ELECTRONICS AND TELEVISION & SHORT-WAVE WORLD

JUNE, 1940

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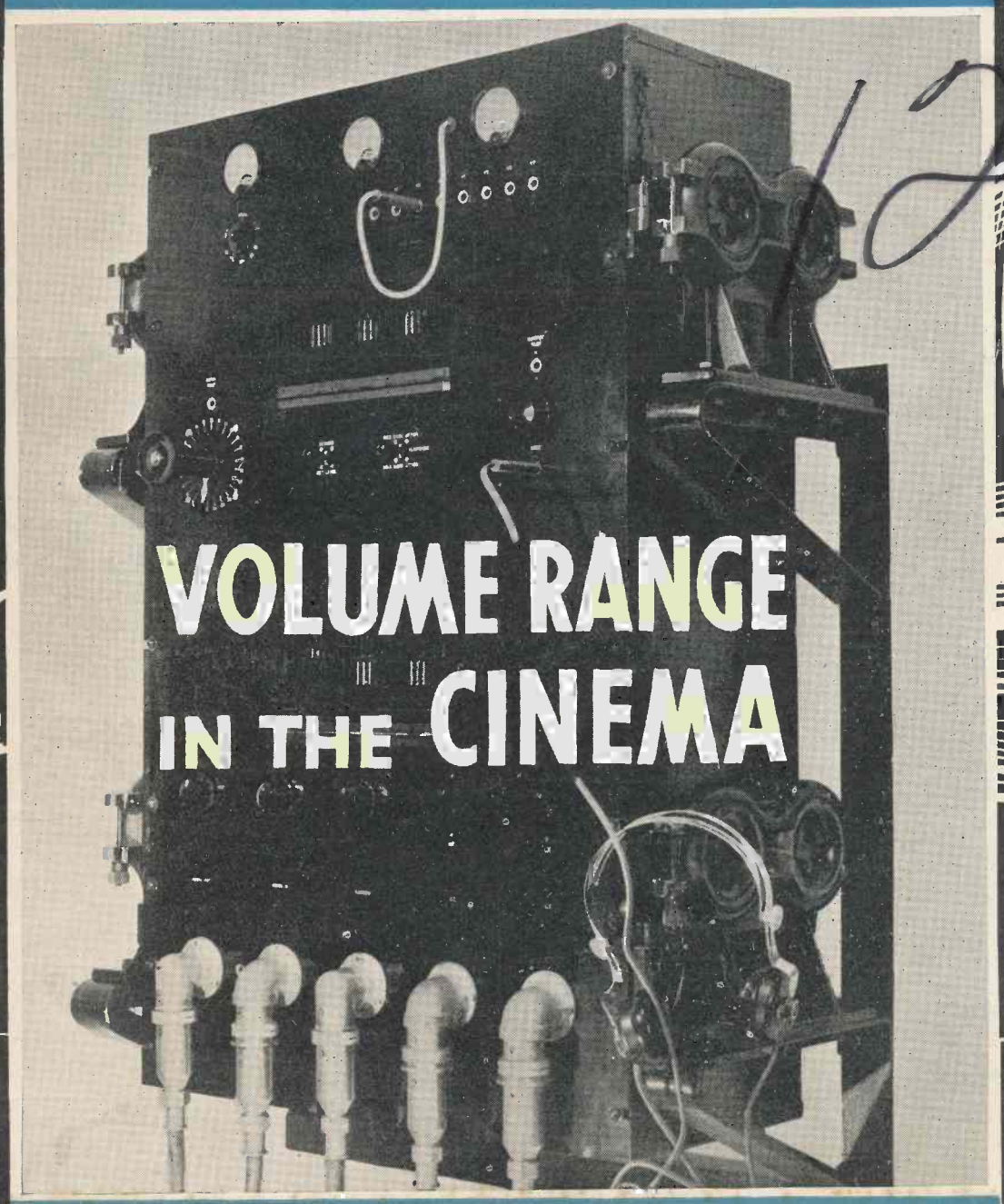

VOLUME RANGE IN THE CINEMA

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Electronics AND TELEVISION AND SHORT-WAVE WORLD

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A Hulton Publication

IN 1928, an off-shot of the company that had been formed to develop the television inventions of Mr. John Logie Baird produced the first issue of this journal. Its title was "Television," the first journal of its kind in the world. The fact that such a journal could be published was in itself remarkable at that date. Two or three years later, "Television" passed into the ownership of Benn Bros, Ltd., a notable house associated with the publishing of trade and technical papers, and in December, 1933, it was sold to Bernard Jones Publications, Ltd., in whose hands it was enlarged and strengthened, so much so, that during the years immediately preceding the public television service it did its part manfully in influencing those in authority and in educating the trade and the public to the need of regular television transmissions.

Now, with this issue, ELECTRONICS AND TELEVISION (as this journal has been known since October last) goes over to Hulton Press, Ltd., already famous as the proprietors of five journals, each entirely distinctive: *Picture Post*, the world-famous picture weekly; *Lilliput*, a clever pocket monthly; *Farmers' Weekly*, a well-produced weekly covering all the interests of the agricultural community; *Nursing Illustrated*, a bright and authoritative weekly for the nursing profession; and lastly, *Housewife*, a pocket monthly of a new order appealing to every woman who is running a house and home. Into the hands of this up-to-date and enterprising house ELECTRONICS AND TELEVISION now passes. For the time being it will be maintained more or less in its present form, but with the resumption of peace, whenever that should come, its new owners hope to develop it on outstanding and generous lines and in so doing to evince the complete confidence which they have in its future possibilities.

CONTENTS FOR JUNE

Recent Progress in TELEVISION STUDIO TECHNIQUE

THE special requirements of the production of studio television have been studied for some time in this country and abroad, and visits have been paid by American engineers to the B.B.C. studios for the exchange of ideas. A great deal of the technique has been adapted from experience gained in motion picture studios, but it has been recognised that there are several major differences which render television production more difficult. The instantaneous reproduction of the scene rules out all " re-takes," and the presentation must be as near perfection as possible at the time of taking. The differences in lighting intensity required by the Iconoscope and the standard panchromatic film are such that special arrangements have had to be designed.

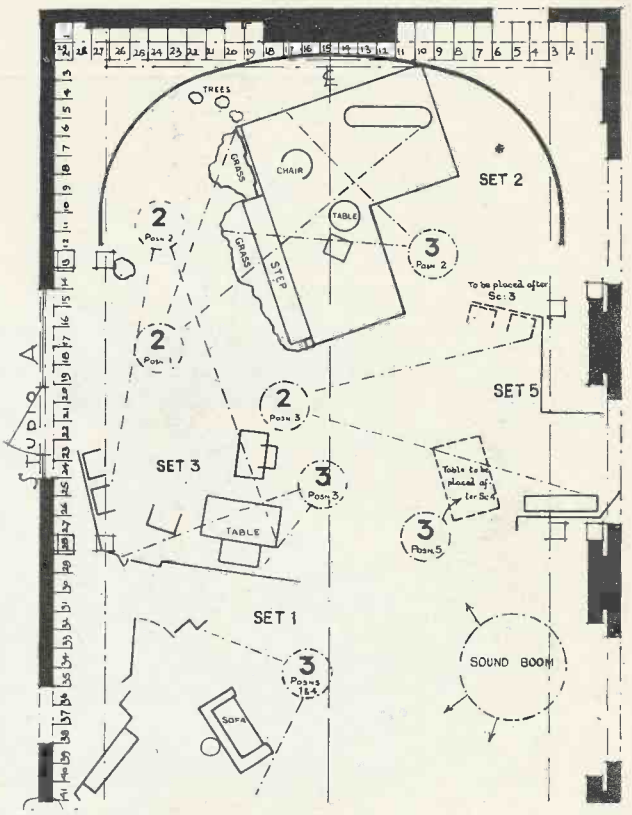

Fig. 1. Producer's plan of studio floor showing positions of cameras and props for a typical three-act play. The cameras are indicated by numbered circles, which also indicate the movement after each "take." The angle of take of the camera is shown by the dashed lines. The sound boom is so placed that it can cover the settings without movement.

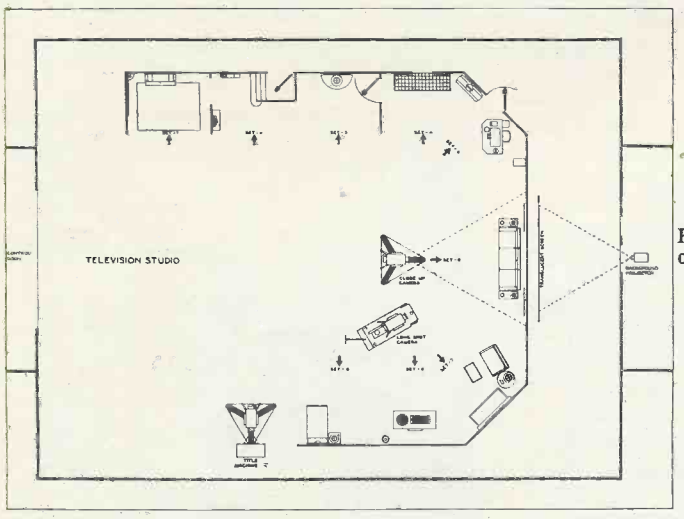

Fig. 2. Plan showing layout of television studio floor.

Studio Layout

In a paper before the Television Society,* Mr. Woolfe Murray described the layout of a typical television " set," which is reproduced in Fig. 1. The positions of the cameras for successive scenes in a three-act play are shown by the numbered circles, the whole layout being designed so that the cameras may be easily swung into their new positions without disturbing the scene or actors. The sets, numbered 1 to 5, are seen disposed round the walls of the studio, and the microphone boom is placed so that the whole area can be covered without transporting the main stand from its marked position.

Fig. 2 shows a typical American television studio layout, as described by A. W. Protzman, of the N.B.C., America.† Apart from the increased area available it will be seen that it is arranged on similar lines to the first diagram, with the notable addition of a screen for " back projection." This is an important improvement borrowed from the cine studio, and gives increased realism to the background view seen through windows, etc.

Background Projection

The problems of background projection in television differ, however, from those encountered in motion pictures. More light is necessary because of the proportionately greater incident light used on the set proper.

Considering the centre of a rear-screen projection as zero angle, it must be possible to make television shots within angles of at least 20 degrees on either side of zero without appreciable loss of picture brightness. This requirement calls for the use of a special screen having a broader viewing angle than those used in making motion picture shots. Also, in motion pictures, the size of the picture on the screen can be varied in the proper relation to the foreground for long shots or close-ups, but for television, the background picture size cannot be changed once the programme starts. The background subject matter must

* Jour. Tel. Soc., Vol. 3 No. 1, p. 1,

† R.C.A. Review, Vol. 4, No. 4, p. 399.

Restrictions Of Focal Depth

also be sharp in detail and high in contrast for good results.

At present, only glass slides are used and a self-circulating water-cell is used to absorb some of the radiant heat from the high-intensity arc. Both sides of the slide are air-cooled, and these precautions permit the use

Fig. 3. Arrangement of "set" in N.B.C. studio.

of slides for approximately 30-minute periods without damage.

The N.B.C. studio is 30 ft. wide, 50 ft. long, and 18 ft. high. Such a size should not be considered a recommendation as to the desired size and proportions of a television studio, as it was not specially designed for television. To those familiar with the large sound stages on the motion picture lots, this size may seem small, but in spite of the limited space, some involved multi-set pick-ups have been achieved by careful planning. Sets, or scenes, are usually placed at one end of the studio and control facilities are located at the opposite end in an elevated booth, affording full view of the studio for the control room staff. Any small sets supplementing the main set are placed along the side walls as near the main set as possible, and in such position as to minimise camera movement. At all times as much of the floor space as possible is kept clear for camera operations and such floor lights that are absolutely essential. At the base of the walls and also on the ceiling are numerous power points to minimise the length of lighting cables. At the rear of the studio is a permanent projection room for background projection.

In respect of available space the N.B.C. is considerably better off than the B.B.C. were, as frequent references were made last year to the difficulty of working in cramped surroundings at Alexandra Palace.

Cameras

Both the British and American studios use similar types of camera mounting—the so-called "dolly-truck" on which the camera can be run to and fro, and the fixed stand for close-ups and caption photography. Each of the N.B.C. cameras is fitted with an assembly of two identical lenses displaced 6 in. vertically. The upper lens focuses the image of the scene on a ground-glass which is viewed by the camera operator. The lower lens focuses the image on the mosaic. The lens housings are demountable and interchangeable. Lenses with focal lengths from 6½ to 18 in. are used at present. Lenses of shorter focal length or wider angle of pick-up cannot be used since the distance between the mosaic and the glass envelope of the Iconoscope is approximately 6 in. Lens changes cannot be effected as fast as on a motion picture camera, since a turret arrangement for the lenses is mechanically impracticable at present.

Ordinarily, one camera utilises a 6½ in. focal length lens with a 36-degree angle, for long shots, while the others use lenses of longer focal lengths for close-up shots. Due to its large aperture, the optical system used at present has considerably less depth of focus than those used in motion pictures, making it essential for camera operators to follow focus continuously and with great care.

This restriction on the camera focus gives rise to difficulty in the arrangement of the actors in a scene when it is desired to take a group, all of whom should be in focus. Their movements must appear natural and at the same time they are restricted in order to keep in focus. An example of the difficulties due to this was experienced in a scene from "Royal Family of Broadway" produced by the B.B.C. early in 1939. Six actors were of necessity in front of the camera at the same time and they had to take position in a line to avoid moving out of range of the camera.

It is expected that this limitation will disappear as more sensitive types of Iconoscope will permit the use of optical systems of greater focal depths.

Vertical parallax between the view finder lens and the Iconoscope lens is compensated for by a specially designed framing device at the ground-glass that works automatically in conjunction with the lens-focusing control. It may be of interest to note here that early television cameras had no framing device, which meant that images, in addition to being inverted as they are in an ordinary view-finder, were also out of frame. The camera operator had to use his judgment in correcting the parallax. With the new framing device, the operator now knows exactly the composition of the picture being focused on the mosaic in his camera, and it can be

Fig. 4. "Single-six" portable lighting unit.

(*Continued on page* 288.)

"Recent Progress in Television Studio Technique"

(*Continued from page 276*)

quickly adjusted to accommodate any lens between 6½ and 18 in. focal length.

Because of the fact that several cameras are often trained on the same scene from various angles, and because all cameras are silent in operation, performers must be informed sometimes—such as when they are speaking directly to the television audience—which camera is active at the moment. Two green signal-lamps mounted below the lens indicate which camera is "on the air."

Make-up

Mr. Woolfe Murray points out that the British cameras used by the B.B.C. appeared to vary occasionally in sensitivity to different colours and this used to necessitate "retouching" of the artists' make-up during a long scene. It has long been known that yellow reproduces better than flat white and the ground work of most white tints is pale yellow. One of the advantages of the modern television camera is that exaggerated make-up is no longer necessary, and in fact the N.B.C. use a type similar to that for ordinary panchromatic ciné films.

Television sets are usually painted in shades of grey. As television reproduction is in black and white, colour in sets is relatively unimportant. Chalky whites are generally avoided because it is not always possible to keep high lights from these highly reflective surfaces which cause a "bloom" in the picture, and, in turn, limits the contrast range of the system.

Due to the fact that the resolution of the all-electronic system is quite high, television sets must be rendered in considerable detail, much more, in fact, than for a corresponding stage production. As in motion picture production, general construction must be as real and genuine as possible; a marked difference, for instance, can be detected between a painted door and a real door. On the legitimate stage, a canvas door may be painted with fixed highlights; that is, a fixed perspective, because the lighting remains practically constant, and the viewing angle is approximately the same from any point in the audience. But, in television the perspective changes from one camera shot to another, and painted perspectives would therefore be out of harmony with a realistic appearance.

Lighting

The Americans* classify the lighting of the scene into "foundation" light and "modelling" light, the former being the flat illumination of the set necessary to give a picture on the mosaic. Modelling light is the illumination which adds to the contrast of the picture, and may be from overhead, floor or background. It adds a characteristic highlight or shadow to the uniformly illuminated scene.

An analysis of the requirements for a satisfactory system seems to indicate that flexibility and efficiency are the paramount factors to be considered, although glare and radiant heat from the units have to be taken into account. Of necessity, the light produced has to be a high-level diffused illumination in quantities encountered only in the colour-film studios. In addition, television requires that the operation, upkeep and manœuvring of this light be of

* W. C. Eddy, Jour. Soc. Motion Picture Engineers, July 1939.

(*Continued opposite*)

such simplicity that one or two men could satisfactorily handle routine productions.

A recent step taken in the N.B.C. studio was the conversion from the concentrated unit to more diffused light from reflectors and "footlights," but the glare produced and the inefficiency led to their abandonment in favour of a battery of 500-watt units, each equipped with a reflector and lens system. These also suffered from lack of flexibility and excessive heat radiation, besides being bulky.

Photometric tests, conducted in the studio, indicated that the inside silvered spotlight would deliver into an area more light per watt than a lens, lamp, and reflector assembly or the standard incandescent bulb and exterior scoop. This new bulb was light in weight and of relatively small envelope size in the wattage required. It remained to design a fixture that would permit simple adjustment in elevation and direction to satisfy the requirements of the multi-set productions proposed by the programme staff. Such a mounting, known as the "single six," incorporates six 500-watt spotlights on a framework of thin-walled steel tubing, so arranged that the centre-to-centre distance between lights is ten inches. This ensures that the light-beams interlock at a distance of eight feet from the fixture and that the light arriving on the set is relatively free from spots and secondary shadows. The total weight of the fixture, equipped with spots, is slightly less than 19 pounds and with three kilowatts produces an index of 18,000 units, compared with an index of 7,650 units registered by an equivalent grouping of lens, lamp, and reflector units. This amounts to an increase in usable light per watt consumed of approximately 240 per cent.

The average set illumination is in the neighbourhood of 1,200 foot-candles of incident light. The average modelling ratio is 2 to 1, while the average light load is slightly more than 50 kW

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