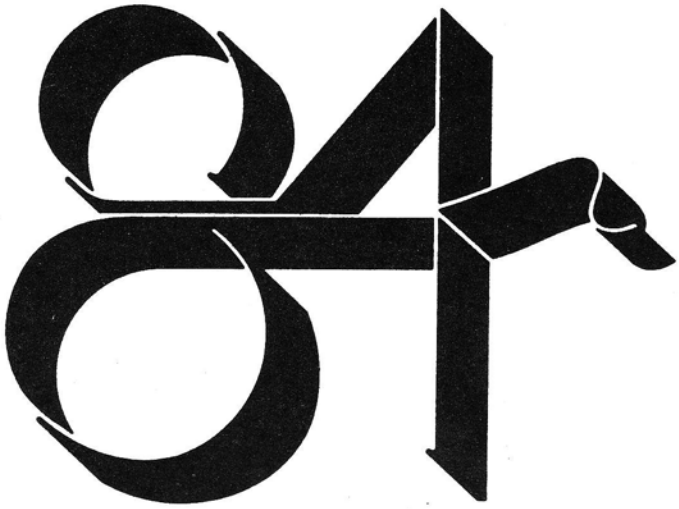
TRACK
FORWARD



"So it is no use standing pat, like some First World War general, muttering 'Ils ne passeront pas.' The citadel is surrounded, and the walls are already being chipped away. The valid debate now concerns what sorts of special claim traditional broadcasting should make against incursions by the newcomers. And here consideration must be given not just to what the new technology can do but also to what it cannot."

Brian Wenham

Graphic Designer John Salisbury

BBC Television Training Production Team Dick Burden
Peter Champness
Gordon Croton
Brian Phillips
John Symons

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The First Track Forward Exhibition was held in 1978 in T.C.1. In the light of the extraordinary pace of technical change it had seemed logical to assemble an exhibition of the latest video technology so that staff could see for themselves and assess its potential. As Robin Scott observed in his introduction to the brochure "the long heralded age of electronic mobility and flexibility has apparently already dawned".

Leafing now through that first brochure, it is hard to imagine that one-inch VT recording had not then been adopted as standard in the BBC or that a writer could note so cautiously . . . "the signs are promising but only an intensive period of programme use will tell if this very real technical breakthrough has worked". It is interesting also to see that "more than a dozen programmes" had been edited via off-line work in 1978 and that the lightest electronic camera in production — the Thomson CSF Microcam — weighed 3.5 kilos without "its small hip pack".

Now, six years later, technical developments are still occurring at a great rate and it is time to stage another of these looks at the future. Although Track Forward 84 emphasises the latest work in Computer Graphics and Special Effects, the complete range of equipment is exceptional in its variety and sophistication. And this year the lightest electronic camera on show — one hesitates to say "in production" — weighs just 2 lbs . . .

Aubrey Singer, February 1984

TELEVISION CENTRE

Television Centre has been built in stages. It all started in 1949 as a sketch — the shape was the familiar question mark — and the last major addition was Stage IV, the Television News Block (the Spur), completed in 1969.

Stage V completes the Spur tail to Wood Lane, and consists of two phases: the first phase Technical Block has a total floor area of about 200,000 sq. ft. spread over seven operational floors. It principally houses a new recording complex on floors one to four, which could ultimately contain some 130 VTR and Telecine machines, installed in multi-purpose areas and in editing and transmission suites. All the necessary office support and technical facilities for a major operation of this scale will also be included.

On the ground floor there will be a replacement music studio with technical storage/workshop accommodation to support the total studio operation. The basement will house the despatch areas and VT storage, with space also allocated to improve Television News facilities. The fifth, the highest operational floor, is an expansion area for future development.

The building is a complex one, and detailed planning is now in hand on the structure and servicing aspects; the uppermost floor will contain the large air handling plants and the associated chillers will be installed at basement level.

The second phase is now under active discussion. It is proposed to build a replacement Television Theatre with an acting area of 7,800 sq. ft. and a fixed auditorium of four hundred seats. The development would be self-contained, with dedicated foyer, scenery, make-up, wardrobe and technical servicing areas. A band room could be used in conjunction with the Sound Control Room for recording sessions even when the studio floor is suffering noisy operations such as 'set and light'.

Current proposals provide for a grid height of at least 60 ft. to allow for scenery flying facilities, with a control suite above and behind the audience, giving an uninterrupted view of the stage.

Building work on the first phase of Stage V starts this autumn, and the office areas will be ready for occupation in the second half of 1987; handover of the technical facilities should start in the following year. The whole project will provide the Television Service with modern areas to last well into the twenty-first century.

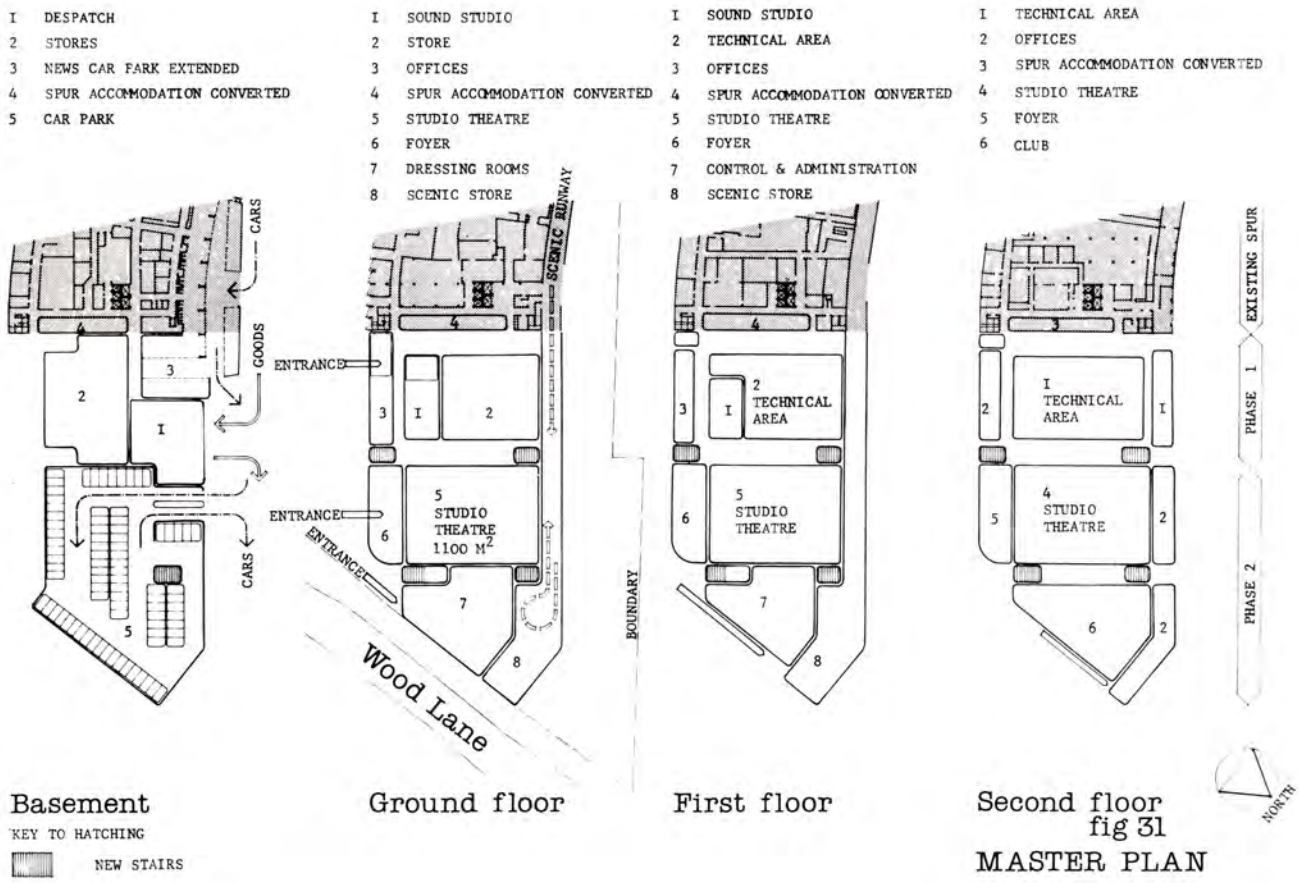
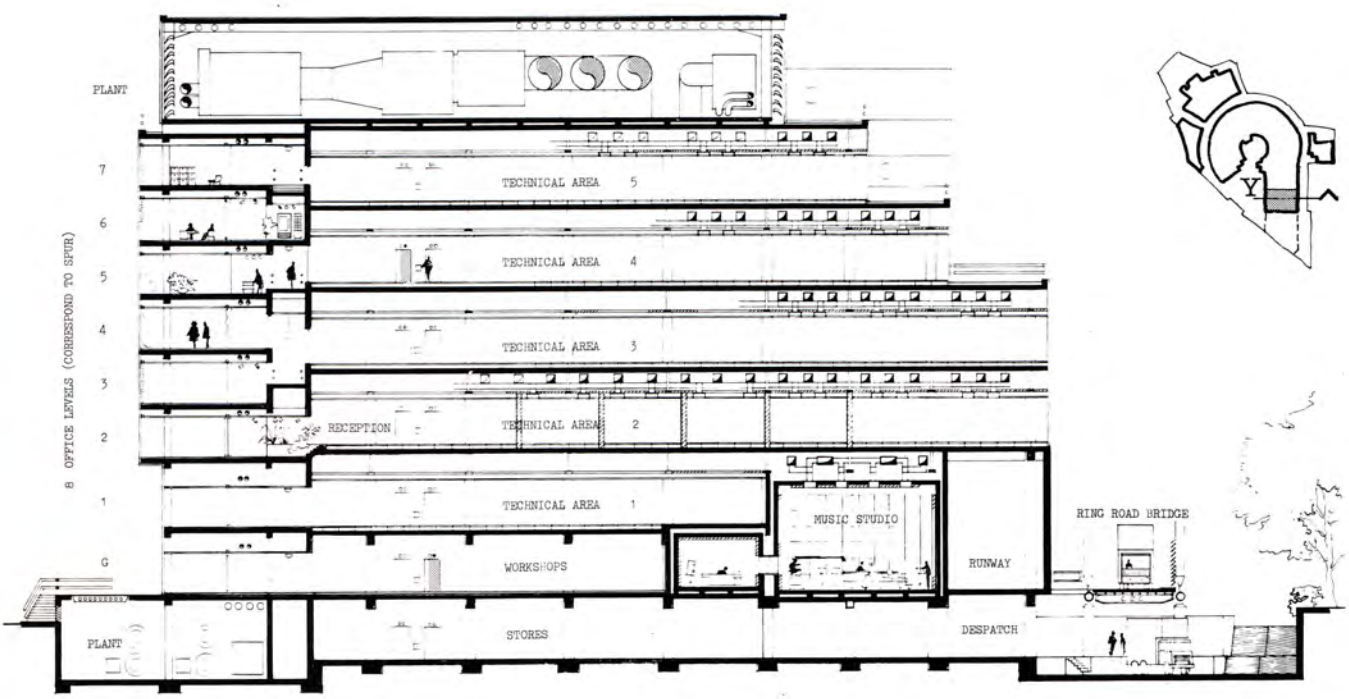
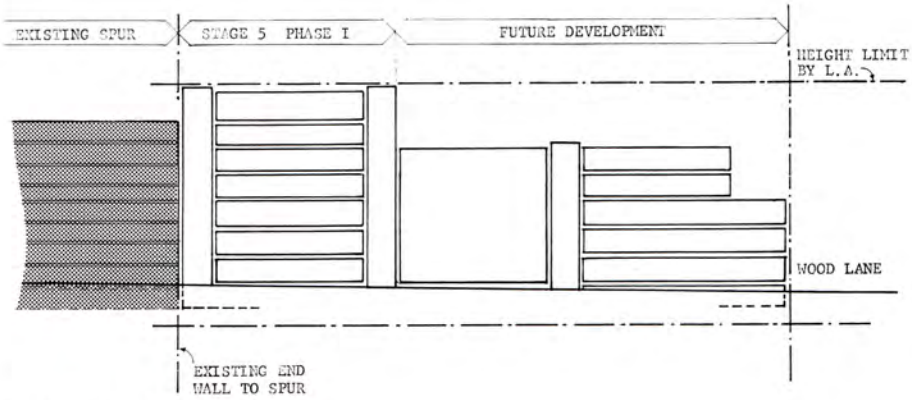


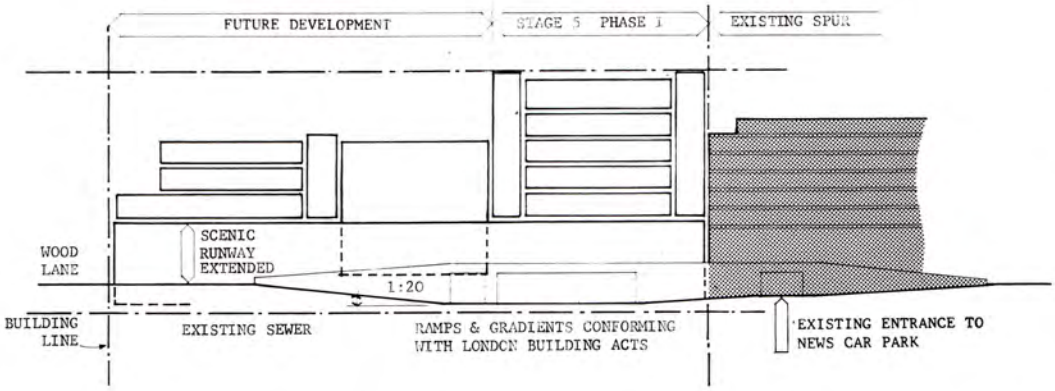
fig 31
MASTER PLAN

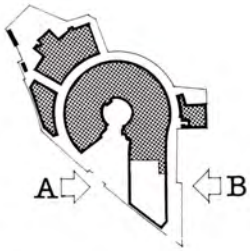


SECTION Y



Elevation from A



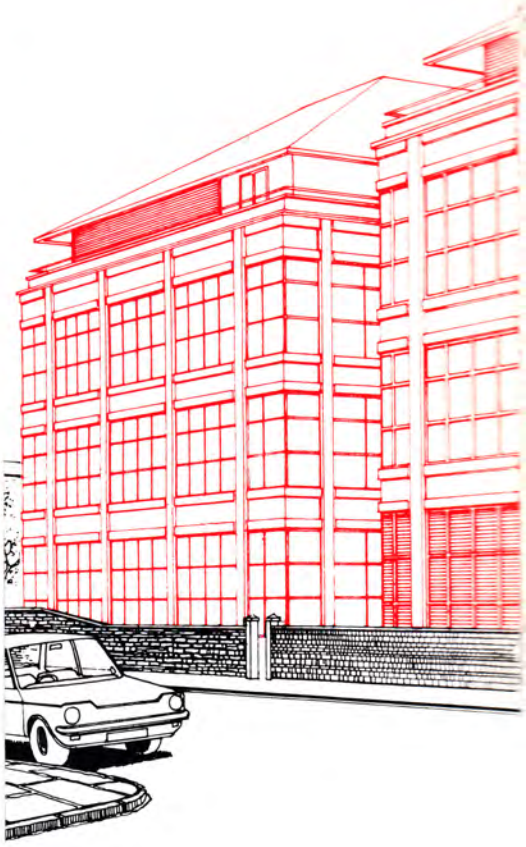


Key plan

Elevation from B

SITE DEVELOPMENT CONSTRAINTS

'Bird Watch' – Ikegarni, Angenieux 25:1 and rope . . .



Phase I of the new development is nearing completion, and consists of totally refurbishing the present building at No. 1 Tyndalls Park Road. This will now house Design and Graphics, and will include a new scene dock with a standby workshop and an electricians' maintenance area. There will also be a new linked newsroom which will be shared by Regional Television and Bristol Radio and will have the capacity to become fully electronic.

Work is due to start in May of this year on Phase II — the Post Production Block. This will be an entirely new building on the site of the car park in Belgrave Road, and will be completed by the end of 1986. On the ground floor will be the VT and TK section, with a central machine room and film storage; the first floor will house offices, conference room and restaurant; 21 editing rooms with office accommodation on the second floor, while on the third floor there will be a Dubbing Suite and a Sypher Suite with transfer facilities.

Bristol has always been noted for its Natural History programmes, which in the past have been made on film. Recent developments in this field have involved the use of an Ikegami 79D together with a one-inch video recorder. On programmes such as 'Bird Watch' the video camera has been fitted with special lenses giving a horizontal viewing angle of 3/4 of a degree. This is ideal for close ups of small birds and given a degree of care, will not disturb them.

March 1984 sees the delivery of a computer controlled rostrum film 35 mm/16 mm camera which will greatly enhance the graphics capability.

It is anticipated that Bristol will be the first NPC to operate Betacam, and plans are in hand — coded 'Deep Rover' — to use Betacam with a manned submersible, capable of reaching depths of initially 1000 metres but with the potential of reaching much greater depths.

Infra red cameras have been used on programmes such as 'Fox Watch' and 'Badger Watch' but plans are in hand to use ultra violet and heat sensitive detectors to delve into this mainly unexplored area of animal behaviour.

Artist's impression of the new Post Production Block at Belgrave Road.

Studio A — 3,200 sq. ft.

Four link 110 cameras with Varotal 30 lenses. Refurbished Production Gallery, Grass Valley 1600 Vision Mixer, with E-MEM. Combined Lighting Gallery and Apparatus Room, Rank Strand MMS Lighting Console, with Zero 88 Lightmaster. Sound Gallery with Calrec 16-channel desk. 35mm caption facilities.

Studio B — 700 sq. ft.

Three EMI 2001 cameras. Multi-purpose Control Gallery, with Prowest 10-channel ABC Vision Mixer (with synthesizer and down-stream keyer), two 35mm slide scanners, 36-channel Strand Lighting Console, Neve 30-channel sound mixer, full auxiliary facilities.

Outside Broadcasts

These consist of a two-camera unit using Link 120 Arrowhead Cameras together with two VPR2 video recorders; the unit tows its own generator and can supply an additional 10 kw of lighting.

Bristol has a locally built SCU which can operate with either a Link 120 Camera or an Ikegami 79D and with an on-board VPR 2 video recorder or the portable VPR20 video recorder. It is a self-contained unit but can link up with the main Unit to supplement its two cameras.

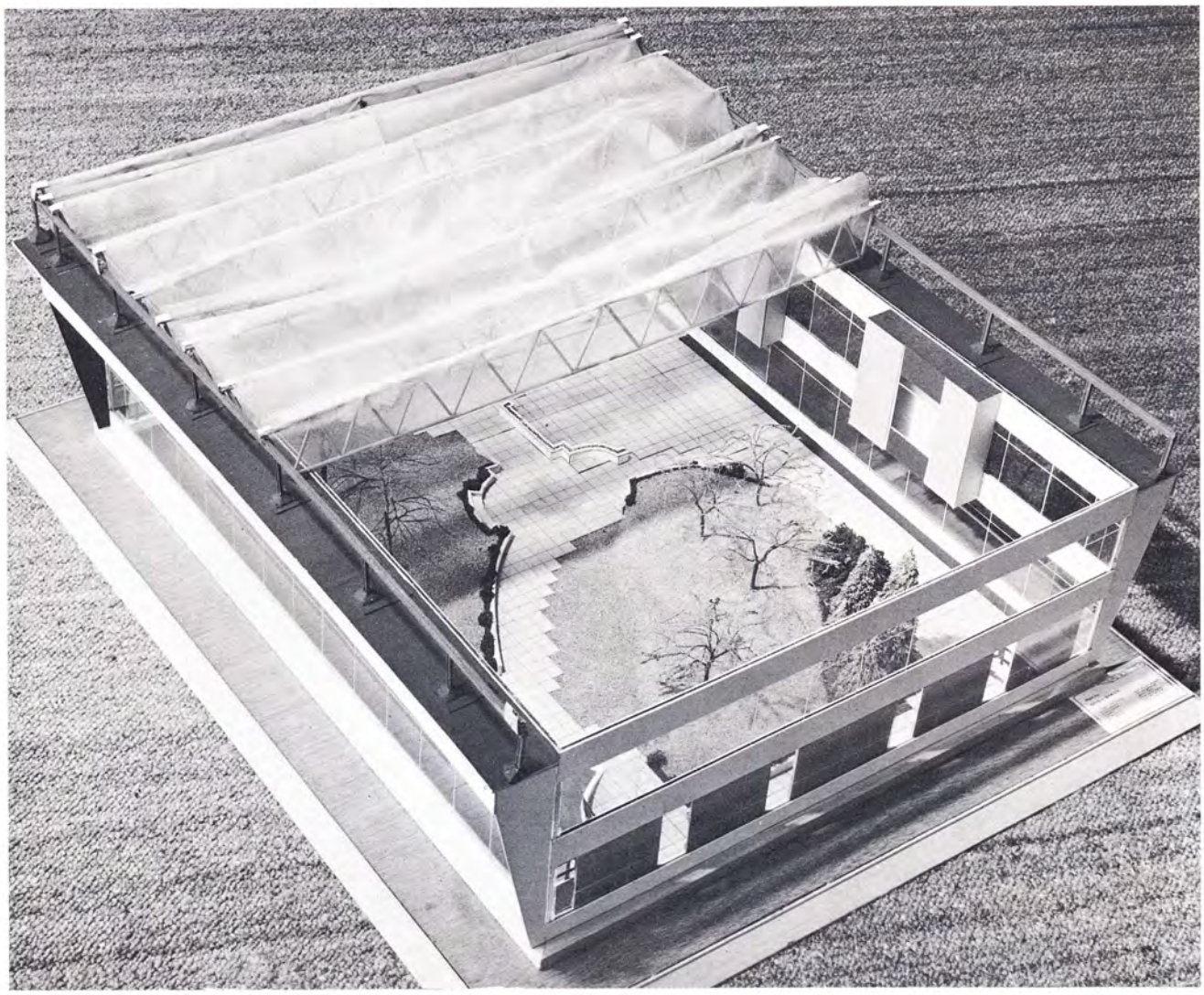
TK/VT

One Cintel MkIII 'Hopping Patch' TK, one Cintel twin-lens TK. By the end of this year, the VT equipment will be three VPR2 pairs, one controlled by an Electra editing system.

Special Effects

One Quantel DS3001, for use in both studios and in TK/VT. By mid-summer, there will be a NEC E-Flex digital unit, with the full range of video effect switches.

PEBBLE MILL



Model showing the unique sliding roof over the new Pebble Mill courtyard.

Development at Pebble Mill has just moved into its final phase, with the Regional Television Studio and Presentation area being taken out of service. Both these areas will be completely refurbished by the summer, with Link 125 cameras replacing the old EMI 2001's, and Grass Valley vision mixers instead of the old BBC type, and by that time all studios will have stereo sound desks.

Work started in 1982 to replace the old Continuity Suite with a dual-purpose Gallery and presentation studio. This is now known as Gallery C and works into the foyer, courtyard, gardens and Radio Studio 1, with separate cameras and Sound Control.

So that programmes can be mounted in the open air atmosphere of the courtyard without worrying too much about the vagaries of the weather, a fully retractable plastic canopy has been provided, running on two parallel tracks and supported by the nine steel trusses. When drawn — the motors take about fifteen minutes — this canopy introduces a very even soft light, with no substantial colour bias.

In addition, planning for the redevelopment of the old Communications Centre is now well advanced. The new Central Technical Area will take account of all long-term aspects, including the possibility of remote switching, and the camera line-up equipment for the three Galleries will all be brought into the same area.

Studio A

Completely refurbished during 1983. Five Link 125 cameras with Schneider lenses. 2 Ikegami HL 79 cameras. Grass Valley 7FPY4 24-channel vision mixer with E-MEM and full special effects. New inlay desk. Neve sound desk. Thorn Q-File lighting system retained for the time being: new system expected in 1985.

For both these studio areas, new Probel Matrix equipment has been developed and installed to combine the functions of test and transmission selection, controlled by appropriate software.

An interesting point was that the studio floor, even after twelve years, was in sufficently good condition not to need replacing; this is widely felt to be attributable to the 'Pebble Mill Peelable' floor treatment which has been used over the last years.

VT

A new three-machine editing suite will be coming into service during 1984, and this will be followed by the replacement of all the Quad two-inch machines by one-inch VPR machines.

Outside Broadcasts

This includes a standard Type V Scanner, a compatible two camera unit and a SCU which comes on-line in April 1984.

This has been built by local Pebble Mill Staff into a commercial vehicle (Talbot Express) and it includes an Ikegami HL 79 camera and an Ampex VPR20 Recorder. The vehicle is air conditioned, fully equipped with monitors and sound mixer, and can either be powered from an ordinary 13 amp socket or from its own petrol generator. Vision switching, monitoring, intercom, talkback and telephone are all controlled by a micro-processor system engineered at Pebble Mill.

Gallery C

Working to the entire foyer, courtyard, garden area (as well as Radio Studio 1), and linked to these by standardised wall boxes containing camera outlets, video and microphone circuits. Four Link 125 cameras with Schneider lenses, 2 Ikegami HL 79D cameras. Grass Valley 2VPY4 16-channel vision mixer. 36-channel Calrec stereo sound desk. Strand Duet lighting console controlling 96 outlets.

Gallery C.

Pebble Mill SCU.

MANCHESTER

Manchester NPC has reached Stage IV of its development, and this most recent addition includes a full electronic graphics suite, comprising a 'Flair' graphics computer, a production prototype Rank Cintel 40-picture stills store, an Ikegami camera and an Aston Character Generator. Housed in what is colloquially known as the QEII — or sometimes the Titanic — this provides one of the most flexible, comprehensive and up-to-date graphics facilities in television. Development is still continuing, however, and by 1987 the proposed Studio 10 will be available. Sited at the rear of the New BH, it will replace the Playhouse Theatre in Hulme, and although intended mainly for radio, it is hoped that television will make as much use as possible of this new LE facility.

Studio A — 5,000 sq. ft.

Five EMI 2005 cameras with Varotal 30 lenses. One HL79 Ikegami camera. Heron, Vinten and Fulmar pedestals. Full Sound Gallery, with 30-channel Neve desk, and 24-channel Soundcraft desk on studio floor. AMS RX16's for digital delay and effects. Quantel 3001.

Studio B — 2,000 sq. ft.

Four LDK 25 cameras with Schneider 15:1 lenses on Fulmar pedestals. 16-channel DCL 480 vision mixer, controlled by data sampling system between gallery and VAA. Thorn 120 lighting console. Rank Cintel twin-port caption scanner, three camera 12" x 9" caption scanner, Aston Character Generator. Full Sound Gallery with 32-channel Calrec desk, usual tape and grams. Quantel 3001.

Studio B Annexe — 580 sq. ft.

A simple interview/newsreader studio with pre-set lighting. There is a Presentation cubicle adjacent to the Annexe. Separate gallery, with 10-channel CDL VS14R vision mixer and 10-channel Calrec sound desk.

Aston, stills store and Flair in the main Electronic Graphics area.

Studio 7

The new music studio, primarily intended for radio use, but equipped for television/radio SB's for presenting music programmes. Comprehensive modern audio equipment, including 32-channel SSL desk, 24-track Otari, Fairy Dust trolley, etc.

TK/VT

Two Mkl Rank Cintel TK's, a re-engineered VT editing suite, with five VPR2 video recorders and specially-designed electronic VT countdown clock.

FLAIR

Flair could be described as an electronic paintbox. Electronic it certainly is, but a great deal of design effort was specifically concerned with removing any electronic barriers to the artists's creative freedom. Few of us have any idea of how the lead is put into a pencil — and yet we still manage to draw with one — and on the same basis operating Flair is not only for those with computer and electronic skills. The business of creating pictures is simple: draw over the surface of the electronic drawing-board with a single stylus, and the image appears on the monitor. The stylus can imitate a whole range of brushes and nibs, from a hair-thin line to a stroke as broad as the screen and everything in between. If the image is built up as an outline and then the colour painted in with broad strokes, Flair will also ensure that the electronic paint does not spread across the edges of the outline. For colour shading, there is an electronic 'airbrush', which mimics the operation of its mechanical cousin: the longer the airbrush is left in one place, the denser the colour becomes. To select a colour, the artist calls up the 'palette', a display of 256 colour blocks which can all be mixed to any one of the 16 million shades.

The other major component is a floppy disc drive. When an image is complete, the artist can 'dump' the data from the store on to the floppy disc.

The concept of the electronic canvas was developed by BBC Reserach Department, and is maunfactured by Logica.

BELFAST

In the last year there have been two major developments in television production in Northern Ireland: building work on the new Television Complex has now finished, and operational use of PSC has been introduced.

The use of PSC has been extended beyond the normal news programmes to drama — traditionally on film but now successfully transferred to PSC using a portable VPR20 one-inch recorder — while for news and topical programmes some two-thirds of all inserts have moved from film to 3/4 inch tape. The operation of the three PSC units and two editing channels currently available is shared between Film and Electronic staff, and the savings made in film stock and processing have been able to fund some of the additional staff required for the recently introduced series of programmes for young people in Northern Ireland.

In the new Television Complex the technical installation is well under way, following the completion of the bricks and mortar. The new facilities should be in service by the end of June 1984.

The three-camera studio, which is the first purpose-built television studio in Northern Ireland, will replace the Region's Studio 8 — a converted Radio Drama studio which has been the mainstay of news and topical output for the past twenty-three years.

Over in the north-west of the Province, building work has started on the new Broadcasting Centre for Radio Foyle, which will include a small television interview area and an injection point for transmitting programme inserts to Belfast.

And there are yet more developments being planned at the moment, including a purpose-built construction workshop and scenery store, a replacement OB base, and the replacement of the Balmoral 'drive-in' studio.

The newly-completed Television Complex.

Studio B — 2,100 sq. ft.

Three Link 125 cameras with Schneider lenses. Cox 16-channel vision mixer with comprehensive wipe-patterns, downstream keying etc. DTL Datalight 120-channel lighting console with full memory. Separate sound area with custom-built 28-channel Neve desk with stereo capability.

Studio C — 640 sq. ft.

One Link 125 camera with Schneider lens. Cox 16-channel vision mixer, as installed in Studio B. 20-channel DTL lighting console. Neve 51-series sound desk with full post-production facilities for possible future use as part of a Sypher system. A continuity suite with full facilities is adjacent to Studio C.

TK/VT

One Rank Cintel Flying Spot telecine machine. One edit pair of VPR2 one-inch video tape recorders, and replacement of the present two-inch Quad machines with one-inch VPR2 machines is currently under discussion.

PSC

Three PSC units are available, equipped with Ikegami HL 79D cameras and serviced by BVU800 edit machines.

WALES

Gabalfa

PSC crew

With the change to broadcasting the BBC's Welsh language programmes on S4C — Siânel Pedwar Cymru in full — the variety of demands on the Wales network has to some extent been reduced. But it is still supplying four different services in two languages, and to ease the burden on news staff in particular, the newsroom at Cardiff has recently been converted to a fully computerised system.

The Cardiff newsroom — already one of the most complex in the country — took a new step forward in December last year when its computer hardware began to arrive. After a period of settling-in, the news operation in both languages will be fully electronic for both television and radio, with journalists typing stories directly into visual display units and editing the text on screen. To complement the new computerised newsroom, three of the nine freelance film units now have PSC, and three more crews in North Wales will have PSC in the near future.

To ease the continued problem of lack of space, the BBC has acquired a thirteen-acre site in the Gabalfa area of Cardiff. This former British Steel building was desperately needed after three hundred more staff were recruited to produce programmes for S4C. BH Cardiff, which opened in 1967, with about five hundred staff, had already been expanded to hold twelve hundred, so the need for a new building was immediate. As well as its main office block, the Gabalfa site also has an annexe which is due to be converted into rehearsal rooms and an OB base.

Main Studios, Cardiff

C1 — 5,800 sq. ft., and C2 — 1,500 sq. ft. C1 has Link 110 cameras, and two Link 120 (lightweight). C2 has three LDK3S cameras, primarily used for news and sport. Also an unattended studio, with one Philips LDK14SL camera, used for news bulletins and Breakfast Time opt-outs.

Two presentation studios, self-op, for BBC Wales and BBC 2 in Wales.

Outside Broadcasts, Cardiff

Three CMCR's, one with five Link 110 cameras, one with four Philips LDK3S cameras, and one with three lightweight Link 120 cameras and two one-inch VTR's.

Bangor, North Wales

Small studio with two EMI 2001 cameras, used primarily for news, current affairs and farming.

TK/VT

Two 16/35 mm Flying Spot Cintel MKIII machines in Cardiff, one 16 mm EMI machine in Bangor. One two-inch Quad VTR, six one-inch Helical machines in three channels as record/transmit/edit pairs, with computer controlled edit suite.

Portable Single Cameras

Five PSC units, all based in Cardiff. Two Ikegami HL 79D cameras and three Sony 330AP cameras. All units use U-matic high-band machines.

Further Facilities

Five news sound crews, two mute crews, sixteen cutting rooms, three dubbing theatres, all spread across Wales. Computer controlled 16/35 mm rostrum camera, multi-track recording studio and post-synching facility, together with 16 mm reversal processing.

NEWCASTLE

North East Region's present television operations are carried out in a 'lying-in hospital' which is 160 years old — not perhaps the most ideal building for the demands of television production, but one in which the staff achieve the impossible by enthusiasm. The main studio is on the first floor, and all equipment has to be manhandled up a narrow staircase. Despite the difficulties, some extremely complex productions have been made, many of them achieved by hiring or borrowing lightweight equipment, and taking advantage of the short turn-round time of electronic picture origination.

The Great North Run is the largest road-race in the country, with over 20,000 competitors, and was broadcast live by begging, scrounging and even stealing as much equipment as possible. It involved twelve cameras, seven radio links and six frame synchronisers and stretched technical, human and financial resources to the limit — and beyond. But it just shows what can be done when there's a real need for it.

The most exciting development for the North East is rising out of the old parade ground at Fenham Barracks — the new Broadcasting Centre. The complex will be entirely electronic, comprising a main 2,500 sq. ft. studio and small ancillary studio, served by two separate control galleries and comprehensive post production facilities, including three or four electronic editing suites.

1824 – note the back-pack carried by the figure in the centre . . .

This will be the first purpose-built centre in the English Regions, and will come into service in the autumn of 1986 — very much looking ahead to the demands of the twenty-first century.

Main Studio — 1,100 sq. ft.

Four EMI 2001 cameras; Cox 20-channel vision mixer; One MkII Rank Cintel telecine; Aston 3 character generator; two VPR2 video tape machines in an editing suite. There is also a 250 sq. ft. presentation studio used for news bulletins and Breakfast Time opt-outs.

Carlisle

A television studio is also installed at Radio Carlisle and is remotely controlled from the gallery in Newcastle by a data transmission system.

Artist's impression of the new Fenham Broadcasting Centre.

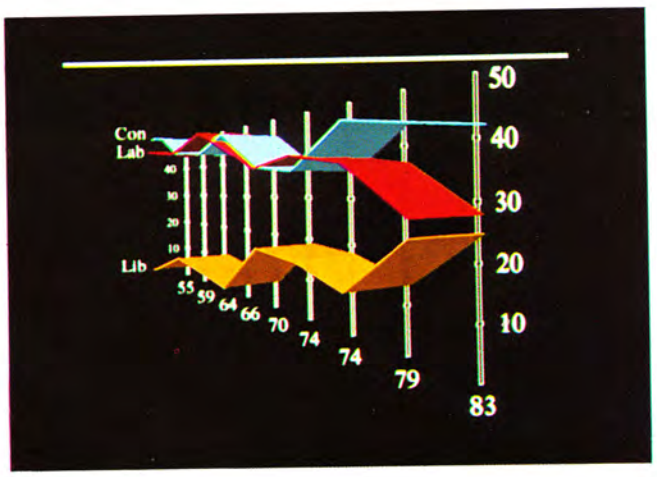
Developments in the Rostrum Camera Unit are in two areas: firstly, physical — cameras are now installed in individual purpose-built sites — and secondly, technical — new film cameras have replaced some of the originals, and the completion of the video rostrum camera has added greater flexibility to the unit as a whole.

Film Rostrum

Programmes are allocated either a film animation rostrum — one 16 mm Mitchell and two dual-gauge Oxberrys — or else one of the four limited facility rostra using 16 mm Arriflex cameras. One of the Oxberry animation cameras is computer controlled, into which many time-consuming processes have been programmed — for example, trailing images and exponential zooms. Using a method called 'key framing', the computer calculates an exact movement path for an image from a simple outline, and if required, the computer's floppy disc can recall and repeat the whole sequence.

One recent contribution has been the titles for the Winter Olympics which would have taken months to produce without electronics.

The 16 mm Arriflex cameras are less sophisticated: in normal operation they are designed to expose each film frame once only, shot development being under the cameraman's control through camera height and bench position.



COMPUTER GRAPHICS

The BBC Computer Graphics Workshop, based at TV Centre, celebrates its fourth birthday in April 1984.

Over these last four years computer graphics have matured sufficiently to be applied to a much broader range of design and production challenges than was thought possible in 1980. At the same time the art of applying computers to image making for television has become one of the technological battlegrounds between BBC TV and its competitors.

No description of this aspect of the Workshop's activities would be complete without mention of the General Election results programme. The complexity of this event and the commitment, by both BBC and ITN, to process and present results in graphic form as quickly as possible, has attracted computer graphic solutions.

The BBC computer used to generate colour graphics for election coverage was developed by Logica Ltd. and used successfully in May 1979. Such is the pace of technological development that by 1980 it was apparent that this system was already obsolescent.

The first application area tackled was the provision of information graphics for By-election and Budget reporting, together with weekly contributions to the Money Programme. Many of the software techniques developed in this period were subsequently employed on the new system when work began in the autumn of 1982 for the next General Election.

The new system was first used in anger on June 9th 1983, and employed 40 VDU's, 4 touch screen control terminals and 4 display devices, 3 Quantel 7001's and 1 Flair attached to a DEC VAX 11/750 computer. Some examples of the 150 different animations made available to Peter Snow are shown opposite.

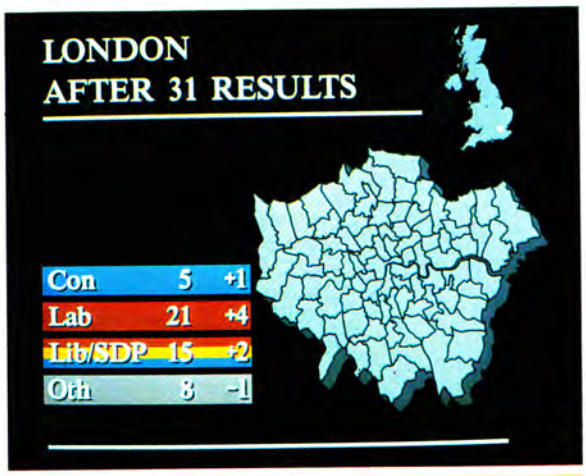
Since the General Election the Workshop has broadened its customer base by acquiring and developing animation software.

The first production animation to use the 3-dimensional capabilities of the Workshop system is the title sequence for the 26 part science fiction series, Tripods.

Storyboarding

In common with most animation, 3-dimensional animation begins with a storyboard drawn by the graphic designer.

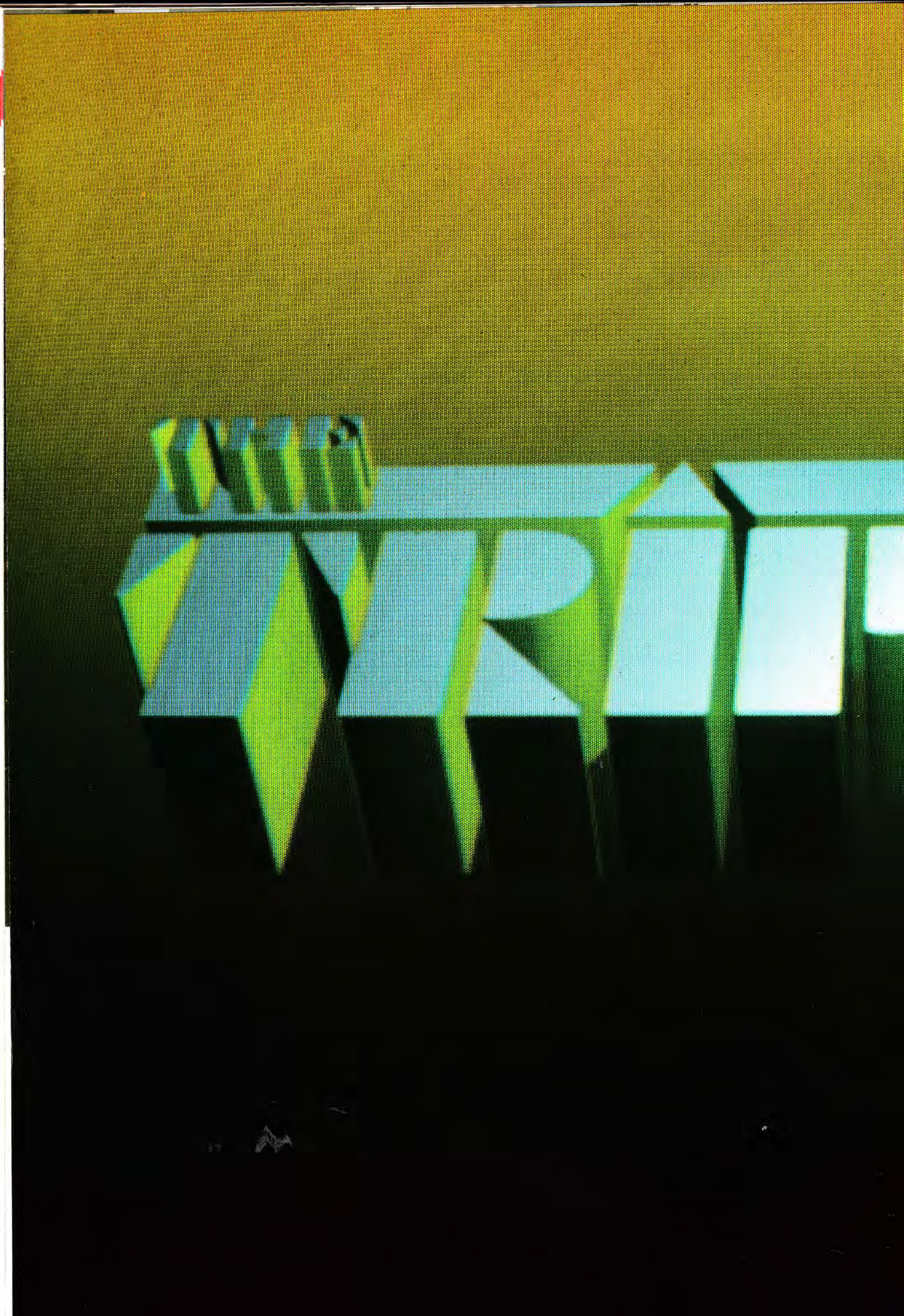
This provides a description of the key stages of the animation visualised by the designer, and serves as a discussion document for all concerned in animation production. In the future computer tools will be used to assist in the initial visualisation process.

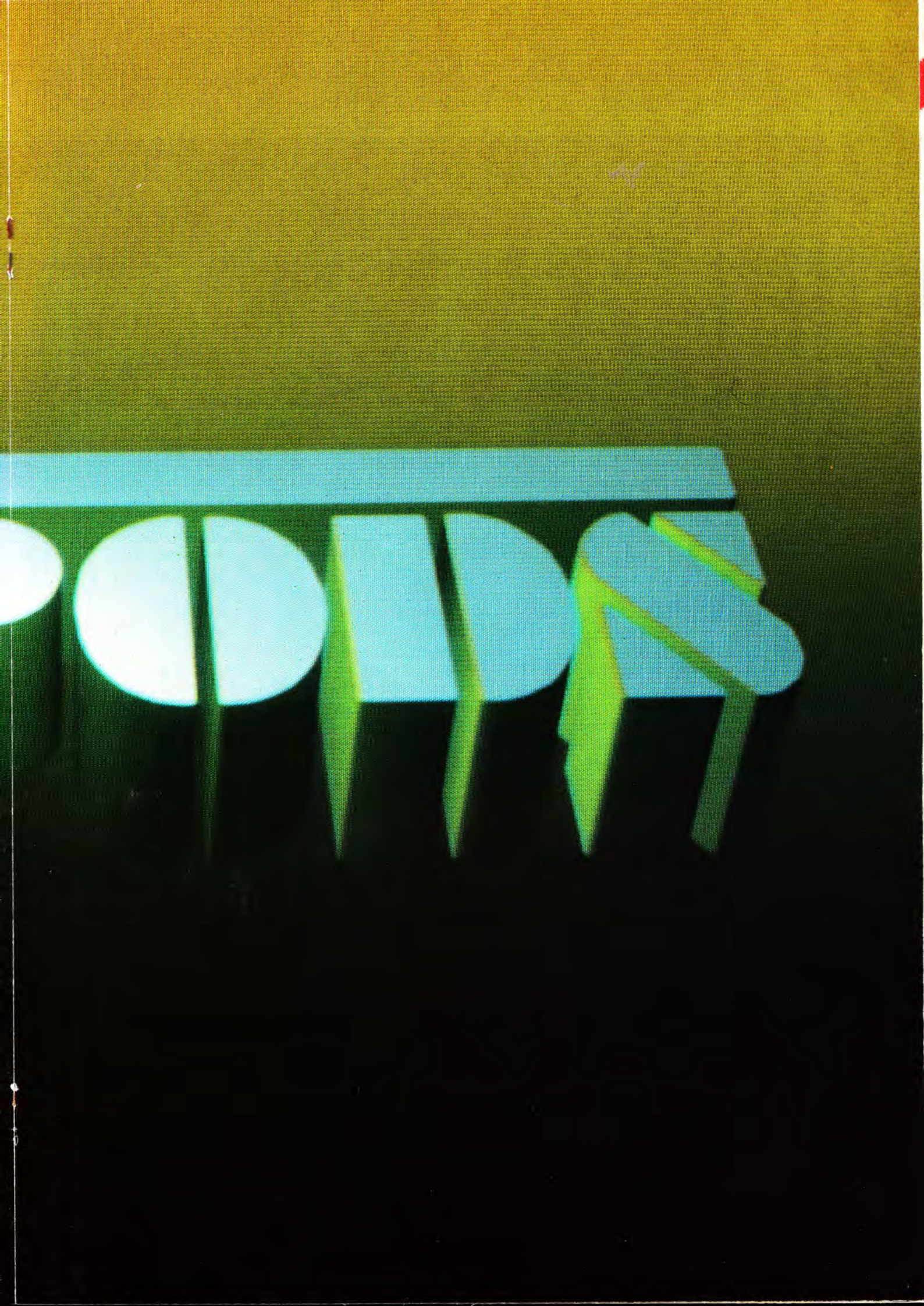


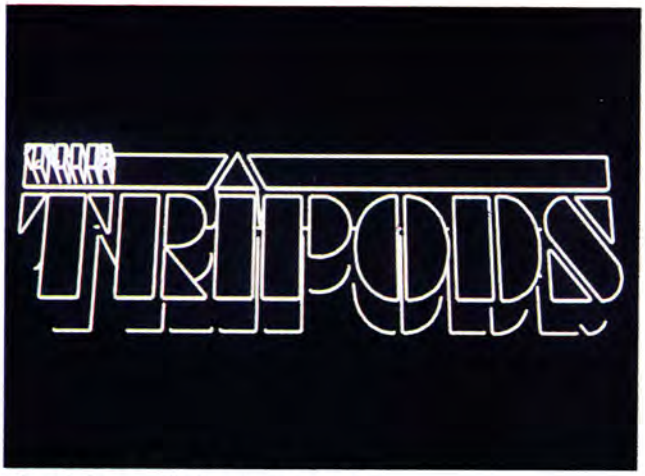
By 1980, the BBC's first computer had already been overtaken.

The first shaded model for the Tripods motif.

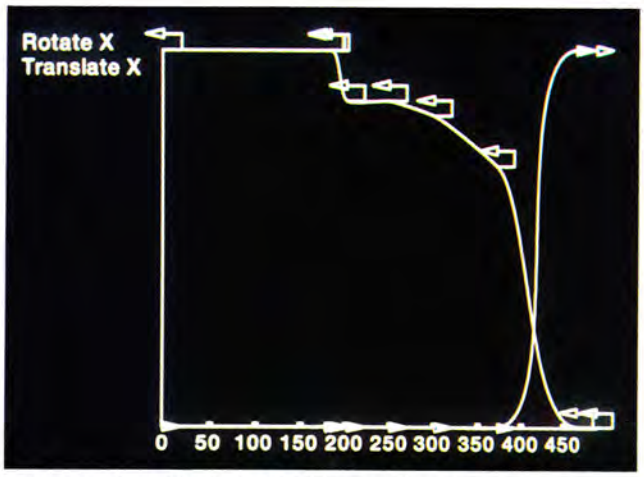
First stage model for Tripods logo, with the lines not yet hidden.




POPPS



Tripods logo with the lines hidden.



The graph method of checking motion and camera parameters.

Model Building

The first stage is to prepare detailed technical drawings of the objects or scenes which the designer wishes to model. Simple models such as the triangular motif and the Tripods lettering can be adequately described by a two-dimensional plan which can be put into the computer by typing in the sizes of the different parts of the model, or by using a device called a digitising tablet. This is an electronic drawing/tracing surface which can sense the location of a special pen placed upon it and convert that information into numerical form.

This set of numbers can then be processed by various programs to smooth the curves and to add a third dimension, in this case, by extrusion. In general the more complex the model, the greater the number of software tools needed to create or modify the data file describing the model.

The next stage is to produce a wireline representation of the model usually on a cheap graphic terminal. The image shown above was produced by computer programs developed at BBC TV Centre and at Brigham Young University in Utah in the United States.

This 3D software uses the concept of a synthetic camera which simulates what an object would look like if viewed by a camera with a particular lens. At this stage the computer can generate the image in a matter of seconds.

Once the wireline model has been checked visually, selected key frames corresponding to those in the storyboard are computed and shown to the designer and the producer.

Motion Planning

The next procedure is to generate a set of viewing parameters for those frames in between the key frames. A prime concern is that the motion path of the synthetic camera and/or the model is smooth and in keeping with the designer's original conception, although modifications are usually possible.

The motion and camera parameter can be checked either by drawing a graph of the movement, or by shooting a line test on film or video of the motion in question. The graph drawing method has the advantage of being cheap and effective. Advances in computer hardware will soon make this stage less difficult and a lot faster.

Rendering & Lighting

By now most of the personnel involved begin to get excited and want to see some of the images in colour. The position and number of light sources needed is determined by selecting a key frame, assigning colour and textures to different parts, and using computer programs to simulate the overall effect of the various physical phenomena in the scene — reflection, shadows, etc. At this stage the images are taking between 5 and 30 minutes each to complete. Hence the discipline of careful checking and consultation at all the previous stages before large number of images are computed and shot.

Shooting

For each batch of images the computer calculates the contents of each frame — which consists of an array of points, 575 lines and 720 pixels across each line. This information is then stored on a computer disc until enough are collected to make a batch for exposure on a computer-controlled film camera. This camera photographs the RGB components sequentially, through a colour filter-wheel on to the same film frame.

An animated title sequence such as Tripods has over 700 frames and can consume considerable quantities of computer time, albeit mostly on an overnight basis when the computers would normally not be used.

Children In Need

One long standing customer is the Children In Need appeal, held annually in November. In 1983 this programme requested computer graphics to allow them to show in an interesting way what the latest contributions amounted to, and to tell the viewer in an animated way how they could donate. In addition an animation of a group of children was available on cue throughout the evening to mask the joins of the various opt-outs.

Graphic Data Basics

In addition to material intended directly for programmes the Workshop also provides a range of support services. The most important of these is the maintenance of a digital typeface library on the VAX system. This consists of a large number of data files containing numerical information describing the shape of particular letter forms, such as Times, New Roman, Helvetica, etc. After transfer to our computer on magnetic tape these typefaces can be processed by software to make them suitable for different types of graphic systems such as Quantel 7001, Flair and Chyron IV.

A similar approach will shortly be adopted towards the establishment of a World map database which can be used in various ways to support maps for television.

As a first step a datafile of maps outlining the U.K. parliamentary constituencies was created for the General Election, using an ingenious line tracking laser which converts map artwork into 40,000 data points. Once these numbers have been captured, maps of the area digitised can be produced at any scale and projection.

Odd One Out

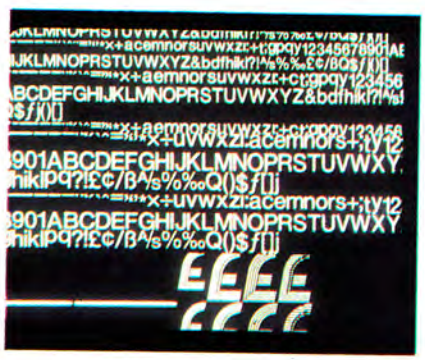
Another project which exploited the computer's ability to provide animations on cue was the 'Odd-One-Out' quiz series which the Workshop serviced for a second time in early 1984. In each programme, groups of four words or picture clues are revealed, one at a time, with the contestants vying to be the first to spot the odd one out. Although the finished product looks very polished and deceptively simple, technically the series is quite challenging, demanding split second timing and great flexibility, which can only easily be provided using computer graphics. Apart from the ability to generate over two hundred clues per programme, the end credits were also produced by the computer system.

Black Boxes

Some of the typefaces and map data described above will eventually be copied into dedicated microcomputers built by BBC Designs Dept. Generally known as 'black boxes', these small computers can display captions, logos, etc., or perform limited animation for clocks, station identification or occasionally title sequences.

Computer Aided Design

The most recent development within the Workshop is the acquisition of a Computer Aided Design system. Originally conceived to tackle the problems of designing and detailing mechanised engineering parts, it uses a special workstation/display and software running on the VAX. Complex models can be built very efficiently in a fraction of the time taken by existing methods. It is intended to examine the feasibility of digitising and storing descriptions of much of the stock scenery owned by the corporation, and to evaluate the assistance that such a system could provide to Scenic Design Dept.



FILM GROUP

BETACAM

One of a new generation of component cameras — nick-named a 'combo' — which links a camera and video recorder as a total package.

The camera is available as a single tube facility for ENG working — 16 lbs in weight — or as a three tube model for higher quality operations (21 lbs). Lenses are interchangeable for specialist work.

The video recorder uses half-inch video tape allowing up to twenty-four minutes recording time; it has two video heads and the recording process is complex — playback from the 'on board' recorder is impossible and a separate field player is needed.

Two audio tracks are available together with standard timecode facilities; the sound recordist can mix the programme audio and send it by wireless RF link direct to the recorder — thus eliminating the cord between vision and audio on conventional PSC systems.

Betacam achieves video and audio performance exceeding that of existing high band systems and approaching the quality of one-inch video tape recorders — whilst consuming less power than either.

Although perhaps not as spectacular as the developments in video, progress in film has kept pace with the new tools, and now offers many of the same facilities as its electronic cousin, while still retaining all the traditional qualities. Using video equipment which is familiar throughout Television, Film Group have greatly enhanced the versatility of the medium.

The electronics of the Ikegami camera have been adjusted to be similar to reversal film; this enables it to handle a wider-than-average range of scenes and still maintain detail in both shadow and highlight areas. In order to overcome the problems of editing PSC material, especially sound, the standard video timecode is used like edge numbers on a film, and is automatically transferred every time the picture is copied, making it possible to conform back to the original material — even after many stages of duplication. To complete the editing process, additional sound tracks are laid on separate U-matic cassettes; these tracks are then transferred to sepmag stock and so dubbed in the normal way. An Editon is used to slave a high-band U-matic to the 16 mm reproducers in the dubbing theatre and the mixed sound is laid back onto the video tape.

The most serious criticism of the equipment currently in use is its weight and the need for a connecting cable between camera and recorder. Both these problems are solved by the arrival of the new Sony Betacam, which is being commissioned at the moment.

Special Camera Mounts

Custom-built camera mounts, provided by Special Facilities, now include an enormous variety of special equipment, from a mounting for a miniature film camera fixed above the shoulder at the eye-line of the artist, to the installation of time-lapse cameras on the dish at Jodrell Bank for an 'Everyman' programme.

'The Creation', shot on the new high-speed colour negative.

Betacam and intrepid birdman.

'Galloping Guy' – Breakfast Time 1983.

Films

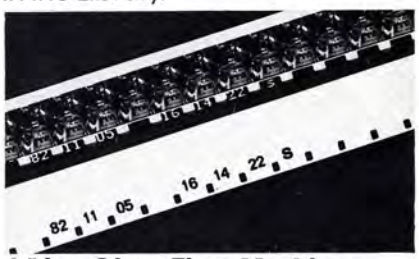
A new high-speed colour negative is now available which needs only about a quarter of the light level required by traditional 100 ASA negatives, and with very little increase in film grain. Rated at 320 ASA, the new negative was developed without recourse to the latest T-grain technology used in fast amateur films.

Kodak have announced two further important developments. Firstly, they are now able to incorporate a magnetic coating onto the base of film stocks without affecting the photographic characteristics. Not only will this facilitate printing and grading operations, but it will allow timecode recording, automatic synching and even frame by frame information for telecine transfer. Secondly, Kodak print films have improved long-keeping dyes and better blue reproduction. The Type 7380 print film is designed to match the limited contrast range of telecine machines and gives a better picture on projection than previous types.

Film and VT Library

Specially designed computer information systems are being developed jointly by Television Computer Services and the Library; these will be applicable to all types of television output. Stock control systems for video tape material have been operational for more than five years, and an equivalent system for film is now ready. Considerable work has already been done on the complex subjects index, and the first stage should be available shortly for the retrieval of programme material. The old manual catalogue will be transferred to the new computerised system on a phased basis.

Viewing and transfer facilities will be improved by providing additional VHS cassette machines, and off-air recording onto VHS cassette will be extended to cover a wider range of programmes. It is also hoped that machines for playback and transfer of standard transmission video tape will soon be installed in the Library.



Aäton Clear Time Marking

The Aäton Clear Time Marking system allows 16 mm film cameras and separate mono or stereo 1/4" tape machines to be synchronised without the need for cables or clapperboards. It works on a quartz clock attached to each camera, which exposes real numbers showing date, time, scene and take along the film edge, recording the corresponding time information on the 1/4" tape. Once set, the clocks maintain synchronism to within one frame for a period of eight hours. After processing and sound transfer, the film has eye-readable numbers along the sprocket edge, and the sepmag sound has matching numbers printed along its backing, so synchronising is simply a matter of matching the numbers.

Equipment

The increase in film speed has been matched by the introduction of a high-quality wide aperture 10:1 Zeiss zoom lens, which needs only one third the light level of previous zoom lenses and complements the well-established Distagon lenses.

16 mm cameras have continued to develop, with quieter new models such as the Arriflex SRII, and an ever widening range of available options, such as clear time marking and synchronisers to phase film cameras to video sources.

ELECTRONIC FILM CONFORMING

Electronic Film Conforming is a new technique developed by a Swedish company, automatically and accurately conforming video tape to an edited film cutting copy. The individual advantages of film and video tape are combined in this versatile and advanced system, which will become available during 1984.

The uncut material — or library material — of any format is first transferred to one-inch tape, and this becomes the master. A 16 mm film recording is derived from the master to provide a cutting copy, or if all the original material was on film, a rush print is obtained; a computer then correlates the timecode on the one-inch tape to the edge numbers on the film cutting copy for future reference at the conforming stage. The film is edited in the conventional way, with all the advantages of flexibility, relatively low cost and minimal constraints; at the conforming stage, any edit point on the film cutting copy will be matched to the frame.

This allows the final tape to be built up at the rate of 100 edits per hour in an automated, computer controlled operation, with each master tape being loaded only once, and all shots being directed automatically to their correct position on the final tape. The sepmag sound track is dubbed and then transferred to the conformed tape.

Simple, isn't it?

The possibilities for effective use of Electronic Film Conforming are many and varied, the most immediately apparent being in compilation programmes, co-productions with different versions of varying length, and complex productions which have been shot on PSC.

TELEVISION RECORDING

Television Recording is the result of the amalgamation early last year of Telecine and Videotape departments. The VT operation is contained in four areas, two multi-purpose and two post-production, and following the amalgamation, VT machines are being installed in TK — initially to facilitate TK-VT transfers. With the introduction of the new C format one-inch VT machines, not only have the old two-inch machines been displaced by the technically superior and less expensive one-inch machines, but the overall number of machines has had to keep pace with ever-increasing production demand. By the end of 1984, there will be approximately fifty one-inch machines in service with Television Recording; some fifteen two-inch machines will still be left but the bulk of these will be phased out by the end of 1985.

Recording/Playback

At present the recording capability is from routed sources to thirty-one one-inch machines and seventeen two-inch machines, with VHS being used for parallel production recordings. Next year, a record bank of at least six new one-inch machines will be introduced, capable of full control from the studio. Most of the record-routable machines can also be used for playback, for machine-to-machine dubbing, studio inserts, viewings, etc. Two cubicles are installed with 3/4 inch high band U-matic machines for use with PSC or ENG material on this format.

Transmission

The main broadcast format is now one-inch, with facilities to transmit two-inch and 3/4 inch U-matic material under full broadcast conditions. Two new transmission suites are now being installed to replace those built in 1968. Each will have two one-inch machines, two two-inch machines, and room for a fifth of any format; they will have full stereo and Ceefax monitoring, and the ability to timecode synchronise and change over any machine to any other for duplex purposes. During 1984 the Ceefax subtitle transmission will be rationalised to allow for the introduction of information at the source machine. Discs prepared by the Sub-title unti will be loaded at the same time as the master reel, and so allow consecutive transmissions on both channels simultaneously to be sub-titled.

Telecine

The present complement at Television Recording is nineteen telecines, all of them flying spot machines: four polygons (two 16 mm, two 35 mm), and four multi-gauge Mk3's (three with digiscan). The polygon machines are particularly useful for variable speed, reverse scanning, nitrate or silent gate replay. The remaining machines are Mk2 twin-lens telecines, which are likely to stay as the standard transmission or studio replay machine for some time. The Mk3 has several special features such as:—

- multi-gauge ability
- freeze-frame
- 25/18/16$^{2}/_{3}$ fps replay

which together with fast shuttling makes it very useful for compiling programmes onto videotape. Some machines have extra controls — Tarif, Topsy or the new Digigrade system — others can transmit films with electronic subtitles — these being stored on floppy discs.

The present Post Production Area will be replaced later this year by the Film Post Production Area (FPPA), which will provide improved computer control for all post production facilities and will include, among other equipment, the new Rank Slide File system for captioning.

Editrace

Certain machines are now equipped with the Editrace two-machine timecode controlled edit system. A logical progression from Ediplace and Edimace, the new Editrace not only controls the playback machine, but also the record machine edit positions — by use of that machine's own timecode. It also allows for timecode control of the playback freeze-frame and slow-motion functions, and for single control of remote machines during recording.

Post-Production

By this autumn, there will be no two-inch three-machine edit suites in Television Centre. Instead, there will be eight one-inch suites — each with three machines — and three of these will have access to a shared fourth machine and their own Quantel 5001. All eight will use the Electra edit system, which will also be in use in Birmingham and Glasgow by the end of the year, and will have access to full vision mix/wipe facilities with automatic transitions programmed from Electra.

Videotape

Developments will, for the forseeable future, be in the field of one-inch tape. In the context of the Television Centre operation, 3/4 inch and 1/2 inch formats will still be best handled by dubbing to one-inch, where the quality and flexibility of the system will outweigh any advantage of post-production work on the original material be it from PSC or the new Betacam.

The second generation of one-inch video tape machines is now available, particularly the new VPR3 and VPR5 models.

OFFLINE VHS EDITING

The term 'Offline' is used to describe an editing system where decisions can be made on low-cost, non-broadcast quality equipment — as opposed to expensive, broadcast quality equipment — and then those decisions can be repeated at the 'online' stage with a high quality editing facility.

The system can be as simple or as sophisticated as the occasion demands — always remembering budgetary contraints! The most expensive equipment will produce an edit list to allow auto-conforming of the online material, but after much investigation the BBC has decided to go for the other end of the scale. The standard is a simple VHS system, using two Panasonic NV8500 editing recorders linked by a Panasonic A500 edit controller. The cost of the complete package is in the order of £6,000. VHS tapes are recorded in parallel with the master studio tape, with a timecode 'burned on' in vision. The editor then cuts the programme using the VHS equipment, and when a finished product is ready a set of notes is prepared based on the timecode obtained from the VHS edit. These editing notes are then used to edit the programme 'online' with a considerable saving in both time and valuable resources.

Experiments are being carried out at the moment to compile edit lists on home computers and then load them directly into the Electra edit system.

The main saving of the 'offline' editing process is in reducing the time wasted in viewing material and decision making at the on-line stage; it was thought that the main demand for the system would come from drama but its use has now spread across the whole spectrum of production, from sport to light entertainment.

There are two offline editing suites in the Television Centre and a third suite which can be operated in production offices. The 'Superstars' production team have made extensive use of the system over the last twelve months in the compilation and editing of this programme. It is likely that many more of these offline suites will be made available over the next few years.

VPR3

The VPR3 is the latest one-inch C format studio video tape recorder to come from Ampex, and will be installed at Television Centre during April 1984. In addition to the facilities provided by the VPR2 — which is in more general use for one-inch recording — the new VPR3 incorporates some trick transport effects which until now have only been available on the Video Disc. For example, the machine will stop and start instantly, and can be operated at any speed in the range from normal reverse to three times normal forwards.

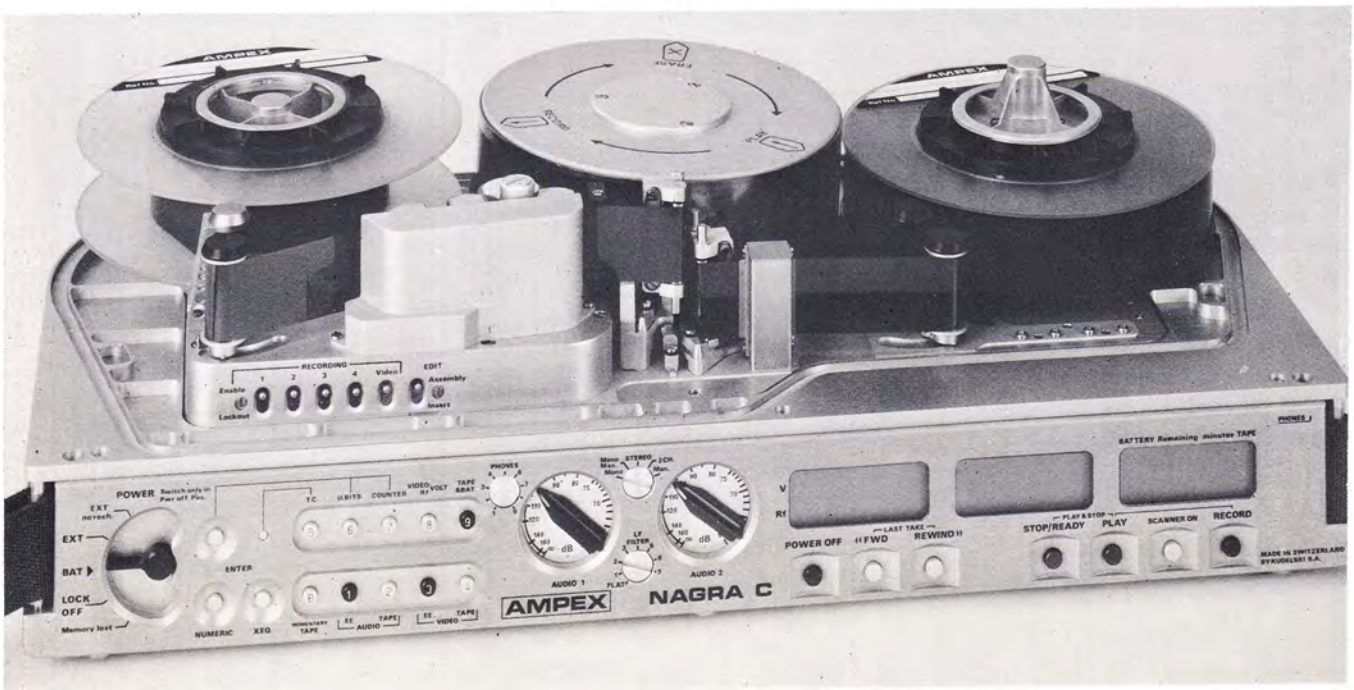
When loaded with fourteen-inch reels of tape, the VPR3 has a recording capacity of three hours, and its unique tape transport system (air-lubricated guides, vacuum capstan and computer-controlled motor) allows shuttle speeds up to twice those of the VPR2, still with recognisable pictures. The VPR3 has several built-in timecode editing facilities, but perhaps the most useful of these involves the variable speed modes, whereby trick effects can be learned by the machine and then accurately reproduced.

Replacing the video disc — now sixteen years old! — the VPR3 provides the normal record/replay facilities, just like any other one-inch C format VTR, and gives much better quality pictures for special effects. It's worth noting that the price of the VPR3 is the same as that of the video disc was in 1968, and it offers a whole host of facilities that were not dreamed of sixteen years ago.

VPR5

Developed jointly by Ampex and Nagra, the new VPR5 is a portable C format one-inch video tape recorder, weighing less than 15 lbs. The small dimensions — 17½" x 8½" x 5½" — and light weight have been achieved by extremely careful design and manufacture: all the mechanical parts are aircraft quality alloy, machined from solid, with extensive use being made of the latest in miniature electronics. Every care has been taken to ensure maximum battery life, even to the extent that when the machine is not recording, the dynamically-braked scanner's energy is returned to the battery to prolong its life.

The VPR5 has its own built-in timecode generator, and automatically edits each take onto the end of the previous one, thereby making a single continuous recording and saving tape. It is also capable of replaying both video and audio 'off tape' in the record mode — for confidence in the machinery! And finally, its recording capacity: normally twenty minutes, but up to one hour with its protective cover removed.



VIDEO EFFECTS WORKSHOP

The new Video Effects Workshop has come about because of the need to provide video productions with as great a range of pre- and post- production facilities as that available to film productions. The workshop is designed to work both as a self-contained unit and as part of a greater whole by combining with any other resource in Television Centre via the Central Apparatus Room.

The complete package consists of a small studio area, an eight-switch vision mixer, three one-inch VTR machines, and a modified Electra editing system.

The facilities include:—

- One EMI 2001 camera
- Two cycloramas, one black and one white
- 20 ft. wide motorised roller blind fitted with blue CSO cloth
- full lighting control
- matte trolley
- caption scanner
- Rank Slide File
- Quantel DPE 5001 with remote controls.

The heart of the Video Effects Workshop is the microprocessor-controlled eight video switch mixer. This is a highly sophisticated and flexible piece of equipment, with multiple re-entry, designed for combining and manipulating images. Since the mixer can be driven from the VT timecode, it is also possible to drive the Quantel 5001 synchronously, to produce frame by frame matte work.

The astonishing flexibility of the system is a product of the powerful microprocessor control. Complex set-ups can be programmed into the memory with frame accuracy, and then triggered on replay by the timecode, thereby reducing the number of VT passes required to achieve the desired effect.

The Workshop can now offer sophisticated post-production matte work, decoded CSO (combined location with studio work), glass shots and model work, the only limiting factor being the size of the studio area.

To achieve convincing video effects, a large number of different skills must be brought together — graphics, camerawork, visual effects, lighting, electronics, scenic design and so on. The new Video Effects Workshop now provides exactly the right environment to combine all these techniques.

The **Rank Slide File** enables electronically originated television pictures to be stored and selected for transmission as conveniently as the 35 mm slides which are used at present in television production. Traditionally, artwork and captions have been photographed onto 35 mm slides, and these are then broadcast using a studio slide scanner. However, existing equipment has proved unreliable, and the need for a totally reliable system has been met by the development of electronic methods of originating signals.

The new Slide File stores up to 84 pictures on a Winchester disc, ready for either random selection using a numbered keyboard, or as a programmed sequence using a cut button or the built-in fade/cross fade facilities. For long term storage, a tape cartridge unit is provided, with each cartridge holding up to 72 pictures. Special control panels have been designed for studio use, and up to five of these can be attached to each store, making the selection of pictures as easy as with the present slide scanners. And as a safety feature, any defects on stored pictures — such as movement — can be dealt with by the system's processing facility.

During this year, 14 Slide Files are being installed: one in the new Video Effects Workshop, one in the new film post-production area (FPPA) in Telecine at Television Centre, four in TC 2, one in TC 3, a routable system in TC 7, one in Manchester, two in Pebble Mill, one in Graphic Design (coupled with the Flair graphics system) and one each in Cardiff and Glasgow for presentation and continuity work.

QUANTEL

The Quantel DPB 7001 — DPB stands for Digital Paint Box — is the latest addition to the range of digital 'black boxes' used by the graphics artist; its manufacturers claim that it is a complete electronic graphics studio. The design philosophy behind it is that a traditionally trained graphic artist/designer should be able to use the system effectively without specific computer skills and, what is more, be able to achieve effects which have been out of reach with older equipment either for technical or for budgetary reasons.

The heart of the 7001 is the powerful hardware package that makes up the 'paint box'. The basic tools are simple: an electronic paint brush and an electronic palette, and the pressure-sensitive stylus provides genuine colour mixing — just like an ordinary paint brush.

Regular shapes, such as circles, rectangles, straight lines and so on, are available as required, and once a picture has been built up and frozen, it is ready to be used as a fresh piece of artwork. Any individual part of it can be manipulated or even incorporated into another picture, text can be added, and the final result can be recorded onto the system's own Winchester disc drive — or transferred to its companion DLS 6001 library for future transmission.

Three of these machines are installed in the Computer Graphics Workshop at the Television Centre and a further two at the Lime Grove TPC.

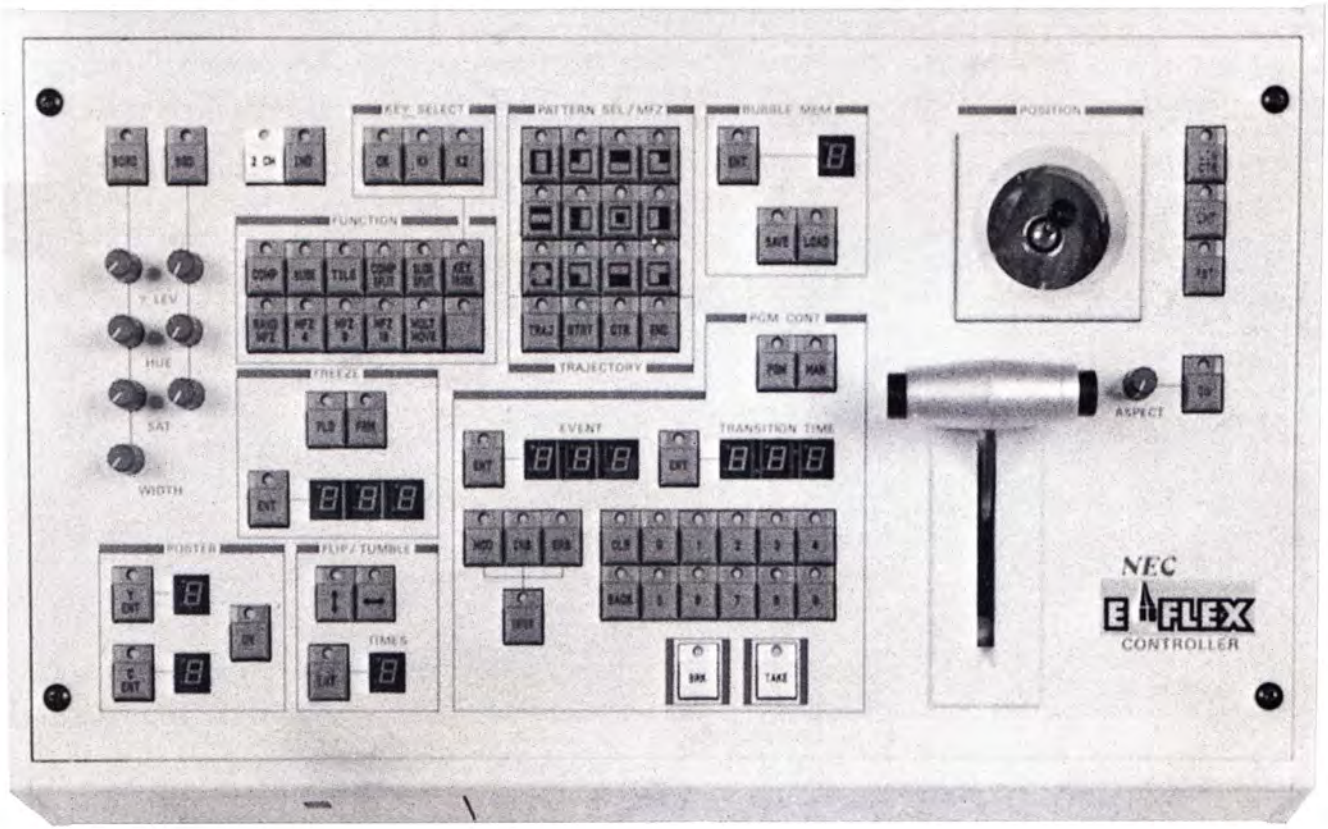
The Quantel DLS 6001 — DLS for Digital Library System — is a compact, economical and expandable electronic picture storage and presentation system.

The source of material is normal colour video — in all its forms — be it off-air transmission, VTR signal, or whatever, and it's particularly designed to accompany the DPB 7001. The incoming signal is digitized, frozen, and then transferred to a Winchester disc with a capacity of several hundred pictures. The storage is a 'one button' operation, and take just one second! This makes the 6001 extremely useful for immediate retrieval of stills from a live video feed such as a news programme. Once stored, the pictures can be recalled and titled using a 'keyword' system — all the pictures with a given keyword in the title can be recalled in one operation. There is also a picture management facility, allowing the user to display on a monitor a collage of up to sixteen separate pictures for selection.

The 6001 has basic production facilities, by which pictures can be cropped, re-sized, and positioned to make a composite of several stills, or to be inserted over a live transmission. These composites can be recorded in the same way as the originals, and borders and mattes can also be added.

The DLS 6001 can be added to by using disc pack drives and conventional videotape machines thus creating enormous picture storage capacity of up to 100,000 frames.

E-FLEX



The recently introduced NEC 'E-Flex' is a single-channel picture manipulator — it is not a synchroniser. Compared with its bigger brothers, installed in Studio A in the Presentation area, Television Theatre and TC 8, the facilities available from E-Flex are relatively limited. But — on the positive side — it is smaller, easier to drive, and considerably cheaper.

Bearing in mind that only one picture can be processed at a time, the range of effects from E-Flex is similar to all other digital video effects systems currently on offer; these include:—

- trajectory
- continuous mosaic tile
- multi-freeze/multi-move
- chroma key tracking
- fixed or variable aspect ratio
- slide/slide split
- automatic flip and tumble
- posterisation
- 128 event integral memory
- memory edit
- colour border/background generator
- incremental freeze
- automatic centring

E-Flex can also accept a key signal to which it adjusts picture position and size.

A version of E-Flex which might be called two-channel is also available, but this is on fact two main frames driven by a single control panel; in this configuration, the second channel is a reciprocal of the first, and there is no independant control of each channel.

There is an internal memory which is capable or storing up to 128 events, with an optional 'Bubble' memory, capable of storing a further 512 events — but the 'Bubbles' are expensive!

One E-Flex has already been installed in TC 2 for sports programmes, another is on order for Pebble Mill, and Bristol NPC should also have one by the summer of 1984.

LONDON OB'S

Six Type V Colour Mobile Control Rooms (CMCR), each with five LDK5 cameras, form the backbone of the London Outside Broadcast operations. These vehicles can operate a further three cameras from each vehicle. It is now possible to use the Philips LDK514 camera on a hand held basis up to one thousand metres using lightweight triax cable.

Two Channel Units

Location Production Unit (LPU)

This vehicle was first seen at Track Forward 1978; it has recently been refurbished with two Sony BVP 330 cameras — one of which can be battery operated — and the cameras can be used via radio circuits. The original two-inch recorder has been replaced by a one-inch VPR2 video recorder and the unit can also operate a portable one-inch VPR20 recorder. This unit is specifically designed for drama productions, a recent example being 'By the Sword Divided'.

Lightweight Mobile Control Room (LMCR)

This is similar to the LPU and has recently been re-equipped with Sony BVP 330 cameras. However, its facilities for vision, sound and communications are more comprehensive than the LPU enabling it to operate as a self-contained unit or as part of a more complex outside broadcast.

London 21 and 22 (LO21, LO22)

LO21 is equipped with two LDK5 cameras and is used mainly as a remote unit working to a main Type V CMCR. Typical programmes are Sports and OB Events.

LO22 has two Philips LDK514 cameras but is also equipped with two one-inch VPR video newsrooms. It is used on a wide variety of programmes ranging from 'European Athletics' and 'Ronnie Corbett' to 'Tripods' — a recent science fiction drama.

Single Channel Units
(SCU2, SCU3 and SCU4)

SCU2 and 3 are the latest addition to the OB fleet and are direct replacements of older vehicles. Each unit retains its original LDK514 camera which can be used as a mobile radio camera in helicopters and golf caddy cars. The vehicles are designed to operate as self-contained units with the appropriate production and sound facilities; provision is made for a portable one-inch VPR20 recorder. Both of the units will come on line in April 1984.

SCU4 offers similar facilities to SCU2 and 3 but in a smaller vehicle. A one-inch VPR20 recorder is permanently installed with power from a generator towed by the vehicle. The unit has been used extensively on 'Superstars'.

All the SCU units are designed to allow the camera and video recorders to be battery operated and independent of the vehicle.

London Mobile Video Tape

LMVT 1, 2, 3 and 5

Each of these units is fitted with two one-inch VPR2 video recorders providing full record, replay and edit facilities.

LMVT 4

Currently equipped with only a single one-inch video recorder but to be replaced by a twin machine facility at the end of 1984.

LMVT 11 and 12

These units are equipped with a single one-inch VPR2 video recorder and built specifically for slow motion replay facilities for sports coverage.

Colour Roving Eye (CRE)

This is a Citreon Safari estate car with a roof mounted platform fitted with a Philips LDK514 camera. Radio link equipment mounted on the car provides full communications to a CMCR, and a one-inch VPR20 can be added for independent working. This unit replaced the original CRE and came into service at the end of 1983.

Other Vehicles

Colour Mobile Central Control Room (CMCCR)

This vehicle is designed for use on complex OB's, as a central mixing point for sound and vision contributions from a large number or remote sources. The sides of the control room can be expanded — but only when stationary! — to nearly double the normal working area inside the unit.

Mobile International Control Room (MICR 1 and 2)

These vehicles provide commentary and communications facilities for up to twentyfive visiting commentators divided between the two.

Mobile Sound Control (MSC)

A separate sound control vehicle for use when complex facilities are required; the equipment includes a 44-channel stereo desk and a limited multi-track recording system.

Portable Single Camera (PSC)

A single unit is operational at Kendal Avenue using a Sony BVP 330 camera and associated 3/4 inch high band field resources. A standard edit pair is available.

Communications

Recent developments in this area include the MCA (Mobile Communications Area), and a Satellite Ground Station. The MCA is used on programmes such as the 'Boat Race', for the co-ordination and control of all sound, vision, and communications circuits.

The Ground Station provides one vision and two sound circuits, via ECS (European Communications Satellite), from remote locations where multiple 'hop' terrestrial links would be required, or from where no other circuit is possible. It was used during the World Cup in Spain for Unilateral transmissions, and in Jersey for a number of programmes including 'Songs of Praise'.

Helicopters are now almost commonplace as both camera platforms and for radio links, and this has been helped by the development of 'flight-pack' equipment, purpose-built for use in aircraft of all types, fixed-wing as well as rotary — although a hang-glider might have a bit of difficulty coping with it! The London Marathon OB involved two helicopters — one with a data-controlled camera to provide aerial coverage, and one as a mid-point reception and re-transmission station for a mobile camera on the ground travelling with the runners. The same system was used for the World Cycling Championships, where the camera and its radio link were mounted on a motorcycle, giving close-up live pictures throughout the race. And for live action coverage in a crowded area — such as the pits at Brands Hatch for Formula One motor racing — the new 'man-pack' equipment frees the cameraman from all the restrictions of the camera cable.

VIDEO CAMERAS

Sony CCD Camera

All television cameras have used glass pick-up tubes with some form of photo-conductive layer, although both the size of the tube and the chemical nature have changed over the years. The breakthrough is to replace the conventional pick-up tube with a solid state receptor thus enabling the size of the camera to be radically reduced. Experimental cameras using these chips have been demonstrated over the last few years but only recently have they produced results which can be said to be acceptable in terms of their quality. The Sony CCD weighs a mere two pounds and has already been used by CBS News where its portability can be exploited in hostile environments. It is likely that broadcast versions will be in use by 1986.

The QuarterCam System

The Bosch QuarterCam is the first ENG unit to provide quality recording and playback using 1/4 inch tape. Using the very latest technology, the weight of the combined camera and recorder is only 17 lbs — lighter than many existing ENG cameras.

A new era in electronic journalism — but not just on the recording side. The first truly portable field editor uses the recorder from the camera to 'plug' into the edit controller and using the spare recorder, gives full editing facility on site.

This system is still under development and is likely to be marketed in the autumn of 1984.

HL 79E

This is the fourth of a generation of Ikegami cameras that have been made available to the Broadcaster. The HL 79E gives very high quality pictures combined with portability, with the attraction of being able to add a sophisticated digital control unit which will handle many of the elctronic functions. The contrast handling has improved over previous generations. Its predecessor, the HL 79D is in service for ENG and PSC operations, studio applications and there are now some sixty Ikegamis of this type in service for the BBC throughout the U.K.

HL 83

There is a compact camera designed specifically for ENG weighing a mere 13 lbs, designed for ENG where portability and speed are the key ingredients. Although still in experimental form, cameras of this nature will work with a micro link clipped to the side of the camera where the signal will be recieved on a separate base station. This will have a major impact on outside broadcast coverage over the next few years.

The present main studio, N1, is about to complete its term of service in what might be thought of as the traditional style. Soon after the beginning of April, its sets will be transferred to the enlarged floor area of studio N2 which, in general terms, is undergoing the same modernisation of control-room technology as bestowed on N3 last year.

Now operational, N3 itself has three Bosch KCB 60 cameras, operated remotely through Vinten servos. A total of fifty separate preset shots can be memorised, and on recall the system will assume each new setting at a speed which is again variable. All contributing cameras including (eventually) those at remote studios, obey smoothly precise digital commands from just two joystick controls, in the hands of, and routed by, the Vision Engineer.

As in most news studios, a vast array of picture monitors confronts the Vision Mixer who, in turn, has a 24-channel CDL mixer at his disposal. A feature of the mixer as installed is that it will accept asynchronous inputs.

In the final arrangement, the apparatus for all three studios will not only be similar in appearance and purpose, but also will share the same space; and N1 is expected to return to service, in its matching form, by the end of the year.

Two Rank Cintel Mk3 Digiscan machines are all that remain of the telecine section, since film procession is now the responsibility of TFS, Ealing. As a further effect of the predominance of ENG, the old TK area is to become the new videotape complex: all the present VT capability — and that includes one two-inch machine — together with the ENG transmission suites will move to the fourth floor site.

A news bulletin may contain something of the order of eighteen stories that involve VT inserts, of which ten or so may have originated on ENG. The department has fifteen electronic cameras ready for the road. Whether edited on-site or not, the material, on cassette, is either transported physically to T.C., relayed via a coax line, or sent through on one of the London reception points — at Millbank Tower, Crystal Palace, and the Barbican.

On station, eleven high-band editing rooms operate entirely separately from the transmission area. Stories, sometimes in several versions according to intended bulletin, are edited on to individual cassettes for play-in from the transmission suite.

News reporting dependent on longer term observation, such as conferences or industrial disputes, is normally covered through use of the OB vehicle. An eight-strong crew, including three rigger/drivers, operate the self-contained unit. Pictures from the two Marconi Mk8 cameras are conveyed to base, mainly by radio-link, for recording or live insert.

Improved communications will be a quality of the new OB unit, equipment for which will include three Ikegami HL 79D cameras, two 3/4 inch VT machines, and a Grass Valley Vision Mixer. Working on the 'Mothership' principle, an on-board synchroniser will permit the use of any available source, and the radio-link will provide an additional sound and vision circuit.

Amidst all the present activity towards what amounts, in equipment terms, to a brand new department, and a new brand of technical standing, 1984 also carries, for Television News, the nearer prospect of a replacement OB vehicle, and the further intention of developing its own use of electronic graphics.

FUTURE DEVELOPMENTS

MACRO—TELEVISION

Last year, engineers at Bristol NPC completed the first Macro-Bench for the Natural History Unit. The basic design idea was that the specimen on the bench should be moved in relation to the camera, rather than the other way around, because there would be generally less mass to move about, and therefore the movement could be controlled more accurately.

Various sizes of specimen table can be fixed to a turntable which normally sits in front of the camera — usually an Ikegami HL 79D, although the system still has a film camera capability. The turntable can then be moved in three dimensions by servo motors which were specially selected to be as vibration-free as possible. Further motors are provided for control of the zoom, aperture and focus functions of the lens. The turntable has a 'flip-over' facility — although bearing in mind that some of the specimens being shot may not like being somersaulted, this is more of a 'slow roll' facility! All the operator controls are mounted on a separate console, which need not necessarily be next to the Macro-Bench; the complete package has been designed so that it can be removed from its home studio and used more or less 'on location'.

Work is now in hand for a Macro-Glide, where a suspended camera with a periscope lens can be remotely controlled for pan, tilt and height; this means that models can be used to create a galaxy of effects — for instance, an insect's eye-view of its world.

STEREO

The growing interest in adding stereo sound to television has presented an engineering challenge. The system has to be compatible with existing equipment and the picture and sound signals have to be kept free from interference.

Tests from the Wenvoe transmitter in South Wales last year indicated that the best solution is probably digital. The area was chosen because the nearby mountains create problems for the reception of television signals, producing severe 'ghosting' and it was important to establish that any proposed stereo system could cope with these conditions. The Wenvoe tests proved encouraging; 'ghosting' was minimal and the digital signal provided excellent stereo quality even when received five stations up the relay chain which feeds one of the more remote valleys.

A full-scale test of this digital system is going ahead on BBC 2 from the Crystal Palace transmitter and the BBC is discussing the project with the Home Office, IBA and industry in order to achieve an agreed UK standard.

One episode of 'Bergerac' — 'The Ice Maiden', 'The Kings Singers Madrigal History Tour' and a 'Match of the Day' have been recorded in stereo as an operational experiment. On the film experiment, a single forward facing gun microphone producing the mono signal was used with a "figure of eight" microphone located next to it producing the separation signal. Both microphones were fitted into a single wind gag — the combination operated by an assistant recordist in the normal way.

CEEFAX

Ceefax has recently started broadcasting computer programs by teletext, known as Telesoftware. They are aimed at owners of the BBC Micro who have the appropriate adaptor which can be used to pick up the programs as they are transmitted and either run them or store them on cassette or disc.

To begin with, the Telesoftware service will provide about half a dozen programs, changing every fortnight; mainly education, they will include occasional games and utilities.

The other development from Ceefax is in subtitling. Up to a dozen recorded programmes each week are available with subtitles — and that number will soon be substantially increased — but the subtitling of live programmes is also now a reality. Tested successfully on several occasions, particularly at Wimbledon last year, the system uses a shorthand keyboard linked to a computer which converts the signal straight into words and onto the screen as conventional subtitles.

HIGH DEFINITION TELEVISION

This was developed by NHK (Japanese Broadcasting Corporation) and has been demonstrated widely in Japan and the USA; it has been shown at major exhibitions at IBC 1982 in Brighton and at the Montreux Symposium in May 1983. This system operates on:

1125 lines, 60 fields per second

— and has five times the information of the current PAL colour system. Picture quality fully matches that of 35 mm motion picture film in respect of colour fidelity and picture definition.

High Definition Video System (HDVS) employs an aspect ratio of 5:3 — almost the same as the Vista Vision film format.

Many European Broadcasters, including the BBC, have used HDVS to produce items for a demonstration video tape. These experimental programmes have been shown using large screen projection systems and the results were highly impressive. Many of the programme items carried stereo sound tracks which further enhanced the presentations.

HDVS is currently being re-engineered in Japan and will next be exhibited in the United Kingdom in September 1984.

CAVITY

'Cavity' is a new system designed and built at the OUPC for recording computer animations onto video tape. Once the computer program has been prepared and the system initiated, operation is entirely automatic and usually takes place overnight.

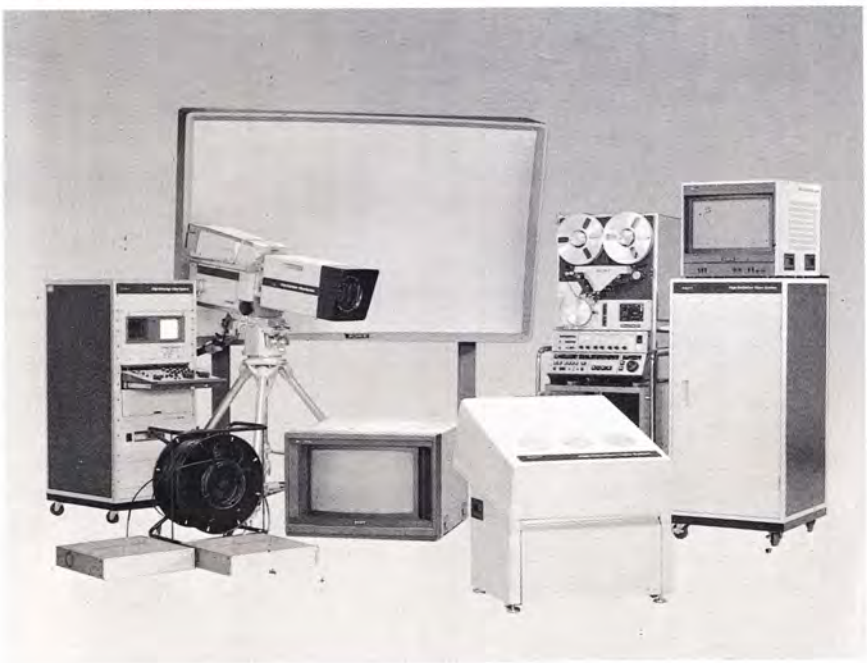
'Cavity' links resources at the Open University itself and the OUPC. Animations are prepared on the OU's DEC 20 mainframe computer and previewed with still frames until acceptable. For overnight recording, a specially modified A6D 767 computer graphics terminal is installed in the Production Centre's VT area.

In addition to graphics codes, the animation program running on the computer also produces control codes. These are detected by the graphics terminal and passed to a specially designed control box which operates the VPR2 video tape recorder. The control box is built round a Z80 microprocessor, and updates timecodes and cues and records as appropriate; to keep the computer and VT machine in step, the control box also tells the computer when each video recording operation is complete.

ADO

The ADO is a digital optics system built by Ampex. In addition to performing the basic functions such as expansion, compression and positioning of video images, the ADO was the first system to provide picture rotation with three-dimensional perspective in real time.

Within a single sequence, the ADO can accommodate up to twenty-five key frames, each of which can contain all the available picture manipulations. Individual key frames can be pre-programmed for the exact position, rate and sequence of picture manipulations, which are performed smoothly and continuously. The ADO also has the ability to take a single frame from a running video source and freeze it for use as a still picture. The system uses floppy discs for storage, allowing easy retrieval from an unlimited library of effects, and was first used in the Television Service on the 'Little & Large Show'.



ELSTREE

1. Studio A
2. Studio B
3. Studio C
4. Studio D and Auditorium
5. Fairbanks
6. Neptune House Office Wing
7. Neptune House Rehearsal Wing
8. Proposed location of Studio E – Television Training

History

The BBC formally took over Elstree Studios on Monday, January 26th 1984, almost seventy years to the day after Neptune Films laid the foundations of its first film studio on the site. From that start in 1914, the British film industry grew throughout the '20s and '30s until there were six studios based at Elstree and Borehamwood.

In 1961 ATV (later Central Independent Television) centralised their television production at Elstree, and developed the site as a programme complex. It is those facilities that the BBC has now taken over. The Elstree Centre is based around four main television studios:

Studio A — 5,600 sq. ft.
B — 5,970 sq ft.
C — 8,850 sq. ft.
D — 8,940 sq. ft.

The sixteen-acre site also contains a number of large buildings for servicing and administration of the studios, including a six-storey office and rehearsal block, a three-storey scenery block with one of the biggest painting bays in Europe, cutting rooms, viewing theatres and an orchestral studio. Most of the areas have been left without technical equipment, apart from Studios C and D, which will be the first working studios to be developed.

Development

Development is expected to be relatively slow at first. Present plans are for Television Training to move to Elstree in the summer of 1984, and then begin a new programme of courses at the end of September. They will initially occupy Studio D, once extensively used by Central as a light entertainment studio, and then move to Studio B in 1985. A twice-weekly drama serial will start production from Studio C in October 1984, with the first transmission scheduled for early 1985.

The Elstree Centre is not only for the Television Service; it is a corporate development, and some of the accommodation will also be used by central London departments.

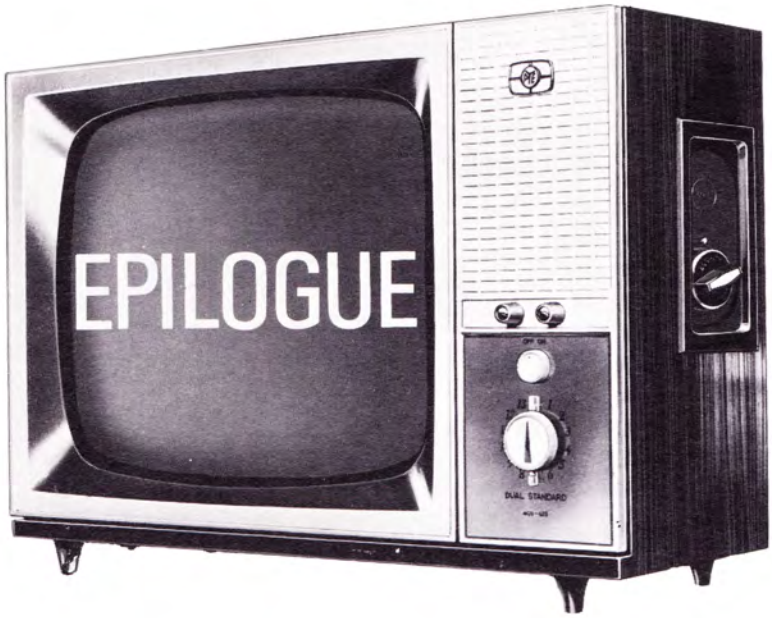
TELEVISION TRAINING

Woodstock Grove has been the home of Television Training for over 20 years.

While studios at Television Centre were still available for training purposes, the old building — originally a tannery — was an adequate, if not wholly appropriate, base for a training Department. But since late 1982 the pressure on studios at the Television Centre has meant that virtually all studio direction training has had to be carried out in Woodstock's two small and non-professionally equipped studios.

The limitations imposed by this kind of working have proved increasingly frustrating as the demand for training has continued to grow. The move to Elstree, it is hoped, will enable Television Training to operate once again from a major studio and with the kind of technical support needed to ensure good training. Track Forward 1984 — farewell Woodstock, hail Elstree . . . !

... and a fond farewell



At midnight on December 31st 1984, all 405 line transmissions for both the BBC and IBA will cease.

1984 signals the end of the two inch video tape recorder in the BBC. Launched in America in November 1956 and introduced here in the UK in 1958, this machine was the mainstay of BBC video recording operations throughout the 60's and 70's. It has been replaced by the one inch video recorder. Only a handful of the two inch recorders will be left to play back the remaining material held in the libraries – all 69,574 reels.

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