Color TV Film System

This system is used to display motion pictures and slides in the TV system and is the intermediate equipment between the optical medium of film and the electronic medium of television. Each van has a color-film system consisting of one TK-27B color-film camera, a TP-55 multiplexer, a TP-66 film projector and a TP-7 slide projector.

Recent refinements in the design of the TK-27B have included built-in contour enhancing circuits which permit high-frequency details in the picture to be amplified without an annoying increase in "noise." Contouring, which enhances picture definition as well as detail, is produced from the TK-27B's luminance signal. The camera employs a four-tube design; three pickup tubes handle chroma signals and the fourth produces luminance, or brightness.

Videotape Recorders

The two TR-60 compact television tape recorders aboard each van are broadcast-quality, quadruplex machines capable of recording color picture and audio signals and playing them back instantly. One machine in each van is equipped with an electronic editing system that permits rapid editing of taped programs without physical cutting of the tape. The TR-60 possesses many of the features used in larger, more expensive tape recorders, including a rear side erase head, complete monitoring of all critical machine waveforms and video signals, high gain servo and head resonance compensation. The machine measures only 33 in (84 cm) wide, 66 in (168 cm) high and 24 in (61 cm) deep.

What Sort of Mobile Television Unit Do We Want?

By K. K. ACKERMAN

Because the high cost, large size and complexity of general purpose mobile TV units may not be justified, it may be more economic to design specialized units for three different applications identified as Live coverage, Drama inserts, and News coverage. The effect on the design of mobile units of lightweight cameras, camera cable and monitors is discussed.

Introduction

Most broadcasting organizations have equipped themselves with general purpose mobile units. A typical specification would include:

(a) four cameras plus one spare and facilities for controlling and accommodating six cameras;
(b) a 24-channel sound desk;
(c) a 10-source vision mixer with full effects and chroma key facilities, etc.;
(d) a monochrome caption scanner for opacities and transparencies with color synthesizer;
(e) five 10:1 and three 18:1 fully servo-controlled zoom lenses;
(f) comprehensive talkback, communication radio talkback and telephone systems;
(g) sophisticated vision synchronizing, auto phasing and locking arrangements; and
(h) a 30-channel lighting control and dimmer system.

An example of such a vehicle is illustrated in Fig. 1. It is 34 ft 10 in (10.62 m) long, 8 ft $2\frac{1}{2}$ in (2.50 m) wide and 10 ft 11 in (3.33 m) high, weighs 13 tons (11.79 metric tons) and costs nearly $900,000.

The high cost and complexity of this type of vehicle are direct results of the wide variety of types of program which it is required to cover. The large sound desk is necessary for light entertainment shows from theaters, and for covering "pop" music groups. The comprehensive talkback and telephone arrangements are essential for sport and other complex live broadcasts particularly when the vehicle may serve as the production linking point for a multiple event covering a number of sites. The large complement of lenses is included to cover both indoor and outdoor telecasts.

The only way to reduce the size, cost and complexity of these mobile units is to identify particular areas of programing and to design vehicles which are suited to that application. In a large organization like the BBC with a sizeable fleet of vehicles, this should be possible and result in worthwhile economics.

Three Types of Mobile Units

Three program categories call for distinctly different technical facilities:

Live Coverage

This includes major sports events, political conventions and the like. The emphasis here is on a large number of cameras; vision synchronizing is essential, as are complex telephone and communications systems. Much less important are a large sound desk, lighting control systems and sophisticated effects facilities on the vision mixer. As the events are predictable, parking arrangements can be planned and therefore a large cumbersome vehicle is not a serious embarrassment.

Drama Inserts and Magazine Programs

Here it should be explained that in the United Kingdom a high percentage of drama is produced in a TV studio on videotape and matching of 16mm film quality to that of the electronic camera is not always adequate despite the very significant improvements that have been effected in 16mm techniques. Experiments have shown that a small mobile

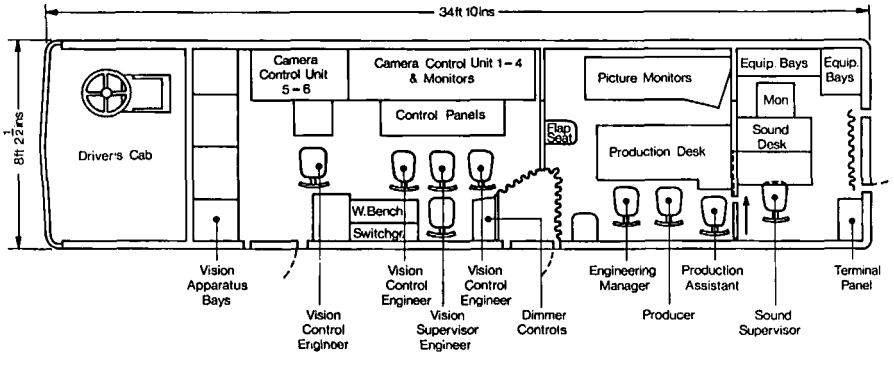

Fig. 1. General-purpose, four- to six-camera color mobile unit.

A contribution submitted on 20 October 1972 by K. R. Ackerman, TV Studio and Outside Broadcast Section, Studio Capital Projects Dept., British Broadcasting Corp., Broadcasting House, London W1A 1AA, England.

van with lightweight electronic cameras can improve this quality and compete on a "total cost" basis with the 16mm camera team.

For this application the specification for the van is quite different, for it can be decided that it will not be used for live coverage.

Immediately it is possible to eliminate complex vision synchronizing arrangements, and much of the communication and telephone systems. The vehicle must be small and maneuverable, need have no more than two cameras, should be equipped with its own silenced power generator with sufficient spare capacity to supply a small amount of lighting equipment, and need have the simplest of vision mixers and a small sound desk. It must of course be fitted with a videotape recorder, and it is to be hoped that broadcast quality color helical scan machines will provide this facility without requiring much space.

Such a vehicle would also be ideally suited for recording magazine programs on subjects such as motoring, fishing and other outdoor activities.

On-the-Spot News Coverage

For the foreseeable future the electronic camera is unlikely to be able to compete with 16mm film for ease of transport and thus ability to be deployed in far-flung places at short notice to cover news events. But it has one powerful advantage — immediacy, i.e., it is able to produce live coverage without the delays inherent in film processing. So where it is possible to predict that a news event is going to take place, if only a few hours in advance, a news mobile unit can be a most effective instrument.

Once more the technical requirements for News are markedly different from either of the two applications so far covered:

While the vision mixer can be simple and two cameras will suffice, the vision synchronizing arrangements must be comprehensive and a microwave link is highly desirable. The sound desk can also be fairly basic but the communication and telephone facilities must be generous. Light, highly portable cameras are essential and they must be capable of producing acceptable quality pictures with the minimum of warm-up and adjustment. As in the case of the Drama unit a built-in silenced power generator would be a value feature, and even more than in the case of Drama, the vehicle must be compact and maneuverable.

Inevitably a vehicle reserved solely for News must have a relatively low level of utilization, for by definition it has to be readily available at very short notice to cover the unexpected. However the facilities are such that it is ideally suited to cover routine sporting events, the Saturday afternoon football match, for example, for which an edited "highlights program" is required for evening transmission.

The BBC has constructed such a vehicle (see Fig. 2) and it is proving invaluable in both the roles described. It is equipped with two color cameras, a monochrome caption scanner, 5-channel vision mixer, 12-channel sound desk, microwave link, but no built-in generator (a trailer generator has been provided). It is 19 ft (5.79 m) long by 7 ft 4 in (2.24 m) wide by 10 ft 2 in (3.10 m) high, weighs 5.5 tons (5 metric tons), and costs about $300,000.

Technical Features

So far this article has considered only the facilities to be provided; but there are new technical developments either on the drawing board or currently available which will have an important impact on the design of mobile units.

Camera Cable

Many of the second generation of color cameras can operate with much lighter and thinner camera cable than the earlier versions. In the ultimate it is now possible to operate cameras either in a cableless radio mode or with a simple triaxial cable weighing less than one-tenth of that in common use today. The importance of this development should not be underestimated when one considers that an average four-camera mobile unit carries with it some 8000 ft (2,440 m) of camera cable weighing approximately 4 tons (3,600 kg).

Remote Vision Synchronizing

Innumerable different systems of locking two vision signals in frequency and phase over a distance are in use with names such as Genlock, Slavelock, Natlock, etc. Each of them has its advantages and disadvantages but may well be superseded by a digital or other type of timing corrector. In the case of the live telecast this development would simplify the life of both engineering and operational staff.

Cameras

The weight and size of cameras have been reduced dramatically over the past ten years and this tendency must be encouraged for there is nothing that will contribute so much to the flexibility of electronic production as the availability of a color camera no bigger than a 16mm film camera with a 10:1 zoom lens. In order to keep the weight and size of the lens down an improvement of at least 2:1 in sensitivity is required as compared with current electronic cameras.

Monitors

The size of the mobile TV unit is to a significant extent governed by the size and weight of picture monitors and the problems of removing them for maintenance are formidable. It is over 20 years now since General Sarnoff called for the production of a TV receiver which would hang on the wall like a picture. Well, it is not only the general public but the broadcasting organizations which are watching with some impatience the rather tentative steps being taken in this direction.

Conclusion

The BBC has a large fleet of vehicles which will come up for renewal within the next few years. The considerations here discussed will form part of the argument which will determine what is specified for their replacement. It will be necessary to analyze very thoroughly the make-up of the O.B. program format, how it may change with time, the problems which a varied fleet will present to our facilities allocation people, and a maze of other factors which could affect the economics of our operation. It will be an interesting and important debate.

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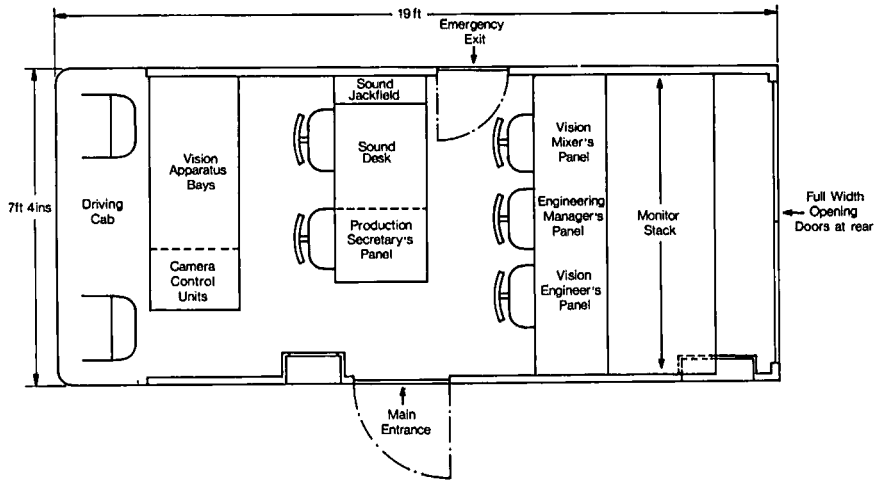

Fig. 2. Two-camera color news vehicle.