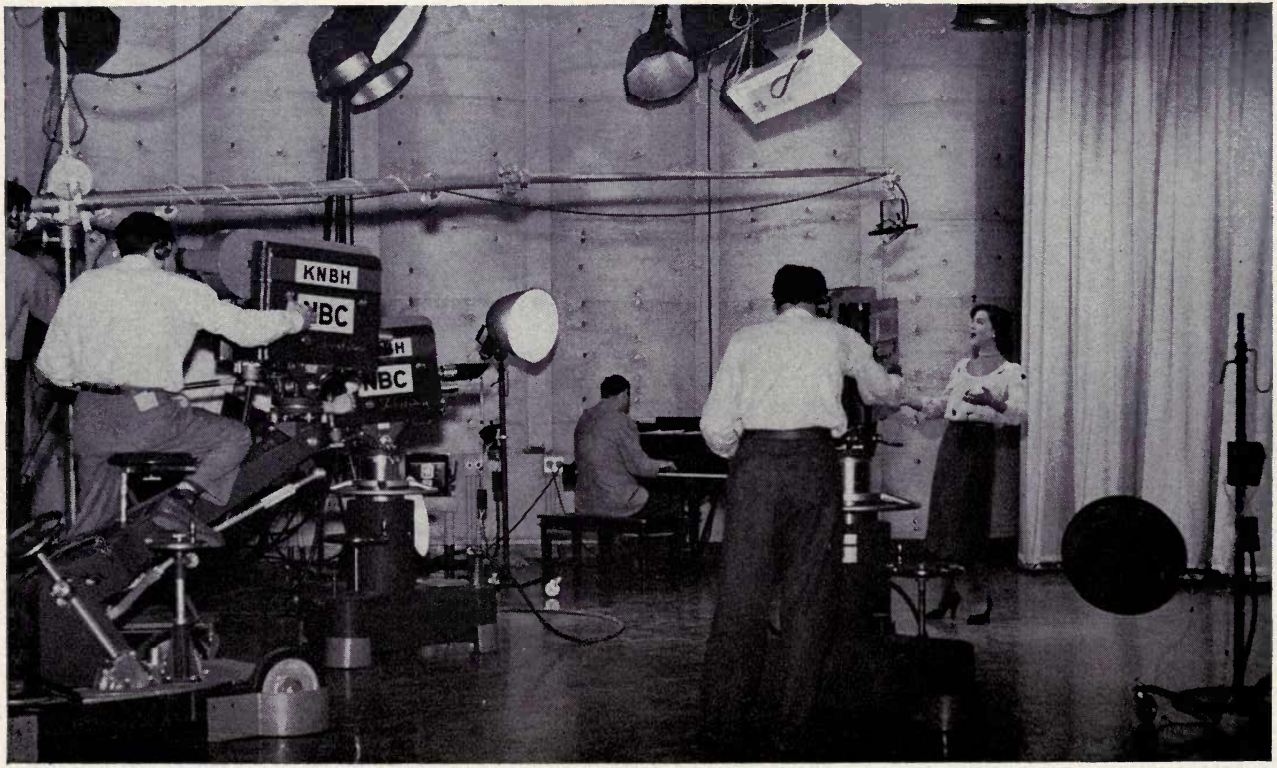
Courtesy CBS

TV AT THE TENNIS MATCHES, FORREST HILLS, LONG ISLAND

do them well. Perhaps the greatest staff man is one who can operate and use up only a minimum of the station's touchiest point—money. Keeping a station running with a roster of well done and entertaining programs is an expensive proposition. Therefore, a director, in the first instance, is of the greatest value to the station when he has the ability to assemble and present a good, well-rounded piece of entertainment while using the least amount of studio and camera time and station facilities and the least amount of rehearsal time. To do this, his snap judgment must be of first order. He must be a man who visualizes from the written script the finished picture that will reach his viewer. He must know exactly what corners he can cut; and he must calculate where his time is best spent, rather than wasting time on lesser details. It has been said many times by many people in the industry that anybody can build a great show if he is given enough time and enough money to get anything he wants. The really valuable man is the one who can do a show that is ninety percent as effective, and do it in one tenth of the time.

REMOTES

Directing outside the studio for a remote program, such as the presentation of a sports event, requires certain different thinking on the director's part. Here, his main job is to give the viewer exactly what he wants most to see and to feed it to him in the most effective way. The most effective way is seldom the most complicated way. It is the simplest way. Keep it simple. This goes for everything you do. Besides making your program easily understandable to the viewer, you do not risk a failure or a sloppily done effect. By the same token, don't indulge in lazy operation. Even in telecasting sports events, it is possible that you can inject greater dramatic values by presenting the affair to the viewer from a constantly changing point of view. It's a simple matter of asking your cameras for close-ups at high spots in the action,



Courtesy KNBH

TELEVISION IN ACTION IN HOLLYWOOD

or long shots—a variation in perspective—to give full value to the entire proceedings.

Mike Stokey, freelance producer of the Stokey-Ebert Productions, Hollywood, when asked where television directors of the near future would come from, replied, "We think the ones most apt to succeed are directors from the motion picture industry." "But," Mr. Ebert interposed, "we want to put a proviso on that. Such will be true only if the director in question has inside him a real and thorough basic understanding of the show business."

Stokey and Ebert are both essentially from radio. Such a statement must be a strong belief indeed to allow them to go back on their old Alma Mater.

Phil Booth, a thoroughly experienced and talented TV director, now on the staff of the American Broadcasting Co. in Los Angeles, has this to say: "On the whole, television is a fascinating and exciting branch of the show business for the director to work in. He probably has more personal control over how his show will appear than a director in any other medium. It's hard work, but it's a lot of fun."

Chapter XI

THE WRITER IN TELEVISION

When we were speaking of actors, we said that there is now in embryo a new species—the TV actor—a specialist in the field. Television writing is, likewise, bringing out a new crop of writers. Every writer from each of the allied arts including fiction, drama, radio, pictures, short story, musical comedy, and opera, is a potential television writer with certain ramifications. Probably, also, a great many complete newcomers will come into the field with no previous background, and, not being hampered by the older rules of writing and thinking, be a resounding success by developing a technique all their own. The newcomer will have the advantage, too, in entering the field, because at this point television is not prepared to pay the high fees which old line writers are accustomed to receiving, and he will work for less to get his start. In other words, it is useless to expect the high fee writers to expend their time and energy with television until such time as the industry is prepared to lure them there. They can receive greater remuneration in other fields. That makes more room for the newcomer.

ADAPTERS

When established writers in other fields have already done their writing, they may receive fees from television through the purchase by TV of the *rights to telecast* the already existing work. This means that there is a big field for the writer who can be an *adapter.* Just as motion pictures, radio, and stage make use of an adapter who fits material to another medium, so a story is dramatized for visual pre-

sentation. When a book is adapted for radio, it takes on a different form because the book story must be presented only by audible means—dialogue and narration with sound effects. Getting a book into the proper form for motion picture shooting is another and different style of adaption because of the many devices which are available in the picture presentation of a story.

Many writers are quite capable of adapting their works into whatever other medium desired. But TV is the newest of the other mediums, and for a long time—or at least until firm rules of form can be laid down—the specialized TV adapter will be in demand.

FORM

No set form for writing down a television script has been developed because there are as many ideas as there are directors. Since the director is Mr. Full-charge in the actual presentation of a live TV drama, it is more or less up to him what form the submitted script will take. Ask five different directors, and you will get five different answers.

Up to now, directors have found that writers are too unfamiliar with the limitations of the average TV facilities to be able to do an accomplished and intelligent job. One way this can be done is to team up a man of writer calibre with a director-calibre man to form a so-called "packaging" company. Such a team conceives, writes, produces, directs and otherwise develops its own properties. Such a team is Mike Stokey and Bernie Ebert in Hollywood—Stokey-Ebert Productions, quoted earlier. There are many others, and under this set-up, a story can be developed under the writer's hand and be kept in line all the way so that when it is finished, it never violates the limits of production, and every scene is perfectly workable and possible to stage. The operation is one of close coordination.

But this does not solve the problem for the station

operator who must keep his program roster filled with acceptable programming and does not want to buy every operation on a piece-work basis. The expense involved would be incompatible with sensible operation unless a sponsor automatically went with such a purchase. So, when it is necessary or desirable to present a live drama for a show, the station assigns a staff director to get an acceptable story, get it adapted if necessary, and get it on the air. To save expenses, the director will read such stories as he can obtain that can be used without the purchase of rights, or he will read such original stories as have been submitted to the station for consideration. If he chooses the *public domain* story (one on which publication and other rights have expired), he is faced with the problem of getting it into dialogue form and then breaking it down into useable scenes for telecasting. As he reads such a story, he thinks in terms of scenes that he can present, devices he can use to keep the plot going, portions that must be narrated, and portions that can be dialogue. When he has finished, he has everything so well in mind that no writer could adapt the story to TV to suit him—except himself. Therefore, this director would like to see any new work from a writer submitted to him in straight story form.

If the director can break down his own scenes but is not capable of writing dialogue, he will want the material submitted in dialogue form. The writer must not, however, attempt to block out his writing into scenes. This is, incidentally a way of indirectly complimenting the director, for in leaving the scenic breakdown in his hands you infer that his intelligent handling of your story will no doubt do it justice.

Perhaps a director likes his submitted story to be broken into scenes, scene form but not done in dialogue. If so, the writer must simply narrate his story—giving specific dialogue only when absolutely necessary to demonstrate certain nuances

of his characters and plot—but must gear the scene sequence so that he knows in advance that they are workable in that order. If the writer is sufficiently familiar with TV that he writes good scenes and a good story, the chances are that the director will then ask the writer to dialogue or fully adapt his own story. Under this procedure, the director can suggest any changes in routining of scenes that may be necessary to make them perfectly workable, and the writer has the advantage of knowing that his finished script will be in perfectly acceptable form when it is re-submitted. It remains for the director to block it all out when he sees what characters become important in the dialogue. If you, as writer, have kept things simple and direct as you should have, this will be a relatively easy operation for his practiced eye.

Later in this chapter a complete script is printed. This script was actually used as it appears. It is easy for any writer to duplicate it in form. But the how and why back of the exact wording of the dialogue, the precise camera placements and routining, the many little things that contributed to its form, are another matter and peculiar only to this very script. Other scripts and stories will have different problems. So do not try to put a script in this finished form when submitting it for reading unless you have had actual experience in TV—enough so that you are cognizant at all times of every practical problem that will arise in getting it ready for presentation.

When writing for the first time, take the writing chore a step at a time by submitting first a simple story that will play in one set and in a minimum number of scenes. Let a director guide you through each step so that by the time your first story or adaptation is aired, and you have watched it grow along the way, you will know first-hand the reasons that forced you to make this or that change. Under similar circumstances in your next story, play, or adaptation, you will automatically maneuver your plot, your characters, and

your show structure so that you will not have to make so many changes along the way. When you have weathered several shows, you are ready then, and not until then, to submit to any experienced director a complete script in finished, shooting form.

WHERE FROM?

Any writer who is experienced in any one of the arts associated with the show business is a potential television writer. May we consider for a minute, then, from which field he might best come and still have a minimum of adjustments to be made within himself.

The qualifications are the same in TV as for anything else in story form: the writer must keep as number one in his mind the dramatic value of his story. No matter how well it might be presented mechanically, he still is not turning out a good show unless he reaps the best possible effect from his plot and dialogue. Along with the dramatic values he must consider the production problems. The two things, in TV, must be considered together rather than in the order mentioned.

FROM THE STAGE?

Probably the writer who has had experience at stage play writing and can successfully turn out a perfectly playable book for a play on his own, is most easily adapted to TV; for on the stage his production problems are much the same. On the other hand, the motion picture scenarist faces the problems attending use of a camera and has access to all sorts of tricks to overcome them. So let's say it's a tie there for general adaptability to TV—with the experienced radio writer running a lagging third. This may sound strange with radio and television being so closely allied, but we must keep in mind that TV is essentially a medium of sight.

We say that stage problems are much the same in television for the writer because, for instance, he is faced with

problems of elapsed time. Suppose, for example, that the heroine, who is on stage in conversation with her fiance, is about to leave for Yuma with another man. It is impossible to let the next scene depict this running away on either stage or live TV because it is physically impossible to get the heroine dressed for the street, her suitcase in hand, and onto the next set in time to keep the story running smoothly. In other words, she can be in only one place at a time. In the motion pictures this would be a simple matter of dissolving the scene in the living room and fading in a shot of the other man and the heroine standing on the railroad station platform as the train pulls in. But probably several days elapsed between the shooting of the living room scene and the railroad station scene, and the actress had ample time to change her costume and get to the other set.

On the stage the effect could be achieved by a device, by letting the curtain fall on the living room scene to end act one. A program note could announce that the next scene is thirty minutes later. Then with the curtain down, the set is changed to the station locale, the heroine's costume is quickly changed, and the curtain goes up depicting the other man and the heroine waiting for the train. It might be awkward to get to the following scene, but perhaps it is played on the station platform.

A device would be used to accomplish this on TV, too. Fade the living room scene as the heroine exits leaving her fiance with a two minute soliloquy and some action such as looking out of the door the girl left by. By working fast, the heroine runs to the adjacent set, slips on the necessary traveling clothes over her other costume and is joined by the other man. As the fiance finishes his lines on set one and camera one, camera two immediately picks up the others standing on the set with station locale. It can be done.

All three accomplish the same thing, but the stage and TV keep something running on stage all the time, and program

flow is not interrupted. Motion pictures do it the easy way —but perhaps not any more effectively.

Among the things to decide here is whether the additional scene of the two at the station was worth, to the story, the additional expense and trouble involved. Perhaps as the living room scene ended, the scene could be faded, and a narrator's voice could describe what had happened while a clip of motion picture film was fed to the viewer, showing a train pulling into the station. This would be much less expensive, providing such a clip were procurable from the film library, than the construction of the railroad station set. The intelligent and experienced TV writer would consider such a device and weigh whether the cost of set construction was warranted before putting it in his script.

FROM MOTION PICTURES

The motion picture scenarist used a device to which he knew he had access. So to adapt himself to television, it remains only for him to brush up on what substitute devices are adaptable for TV, as well as learning the cost of the substitute devices. In TV he's going to have available less money with which to get effects, and he must learn to gear his writing accordingly. Another great obstacle he will have to overcome is a tendency to think in terms of scenes that are too complicated to be produced in a television studio. He must gear himself to creating scenes that are effective, yet will allow the director to present the story with the greatest amount of ease possible. And such presentation will allow the viewer in his home to absorb the story with a minimum of effort.

FROM RADIO?

The radio writer, too, faces a problem of time elapse and handles it in his own way. On radio, to change the scene to the railroad station, all he does is write his scene so that near

the end of the dialogue in the living room, he asks for a complete fade. This effectively removes everyone from the scene and wipes it out. He then fades in slowly with a sound effect record of a train pulling into the station, and his heroine may be heard talking to the other man as the train pulls in. The actress has not had to move from the spot, and elapsed time between scenes is not more than six or seven seconds. All that was necessary was to replace the fiance with the other man at mikeside, and the program flow goes on uninterrupted. In radio, then, the performer can change from one location to another without moving from the microphone.

So to shift himself into television writing, it is necessary for the radio writer to revamp his thinking along the lines of devices. Even more important, and probably more difficult for him in the switchover, is to forget that he must describe the picture he wishes to create, by using words. In TV he'll have the picture there. Now his words of dialogue must further the action rather than creating it. This, of course, leads to much less writing, but it must be much more skillfully planned in order that the writer will allocate the proper portions of plot development to action and the proper parts to dialogue. This is important in creating a TV show that will hold the interest of the viewer.

PROGRAM CREATION

There is little doubt that experienced writers from other fields of writing will successfully gradaute to television and reconcile their thinking so that TV becomes just another medium where there is a market for their product and another medium in which to express themselves. The transition is, even at this time, stimulating creative thinking that is certain to turn up new devices, new formats, new and different ways and means of presentation. An experienced writer, in whatever field, is well grounded in basic show business. He must

be in order to be successful. The application of rational thinking to problems of television cannot help but lead to discoveries that will inspire experimentation. Any director will go along with a new idea even to ordering new apparatus so that, together, you may present something in a new and perhaps yet untried way. You won't get that kind of support the first time you submit a script, but once you are accepted, you have an avenue to try practically anything.

Inevitably, venturing into new methods is going to lead to the creation of a *new program* idea. The field is wide open and even hungry for good program material. The writer should be a fertile source for program ideas—both new and improved. What these will be, no one can say. But surely there is plenty of room for improvement in what we are offering today. We do not mean to depreciate our present program roster; they are, for the most part, a compromise offering between what is available and the limitations of facilities. Also, the viewer is quite apt to accept whatever is offered because the novelty of being able to see a picture of what is happening at a remote point RIGHT NOW is still entrancing. This Utopia cannot remain with us for long just as the novelty of radio faded, and it had to improve to last and become great. Cleverness and vision on the part of writers and other program people will bring about this improvement for television.

One clever program idea was brought forward by a man with an ingenious turn of mind. He presented it to Mr. Hal Roach, Jr., who reports that it was first advanced under conditions of utmost secrecy and with the understanding that it was so good that it might even require Mr. Roach to purchase a TV station in order to take full advantage of it.

The gentleman knew that a great many taverns and bars are using television as a bait to keep customers in their establishments. So his idea was so simple that it was elementary: to transmit a closeup picture all day long that would show

a hand continually throwing a pair of dice. Show a closeup of the dice after each throw, and repeat. Ingenious? Yes. But unfortunately it is a violation of the laws governing radio and TV broadcasting and is, therefore, impossible.

Keep in mind when conjuring up program ideas that lottery laws are extant which prohibit certain types of material wherein somebody receives a prize for solving something or other. In a "give-away" show, the lottery line is a thin one which revolves about the legal point that only where it requires skill to solve or answer in order to receive the reward is the device legal. Otherwise it falls under gambling or lottery. Make sure you are on safe ground before working out any program ideas that might fall into this category.

Established and proved patterns of program content are the safest, the most "sure-fire". They have become established through years of acceptance by the public. The puppet show has always been a form of accepted entertainment, but it took television to revive and improve it. No medium can offer such an ideal springboard on which to present a show of this type. Close-ups are perfect; they make the puppet figure fill the viewer's screen. The figures are animated enough to hold any viewer's interest. They are simple and understandable. Puppets are especially attractive to children, and children in the home guide the tuning of the television receiver. Consider all these things in thinking of a program format. Consider, also, the cost and feasibility of production.

Musical comedies, or adaptations of them, will make ideal television program fare. They provide plot, action, music, dancing, and singing. They are entertainment to any audience. A big drawback to putting musical comedies on TV, however, is their costliness. The expense is prohibitive if they are staged strictly for TV and done one time only. In the future, there is no doubt that some sponsor will enjoy "picking up the check" for a series of such presentations. But

that time must wait until receiver distribution and network operation can give the sponsor enough listening audience to warrant such an action on his part.

The "quiz" show may offer the writer a basis on which to create a show. The quiz may be the lowest form of entertainment, but it has several advantages in TV programming. It is simple in presentation; a camera can follow one man and not miss a thing. It can be done with one set. Its participants are audience, and, therefore, no cast budget is necessary except for a "head man" or master of ceremonies. It is relatively easy to procure "giveaway" prizes for the winners at no expense. Many manufacturers will donate, on a regular basis, one of their products as a prize. They get their reward by having their product seen and publicized in every viewer's home. Thus, the big advantage of the quiz is economy in presentation. Whether or not this attraction is offset by the fact that the program content is trashy or unimportant leaves room for argument, but the fact remains that the viewer of a quiz show puts himself in the place of the contestant on the screen, and this will hold his interest. Keep "audience participation" in mind when planning a program. It has been proved a strong attraction. It is possible that a clever writer can come up with a sufficiently interesting program content that involves use of the studio audience that he will have a strong and lasting new program to offer.

Not all viewers enjoy the boxing match, wrestling, baseball, tennis, hockey and football games. Still, by presenting the viewer with a variegated program schedule, the TV station hopes to please some of the people all of the time but cannot expect to please all the people all the time.

Probably the strongest form of televison programming that has most appeal force to most of the audience is drama. The dramatic show is the most interesting for the writer, also. Since well done drama is relatively expensive to produce, it is up to program minds to design something that is a variation

of drama and yet can cut some corners that will reduce the expense burden. Such a variation is the mystery show.

"WHODUNIT"

The mystery offers, besides dramatic elements, an opportunity for thought-provoking reaction from the viewer. If the action is sufficiently interesting, the viewer will stay to see the plot unraveled for the satisfaction of finding out whether he guessed the answer or picked the villian correctly.

To contain all these elements, combine a little quiz, take in some audience, retain some drama, and still hold the expense of presentation within practical limits is quite an order for the mystery show. However, several such programs have been conceived and successfully launched on TV.

One such program is *"Armchair Detective,"* a program conceived by Stokey-Ebert Productions in Hollywood, and presented as a half-hour show one evening each week. This program has proved itself to be an attractive offering to the viewers, and its continuing popularity is indicated by all the audience surveys. The show is produced by Mr. Stokey and Mr. Ebert, and scripts are purchased by them on a freelance basis. On the following pages appears an exact transcript of one script from which the show was directed. We acknowledge gratefully Stokey-Ebert's permission to reprint it here as an example of a finished script. It is not necessarily intended to be a model of program material, but it is printed to illustrate the form a shooting script for a specific program takes.

The first act is complete with all camera directions used by the director. Actually, the camera switches were written into the script with a red pencil by marking the capital letter "T" over the word dialogue on which the switch is to be made. For convenience, we are indicating these switches on the left side of the dialogue page. "T" means "take" and the switch takes place at the start of the line unless otherwise designated. The numeral designates the camera. Two cameras were used

to do the show. CAM means camera. 2 shot means 2 people.

Note that the second act appears without camera switches indicated. So this act is *exactly* the way the thoroughly experienced TV writers submitted the script.

In this show the idea revolves around the narrator (Ev), a super-sleuth who presents these cases. He brings to the studio each week two contestants who phoned in last week and correctly guessed the clues. They are present this week in person to figure out the clues about to be presented. The announcer (John) introduces them in the opening of the show. This action is picked up by camera one. That done, the presentation is ready as follows.

* * * * * * * * *

PICK UP THE ENTIRE SHOW OPENING AS NORMAL. AT FINISH, SWITCH TO JOHN ON SET.

CAM #1

JOHN: Ev, I understand our first case is fraught with a great deal of suspense.

T #2 (MCU—GET 2)

(READY #1 ON LAMP)

EV: It certainly is John — Insp. Harrison finds himself in a very tight spot.

JOHN: Do you mean the Insp. is actually put on the spot by a gangster?

EV: That's exactly what I mean.

JOHN: I can't wait to see what happens.

EV: You won't have to, John —because right now we'll take you to a room on Main street which the Insp. has just entered . . . .

DISSOLVE TO #1. PAN DOWN, THEN . . . CUE DIALOGUE

MIKE: Go rite in Inspector —I'm sure you'll recognize this room rite off.

CAM: PAN TO GUN POINTED AT BACK OF INSP.

INSP: Yes, I recognize it.

DOLLY # 1 BACK FOR 2 SHOT

ACTION: (BOTH MOVE TO TABLE . . . INSP. LOOKS AROUND ROOM, OR POINTEDLY AT CLUE IF ADVISABLE)

READY #2 ON CLOCK CU. 90

MIKE: It's the same room where you and your coppers killed my pal,—one week ago.

INSP: You know that forcing me here at the point of a gun will mean a kidnapping charge. . .

MIKE: *You'll* never make it! Because when the hands of that clock both point to 12, I'm going to kill you.

T #2 ON CLOCK
READY #1 ON CLOCK MED.

DISSOLVE TO #1

READY #2 ON MIKE MCU

CAM: (THE CLOCK SHOWS A FEW MIN TO 12. TRY TO SHOW CLOCK TIME REPEATEDLY DURING FOLLOWING... AT PAUSES OR DURING PANS) ACTION SHOULD HEIGHTEN SUSPENSE...TIMING IS IMPORTANT SINCE CLIMAX MUST COME AT EXACT MOMENT OF TWELVE.

T #2

READY #1 ON INSP 90

MIKE: At exactly the same minute you killed my pal! Sit down Inspector —relax— if you can. You've got just three minutes to live. I'm going to enjoy each one... but I don't think you will.

T #1

#2 ON MIKE

INSP: No I certainly wont. Mike . . . you weren't known as a killer . . . what brought this about, —and why this elaborate set-up to kill me?

T #2

DOLLY #1 TIGHT ON INSP. 135

MIKE: Because you never gave Joe a chance, that's why. I want you

to know how it feels to be trapped like he was. SO I KEPT EVERYTHING IN THIS ROOM JUST THE SAME AS IT WAS. For you, Inspector. I hope you don't mind.

T #1

INSP: Mike, I presume you got your information from Joe—at the hospital, before he died.

T #2

MIKE: Yeah . . . how else? You're good at figuring things out. But don't be so calm. . . There wasn't a cop or a dick saw me bring you up here,—and you know it. So you haven't got a chance.

T #1

INSP: (NOT CALM—MORE TENSE THRUOUT) You'll take his word against mine as to how it happened?

T #2

MIKE: What do you think? The only difference is that you'll get it from one gun—instead of two or three — like were blazin away at him. . .

DOLLY BACK TILL IT'S A 2 SHOT

He didn't have a gun when you all busted in here and let him have it.

T #1 ON EITHER

INSP: Listen Mike . . . He did have a gun. And we did give him a chance. . . It was either him or us. Let me ask you one thing: Do you know how many slugs were in him?

T #2. FOLLOW MIKE

90 ON 1.

MIKE: Sure I do. There was only one. (IS FURIOUS . . . JUMPS UP) . . . But that proves only one thing copper — you were all lousy shots.

T #1

INSP: Mike, be calm! — If you'll give me a chance, I'll prove to you that your pal lied.

T #2
READY #1 ON CLOCK CU.
SUPER #1 ON LOOK

MIKE: Don't make me laugh. . . (Walks . . . Sits). . . Sure I can be calm. . . But can you. . . Take a look at that clock!

DISSOLVE TO #2. CU ON INSP.
READY #1 CU MIKES FACE

INSP: We gave him every chance in the world, Mike. We banged the door, and I yelled out that we were the police . . . There wasn't a

sound. We knew he was in here, so I told him we'd break down the door if he didn't let us in. . . Riley hit the door low and fell into the room. . . I came in next and your pal started to pull the trigger—the gun misfired, and I dropped him with one shot. THAT'S ALL THE SHOTS THAT WERE FIRED.

T #1 ON MISFIRED
READY #2 SHOT ON 2

READY #1 MCU

MIKE: So his gun misfired . . . Now ain't that cute! Inspector, you're a genius to think up a story like that — at a moment like this. There's only one trouble with it. . . I don't believe it.

T #1. FOLLOW INSP.
PULL BACK . . . GET DOOR & 2

INSP: I'll make you believe it. . . You (HE SITS) you said Joe fell across the table. . . The door is back there, so Joe must have been standing where you are when we broke in.

T #2
READY #1 CU ON CLOCK

MIKE: That's right. And you'd better make it good. You'd better. . .

ON FEW, HALF DISSOLVE TO #1
HOLD, THEN BACK TO #2

READY #1 TIGHT 2 SHOT

because you've only got a few seconds left. . . and standing there just like Joe did—is a very good place to give it to you. Then there's only one other guy to take care of. The guy that ratted on Joe! I've got to get him before he gets me. . . Come on, copper . . . beg for your life.

T #1. PAN TO FOLLOW DOLLY BACK TO GET 2

INSP: (RISES) Mike, you said everything in the room was exactly the same. Well, in the last few seconds I have to live, just take one look around in back of you.

RELEASE #2 FOR CONTESTANTS

PAN TO MIKES FACE & DOLLY IN

MIKE: And you'll grab my gun. . . That's the oldest trick in the world.

PAN TO INSP. . . . DOLLY BACK

INSP: (LOOKS OFF) Mike, if you ever believed a cop in your life, believe me now. . . Somebody's on the fire escape outside that window.

BACK TO GET TABLE & #2

MIKE: (LAFFS) You're killing me, Inspector, You're killing me. . . (LOOKS AT CLOCK) Okay copper, here it is. . .

CUE SOUND

SND: SHOT. . . THEN 2 MORE

MIKE: (STAGGERS AND SHOOTS TOWARD WINDOW. . . THEN FALLS ACROSS TABLE)

PAN UP TO INSP.
& DOLLY IN
CU. OF FACE

INSP: Mike, if you hadn't been so busy watching for the police, you might have noticed your killer pal stalking us.

DISSOLVE TO BLACK
T #2 ON CONTESTANTS

(after first case contestant interview and clues)

JOHN: Ev, to take up our second case now—do I understand that it concerns a rather fabulous character?

EV: It certainly does, John. We're going to introduce a most unusual private detective to our Armchair Detectives.

JOHN: That was my understanding, Ev, as well as the fact that we're due to see a lot of his cases in the future. Am I right?

EV: Yes indeed, John . . . and confidentially, if they're as fascinating as the one we're going to see right now, I'll certainly be looking forward to them . . . And now without further ado, John, we'd like to present ————————

FILM: Roll . . . . . CAR IN RESIDENTIAL DISTRICT

JONAS: (SPEAKING OVER FILM) My name is Flint . . . Jones Delaney Flint, to be exact, tho some people have had occasion to call me "Jonah" when things have gone my way and then ended up on the inside looking out . . . . . I like people tho . . . . They're interesting—Like Shelia . . . She's the one who came to the office and told me about

her sister and her brother-in-law and the strange things going on in the house which the three of them occupied. It was quite a place out in the ultra Wilshire District . . . . We pulled up and went in . . . (FADE)

CAM: PAN TO HENRY IN DRAWING ROOM

JON: Henry Grandon seemed to take an instant dislike for me —so that the atmosphere was still strained after dinner while we were waiting in the drawing room.

HEN: Flint,—I simply can't understand why Shelia invited you here . . . . or "hired" you, is a more accurate way to put it.

JON: No,—she hasn't hired me—yet . . . Are you sure you don't know her reason, Mr. Grandon? Your wife appears to be greatly agitated . . . In fact, I'd say she was on the verge of a nervous breakdown.

HEN: (CRUSHES OUT CIG HE'S JUST LIT) Confound it, Flint,—you have a reputation of being a clever devil. So I'll be frank with you . . . . Shelia has been trying for months to make Helen distrust me,—break up our marriage.

JON: And just what method is Shelia using?

HEN: It's as ridiculous as it's . . . diabolical. She reads cards. And Helen believes her. I tell you, Flint, my wife has reached the point where her mind is becoming unbalanced.

JON: Shelia must give a vivid and factual card reading.

HEN: That's just it! She couldn't possibly guess that accurately —she's got something on me! The card is just an act.

JON: Oh-ho . . .

HEN: Yes . . . I've been playing around . . . But how Shelia knew is beyond—unless . . . you!!

JON: No. No, Shelia did not hire me to watch you. She did ask me out here because she believes you intend to murder her sister.

HEN: Why that—(SOFTLY) . . . If I was going to kill, it would be Shelia! And she may drive me to it yet!

CUE SOUND: (DOOR OPEN)

HELEN: Oh, Mr. Flint—you must have my sister read the cards . . . She's extremely clever.

SHELIA: Helen, I've told you I will not do it again. Forgive me, Mr. Flint, but in order to read cards, I put myself into a trance,—and in that state, it's possible for me to conceal what I see.

JON: Most unusual . . . Would you mind giving me a demonstration?

SHE: Well,—if you insist . . .

BIZ: SHELIA GOES INTO CARD ACT . . .

HEN: Rubbish! That confounded butler always forgets the brandy . . . . Excuse me . . . (HE EXITS)

HEL: My sister has always been most devoted to me, Mr. Flint. You can see for yourself, she's the spiritual type. It explains her supernatural ability . . . .

JON: Oh, of course . . . By all means.

SHE: No! No! I can't do it!—I won't! (BIZ: TEARS CARD) I'll never look at another card as long as I live. Forgive me, Helen . . . . Forgive me.

HEL: It's all right Shelia . . . you can't help it. I know what she saw, Mr. Flint . . . . Unfortunately, I'm still in love with my husband, and if he leaves me, I'll kill myself.

JON: Isn't that rather an old fashioned attitude, Mrs. Grandon? (ENTER) HEN: Well, I suppose it was the same old story?

HEL: Henry, I thought you were going to bring us drinks?

HEN: Oh, I poured them . . . but the idea of this drivel going on in here infuriates me.

HEL: I'll go get them . . . Excuse me . . . (EXITS)

HEN: Shelia,—I'm telling you for the last time,—if you don't stop trying to poison my wife's mind, I'll . . . I'll kill you!

SHE: Henry,—you bore me.

JON: I'm afraid I'm getting a bit bored myself . . . With all due respects to your hospitality, Mr. Grandon, I personally would prefer a water-front bar-room brawl.

HEN: You'd feel more at home, no doubt.

HEL: (ENTERING) Please . . . let's change the subject . . . (SHE OFFERS JONAS A DRINK . . . WHEN HE REACHES FOR A GLASS FARTHEST FROM HIM, SHE NOTICEABLY MOVES THE TRAY SO THAT HE HAS NO CHOICE BUT TO TAKE ONE NEAREST HIM . . . HELEN THEN GIVES DRINKS TO SHELIA AND HENRY) . . . I'm terribly sorry I mentioned the cards, Mr. Flint . . . but I haven't been myself lately.

BIZ: (ALL DRINK)

HEL: And now, my dear sister,—and my dear husband, Mr. Jonas Flint has something of interest to tell you . . .

JON: Indeed I have . . . I wouldn't have taken this case for the biggest fee in the Wilshire District except that I was intrigued by the idea of the card tricks—It's new and different.

SHE: What do you mean?

JON: Shelia, you brought me out here to witness the fact that your sister's mind is in a precarious state . . . so it won't be too surprising if she commits suicide—

SHE: That's a lie!

JON: And the CARDS also told her Henry was planning to kill her . . . . What made you come to me, Shelia? I'll tell you! You heard Helen mention my exploits—just casually. It never occurred to you that Helen had retained me to investigate your supernatural ability to read cards. Yes! Henry WAS playing around! But you knew all about it BECAUSE HE WAS PLAYING AROUND WITH YOU.

SHE: Helen,—don't believe him.

JON: She has all the money . . . The only way you could get it was to murder her! Yes,—murder her in a more brutal fashion than if you had used a gun!

HEL: (WEAKLY) And now, my dear sister,—and my dear husband—I hope you live happily ever after . . . I put

poison in my drink . . . That's what you wanted, isn't it Shelia, my dear—

BIZ: (HELEN SLUMPS IN DEATH)

JON: Helen—Perhaps I should take up card reading, Shelia . . . This was something I couldn't forsee.

SHE: Now isn't that amazing . . . I thought the great Jonas Flint could forsee any eventuality.

HEN: Despite all your noble ethics, Flint, they won't mean a thing in court . . . She committed suicide.

SHE: He'll be our star witness, Henry . . . and he didn't even charge me a fee.

JON: I'll be a witness, Shelia. But sooner than you think. This was the only way I could prove to Helen that you're a couple of despicable vultures . . . (TO HELEN) All right, Helen . . . It was a good act. (LOOKS AT HER) . . . HELEN, HELEN! . . . She IS dead!

Grandon, you poisoned her drink!

HEN: (LAFS) I didn't . . . but even if I had, you couldn't prove it.

JON: Wait a minute. The way she handed me that tray . . . (LOOKS AT HER THEN TAKES A NOTE FROM HER HAND. READS IT) You'll be very interested in this . . . (GIVES NOTE TO SHELIA AND HENRY)

SHE: (READS NOTE AND SCREAMS)

HEN: (HAS STRICKEN BLANK LOOK)

JON: (DIALS OPERATOR) . . . Give me the police . . Helen, you shouldn't have waited for the great Jonas Delaney Flint to see that Justice was dispensed . . . (BITTER LAFF). Hello—give me homicide. This is Jonas Flint. Better come right down . . . and better bring the Coroner along . . . and tell him to plan to stay a while—I think he'll have his hands full . . . . . I'm not usually this much of a JONAH!

CAM: (DISSOLVE TO CONTESTANTS)

QUES. NO. 1: What was in note? (IF NO ANSWER): The

clue was in the stricken look on Henry's face, and Shelia's screaming.

ANS: The note told Shelia and Henry that Helen had poisoned them, also.

QUES. No. 2: Was Jonas Flint able to make any arrests?
ANS: No.

* * * * * * * * *

WRITING THE COMMERCIAL MESSAGE

The Federal Communications Commission authorized television stations who held commercial (as against experimental) license to make a monetary charge for the telecasting of advertising over its facilities on July 1 of 1941. Now, several years later, television still is engaged in even more experimentation with commercials than it is with programs. As yet no code of practice for commercials has been laid down other than the rules that govern every form of advertising. There is not even a hard and fast rule to govern the amount of time that shall be absorbed by a commercial message within a program of given length. It is possible that such rules will be in existence by the time this book reaches your hands, but just now you must "let your conscience be your guide."

In writing the commercial copy, the words which shall be the sponsor's message, for insertion into a telecast, we have two guide posts: (1) radio commercials, and (2) minute-movies.

Let's look at our two sign posts and try to determine several things. Does TV require the hard-hitting wordage of radio in order to sell the product? How much talk can the viewer absorb along with the picture? Which is more important in selling, the entertainment value of the picture or the salient points of the spoken message? At what point will the viewer rebel and turn you off? Where is the line of demarcation? It is much too early in the game to answer all these questions, but we can at this time survey what seem to

be trends and follow them in writing the TV commercial.

It has already been demonstrated that the viewer absorbs the "sly" or gentle—the casual commercial—very easily. In fact, he eats it up. For instance, in a show where the program content is composed of a girl and her assistant in a demonstration of kitchen procedures and recipes, there is never a mention of the fact that "This program is presented to you with the compliments of the blank blank company, makers of that wonderful kitchen accessory the famous Koldkid Refrigerator." Instead, all during the telecast, which is done mostly in close-up, one of the manufacturer's products stands in the background. Only occasionally as the cook turns to get some article or ingredient from its interior, do you see the little trade name "Koldkid," and only once in the fifteen minute program does the cook say, "Please get the milk from the Koldkid." Yet this advertiser reports through his agency that he is already so satisfied with the direct sale results that he is preparing an advertising budget for next year in television that will be many times as great as he now uses. This seems to indicate that the picture is the thing and that the spoken hard-hitting words of radio fall to at least secondary importance.

Another advertiser, who only participates in a "shopping" program, reports a smashing enthusiasm as judged by direct sales. His commercial "copy" consists of a short but interesting demonstration of his product by one of the shoppers in the show who mentions only twice where the product may be purchased. When the demonstration is over, the viewer is shown a simple card that gives the advertiser's telephone number. Advertiser reports his switchboard swamped with orders at each showing. Surely the picture makes TV a powerful "selling" medium.

Of course, there are other existing types of TV commercial that are not so underplayed. A well-known cigarette company

—noted for the blatant noisiness of its radio commercial messages, is trying nearly the same tactics on television. He is making use of the alliterative devices that have become associated with his product via radio. However, his well done picture that accompanies the television presentation will interest any viewer and keep him watching and listening. At least the entertainment value of the picture softens the blow of the ear-splitting verbal accompaniment. At this time we have no definite conclusions or reports available from which we can draw conclusions on the power of the picture as against the words in the selling of this sponsor's product. But he will only get rejection when he has repeated the same picture with the same audio copy to the point where his audience knows the picture so well that it becomes uninteresting.

THE INTEGRATED COMMERCIAL

The spoken word of the sponsor's message has a maximum chance of success because of radio. The housewife has become accustomed to it. It is normal expectancy to hear the sponsor's claims extolled at the start and the finish of radio programs all day long. In some of the more popular radio shows the commercial portion of the program is inside, and is often one of the highlights of the show. Such commercials are "integrated" into the framework. This technique is practiced by such programs as Jack Benny, Burns and Allen, Fibber McGee and Molly, and others with great success and acceptance. Advertising agencies and certain clients consider the integrated commercial enormously successful, and there are indications that such commercials, copy woven into the story or format of the show itself, may be the ultimate answer for television commercials.

Integration presents problems. Obviously, it is almost impossible to integrate a segment of the sponsor's material into a motion picture presentation unless the picture were made especially for that sponsor. Such integration into an already

existing picture would require the reassembling of the picture cast and crew—a prohibitive expense—not to mention the legal aspects involved if a "name" actor helps deliver the message for this or that specific product. On the contrary, in doing live telecasts, there is no reason why the sponsor's message cannot be woven into the format of the presentation with the same success that it is in radio. Exactly how it is to be done is up to the writer of the show. If the writer is not commercially minded, he must work closely with an advertising agency representative who is very familiar with the wishes of the sponsor. Important sales points, which must be pointed up as the copy is delivered, and the commercial policy of the firm determine largely the form the commercial message takes.

Oftentimes, the attainment of a nicely integrated commercial is the work of a copywriter, usually a specialist employed by the sponsor's advertising agency. He takes an already written show and by careful manipulation, deftly inserts into it the sponsor's message, contained in a short scene if the show is drama, or a comedy sequence if the show is of an informal or variety type.

In this case, the commercial writer, in addition to being familiar with his sponsor's sales policy and knowing exactly which merits of the product he must cover, must also have a flair for drama, or comedy writing, as the case may be. In actual practice, this is an operation where the commercial writer and the show writer work in close coördination. The show writer will contrive his situation, or plot, so that the commercial writer may insert his sales points as the whole show is built.

MINUTE MOVIES

The other guide post for TV commercials is the so-called minute-movie. There are some of them in use today on television albeit they were made, many of them, before TV existed. They are what the name implies—a film sequence

one minute or less in length. Normally they contain a good piece of entertainment in the form of cartoon antics which take on a plot that involves the sponsor's product. For instance, three soapboxes (of a shape to correspond with the sponsor's boxes) will be given animation—legs, arms, and faces—and will perform their singing and dancing along with a synchronized sound track. Again, cigarettes will march around in military formations to the accompaniment of a band and will end up by assuming such a formation that they will spell out the sponsor's brand name. These were in use even before TV as a stimulus at salesmen's pep meetings, entertainment at advertising luncheons, and other demonstrations. However, they were also issued to a great many theatres who would run them (for a certain sum) along with their regular feature picture program. They could be sandwiched in along with trailers, program announcements, and short subjects, but were shown as an entertainment offering.

When they were first used in theatres, there was a certain amount of audience rejection due to the fact that the commercial message was overdone. The hard-hitting technique of the radio commercial was too much for the amount of entertainment contained in the shortie film, and audiences registered complaints to theatre managements that they were having advertising thrown at them after they had paid admission to be entertained.

Gradually the producers of the minute-movie became more adept in contriving their film, and the presentation of the films was undertaken only in neighborhood or suburban theatres. This led to a double-barreled effect. (1) the neighborhood audiences actually began to take pride in the fact that their merchants were tied in as distributors of such nicely advertised merchandise, and (2) the sponsor reached precisely the right audience, the ultimate consumer, with his message. Such acceptance was a boon to the minute-movie producer who remained to grow into an industry. The making

of minute-movies today is a fifteen million dollar per year business and shows every sign of multiplying well beyond that due to its tie-in with television. We shall speak at length of this in the following chapter.

There is much that TV can learn from the lessons minute-movies learned. Obviously, a TV viewer has paid no money to get in and be entertained when viewing in his own home. Also, if he does not wish to be exposed to a sponsor's message, it is a simple matter for him to turn off his set or tune in another station. On the other hand, the viewer has already learned to be tolerant and appreciative of the fact that a certain product is responsible for the presentation of a program which he likes and, therefore, deserves some mention.

With the ground work all prepared it remains only for the designers of the TV commercial to exercise care and good taste in order that their efforts will meet with complete success.

DESIGNING THE VIDEO COMMERCIAL

The minute-movie has shown that a success formula for acceptance of commercial copy is vested in the proportions of its content . . . the proportions of actual entertainment as balanced with commercial copy. In judging the balance, remember that television is already proving that it is probably the greatest of all selling mediums. It does the job so easily and is reaching an ever increasing audience. It has a terrific impact. The "selling copy" can be played down to the point where there is no resentment or rejection of the part of the viewer. At the same time, he will willingly absorb information accompanying a picture that is either interesting enough to be absorbing or entertaining enough to make assimilation of the spoken word an unconscious action.

Let us then set down as number one rule for a writer who is designing a video commercial: *Get your viewer interested by entertaining him first with at least one-third of your total time before you start your "sell."*

Budget is the first consideration in determining what the commercial will be. Whether you are designing a commercial for live, kinescoped, or film production, you will have to stay within monetary limits as established by your sponsor. Consider the number of studio sets you will require, how many actors you will need, and whether or not the same commercial will be used again and again in the form you are designing. As with programs, anyone can do a bang-up job planning commercials if given limitless time and money. But the really successful commercial must do the best possible job for the sponsor, and at the same time be economical.

A writer must consider whether or not the product has been advertised in other fields. If it has, it is probable that it has already developed via radio or other mediums an assortment of vocal trademarks with which the general public is already familiar. You should then, by all means, include such trademarks in some form or another in your TV commercial. If your sponsor is an advertiser who has national distribution of his product, your commercial should make use, too, of important identifying characteristics already exploited. The shape of his boxed product and the printed trademark, of course, are important. Although we cannot as yet produce a box which will show colors to the viewer as they do in printed advertising, it has been found that the viewer accepts and recognizes the accurate reproduction of the article even in the grey or black and white of his receiving screen. When he sees the sponsor's product on his grocer's shelf or elsewhere, he is apt to be all the more attracted to it because of the coloring after having seen it previously in grey.

If the advertising slogan has become popular, the writer should accompany a picture of the boxed product with the identical slogan done in the way it has been established. The picture can do the major demonstrating, and the vocal portions should be written to uphold the picture, dwelling on

the details that are the least apparent in the picture. The viewer absorbs many points by sight and need not be overburdened with talking.

Two specimens of TV commercials are printed in the chapter addressed to the announcer. As indicated, these two commercials are "spot" type. They are segments devoted exclusively to the presentation of the product itself and are not to be confused with the "integrated" type commercial previously discussed. The stove copy is harder hitting than the flour, but the stove commercial is kept interesting because there is plenty of action going along with it. The flour commercial contains excellent "sell" because the action is arresting and is brought to a "snap" conclusion when the camera focuses closeup on the actual package of the flour mix. Both commercials are brief.

In conclusion, the writer designs the commercial with an eye to the correct way to emphasize the sales appeal of the product. The ways and means for doing so are still being explored. The writer has an opportunity in the commercial field to show off his cleverness by using new techniques that will make the sponsor's message as appealing as any other part of the entertainment. When this point is reached, the commercial itself may attract more viewers to television. Word of mouth enthusiasm by present owners of sets makes more people buy receivers; more receivers give the sponsor a better dollar value for his advertising, and, finally, more advertising dollars make it possible to give better programs. Everyone benefits, and the snowball will reach huge proportions that will give us the greatest entertainment medium of all time. The "commercial" is the hub of the television show.

Chapter XII

THE FILM IN TELEVISION

The importance of motion picture film to the television industry cannot be over-emphasized. This holds good whether the focus is on program fare, commercials, news, or effects on kindred industries. There are many facets to the matter of films in television, but it is so important that, as we set down these words, all major television station operators are threatening to go into the motion picture business themselves if they cannot agree with existing producers of motion pictures on matters of budgets and available film matter.

FILM PROGRAMMING

The expense involved in producing television programs on a live program basis has been previously indicated. It is, therefore, only natural that station operators should reach for whatever program material is already available so they may keep their rosters full of entertainment and still find operating economically possible. Such program material exists on film. These are shorts, travelogues, cartoons, musicals, newsreels, and feature pictures of all kinds now existent in vaults of all movie studios.

So far, motion picture producers have been loathe to release their products to television for an assortment of economic reasons. TV is not yet capable of payment in amounts to justify rental of the average film before it has played its way through all the theatres in the land. The theory is that showing a film on TV diminishes the audience pull that the film fare would have for the theatre owner and

diminishes the number of potential paying customers for the theatre. On the other hand, it is not economically possible for a film company to make a film in which the high priced major stars are cast, and get its money back by releasing to television alone. So the studio must protect its regular customer, the theatre owner, and must protect its own organization by releasing where the greatest monetary return may be expected. The net result has been the release to TV of only such films as have worn out their usefulness to the theatres and have already returned to their makers practically all the revenue that can be expected. So TV has had to be content with the use of "oldies" or poor film that did no good in the theatre.

This sad condition is rapidly being remedied by film companies who are producing cheaper movies so that costs will be commensurate with expected income from television. Production costs are still high—especially where "name" talent is being used. But the wide breach between production costs and what the stations can afford is gradually being narrowed. The entry into the field of TV pictures of such experts as Hal Roach Jr., Jerry Fairbanks, and others of that magnitude cannot help but improve the quality of available television film and will ultimately force all picture producers to enter the competitive field.

With the advent of better quality film, TV programmers will use more and more film fare. Here is where an argument starts. There are those who hold that there is no substitute for the perfection which can be attained by producing a program on film. This procedure, while it may be slightly more expensive, reaps enormous benefit because a sponsor may "preview," in detail, his entire show. All imperfections or undesirable characteristics may be eliminated before his program is presented to the public. Lighting will be perfect. There will be no "fluffs" or other jarring effects to mar the show. There is much more latitude in

scope possible when film is used. Outdoor scenes, which are impossible to any great extent in live TV studio production, are feasible. If the sponsor desires to repeat his show any number of times, it will always be exactly the same at each presentation.

Dissenters to the use of film in television hold that there is no substitute for the spontaneity and true-to-life presentation that is achieved when programs are produced live. They further hold that when a program is presented on film, its attractiveness to the viewer is diminished for that very reason, just as "electrical transcription" presentations were in radio.

IMMEDIACY

Film dissenters also point to another important factor, "immediacy." Many people believe that immediacy—the fact that "this is happening out there *RIGHT NOW* while I am sitting here at home seeing it happen"—is the very essence of television. They believe that, if we take away this intangible ingredient, we ultimately destroy TV as soon as the novelty wears off.

It is certain that there is much to this argument or viewpoint. However, we cannot be sure as yet that the instantaneous element of immediacy is really that much of television. The other side holds that no one ever stops to think that a motion picture was actually made some time ago and that the viewing audience is completely taken in by the entertainment component alone.

Everyone is entitled to an opinion here, but we may point out that "via electrical transcription" has faded from sight as a source of possible "looking down the nose" for any radio program. Also, each of the major networks are accepting for broadcasting programs which have been thoroughly edited and previewed through the use of tape-recording. This is a "canned" show. It is impossible for

a radio listener to tell whether a program is live, taped or transcribed unless he hears a fore and aft announcement, which is required by FCC ruling, to that effect.

Using this radio criterion as a guide, we may suppose that the viewer of television will watch a program without prejudice and very likely will never find out whether a program is live or film unless he hears an announcement to that effect.

As for spontaneity, it is only fair to point out that a TV film producer, by judicious editing of his film, could leave "in" the final print anything that happened during the shooting that was of a "spontaneous" nature and valuable as such. Plenty of natural things do happen in film making.

So the arguments can go round and round.

FUTURE

To try to forecast in accurate percentages what amount of future TV programming will be on film and what percent live, would be foolish indeed. They will strike their own norms in time. It is safe to say that neither will ever completely supplant the other. The early days of television used well over fifty percent film during program time. Even though the film was old and tired, there was sufficient reminiscent value in it to make it useable. Also, and more important, the novelty of TV itself was still great enough that the viewer accepted practically anything with delight.

With the novelty wearing off, however, viewers have become more choosey and exacting on quality requirements. Several TV stations use no film whatever and say that they will not use it until such time as the quality of available film fare is far better and priced so as to make its use desirable and economical. On the whole, film programming absorbs approximately twenty percent of the time on the average station. This does not take into account programming time filled with kinescoped programs which make use

of film but which are originally live TV studio programs. This percentage is likely to rise as film specially made for television becomes increasingly available at progressively lower rates. Also, the rapidly increasing viewing audience is going to make it more and more advantageous for the sponsor to spend more advertising dollars in TV. He will be able to increase budgets on a sound business basis to the point where the film producer can meet him on a common ground that is mutually beneficial. From this point on, the percentage of program time that will be filled with film material will depend on the growth of "network" operations. It is utterly impossible to predict what changes networks will bring.

PROGRAM TYPES

The use of film as program material takes on, broadly, four forms: newsreels, short subjects (travelogues and musicals), cartoons, and features. Of these, the newsreel is by far the most popular at this time and is the most likely to remain so. Its value in being able to bring into the viewer's home the far-away current event, the remote place, and the important happening must not be underestimated. The newsreel has a proved value to the motion picture theatre. It is proving itself the same way in TV. Everyone is interested in the news. The on-the-spot coverage that the newsreel gives is in no way depreciated by what may have appeared in print ahead of its release. For TV, the newsreel is doubly valuable because it can bring home the picture from places that are inaccessible to the television camera It is informative and often educational. It will always enjoy a high place on TV programs.

Short subjects should also enjoy a lasting popularity. If they are educational in content, probably they will not be "dated." Therefore, they are good for showing at any time. If they are instructive, they will find use in the rapidly broadening field of education by television. From the TV

station point of view, they are valuable because they can be used to fill assorted odd time segments that may need emergency filling due to an upset of planned program schedules. The short subject is invaluable for acquainting the populace with the functions of its city officials and civic enterprises. It engenders civic pride when so used and is a stimulus to the station and the viewer alike.

The cartoon picture is entertainment for any viewer. In addition, the very makeup of such a film makes it easily legible on even the dullest receiver. The plainly drawn characters are ideal for TV transmission. They have appeal for any type audience—young or old. Their chief drawback is the expense of making them, but this is more than offset by not having to pay for a cast. No "big names" are necessary in the making of a cartoon. The most famous maker of all animated cartoon pictures, Walt Disney, is making provisions to enter into the television field. He is certain to enjoy a great success with his product. Once his library of existing features is made available to television stations, the quality of the cartoon type program will go up because even those features made in color will transmit well on the black and white of television. As a matter of fact, films made in color are often better for TV transmission than those made in black and white.

The average film feature picture is a little too long for television. Therefore some editing down or cutting is sometimes necessary before TV transmission. If a feature is so well done that cutting will ruin its presentation, however, most stations will run it in its entirety and patch up their schedules with other material. The well done feature comes into the viewer's home in a flawless, smooth flowing presentation that should be drama or comedy at its best. When features are made especially for television, they will undoubtedly be of lengths to correspond to normal schedules —a half-hour or one hour in running time (29′:30″ or 59′:

30″). Plays or stories must be chosen so that the pace of the presentation is in keeping with the fact that the viewer is an alert and intense audience. He is accustomed to fast moving action, and he is used to ample use of the close-up. The making of feature pictures for TV must take these things into consideration, and it may be some time before a film can be made that is perfectly satisfactory in every way for use in theatre and in TV too.

THE FILM VIDEO COMMERCIAL

One place where film is taking its rightful place in television at a very rapid rate is the commercial field. We have said before that without the commercial the TV station cannot hope to survive. Also, without the proper presentation of the commercial, the sponsor will not survive as a contributor. It is essential that the sponsor be kept happily affiliated by having his message presented every time in the manner that will do the most for selling his product.

Since the sponsor will use his commercial over and over again in most cases, even though the content of his program will change with each presentation, the most economical way to assure flawless presentation is on film. This way he is able to preview the content of his message and the methods used to present it. He can study its effect and test it. Only when he is thoroughly satisfied that it will do the most possible good for his product is it put on the air. He can rest assured that he will get no variation. If the expense of putting signatures, trademarks, and commercial copy on film seems great, study all methods, and you will see that it is actually the most economical way when it is to be used more than once.

COSTS

Expense can be guided in the use of film commercials. It will be determined by the form the commercial or signature will take. Full animation, a process wherein each car-

toon character moves, is the most expensive to produce, especially when used at great length. Thousands of pictures must be taken to come out with a few seconds of finished film. A familiar commercial of marching cigarettes cost just under ten thousand dollars to make.

It must be remembered, however, that when a commercial is put on film, it can also be used in other fields. The economy of an overlapping operation is great. A commercial that appears in theatres, as we mentioned previously, can be shown there in full color, and be used in a TV presentation using exactly the same film or a print thereof.

Partial animation can be made on film at a rate of eighteen hundred dollars for one minute running time, and live-performer commercials can be filmed for as low as five hundred dollars for forty seconds running time, depending upon the sets and props required. Certainly such prices are very much in line for a sponsor who takes a long-haul view in his advertising and wants as near perfection as he can get.

DO'S AND DON'TS FOR FILM COMMERCIALS

Most of the rules that apply to live commercials, and their conception and production, apply also to film commercials. Since it is a rather specialized field, we have sought for guidance a producer who has had much experience in it.

Such a producer is Mr. Harry McMahan, whose company, FIVE STAR PRODUCTIONS, Hollywood, California, is one of the world's largest producers of cartoon advertising films. Mr. McMahan refers to many of our present day television commercials as "Juvenile Delinquents—juvenile in construction and delinquent in sales power." He further maintains that before we go any further, we should consider what corrective measures should be judiciously applied. The following list of DO'S AND DON'TS is a result of such consideration, and the author acknowledges, with thanks, the

cooperation of Mr. McMahan in giving us his rules for consideration and guidance.

1. DON'T WRITE YOUR SCRIPT FIRST. Do set your budget first. Yes, that may seem odd, but it's sensible. Like buying a home for the expected child, you first must determine how much you can spend—then tell the architect your needs and specifications. Create the house to fit the budget. You may find you have to give up an extra room or two, or that fancy landscaping in front, but don't stint on the essentials—bedroom and nursery. That means: consumer interest and practicality.

2. DON'T RISK UNTRIED PRODUCERS. Do demand sample screenings. Television has brought forth a flock of producers who are intrigued with its romance and brag of their fertility, yet, it develops, they have actually produced no children. Remember, there is still no substitute for experience. See a few sample children before you adopt one or start your own propagation. Specifically, ask to see sample screenings, or successful films, in the budget range you have selected.

3. DON'T PRODUCE 'JUST ONE FILM.' Do produce a series of 7 or 13. Large families have many advantages. So, a series avoids monotony on the screen, lowers production costs, and properly develops a campaign for full cumulative sales value. Obviously, it costs a producer almost as much to gear up for one film as for a series since talent and craftsmen are hired by minimum day or week.

4. DON'T 'HOP ABOUT' FOR SUBJECTS. Do have definite format and theme. While we must avoid monotony, we still want all the children to look alike and bear a family resemblance. Smart repetition of a selling theme has an invaluable cumulative effect.

5. DON'T TRY TO ADAPT RADIO COMMERCIALS. Do plan first the visual. Yes, little children should

be seen and not heard. The impact of TV over AM is computed at 10-to-1. Why? The visual, supplemented by the aural. Note that word 'supplemented.' One picture is still worth reams of chatter.

6. DON'T USE 'LIP-SYNC' DIALOGUE. Do use 'off-screen' announcer. Actors are rarely adequate as salesmen; lip-sync slows action (and adds costs). Let your actors demonstrate—have a qualified commercial salesman to sell! Exception: In the 'testimonial' type of commercial, a forceful single line of dialogue from the star.

7. DON'T MAKE 'EM TOO LONG. Do stay within one minute. Theatre screens for years have proved the effectiveness of :60, :40, and even :26 ad-films. There is rarely any excuse for 1½ and 2-minute TV spots.

8. DON'T HAVE TOO MANY ACTORS. Do concentrate on 1 or 2. Too many actors in one film confuse. Where there is a single 'key' model, the audience can then become ingratiated to the personality and a more personal sales job can be accomplished. Because one pretty girl in a magazine ad is good, don't get the idea that six pretty girls in the same ad are better.

9. DON'T FIRE YOUR GUN TOO FAST. Do win audience interest. A good formula is to allow the first one-fourth of your time to winning attention and interest—then start selling.

10. DON'T GO OVERBOARD ON NOVELTY. Do remember your objective. While it is important to "entertain" that initial interest, don't try to continue being so "cute" you forget to do your sales job. Cartoons are naturals for TV spots, but remember they are best for trademarks, trade characters, and exaggerative demonstration. Beware of string puppets. Use caution with live comedy; it's the most difficult mood to present effectively in commercials.

11. DON'T FIGHT HASTY DEADLINES. Do allow ample production time. Rushing the normal gestation period is dangerous. Haste makes, in addition to waste, headaches and unnecessary overtime expense. Good films have been delivered in 2 weeks, 30 days is more normal, 90 days is desirable. Many producers give added discounts for such added time.

12. DON'T WAIT TO GET INTO TELEVISION. And the 'Do' for that is: Do it now!

And there is the check-list. There are exceptions to probably every point but, by and large, we have found it has worked successfully on more than 1,200 theatre and TV ad-films in the last 10 years. It goes a long way in preventing 'Juvenile Delinquents,' and it certainly makes happier parents."

COMPARISONS

The melding of the film industry with television which will surely take place is equally certain to test the ingenuity of the film producers in the matter of money. Normal costs of production for a feature length movie film often run well over a million dollars. Even the so-called "B" picture, whose shooting schedule may run anywhere from ten days to three weeks, costs the producers between 175,000 and 250,000 dollars to make. This will give a screen running time of eighty minutes. Cost of production is, then, at the rate of $2500 per minute for a "B" picture and for the big features approximately $12,500 per minute of running time.

On the other hand, such important radio shows as the *Jack Benny* show and *Edgar Bergen and Charlie McCarthy* cost the sponsor $25,000 per show for talent and another $10,000 for network facilities. The thirty minute high calibre radio show then costs at the rate of $1250 per minute to produce. (Note: All quoted figures are approximations). An accurate estimate for the production of a *Bergen* or a *Benny*

show *for television,* counting time, talent, and facilities, is placed at $2000 per minute for a thirty minute show.

The Ford Hour, a drama now being presented on TV in a sixty minute length, can be produced for $500 per minute —and count in a kinescoped distribution for other areas outside New York City. So, costs per minute of production come down when shows are presented live in longer lengths.

It is evident that the cost of the highest calibre television show for live telecasing is directly comparable to the cost of the "B" picture—the difference being approximately $1000 a minute, certainly not a too consequential difference—especially when we consider that the motion picture was made under a cost set-up well governed by union wage scale whereas television is not. This brings up another facet of costs.

UNIONS

It may be that by the time this book is published the television industry will be governed by unionism in the matter of wage scales for its workers. However, all estimates here set down are based on the fact that no such scales now exist within the industry.

Both radio and motion pictures operate under union rules in the matter of wages and working hours. Radio has AFRA (American Federation of Radio Artists), for its actors, RTDG (Radio and Television Directors Guild) for its directors, and any one of three brotherhoods for its engineers. Motion pictures have a vast network of guilds and unions that encompass every part of the operation, including Directors (SDG), Actors (Equity, AGMA, AGVA and Screen Guild), Painters, Designers, Electricians, Carpenters, Publicists, Hairdressers, and others.

Television is barely organized in this matter, and it is a well-known fact that present pay scales for most workers within the industry are rather low in comparison to those of the other two industries. This is only as it should be,

for the foundling indusrty is now just able to stand on its own feet. All branches of workers are perfectly willing to wait until it can become stronger before settling on what shall be normal wage scales for its workers.

What we wish to point out, however, is that comparable figures given in the foregoing may reach a nearer equitable status when costs of television production rise with the probable attendant rise of union wage scales. Only time will tell where these norms shall be.

OTHER CONSIDERATIONS

Even under existing conditions, however, film producers are working to bring to TV a product that can meet the demands. We previously mentioned Hal Roach, Jr. He is turning out, in series, film programs of thirty minutes duration that can be marketed to the television station, or sponsor, at a price of $7500 to $8000 per program. The film company, headed by Jerry Fairbanks of Hollywood, is turning out excellent film programs of television standard and quality at a cost to sponsor of $10,000 per half hour segment. To do this, the producers make use of their stockpile of facilities which has been built up over a period of years in motion picture production. They have at their fingertips a prop room stuffed with sets of every description, period, and type; a wardrobe know-how that makes for short-cuts; a film library that gives them access to reels of "stock" shots that may be inserted as program material when needed or may be used as back ground in a "process" sequence. They also have thoroughly trained and experienced crews very familiar with television problems.

It is only natural that intelligent application and use of already existing resources can bring shooting costs down with very little, if any, sacrifice in movie quality, so that TV film programmers can economically compare their cost with that of live production.

The arguments between proponents of film, as against live programs for TV, will no doubt go on for some time. In the end, the viewing public will probably be the guide as to whether the *immediacy* component of live production is important or whether the over-perfection of a motion picture loses any of the *spontaneity* present in live programs. They will also decide whether their appetite for a program is lessened because an announcer tells them, "The following program is on film," and station owners, film program producers, and others must prepare to follow this judgment.

KINESCOPED PROGRAMS

The kinescoped program is the "electrical transcription" of television. As now used, this type program is photographed from the face of a viewing tube at the time a program is presented as a live TV show and shipped here and there for release on other stations at another time.

Under present conditions the kinescoped program is serving as a "stand-in" for network operation. It has several other advantages—and some disadvantages too. Proponents of film for television claim that a kinescope film at this time has a fidelity of resolution up to ninety percent that of motion picture film. This may be true, but just the same, the viewer is getting a pretty fuzzy picture on his receiver from the average kinescoped program presentation. This may be due to a variety of reasons, which are not necessarily any fault of the film. When a program is kinescoped, it is photographed from a tube that is connected directly into the monitor line. That is, it is viewed directly from the camera and not after it has been transmitted. Even so, the picture has been subjected already to variations and adjustments of light and focus. It has been controlled. Any small lags in correction for over or under lighting and out of focus

corrections are obviously photographed on the film. When this film is transmitted, the image is again controlled. But this time, in addition to controlling for the normal light values, it must be controlled for the lags, the blooms, and other effects which were photographed onto the film because of the original transmission. All this has a cumulative effect. By the time it is viewed by the home viewer on a receiver that is far from perfect in resolution at best, it has built up every distortive effect that was present in the original. The net effect to the viewer is a much fuzzier picture—especially when you add the ten percent lack of fidelity that is admitted at the beginning. Time, experimentation, and improved techniques will no doubt raise the quality of the kinescoped program.

The greatest advantage enjoyed by this type program is one of time. It is possible for a sponsor to present his show live in New York City at 8:00 P.M. Sunday night and then present his show in Los Angeles at 8:00 P.M. Sunday night a week later. Although this is a lag of a week in presentation, it does establish this sponsor and show at the same time on the same night in each locality. This establishment is very valuable to the sponsor who relies on the listening habits of the viewer. It has been proved an asset in television as well as in radio.

How network operation will effect the kinescoped program, we cannot tell for sure. Obviously, if the sponsor presented his live program from New York on a network, he would be received in Los Angeles at 5:00 P.M. or in the summer at 4:00 P.M. due to time zoning variation. Not as many people want to tune in at 5 o'clock as do at 8 o'clock; therefore, a sponsor will not look with favor on such an arrangement even though the Los Angeles audience has the advantage of viewing the show as a live telecast. Radio solved this time problem by indulging in the "repeat" broadcast, but the estimated cost for the use of the coaxial cables,

or whatever facility will make up a network, is so great that "repeats" are an economically unsound practice. The chances are that, when network operation is a reality, a middle ground will be settled upon that will find one or two time zones taking a program at the time of live presentation and the remainder receiving it on a delayed basis via kinescope.

The kinescope program has another advantage enjoyed also by program on film—it can be edited before being presented again. If there were undesirable effects, words, or devices transmitted in the original presentation, these could be cut out of the kine film before running. No substitutions could be made, or other sequences inserted, but at least glaring faults that might exist could be eliminated.

Just because a sponsor kinescopes his show does not mean he has a show that he can use forever. The musicians Union (AFM) are even now considering a rule that will allow a kinescoped show to be repeated only within a thirty day period, and then it must be destroyed if members of the union are participants of the show. It is probable that other crafts will make some sort of arrangement such as this when they make their agreements with station owners. So the kinescope will wind up as a means of delayed telecasting where it is inopportune to release a program at the time of live presentation, the same as electrical transcription in radio.

OTHER FILM USES

One additional possible use of film that may turn out to be a distinct advantage to TV programming lies in the quick developing process. Some people hold that it is a solution to all editing problems for television.

In this process, the program material is not photographed with a TV camera at all. No matter whether it be a sports event or a studio program, the material is photographed in a camera which is loaded with newly-developed high-emul-

sion special film. This film is capable of being developed so rapidly that it can actually produce a useable negative under two minutes from the time it is shot. From this development, it would pass through the hands of a viewer-editor who could strike out undesirable portions or substitute a shot from another camera and still release the program to the audience with only a two minute lag. This procedure would be hard on the viewer-editor and is a very expensive practice. However, it has been done in actual tests, and a program has been filmed and edited and reached the air a minute and one-half after performance.

DOUBLE EXPOSURE

Some experimenters have gone so far as to attach to each television camera used, a film camera fixed so that whenever the TV camera is activated, the film camera will also function. This way, a delayed-broadcast film is prepared at the time of a live telecast, and the distorted effects, mentioned under kinescoping could be lessened or eliminated by editing. The system presents many additional problems: expense, manipulation of cameras, corresponding lens and focus problems, and others. Being still experimental, this process remains for the future, and it is too early at this time to comment on its practicability for general use. Certainly, it has a basis for trial in that it could very well bring about the use of film for every operation in TV, which statement leads into the ubiquitous argument of live shows versus film again.

PART III

BUSINESS ASPECTS OF TV

CHAPTER XIII

STATION OWNERSHIP

It is not within the scope of this volume to analyze the processes by which an individual or a corporation can apply for, and receive, government permission and allocation of a channel for the transmission of television. There are law firms existent which make a specialty of this type of work, and it is up to them to dictate for their clients the procedures that must be followed. Needless to say, it must be thoroughly proved to the Federal Communications Commission that the applicant for a permit to televise is adequately financed ("adequately" is a mild word for it) that he is thoroughly prepared to start building at once when his permit is granted. Indeed, fully detailed plans for the building and equipment must accompany the applications. The applicant must prove that the channel grant will be in the best interests of public service.

It is a fact that an applicant is obliged to consider every angle of starting a new station before he draws up his application. He must be certain that he is prepared financially to purchase the necessary apparatus that will get him on the air. He must be prepared to operate this equipment with complete personnel and programming hours as set up by the Commission for a year or more, at a financial loss if necessary. He must be certain that the location of his transmitters will adequately serve enough viewers so that once he is in operation his station time will attract sponsors whose advertising will make the venture profitable.

The applicant must decide for himself how many hours per week he can operate economically, for upon the number of hours he intends to operate depends the design of his studios and studio equipment. If he has access to many sports events or other ready-made programs, he may start with smaller studio space for rehearsal and studio originations. If he has access to network or kinescoped programs, he must invest more heavily in film camera equipment than in facilities for live presentations. If his transmitters must be located at a remote point from normal program origination points in order to cover enough area, he must figure on a permanent micro-wave transmission channel and one or more mobile microwave units to get the programs to his transmitter. All these matters, and others, are the problems of an applicant for ownership of a television station.

BASIC EQUIPMENT COSTS

Once the applicant has received his permit or channel allocation, his first consideration is the purchase and installation of the necessary equipment. He must abide by the specifications given in his application, and he begins to work against time. The permit will presumably be a permit to build and will stipulate when the station may, and must, take to the air on at least an experimental basis. Engineering personnel for the installation of the transmitters and equipment will come along with the purchase of the actual equipment, but personnel expenses for the owner start at once. He must employ his own technical staff at this time in order that the personnel of this staff will understand and be able to operate his transmitters. During this installation period, an owner must start employing the studio personnel —cameramen, control room engineers, and technicians—so that they may become acquainted with the studio equipment and its maintenance as it is delivered.

The following breakdown of equipment costs for a major

station, and for smaller station layouts, is indicative of the fact that TV is an expensive operation. The most inexpensive TV station that may be put into service presupposes the following: The station will originate no programs whatever; the program service will come via network; the control room and transmitters are all housed in the same building; the transmitters are the lowest power (500 Watt); the operating channel will be in the lower spectrum (Channels 2 to 6).

All figures are given in round numbers and are based on current prices as established by two leading manufacturers. Labor costs are estimations based on the experience of operating stations.

SCHEDULE I

Transmitters (installed)	$50,000
Spares of all tubes and transmitter parts	2,500
Control room equipment (installed)	35,000
Console	
Monitors (video and audio)	
Power supplies	
Pulse and Blanking equipment	
Test equipment	7,000
3 Oscilloscopes	
Distortion meter	
Wavemeter	
3 Voltmeters	
Sweep generator	
Audio Oscillator	
Transmitter house	5,000
Antenna (with tower and safety lights)	18,000
Labor (assorted)	5,000
TOTAL	$122,500

Note: No figures are included for the purchase of the land site for the transmitter; neither is there listed a contingent allowance for price changes in equipment or labor. A con-

tingent allowance of approximately ten percent of the installed cost of transmitter and tower should be included. (hence, add $6800.00).

If the channel allocated should be in the upper spectrum (Channels 7 - 13), the cost will increase. Add eight percent additional to the cost of the transmitters. This is due to manufacture costs involved. Vacuum tubes do not work as efficiently in the upper spectrum frequencies, and manufacturers must resort to different practices to get the rated power output from a transmitter working at those frequencies.

If the station noted in Schedule I is to be operated 50% network and 50% local, a studio and studio equipment, plus a film camera chain and a mobile unit must be added to the facilities. In Schedule II, below, is given a round-number cost breakdown for such added facilities.

SCHEDULE II

One Studio (complete)	
Audio equipment	$12,000
Video equipment	18,500
Wall treatment and installation	8,500
Lights (installed)	3,500
	$42,500
One Studio Control Room (complete)	35,000
2 Monitors	
1 Console	
2 Sync Generators	
Blanking and Power supplies	
Test equipment	
Installation	6,500
One Mobile Unit (complete)	
Truck	10,000
Audio Equipment	2,500

2 Complete Camera chains	35,000
Power Supply (Aux) and spares	3,000
Test equipment (1 scope, 2 meters)	750
	51,250
One Projection Room (complete)	32,500
2 Film Camera Chains	
1 Film Projector (still)	
Switching equipment	
Installation	
TOTAL	$167,750
Costs of Schedule I	122,500
Overall Total	$290,250
10% for Contingencies	29,000
GRAND TOTAL	$319,250

The figures given in both Schedule I and Schedule II are based on the use of 500 Watt transmitters. If the community of operation warrants fifty percent local operation, as outlined under Schedule II, it will presumably also warrant the use of a high-powered transmitter in order to give program service to the surrounding community. The cost of the 5000 Watt transmitters is approximately twice that of the 500 Watt variety.

Substituting, then, in Schedule I for Transmitter costs ($90,000 for $50,000), we find that a station can be completely installed with all necessary equipment, to operate 28 hours per week with 50% network and 50% programming (film, studio, and remote) for a cost of $359,250.00.

One other cost of this installation should be noted and is not included in the foregoing. If the site of the studio is not the same as that of the transmitters, micro-wave channels to transfer program from studio to transmitter may be

necessary. In certain cases, where the distance is not great, this can be accomplished by the local telephone company. Programs can be transferred over one of their loops, which is a specially attenuated loop carefully set up to pass the wide band of frequencies necessary. In most cases, however, the transfer is made by micro-wave links. Costs for the links may be computed at $12,500 per link. At least two are desirable. Therefore add $25,000 to $359,250, for a total of $384,250, for this type of operation.

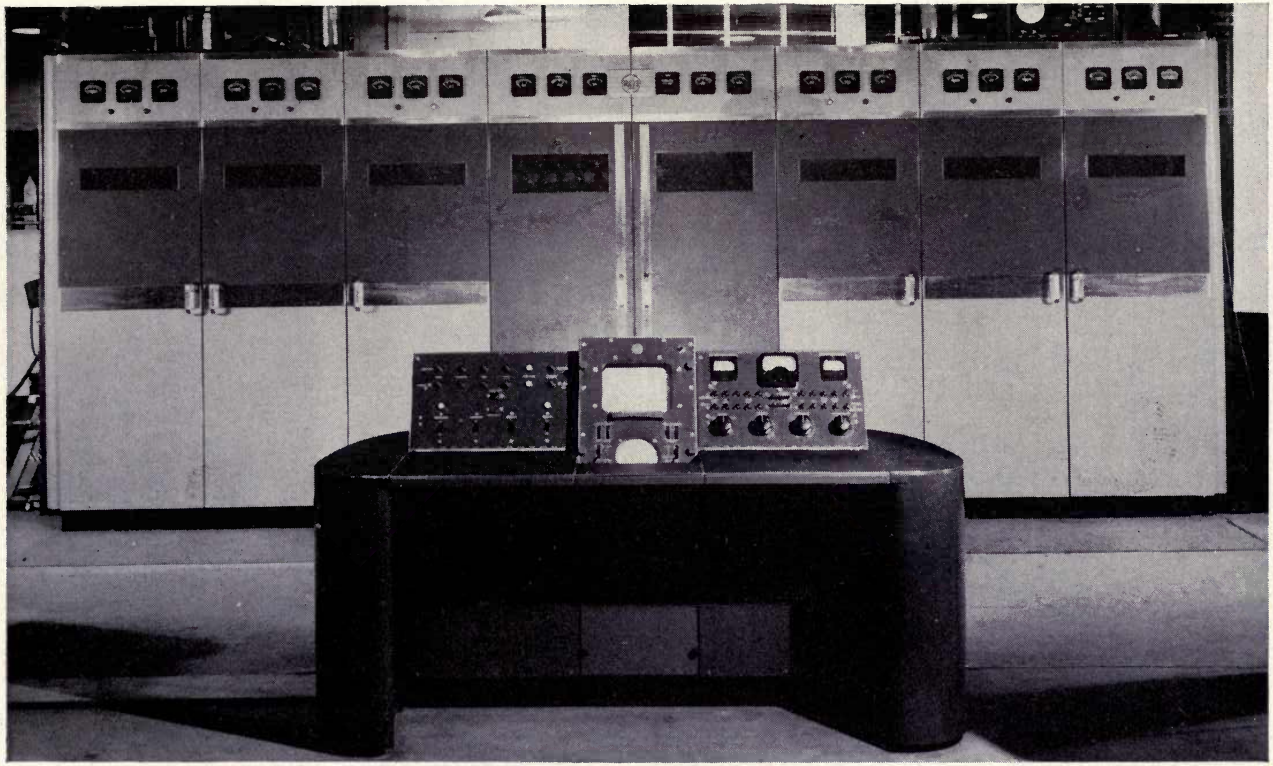
A station such as outlined under Schedule II can be installed to operate as an absolutely independent (no network programs whatever) station by adding one more studio to the facilities as outlined. This addition will also make mandatory a slight increase in the equipment for the master control and switching apparatus. It may also make necessary the addition of two more complete camera chains. However, a corner may be cut here by purchasing field cameras that can double in serving the mobile remote unit and the #2 studio.

Under these conditions, a 5000 Watt station with two complete studios, a film projection installation, and a mobile unit for remote pickup could be operated 28 program-hours per week on an independent basis at a total capital outlay for the station's facilities of $359,250.00 (from Schedule II) plus $50,000 (for added studio and equipment) or $409,250.00. Costs will vary, but let's say that safe figuring will place such a station's initial cost between $400,000 and $425,000 for this installation.

OPERATING COSTS

Schedules III, IV, and V consider the per annum costs of operating the stations as outlined under Schedule I and II.

The station of Schedule I (network programs, no local, 500 Watt power) can be operated with minimum personnel at a cost given below under Schedule III. Salaries will vary according to the locality in which the station operates, but



Courtesy RCA

5-KILOWATT TRANSMITTER INSTALLED

This transmitter can service a large metropolitan area and is equipped to transmit both picture and FM sound. Installation is 17 feet long. Console in foreground is used to monitor picture quality and sound level.

figures given are norms, based on the experience of stations already in operation.

SCHEDULE III

Station manager	$ 6,000 year
Secretarial help	2,500
Technical (chief eng. & one)	7,000
Rents, taxes, insurance	2,000
Tube replacement	1,000
Maintenance	1,000
TOTAL	$19,500

This total figure does not include an allowance for amortizing of the original equipment installation.

If this station goes into operation as outlined under Schedule II (50% network, 50% local programs, 500 Watt transmitters), then the yearly operational costs will take a decided jump. Naturally this jump in costs is due to the program personnel required to create and get on the air the occasional studio program, the news programs, and local events that are available. These costs break down approximately as follows:

SCHEDULE IV

Station manager	$ 6,500 year
Salesman	5,000
Program manager	4,000
Secretarial (4)	5,000
Producers, directors, writers, announcers (10)	42,500
Transmitter tech. personnel (3)	12,500
Studio tech. personnel (6)	18,500
Cameramen (3)	9,000
Camera tubes	3,000

Transmitter power and maintenance	8,500
Mobile (maintenance, spares, power)	10,000
Rents, taxes, insurance, office materials, expense accounts, and travel	7,500
TOTAL	$132,000

No figure is included for the purchasing of program material or any rights for same or for the rental of necessary film program. As before, amortizing of equipment must be added.

If the station outlined under Schedule II goes into 5000 Watt, two-studio operation, with remote mobile unit pick-ups, more staff is needed—both technical and non-technical. For rule-of-thumb computation of added personnel expense, add six technical and eight non-technical people at an average annual salary of $3500 each. The non-technical additions will include additional sales staff, program people and a book-keeping set-up.

Operational costs can be cut if the owner of a TV station is also operating an AM radio set-up or an FM station. This is accomplished by allowing an overlap of duties for some of the personnel. In certain cases, technical men may supervise both sets of transmitters, and maintenance men may be able to keep both sets of equipment serviced and operating. It is impossible to estimate the exact amount of saving that can be accomplished, for it will vary considerably according to the exact surrounding conditions such as union rules, working hours, and other variables. Program men may also overlap their duties from an AM or FM operation into TV also, but, again, it is impossible to set down an estimate of the savings that can be accomplished. Do not depend too much on saving great amounts because TV is very time-consuming for all personnel within it.

By the time a station reaches complete autonomy at its highest scale, operational costs are at their peak. In Schedule V are given annual operating costs of an independent operation. This schedule presupposes 100% local operation, two studios with live talent shows, film programs, remote pick-up, and embraces a complete time-sales force and program production personnel to keep the station on the air 28 hours per week.

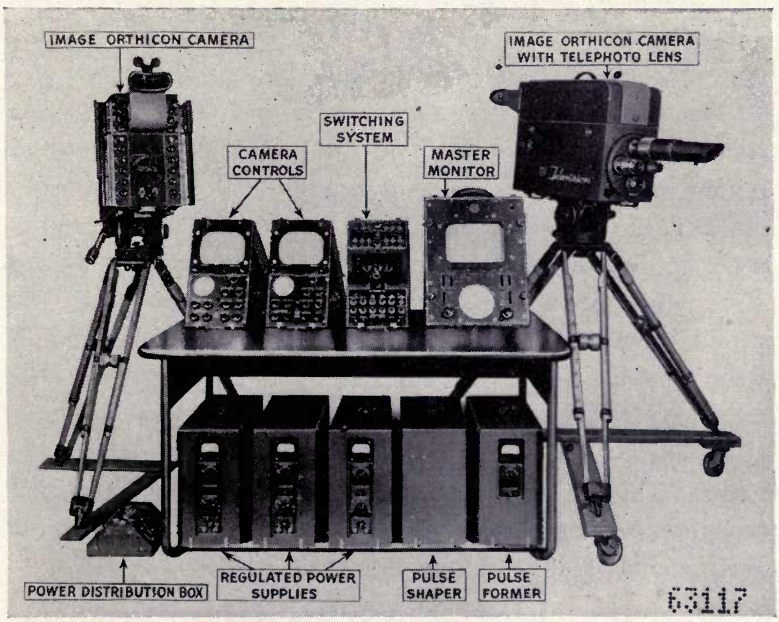
SCHEDULE V

Technical Personnel (32)		
1 Chief engineer	$6,000	year
1 Asst. chief	4,000	
2 Video supervisors	8,000	
3 Transmitter men (maint. & opr.)	9,000	
2 Film men	9,000	
10 Studio control technicians	45,000	
4 Cameramen	16,500	
6 Remote crew (including driver)	19,500	
3 Audio men	$9,500	
		$126,500
Non-Technical personnel (26)		
1 Station manager	10,000	
1 Asst. manager	6,000	
1 Program director	7,000	
4 Sales force	15,000	
10 Program men (4 announcers, 4 prod-dir., 1 news, 1 sport)	51,000	
6 Secretarial and bookkeeping	13,000	
1 Legal man	7,500	
1 Staff Artist	5,000	
1 Studio Maintenance	2,000	
		$116,500

Mobile unit (supplies, power, maintenance	22,500
Studio (power, camera tubes, program loops)	27,500
Transmitters (power, tubes, maintenance)	15,000
Miscellaneous (estimate) (rents, insurance, taxes, travel, expense accts., teletypes)	20,000
TOTAL	$328,000

Schedule V contains absolute minimums in the way of personnel. It is highly probable that a large station, operating in a locality where there are plenty of potential advertisers available, will very soon find it necessary to expand this personnel. The schedule does not contain any listed cost of program material which may be bought, nor is amortizing of equipment included.

It is safe to estimate that a large independent station will cost the operator very close to $400,000 per year in operating



NECESSARY BASIC STATION EQUIPMENT FOR REMOTE PICK-UPS

cash expenditures, depending upon local salary conditions and unions, plus depreciation. It adds up to an expensive operation, and the owner must take careful stock of the potentialities before going into any such large scale plans. He must realize that his sales force will have to sell many hours of time to cover operating expenditures and that a gradual climb to sufficient sponsorship of his programs is indicated. Meantime, the owner must be prepared financially to actually operate at a loss during the climbing period. Station ownership is a heavy financial burden, but the horizon of TV holds a promise that the future for successful and profitable operation is a certainty.

LAWS AND LEGAL PROBLEMS

As a station owner gets ready to fill his air time with program material, he will find himself up against an assortment of rather complex, and in many cases still unanswered, legal problems and governing laws.

First, he is required by law to come on the air for 28 hours per week in order to qualify, under his channel grant, as a station that can operate commercially and charge a sponsor for telecasting his message. This is a headache to the newborn station because 28 are a lot of hours to fill. In many cases, the FCC has been very lenient on this rule to let the station get started. They do this by allowing the showing of the test pattern two hours per day to count as program time. This would leave two hours per day in a seven day week to fill with program, and would all add up to 28 hours. Even the remaining two hours are a great load to the new station if it cannot at once start releasing network originated programs. Thus, in search of possible material for telecasting, the first consideration becomes the question, "Do I have the indisputable right to release this material?"

LAWS OF COPYRIGHT

Our national copyright laws give the creator of an original

work, whether it be a musical composition or a piece of written material, protection in the way of complete right for 28 years. If he should die before this period expires, his heirs or assigns, his estate, may retain these rights and, at expiration, renew the copyright for an additional 28 years. At the end of this time, the rights revert to "public domain," referred to as P.D. Radio and motion pictures have been operating under these laws for years, and television falls in the same category.

If the copyright has expired, and no revision of a work has been copyrighted, the work so relegated to P.D. may be used without permission of any kind. This holds whether it be for songs, books, plays, poems, or other published works. The pitfall to all this is that an author may, and usually does, sell his copyright to a publisher. The publisher will keep the copyright alive by revision and other means, and an unwary user of material may find that, although he can prove that the original copyright held by the author has expired, someone else holds an additional one. Therefore, in using material of any kind it is of first importance that a station owner be certain of his position and that he seek permission for use of material only from the person or company who has the undisputed right and authority to grant such permission.

In the case of a musical composition, getting permission for public performance for profit assumes a slightly more complicated complexion because the copyright here is divided into two categories: non-dramatic "small rights" and dramatic "grand rights". Procuring the non-dramatic rights to do a song is a relatively simple matter, since the composers normally allow an organization, such as ASCAP (American Society of Composers, Authors, and Publishers), to handle all such permissions for them. Every operating TV station gets automatic permission for non-dramatic right by subscribing, for a yearly fee, to all songs controlled by

the organization, and, if a song is registered there, he need seek no other permission.

However, dramatic rights remain vested in the author or the composer, as the case may be, and it is necessary to secure these rights, in writing, directly from them before a station should try performance without risk of legal action.

The dramatic rights are exactly what the name implies: if a song is to be acted, dramatized, or in production, then the user is making use of the "grand rights" of the composer. Just where non-dramatic license leaves off, and dramatic rights are invoked is a decision that has not yet been set down by any court in the land. However, it is an opinion held by many lawyers that the performance of a song on television is making use of a dramatic right, since a picture is accompanying the rendition of the song, and that someday soon a decision to this effect will be handed down from the bench. Music has a dramatic value because of sight. Another decision that has not been handed down as yet, but presumably will be, is that music on television is both public and for profit.

RIGHTS OF PRIVACY

The TV station is confronted with another law—even though it may be telecasting a sport event, a parade, or any public gathering. This law says, in essence, that no one shall use the name or likeness of an individual without the individual's consent. To do so is an invasion of said individual's "right of privacy."

You may say that, if a person is appearing in a place of public gathering, he is no longer private. But there is a fine line here that should be carefully watched. Do not allow a cameraman to dwell overlong, or in closeup, on any member of a gathering unless he is actually part of the entertainment or spectacle. Above all, never allow any person whose permission you do not have to appear in an uncom-

plimentary or unflattering manner in your telecast picture. Should you do this, you are open to legal action, or at least an attempt of such. There are exceptions to this general law, such as historical reviews and the like. But a good rule to follow is to train your personnel to lean on the safe side in such matters . . . keep their cameras moving.

MECHANICAL LICENSE

When a musical composition, or other work, is to be recorded in any way—it automatically falls into a different category as far as law is concerned. This is called the "mechanical right," and separate permission must be procured if, for instance, your televised show is kinescoped. More than often, the "mechanical rights" are included when you get permission to make use of "dramatic rights." But make sure that they are before recording.

OTHER RIGHTS

Most of the other rights and laws that govern television broadcasting are the same as for radio. A TV station must properly identify itself by call letters and location at least twice every hour and on the hour and the half hour, just as a radio station must. Accurate logs must be kept at transmitters which will show at precisely what time of day each broadcast was released. These logs must be accurate in every detail. Script of all shows must be submitted so that program content can be examined upon request by the FCC.

The station is governed by specific rules that limit the claims that may be made by advertisers in their copy. Such laws as the Wheeler-Lea Act and the pure food and drug law prohibit exaggerated or untrue claims by any advertising, and when false advertising is disseminated, the station and the advertiser are both liable to prosecution.

Do not televise the pages of a book. In so doing, you are making a copy. If you do, make sure you have permission to make the copy.

Do not allow a trademark to appear in your televised picture without permission, or you will be liable for suit.

Be on the lookout for program content that might lay you open to infringement of lottery laws. Present "give-away" shows as they are practiced on radio must be careful in this regard, and TV must be likewise. The Crap-table program idea mentioned in Chapter XI is a rather wild example along this line. But if a good program idea is advanced that infringes on the lottery laws make an attempt to bring it into line by acquainting yourself with the laws in this regard and by making the necessary format changes that will remove any objections your legal department might have. Probably some other device will accomplish this.

Don Tatum, legal counsel for one of the radio networks, reports the story of a program man who ran afoul of the lottery laws when he submitted his show to the network. He was told to go away and contrive a way to avoid the device in his show structure and re-present his idea. He advanced several devices which he thought would accomplish the trick, only to be told each time, "That isn't legal," by Mr. Tatum. Any idea that Tatum would accept seemed to ruin the show. Finally, after nearly going crazy trying to get a device that would work and still not destroy his idea, the harried program man blurted, "I get it—if it's legal, it's lousy."

This is, of course, not necessarily true. It just seemed that way to the program man. But it does point out a possible pitfall for anyone who is scrutinizing program ideas. It is quite simple sometimes to get an idea that might have great public appeal because it's out of the ordinary. However, it is that way only because other people are not doing it. Be careful.

There are numerous other rules which must be lived up to by the station, and a station owner must thoroughly familiarize himself with them all. What is set down here pretends in no way to be a full coverage of them.

Chapter XIV

TV NETWORKS

Any treatment of the network in television should properly come under the heading of things for the future since no transcontinental network exists at this writing. However, several regional nets are now in operation. The largest of these opened for business on January 12th, 1949, to link, with co-axial cable, the East Coast and the mid-west.

The television network will be basicly the same as the radio network as we now know it—that is, a program will originate at one point and be piped out to all other release points over a conductor which links them all together. Releasing stations may tap off the main line at any desired point. Originating points may be at any point along the line if the correct connecting arrangements are made.

Normal operation places originating points at one extremity or the other of the connecting link. When originating points are in between the extremities, these points are on a "leg" of the network. When the program material reaches the main line of the network, it must be fed both East and West from the point of origination.

The connecting links, in the radio networks, are telephone lines operated by the American Telephone and Telegraph Company. Each of the existing radio networks rents or leases these facilities in order to disseminate their program material and pipe it to the affiliated releasing stations.

The hooking together of stations to release television programs is not so simple because the telephone line, as presently supplied by the A. T. & T., good as it is, is not capable of transmitting the composite TV signal over any

great distance without so much loss as to make it unuseable. We have previously covered the reasons for this loss, so we will proceed to the ways and means of overcoming it. Basicly, this means takes two forms: (1) the co-axial cable, and (2) the micro wave relay.

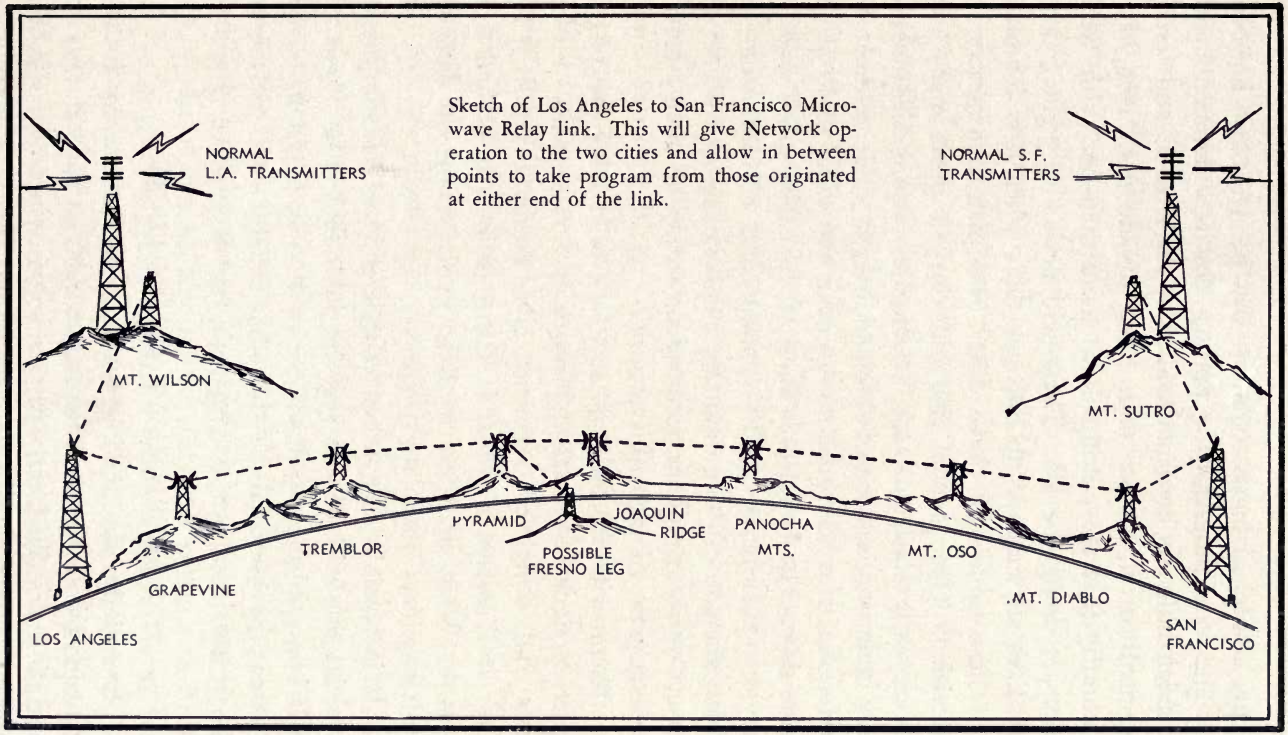
CO-AXIAL CABLE NETWORK

We have seen how useful the co-axial cable is in transmitting the video signal from camera to control room, from control room to transmitter, and from transmitter to antenna because its construction is regulated so that it presents a very low resistance to the passage of the wide-frequency signal along it.

For the same reasons, it is the most useable and reliable development to employ for the transmitting of the signal over the great distances which must be encountered in hooking together the East and the West Coasts of the United States to form a network. The physical problems which must be overcome are great. A cable, or cables, must be constructed wherein two conductors, having concentric centers, are kept a constant finite distance from one another for the three thousand mile trip from New York to Los Angeles. These cables must be element proof and must be spliced as seldom as possible. They should be installed underground—running under rivers and over mountains. Along the way, they must run in and out of amplifiers so that a signal traversing the path will get a "boost" now and then by being amplified sufficiently that it does not lose its fidelity.

In addition to the enormous task of getting the cable underground, the booster stations must be constructed and maintained. This problem will be helped by the fact that the A. T. & T. already has booster stations along the path of its transcontinental telephone circuits, and, presumably, the co-axial cable can be so routed as to pass through them.

Los Angeles-San Francisco Micro-Wave Link



Sketch of Los Angeles to San Francisco Micro-wave Relay link. This will give Network operation to the two cities and allow in between points to take program from those originated at either end of the link.

Many additional booster stations will be necessary, however.

The vast program for putting down a transcontinental co-axial cable has been undertaken by A. T. & T. and certain segments of it, as we said, have already been completed. Naturally they are putting down more than one cable while they are doing the job. There will be six to eight concentric lines all wrapped up into one cable when it is complete.

These cables will have other uses than transmission of television. One co-axial line can carry a great many telephone calls simultaneously. Facsimile picture transmission and other services may be routed over a cable without interference to other services traversing the same cable at the same time. The rental or leasing of the cables to all assorted services, plus rental to TV stations and revenue from the great amount of long-distance telephone calls, will be the means of recouping the tremendous outlay of money that is necessary to complete this project.

There will be little if any loss of fidelity of picture when a signal traverses the entire U. S. via co-ax. Present tests and completed segments give excellent results. The lines are "reversible"—that is, transmission may be had from East to West, or West to East, by reversing the boosters and amplifiers along the route.

It is possible that, when completed, the transcontinental co-axial line will have a segment in it that is not co-ax. If it is impossible to lay down the cable over a certain terrain, this can be overcome by the other reliable way to transmit the video signal over a long path, the micro-wave relay.

MICRO-WAVE RELAY LINKS

Essentially, the linking together of stations to form a network by use of the micro-wave relay is the same as the operation described early in this volume, in which a mobile unit was picking up a baseball game. There is much more to the operation than the one "hop" described, however.

Since numerous "relays," or hops, are involved if a signal is to be transmitted over any great distance, each relay point must be in line-of-sight of two others—one point from which it receives the incoming signal, and the other to which it re-transmits, or relays, the signal. Remember that the "line-of-sight" necessity holds good here, for relay links are licensed to operate on even higher frequency spectrums than the channels with which we have already dealt. The "no-bend" characteristic of the ultra-high frequency wave is still with us.

Equipment has been developed and is operating that can set up a relay link in the spectrums allocated near 2000, 4000, 6000, and 7000 megacycles although some relay work, notably mobile-to-station work, is done in the spectrums as low as 600 and 900 megacycles. The apparatus used at the higher frequencies, such as 7000 mcs., is especially adaptable to mobile and relay work because its design is compact, and components such as the "dish" antennas that are used to keep the signals on a narrow and concentrated beam are easy to handle and relatively small in size because of the short wavelength (high frequency).

For a relay link that will forward a signal from East to West or vice versa, a tower is constructed on a mountain top, or other high vantage point, that is in sight of the origination point to the East. Ideally, it will be thirty-five miles from this point—though greater distances are useable. The origination point will transmit the signal to be relayed by focusing the transmitter's reflecting dish antenna carefully on the tower of the first relay point. Relay point receives this signal by pointing its receiver's antenna to focus on the origination point. Signal is then amplified and fed into a transmitter also located in the tower, but whose antenna and dish are focused on a point to the westward where the next relay station is located within line-of-sight. At second relay station the process is repeated. Signal is received, amplified, and re-transmitted westward.

Obviously it is possible for a station along the way to pick off the transmitted signal as it goes by, and, thus, become a releasing station of the network. It is simply a matter of having an additional relay transmitter alter the course of the signal to send it to a releasing station while the normal transmitter continues to send the signal westward.

Then it is possible to put together a network of any amount of participating stations on a reliable basis by use of a skyway. Engineers further claim that these channels can also carry other services, as a co-ax can, without interference.

Some regional networks are already in service making use of the micro-wave relay. New York and Philadelphia have been linked thus for some time. New York to Boston and Philadelphia to Washington, DC., are also working. NBC and RCA have been transmitting experimental pictures over a relay from New York to Schenectady since 1941. There may be such a link in operation by the time you read this book, from Los Angeles to San Francisco, a distance of some 400 miles. This radio relay could be a "leg" which, if desired, might be tapped onto co-axial cable that might start in New York City and terminate in Los Angeles. Inter-mingling of the two systems to get a network together is perfectly feasible.

STRATOVISION

One other method for hooking distant localities together as a network has been demonstrated with more or less success and has great possibilities. This idea was advanced by Westinghouse Electric Corporation and furthered by Glenn Martin and his airplane company. The method is a variation of the micro-wave relay, and is called Stratovision.

Under this system it is not necessary to have relay stations every thirty-five to seventy-five miles along the way. Instead, an airplane, completely equipped with microwave receiving and transmitting gear, flies over a territory at a height of twenty-five thousand feet or more. Because of this height, obvi-

ously, it is in line-of-sight of many miles of land terrain so that its receivers may pick up a signal that originates up to three hundred miles away (approximately) and amplify and retransmit this signal to the entire terrain within an area nearly five hundred miles in diameter.

During the World Series of baseball in 1948, this system was tried and rooters in Cleveland were able to watch their team perform in Yankee Stadium, New York, with pretty good, if somewhat variable, quality, on their receivers in Cleveland. The plane was picking up the signal beamed by micro-wave from the stadium and retransmitting it to Cleveland while flying over a point about midway between the two cities. As stated, this was only an experiment. But it proved that such a system is workable.

Proponents of Stratovision believe that by using twenty planes, a program originating in Hollywood could be transmitted to the entire United States and Canada simultaneously. Each plane would release the program material on a channel which the viewers can receive and, at the same time, relay the program to the next plane on a micro-wave channel.

One can conjure up all sorts of stumbling blocks such as storms that down a plane, thus destroying the network or interrupting its operation, but there is no telling what the practical application of such a system might do for television once it has been further perfected. It points out that there is no end to the ingenuity which is pouring into TV from every angle and which will surely give us network operation for TV, if we want it, in relatively short order . . . probably late in 1950.

PROGRAMMING PROBLEMS

Anything we set down here at this time about how network operation will affect station programming is conjecture. The only guides are the precedents established by radio.

Radio has indicated that network operation is profitable to the affiliated stations. Surely it is a great boon to the small

station owner who, because of his location, does not have access to great facilities for program production or has no "name" or experienced talent at his fingertips.

Because network origination points are located in highly populated areas where the show business also keeps headquarters, it is evident that the network program will greatly increase the quality of the program material available for release by the "local" station. This, in turn, makes the air time during which the local station is not hooked to the network more valuable to him. The local advertiser is much more willing to spend when his program, or commercial, can precede or follow the high quality, popular network show.

It is supposed that it will work exactly the same in television. A local station will make its time valuable by carrying the "big time" shows which originate in the big production centers—presumably New York and Hollywood. The network reimburses each affiliated station on a per program basis for every sponsored show which he releases. Several of these, released per day, will pay expenses. Station profit will come, then, from the sale of local time to the local advertiser. The station will be gaining also because it will not have to install the extra facilities necessary for local program originations that would be necessary were he not hooked to a network several hours a day.

There is one drawback to this fine sounding Utopia, however, which we have mentioned previously. This has to do with the time zones which exist in the U. S. today.

The greatest *available audience* potentiality has been proved to exist between 8:00 and 10:00 P.M. in any locality. Sponsors wish to have their program reach as many viewers as possible, naturally. Even though rates charged for station time may vary according to the time of day, as they do in radio, still the cost of producing the program itself, with its attendant talent costs, is the same for the advertiser no matter what time of day it is. Nevertheless, a program cannot originate and be released

in New York at 8:00 P.M. and be simultaneously released in Hollywood at the same time by the clock. It is 5:00 P.M. in Hollywood.

Conversely, if a program originates in Hollywood and is released at 8:00 P.M. there, it will be released in New York at 11:00 P.M. Of course it is released in several other time zones within the "peak" listening period, 9:00 P.M. in the Mountain states and 10:00 P.M. in the Central states.

Radio licked this whole problem by indulging in the "repeat show" practice. Under this setup, a *show* may be performed in Hollywood at 4:00 P.M. It is fed in to the network but is not released in either the Pacific or the Mountain time zones. It probably starts being released as it hits Chicago and the Central Times zone, where it gets into the listener's home at 6:00 P.M., and continues eastward where it is released in New York and other localities in the Eastern Zone at 7:00 P.M.

Three hours later, in Hollywood, the show again is presented just as it was the first time. This time it is released in Hollywood and the Pacific Time Zone at 7:00 P.M. and in the Mountain states at 8:00 P.M. Such distribution gives the sponsor his best time-of-day release in all localities, and the extra expense involved is a very small percent of the total cost of the whole operation.

A similar process for television, however, does not appear to be probable. The problem is mainly one of costs, although there are others.

The amount of facilities needed to repeat the network TV show are great. While a show is being fed eastward, it is also necessary for a TV origination point to be supplying the program for the Pacific and Mountain zones. Thus double staffs of personnel and double studio facilities are made necessary to complete only one chain. Further, there will be available only limited co-axial channels, and it will no doubt turn out to be such an expense to repeat a show, which will also

tie up one transcontinental line in order to use only part of it, that some other arrangement will have to be settled upon besides the repeat show.

What the actual cost to user of the network services, which A. T. & T. will supply, will be, is not known at this time. It can only be supposed that, because they are so expensive to install and maintain, and because there will be a competitive demand for their use, that their rental or leasing will be rather costly.

One solution to the network time problem seems to lie in the use of "daytime" programming, as initiated by radio. For instance, it will be plausible for an origination point to feed program to a network from either extremity during the daylight hours and reach a practically even norm of viewing homes in each time zone simultaneously.

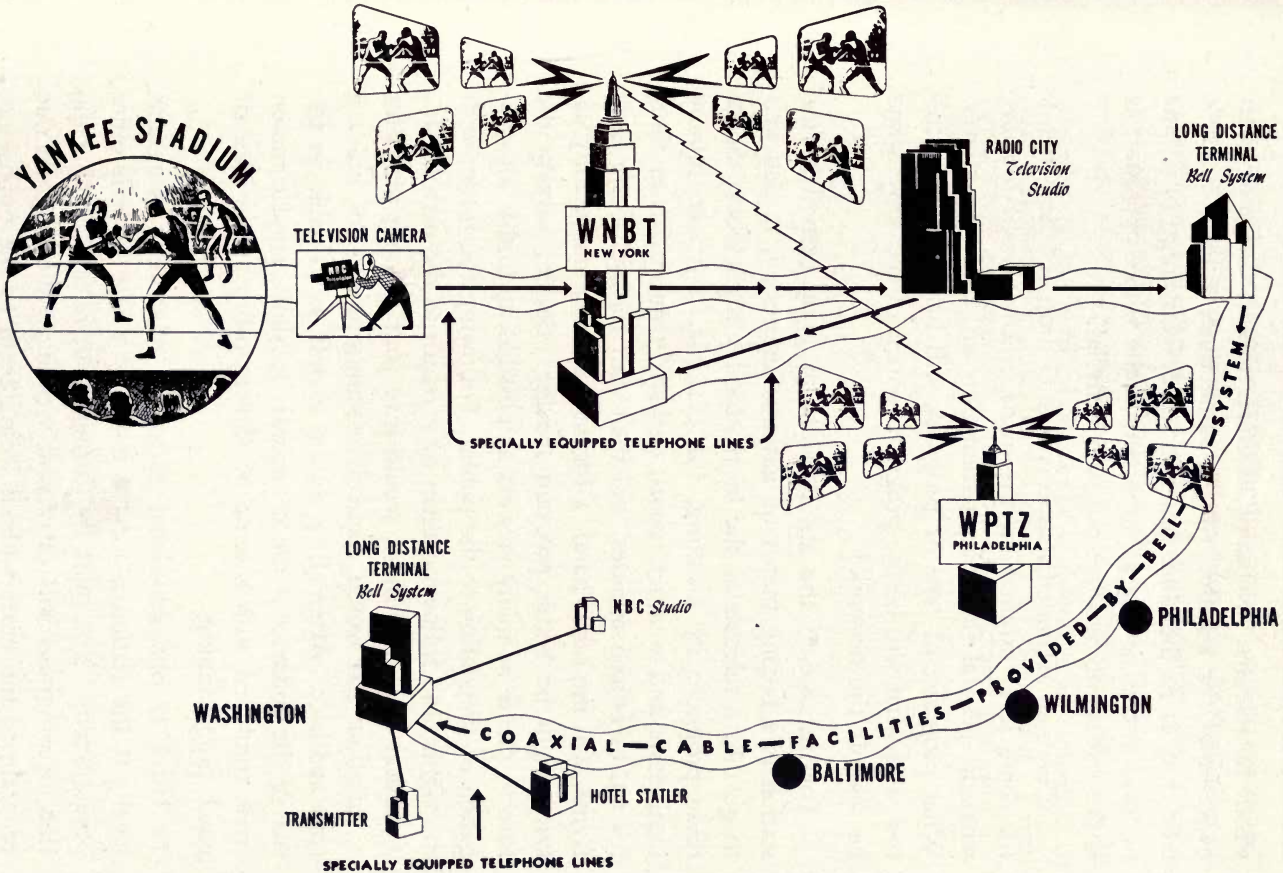
Thus, New York could originate programs for a segment of two continuous hours and, by reversing the network, get respite and prepare for more later while Hollywood originated for a two hour segment. This would lighten the load at either end so operation would be at least practicable, and the affiliated stations along the line would get a continuous flow of programs.

Thus, the afternoon and early evening hours could be serviced by network programs on a straight through basis with no repeats, and the stations could "unhook" from the network and give service to the local advertisers and public during the later evening hours in each locality.

It would seem that even network stations are going to be dependent on the local advertiser in the community for the profit or loss of station operation.

AFFILIATED STATION PROGRAMMING

No station manager should lose sight of what the station means to a locality in which he operates, and he should accordingly, keep a watchful eye on the flow of program



PICTURE PATH OF PRIZE FIGHT TELECAST

Originating in Yankee Stadium, New York City, picture is routed into network facilities and released along the way by affiliated stations.

which he releases. Networks consider this in designing their own shows for release. At the same time, a local station's first duty is to the community it serves. Coverage of events of local interest is just as important in the whole operation as is the release of network program material.

Where an affiliated station is able to drop off the network for some local origination, the management should consider what the general flow of programming will be to the viewer. What program, or type of program, will his origination follow, and what will be the program content of the show when he rejoints the network?

For instance, if the last network program carried by the station is a boxing match of national interest, it is not well to go into a telecast of the local Monday night bouts. Space these programs by inserting, for example, a fifteen minute local news and weather report, perhaps a musical film short for ten or fifteen minutes, and then start release of the local fights. On the other hand, a forum discussing community affairs might be better program spacing. Besides varying the fare to please as many viewers as possible, it fulfills an obligation of the station to the public. Following the forum with the fights, and following them by a return to the network for a musical or variety show, would give your evening programs a variation that would stand a maximum chance of holding your audience. After all, a station is only as valuable as the size of the audience it can command. In short, good common sense combined with a sense of showmanship are in back of good programming.

There is one additional factor in scheduling programs locally if the station is located in a city where there is other programming. You must try to route your releases so that the flow of programs will carry your viewing audience from one program to the next, without losing them to the opposition. With novelty wearing off and competition coming up, every

effort must be made in programming to the end that you will hold your audience. The bait with which you do this is the releasing of a variegated supply of entertaining, educational, instructive, attention-holding programs.

Just what this mixture is will depend a great deal on the community, but the station owner or operator as a member of that community should be well aware of the public "pulse" once he is in operation. Reading of his daily mail will tell him a lot.

Chapter XV

TELEVISION IN THE THEATRE

It is still too early to be able to tell what television will have to do with the theatre or how it will affect it. Much experimentation has gone on in all connecting fields, and as yet no finite ends are in view. So all we can do at this time is consider the situation as it now exists and try, through analyzing the experiments, to explore the possibilities.

"Big Screen TV" has already been tried in motion picture theatres and has been found to be perfectly workable. Several experimenters, notably RCA and the Warner Brothers Studios, have presented TV pickups to theatre audiences with some success. Some theatre chains have applied to the FCC for permission to link their theatres together so that they may present their feature pictures simultaneously in several cities on a "closed circuit" basis. This would solve a few problems for theatres in that each theatre so connected would become a "first run" house. One film print would serve numerous theatres, and distribution of film would be simplified. On a closed circuit basis, the film would be released only to the theatres connected and not released for public viewing via normal TV channels.

The FCC has not acted on these requests, just as they have frozen all requests for channel allocation. The Commission has indicated that it is best to pause for awhile in order that further study of the entire matter can be undertaken. The study has to do with color television and allocation of channels within a higher frequency spectrum than is now in use.

The color study will affect theatre television to a considerable degree. Normally, these days, the bigger pictures put out

by the major studios are done in technicolor. A theatre audience is used to seeing its favorite stars in natural color and in surroundings which carry natural colors as viewed by the eye. Present day television does not have the color components. Thus, any motion picture televised to a theatre network and released to the screens for viewing in a theatre, would certainly suffer much by comparison. The black, white, and gray character of the screen offering would not make a favorable impression on the audience compared with the vivid colored offering of the technicolor film.

Such reactions on the part of the audience would lead to a falling-off of attendance and would cut down the money-making possibilities of the film for the releasing company. Since any major film offering is extremely expensive to reproduce, it is necessary that such film have a good "run," that is, be popular enough to draw a sizable audience over a period of time, for only under these circumstances can a producing company get its return and possibly show a profit. Unless experimentation can bring forth a process for televising film into theatres that will bring up the quality, or unless color becomes feasible and licensed, it is our feeling that theatre televising of films must wait.

PUBLIC EVENTS IN THE THEATRE

Another angle to theatre television is brought up by the possibilities of televising important national or local events which are being released by the normal television stations in a locality. Important events such as political conventions, title boxing bouts, football, etc., may keep possible theatre patrons at home with their TV receivers. The theatre, then, to compete, must try to present some of these important entertainment features in order to survive.

That television and motion picture theatres are competitors in this regard is already more than evident. TV is keeping at home thousands of people who are potential patrons of the motion picture show, and surveys made up to this time in-

dicate a terrific falling off in attendance at the theatre among those who own TV receivers. This situation is alarming to the theatre owner who must think up ways of combating it.

Duane Jones, a New York advertising agent, recently took a sample poll on what television was doing. He questioned 4,500 New Yorkers who had TV sets and had been viewing for some time. Among other things, his sample shows that:

48.5% read magazines less
58.9% read fewer books
80.9% were going to movies less
92.4% listened to less radio

This does not mean 80.9% of the set owners have stopped going to the movies but that they go less than before. Just the same, such an indicator must be a great worry to the theatre owner.

As theatre applications have already been made for sufficient circuits in order that if a title boxing bout, for instance, is scheduled, the theatre owner could pause in his normal film schedule to put this bout on the screen of his theatre at the time it was going on. Thus his patrons would have the advantage of seeing his film presentation and still would not miss a big event, which they might, otherwise, stay at home to view. Meanwhile there is a big economic problem here which is affecting one of the nation's greatest businesses, the moving picture theatre.

Meanwhile, television stations are making a legal point of the fact that their programs must not be picked up and released within theatres or, for that matter, at any other place where an admission is charged. There is even a legal problem involved in the releasing of the TV picture in a bar or similar gathering place. Some tavern owners have attempted to install a "juke-box" television set where it is necessary for a customer to deposit a coin in the receiver in order to see the picture. Since this procedure has many legal ramifications,

including those covered by music copyright and others, the juke box operators have temporarily dodged the legal aspects by allowing the picture to appear on the screen just by turning to the channel, but it requires the dropping in of a coin in order to hear the sound channel which accompanies the picture.

The theory is that, according to license, the TV station is making use of the air that is free to all. It must, therefore, disseminate its program material accordingly—with no charge. The theatre, then, falls into this category if it picks up a program that is being presented on a normal TV station and releases it on its screen. Presumably the patron of the theatre paid to get in only to see the film presentation, and the television pickup was simply an added attraction. All the same, an admission was charged. This part of the problem would be solved if the theatres would be allocated micro-wave channels so that events could be transmitted to the theatre just as a mobile unit transmits them for the TV station.

ECONOMIC PROBLEMS

The advent of television into the home will vitally affect the motion picture theatres. This is the basic reason why major film producing companies cannot release their high grade products, which cost them millions to produce, to the normal TV stations for programming. No one who owns a receiver would bother to go out to a theatre and pay an admission charge to see a picture that he could see in the comfort of his own home without charge. Since this is true, the theatre owner, and in back of him, the film producer, are threatened by TV in a rather alarming way.

The motion picture producer can perhaps come out all right because he can turn out film especially for television, which will make a profit. He can develop new stars for TV—stars who will not cost him the high salaries that are commanded by the motion picture stars he has already built up. He can

make use of the same facilities which he has for the producing of films for theatres and turn out film for TV at the same time he is turning out the costlier productions for theatre consumption.

Mr. Samuel Goldywn has recently said that, if the motion picture producers attempted at this time to fight it out with television, it would be the movies that would take a licking. He sees an amalgamation of the two that will be beneficial to both. In addition, he puts great stock in a device called *Phonevision,* which can show motion pictures in the home via TV for a nominal charge. The charge will appear on the viewer's telephone bill. We will speak more of this device in the last chapter of this book when we look into the possible future.

SPORTS

The boxing promoter is somewhat of a theatre man, too. He is presenting a show for an admission charge. So far, it cannot be proved that the simultaneous release of his show via television has cut down his gate receipts. On the contrary, TV has so popularized prize fights that it has manufactured additional boxing fans who will, from time to time, go to the arenas and pay admission in order to be present in person. Presumably this fan would never have become a paying customer if it were not for television. Practically the same is true of major league baseball. The promotors cannot prove that gate receipts are down because of the fact that the big games are released via TV. However, baseball and other sports have an avenue to recoup any possible loss of revenue that a motion picture theatre does not have. The sports events can charge a televising company a fee for "right" to telecast. The TV station is happy about the whole thing because if an event is of sufficient importance that it can command a "rights" fee for telecasting, it is of such importance that a sponsor is glad to foot the bills for televising costs. The station thus gets

a good sponsor on his roster, and the promoter adds a profitable fee to his gate receipts

LIVE DRAMA

The televising of a legitimate play could seriously affect the monetary return of the play's presentation in a theatre. The management depends on a full house of paid admissions each night to keep the play running, the acting fraternity employed, and the gate receipts piling up. A stage play is expensive to produce and it must run several weeks with full houses before it begins to show a profit. The televising of it, then, presents an economic problem which would not be fully solved even if a charge were made for rights to telecast. Employment for all concerned would be cut down because many potential theatre goers, who would see the play at home on TV receivers, would never show up at the theatre. The "run" of the play would be cut down commensurately.

It may well be, however, that a play can be televised over a network and not be released in or near the locality in which it is playing. This would allow the play to be seen by viewers in other parts of the country, would allow the producers the gain of charging a "rights" fee, and still not seriously affect the attendance in the theatre. The only effect of such a procedure that would be detrimental is that this type of release would cut down the run of the "road show" version of the play, in which the play goes to other localities for presentation.

The televising of a play directly from the theatre where it is being performed for the benefit of the people in the theatre presents a problem or two. Stage plays rely, normally, on assorted effects of lighting. A television camera, placed advantageously out front in the audience to pick up the action, would be seriously handicapped in trying to cover the stage adequately and in getting a good picture under all

lighting conditions. Experiments so far have not demonstrated conclusively that a play so televised is a great TV success. In addition, it is very difficult to place a camera, or cameras, in the audience of a theatre and not have them become distracting to both audience and actor.

The good pickup of sound poses somewhat of a problem in microphone placement. The mike must get a good perspective to be successful and at the same time not be distracting to the physical audience or the actor. In experiments, this problem has been fairly well overcome by judicious hiding of microphones about the stage and a good job of monitor engineering while telecasting.

The labor problem is present if a play is televised directly from its presentation in the theatre. There is a certain overlapping of union jurisdiction that at this time is far from being settled. As we have said before, very few of the union problems as they relate to television have been settled at all. On the other hand, union regulations for the people employed in a stage presentation have long been in effect. Where one leaves off and the other jurisdiction takes up is rather a knotty problem—so knotty, in fact, that one TV director, trying a telecast of a play, had to dig into his own pocket for more money than the salary he was receiving for the job in order to satisfy the demands of all unions concerned before the show was allowed on the air.

What television in the theatre, movie or legitimate stage, adds up to as we view it now, is that movies and plays are too powerful to be put out of business by TV broadcasting. The theatre has too much influence on the entertainment life of our people and is too big a factor in our economic life to be dealt with lightly.

A sound business basis remains to be worked out in the future, whereby television and the theatre will reach a common ground that will satisfy both mediums and make one beneficial to the other.

Chapter XVI

TELEVISION IN EDUCATION

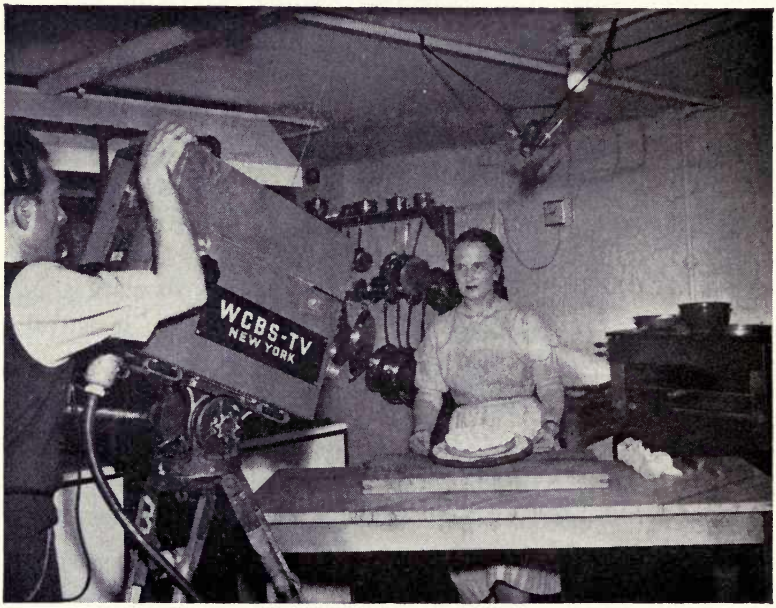
Already TV shows indications of being the greatest medium of all for the spreading of all kinds of information. Not only can it spread information in its broad form, it can also amplify and pick it apart down to the smallest detail, on a mass basis. It is a fact that knowledge can best be absorbed if we learn through our senses. The strongest two senses that we possess for the assimilation of knowledge are those of sight and sound, and they are the senses which we use to assimilate the information contained in a telecast.

Television fulfills the educational requirements on a mass basis to the nth degree. First, it is within the grasp of everyone—or will be in the very near future. Secondly, it is able to do precisely what the training film did for our armed services during the last war. Third, it can bring the top-notch educators to everyone, thus establishing a universal standard.

THE COOKING SCHOOL

Probably the first educational program to be telecast as TV stations go on the air is the cooking lesson program. There are several reasons for this. (1) It is an easy program to produce, that is, it requires only a small cast and simple props. (2) It lends itself to sponsorship very easily because the demonstrator or teacher needs only to make use of some "trade name" products to make sponsorship evident. (3) It is a subject in which at least one member of every home is vitally interested.

The preparation of delectable food dishes on the viewer's screen makes cooking seem simple. The housewife, who



THE COOKING SCHOOL

Camera moves in for close-up of cake. Since most shots in this talent are close-up, mike is fixed rather than on boom.

can easily make notes if she desires, not only knows what proportions of ingredients she should use, but she sees exactly what every step should be and what the finished result should be. By viewing such a presentation, the housewife is kept up to date on the latest methods, the newest implements, and the current offerings in foodstuff and supplies. It may be that cooking comes far down the line as education, but it certainly adds to the general fund of knowledge necessary to living, and, as such, is important.

TV is no doubt the greatest thing that ever hit the children of any generation. Everything that they see and hear is an addition to their education. Programs designed especially for the children in the home are already being used extensively by every intelligent television broadcaster. There is a double-

barreled purpose to originating such programs. The station operator gets credit from the adults for presenting good, clean, wholesome entertainment—combined with something worthwhile—that will keep the kiddies in the home, off the street, occupied, and quiet. At the same time, he feathers his own nest by creating a future audience. This is due to the fact that children in the home help determine what channel a receiver shall be tuned to up until their bedtime. If you doubt this, then you have no children.

Children are easily entertained by sight and sound. They are intent and avid viewers. Simpler forms of entertainment that are also constructive are the order of the day for the benefit of the children.

Such programs may consist of dancing school with children performing. This gives the viewing child an idea of what others are doing and what he himself could do. Programs in drawing are very popular with children and adults alike. Drawing, especially in the black and white of charcoal, telecasts very well. A clever artist can present and demonstrate his drawings in such a way that youngsters are able to catch on and assimilate techniques in short order. This encourages them to try for themselves, and such trying cannot help but benefit the child.

FOR EVERYONE

There are scores of program menus that are education disguised as entertainment. Model planes can be built and demonstrated. Bridge playing can be demonstrated and taught. Painting may be demonstrated, and a viewer will automatically absorb some of the technique which he watches and be entertained at the same time. Films that go into detail on living conditions in foreign lands are informative as well as entertaining. They bring the foreign shore right to your fireside and cannot help but increase the fund of general knowledge and tolerance.

Many people who are in a position to know already believe that there is absolutely nothing that cannot be taught by television. This belief is based on the teaching by film which the Armed Services employed during the war.

When enlisted men were assigned to specific duties, it was necessary that they become thoroughly educated in a field about which they may have known nothing at the time of enlistment, in the shortest possible time. To accomplish this, those in control of the educational facilities for serviceman training worked out a system of quick and thorough education based on sight and sound that proved itself beyond the shadow of a doubt. Training motion picture films were made and issued on every conceivable necessary subject. Instructors found that the serviceman-student was quickly able to assimilate the information which was, of course, attractively presented by the most competent of demonstrators. Not only that, it was conclusively proved out in the field that the man instructed this way retained the information far beyond the norm of retention for average high school and college study.

Now whether it is on film, or done live, television can, and is doing precisely the same thing. The U. S. Navy, for example, is continuing the processes set up during wartime via the film methods and is beginning to use television. At the Navy Special Devices Center on Long Island, TV lectures, which are piped out on a "closed circuit" via coaxial line and micro-wave facilities, are being viewed by classes at the Merchant Marine Academy several miles away. Here they are experimenting to determine, for instance, what the best size of viewing screen for a classroom will be and what the best design for a TV class room will entail. They are trying out a "talk-back" system whereby students that view, even though they are miles away, may ask the instructor questions as a lecture or demonstration proceeds.

ADVANTAGES

Probably the greatest advantage of teaching by television is that every student has a front row seat. No matter how large the class may be, he may observe every movement of the instructor clearly and distinctly. Also, the TV camera can come into close-up at will, thereby scaling the article, device, or project being viewed, up or down, so that it will appear on the classroom screen at exactly the proper size for most effective study by the class.

A closely allied advantage to TV instruction is the fact that an instructor who is first-rate in his subject can teach a very great number of students. This is a great time saving arrangement, for it makes unnecessary a time lag that would be present if an expert had to take the time to teach other instructors so that they, in turn, could teach classes. It also eliminates the "second-hand" teaching that often exists under normal conditions of education. Every student gets his information from the authorities.

Another advantage lies in the fact that there is an enormous flexibility in the choice of instruction material. The lecturer can change at will from maps to motion pictures to film strips to slides and back to working models or artwork. There is no limit to the flexibility which can be arranged. The student sees exactly what the instructor wants him to see in fine detail.

Although television is showing promise of a better type of instruction, its advent is not going to eliminate the teacher. On the contrary, it permits use of local laboratory instructors and assists them with the best of lecture or demonstration help. Money saved by allowing one instructor to service the large classes that exist in our presently overcrowded schools can be put to excellent use in further developing the TV methods and equipment. It can help make available to the student, assistant instructors who may further the detailed teachings by intense coordinated follow-up instruction, which

will impress the subject matter on the student in the fastest possible time.

Such intensity, in addition to saving time, is certain to make for a high percent of retention on the student's part. Actual figures will soon be available from sources where these tests are being made which will show the results and the teaching techniques that have developed.

IN MEDICINE

The medical profession is already reaping the rewards of knowledge gained by use of TV. While this facet has gone little farther than the experimental stage, it is making strides that rival the telecasting industry itself.

Medicine in general, but surgery in particular, lends itself to televising with great advantage. The student doctor, or surgeon, can go through his courses of book learning and be thoroughly prepared for work in the field. But the minute study of an actual operation is of invaluable help when he nears the finish of his studies. It is seeing the practical application of means and methods at work that will round out his years of preparation.

Also, the experienced and practicing surgeon can gain much by observing first-hand the application of new methods and techniques. His education is never completed in a profession which constantly strides forward with experimentation.

The most delicate and complicated of operations have been observed for years by students and practicing surgeons from a close balcony overlooking the operation. But television can observe one with a minuteness never before realized. We do not mean that you, as a viewer, are going to turn on your set some evening and be confronted with a close-up of an appendectomy. This televising is being done on the privacy of the "closed-circuit." Thus, it is released only to such audiences as are set up specially to view it.

As we go to press, a large scale presentation of this kind is being arranged for the yearly convention of the American Medical Association in Atlantic City. Radio equipment manufacturers and existing TV broadcasters are making available the necessary apparatus. Since it is being done on closed circuit, color television is being employed. Continuously, for the four days of the convention, actual surgery, diagnosis, and other medical procedures will be videoed in natural color while being performed by the faculty of the medical school of the University of Pennsylvania and the staff of the Atlantic City Hospital. The picture will be picked up at the Atlantic City Hospital and sent over a micro-wave channel to be picked up and shown in the convention hall where all attending physicians may view it on large screens placed for the purpose. Some twelve thousand viewers will thus expand their fund of knowledge, which cannot help but increase their effectiveness within the profession, and thus do a lasting good for the people of the world.

OTHER APPLICATIONS

There are several other applications of television now in use, and, although they do not necessarily fall under the heading of education, they do approach it and deserve mention here. One of these makes use of a TV camera which contains a much smaller version of the iconoscope than is used for TV program pickup. RCA has developed an Ike that is a two-inch tube which operates with remarkable fidelity under a variety of conditions—and gives a very good 250 line picture. Known as the 5527 tube, it can be made into a camera for a small fraction of the cost which we noted earlier in studio cameras, and, thus, has a variety of industrial uses.

For instance, several of the airplane manufacturing plants make use of this little seeing eye in wind tunnels where it would be too dangerous for a man to enter during tests of

airplane parts. A camera focused on test instruments inside will continuously pick up information and send it to a remote viewing screen where it can be viewed in perfect safety. Any special part or piece of equipment can be minutely watched while under actual test.

During the atomic bomb tests at Bikini, this type of TV viewing was put to use. On shipboard, several TV cameras were pre-focused on target ships and into the sky to view the cloud cone. Thus, personnel was able to watch everything as it happened and still remain in the safety of the shielded viewing quarters. Valuable information could be reported as viewed from many different angles and positions. Under these condiitons, dangerous experiments lose their danger.

The two inch Ike may be sent aloft in a robot plane or missile and will transmit back to those on the ground a visual account of what is going on inside, how the test instruments behave, or a picture of the terrain over which it is soaring. Being small in size, it has no equal as a seeing eye in such experimentation and can be operated with such a small amount of associated electronic gear and circuits that it can be included among the testing equipment for all sorts of experiments.

Some manufacturing plants, where military equipment which must be of a secret nature and guarded is manufactured, are making use of the small TV camera to examine every person or workman who passes through the entrance gate to the plant. An observer, seated at his office desk in another part of the plant, can thus check on the identity of everyone who passes. Also, from time to time, he may view any part of his plant and watch it in operation by the simple expedient of throwing a switch which actuates a small camera installed for this purpose.

Even business men who operate large business offices make use of some variation of this TV operation, where-

in, for instance, an executive may call downstairs to a filing room and have an attendant place in front of the camera the copy of a certain contract or agreement. He sits in his office, with no loss of time or wasted movement, and views any or all clauses of the agreement he may wish to see.

There is no limit to the applications of these practices, and so far only the surface has been scratched. Within the next few years, uses for the seeing eye of the TV camera will no doubt be developed that would cause us to laugh were they set down now. No application that one can think of can be discarded as being impossible for the future.

Chapter XVII

TELEVISION AS A VOCATION

Not in this decade has there come into being any other industry than television that offers such a challenge to those who wish to perform their life's work in an absorbing, exciting atmosphere. Television is a wide open field that needs the services of thousands of competent people.

Aside from the operations that have been noted in this book so far, there are several others which we did not consider, but which are important and necessary to the industry as a whole.

RECEIVER SERVICE

The beginning of the year 1949 saw in operation approximately one million television receivers. The best estimates given out by those most qualified foresee five million at the end of '50 and thirteen million sets in 1952.

The employment of the thousands of people necessary to manufacture the rather complicated receivers of today is one facet. But the result of the usage of the sets by the ultimate consumer is the creation of a very important and lucrative TV field—servicing.

In the beginning, receiver manufacturers sold their sets at a certain price and added a charge for installation and service. This latter charge is normally approximately twenty percent of the list price of the receiver although it is not necessarily based on the receiver price. Anyhow, this is the tip-off, or should be, to the person who knows equipment because of electronic experience during the war, or otherwise,

Courtesy RCA

TV RECEIVERS IN MANUFACTURE

Conveyor belt brings completed chassis to workman who unloads them for final inspection and placement into cabinets.

and is qualified to keep receivers running and in repair. The manufacturers realize that receivers, good as they are, need service. If they did not, they would not insist upon marketing their sets with this charge attached. So it is that each of the ten million sets to be put into operation during the next three years is a potential customer for the television serviceman.

Schools for training of such set doctors are springing up all over our country. Many of them have the Government backing that allows the discharged service man to attend at Government expense. These schools are well qualified to give you the necessary training and instruction that can put you into the field in as short a time as three to six months, fully qualified to repair and service the present day receiver. If it happens that you are one who went through military training in radar, guided missle, and associated electronics, then it is probable that you may be able to enter the servicing field with very little brushing up on receiver circuits and principles. Although some testing and measuring equipment is necessary, it is available so that you may accumulate what you need as you go along. It is not expensive when compared to the remuneration which starts as soon as you open doors for business. Servicing is a fertile field that will employ thousands.

STATION TECHNICAL STAFFS

The manufacture of transmitting equipment for television broadcasters employs many hundreds. Jobs are there for those whose education qualifies them for this exacting work. But the great opportunity for employment is in operating the equipment once it is installed and transmitting.

In Chapter XIII we listed the personnel necessary to the operation of telecasting and gave an indication of the salaries as they are at present. Consultation of the lists will show that each operating station must necessarily employ qualified men in some numbers—even though the station be a

TV CAMERAS BEING ASSEMBLED Courtesy RCA

Each specialized workman has a function to perform on the complicated "insides" of TV's seeing-eye.

small one. Technical men are "king pins" in the TV industry. It is a highly technical medium in every way and depends on electronics and people who know it.

A station that is on the air the minimum number of hours per week (28) and is a "local" station (not attached to a network) will need a technical personnel of twenty-five men minimum—even if the station programs with fifty

percent film or kinescope and the balance remote. A minimum personnel is nearer forty if the station telecasts any number of live studio programs in addition to the remote programs. The list contains persons qualified to perform every function from chief engineer to driver of the remote pickup truck, and includes transmitter technicians, repair men, maintenance men for cameras and studio equipment, boom men, audio monitor, switchers, studio engineer, film camera man, several studio cameramen, shaders, and camera dolly operators. With 37 television stations now in operation in this country, and 65 applications for stations now on file with the FCC, it can readily be seen that possibilities for employment in the technical parts of the field are great. At present, the pay scale for personnel ranges from three thousand to five thousand dollars a year, and more. Union regulations, not yet settled, may even raise these very acceptable salaries. Television offers the technically inclined an opportunity for employment that is remunerative, interesting, and stable.

STUDIO STAFFS

Each station, whether it be network affiliated or independently operated, must have executives at the top who are qualified to operate the program and sales departments. The qualifications are not easily come by, and no rule can be laid down that will give a course of procedure for those who wish to assume this stature in the industry. Presumably a man to be educated for such a position has already had his basic training in one of the affiliated fields—radio or motion pictures. He must know the show business, recognize a good show when he sees one, and realize the commercial value of it, as well as the artistic. If the station is network or AM radio affiliated, the chances are that the executives may overlap their radio duties with TV.

Besides these positions, there are over twenty non-technical jobs necessary to any TV operation. If the station is independent, this number is probably at least thirty and en-

compasses those qualified as announcers, sports and news men, artists, time and program salesmen, bookkeepers and staff, and assorted clerks and secretaries. Salaries in this field approach the norm as it exists in other fields. Naturally, those best qualified can command the above-average salaries. Opportunity is great because of the pace at which television is advancing. A connection made with the industry now, even if the salary be less than could be commanded elsewhere, will be advantageous to the worker in gaining advancement.

The number of directors, writers, and actors necessary to keep television going and program material flowing, is increasingly great. Very few people qualify as "old-timers" because the medium is too new. The door is accordingly wide open to the newcomer. The director who comes from radio is, it has been noted, not fully qualified. Neither is the director who comes from stage or screen. But employers cannot expect personnel to be expert at first trys. An employer is more interested in the initiative and general entertainment knowledge of the director than he is in his past credits. We gave pre-requisites for the director in an earlier chapter, but, in general, he must be a man of diplomacy above all else. In addition, he must know show values—pace, tempo, and effects. He must know the rudimentary things such as how intelligently to cut a script, how to cast it, how to time it. This much background can be garnered in radio, and if a man has a natural flair, he can learn the rest.

TV programs will gobble up a very great amount of material. Writers who can create this material are in demand. The advent of television spreads out the writing field, too. In radio, for instance, the writers, directors, and actors gather in the cities where most programs originate. These are three or four major cities. TV, on the other hand, is much more of a local operation so that every city that has a station will offer opportunity to those who reside therein

or nearby. The field of opportunity is thus spread out for the creative person whereas it is not in radio to any great degree. The writer who can successfully create, and who may have a new approach which would otherwise never see light of day, has his greatest chance—a maximum chance—to become recognized. The actor who has never had the opportunity to display his talents, because he resided in a city remote from headquarters, now has his chance. TV actually creates local jobs for the local talent.

In addition, it creates many new jobs even in the production centers. In radio, a handful of actors work most of the radio shows. They rush from one to the other, even if rehearsal schedules overlap. However, in TV, as we have outlined, the time demanded of each operation prohibits this overlapping. Thus, the actor who held down three or four jobs in a working day can hold down only one. The remainder are then left open for his brethren. Newcomers and young aspirants will thus get their chance, and many will establish themselves and become our stars.

Television likewise offers opportunity to and creates jobs for thousands of others. Those who are competent painters, property men, costumers, and makeup men, will find that TV needs them. In cases where experienced personnel cannot be found in these and like fields, TV will train them—just as it is training people every day in all departments.

No rules of procedure can be advanced here on how one is to get in. Every situation and every locality presents a different situation. But if you have the urge, make use of every contact you can reach so that you may get your foot inside the door. Once inside, you'll be a success if you really have stuff, for TV has a wholesome respect for and will welcome those who are capable of turning in a good job in any department.

Chapter XVIII

A LOOK IN THE CRYSTAL BALL

To try to forecast accurately what television will be or what television can and will do would be foolhardy for anyone to attempt. We have already seen it mushroom up as a great industry which made use of something no one believed possible a very few years ago—sight and sound instantaneously from a distant point. Anything, then, is possible—and anything is probable. Along the way in this writing we have touched upon a few things we believed probable. Certain of these we can foresee coming upon us in the very near future. This last chapter is a summation with a little guess work and crystal-gazing added.

COLOR TELEVISION

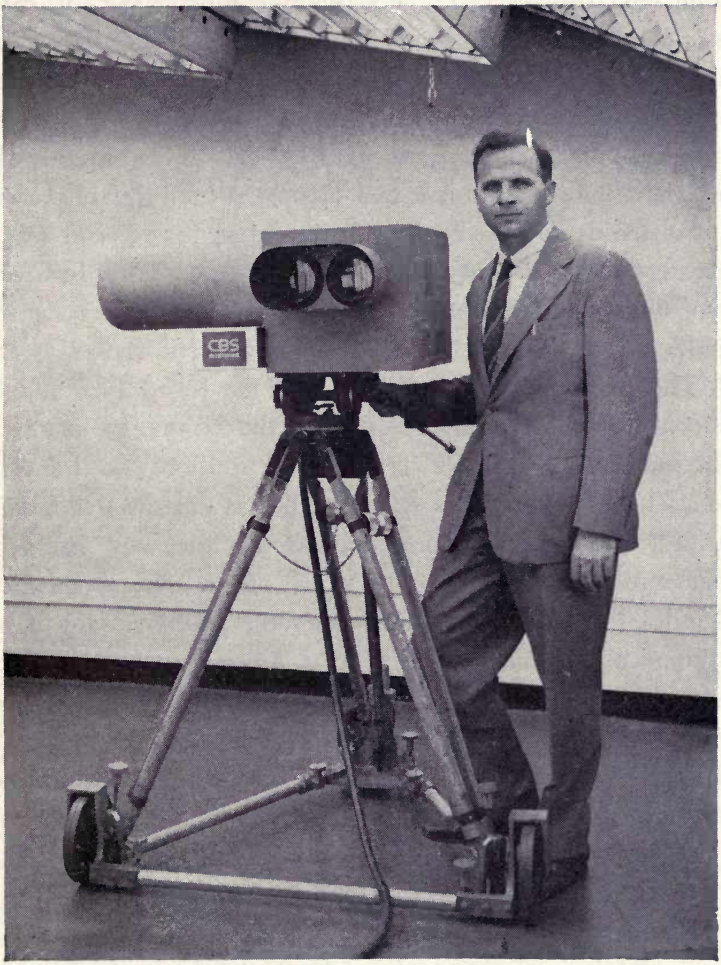
It doesn't take even a glance into the crystal ball to see television pictures as we have them now with colors added. Such a picture is already a reality although not perfected for transmission.

As we touched on it earlier, considerable work has been done in experimenting with color, its techniques, and its adaptability to our present-day black and white picture. The further development rests entirely in the lap of the engineer. The telecasting of color on any basis yet developed is beset with problems of engineering that are many times those that exist for black and white pictures. First, a spectrum is needed wherein channels can be allocated that will be twice the width of our present channels. That means that each channel must be 12 to 20 megacycles wide. The nearest available spectrum where such channels could be given lies in the 480 to 900

megacycle area. In this spectrum, engineers are already having trouble making vacuum tubes perform with enough efficiency to give transmitters enough power output to do the job. Because of the necessary width per channel, transmitters must radiate even more power than they do on our present channels. Even though antenna design will give transmitters above 480 mcs. greater signal per watt input, still the other inefficiencies overcome this advantage to a point where tests so far have indicated that signal strength is not sufficient over a great enough area to do a job. Recent tests show that the primary area of as strong a signal as engineers can produce falls within a radius of fifteen miles from the transmitter site, and often it is only five miles with a useable signal. So, right away, engineering is in trouble in getting a signal of such strength to cover enough area that the FCC will deem it practical to allow channels in the color spectrum. New and more efficient vacuum tubes and circuits are indicated.

To transmit color, a standard of transmission must be set up to be twice our present standard of 525 lines—or nearly 1200 lines. This, engineers say, will be necessary in order properly to resolve the color picture on a receiver. Although such a change of standard would also benefit our present black and white picture, still it poses a problem for the receiver manufacturers and engineers. Their present product is now made to receive a transmission of 525 lines.

Receivers must be designed which will make use of present receivers now in the hands of the public. Presumably this can be done by the addition of a "converter" tuner placed ahead of the present tuner. This is no simple matter, for the frequencies in the 900 mc. band are not as easily made tunable as our present frequencies, and receiver tubes, like transmitting, are not as efficient. Antennas will undergo a change, or an addition. The antenna will become a "dish" —much like the ones pictured earlier as part of the microwave relay link. Every home will have such a dish focused



COLOR TELEVISION CAMERA. Courtesy CBS

Dr. Peter C. Goldmark, Research Engineer, stands beside his color TV camera which has been successfully tested for use in the ultra-high frequencies.

on the transmitter location and it will be small and not unsightly.

Dr. Peter Goldmark, who, under the ægis of Columbia Broadcasting in New York, has indulged in more experimentation than anyone in transmitting color, makes use of a revolving color wheel, which is mechanically introduced,

within the color camera and contains filter slides of three basic colors—red, green, and blue. When a picture so transmitted is received, a similar color wheel must be revolved between the viewer's eye and the screen and kept in perfect sync with that of the transmitter's. This gives, to the eye, the effect of full color as it was present in the original picture.

So here is another engineering problem for receiver manufacturers—how to add this mechanical gadget, this revolving color wheel, to existing receivers, providing this system is finally accepted as the basis for color when it arrives.

The advent of color TV must take the form of an adaptation of present systems because of the economics involved. The industry at present is spending millions on transmission, which is mostly loss, or at any rate is irretrievable money. Indeed, NBC has publicized the fact that they will lose some four million dollars in 1949 alone. Even though this sum includes the amortizing of considerable equipment, it is not economically sound to believe that the industry could throw away such sums on black and white and then start afresh on color. Add to this the investment of the public in the buying of receivers in an enormous sum—figuring over ten million receivers at an average price of three hundred dollars per set—and it becomes unthinkable that color could become the standard if it required all equipment to be brand new.

So, when the color experimenters can prove to the FCC that color is inevitable and can be had by an adaptation of present techniques and apparatus, then FCC will allocate channels for color transmissions, and we shall have full color on our television screen with only a relatively small proportional cost of our original investment added.

Equally certain is the fact that our present receivers will not become obsolete for several years to come and that basic techniques we are now developing more and more will remain even when color comes.

STUDIO AND CAMERA TECHNIQUES

In studio techniques several changes, or additions, are indicated. The greatest of these concerns the camera itself and its present restriction of movement, due to being "chained" to a wall or mobile truck by co-axial cable.

With the development of smaller, lighter, and more powerful vacuum tubes, it is not unreasonable to envision a camera that is absolutely complete in itself—with no physical connections whatever to any stationary object. Thus, a camera, powered by a battery which, in turn, has its power converted to the necessary value to excite and drive the vacuum tubes in its amplifiers and scanning circuits, would become a small transmitter, too. Vacuum tubes such as the Klystron are already in existence which will operate in a frequency range of ten thousand megacycles and more. A single such tube with an antenna a half inch long attached to the camera will be modulated by the camera tube information and picked up in the control room or mobile unit. From there the signal containing the picture will follow procedures previously outlined—being transmitted over co-ax or micro-wave link to the normal transmitter which services the public. Each camera could have a separate frequency of transmission so that a change from camera to camera in the control room would mean only a change to a different receiver circuit.

There will, too, be a cutting down on expensive and extensive studio stage sets. Motion pictures indulge a great deal in "process" shots—a technique whereby a scene or locale, either fixed or moving, is projected on a very large screen in front of which live actors do their performance. They can be transported anywhere by simply putting the proper scene on the background scene. TV has tried the same thing but found it impractical, due to the fact that the actors working live in front of the process screen require

so much light that the projected picture behind is completely washed out.

To make this procedure perfectly feasible for TV of the future, it is only necessary that an improved camera tube be developed that is so sensitive that only normal light is required on any subject in order to get a perfectly useable TV picture. With all lighting within normal bounds, the "process" portion will show just as much as the live action and the composite will be as good as an entire live set would be. Of course, we do not mean to toss off lightly the fact that developing such a sensitive camera tube is not easily accomplished. But who would have thought fifteen years ago that any vacuum tube could transmute a scene into an electronic picture?

Variations of this technique may make it possible for such a process background to be picked up by a remote TV camera and "mixed" in the control room with the live studio action. At the present time, when two such electronic pictures are superimposed, the locale may be "seen-through" the studio actors, thus spoiling the effect. However, the clever mind of the engineer, who has already developed a device whereby black may be turned to white and white to black before your very eyes without altering the picture composition, will not be long stymied by this stumbling block.

EDUCATION

Television cannot be said to have the power to completely revolutionize teaching methods in schools. Instead it has the potential power for becoming a great addition to present methods with an attendant broadening of scope for the teacher and student in remote areas. As we have said previously, not all schools under our present educational systems have the same standards of quality. They differ in curriculum, and in what they can afford to pay to get the best in teachers. Teaching by television can make it possible for students in

remote areas, as well as those in cities, to receive the very best of instruction.

It is not improbable that we shall see a system introduced whereby a hundred classrooms, located at different points, will be serviced for an hour or more per class-day, and, through viewing a demonstration on a large screen in front of them, gain precise instruction on any given subject. Naturally, some subjects will lend themselves to television teaching more than others. What these subjects are will be discovered by experiment. After a TV class, the teacher can conduct question and answer periods, discussing the viewed lesson, and this instructor will be able to answer all questions from a prepared mimeographed paper which is distributed to all teachers before the release of the "telelesson." This way the instructor need not be an expert in the particular subject, yet the class gets the benefit of an added subject, or an extra-curricular slant on some subject normally taught by the instructor.

Such televising need not be released over normal channels of television programming. The "closed circuit" type of dissemination will perhaps be better. Because a number of localities will collectively support it, a closed-circuit will not be prohibitively expensive. The great values that accrue by having the specialist who normally reaches only the few reach all parts of the country will warrant any locality's participation.

If the closed circuit should prove too expensive, perhaps it will be done by a central television station. Thus any school in the surrounding locality may participate by simply owning and operating a large-screen television receiver. This system would be particularly advantageous in highly populated areas where there are hundreds of schools and classrooms distributed throughout one single city.

At any rate, it requires no great imagination or use of the crystal ball, to foresee TV tied solidly into education.

Underwriting of such projects by public spirited individuals and communities is in almost immediate prospect, at least on an experimental basis, and cannot fail to aid the distribution of information that will improve our educational and cultural standards.

RADIO VS. TV

With the advent of television, radio is faced with an even greater problem than is the motion picture theatre or the motion picture producer. Radio has established itself and become great because, in addition to being an entertainment medium, it is a selling medium. As a selling medium it looks for its support to the advertiser. If the advertiser should desert the radio, then radio, as we know it today, is doomed.

Hal Roach Jr. is quoted as believing that TV will deal a death blow to the "B" motion picture. Mr. Roach is an experienced motion picture producer. The "B" picture is one that can be made comparatively cheaply and quickly, and with "small name" casts, which will allow the distributor to get a quick monetary return for his product. On the other hand, Mr. Roach believes that TV will allow greater care and selectivity in the making of "A" pictures. The bigger and better and more expensive article—which will consequently enjoy longer runs and thus remain economically a good investment.

If this argument be true, and no one can doubt it at this time, cannot the same be true of radio? Cannot the great comedian, the great variety show, being perfectly well done, remain in the public favor in spite of television? Only one item will guide this—economics.

Television admittedly has a far greater selling impact than radio has. Radio, however, can reach every nook and cranny of the nation. An advertiser will then look at television from two angles before deserting radio: (1) How much will the cost-per-thousand-listeners be for TV advertising?

(2) Does the extra impact of TV selling give a dollar value comparable to the greater distribution of message enjoyed on radio? Once these two things have been thoroughly evaluated on a monetary basis in the advertiser's mind, we shall be able to see the future of radio clearly.

Trends thus far are taking a course which we might suspect, whereby advertisers are experimenting with the new medium. To do this, they are cutting back budgets allocated normally for radio advertising and putting these monies into television advertising. They do not desert a medium which has served them well and jump head first into the relatively untried. They wish to grow with the new medium and still reap a reasonable value from their dollar spent. As the distribution of the advertiser's message increases, it is presumed that the budgets he will be willing to put into the new medium will increase. His dollar value must be computed on an economic basis that constantly holds cost-per-listener in ratio to impact of message. When TV is able to reach every person that radio does, there will be no question as to where the advertiser's dollar will go. On this fact AM radio's case must rest.

By the end of 1953, according to the most reliable estimates, there will be in operation some fifteen million TV receivers. This means that about sixty million people will be available as audience, and therefore available to a sponsor. It will give the sponsor a distribution for his message that compares very favorably with radio distribution. Certainly it is sufficient distribution to make it economically sound for a percentage of advertisers completely to desert radio.

With this fact in mind, and taking a deep breath and a long look into the crystal ball, we foresee that by the end of 1955 at least two of the four present radio networks will be putting out daytime network programs only. The remaining two, who will be giving network programs daytime and

night time, will sell their time on a basis whereby the time-buy will overlap into television time sale, on a TV network which they operate.

The percentage of advertisers who will remain with radio will be sufficient to fill the choice night time hours for two networks, and, after daylight transmission, the other two will disintegrate into separate local stations. They, in turn, will survive as locals only by getting enough local advertisers to buy their time. They must sell this time at a sufficiently low rate to combat television. What these rates will be will depend upon the availability of television programs within the particular locality.

Thus, radio may become the "kept lady" before deteriorating into a second choice for the advertiser's budget. The public can determine how soon and how far this deterioration will be.

In this generation we have become very used to the radio. It has become a part of everyone's home. Listening habits are hard to break, and as long as there are listeners, radio will continue to be an advertising medium along with its entertainment. If it can withstand the inroads that TV can and is making into its income, there will always be a place for it, even if it is on a local basis where it can surely reliably service the public in combination with other mediums.

EMPLOYMENT

We have covered what we believe to be the general picture of jobs in TV in an earlier chapter. Surely the future holds a great deal for the creation of new and more jobs to be done. For several years more and more receivers will be manufactured and sold. All this will require more in the way of trained and untrained personnel.

In motion pictures, presumably the character actor and actress will come into their own. The industry will create films for television consumption that will be cast from these experienced players and will build them up to a popularity

that may rival our present movie stars. New people must come up to take their places. There is always room for the talented newcomer.

The amounts of entertainment material that television will devour—both on film and live shows—cannot avoid making use of thousands of actors, musicians, technicians, makeup artists, dressmakers and costumers, lighting engineers, and general studio workers, together with writers and directors. Any movie people in these categories who are displaced by television from present employment can be easily absorbed by it. In addition, TV will be a proving ground for the new, aspiring and untried group in all categories who will undoubtedly choose TV as a vocation because of its fascination.

PHONEVISION

The motion picture industry is placing great stock in a device, which is not yet released to the public, as a means of recouping whatever revenue it may lose to TV. This device is a variation on an idea advanced by Zenith, whereby any householder can be shown a current picture on his combination receiver by calling his telephone operator and asking for it. Presently the machine is called Phonevision. No set without the Phonevision attachment can receive the picture, and the charge for the showing will appear on the subscriber's telephone bill.

When a subscriber calls the operator and asks for a certain picture, it will be fed to him via television, and the key (a synchronizing pulse) will be fed to him via the telephone line. The nominal fee paid by the set owner will probably be divided between the picture producer, the television transmitter, and the telephone company. This way, every set owner is still a box-office possibility for the motion picture producer who can still afford to put out a first class production and reap a commensurate reward. He keeps his employees working just as they always have been, and there will be no need

to cut salaries or to lay off workmen. The idea is economically sound, and, like television once was, is just around the corner.

MUSICIANS

One professional group which views television with some alarm at present is the musician. Union executives have already taken notice of the paucity of work for the live musician in video. The American Federation of Musicians under James C. Petrillo, is at present working out assorted schemes whereby it can become more attractive for television stations to employ more of the Union's membership for live programs.

There is little doubt but that some arrangement will be worked out which may take the form of a licensing or royalty fee plan, based on how much music-on-film program is released by an individual station. Each station may be required to pay a licensing fee for making use of film on which musical sound track appears. These fees would be pooled into a fund which would be available to the individual station whenever live musicians are used. Thus, it will be a plan designed to induce TV outlets to make wider use of live musicians.

We have said earlier that all union arrangements remain to be made with the television industry. However, this is certain to be a gradual process whereby labor in each department will not try to burden the new medium with agreements that call for high pay scales until such time as the traffic will bear it. It is probable that the now existing four guilds and unions, which have the actor and actress within its membership, will band together to make one bargaining agent, for the television field. The same may be true for the directors, engineers, and others. This will come to pass within the very near future.

DEVELOPMENT OF OTHER SPECTRUMS

It is certain that the future will bring about television spectrums at frequencies now only in the experimental stage. As we said earlier, color transmission makes more spectrum

mandatory because we must transmit not one video signal six megacycles wide but three such signals, which will each carry one basic color. The nearest spectrum that has not been already assigned to some service is the 480 to 900 MC spectrum already mentioned. Here color television can expand and get out of the experimental stage.

Since the radio wave at these frequencies is still subject to the line-of-sight qualities which we experience even at present frequencies of transmission, many stations can be allocated channels within this spectrum, providing they are physically isolated from one another by terrain and distance. Thus, duplicate channels may be given out, and several stations throughout the country will operate on duplicate channels. There will be room for all. If this spectrum is not sufficient, there are others set aside already up to ten thousand megacycles that will take care of every demand.

As the frequency of the spectrum gets higher, the waves become correspondingly harder to handle in one way and easier in others. For instance, it is much more difficult to make a tuned electronic circuit behave at higher frequencies. Apparatus will then become more touchy and delicate—so touchy, in fact, that it may prove difficult indeed to manufacture reciver tuners that will be sufficiently "fool proof" for the public to handle. Also, at higher frequencies, the "bounce" effect becomes more bothersome and evident because the smaller objects that man introduces become possible reflective surfaces. We mean by this, that at 5000 megacycles, for instance, a half wave length is under ten inches. This means that an object of this length can become a radiator that will make a spurious or secondary image on a receiver by offering a secondary path to a transmitted signal. This will be overcome by making use of highly directional antennas for receivers. An antenna that is as highly focused as an automobile headlight will become the order of the day.

However, this type antenna is one of the things meant

when we referred to certain "easier" methods of handling. An antenna to receive well in the very high spectrums need only to be located within a dish or parabola several inches in diameter. It will then reject, or not receive, radio waves that come at it from any direction except along the very narrow beam on which it is focused. Such an antenna has the added advantage of giving great "gain," or added impetus, to a received signal and, thus, can operate a receiver even though the actual signal picked up by its use is very small indeed.

Under these conditions, it is indicated that TV will push high into the frequency spectrums for its operational channels as soon as engineering genius can put the finishing touches on the equipment to make it feasible. Antennas of the future will be a far cry from the rather cumbersome collection of pipes and wires which we now put up. Equipment will constantly become smaller, rather than larger, in physical dimension. All this will happen while screens for viewing will become increasingly larger, finer in detail, and full of color.

One other development may influence changes in channel spectrums. A possibility exists that the video portion of TV transmission can be better done if Frequency Modulation is employed for it as well as for the sound portion. Exactly what the advent of FM principles will do to the picture and to channel width is not yet known. However, it is a possibility that will be explored in the very near future.

There is no doubt that much of the apparatus now in use, many of the practices, and a great deal of what is set down here, will become laughable within a few years. But it will be a gradual process in reaching that stage, and the excitement of what will go on between now and that time can lead but to one conclusion: Television is the greatest single element affecting our lives that will come in our lifetime, and it's present strength is only the beginning of what it will become tomorrow.

GLOSSARY

ALTERNATING CURRENT—(AC)—
normal power source whose direction of flow changes several times per second.

AMPLIFY—
to raise in volume.

AMPLITUDE—
height.

BLANKING—
eliminating visible trace of scanning beam as it returns from right to left on TV screen.

BLOOM—
bright glare caused by light reflecting into camera lens.

CAMERA CHAIN—
TV camera plus electronic equipment necessary to deliver a complete picture for telecasting.

CARRIER—
the radio wave emanated by a transmitter which "carries" the picture or sound.

CATHODE RAY TUBE—
a vacuum tube for converting pulses into corresponding light energy.

CATHODE—
an element inside a vacuum tube which is the electron source.

CHARGE—
a difference in electrical potential between two conductors.

CLOSED-CIRCUIT—
a wire circuit to carry a private showing.

CONTRAST—
the relation of black to white on a receiver screen.

CYCLE—

one alternation of direction of current flow.

DI-POLE—

literally two poles. An antenna made up of two 1/4 wave sections.

DOLLY—

a platform with wheels.

ELEMENT—

any electrode inside a vacuum tube.

FLAT—

wall or ceiling imitation, constructed of canvas, and painted to serve as scene background.

FLY—

to lift into the rafters.

FRAME—

one complete picture.

FREQUENCY—

number of cycles per second.

GHOST—

secondary, unwanted image on a TV screen caused by reflection.

HOOK—

to connect.

IMPEDENCE—

resistance to current flow.

INFORMATION—

assorted elements of an electronic picture.

INTERLACE—

to scan a picture by alternating lines. 1,3,5,7 the first time and 2,4,6,8 the second. Reduces flicker and increases resolution.

KINESCOPE—

alternate term for Cathode Ray TV tube.

LEVEL—

measure of an electronic circuit. Volume.

LINE—a single scanning line across a picture.

LOOP—special telephone line installed to carry program.

MEGACYCLE—one million cycles.

MODULATE—to force the carrier wave to carry sound or energy.

MOSAIC—an element of an iconoscope that is sensitive to light.

PAN—to swing a camera around horizontally.

PIPE—colloquial—to send along.

POT—abbreviation for potentiometer, a variable resistor used as electronic energy control.

REMOTE—program originating outside a studio.

RESOLVE—to bring out with clarity.

RESISTER—device that deters flow of electrical energy along a wire.

RHEOSTAT—a variable resistor, of smaller value than a pot.

SCANNING—the back and forth action of an electron beam.

SYNCHRONIZE—maintain accurate timing with. Keep in step.

TELECAST—a television broadcast.

VIDEO—Latin for "I see."

WIDE-BAND AMPLIFIER—an apparatus capable of raising the energy strength of a signal without diminishing any of the frequencies which are part of the signal's composition.