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# BBC TELEVISION NEWS COLOUR O.B UNIT

## INTRODUCTION

The aim of the BBC TV News Service is to bring news to the viewers as quickly and accurately as possible. The British public has grown to expect 'instant' picture coverage of events they know are happening – while the BBC is stimulated by competition with Independent Television News as direct comparison of a news story can be made between the two bulletins.

BBC News Engineering must be able to provide the technical service and expertise to enable news events to be covered and transmitted in the shortest possible time. A news service cannot queue for shared facilities which are normally allocated on a long-term booked basis, for example, an o.b unit to a theatre. As news can seldom be predicted, News Division must have its own o.b equipment to provide live story coverage.

BBC TV News has operated a small, two-camera, black-and-white o.b unit since the start of BBC-2. This unit, which has been modified and developed as operational techniques have changed, was used as the basis for planning a new two-camera colour mobile control room (CMCR), primarily for the coverage of news-type programmes (Fig.1). The layout of the CMCR is unconventional as it is designed for unrehearsed transmissions and for staff who carry out a wide variety of functions, usually under time pressure.



Fig.1 General view of vehicle with Marconi Mark VIII colour camera in foreground. (BBC photograph.)

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## OPERATIONAL REQUIREMENTS

The CMCR is needed to cover the following types of programme:

- (a) A continuing news story which is liable to have minute-by-minute variations, e.g. a report from a political conference or an industrial dispute.
- (b) To report statements given by visitors to Downing Street or to bring pictures and reports from an accident location which, if filmed, would not meet the 50 weekly news bulletin 'deadlines'.
- (c) To cover a sporting event, such as a cricket match where the entire match needs to be recorded so that the highlights can be shown later.

An o.b unit can give better coverage of, say, a football match than film for a number of reasons, including superior technical quality and the ability to operate at lower light levels – an important consideration when covering late evening events.

## BASIC SIZE REQUIREMENTS

The unit must satisfy two main basic requirements – which, unfortunately, conflict. Firstly, it should be large enough to remain 'on-site' for perhaps a week and give a reasonable degree of technical facilities and comfort for the staff, e.g. air conditioning. Secondly, it should be small and compact enough to move quickly as well as operate and park in the London area without causing too much disturbance. Here it is worth noting that the CMCR can be accommodated in a parking-meter bay.

A custom-built, double-skinned insulated body was mounted on a chassis designed to carry a 3-ton load (Fig.1). The CMCR is 19ft long, weighs 5½ tons and is powered by a 6-cylinder petrol engine. In comparison, a conventional 4-camera colour mobile control room is some 35ft long and weighs about 14 tons.

It was decided that a 30cwt tender vehicle, with ancillary equipment, should support the CMCR. However, the planning also recognized that the CMCR would sometimes need to operate without the tender vehicle, or the tender might need to deliver equipment and then leave the operational area (due, for example, to parking difficulties). An example of this flexibility is that the cameras can be carried in either the CMCR or the tender (Fig.2).

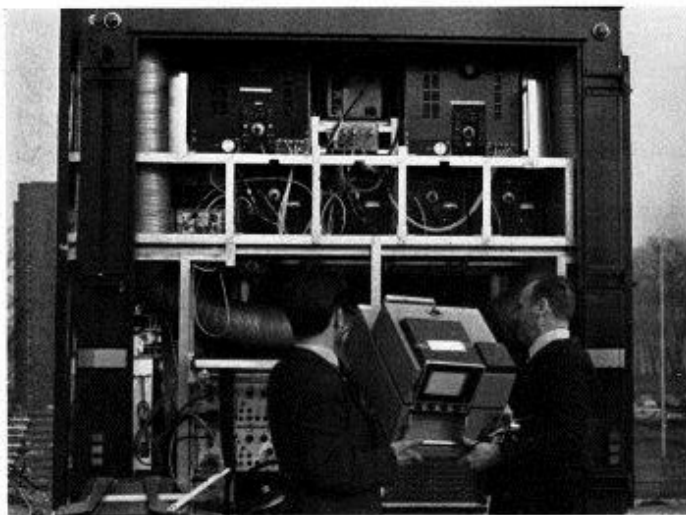


Fig.2 Rear view of the Colour Mobile Control Room showing radio link equipment, camera storage area, air-conditioning unit and rear of monitors. (BBC photograph.)

### BASIC TECHNICAL REQUIREMENTS

The unit should be capable of operating from normal or restricted mains supplies or mobile power sources. The normal power requirements of the CMCR are approximately 30A at 240V (compared with a standard 4-camera o.b unit consumption of some 83A). The CMCR can also operate from a 13A domestic mains supply with one camera and basic vision/sound facilities – but without air-conditioning/heating.

A 'sound only' situation can be maintained on internal batteries, including one stable crystal oven and both radio-link transmitters. The latter enables a vision circuit to be checked from the site in addition to a sound report. A 7kVA trailer generator can be used to support the unit; an internal generator was considered but discounted due to noise and cooling problems.

To enable outside broadcasts to be mounted at short notice, it is essential to rig cables quickly, particularly camera cables. The size of the camera cables and their weight determine:

- (a) The speed of operation
- (b) What cable runs are possible in the time available
- (c) The size of the tender vehicle (or o.b van should it be required to operate without the tender vehicle)
- (d) The number of rigging staff, as the lighter the cables, the easier they are to rig. (Compare 1,000ft of Mark VIII camera cable weighing 6cwt with 1,000ft of standard G101 cable weighing 20cwt.)

The size and weight of the cameras should also be as small as possible to ease the rigging and transportation problems and to enable lightweight tripods or dollies to be used.

The establishment at short notice of sound, vision and communication circuits back to base is one of the main factors to be taken into consideration in planning a vehicle for news operations. The CMCR can work over conventional Post

Office circuits, but, for speed and economy, it was decided to equip it with comprehensive radio-link equipment for its standard method of operation.

In the normal news situation, a link is set-up as soon as possible so that recordings or live transmissions can take place as the story develops. An alternative and a slight refinement on this is to have a mobile VTR with the unit and record 'on site' until the link has been established to the NEWS headquarters. The CMCR is not yet equipped with its own vision recording facilities but it will be possible, at a later date, to install a machine of the helical-scan type.

The vehicle should have a flat roof with a safe, non-slip working area suitable for use as a radio-link parabolic antenna mounting point and also as a camera mounting platform; this facility can save the time and expense of building a rostrum.

All equipment should be easy to line up, remain stable and be so laid out that it can be operated by a small team of engineers.

It should be possible to de-rig a camera channel completely from the unit and install it at a location where the vehicle is not allowed to park, or to cover two venues.

The vehicle should be equipped with extensive communication facilities to enable it to work into a number of programme destinations in quick succession, e.g national, regional or international programmes. It is useful if the cameras have suitable outputs so that they can work with Colour Separation Overlay (Chromakey). This is an aid to production as it enables suitable backgrounds to be obtained in, say, a temporary studio without having to carry large photo blow-ups, curtains or 'flats'.

To give flexibility and reliability, it was decided that two cameras would be the minimum requirement but planning allowed for an industrial type, black-and-white vidicon camera for captions to be fitted later if required.

It was not considered necessary for the CMCR to operate as a 'roving eye' and this simplified some of the technical problems. Another simplification was the decision to originate signals on 625-line PAL standards only.

It was decided to equip the unit with two Marconi Mark VIII cameras fitted with Angenieux 15:1 f/2 zoom lenses with range extenders, as the camera's specification meets many of the requirements outlined above.<sup>1</sup> The automatic system offered, among other things, a reduction in line-up time when on site and the basic layout of the CMCR was designed to take account of these facilities.

### DETAIL DESCRIPTION

A plan layout of the CMCR is shown in figure 3. The Driving Cab Area can be used by a reporter as a base and is fitted with fluorescent strip lighting to enable it to be used when the rest of the van area is dimmed down for operational reasons. A direct exchange-line telephone is also fitted in the cab. A small helical-scan recorder could be fitted in this area at a later date, if required.

Vision Bays back on to the cab area and house two

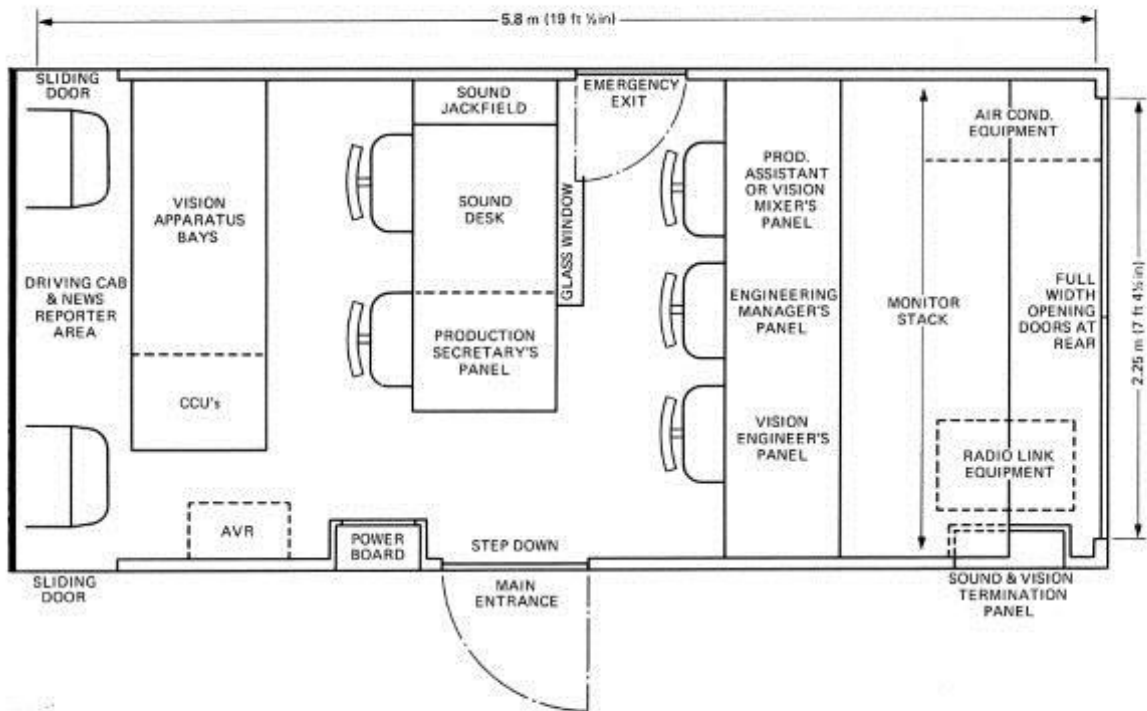


Fig.3 Plan layout; the vehicle has a raised floor with cable and ventilating ducts underneath.

waveform generators and their drive units, genlock and 'natlock' facilities and frequency monitoring equipment. Standard test waveforms (i.e. colour bars, linearity grilles), waveform monitoring oscilloscopes and vectorscopes are also mounted on these vision bays, as are three coders, one for each camera and one for the test waveforms. The vision mixing equipment, remotely controlled from the production area, is mounted in the bays and is of the simple A/B type with five source inputs which can be declared synchronous or non-synchronous. Mixing between A and B sides and cutting between sources is available. In an emergency the mixer can be bypassed and camera cutting carried out on a relay panel. Chromakey is also available between local sources.

'Radio check' receivers for v.h.f and u.h.f are mounted on the bays and fed from appropriate antennas fitted to the roof position when on site.

Next to the 19in Vision Bays are installed the two Marconi Mark VIII rack-mounted Camera Control Units with their power supplies. The CCU's are connected to the Cable Termination Panel in the side of the vehicle and to these can be connected the Mark VIII Cameras through up to 3,000ft (900m), of camera cable. The tender vehicle carries 4,000ft of cable for the two cameras. In front of the CCU's and Vision Bays is the sound area which consists of a 12-channel desk (which can be supplemented with an auxiliary 4-channel mixer).

The main sound channels can be routed to three groups in any combination and 60Ω or 600Ω impedance may be selected. Individual 'pre-fade' is available on all channels for echo or public address requirements. Also installed are a limiter,

compressor unit, tape identification, test oscillator and provision is made for two radio microphones.

A bay-mounted jackfield adjacent to the desk allows the usual flexibility in sound plugging and terminates the tie-lines from the Cable Termination Panel on the side of the vehicle. Line sending amplifiers, talkback amplifiers, relays etc, are all housed in the sound bay.

Comprehensive communication facilities using integrated circuit amplifiers are provided which distribute producer's, engineering manager's, sound mixer, vision engineers and secretary's talkback in various combinations and mixtures to different destinations.

At the end of the sound mixing desk is a position for a production secretary if required for a complex production. A glass panel is fitted in front of the sound desk to help separate the sound mixer from the producer/engineering manager's area with its heavy talkback and communications traffic (Fig.4).

In front of the sound mixing desk are three duty positions. The first position can be used by a production assistant or producer who would operate the five-source vision mixing panel, preview selection panel, talkback controls, etc. (Fig.5). The next position is occupied by the engineering manager. In most NEWS programmes the engineering manager carries out the duties of the production assistant and the vision mixer, but if a complex production is being mounted both positions can be manned.

The engineering manager's panel has preview buttons which select vision signals to the commentator's monitor, test signals to line and a transmission/rehearsal switch which permits a rehearsal to continue while line-up signals are sent from the CMCR. UHF/VHF receiver selection, normal/





Fig.4 Sound engineer's position showing 12-channel mixing console. (BBC photograph.)



Fig.5 Monitors and control desk with positions for (left to right) vision mixer/production assistant, engineering manager, vision engineer. (BBC photograph.)

emergency vision mixer changeover, waveform generator changeover, drive unit changeover and the interior van lighting controls can all be operated from this position together with control of the insertion of 'sound-in-syncs'.

The vision engineer's position is alongside the engineering manager's panel and is equipped with the following facilities: waveform generator manual field phasing, RGB or coded selection to the colour preview monitors, selection for camera viewfinder feeds and metering of the power output from the link transmitters.

In addition, the CCU's are remotely controlled from this position via two panels:

- (a) *The Iris/Lift Panel* which incorporates a fine control of aperture correction plus the automatic colour balance and sequential line-up buttons.
- (b) *Colour Balance Panel* incorporating quadrant-type colour trim controls on RGB plus individual RGB black-level controls. Red and blue gains may be varied in steps up to  $\pm 6\text{dB}$ , a master-gain switch in steps up to  $12\text{dB}$

being also provided together with optical filter selection.

Two waveform monitors complete this position.

In front of the production area are the picture monitors, with indicators, as a very flexible selection facility of the displayed pictures is provided. The monitor complement comprises two 19in colour for producer's transmission/preview and vision engineer's preview, four 11in monochrome for source and preview monitoring and one  $8\frac{1}{2}$ in 405/625 line monitor for radio check purposes. Behind the monitor stack and approached from the rear doors are the camera transport racks, the air-conditioning unit and the radio link control units; these feed combined video, multiplexed audio and power supplies to the microwave transmitters.

### RADIO LINKS

The method of communication employed to feed vision and sound signals back to base is relatively complex. The CMCR has an 's.h.f starter' link with two control units and a choice of four r.f heads. These r.f heads can feed a horn, a 2ft or a 4ft diameter parabolic antenna which may be mounted on the roof. Permanent cabling is installed to facilitate connection of the r.f heads to the control units. Difficult site conditions may sometimes require a special 'Eagle Tower' vehicle near the CMCR if no other suitable structure is available.

Transmitted over the 'starter link' are f.m main and reserve vision channels plus main and reserve sound channels. Each of the latter is fed from multiplex encoder equipment which can provide up to five control channels of 3.4kHz bandwidth. Two or three of these five control channels can be combined to provide a 6.8kHz or 10.2kHz 'music-quality' circuit. Normally 6.8kHz would be sufficient for practical news use giving one 'music' plus three communications channels for control purposes.

The BBC 'sound-in-sync' system of transmitting sound in a vision channel is also available and provides an additional high-quality music channel when needed.

The starter link may be all that is needed to reach the BBC's receiving points at Swains Lane in North London or Crystal Palace in South London. However, as the operation is often mounted from densely built-up areas of London with many high buildings in the signal path (and frequently over long distances in the regions), it is often necessary to utilize a radio link midpoint. The equipment for this would consist of receiving and transmitting parabolic antennas and associated receivers and transmitters which can be powered from batteries capable of working for approximately four hours.

The equipment can be operated in a Landrover vehicle or demounted and placed on top of a convenient building. This midpoint transmitter is then beamed to one of the two BBC receiving points already mentioned or, if necessary, another radio link 'hop' can be brought into service; sometimes 2GHz or 11GHz units are used for this purpose.

The received signals are fed to the NEWS Central apparatus room in the BBC Television

Centre where the multiplex and 'sound-in-sync' audio is decoded and the appropriate NEWS studios or VTR's fed with the signals they require. If the CMCR is working out of the Greater London area, the signal would be received and fed into the normal contribution links to London.

A reverse sound system for feeding the CMCR from base with control circuits is possible using a multiplex encoder in the NEWS CAR and feeding this to a sound transmitter at Swains Lane, the appropriate decoder being available in the CMCR. In addition, there are radio link 'rigging' r/t circuits to assist in lining up the transmitting and receiving point antennas as this is sometimes difficult due to their narrow beamwidth. This specific radio link r/t enables Swains Lane, Crystal Palace, the midpoint vehicle and the CMCR, assisted by selective calling, to communicate with each other. A general NEWS r/t system for information and control is also provided.

NEWS engineers operate the 'starter link', the rest of the radio communications system being operated by BBC communications unit staff based at Acton. The choice of four r.f head units preset to each available BBC channel gives flexibility to the NEWS Service as they can dovetail into the BBC Television Services' radio link operation when a specific channel has been allocated for a long-term booking commitment, whereas the NEWS Programme may be required at very short notice.

#### **LIGHTING**

Lights are normally supplied and rigged by firms under contract and can vary from battery lights to 'brutes'. The level and complexity is governed by the type of programme, the time of day, the time available and the amount of advance warning that has been received (75ft candles, to give a lens aperture of f/4 being an average level. If film camera crews are covering the same event, the level is normally higher).

#### **STAFFING**

NEWS o.b engineering staff must be flexible in their outlook and able to appreciate editorial problems. They must strive to maintain the highest possible technical standards but also be prepared to do their best in situations that may give lower quality but highly newsworthy material. The engineer/operator category has proved to be the best combination to meet the varied operational, maintenance and, if needed, production duties. The CMCR is normally staffed by three rigger-drivers and five engineers, including the camera operators. These can be supplemented by NEWS engineers from other sections if and when required.

#### **PROGRAMME USE**

The first NEWS colour o.b took place in May last year from the Department of Employment and the CMCR has since been in use at the rate of about three programmes each week covering news or current affairs programmes. Examples are the 'tight-rope walk' across the Thames, the Darlington Conference, the Trident air crash at Staines, many football matches, reports from Downing Street, the Prime Minister's visit to Fairford in order to fly in Concorde, veteran cars at Beaulieu, premiere of 'Young Winston', etc. In covering these and many other events the new CMCR has proved to be very valuable and flexible for news and similar programmes.

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#### **REFERENCE**

- 1 D. V. Ryley and G. Claydon: Automatic Features of the Mark VIII Colour Camera, Sound and Vision broadcasting, Vol.12, No.1, Spring 1971.