Field Camera Workshop

Electronic Field Production (EFP):
“EFP” refers to equipment and techniques for recording video and audio at remote locations. The equipment is compact, rugged, and designed for ease of use. EFP equipment frees the video producer from the confines of the traditional TV Studio, and permits recording in more interesting and less artificial locations.

This compactness also allows productions to be done by a very small technical crew, or even just one person.

EFP equipment is commonly used for recording video and audio to be used in specific types of programs, including interviews, documentaries, music videos, and news or magazine style shows.

Video and audio recorded with EFP gear must normally be edited before it will be suitable to watch. Because the “footage” you shoot will be edited, you don’t have to worry about erasing or deleting bad shots from the camera; the editing system lets you easily toss out any “bad takes” that you record, and rearrange the order of the various shots and scenes you videotape.

EFP cameras are poorly suited for certain kinds of “event” productions, like sports contests or concerts, where there are many things happening simultaneously over a large area. If you wish to shoot an event, talk with MetroEast Staff about using one of the multi-camera systems, like Studio A or B, or the Mini-Mobile, Micro-Mobile.

The Camera:
The Panasonic AG-AC160 camcorder records high-quality digital video and audio on “flash memory” cards. The camera comes equipped with 2 64-Gigabyte SDHC cards which combined can hold more than 10 hours of High Definition video in the standard setting.

Once recorded, the video and audio on the memory cards can be transferred to an editing computer quickly. For example, if you completely filled one card with video (over 5 hours), it would only require about 10 minutes to transfer the footage from the card to MetroEast’s Editing Storage system (the “SAN”).

This “Flash Memory” also allows quick and easy review of recorded material; simply select any “clip” from tiny “thumbnails” on the LCD viewfinder. After review, you can immediately begin recording again; no rewinding or fast forwarding is needed.

For sound, the camcorder has connections for attaching high-quality external microphones, or connecting to existing sound systems often found in auditoriums, churches, or clubs.

The camera also provides automatic or manual control of most of the important functions of the camera and recorder. Switch to “Auto” for Point-and-Shoot ease of use, or set the controls to “Manual” for more precision control over color, contrast, or audio.

About This Handout:
This packet provides general information about what the various parts of the camera are for, and how they apply to making video productions.

There is also a smaller companion booklet that offers a step-by-step guide to operation.
Using the Camcorder:
MetroEast has 6 camera packages that you can use for your programs. Each one includes:

1) Panasonic AG-AC160a Camcorder
2) 2 - 64 gigabyte SDHC Memory Cards (5+ hours recording time on each)
3) 3 - Rechargeable Batteries (about 3 hours recording time for each)
4) 1 - AC Power Supply/Battery Charger (with cable)
5) Camera Case
6) Tripod with Case

Reserving a Camera:
To ensure that a camera is available, you should call to reserve as soon as you can:

The MetroEast Equipment Room is open:

- Monday, Thursday, and Friday 2:00 pm - 10:00 pm
- Saturday and Sunday 11:00 am - 9:00 pm

All reservations and equipment pick-up or return should be during these hours.

MetroEast is closed on Tuesdays and Wednesdays.

Call the Equipment Room at 503-667-8848 ext. 307

Equipment Policy:
In order to make equipment available in the fairest manner possible

- All reservations are on a first-come-first-served basis.
- You can reserve the field cameras up to 3 months in advance of your production.
- You can check out a AC160 Camera for up to 72 hours per reservation.
- You can have up to 72 hours of camera usage reserved at any one time. For example, you could have 1 reservation of 72 hours, or 3 reservations of 24 hours each. You must use one of these before you can reserve more time.
- You must be a “Producer” before you can reserve a camera. There is an annual fee of $50, and you must present a government-issued photo ID to get your Producer Card.
- You’ll be asked to sign a “Producer Liability” form when you check-out the camera. Please read it carefully, as it defines your rights and responsibilities if the equipment is damaged, lost, or stolen.
- Please examine the equipment carefully before signing.

Not sure what Equipment you need?
We’re here to help! Please call the Equipment Room for on-the-spot advice, or call Loren at 503-667-8848 ext. 314 to make an appointment to discuss your project.
A Quick Tour of the Camera:
Here are a few of the basic features of the AC160 camcorder:

**Left Side**
- Camera-Microphone
- Lens
- Manual Focus
- Manual Zoom
- Focus Controls
- LCD Viewfinder
- Menu Settings
- Audio Volume
- Auto or Manual Control Switch

**Right Side**
- Power Switch
- Battery
- Zoom Control
- Manual Zoom
- Microphone Connections

**Rear View**
- Eyepiece Viewfinder
- Headphone Jack (under flap)
- Memory Card Slot Selector
- Battery
- Memory Card Slot Selector

**Quick Facts:**
- **Weight:** 6.5 lbs. with battery & memory cards
- **Size:** 6 5/8” x 7” x 17 1/4”
- **Records about 3 hours on 1 battery**
- **Records on SDHC “Flash Memory” cards (2 slots available)**
- **22 x Optical Zoom**
- **Built-in or External Microphones**
The Tripod:
Professional videographers will ALWAYS use a tripod if possible. Using the “sticks” will make your shots more steady, and will make movement of the camera much more smooth and fluid.

Pan Drag
Adjust smoothness of left/right moves.

Pan Lock
Loosen to pivot camera left or right

Tilt Lock
Loosen to pivot camera up or down.

Pedestal Lock
Loosen to raise or lower pedestal.

Leg Extension Locks
Lift levers to extend length of legs to raise camera height

Camera Release
Push and hold to slide camera off tripod.

Camera Mount
Slide camera plate into the channel

Panhandle Adjust
Loosen to tilt handle to comfortable angle.

Panhandle
Provides leverage for smooth moves.

Pedestal
Slide shaft up or down to adjust height.

Ball Level Adjust
Loosen knob to tilt Tripod Head so that camera is level.

Leg Locks
Push button down to spread legs for better stability.

“Fluid Tripod Heads”
Better quality video tripods are often called “fluid heads”.

The TILT DRAG and PAN DRAG knobs on the tripod add friction to the left/right and up/down movements of the camera.

The metal friction plates inside the tripod head are dampened by a thick fluid, which makes the movements smoother.

These knobs should never be overtightened; if you want to prevent camera movement, tighten the TILT LOCK and PAN LOCK levers.
The Tripod Head:
The tripod head includes several controls for attaching/releasing the camera, checking that the camera is level, and adjusting the cameras pivoting movement.

The Camera Mount:

1) Camera Plate Channel: Slide the plate attached to the underside of the camera into this groove.

2) Camera Plate Lock: (other side) Turn this lever to prevent camera from sliding in the camera plate channel.

3) Release Button: Push and hold this button to slide the camera off.

4) Level Bubble: Center the air bubble inside the printed circle to check that the tripod is level.

“Pan and Tilt” Controls:
The main controls of the tripod head adjust the “TILT” (up/down) and “PAN” (left/right) movements of the camera.

The “Locks”:

5) Tilt Lock: Turn the lever clockwise until tight to prevent up/down movement.

6) Pan Lock: Rotate the end of the lever out from the head until to prevent left/right movement.

The “Drag” Controls:
The drag controls add resistance to Pan and Tilt movements to make them smooth and fluid.

7) Pan Drag: Turn the knob (above the pan lock, under the mounting surface) to add or remove friction on pans.

8) Tilt Drag: Turn the knob clockwise to add more resistance to the motion.

NOTE: Don’t over-tighten the Tilt and Pan “drag” controls. Use the Locks to prevent camera movement.

Counter Balance Spring
You may notice that even when you loosen the tilt lock and tilt drag controls, the tripod still holds the camera level.

In fact, if you tilt the camera forward or back, it slowly creeps back toward a level position.

The head is equipped with an internally mounted spring that is designed to keep its normal orientation level.
The Parts of the Camera: Battery vs. Power Supply

The Camcorder can be powered from a rechargeable battery, or from a provided AC power supply. The power supply can also be used for recharging the batteries.

*Attaching a Battery:*
You’ll probably do the majority of your shooting using a battery. Under normal conditions, you should be able to record about 3.5 hours on a fully-charged battery.

1) Set the POWER switch to OFF
2) Gently slide the battery into the top of the slot at the back of the camera.
   Slide the battery down in the slot until you hear a “click” that indicates that the battery has locked into place.
3) To remove the battery, push the release button (located just above the battery) forward, and slide the battery up and out of the slot.

*Using the Power Supply:*
For long shoots, or when your batteries are all exhausted, use the AC Power Supply.

The adaptor attaches to the back of the camera in the same place as the battery.

1) Attach the plug end of the AC adaptor cable to the outlet on the front of the Battery Charger/Power Supply.
2) Set the camera POWER switch to OFF
3) Gently slide the adaptor into the slot at the lower back of the camera, then slide down about 1/4”.
   You should hear a “click” as the adaptor locks into position in the slot.
4) To remove the adaptor, push the release button forward, and pull straight up and out.

NOTE: Please don’t pull on the cable of the power adaptor when removing it from the Battery Slot!
The Parts of the Camera: ON or OFF
With a battery or power supply attached, you can now turn on the power. You can’t record or see the camera image until you turn on the power.

The power switch is located just above the battery slot.

The Power Switch:
1) Push in on the small white button. This lets you rotate the power switch.
2) Rotate the switch so that the pointer is in the “ON” position.

REMEMBER! Please turn off the power when changing batteries or attaching the AC power adaptor.

The Parts of the Camera: Recording
There are two round, red buttons on the camera that are used for starting recording, or pausing while recording.

On The Power Switch:
Just above the battery, facing the rear of the camera is the main record/pause button.

1) The button is in the center of the switch that you used to turn on the power.

Push the button once to begin recording and push it again to pause recording.

You should see a red dot displayed in the viewfinder to confirm recording.

On The Handle:
On the handle on the top of the camera is a secondary record button. You can use either button to start or stop the record process.

NOTE: Since you’ll usually be editing whatever you shoot with the camera, it’s a good idea to start the recording several seconds before you cue the talent. Any excess footage you record can be easily removed in the editing process.
**The Parts of the Camera: The Viewfinders**

Viewfinders let you see what the camera sees while you are recording, and also let you play back what you shot previously. The camera is equipped with 2 viewfinders: Eyepiece and LCD.

Only one of the viewfinders can be used at a time; when you fold-out the LCD viewfinder, it shuts off the picture in the eyepiece.

Both viewfinders can also provide information about the status of camera functions, such as remaining battery life, remaining recording time, audio volume “levels” and settings of iris, gain, and focus controls.

**The Eyepiece:**
This traditional viewfinder style gives the clearest possible view of the shot, providing the best feedback to the shooter of color, focus and framing.

The drawback to eyepiece viewfinders is that they can get uncomfortable after long use, requiring the shooter to hunch over the camera.

The Eyepiece VF can tilt up, to adjust for a more comfortable angle, and has a “diopter” ring to adjust its focus to correct for vision problems.

**The LCD (liquid crystal display):**
The LCD viewfinder can be more comfortable to use on long shoots. They also provide an easy method to play back video for several people to watch.

However, the LCD monitor can be difficult to see clearly in bright light.

The LCD monitor folds out from the left side of the camera. Push the LCD Open button, and gently swivel the screen out from the side.

The LCD screen can be tilted up or down, and can even flip completely over, so that the person being recorded can see themselves.

**NOTE:** Please be careful not to push the LCD monitor too far forward when opening. It is fragile and expensive to repair.
**Lens Functions: Zoom and Focus**

**ZOOM:**
The Zoom controls simulate the effect of moving the camera closer or farther from the subject by magnifying the image. At maximum zoom, the camera magnifies the image by 22X.

For convenience, the camera has 2 zoom controls, the larger “main” zoom, and the smaller “handle” zoom.

The ends of the MAIN ZOOM switch are marked with “W” or “T” for “Wide” and “Telephoto”. Push on the “T” end to “zoom in” (increase the size of the image), or push on the “W” to zoom out (reveal more of the scene).

The MAIN ZOOM is variable speed; push lightly on the control to zoom slowly, or push down harder to zoom faster.

The HANDLE ZOOM is useful when you are handholding the camera. It also has “W” and “T” sides but is not variable speed. Instead, you select from speeds 1 (slow), 2 (medium) or 3 (fast) from the switch on the side of the handle.

**FOCUS:**
Focus controls make the image sharp and clear.

The FOCUS MODE switch has 3 settings:
1) “A” for Auto. The camera will continuously adjust the focus setting. It will focus on the object near the center of the picture that is closest to the camera.

2) “M” for Manual. Turn the FOCUS RING until the image appears sharp in the viewfinder.

3) “∞” for Infinity. Sets the camera focus for objects beyond 30 feet away.

**Other Focus Controls:**

**PUSH AUTO**
This button turns on AUTO FOCUS for as long as you hold the button in. This lets you use the Manual Focus mode, but let the camera set the focus.

**FOCUS ASSIST**
This button enlarges part of the picture to make focusing easier (available in Hi-Def. mode only).
**Camera Technique: Using Zoom and Focus**

**ZOOM:**
The Zoom function can add impact to your video if used thoughtfully:

1) Use zooms sparingly; if overused, they can distract from the content and make the viewer concentrate on the mechanics of the production.

2) If you do zoom, make the move slowly. A fast zoom can be jarring to the viewer. Practice pushing lightly on the main zoom control to get a feel for controlling the speed.

3) Don’t zoom every shot. Mix up non-moving and moving shots to give some variety to your finished program.

4) Common uses for zooms include” Zooming Out (from a close view to a wide view) to reveal new subjects or information to the viewer, or “Zooming In” to draw the viewers attention to a specific part of a scene or subject.

5) Be decisive. Don’t meander around as you zoom. Decide before you begin the zoom what you are zooming-in to, and how close you intend to go.

**FOCUS:**
An out-of-focus shot is almost painful to watch. Here are a few pointers to improve your ability:

The AUTO FOCUS function usually works well. However, if you are trying to focus on a subject that is not in the middle of the picture, or the scene has low contrast or poor lighting, the auto focus may be unsatisfactory. In some cases the auto-focus may “hunt” -- changing the focus over and over -- when the camera can’t decide what to focus on.

If you practice your Manual Focus technique, you may find you prefer using it.

**“Pre-Focus” Technique:** The most accurate method for manually focussing a camera.

1) Zoom in as close as possible to the desired subject. Focus is not “critical” on a wide shot, but becomes obvious when you zoom all-the-way-in.

2) Turn the “FOCUS RING” on the lens until the image appears sharp. If the image is not getting sharp, try turning the ring in the other direction.
   - Turn the ring “clockwise” to focus further away, or “counter-clockwise” to focus on subjects closer to the camera.

3) Zoom out to the desired framing of the image.

4) If the distance from the camera to the subject changes (you move or they do), the focus will be changed. Before you begin recording, repeat steps 1-3.

**PUSH AUTO:**
This handy button lets you use the advantages of Manual Focus, but lets the camera do the focussing work for you. To use it:

1) Set the Focus Mode switch to Manual, and aim the camera at the desired subject.

2) Push the button. The Auto Focus function is engaged, so that the camera can set the focus distance automatically. However, when you release the button, the auto focus stops, and the camera reverts to the manual mode.
**Controlling Brightness: Iris and Gain**

**IRIS:**
The Iris on a camera is like the pupil of your eye, an opening that can be enlarged to let in more light when the room is dark, or closed when the scene is well lit.

For convenience, the camera can adjust its own Iris in the AUTO mode, or be adjusted by you in the MANUAL mode.

For AUTO mode, push the round button labelled IRIS. The viewfinder should display text reading “AUTO IRIS” (if it reads “MANUAL IRIS”, push the button again).

The MANUAL IRIS provides more control over picture brightness. Push the round button until the viewfinder displays “MANUAL IRIS”.

Turn the IRIS ADJUST wheel until the picture is the correct brightness.

Your viewfinder may also display “f-stop” numbers, which relate to the size of the iris opening. See page 18 for information on the viewfinder display.

**GAIN:**
The Gain function increases the cameras sensitivity to light. This has the effect of making the picture brighter when the room is too dark.

To make the picture brighter, the camera sacrifices image quality, so before you “boost the gain”, see if you can turn on more lights.

The GAIN MODE switch has 3 settings: Low (no increase), Medium, and High

*Make sure the IRIS is fully open (in manual mode) or in AUTO before increasing Gain.*

**Other Brightness Controls:**

**ND (Neutral Density) FILTER**
This switch is a like putting sunglasses on the camera, for shooting outdoors on bright days.

When shooting indoors, the switch should almost always be OFF. The other settings cut the brightness by about 1/8th or 1/64th.
Adjusting Color: White Balance

Different sources of light -- the sun, an electric lightbulb -- produce different colors of light.

The “WHITE BALANCE” controls on the camera compensate for these light differences so that the video you record has natural-looking color.

Without White Balance adjustment, the video you shoot outside might look very blue compared to the video you shoot inside.

Anytime you change locations -- from room to room, or from outdoors to indoors -- you should reset the White Balance to ensure accurate color.

Auto vs. Manual White Balance
AUTO white balance will continuously adjust color as you shoot. This can cause a subtle shift in color when there are mixed sources of light (sunlight and man-made light) on a scene.

MANUAL white balance takes a little more work, but can result in more accurate color.

The White Balance Switch:
The camera can “remember” 2 different white balance settings, or select from 2 factory-preset color adjustments.

The “B” and “A” positions are the 2 memory settings. If you are moving back-and-forth between locations -- say one outside and one inside -- you can set the white balance just once in each, and then flip the switch to change the color.

The “PRST” setting is factory-adjusted to Indoor or Outdoor light. If you don’t have time to adjust the white balance, these presets should be close.

Getting Accurate White Balance:
Each location will have its own unique set of challenges for getting good white balance.

Most modern cameras will do a pretty good job in the AUTO mode.

If your color looks a little “off” when you watch it later, the equipment you’ll use to edit also has very useful tools for adjusting the white balance.

About Color Temperature:
The “color” of light is usually described by a measurement called the “Kelvin Temperature Scale”

The scale was based on the color of an object as it was heated to various temperatures, from red hot to blue hot to white hot.

The 2 colors usually used as camera White Balance presets are:

Sunlight, clear sky = 5600°
Video Lights = 3200°
**Other Video Controls:**

Behind & above the LCD monitor, you’ll find several additional video (and some audio controls) underneath. These are used less than those for iris, gain, focus, and white balance.

1) **BARS** - This button makes the camera display “Color Bars” which are a standard color and brightness reference image, used for adjusting monitor settings.

2) **OIS** - The “Optical Image Stabilization” system helps to reduce the vibrations you see when you shoot from a moving car, or hand-hold the camera. It won’t eliminate violent shaking, but it will minimize smaller vibrations.

3) **ZEBRA** - This tool helps you set Iris settings by superimposing a pattern of diagonal lines over areas of the viewfinder picture that are above 80% of the maximum brightness of the scene. When using the manual iris controls, you close the iris until only very bright areas of the picture (sky) show the pattern. The lines are not recorded.

4) **COUNTER and RESET/TC SET** - These buttons let you adjust the “time counter”. There are several options, including “Time Code” (TC) which shows hours, minutes, seconds, and frames, and is the normal setting. Other options include a counter that starts at 0:00:00 and counts up to show total time recorded, and “User Bits” which can be set to show date, time, or other user-selectable information.

5) **USER 1, USER 2, and USER 3** - These buttons can be configured to switch on or off various functions, according to the preference of the user. They are configured as:

   a) **USER 1** - “BACKLIGHT”. This function adjusts picture brightness when a subject has a strong source of light in the background so that the picture is not too dark.

   b) **USER 2** - “DIGITAL ZOOM”, electronically “zooms” the image to increase the magnification beyond the optical zoom, by as much as 10x. Reduces picture quality.

   c) **USER 3** - “SHOT MARK”. Allows the user to “mark” a good or bad shot. Places an indicator on the “thumbnail” of the clip.
Other Video Controls:

Just below the LCD monitor is a row of 4 buttons and a switch.

1) **ZOOM** - This switch turns on or off the motor that operates the zoom function. When in the SERVO position, you can use the zoom controls shown on Page 9 to zoom at variable speeds. If you disengage the motor by switching to the MANU setting, you can perform a very fast “snap zoom” by turning the zoom ring on the lens.

2) **SHUTTER** - These controls (the DIAL SEL button, and the SHTR/F.RATE wheel) allow you to shoot fast-moving video with less blur. Normally, a video camera records 30 still pictures per second, and “exposes” each frame for 1/30th of a second. If the subject moves much during that 1/30th of a second, the image will appear smeared.

The various shutter speeds (1/100, 1/120, 1/250, 1/500, 1/1000, 1/2000) expose each frame for a shorter fraction of a second to reduce this blur. There is also one slower than normal speed (1/15) which creates a blurry, dream-like effect, and one adjustable speed which is useful for shooting television and computer monitors without seeing a dark bar that obscures part of the screen.

3) **DISP/MODE CHK** - This button switches on or off the display of information in the viewfinders about the status of controls for iris, gain, etc. The display of the time counter and “REC” or “PAUSE” status of the camera is always visible.

4) **AUTO/MANUAL** - If all of the buttons and switches are getting in the way of your creativity, this switch is for you. Slide the switch to the AUTO position, and most of the major functions of the camera -- focus, iris, gain, and white balance -- are adjusted by the camera automatically.

**AUTO overrides the AUTO/MANUAL settings on the controls for each of the individual functions (focus, iris, gain, white balance).**

**NOTE:** The AUTO mode works well for many situations. However, experienced shooters prefer the greater control provided by using MANUAL settings. It’s useful to try them out, to better understand the camera, and to give you more control when you need it.
Inside the Viewfinders:
The viewfinders (eyepiece or LCD) provide a wealth of information about the camera controls.

1) MEMORY CARD - The “1” or “2” numbers are highlighted in green to show which of the Memory Cards is currently being used for recording or playback (see page 16). Also shows the approximate total amount of recording time still available.

2) TC - Displays the “time counter” function of the camera. Each “frame” of video has a time code number recorded along with video and audio, and are important for editing.

3) PAUSE or RECORD - Displays a red “•” when recording, and “II” in green when paused.

4) BATTERY GAUGE - Shows how much charge remains. When fully charged, the battery shows 4 blocks. At 75% charge, one block disappears. At 50%, a second disappears.

5) 2h58m - Shows how much time remains on the battery life (approximately)

6) Bch - Shows which White Balance memory is selected (see Page 12) for adjusting color.

7) 0 dB - Displays the Gain setting (see Page 11), used when shooting in low light.

8) ND OFF - Displays the setting of the Neutral Density knob (see Page 11).

9) MF 40 - Displays the position of Manual Focus, with the number ranging from very close (00) to very far away (99). For more information, see page 10.

10) Z26 - Displays the degree of zoom, with the number changing from wide (00) to maximum magnification (99). For more information, see page 10.

11) F8.6 - Displays the Iris setting. Ranges from F1.7 (open) to F16 (closed). See page 11.

12) BACK - Shows Iris setting of Standard or Backlight. This should normally display “STD” unless there is a strong light source behind the talent. See page 14, “User 3” for details.

13) Ch1 and Ch2 - Shows a visual readout of the loudness of the 2 audio recording channels. More information on audio controls begins on page 18.

14) PH1080 - Displays the recording quality setting, and HD format information.
Memory Cards
The AC160 Camera records video and audio on inexpensive, readily available “flash memory” cards. MetroEast will provide cards, but you can also decide to purchase your own if you wish. If you use the provided cards, MetroEast staff will transfer the footage you’ve recorded to the edit system when you return the camera, and then erase the cards for the next user.

About Memory Cards:
1) The camera uses standard “SD” format cards. There are several different forms of the SD “family” of cards, from cheaper versions that can’t record/retrieve data as quickly. These lower quality cards may cause record failures, or not allow high quality record settings.

2) If purchasing your own cards, look for a card of at least “Class 6” or above quality.

3) Recording time is based on the size in “Gigabytes” of the card. In the standard HD recording format, a 32 gigabyte card will provide about 3 hours of record time.

4) The MetroEast provided cards are a pair of 64 gigabyte, Class 10 cards. The 2 cards will provide more than 12 hours of recording.

5) The cameras are configured to automatically switch from one card to the other when one becomes completely full.

6) SD cards use “file-based” recording, meaning that each time you start and then stop recording, it adds a “clip” to the card. This makes it very difficult to accidentally record over already recorded footage, and makes selection of shots easier in editing.

PLEASE! Don’t open the Memory Card Door or remove the cards while out in the field. Doing so allows dirt and moisture to get into the card slots.
**Reviewing What You’ve Recorded:**
You can watch what you’ve recorded on either viewfinder (eyepiece or LCD), or connect an external monitor.

**Switch to Playback mode:**
This control switches from the “Camera” or “Record” function to “Playback” mode.

1) Rotate the Main Power Switch PAST the ON position to the MODE setting. The switch will spring back to the ON position when you let go.

The tiny indicator light just above the switch will change from Camera to PB.

**In the Viewfinder:**
Each “Clip” you recorded -- every time you started and stopped recording -- will be displayed in the Viewfinder as a tiny “Thumbnail” image.

The display provides other information:
1) Starting “Timecode” of each clip
2) Duration of selected clip
3) Which Memory Card the clip is from

Each clip will show a yellow border around the thumbnail frame to indicate which clip is “selected”.

**Select and Play a Clip:**
On the face of the camera, just below the handle, are the controls for selecting and playing the clips.

1) Push the center stick left/right/up/down to select a clip you want to play.
2) Push in on the stick to select the desired clip and start playing.
3) Push the stick up to PAUSE
4) Push UP again to resume PLAY
5) Push Right or Left while playing to FAST SCAN forward or back.
6) Push down to stop play, and return to the clip screen.
Recording Audio:
To record good quality sound, you must:

1) Select and position the correct type of microphone for the sound and conditions.

2) Controlling the volume or “level” at which the sound is recorded.

3) Monitor the sound at all times.

**Two “Channels” of Audio:**
The camera records 2 separate and distinct channels of sound. For example, you can plug 2 mics into the camera. When you edit, you can choose to use only one, or you can mix together the sound of both channels.

Choosing a Microphone:
Although the camera has a convenient “built-in” microphone, it won’t provide very good quality sound; it’s not a great microphone, and it’s never close enough to the source of the sound.

Generally, you’ll get better results if you connect an external microphone. MetroEast has several different microphones for different applications.

Connecting External Microphones:
The 2 mic connections are on the upper handle, just above the main zoom control. The right one connects to Channel 1, and the left one attaches to Channel 2.

**LINE vs. MIC:**
On the opposite side of the handle are 2 important switches.

A microphone creates a very weak electrical signal. Other audio devices -- a CD Player, or the sound system in an auditorium -- are “amplified” and put out a much stronger sound.

The switches for each connection adjust the camera to the strength of audio device you’ll be plugging-in to that connector. The sound will be too quiet (and noisy), or too loud (and distorted) if you pick the wrong setting.

Set the switch to MIC for any microphone plugged directly into the camera.

Set it to LINE for anything that is not a mic.
Recording Audio:

MIC POWER +48V
These switches provide power from the camera to some types of microphones, so that the mic doesn’t need a battery.

a) INPUT 1 - Powers a mic connected to the Channel 1 connection.
b) INPUT 2 - Powers a mic connected to the Channel 2 connection.

Choosing a Microphone:
In the control panel under the LCD viewfinder, there are several switches that control audio.

1) CH1 SELECT
   Lets you select which mic you want to record on Channel 1. Your options are:
   a) INT(L) - The Camera Microphone
   b) INPUT 1 - A mic (or Line source) connected to the Channel 1 connection.
   c) INPUT 2 - A mic (or Line source) connected to the Channel 2 connection. This would have the effect of recording the Channel 2 mic on both channels.

2) CH2 SELECT
   Lets you select which mic you want to record on Channel 2. Your options are:
   a) INT(R) - The Camera Microphone
   b) INPUT 2 - A mic (or Line source) connected to the Channel 2 connection.

   NOTE: Plugging in an external mic does not automatically override the camera mic. You MUST select which you prefer to use!

Monitoring Sound:
You should ALWAYS wear headphones to monitor sound as you record!

   Headphones: The connection is under a rubber flap, on the rear of the camera.

3) Monitor Volume Adjustment: The buttons labeled AUDIO MON/ADV will lower (“-”) or raise (“+”) the volume in the headphones.
Recording Audio:
One of the most important functions of audio is setting the “level” or volume at which the sound is recorded.

If you record the volume at too low a level (too quiet), the sound will have more “noise”, such as buzz, or hiss.

If you record at too high a level, the sound will be distorted, and nearly impossible to understand.

**The V.U. Meter:**
In order to “measure” the loudness of the sound, the camera is equipped with a “Volume Units” meter. The meter is visible in either viewfinder.

The Meter shows the volume of Channel 1 and Channel 2 separately.

The dotted lines change length in relation to the loudness of sound; the louder the sound, the further to the right the dots extend.

**The Marks on the Meter:**
The lines on the meter represent 2 volume “target levels”:
1) -12db (average peak level)
2) 0dB (Excessive peak level)

**Adjusting the Volume:**
3) On the side of the camera are 2 dials for adjusting the volume of Channel 1 and Channel 2.

Before you begin recording, you should set the volume for each channel so that the average “peaks” of sound bounce up to the -12 line.

Each person speaks at a different volume, so you should reset the volume each time you change performers.

NEVER allow the meter to reach up to the 0dB mark. The audio will be unusable.