



Mobile Video Production **TEACHER'S GUIDE**



A Comprehensive Guidebook for Teaching Mobile Video Production



datavideo

A Special Thanks

To the wonderful teachers and video production professionals involved in the creation of this Teacher's Guide. This book would not have been possible without your patience, care, and extensive knowledge in the field of video creation.

Thank you.



Mark Bush
Broadcast Teacher,
Century High School



Warren Carter
Video Production Teacher,
Golden West College



Cathy Balke
Marketing Director at
Datavideo USA

TABLE OF CONTENTS

Chapter 1: Basic Understanding of Equipment

1.1: What is Mobile Production	15
1.2: Know Your Gear	18
1.3: What is the HS-1600T MARK II?	20
1.4: Cameras	22
1.5: What is HDBaseT?	24
1.6: Audio	26

Chapter 2: Plan for the Event

2.1: Location	31
2.2: Run of Show	34

Chapter 3: Setup for the Event

3.1: Production Team	40
3.2: Setting up your Equipment at the Event	42
3.3: Rehearsal	46

Chapter 4: Techniques for the Technical Director

4.1: Camera presets	49
4.2: Scene Switching	52
4.3: Switcher Effects	54

TABLE OF CONTENTS

Chapter 5: Streaming Basics

5.1: How Streaming Works	61
5.2: What is dvCloud?	64
5.3: Why use SRT?	66
5.4: How to Set Up the HS-1600T MARK II's Streaming Encoder	68
5.5: Promoting the Live Stream Before the Event	76

Chapter 6: Case Study of Mobile Production Live Events

6.1: Plan for the Production	82
6.2: Set Up for the Production	83
6.3: Stage Production (School Play or Concert)	84
6.4: Graduation or Award Ceremony	86
6.5: Assembly	88

Chapter 7: Case Study of Mobile Production Sports Games

7.1: Skills For a Play-by-Play Commentator	93
7.2: Do's and Don'ts For Sports Commentating	95
7.3: Skills For An Interviewer	97
7.4: Do's and Don'ts for Live Interviews	99
7.5: Sporting Events	100

Welcome to the Datavideo Video Mobile Production Teacher's Guide:

Preface

Streaming technology has changed the way we consume live video. An audience can now consume video on a phone, tablet, laptop or a smart TV. Audiences can view live video content just about anywhere with a network connection. Creating content for streaming is no longer just for studio production, but for events that happen throughout a school campus or even off campus. Think of all the various school events where a professional video production is needed for events such as graduations, school plays, sporting events, school assemblies, school board meetings, and many more.





This Mobile Production Teachers Guide along with the EPB-1640T or EPB-1650T will provide you with the tools and instructions to produce broadcast quality live streams for school events. This guide will give you tips on where to place the cameras at a venue, how to manage audio, as well as provide the proper streaming needs for your event. For example, you can use a wireless hotspot or any internet connection to live stream your event. It is now possible for any producer with a small budget to stream to a targeted audience for a live event. You no longer need to be in a dedicated video studio setting, but video can be produced nearly anywhere at any time. This guide is designed to help teachers help students learn how to stream professional quality video from nearly any location.

EPB-1640T Included Datavideo Products



HS-1600T MARK II

This is a 12-input switcher with a built-in 17-inch monitor which includes audio inputs, a streaming encoder and a recording device.



PTC-140T (two)

This camera is a PTZ (pan, tilt, zoom) camera which allows the operator to move the camera angle 300 degrees as well as zoom at 20x optical.



HC-800-FS

Case for the two PTC-140 cameras and their power supplies



HC-850

Case for the HS-3200



2x CB-CAT6-100

100ft CAT 6 cable for connecting the cameras to the HS-1600T MARK II.

EPB-1650T Included Datavideo Products



HS-1600T MARK II

This is a 12-input switcher with a built-in 17-inch monitor which includes audio inputs, a streaming encoder and a recording device.



PTC-150TL (two)

This camera is a PTZ (pan, tilt, zoom) camera which allows the operator to move the camera angle 300 degrees as well as zoom at 30x optical.



HC-800-FS

Case for the two PTC-140 cameras and their power supplies



HC-850

Case for the HS-3200



2x CB-CAT6-100

100ft CAT 6 cable for connecting the cameras to the HS-1600T MARK II.

Items Recommended **Not Included in the Datavideo Bundle**



Mackie 8 Audio Mixer



Audio-Technica's Broadcast Stereo
headsets to commentate over video



Hot Spot for WiFi connection



Laptops will be required to key in graphics or bring in a media clip. A laptop with an HDMI output should work. The HS-1600T MARK II will scale to any video resolution to match the other video inputs.



Tripods (two) – Used to mount the PTC-140 cameras. Since the camera does not need an expensive head for mounting (robotic cameras) you should focus on the weight the tripod can handle (8+lbs). The Manfrotto MT190Xpro3 is a good choice.

If you have the following gear for your studio, you should be ready to move to Chapter 1.



Video Production Class Activities that are Aligned to the ISTE Standards for Students

1

1. Empowered Learner:

Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences.

2

2. Digital Citizen:

Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.

3

3. Knowledge Constructor:

Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.



4

4. Innovative Designer:

Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.



5

5. Computational Thinker

Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.



6

6. Creative Communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.



7

7. Global Collaborator

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

one



Chapter 1: Basic Understanding of Equipment

1-1: What is Mobile Production

1-2: Know Your Gear

1-3: What is the HS-1600T MARK II?

1-4: Cameras

1-5: What is HDBaseT?

1-6: Audio



1.1: What is Mobile Production

If you look inside any toolbox, you might find a wrench, screwdriver and other tools for various jobs. You use different tools for different applications and tasks. The same is true with video equipment. The gear you use depends on the type of video you choose to produce.

This Mobile Production Guide will only focus on how to produce video streams outside a traditional production in a studio. In a studio, you might have a green screen, professional lighting, and teleprompters to produce various productions such as morning announcements, news reports, or interviews. However, when you want to produce an event outside of a studio, you need gear which you can manage power and video signal easily while having the portability feature so they are easy to move around from one location to the next. The all new EPB-1640T or EPB-1650T is a kit which allows you to create content outside of a studio.

1.1: What is Mobile Production Cont.

So, let's determine what is required in a mobile production:

1. At least two camera inputs or one camera input with a computer/video device input.
2. A video switcher, which is used for switching camera or PC inputs.
3. Production is designed for live video, not designed for post-production.
4. Video is either being streamed live, recorded for uploading to a platform, or connected to a video conferencing app (Zoom, Microsoft Teams, etc.)
5. Audio embedded into the switcher from an audio mixer or microphone input.
6. Video equipment is portable and easy to set-up and pack-up.

The EPB-1640T or EPB-16050T is the ideal portable studio to set up for the live events throughout the school year. This guide will provide everything you need to properly use these bundles so you can keep your studio intact for studio productions. As students work to connect and operate a variety of equipment, they can **design and innovate** the spaces they work in, creating a suitable environment for a successful video production.

Let's get started.

4

Innovative Designer:

Students will become innovative designers after using a variety of video equipment to produce and create live mobile production shows. They will be able to identify and solve, or troubleshoot, problems.



1.2: Know Your Gear

The difference between the EPB-1640T and EPB-1650T is the camera. EPB-1640T comes with the PTC-140T cameras when EPB-1650T comes with the PTC-150TL cameras. We'll go over the difference between these two cameras in section 1.5.

Let's begin by taking a look at everything that comes in the bundles.

HS-1600T MARK II

HS-1600T MARK II is a four input HDBaseT Mobile Cast Studio. We will go into details about all the amazing features HS-1600T MARK II has in section 1.4.

PTC-140T (if purchased EPB-1640T)

PTC-140T is a 1080p PTZ camera with 20x optical zoom. The bundle comes with two PTC-140T cameras.

PTC-150TL (if purchased EPB-1650T)

PTC-150TL is a 1080p PTZ camera with 30x optical zoom. The bundle comes with two PTC-150TL cameras.

HC-800FS

HC-800FS is a sturdy, protective carry case for the cameras, power supply for the HS-1600T MARK II, and cables. The case comes with a custom cut foam that fits the cameras perfectly and protects it during transportation.

HC-850

HC-850 is a sturdy, protective carry case for the HS-1600T MARK II. It comes with a custom cut foam that fits the HS-1600T MARK II perfectly and protects it during transportation.

CB-CAT6-100

CB-CAT6-100 is a one-hundred-foot CAT 6 cable for connecting the cameras to the HS-1600T MARK II. The bundle comes with two cables.



1.3: What is the HS-1600T MARK II?

HS-1600T MARK II is the star of the bundle. It has three HDBaseT inputs and one HDMI input for a computer source. It also has built-in 17" monitor for multi-view, ergonomic joystick and knob for camera control, easily accessible buttons for camera presets, streaming encoder and recorder all packaged in a portable briefcase style housing. It has a small footprint, so it doesn't take up a lot of space on a production table. Since the switcher, camera controller, preview monitor, streaming encoder and recorder are all built inside the unit, you don't need to carry multiple pieces of equipment for your mobile production.

Having a built-in camera control makes it convenient to control multiple cameras at the same time. In addition to the joystick and knob for controlling pan, tilt, and zoom of the PTZ cameras, the HS-1600T MARK II comes with preset buttons for recalling camera angles from memory. You can save up to four presets per camera input.

Streaming and recording is as easy as pressing a button on the front panel of the switcher. It records onto an SD card, so it is easy to transfer the recorded files and upload to a website. The built-in encoder can stream to two CDN's simultaneously, so you can share your content with a wider audience.

HS-1600T MARK II is an all-in-one unit that is a work horse for your mobile production. It switches, controls, monitors, streams, and records, while providing power to the cameras.





HS-1600T MARK II Front View



HS-1600T MARK II Rear View

1.4: Cameras

The main difference between the PTC-140T and PTC-150TL is the optical zoom lens. PTC-140T has 20x optical zoom and PTC-150TL has 30x optical zoom. So, if you are mostly going to produce mobile productions where your camera needs to be set up far away from the switcher at over 200ft, use the PTC-150TL, which has 30x zoom. PTC-150TL also works better in low light environments, so if you are going to shoot a lot of productions in a dark environment, the PTC-150TL would be a better choice for you.

That is not to say that PTC-140T is an inferior choice by any means. It is a great camera that gives you very high-quality video for both light and dark production environments. The PTC-140T more than suffices for most mobile productions.

So, depending on what your requirements are, you can choose either EPB-1640T or EPB-1650T.



Front of PTC-140T



Rear of PTC-140T

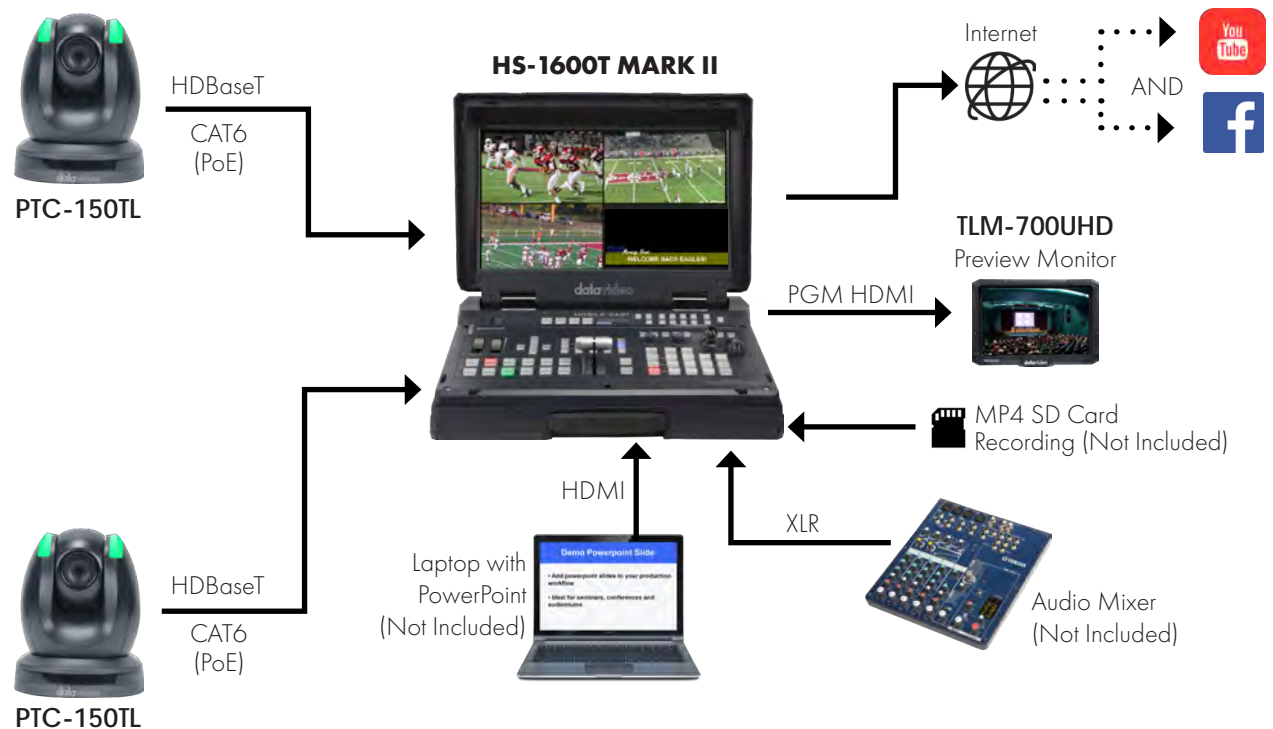


Front of PTC-150TL



Rear of PTC-150TL

Connecting the PTC-140T or PTC-150TL to the HS-1600T MARK II is very easy. Use the included CB-CAT6-100 CAT6 cables and connect each camera to the HDBaseT inputs on the HS-1600T MARK II.



1.5: What is HDBaseT

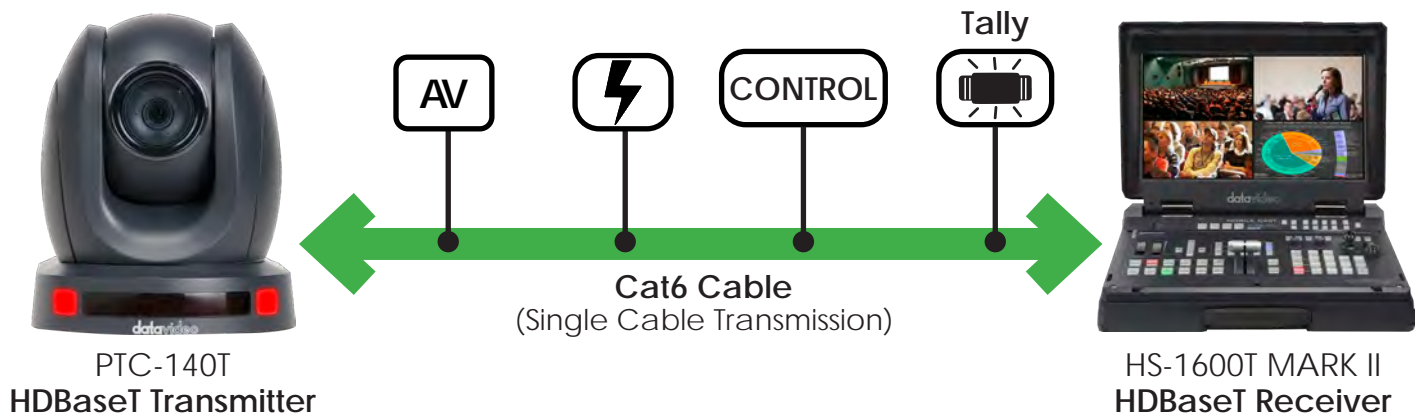
HDBaseT is the global standard for transmission of ultra-high-definition video and audio, control, power and tally over a single cable. HDBaseT can transmit up to 328 feet over a CAT 6 cable.



Why Use HDBaseT?

HDBaseT eliminates the need to have multiple cables in your production. Since it can transmit video, audio, control, power, and tally over a single cable, HDBaseT simplifies the workflow. It makes it easy for mobile productions because setting up and tearing down processes are now as simple as connecting one cable from a camera to a switcher. You no longer need to connect multiple cables for different parts of the production. HDBaseT streamlines the workflow.

The most beneficial part of HDBaseT is Power over Ethernet. Because power can be transmitted over a CAT 6 cable, you don't need to power the cameras locally. This gives you the freedom to place your cameras anywhere for your production without having to worry about finding an electrical outlet to provide power to the camera.



Did you Know?

Benefits of HDBaseT

- **Long-distance transmission:** 100m/328ft with a single cable.
- **Signal convergence:** Transmit ultra-high-definition video and audio, power, control, and tally over single CAT 6 cable eliminating clutter, simplifying installation, with reduced infrastructure costs and low cabling weight
- **Simplicity:** Category (LAN) cables are easy to install and use in the field.
- **Affordability:** HDBaseT relies on low-cost infrastructure without compromising on performance, reducing not only installation but also maintenance costs. The ability to transmit power over HDBaseT eliminates the need for electrical cables and outlets near all of the devices.
- **Standardization:** HDBaseT is an industry standard, facilitating interoperability.
- **Versatility:** HDBaseT is an industry-proven technology, which can be easily adapted across different sectors.

1.6: Audio

Audio is often the most overlooked element in video production. If your audience can't understand what is being said or if audio levels are too low, it can ruin a video production as much as poor lighting or poor camera work. In some cases, audio can be fixed in post-production, but if you are producing live streams, it's best to check all your audio gear before you start. Since audio gear is not included in the Datavideo bundles, we should point out some essential audio equipment needed for mobile event productions.



Choose the Right Microphone for the Job

Handheld Microphones – typically used by news reporters in the field, sporting events and other remote productions which provide direction to your audio. For example, if interviewing someone at a sporting event, it is easier for the talent to point the mic in the direction of whoever is talking than to set up a lapel mic. Handheld mics can be wireless or wired directly to the audio mixer and mixed before going into your switcher or streaming encoder.

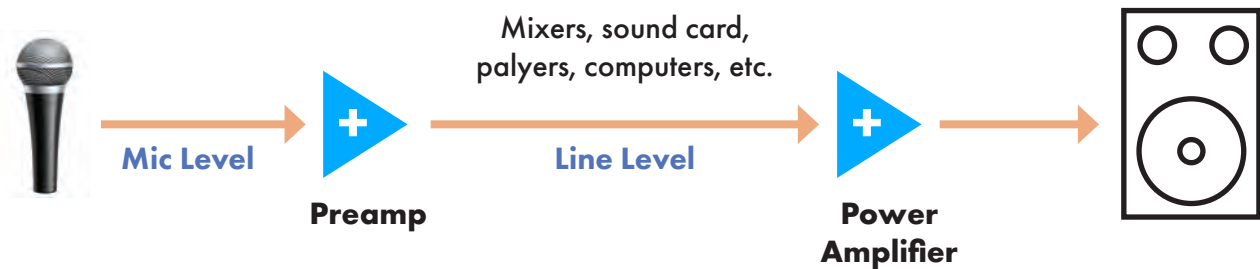
Head worn Microphones – these microphones are typically used in broadcast applications and have a boom type microphone that can be placed near the mouth of the announcer. Head worn microphones are especially useful for loud venues, sporting arenas, and stadiums. These headphones are used for audio commentating over video at sporting events.






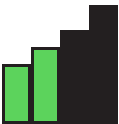
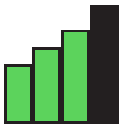
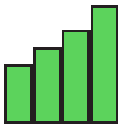
Audio Headphones – It is always a good idea for one of your video team members to monitor audio levels with headphones. The headphone will be able to detect if the talent is loud enough, too loud, or if you can hear background noise picked up by the mics in the room. The headphone may be connected directly to the HS-1600 MARK II switcher, directly from the audio mixer using a mini-jack, or 1/4 inch headphone jack.

Line Level vs. Mic Level

It's important to know the difference between audio level types to determine how best to handle your audio mix, type of cable and where to plug in your cables to an audio mixer. A line-level signal is approximately one volt, or about 1,000 times stronger than a mic-level signal. Because the mic audio level is significantly lower than line, you will need some sort of pre-amplification or mic-preamps to boost the signal so that it is audible. Audio mixers usually have mic-preamps built-in, so you need to make sure that you plug your microphones into the appropriate port on your audio mixer. A line level audio source can be MP3, DVD players, or simply the output from your audio mixer; however, some audio mixers can output line level or mic level audio.

It is crucial to match a device to the correct input, since there's little real technical tolerance for mistakes. Connecting a microphone to a line-level input will result in almost no sound at all because the mic-level signal is too weak to drive the line-level input. Conversely, connecting a line-level source to a mic-level input will cause the sound to be loud and distorted because the line-level signal is much stronger than what the mic input will accept.



MIC LEVEL	INSTRUMENT LEVEL	LINE LEVEL	SPEAKER LEVEL
			
			

Audio Mixer and How it Connects to the HS-1600T MARK II

The audio mixer is a standard piece of equipment that is used in most video production set ups. The mixer performs a very important function by managing and mixing together all of the audio sources. The audio mixer takes in an array of audio sources including microphones, audio inputs from any type of peripheral equipment such as laptops, computers, playback devices, etc. It then will combine all these audio sources and send a mixed live audio output to the HS-1600T MARK II using XLR cables.

Typically, each audio input has a volume control and other sound controls associated with it. This is called a channel. If you have a six-input audio mixer, then you can control the individual sounds of six different audio sources. Each channel comes with its associated individual controls for volume and frequency. This allows you to very specifically fine tune the sound for each audio input source you will have for bass and treble. It also provides a way for you to balance the sound coming from each source by adjusting the corresponding channel controls.

The Mackie 8 mixer has stereo XLR and TRS outputs for connecting to the HS-1600T MARK II and headphones or other monitoring sources. It also has a 1/4" headphone output with level control for personal monitoring, as well as additional TRS 1/4" stereo monitor outputs for sending to powered speakers, amplifiers or devices, such as digital recorders.

If you are doing sports commentary during a sport game production, using the Audiotechnica headphones will allow you to connect two connections to the Mackie 8 mixer. One for hearing the program audio from the game, and one to send audio from the microphone for the commentator.



Mackie 8 Audio Mixer

Microphones



Audio Mixer



HS-1600T MARK II Rear View

TWO



Chapter 2: Plan for the Event

2-1: Location

2-2: Run of Show



2.1 Location

The Location of your shoot is one of the most important parts of planning for your mobile production. It's important to go through a site survey process. Get to know the size of the space where the event is going to take place. As **Global Collaborators**, students will work as a team to survey the location of the set. Working together, they can problem solve, and plan to make sure the product runs smoothly as a group. During the site survey process, you should figure out where you can place the cameras and your switcher. That way, you can figure out the length of the cables between the cameras and the switcher. The included 100ft CAT 6 cables should have more than enough length for most of your mobile productions on or off campus.

7

Global Collaborator

After using this video equipment and digital tools, students will broaden their perspectives and enrich their learning by collaborating with others and working effectively as a team. Creating mobile production events is a team effort, and they will be able to learn how to work with others to achieve a goal.

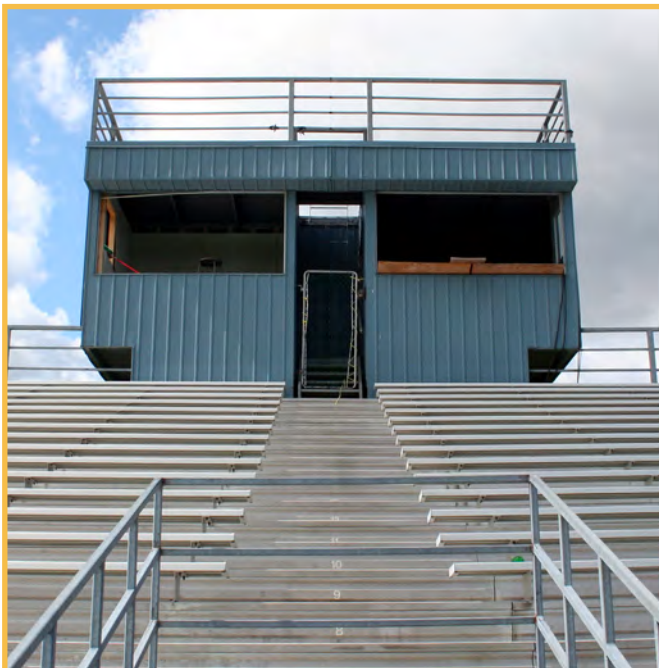
2.1 Location Cont.

Next, find out where the electrical outlets and network connection jack are at the event location. This is where you will be setting up your HS-1600T MARK II switcher. Since we are using HDBaseT technology, you don't need to worry about connecting power at each camera's location. HS-1600T MARK II is providing power to both of your PTZ cameras via HDBaseT. If you are shooting inside an auditorium for a school performance, you will most likely set up your switcher at Front of House (FOH). Front of House is normally positioned in a small sectioned-off area, surrounded by the audience or at the edge of the audience area, usually nearby the house audio mixer. From this position, the production crew have unobstructed listening and a clear view of the performance, enabling them to efficiently switch and produce the show. If you are shooting a sports game, you will be operating your equipment from the Press Box. More on this will be explained in detail in Chapter 7 when we go over each type of mobile production.

After you have figured out where to power your switcher, the next thing to check is the Internet connection. HS-1600T MARK II needs to be connected to an Internet connection via an Ethernet cable to live stream the production. If a network connection is not near where you need to set up your HS-1600T MARK II, make sure that you measure the distance between the switcher and the network jack. You need an Ethernet cable that is long enough to reach from the switcher location to the network jack.

Next, check for any structural elements that might block your view of the stage or the subject you are filming. In concert or play productions, you want to keep eyes on the area of the stage from the production desk to see the movement of the singers and dancers, the timing of special effects, and player changes in sports games.

Once we start planning for the event in the next chapter, we will go over everything in more details about where to set up your equipment. For now, let's move on to the next section, where we go over a Run of Show.



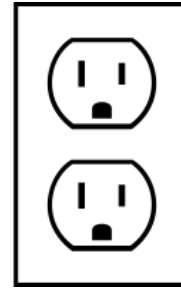
Example of Press Box



PTZ Camera Operating inside a Press Box

Tip

You need to have at least 15 AMPS of power for outlet selected to properly power the equipments.



2.2: Run of Show

Run of Show is one of the most important steps in preparing for the event. In order to have a smooth, successful production, you need to have a Run of Show. Run of Show is an item-by-item sequence of events that will happen within a show. It is an outline of the show that explains what each aspect of the production crew will be doing at what time. It is also known as a rundown of the show.

The Run of Show will tell the production what they need to prepare for assets such as character generation graphics, lowerthird titles, PowerPoint presentations, images, and video clips. Creating a Run of Show means including all the essential elements at the right place to enable a flawless live broadcast. These elements define how your live stream will go from start to end.

Here's a list of what a Run of Show usually includes:

- **Timing:** This consists of both the start and the end time per topic that you want to cover in your live stream.
- **Duration:** This is the time duration you want to speak on a particular topic.
- **Topic:** It will include the subject you want to cover during a given time.
- **Cues:** This section will help you with any auditory or visual cues you need to explain what's going to come next.
- **Screen Content:** It will include what's on the screen at a given time.
- **Lighting:** You can ignore this element if the lighting remains the same during the entire event; else, add details about the lighting sources you need during different segments of the live stream.
- **Audio:** Here, add the details of the different background music tracks you would need during the live broadcast.

Notes: Any additional information can be included in this section.

Status	What	Time (PDT)	Where	Staff	Speaker / Sponsor
✓	Speaker intro	8:40 AM	Main Stage ▾	Jason Y ▾	Matt Stratton
✓	Speaker slides	8:40 AM	Main Stage ▾	Peter ▾	Matt Stratton
✓	SESSION	8:40AM - 9:10AM	Main Stage ▾	Jason Y ▾	Matt Stratton
✓	Poll	8:40AM - 9:10AM	Main Stage ▾	Peter ▾	Matt Stratton
✓	Main Stage monitoring	8:40AM - 9:10AM	Main Stage ▾	Peter ▾	Matt Stratton
✓	Announcement	9:10 AM	Slack ▾	Val ▾	Matt Stratton
✓	Speaker prep	9:05 AM	Green Room ▾	Kimbire ▾	Jennifer Petoff
✓	Sponsored Break	9:10 AM	Slack ▾	Val ▾	CircleCI
✓	Outro into sponsored break	9:10 AM	Main Stage ▾	Jason Y ▾	CircleCI
✓	Break slides +sponsor video	9:10 AM	Main Stage ▾	Peter ▾	CircleCI

Run of Show Example

LIVE STREAM RUN OF SHOW TEMPLATE

[illegible]

LIVE STREAM RUN OF SHOW TEMPLATE

[illegible]

Three



Chapter 3: Setup for the Event

3-1: Production Team

3-2: Setting up your Equipment at the Event

3-3: Rehearsal



Setting up for the event is just as important as the event itself. If everything is set up correctly, the event will run smoothly during production. During setup for the event, students will **develop and employ strategies** for understanding and solving problems in ways that leverage the power of technological methods to develop a live broadcast.

5

Computational Thinker

When doing research for a sports game or live concert, students will be able to collect data or identify relevant information and use digital tools to analyze them and represent the information in various ways to facilitate problem solving and decision making.



3.1: Production Team

Before we jump into setting up for the event, let's form your production team. A production team should have these different departments –

**Production Team:**

(Technical Director/Switcher Operator, Camera Operator, Lighting Technician, Sound Technician)

**Media Production Team:**

(Graphics Creator/Designer, Interviewer, Announcer/Commentator, Streaming Producer)

Let's go over each position and responsibilities.

**Technical Director:**

The Technical Director is typically a video switcher operator who is in charge of cutting and directing the show. The Technical Director is also the team leader or the chief of the production team.

**Camera Operator:**

The Camera Operator sets up all the camera angles and save them as presets on the camera controller, which in this case is the HS-1600T MARK II. They usually take direction from either the director or producer in order to achieve the look and specific shots required for any particular shoot.

Lighting Technician:

The Lighting Technician makes sure the scene or stage is well lit for the cameras to best capture the subject.



Sound Technician:

The Sound Technician is in charge of all things audio in the production team. They are responsible for making sure the audio levels are correct for the live stream as well as for the recording.



Graphics Creator/Designer:

The Graphics Creator/Designer is in charge of making lowerthird titles, logos, and any other graphic elements that are needed for the production.



Interviewer:

An interviewer is the person who asks the interviewee questions on camera to gather narration for a story. A good interviewer can get clear and compelling dialogue out of almost any person being interviewed. Many times, interviewees (the person being interviewed) are nervous on camera. They may have a hard time being themselves on camera. Controlling the conversation and steering the interviewee towards key messages is expected and is part of the interviewer's job.



Announcer/Commentator:

The Announcer delivers verbal messages to the audience during a production. Announcers read off speakers names or program segments during the show or an event.

The Commentator or play-by-play announcer gives a real time commentary of a sports game or an event.



Streaming Producer:

The Streaming Producer is in charge of operating the encoder and ensuring the video quality of the stream.



Disclaimer: These positions are for your reference only. Some positions can be combined based on your production crew and environment.

3.2: Setting up your Equipment at the Event

Setting up your video equipment at the event is the most crucial step in preparing for the event. You will typically set up your switcher and the rest of the production equipment at front of house. As we learned in Chapter 2, front of house is usually located in a small sectioned-off area, surrounded by the audience or at the edge of the audience area. From this position, the production crew have unobstructed listening and a clear view of the performance, enabling them to efficiently switch and produce the show.

Avoid setting up your equipment under bright lights where the direct sunlight or stage lighting can create glare on your monitor display. You want to be able to see the monitor of your switcher clearly, so you can operate and switch the show efficiently.

Camera Placement

Camera positions need to be arranged according to the type of event you are producing. If it is a stage production, the main subject will be the performers on the stage. You don't need to set up the cameras to capture the audience. When mounting the cameras on tripods, make sure the height of the cameras is the same height as the height of the stage. Make sure that you place both cameras to cover the view of the whole stage.

If you are filming a graduation or an award ceremony, place one camera to cover the stage and the second camera will be covering the audience to show friends and families. The camera operator will need to set up different shots and angles to capture different parts of the stage as well as the audience. Once the shots are set up, the camera operator will need to save the shots as presets on the HS-1600T MARK II.

Cable Installation

After setting up the cameras, cable installation is the next step. Since we are using HDBaseT technology, you only need to run a single CAT 6 cable from each camera back to the HS-1600T MARK II. This makes cable installation so much easier and faster than a traditional video production set up.

The principle of cable installation is not to inconvenience the audience or block the aisles. You also want to make sure it's not a safety hazard where people can trip over the cable. So, secure the cables along the walls or under the seats with floor tape to prevent the audience from stumbling over the cables. If you need to run the cables across an aisle or other common areas, cover them with carpet or use a cable guard to prevent accidents. Always make sure to keep the cables nice and tidy. You should never have loose cables laying around where they can be a safety hazard.

Tip

- Do not run longer than 100 feet in cable length.



- Cover cables with carpet or use a cable guard to prevent accidents.
- Use Velcro Straps to secure cables



CHAPTER 3



3.2: Setting up your Equipment at the Event Cont.:

Lighting

Lighting is one of the key factors of any video production. You should know what kind of lighting you are going to have during the event. That way, you can set the white balance of your cameras according to the lighting environment. It is important that your cameras accurately capture light and color. If a shot looks unnaturally orange, or blue, the white balance is not set properly.

Incorrect white balance will show up with orange or blue tints with unnatural skin tones. Every source of white light emits a different mix of colors. Normal household (tungsten) bulbs are strongest in orange color, while mid-day sunlight will be more blue, and fluorescent lamps cast green light.

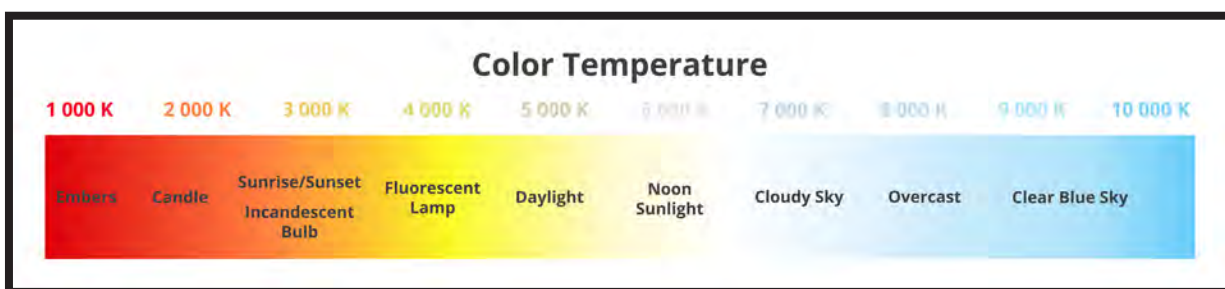
Light is measured in units called “Kelvin” temperature. Camera light balance controls will vary from camera to camera. Most will allow you to achieve “white balance” by rotating or moving a switch to the indicated type of light you are using.

Kelvin temperature is a method of measuring color temperature for your camera.

3200K = Tungsten/Orange

5600-6500K = Daylight/White

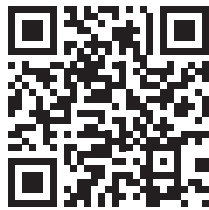
Daylight is white to the human eye, and tungsten is orange; however, you can manually white balance your video camera for more accuracy. This is simple to do. Just hold a blank white piece of paper in front of your video camera after you have adjusted the lighting of your scene. Press the appropriate button, which depends on your camcorder, and the video camera begins analyzing the light coming into the lens. If the light is reddish, for example, the camera will reduce the red signal until it achieves an equal color balance. The whole process takes just a few seconds and it delivers the most accurate color of any of the white balance methods. It is important to set white balance on all the cameras in your production. Make sure to match the white balance of your cameras, so that when you switch from one camera to the In a multi-camera production, the color temperature will be the same.



3.3: Rehearsal (Testing Everything Before Going Live)

Camera Operation

Once you have all of your equipment set up, it is time to rehearse. During rehearsal, you can set up the camera angles and save them as presets, so that during the production, the camera operator can easily recall the shots at the press of a button. If you establish presets before your actual event, you will not need to manually pan the camera for a different shot. This also prevents you from accidentally switching to the camera that is in mid motion during the event.



Here is a video on how to
save camera presets on the
HS-1600T MARK II.

SCAN ME!



Switcher Operation

Using the run of show as a guide, practice switching from one shot to the next. At this point, camera presets should have been saved in the HS-1600T MARK II. So, when the technical director calls for which shot to take to the air, all the switcher operator needs to do is to press a button to recall the camera preset.

Sound Check

Rehearsal is the time for you to do your sound check. Make sure that your audio tech checks all the microphones to make sure the audio levels are correct. Here are the steps to complete during a sound check.

- Mic check to verify audio signals are being sent to the audio mixer.
- Have someone speak into the microphones so the volume can be set.
- Monitor the volume through the switcher and the streaming output.

Program Check

The last thing to check during a production rehearsal is to check your main program output. Whether it is going to a recorder for broadcasting later or streaming live to an encoder, you need to check that your program output is in good video and audio quality.

If you are recording, do a test recording and check the recorded file to verify the quality of the content. If you are streaming, do a test stream on the CDN (Content Delivery Network) you are going to be



FOUR



Chapter 4: Techniques for the Technical Director

4-1: Camera Presets

4-2: Scene Switching (Transitions, Do's & Don'ts)

4-3: Switcher Effects (CG, PIP, Split Screen)



4.1: Camera Presets

In this chapter, we will go over the best practices for video production, specifically the techniques that the technical director should follow. This includes how to set up different camera shots and angles, scene switching and transitions, and how and when to use switcher effects. Learning these techniques will allow students to **innovatively design** a scene to film their event while identifying and solving problems in the production of live video.

Let's get started with setting up your camera shots.

4

Innovative Designer:

Students will become innovative designers after using a variety of video equipment to produce and create live mobile production shows. They will be able to identify and solve, or troubleshoot, problems.

CHAPTER 4

4.1: Camera Presets Cont.

In our mobile production set up, you will use two PTZ cameras that allow you to set up multiple angles and shots. Set up your first camera at the center of the front of the stage, so you can capture the entire stage. This is your full scene camera which provides you with full shots of the stage. There are three different types of shots that the first camera will be set up to capture: extreme full shot, full shot, and medium shot.

Extreme Full Shot

Extreme full shot is the widest shot that covers the whole stage. It is especially suitable for shooting the opening, ending, and large-scale activities of the show.

Full Shot

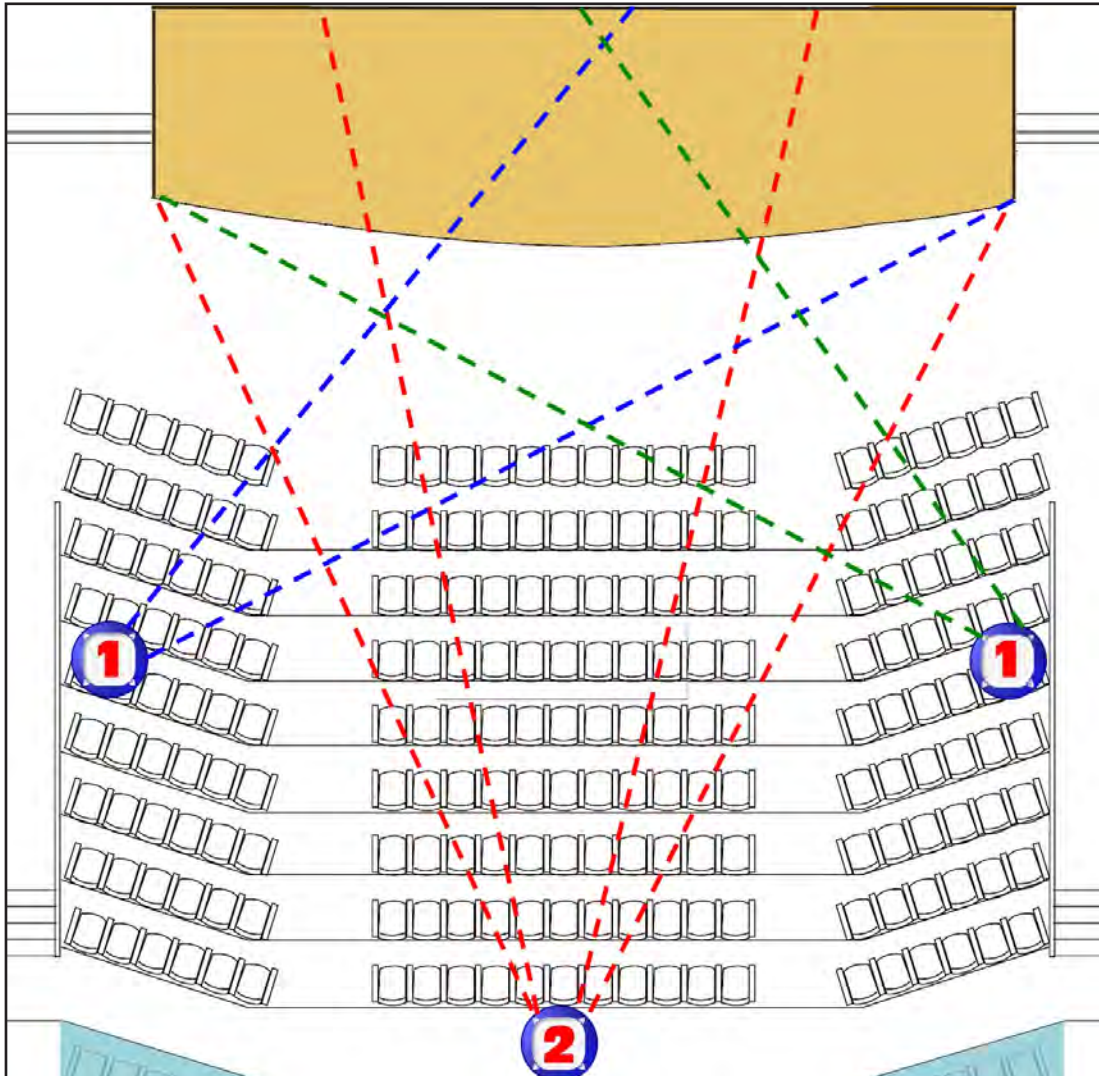
Full shot covers all the activities on the stage. It is flexible and can be changed according to the show content.

Medium Shot

Medium shot focuses on certain parts of the show content. For example, a medium shot may frame a part of the stage that shows a specific group of dancers or performers. Switcher operator will mostly be switching between the full shot and medium shot during the production.

The second camera is typically set up at an angle on either left or right side of the stage. This camera is set up for close up shots and medium shots.





Once all the shots are set up, they should be saved as camera presets on the HS-1600T MARK II. Please refer to a how to set up camera presets video from Chapter 3, Section 3.3.

4.2: Scene Switching (Transitions, Do's and Don'ts)

It is necessary to gauge the tempo of the show when switching from one shot to the next. There are two different transition types that are typically used in a production: cut and dissolve. A cut transition changes the scene directly, and it is the most commonly used transition type in most video productions. A cut is a straight, abrupt transition from one input to the next. It immediately replaces the first video signal with the next one you have cued up on your preview bus of the switcher. A dissolve, or mixed, is another common transition type. A mix transition overlaps two sources and gradually transition into the next source. A mix effect also allows you to fade into the scene in the opening of the show and fade out to black at the end of the show.

Of course, there are more transition types such as wipe, DVE (digital video effect), and stinger transitions, but for this mobile production guide, we will only use cut and dissolve transitions for our shows.

CUT (Recommend)



DISSOLVE (Recommend)



DVE



WIPE



Tip

Use the dissolve transition type to convey a slow pace mood. Use the straight cut most of the time, but especially during upbeat music events to match the beat of the music with fast transitions.

Transition Do's:

- Do use the preview bus on the switcher to cue up your next shot before using a transition to switch.
- Do pay attention to what is happening on the stage, so you can switch to the right shot to cover it.
- Do keep up with the pace of the show when switching from one scene to the next.
- Do follow the run of show.

Transition Don'ts:

- Don't overuse transitions.
- Don't cut straight from the program bus of the switcher.
- Don't use fancy 3D transitions since they can be distracting for the viewers.



Please watch this video on
how to live switch properly for
more info

SCAN ME!

4.3 - Switcher Effects

There are different switcher effects that you can add to your production. HS-1600T MARK II has the ability to add character generation titles, picture-in-picture (PIP), and split screen features. Switcher effects are used to add production value to your show. Let's go over each of these effects that you can add to your production.

Character Generation (CG)

What is Character Generation (CG)? Character Generation, or CG for short, is the process of adding static or animated text and images into a video. CG is used to help present graphic information to viewers and 'brand' your show with appropriate titles and logos. For example, the image of a station's logo that appears on the corner of your TV when you are watching broadcast television is done using character generation. Another example is a news headlines or reporter's name that appears during a news show. This is called a lower third. Lower thirds are used in various video production applications such as sports games, news, award shows, game shows, and many others. CG can be a static image with text, or an animated logo with text. You can add an image of your school mascot or logo to your morning announcement productions using CG.

Character Generation is added to your news show with a combination of software and hardware. In our example, we will use Microsoft PowerPoint as the software to create the graphics and text for lower thirds. The HS-1600T MARK II is the hardware that overlays the titles and graphics over the video.

After completing this chapter, students will become Creative Communicators and communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.



Creating Graphics and Lowerthirds Using PowerPoint

Creating lowerthirds, titles, and graphics to add to your production can be as easy as using a familiar program like Microsoft PowerPoint.

Open PowerPoint on your computer and start a new presentation. You may create a unique presentation for each production or show that you create.

First, add a full screen black box to the slide. You need a black background for your graphics and text because we are going to use the luma key in the HS-1600T MARK II bring in these graphics.

Once you have your slide with a black background, you can add your text, shapes, and logos. Place them however you want to on the slide.

Make sure to use white text and colors that are not close to black since the luma key from the switcher will key out (replace) any black color on the slide with a background video.



Laptop

HDMI



HS-1600T MARK II

4.3 - Switcher Effects Cont.

Picture-in-Picture (PIP)

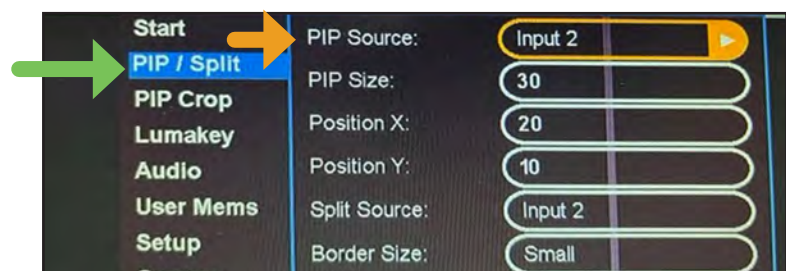
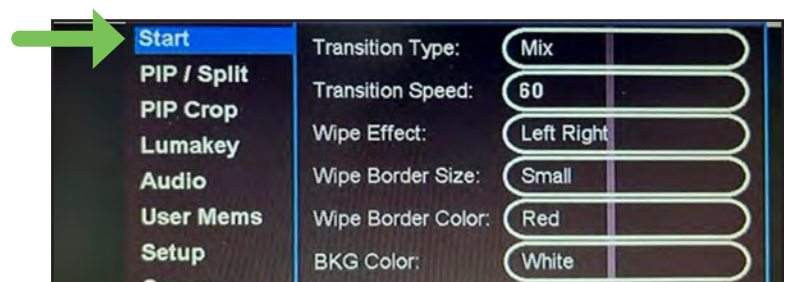
PIP is an effect where you can have two different input sources on one screen at the same time. The sources can be any combination of stills and video. Newscasts frequently use PIP to bring in still images as visual support during interviews or live events. The PIP source can be any of the four inputs on the HS-1600T MARK II.

Here's how you can set the PIP on the HS-1600T MARK II:

- Press and hold the PIP button on the HS-1600T MARK II. Input buttons on the PGM bus will begin to flash.
- Select the input source you want in the PIP window.



(Use Arrows to select Input)



An Example of
Picture-in-Picture



If you want to change the PIP window positions, here's how to do it:

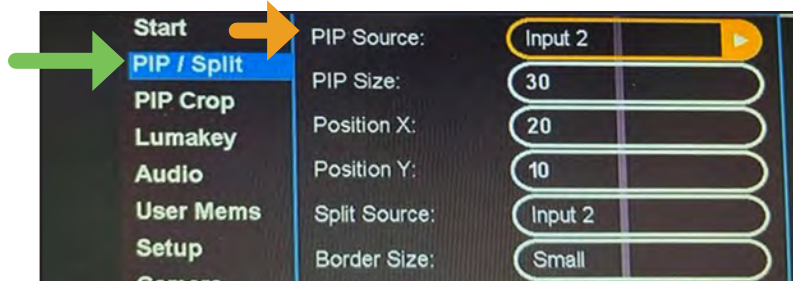
1. Go into the switcher menu.



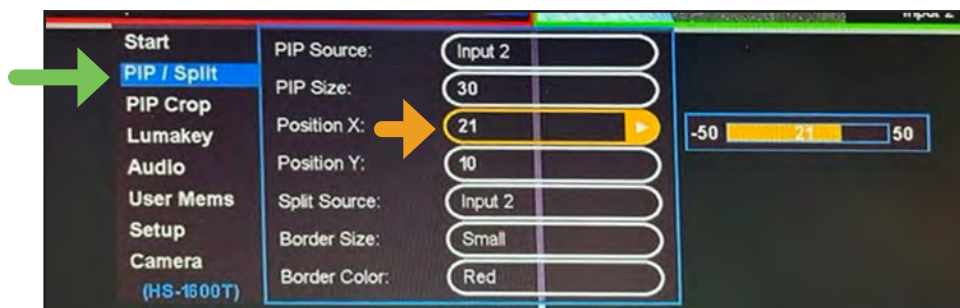
2. Select PIP/Split



3. Select PIP Source



4. Select PIP Position X and Y to adjust the position



4.3 - Switcher Effects Cont.

Split Screen

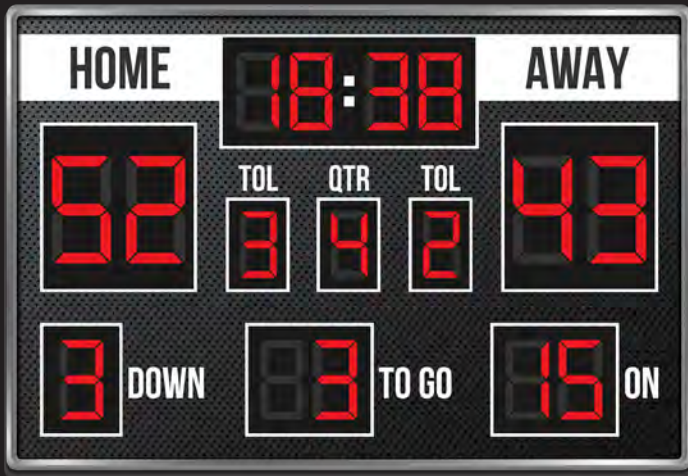
In addition to PIP, you can also set up a split screen. Split screen effect is useful when you want to show two musicians playing next to each other or a shot of two speakers at an assembly or award ceremony. Setting up split screen is very simple. Once you have the PIP set up and activated, simply press the Split button on the HS-1600T MARK II. It will split the program output to a split screen of your program source and PIP source.



It will split the program output to a split screen of your program source and PIP source.



An Example of **Split Screen**



Here's a video tutorial on how to set up the PIP and Split Screen on the HS-1600T MARK II

SCAN ME!

Five



Chapter 5: Streaming Basics

5-1: How Streaming Works

5-2: What is dvCloud?

5-3: Why Use SRT?

5-4: How to Set Up the HS-1600T MARK II Streaming Encoder

5-5: Promoting the Live Stream Before the Event



5.1: How Streaming Works

What is Live Streaming?

Live streaming is when video is sent over the Internet in real time, without first being recorded and stored. Think about the difference between regular streaming and live streaming as the difference between an actor reciting a memorized monologue and improvising a speech. In the former, the content is created beforehand, stored, and then relayed to the audience. In the latter, the audience receives the content in the same moment the actor creates it – just like in live streaming.

How live streaming works is simple. You take a video signal from a camera and audio from a mixer into an encoder. The encoder connects to the Internet, converts signal into a compressed format (ex. H.264 or H.265) and transmits to a CDN or a content delivery network. Most common public CDN's are Facebook and YouTube but you can also stream to any platform public or secure website.

Students should remember their **Digital Citizenship** when preparing content to stream. Learning about streaming will help students to engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online on streaming platforms.

2

Digital Citizenship:

When learning about streaming the productions online and using a networked device, such as the streaming encoder, students will be able to engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online.



5.1: How Streaming Works Cont.:

What is Needed to Stream?

To stream your production, you need the following: an Internet connection, a streaming device, a video source, and a CDN (Content Delivery Network). Streaming requires a fast Internet connection with enough upload bandwidth to order to effectively deliver your stream to the CDN. Check with your Internet provider or do a speed test to find out what your upload speed is (Figure 5.1). A typical internet service will provide about half of your upload speed compared to what your download speed is. You can also check your upload speed by using a SPEEDTEST app or website (Figure 5.2). Your upload speed is measured in megabits per second. Best streaming practices suggest that you want your upload speed to be two and a half times of what your streaming bit rate is. For example, Facebook Live recommends that your streaming bit rate is 4 Mbps, so you would want your Internet upload speed to be 10 Mbps. That way, it compensates for any dips in the connection because it's not a constant upload.

The next thing that you will need is a streaming device. There are different options when it comes to choosing a streaming device. You can use a camera with a built-in encoder, standalone encoder, or in our case, a built-in encoder in the HS-1600T MARK II, Mobile Cast Studio.

The last thing needed to stream is a CDN or a content delivery network. A CDN is a distribution point for your stream. A CDN is an integral piece to reach a larger audience. If you are hosting a stream to 100 people on your network, the amount of bandwidth that is needed to push the stream to 100 people is high enough that it is not feasible for most Internet connections. A CDN solves this problem by helping you distribute your stream to a large number of people.



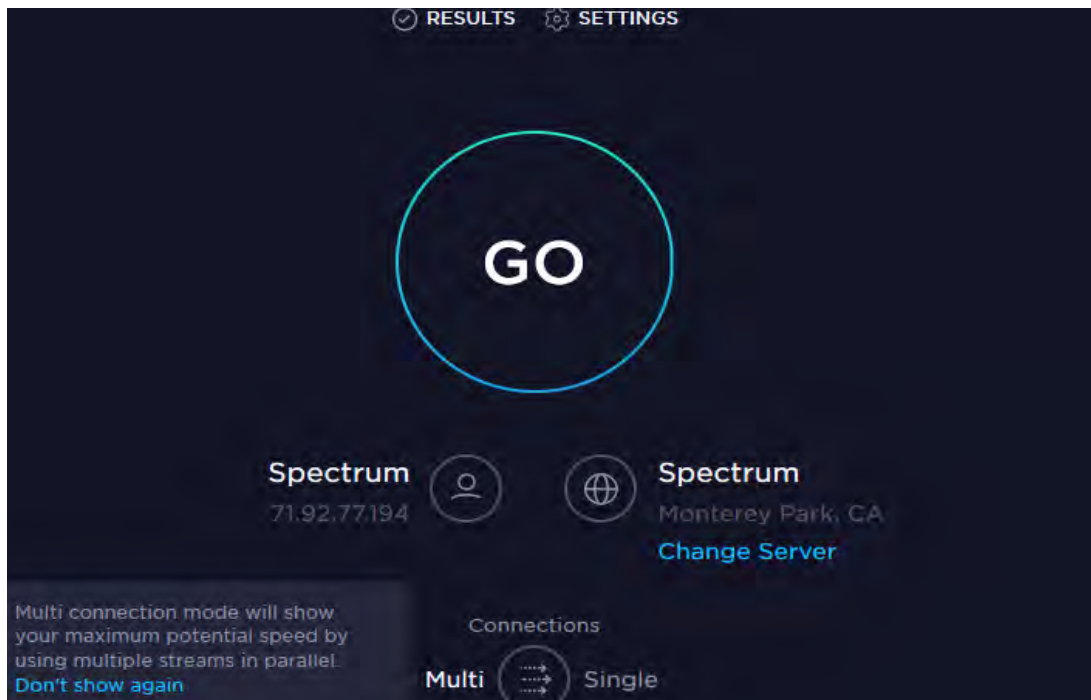


Figure 5.1

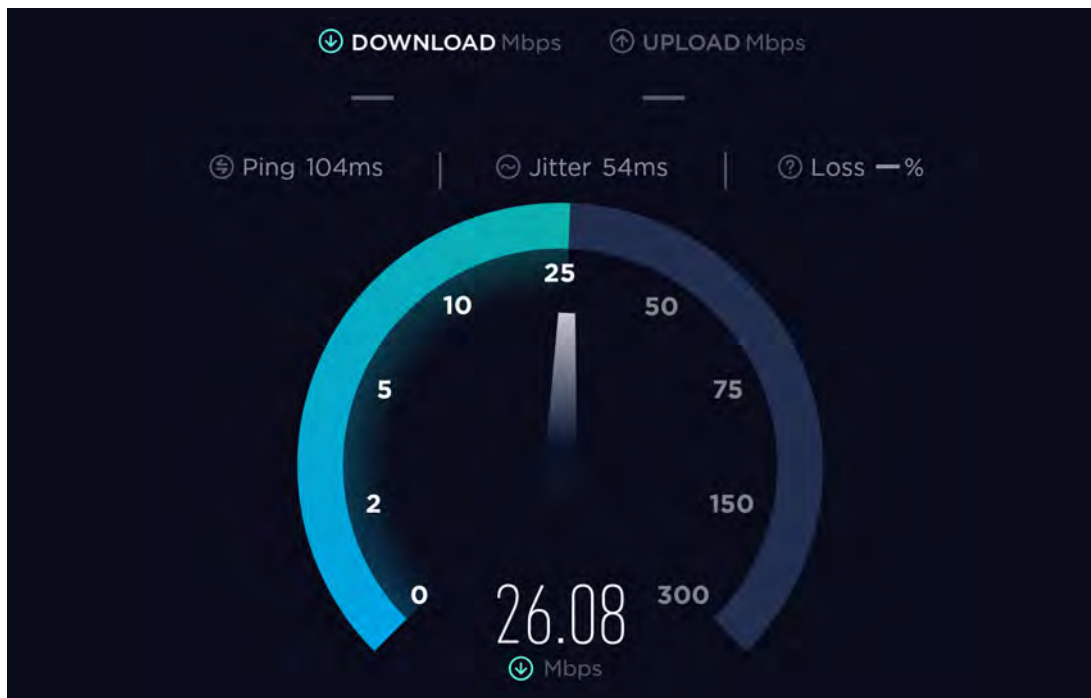


Figure 5.2

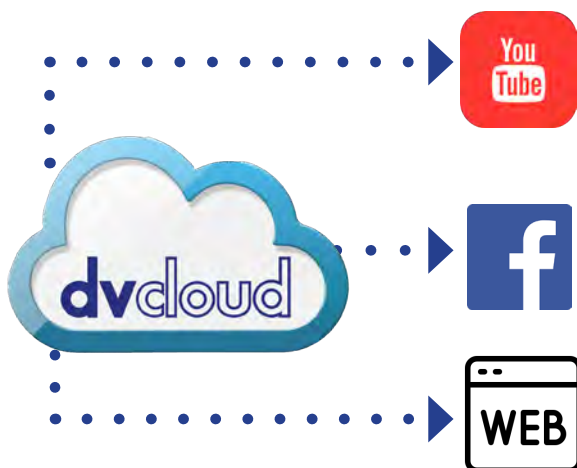
5.2: What is dvCloud?



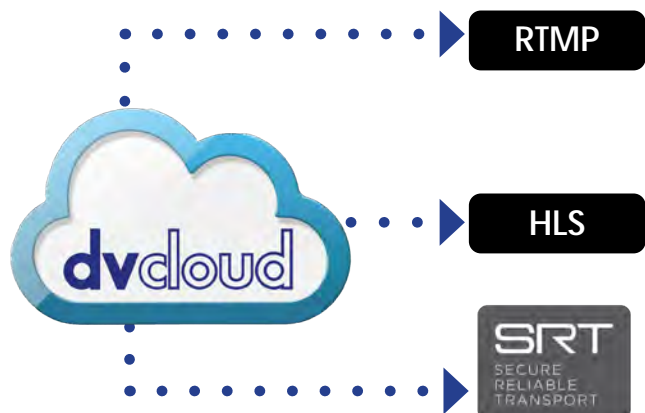
dvCloud is a streaming service, which allows users to stream their production to multiple platforms simultaneously in a simple and cost-effective way. It is a subscription-based service that is provided by Datavideo, so users will automatically receive the latest features and updates.

Why dvCloud?

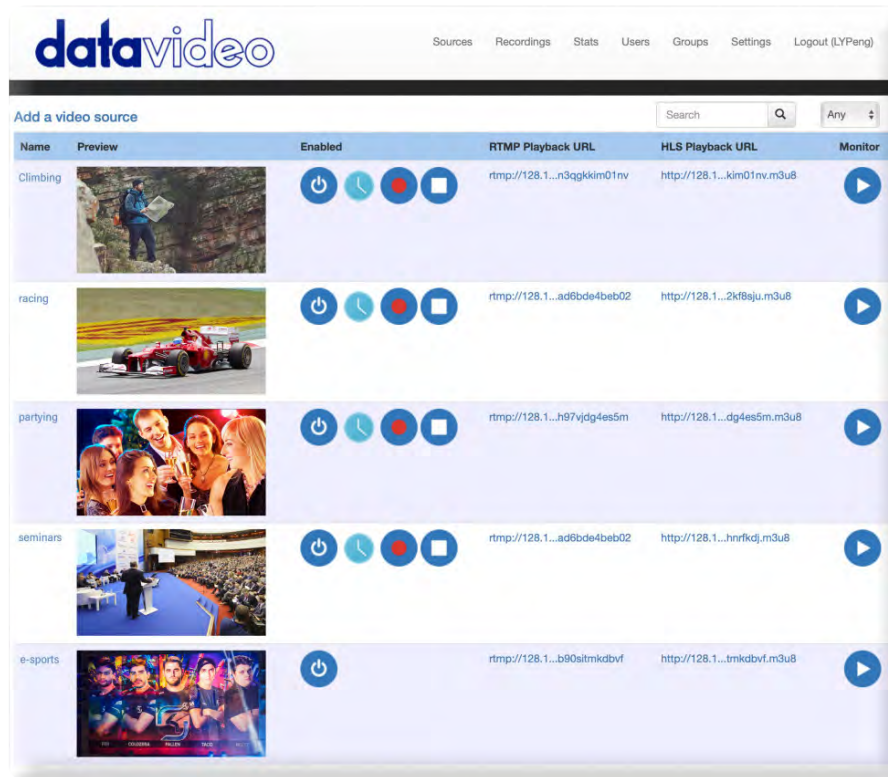
dvCloud provides streaming to multiple platforms and cloud recording.



dvCloud provides streaming to multiple platforms and cloud recording. It supports streaming protocols such as RTMP(s), HLS, and SRT.



To Subscribe to dvCloud, visit www.dvCloud.tv



Example of dvCloud Interface

Workflow

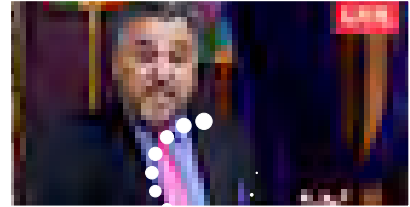
dvCloud also supports SRT streaming protocol, which allows you to stream reliably anywhere, anytime. SRT replaces RTMP when streaming over unreliable and low bandwidth networks, which can cause buffering and pixelated video. This is exceptionally convenient, when live streaming from different locations where a stable, high-speed Internet connection is not always guaranteed.



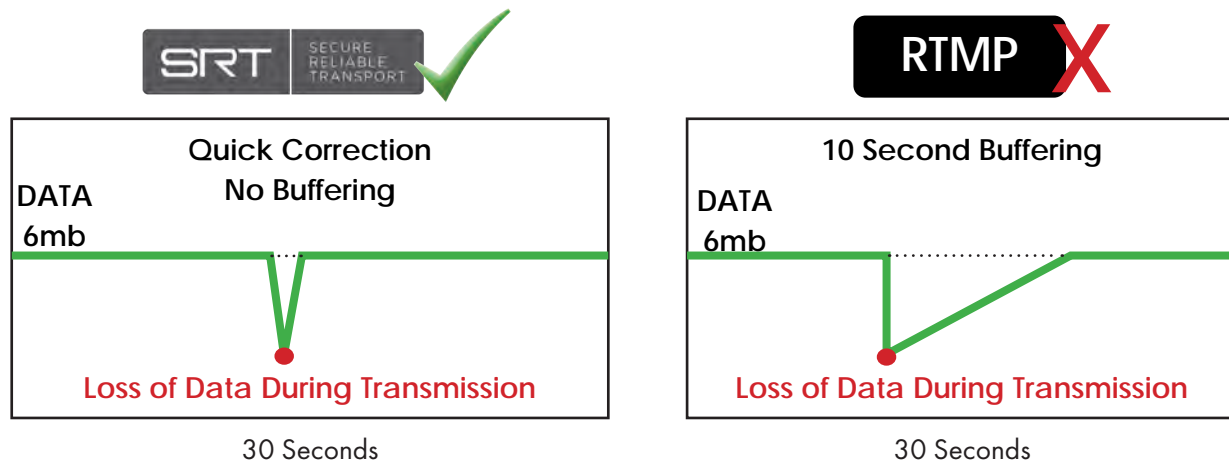
5.3: Why Use SRT?



Does your stream pixelate or buffer? Streaming RTMP over unreliable, low-Bandwidth networks can cause issues. Replace RTMP with SRT. A reliable SRT to dvCloud workflow will fix most streaming issues.



SRT handles problematic networks more efficiently than RTMP protocol, which is the most common streaming protocol. It requires less bandwidth than RTMP to provide a reliable stream. SRT handles data more effectively than RTMP as a result you have less data loss during transmission.



Reliable Streams with dvCloud & SRT

Using Datavideo encoders and dvCloud provides reliable streaming transmission over unreliable networks by using SRT. Datavideo can help you with the First Mile of streaming, which is "Camera to Cloud".

Cameras



Switcher



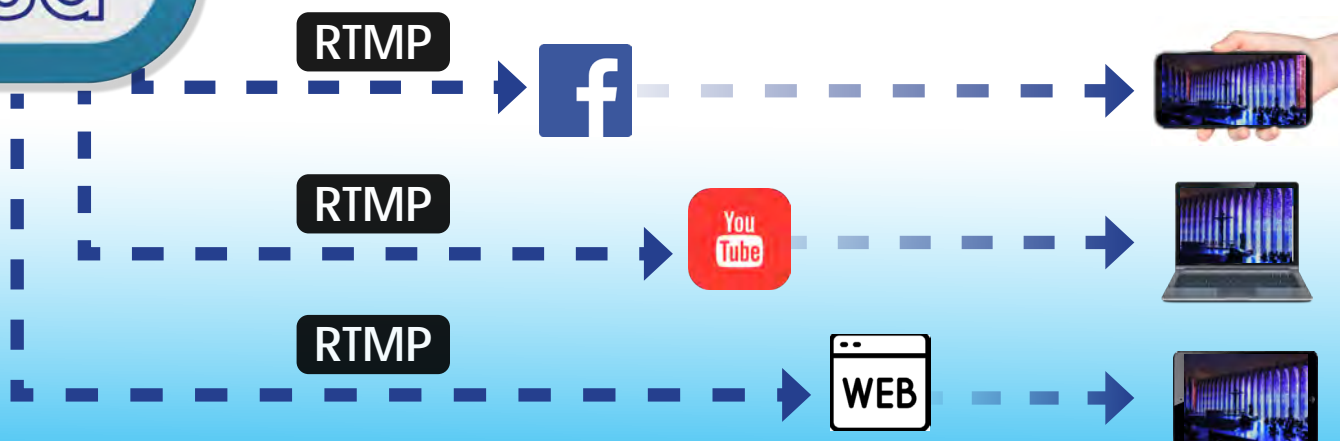
Benefits of SRT

SRT is an open-source video transport protocol that enables delivery of high-quality, secure, and low-latency video across the public Internet. SRT optimizes performance over unreliable networks more efficiently than the current industry standard RTMP. SRT handles data more efficiently resulting in less data loss, plus requires less bandwidth than RTMP, providing more reliable streams.

So, if you are streaming your production from a football field, or school gym, or a courtyard, all you need are a WiFi hotspot and a dvCloud subscription, and you can reliably stream without having to worry about buffering or stream drop off.



dvCloud uses large backbone servers to deliver the RTMP stream to your favorite CDN(s), such as Facebook and/or Youtube. Your Last Mile will have more reliable RTMP streams to "Cloud to Crowd" by using dvCloud.



5.4: How to Set Up the HS-1600T MARK II's Streaming Encoder

The Datavideo HS-1600T MARK II includes a streaming encoder and recorder. The encoder allows you to stream to two different CDN's simultaneously.

The front panel buttons simplify certain features for ease of use. Once the encoder is set up, all you need to do is to press the "stream" button to begin streaming to the CDN of your choice, whether it is to a school Facebook page or a YouTube channel. You can record a live video feed into an MP4 file on an SD card simply by pressing the "record" button.

Now, let's take a look at how to configure the encoder settings of the HS-1600T MARK II.



1. Connect the large (56V) power supply to HS-1600T MARK II.

Power on the HS-1600T MARK II.



2. Connect 50ft CAT6 Cables into the HDBaseT (RJ-45 connector) to the back of Camera 1 and Camera 2, then connect the other end of 50ft cables to "Input 1" and "Input 2" of the HS-1600T MARK II.



3. Connect an Ethernet cable from your network to the LAN port located on the back side of the HS-1600T MARK II



4. The HS-1600 MARK II will now connect to your Ethernet/Web network.

IP Address	Mac Address	FW Version	Device Name
192.168.1.50	00:07:36:03:AA:09	FW20210205NVS	NVS-33 RDI

5. You need to install the supplied "Device finder software" on a computer or laptop connected to your network. Using the Device finder software, you can locate the IP address assigned to the HS-1600T MARK II. .

If you have a Apple Mac Computer, we recommend using either LanScan or Fing.

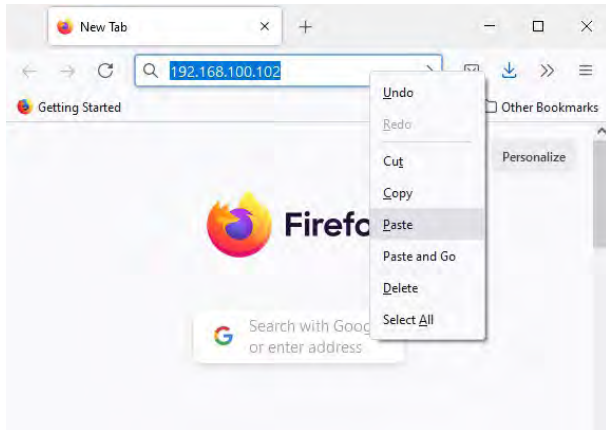
If you have a PC, we recommend using IP Finder Utility for Datavideo Encoders.



The screenshot shows a network configuration window with the "General" tab selected. The "Use the following IP address:" option is selected. The IP address is set to 192.168.100.102, the subnet mask is 255.255.255.0, and the default gateway is 192.168.100.1. These three fields are highlighted with a red rectangle.

6. The number will look something like this: 192.168.X.XXX. This number shows how the HS-1600T MARK II connects to your network and is the unique address to locate and identity the unit.

How to Set Up the HS-1600T MARK II's Streaming Encoder Cont.



7. Once you have obtained the unique IP address assigned to the HS-1600T MARK II by your network, you can simply copy this number (the IP address) into a browser on your computer.



8. If you have performed the prior steps correctly you should see the operating menu for the HS-1600T MARK II, or **NVS-31** as it will show in the browser interface. The software will ask you for a username and password. The default is

Name: **admin**
Password: **000000**

You can change the password anytime you desire.



To learn how to set up and configure the encoder in your HS-1600T MARK II, please scan the QR code to watch a video tutorial.

SCAN ME!

The background of the entire page is a repeating pattern of stylized lightbulbs in a golden-yellow color. Each lightbulb has a simple filament and a base, with small radiating lines around it to suggest light. The pattern is dense and covers the entire page.

Tip

Streaming to Multiple Platforms

Why stream to multiple platforms?

Most people need to stream to Facebook and YouTube simultaneously in order to reach a larger audience. It is necessary to stream to multiple streaming platforms because some of your audience might not use Facebook and they may only want to watch it on YouTube or vice versa. It is always good to give the viewers an option to choose which CDN they prefer to watch your stream on.

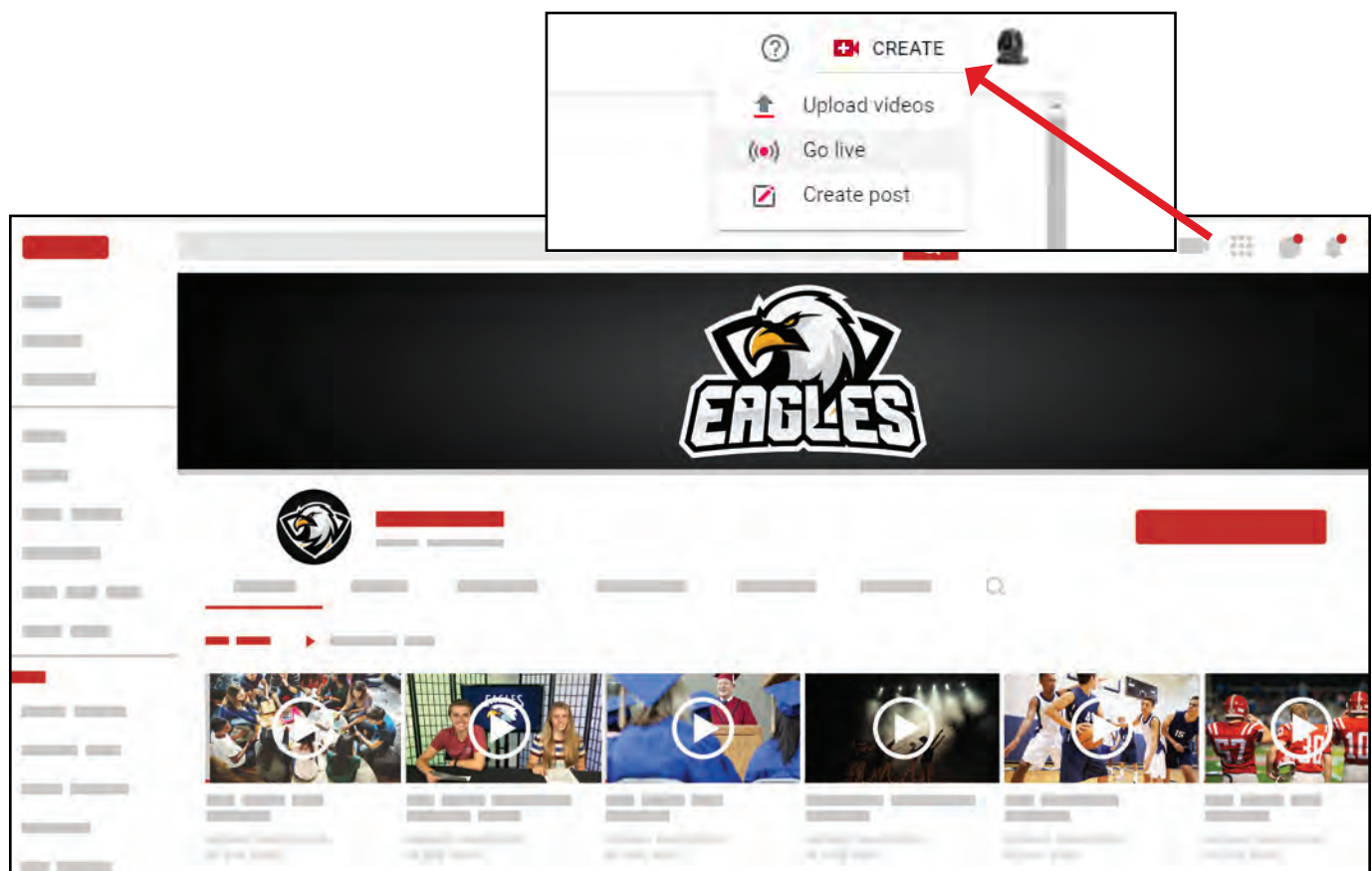
How to stream to multiple platforms?

Now that you know why you want to stream to multiple platforms; the next step is to figure out how to do it. It is as easy as setting up your encoder settings in your HS-1600T MARK II. For single platform streaming, you will only set up the main encoder in the HS-1600T MARK II. If you are streaming to multiple platforms, you will set up both the main and sub encoders in the HS-1600T MARK II.

Streaming to YouTube from the HS-1600T MARK II

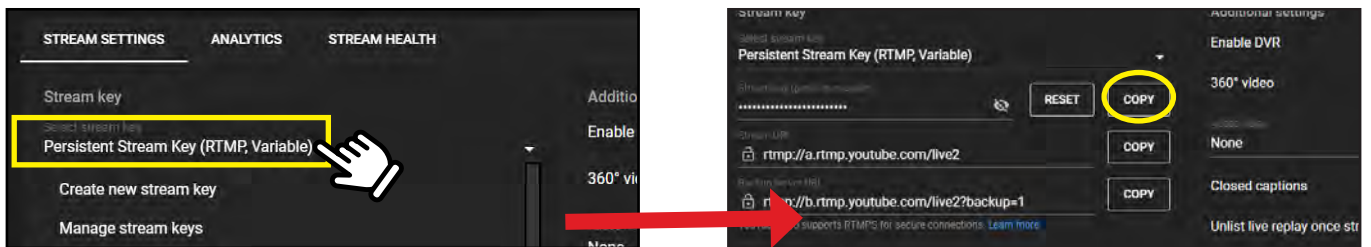
The HS-1600T MARK II comes with a built-in H.264 encoder that can record and stream simultaneously. In section 3.2, we covered how to record on the HS-1600T MARK II. Streaming on the HS-1600T MARK II is as simple as recording on it. You need to do an initial setup using a laptop to connect to the browser control page. Once all the settings are configured, you just need to press the “stream” button on the front of the HS-1600T MARK II to stream. Before we can do the live stream, we need to set up an account with a CDN, otherwise known as Content Delivery Network. There are many CDN’s that are available to use, but we will use YouTube as an example since it is free and easy to use.

First, you must create a YouTube account before you can stream to it. For instructions on how to do this, go to www.youtube.com. After you have created your YouTube account, you will need to go into the YouTube settings menu and enable your live streaming. Under the Encoding setup, you will need to copy both the Server URL and Stream name. This information is located on the bottom of the page.



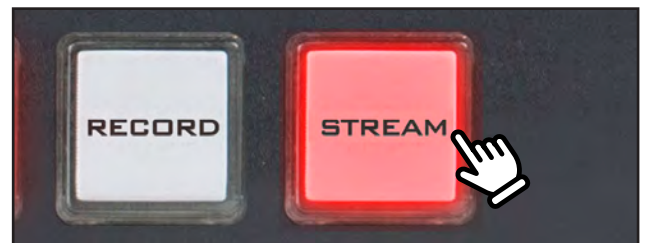
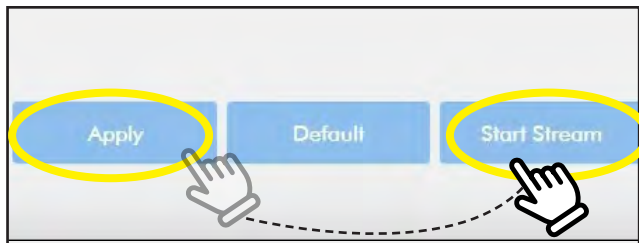
YouTube's Interface

Next, log into your HS-1600T MARK II web browser control panel using the Device Finder software. Go to the “Live Stream Setup” menu and select “RTMP Publishing”. Next you will need to enter the URL and the stream name that, you copied from YouTube into the corresponding RTMP URL and the Stream Name.



Note – this must be entered exactly as you see it on YouTube.

Press “apply” at the bottom of the “Live Stream Setup” menu setup. Your stream will start. Remember it takes a few minutes for the signal to buffer and start the stream.

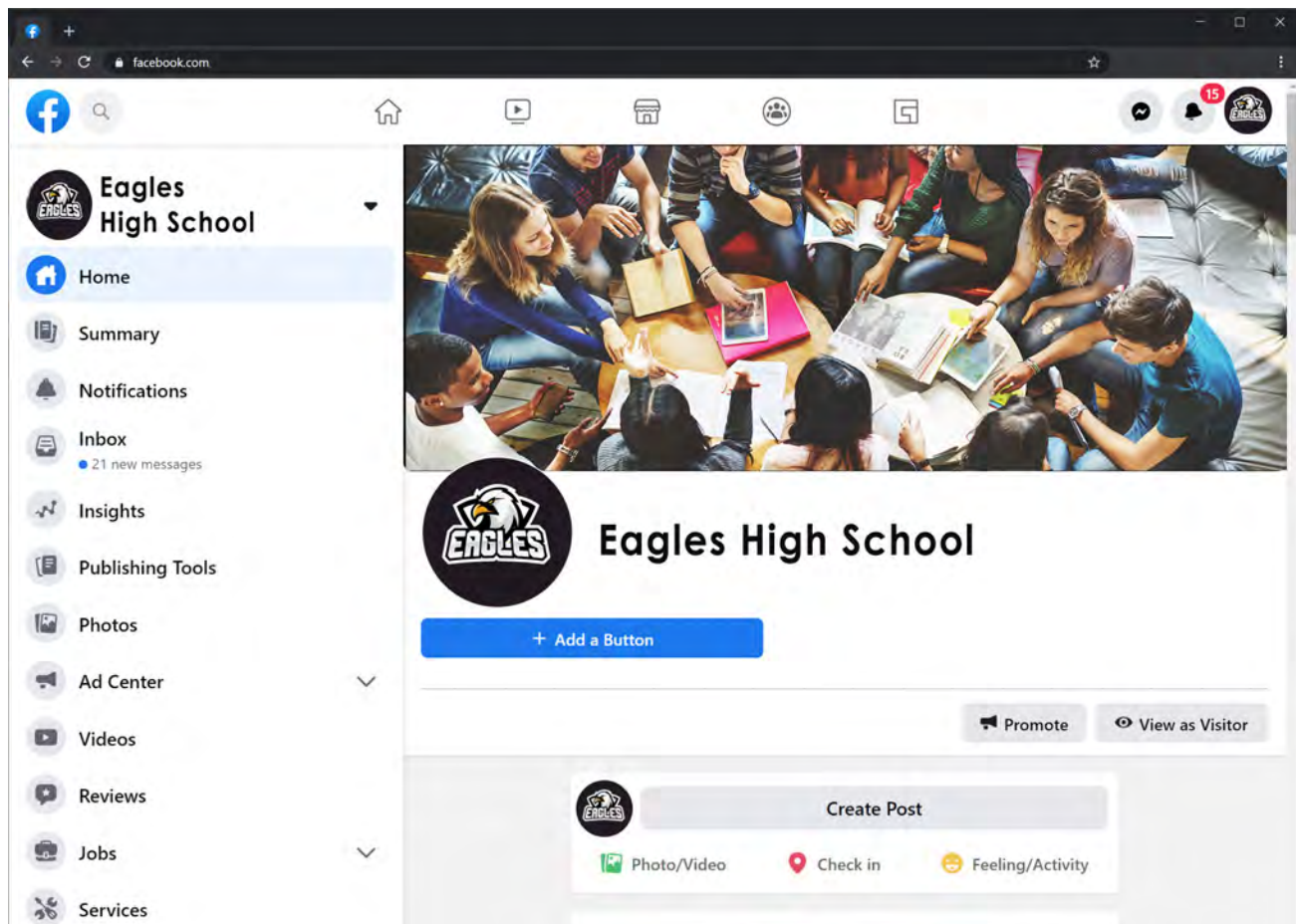


Next go to your YouTube channel to watch the stream. To stop the stream; press and hold the STREAM button on the HS-1600T MARK II for five seconds. Now that you have configured the HS-1600T MARK II for live streaming, your settings are saved, and you can press the STREAM button to start and stop the stream.



Streaming to Facebook from the HS-1600T MARK II

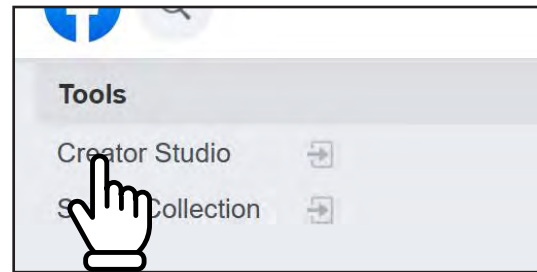
First, you must log in to your organization's Facebook page before you can stream to it. After you have logged into your Facebook account, you will need to go into the Facebook menu and enable your live streaming. Under the Encoding setup, you will need to copy both the Server URL and Stream name. This information is located on the bottom of the page.



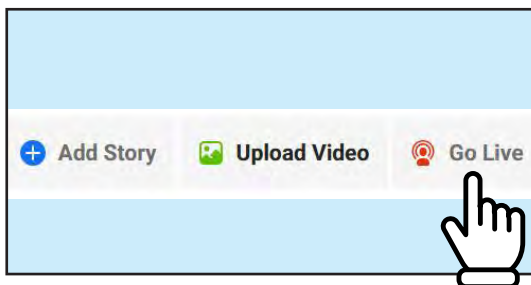
Facebook's Interface



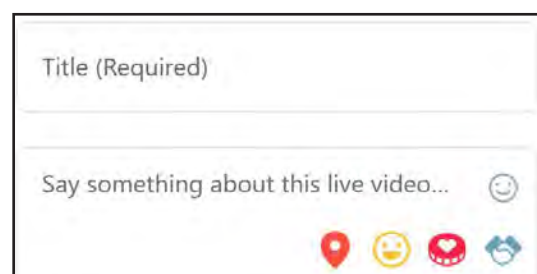
Open "Publishing Tools."



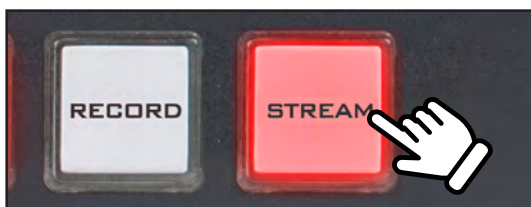
Open "Creator Studio."



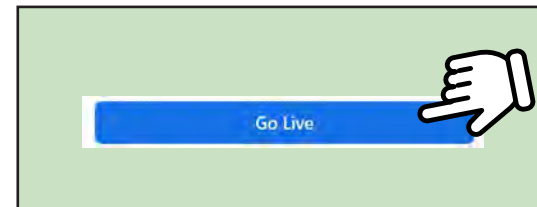
Click on "Go Live" to open the Live Producer.



Write a title and description for your live stream.



On the encoder, press and hold the "stream" button for 5 seconds until the blinking red button becomes solid red.



Ensure that your stream is reaching the Live Producer, then click "Go Live." You are now streaming!

Now that you have configured the HS-1600T MARK II for live streaming, your settings are saved, and you can press the "stream" button to start and stop the stream.



For step-by-step instructions on how to configure the HS-1600T MARK II for live streaming, please scan the QR code to watch a video tutorial.

SCAN ME!

5.5: Promoting the Live Stream Before the Event

Promoting your live stream is just as important as producing the event itself. You want to be able to share your show with as many people as possible, and to do that, you need to promote your live stream weeks before the event.

Here are a few ways to promote your live stream on campus:

- Have it featured during morning announcement shows.
- Create an event on your streaming platform to notify your subscribers or followers of the upcoming live stream.
- Post it on the school website.
- Print flyers and post them up around campus bulletin boards.

While you should do almost all the methods that were mentioned above, the best and most effective way to promote your live stream is via word of mouth. Tell all your friends and family members about the live stream and remind them to watch it on the day of the event. Text them a link to the live stream, so all they have to do is tap on their phone to watch the event.





CHAPTER 5



Tip

You Don't Always have to Livestream. Record an Event, Then Upload to Platforms Later

Obtain your external SD card. This SD card needs to be formatted before it can be used to store data. You can use your computer to perform the formatting. The SD card requires FAT32 formatting.



Once the card is properly formatted, your HS-1600T MARK II is ready to record video. Insert the card into the HS-1600T MARK II



To start recording on the HS-1600T MARK II, you can hit the record button on your software menu or press the "record" button on the front panel of the unit for about three to five seconds. When the HS-1600 MARK II is recording, the corresponding LED will light up on the front of the unit. To stop recording, you will once again press the "record" button on the unit or use the software interface to stop recording.

six



Chapter 6: **Case Study of Mobile Production Live Events**

6-1: Plan for the Production

6-2: Set Up for the Production

6-3: Stage Production (School Play or Concert)

6-4: Graduation or Award Ceremony

6-5: Assembly



Now that we went over all the steps in preparing for a mobile production, let's go out and do these productions. In this chapter, we will go over how to do different mobile productions for various events at school such as stage productions, live concerts, graduations, and assemblies.

Before we begin, let's review all the preparation and setup steps that we learned in the previous chapters.



6.1 Plan for the Production:

Now that we have covered all the steps in preparing for a mobile production, let's go out and make these Productions happen. In this chapter, we will go over how to do different mobile productions for various events at school such as a stage production, concerts, graduations, and assemblies.

Before we begin, let's review all the preparation and setup steps that we learned in the previous chapters.

As we learned in Chapter 2, a well-planned out production is a successful production. Follow these steps to plan for your production:

- Start with surveying the location of the event.
- Plan out where to place the cameras and where and how you are going to run your cables.
- Decide where your Front of House location is, so you know where you will set up your video switcher.
- Find out where you may connect to the Internet.
- Ask for the Run of Show document for the event, so your switcher operator can plan out the pace of scene switching.



6.2 Set up for the Production:

Once you are at the venue and ready to set up your equipment, follow these steps to make sure you don't miss anything.

- Set up your production team. Assign jobs and responsibilities, so each student knows what their job is.
- Set up your cameras. Place your cameras around the stage to have the best coverage of the performance. The angles will be different based on the type of production.
- Install cable runs. Make sure that the cables are in a safe spot away from foot traffic. Cover them with a carpet or use cable guards to avoid accidents.
- Set up your lights. Lighting is vital to your production. Lighting can make or break the quality of your video stream.
- Do a rehearsal. Practice, practice, practice. A rehearsal is a great opportunity for you to test your equipment before the production begins.

During setup for the event, students will **develop and employ strategies** for understanding and solving problems in ways that leverage the power of technological methods such as figuring out the best place to set up the camera to capture a full shot of the stage, and setting up and testing the encoder for streaming to the Internet.

Now, let's go over the setup of different mobile productions.

5

Computational Thinker:

When doing research for a sports game or live concert, students will be able to collect data or identify relevant information and use digital tools to analyze them and represent the information in various ways to facilitate problem solving and decision making.

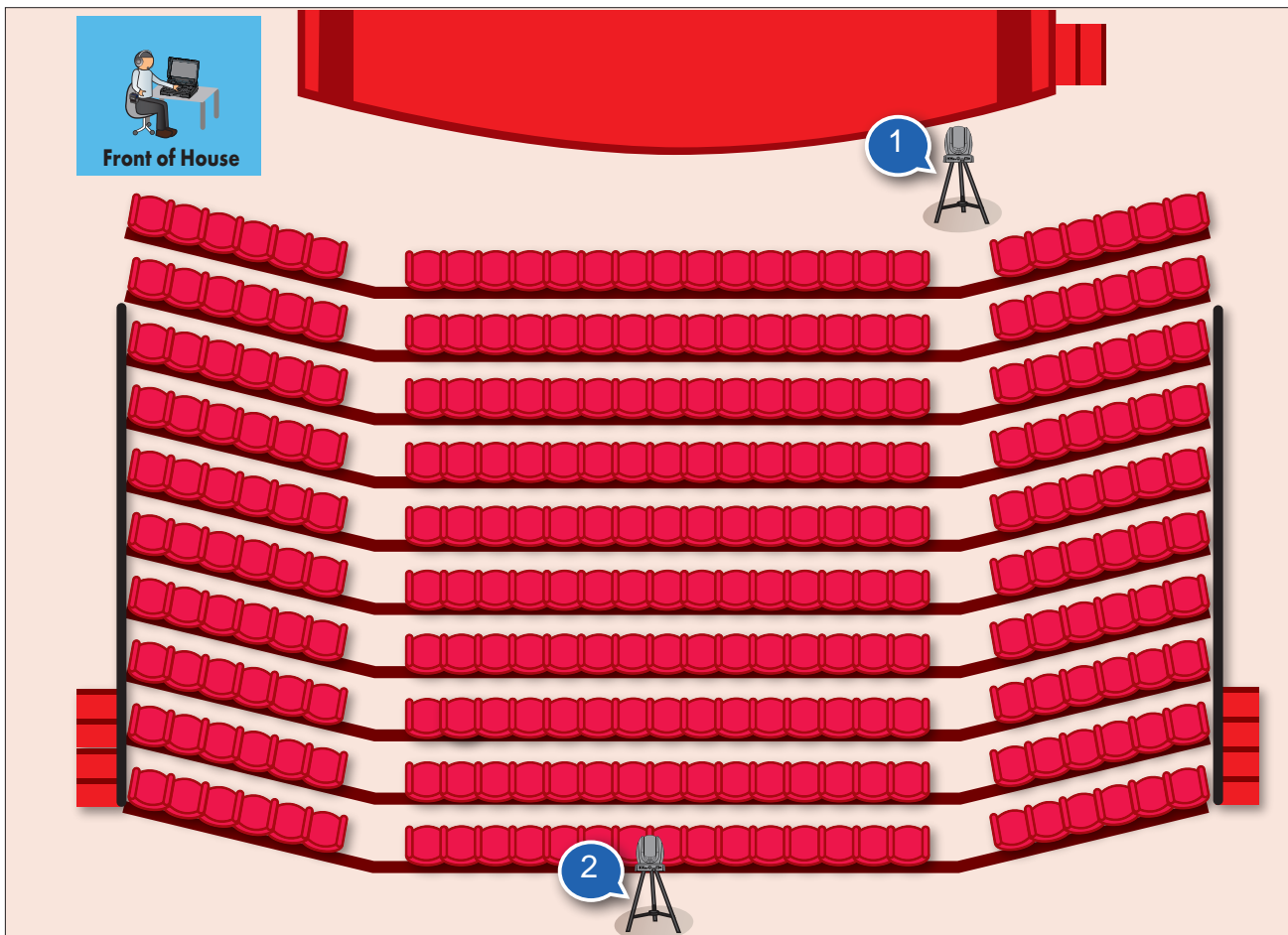
6.3 Stage Production (School Play or Concert)

A stage production at school is typically for a musical, or a play, or a concert. Live streaming the play will allow friends and family of the cast and crew to see the show without needing to attend in person. So, it is important to capture the dynamic of the performances on the stage as well as the tempo of the play, so even the audience at home can feel like they are watching it in person.

Camera Placement:

First Camera: Position it in front of the stage, either to the left or right side, depending on the auditorium and the props on the stage. This camera will be capturing medium shots and close up shots of the activities on stage.

Second Camera: Position this camera in the back of the audience in the center of the auditorium. This camera will be capturing the extreme full shot and some panning shots of the stage.



Camera Presets:

You can save up to four presets per camera on your HS-1600T MARK II. Here are the recommended shots to set up and save as presets.

First Camera:

- Preset #1: A full shot of the stage to frame the entire stage.
- Preset #2: A medium shot of the center of the stage.
- Preset #3: A medium shot of the left side of the stage.
- Preset #4: A medium shot of the right side of the stage.



Preset #1



Preset #2



Preset #3



Preset #4

Second Camera:

- Preset #1: An extreme full shot of the stage.
- Preset #2: A medium shot of the left side of the stage.
- Preset #3: A medium shot of the right side of the stage.
- Preset #4: A full shot of the stage.



Preset #1



Preset #2



Preset #3



Preset #4

These are simply suggested camera presets. Depending on the set up on your production and auditorium, you may set up your camera angles and save them as presets to your liking.

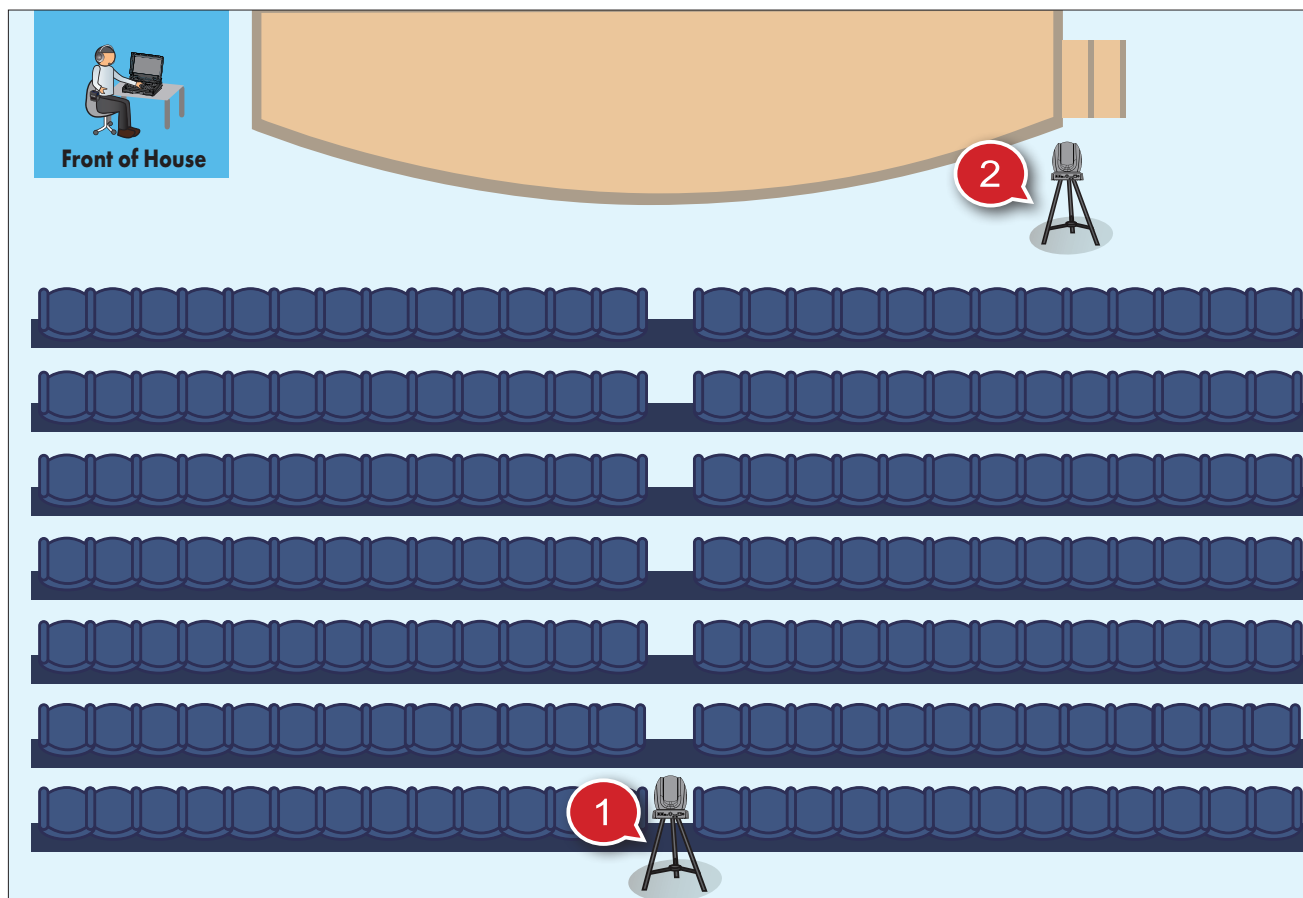
6.4 Graduation or Award Ceremony

Graduation ceremonies are important to everyone involved. Now you can produce and stream it live to friends and family who cannot attend the ceremony in person. Not only that, but a recording of the ceremony may function as a keepsake for the participants, family, and loved ones of the event. So, it is important for the production team to set up the camera shots well to not miss anything from the ceremony. This set up works for any award ceremony at your school.

Camera Placement:

First Camera: Position this camera in the back of the audience in the center of the auditorium or the football field where the ceremony is being held. This camera will be the extreme full shot of the stage as well as some panning shots of the audience.

Second Camera: Position it in front of the stage, either to the left or right side, depending on the ceremony's venue. This camera will be the full shot and medium shot of the activities on stage.



Camera Presets:

You can save up to four presets per camera on your HS-1600T MARK II. Here are the recommended shots to set up and save as presets.

First Camera:

- Preset #1: An extreme full shot of the stage.
- Preset #2: A medium shot of the left side of the stage.
- Preset #3: A medium shot of the audience on the right side of the auditorium.
- Preset #4: A medium shot of the students walking up the stairs to the stage.



Preset #1



Preset #2



Preset #3



Preset #4

Second Camera:

- Preset #1: A full shot of the stage to frame the entire stage.
- Preset #2: A medium shot of the podium for capturing the speakers.
- Preset #3: A full shot of the graduating class sitting in the front.
- Preset #4: A close up shot of the student getting the diploma on stage.



Preset #1



Preset #2



Preset #3



Preset #4

These are simply suggested camera presets. Depending on your setup and venue, you may set up your camera angles and save them as presets to your liking.

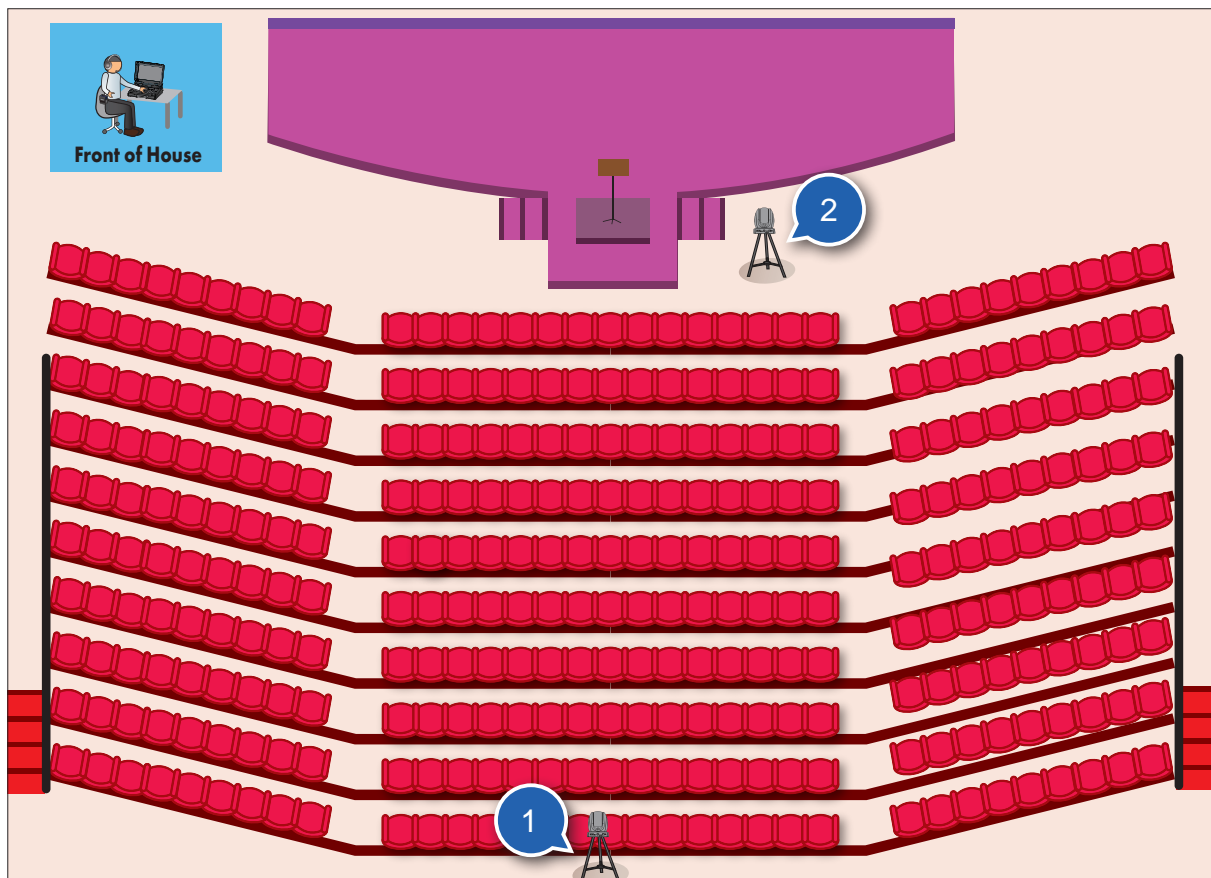
6.5 Assembly

Assemblies are a great way to build your school community. Streaming it live to those not in attendance is a great way to share events that happen on campus, so everyone can stay connected to school events.

Camera Placement:

First Camera: Position this camera behind the audience at the center of the venue. This camera will capture the extreme full shot of the stage and some panning shots of the audience.

Second Camera: Position the camera in front of the stage, either to the left or right side, depending on the venue. This camera will be capturing the full shot and medium shot of the stage.

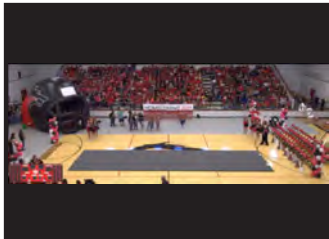


Camera Presets:

You can save up to four presets per camera on your HS-1600T MARK II. Here are the recommended shots to set up and save as presets.

First Camera:

- Preset #1: An extreme full shot of the stage.
- Preset #2: A medium shot of the audience on the left side of the venue.
- Preset #3: A medium shot of the audience on the right side of the venue.
- Preset #4: A medium shot of the center aisle of the venue.



Preset #1



Preset #2



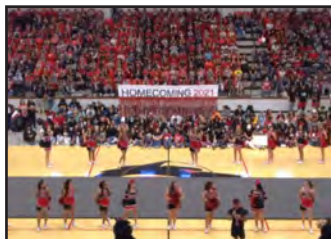
Preset #3



Preset #4

Second Camera:

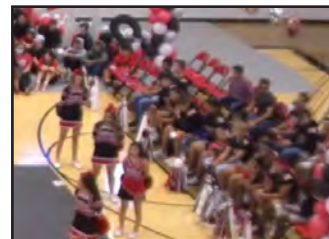
- Preset #1: A full shot of the stage to frame the entire stage.
- Preset #2: A medium shot of the podium for capturing the speakers.
- Preset #3: A full shot of the athletes or talent who are sitting in the front close to the stage.
- Preset #4: A close up shot of the speaker.



Preset #1



Preset #2



Preset #3



Preset #4

These are simply suggested camera presets. Depending on the set up on your production and location of the ceremony, you may set up your camera angles and save them as presets to your liking.

Seven



Chapter 7: Case Study of Mobile Production Sports Games

7-1: Skills For a Play-by-Play Commentator

7-2: Do's and Don'ts For Sports Commentating

7-3: Skills for an Interviewer

7-4: Do's and Don'ts for Live Interviews

7-5: Sporting Events



In the last chapter and activities, we have produced various mobile productions such as concerts, plays, award ceremonies, and assemblies. One of the biggest school productions most schools will live stream is their sports games. Live streaming school sports games is a great way to share with not just students at your school, but with everyone in the community.

While researching to produce a sports game, students will be able to collect data or identify relevant information and use digital tools **to analyze and represent the information** in various ways to facilitate problem solving and decision making.

Through successful research of their school's venue and events, students will embolden the importance of the event through play-by-play commentary.

So, how do we do sports video production?

5

Computational Thinker:

When doing research for a sports game or live concert, students will be able to collect collect data, identify relevant information, and use digital tools to analyze and represent information in a visual live stream of the event during the production.

6

Creative Communicators

Students will be able to demonstrate that they can communicate clearly and express themselves creatively when they speak on camera during live mobile productions. From writing a clear and concise script for voice commentary to producing live shows, students will learn written and oral communication skills.



7.1: Skills for a Play-By-Play Commentator

A sports announcer, or a play-by-play commentator, describes the action of the game and provide colorful commentary for broadcasts of sporting events. It is important for a play-by-play commentator to have the following skills and abilities.

- Knowledge of the sport, the teams that are playing, and their players.
- The ability to quickly summarize what's happening during the game.
- The ability to offer commentary on the game.
- The ability to banter with your on-air colleagues.
- Knowledge of how the particular form of broadcasting works.

Sports announcers must combine all of those, so what they say on the broadcast engages with the audience and come across as friendly and intelligent. They should let their personalities shine through, but not to the extent that they interfere with viewer's and listener's enjoyment of the game.

CHAPTER 7



Headsets



Audio Mixer



7.2: Do's and Don'ts For Sports Commentating

Do's:

- **Do** have an excellent speaking voice. Sports announcers must have a voice people want to listen to. They should be in command of it, speaking clearly and confidently.
- **Do** use your pitch and your tone of voice. This adds excitement and keeps your audience engaged.
- **Do** reflect on the significance of the event. Make sure to elaborate on why this game is important, or why a certain play or part of the game is important to the season.
- **Do** have interpersonal skills. Commentators must interact effectively with other on-air talents as well as, in some cases, in-studio guests and people who call their show.
- **Do** your research. In smaller markets, commentators conduct their own research to generate statistics and trivia about the home team and their opponents.
- **Do** listen to other commentary. This falls into your research. Listen to other sports commentary and learn from others on how they convey the energy and emotions of the game or a match.
- **Do** know the players. By knowing the players and knowing what motivates them, you can reflect and comment on why you think they chose to make a certain play during the game. This way, you can offer insight into the game to your audience.

Don't's:

- **Don't** speak in a monotone voice. don't be afraid to add passion to your voice and have a rhythm to your tone. Speaking in a monotone voice will lead your audience to get bored and tune you out.
- **Don't** be afraid to have an opinion. This is the reason why people are listening to you. They want to hear your opinion, not just the facts. Even if your opinion may not be popular, don't be afraid to say it.
- **Don't** overuse cliché phrases. Chances are, your audience has heard them many times and they don't really convey what you are trying to say. It is always better to offer insight on what is going on in the game than using cliches to make yourself sound cool.

CHAPTER 7



Microphones



Audio Mixer



7.3: Skills For An Interviewer

The first step in conducting an interview is to decide the subject for discussion. Start brainstorming by writing down all of your ideas.

Choosing a subject for the interview requires you to ask some key questions:

- Is the topic going to be relevant to my audience?
- Is your selected topic deep or complicated enough to accommodate your allotted production time?
- How long will the interview take?
- How much time are you allotted for the interview?

Practicing always helps. Once you have your questions written down, practice interviewing with a classmate and time yourself. If you run out of time, you will need to trim the question list down. If you were able to ask all your questions, receive all the answers, and still have time on the clock, you may want to add a question or two. The important take away here is to have some understanding of how much time you are allotted for the interview versus. how long it takes to ask and get your questions answered. You need to establish a reasonable estimate to account for the time you have for the interview.

Conducting and preparing for an interview will help students to become **Creative Communicators**.

6

Creative Communicators

Students will be able to demonstrate that they can communicate clearly and express themselves creatively when they speak on camera during live mobile productions. From writing a clear and concise script for voice commentary to producing live shows, students will learn written and oral communication skills.

CHAPTER 7



7.4: Do's and Don'ts For Live Interviews

Do's:

- Do be a good listener. Most of the time, the interviewee will answer something that you haven't asked, or you weren't planning on asking. It's important to listen carefully to what they are, so that you can either follow up and ask them to elaborate with an additional question. It also makes it sound more like a conversation than an interview.
- Do know your subject. Do your research and find out what you can about the person you are interviewing. Know their background, expertise, and make note of any topics they may not want to discuss.
- Do start slow. Don't begin your interview with a hard-hitting question. Slowly build up to it by asking simple questions first to get the conversation flowing. This will help the interviewee relax as well.
- Do ask open-ended questions. Rather than asking for yes or no answers, ask questions that will lead to a story or a follow up question that offers insight into the person you are interviewing.

Don't's:

- Don't fill empty space with "umms" and "uhhs". Practice and prepare ahead of time so that you know exactly what questions you want to ask, and you are not fumbling over words.
- Don't use jargon. Don't use acronyms that most people will not understand. You are speaking to a broad audience. Simple speech is as important as it gives your audience a chance to understand your message clearly.
- Don't lose track of time. Be mindful of how much time you have left for your interview. Make sure to guide your interviewee to stay on subject to move the questions along.

7.5 Sporting Events

The principles of video production stay the same as other mobile productions that we have done. However, there are some differences that you need to adjust depending on the type of sports game you are producing.

For example, if you are producing a football game, you will be installing longer cable runs than if you were to produce a basketball game that takes place inside a gym.

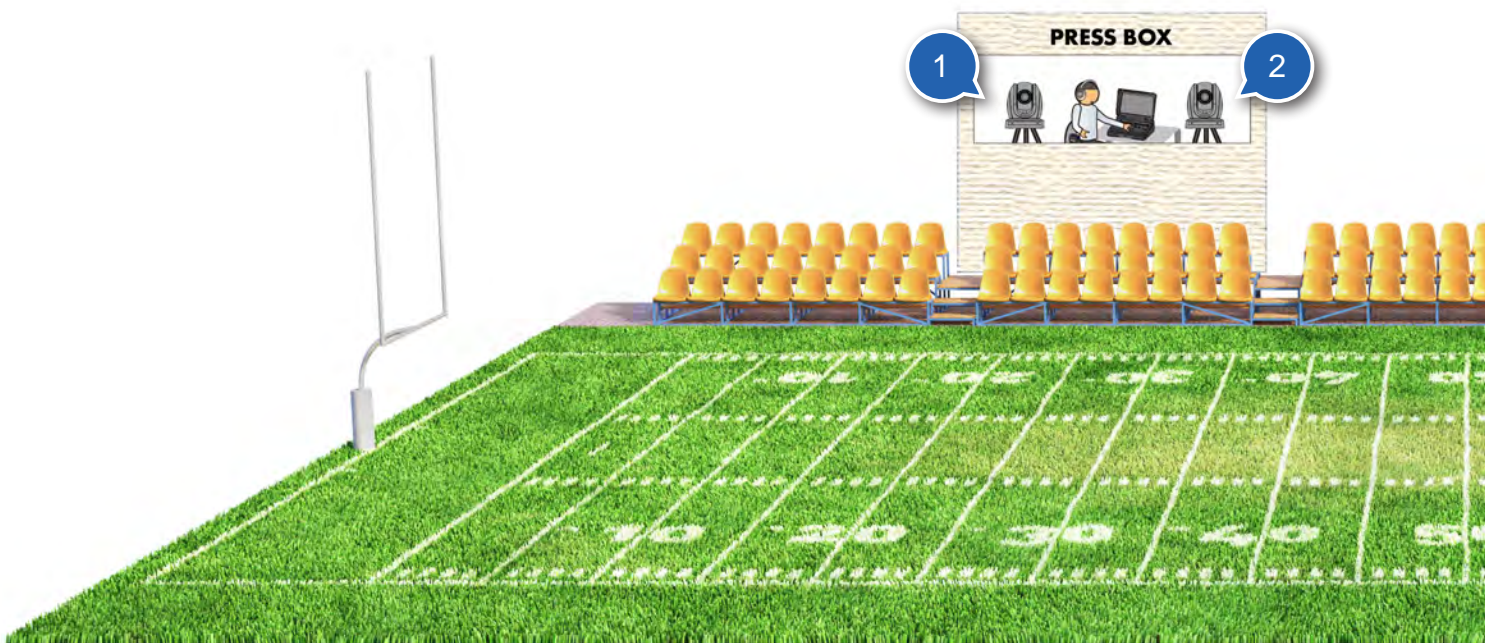
Let's go over camera set up and presets for each sports game production.

Football and Soccer Games

Camera Placement:

First Camera: Position the camera in the press box so it has a clear, overhead view of the entire field. This camera will be capturing the extreme full shot, full shot, and medium shots of the activities on the field. This is also going to be your safety camera that you can cut back to when setting up a shot or following the action on the second camera.

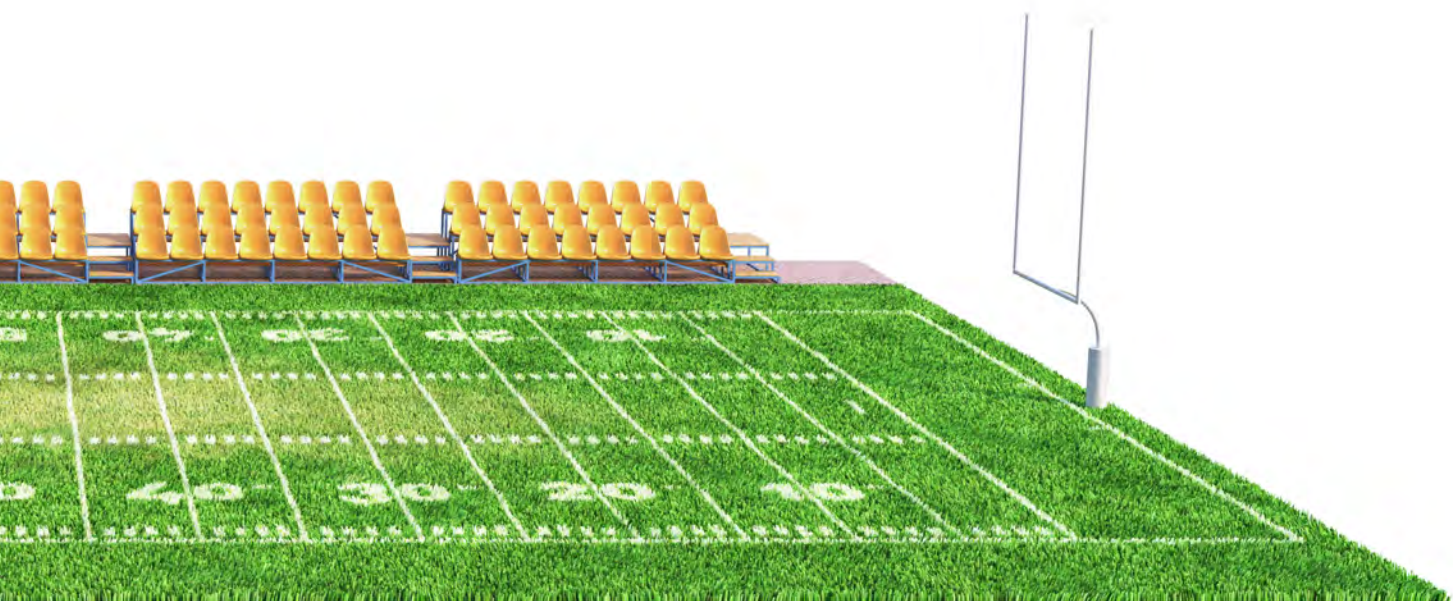
Second Camera: Position this camera in the press box next to the first camera. This camera will be capturing close up shots of the game and will follow the ball as the game progresses. It will also capture shots of the teams sitting on the sidelines.





Tip

For sports production, we don't recommend saving camera presets. Set your first camera as a wide shot to cover the entire field. The second camera is going to follow the action on the field, so it will move constantly.



Basketball or Volleyball Games

Camera Placement:

First Camera: Position the camera on the bleachers or stands, so it has a clear, overhead view of the entire court. This camera will be capturing the extreme full shot, full shot, and medium shots of the activities on the field.

Second Camera: Position this camera on the back of the court at an angle behind one of the baskets. This camera will be capturing close up shots of the game and will follow the ball as the game progresses. It will also capture shots of the coaches and teams sitting on the sidelines.





Baseball Games

Camera Placement:

First Camera: Position it on the side of the field between the home plate and first base, so it can have a view of the entire field. This camera will be capturing the extreme full shot, full shot, and medium shots of the activities on the field.

Second Camera: Position this camera behind the home plate, so it can capture every pitch. This camera will capture shots of the coaches and teams sitting in the dugout.

Technical Director





Tip

For baseball games, we recommend saving camera presets. Set your first camera as a wide shot to cover the entire field. The second camera is going to stay on the pitcher, so it will capture every pitch throughout the game.





Closing:

Just because this guide is complete, it doesn't mean you are finished producing videos. Repeat the production activities to help build your knowledge and skill levels. The more your students practice, the more they will improve their skills. Be creative and keep it fun! Encourage your students to step outside of their comfort zone. This course is a great learning experience for students and strengthens their life-long skill sets that will benefit them for years to come.

Glossary

AC adapter - An electronic device that converts alternating current (AC) taken from an electrical outlet into direct current (DC) that can be used by your camcorder. An AC adapter allows the videographer to use electricity from an electrical outlet, rather than battery power.

Audio - The sound portion of production. Includes script and narration, music, or “live” sound recorded with video track.

Audio dub - The process of replacing the audio tracks on a video recording.

Audio mixer - An electronic component used to select and combine audio sources.

Automatic focus - A camcorder feature that automatically adjusts the lens focal length to achieve optimum picture sharpness.

Automatic gain control (AGC) - A camcorder feature that boosts the video signal power to obtain optimal image brightness.

B-roll – Video footage captured in short clips to better communicate a story or message, and to have greater flexibility when editing.

Backlight (1) - A lighting instrument that illuminates the background in the three-point lighting scheme.

Backlight (2) - A camcorder feature that boosts the video signal power to obtain optimal image brightness. Also known as “automatic gain control.”

BNC - Most common type of professional video connector, which is used for various signals such as HD/SD-SDI, YUV (Component), and CV (Composite).

Brainstorming - The process of developing ideas and topics in a group. All ideas are rapidly written down for later consideration.

Bust shot - Video composition that includes the head and shoulders of the subject.

Camcorder - A combination video camera and videocassette recorder used for recording segments onto videotape.

Camera Operator – The crewmember who is responsible for setting up and operating the camera during a video shoot.

Camera Assistant - Also known as the ‘AC’, responsible for the lenses, tripod, light, and anything else the camera operator needs for the shoot.

Camera Preset – A memory setting of a camera position and angle that can be recalled during the production.

Cardioid – A directional microphone with a narrow area of sensitivity.

Codec – A compression standard for video and audio files.

Chroma key - A special effect that uses color (typically green or blue), or a colored background, to display graphics or video images.

Close-up - Video composition that features details about a single subject.

Complexity - The use of editing and shot selection to intensify the screen action. Complexity is increased by using shorter sequences of video, close-ups, and tightly framed shots.

Continuity - An editing concept that emphasizes consistency between edited shots. For example, the same person in adjacent video segments should be wearing the same clothing, have the same hairstyle, etc.

Contrast ratio - The acceptable difference between the brightest point and the darkest point of a picture. In video, the maximum contrast ratio is 30-to-1.

Condenser - A high-quality microphone element that produces electricity by positioning two oppositely charged magnets in proximity.

Coverage – A term used to describe the necessary shots of a subject or location during a video shoot with multiple angles and perspectives.

Cut - Two adjacent video sources with no transition. One source is immediately replaced with another.

Digital video - A video format that uses half-inch metal evaporate tape to record a very high quality video signal.

Digital zoom lens - A camcorder feature that facilitates a closer view by capturing the center-most portion of the video shot and magnifying it to fill the screen.

Dissolve - A transition used in editing in which one clip gradually replaces another, with no visible line of transition.

Dynamic - A microphone element that produces electricity using a moving coil attached to a diaphragm.

Electronic News Gathering (ENG) - Refers to the process of reporting events and activities that occur outside of the television studio.

Glossary

Establishing shot - Video composition that shows the audience the setting (time and place) of the forthcoming video sequence.

Export – The process of rendering video and audio files from editing software into a format that can be used for playback and distribution.

Exposure – The amount of light captured by the digital image sensor of a camera.

Extreme close-up - Video composition that includes a single subject, showing great detail.

Fade - A dissolve to or from a background color (often black.)

Field Report - A news report from the location of an event, giving viewers information and bringing them the experience.

Fill light - A lighting instrument that decreases shadow on the subject in the three-point lighting scheme.

Focus - The process of making minor adjustments to the lens focal length to create a sharp, clear video image.

Footage - Term used to indicate videotape created with a camcorder. ("Go make some footage of the baseball team.")

Frame (of video) - A complete video picture. NTSC televisions (North America, Japan, and many other countries) display thirty (30) frames per second. Other standards (most notably PAL and SECAM) display 25 frames per second.

Front of House (FOH) - A small sectioned-off area, surrounded by the audience or at the edge of the audience area. From this position, the production crew have unobstructed listening and a clear view of the performance, enabling them to efficiently switch and produce the show.

H.264 – One of the most commonly used video formats for recording, compression, and distribution, also known as MPEG-4 AVC.

Handheld microphone - A microphone used in reporting and interviewing designed to be held by the reporter.

HDMI (High Definition Multimedia Interface) - Most common type of consumer video signal, which can be found in televisions, display monitors, handheld camcorders, DSLR cameras, and personal computers. HDMI can transmit video signal with embedded audio.

HD-SDI (High Definition Serial Digital Interface) - High definition digital signal that can transmit video signal with embedded audio. HD-SDI signal is mostly found in professional equipment. HD-SDI can have the following resolutions - 1280 x 720p 59.94/60Hz, 1920 x 1080i 59.94/60Hz, 1920 x 1080p 23/24/25/29/30/59.94/60Hz

Headphone jack - A feature on camcorders and audio components that allows the technician to connect headphones to monitor audio content.

High speed shutter - A camcorder feature that captures footage so that each individual frame is in focus with no blurring. Often used when detail is desired on quickly moving subjects.

Impedance - A microphone characteristic that indicates resistance to signal flow. Microphones can be categorized as either "high impedance" or "low impedance."

Instant Replay - A video clip of an action that can be played back instantly, either in slow motion or regular playback

Insert editing - The process of adding new video into an editing sequence, while maintaining the existing audio track.

Key light - A lighting instrument that provides the main illumination in the three-point lighting scheme.

Lavalier microphone - A small microphone worn by the talent or subject. Also known as a "tie-clip microphone."

Long shot - Video composition that features a complete view of the subject from a reasonably long distance.

Macro - Close up video shots (less than two feet) of objects. Macro shots are used to "fill the screen" with an object, like a photograph or smaller object. Macros also provide incredible detail, like showing the laces on a baseball.

Medium shot - Video composition of a person that includes the entire body except the portion just below the knees and downward.

Microphone - An electronic device used for recording audio signals. A microphone converts sound into electrical energy.

Microphone element - The portion of the microphone that mechanically converts sound into electrical energy.

Microphone jack - A camcorder or audio component feature that allows the technician to connect a microphone for audio recording.

Mini-DV - A video format that records digital video signal on a compact digital videocassette.

Monitor - A video display device. Two common monitors are computer monitors that display computer signal and video monitors that display video signal.

News Report - A pre-recorded and edited video segment to be played during a newscast.

Omnidirectional - A microphone directionality pattern that indicates that sound will be recorded from all sides of the microphone.

Over-the-shoulder shot - Video composition that includes the subject in the background, and another person's shoulder and, perhaps, the back of their head in the foreground.

Pan – Camera movement to the left or right during a shot.

Pacing - A video concept that emphasizes timing and appropriate shot length to maintain the audience's attention.

Postproduction - All audio and video work that occurs after collection of the raw footage.

Pressure Zone Microphone (PZM) - A microphone consisting of a condenser element attached to a metal or plastic plate. Sound strikes the plate and is reflected onto the element, resulting in even, crisp sound.

Press Box - The press box is a special section of a sports stadium or arena that is set up for the media to report about a given event.

Props - Item used to add to the characterization of a video, like hats, table, chairs, or background items.

PTZ Camera – A camera with a robotic head that can pan, tilt, and zoom from a stationary position, operated with a remote control.

Public Service Announcement (PSA) - A short video segment (like a commercial) that states a message about some value or service helpful to the audience.

Push – For video, a push is the act of zooming towards or changing the perspective and moving the camera itself closer to a subject.

Rack focus - See "Selective focus."

Raw footage - The original audio and video recorded for a video project. Raw footage is edited to create the finished video project.

RCA - Yellow, Red, and White connectors that can be found on older televisions and display monitors. Yellow connector is for Composite video. Red and White connectors are for left and right audio channels.

RF modulator - An electronic device that converts audio and video signals into radio frequency (RF), so that they can be displayed on a television.

Run of Show - An item-by-item sequence of events that will happen within a show. Also known as a rundown of the show.

Script - The audio portion (narration) of a project that gives details and information about the topic. The words said aloud by the talent in the video.

Selective focus - A camera technique in which the lens focal length (focus) is changed so that subjects at different depths go in and out of focus. For example, a shot may begin with the foreground subject in focus, and the background subject out of focus. The focus is changed so that the foreground subject goes out of focus, and the background subject comes into focus.

Set - The furniture, background, and props that are used to design a location.

Shot List - A written list detailing the video shots that coincide with script and the audio portion of a video project.

Shotgun microphone - A microphone with a highly directional pick-up pattern that collects sound from a specific source at a great distance.

Stand up – When a reporter or narrator appears in front of the camera to verbally tell the story to the audience, most often used at the beginning or an end of a video.

Standard Videography Repertoire - A collection of widely used videography shots that all videographers should know how to create. The repertoire includes: long shot, medium shot, close-up, extreme close-up, bust shot, and over-the-shoulder shot.

Storyboard - A written plan of a video project that includes a drawing of the actual shot, a description of the shot, the audio portion or script, and the timing of the shot. Used in project planning.

Strobe - A special effect that produces programmed intervals between video frames during playback. Sometimes referred to as “stop-action”.

Surface-mount microphone - A microphone with a flat back and no handle, designed to be placed on a flat surface (like a tabletop) and used to collect sounds from the surrounding area.

Teleprompter - A device used to transfer script to a video screen for on-camera talent to read during production.

Three-point lighting - A video production lighting technique that involves (1) a key light that provides basic illumination, (2) a fill light that provides additional illumination and decreases shadows created by the key light, and (3) a back light, shined onto the background, that illuminates the backdrop and decreases shadows created by the key light and fill light.

Tilt – Camera movement during a shot moving either up or down.

Transition - A method of connecting two adjacent video sources. Wipes and dissolves are common transitions.

Treatment - A one paragraph description or synopsis of what will happen in a movie or video project.

Tripod - A three-legged mounting device for a camcorder. A tripod provides a steady shot and tireless service.

Unidirectional - A microphone directionality pattern in which the microphone receives signal much better from the top than from the sides. Also known as "cardioid."

Video production - The process of collecting raw footage (video and audio) and using postproduction techniques to create a complete program.

Videographer - A person skilled in videography techniques. Someone who operates a video camera or camcorder with a degree of skill.

Videography - The process of using a video camera or camcorder to record events.

Voice-over - The audio portion that contains the script or narration. The talent is not seen, only heard, as images are displayed during the narration.

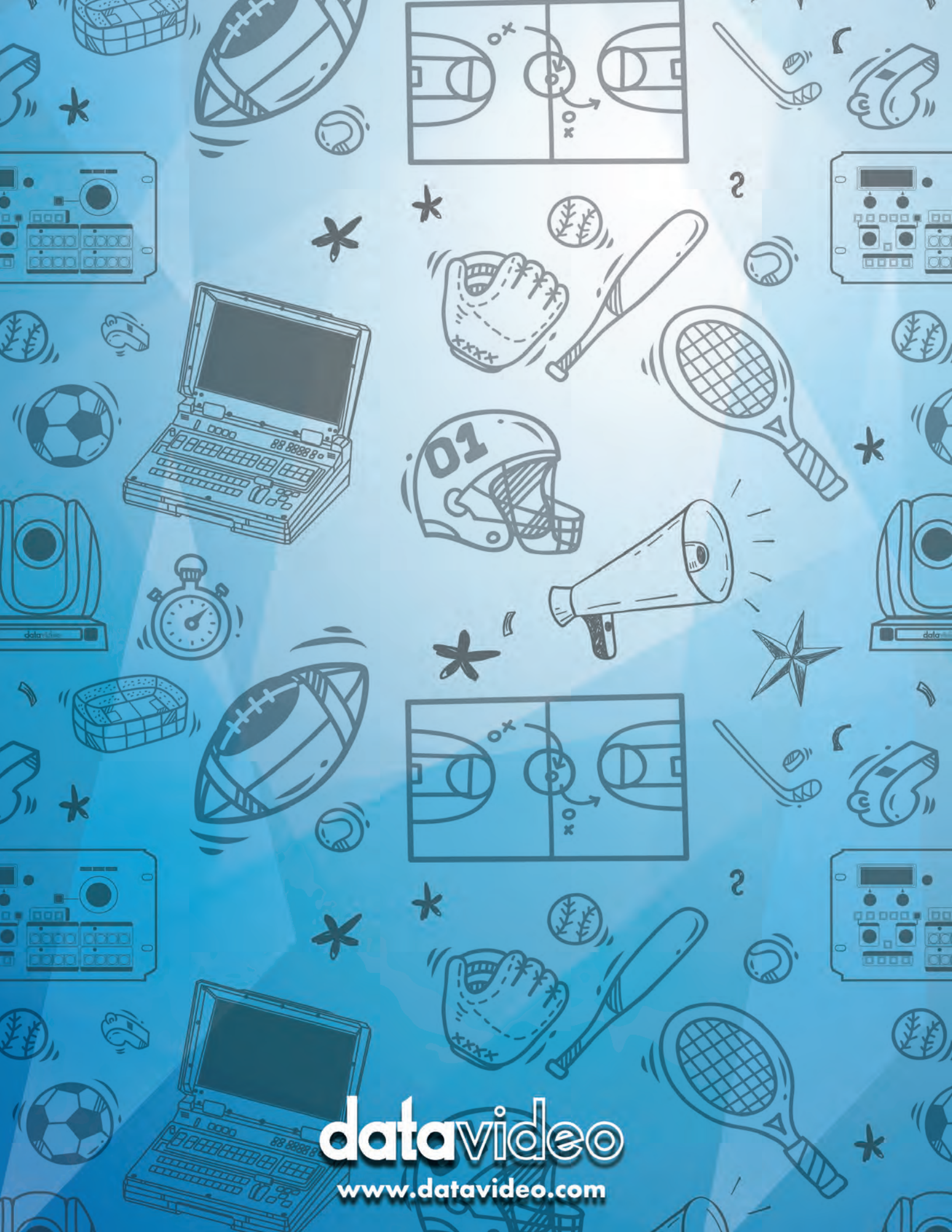
White balance - A camcorder adjustment, in which the videographer adjusts the color response of the camera by either (a) showing the camcorder the color "white" under the current lighting conditions, or (b) selecting the icon on the camcorder display that best describes the lighting situation (indoor, outdoor, etc.)

Wipe - A transition between two adjacent video clips that features a distinct line of transition.

Wireless microphone - A microphone system that replaces the microphone cable with broadcast RF signal. A wireless microphone system consists of a microphone, a transmitter, and a receiving station tuned to the same radio frequency (RF) as the transmitter.

XLR - Most common type of professional audio connector, which can be found in recorders, microphones, and speakers.

Zoom lens - A lens with a variable focal length that can be adjusted by the videographer.



datavideo
www.datavideo.com