

ENGINEERING

AUTUMN 1989

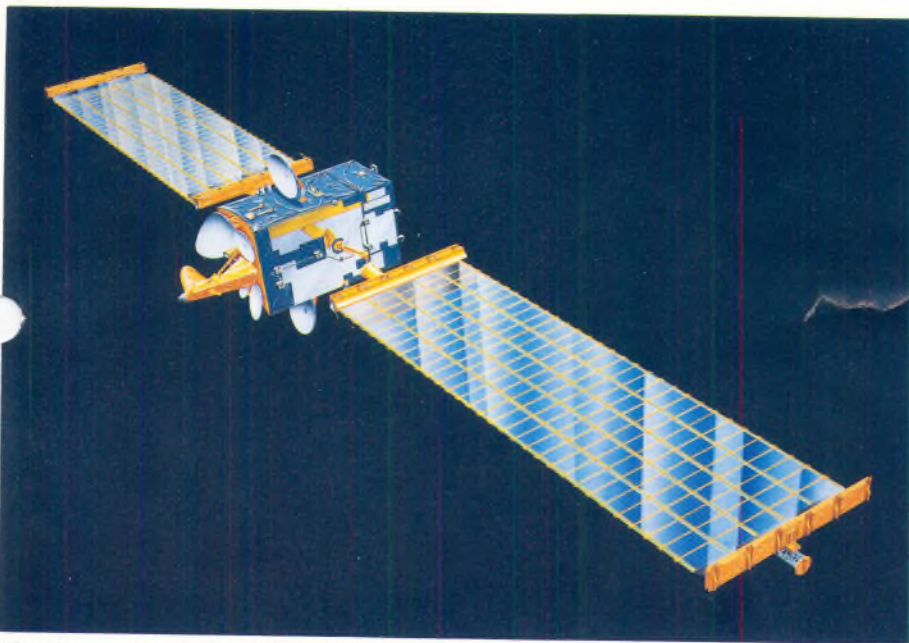
No 38

ENTERPRISES SIGNS OLYMPUS SATELLITE AGREEMENT

BBC Enterprises has signed a five-year agreement with the European Space Agency (ESA) to provide them with eight hours of television and other programming per day. The programmes will be carried at prime time on the European Channel of the recently-launched Olympus 1 satellite. This is a large multi-purpose, high power, communications satellite which was built for ESA by a consortium led by British Aerospace.

The BBC Olympus service — to be known as The Enterprise Channel — will be based initially on the existing BBC TV Europe service, which is a simultaneous relay of BBC 1. Ultimately however, and certainly within the first year, Enterprises intends to develop a new schedule to reflect the innovative, experimental and European nature of the channel.

The Olympus project is described in some greater detail on page 4.



The Olympus 1 satellite (photo: British Aerospace)

Charlie Sandbank honoured by the SMPTE

Deputy Director of Engineering, Charlie Sandbank, has been awarded a Fellowship of the Society of Motion Picture and Television Engineers (SMPTE).

He will receive his award at the SMPTE's 131st Technical Conference, to be held in Los Angeles in late October. Also receiving a Fellowship will be former Director of Engineering, Dr Bryce McCrirrick.

The Los Angeles Technical Conference will commemorate a hundred years of film and fifty years of television in America.

Among the speakers will be another former Director of Engineering — Sir James Redmond — who will deliver a presentation on the history of broadcasting in the UK.

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The closing date for stories to be
included in the winter issue
(No. 39) is 24 November.

Mike Meyer

TRANSMITTER NEWS

The following services opened
between 1 July and 16 September:

Television

| | |
|-------------------|--------------|
| Arisaig | Highland |
| Aviemore | Highland |
| Castle Caereinion | Powys |
| Castleton | N. Yorkshire |
| Taynuilt | Highland |

FM Radio

| | |
|------------|------------|
| Haslingden | Lancashire |
|------------|------------|

★ ★ ★

In late July, the new digital programme feed to the Channel Isles entered service (see the previous Eng Inf). About the same time, Rowridge (Isle of Wight) started broadcasting from a new directional aerial system, which offers mixed polarisation.

On 30 August, the frequencies of Radios 2, 3 and 4 from the Bath relay were each increased by 200 kHz. This is to allow further FM services to be added over the next few years. And on 31 August, the Radio 4 FM transmitter at Limavady, Co. Antrim, began broadcasting in stereo.

On 13 September, Pontop Pike started transmitting from a new aerial system, also offering mixed polarisation.

LICENCE AGREEMENTS

Two licence agreements have been struck since the last issue of Eng Inf.

The first of these, with **Eddystone Radio**, broadens their range of ancillary equipment for Band II installations. The deal encompasses the MN1/15 Programme Failure Monitor and PS2/163A Stabilised Power Supplier (see below), along with two unequipped Equaliser Chassis, CH2/3 and CH2/4.

The second licence covers the set of enhancements for Mk III telecines, comprising the 'Festival' Burn and Shading Corrector (UN26/604) and P.E.C. Head Amplifier (AM1/616) as well as the RP3/511 Shot Change Detector. The agreement for this

equipment is with a new company called **Foster Dene Ltd**, which has been set up specifically to handle these items.

The staff who have formed this company know the units well. They had formerly bought them from the two other licensees — Digi-Grade Systems Ltd and Digi-Tel Systems (UK) Ltd — for installation in telecine machines based mainly in the United States. (Cintel also holds a licence for the Shot Change Detector.)

For further details of these or other agreements, or for information or advice on any aspects of licensing, please contact the D&ED Liaison Engineer, Peter Jefferson, on AH 375.

PS/163 Stabilised Power Supplier

This unit was originally designed in 1974, specifically to power the AM7/11, 12, & 13 series of audio amplifiers. Since then, it has undergone a number of modifications, albeit of a fairly minor nature. Thus, the 1989 model is substantially the same as the fifteen-year-old original design.

Despite its advancing years, the design's popularity has continued. Over two hundred and fifty were ordered last year alone, and there have been no obvious signs that this level of demand will significantly decrease in the immediate future. As a result of this, and because the original design has become less economic to produce, D&ED has recently completed a major reappraisal of the Power Supplier.

The outcome is a revised unit which, although at least as good in terms of performance, features a much-improved mechanical construction. This allows the design to be produced more simply, as well as providing for easier maintenance in the field by virtue of its simplified construction.

This 'new' unit, which is coded PS2/163A, is now available through Design and Equipment Department. It supersedes the original design and will automatically be supplied against existing or future orders for the PS2/163. However, drawings for the latter unit will remain available through the usual channels, in order to allow for continued maintenance of the three thousand plus original units in the field. Note that circuit references have been maintained, so the same handbook (DDHB 3.144) may be used for both generations of the design.

For further information, please contact the D&ED Liaison Engineer, Peter Jefferson, on AH 375.

RADIO PB

The Autumn 1989 edition of the pocket booklet 'BBC Radio Transmitting Stations' is now available from EID. Please telephone LBH 5040 to order your free copy(ies).

MAIDA VALE — Studios 4 and 5 refurbished

The newly-rebuilt Studios 4 and 5 at Maida Vale will take Radio's recording facilities into the 1990s. For the first time, a BBC Radio project has been completely designed by external consultants to a brief produced by Radio Projects.

The first planning meeting was held in July 1987, when it was decided that a leading firm of studio design consultants would be commissioned to design the entire facility. Jon Gibbs (Manager Operations, Music Studios) and his assistant, Bob Conduet, then found out which commercial studios were preferred by studio operational staff. After visits to several London studios, a short list of three studio designers was compiled.

The three designers were then asked to submit an outline design, based on a brief produced by Martin Bravery of Radio Projects. Following interviews, Neil Grant of Harris Grant Associates was awarded the contract to provide the complete design package. This involved all architectural, acoustic, structural, technical, mechanical and electrical works.

The Studios

Previously, Studios 4 & 5 were identical 40-channel SSL-equipped facilities. However, in 1985, Studio 4's cubicle was redesigned by Tom Hidley, an acoustics consultant, to provide a commercial-type environment. Unfortunately, the size of this cubicle was such that there was little room left for any extra equipment or musicians! So when Maida Vale 5 required modernising, the need for a larger cubicle was obvious. Because of the existing studio structure, it was necessary to swap the cubicle and studio roles, thus creating a very large cubicle (or control room) and a small studio.

Studio 4 was also included in the refurbishment which resulted in an integrated complex, allowing either cubicle to use any or all studio areas. The final design also includes a vocal booth, a mezzanine floor in Studio 4 and a machine room-cum-apparatus room.

The Technical Features

The sound desk chosen was an SSL 4000 'G' Series with forty-eight mono and eight stereo channels, and computer automation. This is the latest version of what has become the

BBC's standard music recording desk — the 'E' series SSL of which there are seventeen in BBC service.

Other features of the new control room are: comprehensive effects and processing equipment; Boxer 4 main monitoring loudspeakers; alternative monitoring via Yamaha NS10 and Auratone speakers; MIDI routing matrix; video switcher allowing colour CCTV monitoring of studios; two Studer A800 24-track tape machines, chase-synchronised to provide 48-track capability; DAT and 1/4-inch mastering recorders.

Dimmer-controlled low voltage halogen lighting has been installed in

all areas to provide comprehensive mood lighting.

The complex entered service in July 1989. The variety of Radio 1 and 2 sessions using the facilities so far include: solo Classical guitar; 3-piece Heavy Metal band; 20-piece African band; mixing of Gilbert and Sullivan operas, and MIDI-controlled electronic pop. Everyone has learned a great deal and the end result has been fairly well received. Currently, the facilities are booked at least twelve hours a day, seven days a week, into the foreseeable future.

Martin Bravery, Project Leader
Radio Projects.



Top: Studio 4 at Maida Vale

Bottom: The Control Room of Maida Vale 5

THE OLYMPUS SATELLITE PROJECT

As featured on page 1, BBC Enterprises has signed a five-year agreement with the European Space Agency (ESA) to provide a range of television and other programming on the Olympus satellite's European Channel. Here, Wayne Dunsford of Enterprises describes the new service.

Research carried out by ESA in 1979 identified the need for a large, high-powered, multi-purpose communications satellite for experimental purposes. The Olympus programme has been designed to meet this need and over the past ten years, eight countries (United Kingdom, Austria, Belgium, Canada, Denmark, Italy, Netherlands and Spain) have committed themselves, and some £400

million, to its development. The UK's contribution has been £175 million — almost 44% of the total cost.

Encouraged by the experimental ethos of the Olympus project and, in particular, its relevance to the question of direct-to-home television broadcasting, BBC Enterprises has been very keen to play a major part in its development. The agreement with ESA was negotiated with the assistance of the British National Space Centre (BNSC) and allows us the ideal opportunity to address the pan-European distribution possibilities of a wide variety of broadcasting materials by DBS. Similarly, Olympus is an excellent platform for addressing the business opportunities arising

from the integrated freely-trading Europe of 1992.

Programme sources for the Enterprise Channel are now being explored and are likely to include business and commercial organisations in Europe as well as European broadcasters such as Canal Plus and, of course, BBC Television and World Service. Education and training programmes, natural history and science features, drama and documentaries will be available; all will carry subtitling or simultaneous translations in the main European languages. Enterprises also intends to explore the BBC Datacast and Videocast (downloading) opportunities offered by Olympus.

Enterprises will utilise one of two channels on the Direct Broadcast payload Olympus, launched on 11 July 1989 (the other will be for pre-operational Italian use). Other payloads include a 12/20/30 GHz Propagation package, a 12/14 GHz Specialised Services payload and a 20/30 GHz Communications payload for point-to-point and multi-point teleconference and other experimental applications.

The technical specification of Olympus is:-

| | |
|------------------|-----------|
| Frequency Band | 12 GHz |
| Downlink Channel | 20 |
| Output Power | 230 watts |
| Peak EIRP | 63 dBW |
| Orbital Position | 19° west |

Enterprises will be encrypting their service but are still reviewing the best standard available. It is likely that the transmission system will be D2-MAC.

Outside BBC prime-time hours (1700-0100 hrs Central European Time), the channel will be used by a large number of small experimenters geared to providing pan-European educational and distance-learning programmes. Combined with the Enterprises service, the viewer will therefore receive a multi-dimensional and novel service from Olympus.

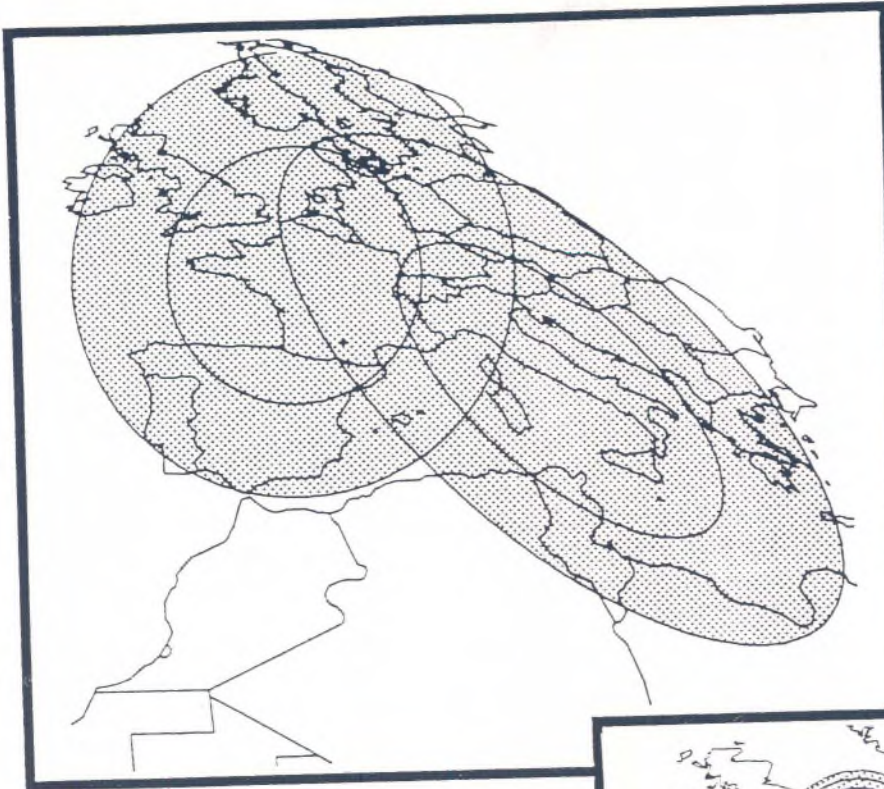
As the flagship for the wider application and use of communication satellites in the future, Olympus represents an exciting opportunity for all concerned. Certainly, BBC Enterprises aims to deliver a service that reflects the importance and value of this project.

Wayne Dunsford
Olympus Project Co-ordinator
BBC Enterprises



Olympus 1 Thermal Model (photo: British Aerospace)

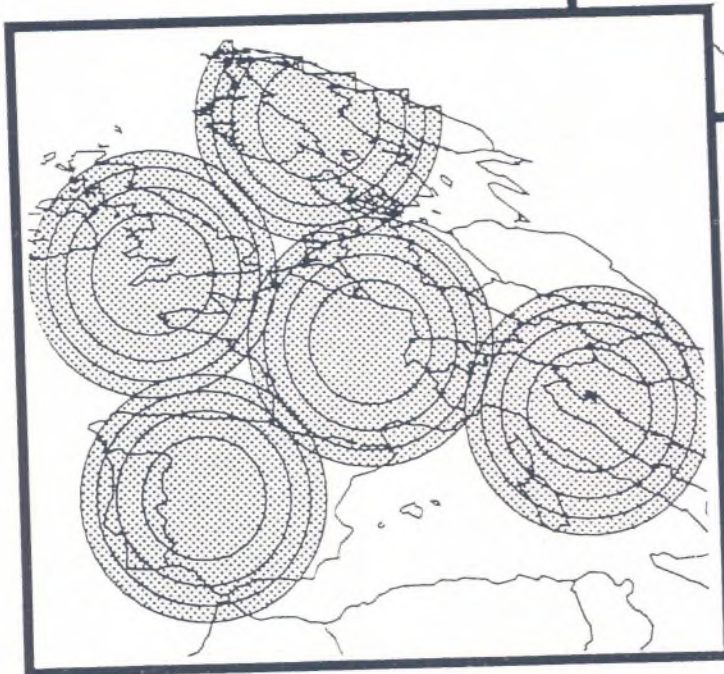
OLYMPUS 1



*Coverage of the Olympus
Direct Broadcast Service
(DBS) Payload*



*Coverage of the Olympus
20/30 GHz Advanced
Communications Payload*



*Coverage of the Olympus
Specialised Services Payload*

Some of Olympus 1's footprints

CCD — cameras for the nineties

It is tempting to say that it all began in April '84 with the launch by RCA of the CCD1 solid state lightweight camera. Of course it didn't. Research into the use of the Charge Coupled Device (CCD) as an image sensor had had a ten year history by that time. But this was the first serious attempt to break into the world of broadcasting and might very well have succeeded, if only RCA had been able to solve their manufacturing problems.

Cameras were not my interest then as I was too busy installing Sypher suites to worry about pictures. But the demonstration was very impressive, even to a layman. Here was a camera that produced pictures instantly on switch-on — before the viewfinder heater had even got out of bed! And not only pictures, but 'registered' pictures at that. In many ways the camera was not broadcast quality but even this early pioneer could knock spots off 'tubes' in certain situations.

Research Department borrowed the prototype for field trials and produced a now famous recording of a car driving round a race track in dull conditions. For comparison purposes, the scene was also shot on an Ikegami HL79 tubed camera. Predictably, the CCD coped well while the tubes struggled with the car lights (and lost!). But the next section of the recording had both cameras pointing at a wall with checkered wallpaper and a clock, which revealed discernible aliasing from the CCD (ie unwanted patterns were visible on the picture). The philistine in me would have been happy to watch the racing but the engineer pursed his lips and grudgingly agreed that the aliasing was unacceptable.

The RCA camera never took off, nor did the company prosper, but it made waves that rocked the industry nevertheless. No-one doubted that the future lay in solid state. The snowball was rolling and growing — no lag, stick, or image burn ... reduced power consumption ...

reduced weight ... perfect geometry and registration (lens permitting!) ... improved movement rendition ... improved corner sharpness.

And now the list that appealed to the accountants — lower capital and MOBP outlay ... greater reliability ... minimal line-up requirements. Not everyone welcomed the impending change but most realised its inevitability. If your head is buried in the sand, the giant snowball has quite a target!

Moving on from the RCA camera, the next major event was the appearance of the Sony DXC3000. Billed as an 'industrial' camera, somehow it managed to get waved under the noses of all the major Broadcasters and, to its credit, Sony feigned surprise quite convincingly when they all wanted one ... or two ... or ten. For less than the price of a set of tubes, here was a complete camera. It could be bought on a programme budget, strapped to a motorbike, taken to fires, riots, even football, and horror of horrors — into the studio! People apologised for it: "I know it's not broadcast quality, but ...". Yet they used it and still use it, because it always works first time and still looks pretty good.

The greatest service provided by the DXC3000 was to create an awareness of solid state pictures. It gave everyone a chance to play with CCD at a realistic cost and it showed up the defects as well as the plus points of the new technology. Although it had much to offer, it clearly told us that there were some critical areas where substantial improvement was necessary before we could commit ourselves to any major investment in CCD cameras. To name but two, extreme highlights could give rise to an objectionable vertical streak in the picture while, in low lighting levels, the discrete element structure of the device could become visible as a fixed pattern of noise. Also, in common with most of its contemporaries, the DXC3000 was still 'sub-Nyquist'

when it came to pixel count and was bound to produce in-band aliasing.

Moving on, and missing out a great deal of steady development, our next glimpse of the snowball was at IBC 88. Every major manufacturer's stand was dominated by solid state cameras. The thermionic warhorses were there too, but the delegates knew what they'd come to see — pixel counts approaching 800 ... optical anti-alias filtering ... greatly-improved highlight overload protection, etc. Electronic shuttering was everywhere, providing an alternative to stopping-down in bright light and enabling spectacular action shots.

Perhaps the camera of most interest to the BBC was the Thomson TTV1647, because it is fully compatible with the 1531 family of cameras on the Type 6 Scanners. Pictures from this camera, and indeed from top-of-the-range models from all the big names, are broadcast quality in every respect. With the exception of the BTS LDK900, however, there is still no commitment to what we would normally think of as a 'studio' camera, if by that we mean a big box with all the bells and whistles.

BBC Scotland has consistently demonstrated the viability of the lightweight studio and is not alone in this conviction, but many still hank after the classic cube. If you are a cubist at heart, take comfort from the fact that studio lenses are not getting any smaller and we might just be heading towards the large lens fitted with viewfinder, wedgeplate and camera! Time alone will tell.

I have merely skimmed the surface of solid state cameras in these few paragraphs but space would not allow much detailed discussion. There are several information sheets and articles on the subject available from Wood Norton. Please contact me on Wood Norton 229 if you would like more detailed information.

Dave McClure, Training Manager
Audio Engineering, ETD

ASCENSION — new control system

A new control system has been installed at World Service's South Atlantic relay station on Ascension. It is the now-standard TED/D&ED system, similar to those installed at Rampisham, Daventry, Hong Kong and Seychelles.

Project-led by Monitoring and Control Section of TED, the new system on Ascension provides full automation of all scheduled operations, with the exception of wave changing and tuning the six senders. These are of 1960s vintage and have no facilities for self-tuning.

A novel digital audio cartridge system has been produced by Ferrograph Ltd for use with the new control system. It provides fully-automatic replay of local announcements and interval signals, without the need for staff to constantly change cartridges each time a different announcement is required. The control system also incorporates Optimod audio processors to boost the audibility of transmissions, without the expense of replacing the transmitters with more powerful ones.



The automatic control equipment on Ascension

The system was fully prefabricated and tested in the UK, which substantially reduced the installation time — it was actually up and running less than two weeks after it arrived on site!

We are indebted to P&ID Tel for the use of their excellent facilities at Wood-

lands, which allowed us to effect a full scale mock-up of the apparatus room on Ascension. This was vital for the accuracy of the prefabrication exercise.

Chris Harrison
Senior Project Engineer
Monitoring & Control Section, TED

BUSH HOUSE — new information display system

A new information display system — Bushfax — has recently been installed in Bush House by Tim Wheeler and Alex Major of the Technical Services section. The equipment is based on a 'Rite Box' from Intelfax and uses the local tv distribution system to reach as wide an audience as possible. Extra monitors have been installed in key public areas, such as receptions and the canteen.

The Rite Box stores up to 500 pages and

causes each required page to be displayed in sequence. As the display time can be adjusted individually for each page, sequences can be made to appear animated if desired. The system is fed by World Service Press and Publicity section, using a highly modified BBC Master computer (modified by Intelfax).

The present system distributes the text as an in-vision signal and therefore can be viewed on a non-teletext receiver, but this takes up a whole channel. A true Teletext inserter has now been purchased from Intelfax to complement the existing system and will be used to carry the same and/or extra pages on one of the other tv channels.

Information currently displayed includes:

Bushline — Promulgations by MDWS or others; MDWS/Director engagements; MDWS points to the Board of Governors; points from programme

evaluation; BBC World Shop information.

Media Matters — Media coverage about World Service.

People — Visitors to Bush House; people going on duty tours.

BBC Wide — DG's promulgations; other corporate news.

In House — Bush House premises announcements

Jobfax — Appointments/attachments in World Service and other staff matters.

Tuning In — New Broadcasting developments.

Travel — Special arrangements during travel strikes.

It is also hoped that we will be able to import pages from Ceefax to Bushfax in the near future; for example, the weather or the travel information.

Phil Lacey
Manager, Technical Services
World Service



Alex Major checks out the Bushfax system capabilities

BROADCASTING HOUSE — new travel centre

For over twenty-five years, the BBC has provided motoring and travel information supplied by the police and other sources such as motoring organisations. Today this information is broadcast not only by television and radio (both national and local) but also by Ceefax.

Much has been made recently of the time lost sitting in traffic jams and the financial burdens this places on industry and the economy. The quality of the BBC's information service has thus been the subject of many discussions with interested parties such as the Department of Transport (DTp), the Association of Chief Police Officers (ACPO) and the motoring organisations. It has been generally agreed that the service has not been as fast or reliable as it should be, particularly in view of the facilities now available via the Radio Data System (RDS).

(RDS enables a suitably-equipped car radio to receive travel announcements originated by a local radio station — even when tuned to a network transmission or

playing a cassette. Car radios which offer this enhanced RDS facility are expected to become available next year.)

Until this summer, travel information was handled by the Motoring and Travel Unit on the first floor of Broadcasting House. Its facilities were very limited: incoming information was received by telephone, fax or telex and logged on a standard office word-processor, on which scripts for the national radio networks and roadworks information for local and regional radio were prepared.

At the beginning of the year, Radio Projects took on the task of creating a more up-to-date Travel Centre with the following objectives:

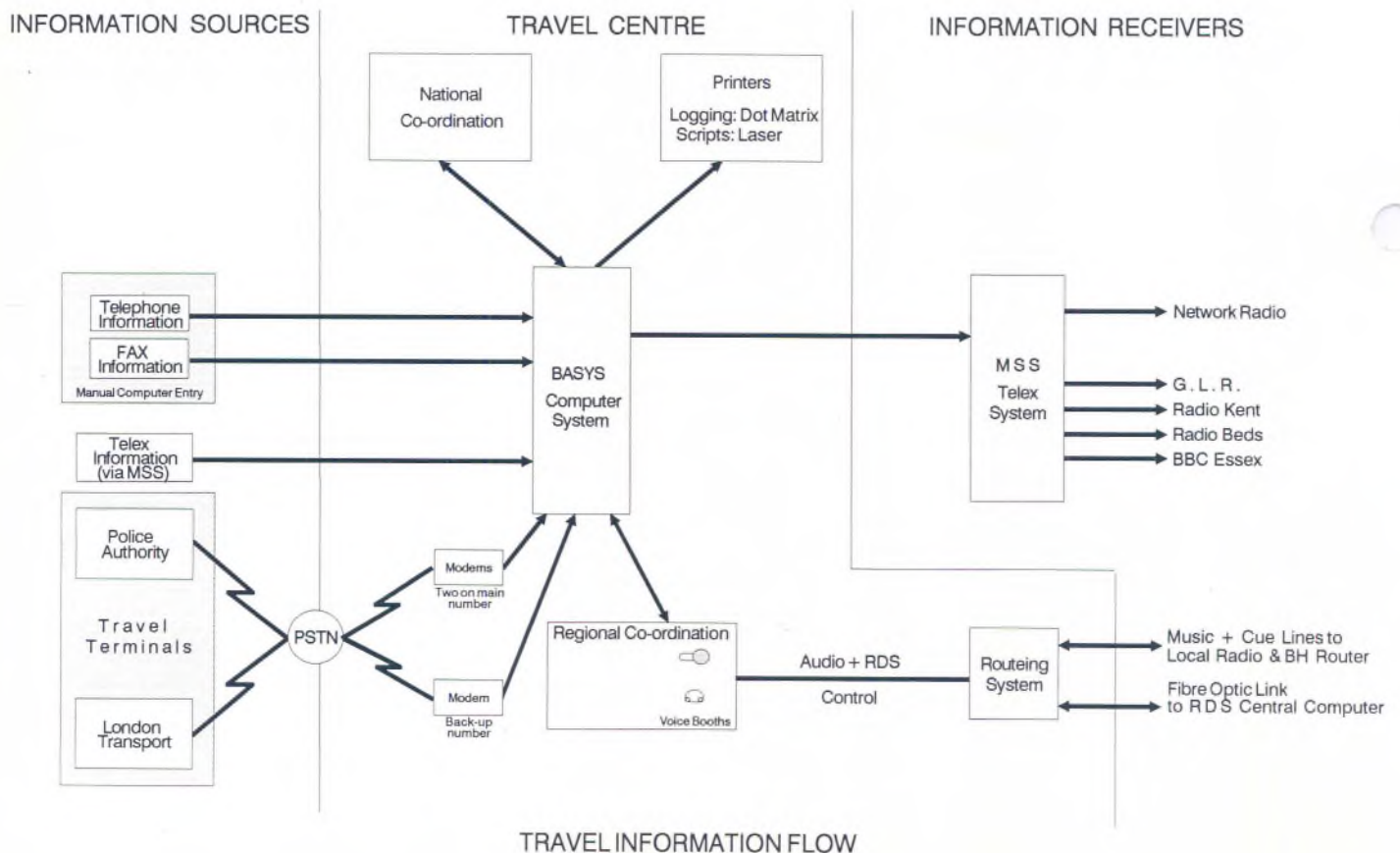
- (1) to improve the quality of information sent in
- (2) to process this information and distribute it quickly to where it was needed
- (3) to provide the equipment which would enable the Centre to exploit the RDS Travel Service features

The Travel Terminal

The first objective was to improve the quality of the information coming in to the BBC. A method of quickly and accurately describing a travel incident was required — one that would free the police and other information suppliers from having to make time-consuming phone calls to the Motoring and Travel Unit in London and to BBC local and regional stations.

Research by the TRRL

The Transport and Road Research Laboratory (TRRL) at Crowthorne, Berkshire, had developed a demonstration computer program for an IBM PC compatible, which went some way towards solving this problem. From research they had carried out, they drew up a set of lists from which choices could be made. The choices made on any one list influenced the options displayed in the following lists.



BBC Improvements

The BBC has now taken this system a step further. In conjunction with Signal Computing Ltd, of Guildford, the TRRL program has been refined to make it easier to use. Messages are created by choosing from each of the following lists:

type of problem — is it a traffic or weather problem

cause — accident, roadworks, etc

effect — delays, lane closures, etc

road number — a choice is made from a list of roads in that area

between/at — location of problem

and — allows a second location to be chosen

advice — speed limit of 30 mph, avoid area, etc

message priority — how urgent is the information.

Finally there is the option of adding some free text to the message to help clarify or give additional information.

Once the message has been completed (and edited if needed), the micro-computer autodials a computer system in Broadcasting House to download the information. Error correcting modems are used to ensure reliable transfer of data.

One of the problems experienced has been the delay in informing the BBC when an incident has been cleared and that the road is 'back to normal'. Review screens are used so that the operator is continually made aware of those messages that have been sent and not cleared. The operator has two options: send an all-clear message, or update the original (required for example if the incident is going to take longer to deal with than at first thought).

The program has been developed primarily for entering road information. However, the principles can easily be extended to other forms of transport and lists have been developed in conjunction with London Transport for use in giving underground and bus information. As lists do not yet exist for sea and air authorities, the program allows them just to send free text and priority information: these messages can be analysed at some future date and a sensible list structure drawn up.

The format of the Travel Terminal message tallies almost exactly with that of the RDS digital Traffic Message Channel, proposed by the European Broadcasting Union (EBU). There is thus a lot of interest from the rest of Europe in how well the program operates — particularly

now that a pilot scheme involving local radio stations has started (see page 10).

The BBC Travel Centre

Whereas the first objective related to the situation outside the BBC, the second and third defined what was needed within the Corporation.

On the first floor of Broadcasting House, opposite the old Motoring and Travel Unit, the new Travel Centre has been built. It comprises a computer system to receive and distribute information and voice booths to enable spoken bulletins to be broadcast.

There are three booths in the Travel Centre. Each is equipped with its own terminal on the computer system and audio equipment as described below. A fourth position also has a computer terminal and is used for preparing the scripts for national radio.

Computer Facilities

At the heart of the Travel Centre is the Basys computer system. It was chosen as it has the necessary telex and modem interfaces as standard and could meet many of the specific information-handling requirements without the need for custom software. It comprises two Wyse PCs running under the Xenix operating system. A third Wyse PC carries out a supervisory role on both machines and enables remote diagnostics to be carried out. Each computer has up to eight items connected to it; an Ethernet link allows each computer to follow the actions of the others, with data being stored on two separate hard disks for security.

Information from the travel terminals is received via modem in a format issued by the Press Association Ltd and known as IPTC 7. This allows the system to determine which source originated the message and thus to file it away in the correct 'pigeon hole'. The system can also respond to the level of priority set in the message and, for example, inform the staff only of urgent or exceptional priority messages.

Information received by telex and via the BBC's internal Message Switching System (MSS) is put through a 'keyword' search (which in this case is set up to look for the codenames of the originator) and filed accordingly.

A back-up read-only file of all incoming information is kept on the system, should it be necessary to retrieve a copy of the original message. A hard-copy of each message is also printed (on a dot-matrix printer) to allow easy analysis of the information flow at a later date. It is

hoped to automate the procedures further as the new system settles down, using some of the more advanced features built into the Basys computer.

Electronically, information comes into the computer in two ways. Firstly, there are three modems to receive information from the travel terminals located in police control rooms, etc. Two of the modems are across a special two-line number while the third is across a backup number on a different telephone exchange. (The travel terminals have been programmed to try the backup number should they fail to establish a connection on the main number.)

The second electronic source of information is the telex network, which is fed to the Travel Centre via MSS. The latter plays a fundamental part in the operation of the Travel Centre as it also takes all the Centre's data output and distributes it to network and local radio studios.

Information is also still received by telephone, primarily from police and other authorities outside the pilot scheme area (which is described later), and by fax which is often used for informing about long-term roadworks. These types of message are entered manually on to the computer and processed in the same way as those received electronically.

Travel Centre staff regularly check the files for any new information, particularly if they have been notified that it is an urgent message. If the message refers to an area covered by one of the local radio stations in the pilot scheme, a staff member responsible for that area will edit it and send it out to the relevant station via the MSS. At the station, the message appears on a screen in front of the presenter and on a silent printer for hard copy. The information can be used in a regular spoken bulletin or, if very urgent, in a travel flash. If the message warrants a travel flash on the national networks, the national co-ordinator will compile a script for use by the networks on-air; this also is sent out via the MSS, direct to the continuities.

Staff also compile longterm roadworks information for each BBC local and regional radio station; it is in this area especially that the procedures could be automated to a high degree.

Audio and RDS Facilities

The audio equipment in each booth is made up of the following: a self-operated audio package, a matrix + RDS controller

— BROADCASTING HOUSE: new Travel Centre —

and a logging cassette deck. The booths can be routed to one of as many as eight destinations by the matrix; at present, the destinations are four local radio stations and the BH router.

The audio package was made by Clyde Electronics Ltd. It has inputs for a microphone and cartridge player plus facilities for up to three outside sources should the need arise. The microphone circuit has an integral compressor. A headphone selector allows the choice of either ring-main or cue from the destination to be heard. When the red light switch is on, the headphone automatically receives the cue feed. There is a telephone balance unit to allow the telephone to replace the music or cue lines, if either should fail. Finally there is a control which can send tone to the music line, for test purposes; this is disabled when the booth red light is on.

The matrix + RDS controller was manufactured to a BBC specification by Audi-onics Ltd in Sheffield. It is essentially a four-into-eight relay matrix with two audio levels and five dc levels. The audio levels route the music and cue lines from each destination to the correct voice booth; the dc levels are used to route the RDS signals to the D&ED-designed RDS

computer interface. The matrix was designed with various interlocks to minimise the effects caused by accidental misuse of the RDS controls.

Ceefax Facilities

A BBC micro, with modem access to the Ceefax computer, has been installed for the direct input of travel information. (The Ceefax travel pages were previously updated from Television Centre.) In the future, it may be possible to update the travel pages on Ceefax direct from the Basys computer (via a Basys-to-Ceefax interface).

The Pilot Scheme

At present, four local radio stations (GLR, Radio Bedfordshire, Radio Kent and BBC Essex) are receiving travel information as part of a pilot scheme to last into next year. They are equipped with Travel screens and printers to receive the information, and music and cue lines to link them with the Travel Centre. It is in these areas only that the RDS travel service is functioning (apart from the Radio WM area which is a separate part of the pilot scheme).

Travel terminals have been installed in all

the police control rooms in the South-East part of the pilot scheme area plus some in surrounding areas. There are also terminals in the Press Office at London Transport and at the Dover Harbour Board. Terminals are soon to be installed in the control rooms covering the 'world's greatest car park' — the M25 motorway — and negotiations are taking place to install more terminals to improve the provision of air and rail information.

The Future

In the autumn, feedback will be requested from the users of the travel terminals to see how they could be improved; any suggestions will be implemented towards the end of the year. Around the middle of next year, the pilot scheme will be reviewed and the success or otherwise of the entire system determined. Judging by information already received from some of the travel terminals, there will be a several-fold increase in the quantity of information the Travel Centre will have to deal with.

Graham Naylor-Smith
Project Leader, BBC Travel Centre.



A general view of the Travel Centre

BROADCASTING HOUSE — new network switcher

A network switcher is used by Radio to switch the outputs of continuities and some studios to the audio distribution chain which, in turn, feeds the transmitter network. It must perform two main tasks:

Firstly, it has to switch audio signals without discernable disruption; this must be done quickly to enable 'hot switching' at a programme junction. Secondly, it must enable control of network-related operations such as turning transmitters on and off. These functions are controlled from the continuity and require interlocks to prevent erroneous switching. It is this source control that makes a switcher slightly different from a normal audio router.

In 1985, discussions started on a replacement for the old switching arrangements. These dated from 1970 and were becoming difficult to maintain as well as being too small for current requirements. Following discussions with a number of manufacturers, a contract was placed with Philip Drake Electronics for the supply of a new switcher to fulfill the BBC's requirements.

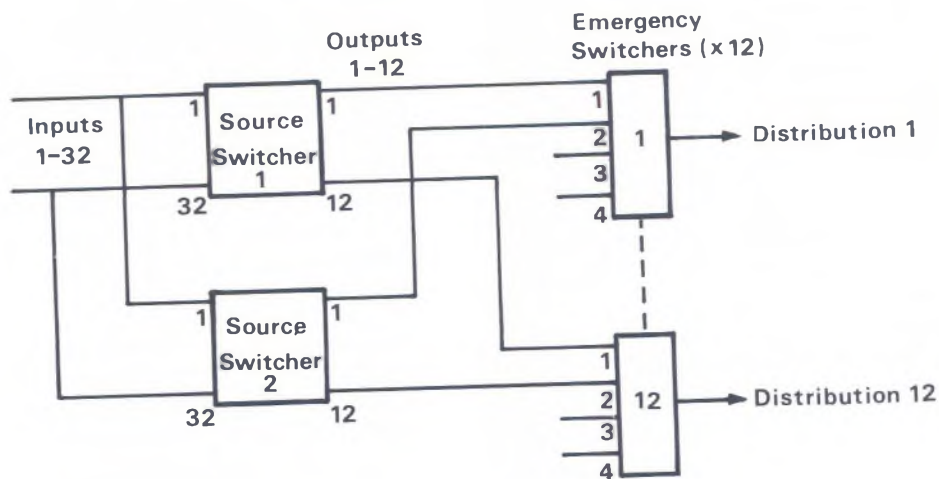
The System Requirements

The new switcher would be a 32-source/12-destination stereo router which offered 'redundancy' to allow for failure and maintenance. It should be completely reliable and operate continuously for ten to fifteen years. The system should offer three independent master control panels, with relevant information displayed on video monitors, and there should be complete system over-ride facilities.

There should be four dc facilities associated with each distribution (ie destination), to allow several pieces of external equipment to be controlled simultaneously. Also, there should be sixteen data acquisition inputs per distribution, to enable the status of external equipment to be displayed. Certain response times of the system were also specified.

The System Approach

The switcher was designed as a 'dual redundancy' system, as shown in the



Block diagram of the new network switching arrangement

diagram. The emergency switcher enables either of the two source switchers to be selected (inputs 1 and 2) and also provides two inputs (3 and 4) for overnight 'parking tones'.

Either switcher can drive a distribution with the other acting as a hot standby. System monitoring warns staff in the Engineering Operations Centre (EOC), and all users of the system, of faults on either switcher (programme comparitors detect any differences in the outputs from Switchers 1 and 2). Jack access is provided around the system to allow any part to be over-plugged, if major maintenance work is required. To cope with any power loss, each switcher is fed from two separate mains supplies, one backed by the station generator, in addition to a supply of 50 V (the station battery!)

Each control panel can produce up to thirty-one pages of information from the two switchers, via two separate data links running at 250 kbit/s. Indicators which give a simple display of which continuity has been selected, are separately wired to (and powered from) the switchers. Thus, they are not reliant upon the panel processor. This approach is also used for the execute button so that, in the event of a panel losing power, it can still be used in a limited manner.

Commissioning the system

The system was completely tested at the manufacturers by Steve Urbanek of Technical Commissioning and Kim Wallace from the maintenance team responsible for the system. Every parameter was tested for each combination of sources and destinations — a painstaking process that took about three months. Once testing was completed, the system was delivered and installed in pre-wired bays, designed by Peter Newbury of Radio Projects, and more tests were carried out to check if the system performance had changed.

Introduction into service was performed in two stages. Firstly, the outputs of the old switcher were connected to spare inputs of the emergency switcher. The next stage was to transfer the dc facilities, one distribution at a time. This required the external equipment to be made inoperable, including holding a relay closed, until the transfer was complete. As each distribution was completed, it was then controlled via the switcher. This work was carried out during the day, over a period of three weeks, and it is of great credit to EOC staff that they coped with the disruption as well as fulfilling their normal duties.

Nick Bentley
Radio Projects, London Facilities

BIRMINGHAM – Studio 5 refurbished

Radio Studio 5 at Pebble Mill went back into service earlier this year after refurbishment. It is used primarily for talks and documentary type programmes and, until refurbishment, was mono-only using a type 'D' console with dedicated channels (which restricted its use for other types of programmes). With the new facilities, it can now host a variety of additional programmes, such as the Charlie Chester Sunday Soapbox, multi-way phone-ins, General Election coverage, music compilations, etc.

One of the more radical steps has been the changing round of the control room and the studio. Thus, what had been a rather unsuitable shape of studio (long and thin) is far more suitable as the control room; likewise, the rather more square control room of old is much better now as a studio. The new control room is around 5.4 x 8.9 metres while the studio is 4.9 x 6.4 metres.

The Control Room

The main part of the installation comprises a Calrec M series mixing console, with eighteen stereo channels feeding into four stereo groups which, in turn, feed the main output. Within the desk control surface are facilities for ten stereo outside sources, with associated cue and

talkback feeds (selectable to either the cue circuits or the control lines).

Also here is a Probel remote outside source switching panel, which controls the main routing matrix in the Pebble Mill communications centre. The Studio Manager selects his/her own outside sources from previously-assembled radio packages, or from any other studio within Pebble Mill using this panel. This equipment was rebuilt by Calrec into two units, to enable it to fit neatly into the main frame of the console.

The console has an extension on the left-hand side which houses the insert jackfield, the record/replay matrix and an AMS digital reverb unit. The matrix allows for up to fourteen replay sources to be pre-mixed onto one of four busbars and provides feeds of desk output, tone, or two miscellaneous record sources to the fourteen record outlets.

Flexibility has been one of the main approaches in the design of the installation. This is what led to the apparent anomaly of having a record button on the remote starts for the grams and CDs. None of the outlets are dedicated, nor are the console channels. This means that the Studio Manager has to build the required set-up on each occasion, but it does enable things to be grouped in the

most advantageous way, depending on what the session requires.

The ancillary equipment comprises: four 1/4-inch tape machines (two Studer A80s and two Studer A810s); two cassette decks (a Studer A720 and a Nagamichi Dragon); a Sony DTC 1000 R-DAT machine; a two-stack Sonifex cart machine; two EMT 948 disc players and two Technics SLP 1200 CD players.

Aural monitoring is on a pair of LS 5/8s and via a small domestic-quality speaker, while visual monitoring utilises three stereo PPMs which can be selected to display standard A+B, M+S or AUX A+B.

There are comprehensive facilities for live and recorded telephone interviews, which service the whole Pebble Mill complex. Two Studer dual-telephone hybrid units enable up to four calls to be on-air at a time while a third unit, built into a flight case, can be taken to whichever other studio requires a phone-in facility on the day of the booking.

The Studio

In the studio itself, there is a pair of LS 3/5s driven by a Quad 521 amplifier, while a Calrec talkback box provides headphone monitoring for a presenter and two guests, together with reverse talkback to the control room. A pair of Beyer M201 mics provides the normal coverage although PGS and a Sony C48 have been retained from the original installation for those occasions when a different approach is required.

A second talkback box, with sound and vision tielines, is installed in the lobby area to provide a link with the control room when a phone-in programme is using the area. This would enable a computer link, giving information about callers, to be established.

The refurbishment was co-ordinated by Nick Sharwood-Smith of Radio Projects who also placed the contracts. My thanks go to all those who were involved in bringing this project to a very successful conclusion.

Ray Lee, Services Engineer
Pebble Mill



The refurbished control room of Pebble Mill 5

WOOD NORTON – switchgear training

BBC staff who are authorised to operate high-voltage (hv) power systems may have attended an hv switchgear course at Wood Norton in the past. The course has always had an operational bias, as staff have limited opportunities elsewhere to develop familiarity with this type of equipment.

The first course in 1975 utilised a single-panel oil circuit breaker, as the sole training facility. As time went on, various bits of new and redundant equipment were added, including a complete low-voltage (lv) switchboard. By 1986, the ancient lv switchboard had been re-engineered with one purloined from Sutton Coldfield. The result was to create a simple system on which exercises were mounted, emphasising the operational demands put on the authorised staff.

The basic policy from the start has been to treat dead equipment as if it were live and in service. Experience has shown that operational staff do not have any difficulty in coping with the fake nature of the arrangements.

The latest development of the system was completed earlier this year. A new vacuum circuit breaker has been added, in line with current practice for new installations, and the complete hv switchboard has been rebuilt on new strong and level foundations. The operation of the system has been greatly improved by adding a mimic control panel.

The mimic presents a clear plan of the system layout and current condition, including metering. It also permits remote control of the hv switchboard which is desirable because of the hazards involved. The Wood Norton lv switchboard, like many others, is entirely manual so the provision of the remote controls required fairly considerable modifications and rewiring work.

A particularly difficult area of the simulation is the meters on the mimic, as there are no real voltages or current to measure. The problem has been effectively solved by the addition of a PLC (programmable logic controller).

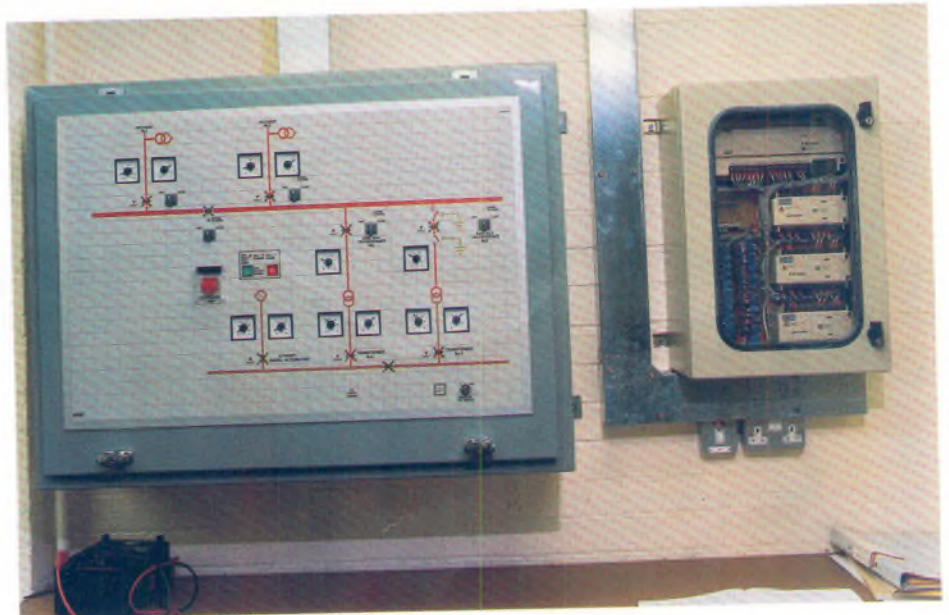
The PLC is a dedicated microproces-

sor system which is widely used for control applications. The Wood Norton PLC reads the condition of the switchgear, via auxiliary contacts, and processes this along with data about the supply sources etc. Ultimately the PLC can determine which of the final circuits on the lv board are live.

A further feature of the PLC is that it controls some of the mains power supplies in the training area. The result is that certain switching operations (and the grosser kind of errors) will plunge the area into darkness. Recent course members will be aware of the mind-concentrating effect of this feature!

The development was carried out as a joint project between ETD and the Power Systems section of TED, who arranged the supply of the new circuit breaker and the mimic. The PLC system was designed, built and programmed by ETD staff. The software development was remarkable for its ease – it took about one man week only, including time for self 'training'. The project has certainly demonstrated the ability of PLC systems to provide low-cost and flexible solutions to otherwise unique problems.

Dave Yates, Training Manager
Transmission Unit, ETD



The mimic control panel (left) and the PLC equipment

ENGINEERING SAFETY PAPERS – GP4 and GP6

All electrical equipment powered by the mains must have Engineering Approval before being brought into use by the BBC.

The Engineering Management Safety Committee (EMSC) has just published a revised version of their Guidance Paper No. 4 (GP4) which deals with the safety evaluation of locally-produced electrical equipment. Copies can be obtained from Secretary to EMSC, Room 238, Henry Wood House (LBH 2245).

It should be noted that Guidance Paper No. 6 (GP6), which deals with non-ionising rf radiation, is no longer in accordance with the latest advice on this hazard. Therefore, it should not be given to contractors and others as a statement of the BBC's position.

A new up-to-date version of GP6 is in preparation but may not be available for quite some time: anyone seeking immediate advice on this topic should contact Dennis Turner on LBH 2978 or Peter Condon on Warwick 3750.

HDTV — at Wembley, Wimbledon and Berlin

Earlier this summer, the Research Department HDTV OB Unit recorded programmes at the Wembley FA Cup Final and at the World Championship Lawn Tennis competitions at Wimbledon. These recordings were part of a 'feet-wetting' exercise, designed to increase operational awareness of HDTV and to find out more about the inherent problems. The recordings were subsequently demonstrated in public, at the IFA exhibition in Berlin.

Wembley and Wimbledon

Two HDTV cameras were used at Wembley and Wimbledon, with recordings being made on the Research Department digital system which uses four D1 recorders to make one HDTV digital recording. The programmes were recorded with surround sound and in four languages, to exploit the potential of the HD-MAC transmission system.

The pictures have been judged outstanding by those who have seen them. The bright sunlight allowed us to operate the cameras at a low gain and this, in conjunction with the digital recording mode, has produced remarkably noise-free signals. HDTV has about four times the resolution of 625-line television and this, coupled with the wider 16 x 9 aspect ratio, provides a realism that is new to most viewers. New production techniques are emerging to exploit this experience.

At Wimbledon, Research Department set up displays in a portacabin so that visitors could judge the pictures for themselves. The response from the visitors — both broadcasters and non broadcasters alike — was very encouraging. The pictures sold themselves.

There are of course problems associated with this type of operation. The equipment is either laboratory-made or, pre-production and experimental in nature. The vision bandwidth (about 30 MHz) creates problems of cable size and length. The signal is either in component



Recording the 1989 Cup Final at Wembley, in the 1250-line HDTV format

or digital form and many facilities which are normal for a 625-line production do not exist yet at the 1250-line standard.

The problems of dealing with multiple-language transmission, coupled with surround sound, are also quite formidable. Sypher facilities and the limitations of the D2-MAC chain, in terms of sound quality and synchronism, have to be taken into account.

The Berlin IFA exhibition

The Wembley and Wimbledon recordings were used as a major part of the Eureka HDTV programmes on display at the Berlin IFA exhibition, held in late August.

IFA (Internationale Funkausstellung) is a very large biennial trade fair, covering radio, television and associated new technologies. It occupies about ten acres of West Berlin and comprises some twenty-five large exhibition halls, four live television studios and two radio stations. It is open to the general public and some 500,000 people attend the ten day event.

At the exhibition, Eureka built an HDTV drive-in studio in which Portuguese, French, German and Dutch broadcasters produced HDTV programmes destined for down-converted transmission on their 625-line national networks.

However, it was the BBC's HDTV productions which formed the major part of the public demonstrations. For the first time, we were able to demonstrate HDTV slow-motion replay, special football and tennis effects plus multiple-language commentary selection by the viewer. The BBC recordings were the only ones which were able to demonstrate all of these features.

Our considerable contribution to these developments has been made possible by the combined efforts and skills of staff in Research Department, Television Sports and Events Group, Television OBs and Television Studios, Network and Recording Group. Thanks are due to them all for their cooperation and enthusiasm.

Brendan Slamin
Special Assistant to DE
Eureka 95

NOTTINGHAM — new East Midlands Broadcasting Centre

Two years of planning and preparation finally bore fruit in May when East Midlands regional television programmes were originated from York House in Nottingham for the first time.

Since 1967, the BBC had had a tv studio in Willson House, on the other side of the city. When separate news bulletins for the East Midlands began in 1983, the staff numbers grew quickly to thirty-five over the next four years. It was clear that no more could be squeezed into the limited space available.

A search was started for suitable alternative premises and, after looking at various locations in and around the city, we decided on a ground floor site in York House — the home of BBC Radio Nottingham since it opened in 1968. The advantages of a shared building would be considerable.

Negotiations to acquire the lease took rather a long time but were completed in August 1988 and the builders moved in the following month. They constructed a new studio and gallery, plus editing and other areas, on the ground floor, and a new newsroom on the first floor to be shared with Radio Nottingham. The local radio staff were shunted around during this phase of the building work and had to put up with a great deal of noise and dust, not to mention inconvenience (as did their audience!).

The main technical installation work began in March of this year and was carried out, under contract, by Ian P Kinloch of Reading, a company which has acquired a good reputation for this type of work.

All the technical equipment was transferred safely from Willson House during a weekend in early May — and most of it worked! However, British Telecom failed to provide on time the fibre-optic cables for getting our television signals in and out of the building. With a few days to go, they installed four temporary radio links between our roof and their building, half a mile away. After encountering some technical problems, the circuits were finally accepted about midnight on the Sunday and the first programme went out on schedule, just before 0700 on the Monday.

Technical Facilities

The studio is about 110 sq metres but acoustic treatment reduces the useful

area to around 90 sq metres. It has three Sony DXC3000 cameras, two of which carry prompt monitors, and a simple scaffold grid for lighting.

The vision mixer is a Grass Valley 1680, with sixteen channels and two effects banks. The preview matrix was made by Probel, with thirty-two sources and sixteen destinations, while the sound mixer was made by Amek, with sixteen channels and four groups. The lighting control system was made by Lee Colortran, with twenty-four channels and three groups. Slidefile, Aston 3 and other items were transferred from Willson House.

Two picture-editing areas are at present equipped with U-matic pairs, for editing material from our PSC crew, and a Betacam player for editing material from our 'mute' cameraman. Linking consoles were designed and built by our own staff, with the design taking account of the planned change to Betacam SP in

autumn 1989. Each area will then have a pair of SP machines, as well as a U-matic for playing in library material.

Future Developments

At present we daily originate seven news bulletins on BBC 1 and opt out of Midlands Today for a few minutes. We also contribute stories to the main part of Midlands Today and to national news programmes. However, we are hoping to expand our output in autumn 1990 by transmitting a full half-hour regional magazine programme every evening. This will require improvements on some of the compromises we made with equipment, and some extra staff. Also, as mentioned above, we plan to change from U-matic to Betacam SP this autumn.

Richard Crawley
Senior Television Engineer
East Midlands

ELSTREE — Studio D refurbished

The enhancement of Network Production facilities at Elstree continues with the recent refurbishment of the Sound Control room in Studio D.

The twenty year old Neve desk has been retired to the Bradford Museum of Film and Television and has been replaced by a Calrec M Series desk, based on that previously supplied for TC5 at Television Centre. It comprises thirty-six channels, eight groups and ten auxiliary outputs and has been designed to work fully in stereo, with provision for 24-track recording.

Philip Drake Electronics, of Welwyn Garden City, supplied the desk under contract together with replacement sound systems, gram decks and studio wall boxes. The contract was placed in January and a series of 'Going for Gold' was scheduled to begin on the 1st September. The manufacturing period for the sound desk meant it could not be delivered until mid August, which resulted in an intensive acceptance and

handover period to meet the service date. P&ID Tel worked closely with Philip Drake and Calrec Audio to alleviate any problems, as even the smallest delay would have jeopardised the first programme.

During the out-of-service period, the opportunity was taken to enhance the environment of the Sound Control room, particularly from an acoustics viewpoint. A new ceiling was installed and the split-level floor was replaced by a modern computer-type. Flimsy internal walls were replaced by full camden partitions and external walls were acoustically treated. All this work was carried out by Building Engineering Services.

In addition to the Sound refurbishment, P&ID Tel was also able to complete the installation of the Thompson 1531 cameras, which had been delayed from an earlier phase due to software problems.

Graham Brewer, Project Manager
Studio and OB Section, P&ID Tel

RADIO WM — the 'Heartlands' project

Radio WM Heartlands — a BBC Midlands response to the Government's inner-city initiative — recently began regular broadcasts from its own studios in Saltley, central Birmingham. A radio station in its own right, it opts into Radio WM's 1458 kHz mw transmissions from Langley Mill — between 8 am and noon, six days a week. Its programming is an entirely new strand, targeted at a very specific audience and encompasses daily outside broadcasts from its Radio Bus.

The Studio Area

The studios centre is on the third floor of St Peter's College, an ex-teachers training college and best described as an oasis in a desert of inner-city deprivation. It comprises a studio, a production area and office accommodation.

The self-op studio is equipped with a nine channel MBI mixer. It has multi-source input switching which allows each channel to be configured with up to three sources including three microphone inputs. Other inputs provide for: two Revox PR99 tape machines; two Technics gram and CD players; two

Denon cassette machines; two cartridge machines (a Sonifex single-stack and a Spotmaster triple-stack); a telephone balance unit, and outside sources.

The production area is equipped with two Revox PR99 tape machines and a Denon cassette machine.

PBX and phone-in requirements have been combined in a single unit by the use of an Austin Taylor sprite exchange with Telecaster software, supplied and installed by Wiltshire Telecom.

The Radio Bus

The Radio Bus, formerly the 'Action for Jobs' bus, was originally fitted out by MBI of Brighton for the Department of Trade and Industry. It is now on secondment to WM Heartlands from the Department of Employment.

The bus is equipped with an MBI Series 12 mixer, two EMT gram decks, a Revox PR99 tape recorder and two Sonifex cartridge machines. Transmission facilities from the bus to the studios are provided by a Wood and Douglas uhf transmitter

while the radio microphones were supplied by Beyer Dynamic Limited.

The project was conceived last December by Radio WM's Manager, Tony Inchley. The joint Project Managers — Gerry Heeley (Manager, Engineering, Local Radio) and Tom Horsfield (EiC Radio WM) — had to anticipate a totally different broadcasting style by putting together a specification that struck a correct balance between a 'Delbert Wilkins' style of community radio and full broadcast grade facilities. It had to take place within tight budgetary constraints yet provide all the facilities that studio operators normally expect.

The success of creating a new BBC radio station, in a record ten weeks, has only been made possible by the dedication of all the staff involved — too many to mention individually here. However, credit must also go to the many manufacturers and suppliers who rose to the challenge of supplying equipment to meet an extremely tight timetable.

Tom Horsfield, EiC
Radio WM



The WM 'Heartlands' bus