

Broadcast Tripodium



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The journal of Pye TVT Limited the Broadcast Company of Philips



To Commemorate the Wedding of Prince Charles to Lady Diana Spencer

In this special edition of Broadcast Tripodium, we describe some of the background to the BBC's extensive radio and television coverage of the Royal Wedding.

As suppliers of television outside broadcast equipment to the BBC, Pye TVT Limited have during the last few years provided the majority of the BBC's new generation of colour cameras.

For this edition we have invited the BBC's technical information department to describe how the cameras were used in their coverage of the processions and ceremonial, and how BBC engineers prepared for what was to become their largest ever outside broadcast.

Introduction

On 29th July 1981 when Prince Charles married Lady Diana Spencer in St. Paul's Cathedral, London, an estimated worldwide audience of 1,000 million either viewed the television pictures of the event or listened on the radio. By far the vast majority of these viewers and listeners enjoyed the pictures and sound from BBC cameras and microphones:

BBC Radio had sole charge of providing the sound of the wedding ceremonial; BBC Television were responsible for the Cathedral lighting; and four communications satellites plus the Eurovision Land-Link distributed coverage of the wedding to more than 70 countries. In the United Kingdom alone 25 million viewed the pictures on BBC Television.



Planning the Television Coverage

One fact was known for certain well before the formal announcement of the Royal Wedding. Not only National, but, worldwide interest in the event, would be enormous and would rival that of Queen Elizabeth's Coronation in 1953.

Significantly though, what had changed since that time was the medium of television itself. From being luxury entertainment in the early 1950s, television has since blanketed the world and indeed reached out well beyond.

Television satellites now ensure that a National event of sufficient international interest can have a global distribution, enabling television viewers almost anywhere on earth to share the occasion instantaneously in colour. It was clear from the intense popular interest in the Royal Couple before their marriage that the wedding of the Prince of Wales to Lady Diana Spencer would have an unprecedented broadcast audience.

Against this background some tentative planning for the broadcast was begun in early 1980. In discussions with the UK's Commercial Television Companies, it was agreed quite early on that for the wedding service itself, the BBC would design and rig the lighting on a shared-cost basis and that BBC Radio would install the microphones and provide the necessary sound feeds. At that time, Westminster Abbey, scene of many Royal Church Services including the Coronation, was thought the most likely venue but when the Royal Wedding was eventually announced and St. Paul's Cathedral chosen, detailed planning was possible. The choice of St. Paul's instead of the Abbey meant many things in a broadcast sense — a loftier building to light, an acoustically kinder building from which to provide sound coverage, and perhaps most significantly — its position dictated a longer processional route. The Cathedral is about $2\frac{1}{4}$ miles from Buckingham Palace, a delight for the spectators but requiring additional television cameras to cover the route in full detail.

The decision to use St. Paul's also settled the main production issue. The siting of the BBC's Colour Mobile Central Control Room (CMCCR), from which the whole Royal Wedding production would be directed, would be in St. Paul's Churchyard, closest to the central event of the day. The mammoth CMCCR vehicle, built specially to house the production facilities for directing large-scale Outside Broadcasts, has physical dimensions which approach the legal limits for vehicles



LDK 5 camera outside St Paul's Cathedral during rehearsals.

travelling by road. But once on site its sides can be electrically expanded to give a production area large enough for a producer to simultaneously view nearly forty source monitors (see opposite). On the production side of the control desk the extra room also provides an improved working environment.

The CMCCR vehicle houses additionally a sound control area and an engineering control section, the latter providing test facilities and technical linking equipment such as distribution amplifiers for accepting pictures from a number of Colour Mobile Control Rooms (CMCR's). These inputs are routed into the CMCCR via a further attendant vehicle, the Mobile Communications Area (MCA), which contains link equipment to connect remote CMCRs and cameras.

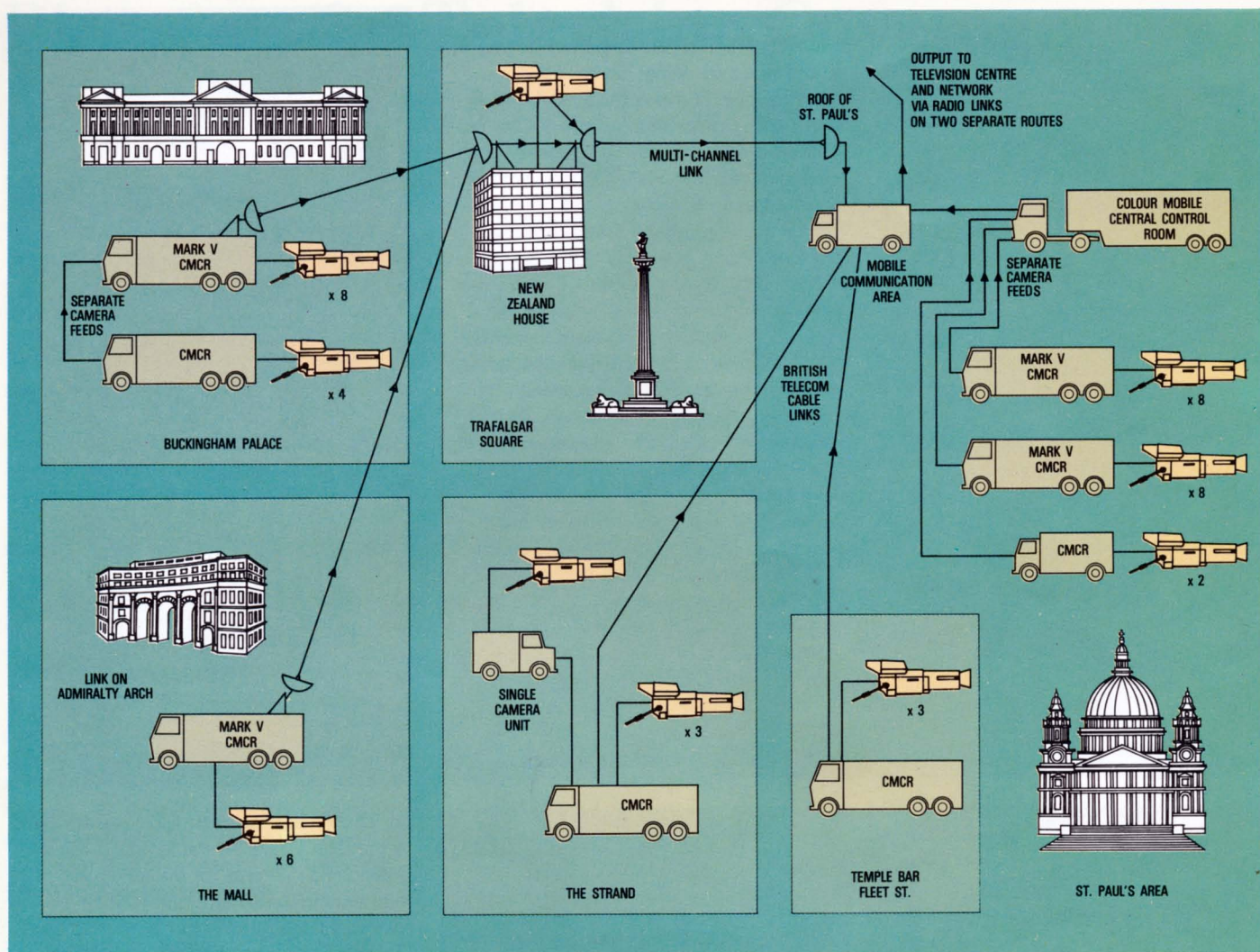
Having established the central production area, there began the task of siting CMCRs and cameras to cover St. Paul's, the processional route from Buckingham Palace and Clarence House and the two-mile honeymoon route from the Palace to Waterloo station. Coverage was then also needed at the Royal Couple's first honeymoon destination at Broadlands, the large house owned by the late Lord Mountbatten in Hampshire. It was clear that about sixty cameras would be required, a very large number by any standards, but more so bearing in mind that the BBC's normal OB commitments



had to be met during the protracted installation and rehearsal period leading up to the wedding. What did ease the resource planning was the availability of four of the Corporation's Type V CMCRs. These newly-introduced vehicles are equipped with five Philips LDK5 cameras apiece, but up to eight camera channels can be accommodated accepting any mixture of LDK5s and LDK14s. The eight-camera capacity makes these CMCRs very efficient and hence two of the Type V vehicles, each controlling eight cameras, were assigned to St. Pauls, an area with severe limitations on parking space. The schematic diagram, overleaf, shows the arrangement of vehicles and cameras for the Royal Wedding production. Two other Type V CMCRs were deployed along the route; an eight-camera unit was positioned close to Buckingham Palace and a six-camera unit near Admiralty Arch covered most of the Mall. The remainder of the route was covered by smaller CMCRs with finally a two-camera Mobile Control Room at St. Paul's operating two LDK14s alongside the LDK5s and LDK15s. All the CMCRs transmitted their pictures



on BBC radio links or British Telecom cable to the CMCCR at St. Pauls. Positioning cameras for the whole event required much taxing thought since relatively large numbers of both BBC and ITV cameras had to be accommodated over short distances along the route and in not a few of the tight corners in St. Paul's. In some situations, including the Cathedral, the positioning was decided, either BBC or ITV, on the toss of a coin once agreement had been reached with the authorities on the actual sites. Camera cabling was relatively straightforward although the LDK14 positioned in the dome had to have its cable rigged externally over the balcony surrounding the base of the dome (see opposite), a total drop of nearly 400 ft. Along the route, positions were agreed with the police and Local Government authorities, the Department of the Environment and owners of individual premises. Two of the cameras positioned in Ludgate Hill were data-controlled over radio links from their parent CMCR and a camera at St. Clement Danes in Fleet Street was data controlled using British Telecom cable link.



Preparations in the Cathedral

In preparing St. Paul's for the broadcasting of the wedding service, BBC engineers were given two exclusive briefs. Firstly to rig and set the lighting for the worldwide television and film audience and secondly to supply a mix of the ceremonial sound, again for the worldwide audience. It clearly made sense to rig only one set of microphones in the Cathedral especially as the microphones' unobtrusiveness was an essential requirement for television coverage. Similarly too, the lighting was best tackled by one organisation to retain a common lighting plot throughout. Naturally enough though, the work was carried out in close liaison with the Commercial Television Companies. Both the lighting and sound installations shared the same constraints. Equipment had to be installed against a background of strict security and while the Cathedral was enduring about ten thousand visitors per day flocking to see the wedding preparations. Each installation took nearly

three weeks, with much of the work being carried out in the evenings and overnight when the Cathedral was closed to the public.

The Television Lighting

The lighting plans were formulated around the decision to use mostly higher efficiency discharge lamps as well as some incandescent units. This enabled lighting levels of up to 1700 lux to be accommodated more economically. This lighting enabled the television cameras to operate at aperture settings in the range f5.6 to f6.3 where the zoom lenses would exhibit better definition and provide an improved depth-of-field. This latter point was particularly beneficial when the lenses were used zoomed-in on their subjects. The lighting plot provided for twenty one camera positions, twelve BBC and nine ITV. The Movietone News Cameras and some fifty stills photographers in the Cathedral also benefitted from the

extensive additional lighting. Luminaires were arranged at two levels, the bulk being rigged in the 70ft. high Triforium Gallery while most of the remainder, used for lighting the side aisles, were rigged about 25ft. up on bars mounted between pillars (see above right). The Triforium lighting not only lit the ceremony and congregation but some lights were angled upwards to light the exquisite mosaics of the Chancel and frescos in the Dome. The height of the Triforium provided one of the major problems since the lighting throw was in excess of 100ft. angled down into the Nave; and in the North and South Transepts lamp-to-subject distances of 200ft. were not unknown. To add to the problems, the North Transept was to be occupied by the 180-strong Bach Choir and the symphony orchestra whose members were all to be wearing dark morning dress, an excellent material for absorbing light. The lamp units used were largely twin 1kW



compact units providing light of colour temperature 4300°K. The main exceptions were the 2.5 kW and 1 kW daylight units mounted near the West Door entrance whose 5500°K light was designed to match the daylight flooding-in through the door as the wedding processions arrived and departed. The gradual change of lighting colour temperature from the West Door area and up the aisle was compensated for by the vision engineers in the appropriate CMC. Daylight streaming through large windows of clear glass in other parts of the Cathedral could have also posed problems. This was counteracted by stretching enormous sheets of combined neutral density and orange filters across the glass to reduce the light level by two stops and to prevent any unwanted blue cast falling across such areas as the choir. The power supply for the lights was drawn from three independent sources and totalled 690 kW. To guard against momentary power failure which might have extinguished the discharge lamps, a 130 kVA standby generator was separately cabled to 126 kW of emergency incandescent lighting directed on to the prime areas of action including the marriage dais. This would have been just sufficient to allow pictures to be transmitted if the worst happened.



Cathedral Sound Installation

Altogether about 57 microphones were rigged to bring the sound of the wedding service to the estimated 1,000 million worldwide audience which included listeners to BBC and Independent Local Radio, and viewers of BBC and ITV. A control area in St. Paul's Crypt housed a 64 channel mixer which produced a "clean" feed of stereo sound (i.e. the ceremonial without the commentary) and a second mixer in the Crypt combined this with the BBC Radio commentaries to produce a "mixed" feed for BBC Radio 4. BBC Television carried out in their own sound mixing and other broadcasting organisations either took direct microphone feeds or outputs from one of the mixers.

The main criteria for siting the microphones for the wedding ceremonial were:

1. Primarily to provide complete coverage bearing in mind the sound radio presentation. Radio listeners, lacking any visual components, easily become confused when any of the action inadvertently wanders beyond microphone coverage.
2. To make the microphone less obtrusive to a television audience without sacrificing sound quality.
3. To provide tighter control of balance by the use of spot microphones. This gave the television sound mixers the useful option of favouring the sounds of small groups of orchestral performers, for instance when they were being shown in close-up by the cameras.

Virtually all microphones were capacitor types used in cardioid configuration and most routed their signals down to the Crypt control room on 20-pair cables. Certain key microphones were individually cabled as an extra precaution against a multi-pair failure.

Control and Mixing

In the control room each microphone's signal was fed firstly to a splitter, one output of which was taken to the clean feed 64-channel mixer and a second to a "ceremonial" bay*. In the case of speech microphones, a further feed was taken to the Cathedral's public address system. The outputs of the "ceremonial" bays provided both direct microphone signals, (for

example, for BBC Television and ITV), or in other cases a mixed feed, for example to BBC Broadcasting House for the Radio Network.

For large ceremonies it is normal practice in BBC Radio for two mixers to be installed where possible. The mixers are used in adjacent but acoustically isolated rooms as they were on this occasion in the Crypt. This isolation enabled the mixer at the "clean feed" desk to concentrate more fully on balancing the ceremonial. The "clean feed" desk output was then fed to the "mixed feed" position where the operator mixed the commentators' microphones using cues from talkback.

*"Ceremonial" Bay is BBC parlance for a type of microphone distribution amplifier used chiefly on ceremonial occasions whence it gets its name. Each bay will handle nine microphone inputs and each channel has two buffered outputs.

Lighting and Sound Co-exist

Probably the biggest problem with the sound installation was slinging and suspending the microphones. Anyone who has struggled to hang Christmas decorations will perhaps understand this particular aspect of Radio OBs work where the problem was magnified many, many times by the sheer dimensions of the task. Although ultimately there were 7 miles of microphone cable co-existing with the 10-mile long lighting network, remarkably few interactive problems arose. Eventually the hums and crackles were traced and all settled down peacefully for the Great Day.



Microphone Placing

Much of the microphone placing was based on previous experience in the Cathedral although the music for this Royal Wedding was more ambitious than on previous such occasions.

Sound coverage was arranged around 20 stereo capacitor microphones (mostly AKG C451s arranged as coincident pairs). Eleven of these were mounted on slings and others suspended on strengthened cables from the Triforium Gallery. The main internal "sound stages" to be covered were the dais and the altar for the marriage ceremony itself, the Cathedral Choir and Kneller Hall trumpeters in the Chancel, the State Trumpeters in the Whispering Gallery and by the West Door, the Orchestra and Bach Choir in the North Transept, the organ speaking in the North-East Quarter Dome and above the West Door, and the Cathedral Bells. An external stereo pair was suspended from the West Portico to catch the West Door Trumpeters, immediately below, sounding the fanfare on the arrival of Lady Diana. The remaining complement consisted of spot microphones for soloists and sections of the orchestra and choir, and lectern positions for the ceremonial.



TV coverage of the Wedding Ceremony



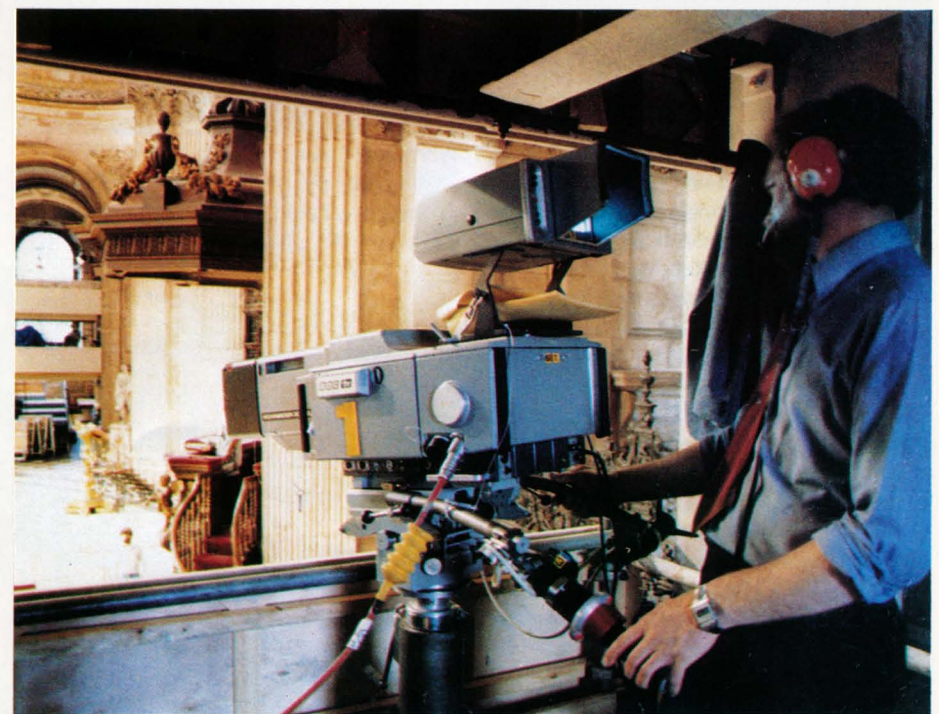
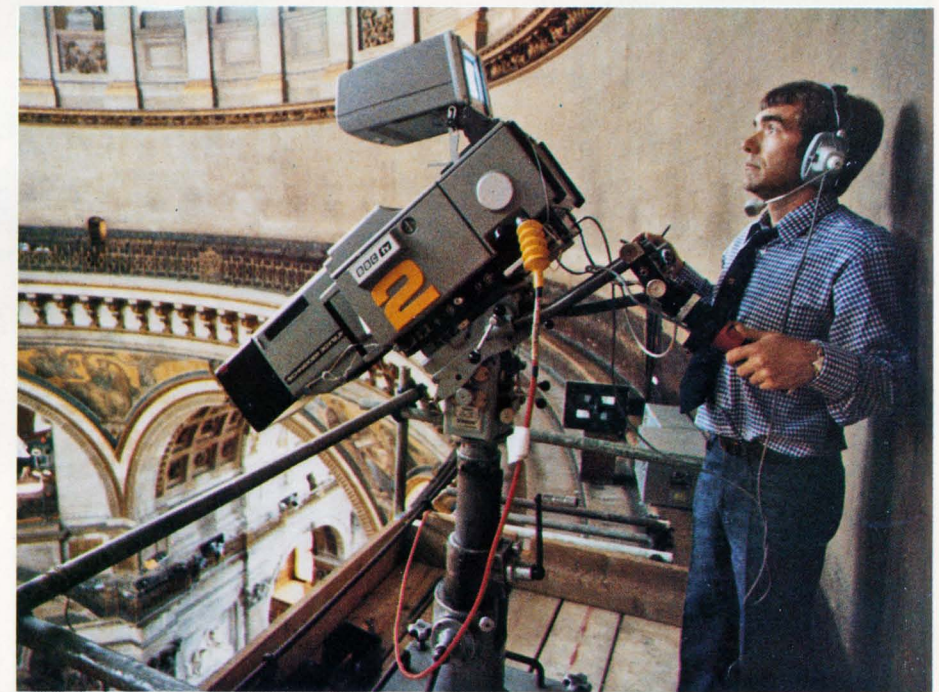
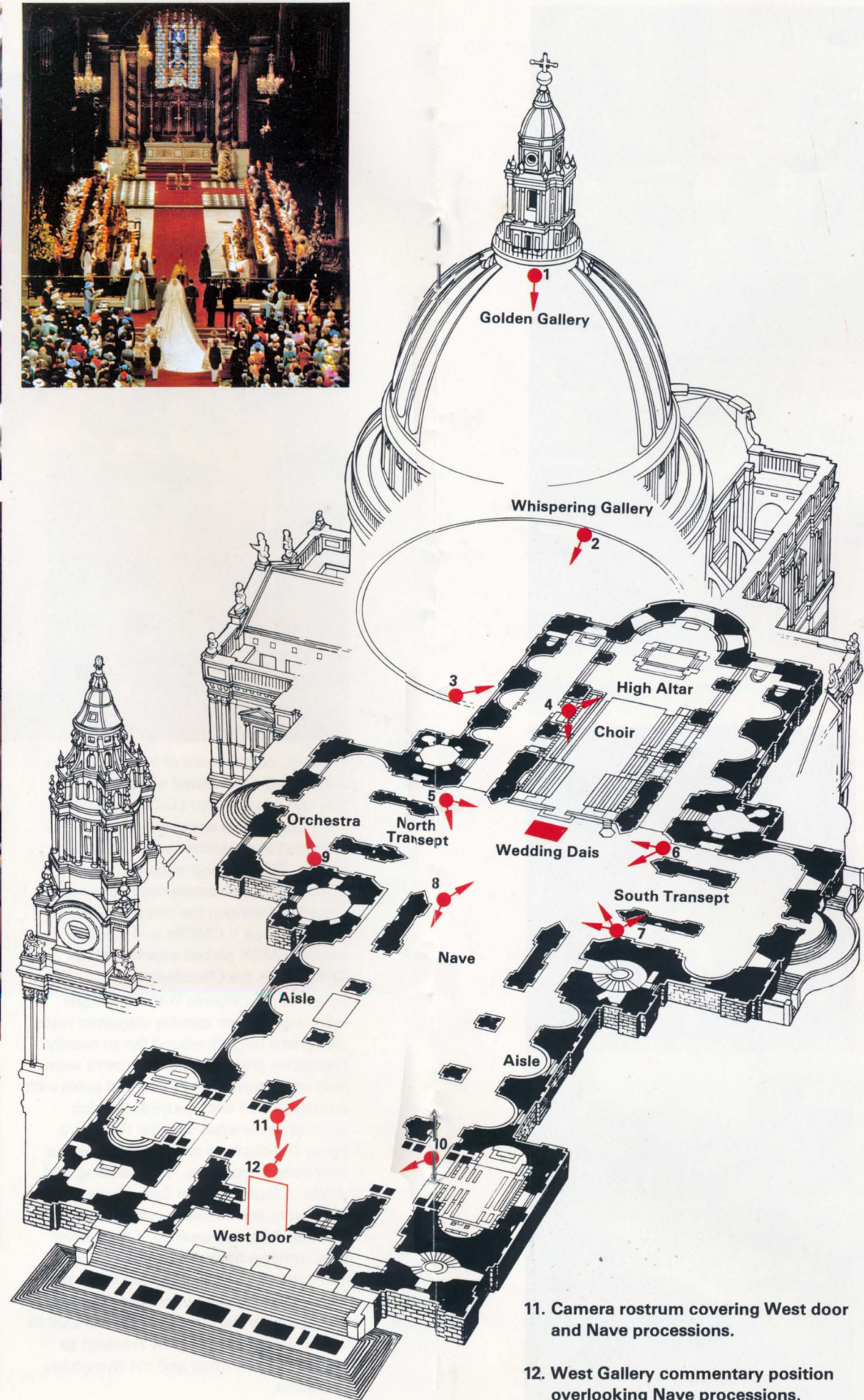
The BBC complement of twelve cameras in the Cathedral consisted of eight LDK5s, two LDK14s and two LDK15s. The latter were used where space was most restricted and matched well with the LDK5s. Triax cabling was used throughout, the camera outputs being dispersed between the two eight-camera capacity Type V CMCs and the two-camera CMC parked adjacent to the Cathedral in the Churchyard.

Seven of the cameras in the Cathedral were deployed on suitably disguised rostra giving lens heights around ten to twenty feet above ground level. The rostra were built using conventional scaffold poles with structures clad with curtaining which allowed cameramen to enter the rostra bases and climb up concealed ladders to their camera positions. The cladding had similar colouring to the Cathedral's stonework and blended well, presenting a most pleasing appearance. These lower level cameras gave views of the arrivals and departures of processions through the West Door and their movements up the aisle as far as the marriage dais. An LDK15 was mounted in the North Transept to cover the Bach Choir and the Symphony Orchestra.

The marriage dais proceedings were televised from each side by LDK5 cameras mounted on 20 ft. high bridges constructed between pillars and giving views slightly in front and well to the side of the bride and bridegroom's position. These cameras also showed the Royal Couple's families positioned either side facing inwards to the dais. The South

Transept Bridge Camera additionally gave frontal views of the orchestra and choir. Completing the complement of lower-level cameras, an LDK5 positioned in the 15 ft. high North Choir gave coverage of the Chancel and High Altar. Moving to the high level cameras, it was these that produced some particularly dramatic shots of the marriage ceremony.



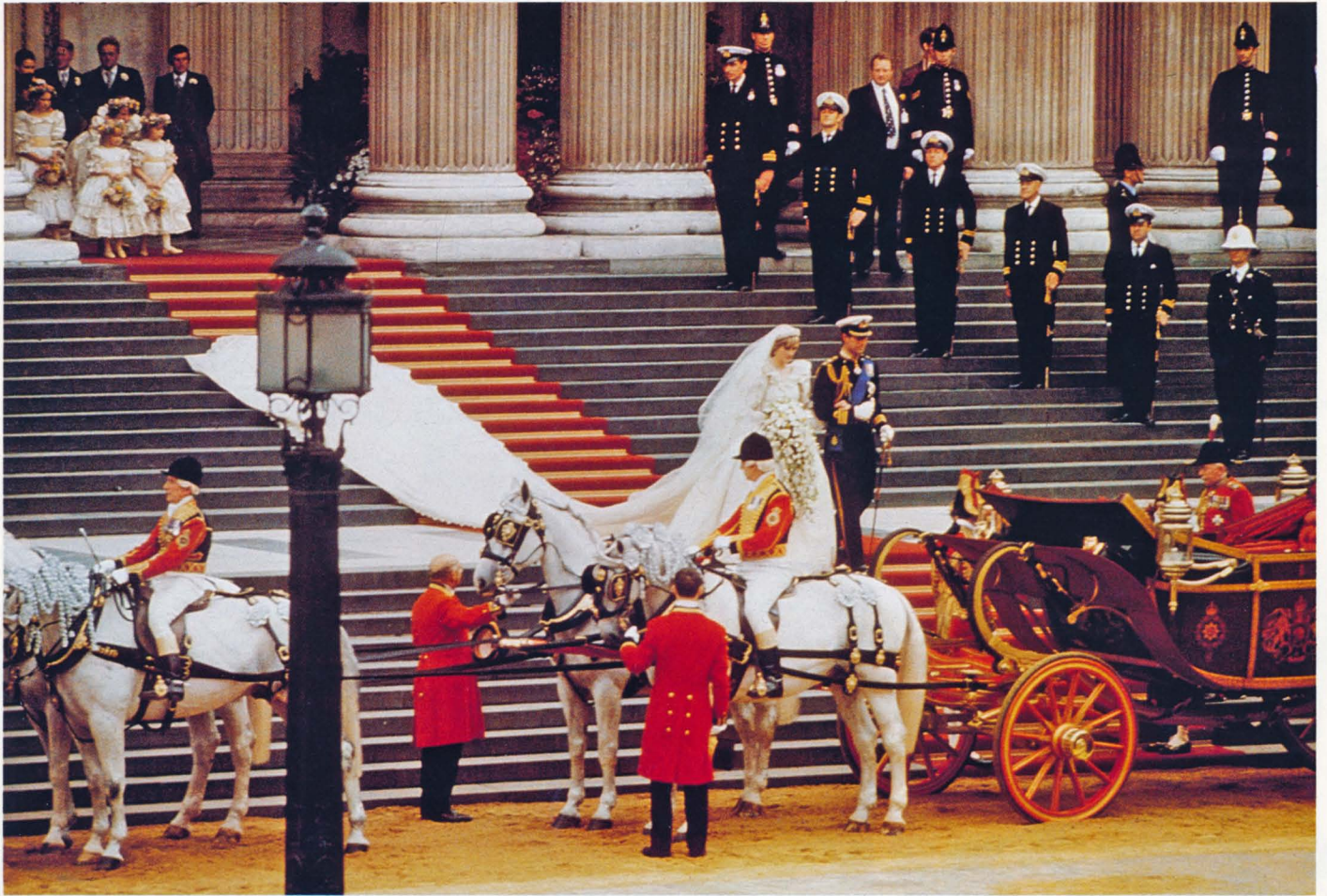


Camera Positions in the Cathedral

1. LDK 14 Camera in apex of Dome and outside on Golden Gallery, see above, top right.
2. Whispering Gallery camera looking into the Nave.
3. Second Whispering Gallery camera giving high angle of Wedding Dais, see centre right.
4. LDK 5 camera in Choir, see top and centre left.

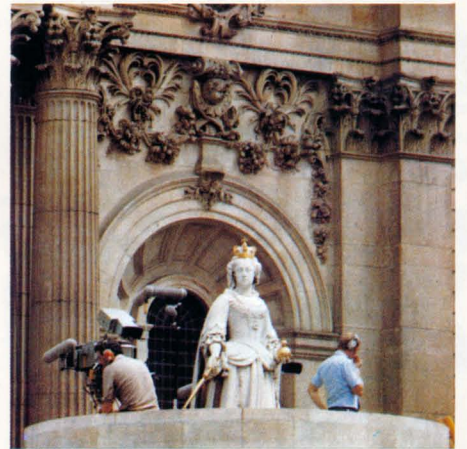
5. Camera on bridge over North Transept.
6. Camera on bridge over South Transept, see picture bottom right.
7. South Aisle camera rostrum covering Wedding Dais, see previous page.
8. North Aisle cameras covering Wedding Dais and Nave.
9. LDK 15 camera overlooking orchestra in North Transept.
10. Camera rostrum covering entry through West door.

11. Camera rostrum covering West door and Nave processions.
12. West Gallery commentary position overlooking Nave processions.



The LDK5 camera positioned about 75 ft. up in the West Gallery over the West Door provided aerial shots along the Nave. This high coverage was supplemented by an LDK5 and LDK15 mounted diametrically opposite each other 100 ft. up in the Whispering Gallery of the Dome. The Dome of St. Paul's crowns the central part of the building at the crossing of the North and South Transepts, and the Nave and Chancel. The marriage dais was positioned beneath the Dome so both Whispering Gallery cameras gave steeply-inclined views of the dais, one camera additionally covering the Chancel and High Altar and the other commanding the view down the Aisle to the West Door. But perhaps the most awe-inspiring shots came from the camera high up in the Dome. This LDK14 was rigged with its lens peering through a conveniently placed

aperture in the top dead centre of the Dome about 300 ft. above the marriage dais. The position gave a perfect plan view of the wedding, the Cathedral seating and the tiling design on the floor below forming an intriguing mosaic pattern. This camera was also used in a second position on top of the dome in the Cathedral's Golden Gallery. To reach this a narrow stone stairway had to be negotiated but a splendid view looking down on part of the processional route made it a most worthwhile vantage point. From this 340 ft. high Gallery the progress of the marriage processions could be observed for about a mile along the route almost to Temple Bar at the boundary of the City of London.



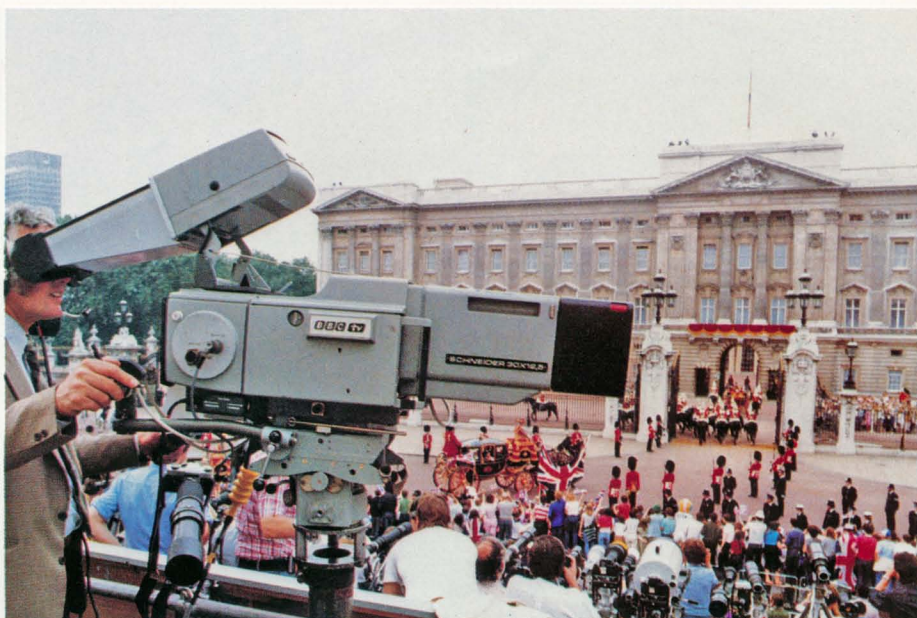
Buckingham Palace Cameras

A total of twelve cameras covered the Buckingham Palace area with a further fourteen being used for the honeymoon departure.

Several cameras were positioned at this end of the Mall to televise, among other things, the morning departure of Lady Diana from Clarence House to the Cathedral.

Three LDK5s were stationed inside the precincts of Buckingham Palace, one at the front on the Palace roof, a second in the Palace's inner quadrangle covering arrivals and departures and one on a mobile mounting in the Palace forecourt. Immediately in front of the Palace, two LDK5s were installed on the Queen Victoria Memorial (see above right), an ideal vantage point for pictures of processions entering and leaving and, of course, the balcony appearances of the Royal Couple with their bridesmaids and the Royal Family after their return from St. Paul's. For the balcony shots special narrow-angle versions of zoom lenses were fitted producing head and shoulder shots from the camera situated on the Memorial some 500 ft. distant.

Special ducting under the road was being



used to carry the technical cabling from the cameras to the CMCRs located in Green Park.

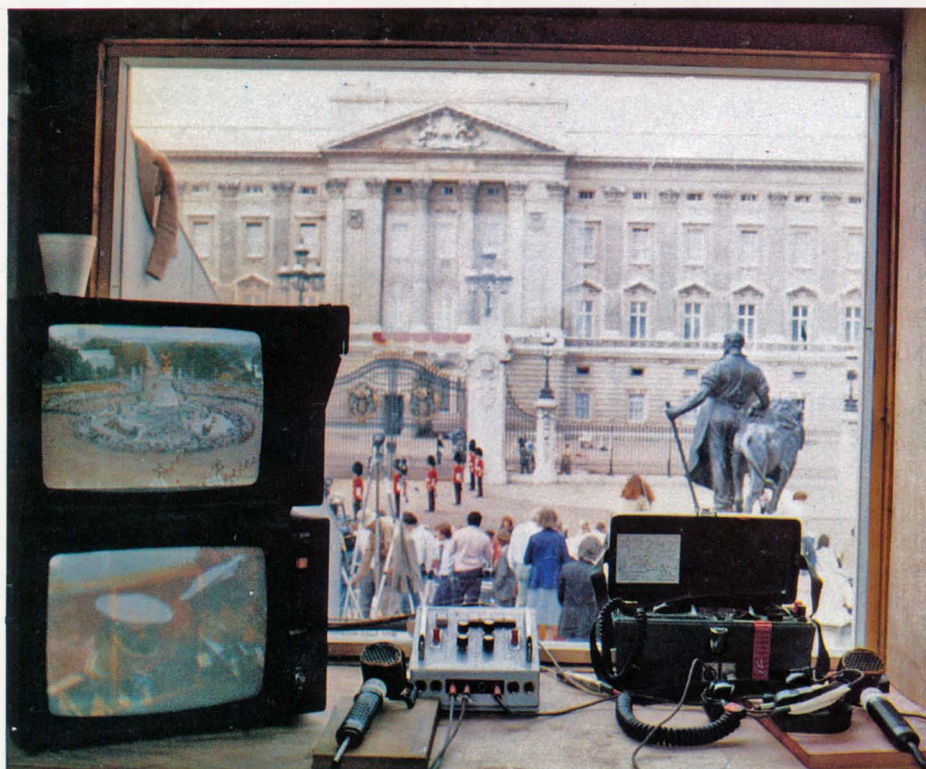
Illustrated below is the Buckingham Palace commentary box overlooking the front of the palace forecourt. The monitors in the picture show views from two nearby camera positions early on during the Royal Wedding day.

The first, from one of the cameras on the Victoria Memorial rostrum, shows the Prince of Wales and Prince Andrew in their carriage, further along the route, on their way to the Cathedral. The second is from the LDK5 on the palace roof. It shows the Victoria Memorial and the Mall behind.

This camera was used later in the day to produce those spectacular shots of the jubilant crowds as they filled the Mall for the Royal Couple's balcony appearances which are illustrated opposite. Pictured below, Terry Wogan, BBC radio's celebrity presenter, with mobile transmitter among the waiting crowds at the Palace gate, providing one of the many spontaneous interviews in the BBC's radio production.

The Palace Balcony

Palace Balcony appearances of the Royal Couple and their Families are a tradition of British Royal Weddings. The balcony





scenes provided one of the highlights of the television production and a moment for which the crowds at the Palace had waited all day. Finally, the balcony picture which none of the waiting cameramen on the

Victoria memorial rostrum, be they press photographers or television cameramen, dare miss. The world's newspapers and news broadcasts proved that few, if any, of them did.



International Distribution

In total some 108 broadcasting organisations in 72 countries transmitted live pictures of the television programme of the Royal Wedding. The pictures were distributed worldwide using a most complex system of landlines, radio links and satellites to enable over one eighth of the world's population to view the pictures.

Pictures were beamed to three communications satellites, two in position over the Atlantic Ocean and one over the Indian Ocean. The pictures were sent initially to the British Telecom Tower in Central London and from there to the satellite up-links at Goonhilly and Madley and then beamed from these stations to the communications satellites.

For European distribution the signals were routed via the Eurovision Land-Link.

While many countries throughout the world broadcast live pictures of the Royal Wedding, in many other countries whose time zones required the recording of the ceremony for later (daytime) transmission, the Royal Wedding was included in special programmes and news items of this, the BBC's longest and most elaborate single television outside broadcast production.

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Pye TVT acknowledge the use of photographs of the Royal Wedding provided by the Daily Telegraph Picture Library, Keystone Press Agency and A'Court Photography.

The exploded diagram of St Paul's Cathedral is reproduced by kind permission of Radio Times.