The design of a novel colour outside broadcast unit

A. O. Moore

Summary In the latter part of March 1978, a colour television outside broadcast unit was delivered to the Dutch speaking Belgian Television Company, Belgische Radio en Televisie (BRT), the fourth and most comprehensive vehicle to have been delivered to the Belgian Television service. In this article the author examines some of the interesting design features of this outstanding vehicle.

Built to the customer's specification, principally to cover large events requiring extensive facilities, the equipment included four colour camera chains, full colour monitoring, a versatile vision mixer, three special effects mixers, two tandem connected downstream keyers, character generator with memory and colourizer, document viewer with colourizer, split screen facilities, CLUE facilities, 36 channel audio mixer, and very comprehensive communication/telephone facilities.

In addition to the wide range of equipment, the very detailed specification covered amongst other factors, the vehicle dimensions and power to weight ratio, full air conditioning plus an independent oil-fired heating system and also defined low noise criteria and a high standard of safety.

A. O. Moore

Born in Yorkshire and educated at Ipswich School in Suffolk. After three years service with the BBC working with transmitters in the General Overseas Service at Daventry, he joined the Post Office to gain experience in repeater stations and microwave links. In 1966 he joined a company specialising in professional sound equipment and was responsible for many sound installations both in televison and film studios including ITN and Westward Television. 1973 saw new employment with the Marconi Company as a systems engineer in the Studio Sales Division working on many export studio and O.B. contracts. He became Chief of Studio Sales in 1976.

Introduction

On March 21st 1978, a group of engineers anxiously watched as 35ft of Mercedes-powered Outside Broadcast Vehicle passed the security gate and made a right turn into New Street, Chelmsford—en route for its short trans-channel crossing, to its final destination of Brussels. This marked the culmination of twelve months work by a dedicated team to produce one of the largest and most sophisticated outside broadcast vehicles ever to be built in the Marconi works at Chelmsford.

From conception . . .

From the moment the specification was received in the latter half of 1976, everyone concerned in the studio design team was aware that this was no ordinary project. The mechanical specification included:

a) Height restriction of 3·6m but with
b) All colour monitors (51cm) in the facia
c) Power specification 9kW horse-power DIN per tonne total weight
d) 20% spare weight capacity
e) Full air-conditioning
f) 10m telescopic mast
g) Additional oil-fired heating
h) Noise criterion specified
j) Access doors, steps and working areas all strictly dimensionally controlled

The video and sound facilities posed an equal number of problems. Although only containing four Mk VIII colour cameras, the peripheral equipment list was prodigious including:

a) Four Mk. VIII colour cameras
b) 15-input, 7-row, vision mixer, three special effects mixers
c) Two tandem connected inserter keyers
d) Character generator with memory and colourizer
e) Document viewer with colourizer, camera to be easily removable
f) Large scale monitoring matrix
g) Split screen facilities
h) 'CLUE' facilities
j) Comprehensive communication/telephone facilities
k) 36-channel audio mixer, with six groups and combined outputs
l) Six 100W PA amplifiers

These lists are by no means exhaustive but give some idea of the number of facilities required under one roof.

Fig. 1. The exterior of the Belgische Radio en Televisie OB van

From the outset it was decided that SAIT Electronics S.A. in Brussels, the company representing Marconi in Belgium, should manufacture the sound and communication equipment. The combined engineering team therefore began to formulate their ideas in preparation for the reply to tender. Throughout this period a constant discourse took place between The Marconi Company, SAIT, the coachbuilder and chassis manufacturer.

Not only was there an overall vehicle specification to answer but also a technical specification for each individual item of equipment to conform to, and these also required suitable responses.

Gradually a suitable design took shape and was submitted.

In December 1976, The Marconi Company and SAIT were awarded the contract, and the time had been reached when theoretical design had to be translated into practical reality.

Some philosophy . . .

The philosophy behind such a complex and somewhat lavish vehicle caused a certain amount of curiosity in the design team during the preparation period. One of the decisions a television company may have to make is whether to incorporate multiple facilities in a new design from the outset, knowing the possibility of under usage, or whether to build a simpler design and transport extra facilities to site when required. It appeared that BRT had studied these problems and felt a more reliable operation would ensue by the former decision. This decision was made easier by the knowledge that this OB, designated Code K6, would principally cover large sports events, major drama and specifically an annual show requiring extensive facilities covering orchestral work on a stage. Democratically, the production staff were involved from the inception of the project, they advised the requirements foreseen for this type of operation.

Before the design is examined in more detail it will be of value to look in general at the basic layout. (Figure 2)

At the forward end of the vehicle are situated the Chief Technician and Camera Operator, each facing the facia panel in which is found their colour and waveform monitors as well as the production monitors. The Chief Technician is responsible for the excellence of audio and video quality and has sophisticated monitoring circuits for this purpose. His duties extend to the power circuits of the van and an electronic insulation tester and circuit breaker is under his control. Safety is considered of prime importance and he is totally responsible for this aspect of the operation. Finally a complex telephone exchange terminates at this position.

The camera operator has all the colour camera operational and colour balance controls at his command together with a document reader and colourizer. Camera adjustment and matching are aided by a sequential switcher and split screen unit.

To the rear of the Chief Technician is located the main production desk at which is found the Producer, Script Assistant and the Vision Mixer. Apart from the mixer control panel, a twin character generator with store is mounted in the desk together with associated monchrome monitors set into the upstand so that inserts may be easily assembled prior to transmission.

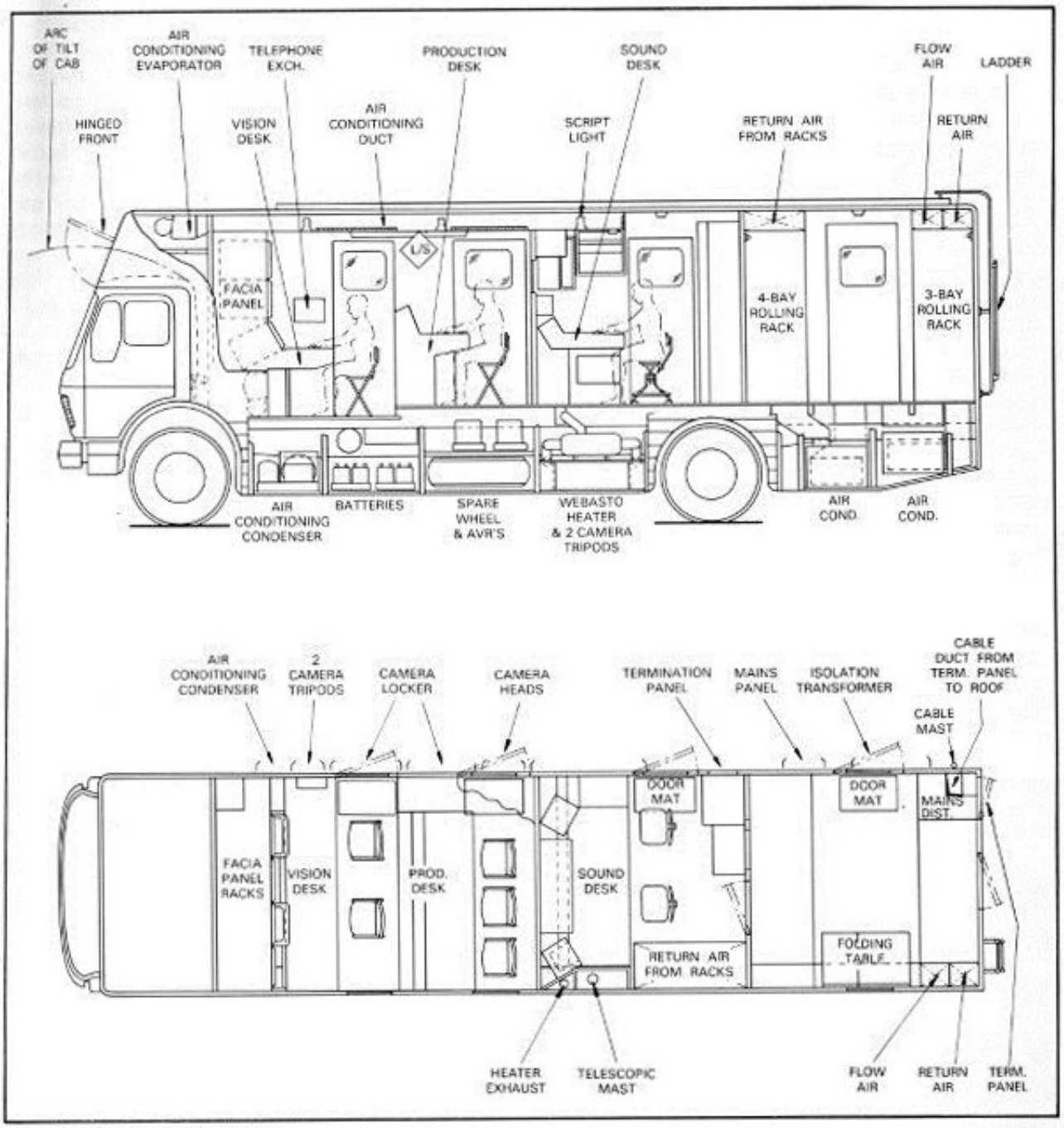


Fig. 2. Drawing showing basic layout

Next is an acoustically separated sound compartment, housing the audio mixer, monitoring amplifiers, tape and communication equipment. Due to the complexity of facilities required it was envisaged that two personnel will normally man this area. At the rear of the vehicle are found the equipment racks, mounted transversely across the chassis, each bay being able to wind forward on a lead screw arrangement so as to gain access from the back. Great emphasis was put on the available space between the racks to ensure comfort and minimum eye strain during long periods of operation in the confines of this area.

The design takes shape . . . vehicle exterior

At the outset of any OB scheme the prime mover is of first consideration. As the requirement was for a 19-tonne chassis with a 9kW DIN per tonne total power to weight ratio, it was decided to utilize the Mercedes 1919 unit with the following specification:

1. Engine: OM401 diesel direct injection. Horse-power DIN 192 at 2,500 revs per minute
2. Gear Box: 8 speed
3. Brakes: Two circuit air brakes with load proportioning on front and rear axle
4. Tyres: 12·00 x 20 radial
5. Wheelbase: 5·9m
6. Electrical system: 24V d.c. negative earth
7. External dimensions of complete van: 10.56m long, 3.6m high, 2.36m wide

One of the immediate problems was that this

chassis was equipped with a tilting cab which is fine for a haulage lorry or tug and trailer operation, however it does not produce such elegant styling in an outside broadcast vehicle. The designers were committed to the integral cab approach and a solution was eventually found which has proved to be totally acceptable in practice.

The bodywork is constructed of light alloy by a well-proven method resulting in a strong, rigid but lightweight assembly. Extruded sections make up the framework, joined by cold-squeeze rivets and the cladding then applied to the framework—flat sheets on the upper sections and ribbed sheets for extra mechanical strength in the lower areas. The space between the cladding and internal wall boards is filled with high-density foam to improve rigidity, acoustic and thermal insulation.

The vehicle is provided with seven access doors, namely two for cab access, two for access to the production area, one for access into the sound compartment and two doors giving access into the racks compartment.

For safety sake all doors were at least 70cm wide.

All available space outside the vehicle was utilized in the best possible manner for storage of equipment, and many items were mounted on heavy duty runners for ease of service. Figure 2 illustrates the arrangements showing the location of air-conditioner condensers, camera lockers etc. However, a special mention may be made concerning the termination panels and mains equipment. When the termination panels were designed they were discovered to be exceedingly large, in fact in excess of 6ft high by 19in wide; they were split therefore into two sections known as UWAP and AWAP. The UWAP termination panel contained only audio connectors and was mounted in the side of the vehicle adjacent to the sound racking. In order to contain the many cables resulting from the great number of possible circuits, especially enlarged cable ducts were formed under the floor. The video and communications connectors were mounted on the AWAP termination panel which was located in the rear wall locker and which could be reached not only from the locker front but also from the roof via a vertical cable shaft.

The power input locker was also somewhat unusual since it was possible to withdraw the whole assembly from the vehicle for service (See figure 8).

The roof of the vehicle is covered with non-slip aluminium treads to provide a good working surface under all weather conditions. Mountings were provided for two cameras, or one camera and a link. A 10m telescopic pneumatic mast, housed within the body shell enables attachment of suitable antennas either link or off-air. Access to the roof is by means of a ladder permanently mounted on the rear of the vehicle designed so that its lower sections can be folded up when not in use.

Reverting to the tilt cab arrangement, it will be remembered that the problem was to provide an integral cab design with a tilt cab chassis. Many ideas were considered and many rejected, but finally the solution was found by building the body over and around the existing cab, buffered away by rubber mouldings, allowing the cab some free movement. As the cab tilted however, by virtue of the arc of movement, the front body section had to be removed and this was skillfully achieved in the following manner. The tilt control mechanism was located behind a small locker door to the rear of the cab (See figure 3), and as soon as this was opened, a microswitch was released automatically activating a ram which cleared the bodywork in preparation for the cab to be tilted. There is therefore no way, except in extreme fault conditions, that the cab can be tipped with the body in situation.

Fig. 3. A view of the cab showing how the tilting feature is accommodated in the body shell

Vehicle interior

The layout of the interior has already been briefly described and, therefore, before the technical facility descriptions, it would be appropriate to describe the monitor facia arrangement, general internal finish and decor, air-conditioning and vehicle heating.

A major problem was encountered early on in the design of the vehicle which centred around the height of the vehicle, specified to be no more than 3.6m. Under normal conditions this would have been quite adequate, however in this case BRT had specified that all facia monitors would be colour; this would require more room (and more air-conditioning) than normal. This problem was eventually overcome by angling the bottom row of monitors, however the situation was not helped by the chassis which arrived six inches higher than had been anticipated from the drawings. The facia contained the following:

a) Four colour camera picture monitors
b) Two external/mix effect colour picture monitors
c) One transmission colour monitor
d) One preview colour monitor
e) One Chief Technician colour monitor, waveform monitor and vectorscope
f) One picture matching colour monitor

g) One picture matching monochrome monitor and wave-form monitor

As stated previously, monochrome picture monitors were also fitted in the upstand of the production desk to serve the character generator and insertion keyers (See figure 5).

The whole interior is fully air-conditioned using four separate air-conditioners. The first unit of 12,000 Btu capacity services the facia panel while unit number 2, of 18,500 Btu capacity, conditions the production and sound areas, the flow duct, being situated in the centre of the ceiling, the stale air returning via ceiling ducts mounted at each side. Air-conditioner number 3 circulates air to one of the 4-bay racks in the rear of the vehicle whilst the fourth unit working on a shared basis, conditions air in bays 5-8 and also the working racks area. Each conditioner contains a 2·7kW heater controlled by thermostats mounted in prominent positions. Other fans used to increase air-flow through the racks were flexibly mounted to help to achieve the critical noise figures.

A certain amount of heat was required in order to preheat the vehicle in extreme cold conditions especially when travelling to site and for this reason an 11kW oil fired heater was provided with outlet louvres in all areas.

The interior walls of the vehicle were clad in carpet to aid sound absorbancy, the ceiling padded, and the windows, some of which were designed to open, were fitted with roller blinds.

Technical facilities—video

1. *Picture matching and monitoring*

Coded outputs from the four Mark VIII colour cameras are distributed from VDAs 1–4 to the termination panel, production colour monitors, central routeing matrix, vision mixer and camera control matrix (figure 4). The latter circuits are fed to 8×1 vision switching units M5–M9 to be distributed in the following manner:

Matrices M5 and M6 provide locally controlled signals to a split screen unit and thence to a colour monitor and vectorscope located in the apparatus area.

Matrices M7 and M8 provide a similar function giving the camera operator a choice of normal or split screen working at the front of the van, M8 being remotely controlled from the camera OCP. M9, with associated remote control panel, delivers a similar signal to a monochrome monitor also located at the Camera Operator's desk. To complete the monitoring facilities at this position a sequential switcher provides a waveform monitor feed to a Tektronix 528 unit mounted in the facia panel.

Back in the racks, picture and waveform monitoring is accomplished by the feeds via matrices M1 and M2 terminating in the apparatus room monitors.

2. *Vision mixer sources*

The sources available at the vision mixer are:

a) Input 1—black picture generator.

Fig. 5. The comprehensively equipped production area

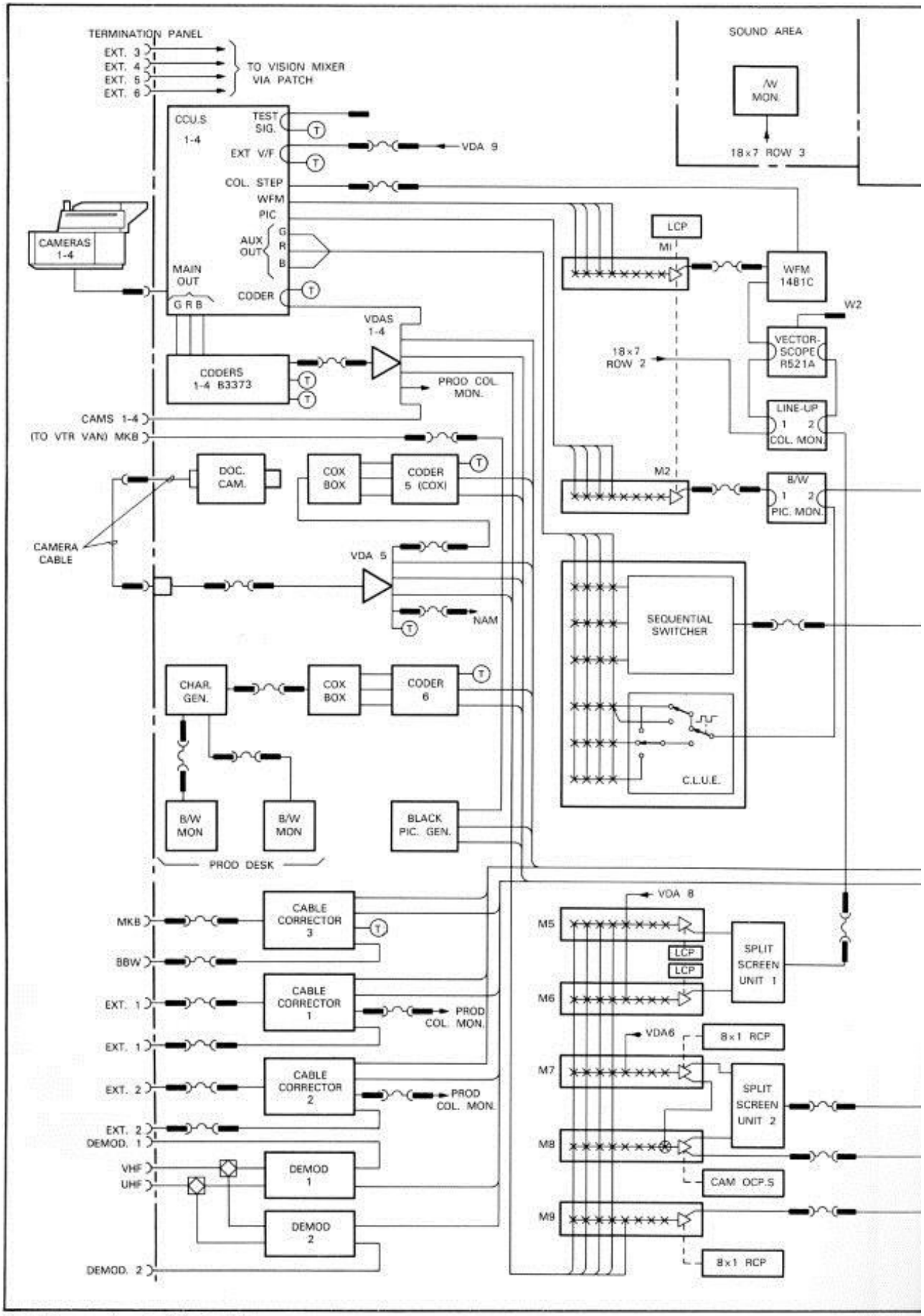
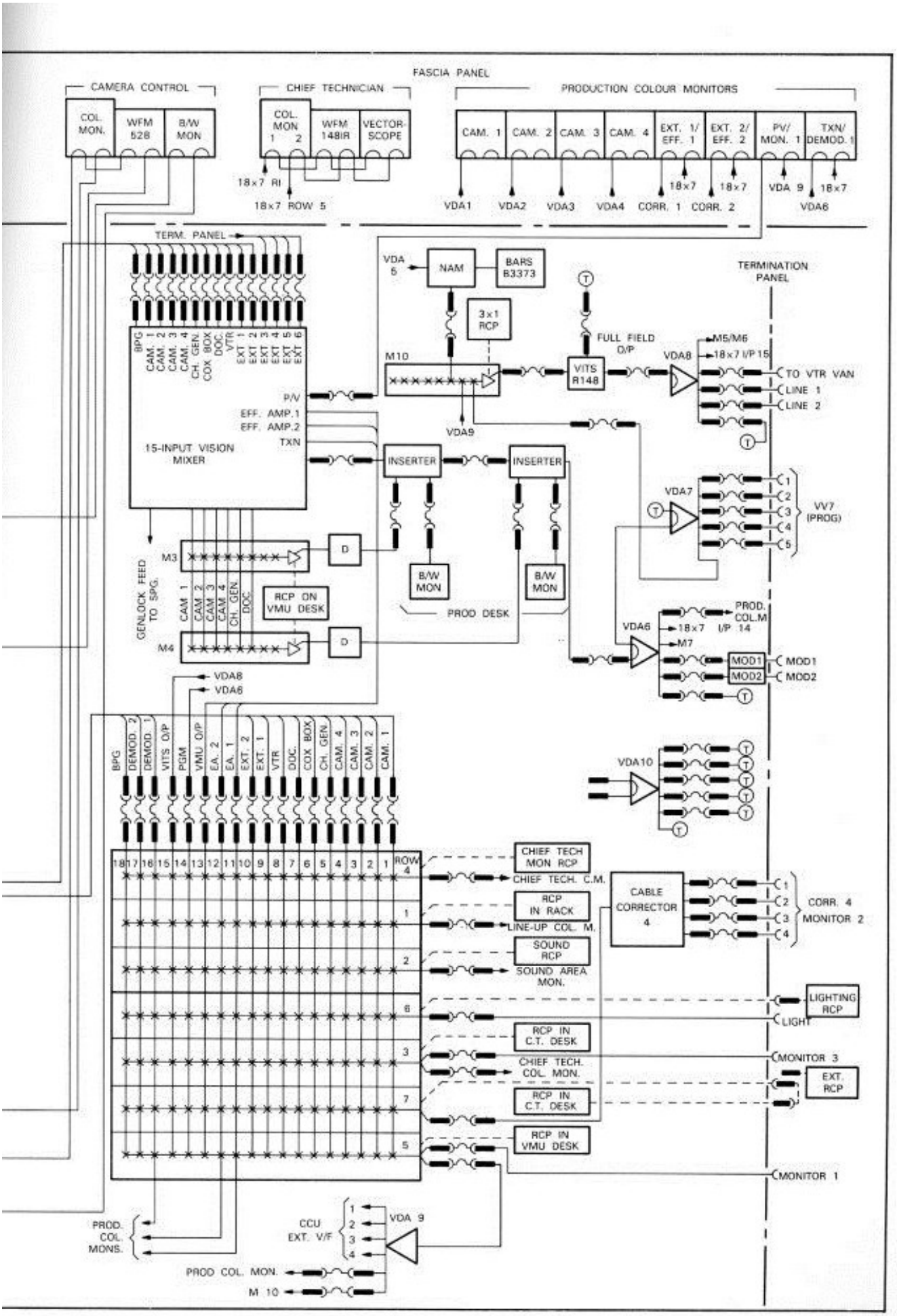


Fig. 4. Diagram showing vision facilities


FASCIA PANEL
CAMERA CONTROL
COL. MON.
WFM 528
B/W MON
CHIEF TECHNICIAN
COL. MON 1 2
WFM 148IR
VECTOR-SCOPE
18x7 RI
18x7 ROW 5
PRODUCTION COLOUR MONITORS
CAM. 1
CAM. 2
CAM. 3
CAM. 4
EXT. 1/ EFF. 1
EXT. 2/ EFF. 2
PV/ MON. 1
TXN/ DEMOD. 1
VDA1
VDA2
VDA3
VDA4
CORR. 1
CORR. 2
VDA 9
VDA6
TERM. PANEL
BPG
CAM. 1
CAM. 2
CAM. 3
CAM. 4
CH. GEN.
COX BOX
DOC.
VTR
EXT 1
EXT 2
EXT 3
EXT 4
EXT 5
EXT 6
P/V
EFF. AMP.1
EFF. AMP.2
TXN
15-INPUT VISION MIXER
VDA 5
NAM
BARS B3373
3x1 RCP
M10
VDA9
FULL FIELD O/P
VITS R148
VDA8
M5/M6
18x7 I/P 15
TERMINATION PANEL
TO VTR VAN
LINE 1
LINE 2
INSERTER
INSERTER
VDA7
VV7 (PROG)
M3
M4
D
D
GENLOCK FEED TO SPG.
CAM 1
CAM 2
CAM 3
CAM 4
CH. GEN
DOC
RCP ON VMU DESK
B/W MON
B/W MON
PROD DESK
VDA6
PROD. COL.M
18x7 I/P 14
M7
MOD1
MOD2
MOD1
MOD2
VDA8
VDA6
VDA10
BPG
DEMOD. 2
DEMOD. 1
VITS O/P
PGM
VMU O/P
EA. 2
EA. 1
EXT. 2
EXT. 1
VTR
DOC.
COX BOX
CH. GEN.
CAM. 4
CAM. 3
CAM. 2
CAM. 1
ROW
CHIEF TECH MON RCP
CHIEF TECH. C.M.
RCP IN RACK
LINE-UP COL. M.
SOUND RCP
SOUND AREA MON.
CABLE CORRECTOR 4
CORR. 4 MONITOR 2
LIGHTING RCP
LIGHT
RCP IN C.T. DESK
MONITOR 3
CHIEF TECH. COL. MON.
EXT. RCP
RCP IN C.T. DESK
RCP IN VMU DESK
MONITOR 1
PROD. COL. MONS.
CCU EXT. V/F
VDA 9
PROD COL. MON.
M 10

b) Inputs 2–5—cameras 1–4.

c) Input 6—character generator. As stated earlier the character generator is a dual device with floppy disc store memory allowing the storage of up to 600 pages on a removable magnetic disc. The user thus has the ability to compose alpha-numeric messages, to store messages, to superimpose the messages upon the video signal output of the vision mixer. The output of the device may be colourized and the output coded before being fed to the vision mixer and central matrix. Two 9in monochrome monitors are supplied, fitted to the production desk enabling the Script Assistant to pre-assemble captions.

d) Input 7—Cox box and coder which are patchable to the document reader.

e) Input 8—document reader. This device, under the control of the camera operator, utilizes a high quality vidicon camera looking through a glass screen at documents, captions etc. The vidicon camera, which is fitted with a zoom lens, can be easily and quickly removed from the reader and can be used up to 100m from the vehicle on external caption work.

f) Inputs 9–15—External feeds, three of which are equalized via active equalizer distribution amplifiers.

Fig. 6. Four of the eight equipment racks

3. *Vision mixer*

The vision mixer consists of a 15-input primary switching matrix with seven outputs which feed signals to three mix effects amplifiers and a preview row. The mixer is thus arranged as preview, A/B, C/D, E/F.

Each mix effects amplifier receives signals from two outputs of the matrix via a sync comparator. The system arrangement is such that the output of mix effects 1 is available as input to the mix effects 2 and 3 as well as direct outputs for monitoring. In a similar fashion mix effects 2 output feeds into mix effects 3. The system therefore can be described as cascading re-entry.

Four auxiliary 8-way busbars are provided allowing up to eight primary input sources to be routed to the inserter keyers and to be used as discrete external key sources.

Each mix effects amplifier provides additive mixing, electronic switching, on-line chroma keying and clamping and fading. Front panel controls include a colour 'joystick' for colourfill, mode buttons selecting various types of keying, mix, fade and spot and a fader paddle.

In the event of a non-synchronous signal being applied to the mixer the sync comparator will inhibit the mix effects amplifiers to revert to cut-only mode in lieu of mix.

The transmission output of the mixer is routed through two series-connected inserter keyers, each with all-round edging, and two 8×1 vision switching units, M3 and M4, will provide keying signals from the primary sources as shown in the drawing. Again, local production monitors enable the vision mixer operator to set up the key accurately. Direct outputs from the van are available via VDAs 6 and 7, while the normal transmission route is via M10, VITS generator and VDA8.

When in the rehearsal mode, Bars and/or Caption may be sent to line.

4. *Central matrix*

An 18×7 matrix allows coded sources to be connected to seven destinations namely:

a) Chief Technician's colour monitor
b) Apparatus room line-up colour monitor
c) Sound area monochrome monitor
d) Lighting control (on stage)
e) Three external locations

5. *General*

Figure 5 illustrates the layout of the Production Area with a character generator in the near foreground alongside the vision mixer. The angled lower row of production monitors are easily visible in the back-ground.

Sound facilities (figure 7)

The complete sound mixing system, communication and telephone equipment is supplied by SAIT Electronics SA of Belgium, and was designed in close co-operation with BRT engineers.

It has been stated before, that extensive audio facilities were required due to the complexity of the programmes envisaged, particularly stage shows and musicals which need multiple microphone positions. For this reason a 36-channel mixer control desk was chosen, each input switchable to three different sources each of which may be

Fig. 7. The highly versatile sound mixer

either high or low level, and one permanent test tone source. Included in every input channel is a frequency equalizer and 'presence' unit. The output circuitry is equally comprehensive. Any channel may be routed to:

a) Six group mix rails.
b) Eight auxiliary output circuits.
c) Direct output

Of the auxiliary output circuits, six are permanently allocated to PA circuits through 100W power amplifiers, and two are tied to a delay unit and reverberation device.

A switching system allows the allocation of three limiter/compressors to be inserted into any of the 36-input channels, six group outputs or the two main output rails. A continental style patch panel occupying half a rack height allows access to all inputs, outputs and intermediary points in the mixing chain. Pre-fade listen is available on all channels outputs and groups.

A dual monitoring and metering circuits gives access to 27 different test points while additional circuits allow comprehensive monitoring at the Chief Technician, Producer and apparatus areas. Also included in the equipment complement are two twin-track tape recorder reproducers and one turntable.

Communications

The communication facilities include:
—one inter-communication network
—one telephone network.

The inter-communication network consists of:

a) One intercom set at each operating position comprising a microphone, limiter amplifier and loudspeaker drive amplifier. Associated with each position is one or more keyboards which enable the selection of the required correspondent and the recognition of the correspondent who may be calling. This is effected by the illumination of a lamp in the keyboard.
b) All the intercom sets and corresponding keyboards are connecting to a communication cabinet which comprises:
    i) The selection matrices, whose function it is to route an intercom set to one or several correspondents.
    ii) Mixing amplifiers, which combine all the incoming correspondents to an intercom set.
    iii) A semi-permanent patch panel which allows a re-arrangement and re-allocation of correspondents to intercom sets.

The above cabinet moreover. has the ability to extend communications circuits to:

1. Three external intercom boxes

2. Two or 4-wire telephone circuits through variable gain isolation amplifiers
3. Portable v.h.f. transmitter/receivers by means of fixed transmitter/receivers included in the cabinet.
4. The PA circuits on the stage.
5. The cameramen.
6. The boom operators.
7. Two EBU commentators' boxes.

The intercom system is constructed in a modular form and all circuits are mounted on plug-in circuit boards.

The telephone network consists of:

a) Six external incoming telephone lines
b) Local battery telephone sets at the positions of the Producer, Script Assistant, Sound Engineer, Chief Technician and apparatus room
c) A local battery telephone exchange is located in the communication cabinet but remotely controlled from the Chief Technician's desk. From here any incoming line may be routed to any telephone set or any other line. The exchange is equipped with full recognition, identification and calling facilities which appear at the Chief Technician's position. In addition the Sound Engineer has the capability to bypass the central telephone exchange and to establish telephone communications between himself and eight correspondents.

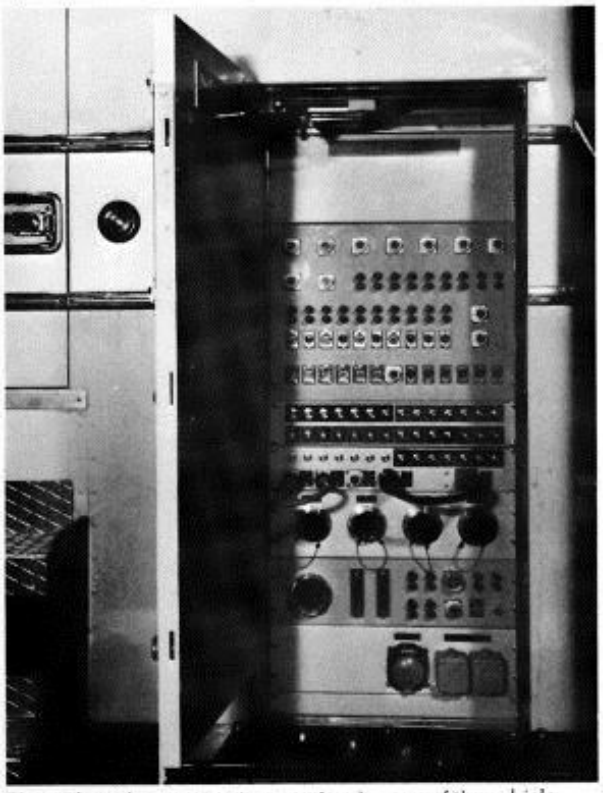


Fig. 9. The video termination panel at the rear of the vehicle. The sound panel is on the other side

Power facilities

The power circuit arrangements, governed by the Belgium Electricity's Authority regulations, are somewhat different from that normally encountered in UK installations. Instead of a line

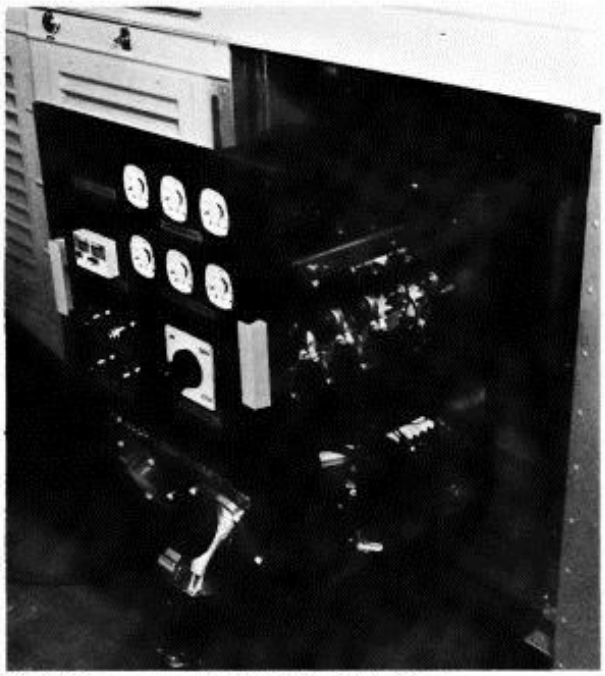


Fig. 8. The power panel showing its accessibility

with neutral return and virtual earth potential, the Belgian system requires a floating supply without earth reference for this type of operation, necessitating a three-wire 380V supply transformed to 220V 2-wire, and requiring all switches on equipment to be of the double pole type. Electronic monitoring equipment is installed which detects low insulation resistance and earth leakage currents and which operates warning circuits both in and outside the vehicles. A comprehensive mains input panel is mounted on telescopic slides (See figure 8) in the rear nearside of the vehicle. This panel contains a selector switch giving a choice of 380/220V input, a primary circuit contactor and metering of primary voltage and current.

A 30kVA isolation transformer, doubly insulated, transforms the incoming power feed to 220V secondary rail voltage. The remainder of the power installation is relatively straight forward, incorporating two automatic voltage regulators with bypass switch and distribution by thermal/magnetic circuit breakers.

. . . the design completed

This article set out briefly to examine a truly remarkable vehicle, one which posed its problems, but which was exciting and interesting to build. It was therefore not unexpected that as the vehicle left the factory that March morning, that the team who had spent nearly 12 months on this project could justifiably feel pleased of their efforts.

Acknowledgements

The author would like to acknowledge the contributions of all those people both within and outside The Marconi Company for making this article possible. Particular thanks are due to BRT, SAIT Electronics, the Marconi Installation Drawing Office and members of both Studio Sales and Studio Contracts departments.

RESUME

Vers la fin du mois de mars 1978, une unité de prise de vues extérieure pour télévision en couleur a été livrée à la société de Télévision belge d'expression néerlandaise Belgische Radio en Televisie (BRT), quatrième véhicule, le plus complet, à avoir été livré à la télévision belge. Dans cet article, l'auteur examine certaines des particularités intéressantes de conception de ce véhicule remarquable.

Réalisé selon les spécifications du client, surtout en vue de couvrir les grands événements qui exigent des dispositifs importants, ce matériel comprend quatre chaînes de caméras couleur, réception de contrôle couleur complète, un pupitre de régie image d'emploi souple, trois pupitres de mélange effets spéciaux, deux connectés ensérie, un générateur de charactères avec mémoire et colorisateur, visionneuse de documents avec colorisateur, dispositifs à écran divisé, dispositifs C.L.U.E., mélangeur de son à 36 voies, et appareils complets de communication/téléphone.

Outre cette vaste gamme de matériel, les spécifications très détaillées comprenaient, entre autres facteurs, les dimensions et le rapport puissance-poids du véhicule, une climatisation complète ainsi qu'un dispositif de chauffage au mazout indépendant, de même qu'étaient définis des critères de bruit faible et des normes de sécurité élevées.

ZUSAMMENFASSUNG

Gegen Ende März 1978 wurde eine Außenreportage-Farbfernseheinheit and die Holländisch sprechende belgische Fernsehgesellschaft, die Belgische Radio en Televisie (BRT), geliefert—das vierte und bestausgestattete Fahrzeug, das an den belgischen Fernsehdienst geliefert worden ist. In diesem Artikel untersucht der Autor verschiedene interessante Designmerkmale dieses hervorragenden Fahrzeugs.

Nach Kundenspezifikation gebaut und hauptsächlich zur Übertragung größerer Veranstaltungen ausgelegt, die umfassende Einrichtungen fordern, bietet das Fahrzeug vier Farbkameraaggregate, komplette Farbbildkontrolle, ein anpassungsfähiges Bildmischpult, drei Spezialeffekt-Mischpulte, zwei Einfügungsmodulatoren in Tandemschaltung, Zeichengenerator mit Speicher und Farbcoder, Filmlesegerät mit Farbcoder, Tricküberblendungsanlage, CLUE-Vorrichtung, 36-Kanal-Audiomixer und sehr umfassenden Funk/Telefoneinrichtungen.

Die äußerst detaillierte Spezifikation schrieb neben dem breiten Ausrüstungsprogramm die Fahrzeugabmessungen und das Leistungsgewicht vor, sowie lückenlose Klimatisierung mit getrenntem Heizsystem mit Ölfeuerung. Außerdemwaren niedrige Geräuschkriterien und ein hochgradiger Sicherheitsstandard vorgeschrieben.

SUMARIO

En la segunda mitad de Marzo de 1978 se entregó una unidad móvil de televisión en color a la Compañía de Televisión Belga de habla holandesa, Belgische Radio en Televisie (BRT), que es el cuarto vehiculo y el más completo que se ha entregado al servicio de TV belga. En este artículo el autor examina algunas de las interesantes características de diseño de este notable vehículo.

Construído conforme a la especificación del cliente, prine a la especificubrir transmisiones de grandes acontecimientos que requieren amplias instalaciones, el equipo incluyó cuatro cadenas de cámaras de color, monitores de color completos, una mezcladora versátil de imagen, tres mezcladoras de efectos especiales, dos manipuladores de insertor conectados en tandem, generador de caracteres con memoria y coloreador, visor de documentos con coloreador, dispositivos de pantalla partida, dispositivos de C.L.U.E., mezcladora de audio de 36 canales y dispositivos completísimos de comunicaciones/teléfonos.

Además de la amplia gama de equipo, la detalladísima especificación abarcaba, entre otros factores, las dimensiones del vehículo y su realción de potencia motriz/peso, sistema completo de aire acondicionado y calefacción independ iente por quemador de aceite pesado, así como criterios definidos para el nivel de ruido permisible y un alto nivel de seguridad.