T. W. DRESSER

AN O.B VEHICLE FOR SMALL STATIONS

This is an account of how a Sound Outside Broadcast Unit was produced in the short time of two months, and some of the problems involved. We will be devoting an article to some of our solutions to similar problems in a future number, but meanwhile must offer our congratulations to Mr Dresser and his colleagues.

SUCCESSFUL OUTSIDE BROADCASTING performances, whatever the size of the organization involved, demand that two essential requirements be met at all times. These are the ability to provide a signal at the studio central control room indistinguishable in quality from that of one originating in a studio, and the complete reliability of the equipment used both at the transmitting and the receiving ends. Other requirements, such as the ability to operate independently of public power supplies, the provision of means of tape recording whilst a broadcast is in progress and means for inserting a taped programme into a live broadcast, also have considerable value, but are not of quite the same importance. These latter requirements are much more likely to be called for by relatively small concerns with limited facilities than by nation-wide networks, particularly if the operation is a commercial one.

The interior of the O.B van. The neat, compact layout is clearly shown. The accessibility of the equipment is also evident.

The Trinidad Broadcasting Company, until some two years ago, customarily used telephone lines for all O.B purposes. Where there were no such lines available obviously an outside broadcast could not be carried out, although frequently these were the places where there was something of interest which would have made an ideal radio feature. Quite apart from the limitations imposed by the shortage or absence of lines, there was also the technical drawback that no such thing as a music line was obtainable, and music transmitted by these lines therefore bore no resemblance to the original performance by the time it arrived at the studio control room. Again, the long distance O.B's often called for in the island frequently resulted in a weak and almost unintelligible signal at the control room. For reasons such as these the company decided that an O.B vehicle had become a necessity, and the planning of such a van commenced in February of 1958, some two months before the anticipated arrival of Princess Margaret to open the Federal Parliament. The deadline for completion was already set therefore, as many of the functions Her Royal Highness would attend could only be covered by such means; lines simply were not there, nor could they be run to many of the points.

Now in Trinidad, as in a great many other places, the materials one needs for a given job are not always readily available. It follows that many things have to be done the hard way.

This was so in the case of the O.B van, particularly with the operational desk. The vehicle in which the equipment was to be installed had already been purchased—an Austin A52, ideal for the purpose as it has no projections or wells on the floor to obstruct a logical layout; it is sturdy and quiet and has plenty of windows to admit light and air. A platform had been welded to the roof, with a slideway beneath for a demountable ladder. After a good deal of footwork around the hardware stores in Port of Spain, it was decided to use Dexion strip for the desk frame, boxing it in with half-inch plywood and covering the top with Vinyl sheeting. The local welder did not fit the members exactly straight and the carpenter followed the lines of the welder, but despite this it looked quite presentable when installed at the front of the body, immediately behind the driving seat and bolted down to the steel flooring. Slatted, readily removable shelves were fitted to the interior to permit access to equipment installed on the floor, and furnish space for such things as extra microphone leads, tools, etc. Sliding doors were provided at the front of the unit.

The desk carries a three-inch-high backboard on which are mounted three microphone sockets, two telephone line outlets, and four power sockets. At a later date speakers were fitted onto the front fixed panels, one fed from the FM receiver and the other from the car receiver, mounted on the dashboard, which functions as a monitor on the 20-kW medium wave transmitter. A breakjack across the latter permits the use of headphones whenever necessary.

The O.B van with the aerial erected. The van can move at slow speeds with the aerial in this position.

Dexion strip was also used for the trays holding the tape recorders and for the vertical supports for the cable reels, the bases of the recorder trays being boxed in the wallboard which was subsequently painted to match the general interior colour. As cable reels of any description were totally unobtainable in the island, it was again necessary to fabricate something to serve the purpose and in this case a number of surplus twelve-inch aluminium recording tape reels were pressed into service. Fitted with a light slatted wood centre drum they serve admirably for the purpose and roll easily at a slight pull on the cables. Four such cable drums are used, three of them carrying microphone cables each thirty-five yards in length, and the fourth, a one hundred yard length of flexible power cable terminated at the inner end in a line connector, and at the outer end in an American-type two-pin plug or a British three-pin plug.

The microphone sockets and line outlets fitted to the desk backboard are wired to similar sockets, and outlets on the distribution board behind the cable rack, thus permitting the mixing unit to be removed for use outside the vehicle and also enabling any microphone cable to be connected to any input socket. The backboard power sockets are wired to a switching arrangement on the distribution board permitting the use of the public power supply or that from a battery-operated rotary converter furnishing an identical supply. (Fig. 1.)

Apart from the four channel mixer, which has been made purposely removable, the remainder of the equipment is permanently installed in the van, the transmitter and receiver together with a co-axial relay "send/receive" switch being mounted in a standard 19-inch rack made of Dexion strip and flexibly mounted on the right side of the desk, and a selector unit flexibly mounted in the centre of the desk. The mixing unit is normally located on the left side of the desk, again in a flexible mount, to absorb road shocks. The units can be readily identified in the photograph of the vehicle's interior.

By means of the selector unit it is possible to carry out the following functions, many of them simultaneously:

1. To feed an audio signal from the mixing unit to either tape recorder, or both at the same time.
2. To pass a signal from the mixing unit to either, or both, of the two telephone line outlets.

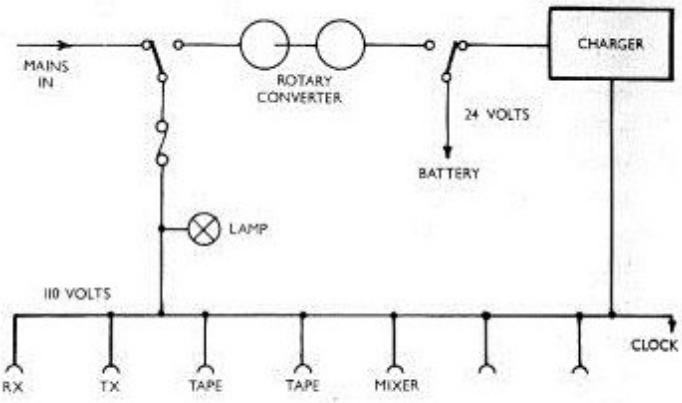

Fig. 1

3. To feed the output from either tape machine into the transmitter.
4. To feed a signal into the transmitter from either of the telephone lines.
5. To pass the output of the mixer (and hence that of any of the three microphones normally carried) into the transmitter.
6. To pass a signal from the VHF receiver to either of the two telephone line outlets, and hence to line.

The basic circuit diagram of the selector unit is given in Fig. 2.

The aerial mast was the next problem of any consequence. The distance from the transmitter at which a good VHF signal can be received is dependent to a great extent upon the height of the transmitting and receiving aerials, as well as, of course, upon the radiated power. Frequency, polarization, and topography of the country to be traversed have only a secondary effect in the matter. The receiving aerial at the studios in Port of Spain is approximately eighty feet high, but the intervening terrain between the southernmost point of the island and the receiving aerial is very mountainous and it was desired to obtain the greatest elevation possible for the transmitting aerial having regard to the fact that the mast used must be capable of being rapidly dismantled and carried in the van. A ready made one was quite out of the question — such a thing was not obtainable locally and would take weeks to import — but fortunately ten-foot lengths of stainless steel tubing were procurable locally and a thirty-foot mast was fabricated from three such sections, telescoping into the lower section

for transporting and carried in cleats on the roof when not in use. The mast fits through a hole in the roof, normally closed with a screw-on cap, down through a futher hole in the desk top and into a stout collar on the floor of the vehicle. In this way it is held rigid even when the van is moving at slow speeds. The exterior photograph of the van gives a fair idea of the mast. The six-element Yagi array which it supports is, incidentally, fitted with a heavy brass tongue which slips into an aperture in the mast top. No other attachment is provided and from experience no other fastening is necessary. When not in use the aerial, like the mast, is carried in cleats on the roof platform.

Wiring in the vehicle has been carried out in the accepted manner for multilevel audio cabling; low level wiring is screened and plastic covered and spaced a minimum distance of eight inches from medium and high level (speakers) cables, though these too are screened. Power wiring is spaced two feet from all signal wiring, whatever level it may be carrying. At all angle bends a reasonable loop is left to take care of frame distortion in the vehicle, thereby saving unnecessary cable breakages.

Simplex operation is used, both for its simplicity where relatively unskilled operational staff is employed as well as for the weight dispensed with, in that only one aerial is called for, and hence one mast. The frequency of operation is 165·2 Mc/s, reasonably clear of all other island communication services. The transmitter is placed above the receiver in the 19-in. rack in order to ensure satisfactory heat dissipation over protracted transmission runs, while the co-axial relay aerial changeover switch is so connected that it is in the quiescent position (de-energized) in the 'send' position, with the aerial connected to the transmitter. As the greater part of the time spent on an outside broadcast will be devoted to transmission it is obviously advantageous to have the relay de-energized for this period rather than for the short intervals when the receiver is in use. Moreover, used in this way the possibility of a burnt out or damaged relay coil becomes very remote, while that of chattering contacts is totally eliminated as the relay armature and switch moving contact are spring tensioned.

The twenty-four volt alkaline battery which supplies power to the rotary converter is charged from a selenium 'bridge' rectifier connected directly to a

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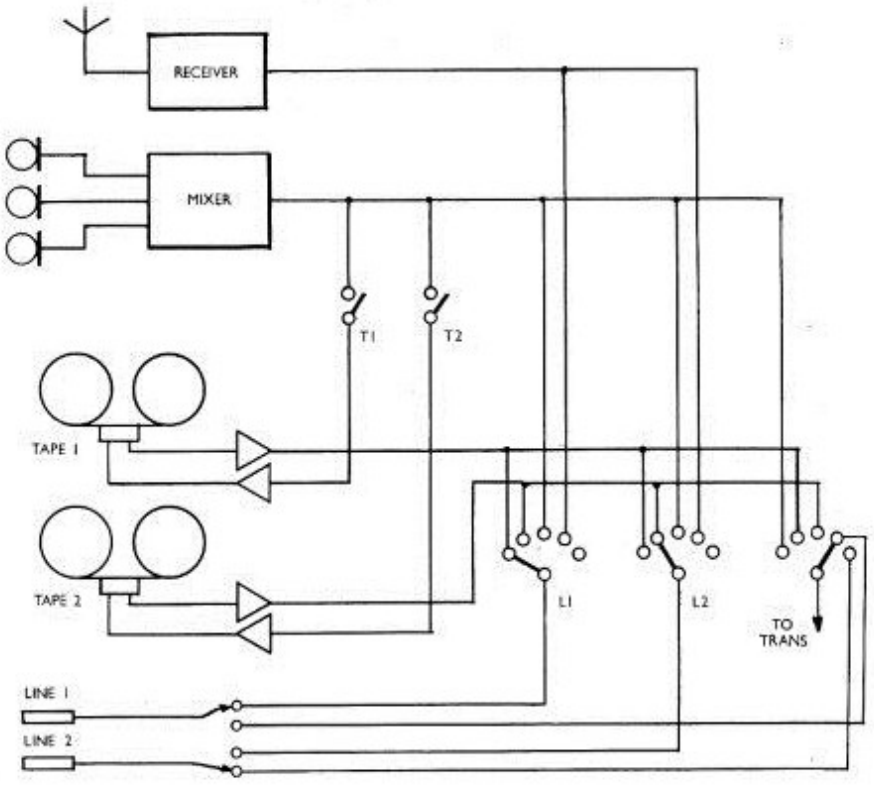

Fig. 2

power switch on the distribution board, and can be charged at any time the public supply lines are connected to the vehicle, a distinct advantage when one O.B may be from an available power source and another, or a recording, is called for within an hour or two at a point where there is no power supply. The battery is capable of running the entire equipment for two hours.

The vehicle is fitted with an electric clock (seen on the far left in the interior photograph), mains lighting over the control desk, and two rubber-vaned fans for cooling in the tropical heat. The first O.B from the van was that of the morning of 21st April, 1958, the date of H.R.H Princess Margaret's arrival in Trinidad. Since then it has been in almost constant use, and has consistently put up a fine performance from points some sixty miles from the studio. Occasionally it has been found that the signal is somewhat down in level, and it would be an advantage to increase the height of the transmitting aerial. In these circumstances, which do not often occur, provision has been made to elevate the aerial to the top of a convenient building or, on occasion, the top of an oil derrick, by means of lashings carried in the desk compartments, and of course, an extension co-axial cable.

In conclusion I have to thank the board of directors and the management of the Trinidad Broadcasting Co. Ltd, and Mr M. F. Comer, Chief Engineer (Caribbean area) Overseas Rediffusion, for permission to publish this article.