



Peter Rainger (DDE) Retires



Peter Rainger



George Cook



Charles Sandbank



Bruce Moffat

Peter Rainger, CBE, FRS, F. Eng., B.Sc(Eng), FIEE, Deputy Director of Engineering (DDE), retired from the BBC on 17 May. He has been succeeded in the post by George Cook, C. Eng., FIEE, previously Assistant Director of Engineering (ADE), who retains his present departmental areas of responsibility. The new ADE is Charles Sandbank, F. Eng., BSc, DIC, F.Inst.P., FIEE, previously Head of Research Department (HRD), who took up his new post on 24 April and took over the departmental responsibilities previously carried out by Peter Rainger. Dr. Bruce Moffat has taken over as Head of Research Department.

Peter Rainger

Peter Rainger joined the BBC as a graduate engineer in 1951 and worked on film equipment and later on magnetic recording and signal-processing equipment in the Planning and Installation Department. He moved to Designs Department, becoming Head of Television Recording Section and then Head of Studio Group before being appointed HDD in 1969. He was appointed Head of Research Department in 1971 and subsequently promoted to ADE and then DDE with responsibility for

all Engineering Research and Development in the BBC.

Peter Rainger has been the recipient of several awards which have marked his distinguished career in the BBC. He received the David Sarnoff gold medal for developments in electronics, and his work in the field of television standards conversion was recognised by the joint award of the J.J. Thomson Premium of the Institution of Electrical Engineers, the Geoffrey Parr Award of the Royal Television Society and an Emmy Award of the National Academy of Television Arts and Sciences of the U.S.A. He was the first to propose a new service, now known as Teletext. The development of the Teletext system recently earned a Queen's Award for Technological Achievement for the Engineering Directorate of the BBC and the IBA's Engineering Division. In 1982 he was elected a Fellow of the Royal Society for his major contributions to the development of electronic techniques used in television.

George Cook

George Cook joined the BBC in 1947 as a maintenance engineer continued on page 5

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Editorial

I have sung the praises of Transmitter Department before in this column, but I would be neglecting my duties if I didn't comment on the problems that the transmitter maintenance teams faced during the blizzards that struck Scotland and Northern England in January and February this year.

Deserving a special mention are the Meldrum team in Scotland who were faced with an aerial fire at the Durriss station in the worst of the weather on January 17th. Two members of the team drove to Durriss having already put in a hard day's work at their base. Unable to effect immediate repair to the aerial, they eventually set off home only to have their Range Rover break down! The following day six inches of ice covered the aerial, and access to the station was impossible due to the heavy snowfall.

Thus it was that the BBC and IBA emergency operations went into full swing. Reserve equipment, transmitters, aerials, communication links and other gear were brought into the Redmoss mf station from as far away as the Isle of Wight, and by the 21st January a temporary make-shift television service was established for the primary service area in Aberdeen. Meanwhile, some of the smaller relay stations had had their re-broadcast aerials swung round to pick up signals from stations not effected by the shutdown.

Throughout this period the weather conditions were bad and the only snow-mobile owned by the BBC, and based at Meldrum, proved to be a valuable asset.

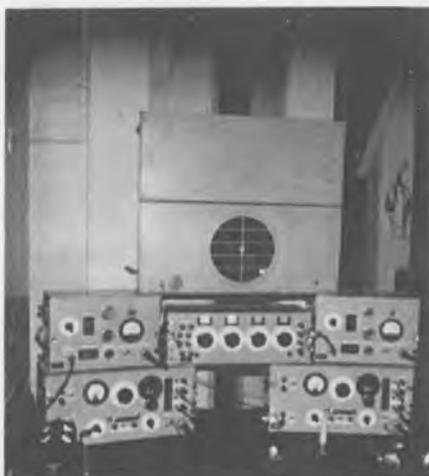
You will notice that I have not singled out anyone for a 'special mention'. The team feel that this would be inappropriate, since the work was a team effort. They pay tribute to the tremendous co-operation that they received from Transmitter Group and from their colleagues in the IBA.

So, congratulations to all involved, whether out in the snow and wind, or answering the telephone to angry viewers who missed part of the 'Thorn Birds'.

Alan Lafferty

Old Soldiers Never Die – OBA/8 Lives On In The War Rooms
The Cabinet War Rooms, situated in the basement of Government offices near Whitehall, were used by Winston Churchill's War Cabinet and the Chiefs of Staff of the armed services during the Second World War. They have now been restored as far as possible to their original condition, and the BBC has contributed working OBA/8 radio outside broadcast equipment identical to that which was installed during the War. The equipment was installed in the renovated rooms by John Ireland, who retired from Engineering Division some 18 months ago, and who had much experience in working with OBA/8 equipment when serving with SCPD.

The OBA/8 was introduced just before the War and was



designed as a number of separate units which could be easily carried and simply stacked for operation or transport. The basic equipment comprised an amplifier, 4-channel mixer, monitoring loudspeaker, and a mains unit; the mains unit and amplifier were duplicated, and stand by batteries were provided. The amplifier used two AC/SP3 high-mutual-conductance rf pentodes originally designed for television, but they proved exceptionally suitable for audio frequency amplifiers – the compactness and simplicity of the OBA/8 amplifier was such that the same techniques were applied to audio frequency amplifiers in general. The specification included a frequency characteristic within 1 dB from 30 – 10,000 Hz, and total harmonic distortion in the order of 1%. The new equipment, as it was in 1939, broke with tradition in providing volume control at the OB point; previously the control had been at the studio centre.

Fittingly enough, one of the last major outside broadcasts to use OBA/8 equipment was the occasion of Winston Churchill's funeral in 1965.

The restored War Rooms are now open to the public under the administration of the Imperial War Museum – Mrs Thatcher performed the opening ceremony in March. The BBC equipment is only one exhibit in a feast of memorabilia ranging from the Map Room used to plot the course of the War, to a few ill-gotten sugar lumps found concealed in the desk drawer of a senior officer of the day. The sugar lumps look remarkably like those of today but they are, of course, 'charged with atmosphere'.

Transmitters Opened

The following uhf transmitters have opened since January:-

Brechin	Tayside
Croydon Old Town	Surrey
Cwm Ffrwd-oer	Gwent
Glyncorrwg	Glamorgan
Kinver	Staffs
Lostwithiel	Cornwall
Lulworth	Dorset
Melvich	Highlands
New Addington	Surrey
Parwich	Derby
Penderyn	Glamorgan
South Maesteg	Glamorgan
Woodnook	Lancashire

The following vhf transmitters have opened or changed:-

Bath (mixed pol'n)	Avon
Llangollen (stereo)	Clwyd
Oban (mixed pol'n)	Strathclyde
Rumster Forest	Highland
(transfer from Thrumster)	

The following Local Radio transmitters have opened or changed:-

Bilsdale West Moor	R. Cleveland
(stereo)	
Blaenavon (vhf)	R. Gwent
Christchurch (vhf)	R. Gwent
High Hunsley	R. Humberside
(mixed pol'n)	
Lancaster	R. Lancashire
(mixed pol'n)	
Les Platons	R. Jersey
(stereo and mixed pol'n)	
Littlebourne (mf)	R. Kent
Oxcliffe (mf)	R. Lancashire
Rusthall (mf)	R. Kent
Whitby (stereo)	R. Cleveland

Copies of the 1984 pocket booklet 'BBC Television and Radio Stations' are now available from EID.

New Equipment at Pebble Mill

Studio A at Pebble Mill returned to service in March following a partial refurbishment of the studio facilities. Gone are the EMI2001 cameras that provided pictures for programmes such as 'Pebble Mill at One', 'Saturday Night at the Mill', and 'Nanny', and in their place are five Link 125s. Optionally the studio can now use two Ikegami HL79D hand held cameras in place of the 125s. Apart from the addition of top cyc lighting the studio itself otherwise remains unchanged, and even the floor, covered in a peelable plastic coating, has not needed any attention.

In the vision and lighting control room the Link camera controls are mounted in a new desk alongside the original Q-File lighting system. Three 26-inch colour monitors and nine 20-inch black and white monitors all come from the Melford factory.

Following the practice in the 'C' production control room (see Eng Inf no. 12) the observation seating in the 'A' control room is lower than, and in front of, the production desk. This is fitted with a Grass Valley 7FPY4 twenty-four channel mixer with extensive effects panels. A Quantel 3001 provides the main effects, whilst other sources could be



Studio 'A' production control room

an Aston caption generator or a specially designed inlay trolley which uses a Link 109 black and white camera as its source. The production desk has the normal engineering monitoring and communications facilities, as well as keyboards that allow Eastmead indicators under the production monitors to be programmed with source identification.

The sound control room remains unchanged, with a Neve 48-channel stereo-capable mixing desk, and LS5/8 monitor loudspeakers. A Soundcraft IS12/2

submixer is used for a separate mix of grams, tape and cartridge machines.

Other work at Pebble Mill continues, with the new Central Technical Area nearing comp-



Central Technical Area

pletion. The vision equipment for studio A and C are both now located in what was a hitherto undeveloped part of the Communications Centre. Caption facilities have also been installed in the same area. These consist of two Rank Cintel slide scanners, two Aston III caption generators, the Quantel 3001, an NEC E-flex and eventually two Rank Cintel Slide Files.

The presentation area, used for local news inserts into programmes such as 'Breakfast Time' and '60 Minutes', has also been re-furbished. A self-operated Calrec mixer has been custom-built for the area. Work continues with the refurbishment of Studio B, the formation of a new three-machine edit suite and a new Sypher suite.



Studio 'A' vision and lighting control room

A Glimpse at Elstree Studios



Studio 'C' vision control room

The BBC has for many years been very successful at both constructing purpose-built studio centres such as those at Pebble Mill and Manchester and converting existing buildings for broadcast purposes such as at Bristol. However, the purchase of the Elstree site is the first time that such a large purpose-built television studio complex has been bought.

The 'BBC Elstree Centre', as a sign outside the front gate announces, was purchased in January from Central Television when they moved their operation to the Midlands. It boasts four television studios, 120,000 sq feet of office accommodation, a three storey scenery block, technical stores, workshops and a film-lot. A restaurant, club facilities and several large car parks complement the other facilities.

Of the four studios (called A, B, C and D naturally), studios C and D are both equipped, and could be used for programme making once the equipment has been maintained. Studio D comprises 9600 sq ft of studio floor, plus permanently fixed audience seating; it is equipped with four early American-built LDK25 cameras with Varotal lenses. The useful studio floor area is bounded by a cyclorama trench, allowing both the bottom of the cyclorama cloth and ground row lighting to be below floor level. This gives

the lighting director the chance to merge the studio floor and cyclorama into one – the so-called 'infinite cyclorama' – a technique particularly appropriate to light entertainment productions. The studio uses monopole telescopic lighting hoists with single source lanterns. Initially the studio will be used by TV Training when they move to Elstree from Woodstock Grove.

Studio C, next door, is equipped with EMI2001 cameras. It is similar in size and technical facilities, though without the audience seating and cyclorama trench. It is

intended to use the studio for a bi-weekly drama serial by the end of 1984.

The Vision Apparatus Room (VAR) and control rooms reflect the differences between the BBC's approach to equipment and production techniques and those of other broadcasters. The VAR's for C and D are a mixture of commercial equipment, the only recognisable BBC item being MN6/501 waveform monitors. Old dual-standard EMI coders are still functioning, though the sync pulse generators were on their last legs and have been replaced. Vision and lighting control are in two adjacent rooms with the TM2 or technical co-ordinator between them. The studios both use Thorn Q-File lighting systems with dimmers that bear the labels of the Grand Theatre, Leeds. The monopole telescopic lighting hoists use a compressed air gun to raise and lower the luminaires, and a series of slotted tracks and wire pulleys allow the grid pattern to be changed. Lighting the productions using this method can be very time consuming.

The sound control rooms have been built on a split-level. On the lower level in both C and D studios is a 36-channel Neve sound mixing desk. On the upper level is a Studer A80 multitrack tape recorder, two Series-8 Ferrograph recorders, and the normal complement of Dolby equipment, jack-



Studio 'C' sound control room

field, distribution amps, and power supplies. There are no gram machines in the studios.

Studio C has a Prowest vision mixer, and Studio D a standard Grass Valley vision mixer in the production control rooms, together with eight monochrome and two colour monitors. The production desk is remarkably uncluttered compared with normal BBC studios. The technical manager operates from the vision and lighting control; there are no outside source lines since there were no live programmes made here, and so there are no complex communication facilities. The only features that one wouldn't find in a BBC studio are the 'applause' buttons, that illuminated signs on the studio floor for audience appreciation. Associated with the studio production areas are small cubicles used as viewing rooms, realisation rooms and producer booths.

Studio A has not been used for production for a few years and is unequipped. It has a wooden floor, which makes it unattractive for television use, though it should become a useful BBC film stage. Studio B is also unequipped, but will eventually be used by TV Training when money can be made available for new equipment.

Currently there are only a few technical staff on site, carrying out much needed equipment maintenance and specification testing. Others are grappling with the problems of topics such as where does the emergency lighting come from and go to? Where do the luminaires connect up? and what temperatures do the archive store-rooms reach? An interesting test using 1 kHz tone had several engineers puzzled when it was plugged through a sound desk to a loudspeaker. Checks at various points using a ppm revealed the presence of the tone, yet it could not be heard. A few minutes detective work revealed that the loudspeaker had box, linings and grille, but no cones!



Studio 'D' Production control room



Studio 'C' lighting control room

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at the Brookmans Park mf transmitter and has held the posts of Assistant to Superintendent Engineer, Television (Regions and Outside Broadcasts), Engineer-in-Charge (Television) at Manchester and Head of Engineering, Wales. In 1967 he became Assistant Chief Engineer, Television Operations, then Chief Engineer, Transmitters before becoming ADE in 1978.

Charles Sandbank

Charles Sandbank joined the BBC as Head of Research Department in 1978 from Standard Telecommunication Laboratories. He started his career with STC working on the development of radio valves, and was later responsible for some of the first silicon-chip integrated circuits to be fabricated in Europe. At STL he was concerned with solid-state microwave generation, display devices, micro-electronics, radio, navigational aids and integrated local area systems, as well as the early work on fibre-optic communications systems. He became Senior Divisional Manager, Advanced Technology and Defence, prior to his appointment at the BBC where his field of activities includes digital techniques, electronic graphics and high definition television.

Bruce Moffat

Bruce Moffat has spent his working career in BBC Research Department apart from a brief

spell as Research and Development Manager for Ilford Zonal.

He joined the BBC in 1962 as a Research Engineer in the Acoustics Section. This was followed by a period in Image Scanning Section, where he undertook investigations into the causes and prevention of head clogging in video tape recorders, and into possible techniques for digital television recording. In 1971 he was promoted to Head of Baseband Systems Section working on the development of multi-channel digital audio transmission systems and near-instantaneous digital companding, the forerunner of Nicam, which forms part of a CCIR recommended system for satellite broadcasting.

In 1976 he transferred to Head of Storage and Recording Section. Here he managed many projects including real-time digital audio signal processing, which has made feasible the development of a digital sound mixing desk; and a project on digital multi-picture storage and animation systems.

In 1981 he was promoted to Head of Studio Group, taking responsibility for Image Scanning, Special Projects, Sound, and Storage and Recording Sections.

Dr. Moffat has been author and co-author of numerous papers mainly on digital video and audio topics and acoustics, and he is presently serving as chairman of the United Kingdom CCIR working group on high definition television.

Double first for ETD



Tony Larkham adjusts a klystron cavity

A new uhf television transmitter installed at ETD, Wood Norton, now means that potential transmitter engineers can, at last, get hands-on experience at routines such as klystron tuning before they graduate to operational stations. The new transmitter is a double-first for ETD. It is the first time they have had a high-power tv transmitter, and it is the first of its type to be installed anywhere in the BBC. The new Pye LDM 1740 high-power transmitter is the first of a new generation that are being installed in the extensive uhf re-engineering programme. It is identical to those being installed at Sutton Coldfield which are expected to be in operational service in the spring. The new transmitters are much more efficient and offer a better performance than their predecessors. The transmitters at Sutton Coldfield and other stations will be installed in a 'parallel' configuration. In such a case there are two complete transmitters for each service, each providing half the output power. If one fails, its partner continues the service, now at reduced power. Each

transmitter of the pair consists of a low-power (about 1 watt) 'driver' transmitter, together with a pair of klystron amplifiers for vision and sound. The pair of klystrons share a suitable power supply and cooling plant.

At Wood Norton the installation consists of the driver transmitter and one (vision) klystron amplifier. The transmitter comes complete with the associated drive, power supply and cooling facilities, and can deliver 15 kW into a water cooled dummy load. This is sufficient to give engineers practice at the delicate art of klystron tuning and transmitter optimisation, which is often unavailable on operational stations.

Klystrons have been used in tv transmitters for many years. Although expensive, they have high rf gain and long operational lives. A klystron has an electron beam like a camera tube, and a magnetic focus field to prevent the beam touching the tube walls. Another difference is length (1 m or more) and dc power - 17 kV and 2 A on the ETD transmitter. The beam is surrounded by four resonant cavities - the adjustment of these cavities being the practice specifically provided on the new training transmitter. Associated with the klystron tuning are many other adjustments in the low-power driver transmitter, which correct for a wide range of distortion elsewhere in the system.

The new vision transmitter at Wood Norton is, 'Fully representative of the new re-engineered transmitters now coming into service', said Tony Larkham, the lecturer in charge of the equipment.

'The benefit to us is that we have a typical installation on which to practice all the skills



Klystron exposed

of tuning and adjustment for which the opportunity simply does not exist elsewhere. The great thing now is that we are doing it on a modern transmitter capable of a very good standard of performance. The students set the transmitter up, within specification, and gain satisfaction and confidence in the process.

When the high efficiency modifications are complete the transmitters will become even more complex to set up and render this type of training even more important'.

Built and installed by Pye TVT, under the watchful eye of TCPD project leader, Duncan Whittle, and Nick Davies, the LDM 1740 is one of a new generation of transmitters that grew from the Channel 4 expansion. Designed for unattended operation it is much smaller than older transmitters, and in some ways simpler. Originally the klystrons were manufactured by Valvo, they are now also available from EEV.

Soundproof Cabins for Radio OBs

Radio OBs recently took delivery of four 'acoustic cabins' designed to provide small temporary studio facilities inside existing buildings. Prototype cabins have already been successfully used at the Conservative Party Conference in Blackpool last year.

Manufactured by Sound Attenuators Ltd., the 4 m x 3 m cabins are normally used in factories and warehouses where a temporary noise-free environment

is required for office-staff. Being a non-permanent installation the cabin is assembled from 0.5 m galvanised steel panels which lock together with an arrangement of slotted hooks and bars set in the edges of the panels. Rubber strips between the panels are compressed to add to the sound insulation, and prevent mechanical noises between individual panels.

The whole assembly is rather like a large 'Lego' kit, with double

insulated windows and doors being sited in the walls to local requirements. Mechanical strength is gained via a metal capping strip along the top of the walls. A roof completes the basic assembly, with provision for forced air ventilation and lighting in the small roof space. The assembled cabin stands on a thick carpet isolating it from local ground noise. The inner walls are lined

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Digital Stereo Control Vehicle

SCPD has started acceptance tests of the world's first commercial all-digital sound mixing desk, manufactured by Neve Ltd. of Cambridge. The new desk, which will later be fitted in a specially constructed Radio OB vehicle, is based on the successful COPAS (Computer Processor for Audio Signals) channel processor developed by Research Department. The desk follows over five years of close collaboration between the BBC and Neve, and is another example of co-operation between the BBC and British Industry that has resulted in high technology products that lead the world.

The channel processor system, COPAS, which is incorporated into the 48-channel desk, can perform all of the normal functions

found in analogue mixing desks; this includes fading, mixing, limiting, compression and filtering. In addition it can add real-time delay for echo effects, and will also provide comprehensive signal routing. The powerful architecture of the processor has enabled the production of versatile software which implements all the necessary digital audio functions.

Following the acceptance tests, the new desk will be installed in the Digital Stereo Control Vehicle developed by SCPD and manufactured by CMA Coachbuilders Ltd. The vehicle is unusual in that it is fitted with sides that expand using hydraulic rams, which allow the room to open-out to 3.7 m wide. The interior has been specially acoustically treated, and this, together with the enlarged



New Radio OB vehicle

control room, enables operators to gain the optimum stereo listening environment. The desk will be tested in a variety of conditions for many different types of programmes.

Provision has been made in the vehicle for both analogue and digital tape recorders, as well as multi-track machines. Two modified LS5/8 loudspeakers provide comprehensive monitoring facilities.

Soundproof Cabins

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with Eurolon, a glass fibre compound and laminate, that, the manufacturers claim, gives a sound reduction index of 35 dB. A hessian cover gives the inner panels a pleasing appearance.

Mains power is connected to the outside of the cabin, with 13 amp outlets on the inside. A special ducting panel allows signal and control cables to enter the cabin. Specially designed fluorescent lights have been cleverly concealed in the roof mounting; electronic starters and a screened field choke prevent buzz or interference reaching any broadcast equipment in the cabin. The forced air ventilation system has been designed with extra attention given to the fan and ducting to prevent noise inside the cabin.

Two cabins mounted side by side can easily be used as a control cubicle and studio. Careful positioning of the doors and windows brings the internal appearance close to any purpose-built radio studio. Depending on the programme requirements, mixers, tape machines and studio desks would be added once the cabins have been assembled.

* * * * *

New CTA for Norwich

A visit in 1981 by Bill Cotton (now MD Tel) to the BBC East headquarters in Norwich has resulted in a new production control room, and the creation of a Central Technical Area. Being unable to view the local magazine programme 'Look East', because of restricted space in the production control room, he backed a scheme to remove some bays of equipment into the newly created CTA nearby.

The project was handled entirely by local staff, and has taken approximately two years to complete. The normal programme output was maintained throughout this period, and this naturally made the job more difficult. New cables were installed in parallel with the existing circuits, and individual pieces of equipment were then transferred from one location to the other, out of programme hours and at weekends.

Moving the vision equipment, including the mixer and the camera control units was a major operation. However this proved to be relatively straightforward compared with the complication of the sound and communication equipments; the large number of multi-way cables resulted in the construction of a new sound jackfield and main distribution frame.

After all the equipment had been removed from the control



Production control

room the additional step was taken to see whether any improvements could be made to the layout of the production desk, monitor stack and sound mixing position. After some heart-searching it was decided to turn the desk through ninety degrees and establish a separate sound cubicle within the control room. This involved removal of part of a wall to accommodate a new monitor stack as well as the replacement of the ceiling, and construction of a raised rostrum for a separate sound cubicle. To assist the programme operations, the sound cubicle was provided with an opening window through which scripts and urgent communication could take place. Ancillary facilities provided in the sound area include two tape recorders, cart-ridge machines and a pair of disc reproducers.

It is expected that the entire project will be completed by spring 1984.

New Central Technical Area for Glasgow BH

The 24th to 27th of February was a busy period for Broadcast Systems staff and S.C.P.D. Engineers when the new computerised Central Technical Area (C.T.A.) in Glasgow came into operation. Fortunately the advance preparation work, and a calm approach to the changeover meant that there were few snags when the new C.T.A. took over from three older control rooms.

The C.T.A., at the heart of Glasgow's studio complex, can be likened to a telephone exchange. However, instead of merely switching telephone conversations, the C.T.A. is responsible for routing and switching all external circuits, both audio and video outside the studio complex; providing the video switching and routing for television presentation and local opt-outs; and providing facilities for routing and switching of all internal video and audio circuits for both radio and television. In addition it provides the necessary cue, control and communications circuits for broadcast operations such as v.t. and telecine.

The C.T.A. replaces an old regional radio control room built in the early 60's, a television switching centre built in the 1970's, and a central apparatus room from the early 60's. The computerised system is designed to be transparent in operation; that is, the users should not know that there is a complex switch between the source and destination. Two PDP 11/44 computers are at the centre of the technical area, one for main use, and the other on standby for emergencies. These control nineteen matrices which connect 'sources' such as v.t., telecine and studios to 'destinations' such as continuity or trans-



Operations desk

mitters. The audio matrices were supplied by NTP in Copenhagen, and the video matrices by Seltech of Bourne End.

Thirty visual display units (vdus) initiate commands to the computer, and these are then confirmed when the route is complete. The computer system has two distinct uses. The bookings and allocations office use it to display studio bookings. These bookings are 'flagged' for the vdus in particular areas. Included in the split screen display is the circuit information for bookings involving areas outside Broadcasting House, Glasgow.

The system is also used to route or switch the various signals from sources to destinations using 'split assignment'. Split assignment allows any destinations to select the programme sound and vision from any source. This is itself a major step forward from the old manual system. However the system also ensures that only the assigned destination is able to select all facilities.

In a small opening ceremony on February 27th, Alan White, Manager of Communications and Engineering Services (M.C.E.S.) in Scotland recorded the 'unique moment in Glasgow's history'. He paid tribute to all of the staff who had contributed to the project since its conception twelve years ago. He singled out, amongst many others, Grant McWilliam from Glasgow, Bill McDowell who inspired the nineteen matrices,

Roger Kelly from S.C.P.D. who looked after the computer operation, and Charlie McCaw from S.C.P.D. who brought the project to life. Alan was then presented with a set of 'gold plated' sound, vision and communications jacks by Roger Kelly, who commented that these should be handled carefully, since they have only been out-of-service for two hours and "the gold paint is still wet!"

* * *

Licence Agreements

The following licence agreements have been announced by Designs Department: SPT Video Ltd. of Unit 1, Heybridge Industrial Estate, Holloway Road, Heybridge, Maldon, Essex CM9 7XS have signed a licence allowing them to manufacture and market the uhf broadcast receiver RC1/511.

Digi-Tel Systems Ltd. of Hillcroft House, Station Road, Eynsford, Kent, have signed a licence allowing them to manufacture and market the Digiscan Shot Change Detector RP3/511.

This unit is designed to be fitted in the equipment rack of a Rank-Cintel Mk III 'Digiscan' type of telecine. It provides a 'change of shot' pulse approx. 100 ms after the first line of a new picture.



The PDP 11/44 computers