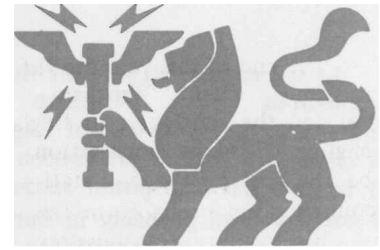


# ENG INF

The Quarterly For BBC Engineering StaH



## The Royal Wedding



Cameraman Chris Wickham covers the procession from St. Clement Danes Church

The Royal Wedding on July 29th was the largest single outside broadcast ever mounted by OB's. Production facilities involved some seventeen Colour Mobile Control Rooms (CMCR's) and over sixty cameras, providing cover of all the wedding celebrations nationwide. 109 broadcasting organisations from 74 countries took the pictures to an estimated worldwide audience of 750 million viewers. In this special feature we take a look behind the scenes at some of the facilities and people that made the broadcast possible.

The engineer behind the broadcast was Frank Hughes, Head of Engineering Planning at Kendal Avenue "It was just like any other outside broadcast really", said Frank, "except on a larger scale." Technical planning for the broadcast had been going on ever since the engagement announcement in March. Some of the early plans had to be changed when clearance for camera positions was refused by the Police; other details, such as the honeymoon departure point, were only known a few days in advance.

Focal point for the outside broadcast was the Colour Mobile Central Control Room (CMCCR) which was located at St. Paul's Cathedral and had only entered service in April for the Boat Race (Eng Inf No. 4). It was designed by Bill Rhodes of SCPD and his team with broadcasts such as Royal Ceremonials, Open Golf Championships

and Wimbledon Tennis in mind.

In productions involving many cameras or other sources, it is not possible to display all of the inputs on monitors because of the limited number available in a conventional CMCR. Even adding additional monitors creates a problem because of the limited space available. Vehicles of conventional roadwidth are just too small for the job, so the CMCCR uses an unusual design to overcome the problem. The sides of the production area in the middle of the vehicle are expanded by 1 metre on each side, increasing the width from 2.4 metres to 4.4 metres. This allows a bank of thirty-four monochrome and four colour monitors to be seen by all of the production staff at the control desk, and all of the picture sources can normally be displayed. For the Royal

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# Wrotham - mixed polarisation

At the end of this year the vhf/fm transmissions from Wrotham for London and the south-east of England will change to mixed polarisation. It will be the first high power station in the country (and probably in Europe) to use this form of transmission. In effect, the power of the transmission is being doubled by the addition of an equal vertically-polarized component to the existing horizontally-polarized one. The change is being made to give better reception to listeners with portable radios and those in cars, all of whom

## Transmitters Opened

The following uhf tv relay stations have opened since June:

June

Kirkoswald, Strathclyde

Broad Haven, Dyfed

Crucorney, Gwent

Delph, Greater Manchester

Union Mills, Isle of Man

Backwell, Avon

July

Lauder, Borders

Stow, Borders

Monmouth, Gwent

Dolwyddelan, Gwynedd

Llanarmon-yn-Ial, Clwyd

Cerrigydrudion, Clwyd

Sunderland, Tyne & Wear

Cartmel, Cumbria

Urswick, Cumbria

Staveley-in-Cartmel, Cumbria

Hawkshead, Cumbria

Kettlewell, N. Yorks

August

Collafirth Hill, Shetland Isles

Beer, Devon

Belper, Derbyshire

September

Kirkfieldbank, Strathclyde

Methven, Tayside

Strathallan, Tayside

Fintry, Central Scotland

Fishguard, Dyfed

Gilfrew, West Glamorgan

Gulval, Cornwall

Millbrook, Hants

Penny Bridge, Cumbria

Backbarrow, Cumbria

Transmitter Changes

Vhf - August

Mynydd Pencarreg, Dyfed - new vhf 3 service station

Local Radio

June - Radio Leicester goes stereo

August - Radio Medway: Extension of service to Tunbridge and Royal Tunbridge Wells.

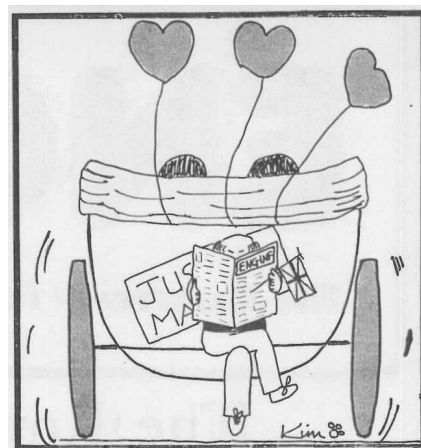
tend to use simple vertical aerials. Research Department investigations over the past few years indicate that these listeners should get a benefit equivalent to increasing power on the present polarization between four and eight times. Listeners who use fixed roof-top or loft aerials are asked to make no change to their installations and should not notice any significant difference in reception on them. (There may be small differences owing to the inability to match the radiation patterns of the new aerial precisely to those of the existing one).

Some local radio stations, and those relay stations recently built in the national regions, already radiate mixed polarisation although it may have been given a different name. Slant polarization implies that the vertical and horizontal components are in phase, whereas circular polarization implies that they are in phase quadrature. On small, simple aerials it is possible to achieve either of these conditions, but on large and complicated aerials like Wrotham the phase difference between the components varies with azimuth so that in most directions the polarization is neither slant nor circular but elliptical. Accordingly the more general term mixed polarization has been adopted to cover all these conditions.

The work at Wrotham started with the installation by Transmitter Capital Projects Department (T.C.P.D.) of four new Pye 10 kW transmitters to carry the Radio 2 and 3 transmissions temporarily while the Architects and Civil Engineers Department (A.C.E.D.) modified the building ready for all the new equipment. Since then a new mast has been built and the outside work on aerials and feeders completed. Inside the building the installation of six new 20 kW Marconi transmitters is well advanced and the transmitter combining units are now in the preliminary stages of installation. The project also involves new monitoring and control gear, drives and auto-phasing equipment. Commissioning tests are due to start in November for service by the end of the year.

This is the first station in a massive programme of re-engineering being carried out by T.C.P.D. and A.C.E.D. covering all ninety-one large and small vhf stations in the UK. The next major stations to be re-engineered are Sutton Coldfield and Holme Moss (by 1983) and the whole programme is scheduled for completion by 1989.

\* \* \*



## Editorial

October has been designated "National Teletext Month", by the Department of Industry and the public are being bombarded with information about the new facilities available. To coincide with the promotion, the BBC will increase the number of lines carrying data information from two to four, halving the page access time, and removing one of the major criticisms of the system. It is encouraging to see that development of the system continues at Research Department, with work on improved graphics, rounded character sets, and photographic quality pictures which will enhance the basic system in years to come.

The viewer should not fear these changes, however, as all of these developments and enhancements will retain the overall compatibility with existing decoders.

BBC engineers can be proud that they have introduced a revolutionary service, and that broadcaster, manufacturer and public will all benefit.

### ROYAL WEDDING

This letter is one of many received from grateful viewers. Well done all concerned.

Dolwyddelan,  
Gwynedd,  
Wales.

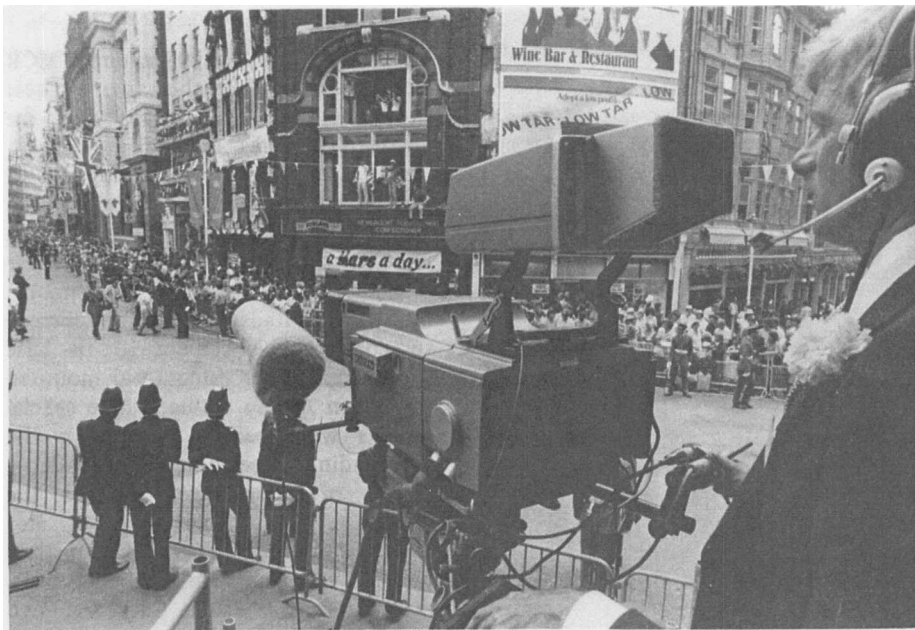
Dear Sirs,

Would you kindly convey to all those responsible and all those who helped them, our most grateful thanks for the new transmitter to serve this village: more especially for getting it functioning in time for the Royal Wedding.

Many of us have written grumbling letters in the past, so my husband and I wanted to say "Thank you" for the superbly improved t.v. picture we now receive - very much appreciated.

Yours gratefully,  
(Mrs.) Dorothy Valentine

## The Royal Wedding



*BBC cameras were in position long before the procession passed*

Wedding an extra eight monochrome monitors were mounted on racking; the additional space created by the expanding sides allowing plenty of room to accommodate them. The extra space also allows greater freedom of movement for staff around the control desk. At the rear of the vehicle is a sound area with a 44 channel Neve stereo sound mixer and a central communications system, the heart of which is a 50 x 100 pin-board matrix which enables the system to be tailored to suit each broadcast. The front of the vehicle contains engineering and vision control, where all of the vision signals from the smaller CMCR's were fed to the CMCCR allowing Michael Lumley the Producer, to have complete production control.

Near Buckingham Palace a technical area was established behind the wrought iron work of Canada Gate, in the corner of Green Park. Thames Television, CBC and ABC shared the site, which soon became festooned with cables and cameras.

The BBC had two type 5 CMCR's in the Park. These vehicles carry a normal complement of four cameras, although they can accommodate up to eight with the associated control equipment. Vision mixing is effected on an ABCD mixer, and a Neve 24 channel sound desk handles the sound mixing. One of the CMCR's, L02, carried a full complement of eight Philips LDK5 cameras, which were mounted in and around the Buckingham Palace area. The second CMCR was detached from the BBC Cardiff OB base for the

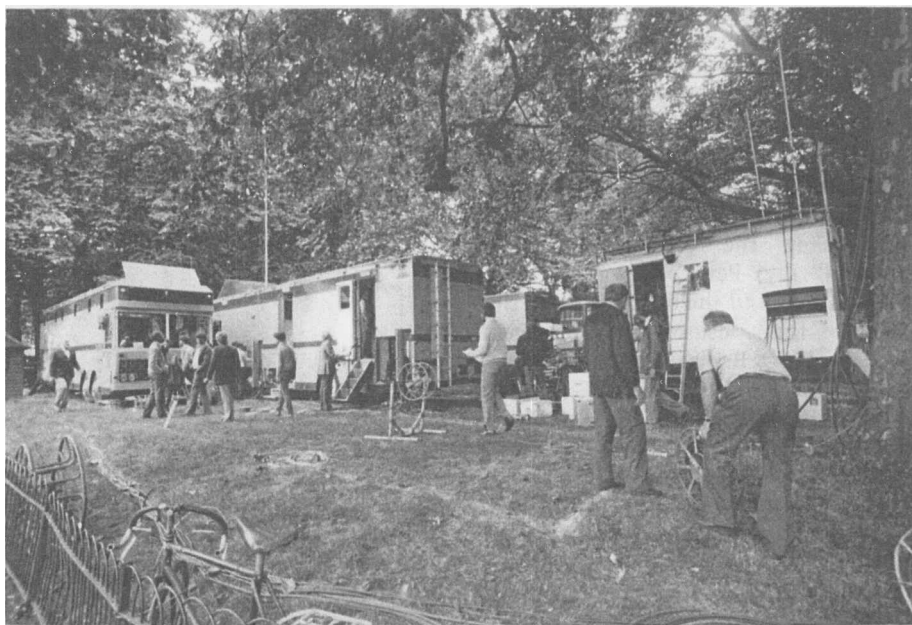
wedding and carried three Link 110 and one Link 120 camera. Special ducts were constructed under Constitution Hill to carry the triaxial camera control and other cables from Buckingham Palace camera positions to the CMCR's. Sound and vision signals from these cameras were mixed locally, and passed to the CMCCR at St. Paul's Cathedral via an shf radio link. Commentary boxes were established on Queen Victoria's memorial in the middle of The Mall, and emergency commentary facilities were provided in the Welsh scanner just in case the crowds proved to be too dense for the commentator,

Tom Fleming, to reach the commentary box; fortunately this "facility was not required.

Further along The Mall another CMCR, L03, had been sited by engineering manager John Livingstone close to Admiralty Arch. Six Philips LDK5 cameras were connected to this vehicle, one of which was mounted on top of the Arch itself, providing the high level shots of the processions in The Mall. Local sound and vision mixing were available to the director, Peter Cleaver, on this, the latest of the type 5 scanners. The output of this vehicle was, like the vehicles at Green Park, connected to the CMCCR at St. Paul's Cathedral via an shf radio link.

The London skyline is not helpful to the communications engineers who require a clear line-of-site path for the shf radio link equipment. An intermediate relay point was therefore established, on top of New Zealand House in Pall Mall. Several shf links were established, four relaying signals to St. Paul's and one to Television Centre. A single LDK5 camera was also mounted on New Zealand House, providing the spectacular aerial shots across the roofs of central London.

In The Strand, Don Craske had brought a three camera CMCR from the Open University production centre at Milton Keynes. Link 110 cameras had been removed from the studios for the broadcast, and these were mounted on Simon hoists which had been parked in side roads leading from The Strand. A 'continued on page 4'



*Radio OB caravans at Canada Gate*

## The Royal Wedding



*Cameraman Ken Moia outside Buckingham Palace*

single-camera unit carrying an EMI 200 I camera was located nearby, and its output was fed to the Open University CMCR. Local mixing was provided for the director, Ken Griffin, the output being fed to St. Paul's Cathedral via wide-band underground cables provided by British Telecom.

Three Philips LDKS cameras were connected to another CMCR near Temple Bar, where Peter Greenyer had obtained permission for the vehicle to park in the yard of the Royal Courts of Justice. One camera was located in the middle of the road, on the island by St. Clement Danes Church, and another was located on a Simon hoist in Bell Yard. The third was located on scaffolding protruding from a solicitor's office in Fleet Street, where the platform had to be counter-balanced to prevent the camera, and Jerry Ellis the cameraman, toppling into the crowds on the narrow streets below. The platform was cleverly concealed behind red, white and blue bunting specially bought for the occasion by Peter Greenyer. "Concealing the platform was no problem" says Peter, "it was the 4km cable run around the back streets to the CMCR that caused the biggest headache!" British Telecom, once again, provided wideband underground cables from the CMCR to St. Paul's Cathedral.

At St. Paul's Cathedral a special fence was erected around the complex of outside broadcast vehicles. The shf radio links were sited high up on the Cathedral roof by Roy Carpenter who was responsible for co-ordinating the communications for the broadcast.

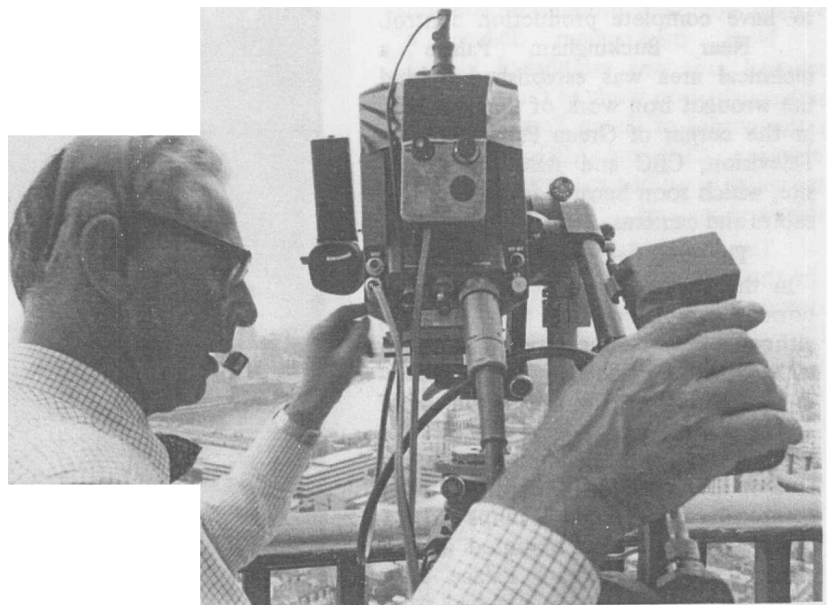
The communication facilities for the broadcast were complex, with each of the local cameras requiring talk-back facilities, as well as the CMCR's located along the route. The Mobile Communications Area vehicle (MCA) housed all of the radio equipment used for the broadcast, as well as six independent vhf radio telephone systems used for talk-back. The vehicle has facilities for monitoring and quality checking both the shf radio links, and the lines provided by British Telecom; after any necessary correction the signals were passed to the CMCCR nearby.

As well as the CMCCR and MCA, under the watchful eye of John Kemp the engineering manager, two type

5 CMCR's and a two-camera CMCR were co-located in this area. These provided the base-stations for the eighteen cameras in and around St. Paul's Cathedral. A Philips LDKS camera was mounted on the roof of the Abbey Life building overlooking the west door of the Cathedral, where the difficulty of laying cables was overcome by using radio-data control equipment to connect the camera to its base station. Another camera was mounted on Queen Anne's statue, where special screens were painted to match the surrounding stonework, and afforded a degree of camouflage. Inside the Cathedral the cameras were also mounted and decorated so that they blended with the natural surroundings.

From St. Paul's Cathedral two separate outputs from the CMCCR were fed via two individual shf radio links and wideband cables to studio 6 in Television Centre, where Angela Rippon and Michael Woods provided linking material and interviews. Next door, in studio 7, forty commentary positions were rigged for use by foreign broadcasting organisations commenting "off-tube".

Programme feeds were made available to the EBU headquarters in Brussels for distribution around Europe, and to three Intelsat satellites, one over the Indian Ocean for reception and distribution to Asia, and two over the Atlantic for North and South America. Over fifty countries took the broadcast live: a two camera CMCR was made available to foreign broadcast



*Cameraman Jack Hayward mounts his LDK 514 in the Golden Gallery*

organisation's for in-vision shots of national commentators; it was located outside Buckingham Palace.

The honeymoon departure from Buckingham Palace to Waterloo Station was covered by the same cameras in The Mall that had covered the earlier wedding procession. A Scottish type 5 CMCR and the lightweight production unit (LPU) were at Waterloo Station. Other units were hired from TV International and Trillion to cover the route from Horse Guards Parade into Whitehall, in Parliament Square, and at County Hall.

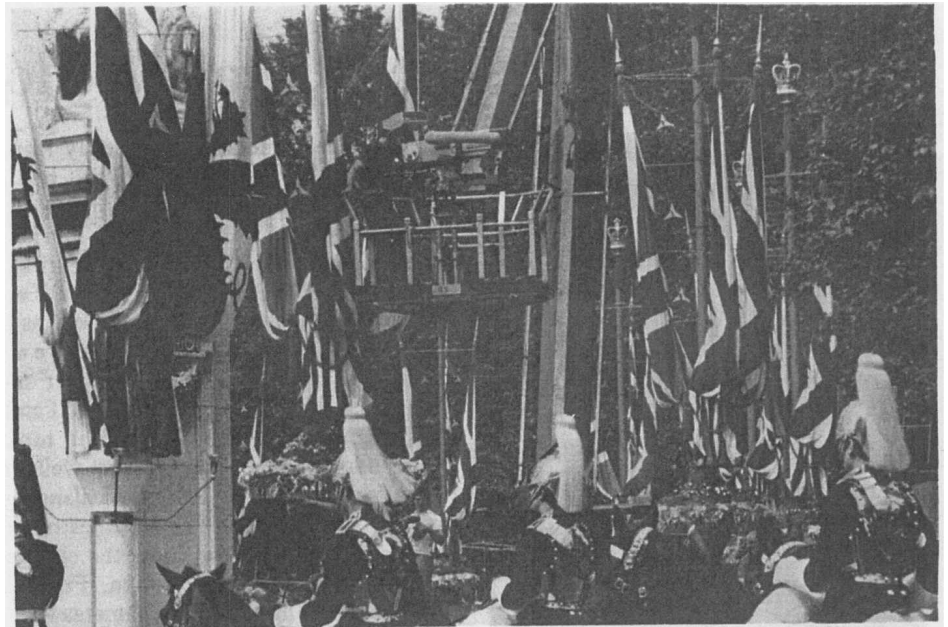
After the honeymoon departure the OB crews worked quickly to de-rig the vehicles and cameras so that they could be re-deployed onto other locations. Two days later the same units were covering athletics from Crystal Palace, showjumping from Hickstead and the "Much Loved Music Show".

**LIGHTING A ROYAL WEDDING**  
by Bryan Wilkes, Head of Lighting, Television Outside Broadcasts

For some in BBC Television the Royal Wedding was, in many ways, just another multi-camera Outside Broadcast, following the pattern set by previous Royal events. However, this one proved to be different - the sense of occasion did 'get to' some of the steeliest professionals, when it was realised this would be 'The Wedding of the Century' with probably the biggest 'live' audience of all time. around 600 million or even more - like a country's GNP, figures of this magnitude are different to comprehend.

What distinguished the event for broadcasters was not only its scale and its setting but its significance in the life of the nation. the wedding of our future King and Queen - which meant that it would be the most important OB for some time, demanding meticulous planning and execution and the best resources available. Lighting alone accounted for nearly £100,000 of combined BBC and ITV cash, an expenditure in modern lighting technology unparalleled in the history of Outside Broadcasts.

Because the venue for the Wedding was not immediately known, I assumed, like many others that it would be Westminster Abbey, but quickly learned that it was to be St. Paul's Cathedral, giving me a bigger and loftier building to light. Just as impressive, but in a different way. Of course, previous broadcasts from St. Paul's had paved the way; we had last lit the Cathedral for the Queen Mother's 80th birthday, and before that there had been Queen Elizabeth's Jubilee Service' and



*One of the camera positions in The Mall*

Sir Winston Churchill's Funeral Service. But, with the developments which had taken place in lighting technology and the improved standards, we could now achieve a higher incident level for a lower Kilowattage.

After several sessions at the Cathedral with producer Michael Lumley and ITV's Jim Pople, I prepared an outline lighting plot relating lights to camera positions, and then discussed the arrangements with Lee Electric (Lighting) Ltd., Wembley. Lee hold the BBC contract for all OB lighting in the UK and EEC countries. In this case ITV had already agreed that we should design and organise the lighting, with ITV sharing the costs. Three Movietone film cameramen and over 50 stills photographers' selected to cover the Wedding would automatically benefit too.

Lee management indicated that they could meet our needs from their extensive stock of equipment, relying on the high-technology Thorn CSI (compact source iodide) and CID (compact iodide, daylight) lamps for most of the lighting because of their superior efficacy and colour stability.

I wanted to light the Cathedral to a level of at least 1700 lux, so that cameras could use aperture settings of around f4 . 5.6 achieving good depth of field and the best optical performance from their lenses. In previous broadcasts we had barely bettered 1000 lux, leaving cameras operating at maximum lens aperture with the difficulties of short depth of field when zoomed into narrow angle of view.

When I had completed my lighting plot, a number of visits were necessary 'continued on page 6'

*Lighting the Wedding required some 270 or more luminaires*