O.B. Systems

Introduction

Outside broadcast trucks provide portable production units for television programmes on location and to provide facilities for studios that do not have a gallery of their own or one with sufficient equipment.

Layout

The layout of a typical truck is split into 3 sections. The first is the engineering and VT area. This is where most of the equipment is housed and where the vision engineers and VT/EVS operators work. The next area is production for the vision mixer, director, producer and PA. Finally is the audio area for sound and comms.

O.B. Truck Equipment

Matrix/Router

At the heart of any OB truck is the matrix. A matrix is used for routing multiple sources to multiple destinations. This could be 32 sources and 32 destinations (32x32) in a small unit or 333x666 or more in arctic truck.

A video matrix may be used to switch HD and SD SDI video as well as analogue composite signals. Combined with this is an audio matrix for analogue sources and possibly digital AES/EBU. Finally there may be a control matrix for switching of RS422 signals. Although there could be 3 or more separate units they are usually controlled by a single system with multiple control panels and possibly a computer interface.

There will usually be a range of different type of control panel all over the truck. In the engineering seat there will be an X-Y Panel. Although the layout and operation of the panel will vary it basically allows the routing of any source to any destination with the ability to switch video, audio and control levels independently or together. Sound may also have an X-Y panel or a panel with an extensive number of sources. Operator positions will have panels that are programmed for there roles. Most will be just to switch the monitor in front of them to sources that are required, while VT/EVS positions will switch the recording inputs. The vision mixer will often have a panel with the main sources (Cameras, VT/EVS, GFX etc) that can override the vision mixer to the TX output should the mixer fail. This is known as the Emergency Cut Bus.

Glue

The term glue refers to equipment such as distribution amplifiers, convertors, transcoders and synchronisers.

There are many types distribution amplifier: Digital Distribution Amplifiers (DDAs) for SDI signals; Monitoring Distribution Amplifiers (MDAs) for multiple SDI outputs and monitoring quality composite outputs; Video Distribution Amplifiers (VDAs) for composite analogue video; Audio Distribution Amplifiers (ADAs) for analogue audio signals are the main types. They do not alter the signal, just provide multiple versions of it. VDAs and ADAs often have some tweaks for signal level, while DDAs will re-clock the digital signals.

Converters are very common now that a truck will handle composite, SD-SDI and HD-SDI signals and will often need to up-convert or down-convert sources in and out of the matrix. Other convertors will convert analogue audio to AES/EBU digital audio and embed the digital audio onto the digital video signal.

Any outside sources that cannot be fed with a reference signal will need to be synchronised with the truck using a synchroniser or frame store before it can be presented to the vision mixer. Most internal equipment will have a reference input and so will be correctly timed, but some semi-domestic or graphics equipment may need to go through a synchroniser also.

Cameras

The camera requirements vary from job to job, and so the camera channels are often moved around and sometimes hired in. The average sport job will have slo-mo and radio cameras in addition to the standard ones. In a HD truck they will generally use fibre, but as many stadiums will be wired only with Triax converter boxes will be used at the CCU and camera. The slo-mo cameras can run from 150fps (compared to 50fps on a conventional camera) up to 2000fps, typically they run at around 400-500fps. The output of the camera goes into an EVS for replaying the slo-motion replays. One limiting factor is the fact that slomo cameras can be anything up to 6 stops less sensitive and so the frame rate may have to be reduced if light levels fall.

VT/EVS

This is another area where requirements will vary with the event. For sport EVS is fairly standard as it is a hard disc recording system with multiple recording inputs and playback outputs with the ability to timeslip and to turn around live recordings quickly, often at variable speed (slo-mo). Tape based VTRs are used for recording the programme and ISOs for later use.

Reference

As with any broadcast installation video reference is vital. Most of the equipment will have reference inputs to be timed together and any outside equipment or trucks should be fed with a common reference if possible. For many big events there may be a number of trucks from more than one OB company or broadcaster. Often, the main host of the event will provide reference to the others so everyone is timed together. The matrix will also be fed with reference so that switching sources is done cleaning, and so that the matrix could act as a backup to the vision mixer should there be a fault (Emergency Cut Bus).

Timecode

The timecode generator will provide signals to the clocks and recording devices. It can either be set manually by the engineer with a good source (like a RC watch a mobile app or the speaking clock) or by the use of a GPS unit.

Tally

The tally system will vary in its complexity but on a basic system it will provide a red tally indication to cameras when they are on air. This maybe a simple tally unit fed with information by the vision mixer and feeding this on to the appropriate camera when it is cut up by the mixer. In a more complex system the tally will also send indications to VTRs, EVS and GFX and may be fed via the matrix. Some events may require two tally indications (one red and one green). This could be when a camera is on the clean feed for example. Systems such as the “Tallyman” incorporate tallys, UMD and matrix control for monitor inputs.

Comms

Like the main matrix this is a vital part of any television system, in fact this is also a matrix system. In an OB truck it will incorporate five types of communication. Firstly there is the comms between the panels around the truck so that people can talk to each other. Next there is “4 Wire” comms. This is for communicating externally of the Comms matrix. The cameras usually have 4 wire connections for instance. Comms with commentators will be via a 4 wire box where they are located, and any other wired communication with other trucks or uplinks will be via 4 wire. Some equipment may be 2 wire, in this care a 4 wire to 2 wire converter will be used. Any OB truck will also require a wireless RF system that will integrate with the comms matrix. On a big job there may be separate channels used for sound, engineering and production, each will require a licence for the event location. There will be an IFB system for interfacing comms with fixed or mobile phones for comms or for phonos. This may be in a separate unit or integrated with the comms matrix. Finally there is ISDN for higher quality comms or phonos where a ISDN line is available.

Tailboard

There will usually be separate tailboards for video and for sound and control, and for camera triax and/or fibre. The video tailboard will include a number matrix inputs and outputs in SDI and composite as well as TX outputs again in digital and analogue. The sound tailboard will have multicore connections for connecting microphones and other sources, as well as XLR inputs and outputs. There will often also be control connections for external panels.

Sound Area

The sound area will obviously include the sound mixer, like the vision mixer they vary in size and capability and will usually be fed by an extensive jackfield. Mic inputs are not routed via the matrix as they will be low level and will often have phantom power on the line. The other sources will usually be fed by the matrix but usually through the jackfield for increased flexibility. Other equipment here will be the comms matrix of course as well as any associated devices and sources like cart and hard disc based playback devices. The sound mixer will have to provide multiple mixes. This is usually programme, effects and ISO feeds of certain sources like presenter mics that will be routed to the ISO VTRs.

Production

The production area will comprise of an extensive bank of monitors showing every source and the mixer outputs. The monitor sources are usually switchable so that the director and have whatever sources he or she needs and have them wherever they want it. Some trucks now use large plasma screens with multiviewers to display the sources. They offer the advantage of varying the size as well as location of a source but may not offer the same quality and can introduce lipsync issues. The vision mixer could be anything from a 16 input basic unit to a 64 input unit with multiple MEs, DVEs etc. Sporting events will usually require a clean output, free of graphics and possibly with different video at times. Some of its inputs may be fixed but some at least will be routed by the matrix for more flexibility. The monitors will usually have UMDs (under monitor display) to name the source, this can be set by the matrix or manually typed. The UMD will often also incorporate the source tally light to indicate when it is on air.

Engineering/Vision Control

This area will have a number of positions. Firstly the guarantee engineer will have the X-Y panel and most likely various computer systems for control of the equipment on the truck. The RCPs for camera control will be split usually in groups of 4 for vision engineer positions. Each will have a high quality monitor, comms panel, WFM/Vectorscope and a matrix panel. The RCPs will have touchdown override to switch the monitor and WFM to the camera being adjusted. This will usually be the location for the video jackfield, the size of which is dependent on many factors. Firstly of course is the size and complexity of the truck. How

much of the video that goes through the jackfield though depends on how the designer. Some will put almost everything through it, others will leave out some of the matrix and mixer inputs or some of the monitor feeds. In smaller trucks it can simply be about available space. A large matrix can make the jackfield virtually redundant but there is sometimes the need to get a source to a destination that cant be done, or there is always equipment failure where you may need to bypass something. Older trucks can have a maze of patch cords though built up over time to do things noone thought of in design and to get around failed, replaced or removed equipment.