



Figure 2.1 High-end professional cameras at a baseball game. Often the same truck, and its cameras, will spend the majority of a sports season at one stadium or venue, pulling out only occasionally to cover another event, usually when the stadium is dark.



Figure 2.2 Security has become a much larger logistical task. At the 2001 Winter Olympics nothing got into a venue compound without going through a security checkpoint. The production crew at a venue will often queue up well before daybreak to get into their compound to begin work for the day. (Source: Chad Wachs)

Planning

An Idea into Action: Planning and Communications are the Keys to Success

As we have already mentioned, the Europeans call it an “outside broadcast,” which is really what a remote is, a broadcast outside of the safety and confines of the home studio. In this chapter we’ll explore what it takes to plan for venturing out of the studio, from the initial concept to going on the air live. We’ll cover who does what and stress the importance of planning and communications, and more planning and communications, to get all the details worked out in advance.

When you take into account that for a large-scale television remote more than a hundred people from various disciplines come together at the last minute to produce a seamless and unified program, the need for a solid, well-defined plan of attack is paramount. The amount of preplanning required will vary depending on the complexity and sophistication of the broadcast, and the frequency at which similar events are produced. For instance, for the Winter Olympics in Salt Lake City, NBC had nearly 3500 employees on site – there were more NBC staff members than Olympic athletes! Getting that many people to the site, housing and feeding them, and ensuring they all understand their responsibilities and the production’s requirements can easily become a huge nightmare.

For your local cable channel’s 50th broadcast of the home baseball team’s game, preplanning will be more concerned with the actual team matchups, starting pitchers, league standings, etc. Virtually all of the technical and design elements will have been set at the start of the season, with a majority of the crew and production staff having worked together during the previous remotes.



Figure 2.3 Start of two days of rehearsals for the American Latin Music Awards at the Shrine Auditorium in Los Angeles. The auditorium has been the site of the Oscars many times in the past. For a major once-a-year event such as the Academy Awards, preplanning for next year’s show starts almost immediately after this year’s show fades to black. This planning may involve hundreds of meetings between the various disciplines involved in the production. Naturally, coverage of an event where television is an observer, such as our baseball game, is a much simpler task than the Academy Awards, where television is an integral and key element of the entire production, both for the theater audience and the viewer at home. Essentially, the venue becomes one huge television studio!



Figure 2.4 For this 1967 ABC prime-time entertainment show, *Operation Entertainment*, the deck of an aircraft carrier served as an outdoor studio. To eliminate any potential problems with cable slack as the tide rose, the production truck was hoisted onto the deck. Notice the camera stage right. It was a second-generation color camera, a PE-250 from GE. It was equipped with a 10:1 zoom lens, standard at the time. Camera heads used to be much larger than their lenses; now the opposite is true. (Source: Jerry Hughes)

The Producer and Director: Communicating a Vision

In general, fairly early in the preplanning process, a producer and a director are selected for the remote. One of their key responsibilities at this early stage is to define and communicate their vision of how the production will look and sound. This vision and the style of production it requires will set the tone for the deployment of facilities and personnel — ultimately driving the budgeting process and the final look and feel of the program.

For a series of events, such as a network's coverage of the NFL season, the style and format of the production will be set by a team comprised of the executive producer, coordinating producer, coordinating director and generally a member of the organization's graphics and operations departments. In this example the producer and director are responsible for carrying out their vision and ensuring their game maintains the standard established production look and feel.

Steps Required for a Remote Production

Let's take a look at the process for a one-of event, such as a parade. For our example, let us assume the management of our local station, Channel 100, has decided it would be a great idea to telecast the town's Memorial Day parade. Viewed both as a nice community service and an opportunity for the station's sales department to sell some advertising time to local retailers at the start of summer, the parade telecast has gained the unanimous support of the station's staff. Let's look at the process leading up to the actual setup of the remote.

A. Securing Rights

First and foremost, the station's management needs to determine who organizes the parade and to approach the organizers about securing rights to broadcast the parade. The broadcast of the parade may be viewed as a great idea by the organizers, or the organizers might view it as a way to recoup some of the cost of putting on the event and require a payment from the station in the form of a rights fee. The networks spend millions of dollars in rights fees to secure exclusive permission to be the sole broadcaster of major events, in the hope of attracting the large audience so desired by advertisers.

B. Development of the Initial Production Plan and Budget

At this point, our station management in conjunction with the sales department, has done a few quick calculations on the projected revenue to be made by the sale of advertising time and subtracted the rights fee, if



Figure 2.6 As compared to Figure 2.4, today a large production truck would probably stay on the dock, as technology has made many of the cables required smaller and easier to manage. In addition, wireless and fiber technology would allow for far fewer cables between the truck and the ship. A drawback with today's large production trucks is that earlier large trucks weighed about half of what today's units do, since modern trucks carry a much larger complement of equipment. (Source: Doug Barry)



Figure 2.5 Production staff working out the details of an entertainment show during rehearsal. For entertainment shows the producer will often enlist the help of music, art and lighting directors in addition to the main director to help define the look and feel of the show. These directors often hire assistants to help in the effort.



Figure 2.7 Television coverage often provides for vantage points that attendees of the event don't have.



Figure 2.8 The technical director (TD), director and producer (left to right) work out graphics and other details for coverage of a college football game. The producer generally decides how the show will unfold, and what graphical elements and interstitial stories and clips will be used to tell the story. The director will then orchestrate getting the necessary camera shots and playing back the other necessary sources to bring the producer's vision to life. The director and producer work as a team not only to cover a televised event, but also to capture any accompanying story or drama for the viewer. The TD controls the video switcher and other effects devices, in accordance with the director's instructions, to weave the video sources into a composite show. Not shown is the audio A1, the person who mixes the audio sources to complete the audio portion of the program. (Source: Core Digital Technologies/SWTV)



Figure 2.9 Remote production, such as coverage of the local parade, is often a good way to "show the flag" out in the community.



Figure 2.10 For the Indianapolis 500 the local station providing coverage for itself and other stations across the country used a vendor's remote truck for the production, but its own Ku satellite uplink truck to get the signal back to its own and other stations. This link from venue to broadcast facility is known in the industry as the backhaul.

any, to determine roughly the amount of money available for the production. It's important to note, this is not simple x minus y equals the money for production. Ad sales revenue is not the only factor used to determine the value of the broadcast. Good will, community service, cross-promotional opportunity and prestige also factor into the equation.

The major broadcast networks consistently report losses on their coverage of the NFL, but continue to produce the games because the carriage contributes to their status as major networks. FOX became a serious fourth network after securing the NFL rights from CBS years ago. CBS felt the NFL was important to them, and at the next opportunity in the rights cycle, took the NFL games from NBC.

At this point we have a rough idea of the budget for our remote and can begin selecting the key team members for the broadcast.

C. Selecting the Team

The producer and director may already be employed by the television station, in which case they may have been involved in the earlier rights discussions. Or they may be hired from the community of freelance producers and directors based upon their expertise in this type of programming. For remotes with national distribution potential, producers and directors with expertise in that type of event are typically hired. Our rights fee discussion may come into play here — if we paid a lot for the rights, we want to make sure we get the best possible production. That factor alone will drive much of the selection of the other team members.

Usually at this point a technical manager is brought into the team to assist with planning the implementation details and a production manager is brought in to deal with logistics. Our team has probably determined whether the station has the necessary in-house technical facilities to successfully pull off the remote. This might be a combination of the station's news vans and camera crews. The team may also determine that an outside facilities vendor is required to bring in a larger, more sophisticated mobile unit. Again budget constraints and audience potential will be a big factor in this preliminary decision.

Depending on the need for lighting and the elaborateness of the audio requirements, a lighting director and an audio mixer, or A1, may be added to the team at this juncture.

Once this core group is assembled, it's time to go meet with the parade's organizers and survey the parade route. ■



Figure 2.11 Production compartment in large remote truck covering a parade. The TD is the second from the right. The rest of the crew members shown are directors, producers and their assistants. In a live production such as this, one of these people will be in contact with the people assembling and releasing parade participants to synchronize the parade and the televising of it. Another person will be in contact with the television station(s) to synchronize the commercial breaks with the parade.



Figure 2.12 High-end production trucks come with high-end audio mixing consoles that are often married to a computer (the center screen is a GUI for setting up the audio console). These complex mixers allow for detailed processing of each audio source, and the audio processing of each source is often convoluted of paths, taking audio sources through the console multiple times as sources are sub-mixed and then finally mixed into a composite audio signal.



Figure 2.13 Above: Trailer parking can be simple, as is the case here, or there may be lots of obstacles involved. The survey must identify where power for the truck will be obtained, and determine that enough space exists that the truck and its equipment bays will be accessible.

Below: Large television compound at NCAA Final 16 venue. Network production trucks are on the terrace at the right. Ku satellite trucks from local television stations fill the lower compound. Satellite trucks must have a view of the southern sky to "see" the arc of geosynchronous satellites over the equator. Thus a compound north of the venue might not work for satellite trucks. Large events often mean large television compounds with vehicles from numerous television entities. The survey must identify that enough power and space is allocated for their particular production, and the location of that space and power.



The Survey

Gathering Onsite Information

The only way to do a remote survey is to go to the site, walk around and take a look. Usually an initial survey will be attended by at least the producer, director, technical manager (TM) and members of the event's organizing group. The more complex event, like our parade example, will require several surveys, often involving lighting designers, audio, lead camera and other disciplines.

For the first survey, it is best to do a quick walk around the venue's exterior, checking for building access, loading docks, fire zones, etc. before proceeding to the actual event site. Our mobile unit will need to park someplace with lots of cables running to the cameras and announcer locations, so it's a good idea to know our options for parking early on. Often times our technical manager will arrive early and get the preliminary exterior walk around out of the way before the start of the official survey. Often a remote production can involve extended areas — when surveying for a parade remote, checking out a block or two on either side of the route where they are planning to anchor our coverage would be in order. A good TM will take pictures of possible parking sites and other points of interest.

Armed with a production's coverage requirements, the TM will locate a possible place to park the mobile unit. Depending on production requirements, this could turn into a TV compound containing the TV trucks, generators, office trailers, catering tents and a satellite uplink. Ideally, the mobile unit would park as close as possible, eliminating long cable runs. A modern expanding trailer with tractor attached will require a reasonably level area approximately 75 by 25 feet for operation and setup. A simple basketball game might require a single truck, while something a little more complex, like a parade, might have a television production truck, a microwave van and an office trailer. The Super Bowl could require a dozen or so mobile units and an equal number of office trailers, along with Porta-Johns and Dumpsters.

Placing Talent and Equipment

Once the production team arrives for the survey, they will be most interested in identifying where the cameras will be located. In many cases, platforms or scaffolding will need to be erected to support the cameras and their operators. Special



Figure 2.14 Often the truck must be parked inside the venue, in which case the path to where it will park must be navigable. There were a couple of well-known venues where the ramp the trucks had to traverse was too steep, causing some trailers to touch ground, or beach, when the tractor started down them. Often the clearance between trailer and ground is less than a foot. It is also helpful to know what will surround the truck at game time. The two production trailers shown are surrounded by emergency crews and the expensive cars of professional hockey players as the event start time draws near.



Figure 2.15 Sometimes the survey team will have to perform an initial survey before the venue is set up for the event, such as when a football venue is to be converted to a basketball venue. (Source: Core Digital Technologies/SWTv)



Figure 2.16 In cases where a venue is transformed for a different event, platforms for cameras might not exist. Scissor lifts might have to be rented and placed instead.



Figure 2.17 Closer view of cameras on top of a lift behind temporary bleachers



Figure 2.18 Places that don't normally see television cameras, such as a parade, will definitely need temporary camera platforms.

mounts such as jibs and pedestals will be identified. Preliminary lens needs will be noted. The TM should take photos of the camera location, and a shot showing the camera's point of view of the action. Once production has identified all the camera locations, cable routes to the truck will be plotted out.

Production's second priority will be the location of the announcers, and again, any special platforms and tables required. This could of course grow to a large set such as is seen on the pre-game show for the Super Bowl. This first survey will include an initial check of light levels and possible lighting positions. Depending on what is found, additional surveys with a lighting designer's services may be required.

The TM should also determine what cables need to run and the paths that cable must take. Often special equipment such as cherry pickers, or union or other

venue-specified crews must be used to install and remove cables. Many venues today have the necessary cables already run. Some venues have over 100,000 feet of audio and video cable permanently installed. But even in those cases the TM should make sure which cables will be available for their use, as others might be using the installed cable at that time.

Incidentals

Additional items that the survey team must consider during the initial survey is the type of peripheral support equipment that will be needed and where it will be housed. This includes things such as copiers; drinking water, soda, food and other catering needs; ice; furniture; bathrooms; and telephones. If these support items will require office trailers or even tents, it must be determined early on where they will go.

Enough information should be gathered during this initial survey to allow planning to be tentatively completed, and as we will see later, to allow for the compilation of a "production book," which we will look at later in this chapter. Hopefully enough information is gathered during the initial survey that other pieces of the production can be determined, including power requirements, which we will address next. ■



Figure 2.19 In the case of a parade, not only do camera platforms need to be obtained, but probably a perch for the talent also.

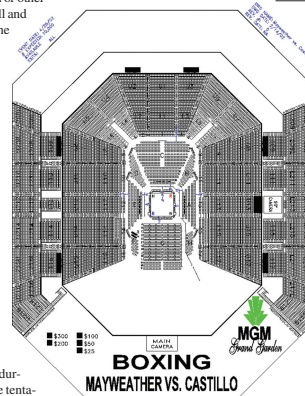


Figure 2.20 Often a map of the venue will be obtained to help prepare for the initial survey. (Source: MGM Grand Garden)

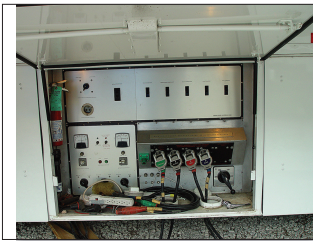


Figure 2.21 Power bay with monitoring input voltage and current draw (amperes meter). This truck runs on three-phase 208V plus a ground.



Figure 2.22 Power bay with three-phase 208V power with no grounding

Power

Planning and Power Philosophies

Mobile units take power, lots of it, typically around 200A, three-phase at 208V. Usually sports venues have power connections for multiple mobile units. Four cables the size of garden hoses are required to connect the unit to power, using a special connector known as a cam-lock. The unit needs to be parked as close to the power connection as possible, as those cables are heavy! Plus, the amount of current drawn means that the longer the power run, the more power is lost through the cable. This loss or drop is known as IR loss. Most trucks carry about 150 feet of power cable.

There has been a fundamental disagreement about whether or not to use grounds on trucks. Over the years one view or the other has gained favor. A ground cable, the green receptacles in these photos, is ostensibly for safety. If a voltage source is shorted to the trailer frame, or anything connected to the trailer's ground, such as anything on coax, triax or audio cables, the shorted voltage source dumps its current back to earth ground through the ground cable. With no ground cable a voltage source shorted to the trailer frame could make the whole trailer rise to the shorted potential.

But some argue that if the truck is grounded it becomes a lightning target in the great outdoors. Once again this affects not only the trailer, but everything connected to it. Also, in theory, an ungrounded truck would have no ground loops. A ground loop is caused when current, or electrons, looking for a way back to earth ground, choose your truck's ground instead of the ground associated with their original source. Enough of this ground current, along with the resistance it encounters along its path, equates to a voltage difference. Thus the truck ends up at a voltage different from other entities in the venue. The common manifestation of this is when that current travels down the shield of coax carrying video and produces 60 cycle "hum." A truck with no ground connected to it, if it was not connected to other trucks or sources not powered by it, would have no ground loops.

But invariably something external will ground the truck — a monitor plugged into a wall outlet in the venue, a camera pedestal leg touching a railing, connection to another truck, etc.

If the power loads on the three phases of the incoming power are not balanced it causes the trailer to rise, or float, in potential above earth ground. This in turn results in a ground loop of current flowing from the truck to the venue's earth ground. EICs on trucks that don't use a ground often check the cable plugged into I/O panels to see if any are elevated in temperature, that is, hot. It is possible for a lone coax to be carrying many



Figure 2.23 Cam-lock connectors. Thick cables (often one or two aught thick) are used to supply the needed power. Often a single truck can draw more than 100kW. These cables can have more than 100A flowing through them. Users twist the cam-lock connector to lock or unlock it, which creates a slight scraping action that cleans the mated surfaces with each use. Very little dirt, read resistance, is required to cause heat buildup and arcing when so much current is flowing. Heat buildup and arcing causes carbon buildup, which creates more resistance and ultimately the cycle leads to failure, or at least unreliability in the connector. One more thing, never pull one of these cables apart while the truck is under load. Besides the fact that the truck's EIC and other people using the truck will not like you, the arc caused by high current as the connector is pulled apart could destroy the connector. You might not like the result of that destruction either.



Figure 2.24 Often backup power generators are rented.



Figure 2.25 Noise-reduced units (Source: Core Digital Technologies/SWTV)

amps of current if it has inadvertently become a ground for an ungrounded truck.

Generators

A power generator such as the ones in Figures 2.24 and 2.25 is three-fourths of a diesel electric locomotive. All they lack are the traction motors to spin the wheels, and many use the same diesel motors that are found in today's locomotive. Generator systems can weigh many tons, reach ear-splitting sound levels of over 70dBA at 50 feet, and have parts of the motor at temperatures approaching 2000° F. Many generators have sound-baffling schemes that can lower the noise level by 30dBA (about 35 times reduction). This is accomplished by channeling the sound coming off the unit through one or more turns through a baffle. The baffles are usually wing-shaped and slightly angled towards each other to cancel, or at least attenuate, sound waves. A unit without sound damping might cost \$150/kw, while sound-damped units can be \$225/kw. When turning air to dampen the sound, things in the unit tend to get bigger and generally require more hardware. Baffles can lower sound levels by 5dBA, while adding absorption material around the unit can lower it another 5dBA. Sealing the unit can reduce sound by another 10dBA. Adding a second enclosure around the first (double-walled enclosure) takes the level down another 10dBA.

Like all engineering feats, generators are a series of trade-offs. They are designed based on the engine that drives them. Diesel engines produce more torque at lower RPMs than do gasoline engines. Thus generators coupled to diesel engines are designed to run at 1800rpm (60Hz AC output), while gas-driven generators run at 3600rpm.

Once we have determined the power requirements for our remote, and how they will be met, we need to determine how we will get our remote production back to the television station or network to be broadcast. In the next section we will look at the options. ■

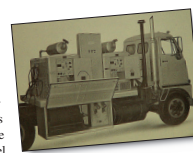


Figure 2.26 Many smaller trucks travel with onboard power generation. This is especially true of ENG and SNG vehicles. Not many large trucks carry their own power. This 1950s vintage tractor carried two generators to power the trailer it pulled.

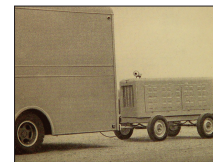


Figure 2.27 This production step van of the same vintage as the tractor above has its generator in tow.

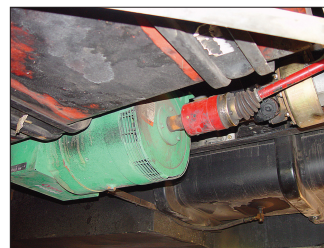


Figure 2.28 This modern midsize production truck has a generator that is powered by the truck's engine (via the red drive shaft) when needed.