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On-the-spot service for TV

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OVER the past 20 years or so few major events in Britain have escaped the searching eye of the television camera. The funeral of Sir Winston Churchill, the 1966 World Cup tournament, the Investiture of the Prince of Wales, Princess Anne's wedding and countless other events were all captured "live" for millions of viewers throughout the country.

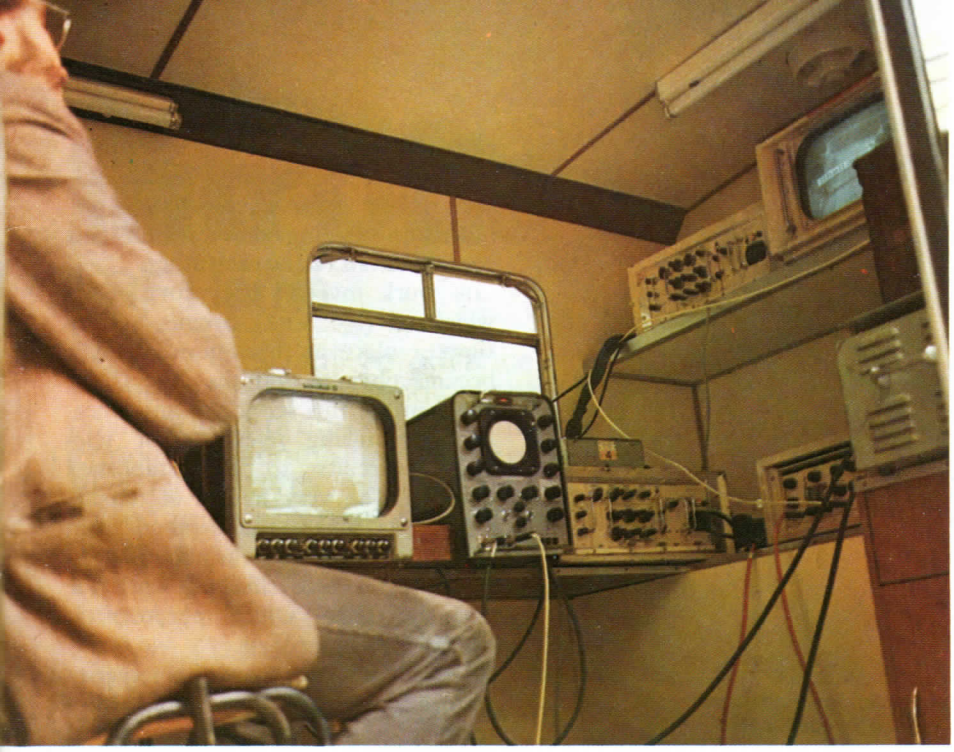
Yet few people ever realise the role played by the Post Office in ensuring these pictures reach their television screens. Providing facilities for outside broadcasts is, in fact, an important part of the Post Office's overall involvement in television transmission, which goes back to the inception of the service in the 1930s. From the earliest days the Post Office has provided the BBC with permanently leased wideband cable circuits for general transmission purposes, and in more recent years the Post Office microwave network has also been used.

For outside broadcasts where Post Office assistance is required, a routine has been developed in which the BBC and IBA approach the local Telephone Area sales office which, in turn, alerts one of five Post Office Television Outside Broadcast (TVOB) teams based around the country. The teams' role is to ensure that television signals are carried from the camera site to the studio by providing links to the nearest convenient point in the television transmission network, either by setting up cable links or, if microwave radio is used, by small portable dish aerials sited where necessary along the length of the route.

The first major outside broadcast was coverage of the Coronation of King George VI in 1937. This involved the Post Office in laying a cable in the West End of London to enable the procession to be televised "live" as it passed along its route. But celebrations were short-lived, as a couple of years later the television service closed because of the war. When it restarted in 1946, however, there was immediate demand from the BBC for circuits capable of carrying good-quality television signals from the sites of outside broadcasts back to the television studios. Provision of these circuits required specially designed vision equipment and a high degree of expertise. To meet what was obviously going to be a growing demand the TVOB service was set up in London.

As BBC coverage extended throughout the country and Independent Television started, first in London and

At a Goodwood race meeting a Post Office television outside broadcast vehicle provides transmission links to bring live pictures to viewers.



Inside the Post Office vehicle a technician monitors the pictures being transmitted.

later in the provinces, the TVOB service formed additional teams in Cardiff, Edinburgh and Manchester in 1952, and in Birmingham in 1955.

The next change in television to affect the TVOB service was the switch from VHF 405-line transmission to UHF 625 lines at the introduction of BBC2 in 1964. It became policy to duplicate all other services to this band and standard, so that a change to colour transmission could easily be made later. Basically, this change meant re-equipping the OB teams with more suitable equipment to meet the more stringent demands of the new system.

At about this time, too, closed-circuit television (CCTV) came on the scene and was able to display, to remote audiences, sporting events, religious meetings and business functions such as the recurring Billy Graham Crusades and World Championship boxing matches. Such events were seen in more than 30 venues through specially set up Post Office networks. These CCTV circuit requirements, together with broadcasters' demands for circuits to cover such important events as the World Cup, the Prince of Wales' Investiture and the General Elections, made the middle and late 1960s the busiest period ever recorded for the Post Office TVOB service.

The broadcasters are exempt from the Post Office Telecommunications monopoly in the provision of television OB circuits. Until 1965 they provided all their own radio link transmission circuits where necessary with the Post Office confining its OB activities to circuits using cable pairs. Since then, however, the Post Office has also helped meet requirements for radio links.

The equipment used to amplify and equalise the cable pairs has been specifically designed and developed by the Post Office since 1945. The first equipment was, in fact, produced by Research Department in conjunction with London Telecommunications Region and the former Engineering Department, and comprised flat frequency response video amplifiers, switchable attenuators and passive equaliser networks mounted on portable racks.

As demand for circuits grew another amplifier (No. 98A) was produced, which functioned by adjusting the frequency response of progressive stages of amplification. It was built into a suitcase-type container for easy transportation. The change to 625-line definition produced the Amplifier Video No. 1A which combined both passive and active equalising sections and this is still in current use.

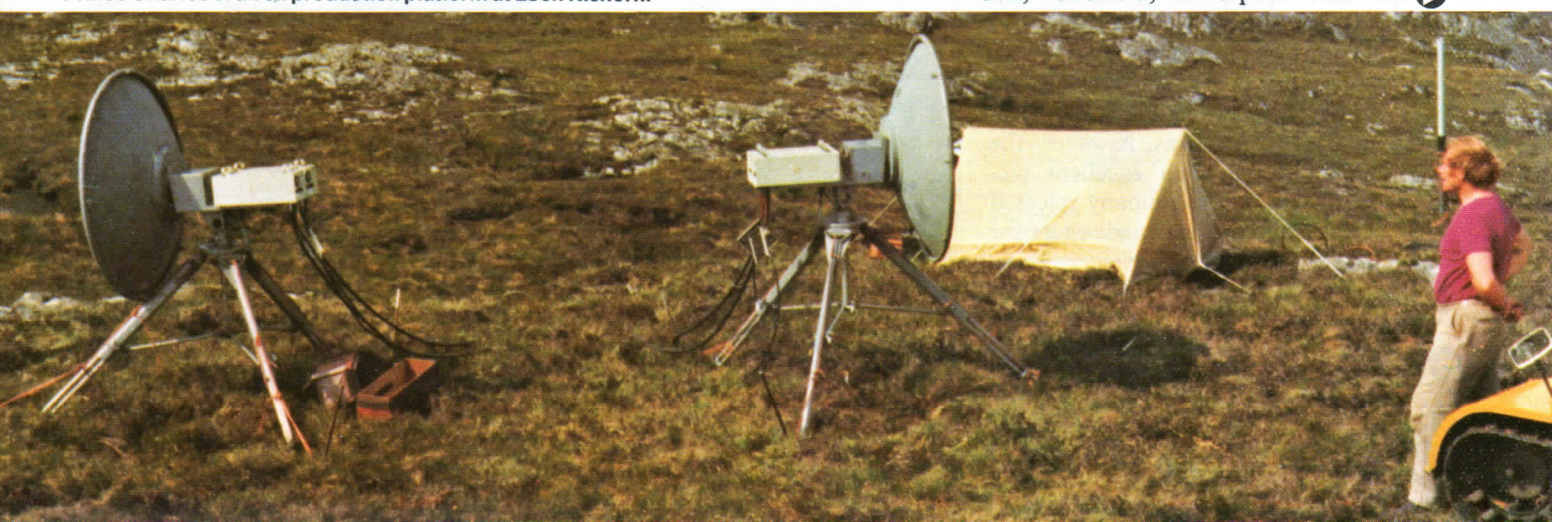
Setting up cable circuits for outside broadcast purposes involves adjusting the linear transmission parameters by sending over the pairs signals that are representative of commonly occurring parts of the television picture with a known frequency content and a waveform shape that could easily show any distortion when displayed on an oscilloscope. The equalising equipments are then set to reproduce the sent waveform. The non-linear parameters are checked using waveforms, and the "noise" of the circuit is measured in this way.

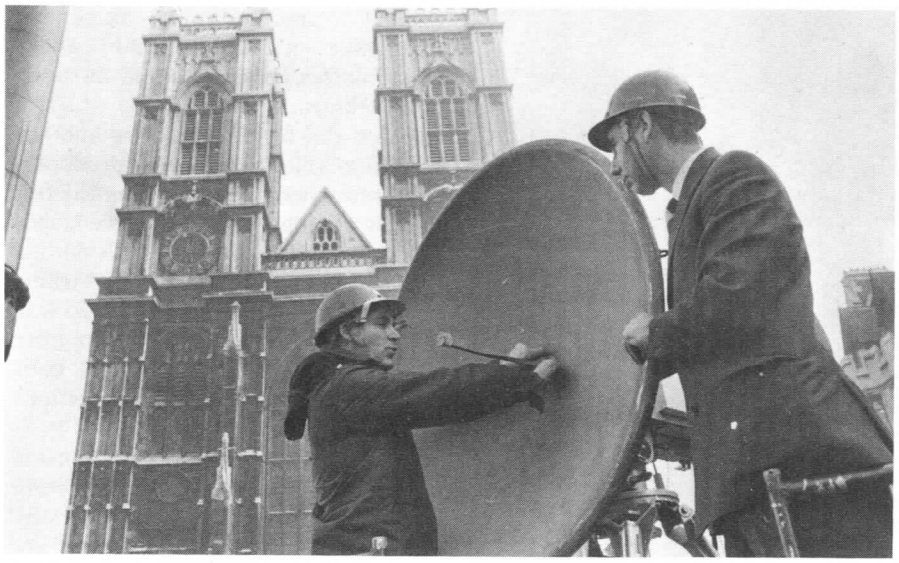
By using this method the longest practical circuit that can be established using ordinary telephone pairs is about three miles, but much longer circuits can be provided if coaxial pairs are used.

In 1965, with the work load expanding, the more stringent requirements of the 625-line colour system and the greater incidence of less suitable small conductor cables, it was decided to add a microwave radio facility to the OB service. Temporary radio links when used in tandem, are capable of providing circuits of great length as each hop can cover distances of more than 20 miles.

Soon after these new techniques for route planning and setting up radio links had been acquired, they were put to the test by the demand for circuits for the 1966 World Cup soccer matches which were played in London, Sheffield, Liverpool and the

The second stage of a five-hop radio link across the Highlands of Scotland set up to transmit closed-circuit television pictures to London. The occasion was the launching by Prince Charles of an oil production platform at Loch Kishorn.





Assistant Executive Engineer Peter Cooke and Technician Joe Nicholls carry out transmission tests before live coverage of Princess Anne's wedding.

North East. The experience proved invaluable and it quickly became obvious that cable pairs and radio links complemented each other and they, in conjunction with the protection channels of the microwave network, made it possible to provide vision circuits to or from any corner of the United Kingdom.

Circuits for CCTV and television outside broadcasts are generally used to cover sports programmes, news items and national events, and any one circuit for any of these may vary from a single equalised cable pair to a multihop radio link. Two examples of the use of such circuits illustrate the difficulties Post Office staff have sometimes to face to make the provision.

When the Prince of Wales launched the world's largest concrete oil production platform at Loch Kishorn on the west coast of Scotland in July 1976, a circuit was required from there to London's Hilton Hotel to provide a CCTV display. The nearest access to the permanent network was at Rosemarkie on the eastern coast of Scotland. This meant the OB teams had to provide a 60-mile radio link across the Highlands, with five hops.

Two of the intermediate stations had helicopter access only, and the others could be reached only by Post Office snow vehicles. One of the intermediate stations was 2,500 feet above sea level. Despite these problems, however, the circuit produced such excellent pictures that the CCTV company released the recordings to the broadcasters for their news programmes.

For the Wimbledon Lawn Tennis Championships circuits are normally provided not only for the BBC and IBA but also for the National Broadcasting Company of America from fixed cameras on their recording vehicle. In 1976 NBC requested an additional circuit to be associated with a mobile camera which was to move among spectators and carry out spot interviews. The TVOB group designed a compact mobile trolley on which was mounted a battery-powered microwave radio link transmitter that could be kept in constant sight of its receiver located on Wimbledon's Ivy Tower.

The trolley proved so successful that NBC requested to use it from a helicopter so that aerial pictures could be obtained. This was achieved by pointing the transmitter horn aerial at the ground receiver aerial. An added complication was that the helicopter pilot was refused permission to remain stationary, so great dexterity was required in keeping the transmit and receive aerials facing each other.

OB work involves the provision of wideband (5.5 MHZ) circuits at any time or place at short notice, and it became obvious that the Post Office could utilise this service in any emergency requiring television or telephony circuits to be established quickly. The very nature of outside broadcasts makes the demand from the broadcasters so variable that to make the service efficient, work for exclusive Post Office purposes is needed to even the load.

It is, for instance, part of emergency restorations plans for certain permanent vision circuits, and considered when schemes for dealing with possible disasters are being dealt with. The service is also used to provide "make good" circuits for the television and telephony microwave networks and to set up circuits in advance of permanent provision for customers needing immediate service. Other uses are the provision of circuits for Confravision when temporary studios are set up, and internal CCTV. All this, of course, is in addition to the service provided for broadcasters.

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Ken French, Assistant Executive Engineer (right), and Technician Dave Peacock load a trolley designed by the London TVOB group to obtain aerial pictures requested by NBC of America during coverage of the Wimbledon lawn tennis championships.