Marconi

TD.196

TELEVISION OUTSIDE BROADCASTING UNIT

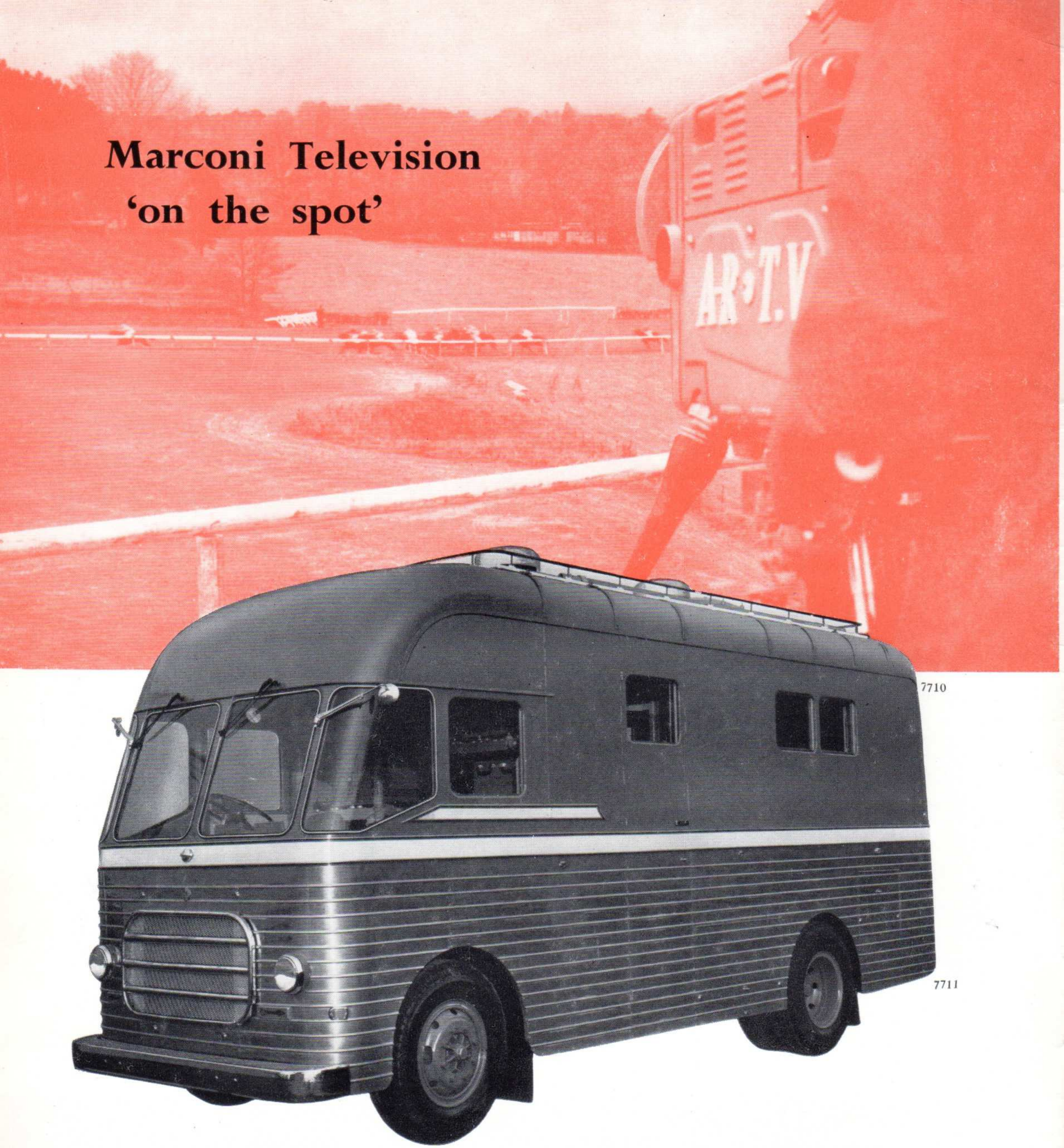
Type BD 604

Technical Description

MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED

Chelmsford, Essex, England · Telephone: Chelmsford 3221 · Telex: 1953 · Telegrams: Expanse Chelmsford Telex

Marconi Television 'on the spot'



7710

7711

Type BD 604 outside broadcasting unit brings the camera to the event

Broadcast Television Technology Trust -- bttt.org.uk

THE PRESENTATION to the public, in their homes, of live happenings in the outside world, such as national events and highlights of sport and entertainment, will always provide an unfailing source of popular programme material to television producers. The scope of this resource is limited only by the degree of versatility and technical capability of the equipment used to capture these topical items and feed them to the transmitter.

The Marconi mobile television unit not only provides a means of conveying the camera to the event, but is in itself a complete television studio with full facilities for the artistic production of a programme from a number of camera channels and sending it direct to the broadcasting transmitter.

DATA SUMMARY

Standards: 405, 525 or 625-line systems.

Power supplies: Mains input 200–240 volts, 50 c/s, single-phase, or 90–120 volts 60 c/s, single-phase.

Power consumption: 10 kVA approx.

Dimensions (approx.):

Length	23 ft. 6 in.	(717 cm)
Width	8 ft.	(244 cm)
Height (Not including link equipment on roof)	11 ft.	(336 cm)
Wheel-base	13 ft.	(397 cm)

Weights (approx.):

Van without equipment	$5\frac{1}{2}$ tons	(5675 kg)
Van fully equipped	$7\frac{1}{2}$ tons	(7627 kg)

NOTE:

Data will depend on the amount of optional equipment supplied. Details are subject to confirmation at the time of ordering.

The following publications are associated with this Description: TD.142, TD.145, TD.147, TD.164.

Broadcast Television Technology Trust -- bttt.org.uk

TECHNICAL DESCRIPTION

THREE CAMERA CHANNELS complete with their associated synchronising generators, vision mixing and sound facilities can be installed in the Mobile Television Unit Type BD 604. A voltage regulator for incoming mains supply is also normally included and a trailer alternator set can be provided when required. Microwave links for transmitting the vision and sound signals to the transmitter are available and can be stowed within the vehicle, thus producing a completely self-contained programme source.

BASIC EQUIPMENT

THE equipment housed in the mobile unit normally consists of two or three camera channels Type BD 808 together with associated units providing the required facilities. The functions of the separate units usually employed are briefly outlined below. For further technical information reference should be made to the publications quoted. The first five items referred to comprise the camera channel Type BD 808, more fully outlined in TD.164.

Television Camera *Type BD 687*

THE CAMERA is built in two basic versions to permit the use of either a 3-inch or 4½-inch image orthicon tube. A feature of the camera of particular value for the outside broadcast is its lens turret. This will carry four lenses which may be any combination from 2-inch to 40-inch types. A zoom lens and an 80-inch lens may also be used, and with both 40- and 80-inch lenses in position the turret may still be rotated with ease, the mechanical handling of the camera being exceedingly fine. Light intensity control is by means of a variable graded filter which replaces conventional remote iris control methods. This control may be carried out from the camera control position.

Television at difficult angles is greatly facilitated by the counterpoised viewfinder which may be moved independently on the camera and so allows operating ease with the camera pointing at sharp angles. The sensitivity of the camera is such that it will operate with as low as 1 foot-candle incident illumination making it ideal for outside broadcasting use.

Camera Control Unit *Type BD 626*

THE camera control unit contains the necessary control and amplifier circuits for the camera. It is normally associated with a picture and waveform monitor, the two units being assembled together to form a control position for each camera channel. Signals are fed from this unit to the vision mixer, the camera viewfinder, and the monitor. Communication facilities are also provided between camera-man and camera-control operator.

Picture and Waveform Monitor *Type BD 627*

DESIGNED FOR a variety of uses, the picture and waveform monitor incorporates a ten-inch picture tube and a five-inch waveform tube. One such unit is employed at each camera channel

Broadcast Television Technology Trust -- bttt.org.uk



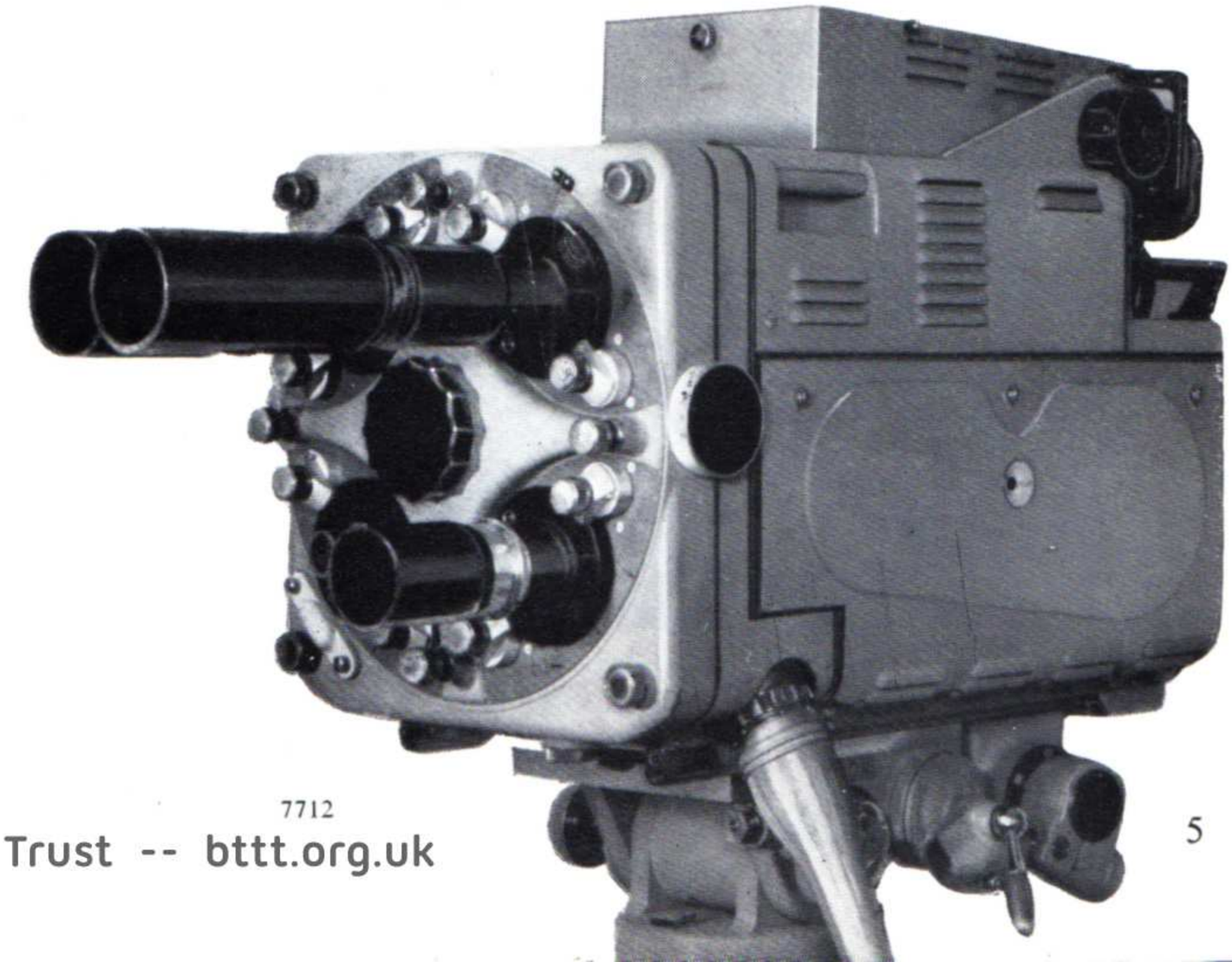
5772

Fig. 1 (right). Mobile Regulated Power Supply Unit Type BD 629. One is employed on each camera channel.



5773

Fig. 2. A picture and waveform monitor, and a camera control unit, housed together in a mobile case to form a self-contained control console for a camera channel.



7712

Fig. 3. The Type BD 687 Image Orthicon Camera, which will operate successfully with as little as 1 foot-candle incident illumination.

Broadcast Television Technology Trust -- bttt.org.uk



7464

Fig. 4. The push-button console of the Vision Mixer Type BD 841M, which provides facilities for cutting, mixing and fading between seven outputs. A line clamp amplifier is also included in the Type BD 841M equipment.



6930

Fig. 5. Sound Control Equipment Type BD 580



6889

Fig. 6. 14-inch Picture Monitor Type BD 851 is used for viewing the particular programme channel being transmitted.

Broadcast Television Technology Trust -- bttt.org.uk

control position and a further monitor serves as a production monitor when used in conjunction with the vision mixer. See TD.147 for detailed information.

Regulated Power Supply Unit
Type BD 629

EACH camera channel has its own power supply unit which is designed to provide all AC and DC supplies, part of the DC output being electronically regulated. Facilities are provided on this unit for mains input transformer tap changing to give maximum flexibility in operation, so permitting a camera channel to be operated remote from the mobile unit. See TD.142 for detailed information.

Focus Supply Unit *Type 2137*

UP TO FOUR focus supply units may be assembled in one case for mobile applications. Each unit comprises a small panel which supplies power to the focus coils of the camera.

Vision Mixer *Type BD 841M*

THE MIXER is suitable for desk mounting in the producer's position. It provides facilities for cutting, mixing and fading between seven inputs. Four outputs plus a monitoring output are available. Direct switching is employed, together with bias fading.

Synchronising Generator
Type BD 638 (or equivalent)

THE SYNCHRONISING generator provides the synchronising and blanking pulses, and the line and field driving pulses for the system. Electrically the circuits divide into two—those providing the timing information and those generating the required waveform. For the sake of convenience the synchronising generator used on 525 and 625-line systems is divided physically into two corresponding chassis: that used for 405 line operation, however, is one unit. Duplicate synchronising generators and an emergency switching unit, Type BD 639B, are normally fitted to ensure reliability of operation.

RF Monitor

FOR CHECKING the transmitter signal an ' off-the-air ' sound and vision receiver, Type BD 905, can be supplied which provides four independent vision and four independent sound outputs for monitoring on a picture monitor. Alternatively, a domestic receiver can be supplied for this purpose.

14-inch Picture Monitor
Type BD 851

THIS picture monitor displays the programme being transmitted and is situated in a prominent position where it can be viewed easily by the production operator and camera-control operators.

Sound Control Equipment
Type BD 580

SPECIALLY designed tor television OB work, this equipment comprises three main items—an amplifier unit, a power supply unit and a control panel. Facilities are provided for the control of five low-level and two high-level inputs with high-level mixing. Prefade listening on all input channels is possible and two independent outputs are available. Alternatively a self-contained desk-console control unit, Type BD 510, can be supplied, which provides control facilities for four low-level sources only and also supplies a separate output for a public address system.

Communication Units

OPERATING personnel need to be in communication with the producer and other members of the production team, and similar facilities are required between the camera and control positions for technical purposes. The communication unit, of which several types are available, serves to provide the necessary facilities. During outside broadcast operations communications play a more vital part than they do in the studio.

Marconi designs use individual amplifiers for the various channels with local control of levels. The basic communication unit has channels for four cameras, producer and programme sound. Commentator's communication units can also be provided. (See TD.145).



6989

Fig. 7. The transmitting head of the Centimetric Vision Link Type BD 401, mounted on a tripod.

Monitor Loudspeaker

Type BD 525C

THIS loudspeaker is used for programme monitoring. Provided with a single-cone 8-inch movement it gives excellent quality reproduction. Its power output is 10 watts.

Centimetric Vision Link

Type BD 401

FOR PROGRAMME relaying between a remote scene and the main studio centre, the centimetric link is ideally suited. The ultra-short operating wavelength of less than 5 centimetres enables parabolic high-gain aerials to be used. By means of these the transmission is 'beamed' in the required direction over distances of up to 30 miles in length. The equipment includes a control unit and transmitter at the transmitting end of a link and a receiver, control unit and power supply unit at the receiving end.

Centrimetric Sound Link

Type BD 415

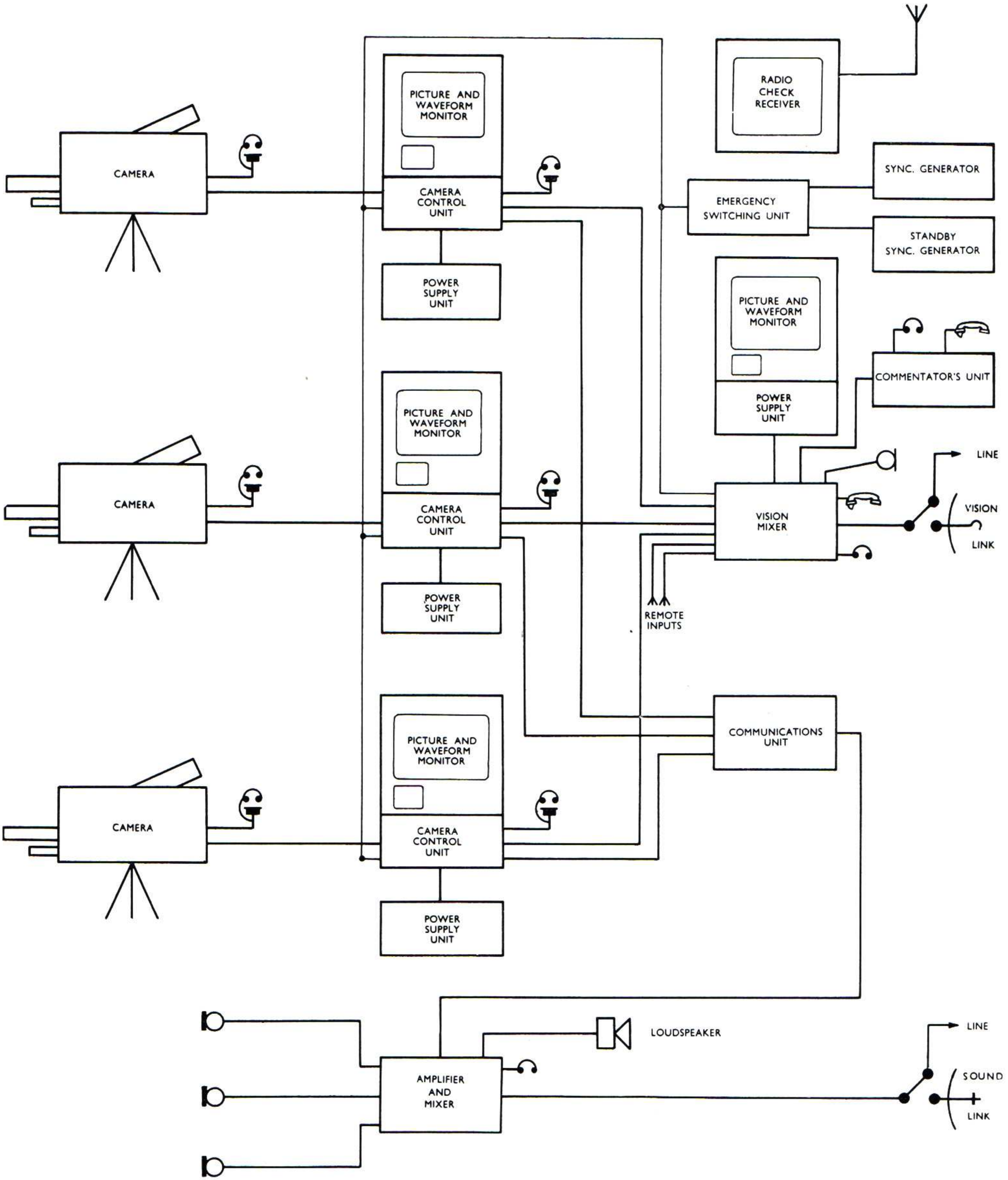
COMPANION to the vision link, the sound equipment comprises travelling wave tube transmitter and receiver head units with identical power supply units.

Automatic Voltage Control Unit

Type BD 640

HAVING a handling capacity of 12.5 kVA this unit supplies all the power to the vehicle at constant voltage. All circuits are fused and metering and alarm facilities are included. The control circuit employs simple non-electronic circuits for stabilisation.

Broadcast Television Technology Trust -- bttt.org.uk



7713

Fig. 8. Diagram showing the facilities offered by a typical outside broadcasting unit.

Broadcast Television Technology Trust -- bttt.org.uk

CONSTRUCTION

THE equipment is contained in a specially designed body, made from aluminium alloy, which is mounted on a 7-ton long-wheelbase chassis.

The interior of the vehicle, behind the driver's cabin is divided into two compartments by a bulkhead, furnished with a communication door. The rear compartment, which is air-conditioned, provides accommodation for the production staff and camera control operators, and the front fan-ventilated compartment houses equipment racks and servicing facilities. A diagrammatic view is shown in Fig. 1.

Exterior

There is a separate door for the driving cab, a door at each side for access to the equipment area and one at the rear for entering the production area. Access doors are provided to the air-conditioning plant, the spare-wheel locker and to a large stowage locker for camera tripods, etc. At the rear is a cable-drum locker which will hold approximately 1000 feet of camera cable.

Driver's cabin

The driver's seat is adjustable for position and height. A portable inspection lamp and two hinged dazzle screens are fitted over the windscreen. The inspection lamp possesses its own reel of cable and lights automatically when taken out of its mounting.

A passenger seat is provided which folds forward to give access to the batteries, and there is capacious shelf space running the full width of the cabin over the windscreen providing further accommodation for small ancillary items.



7714

Fig. 9. Interior view of the production compartment of a Type BD 604 mobile unit. The door leads into the servicing compartment at the front of the vehicle. The layout of this compartment is shown in Fig. 10.

Broadcast Television Technology Trust -- bttt.org.uk

To prevent the vehicle from being rocked by the movement of personnel during transmission, four manually-operated jacks are fitted. If the ignition key is turned on whilst these jacks are down, a red lamp on the dashboard flashes, but the engine will not start until the jacks have been raised. Safety hooks are fitted, the use of which ensures that the jacks do not descend whilst the vehicle is in motion.

Servicing compartment

This is the section of the interior to the front of the central bulkhead and the side doors of the vehicle open into this compartment. Access to the roof is made through a hatchway above the centre of the compartment, a ladder being provided for this purpose.

There are equipment racks to the front and rear of the compartment and also a hinged servicing table. Synchronising generators, power supply units, etc. occupy the racks to the front of the vehicle and on the other racks are mounted the picture and waveform monitors, camera control units, etc. which are used by the camera-control operators. The fronts of these units face through apertures in the central bulkhead into the production compartment at the rear of the vehicle.

Accommodation is provided under the bulkhead racks for stowing the cameras when not in operation. All the rack-mounted units are fixed to antivibration mountings.

The servicing compartment is kept ventilated by air drawn through gratings in the floor and expelled through the roof. Mains-operated extractor fans are fitted in the roof, the diaphragms of which close the openings when the fans are not running, thus preventing dust or rain splashes from entering.

Production compartment

The production compartment is reached from the servicing compartment by a door in the bulkhead.

Seating is arranged on two levels so that the production staff have a good view of the camera control and monitor units. Four places are provided on a seat for the camera-control operators and a script table slides out from the bulkhead for their use. Local lighting is provided.

Behind the camera-control operators' seat is a desk carrying the vision and sound mixing equipment. Chairs for the production staff are behind this desk. These chairs, as well as the control desk and the camera-control operator's seat, are all removable for use outside the van.

In the space at the rear of the van will normally be found a flap table, a bench seat, a notice board, an inspection light, and transport cases for image orthicon tubes housed in a locker also having space for microphones, etc. This locker may be loaded from outside the vehicle.

Sliding windows are fitted in each side of the production compartment. Shutters are also normally fitted over the windows to exclude light.

The production compartment is fitted with an air-conditioning plant, mounted below the floor in a locker on the near side of the vehicle. Cooled or heated air is circulated through grilles in the walls of the compartment to maintain pleasant working conditions for the crew.

Low-temperature electric heaters are fitted, which may be used to keep the interior warm when the van is parked in the open in cold weather.

Cable system

External cables can be brought through either side door (through slots provided) for direct connection with the various units, or alternatively a cable termination panel can be fitted above the cable locker at the rear of the vehicle.

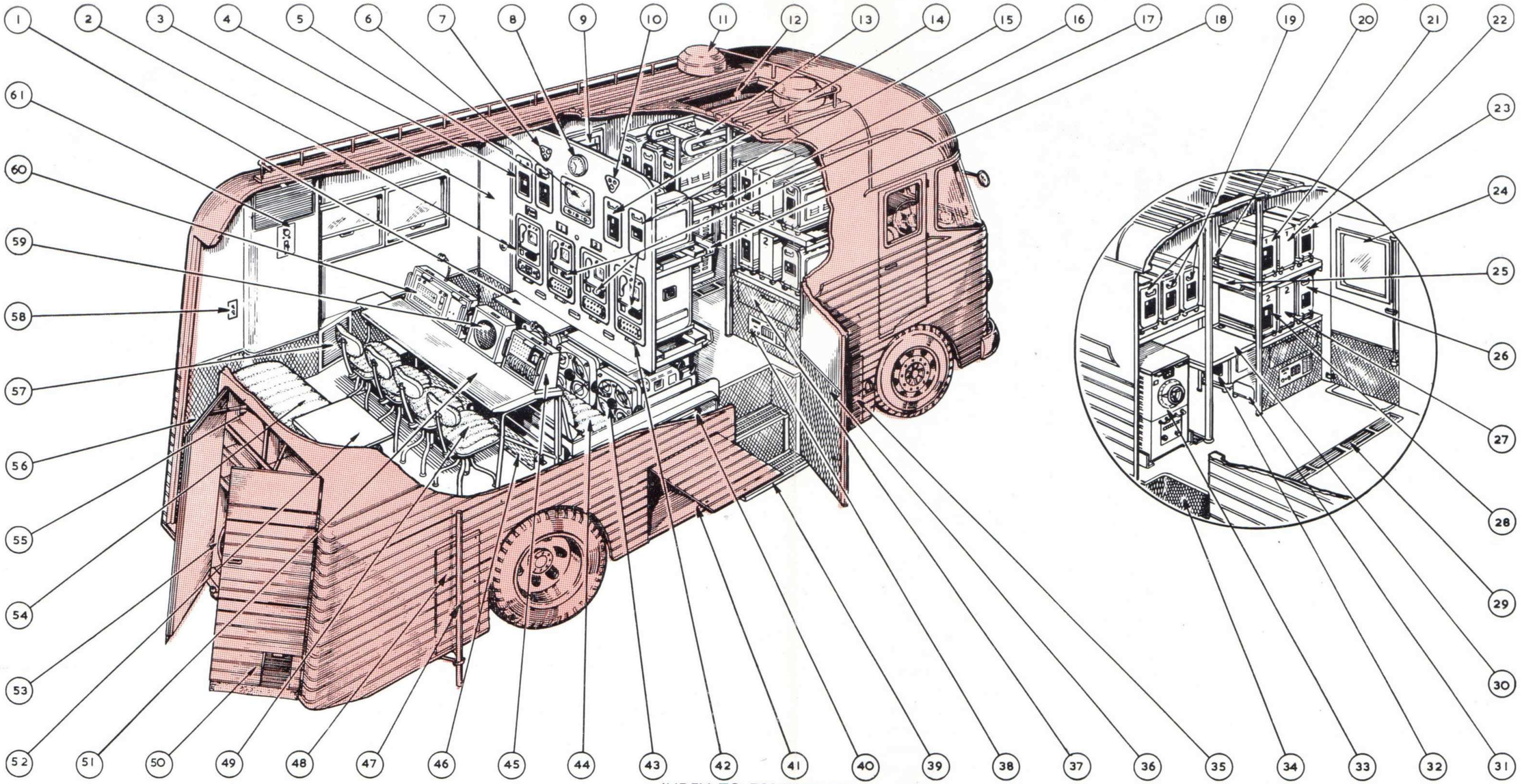
The cables, with few exceptions, are made to run from one unit to another in ducts without cleats or other fixings. This is because in certain cases it may be necessary to remove the units, or some of them, and some or all of the cables from the van and set them up temporarily elsewhere.

Identity labels are fitted to the end of all cables tallying with the labels fixed adjacent to each unit. These labels indicate the unit to which they refer by a code of abbreviations.

The cable connectors are so arranged that cables of a similar function have terminations with the same number of pins: for example, communications cables may have 10-pin connectors, power cables, 12-pin connectors, etc.

← **Fig. 10 (in fold-out). The internal arrangement of a typical outside broadcasting unit.**

Broadcast Television Technology Trust -- bttt.org.uk



INDEX TO EQUIPMENTS

1 SLIDING DESK
2 PICTURE AND WAVEFORM MONITOR WITH POWER SUPPLY
3 BULKHEAD DOOR
4 LINE CLAMP AMPLIFIER
5 SOUND AND VISION RECEIVER
6 PICTURE MONITOR
7 EMERGENCY SWITCHBOX
8 CLOCK
9 ENTRANCE DOOR TO EQUIPMENTS
10 SOCKET PANEL
11 FAN VENTILATORS
12 SLIDING HATCH TO ROOF
13 LADDER IN STOWED POSITION
14 SOUND AMPLIFIER
15 POWER SUPPLY UNIT
16 DISTRIBUTION STRIP
17 CAMERA CONTROL UNITS AND MONITORS
18 CABLE DUCTS
19 REGULATED POWER SUPPLY UNITS
20 DISTRIBUTION STRIP
21 TIMER
22 WAVEFORM GENERATOR
23 FOCUS SUPPLY UNIT
24 ACCESS DOOR TO SERVICING AREA
25 STRIP LIGHTS
26 COMMUNICATION UNIT
27 WAVEFORM GENERATOR 2
28 TIMER 2
29 AIRVENTS IN FLOOR
30 SERVICING TABLE IN POSITION
31 SINGLE-CHAIN COMMUNICATION UNIT
32 TRANSMITTER CONTROL UNIT
33 AUTOMATIC VOLTAGE REGULATOR
34 HINGED STEP
35 STOWAGE LOCKER
36 DOOR
37 VALVE STORAGE LOCKER
38 DISTRIBUTION PANEL
39 HINGED STEP
40 CAMERA SHOCKMOUNTS
41 STOWAGE LOCKER
42 SCRIPT LIGHTS
43 CAMERAS IN STOWED POSITION
44 CAMERA CONTROL OPERATORS' SEATS
45 SOUND MIXER
46 HEATERS
47 MAST AND OUTRIGGERS
48 STOWAGE LOCKERS
49 PRODUCTION OPERATOR SEATS
50 DOORS TO CABLE LOCKER
51 FOLDING TABLE
52 HINGED TABLE
53 CABLES IN STOWED POSITION
54 REAR SEAT AND LOCKERS BELOW
55 IMAGE ORTHICON TRANSIT CASE
56 VENTILATOR IN STEPS
57 SIDE VENTILATOR
58 INTERNAL LIGHT SWITCHES
59 MONITOR LOUDSPEAKER
60 VISION MIXER
61 COOLER CONTROL PANEL

7716

Fig. 10. The internal arrangement of a typical outside broadcasting unit. The main items of equipment only are scheduled. In addition, camera lenses, mountings and other auxiliary items are included. Radio link equipment is also normally supplied.

OPERATION

THE normal mode of operation is to use the vehicle as a control room, removing the cameras to the scene of operation. Each camera is removable up to 1000 feet away from the vehicle.

All supplies are taken from an external mains source within 200 feet of the van. A heavy trailing cable of this length is provided. The voltage regulator can accommodate for a wide range of mains variations.

Where mains supplies are not available a 15 kilovolt-ampere petrol-driven mobile generator can be provided. For convenience in preparing to operate whilst the mains cable is being run out, or for use in the case of mains failure, emergency battery lighting is provided.

If it is impossible to bring the vehicle within reach of the spot selected for the cameras, it is possible to remove equipment from the van and use it externally as a temporary control room. For this purpose folding equipment desks are provided which support camera control and monitor units, with space for power units, etc. beneath. The inter-connection cables as used in the van are taken out and used for the temporary control room.

The production desk and the camera control operators' seat are removable and, to maintain maximum operating efficiency, should if possible be mounted at different levels, as they are in the vehicle.

If the mains supply is sufficiently stable the voltage control unit may be dispensed with. In this case the distribution boxes are removed from the van and connected directly to the mains.

Printed in England and published by Marconi's Wireless Telegraph Company Limited 27557/500