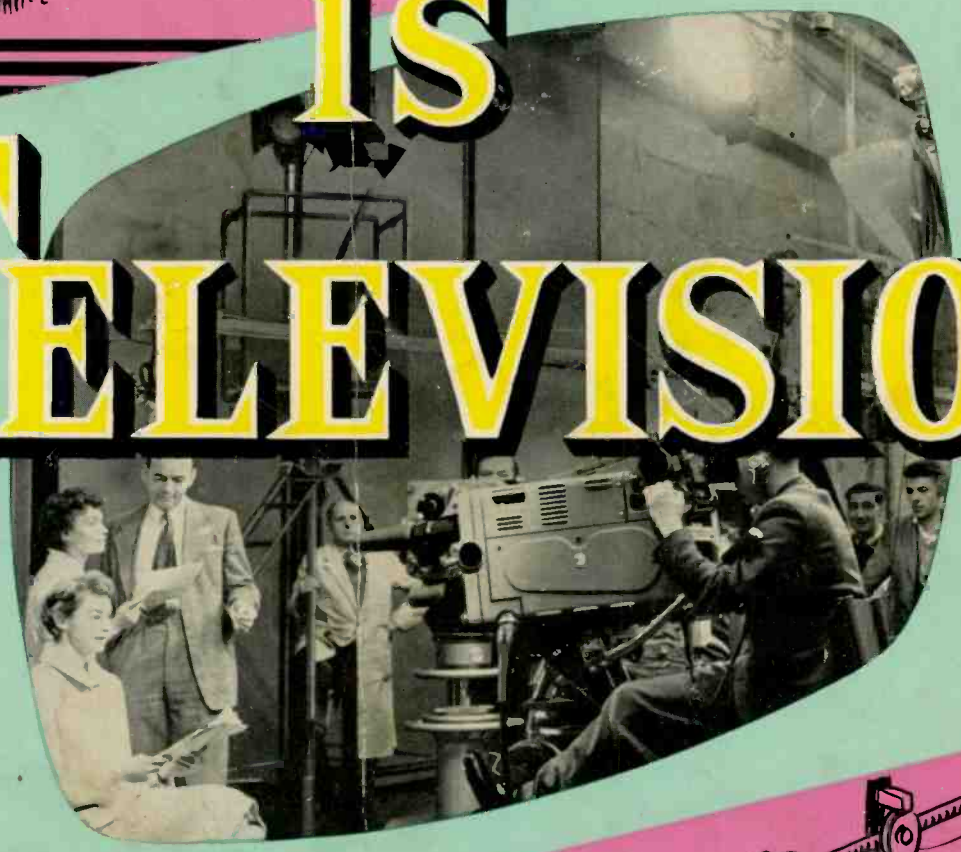
# This is TELEVISION



Richard Carrickford

# THIS IS TELEVISION

Television is one of the most startling developments of the 20th Century and one which can exercise an enormous influence on our lives. New ways of using this medium are constantly being developed, but already it has brought radical changes and undreamed of advantages to education, industry, medicine and communications.

In *This is Television* Richard Carrickford sets out plainly, and in non-technical terms for young readers, exactly how, why and where this new medium of entertainment works. He has written a clear, easy-to-read guide to TV which will enable the reader without technical knowledge to understand how the pictures get to the screen and what goes on in the studio; and there are vivid descriptions of all the different kinds of work which must be done before a programme can be brought into the viewer's home.

The author has a wide and varied experience of TV writing and producing, and is one of the few producers in this country who can list plays, musicals, fashion shows, variety, quizzes and documentary films amongst his TV credits.

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# THIS IS TELEVISION

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FREDERICK MULLER

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# INTRODUCTION

NOT long ago, an actor well known to television viewers arranged to bring his son and daughter to a rehearsal. They were a pleasant mannered, intelligent couple and it was no trouble to find them a vantage point in the studio from where they could see everything. When it was all over and the four of us had time for a chat, I said I hoped they had enjoyed seeing their father at work behind the scenes.

The girl, the elder of the two, replied, tactfully, "It is pleasant having a father who is well known and he is a dear, but he can never answer any of our questions about how television works. That is really what we came to see—and to see for ourselves."

Her father laughed and declared that, like a lot of other adults, he was able to switch on a set or drive a car but knew next to nothing about how either worked.

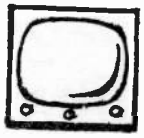
The brother added with tact matching that of his sister, "You know much more about television than the fathers of other fellows at school, even though you would not know a cathode ray tube from a car dynamo. There is no need for you to. But we are building our own T.V. set at school and the only books we can find seem to be written for technicians who already know everything."

This book aims to give some solid information in non-technical language on a highly technical subject, and is written primarily for the modern generation. Most older people are content to accept television as another scientific miracle, as indeed it is, and let it go at that, but people of the younger generation are much more constructively critical. They want to know the whys and wherefores.

There are in this book explanations of the principles of television and details of the functions of the various contributors, mechanical and human, to the finished programme seen on the screen by the viewer. There is nothing dull about television and the illustrations are by an artist who does not always take himself too seriously.

Apart from answering some of the technical questions put by the brother and sister who visited the studio, the book gives an idea of how a television programme is prepared, what goes on inside a studio, how the actors prepare for a show, how the studio lighting is arranged, how the networks are operated, and lets the reader into the secrets—or some of them—of how special effects are obtained such as when an elf-like dancer a few inches tall appears to dance on the keys of a piano.

It is not intended as a career book, but it will show that, for those interested, there is scope for every form of ability in the one outstanding medium where the world sees the world and This Is Television.



# THIS IS TELEVISION

TELEVISION has become so much a part of everyday life that it is now taken as a matter of course. Have you ever thought "I wonder how it works", or have you ever thought about the amount of work entailed to make it possible for you to sit at home, perhaps many miles from the transmitter, and see things as they happen?

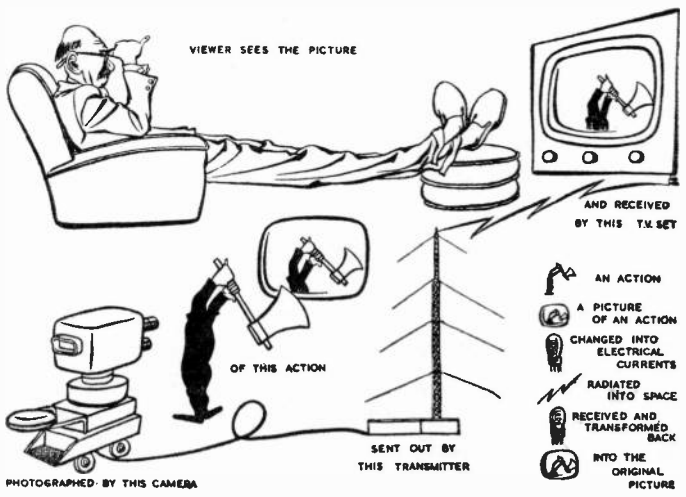
Television is one of the most complex of modern inventions, and to compare it with ordinary sound radio is like comparing a row-boat and a battleship.

If you brought someone from a remote part of the world who had never heard of television into your home and said "This is a television set", they would probably reply "What is television?" and ninety-nine people out of a hundred would be lost for an answer.

The word Television is made up of two parts, the Greek 'tele' and the Latin 'video'. Television means 'seeing at a distance'.

Television means seeing things that are happening outside your range of vision. This could be anything from a few hundred yards to a few thousand miles.

It has taken years to develop although it was not until 1936 that the B.B.C. started the first regular television service in the world.




Progress in television owes much to radio and to picture telegraphy but it also owes much to intelligent amateur experimenters. The best known of these is John Baird, an electrical engineer who was the first man to demonstrate that television was a practical possibility.

Strictly speaking, the viewer looking at a screen is not seeing a moving

picture but a series of still photographs, each a little different, that pass before his eyes so quickly that it gives the effect of movement.

The moving picture on a cinema screen is made up of a series of photographs joined together in a film and as long as they are projected on to the screen at a rate of about 25 a second they give the illusion of movement. If the frames or pictures pass at the rate of 48 frames a second, they are almost perfect.

True, or live, television cannot, of course, wait for a film to be made if it is to show an event while it is actually happening. Scientists tried unsuccessfully for years to devise a means of taking and transmitting pictures fast enough to create the illusion of movement until John Baird succeeded. Strangely enough he was not a scientist, though he know a lot about electricity. It was on a notable day in January in 1926 that he demonstrated to the Royal Institution that he had found the answer. A few months later, Baird startled the world by televising pictures of himself from London to New York. He followed up this with the world's first television outside broadcast of a London street scene.

The picture on your screen is composed of a series of 'lines' which run from left to right, and top to bottom of your screen, just as if you were reading a book.

These 'lines', which are in fact lines of various shades of light, travel across your screen so quickly that they give the impression of one steady continuous picture.

You actually see 25 pictures per second, with 405 lines making up each picture.

The science of televising rapidly developed during the last few years, and is now one of the main forms of entertainment. Interesting events can be seen by lots of people many miles away. Unlike films, which are taken and shown later, television transmissions are instantaneous. Events are seen at the same time as they take place. To do this the picture seen by the eye must be changed into another form. This has all the information in it seen by the eye and it can be distributed over a large area. It can be received and changed back into the original visual picture.

In Sound broadcasting sounds are changed into small electric currents by the microphone. These small currents are sent on telephone cables to a sound transmitter. The transmitter sends them out into space as radio waves and they can be picked-up on a sound receiver and changed back into the original sounds.

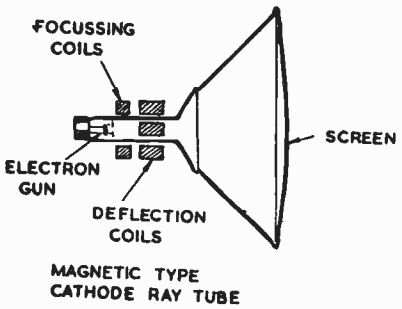
A method similar to this is used in television. The picture is seen by an 'electrical eye' and changed into small electric currents which are sent on a very special kind of cable to a television transmitter. Then they are radiated into space.

These currents are a true representation of the original picture, the strength of the current depending on the amount of light and shadow in the scene. Bright parts of the scene give large currents and darker parts smaller currents.

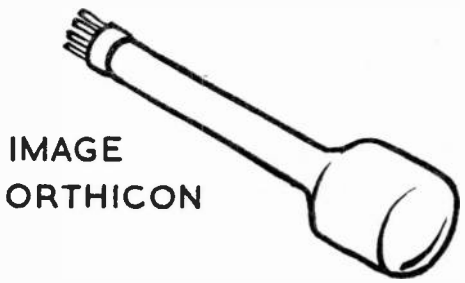
The 'electrical eye' is the camera tube in the television camera, and it is a most important piece of equipment. The quality of the picture depends on the 'goodness' of the tube. There are a number of different types but that generally used is the 'Image Orthicon'. This is extremely sensitive, giving good pictures even when the conditions are bad.

# THE IMAGE ORTHICON

THIS is a kind of radio valve which changes the picture seen by the eye (the visual picture) into a form of electrical picture. Variations in light and shadow become small electrical currents of different strengths. It is a glass cylinder about 17 inches long and with one end wider than the other. The wide end has a light sensitive screen, a thin glass screen a few inches behind it called the target, and in front of the target a fine wire mesh. This is the 'image section' of the tube. The change in the picture takes place here.

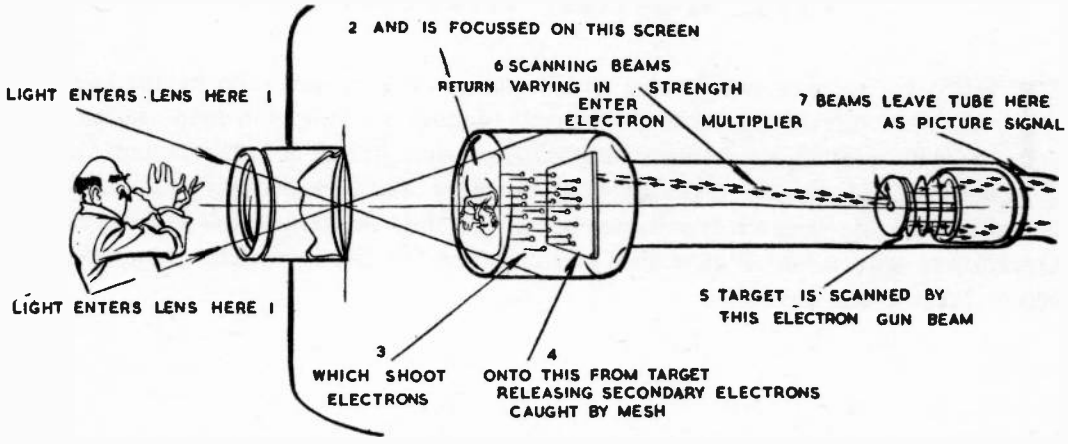


MAGNETIC TYPE CATHODE RAY TUBE




The picture is picked up by the lens on the front of the camera. It is focussed on to the light sensitive screen. This is coated with a chemical substance which gives off very small charges of electricity called 'electrons' when light falls on it. The brighter the light the greater the number of electrons given off. The released electrons fly towards the target and strike it so hard that other electrons are knocked from its surface and escape into the tube. They are caught on the wire mesh grid and do not return to the target. It is now short of electrons, a pattern is formed on it which represents the variations in light and shadow of the picture entering the camera lens. It is an electrical picture of the scene. Before it can be used it must be collected and put into a convenient form.

At the narrow end of the tube there is an 'electron gun'. This emits a narrow stream of electrons like bullets from a gun which is directed on to the target. It is made to move over it from side to side and from top to bottom. As it moves over the target it gives up some of its electrons to make up the deficiencies. Having made good the losses, the beam returns along its original path towards the gun, but before reaching it is persuaded to enter an 'electron multiplier'. This, as its name implies, multiplies the number of electrons coming into it and increases the strength of the beam.



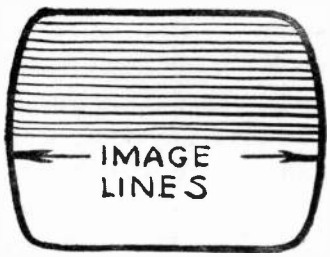

When the beam left the gun it was of constant strength. When it returns it varies in strength because it has given up many of its electrons to the target. The variations in strength correspond to the variations in light and shadow in the original scene. They form an electrical current continually varying in strength. It is an exact electrical reproduction of the visual picture and is called the 'picture signal'.

The picture signal is taken from the tube and strengthened in an amplifier built in the camera. It is then taken to the apparatus room adjacent to the studio.

The movement of the electron beam over the target is called 'scanning'. It is controlled by coils of wire carrying special forms of electric currents. These are fitted at right angles round the narrow portion of the tube. The movement across the tube is 'line scanning'. The coils controlling it are the line scanning coils. The downward movement is 'frame' or 'field' scanning. It is controlled by the 'frame' or 'field' scanning coils.

# SCANNING

THIS is an important part of television. Unfortunately the whole of the electrical information on the target cannot be transmitted all at once. It is easier to divide the picture into small pieces and send the information from each piece in turn. This is called 'scanning'. Although the picture is transmitted piece by piece, it is sent and built up again so quickly the eye always sees a complete picture. The scanning agent in both the camera tube and the cathode ray receiving tube is the electron beam. These are locked together and always move in the same way.




The electron beam in the camera tube moves across the target in a series of horizontal lines. Information is collected from small areas as it goes along. When the end of the line is reached it rapidly flies back to the beginning and at the same time moves down slightly. Then it begins to collect information again. It does this 405 times for each picture, dividing it into 405 lines.

When the last line has been examined the beam flies back rapidly to the beginning of the picture and the whole process begins again. This continues indefinitely, it is like reading a book line by line.

To register movement and continuity in a scene a number of separate pictures are sent out each second. If less than 30 are sent each second the picture flickers. As this is most disturbing, more than 30 must be transmitted. In films 24 pictures are taken each second, and to prevent a flicker which would be seen at this frequency each picture is shown twice. This is done by interrupting the light from the projection lamp by a shutter, thus 48 pictures are seen each second and there is no flicker.

A method similar to this is used in television. The number transmitted each second is 25, and to prevent flicker each is seen twice. Unfortunately, it is not possible to transmit all 405 lines each time, only half the number can be sent, 202½ lines. The first time the odd numbered lines are sent and then the even numbered lines are sent. Each of these is called a 'frame' or 'field' and together they make a complete picture. This process of scanning is technically known as 'twin interlace scanning'. A field contains 202½ lines and is scanned in 1/50 seconds. A complete picture contains 405 lines and is scanned in 1/25 seconds. There is very little flicker as 50 frames are transmitted each second.

# SYNCHRONISATION

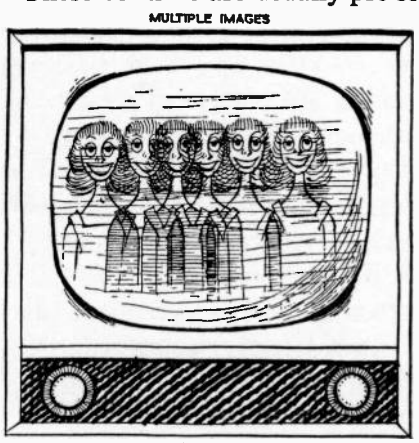
BECAUSE the picture is transmitted piece by piece, it is very important that the pieces are reassembled in the correct order. The electron beam in the camera collecting the information and the electron beam in the cathode ray receiving tube must always move together, and never get out of step. To do this, pulses are generated and sent out at the end of each line and each frame. These are called synchronising pulses. They act as instructors and tell the beams exactly what to do. The pulse controlling the 'line scanning' is the line synchronising pulse or line sync. pulse and the pulse controlling the frame or field scanning, the frame sync. pulse.

Great care is taken to ensure that the synchronising pulses are sent out at the exact moment. The timing cannot vary unless a fault develops in the electrical equipment in the studio or the transmitter. If this should happen, spare apparatus is immediately switched into operation by the engineers to replace the faulty equipment. If the synchronisation is faulty, the picture will not fit together properly or it may continue to 'roll-over'.

Controls are provided on the receiving set to correct this if the fault is in the receiver.

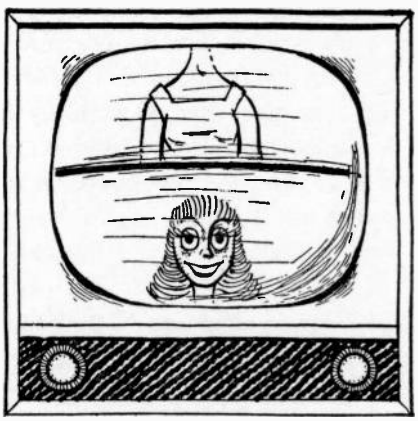
Faulty line synchronisation is corrected by the 'line hold' or 'horizontal hold' control, and faulty frame synchronisation by the 'frame hold' or 'vertical hold' control.

These controls are usually pre-set and require little adjustment.




FAULTY LINE SYNCHRONISATION

ROLLING OVER



FAULTY FRAME SYNCHRONISATION

# ABOUT TELEVISION

TELEVISION is the most exacting medium in the world of entertainment, for both artistes and producer, combining as it does all the elements of the theatre and the cinema, with the advantages of neither and the disadvantages of both.

In the theatre an actor learns his 'lines' (dialogue), 'moves' (positions), and 'business' (the doing of something at a given time); apart from this, the rest of his rehearsal period is devoted to perfecting the character he is going to portray. Should his first performance prove unsatisfactory, he can always improve with subsequent performances.

In the film studio the actor plays his part in a series of short "takes", usually of about one to three minutes, which are always well rehearsed before hand, and if the director is not satisfied that they are good enough, they can always be filmed all over again.

In the film industry, the actor and director have the added advantage of being able to see and criticise their own work. In television this can only happen if the programme has been telerecorded, and this is done quite frequently.

In television the actor has anything from three days to three weeks of rehearsals in which to learn his lines, moves and business, and develop characterization in addition to remembering all the technical details which should NOT have to occupy an actor's mind, such as being exactly on the right spot on the studio floor at a certain time, or standing under the correct light or speaking loudly enough or softly enough for the right sound balance and trying to remember which is the right camera.

Much the same sort of problems confront the producer or director in television, for whereas in the theatre a director is chiefly concerned with the kind of performance his actors are going to give, in the TV studio he also has to worry about all his technical assistants, camera crew, sound crew, lighting, properties, effects, and, most important of all (as far as commercial TV is concerned), TIMING!

The length of a production must be "timed" at rehearsal to within ten seconds. This is done with the aid of a stop-watch, and every speech, song, movement and piece of music, is given a fixed amount of time.

If, for instance, a programme is scheduled to run for 58 minutes and 9 seconds, then that is the EXACT time it should run on transmission.

It's not always possible, of course, to achieve this state of perfection, and so you

will notice that sometimes a programme is cut off halfway through the cast list at the end, or even before the cast list appears.

This, of course, does not apply to the B.B.C. whose time schedules are more elastic as they have no "commercials" or advertising spots to worry about.

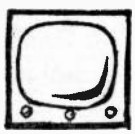
One is sometimes asked "What is the difference between a Producer and a Director?" This is rather a difficult question to answer, because in some cases the answer would be "no difference at all", and in others "quite a lot of difference". Generally speaking, a producer should attend to all the preliminary planning and setting-up of a production, leaving the director free to attend to problems of casting, decor, rehearsals, etc., and maintaining a happy relationship between the members of the cast. The director should be responsible for what you see on the screen, and the producer for what you don't see.

The work of both the director and the producer becomes even more complicated when bringing outside broadcasts to the screen, for television is by no means confined to plays and studio scenes. Outside broadcasts which bring to the viewer interesting events as they are actually happening are of the greatest appeal to all viewers because they enable the onlooker to feel that he or she is actually taking part.

One of the most effective outside broadcasts ever was that of the Coronation of the Queen. It stirred millions of people, not only in Britain but in Europe where it was relayed to France, Germany and Holland, and entailed weeks of careful planning. It was probably the world's most ambitious television broadcast and it was supremely successful. It is not generally realised, however, that it necessitated the use of twenty-one cameras and five mobile control rooms.

Few outside broadcasts are as complicated as this, but even the televising of a football or cricket match requires careful planning and there is always the chance that something over which the director and producer have no control will spoil their work and all their planning will have been in vain. The weather can still play tricks with a programme and there is no answer to a last minute cancellation of a particular attractive event except for a substitute programme to be available immediately.

British viewers were the first in the world to have regular television at their disposal and they are perhaps the world's most advanced viewers. With the arrival of a European Television Network an important step has been taken to world television.

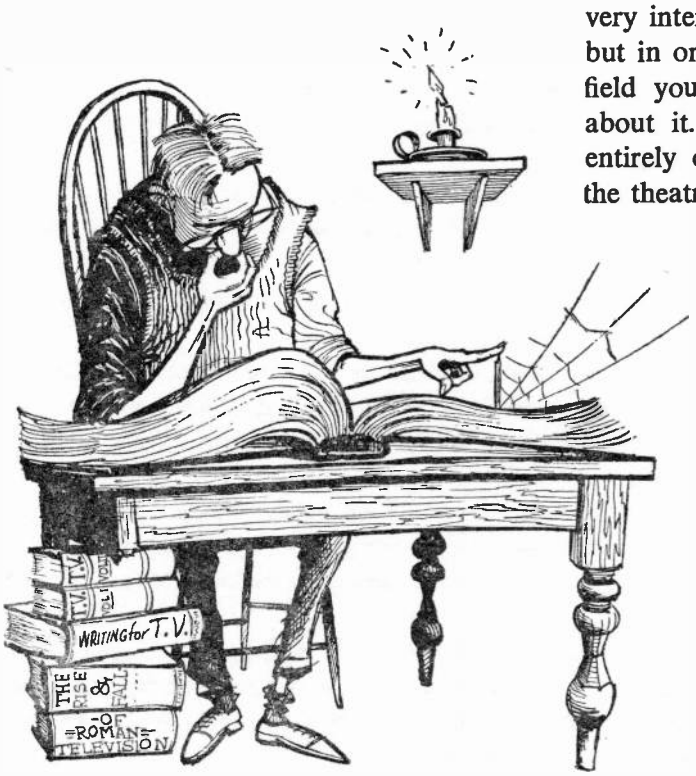


# WRITING FOR TELEVISION

WRITING for television is like a measles rash, if it is in you then it must come out. Either you can write or you can't. If you have a gift for writing, then write you must, irrespective of whether your efforts prove remunerative or not.

Yet even if you are fortunate enough to possess the gift of writing, you will soon discover that you need a lot more than ability.

To become even a moderately successful writer requires a lot of hard work and concentration. It also requires a vivid imagination. A well-known author speaking on the art of writing gave a very apt definition when he said "Writing is one per cent. inspiration and ninety-nine per cent. perspiration."




Writing for television can prove a very interesting and lucrative business, but in order to make a success in this field you must first know something about it. Writing for this medium is entirely different from either films or the theatre.

Films are shot (photographed) over a long period. If a lapse of time is called for, the director can stop the camera while the artistes change their costumes. In a stage play there is an interval during which any necessary changes can be made, but in television there are little or no pauses. Here the lapse of time is sometimes denoted by the hands of a clock moving round to tell us the passing hours, or the passing of the seasons by the foliage on a

tree. There are many devices but each one will occupy only a few seconds of actual time. So what of the unfortunate artiste who is required to change into a completely different costume in those few seconds? This is just one of the situations which require careful forethought. Television script editors read and reject hundreds of scripts every week, usually because they are unproducible for technical reasons and the writers have never bothered to learn anything about the medium they are writing for.

But once having learned this the writer will find a vast, interesting and valuable field, in which to wield the pen.

You have an idea for a television programme? How do you go about getting it produced? First of all, do not merely think in terms of a play. If, of course, you really do combine the craftsmanship of every playwright from Shakespeare to Somerset Maugham, the world is yours, but let us presume that you are an ordinary person to whom good ideas come every now and then.

Television can put across an idea in the form of a talk, a quiz, a documentary, a play, a serial, an interview or a discussion. Do not worry that you cannot write a perfect script complete in detail up to camera rehearsal stage. No producer expects that, but what he does appreciate is a little intelligent co-operation.

He likes to see an outline of the idea neatly typed. If it is a play, he does welcome cheerful rather than mournful ideas; he prefers as few characters as possible and the minimum changes of scenery. There are limitations beyond which studios and their equipment cannot go. The art of writing for television is to think in terms of what is going to be seen, rather than in terms of what is going to be heard. Suppose you are going to write a story in which an engaged couple are estranged, you might open it with the parents of one of the couple discussing them. Your intention may be to give the viewers the background of the couple.

But it would be much quicker off the mark to open with a shot of the girl furiously handing back her engagement ring to the man. The idea is thus conveyed that the story is to be about a couple who have fallen out!

A producer also likes the characters to be true to life, for viewers prefer to see stories about real people—and not too many at a time.

If you have an idea for a quiz game, outline it as briefly as possible. If you have met someone who has just returned from an interesting adventure and you think he or she might give an interesting talk, submit the suggestion, giving a brief outline of the story.

Ideas for documentaries are welcome. The story of some product or famous building, or the background to a current problem or the story of some form of wild life all make good subjects, but hours of research are necessary before putting pen to paper.

Ideally, the script writer and the director should work together as a team, but this is the counsel of perfection and the best way to start on the road to becoming a script writer is to develop and submit your own ideas—neatly typed. It does not matter if the producer has never heard of you, you can be sure your idea will be considered.

# THE STUDIO

THE studio is the place where most television productions take place. The term "studio" is usually applied to a building or group of buildings which in fact contain several studios, in addition to administrative offices, scenery and property stores, paint shops and carpenters shops, "shops" in this instance meaning departments. The size of a studio can, and does, vary considerably, but the more space there is on the studio floor, the easier it is to ensure a smooth production.

The 'floor' is that part of the studio where all the action takes place. The average floor may have as many as five different sets on it. Perhaps a kitchen set, a lounge, a garden, the inside of a taxi, and the top of a mountain.

Naturally, all this scenery spread about is going to take up a lot of room, but in addition to this there are also three or four cameras trailing long, thick cables behind them, which must be able to move about quickly and freely to any part of the floor, two or three sound booms also trailing yards of thick cable, furniture, floodlights, technicians, artistes, effects machines, carpenters, sceneshifters and tables laden with hundreds of 'props' for use in the production.

To ease this congestion the sets are built usually near the walls of the studio, leaving the centre of the floor clear for the cameras, microphone booms and other technical equipment. These can then be moved quickly and silently from one set to the next as the action progresses.

The floor is usually of very substantial construction, as it must carry very heavy weights and must not 'creak' or 'groan' when the camera 'dollies' move over it.

It is covered with a light coloured cork linoleum. This reflects light and helps to add to the illumination of the sets. It also helps to deaden unwanted sounds.

The walls and ceiling are covered with layers of sound absorbing material. This prevents sound reflections which would cause undesirable 'echo', and absorbs unwanted noises from outside, such as traffic, and stops them getting into the studio.

A stout metal grid is fitted to the ceiling and the lights used for illuminating the sets are suspended from it. Provision is also made for raising or lowering the lamps if required. The lamps are connected to sockets on the walls of the studio with heavy flexible cables.

In one of the walls of the studio a large glass window is usually built so that the technicians and director in the control gallery can see the studio floor.

THE STUDIO ~

# THE FLOOR MANAGER

THE Floor Manager is in charge of the studio. He is the man who shares all the headaches with the director. He is responsible for seeing that everything is in its proper place at the right time. He keeps in direct contact with the director in the control room by a pair of headphones, or 'cans' as they are called, and relays the director's instructions to various people.


A floor manager must be firm, diplomatic, alert and a contortionist. He has to duck under cameras, crawl through small openings in the scenery, twist himself around lamp stands and furniture, and see that everyone on the floor knows what they have to do next. He must try to keep everyone happy, artistes, camera crew, sound crew, electricians, carpenters, painters, propmen and sceneshifters, and try and sort out all their individual problems.

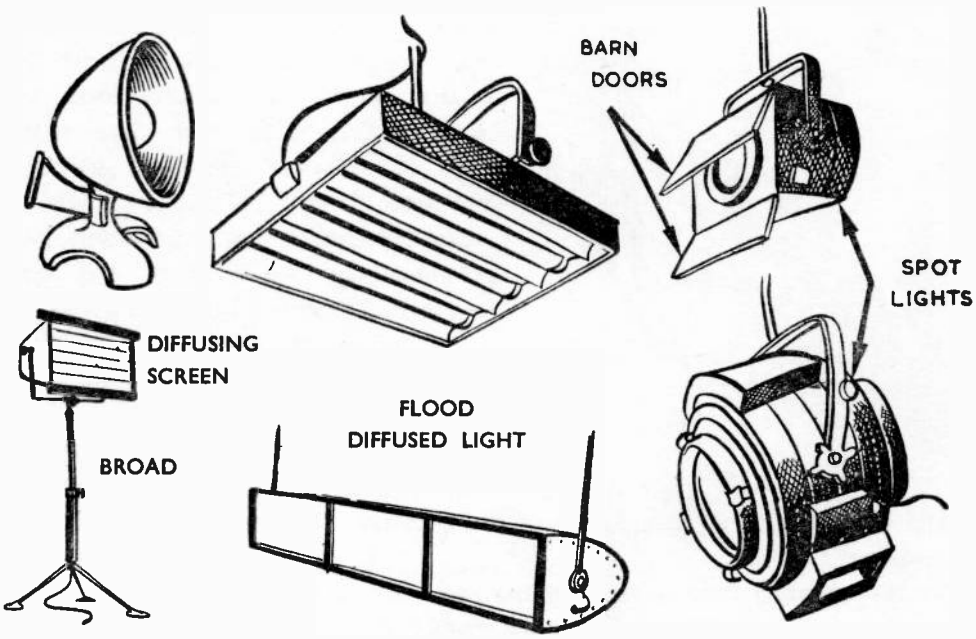
On complicated productions, the floor manager attends the pre-transmission rehearsals which are usually held in an outside rehearsal room. He then becomes familiar with the production, meets the artistes taking part and is often able to solve many of the problems which arise, before the day of transmission.

Studio rehearsal time is very limited and very costly. A great deal of technical equipment is used, and the artistes and many of the technicians are needed. This valuable time must not be wasted; the studio manager has to be sure that the rehearsals start on time, and that they are kept running smoothly with no undesirable 'hold-ups'.

He is responsible for giving the artistes their cues, and although he is working always at high pressure, he must never forget anything. Although on transmission he may be all over the studio he must know always which camera is 'on the air' and never get himself "into shot".

# STUDIO LIGHTING

LIGHTING a set for television is very different to lighting a film studio set. A film is photographed in short sections, or 'takes' and so each little scene can be specially lit, thus ensuring the best results. In television, the action is continuous as you watch it, and there is no time or opportunity to change the lights around for different sets. Therefore the lighting must be suitable for the overall requirements.




This is attained by getting a good even distribution of light in the first place by placing 'soft' or diffused lights across the front of the set. Other lights are then added to areas where the action takes place. The most important light is called the 'key light'. This is a high intensity 'spot light' placed fairly high at the side of the set and focussed on to the subject. On the opposite side of the set another 'spot' is placed of less intensity, called the 'filler light'. This is used to soften out the hard shadows thrown by the 'key light'. A third dimensional effect giving apparent depth to the

picture is obtained by using 'back lights'. These are usually 'spot lights' placed at the back of the set and focussed on to the back of the head, and the shoulders of the artiste, rimming them with light. This lifts them out of the background and gives the apparent depth. Other lights, usually 'floods' giving diffused light, are used for lighting the backings and the walls of the set.

'Barn-doors', movable metallic flaps, so called because they open and close like barn-doors, are often fitted to the 'spot lights'. These control the spread of the beam and are arranged to stop light falling on to any unwanted part of the set. The barn-doors can be fitted to open either vertically or horizontally. They are particularly useful for shutting off part of the light beam to prevent it falling on to the microphone and casting an unwanted mic. shadow. Producers feel that these shadows must be avoided at all costs and full co-operation is needed between the boom operator and the lighting engineer to position the mic. boom to prevent them.

As a television production is continuous, these sets are pre-lit before the transmission. The lamps are connected to a remote control desk, and they can be faded up or down remotely, as required during the production.

Complicated productions take many hours to light, a large number of lamps are required and these have to be rigged in the correct position. To make the setting easier the lamps are numbered, and the position of each lamp is worked out by the lighting engineer in advance, and marked on a plan of the studio floor, showing the position of the sets. This lighting plot is kept as a repeat performance is often required.

Different studios use different types of general lighting, but all the spotlights and floodlights are the same as used in film studios.

An interesting point about lighting effects in television is that most effects can be obtained without changing the lights at all. For instance, you may be watching a night scene, and your screen is very dark. Then someone is supposed to switch on a light, and suddenly your screen gets brighter. This is done by the engineer who controls the brightness of the picture, and can make it light or dark as required.

# SCENERY AND PROPERTIES

DESIGNING and making scenery for television is a highly specialised job. Because of the smallness of your screen the settings you see must be made to appear larger than they really are. The designer will try to give his sets a feeling of space by the clever use of perspective, so that the set looks deeper from front to back than it really is.

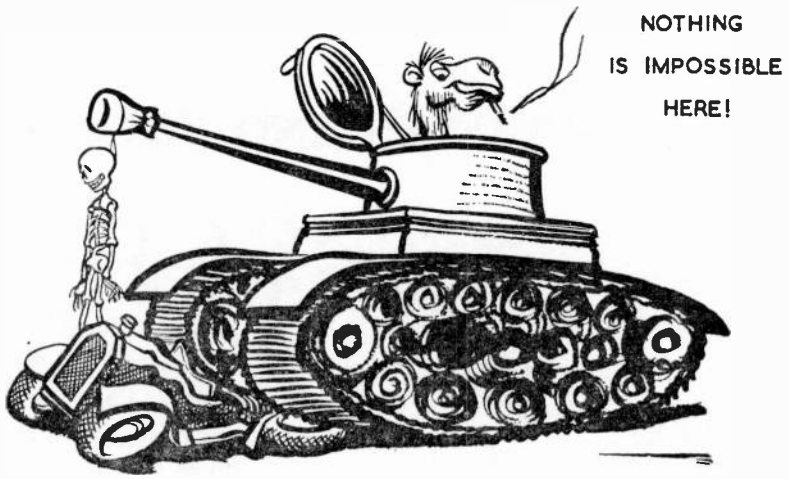
The scenic artist who paints the sets has to know which colour is best to use, and which colours must not be used at all. For although you see your picture as black and white, with various shades of grey, scenery is nearly always painted in colours as near to natural as possible. This is supposed to create more atmosphere for the artistes.

The sets for any productions are always made in sections, and as they sometimes have to be moved quickly, must be quite easily transportable. The construction is, therefore, as light as possible, usually consisting of a framework of light wood covered with strong canvas, and painted over. Things like doors, windows, arches and columns are generally of a more solid nature, and are used many times over.

The man in charge of properties, or 'props' as they are called, has one of the most interesting and harassing jobs in television. He must be a mixture of Sherlock Holmes and a bargain basement, also something of a magician. He is expected to know the exact place where one can obtain practically anything you care to think of. The director makes out the property plot (or prop list) and passes it on to his stage manager, confident that on the appointed day he will find all the

required props assembled in the studio, such as two camels, a donkey, a 1904 racing car, three Ming vases, a blow-pipe, an assortment of priceless bric-a-brac, two skeletons and half a Centurian tank.

Nothing in fact is impossible to the Property Department.



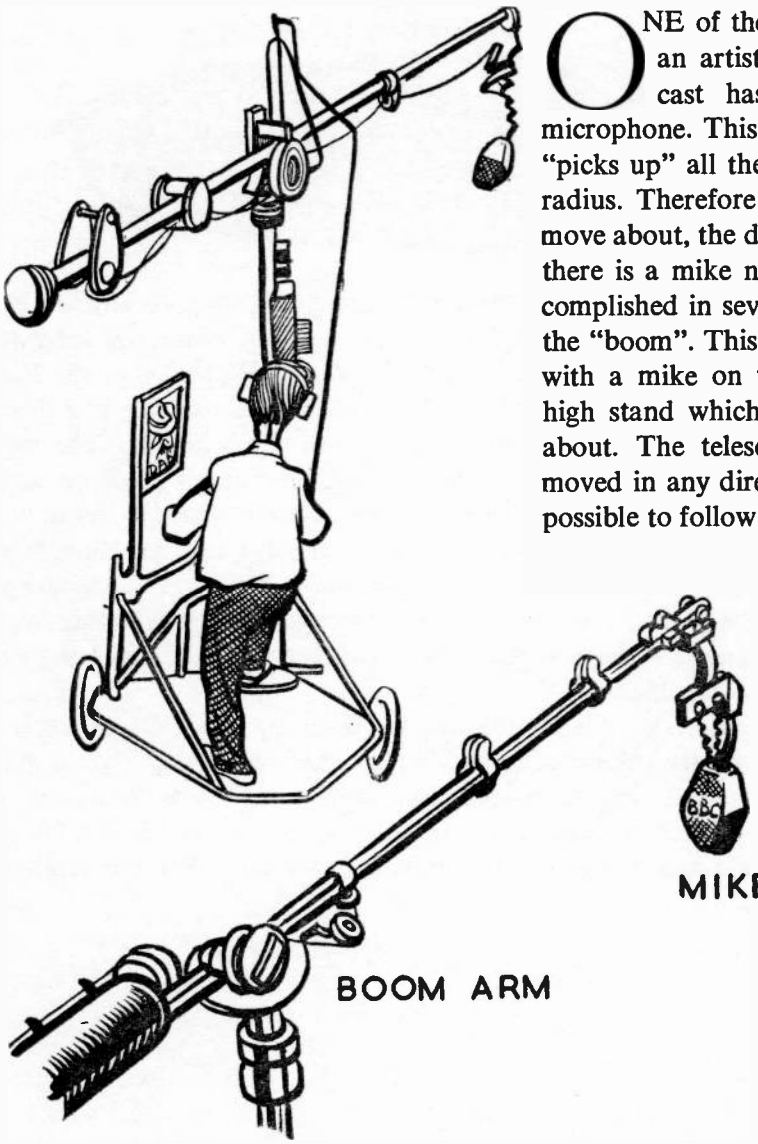

It has truly been said that if there is one person in a studio who is never put out of countenance it is the props manager. He can, on demand, produce anything from a pin to a pantechnicon or from a spear to a space ship.

Strictly speaking, clothes and costumes are not regarded as props but British viewers are quick to note any incongruities. If a set is giving a scene of the late Victorian era, all the characters have to wear clothes of the period. A scene from a story of Henry the Eighth or of the Far East demands costumes of that era or country. Most studios hire clothing and their demands can range from a Mexican sombrero to a Nazi SS headgear. The big costumiers usually have the answer if the props man cannot put his hand on any particular requirement, for his axiom is "If I haven't got it, I know where to get it."

Television studios and film companies often help each other out, for there is a freemasonry among props men and wardrobe supervisors. Life was particularly difficult for them during and immediately after the war years when rationing was in force, although the Board of Trade was generally sympathetic and granted coupons if satisfied that they were essential.

Incidentally, many girls who admire the dresses worn by women announcers may be consoled to know that these often belong to the studio and not to the announcer. One well known woman announcer, as delightful in private life as she is on television, was at a party recently when a friend of hers commented, "I wish I had half as many dresses as you wear." The announcer, with a twinkle in her eye, replied, "I wish I had, too!"

# MICROPHONES AND SOUND CONTROL




ONE of the most important things an artiste in a television broadcast has to remember is the microphone. This is the instrument which "picks up" all the sound within a certain radius. Therefore when an artiste has to move about, the director must be sure that there is a mike near at hand. This is accomplished in several ways. First, there is the "boom". This is a long telescopic arm with a mike on the end, mounted on a high stand which can easily be wheeled about. The telescopic arm can also be moved in any direction, and this makes it possible to follow the artiste about so that the mike is always just overhead, but out of view of the camera.

The man who operates the boom is called a Boom Operator, and wears a pair of headphones connected to the control room so that he can hear the director's instructions. At the same time, he must also listen to what is happening in the studio.

Sometimes, if it

is not possible for the boom to get close enough to pick up the sound, a mike may be concealed in a bowl of fruit, or some other hiding place.

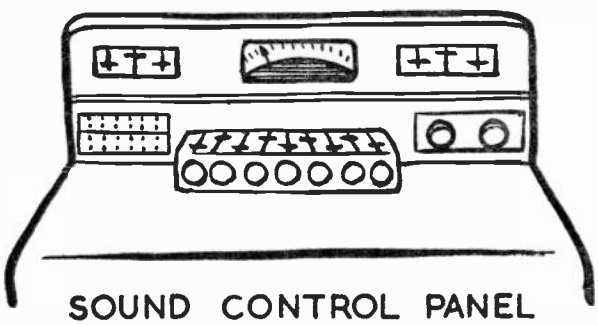
Many different types of microphone are used in the studio, if one is not available which meets all studio requirements.

Two kinds are used generally—'moving coil' microphones, which have a small coil of wire inside made to vibrate in a strong magnetic field by the sound waves and produce very small varying electric currents, and the 'ribbon' microphone which has a very thin, narrow aluminium ribbon, which also vibrates in a magnetic field. These can be either "directional", i.e. sensitive to sounds coming from a particular direction, or "non-directional", i.e. sensitive to sound coming from any direction.

Directional microphones are the most useful because they are very sensitive to sounds in front, but do not pick up sound from behind. They are directed towards the artiste and exclude or ignore other sounds.

Ribbon microphones give very high quality reproduction and are used on orchestral productions. They must be fixed in position because if they are moved when in operation, the ribbon element vibrates, and a low rumble is produced. Moving coil microphones are very robust and are used on the boom. They do not rumble and are not damaged when knocked accidentally. If the microphone is seen in the picture a very small type is used; they are less unsightly and cause less distraction.

The sound of voices or music is picked up by the microphone and changed into electricity, this is carried through a cable to the sound control desk which is operated by the Sound Balancer.



SOUND CONTROL PANEL

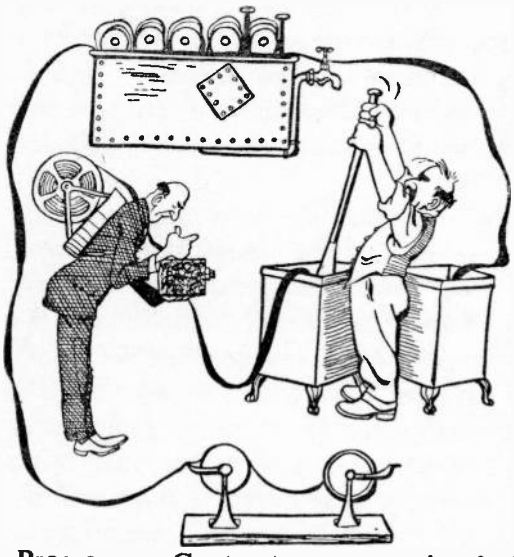
This is the man responsible for seeing that the volume of sound coming from each source is properly balanced, or mixed. In addition to the sound which he gets from the microphones, there is also sound coming in from records of music and special effects . . . a motor car, ship's siren, a baby crying, a ticking clock, etc. There is a sound recording of practically any noise you care to think of.

When a 'film insert' is being used in a live production, the sound balancer must also mix in the sound on the film which comes to him from the telecine room.

Also in the sound control room is a desk containing two large turntables for the 'grams' or gramophone records, which are played as required in the production. There is a special device which enables the operator to pick any particular spot on a record, and start it immediately the director asks him to.

# THE TELECINE ROOM

THE Telecine Room is the place where pictures and sound on film originate from, also slides, or 'telops' as they are called. These slides are used for many purposes. They may be straightforward lettering, used as the title or cast list for a production, or they may be pictures of people, or places. They can be mixed in with, or superimposed over pictures from a 'live' camera in the studio or on an outside location.



A great amount of film is used in television, both 16 millimeter and 35 millimeter. A programme completely on film is the most economical kind of all. Very few people are involved in the transmission, and the studios and 'live' cameras with all their attendant staff are not required at all.

Most of the thirty minute films we see, with the exception of documentaries and travel shorts, have been specially made for television, especially American television, which is the principal market. There are film companies who make these TV films all the time, and having sold them to an American network can afford to sell the English rights to the B.B.C. or Commercial Programme Contractors, at a price far below cost.

As time goes on, more and more films will be used in television, because in addition to cutting costs by half, a film is the best means of bringing the world to your screen.

All television companies have their own film cameramen for shooting special feature or topical items, news, and material for 'live' programmes.

The operators in the telecine room have to see that each machine is properly loaded with the correct film or slides, and then wait for the director in the control room to 'cue' them in.

Most of the advertisements on ITV are made on film, and these also come from the telecine room.

# TELERECORDING

"TELERECORDING" means the recording of sound and vision on film or magnetic tape. Until fairly recently all telerecorded programmes were on film, but the process was not reliable and the results often inferior. The "telerecording" of any particular programme enables it to be transmitted many times and sold to other TV stations.

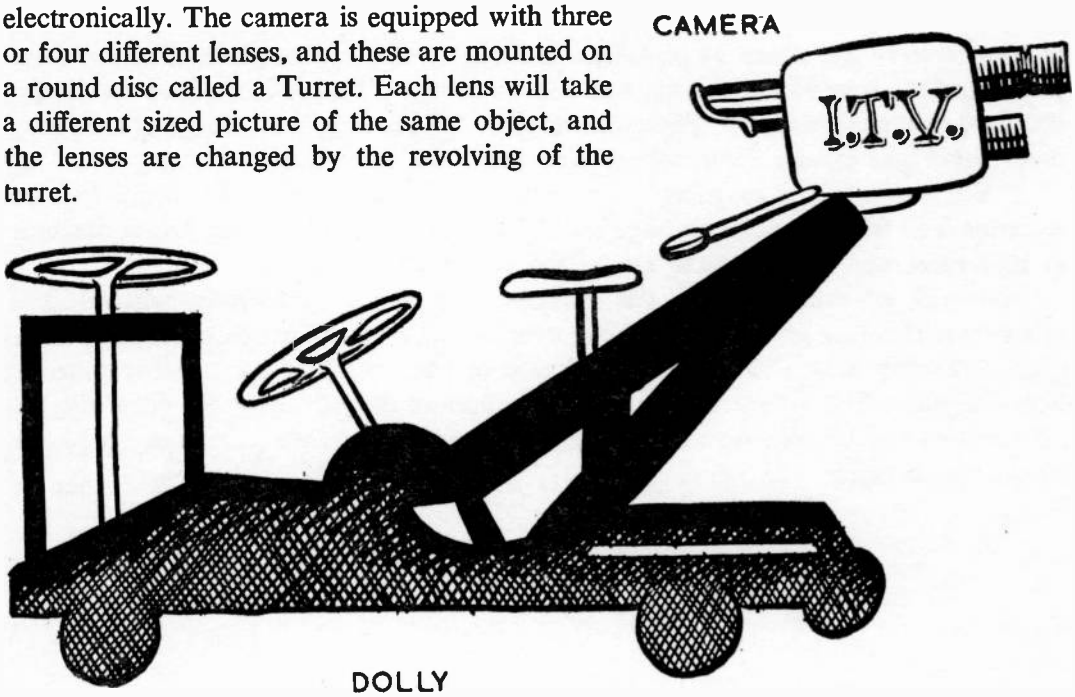
The original telerecording process entailed the use of a film camera focussed on a special receiving tube; the tube was greatly reduced in size to make the detail of the picture as clear and sharp as possible. The film would then run through the camera and record the complete programme as seen on the tube. This system of telerecording is still used to some extent, but the development of "Video-tape" as a means of recording both sound and picture has revolutionised the entire technique.

"Video-tape" is a magnetic tape rather similar to that on an ordinary tape recorder. The tape is wound on large spools and runs through the recording machine at high speed and records sound and vision simultaneously.

As with all magnetic tape, the recording can be played back immediately and this effects a tremendous saving in time over the older film camera technique, as, of course, the film has to be processed before it can be "played back". If a programme is not telerecorded, then it is only seen once and all the work that has gone into the production, and all the scenery, props, wardrobe, artistes, etc., are used up in one single transmission.

# TELEVISION CAMERAS

TELEVISION cameras are sometimes called 'live' cameras because they are used on a live transmission. They are very different from the standard motion picture, or movie camera. The inside is a mass of electronic equipment, rather similar to the inside of your TV set, only much more intricate and fifty times more expensive. There is no film used in a television camera as the whole process of photographing any particular object is done electronically. The camera is equipped with three or four different lenses, and these are mounted on a round disc called a Turret. Each lens will take a different sized picture of the same object, and the lenses are changed by the revolving of the turret.




DOLLY

For instance, a man might be standing by a window at the other side of a room, and by using a "wide angle" lens we see most of the room, the wall, the window, and all of the man. We revolve the turret to a lens with a "narrower angle" and now see only the wall, the window and the man. If we revolve the turret again to another lens, only the man and the window will be seen, apparently much nearer, and if the lens is changed yet again we will get a "close-up" of just the man's head and shoulders.

The picture in front of the camera is collected by the lens and focussed on to a screen inside the camera that is sensitive to light. This screen is composed of countless tiny spots with a special chemical coating. As a ray of light hits each spot, it gives off minute charges of electricity, and these are called electrons.

These electrons are really the amount of light and shade in the picture which the lenses collect.

In the heart of the camera is a special electron tube called the Image Orthicon, and this tube is responsible for turning the picture in front of the camera into tiny particles of electricity, which go through various involved processes before reaching the antenna at the transmitter. They are then sent out into the air, to be carried by audio-frequency waves to your receiver at home.

The average television show uses three, and sometimes four cameras. These are placed in different positions in the studio and moved about to various spots as required by the director. Some of these cameras are mounted on a wheeled pedestal which can be moved around by the cameraman himself. Others are on a sort of crane which is mounted on a wheeled platform called a 'dolly'. Some dollies are motorised with a small electric motor which propels them along, others have to be pushed manually. Because of the crane on the dolly, the camera can be raised or lowered into any required position.

The cameraman looks at a tiny television screen within the camera, and this shows him the picture he is getting, just like a view-finder on an ordinary camera. The cameraman and his assistants wear headphones which are connected with the control room so that all can hear the director's instructions.

# THE CONTROL GALLERY

THE control gallery is usually placed so that everything happening in the studio can be seen through a big glass window, rather like the captain's bridge on a ship.

The engineers who control the picture sit at a control panel in front of a row of television screens called monitors. Each monitor has a different picture showing on it, and is connected either to one particular camera, a telecine machine, or a slide


projector. The engineers have to adjust the contrast and brightness of all these different pictures so that they match up evenly, otherwise the pictures you see on your set would vary in quality and tone each time the director cut to another camera, one picture being dark, the next bright, and so on.

During a transmission, all these monitors are working at once, and the director has to decide in the fraction of a second, which of the pictures he is going to use.

# THE DIRECTOR, P.A., AND VISION MIXER

IN television the director is the one man who must be on his toes every second, of every minute he is on the job. During the actual transmission of a programme, every technician concerned (and this could cover the entire network) is tuned in to the director's instructions. An error of judgment on his part can disorganise a complete programme.

The director is responsible for the whole show, from its initial planning to the time it comes off the air. He decides which artistes will take part, what the setting will be like, the type of music to be used, and, if filmed inserts are necessary, where and when they will be made. He must order his scenery and properties well in advance to give the departments concerned ample time to provide them. He must attend to all advertising and editorial matter concerning his show for inclusion in the various television journals now published, and also for the national press. He has to know when certain artistes will be available to take part in his programme.

A director is allocated a "budget" of so many pounds for each production, out of which must come the cost of artistes' salaries, scenery, props, music and orchestrations, royalties, musicians, filming, and a host of other items which are liable to crop up. A good director should be able to keep his production well under budget, and have something in hand to carry forward if necessary.

The director sits at a desk in the control room. In front of him is the large window through which he should be able to see everything that is happening in the studio. Directly facing him is the row of monitors from which he will select the pictures he is going to use. On his desk is a microphone through which he speaks to everyone in the studio. During the show, he keeps up a kind of running commentary, giving simultaneous instructions to the camera crew, sound engineers, boom operators, musical director and the floor manager.

The floor manager conveys any directions to the cast and anyone else concerned who is not wearing headphones.

Seated on one side of the director is his Production Assistant, or P.A.; this young woman has a difficult and exacting job to do. She is in effect the director's second voice, and helps to plan and organise all his productions. Attends to the office routine, sees that the correct forms are filled in, in triplicate, and organises rehearsals. A stop-watch is her most important piece of equipment. During transmission she sits with one eye on the script and the other on her stop-watch. She tells the camera crew and sound balancer which shots and cues are coming up next. She knows by five seconds if a programme is over-running or under-running, and instructs the studio accordingly.

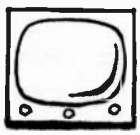
In a television play, the director works out all the camera moves and shots to be taken during the rehearsal period. These are all entered in the script with music and effects cues, and the EXACT time they should happen. Thus, on transmission, with the script in front of her, and a stop-watch in her hand, the P.A. knows exactly what should be happening, and when.

Seated on the other side of the director is the "Vision Mixer". This is an equally difficult job and requires a cool, alert brain and the ability to think and react in a split second.

The vision mixer sits in front of a control panel with lots of little buttons and knobs on it, rather like a flat typewriter. By pressing these various buttons, the picture 'cuts' from one camera to another, or to the telecine machine (for films) or the slide projector. They can also superimpose one picture over another, and create all the special or trick effects you see on your screen.

Each camera has a number—1, 2, 3, 4, etc., and when the director wants to cut from one to another he calls the cuts to the vision mixer, who presses the correct button.

Thus, if we are looking at a picture coming from Camera 1 and the director wants to cut to Camera 4, he'll say "take 4" and so on. The vision mixer must then react quickly and press the right button. If there is a slip of the finger, and the wrong button is accidentally pressed, it will immediately bring the wrong camera on to the air, and you may get a fleeting glimpse of a scene shifter walking away with a piece of scenery.



# HOW A PROGRAMME BEGINS

PLANNING a new show, or series of shows will often take weeks or months. Countless details have to be arranged which involve numerous people in every department. A new show might start life as just an idea, often suggested by someone who has no connection whatever with television. Or it may be "dreamed up" by someone in the programme department. The first step is to get the 'idea' on to paper, and submit it for approval to the Controller of Programmes, who has the final say in what shall, and shall not, go on the air.

When, and if, the Programme Controller approves the idea, the next step is to call in a scriptwriter, either one on the staff or a free lance, to expand and develop the idea into a script suitable for transmission. When completed, the script is then submitted to the head of the particular department, who gives it a 'slot' or specified time and date in the programme schedules. These 'slots' are often changed for various reasons, resulting in a lot of extra work and confusion for the people who are engaged on the planning side. But once the transmission date is definitely agreed, all the details can be attended to.

The writer will work closely with the producer and his P.A. at all times. The designer will be called in to plan the decor and settings. A production conference is called which concerns the lighting supervisor, camera crew, sound crew, floor manager, casting director, wardrobe, property, make-up and publicity departments.

All these people are very much concerned with the initial stages of the production, and must be fully acquainted with every detail concerning the show. The script must be sent to the duplicating department, and as many as fifty copies used for a single production.

When all these primary details have been arranged, and casting completed, it is time to start rehearsals.

# REHEARSING FOR TELEVISION

SOME television shows are completely unrehearsed, or "off the cuff". This is usually an interview type of programme, or quiz show, where members of the public are asked questions and expected to answer them. Some "discussion" programmes are also "off the cuff" but the panel of experts taking part, generally know what they are going to talk about.

The amount of rehearsal time required varies considerably with the type of show; it may be anything from three days to three weeks. For a drama, or spectacular musical show, the longest possible amount of rehearsal time is always required.

A big production always starts with 'outside' rehearsals. These take place anywhere, church halls, scouts halls, night clubs, meeting rooms, dance halls, in fact anything with four walls and a roof. Some of these places are warm, comfortable and light. Others are cold, damp and miserable. One can walk into the most unlikely looking places and find muffled actors "emoting" from the depth of heavy overcoats, or perspiring dancers working out a strenuous routine in a steam heated atmosphere.

Rehearsals usually start at 10 a.m. and finish at 6 p.m., but sometimes they continue until 10 p.m. and include Saturdays and Sundays.

During these periods, the director and his P.A. get the show ready for the studio. Artistes are told where they have to be and what they have to do at certain points in the script. They consult with the director on the way a certain line or speech should be said, and the best way to get this, or that, particular effect.

Camera positions are marked out on the floor so that the artiste knows where the camera will be on transmission. The show is rehearsed, and rehearsed, and rehearsed, bit by bit, until each section, or scene is perfect. Then the whole thing is put together and rehearsed, and rehearsed, all over again. By this time the director will have set the 'pace' of the show, speeding up bits which were too slow, taking out unnecessary 'padding' and so on.

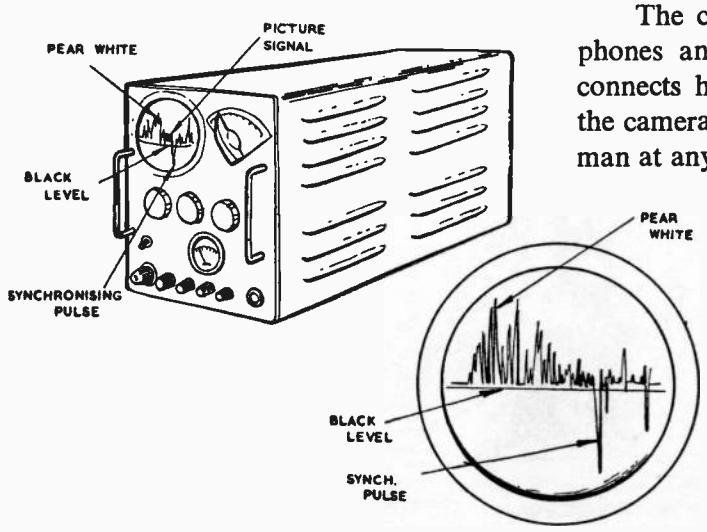
The show is now ready to go 'on the floor' and on the day of transmission the artistes arrive at the studio, usually about 9 a.m. and see the sets they will use, and the cameras and microphones for the first time. There is now a full dress rehearsal with cameras, sound, make-up, wardrobe and props. This lasts about eight hours and is only just long enough to get everything right before the show goes on the air.


REHEARSALS TAKE PLACE IN ODD PLACES !

# THE STUDIO APPARATUS ROOM

THE studio apparatus room adjoins the studio. It often has a large glass window in one of the walls giving a view of the studio. The engineers controlling and adjusting the picture signals work in this room. They sit at a control desk. In front of each they have a camera control unit, C.C.U. for short. On this there are all the controls for adjusting the picture signal. This comes from the camera on one of a number of leads in the special camera cable. This connects the camera to the C.C.U. Each camera has a C.C.U. operated by a control engineer.

This operation is very skilled and needs a lot of experience. The control engineer sees the picture coming from his camera on a picture monitor. This is a kind of television receiver but it only shows the picture from one camera. He continually adjusts his controls to get the best possible picture, and to correct any faults. There is also a smaller cathode ray receiving tube in the C.C.U. This is an 'oscilloscope'. It is used as a meter for examining and measuring the strength of the picture signal. On the end of the tube is the outline or waveform of the picture signal. It looks like a graph and shows at a glance any faults in the signal. Ordinary meters cannot be used for measuring picture signals. The small currents change so rapidly they cannot be followed by the needle.




The control engineer wears headphones and has a microphone which connects him with the cameraman on the camera. He can talk to the cameraman at any time and tells him when adjustments to the camera are needed. A senior engineer is in control of the apparatus room and he is responsible for the technical quality of the pictures from the cameras. He sits in front of a master monitor. He can select and examine any picture he

wishes to make sure it is up to standard. He also balances the brightness of the pictures and keeps them even. This is very important. If the picture from one camera is brighter than another the picture on the home receiver bounces up and down in brightness as the producer changes the cameras. It is most disturbing.

The transmitted picture is seen on a main monitor. By watching this monitor the control engineer can follow the production and he can see when his camera is 'on the air'. Two loudspeakers are provided, one for the programme sound and the other for the 'Producer's Talk Back'. The 'Producer's Talk Back' is used for sending the producer's instructions to all technicians on the production.

There are a number of steel cabinets or racks in the apparatus room. Other electronic equipment used is kept in these. Part of this is the 'vision mixing amplifier', which is used for cutting, mixing or fading the picture signals from the cameras. It is remotely operated by push buttons on the vision mixing desk in the vision control room. Other pieces of equipment strengthen the picture signal before it is sent to the master control room.

Film inserts are often used in a production. These come from the telecine room and they arrive at the apparatus room as 'picture signals' similar to those from the cameras. These signals are fed into a Camera Control Unit, either not being used by a camera, or kept spare for this purpose. The signal from this C.C.U. is then switched remotely by the vision mixer in the Control Gallery as required by the programme.

The 'pre-view' monitors check the picture quality of the picture coming from other places, the telecine room or 'remotes'.

Sometimes the Apparatus Room and the Control Gallery are combined into one room. The engineers operating the C.C.U.'s are then in front of the Director, but on a lower level.

# SPECIAL EFFECTS & BACK PROJECTION

TELEVISION is the greatest medium in the world for building or "faking" pictures, and there is practically nothing that cannot be obtained in the way of special effects.

It is perfectly simple to arrange these effects by mixing pictures or parts of pictures from different sources and making them appear as a composite whole.

Most special effects are obtained with electronic devices called "Inlay" and "Overlay". With these, a director can produce any effect he requires.

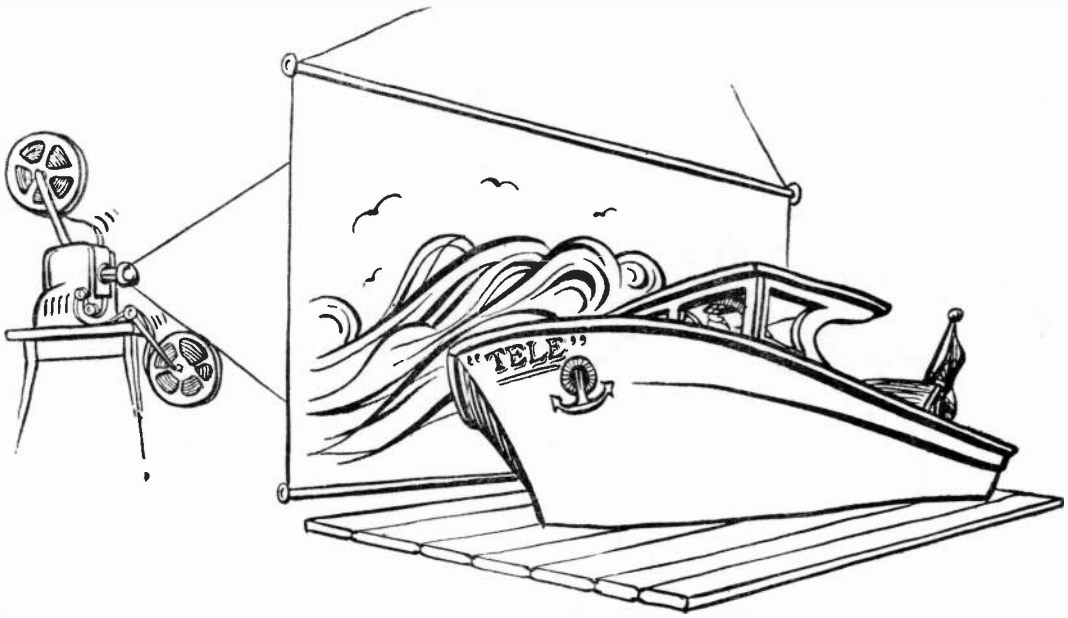
For instance he might make a ballet dancer appear to be about six inches high dancing along the top of a piano, and talking to the pianist. Or someone could enter a room, take off their gloves and appear to have no hands, or remove a coat and have no body underneath. Another type of effect is to make someone appear to look out of the upstairs window of a house, without having to build a house set. It is also possible to focus a camera on a still photograph of, say, a woodland scene, with another camera focussed on a girl singing, and by the use of the electronic device make it appear that the girl is standing in a woodland scene.

Sometimes a commentator in London is seen interviewing a person in another part of the country, perhaps Manchester. Both are seen in the same picture, one on the left hand side and the other on the right hand side. This is done by the special effects unit. It "blacks out" the unwanted half of the London picture and the unwanted half of the picture from Manchester. The two halves are then placed together and give a composite picture. The two speakers, although many miles apart, appear to be in the same studio.

Back Projection, called B.P. for short, is another device used to project a still or moving background on to any scene. A slide or moving film in a film projector is focussed on to the back of a large blank screen about 12 feet long and 8 feet high built into the back of the set, or placed to give a backing to an artiste. You might see a man sitting in a speedboat with water spraying out behind him. The boat is, in fact, built on rockers on the studio floor, and the moving water is on the B.P. screen. You may see two people sitting in a bus or car, which appears to be moving through traffic and streets. This also is done in the studio using moving B.P. and a studio set.

Fixed B.P. is used when a number of different backgrounds are required for a set. These are made on slides which are projected on to the screen as required. The artistes

stand in front of the screen. It is much quicker and cheaper than building sets or painting a number of backcloths. Of course, it has some disadvantages, artistes have to be positioned most carefully in the set and lighting is very difficult and tricky. Light shining on the artiste must not fall on the screen. This reduces the brightness of the image and a very poor picture is picked up by the camera. Shadows of the artiste must not fall across the screen or the illusion is completely spoilt. The distance of the projector from the screen is perhaps as much as 30 feet or even more. This is a lot of




space to be taken up in the studio, as it cannot be used for anything else. Nothing must be built or pass through the beam of light from the projector or shadows will be seen on the screen. To avoid this the projector is usually placed at right angles to the screen and not directly behind it. The picture is then focussed into a large mirror and the reflection thrown on to the screen. This saves a great deal of space.

The B.P. screen is specially prepared to give an evenly diffused picture over the whole surface. It is very expensive, and fragile, and has to be handled most carefully.

Another method of getting a partial moving background is with an effects machine. This requires less room to operate than B.P. and projects directly on to a background. It can create the effect of moving clouds, stormy seas, snowstorms, and other outdoor effects.

# LIGHT ENTERTAINMENT

LIGHT entertainment is a term used to embrace a great many subjects. Variety, fashion shows, quiz games, musical comedy, certain kinds of films, orchestral concerts, situation comedy, and various other types of programmes.


It is rated as the most popular form of television entertainment, but is the most difficult to sustain because of its nature and the speed with which it consumes material. If a variety artiste appeared three weeks running, doing the same act, there would be a storm of protest from viewers. Yet it may have taken the artiste ten years to perfect that particular act.

On the other hand, a straight actor might appear three weeks running and providing he was in a different play each time, no one would think of protesting.

Big musical shows require more planning, and are more difficult to produce than any other type of programme. This is because the cast is usually very large, the sets numerous, and there is so much movement.

# AUDIENCE PARTICIPATION SHOWS AND DO IT YOURSELF

THE two extreme purposes of television are entertainment and instruction. Too much entertainment can satiate; too much instruction can pall. The aim of television, then, is to preserve a satisfactory balance, holding the interest of the viewer all the time.


Audience Participation shows are one of the most popular forms of entertainment partly because they are pure entertainment and partly because anyone is likely to take part. They usually consist of games, quizzes or contests, with the audience present in the studio taking part, and their appeal is largely based on the fact that every viewer has the feeling that he or she is taking part in the show and can test his knowledge against that of the people in the studio. The viewer is at one with the actual audience in the theatre which is often converted into a studio for such shows.

During the past year or so another type of programme which has become very popular is the "Do it Yourself" series. These, too, have a personal challenge for the individual viewer but are unashamedly instructional. Such programmes call for considerable and careful preparation and are usually contributed by experts knowledgeable in subjects ranging from cooking and gardening to the making of useful gadgets for the garden and decorating the house. Television is now accepted as a supremely effective medium for this type of programme, many of which can now more correctly be termed as both entertainment and instruction.

# DRAMA

DRAMATIC shows are generally rather complicated and require a lot of time to plan and rehearse.

Because viewers are inclined to compare cinema and television performances, the television drama must be smooth and polished. The actors and actresses must be word perfect in their parts when the time arrives for the show to go on the air. There must be no hesitancy in remembering dialogue or business. There must be no hitches, technical or otherwise, and everything must run like clockwork.

Often a director merges a live television play with filmed material. Some time before a play is due to go on the air, the artistes are taken on location. It may be to the sea, the country, or whatever outside shots the story calls for.

The outside scenes are then filmed with an ordinary film camera, and sound dialogue may be recorded at the same time, or the film may be shot "mute" with sound effects added afterwards.

When you see the play on your receiver, it may start with live television. The artistes are seen in a room, or a shop, or whatever the story calls for.

Someone may then announce his intention of going for a swim, or a ride on horseback. He goes out through the door, and this is where the filmed sequence is cleverly woven into the action, for you can see the same artiste racing down to the sea, or riding through open country.

These are the film inserts which have been shot days previously, but are so skilfully woven into the live television that unless you are very conversant with the technical side of things, it is difficult to detect where live television ends and the film begins.

# REMOTES, OR OUTSIDE BROADCASTS

NOT all television programmes come from the television studios. Many take place outside in theatres or halls in various parts of the town or country. Sporting events nearly always take place in the open. These are called 'Remotes' or 'Outside Broadcasts'. They are rather specialised, no two are alike. All of these programmes have to be planned most carefully.

Equipment used is similar to that used in the studio. It is taken to the location in vans, one of them is fitted up as a mobile control room. Sometimes the equipment in this van is taken out and put into a suitable room on the location as this gives the engineers and the producer more room to work in. The control van is very cramped and gets very hot in summer.

Before the remote takes place the producer and planning engineer visit the location and make a preliminary survey. They decide on the number of cameras, lenses and microphones to be used. They settle the position of them and any extra lighting that may be necessary if the remote is indoors. Space for the vehicles must also be provided.

The local electricity authority supplies the power to operate the equipment. Sometimes it happens that the electricity supply is inadequate or none is available. A mobile generator is then hired and taken to the location.

Telephone circuits and cables for sending the sound and vision signals back to the studio centre are supplied by the G.P.O. If a cable suitable for the vision signal cannot be supplied, it is sent by a micro-wave radio link. This is a small transmitting set, the equipment being carried in a small van with the aerial which is erected either on the roof or on a small portable mast.

After the preliminary survey the producer works out his programme in the same way as the producer in the studio. He works out his camera shots and microphone positions to give as good a coverage as possible of the action, always keeping within the limitations of the location.

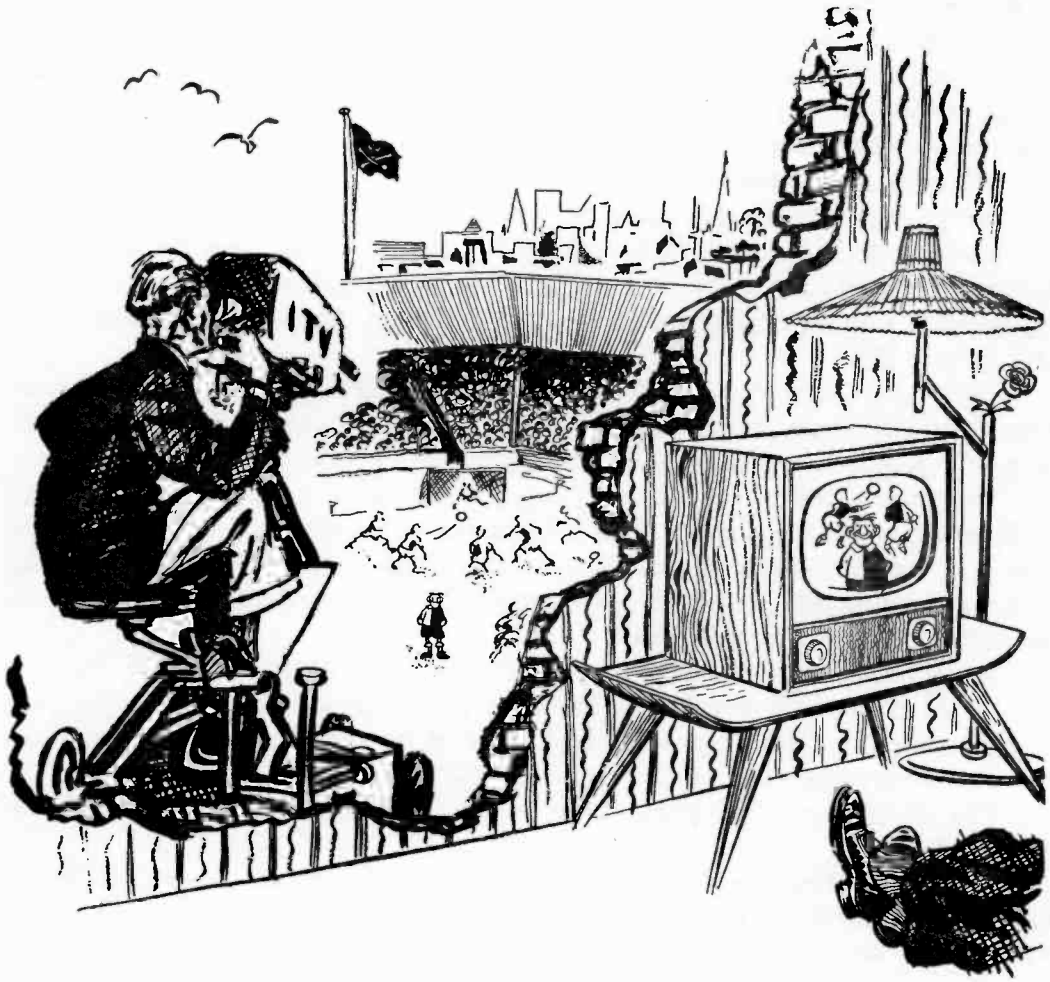
The planning engineer arranges for the supply and installation of the technical equipment.

Sometime before the day of transmission assistants called 'riggers' go to the location and install the camera, microphone and lighting cables. These are run to the positions arranged during the preliminary survey. They also erect and connect

up the extra lamps that may be needed. When this is finished the mobile control room arrives. This is usually a day or two before the day of transmission or even on the same day. The equipment is connected and tested, everything is now ready for the producer to begin rehearsing.

Often it is impossible to rehearse a sporting event like a football match or a race meeting. The producer then arranges the shots to be taken and the lenses to be used with the cameramen and the sound with the sound engineers. The switching of the cameras is usually done by the producer, he cuts from 'long shot' to 'close up' to get the best shots. It is much quicker to do it this way. On a rehearsed production an engineer is usually employed to do the camera switching.

The commentator on a remote works in a sound-proof cubicle overlooking the field of play. He can follow the game and on a picture monitor in front of him he sees the picture which is being transmitted. This helps him to keep his commentary in step with the picture seen by the viewers. He wears headphones and the producer can pass



instructions at any time. Some locations always in use are wired permanently for television. The camera, microphone and lighting cables are run permanently to sockets in convenient places. Then it is only necessary to connect the cameras and microphones to the sockets provided. This saves a lot of valuable time. The equipment must be rigged and de-rigged as quickly as possible as it is in great demand, for remotes form a very important part of the television programme.

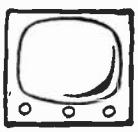
For news reporting or for snap items of interest very mobile equipment is used. Everything is fitted into one van, cameras, microphones, lights and power supplies for operating the equipment. Transmitters are also fitted and these send the sound and vision signals back to the receiving centre. On location the camera is either mounted on the roof of the vehicle or fitted on a tripod outside. Microphones run out, lamps erected, the transmitters started up and the signals sent back in a very short time. A very small equipment is also being made which can be carried by one man, the camera being held in the hand. This would be very useful for interviewing people in a crowd or working in confined places.

Some cameras on remotes are fitted with a special lens called a 'zoom lens'. With this the cameraman can, by operating a single handle 'zoom' change from a 'long shot' to a 'large close-up' and back again as required without replacing the lens. This is a very useful lens as it reduces the number of cameras used.

It is used, for instance, on cricket matches when you see a long shot of the pitch and the fieldsmen, smoothly changing into a large 'close-up' of the batsman.

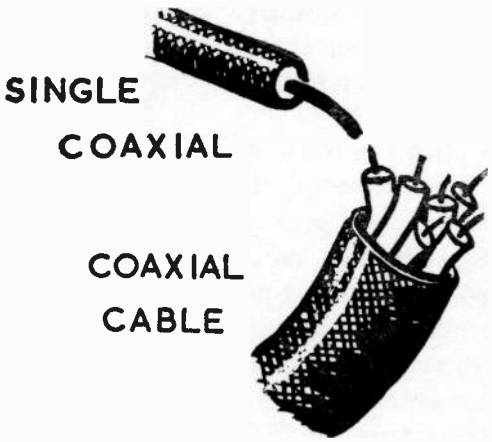
These outside broadcasts are very attractive to viewers as they can see happenings in places miles away. Many interesting events are now brought to the fireside from places on the Continent. Numerous micro-wave links and miles of coaxial cable are used, but the picture is usually of excellent quality, often as good as the pictures from the local studio. Producers are always searching further afield, and the range is always increasing. Already we can see really large events, such as the Olympic Games, on our screens as they are taking place in countries far away.

Helicopters and aeroplanes are sometimes used on an O.B. to give unusual shots. A very small camera with its electrical equipment is fitted into the aircraft. The camera generally looks out through an open door or window, and the pictures from it are sent back to the ground by a small micro-wave transmitter to be mixed with other pictures from cameras on the ground.



# WHAT NETWORKING MEANS

NETWORKING means the sharing of programmes by all the ITV programme contractors. At present there are fourteen of these contractors providing programmes for thirteen areas under the Independent Television Authority. In July 1968 this will be increased to fifteen companies serving fourteen areas. In addition there is, of course, the B.B.C., which has two channels and national coverage on its own.



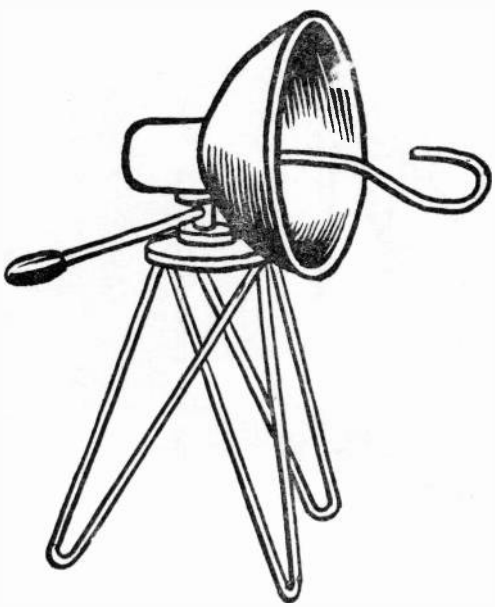

More stations being on the air does not mean that viewers will have a greater choice of programmes, but merely that more viewers will have an alternative programme to the B.B.C.

By networking programmes to each other, the commercial television programme contractors cut their operating costs by half, since one show can be seen from several stations at once. This system also increases the number of viewers watching a programme at any given time and is an inducement to advertisers to buy time on the network.

Programmes are networked by means of a coaxial cable. For instance a show taking place in London is sent to Birmingham and Manchester by coaxial cable. This cable belongs to the Post Office and is rented or hired by the programme contractors.

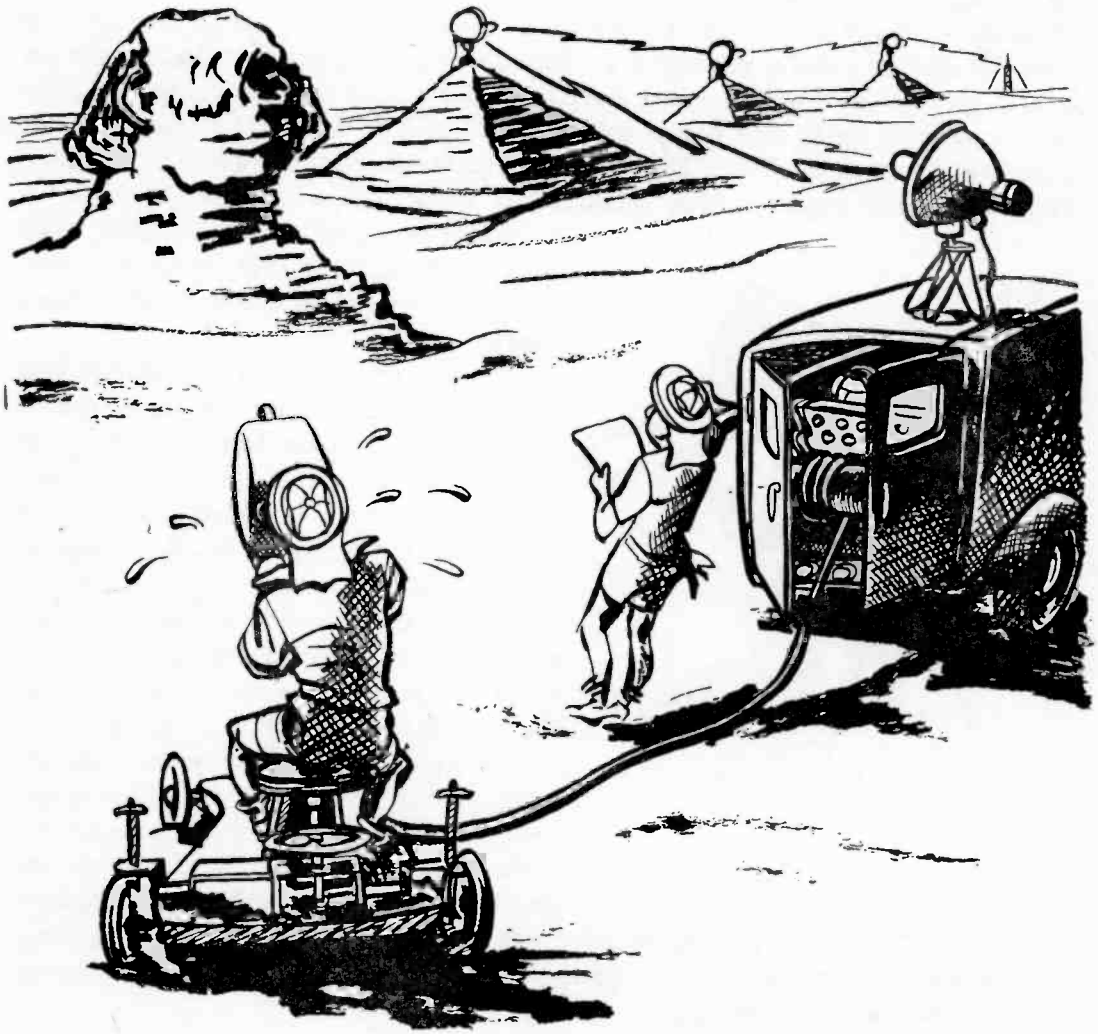
# COAXIAL CABLES AND MICRO-WAVE LINKS

PICTURE signals cannot be sent down normal telephone circuits. The picture signal is made up of a large number of small electric currents which vibrate at different frequencies. Good pictures require all these currents in their right proportions. If any are lost the picture looks 'fuzzy' and out of focus. This happens when the picture signal is sent down a telephone circuit and many of the currents are lost. A special type of cable called a coaxial cable is used to prevent this. It has an outer conductor made of a copper tube or braid and an inner conductor of copper wire down the middle. This is kept in place with small insulators fitted on the wire. Flexible coaxials have an outer conductor of copper braid and the inner wire is embedded in a plastic material called 'polythene'. The signal is sent down the inner wire, the outer acts as a screen and prevents losses.



Picture signals are nearly always sent on coaxial cables, and many miles are now in use connecting up the larger towns in the country. If a coaxial cable cannot be used picture signals are sometimes sent by a micro-wave radio link. A small transmitter is used and the signal is sent out from an aerial fitted inside a large dish-shaped metal reflector. The reflector gathers up the signal and sends it out in a very narrow beam, like the beam of light from a searchlight or car spotlight. This narrow beam is picked up by another reflector at the receiving site and then sent over a coaxial cable to the studio centre. These reflectors must be on the direct 'line of sight' with no obstructions in between. These would stop the beam, it will not pass through or bend round. They must be lined up very accurately, otherwise the beam may shoot off in the wrong direction and never be received.

The range of the transmitter is very small, not more than 20 miles. Two or more links are needed if greater distances have to be covered. Concentrating the energy into a narrow beam helps to increase the distance. Permanent links are often used to link together places when it would be too costly to lay a coaxial cable. These are called relay stations, and usually they are fully automatic in operation. No staff is used at the station. The signal is transmitted from one station to the next, received, and then passed on again until it reaches the end of the chain. Dishes are used for sending and receiving the beam, these are usually fitted back to back at the top of fairly high masts.



# THE MASTER CONTROL ROOM

THIS is the heart of the Television Studio Centre. All programmes coming from the studios, remotes or film come into the master control room before they are sent to the transmitters.

Metal cabinets or racks in the room contain electronic equipment and in the middle of the room is the control desk. Rows of press bottons on the control desk operate relays in the cabinets and switch the programme as required.

The switching is done by the switching engineer who sits at the control desk. He sets up the programme to be transmitted by operating the necessary buttons on the desk. At the exact moment he presses the master button and sends the programme to the transmitters. Instead of switching the sound and picture signals instantaneously he can fade them 'in' or 'out' either together or separately as required by the programme.

A Programme Officer who is always on duty during the whole of the transmission tells the switching engineer when to change the programme. He is responsible for sending out the correct programme at the correct time. He also makes sure that programmes do not overrun. This is most important especially if advertising inserts have to be put into the programme. These are timed most accurately. They must always be sent out at the scheduled time.

There is generally a small studio close to the master control room. This is used for any announcements like the programme summaries or items of interest. An announcer is always on duty in this studio. A twin turntable gramophone desk is available for gramophone interludes. There are a number of picture monitors in the control room placed so that they can be seen easily by the engineers and the Programme Officer. The number varies in different types of control room. There is a main monitor which checks the picture going to the transmitter. Another checks the picture being sent out by the transmitter. This is a radio picture. Others are used as pre-view monitors. These test and check the picture before it is transmitted.

A senior engineer is in charge of the control room. He is responsible for the operation of the technical equipment and makes sure it is working correctly. He also keeps a continual check on the quality of the picture and sound and tells the studios if they are not up to the required standard.

Master synchronising pulses are generated in the master control room. These are sent to all the studios and telecine rooms. They make certain that the equipments in

all the studios begin scanning at the same time. Pictures from the different studios can then be superimposed exactly one on the other, or the picture in one studio mixed with the picture from another. This is a very useful facility.

A loudspeaking inter-communication system is installed in the control room. This links together all the studios and control rooms in the studio centre and information regarding the programme can be sent quickly and accurately to any of them.

The other member of the master control room is the secretary. She keeps an accurate timing of all the programmes radiated.

The Master Control Room is the last link between the studio centre and the transmitter. Programmes other than those from the local studios pass through on their way to the transmitter. Some of these come from studios in other parts of the country, and commercial companies run an interchange system known as 'networking'. These programmes are sent on cables which are rented from the Post Office. Coaxial cables are used to carry the picture signal and special telephone cables are used for the sound. Usually there are a number of these cables, and they converge into the Master Control Room where they are connected to equipment on the apparatus racks. Provision is made for the programmes sent on them to be switched to the transmitter in the same way as a local studio programme.

Before these programmes are transmitted, the sound cables and the coaxial cables are tested very carefully. Special types of test signals are sent from the remote source and these are examined and measured very accurately. The measurements must meet the necessary technical requirements, or the picture cannot be transmitted satisfactorily. If all is well, a picture is sent from the remote source and this can be seen on one of the pre-view monitors provided.

There is also equipment in the Master Control Room for sending test signals to other studio centres.

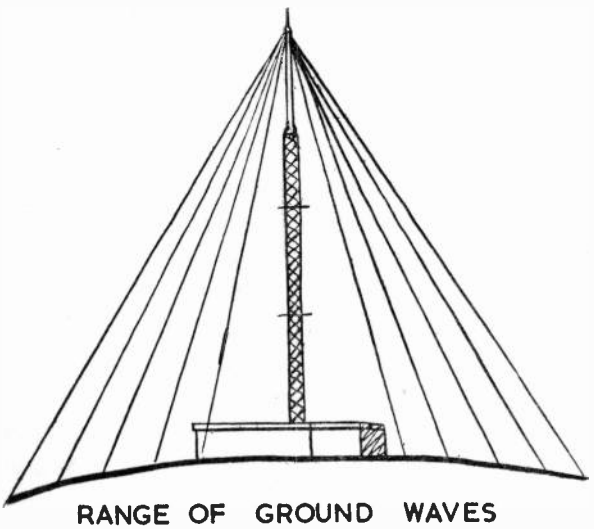
Before transmission, a picture is sent out for 'lining' or 'setting-up' the receivers. This is a 'test card', and during the transmission 'station identification' captions are frequently sent out. These come from special types of camera tube in the Master Control Room known as 'monoscopes'. They look something like the picture tube in the studio camera. On the inside face an image of the caption is printed. This is scanned by the electron beam in the tube, and an electrical signal is produced which can be transmitted whenever it is required. A number of these monoscopes are usually installed, each is used for giving a different caption.

The Master Control Room is a very busy part of the studio centre, for all the time a programme is being radiated it is being checked to make sure that the best possible picture is being sent.

# THE TRANSMITTERS

THE sound and vision signals from the master control room go straight to the transmitters at the transmitting centre. Here there are two transmitters usually in the same building. The sound is radiated from one and the vision from the other. Both transmitters are similar in operation, but the sound and vision signals they transmit are quite different. They generate very powerful high frequency waves called 'carrier waves' and the signals are added or superimposed on the 'carrier wave' which carries them out into space. They are radiated from separate aerials fitted at the top of a very high mast.

Sound signals are made up of small electric currents which vibrate a number of times a second. The number of vibrations a second is called the frequency of the note, and sound frequencies vary from about 20 to 12,000 cycles a second. Vision signals are also made up of small currents of different frequency but these vary from 0 to 3,000,000 cycles a second. The frequencies in these limits is the band width and it is very much greater for the vision signal than the sound signal. To get a good picture the whole band of frequencies must be transmitted. If any are left out the picture may look fuzzy and appear to be out of focus. This makes the design of the vision transmitter rather complex and it must work in the ultra short wave band where it is easier to transmit this very wide band of frequencies.



RANGE OF GROUND WAVES FROM TRANSMITTER

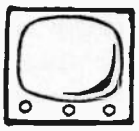
The sound transmitter works in the ultra short wave band as well. Both sound and vision signals are picked up on the same receiving aerial and to do this they must work on wavelengths which are close together. The ultra short waves leaving the transmitting aerials shoot out into space in all directions in straight lines. Some go along the ground. These form the 'ground wave' and others shoot up into the sky

forming the 'sky wave'. The ground wave is the most important in television. This is the one which is received by the television receiver at home. Unfortunately it is absorbed by the ground as it goes over it and it becomes weaker the further it gets from the transmitter. Because of this, the range, or the service area of the television transmitter is rather small. Good reception may only be possible within 30 to 40 miles from the transmitter. High buildings or hills may also make reception poor. If these are in between the transmitter and the receiver they stop the waves from passing; ultra short waves will not bend round obstacles. For good reception the receiving and transmitting aerials should be on the 'line of sight', and to get this they should be erected as high as possible. The transmitter is always built on the highest convenient place and the aerials fitted to a very high mast. The sky wave is reflected back to earth from atmospheric layers high up in the sky. It reaches the ground some distance from the transmitter and it is of little use for television. It is unreliable, the strength varies and its position alters because of changes in the reflecting layers. It is usually the cause of long distance reception sometimes called 'freak reception', and it can cause interference with the local signal especially if this is a little on the weak side.

Each transmitter works on a specially allocated channel in the television waveband. Thirteen channels are available and most of these are now in use. Sometimes transmitters share a common channel and to stop any interference with one another they should be at least 300 miles apart.

Two wavebands have been allocated for the use of television transmitters. These are known as Band I and Band 3. Band 1 covers a range of frequencies from 40 to 80 megacycles, and transmitters radiating the B.B.C. programmes operate in this band. Five channels are available and these are known as Channels 1, 2, 3, 4, and 5. Band 3 covers a much higher frequency band from 174 to 214 megacycles. It is used by transmitters radiating programmes originated by the Commercial Television Companies and eight channels, Channels 6 to 13, are available in this band.

As the range of the television transmitter is small, a large number are necessary to give good television reception in all parts of the country. Big towns with a large number of viewers, such as London, Birmingham, Manchester, have their own very powerful transmitters built on high ground close to the town. Where there are relatively few viewers, small low power transmitters are used to relay the programme. These are relatively cheap to install and economical to run.



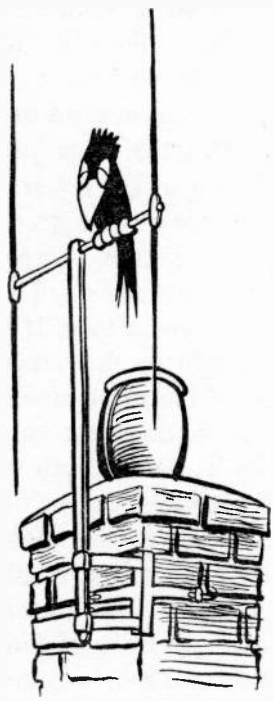
# THE RECEIVER

THE signals transmitted by the sound and vision transmitters are picked up on a special receiving aerial. There are many different types, the common is the H type. It has two elements, the front one nearest to the transmitter picks up the signal and takes it to the receiver through a small flexible coaxial cable. The one behind is slightly longer; it is a reflector. It makes the aerial more sensitive to signals in front and stops signals from behind being picked up. This helps to cut out interference and improves the picture. The aerial is tuned or adjusted to the correct length to receive radio waves from the local transmitter. When the signals reach the receiver, the sound signal is separated from the vision signal. The sound signal is converted into sound waves by the loudspeaker, and the vision signal is fed to a cathode ray receiving tube. The picture is produced on the face of the conically shaped tube. The wide end of the tube is coated internally with a chemical material which glows or fluoresces when small charges of electricity strike it. The greater the number striking it, the greater it glows. It is called a fluorescent screen, and the picture is formed on it. A small piece of equipment in the narrow end of the tube produces a stream of electrons or small charges of electricity; this is called an electron gun. The stream is made into a very narrow beam and directed on to the fluorescent screen. When it strikes it forms a very small but very bright pin point of light, and if it stayed there for any length of time it would burn a permanent black spot on it. The beam is made to move across the screen from side to side and from top to bottom all the time it is switched on. The movement follows exactly the movement of the electron beam in the camera tube. If it just did this continually it would trace out a rectangular patch of light on the screen which would have the same brightness all over, and the brightness of the patch would be controlled by the brightness control on the receiver. The beam does not stay constant in strength, its strength is made to vary in the same way as the strength of the electron beam in the camera tube. The screen changes in brightness depending on the strength of the beam. The stronger the beam the brighter the screen. As the beam moves across the screen in step with the beam in the camera, and changes in strength as the strength of the beam in the camera changes, a picture is formed on the screen which is exactly the same as the picture coming through the camera lens. Each picture on the screen is built up of 405 lines, and 25 complete pictures are formed each second. To stop the picture flickering each picture is seen twice, the first time only the odd num-

bered lines are seen and then the even numbered. These are called frames and each is made up of 202½ lines and 50 are put together each second. This avoids flicker. The two frames put together make a complete picture. This process is called twin inter-laced scanning, and it is the type used in the British television system. The individual lines can be seen if the picture on the screen of a large cathode ray receiving tube is closely examined.

The receiver is a very complex piece of equipment carefully adjusted before it leaves the factory to give the best possible picture. Many adjustments can only be made with very expensive test equipment. Very high voltages are used in the set and even normal sets may use up to 10,000 volts. It is therefore dangerous for anyone to make adjustments inside the set when it is operating, unless very experienced. A number of controls are provided which must be adjusted to get a good picture and are usually quite accessible, clearly marked and self-explanatory. They differ according to the make of set, but usually one finds a 'Brilliance' control, for adjusting the overall brightness of the picture, 'On-Off' switch, 'Sound Volume' control, 'Contrast' control for adjusting the tone values in the picture, and a ' Wave-change' or 'Channel-change' switch. This is set to the channel number of the local transmitter. No tuning is required as the circuits are pre-set.

A number of pre-set controls are also provided which may need occasional adjustments. These, usually less accessible, are 'line amplitude' (picture width), 'line hold' (line synchronisation), 'frame amplitude' (picture height), 'frame hold' (frame synchronisation), 'focus' and 'sensitivity'.



T.V. AERIAL

As the picture is produced on the face of the cathode ray receiving tube, it is obvious that a large picture requires a large tube. Large tubes are difficult to manufacture, and early sets used tubes 9 or 12 inches in diameter. Modern receivers use much larger tubes, the most popular size now being 17 or 21 inches.

It is possible to get pictures much larger than this and, in fact, television pictures have been shown on normal cinema screens. These are projected on to the screen from a very small tube two to three inches in diameter. It produces a small, intensely brilliant picture, which is focussed on to a screen in a matter similar to that for a slide in a film projector. Sets using this principle give pictures from 14 to 44 inches across.

# WHAT OF THE FUTURE?

TELEVISION has become an essential part of our way of life and will become even more important as time goes on. New ways of using this medium are constantly being developed.

In the field of education and visual aids to education, television has brought radical changes and undreamed-of advantages. The world is suffering from a shortage of qualified teachers and skilled educationalists, especially in the slower-developing countries of Asia, Africa and South America. It is here that television can offer perhaps its most valuable contribution to the human race, by feeding the minds of the millions who hunger for knowledge. But television receivers do not grow on trees in the wilderness or jungle, and education will come only when politicians realise that progress is more important than power.

In industry, television is performing many services. Small cameras can be placed at given points and huge machines, blast furnaces, etc., can be left under observation by one or two men.

In undersea exploration, television cameras can go deeper than any diver and uncover the secrets of the ocean bed to the watchers above.

In medicine, important surgical operations can be watched by students and doctors in other parts of the building, or even other parts of the country. This closed-circuit system of television is used also in universities, department stores and even banks. Already television is used by commercial firms to link offices miles apart. One of the first to do so was a London bank which keeps important documents housed in another office in the suburbs. Whenever the head office wish to see a particular ledger or document, they use their own closed-circuit system to study it on a screen in London.

In big construction schemes, such as dams and bridges, closed-circuit television enables the chief engineer to keep an eye on the entire project by merely glancing at a television screen.

In atomic energy and many other spheres, television is playing a vital part in the march of progress.

The television camera is not as sensitive as the human eye but it can reach further, study unblinkingly and record the happenings in the High Street, the heavens and in the bowels of the earth. There are few places it cannot reach.

Television programmes can be sent to and received from any part of the world.

Colour television is now an accepted fact, and the next development will be three-dimensional reproduction.

Television will become a much more personal thing. It is now possible to pick up a telephone and see as well as speak to the person at the other end. Only cost prevents this becoming a general service.

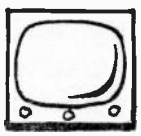
Sony of Japan were first in the market with a small personal video tape recorder, as easy to operate as any ordinary tape recorder. The video tape recorder, of course, records and plays back vision as well as sound. Thus every home can now have its own closed-circuit television and record anything interesting for seeing at a later time.

Television is now established as the most vital media of communication yet devised by man. A science of instant contact in education, art, information and entertainment, a science which will never remain still, but must always expand, improve and forever reach outwards.

The development of Telstar and other artificial satellites in orbit around the earth now makes it possible for us to see and hear events at the same time as they are happening on the other side of the world. Soon space laboratories and platforms, also in orbit around the earth, will receive and relay back to us clear pictures from television cameras mounted in gigantic space rockets, as they orbit or pass by distant planets and stars.

In a few years scientists will build vast laboratories on the moon, where special technicians can live and work for weeks at a time. Television communications between the earth and these men on the moon will be simple and continuous, a matter of flicking a switch or pressing a button. The moon will become the eyes and ears of the world, probing the depths and blackness of outer space.

It is quite possible that during your lifetime, and certainly by the end of this century, the very threshold of the universe will be exposed to the gaze of mankind.



# TERMS USED IN TELEVISION

AMPLIFIER A piece of apparatus used for increasing the strength of an electric current.

ACTUALITY BROADCAST A remote or outside broadcast. A football match. Race meeting. Coronation.

ASPECT RATIO Ratio of picture width to picture height. In television and in the cinema 4 x 3.

AUDIO Anything connected with sound.

AUDIO FREQUENCIES Frequencies used in sound.

AUDIO SIGNAL The Sound signal.

BAND WIDTH The range of frequencies within two definite limits.

BOOM A movable and telescopic arm used for supporting the microphone.

BRIGHTNESS CONTROL A control on the receiver controlling the average illumination of the television picture.

CARRIER WAVE The high frequency radio wave carrying the sound or vision signals through the air.

CATHODE An electrode in the cathode ray tube or thermionic valve emitting electrons.

CATHODE RAY TUBE An electron tube, one end internally coated with chemical screen which fluoresces when bombarded with an electron beam.

COAXIAL CABLE A special cable for carrying high frequency currents consisting of two conductors, a solid wire carrying the current surrounded by a hollow tube insulated from it.

CONTRAST CONTROL A variable receiver controlling the gain of the receiver which changes the contrast between the highlights and shadows in the picture.

CONTROL ROOM Room used by engineers and producer for producing or controlling the programme.

CRANE DOLLY Mobile trolley carrying the camera mounted on a crane arm which can be elevated on the vertical plane or swung in the horizontal plane.

DEFLECTION Movement of the electron across the cathode ray tube.

DEFLECTION GENERATOR Equipment for generating the waveform to move the electron beam across the cathode ray tube screen in a definite pattern.

DEMODULATION OR DETECTION The separation of the signal information from the modulated carrier wave.

DIPOLE An aerial divided and fed in the centre. Has two elements.

DIRECTIONAL AERIAL An aerial which transmits or receives radio waves better in one direction.

DIRECTOR An aerial element used to make the aerial directional. Usually one or more placed in front of the main element.

DISTORTION Any change in the signal. Usually deterioration introduced at any stage by the transmitting or receiving equipment.

DOLLY A wheeled trolley carrying a camera.

DOLLYING Moving the camera from longshot to close or vice versa on the dolly.

ELECTRON A small charge of negative electricity.

ELECTRON GUN The device generating a narrow beam of electron and projecting them in the cathode ray tube.

ELECTRON MULTIPLIER A device for increasing the number of electrons fed into it.

EMISSION The release of electrons from a body.

FADING Uncontrolled changes in the strength of the radio signal.

FLUORESCENT SCREEN The screen in the cathode ray tube which is chemically coated and glows when struck by electrons.

FOCUS CONTROL An adjustment which makes the picture sharper.

FOLDED DIPOLE An aerial folded back on itself.

FRAME OR FIELD In the cinema a complete picture taken in 1/24th second. In television one half of the interlaced picture containing 202½ lines scanned in 1/50th second.

FRAME HOLD The control for adjusting the frame frequency.

FREQUENCY The number of complete cycles per second.

GHOST IMAGE A second image on the picture, slightly displaced, caused by delayed reception of the radio signal after reflection.

GROUND WAVE The radio wave following the surface of the earth.

HERRINGBONE A zig-zag interference pattern across the picture.

HIGH FREQUENCY WAVES Radio waves with very short wavelengths.

ICONOSCOPE An earlier type of camera tube. Rather insensitive.

IMAGE ORTHICON Camera tube now in general use. Very sensitive.

INTERFERENCE Any unwanted signal superimposed on the original signal.

INTERLACED SCANNING The process of scanning the picture a number of times, each scan fitted together giving a complete picture. Used to prevent flicker. In British television twin interlaced scanning is used. The odd numbered lines are scanned first then the even numbered at a frequency twice the picture frequency.

KENNELLY-HEAVISIDE LAYER A region of ionised gas in the atmosphere about 60 miles above the earth which reflects short wave radio signals.

LINE A single sweep of the electron beam across the face of the cathode ray tube or the camera tube.

LINE HOLD A control for locking the line frequency generator to the synchronising signals.

LINE-OF-SIGHT The optical path between the transmitter and receiver.

LINK A transmission system for passing signals from one place to another, either by cable or by radio waves.

MEGACYCLE OR MC. 1,000,000 cycles.

MICROPHONE A device for changing sound waves into electrical currents.

MICRO-WAVES Radio waves of very short wavelengths. Usually less than 1 metre.

MONITOR A cathode ray receiver used to display a television picture.

NETWORK A group of television stations connected by coaxial cable or radio link radiating the same programme.

NOISE A very fine interference pattern on the picture.

OUTSIDE BROADCAST A programme originating outside the studio. A Remote or Actuality Broadcast.

PHOTO-ELECTRIC CELL An electrical device which produces an electrical current when light falls on it.

PHOTO-ELECTRIC MATERIAL A chemical which emits electrons or produces an electric current when light falls on it.

PICTURE FREQUENCY The number of complete pictures per second. British television 25 per second.

PROJECTION TUBE A small cathode ray tube producing a very bright picture which is enlarged and projected on to a big screen.

RADIATOR The element in an aerial which gives out radio waves into space.

RADIO LINK A link connecting together two places by radio waves.

RADIO WAVES Electro-magnetic waves which travel through space at a very great speed. 186,000 miles per second.

RECTIFICATION The changing of alternating current to direct current.

RELAY STATION A station which picks up the original signal and re-transmits it. Usually of low power to increase the coverage of the main transmitter.

RUN-THROUGH A complete rehearsal with or without cameras.

SCANNING The process of dividing and analysing the picture line by line.

SERVICE AREA The area in which the transmitted signal can be received clearly at any time.

SHADING A shadow effect, a defect on the picture caused in certain types of camera tubes like the iconoscope. Can be corrected electrically.

SIGNAL The sound or picture after it has been changed into corresponding electrical currents.

SKYWAVE The part of the transmitted wave which moves away from the earth's surface and is reflected from the ionosphere. Used to give long range short wave reception.

SYNCHRONISING PULSE The signals transmitted or used to keep the electron beam at the television receiver in step with the electron beam in the camera.

SYNC. SEPARATOR The circuit which separates the synchronising pulses from the vision signal.

TELECAST The broadcast of a television programme.

TELECINE The equipment used for the transmission of film on television.

TEST PATTERN A chart specially designed for testing. Usually transmitted before the beginning of a programme to line-up receivers and equipment.

TRANSMISSION LINES Special lines or cables used to transfer electrical energy from place to place with the minimum loss.

TRANSMITTER The equipment used for generating high power high frequency oscillations which carry sound or vision signals out into space.

TV Short for Television.

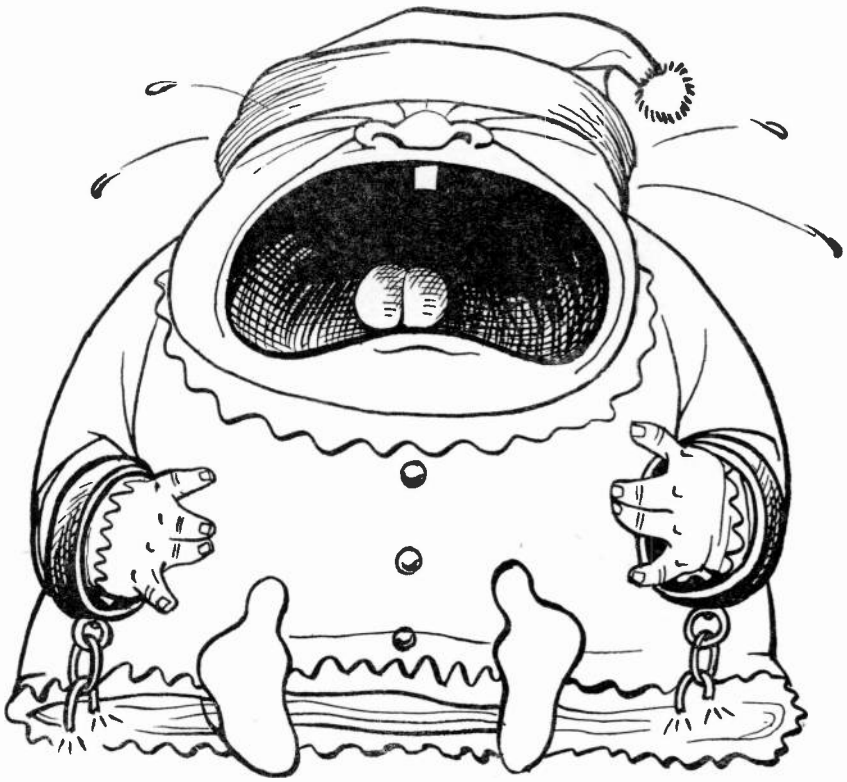
TUNING Adjustment of controls to get the best sound or vision.

VERTICAL HOLD Control for locking the field scanning to the field synchronising pulses to prevent the picture slipping.

VIEWER A person watching television.

WAVE GUIDE A hollow metal tube either circular or rectangular used to carry electro-magnetic waves.

WAVELENGTH The distance between any two corresponding points on adjacent waves. From the crest of one to the crest of the next.



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