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B.B.C TELEVISION CENTRE

A number of papers are being prepared by the British Broadcasting Corporation describing in detail the various aspects of their new Television Centre at White City in the west of London. A full technical description of the Centre is also to be published later in the year. A general description has already been issued titled 'The B.B.C Television Centre' (publication No. 4097, price 42s.) which contains a series of excellent photographs in colour and monochrome and introductory articles on the main features.

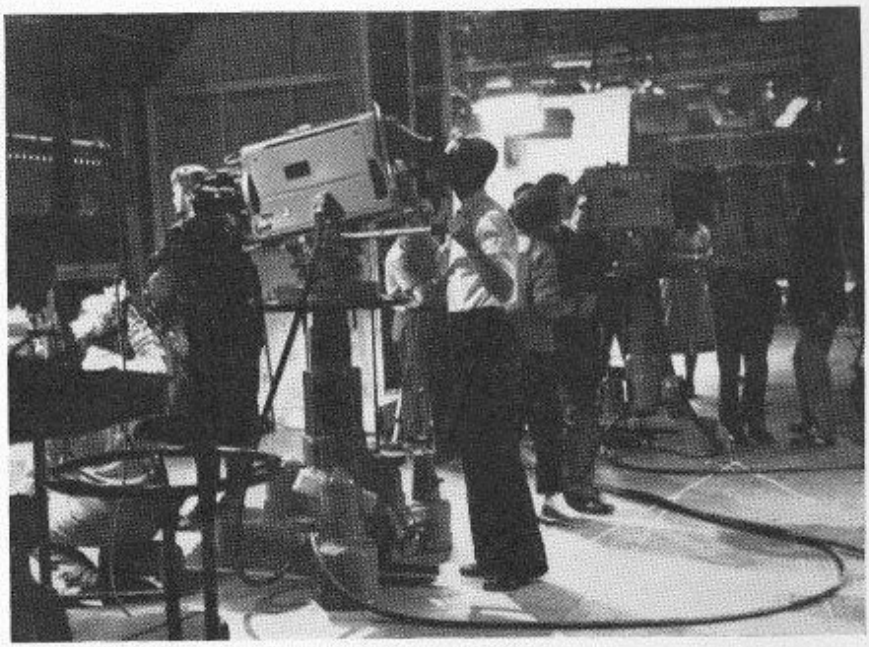
We are indebted to the Corporation for permission to publish the following extract from the section 'The Technical Aspects' by H. W. Baker, C. H. Colborn and H. T. Greatorex of B.B.C Engineering Division.

A brief note on some of the technical equipment installed at the TV Centre appeared in our Winter 1960 issue.

THE TECHNICAL ASPECTS

IN THE PAST, B.B.C television studios have had to be created in buildings designed for other purposes. The conversion of these buildings has always had to be done as quickly as possible to meet the insistent demands for more studio space as the television service expanded; furthermore, the size and shape of the buildings has made it difficult or impossible to lay out the technical areas in the most efficient way.

The opportunity to plan a purpose-built television centre from the beginning therefore presented a welcome challenge. In planning the Television Centre two possible future developments have been borne in mind. First, the introduction of a second B.B.C television programme for which a duplicate programme



Studio 3 at B.B.C Television Centre during a rehearsal

presentation suite has been provided but which will not be equipped until it is required (and if additional production studios are required, they can be provided either by building new studios on the site or by making use of existing studios elsewhere). Secondly, space has been allowed in the technical areas for the possible introduction of colour television in the future, although black-and-white equipment will be installed in the first instance. In this connection it can broadly be stated that colour camera equipment requires about one and a half times the space of black-and-white. Similar provision has been made for the greatly increased level of studio lighting required for colour, which governs the planning of power supplies and ventilation plant capacity.

Production Studios

The present planned development of the Television Centre provides for seven studios. A description follows of the seven studios in terms of size and provisional use. In the first instance, however, only four of these seven studios (those numbered 2, 3, 4 and 5) will be completed and equipped.

Studio 1

108 ft × 100 ft × 54 ft high for light entertainment and for musical spectacles. A pit is provided, fifty feet long by thirty feet wide, which can be filled with water and which will have above it a sectional floor that can descend to a maximum depth of 7 ft 6 in. The whole studio floor is designed to carry very heavy loads.

Studios 3 and 4

Each 100 ft × 80 ft × 44 ft high, the one for drama and the other for light entertainment, music and children's programmes.

Studio 6

100 ft × 80 ft × 44 ft high for general purposes; but capable of division into two studios, each with sound isolation and with separate control suites.

An aerial view of the B.B.C Television Centre looking over the Scenery Block in the foreground towards the Central Wedge and the Studios radiating around the central courtyard.

(Photograph by Aerofilms and Aero Pictorial Ltd)

Studios 2, 5 and 7

Each 70 ft × 50 ft × 34 ft high for general purposes, for schools broadcasts, talks and training.

Each production studio can be operated as an independent unit, as it has its own standard complement of technical areas and technical facilities as described below.

Studio Control and Apparatus Room Suite

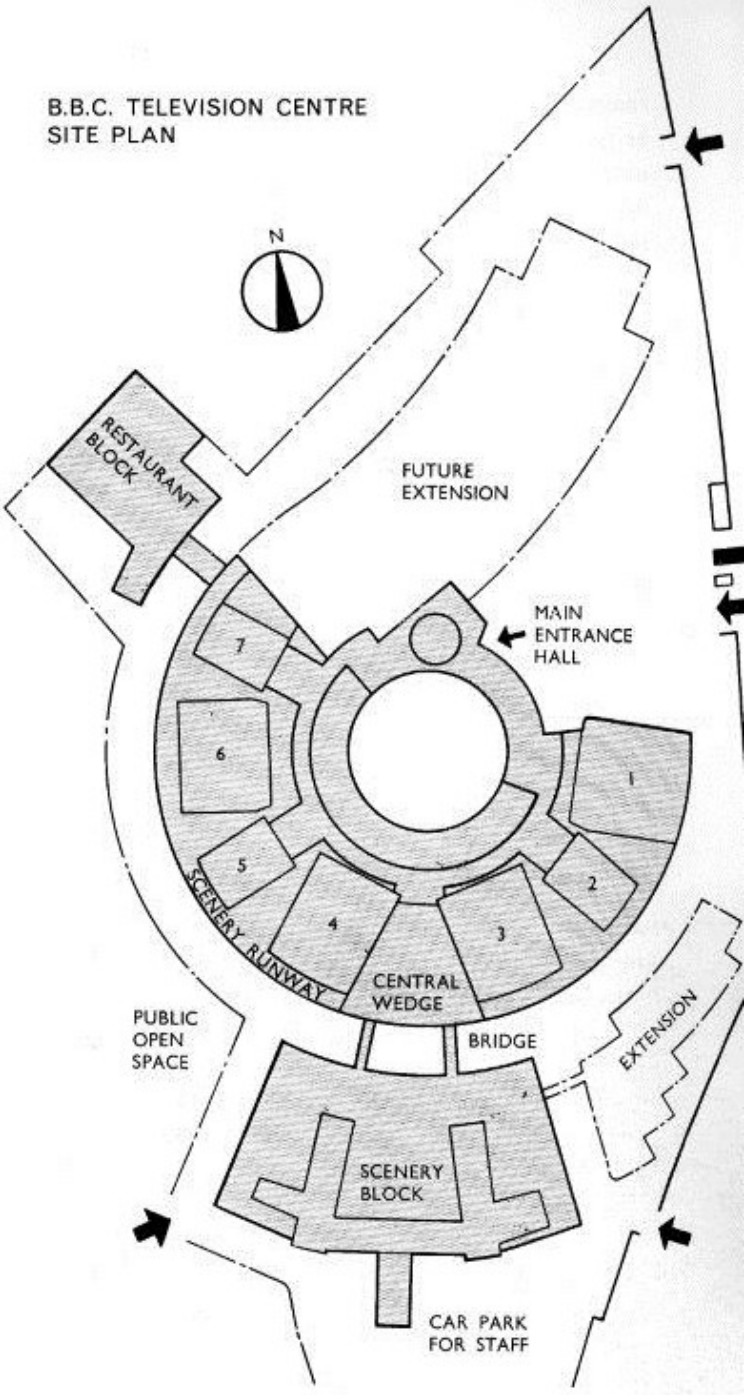
This area is immediately concerned with the production of a programme in a studio—one such area is provided for each studio and is divided into a number of separate rooms as described below. The suite is formed at first floor level (twelve feet above studio floor level) at the inner ring end of the studio in order to provide a good view of the studio floor area for the control room staff through the sloping windows.

The production control room provides operational positions in the front row for the producer, his secretary, the vision mixer (who mixes and switches the outputs from the studio cameras and other picture sources) and the technical operations manager who is in charge of the technical operations crew in the studio concerned. The production control desk is curved in shape, a new departure which will assist close personal contact between the staff and also help each to obtain a first class view of the picture monitors and of the studio floor. Other positions are provided in the second row for the set designer, make-up and wardrobe supervisors, music director and script writer, who are not directly responsible for the final transmission of the programme but are normally present for consultation at the camera rehersals. An operational position is also provided in this room for the operator of the inlay and caption equipment, the purpose of which is described later.

The lighting and vision control room provides operational positions for the lighting supervisor, vision control supervisor, and for their two assistants.

The lighting control console, vision control console, and picture monitors are installed so that the lighting supervisor, in particular, can see through the window the producer and technical operations manager in the production control room—the importance of visual contact between key operational personnel in the control areas, who work closely as a team, cannot be over stressed. A sloping window is provided in this room also to enable the lighting supervisor to obtain

B.B.C. TELEVISION CENTRE
SITE PLAN



a view of the lighting arrangements in the studio, of lighting staff, and of activity on the studio floor.

A vision control console, for the remote control of the camera control units, has been provided as an extension to the lighting control console. This is a departure from conventional practice and is based on the principle that the operational staff responsible for two highly important technical functions—the setting and control of the lighting on the studio scene and the control of the studio camera exposure and resultant

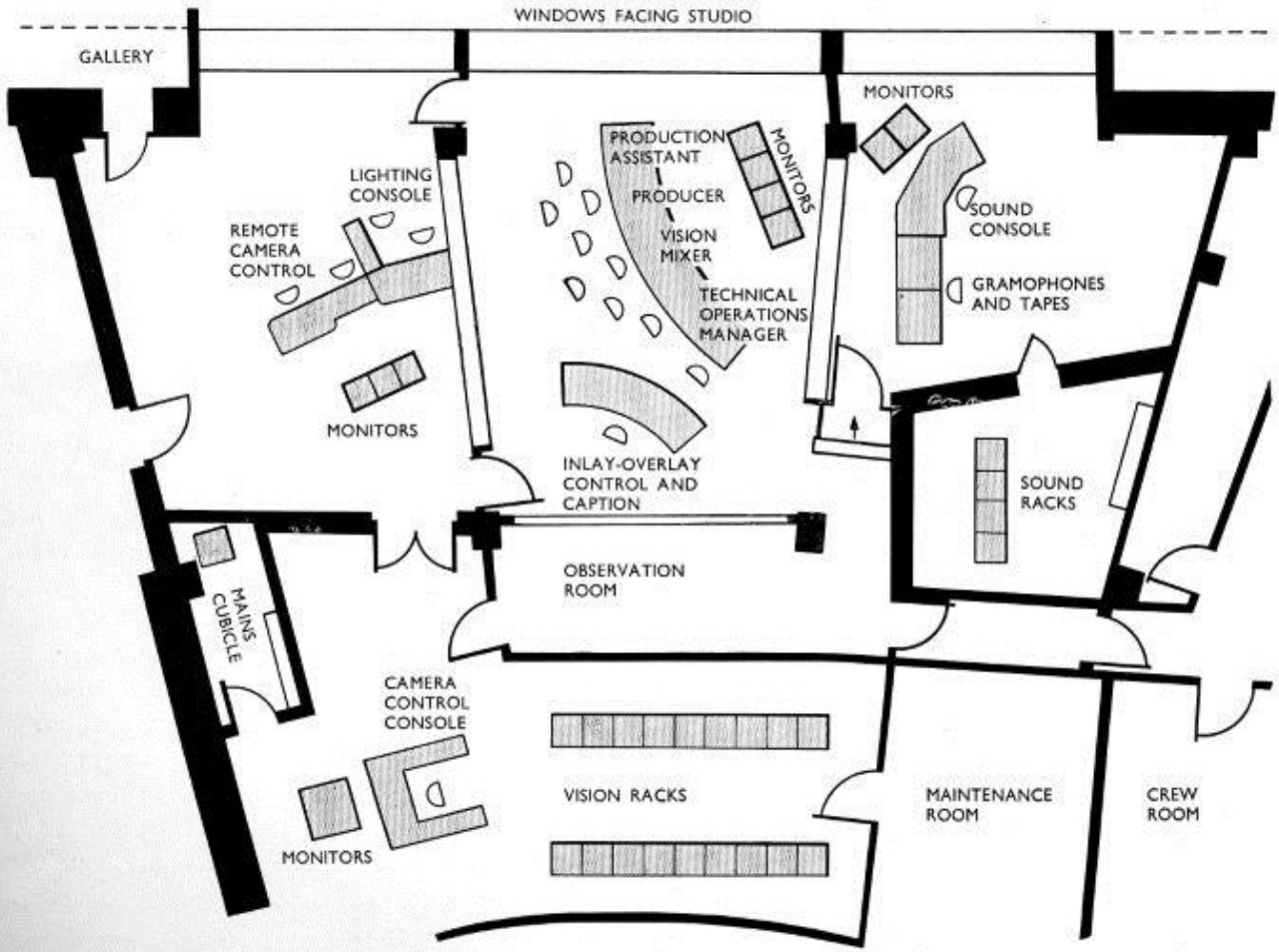
camera video signals—should be positioned as closely as possible to each other and view the same picture monitors. The closest co-operation here is highly desirable if the best possible standard of artistic and technical picture quality is to be obtained.

The sound control room provides operational positions for the sound supervisor, who is responsible for the balance and control of the various studio microphones and other sound sources, and the gramophone operator. The sound control and disc reproducing desks are installed on a raised floor twelve inches above production control room level, to provide good visual contact with the producer and technical operations manager and also a good view into the studio. Two picture monitors are also provided.

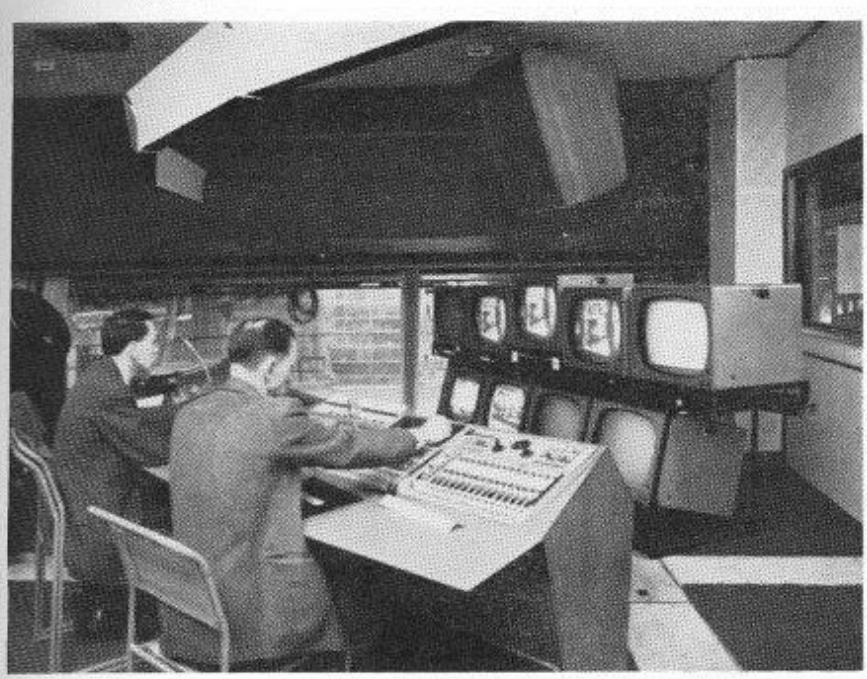
The apparatus room is located behind the control rooms. It contains the technical equipment associated with the operation of the studio cameras and microphones including all the apparatus which is remotely controlled from the consoles mentioned above. Much of this equipment generates a considerable amount of heat and a plentiful supply of conditioned air is therefore provided.

In this room also, the power supplies to the local studio production lighting, technical equipment, and ventilation plants, are switched by remote control. The switching operations are displayed on a mimic power control panel which shows in diagrammatic form the various items of equipment and the power circuits supplying them.

A lighting dimmer and switching room is provided at



TYPICAL STUDIO CONTROL ROOM AREA



The Production Control Room for Studio 3 at the B.B.C Television Centre.

first floor level in the wedge between the studios and houses the dimming equipment, remotely controlled from the lighting console in the lighting and vision control room.

Ancillary areas: Other rooms are provided in the suite just described for various essential purposes not directly concerned with the production of a programme. There is an advance maintenance room for the front line maintenance of the studio vision and sound equipment. Major overhauls and long-term maintenance of all electronic equipment will be carried out in a separate base maintenance area serving all the studios. A local technical equipment store is provided at studio floor level for the storage of valuable technical equipment such as cameras and mountings, microphone booms, and floor lamps which might be damaged during the setting and striking of scenery in the studio. Simple facilities are also provided for mechanical maintenance of the equipment; a well-equipped mechanical workshop for servicing and major overhauls will be provided elsewhere in the Centre. Finally, an observation room has been provided so that visitors and trainee staff can watch the studio control room operations through a glass window.

STUDIO TECHNICAL FACILITIES

Cameras and mountings

Studio No.	*No. of cameras*	*Available Spares*	*Camera Cranes*	*Motorised Camera Dollies*	*Camera Pedestals*
2	3	1	–	1	2
3	4	1	1	1	2
4	4	1	1	1	2
5	3	1	–	1	2

The latest type of Image Orthicon cameras are used incorporating the $4\frac{1}{2}$ in. pick-up tube. Rotating lens turrets will be fitted to the cameras to provide long and medium shots and close-ups; there will be four lenses to each camera giving nominal horizontal viewing angles of 9°, 16°, 24° and 35°. Two cameras in each of the four studios will be fitted with newly developed studio zoom lenses with horizontal viewing angles in the range 9° to 32°.

The vision mixer will accept inputs from eight picture sources. Four of these are normally the four studio cameras, the other four being switchable from the vision mixer's position in the production control room to any of ten other sources including additional cameras in the studio when required, telecine machines, video tape reproducers, inlay and caption equipment, and outside sources. The latter may be

outside broadcasts, programme contributions from other B.B.C studios throughout the country and programmes received over the Eurovision circuit.

One picture monitor is normally associated with each of the eight channels of the mixer, a further monitor being provided for the picture which is being transmitted.

Inlay and caption equipment has been installed to provide two similar and very useful techniques known as inlay and overlay. The inlay process enables a 'hole' of any desired shape or size to be made in the picture from one camera channel and to fit exactly into this hole another picture from an entirely separate source.

The overlay system uses the same electronic equipment, but in this case the portion of the original picture which is suppressed is determined by the second picture; thus, if an actor in light clothing performs in front of a black background, the equipment enables the picture of the actor to be superimposed on a background from another picture source.

Back projection equipment has been provided as a convenient and economical method of providing a background to a scene. The equipment is transportable and includes both moving and static back projection machines, the former with sound reproduction facilities.

The Sound Control Room. The Disc reproducing desk is seen on the left of the sound supervisor's position.

Sound: Each studio has been equipped with a new design of sound control desk which will accept a total of forty-three sound inputs. Four three-speed disc reproducing turntables and a magnetic tape recorder/reproducer are available in the control room and the output from this equipment also appears on the control desk.

Special provision is made for the control of "audience reaction" microphones and of special sound effects circuits. Artificial reverberation is obtained from a "reverberation plate" located in the adjacent sound apparatus room and there are three "echo rooms" in the basement to provide additional reverberation sources, if required.

Centralized Technical Facilities

The equipment and areas so far described are those associated with one studio and are, of course, repeated for each of the studios in the building.

There are in addition a number of technical areas which serve all the studios:

The telecine suite is formed on the second floor of the central wedge to house a total of eleven telecines and a control area. It is possible to run a number of films simultaneously on different telecines without the operator of one machine being distracted by the sound output from the others, due to careful acoustic design of the area.

In the first instance, only six telecines will be installed, all of the flying spot type and having a very high standard of performance. Three will reproduce 35 mm. film in either positive or negative form with combined optical or separate magnetic sound tracks. The other three will reproduce 16 mm. film either in positive or negative form with combined optical, combined magnetic or separate magnetic sound tracks.

The telerecording suite is located in the basement under the centre garden and is at present equipped with four video tape recorders. Space has been allocated for the future installation of 16 mm. and 35 mm. film telerecording equipment, but in the meantime film telerecording will continue to be carried out at the Lime Grove studios.

Two standards converters will be installed to

enable the B.B.C to exchange programmes on video tape with other television authorities throughout the world.

The Presentation Suite

The performance of cable and radio circuits linking the studios and transmitters throughout the country is of sufficient quality to allow centralized control of presentation. All B.B.C television network programmes are distributed from the Presentation Suite at the Television Centre, no matter where they are produced.

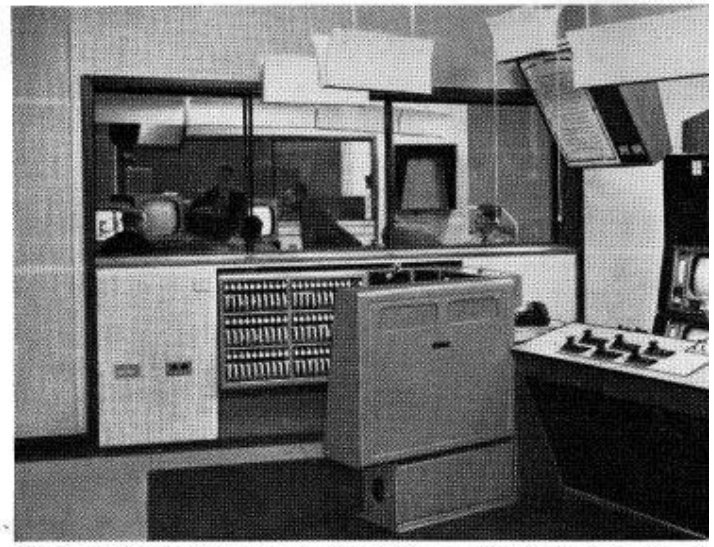
Programmes originating in the Lime Grove or Riverside Studios or in the Television Theatre (all of which are situated within a mile or two of the Centre) are fed to the presentation suite direct by means of underground cable circuits. Programmes from all other sources, reach the presentation suit by way of a television switching centre at Broadcasting House, London.

The complete programme leaving the presentation suite is taken back to this switching centre and is distributed from there to B.B.C studio centres and transmitting stations throughout the country and, where appropriate, to the Eurovision network.

The permanent vision and sound circuits over which the programmes are distributed, are rented by the B.B.C from the Post Office.

The presentation suite is situated on the fourth floor of the central wedge. The focal point of the area is the central control room which provides operation positions for the senior presentation assistant, senior presentation engineer, secretary, and vision and sound mixer. Their main function is to maintain continuity of the national network programme. Similar operational positions are provided in a subcontrol room which is mainly used for the rehearsal of composite programmes involving inserts and contributions from local and outside sources. This room also acts as a spare to the central control room.

Adjacent to the central control room is the presentation studio which is used for announcements and small programme items of the interview type. It has its own local control room and apparatus room which provide in general the same facilities as are available in the larger studios. The two cameras in the presentation studio are of the vidicon type and incorporate



The Lighting and Vision Control Room showing the lighting control position on the left and the vision control position on the right. Apart from being able to see into the studio itself, both positions have visual contact with the producer.

zoom lenses, giving nominal horizontal viewing angles in the range 9° to 32°. Remote operation of camera zoom, iris control, pan and tilt are provided from the studio control room. Equipment for the origination of captions is also provided.

The International control room is intended to replace the present Continental Control Point in Broadcasting House. It will be the focal point for television programmes sent to and received from European countries over the Eurovision link. Sound and vision mixing facilities will be provided for programmes necessitating multilingual commentaries and a comprehensive control line switching system will be installed to facilitate the setting up of the necessary circuits at home and abroad. The facilities will include tape reproducers, carrying indentification signals in various languages.

The Central Apparatus Room

The central apparatus room is situated on the third floor of the central wedge below the presentation suite.

Also in this area is a quality check room where a final watch is maintained on the quality of both picture and sound outputs.

TECHNICAL INNOVATIONS

A vision control system has been proved possible which enables all the cameras in a studio (up to six) to be controlled electrically by one operator. This is, of course, a great advance from the time when it was necessary to have one man controlling each camera channel. To enable this system to be operated, two things are essential. The physical arrangement of the controls and the picture monitors must be such that the minimum of effort is required by the vision control supervisor. This has been fully achieved for the first time at the Television Centre. It is also essential that the cameras in the studio and their associated control equipment in the apparatus room should be designed for remote control and have a very high degree of stability. It is possible, given these conditions, to operate an Image Orthicon camera channel by varying only the light input (by means of a remotely controlled iris) and the picture black level, the remaining controls, numbering approximately thirty, being pre-set in advance.

The studio lighting will follow the general principles satisfactorily pioneered in the two Riverside Studios; the object is to provide a flexible system of lighting control and to obtain the maximum integration of lighting and vision control facilities. Electric hoists will be used for the raising and lowering of groups of lamps mounted on battens and a comprehensive dimming system will give intensity control and switching of every studio light source from a central control desk. An innovation will be the use of illuminators that can be panned, tilted and focused by means of a pole from the studio floor.

Each studio will have a 240 volt single phase power supply. This is a departure from previous B.B.C practice which has been to use a supply voltage of 115 volts. The decision for a change of voltage was taken after a careful assessment of the comparative capital and running costs.

Electricity supplies to the site are taken at 11 kV; there are two supply cables in normal use and a third provides an emergency supply which would satisfy operational requirements in the event of both normal supply routes failing.

Telephone facilities: Within the Television Centre there is a complex communication system of which the central apparatus room is the focal point. It links the studio control rooms, apparatus rooms, and other technical areas, and extends to other B.B.C centres nearby such as the Lime Grove and Riverside Studios and the Television Theatre.