

BBC

Engineering

Progress and achievements

1983



confidential

INTRODUCTION

You can see from this review that we are as busy as ever and that the past year has seen some notable new services and facilities, with many more in train. Particularly gratifying are the highly innovatory and successful Breakfast Time systems at Lime Grove, and the establishment of the satellite links for External Services programme feeds to Cyprus, Masirah and Singapore with more to follow.

Not so encouraging is progress, or rather the lack of it, on the Band II planning front. Government decisions so far seem to be based on the principle of equal dissatisfaction to all, rather than maximum benefit to the listening public: but we shall keep on trying.

The DBS saga continues on its rather frustrating course. In engineering terms we have made good progress in evolving agreements on the sound and signal specifications, but the overall DBS situation is still very fluid. I will update you as far as I can at the meeting.

It's a very interesting time in broadcasting and the pattern of things in the future is difficult to predict. One thing is certain – there are all sorts of exciting opportunities ahead and BBC Engineering is going forward to meet them.

T.B. McCrirrick

TRANSMISSION

Uhf Television

Main Stations

The early uhf Main Station television transmitters, installed in the 1960s, are coming towards the end of their useful lives and will soon need to be replaced. New transmitters using the latest design of broad-band klystrons, with pulsed beam control for improved efficiency, are on order for Sutton Coldfield. The replacement of the television transmitters at Sutton Coldfield will mark the completion of the re-engineering of this station which commenced with the installation of the Monitoring and Information Centre two years ago.

A new television transmitter similar to those being supplied for Sutton Coldfield has recently been purchased and installed for ETD at Woodnorton.

Emergency Television Transmitters

The second and final emergency uhf television transmitter, housed in a transportable container, has been handed over to Transmitter Group.

To facilitate rapid tuning to any channel in the uhf band, and to minimise transport difficulties, the emergency transmitters use air-cooled tetrodes rather than the more usual klystrons.

Monitoring And Information Centres

The MIC project is now nearly complete. The Crystal Palace MIC is in full service and work on the Northern Ireland Monitoring and Collection Point (MCP) well advanced. Some tidying-up of loose ends remains, including up-grading the facilities at Holme Moss to full MIC standards, and up-dating the prototype installation at Kirk O'Shotts.

When Breakfast Television is on the air, transmitters throughout the country are monitored by one MIC – Crystal Palace.

Vhf Radio

Re-Engineering

Work on vhf re-engineering for improving the service with mixed polarisation is continuing in line with the overall project plan; in several cases the necessary space will be provided by the closure of Band I transmitters. Wrotham came into service in December 1981 and Sutton Coldfield and Holme Moss will enter service towards the end of this year. Some difficulties over international clearance for our plans have arisen recently, particularly concerning the Republic of Ireland.

The re-engineering scheme for Wenvoe commenced with preliminary site works in September, allowing the dismantling of the old 191-metre mast to proceed. The new 225-metre mast is scheduled for completion by August 1984. The building works contract for the new transmitter accommodation should be complete by July 1984.

Consideration is now being given to the closure of Kirk o'Shotts with Band II transmissions being re-engineered at Black Hill.

The decision to introduce mixed polarisation made it necessary for industry to design suitable economically-priced aerial systems for our low-power stations. Our aerial engineers have liaised very closely with industry and suitable circularly-polarised aerial panels have been designed and tested. These aerial systems will mainly be used on existing square-section towers but because of their large size and high wind loading it has been necessary for some existing masts to be strengthened or replaced with new structures. TCPD has been co-operating closely with ACED in order to meet target dates.

Future Plan for VHF Radio

Following the First Session of the International Planning Conference last year, work has continued with the objective of arriving at an agreed UK plan. This plan will form the basis of the UK submission to the Second Session of the Conference which is being held in 1984 to agree assignments for the whole band 87.5 - 108 MHz.

While further evaluation has pointed to the aeronautical compatibility problem being less serious than was thought in the immediate aftermath of the First Session of the Conference, the Government's dictate on the way in which the band is to be allocated between the BBC and the IBA has not yielded a plan which the BBC regards as satisfactory. In particular, the decision to allocate to the BBC and IBA a 1.5 MHz segment each, in each of the two 3.0 MHz Local Radio sub-bands will create a number of difficulties, including a substantial deferment of a number of new BBC stations, because one of the two BBC segments will not become fully available until 1996. In addition, the allocation will result in a fragmented frequency plan that can only be confusing for the listener. The BBC is trying to mitigate the effect of this decision.

Also, while it is agreed that the BBC will have a fourth national network to provide

a vhf outlet for Radio 1 and that a fifth network will be created for Independent Radio, the Home Office declined the BBC's request to decide on a specific allocation of the spectrum for these services until after the Second Session of the Conference. Had the BBC, as it wished, been allocated the fourth Stockholm network, an early start could have been made in transmitting Radio 1 in some areas of the country.

Mobile And Fixed Links

Merriman and After

The Merriman Committee recommended that television broadcasting in Bands I and III should be used for a combination of land mobile services and services in operational support of broadcasting, i.e. ancillary services. However, Merriman stressed that where necessary priority should be given to the land mobile services, and in view of the intense competition for spectrum, this could make matters very difficult for the broadcasters.

Responsibility for frequency assignments has recently been transferred from the Home Office to the Department of Trade and Industry, and the BBC and the IBA are currently involved in discussions with the DTI in an attempt to obtain an adequate allocation of spectrum for those ancillary services currently operating within Bands I and III.

Television OB Facilities

Work has been completed recently on the refurbishment of the Outside Broadcast facilities at Crystal Palace, Holme Moss and Kirk o'Shotts and is currently being undertaken at Sutton Coldfield and Wenvoe. The new installations are capable of handling two simultaneous OBs with reverse vision facilities back to the OB site and also provide for increased flexibility of operation. All facilities provided at these sites can be controlled remotely: Crystal Palace by Swains Lane, Holme Moss by Manchester CTA, Kirk o'Shotts by Glasgow CTA, Sutton Coldfield by Pebble Mill and Wenvoe by Llandaff. Information, both monitoring and command indications, can be continually fed back to the control point to give immediate indications of equipment readiness.

Topical Production Vehicle

A communications vehicle has been produced for the Topical Production Centre (Lime Grove) which is capable of operating into any Outside-Broadcast receiving facility at 7 GHz, or into any ENG receiving point at 2 GHz.

ENG

A further two ENG shf receiving terminals have been installed at the Barbican and at

Crystal Palace. With the system already in operation at Millbank there are now three ENG receiving terminals in the London area thereby improving the coverage and increasing the flexibility of the ENG system.

Radio Link Vehicles

Eight major link vehicles are being provided for Communications Department by TCPD; four of these are currently in production with two almost ready for handover. These new vehicles will reflect some changes in operating practice and layout. Currently a requirement for a further eight radio link vehicles for London Television OBs is being considered by TCPD.

PTA (Powered Tower Aerial)

A complete refurbishment of the two PTAs is being carried out by TCPD. This involves modifications to the chassis and hydraulic jacking system, and completely rebuilding and rewiring the equipment area.

Radio Telephone System

The News reporters' radio telephone system in North West England has recently been re-engineered, and a similar system is currently being installed in the North East. Work on a proposal to install a similar system in Northern Ireland is being carried out by TCPD, and a further system in the London area for Radio News reporters and Radio OBs is under consideration.

Local Radio

Work that has been completed in the last year includes the provision of aerial systems and rf distribution systems for all new Local Radio stations and for stations being converted to Mark III format. It also includes the provision of radio cars and radio car systems with up to two base stations for each new Local Radio station.

Stereo programme feeds from the studios to the vhf transmitters in Cornwall, Devon and York have been provided by radio links.

Many radio cars have been replaced in the last year and some Radio OB vans. The latter have been replaced by a redesigned vehicle, utilising a Fort Transit van and incorporating all the facilities provided in the radio car but with the added advantage of extra space for equipment necessary to run an extended OB.

New radio car systems are currently being planned for Shropshire and Bedford, and secondary radio car base stations are planned for Northampton, Cambridge, Norfolk, York and Oxford.

Vhf Re-Engineering

The replacement of the masts at Sutton Coldfield and Holme Moss make it necessary to re-engineer all shf links that operate into or out of these stations (including Television OB facilities). The relocation of equipment in these stations requires that the equipment for the main pcm feed be moved; temporary equipment will be used to maintain the service whilst this is accomplished.

Because the new masts are further from the buildings than the old ones, dish sizes must be increased to compensate. However, at Sutton Coldfield even this cannot overcome many of the problems and consequently a building at the base of the mast is being provided.

Bangor-Cardiff Contribution Circuit

Programme contributions from Bangor to Cardiff are currently routed via Manchester. A new contribution link is being installed between Bangor and Cardiff (via Blaenplwyf) giving Bangor direct access to Cardiff. Installation is now complete and ready for hand-over.

Shf Links

Shf links between Whipsnade and Oxford and Whipsnade and Sandy Heath have been re-equipped; work on the Peterborough - Sandy Heath link has still to be completed.

PCM/Stereo/NICAM

Schemes for the extension and improvement of stereo services to West and Mid-Wales, Londonderry, and North Hessary Tor have been completed during the course of the year, including the first NICAM distribution link which is now in operation carrying the BBC Radio Devon service from Stockland Hill (off-air reception from Exeter St. Thomas) to North Hessary Tor.

Re-Broadcast Standby Feed to Black Hill

In order to provide Black Hill with a usable RBS signal in the event of a main television chain failure, signals from Bilsdale West Moor can be picked up at Great Dun Fell then fed via shf link to Caldbeck, picked up again at Lowther Hill and fed via shf link to Black Hill. This system is complete and is operational.

Dublin-Belfast Contribution Link

The Dublin to Belfast contribution link is currently being re-engineered with new shf link equipment and with standby equipment. A 6-channel over-video system (six 15 kHz programme channels) is also being incorporated into the system.

MF and LF Radio

Destaffing

The destaffing of mf stations continues and we are at present negotiating an agreement with the ABS for the destaffing of Brookmans Park and Droitwich.

Moorside Edge

The re-engineering of Moorside Edge has heralded the construction of the first new mf transmitter building since 1939. The new structure is a major departure from the traditional construction methods and associated grandeur of pre-war design and comprises a semi-industrial concept of half brick and half metal cladding on a steel frame. In size it is one-sixth of the building it replaces whilst the total effective transmitter power has been increased by 100 kW. All heating is provided from transmitter waste heat.

A complete re-design of the aerial system has been made with one of the original masts being dismantled and re-positioned to form a directional radiation pattern. The net aerial gain is +6 dB thereby providing improved reception, particularly in the previously under-served area around Liverpool.

Stagshaw

A new building has similarly been provided at Stagshaw, and the aerial system has been modified. In this case, however, rather than supply new transmitters at high cost, the Doherty transmitters from Lisnagarvey and the original Stagshaw installation have been transferred to the new building.

Droitwich

A new 100-metre mast was completed in August and will form the new aerial system for the mf services when a second 100-metre mast is erected in the spring of 1984 on the site of the existing tower, which is to be demolished.

The building work to form new transmitter and staff accommodation is in progress and the first phase is due for completion this Christmas. The project completion date is Christmas 1985.

Burghead

An estimate has been prepared for replacement of the old building, on the basis that it will be very similar to Moorside Edge. Construction is scheduled to start in April 1984, for TCPD access during December 1984. A full planning application is to be made in October 1983 in order to leave adequate time for dealing with any objections.

Low-Power Stations

A number of low-power mf stations have come into service during the last year, and tests have been completed in the search for a replacement site for Lots Road - negotiations are proceeding for a site in Peckham.

A number of 5-programme combiners (to include ILR) have been brought satisfactorily into service.

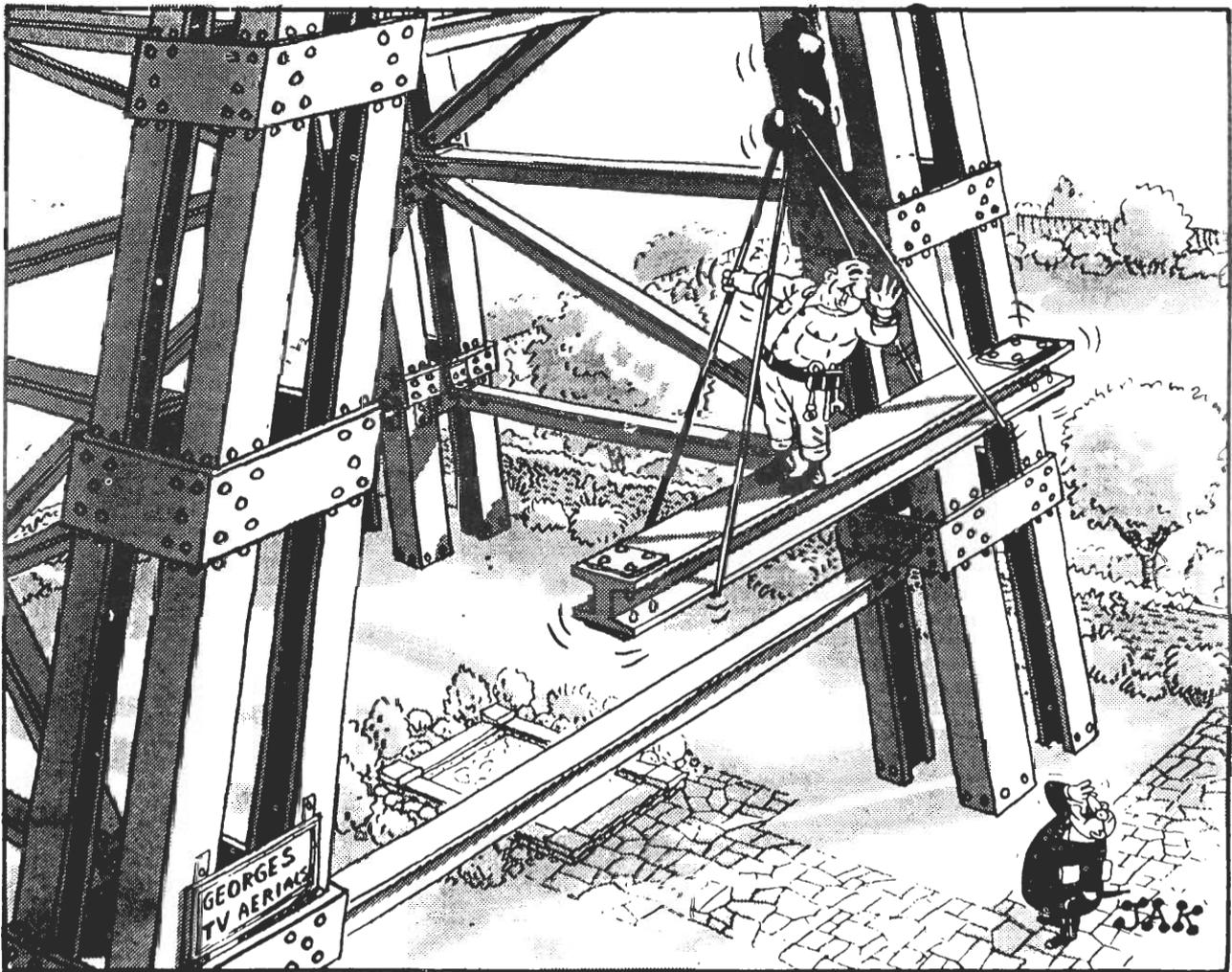
HF Radio

In December of last year the new automatic control system at Skelton A was brought into service. It is similar in design to that provided for Woofferton and to the equipment which is being planned for Rampisham, and is based on the Designs Department 'watch' system. The equipment automatically selects aerials, feeders, and programme sources, and controls transmitter switching. In addition the system provides a wide range of monitoring information.

The work at Rampisham is proceeding.

The first of the new aerial arrays has been erected and the first two Telefunken transmitters have been installed. Problems are being encountered with the 500 kW transmitting valves but the manufacturers, Thompson Tubes, expect to resolve the problems shortly. Subject to the valve problems being overcome the first transmitter is due for service by the end of the year.

The first phase of the scheme for re-equipping the power station on Ascension Island started at the end of last year. The overall scheme involves the removal of seven 900 kW diesel-alternator sets and the installation of six 1.4 MW sets. The first of the new sets is now in operation and the second one will be fully commissioned by the end of the year. The third set is due for installation early in the new year. In addition, TCPD have been involved in installing an overhead power line to provide the new Royal Air Force establishment on Ascension Island with a 1.4 MW capacity electricity supply.



“ACED say it's not strong enough for Vhf”

With acknowledgements to the 'Standard'.

Cartoon provided by ACED.

TELEVISION

London Studios

Television Centre

Phase I of the work on TC4 - the refurbishment of the vision and production lighting facilities - was completed in September. The planning of Phase II sound and communications will start next year.

Work on the Video Effects Suite which is currently being built in the old puppet theatre, will be completed this year. This will be an 'off line' area which will be equipped with a very flexible processing system, using a computer to memorise control settings and routing arrangements. These settings can be recalled at speed during a run through the programme so that pre-arranged and rehearsed video effects can be added to the programme on tape.

The Video Rostrum area, containing the new video rostrum and RD animation store which has suffered considerable delays, will now be available for service in November.

The refurbishment of the News Studios continues: N3 has returned to service and the enlargement of N2, which required the removal of a main steel column, has reached the stage where technical installation is in hand. N2 returns to service in the spring of 1984 to be followed by N1 in the autumn.

Installation of the new Network Control 2 with its integral Continuity commenced in the autumn of 1982 and handover is expected in early 1984. The area will be equipped with a Grass Valley 1600-4S mixer, with real-time automation capability and will also be equipped for stereo sound working. During the 1982/83 Christmas break in the OU transmissions the automated early morning transmission facilities were modified to take account of the change from BBC 1 to BBC 2 due to Breakfast Television. Further changes are expected this year, and both of these projects have adversely affected the Network Control 2 time scale.

The new microprocessor controlled EMX in the International Control Room (ICR) came into service in September 1983. Planning work for a limited refurbishment of ICR commenced in mid-1983. This includes provision of control facilities for two additional EBU circuits, which will be provided by the ECS satellite during summer 1984.

Phase 1 of the rationalisation of the old standards convertor area was completed in

March 1983, providing accommodation for the new Computer Graphics Area.

Lime Grove

Current work includes the refurbishment of the Music Studio, which will have an enlarged gallery and a Neve custom-built 48-channel, 24-track desk. There will be new 24-track A800 recorders and twin-track A80s.

Breakfast Television started from Lime Grove in the newly created Topical Production Centre on 17 January this year. Again additional facilities had to be provided and as foreshadowed last year these included a new video tape area containing 2-inch, 1-inch and 3/4-inch machines and two telecines. Initially, two portable single camera units were provided, and for graphics a Quantel 7001 paint box and a 6001 library store were installed together with a Chyron character generator. Two Hewlett Packard series 44 computers were installed to provide a complete Programme Script and Information service and additional offices were built. The installation includes an extensive multi-level routing system, which was purchased from Utah Scientific as they were the only firm who could deliver in the very short timescale.

Regional Studios

Pebble Mill

The refurbishment of the studios is proceeding as planned, Studio C being complete and Studio A due to return to service on 12 November. The film dubbing theatre has been refurbished and an adjacent new Sypher theatre is under way.

Manchester

The conversion from Quadruplex VTRs to Helical is now complete, including the provision of two replacement MVTRs. An additional transportable 1-inch VTR is to be provided at the beginning of 1984. Additional 3/4-inch editing and transmission facilities are due to be provided for both Network and English Regions use by early next year.

Bristol

Studio A general refurbishment has been completed with the exception of the lighting, wiring and ventilation, which is due to be carried out in 1985.

Belfast

Technical installation is now proceeding in the newly constructed television studio to replace Studio 8. Work started on site in August 1983 for the installation of a new

routing system and Television Continuity. Completion is expected in mid-1984.

Glasgow

The Glasgow Central Technical Area installation is now in its final stages. User training and handover has been delayed by grading and staffing negotiations, but it is now anticipated that the area will be in service by the end of 1983.

The proposal to develop the old Studio B as a news dubbing suite has been abandoned and it is now planned to redevelop it as a remotely controlled single camera studio (Studio C) with provision to accept additional cameras so that it can be used whilst Studio A is out of service for refurbishment. Studio A refurbishment has therefore been deferred until early 1985 to enable Studio C to be completed first.

Cardiff

On 1 November last year the Welsh 4th Channel S4C (Sianel Pedwar Cymru) opened with about half its 22 hours a week of Welsh programming provided by the BBC. In order to provide this considerable increase in output new premises were acquired at Gabalfa just over a mile away from the existing Headquarters in Llandaff. Video tape facilities at Llandaff were expanded and re-equipped with 1-inch helical C format VTRs, a new control room was provided for the annexe studio and a lightweight camera was provided in the continuity. Two film dubbing theatres are being provided at Gabalfa and an additional 2/3-inch camera CMCR was transferred from the OU and refurbished.

Portable Single Camera (PSC)

Following union agreement there is an increased demand for the provision of this equipment which consists of an Ikegami camera and Sony high band U-matic recorder. Eleven sets have already been supplied and a further 12 are due to be issued to the Topical Production Centre and the Regions during the coming year.

Two crews have been equipped at Ealing. Here the gamma of the cameras has been modified to give the typical 'film look.' They have been used mainly for information, training and familiarisation courses.

The use of this equipment at Ealing has led to discussions relating to the need for post production equipment, and we will be conducting a field trial of the Editon synchroniser, a German made unit which will enable traditional film cutting and dubbing techniques to be applied to PSC material.

Computer Graphics

Installation of the computer graphics equipment at Television Centre was completed in time for use during the General Election Programme. It comprises two DEC VAX 11/750 processors, three Quantel 7001 painting systems, visual display units, data communications equipment and extensive facilities for routing and monitoring data, video and audio signals. The VAX processors may either be operated independently or in a main and standby configuration.

The painting systems may be operated as 'stand alone' or in conjunction with one of the VAX processors. They are used in this way either when access to a large data base is required or the range of the painting system needs to be extended. Television Service Computer Graphics staff have developed software for both the painting system and the VAX processor to provide a comprehensive graphics facility. Although principally used by Current Affairs Group it is planned to widen its use to other Television Production Departments.

Quantel 7001s are also in use at Lime Grove Topical Production Centre whilst Manchester has been equipped with Logica Flair.

Ceefax

During the last year interface equipment has been provided to allow the automatic reception of data from the Stock Exchange, air and travel information and our own General Election Computer system.

A new sub-titling unit has been established in Edward House, Glasgow, which will eventually be capable of titling up to 40 hours of programme material per week. Three self contained sub-titling work stations have been installed in Glasgow and the two original work stations in London have been replaced. The equipment used is a Digital Equipment Company PDP 11/03 computer which allows the titles that are being prepared to be displayed superimposed on the picture as they will finally appear.

Telesoftware

To transmit a computer program on Ceefax ('Telesoftware') it is not sufficient merely to transfer the original written program on to Ceefax magazine pages. The program must be presented in the correct telesoftware format, including the addition of 'escape sequences' etc. as determined by the approved protocols. This can be done by hand, but is a very specialised and time-consuming process.

In order to perform this function automatically, and also to automatically load the correctly translated pages on to Ceefax as required by the Telesoftware Organiser, a BBC model B microcomputer with disc drives has been provided, and a translation program was commissioned by SCPD and written by Logica Limited in collaboration with SCPD, Designs Department, Research Department and Acorn Limited.

This equipment, together with the necessary interface equipment to feed into the main Ceefax computer went into service successfully at the beginning of March 1983.

Television Recording

This last year has seen the consolidation of the change from quadruplex to helical recording standards. There has also been a considerable increase in the numbers of BVU machines ordered. Some 50 'C' format and 90 U-matic 'H' machines have been approved during the year bringing the total number to 167 'C' format and 154 U-matic 'H'. Ampex now carry out BBC modifications prior to acceptance and this has streamlined the acceptance programme of 'C' format machines.

Numerous demonstrations of ½-inch component recorders have been organised and although many problems remain they show promise for some applications in the future.

Four new Mobile Video Tape Recorder vehicles are now in service. The conversion of the mobile fleet from quadruplex to helical is almost complete with a major refit being currently carried out on the Cardiff vehicle. Initial discussions have started on the design of a new VTR mobile for Kendal Avenue.

Post Production facilities have been augmented at the Centre to reflect the change from quadruplex to helical recording standards and at present, of the six three-machine edit suites in service, only two are quadruplex. A fifth helical suite will enter service very shortly. The planning for a sixth suite at TV Centre and similar suite for Glasgow and Birmingham has started.

Film

Despite the potential impact of the Portable Single Camera there has been little slackening in the demand for conventional 16 mm film cameras and another 12 Arri SR cameras have been provided this year including three of the high-speed version.

There has been a continuous and heavy workload in the field of editing equipment. Although mainly confined to standard equipment the first two of the editing tables with

video cameras have been delivered. These produce VHS or U-matic copies from film (including negative film in one case) and are for library use and cinemascope preparation work.

Film dubbing area refurbishment has been carried out at Bristol and Birmingham, and is in progress at Cardiff, Theatre X Television Centre, and Television News. The Television News suite will be flexible enough to handle ENG, film and 'C' format VTR requirements.

Telecine

Eight sets of cubicle equipment for Mark III telecines have been constructed during the year. Two sets have been installed in Lime Grove Topical Production Centre, two in Television News, one in Enterprises and the remaining sets are destined for Bristol and Main Block Telecine. The Mk III machines supplied have been a mixture of 'Jumpscan' and 'Digiscan'.

Detailed planning has continued for the Film Post Production Area which is the electronic equivalent of the film printing laboratory, where film material is assembled and transferred to video tape with all necessary effects, captions, and pre-programmed colour corrections added. The choice of machine to replace the existing adapted Mk II telecines for cinemascope showing is still under discussion and review, with the use of field store manipulation a possibility.

Following the combining of telecine and recording staff under a re-organisation, a video tape cubicle is being installed in the previously exclusively telecine area, as a forerunner of the video tape recording bank to be provided later.

Television OB Vehicles

Type 5 CMCRs

This year has seen the completion of the tenth and last of the Type 5 CMCRs. Advance planning for the project began seven years ago and the first contracts were placed in mid-1977. The first vehicle went into service in August 1979 and the final one in January 1983.

Work then immediately started on a major updating of the first two vehicles by fitting Grass Valley vision mixers, as installed in the other eight vehicles. The changes are substantial as they take into account the consequences of an increase from 12 to 16 input channels and changes to the preview system. This work was completed at the end of July and all ten vehicles were in service

from early August. They are deployed in London, Manchester, and Birmingham and form the major Television OB fleet for London and the English regions.

Planning has commenced for replacement of the major vehicles in Scotland, Wales and Northern Ireland with an updated version, currently known as the Type 6.

Colour Roving Eye

Another vehicle replaced this year is the Colour Roving Eye. Although the smallest vehicle in the fleet, it is in some ways the most difficult to design.

It is required to have a low profile so as not to obscure the spectators' view at sporting events. It needs to be very stable on rough ground as the cameraman may be using his 30:1 zoom lens at the end of its range whilst travelling at speed. It must house a driver, engineer and cameraman, as well as technical equipment, which includes a choice of three radio-link transmitters and video-tape capacity. As it sometimes operates in a static mode with the engine stopped it needs to be mains-powered and requires to be air-conditioned either from mains or engine power.

Finally with a gross weight over two tons,

it must attempt to keep pace with the high acceleration of a racehorse which can achieve its maximum speed of 40 mph in a few paces from rest. Fortunately, from the point of view of the cameraman on the roof, this requirement cannot be fully achieved.

After exhaustive tests it was again necessary to use a foreign vehicle, the Citroen Safari, chosen for its load-carrying capacity and suspension system.

Open University

Following the transfer of the old vehicle to the BBC for use in Wales, a new two-camera unit has been built for the Open University. This vehicle, which was handed over in April 1983, is smaller than its predecessor, reflecting the changing pattern of OU operations. It will be operated in conjunction with two existing cars which carry portable single cameras.

When required the cameras will be transferred to the new vehicle which will then be able to carry out vision and sound mixes and recording. The new vehicle is a commercial van which has been fitted with a second body skin incorporating heat insulation material. It is fully air-conditioned and has been kept as small as possible, consistent with staffing requirements, in order to ease site access and parking problems.

RADIO

Over the last few months many Radio Broadcasting projects have come to fruition: three new continuity suites, four new current affairs studios complete with recording and editing annexes, a new solid state switching system for London Control Room, and a series of studio refurbishments and control desk installations in Broadcasting House. And after 61 years of radio broadcasting a proper OB base has been established in London adjacent to the Television OB facility. We now have an OB 'home' that does justice to a fleet whose capability surpasses any other in Europe and arguably in the world.

In June Radio O&M Group was enlarged to include Programme Operations, Computer Services and the Radiophonic Workshop and reorganised in its new form under a Controller.

Network Studios & Facilities

The refurbishment of Network Radio studios has continued, with General-Purpose studios forming the bulk of the work. The studios brought back into service during the past year include B9, B12, B15, B16, 3K, 3B, 4C, 4D, 5A and MV7 in London; Belfast 6; Cardiff 4 and 5; and St. Davids Hall, Cardiff. The total number of GP desks ordered is now about 70.

The showpiece 'state-of-the-art' drama studio at Maida Vale (MV7), now known as the Val Gielgud Studio, is in service. It is the first drama studio to have multi-track facilities and the track routing is carried out by an NTP solid state matrix. The new BH News and Current Affairs studio suite has been completed: this was a complex project from both a building and technical point of view.

Solid State Logic desks remain the standard for music studios and they have been installed in Maida Vale Studio 1 and Birmingham Studio 2. A further SSL desk is currently being installed at the Hippodrome.

The refurbishment of Glasgow Studio 2 is well advanced. The work has included the installation of a new air conditioning plant, the formation of a new cubicle and the installation of a Soundcraft mixing console.

The first set of 'maxi-con' equipment has

been installed in Continuity G in Broadcasting House and a further two sets will be installed in two new continuities in Egton House at the end of the year.

The BH Newsroom refurbishment will be completed in December after considerable delay due to the discovery of asbestos in the main cable risers.

Two Stereo Control Vehicles, SCV3 & SCV4, have been completed: SCV3 is in service with Radio OBs in London and SCV4 in Scotland. Each vehicle is equipped with a Solid State Logic 40-channel computer-assisted desk, a 24-track tape machine and three ¼-inch stereo tape recorders. A multi-track recording vehicle capable of working with any of the stereo control vehicles has also been completed.

The Digital Control Vehicle is now in its final stages of construction and in spite of its expanding sides, excellent sound isolation figures have been achieved. It is anticipated that factory acceptance of the Neve digital desk will start at the end of October and that the vehicle will enter service during the first quarter of 1984.

Early planning work has just started on a further two stereo control vehicles which are to be built on articulated trailers.

Local Radio

Three new stations, Cornwall, Devon and York entered service during the year, and Radio Brighton has undergone a major refurbishment as part of its conversion to stereo. The major refurbishment of Radio Stoke and West Midlands is nearing completion, and the technical installation has just started in the new premises of Radio Cleveland. Early planning work has begun on two new stations, Radio Shropshire and Radio Bedford and work has started on new premises for Radio Bristol and Radio Newcastle.

All stations are still being equipped with the highly successful BBC Mk III desks but it is hoped to start work shortly on the design of a new generation of desks which will be obtained from outside manufacturers.

EXTERNAL SERVICES

Bush House

The work on studio modernisation, part of the improved audibility programme, is not scheduled for completion until 1991. At the moment most work is concentrated on the third and fourth floors of the Centre Block and on the lower ground south-east wing.

The new electronic telephone exchange has now been in service for nearly a year. Its introduction was fairly painless and the new facilities provided are much appreciated.

Satellite Distribution

Three overseas relay stations - Cyprus, Masirah and Singapore - are now fed via an Intelsat satellite over the Indian Ocean. The up-link, from British Telecom's Madley earth station, provides six 128 kbit/s channels, one being used for the World Service and the others for vernacular services. Reception equipment at the station provides for five channels at Cyprus, and four each at Masirah and Singapore. The digital satellite links provide excellent quality, and to ensure that this is not negated by inferior land lines British Telecom have provided high-quality audio lines between London and Madley.

Two new stations scheduled to open in 1986/87, in the Seychelles and Hong Kong, will also receive their programmes via the Indian Ocean satellite, and negotiations are now taking place for the use next year of an Intelsat Atlantic satellite to distribute programmes to Ascension Island and Antigua.

The solid-state switching matrix for the satellite feeds is controlled by a computer system based on three Zeus microprocessors supplied by Designs Department. This system will also accommodate the new satellite feeds when they enter service.

Rampisham/Skelton

As part of the improved audibility programme eight new 500 kW transmitters are being installed at Rampisham in order to provide better signals in areas where at present we are not competitive, i.e. Russia and Central and Eastern Europe. Four 250 kW transmitters are being transferred from Rampisham to Skelton 'A' and significant rescheduling has had to be undertaken to accommodate these changes.

The hf automation programme has continued and during the year the automatic control system for Skelton has been installed and commissioned. Planning work for the automation of Rampisham has now reached an advanced stage.

Schedule Unit

The installation of a computer data base for Schedule Unit is virtually complete: this will replace a vast amount of paper! It will hold all the international administrative data as well as information from the Reception Analysis Unit and band scanning data from Crowsley Park. The computer system will assist Schedule Unit to keep up with the situation as the frequency bands become even more congested.

Hf Planning

The WARC (hf) Conference Part I takes place in Geneva in January/February 1984 and the External Services' involvement has been steadily increasing in the planning phase of this event. It is at this conference that the technical criteria will be established preparatory to the Part II Conference scheduled for October/ November 1986, at which the actual frequency assignments will be hammered out. It remains to be seen how the very sensitive subject of jamming is taken account of! We will attend as part of the UK delegation organised by the Government's Radio Regulatory Department, which has recently been transferred from the Home Office to the Department of Trade and Industry.

Monitoring

The expansion of satellite monitoring has continued at Caversham and Crowsley Park. Responsibility for the Foreign Broadcasting Information Service (American) 5 GHz 4-metre dish installed by TCPD at Crowsley Park has allowed significant monitoring of Russian television, radio and facsimile transmissions as well as other broadcasters' services.

A scheme has been approved by the BBC and now awaits final Treasury approval for the modernisation of the Monitoring Service operation at Caversham. Included in this development will be the provision of a computer system, the development of satellite broadcasting monitoring and improvements to the shortwave reception.

The computer will be used to edit, file, list and retrieve the monitor transcripts and radio telegraphy items for distribution to government departments, news rooms, and to the EDS at Bush.

Included in the scheme is a new extension to house the computer, a new listening room, and general improvements to the existing accommodation. It is also planned to carry out a major refit of all building and technical services.



RESEARCH AND DEVELOPMENT

Direct Broadcasting by Satellite

After considerable activity within the EBU an agreed specification for the DBS signal was produced at the June meeting in Geneva; this has now been issued to industry and sent to CCIR. The specification is based on time-compressed component video using the 'C' format, with packet multiplexing for the digital sound/data.

Experimental packet multiplexing equipment for a 5-channel 2048 kbit/s 'A' format system has been commissioned and equipped to provide two sound channels. Modifications are in hand to enable the equipment to be used for test purposes in conjunction with a C-MAC codec. The construction of further experimental equipment to validate the UK specification is being planned. A programme of work is also under way to evolve a satisfactory method of scrambling for sound and vision with associated encryption control data.

Designs Department, like other areas of the BBC, has been actively involved in the implications of the C-MAC specification and has looked into methods of producing both the transmitting and receiving equipment. In particular it has looked at the possibility of producing the sound decoding part of the receiver in a cheaper form.

Digital Television

Transmission

Reference was made in last year's review to the fully engineered 68 Mbit/s transmission system being produced as a joint project between Research and Designs Departments. The three 68 Mbit/s PAL equipments for the London to Birmingham field trial have been completed and commissioned. Signals have been passed through the three codecs in tandem and twice around the loop from London BH to Pebble Mill and back. These proved the cascability of the sub-Nyquist/DPCM system; the effectiveness of error correction (using artificially inserted errors) was also shown. Testing experimental 140 Mbit/s YUV equipment will also be included in the field trial.

Studios

During the year work has continued, in cooperation with the EBU, on the derivation of the parallel digital interface for video signals.

With the proposal to use C-MAC for the satellite transmissions, work has been done on producing equipment for handling the video signals at the DBS centre in component digital

form. To this end a prototype switching routing matrix suitable for handling digital video has been produced, as well as methods of carrying digital video around a studio using the cheapest possible cables. A simple continuity mixer for handling digital signals and performing many operational tasks in digital mode has also been developed.

Recording

After some early difficulty with the digital record/replay heads of the tape transport a new head stack from Sony Broadcast Ltd. has been supplied and good replay of digitally recorded pictures has been achieved. The Research Department recorder can now be used as a source of recorded digital YUV material. Separate studies of synchronisation and error protection requirements for digital video tape recorders are continuing.

Digital Audio

Studios

In the audio field, work continues on digital equipment and tests are continuing on the various analogue-to-digital converters which are appearing on the market.

Designs Department is also carrying out work in connection with producing a bi-directional interface between the Neve digital desk and the Telefunken MX80 digital recorder. This will be used in the digital control vehicle.

Transmission

During the early part of the year a field trial was carried out using NICAM 3 between Manchester, Birmingham and London and considerable experience was gathered concerning the performance over radio links designed for carrying analogue television signals. Certain faults were highlighted, namely that the radio links tended to have very long breaks, causing disturbances. In these investigations a novel use of MASS (the Modular Audio Storage system described in last year's 'Progress and Achievements') was devised so that it was possible to record these random breaks and assess their significance.

The work on the 1500 MHz digital link is now reaching completion. This link will carry two channels of NICAM and the modulators and demodulators developed will be incorporated in the radio-link equipment being manufactured by CML. The design problems on this project have been considerable due to the stringent Home Office requirements placed on the spectrum usage.

Optical Fibre Transmission

A further trial of the 270 Mbit/s YUV system has been carried out between Lime Grove and Television Centre, this time featuring 'down-stream' colour separation overlay. It was shown that a distinct improvement can be obtained from component - as distinct from composite - based transmission.

High Definition Television and Improved Displays

A camera has been modified to 625/50 1:1 (sequential) scanning followed by conversion to a conventional 625/50 2:1 output standard. This has shown a basic improvement in vertical resolution from the camera tube, and the possibility of vertical aperture correction using picture lines without movement problems. Higher field scan rates will be investigated with a view to establishing facts that might influence the choice of a world HDTV studio standard.

In the improved display work, an adaptive system using a motion and vertical detail detector has been completed to switch between motion and detail algorithms.

Two-Channel Sound With Television

Following encouraging preliminary laboratory tests, discussions have taken place between Research Department, TCPD, Transmitter Group and Designs Department in order to plan further joint tests. Choices of carrier frequency offset, modulation method and filtering have been made for a possible digital two-channel system.

Work has started on the design of a two-channel version of sound-in-syncs so that when stereo sound is required for terrestrial television, the distribution system will be available. This development is being undertaken in collaboration with Pye TVT. It is proposed that the sound coding system, which will be a form of NICAM, will be instrumented by means of a ULA (uncommitted logic array).

Line Array Telecine

A further collaborative agreement with Rank Cintel has been signed to cover continuing work on the ADS-1 telecine, which should soon be in production, together with work towards a next generation telecine having higher resolution sensors and more facilities.

Electronic Graphics

The Television Centre Flair equipment has been converted to work at a sampling frequency of 13.5 MHz. The Research Department Flair equipment was used as a remotely controlled high quality character generator for indicating the State of the Parties in the

General Election programme.

The Breakfast Time clock which appears regularly on our screens is one example of the range of dedicated graphics units produced by Designs Department. The work which was proceeding last year on the production, entirely digitally, of Test Card F has now been finalised and an acceptable result produced.

Uhf Planning

The issue of the initial site briefs for Phase II/ IIE relay stations has continued. Transmission characteristics have been assessed for a number of self-help active deflectors.

In connection with Ancillary Services an assessment of the interference potential of Land Mobile Radio base stations and mobiles with radio-microphone operations was provided for the activity resulting from the Merriman report.

Vhf Radio Site Tests And Surveys

Site tests and surveys have continued for National Network and Local Radio Stations.

Test were carried out at Wenvoe to assess the benefits and possible adverse effects, particularly on multipath interference, of re-engineering the Band II transmissions to mixed polarisation. No significant problems of multipath propagation degradation were identified.

Band II Planning Conference Preparations

UK draft frequency proposals have been forwarded to the EBU for inclusion in a pre-Conference planning study being co-ordinated by the CEPT.

Performance of Analogue Networks

Work continues on the development of methods of automatically measuring the performance of analogue distribution networks carrying audio signals. A suitable test generator is being developed and an automatic measurement system has been built in prototype form ready for field trial by Communications Department.

Headphone Limiter

The work started last year on the headphone protection device is progressing satisfactorily. The circuit has now been put into a thick-film form and incorporated in a suitable encapsulation so that it can become directly associated with the headphones it is protecting.

Computer Aided Design

During the year there has been an increase in the amount of computer-aided design in Designs Department, particularly in the area

of printed-circuit layout. The Department now has two Racal Redac Colour Cadets used for laying out printed-circuit boards. These machines have enabled a much higher packing density to be achieved, as well as a greater accuracy of track width and spacing, giving an overall result which is easier to manufacture consistently.

Uncommitted Logic Arrays

Designs Department has started to look at the possibility of using uncommitted logic arrays

(ULAs) for specific applications, and initial work has started on such a device for coding sound signals to be used in the sound-in-sync equipment. This work is being undertaken in collaboration with Hirst Research (GEC) and the Department is now in a position to carry out much of the circuit simulation on its own VAX computer. Once this technique has been proved it is hoped to put further functions on to the ULA chips, and this technique should prove valuable as the digital era spreads more into audio and video.

NEW ACCOMMODATION AND STUDIOS

The Langham

At the end of last year, the BBC appointed Norman Foster as Architect for the design of a new radio broadcasting centre to be constructed on the Langham site. Foster is an Architect of international repute, having designed a number of prestigious buildings throughout the world. This year he was awarded the RIBA Royal Gold Medal for Architecture. We thus have a top-ranking Architect to design what is regarded as one of the most important current building developments in London.

A Project Control Group has been set up under ADE to work with Norman Foster. The main task so far has been to establish a strategic brief for the project to enable the Architects to proceed with preliminary design work. Design options are due to be presented to the BBC at the end of this year, after which more detailed planning will be aimed towards a planning application in the latter part of 1984. This is a most critical stage, since the Langham is a Grade 2 listed building and permission for its demolition will not be granted lightly. It is vital that the new building is seen by the planning authorities as a worthy successor to the Langham on this important site. All being well, building work should commence in 1986, with first occupation in 1989 and completion in 1992.

Woodlands

In July, BBC Enterprises moved into new purpose-built accommodation at Woodlands, and SCPD staff are now moving in. The restaurant and BBC Club are complete and open.

The ground floor of the building contains comprehensively equipped technical areas which replace inadequate facilities at Lime Grove and Villiers House and will enable Enterprises to cope with the growing demand for BBC television programmes during the next decade. Facilities include a video tape editing suite, five video tape cubicles, telecine, video cassette recording area, film cutting rooms, review theatre, sound transfer and a music and effects suite for sound post-production work. A central technical area contains equipment for monitoring, communication, pulse and test signal distribution and programme routing.

Television Centre Stage 5

Planning is now proceeding for the Television Centre Stage 5 development – the last major development that can be accommodated on the site. It will be constructed in two phases;

a block taking up about half the area between the end face of the Spur and Wood Lane, housing a recording complex which will bring together most telecine and video tape facilities on the site, and a second block currently planned to house a replacement TV Theatre. Financial approval for the first phase building is expected shortly, and a feasibility study for the Theatre block is under way.

Lime Grove

Re-construction and adaptation work to provide accommodation for the Breakfast Television programme was completed successfully to a very fast timescale and consequential adaptation is now nearing completion to provide a comprehensive Topical Production Centre.

Maida Vale

The drama studio is in service and well liked by Radio Drama Department.

Scenery Construction Workshop

Construction at Wa's Farm Road (West London) is well on and a 'topping-out' ceremony is due to take place on 21 October. Construction for a storage and workroom complex is expected to start on site in the Autumn of 1984.

Brookmans Park: Accommodation Redevelopments

The Stage II works are nearing completion and 170 TCPD staff are now accommodated. The current contract is being extended to include development of a buffet/restaurant within the existing building. Office accommodation and a permanent restaurant building, adjacent to the new car park, are now being planned.

Woodnorton

The final phase of the dormitory development is under construction on site and is expected to be finally complete by late-winter/early spring 1985.

Local Radio

Radio Devon was opened by DG on 30 September and Radio Cornwall on 3 October by The Chairman.

Regions

Manchester

A purpose-built BBC Club is under construction adjacent to the Network Centre complex in Oxford Road, and is expected to open by the end of the year.

Newcastle

Civil engineering work is due to commence on the Fenham Barracks site this month. Detail design work for a combined regional television and local radio station is proceeding in parallel.

Bristol

Construction work for Phase I of this development, which includes the Radio Bristol studios, a joint newsroom, and scene dock improvements, is well under way for completion next spring. Construction for Phase II, the new post-production and restaurant block, is due to commence on site late-spring/early-summer 1984 with a planned final completion date of early 1987.

Edinburgh

Planning work has just re-commenced on a new design for a Broadcasting Centre on the BBC site at Leith Walk, and it is hoped that

approval for the design will be given in Spring 1984.

Glasgow

Construction of the new office and rehearsal block frame is well under way for a planned completion of mid-84.

Bangor

An extension has been built on to Bryn Merion to accommodate new technical facilities.

Belfast

Construction of the new television studio is now complete and technical installation has begun.

Londonderry

The building contract to provide a new facility for Radio Foyle is due to be let in October for a start on site in November 1984.

Computer Systems

Business systems continue to expand and two new ICL 2988 processors have been installed in Sulgrave House. The line network associated with the main frame (large computer) activities has become increasingly more inconvenient to modify or expand and to overcome this two pairs of 54-channel Time Division Multiplexers have been added from Broadcasting House to Sulgrave House. The use of distributed processing in some installations will allow for easy expansion and flexibility. Computer developments in BBC News-rooms are under way, with the Topical Production Centre being the first of such systems in service. Hewlett Packard 3000/44 computers, each with 60 ports for VDU and printers allow for easy monitoring and production of script. News agency feeds can be fed straight into the system.

Major London PABX Replacements

Most of the major projects undertaken by Communications Department are described elsewhere in this Report. One that is not is the new PABX for Broadcasting House which serves 4500 extensions for 30 premises in Central London, and was inaugurated by DG on 26 August. The PABX was supplied and installed by Philips Business Systems, and the associated telephone instruments, wiring and installation was completed by British Telecom. Its opening marks the completion of the scheme for replacing the major London exchanges, including Television Centre and Bush House, providing new and improved facilities for a total of 12,000 extensions. Among the new facilities provided is Direct Dialling In (DDI) from the public telephone network direct to the extension without the assistance of the operator.

ENGINEERING TRAINING

A new job category – recording operator – has been introduced in the video tape and telecine areas, and this has required that we establish a new training progression. The first trainees in this category are now in residence at Wood Norton.

The production of low cost video training tapes and the expansion of the resource-centre concept together with package learning techniques are now beginning to have a small but significant impact on training, and this year the B Part 1 course for TAs was conducted entirely through the medium of learning packages.

Avon Wing, the purpose-built 1600 sq. metre building for Engineering lectures, became operational during this year. The transfer of the engineering training in Radio, Communications, Computers and Fundamentals to the new building was completed successfully and the building has been well received both by staff and trainees.

Approval was given during the year for a new 150-bed dormitory to replace the war-time dormitory blocks and some temporary

accommodation built in 1963. This new facility will provide single-room accommodation in a similar style to the Ashbridge and Bishop blocks.

RECRUITMENT

Compared with the previous year the number of technical recruits required by the BBC has doubled and, as a result, the resources of Engineering Training Department have been stretched to the limit. The recruitment of the staff is well under way and all requirements should be met by early 1984.

This success is due both to the very hard work of the recruiters and to the advantage we have of having the whole of the United Kingdom on which to draw in order to fill our vacancies. This enables us to offer a candidate to a number of interested departments, thereby avoiding the loss of a potential operator or engineer who is considered marginal for one area but suitable elsewhere.

The future recruitment of all categories will become increasingly difficult as, once again, our entry rates of pay are beginning to slip behind those of some of our competitors.

