

## THE 'SIX-PIPS' TIME SIGNAL

In early February, the BBC took over responsibility for the generation of the 'six-pips' time signal, which is broadcast at certain times by all four of our radio networks. The pips had previously been generated at fifteen-minute intervals by the Royal Greenwich Observatory (RGO) at Herstmonceux in East Sussex.

The new time signal equipment is located in Broadcasting House, London. In addition to the six-pips, it also generates EBU and BCD timecode, as well as various frequencies for use in digital audio. The system's main features are described on page 5.



Broadcasting House - the new home for the 'six-pips' time signal.

## CONTENTS

BELFAST	
- Further Post Production facilities	19
BRISTOL	
- Design Award for ACED	20
BROADCASTING BILL	
- Additional Services	4
D&ED	
- Coded Equipment Register 1990	2
DIGITAL BROADCASTING (Part II)	
- Transmission Techniques and Standards	14
ENTERPRISES	
- New Transmission Area at Television Centre	II
FILM	
- A Medium or a Style?	8
HDTV	
- The future on display at Ally Pally	10
NETWORK RADIO	
New Time and Frequency distribution system	5
The Emsys computer system	6
NETWORK TELEVISION	
The Telfax display system	7
Transfer of tv facilities from BH to CAR	13
PATENT APPLICATION	
- Auto-tracking antenna system	2
PHILLIPS COMMITTEE REPORT	
- Funding the future	3
RESEARCH DEPARTMENT	
Computer simulation of Signal Processing	6
SAFETY	
- Noises At Work Regulations 1989	2
TRANSMITTER NEWS	2
WOOD NORTON	
The McCrirrick Conference Centre	12

# ENG INF.

Edited, designed and typeset  
by EIO, Room 707A, HWH.  
Tel: LBH 4316

Printed by ETO, Woodnorton

\* \* \* \*

The closing date for material to  
be published in our next issue is  
25 May.

Mike Meyer

## TRANSMITTER NEWS

The following services opened between  
13 December, 1989, and 16 March:

### Television

Nant-y-Moel	Mid Glamorgan
Ross-on-Wye	Heref. & Worc.

Additionally, the St Marks relay at  
Tunbridge Wells, Kent, has been modi-  
fied to improve the quality of the received  
pictures.

### FM Radio

Bow Brickhill	Milton Keynes
Buxton	Derbyshire
Chesterfield	Derbyshire
Cornholme	W. Yorkshire
Hebden Bridge	W. Yorkshire
Todmorden	W. Yorkshire

These all carry Radios 2, 3 and 4: the  
Buxton FM relay also carries Radio 1.

### Radio 1 FM

On 19 December, 1989, Radio 1 FM  
services began from Blaenplwyf,  
Sandale, Tacolneston and Wrotham (re-  
placing the temporary service from  
Crystal Palace). At the same time, the  
Radio 1 services from Holme Moss,  
Sutton Coldfield and Wenvoe stepped  
up to full power on new frequencies.  
Finally, the Radio 1 FM service from  
North Hessary Tor began on 11 February  
and, from Black Hill, on 27 February.

### Radio 4 FM

The Radio 4 FM service from Blaen-  
plwyf began on 19 December, 1989.

### Local Radio

As featured in our previous issue, BBC  
CWR opened on 17 January, with FM  
transmitters at Lark Stoke and Meriden.

# D&ED Coded Equipment Register 1990

The new edition of the Coded Equip-  
ment Register (formerly 'Registered  
Designs & Coded Equipment') is scheduled  
for delivery around the end of March.

This book supplements the 1987 Register  
(the 'silver book' which contains details  
of equipment released during the period  
1977 - 1987) and the 1988 Technical  
Document Cross Reference (the 'yellow  
book'). Both of these should be retained.  
However, note that the 1990 book also  
includes information previously published  
in the 1988 edition of the Coded Equip-  
ment Register which can now be discarded.

(The 1988 Register was actually pu-  
blished in Spring 1989: it was so called  
because it contained information

relating to equipment brought out dur-  
ing 1988. It has now been decided that  
the title of the Register should instead  
reflect the year of publication, hence this  
is the Coded Equipment Register 1990.  
So don't be concerned that you haven't  
seen a 1989 edition!)

Several areas receive their Registers  
through departmental distribution  
points, so you might need to allow some  
time for your copy to reach you. If,  
however, it has not arrived by the end of  
April, then please contact me on AH 375  
and I'll try to sort out the problem.

Peter Jefferson  
D&ED Liaison Unit

## PATENT APPLICATION

### Auto-tracking Antenna System

Chris Gandy of Research Department  
has invented an antenna system for  
automatically tracking non-continuous  
rf signals from a mobile source, such as a  
television OB link from a helicopter. It  
obviates the need for a separate tracking  
link and avoids disturbing the active  
picture.

The television signals are received by an  
automatic tracking antenna, to main-  
tain the strongest signal. During non-  
active periods (eg, field blanking  
intervals), the antenna beam is elec-  
tronically offset in more than one direc-  
tion in turn - to check whether antenna

movement is needed.

To avoid confusion due to multipath  
problems from the helicopter blades -  
these typically occur at frequencies com-  
parable to the field rate - all required  
offsets are accomplished in a single  
interval (such as two line periods in each  
of four directions in each field interval).

The invention has been filed as a UK  
Patent (No 2 217 137) which was  
published on 18th October, 1989. Methods  
of offsetting the beam, regenerating the  
syncs, and hunting after loss of signal,  
are described.

## SAFETY Noise at Work Regulations 1989

The Government has been talking about  
the effects of noise on worker's hearing for  
years. Suddenly, impelled by an EEC  
Directive, they published regulations in  
November 1989 to come into force on 1st  
January 1990.

While the BBC has for a long time had  
rules designed to protect people's hearing,  
there have been a number of detailed  
changes to the law. Within the timescale  
imposed, Engineering Management Safety  
Committee (EMSC) has only been able to  
issue provisional guidance, in the form of  
revised Codes of Practice - No 7: *The Use*  
of Headphones in *the BBC* and  
No 11: *High Sound Levels*.

The new regulations were written to  
cover every industrial situation and were  
not drafted with our sort of work in mind.  
(When they say heavy metal, they mean  
drop-forging rather than Iron Maiden or  
Guns n' Roses!) In order to check that we  
are following the new regulations  
accurately, a Working Party has now been  
set up within the Corporation to establish  
consistent ways of measuring sound levels  
in our particular circumstances. Among  
the problems being faced is the question of  
measuring sound levels at the ear when  
headphones are worn.

Martin Nutt,  
Sec to EMSC

# FUNDING THE FUTURE

The Phillips Report on *Funding the Future* was discussed at a joint meeting of the Board of Management and the Board of Governors on 25th January. The meeting accepted recommendations which will yield savings of £75m per year. Here, Bill Dennay outlines the impact on Engineering directorate.

The excellence of engineering within the BBC has long been an important element in the Corporation's pedigree, matched by its excellence in programmes. However, even centres of excellence cannot escape the changes affecting the broadcasting scene in general and the BBC in particular.

As the result of the deliberations on the Phillips Report, all directorates of the BBC will have to release significant resources. Engineering Directorate has to meet two specific financial objectives: savings of £1.2m per year in Architectural and Civil Engineering Department and £3.3m per year in Transport.

## ACED

The required savings in ACED represents about 25% of their current effort: this will have to be achieved by reducing the in-house resources to an absolute minimum, consistent with the demands of the customer directorates. ACED will remain as a central activity within Engineering directorate, providing expert advice and guidance to users throughout the BBC.

## Transport

As we need to ensure that in-house services are efficient and economic, all Transport services (except rigger-driving in support of outside broadcasts) will become subject to competitive tendering from outside suppliers. The required level and quality of transport services will be carefully established in consultation with the customer departments, thus permitting a fair comparison between internal and external tenders. The overriding policy is that if the external service is acceptable and is cheaper, the internal service can be retained only on the basis of the strongest editorial or policy argument.

I must emphasise that the use of the word 'privatisation' in this context is inaccurate and misleading. Privatisation implies that a decision has been taken to use external contractors: no such decision has been taken. In fact, every effort will be made to ensure fair competition between internal and external tenderers.

It is worth emphasising that these savings cannot be achieved solely by higher productivity or efficiency: the customers of ACED and Transport will need to

reduce their requirements in these two areas.

## Ware Stores

As the result of the closure of Ware stores, arrangements will be made for the purchase and delivery of goods from external suppliers, whilst retaining the financial benefits of our corporate purchasing power.

## Research, Design and Equipment

As a matter of policy, Engineering directorate should not undertake any work that is either unnecessary or already being undertaken outside the BBC. It is necessary to scrutinise the activities of Engineering directorate with this policy in mind. In particular, in consultation with the customer directorates, the minimum level of resources required in Design & Equipment Department will be confirmed. The work being undertaken at Research Department will also be reviewed, taking full account of the needs of the BBC for strategic guidance on engineering matters.

## Recruitment and Training

Last December, a Working Party on Engineering Recruitment and Training, led by John Elfes (Chief Engineer Regional Broadcasting Resources), produced an interim report which makes many important recommendations about modifying the roles of engineers and technicians in the BBC. When the individual directorates have analysed the effects of such changes on their working practices, the Working Party will prepare a final report which will include estimates of future training demands at Wood Norton.

In this context, the vocational emphasis of ETD's work must be stressed; we still look to the State to provide the necessary education. Having said that, we will examine whether universities and/or polytechnics can offer suitable alternative sources of training for our staff.

## Transmission

Transmission is a notable exception from the review procedure: it is widely acknowledged that major savings have already been achieved in this area and that it would be unfair to demand further savings. One activity which Bert Gallon (Chief Engineer, Transmission) is leading is the review of telecommuni-

cations within the BBC, in both programme distribution and telephone traffic. A saving of £1m per year is required in this area.

The successful move of Transmission's HQ to Warwick has demonstrated the economic and social benefits resulting from relocating staff away from the south-east of England in a carefully planned way. The relocation of some other London-based activities across the Corporation is an issue that will be addressed.

## Activity Reviews

The process of reviewing the activities of various departments will be onerous and time-consuming. Bernard Buist (Chief Accountant, Engineering) and I will progress all of the reviews, supported closely by the appropriate heads of departments. It is important that we arrive at the correct conclusions, but I also recognise that rapid conclusions are necessary to dispel any uncertainty amongst staff. I have therefore set a target date of June for completion of the review process, except for the reviews of Transport and ETD which will take longer.

☆ ☆ ☆

In introducing the outcome of the Phillips Report, the Director-General said:

"We *have to take* decisive action if we are to release money to:

be more competitive in *pay* in the expanding broadcasting market, *which* we wish to be;

train *staff* effectively, which we need to *do*; and

maintain *and* improve our programmes to the licence payers *who* support us, which we *have* to do if we are to be an effective cornerstone of British Broadcasting *and* win our *franchise* renewal in 1997."

Some difficult decisions will have to be made as a consequence of the Phillips Report, but I am sure that Engineering directorate will rise to the challenge, will maintain its outstanding record of excellence and will help to create a better BBC.

Bill Dennay  
Director of Engineering

# THE BROADCASTING BILL

The Broadcasting Bill is now wending its way through Parliament. Here, Phil Laven considers the Bill in its present state (in mid March) with particular reference to the provisions for 'Additional Services' :

The Broadcasting Bill is a weighty document: 159 pages with 166 clauses and 12 schedules. To make it thoroughly indigestible, the clauses are full of cross-references to other clauses and previous legislation. Since its publication last December, further clauses have been added. The amended Bill has more than two hundred pages and is now the largest piece of legislation ever generated by the Home Office. As such, I cannot recommend it as bedtime reading, except as a cure for insomnia!

Much of the Bill is concerned with setting up the new regulatory regime for commercial broadcasting. If you have relied on newspaper reports, you could be forgiven for thinking that the Bill is almost entirely about the auctioning process for the franchises for Channel 3 (the new name for ITV). In fact, many elements of the Bill are of direct concern to the BBC, such as Listed Events, the repeal of the 'must-carry' rules for cable services, the Broadcasting Standards Council, the extension of the Obscene Publications Act to broadcasting and the transfer to the BBC of responsibility for collection of the television licence fee. Some new clauses have just been published: privatisation of IBA transmission; copyright in programme listings, and quotas for independent production of BBC television programmes.

## Additional Services

The Bill includes provisions for licensing of 'additional services', but even the media specialists have almost ignored this subject. An additional service is defined in the Bill as:

"any *telecommunications* service which is provided by *wireless telegraphy* by means of the use of spare *capacity* on the *signals* carrying any *television* or sound broadcasting service".

The Independent Television Commission (ITC) and the Radio Authority must ensure that spare capacity on broadcast services is used for additional services. Whilst most of this spare capacity is on television services to be regulated by the ITC, the Secretary of State can notify the ITC of spare capacity on BBC services: the ITC would

then offer such capacity to the highest bidder. The Bill contains no information about how the Secretary of State would define 'spare capacity' on BBC services but on 20 February, David Melior (Minister of State at the Home Office) made the following statement in the House of Commons:

*"The Bill does not require the Secretary of State to notify to the ITC that BBC frequencies are available for allocation. It merely enables him to do so if he sees fit. The BBC will be allowed to retain sufficient spare capacity to continue to provide its Ceefax and Datacast services at current levels and to allow it to continue to provide subtitling for the deaf, to which I attach great importance. Although the BBC uses most of its spare capacity, there will be some additional capacity for allocation. The Bill therefore provides that capacity can be notified by the Secretary of State to the ITC for allocation."*

In response to further questioning from the Opposition about the circumstances in which spare capacity on BBC services would be notified to the ITC, David Melior gave an undertaking that: *"There will be no question of notification of spare capacity to the ITC, save after full consultation with the BBC on all material"*. Such assurances are welcome, but a cynical view is that 'consultation' means different things to different people!

## Impact on the BBC

At present, the BBC is permitted to use eleven lines per field for teletext. There is the possibility that two further lines could be made available for teletext, but only if the BBC spends money to develop and install single line ITS equipment throughout its distribution networks. These additional lines could be used to enhance Ceefax or to generate income via Datacast. As the Bill stands, the BBC could be informed that these lines have been declared to be 'spare capacity' for the ITC to sell to the highest bidder. The BBC could thus be put into the strange position of having to bid, in competition with commercial data services, for use of spare capacity on its own services.

BBC engineers have an enviable record of success in developing systems to exploit 'spare' capacity on broadcasting services. These include teletext, Datacast, RDS, NICAM-728 (Digital stereo sound for television), overnight subscription services and LF Teleswitching. The Broadcasting Bill removes the incentive for the BBC to develop further techniques to exploit spare capacity, either for enhancement of public service broadcasting or for commercial purposes.

There are similar provisions for the Radio Authority to license additional services on radio, including BBC transmissions, but it is important to note that RDS is exempt since it provides a service which is 'ancillary to programmes' in the form of tuning information.

Once the ITC or Radio Authority has been notified of spare capacity on BBC Services it would be impossible to reverse that decision, even if the BBC subsequently discovered an important use for that capacity.

## Impact on ITV and C4

At present, the teletext services on ITV and Channel 4 are provided by Oracle Teletext, which is jointly owned by the ITV contractors (except TV-am). A subscription teletext service is also provided by Air Call Teletext Ltd., a joint venture of Oracle and Air Call plc.

According to the Bill, holders of licences from the ITC will not necessarily be responsible for the provision of teletext services. The licences for 'additional services' will be awarded to the highest bidder. Apart from subtitling and programme-related services, no mechanism is included in the Bill to ensure the continuation of the existing range of teletext services on ITV and Channel 4: the highest bidder might abandon teletext in favour of transmitting data to commercial users.

In response to concerns about the possible loss of the existing teletext services, David Melior defended the Bill by stating that maximum use of the spare capacity on Channels 3 and 4 would be ensured by proper tendering arrangements. He went on to admit

# NETWORK RADIO

## New Time and Frequency distribution system

that this procedure may not result in a teletext service on Channels 3 and 4, but he pointed out that, whatever happens, the BBC will be free to continue its Ceefax service.

Oracle launched a campaign against this aspect of the Bill, culminating in a petition from more than 100,000 people for retention of teletext on Channels 3 and 4. In the face of such determined opposition, David Melior announced on 15 March (the final day of the Standing Committee's deliberations):

"We are clear that it would not be sensible to earmark all the spare capacity on the Channel 3 and 4 signals for teletext and not permit it to be used for any other purpose. That would perpetuate the rigidity in the present law, which has frustrated a number of interesting developments. We accept, however, that there is a strong case for ensuring that there will continue to be a commercial teletext service throughout the country. I am glad to announce today that we accept that case."

"We have therefore decided that the ITC should be under a duty to advertise a teletext service using part of the spare capacity on the Channel 3 and 4 signals. The amount of spare capacity to be allocated to this service by the ITC would be subject to the approval of the Secretary of State. The exact amount to be so allocated will be a matter for further careful consideration and consultation."

The ITV companies have been successful in lobbying for continuation of a commercial teletext service, even if it will be restricted to, say, 50% of the current data capacity.

### Conclusions

Although the Government has partially relented on the issue of commercial teletext services, there is no sign of any concession regarding spare capacity on BBC services being sold by the ITC or the Radio Authority to the highest bidder.

Phil Laven  
Chief Engineer,  
Information and Training

A new Time and Frequency distribution system entered service in Broadcasting House on the 5th of February. One of its main functions is to generate the six-pips time signal, previously generated by the Royal Greenwich Observatory (RGO).

Here, Jim McIlroy describes the facilities offered by the new system.

The Time Standard consists of three off-air radio receivers in a triple-redundancy configuration. Two of these are tuned to 1.542 GHz and receive UTC time and date information from the GPS (Global Positioning System) satellite. The third is tuned to 60 kHz and receives British Civil Time from MSF Rugby (or DCF Mannflingen, in West Germany, as a back-up).

The Frequency Standard has at its heart, two rubidium atomic oscillators in a dual-redundancy configuration. Each oscillator is located in a GPS receiver and any drift is automatically corrected by the received GPS signal. This avoids the need for regular calibration of these units. The resulting accuracy and stability is halfway between a conventional rubidium system and that of a caesium system. The system can thus act as the primary timing level in a digital transmission system.

### System Facilities

Time signals are generated by the system in various electronic formats. One of these is the well-known Greenwich Time Signal (GTS) which has been broadcast by the BBC since 1924. The six pips are distributed to various areas in BH and other parts of the BBC. Other formats generated by the system are EBU timecode, BCD timecode and 24V

impulse. As EBU timecode is an audio signal, it can readily be networked within a broadcast centre. For example, in Broadcasting House it is used to drive display clocks, tape recorders, digital audio systems and other time-dependent equipment.

Frequency generators are incorporated within the system to provide specific frequencies for use in digital audio: 32,44.1 and 48 kHz, plus 1,2,048,5,8,448,10,12,288 and 16,384 MHz. These generators are locked to the frequency standard using phase-locked loop (PLL) techniques but, should a fault occur with the reference signal, each module is capable of stand-alone operation.

### Remote Facilities

Customers at regional BBC sites may obtain time and date information from the system, using a 'dial-up' telephone-access facility. Access is via a Hayes compatible modem and a 300-baud dumb terminal, or a dedicated clock controller incorporating these facilities.

Anyone wanting further details on this system should contact me in Room 101 at Broadcasting House (Tel: LBH 4090).

Jim McIlroy  
Radio Projects

Dr John Pilkington (left) of the RGO receives a model BBC microphone from Duncan Thomas (Director of Resources, Radio), at a special hand-over ceremony at Herstmonceux on the 5th of February.