

# TELEVISION WORKS LIKE THIS

1. THE BEAM SHOOTS OUT OF THE ELECTRON GUN

2. THESE ELECTRIC PLATES SPEED THE ELECTRONS UP

3. THESE PLATES DIRECT THE BEAM AS IT SCANS THE SCREEN

FLUORESCENT  
SCREEN



A Book for Young People by  
**JEANNE & ROBERT BENDICK**

# Magic Eye

At last, a book for the older boy or girl who wants to know how television—the most exciting invention of our day—really works.

This is how it is done, with big, clear diagrams and drawings of studios, cameras, microphones, and so on. The simply written, non-technical text is fitted round these interesting and often amusing illustrations. Quite smoothly it brings in, at the proper place and with clear explanation, such items as the caption roller, the telecine camera, a folded dipole, stratovision by aircraft and image dissectors as well as much information about television actors and producers and how they rehearse and televise.

*Television Works Like This* presents the entire behind-the-scene story of this magical new medium, from the birth of an idea to the transmission of a programme. Many a grown-up will find it fascinating, too.

**WITH MANY  
LINE DIAGRAMS**

8s 6d  
net

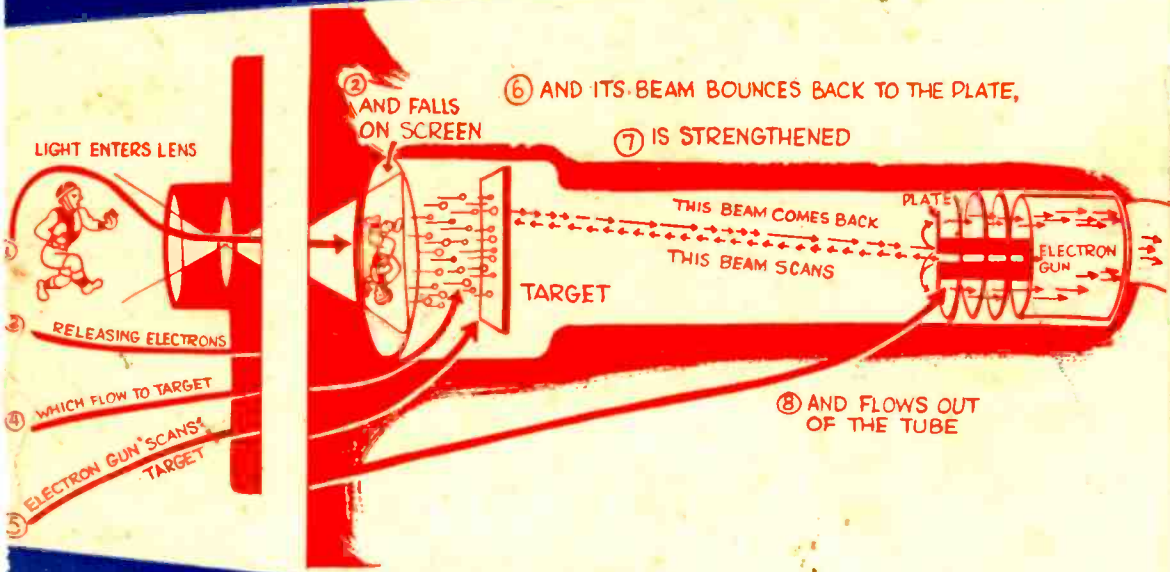
**This English Edition has  
been edited by John Swift**

John Swift has an intimate knowledge of the B.B.C., is an authority on television, and is well known as the author of *Adventure in Vision*, the first standard work on the world history of television and on television as a new medium of art.

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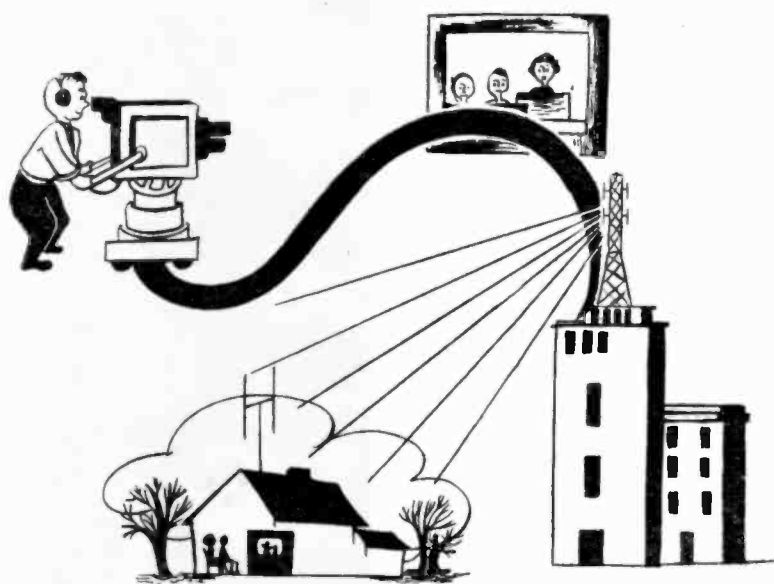


38 WILLIAM IV STREET, CHARING CROSS  
LONDON



# TELEVISION

## WORKS LIKE THIS



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BY JEANNE  
AND ROBERT BENDICK

ENGLISH EDITION PREPARED BY

JOHN SWIFT

*Author of  
Adventure in Vision*

PHOENIX HOUSE LIMITED  
LONDON

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Made 1951 in Great Britain  
Set and Printed at Plymouth by Latimer, Trend & Co. Ltd. for  
*Phoenix House Limited*, 38 William IV Street,  
Charing Cross, London WC2  
*First published 1951*

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# WHAT TELEVISION IS

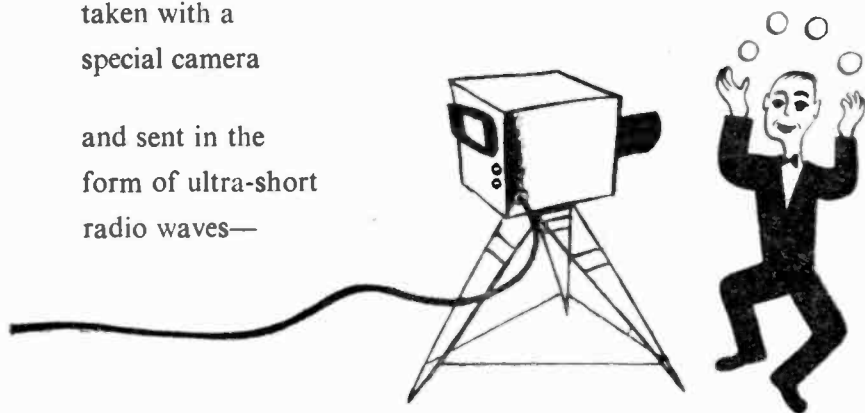
Television means seeing across space. The word comes from the Greek *tele* ("at a distance") and the Latin *video* ("I see").



Television is the picture of an action,

taken with a special camera

and sent in the form of ultra-short radio waves—

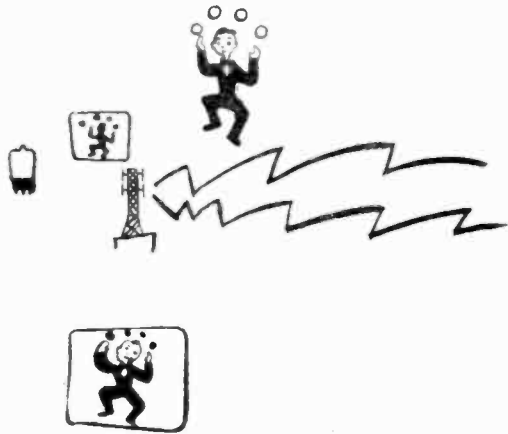




—across space to your receiver.



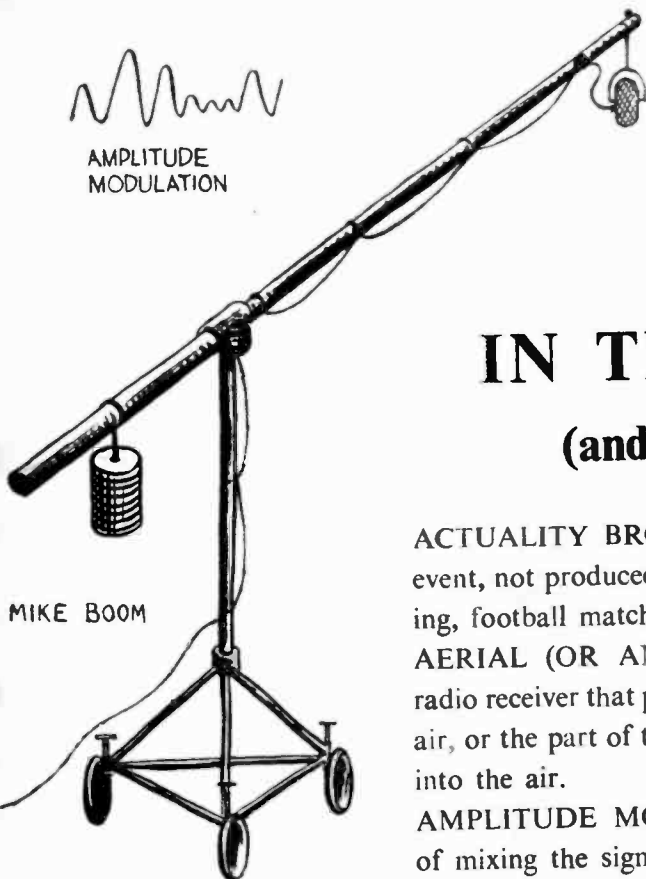
Television is first an action  
Then a picture  
Then electricity  
Then radio waves  
Then electricity again  
And finally a picture again  
in your receiver—  
All in an instant.







AMPLITUDE  
MODULATION



MIKE BOOM

# THE WORDS IN THIS BOOK

(and some others too)

**ACTUALITY BROADCAST** Televising of an event, not produced by the studio, viz. race meeting, football match, public ceremony, etc.

**AERIAL (OR ANTENNA)** The part of the radio receiver that picks the radio waves out of the air, or the part of the transmitter that sends them into the air.

**AMPLITUDE MODULATION (AM)** A way of mixing the signal from the television camera or the microphone with the radio wave that is going to carry it through the air. The waves that carry television pictures are always amplitude-modulated.

**AUDIO** Anything to do with television sound.

**AUDIO-FREQUENCY WAVES** Electrical waves of the same length as sound waves.

**AUDIO SIGNAL** Sound that has been changed into electrical impulses.

**BAND** A range of radio frequencies within two definite limits.

**BOOM** A telescopic pole from which the mike is hung.

**BOUNCE** Sudden changes in the brightness of the picture.

**BRIGHTNESS CONTROL** The knob on your receiver with which you can change the amount of light in the picture.

**BUSY PICTURE** One with so much background detail that it is confusing.

**CARRIER WAVE** The electro-magnetic wave that carries radio or television signals through the air.

**CATHODE-RAY TUBE** An electron tube in which the electrons are freed from their source in a ray or beam. The receiver picture tube is a cathode-ray tube.

**COAXIAL CABLE (COAX)** A special copper cable with a conducting wire suspended inside. Also a bunch of these cables bound together.

**CONTRAST CONTROL** The receiver knob which regulates the varying degrees of light and shadow in the picture.

**CONTROL ROOM** Room where engineers and producer work with monitors and control equipment for a programme.

**CRANE DOLLY** Wheeled platform on which is a crane for camera mounting, making high-level shots possible. (See also **DOLLY**.)

**DEAD SPOT** A place where radio or television signals are received badly or not at all.

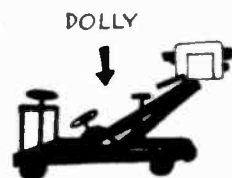
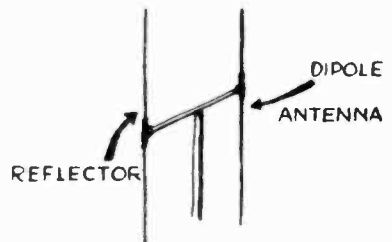
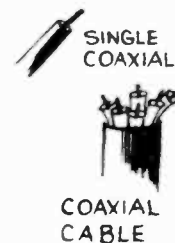
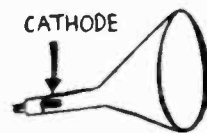
**DIPOLE AERIAL** An aerial (or antenna) split in the middle. (See below.)

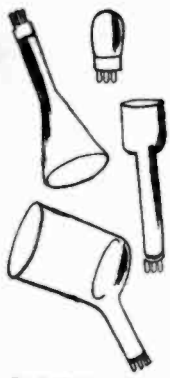
**DIRECTIONAL AERIAL** Any aerial, either broadcasting or receiving, which sends or receives radio waves better in some directions than others.

**DOLLY** A small, wheeled platform on which the camera is mounted. It is used for "tracking" from long-shot to close-up and vice versa.

**ELECTRON** A minute particle of negative electricity.

**ELECTRON GUN** The device in an electron tube from which electrons are shot in a narrow beam.





ELECTRON TUBES

**ELECTRON TUBE.** A vacuum or gas-filled tube in which the beams of electrons do their work.

**FADING** Unwanted lessening and increasing of a radio signal.

**FEED** Any picture, sound, or signal received by the studio.

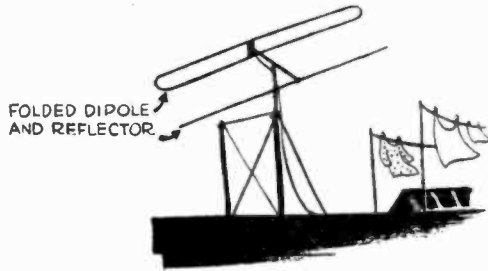
**FLUORESCENT SCREEN** The chemically coated receiver screen which gives off light when hit by electrons.

**FOCUS CONTROL** The adjustment on the receiver which makes the picture sharp.

**FOLDED DIPOLE** A dipole antenna folded back on itself like this. This is a type popular in America.



HERRINGBONE

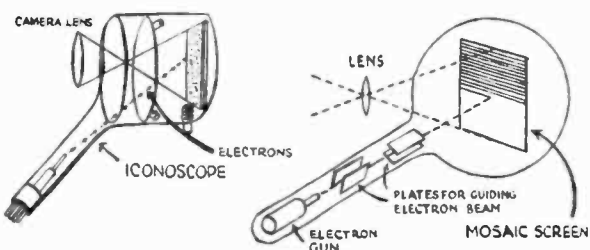


**FRAME** A single television picture. You see 25 frames a second. When the picture is “out of frame”, you see a black line at top and bottom or at each side where the new frame begins. When the cameraman “frames” his picture, he gets his subject in just the right place on his camera screen. The name is taken from the cinema, where a single picture or exposure is also a frame.

**FREQUENCY** The number of cycles (or complete motions) of electro-magnetic waves in one second.

**HERRINGBONE** A zig-zag pattern across the picture caused by interference.

**HIGH-FREQUENCY WAVES** Very short radio waves.



**HORIZONTAL HOLD** The receiver knob used to prevent the picture from slipping off to either side.

**ICONOSCOPE** A kind of television camera tube. The one on the right, another type, serves the same purpose.

**IMAGE DISSECTOR** Another kind of television camera tube, used mostly for televising film.

**IMAGE ORTHICON** An extremely sensitive camera tube which needs very little light.

**INTERFERENCE** Any signal, natural or man-made, which spoils the reception of the sound or picture.

**KILOCYCLE** A frequency of 1,000 cycles a second.

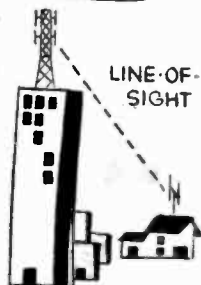
**LEAD-IN** The wire which conducts the signal from the aerial to the receiver. It is made of coaxial cable.

**LINE** A single sweep of the electron beam from left to right across the television screen in either the camera or the receiver. There are 405 lines in the picture at present.

**LINE-OF-SIGHT** A path from transmitting to receiving aerial with nothing in the way.

**LINK** A system for passing radio waves from a remote location or from one transmitter to another. It can be either a radio relay station or a coaxial cable.

**LIVE** Short for "alive"; television of real things and people being taken by the television camera, as opposed to film. A programme is often a mixture of "live" material and film, especially documentaries and other features.



**MAGNIFYING LENS** A rectangular, plastic, liquid-filled lens placed in front of the television screen to enlarge the picture.

**MEGACYCLE** 1,000,000 cycles.

**MICROPHONE (MIKE)** A device which changes sound into electrical impulses.

**MICRO-WAVE RELAY REFLECTOR (DISH)** A dish-like metal reflector behind the aerial or wave guide to concentrate the micro-wave signals into a narrow beam.

**MICRO-WAVES** Radio waves of less than 1 metre (39 inches) in length.

**MONITOR** Station receiving screen to guide producers and technicians.

**MOSAIC** The photosensitive plate on which the picture is focused in the camera tube.

**NETWORK** A group of television stations connected by coaxial cable or relay stations.

**NOISE** A spot of unwanted light in a television picture. A "noisy" picture is one with flashes of light all over it.

**ORTHICON** An Image Orthicon or Studio Orthicon camera tube.

**OUTSIDE BROADCAST (O.B.)** Any programme originating outside the studio. (See also **ACTUALITY BROADCAST.**)

**PHONEVISION** An idea for receiving special programmes by means of a cable directly to your set. One suggestion is that the telephone company would turn the programme on at your request, and you would pay extra for it on your telephone bill.

**POTENTIOMETERS (POTS)** The volume-control knobs on the sound engineer's desk.

**PROJECTION TELEVISION** A combination of lenses and/or reflectors which enlarge a television picture and project it onto a ground-glass or similar screen.

**RADIATOR** The part of the transmitter aerial which radiates the waves into space.

**RADIO LINK** See **LINK.**

**RADIO WAVE** An electro-magnetic wave made by quick changes of current in the transmitter aerial, and travelling through space at 186,000 miles a second.

**RELAY STATION** A station which automatically picks up radio waves and rebroadcasts them, greatly increasing the distance covered by the original transmitter.



"DISH"



"POTS"



ONE TYPE OF  
RELAY STATION

**RUN-THROUGH** A rehearsal, with or without cameras.

**SCANNING** The line-by-line sweep of the electron beam across the screen in the camera and receiver tubes.

**SERVICE AREA** The area over which transmitted signals can be clearly received.

**SIGNAL** The sound or picture after it has been changed into electricity or radio waves.

**SNOW** White dots on a picture, generally caused by a motor-car in the vicinity or other local interference.

**SYNCHRONIZATION (SYNC)** The process of keeping the electron beams in the camera and receiver doing the same thing at the same time.

**TELECAST** The broadcast of a television programme. Short for television broadcast.

**TELECINE** The name given to the transmission of film in television programmes.

**TELEGENIC** Anyone who appears well on television. "Photogenic" is also sometimes used.

**TEST PATTERN** A drawing of lines and circles televised for testing, and to allow you to adjust your receiver.

**TRANSMITTER** The equipment from which the signals are broadcast.

**TV** Short for television.

**VERTICAL HOLD** The control knob used to prevent the picture from slipping up or down on the television receiver screen.

**VIEWER** Anyone watching television. Not a good word, but used for want of a better one.

**WAVE GUIDE** A hollow metal tube which conducts electromagnetic waves.

**WAVELENGTH** The distance between two waves, from the top of one to the top of the next.

**WIDE-ANGLE SHOT** A camera shot taking in a large part of the field of action. Wide-angle lenses are used for panoramic shots as opposed to close-ups.



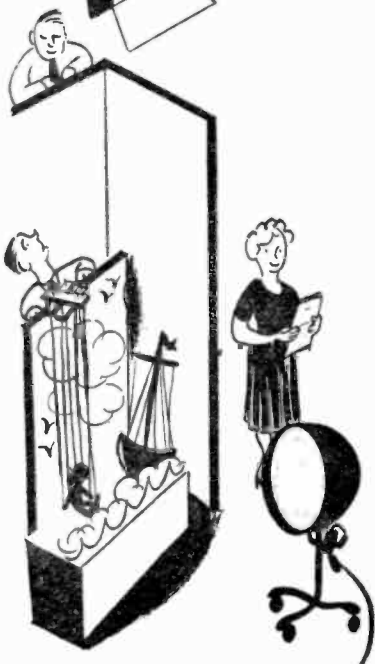
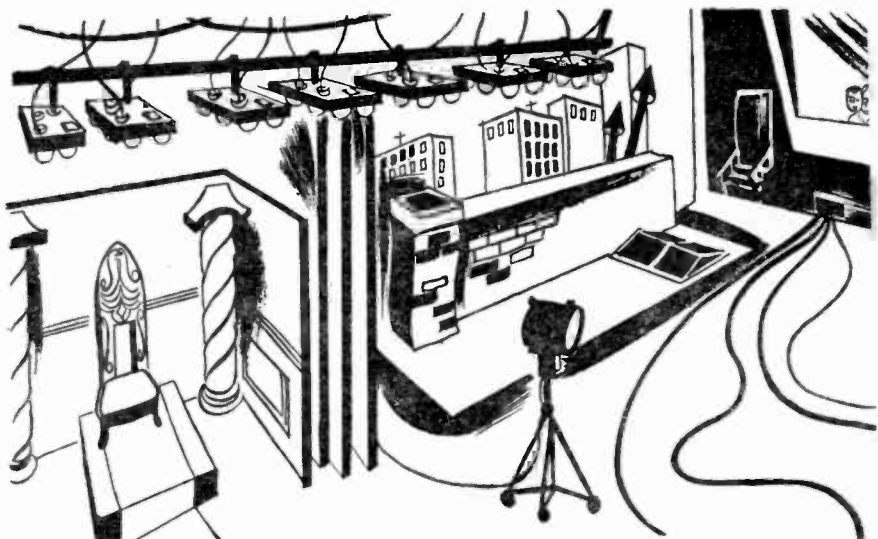
TEST PATTERN



VIEWERS



WAVE GUIDE

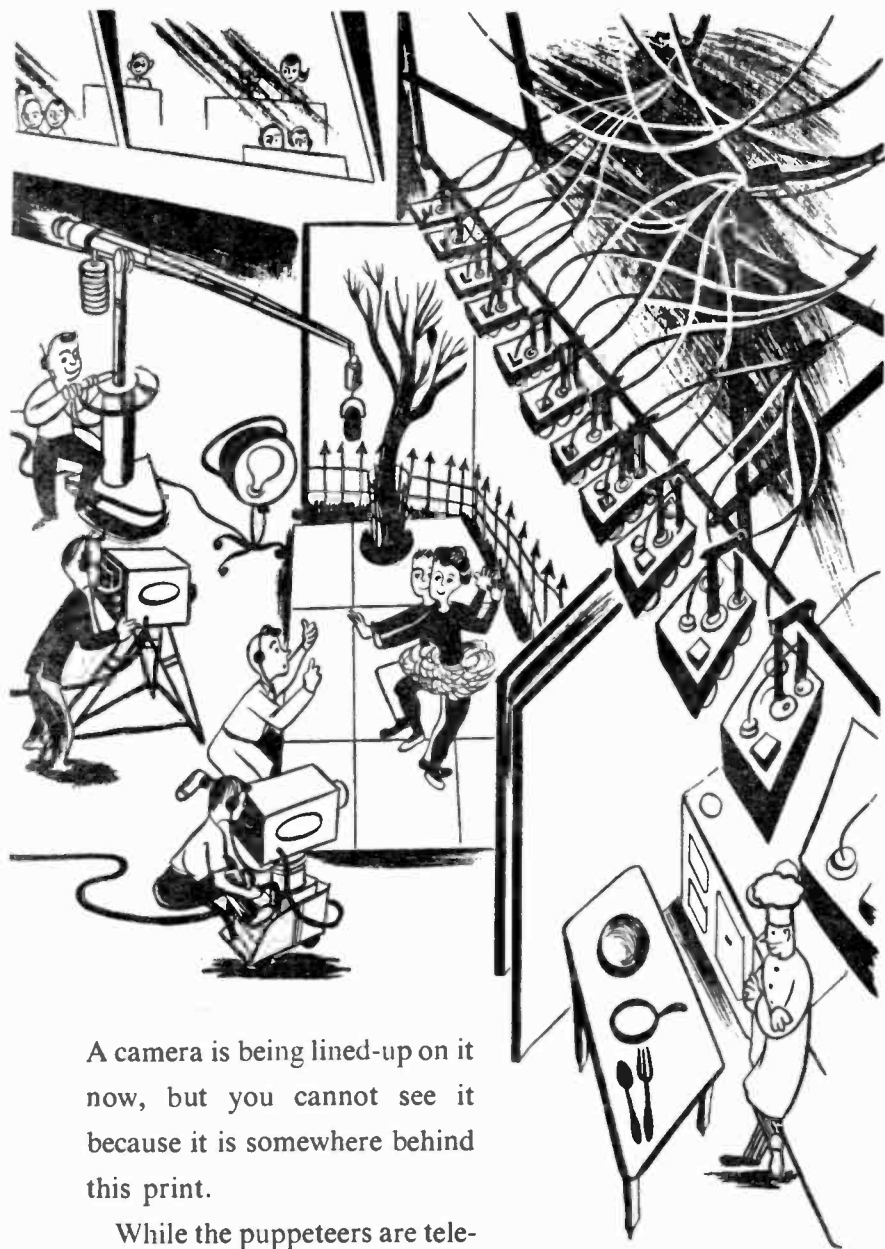


## ON THE STUDIO FLOOR

A television studio is very much like a film studio, with cameras, mikes, and “sets” (scenes), but television production is continuous, cameras “shooting” a scene *immediately* after other cameras have finished on another scene. Many sets are often needed for a single production.

Here is a typical studio in action during a variety programme. The producer and his assistants are in the control room behind sound-proof windows. The cameramen and mike boom operator concentrate on the dancers. The gesticulating gentleman is the studio manager—“liaison officer” between producer and artists. He has special signs for “cues”.

When the dancers have finished the puppet show will begin.



A camera is being lined-up on it now, but you cannot see it because it is somewhere behind this print.

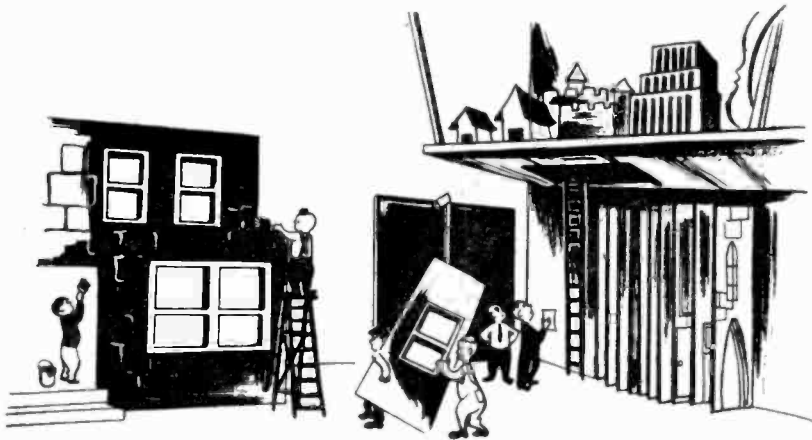
While the puppeteers are tele-vising, the cameras from the dance scene will move silently to one of the sets opposite, ready for later acts. The artists are waiting outside now because you can't have too big a crowd in the studio at one time. The chef, by the way, is waiting to give a cookery lesson after the variety show is over.



# SETS AND PROPS

The people who design the studio sets have to think of many things. Because the picture on your television receiver is small, the designer tries to give the scene a feeling of space. He makes his sets look deeper from front to back than they really are by clever use of perspective design. For instance, he can make a street look a hundred yards long whereas its studio length is only twenty yards or less.

Designers try to build the set so that cameras can look into it from a variety of angles. They peep through doors or picture frames, or perhaps a hole cleverly included in the design of a draught screen. That explains why you often see consecutive shots from opposite directions without the cameras being disclosed to view. The set department has to make so many sets a week that they can't build new ones each time. Using stock parts—doors, windows, and walls that fit together—the set department can construct a new set in a few hours. Then if there is time, they paint it in colour even though viewers see it only in monochrome. Colour helps the actors to feel the mood of the show.

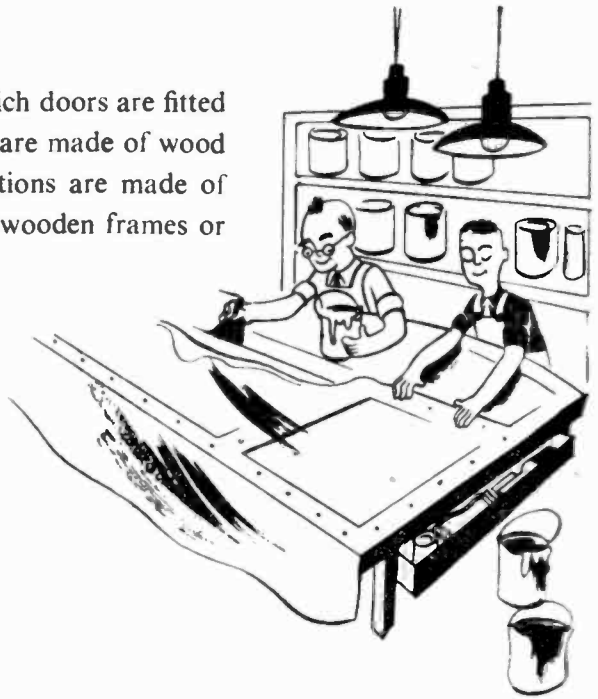


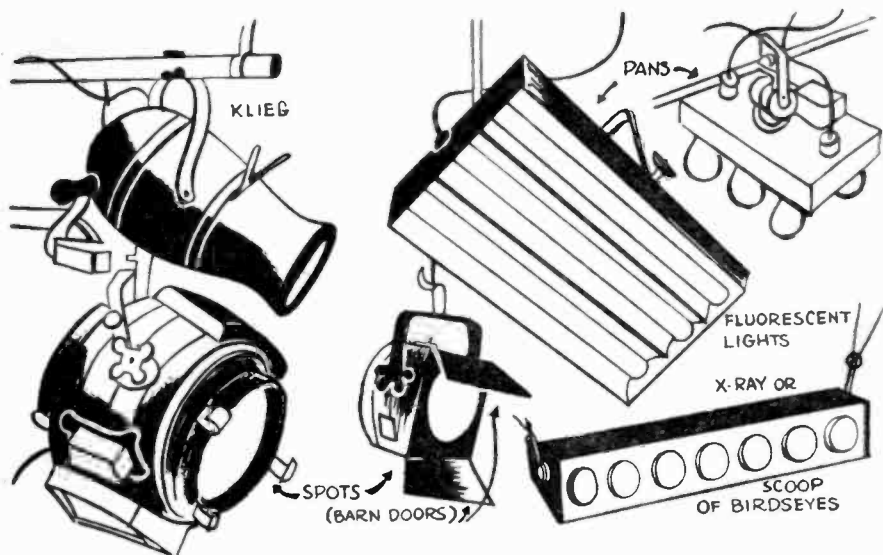
Sometimes the sections into which doors are fitted and pictures or fixtures are hung are made of wood for strength. But most other sections are made of canvas, stretched and glued over wooden frames or sheets of plywood, and then painted.

Mirrors, or glass in picture frames or windows, are seldom used because they catch reflections of the studio lights. (An exception is the use of mirrors intended to show reflected subjects or for trick camera work.)

There are certain basic sets that are used frequently with just the "trimmings" changed. There is always a living-room and perhaps a kitchen. There are permanent sets, too, for shows that go on regularly.

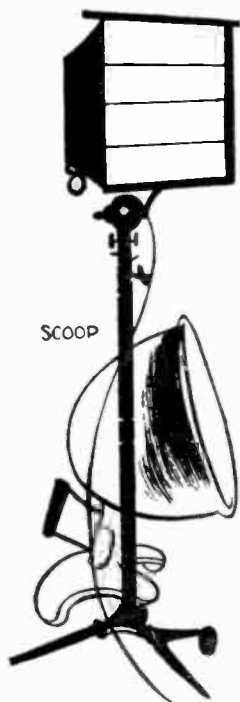
Television stations have their own furniture, pictures, ornaments, and other things that give scenes a real-life atmosphere. These are called "props", short for properties. But unusual props are rented or borrowed. A set may need a dozen milk-bar chairs, a suit of armour, or a stuffed rhinoceros. It wouldn't be practical to try to keep all these things on hand.





## THE LIGHTS

BROAD



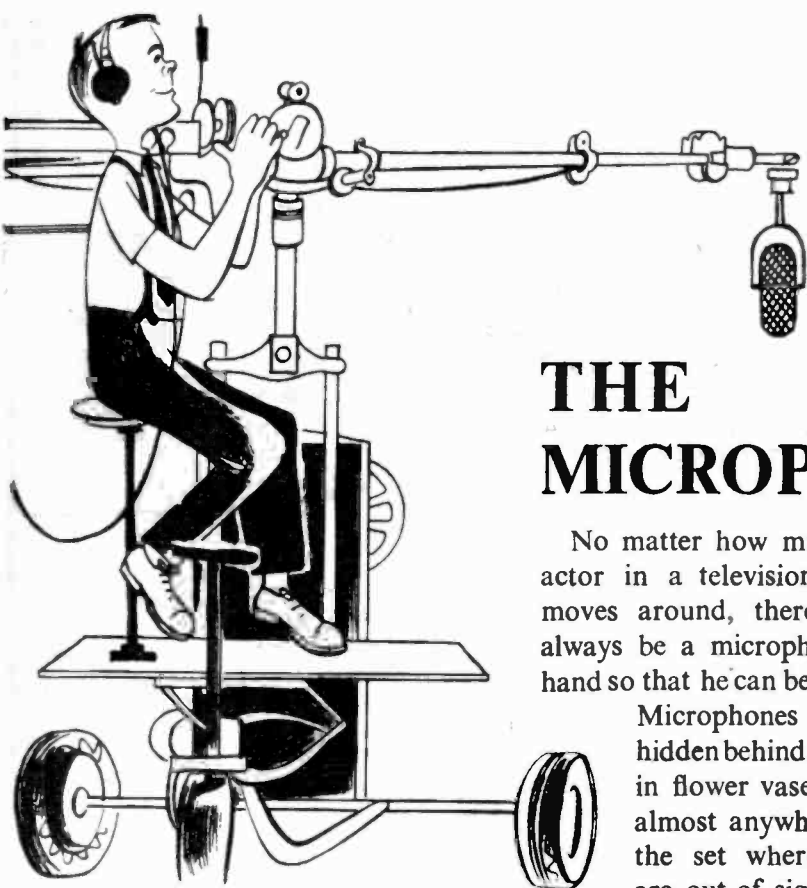
When a television show is on the air, there is little time to adjust the lights. The lighting must be right for every part of the set, right for long shots and close-ups.

The first part of lighting a set is to get good, all-over light. Then other lights are used to highlight the places where the main action happens.

There are different kinds of basic lighting, and again television has much in common with the film studio. There are banks of fluorescent lights, scoops of "birdseyes", and blocks of plain electric lights. The additional lights are all similar, the same as those used in making films.

It is important to remember that not all lighting effects are made by the lights. Some are made by the engineer as he controls the brightness and contrast of the picture that comes to him in the control room. He can make a brightly lighted set appear to be in moonlight.

Until recently television lights had to be very strong—they emitted great heat. Experts tried cooling them down by putting them in jackets of running water. Now, with an improved camera tube, the lights are cooler and easier to work under. The cameras no longer call for very high-power lighting.



## THE MICROPHONE

No matter how much an actor in a television show moves around, there must always be a microphone at hand so that he can be heard.

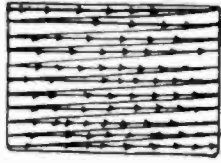
Microphones can be hidden behind books, in flower vases, and almost anywhere on the set where they are out of sight, but

normally the mike is attached to the mike boom, which swings and follows him wherever he goes.

A mike boom is a high stand with a jointed telescopic pole attached to it, and the microphone hangs from the end of the pole—like bait on a fishing-line! The boom man can turn a crank to extend the pole and he can swing the whole thing from side to side. But he has to be careful not to let the mike show in the picture. He wears earphones connected to the control room, who give him instructions and guide him in finding the precise position for the microphone.

Operating the microphone boom is an exacting job because it is not easy to manœuvre speedily in a crowded studio without bumping into an actor or cameraman or knocking over some furniture.

The sound waves of a voice or music enter the microphone to be converted into electricity. Then they travel through a special cable to the sound-control desk in the control room.



THE BEAM SCANS THE TARGET  
SOMETHING LIKE THIS-BUT IT  
TAKES 405 LINES TO MAKE A  
PICTURE (THE ONES WITHOUT  
ARROWS DON'T COUNT)

## HOW THE PICTURE BEGINS

The television picture begins in the camera.

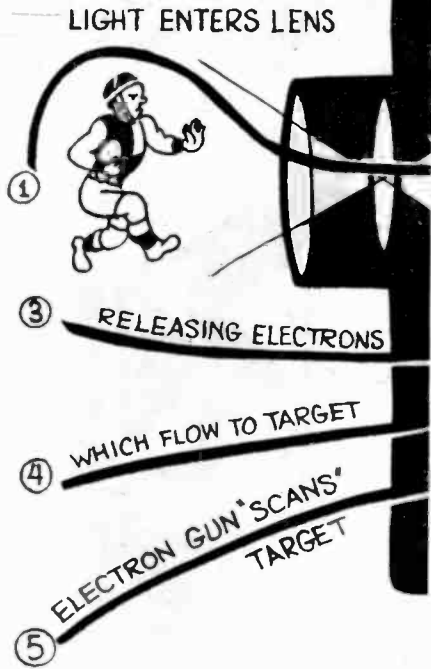
There is no film in this camera. Its job is to change the picture it sees into a sort of electrical picture that can be sent through wires and across space.

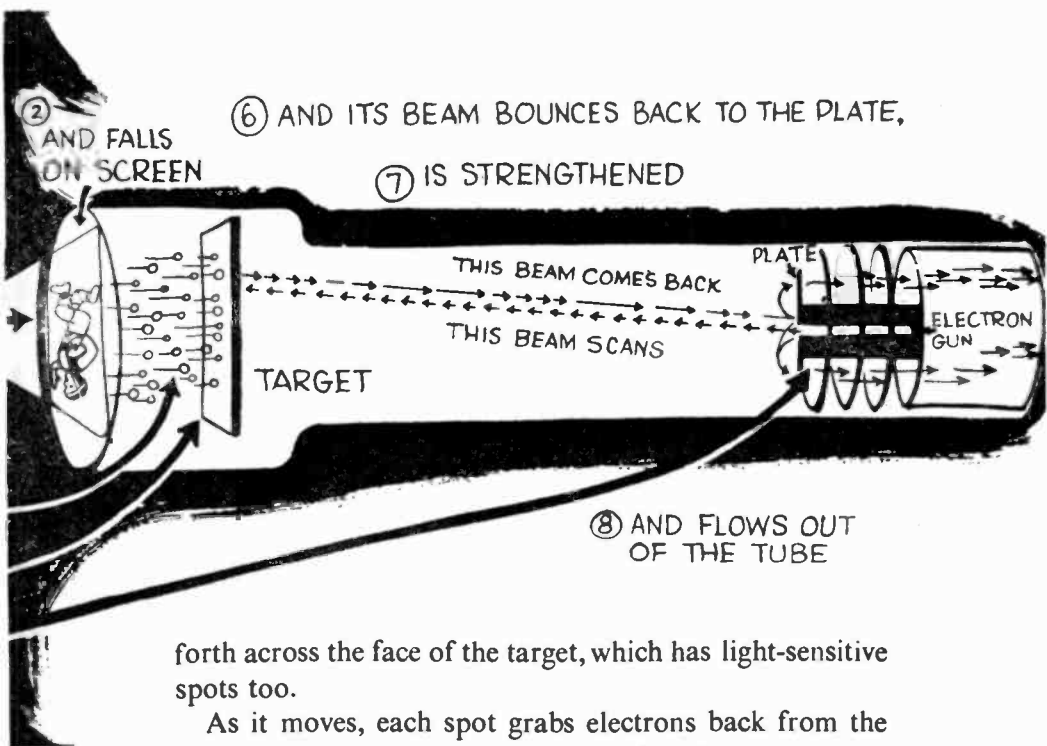
The heart of the camera is an electron tube. One highly sensitive tube in use to-day is the Image Orthicon, and it works like this.

The picture comes in through the camera lens and is focused on a screen that is sensitive to light. The screen (or "mosaic") is made of thousands of tiny, chemically coated spots. As a ray of light hits each spot, it gives off the microscopic charges of electricity called electrons. The brighter the ray of light, the more electrons the spot sends out.

These electrons shoot along to another screen called the target, hitting it so hard that they knock more electrons out of the target. These displaced electrons are collected, leaving the target hungry for electrons.

At the other end of the tube is an electron gun, shooting out a thin stream of electrons, like a Sten gun shooting bullets, but thousands of times faster. This stream of electrons moves back and





forth across the face of the target, which has light-sensitive spots too.

As it moves, each spot grabs electrons back from the stream to replace the ones that were knocked out of it.

Finally the stream bounces back to an electron collection plate. When it leaves the gun, the stream is of a constant strength, but when it bounces back from the target it varies because of the electrons it has lost. The stream varies just as the light and shadow varied in the picture that came into the camera lens.

The stream sweeps back and forth across the target just as your eyes do when you read a book. It covers every point on the picture. This is called scanning.

After the beam is collected in the plate, it is called the signal, and it is an electrical reproduction of the picture in light that came into the tube. Before it flows out of the tube, this signal is made much stronger by an amplifier.

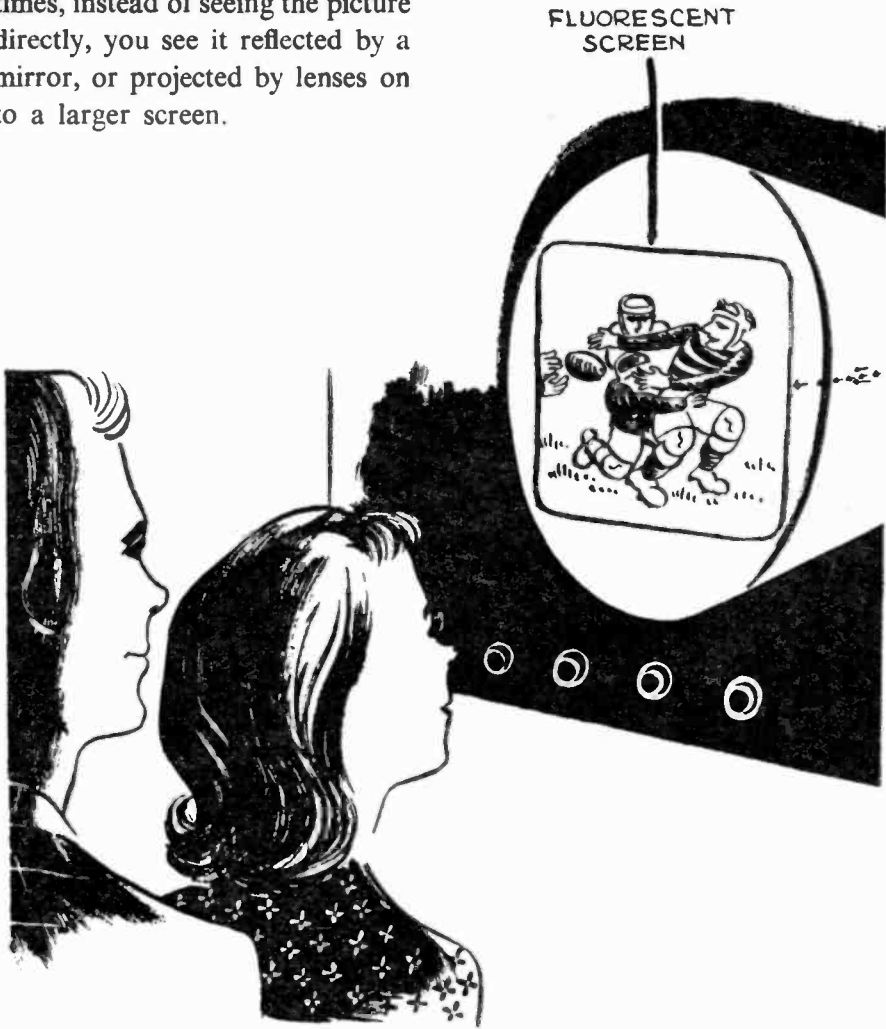
The electron beam scans so quickly that 25 separate pictures are being sent out every second. This is fast enough to catch and send out whatever action is going on in front of the camera.

The Image Orthicon that does all this work is one of the smallest of tubes. It is only about 17 inches long but it costs several hundred pounds. Though the picture on your television screen is much larger, that first picture on the camera tube is only  $\frac{7}{8}$ " high and  $1\frac{1}{4}$ " wide.

# HOW THE PICTURE IS RECEIVED

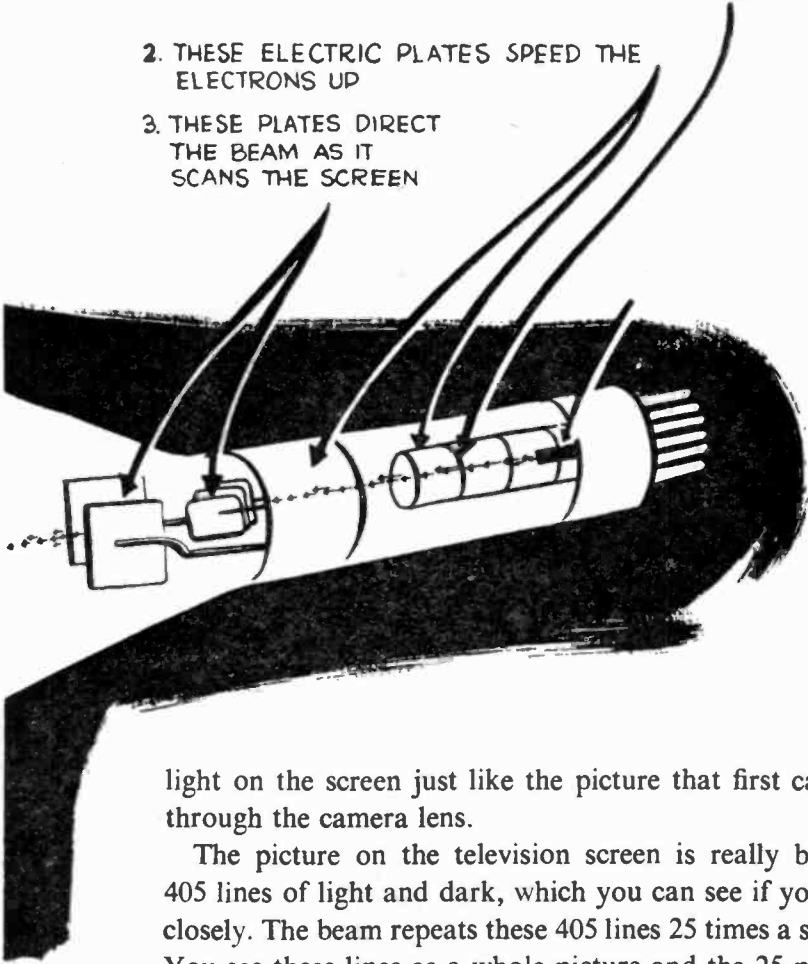
After the aerial has picked the television waves out of the air, they are carried by a special wire into your receiver. The most important part of the receiver is an electron tube, the partner of the one in the camera. This tube is called a cathode-ray tube, and it has an electron gun in it similar to that in the camera tube.

The big end of the tube is a fluorescent screen. This screen gives off rays of light as long as it is being scanned from behind by the beam from the electron gun. This is the screen of your receiver, and the rays of light are the television picture. Sometimes, instead of seeing the picture directly, you see it reflected by a mirror, or projected by lenses on to a larger screen.



The beam of electrons in the cathode-ray tube fluctuates just as the beam in the camera tube did. It shoots out of the gun and scans the fluorescent screen in exactly the same way. And since the beam is made of little charges of electricity exactly like the ones that flowed out of the camera tube, it makes a picture in

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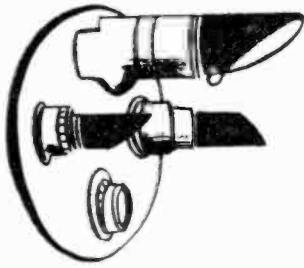
light on the screen just like the picture that first came in through the camera lens.

The picture on the television screen is really built of 405 lines of light and dark, which you can see if you look closely. The beam repeats these 405 lines 25 times a second.

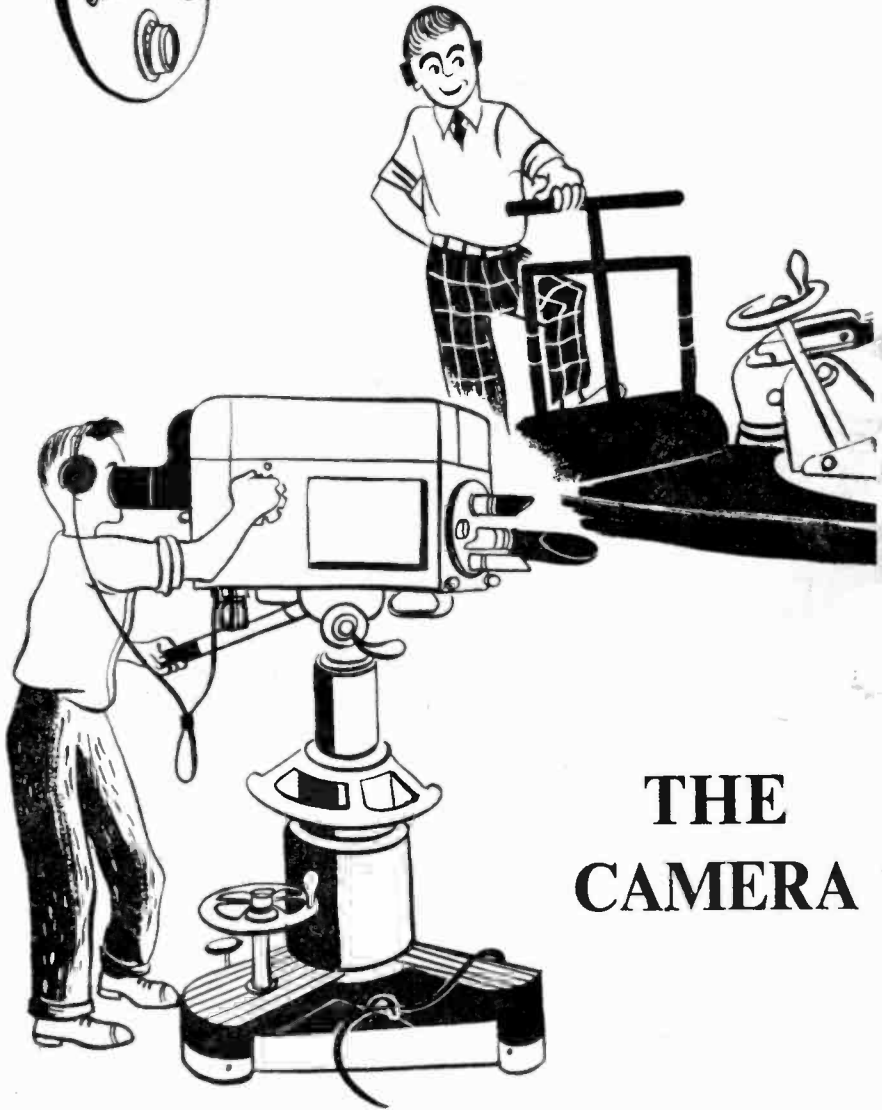
You see these lines as a whole picture and the 25 pictures a second as a moving picture because your eyes don't work fast enough to notice the spaces in between.

Now let's see what happens while the transmitter and camera tubes are in action.



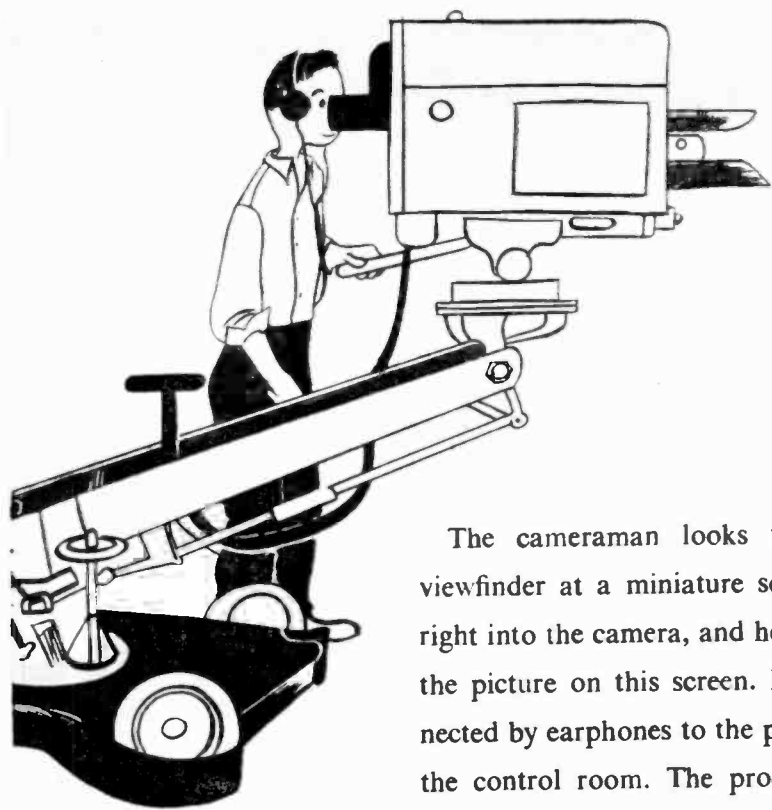


THE CAMERA TURRET CONTAINS SEVERAL LENSES (USUALLY FOUR) EACH OF A DIFFERENT FOCAL LENGTH. BY TURNING A KNOB, THE CAMERA MAN CAN SHOW SHOTS RANGING FROM WIDE ANGLE (DISTANCE) TO CLOSE-UP.



## THE CAMERA

Usually three or four television cameras are used on a studio production. Each camera has four lenses mounted on a round plate called the turret. Each lens takes a different picture of the same subject, from a close-up to a long shot. The cameraman gets the lens he wants into position by revolving the turret.

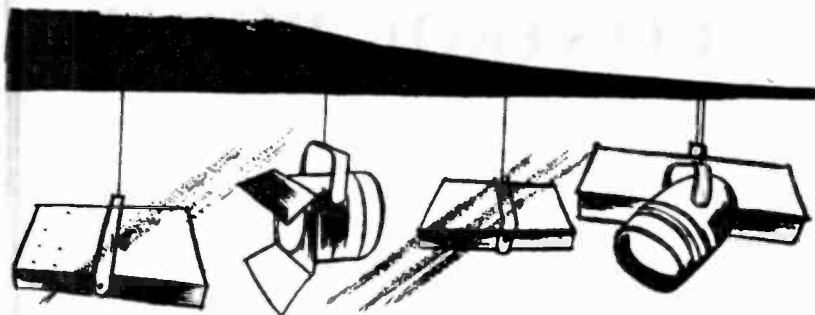


The cameraman looks through a viewfinder at a miniature screen built right into the camera, and he works by the picture on this screen. He is connected by earphones to the producer in the control room. The producer tells him what picture to get and when to change his position to be in place for the next shot.

All studio cameras are pretty much alike, but they are mounted on different kinds of wheeled stands. One is stationary on a pedestal: because of its immobility it is called an "iron man". Another is on a heavy truck called a dolly. Sometimes the dolly has a crane to which the camera is attached. The cameraman will be sitting on the crane and the "dolly man" pushes him around. By cranking wheels, an assistant raises or lowers the cameraman and the camera, or moves them from side to side. A new type of crane-dolly is all-electrically operated by the cameraman himself.

The pictures from all the cameras travel through a cable called the coaxial to the control room.





## THE CONTROL ROOM

**CONTROLLING THE PICTURES** The production control room is set above and overlooking the studio floor so that the producer can watch the floor through a big sound-proof window.

The engineers who control the pictures sit at a control desk in front of a number of monitors. Each monitor is a kind of television receiver. Some monitors are connected to the cameras, others to film projectors in the "telecine" room. There are programmes which use film as well as "live" material.

On each of the camera monitors is the picture from the camera to which it is connected. During a show, all the cameras are taking pictures all the time, and from these the producer selects the one to be televised. He does this in a split second as he watches all the monitors. The transmission monitor shows the picture he chooses, and that is the one that reaches your receiver. We'll see later how he gets it on the air.

The engineers adjust the contrast and brightness of the pictures coming in from the different cameras so that they all match in tone and quality. The picture you receive would be very jumpy if those from one camera were dark, those from another light. Engineers say this kind of picture is "bouncy".

In the main control room there are more monitors and many cabinets crammed full of electron tubes. (See pp. 44-5.) Some supply power. Others amplify the signal before sending it on. The rest keep the signal the station is broadcasting in step with the signal your set is receiving. The technical name for this is "in synchronization", and this set of equipment is called the "sync" generator. Other engineers are constantly checking all the equipment to see that everything is working right.

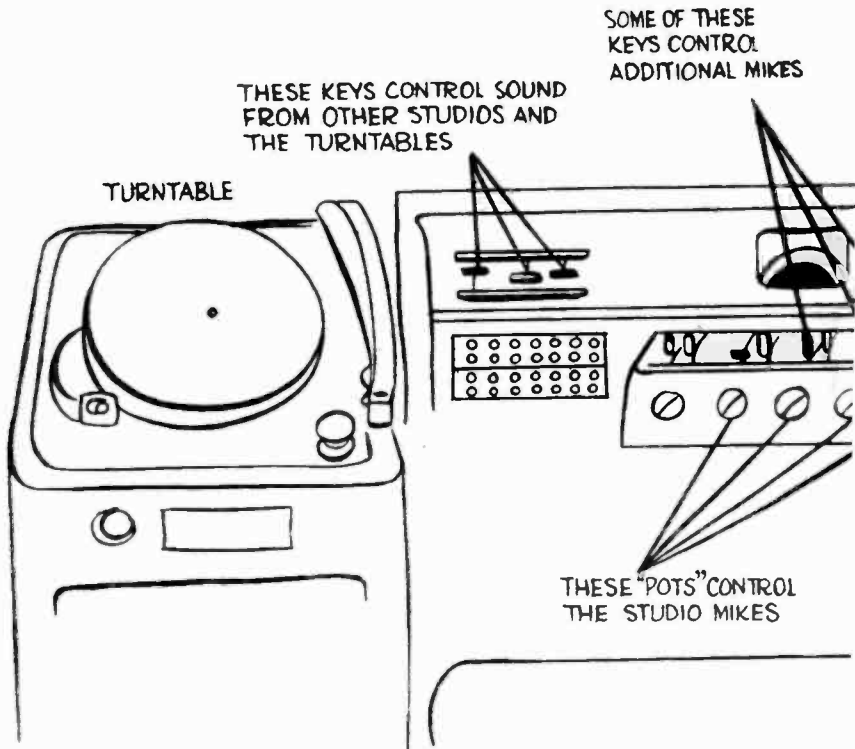
EFFECTS' OPERATOR  
HERE

# THE CONTROL ROOM

**CONTROLLING THE SOUND** Here is what a television sound-control desk might look like. It is similar to the one used in radio broadcasting. This desk has seven or eight sockets into which microphone cables and other kinds of sound equipment are connected. Each socket is called a position, and there is a knob for each position to control the loudness or volume of the sound. These knobs are called "pots", short for potentiometers.

During a show, one or two microphones may be used to pick up the actors' voices, another for the orchestra, and still another for the announcer. Sometimes when sound film is being used on the programme, the sound from the film projector is controlled here too.

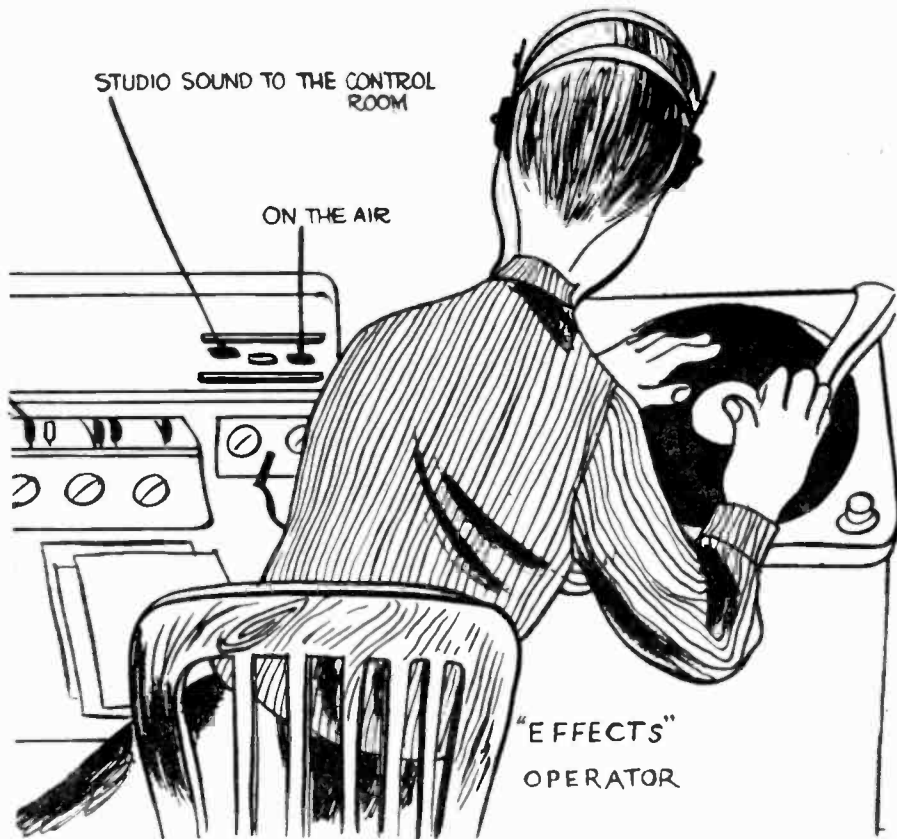
The engineer who operates this equipment—he is often called the 'effects operator'—also has to watch the monitor that carries



the picture being broadcast, to make sure he adjusts the right “pots” at the right time.

Nearby will be a turntable (record player), sometimes two turntables. An assistant puts on the records and plays them at the proper time during the show. The producer gives the cue when he wants to introduce sound from any part of the studio.

Somewhere in the studio there may be another sound-effects man, and the squeaky door, galloping horse, thunder or rain-on-the-window-pane noises he makes are picked up by the mike and sent by cable to one of the positions on the sound-control desk. At exactly the right moment the sound engineer opens that pot so the sound can be heard. More and more “effects” however, are being recorded and transmitted by “discs” from the control room.

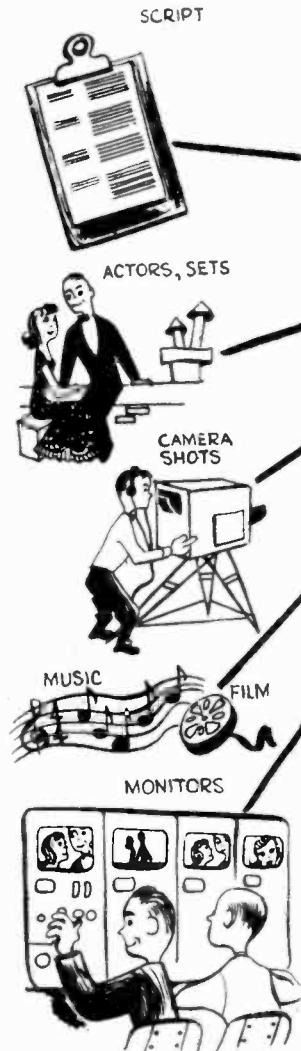


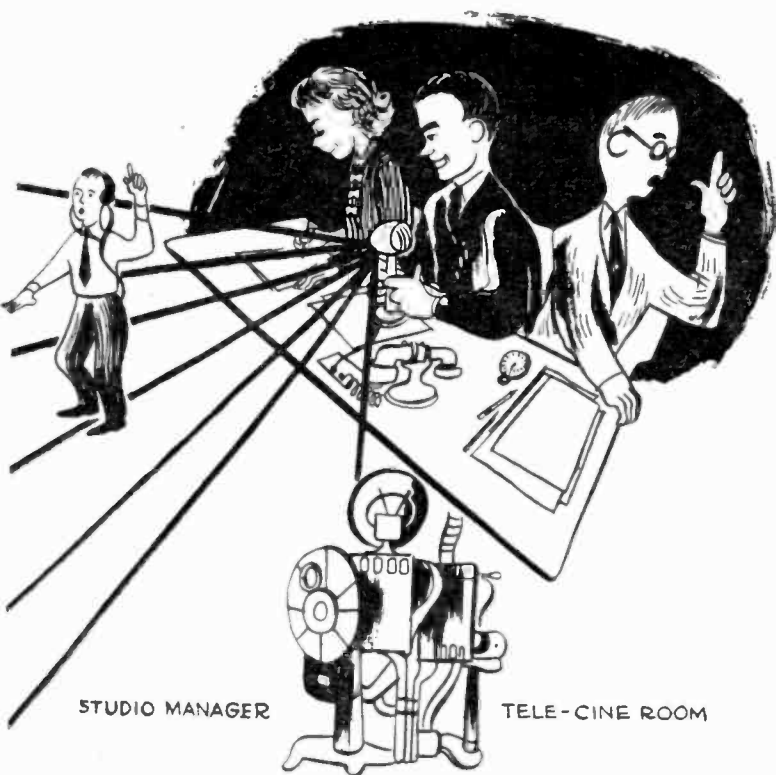
# THE PRODUCER AT WORK

The producer is the key-man in any production. He is the equivalent of the film director and film producer, doing both jobs at the same time. He is also the casting director (he chooses the actors), he plans scenic settings with the designer, decides on the music, (in co-operation with the music department), discusses costumes with the wardrobe manager, and whether pre-shot film will be used for inserts. He has experts to advise him on all problems—and the problems are too numerous to list. Throughout his planning and rehearsal days he must keep in mind the way he wants the picture to look when transmission time comes. Sometimes he has the services of an assistant-producer, but only on big, complicated broadcasts.

When transmission time comes—after a hectic day on final camera rehearsals, conferences with lighting engineers, and the hundred and one other “fine details”—he mounts the ladder to his control room. You’ve already seen something of that control room. His job is to watch the monitor screens and give the cues for camera changes, to see that the right picture is given at the right time from the right angle and with the right lens, to give advice to the studio manager below, the cameramen, and mike operator, as well as the lighting people and others—and to follow his script! He is also connected to the telecine room.

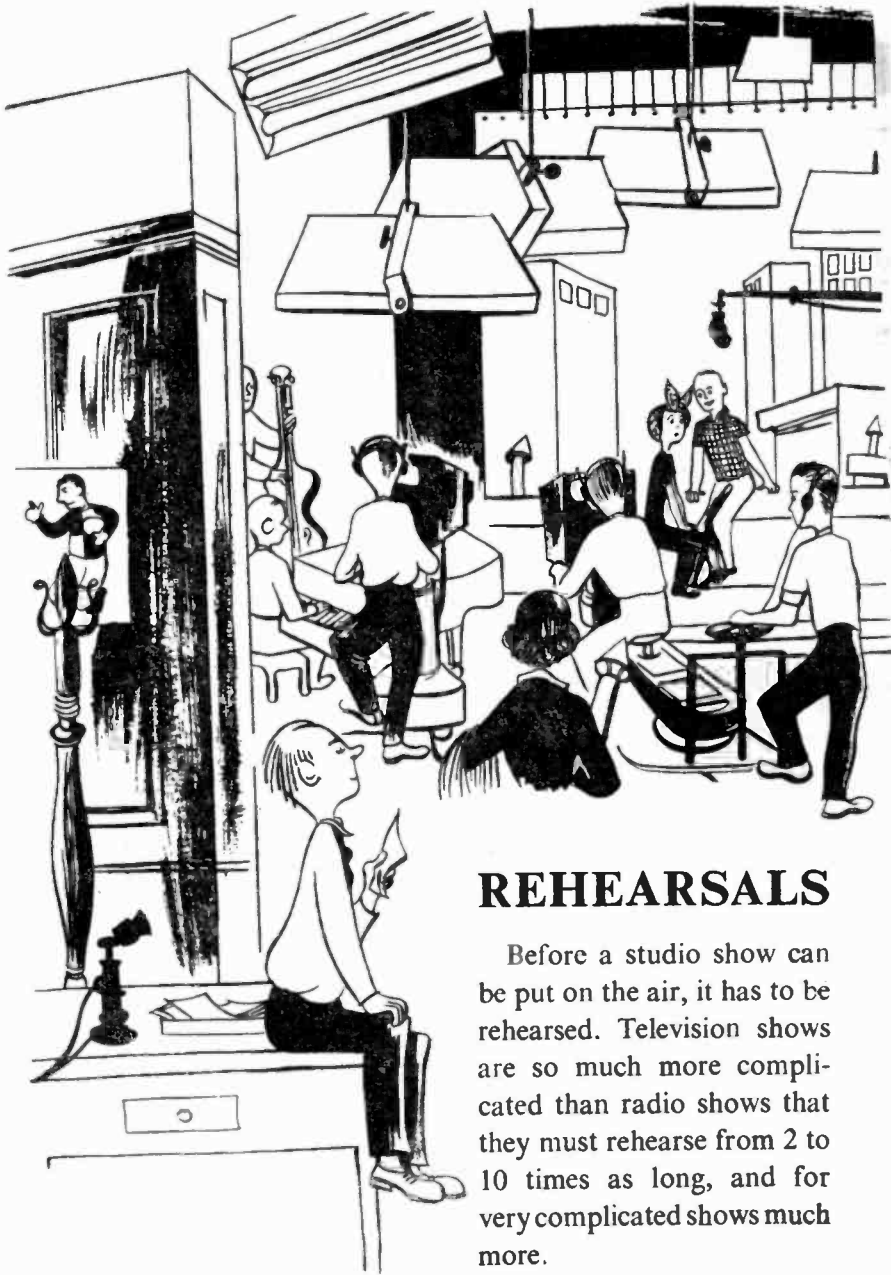
All his camera movements are plotted and rehearsed beforehand and these he must synchronize with the movement of the actors during the transmission.





As the producer watches the monitors he must decide in an instant what picture he wants to transmit. He gives the cue to the cameramen to be ready. Each camera has a number, and when the producer calls through his microphone "Take One" or "Take Two" the picture from Camera One or Camera Two instantly replaces the picture coming from Camera Three or Camera Four. When he gives the word for "Telecine" all pictures from the cameras are cut and the film insert is transmitted from the telecine room. This picture the producer also watches on his monitor so that he knows when to go back to "live" action.



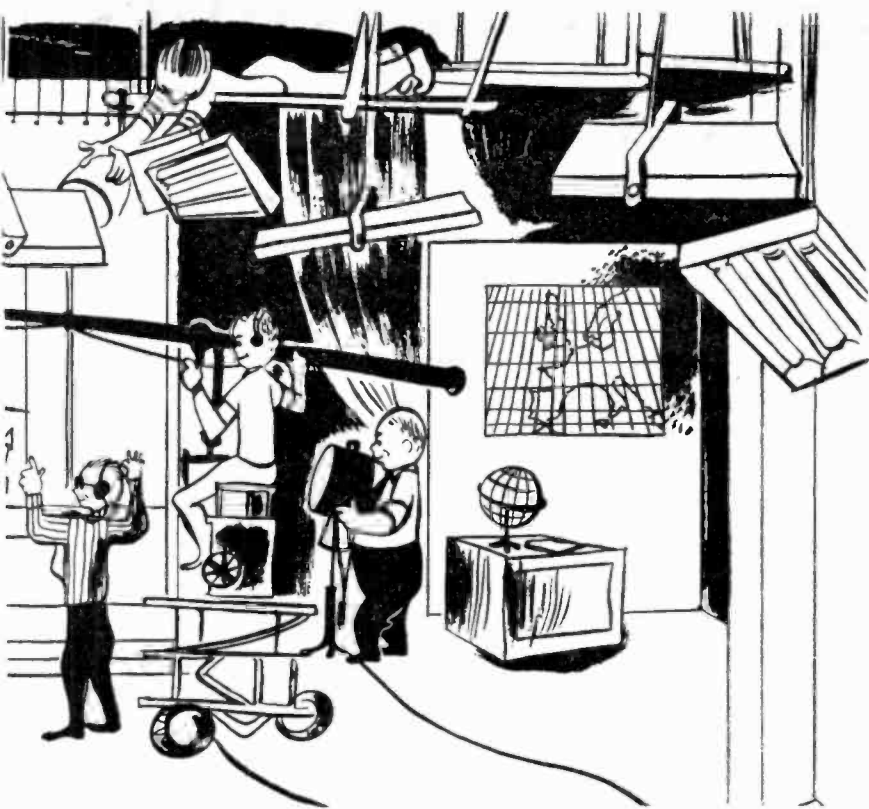


## REHEARSALS

Before a studio show can be put on the air, it has to be rehearsed. Television shows are so much more complicated than radio shows that they must rehearse from 2 to 10 times as long, and for very complicated shows much more.

The sets have to be put in place,  
the lights have to be adjusted,  
the mikes have to be set,  
the props have to be collected,  
all before the camera rehearsals begin.

But these technical jobs are usually done on the day of transmission.



Even before the actors have been assembled the producer has “doctored” his script and roughly planned the players’ movements in relation to the camera angles and sets. For days he rehearses the cast in an empty room without any equipment except a few props. The positions of rooms, doorways, furniture, and the main props are chalked on the floor. It is during these days that the producer must tell his cast everything he wants them to do, because there will be no way of communicating with them once the transmission is on except by signs from the studio manager.

Rehearsals with cameras can take place only when the settings, cameras, and lights are in place in the studio, and that is rarely more than twenty-four hours before the broadcast.

# STUDIO PROGRAMMES

## STARTING A SHOW

A television show starts with an idea. Sometimes it comes from one of the studio staff or from a free-lance writer. Sometimes it comes from someone who has nothing to do with television except as a viewer. Before the idea can be put on the air, a lot of work goes into translating it into television form.

After the programme department has decided to use the idea, it is turned over to a producer. First, he decides what he wants the show to be like on the air. Then he calls in a writer to write a script or if the producer is a capable writer he may do it himself. To get a good background and mood, he works with the set department, the lighting man, and the music people.

Many other people work at getting the show on the air.

The programme operations department assigns stage managers, writers, and production assistants to the show. It assigns studio facilities and rehearsal time.

The technical department assigns engineering and camera crews.

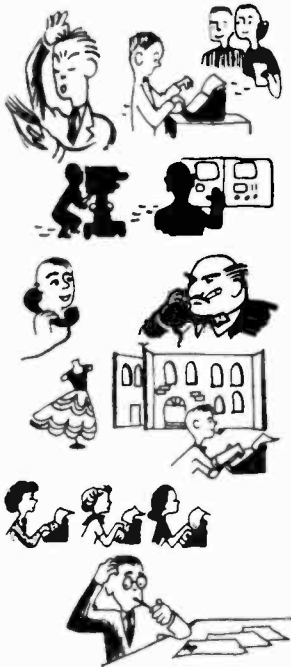
Another department finds and engages the artists the producer wants. This is the department that deals with fees to artists.

The production department starts work on the costumes, props, and scenery, and the publicity man gets out news stories.

Secretaries bang on typewriters, copying scripts and reminders from one department to another.

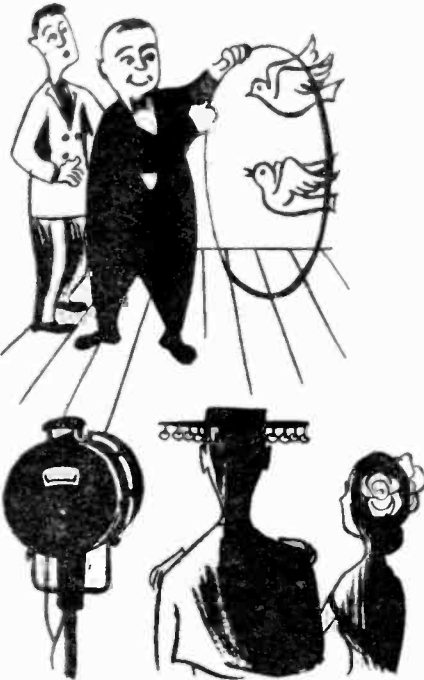
And the finance department estimates the costs of the whole thing.

All kinds of shows are produced in the studio, and may cost anything from a hundred to a thousand pounds or more.



## DRAMA

Plays are usually the most complicated productions, and take most time to plan and rehearse. Since viewers compare television and cinema performances, the television dramatic show must be smooth and finished-looking. But a film is shot over a period of days or months, with time to retake scenes in case of mistakes and to change location. A television play is shot all at once, with no chance



to correct mistakes. The actors have to learn all the lines and action right through just as in the theatre even though it may be only for a single performance.

## VARIETY SHOWS

Almost anything goes into a variety show—singing, dancing, jokes, acrobatics, magicians. The separate acts must be tied together smoothly, usually by a master of ceremonies, known as the compère, and usually an artist himself.

He must keep everything running exactly on time. Variety shows which appear regularly have scouts working all the time to find enough good acts to keep the show entertaining week after week. The risk cannot be taken of viewers getting tired of seeing the same performers too often.

## AUDIENCE PARTICIPATION

Sometimes members of the public take part in programmes, especially those of the "magazine" type in which they are interviewed. Members of the audience have sometimes been asked to put themselves in place of the actors and "see what they can do". A compère coaches them and then they are "left to it". It's all good fun.



## QUIZ SHOWS

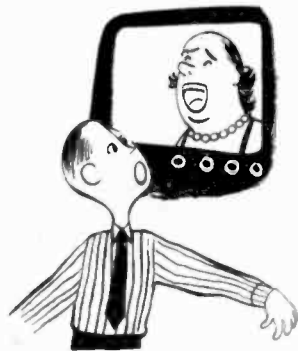


Quiz programmes, like those in radio, are always a good half-hour's entertainment, and enlightening. But television has an advantage over radio because vision widens immensely the scope of any quiz. *Television can give quiz programmes impossible in sound alone.*

This young woman is illustrating something or other in a typical quiz programme.

## MUSIC

Singers and instrumentalists on television must have pleasant personalities as well as be good performers. Most music programmes are short. Usually there isn't enough action to hold the audience's attention for more than 15 or 20 minutes. Television is experimenting with the televising of concerts and operas. The problem is to get pictures that will add enough to the audience's enjoyment of the music to keep them *watching* as well as listening for such a long time.



## HOW TO DO IT

Teaching is one of the things television does best. Experts can show you how to bake a cake, draw a picture, or sew a chair cover. The camera work has to be clear and the programme must move slowly enough for the viewers to see and remember what the expert is doing.



## LEARNING THE EASY WAY

There are no programmes actually *called* educational, but “feature” programmes tell you a lot of things that are interesting to know. A programme may come from an observatory where you can watch how scientists study the stars, or it may be an archaeologist talking about a city thousands of years old. The speaker must know his subject and be interesting, too, and the visual part of the programme must be clear and well arranged. No matter how much information the programme gives, it won’t hold the viewers’ interest if it is dull.

A great many films are used in feature, talks and documentary programmes.



## PUBLIC OPINION

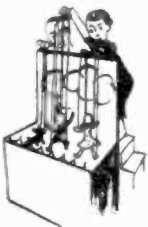
The expression of public opinion is rapidly finding its way into television. In programmes on industry workers are being brought before the cameras to express their points of view. There are discussions on all subjects from politics to sport, from art to industry and social welfare. During big outside events the candid camera and commentator pick someone out from the crowd and questions are asked. The commentator has to know how to “size up” his victim first.



## CHILDREN’S HOUR

Children’s programmes provide fun and information for children—stories, jokes, games, cartoons, and lots of useful things to do. Some shows are built around puppets such as Muffin the Mule and others around the children themselves.

NEWS PROGRAMMES (see page 46)



## SPECIALLY FOR THE CHILDREN

It goes without saying that the keenest of all television enthusiasts are the children, whether they be four or fourteen. Children's programmes first began for the very young. They were shown once a week on Sundays, and sometimes it meant dashing home quickly from Sunday school so as not to miss the first part of the programme—and it was a very quick dash when it was known that Muffin the Mule was due to appear. He is the veteran star of children's programmes, and long ago his reputation spread to the other side of the Atlantic, where his films have been broadcast over the great American television network. He is a puppet, and so he is animated by strings.

But the days of once-a-week programmes for the toddlers have been over a long time now. Muffin still reigns supreme and gets his weekly reward of a carrot or two, but he is supported by a lot more puppets, and there's a programme every day of the week, catering for everybody from the three-year-old to the teenager who is beginning to think that he—or she—is grown up. And Muffin can't be in *every* programme.

On a particular day of each week there may be another episode of a thrilling adventure story or another part of a classic novel that has been dramatized so that it can be better understood by the not-so-grown-up.

Children's Hour is not all just fun and games and any old distraction to get away from algebra or French prep. It is educational too, but that word is never breathed by a soul in case it scares the young audience from switching on the TV receiver!

There have been some Shakespeare plays, and they have been presented in a special way, with commentaries and camera shots behind the scenes to help the children appreciate Shakespeare all the more when they grow up. And it has helped a good many in the end-of-term exams, too. To-day there is everything from debates by the younger generation on everyday affairs to ballet and opera, all presented with the same care and attention to detail as in the programmes for grown-ups. Children's programmes are planned just the same way, with specialist producers for drama, talks, features, and documentaries; there are big studios and scene boys, wardrobe and make-up assistants, and artists who specialize in the sort of scenery needed by television.

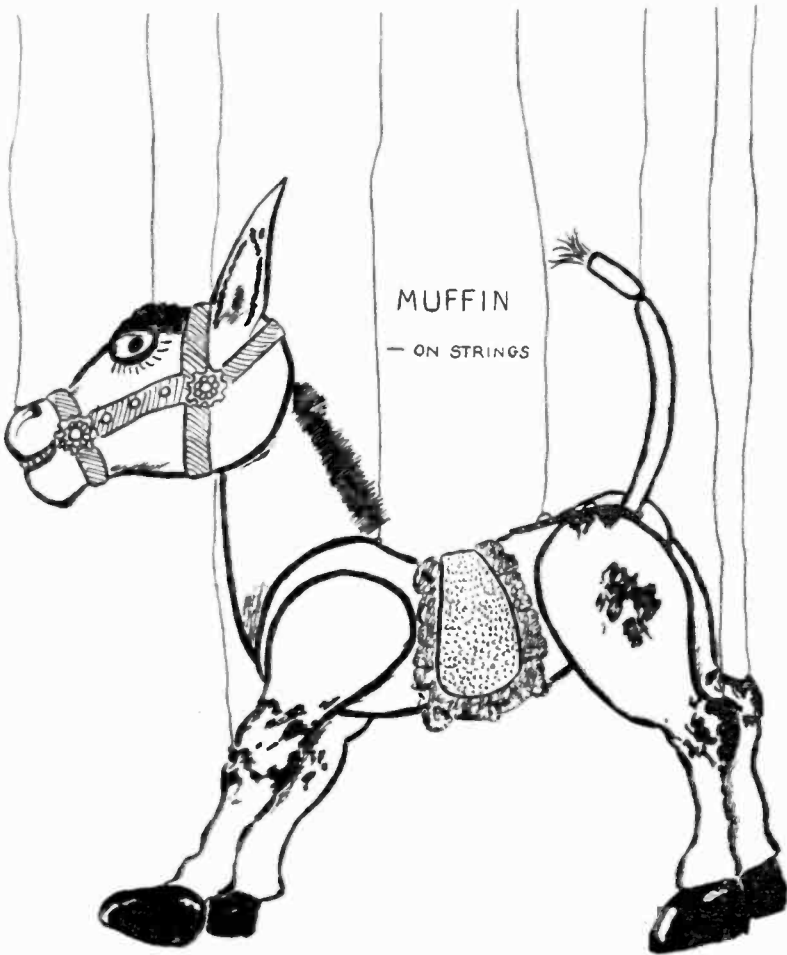
Variety shows frequently find their way into the programmes, and in some of them the artists are all teenagers.

Outside broadcasts are popular, too. The roving cameras go to

all sorts of interesting places—exhibitions, sporting events, the zoo, museums, and so on. A lot of the Outside Broadcast work is instructional, but the sort of instruction in which the children revel—how to swim, play cricket, football, hockey or netball, and it's always the finest experts who appear before the cameras.

Film plays a very big part, too, and there are special children's newsreels which brings all sorts of interesting and exciting pictures from all parts of the world. Now and again there is one of those "rip roaring" Western serials, generally televised during the school holidays so that there's little chance of missing an episode.

In brief, the children have as big a choice of entertainment as do their elders—from fantasy to scientific progress, sport to current affairs, documentaries to party games, as well as music, plays, ballet, opera, competitions—and all the programmes are specially designed for *them*.





# SOME "EFFECTS"

**SUPERIMPOSITION** Pictures from several cameras, telecine, and a caption board can be transmitted at one time to form a single picture. A producer can make a dancer look as if she were dancing in the clouds by focusing one camera on the dancer and superimposing her on a film of clouds. He can show a caption board title on top of that. He can make people appear out of nowhere, or show a conductor's face in close-up over his whole orchestra. By combining the pictures from two or more sources, the producer can create all kinds of effects.



**"MOOD" AND BRIDGING FILM** Many times, especially in plays, the producer does not want to be confined to the limits of the studio floor, so he has films shot to create the illusion of different locations. He may open the play with a film of a city street, then an office building, and then go to his first live scene on the studio floor—the set of an office.

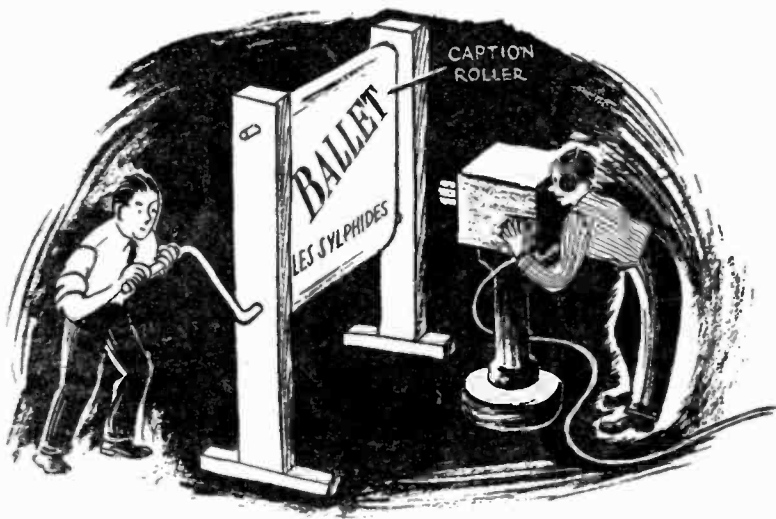
Sometimes to go beyond the limits of the studio he takes his cast out a few days before the broadcast and shoots film on location. This he blends into the live show. Interweaving film in this way allows the director to use a variety of scene comparable with that shown in a cinema. There are many other uses of film, too. The producer does not only send the cameras out on location. Sometimes an actor has to make a quick change which is impossible without having a short interval—perhaps when an interval is not desirable. Part of the scene, therefore, is shot on film beforehand and inserted during the play to give the actor a valuable minute or so to execute his change.

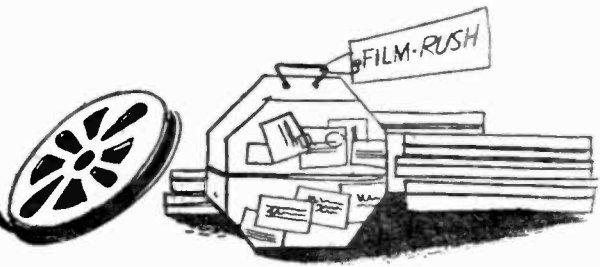


“Atmosphere” or “mood” film is also sometimes televised to the accompaniment of appropriate music during the intervals of a play. This explains itself.

“MIXING” AND “CUTTING” Transitions from one scene to another are made in several ways. At the end of a scene, the picture can be slowly faded until it disappears, and at the same time the new scene brought up from the dark screen into brightness. In going from one shot to another the picture from one camera is faded out of the transmission monitor as the other is brought in, and they overlap. This is called a “slow mix”. When the action is fast, the pictures are changed instantly by a quick switch from one camera to another. This is called a “cut”.

THE CAPTION ROLLER How are those captions (titles, actors’ credits and so on) made to pass over the screen? Here is the simplest answer we can give—a caption roller. It works on much the same principle as a window blind or domestic mangle, but it isn’t really as crude as that in the illustration. The handle is turned slowly and you can see for yourself what happens. Sometimes, captions go horizontally *across* the screen instead of *up* it. It is just a matter of turning the caption roller sideways—more or less.



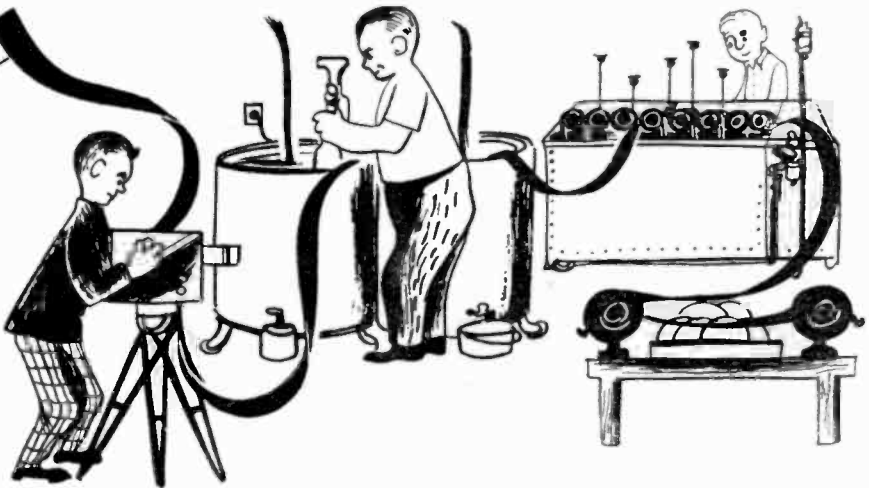


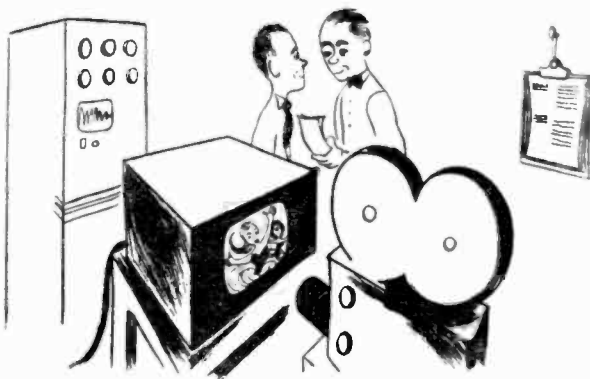
**FILM** A great deal of film is shown on television. Besides being good entertainment, it helps to take the pressure off over-worked and overcrowded studios. Few people and very little rehearsal are needed for a film show. All kinds of films are shown; they may be features, shorts, educationals, or documentaries.

Recent feature films are seldom shown at present because the film companies do not want them competing with the same films in the cinemas, and so they will not release them for television. If the film companies gave permission, within a few years you could see every film that was ever made. Television companies in several countries are making their own films, generally two- or three-reelers suitable for 20- or 30-minute programmes.

Films are important for television because they can take you farther out into the world than the limits of the studio or the limits of any live television broadcast would allow. By showing only the high spots of a news or sports event, a film can give the viewer a feeling that he has seen the whole thing, though it has actually been condensed into programme length.

Television has its own film cameramen who shoot news and feature stories for the news department, film for drama and other productions and any other films that are needed for programmes and can't be obtained from film libraries.





## RECORDING

Until quite recently, once a production was televised, that was the end of it. All the work, rehearsal, sets, and money were used up in not more than two performances. But a way has been found of using a television programme over and over again. A recording, sound and picture, can be made of the complete show directly off a television receiver tube.

It is done like this. An adapted film camera (or a projector adapted to take pictures instead of projecting them) is focused on a receiving tube that is showing the programme. The picture on the tube must be a good one and all the details sharp. The camera shoots the whole programme from beginning to end without stopping. It is necessary to have a camera that holds a great deal more film than an ordinary one does, because there isn't a second to stop to reload the film magazine; part of the show would be lost. Alternatively, two cameras can be used, one being reloaded while the other is in action.

When experiments on recorded vision programmes began several years ago one of the main problems was the synchronizing of the television picture frames (25 per second) with those of the film camera mechanism (24 frames per second). The difference sounds very small, but it was enough to prevent perfect recording.

The system was finally perfected early in 1950, so all outstanding programmes can now be "put on record" for future transmission.

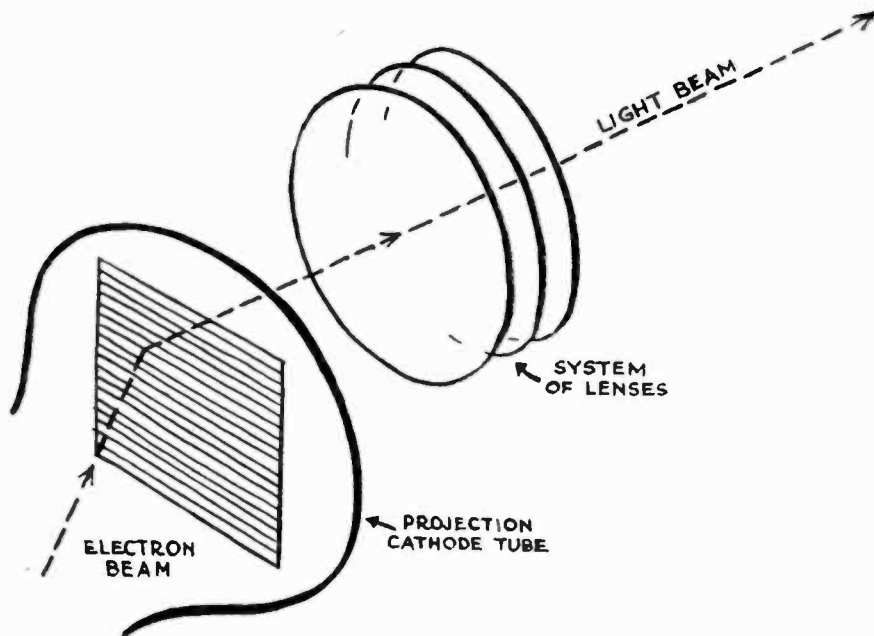
The recorded programme is also a boon to the producer, technician, and artist because now each can see his own programme again and study any faults—a visual post-mortem can be held.

# TELEVISING FILMS

There are several methods of televising films. At one time a form of film projector was used in conjunction with an ordinary TV camera, and reasonable results were obtained. In recent years big strides have been made in improving the reproduction quality of televised films, largely by an intricate combination of optical and electronic systems.

Here is one such method—at least, a very rough guide as to how that method works. For this drawing we took a peep at the innards of a TV telecine camera, were more than a little bewildered at what we saw, and decided to describe its working by using the four main components (to avoid using up the next ten pages!).

The electron gun traces a scanning pattern (405 lines) on the fluorescent screen of a projection cathode-ray tube. The image of

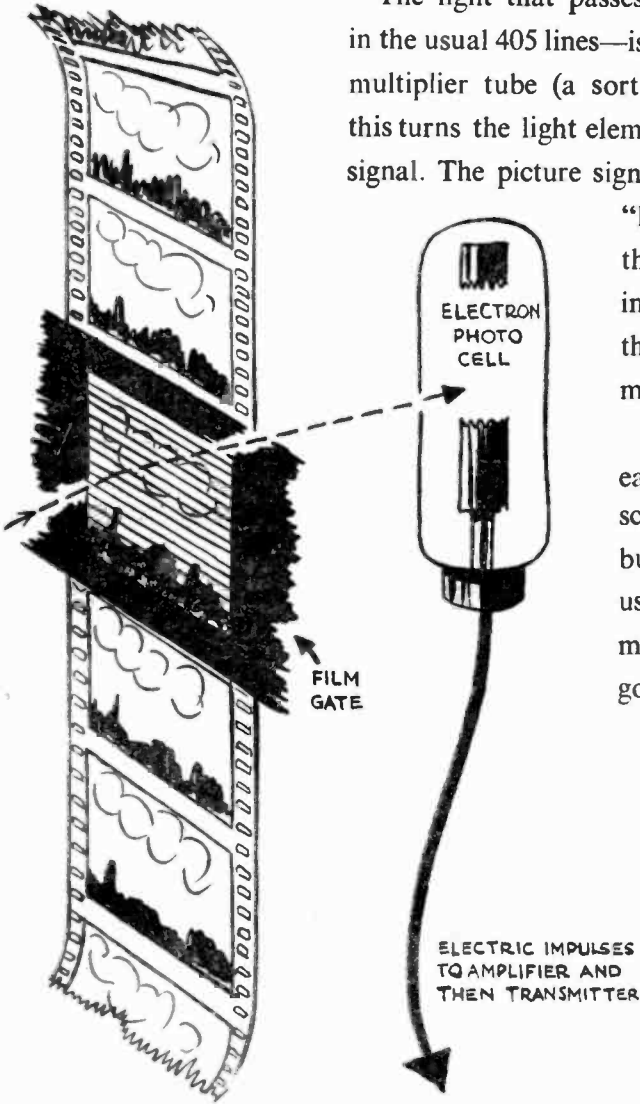


this pattern is projected by an optical system on the “gate” of the film projection component. The film runs continuously through the gate at the rate of 25 frames a second—to synchronise with the speed of normal television pictures. Each frame of the film, therefore, is exposed for a 25th of a second, and is subjected to the scanning pattern for that period.

The light that passes through the film—in the usual 405 lines—is focused on a photo-multiplier tube (a sort of neon tube) and this turns the light elements into the picture signal. The picture signal, as in the case of

“live” televising, is in the form of electric impulses which go to the amplifier and transmitter.

In actual practice, each frame of film is scanned in two halves, but you wouldn't thank us for complicating matters further by going into the details.



# MASTER CONTROL

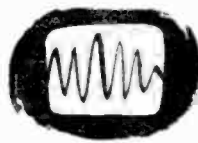
In a television station, programmes from all the studios come from their own control rooms by cable into a big master control room. A lot of things happen here.

The whole room is lined with cabinets of electronic tubes that do all kinds of jobs. Each cabinet has hundreds of wires and connections of its own.

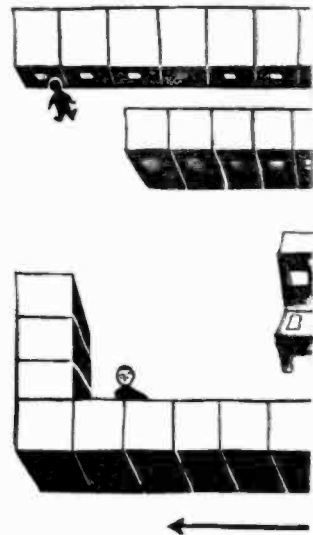
One whole row of cabinets supplies power to work all the studio equipment—all the cameras, mikes, loudspeakers, and control boards.

Another row of cabinets holds all the synchronizing equipment—the tubes that keep everything in step.

More cabinets hold the tubes that control all the sound in the studio and still others control the picture equipment. Many of the cabinets have small screens built into them which look like television screens. But instead of having pictures, the screens show graphs in light of exactly what is happening inside the cabinet. They are called oscillographs.

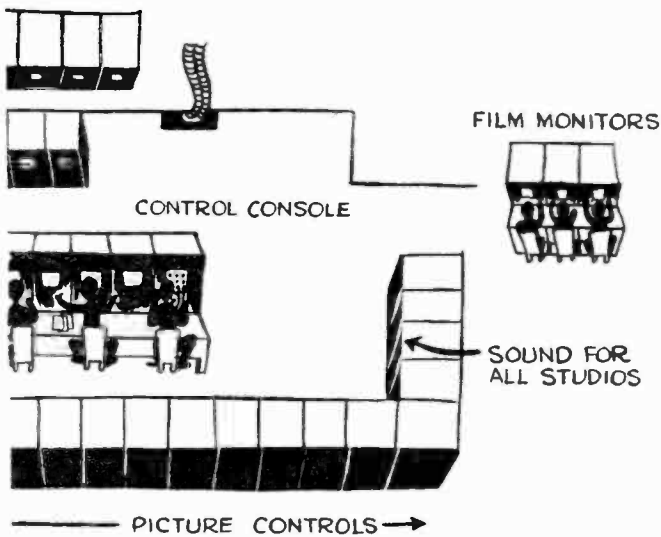


POWER SUPPLIES FOR ALL STUDIO EQUIPMENT



Looking at them, the engineers can tell just how that particular rack of equipment is working. If there is trouble anywhere, the oscillograph paints a chart of it they can see at a glance. There isn't time to stop to look for trouble.

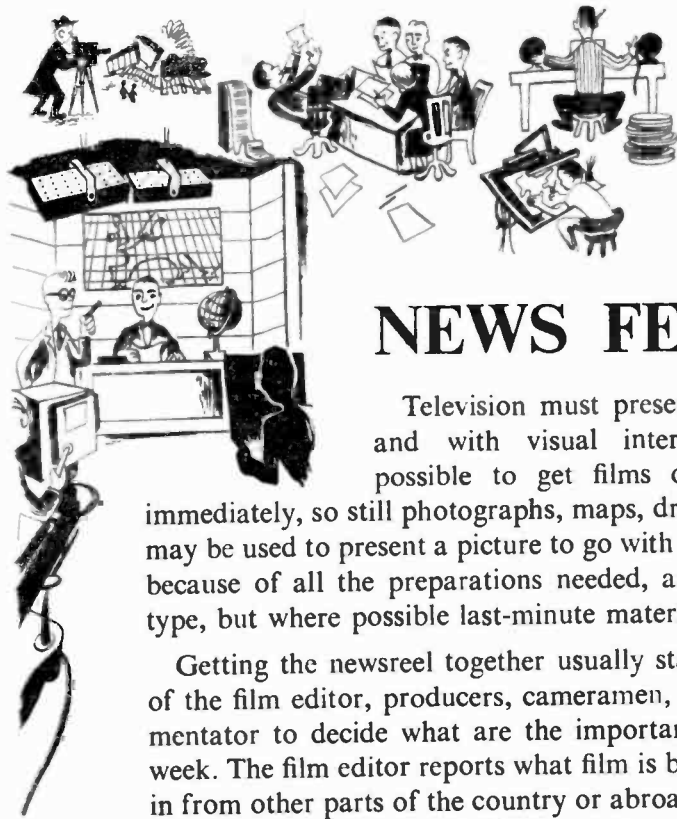
In the middle of the master control room is the control desk, or console, which looks something like the one in the control room. But the monitors on this desk have different pictures. One is a test channel for taking an advance look at studios that are about to go on the air. Another monitor carries the picture that is being transmitted.



At one end of the control console is a telephone switchboard where cues are sent by phone to all the studio control rooms.

There is another control board just for monitoring film from the telecine room.





# NEWS- REELS AND NEWS FEATURES

Television must present the news promptly and with visual interest. It isn't always possible to get films of a big news event immediately, so still photographs, maps, drawings, or animations may be used to present a picture to go with sound. News pictures, because of all the preparations needed, are of the "magazine" type, but where possible last-minute material is incorporated.

Getting the newsreel together usually starts with a conference of the film editor, producers, cameramen, writers, and the commentator to decide what are the important news stories of the week. The film editor reports what film is being shot or is coming in from other parts of the country or abroad. To this film may be added maps or animated charts or other films made in the art department and still pictures from the photographic services that supply the newspapers. The conference decides the order of the stories and how much time each should take—though both these may change, and frequently do, when the "rushes" of the film are seen.

The film cutters cut and edit the films, writers write the commentary, the picture editor inserts any other film material he thinks necessary, and so the newsreel is assembled.

At the moment there is a newsreel several times a week, but as television continues to grow and more staff and equipment are available it may not be long before a regular daily newsreel will be a feature of television broadcasting. It is in newsreel production that television has a great advantage over the film world because only one copy of a film is needed. It can be televised within a matter of hours. The cinemas have to wait until many copies are printed and distributed for simultaneous showing several days afterwards.

# OUTSIDE BROADCASTS

Many television hours, especially in the summer, are devoted to sport. One big problem faces the producer who handles televised sport, and the success of the transmission depends upon how well he works it out.

Because of the size of the television picture, if the entire field of action is shown (in the way you see it when you're there), the individual players are often too small to be seen clearly. On the other hand, a close-up of just a few players eliminates the picture of the surrounding action. The producer has to compromise between these two choices. So he may use a basic shot showing a fair portion of the arena with medium-sized figures. Then he cuts back and forth to quick close-ups and long shots, giving viewers the impression that they are seeing everything that is happening.

The commentator works near the cameras overlooking the field, with a monitor right in front of him. While he is talking about the play he sees on the monitor, he has to watch the field, too, to see how the complete action is developing.

The Outside Broadcast staff operate from mobile transmitter and control vans. Camera positions are always selected carefully so that the action can be seen from various angles, but without confusing viewers who are accustomed to seeing the entire game from one position.

The cameramen, commentator, and producer are a team who must know their sport well, in order to anticipate each move and get the important things on the screen.



THE PRODUCER HAS TO CHOOSE



THE CAMERAMEN AND THE COMMENTATOR AT WORK



THE PRODUCER AND THE ENGINEERS WORK IN THE CONTROL ROOM



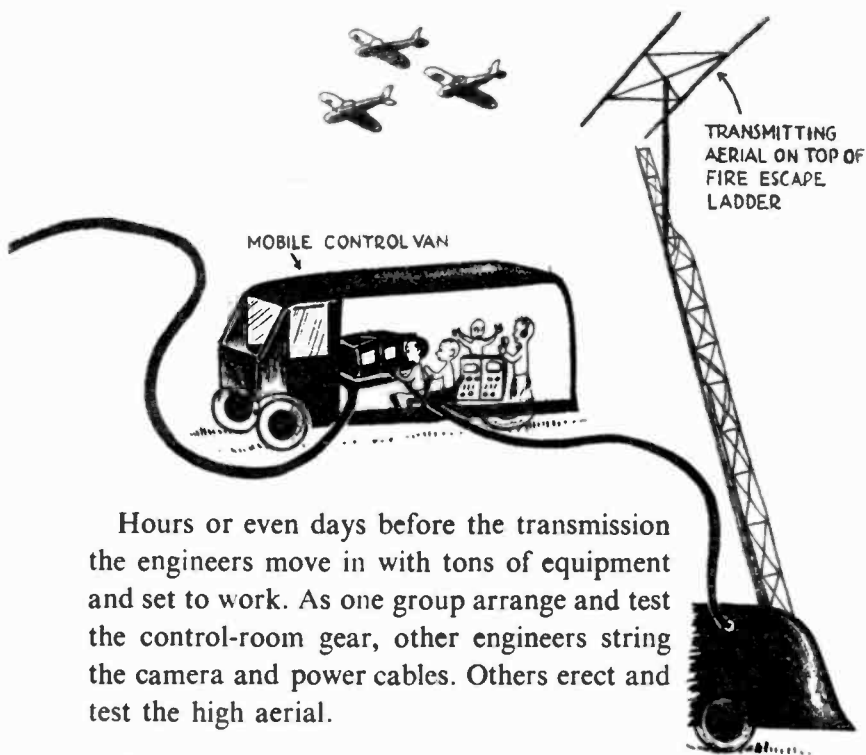


## THIS IS AN "O.B."

Any programme which does not originate in the studio is an Outside Broadcast. Sometimes these programmes are arranged by the television station; for example, museum or countryside visits, a play from a theatre or a circus show. Sometimes they are public events which are reported by the television cameras; for example, the opening of Parliament, all sporting events, or the unveiling of a memorial.

When planning any "O.B.", the producer and an engineer go out to the location. They check the space they will have to work in, the positions for the cameras, the source of enough electric power to run the equipment, and the location for the radio link so that it will be in a direct line with the transmitter. And they have to estimate what lighting will be needed if the event is indoors.

After the producer has made his survey, he builds the programme in much the same way as the studio producer does, but keeping his action within the limitations of the location. If the event is not one produced by the television station, his main job is in placing his cameras and mikes so as to give the most comprehensive pictures of what is going on. He must work closely with the organizers so that he will know what is going to happen and when.



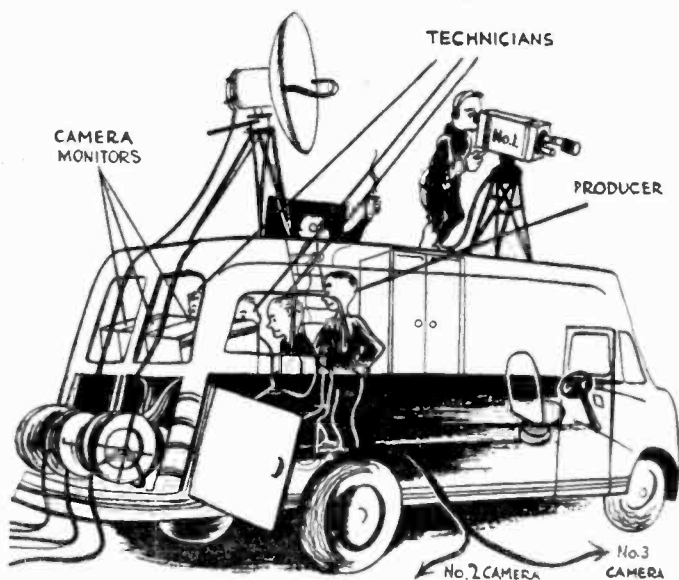
Hours or even days before the transmission the engineers move in with tons of equipment and set to work. As one group arrange and test the control-room gear, other engineers string the camera and power cables. Others erect and test the high aerial.

When O.B.'s come regularly from the same places (such as Wimbledon or Lords) the installations there are semi-permanent and all the surveying and setting up does not have to be done each time.



Once the cable is laid, the cameras are set up. The transmitter, the cameras, and the control equipment are all tested, and the inter-communication system linking the producer, cameramen, and engineers is checked. Constant telephone contact is kept with the station, too.

Now the producer takes his place behind the control monitors. If it is a produced show, there is a real rehearsal. Otherwise the crew just runs through camera positions and lenses before the event starts. The producer and cameramen work as a team, selecting the right lenses and cutting at the right time to get close-up, wide-angle, and medium shots, even though they have never seen the action.



## TELEVISION ON WHEELS

A new development in Outside Broadcasting is transmission to the main station by micro-wave equipment which can be stored in a medium-sized van—a complete station with portable cameras and equipment.

Not only does the van carry equipment from one place to another, but it provides all the gear necessary for operating that equipment. When the van reaches its location, the cameras and mikes are taken out and put where they are needed. Sometimes they are on the roof of the van. Sometimes the cameras may be connected to the van by more than 1,000 feet of cable.

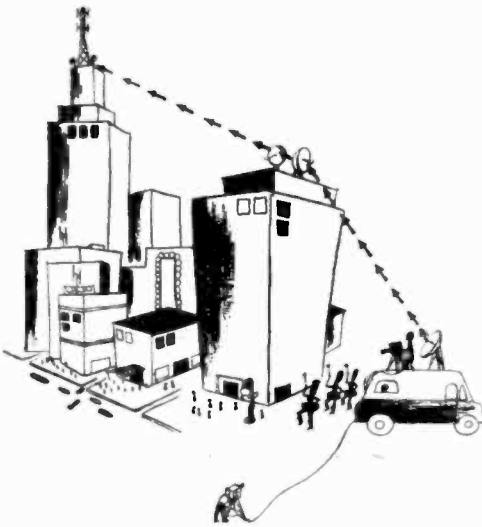
These cables connect the cameras and mikes to the control desk in the van, just as the studio cameras and mikes are connected to the studio control room. The engineers work in the van control room in the same way as they do in the studio. There is usually one engineer to control the pictures, one sound engineer, a switching engineer and the producer.

The mobile unit has to supply power to work all the equipment. Sometimes it does this by plugging into the electric power in a nearby building. Sometimes it carries its own petrol-engine generator.

Finally, the van has to send the signals back to the studio or to the transmitter to be rebroadcast to your receiver. It hasn't enough power to broadcast directly. There are two ways of sending the signal back to the transmitter. One is through a coaxial cable; the other is by a special radio link—a broadcast from the van to the station transmitter.

That is what the big round thing on the roof of the van is for. It is a micro-wave relay reflector, but television men call it just the dish, or link.

The signal from the dish to the receiving aerial at the station must be in direct line-of-sight. That means there must be nothing between them to interfere. But suppose there are high buildings in the way? Well, then there has to be a relay station to pass the radio waves along. It could be another link, or two, on top of a high building that is in line of sight to both the mobile truck and the transmitter.

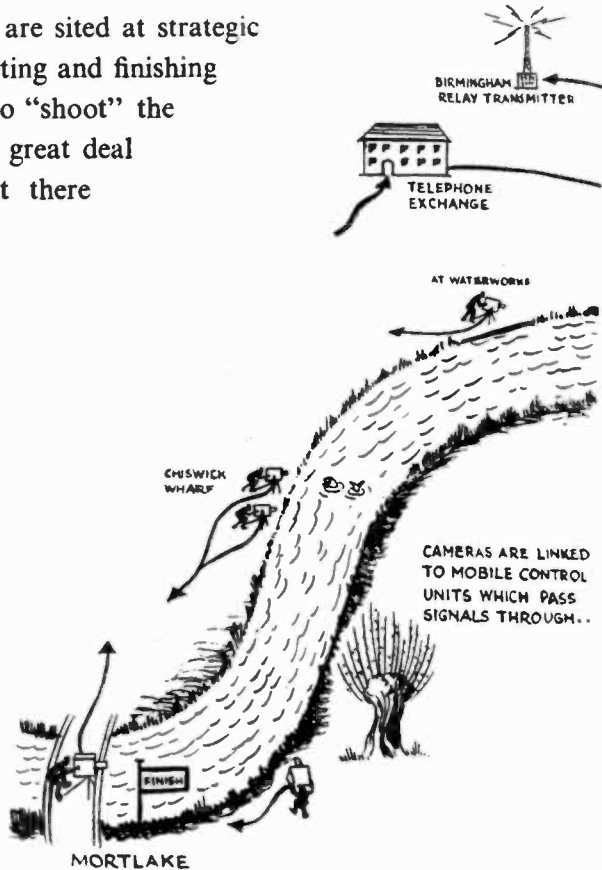


# SPECIAL EVENTS

One of the wonders of present-day entertainment is a "special event" in television. It might be a very special studio show, but more often than not it is an extremely complicated Outside Broadcast. Television pictures have been sent across the English Channel as part of a normal programme. Pictures have also been televised direct from an aeroplane several thousand feet above the River Thames. Outside Broadcasting is a highly involved business. Take the Oxford and Cambridge Boat Race for example. It is televised every year, recently throughout the entire stretch of the course with one camera in a launch actually following the rowing "eights".

This, we hope, will give you some idea of how it is done.

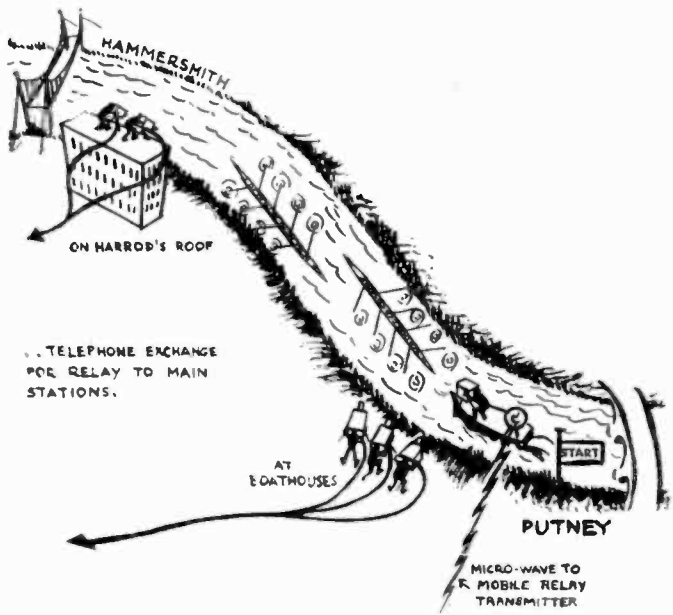
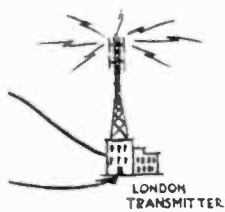
First of all, cameras are sited at strategic points between the starting and finishing lines. These are able to "shoot" the boat-race crews over a great deal of the course so that there



are very few stretches along which you cannot see them from your armchair at home. Those arrows you see coming from the camera units are linked to a number of mobile control vans, and these send on the picture signals to a main telephone exchange, which sends the signals *en route* by coaxial cable for their eventual delivery at the transmitter.

Another camera, a portable one, is installed in a launch, together with a portable generator and transmitter. This launch follows in the wake of the "eights", giving intimate close-up shots as well as covering those stretches of river not in the vision of the cameras on the bank. Picture signals from the launch are sent by the new micro-wave system to a shore-based micro-wave unit, which also relays them through the telephone exchange.

The producer, at the main control panel through which the signals from all these cameras must pass, has the job of choosing which picture to broadcast as the race proceeds. He is the man who "sorts them out at the other end".



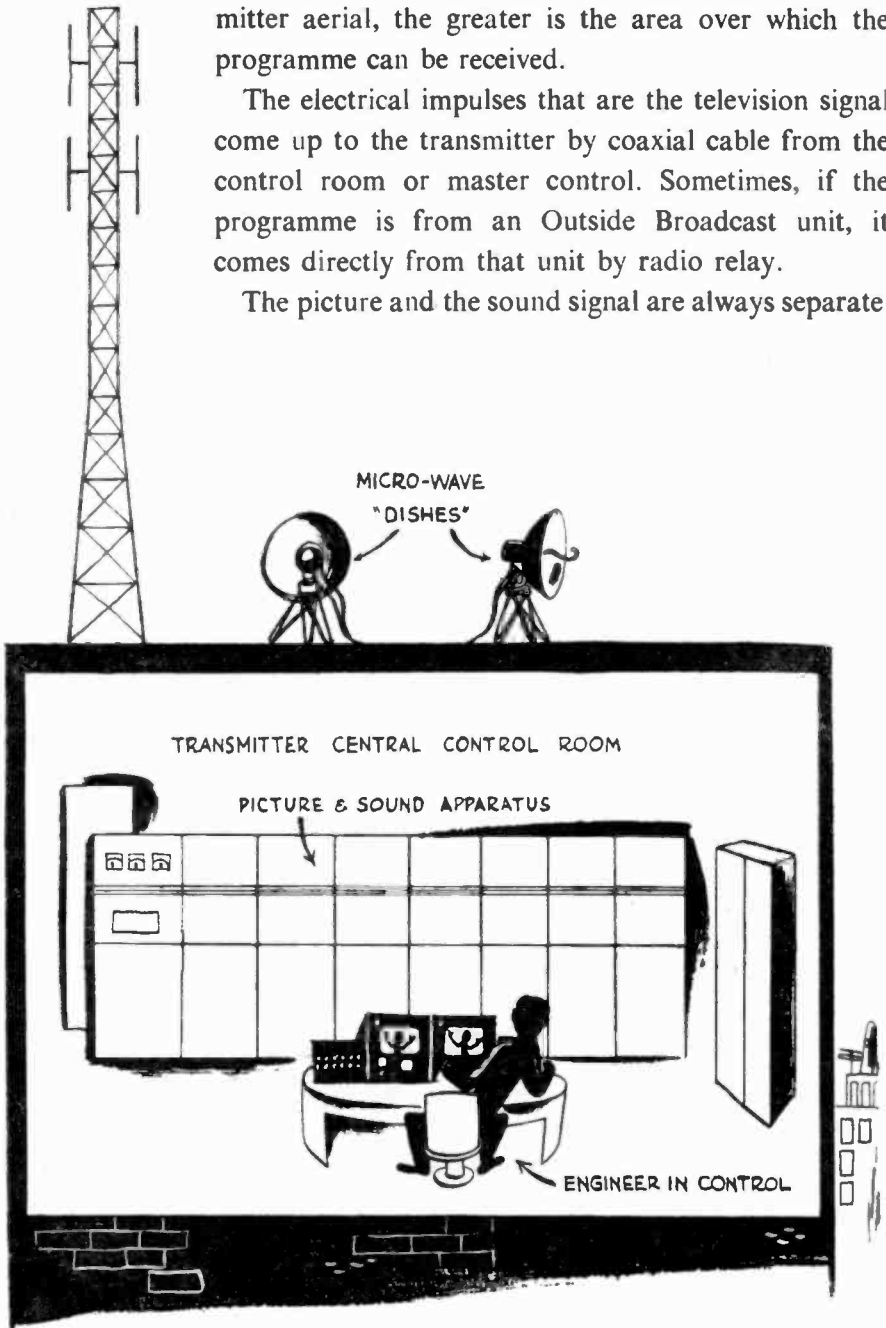


# THE TRANSMITTER

The transmitter is usually put in the highest possible place; on top of a tall building or on top of a hill. The higher the transmitter aerial, the greater is the area over which the programme can be received.

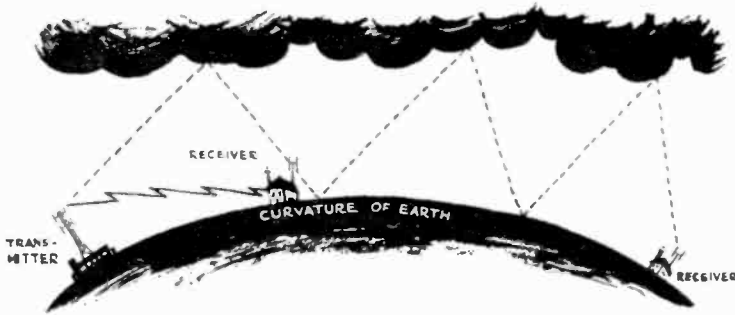
The electrical impulses that are the television signal come up to the transmitter by coaxial cable from the control room or master control. Sometimes, if the programme is from an Outside Broadcast unit, it comes directly from that unit by radio relay.

The picture and the sound signal are always separate.



# ABOUT TV WAVES

Now let us see why a television aerial—transmitting or receiving—should always be situated as high as possible. Perhaps you've heard people talking about a television beam that won't bend. TV signals are transmitted on the ultra-short waveband, and for some reason or other they behave differently from radio signals



on the short, medium, and long wavebands. Radio and television waves shoot out in all directions. Radio waves are reflected back to earth when they reach the upper layer of air, are reflected again when they come to earth, and they go on “bouncing”, so that the signals can be received over tremendous distances.

Television (ultra-short) waves are not like that. They neither “bounce” nor bend, but shoot straight off into space. Therefore any obstacle between transmitter and receiver (a hill or high building) will prevent the passage of the signal. There have, of course, been examples of reception over great distances, but these are really “freaks”. Normally, television cannot be received beyond the line of the horizon.

In the illustration a station is sending out radio as well as TV signals—that is, medium or long waves as well as ultra-short. The nearer house is able to receive both signals. It receives the television signals because *it is in direct line of sight* of the station. The dotted line is the radio signal, the zigzag one the television, these being, of course, purely symbolic. The more distant house, though it has a TV aerial, can receive only the radio signal because the curvature of the earth (or the horizon) prevents a direct line of vision. This is why a number of TV stations are necessary to cover a large area of country.

# COAXIAL CABLES, STRATO-VISION, RELAY STATIONS

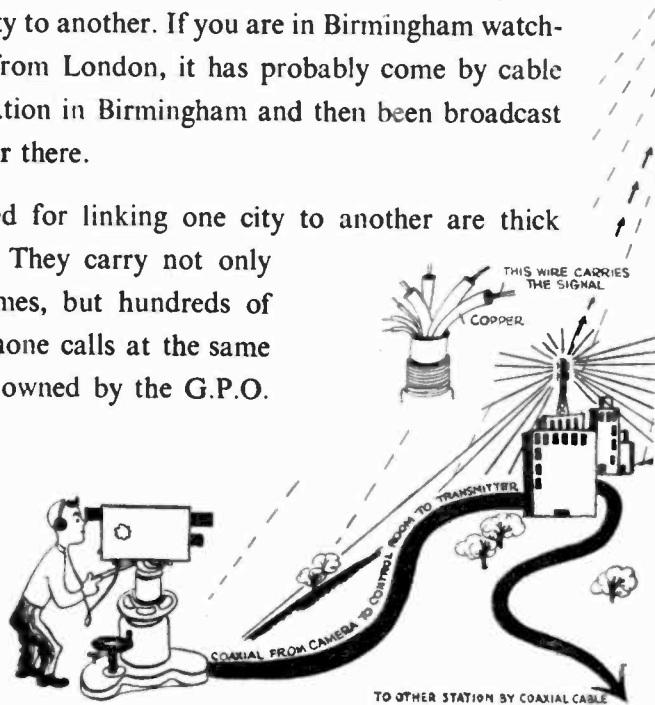
As you saw on the previous page, television programmes cannot be broadcast over great distances from a single transmitting point. Very rarely are the programmes received over distances of more than sixty or seventy miles without a considerable deterioration of the quality of the picture.

Other ways, then, must be found to carry television over distances.

**COAXIAL CABLES** At some time, all television signals travel by coaxial cables. A coaxial cable is a copper tube with a wire suspended inside it. The inside wire carries the signal and the tube round it keeps the signal from leaking away.

The cable that connects the camera with the control room is a coaxial cable, and much longer coaxial cables often carry the picture from one city to another. If you are in Birmingham watching a programme from London, it has probably come by cable to the television station in Birmingham and then been broadcast from the transmitter there.

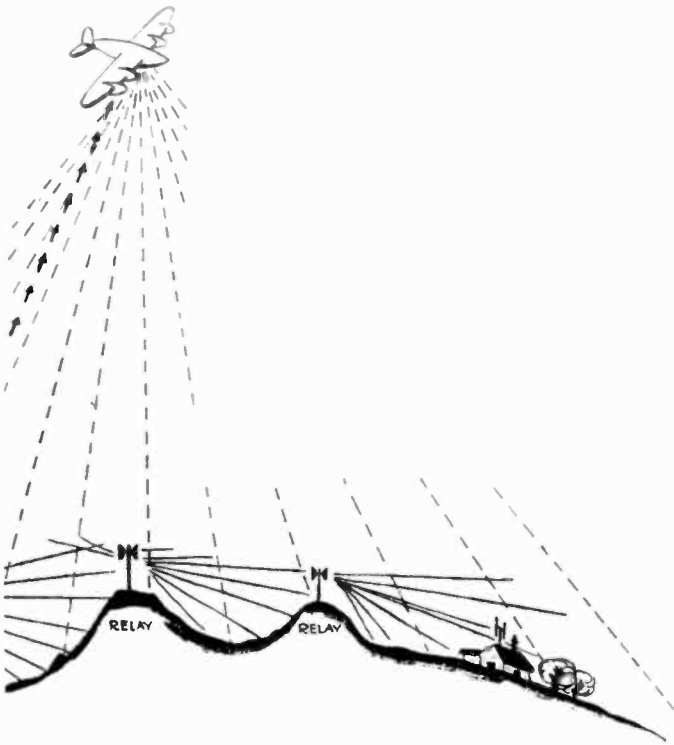
The coaxials used for linking one city to another are thick bunches of cables. They carry not only television programmes, but hundreds of long-distance telephone calls at the same time, and they are owned by the G.P.O.



**STRATOVISION** In America experiments in television relay transmitting have been made from transmitters built into aircraft. The planes fly round in the substratosphere, between 24,000 and 30,000 feet up. We know now that the higher any television transmitter is, the greater area the waves will cover before they stop or shoot off into space. That is why it seemed a good idea to experiment with a transmitter in a plane.

The rapid extension of coaxial and relay networks, however, has lessened the immediate need for stratovision for great areas in the United States.

**RELAY STATIONS** Sometimes television signals travel distances with the help of relay stations. These stations are placed



on hills or mountains, 30 to 40 miles apart. On the top are big reflectors which scoop up the television signals aimed at them. Inside the relay station special radio equipment strengthens the signals and sends them out again, on to the next station. This equipment works automatically. There doesn't have to be anyone at the station at all.

# AERIALS

For the best reception over a distance your television receiver should be connected to an aerial. This collects the television waves out of the air and sends them through a special wire-and-plastic tape called a lead-in into the set. In most sets, the signal comes down from the aerial through a small coaxial cable. The aerial should be as far as possible above the things that cause interference—steel buildings, trees, and even motor car engines.

In almost every street you can see several kinds of television

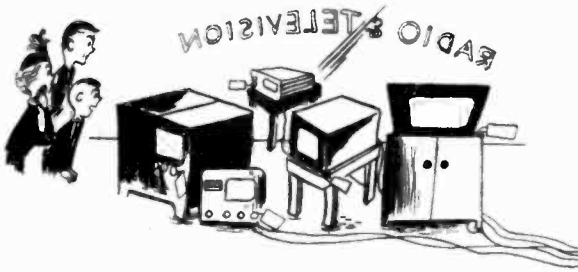


aerial. The most usual is the dipole. A dipole is made of two rods placed end to end on a cross pole.

You usually see what appear to be two dipoles on the cross rod, but one is a reflector. The aerial should really be placed at right angles to the transmitter but sometimes it can be adjusted at a slight angle so as to cut out local interference and improve the picture.

There are at least eight different kinds of aerial in use to-day, so anyone about to install a television set should have a talk with his dealer, who knows the special requirements of the locality. Some aerials are intended for distant reception, others to cut out interference. There are also several kinds of indoor aerial.

Many apartment houses and blocks of flats have master aerials. All the sets in the house are connected to the master aerial so that each one doesn't need a separate aerial of its own.

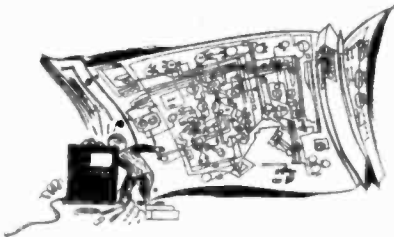


## YOUR SET

Here are some things to remember.

It is quite safe to buy a set made by any reputable manufacturer. But occasionally there may be trouble with even the finest set, so it is best to make certain that the dealer has a good reputation for after-sales service. There is no need to worry about a receiver becoming obsolete. There is a lot of talk about 1,000-line pictures instead of the present 405-line, but it will be many years before any change is made. There is talk of colour, too, but that is in the even more distant future. If colour should come soon, then it is more than likely that your present receiver can be converted. (If it can't it will still receive the pictures—in black and white.)

Anyone who has assembled his own set may know enough to repair it himself if something goes wrong with it. Those who are inexperienced should call the repair man. Never fiddle with the inside of a set. A tremendously high voltage goes through it. Even a television engineer, fixing a set, uses a map to find his way. It looks like this.

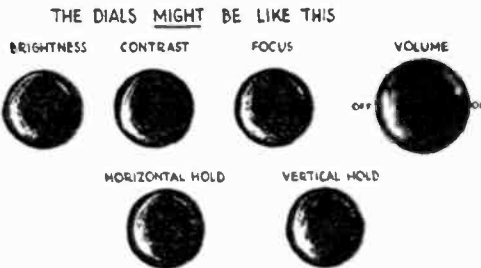


# TUNING YOUR SET

This is the screen of your set. It may be 8 by 6 inches or 15 by 12 inches, but all sets are adjusted in much the same way. Somewhere on the front of the set there are knobs. One turns the set on and also adjusts the sound to make it louder or softer, though sometimes there is a separate "On" and "Off" switch.



Non-technically, the Brightness knob controls the amount of light illuminating the picture—it makes it light or dark. It should be adjusted in conjunction with the Contrast knob: this balances the shades between black and white. The Focus control is self-



explanatory: it makes a picture clear instead of fuzzy. The fourth knob, as explained above, is just like that on your radio set.

The last two knobs are marked Vertical Hold and Horizontal Hold. Vertical Hold keeps the picture from slipping off into the top, like this →



and Horizontal Hold keeps it from slipping off to either side, like this →



A television transmitter sends out a test pattern before a programme session. It's to give you the chance of adjusting your set properly before settling down to see the show. The test pattern should be quite clear, like this →

### BUT

suppose it looks perfectly awful, like this! → There are some more knobs tucked away at the back of the set to cure this, but it happens very rarely. The wisest thing is to call in the dealer to readjust your set. It takes only a few minutes.

### NOW

suppose there is a stripe of a peculiar pattern running across the picture, like this. It is like a herring-bone, and it is caused by another electric signal somewhere in the neighbourhood. Or may be there's some electrical apparatus nearby and it makes a pattern like this. There's nothing to do but hope it goes off soon!

Sometimes there are little white and black dots speckling the picture. They are called snow, and come when your aerial is not strong enough to receive the programme.

Here comes the announcer, who should look like this →

But sometimes he has several faces as in the picture below.

Those extra announcers are called ghosts, and they are reflections of the broadcast signal. They may be bouncing off a cliff or another building and reaching your set a split second later than the original picture. Sometimes a slight change in the direction of your aerial helps. Some ghosts only come when there are certain types of clouds that reflect the signal.

But be consoled. This page prepares you for the *worst*. Usually these things hardly happen at all.







## TELEVISION TO COME

Colour will certainly come, but nobody knows how soon. There have already been successful demonstrations. There are big problems still to be solved, but because colour makes television so much more effective, the engineers will find a way!

There will be an increased number of stations. Before 1956 it is estimated that nine out of ten people throughout the country will be within the television service area.

Large-screen cinema television is coming. Programmes of special interest will be shown regularly. A championship prize fight, for example, might be shown in cinemas in every big town and city.

There will be a way of receiving special programmes by means of cable directly to your television set. You might have the programmes turned on by calling your telephone exchange, and you would pay extra for them on your telephone bill.

Pictures now are made up of 405 lines. Eventually, pictures might have as many as 1,000 lines, which will give them sharper detail.

Television studios will become more and more like film colonies to-day. They might not be quite so large, but they will have to be much bigger than most of the present television studios to deal with rapidly expanding services.

News service will be greatly extended.

Sets get better all the time, and they will gradually get less expensive. There will be larger projection sets for seeing larger pictures at home, and these will be more reasonably priced, too.

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