Digital Video Production
And
Broadcast Technology

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In

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APPROVAL

This thesis report emitted “Digital Video Production & Broadcast Technology” by Mohammad Nasir Uddin Sumon Md. Ashraful Hasan & Md. Nazmul Hasan has been submitted to Department Of Electronics & Telecommunication Engineering (ETE) Daffodil International University in partial fulfillment of The Requirements For The Degree OF Bachelor Of Science In Electronics & Telecommunication Engineering (ETE). This thesis report has been accepted as a satisfactory by the following honorable member if the board Examiner after its presentation that was held on February 2011.

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ABSTRACT

Information and communication these two relative terms are absolutely depended of another term called Technology. Only technology can confirm the appropriate utilization of information and communication. Today we are living in such a world where our total life style is fully accommodated and regulated every moment by information and communication. We have lot of forms and methods of information and communication technologies and every day new forms are coming. Among all the forms and methods; broadcasting media is the most common and popular. The use of information and communication technology is an essential component of teaching-learning strategies to achieve various national goals— social economic and cultural. We know "Education" is exchange and transformation of information and communications. Toady implementation of education fully depends on appropriate use of technology. Education providers, faced with these challenges are seeking new ways of educational technology to impart education. The revolutionary development of electronic information & communication technology --Radio and television might be used on this process. Other new forms of communication technologies like Internet or mobile phones are considered to be the very effective technology of mass education. The use of technology consequently depends on the social-economic condition, life-style and availability of equipments, talent and intellect, power of reception and interaction of people etc. In Bangladesh considering the social economic reality govt. has been using radio and television broadcasting for mass education broadly since the last one decade. A significant result has already been achieved in the field of mass education of Bangladesh.

To develop these projects we make a drama **Dhakar Chairman** which broadcast on channel one. To make this digital TV production we use a lot of electrical equipment and essential device like as camera, microphone, monitor etc for audio and video recording and computer, mixer, edit tolls, edit software etc use for editing and broadcasting.

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CHAPTER- 1

Introduction of digital Video production And Broadcast Technology

1.1: Introduction

Digital video production was first introduced commercially in 1986 with the Sony D-1 format, which recorded an uncompressed standard definition component video signal in digital form instead of the high-band analog forms that had been commonplace until then. Due to its expense, D-1 was used primarily by large television networks. It would eventually be replaced by cheaper systems using compressed data, most notably Sony's Digital Beta cam (still heavily used as a field recording format by professional television producers) that were introduced into the network's studios.

Figure 1.1: Our Digital Video Production Dhakar Chairman

For our thesis we make the drama **Dhakar Chairman** where we use latest digital video, audio and broadcast technology.

There is three basic parts of digital video production and broadcast technology

1. Pre Production

2. Post Production

3. Broadcast

1. 2: Pre Production

Pre Production is a primary and important part of a video production. In this section writer make story and cinematographer make cinematography. In this section director finish his all kind of selection and confirm all of equipment which he needs for recording.

1.3: Post Production

It's a technical part of video production where we use digital camera, lighting, digital video editing and all kinds of other technical equipment.

1.3: Broadcast

It's another technical part of video production where we use broadcast equipment for digital transmission.

In this thesis we discuses about the technical part post production and broadcast technology.

CHAPTER- 2

Digital Video

2.1: Video

Video is the main part of production. Video is the technology of electronically capturing, recording, processing, storing, transmitting, and reconstructing a sequence of still images representing scenes in motion.

2.2: Description of video

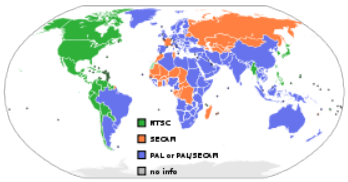


Figure 2.1: Description of video.

Analog video standards worldwide

- NTSC
- PAL or switching to PAL
- SECAM
- No information

2.3: PAL

In Bangladesh our broadcast technology used PAL only and we make the drama **Dhakar Chairman** in PAL setting. PAL, short for Phase Alternating Line, is an analogue television encoding system used in broadcast television systems in many countries. Other common analogue television systems are SECAM and NTSC. This page primarily discusses the color encoding system. See the articles on broadcast television systems and analogue television for additional discussion of frame rates, image resolution and audio modulation. For discussion of the 625-line / 25 frame per second television standard.

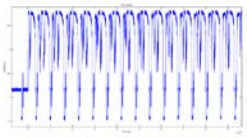


Figure 2.2: Oscillogram of composite PAL signal - several lines.

2.4: NTSC

NTSC, named for the National Television System Committee, is the analog television system used in most of North America, most of South America (except Brazil, Argentina, Uruguay and French Guiana), Burma, South Korea, Taiwan, Japan, Philippines, and some Pacific island nations and territories (see map). NTSC is also the name of the U.S. standardization body that developed the broadcast standard. The first NTSC standard was developed in 1941 and had no provision for color television.

Figure 2.3: The SMPTE color bars.

2.5: SECAM

SECAM, also written SÉCAM is an analog color television system first used in France. A team led by Henri de France working at Companies Franchise de Television (later bought by Thomson now Technicolor) invented SECAM. It is, historically, the first European color television standard.

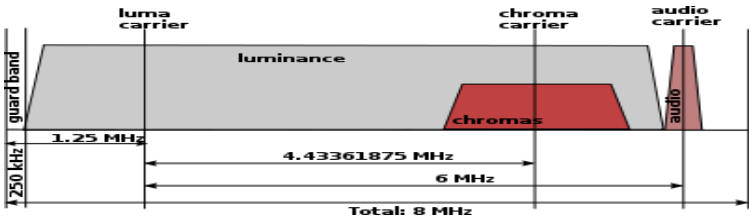


Figure 2.4: spectrum of a system G (bands IV and V) television channel with PAL color sub carrier.

2.6: Characteristics of video streams

2.6.1: Number of frames per seconds

Frame rate, the number of still pictures per unit of time of video, ranges from six or eight frames per second (frame/s) for old mechanical cameras to 120 or more frames per second for new professional cameras. PAL (Europe, Asia, Australia, etc.) and SECAM (France, Russia, parts of Africa etc.) standards specify 25 frame/s, while NTSC (USA, Canada, Japan, etc.) specifies 29.97 frame/s. Film is shot at the slower frame rate of 24photograms/s, which complicates slightly the process of transferring a cinematic motion picture to video. The minimum frame rate to achieve the illusion of a moving image is about fifteen frames per second.

2.6.2: Interlacing

Video can be interlaced or progressive. Interlacing was invented as a way to achieve good visual quality within the limitations of a narrow bandwidth. The horizontal scan lines of each interlaced frame are numbered consecutively and partitioned into two fields: the odd field (upper field) consisting of the odd-numbered lines and the even field (lower field) consisting of the even-numbered lines. NTSC, PAL and SECAM are interlaced formats. Abbreviated video resolution specifications often include an i to indicate interlacing. For example, PAL video format is often specified as 576i50, where 576 indicates the vertical line resolution, i indicate interlacing, and 50 indicates 50 fields (half-frames) per second.

2.6.3: Display resolution

The size of a video image is measured in pixels for digital video, or horizontal scan lines and vertical lines of resolution for analog video. In the digital domain (e.g. DVD) standard-definition television (SDTV) is specified as 720/704/640×480i60 for NTSC and 768/720×576i50 for PAL or SECAM resolution. However in the analog domain, the number of visible scan lines remains constant (486 NTSC/576 PAL) while the horizontal measurement varies with the quality of the signal: approximately 320 pixels per scan line

for VCR quality, 400 pixels for TV broadcasts, and 720 pixels for DVD sources. Aspect ratio is preserved because of non-square "pixels".

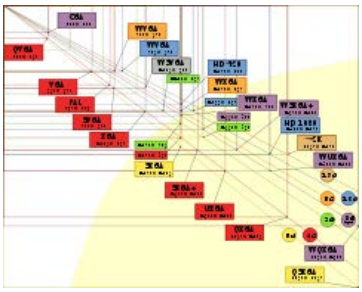


Figure 2.5: Common computer and TV display resolutions.

New high-definition televisions (HDTV) are capable of resolutions up to 1920×1080p60, i.e. 1920 pixels per scan line by 1080 scan lines, progressive, at 60 frames per second.

Video resolution for 3D-video is measured in voxels (volume picture element, representing a value in three dimensional space). For example 512×512×512 voxels resolution, now used for simple 3D-video, can be displayed even on some PDAs.

2.6.4: Aspect ratio

Aspect ratio describes the dimensions of video screens and video picture elements. All popular video formats are rectilinear, and so can be described by a ratio between width and height. The screen aspect ratio of a traditional television screen is 4:3, or about 1.33:1. High definition televisions use an aspect ratio of 16:9, or about 1.78:1. The aspect ratio of a full 35 mm film frame with soundtrack (also known as the Academy ratio) is 1.375:1.

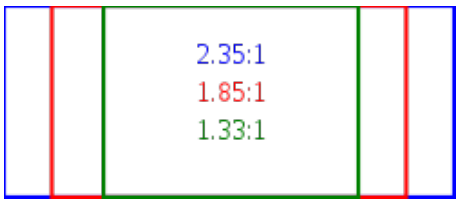


Figure 2.6: aspect ratios.

2.7: Color space and bits per pixel

Color model name describes the video color representation. YIQ was used in NTSC television. It corresponds closely to the YUV scheme used in NTSC and PAL television and the YDbr scheme used by SECAM television.

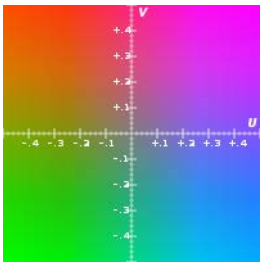


Figure 2.7: Example of U-V color plane, Y value=0.5

The number of distinct colors that can be represented by a pixel depends on the number of bits per pixel (bpp). A common way to reduce the number of bits per pixel in digital video is by chromo sub sampling (e.g. 4:4:4, 4:2:2, 4:2:0/4:1:1).

2.8: Video quality

Video quality can be measured with formal metrics like PSNR or with subjective video quality using expert observation.

The subjective video quality of a video processing system may be evaluated as follows:

- Choose the video sequences (the SRC) to use for testing.
- Choose the settings of the system to evaluate (the HRC).
- Choose a test method for how to present video sequences to experts and to collect their ratings.
- Invite a sufficient number of experts, preferably not fewer than 15.

2.9: Video compression method (digital only)

A wide variety of methods are used to compress video streams. Video data contains spatial and temporal redundancy, making uncompressed video streams extremely inefficient. Broadly speaking, spatial redundancy is reduced by registering differences between parts of a single frame; this task is known as intra frame compression and is closely related to image compression. Likewise, temporal redundancy can be reduced by registering differences between frames; this task is known as inter frame compression, including motion compensation and other techniques. The most common modern standards are MPEG-2 used for DVD and satellite television, and MPEG-4, used for home video.

2.10: Bit rate (digital only)

Bit rate is a measure of the rate of information content in a video stream. It is quantified using the bit per second (bit/s or bps) unit or Megabits per second (Mbit/s). A higher bit rate allows better video quality. For example Video CD, with a bit rate of about 1 Mbit/s, is lower quality than DVD, with a bit rate of about 5 Mbit/s. HD (High Definition Digital Video and TV) has a still higher quality, with a bit rate of about 20 Mbit/s.

2.11: Video formats

There are different layers of video transmission and storage, each with its own set of formats to choose from.

For transmission, there is a physical connector and signal protocol ("video connection standard" below). A given physical link can carry certain "display standards" which specify a particular refresh rate, display resolution, and color space. There are a number of analog and digital tape formats, though digital video files can also be stored on a computer file system which has their own formats. In addition to the physical format used

by the storage or transmission medium, the stream of ones and zeros that is sent must be in a particular digital video "encoding", of which a number are available.

2.12: Video display standards

Different type of video display standards use for video production. In Bangladesh we use PAL video standards for transmission.

2.13: Recording Formats before Video Tape

- Kinescope

2.14: Digital tape formats

There is a lot of digital tape format in the world. We use DV and HDV format in our production

3.15: Digital encoding formats

In **Dhakar Chairman** we use MPEG-1, MPEG-2, MPEG-4 and AVI Format different kinds of section of our production.

3.16: Video format

- Analog television
- Cable television
- Color space
- Digital television
- Digital video
- Film formats
- Interlaced
- Progressive scan
- Satellite television
- Television

CHAPTER- 3

Audio Recording, Mixing

And Processing

3.1: Audio

Audio can mean sound that is capable of being heard.

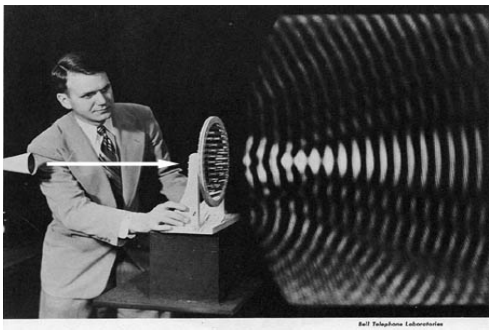


Figure 3.1: Audio

In the drama **Dhakar chairman** we use microphone which attach to the camera for audio recording. After recording we use mixer and a lot of audio software for audio editing.

3.2: Sound recording and reproduction

Sound recording and reproduction is an electrical or mechanical inscription and re-creation of sound waves, such as spoken voice, singing, instrumental music, or sound effects the two main classes of sound recording technology are analog recording and digital recording. Acoustic analog recording is achieved by a small microphone diaphragm that can detect changes in atmospheric pressure (acoustic sound waves) and record them as a graphic representation of the sound waves on a medium such as a phonograph (in which a stylus senses grooves on a record). In magnetic tape recording, the sound waves vibrate the microphone diaphragm and are converted into a varying electric current, which is then converted to a varying magnetic field by an electromagnet, which makes a representation of the sound as magnetized areas on a plastic tape with a magnetic coating on it. Analog sound reproduction is the reverse process, with a bigger

loudspeaker diaphragm causing changes to atmospheric pressure to form acoustic sound waves. Electronically generated sound waves may also be recorded directly from devices such as an electric guitar pickup or a synthesizer, without the use of acoustics in the recording process other than the need for musicians to hear how well they are playing during recording sessions.

3.3: Recording formats

An audio format is a medium for storing sound and music. The term is applied to both the physical recording media and the recording formats of the audio content – in computer science it is often limited to the audio file format, but its wider use usually refers to the physical method used to store the data.

3.4: Conversion process

A digital audio system starts with an ADC that converts an analog signal to a digital signal The ADC runs at a sampling rate and converts at a known bit resolution. For example, CD audio has a sampling rate of 44.1 kHz (44,100 samples per second) and 16-bit resolution for each channel. For stereo there are two channels: 'left' and 'right'. If the analog signal is not already bandlimited then an anti-aliasing filter is necessary before conversion, to prevent aliasing in the digital signal. (Aliasing occurs when frequencies above the Nyquist frequency have not been band limited, and instead appear as audible artifacts in the lower frequencies).

3.5: Digital audio technologies

- Digital Audio Broadcasting (DAB)
- HD Radio
- Digital Radio Mondiale (DRM)
- In-band on-channel (IBOC)

3.6: Digital audio interfaces

Audio-specific interfaces include:

- AC'97 (Audio Codec 1997) interface between Integrated circuits on PC motherboards
- Intel High Definition Audio A modern replacement for AC'97
- ADAT interface
- AES3 interface with XLR connectors
- AES47, Professional AES3-style digital audio over Asynchronous Transfer Mode networks
- MADI Multichannel Audio Digital Interface

3.7: Microphone

A microphone (colloquially called a mic or mike; is an acoustic-to-electric transducer or sensor that converts sound into an electrical signal. In our microphone play important role of sound recording because we record voice in spot recording.

Figure 3.2: Microphone

3.8: Audio mixing

Audio mixing is the process by which a multitude of recorded sounds are combined into one or more channels, most commonly two-channel stereo. In the process, the source signals' level, frequency content, dynamics and panoramic position are manipulated and

effects such as reverb may be added. This practical, aesthetic or otherwise creative treatment is done in order to produce a mix that is more appealing to listeners.

Figure 3.3: Audio mixing

3.9: Equipment

3.9.1: Mixers

A mixer, or mixing console, or mixing desk, or mixing board, or software mixer is the operational heart of the mixing process Mixers offer a multitude of inputs, each is fed by a track from a multitrack recorder; mixers would normally have 2 main outputs (in the case of two-channel stereo mixing) or 8 (in the case of surround).

Mixers offer three main functionalities

- Mixing - summing signals together, which is normally done by a dedicated summing amplifier or in the case of digital by a simple algorithm?
- Routing - allows the routing of source signals to internal buses or external processing units and effects.
- Processing - many mixers also offer on-board processors, like equalizers and compressors.

3.9.2: Outboard gear and plugging

Outboard gear (analog) and software plugging (digital) can be inserted to the signal path in order to extend processing possibilities. Outboard gear and plugging fall into two main categories

- Processors - these devices are normally connected in series to the signal path, so the input signal is replaced with the processed signal (e.g. equalizers).
- Effects - while an effect can be considered as any unit that affects the signal, the term is mostly used to describe units that are connected in parallel to the signal path and therefore they add to the existing sounds, but do not replace them. Examples would include reverb and delay.

3.9.3: Common classes:

Processors:

  - Faders - used to attenuate or boost the level of signals.
  - Pan pots - used to pan signal to the left or right and in surround also back and front.
  - Equalizers - used to manipulate the frequency content of signals.
  - Compressors - used to manipulate the dynamic content of signals. Among many applications they can even the level fluctuations of a singer, or reshape dynamic envelopes of percussive instruments (e.g. adding attack to a snare).
- **Effects**:
  - Reverbs - used to simulate the boundary reflection created in a real room, but that adding a sense of space to otherwise 'dry' recordings.
  - Delays - most commonly used to add distinct echoes as a creative effect.

3.9.4: Mixing Domains

The process of mixing often accounts for a few mixing domains

- Level - concerned with the relative level between instruments and their dynamics.
- Frequency - concerned with the spectral content of the various instruments and the overall mix.
- Space - concerned with the spatial aspect of the various instruments. The space domain is often further subdivided into two sub-domains:

CHAPTER- 4

TELEVISION CAMERA

4.1: video camera

A professional video camera (often called a television camera even though the use has spread) is a high-end device for creating electronic moving images (as opposed to a movie camera that records the images on film). Originally developed for use in television studios, they are now commonly used for corporate and educational videos, music videos, and direct-to-video movies.

Figure 4.1: professional video camera

There are two types of professional video cameras: High end portable, recording cameras (essentially, high-end camcorders) used for ENG and EFP image acquisition, and studio cameras which lack the recording capability of a camcorder, and are often fixed on studio pedestals.

In the drama **Dhakar chairman** we use Sony DV-450 DVCam for vedio recording. It's a latest technology studio professional camera. We use this camera indoor and out door video recording.

4.2: Camera Technology

Most professional cameras utilize an optical prism block directly behind the lens. This prism block (a trichroic assembly comprising two dichroic prisms) filters the image into the three primary colors, red, green, and blue, directing each color into a separate charge-coupled device (CCD) or Active pixel sensor (CMOS image sensor) mounted to the face of each prism. Some high-end consumer cameras also do this, producing a higher-resolution image, with better color fidelity than is normally possible with just a single video pickup.

In both single sensor and triple sensor designs, the weak signal created by the sensors is amplified before being encoded into analog signals for use by the viewfinder and monitor outputs, and also encoded into digital signals for transmission and recording. The analog outputs are normally in the form of either a composite video signal, which combines the color and luminance information to a single output; or an R-Y B-Y Y component video output through three separate connectors.

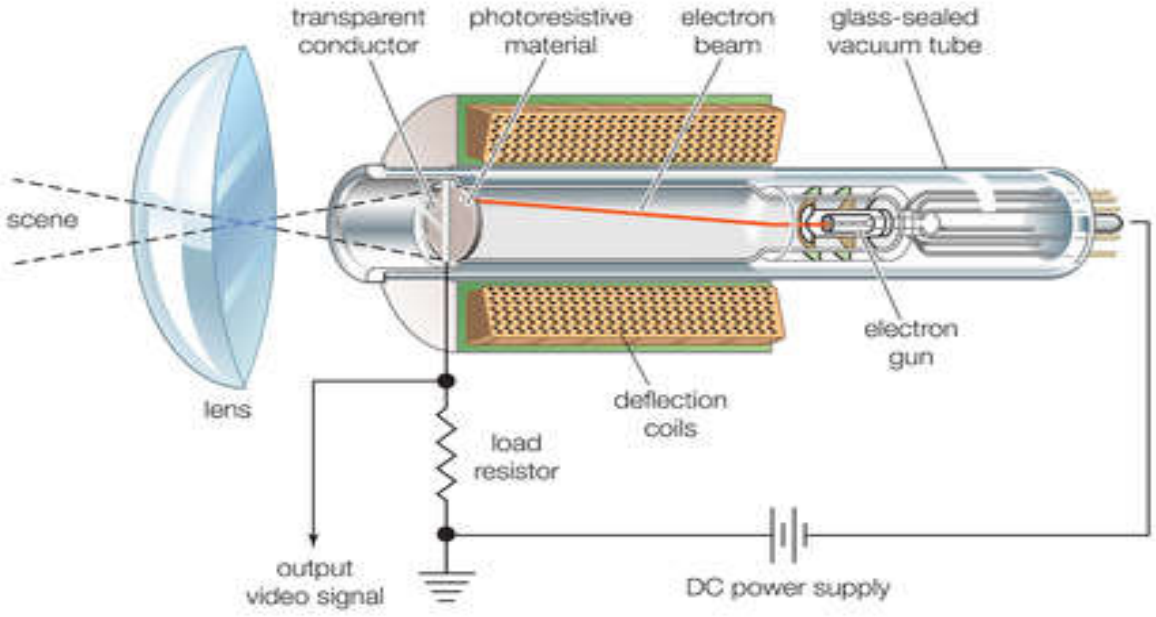


Figure 4.2: Camera Technology

4.3: Studio cameras

Most studio cameras stand on the floor, usually with pneumatic or hydraulic mechanisms called pedestals to adjust the height, and are usually on wheels. Any video camera when used along with other video cameras in a studio setup is controlled by a device known as CCU (camera control unit), to which they are connected via a Triax, Fiber Optic or the almost obsolete Multi core cable. The camera control unit along with other equipment is installed in the production control room often known as the Gallery of the television studio. When used outside a studio, they are often on tripods that may or may not have wheels (depending on the model of the tripod). Initial models used analog technology, but are now obsolete, supplanted by digital models. Studio cameras are light and small enough to be taken off the pedestal and the lens changed to a smaller size to be used on a cameraman's shoulder, but they still have no recorder of their own and are cable-bound. Cameras can be mounted on a tripod, a dolly or a crane, thus making the cameras much more versatile than previous generations of studio cameras.

Figure 4.3: professional studio video camera Sony DV-450.

4.4: Camera Lenses

A camera lens (also known as photographic lens, objective lens or photographic objective) is an optical lens or assembly of lenses used in conjunction with a camera body and mechanism to make images of objects either on photographic film or on other media capable of storing an image chemically or electronically.

Camera lenses are most important element of a digital camera. Lenses use for zoom, focus and much technical reason. In the drama **Dhakar chairman** we used zoom lenses, wide-angle lenses, auto focus lenses, macro lenses, telephoto lenses for video recording.

Figure 4.4: video camera lenses.

4.5: Construction

A camera lens may be made from a number of elements: from one, as in the Box Brownie's meniscus lens, to over 20 in the more complex zooms. These elements may themselves comprise a group of lenses cemented together.

The front element is critical to the performance of the whole assembly. In all modern lenses the surface is coated to reduce abrasion, flare, and surface reflectance, and to adjust color balance. To minimize aberration, the curvature is usually set so that the angle of incidence and the angle of refraction are equal. In a prime lens this is easy, but in a zoom there is always a compromise.

Glass is the most common material used to construct lens elements, due to its good optical properties and resistance to scratching. Other materials are also used, such as quartz glass, fluorite, plastics like acrylic (Plexiglas), and even germanium and meteoritic glass. Plastics allow the manufacturing of strongly spherical lens elements which are difficult or impossible to manufacture in glass, and which simplify or improve lens manufacturing and performance. Plastics are not used for the outermost elements of all but the cheapest lenses as they scratch easily. Molded plastic lenses have been used for the cheapest disposable cameras for many years, and have acquired a bad reputation: manufacturers of quality optics tend to use euphemisms such as "optical resin". However

many modern, high performance (and high priced) lenses from popular manufacturers include molded or hybrid spherical elements, so it is not true that all lenses with plastic elements are of low photographic quality.

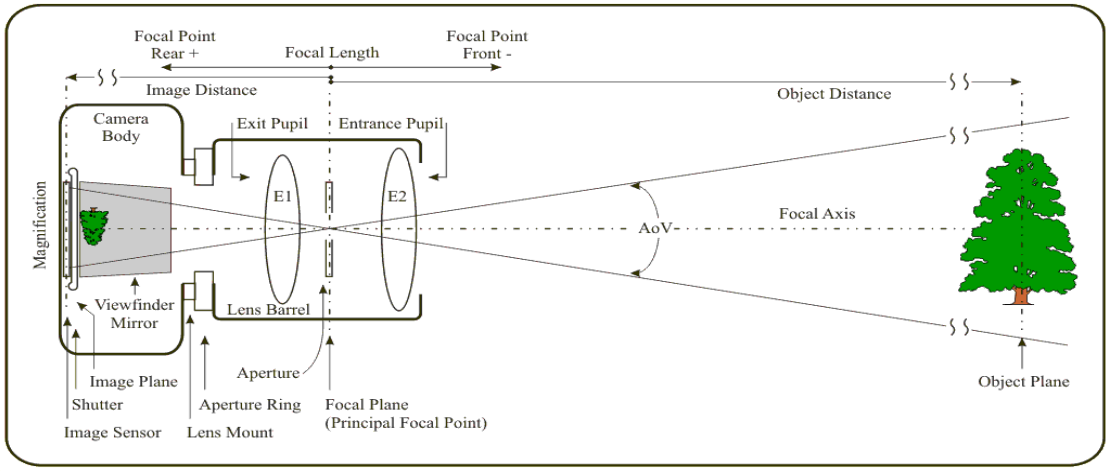


Figure 4.5: Construction video camera lenses.

4.6: Types of lens

"Close-up" or macro

A macro lens used in macro or "close-up" photography (not to be confused with the compositional term "Close up") is any lens that produces an image on the focal plane (i.e., film or a digital sensor) that is the same size or larger than the subject being imaged. This configuration is generally used to image *close-up* very small subjects.

4.6: Macro lenses.

4.7: Zoom Lens

Some lenses, called zoom lenses, have a focal length that varies as internal elements are moved, typically by rotating the barrel or pressing a button which activates an electric motor. Commonly, the lens may zoom from moderate wide-angle, through normal, to moderate telephoto; or from normal to extreme telephoto. The zoom range is limited by manufacturing constraints; the ideal of a lens of large maximum aperture which will zoom from extreme wide-angle to extreme telephoto is not attainable.

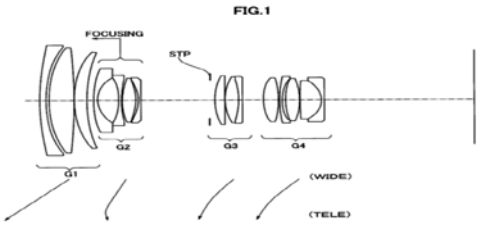


Figure 4.7: Diagram of zoom lenses.

4.8: The telephoto lens

A single-element camera lens is as long as its focal length; for example, 500 mm-focal-length lens requires 500 mm from the lens to the image plane. A telephoto lens is made physically shorter than its nominal focal length by pairing a front positive imaging cell with a rear magnifying negative cell. The powerful front group over-refracts the image, the rear restores the focal plane, thereby greatly shortening the back-focus length. Originally, accessory negative cells were sold to attach to the rear of a regular lens. The Barlow lens, a negative achromatic magnifier invented by Peter Barlow in 1833, is still sold to increase the eyepiece magnification of amateur telescopes. The teleconverter is the modern photographic equivalent.

4.9: The retro focus wide angle lens

Regular wide angle lenses (meaning lenses with focal length much shorter than the format diagonal and producing a wide field of view) need to be mounted close to the film. We use wide angle lenses for wide area video recording.

4.10: The auto focus lens

Since auto focus is primarily an electromechanical feature of the camera, not an optical one of the lens, it did not greatly influence lens design. The only changes wrought by AF were mechanical adaptations: the popularity of "internal focusing" (q.v.), the switch back to "two touch" zooming (q.v.) and the inclusion of AF motors or drive shafts, gearing and electronic control microchips inside the lens shell.

4.11: Video Cassette

In **Dhakar chairman** we use professional DVCam cassette for recording. This cassette is professional for terrestrial and satellite TV broadcasting.

4.12: Video monitor

A video monitor also called a broadcast monitor, broadcast reference monitor or just reference monitor, is a device similar to a television, used to monitor the output of a video-generating device, such as a media play out server, IRD, video camera, VCR, or DVD player. In our drama we use video monitor for viewing video when we record.

Figure 4.8: video monitor.

CHAPTER- 5

Digital video editing

5.1: What is video editing

Video editing is the process of editing segments of motion video footage, special effects and sound recordings. Motion picture film editing is a predecessor to video editing and, in several ways, video editing simulates motion picture film editing, in theory and the use of non-linear and linear editing systems. Using video or film, a director can communicate non-fictional and fictional events. The goals of editing is to manipulate these events for better or for worse communication. It is a visual art.

Figure 5.1: professional video editing.

5.2: Linear video editing

Linear video editing is the process of selecting, arranging and modifying the images and sound recorded on videotape whether captured by a video camera, generated from a computer graphics program or recorded in a studio. Until the advent of computer-based non-linear editing in the early 1990s "linear video editing" was simply called “video editing.”

Figure 5.2: Linear video editing.

5.3:Non-linear editing

In our drama **Dhakar Chairman** we use non linear video editing system .Non-linear editing for films and television postproduction is a modern editing method which enables direct access to any frame in a digital video clip, without needing to play or scrub/shuttle through adjacent footage to reach it, as was necessary with historical videotape editing systems.

Figure 5.3: Non- Linear video editing.

Editing. However, with the appropriation of non-linear editing systems, the destructive act of cutting of film negatives is eliminated. Non-linear, non-destructive methods began to appear with the introduction of digital video technology. It can also be viewed as the audio/video equivalent of word processing, which is why it is called desktop editing in the consumer space

Video and audio data are first captured to hard disks or other digital storage devices. The data is either recorded directly to the storage device or is imported from another source. Once imported they can be edited on a computer using any of a wide range of software. For a comprehensive list of available software, see List of video editing software, whereas Comparison of video editing software gives more detail of features and functionality.

5.4: Video capture

Video capture cards are a class of video capture devices designed to plug directly into expansion slots in personal computers and servers. We use video capture card for capture video with better resolution.

Figure 5.4: Video capture cards.

5.5: FireWire

FireWire can connect up to 63 peripherals in a tree chain topology (as opposed to Parallel SCSI's electrical bus topology). It allows peer-to-peer device communication — such as communication between a scanner and a printer — to take place without using system memory or the CPU. FireWire also supports multiple hosts per bus. It is designed to support Plug and play but not hot swapping. The copper cable it uses (1394's most common implementation) can be up to 4.5 meters (15 ft) long and is more flexible than most Parallel SCSI cables. In its six-circuit or nine-circuit variations, it can supply up to 45 watts of power per port at up to 30 volts, allowing moderate-consumption devices to operate without a separate power supply.

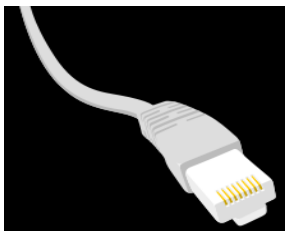


Figure 5.5: FireWire.

5.6: Vision mixer

A vision mixer (also called video switcher, video mixer or production switcher) is a device used to select between several different video sources and in some cases composite (mix) video sources together and add special effects. This is similar to what a mixing console does for audio.

Figure 5.6: A vision mixer

In this section we edit video footage frame by frame and use a lot of video effect.

5.7: Non-linear video editing software

In our production we use the latest digital video editing software Final Cut Pro which use the Mac operating system.

Final Cut Studio

Final Cut Studio is a professional video and audio production suite for Mac OS X from Apple Inc., and a direct competitor to Avid Media Composer in the high-end movie production industry.

Figure 5.7: Final Cut Studio

5.8: Components

Final Cut Studio version 3 contains six main applications and several smaller applications used in editing video. The major applications it includes are:

- Final Cut Pro 7 – "real-time editing for DV, SD and HD"
- Motion 4 – "real-time motion graphics design"
- Soundtrack Pro3 – "advanced audio editing and sound design"
- DVD Studio Pro 4 – encoding, authoring and burning.
- Color 1.5 – a new color grading application adapted from Silicon Color's Final Touch.
- Compressor 3.5 – a video encoding tool for outputting projects in different formats.

Additional applications included are:

- Cinema Tools 4.5 – tools specific to film processing.
- Master 3 – a distributed processing tool.

5.9: Adobe after Effects

Adobe after Effects is digital motion graphics and compositing software published by Adobe Systems. Its main purpose is for film and video post-production.

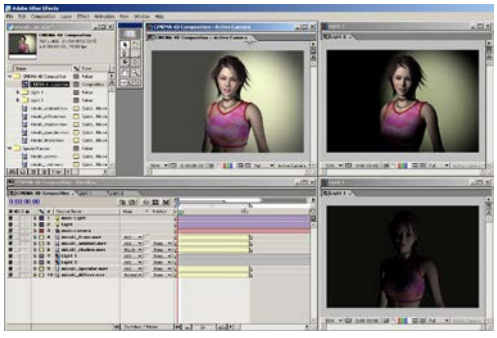


Figure5.8: Adobe after Effects

Adobe after Effects is primarily used for creating motion graphics and visual effects. After Effects allows users to animate, alter and composite media in 2D and 3D space with various built-in tools and third party plug-ins, as well as individual attention to variables like parallax and user-adjustable angle of observation.

We used adobe after effect for title, special effect for bombing and fire in our drama.

5.10:Post-production

Post-production is part of the filmmaking process. It occurs in the making of motion pictures, television programs, radio programs, advertising, videos, audio recordings, photography and digital art. It is term for all stages of production occurring after the actual end of shooting and/or recording the completed work.

Post-production is, in fact, many different processes grouped under one name. These typically include:

- Editing the picture / television program
- Writing, (re)recording, and editing the soundtrack.
- Adding visual special effects - mainly computer-generated imagery (CGI) and digital copy from which release prints will be made (although this may be made obsolete by digital-cinema technologies).
- Sound Design, Sound Effects, ADR, Foley and Music, culminating in a process known as sound re-recording or mixing.
- Transfer of film to Video or Data with a telecine and Color grading.

In video editing when we research about video effect we mixed the color pink, blue, yellow, red and attached another effect which glow the screen little bit and add focus effect for better focusing then we get new type of video footage which video quality color and resolution are more better then previous. This visual effect make our drama visually its similar as film production without using film instrument.

CHAPTER- 6

Broadcast television systems

6.1: Broadcast television systems

Broadcast television systems are encoding or formatting standards for the transmission and reception of analog television signals. Today, there are three main analog broadcast television systems in use around the world. These are NTSC, PAL, or SECAM. These systems have several components, including a set of technical parameters for the broadcast signal, a system for encoding color, and possibly a system for encoding multi-channel audio.

Figure 6.1: Broadcast television systems

6.2: Analog television systems

All but one analog television system began as monochrome systems. Each country, faced with local political, technical, and economic issues, adopted a color system which was grafted onto an existing monochrome system, using gaps in the video spectrum (explained below) to allow color transmission information to fit in the existing channels allotted. The grafting of the color transmission standards onto existing monochrome systems permitted existing monochrome television receivers predating the change over to color television to continue to be operate as monochrome television. Because of this compatibility requirement, color standards added a second signal to the basic monochrome signal, which carries the color information. The color information is called chrominance or C for short, while the black and white information is called the

luminance or Y for short. Monochrome television receivers only display the luminance, while color receivers process both signals. Though in theory any monochrome system could be adopted to a color system, in practice some of the original monochrome systems proved impractical to adapt to color and were abandoned when the switch to color broadcasting was made. All countries now use one of three color systems: NTSC, PAL, or SECAM.

6.3: Digital television transition

The **digital television transition** is the process in which analog television broadcasting is converted to and replaced by digital television. This primarily involves both TV stations and over-the-air viewers; however it also involves content providers like TV networks, and cable TV conversion to digital cable.

Figure 6.2: digital television transition

6.4: Digital-to-analog converters

After the switch from analog to digital broadcasts is complete, analog TVs will be incapable of receiving over-the-air broadcasts without the addition of a set-top converter box. Consequently, a digital converter box – an electronic device that connects to an analog television – must be used in order to allow the television to receive digital broadcasts. In the United States, the government is subsidizing the purchase of such boxes via their coupon-

6.5: Baseband Processing

In telecommunication, a line code (also called digital baseband modulation) is a code chosen for use within a communications system for baseband transmission purposes. Line coding is often used for digital data transport.

Line coding consists of representing the digital signal to be transported by an amplitude- and time-discrete signal that is optimally tuned for the specific properties of the physical channel (and of the receiving equipment). The waveform pattern of voltage or current used to represent the 1s and 0s of a digital data on a transmission link is called line encoding. The common types of line encoding are unipolar, polar, bipolar and Manchester encoding.

6.6: Transmission

In telecommunications, transmission is the process of sending, propagating and receiving an analogue or digital information signal over a physical point-to-point or point-to-multipoint transmission medium, either wired, optical fiber or wireless. Transmission technologies and schemes typically refer to physical layer protocol duties such as modulation, demodulation, line coding, equalization, error control, bit synchronization and multiplexing, but the term may also involve higher-layer protocol duties, for example, digitizing an analog message signal, and source coding (compression).

DVB-T is an abbreviation for **Digital Video Broadcasting — Terrestrial**; it is the DVB European-based consortium standard for the broadcast transmission of digital terrestrial television that was first publicated in 1997 and first broadcast in the UK in 1998. This system transmits compressed digital audio, video and other data in an MPEG transport stream, using coded orthogonal frequency-division multiplexing (COFDM or OFDM) modulation.

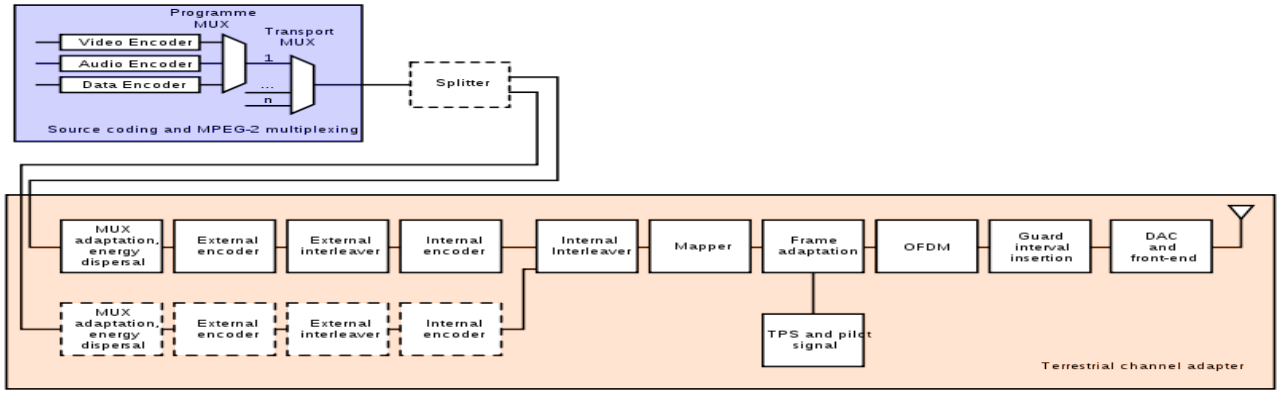


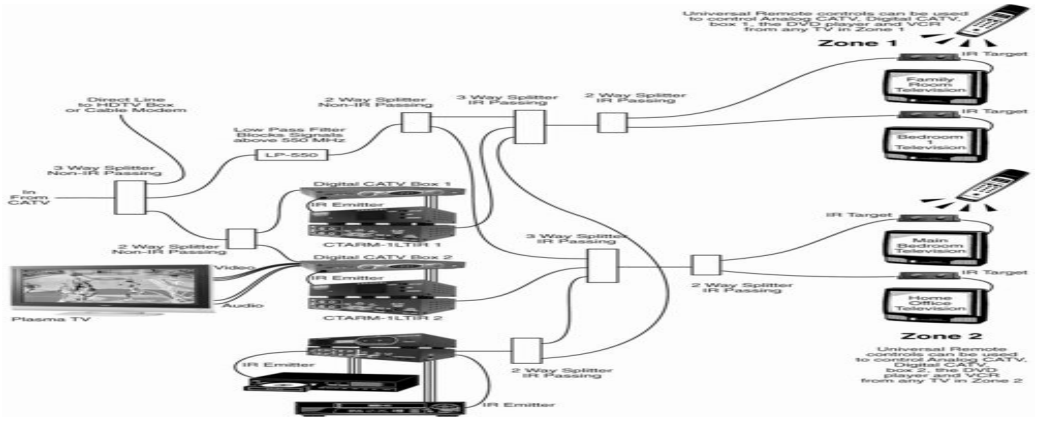
Figure 6.4: Digital- Transmission

6.7: Digital cable and satellite television

Recording satellite or digital cable signals on a digital video recorder can be more complex than recording analog signals or broadcast digital signals. There are several different transmission schemes, and the video streams may be encrypted to restrict access to subscribers only.

Figure 6.5: Digital cable and satellite television

A satellite or cable set-top box both decrypts the signal if encrypted, and decodes the MPEG stream into an analog signal for viewing on the television. In order to record cable or satellite digital signals the signal must be captured after it has been decrypted but before it is decoded; this is how DVRs built into set-top boxes work.



Cable and satellite providers often offer their own digital video recorders along with a service plan. These DVRs have access to the encrypted video stream, and generally enforce the provider's restrictions on copying of material even after recording.

CHAPTER-7

Broadcast Equipment

7.1: Television studio Equipment

A television studio is an installation in which television or video productions take place, either for live television, for recording live to tape, or for the acquisition of raw footage for post-production. The design of a studio is similar to, and derived from, movie studios, with a few amendments for the special requirements of television production. A professional television studio generally has several rooms, which are kept separate for noise and practicality reasons. These rooms are connected via intercom, and personnel will be divided among these workplaces.

7.2: Studio floor

The studio floor is the actual stage on which the actions that will be recorded take place. A studio floor has the following characteristics and installations:

Figure 7.1: studio floor

- decoration and/or sets
- cameras (sometimes one, usually several) on pedestals
- microphones
- Lighting rigs and the associated controlling equipment.
- several video monitors for visual feedback from the production control room
- a small public address system for communication
- A glass window between PCR and studio floor for direct visual contact is usually desired, but not always possible

While a production is in progress, the following people work in the studio floor.

- The on-screen "talent" themselves, and any guests - the subjects of the show.
- A floor director or *floor manager*, who has overall charge of the studio area, and who relays timing and other information from the director.
- Possibly a teleprompter operator, especially if this is a news broadcast

7.3: Production-control room

The production control room (PCR), also known as the "gallery" or Studio Control Room (SCR), is the place in a television studio in which the composition of the outgoing program takes place. Facilities in a PCR include:

Figure 7.2: production control room (PCR)

- A video monitor wall, with monitors for program, preview, VTRs, cameras, graphics and other video sources. In some facilities, the monitor wall is a series of racks containing physical television and computer monitors; in others, the monitor wall has been replaced with a virtual monitor wall (sometimes called a "glass cockpit"), one or more large video screens, each capable of displaying multiple sources in a simulation of a monitor wall.
- A vision mixer, a large control panel used to select the video sources to be seen on air and, in many cases, in any monitors on the set. The term 'vision mixer' is primarily used in Europe, while the term 'switcher' is usually used in North America.
- An audio mixing console and other audio equipment such as effects devices.

- A character generator, which creates the majority of the names and full screen graphics that are inserted into the program
- Digital video effects, or DVE, for manipulation of video sources. In newer vision mixers, the DVE is integrated into the vision mixer; older models without built-in DVE's can often control external DVE devices, or an external DVE can be manually run by an operator.
- A still store, or still frame, device for storage of graphics or other images. While the name suggests that the device is only capable of storing still images, newer still stores can store moving video clips.
- The technical director's station, with waveform monitors, vector scopes and the CCUs or remote control panels for the CCUs.
- In some facilities, VTRs may also be located in the PCR, but are also often found in the central machine room
- Intercom and IFB equipment for communication with talent and crew

7.4: Master-control room

The master control room houses equipment that is too noisy or runs too hot for the production control room. It also makes sure that wire lengths and installation requirements keep within manageable lengths, since most high-quality wiring runs only between devices in this room. This can include:

- The actual circuitry and connection boxes of the vision mixer, DVE and character generator devices
- camera control units
- VTRs
- Patch panels for reconfiguration of the wiring between the various pieces of equipment.

In a broadcast station in the US, master control room or "MCR" is the place where the on-air signal is controlled. It may include controls to play back programs and commercials, switch local or network feeds, record satellite feeds and monitor the

transmitter(s), or these items may be in an adjacent equipment rack room. The term "studio" usually refers to a place where a particular local program is originated. If the program is broadcast live, the signal goes from the production control room to MCR and then out to the transmitter.

7.5: Uplink power control

The simplest way to compensate the rain fade effect in satellite communications is to increase the transmission power: this dynamic fade countermeasure is called uplink power control (UPC). Until more recently, uplink power control had a limited use since it could not provide very large margins without compressing the transmitting amplifier. Modern amplifiers coupled with advanced uplink power control systems (such as Glow link's Model 3010) that offer automatic controls to prevent transponder saturation make uplink power control systems an effective, affordable and easy solution to rain fade in satellite signals.

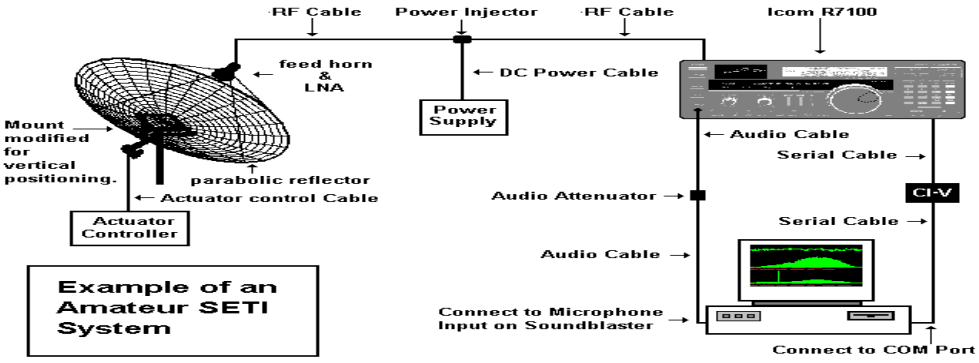


Figure 7.3: Uplink power control

7.6: Editing Equipment

- Two iMac G5 computers each running a copy of Avid Express Pro
- One Mac G5 Tower running a copy of Avid Express Pro
- One Mac G3 Tower running a copy of Media100

Figure 7.4: Editing Equipment

7.7: Camera Equipment

- 2 Canon XL-1 Cameras equipped with professional audio (XLR) shoulder mounts
- 1 Panasonic DVX100A 24P Camera
- 2 Panasonic DVX100B 24P Cameras
- 2 JVC GY-DV500 Cameras

7.8: Production Control Room (PCR) Configuration

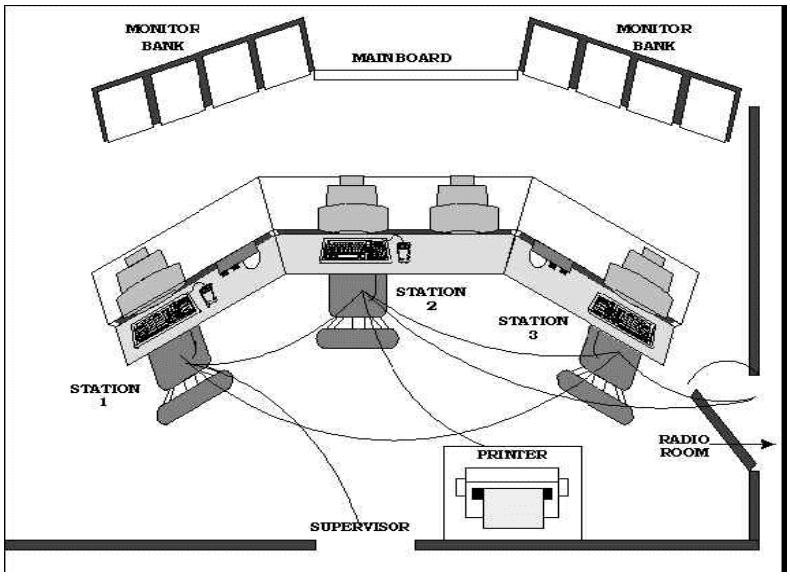


Figure 8.5: Production Control Room (PCR) Configuration

Conclusion

The rapid growth of digital technology revolutionized the media broadcasting industry. The number of television and radio broadcasting stations has immensely increased, media delivery expanded from satellite, cable and terrestrial to include mobile devices (mobile phones, pocket computers and PDA) and the internet. This growth created a need for qualified professionals with core competencies in HDTV and digital broadcast technologies, electronics, communications, digital multi-media, digital broadcast/film production, computer networking and INTERNET technologies in addition to project management and organizational skills. This work is mainly focused on digital video production and broadcast technology. Broadcast television systems are encoding or formatting standards for the transmission and reception of analog television signals. Today, there are three main analog broadcast television systems in use around the world. These are NTSC, PAL, or SECAM. These systems have several components, including a set of technical parameters for the broadcast signal, a system for encoding color, and possibly a system for encoding multi-channel audio.

Today visual media are increasing its technology day by day and newest video production is getting more and enjoyable than the conventional videos. So it's very necessary to learn about video production and broadcast technology in order to make better video program.

After implementation of all functions of this drama, the system is tested in different stages and broadcast **Dhakar Chairman** on channel one successfully.

REFERENCES

[1] Broadcast Engineer's By EPJ Tozer

[2] Broadcast Sound Technology By Michael Talbot-Smith

[3] Broadcast Technology By August E. Grant and Peter Seel

[4] Digital Evolution of Broadcast Technology By Alan Skinner

[5] A Broadcast Engineering Tutorial for Non-Engineers, By Graham Jones

[6] Digital Interactive TV and Metadata: Future Broadcast Multimedia (Signals and

[7] Communication Technology) By Arthur Lugmayr, Samuli Niiranen,and Seppo Kalli

[8] Radio and Television Regulation: Broadcast Technology By Hugh Richard Slotten

[9] Satellite Broadcast Systems Engineering By Jorge Matos Gómez

[10] Video Systems in an IT Environment, Second Edition By Al Kovalick

[11] http://www.google.com

[12] http://en.wikipedia.org