www.ijecs.in
International Journal Of Engineering And Computer Science
Volume 13 Issue 08 August 2024, Page No. 26317-26435
ISSN: 2319-7242 DOI: 10.18535/ijecs/v13i08.4848

Outside Broadcasting Introduction and Basics

Saad Almane

Fleet of the Outside Broadcasting Department at the Ministry of Information Kuwait

:

Abstract

This book was made for any individual who needs to make quality video creations. it's for starting experts the same. We don't expect that you just have past creation experience, yet the substance is profound enough that starting experts can exploit it. more than once, we've utilized photos and representations from the absolute best degrees of creation. The objective is to offer you models that you essentially can adjust to any level at which you're working

Introduction

On the off chance that we talk about outside broadcasting and video creation, there are three to six phases, dependent upon who you address that are crucial to your success. Anyway, when we talk about media There are a couple of extra intends to consider. Furthermore recollect that since you are working in Video, sound can't be ignored since it expect a noteworthy activity in how your message is passed on. the standard three phases to video creation fuse the going with three: pre-creation, creation and after creation with advances in mechanized correspondence in cutting edge development, the perspective has moved from content buyers to content producers. Subsequently we by and by need to consider how our video creation will be granted to the world unhindered. There we at present recall scattering for intelligent media or Digital media we similarly need to consolidate investigation, copy/text, additional media blend, input pretty much. The 5 phases would look like:

- Recharge research
- Pre-creation
- Production
- Post-creation
- Distributions
- Feedback

This Book Addresses to:

This book was made for any individual who needs to make quality video creations. it's for starting experts the same. We don't expect that you just have past creation experience, yet the substance is profound enough that starting experts can exploit it. more than once, we've utilized photos and representations from the absolute best degrees of creation. The objective is to offer you models that you essentially can adjust to any level at which you're working.

Summary

OB Engineer is responsible for all technical operations of the production. Engineers are responsible for maintaining and troubleshooting all camera and sound equipment in a production. They provide most of the facilities of a fixed production studio, but in a mobile environment, and can be used for anything from field recording to live remote inserts into studio programs, to complete live-program production from a remote

location. Inside, the trailer unit is typically divided into multiple, air-conditioned areas for production control, audio control, video control, recording, and other equipment. Most of the equipment permanently installed in a studio complex is required for an outside broadcast. Production, sound, engineering and recording facilities are usually housed in customized vehicles (often referred to as ‘scanners’) or as a travelling kit of lightweight, portable vision mixing panels, video tape recorders and associated engineering equipment, sound mixers, etc. Covering large-scale events means that cameras are scattered a long way from the scanner and camera operators in general need to be more self-sufficient without the immediate technical back-up often available in broadcast studios. Usually OB considered as a Van, with all the equipment necessary for the live transmission from single camera source to multi camera sources. A wide range of television/video cameras are available today, from modestly priced designs for consumers to very sophisticated state-of-the-art cameras. Although cameras at the lower end of the range can provide very satisfactory image quality under optimum conditions, the more advanced equipment designs produce consistently excellent pictures for long periods, even in difficult circumstances. Each studio camera framework incorporates a camera head, with long range focal point and viewfinder, which is associated through a camera link to the camera control unit (CCU). The operational control board (OCP) and, on account of multi-camera tasks likewise an ace control board (MCP), is associated with this CCU. Shows a commonplace square graph of a studio camera, representing one of the numerous potential plans of the link interface. The dynamic range (volume extend) that any sound framework can deal with is restricted. When excessively noisy, sounds will cause over-burden bending, creating a weakened sound sign. Then again, you should forestall the sound sign from getting excessively powerless (under balance) by putting the amplifier sufficiently close and utilizing adequate intensification. And yet, as you will see later, you should not decimate an impression of the elements of the first solid source. A sound blender is required at whatever point there are various sound sources to choose, mix together, and control, (for example, two or three receivers, CD, VCR sound yield, etc). The yield of this unit is taken care of to the recorder on the front board of the sound blender are a progression of handles or sliders. Each of these "pots" (potentiometers) or faders can alter its channel's volume from full sound to become dim (quiet). At the point when sources are connected to the fix board (connector strip) at the back of the switcher, the sound individual can choose the suitable channel. On a huge sound blending board, there might be bunch faders (bunch aces, submasters). Every one of these gathering faders controls the consolidated yields of a few channels, and it might have its own gathering volume marker. For example, one gathering fader can be utilized for all the mics on the crowd Finally, there is an ace fader that controls the general sound quality being sent to line, (for example, on the recorder). An ace volume pointer shows the consolidated quality of the blended sound. Bigger sound blenders incorporate a signal circuit (likewise called tryout) that empowers sound faculty to listen "secretly" on headphones or an amplifier to the yield of any individual channel, in any event, when its pot is grew dim. That way the source, for example, a CD, can be set up at precisely the correct spot, fit to be begun on sign, without this being caught broadcasting in real time .Audio wellbeing is consistently critical to set aside the effort to tape down all sound links that are in person on foot walkways. This isn't just for the wellbeing of others, yet in addition shields your links and gear from inordinate harm. Viewing the video screens indicating system and see shots, to check sound Perspective, and caution against mouthpieces or shadows coming into the shot. Managing (and signaling) administrators on mic blasts, sound circle, and recording playback .Possibly working sound account hardware. In the case of working a sound blender involves "simply blurring up a receiver or two and controlling the sound levels" or a mind boggling process including edge-of-seat choices relies upon the kind of creation. When dealing with a creation that is being taped scene-by-scene, there is an ideal opportunity to set up confounded sound medicines. When there are various sound sources that should be prompted in at accurately the correct second, this postures totally different issues than a less-confounded program, for example, a meeting. Regardless of whether the approaching sources have just been readied, for example, when utilizing pre-recorded material or the live approaching sources should be controlled and ceaselessly checked and balanced. These are only a couple of the issues that choose how complex the sound blend should be. How about we take a gander at commonplace tasks in some detail: Sound sources ought to be blurred in not long before they start (to the proper pot setting), and became dim when finished. Using the sound blender Located at the sound control comfort (board, work area, blender board), the sound control engineer (sound blender, sound boss) chooses and mixes the different program sound sources. Their consideration is partitioned differently among: Selecting and controlling the yields of different sound sources receivers, plates, tape, and so on.

Section 1: TV OUTSIDE BROADCASTING

Chapter1
Obligation of Individual for Operation at OB

❖ Outside broadcasting crew

OB Engineer and maintenance Engineer
Handling technical operations of the production is the primary responsibility of an OB engineer. Some of the major responsibilities include checking the technical feasibility, booking the facilities, ensuring safety of everything, and making sure that everything is working as expected. Camera and sound gear that is utilized in the creation is kept up and checked for investigating by the architects. Three significant specialists like support engineer, studio engineer, Engineer-in-control are liable for normal upkeep, studio, creation truck separately.

Requirement to be OB engineer
Getting a building authentication with specializations that have a productive job during this field. Broadcast engineers utilize their specialized mastery to broadcast transmission on air. They ensure that the projects are communicated during a convenient way and of the absolute best quality. Specialists are included through and through kinds of creation, including: Studio-based radio and television programs, Or off the studio like live shows and different occasions and all the more depending on the job, undertakings may include:

- Designing and introducing sound and visual circuits, equipment and programming, andcommunicate framework
- Establishing sound and visual connections between various units or for outside communicates
- Servicing and testing
- Responding to specialized blames and fixing them quickly
- Designing specially crafted electronic answers for fulfill the needs of associates and clients

Skills and personal qualities a broadcast engineer needs:

- A careful information on communicating innovation
- An comprehension of simple and advanced electronic frameworks
- Excellent IT abilities
- A innovative way to deal with critical thinking
- To be quiet under tension
- The judgment to shuffle contending needs
- Good team working abilities
- Flexibility
- To have the option to work from outlines
- To have the option to clarify specialized subjects in a non-specialized way
- A great establishing in the wellbeing and security parts of the activity.

Figure 1-1 In above picture OB Engineers are analyzing the results

Outside Broadcasting Assistant Engineer

OB Assistant engineers utilize their specialized ability to put shows broadcasting in real time. They ensure customized are communicated at the correct occasions, and at the greatest level. further answerable for studio-based radio and TV projects, for example, visit shows and board games, outside communicates - from banters in the Houses of Parliament to news reports from combat areas - progressively, webcasts of live shows and different occasions. AOB Assistant engineers utilizes a scope of particular gear, a lot of it automated. OB Assistant engineers fill in as a major aspect of a group. Other than specialized partners, this may incorporate makers, studio administrators and moderators. Restricted studio time and the extreme idea of live communicating can make this a profoundly pressurized job.

The assistant engineers:

The associate designers work in a gathering of building ventures and present their reports to the mindful specialist. They are utilized in many designing fields, all things considered to the specialists. They as a rule aid the plan, improvement and assessment of procedures and items, and they are likewise the connection among designers and specialists. Frequently their work is in the field.

Requirements for Assistant Engineer:

• Assistant architect degree

• Professional preparing or comparative experience is suggested.

• Analytical, investigating, critical thinking and relational abilities.

• Practical involvement with the telecom field might be required

• The capacity to adhere to directions and team up with others. Associate designer obligations:

• Understand and complete all undertakings doled out by the designer.

• Cooperate with specialists, laborers, or different experts to actualize, create, test, and improve building items and procedures.

• Perform standard hardware assessments and timetable support or fix.

• Provide help to different building staff or groups.

• Examine infringement, report irregularities, and solicitation increasingly material - if important –

• Evaluate all items and forms and guarantee consistency of value confirmation measures.

• Equipment alignment and investigating varying.

OB Technician

Introduce and work all gear, for example, sound blending supports, media control frameworks, oscilloscopes, recurrence analyzers, and satellite beneficiaries, used to communicate radio and TV programs. Keep up gear to guarantee that it capacities appropriately. Rapidly and investigate issues with transmissions and video quality. Lead utilitarian and operational testing techniques to guarantee quality execution of communicate items including radio and TV programs. Work with specialists to test and incorporate new frameworks. Use PC programming to alter sound and video accounts. Via completing these undertakings, communicates specialists ensure radio and TV programs arrive at audience members and watchers as immaculately as could reasonably be expected.

What technicians do

Technicians are skilled workers who work with sophisticated systems or do what is required of them and perform high-tech diagnostic or initial mechanical tests. Depending on the field, technicians may work independently or under professional supervision. Technicians often spend most of their time outside broadcasters or on the field.

What are the education requirements?

Outside broadcast technicians only have a secondary education to get started, and many other technicians need a technical degree to learn the basics or initial principles in engineering or information technology.

Installers

Installers in the OB install, repair and maintain Electrical and Computer equipment in home and businesses. the duties of an installer include traveling to customers houses or place of business , installing equipment ,suggesting areas for installation troubleshooting and providing customers with operating instructions.

Electricians

Electricians do all electrical props, electrical apparatuses, lamp setting and rigging.

Figure 1-2 Electricians

❖ TV crew

Producer

Specific production is handled by the producer. Producer majority of the times report to the executive producer in the OB. Primarily the producers are concerned with tasks that includes:

- Supervising staff and crew
- Coordination between departments
- Accepting scripts
- Scheduling production
- Assigning tasks to production's director
- Involving in union problems
- Checking for deadline, planning, and location of projects
- Assessing treatment after production
- Final format of program and so on

Director

The director is the core person who visualize the event or script and effectively communicate their vision to the crew. Some of the primary responsibilities and roles of director is to: (In below picture Director is coordinating with camera crew to follow his leads)

- Build team and making them follow a specific vision or direction
- Ensuring coordination, guiding, and advising members of the production team o things like scenic, sound, costume, lightening and so on.
- They also select the cast for the production
- They also plan on how and what to edit
- Plan on how camera will be treated.

Figure 1-1 Director

Technical director/Vision mixer

The technical director is we can say shoulder of the director as he sits with the director and is the one who directly reports to the director. TD is also considered to be chief of the crew and is primarily responsible for handling television production switcher and electronic effects.

Figure 1-2 Vision Mixing person

Graphics operator

During the production the graphics are implemented and handled by the graphic operator. The primary responsibilities of Graphic operator includes:

- Organizing and typing text and titles for the production on screen
- They may also work as designers or artists

Figure 1-3 Graphic Operator

Video operator

The video administrator is liable for controlling the image quality by using test gear to modify the video hardware. Tasks are firmly planned with the lighting executive. There are an assortment of changes that can be made, including presentation, dark level, and shading balance.

Figure 1-4 Video Operator

Audio mixer operators:
The sound blender is answerable for the specialized and masterful nature of the program sound. This activity incorporates deciding the number and arrangement of the amplifiers required for the creation. The person additionally ensures that the sound links are appropriately connected to the sound blender and is answerable for the last blend (sound levels, balance, and apparent nature) of the last creation.

Figure 1-5 Audio mixer operator

VTR operator/tape operator
Recording of the programs and Replays that are embedded in the programs are concern of VTR operator. Although the operator may be recording and play back programming from a memory card, hard disk, or hard drive.

Figure 1-6 Audio mixer operator

CCU operator

Technical Director, Vision controller, CCU operator are the different names for person who is operating CCU units.

Figure 1-7 CCU Operator

Lighting director:

Artistically and technically, lightening director is concerned for the control, arrangement, and design of all lightening treatment. They are concerned with both the indoor and outdoor situation of lightening.

Figure 1-8 Lighting Director

Editor:

The editor checks for mistakes or problems that occur during the production process and sort them out. Other responsibilities of editor includes compiling and cutting videos to produce programs. Programs can be created through compiling different clips into segments. Furthermore, segments can be further converted into programs.

Figure 1-9 Editor

Writer:
Sometimes producer or director writes the material. However, primarily the completion of script is the responsibility of the writer. Occasionally, researchers help writers by assisting them through collecting data, information, and references.

How OB transmits production content and that content received at home?
1) Outdoor production needed crew for the production of content, the crew is the part of OB van and this van came in all size and shape.

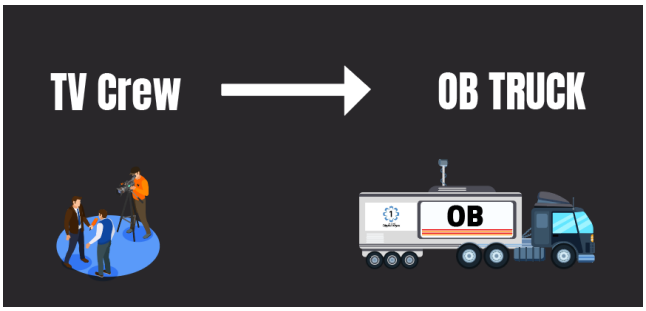


Figure 1-10 SNG truck send signal via satellite

2) In order the transmit the content, OB van need SNG truck to transmit its data (SNG is Satellite News Gathering Van/Truck which is used to Send audio/video broadcast signal from outside location to the anywhere in the world)

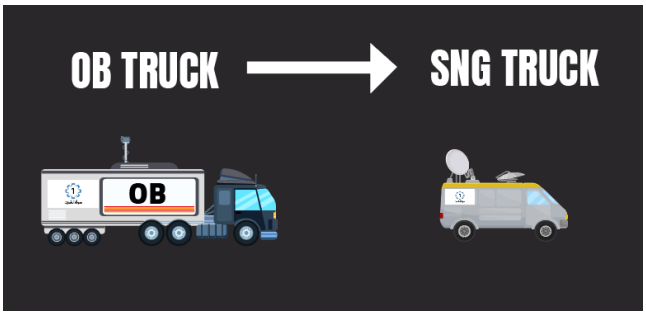


Figure 1-11OB truck send signal via satellite

3) SNG truck send signal via satellite

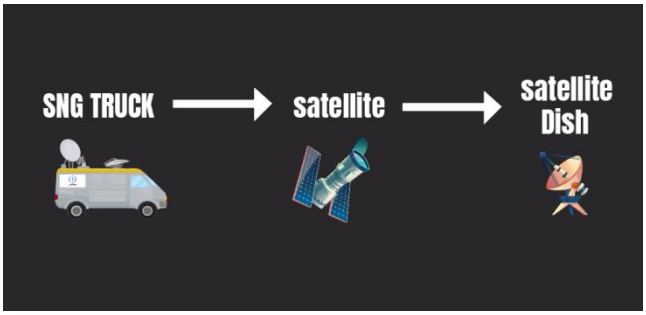


Figure 1-12 SNG truck send signal via satellite and Disk

4) Signal reached to the TV station's MCR (Master control Room a broadcast facility in house of the TV channel to control and monitor and adjust the received audio/video) and Via satellite

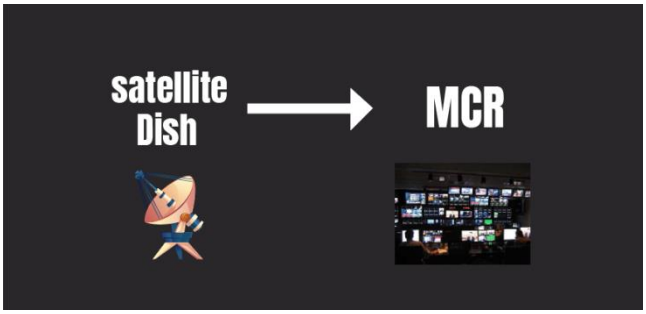


Figure 1-13 MCR and Satellite

5) Then signal sent to TX before sent back to MCR (When reach at MCR , MCR send signal to TX , Tx is a place where people do recording of the feeds , prepare items and add breaks and put commercials between the feeds) then the output of Tx sent back to MCR or uplink department of the TV channel .

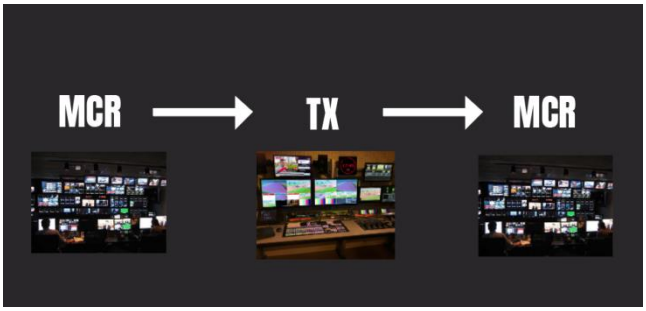


Figure 1-14 MCR and TX

6) Here is the Broadcast uplink of the content from the roof

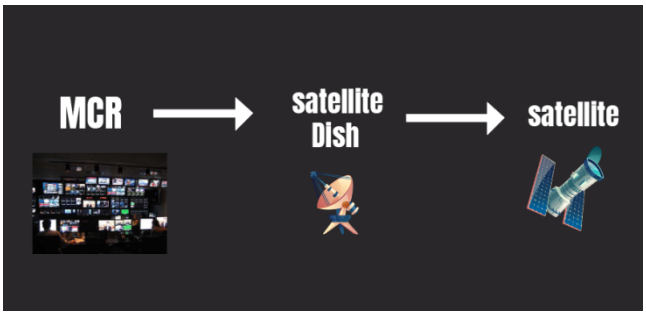


Figure 1-15 MCR and Satellite Disk

7) Then signal is downlinked at the people's home so they can watch on the TV

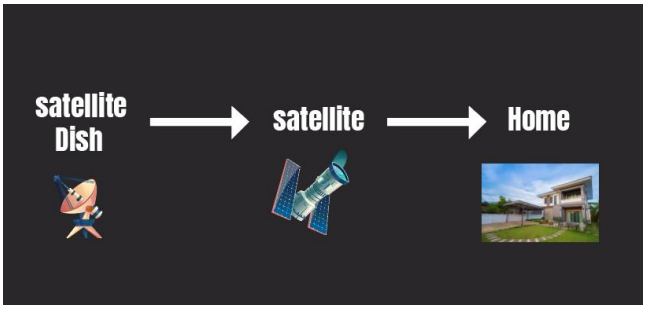


Figure 1-16 Satellite Dish and Home

Chapter2: TV OUTSIDE BROADCASTING CLOSELY

OB: OUTDOOR BROADCASTING:

Mobile production trucks, otherwise called distant trucks or outside broadcast (OB) vehicles, have been utilized for TV broadcasting for a considerable length of time. They give the vast majority of the offices of a fixed creation studio, however in a versatile domain, and can be utilized for anything from field recording to live far off supplements into studio programs, to finish live-program creation from a far off area. All things considered, they by and large seem like ordinary trailer or tractor-trailer trucks. Inside, the trailer unit is normally separated into various, cooled territories for creation control, sound control, video control, recording, and other hardware. Trucks might be controlled from a mains power gracefully at the distant site, yet where this isn't accessible; a trailer-mounted and soundproofed electrical generator might be utilized. A few trucks have their own worked in generator.

Studio and OB equipment:

Any multi-camera video format programmer or programmed insert that is transmitted or recorded outside the studio complex is Outside Broadcast (OB). Most of the equipment permanently installed in a studio complex (see Control rooms, page 36) is required for an outside broadcast. Production, sound, engineering and recording facilities are usually housed in customized vehicles (often referred to as ‘scanners’) or as a travelling kit of lightweight, portable vision mixing panels, video tape recorders and associated engineering equipment, sound mixers, etc. housed in cases and reassembled in a suitable area at the location (e.g. for drama production). In general terms, studio productions have more control of setting, staging, programmer content than an outside broadcast. There is a logistic difficulty in duplicating all these facilities outside the studio but location recording offers the advantage of complex and actual settings plus the ability to cover a huge range of events that are not specifically staged for television. Higher proportion of live or ‘recorded-as-live’ productions plus a greater number of ‘as-directed’ programs (i.e. non-camera scripted) in outside broadcast camera work. Covering large-scale events means that cameras are scattered a long way from the scanner and camera operators in general need to be more self-sufficient without the immediate technical back-up often available in broadcast studios.

Usually OB considered as a Van, with all the equipment necessary for the live transmission from single camera source to multi camera sources.

Figure 2-17 OB HD6

Here mention diagram shows how OB Truck/Van looks like, this is also called a moving PCR or Moving Studio

OB required dedicated and experienced people for its installation, commissioning and operations.

Installation of OB is depending upon availability of equipment and the number of team member installing them, and it requires some expertise to install the equipment on the tailored technical furniture and racks,

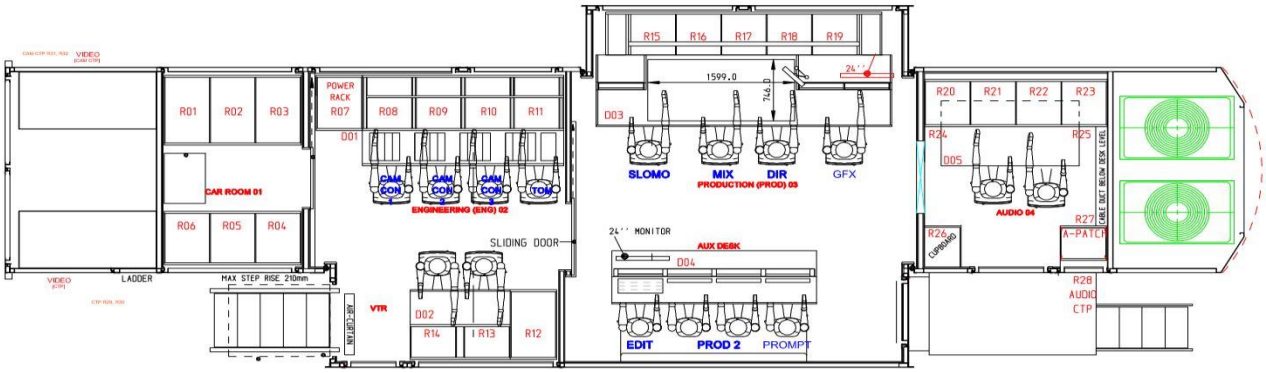


Figure 2-18 From fleet of outside broadcasting department coach building HD6 which shows the main three control rooms

- Types of control rooms in OB:

Production control room:

In television studio or OB there is a place known as PCR where outgoing program's configuration takes place.

SCR or a gallery are other names for PCR, these names were derived from BBC's first studio at Alexandra Palace which was also known as Minstrel's gallery by some people. Broadcast operation is common among most over-the-air television stations and television networks whom technical hub is known to be master control .Television studios is where the activities such as switching from camera to camera are coordinated which distinguishes master control from PCR. A transmission control room (TCR) is usually smaller in size and is a scaled-down version of central casting. A slenderized version and smaller in size comparatively is called Transmission Control Room (TCR).

Figure 2-19 Production Room

Office underway room incorporates

- A video screen divider, with screens for program, see, VTRs, cameras, illustrations and other video sources. Huge screen divider have been supplanted with virtual screens in certain offices. These Virtual screen dividers are otherwise called glass cockpit. These are at least one huge video screens that can show

numerous sources in a recreation of a screen divider. In different offices, arrangement of racks containing PC screens and physical TVs are remembers for screen divider.

- A vision blender is name called essentially by Europeans, while North Americans call it video switcher. They are utilized to choose numerous camera arrangement and different sources to be recorded in any video screen on set.
- Things like viable gadgets which are a piece of expert sound blending console and other sound gear
- For formation of names and on-screen computerized designs which are embedded in lower third part of TV screen, Character Generator (CG) can be utilized.
- For control of video sources Digital video impacts, or DVE can be utilized. DVE are incorporated with vision blender which structures more up to date vision blenders. More seasoned vision blenders didn't have any in-assembled DVE's, however had the option to control DVE gadgets. Administrators can likewise be utilized to physically run outside DVE.
- A still store, or still edge, gadget for capacity of illustrations or different pictures. The more current rendition of still store can be utilized to store movement designs and moving video cuts while on the off chance that we just consider the name it would seem that gadget is just fit for putting away despite everything pictures.
- The specialized chief's station, with waveform screens, vector scopes and the camera control units (CCU) or remote control boards (RCPs) for the CCUs.
- To control the lighting on the studio floor, helping control support can be utilized in numerous offices.
- VTRs are likewise found in Central Apparatus Room (CAR) despite the fact that they are situated in PCR in certain offices.
- For correspondence with ability and TV group, Intercom and IFB gear can be utilized.
- A signal generator to gen lock the entirety of the video gear to a typical reference that requires shading burst

Audio control room

It is a focal control point which handles the activities. It as a rule lives in an encased space. This present room's capacity is to consolidate every different sign that will be transmitted or recorded. Here, all the various cameras and receivers are taken care of into video switches and sound blenders. Moreover, in dramatic frameworks, this is normally where all sound signs are consolidated, extra recorded audio cues might be applied, and the lighting is controlled (in spite of the fact that these might be in independent rooms). It is now and then alluded to in theater as a "Bio-Box," which originates from the Greek word "Profiles," or Way of Life. The control room has a comparable job at a chronicle studio. It's the place the specialists and makers are sitting and taking consideration to guarantee that great signs are caught just as checking what the band is hearing during a show much of the time. In a perfect world, control rooms are intended to be firmly controlled regarding sound protection and compelling sound generation, since this is the place a ultimate choices on how a chronicle should sound are made.

Figure 2-20 Audio control Room

Engineering Control Room:

Focal hardware room (CAR, articulated "C-A-R"), focal gear room (CER) or focal specialized room region (CTA) or rack room is situated in communicate offices where shared gear is regular to every specialized region. Some communicating offices have a couple of those spaces.

It ought to be cooled; however low-clamor necessities are discretionary, for example, acoustic treatment. Gear is either legitimately associated with an appended foldout show, console and mouse or remotely associated by means of KVM switch, VNC or remote work area.

Figure 2-21 CAR room of OB

CARs normally house sound switches, video switches, video servers, blowers and multiplexers that handle network shows utilizing communicate mechanization frameworks with communicate programming applications. They contain broadcasting and observing hardware, through which the Transmission Engineer screens all activities without upsetting the Studio Recordings. CER commonly houses simple and simple

sound and video switches, video servers, blowers and multiplexers UP Link, Digital Processing Synchronizer, Video Patch Panels, and Audio Patch Panel.

Common equipment:

Camera

Television Camera

A wide range of television/video cameras are available today, From affordable model styles to extremely advanced, state-of-the-art cameras. The market spread of models suits a variety of applications; as you would expect, both design and performance vary with cost. Although cameras at the lower end of the range can provide very satisfactory image quality under optimum conditions, the more advanced equipment designs produce consistently excellent pictures for long periods, even in difficult circumstances

Framework Structures

Every studio camera framework incorporates a camera head, with a long range focal point and a viewfinder associated with the camera control unit (CCU) by means of a camera link. This CCU is associated with the operational control board (OCP), and furthermore an ace control board (MCP) for multi-camera tasks. Shows a run of the mill studio camera square chart, which delineates one of numerous conceivable link interface plans

Figure 2-22 Engineer chicking Camera

Camera man ready to shooting

Types of Cameras

Truly, there have been a wide range of kinds of cameras, for the most part arranged into one of three classes: shopper/modern, and expert. For the most part, the classes were appointed by the degree of value and the highlights every camera gave. Obviously, there are still some top of the line proficient cameras and some low-goal/low-highlight customer cameras that are focused on explicit markets. Be that as it may, the nature of the present cameras has obscured the lines between these three classifications, here and there permitting lower-end/lower-cost cameras to be utilized in top of the line proficient creations. A portion of the various styles of cameras are talked about in the accompanying segments. Camcorders are the primary kind of camera utilized today in TV creations. As great camcorders have opened up at lower costs, these have been received by numerous associations all through the world, for both studio and area creation in spite of the fact that camcorders can record their own sign, they can likewise be utilized in multi camera creations. These cameras have demonstrated to be advantageous, yet versatile, with lower working expenses than numerous different cameras.

- Camcorder Styles: Camcorders are additionally alluded to as ENG (electronic news social event) or EFP (electronic field fabricating) cameras. Some of the time these are the cameras fitted with an amplifier and camera light and used to film meetings and break news.

Figure 2-23 ENG CAMERA

- *The Convertible Camera:*You may use interchangeable cameras in a number of configurations. For the most part, this kind of camera begins as a camera "head." The camera head is the piece of the camera that makes the picture — basically the chips. A camera head with connected studio back, which permits it to be utilized in a multi-camera circumstance. Various embellishments may then be connected to the camera head to coordinate a specific creation prerequisite, including different sorts of focal points, viewfinder and recorders.

Figure 2-24 Convertible Camera Head

- *Studio Cameras:*Studio creations utilize a wide assortment of camera types , going from compact cameras in a workshop arrangement to huge traditional workshop cameras. Be that as it may, this style of camera isn't restricted to the studio; you can likewise observe it at games and other multi-camera creations. Ordinarily, the enormous "studio" viewfinder is planned to make it simpler for the camera administrator to correctly center and make the pictures. Studio cameras are regularly mounted on rock solid wheeled carts — platforms or moving tripods — on a dish and tilt head that makes turning (forward) and their concentration and zoom controls are typically associated with the forward handles that hold the head.

Figure 2-25 Studio Camera

- *Camera Basics:* Let’s now take a closer look at the various features found and how they can affect the way you use them:

The camera’s main controls

Figure 2-26 Camera Controls with label

Figure 2-27 Camera Controls with label

Drone

Drone photography is the acquisition by a remotely controlled or autonomous unmanned aerial vehicle (UAV) of still images and video, also known as an unmanned aircraft system (UAS), or more simply as a drone.

Figure 2-28 Drone

GO PRO Camera

GoPro is a traditionalist camera that takes the best attributes of point-and-shoots and camcorders and packs them into a smaller, waterproof, and practically indestructible, intense body. There is an image sensor, processor, ultra-wide - edge point of convergence, and up to three recipients inside the cuboid plan to get sound under different conditions. The UI contains only a couple of gets and for better control, the Hero5 Black and Hero6 Black structures incorporate touchscreens.

Figure 2-29 GO pro Camera

The Viewfinder

Truth is stranger than fiction, the viewfinder – the little square shape on head of your camera. While your DSLR will get a redesign from model to show with as good as ever specs, the little viewfinder remains the equivalent. Be that as it may, it's your eye to the world and the starting point of your inventiveness. What you build out in the viewfinder is the picture – and memory – that you will be bringing home. Glancing through the viewfinder encourages you balance out the camera better. Furthermore, when utilizing the viewfinder you will have the camera supported against your body with your arms took care of (rather than outstretched), which signifies taking more honed pictures.

The two fundamental kinds of viewfinders are pentaprisms and pentamirrors. A pentaprism, found on proficient evaluation DSLRs, utilizes a crystal to divert the light from the focal point to the viewfinder. Pentaprisms are a higher caliber than pentamirrors, which divert the light through a progression of mirrors. Pentaprisms give a more splendid picture in the viewfinder than pentamirrors. Pentamirrors are commonly found on section level DSLRs and are developed of plastic (rather than glass) since it is less expensive to mass produce.

Viewfinders can be either optical or electronic. DSLRs have an optical TTL (through the viewpoint) viewfinder, which permits you to glance through the focal point and see correctly what the focal point ventures onto the sensor. (Here and there on conservative cameras, the viewfinder is corresponding to the camera's focal point with the goal that what you see is not the same as what the focal point ventures onto the sensor.) Optical viewfinders don't devour any force. Electronic or advanced viewfinders are normally the LCD (fluid gem show) screen on the rear of the DSLR. The LCD screen can be utilized to audit photographs or video film and furthermore shows the camera's menus, highlights and capacities. Some advanced conservative cameras have a LCD that can jump out and turn to oblige different shooting points. In any case, when there is splendid sun outside and you can't see the picture on the LCD, it's the optical viewfinder that acts the hero.

For picture takers who wear glasses, the optical viewfinder additionally has a diopter. The diopter demonstrations similarly as eyeglasses to address your vision and acquire everything center. The diopter can assist you with dialing in the concentration and get a sharp picture with or without your glasses. Diopters can be in the eyepiece or snap or slide on. Most diopters have a standard rectification running from - 3 to +1. To change your diopter, centre the camera around an article and glance through the viewfinder. Change the diopter until what you are seeing is sharp. Another path is to glance through the viewfinder and ensure your computerized readings look in the centre.
Below is the labeled diagram of viewfinder

Figure 2-30 Camera and view finder label

The Camera's Controls

TV cameras have three distinct classifications of controls:

• Those to be continually rejusted during shooting, for example, focus.

• Occasional adjustments, for example, repayment for the light moves.

• Those engaged with adjusting the gadgets of the camera in order to accomplish most extreme solid proficiency.

Once these are set up, they ought not be coolly changed! There are extremely two very unmistakable angles to picture making: camera work and picture quality control. These can be controlled physically, semi-consequently, or even totally naturally. How about we take a gander at some down to earth cases.

Multi camera: Video directors who are a bit of a multi-camera yield rely upon the subtleties of camera exercises. They contribute their vitality picking and arranging the shots, focussing, zooming and checking truck advancements explicitly. A video overseer which uses a camera control unit (CCU) distantly controls the idea of the video picture.

Multi camera: Video administrators who are a piece of a multi-camera yield depend on the nuances of camera activities. They invest their energy picking and organizing the shots, focussing, zooming and checking cart developments specifically. A video administrator which utilizes a camera control unit (CCU) remotely controls the nature of the video picture.

Figure 2-31 Multi Camera control

There are essentially two types of camera modifications that the video operator renders

Preset adjustments: Camera hardware is changed during arrangement time to guarantee greatest picture quality. This may incorporate devotion to shading and apparent character, definition and concealing (modifying the gap). These modifications should be possible physically utilizing test signals showed on test

gear or, in advanced frameworks, by embeddings programmable memory cards, the procedure can be semi-computerized.

Dynamic adjustments: during actual TV production, the video operators, sometimes called "shaders," continuously adjust the images of the camera (in terms of. Exposure, black level, gamma, color balance) to optimize the shots' subjective quality and match the different camera's images not only does this approach leave the camera operator free to concentrate on effective camera work, it also results in the highest and most consistent quality of image.

Single Camera: Single-camera administrators are not just required to guarantee that all around formed pictures are gotten, yet they should likewise change the camera to accomplish the most elevated conceivable picture quality.

Figure 2-32 Single camera production

There are a number of options for adjusting the camera:

System Diagram of Camera system:

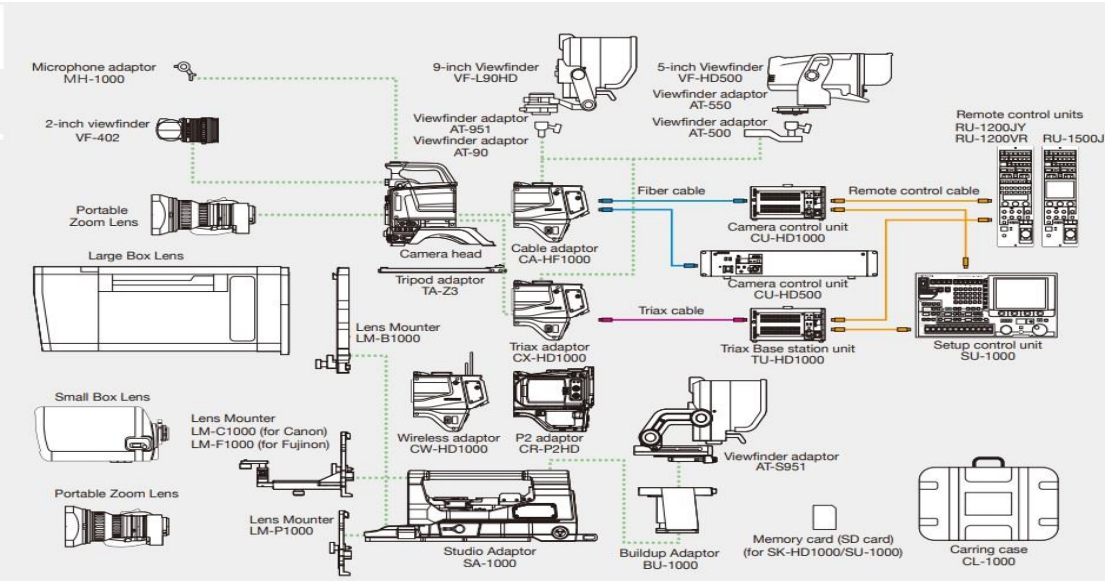


Figure 2-33 System Diagram for studio camera

This Studio configuration Camera need to be assembled according to the given diagram, every brand and model has their own accessories.

CCU Camera control unit:

The Camera Control Unit (CCU) is a vital piece of the TV studio or the vehicle utilized for open air transport. It is liable for working the expert camcorder, taking care of signs sent to and from the camera by means of the triax camera link, and can be utilized for remote control of various camera settings. CCU is additionally used to connection and fit different cameras remotely together related to a remote control board (RCP), waveform screen, and (vector scope).

Alludes to a scope of instruments and exercises identified with video/TV camera remote control capacities. This can include either halfway or full control of the camera. In numerous kinds of TV creation, CCU

activities are a significant segment, particularly multi-camera creations

Figure 2-34 CCU units for multi camera operation

When you use more than one camera at a time and you need multiple angles, a remote camera stand. Often the professional cameraperson will need to collect footage from different angles and with different cameras, so that the remote allows you to control more than one at a time. Of course, the range available includes remote panels which are also suitable for single cameras, giving you the freedom to manage the equipment without having to stand directly before it. From a control room you can track the situation to ensure you get all the various angles to shots that you need. Remote panels for wireless camera are ideal when you're also working on location.

Video operator Terminology:

■ Black level: Black color in video image. If set incorrectly, picture detail quality will be poor in dimly lit areas. Lowering the picture's black level moves all image tones toward black and crushes the lowest tones. Raising the black level lightens picture tones but does not reveal detail in the blackest tones.

■ Color balance: Balancing (matching) the color between all of the video sources is accomplished by using color bars

■White balance: The most common color-balance technique used by a camera. It is the method of calibrating a camera such that the source of light is correctly represented as white. The camera is aimed at a white subject in order to balance the colour, usually a white card lit by the light source of the scene, and the white balance button is pushed to adjust the colour. Through capping the shutter or closing the iris, black balance may also be used after white balance to provide a guide for black.

■ Lens aperture: The opening in the lens (iris) that lets light into the camera. It allows the operator to darken or brighten the video image, depending on the light in the scene.

■ Gamma: Adjusts the tone and contrast of a video image. High gamma settings produce a coarser, exaggerated contrast; lower settings result in thin and reduced tonal contrast.

■ Video gain: Amplifying the video signal of the camera, usually resulting in some video noise. Boosting the gain allows the camera to shoot in lower light situations than normal. However, it also provides a lower-quality image and other configurations such as:

* Iris
* Filters to color temperature
* Negative filter density
* Velocity shutter
* Ultrasound
* Achieve trim (in red, green and blue)

NOTE:

When the camera is installed, and before shooting begins, the white balance and black balance should be done.

XCU (Exchange Control Unit)

There is also a new generation called:

(XCU eXchangeable control unit)

It is more accurate and sophisticated; It is also already applied in some modern OB.

Figure 2-35 XCU ELITE UNITS

RCP (Remote Control Panel)

It is answerable for controlling the expert camcorder, taking care of signs that are sent to and from the camera by means of the camera link, and can be utilized to remotely control different camera boundaries.

Figure 2-36 Remote control panel for multi camera control

Video/Vision mixer:

The Production switcher: The output transition helps the director to alter the different program sources (cameras, designs, satellite feeds and playback units) live between them. The key transitional strategies are:

Cut and take. The most commonly used transformation during operations is this instant shift from one picture to another. It has been said that there are cuts in 99 per cent of all transitions.

Disband/dissolve. Breaks down are a continuous progress starting with one picture then onto the next, and are ordinarily used to demonstrate a period or position change.

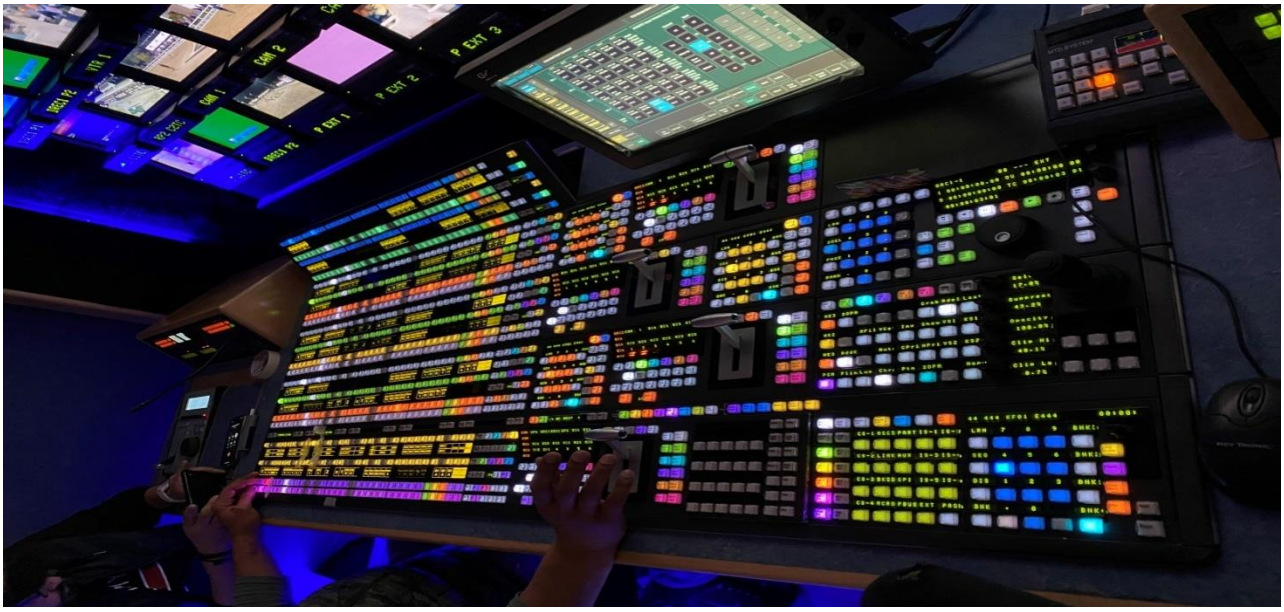


Figure 2-37 Video Switcher

Figure 2-38 the box in screen

The wipe: Wipes, used as a unique transition between incoming images on the switcher, can be quite flexible. Most medium- and higher-end switchers allow wipes to be customized. Although the results are always geometrical, you can change them in several ways:

Pattern size can be adjusted—expanded or contracted.

Pattern shapes can be adjusted. For example, a square can be made rectangular; a circle can become an ellipse.

The pattern can be moved around the frame: up/down, left/right, diagonally.

You can control the speed at which the pattern changes or moves, using a fader lever or an auto wipe button.

The symmetry of the pattern can be adjusted.

The pattern edges can be made hard (sharp) or soft (diffused). If sources are inter switched instantaneously, there will be a sharply defined division.

A border can be placed around a pattern insert, in black, white, or color.

There are literally dozens of wipe patterns, but some typical examples

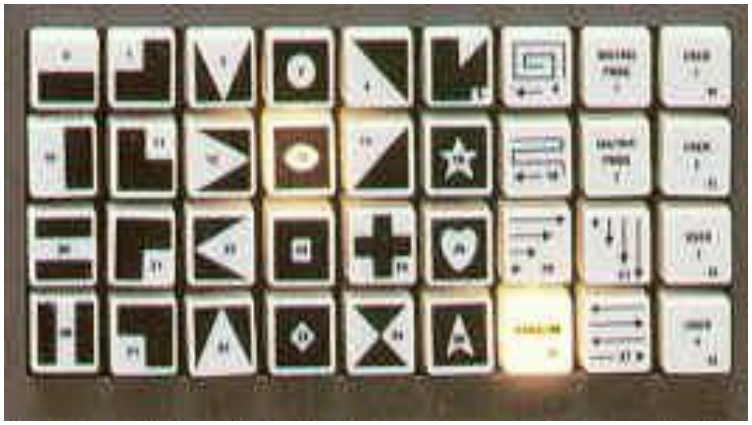


Figure 2-39 Wipe patterns on the keys

Chroma-key:
Chroma-key is a significant option on many switches. Chroma-key makes it possible for the director to insert one image into another. Especially when paired with other video effects it has endless applications. Chroma-key is capable of simulating total reality or creating magical, stylized, decorative displays. A video switcher is a tool used to switch between multiple sources of audio or video, or to select between them. Although the main feature is to switch between the audio or video sources, they are also used to combine video and add videos or special effects to a secondary source Used to integrate two or more video inputs into one output stream. It means you can have several computers, video cameras, etc. all wired into one switch, then simply pick the source you want to display on your event screen

Audio Mixer*:*
An audio converter takes two or more audio signals, mixing them together, and producing one or more outputs. Think like an ensemble conductor of the audio engineer at the controls, ensuring that all different sound sources mesh together in one harmonious final product.

'Audio for Television'
Popular audio is a mixture of three factors:
• Appropriate techniques: how the audio is recorded using the equipment.
• Appropriate creative choices: The creation and combining of sounds.
• Both are basically a matter of technological know-how, combined with experience.

Figure 2-40 Mixer Audio

Machine Audio

The dynamic range (volume extend) which can be taken care of by any sound gadget is little. Sounds can cause over-burden contortion when excessively boisterous, making a debased sound sign. It excessively peaceful, wanted sounds will blend in with comparable level (volume) foundation commotion, for example, tape clamor, murmur, and ventilation. It is in this manner basic not to over-burden the mouthpiece itself (excessively near an uproarious source) or to over-enhance the sign (over tweak) so as to abstain from surpassing these cutoff points. On the other hand, by putting the receiver close to enough and by utilizing suitable enhancement, you should forestall the sound sign from being excessively low (under adjustment). However simultaneously you should not lose a comprehension of the elements of the first stable source, as you will see later.

The Mixer for Audio

At whatever point there are an assortment of sound sources to pick, mix together, and screen, (for example, a couple of receivers, CD, VCR sound yield, etc) a sound blender is required. This current unit's yield is taken care of to the recorder in the sound blender's front board, which is a lot of handles or sliders. Each of these "pots" (potentiometers) or faders can modify the volume of their channel from the entire sound to the become dim (quietness). In certain structures, a "quiet" catch will kill the channel on or on signal. At the point when sources are connected to the fix board at the back of the switcher (connector strip), the sound individual can choose the suitable channel. A few blenders likewise incorporate channel selector switches which permit re-appointment of the channel utilizing a pot, (for example, mic-1 or mic-2). Gathering faders (bunch experts, sub-aces) can happen on an enormous sound blending board. Developing of these gathering faders controls various channels consolidated yields and may have their very own pointer bunch volume. For instance, for all crowd mics, one gathering fader can be utilized. At long last, there is an ace fader that controls the general sound quality sent to line, (for example, on the recorder). That can be utilized to blur in or out the whole blend. A Master Volume Indicator shows the blended sound joined quality. Bigger sound blenders incorporate a signal circuit (additionally called tryout) that permits sound staff to tune in to the yield of any individual channel "secretly" on the headphones or an amplifier, in any event, when its pot is became dull. What's more, the source, similar to a CD, can be set up precisely at the correct area, prepared to begin on signal, without being caught on the radio.

Use the audio mixer

The audio control engineer (sound mixer, sound supervisor) is situated at the audio control console (board, desk and mixer panel) and selects and combines the different sound sources of the system. His focus is divided differently between:

• Selecting and controlling the audio source outputs (microphones, disks, tape, etc.);
• By changing correct channel faders (amplifier gains) to keep the volume indicators within device limits.
• Following the audio and pictures system and the intercom with the director.
• Testing the accuracy of the audio on high-grade speakers.
• Checking software and preview shots from the video monitors, checking sound angle, and warning about microphones or shadows falling into the frame.
• Direct (and cue) microphone boom users, audio disks, and playback recorders.
• Possible audio recording equipment in use.
• Liaise with other members of the development team

Manual Control

Ceaseless control of the program when viewing the sound level meter Audio individual is liable for changing the increase (intensification) of the sound gadget at whatever point proper to accomplish a dependable sound sign. That doesn't mean the complexities can be "resolved" by noisily making all the tranquil areas and keeping all the loud entries off. "Riding the advantage" will devastate the developer's sound along these lines. Rather, when sounds will be frail, envision by expanding the addition bit by bit and, on the other hand, move the restore gradually before noisy passes. The audience members will at that point be unconscious that changes are being made to oblige the confinements of the sound framework. How peaceful the mildest sound can be relies upon the software engineers' goal. At the point when the chronicle is utilized in loud conditions, for instance, or saw in the outside, it may be smarter to hold the increase up to keep away from the calmest sounds dipping under 215 or 220 DB. When recording a piano presentation to be heard inside, be mindful so as not to over-control the elements of the music and utilize the greatest volume scope of the machine. Not at all like programmed control circuits, sound staff can envision and make creative decisions that can make the last sound a lot of better than what it would some way or another be. The hand control drawback is that the sound faculty must be ceaselessly alert, prepared to roll out the necessary improvements. The subsequent sound can be less satisfactory than the auto circuits would have delivered in the event that they aren't cautious. There are numerous sorts of volume pointers however the most widely recognized on video hardware appears as visual presentations utilizing structured presentations or a VU meter (in a matter of seconds clarified). A reference diagram has a strip which comprises of little fragments. This fluctuates in term with the recurrence of the sound sign. Alignments contrast, yet may have a decibel scale somewhere in the range of 250 and 110 dB, Upper working restriction of around 12 db. Modify the control of the sound increase to get the sound tops to this upper imprint. Twin structured presentations are utilized to follow channels on both the left and right. At the point when the sound sign goes into the red area of the visual chart, the sound normally misshapes. The VU meter is a proportion of volume and is generally utilized. It has two scales: a "pressure level" scale set apart in decibels, and another specifying "rate adjustment." Although solid for consistent tones, the VU meter offers misleadingly low readings for brief boisterous sounds or homeless people like percussion. By chance, the VU meter will allow the machine to over-burden. The greatest sign matches with a tweak of 100 percent at 0 db. Beneath that, sounds will be misshaped in the red field, despite the fact that periodic pinnacles are fitting. The ordinary range utilized is somewhere in the range of 220 and 0 dB, normally cresting at 22 to 0 db.

Figure 2-41 Audio Mixer operations

Audio monitoring:

Video system sound control involves:

• Watch: Test the volume indicator and watch a video monitor to make sure that the microphone doesn't unintentionally fall into the clip.

•Listening: Testing the sound quality and balance of High-grade earphones or speakers to avoid any unwanted background noise.

•Audio mixed in: The addition of an audio filter into the systemwill allow major improvements to the quality of the sound.It may be adjusted to raise or decrease the selected portion of the audio range, to exaggerate or reduce thehigher notes or the bottom or middle register, depending on the type of filter system used and how it is modified.The easiest "tone management" slowlylowers higher notes during playback. An equalizer is termed amore flexible type of audio filter. By adjusting the slider pots this filter will raise or decrease any segment(s) of the audio spectrum.

•Microphone Types: In most television production situations, the audio can be recorded using any number of a variety of microphones. One individual may choose one type of microphone and another may choose a completely different microphone. Every person is looking for the best microphone that will deliver the sound they want. The following microphones are only a handful of available audio devices. When the audio plan is made, you will select the microphone that's right for you.

Microphone cameras:

In the event that the camera is fitted with a mouthpiece, the hypothesis is that when it is focused regarding the matter to catch the video, the mic will likewise get quality sound. Be that as it may, a ton relies upon the circumstance and the sort of sound included. Nothing beats an alternate, excellent mouthpiece put in the correct position precisely. Be that as it may, single-camera administrators, working without anyone else and moving around to different shooting positions, may need to utilize the camera receiver. The least difficult type of camera mouthpiece is a little worked in mic at the front of the camera. These mics are known to get sound from all around the camera, including commotion from the camera long range focal point and camera administrator sounds. With care, however, this essential receiver is valuable for general environmental foundation sounds (traffic, swarms), and is practically adequate for close-up voice. Nonetheless, it ought to be utilized for voice just when better alternatives are inaccessible. Attempting to catch a voice more than 4–6 feet away with most camera mics would bring about unsuitably significant levels of foundation commotion as well as sound-related reflections. The shotgun mic, mounted at the head of the camera, is the most well-known sort of camera receiver. Connected the outside mic attachment of the camera, this mic will have the subject's best-quality significant distance catch. As consistently with directional mics, these must be pointed precisely.

Figure 2-42 MICROPHONE

A camera receiver gives the least complex technique for getting program sound:

Thereceiver is on the camera and needn't bother with a subsequent individual to assume responsibility for the chronicle. The receiver will follow any place the camera focuses. Be that as it may, the camera mouthpiece has various disadvantages, as well: Developed-in camera receivers are once in a while conveying top notch sound.

Microphone to handheld:

The handheld mics (or stick mics), used by interviewers, musicians, and commentators,is a familiar sight on TV FIG 2.24

Figure 2-43 Handheld MIC

Microphone shotgun:
The shotgun microphone (hyper-cardioid) comprises of an opened cylinder toward one side that holds an electret mouthpiece. This microphone is intended to get sound from a generally thin point, while being significantly less touchy to sounds from different bearings. It's extraordinary to confine a subject in a group or to avoid close by clamors.

Below is the Diagram of shotgun/boom MIC

Figure 2-44 Shotgun or boom MIC

Wireless microphones

The most broadly utilized remote microphones (or radio receivers) are the handheld mics and the lavaliere microphones. Both of these kinds of microphones can be bought with the remote transmitter incorporated with the amplifier (or belt pack) and a coordinating beneficiary included. Lavalieres mics are exceptionally regular since while moving around the area they permit the ability to for the most part have boundless development. They're utilized with talk with shows in the studio, on arbitrators to hear their calls, and escaped on-screen characters to get their words. By and large, remote amplifiers work on a radio recurrence (RF), and many are recurrence programmable, empowering the sound staff to pick the best recurrence for a specific position. Note must be taken to guarantee the utilization is made of satisfactory frequencies. Working with remote receivers can represent a scope of difficulties. Those mics are running off batteries. The battery life is around 4–6 hours. Battery life is normally sliced down the middle while working in frosty temperatures. Prior to each new meeting, new batteries ought to be put inside the mics Do not leave it to risk, expecting there is satisfactory limit left from the last time If at least two remote mouthpieces are being utilized in a zone, setting them to isolate RF channels is fitting to maintain a strategic distance from impedance. There might be challenges with RF dead spots, blurring, and bending when working near huge metal structures: Or simply meddling. Gathering assorted variety utilizing different receiving wires, has improved this circumstance, yet it's still since some worry.

Figure 2-45 Wireless micro phone system

Microphone Care: While most people look with a certain apprehension at the video camera, there are others who appear to ignore the microphone (or microphone) all too easily. Instead of treating the mics as a delicate tool, they clip it onto a guest's jacket with an air of "that's all we have to do for audio." The microphone and how it is used is really at the heart of the sound of the TV show. If the microphone is bad, if it's broken, if it's in poor position — the sound of the program would suffer. No amount of postproduction work with the audio will make up for doing so right from the start. Sound of the program all starts with the microphone. Understanding how different types of microphones work to use them properly are not necessary. They all transform sound waves in the air into electrical voltage (the audio signal) that fluctuates. However, it does help to be aware of their various characteristics. While most microphones are fairly stable, if they are to remain reliable and work to the standard they need careful handling. Dropping them, hitting them or getting liquid on them is asking for trouble.

Notes:
Repairs On-the-Job: So much so that audio cables are pulled and stepped over because they are always the weak link in the audio network. This means audio workers have to do microphone adjustments on occasion. Such repairs may result in cables being reordered to the connectors and cables being fixed being disconnected.

Clear Audio: Having the time to tape down all audio cables in pedestrian walkways is always necessary. This is not only for other people's protection, but also protects your cables and equipment against unnecessary harm.

Figure 2-46 Audio Clearing Device

Audio security is also necessary to take the time to tape all audio cables in pedestrian walkways down. This is not only for other people's protection, but also protects your cables and equipment against unnecessary harm.

The audio control engineer (sound mixer, sound supervisor) selects and combines the different sound sources of the system using the audio mixer Located at the audio control console (board, desk, mixer panel).

His attention is divided between: selecting and controlling the outputs from different sources of audio (microphones, disks, tape, etc.) maintaining volume indicators within device limits by changing the correct Faders (amplifier gains) channels. The audio and pictures system follows and the director's intercom. Conduct quality checks audios on high-quality laptops. Watching screen display software and demo shots, testing sound angle, and warning about the coming in microphones or shadows. Guiding (and cueing) microphone boom users, audio disks, and record replay. Audio recording equipment may be operating, Liaison with other members of the production team. Whether it's a matter of "fading up a microphone or two and monitoring the sound rates" or a complicated process involving edge-of-seat decisions depends on the production style. For instance: a "live" show, transmitted or recorded as it happens, involves quick decisions. There is always a sense of urgency, tempered with prudence. There is time to set up complex audio treatments while operating on a project which is being filmed scene by scene. Normally anything which goes wrong can be corrected and improved. If there are a variety of sound sources to be handled at the same time, this presents many different problems than a less complex system like an interview. If the incoming sources have already been prepared, such as when using pre-recorded material or the incoming live sources, need to be managed and monitored and modified continuously. These are only a few of the things that will dictate how complex the audio mix will be. Let's look in some depth at the usual operations: Sound sources should be faded in just before they start (to the correct pot setting), and faded out when done. When not in use, the sources channels should not be left "open" (live). Apart from accidentally recording overheard remarks ("Was that all right?") and other unwanted sounds, somebody who is on another mics may be picked up. It is important that the right source is selected at the right time and faded up / down. We can be used with human or party faders. Here is an example: Imagine that a scene is being shot for a drama production. The audience sees the interior of a home, where the radio plays quietly (actually from a CD player located near the mixer). An actor (on live mic-1) is talking to another person (on live mic-2) who is not shown in the shot. A nearby telephone rings (a fade-up using a radio ringing with special effects CD).

Some problems:

Lip Synch:

A related problem here concerns lip synch. Keeping words and pictures in synchronization is an essential requirement in all television, but a task that has actually become more challenging with digital technology. During acquisition, sound is locked alongside the picture on a tape. But in post-production the elements are logged as separate files, summoned into synchronicity by the timecode. As editing manipulates the files, so synch can drift. Unfortunately, watching and listening to the output of a non-linear editing device does not necessarily guarantee that everything is where it should be, since pictures and sound can be routed in different ways. Everything becomes focused on the final conform, where the full-definition images are assembled to make the programmed. It is essential that this final tape is quality checked to ensure not only that there are no black holes, but that there are no infelicities of synchronization. If things go wrong, the penalties are particularly acute in high definition because everything is seen so much more clearly. For example, producers have noticed inconsistencies in lip synchronization when watching projected versions of high definition dramas. Generally sound is preceding picture, and in varying degrees. This kind of problem may result from an electronic projector’s anti-key-stoning operation. Under pressure from heavy levels of data, the projector’s processor can ‘slow down’ then catch up with itself. The effect on screen can be very disagreeable. With experience, producers learn about these problems, but it is easier if they are warned about them early on. With all digital television there are problems resulting from the fact that sound generally passes easily through the system, while pictures may be subject to a great deal of processing. This is true in aspect ratio conversion, where the position of the sound always needs to be retarded to once again achieve true synch. So there are a number of general lessons to learn in implementing high definition, but these become particularly focused during particular kinds of shooting.

Multi Viewer& Monitor:

A multi viewer provides a convenient platform to see visually what is happening on both video and audio sources please write more about monitors

Monitors: An output unit, which displays pictorial details. A monitor usually involves visual display, circuitry, enclosure and power supply

Figure 2-47 Program monitors on the right and on the left they have preview monitors

Monitor wave form: A waveform monitor is a particular type of oscilloscope used in applications for television production. It is typically used to measure and display a video signal's level, or voltage, in time.

Figure 2-48 Image of wave form monitor

Monitor the Array of Vectors:

A vector scope is a special form of oscilloscope used in audio as well as video applications. While an oscilloscope or waveform monitor usually shows a signal plot vs. time, a vector scope shows a two-signal X-Y plot that can show details of the relationship between these two signals.

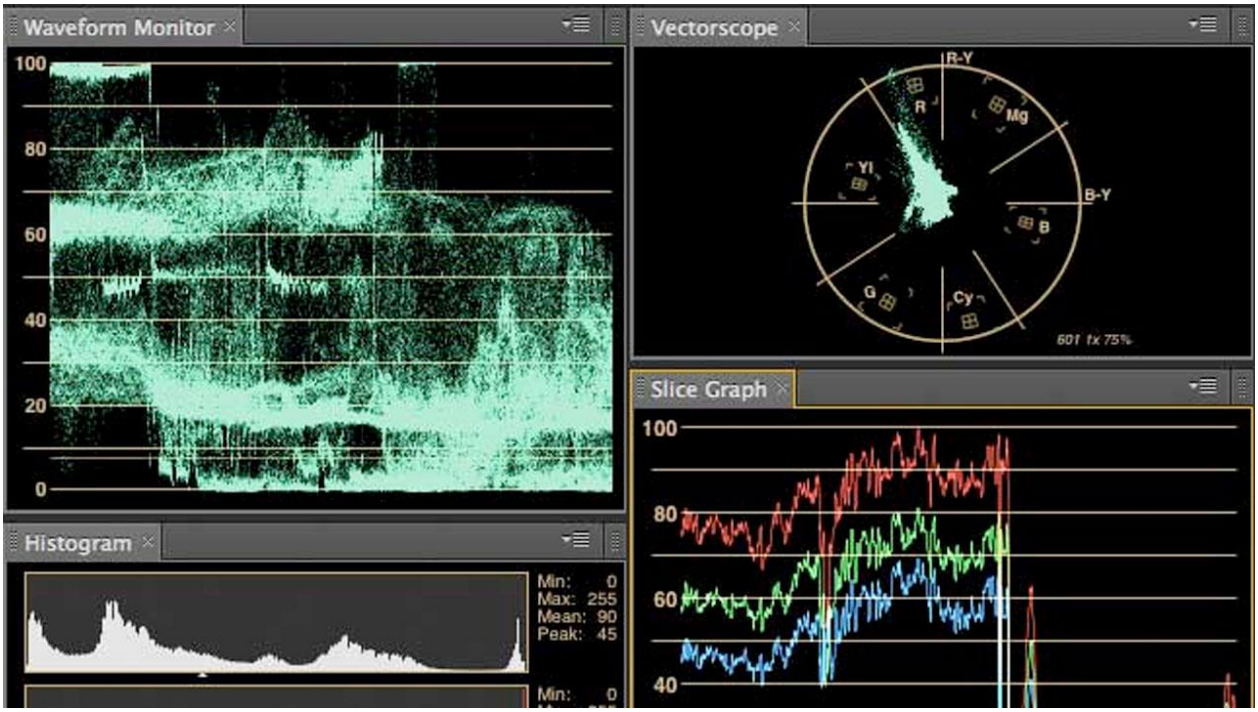


Figure 2-49 image of vector scope

Graphics (CG):
TV graphics used to be limited to something you might use a video camera to film. Today, most of the graphics used in TV advertising are computer generated and vary from showing the interviewee's name to entirely realistic environments and settings.

Graphics operator is the person who actually performs the graphics during the production process. He or she is responsible for arranging and typing for a Production on-screen text and names, either doing so during the manufacturing process or storing them for later use. Only operators can act as designers / artists.

Figure 2-50 CG system

VTR (Video Turntable Recorder):

A Video Tape or turntable Recorder (VTR) is a tape recorder designed to capture and play back magnetic tape video and audio content. Generally speaking, both video cameras and displays are practically interchangeable and can plug in and operate on any VTR. However, many VTRs are not compatible meaning a video tape made on one VTR form can only play back on the same VTR form. This lack of interchangeability is due to the various methods used by a particular VTR to record the different video, audio, and control tracks on the tape; the recording heads setup; and the tape speed and scale. This poses an apparent question. Before making the tape, account should be taken of the reliability of a tape made on a

specific VTR. Consider how much difficult it will be for others to try to play back the programs you're making on your particular VTR. Find out how expensive and complicated it would be to convert your tape to the correct format if they aren't on the same format as you are. Every VTR is identified according to the size tape it uses.

Figure 2-51 SONY VTR

Traditional Broadcast System

Many communicate offices use various VTRs and Digital Disk Recorders (DDRs) or video servers for business and customized play out. These gadgets are interconnected or, freely, 'organized' by means of standard coaxial link to a focal switch that associates these capacity gadgets to the ace control switcher, cameras, Q/A screens, and so on. The two essential stockpiling segments of a run of the mill office are VTRs and video servers.

Device I/O and control:

As a rule, both VTRs and DDRs have video inputs (SDI in a computerized office), video yields (SDI), sound information sources (AES, two sets), sound yields (AES, two sets), sync info and circle through, LTC input, LTC yield, RS-422 port for sequential control, and an equal port for GPI control. Advanced plate recorders may likewise have an Ethernet interface. For a solitary video stream to happen of a VTR or a DDR, there could be upwards of six links associated with every gadget. As the quantity of VTRs and additionally DDRs increment in an office, the quantity of video, sound, time code, sync and control links (sequential/equal) turns out to be exceptionally huge and difficult to oversee. This is positively not news to anybody acquainted with an average communicate office.

Intelligent digital disk recorder (IDDR):

For example (Grass Valley-T2 IDDR): This device is similar to the function of the VTR; But with higher technologies. This device contains a set of software applications for video and audio management; Selecting and modifying clips, trimming them, and other settings, including creating playlists.

It also deals with sections as information and digital and non-digital (electrical) files in the entrances and exits..

Figure 2-52 Shows driver recorder from GV

Note:

Recording Media care:

- It is critical to think about account media. Here are a few proposals for drawing out the life of the different kinds of recording and capacity media:
- The ideal stockpiling temperature is around 65 degrees. Over 100 degrees and under 14 degrees can cause issues with certain media.
- Avoid quick temperature/stickiness changes, (for example, moving from a chilly outside to a warm inside) and permit the two media and hardware to become accustomed before use.
- Before stacking a medium, affirm that it isn't secured against recording (that is, reposition the wellbeing switch). Ensure that you're not recording over something that ought to be held!
- Store media in their defensive boxes to maintain a strategic distance from harm and residue
- Make sure that each recorded medium is plainly distinguished on the (name, contact data, shot/scene numbers, and so forth.).

Video Recording Suggestions:

Here are a few proposals to consider when recording to video media:

- Record at standard speed as opposed to at one of the more slow speeds on tape. This methodology will give better solid and video quality.
- Use the most elevated information rate conceivable on advanced media other than tape. In spite of the fact that this won't permit you to record the same number of minutes on the medium, it will give you a better picture.
- Watch the slipped by time on the camera to ensure that you know how much memory or tape is left and that you know the condition of the battery.
- Reset the tape counter at whatever point you change the tape.
- Review the finish of the takes to check whether the account is agreeable.
- When the medium is removed from the camera, ensure that the security gadget is actualized with the goal that somebody doesn't incidentally record over your unique film.
- Clearly mark all media just as the media holder.

Hard disk magnet:

A hard plate recorder or magnet (HDR) is a high-quality, direct-to-circle advanced recorder. A HDR is a computerized multi track sound or video recorder that moves live spilling information straightforwardly from the source to the memory. It is a document based deck offering similar highlights and expert cassette player power with 4:2:2 shading testing at 10-piece, it records uncompressed video in Quick Time design, and furthermore records video with either ProRes or DNxHD codec.

Figure 2-53 BMD Hyper Deck pro

Slow Motion:

EVS is the industry leader Slow Motion-super slow movement-ultra slow movement devices; there is hardly a sporting event that is free of footage that the human eye does not recognize. Or taking it with a regular camera; As it is possible through these devices that are not less important than the rest of the transport vehicle devices to slow down the captured image; Or replay or prepare them especially dealing with video clips in general, such as recording in different places and calling them at the time of unnecessary.

Without a high-quality instant replay program, today's multi-camera productions will be found inadequate to help audiences evaluate controversial plays during live events. The category has been established by companies like Abekas and EVS, with stellar variable frame rate controllers, and server technology. This, of course, is done with Grass Valley and Sony's high-priced Super SloMo 3X camera systems that record the action at high frame rates (up to three times in real time) and then slow down the scene to 30 frames per second to send us sharply focused replays.

The EVS XTnano is an HD / SD slow motion replay server designed for production of live sports that requires simple workflows. A / V files can be simultaneously played and transferred to other EVS servers as well as to all standard NLE and archive systems with their proprietary loop recording technology and GigE networking capabilities. XTnano can also be configured with four full 3D/1080p video channels (dual link), which offer all types of live slow motion replay and highlight editing features.

Figure 2-54 EVS LSM units

The EVS server can be run from can user interfaces, which can complement one another:

• An app for VGA

• Remote Interface Panel

• LSM System Link

VGA user interface

The first step is the PC boot sequence when turning theEVS mainframe on, and then the Multicam Setup window is displayed:

• If you have previously selected a default application, this application will automatically start after a few seconds if no key is hit.

• If a default configuration has not been set, or if the space bar is hit, the device will stay in the Multicam Setup window and wait for the next instruction from the operator.

KVM

A KVM switch (with KVM as an abbreviation for "keyboard, video and mouse") is a hardware device that enables a user to control multiple computers from one or more keyboard, video and mice sets.

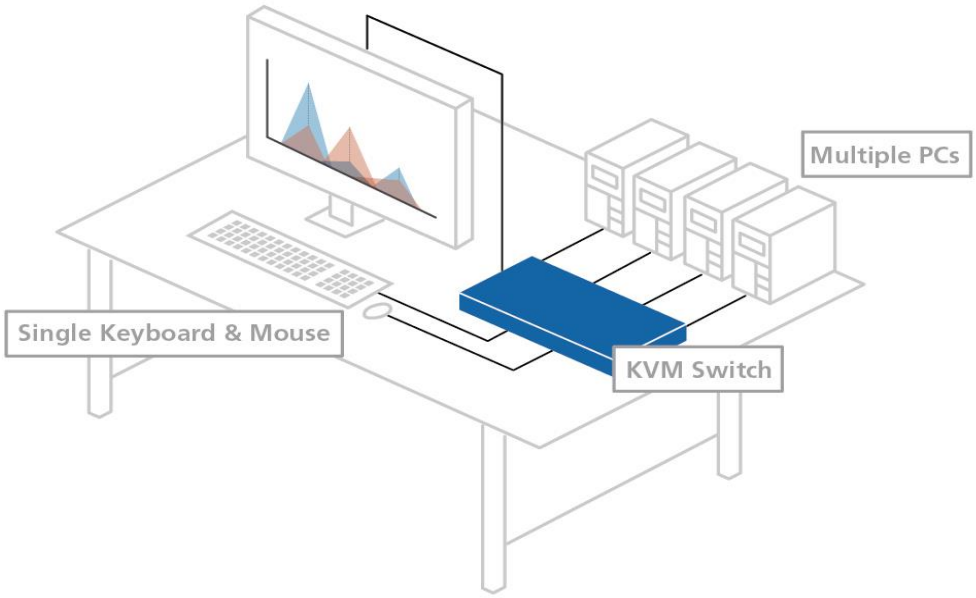


Figure 2-55 KVM Switch and connections

Synch pulse generator:

A sync pulse generator is an extraordinary generator type that produces synchronization signals, with a serious extent of solidness and exactness. These gadgets fill in as an ace planning hotspot for a video establishment.

Since video depends on a progression of successive pictures introduced in an ordinary manner, it is imperative to keep all parts of transmission and gathering gear synchronized in time with one other. Absence of synchronization can cause video casings to be shown inaccurately, bringing about issues like video "rolling," "inclining," or other picture mutilations. To permit all NTSC video parts to be synchronized, both inside (i.e., inside itself) and remotely (i.e., with other hardware in the creation or transmission chain), it is important to show the beginning of every video casing and line. This is finished with synchronizing heartbeats, normally known as sync beats. A level sync beat denotes the start of each video line, and a progression of expansive and thin heartbeats reaching out more than a few lines denotes the beginning of each new video field.

It is an exact and multi-group Platform for simple and computerized signal age, created to produce heartbeats and timing synchronization in communicate applications; Connected to all image/sound gadgets to accomplish synchronization between their various sources.

What does this gadget do?

• Sync beat generator and test signal generator for after creation and transmission establishments

• Research and advancement signal generator research

• Designing and fixing offices

Figure 2-56 SPG Unit of electronic

(Audio/Video)Patch Panel:

A patch panel is a system or unit that features a variety of jacks, typically of the same or similar form, for simple, versatile use of connecting and routing circuits to track, interconnect and check circuits. Patch panels are commonly used in computer networking, audio recording, radio , and TV.

It is like a fixed scoreboard, which can be controlled manually. Cables are used to connect or separate the car equipment or parts from one another or from each other and the circuits can also be rearranged by plugging and removing cables (cords) to get the results required.

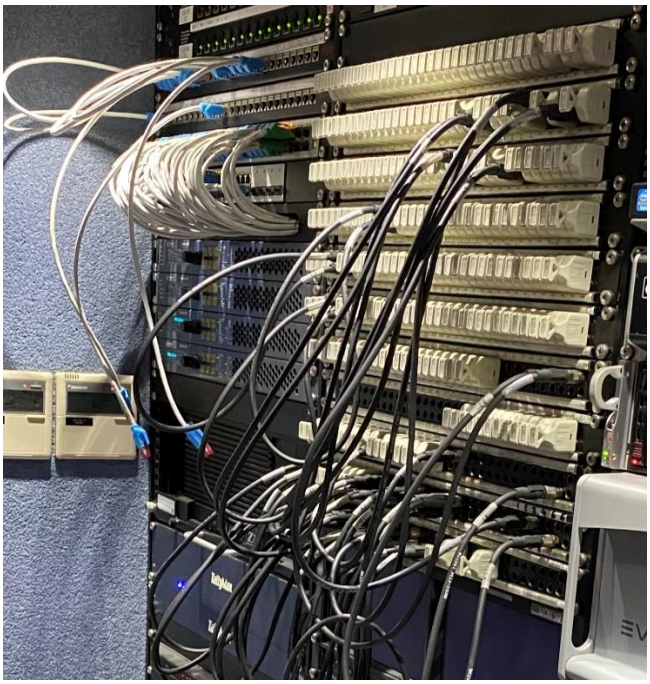


Figure 2-57 Video Patch Panel

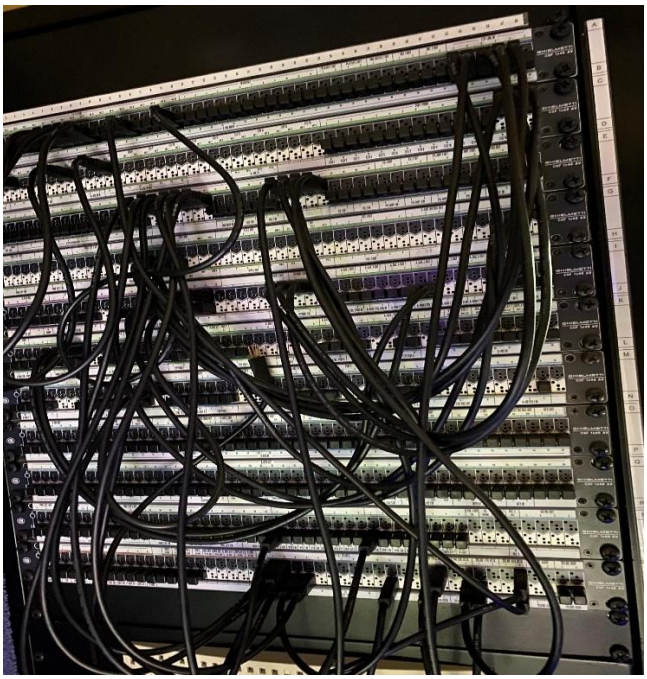


Figure 2-58 AUDIO patch panel

Figure 2-59 Patch Cords

Video / Audio Routers:

With this device, all audio and video inputs and outputs are connected to all devices operating in OB. And controlled by remote control panel:

They are comprehensive control panels of the multi-directional for OB; It meets most directives. These panels (the boards attached to a cable * Ethernet * with different IDs for each of them) help you quickly choose from very large numbers of jobs; Such as sources, destinations, and linking, cutting and merging commands of the image / sound using these panels.

Figure 2-45 GV Router

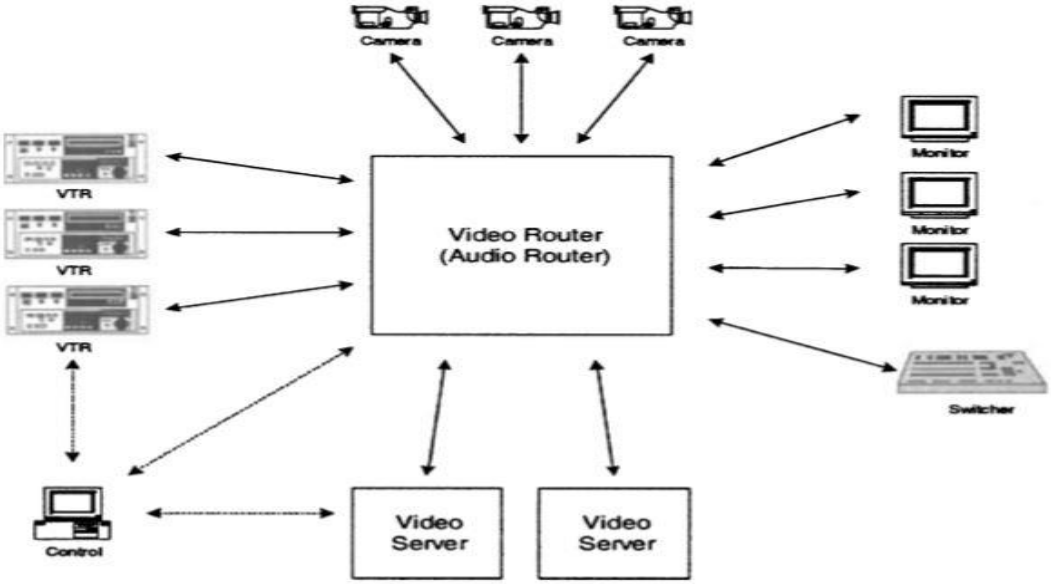


Figure 2-46 router connectivity to every audio video source

Glue Frame:
Conservative Streaming Frame is an ideal answer for the gigantic requests of computerized video conveyance today. This deals with HDTV's rapid details just as SDTV and Analog signs. The edge configuration permits front module extraction, even at 1.5GB/s, without trading off execution. Interfaces legitimately to a SNMP arrange some serious pseudo-SNMP arrangements require transitional application servers or convention interpreters that include idleness, single-point disappointment issues, expenses and multifaceted nature. Edge can hold up to 16 cards; rely on the model and RU, edge can be associated with PC through sequential port or Ethernet port, and however GUI programming you can arrange the cards boundaries. This framework is known as the (stick framework).

Figure 2-47 Glue Frame

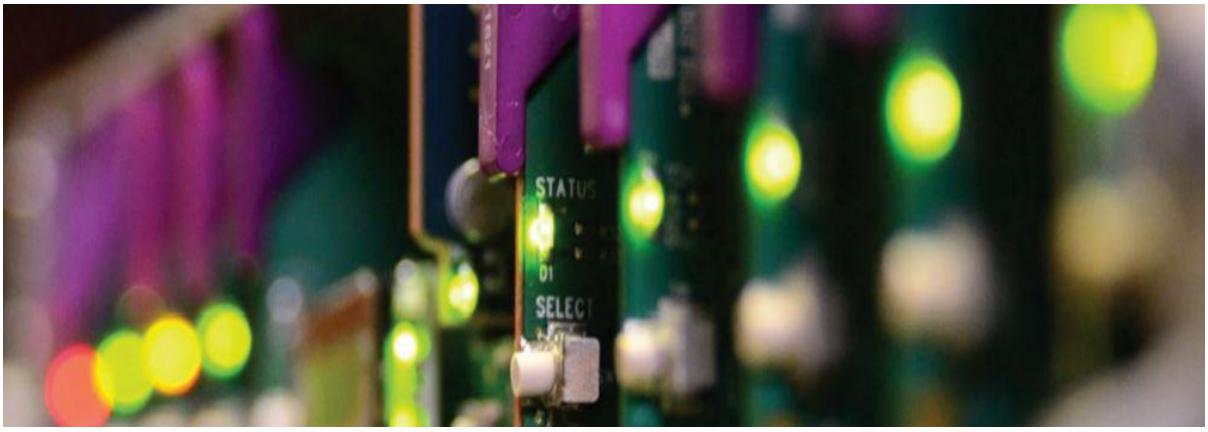


Figure 2-48 Card in Glue frame

Frame Synchronizer/Converter:

To interface extra outside sound and video sources; To make the essential synchronization and control its subtleties through it. Imagine Communications continues setting the standard for inventive, tip top processors-the savvy edge synchronizer and converter from the Selenio X50TM. This best-in - class single-channel commitment with two took care of yields gives the remarkable quality and value that has come to

portray the typical and award winning 1RU-processor Imagine Communications game plan which moreover consolidates the Selenio X85TM. The Selenio X50 offers an assortment of basic and progressed baseband video and sound planning limits and is insignificant and monetarily astute, yet feature rich. This 1RU edge synchronizer/converter supports standard definition and top quality designs satisfactorily and constantly recalling worked for 3Gb/s 1080p Level An and Level B-DL dealing with and 3DTV capacities with respect to crossbreed TV and creation systems. With easy to-use controls, the Selenio X50 comes as standard with a variety of features including concealing change, shut caption/teletext capacity, control and checking through an organized Silverlight. Web server, AFD support, two totally controllable point of view converter extent and inward stable taking care of 24 channels. Choices available join modules for CWDM fiber information and yield (handset), Dolby ® Digital and Dolby ® E codecs, DTS Neural SurroundTM Up/Down Mix, Multimerge and DTS Neural Loudness Control. The specific helpfulness of the Rules Engine places custom video and sound sign control in the customer's proprietorship, with the objective that remarkably revived code shouldn't be moved. With the customer picking the getting ready required for the yield, any video and furthermore stable data circumstance can be recognized. The earth shattering, sensible and essentialness powerful Selenio X50 processor can be helpfully consolidated into any conveyed condition's work procedure from little stations and OB vans to creation studios and frameworks. Edge sync, proc amp and concealing cure capacities for all 1080p/psf yield plans (23.98, 24, 25, 29.97, 30) are as of now open with a fundamental edge rate converter that can be used either for representations, or as a straightforwardness support for straight or development reimbursed diagram rate change in an essential manner Features Intelligent packaging sync/delay, proc amp, upheaval abatement, cutting and concealing amendment Rules Engine for custom sign stream the load up Sync and time base corrector (TBC) and 3DTV-capable left/right eye to side/side impeccable packaging, top/base side/side great packaging, top/base side/side commitment to left/right eye yield Advanced 3D adaptable 10-piece development area for up/down/cross/edge change Two switchable 3G/HD/SD auto-distinguishing commitments up/down/cross/perspective change with two simultaneous, free yield bunches Noise decline (mosquito), sharpness and surface controls Two point of view extent converters with full H/V size and position control Audio de-embedded/embedded, synchronized, increment, turned around and deferred With 16 stations (four social occasions) getting ready PCM and non-PCM (Dolby ® Digital, Dolby ® E) passthrough Modes for Dolby ® Digital, Dolby ® E disentangling and encoding (up to 2 Dolby decoders or encoders) DTS Neural Loudness Upmix, Downmix, Multimerge and DTS Control Audio interfaces: basic 12-piece concealing decoder 3D adaptable brush station Analog YPrPb input part and yield (HD and SD) RGB show Auto-identifying for SD-SDI, HD-SDI, 3G-SDI EDH/CRC botch following and HDMI yield expansion for video Audio Interfaces: Imagine Communications Proprietary and Confidential Selenio X50TM Page 1 of 12 Control and control: 100/100 Ethernet correspondence SNMP Built-in Web server Local control load up CCSTM-pleasant for use with Magellan CCSTM programming: Selenio X85 control loads up Network control loads up Magellan CCS programming Four GPI information sources and yields Optional fiber data and yield 3 Gb/s And 3DTV Built-in video check and sound tone generators Redundant power deftly I-Wings side bar logo generator/inserter foundation while changing over SD memory card for presets Available MAGELLAN and X85-RCP controller and watching loads up.

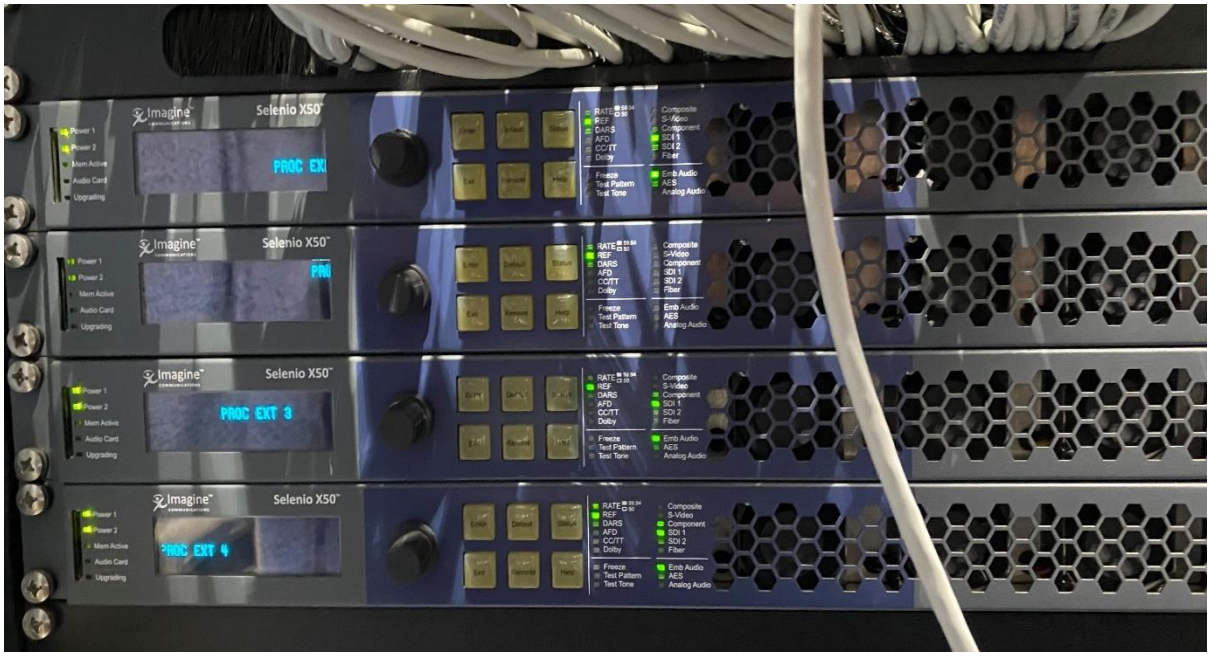


Figure 2-49 Imagine Communication Frame Synchronizer

Air Conditioning System:

You can note in most data centers that the server room on the same building is colder than any other room. You might be intrigued to ask why air conditioners are needed in data centers. You need to know what the data centers are before you answer the question. Data centers are unique buildings which contain servers and store data in the form of data. For particular reasons, data on data centers are analyzed. It may be used as a tool to solve critical problems, depending on the type of data collected. Because of its significance, the majority of people take server maintenance at data centers seriously.

The data collected on servers is on the increase. Hence the server temperature is also rising. When the temperature reaches critical point the components of the server would not be able to operate properly. In the worst-case scenario, the processor will burn to extreme temperature. Therefore data centers need air conditioners. Because the temperature needs to be set in the optimal state, it is advisable to select air conditioner with temperature characteristic based on the processor. The temperature rise will be controlled by such air conditioner so respond accordingly. The IT help will be capable of tracking processor temperature changes in real time. The temperature setting on the data center is the key to ensuring data.

The data stored in data centers is continually analyzed. The selection of air conditioning systems which are able to work continuously is therefore the top priority. Frequent server utilization is the reason why data centers need air conditioners. These air conditioning systems includes air conditioner for backup. The backup air conditioner will take over the job if the main air conditioner fails to maintain the perfect temperature. To this end, regular air-conditioners are not recommended. The air conditioners only function at set times in the standard air-conditioning system. We cannot maintain ideal room temperature outside of the specified time.

Temperature is not the only thing that has affected performance on servers. Humidity is also worth considering as regards aspects. Since you already know why data centers need air conditioners, it is also important to know what features the air conditioner should have in the data center. Control of the humidity is as critical as control of temperature. Along with temperature, humidity can also influence the output of the server on the data center. To ensure the server output is at its highest, it is advisable to choose air conditioning system with humidity control feature.

Figure 2-50 Roof Air conditioning

ANCILLARY SYSTEMS:

Including:

- Clocks and Timers
- Intercom and Talkback
- On-Air Lights and Cue Lights

Cables

Recording studios, radio and TV broadcasters, mobile broadcasting units only want better audio / video signal not only future digital technology processing quality and adequate high-resolution cable infrastructure investment is available if you do it correctly, endpoints reached by the future technology choice because it is true and a guaranteed transfer to the user.

Figure 2-53 Cables

Cable Types:

XLR

The xlr plug is sort of electrical connector that is primarily utilized on proficient sound, video and stage lighting gadgets. The connectors are orchestrated circularly and Have anyplace three and seven pins. A sum of four kinds of XLR connectors are accessible in both male and female models of link and frame mounting plans. This is somewhat bizarre the same number of other connector structures discard one of the styles (ordinarily a frame mounting male connector).

Figure 2-54 XLR cable 4 channels

- **Cables for microphones and for musical instruments**
- **Analog audio cables (analog audio cable to line level)**
- **Optical audio cable AES/ EBU**
- **Multicore analog cables (Multi-Pair analog se**
- **Audio specialty, connectivity and instrumentation**
- **Digital, multicore AES / EBU cables**
- **Cable spokesperson**

Video:

Triax camera cables

Triaxial link, likewise called triax for short, is a kind of electrical link comparable. For coaxial links alongside an additional protection layer and a second directing sheath It conveys more data transmission and impedance dismissal than urge, however is progressively costly In the broadcast business, the most widely recognized utilization of triaxial link is as an interfacing link between Camera Control Unit (CCU) and camera

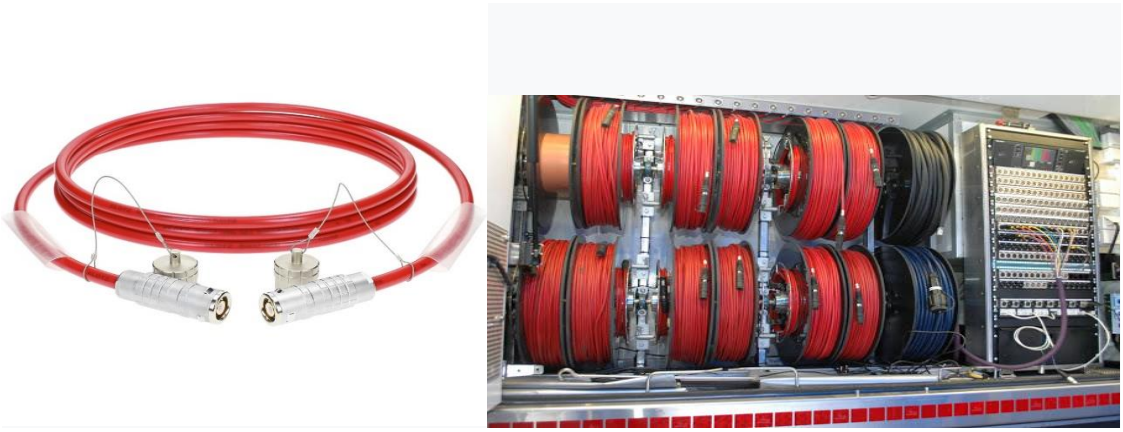


Figure 2-55 Triax Camera Cable

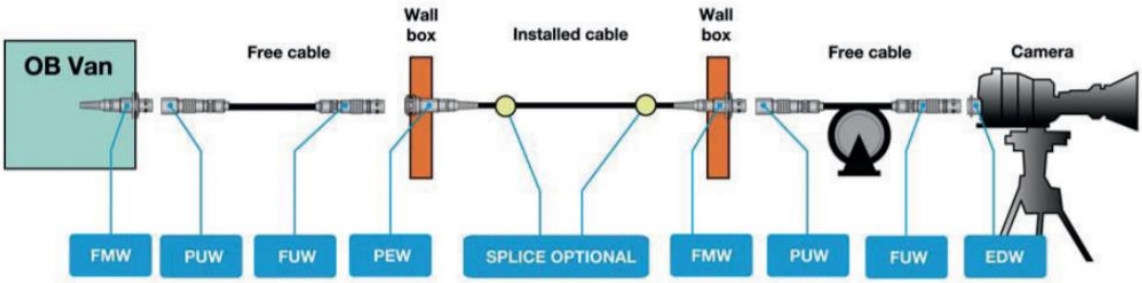


Figure 2-56 Connection of Triax Camera Cable

Cable with Fiber optic

Is a system link containing glass fiber strands inside an encased box. They are intended for significant distance information organizing, elite, and broadcast communications. The fiber optic links give higher transfer speed and transmit information over longer separations contrasted with wired links. Throughout the years, the utilization of fiber optic links in link signal transmission has developed violently. Such links are reasonable for transmitting superior quality TV signals since they have more prominent transfer speed and speeds.

Figure 2-57 Cable with Fiber optic

Note:
An optical interchanges repeater is utilized in a fiber-optic correspondences framework to recover an optical sign. Such repeaters are utilized to broaden the compass of optical correspondences interfaces by conquering misfortune because of constriction of the optical fiber. A few repeaters additionally right for contortion of the optical sign by changing over it to an electrical sign, handling that electrical sign and afterward retransmitting an optical sign. Such repeaters are known as optical-electrical-optical (OEO) because of the transformation of the sign. These repeaters are additionally called regenerators for a similar explanation.

• The BNC connector ("Bayonet Neill – Concelman" initialism) is a scaled down quick connection/disengagement radio recurrence connector utilized for coaxial link.

- Analog video cables
- Digital video cables
- Analog multicore cables
- Digital multicore cables
- A / V and composite camera cables
- RGB and SVHS cables
- Broadband cables

The Camera lens

“Never make the mistake of thinking that a lens is a mere accessory to the camera— especially in HD imaging. the HD lens has the primary role in shaping the image and giving it critical performance attributes that, in turn, will determine the ultimate digital performance of your camera.” larry Thorpe, Canon U.S.A.

Figure 2-58 Camera lens

Specific Lens Principle

Most people who at one point would have used a lens to focus asun 's image or other bright object know the concepts of a simple lens.Simultaneously they would have found that as the distance from the target to the lensis modified, the camera focuses at a different distance and reduces the size of the subject.This magnification theory is utilized inthe development of a zoom lens.The focal length can be constantly adjusted in a zoomlens to adjust the magnification while the image remains centered.

Zoom lens

Most TV / video cameras come with the familiar system of zoom lenses, which is a remarkably flexible production tool. The great advantage of a zoom lens system is that its focal length is adjustable. Simply turning a lever can change its coverage of the scene. This adjustment gives the subjective illusion that the camera is closer to the subject or farther away, while at the same time changing the apparent perspective. The zoom lens at any given setting within its range acts like a prime lens of that focal length

Figure 2-59 Zoom Lens

Lens Controls:

Most focal point frameworks have three autonomous, manual or self-loader changes:

• **Focus:** Adjust the separation the image is most keen at.

• **F-stop:** Adjustment of the iris variable stomach inside the focal point framework.

• **Zoom (if utilizing a long range focal point):** Altering the central length of the focal point to decide how much scene the picture would cover.

Figure 2-60 Box Lens

Choosing a lens for the camera is very tricky , if you choose the wrong lens for the camera your quality will be degraded , and camera man have to adjust focus every time to make it work fine .

What A LENS Play DOES NOW?

Light hits the lens' front surface,and passes through the item of glass.Since light rays bend at any angle otherthan 90 when entering glass, they change direction.The effect is called "refraction." In their nature, lenses can redirectthe light in a particular direction by using various glass shapes-types, really-.Focusing happens as this path is precisely regulated by the lens, so that the light rays converge at one point,exactly where the film is in the frame (or where the CCD is in the case of a digital camera).

Fisheye Lens

A fisheye lens is an ultra-wide - angle lens which produces strong visual distortion designed to create a large panoramic or hemispheric image. The angle of view of a fisheye lens is normally between 100 and 180 degrees, while the focal length depends on the film type for which it is intended.

Figure 2-61 the result of Fisheye lens , it provide 190 degree of view angle

Tripod:
A tripod allows you to capture longer exposure by using up to several seconds of a slower shutter speed. This helps reduce any movement's danger. The use of a tripod would allow much more light to reach the camera when capturing a long exposure than would be possible if you were taking a photo hand held.

Figure 2-62 Tripod

Camera tripods

While the tripod isn't in every case simple to reposition, it has points of interest. It's quick, strong, and is anything but difficult to overlay and transport. These can be utilized in a wide scope of circumstances: on surfaces that are harsh, rough or congested; on steps; and so forth. A tripod basically has three legs, each with independently customizable weight. The legs are dispersed separated to shape a steady camera base. The tripod legs can essentially overlap together when moving to another area. The camera can be straightforwardly screwed to the tripod board and tilt head or a fast discharge mounting plate can be utilized which permits the camera to be disconnected in a second. Tripods are an incredible assistance when utilized appropriately, however they are not idiot proof. Here are some helpful alerts: Don't be enticed to utilize the tripod legs mostly open, as it can without much of a stretch fall over. Rather, consistently modify the camera stature by adjusting the leg length, not by changing the spread. Completely broadened tripods can be somewhat shaky now and again, particularly in blustery conditions. It might be important to utilize a blockade to give security or attach the tripod to the ground or a stage. Try not to leave the camera standing unattended on a high tripod. Individuals (or creatures) may thump it over or a pulled link may over-balance it. It is a lot more secure to drop the tripod to its most minimal level. Tripods for the most part have two sorts of feet: retractable spikes for use on unpleasant surfaces and elastic cushions for floors. Spikes can without much of a stretch harm rugs and wooden floors

Parts of a pan and tilt head

- Operating switch for curl connector
- Sliding handle for plate change
- Take the handle
- Core scoop click
- Ballast handle
- Brake switch inclines
- Brake lift dish
- Center discharge lift lock

- Illuminated bubble at stage
- Central Timer
- Digital Camera
- Taste Illumination
- Sliding plate with graduation
- Controller loop
- Wedge connector screw mounting

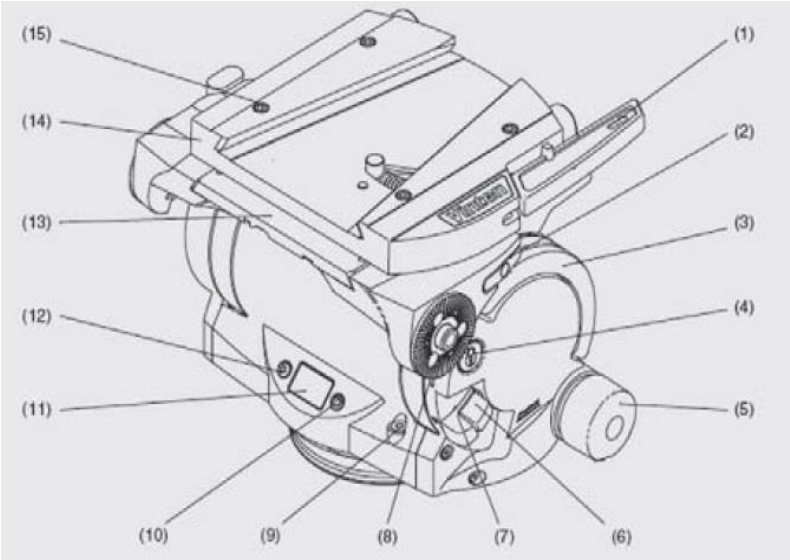


Figure 2-63 Parts of a pan and tilt head

Tripod Dolly:

To permit it to move over a story, a tripod cart is joined to the base of a tripod which can be collapsed for transport. Despite the fact that the cart moves around effectively on a level, level floor, lopsided surfaces will cause a jerky picture, particularly when a zooming focal point is utilized.

Figure 2-64 Dolly for the Tripod

SDI to HMDI converter or Cross Transformer

Connection your expert video hardware with SDI to HDMI Converter to any HDMI show or shopper TV bundle. This miniscule converter retains a SD, HD or 3G-SDI sign and changes over it to a HDMI signal while protecting the first picture quality and goal. This gadget is utilized to converter SDI sign to HDMI or HDMI sign to SDI

More often than not , during activity Engineers or makers may have need of additional checking or they don't have wanted sign for the information or screen , along these lines this cross converter came out of luck.

Figure 2-65 how Converter works and in BI-Directional mode

Generator and inverter

Installation

The generator is commonly installed transversely at the rear of the vehicle .However; Total width of 2, 5 m that road vehicles are needed to puts limits on the size of a generator that can be mounted this way. Faster compact sets with powers up to 80kW can be mounted transversely. On smaller 12V vehicles this is a more severe limitation. It is possible to locate the generating set under the floor, freeing up space. This is only really practical on the 24V chassis due to necessary road clearance.

The location should allow for access to all points on the engine requiring routine servicing and maintenance. This should be added to the overall dimensions of the generator. Where access is impossible the unit can be fixed on slides with flexible hoses; this is only really practical with the smaller sets. The generator must be easily removed from power, electrical, water, and exhaust connections for significant servicing and the unit must be lifted out of the vehicle. Where the application demands high power and the vehicle axle weights do not allow fitting on the vehicle, you should consider a trailer generator which is towed behind the vehicle. This system has the benefits of reducing the weight penalty on the car, and supplying one or more vehicles with a separate power source. The trailer can be remotely parked and removed from the truck, away from microphones and work area. A generating trailer collection will never equal the convenience of an integrated unit, in particular in Electronic News Gathering (ENG) applications. A growing trend in the smaller power applications is the DC generating set. This system will automatically charge the technical battery bank when the voltage falls below a certain threshold. The engine is usually set to run for a minimum time to recharge the batteries. This reduces the engine run time considerably, thereby reducing costs, and avoids the engine running when light loads are required.

Forecast:

This is the input link to the grid network of the mains and enablesthe vehicle to be plugged in wherever possible, reducing the need for generator working**.** It can also be used for a remote generator. Thought should be exercised over what connections can be expected in the field of operation. A typical industrial single-phase connection is rated at 16A, which will give 3.6kW. Where this is insufficient, 32A and 63A connectors are available. The line should be rated for the current and the working temperature, and where appropriate protected from external damage from vehicles driving over it. Steps should be taken to make sure the input to any trailing cable has an earth leakage trip to ensure that damage to the cable will not cause risk of injury.

Inverters:

Inverters are used to recreate an AC supply from the stored energy in a battery or from a DC source such as the vehicle alternator or a DC auxiliary generator. If the inverter is required for a short duration as a backup to a generator, it is commonly referred to as an Uninterrupted Power Supply (UPS). This time is used to safely ‘power down’ the equipment without loss of data. If longer duration is required it is a usually referred to as a standby power system. It can be configured in one of two ways, on-line or off-line. The on-line approach connects the load permanently to the inverter. In turn, the inverter derives its power from a battery

and battery charger. This arrangement is suitable for situations where the load is susceptible to a break in supply or the generator or landline supply is erratic. Since all the current flows through the inverter and battery charger, heat is generated, so it is generally preferred for smaller systems. In large systems the heat can be significant and is an extra burden on the air-conditioning. In this case the off-line system using a transfer switch should be used, as described below. Choosing an inverter requires knowledge of the loads you wish to operate, in particular what waveform the load requires, running and peak current. When discussing an inverter execution individuals allude to sine, semi sine, and square waveforms. It is misdirecting to state that each structure is better than the other; it is every one of the a matter of cost, unwavering quality and execution bargain. Sine-wave execution is nearest to duplicating the gracefully of AC mains, but at the same time is probably going to be the most expensive and least powerful. On the other hand, because of its waveform, square wave is the least expensive, possibly the most impressive, yet in addition the destined to cause operational issues. The semi sine wave is a middle methodology, if appropriately controlled, recreating key highlights of the AC mains gracefully. Given legitimate control and not all semi sine-wave inverters have that, by far most of burdens can be controlled adequately without the greatest sine wave's greater expense and force misfortune. We'll adhere to the European framework for this article, which is 50Hz and 230 VAC, yet similar guidelines apply to different voltages and frequencies.

The mains have four important characteristics:

Peak voltage: This is the pinnacle voltage at the peak of a genuine sine wave. It arrives at 325volts on a 230-volt flexibly. This pinnacle voltage should be kept up so as to effectively work electronic gear, basically to guarantee that force gracefully input capacitors are completely energized.

Average voltage: This is the most extreme worth came to by the necessary against time of the voltage waveform, or as such, the normal voltage. A '230-volt' sine-wave flexibly midpoints 207volts. This trademark is significant for the fruitful activity of attractive gadgets, for example, transformers and engines.

RMS 230 Voltage: This is a scientifically determined proportion of the warming impact of a waveform when applied to a resistive burden, and has customarily been utilized to indicate the greatness of an AC voltage. This trademark, which for a 230-volt mains gracefully is 230 volts, is essential to guarantee that warming and tungsten lighting gear attempts to determination. In the event that this is off base or changes, at that point lighting may fluctuate in power.

Stable frequency (50Hz):This is important to guarantee that planning gadgets utilizing mains recurrence work precisely and that AC engines run at the right speed.

It is recommended to carry out tests on the chosen inverter with the intended loads, thereby identifying potential problems.

Earthing considerations:
A key area of concern is the requirement to use an earth ing spike. This is a spike driven into the ground to connect the vehicle chassis to the potential of earth. In some cases this is impractical, i.e. when parked over concrete, or impossible in the case of a vehicle requiring AC power when being driven.

Electrical safety.
Operation of radio communications equipment and information security .

Considering electrical safety, it is not always necessary to provide an earth spike, and may in some cases be detrimental. The need for an earth spike cannot be considered in isolation, but is part of the electrical system safety design. In general, however, an earth spike is not a reliable system and residual current circuit breakers should be used in preference, to provide protection. Problems can also occur where vehicles are coupled, such as a trailer generating set or external portable generating set, where a break in the ground connection creates a shock hazard. This is a specialist area and you should consult with an experienced practitioner.

Cooling and heat management:

The electrical hardware in the truck and the assistant force framework can create significant warmth. In this manner, cooling air the board is fundamental to keep the electrical parts and batteries in the racks/storage spaces beneath 50C when worked in the most extreme encompassing temperature expected in

administration. One procedure is to deplete some portion of the cooling air through the hardware coves. Bombing this, make wind stream by means of a fan. Don't hermetically seal electrical parts in storage spaces.

chapter 3 Remote Production Amenities

Remote Production

It is compulsory for the remote production to experience countless number of difficulties like handling the weather changes, placing the remote element, setting the nonproduction element for whom it might be challenging to recognize the procedures of the crew, power of electricity, and an unsolicited audio in comparison to the studios. However, the major problem is that mobile elements are constructed to travel on the road as every event cannot take place in a television studio. Mobile units are actually the same thing as compared with the control room that exists in the studios.

Remote trucks (also known as outside broadcast) or manufacturing trucks, are the components that consists of microphones, spaces for cameras, control room as well as other interlinked manufacturing tools.

Remote truck are in general more squeezed and compressed. Remote truck are of different sizes and structure ranging from 12 to 55 feet long. The production units related to sports includes the capability to expand their size and allowing considerable amount of crews inside. On the other hand side, the production units of remote are in general very small and comprise of few people involved in it.

Figure 3-1 The outlook of the production room of Outside broadcasting including monitors and PGM, monitor wall, intercom, switcher and interaction system for communication with the crew

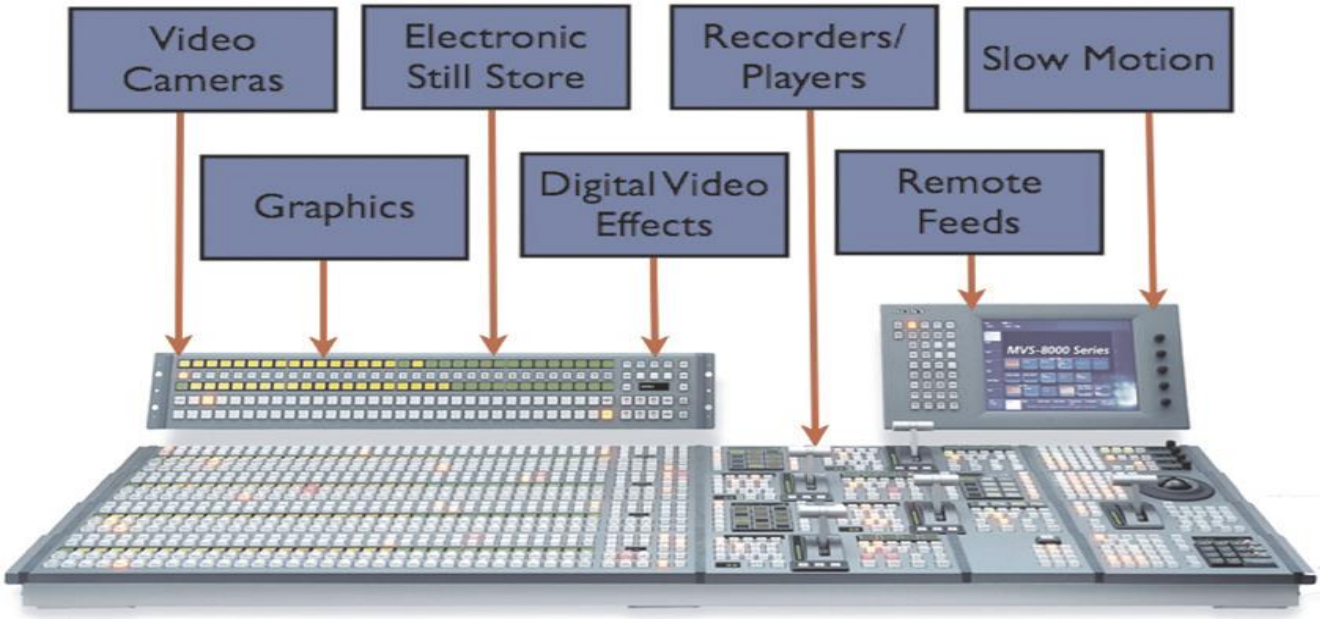


Figure 3-2 The look of the manufacturing area of the remote truck. This space involves director, technical director and producer for the development of the manufacturing and production.

Portable Control Room

The remote components or units are gathered in both a truck as well as crates. Moreover, portable can be transported into a particular area and have the capability to take numerous amount of different shapes. In addition, the portables are a well-organized tool that allows the person to do numerous and countless number of things what they want. However, Fly packs are constructed into transportable shipping bags that are shipped to a particular place without experiencing the problems of moving a truck to a particular area. Moreover, these units can be transported by a well-known and well recognized shipping company and thus due to this, it can less costly in comparison to a remote truck. These units can be also strengthen together with the help of already developed wire connectivity. However, the major problem is that they are time consuming in terms of their construction once they are displayed onsite.

Figure 3-3 Portable Fly Pack

The sizes of the fly packs usually vary and keeps changing. (Left) A one complete unit is almost of the same size when compared with a laptop. Moreover, it comprises of four camera switcher, audio beater, variety of visuals and LCD monitor wall. (Right) A made-to-order fly pack comprises of video and different visuals, audio, large monitor wall and excellent speakers.

Talking in terms of current manufacturing tool, this particular equipment is easy to use and can be viewed at any area or place. Mostly, the remotes are live where most of the control is with the crew as compared to the director and crew covers all the incidents and happenings. There are pre planned productions as well such as when any drama take place. They also consists of different cameras. Single camera is known as ENP (Electronic news production) or EFP (Electronic Field Production.)

Figure 3-4 Portable Fly Pack

Remote production?
Any sort or kind of production outside the studio is known as remote production or outside broadcast. (OB)

Remote productions include all kinds of events:

- News events
- Sports events
- Parades
- Concerts
- Award shows
- Telethons
- Variety shows that are “on the road”

Comparison of Remote Production with Studio Production

The advantage of studio production is that they deliver all out number of mechanism over the theme. The lightning and studio are less manageable and studios execute a perfect place that is not affected by the changes in weather and climate. On the other hand side, remote production delivers thrilling crowds to cheer. During a beneficial weather, lightning and scenery execute excellent pictures but an unfavorable weather can lead to the postponed or even cancellation of the event. Moreover, it is also less costly to shoot as compared to the scheduling of the time of studio.

Figure 3-5 Studio Production

Shooting on Location:

The remote productions usually are in need of expectation of the events that may occur. Therefore, it is quite significant to construct a team that can predict incidents and events for the future days. It is compulsory for the crew to work together and develop backup plans if they go in wrong direction. Therefore, the more they would know about the events such as sports and news event, the better they would perform and thus would lead to easy communication between the director and the talent. .

Decisions regarding cameras in locations involve:

- Number of cameras needed for coverage?
- The type of camera? (dolly, jib, handheld, POV)?
- Favorable locations to locate the cameras? What are the challenges with the camera viewpoint?
- Whether special cameras mount important? (Scaffolding, jibs, etc.)?
- Whether important lenses needed? (such as long telephoto lenses)?
- What are the location of camera cables to operate?

Audio:

Audio is one of the significant and key area of television production. Some of the issues it may include are:

- What is the content that audience want to see? How many number of mikes are required for the coverage of an event?
- What are the best type of microphones? (handheld, lapel mic, shotgun, etc.)?
- Audio or edging sound?
- Ability of the microphones to get noticed in a shot?
- Wired or wireless microphones?
- What are the problems caused by the natural sound in a location? (traffic, crowds, and airplanes)?

Remote Production Vehicles:

The services required for the coverage will be based on the scale of cover and nature of the happenings. Other than trucks, transportation vehicles involve cars, motorbikes, boats and helicopters. In a race coverage, a motorbike might involve a camera, a camera may fit in the helicopter for a long shot. Therefore, it is usually base don the event and how well you perform it.

Preparing for the coverage of Sports:

- Preparation for the coverage of sports:
- Need to be aware of the regulation of that particular sport

- Need to be aware the contestants (athletes, coaches, officials)
- Need to be aware of the location (Venue of the field)

Areas to be taken into account for decisions:

- Cameras
- Camera mounts
- Graphic design
- Audio plan
- Lighting
- Award ceremonies
- Star and finish protocols
- Developing the production plan :
- Meetings
- Review last recordings of events
- Rehearsals

Remote Production Truck/OB Van:

Remote production truck is a well-known unit for the remote production also known as OB truck. These components have different sizes with around 20 cameras in a large truck and around 3 cameras in a small van. The truck includes TV program, monitors, audio, graphics, recordings and son on for the construction of the television program.

Figure 3-6 The Remote production Truck or OB truck

Figure 3-7 The Remote production Truck or OB truck

There are several uses of these units which involve placing the vehicle inside the location with the extension of cables to the cameras at several points. Vehicles may be parked outside the studio which may involve a public hall, theatre, sound stage and so on. The editing may take place inside the remote truck or may be send back to their base through several transmission path.

Live Coverage:
During a live coverage, it is necessary for the production signal to be sent back to the location for broadcasting purposes. Transmission ways include microwave trucks, fiber, Internet and so on. Coverage trucks delivers components that are quick in executing broadcasting. There are systems that allows two way communication between the components and studio

Figure 3-8 SNG VAN

Sports stroke: The contestants can travel to any place in the venue thus sports production are quite different from others. Some venues are big in size such as football field, some are small in size such as boxing match etc. Actions are of three types that are horizontal, vertical and round.

Horizontal Action: Horizontal action comprise of football, soccer, basketball and so on. Cameras run form right to left and from left to right for the coverage.

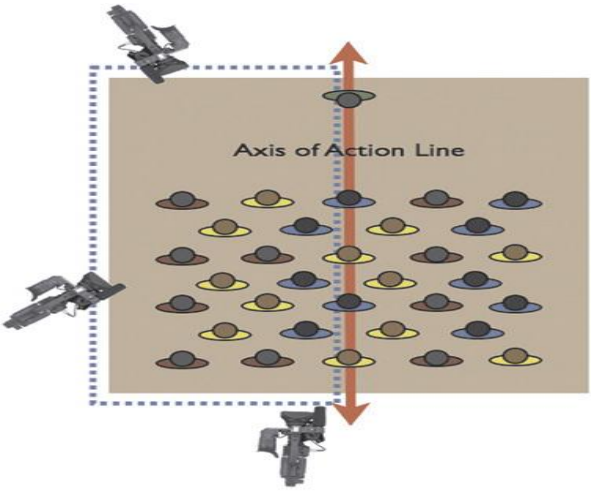


Figure 3-9 Delivers an outlook of speaker communication to number of people and the axis is between the two. Thus, all cameras are on one side.

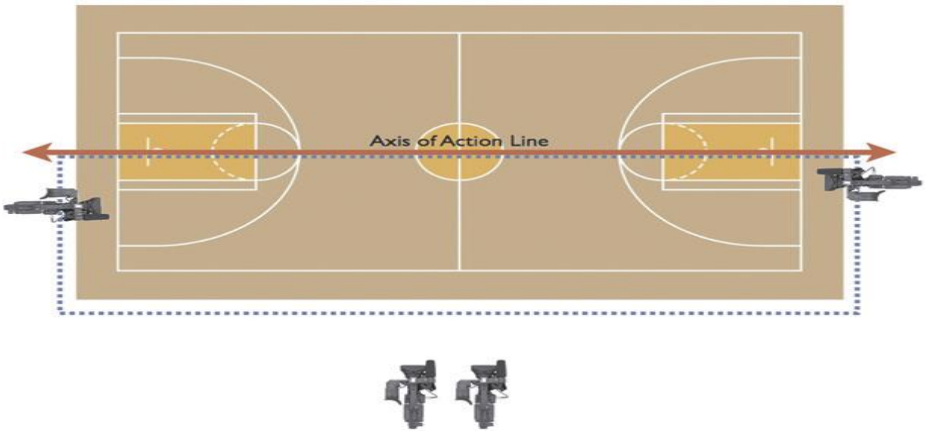


Figure 3-10 delivers that horizontal action includes basketball in which all the cameras are located on one side of the line

Vertical Action:

Vertical action includes sports such as tennis. In this, it is quite challenging for the action to view and trace, thus the cameras are located behind one participant and clearly looking the other participant. Hence, axis is placed on the net

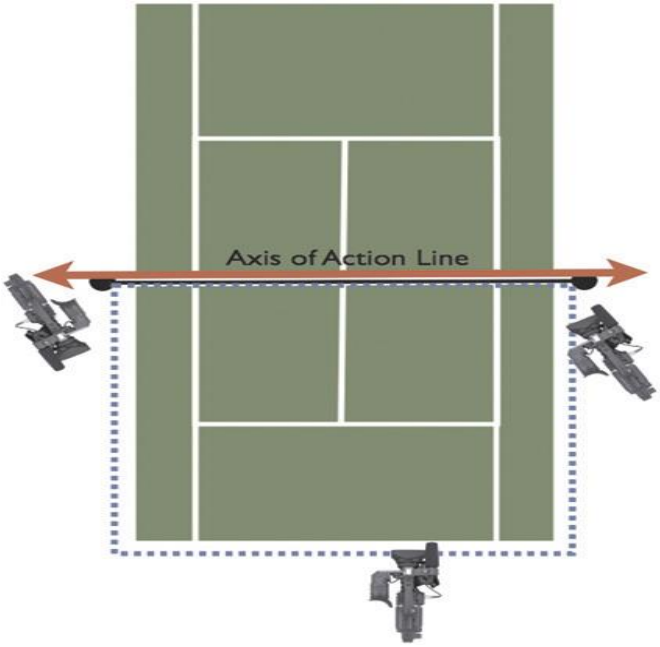


Figure 3-11 displays tennis as an example of vertical action

The axis of action line goes vertically and all the cameras are located on side that is the blue area.

Round Action:

Racing and baseball are the perfect examples of round sport. As the cameras cover the events the whole way, therefore the axis is not developed. The director constructs the scene reportedly to avoid confusion for the audience. For example, a close up shot at car, then it shot close up at the car repeatedly

التاريخ الطلب	أمر تشغيل	نقل خارجي	مباشر/تسجيل

Figure 3-12 proves that baseball is an example of round action

Cameras are located anywhere as there are no axis. The director repeatedly makes long shot in order to avoid confusion for the audience.

Multi-camera remote Production

- Continuous broadcasting from different angles
- Action is delivered over an huge area
- One time only event if the cameras cannot be moved around different viewpoints. (Abolishing of a bridge).
- The changing of the area continuously (sports field of play).
- Difficulties for the camera to move to new location (because of obstructions).
- Locating the cameras in fixed, set places
- Unable to predict that where the action would be delivered

Multi-camera Preparation: There are several factors that make multi camera productions unique from studio productions. And single camera productions. They need considerable amount of preparation, as they are huge productions. Planing involves things such as power, the size of the cables, considerable light and so on which are not considered in a studio. These different problems include

Coordination meetings: These meetings develops a platform are for all the groups included in the production, communication of ideas and ensure that all of these things are developed before time for production. Hence, coordination meetings are quite important in the area of production. These includes events officials, location management and so on.

Remote survey (RECCE): A survey teams goes to the location, after the planning of how the coverage will take place. The survey team takes into consideration that what, who, where, how many and how much. The points related to these will deliver an excellent platform for production planning. Following are the main objectives of remote survey**:**

Some of the location to be identified are power, location expenditure and entry, security, food, Internet, and so on. Following is an example of form of remote survey.

Following is an example of form before project:

نموذج من أمر التشغيل

اسم البرنامج			
الموقع			
اليوم		التاريخ	
وقت الحضور		وقت التصوير	
المخرج هاتف رقم		المتابعة و التنسيق	
الملاحظات			

The single Camera on Location:
They key benefits of single camera production is that they can be placed anywhere without any challenges. Moreover, they are portable and are easily transportable. In addition, it is less costly or cost efficient and is not dependent on its environment

Figure 3-13 Displays Single Camera production

Distinctive arrangements:
There are different sizes available of single camera crews which is usually based on the objectives and the size of the production financial plan**:**

There is a huge demand for the single camera crews in several sports events, news locations as well as documentaries. The crew major focus is on the camera, the microphone and so on. Few crew members are also some times disguised as reporter.

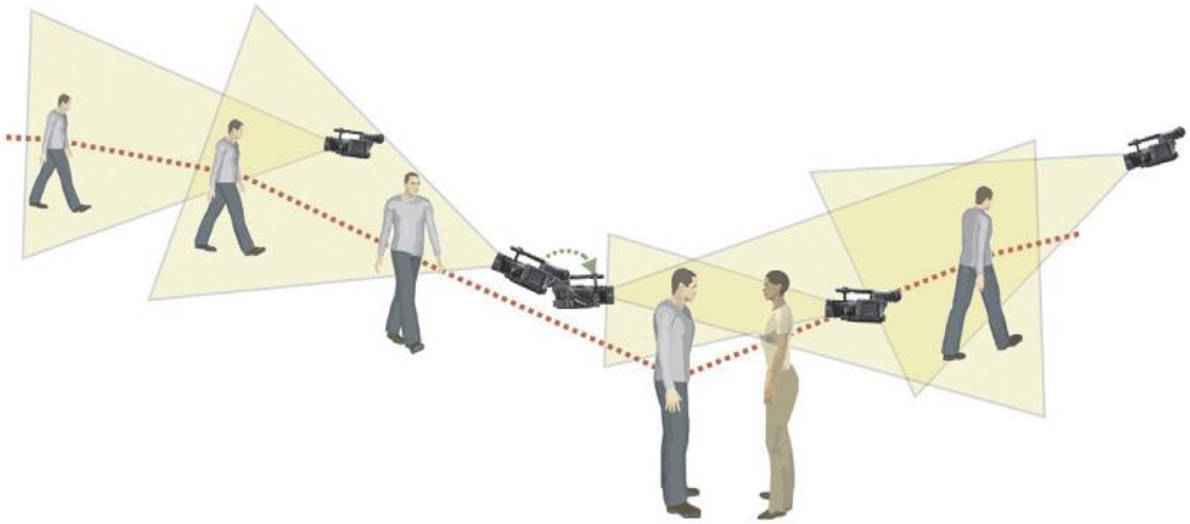


Figure 3-14 Displays single camera shooting: A chain of camera placements are quite important for the fulfillment of uneven and straight event with one camera

The two person single camera crews are constructed with the help of camera operator. The camera operator main focus is on the camera and the other reporter majorly concentrates on the audio.

Camera operator, reporter/director and audio person are used to develop the three person single camera.

Figure 3-15 Displays camera worker, a reporter and audio person are used to develop three person single camera

Single Camera shooting

Managing the Camera

Before the usage of the camera, ensure the comfort ability level of the camera before shooting. It is quite important to use the camera with the movement of your body like rotating with a pan winding with a tilt. Rotation from a center position between the start and finishing of the pan. Moreover, it is quite essential to shoot using one eye which would be seeing through viewfinder, and the other eye is seeing the other shot. Thus, this would help in the prevention of any mishaps. Managing the frame will be displayed on the monitor large screen. Different noticeable colors cannot be recognized in black and white background. Moreover, walking should be avoided during the shooting period. If walking might feel important, hence the person should just twist their legs and move rather than usual walking

Lens angles:

Usage of wide angle lens is beneficial because it has some key advantages. This lens is helps the camera to work easily and little jars are unrecognizable. Talking about extreme angle lens, it has quite disadvantages such as it might create interruptions in the main topic until and unless the topic is an individual. However,

extreme wide angle lens provides a considerable amount of area. The huge lenses constructs unstable scenes thus creating challenges. Other handheld cameras are beneficial as you can take long shots in one breadth.

Power supplies:

A power supply is needed by the professional video cameras which can be developed by batteries. Different batteries have different shapes and formations. Batteries can be located on the camera, on the area under the camera and so on. However, the major disadvantage of batteries are that if they are not properly used, then they might became untrustworthy. Therefore, they should be used properly as they would be providing key benefits. Hence, it is required to have back up batteries if other batteries does not work.

Figure 3-16 Displays (Left) the usage of batteries by professional video cameras on the back side of the equipment. (Right) Usage of battery belt by the photographer of the news event for the purpose of giving power to the camera.

Note:

<u>Battery Maintenance:</u>

Batteries are very sensitive and if they get damaged, the shooting may come to an end:

The advantages of batteries that it provides power to the shoot finder, recorder and other things related to the camera. Therefore, it is compulsory to save power in any way or turn off the camera when shooting is not being conducted otherwise it may create problems.

Managing batteries sensitively as it can fail easily and can stop any certain shooting.

Voltage of battery should be checked when the camera is on..

Batteries should be charged from time to time.

Batteries that are stored are discharged easily

Back up batteries should be stored for memory purposes inside the camera and should be viewed on daily basis

Classification check list:

Examination date: _____ Time: _____

Engineer name: _____ ID: _____

Location: _____ Signature: _____

Equipment	State (Good/bad)	Need repair (YES/NO)	Powering ON (YES/NO)

Camera(s)			
Camera Control Unit (CCU)			
Tripod(s)			
Remote control panel			
SDI Cable			
Audio cable			
Fiber Cable			
Video Switcher			
Audio Mixer			
Audio Video Router			
Monitors			
PGM and Preview monitor			
Graphics System			
Slow motion system			
Frame Synchronizer			
Distribution Frame			
Video encoder			
Network Switch			
Antenna System (if any)			
Modulator (If any)			
Talk back system			
Recorder			
Monitoring headphone/speakers			
VTR			
MICS			
Multi viewer system			
Generator (If any)			
Air conditioning system			
UPS (Inverter)			

Chapter 4 working strategy and Safety limits

Production:

The production meeting is the first and initial phase and every members are comprised in the project. The main people in the meeting are the shooter of the video, the administrator of the video, the project experts, safety officer of water etc. and the workers with a considerable knowledge of shooting, editing etc.

What is accomplished during the production meeting?

A framework is constructed that puts the facts and figures in the video and they are discussed in the same order thar is presented in the video. Moreover, with the help of this, an extensive description is typed down.

Functioning OB with the typical measures.

1. Ensure and start the generator
2. Ensure and start the UPS system of Outside Broadcasting
3. Power should be made on 1 by 1
4. Ensure Cameras balances, Iris and aperture
5. Concentration on the focus and de-focus Must check focus and de-focus
6. Ensure the connections
7. View all references on video mixer
8. View all references on audio mixer
9. View all the recorders
10. Ensure appropriate graphics
11. Ensure audio of every MIC
12. View check router and its references
13. View all features related to monitor
14. Eatery items not allowed within Outside Broadcasting
15. Ensure movement from all sides of OB whether inside or outside

All of these must be tracked by the technician and workers.

What Can Go Wrong?

- Interaction with hazards including failure of power lines.
- Injuries of staff and other public.
- Roads hindrance
- Introduction of trip hazards caused by cables.
- Using vehicles with the connection of cables
- Interacting vehicles to the center of power supplies
- Pollution caused by dishes.
- Getting into the roof of the vehicle
- Problems can be caused, mainly due to smaller vehicles

Control Procedures

Overall Controls

- Make sure the maintenance of the vehicle and whether it is able to (see Vehicle Safety Checks in Useful Documents)
- Planning is necessary for the easy fitting of vehicles in the area available. This is managed by OB management or Television EM.
- Training is required of the person functioning the broadcast vehicle.
- Keep distancing from expected hazards.
- Utilize traffic cones where required
- Be aware of the walkers and movements of the vehicle
- Help the driver in terms of parking on the location. This would be a driver or experienced man and OB sound manager or TV EM can help as per their choice.
- Drivers should not cross the time limit/ working hours.
- Construction of a protected coverage platform for the purpose of multiple vehicle productions.
- Ability to communicate with the police

Vehicle Placement

- Preferable OB workers are given the task for the placement of the vehicles which includes walkways, sides etc.
- Confirmation of no problems caused by public when placement takes place.
- Picking up of loaded items should be done under precautions.
- Workers should wear proper PPE during the deployment of the vehicle like boots, gloves etc.

Masts

- Squeezed air can create telescopic masts. Moreover, construction of pressure can be caused by the failure of the system.
- Check hazards during the process.
- Workers should ensure the mast when it goes up. If any problems occur, it should be dropped down and then should be sent for repairing.
- When mast is going up, avoid movement of vehicle to prevent the collapsing of masts.
- Keep a horizontal distance of 15m from the power lines.
- Moving a vehicle during the mast going up will create an alarm through a warning system located inside the vehicle.
- Ensure no overhead interruptions and then move the mast up. Hence prevention should be taken in the night time
- Observation of wind speed of mast functioning.
- Coverage should be finished if there is problem of lightning. (Sounds and signs within 6 miles – 30 seconds between flash and bang.
- Proper maintenance should be done of masts on daily basis and investigation related to it is conducted by an individual contractor.

Cables

- The design of cables must be made in a way that path to emergency doors are not interrupted
- Cables must be provided with security and should be cleaned if they are located on ground.
- The preferences of cable control should be: 1) fly cables must be located above people or vehicles, 2) slope cables that are unable to be glided, 3) Warning symbols should be utilized to tackle left over expected risks and problems.
- It is compulsory that fly cables should be given full support, should be above in a way that they are safe from any damage and safe from any hazard if they are located above a roadway.
- The delivery of cables must be 8' 6" (2.6m) over the walkways and 17' (5.2m) over the carriageways.
- Avoid locating the cables across a general road or a public road
- If there are no choice left, t will be satisfactory to locate the cables across roadway below a soggy mat while taking security into consideration.
- Equipping the cables should only be done through fold n the door through the instructions provided. Warning alarm will instruct that the doors are open and hence it must be ensured and checked.
- Do not locate cables on walking places. Confirm safe path inside the coverage platforms
- Provide safety to cables if there are chances of any accident.

Ladders

- A path is given to the ladders to visit the equipment on the roof of OB vehicles.
- Safety should be provided when going to the roof.
- On new vehicles, the ladder places onto particular rails that stops movement at the top. On older vehicles, safety is needed as placements are not placed there thus security is needed.
- A safe support is delivered to the user.
- Precautions should be made on the roof to prevent and damage when climbing up the ladder such as transmitters.

Electrical Safety

- Well trained staff of OB are given permission to interact BBC OB vehicles to deliver the power.
- With at least a rating of IP64, power linkages are utilized to link the vehicle with the reference of power.
- The cable linkages must be avoided from places of
- All transportable tool should carry an in date PAT label (Portable Appliance Test).
- Electrical platforms on vehicles are delivered with NICEIC certification. Copies of system diagrams and check certificate should be displayed on the vehicle.
- RCD must be utilized where electrical tool is utilized. However, they are supplied with power from OB vehicles.

- When the person is said to leave the vehicle, and other manufacturing staff is said to be inside the vehicle than it is compulsory that the person inside must be instructed how to manage the power in any emergency.

For Kuwait OB IMPORTANT – SUPPLY ANNOUNCEMENT

- **CONNECTION:**
- 2x 125A, 3P+N+E CONTRIBUTION WITH CONVERTOR
- **TYPE OF SUPPLY:**
- INSTALLATION APPROPRIATE FOR THE FOLLOWING SUPPLIES:
- **TN-S SYSTEM**
- **TT SYSTEM**
-

- **NOTE:**
- AN PME EARTHING SYSTEM SHOULD BE AVOIDED FOR THE PURPOSE OF INSTALLING INSIDE THEROOM OF BS 7671 -SECTION 717 EXCEPT:
- (i) THE INSTALLATION IS SUPERVISED BY EXPEREINCED AND KNOWLEDGEABLE AND,
- (ii) THE APPROPRIATENESS AND RIGHTNESS HAS BEEN GURANTEED BEFORE THE LINKAGE IS CONSTRUCTED FOR THE PURPOSE OF EARTHING
- **NOMINAL VOLTAGE**: 400-415Vac MAX – Frequency 50Hz
- INPUT CONFIGURATION: 2x 125A 3P+N+E
- **ON PANEL EARTHING PREPARATION:**
- **125A**– WILL LEAD THE SOCKET SUPPLYING INTO MOBILE UNIT,WITH EARTH LINK JOINED.
- **125A**– TN-S SYSTEM, WITH EARTH LINK DISCONNECTED.
- **32A** Outlet – WILL FOLLOW THE SOCKET SUPPLYING THIS MOBILE UNIT.
- **MAXIMUM DEMAND: 125A PER PHASE**

OB electrical input Cabinet diagram:

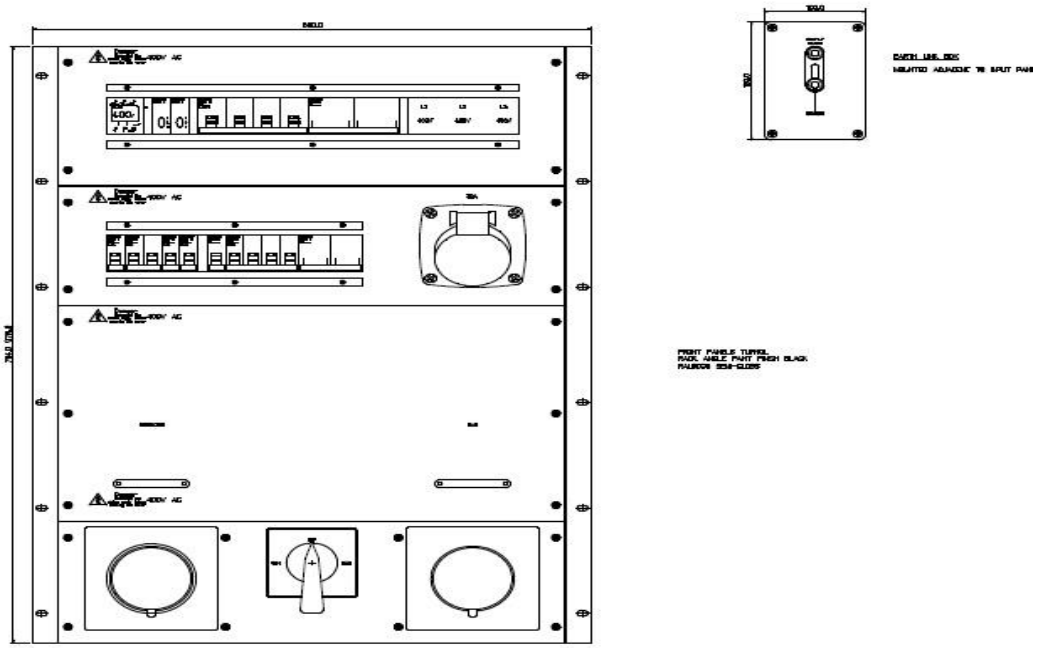


Figure 4-17 Electrical contribution cabinet (HD6)

Power Cabinet General Assembly:

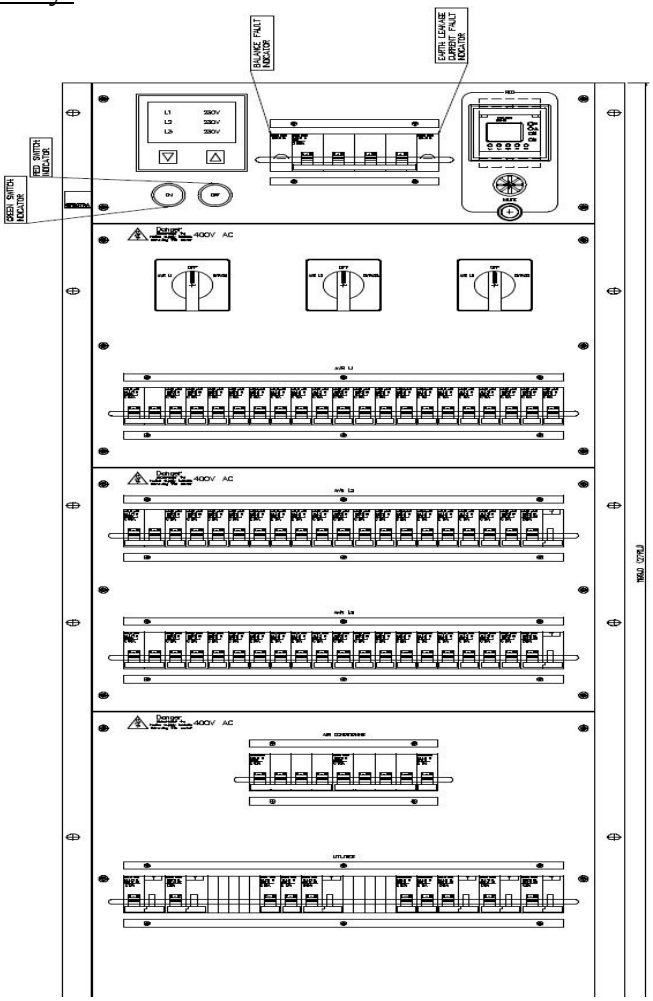


Figure 4-2 Power cabinet assembly (HD6)

DC Cabinet general Assembly:

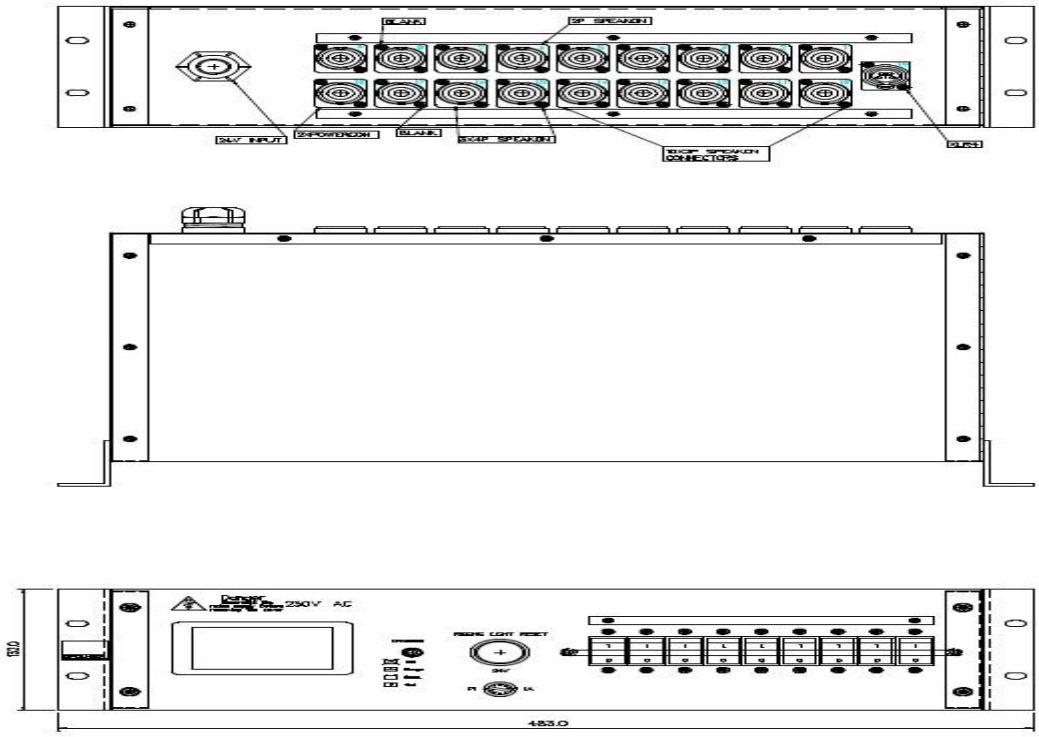


Figure 4-3 Cabinet general assembly (HD6)

GENERAL GUIDE

CAPTURING ALL VEHICLES AND CHOICES:

- BASIC OPERATION INSTRUCTIONS
- HAZARDS AND RISKS
- ROUTINE MAINTENANCE

The main objective of this to identify factors that needs daily supervision, maintenance, and identification of several hazards surrounding the vehicle.

1. BASIC OPERATING INSTRUCTIONS

It is quite significant to alert the vehicle before its usage because the foundations and other platforms are expanded to confirm that AC system has a better drainage system for the purpose of preventing the entry of water in the vehicle. Moreover, the leveling of the vehicle should be done manually or by hands by using landing or hydraulic legs and also utilization of automatic levelling system is quite necessary. In addition, continuous observation is required to avoid any injury.

IT IS IMPORTANT TO NOTE THAT LEGS MAJOR PURPOSE IS FOR STABILISING AND NOT FOR THE HANDLING OF THE VEHICLE. IN ADDITION, LIFITNG VEHICLE FROM THE GROUND SHOULD BE AVOIDED AND LIFTING PROCESS SHOULD BE DONE TO CONSIDER ANY EFFORT WITHIN THE RANGE OS SUSPENSION.

Platforms and Steps

- First step is to withdraw the platforms and finish it before the expansion of the sides.

Expanding Sides:

- (Battery isolator to be on). Obstacle recognition switched are developed to finish the side from being withdrawn with a well-recognized obstacle that interferes during the travelling that is a door and so on that could ultimately lead to damages.
- Obstacle detection platform is unable to identify light articles within the vehicle that could result in destructions during the withdrawing process.
- Before this process, the expansion side roof must be confirmed and ensured and all the things must be immediately removed present on the roof.

- Water in high amount should be removed to avoid any power of water on the end part of the vehicle.

Confirm that all workers know about the expanding side and must be observed on daily basis.

Doors And Lockers:

- During the working of the manufacturing tools and AC system, it should be confirmed that the doors should be closed to guarantee best surrounding situations for the tools and the workers.

Electrical Linkages:

- Confirmation of the well condition of the leads before connection.
- Confirmation of the well condition of the sockets before connectivity.
- Installation should be viewed on yearly basis be an experienced electrician.

2. HAZARDS AND RISKS

Careful at long heights

- Be careful during entry and exit from the roof
- Be careful during entry and exit from the platforms
- Initiating roof banisters.
- Maintaining AC components after the removal of lids.
- Creating entry phases and platform banisters.

Careful with pinch factors

- Positioning roof ladder
- Functioning cable rollers
- Positioning platform, stages and banisters
- Effective slithering desks
- Enlivening and removing floor traps.
- Cabinet gates consists of gas helpers starters.

Overall Care

- Continuous observation needed during the movement process of the vehicle.
- Continuous observation needed during the side movement.
- Entry and Exit from the vehicle
- Entering and closing cabinets
- Visit to cabinets under the expansion of the side.

Electrical Tool Observation

- Observation of plugs and sockets
- Observation of electrical tools before utilization.

3. ROUTINE CONSERVATION:

Bodywork

- Ensure stiffness of the platform at 6 monthly periods
- Lubricate belt pivots at 6 monthly periods.
- Lubrication of door handles and locks at monthly periods.
- Ensure pivots and bolts for stiffness at 6 monthly periods

AVOID GREASE BECAUSE DEPORTMENTS ARE CLOSED

- The inside of the vehicle should be observed on yearly basis to prevent and problem or damage.

Platforms

- PTFE spray should be used on monthly basis for the cleaning of platform.

- Observe banister functions on monthly basis
- PTFE Spray should be used to clean the sliding channels.

Air-conditioning (custom built)

- AC roof pods should be investigated on weekly basis. Cleaning of drainage bars is must by throwing water out when required.
- Cleaning of air filters components on the basis of 6 monthly periods.
- Washing of air filters from inside a 6 monthly periods.
- Inspection of airline with the help of condenser and evaporator at every 6 monthly periods.
- Following the manufactures guidelines and conducting the service.

Air-conditioning (typical off the projection structure)

- Investigating AC pods on monthly basis and washing the dust filters as well as drainage bars.
- Washing dust filters with the help of air con components on monthly basis.
- Signifies production functioning guideline interlinked with daily maintenance.
- Signifies a single guideline interlinked with automatic functioning of louver at the delivery of air for working in cool atmosphere.

Growing Side:

- Ensuring no problems with floor connections and neat aluminum platform on monthly basis.
- Ensure the functioning of the platform on monthly periods.
- Ensure inside and outside seals on 6 monthly periods.
- Investigation of micro switches on the basis of 6 monthly periods.
- Use PTFE spray for lubrication of the remains.
- Use PTFE spray for the lubrication of floor monthly.

Electrical:

- Ensure the supply connections.
- Ensure electrical linkages for the stiffness purposes on yearly basis.
- Test to be conducted on electrical connections on yearly basis.
- Ensure batteries on weekly basis.
- Ensure acid level of battery on the basis of weekly periods.
- Ensure fire warning feature on weekly periods.
- Ensure security system on monthly periods.
- Ensure functioning workers alarm on monthly periods.
- Ensure working of explosion restraining structure on monthly periods.
- Ensure urgent lights on monthly periods.
- Ensure no problems are there with the structure on monthly periods.
- Ensure RCD performance at monthly periods.
- Delivery of a earth station, earth cable and point for the purpose of connectivity.

Compressor:

- Ensure compressor oil condition on weekly periods.
- Drainage of air reservoirs on daily basis.

Hydraulic Structures:

- Ensure oil condition on weekly periods.
- Ensure no oil leakage points on 6 monthly periods.
- Signifies to production guideline for extensive details.
- Maintenance provided by experienced hydraulic worker on yearly basis.

Heating:

- Maintenance is provided in guideline book on 12 monthly periods.

Generators:

- Avoid on and off under load
- Guideline book should be consulted for the purpose of working and functions.
- For vehicle platform, earth cables are delivered to join the vehicle framework when the power is delivered from the generator.

VITAL ANNOUNCEMENT:

Avoid pressing the on button of the generator in any cases. The switch must be closed and when pressing the on button, make the generator to become cool before giving any burden to it.

OVERHAULING:

As per the producer advice, it is conducted by a knowledgeable individual.

Tall Lifts

Servicing should be done according to the producer instruction as mentioned in the guideline book.

ANALYSIS

Must be conducted before annual periods for profitable lifts and 6 moth periods for customer lifts

Customer: INC Kuwait
Job Number: 5464
Chassis Number: SA9DEPSP5ES178034

26/01/2015

This installation, or part of it, is protected by a device which automatically switches off the power supply if an earth fault develops. Test quarterly by pressing the button marked 'T' or 'Test'. The device should switch off the supply and should be then switched on to restore the supply. If the device does not switch off the supply when the button is pressed seek expert advice.

IMPORTANT

This installation should be periodically inspected and tested and a report on its condition obtained, as prescribed in the IET Wiring Regulations BS 7671 Requirements for Electrical Installations.

Date of last inspection 30/01/2015

Recommended date of next inspection 30/01/2016

chapter 5 Engineering

Simple Video Engineering

Terms:

Black stage:The black power in the video

Camera system:Regulating the wheels within the video circuitry.

Color pieces:A chart used as a source to correctly change the camera's colors.

Gamma:Changes the sound of the video.

Genlock:Regulating the clock of pulses to push them into a remote source.

Time-base corrector (TBC):Tool that delivers instinctive reimbursement

Vector scope**:** Oscilloscope ensures the color consistency of every phase of the video.

Video gain:The intensification of the camera's video indication,

Waveform monitor:An oscilloscope constructed to control the video sign.

White balance:Method standardizing a camera for the purpose of reconstructing the light in a consistent manner.

BACKSTAGE

Functioning of TV engineers is divided in three phases:

■ Maintenance

■ Structure

■ Shielding

Maintenance

A base used to confirm that everything is functioning according to the requirements. Sometimes, the components can be removed as well as repaired.

Camera Arrangement

It is quite compulsory to locate the camera within the technical area for the purpose of good quality pictures. Moreover, it is required to design episodic regulations before the practices and before shooting. In a single camera, picture quality might not be ensured however in a multi camera, differences can be observed. In the camera arrangement, camera is connected with CCU and its regulations are changed by hand using some test tools to guarantee the vision of the monitor color bars. In addition, range of charts are also taken into account and are estimated on scopes to determine good quality.

Figure 5-18 CCU are utilized to arrange the camera for the purpose of shooting

TEST APPARATUS

Waveform monitor as well as the vector scope are the most popular test apparatus utilized by the engineers and the producers now are designing a tool that involves both

WAVEFORM MONITOR
An oscilloscope constructed to control the video sign. It also ensures some error to avoid any kind of problems.

VECTORSCOPE
An oscilloscope used to determine the color consistency of each phase of the video. For this color bars are utilized to determine the consistency of the color.

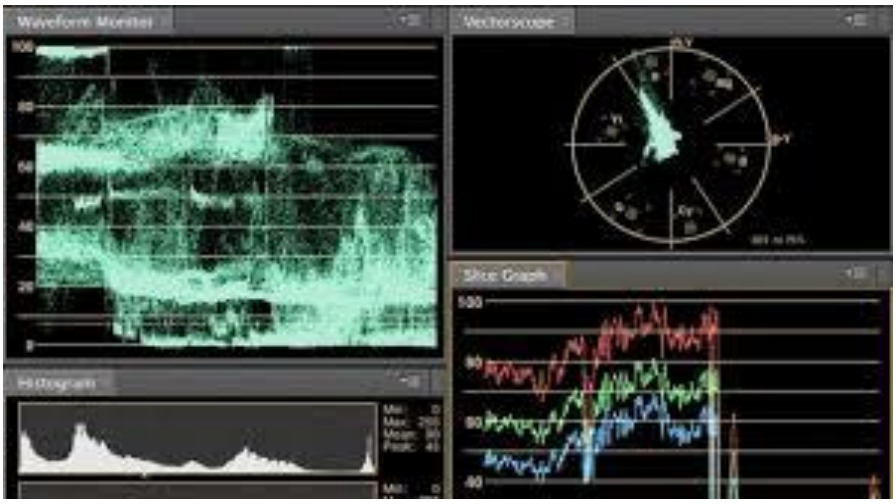


Figure 5-19 Outlook of vector scope

For the purpose of camera arrangements, monitors and vector scopes are taken into account.

VISION MANAGEMENT
The execution of effects and lights can lead to the construction of surrounding image but it is quite based on the qulaityn of the video camera and the arrangement of it. Skills and experience is needed for developing pictures that are eye grabbing and gains attraction. Moreover, the management of the camera should well-handled otherwise can lead to problems such as problems with lights, pixels and tone thus effecting the scene. A well image is highlighted by good tones, attractive lights and cabinets. However, if the camera is not well regulated, then it is better to delete those scenes that delivers bad results. Thus for this, the construction of window gel is quite favorable.

"Image handling" is quite compulsory for a good quality video symbol form tools such as cameras. It is better that all tools must be well managed. Following are the three ways to manage a TV image

Predetermined Modifications
For the purpose of no light challenges, the structure is therefore modified.

Programmed Mechanism
It talks about programmed modifications but the major challenge is that it is does not always constructs good quality image.

Manual Mechanism
Management of the image quality is done by an experienced worker. Every part of the tool is managed and reviewed which leads to the production of good quality picture.

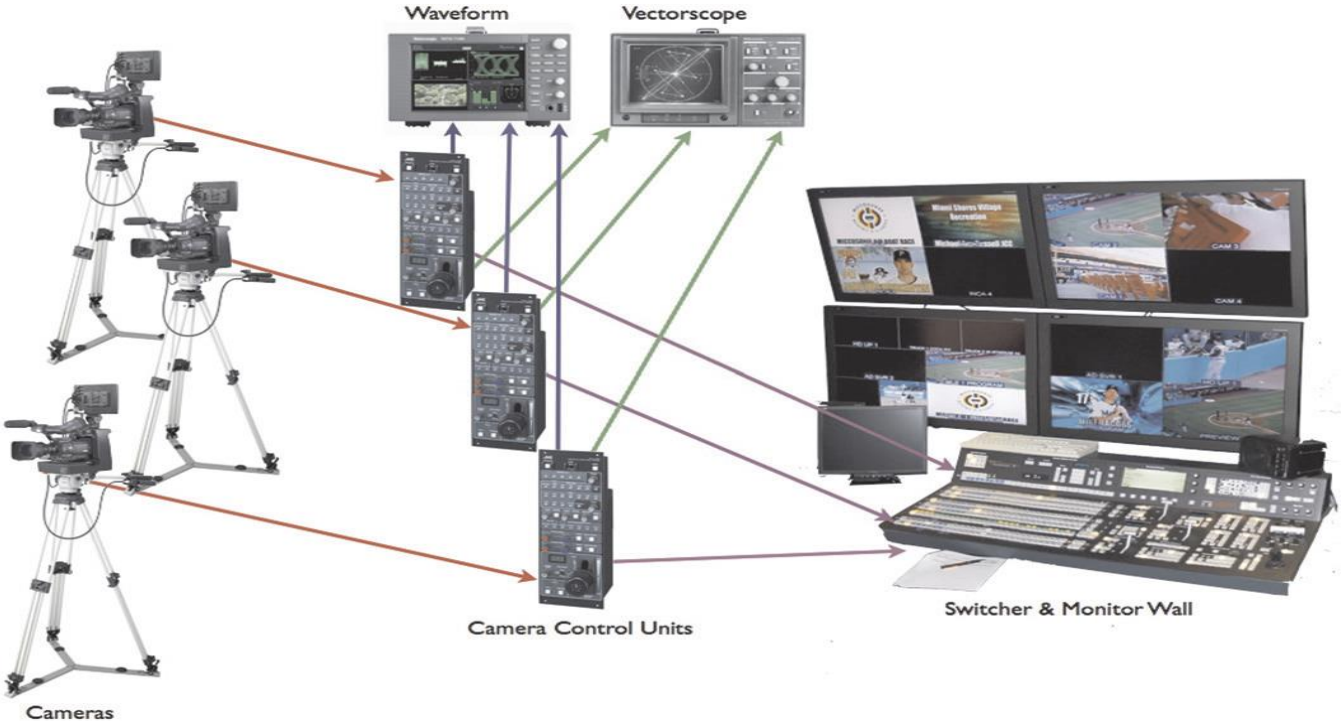


Figure 5-20 Movement of video signals to CCU

COVERAGE AND COLOR MECHANISM

The coverage favorable for one camera placement might not be favorable for the other. Right coverage can be linked to biasedness. Unless a surface is rough, its brightness can alter significantly as we shoot it from various angles.

- Smooth light structure delivers less attractable pictures, thus experienced workers avoid it.
- To access the extensive details of the lightning structure, correct video changes can deliver them in a proper manner.
- Revealing the picture will assist in increasing a dull scene.
- Not required color results can be improved by modifications in camera color.
- Biasedness of colors will improve the environment results. This can be done by utilizing filters, less blue cards and so on.

Matching foundations: Many electronic structures have arrived to match video references that are not dependent. The first was gen lock that regulates the pulses timing and push them into remote source. However, the problem is that the tool used will fail to match structures after a long time. References of recorders also creates another difficulty that with the replay, the matching procedure becomes irrelevant. Moreover, this would lead to loss of colors and problems with the image. TBCs and frame matching are utilized to match the video symbols and matches data from video components. Frame matching is used to match real video symbols for example camera.

Figure 5-21 usage of blue cards to level the color system that leads to a bright picture

chapter 6 Lighting

Terms

Barn doors: Flaps of metal that manages the falling of light in a particular scene.

Diffuser: Glowing item that decreases the intensity of the light.

Flood light: Less dim light coming from cloudy sky.

Incident light: Light quantity going towards a theme.

Lighting plot: Planning of where to position the light.

*Spotlights:*Rigid lighting that constructs harsh images.

Three-point lighting: Usage of spotlights and one flood light to brighten the theme

Zebra: Camera workers analyze the image that has been visible.

OBJECTIVES OF LIGHTING

Following are the objectives of lightning:

■It should be lively to cause the TV camera to create good quality images. This is also known as base lighting.
■Lights must deliver the time, story and so on to the audience.
■Lights should deliver an accurate appearance selected by the director.
■It should stay with the other units such as studio, location etc.
■Attractive lights constructs 3D system in a smooth picture.
■ Lights must decrease the ratio of the dim and dark areas. By giving more light in the dark area or vice versa, it leads to the gaining of extensive details in both locations.

IMPORTANCE OF LIGHTNING?

Technical Reasons

Camera requires little quantity of light to construct good quality image. If there is less light, the depth of the scene decreases. However, if there is lighter, it shows the image until the lens is closed to decrease the light. More light causes power wastage, more problems and less satisfactory working conditions. TV camera can manage only less amount of light. The lights at a particular place might not be favorable. Seeing from the point of view of camera, it might:

■Much clear: Bright sunlight leads to contestants to uneven their eyes.
■Much dim: Less for well clear scenes
■Much smooth: Dim lights in which themes are not clear
■Much distinction: light tones are fired out and shadows becomes black.

THE LIGHT OUTLOOK

Brushes can be utilized for the application of light. They can be cleaned during the scene and their important attributes can be highlighted. However, to manage this, a person must use good words for the refinements of light. Following are the key of brightness:

Power of Light:The power of light needed on the environment and other themes will result in the importance of the amount of powerfulness and the location that has to be covered.

Heat of Color:It is important that light and the camera should hit in a same direction for a good color quality image.

Spreading of Light:Light references can construct rigid light which leads to creation of powerful glooms. Some light references construct soft light which creates few glooms.

Path of Light:Path of light knows that which attributes are important and which are pushed in the gloom. The power of light is the quantity required to bright an area. For example, a person utilizes powerful light to take action and background into account. Structure of the camera are known for being sensitive. However, it is usually based on the environment and the nature of the director. Considerable amount of light is required to find the details on the wall. It can be based on flat and rough surface or on white or designed walls. Amount of dressings can also effect the brightness of the light. Thus lightning cannot be effected by watts of lightning.

chapter 7

How to read diagrams and some practical issues

Regardless of whether it is an old or present day outside communicating vehicles, or as a rule TV/radio studio everything being equal, engineers depend on single line diagrams (SLD) to follow electrical parts that guarantee appropriate upkeep and security rehearses. Goes about as a guide of an appropriation framework or electrical association with a vehicle or studio as a rule, SLD connectors for documentation, converters, overcurrent protection devices (OCPDs) and other electrical gadgets and wellbeing instruments to aid numerous territories of plan and upkeep while diminishing disarray.

SLD is a distinct advantage for computing short out flows, deciding particular coordination and, at last, ascertaining mishap vitality - or even changeless and transitory exchanges, making it one of the most significant security reports at the removal of the office. Albeit essential to the office's protected activity, SLDs frequently don't get the consideration they have the right to accomplish the ideal outcomes.

NB:

- Keep the current SLD and plan for UpToDate
- Take due consideration with getting ready and keeping up SLD reports
- On the off chance that you cause changes to the framework of your electrical framework, to make certain to update the illustrations.

single line diagrams (SLDs) for outside broadcasting have many uses, including but not limited to:

* Detecting problems by following them up and tracking them through the diagrams.

* Connect, cut, mix and in any case, do new increments to help total work without limits, and remember to record what have done.

* By building the diagrams, we can fully control the audio and video sources. Such as separating audio from video or video from audio, etc. Also, there are many different applications.

❖ One of the viable applications:

It is good to take a trip to the ground as we are in actual order:

Often at events, matches, etc., It is necessary to take a video or audio or both of them so that anther channels can take the video without increments, for example, print, comment or TV logo, this is called (CleanFeed) (CLN).

So the realistic and logical developments are as follows.

* Complete information and visualization of what is expected of you as an OB engineer.

* Refer to the design of plans and identify which plans will be used. Moreover, keep track of what you need to do with it, and get it done, no matter if it is with Video Patch Panel (VPP) or (CTP) of OB.

* By following the video diagrams, you will see that there is in the output of the video mixer what is a CLN, which you can control through the video repair panel (VPP)

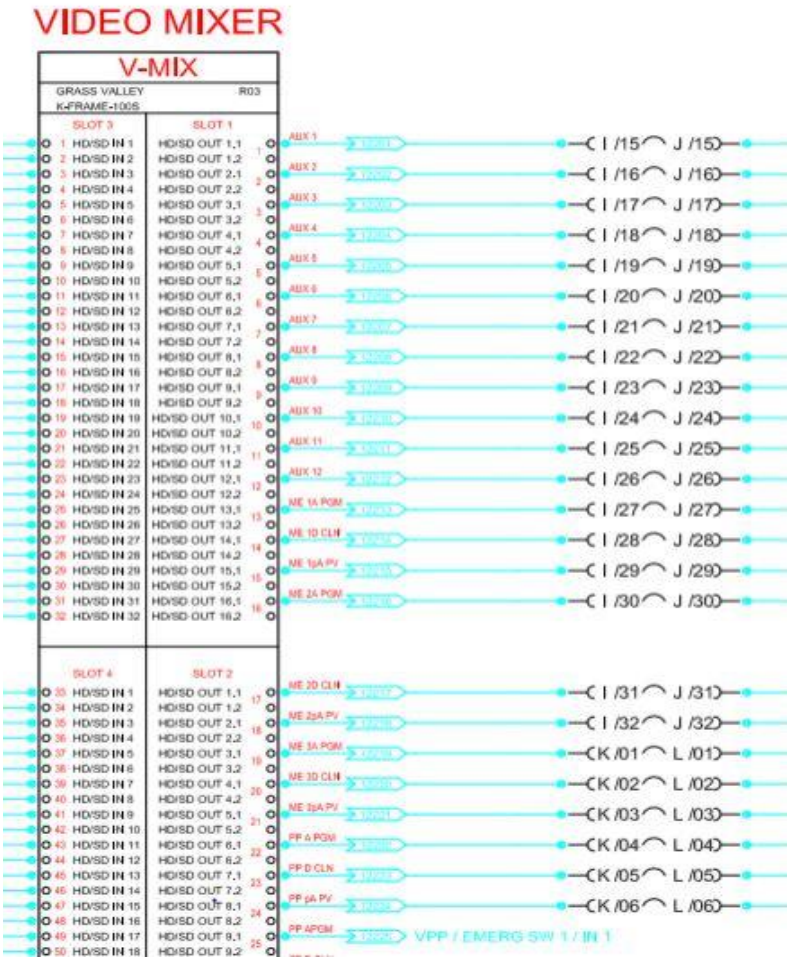


Figure 7-22 HD6 SLD

- You will see that the K05 is connected through (patch panel) with L05,
  what you will do is cut this link through the PP and link it again from K05 to free point CTP, let's choose V01 from the video patch panel (VPP).

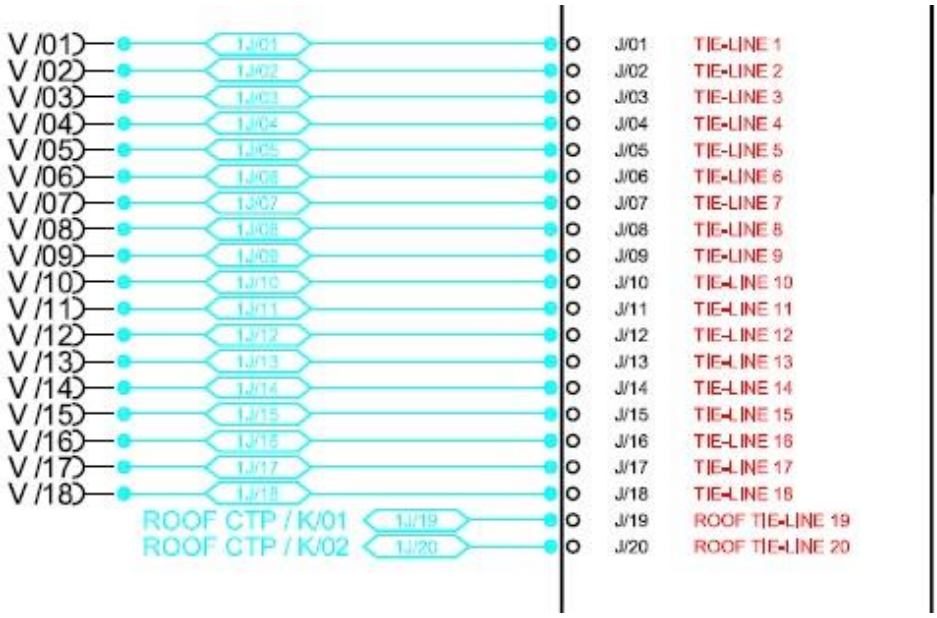


Figure 7-23 HD6 SLD

* will see from the diagram in your grasp that the V01 is linked with one of the focuses outside the vehicle CTP called J/01 in the TIE-LINE 1.

At long last, will get a spotless feed without any problem. Along these lines, the OB engineer can completely control the SLD. total representation and the ability to implement, we will have at our disposal a wonderful and unique work.

Again, in simpler way, and to make the short story shorter:

- Find what you want, what is meant here is CLN.
- Through PP, connect K05 to V01 - If available -
- V01 in PP denotes J/01 (TIE-LINE 1) on CTP, take the output from it.

❖ Other viable applications:

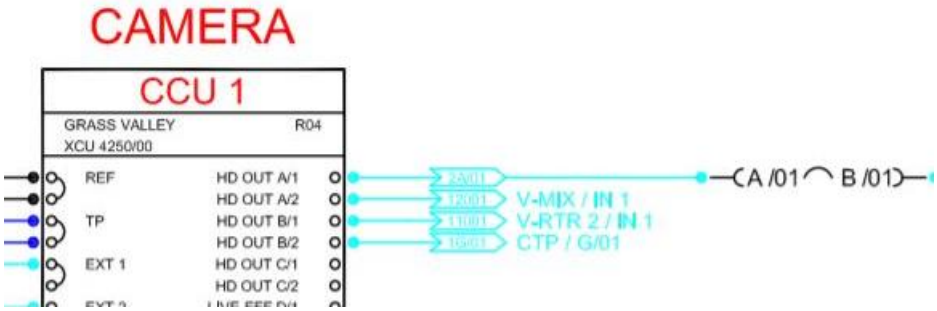
During filming, the broadcaster may need to have a monitor in front of them during shooting, so that they can see themselves for various purposes.

So, assume that Camera No. 1 (CCU1) is the one that shoots the broadcasters and is installed in front of them, there is more than one way to display the shooting through the monitor, and let's take the way to take it through the OB outputs.

Through the diagrams, and from the above mentioned points, let us start working to get the desired result:

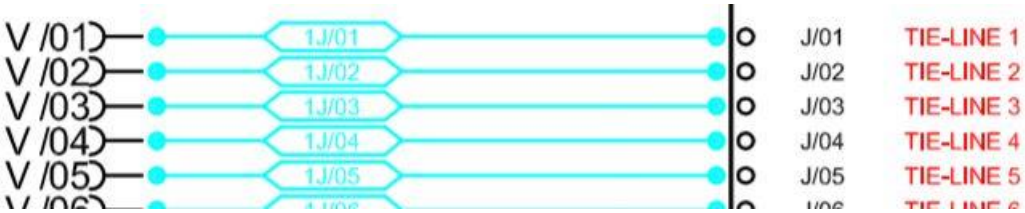
❖ By following the video diagrams, you will see that there is in the outs of the camera – CCU1 is a HD OUT A/1, which you can control it through the video repair panel (VPP).

❖ You will see that the A/01 is connected through (patch panel) with B/01.



❖ what you will do is cut this link through the VPP and connect it again from A/01 to free point of CTP, let's choose V/02 from the video patch panel (VPP).

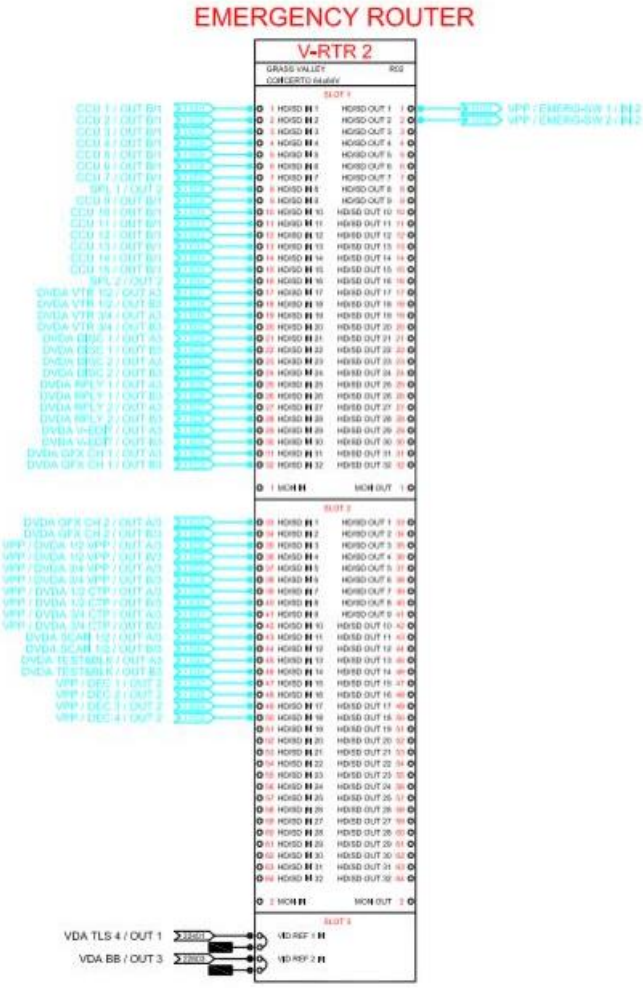
❖ will see from the diagram in your grasp that the V/02 is linked with one of the OB's CTP called J/02 in the TIE-LINE 2.



Emergency Router, Emergency switch...

In emergency cases; Especially in cases of breakdown of the vision mixer.

Switching is done either manually; Or automatically for vision mixer. - you must see the diagrams of the OB to consider the mechanism - then the vision mixer. Moves/changes to a mixer with limited capabilities until the defect in the vision mixer is fixed.



- How to switch:
  Via the glue system; Or routers, there are certain cards - often indicated in the Diagrams - that are involved in managing that fault.

- Point to point explanation:
  vision mix.: A - ChangeOver - C
  Alternative way: B - ChangeOver - C.

Once A is down, B will be activated

Section 2: RADIO OUTSIDE BROADCASTING

Chapter 1: Introduction

Radio is known for the communication via radio waves. By the help of radio, the data is transmitted in the coded form and the information can be conveyed from one place to another without wires. Shortly, people got aware of the methods that were used to build a radio transmitter and the receiver because the technology in building such devices was straightforward. The amateur radio operators started broadcasting messages within range, therefore in 1992 the regulatory government measures incurred on them and license was required with limited broadcast ranges for the purpose of radio operations. (white, n.d.). This regulation set

certain powers for the president as the president could exercise the power of shutting down the radio stations. It was guaranteed that during the world war I the non-proficient radio administrators didn't interfere with the military utilization of radio waves during the war and the president of United states used this power of shutting down the radio stations.

Broadcasting:
The distribution of audio and video content to a scattered audience is called broadcasting. This distribution takes place by the help of television or radio. The contemporary advancement in technology has brought many different types of content distribution in radio broadcasting. That is why we at the present have the choice of turning into more types of radio stations and this was not the case before. (Anon., n.d.).

Analog Radio:

The two fundamental types of the analog radio are:

- Amplitude modulation
- Frequency modulation

The above-mentioned terms are not used for the purpose of referring to the entire station but refers to a specific transmitter.

Figure 8-1 Analog Radio

The long wave bands are used by AM radio that comes with the frequencies lower than that of the FM band. The peaks of carrier waves are made bigger or smaller –this process helps in sending a radio signal. The size of waves (used in the process of sending a signal) is called its amplitude that's why this procedure is known as amplitude modulation. Whereas in frequency modulation, the frequency of the carrier wave is varied in accordance with the amplitude of message signal. The amplitude of carrier wave is not changed in frequency modulation but the frequency is varied.

Digital Radio:

As amplitude and frequency modulation uses analog signals, digital signals are used by digital radio. The songs and the speeches are sent through the air via digital radio as strings of numbers. The signal almost gets through with the help of digital radio no matter what comes between the radio and the transmitter—that is the reason digital radio sounds better.

Internet Radio:

The transmission of audio service via internet is termed as internet radio. Unlike other mediums which have limited coverage, the internet radio can include the music or speech to a large audience. This concept is also referred to as web casting. The services of radio are accessible from any part of the world, only suitable internet connection is needed for this purpose. For example, a person is able to listen to American station even if he/she is in Europe. News, different genres of music, sports, talk are the services offered by internet radio.

Community and National radio:

National radios are those radios that have the reach nationwide. The audience of the national radio which are the listeners in this case are almost from every corner of the country. We can take the example of radio 1 and radio 2 of the BBC (these are the national radio stations) (Anon., n.d.). Whereas community radio's main focus is to deliver its services for the interest of a particular community. The programmes in community radio are broadcasted in local dialects and they are relevant to the interest of the local audience. Local

people often broadcast their own programs and participation is made by them in operating the station (Al-hassan, 2011). Rural development can be made possible with the help of the community radio because various problems such as poverty, gender inequality, proper education and other social problems could be the main focus of the programs.

Satellite Radio:

In this type –Broadcasting reach to a wider area with the help of satellite signals sound. The programs that are relayed by satellite radio carry greater sound quality. Two businesses named XM and SIRUS got their license by federal communication commission (FCC) to produce a radio version of cable television – interested fact being that this was to be done without cables and SIRUS are subscription services and they broadcast several digital audio channels. (Bonsor, n.d.)

Functioning of radio station:
There are three wings in the radio stations and those three wings are:

- Engineering wing
- Administration wing
- Programme wing

Among the above wings program wing and engineering wing have the responsibility of running the boarcast of the radio station.They have to monitor and maintain the techniqual quality of the station's boradcast. (Neelamalar, 2018). The adminstartive wing role is to provide the necessary support require for the proper functioning of radio station (Anon., 2011).

The adminstartive department is responsible for looking on the matters such as Human resoruce, business and accounts areas as well as Public ralations. The program director leads the program department and looks at planning , research and then the production of programs.

Staff at radio:

Radio stations staff is explained below:

On air talent:

DJs are included in on air talent. It is not necessary that DJs are the regular staff in every radio station

The radio programmes are presented by Radio Jockeys. Whenever they have to play certain music, they first give a brief introduction about it. Content (what is being said) and style (how it is said) are the two important components in the transmission of information. Both of these are under the control of the speaker.

Categories of DJs:

There are three types of DJs (Kohli, 2006) which are as follows

Low profile DJ:

In low profile jockeying the importance is placed on music and the DJ has very little to say

The specialist DJ:

In specialist jockeying the specialist DJs are expert in their areas of music. They give definite remarks about the music they play.

The personality DJ:

Personality DJs communicate personally –a brief narration of music is given by them and they create a sense of friendship with their listeners. Narration, quiz questions and phone calls are included by personality DJs

Production directors and program executives:

The duty of program executives is to supervise programs. The programmed of which they are in charge—they have to do planning and they are responsible to take care of all the stages of production.

Qualities of a radio Producer:

Radio producer has to be creative so that he can arrive at new ideas, new programmes and concepts. Similarly, he/she must have good observation –The radio producer's quality is to improve the own program by learning from the other's program. Radio producer should have good managerial skills in order to plan for the future and to execute the things in proper time so that the production proceeds successfully.

Types, participants, effects of radio on life. The radio producer has the eye of error from which he/she is able to sport the mistakes in the programme. (Neelamalar, 2018)

Radio Production Stages:
Radio program production is divided into three stages – first there is pre-production stages, then there comes production and last post production stage. All the stages have several factors that need to be addressed for program to become successful.

Pre-Production Stage:

Whether the program is going to be a documentary, a feature or a music program an idea is formed first to start from the scratch. After idea is formed there comes the plan of action and the producer further expands on the idea. A music program is what is decided in the plan –this plan is further expanded as whether the music will be classical or it will be a film music program. (Neelamalar, 2018)

Script writing:

To get in depth details, research is the requirement in the pre-production stage. There are different formats that can be followed for a drama such as a semi script format or if there is live broadcasting there is announcement and speech—the script is made according to the format of the program.

Contracts/paperwork:

When you are working with people who do not work in your radio stations, it means you are outsourcing and for this purpose you have to make contracts.

Production stage:

This stage includes all the activities of recording and editing the program to give it a final touch and make it ready for the listeners. The transmission takes place directly in the live program so there is no recording there. All the efforts which are put in the production stage and the results that are produced in this stage are dependent on the efficient planning of in the pre-production stage and if it is done right in the early stage than the program runs smoothly (Neelamalar, 2018).

Post production stage:

All the activities or examined again in the post production stage and if there is room for any adjustment whether in the cutting of unnecessary information or if sounds need to be cut off. Errors are deleted in this stage and the errors can be over speaking, repetition or mispronouncing. A good program can get unnoticed by the public therefore efforts need to be made in doing the publicity of the program. There should be a continuous reminder about the content along with the date and time of the program so that it sticks in the mind of the people and eventually become the cause to tune into that particular program once the desire for listening is aroused by the help of publicity.

Elements of radio production:
There are certain elements of the radio program by the help of which a program becomes successfully presentable to the listeners. The elements of the radio production ae discussed below:

Studio:

That room where the radio program is recorded is known as studio. As we know that in the radio program listeners depend only on the sound that is why sound must be clear and if there is distorting sound or the sound that is poorly assembled than the listeners will lose interest and ultimately they will not listen to that program because it will create un uncomfortable situation for the listener (Moyo, 2018).

Figure 8-2 Studio

Because in radio program listeners have to just rely on sound and they create visualization accordingly in their minds while the sound is playing in the background. If sound is not clear than how can visualization become possible? McLeish (2005) in his research states that in order to produce a radio program, there must be sound proof studio in which the voice of human could be made possible to record in finest manner. Audio-mixer analogue that is digital or wholly computerized is included in most studios which is important in controlling the level of volume and various program sources are mixed together with the help of this device.

Microphone:

For the purpose of voice recording, a device called microphone is used. Microphones can covert sound energy (acoustic energy) into electrical energy and in this way, voice is amplified by using a microphone (McLeish,2005). Microphones are known by the directivity and on the basis of directivity they are divided into three types and the types of microphones are:

Uni-directional microphone:

The sound is picked from a single location in this type of microphone. When a person speaks in front of it, the voice of that person is picked up. This type of microphone is used by news presenters and announcers in the radio studio.

Bi-directional microphone:

As the name suggests, sound being picked up from two directions in a bi-directional microphone is useful when recording an interview. Sound is picked up from every direction with the help of omni directional microphone and as the name suggest this type is useful when there are number of voices in a radio program such as in radio drama or a radio discussion.

Figure 8-3 Uni-directional microphone

Figure 8-4 Bi-directional microphone

Sound Effects:

The artificially created sounds or the sounds when enhanced are known as sound effects and they are used in the artistic work in order to express or emphasize an action or a particular feeling as well as mood. Sound effects can also help listeners to imagine the location of a story that the program is presenting. Realism to the program is added by the help of sound effects. (McLeish,2013). There are two ways in which the sound effects can be used and these are spot effects –these are created the person speaks and then there are recorded sound effects also that can be used to create certain emotions. (Housley ,2018)

Music:

Music is termed as to be the soul of the radio. When instrument and vocal sounds are combined that can help in the expression of emotions. Music can also be used for the purpose of signature tunes for particular radio programs as well as for the purpose of theme music for those programs. (McLeish ,2013). Color and life are added by music to any spoken program, scenes and location can be suggested by music and monotony can be broken by the help of music.

Other elements:

Beside the other elements discussed above there are number of other elements such as human voice –that is the voice of the presenter which is spoken in the microphone when script is written and the good quality of presenter attracts the listeners. Then there is distort (this is produced with the help of technology and covers different voice). We can take an example here –if a person is speaking from a mine and that mine is 100 feet below the earth than to make this sound realistic the effect of distort and artificial echo is used.

Writing for the radio:
The script is written down earlier and the person speaks by looking at that script. The person (speaker) talks to us and he/she sound friendly and we found ourselves at ease when we are listening to the radio. The words in the radio are referred to as the spoken words like they are called printed words –when the medium

used to convey information is print media. Printed words are composed for eye while spoken words are composed for ear.

Key things to kept in mind:

When the radio script is being written it should be kept in mind that it is not being written for the readers but it is being written for the listeners .The listeners should be able to understand your words because they will listen to your words for once. (Hörfunk, n.d.). While people are reading newspaper they can read the words or sentences two to three times which they don't understand .Similarly , information can be processed by the readers at their own pace .Some people just need to scan the article and others are slow readers .But for the radio , the speaker has to identify the pace and everyone needs to listen to and understand everything . (Hörfunk, n.d.).If unfamiliar words are used and listeners stumble over those unfamiliar words –they will not be able to follow the train of thoughts and the speaker can lose the attention of listeners .

How it should be done:

The script for radio is not literature and in the context of the radio , simplicity wins .Logical structure and simple , clear words are necessary in order to get the information across .The script for the radio should be polite , informal and direct .When writing radio report it should be thought of as you are trying to convey your message to one individual—i.e. your neighbor .Now how would you start to tell a story to your neighbor ?What words would be used to talk to your neighbor? What is the first thing that you would tell your neighbor and what things will come later? If you consider this phenomenon of talking to your neighbor , you would be able to target your presentation to one concrete person and your tone would be much more direct unlike the situation when you don't imagine that one friend or neighbor that is listening to your story . (Hörfunk, n.d.).

Short sentences:

Researchers have examined that listeners find it difficult to understand when the words in a sentence are more than 15. In this way the listeners will forget what was said at the beginning and they will be unable to understand the end because they forgot the start.

Synonyms, abbreviation and foreign words:

Synonyms can often confuse the listeners and this can be the cause that listeners don't understand anything .For example if the script is being written about US military of defense and the related word which is Pentagon, is used than it can create confusion .As the listeners who are not aware with this word would not get the idea that the speaker is talking about US military of defense and they will lose track because they couldn't understand the situation .

Redundancy is good in radio:

It is said that in literature redundancy is not good and words or sentences should not be repeated as it does not give a good impression. But when it comes to the radio it is always better to repeat the exact words (and not the words that are used in relative to them) two to three times so that listeners of the radio should find themselves at ease to understand the scenario and don't lose track of what is being said.

Facts and figure:

Radio is not the right format to convey numbers or figures because while reading people can clearly note down the exact figures and distinguish in between several figures because they can go back and forth for checking them but when it comes to the radio , only two to three main figures should be used and the rest of the figures should be left out for printed or online articles. Figures should be rounded off when they are being spoken, for the ease of understanding (Hörfunk, n.d.). For example, instead of saying that 8123 people have signed a petition against the new law, it could be better if the speaker says that over 8000 people have signed the petition. Similarly, instead of saying that 50% you should use "half".

Comparison:

Since we know that radio is all about visualization by the help of spoken words .Whatever the speaker says , listeners visualize according to that .So for the purpose of ease when objects sizes are talked about –there should be a comparison with certain things so that it helps in creating a better image .For example if the

speaker is talking about the size of building , instead of stating the size in square meters , the speaker could say that the size of the building is relative to the size of a football field .But the important thing is that some listeners might not know what the football field .For this purpose while writing script , audience frame of reference should be kept in mind i.e. what things they know and can relate to . (Hörfunk, n.d.)An easy approach can be that two to three comparisons are made so that listeners could easily catch the visualization part. Similarly, active voice must be used because it makes the script livelier, and passive voice on the other hand sounds boring and wooden.

Quote:

While writing script, it is easy to put quotation marks at the start and end of the quote but while speaking that is not the case. The listeners may find it confusing where the quote started and where it ended that's why it is better to clarify by saying "quote" for the starting of quote and "end of quote" when quote ends.

The structure of script:
The script should be structured in such a way that it clears all the details about a particular topic. Structure of radio script is designed as:

- Strong introduction
- The main facts (Some important questions)
- Details
- Background information
- Summary/conclusion

Advantages:

Radio is a portable medium therefore one can listen to anything while that person is on the move and unlike television the person does not need to stay at one place and devote special time to it.

Cost:

It is easy to set up a studio room for the person who is new into it, you just need a spare room to start with. For a basic studio the equipment which is needed is mic stand, laptop, internet connection, USB mic and headphones. (Shenton, 2018)

Reach and frequency:

A lot of people listen to the radio from any medium and radio's reach is huge. In 2015 a survey was conducted that the number of people who listen to music are continuously increasing. Several million individuals in Australia tune in to a business radio broadcast for each one hour of the week. (Hetherington, 2018)

Target audience selectivity:

Messages can be localized and tailored to a particular audience by the help of radio. Advertisers can deliver messages and design them for particular demographics and community as well as for specific geographical area. So, every single radio station is operated on the basis of the particular target segments in mind.

Frequency:

For advertising to get noticed frequency is the most important function to kept in mind, because in order to listen and pay attention to the advertising it is necessary that people are at least exposed to the message3 to 4 times after that people would be able to recognize or recall the message. So, if this frequency level is to be maintained radio advertising as compared to other form of advertising is cost effective .People listen to the radio 15 hours on average each week . (Hetherington, 2018) that's why it is good option to advertise on radio because it will cut down cost which a television advertisement can incur.

Educational benefits:

With help of radio it was made possible to distribute information in large segment of people. In the area of distance education radio became popular as an educational tool and its effectiveness was proved by the

number of studies. (jkendell, 2012).Students were able to see the broader spectrum of the world around them by the help of radio because students were exposed to several worldly views

Disadvantages:
There are certain disadvantages associated to radio as well for example permanence lacks in the radio. For example, you are seeing an ad in the newspaper you can crop that part and save it with you on television there are rewind options as well but on radio once you missed any part of the message you have to wait for that advertising to come again , let's say you miss any number that was being stated and couldn't note it than you have to wait for the next term .

Audience attentiveness:

While portability is an advantage associated with radio it can be the factor for poor audience attractiveness as people when listening to the radio will not be attentive to a great extent towards radio. If a person is driving a car on the radio, he/she will not stop to enter a number or the person who listens to the radio while performing work related task than that person is very much focused on the task to be completed. (Eser, n.d.)

Creative limitations:

While playing any advertising on television one can play with different creative elements such as aesthetic visuals and mixing up of different visuals to create a pattern but in radio these opportunities are limited and at the same time advertisers task is to let the audience focus on the message which could get quite hard for them . The main task of the advertisers is to play with the sound because there is no imagery option with which the advertisers can play with.

Radio Advertising:
Ad times are split into day parts by radio stations. One can choose to show the ads exclusively in particular day spot or have an equal distribution of ads—the radio station will switch up what day and at what time the ad is to be shown .One advantage of doing this is that a person may get prime time ads for less rate than the option of showing all the ads during the peak spots .

Prime time:

Morning time from 5 :00 am to 10 :00 am along with the afternoon time from 3:pm to 7:pm are the times that are expensive to buy and this goes true for almost every station but there are discounts on six months or annual contracts which are mostly up to 5%. (Kobliski, 2006).The audience of radio is divided into many age ranges and the age ranges vary from 18-34 ,25-54 or 35+ and it is also divided on the basis of gender . So, people can select those stations which they think cater the target audience according to the message they want to deliver.

Frequency of ads:

Frequency is an important term whenever we think of an advertising. It is common practice for the listeners to tune in and out and change stations. Meanwhile they are engaged in some sort of other activity at the time when the radio is on that is why the message must be appeared several times for the people to hear it .Listeners who are associated with the country and the talk formats stay with the same station for a longer period of time than the listeners who flip through channels on a continuous , so one need to run a few commercial in order to reach those settled listeners rather than to run for the flippers. (Kobliski, 2006)

Radio rating:

There is a device call portable people meter of PPM—a black, pager like device which is referred to as the real "ears" of audience measurement. Tons of data points are collected and they are then weighted to precisely represent both genders along with the age ranges in any given radio market. This system is universally accepted as the standard by which we impute listenership credit. (Lipsky, 2016) It's also accepted as being more reliable and accurate than the old way of asking people when they were asked to remember and write down what radio stations, they listened to in one week.

Figure 8-5 Current PPM Equipment

Radio formats:

A format is selected by the radio stations on which the programs are based on –this describes the overall content of the radio station or a radio program. Some stations chose to run manifold genres but some stations have specific tone and style which becomes their signature. (Halbrooks, 2019)

News, sports and talk:

Rather than music, news and conversation is featured by these types of stations. Local or national news is announced by them with the sports coverage. The radio talk is considered to be the oldest format of radio. To welcome specialists or individuals who are noticeable has been a custom. The individuals who are invited are welcome to represent 10 or 15 minutes on a specific subject. Radio talks request to be intriguing and educational and not something which sound boring. (Halbrooks, 2019)

Religious:

This type of programming has popularity in certain areas. Spiritual content is highlighted by the religious station programs. Different demographics are targeted by programs.

Radio interviewing:

There are four ways of an interview that are:

- Informational
- Interpretative
- Emotional
- Documentation

Informational interview passes information to the listeners, in an interpretive interview, questions are asked by the interviewer by supplying facts and interviewee then comments and give explanation on those facts. In emotional interview human feelings and interest are highlighted rather than interpretation.

Radio Documentary:

A radio program that is devoted to cover a certain topic in depth and by the help of a mixture of sound pictures and commentary is known as documentary program. (Chatterjee, n.d.) It is referred to as the voice documentation of a particular event .These type of programs are based on written records, facts ,interviews and authentic sources .The main objective of the radio documentaries is to inform and its face value must be honesty .Single events with details are dealt with in documentaries .Documentaries can cover many subjects such as political , social ,cultural ,economic and educational problems as well. It can also include biography of a famous person.

Radio drama.

Radio drama is termed as to be the theater of mind. (Verma, 2012).To make a picture in hearer's mind – dialogues , background sound effects and instruments keep harmony .All the words and sound that is used in the program must provide exact pictures. Words and sound tyrannize instead of facial expressions or actions. Radio drama is a pure acoustic performance that is broadcasted on radio. In general, there are 3 to 4 characters in the radio drama and the voice of these characters must be distinguishable so that listeners don't get confused.

Radio commentary:

To be a radio commentator it is necessary to have a quick memory and a lot of background information is required to be a commentator. Because if preparation is done then spoken words get authority. Before speaking in a program, the commentator might need to go the place of the action, a day before the program. In radio station, a question arises that who should allowed to write and who could write he commentaries. It is evaluated whether only senior editors are qualified enough to share the views with the people listening the or is there a possibility that a young journalist might be allowed to do commentary (Hörfunk, n.d.). So, there is this rule of thumb that it could be anybody who qualifies for this purpose can write commentaries but it is necessary to have expert knowledge about the topic which is in question.

Radio Outside broadcasting:
The broadcasting done outside the studio at the location from where the programme is being covered is done by the outside broadcasting team. They cover the event a and the signals are processed in the Outside broadcasting truck from where it is recorded and transmitted to the studio or directly to the radio receivers. This all outside the studio process is called outside broadcasting.

FIGURE 8-6 RADIO OUTSIDE BROADCASTING

It involves certain staff, factors, conditions and equipment which is discussed below.

Factors for outside broadcasting:

While pulling off an outside broadcast, a certain ideal condition is required. A clear broadcast needs certain environment. Some of the factors that are necessary for an outside broadcast are:

- The local noise conditions in the site. This is a necessary factor for a clear, quality and undisrupted transmission.
- The layout of the broadcast that how do we want it to conducted or directed.
- The public involvement required should be check, if there are adequate people not more nor less.
- The equipment is in working conditions.
- The crew which is going to help in the broadcast.

Radio Outside Broadcast Engineer:

The Outside Broadcast (OB) Engineer works outside the studio on the location in order to provide the coverage of the event to provide picture and sound, only audio in case of radio. This work includes the coverage of sports, music and cultural events and also the movies and dramas. He is skilled and has the knowledge of coverage, audio, camera, lighting and all radio transmission and networking systems should come under his expertise. He should have a brief knowledge of workplace safety and problem-solving skills like any engineer. His job is technical supervision and direction of the time to bring maximum creativity required for the production. To produce the required content for the certain targeted audience in the most

influential way while keeping all the constraints of the site in mind. In short, he should be a team player and have great communication skills.

Radio OB technician:

Outside broadcast technician (OB) sets up and operates all the equipment used for the broadcast and transmission of the radio and television programmes. Following are some of the tasks under the job description of outside broadcast technician:

- He maintains the electronic media in right condition so that everything is in working conditions. His job description also includes audio controlling, the regulation of volume and sound quality during the broadcast.
- He has to operate radio transmitter to make broadcast successful and error free. He maintains the programming details as required by management and FCC (federal communication management).
- He maintains strength and clarity of the both incoming and outgoing signals.
- He co-ordinates with the station technician to make the clear transmission successful.

Radio OB crew and truck:

All the outside broadcasting members who are providing the coverage of a certain event include the OB crew and they usually travel in a van or truck which is referred as an OB Truck. It contains all the equipment and necessary facilities need for the broadcast and to manage a production system at the site. Below is an OB truck shown.

FIGURE 8-7 RADIO OB CREW

Outside Broadcasting truck:

The three types of vehicles that are used for the outside broadcasting by BBC .They were first launched for the purpose of Big weekend (Smith, 2010) that is music festival run by BBC radio every year .In Europe it was the biggest ticket free festival that took place every year .In 2018 a fee for ticket was set up .The three type of vehicles used by BBC are explained as below:

Music:

These types of vehicles are the articulated trailers that are designed for the purpose when there is the need to work on complex music shows such as at a festival's main stage or last night of promos. (Smith, 2010).

Characteristics of music truck:

- These are 40ft trailers
- One of the few music trucks which BBC made in 2010 had 48-fader StagetecAurus control surface
- Similarly, BBC had a truck with mixing console (SSL C200), fitting of which is done with Stagetec Nexus core along with; 2 stage boxes with sixty-four channels of mic inputs each.
- These vehicles have the capability of mixing the music events that are most complex
- Fitted with vast outboard processing equipment, these trucks have area for editing and have portable rigging (system of cables and ropes) system as required.

Figure 8-8 The editing area of music vehicle

General purpose vehicles:

Majority of work from simple shows to the second stage of the festival can be carried out by these types of vehicles. General purpose vehicles are 30 ft trucks that are equipped with Stage tecAurus, stage tec Nexus core along with 4 remote stage boxes which have 16 mic channels each. They also have GPIO and video Madi capability, each of which is connected with military grade fiber optics to the van. (Smith, 2010).The vehicles are fitted with several different replay and record format devices that includes multitrack. The mixing console sits on a sliding support structure to maximize the space available in the working area for a non-critical mixing work or to grant access to the rear of the console for maintenance purpose. The music and general-purpose vehicles have substantial acoustic treatment both in terms of sound isolation from internal treatment and sound outside to ensure a good listening space. This is so that the vehicle could be used to create an accurate mix when there is a noisy environment –let's say a close proximity to a stage at a music festival.

Figure 8-9 Mixing console (SSL C200), Outside broadcasting vehicle –BBC

Production Vans:

The unequipped mobile spaces that can be used for the purpose of:

- Mixing area
- Production office
- Studio or anything else that is require

Production vans are based on an Iveco van chassis and these vehicles have no broadcast equipment permanently installed. Production vans have analogue radio; mains distribution, AES, video tie lines as well as air conditioning.

Control measure related to OB truck:

It is to be ensured that the vehicle is up to date with safety inspections and servicing before the use. To make sure that the vehicles will fit into the space available there needs to be done –high level of pre planning. This task is usually done by the engineer manager or the outside broadcasting sound manager. (BBC, 2020). All the people who are operating the vehicle must be considered competent to do so and they all must be trained. Assistance must be available to the driver when necessary, while the vehicle is to be parked on site – especially where pedestrians are in the vicinity. It is to be ensured that the drivers of vehicles don't exceed their working hours (as set out in the road traffic act).

Deployment:

Trained outside broadcasting staff is allowed to deploy several parts of a vehicle when it is parked. While the deployment takes place, is must be ensured that all the members of the public are kept clear. Heavy item which required lifting must be moved with due care and if necessary, more than one person should do this task.

Cables:

Cable across a public road should never be done in any circumstance. But if there is any exceptional circumstance than private roads and entrances can be cabled across using trunking/matting –when it has decided that it can be done safely and risk has been assessed . (BBC, 2020). It should be avoided to place cables on pedestrian areas. Where any collision or trip is likely to happened –cables and ramps must be covered in that case.

Ladders:

To have access to the various equipment on the roof of outside broadcasting trucks, ladders are used. Climbing on the roof should only be done with the correct access equipment and with full cautions. Every ladder is built according to each vehicle's designed -purpose and is built in such a way that a secure support and a secure handhold are available always to the user.

Dishes that are placed on vehicles:

The direction and height of the dishes normally prevents the likelihood of anyone being exposed to noxious levels of non-ionizing Radiofrequency (RF) radiation. Consideration should be given to antenna's side lobe performance when aligning an antenna. Generic directional antenna's diagram is shown below:

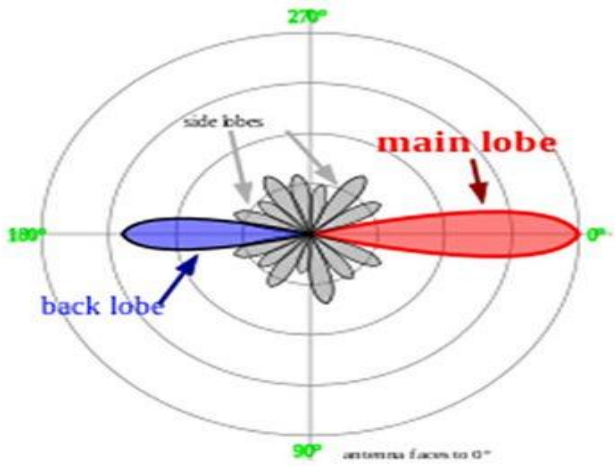


Figure 8-10 Dishes that are placed on vehicles

Electrical Safety:

Trained outside broadcasting staff is only allowed and considered to be competent to connect OB vehicles to the supply of power .The competency level is matched with the outline of BS7909;(Code of Practice for the Temporary Electrical Installations in the Entertainments Industry) (BBC, 2020). An earth loop impedance test must be carried out by the site electrician or OB capable person before connecting to a source of power. This is important especially when connecting to a TN-C-S supply which is sometimes called a PME supply. The power connections with at least a rating of IP64 would be used only to connect the vehicle to the source of power and all portable equipment should carry an in date Portable Appliance Test (PAT label). If the electrically competent person is to leave the vehicle for example during meal period and the production staff need or wants to remain in the vehicle than it is required that one of the people remaining with the vehicle is provided knowledge about instruction on how to depower the vehicle in case of an emergency as this is the requirement of BS7909.

How Radio Works?
All the pictures, data, music transmission, conversations are transmitted over a huge distance using Radio waves. All of this has revolutionized the way the society operates. Some of the gadgets that work on radio waves include cordless phones, the toys which are controlled remotely, receivers that work over GPS, Ham radios, Satellite communications, Police radios and much more.

The Simplest Radio:

You would be surprised to know that by simply using a 9-volt battery and a coin i.e. you need to connect the coin with the terminals for an instant and remove it. By doing this multiple times, you will be able to generate a specific frequency of radio waves that a device called Amplitude Modulation can receive. Radio can be immensely simple. Take the battery/coin pair near an AM radio, tune the radio where static is heard. When you hold a battery near a metallic device known as antenna, you will need to swiftly tap the ends of battery, by doing these proceeding you will be able to hear a sound known and called as a crackle sound which refers to the connection and disconnection of the coin.

Basic Parts of Radio:

Nowadays, the radios which come in the market make use of the recurring sinusoidal waves to transmit all of the data i.e. audio plus video. You can alter its frequency to differentiate from radio waves coming from different source.

When you think about what the radio system will consist of? The answer to this is that it only needs two main parts:

- A transmitter

- A receiver

The former part takes input of data (that may be the sound of some human or anything else), encodes it into a specific frequency sine wave and transmits it. The latter part catches those radio signals and decodes what it has received. The radio signal is transmitted and caught using pointed strings known as antennas.

Real-life Examples:

1) Everybody is familiar with the baby monitor in which a transmitter is fitted in baby's room and the receiver is placed inside parent where you can listen to the baby. A typical baby monitor has the following important characteristics:

- Transmitter Power: 0.25 W
- Range of the frequency: 49 Megahertz
- No. of frequencies: One or 2
- Modulation: AM (Amplitude Modulation)

2) A device is a cell phone as it has both a receiver and a transmitter which can be used simultaneously with many frequencies and has a feature built-in to switch between different frequencies automatically. Characteristics of a typical analog cell phone

- Transmitter Power: 3 W
- Frequency Range: 800 Megahertz
- Number of frequencies: 1664
- Modulation: FM (Frequency Modulation)

Simple transmitters:

The easiest way to understand how transmitters work is to know how the stream of electrons pass through a wire when connected to ends of battery. The moving electrons create a magnetic field around it which is directly proportional to the voltage supplied to it which is significant enough to affect the other wire that is placed near it at a distance. This changing magnetic field induces a current in the other wire for every change in voltage that occur in the first wire.

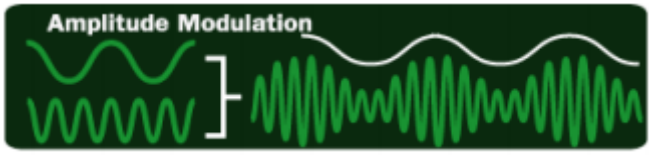


Figure 8-11 Amplitude Modulation

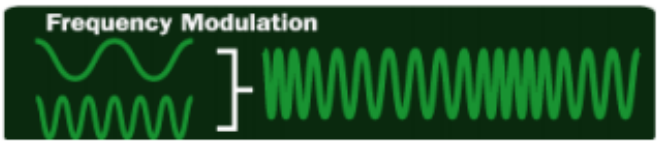


Figure 8-12 Frequency Modulation

Receiving an AM Signal

How does your car receiver receive signal? For example, you set your AM dial in your car to 680, how does this 680,000 times repeating signal converts into sound? Here are the following steps:

Your radio receiver has an antenna, which is usually a wire or a metal stick that is used to increase the interaction of the area which interacts with the transmitter signals. After the antenna, you will need to have a tuner, the tuner basically separates one sine wave from a jumbled radio signals that the antenna receives. In our case, it will be 680,000 Hz signal. The principle on which this tuner work is known as resonance. Tuners resonate and amplify only the particular signal of that frequency in the air. It is usually very easy to make a resonator with an inductor and a capacitor. Now, the only thing that is left is to extract the DJ's voice which

is accomplished by detector or a demodulator. After which the decoded signal is fed to an amplifier after which the sound is heard from the speakers. Following are some of the devices used for the radio broadcasting:

Audio mixer:

An audio mixer basically takes input from analog sources through many channels, adjust its levels and other characteristics of sound and then produce an output. Mixers are basically used in four types of areas:

- In a Live event (sports, concert etc.)
- In a Recording studio
- For a film or drama on Television
- For broadcasting an audio.

Digital mixer:

It is a type of electronic device which mix, route and converts the dynamics and equalization of many input signals which are audio based by using analog circuitry in computers. The signals are processed in digital form. A digital mixer generally has 96kHz frequency and 48 input channels. Several faders, stereo mixes, 64ch I/O ports, 8 soft keys are included in its system. An LCD display is also available.

Mixer for sports:

the sport mixer has 16 channels, 2 stereo inputs along with 12 mic inputs too available for the commentator's mics etc. High quality connectors, stereo monitors and built in FX modules are present.

Shotgun Microphone:

A shotgun microphone is used for the radio broadcasting. It is one of the most directional microphones as it needs to be directed to its target source of sound for perfect recording. They consist of unidirectional microphones so that the beam of concentrated sound can be used for recording. It is highly immune to humidity and have high feedback rejection. It has hypercardiod at low and medium range frequencies.

Wireless microphone system:

This includes the transmitter and receiver system explained above.

Wired microphone:

These microphones are easy to set up as compared to the wireless system. They have on/off switch. They can give high quality noise rejection, high quality feedback and natural reproduction for sound.

Instrumental microphone:

Th instrumental microphone are usually the industry standard based microphones which produced high sound quality. Its frequency response ranges from 40-15000 Hz. It can provide professional reproduction for instruments.

Microphone stand:

A free-standing product which holds the microphone. It helps the positioning of the microphone in the studio or a place which can hold the device without the person himself holding it. Mostly a straight strand is preferred.

Headphones:

These are usually a pair of small loudspeakers which are worn by the user on head and the sound can be heard only by him. They are basically electroacoustic transducers used for conversion of electric signal to sound. Closed and over ear headphones are used in broadcasting systems. Bass reflux, softness and robust are sone of the characteristics desirable in headphones. Speech intelligence and high sound quality are necessary for broadcasting.

Distribution Amplifier:

A distribution amplifier basically known as a splitter is a core component of a multi-monitor system. Now if you have got a situation where you're in an arbitration or a very short trail where you basically are plugging

in an iPad or a laptop directly into a projector and then just shooting an image onto screen, you don't necessarily need one of these but most of courtroom setups, where not only image is shown onto a projection. They also need to duplicate that image onto counsel table monitors sometimes even on the witness stands or to the judges. So especially if we have multiple parties like if we have a four-party trail where each party has its own input and its own counsel table monitor. You need something that's more robust than just what's on the back of the projector which is the distribution amplifier as shown in the picture below.

FIGURE 8-13 EZ-ADA4 DISTRIBUTION AMPLIFIER

It is basically a case encapsulating two devices that really work in conjunction. This is a device which allows you to plug in multiple devices of multiple formats and sends out a uniform image to whatever you want to send it to in this case, we have the ability to use HD based T inputs, VGA or HDMI. We have total of 6 different input options and that's going to send a signal to the splitter and it does by an HDMI cable so the switch connects to the splitter via HDMI cable and then the splitter has the ability to send out the signal through all the ports given on its back to multiple monitors.

There is also an option of HDMI OUT which usually used to send the image directly to the projector. For the projector, normally they are kept really close to them, a one-foot cable is sufficient. For monitors which are almost 40-60 feet away, the HD based T is used which sends a long digital signal along the length. The reason why it is called a Distribution amplifier because it amplifies the signal so that way it can be sent a long distance and also distributes it. In some cases, on the back of some projectors, the only output is the VGA OUT so some people end up thinking that they might connect a whole bunch of monitors using VGA cables that way but if you connect HDMI input to a projector that only has a VGA OUT, the HDMI signals are not going to be distributed. So, it is a must to use a Distribution Amplifier in this case.

Power amplifier:

Power amplifier is the last block which is used inside the transmitter before antenna and we can see from its name "power amplifier", it amplifies the power and increases the amplitude of the signal.

FIGURE 8-14 POWER AMPLIFIER POWER AMP Q3000

What is the purpose of this? Why do we have to amplify the signal? In LNA part, we said that when we send the signal, a part of its power is absorbed by the environment and so at the end when it reaches the receiver part it will have a lower amplitude and lower power so actually our power signal is attenuated by environment so that the solution is we have to increase the power of signal at the transmitter part as much as we can and that's why we use power amplifier. We can increase the power of signal and we want to be sure that whenever power reaches the receiver part, it will be detected by receiver and actually this power amount, this power value depends on applications, it changes when we have a high and long distance like mobile maybe or radar. We need high power at the transmitter so that we can amplify the signal to even higher extent at the transmitter part whereas for something at close distance such as Bluetooth, we don't need to have a high transmitter power.

We can manipulate the frequency by changing the inductance and capacitance of certain circuits in order to make sure that the power gain is maximum. So, for power amplifier we have active and passive components like transistors and inductor capacitors and we can tune them and we can reach the desired output value i.e. maximum desired gain that we want. RF amplifier can tune up to desired range of frequencies. We can have a power amplifier which operates at a single frequency or we can tune power amplifier to operate with in a frequency range or band starting from f1 ending in f2. Power gain of amplifier is always limited at high radio frequencies. This is one of the challenges of the design when we increase the power, when we increase the frequency, our power decreases. We have to be careful about that, that's one of the reasons that actually limits us when we are trying to design a very high frequency amplifier, we suffer from this kind of drawbacks like a low power gain so where is the place of power amplifier in our system. We have a transmitter and receiver block so here we have a mixer local slater filter.

As you can see that the PA is the last block and we connect PA to the antenna and here imagine that at the end of this block it means that at the beginning of the power amplifier we have a signal which has low power and this is the input power. We use power amplifier in order to amplify the signal and have higher and higher power and later, this signal will be conducted to antenna to be transmitted. For example, we have 1-watt power for GSM but when it's like Bluetooth sometimes we have like 0.1-watt power at the output of power amplifier. Let's see some requirements and the most important that we want inside our power amplifier, this part drive the antenna transmitter as you can see in this picture.

We also have a filter but we have to know that this filter is the part of power amplifier and generally we call whole of this thing power amplifier. We also have a filter and matching at the input of this power amplifier so what is the purpose of this filter? Imagine that we have a power at the output of this power amplifier so we call this like P out but if we connected the output of power amplifier directly to the antenna so what we see from the output of this power amplifier here, is the input of antenna maybe 50 so if we do something like that we won't be able to get enough power because this is not a matched case so this is a wrong idea so what should we do? We need a filter or this filter actually the matching network so we put this filter between the power amplifier and antenna actually this filter is designed to transfer the maximum power from our power amplifier to antenna so by putting filter, first of all, we are making the conditions here for example, now if we have a filter we can make the input as it in the input impedance of this filter the optimum impedance which is seen from the power amplifiers that opt so that's the reason we have to put the filter here in order to have the optimal impedance or otherwise if we connect this to antenna, we won't be able to have the optimum impedance at the output of the power amplifier and we will not have the power that we need.

SD Card Recorder:

After a long recording of broadcasts, there is need to store all of that into some unit to keep it safe and for later use. So, for this, we need to have a device that can store all of this data. The device is "SD Card Recorder". It normally comes with two types. One, the portable SD Card Recorder. Other, the Solid-State SD Recorder. We will have detailed explanation on both below.

1) **Portable SD Card Recorder**

It is basically a box incorporating capsules that a purely interchangeable and with the passage of time they can be swapped out with great ease. Each of the recorded scenes is stored in it in the form of tracks. This particular portable SD card recorder can record up to 6 tracks simultaneously and effectively. For the input terminals, 4 mic or input terminals can be attached to it with suitable connectors that are basically the XLR/TRS combo connectors. A display can also be attached to it i.e. Large full-color display. It is angled in such a way that it is easy to read in all environments. The main feature that distinguishes it from the solid-state recorder is that it allows the direct writing on SD, SDHC and SDXC cards extending the space up to 128 GB. It has variety of options to write into it such us 96kHz audio in BWF-compliant WAV or variety of MP3 formats. You'll never miss the perfect take because it has features of Pre-record, Backup-record and Auto-record. We have some multitrack to stereo mixdown internally. This device is commonly used because it comes with Virtual VU meters. The question pops up in everyone's mind that what are these VU meters and what do they do? It is basically a device that is normally used to measure the power levels of audio frequency signals with great accuracy.

The VU meters make use of the special ballistics that calculates and average out complex wave forms to clearly indicate program material that varies simultaneously in both amplitude and frequency. We can take its feature to test which can dub it up to 99 times using the feature called Overdubbing. The main difference between overdubbing and multi-tracking is that a live recording that is happening at some place is usually incased to capture all of the happenings and all of the sound events that are emerging from a single platform, which is done without overdubbing. Whereas when we talk about the recording in multitrack, we imply to use the combination of all the sound sources that can be merged together to make a sound which incorporates every sound cohesively as a whole. Overdubbing is the combining a new performance with the existing recorded performances. In the past, we had separate devices to do separate chores but due to this new technology named Portable SD Card Recorder, we can do all of the stuff it on the same device due to its built-in effects which includes low-cut filtering, compression and limiting.

We can also decode all of the audio and video formats onboard with MS decoding. If you want to play some videos that are on back all the way in the storage unit, you will need to use the A/B loop playback which allows the user to play any type of audio or video continuously over and over again. With the evolution of easy data transfer through the USBs these days, the SD Card recorder comes with the USB port which allows the user to exchange the data smoothly to and from the computer. Moreover, we have a vast multichannel with in-built USB stereo audio interface for PC, Mac as well as iPad. For mounting of some devices onto it, we have camera straps that allows the fitting to be very easy. Lastly, comes its power consumption which is highly essential to be very effective in every case. It normally runs on AA alkaline batteries or sometimes in case of the prior batteries to be unavailable, it also works on NiMH rechargeable batteries. The time for which it works on 4 alkaline batteries is estimated to be over 20 hours in one recharge.

2) **Solid State SD Recorder**

Unlike portable SD card recorder, this one has 4 channels for the input, 2 less than the previous one but that does not mean that this is not as powerful. It comes with ¼ inch combo jacks that have 2 microphone inputs with XLR phantom power. It has duo lines i.e. RCA lines of input and output with stereo feature. Talking about the formats on which it can store data almost remains the same as the previous case, it supports both the WAV format also the MP3 recording formats. It also comes with the battery bank feature that allows it to work after the power shutdown i.e. keeps recording all of the stuff even with no constant supply of electricity. The battery type remains the same, the AA alkaline battery but it does not work on the Nickel batteries on which the portable SD card recorder was able to work. The card variations that it can support are reduced as it can only use cards of SDXC model extending the memory space up to 128GB.

The distinctive nature that makes the Solid-state SD card recorder stand out is its feature to file divide. It can divide the file into several portions for it to be loaded and executed with greater speeds rather than the slow execution when done in bulk. It also makes a copy of the audio while recording at a lower level for a clear and distortion proof track due to the function named Dual recording. The recording that have been recorded can later be played at variable speeds and formats without altering the pitch of the video in which it was captured. The main disadvantage of this recorder is that it comes with the ¼ stereo headphone output which makes it difficult to be versatile in this world of technology because nowadays numerous devices are being produced that use the standard 3.5mm headphone jack. For the footswitch control, it has a partially remote jack which makes it easier to control.

Active Speakers:

This active speaker consists of a two-way and a bi-amplified sound wave. It is a highly optimized active system. There are several worthy features such as FR series 300 which is a built-in feature. If we look at the precision of the device it is in terms of 24dB per octave. This is a very high level of precision. A low frequency transducer is present with a very long range. The output precision is also kept very high by using a driver based on titanium compression. For attaining the maximum dispersion, a high quality of studio is maintained. for time correction electronic controls are present and phase alignment and equalization. The woofer gives the servo feedback. It is portably built amplifier-based loudspeaker.

Portable System Rack Case:

Since you need all of the equipment to be portable, you need to have a system rack case that can incorporate all the of essential devices within it. It is basically a rack sized around 19 inches along with the pop-up rack at the top. The outside body is constructed by a material that is durable to all of the stress during transportation as well as should be light-weight which is primarily PVC exterior plywood. Now for the handles, it has spring-loaded and the recessed latches with rubber-gripped to be held firmly. It has main rails that are basically in the front and at the back. It needs to be dust proof, shock proof, water tight and as mentioned before light in weight. Some of them have heavy duty springs inside them that serves as to absorb all of the shock. The handles also need to be flexible enough for easy lifting to stage and trailer, so the handles are also spring loaded.

Screen Monitor

To display all of the broadcast, you need to have a screen that is big and clear enough to be viewed by the audience. Some of the requirements that the big firms have are that their screen resolution is the 10-Bit OLED which is the clearest up till now with the resolution of 1920 x 1080. The main parts should include series and parallel remote ports. The design needs to be portable and should be able to have OSD and Vector scope waveforms.

Tone Generator and Cable tester:

The cable tester is a basic device for cable installers or anybody working in telecom or LAN situations. It permits you to track cable, discover a brief or breakage in non-powered wires, and perform wire mapping on RJ45 cables, recognizing shorts and open wires. Fueled by included 9-volt batteries within the primary analyzer and farther test unit, the T012-001-K can discover an RJ11, RJ45 or BNC cable settled inside a bunch of cables. The test unit’s Driven spotlight is helpful for working in dark areas. Included earphones assist you work in boisterous situations. A movable volume button lets you fine-tune the tone generator.

Connectors and Adopters:

An adopter may be a gadget that changes over qualities of one gadget to those of an something else contradictory gadget. A few alter power or signal qualities, whereas others only adjust the physical frame of one connector to another. The most commons sizes of coaxial cable are RG-6, RG-11 and RG-59. When these connectors are incorporated with the cable equalizers then the data transfer is significantly improved ranging from 270 Mbps to 2.97 Gbps. The automated era of input equalized signals improves its ability to transfer to longer distances with minimal power losses.

Basic Working Summarization

A great many people don't comprehend the mechanics of how radio telecom functions. While a few people may profess to have a dubious commonality with the procedure of radio wave and sound, many don't genuinely comprehend the nuts and bolts of how a telecom framework really functions. While investigating the closures and outs of broadcasting, a lot of befuddling phrasing creeps up, leaving the consumer caught unaware by wording they don't generally comprehend. Be that as it may, genuinely fathoming the stuff for a radio station framework to work truly doesn't need to be as mind boggling as it initially shows up on the Internet. So, the inquiry remains, how precisely do our main tunes and projects stream through the air to end up on radios?

Starting with nuts and bolts, radio telecom proceeds as a singular transmission which involves transmission in the form of radio waves with the expectation of reaching masses of people. This remote transmission is really electromagnetic radiations (radio waves) that are transferred even in space, allowed information (sound) to travel while it is regulated. These radio waves at that point come into contact with an electronic transmitter that makes certain fields generate an alternating flow where the waves can be changed into the first structure. All together for this procedure to occur, in the beginning there should be a radio transmitter that can manipulate sound (with the chance of taking on various types of regulation). An intriguing segment to radio is that there are diverse sign waves that can be transmitted; this is the place AM and FM radio is determined. AM radio (or Amplitude modulations) contrasts from FM radio (or Frequency tweak) since it differs the quality of the sign related to the size of data that is being transmitted. This was the first type of radio. FM radio differs the recurrence of the sign, implying that the quick recurrence from the bearer will consistently be proportionate to the prompt quality of the info signal.

The following part to radio telecom is the receiving wire, whose activity is to both send and get electrical flows and radio waves. A telecom framework can possibly work with on the off chance that it has a radio wire that can emanate the transmission. So, when tuning the radio to choose your preferred station, it is critical to realize that it is the electrical reverberation that permits the client to pick a radio broadcast. When the radio collector has acquired the data from the receiving wire, it can change over it into the ideal projection, regardless of whether that be sound, pictures, advanced media, and so forth. A radio telecom framework can just work with the fundamental radio gear (the transmitter and beneficiary, with both having a reception apparatus and vital basics like a receiver or amplifier).

Radio is a type of media that is frequently neglected and underestimated among the overall population, yet in the wake of having deciphered exactly how the radio functions, it truly is something to be greatly valued. While current innovative advances cause radio to appear to be a relic of times gone by, seeing how a radio telecom framework functions truly represents the complexities with what many consider to be an out of date power of innovation.

Science behind radio broadcasting waves

Electromagnetic radiation incorporates light just as waves of radio, and the two share numerous characteristics for all intents and purpose. Both of them are spread within space in around straight lines at a speed of around three million meters (hundred and eighty-six miles) every second and have amplitudes that shift consistently with time; actually, they waver from nil adequacy to a most extreme and back once more. The occasions the circulation is rehashed in one second is known as the frequency of the wave (represented as f generally) in cycles every second, and the time taken to finish one cycle is 1/f seconds, now and then called the period. The unit used is hertz, it was introduced by Heinrich Hertz.

The waves of radio being spread through space will at some random moment have a plentifulness variety during its bearing of movement like its time variation, much like a wave going on a waterway. Usually the good ways starting with one wave peak then onto the next is known as the frequency.

Frequency bands:

The frequency range of radio is isolated self-assertively into various groups from exceptionally low frequencies to tremendously high frequencies.

Table 5: Utilization of Radio-Frequency Spectrum

very low frequencies (vlf)		time signals, standard frequencies
	30 kHz	
low frequencies (lf)		fixed, maritime mobile, navigational, radio broadcasting
	300 kHz	
medium frequencies (mf)		land, maritime mobile, radio broadcasting
	3 MHz	
high frequencies (hf)		fixed, mobile, maritime and aeronautical mobile, radio broadcasting, amateur
	30 MHz	
very high frequencies (vhf)		fixed, mobile, maritime and aeronautical mobile, amateur, radio and television broadcasting, radio navigation
	300 MHz	
ultrahigh frequencies (uhf)		fixed, mobile, maritime and aeronautical mobile, amateur, television broadcasting, radio location and navigation, meteorological, space communication
	3 GHz	
superhigh frequencies (shf)		fixed, mobile, radio location and navigation, space and satellite communication
	30 GHz	

Figure 8-25 Utilization of Radio Frequency Spectrum

The bandwidth frequency transfer speed is referred to the frequency's ranges secured through the tweaked frequency signal of radio. The data conveyed by the sign has a specific transfer speed related with it, and the transporter should have a certain width of its channel at any rate as extraordinary as the data transmission capacity. Taking a standard amplitude modulated (AM) communicating the radio-recurrence data transfer capacity must be double the data recurrence transmission capacity. Teleprinter and wire activity requires just a little data transmission, on the request for 200 hertz, contingent upon the greatest beat speed framing the data code. Telephonic discourse must have high comprehensibility, however expectation (high devotion) isn't vital. Tests have indicated that the principle parts of discourse lie between around 300-3,500 hz, and telecommunication stations conveyed by radio are in this way ordinarily limited to a transfer speed of around four kilohertz. The littler the data transfer speed utilized, the more discourse diverts are conveyed in a certain bearer transmission capacity and the more it can be affordable for the framework.

Youngsters can hear sound frequencies running from around 30 hertz to 18 kilohertz, at the same time, as they develop more established, hearing reaches from around 100 hertz to 10 kilohertz. For great (high-loyalty) generation of voice or discourse, the range ought to be at least around 30 hertz (the most minimal recurrence of a huge organ pipe) to 15 kilohertz (piccolo, cymbal, triangle). Worthy sound quality in specific situations might be accomplished with a data transfer capacity as little as five kilohertz, as in AM radio; and a lot bigger transmission capacity is required for transmitting a moving picture since it is important to pass on the general normal light substance of an image just as the image detail. The normal light substance requires frequencies as low as 20 hertz to be transmitted, and picture detail requests frequencies up to five megahertz for a standard TV picture.

Modulations:

The variety of frequency of the bearer is called the deviation of frequency, and for frequency that is very broadcasting it can reach ± 75 kHz. It is observed that more important the deviation of frequency the more prominent is the successful balance. Despite the fact that hypothetically its greatest worth need not be constrained to 75 kHz, any expansion past this worth requires a more extensive channel, which adds to the expense of gathering and decreases the quantity of transmitters that can be obliged in the band. The all-out channel width is around double the entirety of the most extreme deviation recurrence and regulating recurrence. In the event that divert width is confined in either transmitter or collector circuits, twisting of the data signal happens.

The radio stations are of varied forms but typically comprises of just single data signals. The audience hears what he would hear at the mouthpiece position if just one of his ears was working; i.e., it is a monaural framework. In such a framework it is preposterous to expect to increase any impression of the situation of the instrument groupings in an ensemble, nor can horizontal development be demonstrated, however development toward or away from the mouthpiece is passed on by an adjustment in sound volume.

Another arrangement of adjustment turns the transporter can be in "on and off" within beats, the span or position of the beat being dictated by using the data signals. time division multiplex are defined as the arrangement of heartbeat coded tweak can give better assurance from clamor, and various separate discourse channels can be joined by allotting determined gatherings of heartbeats for every data channel and afterward interleaving these heartbeats in a procedure. To achieve this, a relatively wide transmission channel is required, and the transporter must be an ultrahigh or frequency is too high.

Radio and interferences:

Any type of unexpected release of electrical vitality, similar to the lightning, generating passing (brief length) frequent radio waves, which are gotten by receiving wires. These bundles of radio-recurrence vitality produce the snap heard on a sufficiency adjusted radio recipient when an electrical tempest is close by and might be classified as the normal commotion.

High voltage exchange in electrical cables can be create by comparative impacts; the lines help to convey the commotion delivering signals within many important distances. Neighborhood exchanging of lights and electrical hardware can likewise deliver the recognizable snap when the collector is near the clamor creating source. These sources are classed as man-made clamor.

For the most part commotion of the two sorts diminishes as the recurrence is expanded. A special case is vehicle start clamor, which produces most extreme impact in the exceptionally high-recurrence go, causing a sound in close by amplifiers each time a flash fitting flames. Numerous nations have enactment requiring the concealment of man-made clamor by methods for channels that diminish the measure of radio-recurrence vitality discharged at the source. Metallic protecting of prompts and from the clamor source diminishes the emanated impedance. It is likewise conceivable to introduce different clamor lessening gadgets at the contribution to radio recipients.

Clamor is likewise brought about by abnormalities in the progression of electrons in metals, transistors, and electron tubes. This wellspring of clamor at last confines the greatest valuable sign intensification that can be given by a collector. Noise or sound because of the irregular development of electrons causes a murmur in the amplifier. Radio commotion can likewise be gotten from space as a murmur like irregular electron noise or sound.

Blurring of a sign, then again, is because of variety in the proliferation qualities of the sign way or ways. This is especially evident when spread relies upon reflection from the ionosphere as it accomplishes for shorter waves. Spread of waves in the high-recurrence run or more, which enter the ionosphere, can be influenced by temperature changes in the stratosphere, that piece of the climate up to around 15 kilometers (nine miles) from the Earth's surface. The blurring impact can be enormously decreased at the collector amplifier by different electronic controls, for example, programmed gain control.

The wonder of obstruction happens when an undesired sign covers the channel saved for the ideal sign. By communication with the ideal bearer, the undesired data may make discourse become ambiguous. Countermeasures incorporate narrowing the ideal channel, along these lines losing some data however forestalling cover, and utilizing a directional receiving wire to oppress the undesired transmission.

Science of radio circuitry

Vacuum tube:

An electron tube or transistor, assigned a functioning component, works fundamentally as the only enhancer, and its yield is basically an intensified duplicate of the first information signal. The triode is the easiest enhancing electron tube, comprising of a cathode covered with material that gives an extensive gracefully of electrons when warmed, an open-work network permitting electrons to go through however controlling their stream, and a plate (anode) to gather the electrons. The plate is generally kept up at a positively voltage concerning the cathode so as to pull in the electrons; the lattice for the most part has a little negative voltage with the goal that it doesn't gather electrons however controls their stream to the plate. The yield voltage is generally ordinarily more prominent than the info voltage to the lattice. The given cylinder must be siphoned upto a serious extent of vacuum conditions, or the current in plate in a stream is unpredictable.

Transistors:

The transistor, which has to a great extent supplanted the e-tube as a dynamic component in low-voltage electronic circuits, is produced using materials that are semiconductor that is, substances that are neither acceptable conductors nor great covers. germanium and silicon are the most commonly used semiconductors materials, to which modest quantities of contaminations.

A transistor can be defined covered by both side of semiconductor materials with a similar debasement in the two of the external boundaries and an alternate contamination of the middle layer giving current transporters of inverse charge to the ones created by the external layers.

Tuning circuits:

For data (music, voice, TV) are the transmission product, it must be joined to a frequency of radio bearer wave, which is then transferred in a given recurrence channel. The transporter wave and data can be gotten by a recipient tuned to this channel. The procedure using the data is appended to the transporter wave is regulation. Tweaked bearers are disconnected in their different spaces or channels; if the transmitters are geologically near one another, they should not utilize a similar channel or cover each other's channels. In the

event that such cover happens, genuine obstruction results—two radio projects might be heard at the same time or one may shape a contorted foundation to the next.

Oscillators:

A circuit that is self-swaying comprises of a tube of vacuum or transistor, a tuned circuit, and some type of positive criticism (vitality took care of from the yield back to the contribution to such a path as to expand the information). As, the two cylinders and transistors can work as speakers, they can likewise work as oscillators. For recipient circuits, satisfactory oscillator strength can be gotten with ordinary tuned circuits, yet the transmitter oscillator must be profoundly steady, and the circuit comprised of capacitance and inductance, tuned to the ideal recurrence, isn't adequately steady. A piezoelectric precious stone oscillator (a gadget that vibrates or sways at a certain recurrence emanating radio waves when voltage is applied to it) or its proportional is commonly utilized.

Amplifiers:

Amplifiers might be grouped in various manners: as indicated by data transfer capacity (tight or wide); recurrence go (sound, middle of the road, or radio recurrence); or yield boundary necessity (voltage or force).

Antenna:

The antenna is a fundamental piece of a transmission by radio and gathering framework. At the transmitter its function is to extend electro-magnetic vitality in the space and to the recipient in order to extricate vitality from the voyaging electro-magnetic wave delivered by the transmitter reception apparatus.

Transmission lines:

It is referred to the lines that convey waves of radio from the radio transmitter to the receiving wire are called the transmission lines; their motivation is to pass on frequency of radio vitality by least warming and radiation misfortune. Warming misfortunes are decreased by conductors of satisfactory size. Just the external conductor layer conveys current by frequency of radio.

Selectivity and sensitivity:

Communication by frequency of radio needs everything to be dismissed by the receiver except the ideal sign. If only the quantity of recurrence channels equivalent to the interest, every channel could be given its right tuning width phases of a beneficiary. Therefore, for sound telecom every transporter station ought to be 20 kHz wide to oblige both side groups, and every bearer of transmission ought to be 20 kHz, isolated from those on each side. In a great part of the world, the medium-wave and shortwave groups are in such interest that transmitters must have a similar channel and the other channels along these lines must cover. Despite the fact that endeavors have been made to orchestrate sharing by geologically isolated transmitters, the clog has constrained beneficiary producers to decrease the recipient transfer speed to around eight kilohertz (±four kilohertz).

Literature reviews

If we take a thorough check there have been a huge literature published about the radio broadcasting which deals with the waves of fifty thousand cycles in a second to hundreds of millions. These writing published cover various subjects such as theory of waves, radio circuitry, transmitter and receiver designing and advanced circuit designs, acoustics, math and bundle more. RADAR and SONAR are also its applications. Obtaining data and information about how the radio broadcasting is done requires some digging in digital libraries. There were certain rules books having broadcasting laws published by federal commission of communication. The report consists of the communication act which regulates the communication without any social, racial, color, religious and sexual discrimination throughout the national and international broadcasting.

Transmitter and antenna locations:

The antenna’s location should be considered the most significant thing kept in mind for a radio station. This is very important to keep it accurate. There are three considerations that should not be compromised. The considerations are:

- The transmitter antenna's location should be according to the targeted audience area.
- The purchase and the rental dealing for the area of the antenna erection.
- The transmitter and antenna's distance are also an important consideration.

Out of these we can neglect the last 2 points, but if the signals are not reached to the targeted audience then it means the land is not perfect. For this field strength tests are needed to be done. They are done by using receiver and changing its place in different areas. The readings are caught in microvolt per meter which show the field intensity. The places where contours occur have less conductivity and are ultimately unsuitable places for antenna installation.

"The ideal location of a broadcast transmitter is in a low area of marshy or 'crawfishy' sailor area which is damp the maximum percentage of the time and from which a clear view over the entire center of population may be had, and the tall buildings in the business section of the city would cast a shadow across the minimum residential area. The type and condition of the soil or earth immediately around a site is very important. Important, to an extent, is the soil or earth between the site and the principal area to be served. Sandy soil is considered the worst type, with glacial deposits and mineral are areas next. Alluvial, marshy areas and salt water bogs have been found to have the least absorption of the signal. One is fortunate to have available such an area and, if not available, the next best condition must be selected." (Federal communication Commission, 1939)

Historical perspective:

This article was published by OlesGoian in May 2015 which explains the background of Ukrainian-Russian proceedings on radio broadcasting. In recent years, Radio broadcasting of Ukraine was searching over the balance between business and policy. All these occurred during the time when Crimean Peninsula was annexed by the Russian Federation. The 15 years high on working station 'Radio-Leader' was shut down because it was unable to opt. license from Russian federation ceasing all of its radio research. New changes in the policy led to mixing up of Ukrainian media. The main influence was solely on the advertising market causing hinderances in the way of powerful advertising regions i.e. Donetsk and Luhansk. The Russian radio station closed their doors to Ukraine radio station, reason being their broadcasting campaigns which raised funds to army in order to buy their defense equipment. Ukraine broadcast were rigid enough to uphold their broadcast during this time which later was retaliated by Russians which lead to loss of seats to their singers like Valeria and Joseph Kobzon. All those who supported to petition were removed from their seats.

In 2014, due to the military activity and annexation of Crimea, the ratings remained unchanged. Oksana Shchavel mentioned, "Although, it was extremely difficult year not only for media but for all kinds of business, radio demonstrates not bad achievements in the sphere of listeners." A good scheme is followed by particular format companies to get more amount of audience by disengaging them from the reasons for stressful conditions in country i.e. disregarding the negative information and war. At the beginning of 2015, the Ukrainian radio streaming became industry which laid its foundation as a service platform back in 2007. It was a strategic development as all the proceedings were done under the same room with increasing popularity on Internet and on TV market. The companies that used media plans were able to negotiate with their good clients in arguments. Contrary to which the companies which do not radio listening data were hardly recognized as true market players. As Oksana Shchavel says, "amateur times are over and advertisers' confidence is very important for radio stations as well as the possibility to work proficiently and transparently." This statement is highly agreed on point that due to such an innovative increase in the research of radio broadcasting, the work is necessary. The year 2014 had considerable improvements which includes some progress in consolidation unity creation. In the year 2015 dated 7th April, a few numbers of symbolic events from Ukrainian media environment happened in Mystetskyi Arsenal. After the amendments by the President of Ukraine, the logo of 'First National' along with radio call signs were changed in the live streaming. The first channel had general informative discussions while the second channel had experimental innovative broadcasting, the third was a bit leaning towards the cultural side. The most important platform that was formed was in year 2013, the broadcasting channel referred to as 'Public radio' which was filled with 24 hours of information and analytics of the visual results and experimentation of grounded units. However, in later times, a significant trend in Ukrainian radio market was the emergence of more radio stations which had a conversational radio format, in particular, 'Radio Viesti' that incorporated mainly the

East and North audience. The pro-Cremlin editorship which had manipulating facts, was conducted and it was mentioned in some of the books of chief editor. In this time, it is a must to refer to 'Radio Era' which despite of losing a lot audience in Donetsk and Luhansk remained influential as it had been controlling almost all of FM-frequencies.

In 2015, Ukraine became the final one to switch to digital broadcasting which was unreal at that time due to its expenses. Three main platforms were devised,

1) Online-broad casting
2) Multiplatform decisions
3) Hybrid radio

Due to this online modification, every Ukrainian live broad cast station was provided with the web-version and data flow streaming broadcast. It was not boosted off due to slow 3G internet in most of the areas in Ukraine. Most of the FM stations were linked to online radio broadcasting which proposed a model that many of the people will be able to listen to the radio while in their automobiles. Multiplatform decisions included a feature that people will not only be able to listen but also see the video along with the broadcast as the stations had special channels where they uploaded the videography stuff. Hybrid radio combined Internet and FM radio advantages. According to the BBC research in October 2014, 2/3 of the mobile phone owners were considerably attracted to the idea of hybrid radio.

Summing up an 80-year advancement from 1939 (television media type), all the way through 1992 (video plus audio) and in the current 2000's, the hybrid technology was on the peak. All the thanks giving to Internet and mobile telephone industry, the visualization of radio nowadays, became 'visible' and TV succeeded as a good promotion and development partner. it means real achievements and success for radio broadcasting as an important factor in Ukrainian media landscape.

Movement for revival:

In an article published in August 2000, "The Need for Radio Theory in the Digital age "by Tacchi, the author arguments on making a connection between modern and old-world technology dimensions. This field he calls as radio studies. There is very less work been done on this field in the past years. The pervasive nature of radio in the daily lives is not very much apparent. Currently efforts are being made to revive the near dead field of radio. In a conference held in Cardiff it was shown that it is not mere a field of study but there several creative ways with which it holds a place in our lives. Also, the new technologies based on radio should not be dismissed. The major theme of the above-mentioned conference 'Radiocracy' were "theory, technology and innovation". The article emphasizes on the past and future development of the radio. The innovative ways which can turn out to be useful for radio induction in technology world. Why is radio theory needed? Radio is a cheap source of communication medium and had been in use for long time. In the words of Taachi, "The study of radio promotes, among other things, an understanding of the importance of the different senses in articulating private identities and notions of sociality of the enactment of gender relations and identities (Tacchi, forthcoming), and of the impulses and conflicting cultural loyalties of diasporic communities (Tacchi, 1997). I found radio to be a deceptively powerful medium."

Software:

The article "Radio Broadcasting System" published by World Development Foundation covers the modern-day broadcasting in a technical manner, how it's done and what are the components involved, both living and nonliving. The IT has made many contributions in the radio broadcasting. It has been made possible to use an advanced analog device which can also be used for mixing and which can function as a digital storage. For all these attributes and requirements, a complex system is needed. Nowadays the broadcasting systems require parts which prepare and produce the radio program, a digital production and broadcasting system, database and scheduler. A basic radio station has several studios, a tower and transmitters which holds all the antennas and cables. The program is broadcasted in a session, the presenter records or goes live using the RBS system. Then the audio is enhanced through a processor which is then forwarded through a transmitter. It is then converted to a higher frequency. Then the antennas send this in air using RF cables. These signals can be captured by the listen using FM radio. The article mainly discusses how RBS software can be used to conduct fully automated operations. It is easy to us and operate because of its simple interface. It can perform as a full day, twenty-four seven radio station. The details about the functioning of

the software is shown and there is a user manual which explains the operation flow. The process is explained that how to login, use different operations and conduct all the radio broadcasting with the help of a computer. The RBS system contains a variety of features and can perform literally all the tasks you need to run broad casting studio. The figure shows the general interface.

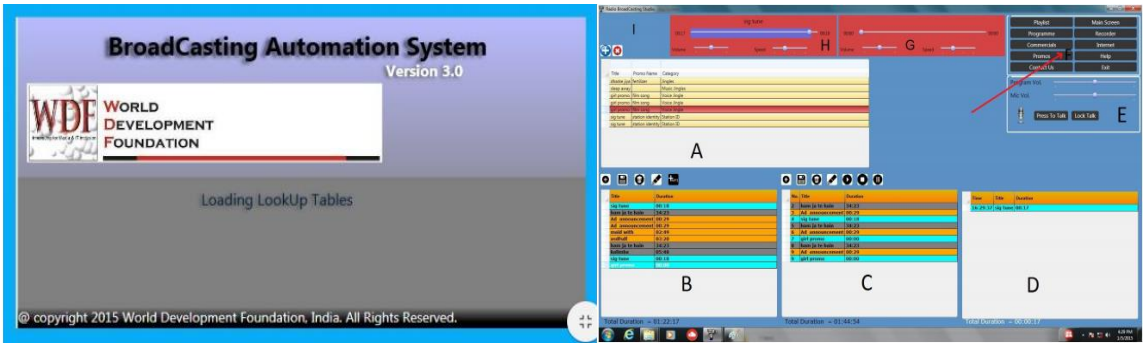


Figure 8-36 Interface of Radio Outside broadcasting

The main screen shows all the relevant details of the programs stored in the database. All the required programs can b sorted as there are separate categories for that. There are separate options for advertisements or commercials or promos etc. The sound and audio tracks can also be captured from CD in an mp3 format by using the CDex ripping software. And the voice can be edited. The software interfaces are shown in the figures. The software provides reporting, administrating, backup, restoration, agency and company, help facilities making it user friendly. It demands window 7 or higher. The other facilities WDF offers includes "User training, work organization help, data processing help, manual data input, digitalization, radio station building and consulting. For a proper detail the user manual journal can be used for guidance and instructions.

Outside Broadcasting:

This article was published in 2014 by Clayton Vallabhan. It is somewhat biased ideologically. The term radio broadcasting is vast immensely in which Outside broadcasting being its part refers to the making and live airing of sports, news, live entertainment shows and everything that can be produced in a studio. "Satellite broadcasting makes it possible for information-hungry residents of many closed societies to bypass state-controlled television channels". For all the events that take place off-studio, the broadcasters need OB vans which are somewhat like mini studio on wheels to air all the live happenings. How it is done? The highly trained individuals use enhanced video cameras and remote microphones to uplift the signals in a temporary control room for modifying and distribution. He continues, "Outside Broadcasting (typically called OB) entails the use of a mobile vehicle, often as large as a semi-trailer, equipped with the full capabilities of a production control room, including technical personnel, and driven to a venue such as a professional soccer stadium, convention center or live event. Outside broadcasting is typically used to cover live sports of all types and major news". Radio broadcasting includes a couple of situations and in each situation the proceedings are different. For example, to air the live happenings and events in a breaking news channel. This is indeed the easiest as well as common outside broadcast. For this, you need to have all the advanced equipment in built in your minivan such as to select correct camera angles, we need production switchers, for balancing the audio quality an audio mixer is required, we need servers to record, transmit and replay. He adds, "How much you need will depend upon the application. A news unit will often be a relatively small van designed for one or two operators, with simple facilities to balance a few sound sources and switch between a handful of cameras. Typically, it will have its own uplink satellite dish on the roof, making it completely self-contained." The question that arises in everyone's mind is that how can they produce smooth broadcasts despite being outside the studio. The prominent answer states that they require highly complex equipment than what they have in their studio for example, Sports game will require a huge number of cameras around 24 or more for highly profile events and it should always be connected to video server network for instant reply. Whereas for a musical event, they will have to cope with a great number of microphones and audio mixers for the production team to console between acts.

A company named Miranda produces products for Outside broad cast that are small, lightweight and easy to perform Telecast fiber connectivity by which the signals for cameras and microphones are easily carried to

control room of the OB van. In the van, the signals are processed by the NVISION routers evenly distributed to Density signal processing equipment and the Kaleido multi-image processor later monitors all of it. The company integrates all the highly enhanced equipment for the service provision as well as for turnkey solutions. Moreover, OB takes credit for all the networks to cover and list the happenings category wise accessible in real time everywhere around the world. The great happenings that were covered by this technology were the 2012 London Games , the 2014 Winter Games and most important of all the Glastonbury Festival. All thanks to this technology. The operator needs to have a good command over his skills to be able to cover all the events creatively, with highest quality standards. The grave challenges that show up during all the broadcast with the OB van are preferably the size and weight of the equipment which should make it portable and to reach the locations with the OB van. "The advantages of the outside broadcast truck are obvious: you drive it up to the venue, set it up and it is a complete production environment with technical areas, sound mixing and the production gallery." The module has to be highly space-constrained; it should be power efficient as well as being light weight at the same time. The introduction of Fiber technology being the most flexible, dynamic as well as scalable paved a new way to streamline high quality signal transmissions at a great distance without disrupting the picture quality. With the advancement from SD to HD, nowadays 3D to 4K makes the radio broadcasting trucks bigger and bigger in size now known as "mega-trucks". In the future, to meet all the 4K and 8K requirements, the equipment needs to be highly modernized incorporating technologies of new era. Now, the satellite broadcasting give stable and will continue and grow for the other 10 years.

Conclusion

To conclude, shooting a particular scene, consists of a long process. All the team, crew, participants, actors and editing takes place. There are a lot of advantages and disadvantages for this processes but still there are some difficulties and challenges that the manufacturing team faces and experiences during this long shooting process. It is compulsory for the remote production to experience countless number of difficulties like handling the weather changes, placing the remote element, setting the nonproduction element for whom it might be challenging to recognize the procedures of the crew, power of electricity, and an unsolicited audio in comparison to the studios. However, the major problem is that mobile elements are constructed to travel on the road as every event cannot take place in a television studio. Mobile units are actually the same thing as compared with the control room that exists in the studios. Moreover, there is also a significant and important role of Outside Broadcasting (OB) in this shooting process. There are a lot of advantages of the location manufacturing phase or area. The advantage of studio production is that they deliver all out number of mechanism over the theme. The lightning and studio are less manageable and studios execute a perfect place that is not affected by the changes in weather and climate. On the other hand side, remote production delivers thrilling crowds to cheer. During a beneficial weather, lightning and scenery execute excellent pictures but an unfavorable weather can lead to the postponed or even cancellation of the event. Moreover, it is also less costly to shoot as compared to the scheduling of the time of studio. In addition, the remote productions usually are in need of expectation of the events that may occur. Therefore, it is quite significant to construct a team that can predict incidents and events for the future days. It is compulsory for the crew to work together and develop backup plans if they go in wrong direction.

Wordlist

720p The structure includes advanced skimming and is known as a great tool for fast movement shots.
1080p A structure that includes advanced skimming and also known as complete HD.
Audibility Considerable sound paths move in flat direction and are affected by rigid platforms. Less sound waves are not interrupted by any challenges.
Surrounding noise Noises in the background
Equivalent footage Making a footage of changes in the video symbols.
Curve Movement of camera in a circle or curve.
Auditory sieves They are utilized to finish the surrounding sounds such as traffic or wind.
Auditory mixer Component that manages audio references that may involve filter of circuits.
Planned concentration The concentration of lenses on the theme.
Axis of exploit streak Known as line eye which is thinkable line through the action of a shot.
Taillight Management Usage of taillight when there is considerable light in the surroundings
Plank The phase in the lights are interlinked.

Bidirectional communication Communication both in back and in front.
Dark close Power of dark color in the scene..
Dark spring Management Part of camera that constructs gloomy picture more clearly.
Camera recorder Pre constructed video plotter in a camera.
Camera Management component Tool that manages the camera by its placement position.
Camera cursive Delivers extensive information regarding the practice and involves numbers, shots etc.
Camera Placement Positioning of camera
Personality temperament Treatment of the actor in the scene.
Slate Start scene delivering data including title, director, shot etc.
Clip A video segment.
CU Motivates the audience to focus on some attributes.
Color block Delivers an accurate source platform for making the videos similar and get good quality image.
Configuration The main objective is to construct a picture that is eye grabbing and communicates to the viewers easily.
Contractor Purposely decreases the audio range
Contractor microphone Good quality communication though a micro phone.
Background Allow the audience to easily understand the subject easily.
Steadiness Ensure accuracy in all the shots of a scene.
Regulator area Place where director manages the TV manufacturing
Counteractive temperament Decreases less important face attributes.
Protection report A footage that protects the editing for the purpose of making the audience believe that editing did not happen.
Boom Beginning Pushes us into the plan flatly that already has been started.
Sneak Words and numbers travel in a horizontal manner on TV screen.
Praise spool Data travelling in a vertical manner in the platform.
Acclaims Words that recognizes the members participating in the program.
Cut Movement from one scene to the next scene.
Cutaway report Utilized to protect the editing.
Departed Environment Sound paths hit the wall, floor etc. and then disappear.
Shallow concentration Focusing on all the details in a shot.
DOF Distance between the objects.
Numerical footage Electronic structure that sees the wave daily and transforms them into numbers and figures.
Electronic increase Viewing small location and places of the similar electronic designed picture.
Electronics Transforming the video symbols into information folders.
Maneuvering microphone Microphone that has the ability to listen voices flatly.
Disband Changes in two pictures slowly over a period of tim
Slog Force placed on a tripod that stables the cameras position.
Dress Practice The objective of this is to see the cabinet and change accordingly.
Dutch Leaning the position of the camera.
Vigorous choice The area includes lowest and the highest voices that can be easily be verified.
(EFP) Utilized for productions which does not involve news.
(ENG) Utilized for capturing news.
Empirical Manufacturing way Where the chances are the rules.
Equalizer Filter that decreases or increases any phase of any audio.
Eye-equal reports Delivers a picture that is flatly at the eye level of the participant.
Eye mark People are meant to look at this point during a shot.
Detail pane Delivers detail regarding any commodity related to a demo execution planning
Dissolve Changes in a picture from black to a video.
Cinematic universe Interupts action simultaneously at separate locations.
Cinematic period Fastening the speed of manufacturing using the editing method.
Showy recollection A structure that contains considerable amount of electronic data but does not include any movement.

Studios Location used as background in any shooting.
Flood lighting Delivers light from every direction.
Principal distance The length between the lens of the camera and the sensor of the picture
Concentration puller Responsibility of an individual for having the camera.
Foley Developing sound impacts that replaces the sounds used originally.
Shadow effort An individual change the placement of the camera action takes place.
Arrangement Puts down products in a show in the sequence of its shooting.
Occupied cursive Contains full data related to manufacturing.
Gamma Settle the sound of the image.
Gel Filters that are colored and settles the light colors.
Genlock Settling the period of pulses to push them in remote references
Objectives Details regarding the objectives that has to be achieved.
Explicit equalizer Instrument that has range of slider management tools.
Grasp locks Tools designed connect light to everything.
GS Director order to make the whole group in the scene.
HH Camera is managed by a person and not by camera mount.
Hand microphone Microphone grabbed in hand.
Hand possessions Products grabbed by participant by hand.
HDD Utilized for capturing electronic pictures. .
Tall viewpoint The placement of camera is higher as compared to theme.
HD 720 to 1080 lines are used in a video to be called as high definition
Hue Dominant color in a video like red, yellow and so on.
I MAG Recording on huge TV screens for the purpose of making the audience see stage clearly.
Straight lighting Calculation of the quantity of light on the theme.
Intercom Communication path that is wired and non-wired among the participants of the crew.
Interweaved skimming Skimming of odd figured points and then travels back to scan the even figured lines.
ISO Camera is recorded on a different video plotter.
Balk A balanced equipment that connects on the tripod and enable camera to move in any direction.
Bang Seeing the video on a video plotter.
Hurdle expurgated Constructed when director orders cut among same kind of scenes.
Lavaliere microphone Presented on the dress of the participant
LED Stands for light emitting diode.
LED light board A chain of LED bulbs makes a camera.
Light plot Determines the placement of every light.
Regulator An instrument that stops loud sound going up.
Direct excision Replication of phases in sequence. ,
LCD Stands for liquid crystal display.
Live environments Indicates a place that consists of majorly rigid platforms leading to echo.
Long shot Constructs a shot for the audience.
Little viewpoint Positioning of the camera lower than the theme.
Luminance How bright the picture is.
Instruction Developed to deliver a edgy picture.
Medium shot Scene designed to show emotions.
Mic close Audio symbol created by mike.
Mono Little audio is recorded.
Screens Designed to deliver good quality picture.
Monopod Support tool for thecamera..
Multicamera manufacture Indicates that more than two camera are utilized in TV manufacturing process.
NAT Footage of surrounding noises in a place.
Nonlinear excision Method of making the video footage electronically.
Standard lens Form of lens that displays the scene The type of lens that portrays the scene approximately the same way a human eye might see it
NTSC Stands for National Television system committee

Impartial camera Keeping an eye on the action from a suitable position.
Purposes Calculative objectives.
Inaugural labels Announces the event to the viewers.
Exposed Location Interacting things together to construct it
Visual zoom Good quality picture controlled by a lens
OB Constructed at the outside portion of the location.
Speed The movement of the scenes.
Head of Tripod Allows the camera to move from its position
Pan scene Movement of camera to any direction and still on the mount
Spontaneous scene Removal of any errors by the angle of the camera
Prearranged manufacture way Construction of a program in a sequence.
Plasma Monitor seen by the audience from every angle.
POV Delivers viewers a different point to see.
Post making Involves activities like edit etc.
Initial calligraphy Complete writing even before edit.
Performance screen Utilized by editor to see the video before showing it to the audience.
Package screen The scene is being aired.
Liberal skimming Scanning of all the marks at one time.
Community area Songs included in a communal place in US.
Speedy-statement base Located in the down side of the camera near the tripod.
Reproduced light metering The vigorous action of light on the theme.
Practice cursive Contains character, manufacturing details, time, participants etc.
Distant review Going to the place for the first time.
Van TV management place that has a far distance from the location.
Reel Words and numbers travelling in any direction on the monitor.
Consecutively instruction Shots delivered to audience in sequence.
Harmless appellation zone 8/10th of the monitor is safe for use
Specimen degree Calculation of the numbers transformed electronically.
Fullness The transparency and cleanliness.
Shot Shields overall scene.
Sensation A basic lighting.
Sequence The sequence of the scenes may be separated considerably.
Single-camera manufacturing Single camera utilized for shooting.
Location review Occuring of a conference of the board at the expected scene area.
State humor A story with comedy.
Lenient light Delivers dim light in a considerable amount.
Limelight Turning light.
Phase supports Theequipments on the location.
Reserve Participant is aware to locate in the line.
Audio Utilization of two audio phases.
Storyboard An outlook of the ad or film.
Conventional greasepaint Makeup exercise on the participant.
Elasticity Participant walking slow.
Captions Locate areas.
Edging noises Jumbled up noises and sounds.
Switcher (vision mixer) A tool for transforming inputs of the video.
Rundown Overlook of the crew , participants, location etc
Score light Present on the initial side of the camera.
Puzzle Display of some clips before revealing the ad, drama and so on.
TV headsets Screens that executes shows with their noises.
Three-socket Usage of three lights
Contraction round Lens are zoomed.
Slope equilibrium Changes placed on the front of tripod for the placement of the camera.
Slope round Movement of camera in any direction.

Timeline Contains video elements considerably
Adornment Shortening longer scenes into bits and pieces.
Support Acts as a helpful tool for the camera.
Van A scene when the camera moves in any direction
VectorscopeA tool that ensures and confirm the consistency of the color.
Tape Used for footages of the pictures.
Viewfinder Controls the image from the camera.
VO Discussion about video. Commentary over video.
Waveform screen Used to control the symbol of video.
Plain equilibrium Light occurring in a white color after adjusting the placement of the camera.
Extensive-viewpoint lens displays more of a scene than predicted
Rough path Surrounding sounds.
Smear A different impact on the images.
XLS High scene.
Zebra Located on the video in the search view.
Region effort Functions of the camera are concentrated on the shot.
Zoom lens Contains changeable distance.

Acknowledgment

"Allah does not thank the person who does not thank people." — Prophet Muhammad (PBUH).

I would like to express my sincere gratitude to His Excellency Abdulrahman Al-Mutairi, Minister of Information of Kuwait, for his exceptional support to all the employees of the ministry. His guidance and oversight have been pivotal in the successful completion of this work.
I am also deeply thankful to all the engineers, technicians, and other contributors whose expertise and tireless efforts have greatly facilitated this project.
Your invaluable support and collaboration have been deeply appreciated.

Thank you all for your significant contribution

References

1. Al-hassan, S., 2011. The Role of Community Radio in Livelihood Improvement: The Case of Simli Radio.
2. Anon., 2011. Survey of broadcasting. [Online]
3. Anon., n.d. [Online]
4. Anon., n.d. [Online]
5. Available at: https://beonair.com/types-of-radio-broadcasting/
6. Available at: https://www.bbc.co.uk/bitesize/guides/z2s97hv/revision/1
7. Available at: Mass Media Movies News & Information Newspapers Public Relations Radio Recordings Television Web
8. BBC, 2020. [Online].
9. Bonsor, K., n.d. How Satellite Radio Works.
10. Broadcast Engineering tutorial for Non Engineers by Skip Pizzi and Graham Jones
11. Chatterjee, M., n.d. adio Documentary: Slice Of Life Through Sound And Silence.
12. Coutts, P., 2014. Analysis of use of Mobile Telecommunications Networks to Deliver Broadcast Radio in Australia.
13. Eser, n.d. 6+ Advantages and disadvantages of radio advertising.
14. Halbrooks, G., 2019. What Are Radio Formats and Why Do They Matter?.
15. Hetherington, S., 2018. 10 Golden Benefits of Radio Advertising.
16. Hörfunk, F., n.d. The Commentary.
17. Hörfunk, F., n.d. Writing for radio.
18. Housley, S. Production and use of sound effects. Available on; HYPERLINK "http://” www.recordforall.com/recordforall. Accessed on (Wednesday, October 24, 2018)
19. jkendell, 2012. The Influence of Radio and Television on Culture, Literacy and Education.

20. Kobliski, K. J., 2006. Radio ads.
21. Kohli, S., 2006. The Radio Jockey Hand Book. s.l.:s.n.
22. Kolessar, R. S., n.d. PORTABLE PEOPLE METERS.
23. Lipsky, M., 2016. WHERE DO RADIO RATINGS COME FROM?.
24. McLeish, R. (2005). Radio Production. 5th edition. Focal press: Great Britain.
25. McLeish, R. (2013). Radio Production. Mass communication. Focal press: Great Britain.
26. Moyo, E., 2018. The Elements of radio production or radio script.
27. Neelamalar, M., 2018. RADIO PROGRAMME PRODUCTION. s.l.:s.n.
28. Shenton, L., 2018. How Much Does it Cost to Start a Radio Station?.
29. Smith, J., 2010. Inside a Radio Outside Broadcast Truck.
30. Television Production by Gerald Millerson
31. Verma, N., 2012. Imagination, Aesthetics, and American Radio Drama. s.l.:s.n.
32. Video Production Handbook by Gerald Millerson
33. white, T., n.d. Pioneering Amateurs (1900–1917), United States Early Radio History,.
34. Woodford., C., 2019. Radio.

OB trucks And portable studios	NO. of CCUs	NO. of frame sync and external sources*	comment
HD12 ALMORQAB	16	Up to 22	10 CCUs: ENG CAM 2 CCUs: Wireless 2 CCUs: MiniCam/fisheye cameras 2 CCUs: ultra-slow-motion cameras
HD10 ALSSAIF	16	Up to 20	10 CCUs: ENG CAM 2 CCUs: Wireless 2 CCUs: MiniCam/fisheye cameras 2 CCUs: ultra-slow-motion cameras
HD11 ALROUDATAIN	16	Up to 20	10 CCUs: ENG CAM 2 CCUs: Wireless 2 CCUs: MiniCam/fisheye cameras 2 CCUs:

			ultra-slow-motion cameras
HD6 ALSALMYA	8	Up to 8	
HD 3 ALDERWAZA	8	Up to 4	
HD1 ALJABRYA	6	Up to 4	
HD4 OM ALMARADEM	6	Up to 4	
HD2 WARBAH	6	Up to 3	
HD5 KOBBAR	4	Up to 2	
HD7 BUBYAN	4	Up to 2	
HD8 AOHA	4	Up to 2	
HD9 FAILEKAH	4	Up to 2	
Portable studio1 ALSOBAHEYAH	N/A	Up to 2	Up to 10 video Input Up to 10 Audio Input
Portable studio2 MASKAN	N/A	Up to 2	Up to 10 video Input Up to 10 Audio Input
Portable studio3	N/A	N/A	Up to 7 video Input Up to 4 Audio Input
Portable studio4	N/A	N/A	Up to 7 video Input Up to 4 Audio

			Input
Portable studio5	N/A	N/A	Up to 7 video Input Up to 4 Audio Input