



# ENGINEERING

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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, i.e. 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	CEEF AX
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/changed since July:-

Uhf television	
Machen Upper	Gwent
Corris	Powys
Llangybi	Dyfed
Bonchester	
Bridge	Borders
Tregaron	Dyfed
Fiunary	(Mu 11)
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

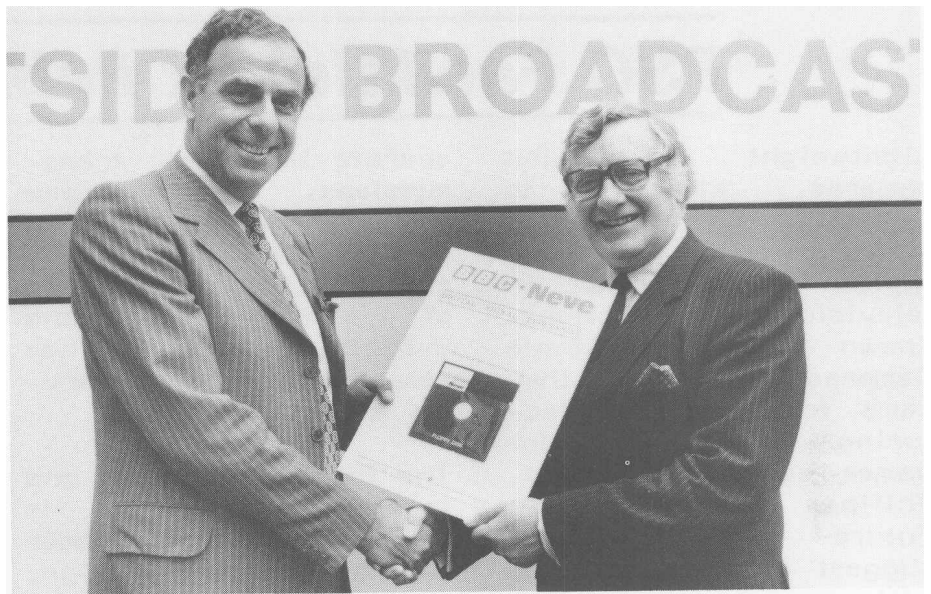
Faders, singly or in groups, can be "moved" about the desk. This means, for example, that a sixteen fader "band mix" could be set up on the central faders during the sound check. This could then be moved to the ends of the desk, whilst a "support band mix" could be done centrally. The main mix, previously 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 converters, 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 a Iso control 1st the input gain. A limiter prevents the analogue-to-digital converter 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 Coachbuilders 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

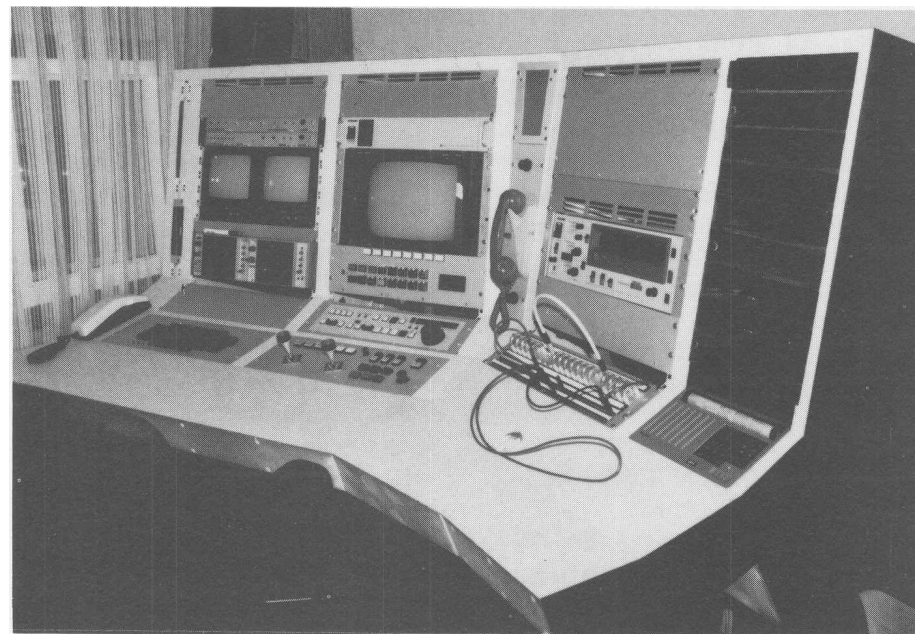
operate for or vtr transmissions. To overcome the problem the first of a pair of suites, dedicated to the transmission of 3/4 inch high-band U-Matic tapes, has recently gone into service at Pebble Mill.

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 menu button-pushings, 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 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 and 1 inch machines.



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 the predecessors.

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 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.

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

Area is an engineer's bay with audio and video jackfield, distribution and cue ampifiers 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 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".

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.

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 LSS/a loudspeakers, a VDU for the Neve system, a rlgging/production TV

monitor and a pair of check loudspeakers.

Recording Area Two Mitsubishi MXaO 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

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