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VERSATILE TWO-CAMERA TELEVISION OUTSIDE BROADCAST VEHICLE

INTRODUCTION

THE INCREASING TREND towards the inclusion of more sporting events and local news items in television programmes has led to a growing interest in Outside Broadcasting Units.

Until recently the demand has been for a sophisticated comprehensive three- or four-camera vehicle capable of carrying out a production with similar equipment to that contained in a comparable studio installation. When televising large events such as processions, athletic matches, ceremonies, etc., a requirement certainly exists for large units employing four or more camera channels.

For some television organizations a four-camera unit is not always justified when considered in relation to the amount of work to be carried out. To cater for such authorities who still require a Television Outside Broadcast Vehicle, a much smaller unit has been developed containing only two camera channels, but still retaining to a large extent the necessary operational and technical facilities of a four-camera unit.

The introduction of this unit has proved more useful than was originally anticipated. Not only is the unit within the reach of the smaller television organizations as far as cost is concerned, it has also provided a valuable asset to the larger organizations who can carry out much more ambitious shows using a four- and two-camera unit together.

The versatility of the two-camera unit in some respects gives it an advantage over a larger unit, as the vehicle, being much smaller, can get closer to the event to be televised. Narrow roads, bridges and entrances to sporting arenas have in the past prevented the use of a larger unit, making it necessary to remove the equipment from the vehicle and set it up in a temporary studio.

Economics have also played a large part in the demand for a two-camera unit, since fewer people are required to operate it, and it has been found that more events can now be televised, where in the past these would have been passed over simply because of the high cost involved.

In the design of any Outside Broadcast Unit consideration must be paid to a number of basic requirements which have been established through past experience. These include choice of chassis, constructional methods, comfort of operating areas, storage compartments, climatic conditions, etc. Each of these requirements has a bearing on the other.

The chassis must, of necessity, be robust and capable of carrying the load of equipment, ancillaries, etc., as well as be able to travel over unmade or made-up roads without any undue strain. As far as operating areas are concerned these must, of course, contain sufficient room for the Production as well as Technical staff.

Climatic conditions have a bearing on whether the vehicle is heated as well as air-conditioned. There are

Fig. 1.
The two-camera Outside Broadcast Vehicle.

very few countries where a unit can be operated without an air-conditioner, and therefore this has been included as a standard item. The production area, where smoking and stale air are prevalent during programmes, is the only part of the vehicle which needs to be air-conditioned, the equipment area having its unwanted heat removed by conventional heavy duty extractor fans.

OPERATION

The Marconi Company, in introducing the new two-camera O.B unit, have taken into account the long experience gained in the design and planning of O.B vehicles for a wide variety of conditions over the past few years. The new unit was designed to carry all the technical equipment necessary for the operation of two cameras and for the sending of both video and audio signals back to base. The unit is equipped with a centimetric vision and sound link, although it is possible to connect the output of the unit to coaxial land lines.

VEHICLE

A 2-ton petrol or diesel-driven standard vehicle chassis/body was chosen having an overall length of 17 ft 3 in. (5·25 m), a turning circle of 35 ft (10·7 m) and a height of 8 ft (2·5 m), giving an internal ceiling height of 6 ft (1·8 m). With the addition of a roof platform and cable tie rail, the overall height is increased by a further 4 in.

This standard vehicle is equipped with such items as passenger's and driver's seats, spare wheel, internal lights, double entrance doors at the rear and sliding doors in the front. Apart from the driver's compartment there is no internal lining. The floor of the vehicle is completely flat apart from two wheel arch boxes situated toward the rear of the vehicle.

CONSTRUCTION

To ensure that the vehicle can be operated in varying climates, the standard unit is completely insulated by lining the walls and ceiling with a layer of expanded polystyrene which is covered by a layer of melamine-faced hardboard secured to the walls by thin strips of light aluminium moulding. The ceiling is covered with perforated hardboard, which adds to the acoustic treatment of the vehicle. The equipment racks, situated behind the passenger area, are made of light aluminium framing and covered on both sides with melamine-faced hardboard. The facia panel, housing the camera and preview monitors, is constructed of aluminium framing and covered with similar material to the walls. Lino tiles are used to cover the complete floor of the vehicle so that, should any damage occur, individual tiles can be replaced. The production table in the centre of the vehicle is constructed of block-board panelling covered on the sides by a sapele mahogany veneer and on the top by Formica.

LAYOUT

The interior of the vehicle is divided into three main areas:

(a) Driver's Compartment
(b) Production Area
(c) Technical Equipment Area.

The driver's compartment is laid out to accommodate the automatic voltage regulator for the technical equipment, in place of passenger seat, and a shock mount tray for the image orthicon cameras which are stowed here whilst in transit.

The production area, which is partitioned from the driver's compartment by means of a curtain, contains an equipment rack holding the two camera control units, their respective power supply units, the synchronizing generators, and a communication unit for both programme sound and camera talk-back facilities (Fig. 2). Provision is also made in this rack for a mains distribution panel. To prevent overheating of equipment an extractor fan is fitted in the roof above the rack and louvred grills in the floor.

In transit the drums containing camera, power, vision, audio and mains cables are securely stowed in the production area. The production table, situated over the rear wheels, contains the control panels for the seven-input 'A/B/Cut' vision mixer type BD934, the four-input audio mixer type BD956 and also an audio distribution amplifier. Additional table area is provided by means of a pullout flap on one side (Fig. 3).

The picture and waveform monitors and the picture monitors associated with the cameras are situated in a facia panel towards the rear of the vehicle in front of the producer's desk. The control panels for the cameras are placed below the picture and waveform monitors, and adjacent to them is a flush-mounted line clamp amplifier and synchronizing generator remote control panel. Other units situated in this area are the line clamp amplifier, loudspeaker, complete with amplifier, and the relay matrix associated with the vision mixer.

A bench seat is provided for the operator of the camera control panels at a lower level than the producer, to allow the operators at the production table to have a clear view of the monitors in the facia panel. The whole production area is air-conditioned by means of a 1½-ton air conditioning unit.

Double doors at the rear of the vehicle give access to the back of equipment in the facia panel (Fig. 5). The termination panel containing all vision and sound inputs, together with mains and camera cables, is placed at a low level just inside the rear door. As with most outside broadcast vehicles, the equipment is sometimes required to be removed for setting up in a temporary control room, and therefore all equipments have quick-release connectors, and the whole cable-form can be removed from the vehicle if required. An extractor fan is situated in the roof behind the facia panel. Two image orthicon tubes are housed in separate metal carrying cases which are held in position by canvas straps behind the foot-well of the camera control operator.

Fig. 2. The equipment rack in the production area, containing the camera control units, power supply units, communication unit and sync. generators.

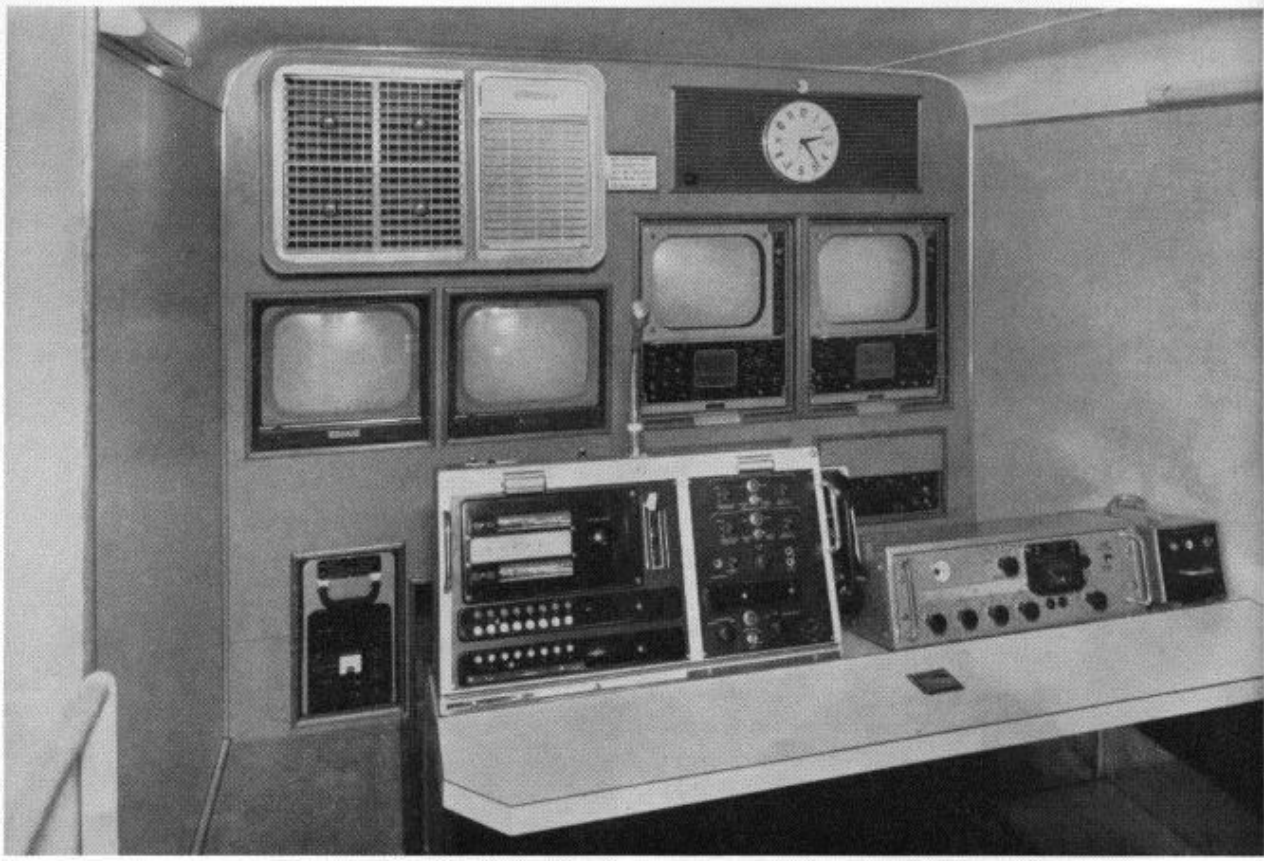

Fig. 3. The production desk. The camera control operator sits on a low bench in front of this. The air-conditioning plant is seen on the upper left.

In planning the layout of the vehicle due consideration was given to weight distribution, as the unit is normally expected to have a constant 24-hour load. The vehicle is designed to carry the necessary equipment of a video and audio microwave link, but as this is not operated permanently within the vehicle, provision is made to stow only the r.f. head unit and transmitter control unit, and these are placed immediately beneath the production table and secured by strong straps whilst in transit. The associated 4-ft parabola is carried on the roof during transit. Sufficient room to store tripods, friction heads, lenses, castor bases and microphones is available in the rear of the vehicle and the production area.

The roof of the vehicle is fitted with a framework with slatted hardwood treads to make a platform which can support a camera and tripod, thus giving an additional camera position when the unit is operating. This area can also be used for the vision and sound link instead of a camera, when the output of the vehicle cannot be connected to land line as a means of transmitting the signal back to the studio.

ANCILLARY EQUIPMENT

When there is no a.c supply available, the O.B vehicle can have its own power unit. This takes the form of a diesel-driven alternator fitted to a two-wheeled trailer towed behind the vehicle. The output of this generator regulates to within $\pm 1\%$ of the voltage to the technical equipment. During programming the diesel alternator is placed between 100 and 200 ft (30 and 60 m) from the vehicle, to prevent the motor noise becoming a nuisance to the production personnel or being picked up by microphones near the vehicle. A number of smaller ancillaries can be accommodated in the vehicle, consisting of such items as zoom lenses, commentators' communication equipment and monitor.

FACILITIES AVAILABLE

The electronic equipment is sufficient for an average

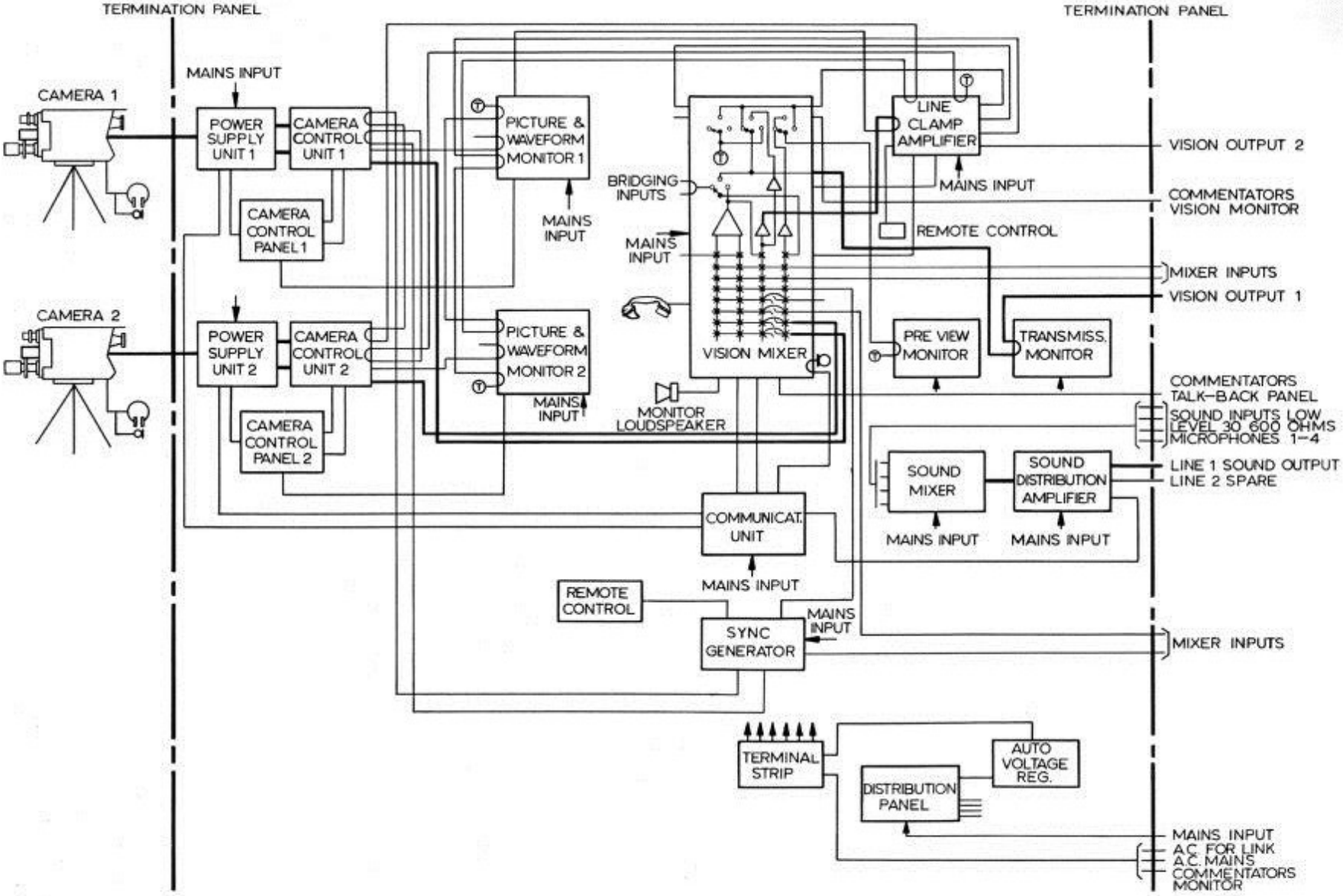

Fig. 4. Facilities diagram. Two-camera television outside broadcast unit.

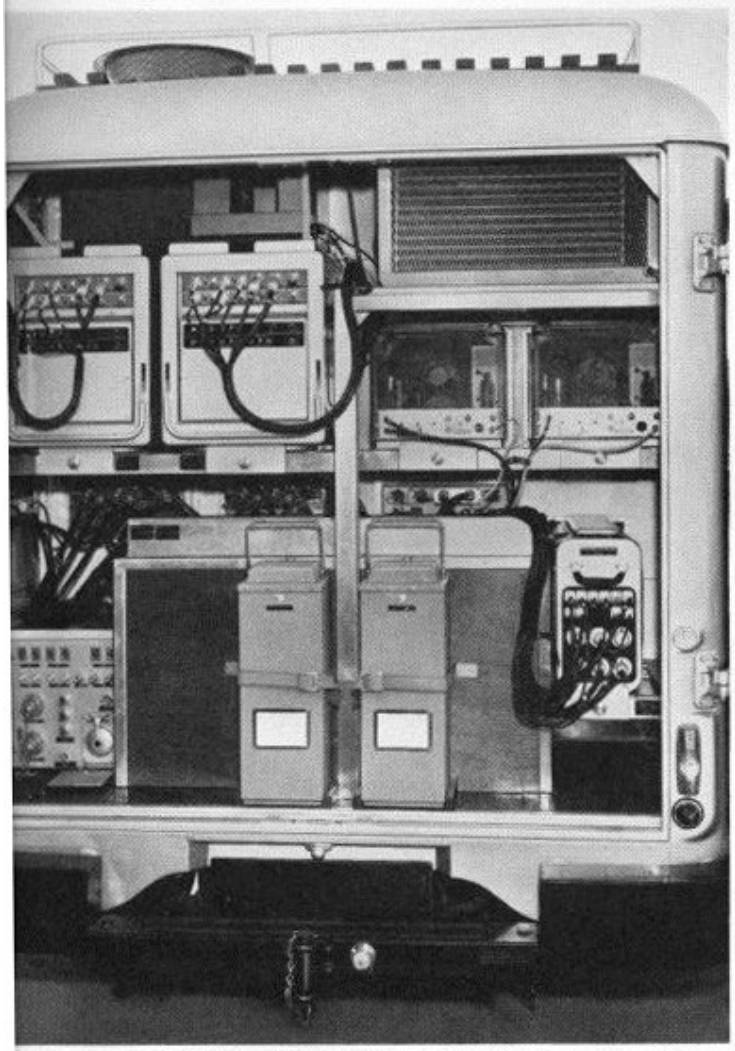

Fig. 5. The van with the rear doors open, giving access to the equipment in the production area. The stowage for spare image orthicon tubes is seen in the middle.

production undertaken by a two-camera vehicle. Two Mark IV 4½-in. Image Orthicon Cameras have been employed because of the high-quality pictures obtained when operating in conditions where the lighting cannot be controlled. The inherent stability of the equipment is such that once the equipment has been set up, the only controls which need to be adjusted by the camera operator are those of lift, gain and iris, which means that one camera control operator can easily look after the two cameras. A seven-input vision relay mixer is employed based on the 'A/B/Cut' preview principle of operation. The main output of the mixer is fed into a line clamp amplifier before passing to either a land line or microwave link. The preview output is taken into a 14-in. general-purpose picture monitor, and a further 14-in. monitor is tied to an output of the line clamp amplifier to show the producer the signal being transmitted. Two picture and waveform monitors are used as technical and preview monitors for the camera channels.

A transistorized four-input mixer controls the sound inputs, the output of this unit being fed into a distribution amplifier which provides signals for monitoring and transmission. The communication unit gives conventional talk-back facilities between the cameras, camera control operator and producer. The producer is provided with a small talk-back panel built into the vision-mixer control panel, and this also provides connections between the producer and one or two commentators. The pulses for the electronic unit are provided by a transistorized synchronizing generator, equipped with two separate generators each complete with its own supply unit, and one locking unit which enables the vehicle to be locked to an incoming source. Automatic switching between the two generators is also provided. To ensure that the mains supply for the technical equipment is stable, a voltage regulator is used, the output of this unit being taken to the vehicle distribution panel before supplying power to the mains distribution boxes.

As other facilities within the vehicle such as air conditioning, lights and heaters also require mains, the incoming mains supply is taken to the vehicle distribution panel before passing to these units. All outgoing circuits from this panel are protected by circuit breakers. The sound mixer can be fed by either an a.c or d.c supply which enables a signal to be sent back to base before the main supply volts are connected, provided the route is by land lines. This important feature is often found useful when breakdowns in the mains supply occur.

CONCLUSION

The first of these units was sold to the Ghana Broadcasting Corporation to enable training of their engineers to start, in readiness for the opening of the Television Network in Ghana at the beginning of 1965. As the studio equipment for this service will be similar to that contained in the two-camera O.B Van a tremendous advantage will be gained by operators, who will be well acquainted with its operation before the opening date. After the start of the service in Ghana the vehicle is expected to travel great distances to bring programmes of local interest to the viewers, and the versatility of the unit will certainly prove an asset to the Ghana Broadcasting Corporation.