

Eng Inf

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The Quarterly for BBC Engineering Staff

Please Circulate

New Digital Sound Mixing Desk



On the 16th September, BBC Radio took delivery of the all-digital sound mixing desk from Neve Electronics Ltd of Cambridge. Accepting the desk the Deputy Managing Director of Radio, Charles McLelland, said "The new desk is a major step towards the all-digital circuit from microphone to receiver. It offers greater flexibility than conventional analogue desks, and will bring even better quality to BBC Radio pro-

grammes". The following day, studio managers and other staff had the opportunity of inspecting the installation.

The desk is the result of a collaborative agreement between Neve and the Engineering Research Dept, whose COPAS digital audio processor has been further developed by Neve to form the basis of the new console.

The new desk has been

fitted into a specially designed articulated trailer which has expanding sides to improve stereo listening conditions. The desk controls can be dismantled from the trailer and connected back to the central processor via 150m of fibre-optic cable. "This will enable the equipment to be used across a wide-range of programmes" said Controller, Operations and Engineering, Russell Fletcher.

The desk is fully assignable and has been ergonomically designed jointly by Neve and the BBC, after an extended period of trials with operational staff. A large number of experimental features have been included in the design of the desk, ie. assignability, fibre optic communication, and digital processing, mixing and routing. The control surface, with a number of novel features, provides:-

Formats

Four formats are pre-programmed into the

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Editorial

Sharp-eyed readers will have noticed that the type-face and layout of this edition of "Eng Inf" is different. New technology has taken over, and a word processor is being used to typeset the copy in place of an old mechanical composer. Although the word-processor speeds up the process of typesetting and layout, this is offset by the better justification properties and print quality of the composer. Eventually the word-processor will be able to produce better copy than this, and I hope that you will bear with us until then.

Engineering Ties

I have just ordered a further batch of BBC Engineering ties in blue or maroon. Available in 6-8 weeks from 707, HWH, at £2.75 each.

An Apology

In the production of a magazine such as "Eng Inf", it is inevitable that we will make mistakes, and not give full credit where it is due. I must, therefore, apologise to the engineers who may have made a major contribution to a project, and yet see someone else getting the credit. The fault is not entirely ours though, since we are only as good as the person who contacts us with the story in the first place. If he or she neglects, or forgets, to mention the involvement of other staff on the project, then unless we bypass the contact, there is no way of knowing who else was involved. I can see but two solutions to this

dilemma: one - we omit all credit, but in the process upset everyone; or two - you make sure that you are the person to contact us with the story!

If you wish to take advantage of this offer, contact me on LBH 5432, or drop in to see me in room 707, Henry Wood House, my door is always open.

Alan Lafferty

BBC ENGINEERING SOCIETY

By Tony Berry, Chairman
BBC Engineering Society

The BBC Engineering Society is a section of the BBC Club and aims, to quote from its constitution, "to meet the needs of those with an interest in engineering and scientific matters by arranging lectures and visits and promoting social activities".

We do indeed set out to organise events which have a wide appeal and so our lectures for example, are not usually directed only towards engineers, but are very often of general interest even though they have some technical content. The programme of lectures for the coming season will comprise the following:-

16 October 85 Austin Rover-Robot Car Building
12 November 85 Television Audience Measurement
17 December 85 National Film Archives
21 January 86 CEEFAX
18 February 86 Communications-past, present and future
15 April 86 Domesday Project.

Visits to organisations of technical/general interest are arranged at intervals throughout the year. In the past these have included: car manufacturers, breweries, museums, research institutions, Tower Bridge, National Theatre, a coal mine and even a farm. A number of visits are currently being planned, which we hope will include the Royal Naval Ordnance Museum at Southampton and London Airport.

Further details for all these activities will be publicised in due course, so keep an eye on Club noticeboards. Better still, join the society, so that you receive full information direct. The annual subscription is only one pound.

If you would like further information, please contact the Hon. Treasurer, Robin Caine (211 Western house, BH 4627) or me (A2004 Woodlands, TC 3701).

Transmitters Opened

The following transmitters have opened/or changed since July:-

Uhf television

Machen Upper	Gwent
Corris	Powys
Llangybi	Dyfed
Bonchester	
Bridge	Borders
Tregaron	Dyfed
Fiunary	(Mull)
Norwich	
Central	Norfolk
Stamford	Lincs
Bow Street	Dyfed

Vhf Radio

Peterborough	Cambridge
Londonderry	
Brougher Mt	Fermanagh
Stranraer	W Galloway

Digital Desk Continued from page 1

desk to enable standard types of desk to be selected immediately upon switch-on. It may be configured as two multi-track desks, an OB desk, or a studio desk. Further set-ups can be configured by using the "assign" panel, then stored on the operator's own disc.

Total free grouping

Any fader can become a group master and there is no theoretical limit to the number of groups formed.

Mobility of faders

Faders, singly or in groups, can be "moved" about the desk. This means, for example, that a sixteen fader "band mix" could be set up on the central faders during the sound check. This could then be moved to the ends of the desk, whilst a "support band mix" could be done centrally. The main mix, previously set up, can then be recalled to the central position, the channel selections unchanged.

Stereo channels

Channels can be configured for stereo with common control to both legs. The "assignable facilities unit" allows fine imbalance to be corrected, but all other functions are controlled in tandem. This can be overridden by the "split" button which gives each leg its own channel strip and leaves only the fader in stereo.

Source naming

Each channel input can be labelled electronically



Laci Nestor-Smith (left), MD of Neve Electronics, presents a floppy disc to Charles McLelland DMDR, as part of the handover of the all-digital control desk:

with the aid of a four-character 15-segment display. Thus any input, its associated fader, and any processing control modules assigned to it, all bear the same label which will "follow" the fader if it is moved.

CONSOLE SPECIFICATION

The desk is based on 16-bit digital-to-analogue and analogue-to-digital convertors, but at various points in the system the dynamic range capability varies. The input conversion is to 16-bit accuracy but is ranged manually (over an 18-bit range) by the use of a novel system whereby the channel fader also controls the input gain. A limiter prevents the analogue-to-digital convertor from being overloaded.

The main mixing bus processing is to 32-bit accuracy to allow sufficient headroom for summing and the effects of extreme boosts of equal-

isation. This is truncated to 16-bits before the output stage.

A maximum of 128 mixed signals can be formed. Unless active processing is required on the combined signal, mixes are not formed until the final output stage. Thus, 'virtual' groups are created for group gain control.

VEHICLE

The Digital Control Vehicle (DCV) is articulated with tractor and purpose built trailer. The trailer was developed by Studio Capital Projects and CMA Coach-builders Ltd, London.

The vehicle has three major areas:

Control Area

To give improved listening conditions the sides of the control area are expanded by hydraulic rams. The volume of

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PSC Facilities at Pebble Mill

Lightweight television cameras, attached to U-Matic video-tape recorders, are increasingly being used in television productions. Known as Portable Single Cameras (PSCs) they came from the manufacturing houses of major names such as Ikegami, Philips, RCA and Sony. Future developments suggest that the cameras will use charge-coupled-devices (ccds) instead of

operate tk or vtr transmissions. To overcome the problem the first of a pair of suites, dedicated to the transmission of 3/4 inch high-band U-Matic tapes, has recently gone into service at Pebble Mill.

The PSC transmission and transfer suite is somewhat innovative both in concept and design, providing full facilities for record or replay and

Positioning of the menu selection buttons, and software optimised for minimal button-pushing, means that operators rarely have to move their hands or eyes out of the operating area. The menu information is presented on the bottom half-inch of the colour monitor, in the form of header-and-labels for the eight selection buttons immediately below.

The header displays the function required of these "soft keys", and is selected by one of sixteen dedicated buttons associated with the control requirements of the system, eg. monitor selections, timecode routing, etc.

The hardware, like the software, allows great flexibility of routing by using a thirty-two input vision matrix, further enhanced by gaining access to the Videotape area record matrix, providing external record lines and monitoring of the areas tk and 1 inch machines.

All the electronic assemblies are built on 3U eurocard format and are housed within the control desk. Interconnections between the control panels, subracks and distribution panel have been made using ribbon cable, even the 2U bantam audio jackfield was terminated into eight 50-way ribbon cables. The audio routing is also extensive and maintains the twin-track distribution provided by the rest of



The PSC suite control desk at Pebble Mill

2/3 inch tubes, and component (RGB or YUV) signal recording. They will also have an in-built recorder and not suffer from the problem of colour balance, sensitivity, and over-weight that are characteristics of their pre-decessors.

The transmission of inserts recorded on PSCs becomes a problem. Few areas are currently equipped for replay from U-Matic equipment in the same way that they

extensive monitoring, within a very small area.

Following consultation with the user department and tk staff, the Engineering Services and Operations staff at Pebble Mill were faced with squeezing a quart into a pint pot. It was decided, following past experience, to produce a simple to use menu control system based on a BBC Micro-computer.



The row of eight white buttons under the monitor control various functions. They are annotated via BBC micro program, and displayed at the bottom of the monitor screen.

the vt area.

The hard-ware and software were produced locally by John Macavoy and Ian Sykes.

Extensive use is now being made of PSC at Pebble Mill. Ninety-five percent of Midland Regional Television News coverage is now on PSC using four camera teams in the East and West Midlands with PSC editing facilities at Pebble Mill and Nottingham.

Network Programmes like "Top Gear" and "Pebble Mill at One" now use substantial amounts of PSC inserts in their programmes and the fullest possible use is being made of the single Network PSC editing and camera facilities at Pebble Mill.

The second of these PSC transmission suites is expected to be ready for the Autumn start of "Pebble Mill at One".

Digital Control Vehicle Continued from page 3

the control area increases from 20 cubic metres to 30 cubic metres with the sides expanded.

The control area has acoustic treatment designed by Research Department to provide optimum listening conditions. It houses the control surface, a pair of specially modified BBC LS5/8 loudspeakers, a VDU for the Neve system, a rigging/production TV

monitor and a pair of check loudspeakers.

Recording Area

Two Mitsubishi MX80 digital stereo tape-recorders with Designs Department interfaces to transcode between the AES/EBU signal format, used by Neve, and the Mitsubishi recording format. Provision has been made for two analogue stereo tape recorders and a digital multi-track machine.

Also in the Recording

Area is an engineer's bay with audio and video jackfield, distribution and cue amplifiers and engineering telephone system.

NICAM digital transmission equipment is housed to the rear of the area.

Equipment Area

Acoustically isolated from the main body of the vehicle, this area contains power control and distribution systems, signal processing racks, input/output stage boxes and cubicle facilities unit for the Neve digital mixing desk.

The power system is split into three separate inputs, each with comprehensive monitoring and control to cope with a maximum load of almost 50kW. The normal running load is of the order of 30kW, consisting of the demand from technical equipment, a cooling system for the technical equipment, and an air-conditioning system for the control and recording areas.

External

Provision has been made at the rear of the trailer for conventional and fibre-optic cable inputs. The cables are stowed in a cabinet at the side-rear.



The digital control vehicle outside the Radio OB base at Concord Road.

News VT Modernised

A two year project came to fruition over the August Bank Holiday weekend, when engineers moved the Television News video tape (vt) operation into a new recording area at Television Centre. The new area has been constructed on the fourth floor of the Spur, in what was the old News telecine (tk) area.

It offers fourteen vt cubicles plus two transmission suites and an apparatus area. Three of the vt cubicles will remain unequipped to allow for future expansion.

Before work could begin on the vt area, provision had to be made to allow telecine operations to continue. This was achieved by converting an area previously occupied by a film optical review theatre into two tk cubicles, each equipped with a new Rank Cintel Mk III



News Telecine 1 showing the Rank Cintel Mk III machine and Schlumberger sepmag facility

machine capable of handling 35 mm, 16 mm or 8 mm gauges. Schlumberger sepmag machines were also installed. At the same time the adjacent projection room was converted into a new sound dubbing control room (DCR2), and equip-ped with a Calrec 16-channel sound mixing desk, four gram decks, a multi-track and two twin-track audio tape recorders. The original dubbing control room (DCR1) was then re-furbished with similar equipment. The sound studio associated with DCR1 was split into two to allow each to operate to a DCR independently. Once this phase of the

project had been completed, the six remaining Designs Department telecine machines and their associated remote control desks were stripped out, and the area sub-divided into cubicles and transmission suites. (It is interesting to note that this area originally housed eleven News tk machines and the refurbishment programme reflects the change from film to tape for news gathering). Meanwhile, at Woodlands, first use was being made of the new SCPD pre-fabrication area to pre-wire the vt technical equipment.

Two main types of cubicles were built - those for housing a pair of one-inch C-format machines, (VTN 1 and 2) and the remainder for the three-quarter inch vcr (U-matic H) pairs (VTN3-5, 7 and 10-13). The two cubicle types designed for recording, editing and transmission work, are identical except that in the case of U-matic cubicles, the control desks have been extended to accommodate the two cassette machines.

A one-off "miscellaneous format" cubicle was also built (VTN 14), which houses a multitude of non-standard machines and domestic cassette machines. Programme material can be transferred to normal transmission format machines, or transmitted direct if necessary. Standard conversions can also be accommodated via the ACE equipment in the Network Area.

Cubicle facilities are identical and include record source and



Dubbing Control Room 2

monitoring selectors, communications (control line and intercom), and inter-cubicle vt remote control.

The vt area was laid out to give the two transmission rooms (TX1 and TX2) the best possible visual communication with the machine cubicles. To achieve an identical layout for both transmission rooms, it was necessary, as part of the building work in TX2, to considerably reduce the size of an inter-floor cable riser, and remove a film hoist.

Each TX room contains four U-matic H vcrs (each with timebase corrector), and most vt inserts into News programmes are replayed on these machines. A Probel matrix has been installed by Television Studio Section (SCPD) which routes these machines, plus a maximum of twenty-eight cubicle machines, to sixteen output lines, via six banks. Five lines are allocated to each of the three News studios, and the sixteenth line appears as a source on the main SCAR matrix.

The control desk in the transmission suites contains the select and routing controls for this replay matrix, in addition to comprehensive communication and monitoring facilities. A bank of thirty-two, 3-inch, monochrome monitors allows the operator to check the output of any of the local or external cubicle machines. In addition, there are six 14-inch colour monitors that are connected across each of the matrix bank outputs,

plus two quality cue monitors. Finally, the control desk has a sound mixer manufactured by Glensound, that enables the levels of the two audio tracks on each local vcr to be adjusted for transmission.

Of the fourteen cubicles, seven were brought into service on Bank Holiday Monday; the two transmission suites and one cubicle having been in use during the previous two weeks. The remaining three should be ready by November.

Why choose a Bank Holiday to move the News vt operation to the fourth floor? Project Leader, John Frisby from SCPD explained, "There was no late news scheduled for this particular Sunday, and except for a brief news summary at lunchtime on the Monday, the next main bulletin was almost twenty-four hours later. This unusually long break gave us enough time to transfer valuable capital equipment such as vcrs, time base correctors and monitors



Sally Beattie at the control desk of News VT transmission Suite B

and check for their correct operation in the new environment. Substantial wiring changes were also necessary to re-route studio input lines from the old to the new replay routes".

John Frisby led the teams of Recording Section engineers and technicians for the vt and tk projects; Alan King from Cinefilm Section, SCPD was project leader for the dubbing theatre work, and John Griffith-Davies was the ACED architect. The main user department representatives were Robin Adams of TV News and Roy Thomas of TV Resources Development.



VTN 1 - one of two identical C-format transmission cubicles with Roy Osborne at the control desk

Greater Stand-by Power for BH

Transmitter Capital Projects Department (Power Systems Section), have recently commissioned two new turbo-charged 474kW diesel generators. These have been installed in Broadcasting House for stand-by electrical power in the event of an interruption of the public supply. They replace two old 100kW sets.

Whenever the mains supply departs from its normal limits, the new generators are automatically started, paralleled together, and connected to the essential electrical services, such as the control room, switching centre, continuity suites, studios and telephone system. When the public supply returns, a controller is used to restore the system to normal, by synchronising the generators with the mains, thus effecting a 'no-break' transfer to the



474kW turbocharged V12 generating sets in BH sub-basement engine room



System control panel containing GEM-80 and showing the operational mimic diagram, VDU and printer.

mains supply. The whole process is fully automatic and incorporates automatic synchronising and load sharing equipment under the overall control of the industry standard programme controller (PC), the GEC "GEM 80".

There are many advantages in using a PC for this kind of application. In particular it provides many more opportunities to cater for sub-system failure. For example, one of the properties of modern turbo-charged engines is their inability to accept full load in one step, particularly when cold. If one set should fail to operate correctly, such as through starting, synchronising, or circuit breaker failure, the PC will instruct the remaining set to power initially half the load and, after 30 seconds, the remaining half which should have been powered by the faulty machine.

Another benefit of the PC is that it enables complex sequences to be stored for initiation at the press of a button. By pressing the 'Transfer to Generator' button,

both generators are run up, synchronised with the mains supply, and, after load transfer, the mains supply is disconnected. This no-break facility is used for grade 1 transmissions and warnings of impending power failures from the London Electricity Board. The no-break transfer can be reversed in a similar manner.

The programmable control system is automatically self checking and the generators are comprehensively protected against unsynchronised



New Maintained supplies switchboard

connections to the mains.

The removal of the old sets and the installation of the new ones in the sub-basement of Broadcasting House extension involved the opening of a shaft from the underground car park, through the basement corridor in front of studios B6 and B7 and into the sub-basement. This was done over a weekend starting at 6.00 pm on a Friday and by mid-day Sunday was complete. During the following months all the associated plant was installed. This included: a major new electrical switchboard and distribution system; two new 800 amp supplies from the London Electricity Board; and the



Engine Radiators on roof of Broadcasting House Extension 13 floors above the generators.

recabling of supplies to the various critical loads throughout the Broadcasting House studio area.

The complete system has now been operational six months and, during that time, has already operated twice due to faults on the public supply. In addition to these occasions, the plant is operated automatically and unattended, for two other reasons. For grade 1 transmissions, the generators are run to safeguard the service. Secondly the entire standby power system is tested once per week by Engineering House Services Radio, who are responsible for the operation and maintenance of the installation. This is done every Thursday morning at 2.30 am when a power failure is simulated and, for four or five seconds, Radio 2 output is lost whilst the diesel engines start up. This is usually 'featured' by the presenter of 'Nightride' and is the price to pay to guarantee the maintenance of broadcasting if a major disruption to the public electricity supply should occur.

M Miller, Project Leader
TCPD Power Systems
Section

Successful Tests of the EBU/SMPTE Digital Remote Control System

The EBU and SMPTE carried out joint tests earlier this summer to verify the practical validity of the protocols designed in EBU documents Tech 3245, and in the functionally-identical SMPTE specifications for the remote control of broadcast studio equipment.

Equipment developed by eight different manufacturing and broadcasting organisations, each according to its own interpretation of the specifications, was brought together on the premises of the Institut für Rundfunktechnik (IRT) in Munich and interconnected in a variety of configurations. These participants were: Ampex, Bosch, BBC, IRT, Kudelski, Pro-Bel, Solid State Logic and Studer. Test support was provided by Dynair, The Grass Valley Group, and Sony. Hewlett Packard and Wandel & Goltermann lent specialised test equipment.

The tests were designed primarily to verify the protocols relating to the electrical/mechanical and supervisory levels (levels 1 and 2) of the specification, but there was also a limited assessment up to, and including, the virtual machine level (level 4), in order to confirm the validity of the control message structure. The tests

were wholly successful and demonstrated the ability of the different items of equipment to pass control messages and return tallies between controlling and controlled devices, which included video and audio tape recorders, a routing switcher and control panels.

Validation of the specifications included investigation of the behaviour of the bus when operating under the control of bus controllers from different manufacturing sources; under conditions of deliberately induced data errors; and with bus lengths up to 1.2km.

A report giving full details of the tests is in preparation and will be published in due course.

Earlier, the EBU Technical Committee approved in principle the detailed specifications of control messages which will permit the full implementation of the standard for vtr systems. Publication of these control message specifications as supplements to EBU document Tech 3245 awaits completion of the SMPTE approval procedure. Final practical verification of the vtr dialect will be made at a further joint test to be held in Redwood City (California) in November 1985.

Radio 1 Needletimer

Radio 1 plays a large number of records in its programme schedule. As the BBC under the 1956 Copyright Act has to pay royalties to the Record Companies, to the Performing Rights Society and to Phonographic Performance Limited, accurate timing of the duration for which each record is played is important.

David Price, Chief Assistant Radio 1, felt that in this technological age there must be a way of timing the actual transmitted duration of records accurately and reliably without the need for someone to time them

individually with a stopwatch. He passed the idea on to Radio Engineering Services, and Paul Newell, a Senior Engineer Investigations, developed the "Radio 1 Needletimer".

The Needletimer itself consists of a Central Processor card, an Interface card and a Power Supply Unit, mounted in a 3U Eurocard Rack which is located in the Radio 1 Continuities Apparatus Room in Egton House. A printer and an alarm panel are installed on the Radio 1 reception desk. The timer prints out the start time and the duration of each

record played. The receptionist can then identify the record title from the programme running sheet and time it accurately from the print out. An improved version is under construction which will also time the Compact Disc players.

Each of the two Radio 1 transmission suites (continuities) has eight outputs connected to the Needletimer, three from the turntables, three from the studio faders and two from "In-Network" indication. When a turntable is running and a fader is opened into network the timer records the fact. The programme continuously stores the start and stop times of all turntables in

Licence to Manufacture

Several UK companies have recently taken out licences to manufacture and market Designs Department equipment:-

Cable length meter

Avitel Electronics Ltd will manufacture the Cable Length Meter ME1/521. This is a battery powered portable instrument for measuring the approximate length of coaxial cable wound on a drum, for estimating the location of short or open circuit faults in a cable or connecting lead, and for accurately matching the electrical lengths of cable. The meter can also measure the dc return path resistance to enable misterrmination to be detected, and can generate a distinct pseudo-video test signal

to enable ends to be identified. All measurements are shown on a four and a half digit display.

The cable length is measured using the pulse reflection principle. Transmitted and received pulses, either positive or negative, are used to trigger a rectangular wave. This is integrated to a dc potential which is measured and displayed by a digital voltmeter. Instrument stability is achieved by using the same supply voltage for the rectangular wave generator and the DVM reference, and by using a quartz crystal oscillator as the timing reference.

Video distribution amplifier

SVT Video Systems Ltd will manufacture the video distribution ampli-

fier AM4/536, Termination Panels PA20/521 and PA20/522, as well as the associated power supplies and delay line mountings. The video distribution amplifier, which has been in service for some time, offers a differential input at low frequencies to give common-mode hum rejection. It has five outputs, and 6dB gain, which makes it suitable for use with EQ5/540 or EQ5/550 equalisers.

Loudspeaker amplifier

HH Electronics Ltd have signed an agreement that allows them to manufacture the AM8/17 loudspeaker amplifier. This is a high performance, single channel, 50 W power amplifier with very low distortion, designed for use with 8 ohm loudspeaker systems, primarily the LS5/9. It can also be used with 4 ohm loud-

both continuities. When a turntable stops, the software checks whether the continuity was in network at the start or at the finish of the record.

If so, the duration is calculated and the information is printed out. In this way the system copes with continuity changeovers. The times of "In-Network" and "Out-of-Network" for each continuity are also shown on the print out.

If the timer programme should stop for any reason, such as for example the printer being switched off, an alarm sounds and an indicator light goes from green to flashing red. The Central Processor

Unit (CPU) is based on a commercial single board computer card using the same 6502 processor as the BBC microcomputer. It includes 16 bits of input/output at TTL logic levels, an RS 423/422 interface, a battery-backed clock and a Random Access Memory (RAM). It uses a version of the BBC micro operating system with a machine code monitor. The unit is made by Control Universal Ltd., of Cambridge. The software for the CPU was developed on a BBC microcomputer in 6502 assembly language and down-loaded using the RS423 link.

The interface card has sixteen optically isolated inputs. Twelve of the

inputs are "AND"-ed together in pairs to give a total of ten outputs at TTL logic level. The card also contains the alarm system. This consists of a monostable which is triggered by the program at regular intervals. It has to be reset regularly by the software to prevent the alarm going off. The front panel of the interface card has LED indicators to show the state of all sixteen inputs.

In the future, it may be possible to remove the continuity printout. With all the records bar-coded they could be identified automatically and their titles and times stored within a microcomputer until the information was required.

speaker systems and other BBC coded loud-speaker assemblies incorporating passive crossover units. It has been designed for either horizontal or vertical mounting, facilitating assembly to the back of a loudspeaker cabinet, as with the LS5/9Z, or installation, two units side by side, in a 19 inch rack.

The unit is normally mains powered but has provision for battery operation from external +24 V supplies. Switching to battery is automatic on loss of mains, with no break in output.

Data Transmission **by Teletext**

The full potential of broadcast data transmission systems like Teletext has yet to be realised.

Besides the normal Ceef-ax service and improved graphics or full photographic quality picture transmissions, it is also possible to transmit data packets for conditional access services. Subscribers to the system would have special decoders that only responded to the encrypted data. For example, a chain of high street stores could each be equipped with a special decoder; the head office could then broadcast to its stores such details as price increases, etc. Other uses could be by city based financial institutions, credit card companies, and other providers of volatile data.

On September 10th the first experimental transmission of independent data services using teletext as a carrier began. Data was origi-

nated by Research Department equipment installed at BH switching centre and inserted in the BBC2 feed to Crystal Palace and its dependants using equipment installed by Designs Department.

The data is divided into packets, each containing between 28 and 36 useful bytes and occupying one television line. At present, lines 18 and 331 are being used, allowing about three million packets to be sent on each network each day.

Every data packet contains a 16-bit cyclic redundancy check allowing it to be tested as correct and complete with a high degree of confidence. During the first days transmission over two million packets were tested on reception

News from Equipment Department

Crimping

The Ministry of Defence have issued the initial part of a guide to crimping. Copies can be obtained by contacting Amanda Webber on AH 227. The guide deals with basic concepts, although many engineering staff will



know more about the subject than is set out in the document. Standards Section also have various documents

which apply to crimping techniques, available on loan.

Extender Boards

Some problems have arisen with the use of 0.1 inch edge connector extender boards. Extender board failures appear to have arisen as the result of an insertion of oscilloscope probes into apertures on the side of the moulding for monitoring purposes. These apertures house the contact retaining tines which, when excessive force is used with the oscilloscope probe causes the contact to become detached from the moulding. When a subsequent mother-board is inserted into the extender board pocket, the contact is driven further into the moulding, rendering it useless, and raising the possibility of short circuit.

All engineers are advised of the need for caution when using tines as monitor points.



Identification Caps

Coloured identification caps are now available for use with 90 degree XLR-LNE connectors. Moulded from nylon, they have been introduced at the request of SCPD, but may have applications elsewhere. Colours are: Black, Brown, Orange, Yellow, Green, Blue, Violet, Grey and White. More details from the Standards Engineer.

Microphones

Are you involved with microphones? If so, you may not be aware of the Equipment Department's "Microphone Showcase". Published three or four times a year EDMS details all of the microphone items that are available from ED stores, which do not appear in the catalogue due to space limitations. Full details from Pete Redman, Microphone Room, ED or ring AH 263.

Ceefax data Continued from page 11

and only two were in error.

The main purpose of the experimental transmission is to establish that such independent data services do not interfere with the normal operation of decoders receiving the Ceefax and Telesoftware services.



Ian Blanthorn, Transmitter Manager at Crystal Palace demonstrates to a Chinese Broadcast delegation how to get hands-on experience with uhf television combiners.