

# 2/3-Camera Outside Broadcast Unit for Independent Television News Ltd

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**Summary** This article describes ITN's compact, but powerful, 2/3-camera outside broadcast facility which has been specifically designed with news operations in mind. Although the vehicle is less than 5.5m long it contains all the features carried by the more usual pantech-nicon-sized outside broadcast units. Great care was taken to

provide a comprehensive and flexible communications system, as good communications are the key to success in live news operations.

The vehicle was built to an ITN specification by Marconi Communication Systems Limited, who carried out the detailed design, installation and commissioning work.

## I. Buffham

Ian Buffham joined the BBC Transmitter Capital Projects Department in 1970 and assisted with the extension of the network of high-power colour television transmitters throughout the United Kingdom. Since joining ITN in 1980 he has worked on the introduction of the outside broadcast vehicle described in this article and on the introduction of three new radio links vehicles and an associated remotely controlled receiving system.



## Introduction

The new outside broadcast unit was built as a replacement for a compact eight-year-old unit based on a Range Rover chassis. In making the replacement the opportunity was taken to include a large number of additional facilities in the new vehicle. In particular, great attention was paid to the provision of comprehensive communications facilities which lie at the heart of successful live news operations. At the same time, strenuous efforts were made to ensure that the overall dimensions of the vehicle did not increase significantly.

## Outline design of the outside broadcast unit

As a first step in the production of the new vehicle a draft specification was produced by the Engineering Projects Department of the Independent Television News (ITN) in conjunction with

the Outside Broadcast (O.B) Department. This specification contained sections on each major area of the overall system:

- vehicle detailed description and fittings,
- cameras,
- vision facilities,
- sound,
- communications,
- radio telephone facilities,
- power supplies and air conditioning.

Several editions of the draft specification were produced, with considerable in-house discussion and updating taking place following the publication of each one. Finally a specification was arrived at which met all the current and foreseeable operational needs of the O.B Department. This specification was then issued to various companies experienced in the construction of O.B vehicles and, as a result, a contract was issued to Marconi Com-

munication Systems Ltd. for the detailed design, construction, installation and commissioning of the complete O.B. unit. Marconi was responsible for the supply and fitting of equipment of its own manufacture and procurement of various items from other manufacturers. Certain items were free-issued by ITN. Coachbuilding work was subcontracted by Marconi to A. Smith (Great Bentley) Ltd.

Each part of the O.B unit will now be considered in detail.

## Vehicle - physical layout

As the unit would be spending a great part of its operational life at news stories in narrow, congested streets in the London area, it was clear that a very compact vehicle layout was required to keep overall dimensions to a minimum. Further size limitations were imposed by the garaging space available at ITN and it was decided that the maximum overall dimensions of the vehicle were not to exceed:

Height	2845 mm
Length	5486 mm
Width	2200 mm

Several vehicles were considered for the design but finally a Bedford TK860 chassis with a 5.4 litre diesel engine was chosen because its compact cab/engine layout permitted a very high percentage of the overall length of the vehicle to be used as a technical area. Also, the TK series is a popular commercial vehicle with spares and servicing expertise easily available. The TK860, in its basic form, exceeded our overall length requirements but Marconi was able to shorten the chassis to meet our specification. This chassis shortening resulted in a reduced vehicle wheelbase thereby giving a reduced vehicle turning circle.

The overall vehicle layout is shown in figure 1. It can be seen that it has been possible to locate the monitor stack immediately behind the driver's cab, leaving as much as possible of the rest of the vehicle available as a technical area.

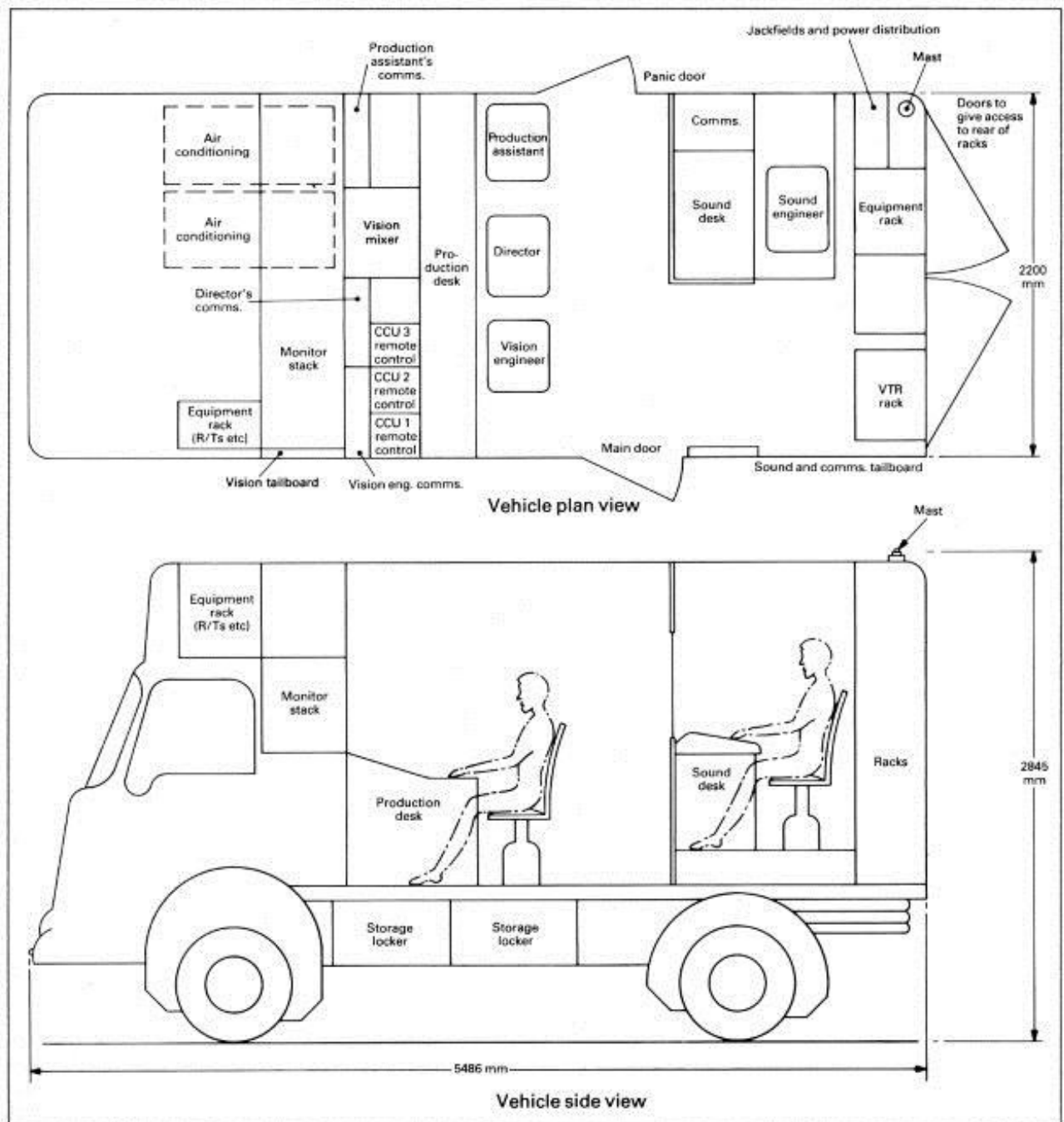


Fig.1. General layout of the O.B. vehicle

The sound engineer and sound-mixing desk are located towards the rear of the vehicle and are partially enclosed by a glass screen. The purpose of this screen is to ensure that the rest of the production team are isolated from the high level of sound traditionally used in the sound area. The sound engineer is raised on a plinth to enable him to see the monitors in the monitor stack over the heads of the production team. Equipment racks to the rear of the sound engineer contain communications equipment, video recording equipment, power distribution board and miscellaneous sound and vision equipment.

The roof of the vehicle is designed to take the weight of a camera plus operators, and a fold-down safety rail is provided within the overall height limit. A ladder built into the side of the vehicle to provide access to the roof is guarded by a lockable door when not in use. A 7m pneumatic mast is provided at the rear of the vehicle to raise the height and to increase the effectiveness of various R/T antennas.

Doors are provided at the rear of the vehicle to give good access to the equipment racks and any remaining areas of space in the side of the vehicle have been converted into storage lockers. Good use is made of the driver's

cab by equipping it as a commentator's position. Also, a caption scanner is located in the cab.

Once the detailed physical layout of the vehicle had been finalized Marconi was able to prepare detailed constructional drawings for the coachbuilder to work to.

## Cameras

The vehicle is equipped with two cameras and three camera-control units. Hence for major news stories the vehicle can easily be upgraded to a three-camera unit. ITN chose special Sony BVP330P cameras able to meet the IBA Code of Practice for Cameras

for O.B use. This ensures commonality of maintenance requirements with ITN's BVP330P electronic news gathering (ENG) cameras. Also the small size of the Sony Camera Control Unit lends itself ideally to such a compact vehicle.

### Sound facilities

The vehicle is equipped with a Neve 12-channel audio-mixing desk type 5452/12. This has been modified to enable a two-channel compressor limiter amplifier to be connected to the output of each mixer group. A two-channel graphic equalizer is also provided in the vehicle. Two LS3/5A loudspeakers are provided in the sound area, one for main sound monitoring and the other for prefade listen. A third LS3/5A loudspeaker is provided for sound monitoring in the production area. A Revox PR99 reel-to-reel recorder is provided for sound recording purposes, and a cartridge machine for sound identification.

Sound output from the vehicle can either be taken from the tailboard or by means of a sound-in-synchs encoder, the use of which eases the problem of transmitting sound and vision from the vehicle via British Telecom circuits or microwave links.

### Communications facilities

In order for the O.B unit to be used to the fullest effect for news-gathering purposes, an efficient communications system is absolutely essential to provide all the message-handling facilities between the following groups of people as appropriate:

- a) O.B Director,
- b) Studio Director,
- c) three camera men,
- d) O.B Sound Engineer,
- e) O.B Vision Engineer,
- f) O.B Director's production assistant
- g) Floor Manager,
- h) Reporter,
- i) Boom Operator.

Communications requirements can vary greatly from story to story and so the communications system has to be as flexible as possible. This is achieved largely by the provision of generous jackfield facilities and the addition of a number of spare mixer amplifiers and distribution amplifiers. The O.B Sound Engineer is in charge of the interconnection of the communica-



Fig.2. O.B vehicle in use. Antennas for local site communications, talkback and off-air reception can be seen on the partially raised mast at the rear of the vehicle



Fig.3. View of the production desk

tions system, and it is also his responsibility to ensure that sound levels through the system are correct. All the mixer amplifiers in the system have front panel gain controls to assist in the setting of correct levels.

Each communications system access unit in the vehicle is equipped with two loudspeakers, one for local and one for remote talkback sources. Local talkback sources comprise the three cameras, floor manager, vision engineer etc, whilst the remote talkback sources include the Studio Director, off-air feed, etc. Studio Director's talkback and return programme sound

are relayed to the vehicle by means of u.h.f radio links.

An interesting feature is that the Floor Manager's talkback facilities are provided by means of a full duplex u.h.f base station located on the vehicle. The Floor Manager receives and sends talkback by means of a hand-portable transceiver and therefore has complete freedom of movement at distances of up to half a mile from the vehicle.

The vehicle is also equipped with control line telephones and standard rotary dial telephones for connection to the public network.

## Radio telephone facilities

As well as the conventional communications facilities described above it is important for the O.B. unit to have other means of communicating with the outside world.

The vehicle is equipped with 2.5GHz radio link transmitting equipment and so it is important for a radio links engineer with the vehicle to be able to communicate with the radio links receiving site and a 25W f.m. mid-band transceiver is provided for this purpose.

In the London area, ITN has a private low-band channel to enable the newsroom assignments desk to keep in touch with the camera crews. A 25W transceiver is provided to give access to this system.

When the vehicle is travelling, or operating outside the London area, communications with ITN House can be a problem. Hence an automatic British Telecom radiophone has been installed.

The assignments transceiver, radio links transceiver and floor manager's talkback base station are connected to antennas on the roof of the vehicle via a small coaxial patch panel. Tie lines run from the patch panel to the base of the 7m mast and it is therefore possible to extend the range of the various systems by mast-mounting the antennas if required. Compact, helically wound antennas have been used for the v.h.f. transceivers in order to keep overall vehicle height to a minimum.

## Power supplies and air conditioning

One of the aims in the design of the old Range Rover was that it should be possible to operate all the technical equipment in the vehicle from a standard domestic 13A socket. It was decided to retain this design feature in the new vehicle since it is essential on news work to be able to obtain power instantly on site from residential or domestic premises without having to wait for the local supply authority to provide a heavy-duty feed.

It was clear that, because of the compact nature of the vehicle, air conditioning would be needed for comfortable operation in hot weather. Air-conditioning plant is a very hungry consumer of power and it was obvious that the vehicle could not be used with air conditioning from a 13A socket.

Hence, two distinct operating modes were devised for the vehicle:

- a) for fast-breaking news stories, vehicle to be powered by 13A socket. Technical equipment and operating area to be cooled by extractor fans of low power consumption,
- b) for planned events such as party conferences and test matches, vehicle to be powered by Electricity Board feed or towed generator. Cooling to be by full air conditioning.

A comprehensive power-distribution board is provided in the vehicle with a 6kVA automatic voltage regulator providing the necessary degree of voltage stability for the technical equipment. D.C. power supplies for the various R/T systems, rigging lights and locker lights are taken from a separate 100Ah battery. This is kept charged by means of a split charge feed from the vehicle engine and an on-board mains battery charger.

## Vision facilities

The heart of the vision system is a Grass Valley 1600-IL vision mixer with 10 inputs and 38 effects. The mixer is also equipped with chroma key facilities, a borderline generator and a downstream keyer for captions.

Three of the mixer inputs are fed by the three camera controls units. Three further inputs are used as equalized remote inputs. These can be put to use either as additional camera inputs or to accept feeds from other O.B. units on major events. A further mixer input is used for the on-board Marconi MR2 Type C format video recorder. This is

complete with a Marconi Monitoring Unit Type B4624 and is remotely controllable from the production desk.

Three high-quality colour monitors are provided for Director's Preview, Transmission and Vision Engineer. A total of eight monochrome preview monitors cover the three cameras, three remote inputs, Marconi MR2 and a caption scanner. Space for the caption scanner was found in the cab between the driver's and passenger's seats. Comprehensive waveform monitoring facilities are provided at the vision engineer's position.

## The vehicle in operation

Since entering service the vehicle has successfully covered a number of assignments of varying complexity.

The flexibility of the vehicle was well proved during the visit of President Reagan to the United Kingdom. For this event an extra camera control unit was hired for the vehicle, bringing the total up to four. Three of the remote inputs to the vision mixer were used to receive pictures from ENG camera crews thereby temporarily converting the vehicle to a seven-camera unit.

The vehicle has performed equally well at more straightforward events such as the Wimbledon Lawn Tennis Championships where it has been used in the conventional three-camera mode.

Figure 4 shows the vehicle in use at a Literary Luncheon in the City of London. On this occasion the vehicle was powered by means of a towed generator which can be seen in the right of the photograph, and three



Fig.4. The O.B. vehicle operating in a confined location in Central London

cameras were deployed. Programme sound and vision and communications were transmitted back to ITN House by means of a 2.5GHz microwave link located on the roof of the building. Studio talkback and reverse prog-

ramme sound were received from ITN by means of one of the two co-linear antennas which can be seen at the rear of the vehicle. The other co-linear antenna was used for the Floor Manager's talkback system as described

earlier in the article.

As figure 4 shows, the compact nature of the vehicle is a great asset when operating in confined locations such as are frequently encountered in Central London.

#### RÉSUMÉ

L'article décrit le nouveau dispositif ITN compact mais puissant, comprenant 2/3 caméras, destiné à être utilisé en extérieur et spécialement conçu pour les prises d'actualités. Bien que le véhicule n'ait que 5,5 mètres de longueur, il contient tous les appareils offrant les possibilités que présentent les unités courantes de prise en extérieur de dimension Pantehnicon. Il a été pris grand soin de fournir un système de communications complet et flexible étant donné que de bonnes communications sont la clé du succès des opérations d'actualités en direct.

C'est selon les spécifications d'ITN que Marconi Communication Systems Limited a construit le véhicule, en a réalisé les plans de détail, l'installation et la mise en exploitation.

#### ZUSAMMENFASSUNG

Dieser Aufsatz beschreibt die neue, für 2-3 Kameras bestimmte, gedungen gebaute aber leistungsfähige Außenreportage-Einrichtung des FS-Nachrichtendienstes ITN, deren Konstruktion besonders auf den Nachrichtendienst orientiert ist. Obwohl das Fahrzeug weniger als 5,5m lang ist, enthält es alle Einrichtungen die gewöhnlich in den in Möbelwagengröße ausgeführten Außenreportage-Einheiten vorgesehen sind. Besondere Aufmerksamkeit wurde einem vollständigen und anpassungsfähigen Kommunikationssystem gewidmet, da gute Kommunikationen den Erfolgsschlüssel bei der aktuellen Nachrichtenübertragung darstellen.

Das Fahrzeug wurde von Marconi Communication Systems Limited entsprechend den Spezifikationen der ITN gebaut, wobei Einzelkonstruktion, Montage und erste Inbetriebnahme von Marconi ausgeführt wurde.

#### RESUMEN

Este artículo describe un nuevo equipo móvil de tomas exteriores de 2/3-cámara de ITN (Independent Television News Ltd), compacto, pero potente; y ha sido diseñado específicamente tomando en cuenta las operaciones de noticias. Aunque el vehículo tiene una longitud inferior a 5,5 m., comprende todas las características típicas de los camiones de tamaños corrientes para tomas exteriores. La finalidad primordial, que se logró con grandísimo esfuerzo y esmero, ha sido suministrar un sistema de comunicaciones amplio y flexible; ya que las buenas comunicaciones constituyen la clave del éxito de las operaciones 'en vivo' de las noticias.

La firma Marconi Communication Systems construyó el vehículo, según la especificación de ITN, encargándose además del diseño detallado de éste, de su instalación y puesta en servicio.