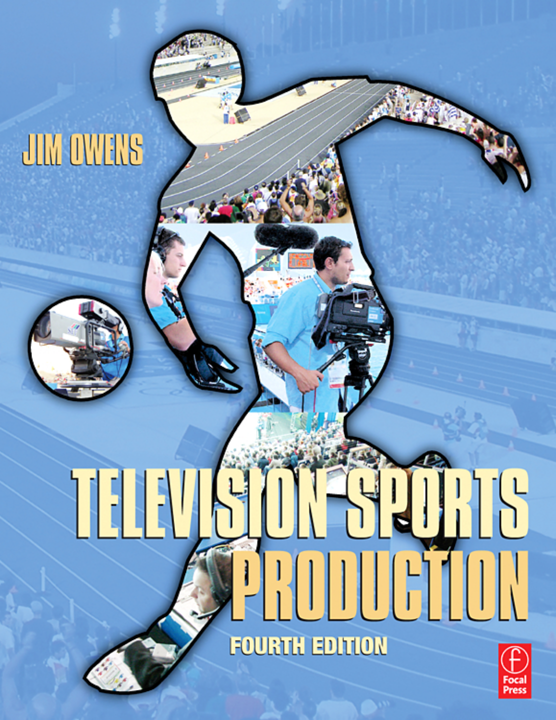

JIM OWENS

TELEVISION SPORTS PRODUCTION

FOURTH EDITION

Focal Press

Television Sports Production

TELEVISION SPORTS PRODUCTION

Fourth Edition

by Jim Owens
Asbury College

ELSEVIER

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FOREWORD

With a presence in nearly every nation, television broadcasting has become one of the most influential means of communicating to the world at large. Through advancements in remote television production, it has become possible for billions of people around the world to get the "best seat in the house" at the greatest events in the history of sport without leaving the comfort of their own homes. From the kick-off of the World Cup, to the final pitch of the World Series, to the triumphs of Olympic competition, live sport broadcasting captivates viewers and makes them a part of the action.

Many factors can affect the coverage of a remote sport event, including weather, lighting, and natural sound. A successful production relies on extensive planning, taking into account location, budget, technology, and the intricacies of the sport itself. More importantly, the people selected for the production crew have the greatest impact on the overall success of the production.

This publication provides a broad overview of how to successfully plan and implement a remote television production. You will find detailed descriptions of the types of mobile units/OB vans, cameras, audio equipment, and lighting requirements used to produce live or taped coverage of sport events. You will learn about different types of sport action and different techniques used by producers and directors to capture the essence of each sport.

I would like to thank the many contributors to this publication and, as you explore the contents, I hope you will find Television Sports Production to be a useful resource.

Manolo Romero, President
International Sports Broadcasting

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PREFACE

The first live television coverage of a sports event, utilizing electronic cameras, is thought to be the 1936 Berlin Olympics. The monstrous camera, almost 7$^1/_2$ feet (2.3 m) long, was dubbed the "television canon." The camera could be used only when the sun was shining. Since home televisions were not yet popular, eight specially installed television viewing rooms, known as Fernsehstuben, were built around the venue so that people could see the television coverage. The telecast covered four venues, utilized a total of three television cameras, and shot a total of 72 hours of live transmission during the Berlin Games. In addition to the electronic cameras, a special film camera mounted on the top of a van equipped with film developing facilities was used to produce delayed television signals. In this process, known as the "intermediate film" system, scenes were shot on film, and this was immediately developed and scanned. In Berlin, news films of the Games were rushed to the United States by Zeppelin airships.

A History of Television, Broadcasting the Olympics *and*
Television in the Olympic Games: The New Era

Television Quality—1936 Olympic Games

The German television picture with 180 lines and 25 frames per second attains a remarkable picture quality.

Television in Germany, the official program
of the 1936 Olympic television coverage

The development of television broadcasting has had a major impact on the way sporting events are viewed around the world. While the stadium can host thousands of spectators in the stands, television broadcasts reach millions more who are unable to attend. Television provides a unique perspective unavailable to most spectators in the stands. Using advanced technology, specialty equipment, and production techniques, the television broadcast has become the best seat in the house. The majority of this coverage occurs through remote television productions.

Remote productions, or multi-camera outside broadcasts, occur on a daily basis around the world, from news events to parades, pageants to award programs, and concerts to sports.

In this handbook we will focus on the sports remote production. Concepts important to a sports remote can be adapted to all other types of remote productions since they all use much the same equipment and personnel. Coverage strategies may differ but the concepts are still the same.

Of all the different types of remotes, why focus on sport? Sporting events are the most popular type of television program. In the United States, historically half of the programs attaining the largest viewing audience are sports programs.

The viewing audience for the 2000 Olympic Games was estimated at nearly 35 billion cumulative people *(Sydney Uplink)*. Dick Pound, International Olympic Committee member, stated that it is calculated that an unprecedented 9 out of 10 individuals on the planet with access to a television watched some part of the [Sydney] Olympics. Viewing of the 2000 Olympic broadcast ranged from an average four hours per viewer in some markets, to more than 37 hours per viewer in Japan and 49 hours per viewer in Australia. David Hill, CEO of Fox Sports, says that “Sport is part of the fabric of society, its the ultimate reality show, and it’s the only form of programming guaranteed to attract huge audiences.”

Television sports are often broadcast live. If the director misses a lay-up during a basketball game, they can’t redo it. Some things, such as commentary, can be reworked in post-production, but the action is live. That means the television broadcast has to be done right the first time, with no retakes, and it has to be done with quality. This live event pressure makes television sport one of the most difficult, if not the most difficult, type of television production.

Sport productions can exist on a very small scale, such as two cameras at a local basketball game shown on cable, as compared to 41 cameras at the Super Bowl or 400 cameras at a multievent Olympic Games.

Throughout this book you will find real-life examples from a variety of events, such as the Olympic Games, World Cup Football, the Super Bowl, the Goodwill Games, the Indianapolis 500, and others, with an emphasis primarily on the larger events. Our hope is that these examples will allow you to adapt the plans outlined to the football game that you are covering with

The Beginning of Commercial Olympic Television

Experimentation with television at the 1936 Berlin Games and the release of Leni Riefenstahl’s two-part Olympia documentary marked the first intrusion of the moving image into the Olympics. For the next Games in 1948, the London Olympic organizing committee charged the BBC 1500 pounds to telecast the event. But when the 1956 Melbourne organizing committee attempted to sell television rights to the Games, broadcast networks in the United States and Europe boycotted the Games, demanding the same access without charge that radio and newsreels had always enjoyed in covering the Olympics as news not entertainment.

The result was that only six pre-recorded, half-hour programs of features and highlights were presented on a scattering of independent stations in the United States. Following that controversy, the International Olympic Committee (IOC) in 1958 passed a new regulation establishing that the local organizing committee shall sell rights with the approval of the IOC. With that policy, the principle of commercial Olympic television was established, and the Olympics would never again be the same.

Michael Real, Television Quarterly

Olympic Syndrome

Data proves the massive interest of Japanese for the Olympic Games. Even though a lot of competitions were broadcast late at night, all white-collar workers waited in front of their screens to watch them, and were literally sleeping in their offices the day after. This phenomenon was even called the “Olympic Syndrome”, with the national productivity going down during the Games.”

Hisashi Hieda, CEO, Fuji TV, Japan

Television Sports Failures

If sport is not working on TV, is not attracting an audience, is languishing, the problem lies with the people controlling that sport. They have either failed to keep that sport vital and alive, through laziness or mismanagement, or they have allowed people presenting their sport to the public through television to get away with sloppy, lazy or inattentive production.

David Hill, *Chairman & CEO*
Fox Sports Television

four cameras or any other sporting event.

This is not a stand-alone guide to television production. Our goal was to create a book or text that supplements other existing television production handbooks (see recommended readings). We wanted to provide an overview of the various aspects of the television remote production industry. However, some basic production material has also been covered in an attempt to get everyone to the same level.

A multi-camera remote production is like a symphony. It is not a solo effort. The director is the conductor, juggling the various components, relying on an incredibly talented crew, to create a production that allows the audience to feel as though they are at the event and as though they have participated.

This is a process style manual. It covers the planning, pre-production and set-up, the production and, finally, post-production, and everything that goes with each of those phases. The emphasis has been placed on how the production goes together, not on specific skills or equipment. That means that some information (such as cameras) will be included multiple times throughout the text.

Beyond familiar production terminology, remote productions sometimes have their own language, definitions, and unique equipment. Our goal is to give you an inside view of how a remote production goes together and the role of each participant.

The Host Broadcast of the Olympics

Every Olympic Games has a Host Broadcaster who is responsible for the unbiased radio and television coverage of every sport event, press conference, and other official Olympic event. The Host Broadcaster's coverage is called the international signal or world feed. Rights Holding Broadcasters take the feed and determine if, or how, they will use it. If they believe the event is of national interest, they will fit it into their broadcast schedule. Broadcasters have the right to alter it, add commentary, insert pre-produced interviews or other stories and add graphics. The goal is for the Broadcaster to make it more interesting specifically for the viewers in their countries. Just as taste and styles are different from country to country, so is the interest in sport.

> *. . . to say that the televised Olympics—along with the Super Bowl, the Oscars, the World Cup, and other super-events—play a leading role in celebrating and shaping our global culture is to begin to approach a realistic sense of television's complex place in the world of today.*
>
> **Michael Real,** Television Quarterly

PART 1:

Introduction to Remote Production

CHAPTER 1: What Is Remote Production?

CHAPTER 2: Personnel

CHAPTER 3: The Television Media

CHAPTER 4: Mobile Unit/OB Van

CHAPTER 1
What Is Remote Production?

Why live? Live events are the core of TV. They are the one thing TV can do that no other medium can match. There are things movies can do better. There are things radio can do better. But no other medium can bring you a visual report of an event as it's happening. TV makes everyone part of history.

Tony Verna, *Director,* 5 Super Bowls and 12 Kentucky Derbys *and*
Live TV: An Inside Look at Directing and Producing

Remote or outside broadcast (OB) production can be defined as a multi-camera production occurring outside of a studio context. Remotes come in all sizes. A small remote may consist of a two-camera production operating out of a small production mini-van. A big remote may include 20 or more cameras including a blimp shot and point-of-view (POV) specialty cameras.

The key to a quality production is to assemble a team that can predict what is going to happen and where it is going to happen. It is important to build a crew that will work well together. The crew must understand how the event will unfold and how best to apply their television-related skills. Key to those predictive skills is the ability to plan for contingencies in case something goes wrong.

The more familiar the crew is with the event, the better they can cover it. Understanding the intricacies of the event allows the director and talent to clearly communicate what is happening on the field of play, allows the audio people to know how to set microphones for the event, and gives camera operators the ability to predict how they should be moving their cameras. Some people are specialists who work only at specific types of events. For instance a producer may specialize in figure skating events.

The Remote
The remote broadcast environment challenges you personally and professionally in every which way; mentally, physically, technically, creatively, and in more ways than can be imagined.

Peteris Saltans,
Audio Broadcast Engineer & Mixer

Today, many events are covered by live remotes. Live events grab the viewers' attention and help them feel as though they are witnessing history as it happens. The crew is also impacted by a live event. With no way to edit their work, there is a palpable need to get it right the first time. The result is a heightened sense of teamwork and concern for quality. Without adequate preparation, "live" can also kill the broadcast production.

Live versus Live-to-Tape

Remote productions can take a number of different forms. Most remote productions utilize a mobile production unit outfitted with live switching gear, recorders, graphics, and space for the crew. However, some sport productions can be covered with multiple electronic news gathering (ENG) cameras. In this case the entire production must be edited in post-production. While live switching is faster, it requires an expensive remote unit, more equipment, longer set-up time, and more crew members. Multiple ENG cameras require an expensive post-production facility and take more time in the post-production process, but in the end are generally less expensive.

Remote versus Studio Production

While the studio can provide the director with the most control over the situation, the advantage to a remote production is the ability to capture the event as it is happening. Producers involved in the event from the beginning may be able to help select the event location so that the best visual background for the event is obtained. At times it is less expensive to shoot in the field than in a studio setting; sometimes it is easier than scheduling studio time.

Weather can be one of the biggest disadvantages to an outside remote because bad weather will often mean cancelling the event.

In the studio you have ultimate control over sound and light, but in the field they can become the biggest problems. On a remote, the production is dependent on people who don't necessarily understand the production process, such as police and venue management/technical personnel.

The mobile unit's size may cause traffic problems, or parking spaces may not be available for the crew who are close to the mobile unit. A portable generator may be required to provide power or even backup power. If the production is occurring far from the home base, management has to be concerned with food, lodging, and transportation for the crew, which can add considerable expense to the production costs.

Often location permits are required for a crew to shoot in remote situations. Obtaining those permits can be a time-consuming process.

When the advantages of a remote production outweigh the disadvantages then you hit the road, with crew and equipment in tow.

CHAPTER 2
Personnel

The producer has the final word on all matters—but don't tell that to the director or talent; most think they do.

Joseph Maar & Rom Rosenblum

Understanding how the remote production goes together requires the understanding of the role of each of the participants, their responsibilities and how they interact. Responsibilities vary with the production company, station, network, and event. People are often required to wear multiple hats in a production.

Additionally, the name of production functions may vary from company to company. While it is difficult to give a definitive description of each position, the following is a brief description of the most common roles within a remote sports crew.

Figure 2.1: The director and producer giving an overview of the production to their crew.

The Producer

Producers give the sportscast its viewpoint, its flavor. The best producers are master painters, Picassos or Rembrandts. The mechanics of their profession – the hows and whens to use different brush strokes – are second nature to them so they are able to rise to another level, combining the individual strokes to create a masterpiece that interprets the world in a unique way. The best producers have the mechanics down cold so they are free to develop a storyline, using the talents of the broadcast crew as their brushes. Good producers have three common characteristics:

(1) they are organized;
(2) they are cool under pressure; and
(3) they respect and support the broadcast team working with them.

Call of the Game

Personnel Descriptions

I've always maintained that with the right crew (producer, director, play-by-play commentator, and analyst) you can make a toenail clipping competition riveting television. With the wrong crew you can make an FA Cup boring.

—David Hill, CEO of Fox Sports Television, Australia

Executive Producer: Responsible for the planning and logistics of one production or a series of productions. Gives overall vision for a production or a series of productions. The Executive Producer's responsibilities generally include finance, scheduling, and sometimes major creative decisions. Negotiating with sport organizations on rights, camera placement, and coverage is often

The Sports Director's Role

Directors must understand the way in which viewers watch television: how they think, feel, and want to be entertained. This means that the director must find ways to capture the viewer's interest. This is best done by doing thorough homework and proper storytelling: the two keys to better coverage.

Homework

By homework we mean not only getting acquainted with the venue, the organizers, and the tools of television production, but also exploring the sport itself. The director's preparation should include in-depth research into the key players: the athletes. Beyond the athlete's names, it is crucial to identify them and their potential. The director must know not only the favorites and the defending champions, but also those athletes with their last shot at a win, recovering from an injury or showing exceptional nerve at a major event.

All of this forms the most important part of production planning, because it hints at, or even reveals, how the event will unfold during the competition. Only then do the start lists begin to make sense. Only then there is solid ground to draft the potential story and decide how to tell it with cameras and microphones.

Storytelling

The viewer expects and demands to be entertained. To do this, we must touch his or her feelings. We must realize that only when a viewer chooses an athlete as a favorite, and identifies with him or her, do the athlete's rivals become a threat.

In his book Poetics, *Aristotle (384–322 B.C.) explained the fundamentals of storytelling. In order to capture the viewer's emotions, he said, a story should contain three parts: the beginning, the middle, and the end. This formula perfectly suits athletics. In athletics the beginning includes the heats of the track events and the qualifications for field event. Here the favorites must be highlighted so that the viewer can recognize them. This is achieved at the cost of other athletes, who appear less in the pictures. This is very important, because, as Aristotle puts it, if we do not know the player, what may happen to him later makes no difference. In the first part of the story, the ingredients are planted in order to evoke expectations. The viewer enjoys the feelings of excitement and suspense that are connected with this anticipation.*

The middle part includes the semifinals and finals of track events and the finals of field events. These are the highlights of the event: the battle for the medals. The competition should be filmed in an intelligible way, without missing any essential incidents. A viewer anywhere in the world must be able to comprehend both the competition itself and the story line. The middle part ends with a climax: as the final of each event concludes, everything becomes clear.

The third section, the end, covers the euphoria of victory and the disappointment of defeat. This part also includes a motivated step back to analyze the race or field event final.

The Viewer's Position

In watching sporting events, particularly athletics, the viewer looks into the depth of the picture. He or she picks out objects of interest from this depth, normally the key athletes of the event. The viewer is reluctant to lose visual contact with his or her favorite. The viewer also participates in the coverage, in effect using the mind as a camera. There is pleasure in mentally zooming, panning, and tilting in the view of a camera shot. The producer and director need to understand this when cutting between cameras. Rapid cutting without any clear motivation irritates the viewer, as visual contact with a favorite competitor may be lost and has to be reestablished. Unnecessary slow-motion replays have the same effect. Furthermore, the filming plan should allocate the viewer the best seats in the stands. These angles should be maintained through the event. The cutting must answer three questions for the viewer. First: where are we or which event? Second: which athlete? Third: how is this athlete doing in relation to his or her rivals?

This approach to directing sports leads to good storytelling, as the reality of the competition becomes entertaining. The target should always be the viewer's mind.

Adapted from
Kalevi Uusivuori & Tapani Parm,
Producer/Directors, YLE television network, Finland

the responsibility of the executive producer. The executive producer may oversee a number of producers or coordinating producers.

Coordinating Producer: Keeps track of budgets, quality control, and logistics for multiple producers. The coordinating producer may also be responsible for the overall look and elements, such as animation and graphics. Reports to the executive producer or the head of production.

Producer: Responsible for planning and logistics before the event. The producer works with the director to implement the overall production plan. Together they are responsible for overseeing all elements of the production of an event. During the production the producer is responsible for coordinating the commercials, calling the replays, and making sure that the needs of the talent are met, in addition to keeping the production within budget and on schedule. Reports to the executive producer, coordinating producer or head of production.

Associate Producer/Assistant Producer (AP): The AP is given specific producing responsibilities by the producer or executive producer. This person often supervises post-production and/or the production of edited video packages and teases that appear within a production. The associate producer may be assigned some of the same responsibilities as the associate director. This person is sometimes called a features producer. Reports to the producer.

Features Producer: See Associate Producer.

Director: Under the guidance of the producer, responsible for the creative and aesthetic portions of the production. Directors must know what they want and how they are going to accomplish it. To coordinate the various aspects of the broadcast, they have to understand the capabilities of the equipment and the crew they have been assigned. The director sets the tone and pace of the production and serves as crew motivator. The director must be able to visually tell the story, to document the event in a way that allows the viewers to feel as if they are part of the action. Occasionally, they

Preparing for the Game

Ultimately the key to NBC's successful basketball playoff coverage lies not so much with its equipment and technology as it does with the mental preparation of the director and crew. Our coverage really begins by spending time with the players, coaches, and announcers, learning what the stories are and studying the game. I'm watching NBA basketball literally every night of the week during the season, learning about the players, their moves, their team's style of play. People say, "Oh you just work during the broadcast" but I'll prep all week for that broadcast and I'm prepping the whole season for the playoffs.

Andy Rosenberg, Director, NBC

Creating Magic

For all the engineering, operations, and production services planning that [go] into an Olympics, we only provide the tools for production guys to come in and create the magic. It takes the production guys and the people in front of the camera and us behind the camera to pull of a successful telecast.

David Mazza,
NBC Olympic Vice President of Engineering

Hiring Personnel

When we hire, we are looking for more than just the most qualified people we can find. We need people who understand how their role fits into the bigger picture, who respect the fact that they maybe a guest in different culture, and who are adaptable and can work under pressure in a fast-paced, unforgiving and constantly changing environment. People who can meet these qualifications will be successful in television sports production.

Hank Levine, Executive Vice President of
Administration, International Sports Broadcasting

are also responsible for working with and directing the talent, although this is rare during a sport production. Reports to the producer.

Associate Director/Assistant Director (AD): Assists the director during the television production by keeping track of timing and making sure that camera shots, graphics, and videotapes are ready for the director's cue. One of the major responsibilities of the AD is to maintain constant communication with the studio, coordinating commercial breaks by numerically counting back timing cues in order to smoothly segue between two entities. This person may be assigned some of the same responsibilities that an associate producer performs. Generally reports to the director and the producer.

Unit Manager: Handles budgetary operations, including outside vendors and overtime. The unit manager also handles crew scheduling. This position is sometimes merged with the production manager and/or the technical manager. Reports to the producer.

Production Manager/Operations Producer: Oversees the operation of the production team, including budgets, personnel assignments, transportation, accommodation, coordinating transmission information, and acts as liaison with the venue. Sometimes this job is merged with the unit manager and/or the technical manager. Generally reports to the producer.

Production Coordinator: Responsible for general operations, such as catering, petty cash, runners, credentials, and phones. This position is sometimes merged with production manager. The production coordinator reports to the production manager, technical manager, unit manager or producer.

Stage Manager/Floor Manager: Coordinates everything occurring in the studio or broadcast booth. The stage manager communicates with hand signals when the talent is on camera and sometimes communicates via cards when off camera. Generally reports to the producer but may report to the director in a remote production. *(See figure 2.2.)*

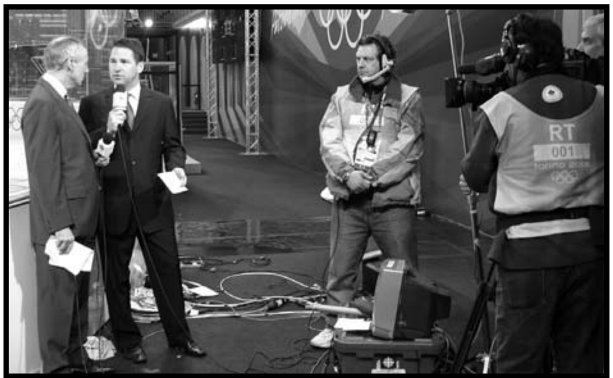


Figure 2.2: The stage manager (middle) coordinates everything with the talent in the field, broadcast booth or studio.

Production Assistant (PA)/Director's Assistant: Handles details for the producer and/or director. These details may include, but are not limited to, overseeing travel arrangements, graphics, show format changes, and distribution of updated information to various staff members. The PA also arranges shipments and pick-up/delivery of food, establishes rights to music, supervises runners, and takes care of anything else the producer and/or director need. Generally reports to the producer and sometimes the director.

Spotter: Advises the production crew regarding important activity or incidents in and around the field of play that may not be immediately evident to the production crew and camera operators. Generally reports to the director.

Statistician: Compiles competition statistics, including past performances and up-to-the-minute competition details. Also gathers general information about current competition conditions, such as weather. Generally reports to the producer and production assistant. *(See figure 2.3.)*

Tape AD: Helps select the appropriate portion of the tape for playback and ensures that VTR operators are cued and ready when the director needs them. Generally reports to the producer.

Technical Director (TD)/Vision Mixer/Vision Switcher: Takes instructions from the director and, using a special effects generator (SEG) or switcher, switches between video images using cuts, dissolves, wipes, special effects, animation, and graphics, sometimes using multiple cameras at the same time. Reports to the director. *(See figure 2.4.)*

Camera Operator: Receives assignments from the director and works to constantly provide the director with the best quality images available for the production. Camera operators are also responsible for transport, set-up, and sometimes general maintenance of their camera. Reports to the director.

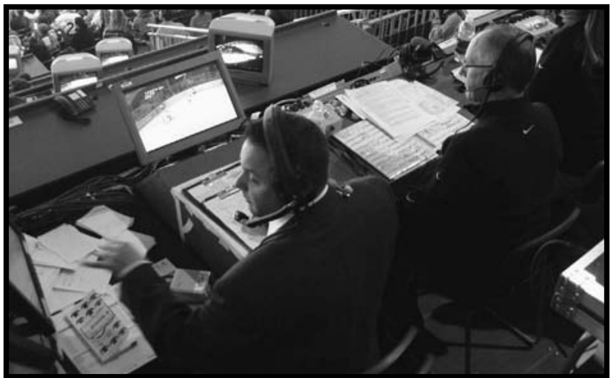


Figure 2.3: Statisticians (left) compile up-to-the-minute statistics that are helpful to the on-air commentators and the production personnel.

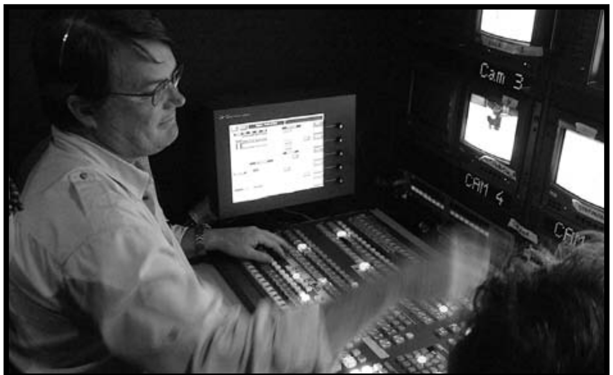


Figure 2.4: The technical director/vision mixer responds to the director.

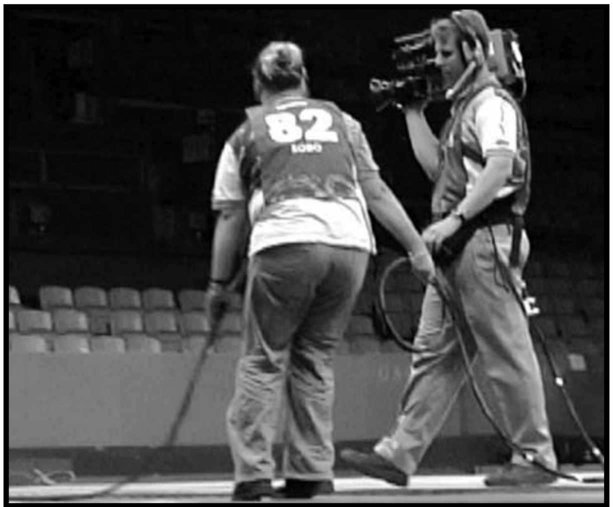


Figure 2.5: The camera assistant reacts to movements by the camera operator by providing more cable and/or neatly coiling unused cable.

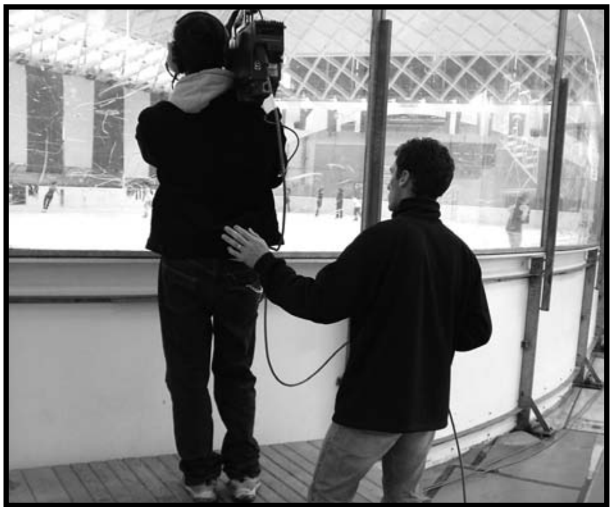


Figure 2.6: Camera assistants must look out for the camera operator by making sure they don't fall.

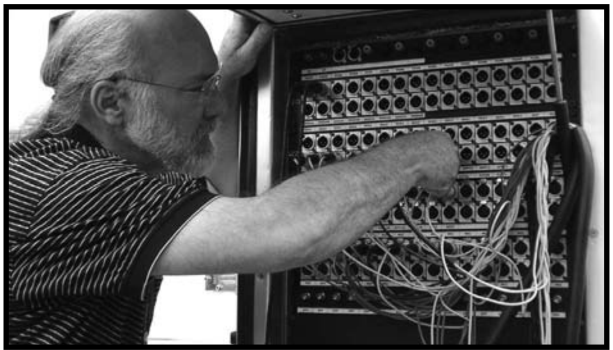


Figure 2.7: The Audio Supervisor (A-1) is responsible for patching audio in the mobile unit.

Electronic Still Store (ESS) Operator: Operates equipment used for the capture, storage, manipulation (if needed), and playback of still images from video. Works under the director during the production. Reports to the producer and director.

Camera Assistant (handheld, Steadicam, crane, etc): Protects and assists the camera operator by keeping people from walking into the camera's field of view, eliminating potential obstacles or obstructions, and keeping camera cables untangled and free from traffic. A handheld camera assistant is mainly responsible for reacting to the camera operator's movement during an event by feeding the operator camera cable during the production. In order to accomplish this feat, the camera assistant has to pay attention and learn the over and under cable coiling method. This method greatly reduces cable tangling and ultimately allows the operator to move freely to react to the task at hand. In addition, the camera assistant may collect food for the camera operator, carry extra batteries, and sometimes work as a spotter, looking for shot possibilities or other happenings that the shooter should know about. The camera assistant may also assist with set-up, reposition, and strike of camera equipment. Reports to the camera operator. *(See figures 2.5 and 2.6.)*

RF Assist: A specific type of camera assistant who is responsible for keeping the RF transmitter (used for wireless cameras) aimed at the RF receiver, as well as preventing the cables between them and the camera operator from becoming tangled or stretched. The RF assist is also responsible for looking out for the camera operator, making sure that no one walks between them or blocks the camera's field of view. Reports to the camera operator.

Rigger: Sets up structures to support lighting or camera equipment before the event and then strikes the equipment after the event is completed. Reports to the technical manager.

Audio (A-1)/Mixer/Audio Supervisor: Determines where microphones are to be placed in the field of play, generally patches the various microphones in the inputs/outputs (I/O) patch panel located on the outside of the mobile unit, gives instructions to the A-2, and sets up and/or patches the PL system in the mobile unit. The A-1 also mixes the audio signal from the various microphones, tape decks, digicarts, house feed, public address system, and CD player during the actual production. Reports to the producer and the director. *(See figure 2.7.)*

Audio Assistant (A-2): Receives instruction from the A-1 as to where microphones should be placed on the field of play and sets out the microphones. Other responsibilities may include patching the I/O, assisting the talent with their microphones, and operating microphones on the field of play, such as a parabolic dish. The A-2 also troubleshoots audio problems during the production. Reports to the A-1.*(See figure 2.8.)*

Utility/Grip/Rigger: Before the actual production, utilities assist the engineering crew by carrying equipment, placing cabling during set-up, and assisting during the tear-down (strike). During the production, utilities may be reassigned to work as camera assistants or be placed in other support positions. Reports to the technical manager and to whomever else they are assigned during the actual production time. *(See figure 2.9.)*

Video Operator (VO)/Video Engineer/Vision Control/Vision Operator/CCU Operator/Shader: Responsible for adjusting video levels as well as establishing the color intensity of cameras on the camera control unit (CCU) to obtain the highest quality image. The video operator also works with the engineer-in-charge (EIC) to patch all video sources and phasing/white balance of cameras. Reports to the director and producer. *(See figure 2.10.)*

Videotape Librarian/Archivist: Collates and maintains the videotapes and record of events ready for retrieval on request. This is accomplished by keeping track of the numeric time code clock displaying the exact time and location on the tape where the particular action can be found. They may also be responsible for dubbing. Reports to the producer.

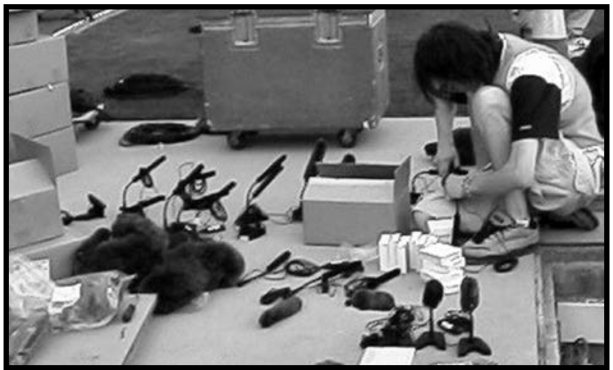


Figure 2.8: An A-2 lays out the audio equipment that will be used during an event.

Figure 2.9: The utility assists the engineering staff is setting-up and tearing-down equipment and cables.

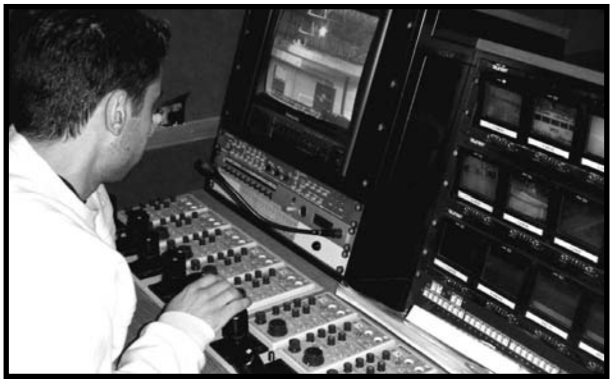


Figure 2.10: Video operators are responsible for adjusting the camera and VTR images to obtain the highest quality possible.

Figure 2.11: Graphics operator and a font coordinator.

VTR Operator: Runs tape machines, monitors audio and video levels, and often operates an auxiliary bus switcher in order to isolate specific cameras on a video recorder. This person may also serve as a slow motion (slo-mo) operator. Reports to the producer and director.

Slo-mo Operator/Super Slo-mo Operator: Operates and maintains slow motion videotape and/or digital disc recorder/players. Provides the slo-mo/super slo-mo replays as required by the director. Reports to the producer and director.

Editor: Selects, compiles, and cuts video and audio to produce highlights, summaries and feature packages. Reports to the producer.

Graphics Operator/Font Operator/Character Generator Operator: Operates the character generator to put text and graphics on the television screen. Reports primarily to the producer and director. *(See figure 2.11.)*

Font Coordinator: Assists the graphics/font operator, keeping them up-to-date during a production. Responsibilities may include spell checking, updating scores, identifying on-screen personnel, etc. The font coordinator is often one of the production assistants. Reports primarily to the producer. *(See figure 2.11.)*

Technical Manager: Responsible for all broadcast-related technical operations at the venue. Reports primarily to the director.

Engineer-in-Charge (EIC)/Chief Vision Engineer/Senior Vision Operator: Works for the mobile unit provider and is responsible for keeping everything working in the truck. Also responsible for making sure that all equipment, cables, and supplies that came with the truck are returned to the unit at the end of the shoot. Primarily reports to the technical manager.

Maintenance Engineer: Maintains production equipment in the truck and on the field of play. Reports to the EIC.

Transmission (TX) Manager/Transmission Operator: Ensures the quality and continuity of the television signal transmission. Reports to the technical manager.

Telecom Manager/Telco Manager: Sets up and troubleshoots communication lines (PLs) between the field crew, talent, and the crew in the trucks. Provides and installs telephone lines for outside calls. Reports to the technical manager.

Runner: Responsible for running errands and completing a variety of tasks assigned by the production assistant, producer, production manager, and almost anyone else on the production. This may include being a driver for personnel, getting food or supplies to the crew in the middle of a shoot, making travel arrangements, and undertaking research. Reports to the production assistant.

Talent: Refers to anyone who appears in front of the camera or is heard on air. Reports to the producer. As mentioned earlier, it is very difficult to give an exact definition for each position since responsibilities can vary greatly from event to event and company to company. It is also impossible to create an organizational chart that will fit every situation. The chart in figure 2.13 shows a common television network structure in a remote sports production.

Field Logger: Field loggers are responsible for providing detailed written descriptions and time codes for all footage shot by an ENG camera person. Logs generally identify all athletes, scores, and results shot. These logs are used by the production personnel to identify time codes and to quickly retrieve footage that can be edited and used in packages. Reports to the Producer. *(See figure 2.12.)*

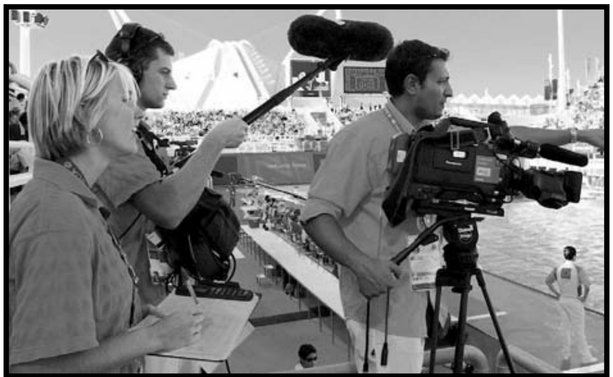


Figure 2.12: Field loggers must list each shot made by an ENG camera operator.

Freelance Personnel

Today it is rare to find a remote production crew that does not have at least a few freelance personnel. Some crews are made up almost entirely of freelance personnel. Freelancers are independent contractors who work for multiple organizations, hiring out their production skills on an as-needed basis.

Many of the positions defined here can be filled by qualified freelancers as opposed to full-time employees.

Freelancers are hired because companies rarely have enough full-time staff to totally crew a remote production. Also, many of the companies that shoot remote productions travel around the region or nation and the least expensive way to staff the crew is to use local personnel. This way the company does not need to pay lodging, travel, and a per diem.

It takes time for freelancers to make the right connections and obtain continual work. However, work is available for skilled freelancers and they can make a good living.

The television industry often relies on verbal commitments when it comes to securing personnel. If the event has fewer than 150 people, contracts are generally not issued. Employment details are often discussed and finalized over the telephone. For larger events, such as a World Cup or the Olympic Games, written contracts are issued. Freelance contracts generally include description of service the freelancer will provide, period of engagement, compensation, travel, and accommodation (if needed). Contracts may also include insurance information, a confidentiality statement, an intellectual property statement and termination information.

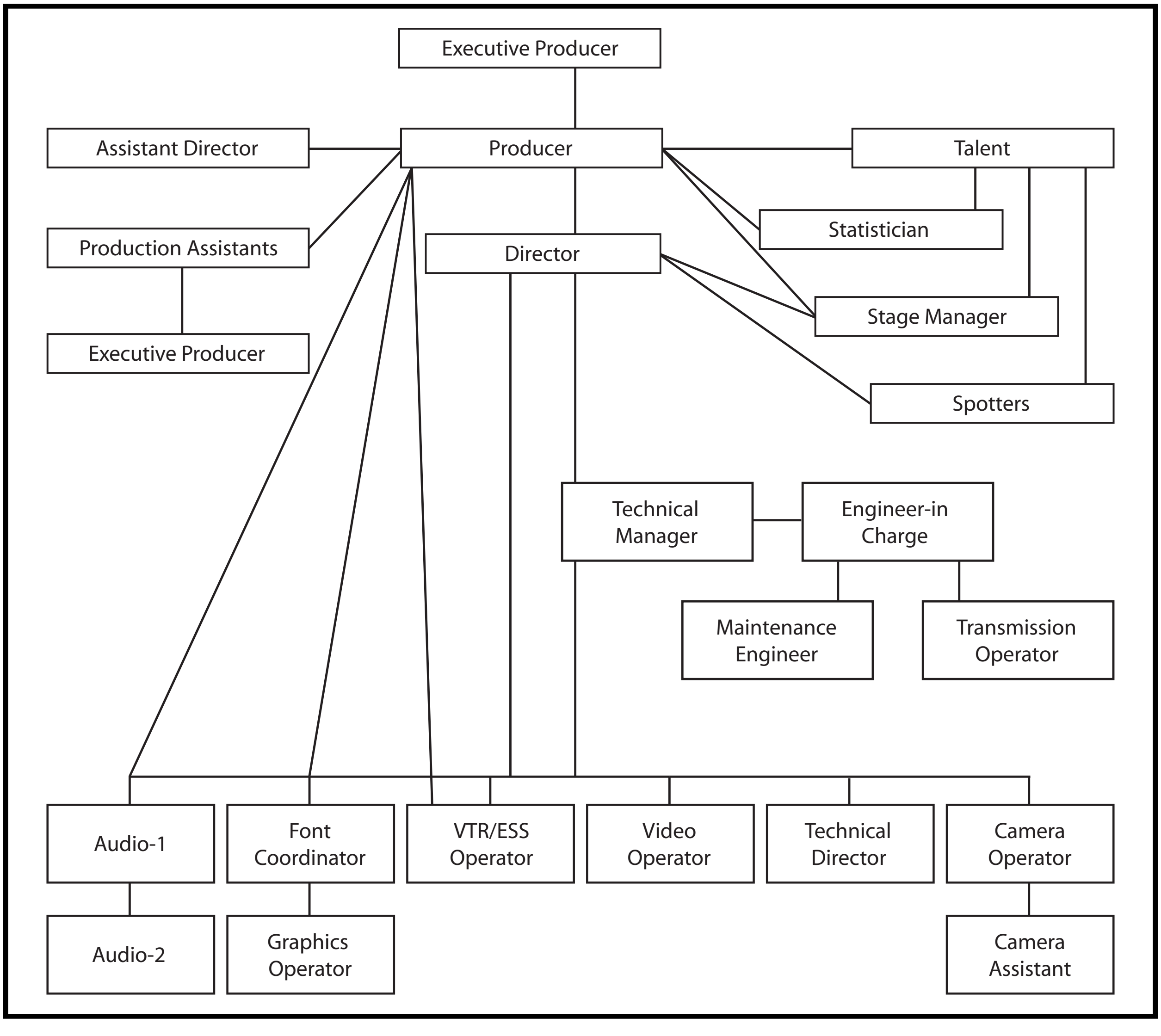
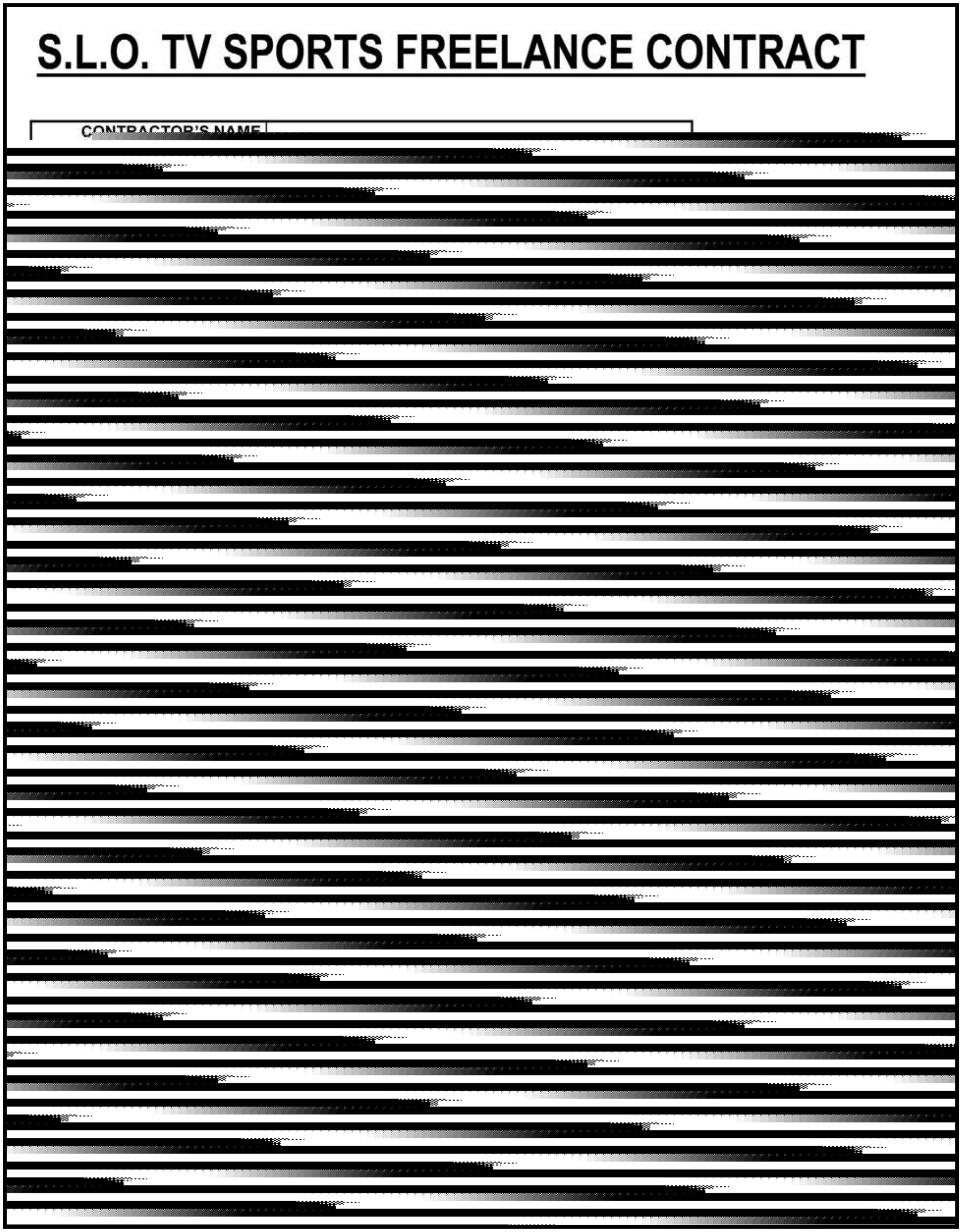


Figure 2.13: Common organizational chart for a network remote sports production crew.



S.L.O. TV SPORTS FREELANCE CONTRACT

CONTRACTOR'S NAME

Figure 2.14: Freelance personnel often sign some type of contract when working for a production company.

on the connector. Do not allow the ends of cables to lie where water may puddle in the event of rain or melting snow.

4. Label all cables, for example, "Cam 1."
5. Report damaged cable to the supervisor. It is far easier to solve problems in the cabling phase than try to troubleshoot the problem during a competition.
6. Excess cable should be placed on the ground in a figure eight pattern or the over-and-under method so that the cable will not kink or tangle. A knotted cable can cause significant stress and subsequently irreparable damage to the cable.
7. Do not run a cable around any object that requires a tight bending radius. An extremely tight bend could damage the cable.
8. Avoid running video and audio cables close, and parallel, to power cables since these cables may be subject to a buzz. Video and audio cables that must cross over power cables should do so at a 90-degree angle to minimize the impact of the power on the video and audio signals.
9. Do not suspend tightly stretched cables between two points for much of a distance. Cables must be supported to ensure the cable is not damaged due to tension. Cables should be pulled and supported by the cable, not the connectors.

Camera Meetings

The camera meeting gives the director a chance to convey the nuances of his or her show.

—Brian Douglas, Head, Host TV Productions, 2002 and 2006 Olympics

Camera meetings are run by the director and are attended primarily by the camera operators. Other attendees include the camera assistants and maybe the associate director. These meetings, which last from 10 minutes to an hour, serve a variety of purposes. Primarily, the meeting allows the director to communicate his or her vision and also discuss with the camera operators how their shots fit into the overall production. The director describes the types of shots expected from each camera including framing details, cutting patterns, and specifically what the camera operators are to

The Basic Tech Kit:

What every technician should carry on a shoot

1. *Leatherman-type tool, a combination tool that generally includes a knife, pliers/wire cutter, various screwdrivers and a file*
2. *Gloves*
3. *BNC barrels*
4. *Roll of electrical tape*
5. *Roll of white tape and permanent pen used for marking cables*

Pre-game Meetings

It's important at pre-game meetings to give a thought process as to what is important, what are our goals. It's always been important for me to allow the technicians – camera operators especially – to have as much freedom as possible and let them express what it is that's coming from within them. From my perspective, we try to take a level of emotion and dedication to what our common goal is and bring it out every single week.

Craig Janoff

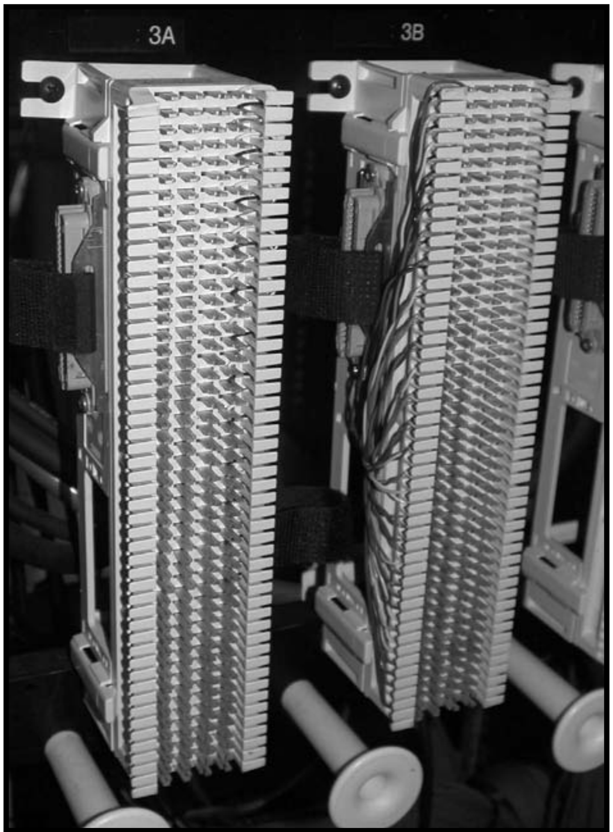


Figure 6.14: T66 audio punch block.

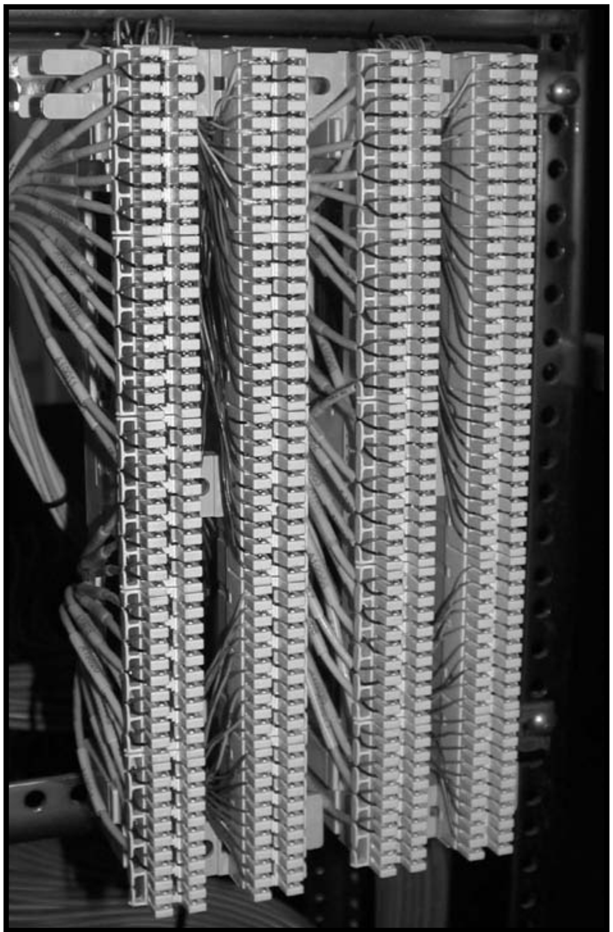


Figure 6.15: Krone audio punch block.

shoot. Often, directors create detailed shot sheets which describe the camera's anticipated shots. Some directors use video prints and/or photocopy the media guide so that camera operators can familiarize themselves with the key individuals they need to cover. Camera operators can then clip the sheets to their camera for easy visual access. In addition, the video prints show the type of shots and framing. *(See figures 6.16 and 6.17.)*

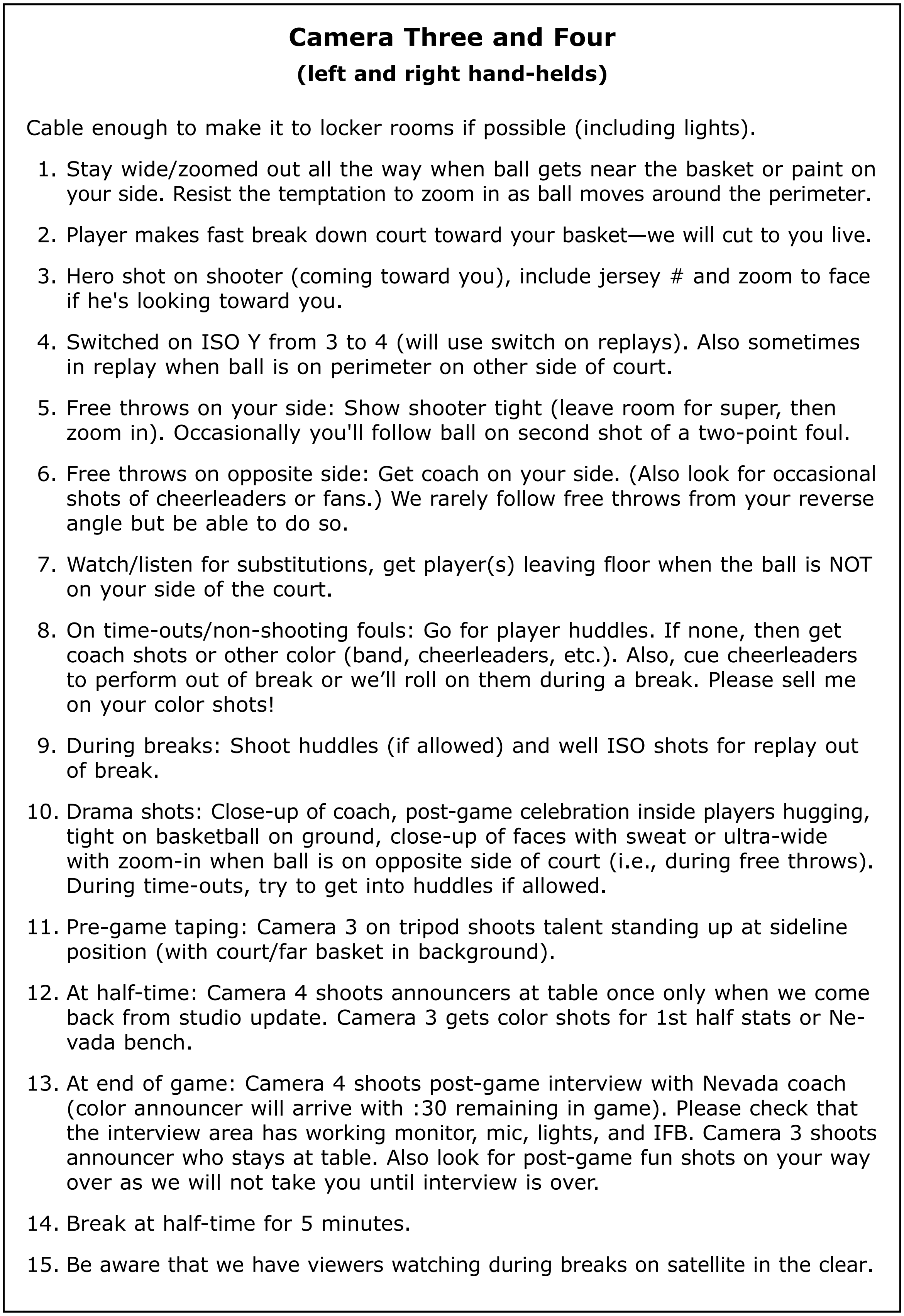
Shot sheets can be created from a production storyboard. Occasionally a director will have a storyboard created for the preshow, post-show or other related event. *(See figure 6.18.)* Appendix V includes two different sport-related storyboards. One of them was used for the medals ceremony at the Athens 2004 Olympics and the other is from the Emmy-winning Opening Ceremony of the 2002 Salt Lake Olympic Games. It is rare to storyboard sport-related programming but it is sometimes done when the show is extremely complex.

The camera meeting is also an effective tool for building teamwork. Mark Wolfson, Executive Producer/Director of KRON-TV in charge of Oakland As baseball, says in *Strangers in the Night* that the purpose of the meeting is to establish a relationship and an attitude with the crew. You need personal contact. The crew has to see that you're serious about what you’re doing—without trying to imply that what we’re doing is brain surgery.

Facilities Check

The facilities check or FAX is a check to see that all equipment is working correctly. Every facet of the production equipment should be tested, from intercoms to monitors. It is critical that the communication system, intercoms and two-way radios are working properly so the crew can hear who they need to hear and are able to respond. Other items that need to be checked during the FAX include:

1. Producer verifies camera feeds appear on the correct monitors on the monitor wall in truck.
2. Camera operators verify that they can see the return.
3. The video operator verifies that the cameras have the correct color match.
4. The technical director ensures that each VTR



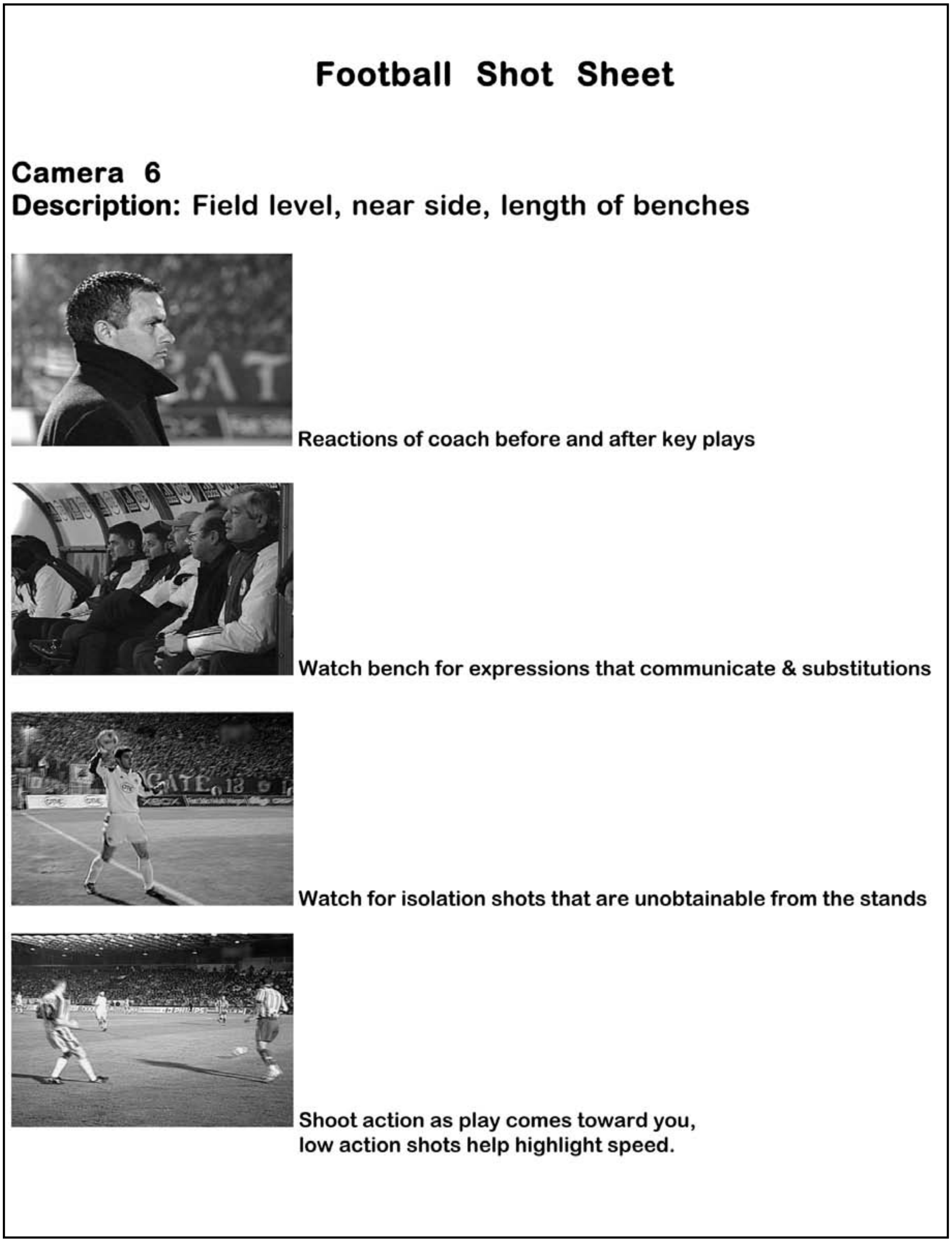
Camera Three and Four

(left and right hand-helds)

Cable enough to make it to locker rooms if possible (including lights).

1. Stay wide/zoomed out all the way when ball gets near the basket or paint on your side. Resist the temptation to zoom in as ball moves around the perimeter.
2. Player makes fast break down court toward your basket—we will cut to you live.
3. Hero shot on shooter (coming toward you), include jersey # and zoom to face if he's looking toward you.
4. Switched on ISO Y from 3 to 4 (will use switch on replays). Also sometimes in replay when ball is on perimeter on other side of court.
5. Free throws on your side: Show shooter tight (leave room for super, then zoom in). Occasionally you'll follow ball on second shot of a two-point foul.
6. Free throws on opposite side: Get coach on your side. (Also look for occasional shots of cheerleaders or fans.) We rarely follow free throws from your reverse angle but be able to do so.
7. Watch/listen for substitutions, get player(s) leaving floor when the ball is NOT on your side of the court.
8. On time-outs/non-shooting fouls: Go for player huddles. If none, then get coach shots or other color (band, cheerleaders, etc.). Also, cue cheerleaders to perform out of break or we'll roll on them during a break. Please sell me on your color shots!
9. During breaks: Shoot huddles (if allowed) and well ISO shots for replay out of break.
10. Drama shots: Close-up of coach, post-game celebration inside players hugging, tight on basketball on ground, close-up of faces with sweat or ultra-wide with zoom-in when ball is on opposite side of court (i.e., during free throws). During time-outs, try to get into huddles if allowed.
11. Pre-game taping: Camera 3 on tripod shoots talent standing up at sideline position (with court/far basket in background).
12. At half-time: Camera 4 shoots announcers at table once only when we come back from studio update. Camera 3 gets color shots for 1st half stats or Nevada bench.
13. At end of game: Camera 4 shoots post-game interview with Nevada coach (color announcer will arrive with :30 remaining in game). Please check that the interview area has working monitor, mic, lights, and IFB. Camera 3 shoots announcer who stays at table. Also look for post-game fun shots on your way over as we will not take you until interview is over.
14. Break at half-time for 5 minutes.
15. Be aware that we have viewers watching during breaks on satellite in the clear.

Figure 6.16: Directors shot list for hand-held cameras from a basketball game. (courtesy Joseph Maar, Director/Producer).



Football Shot Sheet

Camera 6

Description: Field level, near side, length of benches

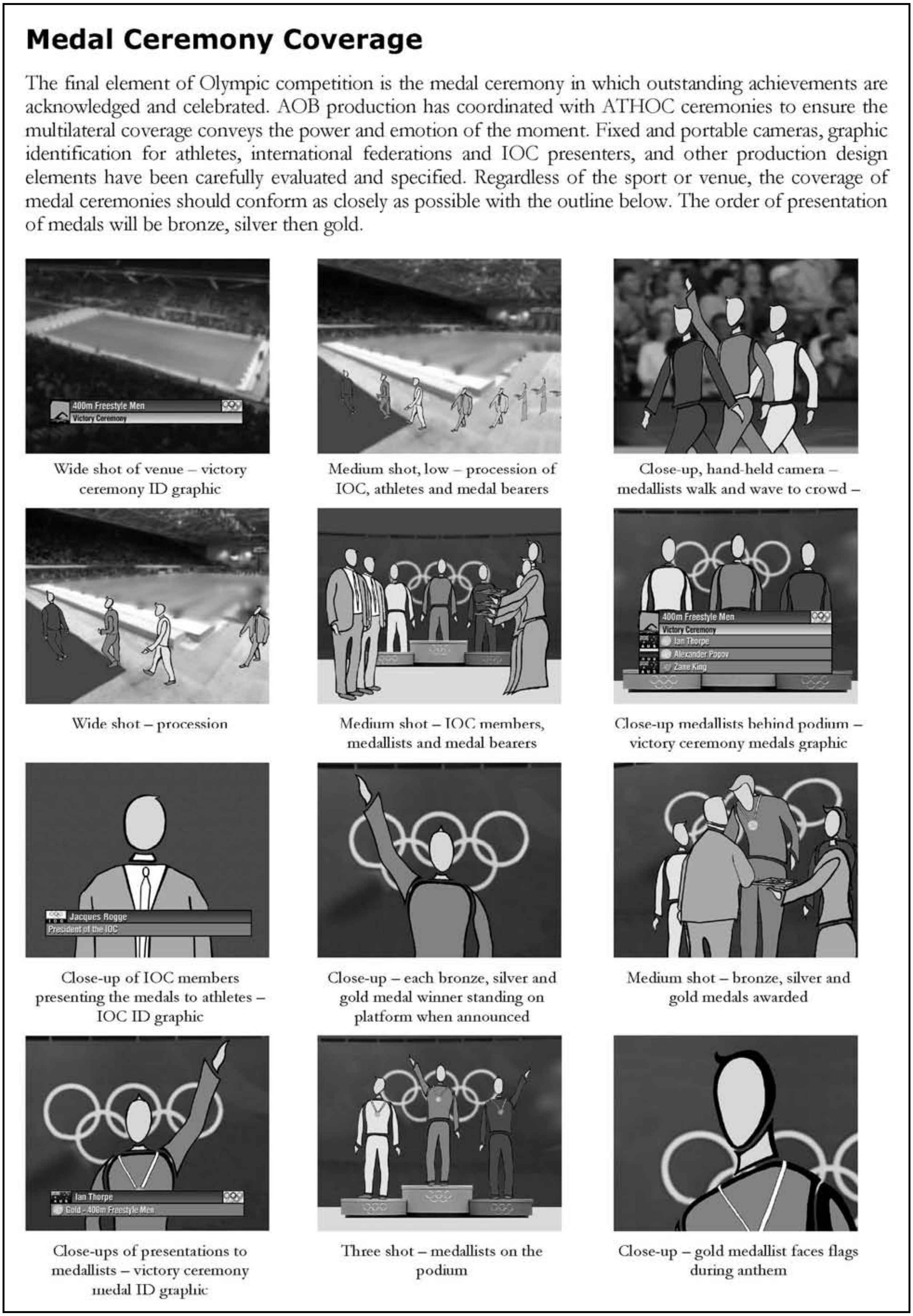
Reactions of coach before and after key plays

Watch bench for expressions that communicate & substitutions

Watch for isolation shots that are unobtainable from the stands

Shoot action as play comes toward you,
low action shots help highlight speed.

Figure 6.17: Visual shot sheet shows the camera operator the types of shots wanted from camera #6.



Medal Ceremony Coverage

The final element of Olympic competition is the medal ceremony in which outstanding achievements are acknowledged and celebrated. AOB production has coordinated with ATHOC ceremonies to ensure the multilateral coverage conveys the power and emotion of the moment. Fixed and portable cameras, graphic identification for athletes, international federations and IOC presenters, and other production design elements have been carefully evaluated and specified. Regardless of the sport or venue, the coverage of medal ceremonies should conform as closely as possible with the outline below. The order of presentation of medals will be bronze, silver then gold.

Wide shot of venue – victory ceremony ID graphic

Medium shot, low – procession of IOC, athletes and medal bearers

Close-up, hand-held camera – medallists walk and wave to crowd –

Wide shot – procession

Medium shot – IOC members, medallists and medal bearers

Close-up medallists behind podium – victory ceremony medals graphic

Close-up of IOC members presenting the medals to athletes – IOC ID graphic

Close-up – each bronze, silver and gold medal winner standing on platform when announced

Medium shot – bronze, silver and gold medals awarded

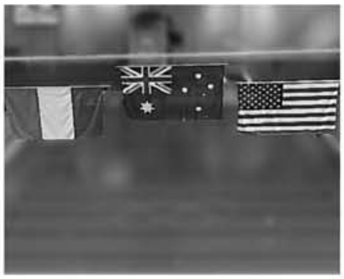
Close-ups of presentations to medallists – victory ceremony medal ID graphic

Three shot – medallists on the podium

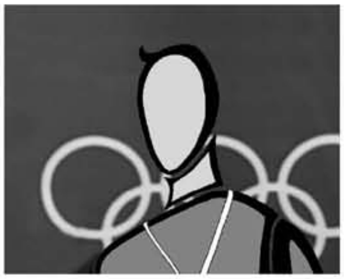
Close-up – gold medallist faces flags during anthem

Figure 6.18: Storyboards are often used to pre-visualize segments of a show.

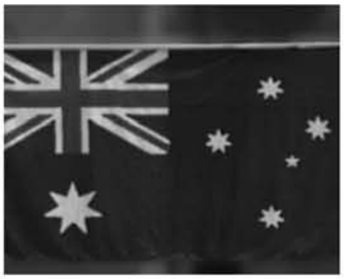
Medal Ceremony Coverage *(continued)*



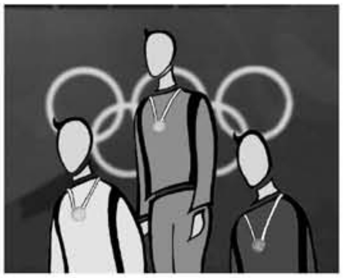
Close-up – country flags of medallists



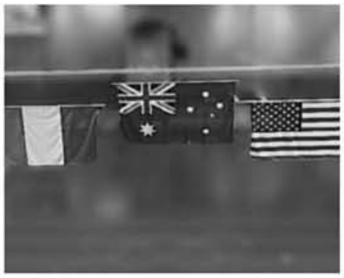
Close-up – gold medallist



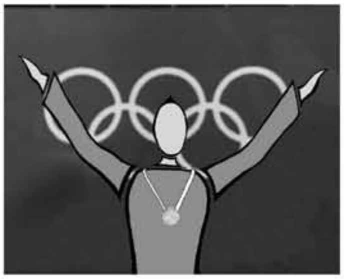
Close-up – country flag of gold medallist



Three shot – medallist during anthem

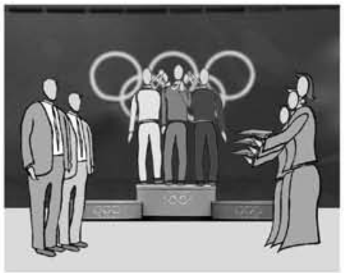


Close-up – country flags of medallists

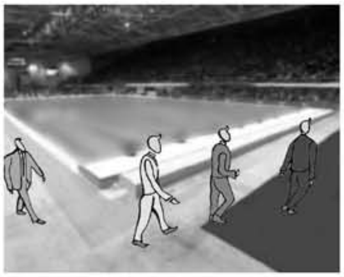


Close-up – gold medallist at the end of the anthem

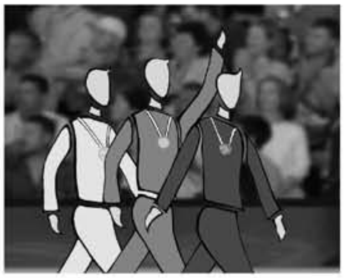
Wide shot – crowd



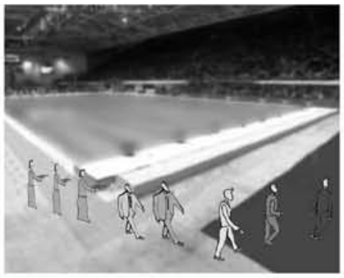
Medium wide shot – medallists posing for photographers



Medium shot, low – IOC members, athletes and medal bearers exit procession



Close-up, hand-held camera – medallists walking



Wide shot – file out procession

operator receives the correct feed.
5. The A-1 and A-2 verify all audio and communication channels.
6. The engineer-in-charge verifies with the transmission facilities that they are receiving the feed.

Schedule

Production schedules vary depending on how familiar the crew is with the venue, how much equipment is already in place, whether the venue is already cabled, and the level of difficulty of the production. The level of difficulty is determined by the number of cameras and specialty cameras, the venue (cabling the side of a mountain or a small basketball court), and the complexity of the actual production format. Cabling crews usually arrive one or two days before the mobile unit, especially if the cabling is difficult—for example, skiing venue.

Productions take teamwork. Each member of the production crew is assigned a specific task. In many cases, one person may not be able to begin their task until another member of the crew has completed their portion of the set-up. At times, this means that some of the crew have to wait for hours until they can do their part. The production schedule helps the crew better plan, knowing exactly when each part of the production must be complete. See figure 6.20 for a sample production schedule for a figure skating competition at the 2000 Winter Goodwill Games.

Rehearsals

You can't "rehearse" a ball game, so you have to pre-plan. People used to tell me my camera rehearsals were too short. I told them that once the camera crew knew the shots I wanted, we'd rehearsed. I could do in seconds what some people needed minutes for—and the difference was knowing what I wanted and communicating it thoroughly.

—*Tony Verna, Director, five Super Bowls, 12 Kentucky Derbys,* Live TV: An Inside Look at Directing and Producing

Television rehearsals take many different forms. If the crew is shooting a scripted event, then theoretically, the order of events is known

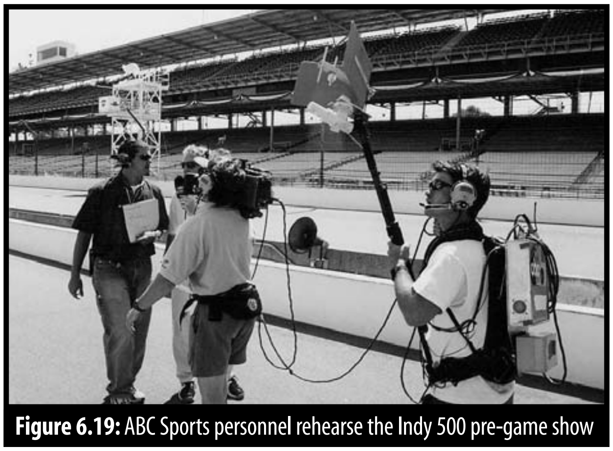


Figure 6.19: ABC Sports personnel rehearse the Indy 500 pre-game show

and the crew can practice the details of the production. Live events present a unique challenge in that anything can happen. The crew must rehearse for the unexpected. Generally, the pre-game and post-game shows are fairly scripted, allowing for some rehearsal. Rehearsals provide an opportunity for the director to make sure the camera operators are providing the required shots. It also gives RF talent a chance to determine if they have enough time to move from location to location. Also, during rehearsal, it is important to check the RF camera paths, verifying their transmissions stay intact throughout the entire area in which they will be shooting.

At the Indianapolis 500, ABC Sports used runners and PAs to serve as "drivers" and "cars" to rehearse the detailed pre-game show. Runners wear the name of the driver on a placard around their neck to allow the director to identify who is being interviewed. *(See figure 6.19.)*

First Color Olympic Broadcast

The first color broadcast of an Olympics occurred in 1968 when ABC Sports covered both the winter and summer Games. Although 1964 was black and white, we knew that we would be doing color by 1968—so we were expecting the changes. But not everything in Grenoble—where the winter Games were held—was color because some things such as bobsleigh, luge, and ski jumping, were taped and therefore still black and white. The most difficult thing about it all was that we had to go without triax, just a 200 foot multicable which was a horrible job. It weighed a pound for every foot, so for 200 feet, it was 200 pounds.

Jules Barnathan, Broadcast Operations,
ABC Sports, 1968 Olympic Games

Day	1	Management and production trailers park and power	
	2	Phone installation	
	3	Furniture, fixtures, and equipment (FF&E) delivered	
	4	Staging and platform construction	
	5	Mobile unit/OB van park and power	
	6	7:00–5:00	Equipment set-up
	7	7:00–Noon	Transmission tests
		Noon–5:00	Results, data, and timing test
	8	6:00–7:00	Equipment set-up
		7:00–Noon	Rehearsal
		Noon–4:00	Equipment set-up
	9	Competition Day	
		8:00–10:00	FAX
		10:00–11:00	Meal
		11:00–Noon	Pre-production
		Noon–3:00	Production
		3:00–5:00	Reset and FAX
		5:00–6:00	Meal
		6:00–8:00	Pre-production
		8:00–11:00	Production

At the end of the multiple-day event, tear down is scheduled for two hours.

Figure 6.20: A set-up and production schedule from the 2000 Winter Goodwill Games.

PART 3:

Creating the Production

CHAPTER 7: Production

CHAPTER 8: Sports Announcing

CHAPTER 9: Post-Production

CHAPTER 10: Television, Computers and Sports

CHAPTER 7
Production

Content is still king. Technology is a secondary thing for us. The responsibility of documenting—creatively, emotionally, journalistically—the games itself is really our goal.

Craig Janoff, Director,

Producing the Remote

There is no set worldwide programming strategy formula for producing a remote. NBC's Olympic Games coverage primarily consists of packaged programs. Other countries however primarily program live, staying away from prepackaged material.

At an IOC Olympic television symposium in 1998, Yosuke Fujiwara, Senior Producer for Olympic Operations at NHK in Japan, made the following statement: "We believe that the essence of the sports broadcast lies in live coverage ... we believe that the unscripted drama exists in sports itself, and live broadcast is the best way to show such drama."

Each producer and director must analyze their audience, the sport, and the available broadcast facilities to determine the best programming strategy for their specific audience.

Several coverage strategies will be discussed in this chapter. Coverage strategies are constantly evolving, changing with the type of sport, the anticipated audience and the skills of the crew.

Better Than Being There

Andy Rosenberg, Coordinating Director of the NBA on NBC stated: One thing that television does exceptionally well is take you to places that you cant get to otherwise. By placing cameras in a variety of locations throughout the stadium, and having some of them fitted with very long lenses, we were able to achieve an intimate view of the players and the game that you just can't get from a fixed seat location in the building.

NBC Blends Drama with Technology
in NBC Playoff Coverage

NBC's Olympic Television Philosophy

The National Broadcasting Company's (NBC's) broadcasting philosophy was born out of hundreds of hours of research, examining the preferences, expectations, and hopes of thousands of Olympic television viewers in the United States. Throughout the research, many of the same themes kept surfacing—story, reality, possibility, idealism, and patriotism. These five themes—which correspond to the five Olympic rings—serve as the foundation of the NBC Olympic television philosophy.

Ring 1: Story

Viewers want a narrative momentum, a story that builds. Stories make connections with reality, among facts, and between the subject and the viewer. This is what the viewer takes away from the telecast.

Ring 2: Reality

Perhaps the major hook for Olympic viewers is the unscripted drama of the Olympics, the idea that anything can happen, both of an athletic and a human nature. People look for real stories and relativity, things that apply to them. They are looking for real life and real emotion presented credibly.

Ring 3: Possibility

This ring covers the feeling of self-realization. The audience experiences the rise of individuals from ordinary athletes and their humble beginnings to their joining of the company of the world's elite. This identification reinforces belief in their own ability to achieve. This embodiment of possibility gives the viewer a reason he or she can make it through.

Ring 4: Idealism

The Olympics are still viewed by a vast majority in the contexts of purity and honor. They appeal to what is best in us. This area summarizes the viewer's need to integrate the intellectual and the emotional.

Ring 5: Patriotism

Love of country is not just limited to an American viewer's love of the United States. National honor and Olympic tradition seem to go hand in hand. The viewer recognizes the love of his or her own country, but, at the same time, respects the international athletes' love of their nation as well.

NBC's Coverage of the
Games of the XXVI Olympiad

Directing the Remote

Portraying passion and teamwork is key in covering sports.

—Lee Henry, Director

The goal of the event director:

1. Build the viewers' excitement about the event.
2. Reveal relationships and educate the audience about the intricacies of the sport.
3. Catch the ambience and emotion of the event.
4. Communicate the event with clarity.

Types of Sports Action

(by Harold Hickman, Directing Television, *© 1991, McGraw-Hill, Inc., reproduced with permission of the McGraw-Hill Companies)*

Whatever the sport, we can divide coverage planning into three variables the director should understand: (1) action flow, (2) team versus individual sports, and (3) horizontal versus vertical versus circular action.

Action Flow

Action flow concerns the continuity of action within the sport. Is there a constant flow, or is the action periodically interrupted by time-outs? In hockey, for example, the action is continuous, with few breaks. The ending of the periods or the stopping for face-offs may be the only interruptions. Soccer is another such game. On the other hand, American football involves very sporadic action. There is a break after every play. Each actual action is condensed into 10 or 15 seconds of intense physical conflict followed by approximately 30 seconds of time out. Golf action is also very slow and sporadic. A shot may last only 5 to 10 seconds, while time spent in walking, club selection, scouting, and preparation add another 5 minutes or more per player. Action flow can thus be divided into two categories: stop-and-go and continuous action.

Stop-and-Go Sports

Stop-and-go sports tend to be rigorous and involve a great deal of physical contact or energy exertion. Golf, perhaps, is the single exception. The chief stop-and-go sports covered by television include football, baseball, tennis, golf, bowling, and track and field. All of these sports involve emotionally intense action followed by some period of inactivity.

Directing Stop-and-Go Action

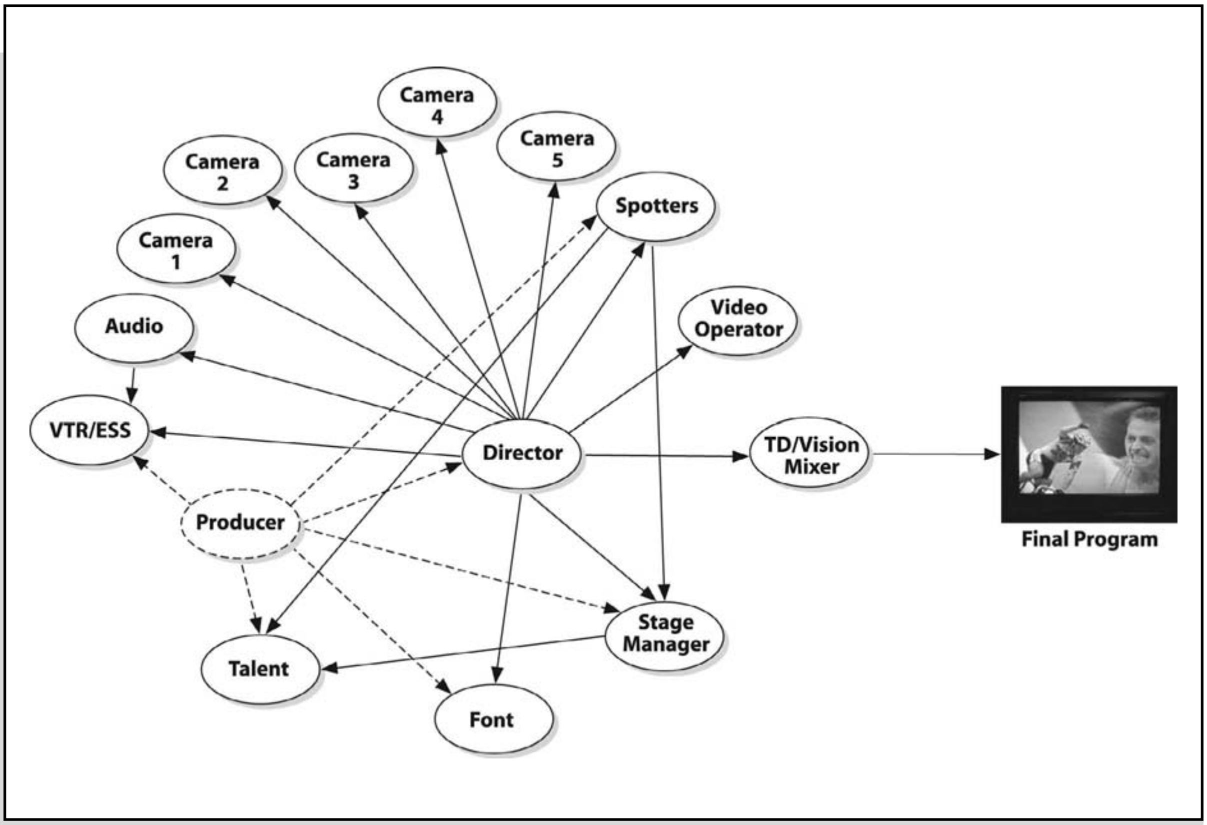
From a production and directing standpoint, the need to maintain audience interest during time-out periods is the primary challenge. Pauses in action are frequent and sometimes very long (at least from the viewers' standpoint). Replay devices have provided an excellent production value for such periods. The longer the "stop" periods or the more complex the action, the greater the need for replay units to provide isolation of and different angles on the same action.

The use of analysis for such events is also essential to maintain the tempo of the production. To sustain viewer interest, it is wise to include sophisticated analysis of the athletes' performance, such as the following: blocking, running, passing, and all elements of defense in football; hitting and fielding form in baseball; form and agility in tennis; form in golf and bowling.

Tips for Remote Switching

1. *Make sure that every camera operator knows what you want them to do before you begin the program. They should consider themselves "live" all the time. That way, if you mis-switch, you may not look bad. If the operators have a basic game plan, you won't have to keep telling them what to do.*
2. *Study each monitor carefully before you switch to it. Even though the director may be screaming "take camera two" and camera two is out of focus, he or she may be confused and really mean "take camera one."*
3. *Use all your fingers on the switcher keys. It is much faster to cut quickly between cameras if you already have your finger on the button.*
4. *Try to anticipate what the on-camera person may do before you switch. When in doubt, cut to a wider shot. Always have at least one camera on a wide shot at all times.*
5. *Try to develop a switching or cutting cadence to your shots. If the action is speeding up, cut faster between cameras. This establishes a rhythm.*

Adapted from
Ten Steps to a Better Remote Switching



The first time observer of a remote production may perceive that all is chaos. However, you can see the large number of interactions that need to take place for the producer and director in a simple five camera sports production. This chart does not include engineering, logistics, and all of the assistants that many of these positions include.

1992 Barcelona Olympic Games Opening Ceremony

For the Opening Ceremony the production team chose to use only four of the five control rooms available at the Olympic stadium. One of them was used for the coverage of the Athletes parade and the choreography and movements of the actors on the stadium floor, using the signal from 16 cameras (half of which were mobile). A second control room received the images of seven cameras aimed at recording the reactions of the dignitaries box and the public, as well as on the speeches podium. Ten cameras, coordinated from a third control room, covered all the action that took place on the stage at one end of the stadium. And a fourth control room, under the command of the director of television production of the ceremony, was responsible for the synthesis of the program with the aid of panoramic shots from cameras located in unusual positions (beauty cameras), such as a helicopter or a crane.

Television in the Olympics

Television Sports Cliches

- *The camera will always show some fan holding a poster that uses the network's initials to spell out a phrase about the home team.*
- *If the television camera locates a significant spectator—an owner or parent/spouse of a coach/player—you can be sure those folks will get an excess amount of camera exposure during breaks in the action.*
- *Late in a night game, viewers will get a close-up of a baby sleeping in the stands.*
- *After a player makes a critical error late in a game that guarantees defeat for his team, the camera will zoom-in on his face as he sits alone on the bench.*
- *If a team is about to lose a game that eliminates them from the playoffs, the camera will lock onto any player sitting on the bench with his face buried in a towel.*
- *Immediately at the conclusion of a championship football game, the winning coach will have a large container of water or sports drink dumped over his head. The TV audience will then watch slow motion replays of this event from multiple angles.*

Mike Hasselbeck

Directing Emphasis on Scoring

The director must be able to even out the emotional highs and lows of the stop-and-go game. Obviously, the coverage of the action is relatively simple—follow-the-bouncing-ball. This means that the director must frame the action in the physical direction of its flow. Most action in stop-and-go is offensive action—that is, the individual or team on offense is the center of the directing concentration. Normally, the team on offense is the only team that can score. A team may intercept a ball (or puck), but that team is immediately on offense. The concentration is on scoring and, therefore, the director's responsibility is to follow the team that has the greatest opportunity to score.

In baseball we have a single player (the hitter) against an entire team. Coverage of defense is a much larger item than coverage of offense. After all, the whole playing field is filled with defensive players and the hitter is even standing out of bounds while in the batter's box. Yet, despite the fact that the main focus of baseball is defense, most of the coverage is of the offensive play (the hitter against the pitcher).

Tennis may also be considered an exception to the "only the offense can score" situation. Here, either player can score—both are on offense. But the serving player has a marked advantage, since he or she has the first offensive opportunity. Each time the ball passes over the net the offense shifts.

Maneuvering the team or player into position to score is the aim of the play in stop-and-go. This is normally accomplished through a series of "plays." The closer the team or player gets to scoring, the more intense the game. The director can enhance this emotional involvement by warming up the coverage—that is, tightening the shots as the emotional level of the production increases. It also means adding more radical shot angles and increasing the intercutting of shots. The pace of the production needs to pick up as the emotional level of the production increases. This enhancement of the emotional level helps the audience grasp the pressure of the sports performance.

Pumping

To enhance an otherwise dull sport performance, the director may want to pump the game through the use of additional production values that may be viewed as unethical by some. Any attempt to make a game or contest appear more exciting or tight (in terms of who will win) can be viewed as beyond the presentational responsibilities of the director. Some viewers may want the director merely to provide adequate coverage and let the viewer decide whether the game is exciting or dull.

But the director's goal and responsibility is to make the production interesting and entertaining for the audience, so there is a very basic objective to be met in the use of increased production values toward that end. How far to go with the introduction of additional production values so as to achieve this end must be determined before the production begins. Obviously, it is questionable whether to allow the announcing talent to pump up the closeness of the conflict through false excitement in play-by-play and color presentation (analysis of game strategy or quality of individual performance), and to augment this with exciting, fast-paced production when the score is 50 to 0. The new director may want to observe the techniques of a seasoned television director faced with coverage of a game that is lopsided in score or athletic match or performance.

The addition of more shots of the crowd (including people with painted faces and bizarre masks or sleeping babies) that are not part of the game or contest will help alleviate the boredom of the game without pumping. Interesting activities on the sidelines can also be included—a worried coach or an injured player. Basically, anything of interest that can divert attention from the slow moving game itself will help maintain the attention level of the audience. Stop-and-go sports make this type of coverage even more difficult and essential.

Continuous Action Sports

Unlike stop-and-go sports production, the continuous action contest provides little or no time to interrupt for color analysis. Continuous action sports include basketball, hockey, and soccer. Generally, these sports have not been as popular as stop-and-go performances on American

Director's Slang

The following are some of the slang words used by directors:

Effect: Switcher cue term for animation, box or special effect
Fly: A non-switcher effect that is generally created by a digital effects generator (DVE)
Go wide: Zoom out
Go close: Zoom in
Mix: Mix cameras without a full dissolve
Pull Focus/Rack Focus: Change the focus from one subject to another
Push in: Zoom in
Pull out: Zoom out
Transform: Animated graphics
You're hot: Your camera is on

Directing HDTV

HD allows the viewer to see much more of the event, as the shots incorporate much more of the action. The expansive shots make viewers feel "much more a part of the event."

Mike Wells, 17-time Emmy Award-winner

Live sporting events shot in HD tend to have approximately 30% fewer cuts and could sometimes be covered with as few as two cameras.

Jeff Cree, Sony Acquisition System Specialist

Each HD shot seems to offer more to the viewer, the detail in every aspect of the shot holds your attention longer, and thus eliminates the need to switch camera angles to improve ones perspective. With HD, I found that the shot simply lasts longer, offering more to the viewers. The clarity of the image requires the director to watch the total shot as opposed to the action you routinely photograph in standard definition. Close-ups in HD can be too overwhelming and thus distract from what you were hoping to accomplish. It is simply more advisable to photograph things from a reasonable distance, than to potentially overwhelm or bombard the audience with sensory overload.

Brian Douglas, HDTV Director,
2002 Olympic Opening Ceremonies

Directors on Directing Sports

Alexandro DeMartino, Director (Sky), Italy

- *Favorite sport to direct: Football*
- *Quote: "For me directing is like a conductor and an orchestra. Single work of each camera means nothing…together they can make something."*
- *How do you prepare for directing? A good director must understand the rules of the sport and must be physically ready*
- *Advice: Be diplomatic, know finance, audio must be at the same quality level as video. Graphic operators need to not only understand the rules of the sport but must be able to predict what is going to happen in order to have the correct graphics together.*

Gary Milkis, Director (NBC and CBS), United States

- *Favorite sport to direct: Downhill Skiing*
- *Quote: "Directing is telling a story with cameras."*
- *How do you prepare to direct? Design the monitor wall so that it makes sense for the sport.*
- *Advice: Find a balance between pushing the crew and not abusing the crew. Have a little fun on the headset.*
- *Biggest challenge: Locating the best camera positions*

Greg Breckell, Director (CTV, TSN, and ESPN), Canada

- *Favorite sport to direct: Golf*
- *How do you prepare to direct? Complete a detailed survey of the course.*
- *Advice: KNOW the game, not just the rules. Properly motivate the crew member who may not feel that their job is an important as others.*
- *Biggest Challenge: Communication and coordination of game plan. Everyone needs to understand what is going on and why. Simple things are what can really hurt a production.*

Brian Douglas, Director (over 700 NBA games), United States

- *Favorite sport to direct: Basketball*
- *Quote: "Know the sport and the people. How a player dribbles the ball can tell you if he is going for a three pointer."*
- *How do you prepare to direct? Research is key, look at tapes.*
- *Advice: Establish a creative environment to work in. Keep in mind that you are there to make others look good, not you. You are not part of the show.*
- *Biggest challenge: Maintaining control of the situation.*

Bai Li, Director (Shanghai TV Sports), China

- *Favorite sports to direct: Table tennis and basketball*
- *Quote: "Have creative new ideas when covering traditional sports. It is easy to do it the old style."*
- *Advice: Know the sport. Watch a lot of sports.*
- *Biggest challenge: This generation is not used to working as a team. The Chinese director must spend more attention on building teamwork and fostering good communication.*

Mark Wallace, Director (BBC and LiM Africa), United Kingdom

- *Favorite sport to direct: Rugby Union*
- *Quote: "The 5 P's of Sports Television: Prior Preparation Prevents Poor Performance!"*
- *How do you prepare to direct? Go around the crew, introduce myself, talk to each member of the crew and explain what I would like them to do. Then get clearly in my own head what needs to be done and when.*
- *Advice: Try to appear calm and in control of yourself. Have a back-up plan and try to always think one step ahead.*

television, because they do not provide the natural breaks for commercial insertion or for the audience to take a break in their viewing to do something else. The single exception is basketball (both professional and college level). Basketball can be considered a basically continuous action sport. There are no breaks between field goals, although there are more breaks in basketball than hockey or soccer. Action stops in basketball for fouls and team time-outs. During the extended stop for a foul, one or more replays of the foul can be shown and other comments made. These are really semi-stops, because the game does continue and there is little time for commercials or extended replays.

Continuous action sports tend to be very rigorous and are usually limited to a specific, bounded playing area. In the cases of basketball and hockey, these areas are rather small, which increases the emotional potential of the game for a television audience because the crowd is close to the playing area and becomes more emotionally involved with the play.

There are other continuous action sports, minor from a television standpoint, including cross-country or marathon races. The Boston and New York marathons are considered major sporting events, especially by runners and by residents of those cities. But not much television time is given to marathons compared to other continuous action sports events. Track-and-field events generally do not fit into this category, because the various events, considered as a single coverage, involve a great deal of stop-and-go.

The director must take into consideration a number of factors when preparing to cover continuous action sports: (1) rapid camera action, (2) increased shot sizes, and (3) camera changes during action.

Camera Action Tends to Be Rapid

Shot size usually is rather wide angle to give the audience a chance to see the relationship of offense to defense and offensive player to defensive player, and to establish the relationship between the ball, the team on offense, and the goal. Still, to increase the warmth of a game, the camera shot needs to be as close as possible.

The Image

It is not the number of cameras that determines the quality of the picture, it is the quality of the perspective. We can learn a great deal from the old masters such as Leonardo da Vinci, Michelangelo, Goya, Rubens or Rembrandt. Their pictures had a strength of the middle. They have a center of concentration, which catches the eye involuntarily. This strength of the middle is also possible in the moving picture, where the eye is guided to the focus point and can rest quietly. Unfortunately, it is missing in many cases.

Horst Seifard, former director of
Sports Programs at ARD, Germany,
Television in the Olympic Games: The New Era

Increase in Shot Size

As the speed of the action increases, there is a tendency also to increase the size of the shot in order to include all of the action. However, as action speed increases, the director really should attempt to tighten shot size to capture the emotion of the faster pace. In basketball, for example, the intensity of the action increases as the ball is worked closer and closer to the basket. Camera shot size should get closer and closer. This does two things: (1) it increases the warmth of the coverage and the emotional involvement of the audience and (2) it gives the audience a better perspective on the action.

This is especially critical in hockey, where the puck is so small and moves so fast that it is difficult for the audience to see and follow it. As the play moves across the blue line and closer to the goal, the camera coverage should move closer to the play.

Camera Changes During Action

A basic rule in sports coverage is to never change from camera to camera when critical action is taking place in the playing area. In basketball this means the director should not change from camera to camera when a shot is in the air (either a field goal or a free throw). In football this means the camera covering a quarterback who is fading back to throw must cover the flight of the ball until it is caught or incomplete. To change camera angles at these critical times requires that the audience reestablish their relationship to the game from another angle. This only takes a second to do, but becomes critical in the split second involved in the pass or the shot. The same critical point occurs in baseball when a pitcher delivers to a batter.

The director must be careful during continuous action sports not to over-direct the coverage. Often a single shot of a mile run, for example, will satisfy the audience, because they are interested in the continuity of the event. Only when the race comes down to the final 100 yards or so should the director attempt to increase the suspense and emotional involvement of the audience by zooming in on the lead runner (or runners).

Team and Individual Sports

Sports coverage can also be planned from the standpoint of the number of athletes involved. Most television sports are team sports (football, basketball, baseball, hockey), but for a number of years there has been a growing interest in individual sports (tennis and golf).

Team Sports

We are obviously spending too much time covering the line-up, the race, and the results, rather than the emotions of the competitors and taking the viewer behind the scene.

—Alan Pascoe, Managing Director of Fast Track, Great Britain

With team sports there is a built-in interest because of the complexity of the teams working together. Most avid sports fans understand the sophistication of various games and appreciate the role of various team members and their contribution to the team's success (or failure). For example, the offensive line of a football team should be made up of players highly skilled at their specific positions. Fans (and replays) may want to concentrate on the efficiency of these players as they carry out their assignments. This increases the attention factors for the viewer, and thus the excitement of the game. In most team sports, the ability of the team to work together as a well-organized and effective unit provides unusual coverage opportunities. It also, however, increases the demands on the director to understand the game and the complexities and fine points of quality play. Because of these complexities, coverage of team sports is more involved than for individual sports.

Individual Sports

Individual sports, on the other hand, have their advantages. There is a greater opportunity for the director to increase the emotional level of the production by concentrating on close-up production techniques. It is easier for the audience to associate themselves with an individual player than with a team of players. This involvement is inherently greater if the individual is in a contest with another individual (tennis) than if he or she is in a contest with him or herself (golf).

With individual sports, the director has a greater opportunity to warm the production through the use of close-ups and single shots. Examples include tennis, boxing, skiing, track and field, golf, and wrestling (real or exhibition).

The director of an individual sports coverage has a number of considerations: (1) building emotional involvement through tighter coverage, (2) dealing with the dominant player, and (3) limited space for coverage.

Building Emotional Involvement

The director has an opportunity to build the emotional involvement of the audience by increasing the warmth of the production. The director can get inside the personal space of the individual in the shot and draw the audience in. He or she can develop a visual situation in which the audience member can relate to the athlete and feel the pain, pressure, and thrill of victory or agony of defeat.

Dealing with the Dominant Player

If the sport provides a conflict between individuals (such as tennis or boxing), coverage may concentrate on the dominant player. This may not always be the winning player. For example, a loser who is suffering from injury or losing control of a match may be the story the director wants to cover. American audiences have a natural affinity for the underdog and this can be translated into interesting coverage if the underdog is attempting to upset the star. Because the player in these contests usually has fans, the director needs to balance the coverage of each player so the fans will be satisfied. Of course, the director can build audience interest and loyalty by the type of coverage given. It is relatively easy to slant the coverage toward one player or another in an individual sport. But the director should try to avoid this. If the coverage takes more shots or tighter shots or better angles of the favored player, cuts away when the favored one is in trouble, shows the disfavored player when he or she is in trouble, or slants the comments from play-by-play or color commentators, then the production is slanting the coverage unethically.

The director should try to be as journalistic as

Softball Coverage in 1945

It was necessary to shrink diamond dimensions for proper perspective. Two cameras covered the game. One was set up behind home plate, the other at first base looking toward second. A 12-inch (30.5 cm) ball was used instead of the standard ball, again to limit action, to keep flies in close, keep hits from going over the fence.

Television Show Business

Monday Night Football, ABC Sports

The Monday Night Football influence of long lens close-ups, greater quarterback coverage, and increased field level shots have enhanced football by providing mythic images of modern gladiators engaged in both sport and spectacle.

Joseph Maar,
Football And Television—A Perfect Match

possible in these situations. He or she should provide balanced and fair coverage of all contestants. This is often difficult when covering the game for the local high school or college against an arch rival from the next town and even more difficult when covering the United States team in Olympic competition. Balance in camera coverage and the establishment of a strong coverage formula will help reduce the possibility of slanting coverage.

Limited Space for Coverage

Individual sports normally have a very limited space that must be covered. You may argue that golf is not limited at all—as a matter of fact has one of the largest playing fields in sports. But we are talking here about the area in which the athlete must work at any given time, not the total field of play. At any point in the round, the golfer is dealing with a small tee area, a bunker, or a green—not the whole golf course. The marathon runner also is dealing only with that space in which he or she is running at the time—not the entire course. In team sports this area is greatly expanded because the team can take up a great deal of area (field or court).

The bowler deals with only a single alley, the tennis player works with a relatively small court and the vaulter deals with two standards, a bar and a short runway. This provides the director with a great deal of flexibility and opportunity for intensity in coverage. Golf and racing (marathons and auto) are perhaps the exceptions, for the director must be prepared to cover wide areas but concentrate on small play areas at any given time. The portable mini-cam and refined portable microwave units have greatly aided such coverage.

This limited working space provides increased warmth to coverage of the individual sport. Because the director can concentrate more cameras on a smaller area, there is the opportunity to tighten shots and to mix angles for more effect. The director who fails to make use of this opportunity will find the coverage becoming dull and cool. For the individual sport to compete with team sports on television, the drama of the contest and the struggles of the athletes must be portrayed. The director is involved in telling the story of the conflict. Anything that can be done to make sure the audience understands the real story should be done.

Horizontal versus Vertical versus Circular Action

All productions have a horizontal axis. In most sports this axis is critical to the orientation of the audience. With few exceptions, sports coverage can be divided into three types: (1) horizontal action, (2) vertical action, and (3) circular action.

Horizontal Action

Fortunately for television directors, most sports contests are horizontal in nature; that is, the action takes place on a horizontal plane in front of the cameras. Football, for example, is made up of two teams moving up and down the field across the screen. Basketball also is a contest of two teams moving up and down the floor in front of the cameras. Unfortunately for the director, such action violates the z-axis rule—it is better to have action toward and away from the camera than across the screen. But since the orientation of the audience to the game is horizontal, this dictates the type of coverage you must use.

The director can take advantage of the ease of establishing cameras in horizontal games by drawing the imaginary axis down the middle of a football field, from goal post to goal post, and down the middle of the basketball court, from backboard to backboard. If during action all cameras are kept to one side of that line, it will be easy to keep the audience in the game.

Cameras can be located within the end zones or under the backboards in a horizontal contest. But if coverage of play extends beyond those points and crosses the axis, the audience will become disoriented. Cameras can be placed in these locations for color and for some timeout coverage, but they should not be used extensively for coverage of plays. The single exception, noted previously, is their use for reverse-angle replays. In these cases the audience must be reestablished through a statement from the announcing crew or from a graphic on the screen indicating that the replay is from the opposite side of the field of play.

Vertical Action

In horizontal games, such as tennis, the director must treat the action as if it were vertical. The movement of the ball and the action of the players makes it difficult to provide general coverage in the horizontal camera set-up. In these cases the z-axis becomes a major factor. The director attempts to make the movement of the ball function within the z-axis, moving toward and away from the camera. In tennis, for example, cameras set up for coverage from one of the baselines show the ball moving from one player (with his or her back to the cameras) to another across the net (facing the cameras). It makes little difference which baseline is used, since the players exchange sides of the net throughout the match. In this case, although the game is horizontal (across the net from court to court), the coverage is vertical (toward and away from the cameras). Since tennis is a stop-and-go game, sideline cameras can be used for "stop" coverage, with close-ups of players and fans.

Golf, on the other hand, is a purely vertical game. The ball, and action, moves toward and away from the camera. There is no horizontal axis. It is extremely difficult to track the ball horizontally because of the speed, distance, and size of the ball. The axis is very flexible in golf, because no two courses are the same. There is a tee area that leads to a fairway that leads to a green, but no two are alike and few have similar out-of-bounds situations.

The dramatic elements of golf occur on the greens during putting. The golf expression "you drive for show and putt for dough" means that the critical element of the game for the professional is putting. This is where scoring happens. Obviously, the objective of golf is to hit the ball fewer times than your opponents—the lowest score wins. The saving of strokes normally comes on the green during putting. The director must, therefore, concentrate on the putting portion of the game. It is at this point that the camera shots must warm. Here, too, the axis is a minor factor. But the director must make sure the audience is established so they can reference the location of the ball to the hole. Since putting is always in the direction of the hole, once establishment has taken place there is little need to reestablish. One caution, however: During the action portion of golf (striking the ball) it is essential that the audience be able to follow-the-bouncing-ball. When the ball is putted, for example, the audience should be able to see the ball and the hole and be able to follow the ball as it rolls toward the hole. As the ball approaches the hole, the director may want to zoom in on the ball and the hole; but the reference between the two must always be maintained.

Some track-and-field sports may be considered vertical as well: javelin, hammer, and shot put are examples.

Circular Action

Some sports appear to be basically round-axis sports—baseball, boxing, racing, and wrestling are examples. Golf putting may also fit into this general category. Here the action seems to move in a circle (although most of the playing areas are square, such as baseball diamonds and boxing rings). Because of this it is difficult to establish a specific axis. The director may help establishment through the use of boundaries, such as the foul lines in baseball or the ropes of the boxing ring. The audience generally will not mind a loss of orientation in these sports as long as reestablishment is provided periodically.

Combinations

Most sports are a combination of the general types we have just discussed. Football is a team, horizontal, and stop-and-go sport. Baseball is a team, stop-and-go, basically circular sport (although the action of the ball, from the pitcher's delivery to the batter as well as its flight from the bat, is more vertical than circular). Golf is an individual, vertical, stop-and-go sport.

These classifications are important because they provide the basis for the design of coverage. The placement of cameras for proper coverage will depend on the axis of the game. The size of shots used, the lenses needed for those shots and the need to establish and reestablish at specific times will be determined by these factors.

Personalize the Production

I'm a firm believer that more cameras do not make a better director and do not make a better show. I've seen directors take four cameras and make them look like eight and vice versa. Whether the viewing public sees more because cameras are used depends on the ability of the director. My number one priority is the athlete. We try to personalize, thereby enabling the viewer to experience the emotion of the game… My camera (operators) know that when someone scores, I want to see his/her face as well as the faces of the opposing coaches. I've tried to instill in my people a principle I learned years ago … that the individual is the key to any story.

Chet Forte, Director

Coverage Design

Follow-the-Bouncing-Ball

The single most critical production value in sports coverage is the need to know where the ball is at all times. This is true for all sports with, perhaps, the exception of individual sports, such as boxing and wrestling, where there is no ball to maneuver.

Needs of the Audience

Sports coverage is presentational television. The directing style is normally invisible. The need of the audience to know the status of the contest is primary. The job of the director is to tell the story to the audience.

Orientation. The audience must have clearly in mind the general situation regarding the game. They must know which team/individual has control or has the momentum in the contest. This orientation is different from establishing, which deals with spatial location. Orientation has to do with the emotional status of the contest. It also has to do with the current score. The audience must know which team/individual has scored the most points (or fewest points as in golf). Your first question when arriving late to watch a football game with friends is usually "What's the score?" It is part of orientation.

Orientation also includes time/distance/frame factors. How much time is remaining in the game/quarter/period? How much more distance must the runner cover? What bowling frame (or boxing round) are we in? So, after you have asked what the score is, your next question may be "What quarter are they in, and how much time is left?" It is easy for the director to forget about the orientation needs of the audience. From a position in the remote truck, the director knows the orientation factors, but the audience at home does not. It is a general rule that the audience must be re-oriented after each play in football (where yardage, down, and time are important) and after each hole in golf (who is leading, what hole we are on). These are just examples. It is not just the last two minutes of a football or basketball game in which the audience wants to know the time remaining; they want to know periodically throughout the game.

Direction of Play. The direction the ball and move to score must be established and maintained. The audience does not need to know if the stadium or playing floor runs north–south or east–west (although almost all outdoor football stadiums run north–south, with camera coverage coming from the west stands because of the afternoon sun). The audience is not concerned about the location of the stadium or arena in the city. They are concerned about the location of the ball and the direction of play within the boundaries, however.

Location of the Ball. The audience must know the location of the ball, especially in games such as football and hockey. The movement of the ball (puck) toward the goal is important. In football the location of the ball with reference to yard markers must be established. The game changes drastically as the ball nears the defensive goal. The audience must reestablish location of the ball between plays, especially after plays that gain high yardage. For variety, a director may want to try some shots of the crowd as it follows a play, but unless the audience has been reestablished before the next play begins, they will be frustrated during the action.

Ball in the Frame. During action sequences, the audience must see the ball in the frame. This is basic to follow-the-bouncing-ball coverage, as has been noted. There is nothing more frustrating to the audience than not knowing where the ball is during action.

Directing Style

Directing style during action elements of a sporting event must be basically invisible. Directors must place themselves psychologically in the position of the audience and then show the audience what they need and want to see.

Directors, especially new directors, should plan to select an action camera that will handle the bulk of the coverage during the action portions of stop-and-go contests. This is especially true of games in which the ball moves quickly or where the action is complex. Other cameras can then be designated to provide coverage during non-action periods.

It is only during the time-out points in stop-and-go that the director may want to show a little creativity or pump up the coverage with production values, such as instant replay, tight

World Cup—Camera 1 Description

Camera one: Main camera positioned at midfield. Camera one is the main coverage camera or master shot. The shot is wide enough to show the flow of play, but not so wide that the ball and players become specks on the screen. The basic philosophy is to show everyone involved in the play, but not anyone who is clearly out of the flow. The camera leads the play in terms of direction of camera movement.

Broadcasters Handbook, XV FIFA World Cup

High Definition Sport Coverage

High definition (HD) really stands out when there's a fast break or long pass down court because you don't have to pan the camera much if at all. One static wide shot can show the entire court. For viewers who like to see plays evolve and follow game strategy, HD provides much more interesting coverage. HD production advice:

- *Loosely frame the majority of shots.*
- *When framing tight on people, be prepared for images that reveal every detail and possible facial flaw.*
- *HD image quality really goes down in areas that aren't well lit.*

Terry Ewert, Head,
Host TV Production, 1996 Olympics

shots, color analysis, or insertion of graphics for additional information. As a general rule, no more than 35% of the show should be taken up with color coverage, unless the contest is so poor it is necessary.

The director must have a sense of the pace of the sport and attempt to match that pace with the style of directing. In many ways the movement of the game and the movement of the athletes in the game are much like directing a musical production, such as a dance or a concert. The movement of the game will rise and fall as the conflict heats and cools. The physical action of a football team must be as precise and rehearsed as that of a ballet group. The quality director will be able to sense this pace and movement and build on it by using a directing style that matches and augments the game.

Facilities and Coverage

How the crew is utilized and how facilities are controlled is sharply different in the coverage of sports—especially in small and medium sized markets. And the role of the director is much different in this situation. In most other situations the director makes every decision regarding camera shots, camera movement, the development of graphics, and the actions of talent. In sports coverage the director becomes the center of a coordinated effort by all talent and crew to provide shots, tape replays, and other input from which the director can select what will be put out on the air. He or she becomes an editor, in this sense, selecting and guiding the production. That is not to say that the director doesn't call for specific shots, coverage, and isolation. But the tempo of the activity in the director's truck is so rapid that the director cannot possibly talk through every shot or sequence with crew and talent.

Directing Cameras

Assigning Cameras

Specific camera placement recommendations for various sports are included later in this chapter. At this point we will outline the general types of camera coverage assignments that can be made for any situation. The camera designations outlined in this section deal with the type of coverage the camera generally provides.

Depending on how many individual camera units you are blessed with for a particular production, each can be generally designated in one of these types. Our concern here is with assignments, not numbers.

Each camera will have a general responsibility: (1) action/game, (2) hero/shag, or (3) iso/special assignment.

Action/Game Camera. The action, or game, camera (or cameras if you have that luxury) is responsible for covering the general action of the sport. This does not mean the director may not use other cameras for this purpose, but the action camera has that specific assignment. If, for example, a football team moves the ball to the one-yard line, you may want to increase warmth by using a utility camera behind the goal post to get a different view of the impending battle at the line. But for general assignment, the action camera has that specific responsibility.

Hero/Shag Camera. The hero, or shag, camera takes close-ups following a particularly outstanding athletic effort, thus the “hero” designation. This camera can also be used to follow the action to highlight important points in the context—hence the “shag” designation. (The term comes from the concept of shagging fly balls in the outfield during baseball practice. This camera is chasing down various shots like an outfielder shags fly balls.) The camera operator must be able to sense the drama and emotion of the contest and give the director shots that show that drama. For example, even though the basketball game continues following a driving lay-up by a guard on the team, the hero-camera operator will give the director a shot of the guard. If the shot the guard attempts is blocked by the big center, the hero camera will focus on the center. The person who makes the play gets the camera shot.

On the other hand, if a football linebacker makes a particularly bruising tackle and injures the runner, the hero camera will focus on the injured player (as long as the injury is not terribly serious), while another camera takes shots of the linebacker. Similarly, the hero camera (with instruction from the director) may concentrate on the tennis player who seems to be losing the momentum in the match. If the player who seemed to have control of the match is beginning to slip, the hero camera will concentrate there. That is where the story is. If, on the other hand, the opponent is making a great comeback and is playing better tennis, that may be the story. The hero/shag camera also covers referees during penalty situations. That's part of the shag responsibility. It is the job of the hero or shag camera(s) to fill in the emotions of the game and to give the director shots that help the production do that.

Iso Cameras/Special-Assignment Cameras. Iso cameras cover specific (isolated) anticipated action points that can be tape recorded for later playback. The iso camera operator's responsibility is to understand the sport well enough to determine when specific actions in the game can be expected. For example, third-and-long yardage situations in football generally mean the team will throw a pass. In addition, the iso camera operator should know (from pre-production meetings) what style of game a particular team (or individual) normally plays. This information will give the iso camera operator a chance to feed the tape assistant director or operator a shot that may be usable when play slows or stops.

The director may have time to cue the iso cameras regarding particular anticipated actions, but then the iso cameras are on their own to provide the shots. The director will not have time to talk them through such coverage.

Special-assignment cameras are designated for specific coverage during the game. Sideline cameras in football or basketball may have the assignment of providing coverage of the bench or the coach. They may shoot sideline talent for special reports. Other such cameras may cover talent in the booth or provide shots of a clock. Most coverage situations in smaller markets and non-network feeds don't have the luxury of many such units, and iso cameras can fill both responsibilities.

Camera Initiative

In pre-production meetings the specific assignments for each camera are reviewed. The camera operators must know what part of the coverage is their responsibility. Specific game situations should be reviewed—"what if" situations. "What do we do if the War Chiefs get inside the 10-yard line?" "Who gets shots of Coach Johnson?"

Before game time, the camera operators experiment with their cameras to see what kinds of shots they can get within their specific assignment, then they may experiment to see what other shots they can get to add to the repertoire of shots from which the director can select.

During the game, all camera operators should provide the director with a broadcast table shot almost all the time, and they should tell the director (via intercom) when they think they've got a shot the director can use for some effect—in a way they try to sell the director on their shot or potential shot.

Sometimes the camera operator may take the initiative to begin to get a particular shot and the director accidentally cuts to that camera in the middle of the move to get to the shot. As a director works with a crew on coverage, however, each will get to know how the other works, so such glitches will occur rarely. The director should be able to watch the monitors of all cameras. Such a cut is the director's mistake, not the camera operator's (unless the director has called for a specific shot on that camera and the operator is out freelancing on his or her own).

When the action of the contest is taking place, the director may be locked to an action camera. The other camera operators, however, must have their heads into the game and should be looking for shots so that when the action stops or slows they can help tell the story and support the style, mood, pace, and rate of the project.

Directing Replays

A replay always breaks the viewers' connection with the reality of the line event. Therefore there must be a strong motivation for a replay—only then does it enhance the coverage. Unnecessary replays annoy the viewer.

—Kalevi Uusivuori and Tapani Parm,
Producers, YLE, Finland

This same kind of teamwork occurs with tape operators and tape assistant directors. The director usually does not have time to call all the replay set-ups, or assign a particular camera to a particular VTR. Nor can he or she tell each iso camera what part of the action to cover. The tape AD or the operator will select (using a simple routing switcher at the VTR) which camera to record on which iso machine. When the director needs a replay, slo-mo, or iso of any kind, the tape AD can tell the director what is available—on which machine—and sell the director a particular cut. The director can then decide which replay to use. Normal coverage in a small market will have two or three replay machines capable of playback at regular and slow-motion speeds.

Directing Graphics

> *Primarily, sports coverage is a numbers game. There are scores, player numbers, and statistics to be organized and presented in a dynamic view on demand. Multichannel character generators and fast operators are a must. Success here often depends on careful pre-game or pre-game-date assembly and storage of names and player stats. CG and tape are the most heavily involved elements during the pre-game production where ten-things-at-once displays are made to happen with the push of a button during the game. A recent addition to the already heavy graphic load in sports has been the introduction of real-time relay and display. In football, this would include hang time of a kickoff presented as a running stopwatch. In baseball, the speed of the pitch and the speed of the batted ball can be shown as a dynamic cell in a corner bug where the ball/strike count and base runner graphic is often included.*
>
> *—Bennett Liles, Production*

In sport production, directors have the same type of relationship with graphics as they do with tape ADs and camera operators. A font coordinator coordinates the loading of graphic material into the electronic character generator equipment (sometimes called Chyron after one of the most popular systems in the field) coordinating the work of the character generator operator with the needs of the producer/director of the production. Pre-existing information is typed into the equipment before the game begins in addition to formatting pages used to input statistical material gathered during the course of the game. This "in game" information can

Replays

Replays are shown whenever the director considers a particular action noteworthy. As a general rule, replays do not cut into live action when the sport is in play. The director may overlap some important replays over live action but only if the live action does not involve interesting play. There must never be a danger of losing important action. The order and length of the replay is the directors call.

Replays generally enter and leave by a digital effect so that the audience knows that it is a replay and not live action. Many times replays end with a freeze frame.

The International Amateur Athletic Federation Television Guidelines state that cameras should also focus on what happens after the finish for some time, before going into slow motion replays. Reaction of the competitors is more important than slow motion. Slow motion shots should have an editorial basis and should not be an automatic decision. It is advisable to have a variety of options available by isolating several cameras in the stadium.

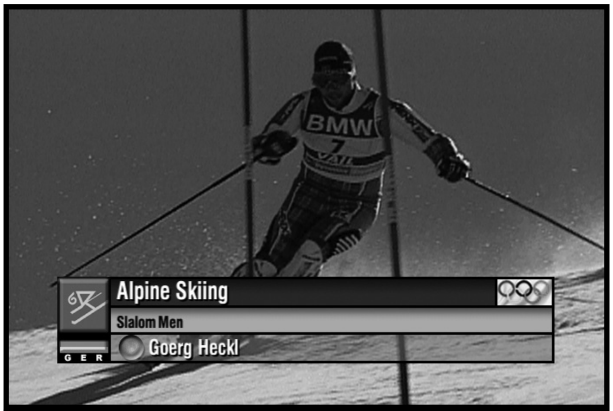
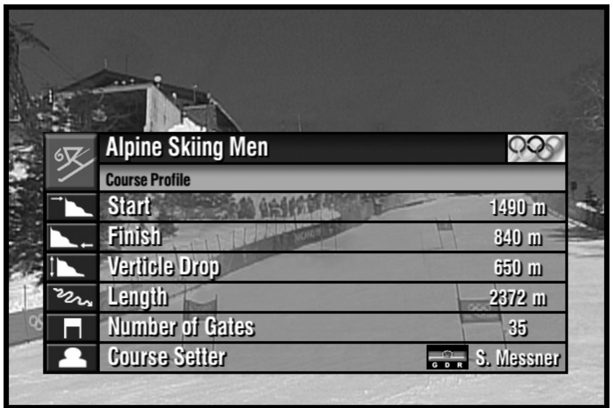


Figure 7.1: Competitor identification: graphic used to show the sport, event, athlete's name, and country.



Alpine Skiing Men

Course Profile

Start	1490 m
Finish	840 m
Verticle Drop	650 m
Length	2372 m
Number of Gates	35
Course Setter	GDR S. Messner

Figure 7.2: Course profile: graphic used to describe the course at the beginning of each event.

be manually inputted during the game or it can be delivered automatically to the device during the competition by a sport data interface. Before the event begins, individual statistics that producers and/or directors anticipate using will be some statistical material during the contest (score, yardage, fouls, field goals, records) that will be entered for immediate display on the screen. Some sports productions (although it is a rarity) will use two character generators—one for retrieval of pre-produced graphics and one for graphics entered during the production.

Since the graphic area is one of the most hectic areas during a sports event, the crew and all of the graphic equipment are sometimes out boarded to a separate trailer, room or truck. This would generally only happen for very high profile events that are very graphic intensive. It has been estimated that graphics get out boarded roughly 10% of the time.

The Camera

It is not the total number of cameras which is important, as much as their positioning. The principle should be that it should be possible to show the whole of one performance with one camera.

—International Amateur Athletic, Federation Television Guidelines

A sports production will utilize a variety of camera types *(see figure 7.3)*, unique point-of-view shots, extremely long telephoto lenses and different kinds of camera mounts. However, the best equipment is useless in the hands of an unskilled camera operator. One of the keys to being a good camera operator is the ability to listen to the director and to anticipate where the action is going and the type of shot the director wants to include. The following section outlines the various shots, camera moves, composition often used, and touches on basic care of a video camera.

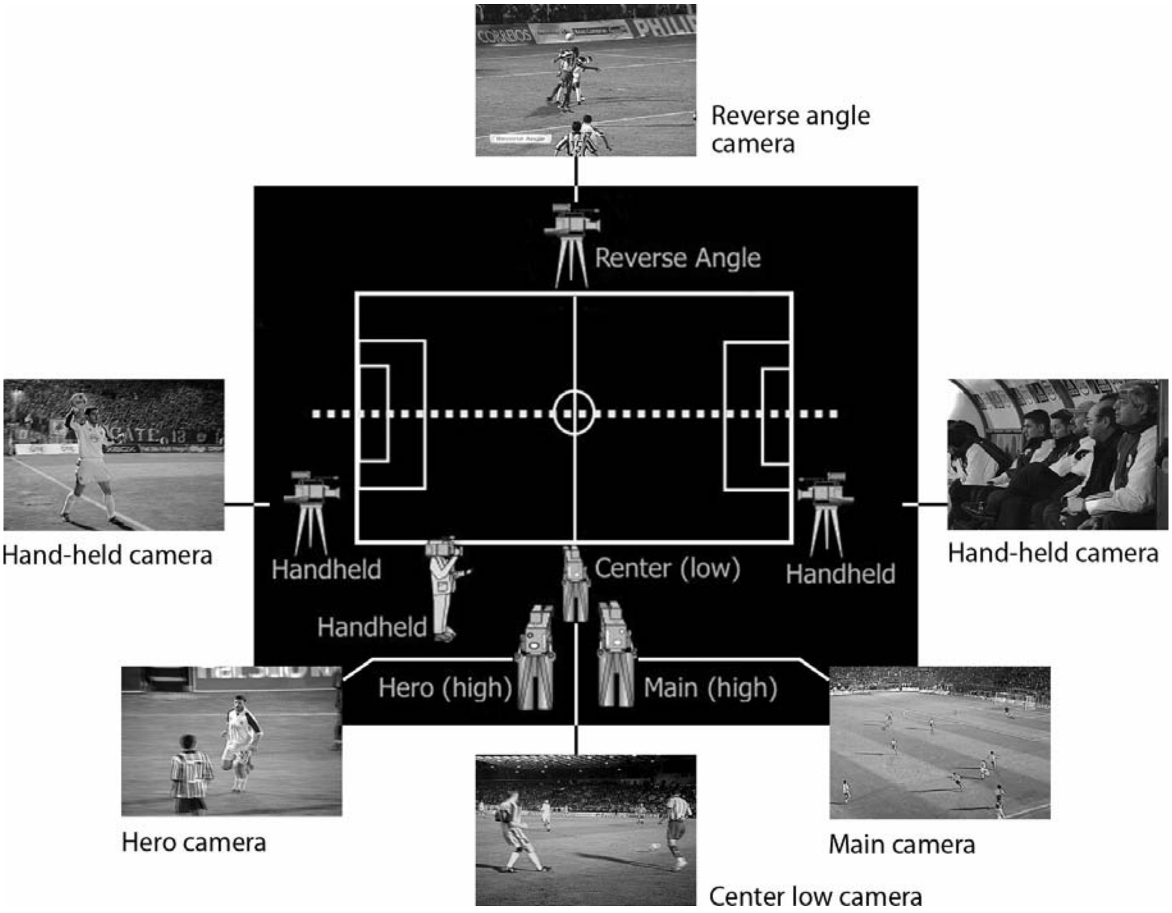


Figure 7.3: Each camera provides a different point of view that the director relies on to tell the story.

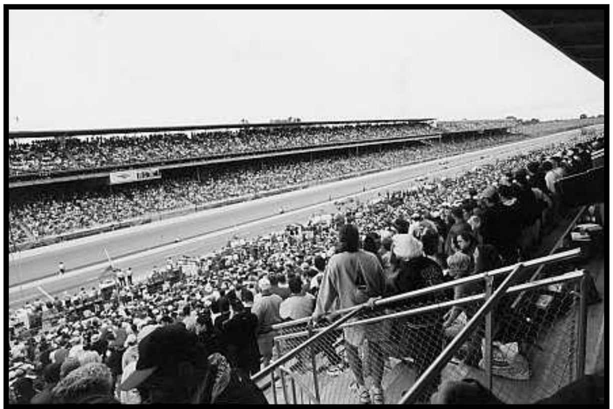


Figure 7.4: Extreme Long Shot (XLS).

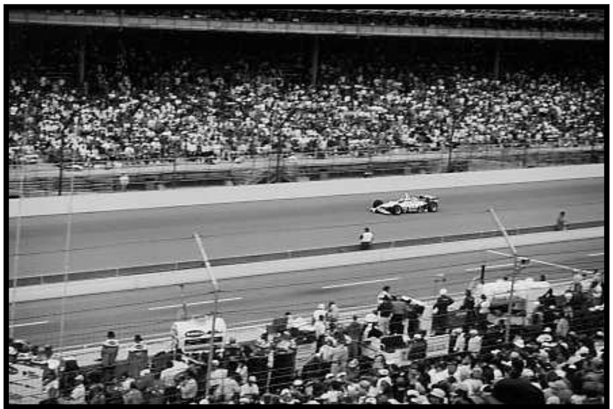


Figure 7.5: Long Shot (LS).

Camera Shots

Camera shots are relative to what you are shooting and must be defined by the director. Camera shot categories are loosely defined. A long shot for one director in a stadium may be a medium shot for a studio director. See figures 7.4–7.8 for illustrations of the general shot composition categories.

The long shot (LS) establishes the scene. This shot shows the audience and director the overall context in which the action is taking place. The distance from the camera to the subject is relative to what you are shooting. For example, a long shot of a person would show the entire person from head to toe. A long shot of the field of play may show the entire field of play.

The extreme long shot (XLS or ELS) is further away than the long shot. Using the examples under long shot, an XLS shot of a person would show the person and their immediate surroundings. An extreme long shot of the field of play may be a blimp shot capturing the entire stadium.

The medium shot (MS) generally tells the story. This is the main shot that shows the subject as well as some of the context. A medium shot of a person may capture them from the waist up. A medium shot at a stadium may include the whole person or even a couple of people.

The close-up shot (CU) adds drama. It is a close shot of the subject being discussed in the program or a person's face. In a large stadium, the close-up may be a shot of a person from the waist up.

The extreme close-up shot (XCU or ECU) intensifies the drama by showing the viewer details of the object being discussed or capturing the

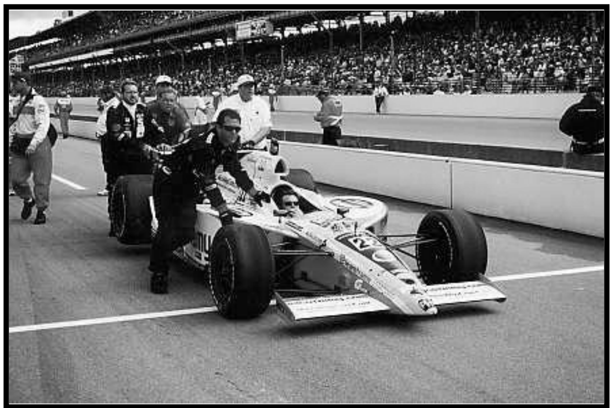


Figure 7.6: Medium Shot (MS).

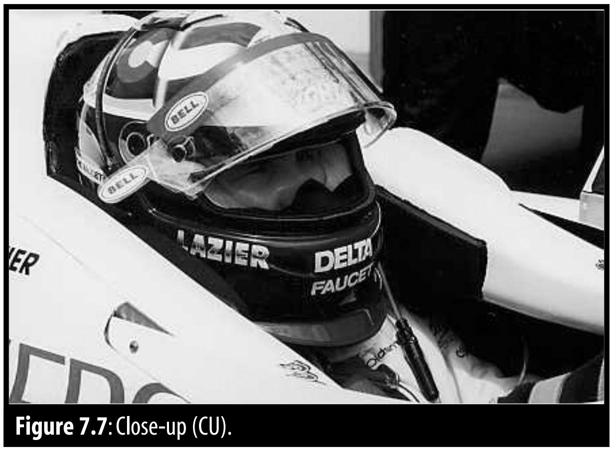


Figure 7.7: Close-up (CU).

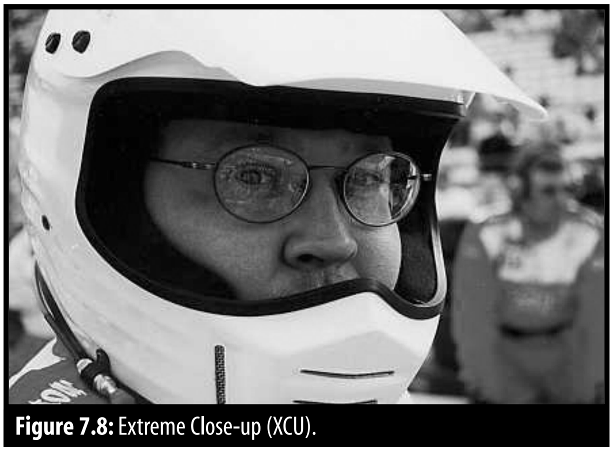


Figure 7.8: Extreme Close-up (XCU).

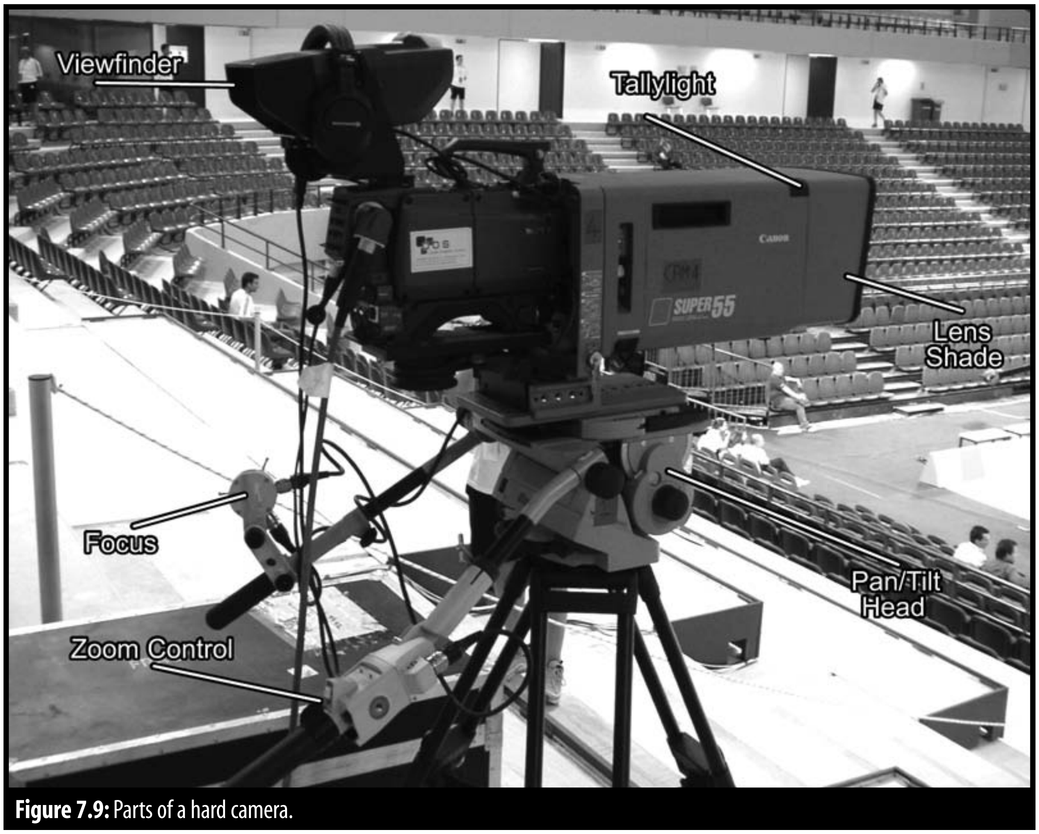


Figure 7.9: Parts of a hard camera.

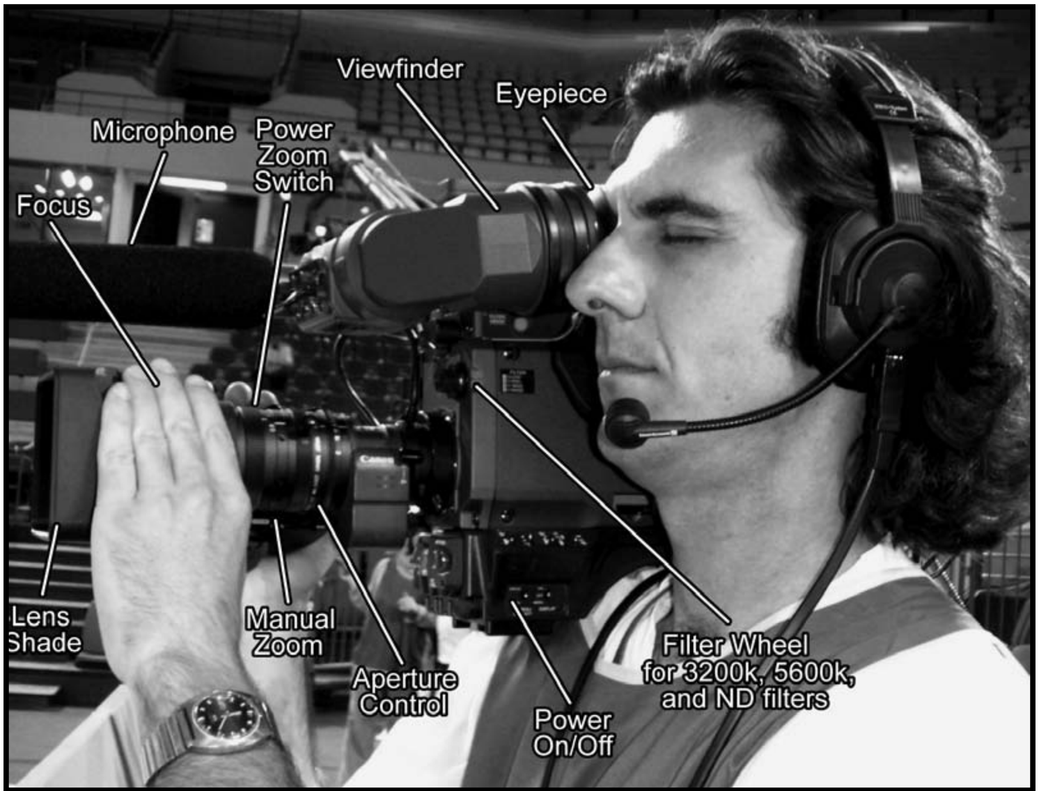


Figure 7.10: Parts of a hand-held camcorder.

emotion on a person's face. ECUs dramatically increase the communication of the emotion.

Camera Movement

In the planning chapter we discussed a variety of moving cameras, such as a rail camera, boatcam, helicopter, Steadicam, and crane. It is the director's responsibility to decide if a specialty camera should be used. Generally, specialty cameras are used when they contribute to the viewer's understanding of an event. The following are the primary reasons why camera movement is used during an event:

- It gives a unique perspective of the action that can't be seen any other way. For example: a helicopter or blimp shot puts the field of play into perspective geographically. A camera mounted on a motorcycle allows the director to stay with the leader throughout a marathon.
- It provides the viewer a feel for the motion of the action. A tracking camera can move alongside sprinters enhancing the viewer's perception of their pace, or a dive camera can drop with a diver capturing impact into the water and the speed of descent.
- Camera movement can pull the spectator into the event. A crane shot can continuously move from a wide shot, with the camera showing the audience, to a close-up of action occurring on the field of play. A Steadicam, moving with an athlete from the locker room to the field of play gives the viewer an intimate view of the athlete's perspective of an event. *(See figure 7.11.)*

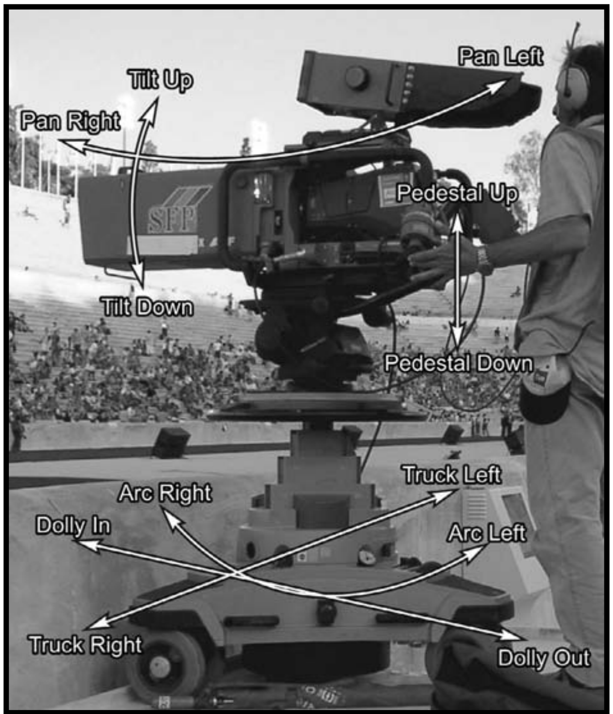


Figure 7.11: Camera moves.

Hand-held HDTV Cameras

With hand-held cameras, plan on a constant follow focus world when moving into and out of shots. Most operators aren't used to focusing when they're zoomed out, yet in HD you need to.

Starting Here, Starting Now

Your focus is 1000 times more critical in HD, you can see how light affects each blade of grass. You can really tell if your focus is off just a bit.

Eye on the Game: Cameras in Sports

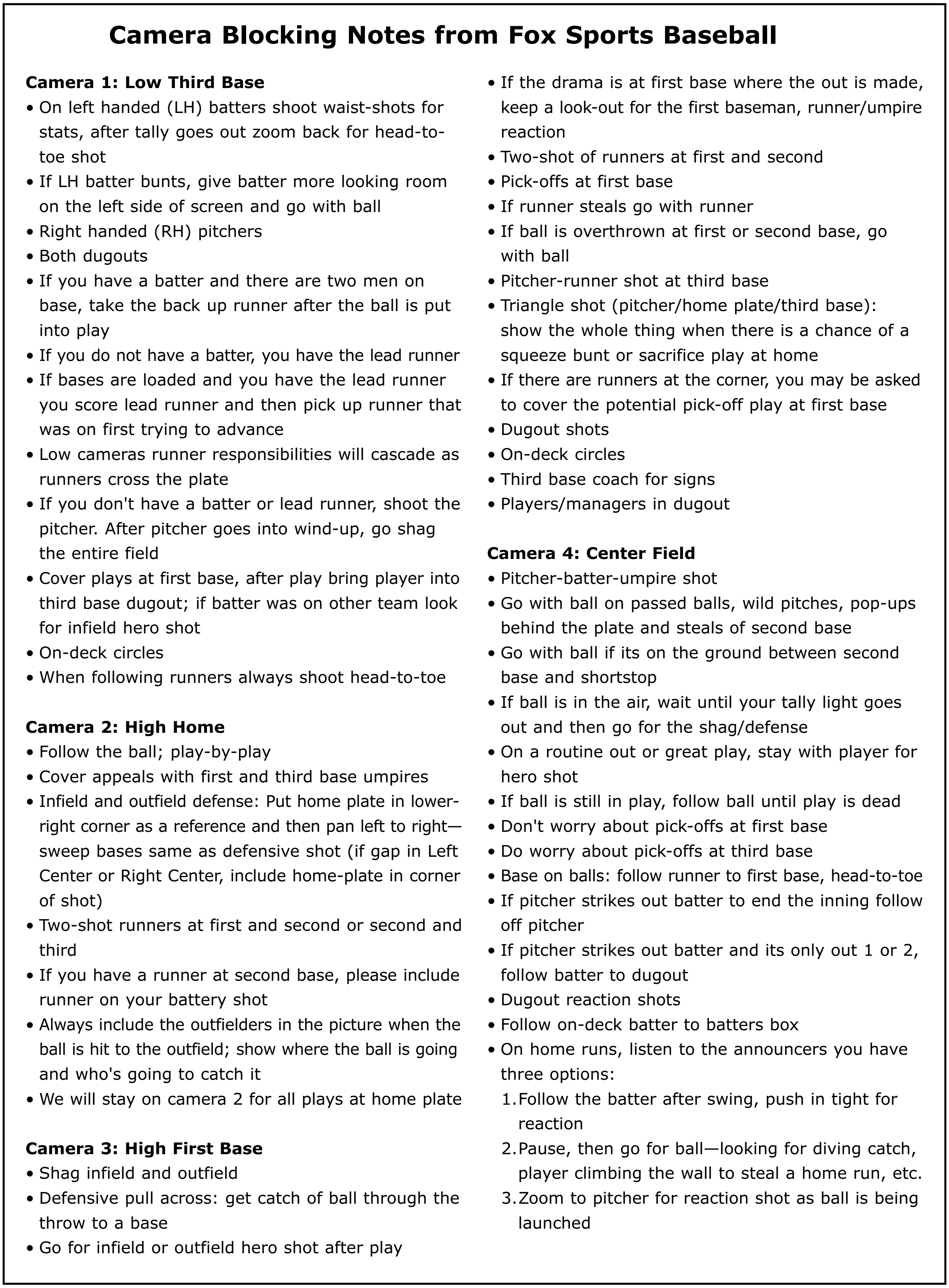
Camera/Lens Moves

A variety of camera and lens moves are used by camera operators to capture the desired coverage. *(See figure 7.11.)*

Zoom. A variable focal length lens. This lens has the ability to continuously go from wide angle to close-up. Directors will sometimes use the word "tighten" to zoom in and "loosen" to zoom out to a wide shot.

Pan. Refers to moving the camera left or right on the camera support's axis, for example, pan right, pan left.

Tilt. Refers to moving the camera up or down on the camera support's axis, for example, tilt up, tilt down.



Camera Blocking Notes from Fox Sports Baseball

Camera 1: Low Third Base
- On left handed (LH) batters shoot waist-shots for stats, after tally goes out zoom back for head-to-toe shot
- If LH batter bunts, give batter more looking room on the left side of screen and go with ball
- Right handed (RH) pitchers
- Both dugouts
- If you have a batter and there are two men on base, take the back up runner after the ball is put into play
- If you do not have a batter, you have the lead runner
- If bases are loaded and you have the lead runner you score lead runner and then pick up runner that was on first trying to advance
- Low cameras runner responsibilities will cascade as runners cross the plate
- If you don't have a batter or lead runner, shoot the pitcher. After pitcher goes into wind-up, go shag the entire field
- Cover plays at first base, after play bring player into third base dugout; if batter was on other team look for infield hero shot
- On-deck circles
- When following runners always shoot head-to-toe

Camera 2: High Home
- Follow the ball; play-by-play
- Cover appeals with first and third base umpires
- Infield and outfield defense: Put home plate in lower-right corner as a reference and then pan left to right—sweep bases same as defensive shot (if gap in Left Center or Right Center, include home-plate in corner of shot)
- Two-shot runners at first and second or second and third
- If you have a runner at second base, please include runner on your battery shot
- Always include the outfielders in the picture when the ball is hit to the outfield; show where the ball is going and who's going to catch it
- We will stay on camera 2 for all plays at home plate

Camera 3: High First Base
- Shag infield and outfield
- Defensive pull across: get catch of ball through the throw to a base
- Go for infield or outfield hero shot after play
- If the drama is at first base where the out is made, keep a look-out for the first baseman, runner/umpire reaction
- Two-shot of runners at first and second
- Pick-offs at first base
- If runner steals go with runner
- If ball is overthrown at first or second base, go with ball
- Pitcher-runner shot at third base
- Triangle shot (pitcher/home plate/third base): show the whole thing when there is a chance of a squeeze bunt or sacrifice play at home
- If there are runners at the corner, you may be asked to cover the potential pick-off play at first base
- Dugout shots
- On-deck circles
- Third base coach for signs
- Players/managers in dugout

Camera 4: Center Field
- Pitcher-batter-umpire shot
- Go with ball on passed balls, wild pitches, pop-ups behind the plate and steals of second base
- Go with ball if its on the ground between second base and shortstop
- If ball is in the air, wait until your tally light goes out and then go for the shag/defense
- On a routine out or great play, stay with player for hero shot
- If ball is still in play, follow ball until play is dead
- Don't worry about pick-offs at first base
- Do worry about pick-offs at third base
- Base on balls: follow runner to first base, head-to-toe
- If pitcher strikes out batter to end the inning follow off pitcher
- If pitcher strikes out batter and its only out 1 or 2, follow batter to dugout
- Dugout reaction shots
- Follow on-deck batter to batters box
- On home runs, listen to the announcers you have three options:
  1. Follow the batter after swing, push in tight for reaction
  2. Pause, then go for ball—looking for diving catch, player climbing the wall to steal a home run, etc.
  3. Zoom to pitcher for reaction shot as ball is being launched

Figure 7.12: Camera blocking notes from baseball. (courtesy Director James Angio, Joseph Maar and Television Broadcast) *continued next page.*

Camera 5: Low First Base

- Right Handed (RH) batters: waist-shot for stats; after tally goes out, zoom back for head-to-toe
- If RH batter bunts, give the batter more looking room on the right side of screen and go with ball
- LH pitchers
- If you have a batter and there are two men on base, take the backup runner after the ball is put into play
- If you do not have a batter you will have the lead runner
- If the bases are loaded and you have the lead runner, you score lead runner and then pick up runner that was on first trying to advance
- Low cameras runner responsibilities will cascade (or alternate) as runners cross the plate
- If you don't have a batter or lead runner shoot the pitcher, after pitcher goes into his wind-up shag the entire field
- Cover plays at first base
- If its a routine out at first base, follow the player back to the dugout
- After play look for infield hero shot
- Both dugouts
- On-deck circles
- When following runners, always shoot head-to-toe

Camera 6: Low Home

- Tight shot of pitcher
- Pitcher-batter shot
- On LH batters you need to move to your left
- On RH batters you need to move to your right
- Follow ball when your tally light goes out
- Look out for behind-the-plate action
- Cover shots
- Runners with good speed: cover the runner at first base; if he steals go with runner
- If ball is hit up-the-middle and a runner crosses in your path, then pick up runner trying to score. What really looks good here is the third base coach trying to hold up runner or giving him the advance sign to home plate

Camera 7: High Third Base

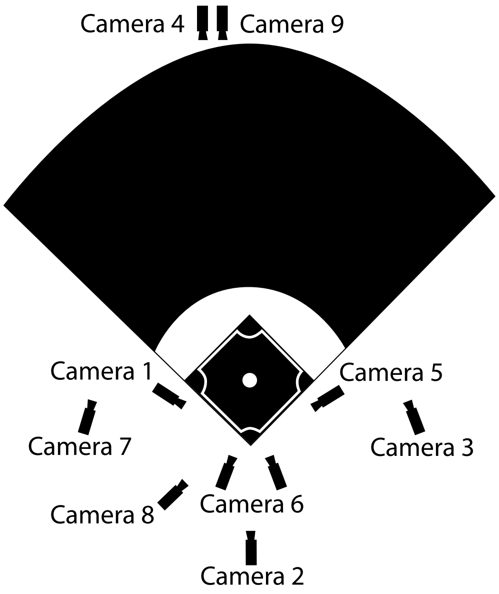
- Pitchers
- Plays at first base
- Dugouts
- On-deck circles
- Pitcher-runner shot
- If runner steals go with runner
- Two-shots of runners at second and third
- Runners at first and third
- Help on passed ball and wild pitches
- If you have a runner, stay with him
- If no runner responsibilities: go with ball for defense shag CF to RF
- Beauty shots
- Congrats in dugout after scoring play
- Sometimes shoot LH batters to show his stance
- Players/managers in dugout
- If you're on the pitcher-runner shot and the pitcher throws over first, don't move. We can cover the man stealing and also see if there had been a balk by staying on your pitcher-runner shot

Camera 8: Concourse Level, Third Base Side—shooting down first base line

- Include batter, catcher, pitcher, first baseman
- Ball looks great hooking down the right field line
- Great diving play by first baseman
- Shag from CF to RF
- Bunts by both RH and LH batters
- If there's a good runner at first base, include catcher and runner—this looks great for pick-offs at first base
- Suicide squeeze at home
- Dugouts
- On-deck circles

Camera 9: Center Field

- Frequently directors use a second camera as a tight ISO.



Arc. Refers to the movement of a camera on a curved path. Arcs can occur on a dolly track, hand-held or Steadicam, for example, arc left or arc right.

Truck. A camera and mount movement to the left or right, for example, truck left or truck right.

Dolly. A camera support that allows a camera to move in different directions. It can also refer to an actual camera move (dolly-in or dolly-out). Dolly-in refers to moving the camera and support forward. Dolly-out is when the camera and support moves backwards.

Crane up/Pedestal up. A crane/pedestal movement is when the camera is moved up or down utilizing a crane or pedestal. Cranes have become an accepted and even expected part of sports coverage. The crane allows continuous movement from a close-up to a high, wide angle giving an entirely different perspective of the event.

Shooting Sports

The field cameras had only sports sights consisting of a wire frame at the front and a peep-sight at the back. The cameraman had no control over focus, which was adjusted from the control truck by remote control, and the field seen in the crude sports-sight was, I'd have to assume, fairly inaccurate.

—Art Smith, Sports camera operator, 1939

As we mentioned earlier, the director will assign the crew to specific cameras and also dictate the type of shot that the camera operators must capture. The camera's viewfinder may not display exactly what the director is seeing in the truck. It is not uncommon for a camera operator to find that centered for their camera may not be centered in the truck. The director will instruct the camera operator on composition. The camera operator should stick with the director's instruction, even if it looks a little off on the camera.

The wider a camera shot, the easier it is to follow the action. However, the wider the shot, the less exciting the image is. Many times directors will ask camera operators to start tight and then widen the shot as the action proceeds. It is important to remember not to get too tight making it impossible to follow the play.

Another advantage of the wide shot is that it is easier to shoot steady handheld images. Telephoto lenses amplify camera movement; movement is less noticeable with a wide shot. Hand-held camera operators should get as close to the action as possible while still using the wide angle shot. Of course, in sports, it is not always possible to get close to the action. For this reason, cameras are equipped with long lenses and always placed on heavy-duty tripods to ensure steadiness.

A tripod substantially increases the stability of the camera and allows more accessibility to the camera's remote controls, even on an ENG-type camera. Without a tripod, it is difficult to focus, zoom, tilt, and pan at the same time.

For beginners, keeping the subject in focus can be incredibly difficult. However, with experience, it becomes second nature. There are primarily two methods of focusing in sports—follow focusing and zone focusing.

Follow Focus. Follow focus, also known as critical focus or tracking focus, means that the camera operator is continually adjusting the focus in order to keep the subject in focus. This is particularly critical when using a telephoto lens.

Zone Focus. The zone method of focusing means that the camera operator prefocuses on the field of play, knowing that anything that comes into a specific area will be in focus. There are a number of variables that determine the effectiveness of zone focusing. First of all, if a wide angle lens is being used on a bright day, the zone of focus, or depth of field, may be from 1.2 m to infinity. The longer the lens, the less depth of field it can cover. Many times there are not enough cameras to allow cameras to focus only on one zone.

Composition

Anticipation is the key to composing shots for sports. The camera operator must anticipate where the competitors are going next in order to capture an image that means something to the viewer. Although good composition is relative to a person's perspective, there are certain composition standards. Good shot composition allows the viewer to have a better understanding of what is going on, makes the viewing experience more enjoyable and can significantly improve the entire production quality. *(See figure 7.14.)*

Composition for Action Shots

- Make sure that there is enough headroom.
- Always keep the subject in the frame (with fast moving action, this can sometimes be incredibly difficult).
- Keep the competitors centered in the frame. However, when the player or team is in motion, always shoot with lead room.
- Watch the background. Ensure that it adds context to the shot.
- Make sure that the horizon is straight for all cameras. This can especially be a problem for handheld cameras.

Composition for Interviews

- Make sure there is enough headroom.
- When needed, compose for graphics. A graphic may need to be inserted below or beside the head.
- Always watch the background. Look for elements that appear to pop out of the talent's head (flags, trees, etc.).
- Whenever possible, interviews should be shot in context. The background should add something to the interview. It should tell you something about the person being interviewed or the event being covered.
- Do not show too much profile.
- Make sure that there is lead room, space for the talent to look toward.

Caring for the Camera

Cameras are very fragile and it is essential to treat them with the utmost care. When working remotes, camera operators and assistants must be especially mindful of the following conditions which could damage the equipment.

Weather. Cameras must be protected from extreme heat, rain, and snow. Extremely cold temperatures reduce the life of equipment and batteries. Condensation can form when moving equipment from cold temperatures into a warm room, rendering the equipment useless.

Water. Cameras cannot be submerged in water without the appropriate underwater gear. If a camera does become submerged, it is generally irreparable.

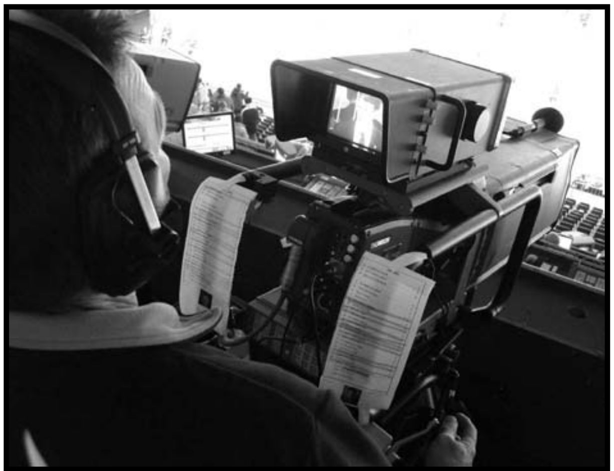


Figure 7.13: Camera operators sometimes attach team lists to their camera in order to quickly identify a player being asked for by the director.

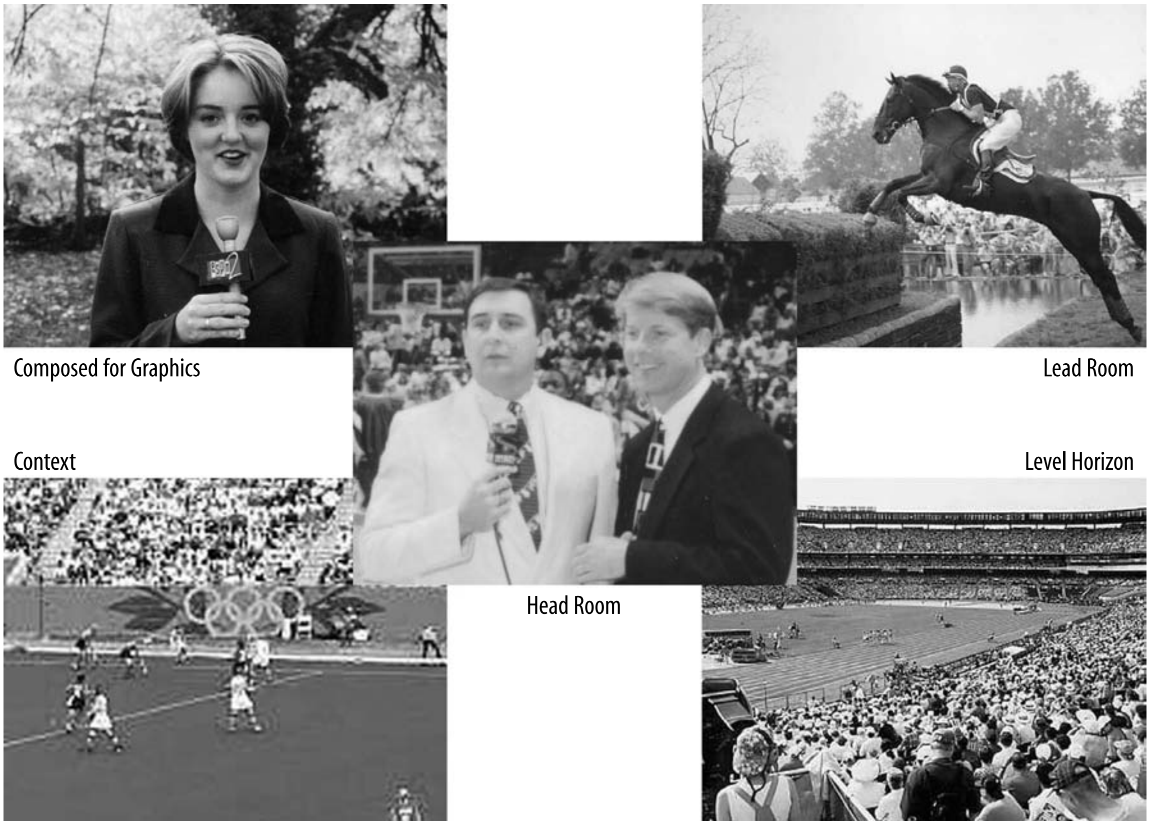


Figure 7.14: Composition examples.

Dust/Sand. Dusty situations wreak havoc on equipment, especially record/playback heads. When the heads become dirty, recording and playback is impossible. It is generally impossible to repair a lens or camera that has been dropped into sand.

Drops/Vibrations. Equipment must be carefully packed in shock absorbent material (foam or a padded case) when travelling. Airplanes, cars, and all other types of transportation will vibrate the camera, often loosening boards and screws. Cameras cannot handle the jolts from being dropped, which can cause video/audio heads and CCDs to go out of alignment.

Magnetic Fields. Videotapes must be kept away from magnetic fields. This can erase or deteriorate the image on the tape.

Shading

It is essential to have all cameras properly adjusted for optimal image quality. Video operators (VO), sometimes known as shaders, are responsible for shading or adjusting the cameras. Cameras need constant attention, especially when shooting outdoors. As the weather changes or as the sun and/or clouds move across the sky, the lighting can change drastically on the same field of play. Video operators work in the video control area of the mobile unit, using the camera control unit (CCU) or remote control unit (RCU) to adjust the various components of the cameras. Generally an RCU is used to control the CCU.

Video operators adjust cameras for correct color, white balance, and contrast. VOs use master black (pedestal) and the white level (iris) for camera adjustments. They use an oscilloscope and wave form monitor to enable them to create the best quality video image.

Audio for Remotes

I learned my craft in a recording studio and my goal has been to paint a picture with the sound, not just cover the action. Theater of the mind, just close your eyes and feel the boxer's pain with each punch. Experience the thundering sound as you hit 200 miles per hour in a Formula 1 car. Good sound accentuates the soundtracks of life.

—Dennis Baxter,
Senior Audio, four Olympics

The types of microphones being used and microphone placement is determined during the planning phase. Microphones are cabled and placed during the set-up phase. Therefore, at production time the A-1 or senior audio person should be ready to mix the event. Audio inputs come from a variety of sources which may or may not include:

- Multiple talent
- Public address system
- Field-of-play microphones (including camera mics)
- Ambience microphones
- Crowd microphones
- CD
- Player/coach/referee wireless mic
- Multiple VTRs or other type of playback equipment

The A-1 is responsible for mixing all of these audio signals into a clear representation of what is actually occurring at the event.

The A-1 must concentrate on which camera is being called for by the director as well as know

Field Hockey Audio

Hockey is a sport where good sound effects will significantly heighten television coverage and the viewers experience of the game. Play action will constantly be moving up and down the field, and sound will be generated by the players when they strike the ball with the stick. The players tend to be vocal and exchange commands during a match to set up and coordinate field positions.

1996 Atlanta Olympic Broadcasting
Venue Technical Manual

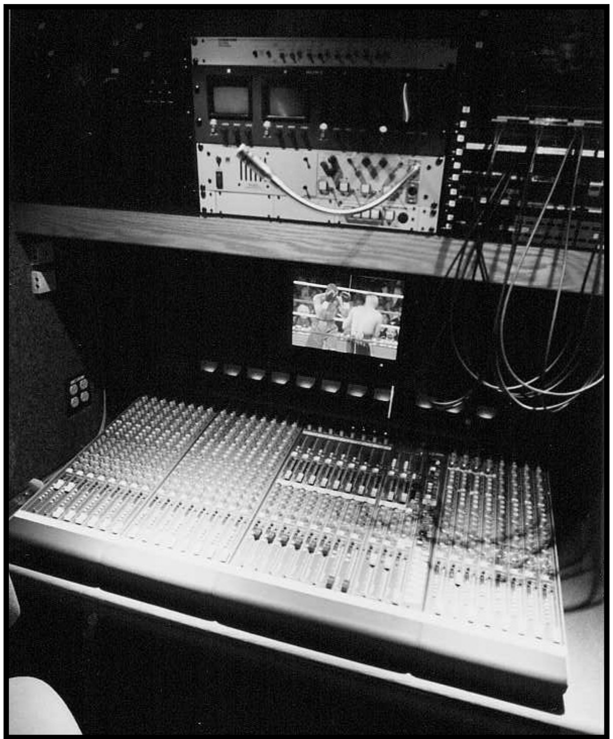


Figure 7.15: Audio area in a small truck.

which talent is going to speak. Then, he or she can "pot up" the corresponding microphone in order to provide the audience with the sound from the proper source.

During the production, the A-2 or audio assistant's responsibilities include hand holding microphones, making sure that wireless mics have good batteries, changing batteries, keeping the appropriate mic flag on the microphone, and troubleshooting any problems with the microphones and cables. Sometimes a microphone or cable may need to be changed during the broadcast.

Audio Guidelines

1. Always test the microphones before the production begins.
2. Run microphone cables perpendicular to electrical cords, not parallel.
3. Limit the distance between the talent and the mic to reduce ambient noise.

Pregame, post-game, and half-time productions offer a myriad of challenges for audio. There are a number of areas that require quality sound, making it almost impossible to only go with "live" sound. Prerecorded audio is often used to supplement and sometimes completely replace live sound. The following is a list of some of the reasons prerecorded audio was used during the 1992 Barcelona Olympic Games Opening Ceremony. At this event, prerecorded audio was used for every aspect of the ceremony—from the roar of airplanes crossing the sky, to opera singers, to the applause of the spectators.

1. Prerecorded sound allows for near perfect synchronization of the technical aspects of the spectacle, offering the ability to link sound, lights, camera movement, and other enhancements.
2. Prerecorded sound ensures optimal quality for television, allowing for stereophonic sound (stadium spectators only hear monophonic sound), as well as mixed enhancements.
3. Prerecorded sound allows a better experience or sense of proximity to the event for television viewers. For both television and stadium spectators prerecorded sound also can direct attention to specific events happening in a very large stadium in a way that live sound can not.
4. Unforeseen weather conditions, such as the rain or the wind, do not affect the prerecording but can affect live music leading to irreparable distortions in a live broadcast.
5. Unforeseen noises, such as friction between the microphone and the actors' clothes, movements of the announcers in respect to the microphone or various feedback effects, can be avoided.
6. The use of prerecorded sound can be more comfortable for the performers in the stadium, especially for the opera singers, some of who, in fact, preferred that their music be prerecorded.
7. There were also several microphones strategically placed in the stadium in order to pick up spontaneous sound during the event, in the form of applause, booing, and cheering.

Graphics

As a director, I always assume that the audience is watching from a noisy bar, or contending with the children, and ultimately unable to hear the commentators. Hence I always place a huge emphasis on the value of graphics and consequently the amount of time devoted to inserting the graphical information on the screen so that the audience has sufficient time to digest the information.

—Brian Douglas, Head,
Host TV Production,
2002 and 2006 Olympics

Graphics were initially introduced to enhance the dialogue of the commentators, but in many situations they have evolved and the industry has changed to a point where they have almost replaced the audio track as the primary means of communication for information and statistics.

Television graphics can be divided into two basic types—text graphics and illustrative graphics. Both these types of graphics contain some of the same elements but they are generally produced for separate purposes, often by separate types of operators and sometimes by separate departments.

Text Graphics are usually composed in either 2D or 3D character generators. They can be static or they can be animated. They usually contain a dense amount of information—in fact their whole purpose is to communicate as much information as possible. The screen can contain some graphic elements but the whole focus is the information not the pretty background or the design elements which usually come out of the standard library for the particular look or show. The person composing this type of graphic is generally called a character generator operator.

Illustrative Graphics are much less predictable on a day-to-day basis. This type of graphic must also adhere to the design concepts defined as being correct for the look or show but the type of requests depend on the needs of that day's stories. This type of graphic can include over-the-shoulder graphics to illustrate the story being talked about by the person on the screen, static or animated backgrounds for text from the CG, maps that illustrate story locations, animations to illustrate what happened in the story being covered, logo designs, promotional material for print or air, introductions to a show or segment, and bumpers in and out of the show. Illustrative graphics can be composed in many different systems. These systems can range anywhere from a simple and inexpensive system where a PC runs a paint program to the large and hugely expensive systems where masses of extremely high end UNIX computers are running 3D real time animation programs. The person composing this type of graphic varies from place to place, in general they are designated as a composer, animator or graphic artist.

Television Graphics Goals

Design for design's sake is useless. We haven't reached our objectives if viewers only talked about our new set. We want people to appreciate the scenery and graphics as part of a more pleasurable way to see the whole…information package that we present.

—Noubar Stone, Creative Director, ESPN

1. Convey information clearly and directly.
2. Establish the show's overall mood and tone through the graphic style.
3. Present facts, concepts or processes visually so the viewer will understand the program content.
4. Prepare for maximum communications impact.

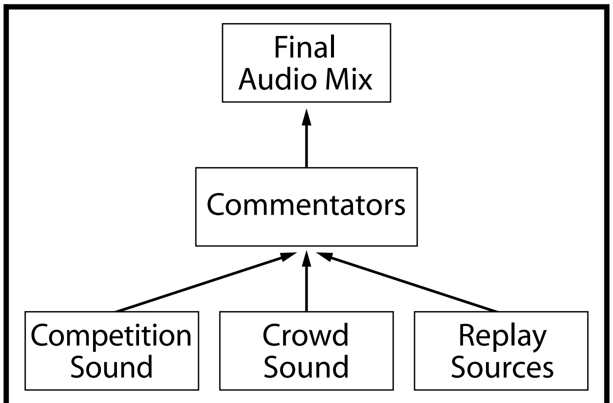


Figure 7.16: Audio mix diagram.

HDTV Audio

HDTV brings more than just better pictures. There are 5.1 channels of audio versus two in an analog feed. I now hear the referee's microphone on one channel, the announcer's on another, the crowd in another, and the sideline reporters have their own. As if I can't keep all of that straight, one channel plays music. With two channels of audio (analog feed), the crowd, the referee, and the announcers share the same channel and a lot of audio information is muffled.

Norm Samet, ABC Sports,
The Guide to Digital Television

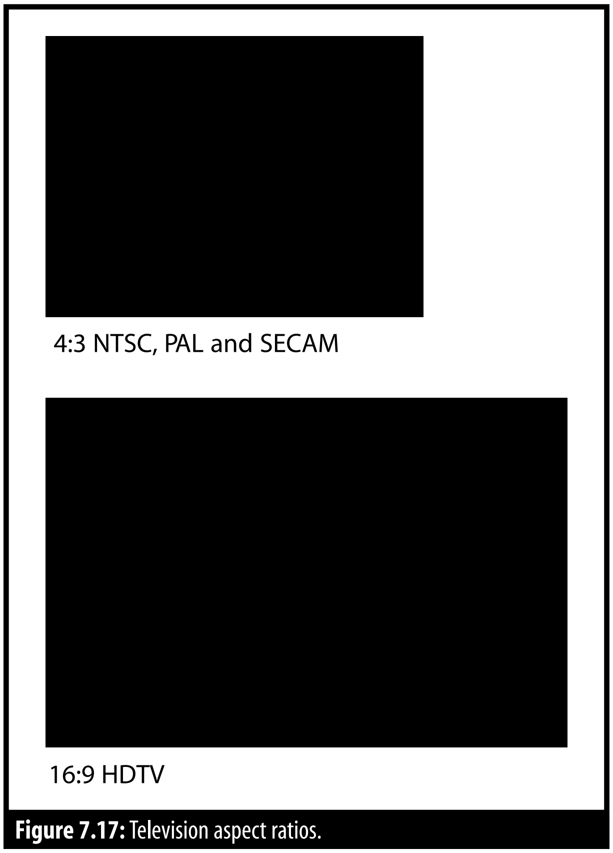


Figure 7.17: Television aspect ratios.

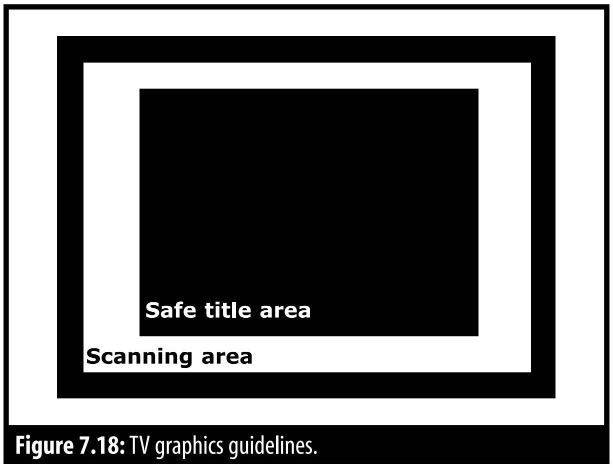


Figure 7.18: TV graphics guidelines.

The design process begins, of course, with the need for a particular graphic. The needs vary, but basically the graphic is to impart information—identification, results, statistics, time or speed, position, titles, etc. Once the need is known, the graphic artist goes to work on the design concept, then a graphic operator converts the design to a digital format. A digital format allows the image to be manipulated into a number of variations. The image might be titled, reversed, flipped, zoomed, squeezed, folded and, using colors, the image can be provided in a 3D effect.

—Olympics Television Production

Television as a format has an aspect ratio that is defined as the ratio of the proportions of the height to the width of the television image. NTSC, PAL, and SECAM televisions have an aspect ratio of 4:3 while HDTV has an aspect ratio of 16:9. It is important to understand the ratios so that graphics can be designed to fit the format of the production. Graphics created for 4:3 should be different than those created for 16:9. *(See figure 7.17.)* The scanning area is the image seen in the camera viewfinder or in the graphics or on-air monitor.

In many cases home televisions do not have the same scanning area as the production equipment. As a result, the graphic should not fill the scanning area as it may not be seen on home television sets. For this reason a safe title area has been created that allows a graphic designer or operator to create graphics within a set area that has been designed to be seen, roughly the center 80% of the scanning area, is where all graphics should be placed to ensure the goals for television graphics are met. *(See figure 7.18.)*

Most companies or events have created their own graphic look for events. Stations and networks have created graphic standards that identify specific colors, font styles, sizing, presentation, and specific animations that are to be used for programming. These graphics are used to create a television brand. The idea is that whenever anyone sees the combination of font, color, and presentation, they will immediately know what event, network or station they are watching.

HDTV graphics bring new challenges to the graphic designer. Unlike television images of the past, the high quality of the HDTV image allows every detail of the graphic to be scrutinized. That means that every bit of design has to be specifically created or it will look like a mistake.

According to the International Amateur Athletic Federation Television Guidelines, graphics must be bold and clear, because satellite transmissions will cause a down-grading of quality. For full screen graphics “freezing” the background helps marginally, but even more effective is to put the graphics against a clear background (e.g., grass rather than crowd); increase the size of the lettering; and add a drop shadow to prevent bleeding. In addition, brighten the colors. A defocused, soft background gives greater texture to the superimposed image and greatly improves legibility.

Where time allows, all competitors need to be identified, including name, number, country, and vital biographical information.

A variety of equipment is used to create the different graphic looks that are seen on television. Stand-alone systems (character generator/paint boxes) are slowly giving way to graphic production software that can run in almost any high-end desktop computer. *(See figure 7.19.)*

In most cases the actual design of the graphics has been determined months or even years before the sport event. Depending on the rules of that particular graphics package, the operator will have either little or no input into which graphics are used and in what manner. The use of these “shells” should be laid out in the package rulebook, or outlined by the font coordinator if that position exists in the crew and the person has worked with the package before. In all cases, preparation time consists of inputting data and statistics that will be used during the game, locating and documenting locations and usage of formats that will be updated with statistics during the game as well as making backup copies of everything that could be needed. There will be no time during the game to stop and look it up and no chance to rebuild something that was accidentally erased. There may be some circumstances when an operator is required to create or modify a shell because

Preparing for an Event as a Graphics Operator

1. *Develop a deep understanding of the sport or event. The more you know about the official rules and participants, the more valuable you are to the production team.*
2. *Gain a very deep knowledge of your graphics package. You contribute greatly if you know the capabilities of the system and can recall specific items with minimum use of reference material. Reacting quickly, accurately, and decisively to the needs of the production at hand is of the utmost importance.*
3. *Organization actually impacts everything and is the key that allows everything to be used to its full potential.*
4. *Gain knowledge of the hardware. It helps with communication and teamwork between coordinator and operator. Knowledge is power.*
5. *Know your support services. Learn to recognize system problems. Know alternative information sources and keep handy the reference that gives emergency procedures and contact methods for support personnel.*
6. *Think teamwork. When everyone works together as a cohesive unit the capability of the unit becomes something greater than anyone would think possible.*

Maria Persechino-Romero, Manager,
Host Graphics, 2002 and 2004 Olympic Games

Sports Data for Graphics

Character generators can be connected to an official scoring/data system. This type of interface has significantly improved the accuracy of the broadcast graphics, allowing for automatic changes updated by the official system.

In the case of a system using a sports data interface, rules for usage and the “do” and “don't” of the system should be well documented. This includes any warnings or standard procedures that must be followed. All interfaces should be tested to see that they are working correctly well before the event begins. It should be noted that in many data interface systems, things like page numbers and content of pages are strictly defined by the system. Usually pages cannot be deleted, modified or moved without causing problems with the system. Pages added by the operator may or may not be supported by the data interface system. Safe record locations for operator-defined pages should also be documented.

Graphics at the Olympics

You are probably so used to seeing graphics on Olympic coverage that you assume they are created by the network over which you are viewing the Games. In some cases this is true however, in reality, the graphics that will be shown on most networks are the responsibility of Host Olympic Broadcaster Organization (OBO).

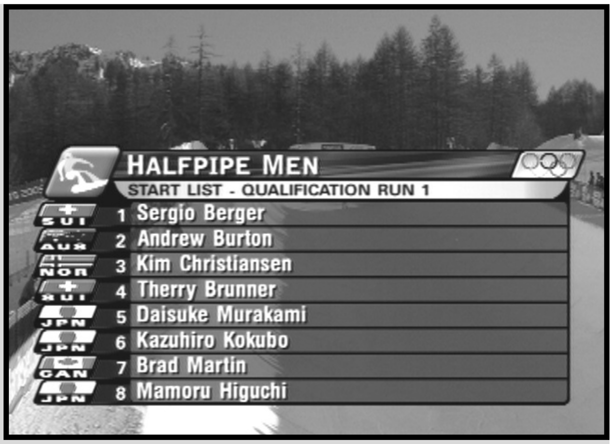
Rights Holding Broadcasters will use the OBO graphics in different ways. Some rights holders do create their own graphic packages so they can have a unique look and feel for their specific show usages, but even of those, most also take the host provided graphics for other uses. In some cases the host graphics are used as they are, with little or no changes, and in other cases the rights holder compliments the information provided in the host production with supplementary or interpretive graphics designed to be as indistinguishable as possible from the host provided sport competition information. In a few cases they will translate the entire look into their own language or duplicate it to allow for animation or other effects not used in the host feed.

The OBO believes that graphics exist "to help explain what is happening on screen, not to replace or detract from what is being seen. The graphics must accent the action on the screen, not overwhelm the competition." Given the breadth of the audience, they must be as simple and as easy to understand as possible. Designers need to take into account the various differences in technology that Rights Holding Broadcasters will use around the world as well as the cultural differences that exist in the countries where they are broadcast. "Our duty is to inform clearly and concisely."

Since English is the most popular second language, English is used. Designers keep the English as simple and basic as possible to allow for best comprehension by all segments of the worldwide television audience. For this reason also, illustrations such as flags, icons, and pictograms are used often to communicate. Once the graphics have been designed, style specifications are locked to provide a consistency across all of the venues at the Games.

There are basically three different types of graphics the OBO uses in production of the Host Broadcast:

Timing and Scoring Graphics: *These take information and data from the field of play with no calculations. This includes, judges marks, start information, running time, interval or split point information, and speed and distance measurements.*



HALFPIPE MEN

START LIST - QUALIFICATION RUN 1

SUI	1	Sergio Berger
AUS	2	Andrew Burton
NOR	3	Kim Christiansen
SUI	4	Therry Brunner
JPN	5	Daisuke Murakami
JPN	6	Kazuhiro Kokubo
CAN	7	Brad Martin
JPN	8	Mamoru Higuchi

Result Graphics: *These are any graphics that require stored information or a calculation. This means no running clock but does mean such things as start lists, result lists, and judges scores with sport rules applied to weed out the highest or lowest or worst score.*

Support Graphics: *These include a pretty substantial list that includes:*

- *Slates, used prior to an event but not seen by viewers (just for "traffic", production or engineering proposes).*
- *Advisories, which have a similar usage but can be seen by viewers if necessary.*
- *Technical graphics, such as overlays that go over color bars or the resolution chart to ensure proper technical adjustment and key level.*
- *Manual graphics (medal presenters or opening and closing graphics).*
- *Bumpers for highlights (identification with texts and flags in the intermissions).*
- *Final montage (text).*
- *DVE boxes (camera replays).*
- *Animations (sport and venue introductions).*
- *Any needed backgrounds for the production.*

Designers create basic concepts, which are then interpreted for each sport and for each format. Each sport essentially has its own distinct and individual graphics package. All in all, over 65,000 pages of data driven sports graphics are estimated to be available from the various venues. Every graphic must be checked in each format to see that contrast, luminance, color, alignment, and other factors are all correct according to both the design philosophy and the various world video engineering standards.

no available formats fit the usage. In this case the package rulebook should include guidelines on how to do this while still following the format.

Tips on Making Great TV Graphics

Effective graphics take time to create. The graphic artist needs to think through a number of stages in the process. Al Tompkins, from The Poynter Institute, has the following suggestions about creating great television graphics. We have adapted them a bit to fit our context:

1. *What is the context of the graphic?* Is the information something that is important to the viewer? How does this statistic relate to others? Does it help the viewer understand the game better?
2. *Think clearly about the purpose of the graphic.* Ask yourself, what exactly do I want the viewer to learn from this graphic?
3. *Does an image convey the message better than words or numbers?* Consider the Olympics where pictograms are used to illustrate sports instead of words.
4. *Movement is good but don't overuse it.* Don't overwhelm the viewer with a constant variety of movement.
5. *When creating a new graphic design, get someone else to look at it.* Let them tell you what the graphic conveys to them.

The Crew

The producer and director are responsible for ensuring the needs of their crew are met. This care includes good lodging, good food, and protection from the elements. If the crew cannot leave during a production, catering will need to be provided. If the crew's needs are neglected, attitudes can deteriorate. Low morale in the crew can impact the overall quality of the entire project.

The crew must be prepared for any type of weather when shooting an outdoor remote. During warm weather, they should wear sun protection, light collared clothes, and be prepared for sudden weather changes, such as rain or temperature drops. Cold weather shoots require layered clothing so that as the temperature fluctuates they can dress accordingly.

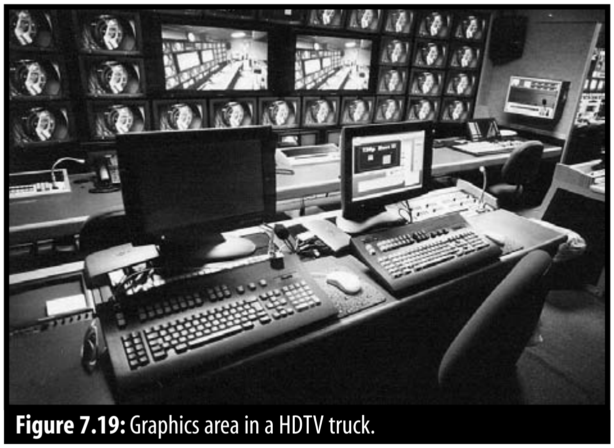


Figure 7.19: Graphics area in a HDTV truck.

ATHENS 2004 Olympic Broadcasting Facts

34	*Venues*
2	*Periscope cameras*
1	*Mobycam*
2	*Wirecams*
7	*Steadicams*
64	*Super slow motion cameras*
18	*Tracking cameras*
2	*ENG cameras*
28	*Cranes*
122	*POV cameras*
230	*Hand-held cameras*
225	*Hard cameras*
52	*Mobile units/OB vans*
64	*Character generators*
3500	*Games-time staff*

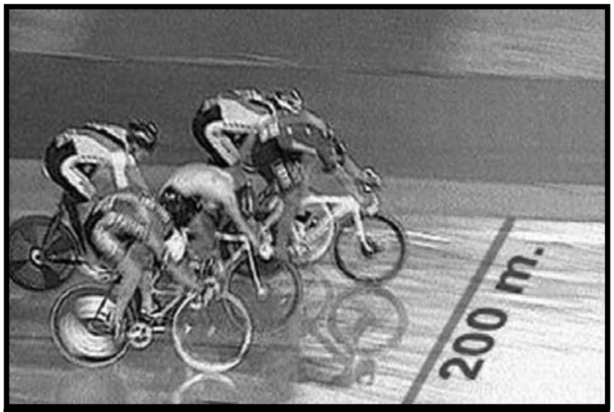


Figure 7.20: Virtual graphics can be used to electronically insert finish lines on the field of play that can only be seen by the television audience.

CHAPTER 8
Sports Announcing

Sport should be fun, and I want viewers to share in the enjoyment I get from the games. But I also owe it to those same viewers to be thoroughly prepared and to know what I am talking about.

Chris Berman, Commentator, ESPN

This chapter is not meant to be a primer for those interested in being professional talent. Instead, it is meant to help the production crew understand the talent's role and responsibilities.

The talent needs to know their specific role in the production and understand the vision of the director and producer. The play-by-play person should have the "ability to call a sporting event with a concise description of the action, while maintaining a natural delivery. The role of the color commentator or analyst is to enhance the broadcast by adding specific and important information, while interacting with the play-by-play announcer." (from *Play-by-Play Sportscaster Training*)

Olympic Research

A small group of dedicated (research) people…will have worked two years to complete nearly 4500 pages of information pertinent to the summer Games. The information in several volumes will be distributed…to the commentators for their use on air. In addition, every page, every word of the biographies, every rule, and every record is entered in the research computer so that the information may be kept up-to-date and rapidly accessed to fill an immediate need.

James Hay, 1984 Olympics

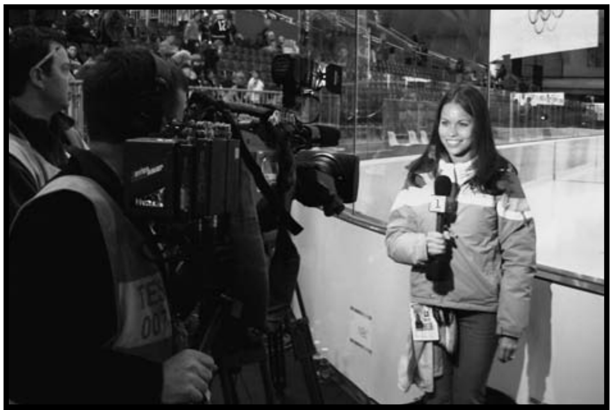


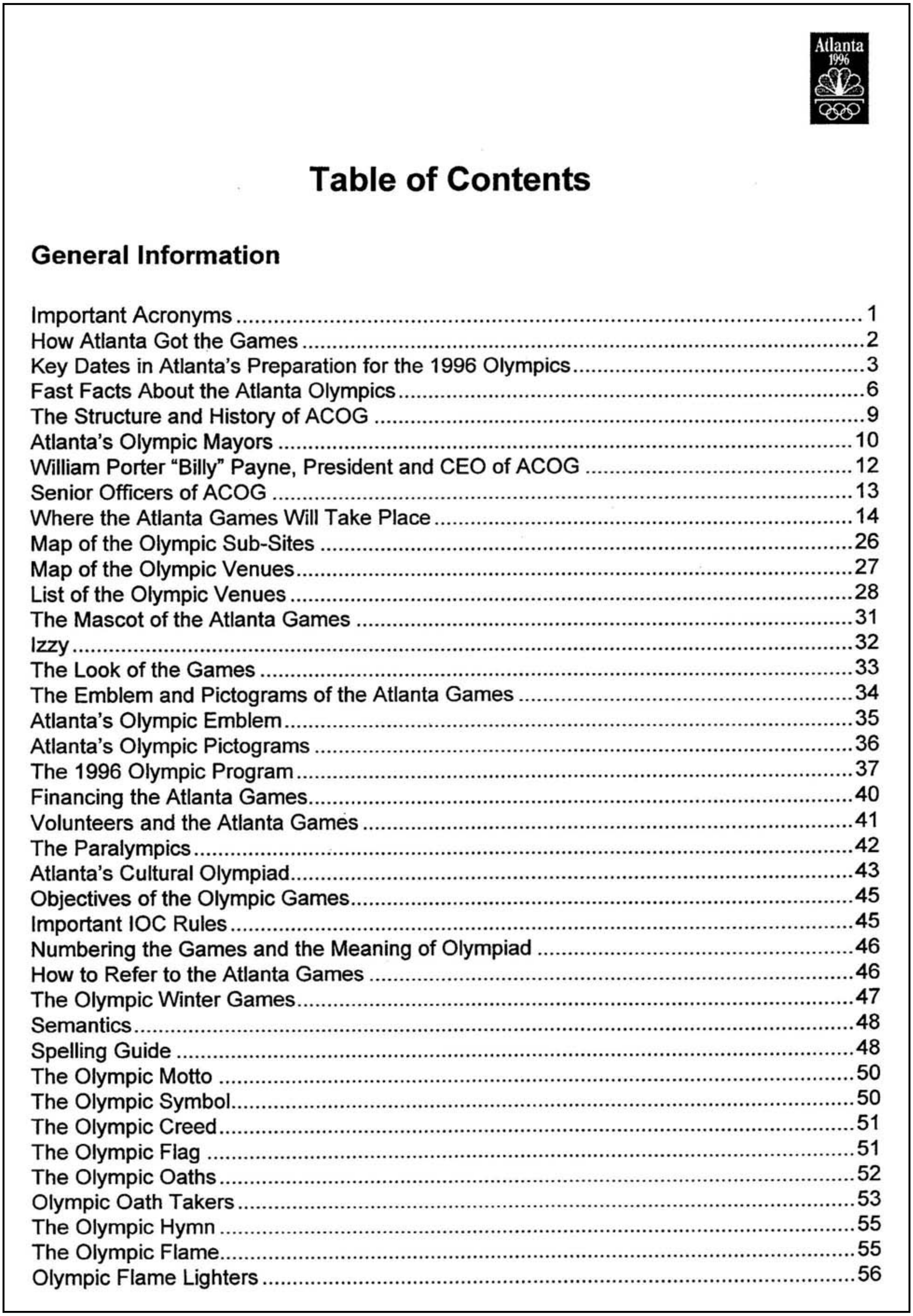
Figure 8.1: Sideline or field-of-play stand-ups provide context to commentary.

Play-by-Play Sportscast Training

Many times, former athletes or coaches are chosen for the role of analyst since an in-depth knowledge of the sport is required. While the play-by-play person describes who the athletes are and what they are doing, the analyst is responsible for explaining to the viewer why the athletes did what they did.

Research

With the competing television channels, newspapers, magazines, and Internet, television commentators have the difficult task of being



Atlanta
1996

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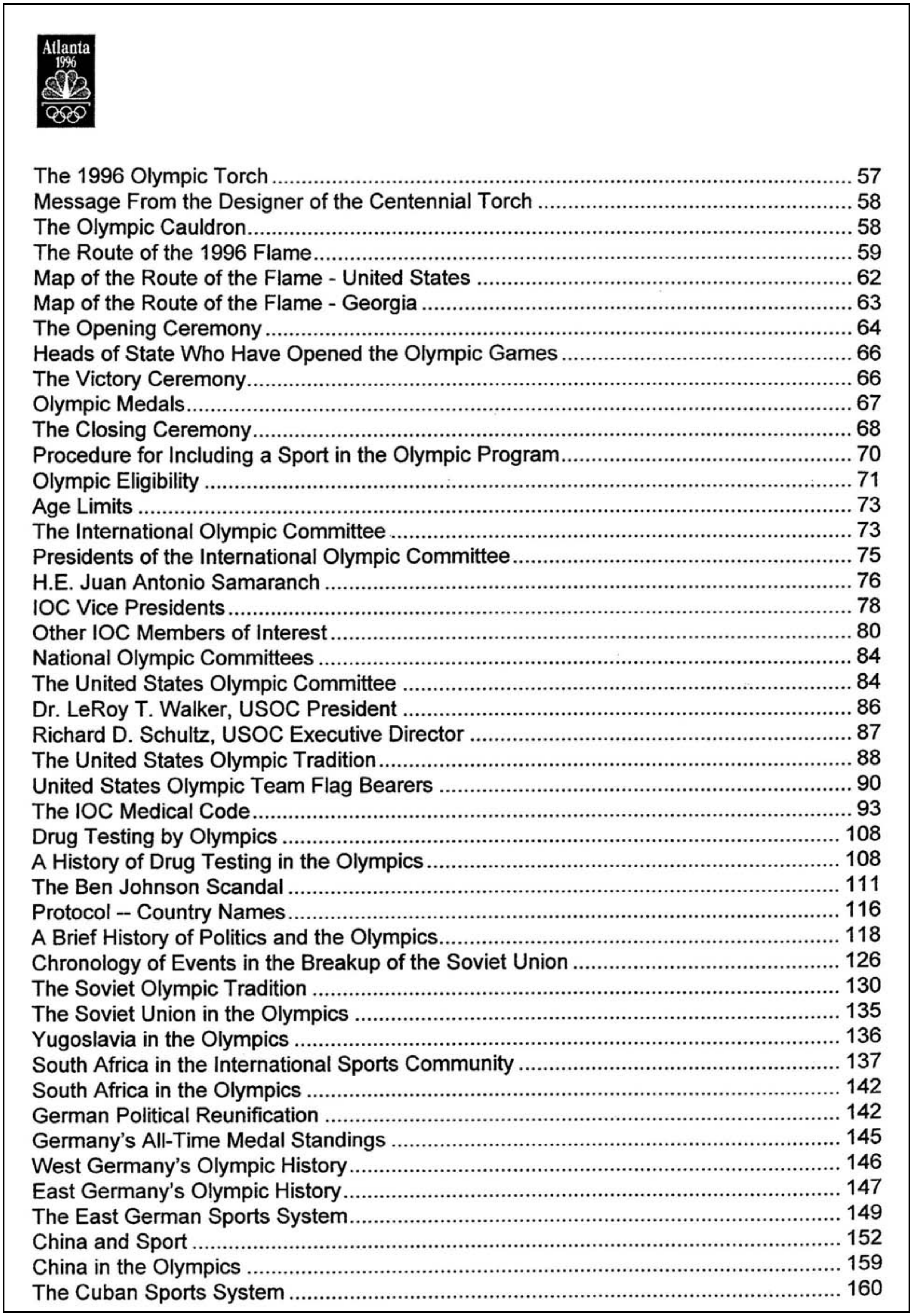
Figure 8.2: Table of contents of NBC Sports' Games of the XXVI Olympiad, Research Manual Volume 1.



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> *innovative every time they are on the air. The audience tires of listening to the same information and the same statistics. Research is the commentator's weapon in being able to comment on the really important issues and describe the images provided to the audience with the maximum drama.*
>
> *—Kostas Kapatais,*
> *Coordinating Producer, Greece*

The talent is responsible for being thoroughly familiar with the event, which involves a tremendous amount of research. Of course, the extent of the research required varies based on the size of the event. See figure 8.2 for two pages of the table of contents from NBC Sports' Games of the XXVI Olympiad, Research Manual Volume 1 showing the first 160 out of 558 items researched for this event.

To prepare for a production, talent should:

- Study the teams and players (know numbers and names so that they can be easily identified).
- Study team and player strategies.
- Study supplemental information from team publicity offices, contacts, and press clippings. Read newspapers, Internet sites, and articles, talk to and/or interview coaches and team members.

Announcer Techniques

The announce booth is designed to give announcers immediate access to information about the event and athletes. *(See figure 8.3.)*

Before going on the air it is imperative that all equipment is checked to make sure that it is working properly. While this may happen

Television Announcer Sports Cliches

- *Sportscasters rarely argue—on the contrary, they go out of their way to compliment each other for saying the most mundane things. The cliché response to a broadcast partner's cliché statement is: "I couldn't agree with you more."*
- *Announcers really struggle with past, present, and future: "He'll smack that ball into the gap for a base hit." He will? Didn't we just see it? Or are you making a prediction about the next guy up? And when analyzing an instant replay, they never switch to the past tense: "If he makes that catch, we've got a whole new ballgame." How about: "If he MADE that catch we'd have a whole new ballgame?"*
- *The highest expression of disbelief for an announcer is the ubiquitous "Unbelievable!", but may soon be replaced by "Are you kiddin' me?!"*
- *If an announcer is hyping-up a team in the pre-game show, for example: "The Chiefs are capable of putting a lot of points on the board", the cliché response is, "Well, the Broncos might have something to say about that."*
- *Often you'll see a slow motion replay of a coach arguing with an umpire, referee or official. One of the announcers is guaranteed to say: "I hope the kids watching at home can't read lips!"*

Mike Hasselbeck

The Commentator in 1945

The television announcer must learn the value of silence, must learn to pace his comments. He can make a dull fight interesting by covering lack of action with colorful comments just as he can talk too much when the boys are mixing it up.

WRGB Announcer Techniques for Boxing,
Television Show Business, 1945

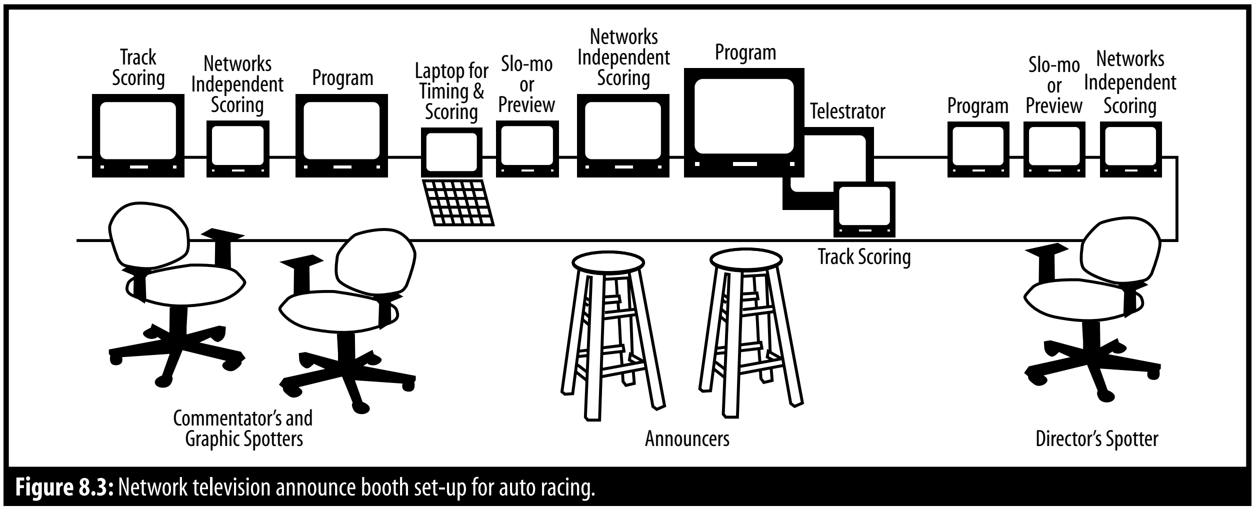

Track Scoring
Networks Independent Scoring
Program
Laptop for Timing & Scoring
Slo-mo or Preview
Networks Independent Scoring
Program
Telestrator
Program
Slo-mo or Preview
Networks Independent Scoring
Track Scoring
Commentator's and Graphic Spotters
Announcers
Director's Spotter

Figure 8.3: Network television announce booth set-up for auto racing.

during the facilities check (FAX), microphones, intercoms, and monitors should be double checked right before air.

The play-by-play person is almost always in the lead with the color commentator playing a supportive role. Commentators generally work out a signal to let each other know when they want to step into the broadcast. However, the play-by-play person usually determines who will talk.

Talent input should complement the visual component. Don't state the obvious. As former ABC commentator Keith Jackson liked to say the role of the sportscaster is to amplify, clarify, and punctuate. Sometimes there are moments when it is important not to talk allowing the event to speak for itself.

Sportscaster James Brown stated that the influx of ex-athletes and coaches (to television) can be a plus. They "have a wonderful way of telling riveting stories and they, more than anyone, understand what the athletes on the field are going through. But unquestionably, the successful ones are those who know they have to put in the time, that they have to work as hard in television as they did (as athletes)."

Announcers must keep one eye on the field and the other on the air monitor in the booth. The game is actually called from the monitor. *(See figure 8.6.)* Most booths also include an additional monitor that shows the announcer the slow motion footage. The challenge commentators face is the numerous tasks that they must do at once—they must watch the field, watch the monitor, listen to the director and/or producer and still make sense to the viewing audience.

Interviews

The key to good interviewing is to find the things that aren't so obvious. Interviewers should strive to get responses that tell us something we don't know or something that adds a level of depth to the scene.

—Ken Colemen and Brad Schultz

The secret is to know (the athlete), if not personally then at least by having read about him or her, to know what their interests are and

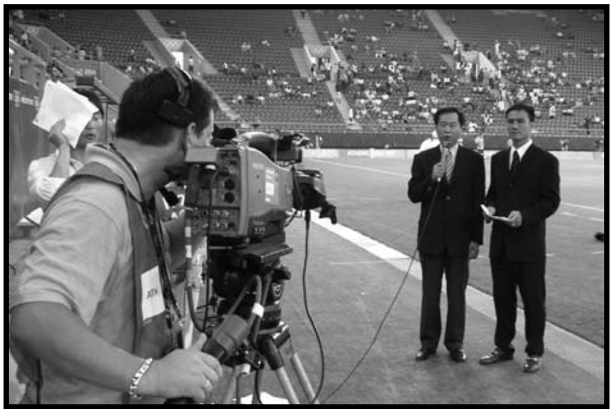


Figure 8.4: Venue officials generally must approve, in advance, shooting locations that are not in the normal broadcast area.

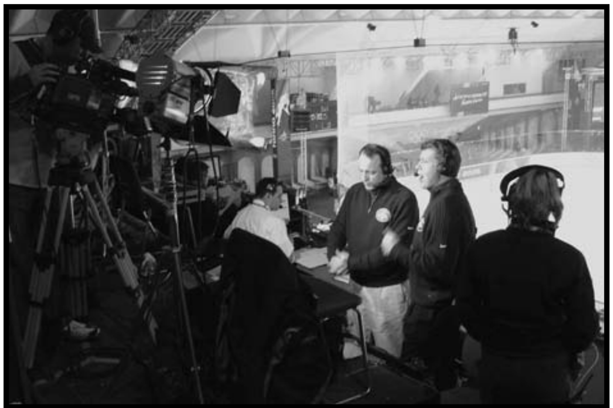


Figure 8.5: Commentators are sometimes able to stand up in their broadcast booth and turn around in order to appear on camera.

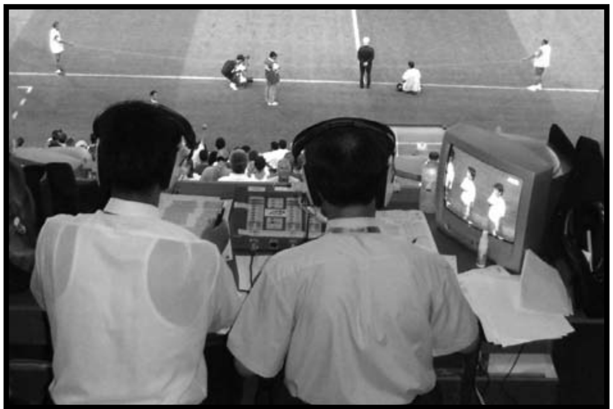


Figure 8.6: Announcers must watch the field and monitor when broadcasting a game.

Delivering Information

First and foremost, I try to deliver information, especially information that the audience might not have been previously aware of or has to be reminded of from time to time. Information is first and foremost in any of the categories as host of an anthology program, as play-by-play man, or doing the NFL wraparound and post-game shows.

Brent Musburger, Commentator, ABC
Live TV: An Inside Look at Directing and Producing

what they like to talk about. Get them going on what is familiar, easy ground for them and you have the makings of a good interview. Interviews are another essential part of sports broadcasting. There are a number of basic rules that need to be kept in mind when conducting an interview:

- Guests needs to know the amount of time allocated for the interview. They usually range from 20 seconds to a few minutes.
- Commentators need to communicate their goals for the interview to the guest.
- The commentator should let the guest know how they plan to close the interview.
- Unless using separate microphones, the commentator should always control the microphone so they can decide who will speak. Commentators determine who will speak by aiming the microphone at the talent or at themselves.
- In order to obtain a good response from the athlete, commentators should always ask questions that require more than a yes/no answer.

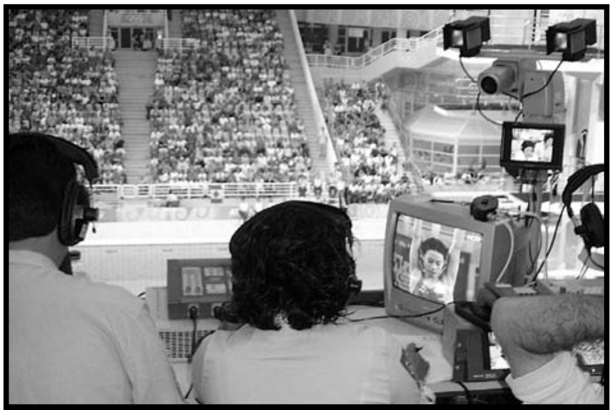


Figure 8.7: Some broadcast booths are equipped with POV cameras in order to show the commentators without pulling a camera operator away from the game.

Figure 8.8: On-camera commentators need to know the amount of time allocated for their talk.

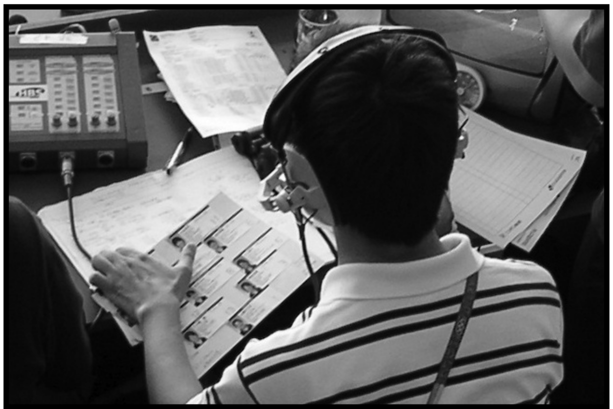


Figure 8.9: This commentator prepared a photo page to identify players.

Go Beyond the Obvious

Asking the right questions when doing interviewing is key to obtaining great story coverage. However, it is sometimes tough to know how far to push or just how to elicit the information that you need. Joe Gisondi has the following suggestions to think about as an interviewer:

- Athletes are people, and people make mistakes. Don't shy away from asking a player or a coach what his/her rational was behind a bad play. You can present a different side other than critiquing how wrong that call/play was.
- Bring a fresh perspective. Think about what other angles there are or find fresh sources.
- Talk about the big plays, but don't forget to discuss what led up to them. Who were the playmakers?
- Know the terminology of the sports you are covering.
- The coaches and players know more than you do. Use them as a resource

- Go to practices and establish relationships. Let them see that you are going to portray them in the most accurate light possible.
- Don't create heroes/villains, state what is there.
- Talk to multiple people. The more perspective you have the more educated you will be to decipher a player's strengths/weaknesses and what they need to improve.

Spotters

Spotters are often used in the announce booth or in various positions around the field of play to help announcers and the director identify various players and to point out significant developments during the competition. The stage manager is generally responsible for the broadcast booth, including assisting the commentator and giving them requested information.

Anchor

Chronologically, anchoring is the very last thing a sports broadcaster does with his show. It comes after the research and legwork, after the planning and preparation, and after all the shooting, producing, and writing, but anchoring is probably the single most important element of the entire process. Certainly, the other elements are important, but it takes good anchoring and good delivery to bring out the best in the writing and photography. A good sports anchor ties all the other elements together and communicates them in an interesting and entertaining way. It is five or so minutes that will make or break your entire sportscast and in some cases an entire career.

Brad Schultz, Sports Broadcasting

What Sportscasters Collect

1. *Key statistics*
2. *Games stories*
3. *Anecdotes*
4. *Highlights*
5. *Coach's comments*
6. *Player development and/or injuries*
7. *Card files on individual players and teams*
8. *Statistics of every game, if possible*

Play-by-Play Sportscast Training

Figure 8.10: The key to interviewing is to know the athlete as well as possible.

CHAPTER 9
Post-production

Post-production gives a producer an opportunity to improve and enhance the original production or correct a mistake. Often it is said, "Don't worry, we'll fix it in post."

Gary Milkis, Director Eight Olympics

At its most basic level, post-production is the process of combining individual shots in a desired order. It can have several purposes:

- To assemble material in a sequential fashion. The competition may have been shot over a number of days and then assembled into one program.
- To correct mistakes by cutting them out or by covering them with other material. The on-camera talent may have made a mistake, but an editor can remove those few seconds or cover them with another shot so that the performance appears to flow flawlessly.
- To create (often re-create), enhance, embellish, and bring to life images and events that were once captured live. Tools such as visual effects, sound effects, and music can give the story more drama, thus more impact on the audience. Slower portions of the competition are often edited out, allowing the production's pacing to move along. Features are added to give the viewer a more in-depth knowledge of a participant or part of the event. The various segments of the event are then assembled into a cohesive production.

The producer supervises the entire editing process with primary concern for keeping the program within the network or station's production guidelines or look. The producer also needs to keep the project on time and on budget. The editor is responsible for operating the editing equipment and combining the various shots in the desired order based on information from the producer. The production assistant (PA) assists the editor by logging footage, keeping track of administrative details, and organizing footage for the edit session. The PA may also be responsible for overseeing the creation of the graphics. The sound editor operates the sound editing equipment, provides edited dialogue, voiceovers, sound effects, and music tracks for the final edit.

It is imperative to maintain post-production continuity. Continuity means that when the production is edited, the viewer should perceive it as a continuous flow and should not be aware that it was assembled from a series of segments that were shot out of order. For example, the opening and some of the features may have been shot the day before the event.

Live productions require very little post-production work other than elements such as opening animations, sound bites or personality features that need to be produced prior to the broadcast. When the production is shot there may be some production reports to complete and, possibly, a post-production meeting to discuss the various aspects of the production with those involved. The post-pro-

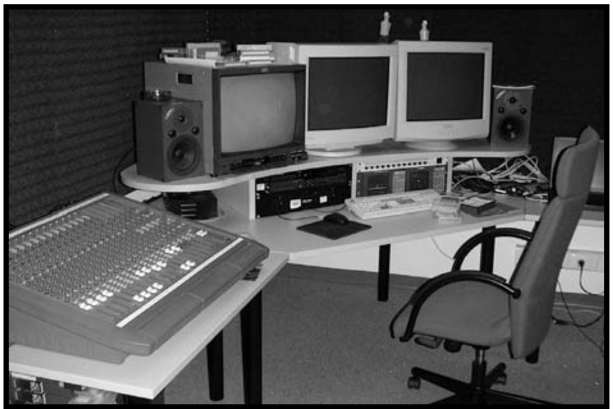


Figure 9.1: Non-linear editors digitize the footage for manipulation by a computer.

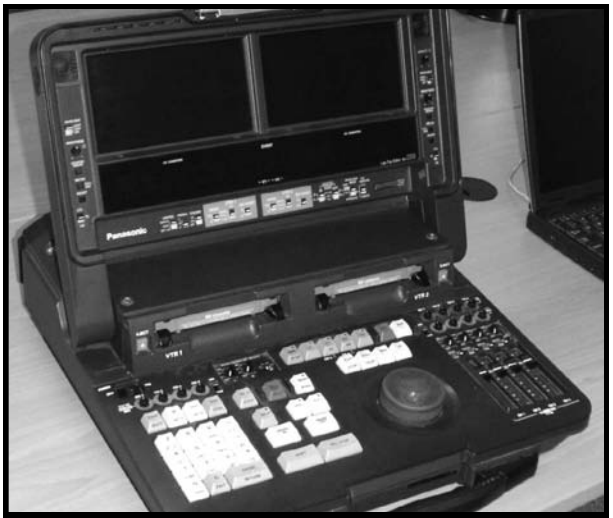


Figure 9.2: Digital linear editing laptops are popular for sports news.

Figure 9.3: Linear editors are slowly being phased out of the production process.

duction meeting gives the producer an opportunity to evaluate the production by listening to crew feedback. They can use the information learned in this meeting to improve future productions.

Live-to-tape productions require extensive post-production work. After the event, the director or producer may want to shoot interviews with some of the outstanding athletes in the event. These will usually be shot with an ENG camera. The tapes are then taken to a post-production facility for editing.

Before the editing can begin, the program footage needs to be logged. This requires someone, often a production assistant, to review all the footage and write down the tape identification number, a description of the footage, any appropriate notes (great shot, bad audio), and the location, generally in time code, where the footage can be found on the tape. It is important to effectively and concisely translate the visuals into descriptive words. Most editors require the in point or beginning point of each new shot and the out point or ending point of the shot. A log can be as simple as a list on a plain piece of paper, a printed log sheet, or the log could be generated using computer software. Logging saves time in the edit suite if the appropriate shots have been selected and the time code location noted. See figure 9.4 for an example of a logging sheet used to document the contents of a videotape.

After shooting the 2000 Women's Series NorAm Cup to tape, NBC Sports spent approximately three and a half days in post-production which included:

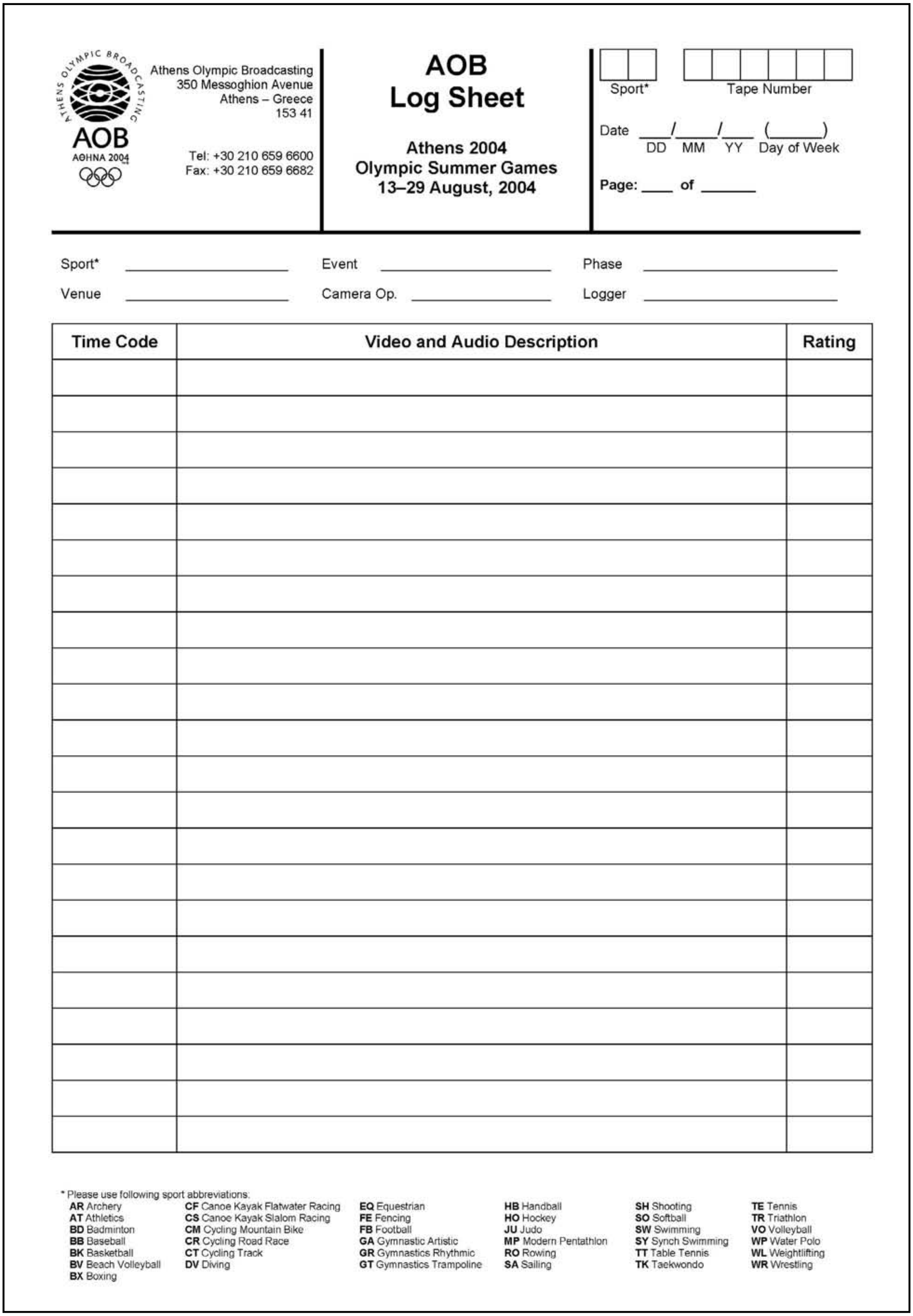
Day 1: Digitize program into non-linear editor (midafternoon, day of shoot)

The digitization process is when the program content, generally recorded onto tape during the live event, is played (digitized) into the computer of a non-linear editor. This process is time-consuming, done in real time. However, once the program is in the computer, the content can be easily edited and manipulated.

Day 2: Edit tease, features, ski segments, and bumpers.

The tease is a short package used to promote the upcoming broadcast event. It is usually edited in a dramatic way to grab attention and convince the viewer to tune in.

Features are video packages that highlight



AOB
ΑΘΗΝΑ 2004

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AOB
Log Sheet

Athens 2004
Olympic Summer Games
13–29 August, 2004

☐☐ Sport*

☐☐☐☐☐☐ Tape Number

Date ____/____/____ (______)
DD MM YY Day of Week

Page: ____ **of** ______

Sport* ________________ Event ________________ Phase ________________

Venue ________________ Camera Op. ________________ Logger ________________

Time Code	Video and Audio Description	Rating

* Please use following sport abbreviations:

AR Archery
AT Athletics
BD Badminton
BB Baseball
BK Basketball
BV Beach Volleyball
BX Boxing
CF Canoe Kayak Flatwater Racing
CS Canoe Kayak Slalom Racing
CM Cycling Mountain Bike
CR Cycling Road Race
CT Cycling Track
DV Diving
EQ Equestrian
FE Fencing
FB Football
GA Gymnastic Artistic
GR Gymnastics Rhythmic
GT Gymnastics Trampoline
HB Handball
HO Hockey
JU Judo
MP Modern Pentathlon
RO Rowing
SA Sailing
SH Shooting
SO Softball
SW Swimming
SY Synch Swimming
TT Table Tennis
TK Taekwondo
TE Tennis
TR Triathlon
VO Volleyball
WP Water Polo
WL Weightlifting
WR Wrestling

Figure 9.4: Logging sheet used to document the contents of a videotape.

someone or something that is related to the sports event. A feature may be an up close and personal view of an athlete or a behind the scenes look at some part of the event. Features are generally short packages that are edited into the final production in order to hold the audience's attention.

Ski segments refer to the ski portions of the competition being broadcast.

Bumpers are generally dramatic shots, often high angle, low angle or spectacular scenery shots, used as transitions between the show segments and commercials.

Day 3. Composite show and create graphics.

Compositing is the editing of the video when visual and sound effects are overlaid and graphics added.

Graphics may be created from scratch or may be typed into a pre-produced template or graphic shell.

Day 4. Record talent voice-overs, mix audio, and complete show.

Since the live-to-tape production is generally shortened, keeping primarily the highlights in the program, the original talent's commentary may not be used. This means that a voice-over will need to take place in a recording studio. The talent must attempt to match the voice energy to the type of energy they would have if they were at the event so that the voice-over sounds like the real thing.

The audio is then mixed, adding the new voice-over track with real venue sound sweetened with sound effects to add realism.

The audio and video components are then edited together to create the final program.

If the show was entirely shot by multiple ENG cameras, the very time-consuming process of cutting an entire show from separate cameras will take place during post-production. Live-to-tape productions also require production reports and possibly post-production meetings.

Editing Guidelines

Post-production is like falling into a mud puddle and coming up with a fish in your pocket. It is the process of forging a glorious result from a seemingly untameable beast.

—Stephen Fleming,
Coordinating Producer,
Athens Olympic Broadcasting

- A change of time, slow motion shot or reverse angle shot is indicated by a dissolve, wipe or digital video effect (DVE).
- A change of geographical location is often indicated by a dissolve, wipe or DVE, and a new establishing shot.
- A program intended to be sequential avoids jump cuts, meaning cutting between two shots that are so similar that the subject appears to jump on screen. The use of a cutaway in between the two shots helps to avoid the jump.
- In general, programs avoid cutting from a camera shot that is in motion—that is, in the middle of a pan, tilt or zoom—to a still camera shot since this is jarring to the viewer. It is better to move from a shot in motion to another shot in motion, and to move from one still shot to another. If you need to get from a shot that is in motion to one that is still, ideally you wait until the moving shot has completed its move. In other words, wait until it is a still shot and then cut to the still shot.
- Cuts should occur during subject movement rather than before or after it. For instance, if a person is about to stand up from the bench, the best place to cut from the medium shot of the person on the bench to the long shot is when the person is in the middle of standing up.
- Cuts should not occur without motivation. The viewer shouldn't notice the edit and wonder why it occurred. In general, it is time to make an edit when:
  (a) The current shot has been on screen long enough for the audience to take in all the pertinent information. This could be as short as one second for a very simple shot or much longer for a shot in motion. The issue of pacing is more an art form than a science.
  (b) Another shot would help to develop the story, advancing the plot and maintaining good pacing. If an athlete scores, it would make sense to cut quickly to the reaction of teammates or the crowd. This will help move the story forward.

(Kathy Bruner contributed to this chapter.)

CHAPTER 10
Television, Computers and Sports

Viewer enhancement tools . . . provide television stations with an innovative tool to upgrade their sports programs . . . and will become standard for major sports events in the near future.

Hartmut Hiestermann, Global Sportsnet, Germany

Roone Arledge, innovative television sports pioneer, said that television tools such as instant replays, slow motion and even superimposing the names of the players on the screen after a good play, were called gimmicks when they were introduced. The computer invasion into television production that began years ago with the character generator, continues to grow. As directors and producers continue to look for tools and techniques that will lead to a more informed viewer, they are increasingly turning to computer based, viewer enhancement tools.

Computer driven techniques cover a wide range of possibilities. Some of them have been successful, some not. Just as computer graphics were considered gimmicks at one point, some of these technologies will be normal in the future. Below is a review of some of the past technologies as well as some of the newest ones.

The FoxTrax

One of the original technological enhancements to television sports was the glowing hockey puck created by Fox Sports called the FoxTrax. “The goal was simple. Make the televised image of a hockey puck glow so it’s easier for the viewer to spot, and, when it’s going really fast, put a tail on it showing its path. The company hoped the system could overcome the main complaint about televised hockey: the trouble that casual views have in following the fast-moving puck on television screens. To track the puck, a number of parameters had to be fed into a computer system and updated continually. First, the system had to know exactly where the broadcast cameras were focused. It also had to have some idea of how each camera lens distorts the image; different brands of lenses vary. It then had to figure out which camera’s feed was being displayed to viewers at any moment. Meanwhile, the system had to know where the puck was and how fast it was traveling, and then it had to create a graphic based on that data and overlay it onto the video image 60 times a second. All of these things had to be exactly synchronized, as the cameras were zooming and panning and the puck was traveling at up to 160 km an hour. Making it work required putting infrared transmitters into each hockey puck *(see figures 10.1 and 10.2)*. Technically, the project was a success. But serious hockey fans hated it. After three years, pro-hockey broadcasts in the United States switched networks, and the system died a quiet death. *(Sportvision)* The FoxTrax system’s technology has now been adapted and is used to highlight racecars during a motor sports events. The glow technology

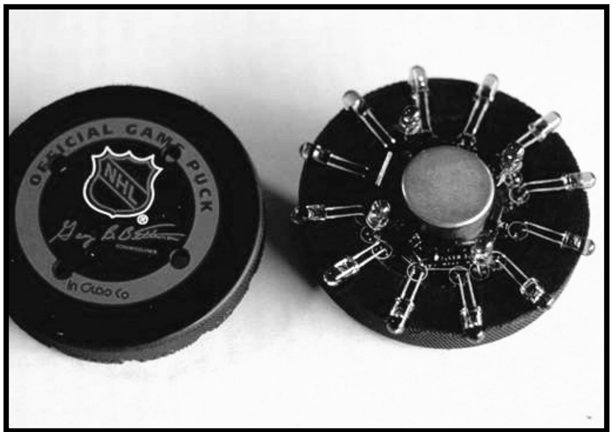


Figure 10.1: Transmitters were installed in a hockey puck to allow viewers to follow the puck on television. (Photo courtesy of Sportvision.)

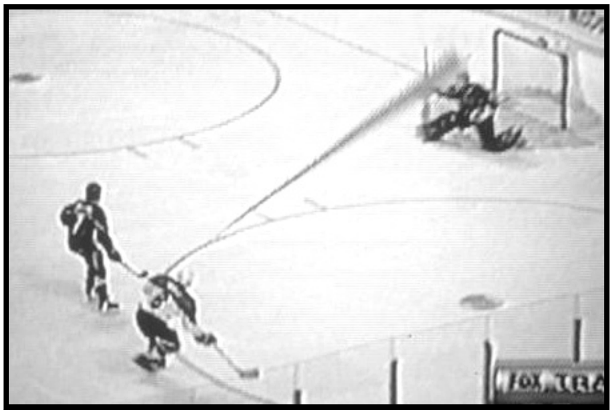


Figure 10.2: The transmitters in the hockey puck, shown in Figure 10.1, created a comet tail on the puck for television viewers. (Photo courtesy of Sportvision.)

allows a commentator to illustrate a specific car's place on the track when it is amid other cars.

Virtual Information Graphics

A number of companies have now created virtual lines on the field of play of different sports and they have become almost the norm. The virtual line on the field of play was more difficult to develop than the hockey puck since the line needed to be perfectly straight (which is difficult with the variety of lenses used), had to look realistic when located on rough ground next to the actual field lines and must appear under the players. This technology was almost immediately accepted by the viewers in sports like American football, football/soccer, and cricket. *(See figure 10.3.)*

RACEf/x

Global Positioning System (GPS) technology is now used in race cars in conjunction with computer graphics to give the viewer detailed information about the driver's name, car's position on the course, speed, brake status, and tachometer. *(See figure 10.4.)*

"Matrix" Style

"Matrix" style computer/camera systems now give the viewer a look at the action from multiple vantage points. Although there are multiple systems using different technology, they both have systems that potentially provide a 360-degree view of a sports image. Robotically controlled cameras, placed 5–12 degrees apart, are used to capture the images. Some of the systems have software that fills in some of the missing information between the camera's images, actually providing moving images as well as still images. A server channel records each individual camera, allowing the system's operator to provide a replay and cut between the multiple digital disc recorders. This provides the capability to rotate the viewer perspective around an image of a play before resuming action. A camera operator will control one of the cameras as a master camera. The other cameras will synchronize, following the

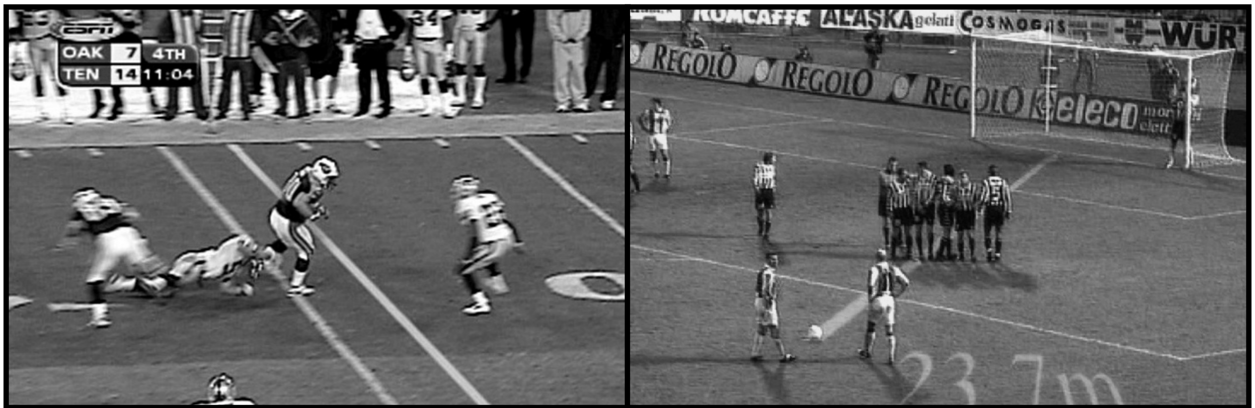


Figure 10.3: Virtual field of play lines allows the production personnel to communicate more information to the viewer. (Photos courtesy of Sportvision and Orad.)

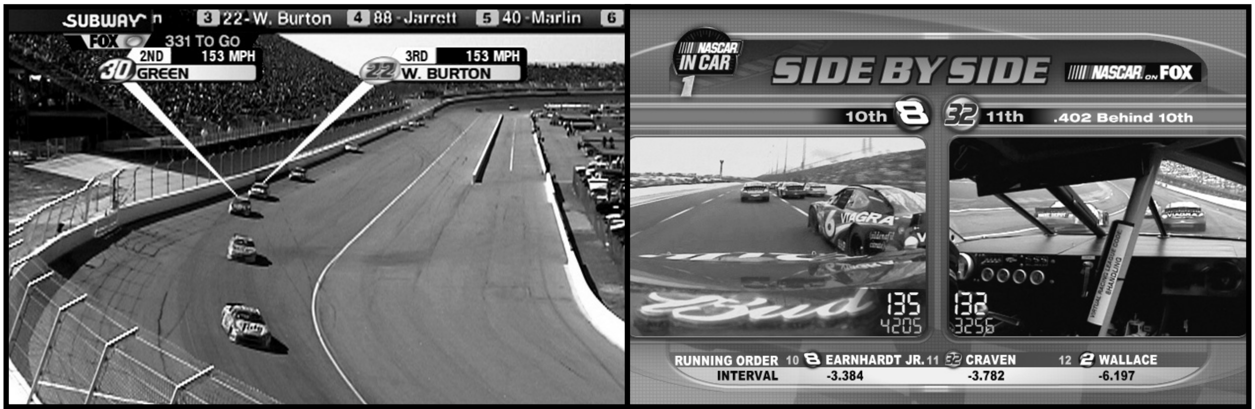

SUBWAY
3 22-W. Burton 4 88-Jarrett 5 40-Marlin 6
FOX 331 To Go
2ND 153 MPH
30 GREEN
3RD 153 MPH
22 W. BURTON
NASCAR IN CAR
SIDE BY SIDE
NASCAR on FOX
10th 8 32 11th .402 Behind 10th
135 4205
132 3256
RUNNING ORDER 10 8 EARNHARDT JR. 11 32 CRAVEN 12 2 WALLACE
INTERVAL -3.384 -3.782 -6.197

Figure 10.4: Global positions system (GPS) technology allows more data to be transmitted to the viewer. (Courtesy of Sportvision.)

cue of the master camera, focusing on the same action, such as a golfer. *(See figure 10.5.)* Each camera interacts with the master camera, constantly adjusting its zoom and focus to keep the image of the golfer the same size as in the images of all the other cameras. "This shared center of focus is what creates the illusion that the player can be seen in three dimensions," said Takeo Kanade, director of the Robotics Institute and a computer vision expert. When images taken at the same time by each camera are viewed sequentially, the effects is of walking or flying around the player. The system has been used for all types of sports. Larry Barbatsoulis, CBS Technical Director, said, "In individual sports, like gymnastics, I could do a 360 around someone doing a rings routine, or the long jump, or a pole vault. Imagine freezing a guy who's going backwards over the high jump, then revolving around him to show his form." (compiled from BUF Technology, The Wire, Newsday.com, Post-Gazette, Berkely.edu/mhonarc, Cahners Business Information)

Transposition Replay Systems

SimulCam transposes a live athlete's performance with the previous or record holder's performance. This simultaneous broadcast of the two performances looked so real that unknowing viewers during the 2002 Winter Olympics voiced concern that the two athletes should not be skiing so close together. *(See figure 10.6.)* This computer transposition system allows the audience the opportunity to compare two performances, allowing them to observe the minute differences in the athletes' movements. This technology can be used with any sports that included individual performances within certain constraints on the field of play.

Another transposition technology, CyberSport, creates a virtual runner that moves at a world record pace around an athletics track as a race unfolds. Like SimilCam above, the virtual runner adds to the drama of the race, allowing the viewer to understand how the current race compares to others.

StroMotion

StroMotion was first used by ABC Sports to

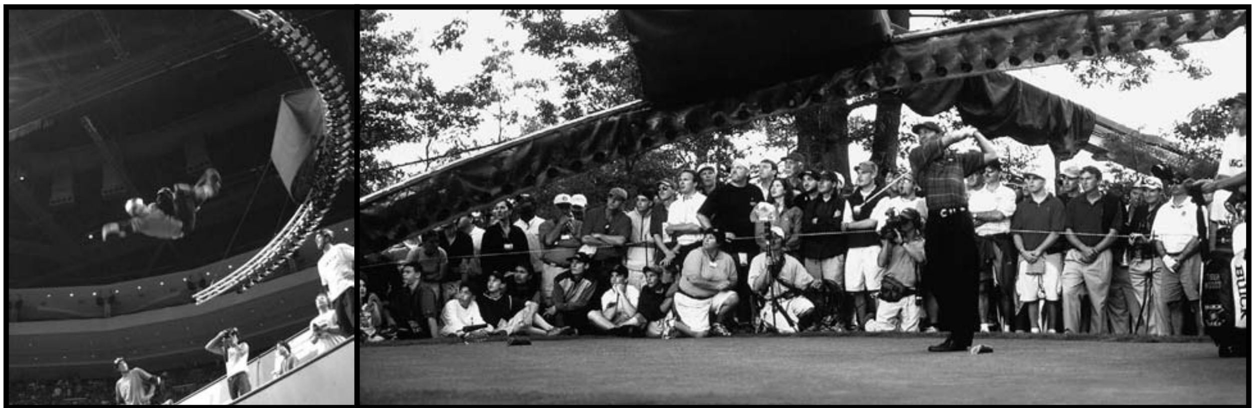


Figure 10.5: Cameras positioned around the athlete portray a "matrix" style of coverage. (Courtesy of Visage-HD.)

allow the viewer to analyze the quadruple jump in figure skating. The technology shows individual video frames of the athlete's performance within one visible frame. Since some sports occur so rapidly that the viewer cannot see the detailed action, StroMotion can break the action down to show key frames, compiling them into one frame, allowing the viewer to analyze the athlete's action. *(See figure 10.7.)*

Virtual Ads

A number of companies provide virtual ad services. These services generally use a type of "green screen" or chroma-key technology to place the ads on the screen. The systems electronically replace existing advertising signs and banners or insert graphics right on the field of play with advertising that has been sold to television program sponsors. The images can also be inserted into the natural landscape of the field or on a race track. While the virtual ads are not seen if you are at the venue, they are added to the broadcast output for the viewing audience. *(See figure 10.8.)*

Internet/Interactive Television

Internet sites and television continue to partner together to attract viewers and provide interactive experiences for sports fans. One Internet application called PitCommand, allows paid subscribers to watch a virtual aerial view of the race and view the track and data for any car they select, run instant replays at will, and change track perspective. Another company

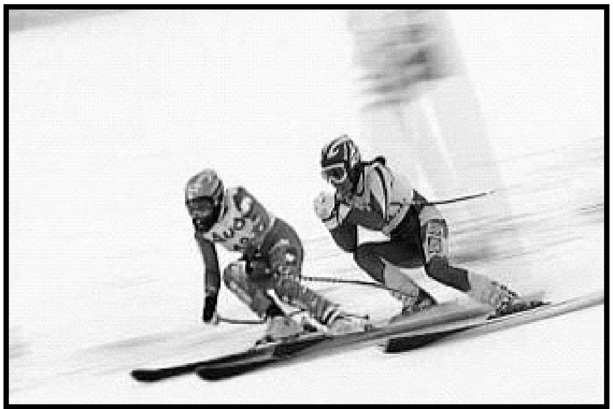


Figure 10.6: Transposition systems allow the viewer to compare athletes. (Courtesy of Dartfish/Sportvision.)

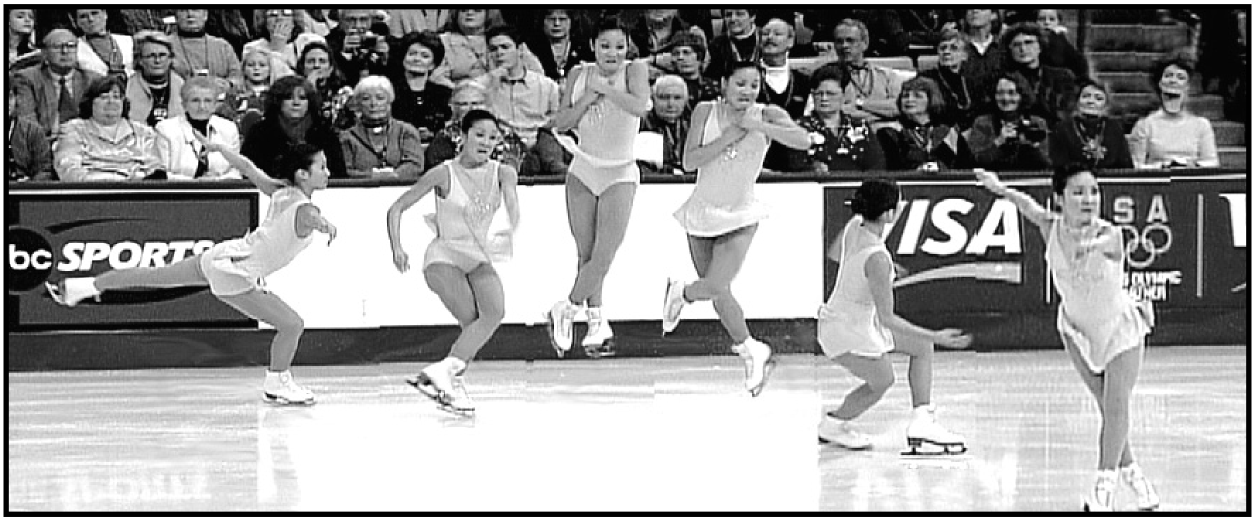


Figure 10.7: StroMotion is used to analyze the athlete's movements. (Courtesy of Dartfish/Sportvision.)

has created sports webcasting technologies that allow sports fans to "watch and play" live or delayed sports events on their computers. Their player and ball automatic tracking methods, combined with Intel's web 3D environment generates live or delayed 3D graphical simulations of live soccer action. Fans get to enjoy a graphical visualization of the match with the added functionality of choosing their viewpoint (for example, viewing the entire match through the eyes of one player). (Virtual TV Becomes Reality) RACEf/x, is developing interactive television games that will allow viewers to insert their own virtual race car onto the screen and allow them to race against the professional drivers during an race.

Technology Summary

The biggest challenge with new technology is to overuse them. At the end of the show you want them to remember the game … not the technology. The difference between using new technology as "electronic toys" and using them responsibly is when they are selected on the basis of whether they contribute to the viewer's understanding and enjoyment of the sport being covered.

… this is about content … it's factually easy to become mesmerized by new technology for its own sake. But technology is only a means to an end—and the end is great content.
—Michael Grade, Chairman, BBC, United Kingdom

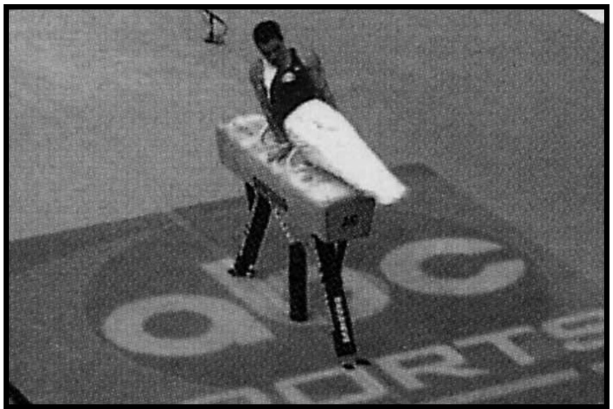


Figure 10.8: Virtual ads have become commonplace on many networks.

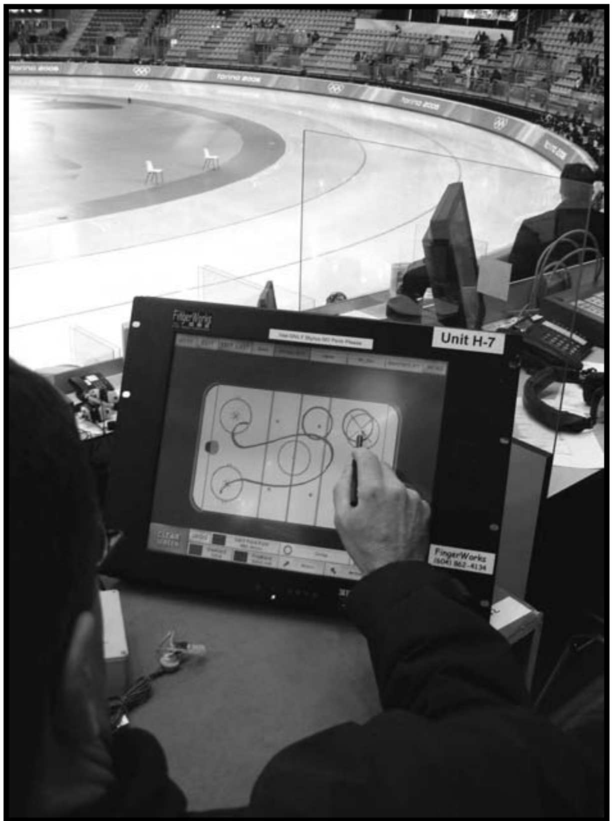


Figure 10.9: Sports analysts have used technological tools, such as this Telestrator, to illustrate what the athlete's strategies since the 60's. While it may look like a normal television monitor, the Telestrator's monitor is touch-sensitive and can be used to draw circles, lines, arrows or pre-loaded graphics directly over the video.

PART 4:

History of Sports Television

CHAPTER 11: Milestones in Sports Broadcasting

CHAPTER 11
Milestones in Sports Broadcasting

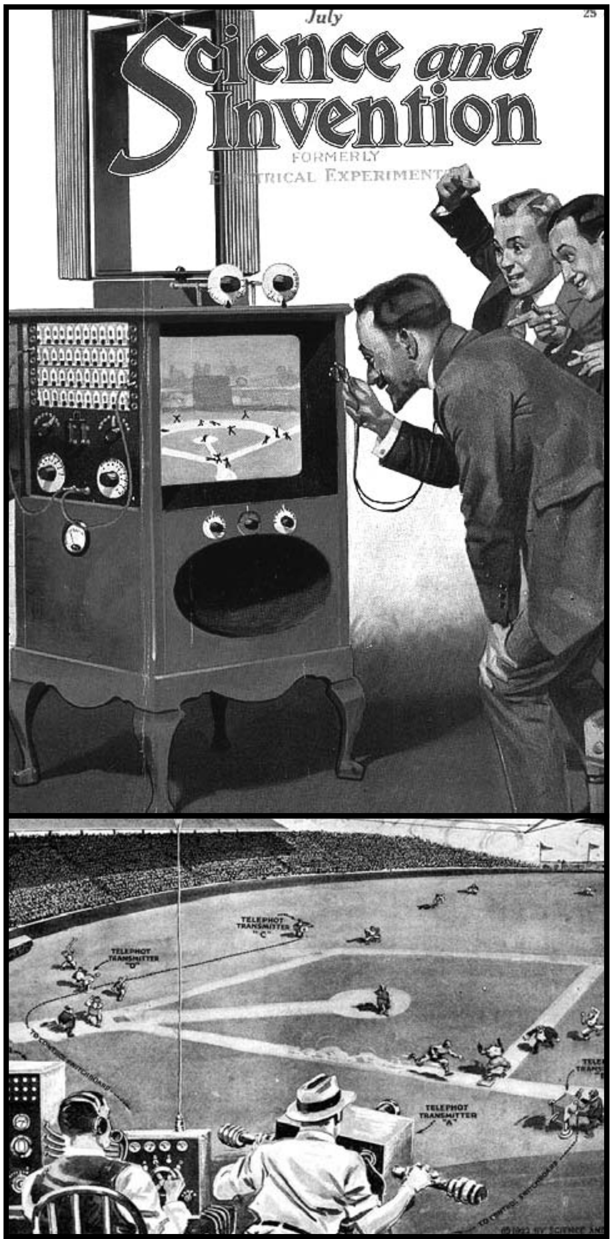


Figure 11.1: July 1922: H. Gernsback published, in *Science and Invention* magazine, detailed drawings of how sports will be covered in the future. While numerous experiments had been completed up to this point, television is not really considered invented until 1926.

Television, What's in a Name?
In the early1920s it was called visual listening, audiovision, telectroscopy, telephonoscope, raduo, electric vision, and radiovision. Finally, television seemed to be the name everyone accepted. The name television comes from "tele" (far off) and "vision" (to see).

July 12, 1928: Although some sources list tennis as being televised as the first sport on television, they were actually only images of a tennis player hitting a ball. It was not really a sports event.

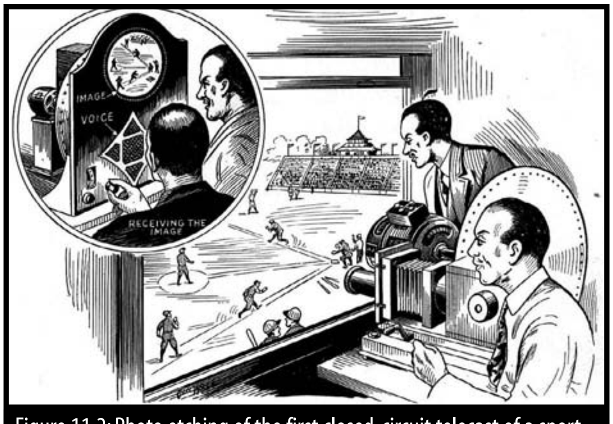


Figure 11.2: Photo etching of the first closed-circuit telecast of a sporting event. (*Television News*, November-December 1931)

February 17, 1931: The first closed-circuit telecast of a sporting event was a baseball game played by the Waseda University baseball club. The images were not seen by the public and were transmitted directly to the Electrical Laboratory at Waseda University in Tokyo. *(See figure 11.2.)*

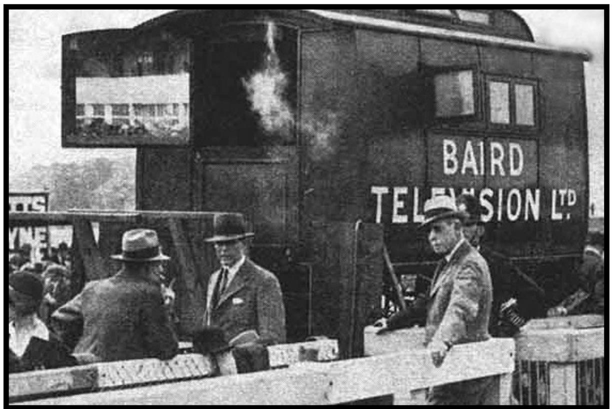


Figure 11.3: The entire vehicle shown above was the camera used to cover the first broadcast sports event. (Courtesty *Radio News*, March 1932 and Tom Genova)

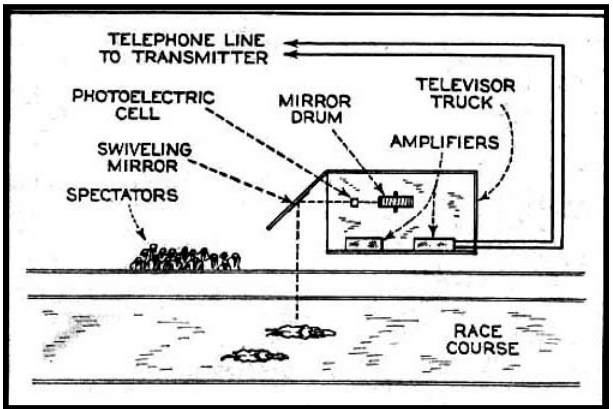


Figure 11.4: The "swiveling mirror" is illustrated in the above drawing. It utilized a moving mirror in order to follow the running horses. (Courtesty *Radio News*, March 1932 and Tom Genova)

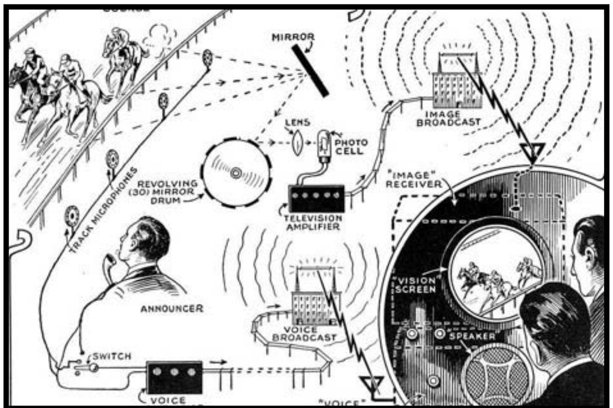


Figure 11.5: The first sports broadcast transmitted it's video over one channel and it's audio over a radio station. (Courtesy *Television News*, September–October 1931 and Tom Genova)

June 2, 1931: The earliest true broadcast (available to the public) of an outdoor sporting event was the BBC's coverage of The Derby (horse race) at Epsom in Great Britain. The production's mechanical television equipment utilized one camera. A movable mirror was used to focus the images of the horses into a large wagon, which contained the camera apparatus. Thus spectators were able to view the entire race from start to finish. The audio and video images were transmitted separately to the home viewer. *(See figures 11.3, 11.4, and 11.5.)*

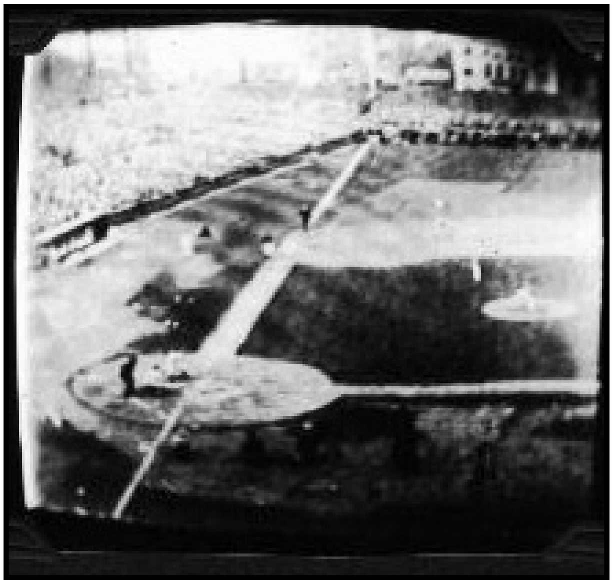


Figure: 11.6: Taken in 1933, this is the earliest known image from a television sports event. The photo was from the private collection of inventor Vladimir Zworykin and was a time exposure of the image on a kinescope. This baseball game took place at the Boston Braves Field and was probably shot with a camera that had 240 lines. (Photo courtesy of Steve Restelli)

1936: The first live television coverage of a sports event, utilizing electronic equipment, was the 1936 Berlin Olympics. RCA and Farnsworth cameras were used for the coverage.

1936: Leni Riefenstahl filmed the 1936 Olympics for the documentary *Olympia*. Her innovative use of dramatic film techniques on a sports event changed the world of film and television sports. The use of tracking dollys, underwater cameras, cameras on hot air balloons, dive cameras, low/high angles had never been attempted before on sports coverage. Broadcasting the Olympics, an International Olympic Committee publication, states that "The shooting techniques used by Leni Riefenstahl have become the standards for Olympic filmmaking and television coverage ever since." See page 42 for more information.

1937: First tennis tournament on television: Wimbledon

February 4, 1937: The first time that sports commentary was heard on television. The BBC hired Herry Mallin to comment on an England versus Ireland amateur boxing contest from the Alexandra Palace.

September 16, 1937: The first football (soccer) match to be filmed live on television was between the Arsenal and the Arsenal Reserves in Highbury, England.

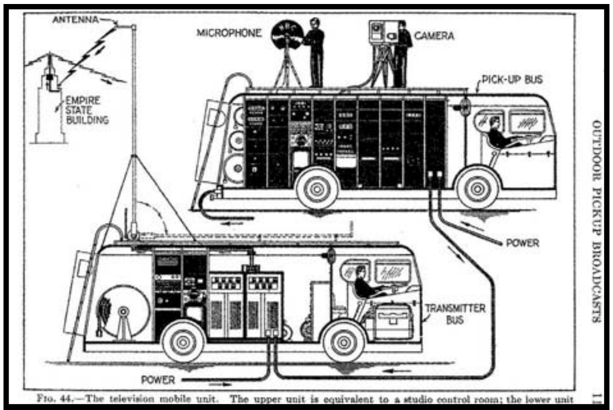

ANTENNA
MICROPHONE
CAMERA
PICK-UP BUS
EMPIRE STATE BUILDING
POWER
TRANSMITTER BUS
POWER
OUTDOOR PICKUP BROADCASTS
FIG. 44.—The television mobile unit. The upper unit is equivalent to a studio control room; the lower unit

Figure 11.7: An early remote television mobile unit from RCA from 1939–1940. (Courtesy of Bill Molzon and Steve McVoy)

May 15–21, 1939: The first telecast of a bicycle race was broadcast by the National Broadcasting Company. The six-day race featured twelve teams, eight of which finished the 2388 miles event. Yankee baseball player, Joe DiMaggio fired the starting gun.

June 1, 1939: First heavyweight boxing match televised, Max Baer versus Lou Nova, from Yankee Stadium

August 26, 1939: First major league baseball game telecast, a double-header between the Cincinnati Reds and the Brooklyn Dodgers at Ebbets Field, Brooklyn, announcer Walter L. "Red" Barber or Bill Stern (sources differ), on W2XBS.

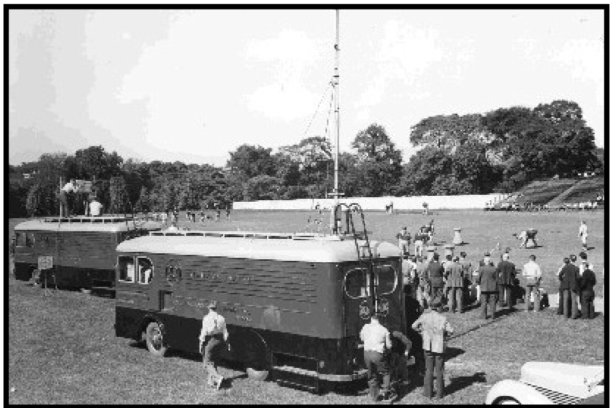


Figure 11.8: First televised college American football game on September 30, 1939. (Courtesy of David Sarnoff Library)

September 30, 1939: First televised college football (American style) game, Fordham versus Waynesburg, at Randall's Island, New York, on W2XBS. *(See figure 11.8.)*

October 22, 1939: First NFL game is televised by W2XBS: Brooklyn Dodgers versus Philadelphia Eagles at Ebbetts Field in Brooklyn. Play-by-play announcer was Allen (Skip) Walz.

February 25, 1940: First hockey game televised, Rangers versus Canadians, on W2XBS, from Madison Square Garden.

March 2, 1940: First televised track event, from Madison Square Madison

October 5, 1940: WPTZ-TV was the first in the country to carry a complete football (American style) schedule—all home games. With only 700 television sets scattered throughout the Philadelphia area, Philco broadcast the University of Pennsylvania's Quakers 51–0 victory over the University of Maryland at Franklin Field.

June 19, 1946: First televised heavyweight title fight (Joe Louis versus Billy Conn), broadcast from Yankee Stadium, was seen by the largest television audience to see a fight (141,000).

September 30, 1947: The first World Series game to be telecast was between the New York Yankees and the Brooklyn Dodgers at Yankee Stadium. The game was carried by WABD, WCBS-TV, and WNBT in New York, and was also telecast in Philadelphia, Schenectady, and Washington. The 1947 World Series brought in television's first mass audience, and was seen by an estimated 3.9 million people, mostly in bars [Tim Brooks].

July 14, 1951: The first "color" sports event was the $15,000 Molly Pitcher Handicap held at the Monmouth Park Jockey Club in Oceanport, New Jersey. This event was broadcast using the CBS Color Television System, which was pre-NTSC.

September 22, 1951: First live sporting event seen coast-to-coast in the United States: a college football game between Duke and the University of Pittsburgh, at Pittsburgh (NBC-TV).

1955: Helivision anti-vibration helicopter camera mount was invented by French director/cinematographer Albert Lamorisse.

November 1, 1959: WLWT-TV televised the first indoor sports event in television history in color. The Cincinnati Royals pro basketball game from the Cincinnati Gardens. It was fed to NBC.

April 1960: Ampex introduces the Intersync accessory, which makes it possible to cut to or from videotape without rolls or discontinuity and to do dissolves and some special effects.

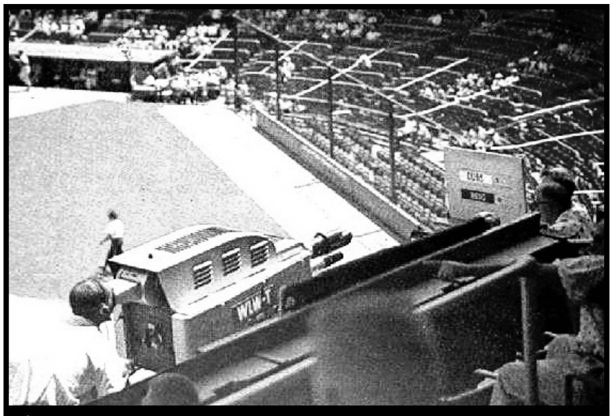


Figure 11.9: In the 1960s this camera was responsible for the infield, outfield, and graphics. (Courtesy of Lytle Hoover)

May 16, 1960: WLWT-TV (USA) televised the first night major league baseball game in television history in color from Crosley Field. Three RCA TK-41 color cameras equipped with low light tubes were used.

August 25, 1960: The opening of the 17th Olympic Games in Rome is transmitted live via the Eurovision link. Video tape was used by broadcasters for the first time at an Olympics.

March 17, 1962: ABC Sports (USA) used special rerun equipment to replay portions of a boxing match.

October 10, 1964: First live color satellite broadcast in history was the opening ceremonies of the 1964 Summer Olympics in Tokyo.

August 1965: MVR video disc machine is built to CBS specifications and is used for instant replays of football games.

April 1967: Ampex introduces the first battery-powered portable high-band color tape recorder. Weighing 35 pounds, it could record for 20 minutes. The accompanying camera weighed 13 pounds.

April 1967: Ampex announces high-band color video disc machine, HS-100, for instant replays. ABC uses it for slow-motion playback of downhill skiing at the World Series of Skiing—an early, if not first, use of slow motion instant replay in sporting events.

1968: NHK in Japan begins work on high definition television (HDTV).

1968: Ampex HS-100 video disc recorder with slow motion and stop-action facilities is used for first time by ABC during Olympic Games.

1969: Development of first handheld video camera.

1969: First exhibition of HDTV at STRL open house (Japan).

1976: Steadicam camera mount, devised by Garrett Brown, is introduced.

1984: Olympic Games were broadcast in stereo.

June 3, 1989: Japan begins regular high definition television transmissions by satellite.

October 1, 1998: Major League Baseball began streaming video on the Internet of post-game conferences, playoff game highlights shortly after each game and the greatest moments in baseball.

December 1, 2000: Digital satellite broadcasting began in Japan.

2001: Major League Baseball streams real-time video of games over the Internet.

May 31, 2003: The Women's National Basketball Association (WNBA) featured the first-ever live video webcast of a game in women's professional sports history.

November 2003: MobiTV becomes the first streaming television content service that delivers live television programming to mobile phones.

August 2004: Broadcasters at the Athens Olympics streamed video and highlight clips of the Olympic Games through mobile phone handsets and via the Internet. The BBC called the Athens Olympics the "Interactive Olympics."

February 2006: Torino Olympics is the first all HD Olympics by NBC.

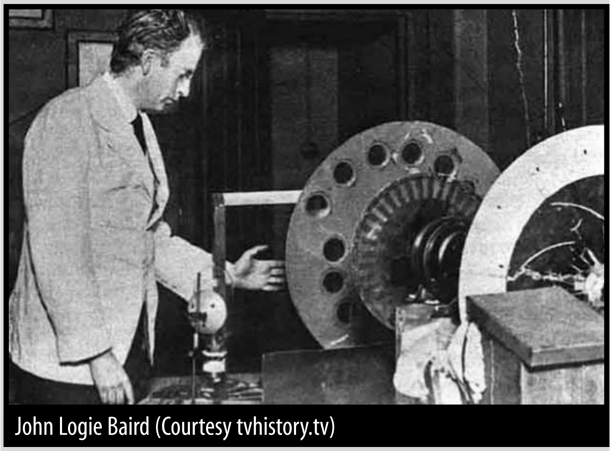
(Compiled with input from Iain Baird, earlytelevision.org, Ed Reitan's Color Television History, Philo T. Farnsworth Archives, Lytle Hoover, terramedia.co.uk, Alexander B. Magoun, David Sarnoff Library, SportandTechology.com, WLWT, Temple University Urban Archives, TV Acres, tvhistory.tv, oldradio.com, and Tom Genova.)

The Inventors of Television

It is very difficult to say exactly who really "invented" television, so many individuals were working around the world on the project. The "inventor" title is based on how you define television. However, there are two individuals who seem to have had the most impact at the beginning of television.

John Logie Baird, of Scotland and later England, was the inventor of mechanical television in 1926. He was the first person who was able to create a visual transmission of a television image. While his mechanical system was defunct in a few years, he continued to experiment and was the first person to ever televise a sports event (see the description of the first sports broadcast from the Derby). His later work included color television, high definition television, and some of the foundation for television as it is today.

Philo T. Farnsworth is credited as being the inventor of electronic television in 1927. While his methodology was significantly different from Baird's, his early television tube was the foundation for electronic television. Farnsworth also created the first television camera and was able to sell his technology to organizations all over the world. In fact, Fernseh, the television production company who televised the Olympics in 1936, used some of Farnsworth's cameras in their coverage.



John Logie Baird (Courtesy tvhistory.tv)

Philo T. Farnsworth (Courtesy the Philo T. Farnsworth Archives)

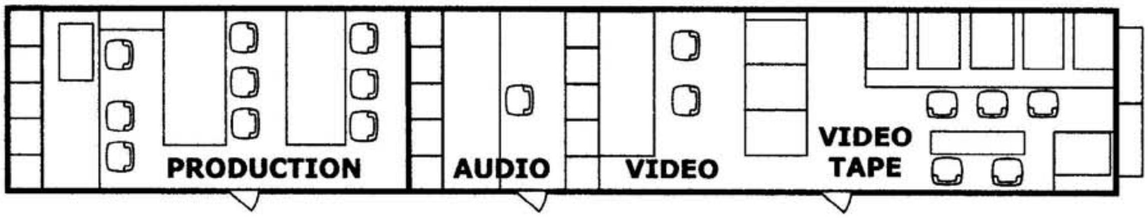
APPENDIX I:
Truck Diagrams

A series of television production truck diagrams are included to show the variety of trucks and the types of equipment available in each truck.

COLORADO STUDIOS

Mountain Mobile Television -- MMT 1

50' Long, 13' High, 8'6" Wide



Control:

- Sony 7350 36-input, 3-M/E switcher
- Sony DME-7000 DVE (dual channel) and single channel Abekas A-53D
- 5-rack monitor wall with 40 - 9" black & white monitors, 8 - 9" color monitors and 3 - 13" color monitors.
- Chyron Infinit
    - 060 processor, 128 MB Expanded Memory, third channel mix, Transform, 1.1GB hard drive, 230 MB Bernoulli drive, 2 GB Jaz drive, 250 Mb Zip drive, Intelligent Interface and video capture
- Dual channel Abekas A42 still store (600 fields)
-

Cameras:

- Sony chip cameras
    - Hard cameras (BVP-375) 5O/55:8.5 lenses
    - Handheld cameras (BVP-90) 18x 8.5 lenses
    - Up to 10 total cameras available on request
- 2 clock cameras

Tape:

- Up to 6 BVW 75 VCRs available on request (with slo-mo controllers)
- BVW-65 playback only VCR
- EVS 4-channel slow-motion disk recorder (available on request)
- 1 BVH-3100 1" VTR
- 2 VHS VCRs
- Master time code generator

Audio:

- Soundcraft Europa audio mixer 40+8/8/2
- Digicart II with 220 keyboard, Sony Minidisc, CD player, audio cassette
- 11 DBX compressor/limiters, 2 Telos and 2 QKT telephone interfaces
- Microphones: 5 Senneheiser ME-66s, 2 - 816s 8 Sony lavalieres, 5 RE 50s, 5 EV 635s, 4 Sportscaster headsets and 3 talk-back boxes

Communications:

- RTS communications system, 12 channel system, 802 master stations, all dual listen
- RTS 4000 series IFB system (12 channels)
- 6 camera ISO system, 20 RTS belt packs, 9 RTS IFB boxes
- 8-Line Panasonic telephone system

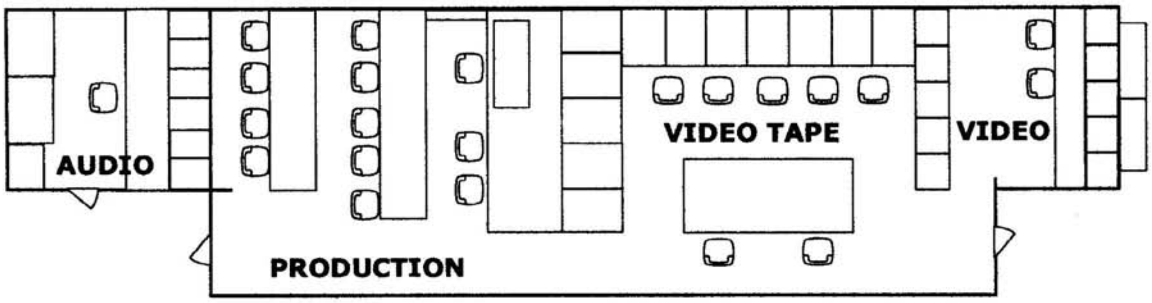
Engineering, Cable and Miscellaneous:

- 32 x 32 DataTek router - breakaway
- Redundant sync generators, w/ auto changeover
- GVG processing amp (patchable), external tallies
- 2 frame synchronizers (more available on request)
- 4,000 feet of triax, 2,000 feet of coax, 1,500 feet of DT-12 audio mults, 2,500 feet of 4 pair audio mults (More cable available on request)
- 2 - 13" portable color monitors, 7 - 9" portable color monitors
- 1 lighting kit
- Power: 208VAC, single-phase, 150 amps

COLORADO STUDIOS

Mountain Mobile Television -- MMT 3X

50' Long, 13' 3" High, 8'6" Wide, Expands to 12'6" Wide



Control:

- GVG 3000 52-input, 3-ME switcher, 6 aux bus, frame store
- DVEous (Dual Twin)
- 6-rack monitor wall with 48 - 9" black & white monitors, 8 - 9" color monitors and 3 - 13" color monitors.
- Chyron Infinit
    - 060 Processor, 128 MB extended memory, third channel mix, Transform II, 4.5 GB hard drive, 230 MB Bernoulli drive, 2 GB Jaz drive, 250 Mb Zip drive, Intelligent Interface and video capture.
- Leitch Still File with streamer

Cameras:

- Sony chip cameras
    - Hard cameras (BVP -500s and BVP-375s)
    - Canon lenses 70:8.5 and 55:8.5
    - Handheld cameras: BVP-550s with 20:8.5 lenses, and BVP-90s with 18: 8.5 lenses
    - Up to 12 triaxed cameras available on request
- 2 clock cameras

Tape:

- Up to 10 BVW-75 VCRs available on request (with slow-motion controllers)
- EVS 4-channel slow-motion disk recorder (available on request)
- 2 VHS VCRs
- Master time code generator

Audio:

- Soundcraft Europa audio mixer 40+8/8/2
- 2 Digicart IIs with 220 keyboard, CD player, audio cassette
- 11 DBX compressor/limiters, 2 Telos and 2 QKT telephone interfaces
- Microphones: 4 Senneheiser 416s, 4 ATI Shotguns, 4 RE 50s, 4 EV 635s, 8 Sony lavalieres, 4 Sportscaster headsets, 4 talk-back boxes

Communications:

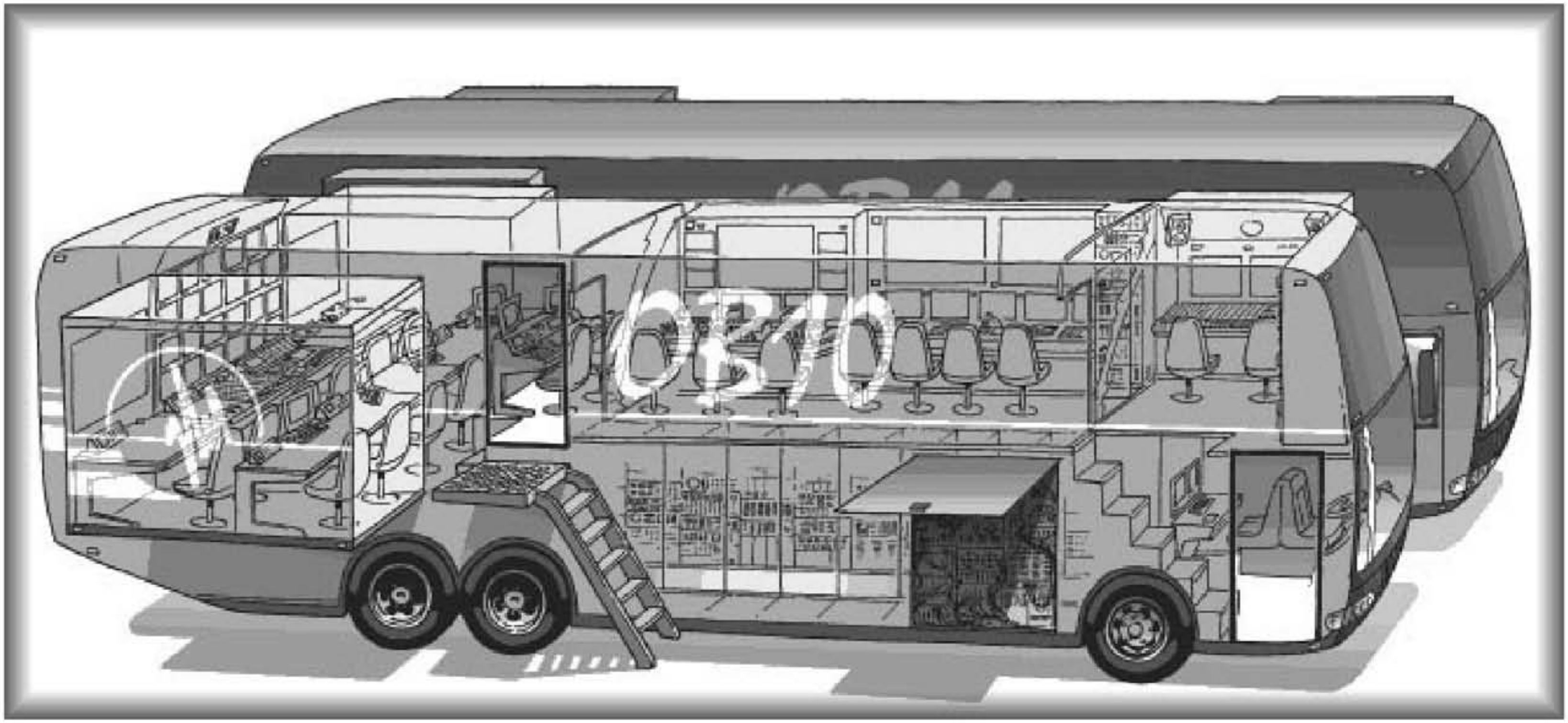
- RTS ADAM communications system plus 9 powered 2-wire channels
- RTS 4000 series IFB system (12 channels)
- Camera ISO system, 20 RTS belt packs, 9 RTS IFB boxes
- 8-Line Panasonic telephone system

Engineering, Cable and Miscellaneous:

- 64 x 64 DataTek router (32 x 32 audio)
- Redundant sync generators, w/ auto changeover
- GVG processing amp (patchable), external tallies
- 2 frame synchronizers (more available on request)
- 4,000 feet of triax, 2,000 feet of coax, 1,500 feet of DT-12 audio mults, 2,000 feet of 4 pair audio mults (more cable available on request)
- 6 - 13" portable color monitors, 8- 9" portable color monitors
- 2 lighting kits
- Power: 208VAC, single-phase, 150 amps

Alfacam

OB 10-11HD



VEHICLE

- VAN HOOL T 927 - 2 level coach, super hi-end finishing
- Special custom made body with 5 areas
- length over all: 13,7 m, width after extension 4,50 m, height 4 m
- 2 levels, ca 68m^2 workspace in total!
- complete with 6 separate air conditioning units, air suspension, automatic leveling system, mains transformer, power stabilisers, ...
- 460 HP MAN motor
- OB10-11HD can operate in 3x170V, 3x190V, 3x380V (63A) in 50hz or 60hz

VIDEO

FULL DIGITAL 16:9-4:3 switchable
FULL HDTV 1080/50i or 60i switchable up to 30 cameras

- Serial Digital Production Switcher PHILIPS DD 35
  SDI mainframe 62 inputs - 3ME+PP
  HDTV mainfram SERAPH 32 inputs - PP
- 4 mixing panels in this truck (absolutely UNIQUE)
  -35/3 with 24 access on 3 MES on main desk
  -24/2 with 24 access on 2 MES on second desk
  -extended satelite panel 16 access on desk where wanted
  -small satelite panel on desk where wanted
- built in FX panel permits
  -4x8 sec RAM recording of clips
  -2 channel built in DVE

SDI MODE

- up to 30 SDI - cameras BTS LDK 100-200 with 8x to 86x lenses
- 6 cameras on FRAME STORES (f.i. steadycam or unlocked)
- 6 SUPERSLOMO cameras BTS LDK 23 available
- 10 LSMs: 4/2-3/1-2/2 and superslomo LSMs (cabled for 10)
- 15 VTR capacity
- different legs and heads (HAWK, VARIPEDS, CRANES, HEAVYLEGS, ...)
- editor BVE 2000
- SDI matrix 96x224
- over 150 viewing monitors:
  BARCO ADVM14, BARCO I-studio multisplitters 5 PLASMAWALLS, 10 BARCO CBM 5049 with 10 Vivaldi quadsplits, 6 hi-end computer LCDs with quadsplits...

HDTV MODE

- up to 30 cameras BTS LDK 6000 with 8x to 86x lenses (today Alphacam owns 48 cameras)
- integration of any NON-HDTV signal is possible
- at present all slomos through Panasonic D5HDTV recorders
- 15 VTR capacity
- different legs and heads (HAWK, VARIPEDS, CRANES, HEAVYLEGS, ...)
- over 20 viewing monitors in HDTV
- in HDTV MODE, OB10-11 can work in both 50 fields-60 fields, this means that all HD sources are in this cases available in rest. PAL-SDI/50 and 1080i/50 or in NTSC-SDI/60 and 1080i/60

DIGITAL SURROUND AUDIO

- Audio desk SOUNDTRACKS DPCII - 80 faders - 112 inputs FULL DIGITAL surround 5.1 audio desk
- CD, DAT, ...
- many different audio effects
- Matrix Plus III intercom system 72-72

OPTICAL VIDEO AND AUDIO

- different coders, decoders (PAL, SDI, audio...) on OPTICAL cables
- AUDIO frame with 56 sources can be set inside the venue and connected optically on 1 optical MADI-FIBRE!!

CONTROL

- All crucial equipment is dedoubled on many different computers, and worked out redundantly

APPENDIX II:

Olympic Broadcast Planning Document

The following is a small part of the television planning documentation from an Olympic broadcast. This documentation illustrates the level of pre-planning that is required for a large sports event.

'E' Center

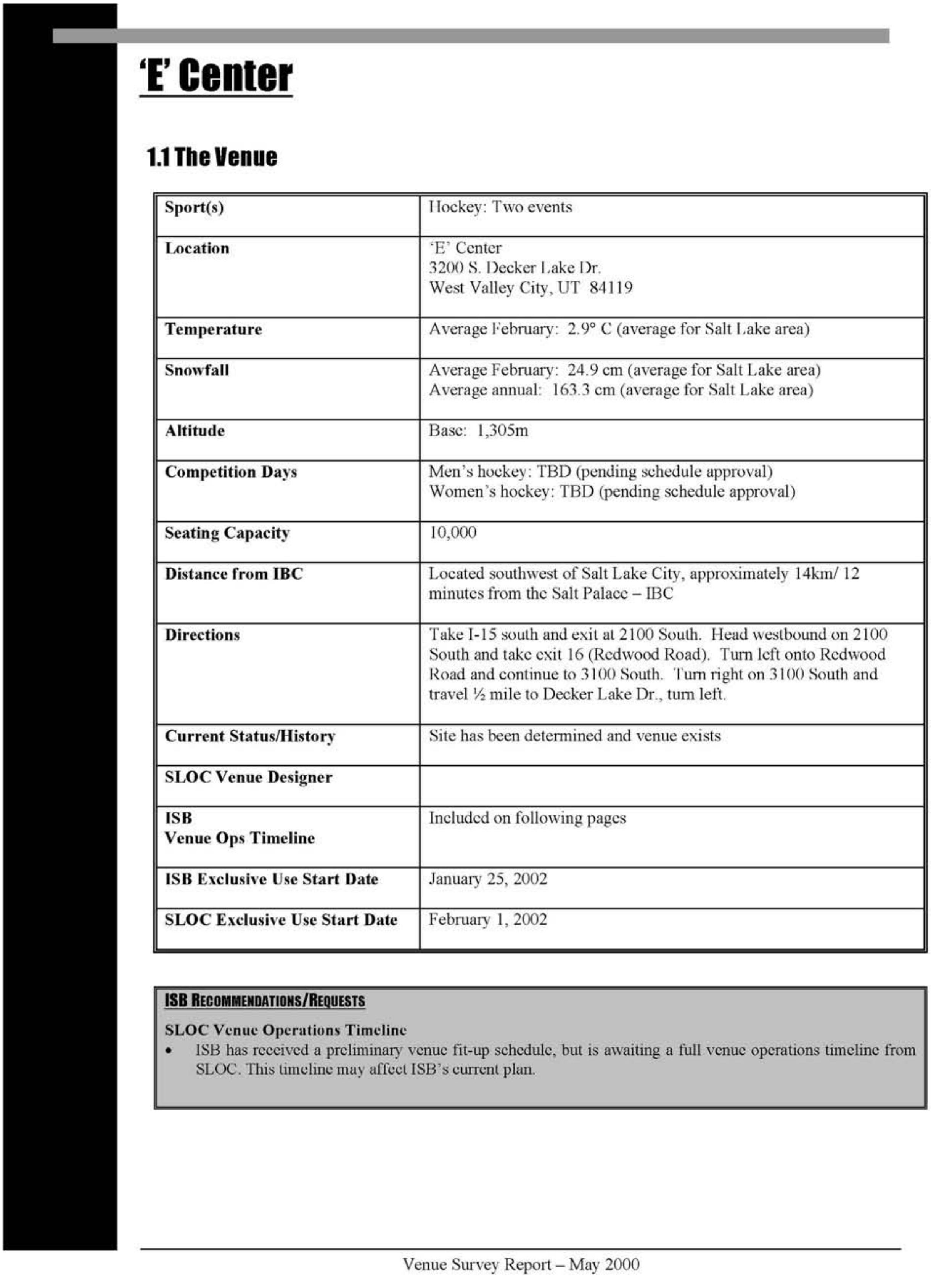
Venue Quick Facts

GENERAL VENUE	
Commentary Positions	70
Observer Seats	80
Parking (Total Spaces)	120
ISB	20
Rights Holders	100
Compound Location/Size	Located on the Northwest side of the venue, in the parking area. (46,500 sq.ft.)

KEY DATES	
Set Up	Feb. 5 – Feb. 7
Final Fax	Feb. 7
Rehearsal	Feb. 8
Training	TBD
Air	TBD
Strike	TBD

EQUIPMENT	
Cameras	18
Videotape Recorders	10
Microphones	33
Specialty Equipment	13
Graphics & Timing	
Character Generator(s)	1
Timing Generator(s)	1
Mobile Unit(s)	Two (Mountain Mobile 3X and one Type C)

CREW	
Total	63
Freelance	36
University Level	20
Vendors	7
Total	63
ISB Local	31
ISB Non-local	32



‘E’ Center

1.1 The Venue

Sport(s)	Hockey: Two events
Location	‘E’ Center 3200 S. Decker Lake Dr. West Valley City, UT 84119
Temperature	Average February: 2.9° C (average for Salt Lake area)
Snowfall	Average February: 24.9 cm (average for Salt Lake area) Average annual: 163.3 cm (average for Salt Lake area)
Altitude	Base: 1,305m
Competition Days	Men’s hockey: TBD (pending schedule approval) Women’s hockey: TBD (pending schedule approval)
Seating Capacity	10,000
Distance from IBC	Located southwest of Salt Lake City, approximately 14km/ 12 minutes from the Salt Palace – IBC
Directions	Take I-15 south and exit at 2100 South. Head westbound on 2100 South and take exit 16 (Redwood Road). Turn left onto Redwood Road and continue to 3100 South. Turn right on 3100 South and travel ½ mile to Decker Lake Dr., turn left.
Current Status/History	Site has been determined and venue exists
SLOC Venue Designer	
ISB Venue Ops Timeline	Included on following pages
ISB Exclusive Use Start Date	January 25, 2002
SLOC Exclusive Use Start Date	February 1, 2002

ISB RECOMMENDATIONS/REQUESTS

SLOC Venue Operations Timeline

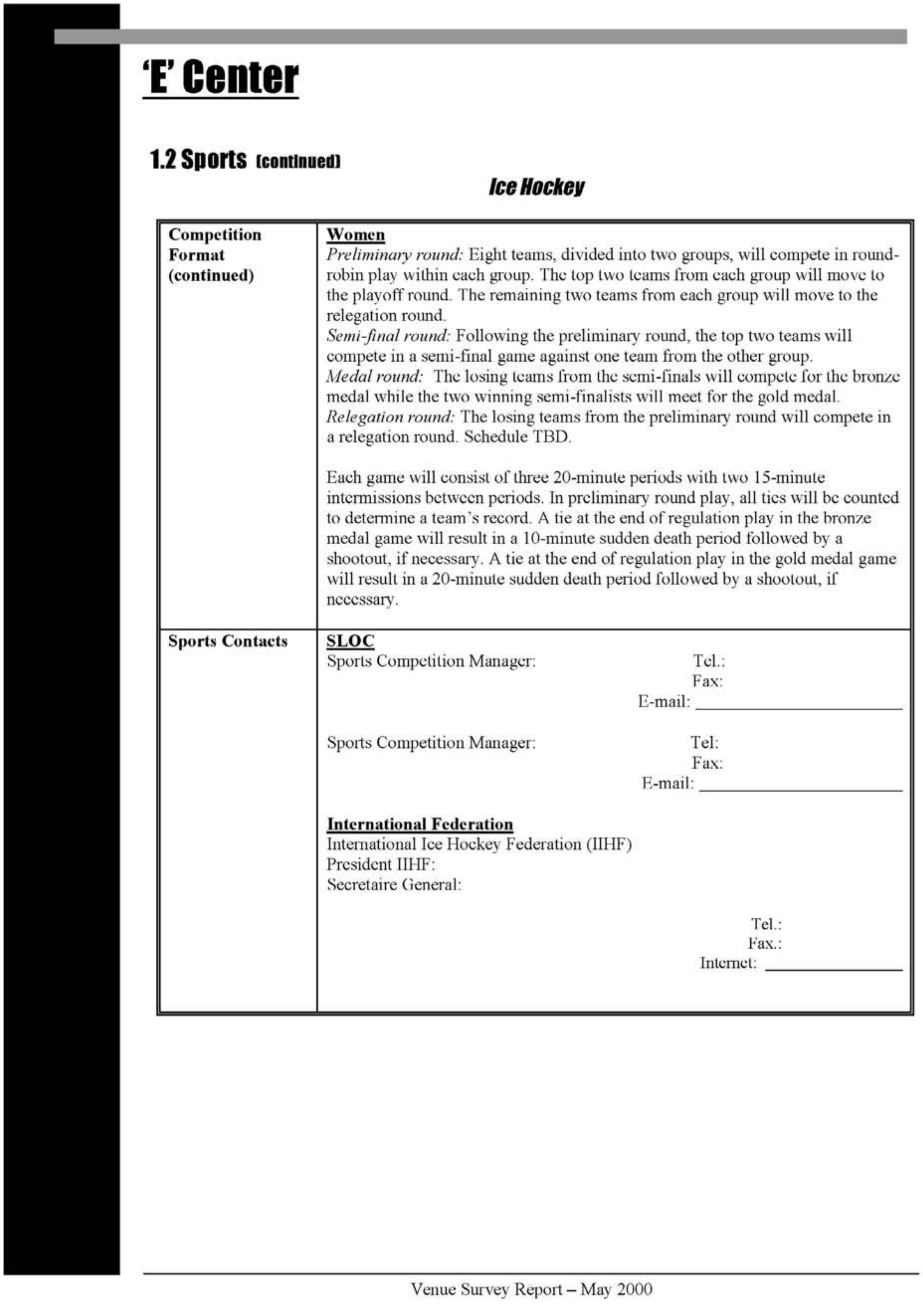
- ISB has received a preliminary venue fit-up schedule, but is awaiting a full venue operations timeline from SLOC. This timeline may affect ISB’s current plan.

'E' Center

1.2 Sports

Ice Hockey

Events/Disciplines	Men's Tournament Women's Tournament
Competition Dates	TBD – Final schedule is currently under consideration by SLOC and the IIHF.
Number of Athletes/Teams	Men's Teams: 14 Women's Teams: 8
Training Site	Men's – Acord Ice Center Women's – Murray Arena
Competition Format	**Men** *Preliminary round:* Eight teams, divided into two groups, will compete in round-robin play within each group. The winners of each group will move to the final round. The team that ranks higher at the Olympic qualifying round will be known as Qualifying 1 and the other team as Qualifying 2. Three relegation games will be played to determine the ranking of the remaining teams. *Final round:* Six prequalified teams join the competition, and along with the Qualifying 1 and Qualifying 2 teams, will form two groups and compete in round-robin play within each group. *Playoff round:* Following the final round, each team will compete in a quarterfinal game against one team from the other group. The four winning teams will compete in the semifinals. *Medal round:* The losing teams from the semifinals will compete for the bronze medal, while the two winning semifinalists will meet for the gold. Each game will consist of three 20-minute periods with two 15-minute intermissions between periods. In preliminary round play, all ties will be counted to determine a team's record. A special criteria will be used to break ties for teams qualifying for medal round play. A tie at the end of regulation play in the bronze medal game will result in a 10-minute sudden death period followed by a shootout, if necessary.



‘E’ Center

1.2 Sports (continued)

Ice Hockey

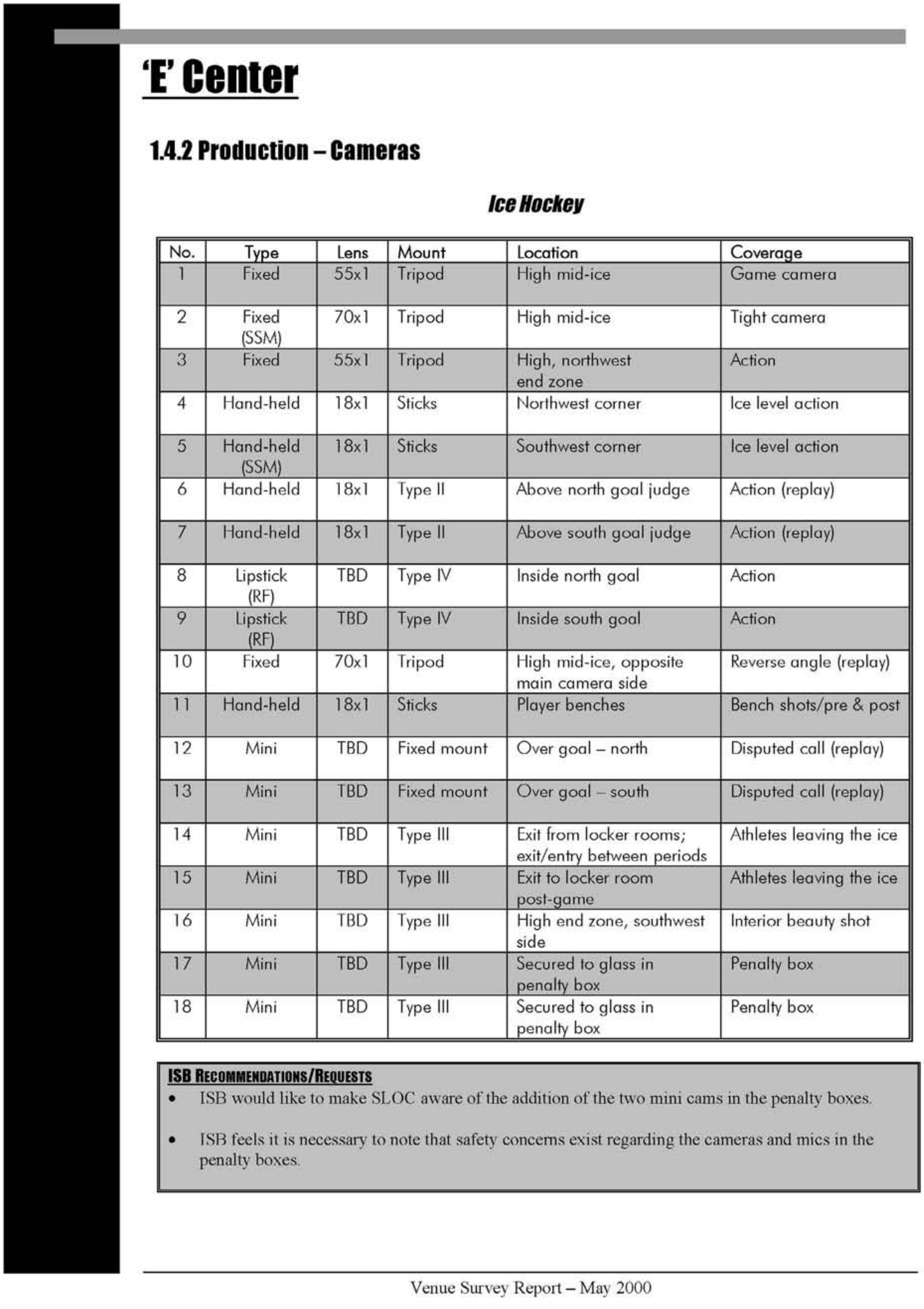
Competition Format (continued)	**Women** *Preliminary round:* Eight teams, divided into two groups, will compete in round-robin play within each group. The top two teams from each group will move to the playoff round. The remaining two teams from each group will move to the relegation round. *Semi-final round:* Following the preliminary round, the top two teams will compete in a semi-final game against one team from the other group. *Medal round:* The losing teams from the semi-finals will compete for the bronze medal while the two winning semi-finalists will meet for the gold medal. *Relegation round:* The losing teams from the preliminary round will compete in a relegation round. Schedule TBD. Each game will consist of three 20-minute periods with two 15-minute intermissions between periods. In preliminary round play, all ties will be counted to determine a team’s record. A tie at the end of regulation play in the bronze medal game will result in a 10-minute sudden death period followed by a shootout, if necessary. A tie at the end of regulation play in the gold medal game will result in a 20-minute sudden death period followed by a shootout, if necessary.
Sports Contacts	**SLOC** Sports Competition Manager: Tel.: Fax: E-mail: ____________________ Sports Competition Manager: Tel: Fax: E-mail: ____________________ **International Federation** International Ice Hockey Federation (IIHF) President IIHF: Secretaire General: Tel.: Fax.: Internet: ______________

'E' Center

1.4.1 Production – Venue Review

Ice Hockey

Coverage	ISB will utilize 18 cameras to broadcast ice hockey at the 'E' Center. Coverage will focus on the speed and action of the game. Replays will illustrate offensive strategy and the defensive battles around the goals. Passing and goaltending nuances will be captured in super slow motion. Cameras will be mounted above, behind and inside the goals. Creative audio techniques will be employed to introduce a more exciting and intimate sound presentation of the broadcasts.
Cameras (Total)	18
Fixed	3 (No. 1, No. 3, No. 10)
Hand-held	4 (No. 4, No. 6, No. 7, No. 11)
Mini	7 (No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18)
Lipstick	2 (No. 8-RF, No. 9-RF)
Super Slow Motion (SSM)	2 (No. 2 – fixed, No. 5 – hand-held)
Videotape Recorders (Total)	10
Super Slow Motion (SSM)	2
Slow motion isolation	6
Backup PGM record	2
Specialty Equipment	13
Robotic lipstick	(No. 8, No. 9)
Robotic mini	(No. 14, No. 15, No. 16, No. 17, No. 18)
Robotic hand-held	(No. 6, No. 7)
Mini cam w/fixed mount	(No. 12, No. 13)
SSM	(No. 2 – fixed, No. 5 – hand-held)
Graphics & Timing	
Character Generator(s)	1
Timing Generator(s)	1



'E' Center

1.4.2 Production – Cameras

Ice Hockey

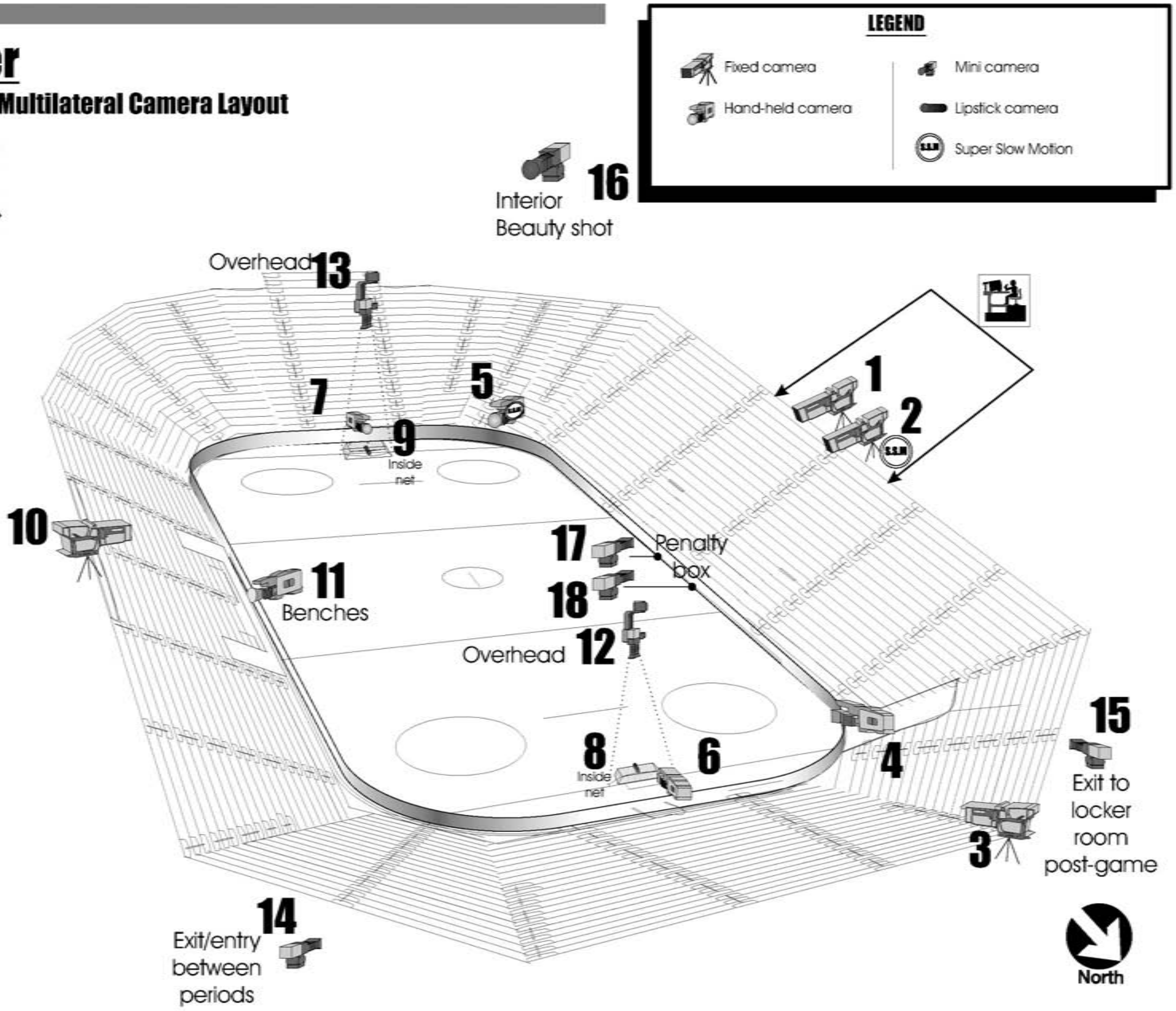
No.	Type	Lens	Mount	Location	Coverage
1	Fixed	55x1	Tripod	High mid-ice	Game camera
2	Fixed (SSM)	70x1	Tripod	High mid-ice	Tight camera
3	Fixed	55x1	Tripod	High, northwest end zone	Action
4	Hand-held	18x1	Sticks	Northwest corner	Ice level action
5	Hand-held (SSM)	18x1	Sticks	Southwest corner	Ice level action
6	Hand-held	18x1	Type II	Above north goal judge	Action (replay)
7	Hand-held	18x1	Type II	Above south goal judge	Action (replay)
8	Lipstick (RF)	TBD	Type IV	Inside north goal	Action
9	Lipstick (RF)	TBD	Type IV	Inside south goal	Action
10	Fixed	70x1	Tripod	High mid-ice, opposite main camera side	Reverse angle (replay)
11	Hand-held	18x1	Sticks	Player benches	Bench shots/pre & post
12	Mini	TBD	Fixed mount	Over goal – north	Disputed call (replay)
13	Mini	TBD	Fixed mount	Over goal – south	Disputed call (replay)
14	Mini	TBD	Type III	Exit from locker rooms; exit/entry between periods	Athletes leaving the ice
15	Mini	TBD	Type III	Exit to locker room post-game	Athletes leaving the ice
16	Mini	TBD	Type III	High end zone, southwest side	Interior beauty shot
17	Mini	TBD	Type III	Secured to glass in penalty box	Penalty box
18	Mini	TBD	Type III	Secured to glass in penalty box	Penalty box

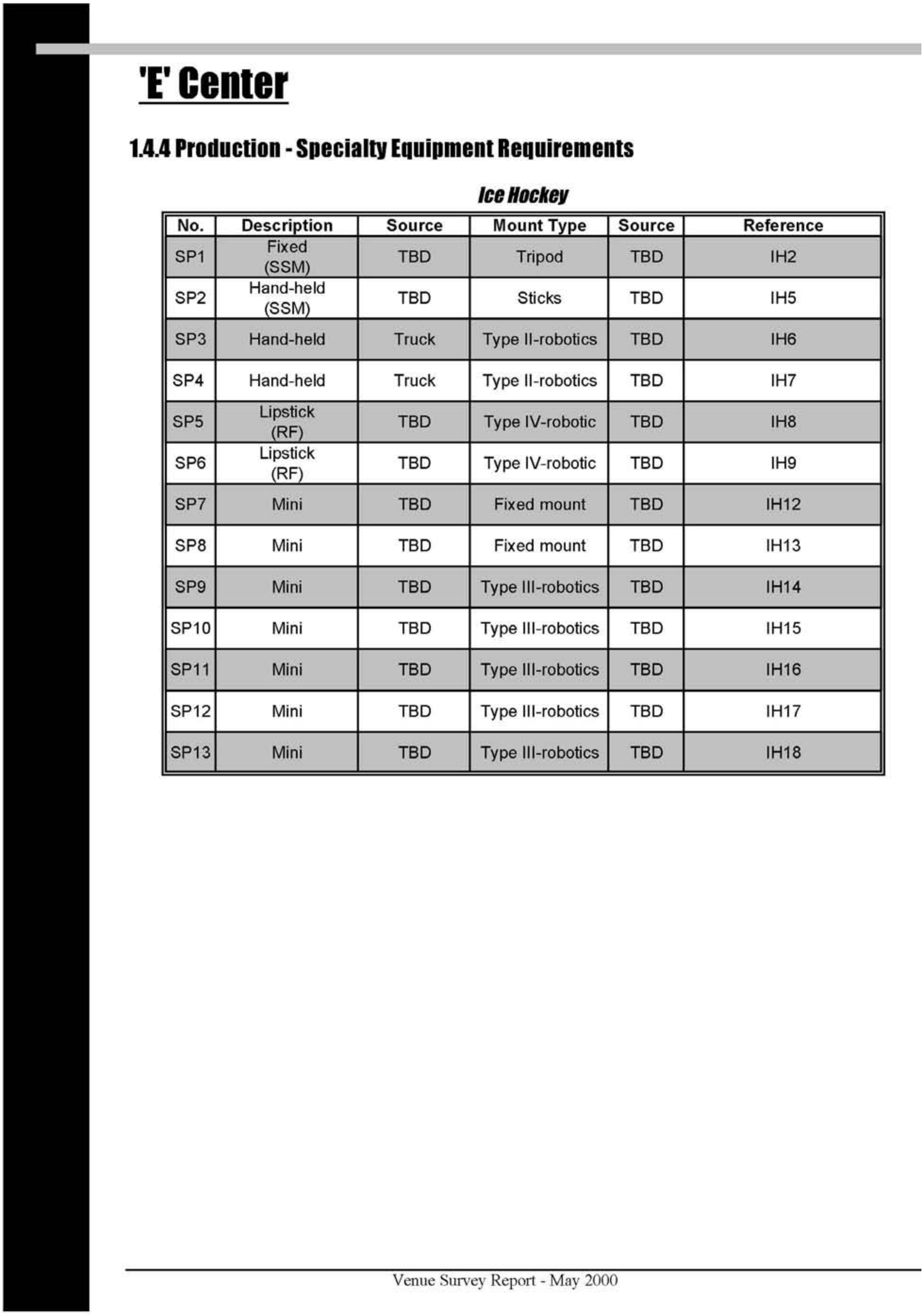
ISB RECOMMENDATIONS/REQUESTS

- ISB would like to make SLOC aware of the addition of the two mini cams in the penalty boxes.
- ISB feels it is necessary to note that safety concerns exist regarding the cameras and mics in the penalty boxes.

'E' Center

Ice Hockey - Multilateral Camera Layout





'E' Center

1.4.4 Production - Specialty Equipment Requirements

Ice Hockey

No.	Description	Source	Mount Type	Source	Reference
SP1	Fixed (SSM)	TBD	Tripod	TBD	IH2
SP2	Hand-held (SSM)	TBD	Sticks	TBD	IH5
SP3	Hand-held	Truck	Type II-robotics	TBD	IH6
SP4	Hand-held	Truck	Type II-robotics	TBD	IH7
SP5	Lipstick (RF)	TBD	Type IV-robotic	TBD	IH8
SP6	Lipstick (RF)	TBD	Type IV-robotic	TBD	IH9
SP7	Mini	TBD	Fixed mount	TBD	IH12
SP8	Mini	TBD	Fixed mount	TBD	IH13
SP9	Mini	TBD	Type III-robotics	TBD	IH14
SP10	Mini	TBD	Type III-robotics	TBD	IH15
SP11	Mini	TBD	Type III-robotics	TBD	IH16
SP12	Mini	TBD	Type III-robotics	TBD	IH17
SP13	Mini	TBD	Type III-robotics	TBD	IH18

'E' Center

1.4.5 Production – Graphics

ISB GRAPHICS INSERTS

As Host Broadcaster, ISB is responsible for the graphic inserts that will be used during the transmission of the International Signal for the 2002 Olympic Winter Games.

In developing these inserts, ISB's goal is to integrate design elements with data and to ensure that the graphics will be readable for the worldwide television audience. Emphasis will be placed on presenting the IOC graphic design in a manner that will clearly identify the coverage as being specific to the Olympic Games. Minimal movement and animations will ensure that the sport is presented without undue distractions.

Graphics will be dissolved on and off. In most cases, ISB will not wipe or use digital effects to insert any graphics. In some cases, cutting to graphics will be acceptable only after discussions with senior graphics personnel.

GRAPHIC INSERT EXAMPLES – 'E' CENTER

The pages that follow this section contain examples of ISB's graphic layout plan for ice hockey.

GRAPHIC EQUIPMENT

For standard graphics at all events, ISB will use a Chyron character generator. The standard graphics include presentations of the venue and events, start lists, individual identifications and result lists. The Chyron character generator will be interfaced directly with the on-venue results system to allow instant access to results information.

For timing graphics, ISB will use a character generator constructed especially for conversion and display of timing data.

GRAPHIC EQUIPMENT – 'E' CENTER

The following equipment will be used at the 'E' Center venue:

- One (1) Chyron character generator for results
- One (1) timing generator

OPENING AND CLOSING ANIMATIONS

ISB will design an opening and closing animation that will run prior to the feed and close every transmission. It will identify the venue, the sport and will incorporate various pictograms.

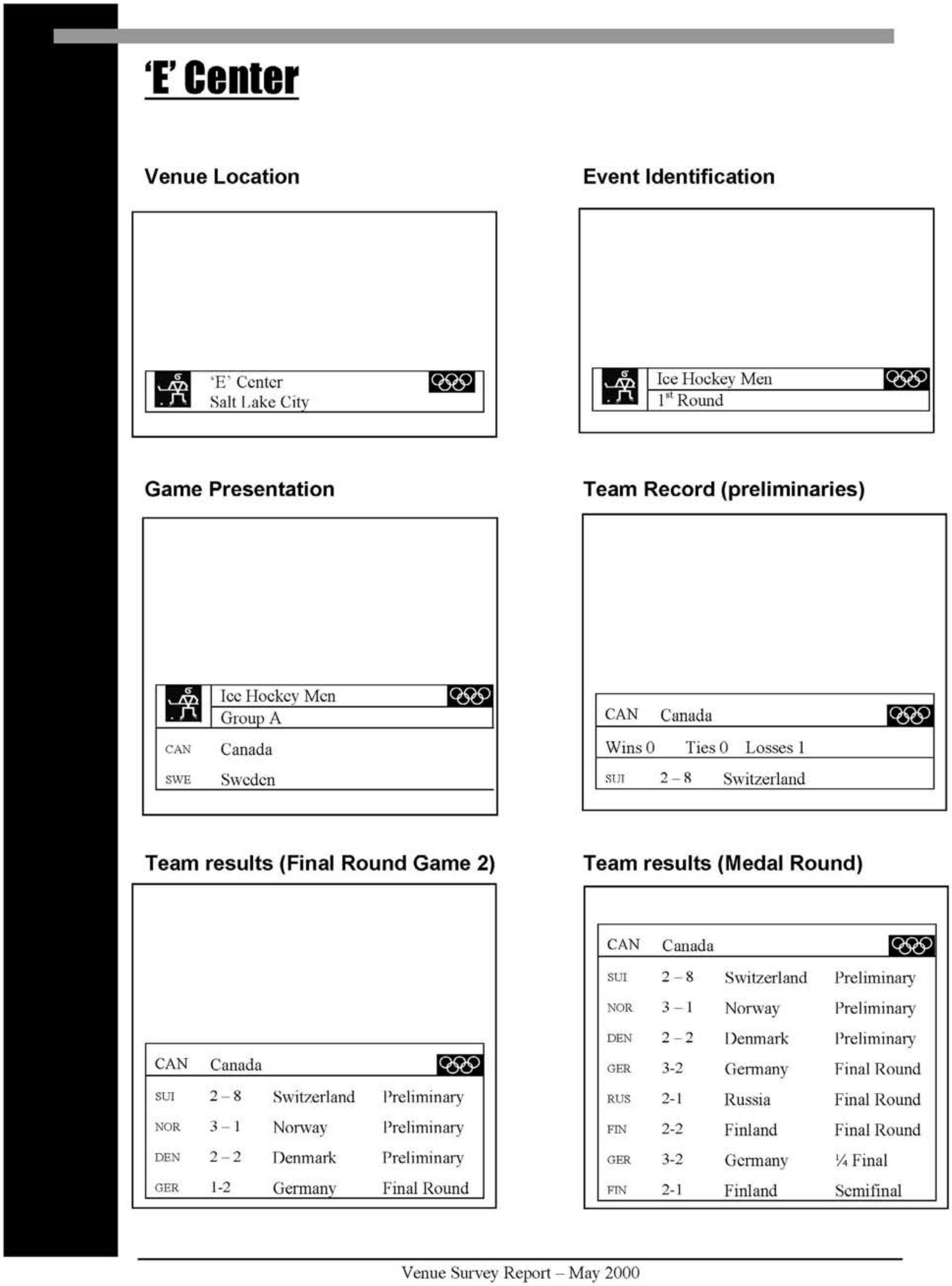
REPLAYS

ISB intends to trigger all TV action replays with a DVE type Olympic Ring transition sequence, similar to what will be used in Sydney during the Summer Games.

ON-SCREEN CREDITS

The on-screen credits for Seiko, the official Timing and Scoring sponsor for the 2002 Olympic Winter Games, will be inserted by the timing generator. The timing sponsor logo will be associated with the timing graphic, and will be positioned directly below the running clock in the lower right-hand corner.

Other requirements for sponsor credit obligations have not yet been determined.



‘E’ Center

Venue Location

‘E’ Center
Salt Lake City

Event Identification

Ice Hockey Men
1st Round

Game Presentation

Ice Hockey Men
Group A

CAN	Canada
SWE	Sweden

Team Record (preliminaries)

CAN Canada

Wins 0 Ties 0 Losses 1

SUI 2 – 8 Switzerland

Team results (Final Round Game 2)

CAN Canada

SUI	2 – 8	Switzerland	Preliminary
NOR	3 – 1	Norway	Preliminary
DEN	2 – 2	Denmark	Preliminary
GER	1-2	Germany	Final Round

Team results (Medal Round)

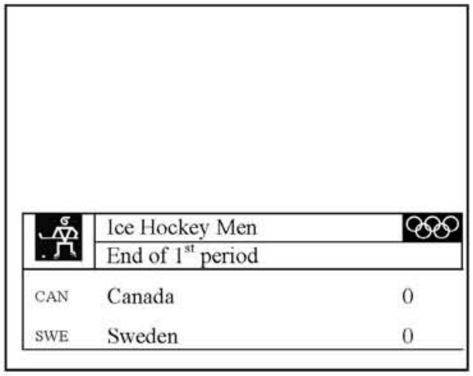
CAN Canada

SUI	2 – 8	Switzerland	Preliminary
NOR	3 – 1	Norway	Preliminary
DEN	2 – 2	Denmark	Preliminary
GER	3-2	Germany	Final Round
RUS	2-1	Russia	Final Round
FIN	2-2	Finland	Final Round
GER	3-2	Germany	¼ Final
FIN	2-1	Finland	Semifinal

Venue Survey Report – May 2000

'E' Center

Score



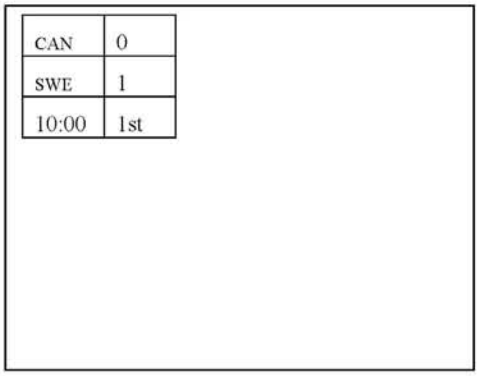
Ice Hockey Men

End of 1st period

CAN Canada 0

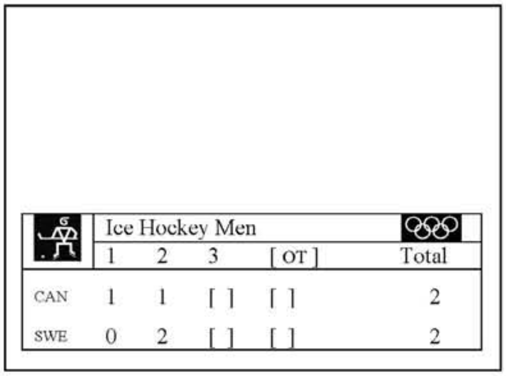
SWE Sweden 0

Mini-Score



CAN	0
SWE	1
10:00	1st

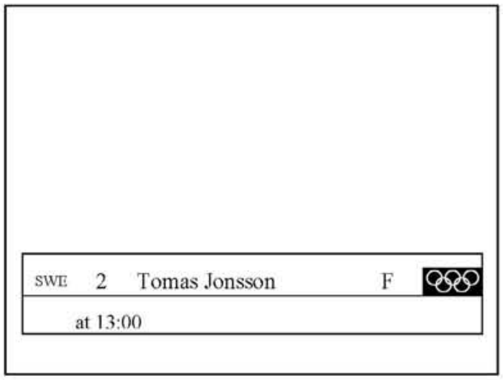
Line Score



Ice Hockey Men

	1	2	3	[OT]	Total
CAN	1	1	[ ]	[ ]	2
SWE	0	2	[ ]	[ ]	2

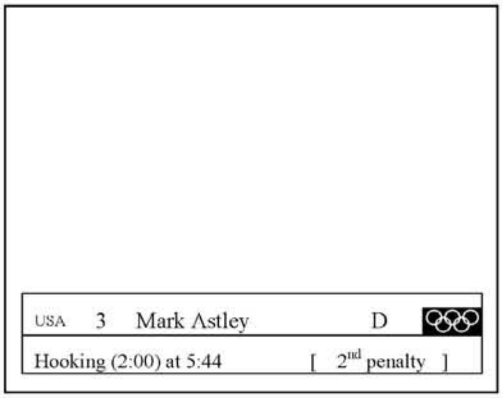
Scorer Identification



SWE 2 Tomas Jonsson F

at 13:00

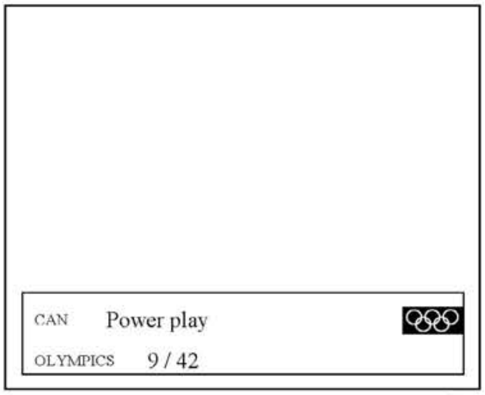
Penalty Identification



USA 3 Mark Astley D

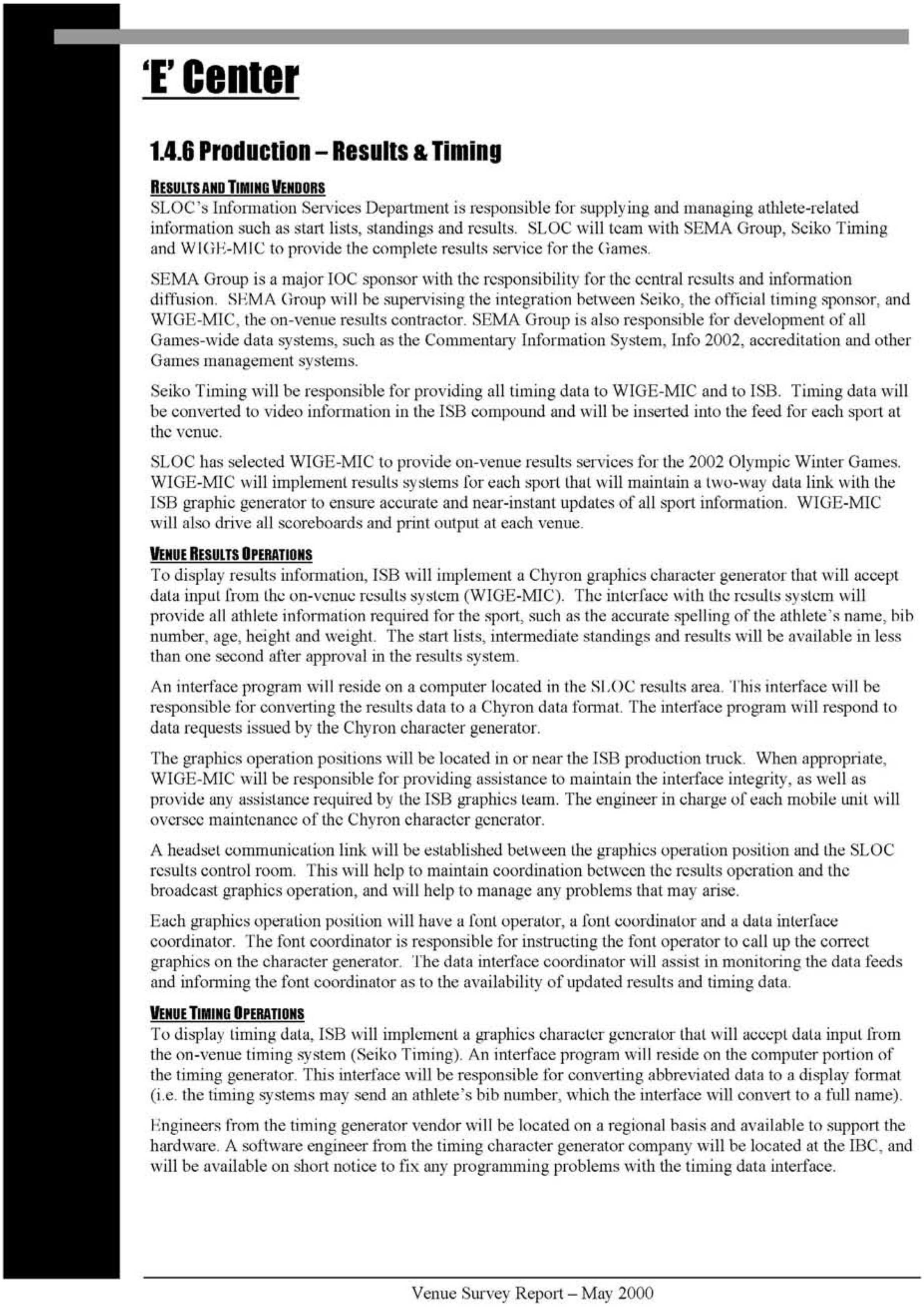
Hooking (2:00) at 5:44 [2nd penalty]

Power Play Scoring Ratio



CAN Power play

OLYMPICS 9 / 42



'E' Center

1.4.6 Production – Results & Timing

RESULTS AND TIMING VENDORS

SLOC's Information Services Department is responsible for supplying and managing athlete-related information such as start lists, standings and results. SLOC will team with SEMA Group, Seiko Timing and WIGE-MIC to provide the complete results service for the Games.

SEMA Group is a major IOC sponsor with the responsibility for the central results and information diffusion. SEMA Group will be supervising the integration between Seiko, the official timing sponsor, and WIGE-MIC, the on-venue results contractor. SEMA Group is also responsible for development of all Games-wide data systems, such as the Commentary Information System, Info 2002, accreditation and other Games management systems.

Seiko Timing will be responsible for providing all timing data to WIGE-MIC and to ISB. Timing data will be converted to video information in the ISB compound and will be inserted into the feed for each sport at the venue.

SLOC has selected WIGE-MIC to provide on-venue results services for the 2002 Olympic Winter Games. WIGE-MIC will implement results systems for each sport that will maintain a two-way data link with the ISB graphic generator to ensure accurate and near-instant updates of all sport information. WIGE-MIC will also drive all scoreboards and print output at each venue.

VENUE RESULTS OPERATIONS

To display results information, ISB will implement a Chyron graphics character generator that will accept data input from the on-venue results system (WIGE-MIC). The interface with the results system will provide all athlete information required for the sport, such as the accurate spelling of the athlete's name, bib number, age, height and weight. The start lists, intermediate standings and results will be available in less than one second after approval in the results system.

An interface program will reside on a computer located in the SLOC results area. This interface will be responsible for converting the results data to a Chyron data format. The interface program will respond to data requests issued by the Chyron character generator.

The graphics operation positions will be located in or near the ISB production truck. When appropriate, WIGE-MIC will be responsible for providing assistance to maintain the interface integrity, as well as provide any assistance required by the ISB graphics team. The engineer in charge of each mobile unit will oversee maintenance of the Chyron character generator.

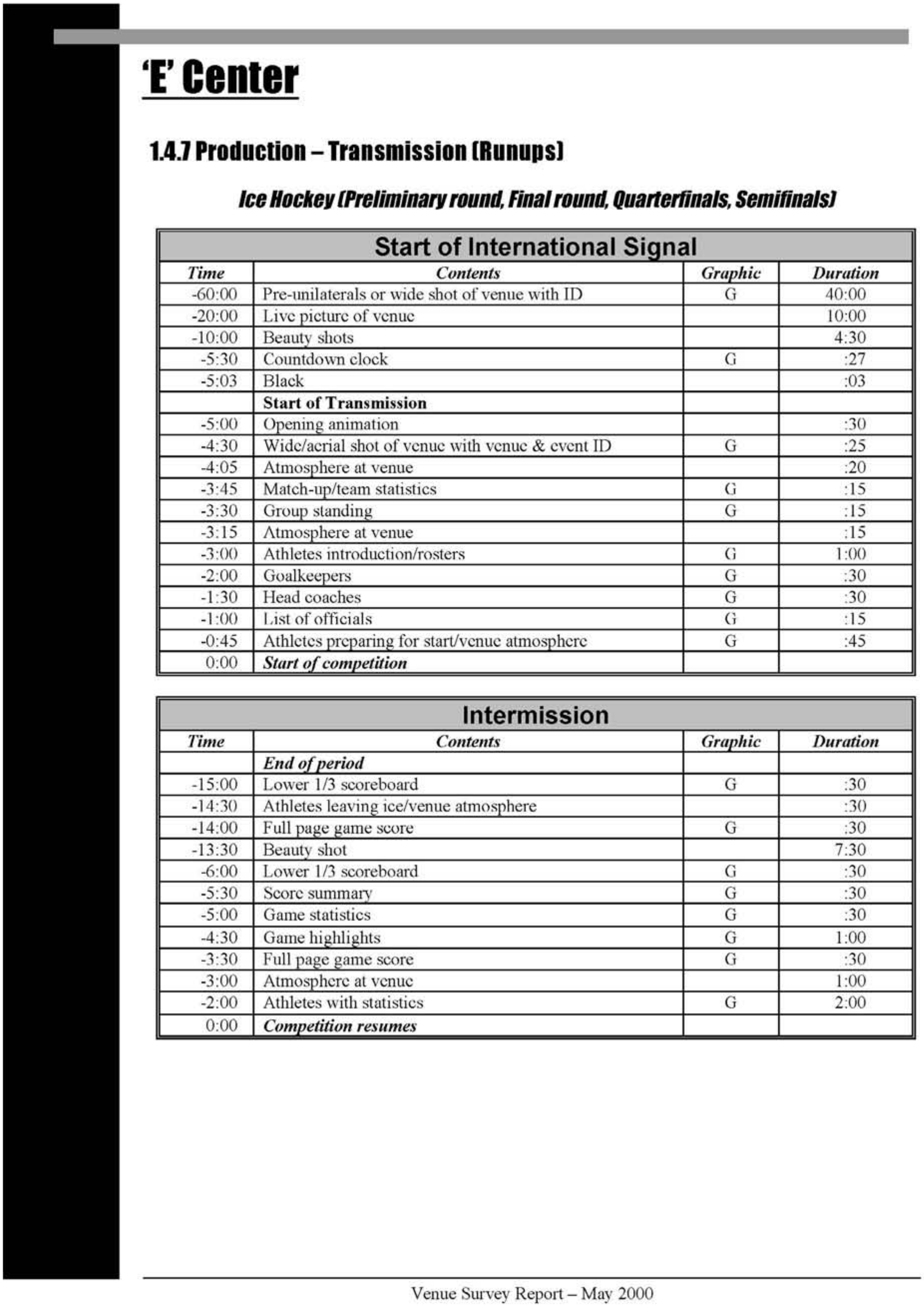
A headset communication link will be established between the graphics operation position and the SLOC results control room. This will help to maintain coordination between the results operation and the broadcast graphics operation, and will help to manage any problems that may arise.

Each graphics operation position will have a font operator, a font coordinator and a data interface coordinator. The font coordinator is responsible for instructing the font operator to call up the correct graphics on the character generator. The data interface coordinator will assist in monitoring the data feeds and informing the font coordinator as to the availability of updated results and timing data.

VENUE TIMING OPERATIONS

To display timing data, ISB will implement a graphics character generator that will accept data input from the on-venue timing system (Seiko Timing). An interface program will reside on the computer portion of the timing generator. This interface will be responsible for converting abbreviated data to a display format (i.e. the timing systems may send an athlete's bib number, which the interface will convert to a full name).

Engineers from the timing generator vendor will be located on a regional basis and available to support the hardware. A software engineer from the timing character generator company will be located at the IBC, and will be available on short notice to fix any programming problems with the timing data interface.



'E' Center

1.4.7 Production – Transmission (Runups)

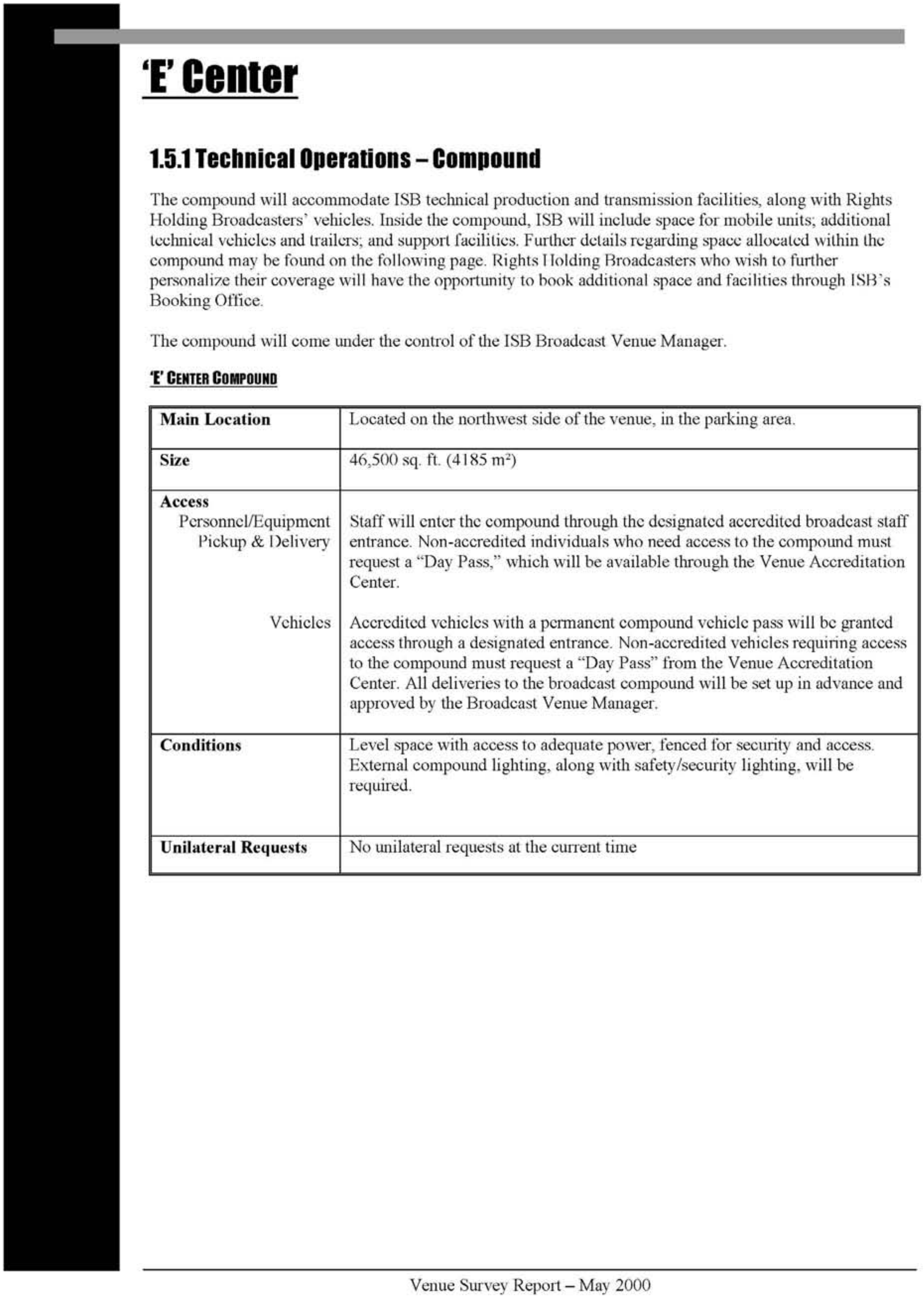
Ice Hockey (Preliminary round, Final round, Quarterfinals, Semifinals)

Start of International Signal

Time	*Contents*	*Graphic*	*Duration*
-60:00	Pre-unilaterals or wide shot of venue with ID	G	40:00
-20:00	Live picture of venue		10:00
-10:00	Beauty shots		4:30
-5:30	Countdown clock	G	:27
-5:03	Black		:03
	Start of Transmission		
-5:00	Opening animation		:30
-4:30	Wide/aerial shot of venue with venue & event ID	G	:25
-4:05	Atmosphere at venue		:20
-3:45	Match-up/team statistics	G	:15
-3:30	Group standing	G	:15
-3:15	Atmosphere at venue		:15
-3:00	Athletes introduction/rosters	G	1:00
-2:00	Goalkeepers	G	:30
-1:30	Head coaches	G	:30
-1:00	List of officials	G	:15
-0:45	Athletes preparing for start/venue atmosphere	G	:45
0:00	***Start of competition***		

Intermission

Time	*Contents*	*Graphic*	*Duration*
	End of period		
-15:00	Lower 1/3 scoreboard	G	:30
-14:30	Athletes leaving ice/venue atmosphere		:30
-14:00	Full page game score	G	:30
-13:30	Beauty shot		7:30
-6:00	Lower 1/3 scoreboard	G	:30
-5:30	Score summary	G	:30
-5:00	Game statistics	G	:30
-4:30	Game highlights	G	1:00
-3:30	Full page game score	G	:30
-3:00	Atmosphere at venue		1:00
-2:00	Athletes with statistics	G	2:00
0:00	***Competition resumes***		



‘E’ Center

1.5.1 Technical Operations – Compound

The compound will accommodate ISB technical production and transmission facilities, along with Rights Holding Broadcasters’ vehicles. Inside the compound, ISB will include space for mobile units; additional technical vehicles and trailers; and support facilities. Further details regarding space allocated within the compound may be found on the following page. Rights Holding Broadcasters who wish to further personalize their coverage will have the opportunity to book additional space and facilities through ISB’s Booking Office.

The compound will come under the control of the ISB Broadcast Venue Manager.

‘E’ CENTER COMPOUND

Main Location	Located on the northwest side of the venue, in the parking area.
Size	46,500 sq. ft. (4185 m²)
Access	
Personnel/Equipment Pickup & Delivery	Staff will enter the compound through the designated accredited broadcast staff entrance. Non-accredited individuals who need access to the compound must request a “Day Pass,” which will be available through the Venue Accreditation Center.
Vehicles	Accredited vehicles with a permanent compound vehicle pass will be granted access through a designated entrance. Non-accredited vehicles requiring access to the compound must request a “Day Pass” from the Venue Accreditation Center. All deliveries to the broadcast compound will be set up in advance and approved by the Broadcast Venue Manager.
Conditions	Level space with access to adequate power, fenced for security and access. External compound lighting, along with safety/security lighting, will be required.
Unilateral Requests	No unilateral requests at the current time

'E' Center

1.5.1 Technical Operations - Compound

Broadcast Compound Space Allocation

No. [1]	User	Type	Size		Footprint		Area / Unit
			W	L	W[2]	L[3]	
		ISB Mobile Units					
1	ISB	Mountain Mobile 3X	10	65	18	75	1,350
2	ISB	Mobile Unit (Type C)	10	45	18	55	990
		ISB Trailers					
3	ISB	TOC / Tech Manager	12	60	20	70	1,400
4	ISB	Broadcast Venue Mgmt / Logistics [4]	12	60	28	70	1,960
5	ISB	Production / Information	12	60	20	70	1,400
6	ISB	Catering / Crew	12	60	20	70	1,400
7	ISB	Catering Kitchen	20	40	28	50	1,400
23	ISB	Technical Storage	12	60	20	70	1,400
		Unilateral Mobile Units					
8	Unilateral	Mobile Unit (Type B)	10	65	18	75	1,350
9	Unilateral	Mobile Unit (HDTV)	10	65	18	75	1,350
10	Unilateral	Flash Unit	10	40	18	50	900
11	Unilateral	Flash Unit	10	40	18	50	900
		Unilateral Trailers					
12	Unilateral	Trailer	12	60	20	70	1,400
13	Unilateral	Trailer	12	60	20	70	1,400
14	Unilateral	Trailer	12	60	20	70	1,400
15	Unilateral	Trailer	12	60	20	70	1,400
16	Unilateral	Trailer	12	60	20	70	1,400
17	Unilateral	Trailer	12	60	20	70	1,400
18	Unilateral	Trailer	12	60	20	70	1,400
19	Unilateral	Trailer	12	60	20	70	1,400
		Generators					
20	SLOC	Dual Generator Package [5]	10	45	18	55	990
21	Unilateral	Dual Generator Package	10	45	18	55	990
22	Unilateral	Dual Generator Package	10	45	18	55	990
		Other					
	SLOC	Portable Restroom Facilities	15	40			600
	ISB	Miscellaneous [6]					5,230
	SLOC	Fire Lane / Access [7]					10,700
						Total Area Compound (rounded up)	**46,500**

[1] Refers to the number assigned to the trailer on the Compound CAD

[2] Footprint Width = Size Width + 8 ft for stairs

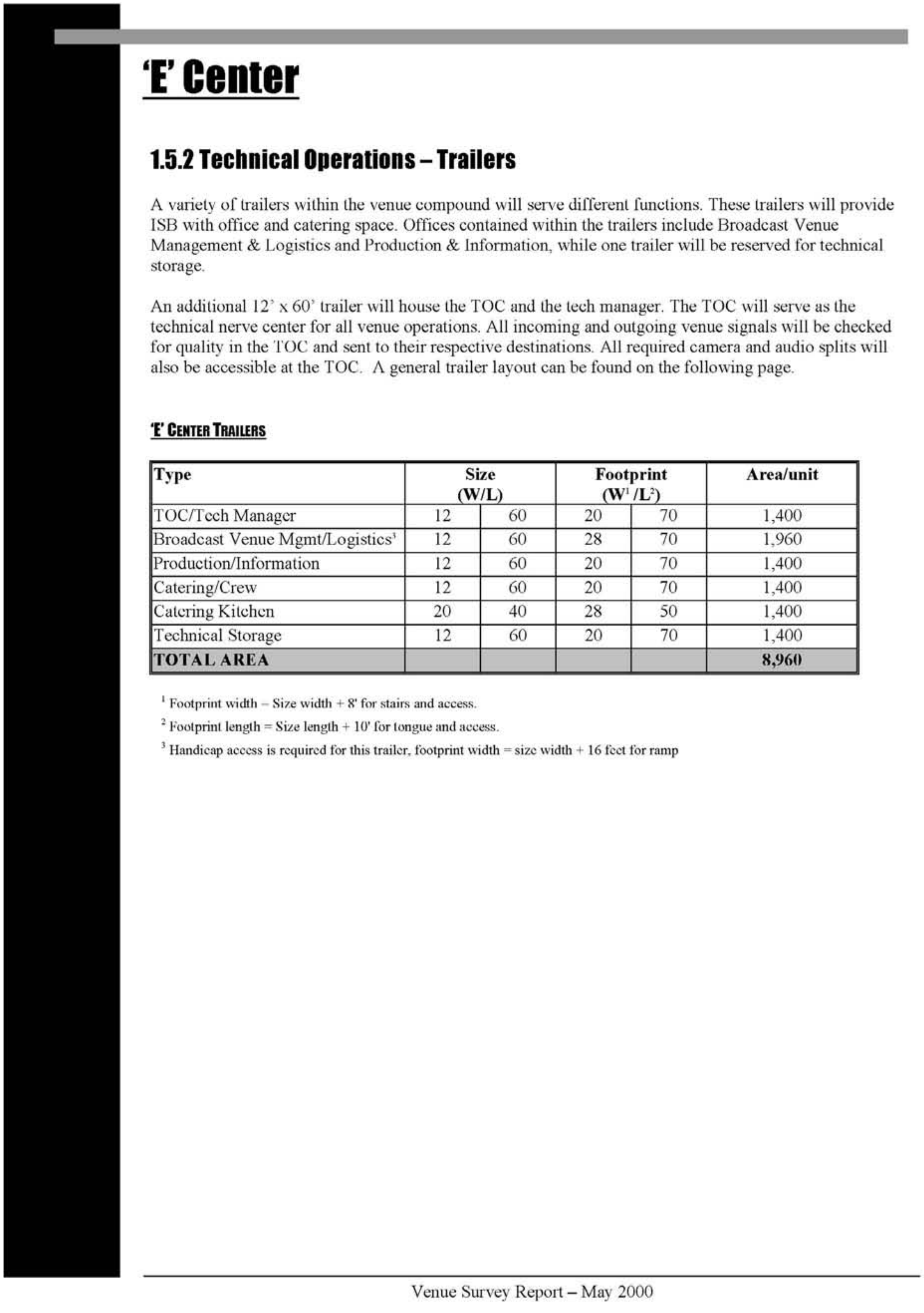
[3] Footprint Length = Size Length + 10 ft for tongue and access

[4] Handicap access is required for this trailer, Footprint width = Size width + 16 feet for ramp

[5] SLOC provide generator for ISB use

[6] Allocations have been increased due to existing structures, obstructions in compound area, or unique shape of the compound.

[7] Assuming units can be parked on either side of Fire Lane



‘E’ Center

1.5.2 Technical Operations – Trailers

A variety of trailers within the venue compound will serve different functions. These trailers will provide ISB with office and catering space. Offices contained within the trailers include Broadcast Venue Management & Logistics and Production & Information, while one trailer will be reserved for technical storage.

An additional 12’ x 60’ trailer will house the TOC and the tech manager. The TOC will serve as the technical nerve center for all venue operations. All incoming and outgoing venue signals will be checked for quality in the TOC and sent to their respective destinations. All required camera and audio splits will also be accessible at the TOC. A general trailer layout can be found on the following page.

‘E’ CENTER TRAILERS

Type	Size (W/L)		Footprint (W[1] /L[2])		Area/unit
TOC/Tech Manager	12	60	20	70	1,400
Broadcast Venue Mgmt/Logistics[3]	12	60	28	70	1,960
Production/Information	12	60	20	70	1,400
Catering/Crew	12	60	20	70	1,400
Catering Kitchen	20	40	28	50	1,400
Technical Storage	12	60	20	70	1,400
TOTAL AREA					**8,960**

[1] Footprint width – Size width + 8' for stairs and access.

[2] Footprint length = Size length + 10' for tongue and access.

[3] Handicap access is required for this trailer, footprint width = size width + 16 feet for ramp

Venue Survey Report – May 2000

'E' Center

1.5.3 Technical Operations – Mobile Units (continued)

EQUIPMENT LIST – MMT 3X

Control

- GVG 3000 52 –Input, 3 M/E switcher, 6 aux bus, frame store
- Abekas DVEous (Dual twin on request)
- 6-rack monitor wall w/ 48-9"black & white monitors, 8-9" color monitors & 3-13" color monitors
- Leitch Still File w/Streamer

Audio

- Soundcraft Europa Audio Mixer 40+8/8/2
- Digicart II w/ 220 keyboard, Sony Minidisc, CD Player, Audio Cassette
- 11 DBX Compressor/Limiters, 2 Telos & 2 QKT Telephone Interface
- Microphones: 4 Senneheiser 416s, 4 ATI Shotguns, 4 RE 50s, 4 EV 635s, 8 Sony Lavaliere, 4 Sportscaster headsets & 4 Talk-back boxes

Communications

- RTS ADAM Communications system plus 9 powered 2-wire channels
- RTS 4000 Series IFB System (12 channel)
- Camera ISO system, 20 RTS Belt packs, 9 RTS IFB boxes
- 8-Line Panasonic Telephone System

Camera

- Sony Chip Cameras, Hard Cameras (BVP-500s & BVP-375s), Canon Lenses 70:8.5 & 55:8.5, Handheld Cameras: BVP-550s w/20:8.5 lenses, and BVP-90s w/ 18x8.5 Lenses, Up to 12 total cameras available on request
- 2 Clock Cameras

Tape

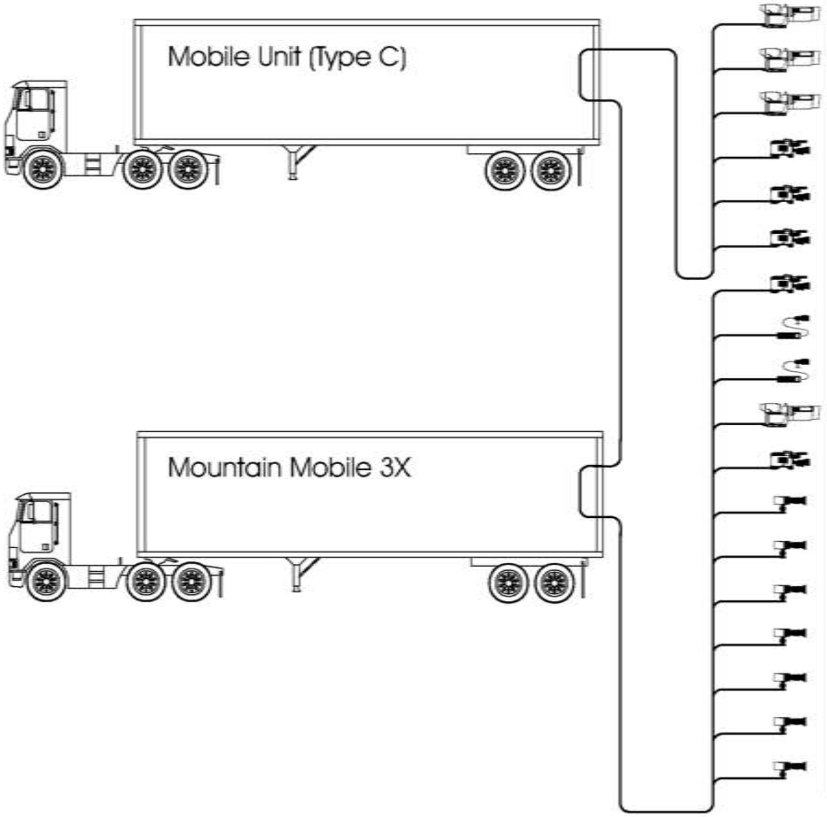
- Up to 10 BVW 75 VCRs available on request (w/slo-mo controllers)
- EVS 4-channel slow-motion disk recorder (available on request)
- 1 VHS VCR
- Master Time Code Generator

Engineering, Cable, & Miscellaneous

- 64x64 Data Tek Router (32x32 Audio)
- Redundant sync generators w/ auto changeover
- GVG Processing Amp (patchable), External Tallies
- 2 Frame Synchronizers (more available on request)
- 4,000 feet of Traix, 2,000 feet of Coax, 1,500 feet of DT-12 audio mults, 2,000 feet of 4 pair audio mults (More cable available on request)
- 6-13" Portable Color monitors 8-9" Portable color monitors
- 1 Lighting kit
- Power: 208V AC, Single-Phase, 150 Amps

‘E’ Center

Ice Hockey - Camera Technical Drawing



No.	Type	Mount	Location
1	Fixed	Tripod	High mid-ice
2	Fixed (SSM)	Tripod	High mid-ice
3	Fixed	Tripod	High, northwest end zone
4	Hand-held	Sticks	Northwest corner
5	Hand-held (SSM)	Sticks	Southwest corner
6	Hand-held	Type II	Above north goal judge
7	Hand-held	Type II	Above south goal judge
8	Lipstick (RF)	Type IV	Inside north goal
9	Lipstick (RF)	Type IV	Inside south goal
10	Fixed	Tripod	High mid-ice, opposite main camera side
11	Hand-held	Sticks	Player benches
12	Mini	Fixed mount	Over goal – north
13	Mini	Fixed mount	Over goal – south
14	Mini	Type III	Exit from locker rooms; exit/entry between periods
15	Mini	Type III	Exit to locker room post-game
16	Mini	Fixed mount	High end zone, southwest side
17	Mini	Type III	Secured to glass in penalty box
18	Mini	Type III	Secured to glass in penalty box

'E' Center

1.5.6 Technical Operations – Lighting

> ***IOC Broadcasting Guide, chapter IV, section f:***
>
> "The lighting at each stadium and competition site must be of the highest quality for television and photographic coverage. The technical specifications for lighting should be established by the OCOG in consultation with the OBO and Press Operations. In general, the lighting level should not be less than 1400 lux measured in the direction of main television cameras. Special care must be taken to match colour temperature in the case of venues where there is a mix of artificial light and daylight. Additionally, at indoor venues where windows and translucent roofs may cause daylight interference, this problem must be addressed to prevent negative effects.
>
> Back-up generators capable of providing at least 50% of the power necessary for lighting will be installed and able to take over at anytime."

Typically, the ISB Production Plan uses more than one "main" camera. ISB's lighting recommendations specify the lighting requirements for each of these "main" cameras. Generally, unless otherwise noted, ISB requires the following:

- ratio of average horizontal to average vertical not to exceed 2:1
- minimum of 1400 vertical lux
- maximum to minimum ratio not to exceed 1.5:1
- minimum ratio of 4:1 vertical between the field of play and audience areas

'E' CENTER LIGHTING EVALUATION

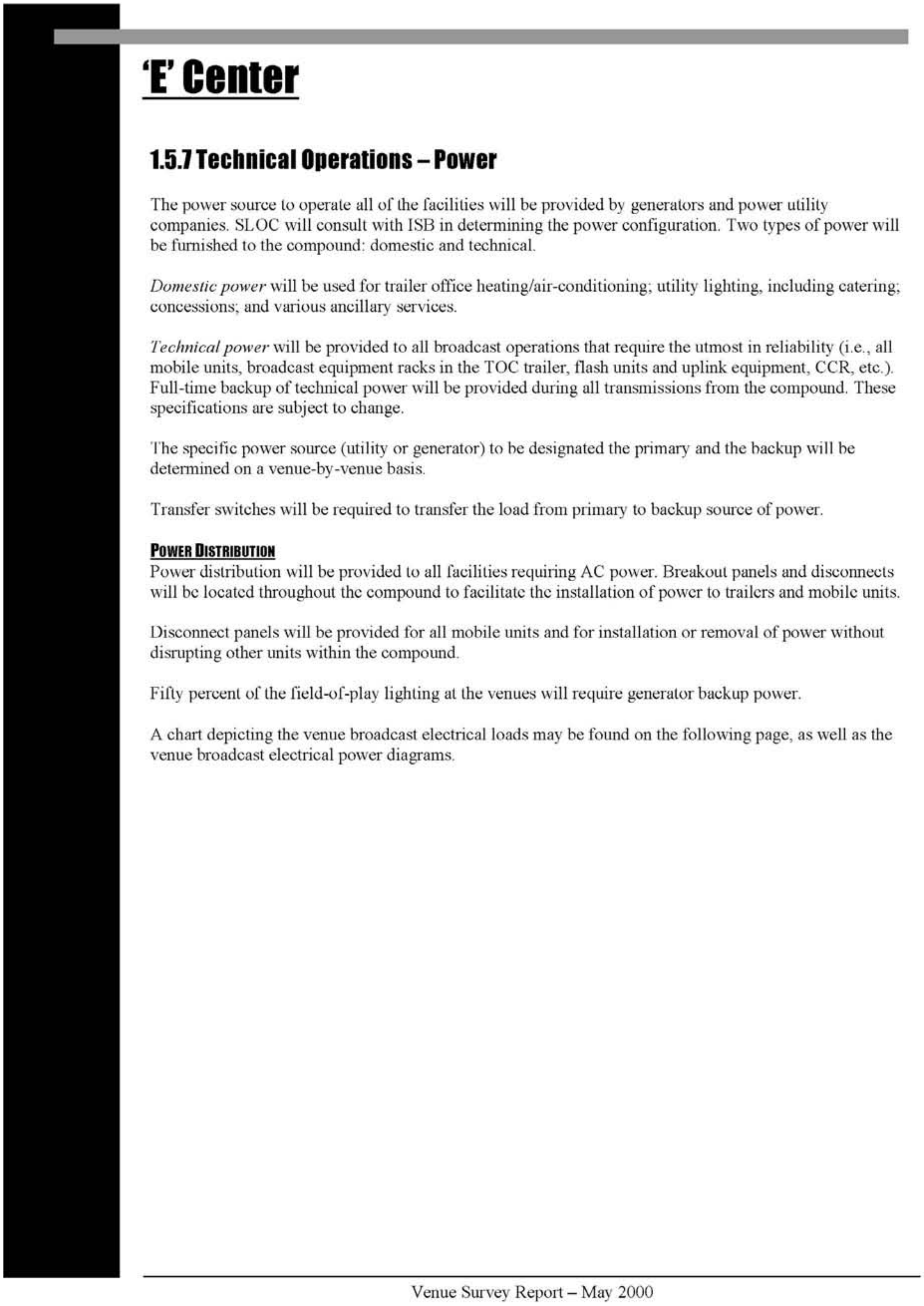
The building is designed and has a lighting system for IHL hockey. The existing system does not reach Olympic light levels or cover international size ice.

RECOMMENDED SOLUTIONS

Supplemental lighting is required to raise the levels to 1400 vertical lux and to extend the coverage area to include international size ice. All of the instruments will need to be cleaned and relamped prior to competition. All supplemental lighting must match the color temperature of any existing lighting used in the arena.

MIXED ZONE

A minimum of 1,000 vertical lux toward the camera is required from multiple sources or an amount not less than the vertical average of the background (such as the Field of Play at 1400 minimum vertical lux) whichever is greater.



'E' Center

1.5.7 Technical Operations – Power

The power source to operate all of the facilities will be provided by generators and power utility companies. SLOC will consult with ISB in determining the power configuration. Two types of power will be furnished to the compound: domestic and technical.

Domestic power will be used for trailer office heating/air-conditioning; utility lighting, including catering; concessions; and various ancillary services.

Technical power will be provided to all broadcast operations that require the utmost in reliability (i.e., all mobile units, broadcast equipment racks in the TOC trailer, flash units and uplink equipment, CCR, etc.). Full-time backup of technical power will be provided during all transmissions from the compound. These specifications are subject to change.

The specific power source (utility or generator) to be designated the primary and the backup will be determined on a venue-by-venue basis.

Transfer switches will be required to transfer the load from primary to backup source of power.

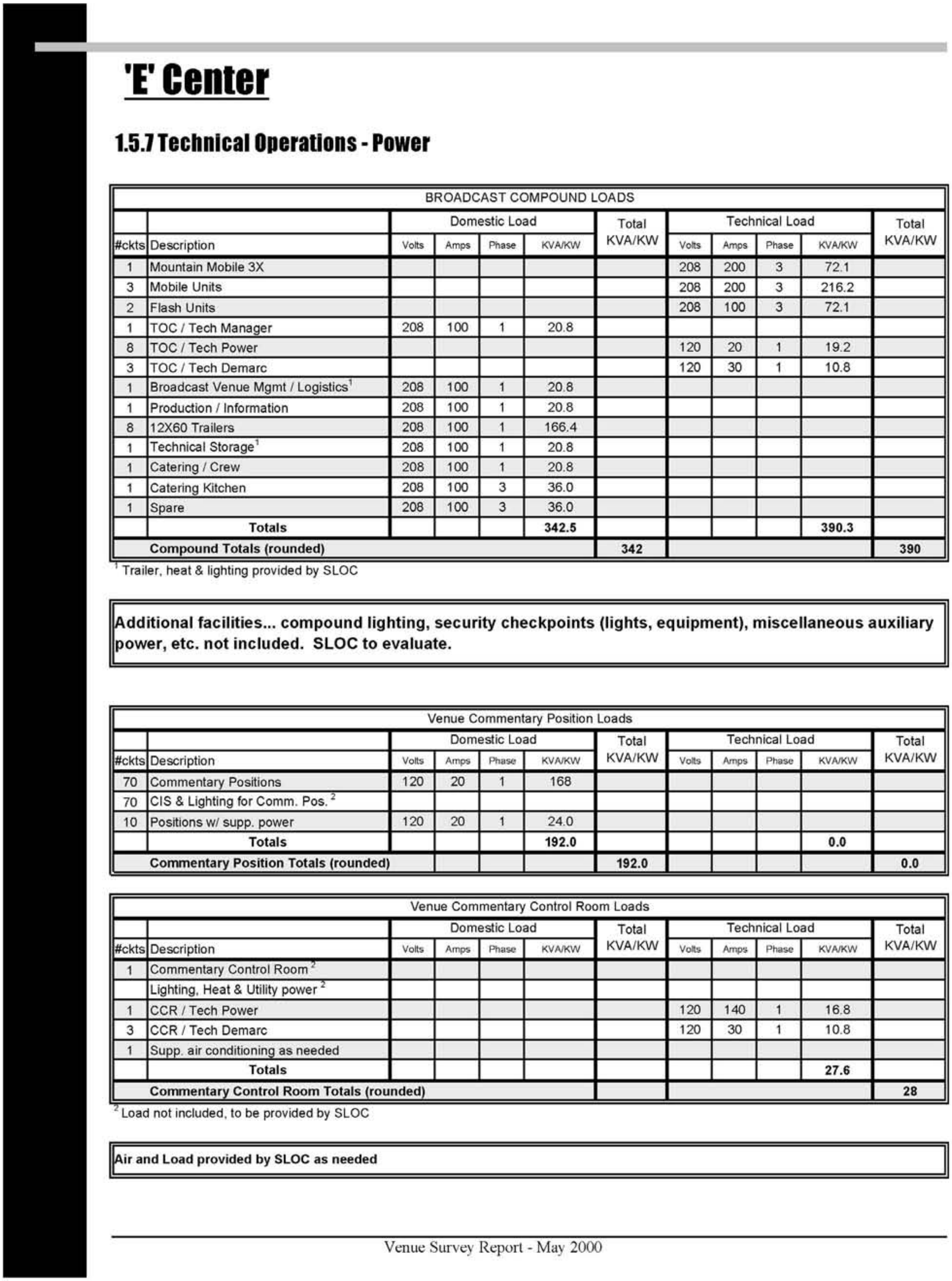
POWER DISTRIBUTION

Power distribution will be provided to all facilities requiring AC power. Breakout panels and disconnects will be located throughout the compound to facilitate the installation of power to trailers and mobile units.

Disconnect panels will be provided for all mobile units and for installation or removal of power without disrupting other units within the compound.

Fifty percent of the field-of-play lighting at the venues will require generator backup power.

A chart depicting the venue broadcast electrical loads may be found on the following page, as well as the venue broadcast electrical power diagrams.



'E' Center

1.5.7 Technical Operations - Power

BROADCAST COMPOUND LOADS

		Domestic Load				Total KVA/KW	Technical Load				Total KVA/KW
#ckts	Description	Volts	Amps	Phase	KVA/KW		Volts	Amps	Phase	KVA/KW	
1	Mountain Mobile 3X						208	200	3	72.1	
3	Mobile Units						208	200	3	216.2	
2	Flash Units						208	100	3	72.1	
1	TOC / Tech Manager	208	100	1	20.8						
8	TOC / Tech Power						120	20	1	19.2	
3	TOC / Tech Demarc						120	30	1	10.8	
1	Broadcast Venue Mgmt / Logistics[1]	208	100	1	20.8						
1	Production / Information	208	100	1	20.8						
8	12X60 Trailers	208	100	1	166.4						
1	Technical Storage[1]	208	100	1	20.8						
1	Catering / Crew	208	100	1	20.8						
1	Catering Kitchen	208	100	3	36.0						
1	Spare	208	100	3	36.0						
	Totals				**342.5**					**390.3**	
	Compound Totals (rounded)					**342**					**390**

[1] Trailer, heat & lighting provided by SLOC

Additional facilities... compound lighting, security checkpoints (lights, equipment), miscellaneous auxiliary power, etc. not included. SLOC to evaluate.

Venue Commentary Position Loads

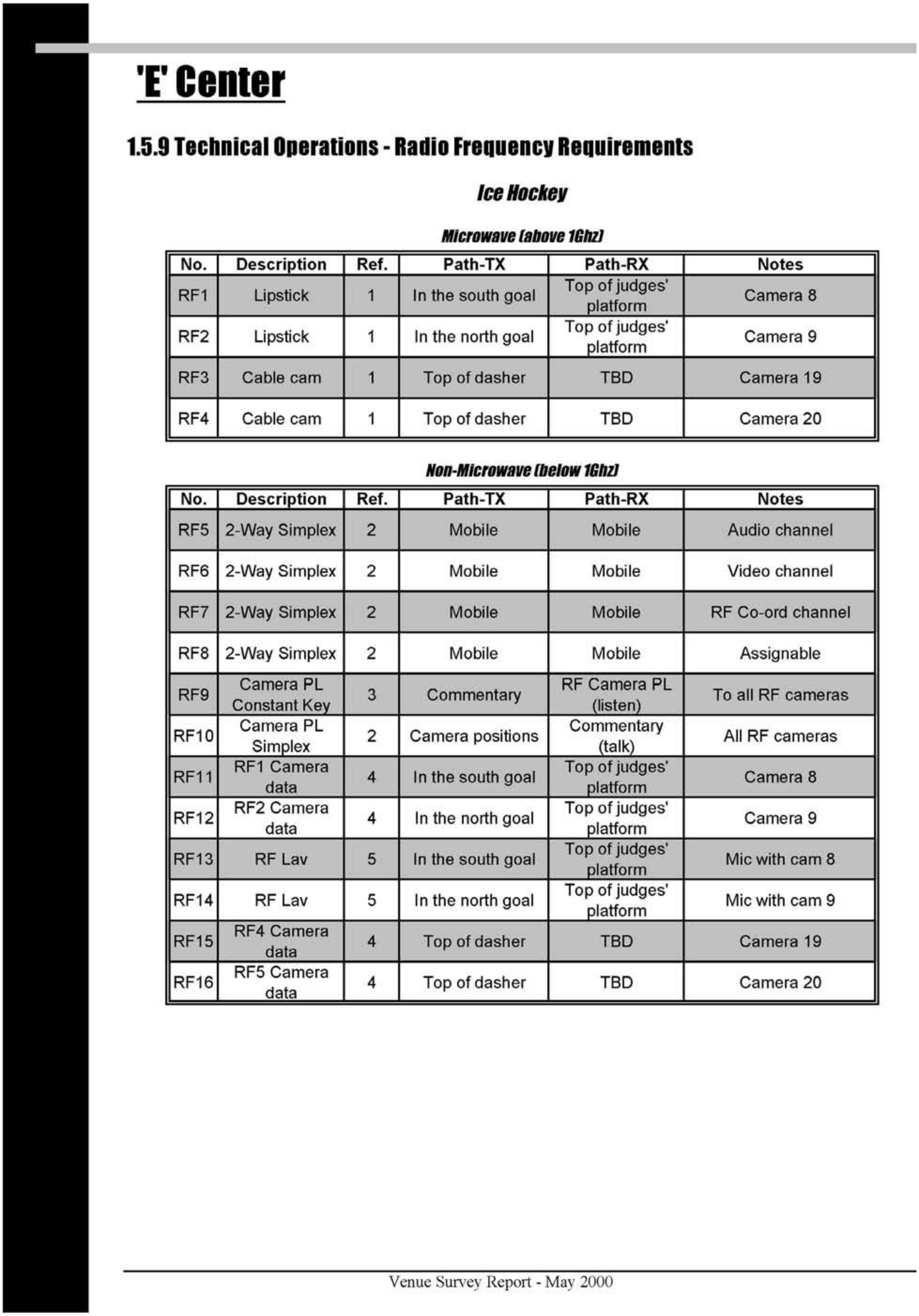
		Domestic Load				Total KVA/KW	Technical Load				Total KVA/KW
#ckts	Description	Volts	Amps	Phase	KVA/KW		Volts	Amps	Phase	KVA/KW	
70	Commentary Positions	120	20	1	168						
70	CIS & Lighting for Comm. Pos. [2]										
10	Positions w/ supp. power	120	20	1	24.0						
	Totals				**192.0**					**0.0**	
	Commentary Position Totals (rounded)					**192.0**					**0.0**

Venue Commentary Control Room Loads

		Domestic Load				Total KVA/KW	Technical Load				Total KVA/KW
#ckts	Description	Volts	Amps	Phase	KVA/KW		Volts	Amps	Phase	KVA/KW	
1	Commentary Control Room [2]										
	Lighting, Heat & Utility power [2]										
1	CCR / Tech Power						120	140	1	16.8	
3	CCR / Tech Demarc						120	30	1	10.8	
1	Supp. air conditioning as needed										
	Totals									**27.6**	
	Commentary Control Room Totals (rounded)										**28**

[2] Load not included, to be provided by SLOC

Air and Load provided by SLOC as needed



'E' Center

1.5.9 Technical Operations - Radio Frequency Requirements

Ice Hockey

Microwave (above 1Ghz)

No.	Description	Ref.	Path-TX	Path-RX	Notes
RF1	Lipstick	1	In the south goal	Top of judges' platform	Camera 8
RF2	Lipstick	1	In the north goal	Top of judges' platform	Camera 9
RF3	Cable cam	1	Top of dasher	TBD	Camera 19
RF4	Cable cam	1	Top of dasher	TBD	Camera 20

Non-Microwave (below 1Ghz)

No.	Description	Ref.	Path-TX	Path-RX	Notes
RF5	2-Way Simplex	2	Mobile	Mobile	Audio channel
RF6	2-Way Simplex	2	Mobile	Mobile	Video channel
RF7	2-Way Simplex	2	Mobile	Mobile	RF Co-ord channel
RF8	2-Way Simplex	2	Mobile	Mobile	Assignable
RF9	Camera PL Constant Key	3	Commentary	RF Camera PL (listen)	To all RF cameras
RF10	Camera PL Simplex	2	Camera positions	Commentary (talk)	All RF cameras
RF11	RF1 Camera data	4	In the south goal	Top of judges' platform	Camera 8
RF12	RF2 Camera data	4	In the north goal	Top of judges' platform	Camera 9
RF13	RF Lav	5	In the south goal	Top of judges' platform	Mic with cam 8
RF14	RF Lav	5	In the north goal	Top of judges' platform	Mic with cam 9
RF15	RF4 Camera data	4	Top of dasher	TBD	Camera 19
RF16	RF5 Camera data	4	Top of dasher	TBD	Camera 20

'E' Center

1.5.10 Technical Operations – Audio Plan

MICROPHONE REQUIREMENTS

Video
All speaker systems and poles must be placed so as not to obstruct camera angles.

Audio
The natural sound effects created by the athletes while competing are an integral part of the television coverage. Sound systems designed without due consideration of television production requirements, can easily mask these natural sound effects, seriously impairing the quality of the production.

Commentary audio is added over a bed of these natural sound effects. Sound systems designed to provide a high level in the commentary area can mask the commentators' voices before they even reach their microphones. Either direct or indirect audio from the sound systems in the commentary area should be kept to a minimum.

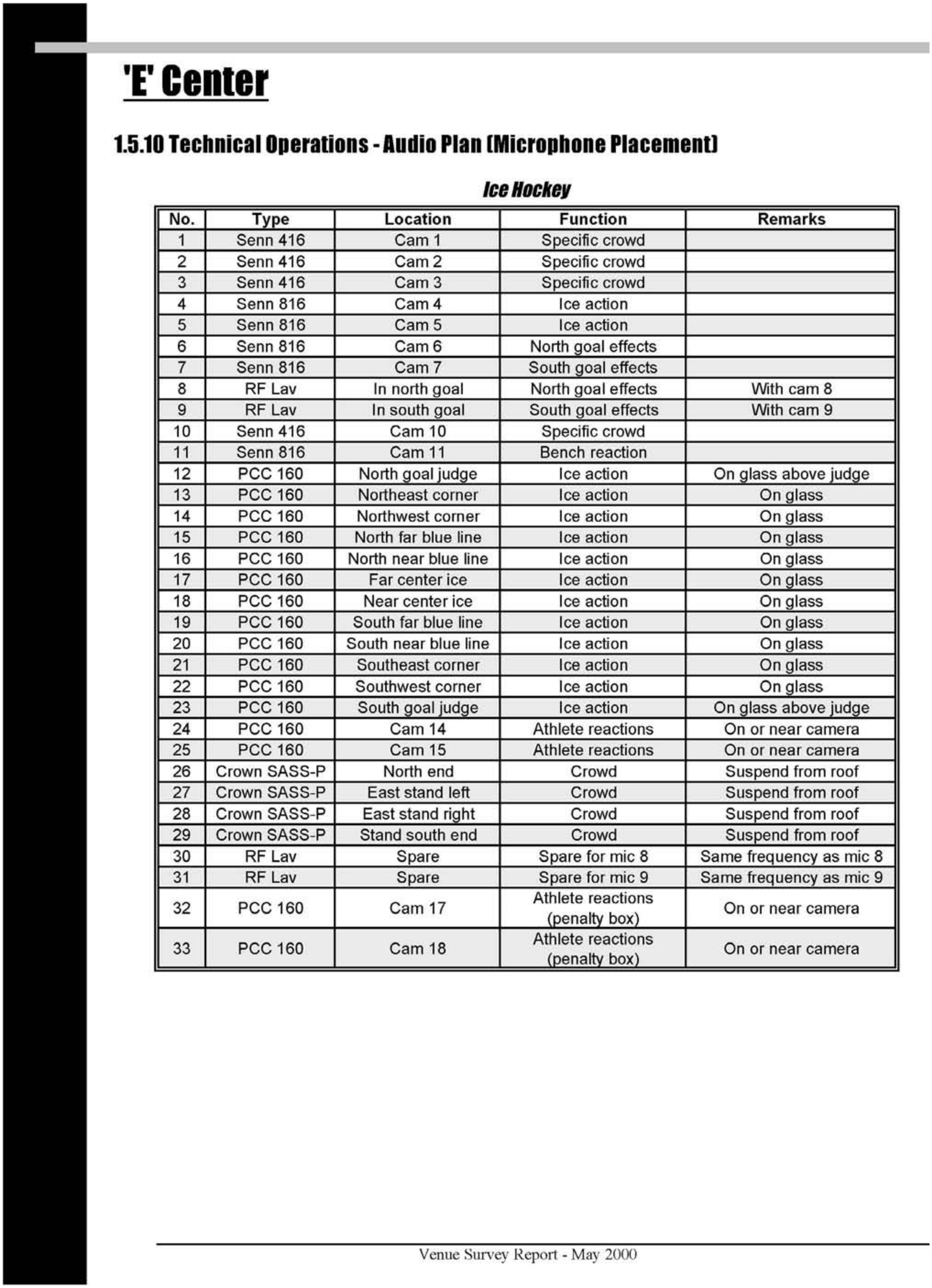
Treating highly reverberant arenas with absorptive material is often the best solution. This will not only increase the intelligibility of the sound system allowing lower sound pressure levels, but also make our directional microphones more effective.

General
All frequencies for wireless microphones have to be frequency coordinated and approved by OGRUC.

Frequency bands will be extremely full. The WAVES system in the spread spectrum requires frequency coordination and approval by OGRUC. The reliable use of this system in Olympic conditions may be difficult to achieve.

'E' Center
- Audio should be reduced in commentary areas, and over the field of play.

See the following pages for microphone placement narratives. A CAD drawing of the microphone locations may be found on the accompanying compact disc.



'E' Center

1.5.10 Technical Operations - Audio Plan (Microphone Placement)

Ice Hockey

No.	Type	Location	Function	Remarks
1	Senn 416	Cam 1	Specific crowd	
2	Senn 416	Cam 2	Specific crowd	
3	Senn 416	Cam 3	Specific crowd	
4	Senn 816	Cam 4	Ice action	
5	Senn 816	Cam 5	Ice action	
6	Senn 816	Cam 6	North goal effects	
7	Senn 816	Cam 7	South goal effects	
8	RF Lav	In north goal	North goal effects	With cam 8
9	RF Lav	In south goal	South goal effects	With cam 9
10	Senn 416	Cam 10	Specific crowd	
11	Senn 816	Cam 11	Bench reaction	
12	PCC 160	North goal judge	Ice action	On glass above judge
13	PCC 160	Northeast corner	Ice action	On glass
14	PCC 160	Northwest corner	Ice action	On glass
15	PCC 160	North far blue line	Ice action	On glass
16	PCC 160	North near blue line	Ice action	On glass
17	PCC 160	Far center ice	Ice action	On glass
18	PCC 160	Near center ice	Ice action	On glass
19	PCC 160	South far blue line	Ice action	On glass
20	PCC 160	South near blue line	Ice action	On glass
21	PCC 160	Southeast corner	Ice action	On glass
22	PCC 160	Southwest corner	Ice action	On glass
23	PCC 160	South goal judge	Ice action	On glass above judge
24	PCC 160	Cam 14	Athlete reactions	On or near camera
25	PCC 160	Cam 15	Athlete reactions	On or near camera
26	Crown SASS-P	North end	Crowd	Suspend from roof
27	Crown SASS-P	East stand left	Crowd	Suspend from roof
28	Crown SASS-P	East stand right	Crowd	Suspend from roof
29	Crown SASS-P	Stand south end	Crowd	Suspend from roof
30	RF Lav	Spare	Spare for mic 8	Same frequency as mic 8
31	RF Lav	Spare	Spare for mic 9	Same frequency as mic 9
32	PCC 160	Cam 17	Athlete reactions (penalty box)	On or near camera
33	PCC 160	Cam 18	Athlete reactions (penalty box)	On or near camera

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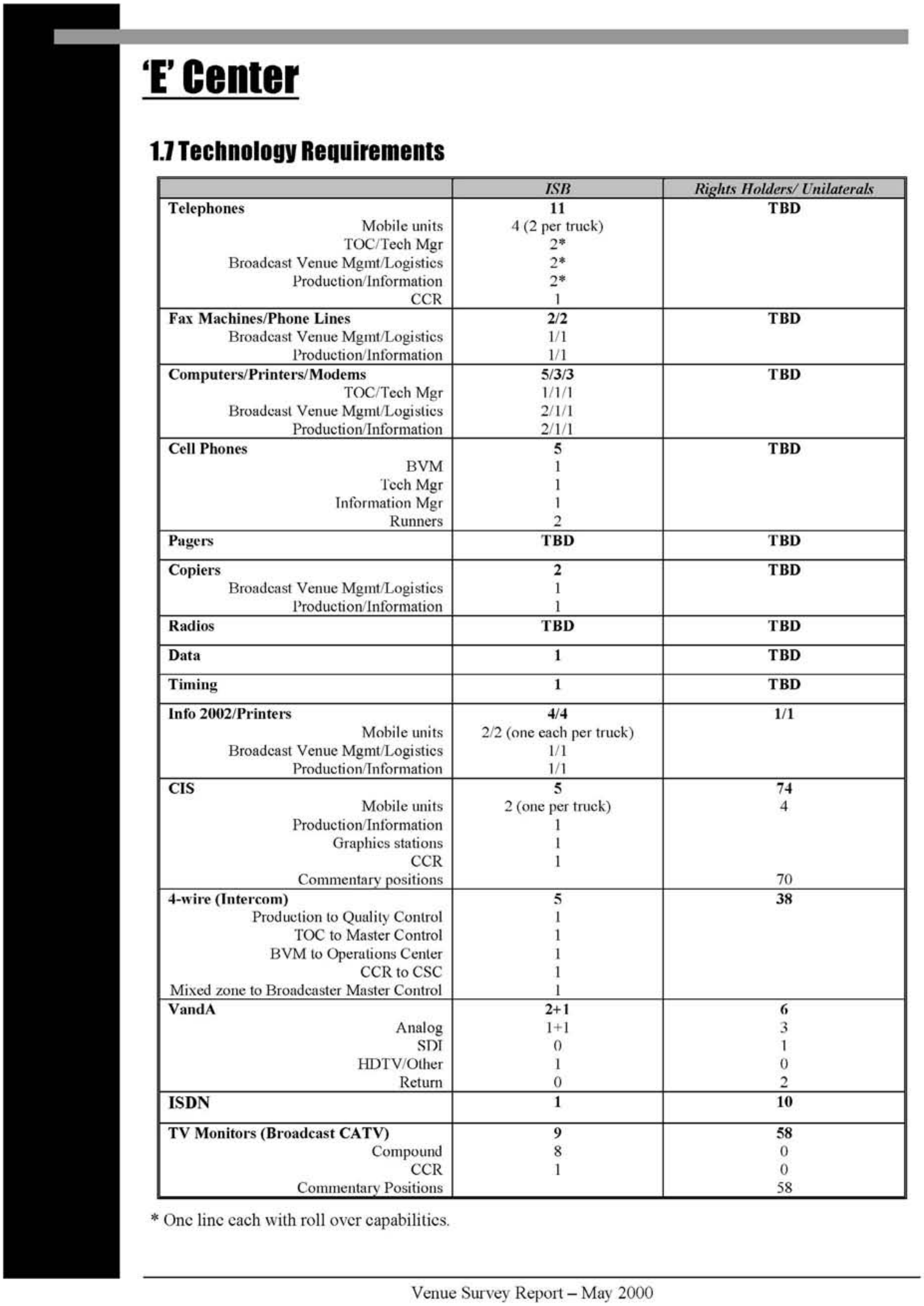

'E' Center

1.7 Technology Requirements

	ISB	*Rights Holders/ Unilaterals*
Telephones	**11**	**TBD**
Mobile units	4 (2 per truck)	
TOC/Tech Mgr	2*	
Broadcast Venue Mgmt/Logistics	2*	
Production/Information	2*	
CCR	1	
Fax Machines/Phone Lines	**2/2**	**TBD**
Broadcast Venue Mgmt/Logistics	1/1	
Production/Information	1/1	
Computers/Printers/Modems	**5/3/3**	**TBD**
TOC/Tech Mgr	1/1/1	
Broadcast Venue Mgmt/Logistics	2/1/1	
Production/Information	2/1/1	
Cell Phones	**5**	**TBD**
BVM	1	
Tech Mgr	1	
Information Mgr	1	
Runners	2	
Pagers	**TBD**	**TBD**
Copiers	**2**	**TBD**
Broadcast Venue Mgmt/Logistics	1	
Production/Information	1	
Radios	**TBD**	**TBD**
Data	**1**	**TBD**
Timing	**1**	**TBD**
Info 2002/Printers	**4/4**	**1/1**
Mobile units	2/2 (one each per truck)	
Broadcast Venue Mgmt/Logistics	1/1	
Production/Information	1/1	
CIS	**5**	**74**
Mobile units	2 (one per truck)	4
Production/Information	1	
Graphics stations	1	
CCR	1	
Commentary positions		70
4-wire (Intercom)	**5**	**38**
Production to Quality Control	1	
TOC to Master Control	1	
BVM to Operations Center	1	
CCR to CSC	1	
Mixed zone to Broadcaster Master Control	1	
VandA	**2+1**	**6**
Analog	1+1	3
SDI	0	1
HDTV/Other	1	0
Return	0	2
ISDN	**1**	**10**
TV Monitors (Broadcast CATV)	**9**	**58**
Compound	8	0
CCR	1	0
Commentary Positions		58

* One line each with roll over capabilities.

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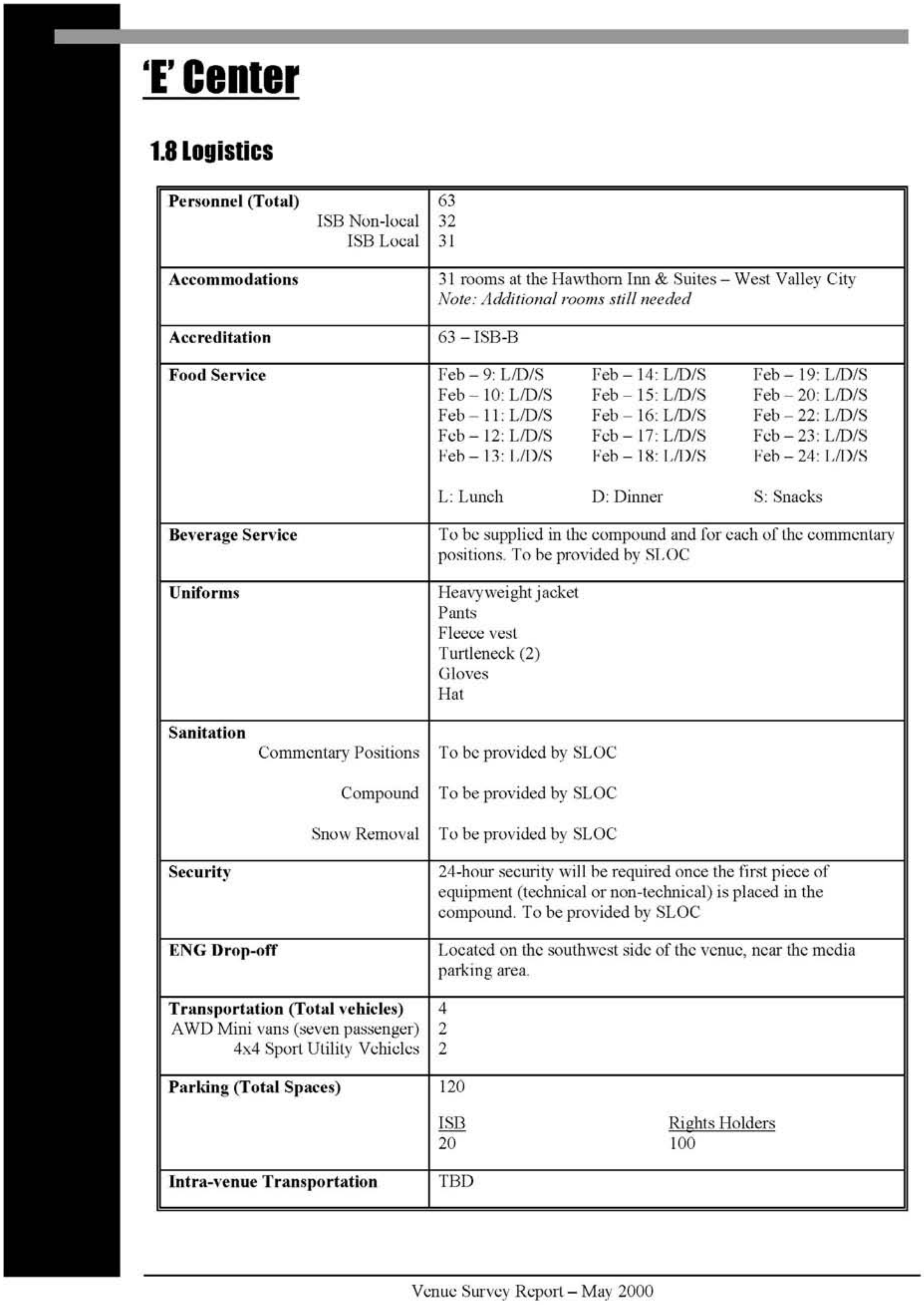

'E' Center

1.8 Logistics

Personnel (Total) ISB Non-local ISB Local	63 32 31
Accommodations	31 rooms at the Hawthorn Inn & Suites – West Valley City *Note: Additional rooms still needed*
Accreditation	63 – ISB-B
Food Service	Feb – 9: L/D/S Feb – 14: L/D/S Feb – 19: L/D/S Feb – 10: L/D/S Feb – 15: L/D/S Feb – 20: L/D/S Feb – 11: L/D/S Feb – 16: L/D/S Feb – 22: L/D/S Feb – 12: L/D/S Feb – 17: L/D/S Feb – 23: L/D/S Feb – 13: L/D/S Feb – 18: L/D/S Feb – 24: L/D/S L: Lunch D: Dinner S: Snacks
Beverage Service	To be supplied in the compound and for each of the commentary positions. To be provided by SLOC
Uniforms	Heavyweight jacket Pants Fleece vest Turtleneck (2) Gloves Hat
Sanitation Commentary Positions Compound Snow Removal	 To be provided by SLOC To be provided by SLOC To be provided by SLOC
Security	24-hour security will be required once the first piece of equipment (technical or non-technical) is placed in the compound. To be provided by SLOC
ENG Drop-off	Located on the southwest side of the venue, near the media parking area.
Transportation (Total vehicles) AWD Mini vans (seven passenger) 4x4 Sport Utility Vehicles	4 2 2
Parking (Total Spaces)	120 ISB Rights Holders 20 100
Intra-venue Transportation	TBD

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'E' Center

1.8.1 Logistics – Accommodations

Accommodations for this venue will be located at the Hawthorn Inn & Suites – West Valley City.

ISB will reserve 31 units for host broadcast personnel at the Hawthorn Inn & Suites. Directions from Salt Lake City are as follows: take I-215, and exit at 3500 South, turn left. The second light will be 2200 West, turn right. The hotel will be on the right side.

Hawthorn Inn & Suites
3540 South 2200 West
West Valley City, UT 84119
(801) 954-9292

1.8.2 Logistics – Accreditation

Accreditation Badges
Accreditation badges will be issued in a yet to be determined site. All accreditation badges will contain specific venue privilege markings. These markings will clearly identify: 1) which venue (not necessarily a sports venue) or venue cluster the accredited personnel may enter; and 2) the areas or "zones" within the venue the cardholder may circulate. Accreditation zones specific to a competition venue may be classified as any of the following: all areas; field of play; media areas; Rights Holding Broadcaster areas; Olympic Family areas; etc.

Rights Holder Access
All Rights Holding Broadcaster personnel will have predetermined credential categories for the venues and IBC. Access for individual broadcast constituencies (senior personnel, production, IBC, etc.) will be determined at a later date.

ISB Access
All ISB personnel will also have predetermined credential categories for the venues and IBC. Access for separate ISB constituencies (senior personnel, production, IBC, etc.) will be determined at a later date. However, it will be necessary for the ISB crew to have access to certain athlete areas, due to the fact that some of the cable paths will exist in athlete zoned areas.

'E' Center Venue Access Points
Rights Holding Broadcaster and ISB venue access points will be determined at a later date.

'E' Center Venue Accreditation Location
Rights Holding Broadcaster and ISB venue accreditation location will be determined at a later date.

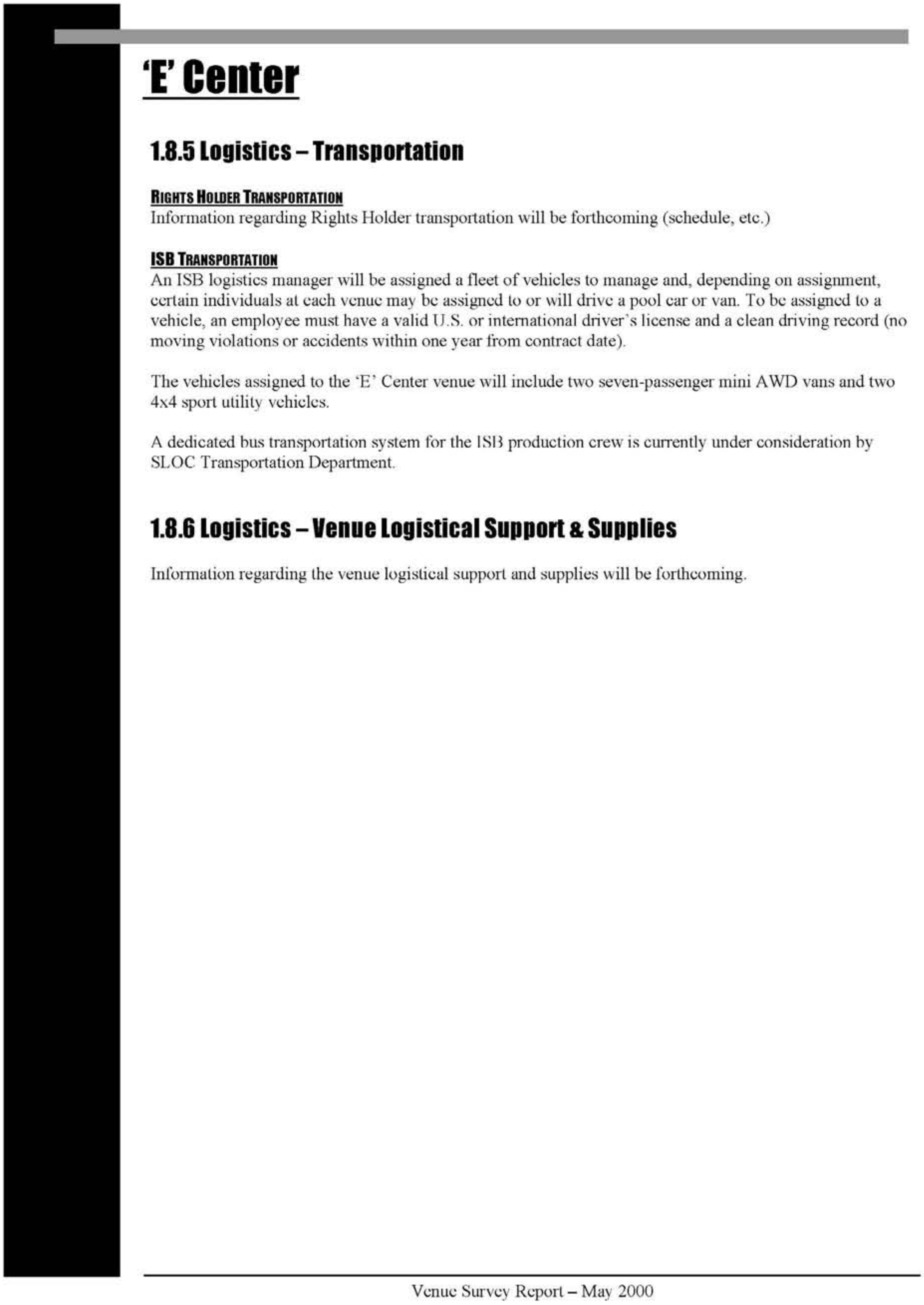
1.8.3 Logistics – Food Service

The venue meal and craft services schedule will vary each day based on the ISB crew schedule. Inside the broadcast compound, bottled water and vending machines will be available (pending agreement with SLOC).

1.8.4 Logistics – Security

SLOC is responsible for supplying all necessary security and personnel at each of the competition and non-competition venues. Security will be responsible for enforcing all rules and regulations at the venue perimeter. Access and the monitoring of accreditation will be enforced by event services. Sanitization dates have yet to be determined.

Security locations (Command Post, Mobile Police, Fire, EMS Command Post, etc.) will be forthcoming.



'E' Center

1.8.5 Logistics – Transportation

RIGHTS HOLDER TRANSPORTATION

Information regarding Rights Holder transportation will be forthcoming (schedule, etc.)

ISB TRANSPORTATION

An ISB logistics manager will be assigned a fleet of vehicles to manage and, depending on assignment, certain individuals at each venue may be assigned to or will drive a pool car or van. To be assigned to a vehicle, an employee must have a valid U.S. or international driver's license and a clean driving record (no moving violations or accidents within one year from contract date).

The vehicles assigned to the 'E' Center venue will include two seven-passenger mini AWD vans and two 4x4 sport utility vehicles.

A dedicated bus transportation system for the ISB production crew is currently under consideration by SLOC Transportation Department.

1.8.6 Logistics – Venue Logistical Support & Supplies

Information regarding the venue logistical support and supplies will be forthcoming.

APPENDIX III:

Camera Diagrams and Plans

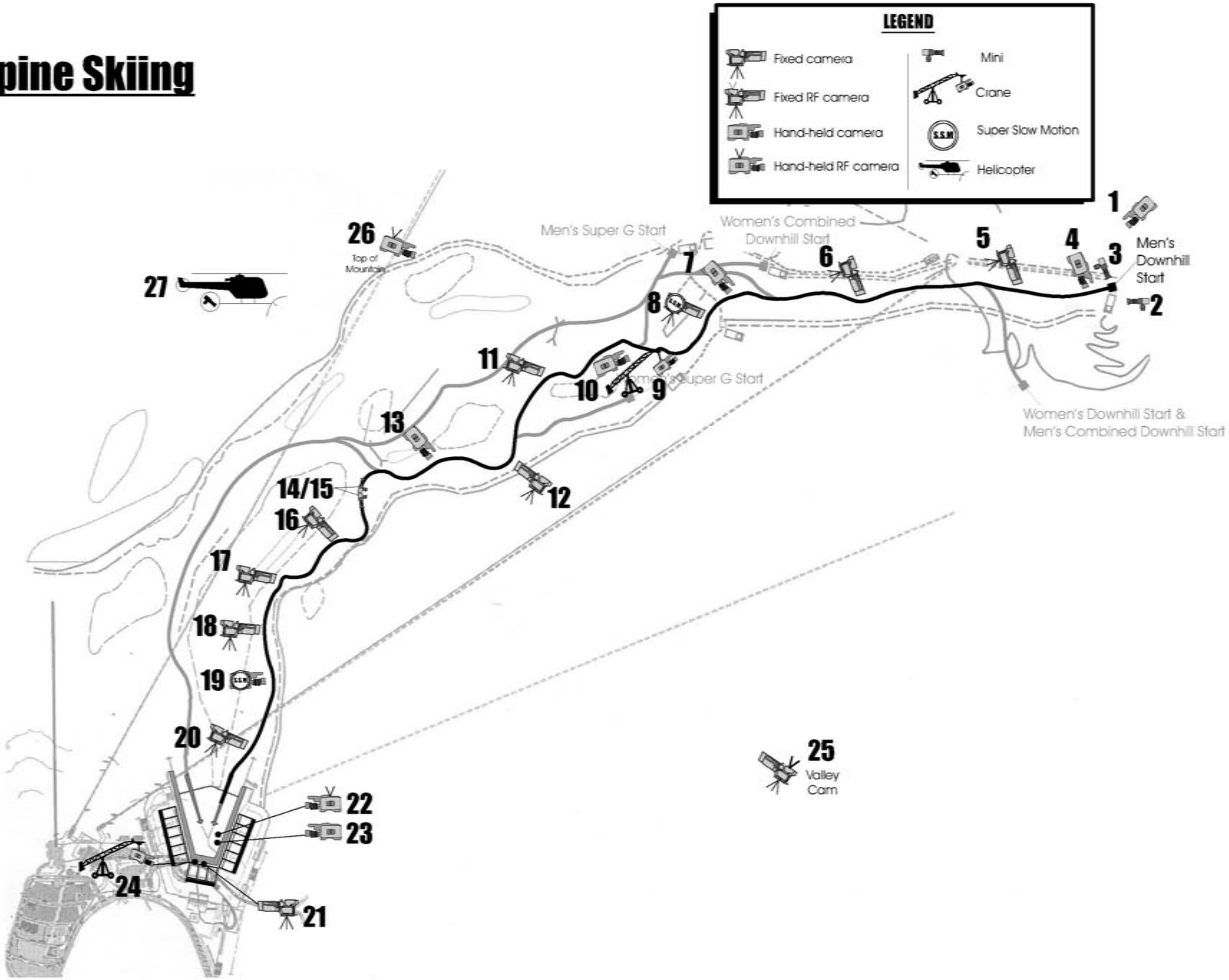
The following camera diagrams and descriptions are actual documents used by networks and production companies to produce television coverage of events. Most of the diagrams are from the winter or summer Olympic Games. Since camera descriptions are included, the camera diagrams can be adapted to smaller events.

Alpine Skiing (Downhill – Men's)

No.	Type	Mount	Location[1]	Coverage
1	Hand-held	Sticks	Warm-up area	Athletes prior to race
2	LPS	Fixed mount	Start house	Shooting start clock
3	Mini	Type III	Start house	Prior to start
4	Hand-held	Sticks	Front of start house	Athlete's face
5	Fixed	Tripod	Edge of rock island	Start house, action
6	Fixed	Tripod	Trail sign, above keyhole	Action
7	Hand-held	Sticks	On course, below entrance to Diamond Bowl at 1st jump	Action
8	Fixed (SSM)	Tripod	Bottom of Diamond Bowl	Action (replay)
9	Hand-held	Crane (Medium)	At Hydrant MD-10 (skier left)	Action
10	Hand-held	Sticks	At Hydrant MD-12 (skier left)	Action
11	Fixed	Tripod	At top of A-Net 3 on V-Tower Platform	Action
12	Fixed	Tripod	Above A-Net 4 (skier left)	Action
13	Hand-held	Sticks	Near top of face, above A-Net 5	Action
14	Specialty	Come & go	At A-Net 5, on gate	Come
15	Specialty	Come & go	At A-Net 5, on gate	Go
16	Fixed	Tripod	Opposite A-Net 6, at Aspen tree with blue marker	Action
17	Fixed	Tripod	On road, before final face	Action
18	Fixed	Tripod	At end of A-Net at final face	Action
19	Hand-held (SSM) (Build-up)	Tripod (studio config.)	At end of A-Net at final face	Action (replay)
20	Fixed	Tripod	At pine tree on finish face	Action
21	Fixed	Tripod	Back of corral, finish area	Finish
22	Hand-held (RF)	Sticks	Finish area	Athletes' faces
23	Hand-held	Sticks	Mixed zone	Current leader
24	Hand-held	Crane (Medium)	Finish stadium	Crowd
25	Fixed (RF)	Tripod	Valley cam	Scenic/action
26	Hand-held (RF)	Type I	Top of mountain	Scenic
27	Specialty (RF)	Stabilized in helicopter	Above venue	Scenic

[1] All cameras to be placed on skier's right side, unless otherwise indicated.

Alpine Skiing

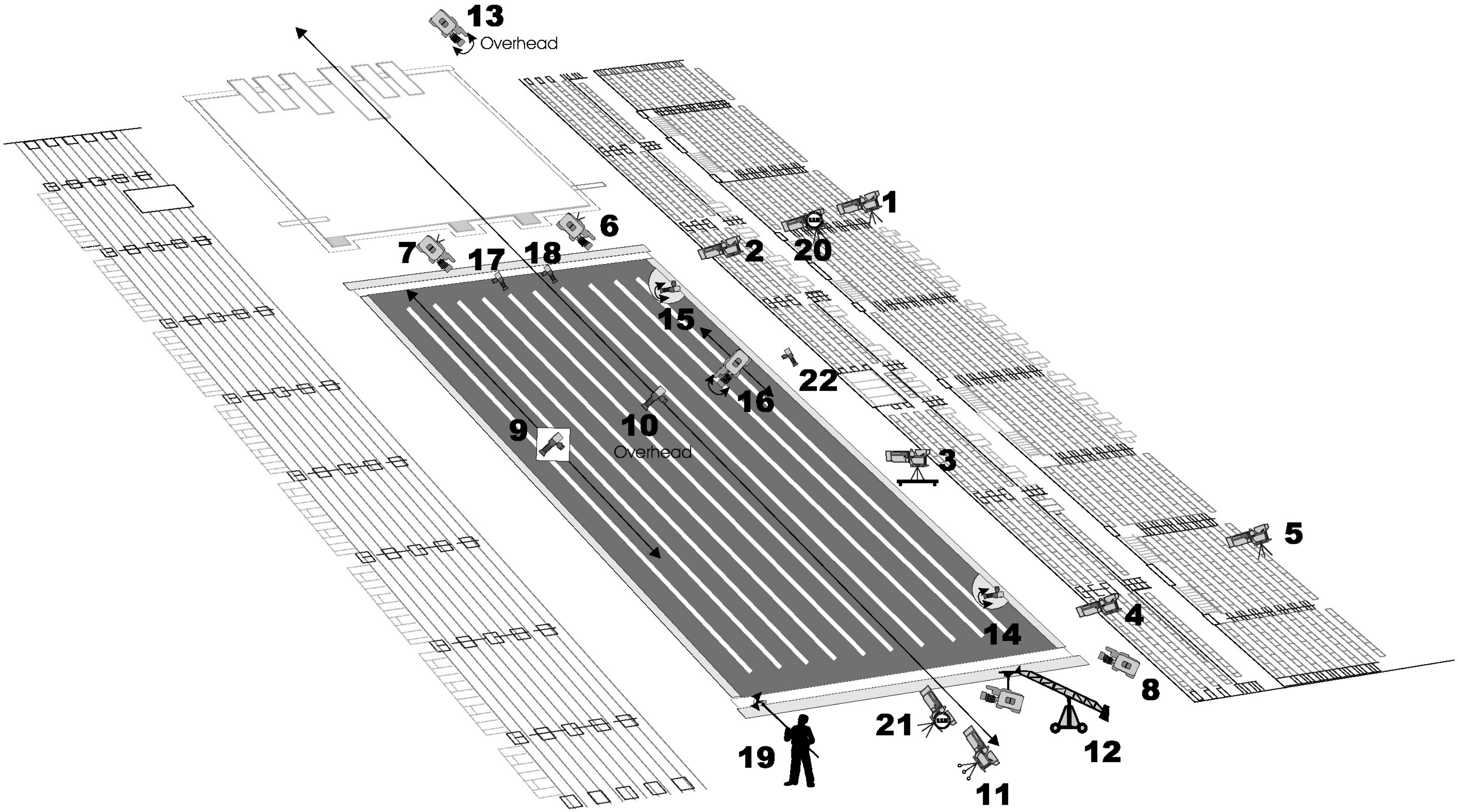


Production – Cameras

Aquatics – Swimming

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	High start/finish	Main follow
2	Fixed	Hi hat	Low start/finish	Close ups
3	Fixed	Tracking dolly	Length of 50m pool	Action
4	Fixed	Hi hat	Low turn	Action/50m start
5	Fixed	Tripod	Mid turn	Master turn/50m start
6	Hand-held (RF)	Steadicam	On deck start/finish	Pool exits
7	Hand-held (RF)	Steadicam	On deck start/finish	Pool exits
8	Hand-held	Sticks	On deck start/finish	Close ups/ceremonies
9	Specialty	Rails – underwater	Bottom of pool running the length to within 2m end walls	Underwater tracking
10	Specialty	Trackcam	80m of track below roof over center lane	Overhead tracking
11	Fixed	Tripod w/wheels	Turn end gantry	Interior beauty shot/action
12	Hand-held	Crane	Poolside on the deck at turn end	Isolation/ceremonies
13	Hand-held	Type II	Suspended on pole over diving pole	Venue wide shot
14	Specialty	Type III (underwater housing)	Pool floor, 3m off camera left start/finish	Flip turn
15	Specialty	Type III (underwater housing)	Pool floor, 3m off camera left start/finish	Flip turn
16	Specialty	Periscope camera mount	Pool wall, 12m from starting block	Underwater coverage from blocks to 15m mark
17	Mini	Fixed mount	In the entry block of lane four	Lane four entry & turn/ swimmers close up
18	Mini	Fixed mount	In the entry block of lane five	Lane five entry & turn/ swimmers close up
19	Specialty	Polecam system	Poolside	Turn end coverage
20	Fixed (SSM)	Tripod	Mid start/finish	Isolation
21	Fixed (SSM)	Tripod	On deck at turn end of pool	Head on isolation
22	Mini	Type III	In athlete's callroom	Callroom isolation

Aquatics - Swimming

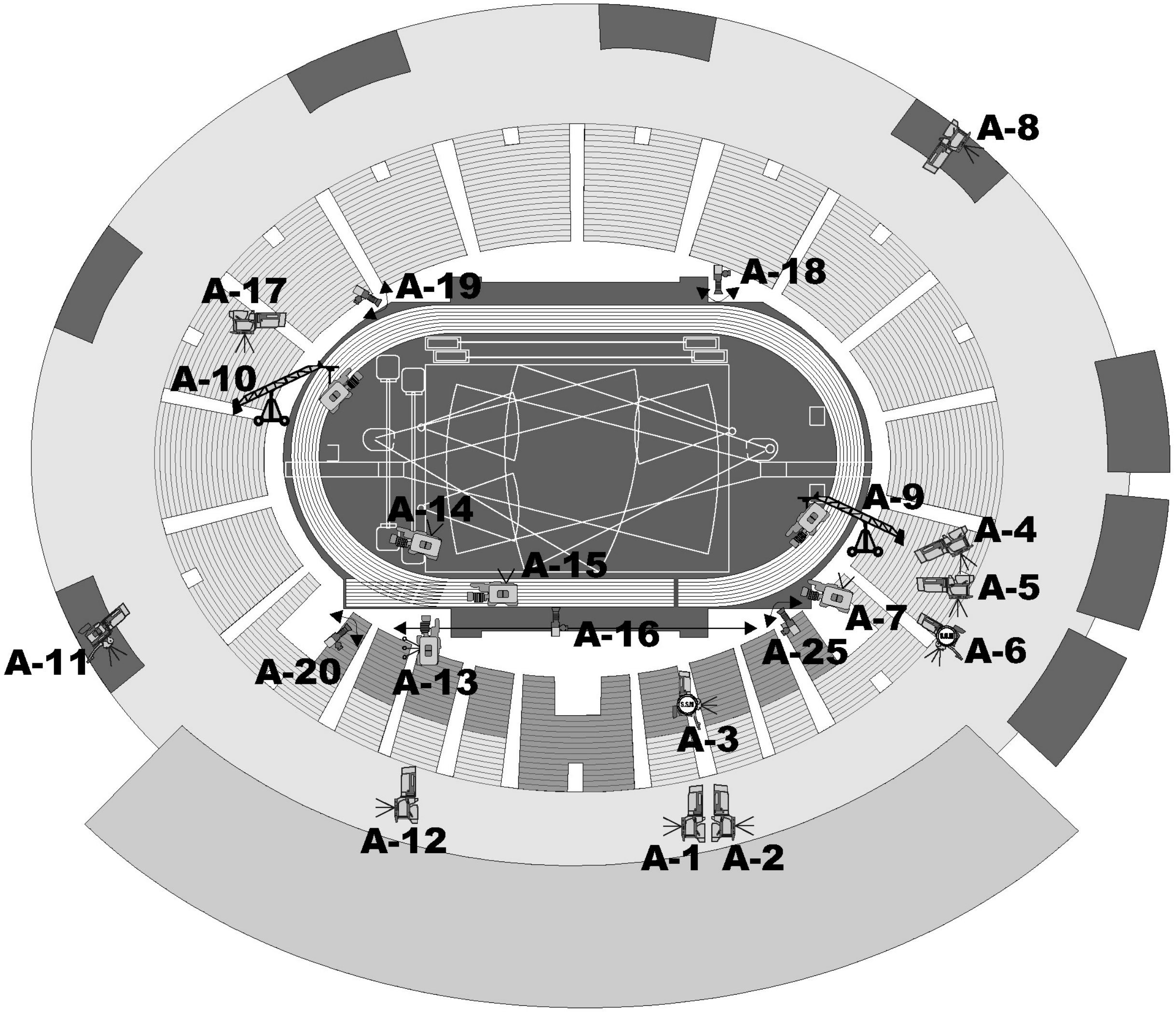


Production – Cameras

Athletics – Track

No.	Type	Mount	Location	Coverage
A-1	Fixed	Tripod	Finish line	Main finish
A-2	Fixed	Tripod	Finish line	Close up finish
A-3	Fixed (SSM)	Tripod	Finish line	Main finish/low angle
A-4	Fixed	Tripod	Head on, run out	Main finish
A-5	Fixed	Tripod	Head on, run out	Isolation finish
A-6	Fixed (SSM)	Tripod	Head on, run out	Isolation finish
A-7	Hand-held (RF)	Steadicam	Head on, run out	Competitor reaction
A-8	Fixed	Tripod	Finish line/roving	Isolation relays/venue wide shot
A-9	Hand-held	Crane	On outside of track at turn	Starts 400/800m, isolation, high jumps
A-10	Hand-held	Crane	On outside of track at turn	Isolation 200m, 500m, steeplechase
A-11	Fixed	Tripod	Turn 4	Master 200m, 500m, steeplechase
A-12	Fixed	Tripod	100m/110m start	High starts, relay final leg
A-13	Hand-held	Sticks	100m/110m start	Low starts, relay isolation
A-14	Hand-held	Steadicam	Roving	Close ups
A-15	Hand-held	Steadicam	Roving	Close ups
A-16	Specialty	Trackcam Rails	Along outside of the frontstretch 100m track	Frontstretch tracking
A-17	Fixed	Tripod	Head on backstraight	Various backstraight
A-18	Mini	Type III	Overhead beginning backstraight	Relay changeover
A-19	Mini	Type III	Overhead end of backstraight	Relay changeover
A-20	Mini	Type III	Overhead beginning home straight	Relay changeover

Athletics - Track



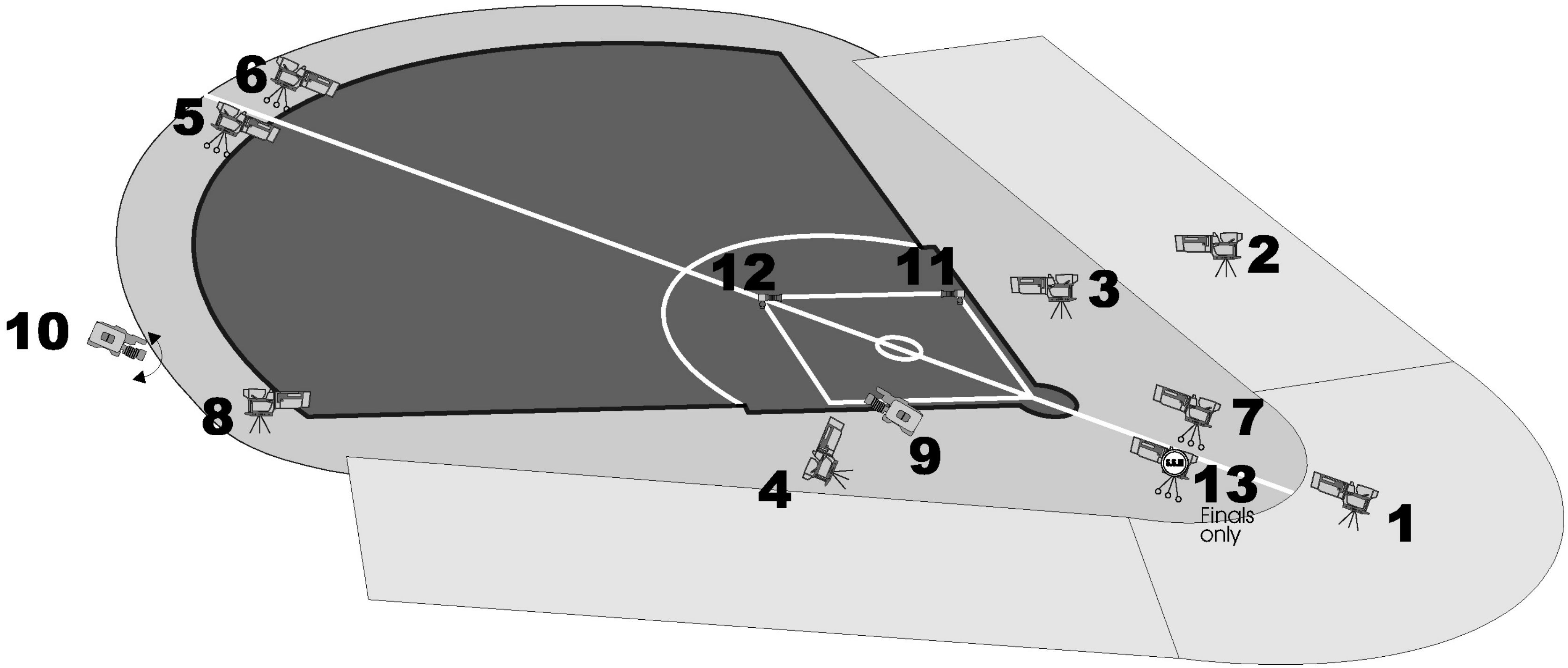
Production – Cameras

Baseball

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	High home	Main follow
2	Fixed	Tripod	High first	Ball flight & baserunners
3	Fixed	Tripod	Low first, dugout	RH batters, runners on second and third, introductions
4	Fixed	Tripod	Low third, dugout	LH batters, runners on first, introductions
5	Fixed	Tripod w/wheels	Low center field	Batter, catcher
6	Fixed	Tripod w/wheels	Low center field	Pitcher, batter, catcher
7	Fixed	Tripod w/wheels	Low home	Pitcher close up, pitch rotation
8	Fixed	Tripod	Low left field foul line	First – second steals, first base dugout
9	Hand-held	Sticks	Third base dugout	Isolation, third base dugout, pre & post
10	Hand-held	Sticks	High third baseline	Beauty shot
11	Mini	Fixed mount	First base	Runner retreating on pick off
12	Mini	Fixed mount	Second base	Runner approaches
13	Fixed	Tripod w/wheels	Low home	Low action replays, finals only

* A typical five-camera set-up for baseball would include cameras 1 – 5. See detailed baseball camera notes on pages 98 – 99.

Baseball



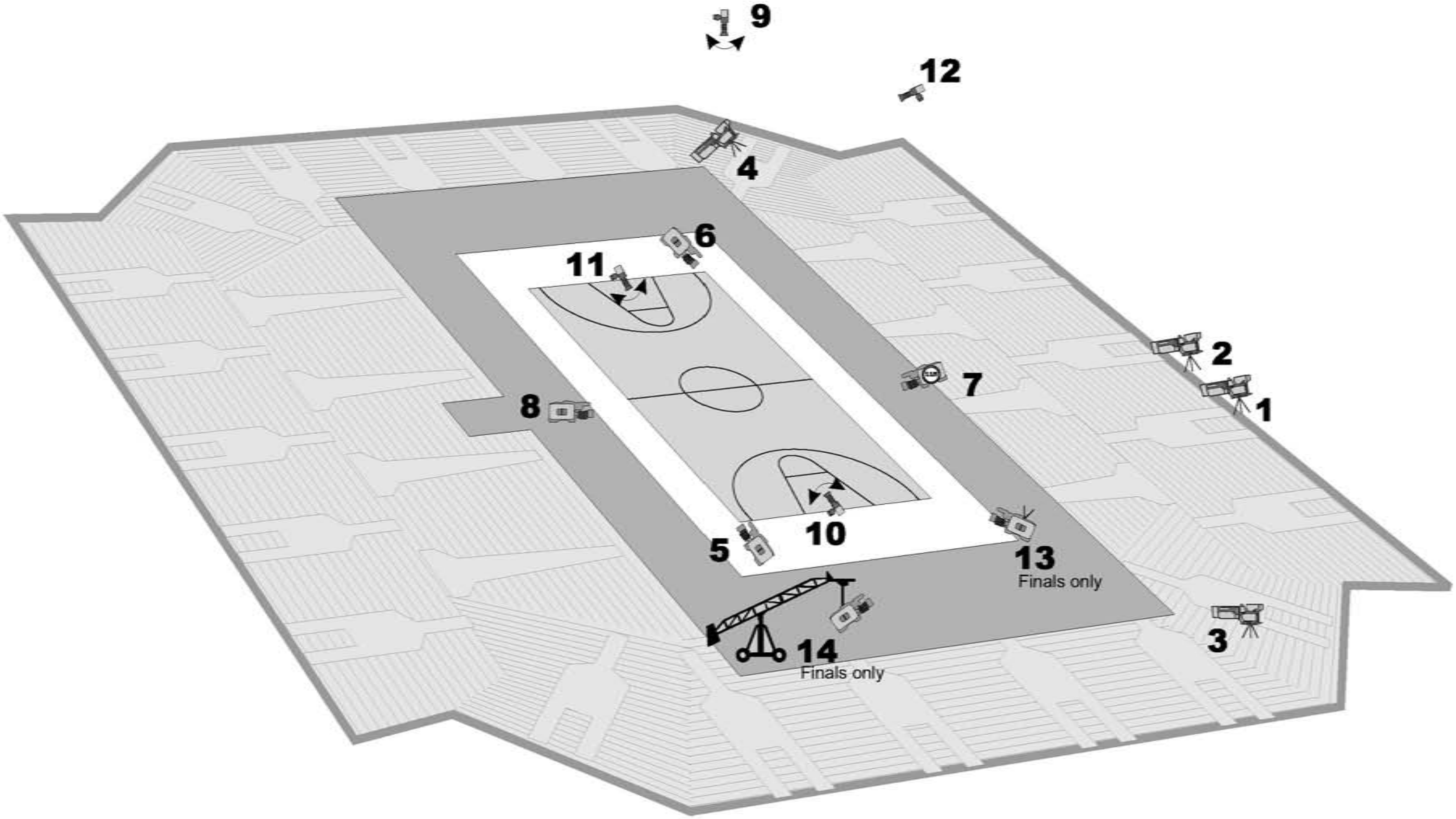
Production – Cameras

Basketball

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	High midcourt	Main follow
2	Fixed	Tripod	High midcourt	Close ups
3	Fixed	Tripod	Mid left ¾	Isolation
4	Fixed	Tripod	Mid right ¾	Isolation
5	Hand-held	Sticks	Left baseline	Isolation & action
6	Hand-held	Sticks	Right baseline	Isolation & action
7	Hand-held (SSM)	Sticks	Midcourt on floor	Isolation & low action
8	Hand-held	Sticks	Midcourt on floor, far side	Isolation & benches
9	Mini	Type III	Overhead	Overhead isolation
10	Mini	Type III	Behind left backboard	Isolation
11	Mini	Type III	Behind right backboard	Isolation
12	Mini	Fixed mount	¾ high near right corner roof	Venue wide shot
13	Hand-held (RF)	Sticks	Midcourt on floor, roving	Crowd
14	Hand-held	Crane	Far side left corner	Action, crowd

* A typical five-camera set-up for basketball would include cameras 1, 2, 3, 5 and 6.

Basketball



Production – Cameras

Bobsleigh & Skeleton

No.	Type	Mount	Location	Coverage
1	Hand-held	Sticks	Warm-up room	Athletes preparation
2	Hand-held (RF)	Sticks	Roving start house/running track	Athletes preparation
3	Specialty	Railcam	Sled right; lens 6 ft. high from track gully; extend appx. 50m	Leaving start
4	Fixed	Tripod	On scaffolding between bob and luge tracks (straight on to sled start)	Action
5	Hand-held	Sticks	Sled right; on luge course; at bobsleigh/luge merge	Action
6	Hand-held	Sticks	Sled left; level with existing concrete walkway; under existing pedestrian bridge	Action
7	Hand-held	Sticks	Sled right; entering Sunny corner; start of wood overhang (cameraman sits on top of overhang)	Action
8	Hand-held	Crane – specialty PBCS* (medium)	Sled left; inside Sunny (Turn 4)	Action
9	Mini	Fixed mount	Sled left; on roof of Cutthroat straightaway, 18 ft. in from start of wooden overhang	Action
10	Hand-held	Sticks	Sled left; entering Snowy (Turn 6) on top of roof; at start of wooden overhang	Action
11	Fixed	Tripod	Sled right; inside Snowy (Turn 6); lens height even w/existing speaker	Action
12	Hand-held	TBD	Sled left; start of Turn 7; platform ¼in from start of wood overhang; 15 ft. before start of water spigot	Action
13	Mini	Fixed mount	Sled left; attached to end of wooden overhang in Turn 7; entrance of Albert's Alley (Turn 8)	Action
14	Hand-held	Sticks	Sled left; on top of roof entering Albert's Alley (Turn 8); at third support bracket from coolant.	Action
15	Hand-held	Sticks	Sled right; mid-Albert's Alley; just under yet-to-be-built pedestrian bridge; on 4-20 ft. platform	Action
16	Mini	Fixed mount	Sled right; attached to end of wooden overhang in Turn 9	Action
17	Mini	Fixed mount	Sled right; appx. 15 ft. from come camera (third fence post)	Action
18	Fixed (SSM)	Tripod	Sled right; entering Turn 11; platform behind track wall shooting straightaway	Action (replay)
19	Fixed	Tripod	Sled left; inside Turn 11; on scaffold	Action

* Pan Bar Control System

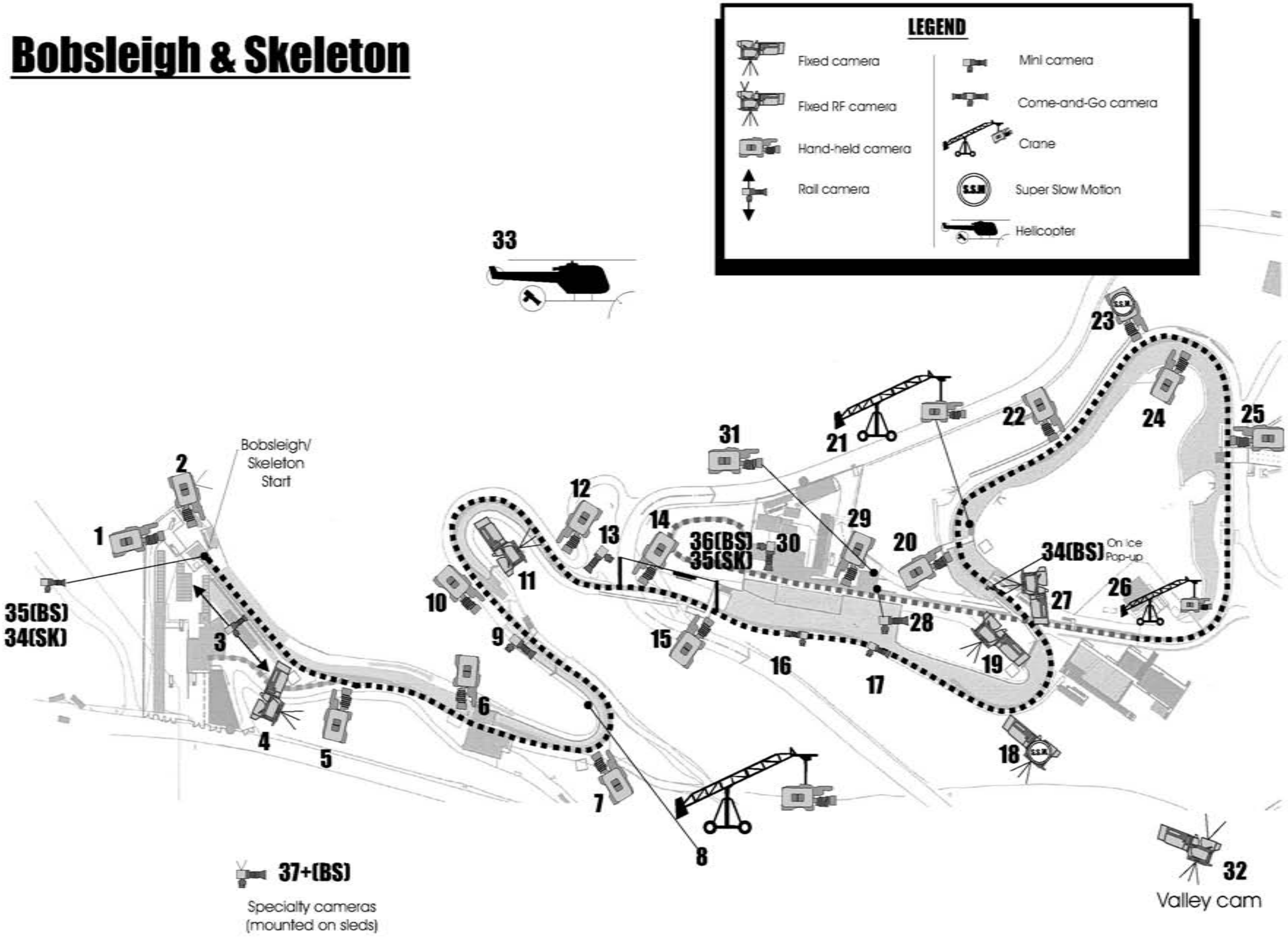
Production – Cameras

Bobsleigh & Skeleton

No.	Type	Mount	Location	Coverage
20	Hand-held	Sticks	Sled left; on top of roof entering Olympic (Turn 12); appx. 10ft. from start of wooden overhang	Action
21	Hand-held	Crane – specialty PBCS* (medium)	Sled right; mid-Olympic	Action
22	Hand-held	Sticks	Sled left; entrance to Turn 13; appx. 4ft. platform	Action
23	Hand-held (SSM)	Sticks	Sled left; entrance to Turn 14; at start of wooden overhang	Action (replay)
24	Hand-held	Sticks	Sled right; mid-Turn 14; even with water pole; platform 6ft. from track and 2 ft. high	Action
25	Hand-held	Sticks	Sled left; straightaway following Turn 14; at existing sled crash take-out/platform	Action
26	Hand-held	Crane – specialty PBCS* (medium)	Sled right; entering final turn (Turn 15)	Finish
27	Fixed	Tripod	Over track; after finish line; On (approx.) 6 ft. platform from track gully	Braking
28	Mini	Fixed mount	Sled right; mounted on yet-to-be built weigh station building; unmanned, front of building	Athlete reaction
29	Hand-held	Sticks	Sled right; at sled take out area	Athlete reaction
30	Mini	Fixed mount	Sled right; mounted on yet-to-be built weigh station building; unmanned, back of building	Athlete reaction
31	Hand-held	Sticks	Weigh-in; review of monitors; pre- and post-unilaterals	Athletes post-run
32	Fixed (Build up) (RF)	Type I	Valley cam	Scenic
33	Specialty (RF)	Stabilized in Helicopter	Above venue, in helicopter	Scenic
34(BS)	Specialty	Pop up	***Bobsleigh only***; middle of track; between existing pedestrian bridge, and turn 12	Action
35(BS) 34(SK)	Mini	Fixed mount	Mounted on start house, directly overhead	Athletes leaving start house
36(BS) 35 (SK)	Specialty	Cable cam	Albert's Alley	Action
37+(BS)	Lipstick (RF)	Specialty	Mounted on bobsleigh's (number of sleds has not yet been determined)	Athlete perspective

* Pan Bar Control System

Bobsleigh & Skeleton

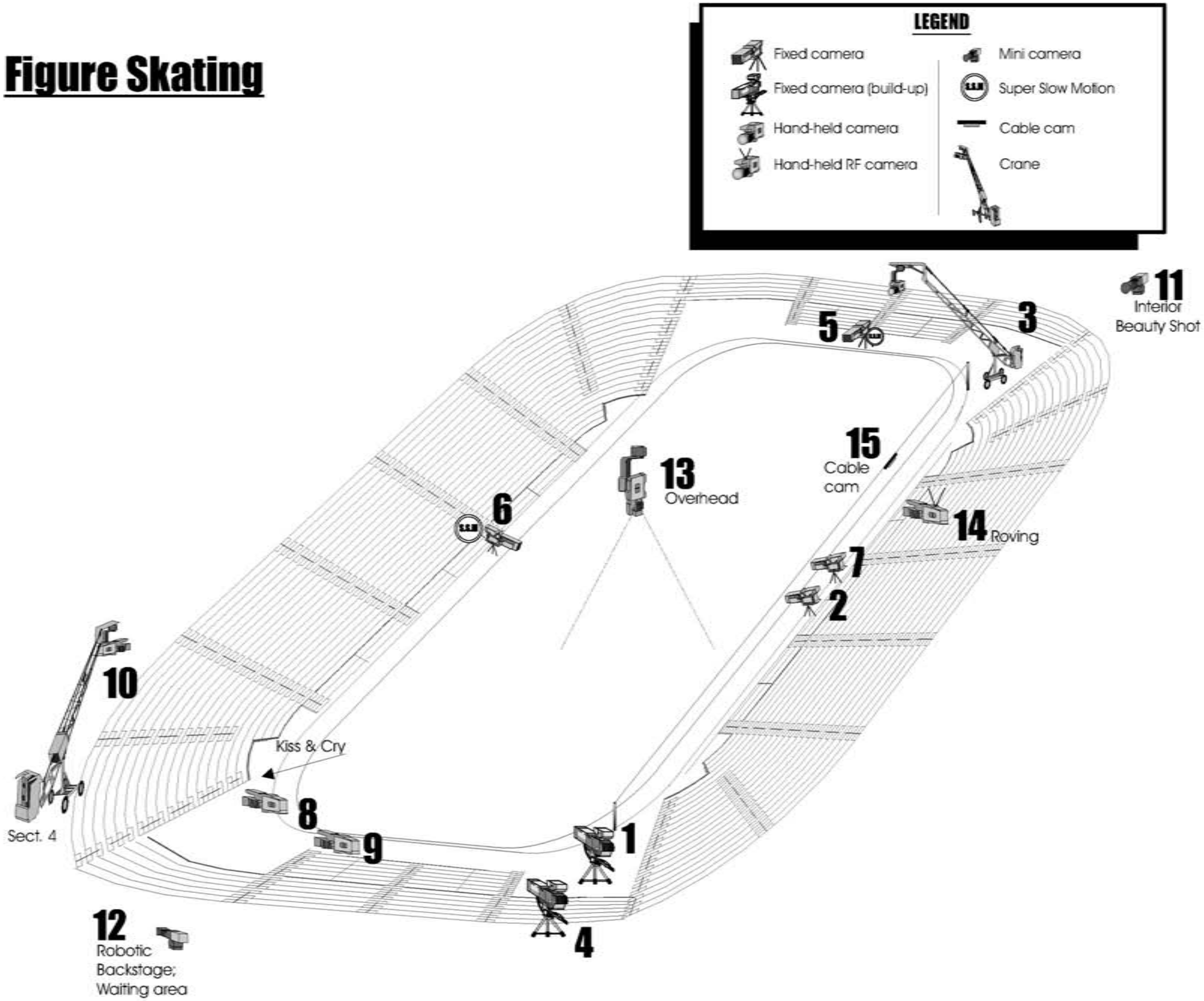


Production – Cameras

Figure Skating

No.	Type	Mount	Location	Coverage
1	Fixed	Low boy	Ice level, northwest end, 12 ft. cutout in dasher	Action
2	Fixed	Tripod	Below lower bowl; cantilever built to hang over judges' table. Section 18.	Main follow
3	Fixed	Crane (medium) (counterbalance)	Southwest end corner, 12 ft. cutout in dasher	Action
4	Fixed	Tripod	Top of lower bowl, Northwest end	Action
5	Fixed (SSM)	Tripod	Southwest end zone	Action
6	Fixed (SSM)	Tripod	Ice level; opposite judges' table. Directly opposite main camera	Action
7	Fixed	Tripod	Below lower bowl; cantilever built to hang over judges' table. Section 18.	Tight follow
8	Hand-held	Sticks	Kiss & Cry	Athletes' faces; action
9	Hand-held	Sticks	Kiss & Cry	On deck in corral/ coach; in front of curtain
10	Hand-held	Crane (medium)	Section 4	Sweeping crowd shots; atmosphere
11	Mini	Fixed mount	Southwest ceiling truss	Beauty shot
12	Mini	Type III (robotic)	Backstage; waiting area	Athletes' preparation
13	Hand-held	Type II (robotic)	Over center ice	Atmosphere athletes on/off ice
14	Hand-held (RF)	Sticks	Roving in stands	Crowd response
15	Specialty (RF)	Mini cable cam	Length of ice, judges' side	Action (replay)

Figure Skating



Production – Cameras

Football

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	High 25-30yd line (left)	Game action when inside the 35yd line (left)
2	Fixed	Tripod	High 50yd line	Game action when at midfield
3	Fixed	Tripod	High 25-30yd line (right)	Game action when inside the 35yd line (right)
4	Fixed	Tripod	Mid-high 50yd line	Close ups on field and opposite sideline
5	Fixed	On dolly	Near sideline (left)	Close ups on field, replays
6	Hand-held (SSM)	Sticks	Near sideline	Replays of game action
7	Fixed	On dolly	Near sideline (right)	Close ups on field, replays
8	Fixed	Tripod	High end zone (left)	Game action, replays, field goals and PATs
9	Fixed	Tripod	Low end zone in stands (left)	Game action, replays
10	Fixed	Tripod	Low end zone in stands (right)	Game action, replays
11	Fixed	On dolly	Far sideline (left)	Close ups on field, reverse angle replays
12	Fixed	On dolly	Far sideline (right)	Close ups on field, reverse angle replays
13	Hand-held (RF)	Sticks	Goal post crossbar	Replays of field goals and PATs
14	Fixed	Tripod	Low end zone (right)	Close ups, replays
15	Hand-held (RF)	Sticks	Goal post crossbar	Replays of field goals and PATs
16	Hand-held (SSM)	Sticks	Far sideline	Replays of game action
17	Fixed	Tripod	Low end zone (left-far)	Close ups, replays
18	Fixed	Tripod	Low end zone (left-near)	Close ups, replays
19	Fixed	Tripod	High 50yd line	Wide field replay
20	Fixed	Tripod	High end zone (right)	Game action, replays, field goals and PATs
21	Fixed	Tripod	Mid-high 25-30yd line (left)	Close ups, replays

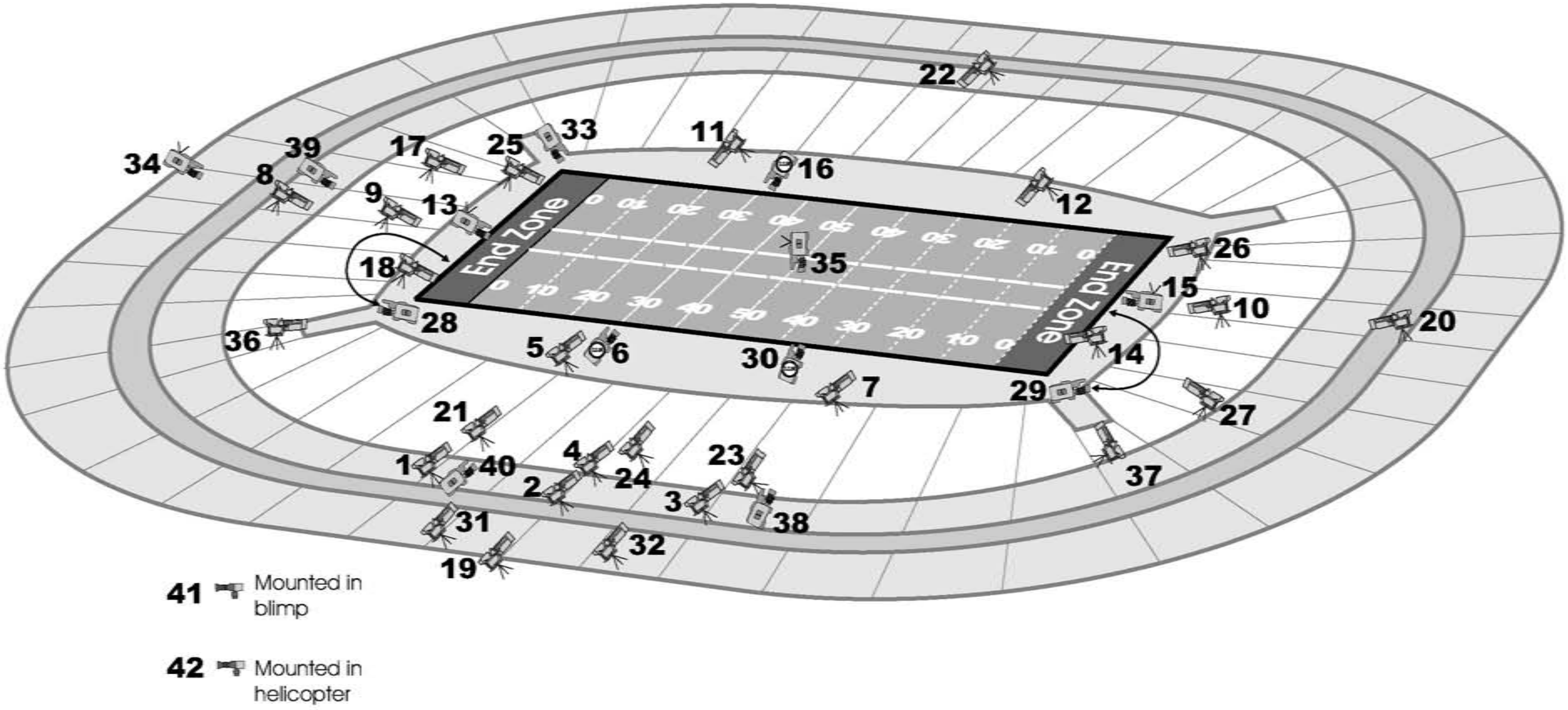
* A typical six-camera set-up for football would usually include cameras 2, 4, 9, 16, 20 and 30.

Production – Cameras

Football

No.	Type	Mount	Location	Coverage
22	Fixed	Tripod	High 50yd line (far)	Near sideline close ups, reverse angle replay
23	Fixed	Tripod	Mid-high 25-30yd line (right)	Close ups, replays
24	Fixed	Tripod	Mid-high 50yd line	Close ups, replays
25	Fixed	Tripod	Low end zone (left-far)	Close ups, replays
26	Fixed	Tripod	Low end zone (right-far)	Close ups, replays
27	Fixed	Tripod	High end zone (right-near)	Close ups, replays
28	Hand-held	Sticks	Under goal post (left)/ Left locker room exterior	Close ups, replays/ Player field entrance/exit, sideline reporter
29	Hand-held	Sticks	Under goal post (right)/ Left locker room exterior	Close ups, replays/ Player field entrance/exit, sideline reporter
30	Hand-held (SSM)	Sticks	Near sideline	Replays
31	Mini	Fixed mount	NFC coaches box	NFC coaching staff
32	Mini	Fixed mount	AFC coaches box	AFC coaching staff
33	Hand-held	On jib	Low end zone corner (left-far)	Beauty shot, halftime show
34	Hand-held (RF)	Sticks	Ceiling (above left end zone)	Replays
35	Hand-held (RF)	Sticks	Ceiling (above mid field)	Replays
36	Mini	Fixed mount	NFC tunnel	NFC locker room entrance/exit
37	Mini	Fixed mount	AFC tunnel	AFC locker room entrance/exit
38	Hand-held	Sticks	High 30yd line	Game clock
39	Hand-held	Sticks	High end zone (left)	40-second clock
40	Hand-held	Sticks	Announce booth	Talent on camera
41	Gyro/ Wescam	Mounted in blimp	Above venue	Exterior aerial scenics
42	Gyro/ Wescam	Mounted in helicopter	Above venue	Exterior aerial scenics

Football


End Zone
End Zone
41 Mounted in blimp
42 Mounted in helicopter

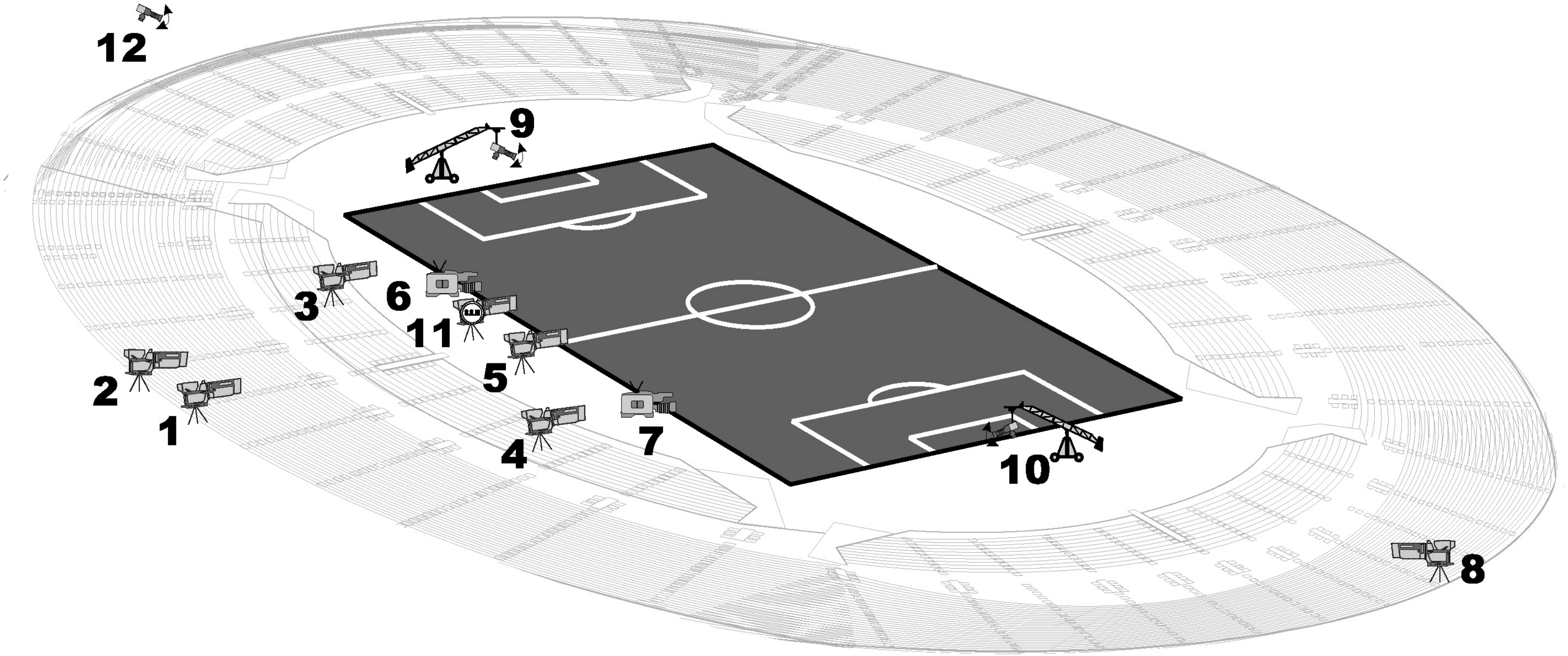
Production – Cameras

Football (Soccer)

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	Center	Main follow
2	Fixed	Tripod	Center	Close ups, isolation
3	Fixed	Tripod	16m line left	Offside replays
4	Fixed	Tripod	16m line right	Offside replays
5	Fixed	Tripod	Field level near side, between benches	Midfield isolation, replays
6	Hand-held (RF)	Steadicam	Field level near side, length of benches	Isolation, bench reactions
7	Hand-held (RF)	Steadicam	Field level near side, length of benches	Isolation, bench reactions
8	Fixed	Tripod	High end zone	Shots on goal, replays, beauty shots
9	Hand-held	Crane	Behind left goal	Isolation, replays
10	Hand-held	Crane	Behind right goal	Isolation, replays
11	Fixed	Tripod	Field level near side, between benches	Midfield isolation replays
12	Mini	Type III	Top of stadium	Beauty shot

* A typical five-camera set-up for soccer would usually include cameras 1, 2, 5, 6 and 8.

Football

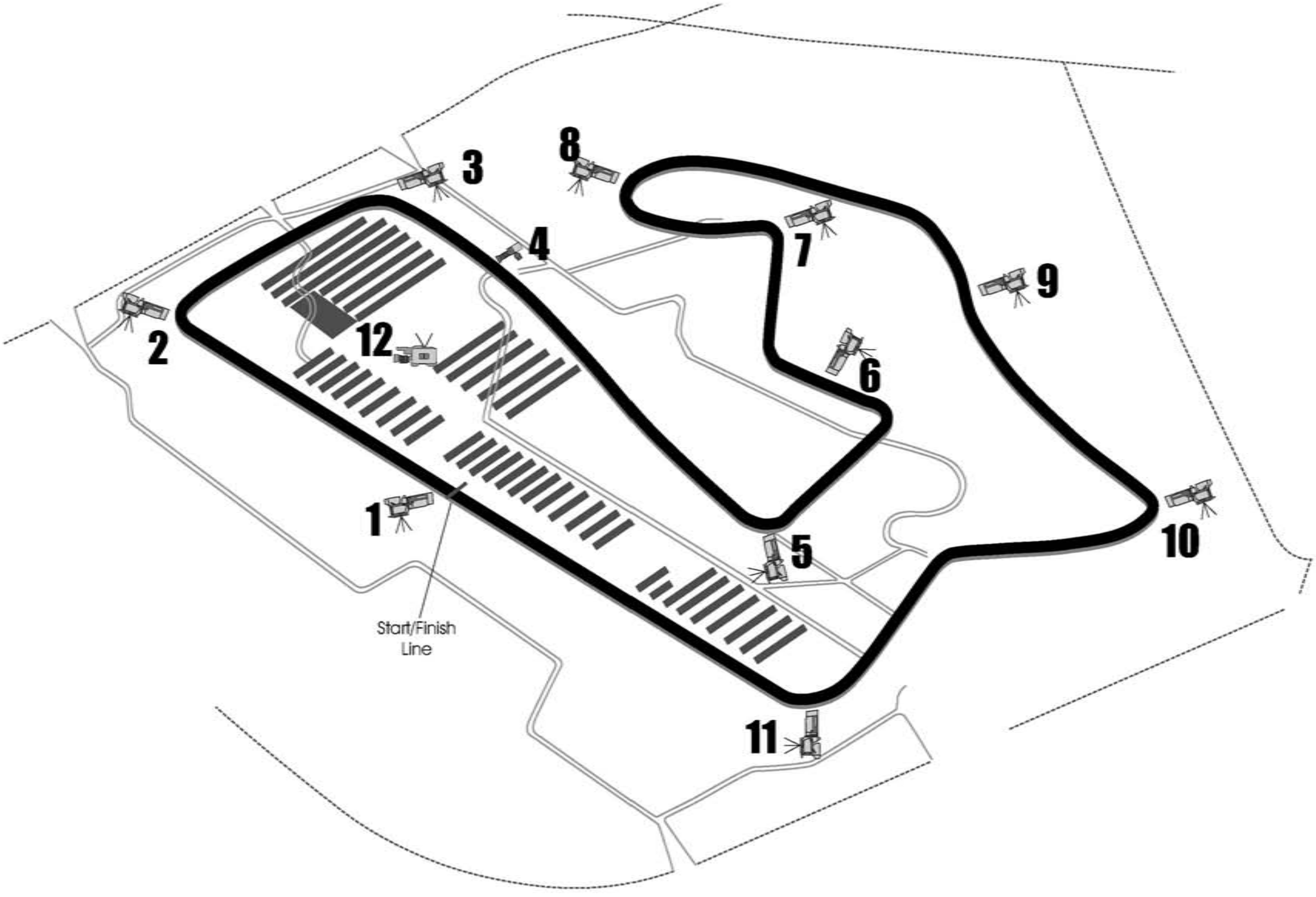


Production – Cameras

Motorcycle Road Race

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	VIP Tower	Wide shot
2	Fixed	Tripod	South corner of field of play	Approach and first turn
3	Fixed	Tripod	Corner near Gate 4	Second turn
4	Mini	Fixed mount	Straightaway between second and third turn	Speed shot
5	Fixed	Tripod	Near scoreboard	Third turn
6	Fixed	Tripod	Near bridge	Fourth turn and start of fifth turn
7	Fixed	Tripod	At sixth turn	Racers coming out of fifth turn and going into sixth
8	Fixed	Tripod	Top of hill	Carousel turn
9	Fixed	Tripod	Kettle Bottoms	Long stretch between Carousel and eighth turn
10	Fixed	Tripod	Canada Corner	Eighth turn
11	Fixed	Tripod	Corner near Gate 1	Final turn and finish
12	Hand-held (RF)	Sticks	Roving	Competition paddock area

Motorcycle Road Race



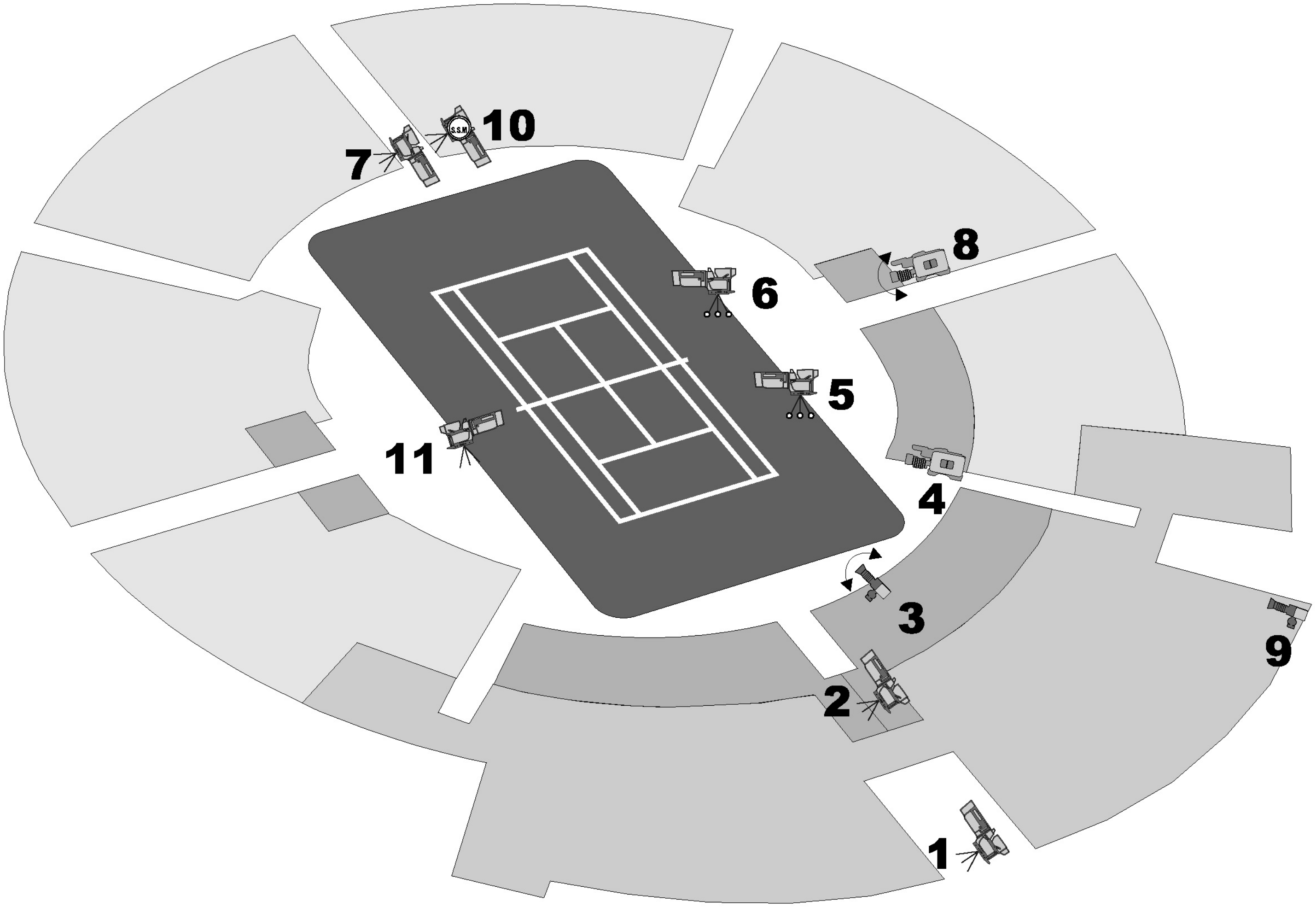
Production – Cameras

Tennis

No.	Type	Mount	Location	Coverage
1	Fixed	Tripod	High centered	Wide shot
2	Fixed	Tripod	Mid centered	Main follow camera
3	Mini	Type III	Low, mounted top of court wall	Isolation
4	Hand-held	Sticks	Roving court level	Isolation, close ups
5	Fixed	Tripod w/wheels	Left of net, court level	Isolation, close ups
6	Fixed	Tripod w/wheels	Right of net, court level	Isolation, close ups
7	Fixed	Tripod	Low centered, reverse angle	Reverse angle replay
8	Hand-held	Type II	Suspended from roof edge in line with net	Isolation
9	Mini	Fixed mount	Mounted on top of building	Beauty shot
10	Fixed (SSM)	Tripod	Low centered, reverse angle	Low action replays
11	Fixed	Tripod	At net	Reverse angle

* A typical five-camera set-up for tennis would usually include cameras 1, 2, 4, 5 and 6.

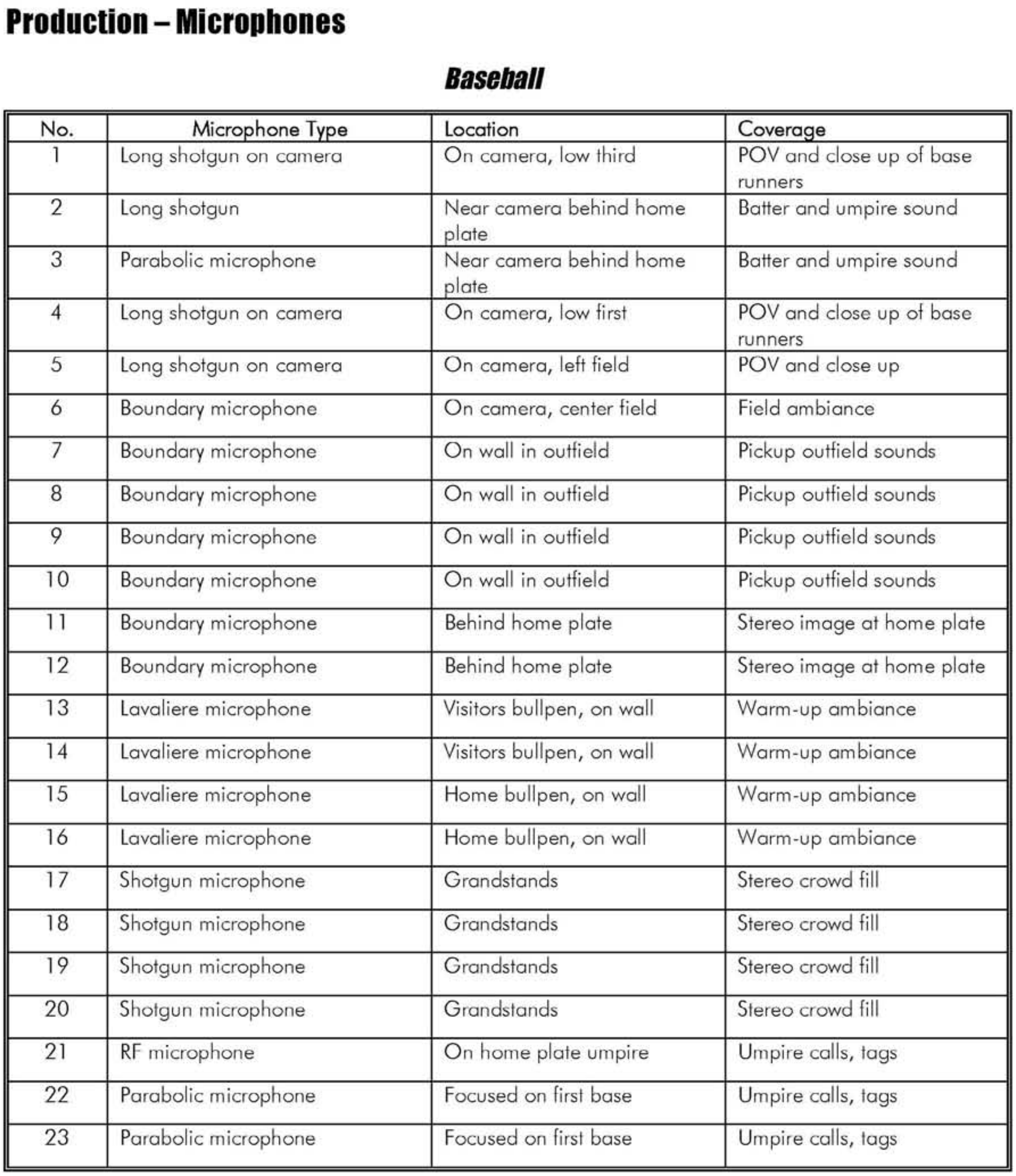
Tennis



APPENDIX IV:

Microphone Diagrams

The following microphone diagrams and descriptions are actual documents used by networks and production companies to produce television coverage of some of the Olympic Games. Since microphone descriptions are included, the microphone diagrams can be adapted to smaller events.

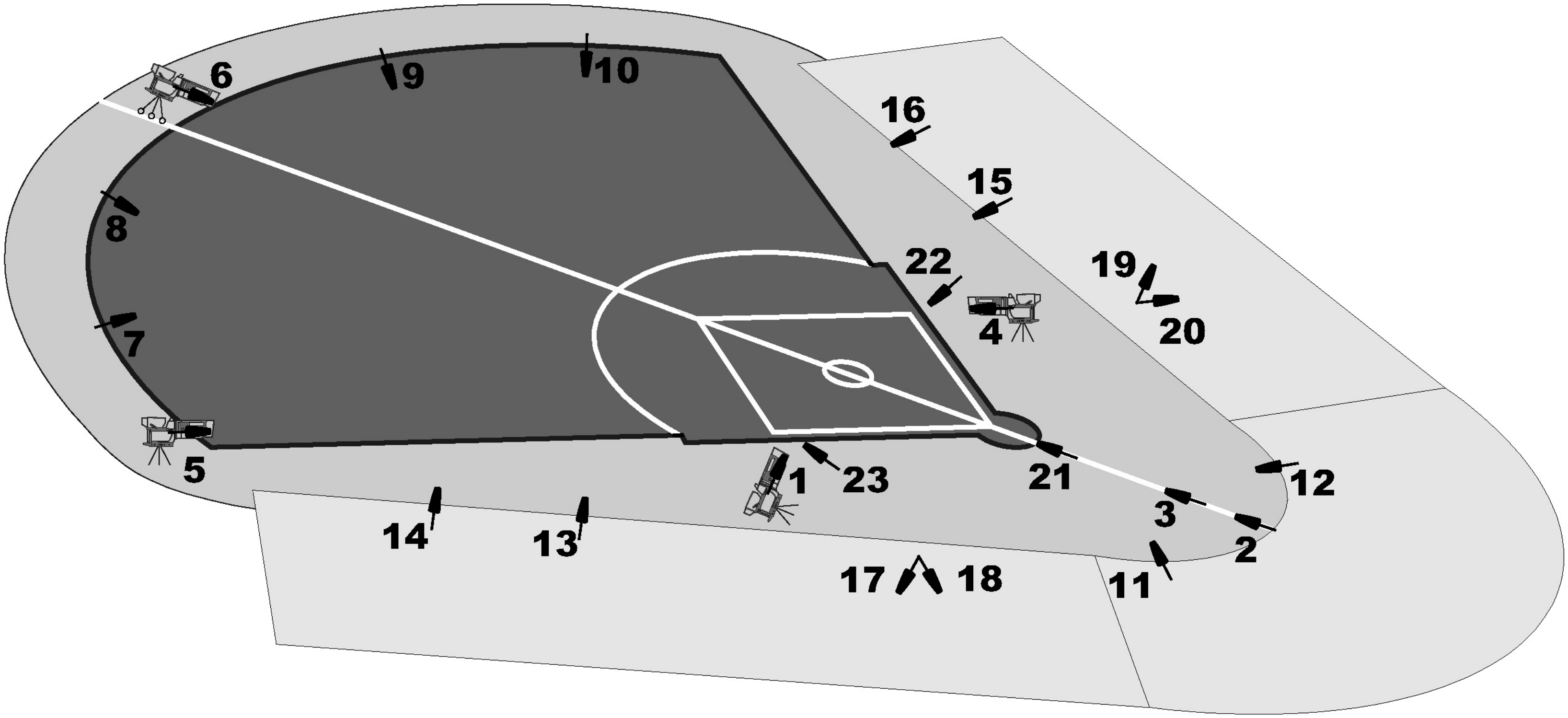


Production – Microphones

Baseball

No.	Microphone Type	Location	Coverage
1	Long shotgun on camera	On camera, low third	POV and close up of base runners
2	Long shotgun	Near camera behind home plate	Batter and umpire sound
3	Parabolic microphone	Near camera behind home plate	Batter and umpire sound
4	Long shotgun on camera	On camera, low first	POV and close up of base runners
5	Long shotgun on camera	On camera, left field	POV and close up
6	Boundary microphone	On camera, center field	Field ambiance
7	Boundary microphone	On wall in outfield	Pickup outfield sounds
8	Boundary microphone	On wall in outfield	Pickup outfield sounds
9	Boundary microphone	On wall in outfield	Pickup outfield sounds
10	Boundary microphone	On wall in outfield	Pickup outfield sounds
11	Boundary microphone	Behind home plate	Stereo image at home plate
12	Boundary microphone	Behind home plate	Stereo image at home plate
13	Lavaliere microphone	Visitors bullpen, on wall	Warm-up ambiance
14	Lavaliere microphone	Visitors bullpen, on wall	Warm-up ambiance
15	Lavaliere microphone	Home bullpen, on wall	Warm-up ambiance
16	Lavaliere microphone	Home bullpen, on wall	Warm-up ambiance
17	Shotgun microphone	Grandstands	Stereo crowd fill
18	Shotgun microphone	Grandstands	Stereo crowd fill
19	Shotgun microphone	Grandstands	Stereo crowd fill
20	Shotgun microphone	Grandstands	Stereo crowd fill
21	RF microphone	On home plate umpire	Umpire calls, tags
22	Parabolic microphone	Focused on first base	Umpire calls, tags
23	Parabolic microphone	Focused on first base	Umpire calls, tags

Baseball

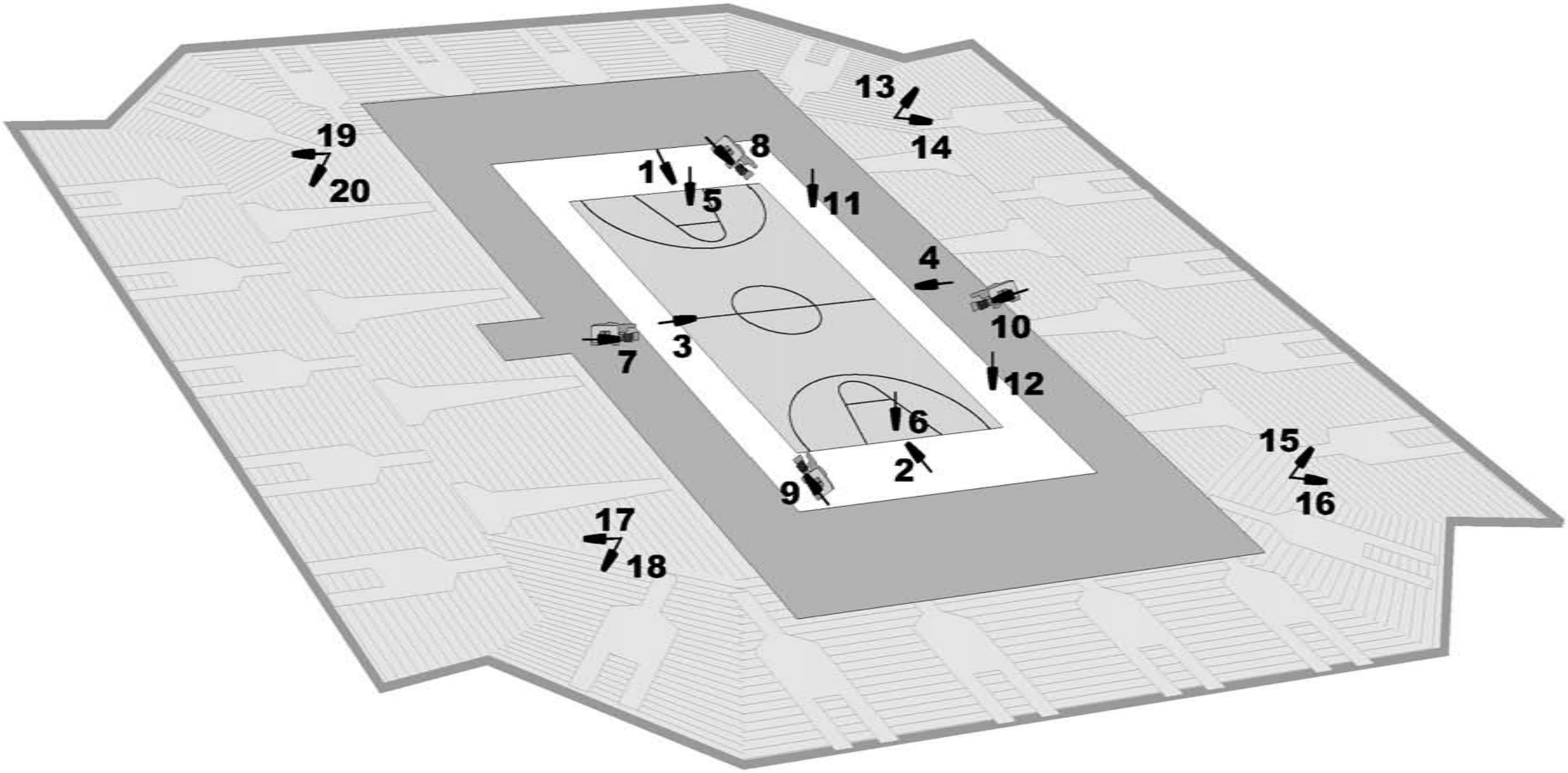


Production – Microphones

Basketball

No.	Microphone Type	Location	Coverage
1	Long shotgun with operator	Left side of court, under basket	Play action left
2	Long shotgun with operator	Rights side of court, under basket	Play action right
3	Long shotgun with operator	Near side, center court	Play action center
4	Short shotgun on 4" stand	Far side, center court, scorers table	Play action center
5	Lavaliere microphone	Left side under net	Close proximity of net
6	Lavaliere microphone	Right side under net	Close proximity of net
7	Long shotgun on camera	On camera, near court	POV and close ups
8	Long shotgun on camera	On camera, left court	POV and close ups
9	Long shotgun on camera	On camera, right court	POV and close ups
10	Long shotgun on camera	On camera, far court	POV and close ups
11	Lavaliere microphone	In the vicinity of bench	Team ambiance
12	Lavaliere microphone	In the vicinity of bench	Team ambiance
13	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
14	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
15	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
16	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
17	Short shotgun	On pole or stand in vicinity of non-competing athletes	Stereo crowd fill
18	Short shotgun	On pole or stand in vicinity of non-competing athletes	Stereo crowd fill
19	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
20	Short shotgun	On pole or stand in front of audience	Stereo crowd fill

Basketball

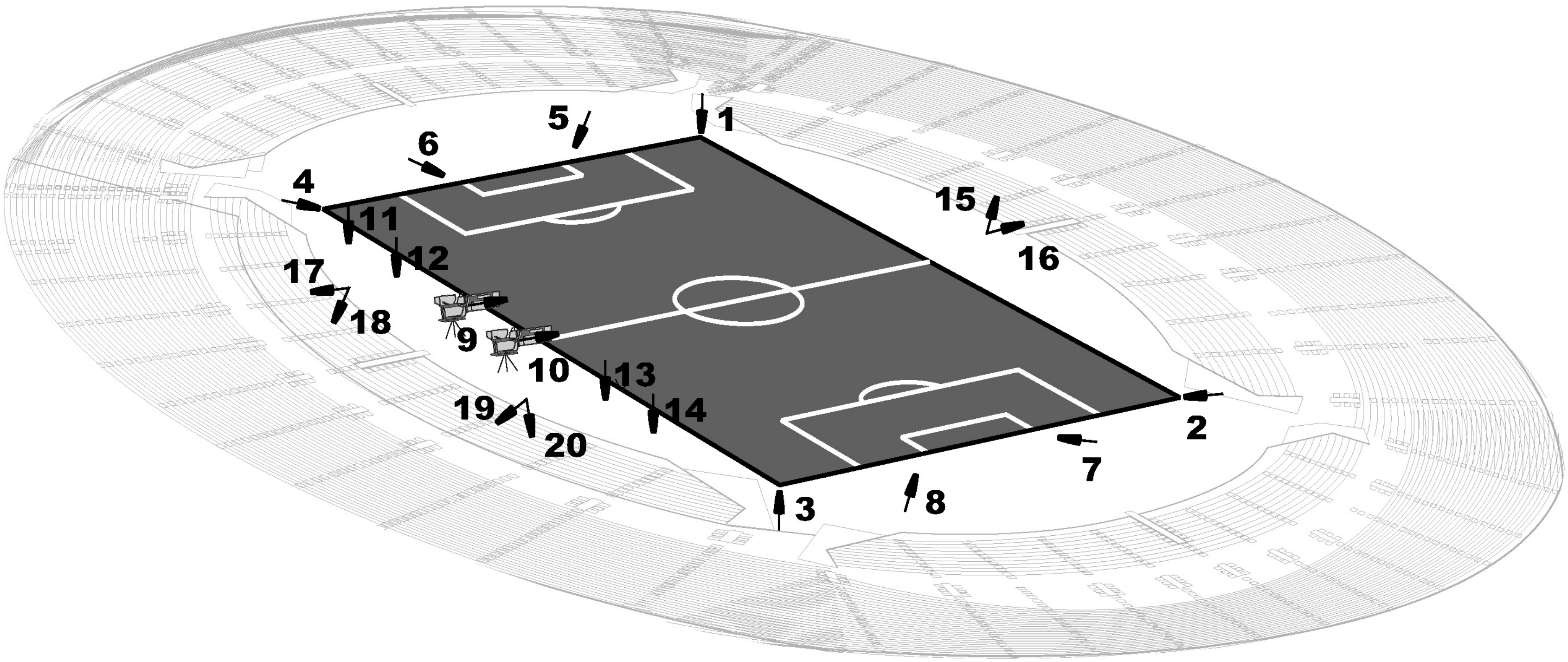


Production – Microphones

Football (Soccer)

No.	Microphone Type	Location	Coverage
1	Parabolic with operator	Far, left side of field	Play action far quadrant
2	Parabolic with operator	Far, right side of field	Play action far quadrant
3	Parabolic with operator	Near, left side of field	Play action near quadrant
4	Parabolic with operator	Near, right side of field	Play action near quadrant
5	Short shotgun	Behind goal, left	Play action goal area
6	Short shotgun	Behind goal, left	Play action goal area
7	Short shotgun	Behind goal, right	Play action goal area
8	Short shotgun	Behind goal, right	Play action goal area
9	Long shotgun	On camera	POV & close ups
10	Long shotgun	On camera	POV & close ups
11	Lavaliere microphone	Bench area	Coaches and athletes
12	Lavaliere microphone	Bench area	Coaches and athletes
13	Lavaliere microphone	Bench area	Coaches and athletes
14	Lavaliere microphone	Bench area	Coaches and athletes
15	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
16	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
17	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
18	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
19	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
20	Short shotgun	On pole or stand in front of audience	Stereo crowd fill

Football

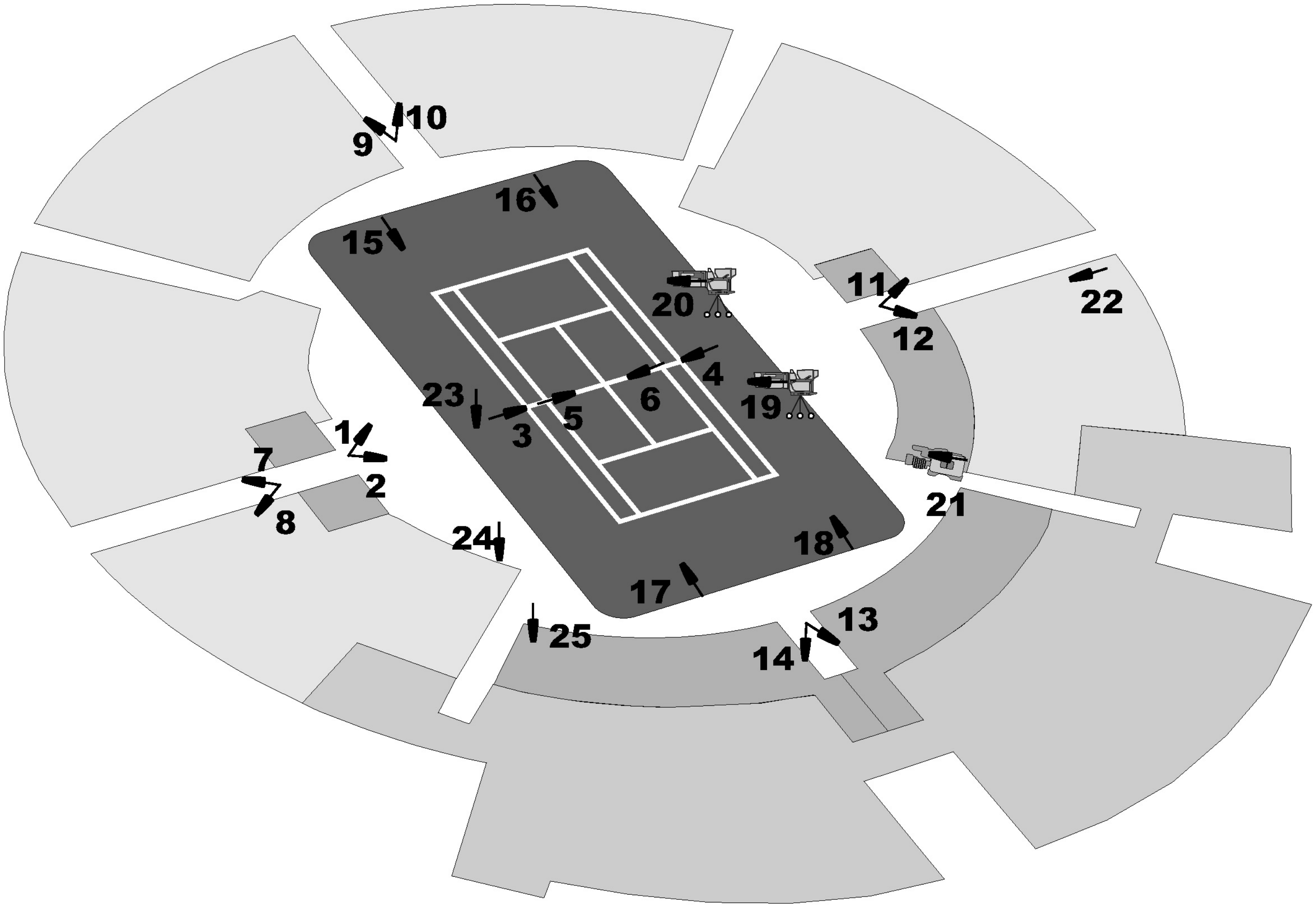


Production – Microphones

Tennis

No.	Microphone Type	Location	Coverage
1	Short shotgun	Mid-court, aiming at front left playing area	Athlete's close-up
2	Short shotgun	Mid-court, aiming at front right playing area	Athlete's close-up
3	Boundary microphone	Mid-court, aiming across playing area	Athlete's close-up
4	Boundary microphone	Mid-court, aiming across playing area	Athlete's close-up
5	Lavaliere microphone	Inseam of net, left side	Close proximity of net
6	Lavaliere microphone	Inseam of net, right side	Close proximity of net
7	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
8	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
9	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
10	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
11	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
12	Short shotgun	On pole or stand in front of audience	Stereo crowd fill
13	Short shotgun	On pole or stand in vicinity of non-competing athletes	Stereo crowd fill
14	Short shotgun	On pole or stand in vicinity of non-competing athletes	Stereo crowd fill
15	Short shotgun	Back court, left in X/Y config.	Close up, back court sound
16	Short shotgun	Back court, left in X/Y config.	Close up, back court sound
17	Short shotgun	Back court, right in X/Y config.	Close up, back court sound
18	Short shotgun	Back court, right in X/Y config.	Close up, back court sound
19	Long shotgun on camera	On camera at mid-court	POV and close ups
20	Long shotgun on camera	On camera at mid-court	POV and close ups
21	Long shotgun on camera	Hand-held camera	POV and close ups
22	Long shotgun on camera	Roving hand-held	POV and close ups
23	Lavaliere microphone	In the vicinity of referee	Judges call
24	Lavaliere microphone	In the vicinity of referee	Judges call
25	Lavaliere microphone	Near scoreboard, celebrity area	Crowd mic

Tennis



APPENDIX V:

Event Storyboards

Two storyboard examples are included in this section:

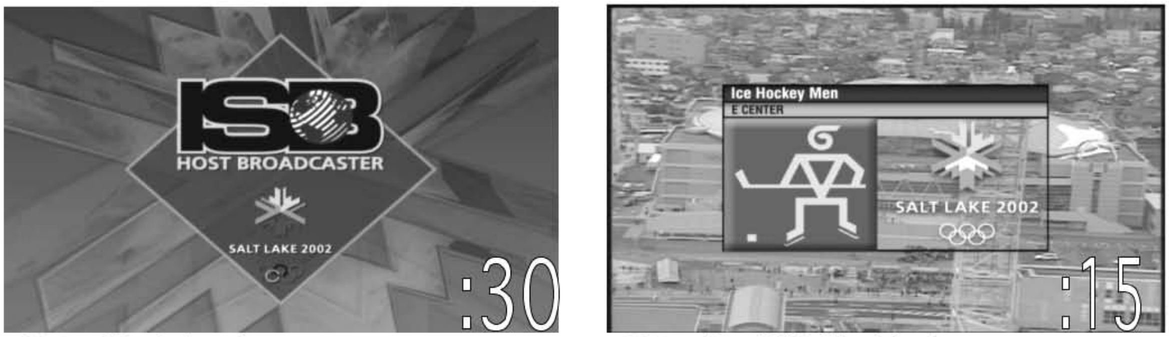
-Runup storyboard from the Salt Lake Olympics

-Opening Ceremony of the Salt Lake 2002 Olympic Winter Games

  - **(a) Olympic Flag/Olympic Hymn**
  - **(b) Olympic Flame enters and cauldron lighting**

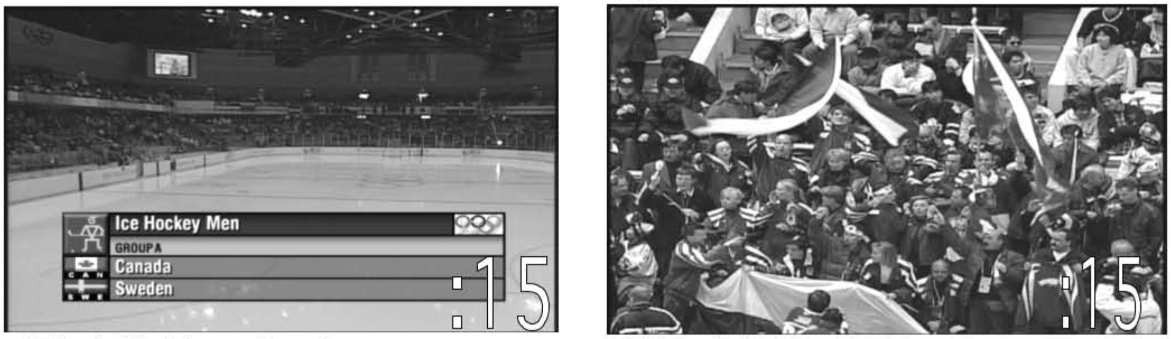
An additional production storyboard is available on page 95-96.

Figure 17: Runup Storyboards



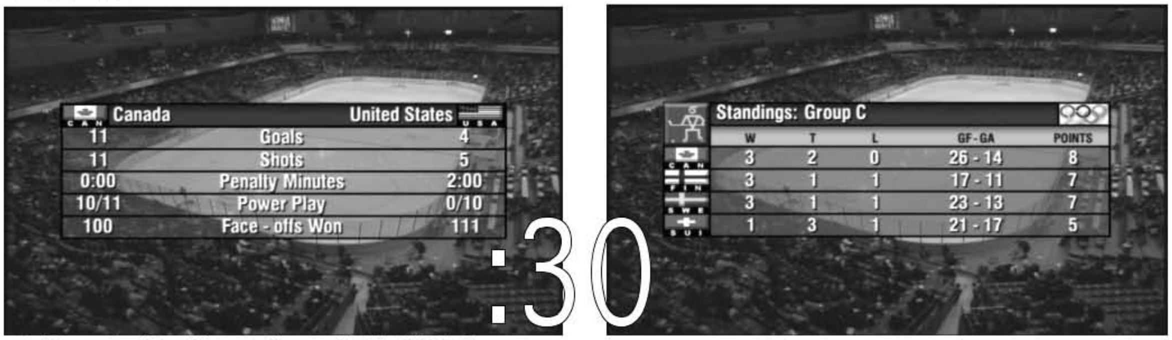
:00 to :30 - Animation

:30 to :45 - Wide/Aerial of venue
GRAPHIC



:45 to 1:00 - Venue Beauty
GRAPHIC

1:00 to 1:15 - Atmosphere at venue



Canada		United States
11	Goals	4
11	Shots	5
0:00	Penalty Minutes	2:00
10/11	Power Play	0/10
100	Face - offs Won	111

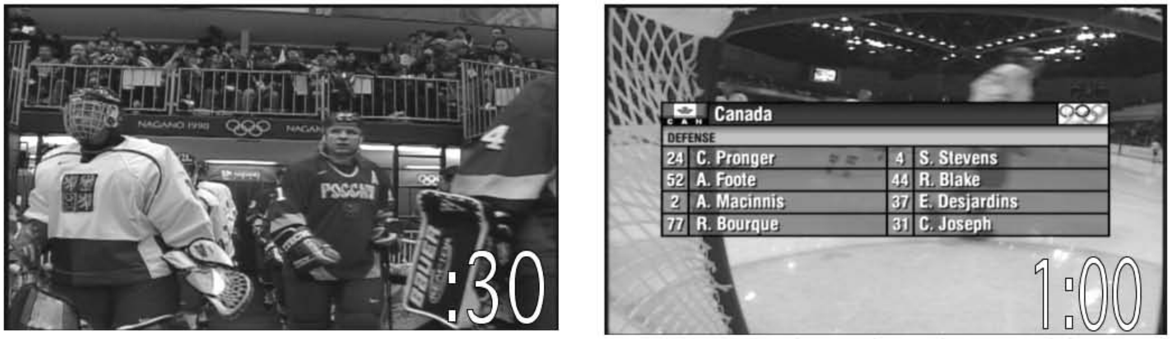
Standings: Group C

	W	T	L	GF - GA	POINTS
CAN	3	2	0	26 - 14	8
FIN	3	1	1	17 - 11	7
SWE	3	1	1	23 - 13	7
SUI	1	3	1	21 - 17	5

1:15 to 1:45 - Shots for **2 GRAPHICS**

1) Tournament Stats for Each Team

2) Group Standings



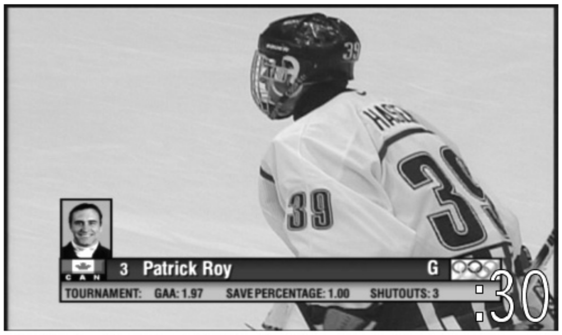
Canada

DEFENSE

24	C. Pronger	4	S. Stevens
52	A. Foote	44	R. Blake
2	A. Macinnis	37	E. Desjardins
77	R. Bourque	31	C. Joseph

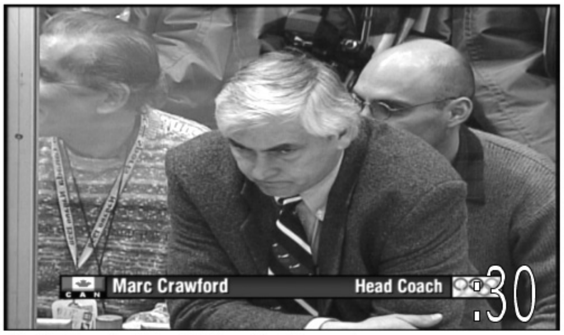
1:45 to 2:15 - Athletes enter ice

2:15 to 3:15 - Shots for **4 GRAPHICS**
(2 roster pages/team; Forward, Defense)


CAN
3 Patrick Roy G
TOURNAMENT: GAA: 1.97 SAVE PERCENTAGE: 1.00 SHUTOUTS: 3
:30

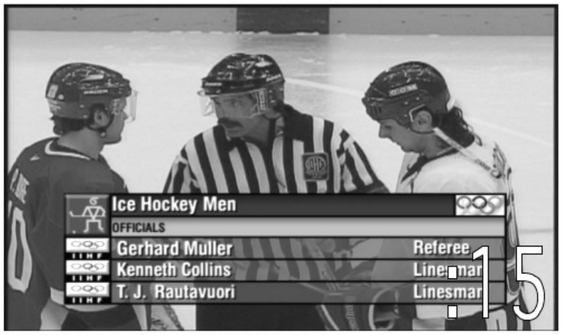
3:15 to 3:45 - ID Both Goaltenders

2 GRAPHICS



3:45 to 4:15 - ID both Coaches

2 GRAPHICS

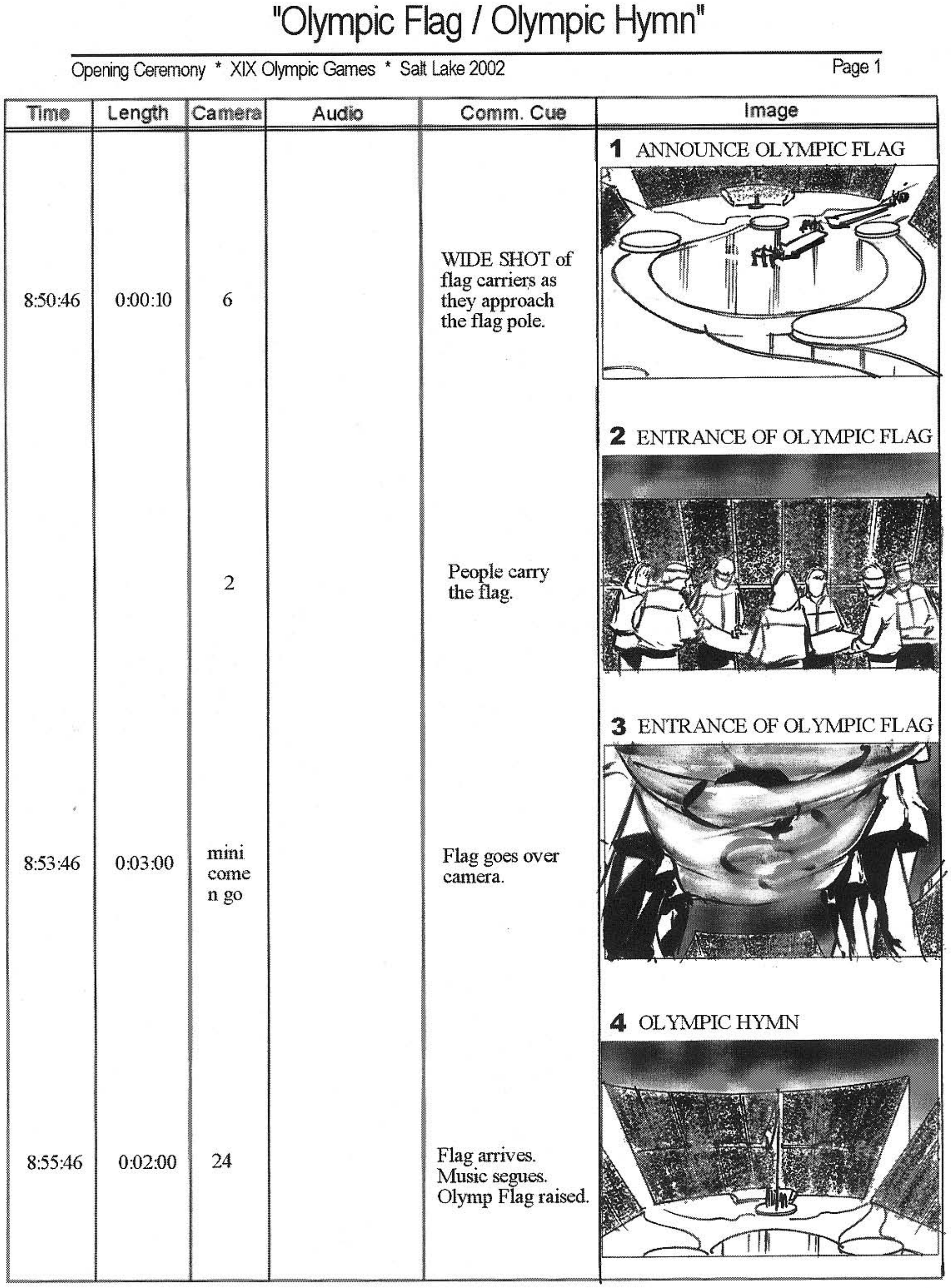

Ice Hockey Men
OFFICIALS
IIHF Gerhard Muller Referee
IIHF Kenneth Collins Linesman
IIHF T. J. Rautavuori Linesman
:15

4:15 to 4:30 - Officials ID

GRAPHIC

4:30 to 5:00 - Athletes prepare for start / atmosphere at venue

5:00 - Start of Competition



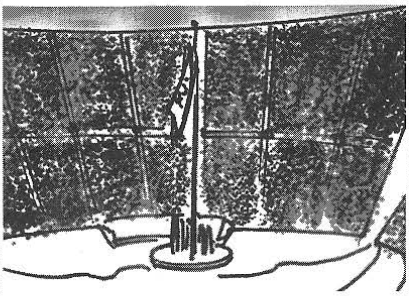
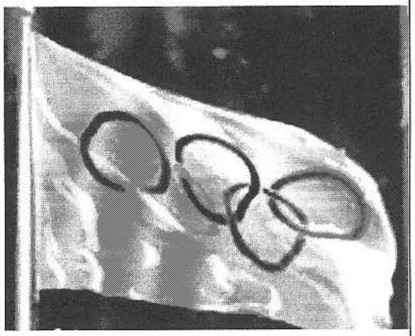
"Olympic Flag / Olympic Hymn"

Opening Ceremony * XIX Olympic Games * Salt Lake 2002 Page 1

Time	Length	Camera	Audio	Comm. Cue	Image
8:50:46	0:00:10	6		WIDE SHOT of flag carriers as they approach the flag pole.	1 ANNOUNCE OLYMPIC FLAG
		2		People carry the flag.	2 ENTRANCE OF OLYMPIC FLAG
8:53:46	0:03:00	mini come n go		Flag goes over camera.	3 ENTRANCE OF OLYMPIC FLAG
8:55:46	0:02:00	24		Flag arrives. Music segues. Olymp Flag raised.	4 OLYMPIC HYMN

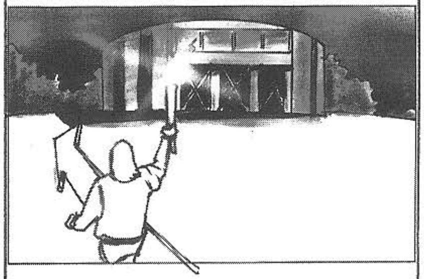
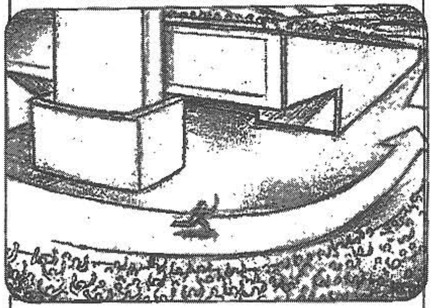
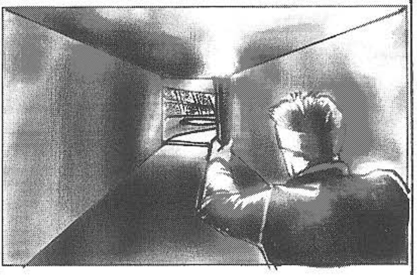
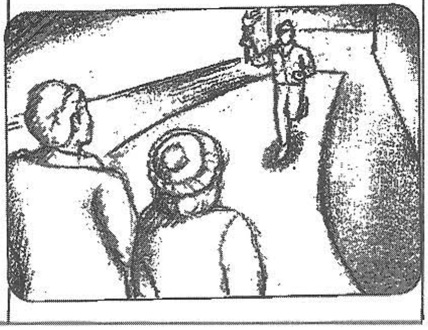
"Olympic Flag / Olympic Hymn"

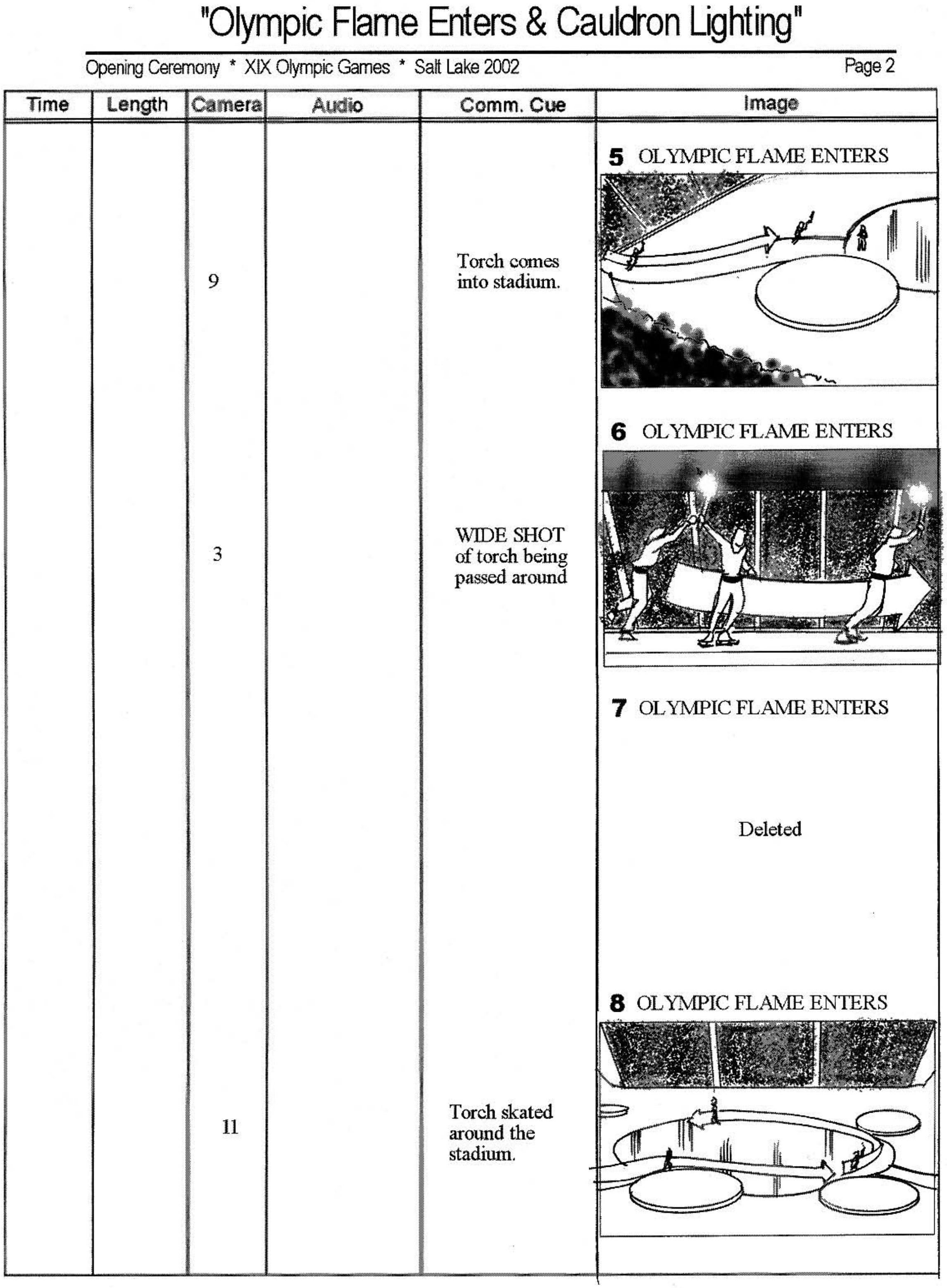
Opening Ceremony * XIX Olympic Games * Salt Lake 2002 Page 2

Time	Length	Camera	Audio	Comm. Cue	Image
		17		Olympic flag is raised.	**5** OLYMPIC HYMN 
		9		CU of Olympic flag.	**6** OLYMPIC HYMN 

"Olympic Flame Enters & Cauldron Lighting"

Opening Ceremony * XIX Olympic Games * Salt Lake 2002 Page 1

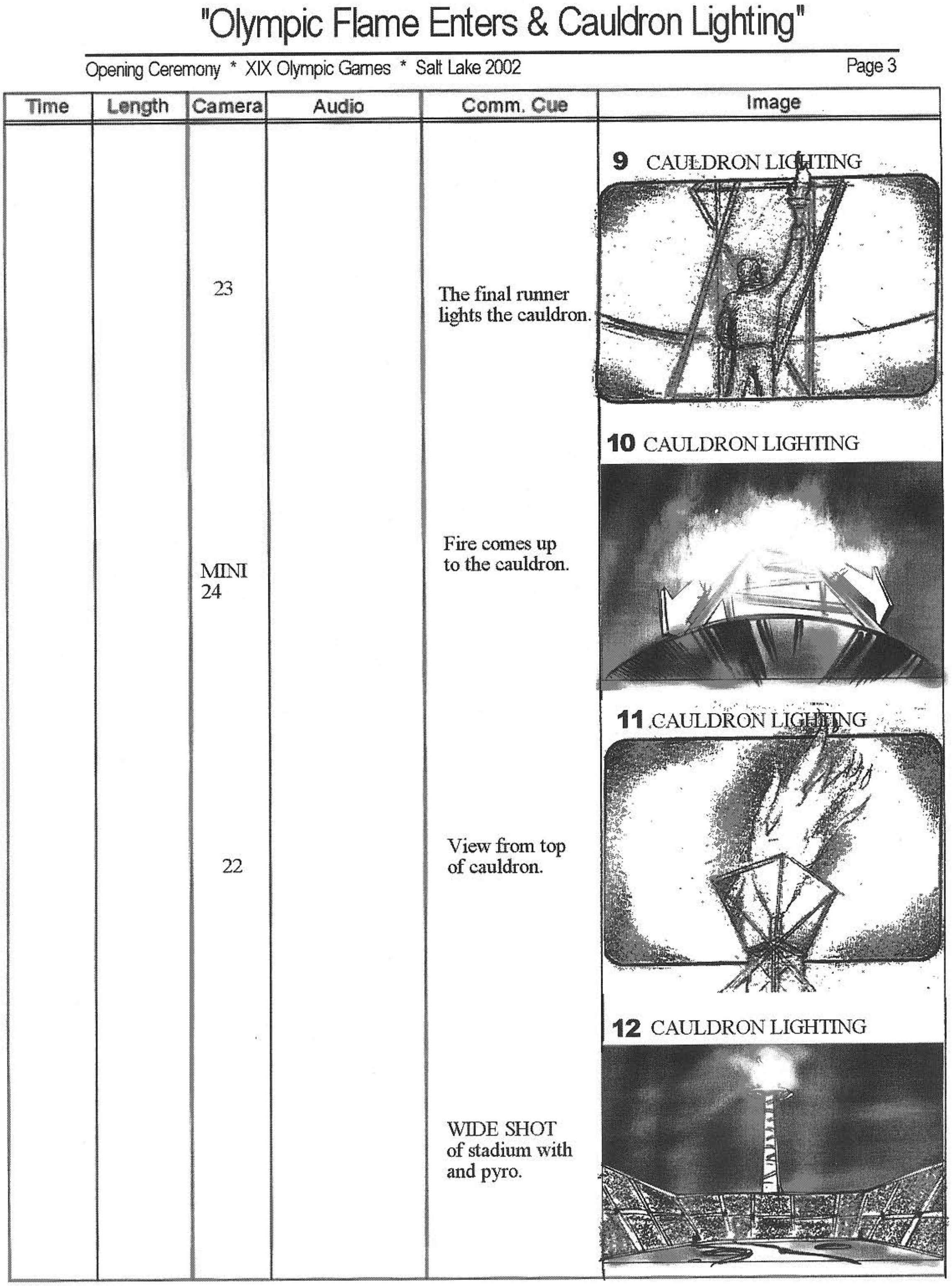
Time	Length	Camera	Audio	Comm. Cue	Image
9:08:56	0:03:00	NBC		Final runner approaches.	1 OLYMPIC FLAME ENTERS 
				WIDE SHOT of same action.	2 OLYMPIC FLAME ENTERS 
				Final runner enters hallway.	3 OLYMPIC FLAME ENTERS 
		6		Final runner hands the torch to a man and woman.	4 OLYMPIC FLAME ENTERS 



"Olympic Flame Enters & Cauldron Lighting"

Opening Ceremony * XIX Olympic Games * Salt Lake 2002 Page 2

Time	Length	Camera	Audio	Comm. Cue	Image
		9		Torch comes into stadium.	**5** OLYMPIC FLAME ENTERS
		3		WIDE SHOT of torch being passed around	**6** OLYMPIC FLAME ENTERS
					7 OLYMPIC FLAME ENTERS Deleted
		11		Torch skated around the stadium.	**8** OLYMPIC FLAME ENTERS



"Olympic Flame Enters & Cauldron Lighting"

Opening Ceremony * XIX Olympic Games * Salt Lake 2002 Page 3

Time	Length	Camera	Audio	Comm. Cue	Image
		23		The final runner lights the cauldron.	**9** CAULDRON LIGHTING
		MINI 24		Fire comes up to the cauldron.	**10** CAULDRON LIGHTING
		22		View from top of cauldron.	**11** CAULDRON LIGHTING
				WIDE SHOT of stadium with and pyro.	**12** CAULDRON LIGHTING

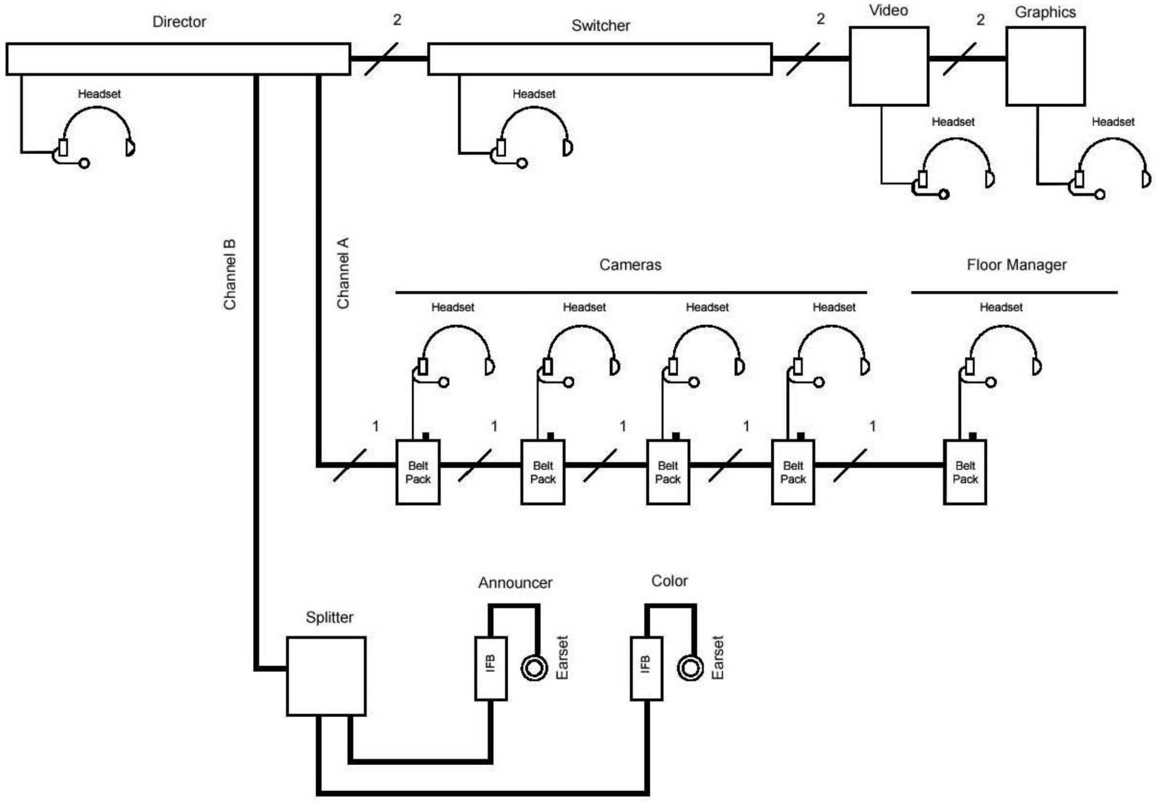
APPENDIX VI:

Intercom Diagrams

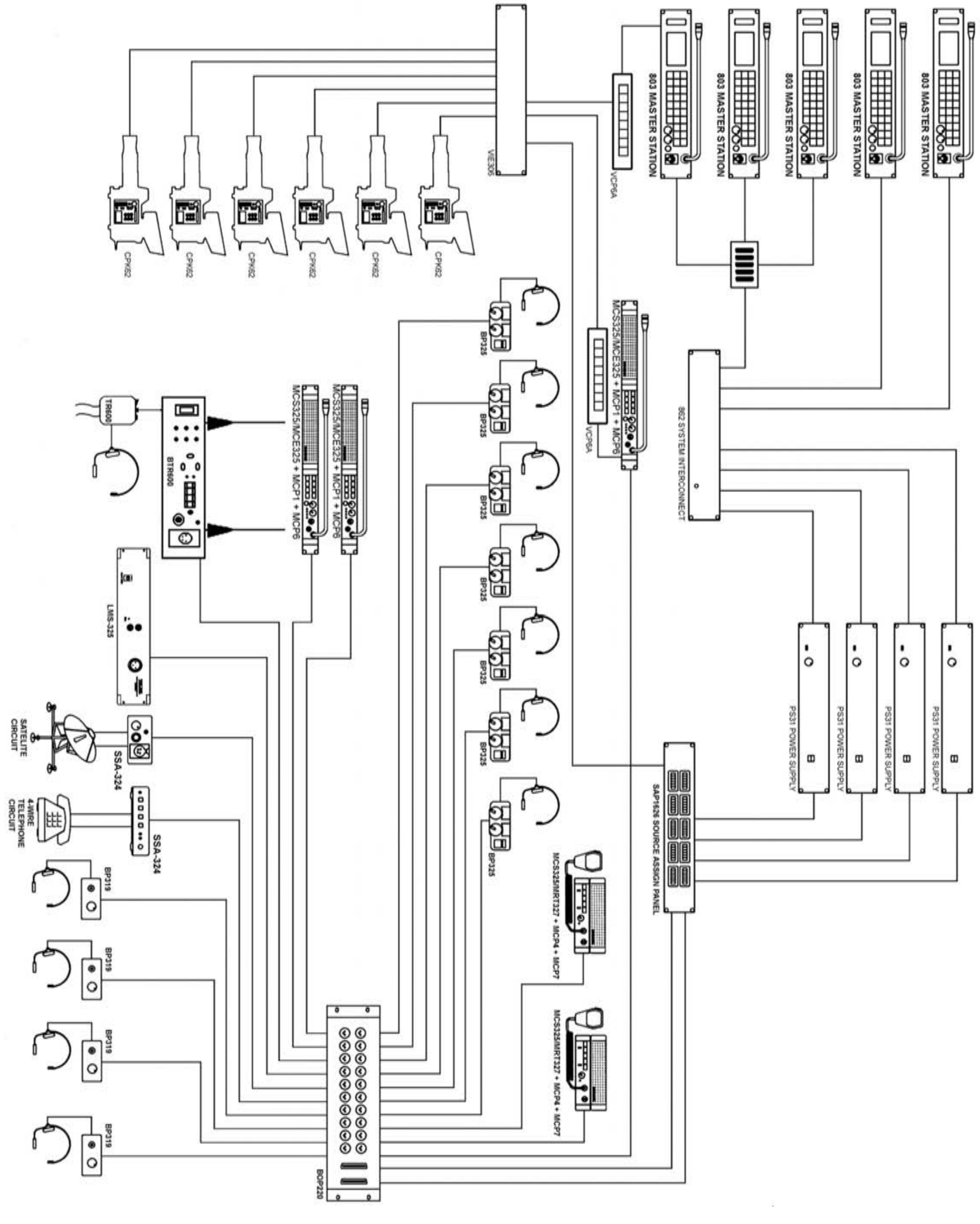
Three different types of sports production intercom system diagrams are included:

- **Small**
- **Medium**
- **Large**

Intercom diagram illustrations reprinted courtesy Telex Communications Inc.



Small-scale production intercom system



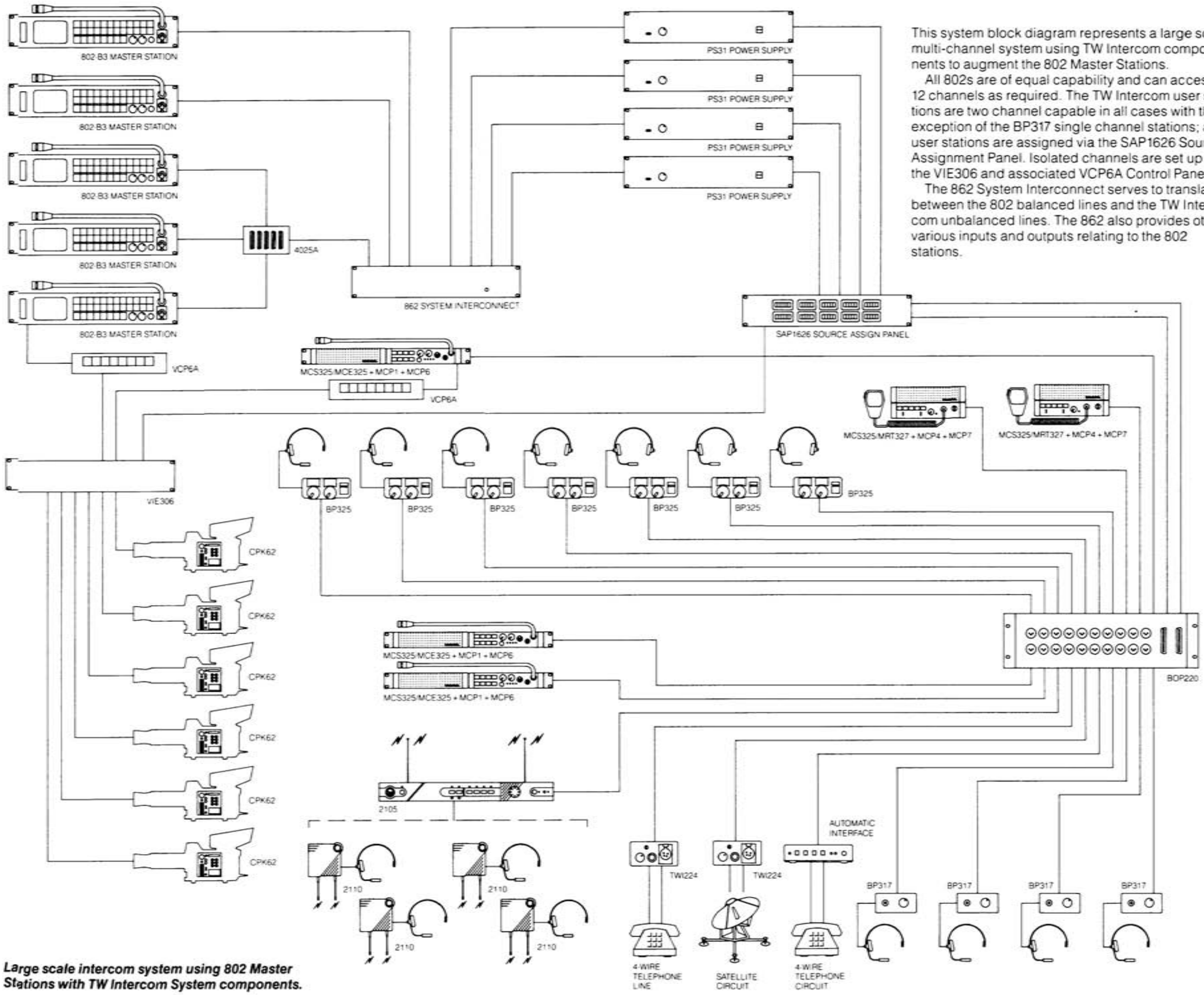
Medium-scale production intercom system

Large-scale production intercom system

This system block diagram represents a large scale multi-channel system using TW Intercom components to augment the 802 Master Stations.

All 802s are of equal capability and can access all 12 channels as required. The TW Intercom user stations are two channel capable in all cases with the exception of the BP317 single channel stations; all user stations are assigned via the SAP1626 Source Assignment Panel. Isolated channels are set up via the VIE306 and associated VCP6A Control Panels.

The 862 System Interconnect serves to translate between the 802 balanced lines and the TW Intercom unbalanced lines. The 862 also provides other various inputs and outputs relating to the 802 stations.

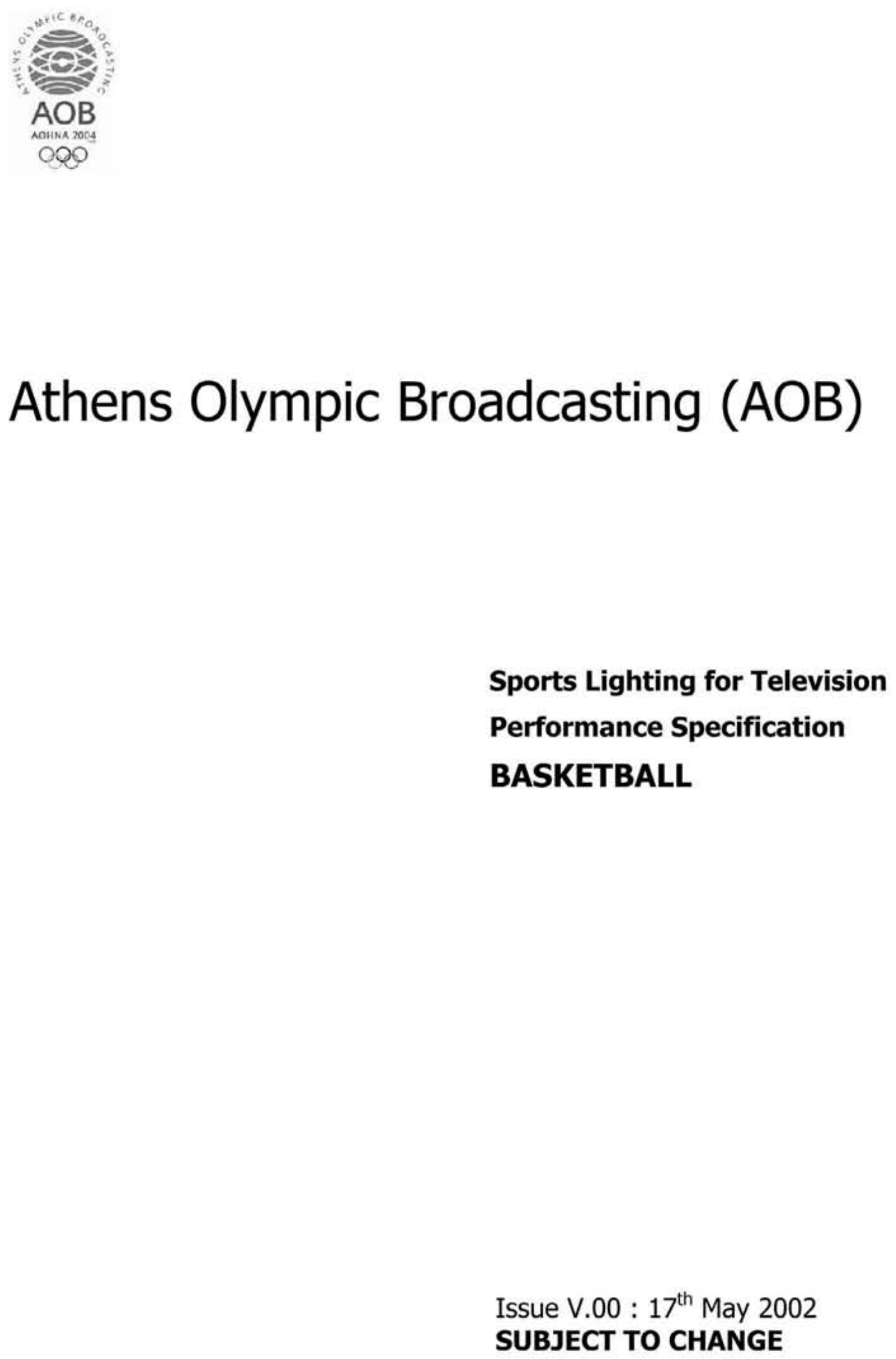


Large scale intercom system using 802 Master Stations with TW Intercom System components.

APPENDIX VII:

Lighting Plan

The following lighting diagram is an actual document used by networks and production companies to produce television coverage of an event.



AOB
ΑΘΗΝΑ 2004

Athens Olympic Broadcasting (AOB)

Sports Lighting for Television
Performance Specification
BASKETBALL

Issue V.00 : 17th May 2002
SUBJECT TO CHANGE

AOB Lighting for Television Specification SUBJECT TO CHANGE
Basketball

AOB Production Plan

Basketball is a game featuring lateral speed and vertical leaping ability. AOB's coverage philosophy dictates that both of these competition attributes be highlighted through the use of strategically placed courtside cameras, overhead and basket point of view perspectives and replay sources that will enable in-depth analysis and storytelling. AOB has positioned handheld cameras with the Field of Play (FOP) serving as a backdrop and are located on or adjacent to the FOP as individual competition circumstances dictate.

The AOB production style will concentrate on the 'theatricality' of basketball and the intention is to create dynamic images focusing on the athlete in contrast to the background.

Field Of Play (FOP)

The basketball FOP consists of the court area of 15m x 28m with a 2m perimeter area - a total FOP of 19m x 32m. A clear area of 25m x 40m is also defined bounded by the corral, which includes the FOP, the coaches and player seating and a photographer's moat – known as sport support.

Beyond the total FOP (outside the corral) is the run-off area which ends at the spectator barrier.

The exact location and dimensions of the court and corral shall be confirmed with ATHOC.

Multiple Venues

The basketball is played at two separate venues. The lighting of each shall be of the same performance quality. This is essential for the coordinated broadcast of the competition.

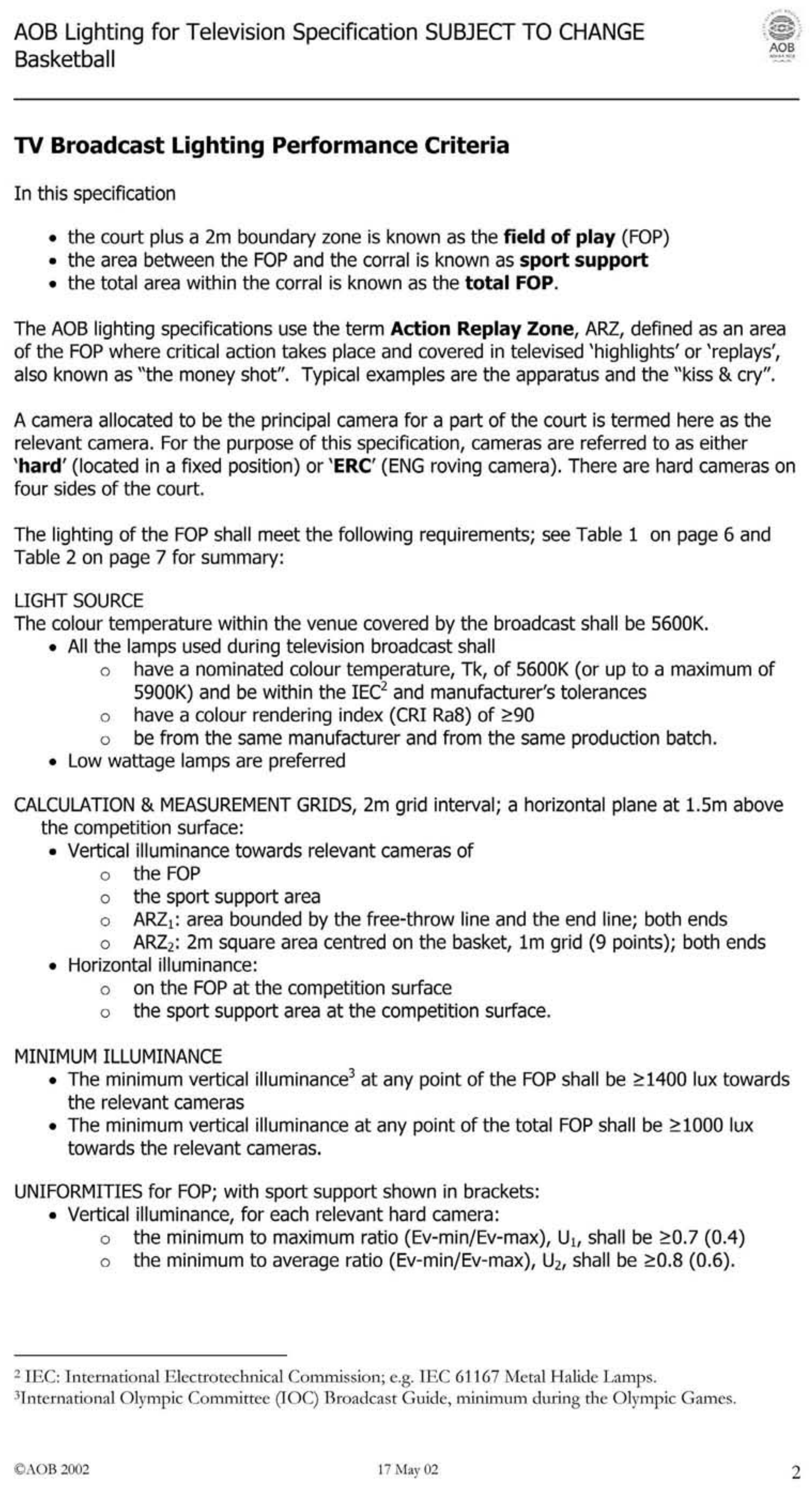
IMPORTANT
This specification covers the requirements for televised broadcast of the sport only. There may be other lighting and switching requirements for the venue – such lighting shall be arranged and switched so that there is no compromise to the specified sports lighting performance during a broadcast.

Camera locations are subject to change. The finalised location of cameras and their respective coverage shall be confirmed with AOB prior to lighting design approval, installation and commissioning.

All lighting performance criteria are minimums during the Games[1].

---

[1] In everyday non-Olympic use, usually a maintenance factor is specified. The Games are held over a short time scale and thus a maintenance factor is not an issue; however the specified minimum, or better, criteria shall be achieved during the Games.



AOB Lighting for Television Specification SUBJECT TO CHANGE
Basketball

TV Broadcast Lighting Performance Criteria

In this specification

- the court plus a 2m boundary zone is known as the **field of play** (FOP)
- the area between the FOP and the corral is known as **sport support**
- the total area within the corral is known as the **total FOP**.

The AOB lighting specifications use the term **Action Replay Zone**, ARZ, defined as an area of the FOP where critical action takes place and covered in televised 'highlights' or 'replays', also known as "the money shot". Typical examples are the apparatus and the "kiss & cry".

A camera allocated to be the principal camera for a part of the court is termed here as the relevant camera. For the purpose of this specification, cameras are referred to as either '**hard**' (located in a fixed position) or '**ERC**' (ENG roving camera). There are hard cameras on four sides of the court.

The lighting of the FOP shall meet the following requirements; see Table 1 on page 6 and Table 2 on page 7 for summary:

LIGHT SOURCE
The colour temperature within the venue covered by the broadcast shall be 5600K.

- All the lamps used during television broadcast shall
  - have a nominated colour temperature, Tk, of 5600K (or up to a maximum of 5900K) and be within the IEC[2] and manufacturer's tolerances
  - have a colour rendering index (CRI Ra8) of ≥90
  - be from the same manufacturer and from the same production batch.
- Low wattage lamps are preferred

CALCULATION & MEASUREMENT GRIDS, 2m grid interval; a horizontal plane at 1.5m above the competition surface:

- Vertical illuminance towards relevant cameras of
  - the FOP
  - the sport support area
  - ARZ$_1$: area bounded by the free-throw line and the end line; both ends
  - ARZ$_2$: 2m square area centred on the basket, 1m grid (9 points); both ends
- Horizontal illuminance:
  - on the FOP at the competition surface
  - the sport support area at the competition surface.

MINIMUM ILLUMINANCE

- The minimum vertical illuminance[3] at any point of the FOP shall be ≥1400 lux towards the relevant cameras
- The minimum vertical illuminance at any point of the total FOP shall be ≥1000 lux towards the relevant cameras.

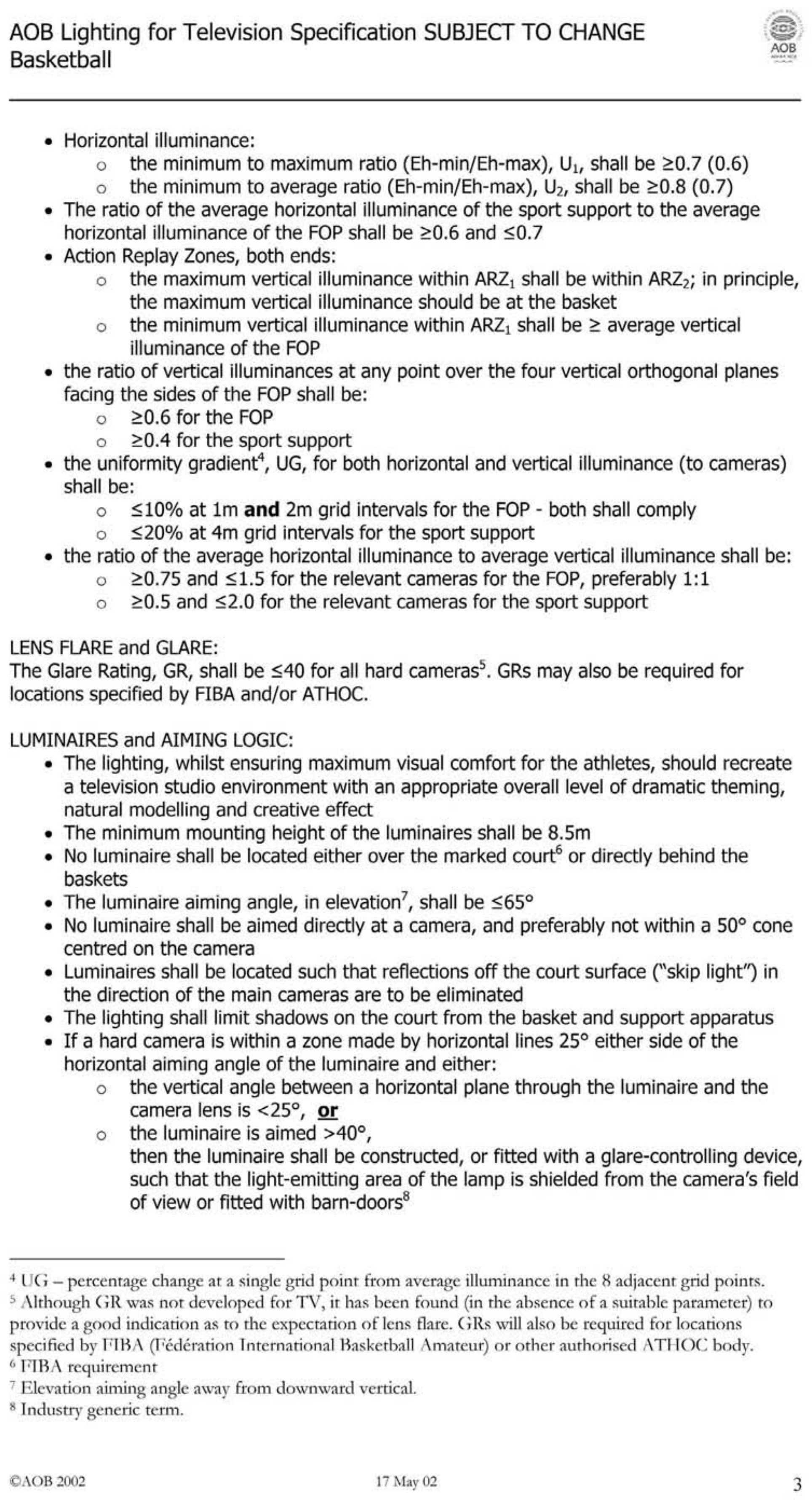
UNIFORMITIES for FOP; with sport support shown in brackets:

- Vertical illuminance, for each relevant hard camera:
  - the minimum to maximum ratio (Ev-min/Ev-max), U_1, shall be ≥0.7 (0.4)
  - the minimum to average ratio (Ev-min/Ev-max), U_2, shall be ≥0.8 (0.6).

---

[2] IEC: International Electrotechnical Commission; e.g. IEC 61167 Metal Halide Lamps.

[3] International Olympic Committee (IOC) Broadcast Guide, minimum during the Olympic Games.



AOB Lighting for Television Specification SUBJECT TO CHANGE
Basketball

- Horizontal illuminance:
    - the minimum to maximum ratio (Eh-min/Eh-max), U_1, shall be ≥0.7 (0.6)
    - the minimum to average ratio (Eh-min/Eh-max), U_2, shall be ≥0.8 (0.7)
- The ratio of the average horizontal illuminance of the sport support to the average horizontal illuminance of the FOP shall be ≥0.6 and ≤0.7
- Action Replay Zones, both ends:
    - the maximum vertical illuminance within ARZ_1 shall be within ARZ_2; in principle, the maximum vertical illuminance should be at the basket
    - the minimum vertical illuminance within ARZ_1 shall be ≥ average vertical illuminance of the FOP
- the ratio of vertical illuminances at any point over the four vertical orthogonal planes facing the sides of the FOP shall be:
    - ≥0.6 for the FOP
    - ≥0.4 for the sport support
- the uniformity gradient[4], UG, for both horizontal and vertical illuminance (to cameras) shall be:
    - ≤10% at 1m **and** 2m grid intervals for the FOP - both shall comply
    - ≤20% at 4m grid intervals for the sport support
- the ratio of the average horizontal illuminance to average vertical illuminance shall be:
    - ≥0.75 and ≤1.5 for the relevant cameras for the FOP, preferably 1:1
    - ≥0.5 and ≤2.0 for the relevant cameras for the sport support

LENS FLARE and GLARE:
The Glare Rating, GR, shall be ≤40 for all hard cameras[5]. GRs may also be required for locations specified by FIBA and/or ATHOC.

LUMINAIRES and AIMING LOGIC:

- The lighting, whilst ensuring maximum visual comfort for the athletes, should recreate a television studio environment with an appropriate overall level of dramatic theming, natural modelling and creative effect
- The minimum mounting height of the luminaires shall be 8.5m
- No luminaire shall be located either over the marked court[6] or directly behind the baskets
- The luminaire aiming angle, in elevation[7], shall be ≤65°
- No luminaire shall be aimed directly at a camera, and preferably not within a 50° cone centred on the camera
- Luminaires shall be located such that reflections off the court surface ("skip light") in the direction of the main cameras are to be eliminated
- The lighting shall limit shadows on the court from the basket and support apparatus
- If a hard camera is within a zone made by horizontal lines 25° either side of the horizontal aiming angle of the luminaire and either:
    - the vertical angle between a horizontal plane through the luminaire and the camera lens is <25°, **or**
    - the luminaire is aimed >40°,
      then the luminaire shall be constructed, or fitted with a glare-controlling device, such that the light-emitting area of the lamp is shielded from the camera's field of view or fitted with barn-doors[8]

---

[4] UG – percentage change at a single grid point from average illuminance in the 8 adjacent grid points.

[5] Although GR was not developed for TV, it has been found (in the absence of a suitable parameter) to provide a good indication as to the expectation of lens flare. GRs will also be required for locations specified by FIBA (Fédération International Basketball Amateur) or other authorised ATHOC body.

[6] FIBA requirement

[7] Elevation aiming angle away from downward vertical.

[8] Industry generic term.

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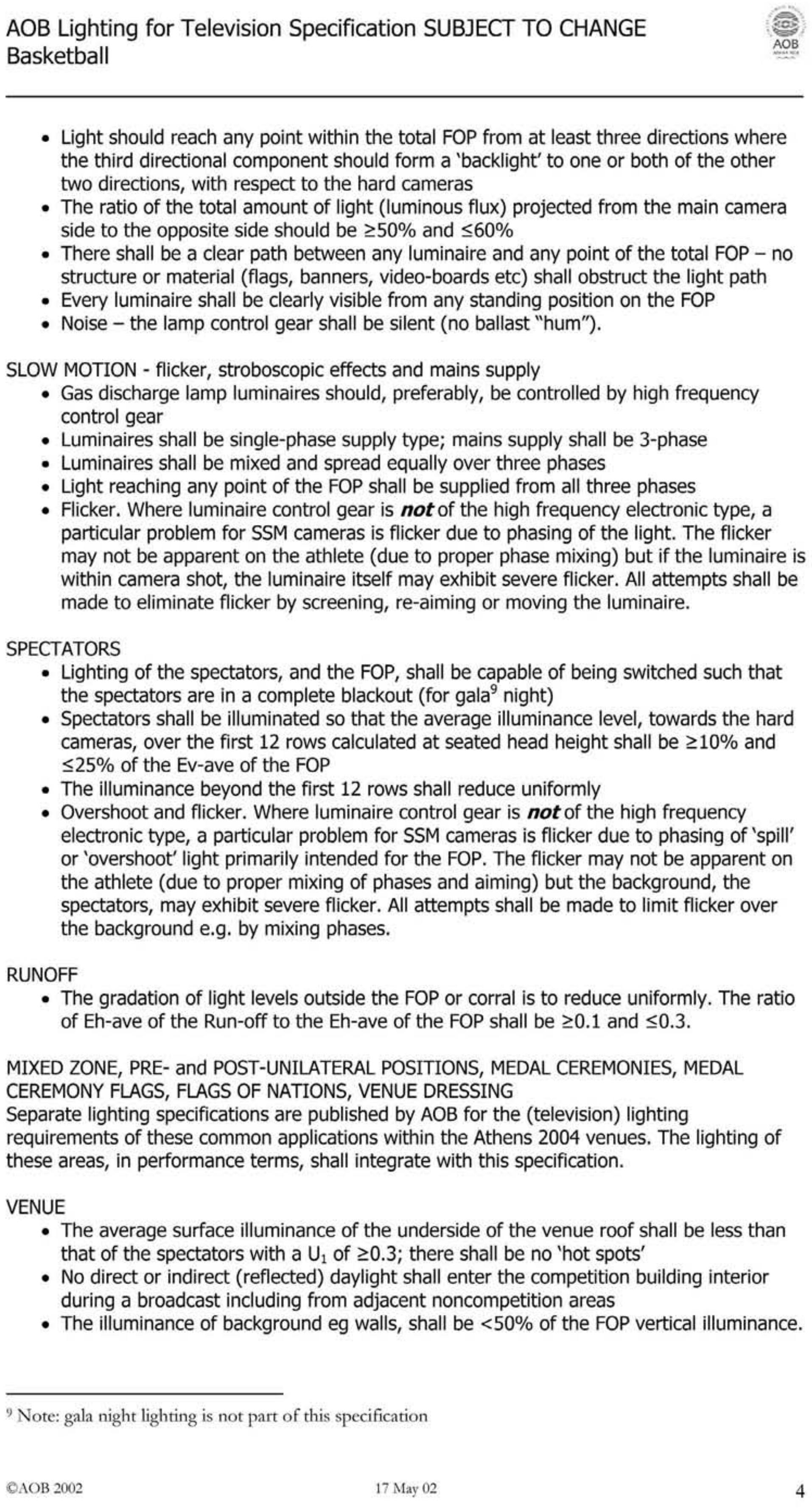

- Light should reach any point within the total FOP from at least three directions where the third directional component should form a 'backlight' to one or both of the other two directions, with respect to the hard cameras
- The ratio of the total amount of light (luminous flux) projected from the main camera side to the opposite side should be $\geq 50\%$ and $\leq 60\%$
- There shall be a clear path between any luminaire and any point of the total FOP – no structure or material (flags, banners, video-boards etc) shall obstruct the light path
- Every luminaire shall be clearly visible from any standing position on the FOP
- Noise – the lamp control gear shall be silent (no ballast "hum").

SLOW MOTION - flicker, stroboscopic effects and mains supply

- Gas discharge lamp luminaires should, preferably, be controlled by high frequency control gear
- Luminaires shall be single-phase supply type; mains supply shall be 3-phase
- Luminaires shall be mixed and spread equally over three phases
- Light reaching any point of the FOP shall be supplied from all three phases
- Flicker. Where luminaire control gear is ***not*** of the high frequency electronic type, a particular problem for SSM cameras is flicker due to phasing of the light. The flicker may not be apparent on the athlete (due to proper phase mixing) but if the luminaire is within camera shot, the luminaire itself may exhibit severe flicker. All attempts shall be made to eliminate flicker by screening, re-aiming or moving the luminaire.

SPECTATORS

- Lighting of the spectators, and the FOP, shall be capable of being switched such that the spectators are in a complete blackout (for gala[9] night)
- Spectators shall be illuminated so that the average illuminance level, towards the hard cameras, over the first 12 rows calculated at seated head height shall be $\geq 10\%$ and $\leq 25\%$ of the Ev-ave of the FOP
- The illuminance beyond the first 12 rows shall reduce uniformly
- Overshoot and flicker. Where luminaire control gear is ***not*** of the high frequency electronic type, a particular problem for SSM cameras is flicker due to phasing of 'spill' or 'overshoot' light primarily intended for the FOP. The flicker may not be apparent on the athlete (due to proper mixing of phases and aiming) but the background, the spectators, may exhibit severe flicker. All attempts shall be made to limit flicker over the background e.g. by mixing phases.

RUNOFF

- The gradation of light levels outside the FOP or corral is to reduce uniformly. The ratio of Eh-ave of the Run-off to the Eh-ave of the FOP shall be ≥ 0.1 and ≤ 0.3.

MIXED ZONE, PRE- and POST-UNILATERAL POSITIONS, MEDAL CEREMONIES, MEDAL CEREMONY FLAGS, FLAGS OF NATIONS, VENUE DRESSING

Separate lighting specifications are published by AOB for the (television) lighting requirements of these common applications within the Athens 2004 venues. The lighting of these areas, in performance terms, shall integrate with this specification.

VENUE

- The average surface illuminance of the underside of the venue roof shall be less than that of the spectators with a U_1 of ≥ 0.3; there shall be no 'hot spots'
- No direct or indirect (reflected) daylight shall enter the competition building interior during a broadcast including from adjacent noncompetition areas
- The illuminance of background eg walls, shall be <50% of the FOP vertical illuminance.

---

[9] Note: gala night lighting is not part of this specification

AOB Lighting for Television Specification SUBJECT TO CHANGE Basketball

'SPORT PRESENTATION' and OTHER LIGHTING WITHIN THE VENUE

All other non-sports lighting that is required within the venue e.g. aisle lights, way-finding, concession lighting, press strobes including 'sport presentation', and that can influence a camera shot shall:

- not compromise the quality of the broadcast
- be integrated with, but without compromising, the sports lighting
- be subject to changes required by AOB to maintain the integrity of the broadcast image
- be screened if within camera shot
- as a general rule, not be the primary colours of light – red or green or blue (RGB) when used over large areas (wash)
- be of colours other than red or green or blue when used as a dominant source. RGB colour can be used in moderation and only as minor elements.

Note: FIBA rules require "The lighting over the playing court shall not be less than 1,500 lux. This level shall be measured 1.5 m above the playing court." The FIBA specified light level is not noted as being for television and is a 'horizontal' illuminance level. This is not an AOB requirement. FIBA also requires for "Olympic Tournaments" that "The lighting shall meet television requirements."

SUMMARY

See Table 1, p6 and Table 2, p7 for summary of performance criteria.

AOB

- The specification incorporates the requirements of the Rights Holding Broadcasters and the production philosophy of Athens Olympic Broadcasting; and is based on the guidelines and recommendations of the IOC, FIBA, GAISF[10], EBU[11] and CIE[12].

- The specification contains a level of detail necessary for high quality broadcast images. If any part of this specification and associated tables is unclear or requires further explanation, contact shall be made with AOB for clarification and confirmation of the intent.

- Subject to live camera tests during rehearsals, AOB reserves the right to instruct and approve final changes to the installed lighting under direction of the AOB Technical Manager, Lighting.

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[10] GAISF: General Association of International Sports Federations

[11] European Broadcasting Union

[12] Commission Internationale d'Eclairage

AOB Lighting for Television Specification SUBJECT TO CHANGE
Basketball

Table 1 Lighting Performance Criteria

Lighting Levels and Uniformities	Illuminance (lux)		Uniformity (minimum)			
	Ev-Cam-min	Eh-ave	Horizontal		Vertical	
	(see note 2)		Emin/Emax	Emin/Eave	Emin/Emax	Emin/Eave
FOP (court) see note 7	1400	(see Ratios)	0.7	0.8	0.6	0.7
Sport support	1000	(see Ratios)	0.6	0.7	0.4	0.6
Runoff (outside corral)		≤150	0.4	0.6		
Spectators (to Cam#1)*	(see Ratios)				0.3	0.5

* first 12 rows; beyond first 12 rows, light level to reduce uniformly

Ratios

Eh-ave-FOP/Ev-ave-Cam-FOP:	≥0.75 and ≤1.5
Eh-ave-SS/Ev-ave-SS:	≥0.5 and ≤2.0
Eh-ave-SS/Eh-ave-FOP:	≥0.6 and ≤0.7
Ev-point-over 4 planes (see note 4)	≥0.6
Ev-ave-C#1-spec/Ev-ave-C#1-FOP	≥0.1 and ≤0.25
Ev-min-ARZ$_1$ (see also note 9)	≥ Ev-ave-C#1-FOP

Uniformity Gradients (maximum):

UG-FOP (2m AND 1m grids)	≤10%
UG-arena-floor (4m grid)	≤20%
UG-spectators (to C#1)	≤20%

Light Source:

CRI Ra:	≥90
Tk :	5600K

Lens Flare – glare rating

GR to hard cams	≤ 40

NOTES:

1. For vertical Illuminance calculation planes (Ev) and Cameras, see table 2.
2. "Ev-min" is a minimum value at any point (not "minimum average").
3. Spectators - sloping calculation plane through seated head position, first 12 rows.
4. Ev-max and Ev-min at any point, within FOP, over four orthogonal vertical planes parallel to FOP sides, to be equal to or greater than 0.6 (0.4 for sport support).
5. All grids to be on 1.0m intervals, unless stated otherwise.
6. The illuminance levels are minimums during Olympic Games.
7. If all main cameras (i.e. other than ERC) meet Ev-min = 1400, then Ev-min to ERC can be 1000 lux.
8. No daylight, direct or indirect, during broadcast
9. Ev-max in ARZ$_1$ shall be within ARZ$_2$.

Abbreviations and Definitions:

Sport support = SS = outside FOP up to corral
Runoff = between corral and spectator barrier
Cam = Cameras (see table 2)
ARZ$_1$ = area within free throw line and endline; both ends
ARZ$_2$ = 2m square area centred on (each) basket
spec = spectators
ERC = ENG roving camera (see table 2)
C#1 = main camera

AOB specification based on IOC, FIBA, EBU and CIE recommendations plus Rights Holding Broadcasters requirements with additional emphasis on super slow motion & theatricality.

Table 2 Cameras and Calculation/Measurement Grids. SUBJECT TO CHANGE.

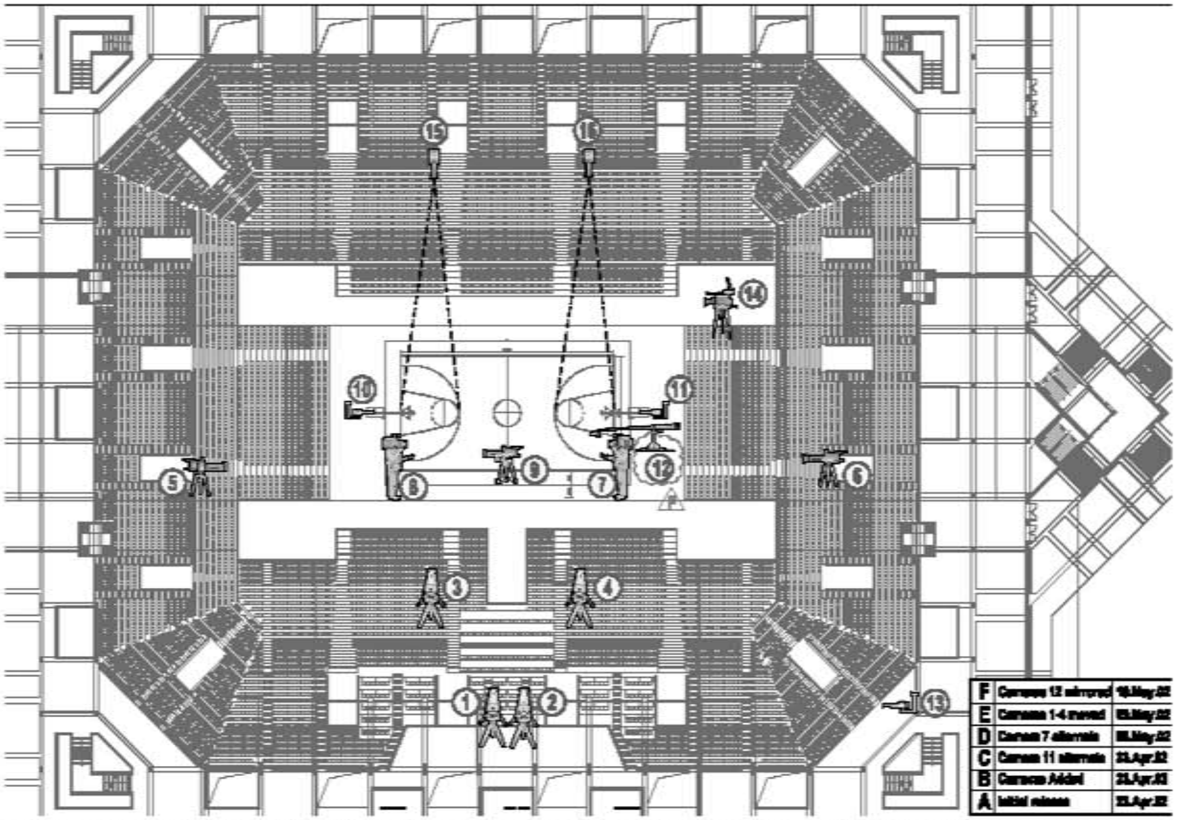
Cam #	Camera Location	Coverage	Notes
1	High/Midcourt	Wide	
3	Mid left ¾	Isolation	
4	Mid right ¾	Isolation	
7	Midcourt on floor/nearside	Low action + isolation	SSM**
8	Midcourt on floor/farside	Isolation + benches	
10	Behind left backboard	Isolation	
11	Behind right backboard	Isolation	
12	¾ high near right corner roof	Venue wide shot	
ERC*	4 orthogonal directions	FOP	

*ERC: ENG Roving Cameras - 4 vertical illuminance planes in orthogonal directions parallel to FOP sides.
** SSM: super slow motion camera

Camera location naming convention: relative to main camera #1 when facing FOP from C#1.

Compliance:
Calculation – all cameras
Measurement – cameras 1, 2, 7, 9; and ERCs.

OAKA - Indoor Hall - Basketball (Finals) - Camera Positions



This specification covers the requirements for televised broadcast of the sport only. There may be other lighting and switching requirements for the venue – such lighting shall be arranged and switched so that there is no compromise to the specified sports lighting performance during a broadcast.

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Glossary

2-Wire: A pair of wires that carry an audio circuit.

4-Wire: A four-wire communication circuit especially used for commentary or coordination.

4x3: Standardized aspect radio of standard television (SD).

16x9: Standardized aspect radio of HDTV and widescreen SD.

24p: Used to describe a video camera that shoots at 24 full frames per second. It may refer to SD or HD. It is thought to provide somewhat of a "film look."

60i: Used to describe a video signal where ½ of the total lines of the image are captured and displayed every 1/60th of a second.

720p: One of the internationally standardized HDTV formats. This format has 720 scan lines and utilizes progressive scanning. The 720p format is best for fast moving motion scenes.

1080i: One of the internationally standardized HDTV formats. This format has 1080 scan lines and uses an interlaced scanning system. The 1080i format has a sharper image than the 720p format.

Above-the-Line Personnel: Refers to all non-technical planning personnel such as producers, directors, chief engineer, and talent.

Active Device: Devices requiring operating power (battery or other) in addition to the signal. Examples are transistors, integrated circuits, amplifiers, and intercoms.

AD: Abbreviation for associate or assistant director.

Air Pack: See Flypack.

Ambiance: Background sound in the venue.

Aperture: The diaphragm opening of the lens that is usually measured in f-stops.

Aspect Ratio: The ratio of the proportions of the height to the width of the television image. NTSC, PAL, and SECAM televisions have an aspect ratio of 4:3 while HDTV has an aspect ratio of 16:9.

Attenuation: The amount of audio or video signal loss from point A to point B.

Attenuation Switch: An attenuation switch reduces the sensitivity of the input of a device and will generally eliminate overloading and distortion.

Audio Check: Commentator speaks into a microphone for audio technician to check the audio level.

Audio-Follow-Video: Refers to when a video special effects generator (SEG) or switcher is designed so that the audio automatically changes when the video is switched. This is helpful in remote events when the director needs audio from whatever camera is on.

Back Focus: Back focus is the distance between the rear of the lens and the camera target. When the back focus is properly adjusted, the camera operator should be able to zoom in, focus, then zoom out, maintaining accurate focus from the zoom in to the wide shot.

Balanced: A cable having two identical conductors that carry voltages opposite in polarity and equal in magnitude with respect to the ground.

Barrel: Also known as "turn around" or "gender bender." An adapter that is male to male or female to female, allowing identical cables to be connected together.

Bars: See Color Bars.

Beauty Camera: A fixed camera designed to shoot wide angle "beauty" shots. It is generally installed on a stadium roof or surrounding tall structure. This camera can also be called a panoramic camera.

Below-the-Line Personnel: Refers to all technical personnel, such as camera operators, technical director, tape operators, etc.

Belt pack: This portable headset intercom station box is designed to be worn on a user's belt but is also fastened to the underside of consoles, taped to a structure near the user or mounted on a piece of equipment. The intercom headset plugs into the belt pack as does the connection to the rest of the intercom.

Bib: A vest that identifies a crew member as someone who is allowed access to restricted areas. Generally worn at larger events by camera and audio personnel.

Binding Post: Converts a dry pair to XLR.

Biscuit: A portable speaker station

Blocking: Occurs when the director works through the process of establishing camera angles, positions, and movement as well as the talent's positions before a rehearsal.

BNC: The standard professional video connector.

Booth Monitor: The monitor that is located in the commentator's area. This monitor usually gets the program feed. Generally the commentators will also have a second monitor that will allow the director to show them a replay before it actually occurs on-air.

Broadcast Supply Panel (BSP): See I/O.

Cam: Abbreviation for camera.

Camera Control Unit (CCU): A remote unit that controls the color balance, registration, aperture, and other technical adjustments on a professional video camera. This unit is operated by a video operator to adjust the camera before and during a production. The operational controls for the CCU, when separate, is called a remote control unit (RCU).

Canon Connector: A three pin shielded audio connector used with most professional microphones. Also called XLR connector.

CCTV: Closed-circuit television.

Character Generator (CG): A special effects generator that electronically produces the words, numbers, and possibly logos that are seen on the TV.

Chip Chart: A test chart used by engineers to set up and adjust a video camera.

Clean feed: A video signal complete with camera and video sources without any graphics.

Coaxial Cable: A video cable that can be used for relatively short distances but is susceptible to outside interference.

Color Bars: The color standard used to align cameras and VTRs. Color bars are generated by professional video cameras, SEGs, or color bar generators.

Come and Go: Refers to two cameras situated back-to-back to capture a subject rapidly moving past them. An example would be of a skier coming down a mountain, the director would use the “come” camera as the skier moves toward the cameras and the “go” camera as the skier moves away from the two cameras. One camera could not adequately document the skier.

Commentary Booth: Location where commentators sit or stand to broadcast the event. Generally it is an enclosed booth that shields the talent from weather and unwanted sounds.

Component Signal: An RGB component system that separates the RGB signals through the recorder and keeps them separated on the tape or disk. A Y/C component system refers to the separation of the luminance “Y” (black and white) and chrominance “C” (color) signals inside the video recorder and then combines the signals when recorded onto the tape or disk.

Composite Signal: The video system where the luminance "Y" (black and white), chrominance "C," and sync are encoded together. Includes both NTSC and PAL.

Compound: The area at the venue designated for the parking of production trucks, office trailers, and other vehicles. Also referred to as a Broadcast Compound.

Crane: A camera crane is used to move a camera (and sometimes operator) to high, medium, and low shots. A crane movement is when the camera is moved up or down.

Crawl: The movement of text across the screen usually from the right.

Crosstalk: Unwanted interference caused by audio energy from one line coupling or leaking into adjacent or nearby lines.

CU: Refers to a camera's close-up shot.

Cue Cards: Cards that have the script, script outline or key words on them for the talent to view during a production. The cards are held up to the lens of the camera so that the talent looks as though they are looking at the camera.

Cut: A transition between two video images that is instantaneous, without any gradual change.

Cutaway: A shot that takes the viewer away from the main action briefly to clarify what is being said, or a shot used to combine two similar shots. If the program is showing a close-up of an athlete's interview and the editor wishes to shorten the athlete's lines, using the first and last few words only and eliminating the middle, a cutaway shot of the athlete on the field of play will allow the editor to create an edit that will be unnoticed by the viewer.

DDR: Abbreviation for digital disk recorder.

Depth of Field: The distance between the nearest and farthest objects in focus.

Digital Disk Recorder: A type of hard drive raided array that can be used to play back and record at the same time. It can be used to record super slow motion, split screen, or two inputs and two outputs. This unit is sometimes called an "EVS," which is the name of the original company that manufactured the digital disk recorders. Directors sometimes call them "Elvis" units, a term that comes from EVS.

Digital Television (DTV): Refers to the broadcast of a signal that consists of digital data.

Digital Video Effects (DVE): Working with the switcher (SEG), this equipment is used to create special effects between video images. A DVE could also refer to the actual effect instead of just the equipment.

Dissolve: The gradual transition from one video image to the next. The two images temporarily overlap.

Distorted Sound: Distortion occurs when the output signal from a piece of equipment is greater than the input capabilities of the receiving equipment. This occurs when the microphone output is too strong for the microphone pre-amplifier in the receiving equipment.

Distortion: Any undesired change in a wave form or signal.

Dolby AC-3: The audio standard for DTV broadcasting. This digital audio compression technique can support from 1 to 6 audio channels (5.1 surround). It was designed as a distribution format and is not directly editable.

Dolby E: Designed as a production and transportation format for discrete surround audio, it is editable and supports up to 8 channels of audio.

Dolby Pro-Logic: An advanced form of surround sound that provides a wider listening/viewing area and better channel seperation.

Dolby Surround: The first generation home theater format that outputs to three channels: left, right, and surround (which is usually split into 2 rear speakers).

Dolly: A camera support that allows a camera to move in different directions. It can also refer to the actual camera move (dolly in or dolly out).

Downlink: The segment of a satellite transmission from the satellite to an earth station.

Dropout: A momentary loss or deterioration of the audio or video signal when playing back on videotape. This is generally caused by recording head malfunctions or poor coating on the videotape.

Dry Pair: A pair of wires without any voltage.

Dub: A duplicate copy of a audio or videotape.

EFP: Electronic field production. Television production activity outside the studio usually shot for post-production (not live). See ENG for additional information.

Electronic Still-Store (ESS): Equipment used for the capture, storage, manipulation, if needed, and playback of still images from video. The ESS can capture a still from any video source, such as camera, videotape or computer and store it on a hard drive. A large ESS system can store thousands of these still images, allowing instant retrieval.

ENG: Electronic news gathering. The use of portable, lightweight cameras, VTRs, lighting and sound equipment for the production of news stories or short reports. Usually done for immediate post-production and editing although the pictures can also be transmitted live from the field.

ESS: Abbreviation for Electronic Still-Store.

F-Stops: The calibration markings on the lens that indicate the aperture or diaphragm opening. The larger the f-stop number, the smaller the aperture, which means the larger the depth of field.

Fade: The graduate dissolve of a video image to or from video black.

Fast Lens: A lens that can capture images in low light situations.

FAX: A facilities check to see that all equipment is working correctly.

FAX Sheet: A facilities request form that lists all technical needs for the production.

Feed: Audio or television electronic signal. Also a signal transmission from one program source to another.

Fiber Optics (F/O): Light transmission through optical fibers for communication and signalling. Fiber optic transmission is immune to most electromagnetic interference and common mode noise (hum).

Field Camera: Camera used outside of a studio on the field of play.

Fixed Camera: Same as hard camera.

Fluid Head: A tripod or other camera mount head that uses a type of hydraulic fluid so that the camera pans and tilts will be smooth.

Flypack or Fly Away Kit: At times it is not cost-effective to transport a mobile unit to the site of an event. One of the options is a flypack. Basically it has the majority of the equipment that a mobile unit would have. However, the equipment racks are built into shipping cases that can be assembled like building blocks and then wired together to make a portable production unit. These units can be shipped via standard air, making them a cost-effective alternative to the mobile unit. Flypacks do take more time to assemble on-site. Sometimes these are also referred to as air packs or grab-and-go packs.

Follow Focus: Follow focusing is when a camera operator keeps the subject in focus as the camera or subject moves around.

Font: A specific size and typeface of lettering or numbers.

Font Operator: Operates the character generator to place text and graphics on the television image.

Format: This term can mean a number of different things in television. It could refer to the medium used to record the event, such as Betacam SP or D-5. It could also refer to the show format or the script of the production.

Frame Synchronizer: A digital device that "locks" a video signal to a known timing reference (for example, black burst). Usually used for incoming video signals from a venue or remote that is not synchronised.

Freeze-Frame: A video frame that is continuously replayed, making the image look as though it is a still shot.

FX: Abbreviation for effects.

Gain: The level of amplification for audio/video signals. Operators may need to periodically adjust these levels during a production.

GFX: Abbreviation for graphics.

Grab-and-Go Pack: See Flypack.

Ground Loop: A completed circuit between shielded pairs of a multiple pair created by random contact between shields. An undesirable circuit condition in which interference is created by ground currents when grounds are connected at more than one point.

Hard Camera: Camera mounted in a stationary or fixed position.

Hard Disk Recorder: A computer-type hard drive unit that is used to digitally record audio and video.

HDTV: A superior production format that touts 720 to 1250 scan lines as compared to an analog format of 525 to 625 lines.

HH: Abbreviation for hand-held camera.

High Impedance: The type of microphone's sound generally becomes distorted when used with an audio cable that is longer than 20 feet. These microphones are generally not used in professional applications. A matching transformer must be used if they are connected to low impedance inputs. Also known as high-z.

High-Z: See High Impedance.

HMI Light: A source that emits light that is the same color temperature as the sun.

Hot Head: Robotic controlled camera mount.

Hum: A term used to describe the 60 or 120 cycle per second noise present in the sound of some communications equipment. Usually hum is the result of undesired coupling to a 60-cycle source or the defective filtering of 120-cycle ripple output rectifier.

IFB: Interrupted fold back (or feedback). Communication system used by production personnel to give directions to on-air talent. Program audio is fed on this circuit.

Impedance: Resistance to the flow in an audio signal in a microphone and its cable.

I/O: The panel, generally located on the outside of the mobile unit, where audio and video are patched for inputs and outputs. The I/O panel is sometimes called the broadcast supply panel.

Interactive television: A television program with interactive content and enhancements. It actually combines traditional television viewing with the interactivity that is enjoyed by those communicating through a network like the Internet.

Interlaced scanning: A type of HDTV system that the beam scans every other line from top to bottom.

Isolated Camera (iso): A camera image that is sent to its own recorder, even when used in a multiple camera production. These iso images are usually used for replay shots.

Jib or Jib Arm: This camera mount allows the camera to move up and down and allows the operator to adjust tilt and pan. The jib arm is similar to a camera crane.

Jog or Jogging: The process of moving the videotape forward or backward one frame at a time with a VTR.

Jump Cut: Cutting between two shots that are so similar that the subject appears to jump on screen. The use of a cutaway in between the two shots helps to avoid the jump.

Lavaliere Microphone: A small microphone that can be clipped to a jacket, collar or other piece of clothing. Sometimes it is called a lapel microphone.

Level: The measurement of the strength of a video or audio signal.

Limiter: An effective communications system needs to limit dynamic range to ensure adequate intelligibility to the listener. The limiter/compressor has the following functions: (1) helps loud talkers and soft talkers be heard equally well; (2) prevents loud noises from being severely distorted; and (3) keeps the voltage levels from exceeding system limits.

Line Level: The audio level generally created by a VTR or line mixer output.

Line Monitor: The monitor that shows the video image going to air or video. This is also sometimes called the on-air monitor or program monitor.

Linear Editing: Linear editing systems assemble the edited program in a sequential fashion. Selected shots are copied from the raw footage tape in the source videotape machine to a master tape in the record videotape machine.

Live: Broadcasting an event as it takes place. As compared to live-to-tape or tape for later replay.

Live-on-Tape: The uninterrupted video recording of an event as though it was being broadcast live.

Location Sketch: A rough drawing that includes important dimensions, location of props and buildings, trucks, power source, camera locations, and sun during time of telecast.

Location Survey: A survey done of the production site during the planning stage. This would include reviewing access, lighting, electrical power, possible camera placement, and potential audio problems. Also referred to as a remote survey.

Loosen Shot: Refers to a zoom out or dolly out away from the subject.

Low Impedance: A low impedance microphone over very long cable (more than 1000 feet) loses little sound quality. These microphones are used in professional applications. A matching transformer should be used if they are connected to high impedance inputs. Also known as low-z.

Low-Z: See Low Impedance.

LS: Refers to a camera's long shot.

Master: The original video recording of an event. A dub master is generally a copy of the master that is used to make duplicates so that there is no risk of damaging the master copy.

Master Shot: The main coverage camera.

Master Station: An intercom user station and an intercom system power supply are combined into one package.

Memory Stick: A removable digital media card that is used to transfer camera setup information and scene files for specific video cameras.

Mic Level: The audio level generated by a microphone.

Microwave Relay: A transmission method from remote locations to the transmitter involving the use of several microwave units.

Minicam: A small remote-controlled camera that is generally used for POV shots.

Mixed Zone: An interview area at the venue located between the competition area and the athlete locker rooms where athletes and media, both electronic and written press, "mix" to conduct post-competition interviews.

Mobile Unit: A large truck housing production and technical facilities at a venue, usually parked in the broadcast compound. Also called an OB van.

Monitor: Professional standard television set, generally does not have audio. This could also refer to an audio speaker that monitors the quality of the audio.

Monochrome: Refers to a black-and-white monitor.

MS: Refers to a camera's medium shot.

Neutral Density Filter (ND): A filter that reduces the amount of light coming into the camera without changing the color of the image.

Non-linear Editing: Non-linear editing takes the video footage shot in the field, usually shot on videotape, and digitizes it onto a computer's hard drive. Digitizing means converting the video and audio signals into data files on a computer. The program is then edited using the computer editing software. When the project is complete, the final product may be output back to videotape or distributed using another medium.

NTSC: The television system used by the United States and Japan. It has 525 scan lines.

OB Van: Outside broadcast mobile unit. See Mobile Unit.

Off-line Editing: Shots are assembled to obtain a rough cut to approximate the edited program. typically, the off-line edit has rough audio, graphics are often not included, and special effects are missing. The final production of an off-line edit may be a videotape that approximates the final product and an edit decision list (EDL) that can be used to expedite the on-line edit.

Omnidirectional Microphone: A microphone that is able to pick up audio equally well from all directions.

On-line Editing: In on-line editing, the program is assembled in its final form, complete with music, effects, and titles in a ready to air version.

Out boarded Equipment: This refers to when equipment is taken out of the mobile unit (such as graphics equipment or VTRs) and put in a temporary trailer or building in order to provide more space for personnel or more units for the production.

PA: Abbreviation for production assistant.

PA System: The public address loudspeaker system at the venue.

PAL: Abbreviation for phase alternating line, which is the color television system widely used in Europe and throughout the world. It was derived from the NTSC system but avoids the hue shift caused by phase errors in the transmission path by reversing the phase of the reference color burst on alternate lines. It has 625 lines of resolution.

PAN: Moving the camera from left to right on a stationary camera mount.

Parabolic Microphone: A parabolic dish with a microphone used to capture faraway sound, especially on the field of play.

Patch Field: See I/O.

Personalized Multiple-Camera Angles: When the content provider (cable, satellite, Internet, network) makes it possible for the viewers to choose what camera angles they want to see a particular event in.

Phantom Power: Voltage sent from the audio console to power a condenser mic.

PL: Abbreviation for any type of communication circuit used as an intercom system. PL was derived from the telephone term "party line."

POV Camera: Point-of-view. Usually a mini-camera placed in an unusual position to give the effect of being part of the action or competition.

Preview Monitor: A monitor generally used to show the director what the next shot will look like. A director can also use the preview monitor to review other camera shots before taking them.

Production Switcher: A switching device used to move from one image to another during a production. This is considered to be live editing. This is also referred to as a switcher or special effects generator.

Program Monitor: See Line Monitor.

Progressive Scanning: A type of HDTV system that uses a beam to scan every line from top to bottom.

Punch Block: A panel used to connect or separate audio/telephone cable. This block is also referred to as a "telco block" or a "66 block."

Quick-Release Plate: The plate allows the camera to rapidly remove a camera or place a camera on a tripod or other camera mount.

Rack Focus: This occurs when a camera operator changes the focus, while on-air, from one subject to another subject. This focus change directs the audience where to look in the image.

Rail Camera: See Tracking Camera.

Record VTR: The VTR used to record the program.

Remote Control Unit (RCU): The RCU is the operational control panel for a camera control unit. The RCU is separate from the CCU.

Remote Survey: See Location Survey.

RF: A camera that uses radio frequency to transmit the video signal.

RGB: The three primary colors used in video processing: red, green, and blue.

Roll: The movement of text up or down the video screen. The director would tell the graphics operator to "roll credits."

Run-ups: Introductory sequences before the broadcast.

Safe Area/Safe Title Area: Roughly the center 80% of the scanning area, where all graphics or important video information should be placed in order to make sure that it is seen by the viewer. The term safe title area is used when referring specifically to the graphic area.

Satellite News Gathering (SNG): The use of a satellite system to transmit the video program from the remote site to the receiver (station, network, or home production facility).

Scaffold Mount: These mounts are primarily used with hard cameras and are mounted on the front rail of scaffolding. The advantage is that it allows the camera to tilt through its entire range. Scaffold mounting also gives the operator more space behind the camera for maximum freedom of movement.

Scanning Area: The area of the video image that is seen on the camera or in the graphics or on-air monitor.

SECAM: The video system used by France and many countries of the former USSR.

Segment Rundown: A list of the order of what will appear on the production within a specific segment.

Selective Focus: Shooting the subject with a shallow depth of field so that the primary subject is sharply in focus while everything else is out of focus.

Shader: The video operator is sometimes called a shader.

Shading: The video operator shades the cameras by adjusting the image contrast, color and black-and-white levels of the incoming video. The shading generally occurs at the camera control unit (CCU).

Shore Power: Electrical power sufficient to power production needs located at the venue.

Shot Sheet: A list of every camera shot that the director wants the camera operator to get with their specific camera.

Show Format: See Format.

Shuttle: The fast-forward and fast-rewind movement of the videotape as a VTR operator looks for a specific segment of the tape.

Signal: Any visible or audible indication that can convey information. Also the information conveyed through a communication system.

Signal-to-Noise Ratio: The ratio of noise to good picture information within a video signal, usually expressed in dB. Digital source equipment is theoretically capable of producing pure noise-free images that have an infinite signal-to-noise ratio.

Slo-mo: A VTR that can replay a videotape in slow motion.

Source VTR: The VTR that is sending the video images to the switcher.

Special Effects Generator (SEG): A switching device used to move from one image to another during a production. This is considered to be live editing. This is also referred to as a switcher or production switcher.

Spreader: A base for a tripod that stabilizes the legs and prevents them from spreading.

SSM: Abbreviation for super slow motion camera.

Stand-by: This refers to two different areas of television production. It could refer to a cue by the director, producer or stage manager to stop what you are doing and wait for instructions concerning an action that is about to happen. It could also refer to a button on a VTR that allows the tape heads to go up to speed before the videotape is started.

Stand-up: On-camera commentator speaking directly to a camera.

Standard Definition (SD): SD generally refers to an NTSC or PAL analog image of interlaced video.

Steadicam: A device designed to stabilize a camera. The camera is attached to a special vest that is worn by the camera operator. An accomplished Steadicam operator has the freedom to walk or run, providing fluid shots.

Stick Mic: A slang term for a handheld microphone.

Still-store: See Electronic Still-Store.

Storyboard: A sheet that shows audio, any special audio or video effects, and the scene the camera will be capturing. It may also be marked for special camera or talent moves.

Strike: Refers to the tear down of all equipment at the end of a production.

Switcher: See Production Switcher.

Talent: A name for all performers who appear on television.

Tally Light: A light on technical equipment indicating a camera or other device is on line as the output of the video mixer.

Tape Format: Refers to the type of videotape that is used to record the event. Examples would include: Digital Betacam, DVC PRO 50, and D-5.

Tapeless Recording: Refers to audio and/or video recording of the event on a hard drive or disc.

TD: Abbreviation for technical director.

Teleprompter: A device that projects computer-generated text on a piece of reflective glass over the lens of the camera. It is designed to allow talent to read a script while looking directly at the camera.

Termination: When there are looping video inputs on equipment, all unused looping inputs must be terminated in 75 ohms to ensure proper signal levels and to minimize reflections. A male BNC connector that contains a 75 ohms resister load is typically used. Balanced audio requires termination at 600 ohms. If devices are designed to loop, like distribution amplifiers, it is sometimes necessary to use a 600 ohm resistor to terminate the path.

Tighten-up: Refers to a zoom in or dolly in to the subject.

Tilt: Whenever the camera moves up or down on a stationary camera mount.

Time Base Corrector: A device that processes a video signal and generally allows for stable playback of an unstable video image.

Time Code: A code that is laid down on videotape to give each frame a unique number. This code is then used for logging, editing, and playback to find the correct image on the tape.

Tone: An audio signal that is consistently zero dB and generally recorded onto videotapes at the beginning of a production in order to properly set up the playback equipment. Generally the tone is recorded at the same time as the color bars.

Tracking: Tracking has multiple definitions in television. It can be an alignment adjustment of the video head to allow for proper playback of the video and audio on a videotape. Tracking can also identify a camera/mount movement from left to right.

Tracking Camera: This automated or manually controlled television camera follows the motion of the object it is shooting. This camera can be mounted on rails, cables or other devices that allow it to move with the object it is shooting.

Transponder: A satellite's own receiver and transmitter.

Triax: A coax-type camera cable that includes three conductors.

Tripod: A three-legged camera support that is available in a variety of sizes. They have telescoping legs and may have multiple sections for height adjustment. A pan and tilt head is mounted on the top of these tripods.

Truck: A camera and mount movement to the left or right.

Two-shot: Framing two people within one shot.

Unbalanced Line: A transmission line in which voltage on the two conductors are unequal with respect to ground—for example, a coaxial cable.

Unidirectional Microphone: A microphone that is sensitive to sound coming from one direction. The most popular unidirectional is the shotgun microphone.

Uplink: Earth station transmitter used to send video and audio signals from the earth to a satellite.

Uplink Truck: A truck that is equipped with uplink capabilities that can send both video and audio signals to a receiver via a satellite.

VandA: Literally, video and audio circuit from one site to another. A VandA is comprised of one video circuit along with a minimum of two audio channels.

Vector Scope: Used by engineers to monitor adjustments made to decks, cameras, and frame synchronizers.

Venue: A specific location where an event is to take place.

Video Noise: Unwanted interference within the electrical system that causes "snow" on the video image.

Video Operator: Responsible for adjusting the cameras for optimal image quality before and during a production.

Voice-Over (VO): Refers to when the talent is speaking over related video but not seen in the image.

VTR: Videotape recorder.

VTR Log: A record of every shot on the tape. This lists all shots, whether good or bad, using time code as a reference. The list generally includes space to make comments about the shots stating what the quality is and relevant details. This log can be created on-the-fly (live) or compiled after the shoot.

Wave Form Monitor: A device used to monitor the video signal and its synchronizing pulses.

Wet Pair: A standard telephone cable that has a twisted pair with roughly 70 volts on it.

Whip-Pan: A fast pan that keeps the subject in the viewfinder. Generally the subject is blurred.

Wipe: A transition between two video images that takes the shape of a specified pattern. Wipes are made by special effect generators.

WS: Refers to a wide shot and is the same thing as an LS (long shot).

XCU: Abbreviation for extreme close-up. Can also be abbreviated as ECU.

XLR: The most commonly used XLR is a three pin shielded audio connector used with most professional microphones. Also called canon connector. However, the same type of connector is available with two to five pins, depending on the application.

XLS: Abbreviation for extreme long shot. Can also be abbreviated as ELS.

XY Pairs: A matched pair of microphones used for recording audio at a venue.

Zebra Stripes: Black lines that are seen in a zebra-equipped television camera that aid the camera operator in making video level adjustments.

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