Producing Videos

Kimberley Brown, Camera Operator and Digital Editor. (Photo by Henry Naudluk)

Producing Videos

A COMPLETE GUIDE

Second Edition

Martha Mollison

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With thanks to my parents
Marie and George Mollison
who gave me wings
and taught me how to use them.

Good Relations community service announcement shoot, Murriimage.

The skills you bring with you—memory, sight, hearing,
perspective—are exploited by media technology to communicate
your message. As a video producer, how you use them can be
good, bad or indifferent. It's up to you.

Carl Fisher, Muriimage Community Video and Film Service, Wolvi via Gympie, Qld, Australia.

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Greeting

Hello to you, Aspiring Videomaker!

You're about to learn a skill which will give you both satisfaction and unexpected challenges. You'll find yourself looking at film and television differently, and even real life will sometimes get a frame around it in your eyes.

The book you're holding is an attempt to pass on to you the things I can tell you about video. I've tried to write it so it feels more like I'm right there talking to you rather than like I think I'm some remote authority on the subject. I hope you find it easy and fun to read.

As with any communication, you have a right to ask about me, so you can decide how to weigh what I've written. But as books aren't geared up for two-way communication, I'll take that step for you.

For 21 years I've been working in video, and it's opened many doors for me which would never have opened otherwise. I've lugged gear to cover a wide range of events—cultural, political, and personal—in the USA and Australia, and gone to Kenya and China as well.

As a teacher of video, I've helped other people develop the tools to tell their own stories, some heartfelt, some fantastical, some straight, some quirky. I've been a sort of midwife of the medium. On screening days, and even at rough cut sessions, I've felt wonder and awe at the imaginativeness and uniqueness of the stories being born in front of me.

At times I've been entrusted with telling other people's stories. To do this I've been invited into the lives and perspectives of people who are elderly, differently abled, newly arrived in Australia, or very young. I've always walked away a richer person.

For me the greatest satisfaction of all has been in working with Indigenous Australians, whose many stories are beginning to emerge and alter forever the consciousness of people worldwide and the accepted definition of what it means to be Australian.

No teacher comes from nowhere, and I owe my own formation as a video person to the Somerville Producers Group, in Somerville, Massachusetts, USA. SPG is a constantly

evolving collection of people who, as a group, have maintained the longest running public access cable TV show in America.

I got lots of practical experience working for Adams Russell Cable TV in Norwood, MA. The Women's Video Collective, from the Boston area, was the enabling group for many intense video experiences, including covering the Women's Encampment for a Future of Peace and Justice in Seneca, New York in 1983, and the International Women's Conference in Nairobi, Kenya in 1985.

When I struck out on my own as a videomaker I had the privilege of making a documentary on the experience of a special sector of US women. It's called *The Invisible Force: Women in the Military*.

In Australia I guess I was in the right place at the right time and got to teach short courses for the Australian Film Television and Radio School. It was through this connection that I was invited to teach video in Ngukurr in East Arnhem Land. And then followed opportunities to do video training with Indigenous Australians in Tennant Creek, Katherine, Alice Springs and Sydney.

I've worked as a video teacher at the University of Technology, Sydney, and the University of Newcastle, and taught within the Koori TV Training Course and the Indigenous TV Training course, both run at the Australian Film Television and Radio School and later at Metro Screen.

In 1995 Director David Wang and I took a team of Indigenous Australian students to south-west China to make a documentary on the women of the Dai ethnic minority who live in the mountains of Yunnan Province.

For the past five years I've taught video at the School of Indigenous Australian Studies at James Cook University in Townsville.

Martha helps Amanda Hart use the vision mixer, ASPIRE program at James Cook University.

Why am I telling you all of this? Because I'm indebted to people all along the way, who've taught me what I didn't know, shown me how to do new things, and shared their ideas and methods generously, and their anecdotes and laughter as well.

It's a great feeling to be part of an international network of media teachers who are passionate about what they do, and committed to helping others build their skills so they can tell their own stories.

In both the first and second editions of this book, many, many video teachers have participated by offering their training tips. The book is better for it, but the thing which makes me happiest is that I feel this book, in some small way, reflects the breadth of people out there trying to bring media literacy and accomplished storytelling within the grasp of those that seek it.

So seek on and build your skills. You have stories to tell which are both uniquely yours and also reflective of the times and culture from which you come.

The more stories that get told, the richer we all will be.

Martha Mollison
Townsville, Queensland, Australia

1

The Camera

The way to learn video is by doing it. So swing that camera up onto your shoulder and have a go! You can't hurt the camera, unless you drop it.

You already know plenty about screen images: you know what you like, what you don't like, and what you want to see.

Now—how to get it.

The most effective way to learn video is to make a start and then ask the questions you need as you go along. No-one can learn a hundred buttons at once, so work at your own pace.

Usually you'll be working in a group and what one person forgets, another person understands and can explain. Don't be afraid to ask someone else, because next time you may remember what they've forgotten.

Most people start off thinking that video production is about technical knowledge. Of course that's part of it. But almost no-one produces a video on their own.

Video work is group work, and it relies on the combined efforts of a good team. When the crew members communicate well with each other, and everyone feels their contribution is needed and respected, people start to really fire with creativity. That lifts the production to a higher level.

Okay, where to start . . .

Camera operator Donna Jamieson from SQIT College of the South West, Roma, Qld, Australia.
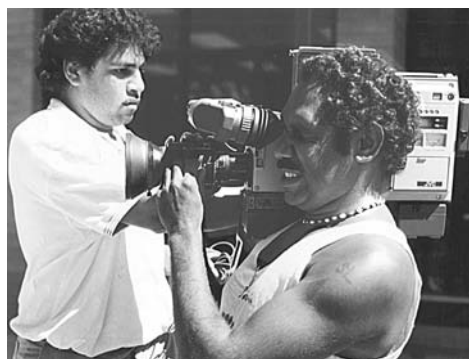
Camera operator and assistant, Batchelor College, Batchelor, NT, Australia.

The Power Supply

There are two ways to power up the camera. You can either use a battery or you can connect the camera to the electrical outlet on the wall, using the AC adaptor.

The Camera Battery

Most cameras operate on a rechargeable battery. The older models used NICAD batteries and the newer models use lithium ion or NMH (nickel metal hydride) batteries. The newer batteries are lighter in weight and they run for longer. NICAD batteries are being phased out now, due to the heavy metal, cadmium, which they contain.

The camera and battery are designed so you can only put the battery into the camera the right way. If you try to put it in upside down or backwards, it won't go.

This leads us to:

> **THE FIRST LAW OF VIDEO**
> If it doesn't go easily, don't force it.
> In video, everything is made to insert or connect easily. If you're having trouble connecting something, you're doing it wrong.
> If you think pushing harder will do the trick, you're doubly wrong. If you try to force something in video, you'll break it.
> If you learn nothing else on the first day, learn this.

If you look at the battery, which is a dark, heavy and uninspiring looking lump of a thing, you'll see that it has little metal contacts on it somewhere. They're the gateway for the battery's stored electrical power to get into the camera. They're on the end which goes into the camera first. If you memorise which way to orient the battery by referring to the metal contacts, you'll be moving a little faster when you get started next time.

When you want to take the battery out of the camera, look for a little button called *battery eject*. It's usually very close to where the battery is inserted or attached to the camera. When you push it, the battery will be released and pop out a little way—but not far enough to shoot out of the camera and knock you out.

Of all the various and sundry extra bits in video, the battery looks the most robust. But there are ways you can damage it.

Metal contacts go in first.

How to Avoid Battery Problems

1. Don't drop it.

The cells inside can be broken by shock. Then the battery won't work.

2. Don't recharge a NICAD battery without fully discharging it.

NICAD batteries, which unfortunately are still available for some cameras, have a quirk you may not know about. If you repeatedly discharge them slightly, and then recharge them again, they can develop a *memory*. So if you frequently use a battery briefly and

then put it on the charger to top it up, what started out as a battery designed to power the camera for 60 minutes, can turn into a battery that's only good for ten minutes. Needless to say, that battery will be a serious liability to anyone who gets it next.

Although it seems considerate to the next group to give them a fully charged battery (and it is), you should either use the battery till it has completely depleted its charge, or make sure the equipment storage people know the battery has been only slightly used.

Most media stores have dischargers that will drain the battery before it's charged up for the next borrower.

Good video manners include that if you get a battery which doesn't last very long at all, you should let the equipment store know that it's sus.

Note: Lithium ion and NMH batteries do NOT give memory problems.

Sometimes 'memorised' batteries can be restored to their full potential by cycling them through a series of charges and discharges.

Batteries do eventually die, though. After 200 or so recharges, or two year's constant use, they've usually done their dash. At that point they should be disposed of.

When you get rid of them DO NOT burn, break, compact, or compost them. Take them to a battery recycling place OR return them to the place you bought them if it was a battery specialist. Battery specialists do some recycling and can recover some of the chemicals in them.

3. **Don't leave it behind.**

Batteries are unobtrusive little numbers and fade into the surroundings quite easily. It's not at all hard to leave one under a chair, on top of a piano, or on the floor of a car.

The problem is, their appearance belies their monetary worth. Unlike the AA cells for your walkman, video batteries can cost a day's pay or more. They're expensive to replace.
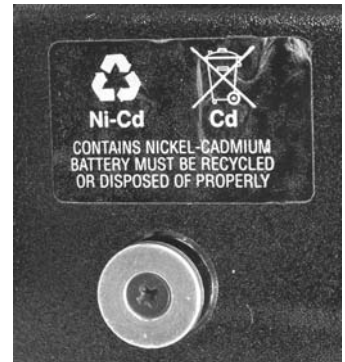
Don't just chuck batteries in the bin.

Charging a Battery

Your camera kit will come with a battery charger. Usually the charger is combined in the same piece of equipment as the AC adaptor (more about that in a minute).

Charging a battery is simply a matter of connecting the battery to the charger (via a cord for that purpose, or by inserting the battery into a slot on the charger), plugging the charger into an electrical socket and turning it on. In some cases you'll also have to move a switch to *charge*. A light will come on to show that it's charging, and the light goes off when the battery is fully charged. On some chargers a red light will come on when a quick charge is happening, and a green light will come on when a trickle charge is happening. A quick charge can get a battery up to a usable level of stored power, and can save the day when on a shoot. But whenever possible you should let your batteries get the full trickle charge.

Sony's DVCAM has a dual battery charger with a handy carry handle.

Batteries take much longer to recharge than to use (a one-hour battery may take three hours to charge), so it's a good idea to charge your batteries the night before your shoot. It's no good having your crew waiting around while you try to will your battery charger to work faster.

Another thing to know: an AC adaptor/charger can only do one thing at a time. If you're using it to power the camera, it can't simultaneously be charging a battery for you. If it's charging a battery, you can't use it to run the camera.

Time for a tea break? Many's the time batteries are charged under the table in a cafe. Just don't go off without them!

Battery Behaviour

Like many of us, batteries work well when they're in comfortably warm surroundings. A battery will last less time if used in a cold setting. So for those shoots of skiers and ice skaters, take more batteries.

Also like many of us, batteries lose energy when left on their own. So a charged battery left in the storage room will gradually lose power. For maximum battery strength, it's best to charge up your batteries the day before, or the day of, your shoot.

The AC Adaptor

Portable video equipment is designed to operate on battery power, so you can be mobile and take the camera wherever you want to go to get your story.

That means the camera is made to use direct current (DC) electricity, because batteries supply DC power.

But the power points (electrical sockets) in buildings supply a different sort of electricity, called alternating current (AC). The camera can't accept AC.

So in order to use wall current, you need to use an AC adaptor—which does just what its name implies: it changes AC to DC.

You plug the adaptor into the wall and it takes the alternating current up the cord from the power point, changes it from AC to DC, and then sends the direct current along the other cord into the camera.

Just one caution: to avoid giving the camera a power surge, which could damage it, make sure that before you plug things together you turn all the power switches off. Connect the AC adaptor to the wall and the camera, then power up in this order:

1. Turn on the wall power point.
2. Turn on the AC adaptor.
3. Turn on the camera.

Follow the cord from the wall.

Why use an AC Adaptor?

1. **To save your batteries.**

   Since batteries have a limited life span, it's sensible to use them only when you need them.

2. **To ensure that your power doesn't cut out at a critical point in your shoot.**

   Scenario: The bride and groom have stood patiently through all the wedding ritual and are just about to exchange their vows when—oops—the camera shuts off. While you scrabble through your bag for the other battery, they say their words, and you're recording again just in time for their exit.

Power Supply Exotica

A BATTERY BELT

When you're doing a shoot which will require battery power over a long period of time (like a surfing carnival) and you won't be able to plug in a battery charger anywhere, try to borrow a battery belt. It holds several batteries connected in series, so it can give you power for hours.

The first down side of a battery belt is that it's so heavy to carry, and if you wear it around your waist it will require considerable endurance to hike up that steep and rocky headland at the end of the beach.

The second down side of a battery belt is that sometimes the wiring breaks, and then it's an utterly useless dead weight.

It's prudent to carry a few regular batteries with you in case your video expedition falls prey to Murphy's Law, and the battery belt succumbs to an unexpected death.

Murray Lui, Indigenous TV Training Course, run by Kuri Productions at AFTRS.

A cigarette lighter still has a use in this post-smoking era!

AN ADAPTOR FOR THE CIGARETTE LIGHTER OF A CAR

An optional video accessory is a little adaptor which plugs into the cigarette lighter of a car and extracts 12 volts of useable current.

If your genre is road movies, this may be just the thing to liberate you from standard sockets and keep your show on the road, so to speak.

Check the length of the cable on the adaptor before you head out, though. The cord tends to be fairly short, so it can keep you closer to your vehicle and the passing trucks than you might otherwise choose.

An extension cord can usually be purchased or soldered together by a helpful technician. Then you can get whatever shots you require.

Another handy use for the cigarette adaptor is to power your battery charger as you move from one production site to another.

A Car Battery

The standard car battery supplies 12 volts of direct current for a long time and can be used as a power source when it's worth the effort.

Doing video in remote mountain villages where there's no electrical supply is the sort of situation where you might want to strap a car battery to a hand trolley and go for it.

A word of warning: make sure your equipment has an internal voltage regulator (or add one to the power supply path) because car batteries can vary up to 14 volts.

Also, make sure that you connect the positive and negative terminals correctly. Even though well-designed equipment has an inbuilt protection against being wired backwards, there's lots of equipment on the market, and some of it has been manufactured with cost cutting in mind. You don't want to fry your equipment by mistake.

Dual Battery Charger/Holder

With a dual battery charger/holder it's possible to be using two batteries on your camera at once. This gives you more time to record without stopping. In fact, you can even take one battery out of the holder and replace it with a fresh one, without stopping your recording. So I guess you could go on like this for hours.

The battery charger/holder clips onto your belt, and because it uses lithium ion batteries, it doesn't drag you down like the old battery belts did.

This system is great if it's imperative that your recording not stop and you're in a situation where you can't use AC power.

Rani Chaleyer uses a Canon XL1 camera with a beltclip dual battery charger/holder, which isn't much bigger than a mobile phone. AFTRS.

Getting to Go

Once you've supplied an electrical source to the camera, find the power switch and turn the camera on.

Remove the lens cap and right away you should see a picture in the viewfinder.

If you see a bright screen but don't see a picture, check that the iris is on automatic. If not, it may be in the closed position.

The iris is the aperture (hole) that lets light into the camera and allows it to 'see'. You'll find the iris control ring on the lens barrel. If it's closed (if *C* is next to the white line), turn the iris ring around, thereby opening up the iris, and a picture should appear.

Alternatively, you can switch the iris from manual to automatic, and it will open up by itself.

If your viewfinder image looks like a dark night of the soul, remove the lens cap.

The Electronic Viewfinder (EVF)

The viewfinder is a tiny monitor which shows you what the camera is 'seeing'. It allows you to establish and frame the shot you want to record.

The viewfinder's picture may be in black and white, even though the camera is producing a colour signal. But aside from this, one of the beauties of video is that 'what you see is what you get'.

Hang on, what if you've turned the camera on and you don't have ANY picture in the viewfinder? Don't panic. Reach around to the front of the lens barrel and take off the lens cap!

Now, if you've got a good picture in the viewfinder, you're pretty well assured that you're recording a good picture.

The EVF gives you your camera's view of the world.

Except . . . some viewfinders have brightness and contrast controls.

EVF Brightness and Contrast Controls

Because any knob on shared equipment is subject to random tweaking, it's always possible that the person before you has turned the brightness or contrast up or down and the viewfinder is not giving you an accurate impression of your shot.

To ensure that the viewfinder is working for you, rather than tricking you, always adjust it to colour bars at the beginning of your shoot.

Using Colour Bars to Normalise the Viewfinder

Colour bars are a standardised video test signal which have a number of uses, and really are in colour if you see them on a monitor or record them, but they may be black and white in your camera viewfinder.

What you see is what you get.

Look for a switch on your camera labelled *bars* and flick it on. In a black and white viewfinder you'll see eight vertical stripes. They should range from peak white on the left, through descending levels of grey, to black on the right. If they don't, the viewfinder is incorrectly set and needs to be adjusted. Turn the brightness and contrast controls until the stripes look the way they should. Once you've adjusted your viewfinder to show this standard signal correctly, then you know that what you see is what you get.
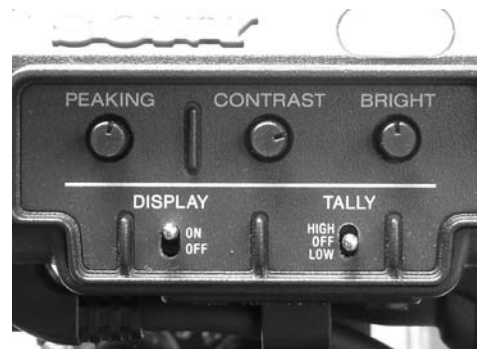
The viewfinder has its own controls, usually somewhat out of sight.

On a colour viewfinder, the stripes from left to right are white, yellow, cyan, green, magenta, red, blue, black.

The colours aren't random—each one has a meaning—and together they represent the total number of combinations possible of the RGB (red, green and blue) signals. To a technician, especially one dealing with NTSC signals, colour bars can indicate problems with the colour part of the video signal, and s/he may need to make adjustments to the camera to align the colours correctly.

Are you Left-eyed or Right-eyed?

Most likely you can't answer this because it's something you've never had to know. Oddly enough, your *eyedness* (is that a word?) doesn't necessarily conform to whether you're left-handed or right-handed.

But there's sufficient variation in people that camera manufacturers have taken account of it. The viewfinder on many cameras will slide left and right, once you untighten a little knob located near it.

Check it out. Which is more comfortable for you, to look through the viewfinder with your right eye or your left eye? Whatever works, that's the way for you. The soft eyecup is removable, so you can turn it around the other way if you're left-eyed. It's a fiddly thing to get off and on, but you can do it with gentleness and patience. Actually, gentleness and patience are useful in lots of video tasks!

Jacqueline Antoinette checks if she's right-eyed . . .   or left-eyed.

Find out if you're left-eyed or right-eyed, then adjust the viewfinder so it works best for you.

Other Words of Wisdom From Your EVF

The viewfinder has various lights and words or symbols which advise you on such things as white balance, battery strength, light levels, remaining tape length, shutter speed, whether you're in manual or auto mode, and whether you're recording or not.

It's a good idea to read the camera manual's page on EVF messages, so you're not the last one to know what your camera is trying to tell you.

Your camera may also have *menus* which can be viewed in the viewfinder. The menus give you options for the various functions of which your camera is capable. You scroll through the menus and register the settings and features you want to activate.

On some cameras you can even access and register menu choices by using the camera's remote control.

Mini DV cameras contain an increasing number of functions and settings you can access and adjust via the menu button on the camera, some of which you may never have need to use. While most people have a natural aversion to reading the manual and can usually get the camera to work without referring to it, it's worthwhile reading it to see what these functions are, as some of them may well be useful to you. It also pays to be very careful that you don't accidentally switch on some camera settings or functions, or that they haven't been left switched on by someone else who used the camera before you.

Andy Nehl, Head of Television, AFTRS.

LCD Screen

The newer cameras often have LCD screens, which show a larger version of your video image, and they're in colour. This is a relief to many people because it allows them to see a full colour representation of their shot, so they can feel more confident about their white balance. (White balance is discussed in Chapter 2.)

But all that glitters is not . . . correctly focused. The LCD colour screens only have one-third the definition of the images being recorded, so you can finish the shoot with a satisfied glint in your eye, and find out back in the edit room, or at the first screening, that your image has a soft focus. It's still a good idea to use the black and white viewfinder for focusing, even if you want to do most of your work using the LCD screen.

It's always your choice as to whether to switch to the little black and white viewfinder or the LCD. If you're handholding the camera and want it next to your eye, of course the LCD is useless, but if you want to show your footage to others, perhaps your actors in order to discuss their performance, the LCD makes it possible to go out recording without an additional field monitor. So that's a plus.

The minor drawback of an LCD screen is that it uses more power than the viewfinder, so if you're running out of batteries, you can squeeze out a little more time by turning off the LCD screen.

A major fault is that if you get direct sunlight on an LCD screen, it can burn out the pixels and you're left with yellow smudges where picture detail should be.

Andy Nehl, Head of Television, AFTRS.

If you're walking and following an actor or shooting tracking shots, always look at the flip-out screen rather than through the viewfinder. You'll get a steadier picture.

LCD Brightness

Just as with the viewfinder, the LCD screen can have a brightness control. If the brightness is turned up too high, you may get a false idea of the brightness of your image. Always use the colour bars display to normalise your viewfinder. Then you can decide whether or not you need more light.

LCD Gymnastics

Some LCD screens not only open out so more than one person can view the image, they can even flip over, so the person in front of the camera can see their own image, if desired.

When you flip the LCD screen over, it can automatically flip the image as well, so it's right side up for the viewer in front of the camera.

When down is up and left is right. Show them what they EXPECT to see.

And just so your actor or presenter doesn't get confused, the screen can be set to show that person a mirror image, rather than the true TV image.

Why? Because we're all used to looking in mirrors and seeing our left hand on the left side of the mirror, and if we move to the right, the mirror image moves to the right of the mirror, too. But in real life, when we're viewed by someone else, they see our left hand on their right side, and so on. That's the way the TV image is, too. But people aren't used to seeing their TV image, and it can get them all flustered when they move one way and the LCD screen shows them moving the other way.

The Diopter

The *diopter* seems to be the best-kept secret in video! It's the lens in the viewfinder's eyepiece—the one with the soft rubber eyecup around it.

Some plain-English camera manuals now refer to the diopter as the *viewfinder lens*. Whatever it's called, you need to use it.
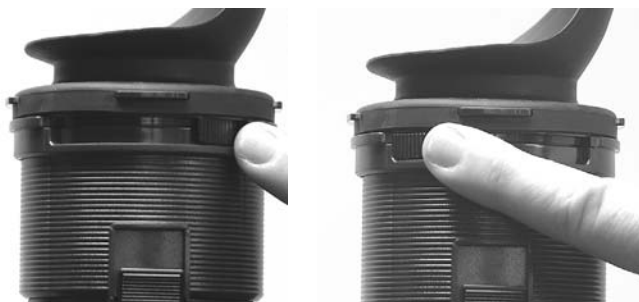
Use this tiny knob, located on the underside of the viewfinder, to adjust the diopter.

This lens can be moved forward and backward to suit the eyesight of each user.

Whenever it's your turn to use the camera, you need to adjust the diopter to your own eyesight, so you can see the camera's image clearly. Otherwise, how can you know if you've got the picture in focus or not?

On some EVFs the diopter is moved by sliding a little button on the underside of the viewfinder. On others, there's a ring behind the eyecup that you turn to control the position of the diopter.

And on still others, there's a ring that you loosen which allows you to pull out the tube holding the diopter and set it to the right position, then you carefully tighten the ring down again to hold the diopter in place for you during the shoot.

How to Make the Diopter Adjustment

The first thing to do is to make sure the main camera lens is zoomed out all the way to the wide angle position. That way, the camera's focus will not be an issue.

Then put your eye to the eyepiece and move the diopter forward and back till you see the clearest possible image. It helps to look at something with a sharply defined outline, like the edge of a door, or at the camera messages on the screen. Once you have it right, secure the diopter in that position.

To adjust this diopter, unscrew the tightening ring and extend the eyepiece towards you, then tighten the ring again.

Changing the EVF to Distance Viewing Mode

On most viewfinders, the diopter is mounted on a hinge and can be swung aside, allowing you to stand back and watch the picture from a distance on a miniature screen.

It often helps to do this on long shoots, when the camera is mounted on a tripod. It lets you stand more comfortably and look around if you need to, and it cuts down on that eye twitching that sets in with fatigue. It also makes it easier for two or three others at a time to review the shots you've recorded.

Diopter closed for handheld operation.

Diopter open—an option for tripod operation.

The Zoom

The zoom is a complex lens system which gives you instant gratification.

It allows you to alter the image you see, continuously varying it from a wide shot, all the way through to a close-up, and back again.

You do this by changing the angle of the lens.

Lens Angles

Wide angle: with a wide angle lens the camera gathers an image from a large vertical and horizontal field.
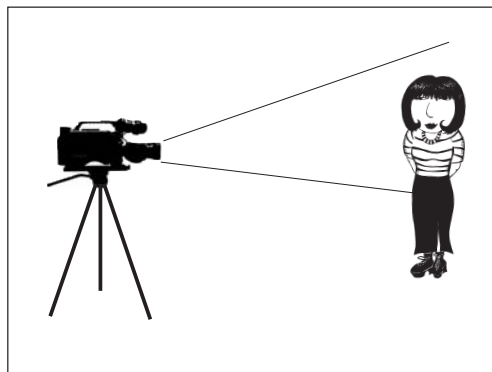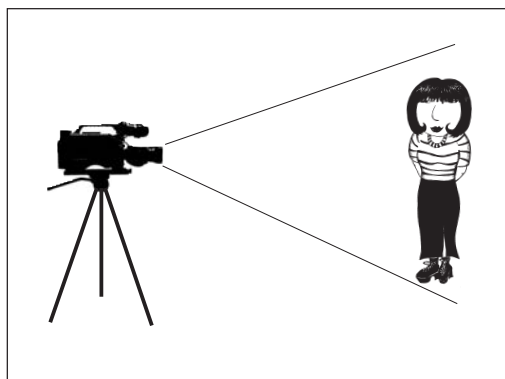
Wide angle

Telephoto

Avoid full telephoto handheld shots. Telephoto magnifies everything, including camera wobble.

Philip Elms, Media Resource Centre.

Telephoto angle: with a telephoto lens the camera gathers an image from a much narrower *angle of view*. It allows the camera to show an enlarged view of a small detail, even from quite a distance.

Zoom Lens

The zoom lens is actually a number of individual lens elements mounted within one unit in the lens barrel of the camera.

The front and back lens elements remain stationary while the middle elements can be moved forward and backward, allowing the camera view to range from wide angle to telephoto, and to reproduce every stage in between.

Zoom lenses are almost always fitted as standard items on video cameras, to provide production flexibility.

A Fixed front elements

B Movable group for internal focusing

C Optically compensated zoom movement for 10:1 ratio

D Fixed rear group
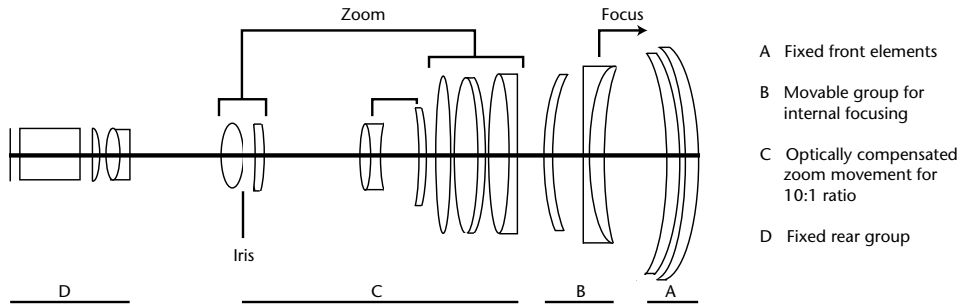
Elements in a zoom lens

Zoom Ratio

The zoom ratio is the degree of difference between the widest shot and the *tightest* shot that the particular zoom lens can handle.

Consumer level cameras often have a 6:1 zoom ratio; better cameras have a 10:1 or 14:1 zoom.

Some zooms have extender lenses which can be flipped into the optics line of the camera and give a higher powered telephoto image.

Since a tripod is almost always used in professional video work, high zoom ratios are acceptable, like 20:1 or even higher.

Some cameras have a pseudo-extender on their zoom which operates by producing a digital enlargement of a section of the image. These give dramatic results, but the image can look a little odd. It often looks like a mosaic.
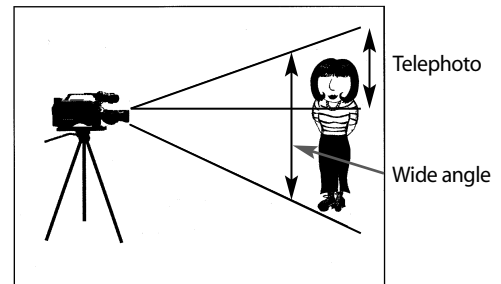
Automatic Zoom

The zoom rocker switch operates the automatic zoom which is powered off the camera battery.

It's usually found to the right of the lens barrel and is labelled W (wide angle) on one side and T (telephoto) on the other.

By pressing the T side of the switch you cause the camera to zoom in all the way to give you a close-up (a *telephoto* or *tight* shot). Pressing the W lets you zoom out all the way to a wide shot.

Zoom rocker switch

Andy Nehl,
Head of
Television,
AFTRS.

Don't use the 'Digital Zoom' setting available on many cameras. Make sure it's turned off in the menu. If you want to zoom further into the image than the lens is capable of by itself, you can do this in post-production in AVID or Final Cut Pro or in Online Edit suites. The exception would be if you're making home videos and there's not going to be any post-production—then there may well be occasions when the digital zoom would be useful.

On some cameras the zoom rocker is touch-sensitive, which means the harder you press, the faster the angle will change.

The advantage of using the auto zoom is that it produces such a smooth transition from one shot size to another.

There are two disadvantages to using the auto zoom.

1. The little motor that operates it makes a whirring sound which can be picked up by the camera mic when there isn't much other sound happening.
2. The motor uses quite a lot of battery power. If your battery is nearly flat, it may be silly to waste power on the auto zoom.

Auto/Manual Zoom Control Switch

You can change the zoom over to manual operation by flipping a camouflaged switch which often lurks on the underbelly of the lens barrel.

Once you change over to manual mode, the zoom rocker switch is disempowered, and the zoom is operated by turning the zoom ring on the lens barrel.

You must flip this switch back again to restore the zoom to auto mode. When the zoom is in auto mode, you can't move it manually. Don't try to force it—put it back to manual if that's what you need.
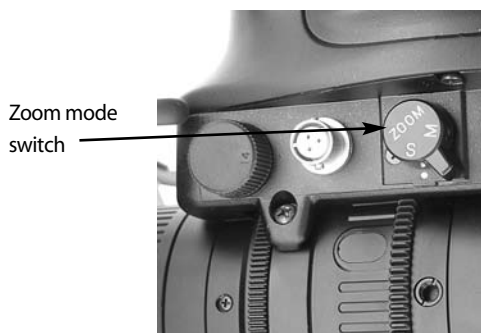
Zoom mode switch

Peer under the lens barrel for the zoom mode switch.

Manual Zoom

You can operate the zoom manually by turning the zoom ring on the camera lens barrel. Usually there's a little stick jutting out from it, which makes it easy to find and latch onto.

It takes some practice to get a manual zoom to look smooth, but on the other hand, if you want some weird effects, like a jagged zoom or some lightning in-and-out changes, hand controlling it is the way to go.

Manual zoom does not cause a drain on your camera battery.

Marc Tewksbury,
The Nine Video
School.

The best way to keep the camera steady without a tripod is to shoot everything on wide angle. Forget about the zoom—move in physically closer to the subject and suddenly your shots will look a lot steadier.

Zoom control stick

Zoom ring
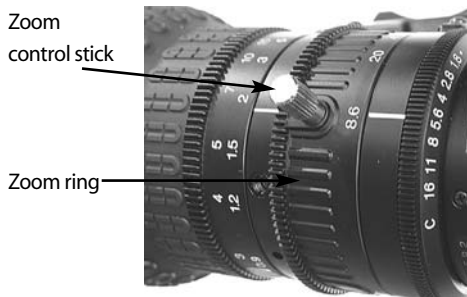
The Iris

The camera iris is the mechanism which controls the amount of light entering the camera. The size of the opening in the iris (the aperture) can be varied to let in greater or lesser amounts of light, depending on the brightness of the scene, and the quality of the image you seek to record.

Human   Camera

Iris   Pupil   Iris   Aperture
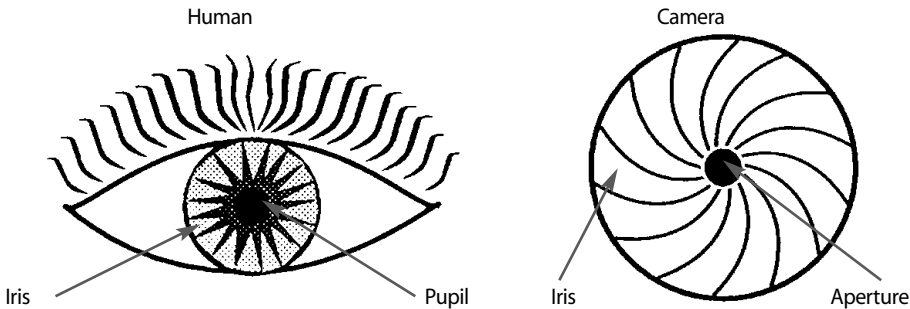
The camera iris system is similar to that of the human eye.

F Stops

The size of the aperture (opening) is measured in *f stops*. A common range of *f* stops is:

f 1.4, *f* 2.8, *f* 4, *f* 5.6, *f* 8, *f* 11, *f* 16 and *f* 22.

This numbering system is confusing because the smallest number (*f 1.4*) means the largest opening, and the biggest number (*f* 22) means the smallest opening.

Just memorise this: the bigger the number, the smaller the hole.

The system is calibrated so that moving from one iris setting to the next either doubles or halves the amount of light admitted to the camera.

For example, moving from *f* 22 (the smallest opening) to *f* 16 (the next opening) doubles the amount of light entering the camera.

Conversely, moving from *f* 16 to *f* 22 halves the light entering the camera.

And so on through all the *f* stops.

Just as with the human eye, the smallest aperture opening is used under the brightest light, and the largest aperture opening is used under low light conditions.
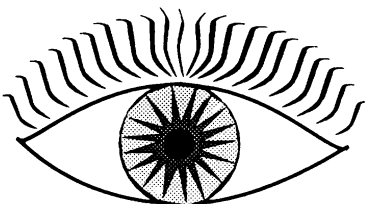
The human eye pupil at a sunny beach.   The human eye pupil in a dark room.
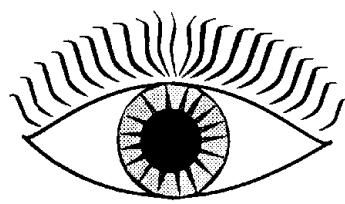
For the best picture results, medium *f* stop settings are preferred (especially *f* 5.6). To be able to use them, you may need to add lights to your scene.

Note: Images shot with large aperture openings have less *depth of field*. This affects the focus of your shot. (See Depth of Field in Chapter 2.)

Iris mode select switch

Iris ring

Jason Benedek, Tin Sheds, University of Sydney.

Luminance: Look at whites. Push the iris till they begin to flare and then wind back a little. In the absence of a zebra function in the camera, this will give a fast, usable video level.

Choosing the Iris Control Mode

The iris can be assigned to either automatic or manual control. Some cameras also allow remote control of the iris, for multicamera situations where the technician adjusts the settings of all the cameras via their CCUs (camera control units) from the studio control room or OB (outside broadcast) van.

There's a movable switch (usually to the right of the lens barrel, near the zoom rocker switch) which is used for selecting the iris control mode. Slide the button to A for automatic control, to M for manual control and to R or S (servo) for remote control.

Manual Iris Control

The iris is adjusted manually by turning the iris ring (covered with *f* stop numbers) which is located towards the back of the lens barrel.

If you choose to operate on manual iris, you decide which iris setting to use for each shot. You select the exposure level to suit the part of the picture which is most important, and to give your image the overall look you want.

You need to be careful to match this look to that of the other shots of the same location which will come before and after it in the planned edited sequence. You don't want a room to pulse light and dark from shot to shot!

If you're not certain which iris setting to choose, you can put the camera to auto and see what it would choose, and then work from there.

Some cameras have a *push auto iris* button. When you press it the auto iris function takes over and selects an iris setting, but when you let go of it, the camera returns to manual iris mode. This button is useful for quick referencing, then you can do the fine tuning yourself.

Manual iris poses a challenge if, in one shot, you're following a subject through changing lighting conditions. Auto iris might be better for this.

Manual iris is especially useful in shots which have a high contrast ratio, and where the dark or bright sections of the image might trick the auto iris into choosing an undesirable aperture setting.

Automatic Iris

In auto iris mode, the camera uses its own inbuilt sensor (a type of light meter) to measure the incoming light. Then the auto iris circuitry averages the variations in brightness and applies a formula to select the appropriate f stop.

Much of the time the auto iris chooses the best aperture setting. In scenes with a low contrast ratio—where there's not a huge difference in brightness between the light and dark areas of the picture—the system works the best.

The formula is constructed to deal with the majority of video images, which have a brighter top than bottom due to the presence of some amount of sky or a well-lit upper background. The light level from the top of the image is given somewhat less weight in the calculation than is that from the bottom of the image.

However, sometimes the auto iris gets tricked.

In images with a high contrast ratio, where there's a substantial part of the picture which is much darker or much lighter than the rest, the calculated formula doesn't give the best result.

For example, in a wide shot of a performer dressed in white, who is on a dark stage, the auto iris could give you an overly bright image of a flaring costume with no detail.

> Are you driving the camera or is the camera driving you? Automatic settings put you on automatic. Take control of the camera and practise 'active' cinematography!
>
> **Keith Smith**, Edith Cowan University.

Auto Iris Mistakes

A person in front of a window or a bright sky becomes a silhouette because the auto iris closes down too far in response to the incoming light.

A person in front of a whiteboard or white wall becomes a near-silhouette because the auto iris closes down too far in response to the reflected brightness of the background surface.

A person in front of a very dark background can look bleached out if the auto iris opens up too much in response to the large section of darkness.

High Speed Shutter

Another control of the amount of light used to form the picture is the *high speed shutter*.

This control allows you to grab each frame of video at a specified speed. It's a good tool for videoing fast action, as in sport or dance.

If you look at fast action taped at the standard shutter speed, you'll see that each individual frame of video has a blurred image because the subject is moving faster than the camera can capture it. When you play back this image, it looks fine because the eye gets the sensation of speed and it doesn't have time to focus on the blurs.

But if your aim is to analyse the motion carefully, to improve your golf swing or find out just where that gymnastics tumble went wrong, you need to see the image clearly in each frame.

You can achieve this by increasing the shutter speed. The speeds available in high speed shutter mode vary from camera to camera, but on some digital cameras you can get speeds from 1/50 sec. to 1/8000 sec.

As you increase the shutter speed, you increase the speed of action which you can capture clearly. So you can record an exact unblurred image in every frame.

However, because the camera still runs at 25 frames per second in PAL video (30 frames per second in NTSC), using high speed shutter means that you'll have gaps in the action. When you play back something which was recorded in high speed shutter, it will look stilted because there's a distinct jump from each frame to the next. There'll be no blurring in the image to smooth the transitions.

The other important factor is that the higher the shutter speed, the less the amount of light that can get into the camera to form the image. The faster the shutter, the darker the picture will be. So high speed shutter works best in a brightly lit space, and is pretty useless in darker areas.

Confusing Buttons

You may find that high speed shutter and manual iris control are operated by the same button on your camera. Although the camera manufacturers may think this makes for compact design, this double-function button can cause disasters for the inexperienced user.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Recent advances in technology are allowing variable frame rates in video. This is great news because it means that true slow motion and time lapse video can be done! This is the crossing of the last frontier of the fundamental differences between film and video.

If you're trying to alter the manual iris setting but are changing the high speed shutter by mistake, you may get quite mystified by what you see happening to your image. If you find the picture getting much darker than you think it should, check whether you're accidentally altering the high speed shutter. This is one instance when studying both your camera manual and the markings on your camera body makes good sense.

Gain

Sometimes you're in a low-light situation where even the largest aperture opening isn't good enough. And you just can't add lights—either you don't have them, there's nowhere to plug them in, or the person in charge of the space has said no.

In a case like this, you can make use of the *gain* function.

The gain allows the camera to electronically boost the brightness level of the signal it's processing. It does this internally—with no added light—and the picture is more acceptable.

There's a trade-off for boosting the gain, though. Your picture will look grainier and it won't copy or edit very well.

Often cameras have these gain settings:

0 dB   which means there's no additional gain inserted, operation is normal.

6 dB   which means the video signal is boosted a bit (by a factor of two). Try to get by with this level if you can.

12 dB   which means the gain is boosted quite a lot (by a factor of three). This can give you a very grainy picture (covered with random red dots) and should only be used when it's essential to get the shot. It won't edit well.

18 dB   this occurs on only some cameras. Be very reluctant to use this one. Wait till you're in a cave!

Gain switch

On a lot of the digital cameras we shoot on 3 dB. It gives you better definition. Some new cameras even have 6dB.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Sunlight on your azaleas can make for an overly bright picture, so you may need to close down your camera iris.

Before you go boosting the gain, though, make sure you really are on the largest aperture possible and not accidentally on high speed shutter.

If your picture has a large amount of white or black in it, you may have to manually adjust the iris or gain to get the best results.

Inserting the Videotape

There's a button on the camera labelled *eject*. When you push it, the side of the camera will pop open, revealing the tape carriage.

You insert the videotape cassette into the carriage slot, making sure that the arrows on the videotape cassette are pointing straight ahead towards the inside of the camera and the clear plastic windows on the tape cassette are against the outer cover (and windows) of the tape carriage.

Andy Nehl, Head of Television, AFTRS.

If your camera doesn't have a flip-out screen and you want walking or tracking shots, it's better not to use the viewfinder at all because your head moves up and down as you walk, as will the camera if you have it to your eye. You'll get a steadier picture if you don't use the viewfinder, hold the camera away from your head in a comfortable position and imagine there's a line running straight through the camera out of the middle of the lens—you point this imaginary line at the centre of the shot you want to frame. You then put your effort into holding the camera steady as you walk rather than trying to keep it to your eye. This is also a safe thing to do because you can see where you're going and are less likely to walk into things.

Sony DVCAM can take both small and large tapes.

Then you gently press the side of the camera back into place. You'll hear a marvellous series of little whirrs and clicks. When they finally stop, the cassette is loaded and the videotape inside has been laced up around the head drum.

The camera is now ready to record an image.

To get the tape out of the camera, press the same eject button. You'll hear some more whirring and clicking (don't lose patience!) and after a while the side of the camera will suddenly pop open again and you'll be re-presented with your tape.

Recording

To make the camera start recording, you use your thumb to press the little flat button on the camera grip.

This is a most unsatisfying button. It barely moves. It never clicks aloud or gives your thumb a sensation that it's affected anything underneath it. It gives no sign of response at all.

Consequently people sometimes think that they need to hold it down to keep the recording going. This is not true.

Once you press the button, you should see a message in the viewfinder which confirms that the camera is recording—it could be the letters REC or it could be a steady or a blinking light. Something will tell you that the show is on the road.

As soon as the camera's recording, you should move your thumb aside, so you don't accidentally put the camera in and out of record mode by unconsciously changing the pressure of your thumb. (It's a sensitive switch, even though it's unsatisfying.) Even if you like special effects, you don't want to strobe things now.

There's often a thumb rest next to this smooth switch, and sometimes it's ridged so you can easily feel the difference. That's where your thumb should be for the rest of the recording session.

So there you go!

The camera is recording and you now know how to zoom in and out, and how to change the brightness of the image by either adjusting the aperture or engaging the gain.

Joanne Ollive, exchange student from the UK, RMIT, Melbourne, Vic, Australia.

Stopping the Recording

You stop recording by putting the camera into pause. This is done by re-pressing the little smooth button on the handle grip that got the recording started.

When you pause the camera, the tape will remain laced around the heads in exactly the same position, waiting for you to begin your next shot. If you press the record button again, the camera will make a beautiful, technically clean edit and the transition (change) to the next shot will look as good as if it had been edited in a proper edit system.

In-Camera Editing

You can make use of the camera's capacity to do clean edits by planning out every shot of your program ahead of time, and then recording your material step by step in the exact program sequence.

You can put together a whole piece this way, and save yourself heaps of time in the edit room. But you have to be quite good at your camera work so every shot is acceptable. And you have to move quickly through your shot list, because the camera won't stay in pause mode for long.

After about five minutes the camera will go out of pause mode and into stop. In stop mode the videotape is no longer laced around the record heads, and the tape is ready to be ejected from the camera.

If you go back into record mode from stop mode, the tape will never lace up on the record heads in exactly the same position, so the possibility of getting a clean edit point is lost. The control track will be broken, and there will be a glitch between the previous shot and the next one.

If you're doing in-camera editing, a glitch like this mars your product.

Rollback Time

Something to be careful about with in-camera editing is *rollback time*.

Just like your car at an intersection, cameras can't go from stop to record speed in an instant. So when you go from pause to record, they roll backwards a little, come forward getting up to speed, and then go into record mode when they're synched up to the signal of the previous shot and just *before* the tape gets to the end of the recorded signal.

This means that you lose a little bit of the video at the end of the previous shot. It also means that the recording doesn't happen just when you press the record button. So you need to allow for both of these things.

First, always shoot a video *buffer*—that is, a little bit more video than you need at the end of the shot. If you're working with a presenter, train this person to finish the commentary, then just stand still so you don't get sideways eye motions or other silly face or body movements. You've seen those reporters on TV who go into freeze mode at the end of their report? If you're taping an action, roll a little more tape after the action is completed.

Then know your camera. Work out how long it takes to get into record mode once you press the record button. This can be about four seconds. Once you're sure of how your camera handles rollback, don't give the signal for speech or action till after those seconds are over. That way, your in-camera editing will work, and you won't have a story which is missing bits, as if some mysterious video moths chewed holes in it when you weren't looking.

Rachel Masters, Corporate Training Coordinator, SBS.

Watch out! Domestic cameras backspace a little before they begin to record. You can test if your camera does this by recruiting the help of a friend and getting him/her to count to 10, on camera. At 10, you pause the camera. Then ask your friend to begin counting again, and you recommence recording. When you play back the tape, you'll see how many seconds the camera has cut out, and then you'll know what its 'roll-up time' is.

Standby

Some cameras go into standby mode to save battery power if they haven't been used to record anything for a few minutes.

In standby the viewfinder goes black but the camera is still receiving a little power. To get it going again, press the standby switch and the camera should come fully on again immediately.

Playback Mode

You can use the camera as a playback machine, too. Once you finish recording, press stop. The camera will go out of record mode and the tape will come off the record heads.

Then you can operate all the same functions you have on your home VCR: Play, fast forward, rewind, search forward, search backward, pause and stop.

You can watch the playback in the tiny viewfinder, or you can connect the camera to a monitor or TV and watch it all on the big screen.

To send the image to a monitor, connect a cable from *video out* on the camera to *video in* on the monitor. For sound, connect another cable from *audio out* on the camera to *audio in* on the monitor.

To send the image to a TV, the camera needs to have an RF out connection. If it does, you need only one cable. You connect it from *RF out* on the camera to *VHF in* (antenna in) on the TV.
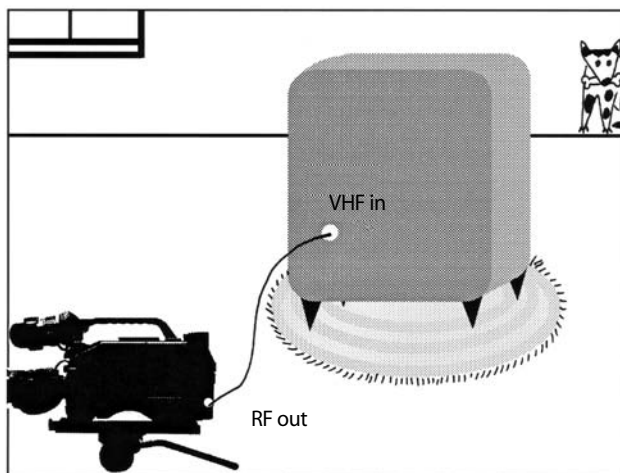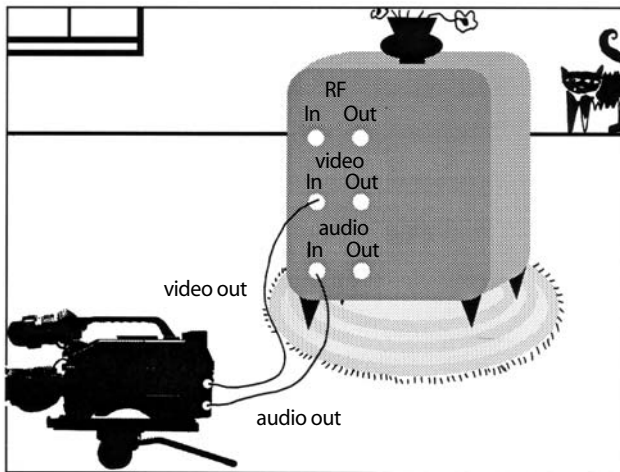
Now you've played back your video, are you thrilled? It's such a high the first time anyone gets picture and sound!

If you found that you had stretches of video which surprised you, long shots of your own feet and the pavement as you walked along, and then nothing of the shot you thought you'd gotten, don't panic. It's just that you fell into the most common of all

video traps, taping when you thought you were off, and not taping when you thought you were on. You know what we call those shots? Spare *foot*age!

Have you had enough? If so, close the book and have a good play with the camera. That's the surest way to learn.

If you can deal with more at this point, the next chapter addresses quite a few more camera essentials, like focus, depth of field, colour temperature, white balance, black balance and the use of filters.

2 Image Control

Now you know how to get the camera up and running, the next step is to be able to get the image that suits your production design.

There are a number of variables in the video image. The most obvious one is focus—you can have an image that's clear, soft or downright blurry. There are times when you might want each of these. But you need to have enough knowledge of the camera so you can **choose** the image quality, rather than getting lumbered with results you don't want.

Focus

In a focused image the subject looks sharp and clear, and objects have well-defined edges. This applies whether you're doing a panorama scene or a close-up of a tiny detail.

Focus is directly related to the distance between the subject and the camera lens. If the camera moves closer to the subject, or if it moves further away, the focus may have to be changed.

Altering the focus is accomplished by changing the distance between the camera's lens and its light-gathering surface (the CCD or tube) inside the body of the camera. To do this, the lens is eased forward or back by turning the focus ring located at the front end of the lens barrel.

There are markings on the focus ring which indicate settings for different distances between your subject and your camera. These are usually written in both metres and feet and range from about 1 m (3 ft) to infinity.

Focus ring   Setting marks

To change the focus, you turn the focus ring at the front of the lens barrel.

You may find these markings helpful in setting the focus, though in fact most people just turn the focus ring until the subject is clear to them in the viewfinder.

Being able to set focus of course depends on being able to see a clear image in the viewfinder in the first place—so it's necessary to have set the diopter correctly for your eyesight. You may want to review the section on the diopter in Chapter 1.

Auto Focus

Auto focus is quite commonly found on camcorders, though professional cameras usually don't have it—for good reason: it isn't the solution it pretends to be. There are many times when autofocus gives you the wrong focus setting.

This is why:

Auto focus operates by sending an infra-red beam out from the front of the camera. The beam hits the 'subject' and bounces back to a beam receiver on the front of the camera. Then the auto focus circuitry calculates the distance between the subject and the camera and adjusts the lens accordingly.

The problem is the system has no judgement.

Auto focus assumes that your subject is in the centre of the frame. If it isn't, auto focus sets focus according to whatever *is* in the centre of the frame, no matter how irrelevant that object is.

Which leads to problems like:

FOCUSING FOR TOO GREAT A DISTANCE

Seeking a more artistic composition, the director has positioned the presenter at the left side of the frame, and asked her to gesture towards a statuette beside her at the right of frame. But in centre frame, quite a distance in the background, there's a small decorative table against a wall.

Result: The infra-red beam targets the table, and the camera focuses clearly on it, while the presenter and the statuette are fuzzy in the foreground.

FOCUSING FOR TOO CLOSE A DISTANCE

There's a chain link fence between you and the geese at the animal park. The camera is resting on your shoulder. As you breathe, the camera moves slightly up and down. With each breath, the heavy-gauge fence wire crosses the centre of the frame.

Result: The focus keeps shifting between your close-up of the goose and a sharp picture of the fence wire. Your audience feels nauseated.

Or

You're at the top of a tower building doing a cityscape shot. The windows haven't been washed for a long time.

Result: The camera focuses on the window dirt rather than the Opera House.

SEARCHING FOR FOCUS

You're doing a pan along a line of people at the cafeteria lunch counter, but you feel self-conscious about being there with the camera so you're standing

at the other side of the room. This means you've had to zoom in all the way to get the close-up face shots you want for your story.

The students are standing in clusters, rather than in a rigid primary school type line, so some are closer to you and some are further away.

During your pan, as each person crosses the centre of frame, the auto focus gets a message that the distance to the subject has changed.

Result: The focus control is continually *searching*, moving the lens in and out. The shot looks ridiculous. Again your audience is nauseated.

OTHER AUTO FOCUS GREMLINS

Autofocus can give you the wrong results if:

> Your image has lots of horizontal stripes.
> Your subject has very reflective surfaces, like chrome or glass.
> Your image has very little contrast, like a pale wall.
> Your subject is on a slant away from you.
> Your subject is quite dark.
> It's night time.

TECHNICAL DIFFICULTIES

You can also get auto focus problems if:

> Something (e.g. your hand) is blocking the sending or receiving of the beam.
> Or, if the beam receiver gets dirty.

> Fifty per cent of the job is having creative knowledge and 50 per cent is having technical knowledge. There's a good balance between the two.
>
> **Kimberley Brown**, Editor/Camera Operator.

So, although people are often delighted to get a camera with auto focus—and willingly pay more for it—using it sometimes gives them poor results.

However, if your eyes have difficulty seeing the image clearly on the small camera viewfinder, and you understand how auto focus works and allow for its limitations, it can be a useful tool.

Still, if you can see clearly, you're better off learning how to focus and relying on your own skill.

How to Focus a Video Camera

Zoom in and focus—it's as simple as that.

Imagine that you're taping an interview with someone and you want to be able to alternate between a long shot, a close-up and a mid shot. Because you'll be rolling tape non-stop through the whole interview, you'll need to avoid any awkward moments when your subject is out of focus.

Before you do any recording, this is how to ensure good focus for all your shots:

1. Set up your camera in relation to your subject.
2. Zoom in all the way to the eyes or mouth of your subject.
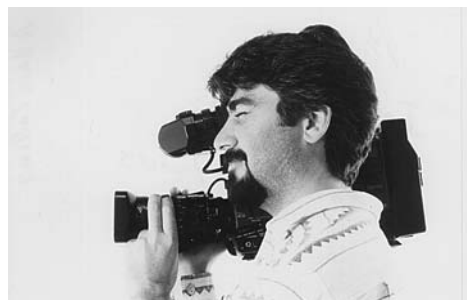
Zoom in and focus. Allan Collins, freelance cinematographer.

High definition TV has five times more information, so you have to be five times more accurate in your focus. The high definition cameras all have black and white viewfinders for clarity of focus, but they recommend you use 9-inch field monitors to be sure of your focus.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

3. Turn the focus ring until the image is as clear as possible.
4. Zoom out.

You're now ready to shoot. You'll find that the image is correctly focused for every type of shot of that subject.

As long as both you and your subject stay at the same distance from each other, you won't have to focus again.

Fixing a Back Focus Problem

If you've zoomed in and focused clearly, but you find that as you zoom out the image goes out of focus, then you have a back focus problem. This is a hazard exclusive to zoom lenses.

The white line should usually be aligned with the triangle.

The back focus adjustment is located at the back of the lens barrel, near the camera body. Because most of the time the back focus lens is meant to stay in one place, you have to untighten a little lever in order to move this ring.

To adjust the back focus, zoom in on your subject again and make certain that it's in clear focus. Then zoom out all the way and turn the back focus ring until you get as sharp a picture as possible.

There's a little marking on the back focus ring which is normally aligned with another mark on the lens barrel when the back focus adjustment is correct.

Once you're happy with the adjustment, carefully twist the lever back in tight so the back focus doesn't get accidentally disturbed.

Macro

Macro is a close-up lens which allows you to get a clear focus on things which are within 1 m of the camera—which is too close for good focus using the standard camera lens.

You adjust focus in macro by turning the macro ring.

The macro adjustment ring is sometimes located right next to the back focus ring, and people do mistakenly untighten the little back focus lever and turn both rings around together. Needless to say, that creates more focus problems.

To use macro, the zoom needs to be in the wide angle position (zoomed out all the way).

Then all you do is turn the macro ring until you get a clear focus on your subject, or that part of your subject which you want to show clearly.

Having macro is a great advantage because it allows you to get good close-ups of very tiny things.

The small print on graduation and wedding invitations, the text of newspaper articles, illustrations from books, small photographs, even details within photos—these can all be captured using macro.

You can place your subject almost against the camera lens and have its image fill the screen in clear detail, using macro.

The one thing you have to watch is that putting the object so close to the lens tends to block out the light needed to illuminate it. Careful positioning of a side light, or working near a window, can help.

A fullscreen view of the diamond.

Don't be tempted to move an artificial light in too close to the camera, though. First the lens hood will melt and then the harder plastic of the camera body will be affected.

The Connection Between Zoom and Focus

Once you've had some practice operating the zoom and the focus, you'll probably notice there's a connection between the two.

In the wide angle view (zoomed out all the way) you can turn the focus ring all the way around in either direction and see very little change in the clarity of the image in the viewfinder. You'll probably find the picture looks pretty good no matter what the focus setting.

But in telephoto (zoomed in all the way) you'll see that a very slight rotation of the focus ring makes a dramatic change to the image and that it will vary from being sharp and clear to being entirely blurry. In fact, there will be only one position where the focus looks right.

In practice, this difference means that focusing is far more critical in telephoto than in wide angle.

When you have only one subject and it's staying still—and so are you—you can set the focus by zooming in and focusing on your subject at the beginning of your shot (or your shoot) and know that it will be right for any zoom position you later choose.

When doing shots at a very great distance, you may need a zoom lens with a higher zoom range. Kimberley Brown, Camera Operator, Pangnirtung, Nunavut, Canada. (Photo by Sylvia Cloutier)

Focusing for More Than One Subject

Often, however, there'll be more than one subject which you're expected to cover.

Have a look at the next drawing, shown in the 'plan' convention—which means it's shown as if you're viewing the scene from above.

This drawing indicates that each person or object which is the same distance away from the camera will require the same focus setting.

5 metres

5 metres
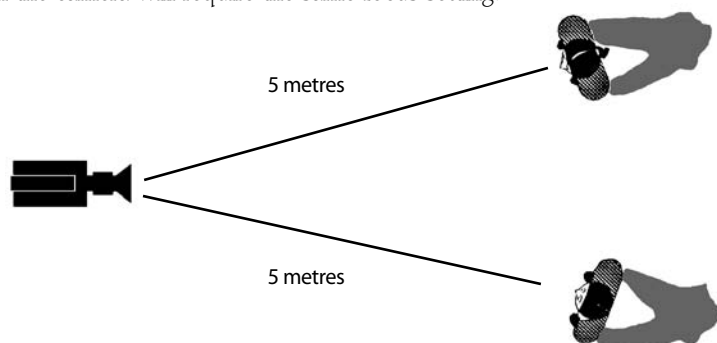
Same distance to subjects = same focus setting

However, if you have more than one subject and they're at different distances to the camera, the correct focus adjustment for each close-up will be different, and you'll have to rehearse your shots carefully so you can smoothly refocus as you change from one person to the next.

5 metres

7 metres

6 metres
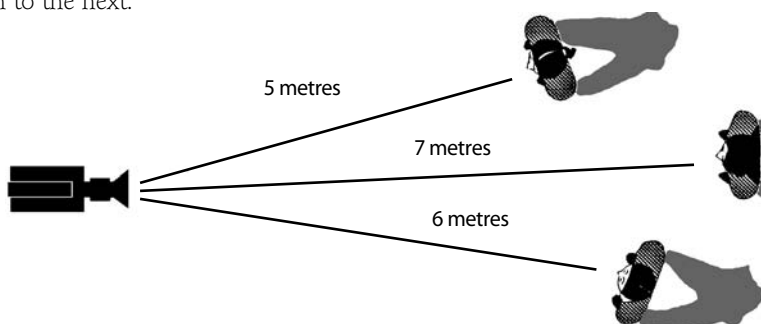
Different distances to subjects = refocus for each subject

At the most basic level, you need to know for sure which way to turn the focus ring so the shot of the new person comes rapidly into focus rather than going further out.

Focus Emergencies

If your subject makes a sudden, unrehearsed movement, and you're zoomed in for a close-up, most likely your shot will go blurry. Zoom out immediately and stay on wide angle until the person settles down into a new position. Only then will it be prudent to attempt another close-up requiring careful focus.

If your subject keeps moving, stay on wide angle.

Push-Auto Focus

Some cameras have a *push-auto focus* button. If you need to find focus very quickly, you can engage the camera's auto focus function briefly by holding in this button. The camera will do its best to find the right focus. When you release the button, the camera's focus stays where it is, and the focus mode goes back to manual.

Difficult Focus Situations

In a pre-rehearsed action with a moving subject, reference to the focus ring markings might help you guarantee a clear focus when the subject reaches its final pre-determined position. However, you may still find that following by eye and synchronising the movement of the focus ring with the changing image in the viewfinder is the most practical and effective method of operation. Remember, in video what you see is what you get.

With subjects that constantly move, such as dancers, close-ups in good focus are nearly impossible. Only with very careful rehearsals could you expect to do well-focused close-ups.

This is due to depth of field.

NAIDOC Day performance at Long Bay Gaol, Sydney, NSW, Australia. (Photo by Michelle Blakeney)

Depth of Field

You now know that focus is related to the distance between the subject and the lens. There will be one focus setting which is the best for a subject at any particular distance.

But it's also true that on either side of this point (both closer and farther away) there's a certain range of distance within which focus is still acceptable. This range, from front to back, is known as the *depth of field.*
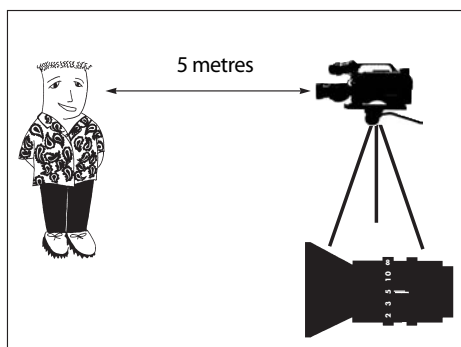
Focus is set correctly for a distance of 5 m from the camera.
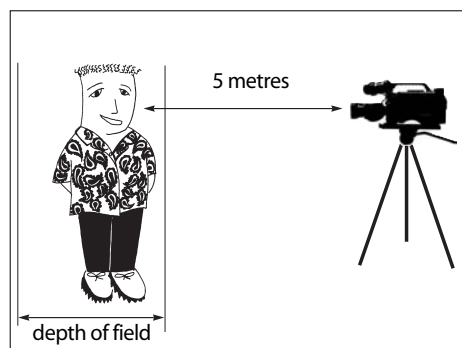
Depth of field is the range of distance within which focus is acceptable.

Lens Angle Affects Depth of Field

Wider lens angles give a greater depth of field. This means that when the camera is zoomed out all the way, your subject will be able to move forward and backward across a considerable range and still be in focus.

Narrower lens angles (especially telephoto) give a smaller depth of field. As you zoom in, the acceptable focus range for your subject will decrease. When you're zoomed in all the way on a close-up shot, the depth of field will be smallest.
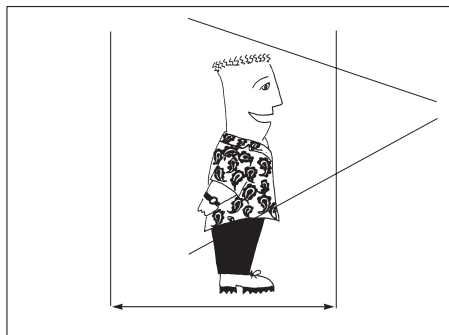
Depth of field on wide angle (zoomed out).　　　　Depth of field on telephoto (zoomed in).
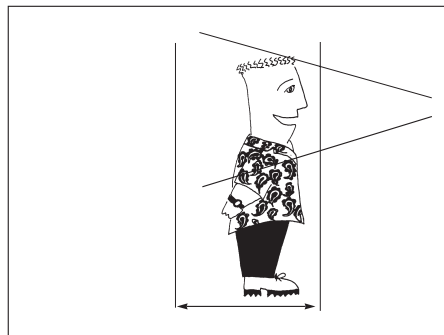
Iris Setting Also Affects Depth of Field

The wider the aperture (the more open the iris) the smaller the depth of field.

This means focus will be more problematic in low light conditions where the iris will need to be opened wide. You'll find that your subject won't be able to move forward or backward very far without going out of focus.
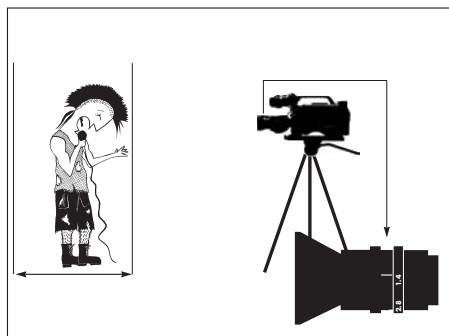
Depth of field with a wide open iris.　　　　Depth of field with a nearly closed iris.
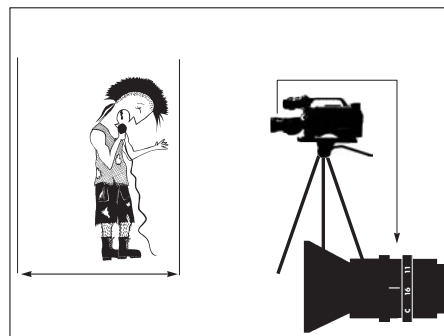
Telephoto Lens and Wide Iris Combined

The combination of telephoto lens (zoomed in all the way) and a wide aperture (big iris opening) gives you the smallest depth of field of all.

This is the hardest situation for shooting action over which you have no directorial control, because very small movements forward or backward will cause focus difficulties.

For example, if you're taping a singer in low light at a night-time outdoor concert, and you have the lens in telephoto to give you a close-up of her face on the screen, you'll find that if she sways only slightly forward or back with the feel of the music, she'll go in and out of focus.

There's not much you can do. Your work will look awful and people won't be able to understand why you didn't just focus the camera.

To retrieve the situation, you can stay on a wider angle shot, and then move your camera in closer to the stage when that song ends. But it's times like this that make you wonder how you got into video in the first place.

For better depth of field in lowlight conditions, you should try to either get in close to your subject so you can stay on the wide angle lens, or add lights, so you can use a smaller aperture.

Aperture Priority/ Shutter Priority

Some cameras are automated to the extent that you can decide what function you want most and set that one, and the camera will adjust all the other function settings accordingly.

For example, if your main concern is to freeze the motion in the image because you're a physio-therapist or sports teacher and you're doing motion analysis, you can tell the camera to prioritise the high speed shutter setting. The camera will then adjust the iris and other functions to suit the high speed shutter setting you've selected.

On the other hand, if you're mainly concerned with getting the greatest depth of field because you're videoing dancers who will be coming forward and backward in the frame and you need them to always be in focus, you can tell the camera to prioritise the aperture setting, and the camera will make all the adjustments needed to the other functions.

> Another solution to improve depth of field under low light levels is to increase the camera's video gain from 0 dB (normal operation) to +6 dB or +12 dB. In the +6 dB setting you can increase the iris setting by a factor of 2, for instance from *f* 2.8 to *f* 4.0, without lowering your camera's video signal.

Ernst Hadenfeld, former Chief Engineer, AFTRS.

Colour Temperature

Different light sources have different colour temperatures.

We don't notice this because our eyes automatically adjust to the light source we're in and they represent colours correctly most of the time. (Still, you may have had the experience of going to a shopping mall wearing a red shirt and having it appear to turn purplish once you get inside.)

The colour temperature of light is measured in degrees Kelvin, which is written °K.

Colour Temperatures of Different Light Sources

Incandescent lights, like the ones used in a video studio, are designed to have a standard colour temperature of 3200°K. Their light has a reddish tinge to it.

Fluorescent lights have a wide range of colour temperatures, but the ones video people come across frequently are those used in schools, which are usually around 4200°K, and have a greenish tinge.

Sunlight also spans a wide range of colour temperatures, but in the middle of a clear sunny day it's generally about 6500°K, and skylight can be upwards of 10 000°K. This light has a bluish tinge to it.

Dawn and dusk sunlight is redder.

On cloudy days the colour temperature outdoors can be as high as 7000°K.

Shade colour temperatures are different from the sunny positions next to them.

°K	
8000	-
7000	-
6000	- • Fluorescent lamp (daylight)
5600	- • Camera flashbulb/ Sunlight at midday
5000	- • Blue lamp for photography
	• Fluorescent lamp (white)
4000	-
3500	- • Fluorescent lamp (off-white)
3200	- • Tungsten lamp for photography
	• Halogen lamp
3000	- • Studio lights
	• Domestic incandescent lamp
2500	-
	• Acetylene lamp
	• Kerosene lamp
	• Candle light
2000	-
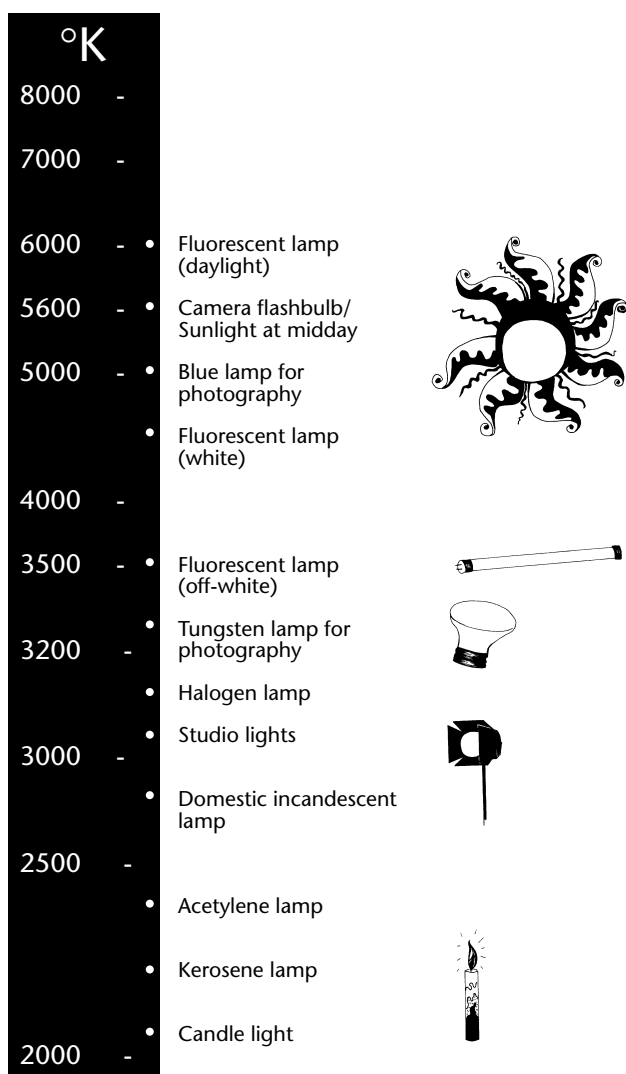
The Filter Wheel

Some cameras come with an inbuilt filter wheel which allows you to insert a colour filter behind the lenses, in the pathway of the light entering the camera. It's usually found on the left side of the camera, close to the front.

The usual filters are 3200°K for use with studio lights; 5600°K for daylight; 5600°K+ 25% ND for very bright daylight; and C for closed.

You operate the filter by rotating the small serrated filter wheel till the number of the filter you choose appears to your view. Most often, there's a little list near the filter wheel to remind you which number goes with which filter.

On tube cameras, the filter wheel should be set to C when the camera is turned off.
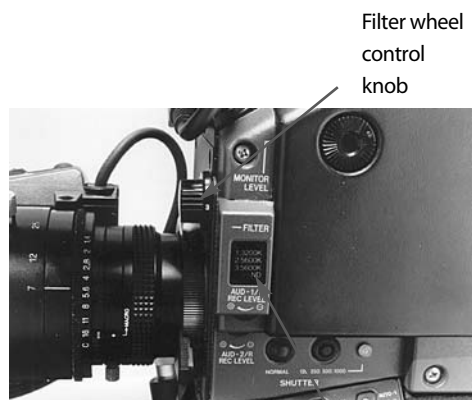
Filter wheel control knob

Guide to filter choices

The filter wheel knob (set to 1) and nearby the range of filter choices available.

The ND Filter

ND means *neutral density*. A neutral density filter reduces the **amount** of light passing through it without changing the **colour** of the light. When an ND filter is combined with a 5600°K filter it's useful for 'taming' the overly bright areas of an image.

On very glary sunshiny shoots, like midday football games where the players have white on their uniforms, and for beach shoots and water shoots, the brightness of the light reflected off the white areas produces 'hot' spots in your image, and causes the iris to close down. The camera then registers these spots as *peak white* (the top level of brightness it can handle) and is forced to raise the black level of the image in compensation. Why?

This is known as the contrast ratio. The camera can only reproduce a certain range of gradations between white and black. When the peak white level is set unusually high, the details in the picture which would normally have appeared grey are lost to the viewer because they get reproduced as black. The definition in the darker, shadowy areas of the picture just can't be seen any more.

Using an ND filter on a bright day allows you to get a fuller, more satisfying image which retains detail in the darker areas.

ND filters are available in different strengths, to suit different shooting conditions.

Because there are lots of very bright shooting circumstances (snow, sand, water) it would seem that all cameras sold should come with an ND filter. But they don't.

If your camera doesn't have one, you can buy an ND filter from a camera shop and attach it to your lens barrel on bright days. You simply unscrew the lens hood, screw on the ND filter, and then put the lens hood back on.

Chant this like a mantra everytime you put your eye to the viewfinder: FILTER, FOCUS, FRAMING, F-STOP, CHECK, DOUBLE CHECK!

Joseph Ford, RMIT.

When to Use the Filter Wheel

If your camera does have a filter wheel, be sure to set the filter to the correct position **before white balancing** the camera. This will give you better colour results.

White Balance (WB)

Video cameras are made to reproduce colours fairly accurately, but to do this they must be electronically alerted to the colour temperature of the light which is illuminating the subject. This is called *white balancing* the camera.

(You know how some labels never seem to fit quite right? I've always thought this process should be called *colour balancing*, because it's the colours which are being adjusted, but I guess it's called white balancing because the signal is being correctly referenced to white.)

How to do a Manual White Balance

1. Set your camera to manual white balance mode. If the WB switch on your camera is on Preset, the camera can't do a manual white balance, so make sure to check the WB switch position;

2. Zoom in on a white card which is under the same light as your subject will be **or** put the white lens cap on and point the camera towards the source of light which will illuminate your subject;

3. Hold the white balance button down for a second or so (on some cameras), or till you get the *white balance completed* message in the viewfinder (on other cameras);

4. Stay pointed at the white card till the viewfinder informs you that white balancing is completed.

Bronwyn Gell does a white balance on the white lens cap, Hamilton Secondary College, Mitchell Park, SA, Australia.

Storing a White Balance Setting

If your camera has the labels WB1 and WB2, it can remember two white balance settings at the same time, which can be very convenient if you're rushing through a shoot with both indoor and outdoor shots.

Do a proper white balance under one of the light conditions with the switch set to WB1, and then do a second white balance under the other light condition with the switch in WB2. The camera will hold the memory of both white balances.

You won't have to re-white balance every time you change location, but you will have to remember to flip the switch from one setting to the other before you start shooting after each change.

Preset Mode

Some cameras have a *preset* white balance setting. In a situation where you're using only 3200°K studio lights, you can switch the camera to Preset 3200°K and not have to white balance.

Caution: studio lights tend to slip to lower colour temperatures as they get older, so if you find that the colours in your shot look slightly off, do a manual white balance.

White Balance Mistakes

When you white balance, be sure to hold the white card under exactly the same light conditions which your subject will be under. If you stand closer to the camera, so you're not really in the shot's light, the camera may be influenced by some other light source and give you the wrong colour result.

You should always white balance the camera at the start of your shoot, and you must do it again any time you change light sources. If you don't, your picture could be tinged with an unrealistic colour.

If you're indoors and go outside without re-white balancing, the bride's dress will change from white to blue as she emerges from the church door.

If you're outdoors and go in without doing a WB adjustment, your characters will suddenly look quite ruddy and the surrounding room will have a golden glow. (Sometimes you may do this deliberately—say you're shooting a breakfast scene and want it to have extra warm tones.)

Not here . . .   white balance here

If you go from the sun to a shade house and forget to white balance, darker skinned people will appear to have bluish skin.

The most frustrating thing about making a white balance mistake was that you were stuck with it, you couldn't correct it later. No matter how beautiful your shot was, it would look odd and unprofessional if its colour was off. Now with digital editing systems, corrections can be made in postproduction. Don't let this knowledge make you get careless, though. It's ALWAYS easier to shoot something right than to have to fix it in postproduction! It's easier in time, money and stress, all important things to consider.
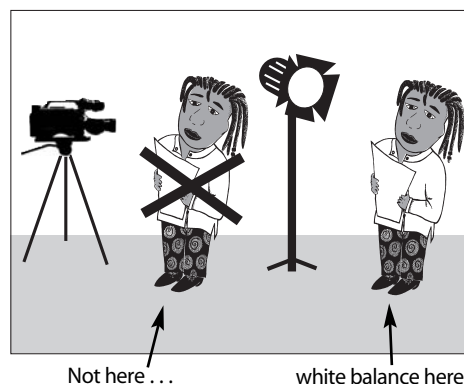
Problems with Automatic White Balance

Many cameras have an auto white balance function which continually assesses white balance and adjusts it automatically, even when you're in record mode.

As long as your subject remains under only one light source your picture will look okay.

However, if you pan from one colour temperature to another, as you would if you were panning across a classroom, from students who are illuminated by the overhead fluorescent lights to students lit by the sun coming through the window, the auto white

Jason Benedek, Tin Sheds, University of Sydney.

Chrominance: skin tones are always my bottom line. You can cheat the white balance (by balancing on shades other than white) to give people warmer, colder or stranger looks. You may need to open the iris or lower the shutter speed for the camera to be able to balance on hues other than white, but it can produce the effect you're after—and remember to be consistent for continuity's sake.

Peter Thurmer, Hamilton Secondary College.

You can *warm up* your video images by white balancing with a *quarter blue* gel or an *eighth blue* gel, instead of *white,* when manually white balancing

balance mode will cause your picture to change colour in mid-shot as it senses the second light temperature. Again, that's not a professional looking shot.

For the director, it's decision time. Is that pan really necessary? Or could you use just one wide shot? Or should you go for two separate shots, one white balanced for the students lit by the fluorescent lights, and a second shot white balanced for the students over near the windows who are lit by sunlight?

Creative Use of White Balance

You can deliberately trick the white balance of a camera by white balancing to a card of another colour. Then you can get some wild looking pictures!

Throwing the white balance off deliberately like this will make the camera reproduce even white as another colour. This can work to your advantage. If you're using computer generated titles which have been printed out onto white paper so you can video them, you can make the paper look another colour this way and give your program coloured titles.

Black Balance

Some cameras also allow you to do a black balance. Usually this is done by flicking the white balance toggle switch in the other direction to the setting labelled BB.

The camera will close its iris and balance its colour to the black it 'sees' within itself. You know it's finished when you get the 'completed' signal in the viewfinder.

Black balancing should be done before white balancing, at the beginning of each shoot.

It's not necessary to black balance again when you re-white balance on the same shoot, but then, it doesn't do any harm.

Filters

Filters are glass disks which screw on to the front of your lens barrel and alter the light entering the camera, thus affecting the image the camera produces.

There's a wide variety of filters available from photography stores, and many are the right size for your video camera.

By using filters, you can make almost any alteration to the colour or distinctness of your image that you can imagine.

Colour Filters

There are filters which add a uniform colour across the whole image. You can use these to 'warm up' or 'cool down' the tone or mood of the image.

Or you can give the image an overall colour wash—make it magenta, yellow, green . . .

Graduated Filters

Some filters have a colour which is darker at one edge of the filter disk and lighter at the other, changing its depth of colour evenly across the filter.

These give a more intense colour to the top, bottom or side of your image (depending on how you orient the filter in relation to the lens), but contribute a tinge of that colour throughout the whole image.

Graduated filters can be used to intensify the sky colours on sunsets, for example.

Paul Pledger watches as Adam Giles checks out a graduated filter. Hamilton Secondary College, Mitchell Park, SA, Australia.

Bi-Coloured Filters

There are filters which can add two different colours to your image.

They can simultaneously enrich the blue of the sky and the green of the land—or whatever you choose. You have to construct your shot to match the filter, though, or you may get a colour in the wrong place.

Star Filter

A star filter turns any very bright spot in your picture into a star (e.g. lights, headlights, reflections off glass). Some people like them and some people hate them, so they should be used with discretion.

They can make a group of children holding candles and singing carols look like they've just arrived from another sphere. Great for special effects on holiday tapes.

Polarising Filter

A polarising filter reduces or cuts out bright reflections and glare. It can let your camera see the fish swimming beneath the surface of a brightly reflective pool. It can heighten the drama of cumulus clouds in a bright sky.

Because a polarising filter is directional, you can adjust the degree of effect you want. If you want to get rid of all the glare, orient it one way; if you want to get rid of just some, give it a bit of a turn. You can keep turning it till it gets rid of no glare at all.

A polarising filter affects all wavelengths equally, so it has no affect on colour balance.

Multiple Image Filter

If you're into drastically altering your picture, you can use filters which multiply your image across the screen.

So instead of one red Ferrari driving in, you can have five. And they can be driving in the top, bottom, sides and centre of your screen.

Avoid some lens flare by using your hand as an extension of the rubber lens hood.

Lyvern Myi,
Media
Resource
Centre.

UV Filter

An ultraviolet (UV) filter absorbs ultraviolet radiation beyond the visible spectrum. The UV radiation would otherwise cause a blue colour cast.

A UV filter doesn't alter your image much, but it's an inexpensive and effective way to protect your lens from scratches and other damage. Lots of people put a UV filter on a new camera for just that reason.

Additional Camera Features

Your camera may have additional features which allow you to affect the image you're recording. These are delightful at first, and fun to play around with, but all of them can be done at the editing stage as well. These effects are most useful to the home user, who doesn't have access to video editing.

It helps to bear in mind one of the real advantages of working in video, which is that video editing is a non-destructive process. Video footage isn't cut up or in any way altered by the editing process, so good shots can be used again and again in several different projects. Although at this point in time you might want an effect on the footage you're shooting, for another project you may not want that effect. That's why it's more efficient to shoot footage plain to start with, and add the effects later.

Superimposed Text

Nearly any camera these days allows the operator to add titles while taping. The titles can be an opening name for the program, like 'Lisa's Birthday Party' or 'Jack and Judy's Wedding'. Spiffier setups can do rolls on the screen, so end credits can rise across the image, like you see on TV. Some cameras are even able to do key effects, so you can superimpose a sort of stencil of one image over another one. There's lots of scope for creativity with this.

The simplest superimposed text is when you record the date and time as you tape. Not everyone realises that the date and time can be turned off and on, and that variations can be used, like the date but not the time. And not everyone even *notices* the date and time in the bottom corner of the screen while taping.

If you're shooting video as a record of a trip, the date and time can be very handy as a memory jogger, and a sort of diary record. It may even solve some arguments with your travel companions about when you were at a particular place!

But imagine how silly a drama would look if it were shot over several days but not shot in the order of the final story (the script order). The first shot could say one day, the second shot could say an earlier day, the third shot could jump to a week later, and so on.

If you're shooting for editing, jumping dates is a ridiculous effect.

So train your eye to always check the viewfinder screen carefully to make sure the date and time aren't displayed—what you see is what you get.

With any of these superimposed effects, once they're recorded as part of the image, you can't get them off.

Digital Effects

There are many digital effects your camera might offer you. You can strobe the motion, introduce cometing of the image, put a spotlight onto a performer, produce mosaic effects and freeze frames, you can shoot in black and white, or squeeze or stretch the image. For going from one shot to another, you can set up neat transitions, like dissolves, fades and various wipes.

This is good fun for home movies, and it will produce lots of laughs from the family when played back, but the same thing applies as with the superimposed effects. Once you shoot footage with a digital effect, you're stuck with it.

If you're shooting for a more public project than home movies, it's better to shoot the footage plain because you have far more control of an effect in editing.

Say you want to strobe your friend as he plays his guitar and his offsider dances. If the strobe (jumpy vision) starts in the right spot it could look great. But if the strobe starts a mini-second earlier or later, the whole strobe can look awkward and less appealing. Previewing the strobe effect before editing it can help you find exactly the best place and time to start the effect.

But if you've shot it strobed in the first place, you just **don't have** the missing bits, and you're stuck with whatever way it happened at the shoot.

How lucky are you? Don't answer that.

Other Image Changers

There are many semi-transparent things which you can put in front of the lens. If the material is very close to the lens, so the lens can't focus on it but looks through it, you can get some wonderful effects.

One or two layers of black silk stocking stretched tightly across the lens (held in place with an elastic band or tape) can beautifully soften the image, making it look more romantic—good for topics dealing with memories, dreams, nostalgia.

If no-one has black silk stockings (and who does these days?) try anyone's semi-sheer tights and see what you get.

Other good materials to try are lightweight gauzes, and very fine fabrics.

And then there's the age-old trick with Vaseline (petroleum jelly).

You smear Vaseline around the outer edge of a clear glass filter or a UV filter—NOT your camera's lens—and then attach this in front of your camera lens. You'll get an image with soft edges all around, like a photographic vignette—again, good for dreams and memories.

Use your imagination. Try lots of things. Create your own look. Be an initiator in the screen world!

Cleaning the Lens

No matter whether you want to reproduce life in the natural colours you see, or alter the image to make your own unique aesthetic statement, you need a clear lens.

If there are fingerprints, dust, smoke, fluff, pollen, sea spray or hairs between the world and the camera, the truth of the image will be reduced, due to an inglorious lack of good housekeeping. Maintaining the cleanliness of the lens is paramount.

The first way to keep the lens clean is to put the lens cap on whenever the camera isn't in use. Shelter the camera from blowing dust, smoke, grit. Don't let sea spray or rain drops get to it. Don't let that toddler, with her peanut butter-smeared fingers, run up and touch it.

But sometimes lenses do get dirty, and you need to clean them before your next shoot.

Remember: glass scratches easily. There are sharpnesses that you wouldn't suspect in ordinary cloth and paper tissues. So always clean your lens with the tissues that are sold in photography stores especially for lens cleaning.

You can buy a lens cleaning kit. It has a soft brush for clearing away any major dust and grit. And it has a small bottle of lens cleaning fluid and the special super-soft tissues.

1. Brush or blow away any movable debris.
2. Wet the tissue with a few drops of lens cleaning fluid.
3. Start cleaning at the middle of the lens and make circular motions with the tissue till you gradually work your way to the outer edges.
4. Repeat the circular cleaning till the fingerprints and other marks are gone.
5. Don't try to scrub off the purplish coating! It's supposed to be there! It helps reduce unwanted internal light reflections in the lens system and also helps reduce flare.

Suggestions from Rachel Masters

The Macro Lens Practise using the *macro* lens of a camera by taping a short collage piece—no longer than 60 seconds or 20 shots—using in-camera editing. (Don't forget the roll-up time!)

Shoot macro shots of interesting colours, shapes, features and textures. If you frame the shot very tightly, it will be hard to tell what each surface belongs to.

What does the texture of brick look like in a close-up? What about grass? Try to shoot contrasting colours and textures and observe closely the way the light affects the focus and depth within the frame. Explore the use of focus.

Perhaps you can save this original vision for an editing exercise later on.

Image Altering Try putting an old mirror tile in a bucket of water and shooting the mirror reflection through the ripples in the water. Frame out the bucket so the final image is just the reflection.

Experimenting with Creative Images Test the effects of shooting through glass, net, nylon, gauze, coloured plastic or the bottom of a glass tumbler.

Shoot through a frame made of tin foil, or through a long tube. Or cut out a paper mask frame and attach it to the front of the camera.

3 Composition and Framing

Television and video are limited to presenting a flat image within a rectangular frame. In the past this frame had fixed dimensions, in an aspect ratio of 4:3. This means that however wide the image was, the height was only three-quarters of that measurement.

Widescreen is the name given to the new format that some of the high-end digital cameras, like Digital Betacam, shoot. Its *aspect ratio* is 16:9. It looks more like the shape of the image we see at the movies.

HDTV (High Definition TV) is also shot in 16:9. But HDTV is actually another format altogether, with quite a different signal.

When a 16:9 image is shown on a standard 4:3 screen, there are black bars across the top and bottom of the screen. This resulting image is sometimes referred to as *letterboxing* because the image appears to be being seen through a wide slit which runs across the width of the screen.

Your camera may be switchable between the normal image and what is called *cinema*. If you choose to shoot in *cinema* your image will also have black bars across the top and bottom of the picture when it's shown on a standard TV set, and the image might look a bit vertically squashed, but it will look fine on a widescreen TV.

Some people like the cinema look with the black bars, and shoot this way to be arty. Others don't like to lose any part of the screen to blackness. One consideration is what type of monitor your audience is likely to have.

Whatever the shape of the image, it is through this peephole that directors seek to convey a believable three-dimensional world.

Widescreen can be up-converted to HDTV, but it will never be as good as something which was sourced on HDTV.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

The general public hates *letterboxing*. They feel they're not getting the whole picture. But they are; it's just smaller so you can show the entire width of the shot. It's the difference in the shape of the 16:9 frame that necessitates the black bars at the top and bottom.

Philip Elms, Media Resource Centre.

If shooting for TV broadcast, use the 16:9 or widescreen mode. VHS dubs can be made with the letterbox effect for viewing on a standard 4:3 TV monitor. A widescreen monitor is recommended, however, during the edit.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Cinema mode on mini DV cameras is bogus widescreen. You get the look but you're losing 25 per cent of your vertical resolution. But you can buy a 16:9 optical converter for your camera, which lets you shoot true 16:9 and not lose the vertical resolution. That will produce a picture which looks fine on widescreen TV.

Despite the necessary compression of both time and space within the screen production, viewers are meant to grasp the meaning of the story and become immersed in its telling.

A tall order? Yes. But over the years a vocabulary and grammar of visual images—a visual language—has developed. Knowing and using this language helps directors and camera operators convey their thoughts and their stories.

1. Part of visual language is screen *composition*.

    Composition deals with the way the parts (elements) of the picture are arranged in relation to each other, and where each one appears on the screen. The image can be made to look crowded or spacious, elegant or confusing. Some ways of arranging a picture are considered more beautiful than others, or more dynamic.

    There are known ways to lead a viewer's attention into a picture and to guide the eye's gaze around the various parts of it.

    Aesthetic and dramatic statements can be made by the specific arrangement of the elements in an image.

2. Another part of visual language involves *shot sizes*.

    Shot size is related to how much of the picture is filled by the subject. When the subject fills the picture, it's considered to be a *closer* shot, even if the camera itself is located quite a distance away. When the subject is just a small element in the picture, it's considered to be a *longer* (further away) or *wider* shot.

What is your shot trying to say?

Julian Ellis, Cinematographer, AFTRS.

The size of the shot is important to the meaning of the shot, and to the meaning of the shots that have come before or will come after.

There are standard shot sizes which directors call upon. The way a director chooses to use—or alter, or distort—these accepted shot sizes is part of the style and the meaning of the story.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

You've got to keep in mind the 4:3 screen when you frame a shot in widescreen, so the 4:3 shot can be used for those people who still have the standard TVs. The widescreen camera has a 4:3 safety zone which you can call up on the viewfinder to check how your framing will work on standard TV.

3. A third part of visual language is the *framing* of the shot.

    Framing refers to where the edges of the shot have been placed. You can compare it to the frame of a picture on the wall. If the framing is *tight*, there's not much space surrounding the subject. If the framing is *loose*, the edges of the picture are a little further out from the subject than they are in a conventional shot of that size.

    The frame can be placed in accordance to normal television practice, or it can be deliberately readjusted to make a statement using visual language.

The way a frame is set can contribute conceptually to the overall meaning of the piece. For example, if a character in a drama is always framed at the very edge of the shot, or half out of it, it can visually underscore a view of this person as being marginal or eccentric.

And the shooting mode you use will have an impact on how you frame your shots.

Composition

By Tom Jeffrey, Producer/Director

The art of composition is in arranging the elements of a scene so the totality of the picture yields the desired effect.

In most cases the aim is for a balanced and visually pleasing image, but sometimes a disharmonious composition is used to reinforce the tension or drama of the storyline.

In composition, there's nothing which is absolutely right or always wrong.

Balance

Balance depends on a number of factors, such as the size of the subject, the subject's position within the frame and the relationship of it to other objects or subjects.

> The sooner we get out of the 4:3 world, the better, because it's a different feel for composition.
>
> **Richard Fitzpatrick**, Camera Operator, Digital Dimensions.

Balance is usually desirable, but shots can be balanced and dull. A series of shots where the subject is always positioned in the centre of the frame won't hold the viewer's interest for long.

Angled shots often give more drama and dimension than full frontals.

Horizon or Horizontal Lines

In most pictures there is a horizon line. The simplest horizon line will divide the picture into two equal parts. This can be very boring to the eye.
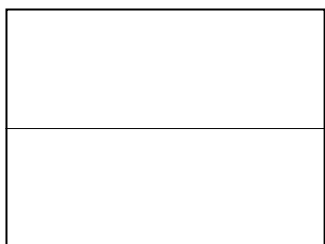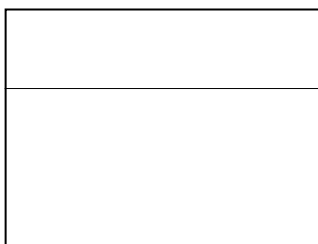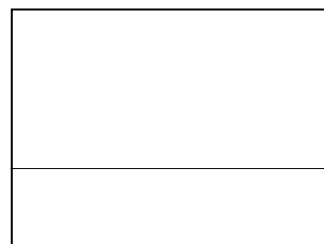
Boring   Preferred   Preferred

Vertical Lines

Similarly, a vertical line which divides the frame into two equal parts can be quite uninteresting. Shifting the emphasis of the verticals to the left or the right creates increased interest.
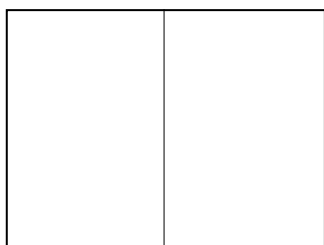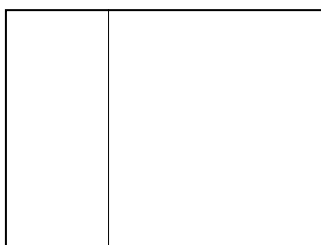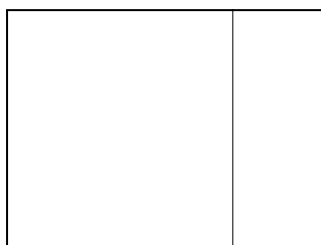
Boring   Preferred   Preferred

Thirds

From these ideas on horizontal and vertical lines, we can reach the notion of dividing the frame into *thirds*.

+ =

+ =
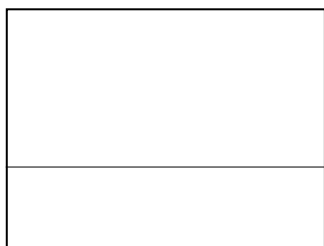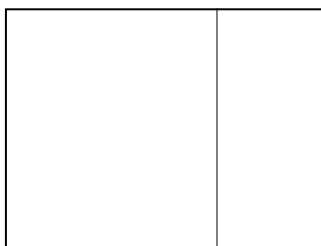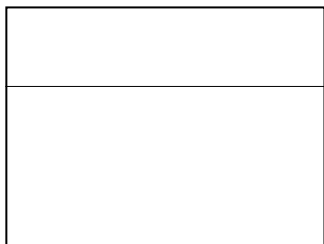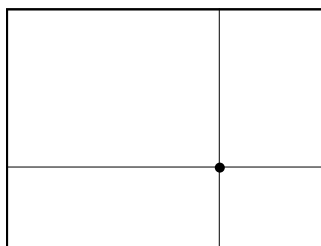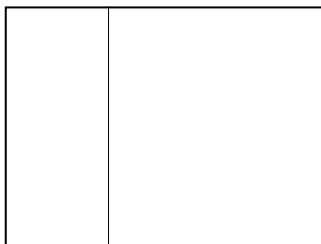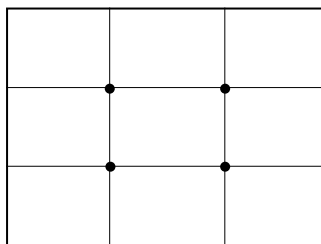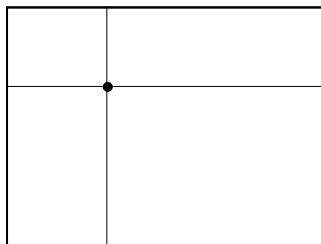
Where the lines intersect can be *points of interest.*

Diagonal Lines

Lines which dissect the frame at angles can heighten interest, heighten tension or increase the strength of a point of interest in the picture.

or

or

or
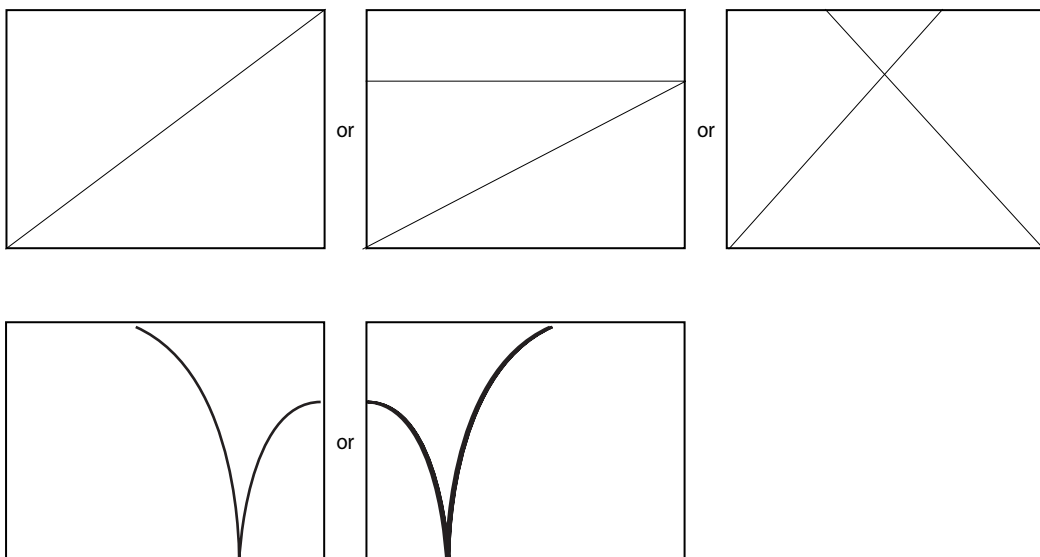
Diagonals can also curve.

Triangles

Triangles can give strength to a picture.

The face forms a natural triangle.

A group of people can make one too.

The classic mother and baby may be the best known compositional triangle.

Perspective

Perspective, in its simplest descriptive form, is a combination of vertical and diagonal lines which give a three dimensional look to the two dimensional picture—creating a feeling of distance or space.

When directing, remembering the rules is very important, but also always remember that if the idea works for the script in hand, then it is right, so do it.

Ian Ingram Young, Academy of Photogenic Arts.
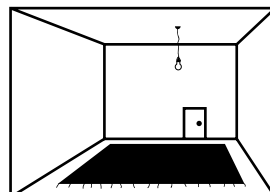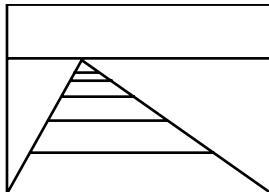
Comparisons in Composition and Framing

Consider the following examples of possible shot compositions and framings.

Don't have all main picture elements equi-distant from each other.

Not so good
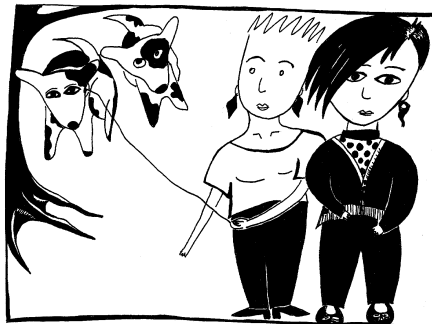
Preferred

To add visual interest and a sense of depth, arrange your subjects at different distances from the camera, taking care they don't conceal each other.

Not so good

Preferred

Left/right symmetry can be boring. Balance the elements in the frame in an asymmetrical fashion.

Not so good   Preferred

Keep the horizon above or below the centre of the frame.
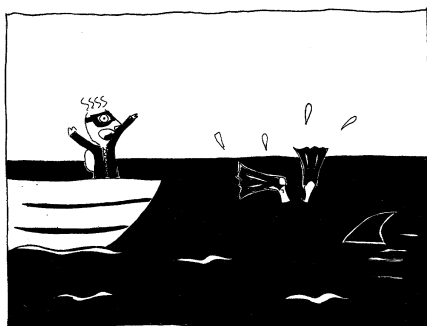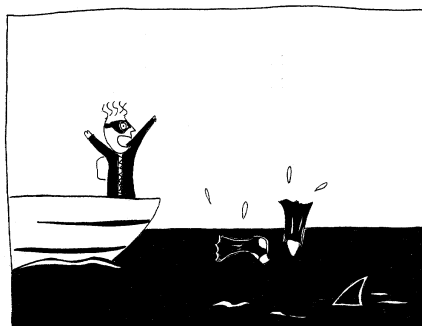
Not so good   Preferred

When the subject is in the distance, a secondary object in the foreground can emphasise depth.

Not so good   Preferred

Parallel horizontal lines can shorten perspective and reduce the sense of depth. Try to place a diagonal against a horizontal.
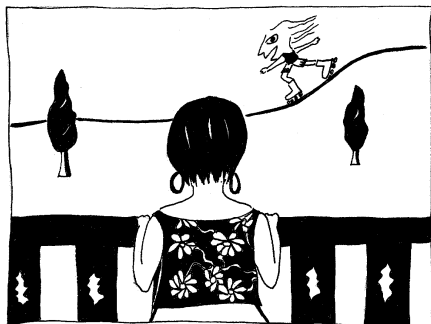
Not so good   Preferred

Shooting two-dimensional objects, like paintings or signs, from a side angle will produce a distortion. Shoot them straight-on unless the distortion is desired.

Not so good   Preferred

Composition for Reverse Shots for Dialogue

The subject facing the camera should get about two-thirds of the screen space.

Main shot   Reverse shot

Shot Sizes

The shot is the basic building block of a screen production. Through a succession of shots the story emerges.

You might consider each shot to be like a phrase or sentence in a written text.

Each shot, therefore, is important and should be carefully designed to 'say' what it's meant to say.

Choosing the right *shot size* is one of the key decisions the director makes. It's no good having a deep emotional scene shown in such a long shot that the people's facial expressions can't be interpreted. And it's no good having a shot so close that important body action is happening outside the frame.

The following illustrations show the standard shot sizes used in broadcast television. A fluent understanding of these shot sizes will help you plan your coverage, fill out your storyboard and call the shots on the day of the shoot.

You don't have to stick to these shots exactly. You can have a 'tight mid-shot' or a 'loose close-up'. But these terms give you a common set of reference points, shared by other people in the industry, which allow you to communicate the scenes in your head to the other members of your crew.
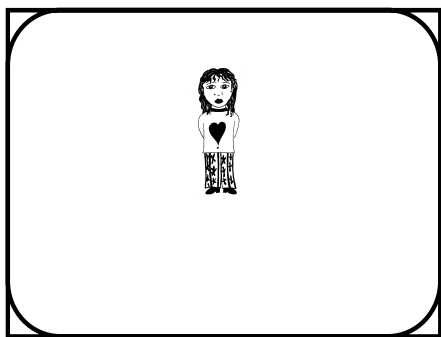
Very Long Shot (VLS)

Long shot (LS)

Medium long shot (MLS)

Mid-shot (MS)

Medium close-up (MCU)

Close-up (CU)

Big close-up (BCU)

Extreme close-up (ECU)

Underwater camera work was traditionally wide shots, following shots. Now we apply standard shot sizes to build story sequences. Anyone who wants to do nature filming should apply the same traditional film techniques that are used in drama, i.e. build up visual sequences. That's what producers look for in demo reels and in programs.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

As you can see, shot sizes are defined in relation to the human figure. With the exception of the term *close-up*, these terms aren't applied to other objects.

You can't have a mid-shot of a car, for example (regardless of how personal your relationship is with your car!).

There's one other shot size, not shown above. It's the *wide shot*. The wide shot is the unhindered view you get looking at a scene. It can be very wide, like a view of the Sydney Harbour Bridge, or smaller, like the front of a cafe. In a wide shot it's possible to see many human figures.

Framing

Here are some guidelines to consider when framing your subject.

Head Room

Shots of people are usually framed with a small amount of space above their heads. This space is called *head room*.

Shots need to have sufficient head room because when the top of the head is right against the top of the frame, it can produce a claustrophobic impression.

The most common framing error of beginners is to put the subject too low in the picture, leaving heaps of head room. If nothing important is happening in the part of the frame that's above the head, this is wasted screen space and you could more productively either tilt down to show more of the person's body, or zoom in to give the viewer a better look at the subject's face.

Too little head room   Too much head room   Good

If the person isn't framed properly s/he will appear to head-butt the frame or to be hanging by the neck.

The Eyes

Generally speaking, you should aim to put the subject's eye level about two-thirds of the way up the screen.

The eyes play a very important role in communication, and eye signals and eye orientation are very closely connected to culture.

Although it's standard practice in broadcast television to use close-ups of subjects facing directly to the camera, with their eyes looking straight down the lens barrel, this is culturally inappropriate in many societies, including some Indigenous peoples.

Because it's unacceptable in some cultures for a younger person to meet the eyes of an older person, the full-on gaze of an older person looking out from the television screen can cause some younger viewers to avert their eyes. If it's important for your audience to continue watching the screen, it makes sense to arrange your shot so they can comfortably do so.

It may be more acceptable to have the elder shown in three-quarter face (i.e. looking slightly away from the camera), or even in profile, so their eyes aren't directed straight

at the viewer, so that the scene reflects the image the audience would normally see in daily life.

When you're making a program, consider the cultural mores of your subject and the needs and responses of your anticipated audience.

The Mouth

The mouth is also an important element in communication. The shot should usually be framed so the audience can get a good view of moving lips, so the mouth shouldn't be partway off the screen.

Because many people watch mouth movements when they're listening to a person speak, profile shots—which show only the side of the mouth—can reduce the viewer's ability to catch the words the person is saying.

Any program which is aimed at an audience which includes hearing impaired people (could we say this is *every* audience?) should be made with thought given to the placement and visibility of the talking mouth on the screen.

Looking/Talking Room

When a person is framed so s/he is looking off screen, there should be more space in front of the person's face than behind the head. This is called looking room.

When a person is talking to someone off screen, as in a three-quarter close-up of a person in a talk show situation, there should be space in front of them in the frame for their words to flow out of their mouths. It may sound silly, but if the edge of frame is close to the front of their face, it feels to the viewer as if their words will hit a brick wall and go nowhere.

Not enought looking/talking space   Preferred

Walking Room

Similarly, a person walking across the screen needs to have walking room at the front.

Keeping walking room requires well-timed panning on the part of the camera operator. It's easy to go a little too slow and have the person appearing to head into a rigid barrier (the edge of the frame), and then jerk the pan over to try to catch up. This looks daggy. Shots with planned movements like this should be well rehearsed before they're recorded.

The concept of walking room also applies to other human movements, like skating, swimming, skiing and so forth.

And it also applies to vehicular movement—planes, trains and automobiles.

Framing for Widescreen

If you're shooting on a widescreen format, most of the same ideas on composition apply, but in addition you have to consider who your audience will be. Will they be viewing your material on widescreen? Or will they still have to see it on standard 4:3 screens? Some frames just don't convert from wide screen to 4:3.

This shot was framed for widescreen—16:9 aspect ratio.

A 4:3 centrecut of this frame looks ridiculous.

Some editors will 'pan and scan' it into two shots like this.

Because we're in this transition to widescreen TV, you have to shoot everything in 16:9 so it's 'future-proofed', so it will be compatible to go in programs made a few years from now. But you also have to frame your shots so they're acceptable for viewing on today's 4:3 screens.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Appropriate Size

Make sure the subject is shown at an appropriate size, so sufficient detail can be seen and important parts aren't chopped off by framing that's too tight.
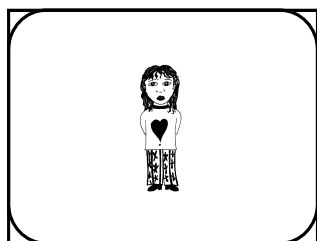
Too small
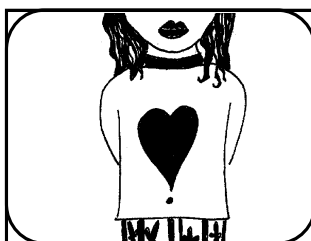
Too tight
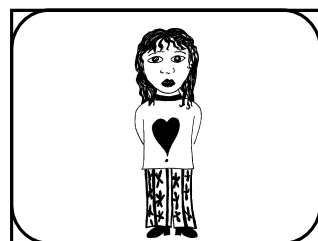
Preferred

Inclusiveness

Make sure that important elements are shown completely.
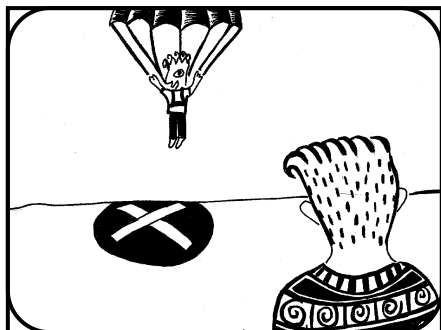
Element cut off
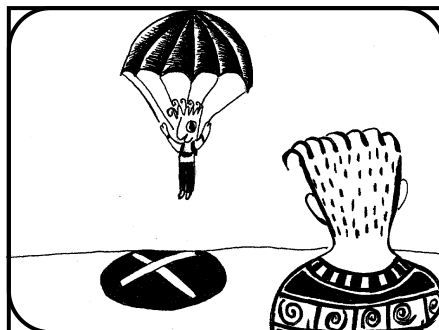
Element fully within frame

Masking

Don't let one important element obscure another main element or its value will be reduced.

Element obscured

Preferred

Suggestions from Rachel Masters

Look at the shapes the body naturally makes and interchange these with shapes found naturally in the environment. Do the fingers on your hand remind you of anything? Are they like the branches of a tree? What about the freckles on your friend's face? Are they similar to a pebbled path? The angle of a beautiful aquiline nose may remind you of the corner edge of a roof.

Shoot a collage video intercutting these images together. Be imaginative—look at things in a new way. Have fun!

Many thanks to Tom Jeffrey for his help in the preparation of this chapter.

4 The Camera's View

The image is produced not only by the size and framing of the shot, and the arrangement of the elements within it. It's also greatly affected by *where* the camera is: its position, its height, its closeness to the action, and whether it's moving or not.

Handholding

There are definite advantages to handholding. The camera is able to move fluidly through the location and even the action, changing its point of view, responding quickly to unexpected changes, and sometimes interacting with the subjects.

But there are difficulties with handholding, too. In the hands of a beginner, the resulting image can be shaky when the operator is standing still, and jerky when the operator attempts to walk. The picture recorded with the lens on wide angle will look less bad, but if there's any attempt to use telephoto, the image will be unacceptably jittery.

Tan Shaojun, from Yunnan Normal University, on location in China for *Dai Women Speak* by Arise Productions. (Photo by Michelle Blakeney)

> When there are people in the shot, the shot can support a bit of a shake. Shots with nobody in them should be dead steady.
>
> **Chris Fraser**, Cinematography Department, AFTRS.

> A steady handheld camera can add production value to your program and save you time in the edit suite. Handheld moving camera allows you to capture action that might have otherwise taken a number of camera set ups. Effectively you're editing in-camera, going from wide shot to close up and back again, changing subjects, changing POVs, etc. With handholding you're able to follow actors and action, and shoot in confined spaces, saving time on location.
>
> **Andy Nehl,** Head of Television, AFTRS.

Steadicam

Many people dream of getting a steadicam. The original steadicam is a harness contraption which holds the camera on a jointed arm, isolated from the movements of the camera operator. The view taken using steadicam is one which seems to glide through the world, without the jolts of the operator's footsteps, or the rise and fall of the operator's shoulder as s/he breathes.

With steadicam, there's an adjustable monitoring system for the operator, since the normal viewfinder won't do.

Chris Fraser demonstrates the use of a steadicam, AFTRS.

Unfortunately, a steadicam is expensive, and not likely to get bought by the media centre in the next budget round.

S-o-o-o-o . . . you could get *very* good at handholding. Practice does help.

There are ways of steadying the camera by supporting your camera-holding arm with your other arm or by holding the camera with both hands and pressing your elbows into your chest for a firm support.

You can stabilise the camera by propping your elbow against your other arm or steadying your camera arm. Allan Collins, freelance cinematographer.

And there are usually other objects nearby which will help you steady your shot. Rest your camera on a fence post, a stone wall, the roof of a car, a tabletop, a boulder, whatever you can find that's strong enough and less likely to wobble or move than you are.

There are also ways to walk more smoothly, by keeping your knees loose and slightly bent, so they absorb the shock of each footstep rather than transferring the jolt up through your body to the camera. You may look like a silent-film comedian, but people won't laugh when they see your footage. What's better, they won't scream or reach for the motion sickness tablets.

There are even ways of breathing more shallowly so your shoulder doesn't rise and fall so much. In fact, for quite short shots some camera operators take a big breath beforehand and don't breathe until the shot is finished.

Image Stabiliser

Some cameras boast an image stabiliser. Its purpose in life is to get rid of shaky camerawork by adjusting away your own personal shakiness as you record your video. (This might sound good after a big night out.)

But not all image stabilisers are equal. Electronic image stabilisers can cause a loss in picture quality. It's claimed that some optical image stabilisers can keep a recording steady even when using the telephoto setting or when shooting video from a moving car or train, when the bumpiness has nothing to do with your own skill as an operator.

The image stabiliser is an option that can be turned on and off, except in locked modes like *easy recording*.

It's recommended that you turn the image stabiliser off if you're using a tripod.

> When shooting while walking, open both eyes to avoid collisions.
>
> **Lyvern Myi**, Media Resource Centre.

> Hold the camera nice and still, and then move it around slowly.
>
> **David Cox-Taylor**, AFTRS.

> Make sure the steadyshot or stabiliser is switched on. While stabilisers and steadyshots will degrade your image quality very slightly this minor degradation is far outweighed by the smoothness that they add to handheld shooting. Optical stabilisers are better than digital stabilisers so if you have a choice when purchasing, hiring or borrowing a camera, go for one with an optical stabiliser. If you are shooting on a tripod turn the stabiliser or steadyshot off.
>
> **Andy Nehl**, Head of Television, AFTRS.

Stationary Camera

If the camera doesn't have to move around or through the action space, then the best idea is to stabilise it firmly in one spot. A good quality tripod is probably the thing.

For any shots which require absolute stillness of the camera, like telephoto shots and macro shots, the tripod is close to essential.

The Tripod

The tripod is a three-legged structure (as its name implies) which telescopes down to a small size for transporting it, but which can be made into quite a tall camera support if needed.

The tripod, like some funny android, doesn't have much to it—it's all legs and head.

Tripod Construction

There's variety in the shape and material of tripod legs. There are the rugged heavy wooden ones, and the lighter weight metal ones. Some tripods are absolutely spindly. These were designed to be used with lightweight still cameras, not video cameras.

The first considerations in choosing a tripod are whether it's strong enough to support a camera of the size you're using—and whether it's got sufficient weight in itself to keep a gust of wind from blowing it over once the camera is on it.

The second consideration is whether it pans and tilts smoothly. Don't use one which requires you to unlock the tilt mechanism by twisting the panning lever's handle. These give you terrible picture results because every time you want to change the tilt, that twisting motion puts a jerk into your picture. Many of the cheaper tripods have this obnoxious problem. Okay for stills, not okay for video.

The third consideration is how heavy the tripod is, and how far you'll have to carry it. Unless you've got a Rambo on your crew, you may not want to take a heavy one on a long bush trek.

The Legs

You'll find, along the three collapsed legs, a series of knobs, enlarged wing nuts, or some other form of release mechanism. Wherever you find one, that's an expansion point for the tripod leg. There are one, two or three of these for each leg, depending on the brand and style of tripod you've got. The expansion points allow you to open the tripod up to be very tall, put it to a medium height, or even use it at a very low level.

In fact, tripods can be purchased in different sizes, from tall to baby legs. For table work, you can even buy the head mount without any legs at all.

One of the tricks of using a tripod is lengthening all the legs evenly. If the legs are uneven, then the platform at the top where you attach the camera won't be level, and your shot will be slanted in relation to the horizon or the walls of the room you're in.

Lengthen the tripod legs evenly before you open them. Gunther Hang, AFTRS.

One effective way of evenly lengthening tripod legs is to lay the closed tripod across your lap, and extend all three legs so the feet are flat against your outheld vertical palm. If they're even when the legs are closed, they'll be even when the tripod is set up.

The leg procedure goes like this:

1. Loosen a leg.
2. Lengthen the leg.
3. Retighten the leg.
4. Roll the tripod over to do the next leg.

Step 3 is the important one. It's so easy when you're rushing or momentarily distracted to forget to tighten one of the legs!

Then what can happen? You can attach the camera to the tripod top, turn to get a battery out of the bag, and look back to see the untightened leg collapsing and the camera beginning to topple (or worse).

So, . . . Loosen . . . Lengthen . . . Tighten.

The Feet

At the base of the tripod legs are what we might call the feet. Some tripod models give you a choice in feet. You can use the round rubber bottoms, or you can screw them upwards to reveal pointy metal ends; on other models, there are metal claws which you can flip downward. Choice of feet, like your choice of shoes, is based on common sense. Which tripod feet would you use on the polished wooden floor of a library? Which feet would you use at the soccer field?

Tripod foot with rubber pad.

Tripod foot with spiky point.

Setting Up

When you set the tripod up, it's a good idea to spread the legs out fairly wide so it has a good stable base. It's better to have the legs extended a bit further and the feet out wider (if there's space where you're operating) than it is to have the legs precariously close together.

Most tripods have a way of stabilising the spread of the legs, with straps, chains or connecting strips. If your tripod doesn't have any way of keeping the legs from sliding further out, you can build a wooden triangle to set the legs in. Oddly enough, this triangle is called a 'spreader'.

Tightening the bolts at the apex (top) of the legs also stops them from spreading.

The Head

Some cheaper tripods have a fixed head attached at the top of the legs, but professional tripods usually have a head which attaches via an adjustable, swivelling ball-and-cavity system. This lets the operator level the camera platform independently of the legs, and check the levelness of it by using the spirit level gauge on the side of the head. When the head is level, the little bubble will be inside the circle on the gauge.

Attaching the Camera

There are a number of ways that cameras can be attached to tripods.

The easiest way is if your camera comes with a mounting plate. In that case, you screw the lightweight

You're not always going to have level ground. On location for *Dai Women Speak*. (Photo by Michelle Blakeney)

Michelle Watson adjusts tripod using spirit level. Hamilton Secondary College, Mitchell Park, SA, Australia. (Photo by Stephanie Rowe)

Ian Slade, Southern Cross University.

In this age of lighter, more portable and smarter digital cameras, tripods may seem to have almost become irrelevant. Image stabilisers can smooth out the camera operator's excitement in capturing the action. Stabilisers are good for dealing with small amounts of camera movement, but only up to a point. After that, image quality is what is being sacrificed to keep the image steady.

With the increasing use of the 16:9 aspect ratio across all digital cameras, editing and digital television broadcasting, image quality is becoming more important. The wider screen demands extremely high quality image reproduction.

People often choose lightweight tripods. This is fine if you're not wanting to pan and tilt with accurate beginnings and endings to your shots. The choice of a rock-steady tripod and fluid head that offers smooth variable dampening in pan and tilt should be the start of wonderful relationship between what you see in the viewfinder and what the audience gets to see. You'll get steady images when you need them, and of course when you don't you can go back to wobble cam.

So choose a tripod that can handle a little more than you're asking it to carry. Then the image quality will come with practice, no more blaming the tripod.

mounting plate onto the receiving bolt on the tripod head.

Some tripod heads have a tightening system consisting of two knobs and a lever. With that system, you tighten the smaller bottom knob first, then the wider upper one, and finally you swing the lever across to do the last tightening. (Make sure you start with the lever moved to the untightened side, so it has somewhere to go when you need to use it for the final tightening.)

Once you're sure that the camera plate is firmly on (give it a wiggle and check to see if you can see any air between the underside of it and the tripod head), then you can attach the camera.

Screw the mounting plate on tight.

Make sure you insert the camera correctly into the mounting plate and then lock it in place.

Give it a wobble to make sure it's secure.

Carefully place the camera into the positioning slots at the back and front of the mounting plate, flip the lever at the front of the plate, and it's locked into place.

Be sure to position the camera correctly—it *is* possible to do it wrong and still flip the locking mechanism.

So you never let go of the camera until you've given it a little shake to see if it's firmly attached.

Another way to attach a camera is when the tripod itself comes with a *quick release* plate. This is a small plate which is pentagonal or hexagonal in shape. You screw it onto the bottom of your camera, and then the plate itself fits into a slot on the tripod head. Again, there's a locking lever, this time to hold the plate firmly in place.

Never leave a camera unattended on a tripod.

The third way to mount a camera is to screw it directly to the bolt on the tripod head. This is the fiddliest way—and some people find it quite hard to do. Part of the problem is in supporting the weight of a heavy camera, and the other part is in lining up the bolt to thread correctly into the camera bottom.

Tracy Dickson, College of the South West.

There never seem to be many turns of thread to grab onto the camera, so be sure that you get it as tight as possible.

Tripod-head Moves

Although the tripod holds the camera in one place, the camera can still be moved to vary its view from that one spot, similar to the way we can move our heads on our shoulders. The smoothest moves are done with a fluid head tripod.

Pan

Panning refers to rotating the camera in the horizontal plane—that is, to the left or right.

Panning is used to follow an action, survey a scene or show where one person or object is in relation to another.

Some things to keep in mind when preparing to pan:

When panning, try to frame in such a way that if your shot was still-framed, you would be happy to get it back from Kodak.

Chris Fraser, Cinematography Department, AFTRS.

1. Make sure the horizon line will be level at both the beginning and the end of the pan. It will go out of whack partway through if your tripod is on a slight slant.
2. Record tape with the camera still before starting the pan, and continue to record more with the camera still after you've finished the pan. This is necessary for editing. It's not usually acceptable to begin or end an edit in the middle of a pan.
3. The speed of the pan should be slow enough so the audience can absorb the information and fast enough to prevent the audience from getting bored with the shot. (When you have enough time, it's a good idea to redo the pan at different speeds and in different directions, so there's more choice when it comes to the edit.)
4. Whether using a tripod or handholding, always move your body from an uncomfortable position to a comfortable one. This means you should stand facing

Philip Elms, Media Resource Centre.

When panning, try to start and end on a well-framed and composed shot.

the end point of your pan, then turn the camera and your body towards the starting position, with your feet still facing the end of the shot. Doing the pan from this position means that it will get easier for you as you move through it, and helps avoid that awkward, shot-ruining camera jerk just at the end of a beautifully executed pan.

Tilt

Tilting is the vertical movement of the camera, when you tip the camera lens up and down from a fixed position.

It's used to emphasise height or depth, to follow an action, to survey the face of a building or the length of a human body, and to show the relationship between one place or object and another.

Zoom

When you have a camera attached to a tripod, it's often easier to change the camera's shot size by zooming than by actually moving.

You may zoom to prepare for your next shot, or you may zoom while you're rolling tape. It's easy to overdo recorded zooming, though. Despite the fact that it tends to fascinate the novice camera operator, too many zooms can irritate the viewer and make editing the shots difficult.

(Zooming in and out frequently is called *tromboning*.)

Combining a Tilt With a Zoom

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

I find it easier to get a smooth pan by twisting the tripod head itself, rather than using the extension handle.

With experience you'll see that zooming in or out changes the height of your subject in the frame, so in order to keep a consistent framing, you'll need to combine a tilt with your zoom. If you practise the shot before you launch into recording it, you'll get better results.

Motivation for a Camera Move

Something within your shot can motivate a camera move. Your viewer can develop a desire to have a question answered. For example:

'What is that object in the distance?'
or
'What is that child playing with?'

This gives the shot motivation to zoom in so the eye can see more clearly.

'Where is that person going?'
or
'What's at the other end of that bridge?'

This gives the shot motivation to pan left or right.

> 'How tall is that building?'
> or
> 'Whose feet are these?'

This motivates a tilt upward.

I don't ever lock a tripod off unless an effect (animation, superimposition) hinges on it. You never know when an action or gesture will extend beyond the area it took place in during rehearsal/blocking. You need to keep the flexibility to follow it and capture it all. This applies even to tighter frames of people talking, moving, gesticulating.

Jason Benedek, Tin Sheds, University of Sydney.

Moving the Camera

Many directors prefer to use a static (stationary) camera. It gives good control over the image and, when necessary, it's possible to produce strong feelings of movement within the shot by carefully orienting the fixed camera in relation to the action.

However, as we all know, sometimes you just have to move.

The Dolly

A dolly is a unit with wheels on it, to which a tripod can be attached. Once the tripod is on a dolly it can be moved along smoothly in any direction.

When a director wants a camera operator to move the camera in closer to the subject or to back away from it, the expressions used are *dolly in* and *dolly out*.

The terms dolly and track have become blurred, and the word track is now used to cover all these movements. Few people use the word dolly nowadays.

Chris Fraser, Cinematography Department, AFTRS.

When a director wants the camera to be moved to the left or to the right, the expressions used are *track left* and *track right*.

If you need the dolly to stay fixed in one spot, you can lock the wheels by stepping on the footbrake above each one.

Tracking shots can be used to move the camera alongside, or to the front or back of, a walking figure or a moving animal or object.

With the camera moving, it's possible to keep the subject the same size in the shot, even though the subject's relationship to the background is changing.

A wheelchair is wonderfully manoeuvrable and can get through some small passageways.

Other camera-moving possibilities are: a baby carriage, a supermarket trolley, the equipment trolley from the media store (though these can give a pretty rough ride, maybe worse than handholding), a slow-moving automobile, a child's wagon (again, could be bumpy), a merry-go-round, rollerskates, rollerblades and a skateboard. Can you think of others?

Studio work, University of South Australia.

A wheelchair can make a great dolly and tracking device and can be bought cheaply second hand.

Peter Thurmer, Hamilton Secondary College.

With the last three you definitely need a competent rider. The idea is to provide a moving camera *support*, not a camera death ride.

For a ground level tracking shot, a camera strapped to a skateboard and rolled along can be quite effective.

It's great to be creative, but whatever camera-moving device you use, think safety first for both the operator and the equipment.

Andy Nehl's camera moves from a fixed position

If you're going to use camera movement and vary the shot as part of your shooting style while your subject is not moving, you can achieve a range of variation in your shots with a steady moving image by standing on the one spot and moving your body with large, flowing movements.

If you place your feet about 1 m (1 yard) apart, by bending one knee and moving down and forward over it, holding the camera in front of you, you can achieve about a metre of forward movement which can vary the shot significantly if your subject is close and you're on full wide angle lens.

By keeping the balls of your feet on the same spot and pivoting around to bending the other knee, as you turn you can achieve a relatively smooth handheld pan through 180 degrees.

This position also allows you to move up and down.

It's worthwhile practising it so you can get good at smooth movements. It's also worthwhile blocking through these kinds of shots before you shoot them if you have time.

Tracks

A very few video training centres have access to a dolly and track system. The tracks may not take you far, but it's a great ride!

Alex Dunton tracks Paul Pledger while also monitoring the actor's wireless mic. Hamilton Secondary College, Mitchell Park, SA, Australia.
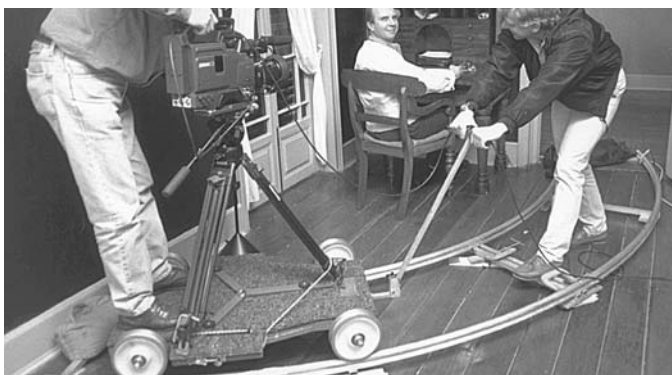
L to R: Peter Watkins, Hunter Cordaiy and Colin Barton record a scene from Our Heritage of Learning—The History of Education in Bankstown, University of Western Sydney.

Andy Nehl demonstrates his fluid method of camera movements, all of which arise from a fixed position.

Tony Bosch with Piccolo crane, AFTRS.

Barbara Bishop, Winthrop Cable TV.

One thing I like at Wakefield Community Access TV is a camera on a boom that is controlled by the camera person. It's a digital camera (they all are) mounted on a 10-ft 'pole' on a fluid head tripod with a camera monitor at eye level. The camera can swing around, up and down, whatever, with a very smooth movement. They use it for opening and closing shots for serious programs and kids love it for music videos.

Cranes

Cranes are used to lift the camera to great heights, and lower it down again.

They're good for long shots which survey the scene, or the shot which brings the viewer down from a high perspective and into a locality.

The thought of having a crane on a shoot is seductive, but as with other seductive thoughts, there are important second thoughts about what it means for both the personal safety of the camera operator and the survival of the project budget.

At Wakefield Community Access TV they've mounted a digital camera onto a boom pole, for great 3D control of the camera, with a sense of freedom and flight. Wakefield, MA, USA.

Camera Angles

The height of the camera and the angle at which it views the subject can subconsciously affect the way the audience perceives the subject. The camera's angle of view can resonate with meanings in the viewer's life experience.

Eye level   High angle   Low angle
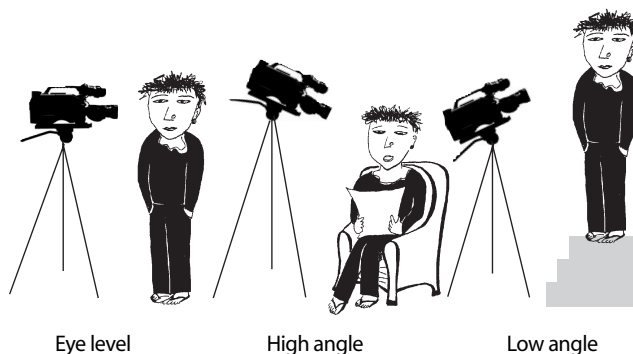
High Angle

When the camera is high in relation to a human subject, so it's tilted downward to get its shot, the perspective is similar to that of an adult looking at a child.

This angle of view tends to diminish the authority of the person in front of the camera. It can make that person look inferior, and give the viewer an impression of their own superiority.

A high angle shot is useful when doing a long shot of a larger scene because it can give more of a 'bird's eye view', showing the relationship of the various elements in the scene, giving a sense of the geographical layout of the location, and showing action in greater spatial depth.

Rima Tamou and Murray Lui on location for a University of Western Sydney co-producion, Katoomba, NSW, Australia.

Low Angle

With a low angle shot, where the camera is looking upward at the human subject, the camera's view is like that of a child looking up at an adult, or an underling looking up at a figure of power.

This camera angle can make the subject look more dramatic, and give the person an aura of authority or grandeur.

Low angle shots are useful for eliminating unwanted background elements, or for separating the subject from the background. They can heighten the sense of size and, in some cases, speed.

They're also useful for dramatising a point of view—of a child, or a dog, say.

A fly on the wall—most shots are from the objective point of view, like the view of a fly on the wall. But the common fly doesn't always hover at eye level. Make your camera work more interesting by shooting above or below eye level.

Marc Tewksbury, The Nine Video School.

Don't look down on your subject.

Go for a neutral angle.

Andy Nehl,
Head of
Television,
AFTRS.

As a general rule, shoot with the camera at full wide and frame your shot by physically moving closer to the subject rather than zooming in. The wider you are, the steadier your handheld shot will be; the more you zoom in, the shakier your shot will be. The exceptions would be if you can't move in physically closer, or the value of the close-up to the story you're telling outweighs the negative of the shakiness of the shot. (E.g. the person with the home video camera who zoomed in on the Concorde to see the flames streaming out of its engines as it crashed near Paris made the right decision.)

Neutral Angle

A neutral angle shot puts the viewer's perspective on an equal par with the subject, so there's no subliminal commentary going on in the visual language of the program.

Unintended Angles—Handholding

An up-the-nostril shot! University of Technology, Sydney. (Photo by Bob Humphries)

Sue L'Estrange,
Videographer.

Choose an interesting angle.

Short people need to stand on a box to avoid getting that up-the-nostril shot. Tall people need to lower themselves so the tone of their footage doesn't always look down on their subjects.

When a person is handholding, the camera's view is the same as their own. When a tall person is holding the camera it's higher off the ground than when a short person is holding it. If the operator is unaware of this, unintended messages can be introduced into the look of the image.

Unintended Angles—Tripods

If people aren't aware of the meaning of camera angles, they set the tripod to the height that's comfortable for them.

So when someone's shooting an interview of seated people, the shot gets done from a high angle because the camera operator is standing. This usually gives a diminished look to the interviewee.

Or when someone is shooting a standing presenter, the shot gets done from whatever height works for the camera operator, rather than from a neutral angle at the height of the presenter's eyes.

Learn to ask yourself: What is the **right** angle for this shot?

Sometimes the director and the camera work from different heights! (Photo by Michelle Blakeney)

Choosing the Right Lens

Your videocamera will have a zoom lens so you can take shots from a distance, and it's also likely to have a macro lens for close-ups. But sometimes the work you choose (or get asked or told to do) requires specialist equipment. Sorting out what gear you need is a job for the time period known as preproduction. You don't want to get to the job and then realise you haven't got what it takes (literally or otherwise).

But how can you know what to choose if you don't even know what's out there? Here are some interesting possibilities.

For wildlife photography you'll need the ability to do super zooms and super close-ups.

This long slim lens is called a probe lens. It allows you to get in extremely close for wonderful shots which fill the screen.

Eyeballing a snake. Richard Fitzpatrick uses a probe lens for Digital Dimensions.

The endoscope lens is very tiny and comes on a long flexible lead with a light mounted next to it.

The baby turtles dash for the sea, and on to the TV screen, taped for Digital Dimensions.

The endoscope lens attaches to the front of the camera lens, shown here by Julian Ellis, cinematographer.

A tiny bat takes refuge on the dive boat, taped for Digital Dimensions.

An endoscope lens comes with a fibre optic internal reflection cable mounted next to the lens. The cable can be bent any which way and still send light through it. The lightable end is mounted right next to the lens so you can get into very tiny spots where you couldn't video otherwise. You attach the endoscope lens to the front of your camera.

Some of the animal behaviour shoots I do can take months, but I may only be shooting once a week.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Choosing the Right Camera

This is called lipstick cam—it fits in your handbag!

When the camera needs to work inside very tiny places, you can use a *lipstick cam*.

Lipstick cam is very useful in wildlife photography. For example, you can drill a hole in the side of a box in which an animal is giving birth, and insert the lipstick cam through the hole to video the process without disturbing the animal. Lipstick cam can use a variety of lenses, including wide angle.

If the camera must soar, here's one way to do it.

Helicopter cam. (Photo by Digital Dimensions)

Caring for the Camera

Caring for the camera is largely common sense. But for those for whom common sense is commonly absent, try to remember these few things:

Don't EVER let it get wet. This could mean carrying a spare (clean) garbage bag with you on every shoot so that if it starts to rain you can cover it for the run back to the car. If you're working in the Tanami Desert, you don't need to take the bag for rain protection, but then again, you may need it for the next rule.

Keep it away from sand, dirt, smoke and other airborne particles. Grit can scratch the lens and cause problems with the tape transport system. The salt of seaspray is corrosive.

Keep it fairly cool. Don't ever leave it in a hot car, especially not where the sun can get to it. Don't leave it too close to video lights or a wood stove.

Carry the camera by its handle, not by its view-finder or microphone!

Don't knock the camera into things, or allow it to bang around in the back of the car while being driven to the next shoot.

When moving between very different temperatures, allow the camera some time to adjust to the new situation. Going from an airconditioned room to a humid outdoors area can cause condensation to form on the lens and the electronics. This has to dry off before the camera is able to operate.

Don't use the camera near TV transmitters, portable communication devices and other sources of magnetic or electric radiation. These can cause disturbance to your picture and may even permanently damage the camera.

Pressurised air can clean fine particles from the lens without scratching it.

Fine dirt on the lens, or salt spray if you are shooting at the beach, may not be visible on the flip-out screen but will show up more easily on the B&W viewfinder in the eyepiece if your camera has one. It sounds obvious, but it's worthwhile to remember to visually inspect the front of the lens regularly to make sure it's clean. Lens cleaning tissues are cheap from any camera store and a very worthwhile addition to your camera kit.

Andy Nehl, Head of Television, AFTRS.

5 Telling the Story

There's another kind of angle to consider when you're making a story for the screen. That's the inner perspective on the action that you want the viewer to experience. Where you put your viewer psychologically is very much a part of how you tell the story, and it affects what your viewer will think and feel.

The Inner Perspective

Objective View

An objective camera views the action impersonally, as if through the eyes of an unseen, outside observer.

Objective camera angles are good for giving an overall view of what's happening. They're frequently used in news reports and documentaries.

These 9th graders, Sharmisha Willis, Lenard Howze and Dyon Smoots, were credentialled, through the World Trade Organization in Geneva, Switzerland, to cover the WTO meeting. The students are from Aki Kurose Middle School Academy, Seattle, WA, USA. (Photo by Bi Hoa Caldwell)

Subjective View

Subjective shooting brings the viewer into the scene. The camera lens becomes the eye of a person able to move through the action, and therefore able to observe it from many different angles. The audience tends to feel more involved with this kind of camera work, not just as though they're stuck on the sidelines or in front of the stage.

Subjective camera work is much more common in recent years, and has been highlighted in TV shows like *NYPD Blue* and *Blue Heelers*.

Some people say this style of camera work, which evokes being present in the scene, is a result of the rise of home videos. People have become used to shots recorded by a camera operator who's a member of the family which is celebrating the wedding or travelling through the theme park.

Home videos may also be the genesis of what I disparagingly call *wobbly cam,* but that's another story.

> When you are operating a camera you should always remember that, as you move your camera, you are moving your audience.
>
> **Ian Ingram Young,** Academy of Photogenic Arts.

POV

POV stands for *point of view*. It's the most subjective camera view of all. The POV shot is taken from the perspective of one of the participants in the action, perhaps the presenter in a travelogue, or one of the characters in a drama.

The POV is very powerful, because it shows the viewer everything from the 'head' of someone inside the program. It's also very limited because it can't look neutrally at what's happening. It can't step outside the action for a more objective assessment.

With POV camera work you can take your audience on a ride, whether a plane or rollercoaster ride in an IMAX cinema, or a descent into fear or grief. Be careful with it.

> When you're introducing kids to the creative medium of film or video construction:
>
> **Josephine Bourne,** Video Producer/ Community Education Counsellor, Pimlico High School.
>
> • Don't freak out if you're not where you want to be at, at any given time; you have to let them lead you a little.
> • Be aware that as the experienced film maker you're going to feel a little out of control. There's a brief moment when you have to give them control, yet still guide them to achieve their vision and maintain quality.
> • Remember: It's a creative thought process. You can't always tell them what their vision should look like. Once you take away their creative freedom, it's no longer fun. This isn't to say that working with this medium is not hard work. What I'm trying to say is that it can be fun, so why not allow for it to be?

Children in Sandy Tyndall's class, Years 5, 6 and 7 at Mabuiag Island State School, worked with Josephine Bourne on a short video documentary on diabetes.

Your Own Perspective

Another choice you have is to be clearly autobiographical in your work, and to include yourself as the person speaking.
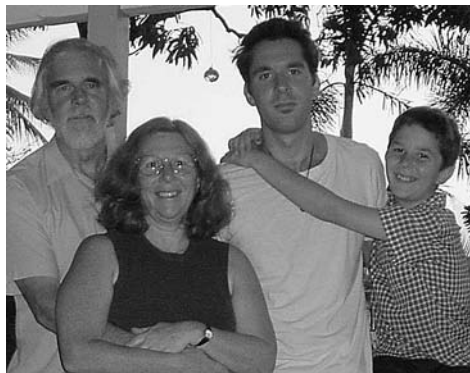
With the remote control the whole family can be seen and heard.

Many cameras come with a remote control unit, which allows you to start and stop recording despite being at a distance from the camera.

This sort of recording is especially nice when sending messages to loved ones, or when making your own brand of video diary of your thoughts and feelings. Under such circumstances people often prefer to have privacy rather than speak with a camera operator in the room.

One helpful hint is this: Attach a monitor to the camera so you can see what the shot looks like throughout the taping session. It's so easy for you to shift your position while speaking and later find that the shot looks poorly framed, or that your head has left the picture entirely!

With some digital cameras, you can flip the LCD screen so you can look at that and not have to worry about adding a monitor.

Remote Operation

There are many other uses for remote operation. It can work in circumstances when getting the view you want is not something you would normally be able to get. For example, you may want to capture some great close-up shots of the wild birds at the birdfeeder.

If you set up your camera on a tripod near the feeder, put the camera on wide angle lens so focus isn't a problem, and then settle yourself in a comfortable chair on the other side of the verandah, you could get some absolutely wonderful footage. It may take a few attempts to get the aiming and framing right, and the birds will have to become accustomed to the new weird object near their feeder, but patience does have its rewards in video.

You may find that remote operation works better with your family, too, if they tend to freeze up when you approach them with a camera on your shoulder. The main trick is to remember to keep the lens on wide angle.

Julie Booras and Jodie Cutter select photos for the video *The Story of Nana*, produced by Offspring Productions, Lynnfield, MA, USA.

The Historical View

Photographs from the past, from many other people's perspectives, are often important in telling a story. You can incorporate photographs into your video very easily.

All you do is pin the outer edges of each photo carefully to some cork or other upright backing, put the camera on a tripod, zoom in till the picture fills the frame, and shoot.

There's a huge range of wonderful materials kept in people's homes, even in old coffee tins in the attic!

Photos don't need to be still images when transferred to video. You can add liveliness by moving the

camera through the picture, panning across a row of basketball players, for example, or starting in close on someone in a group shot and zooming out to show everyone else.

There are a couple things to bear in mind when shooting photographs. You have to make sure there's enough light on them. Mounting them near a window helps, or working in a studio situation where there's good lighting. Don't let a hot light get too close to the camera, though. I once saw someone melt a lens hood that way!

If the photos have a glossy surface, your light may cause unwanted reflections which will show up as white spots on the picture. Getting it right is a matter of fiddling with the light and the placement of the photos, and sometimes with the angle of the camera.

Making History Yourself

Digital cameras often have the capacity to shoot in *photo mode*. You can go around and take video-based stills yourself which you can then edit into your project. Lots of scenes are timeless and can be discreetly mixed in with archival footage.

If you really want your stills to look historical, you can employ the sepia effect from your camera's digital effects menu, or use the black and white setting.

Whether historical or not, a collection of stills makes a great zappy montage for an opening sequence or a transition (segue) between two parts of a program.

It's a shame that the camera makers aren't involving professional photographers in the design of the digital stills cameras. They're being designed by computer people, not photographers. A photographer would like to be able to feel as at home with the digital camera as he would with a conventional camera. What he needs is focus, *f* stops, shutter speed, ISO ratings, not all the effects. They can be done at home on the computer later. These digital cameras are like microwave ovens!

John Buckingham, Photographer.

The Storyboard

One sign of a beginner in video is the person who thinks s/he can just *wing it* on the day.

'I'll just shoot what's happening,' or 'I'll get what moves me at the time.'

A more experienced person knows that having a shooting plan will make the success of the end video far more likely.

One kind of shooting plan is the storyboard.

A *storyboard* is a series of drawings which clearly shows the expected camera coverage for a shoot. It's drawn out shot by shot—looking rather like a comic strip—and amounts to a paper edit of the project.

The storyboard is drawn up during pre-production, and then carefully discussed and revamped until the director feels satisfied that the coverage is complete, and that once shot, the images will be able to be edited.

Plan. Plan, Plan, Plan and Plan. That is where the real work lies. Editing is the magic, the rest will fall into place.

Claire Beach, Edmonds-Woodway High School.

It's essential to storyboard your scenes before the day of the shoot. If you're working with an editor, have him/her look over your story boards and give you feedback.

Julie Booras, Offspring Productions.

CU biker puts helmet on.

LS biker rides towards camera, race banner in b/g.

MS profile biker rides to screen right.
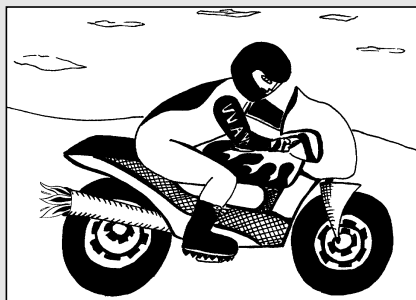
VLS biker rides to screen right.
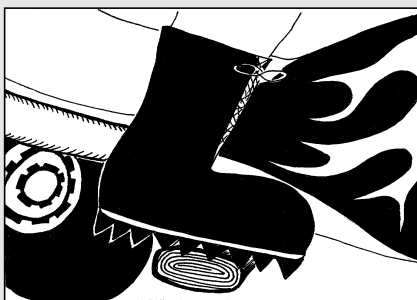
CU boot on pedal.
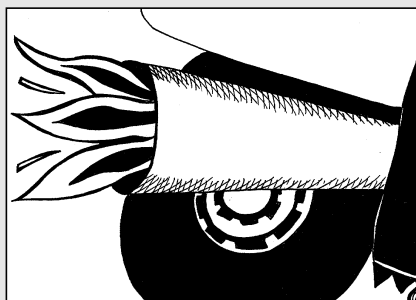
CU exhaust pipe shooting flames.

LS from rear, Biker rides towards finish line.

CU biker's head as he passes finish line flag.

Working things out carefully before the heat of the moment gives the director the mental space to imagine creative shots, and to check whether there are any gaps in the coverage or places where there may be *jump cuts* which require the shooting of cutaways or cut-ins.

Jump cuts occur if two similarly composed shots of the same subject are edited in next to each other. The effect is disconcerting because the subject appears to suddenly jump to the new position.

There are ways to plan your shots to avoid jump cuts in the edit suite.

1. Make a major difference in shot size for any two shots which will be adjacent in the final edit. For example, follow a long shot with a medium shot or follow a close-up with an MCU. This can be done either by moving the camera nearer to the subject (or further away), moving the subject, or zooming in or out.
2. Change the camera angle between shots. For example, go from full face to half profile or from eye level to a lower or higher angle shot.
3. Shoot cutaways to use where similar shots must go together.

It helps to think of the shot *before* and the shot *after* each shot—when visualising, scripting, shooting, editing—whenever.

Denise Galloway, University of South Australia.

When you're thinking of a shot, first of all you have to ask, 'Is it going to cut?'

Julian Ellis, Cinematographer, AFTRS.

Planning both drama and camera direction requires careful visualisation. If you don't know what you want, how can you hope to create it?

Ian Ingram Young, Academy of Photogenic Arts.

Never cut from this . . .   . . . to this (jump cut)

It's okay to cut from this . . .   . . . to this (change of angle and size of shot).
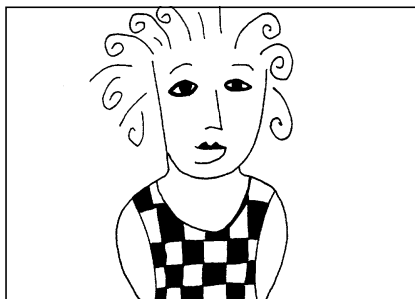
Or cutaway from this . . .   . . . to this . . .

. . . to then return.

Crossing the Line

In any scene you shoot, there's an imaginary 180° line called the *action axis line*. It runs along the path of the dominant action. This action may be moving people or vehicles, or the eyeline between the characters in the scene.

If the camera shoots the action from one side and then crosses over the line to the other side for a different shot, the subjects will jump from one side of the frame to the other when the two shots are edited together.

Or the vehicle or moving person will appear to reverse direction.

During an action sequence, for example, continuity of screen direction is essential. It tells the viewer where s/he is. Break that illusion and the viewer becomes disoriented and distracted and the edited sequence becomes nonsense.

How can you avoid 'crossing the line'?

1. Draw the imaginary action-axis line on your storyboard picture before shooting a scene. This will show you the limits of your camera positions.
2. Then always make sure that if the subject appears on the left side of the screen in one shot, it also appears on the left side in the next.
3. Be sure that people or objects only change direction if they're seen to do so in a shot, **or** if there's a neutral shot edited in between the shots which show a reversal.

   A neutral shot shows the action headed straight towards the camera or straight away from it.

Camera C
(No!)

View from Camera A (okay)

View from Camera B (okay)
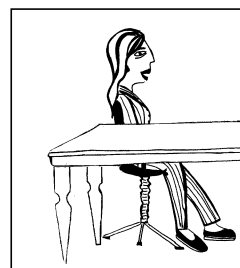
View from Camera C
(Not okay—subject
appears to have
switched to the
other side of the
table.)

Camera A

Camera B

Action axis line

If you cross the line, the characters will
swap screen positions.

View from Camera B

Action axis line
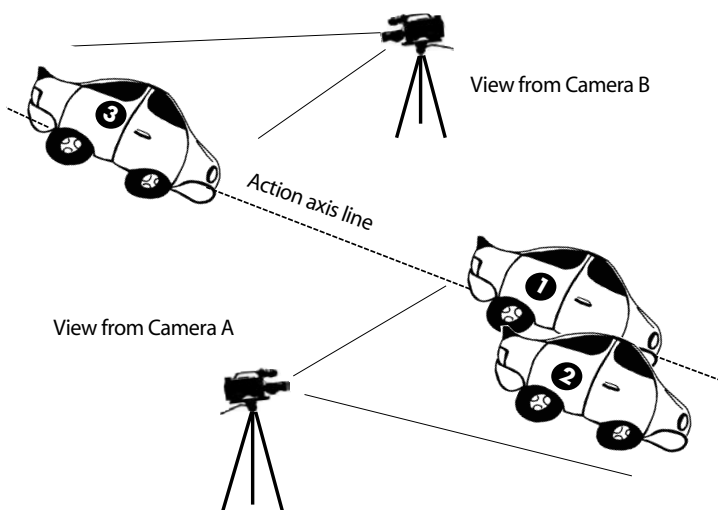
View from Camera A
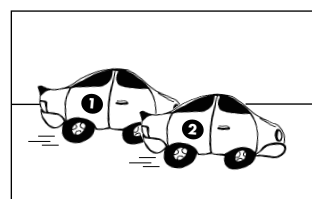
Camera A
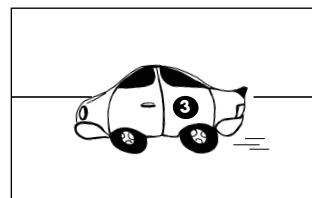
Camera B

Are they going in the same
direction? How can a viewer make
sense of this footage?

But not everybody agrees all of the time.

Directors don't always worry about crossing the line anymore. Watch the Bathurst races, the cars go in all directions. Who cares? We all know that they're going in the same direction. It's far better to place your cameras where they get the best shot, and assume your audience is visually literate.

Chris Fraser,
Cinematography
Department,
AFTRS.

Suggestions from Rachel Masters

Shot Angle

Choose something very mundane and ordinary like a garbage can. Shoot the garbage can from as many different angles as you can think of—high, low, standing, sitting, overhead, underneath, and POV from the inside of the garbage can.

When you play the video back, ask yourself, 'How does the angle affect the content?' That is, how does it affect the way you **understand** the shot? Does a low angle make the garbage bin look large, intimidating or imposing? Does a high angle make it look small and insignificant? What does the world look like from inside the garbage can? (Don't forget to leave the lid off—it can get pretty dark in there!)

Depth

What is it that makes television, video and film so interesting to watch? Maybe it really is magic! One could argue that it's the illusion of depth within the frame. The television monitor is only a square box, after all.

An interesting video makes you feel involved, you feel like you go inside the picture, inside the frame. To explore depth, go to a park and videotape a friend walking *towards* the camera from a way-off point in the distance, the point of infinity. Then tape the friend walking away from the camera, starting by entering the frame from behind the camera. View these shots back. Are you exploring the full depth and scope of the frame?

Experimenting with Images

If it's a cloudy day, prop the camera on its end and place a small sheet of glass across the lens. Then gently drop lightweight things on the glass. Try flowers, leaves or even worms! Look at how the strength of the light can make the images on the glass appear almost transparent. How does this influence the audience's point of view of the objects?

Unpredictability

Exciting vision is often unpredictable. Shoot several shots where people enter the frame from different sides. (For example, a head pops up from the bottom of the frame, or two hands come in from the left and right sides of the frame.) Watch your shots back. Have you discovered the six types of screen space? (Left, right, up, down, from behind the camera, coming towards the camera.)

IMAGE ORDERING

How does rearranging the order of the images affect the story?

Editing equipment is very expensive and often in high demand. It's a good idea to try to get your head around the concepts of ordering and sequencing images well before you go into an edit suite.

Here's a game you may have played as a kid. First of all, draw a series of images on single sheets of paper, perhaps a woman on one, a dog on the next, a house, a butcher's shop, a butcher, a bone, a street and a hat.

Now lay the drawings out on the floor. Ask someone to narrate a story using the pictures, and you arrange (*sequence*) the drawings in the order of the story. For example, start with the **butcher's shop**. The *dog* looks through the window and barks at the *butcher*. There's a *woman* wearing a *hat* inside the shop. She feels sorry for the dog and buys him a *bone*. The woman and the dog walk down the *street* together towards the woman's *house*.

Now ask someone else to rearrange the drawings to tell a different story, starting with the **woman**. A *woman* is walking down the *street* when she is chased by a snapping *dog*. A *butcher* comes running out of the *butcher's shop,* brandishing a *bone* like a club to chase away the dog. The feral dog jumps at the butcher and tries to bite him, but only gets his *hat*. The dog runs away.

> One thing to remember about video: if you haven't shot it, you can't edit it. Make sure you're thinking about alternatives both before and during the shoot, and be sure to shoot enough material.

There could be so many different versions using these images. Another could start with the **butcher**. The *butcher* is in his shop. The *woman* is a shoplifter and hides a *bone* for her *dog* under her *hat* when the butcher isn't looking.

Use your imagination—everyone should be able to think of a new story with the same pictures. Some stories may not need all the pictures.

When you tell your story, are you telling it from the point of view of the woman? The dog? The butcher? Are you using an objective or subjective point of view?

STORYBOARDING

Draw up a series of images for a short drama shoot. Explore a range of options. How would it affect the story if you edit the images in a different order?

REVERSING THE ORDER

Another interesting exercise is to attempt to tell your story backwards. Is it possible to begin your story with the last scene? How does this affect the way the audience will interact with your story? Will the audience view your characters differently?

PLANNING A SHOT SEQUENCE

Practise shooting a scene which happens only once. Plan a short video of 60 seconds which will feature a person eating an icecream. The scene starts with the icecream in a wrapper and ends when the wrapper drops in the bin. As the icecream will melt fairly quickly, you'll need to plan the scene carefully before you start shooting—it could get expensive doing reshoots. And everyone has a limit on how much they can eat! Think about continuity during the planning of the shoot. The aim is to show the action without any jump cuts. You'll need to shoot cutaways to link the shots together.

Videotape and Data Storage

Videotape is made using a clear plastic polymer as the base. This allows the tape to be thin, strong and durable.

On one side, the plastic is coated with very tiny particles which are sensitive to magnetism. Videotape manufacturers try to make these particles smaller, more uniform in size and shape, and pack them in more densely. These factors contribute to the quality of the image which the tape is able to reproduce.

The magnetic particles are suspended in a *matrix* or *binder* (if you cook, you can think of it as a sort of batter) which holds them together and keeps them attached to the tape. The degree to which the binder adheres to the tape under varying conditions is another factor in the quality of videotape. Quite simply, if it flakes off, there will be holes in the picture. These missing parts of the image are called *drop-out*.

Tape manufacturers also try to get an optimum blend of materials for their particles—materials which respond more strongly to magnetic fields and which hold that response more faithfully. Each company's 'recipe' is better guarded than Aunt Milly's prize-winning pumpkin scone mix.

When you look at the *emulsion* side of the tape (the side with the coating of magnetic particles), the surface is black and shiny because it's highly polished. Manufacturers aim to make ever better tapes which will cause less and less wear to the record heads of cameras and playback machines.

This side is where the video signal is recorded, but it isn't a 'picture' as we know it. You can't tell by eye whether a tape has a signal on it or not. You have to play it in a VCR or camera to find out.

On the other side, the tape has a fine coating of carbon material. Because carbon does not respond to magnetic fields, this coating helps prevent a bleed-through of the recorded magnetic signal from one layer of tape to the next as the tape gets rewound onto the take-up spool. The carbon is also a dry lubricant which buffers the layers of tape from each other, reduces tape drag and prevents the layers from sticking together.

SVHS Tape

In SVHS tape construction, there's an additional undercoating layer between the polymer base and the magnetic layer.

High charge magnetic layer
Beridox-SHR 0.5 microns

Undercoating layer
0.3 microns

New smooth tape base
14 microns

New back coating 0.3 microns
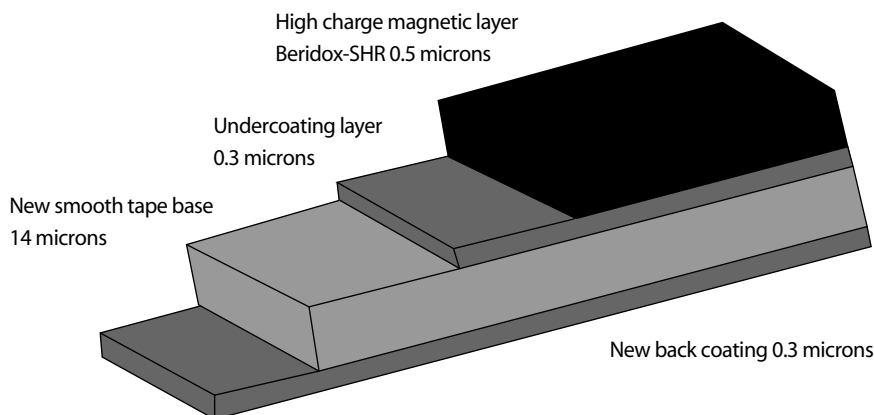
SVHS tape construction is designed to reduce modulation noise and tape drop out. (Courtesy of Panasonic)

Digital Tapes

In digital tapes, both the binder and the micro oxide particles have been further improved. Drop out seems to be much less of a problem with digital tapes.

DLC: Diamond-like carbon coating

• Improved durability
• Protection from
 oxidation

Lubricant
• Improved reliability
• Reduced friction

**Hyper-evaticle:
100% cobalt layer**

• Increased signal
 output

Base film

Back coating
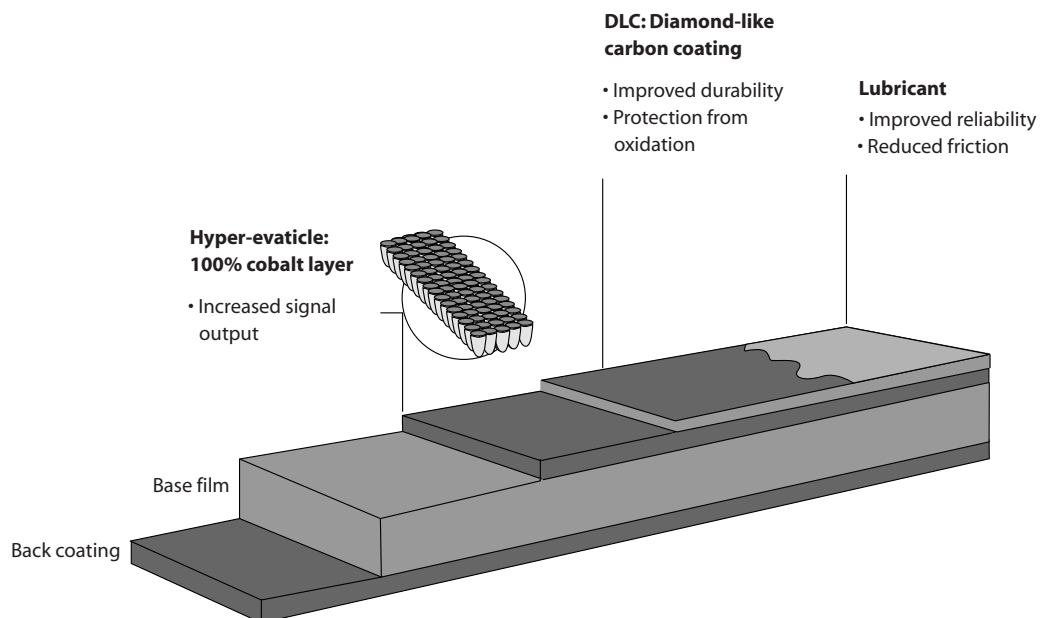
Advanced metal evaporated (AME) tape. (Courtesy of Sony)

There are five layers in Sony DV tape.

1. A lubricant (called the surface preparation layer) which acts as a barrier to oxidisation of the magnetic layer, and reduces friction between the tape and the recording heads and drum.
2. A diamond-like carbon (DLC) layer, which is an overcoat of evaporated carbon, there to protect the magnetic layer which is where the recording is stored.
3. Double metal-evaporated magnetic layer. (Yes, this is where the recording resides, behind the moat of the above two layers.)
4. A base film which is the tape part.
5. Another lubricant, the back coating, to make the tape pass smoothly over the guide pins.

Changes to Videotape Ingredients

As good as they are, digital tapes are not infallible. They are still prone to stretch, dirt, jamming, and can be accidentally erased.

Philip Elms, Media Resource Centre.

The move at present is from metal particle tape to metal evaporated tape. Metal particle tape has the magnetic particles sitting in a mostly non-magnetic binder (matrix), so the layer is about 45 per cent true metal, but Sony claims to have eliminated the binder and come up with a coating that's 80 per cent metal.

Another change is that rather than having the magnetic cobalt mixed with non-magnetic nickel, the advanced metal evaporated tape (AME tape) has a metal grain which is 100 per cent cobalt.

Tape Sizes

Videotape comes in several sizes, which are named in reference to the actual width of the tape:

Requiem for 3/4 inch tape? Vale, dear friend.

1 inch has been used in the high quality, non-portable equipment of broadcast stations and postproduction houses.

¾ inch has been used in both lowband Umatic and highband Umatic (BVU). Though many current video teachers learned on this format, and may remember it fondly, it's pretty hard to get ahold of anymore.

½ inch is the size of the tape used in VHS, SVHS, Betacam and SP Betacam equipment.

½ inch is the also the size for SVHS C (compact) cassettes, but the cassette housing is much smaller. These tapes can play in ordinary SVHS players by the use of an adaptor.

8 mm is the size tape for Video 8 and Hi-8 equipment.
6 mm (actually 6.35mm or 1/4 inch) is the tape width used in consumer level digital camcorders.

Digital tapes come in a variety of tape widths and cassette sizes. Are you ready for a rush of information?

Digital Betacam and *Betacam SX* tapes are the same size tape (½ inch) and cassettes as the earlier Betacam tapes.
JVC digital VHS tapes (D-VHS) are the same size as normal VHS tapes.
Digital-S, JVC's competitor to DVCPRO and Betacam SP, also uses VHS size tapes.
Digital 8 tapes are the same size as those that the Hi-8 cameras take. Backward compatibility means that Digital 8 cameras will also play Hi-8 tapes.
The *standard DV cassette*, which is used in the DVCR (desktop player) and can play up to 4.5 hours, is about the size of an audio Compact Cassette.
The *mini DV cassette*, which is used in DV camcorders, is much smaller and can play for either 30 minutes or 1 hour.

A size comparison of the smaller videotapes: SVHS-C, miniDV, Hi-8 and DVCAM.

DVCAM takes standard DV tapes but runs them through faster and it uses a wider track size, so it records 40 minutes on the 60-minute DV tape and 184 minutes on the large cassette.

The DVCPRO M field tape cassettes are larger than the mini DV tapes, though mini DV tapes can be played in DVCPRO equipment by using an adaptor.

And now for the mind boggling statistic:

By the defined DV standard, one hour of DV video requires 13 gigabytes (13 GB) of storage. So each little 60-minute mini-DV cassette holds 13 billion bytes of data!

The size of the videotape does not necessarily determine the quality of the recording which will be made on it. For example, the Betacam system emerged using a narrow gauge tape, which at a glance looked like the ordinary Betamax, but it passed the tape through the recorder at a much higher speed (six times faster), allowing for a far superior recording to be made. And the Betacam tape itself is a higher quality than Betamax or VHS tape.

Using mini DV tapes in a DVCAM recorder or camera will provide greater quality but a shorter record duration.

Philip Elms, Media Resource Centre.

From the Sony stable of videotapes

Bigger's Not Always Better

Although tape size isn't strictly linked to quality of recording, the smaller size of DV tape, combined with its smoother transport mechanism, means that DV camcorders use less battery power rolling it through the system, and having more battery power is one very definite form of higher quality for anyone doing field work!

Compatibility

A signal recorded on any videotape *format* (size) can be converted to any other format.

It's quite common, for example, to record field material on SVHS or Betacam and then edit it to 1-inch tape.

Signals recorded on home video cameras can even be 'bumped up' to 1-inch and then broadcast, when the TV stations decide the content is sufficiently important.

Broadcast Quality

When people are told their video is not *broadcast quality*, it means that the technical requirements for legal broadcast transmission are not met by that particular tape format. It has to do with the reliability of the timing pulses, for one thing.

For example, VHS is not technically broadcast quality.

But VHS tape can be bumped up, if the decision is made to do so, and the bumped up signal *is* broadcast quality.

In the USA, SVHS and even VHS tape recordings are used in the cable television system, which sends its signal along cables rather than through the air. This signal is therefore subject to less disturbance enroute to the receiving TVs, so it doesn't have to start out with such high standards.

SVHS tape is routinely broadcast through the air in some Pacific Island nations and was used by country TV stations in Australia.

Always keep a *spare* tape hidden in your car. You never know when you'll come across some great video!

Andrew Abernathy, Channel Seven TV.

Sometimes it seems the broadcast quality argument is used to protect the major broadcast players and keep people with less access to high quality gear out of the broadcasting system. There's no doubt that tape footage with a high market value (plane crashes, spectacular fires, crime scenes) becomes broadcast quality quickly enough.

The Videotape Cassette

Videotape is housed in a hard, rectangular plastic cassette, except for some 1-inch tape which is still kept on large open spools.

The cassette has either one or two clear plastic windows on one of its large flat sides. This is the 'top' side when you insert a video into a home VCR. The windows let you see the tape wound neatly around the spools inside, and allow you to judge how much

tape you have used up during your recording session, or whether the tape has been rewound to the beginning or is still at its far end.

A word of caution here: VHS, SVHS, Video 8, Hi-8 and Betacam videotape run through VCRs from the left spool to the right one, if you're looking at the tape as you hold it in your hand to insert it into the VCR. But with Umatic tape, the direction of tape travel is the reverse! It runs through the recorder from the right spool to the left one. Misjudging 'where' the tape is in relation to what's been recorded on it can lead to accidentally erasing something you wanted to keep, or running out of tape partway through your next recording session!

When in doubt, it's safest to rewind the videotape to the beginning and then play it forward in *fast search* mode so you can see where the recorded material ends and the 'snow' begins. Then you can be sure just how much unrecorded tape is left.

Snow is the term used for the random, shifting, black and white dotty image you see on the monitor screen when you're playing a portion of tape which has no recording on it. It's also called *video noise*.

Looking again at the videotape cassette: the 'bottom' side has holes which allow the VCR's tape drive system to spin the tape spools forward or backward in order to move the tape through the machine for recording or playback.

This is *snow*.

Three of the four narrow *standing* sides are solid plastic, and the fourth side (the front) is a bit wobbly. This fourth side is the *door*, which opens when the cassette is loaded into a VCR or camcorder, and through which the tape is drawn out and threaded across the video and audio heads.

At first the door seems unopenable, but that's just to protect the tape from ill-considered prodding.

(Now begins your initiation into the secrets of video.)

Near every door is a little button which pushes in or slides sideways, thus unlocking the door and allowing it to swing upward and reveal the videotape.
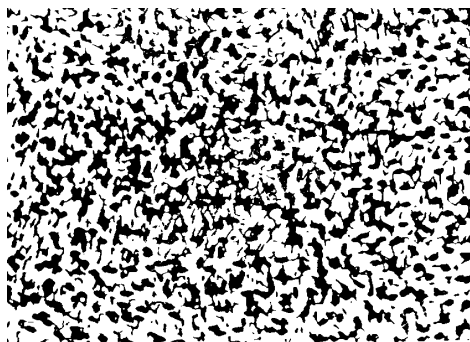
Pressing the little button unlocks the door.

Have a look at your tape if you suspect it's damaged.

Umatic retains its quirks, and has a tiny lever in a hole which you can move sideways with the tip of a pencil or whatever other slim device you have at hand.

The reason you'd want to open up the cassette in the first place is to check if the tape itself is damaged. You might suspect damage if the playback of your recording goes weird, or if you hear unusual (terrifying) sounds when you load the tape into a machine.

It's important not to touch the tape with your fingers, because natural skin oil and dirt will stick to the tape and then get conveyed into your video equipment, generally gumming up the works and possibly leading to dirty heads or even head damage.

If you do find a scratch along the tape, or the bottom or top edge is ruffled, or the tape is wrinkled, you've got problems. Whatever was recorded on that section won't play back properly again.

It's not a good idea to put a damaged tape into a camcorder or VCR. A new tape will cost you less than $20, but repairing fragile heads that got yanked by a wrinkle could cost you hundreds. If the tape is damaged, throw it away.

Retrieving Material From a Damaged Tape

If the tape contains critical recorded material that you can't do without, you can make a copy on some machines using this method:

1. Start your dub of the valuable recording by cuing up the damaged tape on the source machine to a section of tape before the wrinkle, ruffle, scratch or whatever occurs. Then put the source machine into *play* and the record machine into *record*.
2. Press *stop* on your source machine just before you get to the damaged section, and *pause* the record machine.
3. *Press stop, then fast forward* the source machine till you're sure you've passed the damaged part. In *fast forward* mode the damaged tape will not be in contact with the heads. DO NOT use search mode! If you can see the image on the player monitor, you're in search mode, and using this drags the damaged tape even faster across the fragile heads, increasing the likelihood of damage.
4. Return the source machine to play mode when it's reached good tape again, and put the record machine back into record mode to copy the rest of the footage to the end of your video.
5. Then throw the damaged tape away. Or if you're into the unusual, use it for streamers at your next party.

Warning: Some of the newer machines do keep contact with the heads in fast forward and rewind modes—so check out your VCR before you begin this process.

The Smart Cassette

Sony DVCAM cassettes have a new feature. The cassette itself has a memory chip which allows a person to mark shots while out in the field shooting. There's enough memory to mark OK/NG (for *okay/no good*) along with the timecode in and outs, the reel number, scene number, and take number for 198 scenes.

Why? Because when the tape goes back to the edit suite, the computer edit system will then only copy into itself the ones marked good, so no time is wasted in transferring unusable material.

Caring for Your Videotapes

Try Not to Drop Them

Especially onto concrete or other hard surfaces. They're surprisingly slippery little things, especially if you're carrying a stack of them around and they're not in their cases.

> *Scenario: It's late at night, you're trundling out of the edit room, bleary-eyed and brain-fried. A tape in the middle of your armload enters another reality, suddenly auto-ejecting, like an air force prototype, and all the others follow like lemmings in a spasm of catapulting black plastic.*

No, Virginia, this is not *drop-out*.

Though videotapes are made from quite durable plastic, if they land smack on a corner, the corner can sometimes break off.

Trying to salvage the situation by putting your videotape into another cassette housing is a nightmare of flying springs and little metal bits, and can most gently be described as utter insanity.

You don't need that aggravation, nor do you want to risk losing your recorded material.

Keep Them Away From Magnets

The recorded video signal is merely an arrangement of magnetic particles which was caused by passing the tape rapidly through a magnetic field in the recorder. Any other strong magnetic field will *erase* that signal by pulling the magnetic particles into a different alignment.

You may not have horseshoe magnets lying around on your coffee table, but don't forget that televisions, VCRs, speakers, electric motors, power transformers, computers, and other household items generate magnetic fields and might erase your tapes without giving you any warning. Though most home equipment has shielding to keep its magnetic fields from affecting other things, sometimes there is leakage.

Hey, what are those tapes doing on top of your TV?

Keep Them Clean

Dust, cat fur, carpet fluff, pollen, human hair, sawdust, cigarette smoke and ash—think of all the airborne particles that could stick onto a videotape.

Wherever something has stuck onto the tape, it prevents the playback heads from reading the video signal properly, causing drop-out to occur. Drop-out shows up on your monitor screen as a white spot or line where there should be signal information. The more drop-out there is, the more degraded the image is.

This is drop-out.

Drop-out also occurs with old tapes which are flecking off bits of their magnetic coating layer (emulsion). This sloughed-off magnetic material gets deposited inside your VCR and makes a mess.

The dirtier the tape is, the dirtier it will make your VCR. Soon you'll be unlucky and some little particle will get caught in the gap at the heads. This is called a head clog.

Occasionally you can fix a head clog by running the tape forward and backward a few times in search mode. This can sometimes dislodge the offending particle and send it on its way.

If it doesn't, you'll need to get the heads cleaned. That costs.

Another thing is that clean tapes used after a dirty tape can pick up residues waiting to ambush them along the tape path in your VCR, so you could end up damaging a prize tape by being careless about what you played before it.

One of the hazards of video rental tapes is you never know how dirty they are, or 'where they've been'.

Grit and sand, due to their size and sharpness, can actually slice into a videotape as it runs through a machine.

So don't set your unprotected tapes down on grass, dirt, sand, shedding carpets, and so forth. Don't put one down on a counter where there was a sugar doughnut a minute ago, or where someone was just spooning out the coffee.

Thank goodness this was just a dub and not the master!

Keep Them Cool

Heat can damage tapes. The temperature in a closed car in the sun can reach over 50°C (120°F).

A risky place to put videotapes is on the shelf beneath the rear window of a car. If it's not hot that day, it may be the next, and what if you forget them there?

Keep Them Upright

Have you ever seen what happens to a roll of cellophane tape which has been left on its side for a long time? Gradually the tape droops downward from the spool, morphing from a flat reel to a cone shape.

A videotape left on its side can suffer from tape droop, too. Then when you put it into a VCR to play it, the tape isn't lined up right for the tape path and it can get edge damage, which will knock out your sound track or more.

So videotapes should be stored standing upright, like books on a shelf, or stored on their spines (which makes it easy to read their labels if they're kept in a drawer) but never lying flat on their large surfaces—or gravity may take them to an altered state.

Rewind Them After Use

Always rewind the tape after use, as this prevents it from getting a bend in the middle of the program material.

The Quality of a Videotape

Tape is sold for wildly different prices from one store to the next. In some cases this is because large businesses can buy in bulk and pass on the discounts to their customers. But other times it's just plain baffling to the beginner—why pay more, when you can get it for less?

The answer is that tape is marketed according to the quality of the tape itself, and also the quality of its cassette housing.

There are some extremely cheap videotapes—no-name brands which show up in bargain basements—which have cassettes of such poor construction that the reels don't turn properly. These can make terrible noises when loaded into a VCR, and you can use your imagination about how smoothly their tape would travel through your equipment. If you ever get one of these, take it as a lesson in life, make a note of what it was called, throw it out, and never buy one of them again.

With the better known and established brands of tape, the main thing that enters into the manufacturer's quality control of any particular format is the reliability of the coating. No tape coating is absolutely perfect, but some tape is coated more smoothly and successfully than other tape.

Wherever there are irregularities in the coating, there may be drop-out. So tape is graded according to drop-outs per metre. Cheap tape has more drop-out than tape of a higher grade.

But grasping the true meaning of a tape's grading can be hard at first because tapes are labelled with a confusing array of names. A basic rule of thumb is this: if the tape has the word 'standard' in it, it's a lower grade tape. Even if it's called 'Super High Grade Standard', it's still in the standard category. That brand of tape is economical and satisfactory for taping programs off-air for once-only viewing.

> Please use quality videotapes! Not rubbish from the supermarket.

Peter Watkins, Educational Media Services, University of Western Sydney.

But if you're putting the effort into going out and taping material for an edited program, you should use a high quality tape.

Your best image will always be your *field footage*, i.e. your original recording. Everything after that, any copy or edited version, will be less good because it will be down at least one generation, maybe two or more.

One frustrating part of videomaking is that you can't make a poor image better. So you should be sure you start with the best possible tape quality so you'll have the best possible originals (masters) you can get.

When you're editing your rough cuts (your various trial versions in which you experiment with different edited sequences to see what works best) you can economise by using cheaper or recycled tapes.

But of course when you do your final version, your fine cut, you should always use a high quality tape.

Going Down a Generation in Video

When you record an image with your camera, this recording is called *first generation*.

When you make a copy of this first generation image, the copy is called *second*

generation. If you make a copy of the copy, the new recording is called *third generation*. And so on.

Have you ever had much to do with a photocopier? You know how when you make a copy of a copy, it's never as good as the original? And if you make copies of copies of copies, straight lines start to go curvy and the image bears less and less resemblance to the first one?

Well, with video it's similar but worse—each generation is less good than the one which came before. With formats like VHS, third generation is visibly degenerated from first generation.

If you think of the normal process of making an edited project, you'll see how important thinking about generations is.

1. First generation is the tape you recorded your location shoot on.
2. Second generation is the version you produced through the editing process—it's your edit master. But after 30 or so hours of editing, you'd be mad to give away your edit master. So you make copies of it.
3. Third generation is your distribution copy.

Now if third generation is noticeably less good than first generation, how smart would it be to edit something into your program which was from a dub (copy)? It would be fourth generation video by the time it got to your distribution copy. Fourth generation VHS video is a wretched excuse for a signal.

Other tape formats hold their quality longer through the generations. Umatic is better than VHS, Betacam and 1-inch are even better.

The utopia for video editors is the video which is absolutely transparent through the generations. This is one of the many halos around digital technology.

Protecting your Recordings

Once you've made your recording, whether it's your field footage (otherwise known as your *camera originals*) or your final edited tape, you won't want it to be accidentally erased.

This is where the infamous red button comes in! With Umatic tape ($\frac{3}{4}$ inch), if you turn the tape cassette over, you'll see a little red button. It's removable. If you take the button out, the tape cannot be recorded on again. VCRs just won't be able to go into record if the red button is missing. So always remove the red button at the end of a recording session.

If you later want to record on that tape, just pop the red button back in, and the tape is no longer record-protected.

The obnoxious thing is that if you go to do an edit session, or use a recycled tape, you may find that the cassette has no red button. Then you're stuck. It's a good idea to always keep a spare red button in your wallet for just those times like when you drive 100 km to a shoot, and then find out that the red button isn't in the tape.

If you're working with VHS and SVHS, there's a little plastic tab at the back of the cassette. If you break off the tab, the recording is protected. To reuse the videotape, put a piece of masking tape across the gap.

Sometimes the bit of tape falls off when it gets old, and finds a new home in the guts of the camera or edit system. So it's a good idea to check if it's about to drop off before you put the videotape into a machine. If the tape patch is on the verge, replace it.

Emerging Formats

DV25 is the current standard, which records 25 megabits of data per second (25 Mbits/sec).

Emerging standards include:

- DV50 which records 50 Mbits/sec. Its quality is very high. It uses 4:2:2 colour sampling and a lower compression rate of 3:3:1.
- DV100 which records 100Mbits/sec. This is the standard which is expected to be used for HDTV (High Definition Television).

Data Storage Systems

CDs (Compact Discs)

Video can be stored as digital data on a CD. One of the problems with CDs is that they don't play back the same way on different computers.

A CD has 525, 650 or 700 megabytes of memory. It can hold only seconds of uncompressed video, so CDs use a significant compression rate in order to deliver an effective amount of video.

CDs are likely to phase out because DVDs can hold so much more information.

DVDs (Digital Versatile Discs)

DVDs hold much more bandwidth than CDs. Current DVDs hold 4.7 gigabytes, which is roughly seven times what a CD can hold.

New DVDs will hold 27 gigabytes, and probably more as time goes on.

DVDs also can stream video out faster than CDs can.

In order to output your digitally edited video to a DVD, you need the right software. IDVD does this at a basic level, and DVDPro does it at a more professional level.

A DVD can hold more than seven times the data that a CD can.

There's no standard in DVD. As long as you stay within one platform it's fine, but go to another and it won't always play.

Rob Davis, Editor, Digital Dimensions.

Copy Management

Copy management is the term given to the issue of people making illegal copies of digital material. What it comes down to, partly, is that movie makers don't want people copying movies. So manufacturers of digital equipment have been pressured to develop an encryption system which prevents copying. There has also been a demand for a geographical playback restriction, too, so DVDs released in one country can't be played back in another.

Getting Technical Information

The Internet is awash with technical information, *if you know where to look*. Some of the websites of the major video manufacturers are aimed highly at consumers, and the techo sites are harder to find. They're there, but you have to dig a bit. A Sony technician told me about this one, and I was pleased with all the topics I could read about. Of course one always has to mentally allow for the advertising embedded in the text!

But if you want to know the latest, which no published book can possibly give, try looking at sites like:

<<www.sel.sony.com/SEL/rmeg/mediatech/>>
<<www.smap.sony.com/websites/RMETech/index.html>>

A sample of topics available on one day:

> Data Media No.1 Top Ten Reasons to Back Up. Backup Basics: Your OS. The Affordable Backup Solution. Helpful Hints.
> Data Media No.2 The Clear Facts on CD-R. The Optical Road Ahead.
> Professional Media No.1 DVCAM Tape: The Foundation of the Format. DV versus DVCAM Tape: Is There Really a Difference?
> Professional Media No.2 The Clean Machine: Your Key to High-performance Audio/Video. The Chemistry is Just Right: Sony's CLQ-30K.
> Professional Media No.3 Take Special Care When Shipping D-1 and D-2 Large Cassettes. Helpful Hint: Watch Out for the Terminator! Don't Forget Sony's Recommendations. Here Comes HDCAM™!
> Professional Media No.4 MD Data Goes Multitrack. A Sneak Peek at MD Data's Future. ADAT™ and DTRS Meet Their Match. Helpful Hints.
> Professional Media No.5 New Alternatives in DVCAM™ tape.
> MSC Training Center Issue No. 8 MagicGate™ Memory Stick Media®: The Versatility of Flash Memory.
> MSC Training Center Issue No. 9 MPEG IMX™ Recording. Entry Into the World of MPEG.

You can also contact Sony with your technical questions using their MEDIAFAX ™ PROGRAM, which is a fax-back system for quick answers to routine questions.

7 The Video Signal

The video signal makes use of certain characteristics of the human eye. One of these is *persistence of vision*.

When light enters the eye, the lens focuses the light onto the retina, which is a light-sensitive surface on the inside of the back wall of the eye. The retina has many light receptors, called rods and cones, which are excited by the incoming light. These rods and cones send a message about the incoming image to the brain, via the optic nerve.

Because the rods and cones stay excited for a small amount of time after they've been triggered off, a new image presented to the eye will activate the retina before the old image has disappeared from it.

If several images, each slightly different from the one before, are presented rapidly enough, the eye will blend the still images together in such a way that the brain believes it's seeing a smooth and continuous change from one to the next. It will believe it's seeing motion.

Both film and television make use of this persistence of vision to give the viewer the impression of moving pictures.

In film, the viewer is shown 24 frames (complete pictures) per second. In video, the frame rate is slightly faster. In the PAL video system (used in Australia, New Zealand, the UK, China, and much of western Europe) the frame rate is 25 frames per second, as it is with SECAM (France, Russia, and the former Eastern Bloc countries). NTSC (used in North America, Japan and much of South America) is 30 frames per second.
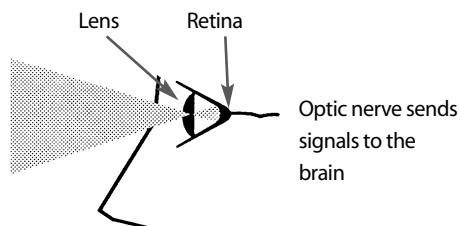
Light information registered upon the retina is sent to the brain.
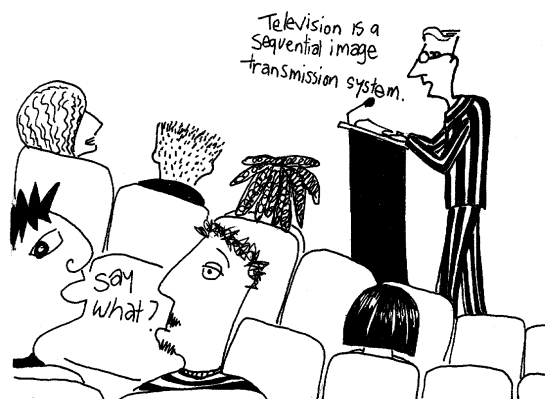
Television is a sequential image transmission system.

What is a Frame?

A *frame* is one complete picture.

The term comes from film, where you can actually see each separate and complete frame (picture) by holding a strip of processed film up to the light.

But with video, though the word still means one complete picture, the technology is different, and the picture is composed quite differently.

The Video Frame

Each video frame is actually made up of many horizontal lines of picture information. In the PAL and SECAM video systems, it takes 625 horizontal lines of picture information to make up one single frame of video. In NTSC it takes 525 lines.

Produced by

The Australian Film, Television & Radio School

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AFTRS
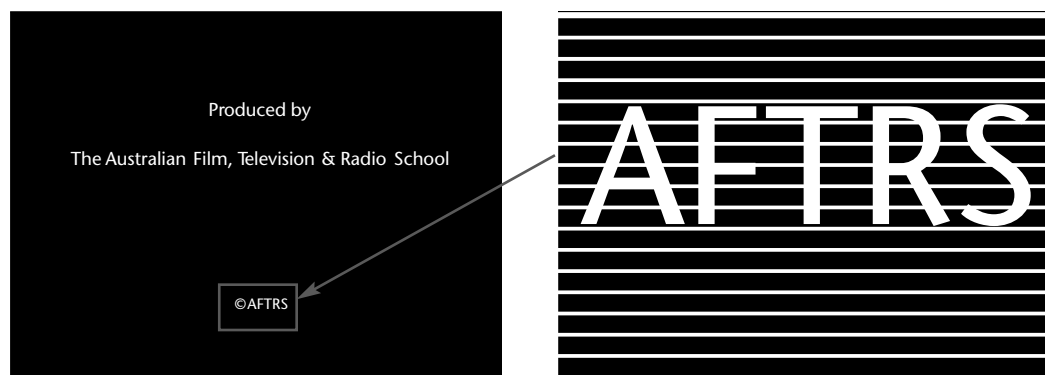
The video image is made up of a series of horizontal lines of picture information.   Enlargement of detail

The line structure of the video image relies on a second characteristic of our eyes, a phenomenon called *geometrical integration*. This is the inability of our eyes to resolve (see separately) extremely small details. So we don't see 625 (or 525) separate lines. Instead, our eyes blend the tiny lines together and we think we're viewing one whole, unified picture.

So with many lines in each frame, and many frames in each second, we're tricked into thinking we're seeing whole images actually in motion. (In a way, video is a double con.)

The Making of the Video Signal

With video, light is reflected off the objects in front of the camera and it enters the lens barrel. It passes through the lenses and is focused on the CCD (charge coupled device) which is the light-gathering surface of the camera. This surface is *photosensitive*, which means it responds to the light which comes into contact with it.

Light travels through the lens system to the image-gathering surface of the CCD. It's at the light-gathering surface that the light is converted into a video (electrical) signal.

In the CCD, the picture is imaged on the 'A' register. At each vertical interval, the entire charge image is transferred to the 'B' register. During the next field, the image is clocked out line by line through the 'C' register. To avoid smearing during the charge transfer, a shutter is used.

lens

image area (register) A

image area (register) B

Output C
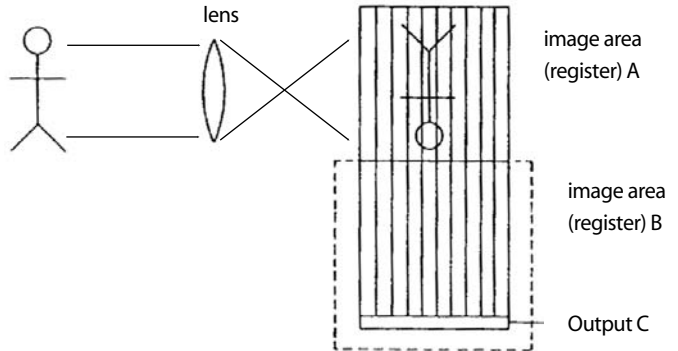
The CCD is often referred to as a *chip*. Some cameras have only one CCD, and others are three-chip cameras. In this case, more IS better.

The Horizontal Scanning System

A scanning system allows the camera to electronically survey the image on the light-gathering surface, and produce a stream of electrical information about it, structured into a series of *horizontal lines*. Each line captures a different horizontal sweep of the image, and holds information about the brightness and darkness, and the colour, of that section of the image.

Bright areas cause more electricity to flow, and darker areas cause less electricity to flow.

Though at first this may seem a strange way to assemble a picture, you may find it easier to grasp this scanning process by comparing it to the way our eyes read words on a printed page. We can't take in all the information typed on a page at once, so our eyes move from the left side to the right side of the page along a line of type, then return to the left side, shift slightly downward, and travel from the left side to the right side again, and so on till all the lines on the page have been scanned.

In the same way, the video image is constructed of 625 (or 525) horizontal scan lines, which, all put together, make one complete picture.

Fields

Each frame of video is divided in half, into what are called *fields*. So there are two fields in each frame. Each *field* is made up of half the horizontal scan lines—but not the top half or the bottom half.

The first field is made up of all the odd-numbered lines of the frame (lines 1, 3, 5, 7, and so on) and for this reason it's known as the *odd field*.

The second field is made up of all the even-numbered lines of the frame (lines 2, 4, 6, 8, and so on), so it's called the *even field*.
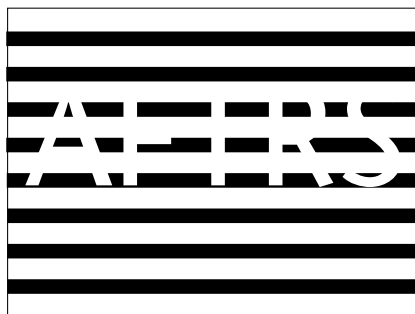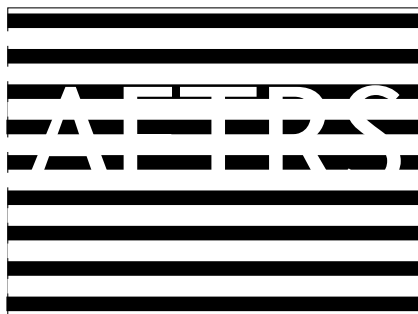
Two fields make one complete frame of video.

Video uses a *line interlace* system, which means that when the frame is reassembled, a line from the first field is followed by a line from the second field, and that's followed by a line from the first field, and so on.
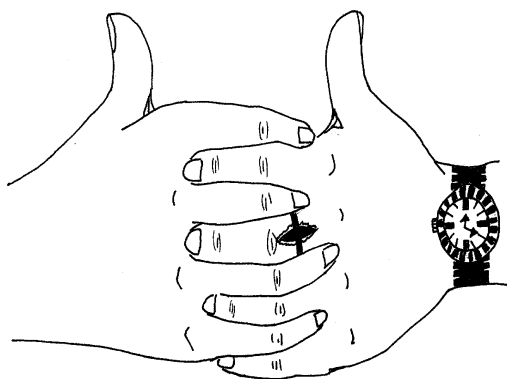
The lines of the two fields interlace, like these fingers, to form one complete frame of video.

You may wonder why anyone would bother inventing such a silly-seeming system. But by presenting each video frame as two separate fields, this doubles the apparent image presentation rate. So instead of seeing 25 (or 30) complete frames in a second, we see 50 fields (or 60 fields) which are half frames, in a second. Again our eyes are tricked, and the prize for this effort is that the image doesn't seem to flicker.

So video is all based on visual tricks, if not smoke and mirrors.

That steady steady image is:

Motion from stillness;
Wholeness from stripes;
And all done without flicker.

Horizontal Retrace (Blanking)

After each horizontal line is scanned, there's a brief period in the video signal which is called *horizontal blanking*. The blanking period is needed to allow the scanning beam to fly back across the screen to the starting point of the next horizontal line. During horizontal blanking the scanning beam is *visually suppressed*, which means the viewer can't see any trace of light from the scanning beam while this happens during replay.

Horizontal Synchronising Pulse

The *horizontal synchronising pulse* (or h.sync pulse) is what keeps the time for all this horizontal scanning. Each line has to be scanned at exactly the same speed, in exactly the same amount of time. So this little pulse effectively tells the horizontal scanning system, go NOW, go NOW, go NOW.

Horizontal scan line
—

Horizontal retrace
· · · ·
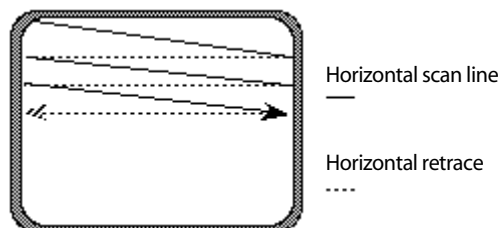
Vertical Retrace

At the end of each field, there's a different brief period of time in the video signal, which is called the *vertical retrace*. This is when the scanner quickly returns to the top of the frame to begin the first horizontal line of the next field. The vertical retrace is also *visually suppressed.*

Vertical Synchronising Pulse

Just as with the horizontal scanning, there has to be another electronic 'drummer' which keeps the beat for the start of each field of video. Every field has to be exactly the same length of time as every other one, or the image couldn't be replayed properly. This pulse is known as the vertical synchronising pulse (or the v.sync pulse). I bet you guessed that one!

odd field   even field

1
3
5
7
.
.
.
.
.
625

625
2
4
6
.
.
.
.
624

Vertical retrace
in odd field

Vertical retrace
in even field
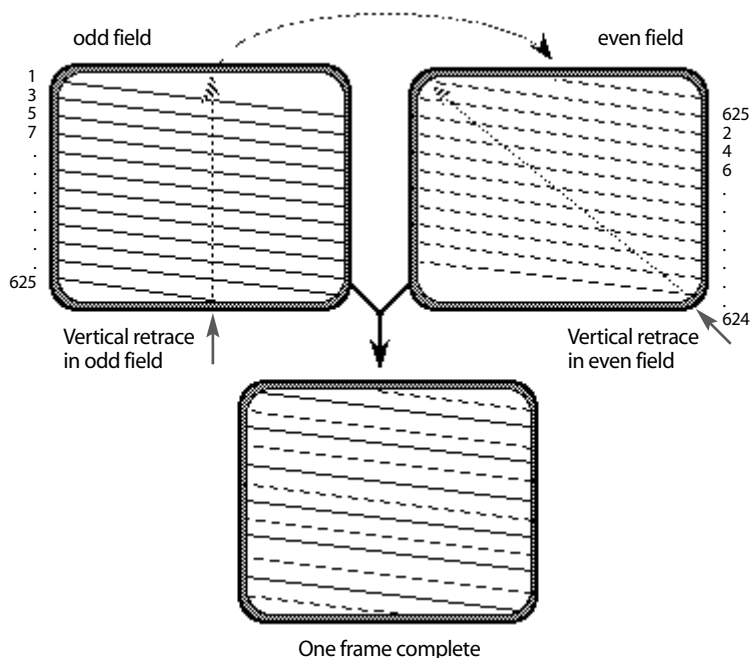
Now you detectives can see the solution to the horizontal scanning problem caused by the very minor sloping of the horizontal scan lines: The missing half line at the bottom of the odd field occurs at the top of the even field.

One frame complete
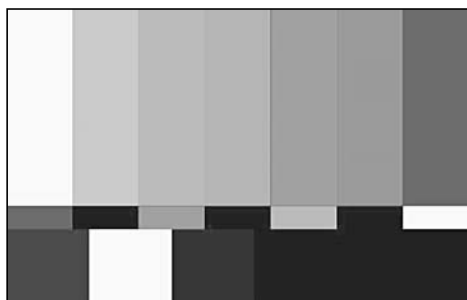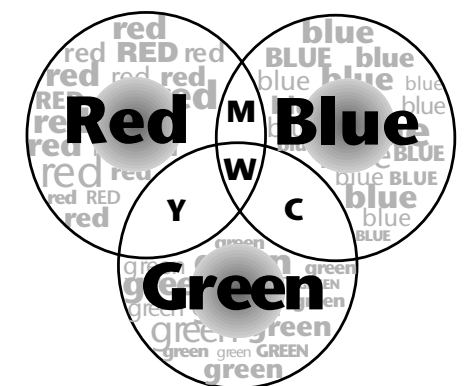
From left to right: White, yellow, cyan, green, magenta, red, blue. Black is at the bottom.

Colour

The three primary colours in video are red, green and blue, not red, yellow and blue, as you learned about the primary colours of pigments in preschool.

Sometimes you may hear people refer to the *RGB*—well, they're talking about the components of the colour video signal—Red, Green and Blue.

Additive Colour Mixing

Video colour is the result of additive colour mixing. This means that the three primary colours (red, green and blue) can be combined in various percentages to produce all the other colours. Surprisingly enough, green and red produce yellow!

Colour Bars

You may have noticed that these primary and secondary colours are the same as appear in *colour bars*, the test signal used for lining up a signal in preparation for recording or broadcast.

Colour Variables

The three variable characteristics of the colour signal are referred to as luminance, hue and saturation.

Luminance

The term *luminance* refers to brightness. When a colour is very luminous, it approaches peak signal level (it can appear white). When it's very non-luminous, or dark, it approaches the black level of the signal.

Hue

The term *hue* has the meaning which we generally understand for the word 'colour'. That is, red, green, blue, yellow, and so forth.

Saturation

The term *saturation* refers to the richness of the colour present. Pastel colours are less saturated than vivid colours.

Lines of Resolution

Lines of resolution is a term which is easy to confuse because of the other use of the word 'lines' in the phrase *horizontal scan lines*.

But *lines of resolution* refers to the number of **vertical** lines (black lines on a white background) which the camera can show distinctly. Because the scanning action of the camera's picture sensor goes horizontally across the frame, this measurement is referred to as *horizontal lines of resolution*. No wonder people get confused! It just means how many **vertical** lines can be resolved (clearly shown) in the horizontal sweep of the scanner.

The term is used to designate the degree of sharpness of the video image, the amount of fine detail which can be seen, and one of the ways cameras are rated is by their *lines of resolution*.

If all this seems like gobbledygook to you, just remember that yet again in this case, *more is better*. (In life, this is not always true.)

Hi-8 and SVHS formats are said to have about 400 lines of resolution. Digital camcorders claim about 500 lines of resolution. (They also have better colour accuracy.)

Resolution

More recently, because of the change to digital, the capacity for fine detail in a screen is measured by *resolution*. This concept is pretty similar to the *lines of resolution* idea used in analog.

Because digital images are produced by the glowing of *picture elements* (or *pixels)* in horizontal rows, the potential quality of an image is measured by how many pixels are there. It makes sense that the system can't produce more detail than its total number of pixels, since each pixel can only do one thing at a time.

So resolution is figured by listing the number of pixels in the horizontal sweep, times the number of horizontal lines there are altogether (or the vertical measurement, if you will). This method produces figures like 640 × 480 and 720 × 480. Got the idea? (Again, the more is better theory is alive and well.)

World Television Standards

There are three major television standards in use around the world and, wouldn't you guess it, they're incompatible with each other. A PAL tape won't play on an NTSC recorder or monitor and vice versa, although there are now dual standard VCRs and monitors which can play back both PAL and NTSC. Multistandard VCRs and monitors play PAL/NTSC/SECAM. They don't record in more than one signal form, though.

This has hindered our ability to send video to friends overseas, and has been very frustrating.

To change video from one standard to another has involved a signal conversion, which has been costly to buy and results in some loss of quality.

The end results are noticeably better when going from PAL to NTSC than when going from NTSC to PAL. You can easily see why. PAL to NTSC means shrinking from 625 horizontal scan lines per frame to 525 h.s. lines per frame, but when you go the other way, how can the system invent 100 more lines?

Because colour is handled differently in the three systems, and is far less stable in NTSC, some very weird results show on PAL TV screens from video imported from NTSC sources.

Budget Standards Conversion

For non-professional use, people sometimes record the picture off a monitor, using a camera of the desired standard. Though this method yields a flickering picture, it's the low cost way to make personal tapes playable for friends and family overseas.

The audio part of the signal can actually be copied directly from the source, by connecting *audio out* from the player VCR to *audio in* of the recording camera. By doing a direct line copy, you'll get a better quality sound transfer than you would by taping it from the monitor speakers, and you won't pick up noises from the room in which you're recording.

But be aware that you're likely to have to cut the audio signal level down, because *audio out* is a *line level* signal and the camera's input is likely to be a *mic level* input. You can convert the audio signal from line level to mic level by using an *audio pad* or running your sound through a portable mixer.

Commercial Standards Conversion

If you're sending a tape overseas for commercial use, you need to get it transferred to the appropriate signal using proper standards conversion equipment. The bigger video duplicating houses often can do standards conversions. The price for these is coming down, but it's still expensive. The first tape costs the most, but if you're getting several dubs (copies) made, the unit price goes down.

However, digitising the signal and exporting it as a Quicktime file, or as an MPEG2 file, has made international video sharing much easier and much better viewing, too.

Although many countries will be converting to broadcasting digital signals in the upcoming few years, the transition will take time and countries won't always prioritise changing their TV standard in the light of far graver health and nutrition problems.

So for the indeterminable future, you may find the following list to be still applicable. This information was supplied by the wall chart distributed by Video 8 Broadcast in Artarmon, NSW, Australia.

There are many different forms of HDTV, but it's only the progressive scan format that allows full backward compatibility with other HD formats and standard definition formats like PAL and NTSC, both widescreen and 4:3.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

PAL (Phase Alternate Line)

The PAL signal's frame is composed of 625 lines, and the signal runs at 50 Hz, which is 50 fields per second, 25 frames per second.

PAL is used in Afghanistan, Algeria, Andorra, Angola, Argentina, Australia, Austria, Azores, Bahrain, Bangladesh, Belgium, Bosnia and Herzogovina, Brazil, Brunei, Cameroon, China, Cook Islands, Croatia, Denmark, Ethiopia, Finland, Gambia, Germany, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jordan, Kenya, North Korea, Kuwait, Laos, Lebanon, Lesotho, Liberia, Macedonia, Malaysia, Maldives, Malta, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Papua New Guinea, Paraguay, Poland, Portugal, Qatar, Romania, San Marino, Montenegro, Serbia, Seychelles, Sierra Leone, Singapore, Slovenia, Somalia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Tanzania, Thailand, Tonga, Turkey, Uganda, United Arab Emirates, United Kingdom, Uruguay, Vanuatu, Vietnam, Yemen, Yugoslavia, Zambia, Zimbabwe.

SECAM (Système Electronique Couleur Avec Memoire)

The SECAM signal's frame is also composed of 625 lines and the signal runs at 50 Hz, which is 50 fields per second, 25 frames per second.

SECAM is used in Albania, Armenia, Azerbaijan, Benin, Botswana, Bulgaria, Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of Congo, Egypt, Equatorial Guinea, France, Gabon, Georgia, Greece, Iran, Iraq, Kazakhstan, Kyrgyzstan, Latvia, Madagascar, Mali, Mauritania, Mauritius, Mongolia, Morocco, New Caledonia, Niger, Russia, Rwanda, Saudi Arabia, Tajikistan, Togo, Tunisia, Turkmenistan, Ukraine, Uzbekistan.

Both PAL and SECAM

Cyprus, Czech Republic, Djibouti, Estonia, Ghana, Lithuania, Luxembourg, Monaco, Senegal, Slovakia, Syria.

NTSC (National Television Standards Committee)

The NTSC signal's frame is composed of 525 lines and the signal runs at 60 Hz, which is 60 fields per second, 30 frames per second.

NTSC is used in Antigua and Barbuda, Bahamas, Barbados, Belize, Bolivia, Burma, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Ecuador, El Salvador, Fiji, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, Jamaica, Japan, South Korea, Marshall Islands, Mexico, Micronesia, Nicaragua, Palau, Peru, Philippines, Puerto Rico, Suriname, Trinidad, United States of America, Venezuala.

Why Are There Different Television Standards?

The history of this variation in television standards goes back to the politics and trading patterns of the immediate post-WWII era, when television broadcast stations were first being set up around the world. Unfortunately, those patterns (divisions) deeply affected the ability of the world's people to communicate with each other via television.

NTSC was developed in the USA and, as you can see, was the system purchased by many of the countries within the USA's post-WWII political sphere of influence.

PAL was developed in Germany, SECAM was developed by the French. Both are better signals than NTSC because they have more lines in the frame (thus more information in the image) and the colour is more stable. The PAL system was adopted by most countries, with the exception of France, the former USSR, many of the other countries in the former Eastern Bloc and some Arab countries, which adopted SECAM.

The principles of television production presented in this book can be applied to all the television systems listed above.

Monitors

A video monitor looks like an ordinary television set, but it's unable to receive the signals broadcast through the air by television stations. It can only receive video and audio signals directly through cables, as from a camera or VCR. These signals enter connection points at the back called *line in,* or *video in* and *audio in*.

A receiver/monitor is a more flexible piece of equipment which can receive both types of signals. A switch allows you to select for viewing either broadcast television signals (RF, which means *radio frequency*) or direct-line video and audio signals.

Monitors and receiver/monitors are most commonly used in video and television production sites.

As you probably know from your home experience, it's also possible to replay a videotape through an ordinary television receiver, when the VCR is fitted with an *RF converter*. Home models normally have these, though for industrial models they can be an optional extra.

The *RF converter* changes the video signal into a radio frequency (RF), and it can travel out of the VCR from a connection point labelled *RF out* and into the TV at a terminal labelled *RF in* or *antenna in*, or via the TV aerial terminals labelled *VHF.*

The RF unit usually sends a signal which can be received on channel 0 or channel 1 on your TV. If you select one of these channels and the signal appears there but it isn't clear, adjust the fine tuning control on your television.

If you're having problems when trying to play a tape back through a monitor, check the connections between the VCR and the monitor to see if they've been made to the right connecting points. Misconnections are often the problem—and it's not always easy to read the labels on connecting points which are at the back of bulky, hard-to-shift pieces of equipment.

If misconnection isn't the reason, check whether the connections are loose and whether the *leads* (cables) are damaged. Leads are most likely to be faulty at the point where the flexible cable attaches to the metal connector. Sometimes you'll have an intermittent fault, which is caused by a lead which isn't fully broken so it works in one position and not in another. That's where tape or clever propping techniques come in handy! (At least in the short term.)

With a receiver/monitor the problem can be simply that the TV/VCR switch is in the wrong position. Make sure it's on TV if you're connected to *RF in*, and on VCR if you're using *video in* and *audio in*.

Video and Film

Do you remember that film is shown at 24 frames per second?

Because of the difference in frame rates, film and video aren't perfectly compatible.

Sometimes people transfer film to PAL video using variable speed projectors and speeding the film projection up to 25 frames per second. This works fairly well, though it causes a minor shift in the audio.

In NTSC, with its 30 frames per second, the difference between video and film is greater, so trying to speed up the projector yields a more drastically altered screen product.

Transfers from film to television are made using a device called *telecine*. Telecine equipment corrects for the difference in frame rate between film and video.

Craig Dingwall, Jim Spencer and Christina Sparrow with the telecine machine used at ScreenSound Australia, the National Screen and Sound Archive, Canberra, ACT, Australia.

Thanks to Ernst Hadenfeld for his help in the preparation of this chapter.

8 Recording the Video Signal

How Does Video Recording Happen?

The beginning of the process is the same as for television transmission. The video camera's image-sensing mechanism scans across the incoming image in a series of horizontal sweeps, and translates this image into a stream of electricity.

It represents the brighter areas with a higher voltage of electricity and the darker areas with a lower voltage.

This stream of electricity travels through the camera's signal processing circuits and then is output to the recording mechanism which resides within the camera's housing, in the case of a video camcorder, or through a camera cable or a BNC cable, in the case of a studio record machine.

The Head Drum

The record heads are very small and mounted on the outer edge of a circular, polished metal *head drum*. This drum spins rapidly during the recording process. In digital video the drum spins at exactly 9000 rpm for PAL and SECAM, and roughly that for NTSC.

In record mode, the videotape is laced up tight against the head drum as
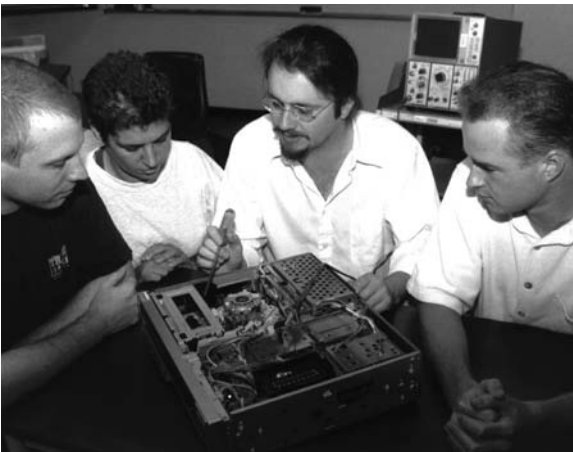
Alistair Jackson, Technical Training Officer, with Broadcast Engineering Trainees, ABC, Sydney, NSW, Australia.

it travels along the recording pathway in its journey from one reel of its cassette to the other reel.

Because the videotape is moved across the head drum in the opposite direction from the spin of the head drum, this produces a very high *tape-to-head speed*.

The video head drum spins in the opposite direction to the tape travel.

The tiny video head is mounted at the base of the head drum.

The Record Head

Each record head has a tiny gap in it. Across this gap, an electromagnetic field forms, which fluctuates according to the video signal being sent to the head.

Getting the Signal Onto the Tape

Remember how the tape is coated with tiny particles that are sensitive to magnetism? What happened when your primary school teacher brought out the horseshoe magnet and the jar of iron filings? (It was your teacher's finest hour in science.) After dramatically sprinkling a pile of iron filings onto a sheet of white card, the large magnet was placed underneath the card and moved this way and that. Wherever it was, the iron filings stood up like the hairs on a frightened cat, and if the magnet was moved around, the filings went too.

Video recording happens in much the same way.

As the videotape is drawn across the record heads, the tape moves through the electromagnetic field at the head gap and the sensitive particles on the tape respond to the magnetism present. They get realigned into a distinct pattern, according to whatever is happening at the heads at that microsecond. That pattern is the picture information.

Once the tape has passed away from the record heads, the particles are outside the range of the magnetic field, so they stay put in their new pattern. That new pattern is the *recording*.

Electromagnetic signal

It all happens at the gap

Record head
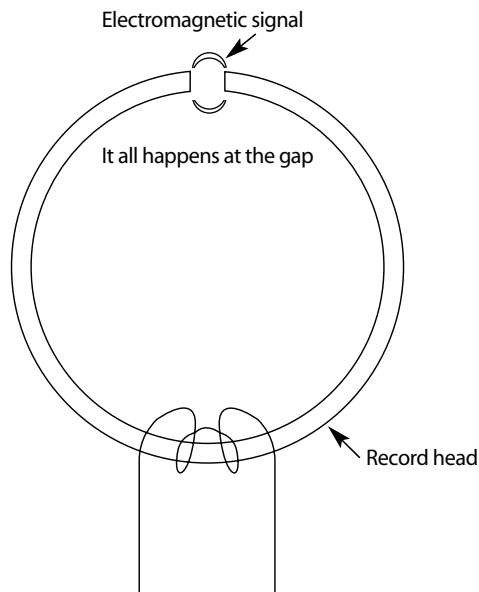
Are Two Heads Better Than One?

In video, two heads are essential!

In the basic recording system, there are two video heads, mounted exactly opposite each other on either side of the head drum. One head records the odd field and the other head records the even field.

So it takes one complete rotation of the head drum to record a single frame of video.

The tape is held in place against the head drum assembly by tape guides, and one or the other of the record heads is in contact with the tape at any given time.

Head for odd field   Head for even field
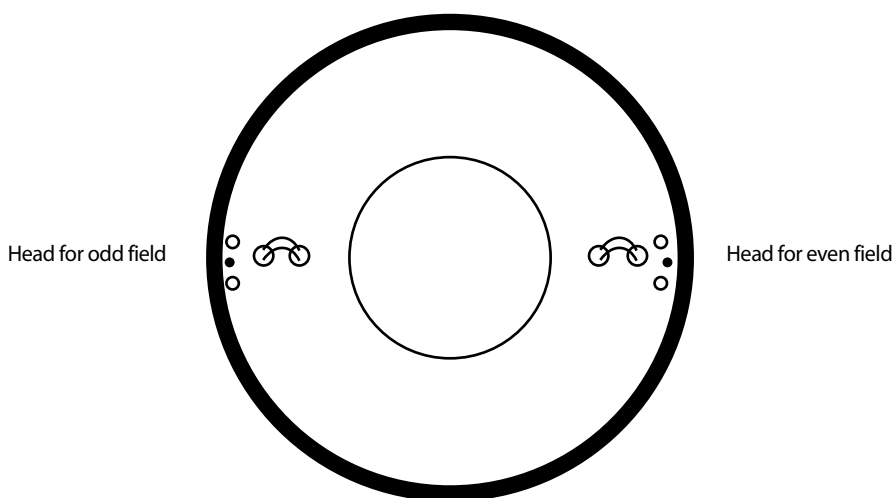
The two heads are mounted on opposite sides
of the head drum.

SP and LP

If the recorder you're using has four heads, it's most likely that it has two different recording speeds: SP (standard play) and LP (long play).

One pair of heads is active during the recording of the signal at the standard play speed (in which you'll get an hour of recording on a one-hour videotape), and the other two heads are used for the long play speed (in which you can get double—or more—the recording time onto the same sized tape).

LP is a great speed for taping long programs, where the quality of the recording isn't too critical.

Many people like to use LP for taping full length feature films off-air, because they can get the whole film on one tape, and quality isn't an issue because they know they're going to erase it after one viewing anyway. They're not planning to ever use the material in a video production.

> Avoid shooting in Long Play mode. It's really a false economy as it sacrifices quality and may reduce editing possibilities.

Philip Elms, Media Resource Centre.

But it's quite different if you're taping material for your video project. You see, the edit systems only work in standard play speed (SP). So if you tape in LP, you'll find that the serious interview with your school's top administrator plays back much faster on the edit system than it happened in real life, and he's sounding like Donald Duck. Now regardless of how funny this seems, perhaps because of what *you* think of the person, such a recording is a problem because the only way you can edit the material is if it's in SP.

If you do discover one day that you have this problem, you can either reshoot the interview (not always possible, or politically advisable) or you can copy the footage onto another player, into SP. But that puts you down a generation with your edit source tape, and the original LP recording was a lower quality one to start with.

It's easy to get trapped by not noticing that the recorder was left in LP, so teach yourself to check the record speed indicator on the VCR as part of your set-up procedure.

Flying Erase Heads

Another type of head mounted on the head drum is the *flying erase heads*. They can't record anything, though. They're positioned right beside each of the video record heads, and their job is to erase, field by field, each diagonal track of video information when the recorder is put into insert edit mode.

DVCPRO is the Hydra of video cameras, with six heads, two for recording, two for erasing and two for playback.

Panasonic DVCPRO

Helical Scanning

The tape travels along a pathway which is at a slant in relation to the head drum, so the video heads inscribe each field as a diagonal track of magnetised particles. This method of recording video in diagonal lines of information is called *helical scanning*.

Helical scanning allows the recording of lots of video information in a more compact space of tape than was possible with the earlier quadruplex recording system.

Tape guide   Video record head
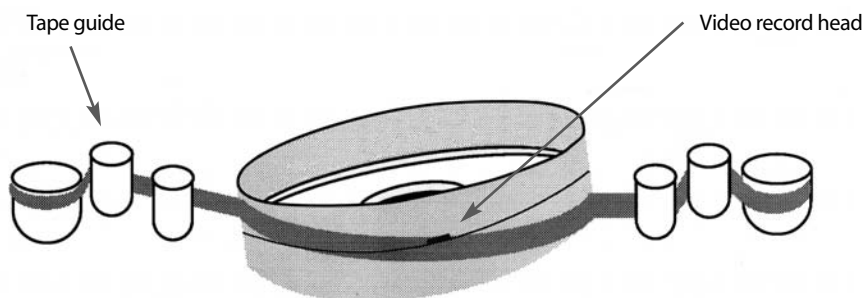
As the tape is drawn across the head drum, the video heads pass across the tape at a high speed, magnetising the magnetic particles on the tape into a pattern of diagonal tracks.

The Tracks on the Videotape

With VHS and SVHS, there are four signal tracks recorded on the videotape.

The Video Track

The video track takes up most of the width of the videotape. It needs to because there's so much information involved in reproducing the picture signal. The video is recorded in diagonal stripes across the width of the video track, one stripe for each *field* of video in analog tape. These stripes are also called *tracks*, so here's another instance of a word being used in two ways.
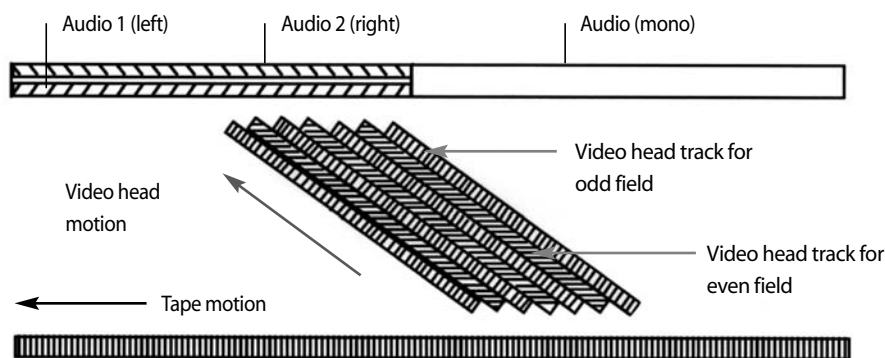
With VHS, channel 1 (also called the *left channel*) is the inside audio track.

Normal Audio Tracks

The *normal* audio signal is recorded in two slim tracks along one edge of the tape. It's recorded by *fixed* audio heads (*stationary heads*), which means the heads don't move. The audio heads are positioned further along the tape path, past the video heads.

The normal audio signal track is *longitudinal*. This means it's recorded in one straight path, not in diagonal sections like the video signal. This works because the audio signal needs less space for its information.

Audio on Video 8 and Hi-8

Video 8 and Hi-8 both record audio within the video track space. They have either one or two types of audio, depending on the model. Some models have mono or stereo AFM audio, which is recorded along with the video signal. Other models also have PCM audio (which is digital sound) which is recorded in the bottom 1/5th of the track space allocated to the video signal.

So with Video 8 and Hi-8, you never have to worry about which is the inside track!

The Control Track

The *control track* is video timing information that ensures that the video signal is replayed correctly. It's a series of electronic pulses recorded by a fixed head located next to the audio heads, at the rate of one pulse per field of video.

The control track also allows the edit system to count the frames on a tape as they pass by, thereby enabling the edit machine to return to your specified edit points when you ask it to do a preview or an edit.

Digital video doesn't use a conventional control track, but has pilot tones imbedded in the data tracks.
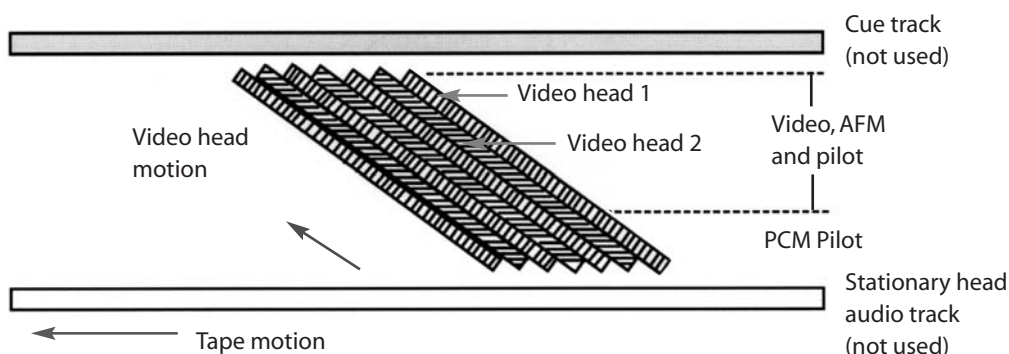
The Video 8 format uses ATF instead of the usual control track.

Automatic Track Finding (ATF)

Video 8 and Hi-8 don't have a longitudinal control track like the other formats do. These formats use a system called *automatic track finding*. ATF records a repeating sequence of four pilot tones within the video track. These tones identify the video signal position to the playback equipment.

Hi-Fi Audio

Some video equipment records *hi-fi audio* in addition to normal audio. Hi-fi audio is a more recent form of audio recording for videotape. It's recorded in the same track space as the video signal, and it's recorded at a much higher speed than longitudinal audio is. Therefore it can record a better quality audio signal.

Hi-fi audio is recorded as an FM signal within the video track space. It's recorded in diagonal tracks, like the video signal is, but the tracks are at a different *azimuth* (angle) than the video tracks, to prevent interference between the two signals. They're also recorded at a different *tape depth* (a different level in the magnetic coating) than the video signal.

Timecode Track

Another track which can be recorded on the videotape is a timecode track.

It sometimes has an *address track* dedicated to it. Other times, time code is recorded in one of the longitudinal (normal) audio tracks, or incorporated within part of the video signal.

A   Video and audio (hi-fi stereo)
B   Index, RC time code and data code
C   PCM audio (stereo)
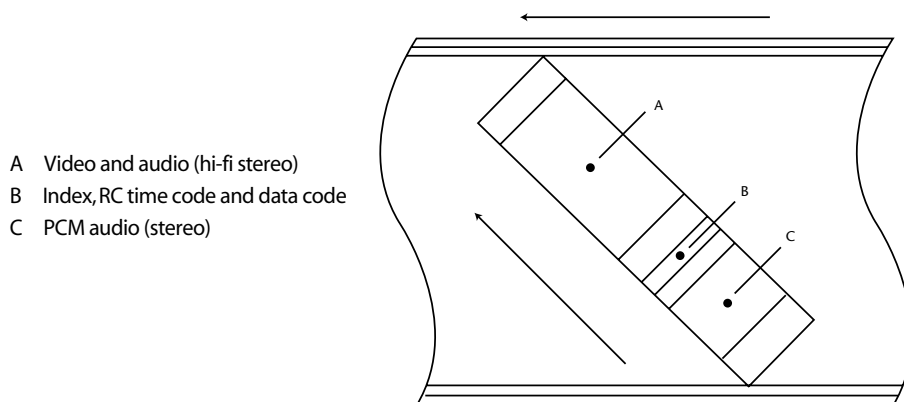
Some models of Video 8 and Hi-8 record both time code and index pulses in a segment between the video recording and the PCM (digital) sound recording.

Audio 2
Audio 1
Luminance tracks
Video head motion
Chrominance tracks
Tape motion
Control track
Time code
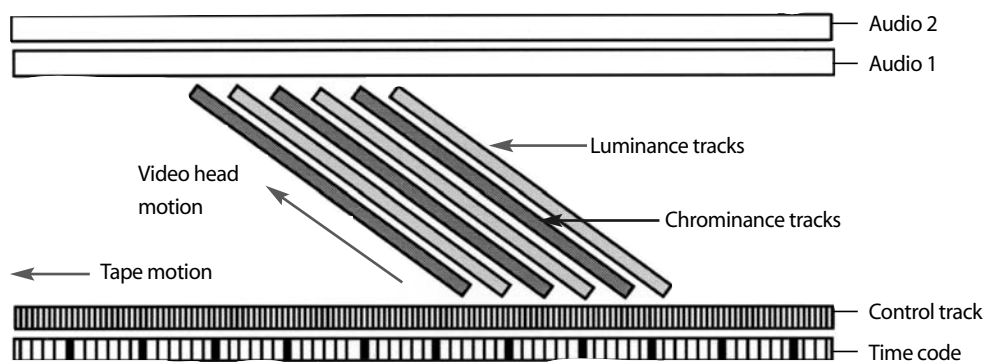
On Betacam, the time code track is next to the control track.

Tracks on a Digital Recording

In a digital recording, the tracks are much thinner and closer together. Instead of tracks which are 58 microns wide, as in VHS, the tracks in a digital recording are 10 microns wide. As a reference, the width of an average human hair is 100 microns. This example is intended to help you visualise the tininess of the size of the tracks.

In digital recordings, the tracks are still inscribed using the helical scanning method, but the angle (azimuth) of the diagonal tracks is much steeper. This allows increased head-to-tape speed.

In digital formats, in an effort to increase commonality between NTSC and PAL/SECAM, the track (stripe) laying has been altered. NTSC uses 10 tracks (diagonal stripes) to make one frame, and PAL/SECAM use 12 tracks to make one frame.
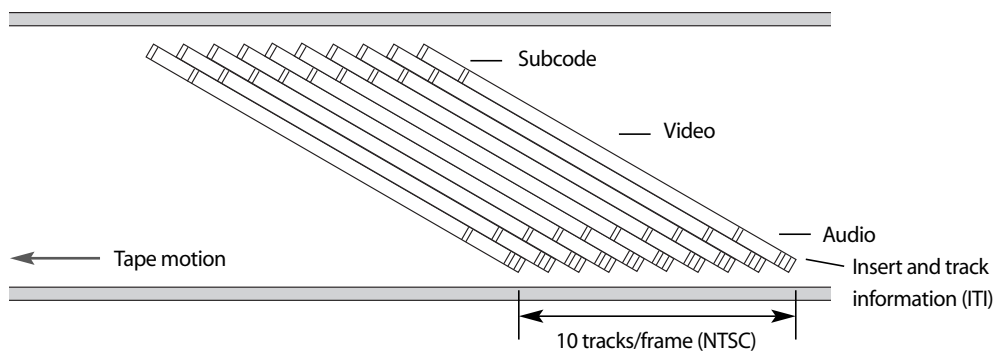
Frame sequence for digital recording in NTSC.

There are 10 tracks per frame in NTSC, this is known as the *frame sequence*. PAL/SECAM use 12 tracks per frame.

Helical Track Sectors

In digital recording the helical tracks (or diagonal stripes, as I have called them) are divided into four *sectors* (which means sections). These are:

The insert and track information sector (ITI)   In this section of the helical track there's information on track status, and it also functions like a conventional control track during video insert editing because the pilot tones aren't accessible when in overwrite mode.

The audio sector   The audio sector contains both audio and auxiliary data (AAUX). DV allows either two 12-bit (nonlinear) stereo channels or one 16-bit stereo channel.

The video sector   The video sector contains both video data and auxiliary video data (VAUX). The video data is compressed at about a 5:1 ratio. The auxiliary data recorded is information about the camera settings, like lens aperture, shutter speed, date and time, and colour balance.

The subcode sector   This is where the timecode goes, and lots of other things you might never imagine, like teletext, closed captioning in several languages, program identification, subtitles and karaoke lyrics in many languages!

The Digital Recording

It is claimed that DV systems mask drop-outs, and eliminate tape noise and chroma artefacts. These have all been signal blemishes with VHS, SVHS, Video 8 and Hi-8. The digital Cinderella is expected to eventually vanquish her older-format stepsisters.

An international *specification* was developed to define just what consumer-use digital video was. It was defined as recording at a fixed compression rate of 5:1, which is similar to intraframe (within frame) MPEG.

But because manufacturers can decide how their compressor will work within their cameras and recorders, there's variation in image quality from one camera to another. Different camera chips also lead to different results. So generalisations about digital recording are just that, generalisations.

> Before starting a job, find out how it will be finished. Converting between different formats can introduce artefacts which can degrade the image.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

It's claimed that the digital recording format in the prosumer level video cameras is mounting a challenge to the higher priced traditional ENG (electronic news gathering) cameras. This may be true, but it must be remembered that the quality of the lens on the front of the camera is another important determinant of image quality. There has to be some reason to pay a much higher price!

Record and Replay

In record, as the tape passes over each of the video heads, magnetic fields generated at the head gap rearrange the magnetic particles which are impregnated in the videotape. These new arrangements, or patterns, are the recorded signal.

When the tape is replayed, this procedure is reversed. The same video heads *read* the patterns of oxide on the tape, convert this information into an electrical signal and output it to the monitor or television, which reconverts it on the front screen to a pattern of light and darkness, producing a viewable picture.

Because video heads can both record and play back, they're referred to as *read/write heads*.

The television (or monitor) is like an inverse camera, with a photosensitive surface at the screen. The camera's original scanning process is repeated by the television to reproduce the horizontal lines

Video signal in

Electron gun

Electron beam

The video signal is changed back to light at the television screen.

of picture information which are stored on the videotape, this time changing the signal from electricity back to light at the TV screen.

The Big Picture

The light from the TV screen is sent off across the room and into our eyes. The process then repeats itself within our eyes—light is focused onto the retina and is changed into electrochemical impulses which are sent along the optic nerve and received, interpreted and recorded by the brain.

Tracking

Tracking simply refers to whether the video heads, in playback, are moving exactly along the pattern of video signal tracks that are on the videotape.

If the player is tracking correctly, the video reading heads pick up the full strength of the video signal recorded on the tape, and the VCR sends a strong and accurate signal to the TV or monitor.

If the player's heads are tracking slightly to the left or right of the diagonal tracks of the recorded video signal, the heads can't pick up a full strength image, and the VCR sends a flawed signal to the TV or monitor. This is called a tracking problem, and it looks like there are ragged white lines across the video image. A mild tracking error causes a slight disturbance of the picture, a major tracking error makes the picture look terrible.

Tracking can be corrected using the *tracking* knob on the VCR. Just turn it to the left or right until the image on the monitor looks the best. (This little knob is often hard to find on home VCRs, to keep people from moving it without deliberately meaning to.)

Some VCRs have tracking meters which show when the VCR is tracking the best it can on the videotape in question. There's a normal variation in

A tracking problem can be minor or major.

tracking from one machine to another. A tracking error doesn't mean there's anything wrong with your video. It just means the playback equipment needs adjusting.

On machines which read hi-fi audio (like SVHS), correcting the tracking also affects the sound, because hi-fi audio is recorded in diagonal stripes in the video track, and these require correct tracking as well.

If you're playing back a tape on which you recorded hi-fi sound, and you can't hear a thing, adjust the tracking to hear if the signal's there or not before you panic.

If you're playing back a digital tape, you won't find a tracking knob. There's no way an operator can adjust tracking in digital video. That's in the mysterious province of the technician's internal adjustments.

Tracking and Editing

It's especially important when you're editing to make sure that the player machine is tracking the signal on the source tape as well as possible.

The tracking knob could have been adjusted by whoever used the edit system before you, so it could be in quite a different position from what's suitable for your tapes. It's *never* a good idea to edit from a signal which is below par from the start.

Because a slight tracking problem isn't always visible on the playback monitor, be careful to check the reading on the tracking meter before you begin editing anything from the player.

The tracking meter is often combined with the audio VU meter for channel 2. A little button will switch the meter from displaying the audio signal to displaying the tracking strength. Put your field tape into play mode and then manually adjust the tracking knob

so the needle is peaking at its highest possible point. This may take a little fiddling. And the tracking function needs to be in manual mode for anything to happen.

If your tape is tracking very irregularly, it may be best to set the tracking to *auto*. If your tape is this erratic, it could be a good idea to get the camera or VCR that recorded the signal checked by a technician.

Tracking in Record Mode

By the way, the tracking knob has no effect at all when a VCR is in record mode. This is because the machine is making the tracks at that stage, rather than trying to read them.

Dirty Heads

If the horizontal white lines or picture disturbances don't go away when you adjust the tracking, the problem could be dirty heads. This means that some dirt or fluff or other material has become lodged in the gap of the video heads. Occasionally you can fix a head clog by running the tape forward and backward a few times in search mode. This can dislodge the offending particle and send it on its way. If not, the heads need to be cleaned to get rid of it.

If one head is completely clogged, the monitor will only be showing one field of video, which is every other horizontal line of picture information. If both heads are clogged, the image on the screen will be snow.
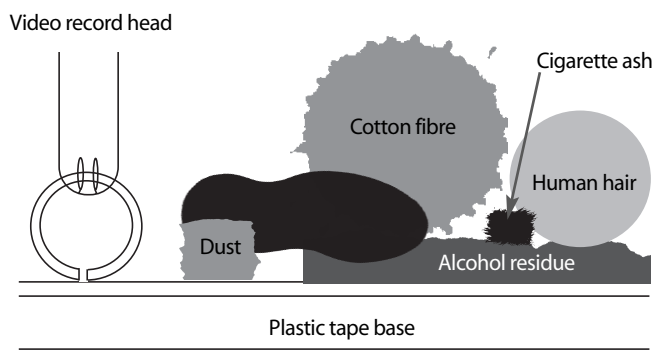
Watch out—lots of little things can clog the video heads.

Because the gap is much smaller on the heads used in digital recording, clogged heads are much less common, but still possible. Because the digital signal is laid down with more tracks per completed frame, head clogs show up as bands across the picture, rather than as a fuzzy or missing picture.

Head Cleaning Tapes

There are head cleaning tapes available. Technicians generally advise people not to use them, because they're abrasive and can damage the record heads.

If you use a commercial head cleaning tape, be sure to follow the directions carefully, and don't assume that if running it for 10 seconds in your VCR will be good, then 20 seconds will be better.

If you have persistently clogged heads, they will have to be cleaned manually by someone who knows what they're doing, and who has the right head cleaning fluid and chamois or non-fibrous cleaning tips to use.

Cotton buds are a bad choice for cleaning video heads because the cotton fibres themselves can get caught in the head gap, compounding the problem.

When cleaning video heads, it's easy to damage them if the cleaning implement is moved up and down, perpendicular to the direction of the head travel. Hold the cleaning material stationary against the heads and rotate the head drum backward and forward by hand.

Ian Clark, Maintenance Technician, AFTRS.

9

Analog Video Editing

Video editing is a process of electronic copying.

Analog editing requires two VCRs, linked together. The first one plays the video signal that's on the source tape and sends it through a connecting cable to the second one, which records the playback signal only when it's told to do so.

The first VCR is called the *player* and the second one is called the *recorder* (or sometimes the *editor*).

When the editing is finished, the original tape is still whole and has all the same material on it that it started with. That's one of the beauties of working in video—you can edit material from the same tape again and again, possibly reusing your

Editing at the Tin Sheds, University of Sydney, Sydney, NSW, Australia.
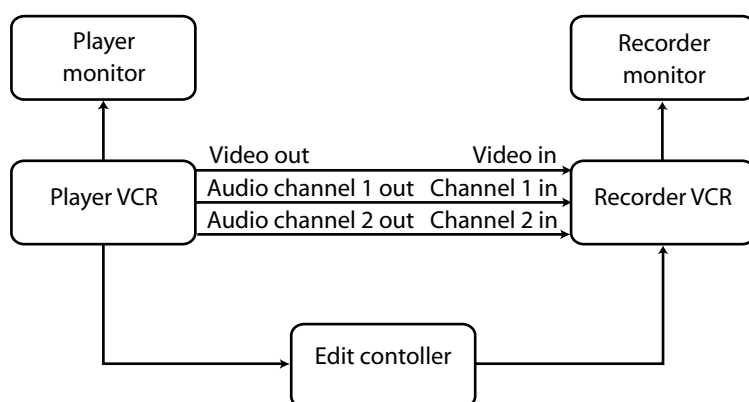
Edit system configuration

great shots in several different programs over a period of years, and you still have your original tape intact.

> Video editing is not like film. You can't cut the tape into pieces.
>
> **Steve Morrison**, University of Western Sydney, Nepean.

An Overview of the Process

Editing is an interplay of two types of tasks. There's the conceptual and the button pushing.

First you *view* and *log* all the source material you've gathered to use in your video project. This might include video from several different tapes, computer generated titles and images, photos transferred to videotape and possibly even film transferred to tape.

Then you *select the shots* you'll use, and decide on the order in which you'll use them. At this stage you're trying to fulfil the needs of your script. But don't be too rigid. You may have some wonderful shots you didn't anticipate, and more than likely there will be some shots you're missing. So this is a time for flexibility, creative adaptation and some adventuring, as you try to make the most of what you've got.

The next phase is in the edit suite, doing a *rough cut* from your *work dubs*, the copies you've made of your field material. This is the first edit of your footage. (It should not be your last! Just like you'd never submit a first draft in writing as an article for publication, you should never expect your first cut in video to be your final cut.)

Matthew Gleeson and William Thrupp, SQIT College of the South West, Roma, Qld, Australia.

Once you've done your rough cut, have a break, and then you and the rest of your team should **look at this first version as if you're the intended audience**. If possible, you should also get some other trusted people to view it and comment on it.

Many things will show up in a rough cut. Some shots won't work next to each other, some shots just won't work at all (be ruthless, get rid of them!), some points you thought you were making won't come across to the audience, and often the pacing of a few sequences will be wrong. (Pacing is an aspect that's especially hard to judge when you're editing a tough section for hours, because you're not seeing it in real time or in the context of the entire piece.)

After you've taken on board what everyone has had to say, try to improve your product. Rearrange sequences, get more footage if necessary, adjust the voiceover to explain things more clearly. Make the editing snappier, improve the flow of the sound. You may do one, two, three or more additional cuts, still working from your work dubs.

Show the rough cut to your team members and get their opinions. Debra Kroon with students at Northern Territory University, Darwin, NT, Australia.

At last, when you're satisfied that you've got it as right as you can get it, then you edit your *fine cut*, from your camera originals. This is your *edit master*—your show piece.

If you have a choice in edit systems, always book the best edit system you can get your hands on when you do your fine cut. This way you should get the best quality edit accessible to you, and face the least likelihood of damage to your camera originals.

Three things the editor has to keep in mind about each cut:

1. *Content* (what's in the cut).
2. *Context* (what cut precedes this one and what cut will come after it).
3. *Contact* (how long to keep it on the screen before the next cut).

Danny Sheehy, Queensland School of Film and Television.

Another caution: stick to only one system when doing your fine cut. Different systems have slightly different tracking and if you move between two or more edit suites you may end up with a master which needs tracking adjustments in the middle. That's not exactly a good situation for any playback, but especially bad for your big screening—the person doing playback can't be expected to do tracking adjustments on the run.

Once your fine cut is complete, take the red button out of it (if it's Umatic) or pull off the plastic tab (for VHS or SVHS) so no-one can accidentally erase it. Then make a copy of your fine cut right away, and use the copy for showing your project to others.

Keep your fine cut, labelled as such, in a safe place and use it only for screenings and for generating distribution copies.

Logging

First of all, you need to know what's on each videotape, and where on the tape it appears, so you can find it quickly when it's time to edit.

To do this you make a list of everything usable that you have on tape, recording the counter number or timecode number for the beginning of each shot, along with a description of that shot. This is called *logging*.

A log should also indicate the quality of your visuals and audio, and any other information which is relevant to you.

Paper Logs

It's useful to design a log sheet which suits your type of video work, and then make a stash of photocopies. You only need to give general tape information on the cover page for each videotape log, the following pages can simply give counter numbers and shot details. As long as you staple the pages together, you'll have the extended information at hand when you need it. If you carefully file away your logs, you can reuse them later when you're trying to refind material for another project.

Here's a sample log sheet:

Project: PUPPY LOVE   Tape#: *3 (out of 5), SVHS*

Produced for: *Newtown Animal Shelter*

Contact: *Tim Chapman*

Phone: 2222 9999   Date shot: *26, 28, 30 April 2003*

Director: *Sky Cooper*

Camera Operator: *Sarah Lord*

Sound: *Gareth Jones*

Equipment used: *JVC X1 camera, Sennheiser 416 microphone*

General comments: *Very good footage, 3 minutes of snow between 2nd and 3rd day's shoot, skateboard used for tracking*

Counter #	Take #	Use?	Video content	Video Quality	Channel 1	Channel 2
1:30	—	Yes	Child enters	good	none	buzz
2:05	1	No	Dog jumps on chair	poor focus	low	low
3:10	2	Yes	Dog jumps on chair	good	okay	okay
3:50	—	*Yes!	Child pats dog—zoom to focus on hand on fur	great	okay	okay

Shotlister

A few media centres have a computer based data-capture system called *Shotlister*, which was developed in Australia by Digiteyes.

Shotlister allows you to capture the *timecode* at the start of each shot on your source tape by simply tapping the P or R key on a keyboard. You type in a description of each shot as you go, and build up your log as a computer file which you can then save to disk, and of course print out or reuse at any point.

When you do your rough cut, Shotlister automatically keeps track of the in and out points of both the video edits and the sound edits. No

Logging on Shotlister from Digiteyes. (Courtesy Digiteyes)

matter how many times you change your shots around, you always have an up-to-date list and a graphic display of how your video and audio cuts relate to each other.

Later on this computer data can be turned into an *EDL* (edit decision list), stored on disk and taken to an on-line suite for use in editing the final cut.

The Tracks on the Tape

The signal tracks on a videotape can't be seen by eye, but they're quite obvious to the edit system, and if there's anything wrong with them you'll certainly find out about it!

There are four tracks on VHS and Umatic videotapes. The widest is the *video track*, which is the middle one. It carries the picture signal in diagonal stripes, one stripe for each field of video.
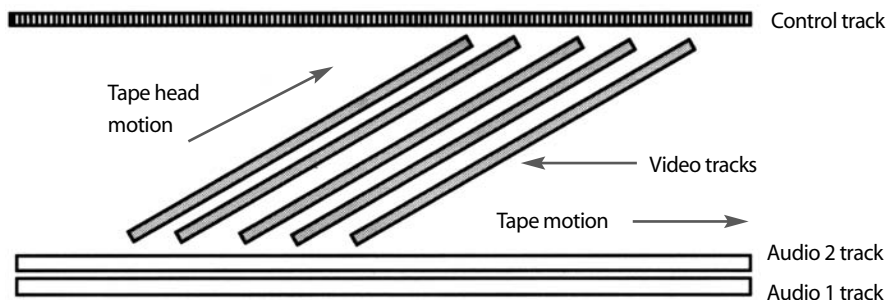
The signal tracks on Umatic tape.

On one edge of the tape, next to the video track, is the *control track*. You may never have heard of a control track before, but from now on it will rule your life! Or so it seems, some days.

The control track is a series of pulses, one for each field of video. The pulses are identical, and they have no numbers connected to them.

The control track is recorded at the same time as the video signal, and it has two purposes. It tells the VCR when each field of video starts, so it can play back the signal correctly. And the edit system counts the control track pulses in order to tell where it is on a tape, and to refind edit points after the tape has been shuttled to another position.

> Think of a control track as the foundation of a house. Once laid, the rest of the construction can be added.
>
> **Philip Elms**, Media Resource Centre.

When editing your project, you'll need to have a continuous, unbroken control track on the tape that is your edit master (see Striping the Tape, later in this chapter).

On the other edge of the tape there are two thin stripes which carry the sound in *longitudinal audio tracks*, called channel 1 and channel 2.

On Umatic tape, channel 1 is on the outside and channel 2 is on the inside.
On VHS tapes, channel 1 is the inside track.
On SVHS, channel 1 is the inside track.
On Video 8, no longitudinal tracks are used for audio.
On Hi-8, no longitudinal tracks are used for audio.
On Betacam, channel 1 is the inside track.

Whatever system you're using, you always record your most important audio on the inside track, just in case your tape gets edge damaged.

Think about it: it's less of a catastrophe to lose the recording of your voice asking the questions than it is to lose the answers given you in that once-in-a-lifetime interview you scored with a superstar.

Hi-Fi Audio

Besides longitudinal audio tracks, some of the better video formats can also record hi-fi audio. This high quality audio recording requires more tape space, so, surprising as it seems, it's recorded in the same large track as the video signal. It's recorded in diagonal strips, at a different *azimuth* (recording angle) and a different *tape depth*, so the sound doesn't interfere with the video during playback.

There's no doubt that hi-fi audio is better quality than longitudinal audio.

But there's a hitch in the system—you can't edit hi-fi audio without editing the video as well, since they're both on the same track.

This causes problems like: you can't lay down a song in hi-fi audio and then edit pictures to it. You're restricted to converting the hi-fi audio to longitudinal audio if you need to separate pictures from sounds.

Timecode

Timecode is a video frame numbering system. With timecode, every single frame of video has its own number assigned to it and recorded with it on the tape.

There are two types of timecode:

Longitudinal Timecode (LTC)

Longitudinal timecode gets its name because it runs along the length of the videotape, either in one of the longitudinal audio tracks along the bottom of the videotape (sometimes called audio timecode) or in a special separate track running along the top (sometimes called address track timecode).

LTC is inexpensive to generate, record and read, so it's more likely to be found in facilities with tighter budget considerations.

LTC can be added to a tape after the video has already been recorded, so it's often used in connection with half-inch and Umatic formats. Of course, if you plan to put timecode onto a source tape, you need to leave one audio track free for that purpose.

If you plan to use timecode, be certain to put all your field audio onto the other track!

The worst mistake is to record some of your audio on channel 1, and then some other audio on channel 2. If you've done that, you can only put on a continuous timecode by erasing the audio on one of the channels—never a desirable situation.

On Betacam and Hi Band Umatic, timecode is striped onto a dedicated timecode track, *track 3*.

Timecode is read from left to right as hours, minutes, seconds and frames. For example, a tape with 07:02:30:05 means: hour 7, minute 2, second 30, frame 5.

READING THE CODE

The hour of your timecode can be read by your computer off-line system as the reel number. This coding is only of value up to the 23rd reel, however, as the 24th hour will revert to 00.

USER BITS

User bits are separate from timecode. They're a constant value, set at the same time as the timecode. A computer edit system can automatically read user bits as reel numbers. User bits are especially useful when you have more than 24 source tapes, because timecode reel numbers can't go beyond 24.

VERTICAL INTERVAL TIMECODE (VITC)

Vertical interval timecode is recorded in the video track as an integral part of the video signal (in that black bar you see between the frames). Therefore, it **must** be recorded at the same time as you record your video.

Some cameras, like SVHS, Hi-8 and Betacam have timecode recorders built into them. Take care to set them correctly at the beginning of your shoot, so you don't get two tapes with identical codes on them, and also don't forget to set the timecode generator to run during recording.

People can also get timecode inserted into the video signal when they're 'bumping up' their images to a better quality tape format, like SP Betacam or 1-inch.

Timecode Burn-in

A *timecode burn-in* is when the timecode is recorded in visible numbers onto the video image. This, of course, is only done to work dubs. Burn-in numbers can be read no matter where you're viewing the tape, rather than just on the timecode reading device connected to an edit system. So burn-ins are useful for logging at home, or planning a cut without having to sit in an edit suite. Burnt-in timecode cannot be read by a computer. It's a visual reference only.

Unlike control track, timecode has the benefit that the number assigned to each frame always remains the same, which is extremely useful in logging and in finding the right shot when you're editing on off-line systems.

Timecoded tapes are essential when editing in a computer-controlled on-line suite.

Timecode burn-in can be put anywhere on the picture, but it's usually put on the bottom.

Edit Modes

There are two edit modes and each has its distinct capabilities and uses. Using the wrong edit mode can ruin your project and cause you to have to re-edit the whole thing.

Assemble Edit Mode

An assemble edit can do only one thing: it erases all signal tracks and replaces them all with new video, audio and control tracks. Assemble edits are useful for three jobs:

1. Copying an already edited tape (called *making a dub*).
2. Making a compilation tape composed of a series of finished segments which require no further editing.
3. Striping a tape.

The thing to remember about assemble edits is that they always end in snow!

Insert Edit Mode

An insert edit can do many different things: it erases and replaces any combination of tracks except the control track. Insert edits allow you to:

1. Record just one audio track.
2. Record two audio tracks, but not the video.
3. Record a video track without affecting the audio tracks.
4. Record a video and an audio track, while leaving the other audio track alone.

It is the insert edit mode which you'll use to edit your project.

The thing to remember is that **an insert edit can't record a control track**. It relies on a control track being already on the tape so it can align the new video signal to it.

So the confusing bit is: an insert edit can't record a control track, but it requires one in order to do its thing. The solution is *striping the tape*, and you need to use assemble edit mode to do this, because only in assemble edit mode can you record a control track.

Striping the Tape

To prepare a tape for insert editing, you need to record a control track onto it. This is called *striping the tape*. You can't see the stripe of electronic pulses, but the edit machine can. In fact, if there's the slightest irregularity in that stream of pulses, the edit system will refuse to do the edit.

So you need a perfect, continuous control track from the start of your tape to past the point where your edited project will end. It's a good idea to make the stripe a few minutes longer than you expect your project to be—then you don't get caught trying to edit past the end of the control track if your project runs a bit overtime.

> When it comes to video editing, be warned that the control track will rule your life.

Kevin Bowley, University of Wollongong.

You stripe a tape by putting the edit system into assemble edit mode, putting your tape into the recorder and copying a continuous video signal onto it. Any continuous signal will work—colour bars, a plain colour, video from a powered-up camera—but the usual practice is to stripe a tape with black. (Some people call it 'blacking' the tape.) Some studios and edit suites have black generators which can be used for this purpose.

A used tape which has a recording on it may seem like it has a control track—and it does—but the question is whether it's continuous. If the recorder went into stop at any point while the recording was being made, the control track will be discontinuous, and an insert edit will not be possible over that point on the tape.

New tapes have no signal on them at all. Their magnetic particles are entirely random; if you play them you see snow. They obviously need to be striped. Once you stripe them they should look black.

Warning: True video black with control track looks the same as the black you see on the monitor if there's no signal getting to the record machine.

Don't despair! You can tell that you're successfully striping the tape if the counter numbers on the record machine are running. If the counter is still, the monitor may look black, but there's no control track happening, so there's nothing to count. A tape with no control track is useless to you, so you'll have to start again.

Another warning: When striping a tape, always do a 30-second test recording, then wind the tape back and view it to check that you're getting a good recording. If you are, great. Wind it back again to the head of the tape and start striping.

If not, *now's the time* to troubleshoot why striping the tape isn't working. You don't want to discover a problem with the signal in an hour's time when you've got to start editing!

Yet another warning: Once you start recording your control track, don't stop the record machine until you have more than enough stripe for the duration of your project. If you stop and start again, the edit system will see it as a broken control track and it won't edit over it.

Because control track can only be laid in real time, you may feel the urge to leave the edit suite for a coffee or some other stimulant while your tape is being striped. If you do leave, put a sign on the equipment so the next person will know what's happening. Otherwise it's so easy for someone to just pop in to do a quick edit, stop the machine and cause you to have to start all over again.

Fiona Strain, Editing Department, AFTRS.

Striping your tape can involve striping timecode onto your tape as well. This is generally done using a machine which has a timecode reader/generator installed, or by getting a facility to do it for you. It's also advisable to get user bits striped with coding to indicate the edit you're up to. The '900' series is usually allocated to edit masters, 901 being the first rough cut, 902 the second version, and so on.

Breaking the Control Track

Once you've striped a tape, you should do **only** insert edits on it. If you do an assemble edit on a striped tape, you'll put a break in your control track—remember, an assemble edit always ends in snow.

Why? In assemble edit mode, the main erase head is activated, to erase all tracks that might previously have been recorded on the tape. Of course, this includes the control track.

The erase head is mounted so that it erases the tape a few centimetres before the tape reaches the recording heads. So when an assemble edit ends, there's always a length of tape which has been erased but has not yet had a new control track recorded on it. That bit of tape is the snow that you see.

Now, the only type of edit that can cover snow (i.e. record control track pulses) is an assemble edit—which always ends in snow. So once you break your control track you're in a terrible bind: every edit you do to cover the previous snow ends in snow . . .
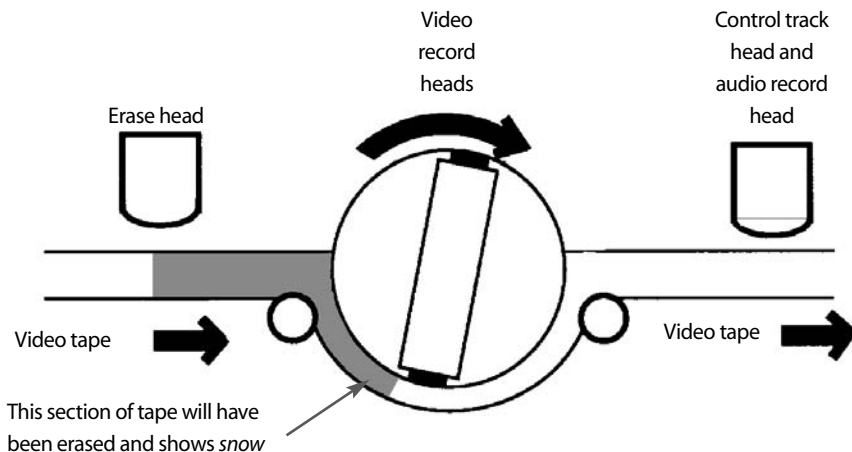
The snow is the erased section of tape.

The Classic Editing Disaster Scenario

After enormous effort, much more than you bargained for, your video project is finished, very late on the night before it's due. On the last morning, a couple of hours before screening time, you rush to the edit suite to do one last tiny edit: the opening graphic for the show. In your nervousness and haste you fail to notice that the edit system is now in assemble mode. You set up the edit and it previews perfectly. But when it records, a terrible snowy glitch occurs just where your host used to be saying 'hello'.

You think you will die, right there, right then.

But suddenly your feverish brain recalls that you can cover snow with an assemble edit, so you grab your source tape out of your backpack and edit the host in again. Then you see to your horror that the second edit has ended in snow and now you're missing your guest. So you do another edit, and so on . . .

Do you have 30 hours free to re-edit the whole tape?

Flying Erase Heads

In insert edit mode, *flying erase heads,* mounted on the head drum next to the video head, erase the video just one field at a time ahead of the new recording, so when an insert edit is stopped, there's no snow on the tape.

Getting the Settings Right

Make sure you check the switch settings on the edit system before you begin, so it ends up doing what you want it to do, and not something unexpected.

All equipment of an edit suite should be plugged into the same power circuit. If you use two circuits, you're much more likely to get a hum in the system.

Ian Andrews, Metro Television.

Although the buttons vary slightly from one edit controller to another, the concepts remain the same for each system.

At first all these settings will seem boggling, but in time they'll fall into place.

On the System

If the edit system allows you to play tapes from more than one source VCR, select for the particular source you'll be using. For example, the system may allow you to use either a Umatic or SVHS player, so you have to tell it which one you want to use.

If the edit system incorporates an audio mixer, raise the faders which control the audio from the source VCR you'll be using, and raise the output fader which controls the level of sound being sent to the recorder. If you don't, no sound will get to the recorder.

Panasonic A67650 Player

| Tracking | Audio monitor ch1/ch2/mix | Hi-fi/normal meter and monitor | Memory | Control remote/normal | Sync select | Hi-fi/normal audio out |
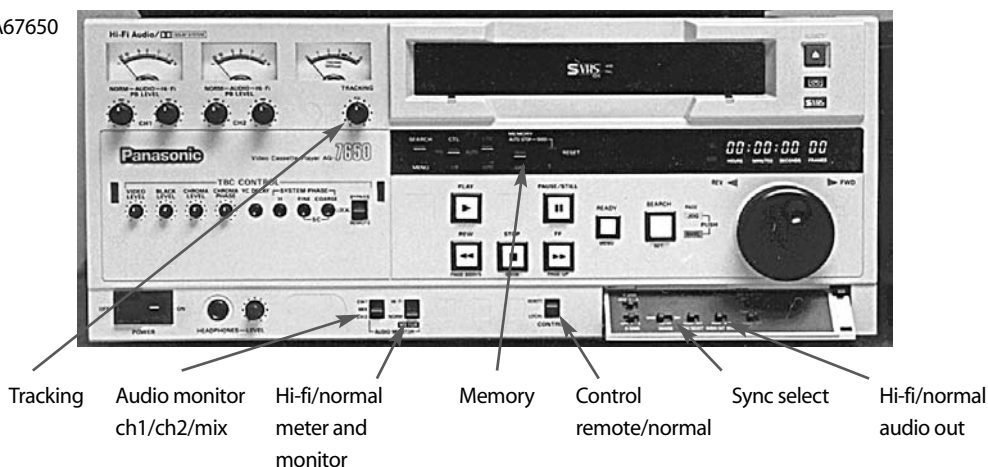
On the Player

1. Set the *mode select* (or sync select) switch to *normal*.
2. Make sure the *memory* switch is set to *off*.
3. Choose whether you want to use *hi-fi* or *normal* (longitudinal) *audio*.
4. Set the *audio monitor* switch to *mix*, unless you want to hear only one track.
5. Insert your source tape into the player and play it so you can *adjust the tracking* to get the best possible picture.
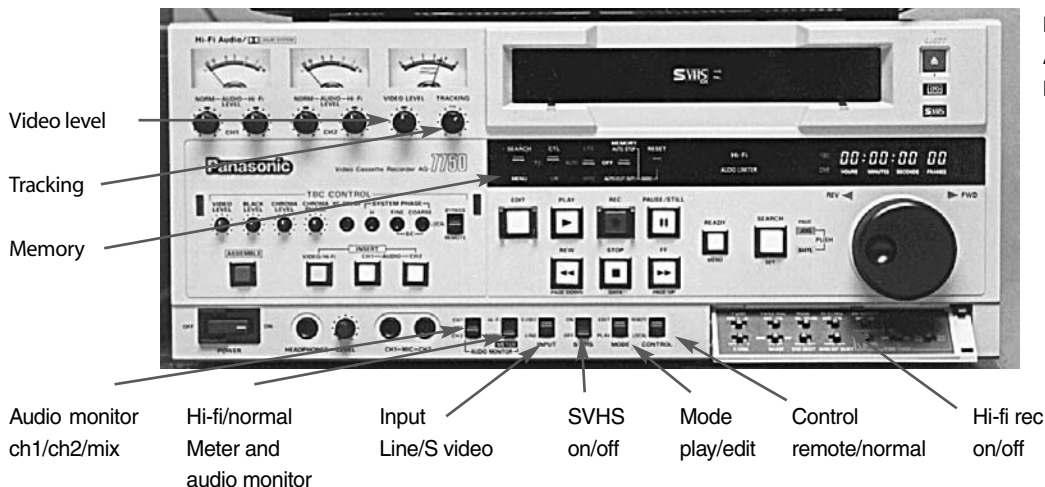
Panasonic A67750 Recorder

Video level

Tracking

Memory

| Audio monitor ch1/ch2/mix | Hi-fi/normal Meter and audio monitor | Input Line/S video | SVHS on/off | Mode play/edit | Control remote/normal | Hi-fi rec on/off |

On the Recorder

1. Choose *hi-fi* or *normal audio*, whichever you plan to record.
2. The *audio monitor* switch is usually set to *mix*.
3. Set the *input select* switch to *dub* if you're doing straight-cut editing between the two VCRs. If you're using a vision mixer, set the input select switch to *line*.
4. Set the *mode* switch to *edit*.
5. Set the *memory* switch to *off*.
6. Set the *audio record levels* by leaving the recorder in *stop* and playing the source tape in the player. The audio signal will then be sent straight through to the record VCR and its level will register on the recorder's VU meters (channel 1 and/or channel 2) and the input levels can be correctly adjusted on the knobs below the VU meters before editing begins. Before setting the levels, switch the *audio limiter off*. After setting the levels, you may turn the audio limiter back on, if you choose to use it.
7. Load your pre-striped record tape into the recorder. Play it for at least 30 seconds, then stop the tape and reset the record tape counter to zero.

On timecoded tapes, always start your first edit at 00:01:30:00 (one minute, 30 seconds). Why? Damage can occur at the head of the tape on rewind, and if your tape has any professional finish, there's usually an ident board, tone and colour bars (one minute) and countdown prior to your first frame of image.

Fiona Strain, Editing Department, AFTRS.
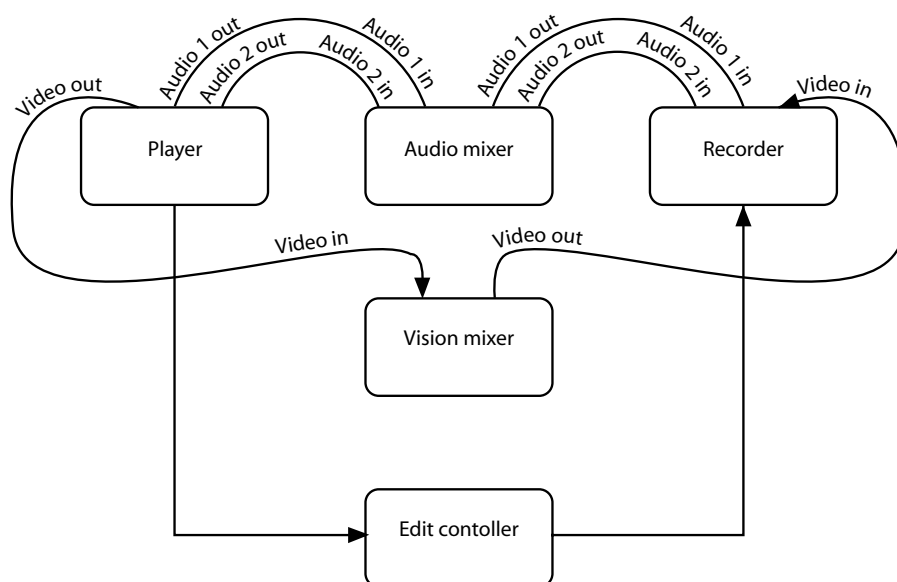
When using a video signal through a vision mixer, the recorder input mode must be on *line*, not on *dub*.

Be sure to **label your edit master tape** (not just the case) even before you begin editing on it—what a nightmare if someone thinks your tape is blank and uses it to record something else!

Panasonic A770
Edit Controller.
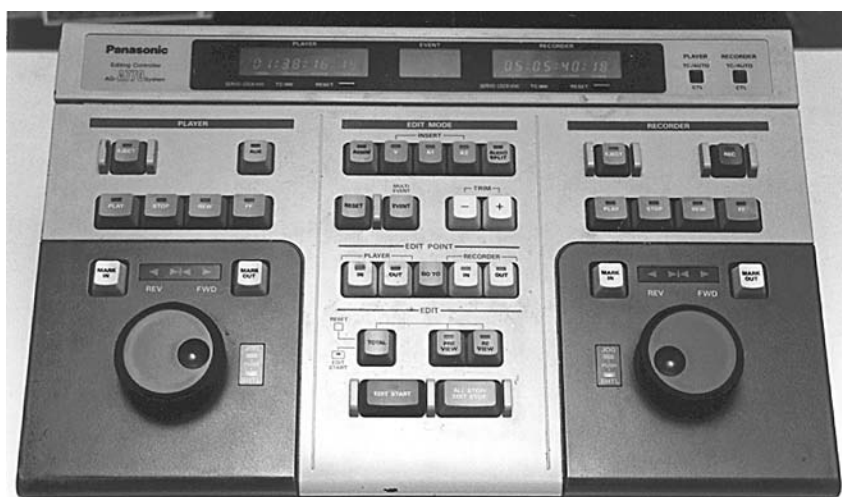
On the Edit Controller

1. Select *insert edit* mode.
2. Select the tracks you'll be editing. (Video and channel 1 audio? Whatever you need for this cut.)
3. Choose the longest pre-roll time available, so the system has the best chance of getting both VCRs in sync before the edit occurs.

Insert mode

Video/ Hi-fi audio

Channel 1 audio

Assemble mode

Channel 2 audio

Mark in

Choose insert mode, and select the tracks you'll be editing.
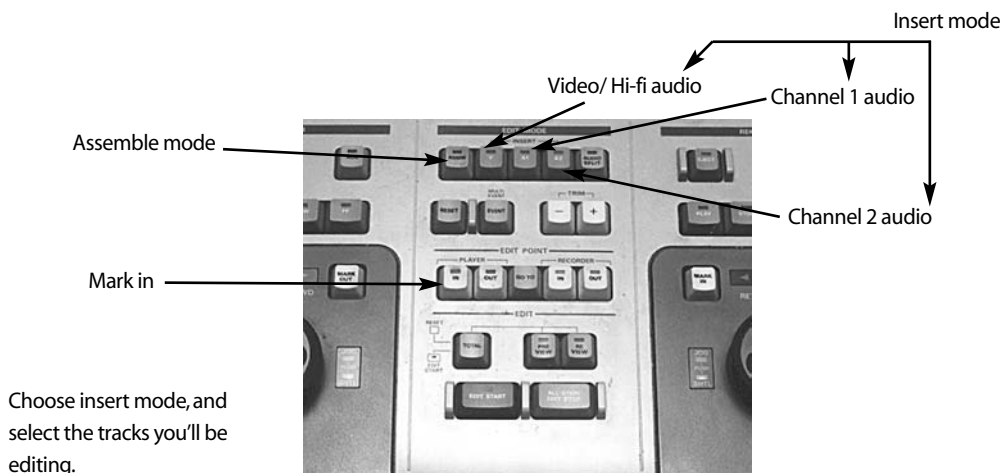
Doing the Edit

Though different edit system controllers have slightly different placement of buttons, the functions are the same from one to the next.

Register the Edit-in Points

1. Find the beginning of your shot on the source tape. Pause the tape.
2. Simultaneously press the *in* and *entry* buttons on the player section of the edit controller or the *mark in* button—whichever is displayed on your model. The *in* lamp will stop blinking and light continuously. This means the edit-in point has been registered for the player.
3. Find the spot for your shot to be put on the record tape. Pause the tape.
4. Simultaneously press the *in* and *entry* buttons on the recorder section of the edit controller. The *in* lamp will stop blinking and light continuously. This means the edit-in point has been registered for the recorder.

First you find the shot you want. Safina Uberoi, Australian Film Television and Radio School.

Register an Edit-out Point, Only if You Choose To

Either:

1. Find the end of your shot on the source tape, and
2. Simultaneously press the *out* and *entry* buttons or *mark out* on the player section of the edit controller. The *out* lamp will stop blinking and light continuously. This means the edit-out point has been registered for the player.

Or:

1. Find the place where your shot should end on the record tape, and
2. Simultaneously press the *out* and *entry* buttons or *mark out* on the recorder section of the edit controller. The *out* lamp will stop blinking and light continuously. This means the edit-out point has been registered for the recorder.

There's no need to enter a second edit-out point, because the edit controller will compute that point automatically. In fact, if you enter a second one yourself, and it doesn't make the two shot lengths **exactly** the same, the two out-point lights will start to carry on, blinking back and forth, and the system won't do the edit until you correct the contradiction.

On some systems, the second out-point will automatically *replace* the first. With some experience, you'll learn the particulars of your edit system.

It makes no difference to the edit system which in-point or out-point you enter first, so do it in the order which suits you best.

Edit Point Errors

If the *in* and *out* lamps blink alternately:

> Either the same point on the tape is entered as **both** the edit-in point and the edit-out point, or the time of the edit-out point is **before** that of the edit-in point.

In these cases, the system won't attempt the edit. You need to re-enter the edit-in and edit-out points correctly.

If you're unsure of where your edit points are, press *in* (or *out*) and the time counter of the edit controller will display your registered edit point.

Always check your edit points by doing a preview.

Preview

This is where things start to get confusing. The *preview* function shows you what the edit will look like **if you do it**. Preview does **not** do the edit. To initiate a preview, press the *preview* button on the edit controller.

The normal next reaction for people is to panic—because both VCRs will start to go backwards, and you may feel that things are going out of control. They're not. This is just the *pre-roll* happening.

You see, the edit can't be previewed or done without the two VCRs being up to the right speed. And just like your car can't go from zero to 80 km/per hour instantly from the red light, the VCRs need time to get up to speed too. So they roll backwards a few seconds, then they stop, hesitate, then they go forward, getting to the right speed, then you see the preview.

Here's another confusing bit. Though things will be happening on both monitors, the preview will be happening only on the record monitor. Watch that one by itself, so you don't get mixed up.

If you didn't already set an out-point for your edit, you do it when you preview. Watch carefully, and when your shot has passed the desired out-point, press the *end* button on the controller. You'll see the *out* lamp light up on the edit controller, confirming that the system got the message.

If you don't want to set an out-point yet, on some systems you can press *all stop* and no out-point will be entered.

After the preview ends, the VCRs will still be rolling. Now they're decelerating and after a few seconds they'll stop. Then they'll roll back to the out-points on both VCRs. Perhaps this should be called the 'post-roll', but no-one calls it anything.

Once you've previewed the edit, decide if it looked right or not. If you're not sure, if you looked away, talked to your editing partner, or thought about something else while it happened, preview it again. You can preview an unlimited number of times.

Sometimes preview will cause your edit point to slip a frame or two. If this occurs, use your *go to in* and *go to out* buttons to take you back to your edit points. Re-establish them by pressing the *entry in* or *entry out* buttons, after you've got to your edit points.

If you didn't like the preview, reset your edit points to the places you think will be right and preview again.

For major adjustments, run the tape (on either machine) to find the new edit point. Then press *in* and *entry* simultaneously to cancel the old point and register the new one.

Trim

If you wish to make a slight adjustment, use the *trim* mode. Press down the *in* button and at the same time press *trim+* or *trim–*. The edit-in point will change by one frame, either forward (+) or backward (–) each time you press the trim button.

Keep adjusting and previewing until you see exactly the cut you want.

Once the preview is right, do the edit. Don't preview it again because you love it so much, because the edit points may slip, and you may have to reset them again.

Trim buttons

In & out point buttons

Preview

Review
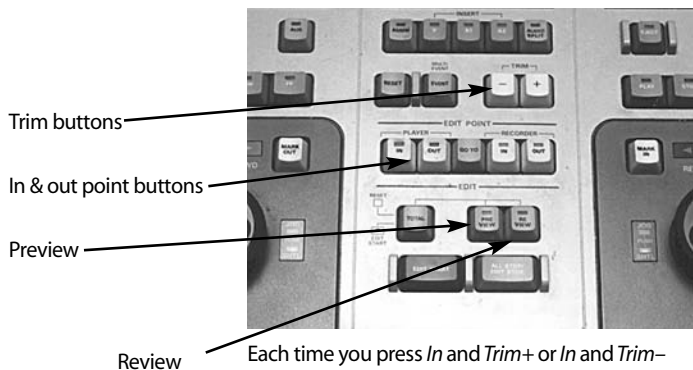
Each time you press *In* and *Trim+* or *In* and *Trim–* the edit point changes by one frame. Pressing In or Out alone will give you your current registered point.

Edit

Doing the edit is the easiest part of all. You just push the auto edit button on the edit controller and sit back while the VCRs go into pre-roll and then execute the edit.

Try not to end the edit too tightly at the finish of your shot. It's a good idea to record a second or two more than you need at the end of an edit (unless you're inserting a piece into an already edited sequence). This gives you a video buffer area in case the edit system slips a few frames at the beginning of the next edit. If you cut at the exact frame where you want the edit to end, and the next edit slips forward or back a few frames, you'll either have a few frames of black showing at the edit point, or you'll cut off the end of your shot and have to go back and edit it in again.

Review

Now this is the bit some people mistakenly skip.

After you've done the edit, press the *review* button on the edit controller.

The edit system will show you the edit it's just done. Watch this very carefully, especially at the in-and out-points. Sometimes an edit looks right in both preview and edit, but it doesn't play back right. If the edit points are wrong, or if the edit flips at the beginning or the end, you **must** do it again. Or live with the mistake. Which will look bigger and more obvious every time you view the tape.

Again, you should watch only the record monitor. In fact, the image on the player monitor should be still, which is one proof that the edit really is on the record tape now.

Sometimes people believe they've done an edit when they've really just previewed it again for the millionth time. Review assures you that it's there on the record tape. If it isn't, but you move on to do the next edit, and the next, at some point (three hours of editing later?) you'll discover the mistake and you'll be forced to re-edit them all. That's a real waste.

Return/Jump

If you're reviewing a very long edit (say a three-minute song) your concern will be whether it began and ended correctly. Once you've pressed *review* and watched the beginning, you can skip over to the end to check it out by pressing the *return/jump* button.

This will cause the recorder to fast forward in search mode till just before the edit-out point and then play normally again, so you can see how it ends.

It will save you minutes, which all add up, whether you're paying cash for the edit system or using your four-hour edit time allotment at a university media centre.

Editing Audio

It's usual to put dialogue on the inside audio track, leaving the outer track free for any additional sound, such as voiceover, music or sound effects.

This protects your valuable field audio, which is nicely in sync with your video, in the event of edge damage to your tape. Because the *M&E* (music and effects track) is a later add-on anyway, it's easier to redo that than resync all the field audio.

Warning: When you record your M&E track, make sure that the video insert and inner channel audio insert switches are turned off to prevent the erasure of these signals.

Time Needed for Editing

Editing always takes much longer than you'd expect. As a rule of thumb, people say an hour of editing time is needed to cut one minute of tape. This ratio helps get a perspective on things, though there will be some minutes which may take you three hours (and leave you wondering where the time—and your sanity—went) and other segments which will flow smoothly and quickly.

It's usually a timesaver to edit with a partner at first, because the button that one person forgets, the other person might remember.

Tip: don't promise anyone you'll be home from editing before midnight.

Human Care

Editing is exhausting, especially when you're a beginner. If you stay in the edit room too long, you're likely to start feeling weird effects, like headache, nausea and the sense that your brain has been scrambled.

Always label your tapes. Any unlabelled tape is in danger of being reused.

Penny McDonald, Freelance Film and Videomaker.

Four-hour editing sessions are long enough, until your system gets used to it. For some people, four hours will always be pushing the limits of what they can stand. Plan your editing sessions according to what your body tells you, and not just what the facility will allow.

Also, take care to sit as far from the monitors as you can, so you don't get a dose of radiation.

Erase Protection

Having put so much effort and so many hours into editing your tape, you'll want to make sure no-one erases it by mistake! There are two essential things to do. First*, erase-protect* the tape, and second, label it clearly as a master tape.

If you've edited onto Umatic tape, pull the red button out of the back of the tape cassette. If you've edited onto VHS or SVHS, there's a plastic tab at the back of the tape cassette which you break off, and then the tape is record protected.

A mistake some people make is that they carefully label the plastic case that the tape goes in—that's good as far as it goes—but they don't label the video cassette itself. But once the tape is removed from its case, no-one can tell what's on it, and they can easily mistake it for a blank one.

Now it's true there are people who manage to keep track of several unlabelled tapes and know what's on them by various scratches and nicks, or they can somehow divine the contents by a sort of laying on of hands. But for people without such powers, unless the tape is **clearly** labelled, it risks being reused by someone else, or even yourself.

'Clearly' is the operative word here. If you're editing onto recycled Umatic tapes from the local TV station or postproduction house, the tape will already have a typed label on it. If you've used it after other students have, the original neat label will be crossed out with a marking pen and something else written there—say, 'Fiona, Peter, and Daphne, Exploratory Exercise, Autumn 02'. If you then squeeze your video's title somewhere onto this bodgy label, it could well be overlooked and grabbed by someone else in a hurry to transfer their own rushes.

So: Erase-protect and label.

Postproduction with Commercial Assistance

In an analog world, the normal procedure is for a program to be rough cut using an off-line edit system. It may be Umatic, SVHS or VHS. Several rough cuts are usually done, but eventually the program is considered finished and all the final edit decisions have been made.

The list of these edit decisions, for video and audio and any special effects, is stored on a floppy disk. This list is called the EDL—the edit decision list.

This EDL, on disk, is then taken to the commercial postproduction house, so it can instruct the computerised edit system. There the program is *on-lined*. This means it's edited onto 1-inch tape, or sometimes onto Betacam.

The on-line product is the *master edit* and it's considered to be *broadcast quality*, which means it meets the technical standards required by federal communications regulations for it to be transmitted through the air as an RF television signal.

On-line time can cost several hundred dollars an hour, so the on-line suite is not the place to make any new decisions or to try out different program sequences.

Most postproduction houses have a myriad special effects which can be added into your program, for a price, during the on-line sessions. Slow motion is possible, as well as the full array of wipes, dissolves, fades and colour mattes.

Spinning, glistening graphics can be purchased, by the second, and all manner of image manipulations can be custom designed, or purchased from a range of stock effects.

3-D computer animations can also be generated and inserted into the video. But these may take days to program, so they should be completed before the on-line session begins.

Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

10 Going Digital

For those of us who have been doing video for many years (which includes many current teachers of video), the prospect of *going digital* is a spectre which began looming on the horizon in about the mid-nineties.

I say spectre because *going digital* is tied up with using computers, and it's an understatement to say that people hold different opinions of computers and have had the whole range of experiences with them. For some people, going digital has glowed like the Northern Lights in the winter sky. It's offered the promise of release from the straightjacket of editing every shot in order, one after the other, and an escape from the nightmare of trying to change a shot once the final cut has been completed.

For other people, just the mention of going digital has deluged them with bad memories associated with all those other struggles they've already had with computers (lost files, system crashes, esoteric and innumerable commands to

Students learn to use Final Cut Pro on iMac computers, digital video production lab, Charles Sturt University, Bathurst, NSW, Australia.

learn) and their knee-jerk reaction is to want to stay with the system they know (analog).

In many places highly skilled editors are still working with analog systems. Some people and organisations have invested so heavily in top-end analog equipment that going digital isn't economically feasible, and won't be for some time yet.

And many of the rest of us in school systems scrabble along in a budgetary environment which makes buying a chocolate bar look like a major purchase.

For those who are still hesitating on the brink, I'm reminded of a remark in a lecture I attended recently. Addressing a hall full of people engaged in literacy training, the

speaker announced, 'We're getting *very good* at teaching people how to live in the 1980s.' It made me swallow hard. A survey of who's teaching video in schools at present doesn't read like a who's who of the under thirties.

Although I think it's fair to assume that most of us will go digital over the next few years, we'll go at different speeds and with different levels of ease.

In a positive view, this time of transition gives us a great opportunity to link up with each other, to share knowledge on both new procedures and new products, and weave together a web of support which can enhance all of our teaching efforts from now on.

A crucial site for you to know about and access is: <<www.wwug.com>>. The abbreviation *wwug* means 'world wide user group'. This is a 'digital media net community', and on it you can get answers to nearly anything you can ask about digital equipment and editing processes. You can post your irksome question and then quickly receive one or more replies from people who've already tackled that issue. It's a great help!

Other websites to check out are:
<<www.creativecow.net>>
<<www.greatdv.com>>

Norwegian student Lina Leth-Olsen at the controls of a digital editing suite. Edith Cowan University, Perth, WA, Australia. (Photo by Keith Smith)

Everything's on-line now. There are complete manuals. Read whatever you can, don't waste your time on games.

Rob Davis,
Editor, Digital
Dimensions.

Digital is being confused for quality, and it's not. You still can't make a good image out of a bad image.

Neil Smith,
t.a.v.
productions.

Various Models for Going Digital

People go digital via many pathways. Their choices depend partly on their finances, but they're also influenced by what other people they know have done, other systems they've had the good fortune to see, and also what sales representatives persuade them would be best.

It might help to realise that you don't have to go digital all at once. Many people shift to digital editing as their first move. That's not hard to understand, because anyone who's struggled with analog editing can immediately see the merits of being able to move shots around at will.

Starting with Digital Editing

If you have a computer at home, getting started with digital editing is fairly simple. Most likely you'll need to do three things:

1. Purchase an editing software program.
2. Add more memory to your computer.
3. Find a way to digitise your analog video so you can send it into the computer.

When setting up an edit system, making sure you consider *ergonomics*. A monitor should be at your comfortable eye level. You shouldn't be tilting your head up or down to see it, or your neck will revolt.

Rob Davis, Editor, Digital Dimensions.

Purchasing an editing software program

There are many brands of editing software. For up-to-date information on some of the well-known editing programs contact:

> Adobe Premier 6 <<www.adobe.com>>
> AVID and AVID Xpress DV2 <<www.avid.com>>
> Edit Studio 3 <<www.puremotion.com>>
> FASTstudio.DV 3 <<www.fastmultimedia.com>>
> Final Cut Pro 3 <<www.apple.com/finalcutpro/>>
> iMovie 2 <<www.apple.com/imovie/>>
> iFinish <<www.media100.com/Dualstream.asp>>
> Media 100 <<www.media100.com/Dualstream.asp>>
> Media Studio Pro 6.5 <<www.ulead.co.uk>>
> MoviePack 3 <<www.hisoft.co.uk>>
> Speed Razor 2000X <<www.in-sync.com>>
> Vegas Video 3.0 <<www.sonicfoundry.com>>

Needless to say, editing packages are changing and developing at a meteoric rate, so I know as I write this that the information will be old before it's printed. And tempting as it would be to make some judgemental statements on the above-listed programs, I will resist that ill-conceived urge.

There are dozens of so-called editing software applications; many come bundled with computer magazines. Be wary, they can be less than user-friendly, and they may be incompatible with everyone else's system.

Rob Davis, Editor, Digital Dimensions.

You have a role here, which you may savour or find unpalatable, and that is to check the websites listed above for the latest information on editing programs, and also ask other people, because that way you'll get truthful answers to your own specific questions.

However, I can give you a list of considerations which you could mull over when trying to decide which program to go for.

Considerations When Choosing Editing Software

Is the Interface Easy to Learn for You or for Your Students?

How hard will it be to get people up to speed on the basic operations of the program?
How clearly written is the manual?
Do any other training devices come with it, like handouts? A tutorial on a CD?
Can you make editing changes directly on the timeline?

What Will You be Doing with Your Edited Footage?

Will it just be shown from your computer screen?
Will you want to make VHS dubs?
Will you send it over the Internet? If you're planning to be webcasting, look for editing software which is bundled with an encoder, to put your final product into a format which can go on the Web.

Will it be part of your website?
Will you be burning it to CD? DVD?

Once you work out the answers about your intended usage, then it will be obvious why you should ask the next question.

What Does it Output?

A standard digital signal?
Quicktime files?
MPEG1?
MPEG2?
Composite video?
Component video?

Hard as it may be to believe, some systems don't output any of these! They're fun and games on your PC, but they get your edited video nowhere.

Final Cut Pro 3

Will it Work on Your Brand of Computer?

Currently iMovie and Final Cut Pro 3 will only work on Macintosh computers. This is not a dissuading factor for a Mac owner or groupie. Of course both programs output a standard digital signal, Quicktime files, MPEG and composite video, so your end product is compatible with standard usage.

Will the Editing Program Work with Your OS (Operating System)?

Although it works with your computer (*hardware*), you may need to upgrade your operating system (*software*) so you have enough power to run the editing program.

Some editing programs are extremely specific about minimum operating systems. For example, for Final Cut Pro 3, OS 9.2 is not good enough, you need 9.2.2 (which can be downloaded for free from the Web if you already have 9.2).

The difference in the numbers may seem insignificant to a beginner, but it's definitely important to be exact in matching the specifications for the editing program with the reality of your computer, or you may have many frustrated hours unsuccessfully trying to get your program up and running.
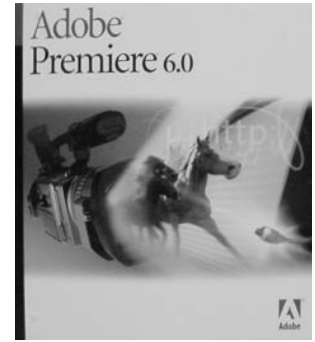
Adobe Premiere 6

What Effects and Transitions are Part of the Editing Program?

Does the program offer you anything beyond basic wipes and dissolves?
Does it allow you to invent your own transitions?

What Kind of Image Manipulation is Possible?

Is there a strong paint program?
Rotoscope?
Animation possibilities?
2-D motion tracking?
3-D effects?
Distortion?
Movements of video around the screen?
Blue screen and chroma key?
Slow motion?

> The only thing that's easy about digital editing, is that you can manipulate your material in ways that you couldn't before.
>
> **Christine Togo-Smallwood**, Entrepreneurial Unit, School of Indigenous Australian Studies, James Cook University.

How Does the Program Handle Audio?

Is there an inbuilt audio mixer?
Does it have a graphic equaliser?
Can you record live sound with this program?
Is there adequate noise reduction?

What Capacity for Titles Does the Program Have?

Is the range of fonts adequate for your needs?
Are there pre-programmed scrolling effects so you can just type in your credits and go?
Can you work on multi-layered compositions?
Are you able to use an edited timeline from one program as a clip in a larger project?

Rob Davis,
Editor, Digital
Dimensions.

It's possible to be doing basic cut-and-paste editing in a few minutes, but if you don't know the structure of the data management in the computer (i.e. where rendered files, master clips, etc. reside) it's possible to delete the wrong information and something you've spent ages on can disappear at a keystroke.

Becky Furniss edits with Media 100, Deakin University, Clayton, Vic, Australia.

Does the Program Render Transitions and Effects Quickly or in Real Time?

How long do you have to wait to see simple effects?
Complex effects?
Can it render in the background while you carry on with your edit?

What Other Software Packages are *Bundled* with the Editing Package?

Is there an audio mixer bundled with the package?
Is there a special effects program packaged with it, like After Effects?
Is there software for outputting media to the web, like Media Cleaner EZ 5?
Peak DV (for audio)?
Boris Script Ltd (a titler)?
Commotion DV (for animation)?
Cinema 4D GO (for 3-D objects)?
Does it come with a free capture card?

Can You Add Web Interactivity to Your Media Files?

Check if you can create URL flips, hotspots and chapters, so if your video is going to be viewed on the Web, your audience can connect directly to other websites.

Does the Program Accept Plug-ins?

How many?
Which ones?
Are they desirable to you?
Can you build your media centre's editing capacity by purchasing compatible software top-ups in next year's budget?
If you later decide to upgrade, will your current files (and skills!) work on the next version up?

What Else Do You Need?

Does it only work well with two monitors?

And, of Course:

How much does the editing program software cost?

Adding More Memory to Your Computer

Check the requirements of your editing program carefully. You'll probably find that your computer will operate more efficiently if you upgrade its memory capacity. You can do this by adding memory either internally or by attaching an external drive, like a firewire drive.

For information on increasing your computer's storage capacity, see the Chapter 11, Thanks for the Memory!

Digitising Your Analog Video

The tapes you take, or have taken, on your analog camera are not a lost cause. You just have to change their signal into a digital one. The only disappointment is that there will be some loss of quality in the process, because when you change an analog signal into a digital data stream, and then change it back to an analog signal, there is some decrease to your signal-to-noise ratio (SNR).

But the gains most likely outweigh this small loss, as there are always losses in editing analog footage anyway, by being forced to go down a generation or two.

Basically, you have to get your current analog signal converted into a digital signal, and get it into the computer.

You have three options here. (Oh, isn't it nice to have options in life!)

1. First check the back of your computer. If your computer has an external connection point for a video signal, but that input currently goes to nothing inside the computer, you can buy a video digitising board, usually called a *video-capture card*, which will enable your computer to handle video signals. Modern (post modern?) computers which don't already have video capacity come with an aching vacancy inside, just waiting for you to fill it. The internal connection points are all there—installing a videocapture card is not much harder than putting a slice of bread in a toaster.

We bought a system about two years ago and nobody has mastered it. They'd get partway through their edit and the system would crash.

Would you believe that in this country and state, with all the consumer protection laws, there is not much protection in the area of software? A company can sell knowingly untested or flawed software to a customer, and there's not much recourse. I guess it happens all the time when new software is introduced.

Apparently that's what happened to us with the non-linear editing software we bought as part of a package with two monitors and the whole works. We were anxiously waiting for the release of a new product and in the rush to get it out, it was either not tested, or perhaps it was tested and the manufacturer knew there were problems with it. Much later, they upgraded the software. So to date there's only one person in our public access centre who has learned digital editing, and he does it on his computer at home.

Barbara Bishop, Video Producer, Winthrop Community Access TV.

Buy only what you immediately need. Just buy what the job you're doing can pay for.

Ben Lay, Editing Department, AFTRS.

This Matrox handles both analog and digital signals in and out of the computer.

To get a digital signal into your computer, there must be an appropriate and *functioning* input. The input might be there, but it may be attached to nothing inside the computer.

Just make sure you get the right one! Some video capture cards *do* handle analog signals, but *some don't*. Some only work as a conduit for already-digitised signals to come and go.

2. Alternatively, you can get a little conversion box which will take your analog video in and convert it to a digital signal, which it then can supply to your computer through a cable known as a *firewire*.

   To do this your computer must have a connection point which can accept a digital video signal.

3. If you're a home user, it could work to borrow a digital camera from a friend and send your signal through the borrowed camera and along its firewire into your computer.

   This third option works best if the digital camera is able to instantly convert the signal from analog to digital.

   Some cameras can take in an analog signal and record it in digital, but can't simultaneously output a digital signal.

   So check carefully. If the camera you've borrowed is limited, you'll need to record your video to a digital tape inside the borrowed camera, *then* play back the signal from the tape inside the camera and send it down the firewire to your computer.

This is time consuming, but some people have more time than money for working on their videos, and everybody has a story to tell.

Peter Giles, Head of Digital Media, AFTRS.

If you're working on longer projects, the time it takes to actually digitise the video as part of the on-line and then copying back out from hard disk to tape is prohibitive.

Digital Shooting

The first question: What camera to buy?

Again, I don't mean to be tedious, but it comes down to the basics like:

> Who's going to use it?
> What size and weight do you need for the carrying you'll be doing?
> What style do you like? Shoulder mounted? Handheld? Palm size?
> How much use will it get overall?
> And, of course, what can the budget afford this year?

There are plenty of digital cameras out there, and the happy news is, they're mostly quite good. So this is not a life and death decision. In many ways, it's easier than choosing the edit system, as there's less to consider.

But there are some aspects which can be specific to your needs, which you should consider before signing that purchase requisition or handing your credit card across the glass counter.

Just to orient you, camera manufacturers design their cameras and market them to at least three levels of buyers:

1. The consumer—This can be either the home user or the school which is teaching entry level video skills. These cameras usually cost $1000–3000.
2. The prosumer—This is the person who's doing video work commercially, probably working from home or a small production house. It can also be the university media centre which wants its students to be able to produce résumé tapes of a high standard or to do entry level projects for commercial sale. These cameras generally don't cost more than $10 000.
3. The broadcaster—These are the high-end people who are working in broadcast TV stations or for advertising firms. $80 000 wouldn't be too much for their budgets, and with additional specialist lenses—well, it hardly bears thinking about.

> If you've got a good eye and the right skills, you'll get a good result regardless of whether you use a top of the line digital Betacam or a much more modest camera. If you don't have the skills, you'll get a poor result regardless of the camera you use.
>
> **John Fidler**, Reel Image Video Productions.

Some models available at the time of writing include the Sony DVCAM, Panasonic DVCPro and Canon XM2 3CCD.

Sony DVCAM   Panasonic DVCPro

Choose the camera that fits both your body and your budget.

Canon XM2 3CCD

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

With broadcast gear, all the cameras are laid out the same, all the buttons are in the same places, no matter what the manufacturer.

The Audio Input

Think about audio input.

I'm listing this first because most of the promotional material on cameras deals with the picture. This is no accident, because it seems that's where most of the effort has gone in developing the cameras. But videomakers quickly learn that sound quality is the make-or-break factor in TV.

Many digital cameras have only one input for sound, and that's limited to a little mini socket.

So I ask you, what happens when you do a simple interview? Are you stuck with your offsider hand-holding a cardioid mic and trusting that s/he can handle this properly, always remembering to point it at the person who's speaking at the time?

To do a two-mic interview, you need to have _either_ an audio adaptor which has two mic inputs and plugs into the camera's single mic input, _or_ a separate portable audio mixer, _or_ try to make do by pinning a lav mic on the person with the weaker voice, or on the interviewee.

Charlie Tesch, Somerville Producers Group.

You can't do anything without good audio, it's the most important thing and it's the hardest part.

If you can hear it, but you can't see it, it still works.

If you can see it, but you can't hear it, it's useless.

The Canon DV camera has an adaptor which allows two XLR audio inputs at the back.

It's possible to get an adaptor which will allow you to use two microphones on your single audio input.

The Lens Quality

It's the lens which focuses the light to form the image. The higher the quality of lens, the better the image.

If you're shooting home movies, a standard lens may be just fine. But if you're shooting for professional release, make sure you put your (however limited) money into the best lens system you can buy.

The Zoom Ratio of the Lens

A 6X zoom lens is fine for family events, because presumably your family will let you get fairly close to them.

But if you're taping sea eagles or other distant creatures or objects, go for 10X or higher.

For specialist work, make sure you have the right lens for the job.

Richard Fitzpatrick, Digital Dimensions.

Don't be tricked by outrageous claims about digital zoom rates. If you zoom way in with them, you often get a fractured, mosaic type image. When in doubt, do a test taping in the store while you're surveying what's out there.

Interchangeability of Lenses

If your work is varied, you may need to swap lenses from time to time. Perhaps you'll need both a very wide angle lens and an extreme telephoto lens.

Or if you're buying for a media centre, you may want your students to be able to experiment with, and then employ, a variety of lenses.

In either case, check that the camera you're looking at allows lenses to be interchanged easily. And check what lenses the camera can accept.

A prominent feature of the Canon XM2 is that it has interchangeable lenses.

Can It Digitise a Composite Video Signal?

Be wary! Not all digital cameras can digitise an incoming VHS or SVHS signal. If you have shelves full of analog tapes, you most likely still want to have access to that footage for future edit projects.

Don't get caught out with a cheaper camera which can't digitise your older stock shots or the videos of when the kids were young. Remember, when your baby turns 21, you'll probably want to use all that old stuff again, for the big screen at the megaparty.

Cute as a baby, cuter at 21.

Does It Have Firewire In and Out?

It probably does, but like a mother holding her newborn and counting all the fingers and toes, there's no harm in checking. There's always the exception, and the lack of a firewire output was a serious flaw in some of the early digital camcorders.

Does It Have Composite Video In and Out?

You will need this if you want to run off a dub of your footage for someone else, or if you're given video that you want to make a copy of.

Digital Production Studio

If your aim is to set yourself up as a working video production studio, one of the joys of going digital is that there are far fewer pieces of equipment to buy, to try to squeeze into your space, to connect up with a tangle of cables, to have to learn how to operate, and to maintain and repair.

If you purchase the right video editing system, you'll find that the vision mixer, the audio mixer, the time base corrector, the FX generator, the character generator, the animator, the player and record machines, and the dubbing suite are all rolled into one!

If your system can burn CDs and DVDs, and output composite video, what else could you need?

Labels! But your edit program will usually have a graphics capacity, and a freeze frame capacity, so you can make the labels and CD/DVD covers yourself.

Production houses have to be flexible and work to deadlines, some projects are done in a short time and some take months or even years to complete. So that you never have to be dumping one lot of digitised material to work on another project, buy up big on storage devices. Firewire drives can be plugged in and unplugged with ease, and carried to other places as well.

For the most clarity of all, and the least possibility of errors, some people have a rule of 'one firewire drive per project'.

A website which lists lots of production gear suitable for setting up studios is <<www.pinnaclesys.com>>

I'm constantly managing media. You can't just have all your material there, like we did with tapes. You have to be sensible about what you digitise because storage is still a huge issue. Storage controls the logging and capturing process [digitising].

Christine Togo-Smallwood, Entrepreneurial Unit, School of Indigenous Australian Studies, James Cook University.

Media Centre Edit Labs

If you're buying for an entire media centre, which services scores or hundreds of students, going digital is likely to take careful planning over several years.

One of the main things to be careful about when planning the purchase of equipment is compatibility.

Even at this late stage of video development, incompatibility rears its ugly head. There's still to be a true marriage of video technologies. Although it may not surprise you when a no-frills brand camera doesn't mesh in well with the standard big name companies' products, you might not expect that you can get caught out even when buying very expensive gear. For example, one expensive digital camera could read consumer level DV tapes, but couldn't read another company's expensive camera recordings.

Whether this is smart marketing or the continuation of corporate schoolyard grudges can be debated. But whatever it is, it won't get your tape played if you've mixed and matched without considerable forethought or straight-out good luck.

> You always have to know where the market's going because it has downstream effects. A lot of people have been caught out buying the wrong gear. It's no use buying something unless people want to hire it off you as well.
>
> **Richard Fitzpatrick**, Camera Operator, Digital Dimensions.

Outputting the End Product

Home computers and small production houses with only one or two edit systems will probably go for outputting the signal directly from the computer to a record machine (or dubbing rack) close by.

But in a media centre where there may be 6, 10, 20, or more edit systems, it makes no sense economically to have record machines for every edit system. There may be 60 students who need to be editing their material, but each one may only output three projects in a semester.

In a media centre situation, it makes sense to hardwire all the edit systems in a given computer lab to one or two output stations. Or to have the students carry their projects, on their portable drives, to an output station. If a facility is buying only one or two output stations, it can afford to have a good variety of formats available, like VHS, SVHS, DV tape, CD and DVD.

> Actually we do work often in groups in the big open lab, and the group or team will cluster around their work station. They usually use the speakers when in groups since we don't provide a bridge for three or four headphone outputs. We've found that students relating to their work, engaged by their efforts, tune out the rest of the room. Their ability to concentrate and focus solves what would appear to be an issue. They debate, argue, resolve conflicts as a team, or at other times as individuals working on a solo project. No-one complains, but my lab assistants, when simply walking around, are always impressed at how much order there actually is.
>
> We have six rooms which are isolatable (is that a word?). We call them 'suites', and they were designed for isolation and group work. In practice they are most frequently used by grad students or advanced students working on major projects for longer blocks of time.
>
> **Peter Chvany**, Facilities Manager, Emerson College.

The Fully Networked Facility

The model which some people are now moving towards is the fully networked digital production facility.

In this model the computer has taken over nearly all of the functions of the facility, and the individual edit rooms are like satellites connecting in to the central storage hub.

With a fully networked facility, field footage can be stored directly to the central server, and then can be extracted from there by any edit suite which is on the network. This means that several people can be accessing the same footage and making their own edits from it, without having to pass tapes around or wait for additional work dubs to be made.

This is a very handy scenario for students who've been challenged to all cut a video piece from the same material.

It's also one solution to the age-old problem of internal strife within an edit team, where two hard heads each want their own cut and won't compromise. This makes it possible for each of them to see the logical (or illogical) end of their edit choice preferences, and for the whole class to view a variety of cuts and constructively analyse the end products.

Can you visualise the set-up? Each edit suite is basically a workstation which can receive video footage from the central server and store edited programs back to the central server. The workstations may all be in one big lab or they may each have their own little edit room. Money and space will probably determine this.

Of course, the workstation computer could also have the normal outputs, so it's possible to attach a VHS or SVHS record machine to an edit suite, so editors can run off tape editions of their work for home viewing or for showing to clients.

The hub of this facility is a very powerful computer called a server. You may need more than one server, depending on the media traffic it will need to handle. You may also need to have a separate server dedicated to the work being generated in the multicamera video studio.

As usual, you'll need to keep archives of stock footage, but this can be done on DVDs, which will save lots of space and make accessing footage much easier. But there will always be a need for useful logs to be stored somehow in relation to the file footage!

So, there's a server with a large storage capacity in a central room. It has fibre optic wiring to a bank of edit suites and to the studio control room.

There are shelves of DVDs with archived footage.

There's a patchbay which outputs to the dubbing racks.

Laptops and Ethernet

One media centre sees the future like this:

> Upon arrival every student will be issued with a laptop computer which has all the appropriate software loaded on it. They will do their editing wherever they choose, and when they come back to the college will be able to connect their laptop to any Ethernet port in the building (the building is already wired for this) and play their video on any monitor or video display system they choose.

Is the Future Wireless?

Some people are saying that in the future everything will be wireless.

It would certainly seem more convenient to get rid of all the wires, and allow people to work from the surroundings they choose, than to link them in to edit labs or rooms which they find distracting or claustrophobic, or hard to get home from late at night. And what about being able to have that doughnut and coffee fairly close at hand?

There's little doubt that wireless technology appeals particularly to consumers.

But at present wireless technology is still slower than cable-based systems. Another problem is that the current equipment has less memory capacity.

But who knows what will be available in the next few years?

When buying a computer for digital video work, always get at least two hard drives—the faster the better. This way you can separate your system data (operating system) from your video work, and you can also improve performance. Because each hard drive only has one read/write head, it can only do one thing at a time. So with two separate hard drives, the computer can be reading or writing the two drives at once—e.g. capturing video (writing) to the video disk, and doing system work (like memory paging) on the other hard disk. If you're using Adobe Premiere, the manual will give you some instructions about how to set up your scratch disks for best performance.

Lindsay Ward, School of Information Technology, James Cook University.

11 Thanks for the Memory

In the beginning years of television, programs could be broadcast but couldn't be recorded electronically. The only early programs which were recorded were shot on film, which was very expensive, so not frequently done. Those *I Love Lucy* shows you've seen from the fifties? Lucille Ball paid for the filming herself. Other shows just passed out into the universe . . .

Early experiments in magnetic recording were happening in 1951 at places like Bing Crosby Labs, RCA and Ampex. But in the early 1950s, news stories were still shot on film. This meant, of course, that the film had to be processed and edited into story form, which took time. But even then, because the frame rate of film is different from that of video, the film stories had to be converted to video before they could be broadcast on TV.

The conversion from film to video was done through a process called telecine. Telecine is still used to convert film to video.

News then was a far cry from today's reporter on the scene! Now either an experienced reporter on a live link, or a story edited on a portable edit system, can be beamed back by microwave link and satellite so that the story can be broadcast from the home station at once, or within minutes.

Finding the way to capture the TV signal and store it for later use was a big challenge, and it took years to solve.

Craig Dingwell threads film onto a telecine machine. (Courtesy of ScreenSound Australia)

Telecine transfer in progress at ScreenSound Australia, the National Screen and Sound Archive, Canberra, ACT, Australia. (Courtesy of ScreenSound Australia)

In the first days of electronic recording, the video image was recorded on 2-inch magnetic tape, which was spooled on large reels and played on a gigantic quadruplex recorder. Although it was a breakthrough for its time, the size and weight of the quadruplex recorder meant that only studio-based recording was feasible.

Portable black and white reel-to-reel recordings became available in the late 1960s, and enthusiasts embraced field production, despite the difficulties of editing by cutting and splicing the tape.

Sony produced the first Umatic videocassettes in the early 1970s: the KC-60 in 1971 and the KC-20 in 1972. They then produced the half-inch video-cassette, the Betamax, in 1975. This was quickly followed by JVC with the VHS (video home system) half-inch video cassette in 1976.

Wherever you are, your report can be sent back to the studio and broadcast quickly. Liz Kravitz on location filing the news for WEBN. Nick Spinetto on camera. Emerson College, Boston, MA, USA.

After a battle of the tape formats waged in consumerland, VHS finally tipped the scales as the more often purchased tape, and Betamax was discontinued. However, Betacam, also a half-inch format produced by Sony, became the standard for ENG (electronic news gathering) at TV stations.

With videocassette recording available, and supported by analog editing systems which didn't cost the earth (just close to it), the use of video technology by non-professionals exploded. Video access centres were opened by government and education

Christina Sparrow threads a quarter-inch J-format reel-to-reel videoplayer. (Courtesy of ScreenSound Australia, National Screen and Sound Archive, Canberra, ACT, Australia)
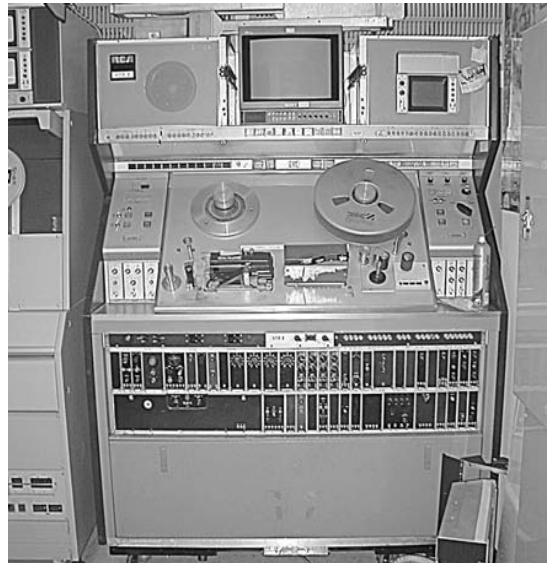
A quadruplex recorder. (Courtesy of ScreenSound Australia, National Screen and Sound Archive, Canberra, ACT, Australia)

Bruce McCallum, Technician, Sony Australia.

For access to historical information on the development of video, check out the Internet. Sites like the web-based Sony Museum <<www.sony.net/Fun/the-museum/>> can be very informative.

groups, and also by cable TV companies. Lots of people began to use video for their own purposes.

Unassuming and old-fashioned as it may seem, videotape is still stunning in its capacity to store video data.

Technology developers had a long struggle to improve on magnetic tape as a video data storage device.

The question was, how could such a *huge* file size as a single video frame (1 megabyte in size) be handled by computers?

Which leads us to one of the key ideas in digital video storage: compression.

Compression

In any video picture, there are many tiny bits of picture information, some of which are repetitive.

To understand this, imagine a scene with a little pond surrounded by trees in full leaf. The surface of the pond is mostly blue, the trees are mostly green. When this image is electronically scanned, the data produced says, in effect:

Blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, blue, for a horizontal scan line traced across the pond.

And green, green, green, green, green, green, green, green, green, green, green, for a similar horizontal scan line drawn across the wooded area.

This pretty scene can be greatly compressed without any noticeable loss for the viewer.

Of course, the trees have trunks which are also evident, and there may be ducks on the pond. But still, *much* of the additional picture information, on any given scan line, is a repeat of the same.

So, instead of wasting storage space by repeating so much of the data, there's a way to electronically say *ditto* (*compressing* the data) when storing the picture information, and a corresponding way to uncompress the picture correctly when it has to be displayed.

This:	green	In effect becomes this:	green
	green		"
	green		"
	green		"
	green		"

In a way, compression is like a ditto formula, which saves lots of storage space.

Digital videocameras compress video as they record it. The standard compression rate for DV is 5:1. You may also hear the expression 'DV25'. This comes from the fact that DV compression is at a fixed rate of 25 megabits per second.

So right from the start with digital video you're dealing with a compressed image. When the signal is passed into a computer it can be compressed even further, in order to reduce the file size and save on the use of the hard drive's memory.

What is a CODEC?

A *codec* is what compresses and decompresses video signals. Get it? <u>C</u>ompresses and <u>dec</u>ompresses. A codec can be a piece of hardware which can be purchased on its own. It's sometimes inbuilt in equipment, like DV camcorders and capture cards.

A codec can also be software.

Some codecs operate with a fixed compression rate, and some have the ability for the compression rate to be varied, and set as needed by the operator.

With a variable codec, you can choose whatever compression rate you want to work with during your rough cut, when you need to enter large amounts of footage into the computer as possible source material.

But in the end, you can do your fine cut from files which are entered into the computer as less compressed video. This way, your final product can be put together, stored and output at the best quality your system can deliver.

Changing Video File Sizes

Computer editing programs allow the editor several choices. Originally uncompressed video can be stored in the computer uncompressed or at various different compression levels.

One single frame of uncompressed NTSC video takes about 1 megabyte (MB) to store it.

This figure is reached by multiplying the horizontal resolution (720 pixels) by the vertical resolution (486 pixels), then multiplying × 3 bytes for the RGB colour information. At the rate of 29.97 frames per second, this results in the use of about 30MB storage for every *second* of uncompressed video! (These, and the following statistics as well, were taken from *A Digital Video Primer*, from the Adobe Dynamic Media Group. For great information, check out <<www.adobe.com/support/techguides/>>)

Who's got that level of memory available? I imagine you can see the need for compression now.

Compression, like much in life, is a bit of a juggling act. You want to keep the highest possible quality at the lowest memory cost. The reality is, the bigger the file size, the higher the quality. The trick is to wind back the file size to the point where the loss of quality is invisible to the viewer.

Knowing what level of compression to use is connected with knowing how your viewer will see your product. Anything viewed on a full screen TV will need bigger file sizes than something viewed in a tiny window on a website.

Video on the Web can be compressed 50:1 or more.

Different Methods of Compression

Reducing Frame Size

One method of compression is to reduce the size of each frame. This achieves quite dramatic results. A 320 × 240 image uses only a quarter the number of pixels as a 640 × 480 picture. So if you're authoring for the Web, it's very smart to send smaller frames. People are used to accepting pictures which don't fill their computer screens.

Always ask how your product will be delivered. On videotape? Via CD? Or DVD?

Reducing Frame Rate

Another method of compression is to reduce the frame rate of the video. Video with a frame rate of 15 frames per second will look fairly smooth to the eye, but it will be using only half the storage rate of the normal (NTSC) signal. The same system can be applied to PAL video, of course.

Reducing the Colour Information

Another factor that the compression inventers have taken into consideration is that the human eye is less sensitive to changes in colour than it is to changes in brightness. So lots of colour information can be discarded before the compression becomes noticeable to the viewer.

Colour compression does produce some artefacts (visible degradations of the image), however. These show up most on sharp colour boundaries, like white text on a dark background.

Lossy vs Lossless Methods

When a signal is compressed, then decompressed, then compressed again, repeatedly, it does begin to degrade. But most editing processes don't require repeated conversions.

However, when a DV signal is *transmitted* from generation to generation, the process is *transparent*—that is, there is no loss of signal quality.

Intra-frame Compression

With *intra-frame compression*, each single video frame is compressed separately. Intra-frame compression is used by these codecs:

MJPEG   Used for general applications
MPEG1   Used for CD-Rom and Web
MPEG2   Used for DVD and Satellite TV
DV   Used for Consumer, Industrial and Broadcast

Inter-frame Compression

Inter-frame compression operates differently. It works on the fact that much of the data from one video frame to the next is the same. Inter-frame compression just stores the *differences* from one frame to the next.

Inter-frame compression is used only in MPEG2, which is also the only format which uses both modes of compression.

MPEG-2 is used for DVD and satellite TV. It's also the format that has been chosen for future broadcast TV in the United States.

In fact, there are three kinds of frames in MPEG2. (Just skip this bit if your brain is in overload, but hang in there if you like knowing the nitty gritty of the tech stuff.)

First, there's the *I frame*. This means *intra-frame*, which is just like the normal DV frame. This type of frame has the largest amount of data.

Then there's the *P frame*, standing for *predicted frame*. It's arrived at by referencing it to the frames which came before it. A P frame can be less than a tenth of the size of the frame that came before it.

And there's the *B frame*. The B stands for *bi-directional*. B frames are calculated from the frames that come before them and after them.

So MPEG2 is said to have an *IPB format*. (I'm SURE I don't have to explain why this is so.) A compressed IPB video signal could look something like this:

I-P-P-P-P-B-B-B-P-B-B-B-I-P-P-P-P-B-B-B-B-P-I-P-P-P-B-B

The *I frames* have to recur every now and then so there isn't a problem with accumulated error, which could cause unacceptable distortion of the original signal.

D1 Video

If anyone says to you, 'Well if you're so smart, what's the compression type for D1?', look at them coolly and say, 'The D1 format is uncompressed.'

A Quick Review

So you can reduce your video file sizes in several ways:

- Make the playback frames smaller (reduce frame size).
- Play back fewer frames per second (reducing frame rate).
- Cut back on colour information (colour compression).

And this compression can be done in two ways:

- Intra-frame—that is, each frame by itself.
- Inter-frame—that is, generating only the *changes* in data from one frame to the next.

Have You Been Told About Your *Over-byte*?

To ensure the next few pages make sense to you, you need to understand how quantities of computer data are measured. Here goes:

A **bit** is the basic unit of measurement. A bit stores just one value, either a 1 or a 0, which are the only numbers in the binary system computers use (1 = on and 0 = off).

A **byte** is made up of 8 bits, so depending on the way the bits are arranged in it, it can store any one of 256 values (2 to the power of 8).

(A **nibble** is 4 bits—you don't need to know this, but I like the word myself.)

A **kilobyte** (**KB**) is roughly 1000 bytes. Technically it's a bit over that amount, it's 1024. This is arrived at by taking 2 to the power of 10, but for our purposes 1000 is close enough. Kilobytes are often referred to as Ks.

By the same token, a **megabyte** (**MB**) is roughly a million bytes. (People talk about megs meaning megabytes.)

And a **gigabyte** (**GB**) is roughly what the Americans call a billion, and what the Australians call a thousand million. So that's what people mean when they say *gigs* (unless they're musicians!).

You can follow all the rest of the chapter by remembering that a meg is a lot bigger than a K and a gig is really huge.

Despite significant compression, video files are still large files for a computer to handle. Run-of-the-mill word processing generates files measured in kilobytes, but video files run to megabytes and even gigabytes in length. One hour of DV video (which by definition has already has been compressed in a 5:1 ratio) takes about 13Gb to store.

Solving the Memory Dilemma

There are many different strategies for supplying a computer edit system with enough memory to work well.

The Macintosh G4 tower with a LaCie firewire drive.

Two Kinds of Memory

There are two kinds of memory in computers: RAM and ROM.

RAM is the memory that allows your computer to run its programs, to process data. So it's *processing power* for activities like real-time video playback and for rendering.

ROM is *storage capacity*. So it's space for storing your data, like your video files.

For video editing, you need lots of both kinds of memory, and not having enough of one or the other can be the cause of many problems.

Some current systems require 500 MB of RAM, and if you have 750–1000 MB it won't go astray.

If you're in a position to buy new equipment, large amounts of memory are possible in storage towers, like those used for servers, and in later models like the Macintosh G4. You can hook additional drives to these for even larger storage capacity.

Fortunately, for those needing to add on to the computer they already have, the price of additional memory continues to fall.

For a single operator with a home computer, boosting the memory can be done by adding boards to the inside of the computer box itself, or attaching plug-in memory, like an external hard drive, which can be positioned beside the computer.

Many Users, Portable Memory

In schools and other facilities where many users need to edit on the same computers, it just doesn't work for one person to tie up most of the ROM in the hard drive of a single computer. So facilities managers find ways that students can have *portable* memory, in other words, be able to take their project out of the computer and away with them at the end of each editing session.

With portable memory, students can sit at whatever work station is available to them at any point in time and still be able to work on their projects. It also means that no-one else can delete, alter or corrupt footage from their project.

Early editing systems involved devices which plugged into the computer and sat next to them on the bench or rested on top of them. Students could save small amounts of video and then take it away with them. In those days, to be able to edit a five-minute piece might have tested the limits of the computers.

Unfortunately for many students (and the technicians! and the teachers! and everyone else who lived within the students' sphere of influence!), some of the early systems were not reliable. People would get partway through, or even finish their edit and the storage device would fail. One head technician told of a device which had about a 40 per cent failure rate. No need to name the ones no-one would want . . .

> At some public access sites in the States, they encourage people to use their own home computers for editing, so they sign out a portable 40-gig hard drive for a month or so at a time, and expect the finished project to be turned in on that!
>
> **Barbara Bishop**, Independent Producer.

> Back it all up, and back up the back up.
>
> **Peter Chvany**, Facilities Manager, Emerson College.

Possible Memory Storage Devices

Zip Drive

A zip drive is great for additional memory for text-based work, but in a production set-up it's only good for storing graphics. It's too slow for video because of the problem of how quickly the frame can be repeated.

Orb Cartridge

An orb cartridge works well when students are doing small assignments. It could be a good idea for the computer lab where the Level One students are working on short, beginners' projects.

An orb cartridge is almost the same size as a floppy disk, but it's thicker. It inserts into a device which plugs into the computer. Because it's so small and lightweight, it's convenient for students to tote around in their bags, and it's very inexpensive. It's quite reliable and holds 2.2 gigs.

Brick

A *brick* is a portable hard drive with a carrying handle and a SCSI connection. Emerson College in Boston loans them out to students from their storeroom, just as they loan out any other production equipment. There's usually enough memory on a brick for students to save all their work for the whole semester on it.

The computer editing lab is set up so the brick can be plugged in at any computer. It's a much more expensive item than an orb, and bulkier, so harder for students to carry around, but it provides 16 gigabytes of memory.

Two bricks can be mounted side by side (32 gigs), or several can be mounted in an array (6 or 8 bricks together).

Firewire drive for increased storage capacity.

Bill O'Donnell, Video Consultant.

Be very wary of how many devices you attach to your computer editing system. The computer will be phantom-powering them. It can handle a moderate load, but it can't run your refrigerator.

Firewire Drive

A firewire drive is another step up in memory. It can hold 80 gigs, which is five hours of uncompressed video. This should be plenty for most students working on a project of a half hour or less.

A firewire drive is a smallish flat box, which attaches to the computer. It costs more than a brick. A firewire drive is light in weight and easy to carry around.

For cost and efficiency, this is a good option for upper level students doing longer projects.

Ice Cube

The Ice Cube is an external drive *holder*, which allows you to add extra storage space to your computer.

Because the Ice Cube is made of clear plastic, with inner metal walls, it looks a bit icy. But it's cool for more than that reason. With it you can add on pretty much whatever amount of additional memory you want. You just insert your hard drive (40 gigs? 80 gigs? 120 gigs?) into the plastic housing and the Ice Cube then connects to the computer via the firewire input.

The Ice Cube can be carried around easily, so if you need to work on your edit somewhere else, you can just take the Ice Cube with you.

You can also *daisy chain* Ice Cubes, which means you can attach two or more together via the firewire in and out connection points on them, and have a string of them all connected to your computer at once.

Just remember, if you insert a drive higher than 40 gigs you need to externally power the Ice Cube. But for smaller drives the computer can phantom power it.

The Ice Cube is also *hot swappable*, which means you can disconnect one and connect another while your edit session is running, without any problem for the computer in recognising the new drive.

The Clearlight is a smaller version of the Ice Cube and is handy for use with laptops.

You can get the latest information on data storage devices by searching the Internet. One URL that includes Ice Cube and Clearlight is

<<www.siliconmemory.com.au>>

Hard Drive Array

A *hard drive array* can hold 120 gigs and is significantly faster than a firewire. But it costs much more. A hard drive array would work well for people doing quite long projects, or for well-trained users who would leave each other's stored material alone. A hard drive array could be a good resource in a small production house, where two or three people share one computer in different time slots.

The Ice Cube can be loaded with whatever drive size you choose.

The Ice Cube attaches easily to your computer via the firewire input.

You know how the saying goes—the amount of data we want to store is always just that little bit more than the amount of storage space available.
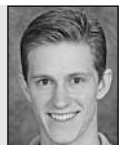
Lindsay Ward, School of Information Technology, James Cook University.

Thanks to Peter Chvany, Bill O'Donnell, Bruce McCallum and Lindsay Ward for their help in the preparation of this chapter.

12 Digital Editing

Linear vs Non-linear

The use of jargon can lock people out of feeling comfortable at their work, so let's spend a little time getting straight on the meaning of some words.

The process of editing a video signal from one tape to another tape is called *linear editing.*

This is because the method used is one of editing one shot after another, like systematically moving along a *line.* You edit the first shot, then the second, then the third and so forth, going step by step, in the prearranged order, all the way through the requirements of the edit script.

In linear editing, you can't go back!

In linear editing, there's no way to rearrange shots in the middle of an edited section, unless the new sequence takes up exactly the same number of frames as the material it's replacing.

If the new sequence is longer, you have to choose between losing some video on the end of the earlier shot or some video at the beginning of the shot which follows the new sequence. Or you have to re-edit everything that comes after the new sequence.

If the new sequence is shorter than the material you're replacing, there will be a few spare frames of unwanted video from the previous edit lurking at the beginning or end (or both) of the new sequence.

The already-recorded images just won't obligingly slide up or down the tape to make room, or eliminate a gap which has appeared.

Lengthening or shortening a shot can mean you have to edit in the new image, and then re-do all the shots that come after it.

This is an aspect of video which has been extremely frustrating. (The handfuls of ripped-out editor's hair on the floor of edit suites attest to this!)

Although it's true that in a *rough cut* you can change a sequence by rearranging sections of it onto another tape, you can only disregard the resulting drop in quality from *going down a generation* because anyone viewing it mentally allows for the fact that it's a practice run and not the completed project.

But in the final cut, it has to be *linear* all the way. Now *that's* a sweaty palms experience!

> A few things have also been lost with the passing of linear editing. Students don't have to take such care ordering their material going into the edit, which means they can get sloppy and waste time.
>
> **Tom Kingdon**, Emerson College.

Non-linear Editing—It Started with Film

When people edit film—which they've been doing for a lot longer than anyone's been editing videotape—they literally *cut* it. They take the bits they like and stick them together in an order which they think will work. If it doesn't work, they unstick the bits, reassemble them in a new order, add new shots, throw some out, lengthen or shorten shots here and there, and have another look to see if it works this time.

> Sprocket holes, the original non-linear editing system, a system advanced enough to require you to think.
>
> **Francis Treacey**, Deakin University.

Because the editor can work on any shot at any time, without affecting the others, the process is called *non-linear editing* (NLE, for those of you who like unpronounceable acronyms).

In other words, the editor is not working strictly down a line of shots, but working at any point along that line, as needed.

If you've used your computer for word processing, the process is much the same. You can cut and paste, add and delete, as you need to. You can start anywhere in the file and then move on to anywhere else. No need to think or work in step-after-step order.

Heidi Crawford and Tom McEvoy learn the classic art of film editing, Deakin University, Clayton, Vic, Australia.

Media students using a digital edit system, Northern Melbourne Institute of TAFE.

I don't think I know a single editor who doesn't prefer non-linear editing.

Phillippa Harvey, Editing Department, AFTRS.

Non-linear (Digital) Video Editing

Non-linear editing in video is possible through the use of computers. This is an example of *convergence,* where two technologies come together to accomplish a new task, or an old task in a new way.

But there was a major hurdle to be overcome before this could happen. The video signal was an analog signal, but computers work only with digital information.

Analog vs Digital

A good way to understand the difference between analog and digital is to consider wrist watches.

The Analog Signal

The old-style watch has a second hand which travels smoothly around and around the face of the watch. It gives a constant readout of the time. You can see that time is always changing, in a smooth, unbroken, regular motion. It's possible to observe (or grasp) that time is always happening; that, for example, there's time in between three seconds and four seconds past eight.

Now one could discuss concepts of time for the length of many books. But what concerns us here is the impression (illusion?) of time which the analog watch is giving us. The analog watch signal is continuous: it displays its entire travel from one position on the watch face to the next.

Another way to think of the analog signal is to compare it to the motion of an ocean wave. A wave has a continuous rising and falling motion. You can see the entire smooth movement from trough to crest to trough.

Analog signals are made up of waveforms which are continuously varying.

The Digital Signal

The digital watch is quite different. Digital information operates on a *binary* system.

A binary system is one which is based on only two numbers, which are 0 and 1. Electricity is binary—electricity is either on or off. There are only two possibilities.

Computers are also binary. They use the on/off of electricity as the basis of their languages.

The digital watch displays its information about time as a series of pulses. Its readout is a *sample* of time. A new sample is taken every second. So with a digital watch we're told that it's three seconds past eight for a whole second, then instantly it's four seconds past eight. And that 'time' lasts for a whole second, too. And so on.

(In this description, the word 'digital' refers to the sampling process, not to the digits on the watch face.)

Although our experience of lived life is analog, we can accept this digital representation of it because the pulses are sufficiently close together. If the smallest segments the watch could register were hours, the readout would seem too fractured for us.

Now think about video. The video signal is gathered by the scanning device of the camera making horizontal sweeps across the image and assigning variations in electrical voltage to represent brightness and darkness. The motion of the electron beam in a video tube is analog—it moves in a continuous flow.

Digital information about the horizontal line of video gives a series of separate brightness and colour values to specific spots (*pixels*) along the horizontal line. There's no information between these spots. But because the spots are close enough together, it doesn't matter. Our eyes can integrate a whole picture from the discrete bits of information given in the digital readout.

In fact, we do this all the time when we look at photographs in the newspaper or in magazines. They're also made up of tiny dots, but our eyes see an integrated image.

> It's useful to have both linear and non-linear edit systems because they both have good qualities and they both have downfalls. For some things, it's better to use linear, but for editing the final version of shows, non-linear is the best.
>
> **Kimberley Brown**, Editor/ Camera Operator, Canada.

Copying the Signals

So this is what to understand:

Analog information is continuous, and digital information is in separate bits.

When a copy is made of an analog signal, the copy is never perfect. Slight imperfections are introduced in the copying process.

This is why there's always a loss in quality when you *go down a generation* with an analog signal. (That is, when you copy the signal from one tape to another, in other words, make a *dub*.)

However, when a copy is made of a digital signal, the copy is identical to the original. So there's no need to worry about *generations* when working with digital signals.

```
01100011110010100
```

```
01100011110010100
```
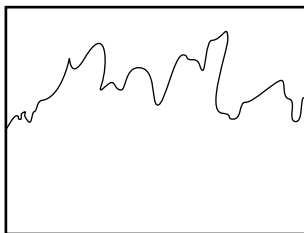
Analog to analog is never a perfect copy.
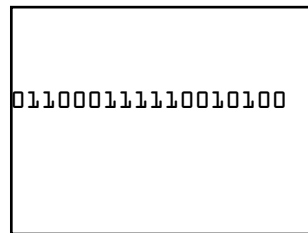
Digital to digital is a perfect copy.

First, you have to digitise the video signal. Julia Melvin captures Hi-8 footage to the Media 100, AFTRS.

Moving from Analog to Digital

In order to do computer based, non-linear editing, the video signal has to be in binary code.

Video which has been recorded as an analog signal has to be *digitised*. That means it has to be changed (converted) into a digital signal. Some computer editing systems can do this for you.

Or if you have a digital video camera, you can record your video as a digital signal right from the start. Then, though you'll still need to *capture* the signal into the non-linear editing program, you may be able to capture it much faster because the signal is already a stream of binary data, rather than an analog signal.

Phillippa Harvey—Comparisons

Phillippa Harvey is an editing mentor at the Australian Film Television and Radio School. She makes these comments about digital editing.

Advantages

Digital editing gives you random access to any footage you have.

You can make edit changes rapidly, you no longer have to work in real time.

You can try out different digital effects quickly and easily, create titles, online, colour grade and mix your project.

You can keep several versions of the same program—for example, the director's cut, the editor's cut.

You can do sophisticated sound mixes for screenings because there are up to 24 audio tracks to work with. But of course you have to mix them down to play out the sound track for a screening.

You can crop and redefine or reposition or blow up frames, if you don't want to use the whole frame as it was shot.

Disadvantages

The rough cut process seems to have disappeared as people try to go directly for the fine cut.

People are less disciplined about preparing their material before they begin to edit.

People want to *see* every effect, just because they can. This can waste a lot of time on things that will never be used in the final edit.

People start fine cutting without an overview of the pacing of the whole program.

Different Uses of Time

Analog and digital editing use up your time differently.

With analog editing, you can *start* viewing and editing your tapes as soon as you get to the edit system.

The editing process itself can take quite a while because each shot must be copied to the record tape in real time (and, in fact, the previews are done one or more times in real time, too). However, at the end of editing, the tape can be taken out of the record machine and shown straight away.

With digital editing, the holdups are at the beginning and the end.

Before you can start editing, you must log and capture all your shots. Capturing is done in real time.

While you're editing, you're previewing in real time, but when it comes to actually moving a shot to the timeline, this is done in a blink, by just clicking and dragging the shot icon. No copying time here. However, once the edit is finished, the program is still sitting inside the computer, and it must be copied back out onto videotape. Again, this is done in real time.

With both systems, there are aspects of 'Hurry up and wait'. The waiting just happens at different points in the process.

An Overview of the Process

The process of non-linear editing can best be paralleled with using your favourite word processing program on your computer.

If you haven't learned to use a word processing program yet, then learning non-linear editing will be a steeper learning curve, but don't despair, you'll get there.

> Get computer literate now! Convergent technology means it's a digital world.
>
> **John Carroll**, Charles Sturt University.

The Basic Steps

1. **Log** your original footage and decide which shots you'll digitise.
2. **Create a project folder** for your work in the non-linear edit system.
3. **Capture** the relevant and useable video shots into the computer's storage (hard drive).
4. **Sort** your video shots (*clips*) into *bins*, by whatever categories are useful to you ('exterior shots', or 'close-ups', or 'shots of people working').
5. **Label** your captured shots.
6. **Cut and paste** the chosen shots (*clips*). Drop the shots onto the timeline and then trim and manipulate them there till you have an edit you're happy with.
7. After you have *locked off* (finished) your cut, **save your EDL** (edit decision list) to a computer floppy disk, and take it to the on-line suite for finishing, **or** do your finishing (*up-resing*) on the non-linear system where you are.

> First thing to do when you start a non-linear edit is to look at the tapes. Second thing to do is log them. Third thing, look at them again. Fourth thing is a paper-edit. Fifth and final thing, turn on the computer.
>
> **Francis Treacey**, Deakin University.

Christine Togo-Smallwood, Entrepreneurial Unit, School of Indigenous Australian Studies, James Cook University.

> Logging and capturing takes up half the editing time. Capturing has to be done in real time. Anything in real time slows you up.

Peter Giles, Head of Digital Media, AFTRS.

> Log your tapes before you go into the editing room!

Harry Kirchner, La Trobe University.

> Continuous timecode on your DV tape will save a lot of headaches when digitising your material during post production.

Philip Elms, Media Resource Centre.

> As with the linear edit, familiarity with the footage is always helpful. If tapes are digitised in their entirety, then knowing the shot order via timecode logs and visually allows you to quickly locate them using the play head tool.

Logging

It's important to take the time to create accurate logs of your original footage. This is true whether you've shot in analog or digital.

Shots which are clearly unusable should be labelled NG (no good). Shots which are good in themselves, but not useful for your current project, should be labelled accordingly.

Be sure to keep accurate records of *which tape* each clip came from. And your tape numbering system needs to be compatible with the one used at the on-line suite you'll finish your project on.

Capturing

Capturing means recording your original images and sounds onto the computer's hard drive—that is, its memory storage place. This process is also known as *digitising*, because it can involve converting analog video to digital. Even some digital cameras still need to have their signal digitised to be compatible with the edit system being used.

You may find that capturing is the longest part of the process for you, because you have to capture the video in *real time*—that is, an hour of analog video will take an hour to capture.

Capture only the material that you might need for your edit. Anything labelled on your log as NG will only take up valuable storage space if it's transferred and not used.

As much as possible, break your material into small segments as you capture it. For instance, you might capture each *take* separately. That way, you can easily delete the material you decide not to use, to make more room in the computer storage. If you capture in big slabs of video, you have to either keep it all on the hard disk or throw it all out.

BATCH CAPTURING

To capture many shots at once, you log a bunch of them and then do a batch capture.

As with anything else to do with computers, it's advisable to batch capture fairly frequently, say every 20 or 30 minutes. After all, what if you log shots for two hours and then the computer freezes? You will have lost all your work! Believe me, it happens.

Memory Requirements for Video

One of the obstacles with the computer interface has been the huge memory needed to store video images.

As already discussed, one second of PAL video is actually made up of 25 discrete images, called frames; and one second of NTSC video is made up of 30 frames.

Each of these frames, without compression, can fill just on one megabyte of storage space on a computer's hard drive. So 25 megabytes or more of storage space are needed to save one second of uncompressed video!

This is why non-linear editing systems may have 120 gigabytes of hard drive storage. More space than an editor could ever use . . . until the next edit.

Some systems compromise by using only a small portion of the screen to show the video signal.

Compression is used to reduce the amount of data needed to convey the information from the frame. This lets you make maximum use of the available storage space on the computer's hard disk.

To capture many shots at once, you can do a *batch capture*. If there's a break in your timecode, you can't batch capture across the break.

Rob Davis, Editor, Digital Dimensions.

Capturing video from a digital camera, using a firewire. Charles Sturt University, Bathurst, NSW, Australia.

COMPRESSION (DATA BIT REDUCTION)

Different non-linear systems use different compression methods to achieve an efficient use of the hard disk storage. All data compression systems have several things in common and the one that affects the user most has to do with the quality of images being stored.

Compression decreases the quality of the image being digitised.

The amount of compression can be selected, based on whether you need low quality video for off-line editing or high quality video for on-line editing.

You can use greatly compressed video for rough cutting, because the quality of the signal isn't so important at the rough cut stage. What is important is that you have access to a broad range of shots, anything that might possibly be useful to you for your project.

For the fine cut, you can re-digitise the required footage at a lower compression rate.

Don't get confused here—lower compression means higher level of detail and a better quality of image.

At this lower compression rate, each frame will require more storage space. But because you've made your final edit decisions and have eliminated the need for many of the shots which were available to you for the rough cut, it shouldn't be a problem.

Find out anything you can to do with timecode, the vectorscope and waveform monitor. Learn the difference between dropframe and non dropframe.

Kimberley Brown, Editor/ Camera Operator.

Digitising all the final shots at a good quality will demand less storage space from your computer's disk drive than was needed for storing all your lower quality captures for the rough cut.

FRAME REDUCTION

Another method used to reduce the storage space required is to adjust the number of fields or frames that are digitised per second. Some systems allow the editor to digitise less than the 25 (or 30) frames in each second of video. This method of saving storage space does not allow the editor to do frame-accurate editing, because some of the frames that the editor might want to perform a cut on may not be on the hard drive.

Images digitised in this way will also appear to suffer a loss of detail in any motion. While some editors may find this acceptable in off-line, it would mean some fine tuning in the on-line edit.

Frame reduction is probably more useful when editing for the Web than for products which will be finished to tape or DVD.

Generally, this is not really a desirable way to edit.

DEALING WITH STORAGE SPACE SHORTAGE

You either need to be selective about what you digitise—which means having your shots well logged before you begin, and only capturing shots which may be useful.

Or you need to have a lot of storage space. Buy more hard drives or get bigger ones than you already have.

The price of hard drive storage has dropped dramatically, so memory is far less of an issue than it once was. (See Chapter 11, Thanks for the Memory)

If you've shot on analog, it can make more sense to rough cut in analog. Once you know the shots you'll be using in your show, then you digitise just those shots. This saves you time and computer memory. Then you do the final cut in non-linear.

Kimberley Brown, Editor/Camera Operator.

Labelling Your Material

The edit system will allow you to label all your shots and enter some text as a description.

The descriptive words you choose will help you find your shots later on, so take care about how you do your labelling. When you're searching for all the shots of _Vanessa_ standing next to the _tree_, the program will search the text descriptions you used as labels and highlight all the shots that match your search criteria.

CLIPS

Each section of video and audio that you've captured and labelled is referred to as a _clip_.

Once each clip is labelled, it's available to be selected and played independently of any other clip. Each clip can be a video segment or audio segment, or a combination of both.

BINS

You store your clips in _bins_. So you decide what categories of shots you want to use in relation to
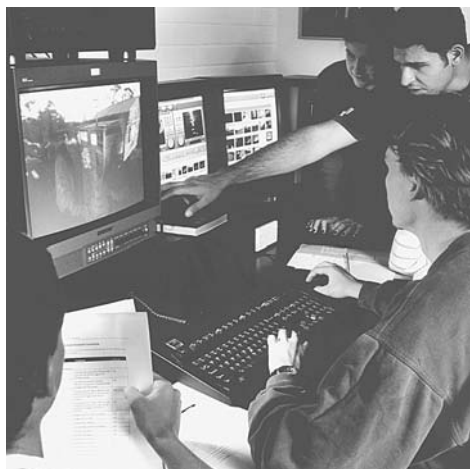
The D-Vision, XED on-line suite at the Academy of Photogenic Arts, Artarmon, NSW, Australia.

your project, and you label each bin according to a category. For example, you may want to put all the shots of a certain location together, and all the shots of a certain activity together, or group all the shots of a particular shot size together.

The decision as to which bin to put a shot in needn't be agonising. You can store a clip in more than one bin without making much of a dent in the computer storage available. This is because the computer stores a clip as merely the in and out points from your videotape, not the actual digitised picture itself.

#1 The clips available for the edit.

THUMBNAILS (OR TILES)

You can assign a *thumbnail* (a tiny picture) to represent each of your shots, so you can have a whole selection of tiny pictures sitting on your computer screen ready for you to begin editing the shots they represent into the order you choose.

Often the editing program will select the first frame of a clip as the thumbnail to represent that clip, but you can override this and use whatever thumbnail you want. It could well be that the first few frames of a shot don't show you the essential content of the shot.

DIGITISED MEDIA

Digitised media is the term used to refer to the stored video images.

Sometimes people get confused between clips and digitised media. The digitised media is what takes up the huge amount of storage space. The clips are merely the in and out points of the various shots in the digitised media. In a sense, they're pointers for the computer to find the images, but not the images themselves.

So if you're asked to delete your material from the computer and you just delete the clips, the computer will still be burdened with the huge file which holds your images.

#2 The screen with the timeline to which you do your editing

#3 The video monitor showing composite video, so you can check your colours and see the playback images on the full screen.

Rob Davis,
Editor, Digital
Dimensions.

> When deleting files, make sure you really know what each file is, or you could be deleting an entire timeline sequence, an entire edited program.

On the other hand, if you delete the digitised media and save the clips, you'll have no images for the computer to go to.

The Digital Editing Process—How is it Different?

Imagine that you could have a whole postproduction studio in one machine. That's pretty much what digital editing offers. In the old analog suite there was the basic 2-VCR edit set-up, which you could add to till you had lots of pieces of equipment, all linked into it, all doing different things.

You could add a titler, so you could put credits on your video. You could add a vision mixer, so you could do shot transitions like fades, wipes and dissolves. If you wanted true dissolves from moving images you needed to add a second video player, and for good control you needed to add an AB roll controller. For extra backgrounds and special effects you added in a computer, to handle more complex sound tracks you added an audio mixer, for rolling in sound from various sources you needed to connect a tape player, a CD player, even a record player. Then, to make sure the system was using a stable control track, you could add a timebase corrector. It was a bit like a kid's connecting-the-pieces game, but each piece was so expensive that every move was a serious one.

Richard Fitzpatrick,
Camera
Operator,
Digital
Dimensions.

> If editing for 4:3 from 16:9 footage, you can 'pan and scan' in the digital edit system, to frame the 4:3 shot however you want it, or you can set the system to just 'centre cut' by default. But I think that to pan and scan within a shot is just sacrilege. It goes against the original artistic side of the composition.

If your media centre could only afford to upgrade one of the edit suites, students fought to get into the one with the top gear. Some pretty awesome antagonisms developed at times, when it was close to the screening date or the end of semester. Bribing and jockeying for position weren't unknown, though in general a first come, first served rule was applied.

With digital editing, all of the image and sound manipulation functions are incorporated within the edit program itself. You just need to get the pictures and sound into the computer, then it's amazing

Philip Elms,
Media
Resource
Centre.

> During an edit, learn where the 'save' button is and use it every 5 minutes or so. If the worst happens, at least you will not lose too much work.

what you can do with the edit system. Even key effects, like chroma keying, can be done.

The Edit—the Rough Cut

The edited piece you're working on will be represented on your computer screen by a timeline, on which the separate, or combined, video and audio components of the program are viewable as you assemble them.

The available shots will be represented by thumbnails for each clip.

You do the editing by using the same sort of *cut and paste* techniques you use in a word processor.

This means you cut the shot from the available source material by clicking on the *drop icon* for the clip you want. Then you drag it across the screen to the place on the timeline where you want the shot to occur, and then unclick the mouse to paste the icon to that place.

When you're working out a sequence, you can manipulate the shots into a chosen order, and then the computer screen can show you what the sequence would look like. At this point you're not committing images to tape. You're seeing a preview, computer style.

You're playing back a sequence of shots from your media files in real time. But nothing is being cut or joined. All the material still remains as it was initially saved on the hard drive.

As you cut and paste you're creating a new version of your edit, in any order you feel is right at that moment, for better or worse. If you find it's for worse, then just dump it. Your original material is unaffected.

On some systems you have an *undo* command. Using that will take you back to how your edit was one command previously. If you have *multiple undos*, you can keep going back and back till you get to the last place where you were happy with your work. If your edit system will display a *history* of the decisions (commands) you've been making, you don't have to go back one step at a time, but just look through the history list till you find where you want to get to, and you can go there in one click. Breathtaking, eh?

You can rearrange the images again and again till you have what you want. Each time you choose a shot, the computer stores the new in-point and out-point data in a file (an EDL or edit decision list) which can later be used as your cutting script.

A major advantage with non-linear editing is that you can see a preview of a whole series of shots, whereas on analog video edit systems, you can preview only one shot at a time. This is a big change.

If you're unsure which edited version you like best, maybe feeling that two or three versions have merit, any number of shot sequences can be saved to files without affecting the original material.

Then you can call up your various possibilities at any time. They'll be there on tap to show your editing partners, when they return from that inexplicably lengthy coffee break.

Non-linear rough cutting makes the shot assembling side of editing move much faster.

> Non-linear allows you to shuffle images endlessly; it is not an intelligent life source, it does not think, therefore it does not edit, you do.
>
> **Francis Treacey**, Deakin University.

> Figure out what your pain threshold is—how many hours/minutes of work could you bear to re-do? Then use an alternating back-up system; save to disk A, next time to disk B, then to disk A again, so any file corruption won't wipe your project out.
>
> **Jason Wheatley**, Educational Media, AFTRS.

> If you do something you're really excited about, save it immediately.
>
> **Fiona Strain**, Editing Department, AFTRS.

> The thing about Final Cut Pro editing is that you can have multiple video tracks. You can place various cutaways in the same timeline spot, and then play each version till you decide which one you want. You can even leave several there, and by a method of locking and unlocking tracks you can have different versions simultaneously saved.
>
> **Christine Togo-Smallwood**, Entrepreneurial Unit, School of Indigenous Australian Studies, James Cook University.

Christine Togo-Smallwood, Entrepreneurial Unit, School of Indigenous Australian Studies, James Cook University.

> Digital editing *is* faster and easier, but the creative process is still the same as working in analog. Like all artistic processes, it's still labour intensive.

But like all good software, the output is only as good as the person using it. The creative side of the edit is still up to you.

Non-linear edit suite at Macquarie University, North Ryde, NSW, Australia. (Photo by Mario Bianchino)

George Karpathakis, Edith Cowan University.

> Don't be too hasty to start an edit session—check your step preferences before you begin and save angst later!

Rob Davis, Editor, Digital Dimensions.

> Take a break!

Human Care

Just in case you didn't read Chapter 9 on analog editing, I'll repeat this one thought:

Editing is exhausting, especially when you're a beginner. If you stay in the edit room too long, you're likely to start feeling weird effects, like headache, nausea and the sense that your brain has been scrambled.

Four-hour editing sessions are long enough, until your system gets used to it. For some people, four hours will always be pushing the limits of what they can stand. Plan your editing sessions according to what your body tells you, and not just what the facility will allow.

Also, take care to sit as far from the monitors as you can, so you don't get a dose of radiation.

Final Cut

With non-linear editing, the distinction between the rough cut and the fine cut tends to disappear. You can use the non-linear system to finalise your edit, complete with music and effects. So if your project will be finished on your non-linear system, then the rough cut simply becomes the fine cut when you decide to stop manipulating things.

But if you're going to use a postproduction house for your fine cut, non-linear systems produce cutting lists and EDLs which are frame perfect.

Some non-linear edit systems will *auto capture* your material for the fine cut. You just put each of your camera original tapes into the connected VCR, and the computer will take over the motion control of the playback machine, and extract each specific segment required by your EDL. Nice, eh?

You would take the EDL to a postproduction suite if you need effects which your non-linear system can't do.

Accurate logging, well-labelled tapes and an off-line edit will assist in saving money and time in an expensive on-line suite.

Philip Elms, Media Resource Centre.

Ben Lay and Serge Golikov operate the online suite at the Australian Film Television and Radio School.

Making the Process Clear

In order to teach video editing, lecturers and technicians develop instruction sheets which relate not just to the editing software the unit has committed to, but also to the little quirks and idiosyncracies of their media centre. These sheets are laborious to write, as is anything to do with operating computers. You just can't miss out a single step, or the process will founder.

A good tape is a finished tape.

Hsing Min Sha, Independent Producer.

A well-written sheet can help a student through the initial morass of learning editing, and save the trainer some repetitive explanations, as long as the student is willing to learn from written words.

With the price of the software going down, the concept of having people buying their own software and editing at home is catching on. They just turn in their finished product. This will cut down on the number of people who use the studio for editing, but it will also reduce the social connections among producers (which I personally think are critical) but it allows people to edit at any time of the day or night, not just when the access centre is open. It's the next phase of public access television!

Barbara Bishop, Independent Producer.

So in the interests of you spending less time re-inventing the wheel, and more on quality time with your students or on your own video project, get some help and training sheets from Harry Kirchner's site, which is: <<www.latrobe.edu.au/videotips>>

How do Edit Systems Vary?

Digital edit systems use the image of a timeline for you to edit to, so you get an actual graphic representation of where your shot sits in the edit sequence. If you take a shot out of the sequence, all the other shots can be made to shuttle along to fill up the vacancy (as we always used to wish they would) or the space can be altered to be larger or smaller for a new shot to fit in.

To move a shot into the timeline, you just click on it and drag it to the timeline on the screen, and insert it where you want it to go. It's all very visual. No more stomach-lurching pre-rolls, no more slipped frames in editing.

One of the neat things about some digital editing systems is that you can do minor adjustments to the length of a shot which were never possible before. So say you need your shot to last just an eensy bit longer, you can stretch it out a bit. You also have the option of compressing it.

A great feature of Final Cut Pro is that you can have multiple video tracks. Why on earth would you want that, you ask? After all, you're only making one visual. But are you? Imagine you lay down a bedtrack of an interview. That's fine. That's the normal way to start an edit. Then you want to add some cutaways to hide the edit points where you deleted material from the interview.

Instead of erasing your speaker's image in order to insert the cutaways, you can put them on another video track which sits on the screen right above the first one. Then you can start a third track and put on a different series of cutaways. When your client comes to view the progress you've made, you can *lock* and *unlock* the additional video tracks, allowing you to show the version with the first set of cutaways, the version with the second set of cutaways, and still have the original bedtrack undisturbed if the client doesn't like anything you've done. (Sniff!)

Final Cut Pro allows up to 99 video tracks on which you can have all manner of transitions and alternative sequences. The disadvantage is that all that locking and unlocking of tracks can get confusing!

Tapeless Storage

Digital storage systems are constantly getting better. If you have access to the equipment to have your entire video project stored in digital form, you can skip saving it to videotape. (Still, you'll probably want to make a copy on tape to play on your home VCR.)

Once you've completed your edit, you should always store your EDL and clip files on floppy disks. Then you can delete your digitised media files. If you need to run the video again, you can re-digitise the original video footage, and the computer can put the program all together again.

However, if you've used any composited images, graphics or animations, they'll be lost if you dump your digital media files, because they weren't

Output more than one master tape on multiple formats from the non-linear edited program. Each master will be of the highest quality possible and saves dubbing sub masters later if needed.

Philip Elms, Media Resource Centre.

part of your original video footage. In this case, you should store these images on a high capacity digital back-up system.

If you can burn DVDs, save all your media and your edits that way.

Tapeless Distribution

The most practical way to distribute your product is via DVD. A DVD is lightweight, it takes up very little space on the shelf, it's robust and it's easy to mail.

The only thing is, will your client or audience own a DVD player? If you can't answer yes here, you might as well send a pie plate.

Moving to the the ethereal type of distribution, you can post your video to a website, or send a digitised image along the Internet, and the person who receives it, perhaps on the other side of the world, can play it back on their computer screen, sound and all.

Though the downloading time for video is still considerable, things are quickly getting better.

A whole new concept of broadcasting is emerging. It's no longer just the TV stations that can send a signal out to millions!

13 Editing Techniques

How often have you been watching a TV show when someone has exclaimed, 'The editing is fantastic!'

Probably not very often. Maybe never. People notice great camera work, they get drawn into a captivating story line, they like exciting soundtracks . . . but good editing, even great editing, often goes unnoticed.

Good editing, like good sewing, appears seamless. The material flows fluidly before the eyes, one scene into the next, and the viewer is unconscious of the shot changes, unless they're deliberately attention-getting.

A good way to begin noticing shots and shot changes is to turn the sound down completely on your TV and just watch the visuals. Without the soundtrack propelling you along, you'll be able to pay much more attention to the length of the shots, the types of shots used, the points at which the shots change, and the kind of changes employed. In fact, you may start to notice the editing for the first time (and you'll never be so visually innocent again).

VHS edit suite,
Media Resource
Centre, Adelaide, SA,
Australia.

Through editing, time is manipulated to encompass a span of minutes, hours, days or longer (sometimes millennia in space odysseys!) within a short sequence of shots. And yet the meaning remains comprehensible and we accept it without question. Why?

There are certain picture signals which over the years have come to have accepted meanings for audiences. The erudite way to talk about this is to refer to the *conventions of screen language*.

No-one needs to tell you that a fade to black, followed by a fade up to another image, indicates either the passage of time or a change of location. Through repeated use, the fade has come to mean a break, or disjuncture, in time and space.

Editors make use of the accepted conventions of screen language to assist them in telling their stories. With the exception of sports and incredibly hot-breaking news stories, viewers just don't have time to watch screen stories in real time.

So *time shortening* is one of the major functions of editing.

Time Manipulation

Jump cuts

If an editor simply chops out sections of footage of an event, the result is a *jump cut*. The person on the screen is suddenly in a different position from where he or she was a milli-second ago. Though what is being said on the soundtrack may make sense, the viewer will experience a momentary visual disturbance, because in our real-life experience people don't make lightning rearrangements of their posture or their position in space.

If you cut from this . . .   to this . . .   to this, your speaker will appear to
                                                                              jump through his talk.

Dan Dow discusses a car scene for a film.

If these three shots are edited together, the viewer will see the speaker appear to jump from one shot to the next.

Now the truth is that with most interviews, the editor must shorten a person's responses to a handful of their most relevant sentences. So a half-hour of rambling becomes two minutes or less of succinct commentary.

The editor does this by removing all the waffle. The best sentences are selected and assembled into a coherent sequence of thoughts, but this often results in a series of visual jumps at the edit points.

Though sometimes jump cuts are allowed to be shown in late breaking news stories, they're generally considered to look jarring and unprofessional.

Noddies

It's acceptable style in news work and current affairs to acknowledge the presence of the interviewer. This makes the editor's job easier.

The audience understands the interviewer's role as twofold: asking the right questions and reacting to the answers. So the camera operator is instructed to tape the interviewer asking at least the key questions and then some *noddies* (reaction shots) showing the interviewer reacting to the comments of the person being questioned. Reaction shots usually include smiles, thoughtful expressions, quizzical looks, sometimes sceptical looks or surprise, and nods which indicate general agreement or a signal to the person to continue speaking.

Use a noddy to get smoothly from the first shot of your interviewee to the second. Jacqueline Antoinette is interviewed by Rachael Crinks at AFTRS.

When shooting noddies, check that your eye lines and screen direction are correct.

Julie Booras, Offspring Productions.

The trick is that for efficiency's sake, ordinary interviews are usually covered with only one camera, so the questions and the reaction shots are taped after the interview has ended, and often after the VIP has left the room.

Until a presenter becomes used to pumping out these visual artefacts, or *noddies*, it's easy to feel silly sitting and smiling and nodding to a camera which has been repositioned behind the interviewee's empty chair.

But forced or ridiculous as the process may seem, noddies give the editor a variety of shots to cover the jump cuts at the necessary edit points, and allow the edited sequence to flow along rather than to hobble. When the viewer has the experience of looking away to the interviewer and then looks back at the VIP, it's no surprise to see a head tilted at a different angle or an arm in a different position. The jolt is gone.

Note: Directors must make sure that the presenter's eyeline is correctly oriented to where the face of the interviewee was during the taping session, or the noddies will be unconvincing to the audience.

Also, care should be taken that the questions are repeated exactly as they were asked during the interview, and that any additional questions which were not on the planned interview script but were thrown in on the spur of the moment, are remembered and re-asked.

Cutaways

A *cutaway* is any visual which bears some relationship to the sequence being edited.

Cutaways are used to illustrate what the interviewee or commentator is saying, or to cover an edit point which would otherwise be a jump cut. They're useful for shortening the length of a scene because they shift the viewer's attention to something else, and when the editor cuts back to the original scene, real time can be accepted to have passed.

Noddies are a particular type of cutaway, but the options seem endless. For example, in an edit of a person speaking about the environment, cutaways could include shots of the bush, rivers, the sea, wildlife, traffic, buildings, the sky, and so on.

The more relevant and high quality the cutaways, the better the edited sequence will look. Steady camera work (involving the use of a tripod) is desirable.

Generally, people want to shoot their own cutaways on location to go with their story. But in a pinch someone else, or a stock footage supplier, may have a good usable shot.

Because viewers assume a link between the soundtrack and the cutaways, there are ethical considerations in using cutaways. It's unfair to throw in a shot which alters the meaning of the story being told, unless it's clear to the viewer that the edit is not a faithful account. This is why TV broadcasters are supposed to label and date stock footage when they drop it into a fresh news story.

You'll need cutaways to edit an interview down to its best points. Michelle Blakeney interviews mothers in a schoolyard in Ginghong, China, for *Dai Women Speak*. (Photo by Gill Moody)

Cut-ins

A *cut-in* is a closer look at something which is within the scene being shown. It could be a close-up of an object, a hand performing an action, or a vase of flowers on an elegant table setting—anything which is a detail from the wider shot.

It's used in the same way as a cutaway, allowing time to be shortened by focusing the viewer's eye on a finer point, while the editor adjusts the scene or removes footage from the shot material and returns to the story at a different point in time.

If you use a cut-in to a smaller part of the frame, you can cut back out to a different shot. Luke Barrowcliffe teaches how to mix music, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Exit and Entrance

Another way to shorten time without a jump cut is to have the actor fully leave the frame during a shot, then cut to a different scene and have the actor enter the new one. Almost any amount of time or space can be eradicated, as long as an exit and entrance are clearly shown.

> The best way to learn how to shoot is to have to edit your own stuff.

Martha Mollison, Video Producer.

For example, a surfer lifts her board and walks out of the water and out of frame. In the next shot the surfer is getting into a car. Whether she's leaving a nearby parking lot or has just hiked 300 steep steps up a cliff, the time is equally gone, yet the story thread is intact.

But, exit and entrance shots work only if the footage was shot that way in the first place, and our surfer exits leaving a clean frame or enters into a clean frame. Getting the screen direction to match is a help too.

So the choices available in the edit suite hark back to the skill of the director.

Parallel Action

When two characters in two different places are shown alternately in an edited sequence, two aspects of the story can be developed at once and the switching from one to the other works for the editor the same way that a cutaway does. Great chunks of time and action can be eliminated through the use of parallel action.

So:

> *Long Shot* (LS): Semi-trailer zipping down the highway on a rainy night, past the turn-off for Port Hedland.
> Dissolve to *Close-up* (CU): Truck driver rubbing his eye.
> *Midshot* (MS): Young woman tucks small child into bed.
> *Midshot* (MS): Truck driver lifts mug of coffee in roadside cafe in Broome.
> *Medium Close-up* (MCU): Young woman in nightdress stares out window at blowing trees.

The truck driver has travelled more than 100 km in five shots, and we've travelled the distance between him and his home twice.

Establishing Shots

An *establishing shot* is a fairly wide shot which shows the viewer the general surroundings in which the characters find themselves. It can be the very first shot used in an edited sequence, to let the audience get oriented to the overall setting and understand the action within its broader context.

Sometimes the establishing shot is used later in a sequence, when the aim is to tantalise the viewer as to where the action is taking place, or give a jolt or surprise. This works well with suspense and comedy.

Master Shot Coverage

One day in the edit suite you may feel like the old-timer informing the tourist, 'You can't get *there* from *here . . .*'

Sometimes there are essential bits of footage which just weren't shot. Or there's a continuity problem, so the shots which were supposed to go together just can't be linked. Then it's handy to have a long shot which is a master shot showing the entire action from the viewpoint of an outside observer. This can be used to bridge the gaps.

Like good camera work, editing should be invisible, so the viewer can concentrate on the story.

Marc Tewksbury, The Nine Video School.

It's another example of how successful editing relies heavily on well-planned coverage on the day of the shoot.

Visual Transitions

A *shot transition* is the way an editor makes the change from one shot to the next. The type of shot transition chosen is related to the style of the piece being cut.

Straight Cut

A *cut*, as its name implies, is when the picture is entirely changed from one shot to the next. (It's a term from film technique, where editors do literally cut the film between frames and then attach the next shot to where the cut was made.)

Caroline Gee and Amber Sloan at A/B roll edit suite, RMIT, Melbourne, Vic, Australia.

A cut is the transition the camera produces when you go in and out of pause mode, and the transition the edit system makes when you do standard editing. A basic no-frills edit suite, which can't do any other shot transitions, is called a *straight-cut edit suite*. In most productions, the vast majority of shot transitions are cuts.

If the cut is technically okay it won't flip at the edit point (*flip* means roll upward once, as if there's a problem with the vertical hold adjustment on the monitor), or flash or otherwise jump. If it does flip, it will always flip and you should edit it again.

The cut should be fine if both VCRs are able to get into sync with each other before the edit happens. Some edit systems will self-monitor so if the VCRs aren't in sync, the system will pre-roll again, up to two more times, trying to get the timing right. After three tries, if the VCRs still can't 'lock up' their timing, they'll just stop. If that happens, you should try other edit points.

If the change in brightness from one shot to the next is very dramatic, like going from a really dark scene to a very bright one, the edit point may jolt the viewer. In that case it's best to change the edit points if possible to make the change less stark. Unless, of course, you want to make a point by emphasising the contrast.

Transitions Using Two Sources

In analog editing, other types of shot transitions require the use of either an effects unit or an A/B roll set-up, which means that the edit system has two players (source machines). To do these visual transitions, both shots need to be played simultaneously.

Fade

A *fade* is when the picture information gradually disappears, leaving a blank screen. Most often people use a fade to black, but in many systems it's possible to fade to white, or any other colour. The fade to black is frequently used at the end of a production.

It's also possible to fade up from a black, white or coloured screen. One use of this transition is for opening shots.

The fade to black followed by a fade up to a new shot is understood to mean the passage of time or a change of place.

Fades can be taped in-camera by using the fade function or by simply closing down the manual iris or reopening it. Many simple edit controllers will also do a fade to black.

Dissolve (Mix)

A *dissolve* is when one whole picture fades away while another whole picture is appearing. At the halfway point, or mid-dissolve, both pictures are visible at half-strength. At the end point, the first picture is gone and the second one is full-strength on the screen.

A dissolve between two moving shots can only be done on a system which allows two active video signals to be input at the same time. In analog editing, this requires two playback VCRs to be in use, one for each tape segment.

This set-up is commonly referred to as *A/B roll*, meaning that tape A is rolling on one machine and tape B is rolling on the other.

Many people have two playback VCRs but have only basic-level mixing equipment and don't have a controller which can synchronise the two playback VCRs. They manage to do dissolves by rehearsing the timing on both VCRs, practising till they can get both tapes rolling in the right relation to each other, and sliding the fader knob on the mixer at the right point so the dissolve happens at a satisfactory place in the footage.

Another basic-equipment trick is to dissolve between a freeze-frame grabbed from a tape and a moving image from the same tape.

Tom Kingdon, Emerson College.

The dissolve is so accessible on non-linear editing that students resort to it too frequently and have all but lost the sense of how to make an effective straight cut. The cut is still the strongest and most versatile transition and, unless you are working with music or want to achieve a specific effect (like the passing of time), you should use it 99 per cent of the time.

But for very accurate dissolves (without a psychotic episode) it's necessary to have an edit controller that controls both the A roll and the B roll VCRs, so the editor can preview and execute the edits with precision.

In order to get the highest quality results, dissolves need to be planned before the material is shot. This is so the shots which will be dissolved together have been originally recorded on different tapes, so they can both be edited from first generation footage.

As a general rule, people put the footage that's central to the final edited piece on the *A roll tape*, and

the cutaway footage, which is likely to be dissolved to, on the *B roll tape*. But any other dissolves the editor is planning, possibly from one cutaway to another, should have their shots allocated to specific record tapes **before** the shoot, and the camera operator needs direction about when to change from one tape to another.

An editor is concerned with the flow of the program, the pace, rhythm and timing.

Phillippa Harvey, Editing Department, AFTRS.

Dissolves are often done live, in a studio or OB van situation, where it's possible to use a vision mixer during the shoot. One of the advantages of recording them live is that it's easier to compare the shots when you can see the framing of both cameras at once, and the preview monitor lets you check if the dissolve looks right before you commit it to tape. You also end up with all your footage on one tape.

Dissolves are often used in dance and music pieces and in some transitions in drama. The speed of the dissolve affects the overall mood and flow of the piece.

Wipe

A *wipe* is when one full-strength image is progressively replaced by another full-strength image. The second image may appear at the left of screen or the right, the top, the bottom, the middle, or in several places at once. It then takes over the screen by following some geometric pattern. Simple mixers do basic wipes, like left to right (and reverse), top to bottom (and reverse) and centre out (and reverse). Some mixers allow for over a hundred different wipe patterns.

Other variations are: the edge of the wipe can be made hard or soft; there can be a border at the edge, which can have a colour to it, and the border can be wide or thin; on the fancier mixers the edge can be made to move in waves, and the height and frequency of the waves can be adjusted.

Wipes are often used on game shows, children's programs and advertising. Some people love them, some hate them. It's a question of style.

Pace

The *pace* of a piece relates to the speed with which the audience moves through the material. Some programs benefit from a brisk pace, with short shots, many shot changes and lots of action on the screen. Other pieces call for a more gentle, even languid pace, lengthy shots and slow dissolves.

Pace can also change within a piece, and often that car chase at the end of an action feature has much faster cuts than the character development scenes at the beginning.

Editing gives your work rhythm; this is measured in heart beats, not frames.

Cameron Rose, Video Art Society, University of Tasmania.

Pace is a feature of editing, but like almost everything else, it relies on the right footage having been shot in the first place. How can an editor produce a one-minute car chase scene, with a shot change every two seconds (yes, divide two into 60 seconds), unless the field footage includes 30 good shots? Since not all shots are good, and not all good ones will be usable, considerably more than 30 shots need to be taped. Directors take note.

Creative Considerations

By Sara Bennett

Once you get familiar with the basics of editing, the process will change from being an activity which is governed by concerns about 'Which button do I push next?' and you'll feel ready to move on to the next challenge.

With basic cutting experience behind you, and more complex material available to you, the process can become quite exciting, creative and satisfying. Some people say that it's the second chance to 'write the story', only this time it's with pictures and sounds.

And, just as with writing, editing is often a long, slow process where a small change of emphasis makes a very big difference.

It's always revealing when a group of students is given the same five shots which contain the same two lines of dialogue and see how many variations they come up with. Multiply that a few hundred times and you'll see why it can take six months to a year to edit a feature film! So you should never think that your first cut, called the *rough cut*, is the

Sara Bennett, Editing Department, AFTRS.

> Planning pays off. Don't be a bull at the gate. Think before you cut and even then don't be surprised if other members of the creative team can think of other/better ways of doing it. That's editing!

final cut. It's always worth trying to think of other ways of using the material, other ways of telling the story.

Audio Transitions

The audio track often unifies the edited piece, providing the information backbone of the story to which the pictures refer, or, in the case of MTV, the musical engine on which the images ride.

Though in the field the sound is recorded along with the picture, the relationship of the two is often altered during editing. There are various techniques for linking the audio and the video.

Video Precedes Audio

Video precedes audio means that the picture starts first, and then the related sound begins.

So you could see a shot of a person talking, while you hear the voiceover introducing who the person is, and then you begin to hear the words the person is actually saying.

Audio Precedes Video

Audio precedes video means that you hear the sound first, and then you see the pictures related to the sound.

So you might be watching a presenter talk about an arts festival, and while she's still speaking you begin to hear some music softly playing in the background. As she finishes the music becomes louder and then the picture changes to the dance piece which she was introducing.

To have the music begin while the presenter is still speaking, you need to record the presenter's words on one audio track and the music on the other track. You can't mix music into a track which has already been recorded on—as soon as you go into record mode, you erase what was there before.

However, with an audio mixer you can combine the voiceover and the music and then send that mixed signal to the record VCR so it's all on one track, if that's what you want to do. It takes patience and skill to get it all right in a live mix.

Rolling-in the Audio

Of course, the simplest thing is to have the sound and picture begin together at the edit point. One good trick to know is about *rolling-in* the audio.

If the sound is fairly loud on the audio you're editing in, sometimes it will sound too abrupt at the edit-in point or come in slightly distorted at the start of the edit. So what you do is turn down the audio record level on the record VCR, let the edit begin and then rotate the audio record level knob (either quickly or slowly) till you get to the end level you want, thus rolling-in the sound.

Fading the Audio In or Out

Other times it works well to have the audio record level on the record VCR set at zero, and then fade the sound up from silence after the cut begins and the picture is on screen, again by rotating the audio record level knob while in record mode.

Jessica Gould and Camilla Havmoller at the School of Film, Media and Cultural Studies, Griffith University, Brisbane, Qld, Australia.

It's also nice at times to fade the sound out, by turning the audio record level knob back to zero before the edit ends.

In either case, you **must** do the audio fade during the edit. You can't tone the sound down later.

Shooting Ratios

The *shooting ratio* is the relationship between how much footage you shoot and how much footage is used in the final edited product.

With pre-scripted and rehearsed material, like drama or training tapes, the shooting ratio should be fairly low, like 6:1. This means you may do several takes of a shot, but you know what shots to do. For a one-hour piece, you shouldn't have much more than six hours of raw footage, if that.

With less predictable genres, like documentary, the shooting ratio can be as high as 20:1.

Take care not to wildly overshoot. Having heaps of vaguely conceived footage is a logging and editing nightmare.

If you are asking me if I think you should leave a shot out of the edit, then you already know the answer: cut it!

Francis Treacey, Deakin University.

That sunrise shot you spent three hours setting up for might look fantastic, but if it doesn't end up serving the film as a whole, you might have to grit your teeth and be prepared to leave it on that virtual cutting room floor.

Harry Kirchner, La Trobe University.

Editing Tips

- Be ruthless in your edit decisions. Don't ever edit a poor shot into a final product. It brings down the tone of your work very quickly. A few wobbly, out-of-focus, or wrongly white-balanced shots will make your product look amateurish, no matter how good the rest of your shots are.
- Let go of things. Don't include a shot because it's your favourite, or because it took you forever to do. Use it only if it works.
- Cut concisely. Let the shot speak and then move to the next one. Shots which drag on dull the flow.
- Don't cut into or out of a partially completed pan, tilt or zoom. Let the camera movement run its full course.
- Don't put too many camera movements close together unless you're serving motion sickness tablets to your audience.
- Take care that the two audio tracks don't fight each other. Usually a song with words can't co-exist with commentary or dialogue. And music which is too loud will easily drown out the voice track.

14 Digital Effects

Have you ever watched a 'The Making of . . .' show on TV and been fascinated by how the actors flipped and flew around, or by how things exploded, or by how creatures morphed and melted into liquid mercury puddles?

The technology to digitise picture information has opened doors to all kinds of manipulation of the inherent image data. Once converted to a series of ones and zeros, pictures can be squeezed, expanded, distorted, re-sized, copied and composited with other pictures. Elements can be extracted from one background and added to another. A whole medley of individual elements from separate sources can come together within one frame.

Elements can be produced solely within computer graphics programs and then mixed in with others that have been recorded by a camera, so creatures that never were can chase real people through landscapes which originated in some designer's head.

It's great to watch, and lots of people think it would be great to do.

Although it's still pricey, there are computer programs available for schools and even home users to get into digital effects in a pretty substantial way. Here's a bit of a breakdown to help you get your head around what processes are encompassed in the overarching term *digital effects*. This list isn't complete and it may become out of date quickly (ah, the frustration of publishing books in this field!). Still, it may point you in a direction which will yield some good results down the track—it's just that you have to do the hard yards.

The major separation of approach and technology seems to be between 2-D and 3-D.

> From our small Internet monitors to the huge multiplex cinema screens, we're bombarded by fantastic imagery. After you've been editing for a while, you wonder if you can do similar things, and by experimenting you succeed in creating Hollywood-style effects in a smaller way. Soon you realise that putting shots in order is only one part of telling a story.
>
> **Rob Davis**, Editor, Digital Dimensions.

2-D

2-D means two dimensions, which means flat stuff. Height and width only. Well, there's nothing new here to video people—we've been working in 2-D all along.

There are three general categories of 2-D work: painting, compositing and digital video effects (DVEs).

Painting

Paint techniques allow you to generate and manipulate flat images on screen. In paint programs you can work with:

Titles and Graphics

You can do such things as:

1. Generate titles (words) on the screen.
2. Animate titles—make them follow pathways across the screen, in all kinds of directions, at different speeds and at different rates of acceleration and deceleration.
3. Flip titles around, making them merge together, making them dance.
4. Generate graphics like logos, little flat characters, vehicles, structures . . . *line graphics*; animate these line graphics (*elements*).
5. Import images into your video from other video footage, from digital stills and from other graphics sources like photographs, artwork and maps; manipulate these images, add to them, subtract from them, distort them, multiply (clone) them, merge them, explode them . . . the list goes on.

You need to design titles that work in both 16:9 and 4:3 aspect ratios, as both ratios are currently broadcast.

Peter Giles,
Head of
Digital Media,
AFTRS.

Matte Creation

This is where a live action character is shot against a blue screen and keying is used to create a matte so that you can combine this person with a different background. (Rotoscoping or rotasplining—commonly referred to in many software packages— should be mainly used for fine touch-up work to clean mattes and edges.)

This also means you can select an element out of a picture, such as removing your friend from a background, and inserting that person into another background.

You can take a number of people/creatures from various sources and put them all together in one invented landscape.

Conversely, computer-generated characters can find their way into real environments, too. You've seen those dinosaurs.

Cel Animation

Entire video movies can be constructed frame by frame from 2-D drawings in computer graphics programs.

First, you do the line work for the *key frames*, and check that the pictures and motions you've drawn look right and are working correctly.

Peter Giles, Head of Digital Media, AFTRS.

There is a range of specialist software for cel animation which is really designed to register scans of drawings (so they all line up) and to complete various parts of the animation process. Cel animation packages include Retas Pro, Toons and Animation Stand.

Anna Fraser, digital media student, uses a Wacom Tablet to control a graphics program, AFTRS.

Then, you draw the *in betweens*, which are all those other frames which make up the 25 (or 30) frames per second, so that the characters move smoothly through your invented world. Then you go back and colour them all in, using ink and paint.
You'd want to have a team working on it!

Paint Programs

There are programs used by the big movie production houses, and there are programs which can be used on fast home computers. These programs have digital paint modules:

Peter Giles, Head of Digital Media, AFTRS.

Digital video's all about compression. The more compression you have, the more image degradation you'll get, especially when applying digital effects. The more processes you apply to an image the more artefacts will appear.

- **High end**
  From *Discreet:* Flame; Smoke; Inferno
  From *Quantel:* Henry; Edit Box; QEdit Pro

- **Desktop**
  Discreet Combustion
  Adobe Photoshop
  Procreate Painter
  Pinnacle Commotion

Compositing

Compositing has to do with image layering, and the integration of separate images into a whole picture.

Each image (element) sits on a separate graphics layer—like on clear plastic sheets in the physical world—and you digitally pile them on top of each other so all the elements show through to the top and come together to make one final integrated picture.

> Not saving regularly is a guaranteed strategy to make your computer crash.

Jeff Bodmer-Turner, Manchester Memorial School.

> The technology is secondary to the message.

Steven Parris, Edmonds-Woodway High School.

> You'll never get a perfect chroma key on lower-end systems because of the compression ratios. You need to go to DigiBeta to get really crisp images in chroma key.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Title Graphics and Promos

You know how words and images can be superimposed over video footage. It's common for advertisements for large chain stores, for example, to have a basic shell (or doughnut) which shows their shop or logo, and on top of that the local TV station editor puts in the price of groceries and other items for each week.

CGI/Live Action Integration

A lot of this is about placing a digital character into a live action scene.

Of course, care has to be taken to ensure the actors and their computer-generated companions are all correctly positioned for the composited picture. Simple things like the wrong eyeline or a slightly wrong body orientation can break the illusion that the invented character is actually in the physical space.

Shadows and lighting effects are used to assist in the impression of substance, so the viewers can believe that the characters are really within the computer-generated scene.

Even the way a character would break the rays of light present while moving through a scene has to be considered and allowed for. For example, a person walking through the forest in the filtered rays of the setting sun would be breaking those light rays as they passed along, in addition to casting a shadow. And wouldn't soft items, like bushes and flowers, move slightly when a character passes them? To say nothing of the whole earth trembling as a dinosaur walks into a valley!

Digital Visual Effects

Digital visual effects (DVEs) is the accepted term used for effects which are computer generated in postproduction, often by compositing. Any effects which are originated within the camera at the time of shooting are called *special effects* or *SFX*.

Sources for software

- **High end**
  Discreet Flame, Inferno
  Quantel Henry Infinity
  Apple Shake

- **Desktop**
  Adobe After Effects
  Discreet Combustion

Editing

Editing means combining image sequences (video) over time.

Cuts and Dissolves

These are the standard shot transitions which were available in analog editing as well. A cut is a cut is a cut.

But with dissolves, doing them digitally allows you to try out several speeds, one after the other, and then you can decide on the one you prefer and execute it.

Other Video Transitions

Edit systems come with a swag of shot transitions, some quite eyecatching. These flash across our TV screens with every updated software package the broadcasters can get in. Because of this, some of them tend to date the look of your video product, but choices in transition effects come down to the overall style of your program and what you and your client (and audience) want.

Sources for Software

- **High end**
  Softimage DS
  Discreet Smoke
  AVID
  Quantel Editbox

- **Desktop**
  Edit
  Media 100
  Final Cut Pro
  Adobe Premiere

Do You Believe in the Power of the Pix-ies?

As you know, digital video is made up of discrete units of information, and the basic unit is the pixel.

On normal screens, pixels are so numerous, and individual pixels so small, that we don't really notice them. They're below our vision threshold except when viewed on a very large screen.

Whether you can see them individually or not, they're there and doing what they do best—glowing. As a group, they give us the light, dark and colour data which our minds convert into images with meaning.

Digital video standard CCIR 601 is for *rectangular* pixels. The *resolution* of that image is 720 × 576. This

Students from the Bachelor of Screen Production in Digital Media shoot a QuickTime Virtual Reality panorama. These panoramas, together with animation, graphics and linear video, are used to create interactive videospaces. Carolyn Harris, Jessica Gould and Camilla Havmoller, Griffith University, Brisbane, Qld, Australia. (Photo by Bernadette Flynn)

Students can draw on ideas of docospace, gamespace and portrait space to explore the ideas of the screen as a navigable exploratory world to be published on CD-R or DVD-R.

Bernadette Flynn, Griffith University.

means that the image is made up of a grid that is 720 pixels in width and 576 pixels in height. _The CCIR 601 standard used for Digital Betacam and DV uses rectangular pixels._

But the first generation of digital video PCI cards digitised analog video as _square_ pixels. Most digital imaging programs, like Photoshop, work in square pixels.

This doesn't matter if you're just shooting field footage, but if you're generating an image in a 2-D program, you need to be aware of the differences, or you may end up with unintended visual results, like circles that look like ovals. It's a good idea to check on a monitor how your work is coming along before you get too far down the creative track.
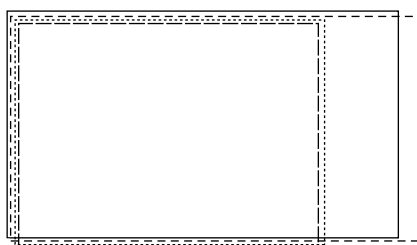
1.78:1 RATIO—Video (Widescreen 16:9)
1.85:1 RATIO—Film Widescreen
1.37:1 RATIO—Film Academy
1.33:1 RATIO—Standard Video

PAL VIDEO
4:3 ASPECT RATIO or 1.33:1
approx 1.3 MB per frame

NB: Digital Video standard CCIR 601 (Digital Betacam and DV) uses rectangular pixels. Ratio = 720 × 576 but width of image is stretched.

1K image
at 1.85:1
ASPECT RATIO
approx. 2.3 MB
per frame

2K image
at 1.85:1
ASPECT RATIO
approx. 5.13 MB
per frame

576

648

768

1200

800
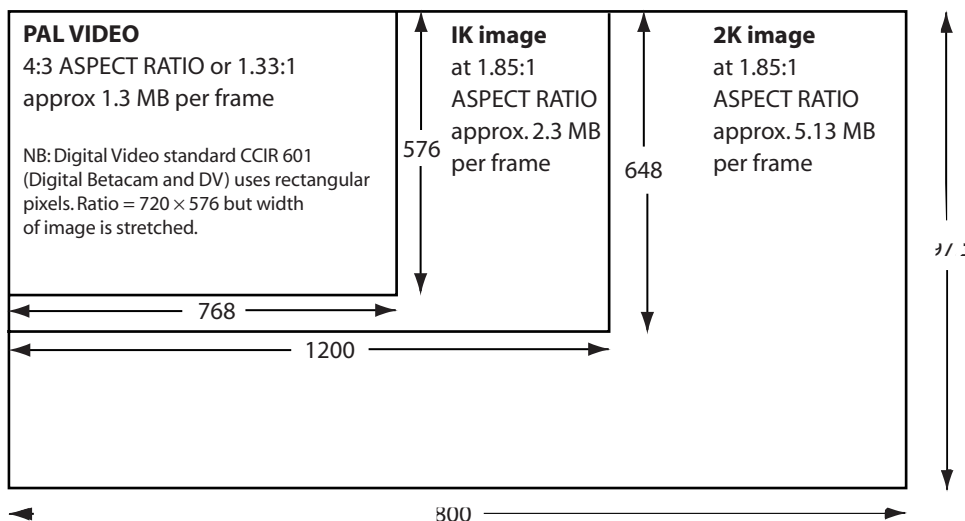
1K and 2K aspect ratios are examples only, based on maximum resolution of Solitaire Cinell film recorder. PAL image resolution is for square pixels.

How to calculate the aspect ratio

$$\frac{\text{width (pixels)}}{\text{height (pixels)}} = \text{ratio}$$

for an image of 768 × 576 pixels

$$\frac{768}{576} = 1.33$$

Graphic thanks to Peter Giles, © AFTRS 2002.

Rendering

You can ask the computer to do all sorts of wonderful things, but for some tasks it takes time for the computer to calculate the data necessary for all the frames.

In the early days of digital effects, people were designing a sequence (or sometimes even one shot) during the day, and putting the computer into render mode for the whole night! Sometimes rendering went on over several weeks. Overnight rendering does still occur—often several evenings of rendering can be involved, depending on the sophistication of the calculations the computer has to perform. Some relief has come because even the desktop computers of today are more powerful than the super-computers of the early 1990s.

Rendering can mean waiting time. Some effects take only a few seconds to render, and a few deep breaths or a quick call to a friend gets you through the time with grace.

Other effects and sequences take longer. You may get good at doing something else while your computer renders. Having a break from looking at the screen is not at all a bad idea.

For the hardcore screen-eyed, a dual processor computer with two monitors allows you to render one sequence while working on another.

3-D

When you work in 3-D, you're creating synthetic characters and environments.

Your characters and objects can be viewed from all sides, and the illusion (because it's still a flat screen) is that the elements have form and substance and can move through these created spaces with the laws of physics applying or not, as you may decide.

The synthesis of imagery in the computer is the basis of 3-D computer graphics and is different from digital imaging because you are creating virtual objects rather than manipulating 2-D photographic images.

> Planning is the heart of successful visual effects.

Peter Giles, Head of Digital Media, AFTRS.

Virtual Object Creation

You can build all sorts of structures, machines, tools, vehicles, implements, artefacts—you name it.

There's basically no limit to what you can invent here. You can build environments with landscapes that have lots of trees and plants, grasses, rocks, hummocks, waterfalls, and on and on. Depending on your level of attention to detail you can model each of these items individually, or you can judiciously clone things and sprinkle the copies through the landscape to save yourself some time.

3-D programs allow you to assign different attributes to your basic models. So once you've made a prototype model of something, you can cover it with a wide range of surfaces supplied by the program (or your own custom surfaces). The surfaces can have different textures, different levels of light reflectivity and different plasticity.

> Whenever you're dealing with a computer, always back up daily on a disk and *take the disk home with you!*

Fiona Strain, Editing Department, AFTRS.

The model can be assigned different weights, different bounce-abilities. It can interact within its environment along whatever set of rules you give to it.

Will it bounce or go splat? Will it distort on impact or remain pretty rigid? Will it crack or shatter, shudder or blubber? If you're a person who likes to make the rules, 3-D animation may be your rightful career choice!

3-D Character Animation

Some people are into spaces, and other people are into characters. In 3-D animation, huge teams are needed to get through all the work, so on a media project everyone can get into their preferred niche. If you're working at home, late at night, on your own computer, you can invent any Frankenstein or Peter Pan you like.

3-D computer graphics: Estimate the time the digital artist thinks it will take, and then quadruple it.

Peter Giles,
Head of
Digital Media,
AFTRS.

With character animation there are certain aspects which come to the fore. It's important how the character *moves* and it's important how the character *expresses emotion*.

Characters can be built from scratch, or they can be built by having humans or animals move through a space, with sensors on their bodies, so that the computer can make a model of how they move (motion capture). Then the animator gets to work with surface aspects, like skin, hair and clothing.

Virtual Sets

When you're designing a virtual set in 3-D, you assign a virtual camera angle which matches your live action camera position, so your characters and the sets they're in will come together convincingly when you do the compositing.

3-D Effects Systems

Particles

Particles allow you to generate dynamic systems of moving elements.

You position a *particle emitter* and have it send out a profusion of specified particles. They can be used to create smoke, fire, hail, sandstorms, dust storms, explosions, debris—whatever you want.

You define the size and shape of the particles, and their lifespan (how long they last on the screen before disappearing).

You also define how they respond to other forces, like gravity, wind and objects near them. Magnetism?

You determine what pathway they take—a raging vortex? a lolly-doddle flow?

Paint

A few programs have paint in 3-D. This allows you to paint objects all over (grass, trees and other vegetation, for example) so you can view them from any angle and animate them, and they're fully covered with colour.

Sources

- **High end**
  Alias Wavefront Maya
  Lightwave
  AVID Softimage
  Electric Image
  Houdini
  3D Studio Max

- **Desktop**
  Alias Wavefront Maya has a version which can be downloaded free from the Web.
  3D Studio Max

> High end and desktop 3-D graphics have pretty much merged—the most widely used software is Alias Wavefront Maya and Discreet 3-D Studio Max. Costs of these packages have decreased radically in the past year.
>
> **Peter Giles**, Head of Digital Media, AFTRS.

On a Final Note

It's an exhilarating prospect to do 3-D graphics, but they do take a lot of time.

3-D is still the most technically challenging area of computer graphics and the learning curve is steep. To make things look good is particularly difficult and time consuming.

Only you can know if it's worth it to go this route.

For up-to-date information, check out the following sites for yourself:

- Discreet: <<www.discreet.com>>
- Avid: <<www.avid.com>>
- Quantel: <<www.quantel.com>>
- Adobe: <<www.adobe.com>>

> We mustn't forget we're telling stories. The story's more important than the visuals. You can watch a movie with fantastic effects and come out of the theatre with a lacklustre emotional response.
>
> **Rob Davis**, Editor, Digital Dimensions.

Thanks to Peter Giles and Rob Davis for their help in the preparation of this chapter.

15

Microphones

What people notice first about video is the image. That's what the cameras are designed to do well; that's what most camera advertisements stress.

But if the soundtrack on your project is poor or annoying, people will turn away very quickly.

Recording good quality sound requires you to look beyond the basic camera equipment package. This is because almost all cameras are equipped with *omnidirectional microphones*, and the *omni* is the least useful to you for getting clear and controllable sound.

There are many other *mics*, each designed for specific recording needs. Their cables can be plugged into your camera where it says *mic in*. Sometimes just plugging the mic in will override your camera mic, but on some cameras you have to move a switch from *internal mic* to *external mic* in order for the sound from the auxiliary mic to be recorded.

On the Sony DVCAM, you set the audio inputs for either mic or line level, depending on your source signal.

Pick-up Patterns

Each microphone is classified by its *pick-up pattern*, which is the range of directions from which it's designed to pick up sound well.

Omnidirectional

Omni means 'every'. An omnidirectional microphone picks up sound from all directions—in front of it, behind it, above, below, and from all sides.

It's exactly the type of mic to choose to record *ambient sound*, which is the sound coming into a scene from all directions. An omni would capture the general atmosphere of a street market day—all the voices mingling, the wind chimes, the poultry squawking, the buskers, the vehicles passing . . .

It's the right mic for recording the *atmos*, which means all the sounds in the local area—the sound atmosphere.

As a standard practice, you should be sure to record at least a couple of minutes of atmos at each of your shooting locations, so this background sound can be mixed into your soundtrack and reproduce for your viewers the aural feel of the place. It greatly enriches your soundtrack to have your foreground commentary supported by true atmos, rather than just the sterility of a blank background.

Omnis come in a variety of shapes and sizes, including non-removable camera mics and rugged handheld workhorse versions.

The problem with an omni is it's entirely undiscriminating. In reproducing everything, it hones in on nothing. Yet most of the time we need to focus on the person speaking, the instrument playing, the sound of the equipment being handled, and so forth. We don't want the presenter's comments to be drowned out by a passing truck, or the mood of the music to be ruined by the dog barking in the background.

So other types of microphones are needed to do the more focused jobs.
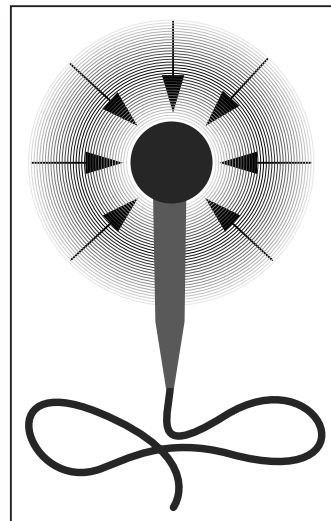
The pick-up pattern of the omnidirectional mic.

An *omni* picks up sound equally from all directions.

Unidirectional

A *unidirectional mic* is designed to pick up sound from the front, and reject sound from the sides and rear. There are ports in the sides which take in the sounds from the sides and rear, but then cancel them out.

These mics are also referred to as *shotgun mics* or *gun mics*, due to their long, thin shape.

Unidirectional mics come in quite a range. Some have a pick-up pattern which is a very narrow-angled cone shape. These are called *super-directional* or *hyperdirectional*. Others have a much broader angle of receptivity, all the way out to the cardioid pattern.

A unidirectional mic is terrific for picking up very specific sounds, and can do so from considerable distances. It's often used in drama or other situations where the mic needs to be kept out of frame.

Gun mics are frequently mounted on booms so they can be moved in as close as possible to the sound source without getting into the shot. Since they're very sensitive and susceptible to
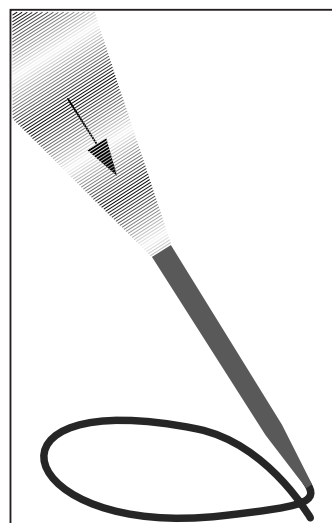
This is the pick-up pattern of the unidirectional mic.

A Sennheiser 816 has a very narrow cone-shaped pick-up pattern. Notice the ports along its side.
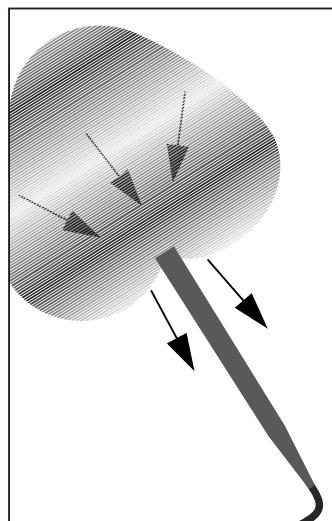
The pick-up pattern of the super-cardioid mic.

This *half-gun* has a super-cardioid pick-up pattern.

handling noise, they need to be in a shock mount to prevent them from being rubbed or jarred.

The mic handler or boom operator must take care to point the gun mic exactly at the sound source. A slight error in pointing will cause the recorded sound to be *off mic*. *Off mic* sound can still be heard, but it's dull in tone, because it's missing the crispness of the high frequencies present in *on mic* sound.
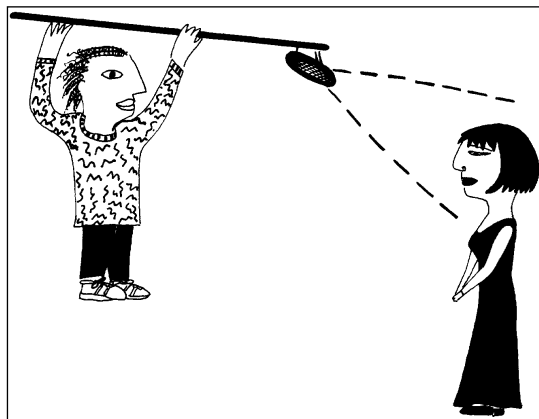
On mic
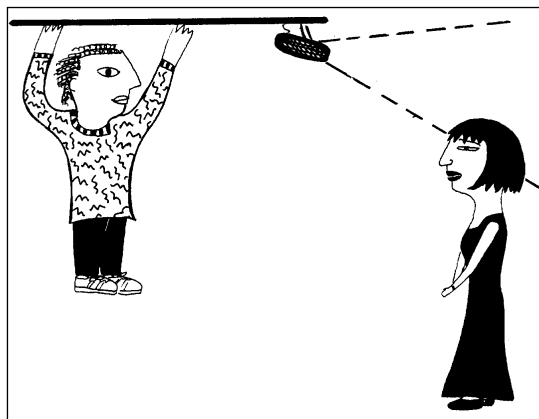
Off mic

Cardioid

The *cardioid mic* is a unidirectional mic with a very broad pick-up pattern which looks like an upside-down heart, hence its name. It picks up well from the front and upper sides, and is biased against picking up sound from the rear.

By careful pointing of a cardioid, you can minimise some unwanted noise.
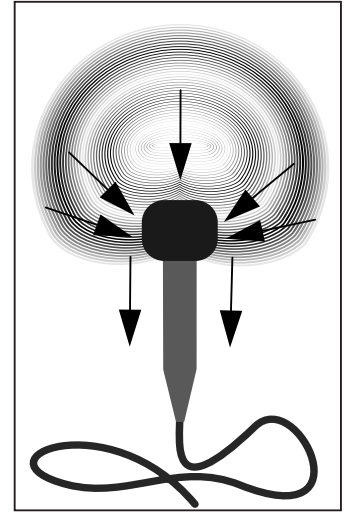
The pick-up pattern of a cardioid mic.

Cardioid mics are frequently used in hand-held, on-the-street style interview situations. This mic needs to be pointed towards the speaker's mouth and away from the major noise sources. With skilful positioning and handling, a cardioid can yield good voice recordings and eliminate much of the background noise.

One aspect of the cardioid mic you should know about is called the *proximity effect.* This is an exaggeration of the bass frequencies (the lower tones) in the sound being recorded. It happens when the mic is held very close to the mouth. Some people like the 'close, intimate sound' which this particular distortion produces, and deliberately cause it to happen. If you don't like it, just move the mic further away from the mouth.

Rick Davey, technician at the University of Technology, Sydney, demonstrates mic handling. A cardioid mic, held close, will produce a distortion called the *proximity effect*.

There are two simple tricks to remember when using a cardioid.

First, make sure you don't nervously rub the mic with your thumb or fingers, because the mic is *hot* all over. That means it reproduces grievous handling noise from any rubbing on it, or movement of its cord.

Second, make sure you don't get out of sync in your pointing! (This is a surprisingly common mistake.) If you point to yourself when the interviewee is speaking and to the

interviewee when you're asking the next question, you'll get worse results than with an omni, because the mic is made to reject sound from the rear.

Good sound—when pointed towards the speaker.

Poor sound—when pointed away from the speaker.

Bi-directional

The *bi-directional* mic picks up sounds from its two large opposite sides and rejects sounds from the other two (thinner) sides, and also from the top and the rear. Its pick-up pattern is drawn like a figure eight.

A bi-directional mic is good used on either a table mount or a hanging mount for stationary interviews, so it works well for radio shows which are based on live interviews.
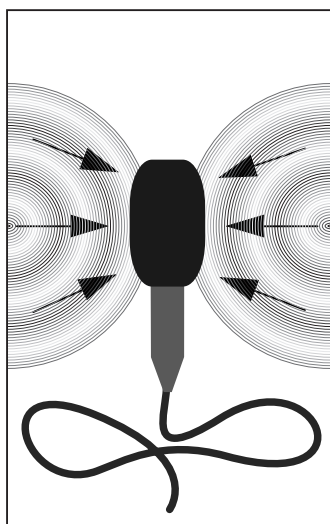
This is the pick-up pattern of the bi-directional mic.

Bi-directional mic.

PZM (pressure zone microphone)

Though the *PZM* (also called a *boundary mic*) looks more like an egg-flip than a mic, don't dismiss it for its weird appearance. There are times when it's extremely useful.
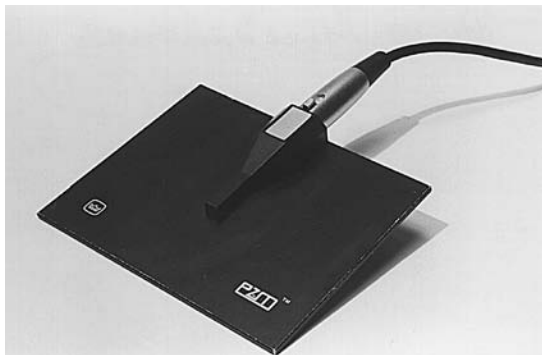
A PZM will pick up all the sound in a small room.

The microphone head is actually very tiny and held facing down towards the large, smooth, sound-gathering surface. When the PZM is mounted on a wall, floor or table top, all the sounds in a room hit that large surface and are reflected straight into the little mic, making it a very efficient reproducer with a hemispherical (half-dome) shaped pick-up pattern.

It's a terrific mic for unobtrusively taping a round-table discussion with several participants, in situations when pointing a mic at people would intimidate them and limit their comments.

It's so sensitive that it overproduces paper rustling and table banging, so for best results people do need to be asked to be as still as they can comfortably be.
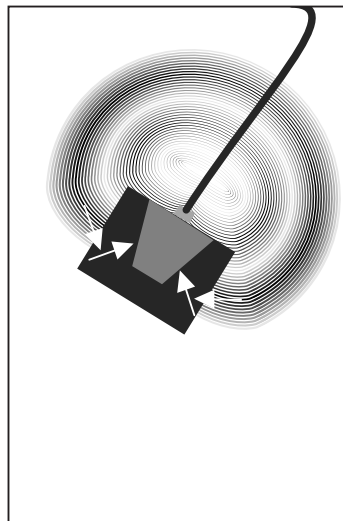
This is the pick-up pattern of the PZM mic.

You can make your own temporary PZM by using a bit of Blu-Tack to secure a lavalier mic so it's facing *towards* a smooth hard surface, like a desk top. This trick works well and will save you both money and packing space.

Barry Fernandes, Sound Department, AFTRS.

Reach

Another important aspect of a mic is its *reach*. This means how far away it can be from the sound source and still bring in a good quality sound.

Hand-held cardioid mics have a limited reach, and work best if held quite close to the mouth of the person speaking: 15–20 cm (6–8 inches) works well. Other cardioids, like the Sennheiser 416, have a longer reach and can be held out of frame in close shots and still yield a good sound.

The shotgun mic has the longest reach and can be used just out of frame with long shots.

Personally Mounted Mics

Lavalier Mic

The *lavalier mic* (or *lav*) is a tiny mic which is clipped to a person's clothing or hung around the neck on a short cord.

The lav is actually an omnidirectional mic with a bass cut to counteract the resonance of the chest but, because it has a very limited reach, it excludes most sounds except for the voice of the person on whom it's mounted. Because it's an omni, the speaker can turn his or her head in any direction and the lav will still pick up a good sound.
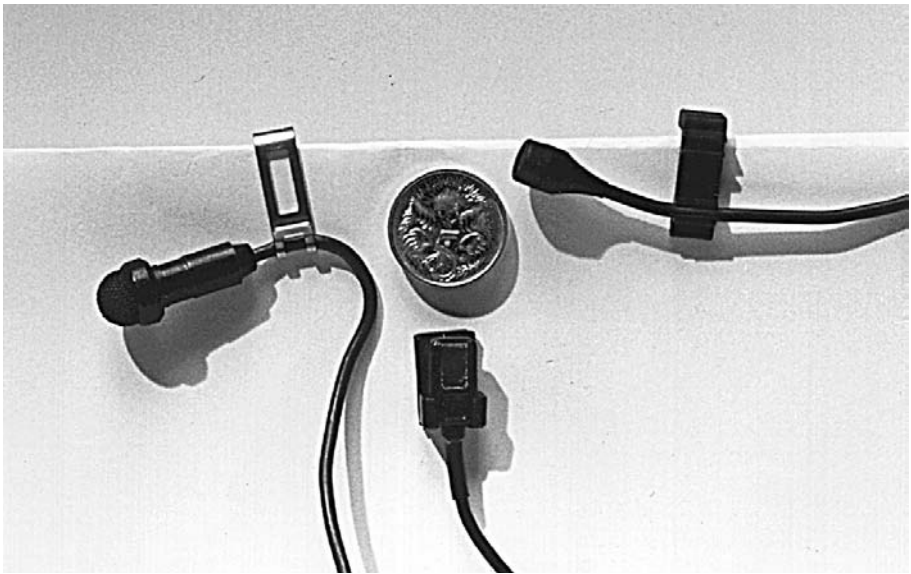
Lav mics are very tiny and clip on to clothing.

A lav mic works well for longer interviews, because the speaker tends to forget about it, relax and speak more naturally. (There's nothing like a mic thrust in your face to make your throat tighten.)

Lavs can either be clipped on the shirt front in plain view, or concealed under an outer layer of clothing, depending on the style of program.

For concealed mics, you can use a little *turtle clip* or *mic cage* to put the mic in when it's being worn. This device hangs around the neck and holds the mic on the mid-chest, like a pendant, isolating it from both skin and clothing contact, thus eliminating clothing rustle sounds.

Mic placement is important with lavs. They should be out of range of necklaces or other jewellery which could clang against them. For softly spoken people, the mic can be clipped higher on the shirt or the record level on the camera can be turned up. For those with louder voices, the mic can be moved lower to achieve the desired recording level.

When the person wearing the lav turns his or her head to the left or right, you can get changes in the recording level. This fluctuation can be reduced by moving the mic a little further away from the speaker's mouth.

Radio Mics

Sometimes you need a very wide shot but also want the mic to be unseen. You can't get a boom in close enough, and you don't want to see cables running across the floor or ground. In that case, you can use a *radio mic*, if you're lucky enough to have access to one. (They're very expensive.)

Like lavs, radio mics are tiny and can be pinned to clothing. Instead of sending the sound signal through a cable to the camera, the radio mic has a tiny transmitter with a short antenna attached. This is attached to the mic via a slender cable and is fixed onto the person, somewhere out of sight.

The transmitter sends the sound signal via a radio frequency to a separate receiver, which is tuned in to the transmitter's frequency, and which is kept near the camera, attached via a cable to the camera's *mic in* socket.

A radio mic can allow sound to be recorded under very difficult conditions. For example, the dancing, leaping, gyrating, singing performers in *Cats* were all wearing radio mics. The mics were concealed on their foreheads under their cat wigs, and the transmitters were taped inside their costumes in the curve of their lower backs, wrapped in plastic bags to prevent sweating from shorting them out.

Wonderful as radio mics are, they're notorious for giving problems. The batteries wear down very quickly, for one thing. And they're prone to picking up interference, or *fizz*, from large metal objects nearby, like cars. Many sound recordists avoid them whenever possible.

Transmitter

Receiver

Mic
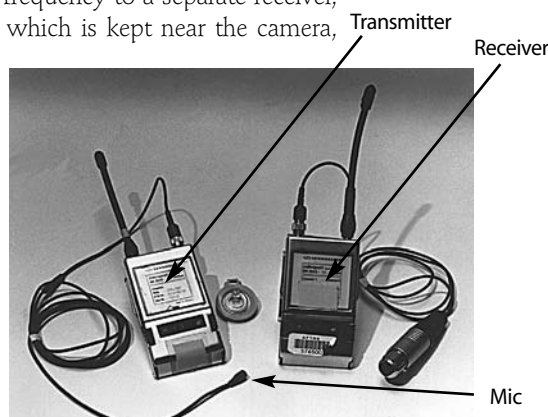
The radio mic is clipped to the speaker's shirt and the transmitter can be attached to the speaker's belt or put in a pocket. The receiver is plugged into the *ext mic* input on the camera recorder.

Sound Concepts

Sound is caused by vibration. The speed of the vibration determines the pitch of the sound. A very fast vibration produces the high-pitched *treble* sound. A slow vibration produces the low-pitched *bass* sound.

The vibrating material, whether it's a person's vocal chords, a violin string or the surface of a drum, pushes against the air next to it, sending a wave of sound energy out around it, like the rings in a pool after a stone has been dropped in the water. But whatever the material, it can only move out just so far, then it swings back to its still position and then pushes out an equal distance in the opposite direction. (Just imagine how a drum skin works.)

When this motion is graphed we see a wave form with peaks and troughs equally distant from the zero position, which represents where the material is at rest.
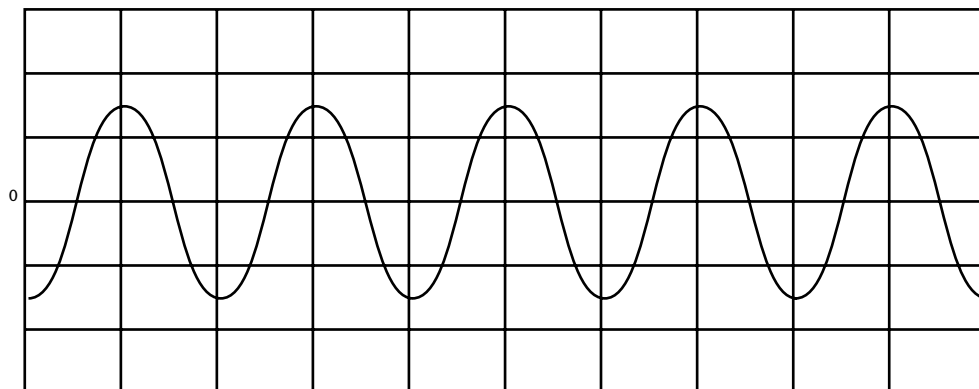
Low-frequency waves produce a bass sound.

One positive and negative section put together (one thrust of the material in each direction) is considered to be one complete wave or *cycle*.

Sound is measured by the *frequency* of these complete wave forms—that is, by how many of them happen in a second. In other words, sound is measured by how many *cycles per second* occur.

Another term meaning cycles per second is *Hertz*. Hertz is usually written in its abbreviated form Hz.

So when people talk about sound you'll hear them say things like '100 Hz' (which is a bass sound) or '12 000 Hz' (which is a treble sound).

The human hearing range is from about 20 Hz to 18 000 Hz, so that's the range we want microphones to be able to reproduce.
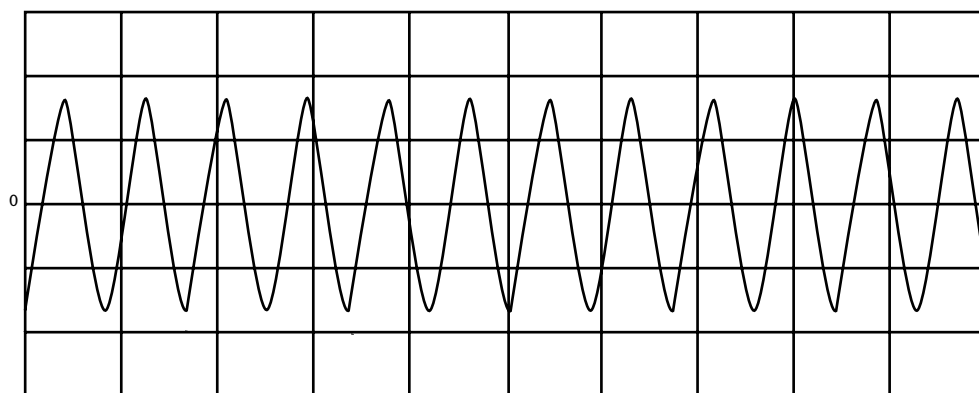
High frequency waves produce a treble sound.

Microphones pick up these sound waves and change them into electrical energy, which can then be either transmitted or stored (recorded).

First octave	Second octave	Third octave	Fourth octave	Fifth octave	Sixth octave	Seventh octave	Eighth octave	Ninth octave	Tenth octave

16 Hz   32 Hz   64 Hz   128 Hz   256 Hz   512 Hz   1024 Hz   2048 Hz   4096 Hz   8192 Hz   16384 Hz

BASS   **MID-RANGE**   **TREBLE**

FULL SOUND   HORNLIKE SOUND   TINNY SOUND   BRIGHT SOUND

PRESENCE

POWER   RHYTHM   SIBILANT SOUND   BRILLIANCE

Frequencies required for intelligible speech

Frequency ranges of bass, mid-range and treble.

Response Characteristics

Microphones are rated according to their *response characteristics*—that is, according to how well they can reproduce sounds of different frequencies. The specifications which come with a mic tell you how good it is in the different frequency ranges, and from which directions it handles what sounds best.

The sibilant sounds, likes 't' and 's', occur in the higher frequencies of the human voice range. These contribute to the crispness and clarity of the voice, and help us distinguish one word from the next. A mic which is poor in these frequencies yields muddy sounding recordings which are difficult to understand.

Some mics, often the cheaper ones, exaggerate the high frequencies but are poor at reproducing the low frequencies. These produce thin sounds which are called *toppy* because of the overdose from the top end of the frequency range.

Mics which are very good at the low-frequency end, the bass range, tend to be more expensive. But they do produce a much fuller, richer sound, especially for those deeper voices.

Some microphones have filters which allow the operator to decrease the emphasis of certain frequencies. For example, a bass roll-off filter cuts down on the reproduction of bass sounds, and can be handy for reducing the impact of low level traffic rumbling. You have to be careful not to overuse the bass roll-off, though, or the recorded sound might be too thin.

Microphone Construction Types

The two major construction types of microphones are the *dynamic* and the *condenser*.

Magnets

N

S

Output leads
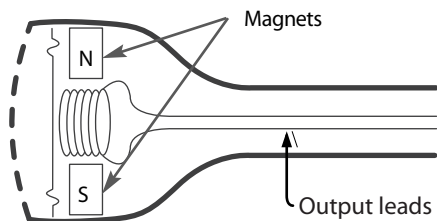
A dynamic mic needs no power supply.

Dynamic

A dynamic mic has a diaphragm (a lightweight membrane), which vibrates when it is hit by sound waves. A coil is attached to the diaphragm and vibrates within a magnetic field, thus generating a small electrical current. This electrical signal is then output to the record machine.

Dynamic microphones aren't the greatest at reproducing sound subtleties, but they're robust, inexpensive, and they don't require a battery or other power supply.

Condenser

In the condenser mic, a diaphragm and a fixed metal plate act as the opposite poles of a capacitor. Sound waves strike the membrane and cause it to vibrate. This causes changes in the *capacitance* (stored energy) of the circuit and produces a tiny electrical output.

A condenser microphone requires a power supply to provide electricity for the pre-amp and the fixed plate.

Sometimes the power supply is a battery inserted within the mic housing—as with the *electret condenser* mics.

Sometimes a separate black box, called the *power supply*, needs to be included in the connection between the mic and the record machine. The power supply can be either battery power, or it can be an adaptor which uses AC current from the wall.

Taut metalised diaphragm

Stationary backplate

R

Signal output
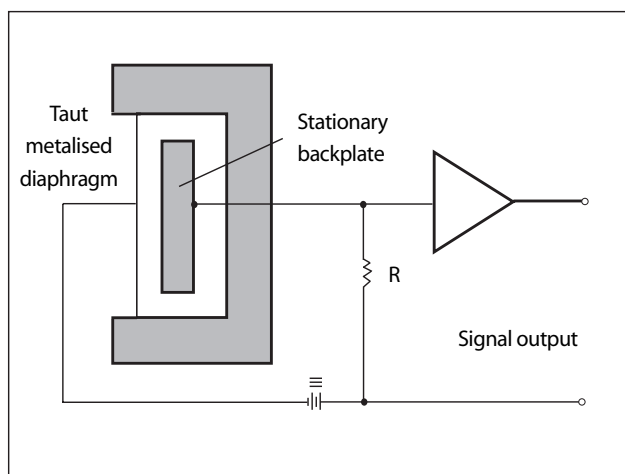
A condenser mic requires a power supply.

And sometimes the condensor mic can use *phantom power* supplied by the record machine or audio mixer it's attached to.

No matter which way the condenser mic takes its power, the key thing to be clear on is that it just won't work without it. So always make sure you pick up the battery or power supply when you borrow a condenser mic, and it's a good idea to take a spare battery as well.

Some sound recordists call electret condenser mics *cheap and nasties*. The electret condenser already has a fixed charge on the plates, but this charge doesn't last forever, so they deteriorate in quality over time, and eventually you should throw them away. Though the true condensers cost more money, it's money well spent—if you have it.

Condenser mics are more sensitive than dynamic mics, and are better at reproducing the subtleties and nuances in sound. They're less shock resistant, and they cost more to buy, but they do give a better recording.

Choosing the Right Microphone for the Job

Every recording situation comes with its own set of sound circumstances. In order to choose the right microphone for the job, you need to know as much as possible about the conditions which will apply on the day of the shoot.

It's a good idea for the sound recordist to check out the shoot location at the time of day and day of the week when the recording session will occur. Certain loud sounds, like those from aeroplane flight paths, peak hour traffic, construction sites and school playgrounds, vary considerably according to the time. You need a mic that can handle the conditions you'll have to face.

> The saying may be that a picture is worth a thousand words, but a video picture without good sound can be virtually useless if you really need to hear what's going on.
>
> **Rachel Masters**, Corporate Training Coordinator, SBS.

You also need a mic which will give the sound quality and sound breadth you require. The right mic for an interview wouldn't be the one you'd use for a broad ambient sound. A super-sensitive condenser will die in front of a big drum or powerful woofer.

Sound recordists try to narrow the choices down to a couple of likely mics, and take them both along to listen to how each one performs in the situation. Then they make their final choice.

By the way, it's prudent to take along an extra mic cable, too. You never know when one will be slammed in a door or just go crackly of its own sweet accord. Always take back-ups.

Powering the Mic

If you're using a battery-powered mic, it will need a healthy battery to record a strong signal. If you suspect that the sound you're getting is weaker than it should be, put in a fresh battery. It's pointless to record a wimpy signal with a poor signal-to-noise ratio. It will never edit well.

Although some mics take the AA batteries used in a Walkman, many mics take weirdo batteries which can only be bought from specialist suppliers. So always take spare batteries with you. The corner store near the shoot just won't have the right kind.

Needless to say, you always turn a mic off when you're not using it because it will just go on responding to the sound around it and draining the battery. When you store the mic in its case for the night, take the battery out of it.

Suggestions from Rachel Masters

Sound response patterns vary between microphones. It's a good idea to test the microphone(s) you have access to, and determine what pattern of sound they will pick up. Don't believe what the manufacturer says, test it for yourself.

1. Ask a friend to help you test the sound pattern by talking and walking around the microphone in a circle while you're holding the mic pointed in one direction. Play back the sound and draw a picture of the sound response pattern.
2. Note the variation in quality of sound between different microphones. Assess which microphone would be best for the following situations:
   - A two-person interview.
   - Recording music.
   - Recording several voices simultaneously.
   - One person speaking in a wide shot.

Keep your notes about the results. They'll help you decide which mic you need for your various future shoots, and they'll also guide you about what angle and position each mic needs to be placed in for it to record sound best.

Training Materials

Microphones and Their Uses, Ross Linton, AFTRS videotape.
Shaping Your Sound With Microphones, Tom Lubin, videotape available from the AFTRS.
Studio Seconds, Tom Lubin, book and videotape, available from the AFTRS.
Audio in Media, Stanley R. Alten, Wadsworth Publishing Co., Belmont, CA.

16 Having the Right Connections

It's often said that the screen production industry works on connections—that your next job is more likely to come from word-of-mouth than from answering an ad. There's a lot of truth in that.

And having the right connections is important on more than just the personal level!

When it comes to equipment, it doesn't matter how good your gear is if you can't get the signal to flow from camera to tape or from sound source to tape.

Being able to put the various bits together relies on your ability to tell one connector from another, and to make sure that you have the necessary adaptors if you haven't got a perfect match.

Great picture, but can't connect the mic?

Sex Lies in Videotape

(Or near it, anyway.)

For every type of connector, there are two models. Video technicians call these models *male* and *female*.

What it comes down to is that the model of a connector which has a prong or a pin or some sort of sticking-out bit (or three) is called male, and its partner version, to which it connects, is called female.

When you go to buy a connector in a shop or ask for it at the media centre, it's important to get the right model. If you get the reverse of what you need, it won't make the right connection for you.

So if you ask for a *female mini* to *male phone* adaptor, you should be given the little adaptor which allows a mic with a mini plug on the end of its cable to connect into the 6.5 mm input on an audio mixer.

An adaptor which could also be called *mini to phone* would look like an inverted model of this, with a hefty receiving dock and a tiny male member. This, called a *female phone* to *male mini*, is exactly the type you'd need to allow a mic with the larger plug to connect into the *mic in* on a camera which has the smaller (3.5 mm) size input.

As a general rule (which indeed has some exceptions), the signal flow goes from the male connector **to** the female connector enroute to its final destination. So the connector-out of most microphones is male, and that is attached to a female connector on the mic cable, which has a male connector on the other end, which attaches into a female connector on the mixing desk. Got the drift?
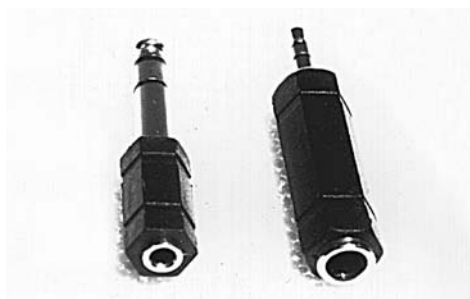
A female mini (3.5 mm) to male phone (6.5 mm)

A female phone (6.5 mm) to male mini (3.5 mm)

Video Connectors

BNC

BNC connectors are the standard video connectors for professional equipment. They're used for conveying the composite video signal—that is, the analog signal in which the luminance and chrominance signals are composited together and travel along one cable. They're also used for conveying component video—that is, where the luminance and chrominance signals are separated and sent along different cables.

BNC connectors are constructed so they lock together and can't be pulled undone accidentally.

This is how:

Once the male and female connectors are joined together, the metal collar of the male BNC is given a half turn so the two little metal nubbins on the outside of the female connector are drawn in along the spiral grooves of the outer metal collar until they slip into two little cut-out sections and the connectors are then locked together.

To disconnect, the metal collar is pushed forward to reposition the metal nubbins back into the spiral grooves and then the collar is untwisted until they're released and the two connectors can be pulled apart.

When you're using a BNC connector, remember that it won't lock on unless you turn the metal collar. Just pushing it straight on will leave the connection susceptible to being pulled off if the equipment is
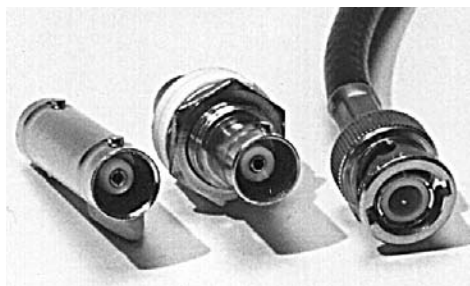
L to R: BNC F barrel connector for attaching two BNC cables together, F BNC, M BNC.

moved. Then you could lose your signal, and have to go searching for why.

SVHS Y/C Connector

The Y/C connector conveys the SVHS video signal which is the analog video signal separated out into the Y/C components. (Y = luminance and C = chrominance.) It's found on SVHS cameras and SVHS edit systems.
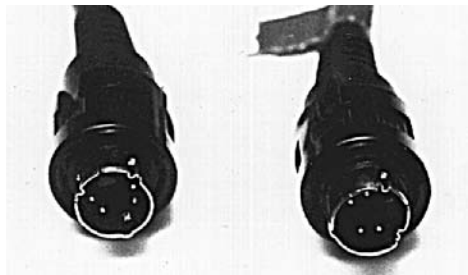
This is the connecting cable for SVHS Y/C in an edit system.

IEEE1394 (FireWire or i.LINK)

The FireWire conveys lots of signals: video, audio, timecode and device control (allowing your computer to remotely control your digital camera). You'll probably encounter it first as the connection cable for putting your video signal into your computer.

It's a high-speed serial interface. It's use isn't limited to passing video. It can be used for connecting hard drives to your computer, as well as scanners, and it's also used for networking.

The FireWire connector is used when sending digital video into and out of a computer. It's also used to attach other equipment to a computer.

UHF

These are now the dinosaurs of the video connectors, but if you're into video palaeontology you never know when you might unearth a piece of equipment that has one. They have zigzag edges which fit together, a thick central pin, and an outer threaded collar which twists on to lock the plug to the socket.
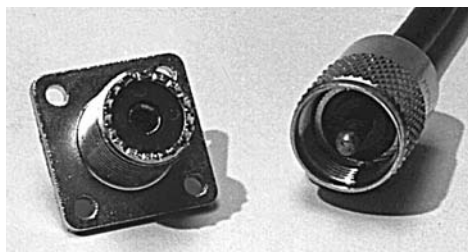
Female UHF   Male UHF

Video/Audio Connectors

RF

The male and female *RF* connectors look almost the same. The male RF connector has a round metal collar surrounding a bare inner wire. The female RF connector has a similar round metal collar surrounding a slim connection socket. They're easy to use because they just slip together, but they don't lock into place.
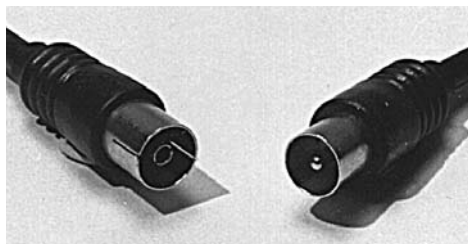
Female RF   Male RF

The RF connector appears on RF cables which carry both video and audio signals together, down a single wire. They bring the RF (radio frequency) signal in from your outdoor TV antenna or from your cable TV feedwire and insert it into your TV set or VCR. It's also the connector on the RF cable that runs out of your VCR and into your TV.

RCA

The male *RCA* connector looks similar to the RF connector, but it can have two or four slits in its metal collar, and its smooth, rounded metal plug projects out beyond the collar.

The female looks quite different; it's a streamlined, circular receptor.

The RCA connector is commonly used on home video equipment and on some camcorders. It's easy to attach, but can't be locked into position.

You'll also recognise the RCA as the connector on your home stereo equipment cables. And it's used for line level audio inputs and outputs on some VCRs, mixers and camcorders.
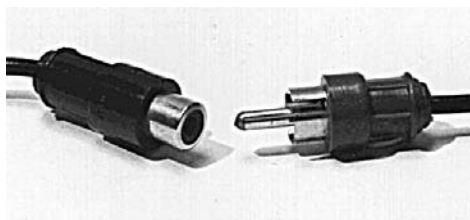
Female RCA   Male RCA

Multi-pin Connectors

l0-pin, 12-pin and l4-pin connectors are used when a single cable is carrying a variety of signals—video, audio and servo information. They're used to connect cameras to separate recorders and cameras to *CCU*s (camera control units) in control rooms.

Their pins must be aligned correctly to the socket pattern before you attempt to connect them together. Locating pins assist in this. Careless connection attempts can result in bent pins and very expensive repairs.
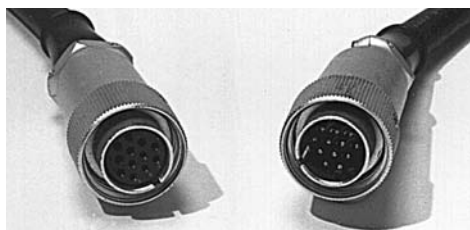
Female 12-pin   Male 12-pin

8-pin Connectors

8-pin connectors transmit video and audio in both directions between a VCR and a TV or monitor. The male is found on the end of cables and the female is mounted on the equipment.
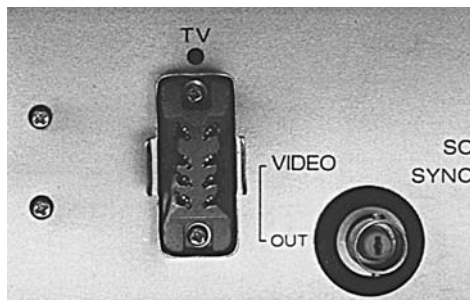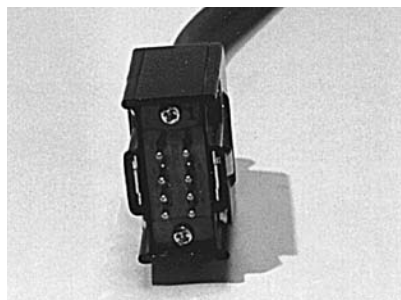
Female 8-pin   Male 8-pin

The pins are arranged in groups of 6 and 2, so the connectors can only be attached when they're correctly lined up. They snap on and are locked together.

They can be disconnected by pinching in on small metal tabs on the sides of the male connector housing and simultaneously pulling it away from the equipment it's attached to.

Always be nice to people on the way up . . .'cause you never know who you'll need on the way down! (I know this isn't what you mean by having the right connections, but I thought I'd mention it.)

Rachel Masters, Training Coordinator, SBS.

Audio Connectors

Mini or 3.5 mm

These carry unbalanced mono or stereo audio signals from microphones to some cameras. They're also used on some headphones.

They're easy to use, but notorious for breaking, and they can disconnect easily during a shoot, so they should be carefully watched.

Female mini   Mono male mini

Phone or 6.5 mm

These carry mono and stereo audio signals from microphones to some VCRs. They're found on the end of studio monitoring headphones and intercom headphones. They also carry line level signals between pieces of audio equipment.
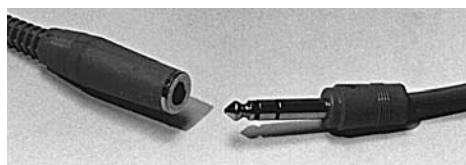
Female phone   Stereo male phone

XLR (Cannon) 3-pin

These are found on good quality microphones. They convey balanced audio signals. They're used on good quality audio cables, as the audio inputs and outputs on professional camera equipment, on audio mixers and video edit systems.

The XLR connector clicks when you attach it and locks into place. To disconnect it, you push a little metal tab on the outside of the female connector and simultaneously pull them apart.

Female XLR   Male XLR

Electrical Connector (DC)

The DC (direct current) connector looks very much like the XLR, and it's easy to grab the wrong one when in a hurry. But there's no way you can interchange them because the DC connector has 4 pins (M) or sockets (F) whereas the XLR has only 3.

Female 4-pin   Male 4-pin

The DC connector (or *4-pin,* as it's called) has a large silvery metal housing nearly identical to the XLR, and it can lock into place with a satisfying click. This is good because you certainly want to be assured that your electrical connection is secure. Like the XLR, the connectors have little push tabs to release them from their locked-on positions.

Computer Connectors

Computers have their own ways of linking up and networking, as do computer people. In computer talk you don't usually say connector, you say *port.* The *port* is the linking spot on the computer itself, and the right connector is whatever fits into that particular port.

Convergence of technologies also means convergence of work cultures, and this is just the beginning of the synergy.

USB male   USB female

USB

The USB (Universal Serial Bus) has several uses. It's used in digital imaging, multimedia games and PC telephony. Your computer can have one or several USB ports, through which you can attach a range of devices. The USB connector looks quite similar to the firewire connector—look carefully before you decide to plug it in.

FireWire

Here it is again, just in case you're looking for it in the computer connections section.

Female firewire   Male firewire

Cables

Although at first glance all video cables may look to you like a pile of spaghetti, they're actually quite different, both in how they're made and what they do.

They can be categorised according to the type of signal they carry:

• RF signal.
• Video signal.
• Audio signal.
• Multiple signals.

RF Cable

RF stands for radio frequency. This is the type of signal that's transmitted by television stations through the atmosphere. It enters the TV antenna on the roof of your home, then travels along your antenna cable and goes into the tuner inside your TV set.

If your antenna connects directly into a VCR, then a second, short RF cable takes the signal out of your VCR and into your TV.

The RF signal is also sent through cables in closed circuit TV systems and cablecast through landlines in cable television systems.

An RF signal contains both picture and sound information, so only one cable is needed to transmit a TV program as an RF signal.

Video Cable

The video is the picture part of the TV signal. Video is usually transmitted on co-axial cable (or *co-ax*). Co-ax cable consists of:

• An inner wire (or bundle of thinner wires twisted together) which carries the main video signal.
• A surrounding thick wall of high density foam polythene, called the *dielectric*, which insulates the inner wire from the shielding.
• A plaited mesh of wire, called the *shielding*, that surrounds the dielectric and shields the inner signal-bearing wire from external interference like radio signals.
• A PVC outer covering which protects the cable from water, dirt and other damagers.

Outer cover
Shielding
Dielectric
Signal wire
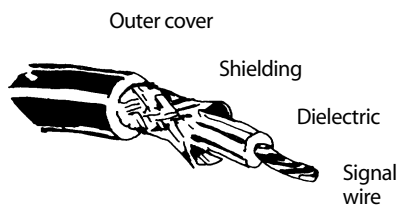
A cross-section of co-ax cable.

Audio Cable

The audio is the sound part of the TV signal. Audio cable is composed of:

• An inner wire to carry the audio signal (*unbalanced* cable has only one inner wire; *balanced* cable has two inner wires).
• A surrounding PVC insulation cover (much thinner and more flexible than the dielectric in co-ax).
• A mesh of shielding (also known as the 'ground') which conducts unwanted interfering signals to earth.
• A flexible PVC outer covering.

Unbalanced audio cable

Balanced audio cable

Siamese Cables

So-called *Siamese cables* are two cables which are joined together, although they have separate connectors on the ends. RCA cables often come in Siamese pairs and even in Siamese quads. (That's stretching the image!)

It's very handy to have Siamese RCAs because instead of having the snarl of two individual cables, which would normally be used side by side, as in conveying channel 1 and channel 2 audio signals from the same piece of equipment, you have just one double cable. In a video spaghetti situation, this is a help.

Siamese quads are used when handling a double function which also happens side by side, like connecting your VCR and TV at home: video and audio out to the TV and video and audio in from the TV.

If you're using a Siamese cable and the connecting points at one end are too far apart from each other for the twins at that end to reach to, the cable is designed so you can gently tear the two ends apart and lengthen their reach.

The DV breakout cable is a strange looking beast—quite different at each end.

DV Breakout Cable

This is a hybrid cable which looks like it's trying to be two things at once. On one end there's a plug shaped like a mini connector, which gets inserted into the AV output on a digital videocamera. On the other end there are three cables, one for video and two for audio. This *breakout* cable is used to connect the digital camera to a monitor, a VCR, or another camera.
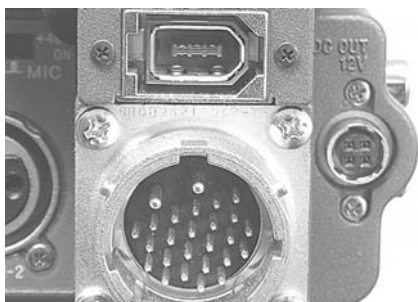
Camera cables use multi-pin connectors.

Multiple Signal Cables

Some cables carry an assorted bundle of wires which convey video signals, audio signals, signals to operate servos, power signals and grounding. These have multi-pin connectors on their ends.

Connector and Cable Care

- Connectors can be damaged easily by mis-handling, so treat them carefully. Re-soldering a plug can be a lengthy and demanding project.
- When attaching multi-pin connectors, be sure to refer to their locating pins to help you line them up right.
- When disconnecting cables from equipment, always grasp the connector by the body of the plug, and pull firmly and straight out.
- Never try to disconnect anything by yanking on the cable.
- If a plug is difficult to disconnect, look for a release mechanism.
- Avoid kinking cables or slamming them in the lids of cases or in doors.
- Don't run over cables with dollies or vehicles.
- Coil cables after use.

Keep on hand a set of the commonly used cables and connectors and always take spares with you on a shoot.

Checking for Faults

A multi-meter will tell you if a cable is faulty. A soldering iron, and some solder and flux will allow you to repair it.

Jeremy Reurich, technical trainee, Australian Film Television and Radio School.

This equipment room has a system of shelving units on a floor track which can be pushed left or right to reveal the contents of the shelves on the units, like bookcases, so only the solid end shows—it looks much neater. Then they just push the first unit, for instance, to the left, and people can fit between the bookcases to access the equipment. The system is also good for security. When people pass through that room there's no chance of someone taking something off the shelf, a microphone, for instance, because only the solid ends of the bookcase show—until someone pushes the shelves apart. I thought it was a good idea for saving space and makes the equipment room look organised.

Barbara Bishop, Independent Producer, Winthrop.
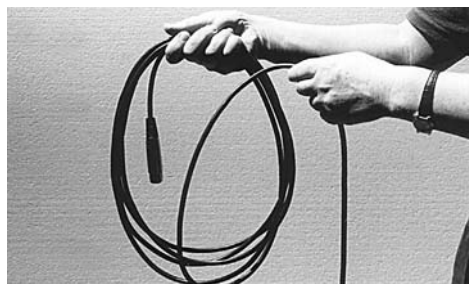
Coil the cables neatly before putting them away.

17 Location Sound Recording

Sound recording is the Achilles' heel of video.

Beginners' video projects are far more likely to have poor quality sound than poor quality images. Why?

This is due to the overwhelming importance the video image **seems** to have.

There's no doubt that getting a beautiful, dramatic or grotesque image is an exciting achievement, and that such images are fascinating to audiences. But their magnetism is short lived.

If your audio sucks, your video sucks.

Rich Howley, Video trainer.

Recording sound is easy, but recording it well takes skill.

Jane Paterson, Sound Editor, AFTRS.

Unless a program has the additional depth the soundtrack can give, by contributing spoken ideas or enhancing the images with music or sounds, people tire of it quickly. It soon enters the realm of 'video wallpaper'.

Worse still, if the soundtrack is actively bad, due to buzzes, hums, crackles, background noise, muffled speech and distortion, people will refuse to watch it.

Camera operators practise hard-to-get clear focus, steady shots, good composition and smooth action. Good sound recording techniques take similar practice and attention to detail.

On location at Banrock Station in South Australia, taping Australian Food and Wine television series for ABC Asia Pacific show *Nexus*. Audio Rob Stankovich, DOP Gerald Manogue. (Photo by Neil Smith)

Which Microphone Will Do the Job?

Every recording situation comes with its own set of sound circumstances. In order to choose the right microphone for the job, you need to know as much as possible about the conditions which will apply on the day of the shoot.

Again, it's a good idea to check out the shoot location ahead of time, at the same time of day, and same day of the week, as when the recording session will occur. Certain loud sounds like those from commuter trains, nearby factories, sports facilities and schoolyards vary considerably according to the time and day, so you need to be sure what you'll have to allow for.

Once you've checked out the location, you need to select (borrow, hire, acquire) a mic that can handle the conditions you'll have to face during the shoot.

You also need to choose a mic which will give the *sound quality* and *sound breadth* you require.

The right mic for an on-the-street interview in a noisy location wouldn't be the right one for recording a quiet love scene. As discussed previously, a super-sensitive condenser mic will just die in front of a big drum or powerful woofer, and it would be no good at all for recording gunshots and explosions.

Experienced sound recordists try to narrow the choices down to a couple of likely mics, and take them both along to listen to how each one performs in the situation. Then they make their final choice.

Always take along an extra mic and extra cables and audio adaptors. You never know when something will just go crackly of its own sweet accord.

If you're stuck using the camera mic, move in as close as possible to the presenter. Favour close-ups over wide shots to get decent sound. In noisy locations it's better to have an extreme close-up on someone with the camera six inches from their face and hear what they're saying than have a perfectly composed shot and you can't hear what they're saying. Most viewers will put up with crappy pictures a lot longer than they'll put up with crappy sound.

Andy Nehl, Head of Television, AFTRS

When trying new locations, check two or three mics to see which one gives you the sound you like best. Students from University of Western Sydney—Nepean, Werrington, NSW, Australia.

Don't Use the Camera Mic

The camera mic is almost always an omnidirectional mic. Because it picks up sound equally from all directions, it's terrific for recording a surround sound, but not much good for anything else. Under most circumstances, it's not the right mic for the job.

You'll need to use an external microphone—which just means it's an additional one which you have to plug into the camera.

Do not rely on your in-camera mic. Try to use external mics (boom, lavalier clip-ons, etc.) and a separate sound mixer to keep audio levels balanced and clean.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

> You can't fix it in the mix! Get good sound now!

Carol Brands, Curtin University of Technology.

You attach the external mic to the input labelled *mic in* or *mic*. That input is frequently towards the front of the camera, even next to the camera mic, but on some cameras you need to disconnect the camera mic to reveal the input for attaching the external mic.

If you're out of luck, you'll find that your camera has no place to attach another mic. (That's one of the reasons it didn't cost so much.) If you're deciding on what camera to buy, always make sure it has the capacity to attach an external mic, or you'll be setting yourself up for poor audio recordings.

> For best results, use the same audio bit-rate for recording as you'll be using in your edit system.

Martha Mollison, Video Producer.

Get In Close

No matter what sound you're recording, the single most important thing to do is to get the (appropriate) microphone as close as possible to the sound source. Your aim is to record the sound you want at a good strong level, without having it be distorted. This can be called having a good *signal-to-noise ratio*.

Signal-to-Noise Ratio

The word 'noise' is used in several ways in video production. It can mean the soft background level of hiss which is generated by any tape during playback, it can mean surrounding sounds which aren't being selected during a shoot, it can even mean the visible graininess which appears in the video part of the signal when the camera is operated on a high gain setting.

In any of these cases, noise is an undesired part of the signal.

Having a good signal-to-noise ratio means that the desired signal is loud enough to more than dominate the background noise. Once a sound has been recorded, it can't be separated from either the background location noises or the inherent tape noise.

What does this mean for your audio track?

> Always place the microphone as close as possible to your sound source. And be alert to ambient noise that may be recorded in the background during an on-camera interview which will be distracting to viewers.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

It means that if you record a good strong signal during the shoot, the signal will play back clearly and well on the monitor afterwards, and it will have gusto when being sent through the audio path of an edit system.

If you record a weak sound, you'll be forced to turn the volume of the monitor up during playback, and boost the record machine's audio level during editing. This boosting may let you hear the sound okay but it also brings up the level of the undesired background noise, and hiss from the recording system and the tape, and it results in poor quality audio and a muddy edited sound.

How Much Reach is Needed?

You need to be clear on whether it's okay for the mic to be visible in the shot or not. If it's okay for the mic to be shown, you'll usually have no problem getting the mic in close. A lapel mic, or one which is hand-held or on a stand, will all do.

When your framing is wide, you need to have a mic with considerable *reach*, and a boom pole comes in handy. Mariano Aupilarjuk plays skin drum at Rankin Inlet, Nunavut. Albert Kimaliakyuk is sound recordist for *Inuit Piqqusingit: Inuit Ways, Inuit Survival*. (Photo by Kimberley Brown)

But if the mic must be unseen, you need to choose one which can pull in sound over a distance, or which is small enough to be hidden, either on the person or in the set somewhere close to the speaker.

Recording Levels

Not all video cameras allow for adequate operator control of audio recording levels. Many camcorders have no VU meters (VU = *volume unit*) to indicate the level (volume) of sound being received by the camera or to show if the received signal is so overly loud that distortion is happening in the recording of it.

These cameras rely on their inbuilt *ALC* circuitry.

Manual level controls

Auto/ manual level select

Audio input select

The sound control buttons are behind a little door on many video cameras, including this Sony DVCAM.

ALC

ALC stands for *automatic level control*. The ALC function in the audio circuitry is supposed to ensure that a good level of signal is being recorded by the camera.

Like any auto system on the camera, it works well sometimes, but there are certain circumstances which are too much for it. Overall, it will handle a good signal well, it will clamp down on an overly loud one, and it will boost a low one.

It gets tricky when you alternate between a weak signal and a strong one, because when the ALC boosts the low one up to an adequate level, it brings up the background noise with it, so you end up with a sound continuity problem, where the rising and falling of background noise mars the flow of the recording.

On some cameras you can choose to use the ALC or turn it off. It's often controlled by one of those tiny buttons hidden behind a secret door on the side of the camera. It pays to snoop over your camera thoroughly to find all these esoteric buttons—knowing what they do and how to use them can make a big difference to your end product.

Always use headphones to listen to the sound coming into the camera. Ideally, you should use headphones that have leather padding that encloses the ears, rather than foam ear pads, as foam ear pads allow more external sound into your ears.

> Have the headphones over both ears to check audio quality before you shoot, but when you're shooting have the headphones over only one ear so you can hear what's going into the camera and also hear what's happening in the world around you.

Andy Nehl, Head of Television, AFTRS.

Audio Limiter

The *audio limiter* is another sound control device which can be engaged during recording.

Its function is to keep the record level of the incoming signal from going too high, into the distortion range.

When setting an incoming signal level, the audio limiter should always be turned off, so the true (unlimited) strength of the signal can be seen on the VU meter. Then the record level can be accurately set so the audio will be strong but not distorted.

So first turn the audio limiter off, and begin with the audio input level knobs wound all the way over to the off position. Then slowly rotate the knobs clockwise, increasing the incoming volume till the sound is showing at a good level on the VU meter.

After setting the levels, the limiter can then be turned back on and any short, transient loud sounds will be controlled by the limiter and the main program audio will be at a strong, but not distorted, level.

The main hazard of using an audio limiter occurs if you set the audio input level on the record machine while the limiter is still switched on. Then it's possible to set the audio record level too high, and even when you check the VU meter, the needle won't show any distortion (because the limiter won't let the needle go into the red). However, you'll end up with a very squashed sounding audio.

> Good audio is extremely important in video production. Viewers will tolerate shaky camera work longer than they will an annoying hum or background buzz.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

Some sound recordists like using a limiter, while others never use them. They prefer to always have full knowledge of the incoming audio, and ride the levels themselves manually throughout the recording session.

Setting the Audio Input Levels

Some camcorders give you no choice on sound levels—the incoming sound is controlled by the ALC, and that's that.

Other cameras allow you to switch off the ALC and adjust the levels however you like. The ones which allow manual adjustment usually have VU meters or *PPMs* (peak program meters) to guide you.

If your camera allows manual adjustment, there's usually a little knob for each channel. You turn the knob till the level of the signal showing on the meter is the level you want to record.

Monitor Levels

In addition to having controls for the audio input levels, the camera may have a *monitor level* knob.

Turning the *monitor out* knob will raise or lower the volume of the sound you hear through the headphones, *but it will in no way affect the level of the audio being recorded by the camera*. The monitor level is merely an adjustment for the comfort of the operator.

Don't let the loudness or softness of the sound in your headphones distract you from setting the audio level by the input meters.

As with flying light planes, you have to learn to trust your meters.

If you're setting sound recording levels manually, remember that digital sound on a MiniDV camera should *not* peak at 0 dB on the VU meter. Hitting 0 dB or going over is likely to give you distorted sound. The industry standard is to peak at 18 dB. While your camera probably won't have an 18 dB point marked on the meter, having the audio peak about halfway between 20 dB and 12 dB will be fine. If there are no dB markings on your DV camera's meter, have the audio signal peak at halfway on the VU meter.

Andy Nehl, Head of Television, AFTRS.

If the volume knob on your Betacam is turned very low, say pointing to the 9 position on the clock face, you could have problems. Investigate! This is a sign that the input could be overloaded. Usually monitoring conditions from the camera's speaker monitor and headphone-out are so low level that it can be impossible to pick up distortion. The normal position for the knob is between 11 and 1 o'clock.

Barry Fernandes, Sound Department, AFTRS.

Normal, Hi-fi and Both

On some cameras you can only record *normal* audio. That's the longitudinal type which goes in the tracks along the edge of the tape.

Other cameras let you record *hi-fi* audio, which is a better quality audio, and is recorded in the video track.

On some cameras, you can choose to record both types of audio at the same time. This is, in fact, a good strategy. Then if anything goes wrong with the hi-fi audio, you have the normal audio as a back-up.

If you choose to record both, make sure you understand how the camera's metering system and monitoring system works.

Sometimes the normal audio is connected only to the ALC, and the hi-fi audio is connected only to the audio input controls. If you intend to use hi-fi audio for your program but the levels are set wrong, you won't know it if you're happily listening to the normal audio, controlled by the ALC. You could get back to your base and find you've got terrible hi-fi audio because you were actually monitoring the normal audio all along and didn't realise it.

If this happens, don't despair. It's happened to others, too. Just learn from the mistake so it doesn't happen again.

Mic Handling Techniques

It's easy to think of microphones as being open to sound at their tops, as if they're a sort of vessel, and the sound gets put in that end and sent out the other end to run along the cable to the record machine . . .

Mic Handling Noise

But mics are *hot* all over. This means that touching a mic anywhere on its surface, or along its cord for that matter, can cause a sound to be recorded. These sounds aren't heard through the air by our ears, but they can be detected through headphones attached to the recorder, and they can be very loud and obnoxious on a sound recording.

This sort of sound is called *mic handling noise,* and it's unacceptable on a soundtrack. Interestingly enough, omni mics are less sensitive to handling noise and to wind.
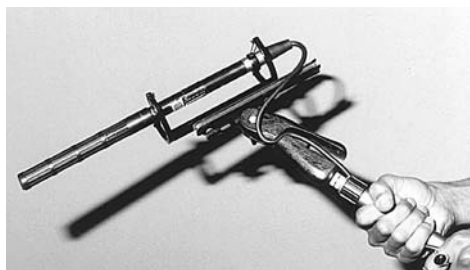
The shock mount isolates the mic from handling noise.

Shock Mounts

To avoid mic handling noise, microphones can be attached to a *shock mount,* a mic-holding device which separates the surface of the mic from the hands of the operator and buffers the mic against thumps and other movements. A shock mount is definitely worth the price you pay for it.

Internal Shock Mounts

Some microphones have inbuilt shock mounts which invisibly protect their sound recording mechanism from jolts and handling noise. This is often true of mics designed for hand-held jobs, like dynamic cardioids, which are frequently used for on-the-street interviewing. Needless to say, such mics don't need to be put in an external shock mount.

Ben Farrawell, TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia.

Boom Handling Noise

A *boom* is a special pole made in sections. When you're transporting the boom to the shoot and back, the sections collapse down inside each other to reduce the boom to an easy carrying size, but on location it can be extended out to quite a length.

The boom is used to get a microphone close in to the action, so good sound can be recorded, while still keeping the mic out of shot. The boom is manoeuvred and held in position for each shot by the sound recordist's assistant, known as the *boom operator*.

Though the mic is suspended in a shock mount, which is screwed on to the end of the boom, the mic cable is usually looped around the boom a couple of times to get it back to where the boom operator can control it when moving the boom about.

Boom handling noise happens if the boom operator jiggles the cable or twists or rattles the interconnecting boom sections during recording. Boom handling noise is unacceptable on a soundtrack.

Let's face it, you want your mic to record the program sound and not anything else added in by accident.

Get your mic in as close as possible without getting it in the shot. On the set for *Ash Wednesday*. Australian Film Television and Radio School.

Checking if the Mic is Working

In a noisy environment, it's not easy to tell if the sound you're hearing is coming to your ears through the headphones from the mic, or simply through the air. So how can you tell if the mic is working or not?

The sure-fire way is to test the mic by picking a sound you know you can't hear through the air. This is very easily done. Just rub your finger gently along the top of the mic or the wind gag over the mic. You can't hear that sound through the air, so if you hear a grating or rubbing noise when you do this, the mic is surely working.

It's not necessary to shout 'Test, test' into the mic, and it's downright stupid to bang it on the side of the table.

When operating a boom, make sure the mic cable is secured to the boom pole, so it won't cause handling noise when you move the pole.

Jeremy Reurich, Technical Trainee, AFTRS.

Monitor Everything

When using an external mic, many things can go wrong:

1. The mic connection to the camera can come undone. This is most likely to happen with a non-locking audio connector like a mini (3.5 mm) plug.

Adrian Rostirolla, Metro Screen.

Never run a mic cable parallel to an electrical cable because it can pick up an electrical hum. If you're forced to cross a mic cable over an electrical cable, cross them at 90° to each other and separate them if possible. For example, you might be able to run one cable over the seat of a chair and the other one on the floor underneath.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

When videotaping an interview indoors be aware of ambient sounds from air conditioners, appliances, cuckoo clocks, telephones, answering machines, doorbells and interoffice paging systems.

Philip Elms, Media Resource Centre.

Monitor camera audio wherever possible. Just checking VU meters won't tell you if there's mic crackle or distortion.

The connector doesn't have to fall out of the camera socket completely for there to be problems. The signal-conducting tip of it just needs to be pulled slightly away from the contact point inside the socket. Sometimes this happens and the mic still looks like it's connected.

2. The mic battery can run down, so the mic output gets too weak.

3. The microphone cable can start crackling when the mic is moved back and forth between speakers.

4. The mic extension cable (you know the one that got slammed when you closed the boot of the car?) can ground out and develop a constant buzz.

5. The microphone cable can pick up a 50-cycle electrical hum if it's too close to an electrical cord or a piece of electrical equipment, like a refrigerator or air conditioner.

6. The mic can also pick up a hum or buzz from lighting dimmers, especially the cheaper ones.

7. The extra long mic cable you got for this special job can start acting like an antenna and pick up a radio station!

So you always check your sound before you start recording. You check it in two ways. First, you listen to it carefully through the headphones. Then you do a 60-second test record of both video and audio, play back the test, and again listen carefully through the headphones.

Some problems, like hums and buzzes from nearby equipment or dying fluorescent lights, can only be heard in playback, so unless you do a test recording you won't know you have a problem till the shoot is over.

Once you've got the sound right, you can begin to shoot, but you can't be sure that problems won't materialise while you're at work. So make sure someone (not too spacey) listens on headphones during the whole shoot.

Five Tips for Using a Cardioid

Though good mic handling skills aren't automatic, they're also not hard to learn. These simple suggestions can help you greatly improve your recorded sound, when doing interviews with a handheld cardioid mic.

1. Keep Your Mic Hand Firm and Still

Make sure you don't nervously rub the mic with your thumb or fingers, because the mic is *hot* all over. That means it reproduces grievous handling noise from any rubbing on it, or movement of its cord.

A nervous thumb can also find the on/off switch which is on the side of some cardioids, and turn it on and off. Imagine what that would do to your interview sound!

2. Always Point the Mic at the Person Who's Speaking

Make sure you don't get out of sync in your pointing! (This is a surprisingly common mistake.) If you point to yourself when the interviewee is speaking and to the interviewee when you're asking the next question, you'll get worse results than with an omni, because the cardioid mic is made to reject sound from the rear.

3. Maintain a Good Mic-to-mouth Distance

Fifteen to 20 centimetres (6–8 inches) is a good distance to have between the speaker's mouth and the mic. You need the mic close enough so the person's voice will dominate over the background sound, but not so close that the speaker will feel his or her personal space is being invaded.

Another problem with putting the mic too close is that you may get 'popping' distortions from the force of the speaker's mouth air physically hitting the mic when saying those more explosive consonants like 'b', 'p' and 't'.

Interview mics can come with a *pop filter* which can be used to reduce this form of distortion.

4. Don't Relinquish the Mic

You may find that the person you're interviewing reaches out to take the mic from you. Be assertive about hanging on to it. This is not karaoke time. An inexperienced interviewee won't have developed the handling skills you've had to learn, and the simple act of letting go of the mic may result in sound which is unusable for your project and add up to wasted effort for everyone involved.

Another hazard is that the person who took the mic from you will pass it to another person. You could tape a whole series of people saying their bit, but end up with nothing recorded at all because someone unwittingly switched the mic off somewhere along the way. (This is a particular hazard at heady events like weddings, where everyone wants to—and should—get in on the video.)

5. Take Extras

It's prudent to take along an extra mic and an extra mic cable, too. (Something to do with Murphy's Law.)

Using an Audio Mixer

An *audio mixer* is a device which allows several sound sources to be combined into one or two channels of audio.

Mixers come in a range of sizes; the larger ones (with 24 inputs and from 2 to 24 outputs) generally remain fixed in audio control rooms, outside broadcast (*OB*) vans and recording studios. But there are smaller, quite portable, ones which are very useful in location work.

SQN-4S portable mixer.
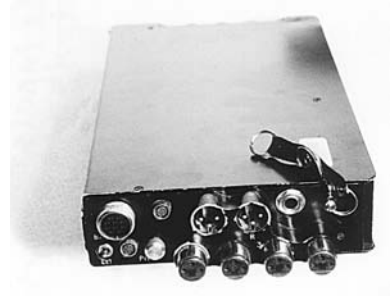
This portable mixer has four inputs and two outputs.

With a mixer you can input more than two mics at a time. Jason Troutman on location in Xishuangbanna, Yunnan, China, for *Dai Women Speak*. (Photo by Michelle Blakeney)

Using Several Sound Sources

Sometimes you'll be taping in a situation where you need to use more than two mics simultaneously. Yet there are only two mic inputs on your camera. In fact, sometimes there's only one.

With a basic level portable audio mixer, you can use four separate mics, run them through the mixer, and output two channels (or one channel) of mixed audio into your camera.

You can also take pre-recorded sound—like music—directly from a CD player, boom box, another VCR, or a mixer split or feed from a house system, input it directly into the mixer, and blend it with your live program sound.

The volume faders on the mixer allow you to fade the various sources up and down during the recording session. So you can open with your program's theme, then fade the music down and bring up the interviewer's mic for the introduction to the segment, and then open the mic of the guest.

Having some mics *open* (their volume faded up) and some mics *closed* (their volume faded down) is usually advisable.

As an example, consider that you're taping a short presentation from several speakers, followed by a discussion. Only the active speaker's mic should be open, so the extraneous noise or muttered comments of the others don't make it onto the soundtrack.
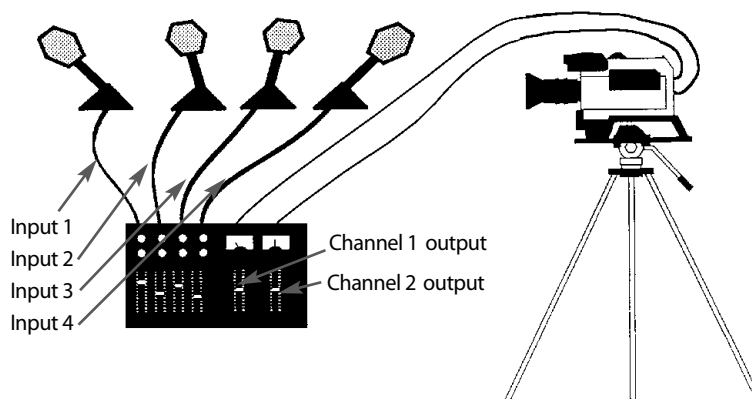
With an audio mixer you can use several sound sources at once, and mix them down to the two audio tracks which are on videotape.

Of course, an unpredictable speaking arrangement, like the round-table discussion, requires a sound operator who's always on headphones. This operator's responsibility is to *ride the levels,* in other words, to make sure that only the right mics are open at each point during the recording, and that the open mics are faded up loud enough to produce an adequate program sound.

The camera operator has to concentrate on getting the picture right, so s/he can't be responsible for monitoring and controlling the audio of several mics. Don't let anyone tell you that you can do this job alone!

Mic Level and Line Level

Mixers often have two connection points for each sound source input, one for a *mic level* signal, and the other for a *line level* signal.

These two signals are quite different in strength. The mic level signal is only 2–5 millivolts, and a line level signal can be a full volt.

A mic level signal, sent into a line level input, will barely be heard. A line level signal, sent into a mic level input, will be totally blasting and distorted.

So it's important to make sure that you attach your sound source to the correct connection point.

Generally speaking, an RCA socket indicates a line level input, and a mini (3.5 mm) or phone (6.5 mm) socket indicates a mic level input. But they should be clearly labelled, so you can rely here on your literacy as well as your connector recognition. Some mixers with XLR input connections can be manually switched between mic and line level.

The mixer outputs can also be either mic level or line level. So check your mixer labels carefully, or read the mixer's specification sheet, so you know whether to connect the mixer to the mic level or line level inputs on your camera or record machine.

Using a Mixer for Sound Quality Control

The controls for adjusting audio levels on cameras are often awkwardly placed. Even an alert sound recordist is hard pressed to tweak knobs which are sandwiched in somewhere between the camera and the camera operator's head! And even if you can get your hand in there, tweaking the knob will often cause the camera to move and put an unwanted jiggle in the shot.

It's also impossible for someone who's holding the mic for an interview to be reaching back to the camera to make audio level adjustments.

So for better quality control of location sound, the recordist may choose to use a mixer, even if there will be only one or two mics used during the shoot.

The sound recordist carries the mixer around with a shoulder strap or stashes it somewhere that s/he can attend to it easily.

During set-up, the sound recordist sends the calibrated _tone_ from the mixer to the camera and then sets the levels on the camera's sound inputs so that tone registers at 0.

Then any changes in audio levels which occur during the shoot can be taken care of at the mixer without disturbing the concentration and smooth work of the camera operator.

Setting Input Switches on Your Camera

(Some sound advice from Andy Nehl.)
Depending on what kind of DV camera you have, you may have external microphone switches that have settings for:

- Mic (microphone level).
- Line (Line level).
- ATT (Attenuate).
- +48 v (also known as phantom power).

The _Mic_ setting is for audio signal coming from a microphone.

The _Line_ setting is for audio signals coming in from an audio mixer, CD player, DAT or some other non-microphone audio source.

The _ATT_ setting is useful for recording audio levels that are really high. It will cut the audio signal coming from the mic into the camera by a preset amount, usually 20 dB. If you're recording normal audio levels, make sure the audio switch is not set to _ATT_ or your levels will be really low.

The '+48 v' or Phantom Power setting is for use with _condenser_ microphones that do not have their own internal battery and require 48 volts of power from the camera to operate. It should be switched to +48 v for the microphone to work.

Some older _condenser_ microphones were built to operate with +12 v (12 volts) of phantom power. These mics will not work with modern MiniDV cameras.

Make sure you know what kind of microphones you're using and adjust the settings appropriately whenever you change mics. If in doubt, check your manual.

Using a Back-up Recorder

Think of using two sound recording systems. As well as the tape in the camcorder, you can use DAT, a Nagra or a cassette recorder. Your second system may, in fact, give you even better quality sound than the camera will. But the main reason is that almost ANY quality is better than no sound if the first system fails for some reason.

> I would say that it's better for sound to use DAT as a primary recording source and use the tape as a back-up in case of DAT failure.
>
> **Jane Paterson**, Sound Editor, AFTRS.

Digital Sound

Digital sound recordings can be transmitted very accurately. This is called *high fidelity* (or literally *high truth*). When an analog signal is being transmitted, the receiving instrument has no way of distinguishing between the signal itself and any *noise* that has been introduced during the transmission. Then if that signal, with its introduced noise, is retransmitted, more noise is incorporated into the signal by the next receiving instrument. So each successive *generation* of analog sound gets worse and worse—like analog video does, as you already know.

> DATs are very fragile. You have to treat them gently and push the button softly.
>
> **Alison Wotherspoon**, Flinders University.

However, with a digital sound signal, the noise is far more easily disassociated from the main signal. This allows transparent passage of sound signals through many generations of transmission or recording.

> With sound, there's no headroom in digital. If you get a distortion, the sound's gone. So we're back to having soundmen on crews, which is good.
>
> **Richard Fitzpatrick**, Camera Operator, Digital Dimensions.

Common Pitfalls in Location Sound Recording

Wind

Even a slight breeze blowing across a microphone can produce an unpleasant rumbling noise on a sound recording. Although we don't hear this wind sound through the air during the shoot, we can hear it through headphones, which is yet another reason to constantly monitor sound with headphones during any recording session.

Wind noise can range from being an occasional irritant in an otherwise good soundtrack, to being so bad that the whole recording is useless.

Wind gags are specially designed devices which shield the surface of the microphone from contact with moving air, thus eliminating wind noise.

In windy areas, you need to use a substantial wind gag over the mic. On location for SA Water's video newsletter. Audio Mylene Ludgate, DOP Malcolm Foreman, Producer Amanda Duggan, for t.a.v. productions, Adelaide, SA, Australia. (Photo by Kathy Nixon)

Wind gags come in many shapes and sizes, and there are wind gags to suit every sort of mic. Many of them are made out of foam, some are made of more sturdy plastic or metal. All of them are designed to let sound through quite well, though they can reduce the high frequencies somewhat.

The zeppelin-shaped ones are better than the foam ones, because they preserve a cushion of undisturbed (wind free) air next to the mic.

They also come in different capacities—some are okay for slight wind, and others are heavy duty, for the really trying weather conditions. There are some like socks, which fit over the zeppelin-shaped plastic wind gags.

> Unless you're the person who's going to fix it in post, don't assume that it CAN be fixed in post.
>
> **Jane Paterson**, Sound Editor, AFTRS.

For the most extreme conditions, there's the *shaggy dog,* which is covered with long fur, like a soft toy, and also fits over wind gags like a sock. It's a funny sight because it has two eyes on it, which go on the end of the mic that you point at the sound source.

Background Waves

Any background sound which has a predictable rhythm to it, like ocean waves, a spinning garden sprinkler, passing traffic or cicadas, can pose terrible continuity problems in postproduction.

Although the background sound may seem low level and innocuous—even pleasant—on the day, when the presenter's words or the actors' dialogue are being recut, a break in the background rhythm leaps to the foreground of the viewer's consciousness.

The wave which comes halfway in behind a spoken line and then disappears through a black hole at the edit point, and the wave which seems to be double or triple-crested, are just two of the oddities editors tear their hair over.

Whenever you're taping near a rhythmic background, it's a good idea to use a directional mic and point it away from that sound. Or move to somewhere else entirely.

If you can't move, be sure to record a couple of good minutes of *atmos*—nothing but the rhythmic sound on its own—so the sound editor can smooth out the rough spots in the background during sound postproduction.

VU meters

The VU meters are your guide to the levels you're recording. Believe the meters, not your headphones.

Over-adjusting the Input Levels

> *Scenario: You're taping a drama and didn't notice till the shooting started that the boom swinger isn't able to get the mic quite close enough to the second actor. The mic's sound level from this person is low compared to the first actor.*
>
> *So every time the second person speaks, you assiduously boost the input level. You feel happy that you've managed to record both actors' voices at equal strength.*

The problem is, that every time you crank up the audio level for the second actor, you also boost the background noise. So the sound editor will collapse at the lack of continuity in the background sound.

What else could you have done?

> *Scenario: You're taping a music concert and you notice that sometimes the needle on the VU meter is reading low and other times it's reading very high. You decide to 'ride the levels' to get a good even sound.*

Changes in volume level are part of the expressiveness of music. Anita Spring, World Music Festival, Australia. (Photo by Michelle Blakeney)

The problem is, that every time you adjust the audio level for the fluctuations in the volume of the music, you're eliminating one of the expressive elements of the performance. Music is *supposed* to get louder and softer at different points.

One of the beauties of a good recording is that it can employ the *dynamic range* of the tape (the usable range between high and low volumes) to reproduce the experience of varying sound intensities that the people present at the concert felt.

What else could you have done?

National Aboriginal and Islander Week celebration, Woolloomooloo, NSW, Australia. (Photo by Michelle Blakeney)

Taping Concerts

If you've been asked to videotape a music concert, you should arrange to meet with the person in charge of the sound as soon as possible.

If the music will be mixed live and sent out via speakers, sometimes the desk operator will be willing to let you take a feed from an auxiliary output and run it into your camera. In this case, there are four things to check first:

1. Will you be getting a mono or stereo feed?
2. *Precisely* what connectors will you need to attach your camera to the mixing desk?
3. Will there be two versions done of the mix—one for the desires of the audience, which may require only the vocals to be boosted to compete with the room levels of the bass, and a different one for recording to tape? If there will be two mixes, of course you want to make sure you get the full mix version.
4. How far away from the mixer's location will you be setting up your camera? Which means, how much cable do you need to run from the desk to your set-up?

Then you need to consider:

1. Will this person do a good mix? Can s/he be relied upon to give you an undistorted output level? If the feed is too *hot* and overdrives your video recording, you'll have worse audio than your camera mic would have given you. Included in this question is the need to make sure that if it's a *line level* output, your camera can handle it. Some cameras only have a *mic level* input.
2. Room sound. Though getting a good quality feed from the mixer is a great boon, nevertheless it will be a rather sterile sound. Your video recording needs to include the presence of a live audience, their clapping and laughter, their soft rustling movements, even their coughs or sneezes.

Doing Your Own Mix at the Camera

To get the ambient sound of an audience, two super-cardioids placed close to the house speakers and aimed **away** from the speakers and **towards** the audience will give you the sound of the live house, without the delay in the music which you'd get if you just placed an omni in the audience.

If the concert's soundperson gives you a good quality stereo feed, and you set up the cardioids near the speakers, then with a small portable mixer and a second person to help you, you can do a good mix-down of the three or four channels and end up with a soundtrack worthy of the performance.

If you don't feel you can rely on the concert's soundperson, or you're not able to get a feed, an omni mic may be your best bet for recording the performance. This is because it will capture the PA mix as the audience heard it, and it will also include the ambient sound of the hall.

Though omni mics have only limited uses, this is one case where they can do well. And don't forget your camera mic is likely to be an omni.

Tips for Recording Music

To get a good recording of a musical performance, you need a separate mic for each instrument, and for each vocalist. In other words, you need a mixer.

Cascading Mixers

Many performances will require the use of a large mixer. If you can only get your hands on two or three small portable mixers, you can *link* them into each other.

For example, the drum kit alone will need a mic for each drum. You could use a 6-channel mixer for the mics coming from the drum kit, and do a percussion sub-mix on that mixer. Then you could run the output of that mixer into one of the input faders on a second mixer. Get the idea?

Make sure you're clear about mic and line levels, with both the inputs and the outputs.

Betty Little performs at the University of Technology Sydney, NSW, Australia. (Photo by Michelle Blakeney)

Recording an Acoustic Guitar and a Singer

A good trick for recording a full sound from an acoustic guitar is to tape a little omni lav mic inside the sound chamber of the guitar. You can attach the mic to a small piece of foam, and attach the foam to the interior of the guitar. Then the full, resonant sound of the guitar will be the dominant sound into this mic.

You put the singer on a second mic, preferably a directional one which can be pointed straight at the singer's mouth. Aiming it correctly can be tricky because you're trying to avoid most of the sound from the guitar. A boom or mic stand will be helpful for keeping this mic stable and noiseless.

The aim is for the singer's mic to pick up much more of the voice than of the guitar. Then you adjust the pan control on the audio mixer so the guitar and the singer are assigned to separate tracks. Or you just run each mic directly into a record machine onto different channels.

This set-up allows you to later, in sound postproduction, vary the levels of the voice and the guitar in relation to each other. Sometimes one sound overpowers the other— this way you can make the blend you need, and not be stuck with having both sounds on one mic, with no way to separate the sounds from each other.

Use the Best Recording Space

Don't set yourself up for failure! Before you decide where to record a musician, check out the possible spaces available to you.

Sound bounces well off hard surfaces. A classroom with a tiled floor, smooth hard walls and a low ceiling is a very *bouncy* place. As well as the *initial* sound signal coming into your mic straight from the singer's mouth, you'll be picking up bounced sound (echoes) from all those surfaces, and each different bounce will come with its own delay,

Recording studios often have special acoustic coverings on the walls to make the recordings sound better. Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

depending on where it bounced from. So instead of getting a crisp recording, your sound will be muddied by all the bounced signals.

Sound recording studios are specially designed to be *dead.* (Who thinks up these terms?) This means that the sound is absorbed into the special coverings on the walls, floor and ceiling, so only the initial sound directed to the mic is recorded.

You can reduce bounce a little by using a carpet and curtains, but if you're serious about good quality recording, check into how to make your space more sound absorbing.

Because we're used to sound bounce in what we hear, listening to yourself speak in a totally deadened space is quite unnerving.

Planning for the Postproduction Mix

As with the picture side of video editing, postproduction actually starts in preproduction, and is very dependent on the shoot. It comes down to this—you can't edit what you don't have.

So you need to think very carefully about any sounds you *might* want in the edit, and plan to record them when you're on location.

Clean Dialogue

The uppermost aim is usually to get *clean* dialogue. This means making sure that there aren't variations in the background sound which will make rearranging the order of the shots later on into a continuity nightmare.

When videotaping an interview outdoors, pay attention to common sounds of traffic, sirens, lawnmowers and electric hedge-clippers.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

A piece of equipment which was rumbling in the background during part of the shoot, say a lawnmower in the neighbour's yard, can yield an odd result if you have to swap the order of various spoken lines. The lawnmower takes on an inexplicable stop-and-start presence behind the dialogue.

Sound Effects

Although there are some stock sound effects which you can get from sound libraries, it's generally best to record, on location, any sounds which could enhance the sound environment you plan to present on your videotape.

The creak of the sails, and the thud of the rudder, that you record on the boat you've videoed will give your soundtrack a life and authenticity that stock FX CDs are unlikely to be able to match.

The Buzz Track or Room Tone

A *buzz track* recording (also known as *room tone*) captures the general background sound present at a location. It's used in sound postproduction to patch and fill those spots where there are gaps in the edited soundtrack.

These gaps can occur for any number of reasons—maybe the director's voice was heard, so it had to be taken out, or the video image needed to be extended with a cutaway or reaction shot, but the next dialogue line couldn't start quite yet . . . whatever the cause, the buzz track is the sound editor's spackle.

> There's always time for an atmos track!

Carol Brands, Curtin University of Technology.

So always take the time to record one to two uninterrupted minutes of the ambient sound at each location.

This buzz track is usually recorded at the end of the shoot. With a professional crew, everyone is expected to remain in place and stay completely still and soundless during the recording of the buzz track. The sound recordist calls out the start and finish times of this recording. It can seem very long at the end of a hard day, but the buzz track is essential to sound postproduction, and this 'freeze' of the crew is part of the discipline which comes with being committed to making a good product.

All the bits of staging and the arrangement of personnel needs to remain the same for the recording of the buzz track, or the acoustics of the room could sound different. Also, it's no good turning the portable lights off until it's finished, because cooling lights generate clicks and other noises which will mar the recording.

On location for *Oral Hygiene for Aged Care* for the Australian Dental Association. Audio David McDonald, DOP Gerald Manogue, for t.a.c. productions, Adelaide, SA, Australia. (Photo by Simon Stanbury)

The Atmos Track

The *atmos track* is a distinct sound entity, though it's a term often used interchangeably with buzz track. The atmos track gives an overall sound of the location, and is sometimes recorded in the same place before or after the shoot, while at other times it's recorded somewhere else, if the other place gives the right feel for the sound design of the video.

The atmos track is mixed in to the overall soundtrack during sound postproduction.

Recording Pictures Only

In some video productions, sound and image are combined in the editing process. When people are out shooting the images, they may take little or no care about the quality of the sound they're recording, because they plan to get rid of it in postproduction anyway. This is the case for some MTV style tapes, or other productions which employ a series

National Aboriginal and Islander Week performance, Sydney, NSW, Australia. (Photo by Michelle Blakeney)

of images set to music. It's also true when people are out shooting cutaways which will go with a voiceover.

Some camera operators actually turn off the sound recording when they're doing these shoots.

This is unduly reckless, for two reasons. The plain fact is that you never know what's going to happen next, and suddenly wonderful and unrepeatable sounds can occur when you're out there with a camera. If you're set up for recording sound and you capture them, you may well be able to use them, if not on the current project, then on another one later on.

The other reason is that the soundtrack can be useful as a guide track for locating shots later on, or synching actions (as in dance or music playing) to other recordings of the same piece.

Suggestions from Rachel Masters

PAINTING WITH SOUND

Sound often emphasises little details that can make a story more interesting and creative: the dripping of rain off a roof awning, the school games in a playground, the grating of an old ferris wheel mechanism.

Record some unusual sounds on location and keep the lens cap on the camera for a minute before recording an image of what the sound source is. Test your friends—can they guess the sounds?

ISOLATING THE AUDIO STRANDS

You don't even need the camera to do this one. Next time you're waiting for the bus or train, or you're in a cafe, at work, out in the bush, at the beach, at your relatives' place, close your eyes for a minute. Imagine you're planning a shoot for this location. What do you hear that would add interest to your shoot?

LOCATION SOUNDS

Great location sound makes for a great production. An interesting exercise is to record location sound without the visual images. Listen to the location sounds on playback— what do they tell you about the location that you didn't notice when you were there?

Practise recording sound at a few locations:

1. A shopping centre.
2. A fun park.
3. Your own house.
4. Outside a school playground.

On playback, listen very carefully to the sounds. Do you hear new sounds you didn't notice before? How can you use these observations in your video making?

18 Sound Postproduction

In student projects made just for in-class screenings and assessment by teachers and peers, the final audio tracks are often relatively simple and they're completed in the video edit suite.

Usually the spoken words are assigned to the inside audio track of the videotape: that is, channel 2 in Umatic (one never knows where top technicians have been keeping this old gear running!), channel 1 in SVHS and channel 1 in Betacam. Hi-8 and digital record the audio in the diagonal tracks, so channel choice isn't the concern it once was.

Spoken words are edited in at the same time as the video images of any visible speakers so *lip sync* is retained. This means that all the words heard on the audio track correspond to the position of the lips of the on-screen speaker.

Of course, it's technically possible to edit in the words either later or earlier than the video, using separate insert edits, but re-achieving lip sync is a time-consuming and frustrating exercise. Some edit systems aren't 'frame accurate' and the in and out points may erratically slip, in either direction, from your assigned edit points.

It's usually best to edit picture and sound together, so that lip sync is visible. Kevin Noakes hosts *A Blackcurrent Affair*, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Talking heads tend to get boring very quickly, though, so you're likely to want to include cutaways over some of the spoken passages. No problem. Edit in all the words the speaker will say, along with the video of them speaking, and then afterwards do insert edits of any video cutaways you want.

A good method for smoothly shortening an interview, or rearranging the order of the answers, is to chop and change it the way you want it and then conceal your edit 'seams' by putting video 'patches' over them—a bit like clever sewing.

Sometimes this re-assembling of speech can be offensive to the person interviewed. If you don't want to thus deceive your audience about *exactly* how the person answered, let the cuts remain visible in the video.

A fade to black, or white, and back again, gracefully acknowledges that a cut has been made.

Recording a Voiceover

You may want to include sections of spoken commentary to link one part of your video to the next, or to give the viewer an overview of the topic.

If so, record your narration onto a separate videotape, and then edit it onto your master tape, bit by bit. Having the voiceover on videotape rather than audiotape gives you more accuracy in editing by allowing you to control the playback of the voiceover tape with the edit controller and letting you preview each cut.

Caution: Make sure when you record the voiceover that you record a control track at the same time. If there's no control track on the voiceover videotape, the edit system won't be able to align the audio footage for either previews or edits, so you'll be no better off than having it on an audiotape player and doing manual, self-timed roll-ins.

You can record a control track on the voiceover tape by using assemble edit mode and simultaneously recording either an image from a camera or a test signal, like colour bars or studio black, when you're laying down the commentary.

It can be very helpful later on during editing if you take the trouble to aim a camera at the narrator when you record the voiceover. This added vision can help you find the right spots when you're editing, especially if you include specific visual markers.

Media student at Batchelor College, Batchelor, NT, Australia.

Trying to find the right take, when there are five versions of one sentence, can drive you mad if each time you have to find the first one and then count them out as you spool through the tape in search mode. Make it easy on yourself! It's going to be hard enough anyway.

To prevent editing insanity, ask the narrator, or an assistant, to hold up a card which tells which segment—and which take—is which. Alternatively, you can use a slate or character generator to mark each take.

The other advantage of using a camera image, rather than a test signal or black, is that it makes your tape identifiable. Having no visually discernible content can put your tape at risk, because you (or someone else) might be tricked into thinking it's an empty tape, if you can't *see* a recording when you spot check it.

Needless to say, any voiceover tapes should be clearly labelled as such.

The M&E Track

Once you're happy that you have all the words put together correctly on the inside track, you can start working on the *music and effects* (M&E) on the outside audio track.

Atmos

You may find that there are holes in the background sound in between your dialogue cuts. Silence can be very loud and obvious at times like this! This is where having recorded one or two minutes of *atmos* or *buzz* track at the shoot will pay off. You can fill all these gaps using the ambient sound from the location.

It's best to record the atmos continuously on the outside track, so it's heard behind all the speech, and maybe fade it up slightly in between the speaking sections to accentuate the sound of the magpies, the playing children, or whatever, to give your tape a feeling of immediacy and presence in the situation.

Country Ebony—Gus Williams, with Warren Williams (standing) and Clyde Williams (kneeling), Australia. (Photo by Michelle Blakeney)

Cyclical Background Sounds

There are some background sounds which are nightmares for sound postproduction.

Beach waves are in this category. Though they may be balm to the spirit when heard in their full, mind-massaging rhythm, they sound very odd if the crest of one wave sound is abruptly cut off and replaced by a trough, or if two crests are edited in too close together, so the natural sound flow is broken.

When rearranging the words of your speaker on the beach, or selecting the very best drama takes and assembling them, the background rhythm is very likely to be thrown off kilter.

In *post*, sometimes laying in some continuous atmos waves on the outside track will disguise the oddity of sound behind the words on the inside track, *providing* that the cyclical sound behind the dialogue was of fairly low volume level in the original recording.

One trick for achieving a minimum of background wave sounds is to use a directional mic and orient it so that its back is towards the ocean and its front is held in as close as possible to the speaker.

Other sounds which have to be addressed in post are the *vanishing acts*, like the train or aeroplane which is travelling along in the background of the dialogue, and then drops away suddenly at the end of the cut. For the audio track to sound right, that train or plane sound has to be extended beyond the cut and then faded away.

Never tape dialogue over cicadas.

Martha Mollison, Video Producer.

In a perfect world, all dialogue would be *clean*, free of such annoyances. And care taken by the sound recordist on the day makes a **big** difference when editing time comes. Though the director may have all concentration focused on the quality of the acting which is happening, and be oblivious to background sounds, the sound recordist should halt any take before it begins if a plane sound appears on his/her headphones.

Location Sound Effects

You should have recorded any special sound effects inherent to your locations during your shoots. These are likely to sound more genuine than effects you do later.

They should be carefully logged so you can find them easily during sound postproduction. Then you make up a chart which shows exactly where they go in your M&E track.

Foley

Sometimes there are sound effects needed in the final edit which weren't shot on location. Maybe they were forgotten, they were impossible at the time, or they were decided upon later.

This is where *foley* comes in. Named after the sound effects artist, Jack Foley from Universal Studios, foley is now the generic term for studio-recorded sound effects. It can include footsteps on wood or on various surfaces (e.g. walking in large trays of sand or gravel). The foley studio has doors for slamming, creaking or knocking on, and the foley artist uses inventiveness and imagination to produce a myriad of sounds, from kissing flesh, to punching sides of beef for fight scenes, and stabbing cabbages for stabbing scenes.

Track Stars is an entertaining short Canadian film (7 minutes) which shows foley artists at work. (See end of chapter for purchase details.)

Kimberly Rabe edits music with assistance from Claire Beach, Edmonds-Woodway High School, Edmonds, WA, USA.

Library Sound Effects

You may not have the time to do your own foley. Or there may be sounds which are too hard or impossible for you to get.

In that case, there are many records and CDs of sound effects, from baby cries to animal sounds to gun shots to boat whistles to . . .

Check with your media centre to see what they own. The student radio station often has a good selection of sound effects, too. And some people decide to purchase an effects library for their own use.

Sound effects libraries include copyright with the sale of the recording, so there's no problem copying them into your video.

Music

If you want your images to exactly match the music—for example, if you want the pictures to change with the beat of the music—you should record the music track first, and then cut the pictures.

But if you will be using music for background or mood, you should cut it in after the dialogue track is in place. This is so you can tell exactly where to fade it in and out, so it comes in nicely after the speaking ends and fades down before the next dialogue segment begins.

A common mistake is to record the music track too loud, and find that it drowns out the dialogue track. The dialogue should be recorded good and strong, with the VU meter needle right up near the red (distortion) section, but not in it. Background music, however, should be recorded at a much lower level, with the needle not rising very high at all. The best way to tell if the level is right is to listen to both tracks together while you're setting the level for the music recording, and to monitor both tracks while you do the recording.

One major hazard is choosing a music track with words to put under a dialogue track. No matter how much you like the song, the words connected to the music will fight with the dialogue, and the end result will be an audio muddle and confusion on the part of the audience.

Sometimes people like to use an *audio wash*, which is a music track so low in the background that it's barely audible, but it adds to the fullness of the soundtrack, and contributes to the mood of the piece.

Other people feel that it's manipulative to use music to set mood, and the soundtrack should be composed only of sounds which are inherent to the location.

As you can see, there's both philosophy and craft to the production of soundtracks.

In Digital, You Can See Sound

One of the changes in moving to digital sound editing is that you get a graphic representation of the sound on your computer screen while you hear it from your speakers. You watch a marker pass over the sound read-out as the sound is played back to you. This is great fun at first, to *see* sound. And it's fascinating to see how the crisp attack of hard consonants like 'k', shows up, and how a group of words can run together as nearly continuous sound, while other words are phrased quite separately from each other.

One benefit is that, with practice, you can see where to make your edit trims. You can see just where the silence is. But of course there's always some silence in natural speech, so you can't cut it all out, or the dialogue you're editing will sound wrong.

The first time you see sound, it may be quite different from what you've expected. A student from Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

The Sound Mix

Once you've done a couple of video projects, your ambitions for your soundtrack may surge, and you'll find that having only two audio tracks to work with just isn't enough. All you need to aspire to is a cross-fade between a sound effect and a piece of music, and you'll crave a third track. Then a fourth, and so on.

So the next step is to use an audio mixer.

Seriana Lui does sound mix during a studio production at the School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

First, you need to make up a track-laying plan, fully organise all your sound sources and attach them to the different inputs on the audio mixer, and then do the mix by raising and lowering a number of input faders as the recording proceeds.

Doing this sort of mix requires concentration, patience and practice. Professionals usually do a mix in segments or *runs* because of the difficulty of getting so many things exactly right. A manual mix often requires the help of one or two other people, to assist with handling the various faders and playback machines.

However, some high level mixing desks are computer-linked and can memorise the positions and movements of all the faders.

The operator can design a mix and store all the information about it in the computer. At a command, the audio desk will come to life, rolling through the whole sequence, with 16 or more faders rising and falling and no hands touching them.

The operator can sit back and critically listen to it, then make a few changes, store the new mix, play both of them to compare them, and make a choice. Or enter a third option and listen to all three being played back.

Old-time tracklayers, eat your hearts out!

For a good example of an audio mix happening, view the videotape *The Dub* (available from AFTRS).

Operating the Studio Audio Mixer

Operating the mixing desk at Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

If your next step is to learn how to do a sound mix using an 8-channel (or larger) audio mixer, turn to Chapter 31, Operating the Studio Audio Mixer.

The Digital Audio Workstation

Relatively low-cost *digital audio workstations* (DAWs), which connect to personal computers, have produced a revolution in the way people are doing audio postproduction.

Many video training providers throughout Australia have recently purchased DAWs, and people are beginning to sort out how to use them.

One problem is that each DAW uses a different vocabulary for naming its various operations, so to shift from one to another requires a process of re-learning. And even within the same brand names, system design is evolving so quickly that knowing an earlier model doesn't mean you know how to operate the new one, which comes out six months later.

Still, DAWs' capacity for implementing a precision sound mix is so seductive. The promise of being able to sliver off the tiniest audio flaw, a syllable here or there, and make patches and reconstructions—and the ability to work in non-linear style—has convinced people that it's worth undergoing a steep learning curve to get there, and the large cash outlay.

Setting Up a DAW

To get started you need a software package and some hardware.

SOFTWARE

There are many different DAW software packages. Your decision on which one to buy will be influenced by their minimum system requirements. Be sure to check carefully that your current computer has the capacity to handle the software you want to install.

Generally speaking, one gigabyte of hard disk memory will store three hours of mono sound. This would be plenty for a short project. Floppy disks don't have enough storage space for this kind of work. Some sound post sites limit work to only one project at a time, while other places use removable hard disks for purposes of having back-ups of tracks and to allow switching between work on different projects.

It's a good idea to take your time when making the software decision. If possible, visit people near you who have already purchased different systems, and see how easy (or hard) they are to operate. Get comments from the people who are using them.

Check with your local video training centre to see who has bought what.

The sound department at the AFTRS currently uses ProTools.

HARDWARE

To connect your input sound sources and your recording machine to the DAW software in your computer, you'll need a *break-out box*. This box will have connecting points for *audio in* and *audio out*, both digital and analog.

Some break-out boxes have RCA connections (for *unbalanced* audio), and some have XLR connections (for *balanced* audio).

The break-out box will also have connections for timecode in and out. DAWs can only work with recorded material which has timecode.

The break-out box comes with associated *cards,* which are computer circuit boards that slip inside the housing of your computer. When you purchase a DAW, the installation of these cards into your computer can be part of the deal.

Media student makes sense of all those buttons, Griffith University, Brisbane, Qld, Australia.

The Process of Sound Postproduction with a DAW

The digital audio workstation is a new technology for handling sound but the process and underlying concepts of audio mixing are the same as for the earlier method of sound postproduction—laying up all the tracks on tape and mixing them through an analog mixing desk.

A sound editor should keep good communication channels with the location sound recordist and the visuals editor so s/he can be forewarned of any upcoming challenges (to put it delicately).

Jane Paterson, Sound Editor, AFTRS.

In fact, to assist sound post operators with their transition to the new gadgetry, the on-screen display on a DAW includes a graphic representation of a multi-track mixer, complete with faders which can be moved up and down.

Okay, so what is the process?

Sound postproduction doesn't happen until the fine cut of the video edit is completed.

Important: The fine cut must have timecode on it. Even if you recorded your field video *wild*—that is, your camera wasn't assigning timecode to the footage—make sure when you transfer (bump up) your tapes to Betacam, 1-inch or HiBand Umatic for the final edit, that you put timecode on your material. The DAW can't work without it.

Note: Betacam and 1-inch use a third track for timecode, so you don't risk losing one of your audio tracks in the transfer, as is the case with some earlier video formats.

Step 1: Layover of Audio Tracks

The vision editor passes over the location sound tracks to the sound editor via an OMF (open media file interchange). The sound files are usually burnt onto a CD, but they can also be swapped directly from one hard drive to another.

Another way to pass on sound materials is to give all the tapes and an EDL (edit decision list on a floppy disk) to the sound editor. ProTools will then assemble the planned soundtrack according to the EDL. ProTools does this via an additional software program called Digitranslator.

If you're working on your own, transfer the two audio tracks from the fine cut of your video piece onto the hard disk of the DAW.

During this transfer, make sure you keep the two tracks separate from each other in the DAW by panning them to the left and right, respectively. While you're doing this transfer (layover), listen carefully to the tracks and mark up a rough log on a track sheet. (Yes, even in the jaws of DAWs, there's still need for paper and pencil work!)

Then transfer in all the other audio material you have to work with—your voiceovers, atmos recordings, special effects, music and so forth.

A sound postproduction department will also have SFX, library music and atmospheres which you can draw upon.

Jeremy Ireland uses ProTools, Australian Film Television and Radio School.

Step 2: Assess Your Material

Replay the audio from the hard disk and listen to it very carefully.

Because you can now stop and start the audio as you like, you can greatly refine your log, and mark outcues and the times of items which need to be fixed or removed.

Because the computer is locked to the video, you can watch the video program as you listen. Pausing the video automatically pauses the computer.

At this stage, you're mainly concerned with fixing the dialogue. You figure out what needs to be added (like clipped endings on words), replaced (bad quality sound), deleted (audible director's cues), extended (that plane flight overhead which ended at the cut), or masked (this could be anything).

Step 3: Sound Design

Although for many videos sound design would (and should) have started in the project development stage, now is the time to face the reality of what material is actually at hand.

The *spotting session* is held, in which the director, musician and sound postproduction person meet together. In some cases these are one and the same person, so if you're a Renaissance Person get used to holding inner dialogues!

The director says what s/he needs for the completion of the project. Then everyone discusses ideas and options. The overall aim is to fix up the bad parts, and achieve the director's goals for the audio track.

Some things to consider are: will the use of music hide the presence of intended sound effects? If so, which should be dropped, the music or the effects?

Step 4: Cleaning Up the Tracks

Go over the existing program sound with the equivalent of a fine-toothed comb, removing any unwanted sounds and putting in niceties, like fading between sound clips at edit points to make the cuts more subtle.

The sound editor's job is to fix the messy location dialogue, smooth the transitions, even out the backgrounds and add in additional material.

The rule of thumb for the editor of the video fine cut is to 'give more rather than less', since it's easier to delete unwanted bits than to add in or manufacture missing sounds.

Step 5: Start Adding in the Other Tracks Efficiently

See how well you can add in the needed sounds, using as few tracks as possible. The DAW may have only four available tracks, so if you can manage to sandwich in the voiceover segments between the dialogue sections and thereby get both items into one track, well done.

Keyboard from sound studio at Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Step 6a: Lay in the Music Tracks

Some postproduction people prefer to lay in the music next.

The idea is this: once you've put the music in, you can tell where the remaining gaps are. There's no use spending time putting in sound effects which won't be heard.

A lot of sound post is problem solving, and time management is very important. As a sound editor you should assume that technical problems beyond your control can just *happen*, so build enough time into your editing schedule so you can still complete the project on the deadline. With enough time anything can be solved.

Jane Paterson, Sound Editor, AFTRS.

Step 6b: Lay in the Effects and Atmos Tracks

Other sound post people prefer to put in the effects and atmos next, and leave the music to last. Once it's clear where the remaining gaps are, music selections can be timed and chosen. Perhaps music will be specially composed for these gaps.

The particular project's style and needs may determine whether you put in music or effects first.

A good spotting session should predict whether putting in the music or the effects first would be the best route.

Doing a Pre-Mix (Bounce Down)

The four key elements of a soundtrack are:

- Dialogue and voiceover.
- Effects.
- Atmos.
- Music.

Sometimes one or more of these elements requires more than one recording track. For example, you may have a large number of effects which need to overlap each other. In this case, you can use the four (sometimes more) tracks of the DAW to lay out the effects separately, then cross-fade and mix all these effects onto one master FX track. You do this by using the *track bounce* function.

Once the tracks have been bounced to the single FX track, the original four (or so) tracks can be deleted, thus freeing up track space for the other sound elements such as dialogue/voiceover, atmos and music. You do this freeing-up of tracks by hitting the command *auto replace* to erase (*blow away*) the component tracks.

This process is called doing a *bounce down*. It basically means reducing the audio material from many tracks to one track.

In the end you need to get all the elements mixed down to the number of tracks the DAW can handle for the final mix.

The last sound postmix bounces down the final dialogue/voiceover, music, atmos and effects tracks to either a mono or a stereo pair, which is then ready to be transferred to the master edit tape.

The Completed Sound Track

The final objective is to *lay back* the mono or stereo mix from the DAW to the two audio tracks on the master video edit.

This must be done locked to timecode so that every sound recurs in the right place.

The end result is that the initial thin and flawed soundtrack from the video edit is replaced by a richer, deeper and cleaner postproduced soundtrack.

Oh, how satisfying.

Using a Digital Audio Multi-track Recorder

If you're recording music live, you could need a number of tracks to cover the various instruments. For example, a drum set alone usually requires several mics to catch the sound of each drum and cymbal and adequately reproduce their sounds.

In this case you could use a digital audio multi-track recorder to do a sub-mix, integrating all the mic inputs into one mixed output which can then be laid over into the DAW.

Mixing for Theatre Sound

Sometimes people want to end up with a much more complicated soundtrack which will work in a theatre presentation.

They lay up and edit their audio tracks on a DAW, then dub them over onto a digital multi-track. Sometimes they even need more than one digital audio recorder to hold all their tracks.

Once they have everything recorded on tape, they take the lot to a posh mixing studio where their sound track is mixed for left, centre, right and surround sound.

Suggestions from Rachel Masters

1. Changing a soundtrack or re-voicing your favourite TV show can be difficult but very entertaining. Record a very small section of your favourite show. In the edit suite, record over the audio tracks only, adding whatever new dialogue or sound effects you choose. Try turning a sitcom into a serious drama, or a drama into a sitcom.
2. Another challenging exercise is to try to entirely change the genre of your favourite show. Turn a comedy into a clichéd horror skit, complete with creaky doors and music of impending doom.
3. Write a short script which is versatile enough to be used in several genres. Working in pairs, design a soundtrack to work with the script in the following genres: romance, horror, action, drama, film noir and science fiction.
4. Try creating your own soundtrack from scratch. Make it tell a story which uses only sound and no dialogue. Listen to a few professional soundscapes or dance music for inspiration.

Assessing Production Work

Steve Parris of Edmonds-Woodway High School (Edmonds, WA, USA) has developed a checklist for students and teachers to assess audio production work. Here it is:

AUDIO PRODUCTION RUBRIC

	5	4	3	2	1	0
Technical	Recording levels are perfect for each instrument	Levels are appropriate	Some levels are too strong and/or too weak	Something really sticks out too much	Levels are terribly unbalanced	No project
	Signal QUALITY	Signal levels are clear and clean	Signals are mostly clear, some are muddy or distorted	Signal quality is uneven and distracts the listener	Signal quality is a major distraction	No project
	Use of effects is subtle and artistic	Effects are appropriate	Something has a distracting amount of effects	Badly needs effects or less effects	Effect use causes major distraction	No project
	Equalisation is wonderful	EQ is well done and fits recording	Most things use EQ well	Something has a major EQ problem	EQ is a huge distraction	No project
	Recording is exceptionally mastered	Mastering has cleaned up and bettered recording	Something should have been cleaned in mastering	Mastering in dire need	No mastering	No project
	5	**4**	**3**	**2**	**1**	**0**
Aesthetic	A well-balanced recording, one doesn't even notice the production	Project is well-balanced and even	Something is too strong or missing	Something is sticking out or distracting	Very unbalanced recording	No project
	Performances are incredible!	Performances are solid and clean	Performances are fine but uneven	Performances are good but clearly by an amateur	Very amateurish performance	No project
	Radio ready—recording will draw interest from discerning listeners	Could be on the radio	Is pretty good, but really isn't ready for radio play	Maybe radio-friendly, but pushing it	Not even close to ready	No project
	Message recording is trying to make is very strong and clear	Message is clear	Message gets a little lost in the translation	Message is largely inconsistent	Message almost cannot be discerned	No project
	Overall gut reaction is overwhelming	Strong gut reaction	Okay gut reaction	Mixed feelings about recording	Poor gut reaction to project	No project

Suggested Resources

Producing Great Sound for Digital Video, by Jay Rose, CMP Books, 2000.

The Dub, AFTRS videotape about doing the sound mix for a feature film, using *The Fringe Dwellers* as its example. Available for purchase from AFTRS: Direct Sales Tel +61 2 9805 6611 or fax +61 2 9887 1030.

Track Stars: The Unseen Heroes of Movie Sound, by Terry Bourke and Andy Malcolm, distributed by Kinetic Inc, 408 Dundas Street East, Toronto, Ontario, 2022, Canada: Tel +1 416 963 5979 or fax +1 416 925 0653.

The Art of the Sound Effects Editor, by Marvin Kerner, Focal Press, 1989. Available within Australia on interlibrary loan from the Jerzy Toplitz Library at AFTRS, North Ryde, NSW: Tel +61 2 9805 6440 or fax +61 2 9805 6652; email library@aftrs.edu.au

Digital, an Australian magazine which covers the latest in home audio.

Explore websites, such as the Audio Engineering Society's <<http://www.aes.org/>>

19 Safety on the Set

By Don Bethel

Safety should be a state of mind—a top priority state of mind. Fortunately, most people *are* safety conscious, yet accidents still happen; or, rather, are caused.

From the beginning of your training it is essential that you pursue an awareness of safety codes and practices which will keep pace with your expanding knowledge of video techniques and your developing craft skills.

Tanya Andrea and Sebastion Craig haul gear for a production, Australian Film Television and Radio School.

Work Environments

Video, television, film, theatre and concert presentation all share a common factor. There is a **continuous state of change** during production. The manufacturing environment can easily alter from safe to high risk.

Our work is considered as an artistic endeavour—but the production process is definitely industrial.

Industrial Safety Standards

Industrial means:

- Working as a *team member.*
- Using *specialised equipment* (tools).

- Being in the process of *manufacturing a product* (for further use/distribution).
- Being in a temporary, selective, *work environment*.

Warning: There's a subtle shift from regarding video as a home craft to regarding it as an industrial activity.

At first, video production may not seem industrial. After all, domestic camcorders are routinely used at home. But no matter how simply you start out in video production, as your skills develop, your projects will become more ambitious. You'll soon be involved in productions which require a professional level of organisation and craft skills, and an appropriate assessment of health and safety factors.

General Conditions

We work under time-related pressure. We accept around-the-clock rostering and mixed day and night shifts as normal.

Work routines are variable and performed in all weather conditions, often for long hours.

We create our own environment, then change it continuously—the location, casts, sets, crews . . . all temporary.

On location shoots the workplace is the world! Not only do we have to operate within our own industry's safety standards, but we 'inherit' all the other environments—where often no standards exist.

Obviously, in this industry an individual's health and safety are at some risk.

A Safety Choice

We can minimise the risk to ourselves by:

1. Increasing the intensity of our safety first attitude.
2. Treating safety as a craft skill. In other words, we should **study** survival needs.

> Never work with a director or presenter who's braver than you.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

This croc had his jaws tied shut with fishing line—but it was discovered at the end of the shoot that the fishing line had broken sometime earlier! Richard Fitzpatrick with watery mate, Digital Dimensions, Townsville, Qld, Australia.

Accidents

The human body is equipped with a wonderful array of healing and repairing mechanisms—reflect on your childhood accidents and how you have survived!

But irrespective of the type of injury, the sequence was common:

- It hurt.
- Patching and healing was an unpleasant experience.
- It often stopped us from doing what we wanted to do.

As adults, injuries are even more annoying—especially if the accident was the result of carrying out a routine task:

- A knife cut from peeling an apple.
- A burn from serving hot food.
- A fall over a small stray object.
- A splinter from handling a wooden or metal utensil.

Slack Concentration

As adults, we know the everyday risks. So what happened?

Were we distracted at the time? Operating on remote?

We tend to leave our personal safety awareness on 'automatic pilot', allowing our senses and past painful experiences to remind us. But usually this is at the last moment, perhaps too late, and we may end up repeating the whole painful episode.

Anticipation and the 'Safety Scan'

We can't expect better results until we increase our intensity of safety awareness.

Whenever you do helicopter shoots, double check that you're strapped in. And make sure you can get out of the harness quickly if you crash.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

In new or unusual circumstances the anticipation of danger is the respect we give to our common sense.

Learn to trust your judgements.

Use all your senses:

If it _looks unsafe_ . . . it probably is . . .

If it _feels unstable_ . . . it definitely is . . .

If it _sounds odd, loose_ . . . it usually is . . .

If it _smells hot, burning_ . . . Quick! Switch it off! . . .

And if it _tastes terrible_ . . . you've booked the wrong caterers.

Workplace Conditions

We do get bumps and bruises—no matter how carefully we move around. We assemble boxes of gear, load, unload, stack, unpack, tidy up, rehearse, shoot, de-rig, stack, pack, travel and start all over again. There are many opportunities for body contact with equipment.

Lifting

We also do a lot of lifting.

Thanks to recent technology, many electronic items have been reduced in size and weight. The equipment now used for *EFP* (electronic field production) is certainly more compact than it was in the past!

But cables, lights, stands, sandbags and other ballast remain the same—heavy, or awkward to lift.

Heavy Weights

So let's define heavy.

Heavy is **any** weight which you find needs maximum effort for you to move or lift.

Your ability to perform is due to factors of fitness and size—muscle tone, physical build and prior experience.

Don't try to match others who display ease in shifting heavy equipment.

Rob Stewart, Coordinator of Television Training Unit, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

An Action Plan

Take time to plan the lift. Approach the task methodically—start gently, observe techniques, don't struggle—and don't hesitate to ask for help.

Never attempt any labouring duties until you warm up physically.
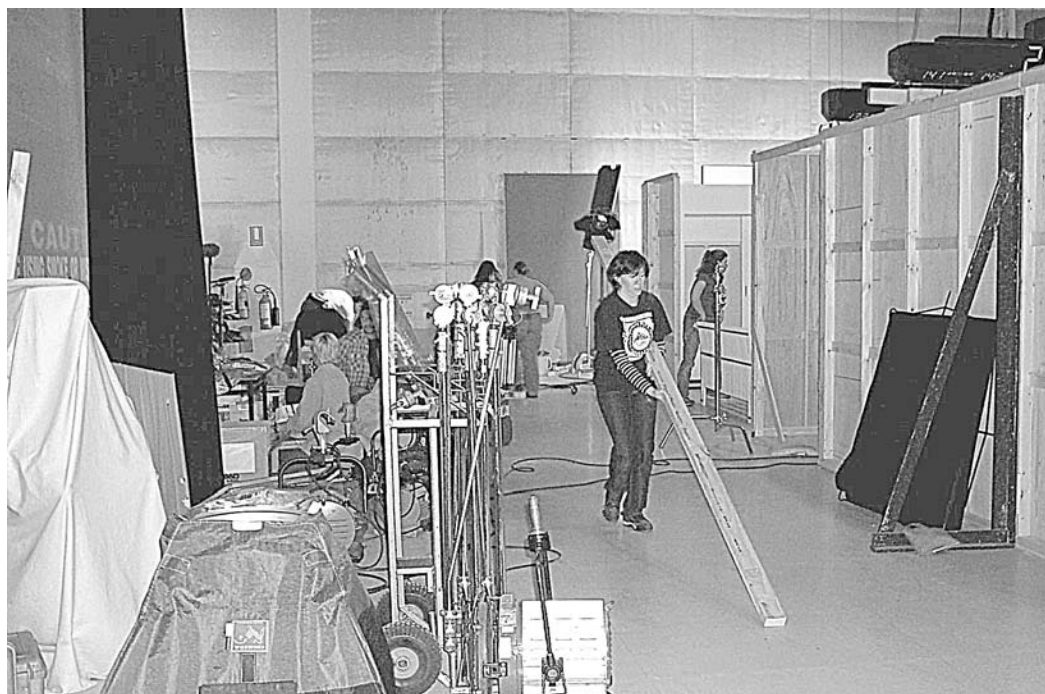
There's lots to carry around when preparing the set.

STRATEGIES FOR LIFTING ON YOUR OWN

Plan the move. Run this checklist:

1. How will I hold this object?
2. Will it be easy to remove? How do I stack?
3. Will my grip be easy to maintain?
4. Where is it to go?
5. Is the next resting place adequate? Clear?
6. Is the floor/ground even? Is there good traction for walking?
7. How far away is the final position? Are there steps? How many?
8. What is the height of the final position?
9. Is there enough space in the final position for me to release my grip?
10. When the object is taken to the lift position will my view be obscured?

BASIC LIFT

1. For each lifting operation, stand with your feet slightly apart—in your best/most comfortable balance position. Bend your knees, but keep your back straight. Take strain gently—let your leg muscles do the work.
2. **Don't lift** and **turn your body** in one movement.
3. If the load shifts and you're losing balance, reverse your lift routine if possible. If not, let the load go. Hard on the equipment, safe for your back.

Don't be afraid to share the load. Students returning gear after a shoot.

LIFTING WITH ASSISTANCE

Some objects are awkward for one person to handle. A long ladder is an example. Another is a box full of cables, with no handles on it.

As a team, *discuss the action plan* (all points as before) and who will give the guidance cues to lift . . . pause . . . lower . . . change hands, etc.

TRAPS FOR LIFTERS

'I can lift it on my own'—well, maybe not.

You may be able to carry it on your own—but reaching for it, on the back seat or in the boot of a car, imposes a totally different mechanical stress on the back.

Get help to slide/lift the object to your comfortable carrying position—then stagger off with it.

PACKING AND UNPACKING VEHICLES

When packing/unpacking vehicles, consider getting help. Slide pieces into place. Leave heavy objects close to access points. Make use of handles. During packing, remember to position handles for easy grasping for the unloading.

LOADS OVER DISTANCES

If gear has to be carried some distance between unload and first set-up, pack and use a trolley whenever it's practical.

Use a strap to secure heavy items to a hand trolley. Tony Atkins, Building Maintenance Officer, Australian Film Television and Radio School.
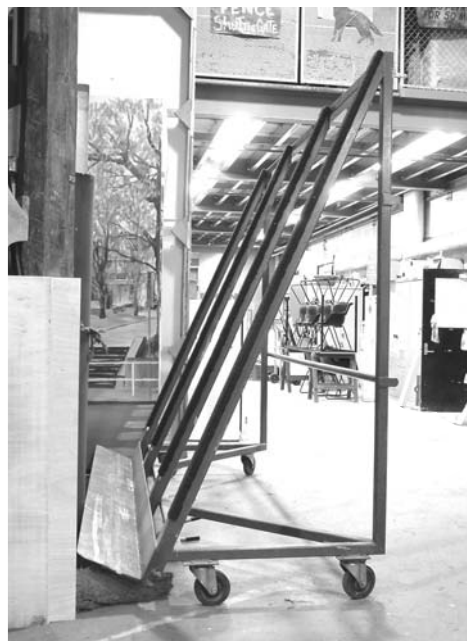
This is Big Red, the trolley for moving flats for sets. Australian Film Television and Radio School.

Planning Ahead

'Use a trolley whenever it's practical' implies planning ahead.

The first step is to think about the location—the environment. Would it be possible to use a trolley to lessen the strain?

Location Surveys (in Preproduction)

A location survey has to encompass consideration of the many diverse needs of both the production and the crew.

The suitability of the location for the needs of the script is the important factor, but accessibility for the crew, access to electrical power, likely weather conditions and many other things affect the practicality/viability of the site.

This is the time to think the whole operation through from set-up to pull-down, considering safety as you go.

We do a lot of first aid and medical training. I've stitched someone up out at sea. When we do shark studies we're 24 hours away from medical help, so we have to carry full medical kits, including morphine and defibrillators. We're all trained in how to do things, but we have to ring up the Royal Flying Doctor Service on the satellite phone and they instruct us on what procedures to take.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Assessing the Mechanics

In any production, there are always two major spaces to consider. There's the action area, which will be revealed on screen—this space will be occupied by the performers; and there's the off-screen work area, occupied by the crew with all their equipment.

These two areas have different needs. The screen action area may be free of any hazard—but what about space for the boom swinger who has to follow the action, and what about the space(s) allocated as camera positions?

Check for Changes

If it's an exterior location, how will extremes of weather just prior to your shoot date affect the environment?

This practice of anticipation, of visualising the mechanics of the production, considering the practical aspects of the site that occur **before**, **during** and **after** the shoot, will help you expose some of the safety risk factors.

Combine this with the check lists (e.g. lifting plan) and you get the results of a safety scan—a report back to you for assessing risks. Then you can plan the right actions/precautions to minimise or eliminate those risks.

The Industry's Commitment to Safety

For major production work, a specialist safety officer, contracted by the producer, will prepare a safety report which lists the observed risks on each location and how to minimise/eliminate these potential hazards.

Whenever you ask an actor to take on a risky situation, you have to be sure that you've got safety precautions worked out ahead of time. On set for *Ash Wednesday*, Australian Film Television and Radio School.

Recognition of Safety Requirements

The production's specified safety person bases his/her recommendations on site investigation, knowledge of local Occupational Health and Safety regulations, the product (script as developed), and casting, particularly if children are involved.

Introduced Risks

If stunts, firearms, special effects, activity in or near water are part of the script, extra specialists are required to train/guide/supervise these activities.

Preventative Control

These specialists must go through their own safety scan technique. This will alert them to **further** considerations, until they feel confident of their strategies for risk control.

Their recommendations/guidelines are then adopted by production personnel as best operational safety procedures.

Personal note: Safety guidelines are only effective if they're accepted and applied. The attitude and practice of all crew members are important here.

FM or 1st AD Responsible for Safety on the Set

On the set, the FM (floor manager) or 1st AD (first assistant director) is responsible for maintaining safety standards. Situations do develop in the creative process, situations which vary from the original concept.

If the FM or 1st AD considers the new plan of action involves a change from safe to unsafe, then s/he has the authority to disallow the new plan.

Crew members shouldn't disregard or argue with these judgements.

Universal Production Rules

Wherever you work, obey the house safety regulations, like those requiring the use of hard hats and protective clothing.

Unless it's part of screen action:

- No smoking on set—fire risk.
- No eating/drinking on set—spill damage.

These rules apply to technical areas, too, like edit suites and control rooms.

Just think of food particles in tape machine heads, a half-cup of coffee (sugared) in a mixing console . . .

Extra Skills Needed

We do need some extra skills to give us the 'edge' in emergencies.

Fire

Do get some training in handling fire extinguishers. Learn to identify the appropriate extinguisher for the different sources and causes of fires.

At your workplace:

- Note the small tag on the fire extinguisher which informs you of last date serviced. If it's been **more than a year**, it's time to get the fire extinguisher recharged/serviced.
- Lift each type of extinguisher—don't discharge it, but carry out, as a rehearsal, the operational instructions.
- Notice how heavy some fire extinguishers are. That doesn't mean they'll last for hours! As a research task, check with your fire safety officer on likely duration/capacity.

Learn how to use the fire extinguishers. Josh Bullen, volunteer, Australian Film Television and Radio School.

First Aid

Consider training in first aid—a must for anyone contemplating location work. A St John's Ambulance course or equivalent is excellent. A first aid kit should be readily available on all shoots. Check its stock regularly.

ESSENTIALS FOR SMALL CREWS

- A box containing a blanket and/or a ground sheet.
- A first aid kit.
- Thermos and ice.
- Strong beam torch.
- Clipboard with up-to-date **local** emergency numbers.
- A second kit containing all of the above **and** a small fire blanket and general purpose extinguisher.

This is your minimum safety equipment.

EMERGENCY NUMBERS

Professional crews get call sheets with emergency numbers listed for the doctor(s), hospital and police station nearest to the production site. In an emergency, there's no time to hunt these details out.

ON LOCATION

Emergencies don't recognise industry status—so even if it is your group's first location shoot, do the right thing for safety reasons.

Don't ever tap someone on the shoulder or try to get their attention while they're working with machinery. Hilton Ellingham, Props and Staging, AFTRS.

Creating a Hazard

Accidents don't _just happen._

Compounding causes: Consider again the injury in the example of peeling the apple.

Possible factors: Hygiene was observed—the apple was washed. But:

- Hands, apple not thoroughly dry?
  So, not a firm, but a slippery grasp.
- Knife not really sharp, perhaps blunt?
  So, force was needed to cut it.
- Result: Natural laws of physics went into action (instability + applied force = . . .)

That was a two-factor incident involving one person.

Construction Work

When building sets, be sure to wear hearing protection, eye protection and have no loose hanging clothing that might get caught in the equipment. When sawing, be sure to use

the blade guard, and pull the nearly sawed piece through the last bit, rather than pushing your hand towards the blade.

Creating a Risk Factor

Now let's consider cumulative hidden agendas which can stress a group situation into a potential hazard for everyone.

It's a rostered early start—EFP (electronic field production) shoot.

- Crew member A is late, arriving well after the planned departure time.
- Crew member B, as navigator, hasn't bothered to plan the best route.
- They get lost and get further behind on the production schedule.
- The driver tries to make up lost time, speeds, takes small risks.
- Crew member C knows the vehicle is overloaded but says nothing.
- No-one knows the car is overdue for brake service.

All are minor contributors to a possible disaster.

Note: Everyone has equal responsibility for the safety and well-being of the others who share the same work area.

'No Hazard' Checklist

Placement of Gear

- Never clutter the studio with unnecessary items, and never have standby equipment, lighting stands, the odd table, props, camera boxes, and so on, in front of a fire exit, hose reel or extinguisher point—and certainly no gear resting on fire stairs.
- On location, don't block existing emergency exits or fire stairs with any bits of gear just because 'there's nowhere else to put them'.
Look again—there has to be!

Cables

- After you connect cables, neaten the scene.
- Don't have easily tripped-over piles or loops of cables.
- Don't have strained cables raised off the floor.
- If cables cross a main foot traffic area, tape them down or place a mat across them, then tape the edges of the mat down.

Cables should be tidied, and never curling up or stretched above floor level.

Electrical Spot Check

- Cables and connections?
- Damaged insulation?
- Loose connections?
- Connections near water?
- *Electrical Practices in the Film Industry*, WorkCover Authority, NSW, or similar publications in your state or country.

Never turn on a light that's plugged into an electrical cable which is still coiled up. Uncoil the cable first! A coiled cable can heat up and even melt down.

Adrian Rostirolla, Metro Screen.

Don't try to climb a ladder while carrying gear. Get someone to pass it up to you. Don Bethel and Rod Bower, Australian Film Television and Radio School.
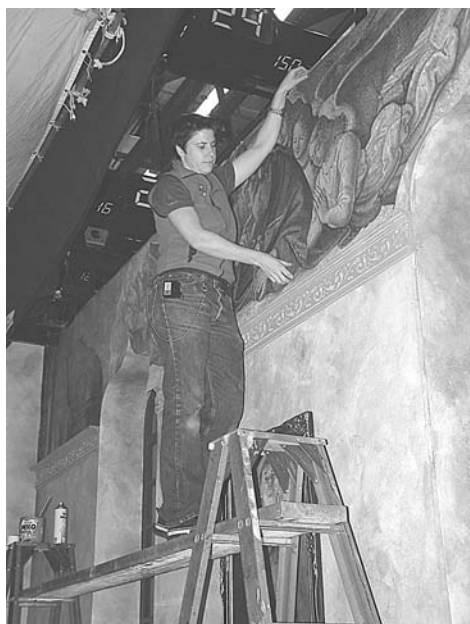
Annie Wright uses a secure plank between two ladders to re-attach wallpaper high on the set wall. Australian Film Television and Radio School.

Hold onto the upper section of a lightstand when loosening it . . . or it can collapse on your fingers.

LADDERS

- Wooden ladders are safer electrically.
- Check before using that the ladder is structurally safe.
- Don't carry weights in one hand when climbing. Have someone pass the object to you.
- It's best to treat all ladder work as a two-person job.

LIGHTING

- Elevated floor stands/supports must be correctly ballasted/tied off.
- Do not place lamps near drapes or the ceiling—fire risk.
- Do not place lamps near automatic fire sprinklers—heat from lamps can activate sprinklers.
- Switch off lamps before repositioning them.
- Check lamps for residual heat before handling them.
- All gear hung above head height needs a second safety fixing.
- If cutting/fitting colour gels, put off-cuts immediately into waste receptacle. Small pieces underfoot may cause people to slip or fall.

- Duck your head, shield yourself and wait before looking.
- Don't immediately turn and look in the direction of the sound. The housing and the Fresnel lens will usually contain the glass fragments. Most—but not *all*.

During a television rehearsal with the Sydney Symphony Orchestra, a 2 K lamp exploded and showered down small fragments of red hot glass. No-one was injured but some musical scores had extra little black 'notes' burnt into their pages.

Grid Work Restrictions

Don't attempt to work on grids or lighting battens unless under the supervision of a qualified electrician.

Lamps suspended overhead need a safety chain in addition to normal fixing.

Barn doors must also have a safety chain linked to the lamp housing frame.

Check also that safety gauze/glass is in place.

Fire on the Set

If screen action requires a naked flame—lighting a cigarette, candles, kerosene lamps— that action requires a minder in the role of standby props or special FX person, with the floor manager/1st/2nd/3rd AD as back-up.

Sharing Space

A crew should observe more care when sharing a location, as when shooting in other people's work areas.

Site permissions are one thing—they're for right of entry only.

A video crew should never 'take over' or impose possible hazards on others.

A video crew is distracting just by being there, so everyone's behaviour should be as unobtrusive as possible—quiet, moderate, business-like.

To keep an objective perspective on the crew's behaviour, ask yourself this: 'If we needed to reshoot in the same environment, would we be welcomed back?'

> Leave a location as you find it. You may have to return for reshoots or pick-up shots.

Philip Elms, Media Resource Centre.

Adjusting the Location Site's Lighting Conditions

Work areas lit by fluorescent lights are often a problem for video. The camera has difficulty reproducing correct skin tones/colour balance. In a studio setting, you get rid of the fluorescents, you just switch them off before you roll tape. But what if you're in someone else's office space?

If it's absolutely necessary to switch off house/work lights for the colour balance and recording, prior arrangements must be made with area operators and management.

Once agreement has been reached, the routine is:

1. Contact personally the on-site workers who'll be affected.
2. Explain to the on-site workers the light-changing procedure you'll be following and the warnings you'll be giving them.

3. Prior to making lighting changes, announce the change clearly.
4. Switch your video production lighting on (assumed).
5. Switch off the house/work lights.
6. At the end of the take, switch on the house lights.
7. At your leisure, switch off your production lights.
8. Say 'thank you'.

Personal Protection

Clothing

- Dress appropriately for an **industrial** environment. Wear low-heeled shoes, in good condition. Never wear thongs (_flip-flops_).
- For location work, take wet weather gear and any extra items you have decided on from your safety scan. Consider the exercise as you would a two-day bush hike.
- Head gear is essential—a hat for the sun, and a cap for cold nights and windy weather.

Skin Protection

- For protection from sun, wind, insects—the usual sprays, lotions.
- Apply sunscreens approximately 20 minutes before exposure and reapply regularly.

Gloves

- Not everyone can work wearing gloves, but the light garden type are great for handling and rewinding cables that are dirty or muddy.

Feed the crew! Crew member from _Uncle Tony's Kebabs_, an independent production directed by Marc Tewksbury.

Food

- Do have regular meal breaks and eat only nourishing food.
- Once energy is on the wane, concentration decreases—we become less alert—a perfect scenario for mistakes and accidents.

Liquids

- Fluid intake is important too. If you're on location and water has to be carried, take more than you think you'll need—and ice.
- Take a thermos of ice—even in winter. An ice pack is great relief for a bump or a bruise.

Not Your Scene

Be careful when helping out in craft areas where you are not familiar with the work practices. Helping with stage scenery might be one example, if you are not used to working in the staging area.

Hazards in Helping

- Special techniques are needed when handling scenery flats, rostrum tops and bases, etc. If you don't have these skills, ask for guidance/training before giving assistance. Mishandling can cause back injuries.

When carrying flats, one person's hands should be positioned in the mirror image of the other person's, so the stronger person doesn't overbalance the less strong one. Australian Film Televison and Radio School.

When two people are carrying flats or other heavy items, they should face each other and have their hand positions in a mirror image of each other. So if one person has their left hand at the top, and their right hand at the bottom, the other person should be the opposite—right hand at the top and left hand at the bottom. If not, the stronger person can overbalance the load and twist the weaker person, resulting in back damage.

Alistair Thornton, Props and Staging Department, AFTRS.

Sandbag

Ken Manning repairs a French brace. Note the placement of the sandbag. Australian Film Television and Radio School.

Counterweights

- Don't help yourself to items which may be doing a vital job for other crafts. Removing a sandbag from a French brace, which is holding up a flat, could collapse the whole set.
- If you're asked to 'chuck a sandbag on the brace' . . . the place to put it is in or outside the sharp angle at the bottom of the brace, as far from the flat as possible. This will counterweight the flat so it won't fall. If you put the sandbag closer to the flat, the counterweighting may not be strong enough.

- If you're asked to 'hammer a nail into . . .'—for whatever reason—think about the end result. Will it protrude (at eye level) and cause damage to personnel or equipment?
- And before you strike a blow, do check the striking face of the hammer. If the surface is dirty, it can mishit on the nail—but find your finger(s) an easier target.

Then, of course, there are staples and . . . So, take care when helping outside your current area of skills.

Health Hazards

There are some not-so-obvious health hazards—the sneaky ones which build up and eventually cause us personal stress.

Eye strain, lower back pain, RSI (repetitive strain injury), damage to our auditory sense—all due to poor understanding of personal risks.

All computer/screen work, whether typing or editing, when performed over long hours with incorrect lighting/seating and the concentrated use of a 'mouse' control can give us the trifecta of eye strain, back/neck pain and RSI to the wrist/forearm.

Lengthy sessions of loud music (concert conditions or home hi-fi) will decrease hearing sensitivity. Not good for anyone, especially sound recordists and editors.

Publications with specific guidance on *prevention* of these disorders are readily available.

The Broad Issues

Guidelines on health and safety matters that relate specifically to the film and television industry have been developed by the industry and unions. Information on these can be found by searching the website of the Media Entertainment and Arts Alliance (MEAA), <<www.alliance.org.au>>, for 'safety guidelines for the entertainment industry'. The guidelines have been developed and endorsed by the MEAA and the Australian Entertainment Industry Association (AEIA) in association with the Musicians' Union of Australia (MUA). Endorsement is also being sought from the relevant workers' compensation authorities.

While the guidelines may sound legalistic they are really helpful and clearly written, with advice on risk assessment, safety induction, key safety issues and incident and hazard reporting.

A Fact of Life

During production we'll always be working in conditions which require split concentration—one part on the demands of covering the action of producing (in tight time frames), the other on coping, in a safe manner, with the risk factors inherent with

variable and constantly changing location environments. The balance must always be in favour of our health and safety.

Dos and Don'ts

- **Do** read and adopt the valuable advice given by health and safety organisations on health hazard prevention.
- **Do** lift your state of safety awareness.
- **Don't** repeat your early 'accident' experiences.
- **Do** enjoy your craft!

20 Lighting

Light is the basic *material* from which you make video images. (I know this is an odd concept, because whether light has substance or not has intrigued physicists for centuries.) But it's the light landing in the camera that forms the video image. Without it, there's no picture.

As a video artist, the different qualities and colours of light are the choices on your palette. As a run-of-the-mill videographer, it's still light which is the *stuff* of your work.

Two Kinds of Light

When people speak of light, they refer to *incident* light and *reflected* light. Incident light is the light as it's travelling from the source. Reflected light is the light after it has hit a surface and bounced off it.

The video image is made from the pattern of reflected light which enters the camera's lens.

As a videographer, your job is to choose the right light sources (incident light) for the visual effect you want to achieve, and then carefully arrange their heights, positions, intensities, colours and reach so the resulting composite of reflected light produces the picture and mood you seek.

Every surface reflects light differently. Some surfaces are smooth and shiny. They reflect an even light, which may be bright or dark depending on the colour of the surface, the intensity of the incident light and the angle of reflection of the light into the camera lens.

Michelle Watson puts spun over light for Bryan Mason's production *Room*, Hamilton Secondary College, Mitchell Park, SA, Australia. (Photo by Bronwyn Gell)

For example, a polished black stone surface can reflect a very bright light from some angles, but appear as an even, dark black from other angles. Getting the angle right between your camera lens and a critical surface can make or break a shot.

Other surfaces are textured and reflect a variegated pattern of light interspersed with tiny shadows.

The angle of the incident light in relation to the surface texture is important. Frontal lighting reduces shadowing to almost nothing, whereas side lighting produces dramatic shadows. Knowing this allows you to emphasise or downplay the degree of apparent texturing of any surface in your picture.

> So here's the thing—if there's no light on the subject, how can the camera see it?
>
> **Francis Treacey**, Deakin University.

So you can choose to make the performer's face look smooth, by lighting from the front, or craggy, by lighting from the side.

Or you can highlight the folds of a background curtain by lighting the curtain from the side, or make the folds almost unnoticeable by lighting them from the front.

Curving surfaces reflect a gradation in intensity of light, with some parts bright and some areas falling away into shadow.

As a baby you had to learn to interpret the meaning of different types of reflected light—you learned to predict hard and soft, sharp and 'comfy', wet and dry, as well as near and far.

As a lighting person, you need to convey similar meanings of texture and depth to your audience, although, because you're working with a flat screen, you have only two dimensions with which to get across the *feel* of things.

When you set up the lighting for a shot or a scene, you should constantly draw on what you already know about reflected light. But don't stop there—continue to observe keenly and use what you discover.

That's how to lift your shots from mediocre to stunning.

> A good way to see how lighting affects the look of a production is to turn down the colour controls on your monitor for a few minutes. If the images you see then are solid black and white, chances are the lighting is quite harsh and contrasty. That's great if you want this effect, but generally when shooting video you aim to create a wide tonal variation to add depth and interest.
>
> **Rachel Masters**, Corporate Training Coordinator, SBS.

The Quality of Light

Of course, the word 'quality' can mean many things, but when applied to lighting two of the fundamental concepts are *hard light* and *soft light*.

Hard Light

Hard light is the light you get from direct sunlight and from unshielded light sources which are throwing their light in a straight line of sight to the subject being lit.

With a hard light, you can see the *source* of the light, and you can also see a somewhat distorted reflection, on the surface of the subject, of the light's filament or arc.

With the light placed behind a large diffusion screen . . .

. . . a wonderful soft light on the child is obtained.
(Photo courtesy of AFTRS)

Hard light is very directional. It sharply illuminates the side of the object it hits and causes deep shadows with clearly defined edges on the other side. So hard light is good for dramatic lighting. And it brings out textures well.

But used alone, it can look too harsh, and it can over-illuminate areas in the shot, producing *hot spots* (overly bright areas) or causing problems with the contrast ratio.

It can also cause the formation of unattractive shadows, like nose shadows, on your actors. When two or more hard lights are used, there can be many ugly shadows.

Soft Light

Soft light is a bit tricky to define. An indication that a light is soft is the *wrap-around effect,* which means that the incident light wraps around the subject in such a way that there are no shadows on the contours of the subject's surface.

Another sign of soft light is if the shadows cast behind the subject have soft edges to them.

Whether a light is soft or not depends on its size in relation to the subject. A large source, even if it's a hard light, will wrap around a small subject, and the wrap-around effect increases as the light is moved closer to the subject.

You can say that soft light is much more diffuse than hard light. It's the type of sunlight you get on a cloudy or hazy day, and the light you get from artificial light sources which are throwing their light in another direction and that is bouncing back into your shot (in other words, indirect light).

Soft light is 'pretty' light. It can be very delicate and give a mellow quality to the subject being lit. For this reason, it's often used in portraiture.

It's also less directional. It produces less deep shadows than hard light does, and the shadows have blurry, indistinct edges. Soft light tends to scatter and is harder to control.

Here light is directed at a sheet of lightweight white polystyrene and bounced from there onto Vicki's face. A soft, bounced, fill light can give a pretty image. Vicki Lucan, Australian Film Television and Radio School.

Soft light is good used as fill light to lighten up the dark shadow areas caused by hard lights.

Soft light is not good for bringing out textures. Nor is it the best for highlighting sharp contours or modelling the shape of an object or figure. Used on its own, it can result in a flat illumination.

Combining Lighting on a Set

When you're working out the lighting requirements for an entire scene (or studio set), you'll probably use a variety of lighting equipment and employ differences in hardness and softness of light, and whether it's bounced or not. You can also colourise some lights.

Just like a painter, you don't rely on only one type of stroke or size of brush to produce a memorable picture.

A strong soft source may be improvised by reflecting the sun off a mirror and through a frame with heavy diffusion on it. The frame can be simply made from 1-inch x 1-inch aluminium tube and removable corner pieces, so it comes apart and stows neatly in a bag.

Tony Mandl, Gaffer, AFTRS.

The arrangement of the set elements and the positions of some of the lights.

A gelled light shines on a background flat, to appear as a brick wall outside the building.

A light shining through a diffusion screen provides a soft light for the actor in front of the window frame.
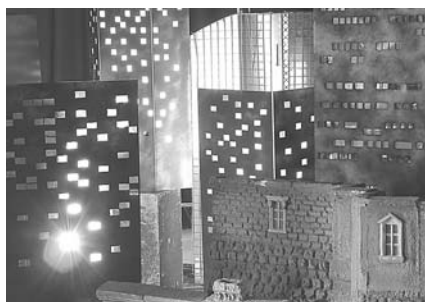
A miniature set made of cardboard has cutout windows, backlit, to give the impression of a city at night.

A model tests the effects of the lighting.

Helen Carter, Cinematographer, and Sharon Fulton, Designer, conduct lighting tests for a drama which is being planned. They're trying to work out what lights and what set elements will produce the desired effects within the scene. Australian Film Television and Radio School.

Contrast Ratio

The contrast ratio is the difference in brightness between the darkest part of the picture and the brightest part.

As a rule of thumb, the video image shouldn't have a contrast ratio greater than 30:1. This means that the reflected light from the brightest part of the picture shouldn't be more than 30 times as bright as the reflected light from the darkest part.

You can detect the various brightness levels across your set by using a light meter, if you like, and it's good practice to learn to use one.

But since video cameras have inbuilt light meters, video people often check lighting by looking at the image in a monitor connected to a camera viewing the scene. This shows you hot spots which you won't see with your eyes until you're very practised at lighting.

One trap people fall into with using a monitor is that, when they're using the monitor near bright studio lights, they boost the screen brightness so they can see the image better. But if the screen is cranked up too bright, the lighting person and the director can end up deciding to go with a scene which is actually underlit.

A monitor is only reliable if it's correctly adjusted. So put the monitor on colour bars and adjust the brightness and contrast so the bars are correct, then don't tweak those knobs again.

If you put the camera temporarily into auto iris and check the *f* stop reading, you'll usually get a good idea of whether the lighting is bright enough.

Video is less able to handle high contrast ratios than our eyes are, or, in fact, than film is. In a scene which is too contrasty, you'll have to choose an iris setting which suits the brightest parts, and leaves the darker areas of the picture looking impenetrably black, or an iris setting which suits the dark areas and makes the bright ones bleached out to white. Depending on your production, it may be that neither is an acceptable option.

So it's a good idea to steer clear of known troublemakers. White clothing is extremely reflective of light. Black and navy blue are very absorbent of light. Generally speaking, performers should be advised to not wear white, black or navy blue. Medium tones will work in much better with skin tones to give a good contrast ratio and a pleasing image.

(So now you know why the news readers wear 'TV blue'.)

Sometimes you just can't escape the situation. Your studio guest is wearing something white and it's just too reflective for the lighting you want to use. You can cut the intensity of light reaching that part of the picture, by shading it from the light with a piece of card, or a *cutter* or a *black flag,* a *net* or a *gel.* You can also use a *scrim* or *half scrim* in front of the light which is causing the reflection. (A scrim is a wire mesh mounted in a metal frame.) These methods should bring your contrast ratio into line. If not, maybe you can loan the performer a sweater!

If the problem is that there are areas in the picture which are too dark, try bouncing light into the shadows to lift their light level.

Lighting and Depth of Field

The darker the scene, the more open your camera iris will have to be to let in enough light to reproduce the image adequately.

The wider the iris opening (the lower the *f* stop number), the narrower the depth of field.

If you want to have a narrow depth of field, you can go ahead and shoot with lower lighting. But if you need clear focus across a broad depth of field, you need to make sure that the scene is brightly lit.

Where this consideration usually comes into play is in videotaping concerts and stage performances. Stage lighting is often dimmer, overall, than TV lighting, and it's almost always much more contrasty. The contrast is the harder aspect to adjust for.

If you're trying to videotape someone else's performance, you have three possible paths. The first is to convince the person in charge of the performance lighting to use brighter lights on the night you tape. (But you're not likely to find agreement on this.)

Another choice is to convince the show to do a command performance for you, with brighter lights. The risk with this is that the lack of an audience could cause the performance level to drop.

If you move in close to the performance, you can stay on wide angle and keep a good depth of field.

The most likely situation is that you'll end up taping the performance with the low light situation. Now, remembering that when you're zoomed in all the way, you also decrease the depth of field, make sure that you get your camera as close to the stage as possible. This way you can work on wide angle lens to maximise your depth of field. Otherwise, you could find that the slightest swaying back and forth of the singer will cause him/her to go in and out of focus. Your image quality will be disastrous.

(If this section is confusing to you, you may want to re-read the Depth of Field explanation in Chapter 2 Image Control.)

Using Location Lighting

There are different opinions on location lighting. Some people prefer to use the natural lighting that exists at a location, as much as possible, and to assist it with bounced sunlight and the occasional portable light, appropriately gelled.

Other lighting people always use artificial light to ensure exactly the quality and control they seek for their image.

The key thing is to be able to work *with* your light sources, rather than have out-of-control elements compromise or ruin your images.

Windows

Windows are a blessing and a bane. They can let in enough light for you to operate entirely with sunlight and bounce cards, but they can be very hard to work around.

**Sue
L'Estrange**,
Videographer.

Shoot with the light behind you.

Make sure that you notice the number, size and location of windows when you do your site check, and find out which way they face. Will it be a morning shoot with the rising sun flooding in? Or do these windows face west? Will the light be blocked by a clump of trees? Does the building next door shade the room from direct light?

If you want to use natural light, you have to be able to arrange the set so you can either have the window light at your back, with your performer close enough to the window to be shone upon, or the window at your side and the performer side-on to the window as well. A large white card or piece of polystyrene held at the correct angle on the non-window side of the performer can bounce back a soft fill light to take care of the shadowy side.

Tony Mandl,
Gaffer, AFTRS.

Sometimes you do want to use the view out of a window, to add to the sense of place in your image. Windows *can* be included in the frame if their brightness can be controlled. (A good level is $1-1\frac{1}{2}$ *f* stops over your exposure.)

In modern office buildings, there may already be ND built into the windows, or they may have a heavily tinted film on them. Look around—there may be venetian blinds, or vertical blinds, which can be adjusted to allow the outside to be seen, but not blow out. A piece of neutral density gel may be taped to the glass, and reduce the outside brightness by as much as four stops.

Also, the size of the shot, and the amount of the window shown, can be adjusted. This way, the viewer can still see some of the outside, and you can keep the edges of the gel out of shot. The part of the window which is not in shot can still act as a source of light.

Do this.

Do this.

Or do this.

But not this!

Never try to shoot directly into a window. The auto iris will respond to the brightness and close way down, giving you a good picture of the outdoors and a silhouette of your performer. If you switch to manual iris and open it up so the performer looks okay, the background will be all bleached out.

Bright Sky

One of the most common problems with outdoor lighting happens when you try to get a shot of a person with sky behind their head. If you're facing the sunny side of the sky, or if it's a bright hazy day, the auto iris will respond to the brightness of the background sky and close down, leaving your subject as a semi-silhouette.

If the background is very bright, your subject may become semi-silhouetted.

The first thing to try is simply turning the shot around, so the sunniest part of the sky is at the back of the camera.

If the person still looks too dark, put the camera on manual iris, zoom in so the presenter's face fills the screen and set the iris to give the right result for the face. Then leave the iris setting there, and zoom out. Your picture may now be acceptable. The sky will be lighter, but if it doesn't look too bleached out, you can probably go with it.

If the background is now too glary, change the shot so the background is trees, shrubbery or anything else medium toned or darker.

Here's the shot with sunlight *behind* the camera. Lucien Cooper and Hayden Barltrop, best mates.

Bough Shelters

Another tricky lighting situation arises with many Indigenous communities. The bough shelter is a shaded space made using poles as uprights, with a roof of tree boughs, where community meetings take place. Outside it may be very bright and hot, but it's cooler and darker in the bough shelter.

The shelter often has no walls—it's open on all four sides. This is handy for getting different angled shots of the group, and certainly helps the people in the meeting get a bit of air, but the problem for the person videotaping the meeting is that the surrounding ground is often extremely reflective of sunlight, whether it's red sandy desert or burnt yellow grass.

So whenever the camera operator goes for a wide shot, the very bright ground on the far side of the shelter affects the auto iris and makes it close down, and all detail of the people inside is lost.

One way to avoid this is to stay in on mid-shots and close-ups as much as possible, so the people's faces fill the screen and the outside ground isn't in shot.

Still, it's often desirable to use wider shots to show who's seated near whom (which can be important to the story).

The bough shelter is a hard location to cover.

Small Rooms and Crowded Spaces

When a room is very small—and often when you go to interview people in their offices you strike cramped space—there's no room for a three-point lighting set-up. However, you can raise the illumination level enough to get a viewable shot by setting up one light and bouncing it off the white ceiling or off the white or cream coloured walls.

Sometimes on-site shooting has too much stuff in the way for doing much of a lighting set-up. Here, too, bounced light can save the shoot.

But bounced lighting is hard to control, so it should be a last resort. A bounce off the ceiling can be very *toppy*, leaving people with shiny heads and dark sockets where their eyes presumably are.

Another factor to watch with bounced lighting is *colour bounce*. Whatever colour the wall is, that colour will bounce onto the surface of your subject . . . Is that person really pink or green or blue?

So first see how you go with using different options, like a single redhead, with spun (a soft white fibreglass material) on it, from one corner of the room.

On location in Canberra Pharmacy for the production of *Asthma Care*, produced and directed by Owen Murray, University of Western Sydney—Macarthur, Bankstown, NSW, Australia. (Photo by Owen Murray)

Beaches, Snow and Water

Other tricky locations are beaches, snowfields and waterways. Sand, snow and water are all extremely reflective and can cause silhouetting of your presenter/actor.

A neutral density filter is essential to cut down the intensity of the light. Cloudy or hazy days can be better to shoot on, as they reduce the harshness of the direct and reflected sunlight.

Picking the best time of day is helpful, too—try to keep an angled sun to the back of the camera operator. When it's midday, chill out in a cafe.

Bouncing Light into Shaded Areas

When faced by conditions of harsh light, it can be best to put your performer in the shade. You'll get better colour representation and you can use a flexifill or a big bounce card to reflect the sunlight in at them, if necessary.

Be sure you re-white balance for the new lighting conditions, though. Shade has a different colour temperature to sunlight.

Aluminium foil provides the strongest reflection. If you use a bounce card covered with crumpled foil, it will diffuse the reflection somewhat. Silver foil gives a colder reflection, gold foil gives a warmer, mellower reflection. White polystyrene gives a soft reflection, as does white cloth. You can even use a white wall if it's nearby.

Both Rosco and Lee sell a foil fabric scrim with holes in it, which is the most useful soft reflector you can get.

You can attach it to a board and use it to bounce light, and you'll get a brighter bounce without the hot spots reflected back on your subject which you almost always get with polystyrene. You can use it in place of ND gel on a window, and you won't get the additional reflection the gel would give you. Because it's a fabric, you can simply lay it on a desk surface, or wherever you need it. You can roll it up to carry it around with you. Its one drawback is that it's fragile.

Hat Shade and Brow Shadows

For interviews in sunny places, bounce cards held at the presenter's lap level can do a good job of lifting the light level under a broad-rimmed hat and lessening shadows in deep-set eyes.

Adjusting for Mixed Colour Temperatures

If you use a mixture of sunlight and incandescent lights (portable lights), you'll have to address the problem of mixed colour temperatures.

Say you're doing an interview and you've seated your subject next to a window. But the room is so dark that you've decided to lift the base illumination level by using a couple of portable lights.

The sunlight striking one side of her face has a bluish tinge and the incandescent lights inside the room, and affecting the other side of her face, have a reddish tinge. If you white balance for sunlight, one side of her face will look ruddy and her clothing colour on that side may be reddish, too. If you white balance to the portable lights, her indoor side will look fine, but the side towards the window will have a strangely alien blueness to it. Ugh!

There are five strategies to consider

1. Use a full or half daylight blue *gel*, which is a special transparent coloured sheet which won't melt from the heat of a light. Attach the blue gel to the front of your portable lights, with wooden clothes pegs, and white balance the camera to the portable lights. Now the colour contrast between outdoors and indoors won't be too great.
2. Put an amber gel across the window and white balance to the reddish portable lights. Again, both sides will match. But this can be harder because you need the amber gel to be smoothly attached to the window, not torn or wrinkly, so it won't give itself away.
3. Try using a large bounce card so the inside fill light will actually be reflected window light, and therefore will automatically be of matching colour temperature to the sunlight.
4. Close the drapes.
5. Move the shot.

Direction of Light

Simply moving a light to a new position alters the effect of the light. When you have the time, have fun and experiment!

Frontal Lighting

Light aimed from the camera's viewpoint reduces modelling of figures and minimises their surface textures.

For some faces, indirect frontal lighting is 'pretty' lighting—it smooths out face wrinkles and minimises other skin bumps and variations.

Edge Lighting or Rim Lighting

Lighting from the side emphasises texture and modelling. It's good for bringing out interesting surfaces, dramatising facial features and highlighting objects in relief.

Under lighting is great for horror shows.

Under Lighting

This gives a wonderful, scary image, good for grotesques. Because it inverts the usual facial modelling and shadowing, it's a device used for mystery stories.

One thing to be careful about—hand gestures may sometimes throw shadows onto the face.

Overhead Lighting

This can leave the eyes looking like deep black cavities. It's not a flattering lighting, but it can emphasise some moods—possibly isolation or desolation. It certainly works well for interrogation scenes.

More often than not, though, it's a mistake, which happens from not paying attention to the placement of location lighting. If you seat someone under a ceiling light because that's where the room is brightest, you'll get back to the edit room to discover that your image is dull, disappointing and filled with people with cavernous eyes.

Overhead lighting can be very *toppy*, and produce cavernous eye shadows.

However, a large softlight is sometimes shone from overhead through diffusion material to raise the general light level in a studio set. It can send an overall wash of light into the set, letting individual key lights isolate and accent the actors and important set elements.

Back Lighting

Lighting from behind can outline a figure or object with light. It can be beautiful used on its own.

But usually a back light is part of a total lighting set-up, adding its halo effect to separate the figure from the background.

Back light is terrific for illuminating smoke, which tends to disappear with front lighting. You need to have a dark background and the back light set just right, then the smoke will 'materialise' in your video image.

For those for whom the screen dimension is not a smoke-free zone, cigarettes, pipes, 'steaming' mugs of coffee, genies, even guns, can waft and coil their varied spirits for posterity onto magnetic tape.

Silhouette Lighting

This is achieved by lighting the background but letting no light fall on the camera side of the subject. The subject's outline is apparent, but little or no surface detail can be seen.

The background can either be lit from the front, or, if it's a translucent screen, it can be lit from behind.

Before you record this image, make sure there are no hot spots on the rear wall.

Indirect 'Firelight'

You can simulate the flicker of a campfire. To do this, place a shallow tray of water in front of your actor and direct a light downward onto it. You may decide to put a red gel on the light, too. Then you have an assistant, who remains out of shot, agitate the water. The light bounces erratically off the wavelets and produces an effect like firelight on the actor's face.

Rippled chrome plastic sheeting (you can get wrapping paper like this) wrapped around a board will give you a similar effect. And it will allow you more flexibility because you can tip it and angle it as needed. With the water tray you're limited to a horizontal and immobile reflecting body, so you have to get your actors right over close to it.

With ingenuity, you can get some wonderful effects.

Another old firelight effect is achieved by hanging strips of coloured gels from a stick and waving them in front of the light source.

Coloured Lighting

Lights can be given different colours by attaching gels in front of them. A gel is made of a heat-resistant material which won't melt or burn when attached to very hot lights. It's not just coloured plastic from the newsagent, and needs to be purchased from a supplier.

Gels are expensive, and are usually bought by the roll and then cut off into the sizes needed for each shoot. They're slippery and uncooperative when you try to carry them about, but if they're rolled up, secured with elastic bands and stored carefully at the end of the shoot, gels can be reused many times. It's worth taking care of them and not just crumpling them into the light kit.

Gels can be clamped into metal frames which can either be attached directly to the light fixture or held separately in front of it on a *C-stand*. Alternatively, gels can be pegged to the *barn doors*—those four black metal flaps mounted on the outer front rim of the light fixture—using wooden clothes pegs (not plastic ones, which will melt).

> Gels last longer if you don't *spot* the light onto them. And keeping the gel further away from the light helps, too, even if it means you need a larger piece.
>
> **Tony Mandl**, Gaffer, AFTRS.

Gels come in any colour. (It's fun to look through the manufacturer's sample book!) The most frequently used colours are blue and red.

There are special blues which are calibrated to raise the colour temperature of incandescent lights to that of sunlight. You can get them in *half daylight*, *quarter daylight* and *full daylight*. They're useful if you need to match a portable light to sunlight on a location shoot.

The darker blues cut down the intensity of the light quite dramatically, so if you want lots of blue light, you'll need heaps of lights. They can give a coolness to the image, and can be used to indicate night time.

> **Tony Mandl**, Gaffer, AFTRS.
>
> There are no set answers in lighting. It very much depends on the situation you're in. How effectively you light depends on knowing what you can do with the equipment you've got, and relating that to the action you're lighting and the style of the program you're working on.

The reds are popular when people are taping musicians. They can give a feeling of nightclub lighting or theatre lighting.

Yellows can be tricky. They can make people look rather sallow. But a peach coloured gel, on the other hand, can make people look healthier than they are.

Coloured accent lights, in an otherwise normal looking image, have become quite popular. And then there are those images which look red all over.

Spot Light and Flood Light

Some lights have movable globes. By turning or sliding a knob you can vary the type of light between *spot light* and *flood light*. The knobs are labelled with arrows showing which way is spot and which is flood.

Spot Light

When the globe is in the spot position, it's held well back inside the light fixture's curved metallic reflector. This causes the beam of light to be controlled by the reflector. It produces a limited and intense, direct beam of hard light.

If you watch someone walk across this beam, you'll see that the intensity of it varies. It's bright in the middle, and much less bright at the sides.

Flood Light

When the globe is in the flood position, it's thrust forward towards the open front of the light fixture's reflector. This allows less control of the light beam, which spills out the sides.

The result is a less intense, broader spread of direct light. It's a somewhat softer light, too.

The intensity of the light beam is more even across its spread, just dropping off a bit at the edges.

Fresnel Lights

Fresnel lights have a glass lens with raised circular ridges of glass on its outer surface. This lens is mounted on the front of the light fixture and can be swung aside like a door when you need to change the globe.

On a fresnel lamp, when you move between spot and flood, the whole inside of the lamp—both globe and reflector—moves forward and backward. The focusing of the beam is done by the glass lens, rather than by the relationship between the globe and the reflector.

The ridged lens at the front of the fresnel controls the throw of the light, whether spot or flood.

Basic 'Three Point Lighting'

Some people feel that all you need is **enough** light. So they turn several lamps in the direction of the set and blast the whole area with light. They do have enough.

But the problem is the effect is flat. There's no modelling or highlighting. Nothing in particular draws the eye of the viewer. There's no sparkle to the scene. What's more, every segment, every show, will look boringly similar. Understanding a few basic concepts in lighting can give you the tools to begin to control the look you achieve. And vary the mood from piece to piece.

Here are the fundamental lighting positions for lighting one person. You don't have to stick with this slavishly, but it's a good theoretical starting point.
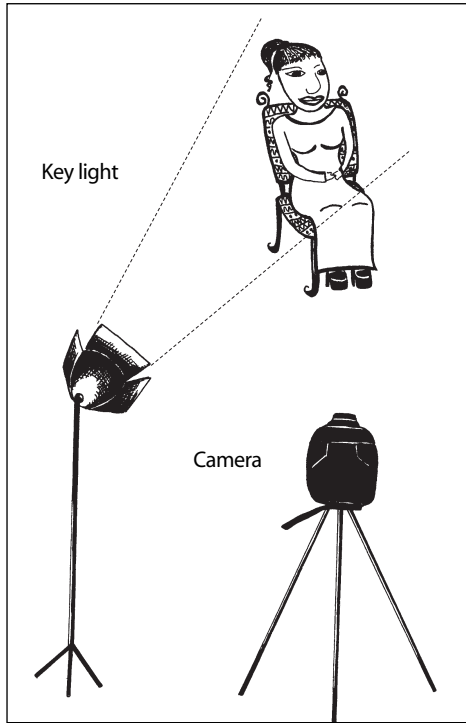
The *key light* provides the main light on the subject.

Key Light

The *key light* provides the main illumination of the subject. It's often a hard light which helps to model the contours of the figure.

The key light is placed to one side of the camera. It's up to you which side you choose. It shouldn't be too close to the camera because then it would be shining into the eyes of the performer and cause discomfort (bad for them) and squinting (bad for the video image).

Once you turn the key light on, you'll see that one side of the person's face is well lit, but the other side now is shaded.

The further to the side of the performer's face that you set the key light, the more dramatic the lighting and the more texture you'll reveal on the face. Position the light according to the effect you want, considering the mood of your program.
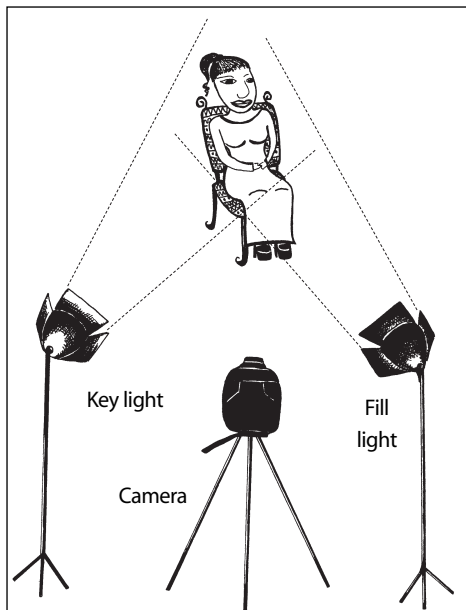
The *fill light* fills in the shadowy side of the subject, and is positioned on the other side of the camera.

Fill Light

You position the *fill light* on the opposite side of the camera to the key light.

The purpose of the fill light is to illuminate the other side of the performer's face, lifting the shadow that is caused by the key light. The fill light is often a softer light, and of a lower intensity than the key light.

You can achieve this by placing it further away from the subject, setting it to the *flood* position and/or putting some spun in front of it. You can also use an indirect light or soft light for the fill.

Back Light

The *back light* is placed to the rear and side of the performer, often opposite the throw of the key light.

The job of the back light is to separate the image of the person from the background.

The back light is a strong, hard, direct light which is limited in its spread by the use of the barn doors. The back light should light just the top and side of the head and the top of the shoulders. Light shouldn't spill onto the chest or knees of the person.

The intensity of the back light varies with the hair colour of the subject. Blonde hair is very reflective, so it needs a less intense back light. With fluffy, curly hair, the back light can be very glamorising indeed.
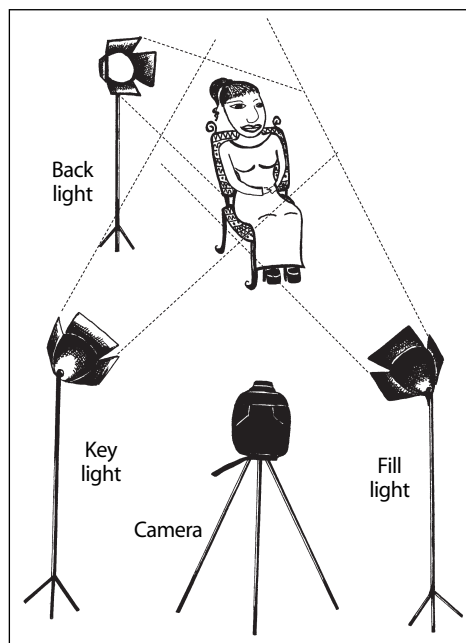
The *back light* puts a glamorous halo of light on the hair and shoulders of the subject, and separates the subject from the background.

Background Light

The key, fill and back lights illuminate and model the subject with light, but you may also want that person to be situated in a visible background. For this purpose you use a *background light*, or lights.

If all you want is for the background to be seen, it's sufficient to use one broad soft light placed so its throw of light misses the performer but does illuminate the curtain, flat or wall behind.

If your subject isn't in front of a wall-like backdrop, you can use two or more lights to highlight specific items at different distances away from the camera, giving your shot a sense of depth extending backward.
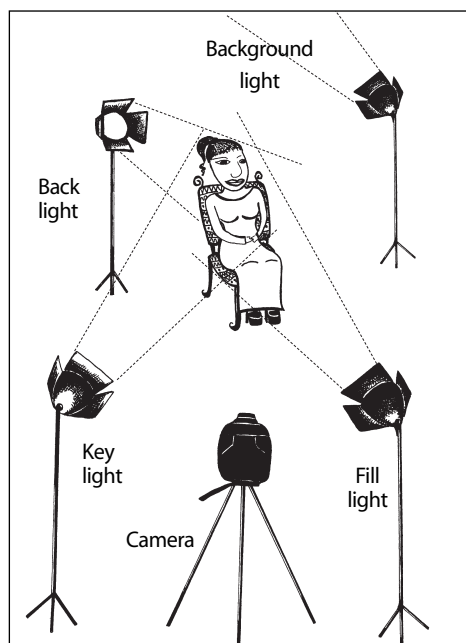
The *background light* illuminates the wall or curtains behind the performer.

Lighting a Group of People

If you have two or more people in your shot, you can give each person a key, fill and back light.

But too many lights flooding into a small area can cancel out each other's modelling effects.

Barn doors become very useful for restricting each light to striking only the person for whom it's intended. You can ensure that your light paths are distinct by lighting one person at a time and turning the house lights off to check that that person's light is going nowhere except on that one person. Light shouldn't be allowed to spill onto the floor either, because light-coloured floors will bounce plenty of light, muddling the effect you're striving for.

Of course, many people have limited access to lights, and many studios have just a few. So you may have to arrange people in groups and then light each cluster. For example, with five subjects you might have to use one key, fill and back light for one group of three, and another three point set-up for the remaining group of two.

This lighting won't win you prizes, but sometimes the bottom line is making everyone visible.

Or . . . with careful placement, and the use of a half scrim to vary the intensity of the light, you can have one light perform more than one function. For example, it can be the back light for one person and the key light for another.
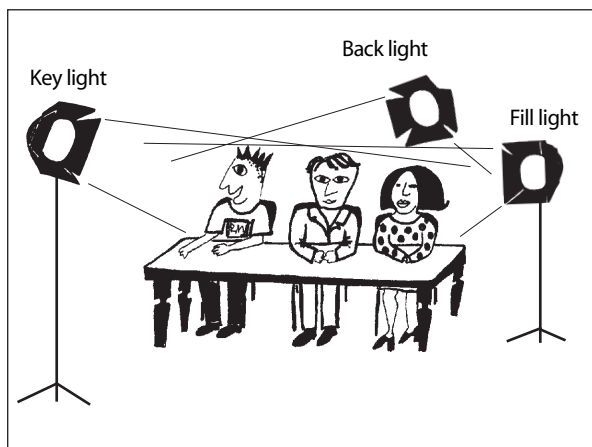
When you're short on lights, you can use three point lighting on small groups, rather than individuals.
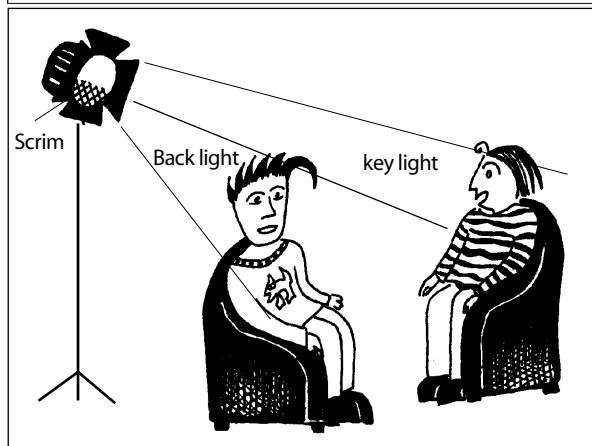
You can use a half scrim to send a strong light to one person and a less intense light to the other.

Suggestions from Rachel Masters

1. Take an object or a person and light the image in different ways: key light, fill light, high angle, low angle, from under the chin . . . How does the lighting affect the way you regard the image? How does lighting affect the mood the audience feels? How many different moods can you create using just one light?

2. Keep a written log of places you visit: an indoor swimming pool, your parents' house, the football field. Observe the light carefully. How does the colour of the light change throughout the day? Does the quality of the light indicate the time of day? Does the light reveal textures of surfaces? Look at the shadows the light creates: Are they long? Soft? Hard? Rippled? Do the shadows affect the scene?

3. What impressions does the light leave with you? How does it make you feel? Use the observations from your log to recreate similar moods and feelings in your video productions.

Suggested Resources

Lighting the Office Interview
Lighting Dances with Wolves, and *Lighting Dead Poets Society,* both from the Kodack Cinematography Master Class Series.
(These three tapes are AFTRS training tapes, and are available for purchase from AFTRS Direct Sales: Tel +61 2 9805 6423, fax +61 2 9887 1030. Email direct.sales@aftrs.edu.au)

Motion Picture and Video Lighting, Blain Brown, Focal Press, revised edition.

21 Using Lighting Equipment

There's a huge range of lighting equipment. Unfortunately, most of it is very expensive. *So* expensive that small production companies can find it more economical to rent lights for their shoots, rather than invest in buying them.

So it's no surprise that training courses usually have access to a very limited number of lights, sometimes only a kit of redheads.

Never mind. More isn't always better. With lights (as with other things in life), it's how you use what you've got that counts. Great productions are made by people who are using just the sun and some bounce cards.

Still, whatever lights you *can* get your hands on, you need to use them safely.

Safety with Lights

Lights are the one item in video which can kill you. They carry high levels of electrical current and become life threatening if used improperly or if they're faulty. Safe practice with lights is essential. People should not use lights without knowing how to use them safely.

RCDs

RCDs (residual current devices)—also called life saver power boards—prevent accidental injury or death from electrocution. They do this by detecting when electricity is altering its normal pathway and going to earth; for example, when it's taking a path through you. Then they instantly switch off the power flow.

In 1993 an Australian university student was nearly killed on a location shoot due to a faulty light. Now that university requires that all portable lights be used only with RCDs. Many of the lights have had their regular plugs replaced with special RCD plugs.

Other lights are loaned out with separate RCD power boards in their kit.

At the beginning of each shoot, before relying on the RCD, you should give it a quick test to make sure that it's working right and will turn off in the event of trouble.

Students should pass a lighting proficiency test, which includes how to test and use RCDs, before they're allowed to borrow lights from the media equipment store.

Calculating the Electrical Load

Portable lights use high powered lamps. *Redheads* typically have 800 watt bulbs, *blondies* usually have 2000 watt bulbs, other lights may require much more power. The *six-light*, though each bulb takes only 650 watts, runs in paired circuits which total 1300 watts, and when all three pairs are connected, that lighting unit draws 3900 watts!

In Australia, normal household power circuits carry either 15 amps (older installations) or 16 amps (newer installations).

There's a simple mathematical formula to calculate how many lights you can plug into a circuit without blowing the fuse.

Amps (amount of current) × **Volts** (force driving the current) = **Watts** (power)

or: Amps × Volts = Watts

so: A 15 amp circuit × 240 volts (household current in Australia) = 3600 watts

or: A 15 Amp circuit × 120 volts (household current in the USA) = 1800 watts

The circuit will carry 3600 watts (USA: 1800 watts), but each circuit is likely to have more than one power point connected to it.

Therefore, when each redhead carries an 800 watt bulb, you can plug three redhead lights into one circuit (in the USA, only two lights)—but only if **nothing** else is running off that circuit. Have an electrical extension cord with you to run to another circuit for powering additional lights.

Since you can't always be sure if anything else is running off the entire circuit, it's a good idea to plug in fewer, rather than more, lights per circuit.

The number of circuits available is the same as the number of fuses marked *power* in the fuse-box of the house.

Some household devices draw large amounts of electricity. For example, little electric space heaters really chew through the power. If you want to run a space heater on the same circuit with lights, be very careful not to overload the circuit capacity. On second thought, why not warm up by sitting under the lights?

Test button
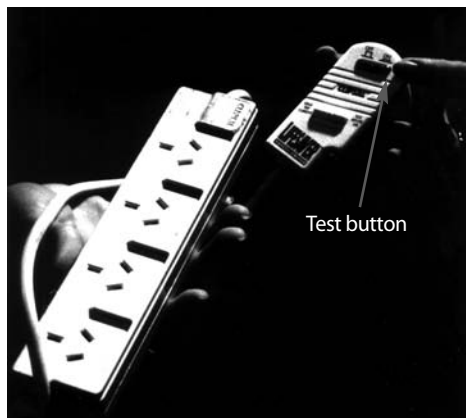
Always use an RCD when you plug in lights, and be sure to test it before you turn the lights on.

It's important to use RCDs, but it *is* possible to electrocute yourself, despite using one. So *always* unplug lights before changing bulbs.

Tony Mandl, Gaffer, AFTRS.

A general rule of thumb: 1 Kw = 4$\frac{1}{2}$ Amps.

Ian Bosman, Gaffer, AFTRS.

Plugging In

Most homes built in the last 20 years have at least four electrical circuits, two for power, which service the electrical outlets that you can plug things into, and two for lights, which run the fixed lights in the ceilings.

Some fuse-boxes have a circuit map which tells you which power points go with which circuit, but if this isn't available, you can work out which goes to which by using this simple method:

On

Main switch   Power 15 amps   Power 15 amps   Lights 10 amps   Lights 10 amps
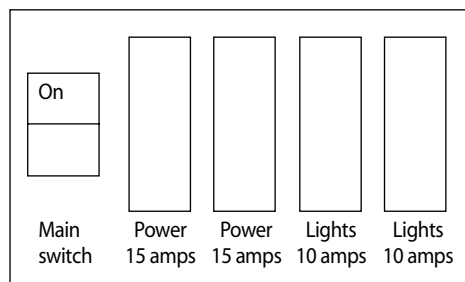
1. Go to the fuse-box and turn off the main switch. But **before you do this, ask for permission**. Turning off the main power supply can wreak havoc with anything that's got an electronic timer in it, like the VCR, the clock radio or the computer, unless they have back-up batteries for power outages.
2. Remove a fuse from a position labelled *power*.
3. Turn the main power switch back on.
4. Take a small desk lamp and plug it into each power point in the area where you'll be working.
   (a) If the light turns on, label the power point 'A' (using a marker and masking tape).
   (b) If the light doesn't turn on, label the power point 'B'.
5. Once you've done all the power points in the relevant area, return to the fuse-box and turn the main power switch off again.
6. Replace the fuse you removed.
7. Turn the main power switch back on again.

Congratulations! You now know which power point goes to each of the two power circuits, so you should be able to plug your lights in sensibly, not blow any fuses, and begin your shoot with at least one thing going right.

If you do blow a fuse, re-check your plug-in arrangement to see if you've mistakenly overloaded it, and look for any hidden electrical load running on that circuit. Refrigerator? Freezer? Sometimes you can get permission to unplug things, sometimes you can't. Try to adjust the load and your lights so the circuit will work.

Then rewire the fuse with the correct strength fuse wire. If it blows a second time, assume there's an electrical fault somewhere. It could be your lights or it could be the house wiring. Call off the shoot until a certified electrician can check the lights and the location and fix the problem.

Replacing the Globes

1. Always **turn off** and **unplug** a light before you attempt to change the globe!
2. Tota light globes are cylindrical glass envelopes which are held tight in the lamp housing between two ceramic end pieces in a spring-loaded system. In order to remove the spent globe, pry one of the ceramic ends aside and gently lift the globe out. Never just grasp the light and yank, as it will shatter in your hand. Often the springs are very tight and it takes some effort to get the ceramic end to move.
3. Never touch the glass of the new globe with your fingers. Everyone has traces of skin oil on their fingers. If this oil is transferred to a light globe, it can cause the globe

to superheat in those spots and it could explode. It is okay to touch the ceramic ends of the globe.

4. Leave the paper wrapper around the new globe so you can get a good grip on the globe. Then pry aside the end ceramic piece in the light fixture again, put one end of the globe into the other end of the lamp socket, align the globe so it will be in the right place to be connected to the end you've opened, and ease the ceramic end back so it grasps the globe securely. You can give the globe a little wiggle to make sure it's correctly positioned. Then pull off the paper wrapper and the light is ready to be used.
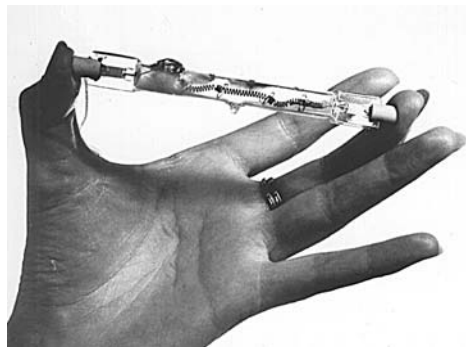
It's okay to touch the ceramic ends, but not the glass.
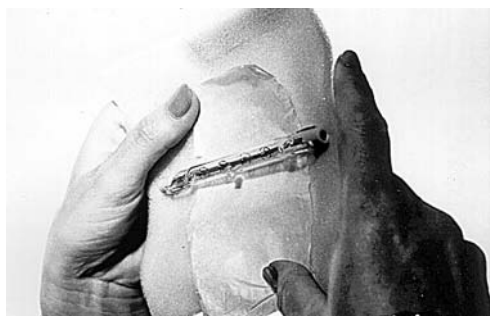
The globe comes wrapped in foam and paper
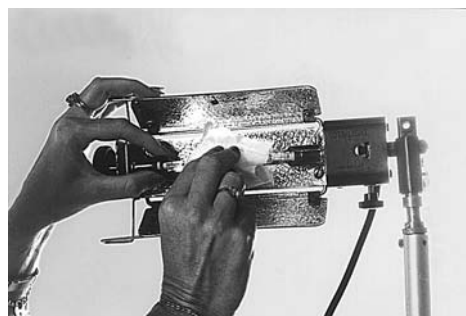
Handle the globe with the tissue paper still wrapped around it.

Follow a similar procedure with all other types of video light globes.

Danger from Water and Other Liquids

Water and electricity don't safely mix. **Never** run light cables through wet areas or puddles. Don't have any watery effects happening near them. Don't set coffee cups and drink containers on the ground near power boards, where they might get knocked over and spilled.

And watch that you don't set up a light beneath an emergency sprinkler system in a ceiling. The heat rising from the very hot light can cause the sprinkler system to go off.

Danger from Heat

Lights are also dangerous because of the very high heat they generate. People adjusting barn doors on lights which are lit should wear gloves, or use some cloth, to protect their hands from being burnt.

Lights put too close to other items on the set can bubble paintwork, singe woodwork, melt polystyrene, crack glass and set fire to papers and drapes.

Fluorescent technology's gone through the roof in the last few years. The new fluoros run cooler, the energy's in the light, not in the radiant heat.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Danger from Falling

Lights are also heavy. If someone trips over them and they fall, a series of results can occur, from people being hurt and set items being damaged, to fires starting.

Types of Portable Lights

REDHEADS

These are commonly used portable lights. They come in kits of three lights with stands. They use 800 watt globes which are mounted in a curved reflector. They have attachable barn doors and hooks for securing scrims. Their globes are movable between spot and flood positions.

BLONDIES

These are much bigger than redheads and come two to a kit. They use 2000 watt globes mounted in large hemispherical reflectors. They also have barn doors and their globes can be set anywhere between the spot and flood positions.

Redhead   Tota light   Blondie
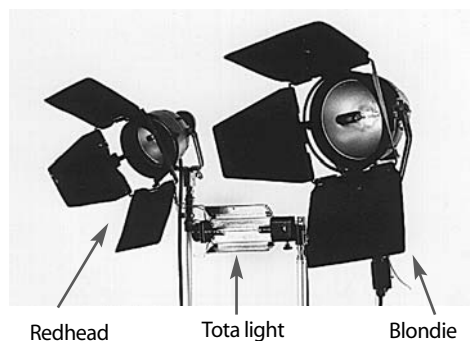
TOTA LIGHTS

These are very lightweight portable lights that come in kits of three or four. They take globes of a variety of wattages (300–800 W) and are good for raising the general light level. Their globes are fixed in one position, so you can't spot or flood them, and they have minuscule barn doors. They work well as soft lights when used with their reflector umbrellas. They're easier to carry than most other portable lights.

HMIs

These are arc lamps which give out an enormous amount of light for their size. Large ones (4 to 12 Kw) can be used to illuminate broad areas. The light they give off is the colour temperature of sunlight, so they're used for providing 'sun' for a shot or augmenting the available sunlight.

Small units are often used by news teams. Larger units are usually rented and come with a gaffer and a lighting truck.

OTHER SMALL LIGHTS

Other small lights include:

- Mole-Richardson Tweenies (650 W).
- Dido lights (100 W).
- Inkies.

Sometimes all you need is to lift the local lighting just a little. Sometimes you need to additionally highlight a small part of the set. Other times your set itself is very small, or your framing is very tight.

These tiny lights are intense in their effect but lighweight. What could be better? It's definitely worth having a few little accent lights in addition to the backbreaking main light kits.

Lifting Heavy Light Kits

Another safety factor with lights is their weight. A kit with three redheads or two blondies in it is very heavy.

You could easily do your back in if you're not careful when you're lifting light kits.

Working with a Partner

The big kits come with three handles: one at the front and one at the back, with a third one on the top. The extra handles mean that the kit is very heavy and can be more easily (and sensibly) carried by two people.

There's no need to feel that sharing the load is an assault on your physical prowess— whether you're male or female. The alternative could be that you pull a back muscle and are immobilised for the rest of the shoot. Which is worse?

Solo Lifting

If you're lifting a kit by yourself, never bend over and pick it up by straightening up your back. That's how the damage is likely to be done. It puts far too much strain on the muscles of your lower back.

The way to lift the kit is to:

1. Stand beside it, with your side to the kit.
2. Bend your knees till you're low enough to grasp the handle.
3. Lift the kit by straightening your legs—that way the lifting is done by your leg muscles.
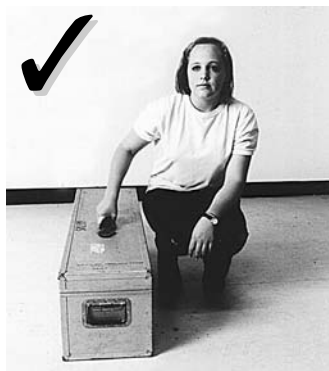
Sally Don, Roseville College, during work experience at Australian Film Television and Radio School.

Never this way!   Do this.

Once you've lifted the kit, the walking isn't too bad, as long as you're not going far. If you are, try to use an equipment trolley.

In and Out of Cars

If you lift the kit up and put it on the outer ledge of your car boot, then you and another person can gently manoeuvre it down into the boot. That works pretty well.

The trick comes when you have to get the kit back out of there. Don't do it alone! If you're leaning way forward and then trying to lift, you're putting your back at great risk. Retrieving a light kit from a boot is never an easy job, but two people can manage this job better than one.

The best way to transport light kits is in a truck or station wagon, so you can lift the kit up to the tailgate and then just slide it forward. Unloading isn't a problem—just slide it to the edge again, get a good grip and lift it down to the pavement or the waiting equipment trolley.

Setting Up Portable Lights

Portable lightstands are similar to tripods—in fact their base legs open out to form a tripod.

Like a tripod, they're stored and transported in a collapsed form, and then are opened up when it's time to use them.

How do you open them up? Just like a tripod. Wherever you find a release mechanism, that's where the pole opens up, so the stand becomes taller and taller and taller.

Unlike the tripod you don't have to adjust the length of each leg separately.

Tighten as You Extend

For each length of the telescoping pole that you pull out, retighten its knob firmly. Though the pole may stand up fine on its own with just a slight tightening, once you add the heavy light head one of its sections can lose its grip and collapse down into the lower tube. It's not the sudden loud noise that's the problem so much as the fact that the impact can cause the globe to break.

Of course, you'd have remembered to bring an extra globe along, but they're costly, and the light might crash down in mid-shoot. Not great for continuity or the tranquillity of the performers.

Watch the Spread of the Legs

The legs on the lightstand have a surprising opening action. When you pull them out, they go wider and wider, and then, as you continue to pull them, their bottom ends move inward towards the pole again. So midway open is the widest and most stable position to use them in. If you open them all the way, the base of the stand will have become too narrow for you to put a heavy light way up there and have much (justifiable) confidence in the system.

Be sure to tighten the knob at the bottom of the stand between the legs. That will prevent the stand from slowly collapsing.

Securing the Light Head

At the base of the light head is a hollow tubular section which slips over the top of the lightstand pole. There's a wing nut at the side of this section of the light head, and you screw it in until the pressure against the lightstand pole is sufficient to hold the light head securely.

There's only one trick to it. If you don't **un**screw the wing nut far enough out to start with, the light head's progress down onto the pole will be obstructed by the tip of the bolt which is meant to squeeze it in place. So the light head will be just resting precariously on the top of the pole, and when you then twist the wing nut to tighten down the bolt it won't really be tightening anything.

The light head has to settle down onto the pole by several centimetres (a couple of inches). If it doesn't, check to see what's wrong.

Stabilising Lightstands

It's a funny thing about portable lightstand legs. People just don't see them. Somehow the light head at the top is all their brains register.

Maybe it's because the stands are slim, and they're an unobtrusive silver-grey or black. Yet even the ones with their bottom tripod legs painted red, as a warning, seem to escape the notice of erstwhile assistants.

People see you putting up lights and they're overcome with the urge to rush over to you (maybe to offer help). Next thing you know, they catch a foot under one of the three outward-slanting base legs and whammo! Either the person or the light—or both—is on the ground.

You can secure lightstands with sandbags.

So you always set the lights up so people won't trip. It's a good strategy to tuck the jutting tripod legs out of people's way. In an auditorium setting, you can get two of the three legs under a row of seats. If you place a rubbish bin next to the third leg, you've effectively highlighted the no-walk area.

Another way to secure a lightstand is to put a sandbag over one of its tripod legs. Sandbags do a good job, and it's easy enough to use them at the studio, but they're quite heavy to carry around on a location shoot. An alternative is to use waterfilled 'sandbags', which are special sturdy bladders that you can fill once you get to the location and empty before you repack to go home. (Do NOT use the flimsy bladders from wine casks! Water on the set is a grievous danger.)

If you have to walk away from a lightstand before you've got it secured, ask someone to help you by standing next to it and holding onto the upright pole. Other people will see the person, skirt around him or her, and not knock it over.

Gaffing Down the Cables

Another hazard with lights is their cables. People can trip over them easily, and you're usually forced to run cables across some portion of the floor area to plug them in.

First of all, you should do your lighting set-up long before non-crew people arrive—like the audience and guests. In general, you should allow at least an hour to set up lights, and they should be fully set up an hour before shooting time.

You can use a person of similar height to sit in for the performer, so you can work out the placement of the lightstands and the general throw of the light. Once you're sure where the lights need to be, you should tape down all the cables thoroughly with gaffer tape (that broad, expensive, silver, black or white tape, also known as duct tape).

Before you tape them, make sure that each cable is hanging straight down to the floor along the side of its lightstand, and then run it in a short straight path to the electrical outlet. Also, make sure you leave enough slack in the cable by the stand so you can extend the light to its full height, and so you can adjust the lighthead later on.

It's good if you can run the electrical cable under a row of seats or some other furniture so people's feet won't be likely to make contact with it. Most of all, never pull the cord outward from the light and through the air, effectively cordoning off a section of the room. That's a real trap for someone.

With your lighting set-up basically placed and aimed, you can use the last hour, while others fuss with the camera and mics, to ensure the lights are giving you just the right effect. Then you can do the final tweaking once your performer is able to be seated.

Controlling the Light

Three aspects of light that you'll need to control are its intensity, its spread and its hardness or softness.

Controlling Light Intensity

The *intensity* of the lights can be controlled by moving them away from the subject, or closer to it.

In practice, if you double the distance the light is away from the subject, you cut down to one quarter the intensity of the light. This is known as the *inverse square law*.

For example: If, as the starting point, your distance from the light to the subject equals 1, and the intensity of the light at that distance equals 1, then, if the distance between them becomes 2, the intensity is inverted (to half) and squared (to quarter). **So by doubling the distance, you quarter the intensity of the light.**

If you're not into calculating, just remember that moving a light away from the subject diminishes its intensity very effectively.

Another way to control the intensity of the light is to add a *scrim* to the front of it. Portable lights are made with clips or attaching hooks at the front, so that one or more scrims can be attached to the front of them.

Ordinary fibreglass insect screen mesh makes an efficient scrim. (Disregard slight smoking when new.)

Ian Bosman,
Gaffer, AFTRS.

Scrims won't change the light quality, you'll still have a hard light with a hard shadow.

You can also cut the intensity of the light by putting *spun* in front of it. Spun is a soft white fibreglass material which can be attached to the barn doors using *wooden* clothes pegs. (Plastic ones would melt.)

There's a gel-like material which is white and *translucent* (which means the light can go through it, but you can't see through it). It's called *white diffusion*. This can be pegged to the front of a light to cut the light's intensity, too.

Spun, diffusion and gels can be hung in front of a light by mounting them in a frame and attaching

A C-stand can hold a *cutter* or *black flag* to shield an area on set from direct light. Vicki Lucan and Ken Crouch, Australian Film Television and Radio School.

the frame to a *C-stand*. A C-stand is a sturdy stand with tripod legs to which you can attach a marvellous range of things. These materials do soften the light.

Controlling the Light Pathway

You can also use a C-stand to hold a *cutter* or *black flag*. These are flat black wooden or metal pieces, with a metal stem, which come in various shapes and sizes. They're used to control light by blocking it from falling on some part of your set.

For example, you may have an element in your set which is highly reflective, but you don't want to remove it. Perhaps a prism paperweight on the executive's desk.

Or you may need a dark area next to a bright one, to accentuate a part of the image.

Pieces of cardboard, or polystyrene, or almost anything else at hand, can be used to block the path of light, and thus control your image. But watch the heat!

> Lighting a scene is like eating potato chips—one light can be too many and a hundred never enough.

Shane McNeil, Flinders University.

You can also use a half scrim, if you want to have one part of the light's beam stronger than the other half. One circumstance for doing this is when the light needs to fall strongly on the subject's face, but unfortunately the person has arrived wearing a shirt with white in it. The half scrim can cut the intensity of the light falling on the shirt, while still allowing good illumination of the face.

Softening the Light

Light is softer if it's coming from a broader area rather than from a point source. So you can soften light by bouncing it off a big white surface, like a large piece of polystyrene or cardboard.

To make a 'soft light', turn your redhead away from your subject, facing a large white surface, and the resulting bright reflected light bouncing off that surface will give a softer, less shadow-creating illumination for your subject.

Pointing a light towards polystyrene will give you a good bounce. Andrew Belletty and Peter Johnson, Australian Film Television and Radio School.

Another way to soften light is to point it at a reflective umbrella. Tota lights come with little silver umbrellas which are designed to be attached to the side of the tota lightheads.

A *flexifill* is a large piece of reflective material, white on one side and silver on the other, which is mounted in a flexible circular frame. It's lightweight and can be hand-held by an assistant during a short interview, to bounce a soft light onto the subject's face. Or it can be mounted on a C-stand for a longer shoot.

When you're done with it, you can twist it down neatly into a small shape to pack it into its zipper bag.

You can bounce your key light from a sheet of poly to get a soft fill. Vicki Lucan, Australian Film Television and Radio School.

Bouncing Light

Light can also be bounced off white walls and low white ceilings.

Many times you'll find you're shooting in a tiny office space or somewhere just too small to handle the intensity of three redheads. So bouncing light can save the situation.

The thing to watch with bouncing light is that colours will bounce, too. So a cream coloured wall will bounce a warm creamy light back and a pink wall might give your subject a feverish look.

Sometimes you may not intentionally bounce light, but may find that the placement of your subject is in the throw of a coloured bounce. Make sure you can live with it before you go ahead and shoot there.

A terrible effect comes from shooting under a bluish tent or sunshade. The people end up looking like cadavers. (Yes, we can believe it's their 50th wedding anniversary. The question is, are they still alive?)

Studio Lights

Studio lights tend to be bigger and more powerful than portable lights. They're less transportable. They're mounted on heavy stands, often on wheels so they can be shifted around with ease, or they're attached to a lighting grid overhead.

Some basic grids are an arrangement of fixed poles. In order to move lights around, you have to get up there on a ladder, undo them and reattach them somewhere else.

Better grids allow the light-bearing poles to be moved forward and backward on tracks, and they have some diagonal movement as well.

Really great grids are computer controlled and have motor driven batons which will lower the lights down so the globes can be changed from floor level.
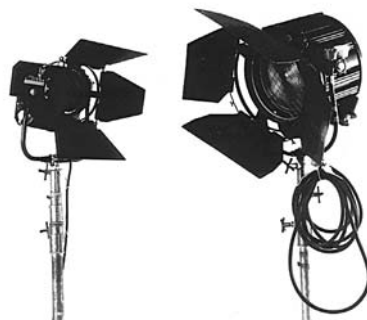
2 Kw fresnel and 5 Kw fresnel

Safety Chains

No matter what type of lighting grid you have, every single light which is attached to it should also be attached by a safety chain.

Lights are very heavy; it's easy for one to slip out of the grip of someone who's trying to detach it, or move it to another spot, or reattach it.

And a poorly attached light might lose its grip with no warning.

A falling light could easily crack the skull of someone down below.

Whenever moving lights, undo the safety chain last, and do it up again first at the new position. Then if the heavy light slips your grasp, it doesn't drop. Joe Conway, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

A falling light once missed my head by a few centimetres when I was the guest on a cable TV show in America. I was sitting in my on-set chair going over my notes while people were still adjusting the lights around me. Suddenly the back light slipped out of the hands of the gaffer up on the ladder, and it came crashing down by my ear. There were no safety chains in that studio. Needless to say, I'm convinced of their value!

Martha Mollison, Video Producer.

Adjusting the Lights

Sometimes grid-mounted lights can be adjusted from floor level using a long pole. The pole has a little hook on the end of it which slips over a thin metal bar inside each large colour-coded adjustment knob on the sides of the light fixture. One knob is for tilting the light, one is for panning it, one is for focus (spot or flood), and one is for turning the power off and on.

Change the globe on the light *after* you turn the power off. Bryan Mason, MAPS Program, Hamilton Secondary College, Mitchell Park, SA, Australia.

Changing Globes

Usually the lights are wired up so their power can be turned on from switches down below at the lighting patch bay. Still, you'd always turn the power off at the light **and** unplug the light if you were going to change the globe. Who knows—once you're up on the ladder, with your hand in the light, someone else might come along and start flipping switches at the lighting controls below, quite unmindful of your predicament.

Of course, you'd use the same procedure as changing the globes of portable lights.

Never touch the globe with your fingers—always handle it in its tissue wrapper.

Some places only allow the technical staff to change the globes of the grid-mounted lights.

Moving the Lights

Because lights are so heavy and difficult to move, studios usually have them set on the grid in an arrangement which suits their major usage patterns.

It's best to think carefully about how you can use the pattern that's there before you launch into undoing the lights and rearranging them.

Sometimes you can get that one additional key light you need by setting up a redhead on a floorstand, rather than pinching lights from the back area of the lighting grid.

On the other hand, sometimes you really do need to do a major rearrangement. You should have helpers to do this.

Some people don't like being up ladders. It's possible to get a ladder type structure which has a secure standing platform on the top of it, with a surrounding guard rail. If a studio has one of these it lets more people learn about lighting and contribute to it.

When removing a light from a grid, it's a good idea to have a person waiting at the bottom of the ladder to grab the light from you, so you can descend safely yourself. Just make sure they're **never** standing beneath the light, in case you lose your grip on it!

When you disconnect the light from the grid, detach the main connection first, always leaving the safety chain attached till you're certain you can manage the weight of the light. When you're reattaching the light, reattach the safety chain first.

Types of Studio Lights

SOFT LIGHTS

These are large lights which use from 1000 to 5000 watts (1–5 Kw). Their globes are mounted facing giant scoop-shaped reflectors. They're good for lifting the general light level, for illuminating the background curtain or set, and for providing a soft light over a wide area. As with other soft lights, you can't spot or flood them.

FRESNELS

These are lensed lights which can be adjusted between spot and flood. Good for key lights on the subjects.

2 Kw soft light and 5 Kw soft light
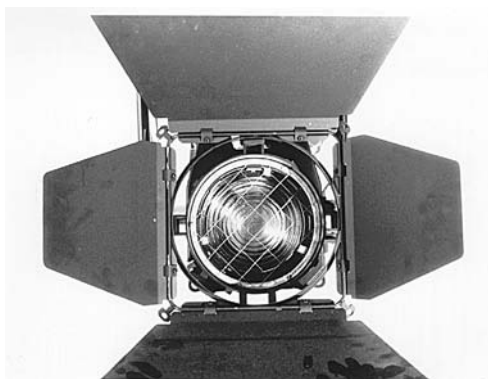
A fresnel lamphead has a thick glass lens on its front.
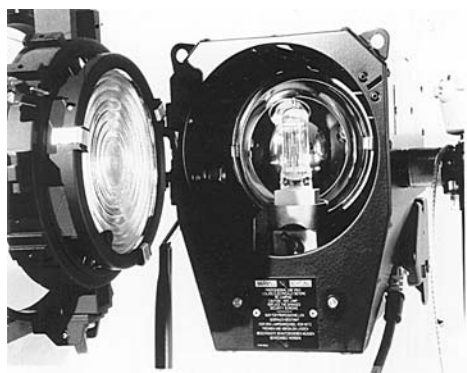
You can swing the lens to the side to replace the globe.

FOLLOW SPOTS

These are hard light sources which provide a bright circle of light. They're used in stage and variety show performances, especially for following guest entrances, and individual dancers and singers as they move around the set.
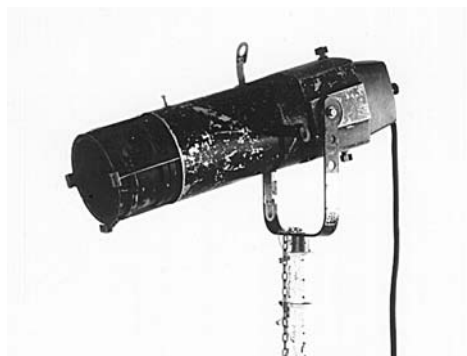
Spot light

Jolean Dilorenzo, TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia.

Lighting Controls

BARN DOORS

Barn doors are hinged plates which usually come attached to a circular ring in sets of four: two rectangles and two trapezoids. They attach to the front of lightheads. By moving them in and out, you can control the flow of the light beam. You can narrow it down or block it off at the top, bottom and sides.

People are often puzzled about how to orient them and ask, 'Which way do they go?' It doesn't matter—do what works for your situation.

SCRIM

This is wire gauze which can be put in front of a light to reduce its intensity.

It comes in different gauges of mesh, producing different results. It can make a difference of ½ to 1 f stop on your iris setting. It's mounted in frames to hold it straight and can be attached between the barn doors and the reflector on many lightheads.

SPUN

A soft fibreglass material which also reduces the intensity of light, and softens it somewhat.

CUTTER (OR BLACK FLAG)

A black piece of wooden ply with a metal stem, which is used to block light from reaching some part of the set.

GOBO (OR CUCALORIS, OR COOKIE)

A cut-out stencil which can be used in front of a light to cast a desired shadow pattern, like venetian blinds and tree branches.

It can also be a cut metal stencil, inserted between the globe and lens of a pattern spot.

DINGLE

Generally a leafy branch placed in front of a light, to give a broken pattern on an otherwise flat surface.

SNOOT

A circular attachment which narrows the light beam for a spotlight effect. Used in place of barn doors.

DIMMERS

Controls which allow lights to be gradually faded from full-on to full-off, or anywhere in between. Lights can be assigned to dimmers so they'll fade singly or in groups.

GELS

Special coloured transparent sheets which can be placed in front of lights to change their colour or their colour temperature. Unlike normal plastic, they won't melt or burn from light heat—unless they're wrongly placed so they're touching the globe.

Gels let you colour the light. Sarah Moore from Roseville College, during work experience at the Australian Film Television and Radio School.

22 Production Options

When you're developing the idea for a project, there are some key questions to answer right at the start:

The Greys, a production by the Queensland School of Film and Television, Brisbane, Qld, Australia.

1. Is it a live event which will have to be shot from beginning to end in one go?
2. Or will you have the time and space to do rehearsals with the crew and be able to shoot retakes as necessary?

3. What sort of equipment will you be able to use?
    (a) One camera only?
    (b) Three single cameras on location?
    (c) An outside broadcast van?
    (d) A studio?
4. Will you have the time or equipment to edit the program?
5. Or will you have to do it all with in-camera editing?

Francis Treacey, Deakin University.

Take a chance and shoot for the moon, because a magnificent failure is better than a conservative success. Risk-taking in a supportive environment is an essential element in learning and, within a course, process is more important than end result.

Maybe at first you won't know which method to choose. Each of these production options has its advantages and disadvantages. You have to decide both what you can afford and what you can live with.

Single Camera—In-camera Edited

Advantages

1. Low cost.
2. Small equipment load.
3. Small crew.
4. Easy to move crew to site and back.
5. Crew can maintain a low profile at the site and have less impact on the people at the location.
6. At the end of the shoot, the program is complete.
7. The program can be shown immediately to the people in it.
8. The program is made of first generation video.
9. Tape is ready to be shown and distributed right away.
10. Copies can be made at the site to give to the people in the video.

Disadvantages

1. All shots must be done in the script sequence, regardless of how awkward that is.
2. Shots must be done quickly to keep the camera from going into stop mode and causing a glitch at a shot-change point.
3. Every shot must be done correctly the first time, because to redo a shot eats into the frames at the end of the previous shot.
4. Late ideas are hard to incorporate into a partly shot program.

Check all camera operations carefully before you begin. Tim Wiedman and Daniel Klein, SQIT College of the South West, Roma, QLD, Australia.

Single Camera—Postproduced

Advantages

1. Shots can be taken from a variety of camera angles, if there's enough time.
2. Shots can be taken in any order.
3. Last minute ideas and unexpected shots can be incorporated into the production.
4. Low cost.
5. Small equipment load.

What you shoot today may be used again in another program. On location for Australian Wholefoods production. DOP Malcolm Foreman for t.a.v. productions, Adelaide, SA, Australia. (Photo by Neil Smith)

6. Small crew.
7. Easy to move crew to site and back.
8. Crew can maintain a low profile at the site and have less impact on the people at the location.
9. Program can be edited into any shot order, and in a variety of ways.
10. Rough cuts can be shown to advisers for helpful suggestions.
11. Music can be added later.
12. Voiceover can be added later.
13. Titles and graphics can be added later.
14. Field material can be used again for a number of other projects.

Disadvantages

1. Continuity from shot to shot has to be carefully watched. Continuity person needed for this.
2. Lots of cutaways needed to avoid jump cuts in edited footage.
3. All tapes must be logged.
4. Editing the project requires a major work commitment after the shoot.
5. Editing equipment can be expensive.
6. Project takes considerable amount of time to complete.

During a production of *Dead Air Live*; left to right, Tim Macklin, Mahera Omar, Rachel Eisengart, director Craig Bouchard and Charlie Tesch, technical adviser. Somerville Producers Group, Somerville Community Access TV (SCAT), Somerville, MA, USA.

Multi-camera Studio—Live Switching

Advantages

1. Good space for rehearsals.
2. Good technical conditions for producing the program.
3. Access to a range of equipment, including titling.
4. Use of lighting grid.
5. Good sound mixing capacity, including roll-ins of music and sound effects.
6. Help from the studio's technical director.
7. Constant choice of shots which are all viewable by director.

8. All action can be covered from several angles at once—no continuity concerns from doing the same action several times for a repositioned camera.
9. Live audience possible—good to inspire better performance and to provide visual and audio reactions.
10. Possibility of getting questions and comments from the live audience.
11. At the end of the shoot, the program is complete.
12. No postproduction time or costs.

Disadvantages

1. High cost for studio and equipment.
2. Time limits on studio bookings for both rehearsals and the shoot.
3. Large crew needed.
4. Any mistakes made during the shoot (by performers, camera operators, switcher, sound) are in the final product.
5. Good shots may not get selected and are lost.
6. Needs of live audience have to be attended to.

Red Shepherd, a multi-camera drama, is shot in The Canyon set. Erin Quinlan, boom swinger, Amanda Robertson, production designer (seated), and Fiona Schipplock, camera operator, Griffith University, Brisbane, Qld, Australia.

Multi-camera OB Van—Live Switching

Advantages

1. Ability to get to an outside location, even a remote location.
2. Action can be covered from several angles simultaneously—especially good for sports, races, concerts, parades and other live one-off events.
3. Constant choice of shots which are all viewable by director.
4. High public visibility for the production and the production crew.
5. The program is complete at the end of the shoot.
6. No postproduction time or costs.

Disadvantages

1. Large amount of equipment to deal with.
2. Lengthy and complicated set-up.
3. High cost for van and equipment.
4. Large crew needed.
5. Transportation requirements for large crew.
6. Rehearsal time may be limited to the same day as the shoot.
7. Rain or snow can make set-ups difficult and unpleasant.
8. Good shots may not get selected and are lost.

Nick Spinetto works on live broadcast for WEBN, Emerson College, Boston, MA, USA.

Multi-camera—Postproduced

Advantages

1. Cameras at several angles simultaneously.
2. All shots are captured so everything is available for use in the final edit.
3. Continuity problems eliminated from action shots.
4. If one camera has problems, all the other cameras' shots are still recorded.
5. Program doesn't rely on the skill of the switcher.

Disadvantages

1. High cost for equipment.
2. Large number of tapes needed.
3. Large crew required.
4. If cameras aren't linked they may not match in white balance or other signal qualities.
5. Huge amount of footage to be logged.
6. Lengthy and expensive editing.

Composite Shows

It's also possible to have a show which combines several of the production methods mentioned above. A live magazine style show can include loosely scripted live talk segments, pre-recorded on-the-street interviews rolled into the show, rehearsed song or dance performances, pre-edited tape segments and unrehearsed last-minute live segments.

Make the stopwatch your friend.

Sandra Chung, ABC TV, Training and Development.

A show like this needs an exact script order and predetermined time allotments for each segment. The director's assistant will be very busy on this type of production, keeping track of the rundown and carefully timing each piece to make sure there are no time overruns and everything fits into the program's time slot.

Real-time Productions

When a program is being recorded in just one take, it requires careful planning, and a crew with excellent technical skills. There's no second chance.

Some live productions, like orchestral concerts and stage productions, allow for rehearsals. It would be madness to plan to shoot such an event without attending rehearsals to give yourself a good idea of how things will go.

Usually you can get a copy of the program or script. Sometimes you can get permission to have your crew practice their camera work at a rehearsal. Occasionally, you can get permission to tape a dress rehearsal. These shots may save you in the edit the following week!

Other live events, like the visit of an important person, allow for no rehearsals. You should make sure you find out everything you can about the planned schedule for the person, and work out the best places to put your cameras.

You may have to figure on the presence of a large crowd.

Don't forget that your crew may need special passes to get into the action areas, and they may have to get the equipment there very early before streets get cordoned off to vehicles.

With live events, get the schedule of activities ahead of time. Lt-General Sir Michael Jeffries, Governor of WA, accompanied by Brian Williams, Western Australian School of Art and Design, Northbridge, WA, Australia.

Production Types

There are many standard types of productions. Of course, you may be one of those creative people who develops a new form!

But you want to cut your teeth on some of the following well-known formats.

The Lecture

The lecture sounds like it would be easy—just one person speaking for the whole show. But it's deceptively tricky.

Check out the site. Is the person speaking in front of a white wall or whiteboard? This will require care with lighting so you don't end up with the speaker in semi-silhouette. Or maybe you can add an appropriate backdrop? A plain piece of medium blue cloth can work wonders on a white wall, and the speaker will look much better.

Will an overhead projector or slide projector be used? If so, where will the images be projected? Will the person be standing in a darkened area much of the time? Or will someone else be changing overheads for him/her?

If you succumb to the temptation to use the fluorescent room lights, you can expect to end up with a person who has black sockets for eyes (from toppy ceiling lighting) and who looks green around the gills.

Does the speaker usually move around or cling onto the lectern for dear life? The speaker can usually tell you this ahead of time.

Someone who stands still can be miked with a cardioid on a table stand. Someone who turns away from the lectern frequently, to talk while looking at projected slides, will need a lavalier (neck) mic. Someone who strides around energetically is better off wearing a cordless radio mic lav. Someone who will be entering the audience and asking them for comments needs a cordless cardioid radio mic, to pick up sound from both audience and self.

Though your speaker will be addressing an audience, you need to have at least a semi-eyeline to camera. Profiles of speakers are hard to watch for long, so position your camera so you get a decent shot of the speaker's face.

Because lectures are often too long (and boring) for their full length to be shown on TV or video, plan your shooting so you can shorten the piece. To avoid having jump

cuts, you can cover the edits you'll need to make with cutaway shots of the audience. You can do these before the speaker starts, but make sure the ones you take are useable. It's pointless taking wide shots which include people arriving if you plan to edit them into the middle of the lecture.

You can get away with tight two-shots and close-ups of people who appear to be paying attention to the front. A good method with cutaways is to shoot them for 15–20 seconds each. Don't just take three to five seconds, because you'll find to your dismay that people tend to do something ridiculous as soon as they notice you're shooting them, and that renders part of your shot unusable. And of course you have to consider having pre-roll time.

Shoot **lots** of cutaways. You'll be surprised how many you need and it looks ridiculous to keep reusing the same ones.

Karene McIntosh and Ross Williams present a panel at 'Sharing the Road, Disability and Sexuality', James Cook University, Townsville, Qld, Australia. (Photo by Christine Togo-Smallwood)

Calling the shots at Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

The Panel Discussion

Panel discussions can't be scripted ahead of time because there's no way of predicting who will speak when or what they'll choose to say.

What can be scripted is the opening by the host or facilitator, and the planned closing remarks.

There should also be a general idea of what topics will be introduced, and in which order.

The host should have a good understanding of the topic, and have written details on the names and special titles of each of the panellists, as well as their connection to the topic.

The director needs to decide ahead of time on the best angles for the cameras, and basic coverage strategies—like which two-shots or three-shots work best. Due to the unpredictable nature of the panel discussion, once the show starts the director will have to be concentrating fully on who is talking and who is reacting. There'll be no time then to work out the shots.

Panels need to be carefully miked so everyone's comments can be heard well. Each person can be linked to the mixer with a lav mic, or groups of two can share a table-mounted cardioid.

This type of production needs to be mixed live, with a very attentive audio operator who rides the levels and continually raises the mic of the person speaking and lowers all the others.

If all mics are left fully on, some embarrassing muttered comments can enter the soundtrack at full record level. Remember, many panellists are unused to working with mics. Don't let them come to grief from unfamiliar technology.

The Demonstration

It's difficult to script a demonstration tightly, and it's unlikely that an unskilled demonstrator will exactly duplicate what s/he did in rehearsal.

So demonstrations present coverage problems. You need to decide what your basic shots will be, and hang loose to switch from one to another as the need arises. A demonstration needs at least two cameras.

Essential shots, of course, are a good close-up of the demonstration object(s), and a wider shot which includes the demonstrator. At times you can use a close-up of the demonstrator's face, and cut to it while you're refocusing on the omelette in the pan, or the lizard crawling up the assistant's arm.

Wolf Blass wine demonstration at Northern Territory University, Darwin, NT, Australia.

If the demonstration can't be fully rehearsed ahead of time, make sure you find out from the demonstrator what the main elements will be.

The Training Tape

The aim of the training tape is to teach something to a target audience. It's very important to work out who the target audience is—the production style you use for senior citizens won't be the same as that which you use for 12–17 year olds, and a tape made about the benefits of housing loans from a certain bank will have a quite different tone and look from one dealing with drink driving or drug use. Unless your audience feels that the message is addressed to them, they'll disregard it.

Training tapes can incorporate a demonstration. They can also use documentary style and short dramas. Training tapes, though the phrase itself may sound boring, are wonderfully malleable in style and quite challenging to produce well.

In general, shorter is better than longer. The message needs to be very clear and simple. Sometimes text on the screen can reinforce the message.

You've no doubt been on the receiving end of some poorly designed training tapes. When you go to make one, think hard about the features of the training tapes which have impressed you.

I got into video production as a format for teaching exercise. Not just to put an aerobics class on video but to teach about the body and how to use exercise to improve both daily activity and well being.

Jeanne Flanagan, Independent Producer.

The Boston Blades, Paralympic Ice Sledge Hockey Champions, on *Dead Air Live*, produced by Jeanne Flanagan and the Somerville Producers Group. Somerville Community Access TV, Somerville, MA, USA.

Documentary

Documentary has the wonderful capacity to take viewers into places they would never otherwise go—perhaps through choice, or perhaps through lack of opportunity.

Steven Parris, Edmonds-Woodway High School.

When students start getting their feet wet and using the medium for something that isn't corporate or commercial, they get a strong sense of empowerment.

Because a documentary is made up of footage shot of real people in their actual locations, doing their normal everyday activities—or in some cases doing something extraordinary for them—it has a freshness and vitality to it if shot well.

People shooting documentaries have to be very sensitive and diplomatic. Their presence should be as low key as possible, so their featured people can relax and behave and talk in their normal ways.

A documentary with an overbearing crew, which tries to alter things too much at the location, is really shooting a form of interfered-with reality. A sort of fiction which purports to be true. Sadly, a lie.

Getting the protest onto video gives you a wider audience. Demonstrators in Seattle, WA, USA.

Quvianaktulia (Kov) Tapaungai presents the meaning of the Inukshuk (man made of stone) for *Inuit Piqqusingit: Inuit Ways, Inuit Survival*. Jamisee Pudloo, sound recordist, Cape Dorset, Nunavut, Canada. (Photo by Kimberley Brown)

Trevor Graham, Producer.

Documentary making gives you the opportunity to explore the real world and tell a story. I believe that truth is stranger than fiction. Trust is the most important thing, getting to know the people you'll be working with, getting to trust them, getting them to trust you. Everything after that is story, story, story. Finding the story you want to tell.

One of the benefits of documentary form is that you record people telling their own stories, using their own words and patterns of thinking, their own anecdotes and analogies. This can be very powerful, and very poignant. It can give respect to those people, and gain respect for them from the viewers.

Oral History/Life History

By combining photographs, coloured slides, newspaper clippings, super-8 home movies, family videos, drawings and current footage, people make wonderful tributes to their families or friends, or to members of their communities or organisations.

If your video/film work comes from your heart, your audience will know it and you will have made a difference.

Claire Beach, Edmonds-Woodway High School.

Although these life histories may err on the side of glossing over the hard times or the character flaws, there's nothing wrong with presenting a personal view of someone to an appreciative audience. Such amalgams of visual media take a long time to complete, but by setting your camera up on a tripod in front of photos pinned on a corkboard you can get very good results. Films can be projected on a white wall or screen and shot from there. Drawings, clippings, cards and other artwork, like sculptures, can all be shot directly with the camera. It may be a good time to try out the macro lens.

Peter C. Kenny Jr. and Peter C. Kenny III, New York, c.1947. Kenny was recently decorated, at a ceremony in Washington DC, by the Russian government, for getting supplies through to the Russian people during WWII. Clio Associates videotaped his oral history for a US Merchant Marine project, and it's stored in the USMM Academy archives.

Older people may tire easily, so keep the on-camera interview format to no more than two hours maximum, with a stretch break after 45-60 minutes. Also be sure to place a glass of water and tissues within easy reach beside the person being interviewed during these long sessions, regardless of their age.

Donna Kenny, Clio Associates, The Video History Company and Center for Recording Life Stories.

Drama

Drama is made up of scenes which are played by actors. Drama can involve the telling of a piece of fiction, or it can be a re-enactment of the documented words and actions of real people, living or dead.

Drama is almost always postproduced—that is, edited from material shot in segments.

A director will ask the actors to repeat a scene several times, and then have a variety of takes to choose from during editing. So a major concern with drama is that the actors repeat their lines and actions the same way for each take. Of course, their performance may vary—their voice volume and way of saying their lines may have different emotional qualities—but the basics, of which words were said and where the person was standing when they were said, need to be right on the mark which was agreed to during rehearsals. This is to get over continuity problems in the editing stage.

Drama needs to be well rehearsed, and the actors need to be capable of giving a convincing performance. Otherwise it will fall flat. Sometimes you can get good actors from among your friends. Often drama students are very happy to have the opportunity to do a performance for tape because they can use it in their show reel. At other times, it's the best idea to get help from professionals.

Shooting and editing a drama is a huge commitment—don't doom your project to failure—or laughter—by neglecting to get the best actors you possibly can.

Sets are also important with drama. You can do location shoots or in-studio work. Both have their pluses. Locations can be difficult to light well, and the amount of time they're available to you may be limited. Studios give you more control, but you have to build a convincing scene from flats and props—this takes time, imagination and access to materials.

Docu-drama

Docu-drama is a very popular and frequently used hybrid form. It takes as its subject real people and real events, but uses re-enactments by actors for some or all of the sequences. Parts of the dialogue may be from bona-fide sources, and parts may be fictional.

> Enjoy it! It's got to be an enjoyable experience, even if it's tough.

Trevor Graham, Producer.

Docu-drama is very useful for presenting educated guesses about events in the past which were not recorded, and for bringing life and interest to moments in history.

The risk with docu-drama is that the viewers take in the whole program as if it is fact, when it isn't. Even for the knowledgeable and careful viewer, it can be hard to separate fact from speculation in a docu-drama. As a program maker, you may find ways of assisting your viewers in this.

'Ficumentary' (or 'mocumentary')

Sometimes fiction is shot to look like documentary. By making use of production styles and elements associated with documentaries, like hand-held moving camera techniques, on-site interviews and comments, and recognisable real-life locations and passers-by, it's possible to construct a work of fiction and pass it off as 'real'. This can be a great spoof, it can also be a dangerous falsehood.

> There's no point in trying to show how things look in reality. Video can convey emotion, drama, form, mood, space, etc. by altering reality. How you light, frame and move the camera (not to mention what you do in the edit suite) will play a large part in the overall look of your video. Good video production utilises this principle.

Marc Tewksbury, The Nine Video School.

Program makers should have ethics which they consult when entering grey areas like this. What is the aim of the program? Who is the audience? Will the audience understand that this is fiction? How much harm can be done if they don't?

There's a traditional form in literature called the 'historical novel'. Such a work tries to bring to life the ambience of a time period, by presenting fictional characters who live out their lives among the events of history as it's been recorded. These characters are informed by the values and common knowledge available to a particular group of people,

and they're presented with the likely choices and dilemmas of the day. 'Ficumentary' could be seen as a modern video variation on the historical novel.

A 'ficumentary', clearly labelled as such, can be a thought-provoking work, as long as the audience understands what it is.

The Music Clip

Now this is the form many people want to try! There's so much surface variation in the music clip genre, there's no point in trying to make up rules of coverage beyond these:

1. Get a good quality recording of the soundtrack! Don't waste your time with distorted audio or muddy music recordings. It may be best to record the music in a proper sound recording studio, then lay it onto videotape in the postproduction stage.
2. You can use a video studio to record the pictures of the musicians playing the music. The recording situation is set up so the musicians hear their pre-recorded tape as *foldback* sound, and sing and play along with it. Do make a simple audio recording of this video, though, so you can use it as a guide track to match to the studio tracks recorded beforehand.
3. When editing, put the top quality studio-recorded music onto the edit master first, as an audio insert edit. Then you can cut your images in exactly where you want them in relation to the music, the words and the beat.

Get the best sound recording you can. Long Bay Gaol for NAIDOC Week, Sydney, NSW, Australia. (Photo by Michelle Blakeney)
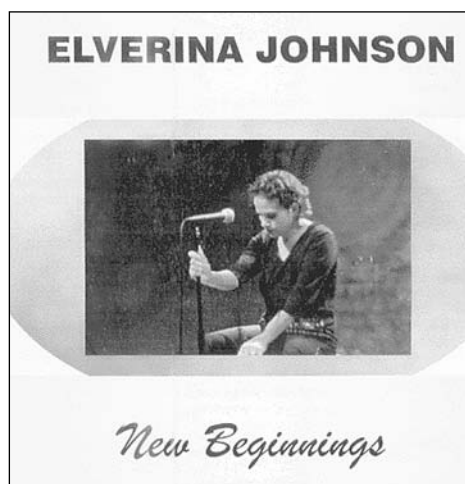
Best Friend music clip, produced by Elverina Johnson and edited by Josephine Bourne, Townsville, QLD, Australia.

The Use of Voiceover (Commentary)

Sometimes you'll choose to supply information to your audience by using a voiceover or commentary. This is a scripted piece which is recorded separately and then added into the program at the editing stage.

Voiceover can be used to tell the whole story. This is sometimes the case in training tapes. Or it can be used to link one segment of a program to the next. This is a common technique in documentary, where

It can be easier to write new words than to take new video shots! Marilyn Murphy, Australian Film Television and Radio School.

there's no field footage to make the link, or where an outside voice is considered better for some reason.

Commentary can be written at different stages in the production process.

Writing Commentary in Advance

If the process to be shown is complex, it can help to work out a description of the process ahead of time. This can assist in visualising the necessary shot coverage and in working out the shooting plan.

Writing After the Shooting is Done

At this point it will be clear what links need to be made. If the linking voiceovers are recorded before the editing begins, the visuals can be cut to the right length to match them. Sometimes, however, this can lead to awkward shot lengths and a loss of rhythm.

> With any production, think creatively, think critically, think commercially.

Danny Sheehy, Queensland School of Film and Television.

Writing After Editing

If the commentary is written when the program has a definite form, snippets of narration can be written to fill in missing background information, add important details and set the mood for upcoming scenes.

In this case, narration can be written to match the available spaces. During writing, it's best to have the narrator read the material in the way they'll record it, to get an idea of the likely spoken time. Everyone speaks slightly differently. You may have to tinker with the text, adding or eliminating a few words, so the segments will fit into their assigned slots.

Suggestions from Rachel Masters

When you organise the shoot and write the recce plan, try to think of as many creative options as possible. Should the shoot be done in the studio or on location? Would a different location be more interesting? Could the light there be different, more atmospheric?

Is it essential to always be at the particular location in the script? For example, will the audience know whether or not you're at the beach if the only shot you need is a close-up of sand? Could you use a sandbox instead?

Make a list of alternative 'trick' locations. When is a hospital not a hospital? When it's a white wall with medical posters and hospital signs instead! Draw your inspiration from the theatre . . . stage and set designers have been using illusion for thousands of years. How could you recreate these scenes: the beach, a garage, a cafe, a spaceship, the moon?

23 Scriptwriting

Lots of people have wonderful ideas. Over a beer or a cappuccino or a Saturday night curry, they can tell you amazing anecdotes from their own lives or lives of people they've known.

And often someone will say, 'You should write a book!' or, 'That would make a great movie! You should write it down'. But most never do.

For a story to take sufficient form for it to be made into a screen production, it has to be transferred onto the page. The script is the blueprint for the production.

People have to be inspired by it, and then realise it in a practical form. This involves a lot of collaboration between the writer, the producer, the director and the other key creative departments.

A scriptwriter is a special kind of writer, a person who's a *visualiser*, who can tell a story or teach a concept through a series of images. A scriptwriter is someone who can marry images with sounds. It's quite a different form of writing from short stories and novels, essays and reports.

The drama scriptwriter has to imagine and construct a series of scenes which give the actors the opportunity to convey the personalities of their characters, and the meaning of their characters' actions.

Dialogue is a part of the script for a screen production, but it only takes up a limited percentage of the total screen time. The pictures, on the other hand, are always there. They should each speak a thousand words.

Scriptwriting for documentaries has its similarities. Though the characters aren't actors but real people, and the final scriptwriting is done after the footage is shot, still the audience

> Ideas are a dime a dozen. Few can tell a really good story. Good scripts are 10 per cent inspiration and 90 per cent perspiration.

Helen Carmichael, Scriptwriting Department, AFTRS.

> Writers write it down.

Mark Stiles, Writer and Filmmaker.

> When writing a drama script always ask yourself, 'Is this scene pushing the story forward?' *If in doubt, cut it out.*

Lester Crombie, Queensland School of Film and Television.

needs to understand where the people are coming from, why they feel the way they do, and what motivates them to take the actions which the video portrays. The scriptwriter shapes the story so its overall message is clear.

In a video or film script, every situation, every scene, should contribute to the underlying aims of the production. It's a very condensed form of story-telling—there's no time to waste on extras. Ninety minutes of screen time is the usual duration of a feature, and most videos are allotted much less than that, so everything in the script must lead to the fulfilment of the project's aims.

Know your *characters* because they have to drive the script. If it's the other way around and the plot drives the characters, you're less likely to engage your audience.

Yvonne Madon, Scriptwriting Department, AFTRS.

The Central Theme

You should be able to write the main concept down in a few sentences, sometimes in just one. For example:

What story do you have to tell? Just do it! Get out a pen and paper and write it down. You don't need a computer, you don't need a scriptwriting program.

John Lonie, Scriptwriting Department, AFTRS.

This story shows how blood ties win out over everything else.
or
This story shows how our people need our culture to survive.
or
This story is about how betrayal ruins relationships.
or
This story shows how a person with utter determination can overcome an obstacle which seems insurmountable.

If you're going to create something, make sure it moves people. It can make them laugh, cry, doubt, agree, get angry, but the most important thing is that it moves them into action of some significance.

We have too much empty air time. Make it count.

Claire Beach, Edmonds-Woodway High School.

To write a good script, you need to be clear about the main aim of the video. Tanith Carroll, TEAME Indigenous Television and Video Course, Metro TV, Paddington, NSW, Australia.

Asking the Key Questions

Before you begin to write, you need to know your *brief*. What is it that you're trying to do (or being asked to do)?

1. What is the main purpose of the tape? To educate? To persuade? To entertain?
2. Who is the intended audience? What is known about this audience? What are their ages? Their occupations? Their education level? How much do they know about the topic? What sort of screen productions does this group of people generally choose to watch?
3. How will the tape be shown? Will it be broadcast? Will it be part of a teaching module? Or shown as a trigger tape for small discussion groups?
4. Is your project more appropriate to be produced on a CD? Can it be interactive?
5. What are the main points which must be conveyed?
6. How long should the tape be?
7. Where can you get information about the topic? Who are the experts on it? What other people have valuable contributions to make? What about opposing views?
8. How much budget has been allocated for the project? The budget level often determines:
   (a) The number of actors who can be involved.
   (b) The number of different locations possible. (Maybe some locations can be faked in a studio, or presented through still photos or stock footage.)
   (c) The amount and type of equipment which can be used.
   (d) The number of shooting days.
   (e) The amount of special effects and graphics which can be included.
   (f) The acquisition of music.

First decide what the aims of your project are. Mosese Fonohema, University of South Australia, Underdale, SA, Australia. (Photo by Mark Bradley)

If you can tell the story out loud and people dig it, then you're onto something.

Gypsy Rose Tucker, Writer.

CD Rom technology allows you to tell stories in different ways, rather than in a linear, fixed time way, as you're bound to in a TV broadcast timeslot. Your task as the producer/author is to make it engagingly interactive.

Trevor Graham, Producer.

Still, don't feel overly restricted, because there are creative ways around some pretty amazing script requirements. Like the script which called for a herd of elephants to thunder past a house in Africa.

It's really hard to make a good movie out of a weak story line.

Rob Davis, Editor, Digital Dimensions.

There was no budget for a trip to Africa (or for a herd of elephants, for that matter). The scene was shot in a studio using a set for the inside of the African house. The main character went to a pretend window and exclaimed about the passing elephants he could see, the sound of the elephant herd was rolled in through the audio mixer using a purchased sound effect, and some dust billowed in the window to complete the illusion!

Choosing the Elements

There are many ways to tell any story. You need to work out just what production elements you want to call for in your script, in order to tell the story *your* way. Be sure to consider what elements are most likely to attract your specific audience to the story.

Will the story be told through drama?
Or will real people tell the story themselves?
Should the dialogue be tightly scripted or ad-libbed?
Should the program include interviews?
Should there be a link person? If so, should the link be a well-known personality
    (this can be expensive) or a just a local person who can present information well?
Will some of the information be supplied through voiceover?

Will there be location shoots?
Will there be graphics?
Will there be animations?
Will photos be used?
What kind of video special effects will be included?

Never underestimate the importance of the title.

Miranda Douglas, Publishing Department, AFTRS.

What music would work well?
What kind of audio special effects will be needed?

Training Tapes

With training tapes you should be careful to restrict the number of points you're trying to get across. If you need to cover a lot of ground in a subject area, consider breaking the program into several segments. A series of short videos can be more effective than one long one which leaves the audience with their heads whirling with new ideas, none of which is fully grasped, and many of which just whirl out again into oblivion.

If you write several short scripts, the individual segments can then be produced and assembled onto one videotape with quiet space between them. The instructor can pause the tape at the end of each segment for class discussion and clarification before moving on, or use just one segment per lesson over a series of classes.

When you're deciding what to include in a script, try listing from one to five main points (no more), and then imagine how you can most effectively get them across visually.

Then, having answered the key questions and chosen the points you'll be making, you can begin to design the program.

Designing the Video

The first step in getting any message across is to get the audience's attention. A technique which works well with training tapes is to have the presenter, or the main character, look and act like a *member* of the target audience—that is, one of those people who will be watching the tape to learn something. Another technique is to use a person who holds great appeal for the target audience.

Having got the audience's attention, your next challenge is to hold it. That's trickier.

If the audience feels that the message is directed to them, they're more likely to continue watching and paying attention. What methods could you use to say—through pictures, sounds, tone and overall look—'This is for **you**'? (And it won't hurt.) Think of scenes the target audience will be familiar with, think of situations they're likely to encounter in relation to this topic.

Say, for example, you're doing a health promotion tape on drink driving. If the scenes you include are unfamiliar to the audience, they'll feel the message is for other people and they'll disregard it. But if they can hear the sounds they usually hear at the pub, if the people are talking in the same style of language, about topics which interest them, they're more likely to be drawn into the tape. The right music helps immensely here. And humour is terrifically potent in holding people's attention.

The next step is to present the information in a way that the audience will understand it.

Sometimes people make the mistake that a training tape should use big words to sound impressive. The problem is, the aim is not to impress, but to teach. Unless the audience grasps the message—easily—the tape is a failure. Teachers won't use it, it will sit on the shelf, and the time, effort and money used to make it will have been wasted.

How do people learn? It helps to present the message in a unique and memorable way. Striking images help people remember things. Surprise can be effective—like putting in a twist at the end of a well-known story format.

But perhaps the most important thing is emotion. You need to move people.

Find a way to make your images memorable. *Uncle Tony's Kebabs*, directed by Marc Tewksbury.

As James Joyce said, write 'what is in your blood, not what is in your brain'.

Helen Carmichael, Scriptwriting Department, AFTRS.

Working Out the Structure

1. How will the program **start**? At the beginning you let the audience know clearly what the program is about.
2. How will it **develop**? The middle section is where you deliver the information of the message. This is where the presenter demonstrates the procedure, or you show the cells dividing, or the drama unfolds about the person leaving the party drunk.
3. How will it **end**? This is where the main point of your message is reinforced. Sometimes

You can get ideas on structure from other plans which have worked in the past. The Film and Television Institute's Library and Resource Centre, Fremantle, WA, Australia.

Bernadette Flynn, School of Film, Media and Cultural Studies, Griffith University.

Consider whether multi-media interactivity is the best option for the script. Develop a concept design and pre-visualisation materials to strengthen the idea.

Trevor Graham, Producer.

Research and research and research. Spread your wings and become thoroughly immersed in the subject matter. You need to soak it up. It doesn't matter what it is. The subject can be close to you or quite distant. You can never do enough research. But there comes a point where you have to stop. This is probably when you can talk confidently about your project and when you feel inside that you know enough.

Bernadette Flynn, School of Film, Media and Cultural Studies, Griffith University.

Visit galleries, watch films and look at CD work to increase knowledge of cultural history and production.

John Lonie, Scriptwriting Department, AFTRS.

No holds barred. Don't censor yourself—go all the way. Where you think you've come to the end may just be the beginning.

messages are repeated verbally, sometimes they're written on the screen.

4. Sometimes there's an additional *action consequence* message at the end of a training tape, like 'To get your free blood test, contact your local clinic at . . .'

Research

There are many sources of information for a video project.

You Can Start with People You Know

First of all, there are usually people near you who know something about the topic you've chosen or been given. You can speak to them about it and find out what they know.

They can give you leads about other people who could be useful, and they can also send you in the right direction for additional materials. Maybe they can get permission for you to use a resource centre at their workplace, or maybe they know of a collection of materials held by an institution.

Often your own institution will have at least some beginning materials for you to read. This can

Careful research pays off well when it comes to scriptwriting. Working in the Film and Television Institute's Library and Resource Centre, Fremantle, WA, Australia.

get you started. Besides following other people's suggestions, learn to follow your own nose to sniff out a story.

Lies and Videotape

Once information is made into a video and presented, people tend to take the information as true. It's something about the power of the medium—if you see it on the screen it has an aura of authority.

So, if you don't research your topic well, and present falsities or half truths in your video, some people will still believe it, because they've seen it on the screen. That's bad in itself.

But there's another consequence as well. Those who know you're wrong will lose confidence in your work. And that affects your long-term reputation.

Script Development

Scripts aren't found under cabbages or delivered by storks. Scriptwriting involves a fairly regular sequence of developmental stages.

The Outline

This is a brief explanation of what the program will be about. It can be written in point form to show which topics will be covered, which points will be made. It should include:

- The style of the program.
- The intended audience.
- A list of the main characters.

It needn't be more than a page long.

The Treatment

This is more specific and detailed than an outline, and runs from about one to four pages in length. This is what people usually use when they're trying to interest others in their project, for funding or some other kind of involvement. For a drama, the treatment should include:

Ideally, the prose of the treatment should echo the style of the video.

Helen Carmichael, Scriptwriting Department, AFTRS.

- The theme.
- The main story arc (i.e. the overall story development, without going into details).
- The main character arcs (i.e. the changes that each of the main characters will undergo).
- The style.

In describing your characters, you may include a couple lines of their dialogue.

For a documentary, the treatment presents the major topics planned to be covered, it outlines the sequences expected to be shot and lists possible interviews. Because of

No drama, no film.

John Lonie,
Scriptwriting
Department,
AFTRS.

the nature of documentary, where you often don't know what you'll find till you get there, the treatment is a guideline but not a total commitment.

The Script

Script is a general term which refers to a variety of shooting plans. It doesn't necessarily include either dialogue or narration. For instance, a program can be made up entirely of pictures set to music, but still it needs a script to say what happens and when.

The Draft Script

The draft script is often developed from the original treatment. It includes all the scenes, dialogue and action.

For training tapes, the draft script would set out, in program order, all the elements planned for inclusion in the production. Although some segments can't be tightly scripted because they're interviews or demonstrations, the major points to be made in them should be listed.

For documentary, the script's structure and content will probably alter during shooting and postproduction. Still, having a good script plan before going on location means the producer, director and crew have a clear idea of what they're looking for, and when the unexpected happens they can make good use of it.

Scripts go through many drafts before they're ready to be used. It's a process of gestation, consultation, rethinking and rewriting.

Throughout this process, the scriptwriter can benefit by consulting other people who have good critical judgement about scripts. The writer hones the focus of the script by taking on board and interpreting some suggestions, and rejecting others.

A script is never written . . . It is rewritten and rewritten and rewritten!

Brian Williams,
Western
Australian
School of Art
and Design.

This may involve tinkering with the script here and there, or even turfing out whole scenes and developing new ones.

Scriptwriters need to be able to accept constructive criticism and make use of the perspectives other people offer.

Scripts can go through six or more drafts before they're ready. In fact, a feature film script would almost never go through less than three drafts. So take heart and don't let the process get you down. It's a matter of working with a vision and a professional attitude.

A scriptwriter directs from the page.

Helen Carmichael,
Scriptwriting
Department,
AFTRS.

After all, what's the gain in shooting something that isn't as good as you can make it?

The Script Workshop

Sometimes a script benefits from being workshopped by a director and a group of actors. This process can include a final reading or performance in front of a live audience. Attending the workshops helps the writer to spot what sections work, so s/he can develop these parts further. It can also help the writer to spot the problem areas.

Workshopping is especially beneficial to writers who are at the beginning of their careers.

The Rehearsal Script

This is the final draft script. It may undergo some minor revisions and dialogue polish during the rehearsal period.

The Camera Script

This is the script that will be used during the shoot. It has all the camera directions on it and the shots are marked and numbered. Graphics and captions are also listed, and any special instructions are included.

An Example of Script Development Stages

Step One: Outline

VALDA attempts to renegotiate the household duties by trying out her new assertiveness skills.

Step Two: Treatment

VALDA stands at the sink, washing the dishes. CAROLINE enters the kitchen. VALDA decides to confront her about the unwashed dishes.

Step Three: Draft Script

1. INT KITCHEN DAY

VALDA stands at the sink washing dishes. 'Message to My Girl' by Enzo plays on a tape recorder on the counter between her and the fridge. VALDA turns and looks at the kitchen table which has more dirty dishes. She scowls as she picks them up.
CAROLINE passes the window, bopping to music on her walkman. She enters the kitchen, takes a slice of pizza from the fridge, and turns off the tape player.

CAROLINE: How can you listen to that stuff?

VALDA: Caroline, we need to have a talk.

Step Four: Camera Script for a Multi-camera TV Production

1. INT KITCHEN DAY

1. C 1 WS Room VALDA who's facing sink.   /

VALDA IS
LISTENING TO A
TAPE OF 'MESSAGE
TO MY GIRL' BY
ENZO. SHE TURNS TO
LOOK AT THE
KITCHEN TABLE.

2. C 2 MS VALDA   /

VALDA WALKS TO
THE TABLE AND
PICKS UP THE LAST
OF THE DIRTY
DISHES. SHE SCOWLS.

3. C 1 MLS VALDA   /

VALDA WALKS BACK
TO SINK & PUTS
DISHES IN THE
WATER.
CAROLINE PASSES
BY THE
WINDOW, BOPPING
TO THE
MUSIC ON HER
WALKMAN.

4. C 2 MS CAROLINE, follows CAROLINE from door, to fridge, to
tape player, to table.   /

CAROLINE ENTERS,
GETS SLICE OF
PIZZA FROM FRIDGE
AND TURNS OFF THE
TAPE PLAYER.

<pre>
                          CAROLINE: How can you listen to that stuff?
CAROLINE PLONKS
HERSELF IN A
CHAIR BY THE
TABLE.

5. C 1 MCU VALDA   /
                          VALDA: Caroline, we need to have a talk.
</pre>

TV Script Format

Different production houses use different script formats. But within a production house there's usually an accepted scripting style which writers are required to use. This consistency helps all the crew to find the information they need quickly, without having to adapt from day to day to every new script.

Basically, the shooting script needs to include these things:

For Each Scene

- The scene number.
- The location.
- Interior or exterior?
- Day or night?

For Each Shot

- The shot number.
- Which camera will do the shot.
- What is the shot size? How will it vary during the shot (zoom out, pan right, pull focus)?
- Who (or what) is in the shot?
- What is the action?
- What is said?
- What sound effects are needed?

Attached to a drama script is the scene breakdown, the cast list, the crew list and the shooting schedule.

Computer Programs for Scriptwriters

There are computer programs which assist writers in doing standard script layouts. They format the dialogue and instructions correctly, and can keep you from going insane with tabs and margins and capitalising character names.

Or you can use a good word processing program and learn to do the layout for yourself.

A Simple Script Format for Video Projects

When people are making a script for editing a simple video project, it's not necessary to use the full-on TV format. Often people just use three columns, like this:

TIME	VIDEO	AUDIO
2 minutes	Host opens with details about the upcoming parade.	Host mic only, then roll in music of 1st band.
3 minutes	Two bands pass, then dance group does choreographed routine in front of judges' stand.	Field sound of 2 bands, then voiceover of host describing development of dance routine.
1 minute	Insert pre-recorded tape of lead dancer accepting award.	Pre-recorded sound from awards ceremony

Danny Sheehy, Queensland School of Film and Television, Brisbane.

The three aims when writing corporate video scripts:

1. Aim at the emotions.
2. Aim for credibility.
3. Aim to convince.

Language for Narration or Voiceover

One form of scriptwriting is for narration, or voiceover. Some of the functions of narration are:

1. To give the audience an overview of the topic.
2. To explain a procedure which is being illustrated on the screen.
3. To provide links from one section of a tape to the next.
4. To draw attention to something the viewer might otherwise miss.
5. To explain the meaning or significance of a picture.
6. To summarise key points.

Stewart Klein, Scriptwriting, Department, AFTRS.

Write from the heart.

Narration is most easily understood by the audience if it's written in a conversational tone. So it's important to realise that people don't speak the way they write. They choose less formal words, and use shorter and more direct sentence structures. Convoluted wording is okay for written text, where the reader can go back

and re-read the sentence again a time or two. But narration has only one chance to make its point.

Check your narration script by speaking it aloud to yourself or, better yet, by having someone else read it out to you, to see if it sounds right. Does it sound like natural speech? Does it have the right rhythm? Does it convey the right tone for your chosen narrator? Is the mood right for the topic?

And don't overwrite. You don't need to fill all available tape spaces with words. Allow breathing space within the narration. Your tape can use music and sound effects to help tell the story, too. Let these elements have a chance.

Technical terms and jargon can be a problem because they'll be hard for your audience to grasp, and while the viewers are worrying about a particular word you've used, they won't be paying attention to the next sequence on your tape. The audience should be able to grasp the meaning of the video without strain or confusion.

So try to avoid any technical words you can. If you must use some, it can help your viewers to see them. You can superimpose them over non-critical footage, or put them up on the screen against a plain background.

The pictures and the narration should never compete with each other, and they shouldn't just duplicate each other. Each should add its bit without distracting from the other.

Suggestions from Rachel Masters

Write a three-minute script about a person or a subject which really interests you, someone or something which you feel passionate about.

Before you write your script, think about what it is that makes the subject interesting. As you write, try to explore the character, the event or the favourite place. Think visually. What images should be included? What does the person do that reveals their character?

Irony and juxtaposition are two very strong elements which can create a strong impact. Write a script, or plan a soundtrack, which will contrast with the visual images you have shot for your production.

Perhaps you could show a woman getting ready for work. At first she appears happy, brisk and enthusiastic. But as she narrates her thoughts she tells the audience of her unhappiness, boredom and worries for her future. The 'picture' the audience ends with is quite different from their first impression of her.

Or perhaps a scene of logging or of a forest being cleared could be overlaid with a poem about the beauties of the bush, and the sound of birds and wildlife. Try to develop tension and contrast between what you see and what you hear.

Stewart Klein, Scriptwriting Department, AFTRS.

I recommend you read *Screenwriting from the Heart*, by James Ryan, Billboard Books, 2000.

to get access via inter-library loan, and also scripts themselves.

Resources

A good book is *Scriptwriting Updated*, by Linda Aronson, Allen & Unwin, Sydney, 2000.

Also, contact the Jerzy Toeplitz Library, housed at the Australian Film Television and Radio School, to a wonderful collection of books on scriptwriting,

24 Doing Short Dramas

By Harry Kirchner, La Trobe University

Let's briefly compare two multi-award winning short films, both excellent but quite different in story form. Rachel Griffiths' *Tulip* (1998) has a storyline which follows dramatic conventions similar to the ones we might find in a feature film. The second, Jane Campion's *Peel* (1982), displays a quirkiness and open ended story more typically found in short films.

Tulip is about an elderly man whose wife has recently died, and how he overcomes the cow's reluctance to be milked. Tulip wants to be milked only by the wife, and despite his determined efforts to milk her, she becomes increasingly bloated until finally the man accidentally stumbles on a solution to the problem. He dresses in his wife's clothing, and the cow, now believing the man to be her old friend, allows the man to milk her. *Tulip* follows the conventions of many narratives. The man is faced with a challenge or obstacle. The man overcomes the obstacle and is also changed in the end in the sense that he comes closer to an acceptance of his wife's death. It has a three act structure: a beginning, a middle and an end.

Peel is a mini road movie about shifts in power within a family. The family are on their way home from a drive in the country where they have looked at a scrappy block of land. Everyone is a little disappointed and the son starts throwing orange peel out the car window to amuse himself and annoy his parents. The father stops the car and insists the son pick up the bits of peel. After the son finally accepts the father's ultimatum and returns to the car, he discovers the mother throwing peel out the car window from her own orange. The father and son gang up on the mother, and a stalemate results when the mother refuses to pick up her own peel. We leave the family on the side of the road and ponder the question as to who will eventually give in.

Jean Bain and Bud Tingwell as Ruth and Will in *Tulip*, directed by Rachel Griffiths and produced by Louise Smith.

Will has to think of a way to milk Tulip . . .

 . . . and he works it out! (Photos courtesy Louise Smith)

The endings of many short films are inconclusive. Successful shorts often depend on a clever, sometimes quirky, treatment of their subject matter, often more extreme than we might find in longer pieces such as television dramas or feature films. Short films also often employ exaggerated genre elements. One example of this is Alison Maclean's *Kitchen Sink* (1989), where our expectations and fears are milked to the maximum by devices skilfully borrowed from the horror genre.

Sometimes shorts comprise a series of self-contained vignettes with apparently little in common, like Jane Campion's *Passionless Moments* (1983). But notwithstanding the original idea, they all involve a screenplay which at some time, somebody has painstakingly written to a set of very specific conventions.

What Drives a Short Screenplay?

The best screenplays, whether they are shorts, teleplays or features, all involve ideas which are both character driven and story driven in a way that it's hard to tell which of these driving forces dominate. Whether something is 'story driven' or 'character driven', they are both sides of the same coin.

The family and friends in *Alone,* produced by the TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia.

Questions to Address

Consider the following theme or story pretexts:

- An injustice to be corrected.
- A danger to be faced.

For the character, these are translated into the following questions:

- What do I want?
- What are the obstacles in my way?
- How am I to overcome these obstacles?
- What are the consequences of my attempting to overcome these obstacles?
- Do I eventually achieve my goal?
- What have I learnt from my journey?

Screenplay Format

In the same way that architects are obliged to follow strict conventions in the expression of their design ideas, so too are screenwriters of drama expected to conform to certain rules. However creatively brilliant any screenplay is, it will nevertheless alienate potential collaborators if it is not laid out properly.

Attention to detail is paramount. This extends to whether notation is in upper or lower case, the placement of *parenthetical* instructions (instructions in brackets) in the right spot, the number of spaces between lines, and so on.

Screenplay Layout is not Rocket Science

Screenplay layout should be easy enough for anyone who's moderately computer literate. It just takes a basic grasp of word processing tools, like justification, line spacing, font formatting, tabulation, and the manipulation of headers and footers.

Don't Include Shot Sizes

It's rare for screenplays to contain instructions about shots. Instead, screenplays are similar to stage plays. Regrettably, there are 'how to' screenwriting books still in print which suggest it's acceptable (or worse still, desirable), for the screenwriter to indicate what kind of shot the audience is meant to be seeing: MCU (medium close-up), MS (medium shot) and so on. These days, this is *not* the screenwriter's job. This notation was used once upon a time in the days when writers and directors were contracted to Hollywood studios, and indeed is indicative of how the roles of both writers and directors have changed over the years.

Since the emergence of the *auteur* theory in the 1960s, when the director was beginning to be seen, rightly or wrongly, as the 'author' of the film, directors have gained more prominence as interpreters of the script. Suffice to say, it's up to the director to decide how any particular scene is to be *covered*—that is, what shots are to be used. These days, a writer may imply or suggest what the audience is to see, but not how to achieve it. If the writer is intending to direct as well, the same rules apply and the level of detail should be no more or less than if somebody else were directing.

Director Clodine Mallinckrodt explains the next scene to her actors and crew. Left to right: Walter Locke, actor; Clodine Mallinckrodt; Jill Reurs, first AD; and David Bachman, actor. On the set for *Dot Com Dementia*, Boston, MA, USA.

Layout and Language Conventions

The scene heading is sometimes referred to as the slug line.

The Scene Heading (or Slug Line)

A cursory glance at any screenplay will reveal the scene heading to be made up of:

- The scene number (on both sides of the page).
- Where the action takes place:
     Indoors = INT, for *interior.*
     Outdoors = EXT, for *exterior.*
- The location.
- The 'time' of day: DAY, NIGHT, DAWN or DUSK.

```
1.    EXT.   UNIVERSITY CAMPUS - DAY                              1.

      Establishing shot.


2.    EXT.   CAMPUS LAWN - DAY                                    2.

      Two students, LEE and PIP are finishing their lunch. PIP
      checks the time.

                                PIP
                 We should get going or we'll be late
                 for this lecture.
```
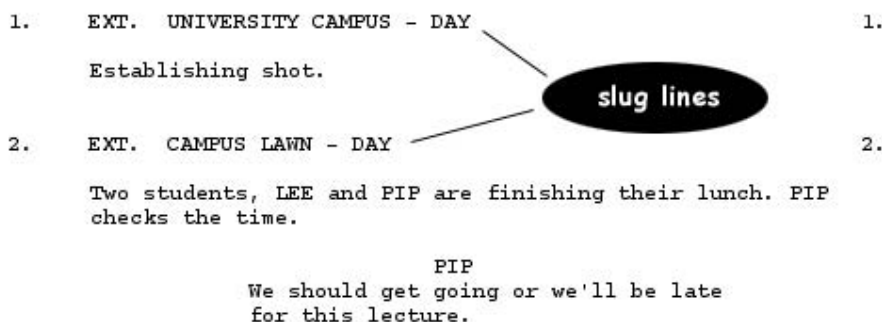
slug lines

It can be seen from the example that the body of any scene is normally single spaced.

And there are two line spaces between the slug line and the action; and three line spaces between the last line of a scene and the next slug line.

The Big Print

The description of the action is called the *big print*. The first rule is that the big print should always be written in the present tense: 'Bob comes down the stairs', *not* 'Bob came down the stairs'.

Big print should also be as economical as possible. Screenplay readers don't want to wade through masses of description. Writers experienced in prose fiction often overwrite their big print, finding it sometimes more difficult to adapt to screenplay writing than those who have written little or no creative prose. A screenplay is not a piece of literature.

Timing the Script

A screenplay should read at around the same pace that we might imagine seeing the film. A rule of thumb which is often used is that a screenplay should roughly play out at one minute of screen time per page.

Economy of Phrase

The best big print conveys meaning without being too mechanistic. In Callie Khouri's *Thelma and Louise*, for example, there's a wonderful piece of big print which refers to Darryl, Louise's husband: 'Polyester was made for this man.'

We don't know whether Darryl is short or tall, fat or thin, attractive or ugly. But we get a perfect sense of how the writer wants us to feel about this character.

The best way to get a feel for big print is to read as many screenplays as possible.

Study Your Craft

Although it's important to write down the gist of your story while you feel the impetus, it's also advisable to read other work in the screen genre you're planning to use.

Nobody in their right mind would seriously sit down and begin to write a short story, or embark upon a novel, unless they had read at least several short stories or novels—yet sometimes people feel they're equipped to write a screenplay once they've familiarised themselves with the layout conventions. You should study how other scripts are constructed in the genre that interests you. This way your mind will be tuned in to catch the devices used that make the script live and work. Actually, it's a good idea to read a broad range of screenplays when you're developing your craft.

Teach yourself by reading the sort of scripts you want to write. Evelyn Lowah works to achieve her dreams, School of Indigenous Australian Studies, James Cook University, Townsville, QLD, Australia.

Common Errors in Scripting

- Use of *morning, afternoon* or any time of day *other than* DAY, NIGHT, DAWN or DUSK.
- Dialogue centre justified (as opposed to left justified).
- Dialogue which extends all the way across to the right hand side of the page.
- No page numbers.
- Use of more than one font, e.g. page number font different from main text.
- Continuous big print or dialogue which extends over onto the next page.
- Use of shots or camera movement, e.g. 'close up of', 'zoom in on'.
- Use of backstory in big print, e.g. 'She looks out the window and remembers the time when'.
- Use of past tense in big print, e.g. 'Jane was the girl he liked the most at school'.

A Word About Writing Dialogue

First-time writers often enjoy writing dialogue, sometimes finding it fun to write large passages for their actors. There's nothing intrinsically wrong with this. It should be remembered, however, that it's a lot easier for a non-professional actor to remember one or two sentences before the other character replies than to have a character deliver a long passage of dialogue.

The practicalities of filming demand that actors must be able to repeat their lines. The longer the passage of dialogue, the more difficult it is for an actor to repeat lines.

Solution? Make your dialogue interactive throughout your script, with short passages for the characters. The longer the passage of dialogue, the more likely you'll have to be prepared to 'go again'. If the drama demands a long passage of dialogue, it's helpful to cover the action in a way that you're able to cut away to a reaction shot so you can use bits and pieces of various takes. If, when you're wearing the director's hat, you want to cover a long passage of dialogue with a complicated tracking shot, you want to be very confident that the actor can remember their lines.

Two problems solved for this shoot: to control the light, the upper windows of the room were blacked out with plastic, and to illuminate the actors' faces, lighting was set up in the middle hole in the table. *Dot Com Dementia*, Boston, MA, USA.

To get an eye-level camera angle around the boardroom table, the camera was set on a high hat. Leah Polacco, actor, on set for *Dot Com Dementia*.

On set for *The Spirit of Our Land*, by Mitchell Edwards, with Sharon Marshall on camera, Amber Dallachy and Barry Ugle, actors. School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Shooting a Short Single-Camera Drama

When shooting a drama in a television studio, several cameras are normally used. In this sense, *multicamera* television drama is a bit like staging a play. Individual cameras cover different characters and different parts of the action at the same time, so that the vision mixer switches to whichever camera is dramatically appropriate at the time. In short, the shots are cut to tape in real time.

What is Single-camera Drama?

However, feature films and most video dramas are usually shot *single camera*. That is, the same action is repeated several times, with the camera framing a different part of the action each time. Thus, the editor will have a choice of two or more shots to choose from when the scene is edited in the cutting room. This is more time consuming, but allows the editor to try out different ways of interpreting a scene, and to preview cuts before ultimately deciding on a particular course of action.

Even on large budget feature films, only one camera is normally used. The exception to this is when a shot cannot easily be repeated, for example, an expensive stunt such as blowing up a bridge. In this case, several cameras might be strategically placed to get different angles and shot sizes for use by the editor when cutting the scene together.

Coverage

Coverage is the technical term used to describe the shots a director uses to interpret a scene. In other words, they're the shots which are provided by the director for the editor to cut together in order to create the illusion that the action in the scene is happening in real time. Ideally, an editor will have a choice of more than one shot to use at any one time. Thus, any scene shot by a director will be subject to any number of interpretations by the editor. How is this achieved on set?

As we have already seen from the drama script example, single-camera scripts look similar to plays,

with perhaps a little more detail as to the action and 'business'—the physical things actors do such as picking up a coffee cup. (These moveable props are referred to as standby props.) Nevertheless, many scripts leave these physical actions for the director and actors to work out for themselves; this is not only acceptable but, arguably, preferable.

Arriving on Set

In student film and video, rehearsal is often considered a luxury, so let's assume the actors, crew and director have arrived on set, not having rehearsed the scene. Any good crew will be keen to get working, but in the initial stages, it's important that the director works through the whole action of the scene with the actors *before* addressing any technical matters, or any discussion of shots.

Inexperienced directors sometimes over-prepare. It's good to have an idea of how a scene might be interpreted, but invariably a director will be forced to think on their feet when they discover that the shots they might have imagined are not easily achievable. Storyboards can be useful, but they can also be a trap, especially when a director attempts to shoot a scene *in the same order* in which it appears in the storyboard. This will almost certainly be an inefficient way of shooting any scene.

The Dry Read

The director takes the actors through a *dry read*—that is, without any interpretation of lines (acting). This is to ensure that the actors can actually say the lines—sometimes harder than it might seem. (This can be done standing or sitting, but should not address any problems of props or physical movement at this stage.)

Blocking Out With the Actors

The actors play out the scene, sometimes a few times, moving about and using props to their satisfaction, and the director's, until it **feels right**. At this stage, the camera person is likely to be paying attention to physical movement through the set/location, and thinking about possible shots and implications for lighting. This is called *blocking out the action*, and does not normally involve the overall crew. Once the action for the whole scene is established, it's time to start thinking about shots, or coverage.

In professional work the scene may have been rehearsed and blocked before shooting day.

It is the director's job to create the most conducive working environment possible for the actors. Respect for the actors is the first lesson in good directing. Performers need confidence, and the director must provide a secure, protected, quiet, concentrated and creative environment on the set.

Tom Kingdon, Emerson College, Boston, MA, USA.

Decide on the Camera Coverage

The director and the cameraperson now discuss the camera coverage—what shots are to be used in capturing the action—and they arrive at a way of covering the scene. The

relationship between cameraperson and director invariably differs from shoot to shoot. Sometimes a director will defer to the cameraperson regarding advice on coverage. Sometimes the director will have a clear idea of what s/he wants, in which case it's the cameraperson's job to advise as to whether this is achievable or not. Please note that the role of the remainder of the crew up until this stage has been marginal—except that they will have been listening quietly, and thinking about their own roles in the process which is to come.

Explain the Coverage to the Crew

The director then blocks out the shots for the crew. But first, the **blocking out with the actors is repeated**, so the action for the whole scene is played out for the crew. Next, the director stops and starts the action, explaining what shots will be used, and in what order this will take place. (In professional crews, the First Assistant Director usually performs this task.)

Imagine a scene is to be covered in a wide shot, which in this case we'll call the master shot, then a two shot, then two medium close-ups. That's three shot sizes so far. There might also be a close-up—picking up the telephone receiver, for example. Please note that even if the director has envisaged that the telephone receiver shot might be the first shot the audience sees when the scene is finally cut together, this shot will probably be one of the last shots to be taped on the day. For the purposes of lighting and continuity, the order of shots taped on the day is usually from widest to tightest.

Once the crew is familiar with the entire sequence of shots which will be used to cover a scene, the shooting for the scene can commence.

Mark every take of every scene you do. Kingi Tahana, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Shooting the First Slate

A _slate_ is a camera set-up. A scene with four shots will have four slates. If an actor makes a mistake, or the director wants to _go again_ for technical reasons (camera or sound, for example), this becomes a second _take_. The clapper board (which is also sometimes called the _slate_) would then read: 3:1:2 (i.e. Scene 3: Slate 1: Take 2). Mark every take of every scene you do before you shoot it. When you're editing, it's much easier to find a take visually by these markers than to have to search through the tape and count them out each time.

For student productions, you can make your own slate to write on with whiteboard marker by covering a piece of cardboard with clear adhesive contact plastic. All the information on the slate should also be recorded on a logging sheet. In addition, you should have somebody mark up a copy of the script, for the editor. To do this, draw lines down through sections of the script, using various colours to indicate which lines and actions have been shot as a single (one actor only), a 2-shot (two people in the shot), a master shot (showing the whole action), and so forth.

But first things first. Let's imagine the dry read, blocking and order of coverage have already been explained to the crew, and we're about to shoot the first slate. Crews normally follow a defined series of protocols.

Crew Protocol

1. Shot decided upon by director.
2. Director informs crew, e.g. 'We're going to do an MCU of Emily'.
3. Cameraperson rehearses any camera movement with actor/s while remainder of crew observes quietly. Any cues are worked out during this process.
4. Cameraperson checks focus—zooms in and focuses, zooms out to required opening frame. *Focus pull* positions are marked if required. Camera calls 'Camera standing by'.
5. Sound person edges microphone in to find edge of frame and, taking into account any camera movement, establishes microphone positioning, leaving sufficient space for *safety*. Sound calls 'Sound standing by'.
6. Director calls 'Ready to go for a take'.
7. Slate person positions slate into shot.
8. Director calls 'Roll camera' or 'Turn over'.
9. Cameraperson calls 'Camera rolling' after record indicator is displayed in viewfinder.
10. Slate person counts down, e.g 'Five, four, three . . .' etc.
11. Director calls 'Action', and 'Cut' after shot has finished.
    If the camera operator or sound recordist makes a mistake, they should tell the director immediately at the end of the shot.
12. After the shot is completed, the director asks actors, camera and sound (in this order), if it was okay for them. 'How was that for camera?'. Director may decide to go on to the next shot (slate/set-up) or to go for another take. The director informs the crew if shot was *N/G* (no good, go again), *okay* (possibly go again), or *pref* (preferable, from a number of takes).
13. Slate person marks up the logging sheet and script, and marks up the new slate in advance for the next shot.

Dan Dow (director, floor manager and camera operator!) counts in the next sequence for the comedy *A Blackcurrent Affair*, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

In a professional crew situation, the continuity person would mark up the script, and the clapper loader (and sound recordist on their own individual sound sheet) would log the shot. Indeed, many of the roles would be highly specialised into departments. Nevertheless, many successful short dramas have been achieved with small crews. The demarcation of roles depends very much, of course, on the budget, goodwill and expertise of the crew.

It should be noted, however, that once roles and jobs have been determined at the outset, it's unwise for crew members to cross over into the areas of other crew members. This is especially important when working with actors, whose job is difficult enough without additional *help* from crew members other than the director.

Further Reading

The above is a thumbnail sketch of how a short drama production might be approached in terms of conception, scripting and *shooting any single scene*. Production management and scheduling are dealt with in other sections of this book, and although many of the same principles apply to both drama and documentary, *production management* for drama is an especially complicated process. Anyone seriously embarking upon a drama shoot should therefore be prepared to look at additional resources such as the Australian Film Television and Radio School's *Production Budgeting and Film Management* kit.

And also:

Douglass, John S. and Harnded, Glen, *The Art of Technique: An Aesthetic Approach to Film and Video Production*. Allyn and Bacon, Boston, 1996.
Jeffrey, Tom, *Film Business: A Handbook for Producers*. AFTRS, Sydney, 2000.
Seger, Linda, *Making A Good Script Great*. Samuel French, Hollywood, 1994.
Vogler, Christopher, *The Writer's Journey: Mythic Structure for Storytellers and Screenwriters*. Boxtree, London, 1996.

25 Preproduction

The preproduction period is that stretch of time between your commitment—or commercial agreement—to do a video project and the beginning of the shoot itself. Although this phase is less 'visible', and may seem less exciting, than the actual production time, the success of your video project depends largely on the amount of detailed care you take during this preparation period.

There are five keys to good pre-production:

Good preproduction is the best insurance you can get for a successful shoot. Tanith Carroll, TEAME Indigenous Television and Video Course, Metro Screen, Paddington, NSW, Australia.

1. Being able to **determine** what cast and crew, equipment and arrangements will be necessary for the success of the shoot.
2. Being able to **imagine** the possible difficulties in accomplishing the production, and finding the ways to overcome the difficulties or adjusting the production plans so the goals are achievable.
3. Being **thorough** in planning and in sorting out all the details. Never assuming things will turn out right by themselves.
4. Keeping **written records** so phone numbers, addresses, dates, quoted prices, location agreements, interview consent forms, and all the other details involved in a production can be accessed whenever necessary.
5. Allowing enough **time**, and **people**, to attend to everything.

Ask yourself 'Is it do-able?' If not, don't do it.

Philip Hayward, Macquarie University.

The Production Timeline

Your production will go through a number of phases. The first one is development (or **pre**-preproduction)—this is when the skeleton work is done for the project. It includes:

1. Writing the treatment and selling your idea to a funding body or buyer.
2. Writing the script and getting it approved.
3. Nutting out the budget (if you have one!).
4. Lining up a reputable crew (a commitment from a known director or camera operator is a good selling point).

> When shooting widescreen, you should always shoot the best format you can afford.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

> It's all very well to be an auteur, but it's very hard to get funding, past short film budget levels, without a producer.

Alison Wotherspoon, Flinders University.

In commercial situations, the development work must be completed before a project is given the go-ahead by whoever is commissioning it. Sometimes people are able to get grants or payment for this development time. Other times it's a labour of love (or desperation)—it's work time you gamble in the hopes that you can sell your idea to someone. People don't commit money to a formless inspiration floating around in your head, no matter how lit up your eyes are. You have to get at least a treatment in writing in order to sell it.

In a course setting, you still do this development phase, but it usually has to fall within the semester framework, so you can consider this within your 13-week production timeline.

Fixed Deadlines

The first thing to get clear on is how much time you have, all up. Often the one date you'll know for sure is when the project must be completed.

Once you know this, then you can count up how many weeks or months you have until then. That's the full extent of time you have to work with, and you must fit all production tasks somehow within this limit—or renegotiate the delivery date right away.

Within this time limit you schedule:

Preproduction Organising everything necessary for a successful production.

Production The shooting days, including any travel to and from the locations.

Postproduction Logging, editing the rough cuts, possibly doing some minor re-shoots (*pick-ups*), getting decisions and approvals for the fine cut, editing the fine cut, producing the soundtrack, dubbing the necessary copies.

Distribution Artwork for cassette label and cover, promotional brochures, organising details for the premiere screening—including venue, invitations, catering and press coverage. (For students, this may

Albert Kimaliakyuk, Cindy Rennie, Mariano Aupilarjuk (drummer), Gloria Kowtak, Henry Naulaq, Johnny Aupilarjuk, Sylvia Cloutier and Feliks Kappi, for the show Inuit Shamanism, in *Inuit Piqqusingit: Inuit Ways, Inuit Survival.* Rankin Inlet, Nunavut, Canada. (Photo by Kimberley Brown)

be simplified to getting your finished tape in the box on the lecturer's desk by noon on the day of the screening.)

Production managers often work backwards when constructing the production timeline, marking in the foreseeable deadlines and making best estimates on how long each production phase will take (or can be allowed to take). The way of thinking goes like this:

1. If the project has to be finished by 15 June (for example), and it will take three weeks for postproduction, then the shooting has to be finished by the third week of May.
2. The shoot will take two weekends (so schedule three weekends, to allow for hold-ups like rain, equipment breakdown, performers getting the flu, incorrect shooting time estimate, and so forth), so we have to have everything ready to go by the beginning of May.
3. That means that all the preproduction work (sites found and booked, equipment booked, transport arrangements completed, cast and crew finalised, and so forth) has to be done in April. But people will be away for Easter break in April, so that's going to be a push.
4. Which means the script had better be finished by the end of March, so we know what we're arranging for!!

Contingency Time

Though this may seem laughable to students juggling a full semester of course work, it's a very good idea to allow a little extra time (contingency time) at the end of each section of the schedule.

You see, even if your production relied solely on you, it would be a good idea to have some flexibility. But when you're juggling the schedules and needs (health, emotional and academic) of an entire crew, things almost never work out entirely according to your original schedule. Being able to adapt quickly, and to imaginatively surmount the insurmountable, is what's required.

Some Standard Tasks of Preproduction

Though every shoot has its own particular require-ments, there are certain generic tasks which need to be done during preproduction.

1. Finalise the script and storyboards. Photocopy and distribute them.
2. Draw up the production schedule.
3. Engage the key creative team.

Make sure everyone is clear on what will be happening. Claudine Sartain discusses plans for her interview with Pauline Clague for *XX Live*, Channel 31, Sydney, NSW, Australia. (Photo by Michelle Blakeney)

Julie Booras, Offspring Productions.

I think it's extremely important BEFORE shooting video to think about how it's going to be edited together. If you're shooting a talking head interview that you will need to edit down, what material will you use to cover those edits? You might want to think about shooting some interesting B-roll. If you're shooting dialogue between two or three people, do you have the coverage necessary to edit your scene together successfully?

Philip Elms, Media Resource Centre.

Plan postproduction effects in preproduction.

Don Bethel, Consultant, Television Production Techniques.

Never leave to the day those jobs that can be done the day before!

4. Have discussions with the camera operator and the designer about the look of the video and how it will be realised. Order sets to be constructed, props found, wardrobe found or made.
5. Organise insurance coverage, bookkeeping and payrolls.
6. Book the cast, negotiate contracts.
7. Book the crew, negotiate contracts.
8. Conduct preproduction meetings with crew to make sure everyone knows what's going to happen and to allow for their input.
9. Book the equipment, buy the videotapes.
10. Check out possible locations (*site checks* should be done by the director, cameraperson, sound operator and safety officer).
11. Choose the locations, obtain permits and clearances where necessary.
12. Book interviews, if needed.
13. Make the arrangements for travel, food and accommodation.
14. Arrange and conduct performance rehearsals prior to camera rehearsals, when needed.
15. Ensure that sets are being built according to design decisions, and that they'll be completed on time.
16. Get artwork done.
17. Make and distribute call sheets for shoot days— these tell everyone where and when they'll be working.
18. Check that all props have been found, that wardrobe is complete.

As you can see, this list is long, and it's still not all-inclusive. The point to remember is that anything that's overlooked can give you big problems on the shoot.

Crew members often can contribute ideas which make the final product better. Erika Addis, Bernard Purcell and Deborah Klika discuss camera coverage plans for *Bernie's World*.

Problems to solve ahead of time

Another aim of preproduction is to think ahead, and foresee problem areas so they can be sorted out before the actual shoot begins.

Scripts need to be read carefully for any built-in challenges, and props and staging issues should be tackled early, while there's a hope of managing them.

Hamilton Secondary College, as is their wont, came up with a superb response to a script which required an under-age driver.

Does your script require a lad at the wheel?

Work out the camera angle you need and then . . .

. . . solve how you'll achieve it. Shooting '*And she said . . .* ', Hamilton Secondary College, Mitchell Park, SA, Australia. (Photos by Liesl Cosh)

Each of the umbrella categories in the preproduction checklist covers a wide number of individual tasks. A good example of this is the site check.

The Site Check

The site check, which is also known as the *location recce* (for reconnaissance), is the careful assessment of the planned shooting location to figure out what problems it could pose to the production. You can expect there will be *some* problems, and you may find there are so many that a better site needs to be chosen.

It's amazing how many beginners blithely grab a camera and rush off to a shoot, with only the sketchiest idea of what the location will be like. Sometimes they're lucky and get great results, but many times they're faced with difficult or impossible conditions.

This could mean a very trying shoot, last-minute changes to the storyboard, unfortunate compromises which handicap the realisation of the project idea, and sometimes outright failure.

It's always easy to rush into a shoot, and sometimes, if you need to catch a news event, it may be warranted. But taking the time to think about the purpose of the shoot and what you're attempting to achieve can be rewarding in the long run. Go to locations before the shoot and prepare a thorough recce plan.

Rachel Masters, Corporate Training Coordinator, SBS.

So **always** do a site check.

Note: Be sure to do your site check at the time of day, and day of the week, that you plan to do your shoot, because many things at a site change as the time changes.

With outdoor sites this will be true of sun position, for sure.

Ambient noise level usually varies, depending on what goes on at or near the site, and sometimes there are dramatic external factors, like aeroplane flight paths, school playground noise and building construction, which render some sites useless at some times even though they're fine at others.

Power

IS AC ELECTRICITY AVAILABLE?

- How many power points are there?
- How far are the power points from the shooting site? (Which means, what lengths of electrical extension cable will be necessary? And how many multisocket connection boards will be needed to plug everything in?)
- Where is the fuse-box? The circuit breakers? Who will be around to help with electrical supply at the time of the shoot? (Make friends with the caretaker.)
- How much electrical load can the circuits carry? Will your proposed lighting set-up overload this?
- What about safety? Will the shoot need a licensed electrician to be present?

IF NO AC POWER IS AVAILABLE

- How many batteries will be needed?
- How can batteries be recharged during the shoot?
- Can you use the car battery?
- Would a battery belt be useful?
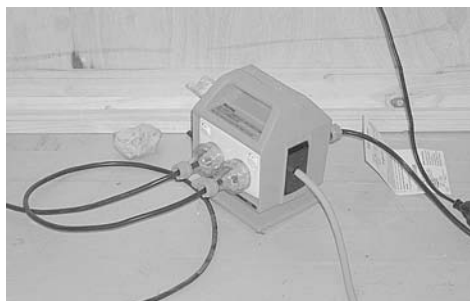
How much capacity will you need for plugging in equipment? Bring along enough extra sockets!

If battery power will be insufficient:

- Can a generator be used instead of batteries?
- Where could you get a generator locally? How much would it cost?
- Can it be positioned out of range of the microphones?

Light

Outdoors

- Will sunlight be sufficient for the shoot? If so, where is the sun in the morning? In the afternoon? Does the position of the sun restrict the times when the site is useable?
- If you need any big location feature, like the front of a building, to look its best, at what time of day is the light right for this?
- Where are the shadows at the different times of the day? Will shadows be a problem to the shoot at any time? Will reflector boards be necessary to bounce light into deep shadows? Or will lights be needed?
- Will the sun be so bright that some screening will be necessary? What about an ND filter for the camera?
- Are additional portable lights needed? How large an area needs to be lit? What quality of light is called for?
- Will any colour correction (gels) be necessary due to light sources of different colour temperatures?

Where will the sun rise? Where will it set? How will the shadows fall at the time you'll be shooting? Should you shoot early, late or at midday? Andrew Belletty and Peter Johnson consider a site, Australian Film Television and Radio School.

- What sunlight will be available?
- What other lights will be available? Are any of the available lights unusable? For example, fluorescent lights often give a green tinge to the image, so they should be avoided if possible.
- Will any wall or ceiling surfaces be useful for bouncing light? Or are their colours wrong?
- How large an area needs to be lit? What quality of light is called for?
- Will any colour correction (gels) be necessary due to light sources of different colour temperatures?

Visuals

- Does the scene contain sacred sites which you should not be videoing?
- Are there electrical power lines strung across the view?
- Is there a building which is inconsistent with the set design?
- Are there billboards or signs which could be a problem? Can you shoot around them?
- Is it possible to get the view you want from the camera? Can the crew safely get to the right position? Check this by going to the spot yourself. Does the view look the way you want it from there?

How many mics will you need? What sort? Clyde Williams, of *Black Ebony.* (Photo by Michelle Blakeney)

Sound

You need to think of both the sound you'll want to record, and the sound that's inherent to the location.

AMBIENT SOUND

What are the ambient sounds at the time of day and the day of the week when the shoot will happen?

- Will planes, trains or automobiles cause unacceptable disruption to the sound recording process?
- Is there a construction site nearby? A stadium or race track with amplified sound? Any other uncontrollable source of sound?
- Are there objectionable sounds which can be avoided by planning ahead? For example, can the airconditioner be turned off, can the phone be left off the hook, can the shoot happen after the nearby playground is emptied for the afternoon, can the street be temporarily closed off to vehicles? What day are the lawns mowed?
- Will the rhythm of unavoidable background sounds cause problems in editing dialogue? For example, ocean waves, though soothing to listen to, pose difficulties when editing. This is because their rhythm is so noticeable that when one actor's line ends on a wave crest, the next edit has to begin on a similar wave crest or the change in the background sound will be jarring.

MICROPHONES

- What microphones will be necessary to capture the sound required by the shoot?
- How many microphones will be needed?
- Can these microphones be correctly placed given the limits of the site?
- How much mic extension cable will be needed?
- Will special mic supports or booms be needed?
- Will an audio mixer be needed? If so, will an additional sound operator be required?

SOUND EFFECTS

- Can all the sound effects be recorded during the shoot? Or will some need to be done at another time?
- Are any needed effects impossible to record at the site? Will foley effects be required? (Foley effects are those sound effects recorded in a studio.)

> Record any wild material you can while on location. That's much easier than coming up with it in sound postproduction.
>
> **Jane Paterson**, Sound Editor, AFTRS.

Access

VEHICLES

- How will people get to the site? Is it near public transport?
- What sort of vehicles will be needed? Four-wheel drive?
- Do crew members have these vehicles or do they need to be rented?
- Who can drive the required vehicles? Do these drivers have valid licences? Does anyone need to get trained and certified ahead of time?

PARKING

- What parking facilities are available?
- Are parking permits needed? What do they cost? How do you get them? Who will get them?
- Is the parking lot supervised or not? Would the attendant be able to give instructions or directions to later arriving crew members?

> It doesn't matter where you come from or how many times you've done it, always go for local knowledge. Ask around.
>
> **Richard Fitzpatrick**, Camera Operator, Digital Dimensions,

UNLOADING

- Where can the gear be unloaded from the vehicles?
- Is there a time limit on how long you can stay in the unloading area?
- What's the most convenient pathway to carry equipment to the set? For example, which door is closest to the right lifts or stairways inside the building?

SHELTER

- Where can the cast and crew rest?
- Can people get out of the sun, or do you need to bring a tarpaulin or tent?
- Can people and gear get out of the rain?

TIMES

- Are there restrictions on times of arrival and departure?
- Is the park only open till dusk? Does the building close at the end of business hours? Does the crew have to use the site only when the public is not there?
- Are other times important to consider? Does it matter when the tide is high or low? Does it matter when it's peak hour?

PERMISSIONS

- Is it necessary to get permits for the use of this site? If so, how do you get the permits? What do they cost? How long does it take to get them? Who controls them?
- Who holds the key to the building?
- Does the location owner know about the shoot?
- Have the police been advised?

A chain reaction: Video production is a constant process of decision making. Every decision you make from the preproduction phase affects everything that comes after. Every decision made while shooting affects editing decisions, and so it's like a chain reaction. The preceding link affects the following one.

Marc Tewksbury, The Nine Video School.

FACILITIES

- Where are the toilets?
- Where are shops for food? Emergency supplies?
- Where can people stay overnight?
- Where is the nearest medical facility in case of an emergency? What is its phone number?
- Is there any suitable place for playback?

How's that for starters? And the site check is only one element of preproduction.

Rearranging a Location Set-up

There are times when the site check can alert you to problems which can be changed by acting early and using some diplomacy. Here's a good example:

> *You've been asked to videotape the wedding of a friend. You're happy to use your new skills to do this, and by now you understand that video skills go far beyond camera operation and include many other things, including good preproduction practices. So you agree, but say you need to have a look at the wedding site a couple of weeks ahead.*
>
> *It turns out that the wedding is to be held in a relation's home that you've never been to. Since you've made your request early, your friend manages to schedule a visit before all the hoopla begins. Your friend's aunty leads you cheerfully out to the back verandah, which has a northerly aspect and overlooks the bush. She beams with pleasure when you tell her it's a beautiful site for a wedding, and how generous of her to offer her home.*
>
> *'And how will you have it arranged on the day?' you ask. (This is the key question.)*

'Well, we thought we'd have the bride and groom standing here facing everyone,' she says, gesturing to the west end of the narrow porch, 'and have the chairs lined up in rows facing them.'

'Oh,' you say softly. Your mind is racing—it's your first wedding and you get the worst case scenario!

'Hmmm,' you say, looking thoughtful and professional. 'The wedding will be at four in the afternoon, right? And that's the west side of the house. Which means the sun will be shining directly in at a low angle from that side. You know what will happen? The brightness of the sun will make the camera's iris close down and the bride and groom will just be silhouettes.'

'Oh no!' says the aunty, surprised and genuinely concerned. 'We want the video to be good so we can send it to his grandparents, who can't come.'

'What if . . .' you say gently, 'what if we have the bride and groom standing on the east side of the verandah facing everyone? Then the afternoon sun will light their faces and all the colours will be beautiful.'

'Of course! Will that fix things?' says Aunty with relief. 'It doesn't really matter which way we set it up. I just pictured it the other way so the frangipani would be in the picture.'

'Well, we'd get that in silhouette, too,' you say matter-of-factly. 'But I could get a beautiful shot of that for you earlier in the day by looking in at the verandah from the west side to show all the flowers and decorations. I could do that before everyone arrives.'

'That would be great. I'm so glad we got this sorted out ahead of time.' And then you have the obligatory cup of tea.

The shoot is salvaged from disaster—and you've rescued yourself from considerable embarrassment.

If you're shooting a wedding, you can't do a reshoot. Ensure that you know as much as you can about the site and the plans ahead of time. Ron and Doreen Cooper.

In contrast, can you imagine the other possible scene?

You arrive at the house 20 minutes before the wedding party does. The aunt is in the kitchen taking headache tablets and fanning herself. She's visibly shaking, but when she spots your camera she quickly ushers you out to the verandah. It's been lovingly decked out with crepe paper streamers and baskets of flowers. Sixty folding chairs are facing west towards an arbour of ivy and tiny white blossoms which have been wired onto a large rented arch. And the huge wedding cake is sitting on a table at the east end of the verandah. The doorbell rings and the aunt hurries off.

You sit down because your knees are shaking. 'It's my first wedding and I get the worst-case scenario!' Do you:

(a) Rush out and tell the aunt that the video will be ruined unless everything is rearranged to face in the other direction?

(b) Tape the wedding as it is, knowing that the ceremony part will look awful, and try to think of what other shots you can get to partially salvage the situation?

(c) Leave quietly through the back gate?

(d) Awake from this normal anxiety dream knowing that you've done the site check and everything will be right on the day?

Choosing the Crew

Video is not a lonely-writer-in-a-garret activity. It's a group effort that benefits from the skill, ideas and commitment of every crew member. For people to give their best, they need to feel that they're working in a well-assembled team, that the director has a clearly focused goal, and that their individual contribution is valued and supported.

Crew Size

The size of your crew depends on the logistics and complexity of your production.

Documentary crews sometimes need to be very small, so they can move around quickly, use only one or two vehicles, and not take up too much space on location.

Drama features seem to have a cast of thousands behind the camera as well as in front of it. (Give some thought to the credits at the end of the next feature film you watch, if you want to think mega-crew.)

If your project is small, crew members can sometimes double or triple up on roles. Your production assistant during preproduction might also look after props/wardrobe ahead of time and be a driver on the day of the shoot.

But on larger shoots, many jobs have to be done all at once, so you need a person looking after each role. Even if that person will be inactive and waiting around at times. (Patience is not just a virtue, but a requirement in this industry.)

It's a false economy to undercrew a shoot. Trying to fix up things that went wrong because you were short one or two people will cost you much more in money, psychic energy, or both, than it would have to book a full crew for the day.

> For professional work, never try to interview someone and also operate the equipment. Thoughtful on-camera documentary interviews require *at least a two-person crew*—one to relate to and handle the interviewee(s) and one to focus on the equipment.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

Who to Choose

There are several things to consider when choosing crew members:

1. Does the person have the skill and experience to do the job well?
2. Will the person give a full commitment to the success of your project?
3. Will the person take direction from you?
4. Will the person get along with the rest of the crew?
5. Will the person act responsibly and professionally on the day?

You should be able to answer yes to all of these questions.

Crew Dynamics

A crew is like a living organism: if one part of it isn't functioning well, the whole being feels sick and is dragged down.

There's a saying, 'People choose friends for their faults, not their good points'.

The idea is that no matter how much you like and admire a person, if he or she has a fault you cannot abide, then you'll never be friends with that person. On the other hand, you can hang around for years with a person who has faults you can live with.

Like any saying, it has its truths and its limitations. But in this case, it means that crew members should be chosen with an eye to the way they'll interact with the other people you're choosing.

Note that the emphasis is on *the way they'll interact.* Crew members with a professional attitude can function well on a job even when they don't really like another crew member. Being courteous and respectful of each crew member's skill, and getting on with your own job the best way you know how, is part of the discipline of being professional.

A harmonious crew will produce much better work than one torn by irritations, jealousies and intolerances. For someone to deliberately bring ill-feeling onto a shoot is unacceptable.

In extreme filming, you have to be totally competent at what you're doing before you add a camera to the activity. No-one should be filming who's new at the sport. I reckon a person should have a couple of hundred dives under their belt before they try to do underwater filming.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Working collaboratively and developing creative teams is one great thing you can get out of tertiary training.

Alison Wotherspoon, Flinders University.

Michelle Blakeney interviews Toni Janke for *XX Live*, the women's show, for Community Channel 31, Sydney, NSW, Australia. (Photo by Claudine Sartain)

When you choose your crew, use both the information you can get about their job skills and about their people skills. Your intuition may be a good guide for your choices.

Camera operators David Poisy and Kimberley Brown with excellent throat singers Napatchee Pootoogook (left) and Qaunaq Makkigak (right), Cape Dorset, Nunavut, Canada.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Film crews can be so arrogant and they end up burning their bridges in communities. You should always be mindful of people's needs and be as little disruptive as possible. Work around their daily lives.

Sensitivity to the People in Your Video

How would you feel if some people you barely knew came to your workplace, or even worse, to your house, and wanted to ask you a lot of deep and meaningful questions?

You might feel upset and invaded.

If you liked the people, you might want to help them out and do a good job with the interview, but you still might feel nervous and hear yourself giving stiff and awkward replies.

Alternatively, how would you feel if one or two of the video people had visited you a week earlier and had a relaxed discussion with you about their project and why you were chosen to be in it?

What if they'd shown you some of their materials and told you a few stories about why they'd chosen this topic and how things were going for them so far?

What if they told you things about themselves which made you feel that you all had some common interests and values?

How can the actions of the crew help to relax the person being interviewed? A production by KINO, University of New South Wales, Kensington, NSW, Australia.

What if their manner made you feel an intuitive trust in them, sensing that they would consider you when they did the editing and not show things in a way that would make you lose face?

What if they offered to give you something in return for your time and effort—like a copy of the video once it was done?

Now say you were the videographer in this story. Under which circumstances would you get the best video, with the most natural look and the greatest amount of information coming forth?

Under which circumstances would you enjoy the shoot and go home happy and feeling like everyone else was happy, too?

Lists and Forms: Building on Experience

One way to make preproduction both easier and more certain is to develop lists and forms which you can use for each new shoot. For example, compile a list of the video equipment you need for a basic shoot. Your personal list will probably contain the items which you know how to use and have ready access to. It doesn't matter if it's your own camcorder, or the local access centre's SVHS gear, or the up-market video hire service's Betacam rig. This list comprises what is functionally *your* gear.

During postproduction, one often asks, 'What went wrong?' Everyone has problems or makes mistakes. The real trick is to learn from your experience. The best time to head off problems is during preproduction, before you've gone down the track too far.

Creating standard forms for use in preproduction can be a good start. Why not create your own version of a call sheet, a recce and location plan, shotlist, logging sheet and edit sheet? You can create the sheets using your own invented production company name. With customised sheets you'll look very organised and professional.

Rachel Masters, Corporate Training Supervisor, SBS.

Plan out how you'll handle the risks of each scene. Be prepared for what could go wrong. On-site shooting, Digital Dimensions, Townsville, Qld, Australia.

After listing the basics, like camera, tripod, microphones, headphones and light kit, you list those essential little accessories which must not be forgotten. You'll learn through experience (or even—could it be?—thoughtful foresight) what these bits and pieces are. For example, it may be that your headphones can't plug into the camera without a *phone-to-mini* adaptor, or your microphone needs an *XLR-to-mini* cable in order to connect it to the camera.

Without these adaptors your equipment set-up won't be functional, but they're small and easy to overlook. It's not only easy to forget them when you're booking the gear, there's always the risk of forgetting to take them to the shoot, or forgetting to bring them back with you when it's all over. So this one list can help you check your gear at several different times during the project.

You could make a secondary list of the less commonly used pieces of equipment, under general categories like lighting and sound. This will assist you in drawing up your equipment list for more complicated shoots. That way, during quiet, un-pressured times, you can put some good thinking to long-term use. There's no point in reinventing the wheel, or anything else, during actual prepro-duction—you'll have enough else to do.

Other forms that are useful to have on file are:

- Production schedule sheet.
- Call sheet.
- Consent forms.
- Basic contracts.

> When doing commissioned work for overseas companies, there's a lot of paperwork you have to do relating to insurance indemnities. I have to write out protocols for extreme shoots. Be prepared to write out huge standards and procedures, and program risk assessments. It's a nightmare, but it makes you think about what you're going to do. Like when we work with snakes, we have to phone the hospital and make sure they have a supply of anti-venom. We once had a snake bite on a shoot. We had a helicopter on call for the shoot and the snake handler was medivac-ed out of the Tablelands. You know, we used the sequence in the doco, it was great TV!
>
> **Richard Fitzpatrick**, Camera Operator, Digital Dimensions.

A Basic Call Sheet

HOSPITAL:	AMBULANCE:	FIRE:	POLICE:

A F T R S
AUSTRALIAN   CALL SHEET: DAY:
FILM   DATE:
TELEVISION &   . . . .   M/U & W/ROBE CALL:
RADIO   DIRECTOR: CREW CALL AFTRS:
SCHOOL   CREW CALL LOCATION:
    . . . .
    PROJECT#:. . . . .   PRE-LIGHT:
    EST. WRAP:
    SUNRISE:
    SUNSET:
(02) 9805 6611   EST. SCREENTIME:

SETS LOCATIONS: . . . .

WET WEATHER CALL

SCENE/ PAGE	D/N DUR	INT EXT	SET/LOCATION SYNOPSIS	CHARACTERS	ARTIST	P/U	M/U	ON SET

PROPS:
ART DEPT:
PICTURE VEHICLES:
LIVE STOCK:
ADDITIONAL CREW:
STUNTS/SAFETY:
SFX:
SPECIAL REQUIREMENTS:
CATERING:
MOVEMENT ORDER:
PARKING:
TRANSPORT:
RUSHES   (EXPOSED):
        (SCREENING):
WET WEATHER COVER:
ADVANCE SCHEDULE:
NOTES:

Sample Consent Form

Australian Film Television & Radio School

RE: STUDENT FILM/TELEVISION PROJECT
I . . . .
hereby give my consent to be filmed by the Australian Film Television & Radio School. The
footage is to be utilised in the making of . . . .

I also agree that the School may use the aforesaid film in whole or part in the final version
of any motion picture film or television program either as a sequence on its own,
or preceded, interlaced or followed by such other material as the School may desire.

Signed: . . . . Date: . . . .

Name & Address (please print):

. . . .

. . . .

. . . .

. . . .

. . . .

Cnr Epping & Balaclava Roads, North Ryde NSW
Postal Address: PO Box 126 North Ryde NSW 2113
Tel: (61) 2 9805 6611 Fax: (61) 2 9887 1030

Performer's Clearance Form

Australian Film Television & Radio School

TO: . . . .
Australian Film Television & Radio School

RE: 'NAME OF FILM/VIDEO'

I, ... acknowledge receipt of $ . . . /$NIL* as full payment
for my contribution and performance for the production of a sound recording for use
on the soundtrack of cinematograph films or television programs.

I acknowledge that I have no right, title or interest in the sound recording containing
my performance.

SIGNED: . . . .

DATED: . . . .

*delete one

Cnr Epping & Balaclava Roads, North Ryde NSW
Postal Address: PO Box 126, North Ryde NSW 2113
Tel: (61) 2 9805 6611 Fax: (61) 2 9887 1030

Sample Request for Use of a Site

University of Technology, Sydney
PO Box 123
Broadway NSW 2007
Australia
Tel +61 2 9330 1990 Fax +61 2 9330 1551

Media Centre
Faculty of Humanities and Social Sciences
PO Box 123
Broadway NSW 2007
Tel: (02) 9330 2282 Fax: (02) 9330 1041

REQUEST FOR USE OF SITE

The bearer . . . . , Student Number . . . .
is a student in the Faculty of Humanities and Social Sciences. S/he is seeking your cooperation
in carrying out photography; film production; video/audio recording as part of her/his course
work at a site owned, leased or controlled by yourselves namely:

. . . .
Should you grant permission for use of the site, the University's insurance policies cover the
following contingencies and the University will meet claims arising from these, subject to
negligence on your part:

Accident or injury to the student, and to his/her unpaid individuals (whether or not these
persons are students of the University) whilst on the site or travelling to or from the site;

Accident or injury to third parties at the site arising from the student's use of the site;

Damage to the site and to property thereon, arising from the student's use of the site.

Occasionally a student's work may involve potentially hazardous situations. These include, but
are not limited to, use of inflammables, firearms and copies thereof, stunts and any aerial or
marine recording/photography/filming. In these instances, the student is obliged to disclose
fully such situations when seeking permission for use of the site, and to present, prior to use
of the site, authorisation from the University's insurers that the policies apply to their work.

If you require any further information, please contact the undersigned on . . . . or the
Universities Asset Control Officer on . . . . The University will not normally issue any
further documentation regarding the use of the site, except as required by the previous
paragraph.

We request that you state permission for use of site in writing—the form overleaf may be used,
with the original being returned to the student and copy retained by yourselves.

Yours faithfully,   Date . . . .

Officer City campus, No 1 Broadway, Sydney NSW
Campuses City, Kuring-gai, St Leonards

Used with the permission of University of Technology, Sydney.

Sample of Site Agreement

University of Technology, Sydney
PO Box 123
Broadway NSW 2007
Australia
Tel +61 2 9330 1990 Fax +61 2 93301551

Elizabeth Jacka
Dean
Faculty of Humanities and Social Sciences
PO Box 123
Broadway NSW 2007
Tel: (02) 9330 1926   Fax: (02) 9330 1041

AGREEMENT FOR USE OF SITE

I, ...
being (tick one)

                owner of
                lessee of
                a duly authorised person in relation to the site

give permisssion for . . . .
a student enrolled in the Faculty of Humanities and Social Sciences of the University of
Technology, Sydney, and for . . . . unpaid individuals to use the site at:

. . . .
. . . .
to record, film or photograph in pursuance of his/her course requirements, on dates to be
agreed between us.

Permission is given to the University of Technology, Sydney agreeing to meet claims arising
from accident and damage, as stated in its attached letter.

. . . .
Signature of Authorising Person   Signature of Witness
Date   /   /   Date   /   /

. . . .
Position—if signing on behalf of company, other organisation, government department or
instrumentality.

. . . .
           Name   Witness Name

. . . .

. . . .
          Address   Witness Address

Office City campus, No 1 Broadway, Sydney NSW
Campuses Balmain, City, Kuring-gai, St Leonards

Used with the permission of the University of Technology, Sydney.

Location Survey Checklist

Australian Film Television & Radio School
Cnr Balaclava & Epping Roads
NORTH RYDE NSW 2113
Phone: +61 2 9805 6611   Fax: +61 2 9690 1283

PRODUCTION TITLE: . . . . INTERIOR/EXTERIOR: . . . .
. . . . SCENE NO. . . . .
DIRECTOR: . . . . WEATHER/TIME . . . .
. . . . DAY/NIGHT/D for N . . . .
 REC. BY: . . . . FILMING DATE(S) . . . .

LOCATION . . . . ADDRESS . . . . FLOOR NO. . . . . MAP REF	LOCATION FEE . . . . TERMS OF PAYMENT . . . .

CONTACT . . . .
      WORK PHONE . . . .
      HOME PHONE . . . .
CONTACT . . . .
      WORK PHONE . . . .
      HOME PHONE . . . .
	COUNCIL CONTACT . . . .
	      PHONE . . . .
	POLICE CONTACT . . . .
	      PHONE . . . .
	OTHER CONTACT . . . .
	      PHONE . . . .

TOILETS . . . . PORTABLE? . . . . WARD/MAKEUP . . . . TELEPHONE . . . . ACCESS . . . . KEYS REQUIRED . . . . HOURS OPEN FOR BUSINESS . . . . USE OF PREMISES (DAYS) . . . . (HRS) . . . . REHEARSAL/PROPS ACCESS . . . . ELEMENTS RE LETTER OF INDEMNITY	USE OF LOCATION . . . . PROP AT PRESENT . . . . PROPS NEEDED . . . . SECURITY NEEDED . . . . SPRINKLER SYSTEM/ HEAT SYSTEM . . . . TURNED OFF . . . . NEIGHBOURS CONTACTED . . . . SCRIPT FORWARDED . . . . INSURANCE POLICY FORWARDED . . . . . STRUCTURAL CHANGES OR ADDITIONS . . . . VISUAL PROBLEMS NEON SIGNS . . . . OTHERS . . . . NOISE PROBLEMS . . . . SPECIAL EFFECTS . . . .

FLOOR PLAN (Windows & Doors)	ACCESS (Parking, Signs, Loading Zones)
FUSE BOX DIAGRAM (attach polaroid photograph for electrician)	NOTES/PICTURES

Insurance Indemnity Form

University of Technology, Sydney
PO Box 123
Broadway NSW 2007
Australia
Tel +61 2 9330 1990   Fax +61 2 9330 1551

TO BE AUTHORISED BY INSURANCE OFFICER
REFER to MR KEITH REICHENBACH
Indemnity

UNIVERSITY OF TECHNOLOGY, SYDNEY (hereinafter 'the University')
in consideration of its having requested and been granted permission by

. . . .
(name of organisation)
(hereinafter **'the receiving organisation'**) for . . . .
(state numbers of staff)
members of the University's staff and . . . . students of the Faculty of
(state numbers)
. . . . , plus . . . . voluntary
(state Faculty)   *(state numbers)*
workers to visit . . . .
(state site and site address)
(hereinafter **'the site'**).
Indemnity period from . . . . to . . . . (inclusive).

HEREBY AGREES that if any such member of staff or any such student or voluntary worker
sustains injury or damage to his/her property or person however caused whilst visiting the site
whether or not such injury results in or contributes to his/her death AND/OR if any act of any
such member of staff or student or voluntary worker causes any damage, or loss to the
receiving organisation AND/OR if any claim is made against the receiving organisation as a
result of granting this permission AND/OR the excercise of this permission if liability would be
attached to the University notwithstanding the terms of this permission THEN IN EVERY SUCH
CASE the University will release and indemnify and keep indemnified the receiving
organisation from and against all actions, claims, damage and loss that have arisen or that may
at any future time arise therefrom.
DATED this . . . . day of . . . . 20 . . . .

State the names of all students,
staff and voluntary workers going
on to the site: . . . .
                                                             AUTHORISING OFFICER

. . . .
. . . .
. . . .   Office City campus No 1 Broadway, Sydney NSW
                                                        Campuses Balmain, City, Kuring-gai, St Leonards
. . . .
(Please attach list if space not available)   *Used with the permission of the University of Technology, Sydney.*

Schools with media programs usually have insurance coverage for their students while they're out on shoots. It may be required, for coverage purposes, for the shoot details to be lodged with some school authority before the students embark. When this is required, **be sure to do it**.

Most likely you'll need to list the names of all the crew and performers who will be working on the site with you. School insurance can be organised to cover all members of the shoot, whether they're students of the school or not. But it's essential to list these people on the form before the shoot.

Also, your school administration may be able to give you a printed statement about the insurance coverage available to you and your crew. It may be useful to show this statement to the site manager when you're negotiating use of a location for your project.

Assuring Competence

Preproduction is the time to make sure that all the performers and crew can do whatever will be required of them. This may seem appallingly obvious, but it's a common oversight.

A True Video Fable

There was once a minor twelve-shot storyboard which called for a whistling person to walk through a field, discover a fire in the brush and run to get a fire extinguisher to put it out. Simple?

Video production follows Murphy's law. Anything that can go wrong, will go wrong— so be prepared for it!

Ross Harley, University of New South Wales School of Theatre and Film Studies.

The video crew found a willing friend to play the part. They didn't show him the storyboard. At the beginning of the shoot, it was discovered that he couldn't whistle. The crew adjusted by having him pretend to whistle while someone else held a microphone and whistled into it.

The fire was lit, all sorts of close-ups and long shots were quickly done, while the fire was still containable. The friend was shot approaching the fire, discovering the fire, and then . . . the crew found out that due to an injured ligament in his heel, the friend was unable to run! His slow lope to the fire extinguisher was an irretrievable blow to the project.

Always prepare for the worst case scenario.

But it was too late to reshoot. Enough said?

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Unfamiliar Equipment

It's not only important that people can do what is required of them, but that they can do it with the equipment you've booked. A person can be quite competent at camera handling and camera technique, but if s/he has never laid eyes on the model of camera you've booked, there will need to be time available to go over it, possibly even to read the manual (make sure it's available) and practise a bit. It's very unwise to give a person a new piece of equipment and expect them to use it in the next three minutes.

Suggestions from Rachel Masters

The more you think about locations, and the difficulties and rewards of using a particular site, the more alternative great ideas will be generated. When planning a shoot, try to think ahead of alternatives in case the weather changes.

Make a list of your five favourite places and prepare comprehensive recce reports for these locations. Great locations could be: ocean baths, a country field, a dog obedience training school, a football field, the theatre, an ice-skating rink or your own lounge room.

26

Budgeting

'How much will it cost?'

That's the first question most clients or sponsors will ask you, once you've told them your great idea for a video.

And it may be the one you feel least prepared to answer.

A video production can cost almost anything people are prepared to spend. It can range anywhere from the free piece done by volunteers using public access equipment, to the 60-second TV ad, which can easily cost tens of thousands of dollars.

So maybe your first question should be, 'How much will we be able to spend?'

Most sponsors have a certain amount of money in mind when they set out to do a video, but very often the amount isn't based on any experience with the cost of media production, but rather on a 'gut feeling' of what they think such a thing should cost.

For example, it's not uncommon for people to think that a couple of thousand should buy a CSA (community service announcement). Little do they know that it could cost nearly that for the final edit to one-inch tape in order for their product to be broadcast quality.

But then, maybe they don't intend for it to be broadcast at all, maybe they plan to distribute it by sending dubs around to schools or organisations. It's critical for you to know what sort of distribution method is required because that will help determine the quality of all the equipment needed, from the first shoot right through to the final edit.

What is a Budget?

A budget is the financial map used to navigate through the making of the screen production.

What to Include in a Budget

Your budget should clearly set out all the expected costs for every aspect of the project. The five stages of a video production are:

- Development.
- Preproduction.
- Production.
- Postproduction.
- Distribution.

Be sure to include all the stages of the production in the budget right from the start. It's no good getting the project shot, and not having the money to edit it, or completing it all, and having no money left for distribution.

Another good policy is to err on the side of higher quotes. Be conservative. Include the higher quote rather than the lower one whenever you're adding up how much things will cost.

A constant perceived limitation in video production is the budget and the facilities. At times it may be tempting to cut back, to think small, to abandon your ideas. But there's always another way. You need to ask yourself, 'What are the imaginative substitutes?'

Rachel Masters, Corporate Training Coordinator, SBS.

There's no magic to preparing a budget. It's simply a task which requires careful thinking, up-to-date information on costs, and thorough attention to detail. As with preproduction planning, some standard lists can be timesavers and memory prompters. There's really no point in 'reinventing the budget' for every project you do.

And a standard layout, either kept in your computer or on paper, can help you put all the costs down in a readable format.

Some Useful Lists

There's no one budget that suits all projects because every project has its own peculiarities. But there are certain items which are likely to appear for each stage.

The following lists, by no means exhaustive, may serve as a useful skeleton from which you can develop your own budget forms. You won't need all the items listed, and there may be others, not listed, which you'll always need for your projects.

Development

- Develop the concept.
- Write the treatment.
- Write proposals for funding.
- Approach funding bodies.

This stage is often unpaid. People develop projects in their own time and then sell them to a funding body, with a budget that begins with 'Preproduction'.

Sometimes, however, there's 'seed money' or 'development funding' available that will pay for the writing of the first one or two drafts of the script, and a round of script editing.

Preproduction

Personnel—fees and wages (including annual leave at 17½ per cent and superannuation at 9 per cent*):

- Script writer.
- Script editor.
- Producer.
- Director (planning, storyboarding, conducting rehearsals).
- Production designer.
- Office manager.
- Bookkeeper/accountant.
- Production manager.
- Site scout.
- Camera operator (planning and site check).
- Sound recordist (planning and site check).
- Performers (rehearsals).

Costs:

- Office costs (phone, stationery, photocopying, postage, electricity, heat).
- Insurance.
- Site check (vehicle, petrol, food and accommodation for site scout).
- Requirements (materials and manufacture of sets, costumes, and props).
- Rehearsals: duplication of scripts, hire of rehearsal space.
- (Story rights: purchase).

> Believe no-one, assume nothing and follow the money.

Marsha Della-Giustina, Emerson College.

> The designer draws up the plans for the set, then comes and speaks to me. It's important that this happens as early as possible. I work out how much it will cost, and how much time it will take, to construct it as shown, then we look at how much has been allotted for the set in the budget. The next step is compromising, trying to get the best set, as close to the design as possible, with the funding available. Once a realistic redesign has happened, Props and Staging get on with building the set.

Wayne Smith, Head of Props and Staging, AFTRS.

> Put your money on the screen.

Darrell Lass, Production Designer.
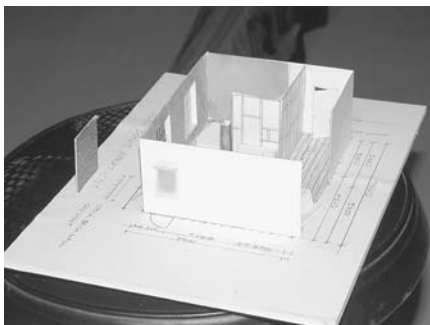
A model of the set helps everyone visualise shots, lighting, actions and possible sound problems. AFTRS.

Wayne Smith, Hilton Ellingham and Ken Manning check out staging plans, AFTRS.

* Annual leave and superannuation allowances applicable in Australia.

Make sure you include everything! Peter Millyn, Production Accountant, Australian Film Television and Radio School.

Stephen Jones, AFTRS.

Never underestimate the value of *chocolate!* . . . Catering is about caring for the crew. So don't underestimate its value. Budget for meals, morning and afternoon teas, and treats on the set.

- Music (composition of original music and/or search and selection of existing works).

Production

Personnel—fees and wages (including annual leave loading at 17½ per cent and superannuation at 9 per cent*):

- Producer.
- Director.
- Director's assistant.
- Floor manager.
- Production manager.
- Office manager.
- Bookkeeper/accountant.
- Lighting director.
- (Vision mixer.)
- (Technical director.)
- Camera operators.
- Sound recordist.
- Boom operator.
- Performers.
- (Stunt person.)
- Caterer.
- (Child care.)
- (Animal wrangler—that is, person in charge of care of animals on set.)
- Drivers and runners.

Costs:

- Equipment: purchasing or hiring costs.
- Stock (videotapes).
- Travel costs (vehicles, petrol, parking, aeroplane tickets, departure taxes, visas, inoculations, medical (e.g. malaria pills), accommodation, food allowances).
- Studio rental.
- Site fees and permits.
- Food catering for all shooting days.
- Office costs (phone, stationery, photocopying, postage, electricity, heat).
- Insurance (equipment, site, personnel—check with client as to who is covered by what).

Postproduction

Personnel—fees and wages (including annual leave loading at 17½ per cent and superannuation at 9 per cent*):

---

* Annual leave and superannuation allowances applicable in Australia.

- Producer.
- Director.
- Office manager.
- Bookkeeper/accountant.
- Postproduction supervisor.
- Logging person.
- Editor for off-line cuts.
- Editor for on-line final cut.
- Sound (tracklayer, mixer; musicians, performers, conductor; voiceover talent; sound effects [manufacture and/or search and purchase]).

Costs:

- Logging (equipment hire).
- Rough cuts (off-line equipment hire).
- Music (recording facilities hire).
- Audio track (sound mixing suite hire).
- Fine cut (on-line facilities hire).
- Stock (videotapes).
- Artwork/graphics.
- Music rights.

> If the budget is tight, beg, borrow and use your imagination.

Darrell Lass, Production Designer.

Distribution

Personnel—fees and wages (including annual leave loading at 17½ per cent and superannuation at 9 per cent*):

- Office manager.
- Distribution coordinator.
- Bookkeeper/accountant.
- Auditor of accounts.

> Budgeting is knowing how much things are going to cost. Production management is getting them done for the price.

Ian Ingram Young, Academy of Photogenic Arts.

Costs:

- Launch party.
- Publicity (advertising, brochure, accompanying material).
- Stock (videotapes, CDs, DVDs for dubs).
- Dubbing fees.
- Packaging.
- Postage.

Contingency

Once you've come up with the total cost estimate for the project, add 10 per cent on top of that and label it *contingency*. That means you've allowed some extra money for unexpected costs. You may well need it. If you don't, everyone will be pleased that you've come in under budget.

---

* Annual leave and superannuation allowances applicable in Australia.

Peter Millyn,
Production
Accountant,
AFTRS.

Don't spend the contingency in your head. If there's an expense, include it in your ongoing accounts. Leave the contingency intact for real blow-outs.

In-kind Contributions

Not all the costs of a project end up being paid for directly in cash. Sometimes one or more of the people working on a project are receiving their pay from their normal job. This is the case, for example, with many in-house productions, where people within a workplace are producing a training tape for their company or government department. Their time appears to come free. The same may go for equipment costs, editing time, office costs. Many budget items can be invisible when it comes to direct cash payouts.

There are at least three reasons why it's usually the best idea to include these items in your budget anyway, and label them appropriately.

Never use your own money.

First, it helps both you and your sponsors to see what the true cost of the project is.

Second, it gives credit where credit is due, either within the organisation or to the helpful contacts outside it.

Brian Williams,
Western Australian School of Art and Design.

And third, funding bodies often want to see that many of the production costs are being taken care of by someone else.

Keep Records

It's a good idea to keep your old budgets filed away. They will help you draw up your new ones more quickly, and they can help you learn from your mistakes. If you find that you underestimated costs somewhere within a project, make a note of it so you won't be caught out again.

If an unforeseen cost arose, record that too. It may help you foresee it next time.

Keep track of the spending as you go, so you can make adjustments if you're having a cost blow-out. Dave Sheridan and Sarah Curnow, Australian Film Television and Radio School.

Stick to the Budget

Although you may find that you spend slightly less in one area and slightly more in another, overall you should make every effort to live within the budget once it's been accepted by all parties. This is especially true in preproduction and production.

Monitor your budget progress regularly, so things don't get out of hand without you knowing it. And be sure to communicate regularly and clearly with the producer about the current status of the budget.

Lastly, be prepared to reassess the plans for the rest of the production, if significant budget blow-outs have occurred.

Suggestions from Rachel Masters

Time is money. Yet time is often the thing people find hardest to budget.

If learning to budget even the smallest production achieves the recognition that people value their time more than anything else, it's well worth it.

When you budget a production, often you place value only on the tangible things like equipment and consumables. But the time that you and your friends put into a shoot needs to be budgeted too.

Sometimes the opportunity to go into someone's home or to a special event can't be calculated on a monetary basis, but you still need to value the contribution these opportunities make to your production.

Practise including *all* the contributions to your shoot into its budget. It often helps people to be more economical and thoughtful.

27 The Location Shoot

The big day has arrived! All your plans, preproduction efforts and rehearsals have led to this. Now the challenge is to achieve the best possible results from your shoot. What do you need for this to happen?

Students from the University of Ballarat, Ballarat, Vic, Australia. (Photo by Paul Mensch)

1. You need everyone to get to the site, on time and in good condition, so they can work well.
2. You need all the equipment to be there, in good working order.
3. You need everyone to understand what they're supposed to do, and be up-to-date on any changes that have been made to the plan.
4. You need people to feel enthused about the project and energised for the work ahead of them.

Getting the Crew to the Site

Before the day of the shoot, everyone should be given, **in writing,** a call sheet which tells them:

1. The address of the shoot.
2. The starting time and estimated finish time.
3. The contact phone number at the site, and the mobile phone number of the production manager.
4. Emergency details, like the address and phone number of the hospital nearest the shoot location.

It should have been determined ahead of time how each person will get to the site. If someone needs to be picked up, there should be a written record of who's picking that person up, at what time, and the driver and rider should have each other's phone numbers.

If the rider is to meet the driver somewhere other than at home, both people should have, written down, the meeting place details. A rendezvous at 'Melbourne Central' is not clear enough. Which entrance, on which street? Even if they might finally find each other by checking all the entrances, you don't want people arriving late for the shoot.

Drive and talk, don't talk and drive.

Gerry Letts, Operations and Facilities, AFTRS.

If people are travelling by bus or train, they need to know for sure which bus or train route to take, and they should have a copy of the timetable for that route. They also need a clear and well-labelled map showing them how to get to the production location from the bus stop or train station. And they need to know how long the trip is likely to take, so they know how early in the day to set out.

Car parking details should have been worked out during preproduction, so drivers have the necessary permits or entrance money, and if there's a guard on an entrance gate, the guard should have a list of the vehicles which will be involved in the shoot.

And in the best of all possible worlds (which rarely seems to be the case on student shoots), it's a good idea if everyone has had a decent night's sleep and something to eat before the shoot begins.

A doco crew arrives at the location. Scott Barber, Pat Saunders, Chris Ellis, Brad Francis, Curtin University of Technology, Perth, WA, Australia. (Photo by Ryan Hodgson)

Checking Out the Equipment

Take more batteries.

Hart Cohen, University of Western Sydney— Nepean.

This may be the point of greatest resistance for beginners, but it's really very important. **Make sure you put all the equipment together and check that it's all working BEFORE you leave for the shoot.**

In fact, the most sensible time to do this is when you pick the equipment up at the media centre, because that saves you lugging it home and then back again if it doesn't work. It also saves you being accused of having broken it yourself.

A number of good things happen when you do a thorough gear check:

ALWAYS check that your equipment works before you go to the interview.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

1. You find out if everything you need is there . . . 'Oh no! We've forgotten the tapes!'
2. You find out if it all connects together . . . 'Hey, we can't plug this microphone into the camera without an adaptor!'
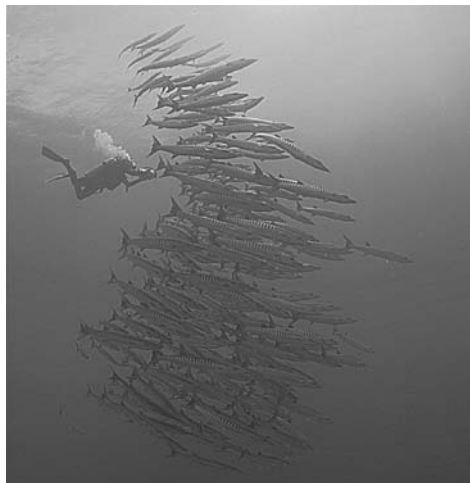
Don't be the only guy in the school who hasn't got what he needs. Richard Fitzpatrick, Digital Dimensions, Townsville, Qld, Australia. (Photo from Digital Dimensions)

When doing extreme location work, have a checklist. It's no good doing a dive without a tape, or a battery!

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Make sure you get everything you need. Media Centre Equipment Store, University of Technology, Sydney, NSW, Australia.

3. You find out if it does or doesn't work, and hopefully have time to do something about it . . . 'Can we book another tripod? This one's had it!' . . . 'This battery is dead!' . . . 'This viewfinder is just hanging on by a thread!' . . . 'This lens is dirty—do we have a lens cleaning kit?'

4. You can leave for the shoot with a modicum of confidence.

Now a gear check doesn't just happen. Someone has to agree to do it. It's handy if the person with the car can do the gear check, but, whoever it is, they need to be able to spot a problem if there is one.

The person picking up the gear needs to allow an HOUR or so for the gear check. Careening in to grab the camera on the way to the shoot, and not checking the gear, leaves you open to getting to the site with something disastrously wrong.

It's a totally good idea to get a copy of the list of what you've borrowed. That way you can be sure you pack everything up again at the end of the shoot.

Before getting into the car to drive for two hours for that fantastic shoot/interview/ location, don't forget to ask, 'Who's got the blank tapes?' Getting to a location without the tapes can be very infuriating. Oh, and don't forget to label the tapes before the shoot. Erasing material because you forgot what was on the tape can almost be a criminal offence.

Rachel Masters, Corporate Training Coordinator, SBS.

If your shoot is in a remote location, be EXTRA sure you have everything with you. There may not be a chance to duck into a shop for batteries or more tape! Quvianaktulia Tapaungai and Loretta Kanatsiak unload sleds during the shoot of Inukshuk for *Inuit Ways, Inuit Survival*, Cape Dorset, Nunavut, Canada.

And what is the accommodation enroute to the shoot? Cindy Rennie, Kimberley Brown and Jimmie Papatsie hunker down in an igloo for the night, on their two-day skidoo trip to the shooting site for *Inukshuk, Inuit Ways, Inuit Survival*, Cape Dorset, Nunavut, Canada,

Getting the Gear to the Shoot

Video equipment is heavy, but it's also delicate. It should never be banged or dropped. It should be packed in well-padded cases before it's transported, and loaded into a vehicle so that it's protected from being flung about. Wrapping it in thick blankets can help protect it, and also hide it from view. Putting it on the floor instead of the back seat of a car is a good idea, so it can't slide off the seat if there's a sudden stop.

Never leave video gear unattended in a car when it's visible through the windows. Insurance companies consider this negligence, and may not pay for its replacement if you find your window smashed and the camera gone.

Never leave video gear unattended when you're unloading at a location site. Unloading gear to a location which is out of line-of-sight from the vehicle requires three people: one to carry the gear to the site; one to guard the gear once it's at the site; and one to remain with the car that still has equipment waiting in it. Of course, the same person doesn't have to do all the carrying.

If you work in the tropics, build a heat cupboard for your camera and recorder. With the levels of humidity we get in the wet season, going from even mild airconditioning to outdoors can cause condensation that takes an hour to clear!

Debra Kroon, Northern Territory University.

A big part of producing videos is lugging gear. NEVER leave gear unattended in a public space. Kimberley Brown hauls the camera to the next level, Canadian Museum of Civilization, Hull, Quebec, Canada.

Crew Briefing and Scripts

Smoothly functioning shoots don't begin the instant people jump out of their cars and unload the gear. There needs to be a crew briefing at the beginning so everyone is certain about where they should be, what they should be doing, and what changes were made to the plan at 11 pm the night before.

Peter Chvany, Emerson College.

> The game plan here is . . .

In the excitement of getting going, it may seem stodgy to have a meeting rather than just launch into things, but it takes a lot longer to round people up later and try to correct their misinformation.

This is also when the latest version of the script should be available to everyone, and all other versions should be collected or marked as out of date, so some people aren't mistakenly following yesterday's shot list.

Elisabeth Knight, Directing Department, AFTRS.

> Always date your scripts.

If last-minute changes in job roles and responsibilities have to be made, this is the time to make them. No-one should begin the shoot unclear about what contribution is expected from them. Any hazy areas or overlaps where more than one person is trying to attend to a single job should be straightened out before there are emotional fireworks on the set.

A well-tuned crew hums along—it doesn't backfire, spit, cough, sputter and stall.

Peter Watkins, Educational Media Services, University of Western Sydney—Macarthur.

> One camera, one operator!

Depending on your crew and the work situation, you may decide that this is a sensible time to ensure that everyone has something in their stomachs before the work begins.

Energising the Crew

The director is the source of inspiration for the whole crew, and it's from the director's zest that crew members get their drive.

If the director is full of fire and raring to go, the crew will catch that wave of enthusiasm. If the director is dragging around, the crew will slow down, too. Once the crew's energy drops, it's hard to get everyone up again.

Marsha Della-Giustina, Emerson College.

> Let the people tell the story instead of you . . . marry pictures and words . . . shoot close-ups so I can smell, taste and feel whatever you're showing . . . take me there to the story, you are my eyes and ears . . . the camera is our eye . . . make yourself into a human tripod. If it's a situation where you can't use a tripod, use the ground, a wall, a car hood, stand up against a pole, put the camera under your arm . . .

Brian McDuffie, Director.

> A director has to be white hot in the morning, so he can still be red hot by the end of the day. If he's red hot in the morning, he's ash by lunchtime.

Give People Adequate Breaks

Enthusiasm has to be tempered with reality, and reasonable and safe work practices.

People need to be given breaks now and then in order to keep up their stamina and refresh themselves. The director may be running on pure adrenalin (or fear) but the crew's well-being has got to be considered. Some of the worst tailspins a crew can go into happen when people have been worked too long and not fed.

Normal practice is that five hours after crew call there must be a meal break.

As no smoking is allowed on set, you may need to consider including smoking breaks.

Food

Whether you like it or not, food is a big issue on video shoots. It seems there's always someone who arrives hungry and shaky.

It should have been decided in preproduction whether people will be responsible for feeding themselves or whether they'll be fed as a crew. One way or another, they have to eat well to work well.

If they're feeding themselves, it's best if they bring their food with them. Why? Because no matter how close the nearest convenience store or fish and chips place is, once crew members leave a production site they can be swallowed up into some sort of black hole and not return for ages. Then there are the wildest explanations, if you have time to listen to them.

That's why on commercial shoots the crew is always fed on location, and they're fed **well**. No-one leaves the site until the shoot is over.

On low budget student productions, where no-one has any money, it still may be a good idea for the director to supply a minimum level of calories to keep the crew going—whether it's coffee and tea to start, juice and biscuits for morning tea, or sandwiches at lunch time . . . keep them happy and keep them on site.

And it's always a good move to have a wrap party.

In a professional setting, *always go* to the wrap party, and leave early. It shows you are social but professional.

Sara Hourez, former director of *Neighbours*.

David Wang directs international crew in China, for *Dai Women Speak*, Arise Productions. (Photo by Michelle Blakeney)

Coffee break in Nunavut. Loretta Kanatsiak, David Poisy and Quvianaktulia Tapaungai, *Inuit Ways, Inuit Survival*, Cape Dorset, Nunavut, Canada.

Adrian Barham, Colin Richards, Jeremy Watkins, Harold Lowah, Imparja TV, Alice Springs, NT, Australia.

Allowing Enough Time for a Careful Set-up

People forget things when they're nervous or hurrying, and when they're under stress. They forget little things that they'd normally remember.
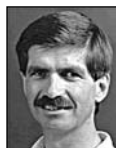
Peter Watkins, Educational Media Services, University of Western Sydney— Macarthur.

Remember to switch off the date/time!

Unfortunately, in video there are tiny things that can make or break the quality of the image. Like forgetting to white balance, and having the whole day's shoot come out too blue. Or forgetting to put the camera's audio switch to *external mic* and getting an entire interview with thin, echo-y, camera-mic sound.

Then there are the little things that can make or break the equipment. Like forgetting to tighten one of the tripod legs and having the camera keel over when you turn away from it. Or forgetting to gaffer-tape the light cable down and watching the redhead crash to the floor when someone's foot gets caught in it.

Make a generous estimate of the amount of time you'll need for set-up. A good rule of thumb is at least an hour for a simple shoot without lights, and an additional hour if there are lights.

Andy Nehl, Head of Television, AFTRS.

Become aware of the icons in the viewfinder that are usually visible for normal shooting settings. If you see an icon and you don't know what it is or why it's there, find out. If it's not meant to be there, turn it off.

Go through the set-up methodically, checking that every piece of equipment is connected right and is working the way it should.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

When you're loading an underwater camera, don't let anyone talk to you. Go through your checklist methodically, at your own pace, 'cause if you screw up you can flood the gear. Rushing leads to disaster.

Underwater camera work by Richard Fitzpatrick, Digital Dimensions, Townsville, Qld, Australia. (Photo from Digital Dimensions)

The Test Record

Finally, you do a short test recording—60 seconds should be enough—and play it back to make sure that you have a good picture and good sound (use headphones).

There are some problems you can only discover this way, like:

1. A 50-cycle (or 60-cycle) electrical hum in the audio—which you can get if a mic cable is too close to an electrical cord or device.
2. A rolling line of disturbance in the video—also called a video hum—which comes from an electrical current nearby.

3. A picture which breaks up due to a creased or damaged tape.
4. A spotty image due to excessive dropout on the tape. (It's common sense to invest in new, good quality tapes for your original footage. Use the recycled tapes for your rough cuts.)
5. A half-image or no image at all, due to clogged video heads.

Other problems which will show up are:

1. No sound at all, due to the mic being turned off, or a flat mic battery.
2. Wrong sound quality, due to the mic selection switch being in the wrong position—especially having the camera mic engaged instead of the external (auxiliary) mic.
3. Mic handling noises.
4. Wind noise.

People often feel very rushed and don't take time for a test recording. But ask yourself if you've got the time to lose the whole shoot.

Once you're sure things are recording okay, you can go ahead. But even though you've had confirmation that things are working right at the beginning, you should stay alert to possible changes as the shoot goes along.

For example, the sound should be monitored throughout—mic cables sometimes get pulled out of the camera socket or they develop strange crackling sounds. Location poltergeists abound!

Ask yourself, is doing a 30-second test recording more work than doing this shoot again? In fact CAN we do this shoot again? David Poisy, camera operator, and David Maltby, director, shooting *Inukshuk, Inuit Ways, Inuit Survival,* Cape Dorset, Nunavut, Canada. (Photo by Kimberley Brown)

Monitor everything!

Hart Cohen, University of Western Sydney—Nepean.

Malcolm Foreman shoots close-ups for Australian Wholefoods corporate presentation, t.a.v. productions, Adelaide, SA, Australia. (Photo by Neil Smith)

> Never let the producer behind the camera! They can have a field monitor, but don't let them near the camera.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

Dai girls review a scene shot for the documentary *Dai Women Speak*, Xishuangbanna, China, Arise Productions. (Photo by Michelle Blakeney)

> Mark off each shot on the script or storyboard as you finish shooting it, to avoid confusion later on.

Philip Elms, Media Resource Centre.

> Inexperienced directors sometimes over-prepare. It can be useful to have a storyboard or a shot list, but you should also be able to think on your feet. You should be willing to acknowledge the practical problems of your original plan as well as new possibilities when you get on location with your actors.

Harry Kirchner, La Trobe University.

Using a Field Monitor

Because the camera's viewfinder is black and white, a field monitor can be useful for checking the colour of your shot, making sure the white balance worked, and that the overall look is what you want.

By first adjusting the colour, contrast and brightness to camera-generated colour bars, you can be sure that what you see is what you're getting.

There are those who say people should have enough skill to work without field monitors. That they're for wimps. And there are those who have no choice because there are no little portable models in their equipment store.

But there are other good reasons for a field monitor. For some people it's easier to get a perfect focus if they can look at a bigger image. It also helps to work from a bigger monitor for a long shoot, so you don't develop spasms in your left (or right) eye.

And if decisions on shots are to be made by two or more people, it's much more convenient if everyone can view and discuss the shots at the same time.

Possibly the best reason is that after the shoot, it's good public relations to let people have a look at what they've done—to give them back something of what they've given you.

If the camera has an RF unit, you can also play back through your home TV set. Connect the lead from *RF-out* on the camera to the antenna *VHF input* or the *RF input* on the TV and tune to the appropriate channel.

Time Management at the Shoot

It's the responsibility of the director, the director's assistant and the floor manager to keep the activities moving along according to the production schedule. By the end of the day, the planned amount of work needs to have been completed.

When a production hits a snag, it needs to be dealt with as efficiently as possible, and the momentum of the shoot must be kept going.

From Don Bethel

Variations in Busy-ness

There are peak loads at certain stages of production. Everyone should be available to contribute in their main role at these points, undistracted by other responsibilities. So cover these times with an adequate number of crew. This may mean that some support crew members are hanging around for long periods in between with little to do or to interest them, but that's the nature of TV/video making.

> Unless you enjoy buying cartons of beer for the rest of the crew, turn off your mobile phone during filming.

Philip Elms, Media Resource Centre.

A word here about attitudes. Inexperienced crew members, bored with waiting, can become social and treat the production area with less respect, becoming noisy or inattentive. At best they look amateurish, at worst they detract from the concentration of the crew and cast who are still working.

Such behaviour usually results in a rocket from the director or the floor manager/first assistant and is justly deserved. A crew member's best contribution for the day may be their patience! Everyone needs stacks of it—and stamina, too.

Another consideration in assessing crew numbers is the turnaround factor. During and after each rehearsal and prior to the take, time must be allowed for resetting of props, the repositioning of cameras and booms, and for wardrobe changes. Slates/idents have to be recorded, make-up patched, continuity checked. Time is wasted if crew numbers don't match the workload. Further time is lost if these functions are not efficiently coordinated. This is one of the responsibilities of the floor manager/first assistant.

> Producers and directors are always pushing for time, always want to move on to the next site. Resist their rushing you, make sure you get enough cutaways. They'll come back to you later and say thank you. At the end of the day, it's your reputation on the line.

Richard Fitzpatrick, Camera Operator, Digital Dimensions.

A complete pull-down (strike) and movement to a new location presents another time management challenge. You may have to consider booking additional assistant camera, lighting, sound, props or wardrobe crew.

The production manager or floor manager, while preparing the production schedule, mentally rehearses these turnarounds/transitions and makes a judgement on estimated time and crewing requirements.

As your product increases in complexity, so does the need for planning. Early attention to detailing the mechanics of production gives you more time to attend to performance values on your recording day.

Anticipation is the name of the game.

Gil Scrine, conducting Directors' Master Class, Summer Institute of Film and TV, University of Western Sydney—Nepean, Werrington, NSW, Australia.

The Good Director

You don't have to think for or direct everyone in their skill area—let your crew feel they're supporting your production idea by getting on with their jobs. But

Sara Hourez,
Special
Projects,
AFTRS.

Plan everything and be flexible enough to cope with sudden cast absences, relocations or camera breakdowns.

you must make it clear what you want. If you have to make a change, be sure everyone understands thoroughly the new direction—otherwise there'll be much confusion and flack heading your way!

The Crew and Professionalism

If you commit yourself to a crew position, recognise that you will need patience—lots of it—while you wait for some other crew member to rehearse his/her bit again, or change to a better position, or change batteries, or . . .

Video production calls for long spans of concentration, long hours of waiting, and then having to perform your task under pressure. It requires a sensitivity to the difficulty that others are experiencing, and an understanding of the shared frustration when it all falls apart and has to be redone.

It requires a great deal of empathy and energy from every single member of the crew in order to be supportive, but that's what being 'crew'—a team member—is all about.

Welcome to the challenge!

Shooting for Editing

It's most important to remember to roll tape in record mode for about 15 seconds before each shot begins.

Philip Elms,
Media
Resource
Centre.

Shoot with 'handles' on the start and end of each shot. This helps for pre-roll in linear editing and for batch capture or transitional effects in non-linear editing.

This way you'll have enough stable signal on tape for a full-length pre-roll to run smoothly. The edit system needs this (so you need this) in order to get the video signal stabilised and supply ten seconds of steady control track before each edit-in point.

If you don't allow record time for an adequate pre-roll for each shot, you may find it difficult, or even impossible, to edit your shot exactly as you want it.

You may need to explain to the cast and crew why you're rolling tape well before cueing the action to begin.

Gill Leahy,
University of
Technology,
Sydney.

Remember to count to ten before you call action.

Rob Davis,
Editor, Digital
Dimensions.

If your timecode restarts on a tape, due to ejecting the tape, a battery, or whatever, the computer can't tell which shot is which and may capture the wrong shots or not anything.

It's okay to look back over your material when you're on location but decide if it might not be just as easy to go for another take. If you want to review your last shot, that's fine but don't fast forward into blank tape or you might end up with a timecode break. Continuous timecode on your DV tape will save a lot of headaches when batch digitising your material during post production.

Harry Kirchner,
La Trobe
University.

Leanne Holland videotapes Martin Adams and Kingi Tahana, using camera support for her wheelchair made by Joe Conway, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Guidelines for Shooting an Interview

Here are a few suggestions to consider before doing an on-site interview.

Preproduction

- Visit the person whom you'll be interviewing before the day of the shoot and establish, as much as you can, a feeling of trust and rapport with him/her.
- Visit the intended site ahead of time, so you can plan how you'll set up the shots and figure out what difficulties there may be.
- Brief your crew, ahead of time, about the interviewee(s) and the site.
- Research your topic carefully, and know how the interviewee is connected to the topic.
- Have a well-organised list of questions, written out clearly, and held neatly and reliably on a clipboard.
- Find out if direct questions are culturally appropriate or considered downright rude in the culture of the person you're going to interview. In some cultures information and knowledge are shared differently, so be sure to find out how to do an interview correctly with that person.

> Prepare your questions—many more than you can realistically use—before you interview someone on camera. Have the questions written in large print on index cards which can be held quietly on your lap during the taping. Do your research ahead of time and know how to pronounce key words, names and terms that may come up.
>
> **Donna Kenny**, The Video History Company and Center for Recording Life Stories.

Setting up

- Set up as quickly and unobtrusively as possible. Don't let the technical processes dominate the interviewee's experience of the interview.
- Never argue with the crew or shout at them. (This goes for any shoot.)
- Try to sit down quietly somewhere with the interviewee, away from the setting up. Have an easy chat, if possible. Maybe a cup of tea.

Carl Fisher, Murriimage, Wolvi via Gympie, Qld, Australia.

Learn from your mistakes.

- Don't talk the subject out before the camera rolls. Give a general idea of the outline and flow of the interview, but don't rehearse the actual questions and answers. People answer most vibrantly when they're engaged by a question. Their answers are often shorter, less detailed and lacklustre when they're repeating an answer they've already given.
- If the interviewee is worried about making a mistake or leaving something out, give your assurance that any answer can be started again or entirely redone at the interviewee's request.

Rolling

- If a hand mic is used, keep it in the hand further from the camera.
- Start off with a couple of easy questions to get your subject relaxed and warmed up. You don't have to use these answers in the final edit, but it will help ease the tension.
- Aim for clear and precise answers, but avoid 'closed' questions which can be answered by a one word answer or a 'yes' or 'no'. Aim to draw as much useful information out of the interview as you can.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

Ensure your interviewee is comfortable before you start the interview. When interviewing Elders, always ask them where they would like you to conduct the interview. Most Elders feel more comfortable at home, so be prepared to go to them.

- Keep in mind that you're not in a competition and don't have to prove that you know more than the interviewee. In fact, if you appear to know only the basics of a topic, your guest can feel prompted to elaborate.
- Although your questions are written down, don't read them out. Refer to your notes and then look at the guest and ask the questions naturally.
- Always listen to the answers. If something unexpected but interesting is said, follow up on it. You needn't feel obliged to rush straight on to the next question.
- If you're going to edit out the question, ensure that the interviewee speaks in full statements, rather than in short responses to your question. For example: 'I was born in Wagga.' Not: Q. 'Where were you born?'; A. 'In Wagga.'

Donna Kenny, The Video History Company and Center for Recording Life Stories.

Ask your questions and then step out of their way. Be quiet. Omit all 'um-humms' and other verbal supports. Especially if the interviewer is off camera, he/she can use body language—nods, smiles, raised eyebrows, leaning forward, etc.—to encourage the interviewee's responses.

- Maintain good eye contact, if it's culturally appropriate to do so. The interviewee is usually more nervous than you. If you look at him/her directly and nod in affirmation from time to time, the interviewee will gain confidence.
- Avoid punctuating the interviewee's answers with 'I see' or 'Uh-huh'. These utterances can be irritating to the viewer, and make it difficult to edit the taped sequence, especially if you make these sounds while the other person is speaking.
- Leave quiet space at the end of each answer for the editor to make a cut, if necessary.

- Remain aware of the director and the camera operator, who may be signalling some kind of message to you.
- Maintain an air of respect for the interviewee.
- Don't be afraid to stop if things aren't going well. If you're dealing with a hostile interviewee, it often pays to pause for a while and allow time for everyone to blow off steam.
- Don't go on forever in the hope of getting the answer you want. Interviewees tend to burn out after awhile. If you haven't got all the information you'd hoped for, you might be able to add it in later with a voiceover or with an interview with someone else.

At the Wrap

- Always thank the interviewee cordially for their time and assistance.
- If appropriate, invite the interviewee to watch a playback of the interview on your field monitor or their TV.

Take some quality 'staged' still photographs on set for publicity, rather than trying to print from the video after the shoot. It will be less costly and better quality.

Philip Elms, Media Resource Centre.

Wet Weather

Water wrecks video equipment. If you strike rain on the day of your shoot, cancel the shoot if you can. If you can't cancel, move inside. If you must be outside, cover the camera with a garbage bag and have someone holding an umbrella over the camera operator and the camera.

The wind ruffling the garbage bag will put terrible noises into a camera mic. A hand-held mic wrapped in plastic will record the sound of the raindrops that hit it.

Never run cables through puddles!

If you're near the water, use a splash protector for the camera. (Photo from Digital Dimensions)

Making TV programs and videos involves teams of passionate creative people all working together, and can be very rewarding and a lot of fun. It can also be very stressful when resources are less than ideal, personalities clash and things don't go as planned. If you find yourself getting really stressed out, no matter how worthwhile and important the project is, it's not worth giving yourself a heart attack over it. Just remember . . . at the end of the day, it's just dots on a screen.

Andy Nehl, Head of Television, AFTRS.

Keeping Perspective

What if your shoot is of an event that's happening apart from your own efforts? A concert or conference, a religious ceremony, an awards presentation, a sports competition?

When you're the documenter, rather than the initiator, your role and the degree of control and influence you have over the action is quite different from when you're doing a drama or even an interview.

Sometimes it's hard to remember that the video itself is not the event, that there are other interests at least as important as your own, that the show will go on whether you're ready or not, and if you're not—that's just tough.

Documenters should not change the event they're covering. Of course the mere presence of any camera does change things a bit. But sometimes video crews walk in like they're the main item. They string cables and lights all over, regardless of how difficult or uncomfortable they make things for the guests or the audience; they set their cameras up in front of people who have a right to their own view; and they even take hand-held cameras into the performance area.

High praise for a video crew is for someone to say, 'We hardly knew you were there.'

What's more important . . . the event or the video?

Keeping a low profile, working discreetly and efficiently, may mean you'll be the one group that gets asked back.

Are *you* the show or are you documenting it? Students from National Recording Studio Training School, Canberra, ACT, Australia.

Philip Elms, Media Resource Centre.

Take a second shot just for safety's sake.

Quality of Work

The director decides when a take is good enough. If the director wants another take, the crew does another take.

Sometimes it may seem that it isn't worth the effort, that the problem was minor, but no matter what the crew thinks, it remains the director's job to assess the take, and the overall situation, and decide if the extra effort is necessary for the final product.

To be able to do this, the director must carry in his or her head a vision of the finished whole. The director's reputation relies on the final cut, and any compromise on quality at the shoot lessens the possibility of achieving that vision in the end.

Phil Hayward, Macquarie University.

Remember *you* have to edit it.

Still, the director can't know everything about what's happened, and s/he needs to make quality decisions based on as much information as possible.

Great preparation and direction can be ruined by a glitch in the camerawork or the sound recordist not alerting the director to a passing jet. (This should be done before or right after the shot has been completed, not during the shooting of it.)

So it's important for crew members to let the director know if they realise something has gone wrong. It's in the nature of video that even when each crew member is striving

to do his or her best, mistakes can be made, an unforeseen difficulty can get in the way, or a shot just doesn't work. Directors know this.

It's no good covering up a problem—it will show up in the editing room and then it will be much harder to fix, maybe impossible.

Covering up lowers a crew member's professional reputation, and that affects their future work chances.

> Never rely on postproduction to put things right. This is a myth which seldom works—and never without extra expense and some compromise to the quality of the program. Get it right at the time of shooting if possible. There will be enough to fix up in post in any event.
>
> **Ian Ingram Young**, Academy of Photogenic Arts.

Quality of Personal Relations

You need to be careful about the quality of your interactions with your crew, as well as the quality of the video on tape.

Be considerate and professional in your criticisms. Wherever possible, speak to people quietly and privately about what you'd like them to do differently.

You need a good flow of information from your crew. If people feel that they'll be given a public dressing-down, or spoken to in an arrogant or humiliating fashion, they're not likely to tell you much.

On the other hand, praise goes a long way towards making people feel happy to be on the job. And a crew that feels you value them will usually go the extra distance for you when the chips are down.

A successful shoot relies on the skill, care, cooperation and good energy of everyone involved. Make sure you let everyone know you appreciate their work. The crew of *'And she said . . .'*, a full-length feature shot at Hamilton Secondary College, Mitchell Park, SA, Australia. (Photo by Mark Pilla)

Martha Mollison, Video Producer.

Thanking someone for an extra effort or a particularly good piece of work is a form of recognition and reward, even when you know you can't write anyone a cheque at the end of the day.

Philip Elms, Media Resource Centre.

Thoroughly clean camera equipment after shooting on the beach, as salt spray residue can damage lens coatings and electronic circuitry.

If you're not sure what's missing, refer to your check-out list. What's missing from this shot? See end of this chapter.

Hart Cohen, University of Western Sydney— Nepean.

To err is human, to bring back broken equipment is unforgivable.

Gerry Letts, Operations and Facilities, AFTRS.

Clean the car! Return it clean and don't be mean.

The Idiot Check

When the end of the shoot comes, the work isn't over. First of all, the performers should be thanked for their participation and their performance (hopefully enthusiastically, but at least courteously), the crew should be thanked, and the site should be returned to the state it was in at the beginning of the shoot.

A double check should be made that all tapes are accounted for and labelled correctly.

And the equipment needs to be packed away carefully, making sure that every little cord, adaptor and doo-dad is found and put in its rightful case.

This is when you pull that photocopy or printout from the equipment store out of your pocket and start ticking off each item you borrowed as it's rounded up and packed in the car.

Once everything is checked off against the equipment list, loaded into the vehicles, and the crew have packed up their personal items and prepared to leave, someone should do an 'idiot check'.

The idiot check is when the entire shoot area is carefully looked over, one last time, to find anything that has been left behind without anyone noticing. That's when small bits and pieces like the little black camera battery is found atop the black piano, or the tiny lav mic is discovered on a chair, even though the case has already been packed away.

If there was anything wrong with the gear, tell the equipment store people about it when you return it. A student discusses a mic with Dmitri Mazin, Media Centre Equipment Store, University of Technology, Sydney, NSW, Australia.

When equipment is returned to a media centre or hire store, anything that didn't work right, or got broken during the shoot, should be pointed out to the person checking in the gear. That saves the next borrower from copping it unrepaired.

Protecting Your Original Footage

You should safeguard your original footage so it will be in the best possible shape when it comes time to do your fine cut.

As soon as possible after your shoot, copy your field material onto another tape. This copy is your *work dub*, and you'll use it whenever you want to play your material for viewing, for logging and for all your rough cuts. If you're editing digitally, transfer your footage to a storage drive as soon as is feasible. Then, whatever stresses and strains afflict the tapes or digitised footage during the rough cutting stages, your source tape will remain pristine. If you're cutting in analog, it's economical to use recycled tapes for work dubs.

> Don't be disappointed if your first production isn't Academy Award material. It's a learning process, and even great directors make 'stinkers' from time to time!
>
> **Keith Smith**, Edith Cowan University.

Your original footage should be carefully labelled as such and put away in a safe place. (Remember: Cool, dry, dust free and away from magnetic fields.) **Never** risk playing it in any VCR before the fine cut because you can't tell when the universe will frown on you and some cranky machine will just eat your tape. There's too much work involved in a reshoot and too little time at the end of a semester to play roulette with your original material.

Sometimes you'll have material which is so valuable to you that it's worth also making a *security dub*. This is a copy of your original footage which is also never used, and stored in a different safe place, so if anything goes wrong and you lose your original footage, you'll have a good quality copy to fall back on.

Of course, you should use new, high grade tapes for security dubs, and you should take care that you copy the audio levels well when you make these dubs so that you don't end up with low level or distorted audio if you need to rely on them in the end.

This is what was missing—the base plate for the tripod!

Be sure you keep a list of exactly what you borrowed.

28 Studio Layout and Equipment

Studios come in all sizes. Some are large enough to hold a symphony orchestra, with room to spare. Others are tiny rooms with a chair for a presenter and a minimal background set.

Whether your studio has access to the latest high tech equipment with all the bells and whistles, or you have the most rudimentary of set-ups, your studio layout and the principles behind your equipment hook-up will be similar.

And with imagination and tenacity, you can achieve good results under almost any conditions.

Not every organisation has the luxury of a studio floor which serves only one purpose. In many schools the studio doubles as a classroom. In public access cable TV stations, it can have all manner of functions!

Multicamera TV studio at Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

At Wakefield Community Access TV, their studio doubles or triples as a classroom and meeting area. Tables are set up for a public meeting. One wall of the studio is painted in the sponge technique and works well as a background. Part of another wall is painted chroma key blue. Wakefield Community Access TV, Wakefield, MA, USA. (Photo by Ruth Stegner)

The Studio Floor

The studio floor is the area where the cameras face the performers.

Although it's possible to do a single-camera shoot in a studio set-up, studios are usually organised for the simultaneous use of two, three or more cameras.

It's helpful if the studio has a lighting grid above the studio floor so lights can be mounted in a variety of positions without getting in the way of the cameras' movements and without having their stands be in frame of some shots. But a studio can work with portable lights only.

Some studios have flats which can be used for simple backgrounds or hooked together for more elaborate sets, like mock-up rooms.

Some studios have risers, which are movable platforms upon which presenters and performers can be seated. With the performers on risers, the camera operators can stand comfortably upright and still get a neutral shot into the presenter's and guests' eyes, rather than a high shot which looks down on the seated people and subtly diminishes their authority to the viewing audience.

Studio production at the University of Southern Queensland, Darling Heights, Qld, Australia.

Studio walls are sometimes painted with good basic background colours or patterns, or chroma key colours.

Dark floors can be an advantage because they won't give off lots of uncontrollable bounced light from the studio lights hung from the overhead lighting grid. Some studios paint and repaint their floors, based on the needs for the current set.

The camera operators should wear rubber-soled shoes so their footsteps aren't a problem. Carpets can help reduce sound bounce from the floors. Rollable carpets can sometimes be bought quite cheaply at charity shops.

Lots of useful props can be picked up there, too, over time. In fact, some remarkable items can be scrounged from the tip (dump).

The *cyclorama* or *cyc* is a long curtain attached to little rollers which run in the grooves of a curving track. The track is mounted high up along three or four walls of the studio. When the cyc is pulled open, it makes a good generic background, hiding the bare studio walls (and a myriad oddments) with soft folds of cloth. Cycs are frequently black or deep blue, but they also come in chroma key blue and chroma key green, for use in chroma key effects.

The studio floor should be able to be isolated from passing noise and interruptions. Usually it's a large room with a double door system for sound proofing. Outside the outer door, there's often a red light which is lit up during recording sessions so people are warned not to enter and spoil the take.

The cyclorama can give your shot a neutral background. Erika Addis adjusts cyc at the Australian Film Television and Radio School.

The Control Room

The main control room is where the director is during a production, and where the vision mixer (VM) sits at the switcher (or vision mixing console), electronically selecting the chosen camera shots and executing the visual special effects which are needed.

During studio production at the University of Southern Queensland, Darling Heights, Qld, Australia.

The director and vision mixer work in front of a bank of monitors, each of which presents them with an available video source. There's a monitor for each studio camera and for each of the other possible inputs, like the playback VCRs, the character generator, the computer, the frame stores and other special effects units, remote sources (like an OB van or microwave link) and the telecine.

Also in the bank of monitors there's a large colour Program Out monitor which shows the signal which is currently going to line, either to tape or broadcast. And there's a Preview monitor next to it which lets the director look at the upcoming shot and make sure it's right.

Also present in the control room are the DA (director's assistant), the TD (technical director) and the lighting director.

Wakefield Community Access TV has a main control room, and it also has a control room on wheels, which it can wheel to different parts of the building. Wakefield, MA, USA. (Photo by Ruth Stegner)

Control room, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Barbara Bishop, Independent Producer.

At Wakefield Community Access TV, there are audio and video 'outlets' in the lounge so they can just plug in an audio mixer and camera and use that room as a studio as well. The 'outlets' are connected into their second control room, which doubles as an audio studio for voiceovers. They have a small table and two chairs in this control room which can be used as a set as well.

In larger productions, other crew members like the designer and the wardrobe supervisor may be in the control room as well. The make-up artist would work from the studio floor.

Program sound is heard over loudspeakers by everyone in the control room.

There's a talkback microphone into which both the director and director's assistant speak, linking them to the floor manager and the camera operators on the studio floor, and to audio control and videotapes.

Quite often there's a huge soundproof glass window between the control room and the studio floor, so the director and DA can see what's happening in there. But sometimes there's no window, and the two rooms may even be in separate parts of the building. In that case, the floor manager is essential as the eyes and ears of the director, and the only view the director has is what the camera operators provide.

In this control room the crew can use either the TV monitors or the glass window to check what's happening on the studio floor. Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Vision Control

Vision control may be in the main control room, or nearby.

Each studio camera has a long thick, multipin cable which carries signals in both directions. Besides sending the video signal to the control room equipment, it carries the genlock signal to the camera, it can handle intercom signals and also *return video*, so the camera operators can check which shot is selected at any moment by the vision mixer. Usually each camera cable plugs into a patch bay on the studio wall, and from there it's connected to its own CCU (camera control unit). But in some set-ups there's just a hole in the wall, and the camera cables run through it.

This little control room can be used for voiceovers or cable radio. Wakefield Community Access TV, Wakefield, MA, USA. (Photo by Ruth Stegner)

The TD sets up all the cameras so their signals are within the required range and their images match each other in colour, brightness, contrast and black level. White balancing is done at the CCUs, as well as some tweaking to adjust luminance levels, video gain, the black pedestal, and the blue and red signals, if need be.

Without this matching, the look of the picture could change from shot to shot, distracting the viewers.

From the CCUs, the video signals are fed into the vision mixer.

Audio Control

Audio control may be in the main control room, but it's better if it's separate from the general frenzy and noise so the sound operator can hear the program sound well and pick up on signal problems, like buzzes or crackling cables. Often it's in a nearby room; sometimes it's viewable from the main control room through a large window.

All the studio mics are plugged in to a patch bay on the studio wall, and from there audio cables are run to audio control and connected to the input sockets at the back of the audio mixer.

Operating the audio mixer, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Audio control also contains various playback machines, like phonographs, and tape cassette, DAT and CD players.

The responsibility of audio control is to test, adjust and control the volume and quality of each sound source, and insert each one into the program correctly, according to the director's calls. The sound operator must ensure that the signal output from the mixing desk is strong enough and that throughout the program sound levels are consistent.

Sometimes the sound operator works alone, and sometimes there's an assistant who helps by playing the needed disks, tapes and cassettes for program music and special effects.

Dominic Kanak, TEAME Indigenous TV and Video Training Course, Metro TV, Paddington, NSW, Australia. (Photo by Anne Douglas)

Lightweight camera pedestals at the Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Studio Cameras

Studio cameras are usually the best quality cameras the institution can muster. Most places try to limit the use of these cameras to just the studio, plus maybe the OB van.

But it's also possible to hook field cameras into a studio system, either as the mainstay cameras, or as auxiliary stationary or roving cameras for more complex shoots.

Studio cameras have larger viewfinders, so the camera operators don't have to put their eye to the viewfinder and can stand back and comfortably frame and focus their shots. Such viewfinders have an on-air light (called a *tally light*), which lets the operator know when that camera's signal is being used in the program.

The camera's zoom and focus controls are connected to *servos* (cables which allow remote control) and are mounted on the tripod's control handles. This allows the operators to make zoom and focus adjustments with their fingers while still having complete control of the pan and tilt of the studio cameras.

Headsets allow the camera operators to receive instructions from the director or DA and to talk back

to the control room when necessary, but for the most part, camera operators don't speak once the show begins.

Signal adjustments, like white balance and the iris setting, are not done by the camera operators. They're controlled by the TD operating the CCUs in vision control.

Camera Mounts

Studio cameras are mounted on camera pedestals or on tripods with dolly wheels.

The camera pedestal is designed to move the camera quickly, smoothly and quietly around the studio floor. A sideways movement is called *tracking* or *trucking*. A forward or backward movement is called *dollying*. When a stationary camera is needed, the brakes can be locked on.

The camera pedestal can also smoothly raise or lower the height of the camera. This camera action is called *ped up* and *ped down.*

Some camera pedestals are controlled by a steering wheel mounted horizontally beneath the camera. You turn it in the direction you want the camera to go in, give a push and away it goes.

The camera is mounted on a pan/tilt head, which is controlled by four knobs.

Mounted studio camera, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

In Australia, camera operators get to their *use-by date* at 30 years of age, and should think about moving on to floor managing or directing.

Chris Fraser, Cinematography Department, AFTRS.

Tilt Lock

This knob locks or loosens the tripod head's tilting action (which allows the upward and downward swing of the camera lens). The tilt should always be locked before the camera operator walks away from the camera.

Tilt Friction (Tilt Drag)

This knob allows the camera operator to adjust the tension control on the tilt action. The ease of movement of the tilt can be varied from very fluid to quite firm, depending on the requirements of the shot and the ability of the operator.

The tilt friction should never be used to lock off the tilt—this can strip the control and render it useless.

Pan Lock

This knob locks or loosens the tripod head's panning action (the swivelling of the camera to the left or right). The pan should be locked before the camera operator walks away from the camera.

Pan Friction (Pan Drag)

This knob allows the camera operator to adjust the tension control on the pan action. The ease of movement of the pan can be varied from very fluid to quite firm, depending on the requirements of the shot and the ability of the operator.

If the pan friction is on too tight, the panning action might lose its smoothness and become jerky.

The pan friction should never be used to lock off the pan—this can strip the control and render it useless.

The vision mixer lets you select any source which is connected to it, by pressing the corresponding button. (Photo from Northern Melbourne Institute of TAFE)

When the light's on, that source is selected. (Photo from Northern Melbourne Institute of TAFE)

The Vision Mixer

The vision mixer is a device with a counter-mounted panel with buttons on it, which allows the operator to electronically preview and select program video from the array of camera shots and other video sources which are patched in to it, and to set up and execute visual effects and transitions. The chosen button lights up, so the current choices are clear to anyone at a glance.

The line output of the vision mixer is routed either to a record VCR, to broadcast or to both.

For details on the operation of the vision mixer, see Chapter 30, Operating the Vision Mixer.

Live Video vs Pre-recorded Video

Video which is being generated at the moment from a camera or other video generating device is called *live*. Video which has been recorded on tape and is being played back on a VCR is called *pre-recorded*.

Why is this important? Because live video has a stable sync pulse (timing pulse) to it, and pre-recorded video has slight variations in its timing, due to extremely minor variations in the speed of the mechanical rotation of the VCR's playback heads. So pre-recorded video has an unstable timebase.

A vision mixer can't do a technically clean cut, wipe or dissolve between two video sources unless they both have exactly the same timing and both have stable timebases.

Genlock

Video cameras have to be able to generate their own timing pulse (or sync) so they can function independently and record a stable signal on their own.

Some cameras can also receive a sync pulse from an external source and use that pulse as the timebase for the signal they produce.

When cameras (or other video-generating devices) are sent the same sync pulse from an external source they operate to exactly the same timing, and they're said to be *genlocked*.

Their video signals can then be used sequentially on the vision mixer in cuts, dissolves, wipes and other effects without causing any signal break-up or glitching due to differences in timing.

The sync signal from the studio sync generator, or some other timing device, is fed to the camera through the genlock input.

Though the sync pulse generator is the normal source of genlock, it's also possible to genlock equipment from the composite video out signal of a camera, from the output of a vision mixer, and even from a VCR. The VCR tends to be the least reliable source of sync.

Any video signals that are input into a vision mixer need to be from sources which are *synchronised* (*synchronous* with each other, having the same *timebase* as each other). Synchronisation can be achieved through genlock or, in the case of some smaller vision mixers, the synchronising of the incoming signals is done within the mixer itself and genlock cabling isn't necessary.

When the *NS* light comes on during a mix or wipe on a vision mixer, it means that the two sources are *non-synchronous*, and they can't be combined smoothly until they're synchronised.

Sync Pulse Generator

The sync pulse generator is used in a multicamera studio or OB van to genlock the equipment by generating stable timing pulses (sync pulses) and sending them to all the equipment which will be providing video signals to the vision mixer.

It produces signals for horizontal and vertical sync pulses, blanking pulses and composite sync pulses.

The sync pulse generator (SPG) gives the correct timing signal to all the equipment in a studio.

Timebase Corrector
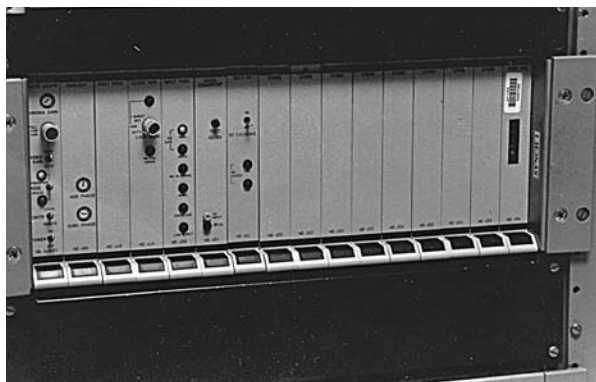
The timebase corrector (TBC) removes the sync from a video signal and attaches a new, steady, sync signal. A TBC is usually needed when sending pre-recorded video into a vision mixer.

The *timebase corrector* (TBC) receives the video output from the playback VCRs, strips the signal of its unstable sync (timebase) and then attaches that signal to a 'rock solid' timebase and outputs it to the vision mixer, where it can then be successfully combined with other signals.

TBCs also allow adjustments to be made to the video signal being processed, such as altering the video gain, the black pedestal and the colour balance.

Playback

The playback decks you see in the back of the picture are mini-DV playback decks bought for $150 each at a local store. They are not industrial quality, which are much more expensive, but they are not used 24-7 so they do the job. Wakefield Community Access TV, Wakefield, MA, USA. (Photo by Ruth Stegner)

Frequently during live shows, the director wants to insert material which has already been taped and edited. This could be on-the-street interviews done on the topic the program is addressing, it could be public service announcements (PSAs), or even advertisements, depending on what the station is allowed to do.

In all these cases, the playback VCRs (the *decks*) have to be sending video signals with exactly the same timing as the live video which is being generated by the cameras, so that the signals can all be intermeshed without glitches as they pass through the vision mixer.

Barbara Bishop, Independent Producer.

Wakefield has programming about 8 hours a day, and the rest of the time it's their community bulletin board. The playback area is interesting because they converted from SVHS playback to DV by simply replacing one deck with the other. The connector types were the same, so it was immediately compatible. A carousel system would have been much more expensive to buy and to service—and if the system went down they would be off the air. This way, they can run down to the local video store and buy a new deck out of petty cash, and they're back up and running in no time.

Frame Store

A frame store can do the timing correction that a TBC does, but it's also able to hold in memory a full frame of video information.

This increased memory capacity makes it possible for the frame store to do an array of wondrous signal manipulations, including:

- *Freeze frame*, which grabs one whole frame of video and continuously repeats it, giving the effect of a still photograph on the screen.
- *Freeze field*, which reproduces just one field of information, again with the appearance of a still photograph on the screen. Freeze field is what to use if the frame has action in it. For example, while a freeze frame will show a guitarist's hands shimmering, the freeze field will show a still image.
- *Strobe*, which is an effect caused by the video signal going in and out of freeze frame mode at a regular rate. This rate can be varied.
- *Mosaic*, which gives the image the appearance of being made of tiny tiles. This effect can be increased to the point that the image is unrecognisable, or decreased till the effect is barely noticeable, by controlling the size of the tiles both vertically and horizontally.
- *Paint* (or *posterisation*), which gives the image the appearance of a paint-by-number project. This effect can also be increased till the picture looks like a flat-toned poster made up of wide swathes of monotone colours, or decreased till the effect is hardly evident.
- *Mirror image*, where the image from one half of the screen is reproduced in a mirror image on the other half of the screen.
- *Negative image*, where the lights are dark, the darks are light, and the colours are replaced by their opposites (red is cyan, blue is yellow, and so forth).
- *Compression*, which digitises the signal and then allows it to be squashed or stretched, either vertically or horizontally.
- *Multiple images*, which allows the same picture to be repeated in miniature several times in different positions on the screen, with one little section active (displaying moving video) and the other positions showing freeze frames.

A frame store does the same job as a TBC, but it can also do additional special effects.

Black Generator

The black generator comes either as a device on its own, or it can reside inside the vision mixer.

It produces a clean black signal with solid sync pulses. It's used to produce the black for the beginning and end of shows, and its composite video out signal can also be used to genlock the studio.

Video Distribution Amplifier

A *video distribution amplifier* (VDA) is a simple device which takes a video signal in at one port and outputs the same signal, at full strength, to four or six ports.

Thus the VDA allows the same signal to be sent at once to several studio devices, without its signal level being lowered (attenuated). A typical distribution of a video signal would be that the camera signal is taken out of the CCU and sent simultaneously to:

1. The patch bay connected to the waveform monitor and vectorscope.
2. The camera monitor.
3. The vision mixer.
4. The patch bay for the frame store.

A VDA is essential to a video copying set-up, where several VCRs need to receive the same signal at once.

Routing Switcher

The routing switcher works in reverse to the VDA. It takes in many video signals but has only one or two outputs.

A routing switcher is simply a row of buttons, when viewed from the front. At the back it has a row of BNC sockets which allow several video signals to be input into it, and it has one or two video outputs.

The routing switcher is used to assign a variety of video sources to a single piece of video test equipment, like the waveform monitor or the vectorscope, or to a monitor, a VCR, or whatever is desired.

The TD can select any source s/he wants to view or adjust by pressing the labelled button at the front which corresponds to that source's input, and then that signal is allowed to pass through to the video out of the routing switcher and is sent along to the test equipment or wherever.

Routing switchers are usually rack mounted so the input cables at the back are inaccessible to all but the technicians. This is so the cables stay connected to the right positions and the routing switcher remains reliable for the next operator.

The routing switcher lets you select a signal and send it to whatever equipment you choose.

Patch Bay

Patch bays are the ultimate for allowing the user choice in connections. They can be used for both video and audio signals, and also for assigning lights to the lighting mixer.

A patch bay has a row of inputs and a row of outputs. It's rack mounted and the cables coming from and going to the various pieces of studio equipment are labelled and connected at the back. The back is usually accessible to the technicians only.

At the front are connecting sockets for every in and out position, and each socket is (hopefully) correctly and legibly labelled. (We're talking about the best of all possible worlds here!)

The patch bay allows anyone to connect any input to any output by the use of short cables or attaching devices.

The patch bay allows much more flexible use of equipment by giving the operator the ability to quickly and easily set up whatever signal paths are desired. No need to climb in behind the rack and reconnect everything—or make a total mess of the studio hook-up. Any signal paths can be set up by one user, and then unplugged at the end of the shoot so all the wiring is intact for the next user and all the options are still available.
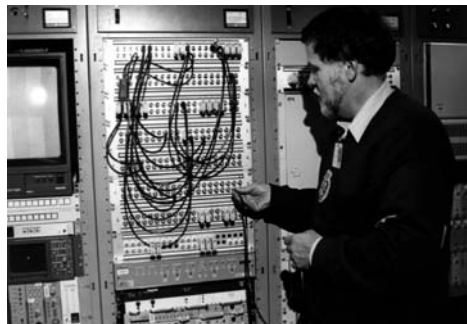
Patching in a video cable. Colin Kemp, Engineering Department, Australian Film Television and Radio School.

Routing audio through a patch bay, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

Character Generator

The *character generator* (CG) has a keyboard which allows the operator to type in titles for the opening and closing credits and for superimposed titles within the show.

The basic CGs have only one font type (lettering style) and two or three font sizes to choose from, and are limited to white on black. They can send one still page of lettering at a time. Never mind, they get the message across.

The fancier ones are word processors which have a range of fonts and font sizes, can do special effects on the lettering (like drop shadow, bold and outline), can generate coloured letters and backgrounds, and can store several pages of credits in memory.

They can also present the pages of credits in a variety of scrolls (where the words roll upward or downward across the screen) and crawls (where the letters move horizontally across some section of the screen).

Store a template of the standard end credits for your show, including your copyright announcement. Then for each new program you only need to adjust the names of the crew. No need to retype the whole thing each week!

Martha Mollison, Video Producer, Sydney, NSW, Australia.

Teleprompter

A teleprompter is basically a computer and display system.

Whatever the presenter has to say, the news, the weather, the commentary, anything, it can be typed in advance and saved to a file on the computer's C-drive or on a floppy disk.

When rehearsal time comes, the presenter looks towards the camera which has the display of the words either attached to it or near it. Because the words have to be large so the presenter can read them at a distance, the words have to roll up the screen to show the whole speech.

In the control room, the operator of the teleprompter works out what's the best speed for the presenter to read the words aloud, and makes a note of it, with any variations due to long hard words, or quickly spoken phrases.

Then for the program, the presenter can rely on the words rolling out in front of his/her eyes at just the right speed.

Multicamera TV studio, Charles Sturt University—Mitchell, Bathurst, NSW, Australia.

Graphics Computer

For more elaborate credits and for computer generated graphics, there are computers with good graphics programs and composite video outputs, which can be connected into the vision mixer and used as a flexible source for imaginative program content.

The graphics can be presented on their own, or mixed or wiped into combinations with live video from the studio cameras or from pre-recorded video.

The Audio Mixer

A simple audio mixer allows a number of sound sources to be input into it (like the studio mics, the playback VCRs, and the tape, cassette and disk machines) and all these sources can be mixed down into one or two audio outputs, which can then be inserted into the production, either for recording or for broadcast.

For each input sound there's a corresponding fader control which allows the operator to set the volume of that sound and to fade it in and out, as required.

There's also a master output fader (or two) for volume control of the mixed sound as its output to the next step on the signal path.

On more complex mixers, the sound quality can be manipulated by using equalisation controls for bass, mid-range and treble frequencies, the sound can be selectively assigned to any combination of outputs, the gain can be adjusted, the fader can be muted if necessary, and any single source can be listened to on its own (solo).

For more about the audio mixer, see Chapter 31, Operating the Studio Audio Mixer.

Each fader knob controls the volume level of the signal attached to one sound input.

The Lighting Mixer

The lighting mixer follows much the same principles as the vision and sound mixers. It has a number of fader-controlled inputs, which can be used to adjust the output levels of the various studio lights.

However, as there are often more lights than there are inputs, it's usually serviced by a patch bay. Whatever lights are needed for the production can be attached to the patch bay during set-up time, and then the patch bay is cleared at the end of the production.

The mixer is operated by faders which allow the brightness of each light to be set, so some lights can be on at full strength while others are slightly or seriously dimmed.

Some mixing consoles allow more than one lighting set-up to be installed at once— either manually or assisted by a computer. Then it's possible to do a slow or quick crossfade from one lighting arrangement to the next, giving a smoother transition from scene to scene on the same set.

A master fader will raise and lower an entire lighting arrangement, simultaneously getting each light to its assigned output level.

Lights can also be switched to being *independents*, so they're separately put on and off by their individual faders.

Waveform Monitor

The waveform monitor is a signal testing device which has several different displays, selected by a knob.

The TD uses the waveform monitor to check specific aspects of the video signal, like the *sync pulses*, the *luminance level* and the *pedestal* (black level). It's helpful in diagnosing problems, matching signals from different sources, and ensuring that the studio output signal conforms to broadcast standards.
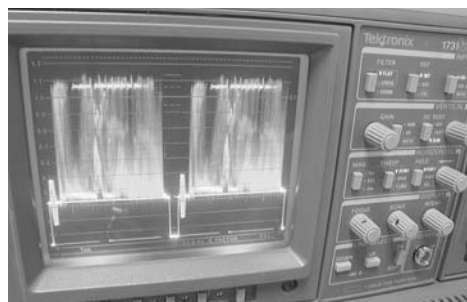
The waveform monitor shows information about the luminance signal, and the vectorscope shows information about the colour signal.

Vectorscope

The vectorscope is another signal testing device, used for analysing the properties of the colour portion of the video signal.

It shows *colour phase* and the *chroma amplitude* (strength of the colour signal).

It's especially useful when operating in NTSC, where the colour from each camera can be out of phase, and therefore unmatched to the next one.

Suggestions from Rachel Masters

Try to create an opportunity where you and your friends can observe the workings of a television studio. Often television stations need audiences. Phone your local station for tickets and be a part of the show, while observing what's going on behind the scenes. Making television is fun—even though everyone often looks very serious. Try not to be disappointed when you see that all the glamour is in front of the cameras.

29 Studio Roles

Some studio crews number 20 or more people, and other wizards pull off a good production with only two or three people doing all the studio jobs.

So when we talk about studio roles, it's as a general guideline only. You have to work with what you've got and whoever is there to help you.

However, it does help, when dividing up the work, to have a general overview of all the jobs that need to be done. So here goes.

The Producer

The producer is the head of the production team and is responsible for the successful completion of the project.

The producer decides on the program concept, chooses the director and other key production personnel, like the heads of design, photography, lighting and sound, and may be involved in the selection of other crew and performers.

The producer has the final say on artistic and editorial policy, and controls the budget. The producer also has overall responsibility for the quality of the program.

However, once the major decisions on program treatment have been made, the producer hands the artistic realisation of the production over to the director in the studio. In a drama production, the producer does not usually sit in the control room and dictate ideas on how the shots should go.

In broadcast news and current affairs, where stories are sometimes being included and dropped up until the moment of transmission, the producer is present in the control room to make those last-minute decisions.

> It's the ideas that count. The producer's business is content.

The producer is responsible to the television station or to whomever has commissioned the project.

Gilda Baracchi, Producer.

The Director

The director is responsible for the creative vision behind the production, and for guiding the program designers in realising that vision through sets, costumes, lighting and sound. It's the director's responsibility to decide the final visual and audio treatment.

The director is responsible for explaining the production to the performers and the technical crew, rehearsing them till they're ready to give a good performance, and directing them through every step of the actual taped or broadcast program.

The director must enthuse the whole team, so everyone is committed to the success of the project.

As a result of all this responsibility, it's usually the director who gets the overall credit or blame at the completion of the project. The director is responsible to the producer.

Directing involves being able to live in two worlds—the world of your inner vision, and the day-to-day world where your inner vision is given life.

Kathryn Brown, Director.

As a director you have to stay flexible, because control room procedures vary from place to place. For example, in Sydney the DA calls the shots, and in Melbourne s/he doesn't. As a freelance director you have to adapt to the crew you are directing.

Sara Hourez, Former Director of *Neighbours*.

The director needs to keep the DA up-to-date on any changes to the program. The DA then informs the rest of the crew.

The Director's Assistant

The director's assistant (DA, or producer's assistant), performs a wide range of tasks which help the director to organise and run the production.

The DA performs many administrative tasks, like ensuring the scripts and rundown are copied and up-to-date with last-minute changes, and distributing them to all crew members.

The DA acts as the director's go-between with every department involved in the production, and ensures everyone knows exactly when and how the production will proceed.

For the actual performance the DA alerts Videotape to record, times all segments and the program itself, prepares cameras for their upcoming shots, uses the character generator, watches continuity, liaises with external program sources such as an OB van or feed from another site, alerts the director to snags or timing problems, and may type in the credits.

DA Anna Lang times a segment in Studio 1, Australian Film Television and Radio School, Sydney.

Be ready for any eventuality—and don't be afraid to ask! If *you* don't know what's going on, how can you tell everyone else?

Anna Lang, Directing Department, AFTRS.

Take one step at a time!

Sandra Chung, ABC TV Training and Development.

The DA needs excellent communications skills, diplomacy and a good knowledge of every role in the production process. The DA may need special qualifications if working on productions like music or dance.

The director's assistant is responsible to the director.

The Designer

The designer is responsible for the overall look of the production, and is in charge of staging and properties, wardrobe and make-up.

In response to the producer's brief, the designer draws up a proposed set. Once s/he has received the go-ahead, the designer draws up and delivers floor plans to the producer, the director and the technical director.

The designer arranges for the construction of staging and any other necessary set elements, and makes sure that they're built according to the approved specifications and delivered on time.

The designer also makes sure that all props are procured, and that the performers are dressed appropriately, in the correct period of wardrobe and make-up.

The designer is responsible to the producer and the director.

Anyone can design with a million dollars. It takes a clever designer with a hundred dollars to make it look like a million.

Darrell Lass, Production Designer.

The Floor Manager

The floor manager is in charge of everything that happens on the studio floor, during pre-production times, rehearsals and the production itself. S/he is the director's right-hand person and representative on the studio floor.

Don Bethel, Floor Manager and Consultant, Television Production Techniques.

Anticipation is the name of the game.

The floor manager also attends site checks for location shoots.

The FM is particularly concerned with safety, crew morale and contentedness, performance achievement and discipline—where necessary.

The floor manager compiles a workable schedule which allows for the creative needs of the director and performers, and the practical needs of the technical and support crew. This schedule would include the amount of time needed to do special effects, for example.

At the beginning of a production, the FM welcomes the performers and guests to the studio and looks after their comfort and needs.

The FM puts tape markings on the floor to help the performers know where they should stand, or to stop their movement, and assists performers to achieve the right positions and eyelines.

During rehearsals the floor manager can give the director information about possible difficulties with the stage directions planned, and during performance the FM remains alert to anything which might get in the way of achieving the desired shots, remedying whatever is possible.

The floor manager gives the countdown to the actors so they know when the show begins.

The FM remains in constant contact with the director, via headphones _with talkback_, and conveys the director's instructions to the performers and crew. The FM also discreetly relays to the director the needs of performers and crew, making sure that the director is aware of the mood on the studio floor, and that people get rest breaks when they need them.

At the end of rehearsals and the production, the FM thanks the performers and crew, on behalf of the director.

The floor manager is responsible to the director.

The floor manager, Erik Vaage Teigen, gives a countdown cue to the band, Mech, Griffith University, Brisbane, Qld, Australia. (Photo by Walter Holt)

Ben Farrawelle, boom operator, and Charlene Davison, floor manager, on set for _Alone_, TEAME Indigenous and Video Training Course, Metro Screen, Paddington, NSW, Australia. (Photo by Anne Douglas)

The Technical Director

The technical director is in charge of the booking and operation of all technical resources, and liaises between the director and the technical crew.

It's the responsibility of the TD to ensure that each camera's picture is technically lined up and that the signals from all the cameras are correctly white balanced and match in colour, brightness, contrast and black level. This is done by adjusting the CCU (camera control unit) for each camera. The CCUs are all housed in the vision control room, where they're linked to signal test equipment—a waveform monitor and a vectorscope—so their signals can be analysed.
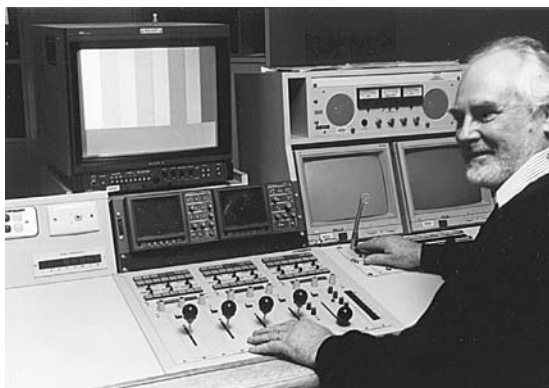
Adjusting camera levels. Rod Bower, Australian Film Television and Radio School.

The TD also makes sure that the system is correctly set up for special effects, like chroma key.

The technical director is responsible to the director.

The Vision Mixer

The vision mixer inserts each shot into the program by operating the vision mixing console according to the instructions of the director.

During rehearsals, the VM works out how to achieve the shot sequences and special effects which the director may require. On air, the VM sets up and programs any effects required and switches the cameras and other sources to line. In a harmonious working relationship, the VM could alert the director to problems related to effects or shot sequences.

The VM needs to be able to follow a script and/or rundown and to constantly think one step ahead.

In most cases, the vision mixer is responsible to the director.

Vision mixing in the control room of the University of South Australia, Underdale, SA, Australia.

The Sound Supervisor

The sound supervisor might be working alone or overseeing a sound crew. In either case, s/he ensures that all elements of the desired soundtrack for the production are ready, and that each one gets correctly mixed into the program.

This includes:

1. Making sure any necessary pre-recorded music and effects have been procured, and the necessary playback machines have been hooked up to the audio mixer. Also that

Operating the Studio 3 audio mixer. Barry Fernandes, Sound Department, Australian Film Television and Radio School.

the corresponding mixer faders have been labelled, the sources are cued up and that sound checks have been done to find the correct levels to achieve the program's needs.

2. Selecting the right mics and making sure they're placed so the desired sound can be captured.
3. Participating in rehearsals and alerting the director to any problems with boom moves, in relation to lighting, or to the performers.
4. Mixing all sound sources (from mics, VCRs, disk players, tapes, OB van and remote sources, special effects equipment, etc.) into the program soundtrack.
5. Ensuring that the program sound level is consistent and neither too high nor too low.
6. Returning all sound equipment to its proper storage at the end of the production.

The sound supervisor is responsible to the director.

The Lighting Director

The lighting director is responsible for designing the right lighting look and for achieving it.

This includes deciding on the type and strength of all lighting fixtures to be used, drawing up a chart which shows where each light will be hung or stood, and planning for the appropriate use of gels, spun and reflectors. It also includes working out the details of special lighting effects, like helicopter lights.

The lighting director oversees the installation of the lights for the production, and works with the sound supervisor to solve problems relating to boom access or boom shadows.

The lighting director makes sure that the script for the program lighting is correct, that the lighting board or computer control is properly programmed, and that the lighting operation is adequately rehearsed and correctly performed during the production.

The lighting director is responsible to the director.

The Videotape Operator

The videotape operator is responsible for cueing up all videotape inserts and rolling the tapes quickly when requested to do so. It's important to be familiar with the operation (and quirks) of the VCRs in question.

In small studios, the same person may also operate the record VCR to tape the program. S/he must load the correct record tape, put the VCR into and out of record mode as instructed by the director, and play back segments so they can be checked.

The videotape operator makes sure everything is recording correctly by referring to the record VCR monitor and the video level meter, and watching the audio VU meters to make sure the sound is reaching the record VCR and that it's strong enough but not distorting.

After the program, the videotape operator sometimes is asked to replay the program for viewing by the director, the crew and possibly the performers.

S/he is also responsible for correctly labelling both the tape and the tape case, and delivering the tape to the director.

In a production facility, the videotape operator's job is complex and involves many important functions, including editing. But to a student just beginning to learn studio work—whose only duties are to put the VCR into record, watch the levels and stop the tape at the end of the shoot—being put in the videotapes job slot can seem like a set-up for a boring class. Still, when you come right down to it, what good is everyone else's work if it doesn't get recorded? Which sometimes happens. This is a critical position.

The videotape operator is responsible to the director.

Operations Department, Imparja TV, Alice Springs, NT, Australia.

The Camera Operators

The camera operators should be totally familiar with the cameras and pedestals they're using. The current standard studio set-up has four or five cameras, three on pedestals, and one or two hand-held that are able to rove.

Although shot sizes are roughly standardised, each camera operator should be sure to learn what the current director means by each shot size.

They should rehearse each shot they'll be required to produce, according to the planned script, and they should make sure that their camera cards, which list their shots, are correct and up-to-date on any changes.

The camera operators should practise any difficult camera moves and let the floor manager or director know of any anticipated problems. Each camera operator should get to know whether the director wants him/her to offer up shots and, if so, then to do so (the director's feelings on this become obvious pretty quickly!).

During the production, each camera operator

The real buzz of being a camera operator is not the money. The biggest reward is having the skill to interpret what the director wants and achieving it every time.

Chris Fraser, Cinematography Department, AFTRS.

should go directly to the next scripted shot as soon as the last one is no longer being used. In productions where the shots aren't totally scripted, the camera operators should follow the general coverage instructions they've been given (like 'stay mainly on the host', or 'keep to long shots').

The camera operators are connected by headphones to the control room. They can talk back to the DA or the director during rehearsals, but should usually refrain from speaking during the production.

If camera operators make a mistake, they should keep going regardless and **never** stop the production.

The camera operators are responsible to the technical director, and they work for the director.

TV Production Studio, Macquarie University, North Ryde, NSW, Australia. (Photo by Mario Bianchino)

The Boom Operator

The boom operator guides the boom to pick up the needed sound for each part of the production. The boom may be hand-held or it may be mounted on a movable dolly. The boom operator is connected by headphones to the control room.

The boom operator should rehearse all moves carefully, watching for problems like boom shadows being cast on the set, or potential collisions with moving cameras, lighting fixtures or other set elements.

The boom operator is responsible to the sound supervisor and to the director.

Lena Adams booms a drama production at the School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Jeremy Reurich, technical trainee, operates boom in Studio 1, Australian Film Television and Radio School.

The Performers

The performers should arrive on time for rehearsals, follow the directions of the director and the floor manager, be clear about whatever needs they have which can be accommodated, and put out the best performance they can.

Performers should watch their energy levels, giving less energy to early rehearsals, so they have reserves left for building up to full performance level for the final rehearsals and the production.

Other Roles

In large studios the production team would include many other positions, like costume designer, make-up artist, stage hands, electricians and gaffers, camera assistants and grips.

Production Manager

The production manager books the studio facilities and looks after a myriad other production details long before the day of the shoot. The production manager, in some cases, even does the budgeting.

Production Secretary

The production secretary types and photocopies scripts, and does other things to help the production run smoothly.

Aysha Ahmed is a volunteer production assistant, Australian Film Television and Radio School.

The Casting Director

The casting director works in consultation with the producer and director to find the appropriate performers for the production. Their job is to understand what the director is after for a particular role

This elaborate Victorian Hospital set . . .

. . . and its waiting room . . .

. . . were built by Ken Manning, Annie Wright, Wayne Smith and others in the Props and Staging Department of the Australian Film Televison and Radio School.

Make-up artist preparing performer for *Uncle Tony's Kebabs*, directed by Marc Tewksbury.

You're only as good as your last job.

Rob Stewart, Coordinator Television Training Unit, Northern Melbourne Institute of TAFE.

and draw on their knowledge of actors to present a list of suitable available choices for the director to consider.

The casting director would then arrange for the director to meet the actors for a chat or audition and offer any advice or knowledge to help the director make his/her decision.

Once a performer is decided upon, the casting director will negotiate with the actor's agent to contract the artist.

Productions that cannot afford a casting director, and have no money to pay performers, will need to approach organisations/drama schools or local theatre groups to seek out actors. These places do not act as agents (i.e. offer suggestions for each role) but will usually allow you to put up a notice with your requirements so that actors can contact you for an audition. It would depend on the type and age of the role as to which organisation to approach—for example, a children's theatre company for juveniles, amateur theatre groups for others. Often these people are keen to get the experience; however, the quality of performance can at times suffer.

Suggestions from Rachel Masters

Learning to cooperate but not to compromise on standards is a good rule when working with your friends.

Making friends may be easy, but keeping them can be hard when everyone is striving to make the production a success and some people are losing their tempers under the pressure.

Before the production, organise a production meeting and decide on the roles you will need on the shoot day. Decide, as a group, who will be the director, the producer, the director's assistant/continuity, the editor, the sound recordist, the lighting person. You may need to double up on roles.

Then the next time you shoot a production together, rotate the roles so that everyone gets to understand the responsibilities and duties of each role. Eventually you may have your personal preferences, but learning that each team member's contribution is integral is also invaluable.

When you work as a team, don't forget to follow the plan.

'What plan?' you say.

Exactly . . . don't forget to have one that's written down.

30 Operating the Vision Mixer

The vision mixer is a video signal handling device which allows two or more video signals to be input to it. It has a number of buttons which the operator uses to choose which signal will be output to the *program out (line out)* port at any given time.

Vision mixers are used in video studios, edit suites, OB vans, portable multicam set-ups, and for selecting which signal goes to air from a broadcast control centre.

All the video signals which are input into a vision mixer need to be *synchronous*; that is, they all need to have exactly the same underlying timing pulses. So all the sources need to be genlocked to a sync generator or other timing supplier.

If two signals aren't *in sync*, you can't do any effect which involves both of them together, and if you try to cut from one to the next, you'll get a glitch at the cut. On some vision mixers, you'll see the *NS* light come on, which means the signals are *non-synchronous*.

The output of a vision mixer is sent to a record machine, through an in-house closed circuit system, to a transmitter for broadcast, through an external cable network, or any combination of these.

The vision mixer can pass on any input signal unaltered, or it can impose an effect on the signal or combine two or more signals together.

These controls decide the signal which goes to broadcast or to tape. (Photo from Northern Melbourne Institute of TAFE)

Tanith Carroll, vision mixer, Robin Cowburn, director, Kathryn Brown, instructor. TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia. (Photo by Anne Douglas)

Learning to Use a Vision Mixer

For most people vision mixers and video effects units are a bit boggling at first—some of them have so many buttons and moving levers.

A good way to start is to have a session or two with someone who already knows how to use the equipment pretty well. That person can run you through the basic knobs and show you how to get some of the effects you've always wanted to achieve.

Then it's great fun to play around with the equipment by yourself, especially when using your own footage. The more you play, the better you'll understand the equipment and the larger your own personal bag of tricks will be.

When you get an effect you really like, it's a good idea to jot down the positions of the knobs and faders. That way you should be able to reproduce the effect later on, whether it's to show someone else or to use it in one of your own projects.

(There's many a frustrated beginner who just can't figure out how to get back to that deadly effect s/he got on the first day!)

You could even try following the steps suggested in the equipment manual. You may come across effects you'd never discover on your own. Perhaps even effects nobody else at your school has learned yet. After all, who reads manuals?

Standard Vision Mixer Functions

There's quite a range in vision mixers, from the simple and inexpensive Panasonic MX10 and MX12, which are frequently used in VHS and SVHS edit suites, to the enormous Grass Valley mixers in broadcast stations, which can offer over a hundred choices in wipes. Still, there are certain functions found in almost all vision mixers.

This chapter will deal with the basic concepts used in operating a vision mixer.

The Bus

A *bus* is a row of buttons. It may be three buttons long or ten or more, depending on the mixer. (I don't know why it's called a *bus* since all those little buttons in a row look more like a train to me!)
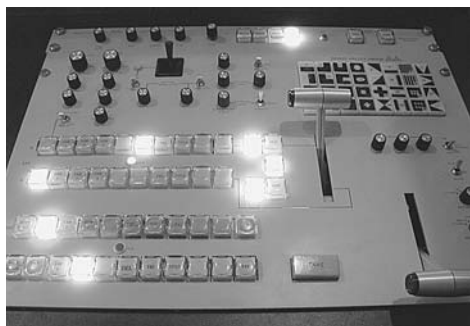
Whatever button is lit up tells you the input signal sources that are active at the moment. (Photo from Northern Melbourne Institute of TAFE)

Each button is connected to a different input video signal. By pressing a button down, the vision mixer operator selects the signal to be used. On many mixers, the button which has been selected lights up.

On all but the most basic mixers, there are at least two buses. One is used for selecting the signal for 'program out', so it's called the *program bus*. The other is used for checking a signal before it's selected for the program, so it's called the *preview bus*. Preview is especially important if you're trying to set up a special effect and you want to make sure it's right before you put it into the program.

The buses are connected to their inputs and the buttons on each bus correspond to those on the bus

next to it. So if the program bus goes, from left to right, camera 1, camera 2, camera 3, frame store 1, frame store 2, colour bars, character generator, colour, video black, and effects, then, to avoid confusion, all the buses on the mixer should be connected up in the same order.

Obvious as this may seem, it's important for each button to be clearly labelled. New users shouldn't have to puzzle over the meaning of half-scratched-off labels in the studio or edit room.

When you're doing a remote multicamera shoot, you'll be assigning the inputs to the mixer yourself. A strip of masking tape stuck beneath each bus works well for temporary labelling.

Both the program bus and the preview bus are connected to monitors, so the vision mixer operator can see what's been chosen on each one. In a studio situation, although the control room's camera monitors may be black and white, the program and preview monitors are almost always in colour.

These monitors should be clearly labelled, too. A classic mistake is for a director to get confused between the two monitors and start calling the program shots according to what's on the preview monitor!

Some mixers have a *take* button which, when pushed, sends whatever is on the preview bus to the program bus. Other mixers let you toggle (switch) between the two buses by moving the fader handle forward or backward.

Whatever button you select will light up. (Photo from Northern Melbourne Institute of TAFE)
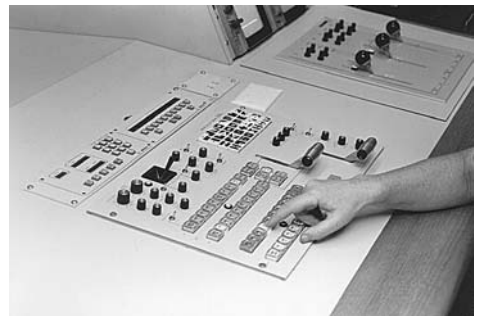
The program bus controls the signal which goes to the vision mixer's program output.

In a two-camera studio, because most switching is done between camera 1 and camera 2, pressing the take button makes operating the mixer a piece of cake for a beginner, as long as the show is made up exclusively of cuts.

Cut

A *cut* is when one entire signal instantaneously and completely replaces another. It's like a straight-out clean edit between the two sources.

Many programs are made up entirely of cuts, and many others have only a small number of shot transitions using other effects.

More is not always better when it comes to video effects. The overall look of the program is important to consider when deciding what style of shot transitions to use.

Other Buses

There are several other standard functions on a vision mixer. They are:

- Mix/Dissolve.
- Fade.
- Wipe.

Vision mixers usually have two more buses, called *effects buses*, to allow the operator to set up these other shot transitions.

The effects buses are often named the *A bus* and the *B bus*. (How's that for wildly imaginative nomenclature?)

To use an effect in your program, you first select the button labelled *effects* on the program bus. Once that's selected, whatever source is chosen between the two effects buses will be automatically sent to program out.

How do you set up the effect? It's pretty simple once you get the hang of it. There's a fader handle which moves between the two effects buses. This handle can be positioned to select the signal which is assigned to the A bus or the signal on the B bus. It can also be set anywhere between the two.

Mix/Dissolve

A *mix* (also called a *dissolve*) is a blend of the images from two sources. As you do a mix, one whole picture fades away as the other picture gets stronger on the screen. In mid-dissolve both pictures are viewable at half-strength.

To do a mix, select the *mix* button from the effects-mode choices. Then select one of your desired signals on the A bus, and the other one on the B bus. As you move the fader handle from the A position towards the B position, you'll see the A picture becoming fainter and the B picture becoming stronger. When you get all the way to the B position, the B picture is full-strength and the A picture is completely gone.

When you move the handle from the B bus back to the A bus, the dissolve is reversed.

If you want your next shot transition to be a dissolve to a different source, select the new source on the inactive effects bus, and then move the fader to that bus when the time comes.
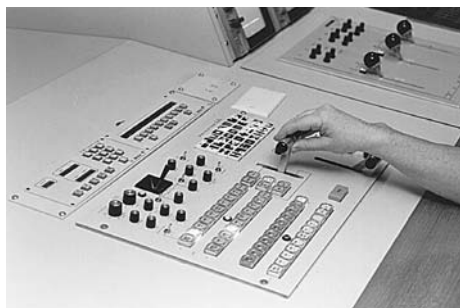
To do a mix, first select *effects* on the program bus, then move the effects fader between your chosen sources on the A effects bus and the B effects bus.

Cutting on an Effects Bus

Once you've completed a dissolve (or fade or wipe), you can stay working on the active effects bus, cutting from shot to shot as long as you like by just pressing the buttons on that same bus for the shots you require. Each shot will automatically go to program out. Then you're well positioned to do another effect when you need to.

Or you can return to cutting your shots on the program bus.

Just remember to reactivate the *effects* button on the program bus when you need to do your next mix, fade or wipe.

Fade

A fade is like a dissolve, but it goes from a picture to black, or white, or to a plain colour, all of which are internally generated by the vision mixer.

You do it in the same way as a mix, by selecting the picture on one effects bus, and the black or colour button on the other bus, then moving the effects fader from one to the other.

You can also fade up from black (or any other colour).

Fades are used at the beginning and end of programs, to indicate the passage of time, and to create a pause in the flow of the action.

Choosing the Colour

On mixers which have internally generated colours, you can have up to three controls affecting the colours:

- *Hue*, which selects what we normally call the colour—like red, blue, green and so forth.
- *Saturation*, which selects the intensity of the colour, ranging from pastel to vivid.
- *Luminance*, which selects the brightness of the colour, from very dark to nearly white.

By playing around with the three controls, you'll discover quite a range of colours, from muted sepia-like tones to garish chartreuse. You can use anything you want, from the restrained to the outlandish.

These colours can be used in fades and wipes, and other effects like superimpose and key.

Working on *ICAM*, Julie Nimmo, TEAME Indigenous TV and Video Production Trainee, SBS TV, Australia.

Wipe

A wipe is an effect which causes one picture to replace another by moving across the screen in any one of many selectable geometric patterns.

A wipe is done much the same way as a dissolve or a fade.

You start off by selecting the *wipe* button from the effects-mode choices. But then you have to deal with another whole range of choices! Are you up to it? You'll find an array of buttons with geometric patterns on them. Each pattern shows you the kind of wipe that button will give you. So choose your wipe pattern—maybe you want to start with a wipe which replaces the picture diagonally from top left to bottom right across the screen.

Then you assign your two signal choices to the A and B buses respectively. As you move the effects fader handle you'll see the wipe transition happening.

To do a wipe:

1. Select *wipe* mode from the *effects-mode* choices.
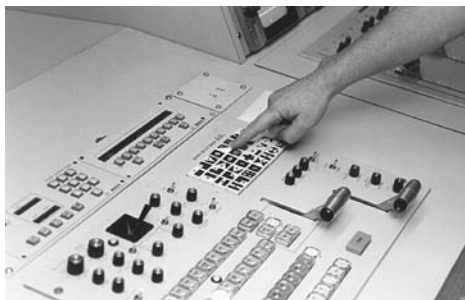
2. Then select the geometric pattern you want.
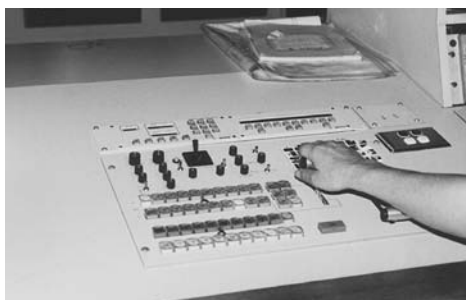
3. Then move the fader between the A and B effects buses.
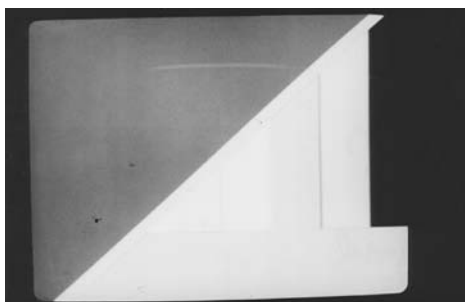
4. . . . And there's your wipe!

If you move the fader back, the wipe will recur in reverse, unless . . .

Wipe Direction Controls

Some mixers have a way for you to select the direction of the wipe, regardless of the direction you're moving the fader handle. You can assign the wipe function to always go in one direction (from left to right, for example, or from centre to edge). Or you can choose for the wipe to always go in the other direction. Or you can choose for the movement of the effects fader handle to correspond to the changes in wipe direction, so if you move the handle down, the wipe goes one way, and if you move it up, the wipe goes the other way across the screen.

Positioner Joystick

Look for a little handle sticking out like a gearshift in a racing car. This is the positioner. It does nothing unless you turn it on—there'll be a switch labelled

Robby Paul vision mixes for the drama *The Spirit of Our Land*, directed by Janice Stevens, with Chandini Jesudason on lighting. School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia. (Photo by Jason Troutman)

positioner on/off. Once you turn it on, you'll find that the positioner affects the starting position of certain wipes—usually the ones which open from the centre of the screen.

So, for example, if you're using a circle wipe, you can make it start from the top right of the screen or the bottom left, or wherever you want it to. You can even colour it and move it around—remember 'follow the bouncing ball'?

Framing for a Live Effect

When you're preparing and rehearsing an effect for a live production in the studio, your camera operators need to be clearly told what you're trying to achieve. Usually they like the challenge—it makes the shoot more interesting for them.

They can press the *return video* button, which is generally a tiny button on the underneath side of one of their servo tripod handles, so they can see the combined image which is being produced by the vision mixer, and adjust their shots accordingly.

If the cameras don't have return video, a monitor in the studio can help them line up their shots.

If the studio doesn't have a monitor (some studios work with skeleton equipment), the camera operators can crane their necks and look through the control room window at the program monitor.

If the control room doesn't have a window—they have to listen very carefully to the director's instructions through their headsets.

If there are no headsets . . . it's one of those crews which knows how to fly by the seat of their pants, and they'll find a way. (Maybe they don't have a wipe button either.)

Framing for a Postproduction Effect

When you're planning to do an effect in postproduction, you need to be sure you frame your shot correctly at the location shoot.

For example, if you want to open your show with a child's head appearing in a circle wipe at the centre of frame, you have to take care to shoot the original footage with the child's head in the centre of your shot, and it must be the correct size to fit into the circle wipe you intend to use. It's no good taking a slightly longer shot than needed and having a T-shirt logo in the centre rather than an elfin grin.

This may seem painfully obvious, but unless you're very careful about framing during the location shoot, your split-screen may make your performers look even more fragmented than they seemed on the day of the shoot, or your title graphic may be just too big or too small or too high or too low for the effect you worked out so carefully on the storyboard.

Do you have the time to re-shoot?

Wipe Borders

On some mixers you can also choose to put a border on the edge of your wipe. There'll be a switch which is labelled *border on/off*. When you flip it on, suddenly a border appears, clinging to the edge of your wipe, and it moves across the screen as your wipe moves.

Now this border has its own set of controls:
* *Colour*, to adjust the hue, saturation and luminance of the border colour.
* *Width*, to make the border wider and thinner.

Wipe Edges/Border Edges

As if that's not enough, there's another knob which you can turn to make the edge of the wipe or the edge of the border either hard—like a straight line—or softer and softer till it's blurry like a mid-dissolve or vignette.

Moving Edges/Moving Borders

Now for the people who gravitate to the psychedelic, you can also choose to make the edges or borders oscillate in a wave pattern. There's a *modulator on/off* switch to get this happening. And then you can really let loose. The waves can be made to be deep or shallow, by turning the *amplitude* knob, and they can be made to be many or very few, by turning the *frequency* knob.

If you've got a mixer which lets you oscillate borders, you'll probably be transfixed for some time.

It might be a good idea to stop here and try these basic mixer moves.

Vision Mixing Round Two

You're back for more? Well, moving right along, we still need to cover:

- Superimpose, and
- The key effects:
    - Luminance key.
    - Chroma key.
    - Internal key.
    - External key.
    - Downstream key.

Superimpose

When you *superimpose* something, you make it appear over the video image. This effect is used for putting titles or graphics onto a picture.

You can superimpose a title by stopping a dissolve midway, but better results can be obtained by keying if the mixer doesn't have a button labelled *super*.

Key Effects

The key effects cause parts of the video image to disappear and be replaced by another video signal. The resulting effect is as if a cut-out stencil were being applied to the screen.

The different key effects operate by being connected to different aspects of the video signal. So for each type of key, different video information is used to determine the shape of the holes which the key stencil cuts.

LUMINANCE KEY

The *luminance key* is connected to the brightness part of the video signal. When using luminance key, you can make any area of the image disappear which is **above** a certain

luminance level (brightness level). You can vary the level of brightness at which the key becomes active by adjusting the *clip* and *level* knobs in the section of the vision mixer labelled key effects.

Wherever the initial image disappears, another video signal will replace it. You can choose whatever signal you want to supply the replacement video. You can use the signal from a camera, or from the vision mixer's own internally generated colours, or you can use colour bars, black, a pre-recorded image . . . It's up to you, and there's enormous scope.

So, for example, all the white shirts and bright parts of faces can be replaced with purple or black or colour bars or some moving image.

You can also switch the luminance key to *negative* and have the initial signal drop out sections of the image which are **below** a designated brightness level. So all the dark hair and black pants can suddenly be replaced with whatever you decide.

White on black captions can be inserted easily and well, using luminance key.

To engage luminance key, you need to use the *lum* knob at the *key effects* section of the mixer panel, and you also have to select *key* at the *effects mode* section on the panel.

CHROMA KEY

Keying can also be done in connection with the chrominance (colour) of the signal.

You do this by selecting *chroma key* with the key effects choices dial on the vision mixer. Then you have to tell the mixer what colour you want to eliminate from the signal.

Some colours tend to work better than others. Red can be a poor choice for a chroma key because red is a component in skin tones, and usually the aim is not to have parts of people's faces eaten away.

Often the aim is to get rid of the background of the shot and replace it with something entirely different.

Your guitarist can appear to be playing music in the wildflowers on a mountainside in Switzerland, or your love scene can be played out in a cafe with the Eiffel Tower in the background.

To make the effect happen, you have one camera pointed at the actor, who's positioned in front of a plain coloured background. You delete that background colour from the image using the chroma key function, and you insert in its place an alternative background which is being supplied by another camera, aimed at a carefully lit scene from a postcard, picture book, or painting which is mounted on a graphics stand.

Another possible background source is a computer generated image supplied by a graphics computer linked in to the vision mixer. With computer generated backgrounds you can let loose your fantasies.

The camera that shoots the chroma key window is called the *source camera*. On some vision mixers, there's only one input for a chroma key source camera, so only one camera at a time can be used as the chroma key source. Save yourself some frustration by finding out if this is the case with yours! (To do this look at the cable connection at the back of the vision mixer.)

Any other camera can be used to supply the *fill* video (to fill in the holes), but the stencil for the chroma key must be *cut* with the source camera.

Chroma key can be a fiddly process—you have to check your image carefully before you record it. Watch for craggy edges around hair, or incomplete keying in shadow areas.

Watch out for tell-tale glare from the glossy page you're using as the replacement background image.

Chroma key blue, which is a very vivid blue, is frequently used for chroma keying because it's a colour which can be avoided deliberately in clothing and it isn't a skin tone. Sometimes you can run amuck with it on close-ups of blue-eyed people, though. Consider what your shots will be before you make your key colour choice. Bright green is also commonly used for chroma keying.

Screens and studio curtains can be bought in chroma key blue. The shadows in the folds of the curtains can give problems in getting a clean key effect, though. You'll probably need to pull them out flat.

Special paint can be bought in chroma key blue. It's expensive, but if used only as necessary it can allow you to create some terrific effects. You can paint it on chairs, boxes, wooden structures . . .

Once there were some students at the University of Technology, Sydney, who were crazy about *Star Trek*. For their final project, they painted boxes with chroma key blue and carefully placed them at the front of their set, and put a blue screen at the back. Then they performed their actions in between the two blue surfaces.

Interview with *chroma key* background, for *Asthma Care*. University of Western Sydney—Macarthur, Bankstown, NSW, Australia.

The vision mixer operator did a chroma key, inserting a freeze frame of the control room of a spaceship as the replacement signal. The blue on the boxes dropped away to be replaced by the front of the spaceship's control panel. The Trekkies stood behind it speaking in Klingon, and behind them the screen dropped away and was replaced by the rear wall of the spaceship control room, complete with a window out into the universe.

The effect worked so well that they forged ahead and managed to insert one of their number into a scene with Spock himself!

By the way, no matter what colour you use as the drop-away colour in a chroma key, that colour can occur in the replacement signal with no problem. It won't drop out of the replacement signal.

INTERNAL KEY

Internal key is a luminance key. It uses as its key source a signal which is on the A or B effects buses. This is frequently one of the studio cameras, but it could be any signal which is connected into the effects buses.

With internal key, the luminance signal from one of the buses cuts the key stencil and that same signal fills in the resulting 'holes'. The signal from the other bus supplies the rest of the picture.

Like the other key effects, it's controlled by the clip and level knobs in the key section of the vision mixer.

EXTERNAL KEY

External key is also a luminance key. The difference is that the external key source is not available to be selected on either of the effects buses, in other words, there's no button there for it. It's a video signal which is connected only to the vision mixer's input labelled *external key in*.

With external key, the stencil is cut by a source which cannot otherwise be called up for the program. The 'hole' which the external key source cuts is filled by the video from one of the effects buses, and the rest of the picture is from the signal on the other effects bus.

Again, it's controlled by the clip and level knobs in the key section of the vision mixer.

DOWNSTREAM KEY

This is often used for inserting titles into a program from a camera which is permanently set up and aimed at a graphics stand.

It's called *downstream key* (DSK) because it performs the key function on the signal just before it reaches *program out*. Because this effect happens after the signal has passed beyond the effects circuits in the vision mixer (in other words, downstream of those circuits), it leaves the main effects system free for constructing other effects.

> For the best key results, go for the biggest luminance contrast. Black and white work best.
>
> **Jim Tumeth**, Training Development, AFTRS.

Timing Effects

Some video effects don't just cause two discrete images to screen-share in one way or another. They alter the timing of the signal's playback.

Freeze Frame

By pressing the button labelled *freeze frame* you can get a still image. Even if the signal is from a videotape which continues to play onward, the image will stay the same in the effects unit until you unfreeze it.

You can then apply other image altering effects to a freeze frame image, or use it in wipes, mixes, fades or whatever you like.

Freeze Field

A frame is made up of two fields, each of which is the scan of every other line of an image (the odd field is all the odd lines and the even field is all the even lines).

Well, when there's some fast motion happening, even the tiny time difference between the scanning of one field and the next can pick up a variation in the image. So you can find that a freeze frame looks slightly unstable.

A case in point is if you've videotaped a guitarist playing music. The hand which is strumming the strings will have been moving very fast. When you play back a freeze frame of this image, the strumming hand may appear to flutter. That's when you need to use a *freeze field* instead of a freeze frame. It will give you a more stable still picture.

Strobe

Strobe is a series of freeze frames which are grabbed from the video as it plays back in real time. It gives the effect you may have seen when dancing under strobe lights.

The speed of the strobe is variable, so it can be a rapid series of short quick shots, resulting in very little picture information being missing, or the individual freeze frames can be longer in duration, thus blocking out large chunks of the intervening video.

Some home video cameras allow the user to shoot field footage in strobe. This may please someone who has no access to an edit system, but it means that if the strobing falls awkwardly on the action, there's no way to regain the missing picture information.

It's almost always better to record the image normally and apply effects in postproduction. Then you can try the effect different ways until you get what you like and the timing is the best you can manage.

Altered Images

Some effects reproduce your image in its correct timing and with its picture elements retaining their normal dimensions, but with some aspect of the signal dramatically changed.

Negative

The *negative* button will cause your image to be produced in its colour opposites. Not quite the same as a photographic negative, because video colour opposites are different, but you get the idea.

Invert

Invert, as you've probably guessed, presents your image upside down.

Ratana Salam does a dissolve. School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Monochrome (Mono)

By pressing the *mono* button, you can turn your image into black and white.

Paint

The *paint* effect simplifies the colour values in the image by reducing the number of tones. All the shades of a colour within certain ranges are reproduced as one flat tone, so as you increase the paint effect the picture looks more and more like a paint-by-numbers oil painting or a poster. (On some mixers it's called *posterisation*.)

Paint is a variable function, so you can increase or decrease the effect, as you see fit. If your image

starts to remind you more of your elderly uncle's lounge room paintings than a chic poster, you might reconsider using it.

Mosaic

The *mosaic* effect breaks the whole image into rectangles, like mosaic tiles. When a small amount of mosaic is dialled up, the image is only slightly affected, but when it's fully applied, the image is no longer recognisable.

Mosaic can come with horizontal and vertical controls which operate independently of each other, so you can have tall thin tiles, or short fat ones, or square ones.

Compression Effects

There are a number of variations possible with compression circuitry. For one thing, you can have the image squeezed thin so two images can appear side by side on your screen.

Or it can look flattened, so two squashed images can sit atop each other on your screen.

Mirror

The *mirror* effect compresses the image vertically or horizontally, so it fits into half the screen and then fills the other half of the screen with its mirror image.

Multiple Image

Compression can also make your image smaller while it retains its original internal dimensions. So you can have several images appear on one screen at the same time. This can be a neat way to show headshots of all the actors in your drama, or present shots from various segments of your magazine-style program. You can also use it when wrapping up a show.

On some systems, the last image you select remains active, so you can have, for example, four small frozen frames and one with an image running in real time.

It does take rehearsals to get the effect right.

Some effects units are programmable, so once you decide on your sequence the machine can store it and then reproduce it again and again on command.

Titles

Titles can be captured by shooting white lettering on a black background and bringing it into the image via a key function on the vision mixer.

Or they can be drawn up as artwork and cut in straight as a normal camera image.

They can also be produced by a character generator or a computer which can output a composite video signal.

Depending on the type of CG or computer, titles can be produced in several sizes and in different fonts (lettering styles).

Some equipment allows you to colour the letters and/or the background. Some allows you to make the letters bold or put them into italics, to add borders around the letters or give them drop shadows.

Television Aspect Ratio

If you're making your titles by hand-drawing them or using stencils or pre-punched letters like Letraset, it's important to set them out in the right proportions on the page or the cardboard.
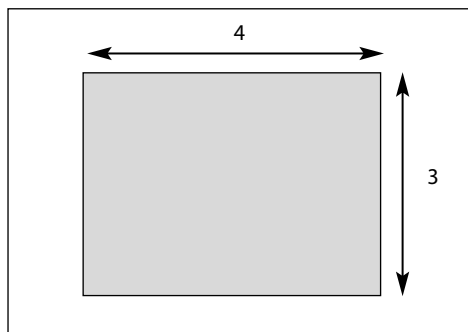
The TV screen has an *aspect ratio* of 4:3 (16:9 in widescreen). This means that the standard TV screen is four units wide by three units high (or 16 units wide by 9 units high).

Unless your title cards and other graphics are made to these proportions, they won't fit nicely onto the screen. You may have to shoot them smaller than you'd like, or redo them to make them fit. A common mistake is to draw them up on the normal page, which is taller than it is wide. Titles have to be wider than they are tall. When using a computer, choose the *landscape* mode.

Safe Titling Area

When framing graphics, don't forget the *safe titling area*.

Because not all TV screens have the same amount of image cut-off at the top, bottom and sides, the titles will appear differently placed when viewed from screen to screen.

Now, you don't want any part of your lettering to disappear off the left or right sides of the screen, or for your subtitles or people's names to be hanging off the bottom of the frame, so make sure your titles are placed with plenty of screen space all around the lettering.

1 Title card

2 Camera's frame

3 The portion of the frame which will show up on TV

4 Safe titling area
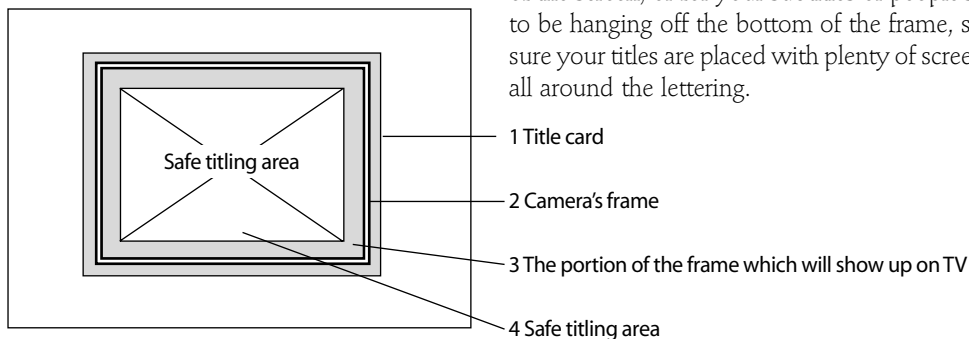
Presenting the Titles

Titles can be presented in a variety of ways. The basic ways are page by page, or as a roll or a crawl.

PAGE BY PAGE

Character generators can store a number of pages of titles in their memory bank. When they're needed, each page can be called up in succession, or a particular page can be summoned by typing in its page number.

When a production assistant types in the credits, it's good to write down which credits are on which page, so in the rush of a live program the right page can be called upon quickly.

This would be especially important when calling up the names to put with the images of guests on a show—you certainly wouldn't want to put the wrong name up on someone, or have to search through several pages to find the right one.

CREDIT ROLL

Rolling credits means to make the credits roll up across the screen. Several pages of credits can be made to roll in succession. This is a common way of presenting the end credits for a show.

Most CGs and computers will do a roll in several different speeds.

Allow plenty of time for doing your credits. Often there are surprising disputes about whose name goes where and in what size type—and never assume you know how to spell every name.

Meredith Quinn, Publishing Department, AFTRS.

THE CRAWL

A *crawl* is when the words are made to travel horizontally across the screen, usually at the bottom, but crawls can also be placed at the top or the middle of the frame.

Crawls can also be composed of several pages of credits, though usually they're used for shorter messages.

Crawls can be run at a variety of speeds.

Though these are the most common forms of credit displays, some new computer programs will display credits in almost any way imaginable.

They can whoosh in from one side or the other and either stop or keep going, they can leap on line by line, they can roll from the top or the bottom or seem to emerge from invisible slits at any height in the picture, and on and on. Choosing the credit display style you want may be very time consuming in itself—another reason to allow more time than you think you need for postproduction.

Live Switching

During rehearsals for a program, the vision mixer works out how to achieve the effects the director asks for. Once a decision has been made to use an effect, the vision mixer notes it on the production script.

During the actual program the vision mixer works from the production script, making the prearranged transitions. But s/he is not supposed to execute any shot change or effect until the director calls for it.

If you want to use digital effects and transitions which normally need to be rendered, you have to either pay very big bucks for a TV station type vision mixer, or content yourself to doing these effects in post production.

Suggestions from Rachel Masters

Depending on the access you have to a video mixer and digital video effects generator, the sky is really the limit! But even with a simple split screen you can create some mind-boggling effects.

Script a scene that involves a two-person conversation. Then videotape the scene with one person holding the first half of the conversation and standing on the far left of the frame, but talking to the right side of the frame (as if someone were there). **Don't move the camera.**

Now ask the *same* person to play the other part in the conversation and be at the right side of the frame, talking to the left side.

Time the pauses in the conversation carefully to allow for the other part of the dialogue to fit in. Then if you run the two recordings into a vision mixer at the same time, and make a split screen wipe down the centre of the frame, you can make the conversation appear to be happening in real time!

The practicalities of this idea take a bit of practice. You'll need to keep the camera perfectly still so the split screen line down the centre doesn't move. The line in the frame between the two people should be invisible. You'll also need to record each half of the conversation in one take and time it exactly. If you did an edit in either half of the conversation, you'd get a jump cut. Changes in lighting will also give the game away.

Give it a go. It can be very odd to have a conversation with yourself and see it on screen—unless you're an identical twin, in which case you probably know the feeling already.

31 Operating the Studio Audio Mixer

The first glimpse you get of a *studio audio mixer* will either delight you—if you're a buttons person—or give you a fright.

It's a bit like walking into the cockpit of a plane. 'How can anyone learn all these buttons?'

Well, the big relief is that the *desk* is full of repetition. Once you've learned the buttons related to one sound input, all the other input rows are basically the same!

The function of the audio mixer is to take in a variety of sound sources, blend them together, and send them out through either one or two master output channels.

In a studio situation, it would be usual for some of the inputs to be used for live mics from the studio floor, some for rolled-in music from CDs, DATs or tapes, and some for rolled-in sound accompanying pre-edited video inserts. There could also be telephone feeds, sound from a remote site, and special effects.

The person operating the mixing desk, who's also called the *audio mixer* or the *sound desk operator*, has to be constantly alert to make sure that all the sounds are flowing through at the right volume. Each sound needs to be loud enough but not distorted. And each sound needs to appear and disappear at the right times.

Studio audio mixing desks are also used for doing sound postproduction for video edits.
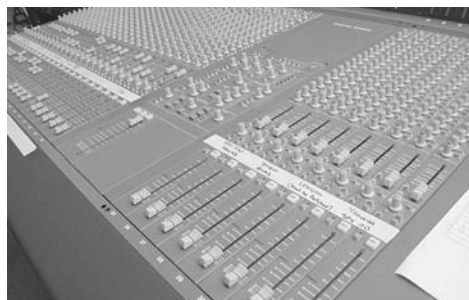
It looks hard at first glance . . . (Photo by Northern Melbourne Institute of TAFE)

. . . but don't panic. Operating the studio audio mixer at Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia. (Photo by Shane Fox)

Inputting the Sound

The sound enters the audio mixer at the back of the mixing desk, which is the opposite side from where the operator sits, and is usually kept almost inaccessible.

This arrangement contributes to the athleticism of the operator. In times of confusion or full-on crisis, the operator may have to scrabble through a small space under the desk and arch his/her body upward in the darkness, hand-tracing the snarl of cables to check if the connections have been correctly made, or alternatively do a full body sprawl across the top and hang upside-down, trying to read the input labels and tugging at the wiring to check that it's secure.

In practice, most technicians who maintain a studio would like to get their hands on midnight cable swappers. A hint for survival in a media centre environment: ask the resident technician to make any cabling changes you need.

For now, let's assume that no clown has been in there rearranging things the night before it's your turn to operate.

The Inputs
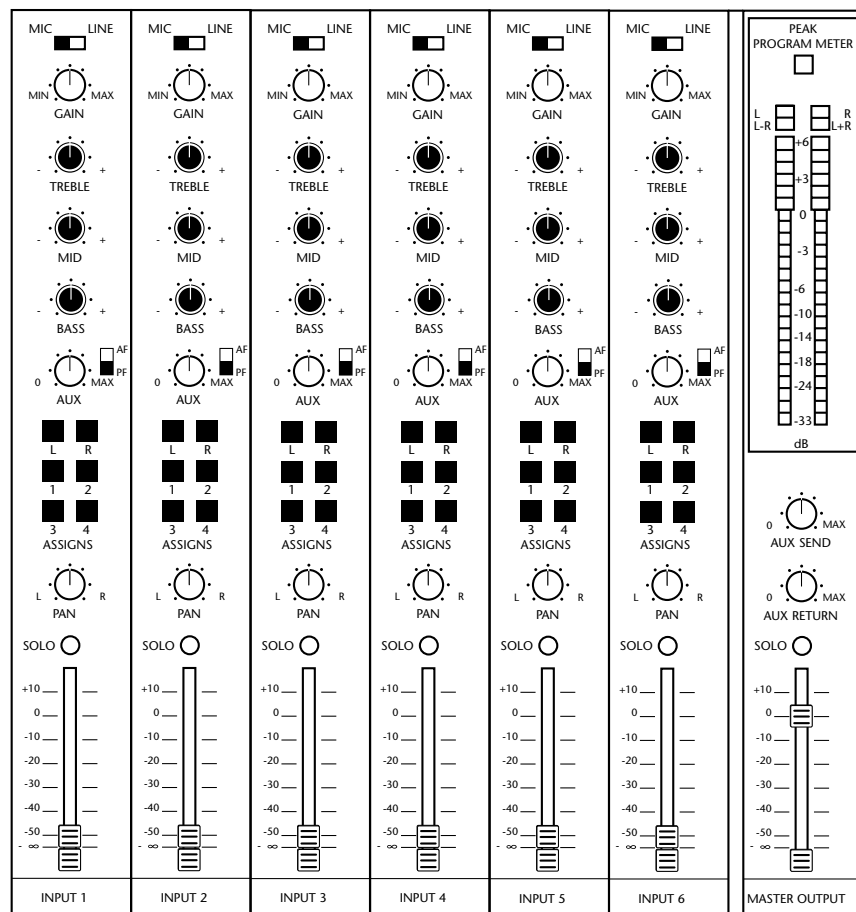
The buttons of one input row are repeated for every input row across the mixing desk.

Each *input* (or *input channel*) is made up of the connection socket, where a sound signal enters the mixer, and the row of control buttons and switches which can be used to affect that particular sound signal.

A 6/2 channel mixer has six inputs and two *outputs*, a 16-channel mixer has 16 inputs and could have any number of outputs, from 16 to two to one.

Once you learn the controls on one input, you know how all the others work. So in one fell swoop, you'll have learned most of the mixer's buttons.

At the back end of the audio mixer, for every input row there are usually two connection sockets, a 6.5mm (*phone*) connection and an XLR (*3-pin*) connection.

This dual capacity means that it's possible to assign two different cables to each input, effectively doubling the number of signal sources which can be wired into the mixer, but of course only one connection for each input can be used at a time. Usually one signal for each input is used for a *mic level signal* and the other one is used for a *line level signal*.

Mic Level vs Line Level

What's the difference?

A mic level signal is the audio signal level which is available from many microphones. It's a lower voltage signal (usually from 2–5 millivolts).

A line level signal is a higher voltage signal (up near 1 volt or even higher), and is usually sent from a piece of equipment, like a VCR, a tape recorder or a CD player. Now in this case the expression *higher voltage* is a relative term. In no way is this voltage dangerous to the operator. But the mixer's circuitry is very sensitive to these differences in voltage.

The first choice the sound operator makes in setting up a mixer for the project at hand is to select whether the input signal is mic level or line level.

If the operator makes an error, and a mic level signal is assigned as a line level source, the volume coming through the mixer will be far too low. Even moving the input's volume fader up to maximum level may not yield an adequate signal.

On the other hand, if a line level signal is assigned as a mic level source, the volume will be blasting and distorted, even when the volume fader is only moved up a little way.

Radically low or high volume is a good indication that the input signal has been incorrectly designated.

MIC   LINE

The switch with the greatest effect on the input signal is the *mic/line* selector.

Gain

Moving systematically down from the mic/line switch (which is the correct order in which to adjust an input signal), the second choice the operator makes is the signal's gain level.

The *gain* knob (also called *trim* or *sensitivity*) allows the operator to boost or diminish the raw volume of the incoming signal. If the signal is very *hot* (high in volume), it can be reduced at this point. If it's coming in low, it can be boosted here.

MIN   MAX
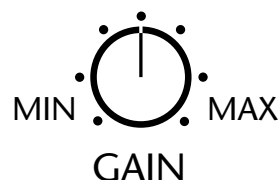
GAIN

The *gain* knob is for initial gross volume control.

TREBLE

- +

MID

- +

BASS

- +
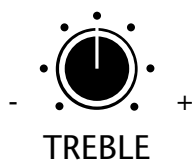
The equalisation knobs let you alter the *quality* of the sound.

Equalisation

The third section in the line of buttons is the equalisation section.

This function allows the operator to affect the *quality* of the sound coming through the mixer by selectively emphasising or diminishing the relative strength of different parts of the sound.

Very basic mixers have two equalisation controls: treble and bass. Bigger studio models also have a control for the mid-range frequencies. Some mixers have several mid-range knobs.

The equalisation knobs have a passive position (the *detent* position), sometimes marked right above them by a zero. When the white line on the top of the knob is oriented straight up and down in relation to the column of buttons in the input, it's lined up with this zero, and the knob is therefore in the detent position. Some knobs also settle into a little grooved resting place in this position.

When the knob is in this zero position, the signal is allowed to pass through this part of the input circuitry unaffected.

Turning the knob to the left, towards the *min* (–), will reduce the volume of the frequencies affected by this knob. Turning the knob to the right, towards the *max* (+), will increase the volume of the frequencies affected by the knob.

George Karpathakis explains equalisation to Daniela Fego, Edith Cowan University, Perth, WA, Australia. (Photo by Keith Smith)

TREBLE

The *treble* knob affects the high frequencies in the sound. Turning the knob towards *min* (–) will separate out and reduce the volume of the high frequency elements within the sound signal. It reduces the presence and the impact of the high frequency section of the sound.

Turning the knob towards *max* (+) will increase the volume of those frequencies.

Why would you adjust the treble?

If your recording is very *toppy* or *hissy*, you'd reduce the treble frequencies.

MID-RANGE

The knob labelled *mid* is the one for adjusting the mid-frequencies of the sound. This one controls the main components of the human voice, and is less often adjusted than the treble or bass, which is probably why cheaper mixers don't even have this knob. Still, there are times when tweaking this one will help the quality of your sound.

You might want to decrease the higher mid-range if you're equalising the sound from the mic of a speaker with an overly sibilant voice—the sort who makes annoying little whistles with their dentures when pronouncing *s,* for example.

On the other hand, you'd probably try to increase the mid-frequency part of the sound signal if the voice you were recording (or had recorded) sounded a bit muddy. That is, if you found it lacking in clarity and crispness—the sharpness of a *t* or *s*, for example.

BASS

The *bass* sounds are the low frequencies, including what you know as the bass in human voices and in the sounds produced by musical instruments.

Bass also includes the low frequency rumble from traffic and the 50-cycle (and 60-cycle) electrical hum which can be picked up sometimes by mic cables.

You may well have a pre-recorded on-the-street interview which would benefit from having the bass frequencies diminished.

A 50Hz (or 60Hz) *notch filter* can be used to eliminate a 50- or 60-cycle hum.

When would you increase the bass frequencies? Well, some people like to add bass to male voices, in the belief that it makes them sound sexier, or scarier, or more authoritative.

Any time you encounter a thin-sounding voice, you could try adding a bit more bass, to see if this increases the warmth of the voice.

Equalisation On/Off

Some mixers have EQ (equalisation) on/off switches. To compare whether the equalised signal is better or worse than the unequalised signal, switch between EQ on and off, listening carefully to the difference. EQ, like salt, can be quite effective in small doses.

Also, always check that the EQ switch is off when you first start your recording session, or you may hear, and even record, a voice that's drastically different to reality, just because someone else's EQ from a previous session wasn't turned off.

In fact, the first thing to do, whenever you arrive at a session, is to go over the mixer carefully and check that all the knobs are in the off or detent positions. That way you start with a clean slate (to use a nineteenth-century expression).

CONSISTENCY IN EQUALISATION

One trap which goes with altering the sound of a person's voice is that later you may not remember exactly how much treble or bass you added to or subtracted from it.

If you're doing more than one shoot with the same people, you'll need their voices to sound the same on each tape.

So if you do employ the equalisation circuitry, carefully draw a picture for yourself of the equalisation knob positions, so next time you can set the adjustments exactly the same.

If you're doing a number of shoots for a project which will be edited later, it's generally a good idea **not** to equalise the voices, but to record them as they are, and then the equalisation, if needed, can be done in one go in sound postproduction.

It's very odd to have an actor or presenter who sounds like a different person from one scene to the next.

Auxiliary

The *auxiliary* button controls an output which you may or may not want to use.

Beside it there's a tiny switch with two possible positions, labelled *prefader* and *postfader.* It is important to understand the function of this little switch.

If the switch is set on *prefader*, the sound which is sent out of this output will be unaffected by the position of the main volume fader (which is the sliding button at the bottom of the input row which controls the volume level of the sound being sent to the main output channels).

AF = prefade (antefade)
PF = postfade

MIC   LINE

The position of the *prefader/postfader* switch is a key concern.

With the *assign* buttons, you can send several inputs to a subgroup, so you have less faders to move when you're mixing.

L   R

1   2

3   4

ASSIGNS

Music recording studio, Northern Melbourne Institute of TAFE, Collingwood, Vic, Australia.

An example of using the prefader position would be if the presenter wants to hear his/her own sound in foldback even when the program sound has been faded out—say, during a commercial break or a pre-recorded tape roll-in.

If the switch is set to *postfader*, the sound which is sent out this output will be at the volume level that is being specified by the volume fader knob at the bottom of the input row.

As with the gain switch, this knob controls the volume of the signal, but in this case it's the signal **after** the equalisation has been applied, and in direct relation to the position of the volume fader.

Assign Buttons

The *assign* buttons control the pathways the signal will take once it leaves this input. You can assign the signal to the left and right channel outputs, and most likely you would. You might also assign the signal to other outputs going to other record machines, or to foldback to the studio floor.

There are also times when you'd decide to group several inputs into a *subgroup*, which is then controlled by one volume fader, and from there sent to the master outputs (the left and right channels).

An example of this would be if you had miked several drums from a drum kit, and you wanted to be able to raise and lower the overall drum volume separate from the rest of the mix. It's a lot easier to have five drums assigned to a subgroup, which is controlled by one fader, than to be trying to raise and lower five faders at once while keeping their volumes still correct in relation to each other!

So the *assign* buttons are for establishing subgroups, as well as sending the signal to either the left or right channel or both.

An important thing to remember is that the sound from any individual input won't go **anywhere** unless it is assigned to a subgroup or output.

Pan Pot

The *pan pot* knob (pan potentiometer) allows the mixer operator to apportion the percentage (amount) of sound from each input channel to each output channel—that is, to adjust the balance.

So some sounds can be assigned entirely to the left output channel, and other sounds can be assigned entirely to the right output channel.

When the *pan pot* knob is in the middle position, it assigns the sound from that input channel equally to both left and right output channels.

Why would you want to split the sounds into distinct channels?

There are numerous reasons, but let's take a simple but frequent scenario as an example:

MIC   LIN

Turning the *pan pot* knob can make footsteps travel from the left speaker to the right one.

> *You're recording a friend singing a terrific song she's written for your project. Another friend will accompany her on an acoustic guitar. This pleases you because they're both good at what they do, and you feel that at least this part of your project will seem professional.*
>
> *During the recording session, you tape both the vocal and the instrumental sounds at the same time. You notice that the guitarist is playing unusually energetically, but you think it will be okay.*
>
> *Later you decide that the guitar is just a bit too overpowering at some points, and you think the song would have a better feel if you could lower the level of the guitar in relation to the singing voice.*

If the two sounds have been assigned to separate tracks, you can change the balance between them in postproduction. But if both sounds have been assigned equally to both output channels, you're stuck with the balance that was recorded on the day.

Solo

At the bottom end of this whole column of control knobs and buttons on the input channel, there's a little press button labelled *solo*.

When you hold this button in, you can hear the sound from that input exactly as it is on its own, unmixed with any other audio input.

This is a good tool for finding where an audio problem is. If there's a hum or crackle coming from somewhere in the mix, checking the solo sound for each input channel can locate the culprit channel (and sound source) easily.

MIC

Solo lets you hear each input sound on its own, with no regard to the volume fader's position.

One thing to know: some solo buttons will stay on without being held. If a mixer has a solo button engaged, the headphones and the monitor speaker will only output the sound from that input. The program sound will not be heard again through the headphones until the solo is disengaged. So, if you can't figure out where your program sound has disappeared to, check the solo buttons before you panic.

MIC   LINE

MIN   MAX

GAIN

-          +

TREBLE

During the mix, the *volume faders* are the only buttons you should need to be moving.

Barry Fernandes, Sound Department, AFTRS.

If the volume fader on your mixer is raised less than one quarter of the way up, you could have problems. Investigate! Try winding back the gain knob at the top of the input row, so you can bring the fader up further. Or try switching a pad in. That way the quality of the sound should be much better.

Volume Fader

The *volume fader* is the last control for each input. It's a sliding button which glides up and down within a groove at the base of the input.

The groove has numbers along the side of it, ranging from the very bottom position, which lets no volume pass out of the input, up through numbers like –50, –40, –30, –20, –10, to 0, then on to +10.

Each fader controls the volume of the sound which is sent out of its input channel into the overall mix.

All the other previously mentioned input buttons should be set before the studio production or sound post-mix begins, but it's during the production itself that the volume faders are moved up and down.

This is when the sound desk operator responds to the director's instructions, such as:

'Cue music' (by raising the correct fader).
'Cue presenter' (by raising the fader for the studio boom mic or presenter's lav mic).
'Roll insert' (by lowering the studio mics and raising the fader for the pre-recorded roll-in).
'Fade to black' (by lowering the master output fader).

It's the desk operator's job to *ride the levels* during a mix, so if someone in the studio starts talking louder or softer, their fader can be nudged subtly up or down to maintain a consistent sound level for the program.

Outputting the Sound

Once all the input sounds have been checked and the sound levels and equalisation have been adjusted where necessary, the mixer is ready to blend the various sounds together according to the volume fader positions.

After passing through the mixing circuitry, the sound is sent to the outputs.

Studio audio mixers have a minimum of two audio outputs, which can be connected by cables to the two sound inputs on the studio recorder VCR.

The output sound is *line level*, so it should be connected into the record VCR (or audio tape machine) at the *line in* (*audio in*) input, not the *mic in* input.

Portable audio mixers for field use sometimes output mic level sound, so be careful that you remain clear on the differences when you're connecting different pieces of

equipment together. If you're in doubt, check the output—it should be clearly labelled as either *line out* or *mic out*.

Some studio audio mixers have more than two outputs. These auxiliary outputs can be sent to the *PA (public address sytem)* for the audience, or to foldback to the presenter or singer. Sound can also be sent out to another piece of recording equipment, or sound can be sent to special effects equipment, for reverberation—or other tricks—to be added. Then the sound can be brought back into the mixer and re-added to the mix.

In most cases there will be at least two master output volume faders, one for all the sounds the operator has assigned to be output as channel 1, and the other for the channel 2 combination.

Phantom Power

Phantom power is 48 volts DC power sent from the mixer out along the mic cables to power the mics which are connected to the inputs.

If your mixer has phantom power, you won't need to use separate power supplies for each of those mics which normally require them.

Be very careful you don't apply phantom power to mics that don't take it, like dynamic mics, or you could damage them.

If you have problems, first check if there's the appropriate power to the microphone. Maybe there's a flat battery or phantom power isn't arriving.

Barry Fernandes, Sound Department, AFTRS.

Don't use phantom power on a dynamic mic.

Colin Kemp, Engineering Department, AFTRS.

PEAK PROGRAM METER

L L-R | R L+R

+6
+3
0
-3
-6
-10
-14
-18
-24
-33
dB
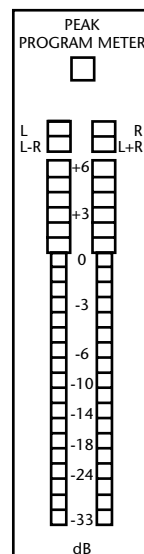
The program out signal should be kept at a good volume level, unless the director has asked for a fade.

0 MAX
AUX SEND

0 MAX
AUX RETURN

SOLO

+10
0
-10
-20
-30
-40
-50
-∞

MASTER OUTPUT
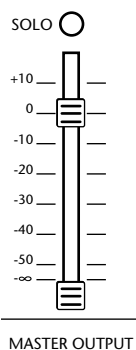
VU Meters and PPM Meters

On a good audio mixer, there will be a *VU (volume unit)* meter for every input, so the operator can see the level of every individual sound source at any given point.

The operator should take care to keep the signal levels right. Generally speaking, sounds like dialogue should be kept good and strong. The VU meter's needle should be reading up between 5 and 0, but not in the distortion range past the zero—that is, right up near the red, but not in it.
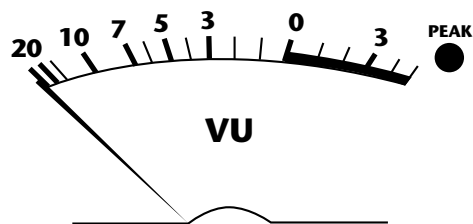
When the VU meter needle passes beyond the 0, the sound is distorting.

Watch the levels!

Jim Tumeth, Training Development, AFTRS.

It's better to have a strong initial signal available from each input than to have to boost the sound too much with the volume faders. If you're having to run your faders way up at their top limit, go back and boost the gain at the input so you're working with a more substantial signal.

Even if there are no input VU meters, there will be output meters. These show you the level of the sound departing through the outputs.

On some mixers, the output meters are PPMs (peak program meters). These are made up of lines of LED lights, green ones for up to the 0 level, and then red ones to indicate distortion levels. PPMs are more sensitive to sudden loud sounds (transients) than VU meters are.

For the output channels it's essential to make sure the mixer is passing along a good strong signal. Don't rely on cranking up the record levels at the VCR. If you're boosting a weak signal further down the line, you may get it loud enough, but you'll have an undesirable amount of background noise or hiss with it.

On the other hand, be careful that you're not sending out a distorted signal, either. Even if it's recorded at a low level at the VCR, the distortion in the sound will be recorded, and you'll be stuck with it on your master tape.

Level Setting Order

Always set sound levels starting from the source and following the entire signal path to the final recording machine.

If you like, you can think of the signal flow like water going down a stream. Start from the headwaters and move to the sea.

The **last** machine to set levels on is the record VCR.

Make sure you're not sending too much level to the headphones, or you'll deafen yourself.

Jeremy Reurich, Technical Trainee, AFTRS.

Monitoring the Sound

The mixer will have a headphones outlet, so the operator can listen to each sound without the distraction of whatever control room noise is happening at the time, and so the other people trying to sort things out in the control room don't have to listen to every step of the sound checks.

Close to the headphones outlet, there's usually a volume knob labelled *monitor*. This controls the level of the sound sent to the headphones, but doesn't affect the master output sound in any way.

Take care that you watch the output meters to gauge the levels of your program sound. Don't be tricked by thinking it's loud enough because some wax-eared or walkman-deafened person before you left the monitor sound turned way up.

Other Possible Features

Studio audio mixers may have many other features, including:

- A talkback system.
- An inbuilt speaker.
- *Aux send* and *aux return* monitoring controls.
- The facility to do four or more submixes in them.

Despite the cringe that this comment usually elicits, it's a good idea to thoroughly read the manual for your audio mixer. You may find out that your mixer can do all sorts of things no-one at your media centre ever knew about!

Normalising the Mixer

Before you set out to do anything with the studio audio mixer, you should *normalise* it. This means putting all the input knobs to their zero (passive, detent) positions, so you can hear every sound fresh and unaltered by any electronic circuitry.

It can be alarming to do a sound check and hear your great guest singer's voice sounding way to thin or too bassy. You can add minutes to your life by getting rid of any *EQ* (equalisation) left on the mixer from someone else's mix, before you start judging your sound sources.

And after all, a signal which sounds good unaided can probably best be left that way! No need to tweak knobs for the sake of it.

It's good audio manners to renormalise a mixer when you've finished working with it, too.

Doing a Sound Check

Part of setting up for a studio production is doing a sound check. The aim of this is to find the right operating level for each input fader.

You can usually set the levels for roll-in music and other pre-recorded material during rehearsals.

When the time comes to set the levels for guests or actors using studio mics, it's good to have a helper.

First, the assistant pins the mic to the person's shirt, or seats the person and sets the mic on its stand in the planned program position. Then, when the desk operator is ready, the assistant asks the guest to speak in their normal speaking voice—this request does tend to tongue-tie people, so you could suggest that they tell you how their trip to the studio went, or tell you their name, address and other fairly automatic details.

The guest can say *anything*, as long as it's in a normal speaking voice. It's just that people are often nervous and get hung up trying to think of what to say so the people around them won't think they're buffoons. It usually works to give them an easy task

because they're more likely to speak up naturally if they're not nervous about what they're saying. Don't ask them to count, though. It's too staccato a sound.

As each person you're checking is speaking, the desk operator brings the input volume fader up to the right level for program sound. Some people like to mark this spot with a bit of masking tape so that during the program it's clear what level to take each fader to for the right sound volume.

You should adjust the gain so you can set the fader level so that there's a little more room to move it up during the program if needed. Though most people tend to speak louder once they get going on a topic, you need to give yourself some correction leeway in case they speak softer for some reason.

Always check for *air gaps*. Is everything plugged in?

Barry Fernandes, Sound Department, AFTRS.

Once you've done a sound check on all sources, you're nearly ready.

Lining Up Tone

There's still one more job to do. You need to send *tone*, so the person operating the record VCR can set the audio input levels correctly.

Set the tone as quickly as possible, because the sound of the tone annoys many people.

Colin Kemp, Engineering Department, AFTRS.

Find the button on the audio mixer which switches on the calibrated tone, which is a standardised line-up signal. Then adjust your master output faders so you're sending tone out at 0 volume level, which is a strong signal level, just below the distortion level.

The VCR operator should then set the audio input VU meters on the master record machine so they're reading the tone at 0, as well.

From then on, the adjustments to program sound should all be done at the audio mixer.

The person watching the record machine shouldn't be making independent decisions about program sound level. If something appears to them to be wrong, for example if there's no sound arriving at their VCR, or it's too low, or it remains distorted, the audio desk operator should be told at once. But corrections should be done at the mixer, **not** at the record machine.

Operating Tips

Label Each Fader

There's nothing worse than losing track of what sound is which on the mixer. You can label an audio mixer, without damaging it, by running a strip of masking tape along the base of the inputs and writing each fader source on it with a marking pen.

Assign Mics to Faders in a Sensible Pattern

It often helps to have a logical connection between what you can see and what you're doing!

Have your sound assistant set up the studio mics so their inputs correspond to the same left-to-right order as the seating arrangement of the studio guests and host.

So if, during the program, you forget who 'Melissa' is, you can at least raise the fader of that person on the far left whose mouth is moving.

Masking tape is commonly used to label which signal is going to which fader. Tape can also be used to mark the right level for each fader. (Photo from Northern Melbourne Institute of TAFE)

Keep in Contact with the Studio Floor

Not all studios have enough talkback headphones to go around, and they tend to be passed out first to the camera operators.

But the sound assistant needs to be in contact with the audio desk operator, and vice versa. This can be managed by leaving the boom mic fader up during set-ups, otherwise known as *leaving the boom open*.

The sound assistant can then go over near the boom mic and speak quietly to audio control, and audio control can speak back via the PA system to the studio.

In the absence of boom mic and PA, a good set of hand signals can get messages across, providing there's line-of-sight between audio control and the studio floor.

> When you're plugging or unplugging sources from a mixer, ensure that the channel fader is at a minimum and the monitoring level is set to low.
>
> **Colin Kemp**, Engineering Department, AFTRS.

32 Studio Procedures

Studio work requires the smooth coordination of a team of people who are spread out over two, three or more rooms. Everyone needs to know what's happening, everyone needs to be up-to-date on whatever changes have been made by the director.

Studios use talkback systems which allow the director and director's assistant to converse with the floor manager on the studio floor, all the camera operators, the sound supervisor in audio control, and the videotapes operator in the tapes area. The sound supervisor can also communicate with the boom operator via headphones.

Audio control can also leave a boom mic *open* during preparation times so the director can hear what's happening on the studio floor and anyone on the floor can speak to the director through this mic if necessary.

Third year students prepare to record Business Studies unit for replay by satellite throughout WA. Western Australian School of Art and Design, Northbridge, WA, Australia.

A Word to the Director

The main point to remember when directing a production is to promote effective communication. You have to make sure that everyone knows what you want to have happen, when you want it to happen, and what you want it to look like.

All crew involved in the production must be kept constantly informed of any changes.

A new shotlist for cameras, changes to the script, different moves, a change of running order—everything must be communicated to everyone involved.

In the heat of the moment, it's easy to forget that you, as director, are the source of all action. The rest of the crew have to act on your instructions. Keep them informed, and always give them plenty of warning.

> Remember the 7 Cs: clear concise communication is the cornerstone in creating a capable crew.
>
> **Carol Brands**, Curtin University of Technology.

The Floor Manager

The floor manager is pivotal in studio communication. The FM is in charge of relaying messages promptly and accurately to anyone on the studio floor who is not wearing headphones. This includes the performers, obviously, and any other helpers, like those arranging the set or adjusting lights.

Once the floor manager puts on headphones and establishes initial communication flow with the director, the FM should never break that link by taking the headphones (*headsets* or *cans*) off. If that link is broken, the production will soon grind to a halt. During rehearsal, if the FM must leave the studio floor, the headphones—and the floor manager's duties—should be delegated to an assistant until the FM resumes them.

Because the FM also needs to be in contact with the people on the studio floor, a good trick is to wear the headphones with one earpiece on—to listen to the director—and one earpiece off—to listen to the people on the studio floor.

The floor manager gives a countdown cue for studio production, Northern Melbourne Istitute of TAFE, Collingwood, Vic, Australia.

Establishing Comms

During the set-up period, time should be allowed for a routine communications check:

1. The director speaks to the floor manager and the floor manager reponds.
2. The director speaks to each camera, and each camera responds in turn.
3. The director speaks to audio control, and audio control responds. (The boom operator has a *split* of director's comms and program sound.)

Camera operators should keep their headphones on throughout the rehearsal period. Robin Cowburn, TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia. (Photo by Michelle Blakeney)

4.   The director speaks to the videotapes area, and videotapes responds.
5.   The director speaks to the lighting area (if it's separate), and lighting responds.

The technical director also has communication with the technical areas, to establish program levels, and so forth.

Sometimes the DA and director share the same mic. A balance should be established early on, because the DA's shot-calling and instructions need to be heard at the same volume level as the calls of the director.

It's good if the director and director's assistant have noticeably different voices, like one male and one female, so everyone on the intercoms can easily identify which person is speaking.

If each crew member knows their job and is treated with respect, you'll have a happy and committed crew. L to R: Derek Whittaker, Evonne Dunne, Greg Barnes, Arran Gerrard, Nicole Baxter. Curtin University of Technology, Perth, WA, Australia. (Photo by Sue Scrutton, CU Public Affairs Unit)

Using Talkback Systems

In most speaking situations, we're face to face with the one or two people we're talking to, so it's obvious who's speaking and who's being addressed, people take turns in speaking and outsiders don't butt in. These are the communication rules we were taught at a young age. Telephone conversations follow a similar pattern because they're still one to one, even though we don't have eye contact.

But when you hook up many people to a talkback system—where they can't see each other—many people could have something to say at the same time. When everyone is hearing messages which are not addressed to them, and most people are under pressure, good communication can break down quickly.

The director sets the mood during the production, so the director's talkback manners have a big impact on the overall feeling happening within the crew.

For good talkback people should:

1.   Use the same courtesies of speech that you'd use in person.
     Director: 'Let's go for a rehearsal. Would everybody please stand by?'
2.   Always specifically address the person to whom you're speaking, before you give your message.
     Director: 'Camera 1, could you give me the opening shot, please? A little tighter, thanks. Yes, that's fine.'
3.   Don't speak unless you have something to say which is relevant to the production. People should not be chatting about other things over the talkback system—the 'airwaves' need to stay clear for necessary production communication.
4.   Stay quiet. There's nothing worse than someone adding useless noise into everyone's ears. So refrain from humming, whistling, clicking, grunting, burping, and so on.
5.   Speak in a normal tone. Not all headsets have volume controls and being constantly screamed at is enough to set people right on edge.

PTT (Push to talk)

To cut down on the amount of noise which would go through the talkback system, many headsets, especially those worn by the camera operators, have a good feature called a PTT button. This means that what you say is only transmitted into the system while you're pushing that button, the rest of the time you can't be heard.

Never switch off control room communications to the floor. Your floor crew may think that you are talking about them in the control room and paranoia will reign. Also, don't joke in the control room, because if the performers on the set see the camera operators laughing, they may think you're laughing at them.

Sara Hourez, former director of *Neighbours*.

Mute

The talkback mic in the control room usually gives the director a number of options about who can hear what's being said. The director can choose to speak only to the floor manager or only to the camera operators. It's also usually possible for the director to speak to everyone on the studio floor through an intercom speaker, or to mute the whole system and speak only to those in the control room.

In times of crisis it may be best for the director to mute the talkback system and sort out the problem in private. No point sending aggravation out to everyone. It's important to get back on line as soon as possible though, because crew feel very nervous if they're cut off for long.

Before muting the comms, the director should always explain that this is about to happen and give a time estimate of how long the mute will last.

'Sorry, we need to sort out a question here. We'll be back in about three minutes.'

If the problem takes longer, the floor manager should be advised.

'This will probably take another ten minutes. Let everyone have a break.'

Don't leave people just hanging and wondering.

Regrettable Speech

Talkback demands another self-discipline. A person should **never** say something over talkback which is meant as a private comment. Everyone hears what is said, and the words can't be recalled.

It's especially important to not rudely criticise anyone's work in public like this, or to make derogatory comments about a crew member or performer. Such speech is unprofessional, unkind and also capable of being accidentally sent out over a speaker or recorded on tape.

Technical Difficulties

Talkback systems vary in quality and some can be quirky and discouraging. Successful productions have been put together with only a couple of headsets working on the day, with the floor manager whispering shot directions to a camera operator, or with no-one able to talk back to the director at all.

The DA instructs each camera operator to line up their next shot. Julie Nimmo, TEAME Indigenous TV Training, SBS TV, Sydney, NSW, Australia. (Photo by Anna Warby and Arne-Romy Berg)

In times of necessity, people rely on hand signals and dramatic facial expressions sent through the window between the studio floor and the control room.

Control Room Dialogue

Directors need to make their messages simple, clear and polite, and use as calm a tone of voice as can be mustered under the circumstances. There should be enough time for people to give their replies.

Here's a sample of the way a director would speak during a rehearsal.

Director (this message is relayed via the floor manager): 'Standby everyone.'
'We'll be going in about 30 seconds.'
'Everyone okay?'

Note: Audio control should have left one of the studio microphones open so that people on the floor can talk back to the director if they need to.

Director (over headphones talkback system): 'Standby studio.'
'Standby audio.'
'Standby videotapes with opening titles.'

Floor Manager (after checking that the floor is ready): 'The floor is standing by.'

Audio Control: 'Audio standing by.'

Videotapes: 'Videotapes standing by,'

Director: 'Opening shots please.'
'Videotapes, roll to record.'

Videotapes: 'Tape is rolling' (or 'We're recording').

Director: 'Ten seconds . . .'
(Either the DA or director will count down from 10 to 0.)
'After titles, we're opening on Camera 2.'
'Go theme . . .'

Audio control brings up the opening music to be played under the titles.

Director: 'Take titles.'
'Ready 2 . . .'

For the director's assistant: Don't worry about the closing titles when you're rolling the opening titles.

Sandra Chung, ABC TV Training and Development.

As the production proceeds, the director is responsible for telling the vision mixer exactly what images to put to line. The director tells the VM when to cut, dissolve, set-up for an effect, do an effect, and so forth.

They may be working from prearranged shots notated on a script, or ad-libbing. In either case, the director needs to watch what's happening on the camera monitors and the preview monitors because things don't always

Audio control has all the music and effects cued and ready. Broadcasting students, Batchelor College, Batchelor, NT, Australia.

Tanith Carroll, vision mixer, and Robin Cowburn, director. TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia. (Photo by Anne Douglas)

go to plan. It's pointless to put a camera to line if the shot isn't ready, no matter what the script says.

In scripted work, the director's assistant prompts each camera to get ready for the next shot.

Director's Assistant: 'Camera 1, a mid-shot of the guest, please.'

Director: 'Stand by to take [camera] 1.'
　　'Take one.'

Camera operators need warning that their picture is about to be used.

Director: 'Camera 2, can you get me a close-up of the host?'
　　'Focus?'
　　'Good.'
　　'Standby, 2.'
　　'Take two.'

The same procedure applies to videotapes, to the character generator and to any slides or graphics being used. The director's assistant makes sure each source is ready, and the director calls the take.

Director: 'Take videotape.'
　　'Take character generator.'
　　'Take slide.'

If these sources are available on preview monitors, the director may refer to the number of the monitor instead of the actual source.

Director: 'Take six.'

In multicamera, once you've committed yourself to a shot, let it go to air or tape. Look ahead to the next shot and ensure that it is what you want. In high turnover television (over 25 minutes screen time per day), you do not have the luxury of revision and perfecting.

In multicamera television drama series in studio, you usually use and camera script to three cameras. You might, without warning, need to rescript for two cameras.

Sara Hourez, former director of *Neighbours*.

Using Graphics Mounted for Cameras

If there are a number of graphics on the floor, the director's assistant will oversee the *flipping* (or changing) of them. As soon as a graphic has been taken and the director has gone on to the next shot, the director's assistant will say:

Director's Assistant: 'Flip on 1' (meaning the graphic appearing on Camera 1).
'Flip on 2', etc.

Cuing Audio

Sound must be cued by the director whenever it's needed. The sound operator should be ready to bring in the next music or effect by reading the script, but the exact time and the pace at which the music is brought in is a creative decision made by the director.

After several rehearsals, the sound operator will have a pretty good idea of what's required, but it's still up to the director to give the cue.

Never assume, always ask—for example, are there any reflective surfaces on the set? As drama crews know the set backwards, clarification of this will mean no time wasted on a re-shoot.

Sara Hourez, former director of *Neighbours*.

Lighting

Lighting changes must also be cued, unless there's a standard format to the show which is always followed. Usually a standby is given to the lighting operator, with a description of the next lighting needed.

Performers

Instructions for the performers are passed on through the floor manager. When the director wants the performers to begin talking, or moving, or taking any particular action, s/he says:

Director: 'Cue performer.'

Then the floor manager makes the appropriate signal, taking care to be in the current eyeline of the performer.

Of course, the FM never speaks out loud, as the voice would be picked up on the studio microphone.

Once the performer has received the director's cue:

Director: 'Take one' (or whatever), the shooting sequence begins.

Relax—enjoy it—it's not brain surgery!

Leone Adams, NSW ABC TV Training Co-ordinator.

Silent Communication on the Floor

The floor manager uses a vocabulary of hand signals which should be well understood by the host and the rest of the production crew.

With inexperienced performers, the FM needs to explain, before the start of the show, the signals that are likely to be used and where s/he will stand to give the signals. This way the performers won't just stop talking and look stunned when confronted with an incomprehensible hand sign or waving of arms.

Make sure that signals are always repeated in the same form and in the same spot.

Types of Cues

There are three major types of cue a floor manager handles:

* Time cues.
* Performance cues.
* Written information cues.

Time Cues

Time cues let the performers know how long it will be until the segment starts, when to begin speaking, and how much time is left until the segment ends.

Standing by
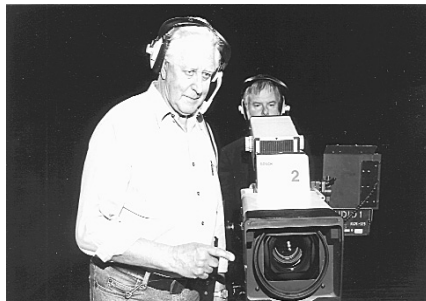
Start
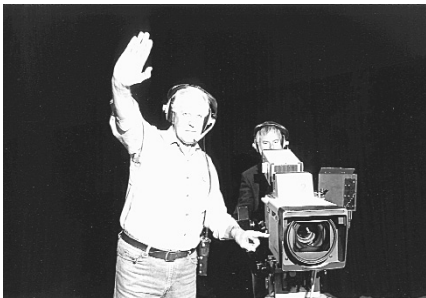
Standing by (further away from performer)
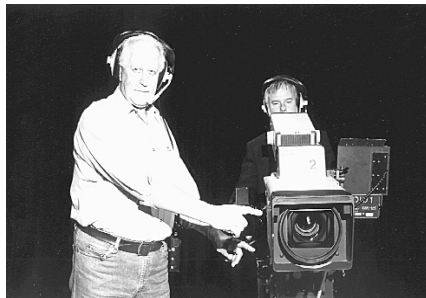
Start (further away from performer)
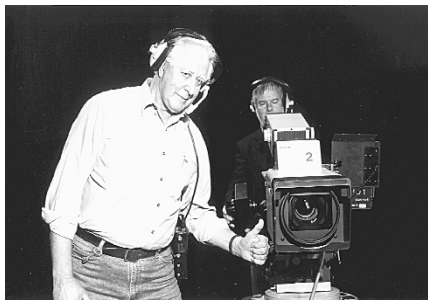
We're on-line (or) Everything's okay
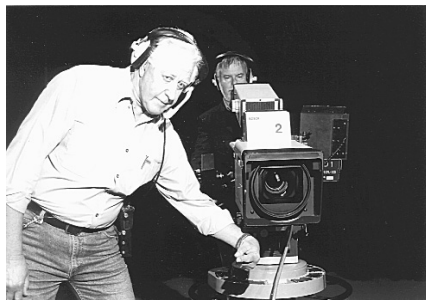
Wind up (move finger in circular motion)

Stretch (move hands as if to pull on elastic)

Cut!
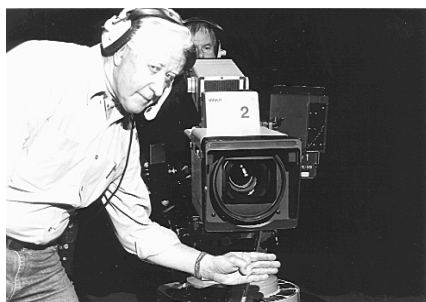
Cut! (used when performer's eyeline is directly to camera)
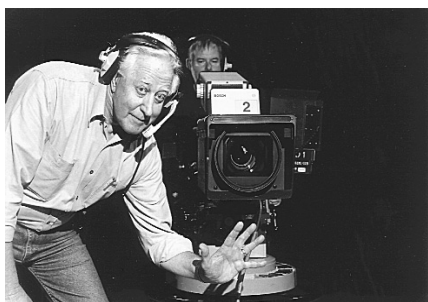
5 minutes

30 seconds
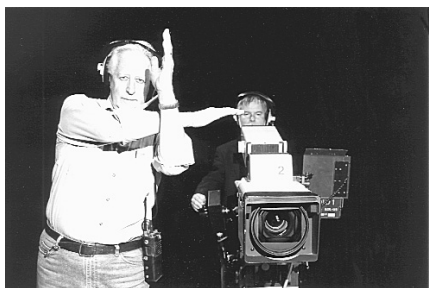
30 seconds (at a distance)
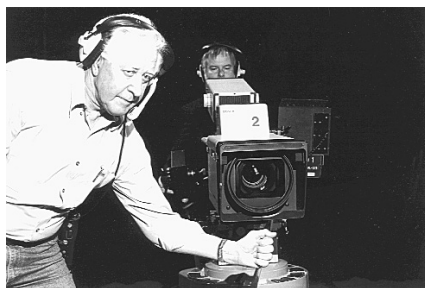
15 seconds
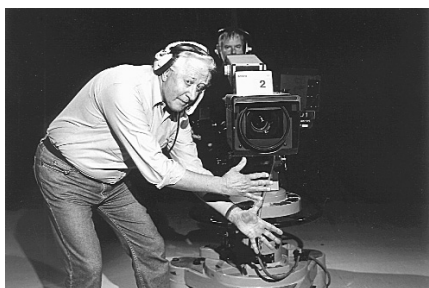
10 seconds
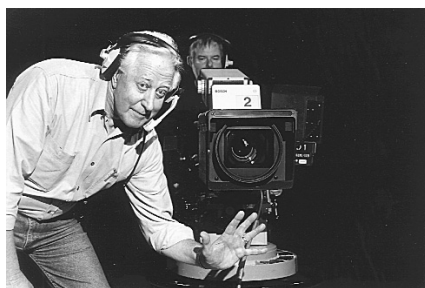
5 seconds

Performance Cues

Performance cues give the performers directions about where and when to move, how to change speaking or singing level, the limits of the frame to which the performers are working (this takes considerable skill on the part of the floor manager), and which camera to direct the performance to. The floor manager can even use them to direct or correct the performer's eyeline.
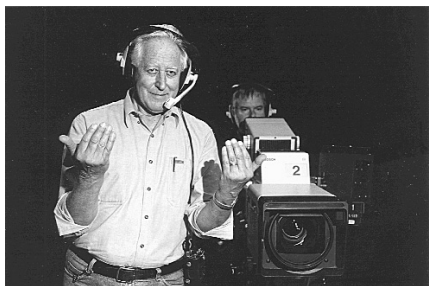
Come closer

Move back
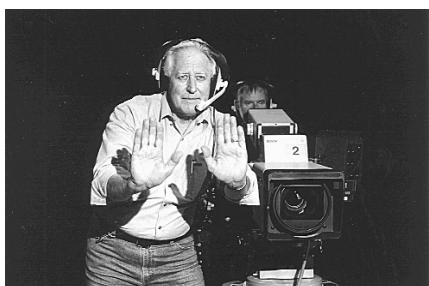
Stop!
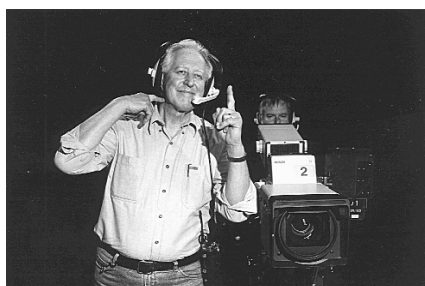
Speak up
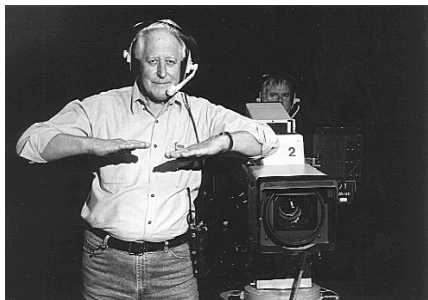
Tone it down
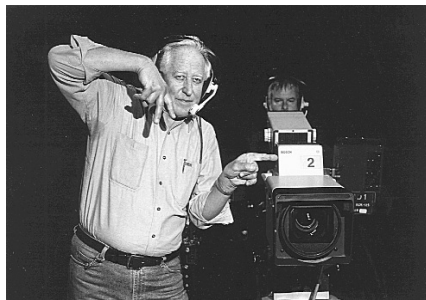
Walk in that direction

Go from this camera . . .
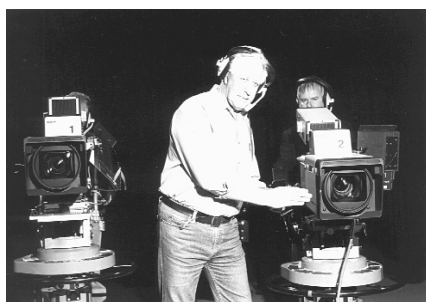
. . . to this camera

Go from this monitor . . .
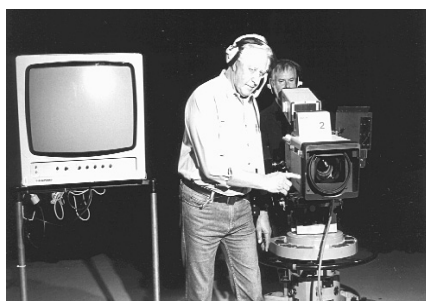
. . . to this camera
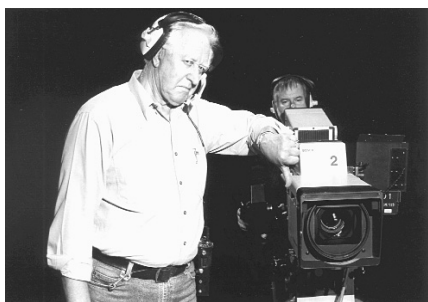
No good
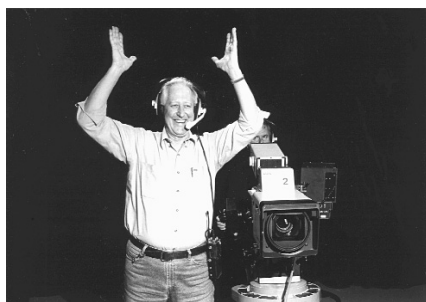
Applause!

The floor manager must be acutely aware of which camera is being used and the eyeline of the performer to whom s/he is signalling.

The floor manager must always signal messages from a place which will allow the performer to continue speaking or acting **without being seen to have been given a message**. On television, when eyes move even slightly left or right, *hunting*, the uncharacteristic glance is completely obvious.

In practice, this means the floor manager stands right next to the camera the presenter is working to, or, if there's a conversation going on with a studio guest, the floor manager's signals are offered in the eyeline of the presenter but, of course, out of frame of the camera's shot and also not casting shadows into the shot.
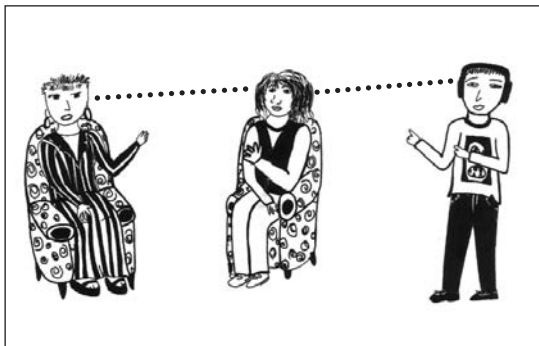
Signal along the eyeline of the presenter.
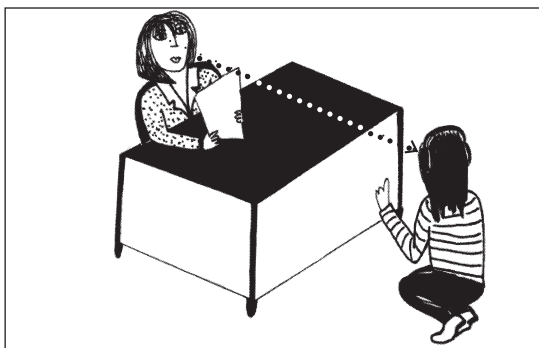
Whatever it requires, the floor manager signals along the eyeline of the performer.

Complications in Sending the Signals

Sometimes the floor manager has to give directions to more than one actor and isn't physically able to get to the next signalling position in time. This problem should usually be spotted during rehearsal and can be solved by working out a plan for *bouncing* signals.

In such a case, the floor manager receives the director's cue over the headphones and signals the assistant floor manager or other designated floor crew member (who's positioned correctly), or even another actor who won't be on camera for that shot but will be in the eyeline of the performer, and the signal is received and then sent on by the *bouncer*.

Sometimes a signal must be bounced.
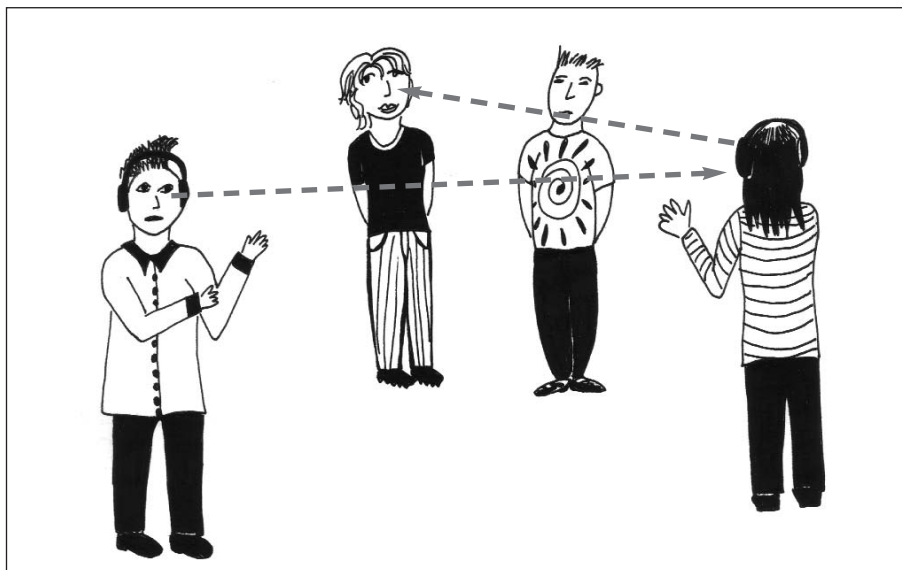
Another complication is when the performer is unable to see a signal given by anyone. For example, the performer might have to begin an action from a face-to-the-floor position. In this case, the floor manager could work out that the performance would begin a certain number of beats of time (counted silently by the actor) after a spoken signal is given by the floor manager.

Or an off-camera physical signal, like a tap to the bottom of the foot, could be used.

Floor managing often requires quick thinking and ingenuity—coupled with common sense. Elaborate signals are never preferable to clear, concise ones. Which brings us to style. A skilled floor manager gives signals in an unambiguous style which neither confuses nor distracts the performer.

For example, time signals should appear at the correct time and then be finished. A cue for 'two minutes left' which is hanging in the air for ten to fifteen seconds becomes less useable because it's less accurate.

This can lead to a bit of a quandary. If the floor manager must finish a signal as soon as it's received by the performer, the performer must have some subtle way of letting the floor manager know that the signal has been received.

If the performer is off-camera at the time, that's not so hard—a minor hand movement or nod will do. But when the performer is on camera, this kind of message acknowledgement is part of the craft of competent actors and floor managers.

Carol Brands rehearsing Ben Air, Katie Air and Sam Talbot-Dunn for a post-grad project. Curtin University of Technology, Perth, WA, Australia. (Photo by Judy Wheeler)

Written Cues

There are times when a presenter needs to be prompted with a name, a title or some non-signable information. When this happens, the felt pen and the white card, strategically placed, save the day.

It's a good idea to not rely too much on written instructions, however. Presenters can get too dependent on them, and it's hard to disguise the fact that they're being read.

Rehearsal Routines

Marking a Position

Once a position for the performer has been lit and approved on camera, the floor manager will see that appropriate and discreet floor marks are placed down (using floor-marking tape), thereby targeting or 'locking in' the preferred action area.

Studio Calls During a Rehearsal

The floor manager conveys the stages of production to those personnel not in headset contact with the director by using these standardised calls:

'Quiet please, we're standing by for a **stagger through**.'

This signals the first attempt at coordinating all production elements—performers, cameras, audio, lighting, etc.

At this stage everyone expects stops and starts and repeating the action several times. Performers will speak their lines but there will be no performance yet.

'Quiet please, we're standing by for a **run**.'

This means a **continuous** rehearsal of the segment or scene, hopefully with few interruptions. From this the crew should get an indication of pace and a recognition of performance. Rehearsals continue with improvements until:

'Quiet please, we're going for a **final run**.'

This signals the last rehearsal. Everyone gives their top performance.
Then:

'Quiet please, we're going for a **take**.'

Commitment!

Throughout the rehearsal period, it's important that the floor manager indicates to performers, as soon as possible after each stop, the recommencement point:
'We'll pick it up from . . .'

Live transmission

Live transmission is called in as:
'[number of] minutes to air.'

All communication in the production environment should be clear and concise, avoiding confusion and wasted time. The floor manager, in the coordinating role, is the key figure in the passing on of accurate information.

So say what you mean, and mean what you say!

The Floor Manager's Tool Kit

Before rehearsal begins, make sure you have a talkback headset with sufficient cable length for adequate movement (a radio headset is preferable) and that you have access to:

- Slates and identification boards.
- Cue cards, white board.
- Felt pens, chalk.
- Floor-marking tape, gaffer tape, double-sided tape.
- Cloths.
- Staple gun, hammer, screwdriver, pliers, clips.

The Floor Manager's Survival Guide

Preparation

- Study script and floor plans carefully.
- Assess problem areas.
- Discuss problem areas with your director.
- Liaise with technical and support staff.
- Schedule appropriately.
- Check progress on all work prior to production period.

Production

- Be early. Check that everything and everybody is ready.
- Start rehearsals on time.
- Give adequate and timely refreshment breaks.

Overall

- Use common sense.
- Be calm and courteous.
- Maintain a quiet discipline.
- Anticipate the director's needs.
- **Care** for the cast and crew.

Production Identification on the Tape

Every production must have some form of identification recorded on the tape before the program itself. This can be done either by using the character generator or by an ID board.

A program ID should include:

- Program title.
- Director.
- Date of recording.

It could also include:

- Producer.
- The name of the client who commissioned it.
- The place where it was made.

When the control room team are confident in their equipment and everyone understands the communication procedures, studio production can be both an adrenalin rush and a lot of fun. Jason Troutman on vision mixer with Sylvia Tabua directing, School of Indigenous Australian Studies, James Cook University, Townsville, Qld, Australia.

Segment Identification

Every segment of a program should be identified just before the beginning of the segment. Often this is done by typing the information into a character generator in the control room and recording its signal.

When a character generator isn't available, the floor manager is responsible for providing the identification for each taped segment. This is done by speaking the information while using an identification slate or clapperboard, as in film production.

Information should be complete and include:

- The segment or scene number.
- The take number.
- The script line reference.
- The program title.
- Whether it's for A-roll or B-roll use in editing.

Rolling-in Sequence

The lead-in to a recording can be:

- 30–60 seconds of colour bars.
- Fifteen seconds of tape identification.
- Ten seconds of black.
- Ten seconds of countdown.
- Program begins.

All tapes should be properly labelled with production name, roll number, time code and date.

Serge Golikov, Post Production, AFTRS.

Assessing Studio Work

Steve Parris of Edmonds-Woodway High School (Edmonds, WA, USA) has developed this humorous sheet for students and staff to assess studio production work.

EWTV STUDIO PRODUCTION RUBRIC

	5	4	3	2	1	0 (no show at all)
Technical	Camera composition is consistently beautiful	Solid composition looks good throughout	Camera shots have a few weak shots with poor framing	Shots are consistently outside of prescribed composition guidelines	No shots use quality composition	Show didn't make deadline
	Switches are timed and create a fluidity without any errors	Switches are well-timed and clean	A couple switches are early or late or use inappropriate wipes	Most switches are out of sync with the show script	Switches cause major distraction	Too little, too late!?!
	Audio quality is flawless and perfectly equalised	Audio is clear and well equalised	A couple of audio distractions, okay EQ	Audio mishaps, poor EQ	Major audio dropouts or distractions; draws attention away	My dog ate our tape
	Talent makes NO errors, with clear, professional delivery	Talent speaks clearly; good eye contact, posture and language	Inconsistent eye contact; can't hear some words; weak presence	Poor eye contact, speaking and presence	Talent is using the opportunity to grandstand their own ego	Just five more minutes!?!
	Lighting is very inviting, flattering	Lighting looks good, no glaring shadows	A few shadows, light uneven	Many shadows very uneven	Very distracting lighting	We don't have a show because _____ .
	Gear is stored better than it was	Gear is put away as prescribed	Room is a bit messy	Cables lying around uncoiled, stuff laying around	Messy Marvin City!	Show is a no show
Aesthetic	Show has a smooth continuity and rhythm	Show is well made without any glaring errors to draw away from message	A few hiccups in flow and continuity	The show stops and starts like an old Buick	This is a show?	We punt!
	Maintains a high level of interest in viewers (they can't stop watching)	Viewers stay interested!	Viewers say: 'Yeah, that was okay…'	Show was pretty lame	Show is REALLY, REALLY LAME!	Crew abducted by aliens? Yeah, right…
	The show touches us in a meaningful way!	The show has important content.	Some stuff that we could care less about	Lots of fluff	WHO CARES!	'Show is missing… with Elvis…'
	GUT FEELING	GUT FEELING	GUT FEELING	GUT FEELING	GUT FEELING	No show? No score, Baby…

Caring for the Studio Space

A studio is a shared space which is used by different groups of people, who may never meet, but are joined by the desire that their program will be done as well as it can be.

As a user of this space, you want it to be clean and functional when you arrive. So does everyone else.

Somerville Community Access TV, which services a wide range of public access groups, has developed this studio checklist which all groups are expected to fill out when they arrive and when they leave.

Somerville Community Access TV
Studio Checksheet

Producer _____   Date _____

Staff		Staff		
	In	Out	In	Out
Chairs/tables/risers/flats properly stored				
Rugs rolled and stored/Props in bins				
All lights on grid with safety chains attached				
Lighting board: masters/lights and all faders off				
Program/intercom/CAM 4 cables on hook				
XLR cables neatly coiled				
All four Lavalier mics, clips and batteries in cases				
Cabinet neat: mugs, headphones, gels, gloves				
All three studio cameras:				
Three wheels locked				
Lens cap on				
Tilt and pan locked				
Cable on hook				

Comments:

_____

_____

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The HOT Studio
(Host Operated Television)

Although it's usually easier to do video as part of a group, many people are attempting to do productions on their own, either for an assignment, as a community service or as a hobby.

People in remote communities, working in tiny broadcast stations, can find that they're the only ones around with the skills and interest to do video, and therefore their community expects them to carry the whole load.

It is feasible (I didn't say easy) to go out alone and interview someone, then return to base and edit the piece together, eliminating the blips and repetitions, and adding titles and credits to the beginning and end (sometimes called *tops and tails*). This results in a finished video which can then be distributed, donated or sold.

But the idea of doing a full-scale studio production, single handed, could seem impossible.

If you sometimes have to do the video all by yourself in your community, the HOT studio is for you! Sylvia Tabua, broadcaster for the Torres Strait Island Media Association, Thursday Island, Australia.

Democratising the Means of Production

However, with a nifty design and a minimum of equipment, a single person can produce finished video shows which look like they were done by a whole team.

Not only can the show have multiple sources, but it can be done LIVE for broadcast, and can include phone calls into the studio from the watching audience!

It's not exactly a smoke and mirrors act, but most viewers are probably tricked by it.

The Room Layout

All you need is a small room—4 × 5 metres (12 × 15 feet) would be enough.

For fire safety reasons the room should have two exits. Check with the local fire regulations to see if you need to add a door to the exterior. Remember, the design idea is HOT, but we're not building an oven to cook anyone in!

You'll also need to consider ventilation and cooling. A small room running studio lights will become very warm very quickly. However, the noise of an airconditioner or a fan can do terrible things to your audio by adding an obnoxious background hum. You need to think carefully about the temperature conditions in your community, and allow for quiet room cooling, or you may limit yourself and your facility to rather short shows.
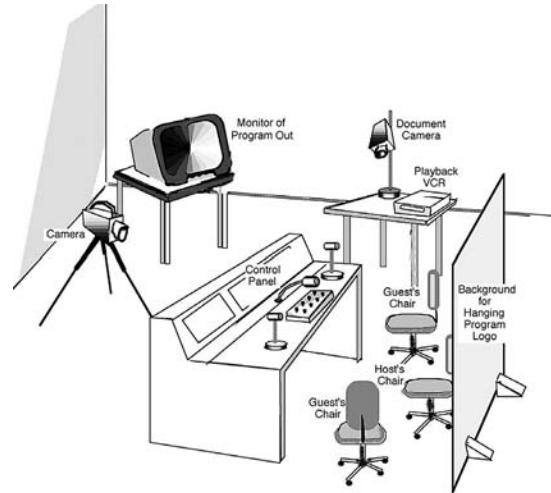
With only very little gear and a small room, you can have a HOT studio that works for community broadcasting.

Lighting

If you have the luxury of planning ahead and making the HOT studio part of a purpose-built facility, be sure to call for quite high ceilings. This is so you can have a small overhead lighting grid. The grid can be made of criss-crossed poles and suspended from the ceiling.

A lighting grid can only be used if you have a high ceiling because the studio lights run very hot, so they have to be sufficiently lower than the ceiling so they don't melt it, burn it, or cause harmful gases to be heat-released from ceiling materials.

The electrical wiring for any TV studio needs to take higher power electricity than normal household circuits provide. Have a separate circuit installed to supply the lighting grid. The sockets for the grid lights can be up along the grid poles, too, so there's no need for the electrical cords from the lights to hang down and get in the way.

A basic set of lights can be attached to the grid, and they can even be wired so they can be turned on by ordinary light switches next to the entry door. One or two frontal lights to light the host and guests, a back light to separate the people from the background, and a background light to illuminate their signage or backdrop would do.

In a HOT studio, try to keep the lights COOL! A small room heats quickly and airconditioning ruins a sound track. HOT Studio, Somerville Community Access, TV, Somerville, MA, USA.

For those artistes who need more complicated lighting, the grid is there for adding whatever lights they choose. Even attaching coloured gels to the front of some lights can go a long way towards changing the look of a standard set. A gobo (cucaloris or cookie) can give a new background in an instant.

If you're working with a room in your existing building, or even in your own home, a lighting grid may not be possible. Don't worry, you can use lights on floor stands, it will just be more cluttered at floor level. Take care to stabilise them with sandbags so you don't trip on a stand leg and knock over a light.

The most basic camera will do, since there's no need to genlock it in a HOT studio. HOT studio, Somerville Community Access TV, Somerville, MA, USA.

Camera

This is the easiest part. Your portable camera can be mounted on a tripod and set up facing the end of the room where your host will sit. You will need to take the signal out of this camera and send it to the little vision mixer on your studio desk. This is done by running a connecting cable from the *video out* port on the camera to one of the *video in* ports on the vision mixer.

If you're a tiny operation, you can have the camera connecting cable attached to the desk and reconnect the end to the camera whenever you use the HOT studio. If you have more than one camera, you could dedicate one to the HOT studio and not have to be plugging and unplugging every time.

Everything the presenter needs is within an easy reach. HOT studio, Somerville Community Access TV, Somerville, MA, USA.

The Host Desk

This is where the HOT studio comes together. Whatever you put into the host desk determines the technical capacity the host will have with which to assemble a show.

The host desk is fairly broad, as it faces the camera. It has a rising section at the front, which the camera sees as a nicely painted or panelled desk-front, but which secretly holds most of the studio operating equipment.

You should decide on the design of the host desk yourself, keeping in mind what your own shows will be like and what your community needs are. But here's an example to start off from.

First of all, you need a vision mixer, which allows you to switch from one video signal to another. This should be set into the tabletop of the desk so you can operate it without appearing to reach around and push buttons.

A very simple vision mixer has inputs from only four sources, but that's enough for you to make quite an impressive show. Let's consider what you would connect to it.

Each different piece of equipment is known as a *source*. Each source is attached to a different input on the vision mixer.

The most obvious source is your camera. You can connect that to the input labelled source #1 on the vision mixer. Then whenever you press the button marked #1 on the vision mixer, the camera's signal will be broadcast, or sent to your record tape, or both.

In the rising part of the desk, at the front of your work surface, you can have a monitor which shows you the signal from your main camera. This way you can be sure that the picture is well framed and in focus. If it isn't, you need to adjust your camera before your show starts. Pretty essential stuff!

Another handy source for your program is a VCR. This allows you to play any video that you've shot and edited before the show. Or a tape someone else has sent you, perhaps from another community like yours, or from a national organisation which deals with your topic.

So your show could open with your personal introduction, then go to a pre-recorded tape, and after the tape has finished, it could go back to you for the wrap-up comments.

Therefore, you could connect a VCR as source #2.

Another handy input is a document camera. This is another portable videocamera, mounted in a stand facing downward towards a flat surface (you can buy these stands or make one). This camera can be used to give a close-up view of anything too small to show well with the main camera. The document camera should be close enough for you to reach easily, maybe just off-camera to your right.

So you could connect the document camera as source #3.

Source #4 could be a computer which can input graphics and credits into your show.

Also hidden on your desk you could have a small computer monitor displaying your script or rough running sheet. You could also use a regular piece of paper for that. Which means you could use the monitor screen for something else. How about having a live phone-in capacity?

This HOT studio is hot to trot. It's ready to go wherever the show needs to be, and can get there on its own wheels. Wakefield Community Access TV, Wakefield, MA, USA.

This is a HOT studio. It allows one person to produce an entire show. They have push-pull levers which control the intensity of lights, and all kinds of other features. Great Northern Video in New Hampshire is selling these packages for use at municipal meetings. They can be connected to permanently wall-mounted robotic cameras, and the cabinet can be locked with a padlock. This allows one person to complete a very sophisticated production with a minimum of lugging of equipment. Nice!

Barbara Bishop, Independent Producer.

If you can link this screen to the computer in the front office of your building, and manage to get someone to agree to take your calls, then people can phone in to your show. Your telephonist can answer the calls and send the basic information on to you discreetly via the computer screen in your desk. So your screen might say:

Line 1	Jennifer from Brockton
Line 2	Michael from Haverhill
Line 3	Hot Lips from MASH

This option certainly makes local shows much more exciting and involving for the community of viewers! It means, though, that your desk will need another little box with buttons which allows you to select the phone line you want next. Then once you make the choice, you're on your own!

Nancy Grabowski and Debby Higgins produce a live call-in show on Special Education. HOT Studio, Somerville Community Access TV, Somerville, MA, USA.

You rig your audio system so the caller's voice is sent out via a speaker into the studio; that way your audience can hear both sides of the conversation, and you don't need to be fussing around with a telephone handset.

A final monitor in the host desk shows the output of the vision mixer, so you can always see what your show looks like, and be sure that you've pushed the right button to get the signal you want into your show.

The vision mixer needs to be wired in to your broadcast system, so you can send your video feed live to cable or live to air. Additionally, you most likely would choose to have a second VCR, this one attached to the output of the vision mixer, so you can record your program. Good for checking your work, and also good so you have a finished tape for reruns.

Sound

It makes sense, when you're designing your HOT studio, to think of what possible uses both you and others might make of it in the future.

So although you may start off thinking of it as being just what you need for *you* to make a show on your own, the day might come when you decide to have a guest. Maybe two guests. Maybe more.

Where would they sit? How would you capture their voices well?

In the HOT studio in Somerville, MA, USA, there are three cardioid microphones attached to long bendable necks. There's one in the middle of the desk for the host, and one on each end for whoever else might squeeze onto the show.

Each microphone is wired into the audio mixer (sorry, yet another box with buttons to operate!) and can be turned on and off. If only the host is on the show, only the middle mic needs to be activated. If there's one guest, then one end mic gets turned on as well. And so forth.

Background

The background may be simple to decide upon. For example, your community station may decide that the Aboriginal or Torres Strait Island flag should be behind all your shows. Or the local TV committee may decide that every show should have its own look.

One simple solution is to have a plain or textured cloth background, in some medium tone, hung on the wall behind the host's chair. A medium blue works well on TV.

The worst thing you can have is a glossy white wall behind the host. This reflective background will make the auto iris on the main camera close down, and anyone seated in the host's chair will look semi-silhouetted. As a general rule, the darker the skin tone of the host, the darker the background should be. So think of your range of producers when deciding on your background.

Ideally the cloth should be backed with cork or some other such material, so things can be easily attached to the background with pins. But if not, if it's cloth over a hard surface, Velcro tabs work well.

With this generic background, anyone using the studio can put up their own posters or artwork, their show sign or tapestry, and they've quickly and easily established the look for their show.

Problems Likely in a HOT Studio

- Overheating from studio lights.
- Background noise from air conditioner or fan.
- Sound from other places in the building or from outside.

Want to Know More?

Information in this chapter is based on the HOT Studio at:

Somerville Community Access TV
90 Union Square
Somerville MA 02143
USA
<<www.access-scat.org>>
Tel: +1 617 628 8826; Fax: +1 617 628 1811
Email: info@access-scat.org
Thank you SCAT!

34 Studio Interviews

The studio interview is a simple, low cost and efficient way of getting information across. It can also be entertaining and humorous, with the right host and guest combination. It's worth aiming high and being imaginative when you're searching for guests.

The interview can stand on its own, as just *talking heads*, or it can be interspersed with pre-recorded tape segments. It can also be livened up if the guest shows things s/he's brought in, or gets up and does a live demonstration.

Faye Starr from the AFTRS Student Centre is interviewed by Vicki Lucan, Australian Film Television and Radio School.

The Set

In the interview, the guests and what they have to say should be the focus of attention, so the set is usually kept quite simple. Frequently the cyc curtain is drawn across the background, so the interview is in an indeterminate location with a soft background.

Still, adding simple but appropriate artefacts, which reflect the culture of the guest or the content of the interview, can lift the visuals and enhance the aesthetics of the program.

Because camera operators usually stand, the comfortable height for their cameras is higher than the eyeline of seated guests. For this reason, the interview set is elevated on *risers* (movable platforms) when possible. This makes the camera angle neutral in relation to the host's and guest's eyelines.

A standard interview set consists of a chair for each guest and the host. Sometimes a low table is placed in front of them, so items which will be discussed can be at hand for close-ups.

It's important that the set doesn't get in the way of camera moves, and that it doesn't look peculiar from any anticipated camera angle.

Check that background details and designs don't appear to grow out of anyone's head, and watch that unexpected words don't appear when someone's head blocks out sections of background lettering.

Lighting the Interview

Simple three-point lighting set-ups work well for the studio interview, and they're easy to achieve because there's a high ceiling and adequate space around the seated people.

If there are plenty of lights, each person can have a key light, a back light and a fill light of their own.
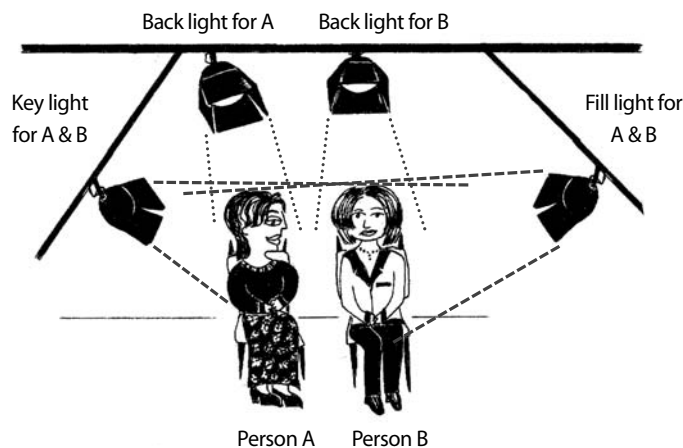
In this set-up, only one key light and one fill light is used for both people. They each have their own back light.
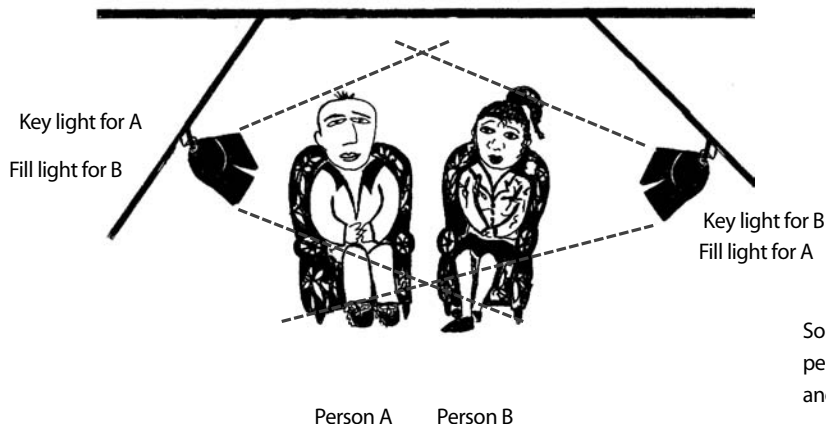
Sometimes the key light of one person can be the fill light for another.

However, when two people are sitting side by side, it's workable to light them both with the same key and fill lights, and give them each their own back light. Sometimes the back light can be shared as well.

If two people are facing each other, it's possible for the key light of one person to be the fill light for the other and vice versa.

It's also possible for both people to share a key light and each have their own fill and back lights.
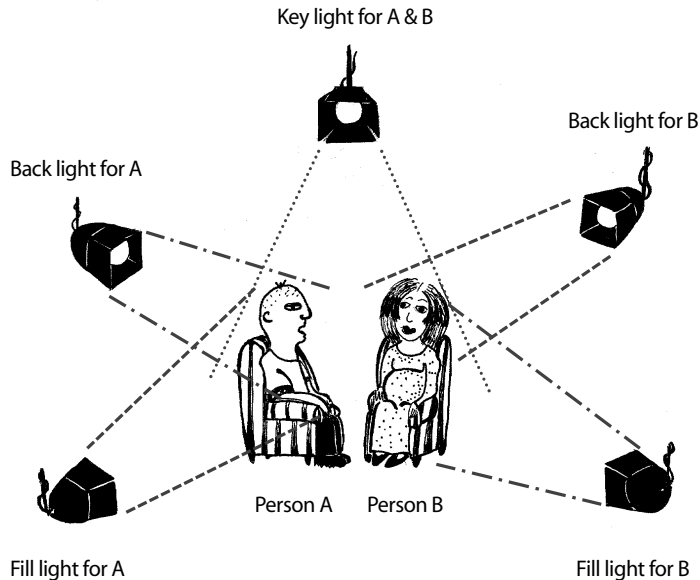
If the key light comes from the centre rear, one key light can serve both people, but they may each need their own fill lights and back lights.

Indirect frontal lighting can be soft and shadowless. Combined with a strong back light on the head and shoulders, this lighting set-up can give a very pretty effect.

Indirect frontal lighting from floorstands can get in the way of camera shots and tracking moves, though.

When lighting an interview, take care to control the light intensity which falls on each face. Lighter skinned people tend to look bleached-out fairly easily, while darker skinned people can handle a stronger light intensity. When lighting two people together who have quite different skin tones, seat the darker skinned person closer to the light.

Guests should be advised to arrive in clothing which is neither very pale (white is especially reflective and difficult) nor dark (black is a problem, too), as these contrast too starkly with skin tones and make lighting very difficult. Medium tones, especially blues and rose, work well. Green can sometimes make a person look sickly.

Coloured gels can be used for throwing mood lighting on the cyc, but should usually be kept off the skin and hair of the guests.

The person who designs the lighting can make it soft and flattering, or stark and dramatic, depending on the tone of the program.

Good lighting adds greatly to the aesthetics of an interview, so allow enough time to get it right, and don't cut corners.

Setting the Sound

Let's face it, talking heads with poor sound is a waste of everyone's time. No-one will watch it, not even your mother!

First of all, you should use the best mics you can get your hands on.

Second, you should never accept buzzing or crackling sound. Find the source of the buzz and remedy it. Change to another cable to get rid of the crackle.

Third, if the sound level is too low, replace the mic batteries with new ones. If you can't get an adequate level, change mics.

If you have only one mic, you need to place it so the sound is of equal quality from both—or all—the speakers. This probably means positioning it closer to the more softly spoken person.

Because interviews aren't totally pre-scripted, and people can jump in with a comment at any point, it's very difficult to mic them with a super-directional boom mic. It works best if each person has his or her own mic, either a clip-on lav or a directional mic, which is out of shot if possible.

Once the mics have been placed, a sound check needs to be done to find the right record levels for each voice.

The floor manager or studio sound assistant asks each person to talk in their normal speaking voice. Giving them something easy to do, like talk about their trip to the studio that day, helps them to speak fluently for long enough so the person operating the audio desk can get a good sample of their voice volume and mark their fader at the right program level for them. Their voice level should be set so the VU meter needle on the mixer is up near the red, but not in it.

Bear in mind that people tend to speak louder once they get revved up, so it may be necessary to lower their level slightly during the actual interview.

I have particularly enjoyed the live format of our productions because they are less formal and more interactive than a taped program structured to get the maximum information into the shortest time.

Jeanne Flanagan, Independent Producer.

Michelle Fullerton attaches lav to Kris Flanders, TEAME Indigenous TV and Video Training Course, Metro Screen, Paddington, NSW, Australia. (Photo by Michelle Blakeney)

Preparation

The success of an interview depends on both the skill and the preparedness of the host. A person's ability to be lively and entertaining on camera isn't always matched with a knowledge of the relevant issues.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

Research and preparation are the key to an effective interview. By the time you sit down to do the interview, you should know as much as, or even more, on the topic, than the interviewee.

Always ask your interviewee what his/her title is, and how s/he would like to be addressed on the tape.

Research

Someone needs to do good research and become thoroughly grounded in the facts, opinions and controversies surrounding the subject to be discussed. This person may be the host, or it may be another crew member acting in the role of researcher. Either way, the end result should be that the host is thoroughly familiar with:

1. The main aspects of the issue.
2. The names of key people active in the area to be discussed.
3. The main arguments held by proponents and opponents of the show's guest.

Cultural Awareness and Sensitivity

People from different cultures ask questions in different ways; they also ask different questions. In some cultures, direct questions are downright rude or only certain people have the right to ask certain questions.

Body language varies, too. Looking straight into the eyes is respectful for some and insulting for others. The list goes on and on.

You need to be as knowledgeable as possible about the culture from which your guest comes. This way the risk of giving offence to your guest or to members of your audience is less.

And it's quite amazing how much more positively many people respond if they feel you've taken the time to try to understand where they're coming from.

A seemingly small gesture, like greeting a person in the _hello_ of their first language, can make a huge difference to the results of your interview.

Lester Bostock, director of TEAME Indigenous TV and Video Training Course, with actor Lee Willis, Metro Screen, Paddington, NSW, Australia. (Photo by Anne Douglas)

Questions

The interview should be structured around a list of key questions or topics. The director, researcher and host should have a preproduction meeting in which they discuss the questions/topics ahead of time and

decide the order in which they will be addressed, usually starting with easy areas designed to put the guest at ease, and building to the real stingers which should bring out strong reactions and statements from the guest.

The host should have this list written down on hand-held prompt cards or on a clearly readable script held on a clipboard. The director should have a copy of the list, so if necessary s/he can prompt the host to ask one which was missed out.

Part of the art of interviewing is to know when to follow a lead. The guest may say something which opens up a whole unexpected area. The host needs to make a decision on the fly about whether to follow an unplanned line, or return to the prearranged plan. To a certain extent, the director needs to trust the interviewer to follow his or her instincts in this.

> Treat your talent with respect; this means respecting cultural difference and diversity.

Marjorie Anderson, National Coordinator Aboriginal Employment and Development, ABC TV.

Hospitality

> An open heart and open mind opens doors of possibilities.

Claire Beach, Edmonds-Woodway High School.

The guest is the most important person in the program; in fact, there is no program without the guest. The guest should be warmly greeted and treated well during the entire time he or she is there.

Hospitality for the guest is primarily the responsibility of the floor manager, but all the crew should be polite to and considerate of the guest. It's unprofessional to ever make a guest feel unwelcome or belittled, no matter what you may think of his or her line of argument.

The flow of the taping session should be clearly explained to the guest. The floor manager should go over all the hand signals which might be used during the show, make sure the guest is comfortable in the set's chair, and promptly explain the reason for any hold-ups and the expected duration of the delays.

> Listening: Always conduct your interview with an open ear. If you're not listening to what the person is saying, you can miss the opportunity to pick up on things you were unaware of.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

On long shoots, the floor manager should make sure that the guest gets tea and rest breaks at comfortable intervals.

At the end of the recording session, the guest should be thanked and accompanied to the door. If possible, the guest should either be allowed to view the tape playback right away or promised a copy of it at a later date.

> You don't need to be an expert in the subject—they are—but you do need to know the right questions to ask to elicit their most informative and dynamic responses.

Donna Kenny, The Video History Company and Center for Recording Life Stories.

Those lights get hot! Floor Manager Christine Parlevliet passes a drink of water to Dianne Bain, while Sunshine De Luna looks on. Edith Cowan University, Perth, WA, Australia. (Photo by Keith Smith)

The floor manager makes sure the performer is comfortable and understands all the hand signals to be used. University of Southern Queensland, Darling Heights, Qld, Australia.

Coverage Guidelines for the Director

1. When setting lights and planning out camera shots during rehearsal, use other people to stand in for your guests. It's not a good idea to tire guests out, and they would benefit more from having a relaxed chat with the show's host in another room.
2. Establish the physical relationship between the host and guest at the beginning of the interview. A wide 2-shot can do this.
3. During the interview, it's important to listen as well as to look.
4. The pace of switching between shots will depend on the mood of the discussion. Lively, controversial interviews benefit from quick cutting. More personal or reflective interviews suggest longer and more intimate shots, slow zooms and thoughtful reaction shots.
5. Medium close-ups and close-ups are the lifeblood of interviews.
6. Make sure that the shots of your host and guest match in both size and framing. Never intercut between shots in which the interviewer appears larger on the screen than the guest does.
7. When either the guest or host is gesticulating, either zoom out to include a full view of the hand motions, or zoom in and lose the hands entirely. Never let the gestures be only partially seen at the bottom of the frame.

Never say 'We're ahead of schedule.' You're asking for it!

Sara Hourez, Special Projects, AFTRS.

8. Name captions should be superimposed over medium shots, not close-ups. Writing across a person's chin looks bizarre.
9. Tape or film inserts, photographs, graphics and props can make an interview more interesting. But the timing and order of these additions should be scripted ahead of time so that they flow into the program smoothly, everyone knows when they will appear and their usefulness is maximised.
10. If the guest or interviewer is to give a live commentary to a pre-recorded tape segment, s/he needs to preview the tape and have one or two rehearsals, preferably in a quiet place away from the studio. Once on the set, the commentator needs to have an unobstructed view of the monitor which is showing the segment.

A Selection of Basic Camera Set-ups

The arrangement of the chairs on the set has a surprisingly great impact on the way the guests feel, and therefore how they act and speak. This, and the positioning of the cameras, affects the way the audience perceives the interview.

So don't just automatically plonk people into the set's chairs as you find them; rather, think carefully about what the dynamics of the interview will be and arrange the set to underscore the alliances or conflicts you hope to show your viewers.

Use whatever camera resources you have to give you the flexibility you need for good coverage. It's almost always possible to connect an additional camera into the studio mixer, using a BNC cable from the camera's video output. So don't be shy to go for a second, third or fourth camera if you need it.

One Camera, One Guest

Covering an interview with only one camera demands skill on the part of the camera operator. Every camera move must be done well because that camera's shot is always on show.

The majority of interviews are done with people who are known for their interest in a subject, or their specialised knowledge, but whose ability in front of a camera is an unknown quantity.

As a director, you need to arrange the shoot so your program host can carry the interview if necessary.

SUGGESTED COVERAGE IF HOST AND GUEST SHARE EQUAL PROMINENCE

When the guest's speaking ability is unknown, the guest and host can be given equal screen importance.

Guest   Interviewer
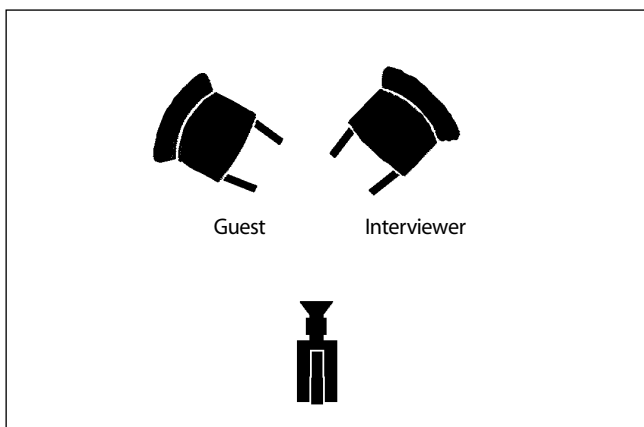
With this set-up, the guest and host have equal prominence.

- You could begin with a medium shot of the host, who looks directly down the camera lens to give an introduction to the piece.
- As the host turns to introduce the guest, zoom or dolly out to reveal the guest, till both are framed in a tight 2-shot. Stay with this 2-shot for a while (maybe till the guest is answering the second question), and then tighten the shot to a medium shot of the guest only.

Speak clearly, in short sentences that the interviewee and the audience understand.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

- As long as the guest is performing well, you can stay with this 1-shot, varying it from medium shot, to medium close-up, to close-up, depending on the content and emotional quality of the answers.
- For variety, pan to the host for a question or reaction shot. But do this only from a medium shot, never from a close-up.
- Also for variety, sometimes widen out from the guest to a 2-shot. You may choose to do this if the guest is faltering and you think the footage would benefit from the additional image and body language of the host. Take care to stay with your 2-shot for a decent amount of time, because frequent zooming in and out is annoying to the viewer.
- At a prearranged signal, return to a medium close-up of the host who again looks directly to camera for closing remarks.
- Fade studio audio, fade up program end music, and slowly widen to a 2-shot of host and guest quietly talking to each other as you roll credits over the screen. For an arty effect, fade down the frontal lights and show the host and guest silhouetted against the background.

Suggested Coverage if the Guest is Capable of Carrying the Interview

When the guest is capable of carrying the interview, the host can be shown in partial profile in the 2-shots. This bolsters the screen importance of the guest.

- Begin with a medium shot of the host, who turns his or her upper body around to show full face to the camera.

Guest   Interviewer

With this set-up, the camera emphasis is on the guest.
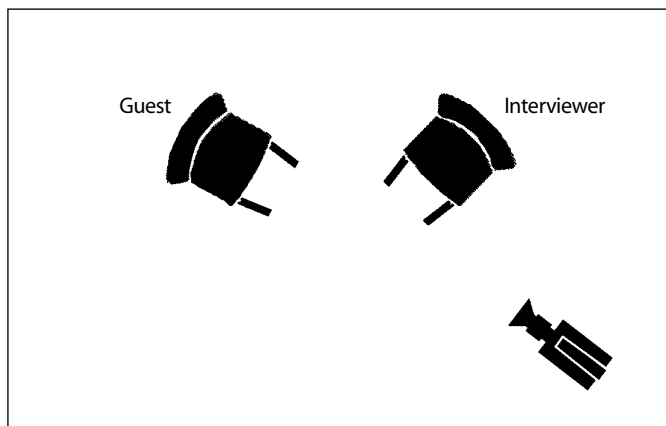
- As the host introduces the guest, pan left to a 2-shot with depth, or track back slightly to include the guest in a wider 2-shot. You can stay with this 2-shot until the guest has answered the first question.
- Then either zoom or dolly to tighten to a medium shot of the guest. As long as the guest is performing well, you can stay with this 1-shot, varying it from medium shot, to medium close-up, to close-up, depending on the content and emotional quality of the answers.
- Towards the end of the interview, widen out to a 2-shot again, or pan to a single of the host and have the host turn to the camera again for the closing.

> Double-barrelled questions: These often confuse the interviewee. For example: 'Where is the conference going to be held, and who's going to be there?'

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

Two Cameras, One Guest

Having the second camera gives you a great advantage, because now you can adjust one shot unseen while your viewers are looking at another one which is steady and well-focused.

SUGGESTED COVERAGE FOR A RELAXED STYLE OF INTERVIEW

When the relationship between the guest and host is relaxed and friendly:

Guest   Interviewer

Camera 1   Camera 2
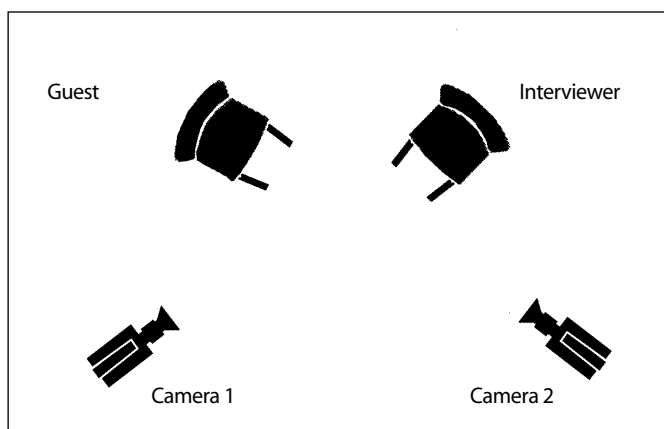
With this set-up, both the guest and the host have a dedicated camera.

It's a convention that cameras are numbered from left to right across the set. Although this isn't totally necessary, it does help to reduce the director's and vision mixer's confusion, and there's definite benefit in that!

- Camera 2 can start off with the establishment 2-shot.
- Then camera 1 can be used in a medium shot for the host's initial remarks.
- Camera 2 reframes to a medium shot of the guest, and the director cuts to the guest during the introduction.

Floor Manager Clare Mowday discusses a camera script with operator Kira Morsley. Edith Cowan University, Perth, WA, Australia. (Photo by Keith Smith)

As the interview proceeds:

- Camera 1 covers all single shots of the host.
- Camera 2 covers all single shots of the guest.
- Either camera can be asked for a 2-shot. However, this is more likely to be asked of camera 1, because camera 2 will be used for the greater amount of screen time, leaving camera 1 more opportunity to dolly or rearrange shots.
- Camera 1 can dolly to a more central position to pick up an evenly balanced 2-shot of the guest and host.
- Camera 1 can also be used to cover close-ups of objects the guest wants to show.
- Camera 1 can turn left to get shots of graphics on a pre-lit graphics stand.

Suggested coverage for a confrontational style of interview

For a 'hard-nosed' interview where there could be a feeling of confrontation between the guest and the host, a table can be used in between them.

A table or desk between the guest and host heightens the feeling of confrontation.
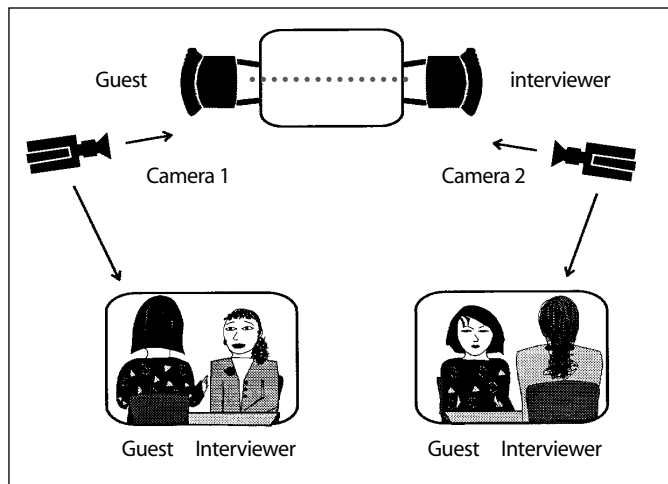
- The two cameras need to be positioned almost directly opposite each other, but still out of each other's shot. Each camera should have a good over-the-shoulder shot.
- Cameras should take care not to cross the action axis line, drawn in dots in the illustration above.
- The two camera shots should be carefully balanced by:
    1. Matching the lens heights of both cameras.
    2. Matching the camera positions in relation to their subjects.
    3. Matching the framing of both shots.

As with all interviews, it's best to have a neutral angle shot of both guest and host. This is done by setting the camera lens at the eye level of each person. Elevating the guest's chair on risers, or lowering the camera height, will achieve this, with the first option being the preferred one for the comfort of the camera operators. Especially in a confrontational type interview, you don't want to diminish the authority of any speaker by looking down at that person from a high camera angle. Nor do you want to artificially aggrandise one or the other by looking up at that person from a low camera angle.

As with the previous set-up, the bulk of the screen time will go to camera 2, so camera 1 is the camera to ask to dolly out to a more central position for a 2-shot, or to cover any extra shots, like objects and graphics.

Two Cameras, Two Guests

There's more than one way of looking at the idea of having two guests on a show. Some say that each person has to be able to make a distinct contribution to the interview or you should go with just one guest, that it's pointless to have a second person who says little and is basically a rubber stamp of the first.

On the other hand, some say that asking people to appear in a studio interview is a very big request, and that many people find the thought quite frightening. By allowing a second person who holds a similar position on the subject to come along, you give your guests some moral support, and you cover yourself if your primary guest goes speechless.

SUGGESTED COVERAGE FOR AN AMIABLE INTERVIEW WITH TWO PEOPLE

When there are two guests who concur on the subject, they can feel more comfortable if seated together.
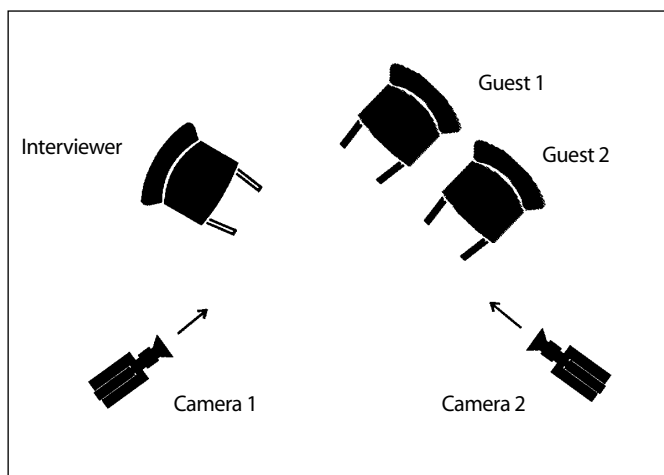
Guests who take a similar stand on an issue are usually happy to sit side by side.

- Camera 1 is responsible for covering each of the guests, using both 2-shots and singles. This means camera 1 will be very busy, and will be asked to change shots frequently and rapidly. It makes good directorial sense to put your better camera operator on this camera.

- Camera 2 covers the host, during opening remarks, questioning, reaction shots and the final wrap-up.
- Camera 2 can also be asked to dolly back and get a 3-shot, or track left for a 3-shot.
- For variety, camera 2 can track right and get a deep profile shot of the two guests.

SUGGESTED COVERAGE FOR AN INTERVIEW OF TWO PEOPLE WITH OPPOSING VIEWS

When there are two guests who oppose each other on the subject, it may be better to seat them on either side of the host.

Guests who take an opposing stand on an issue may prefer to be seated separately.
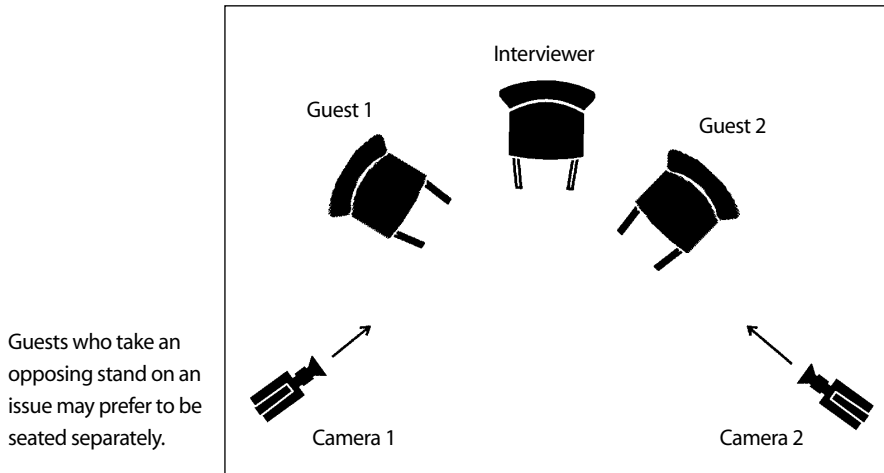
- The role of the host could be minimal in this interview because the two guests are likely to fuel each other, and each will have plenty to say. Most of the camera coverage will go to the guests. Still, the host needs to keep control of the show.
- The opening of this interview is tricky because each guest needs a good shot for their moment of glory—the introduction. Two possible ways to handle this are:
  1. (a) Move one of the cameras to a central position and open with an establishing 3-shot, then zoom in to a medium shot of the host, for opening remarks.
     (b) Cut to the other camera, which has a medium shot of the first guest to be introduced.
     (c) Cut to your first camera, which is now on a medium shot of the second guest, for the second introduction.
  2. (a) Open with a medium shot of the host.
     (b) As the first guest is introduced, widen out with that camera to a 2-shot which includes the first guest.
     (c) Cut to the other camera for a medium shot of the second guest for the second introduction.
- It's critical for everyone to be clear on which guest will be introduced first. It doesn't matter whether Guest 1 or Guest 2 is the chosen one, as long as everyone knows the game plan.

- Coverage can proceed with successive single shots of the guests, interspersed with shots of the host for variety.
- 2-shots are also good showing the host and a guest framed together. Just don't jump from one 2-shot to another, or the host will appear to leap from side to side of the frame.

Suggested coverage for two openly antagonistic

people

Where the two guests hold strongly opposed views, providing them with a physical barrier might be a good idea.

Body language is important when conducting an interview. You can acknowledge the interviewee by nodding your head rather than by saying 'yes' or 'uh-huh' or grunting. This appreciative silence will save you lots of heartache when editing. There's nothing worse than a tape splattered with off-camera sounds, which can't be explained later without being forced to show the interviewer.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.
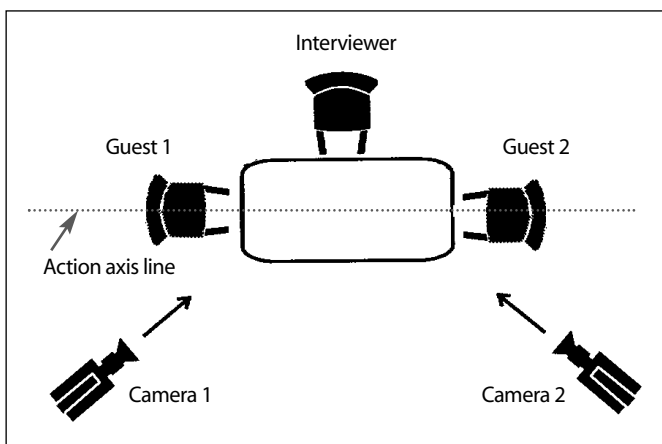
Sometimes the drama is heightened by emphasising the difference between the two guests.

- Inserting a table between the two guests does physically separate them, giving them each their own space, while also acting as a psychological barricade (and possibly stopping them from slugging it out!).
- The director needs to be especially aware of eyelines when cutting between singles, so people don't seem to be looking the wrong way.
- There's a good opportunity for over-the-shoulder shots, but take care to keep both cameras to the front of the action axis line.
- Again, you shouldn't cut from one 2-shot to another, because your host will appear to leap from side to side of the screen.

Three Cameras, Two Guests

SUGGESTED COVERAGE WHERE EACH GUEST CAN HOLD THEIR OWN

You can use your cameras to maintain the distinctness of each guest.

The third camera greatly increases your flexibility.
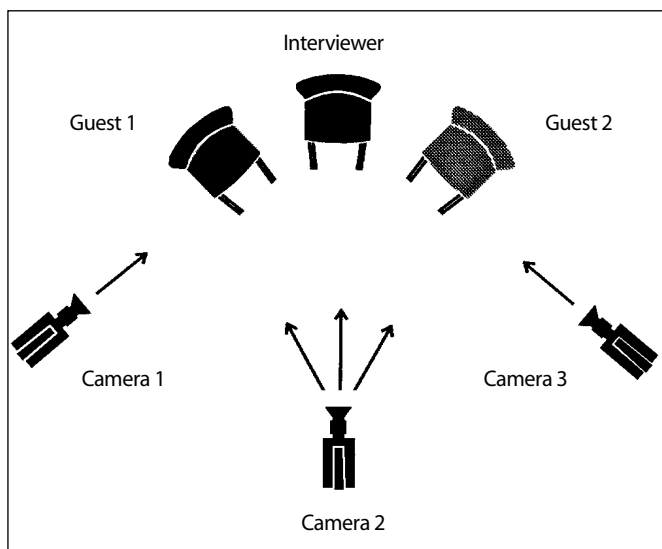
- Camera 2 can open, either with:
  1. An establishing 3-shot which zooms in to a medium shot of the host.
  2. A medium shot of the host.
  3. A medium shot of the host which widens out to a 3-shot.
- Coverage continues with each camera dedicated to cover the singles of one of the persons on the set.
- Camera 1 covers Guest 2 and can also be asked for 2-shots of the host and Guest 2, and for occasional 3-shots.
- Camera 3 covers Guest 1 and can also be asked for 2-shots of the host and Guest 1, and for occasional 3-shots.
- Camera 2 covers the host and can also be used for:
  1. A safety 2-shot.
  2. A safety 3-shot.
  3. Graphics from a pre-lit graphics stand.
  4. Shots of guests in partial profile, if tracking is possible.

SUGGESTED COVERAGE WHERE THE TWO GUESTS GIVE EACH OTHER SUPPORT

You can seat the guests so they feel each other's support.

- Camera 1 covers most singles of Guest 1, and can be asked to truck left to get shots of either guest over the shoulder of the host.
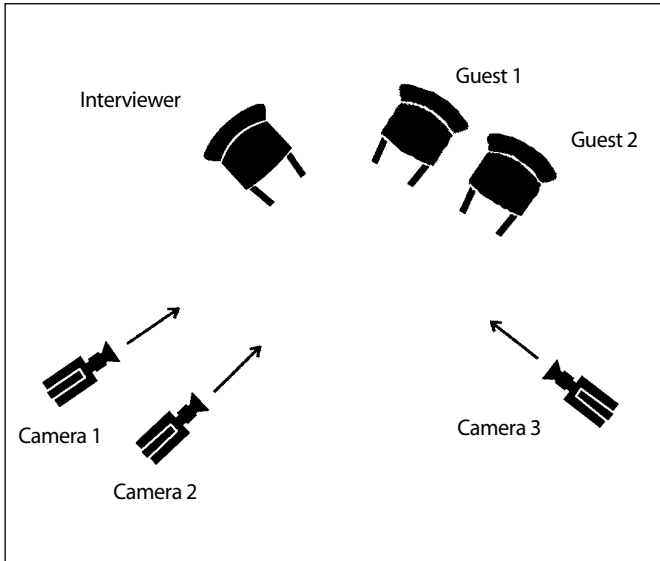
Each guest is covered separately, but they can feel supported by each other.

- Camera 2 covers most singles of Guest 2, and can get 2-shots of the guests. Camera 2 can also get a profile of the host, if needed.
- Camera 3 covers the host and can get a 3-shot with depth.
- You may need to use one of your cameras for graphics, or for covering a close-up of something one of the guests has to show. The camera you choose will depend on which cameras you're using leading up to the shot. This is where planning ahead will definitely help you troubleshoot.
- You may need to release one of your cameras for use on the next segment in your program. If so, give this camera ample warning and plenty of time to reach its new studio position so it can frame and focus before you have to use its shot. Don't wind up one segment before the first shot of the next one is ready!

Once you have completed your interview, replay a small segment of it to ensure:

1. That you have it.
2. That the sound quality and levels are good for broadcast.

Florence Onus, Journalism Lecturer, School of Indigenous Australian Studies, James Cook University.

Ethics and the Interview

It's easy to influence the tone of a studio interview. The director does this by choosing the seating arrangement, and selecting the content and order of the questions.

The interviewer does this by tone of voice when asking the questions, and by changes in facial expression and body language.

It's also possible for the director to use camera shots to subtly, even subliminally, influence the viewing audience.

A high camera angle looking down on the guest can be interpreted as reducing his or her authority.

A very tight shot of the guest, intercut with loose relaxed shots of the host, can seem to put the guest in the hot seat. If the guest is able to see his or her image in a studio monitor (which is almost never a good idea), s/he can feel squeezed and under attack by such an image. This can affect performance, especially in a guest who's started a downward spiral.

A close-up reaction shot of the host with a slightly raised eyebrow or tiny smile may imply that the guest is not telling the truth.

Don't succumb to underhanded tricks like these. Camera shots and angles should remain neutral and people's credibility should stand or fall on their words and their own performance.

Otherwise it can be justly said that the guest has not had a fair go.

Suggestions from Rachel Masters

If you can record an interesting one-person interview, you're well on the way to becoming an accomplished videomaker.

There are many different variations on the one-person interview, but they all revolve around the same idea: the interviewee should be the focus of the interview. Your friends may be budding current affairs journalists, but their face on camera may not always be needed, and it can be distracting.

Record a one-person interview which, when edited, will run for about four minutes. Remember to include cutaways and reversals.

If you don't have access to a studio, don't worry, there are lots of appropriate places to do interviews. Perhaps you can do the shoot on location. Look around your neighbourhood. Who are the local celebrities?

Training Resource

The Greater Perspective, 2nd edition, Lester Bostock, SBS, 1997. Available from SBS. This style manual gives information about how to go about doing screen productions within Australian Indigenous communities. A must to read.

Lester Bostock, author of *The Greater Perspective.*

35 Video Transmission Methods

The video signal can be transmitted in several ways. It can be sent along a wire as a *composite video signal*. This is the way video is transmitted within a studio, and through some *closed circuit TV systems*. When sent this way, only the picture is carried on the video signal wire. The sound needs to be carried on a separate audio wire.

The video signal can also be sent along a wire as an *RF* (radio frequency) signal. When sent this way, the video and audio signals are converted to a single radio frequency signal and sent together along just one wire. This is the form of transmission used by *cable TV.* The transmission of programming along cables is often referred to as *cablecasting*, instead of broadcasting.

When the signal is transmitted through the air, it's transmitted as a radio frequency (RF). This is the method used for broadcast television.

Community access TV stations work on a public access, first-come, first-served basis. So anyone from that particular community who wants to learn how to do video has the right to participate. Open Day at Wakefield Community Access TV, Wakefield, MA, USA. (Photo by Barbara Bishop)

Cable TV

With cable TV, the service provider transmits signals along a vast system of cables which emanate from the provider's *head end* transmission facility.

From the head end, there are many *trunk lines* which radiate to sections of the city or the geographic region. These trunk lines lead to system sub-centres called *gateways.* From the gateways, smaller areas called *nodes* are serviced. Within these nodes, broadband cable is strung along the telephone poles, or entrenched underground, throughout each

neighbourhood. Amplifiers are placed along the broadband cable pathways to maintain a consistent signal level. Along the way, between the amplifiers, are *taps*. Each tap allows from two to eight homes to be serviced by direct wires from the cable system. These individual wires are connected to people's houses and from there to their TV sets.

A *cable TV provider* (company) collects TV programming from a variety of sources and distributes its collection of programs on a number of cable channels. This programming is received only in the homes of the subscribers who have signed up for the cable service, usually on the basis of a monthly fee.

Cable TV providers generally offer a range of choices in channel *packages*, which are also referred to as *levels* or *tiers*. The customer can choose to receive either a small number of channels for a lower price, or packages which include a larger number of channels with some special enticers, like channels showing new movies, top sporting events or adults only material.

To acquire their programming, cable TV providers pay a fee to collect signals from different satellites, using giant satellite dishes located at the system's *head end*. They also receive *off-air* signals from local TV broadcasters (both commercial and government-sponsored channels), and they can generate their own programming from their studios, if they have any, and from their OB (outside broadcast) vans—which are used for local sports coverage, local events, government meetings, and so on. In addition, they can collect new programming on videotape from other providers.

These other providers could have a commercial arrangement with the cable system, and pay to have their programs transmitted. Or they could be approved providers who supply program material for free-to-air channels reserved for government meetings, health, education or religious programming.

There's another category of program provider which could apply to you. That's *public access*.

Public Access

Public access channels are available to community groups or individuals for *free*, so anyone can broadcast their own programming. Needless to say, the variety of programming which arises from a whole community is almost by definition broader than the choices available from any other channel. From a multiplicity of producers can come a wonderful spectrum of programming.

A public access channel is defined as *a common carrier, available on a first-come, first-served basis*. You can understand this definition by thinking about a public road. Anyone can travel down it, and the first one who gets to it, gets to ride down it first. Then all others can use it in the order in which they arrived.

Public Access in the USA

In the USA, cable TV systems offer public access packages to the communities from which they extract their service provision fees. Although the public access facilities are

free to community members, and may cost a lot of money to set up, the cost to the cable company for providing them is minor compared to the quite considerable sum paid in monthly fees by the overall community to the cable TV company. So public access is not a charity set-up, and is seen by many media advocates and community members as a public service obligation. Still, there are some cable TV providers who offer little or no public access.

Public access packages can include access to production equipment, fully equipped studios and OB vans. They often include wages for teachers to train community members in how to plan, make and edit their own programs. They can also pay the wages of people who are hired to produce local programs, and for coordinators who oversee all of this production activity. So local public access channels can supply the community with jobs for local media people.

Charlie Tesch and Larry Sawires Yager receive an award from Bunny Riedel on behalf of the Somerville Producers Group, for producing the longest continously running public access program (*Dead Air Live*) in the USA.

In places where cable TV systems compete for permission to supply a community with cable service, local media activists can pressure the competing providers to offer very good public access equipment and services as part of their overall commitment to the community.

Public Access in Australia is Available Free-to-Air

In Australia, free-to-air public access is currently available in six cities on the community broadcast channel, usually Channel 31, often referred to as the 'sixth channel'.

The sixth channel is on the UHF spectrum. Channel 31 is located near SBS in the UHF frequency range.

Community broadcast channels are allocated their licence by the Public Broadcasting Association. At time of writing the community channels are:

Adelaide	ACE TV	UHF 31
Brisbane	BRIZ 31	UHF 31
Lismore	LINC TV	UHF 68
Melbourne	MCTC Channel 31	UHF 31
Perth	Access 31 Perth	UHF 31
Sydney	CTS Channel 31 Sydney	UHF 31

These channels are all up for renewal at the end of 2002.

Other cities have the right to apply for a community channel, and some have done so, and even been licensed, but then the channel has folded for some reason.

Broadcast TV

The television most people experience is that which is a signal transmitted through the air as an RF frequency. It's broadcast from a TV transmitting tower, which is situated high on a hill in each locality. There are two reasons for this arrangement: television signals don't travel very far, and they have to travel in a straight line.

As the RF TV signal passes each home, it's captured by an aerial on the top of the house or block of units or apartments, then it runs through a cable directly to the individual TV sets. When there's no rooftop aerial, people can use 'rabbit ears' on top of their TV set to capture the RF signal.
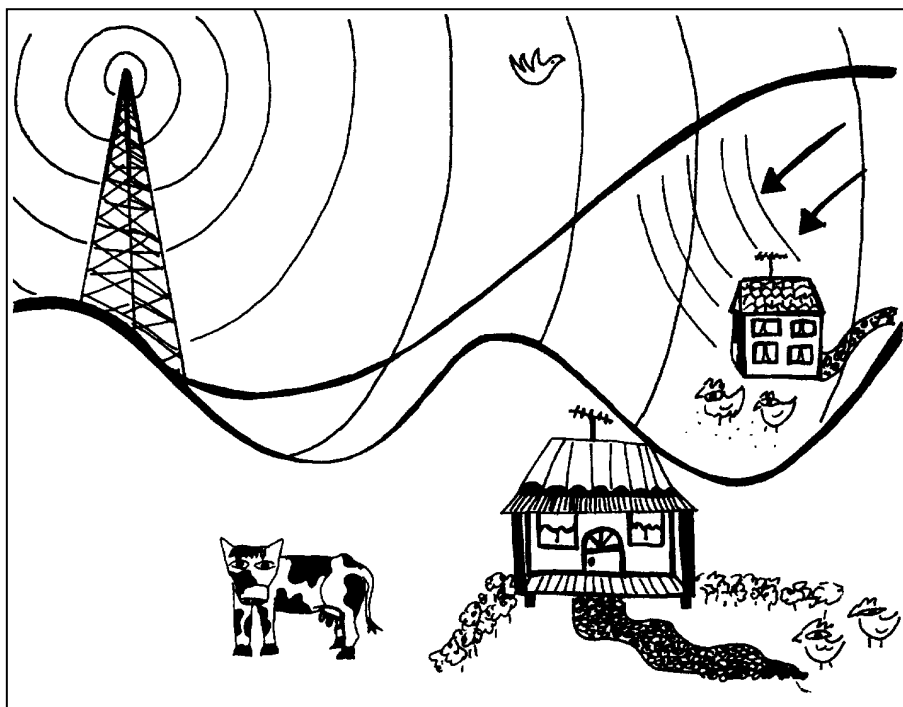
The broadcast TV signal bounces off hills. It can't pass through them.

TV signals sent through the air can't pass through hills. In fact, they bounce off them, and this rebounded signal can then enter TV aerials which have already received the signal directly from the transmitting tower. This is why some people have problems with *ghosting* on their TVs. They're actually receiving both a direct signal and a reflected signal, with the second one arriving marginally later than the first, and appearing slightly displaced to the right on their screen.

This also explains why some people who live quite close to a TV broadcasting transmitter can get very poor signals. If they live in a hollow on the far side of another hill near the transmitter, they're in an area which can't get a direct signal.

When a household has a VCR, the rooftop aerial cable is usually connected directly to the VCR, and from there another shorter cable takes the RF signal from the VCR to the TV. Connecting the aerial to the VCR allows people to tape TV programs off-air. This practice is commonly done for *timeshifting*, which simply means that the viewer wants to watch a program at any later time, rather than being stuck with the TV station's broadcast time slot.

With this hook-up, it's possible for inveterate viewers to watch one program and tape another at the same time. If you can't do that with your present set-up, swapping the cables around may be all you need to do to have this capacity.
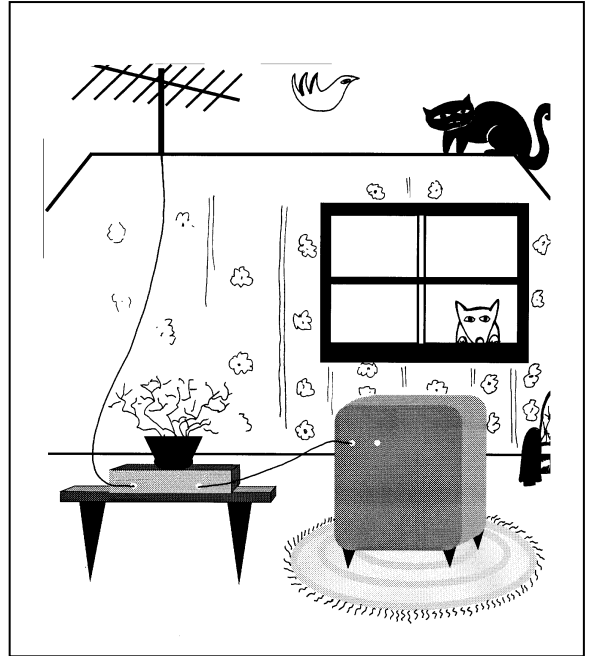
The signal path is from the rooftop aerial to the VCR, and then from the VCR to the TV.

Microwave Links

Video can also be sent via a *microwave* link. With microwave transmission, the TV signal is an RF signal which is loaded onto a microwave *carrier*. Microwave transmission requires *line of sight*, which means that it too can only be done in a straight line. For this reason, microwave links are commonly set up on hilltops or the tops of tall buildings. With a microwave link, a signal can be received and then retransmitted. This is one way TV signals can be sent across vast distances.

Landlines

TV signals can be sent along landlines (or *bearers*) from one capital city to another. In the past, these landlines were *coaxial cables*, but they've gradually been replaced by broadband *fibre optics*.

Program segments can be sent along landlines from several different cities to one studio, and then edited together there into a whole program.

Satellite Transmission

Another way to send video from one geographical region to another is to use a satellite link. Satellite links are routinely used for collecting news stories from around the nation and world, so they can be edited together each night for TV news bulletins, for example.

Satellite distribution is the preferred method for international TV distribution, especially for Australia and New Zealand, which are geographically isolated from other English-speaking countries.

How Does a Satellite Link Work?

The first thing you may have learned about satellites and TV transmission is that there needs to be a *satellite dish*. You can see these on top of the hotels and clubs which advertise SKY Channel, and you can see them dotted around the countryside on top of buildings and hills, and at big institutions, such as universities and hospitals.

The satellite dish, also known as an antenna, comes in two varieties. One can only receive signals. Needless to say, these cost less and are far more common. The other sort can send signals as well.

If you have a close look at a satellite dish, you'll see that it's comprised of a large curved surface which has a smaller device mounted at a distance from the inside base of the curve. This is called the *feed horn*. The feed horn directs the transmitted signal to the broad curved surface of the dish and from there it bounces off into the sky. The feed horn can either direct the signal straight at the curved reflector surface, or it can use a double bounce system, in which case the dish is called a dual-reflector antenna.

The dish has to be correctly oriented towards the sky so the transmitted signal can be received by the right satellite.

The satellites used for the conveyance of television signals aren't the ones you can see crossing the sky at dusk like purposeful shooting stars. They're the ones which are in orbits which are *geosynchronous* to the earth's surface. This means that, though they're in orbit through space, they stay in a fixed position in relation to the earth, so, for example, the ones which serve Australia are always in the same place in relation to Australia. In order to be geosynchronous, they must be 35 680 km (22 300 miles) above the Equator.

Launching into Satellite Vocabulary

A satellite broadcast operates via a TV station sending a *baseband signal* to an *earthstation* which has a *satellite dish* which can be used for the *uplink*. The signal is uplinked to a *geosynchronous satellite*, where it's received by a *transponder*. The transponder changes the frequency of the signal and amplifies it. Then it sends the signal to another transponder on the same satellite. The second transponder retransmits the signal back to the Earth, using the new frequency to protect the retransmitted signal from interference from the original signal. The *downlink* signal can then be picked up by the satellite dishes of any of the earth stations within the *footprint* of that satellite.

- *Uplink:* Transmission system sending a signal to a satellite; also, the signal sent up to the satellite.
- *Downlink:* Transmission system receiving a signal sent from the satellite to the earth; also, the signal sent to the Earth.
- *Footprint:* The geographical area on the Earth which receives the downlink signal from a particular satellite at a useful strength. Because footprints don't align with national borders, satellite signals can be received in countries which don't necessarily approve their program content, yet have no regulatory control over their broadcasters. This is one of the benefits (or hazards—depending on your point of view) of satellite TV.

- *Earthstation:* A facility for the transmission and reception/distribution of satellite-mediated (handled) television and radio signals.
- *Antenna* or *satellite dish:* A piece of equipment composed of a curved reflector and a feed horn, which can be used to receive signals from, or transmit them to, a satellite.
- *Geosynchronous satellite:* A satellite which stays in a fixed position in relation to the Earth.
- *Transponder:* The part of the satellite which receives the uplinked signal, converts the signal to another frequency, and amplifies it for retransmission to earth via another (downlink) transponder.
- *Baseband signal:* The signal which is sent from the TV station to the earthstation for uplink to the satellite.

DBS: Direct Broadcast Satellite

When an individual receiver, like a home or business, has its own satellite dish and receives programming directly from a satellite for its own use and not for distribution to others, this is called DBS. Some satellite TV broadcasts can be purchased directly like this.

Interactive Satellite Communication

World Telly at AFTRS

Using a combination of most of these methods of video transmission, it's possible to construct a signal path for interactive satellite communication.

In March 1996, a one-hour interactive satellite program called *World Telly* was put together in the main TV studio at the Australian Film Television and Radio School.

World Telly was a magazine-style variety program which incorporated live performances from AFTRS in Sydney, and live performances from Bangkok, Thailand, as well as pretaped segments rolled-in to the program from both sites. The two studios were connected via a satellite link, and the set-up allowed for two-way video and two-way audio.

The signal path for this program was a feat of cooperative transmission!

If you're ready for a real challenge, try to follow this:

> The signal originating in the AFTRS studio (in the Sydney suburb of North Ryde) was sent by coax cable to the rooftop, to the microwave transmitter, which sent it by microwave link to the government-sponsored TV station, ABC TV, a few kilometres away, still on Sydney's north shore.
>
> From the ABC, the signal went by landline to TOC (Telstra Operations Centre) which is at the Centrepoint Tower in the centre of Sydney's business district. From TOC, the signal was sent along TV1, a dedicated landline, to the ABC earthstation in Darwin.
>
> From Darwin the signal was uplinked to Palapa B2P, an Indonesian satellite. It was received on Transponder 'T5 Lower'. This is the transponder

Explaining last minute details of *World Telly*, Scott Watkins-Sully, producer, Australian Film Television and Radio School.

which is permanently booked by the ABC for Australia Television, the international satellite TV broadcasting service of the Australian Broadcasting Corporation.

The signal was then downlinked to Si Racha earthstation, owned by CAT (Communications Authority of Thailand). From Si Racha earth-station, the signal was microwaved to Channel 11 in Bangkok. This is the national TV broad-caster for Thailand.

Because Channel 11 had no uplink capacity, a mobile earthstation (on a truck) was hired and parked at Channel 11.

The signal from Channel 11 studio was transmitted to the mobile earthstation via temporarily laid coax cable.

From the mobile earthstation, the signal was uplinked to Transponder 'T2 Horizontal' on Palapa B2P satellite.

The signal was then downlinked to Darwin, to the ABC. Because the ABC landline link to Sydney was unavailable, the signal was then microwaved to the Optus earthstation in Palmerston, NT (just south of Darwin).

The Optus earthstation uplinked the signal to BIT 5L, which is the Optus satellite.

From the Optus satellite, the signal was downlinked to the satellite receive-only dish at AFTRS, and sent by coax cable to the control room of the main studio!

Scott Watkins-Sully, AFTRS student and producer of *World Telly*.

The process and practice of a project such as *World Telly* provides invaluable experience of the kind of international coproduction that will surely become commonplace in the near future, through the implementation of larger satellite footprints and easier access to technology.

World Telly could be received in 24 countries, as far away as India and Sri Lanka to the west, China and Korea to the north, and Tonga and other Pacific Island nations to the east. It was broadcast by the ABC channel Australia Television, and broadcast internally in Thailand.

When you send a signal up to a satellite, there's no way of knowing who will pull it down, and record it, and/or retransmit it. The program can end up anywhere in the world!

A great feeling for megalomaniacs. Not so great for control freaks.

For anyone else hoping to try an interactive satellite program, here are some helpful hints from Scott Watkins-Sully, the AFTRS student who initiated and tenaciously followed through on *World Telly*.

First, learn as much as possible about the culture of the people you're cooperating with, and be respectful of their ways of doing things.

Then, know your signal path—transponder names, uplink frequencies at every point, and the names and phone numbers of the transmission officers who will be on duty at the time.

Make sure you have paperwork confirming every stage of every link, and copy that paperwork to everyone who's part of the link, complete with phone numbers.

Don't be afraid to approach people for information. Interactive satellite communication is a process everyone's constantly learning about.

Ensure that you know your signal path within the control room and the video and audio consoles, and that you have total control over all incoming and outgoing signals.

Know your signal path! Barry Fernandes and Scott Watkins-Sully confer on *World Telly*, Australian Film Television and Radio School.

Ensure that everything's up and running and patched as far in advance as possible. You should have at least 15–20 minutes line-up time for the satellite feeds.

Be certain that you have very, very carefully balanced foldback audio to the studio floor at every live site.

Project set-up time depends on resources. A broadcast station could put together an interactive satellite program more quickly, but with relatively unresourced projects, it would take six months or more to put one together.

Dealing with overseas links takes lots of time to negotiate and confirm production details.

World Telly II, a coproduction with Fiji, was transmitted in February 1997.

If anyone would like to get more information about *World Telly* or how to put together an interactive satellite program, you may contact Scott:

Scott Watkins-Sully, 22 Cavendish Street, Pennant Hills, NSW 2120, Australia; tel: +61 2 9484 4824; mobile: 0414 864 916; fax: +61 2 9484 8747.

36 Videoconferencing

Videoconference set-ups are somewhat similar to the HOT studio. They also allow for only one or two people per site to generate a continuous program from several sources. This is done by using cameras in fixed positions, which are operated by remote control. Other signal-generating equipment, like a VCR, a computer or an audio player, can be hooked into the system as well.

Universities and businesses have invested in increasingly comprehensive video-conferencing set-ups.

A Typical Videoconference System

It is increasingly common for universities to provide subjects which are physically taught at only one campus, but attended by students from one or more other campuses as well. Videoconferencing is one of the many techniques included in *distance education*.
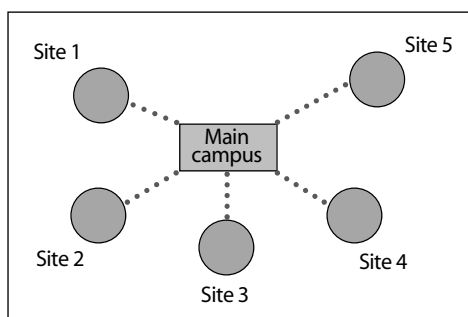
Students from all five satellite sites can see, and converse with, the lecturer and the class at the main campus.

The distant students (who may only be in a building a block away, but could also be on the other side of the world) go to a designated videoconference room at their own campus or a local community centre, to connect in to their teacher's lecture theatre at the main campus.

With videoconferencing the teacher becomes, willingly or not, the producer of an interactive multicamera media event which is produced live, broadcast simultaneously to several sites and recorded for posterity, for better or worse.

But as the producer of the show, it's up to the teacher whether to go for a very simple production

or a much more complex one. For many teachers it's an invigorating challenge and for some it's a chance to dabble in a bit of the theatrical.

Typically, in the videoconference room where the teacher will be, you find a hand-held remote control, a couple of large monitors, a main camera and second camera, possibly a spotlight, microphones, document camera, and other plug-in equipment such as a VCR and a computer.

Remote Control

The hand-held remote control operates the rest of the equipment.

Monitors

One of the large monitors shows the image which is being generated from the main lecture hall, and the other shows the image which is the *return video*—that is, whatever is being received from somewhere else. In a basic set-up with only two sites, it simply shows the other site.

Whoever holds the remote control chooses the displays people see.

In a more complex set-up, the second monitor shows a full screen image of whatever remote site has been selected by the remote control in the teacher's room, and a small PIP (picture in the picture) appears on the screen for every other remote site linked into the conference. By clicking the remote control, any PIP can be turned into a full screen image.

If the site has only one monitor, the PIP setting can be used so that a small box in a corner of the screen can show one image and the rest of the screen shows the other. So the teacher and home audience can still see both the output video and the incoming video.

In videoconferencing, you can be happy if someone gives you the PIP.

Cameras and Microphones

A *main camera*, is mounted high up, perhaps from the ceiling of the room or from a wall mount. This camera is positioned to produce a good view of the teacher, both in a long shot and in a medium close-up. This camera can be panned and zoomed using the remote control, so the teacher can move around the front of the room, and go between the whiteboard and the document camera or whatever.

There may be a spotlight which can be turned on to highlight the teacher in an otherwise dully lit room. The spotlight should be well placed, certainly not mounted right above the lectern or presentation desk, or the resulting toppy lighting will make the teacher look haggard indeed.

There is a *second camera* which is mounted to give a wide shot of the classroom or lecture theatre. It shows all those participants present at the main centre. This camera

In the ISL (Interactive Systemwide Learning) lecture hall, the camera swivels towards whoever pulls down the toggle switch on the base of their microphone. The camera is in the upper left-hand corner of the picture, behind the smoked glass. Central Queensland University, Bundaburg, Qld, Australia. (Photo by Karl Neuenfeldt)
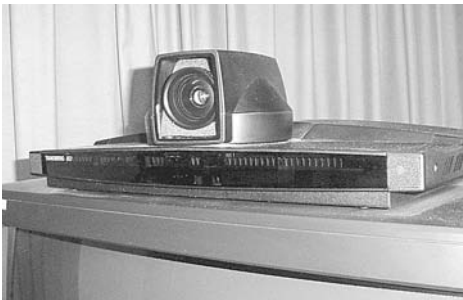
Ideally, the second camera is mounted above the monitors.

Lecturer Florence Onus shows her videoconference class a graphic using the document camera. James Cook University, Townsville, Qld, Australia.

can be panned and zoomed, so a small group of students can be found and highlighted, or an individual asking a question or making a comment can be seen well by those at other sites.

It's a good idea for the second camera to be mounted above the monitors so that the students in all sites get images of people facing them.

Ideally the _main camera_ on the teacher is mounted at such an angle that when the teacher looks at the class in the room, his/her eyeline is roughly correct for the students who are at the other sites. Sometimes this positioning is not thought out carefully and the people at the other sites see only a profile of the teacher addressing the warm bodies present. The teacher has to learn to regularly face the lens of the main camera so the participants at the remote sites don't feel left out.

The teacher may have to alternate between looking at the students in the room and those on the monitor.

In some systems the second camera is controlled by the remote control. In more fully automated systems, there are microphones built into the lecture theatre tiers which are linked to the second camera. So when a microphone detects a question or comment from a participant in the audience, the camera automatically zooms in to the area around that microphone. (You'd quickly learn to _whisper_ to the people next to you!)

In any case, the system provides a mounted microphone for the teacher, and one or more microphones for the room, depending on the size of the room.

The second camera can be projected on a big screen at the front of the hall so everyone present gets a TV view of who's talking. The big screen, in fact, can show the entire videoconference, with all its different camera shots and other sources, if desired.

There is a third camera, referred to as the _document camera_, set within easy reach of the teacher. This camera is mounted above a small well-lit platform. This camera can easily be raised and lowered to give either a wider or a closer shot, and the lens can also be zoomed in and out, and focused. It can be operated locally by the teacher, or remotely, using the remote control.

Under this camera can go anything that fits there—smallish objects for inspection by the class, like rocks, flowers, feathers, computer chips, gadgets . . .

Flat on the little platform can be placed printed material, like charts, graphs, maps, photos, artwork, actual documents, converted OHPs (overhead projector sheets) and computer printouts.

Other equipment

In addition to the three main cameras, other electronic equipment can be wired into the system. There can be a VCR, an audiotape player, a CD player, a DVD player, a digital camera and a computer, whatever sends a visual or sound signal.

The computer can be used to display Power Point programs and other graphics or text files, even relevant emails or websites.

Students can view videos, documents and students at the other sites, on either the big screen at the front of the room, or on the monitors at the right. James Cook University, Townsville, Qld, Australia.

Operating the Videoconference System

The teacher just needs to put the desired equipment into play mode, select the appropriate source on the remote control, and the image will be presented to the class on the monitor and on the big screen as well. The sound will be delivered through the room's speaker system. All the remote sites get the signals, too, on their monitors.

In some systems the computer connecting port is there, but the computer is not. Teachers arrive with their own laptops and plug them in. In this instance it's important that the right cables and connectors are available to allow the teachers to successfully connect to and use the system. This means the technicians in charge should be aware of what varieties of connection ports are on the various computers used by the teachers, and each teacher should do a test run of computer connecting, well before the class, to make sure everything works.

A dedicated VCR, often located under one of the monitors, can be used to tape the whole lecture, for the people who couldn't be there at the time, or for the archives.

A side benefit of making the video recording is that reviewing the tape can give teachers feedback on what they're doing, and help them work to improve their presentations. Careful viewing can also help teachers figure out what might be going wrong with the dynamics in the class, if they've perceived there's a problem.

> The probability of the success of your technology presentation is inversely related to the status of your audience. If a parent comes in to see something, it will probably work. If the superintendent comes in, there's no way it will work! Always have a fallback plan so you can show your work some other way.
>
> USB cables are standardised on the end that attaches to the computer BUT the other end varies from camera to camera, even within the same brand. If someone tells you not to worry, they have the cable you need, chances are they don't.

Paul Clark, Manchester Memorial School

Remote Sites

There may be less equipment in the other rooms (the remote sites), if teaching is not going to be generated from those sites.

The students in the remote sites may also have hand-held remote controls, and their remote controls may be able to override the one in the teacher's classroom. Ah, the duel of the remotes! The struggle for technological dominance!

These auxiliary remote controls give the distant participants some measure of control over what they see and what they transmit. They can control the camera in their own room, so they can zoom in on speakers when they want to, or frame out people who wish not to be televised.

A Production Management Tip

For teachers who aren't control freaks, who also have responsible students (in other words, in most cases), it works well to give the operation of the remote control over to a student. This job can be rotated from week to week, so everyone gets a feel for the technology, and no-one misses out too much. Concentrating on what shot should be on next, and how to get to it, can distract a student from the content of the lesson.

Having given away the vision mixing, the teacher can concentrate on the best possible delivery of content. In addition to a dynamic personal presentation replete with movement and body language, this can involve juggling between such additions as items placed under the document camera, short pre-recorded videotapes and computer-based data displays.

An attentive student can make sure that at any given time the best possible image is being transmitted. This avoids the problem of the teacher forgetting to press the buttons on the remote and ending up with 10 minutes transmission of some graphic under the document camera, rather than the lively debate which is happening in the room.

Digital Networks

For people living in remote communities, digitial networks can connect them to the mainstream of communication in their own country, and open up the world of cyberspace to them.

In Australia, the current federal policy is to improve the communications systems in regional and remote areas, to ensure everyone has access and no-one is *communication poor*. This needs to be seen in the context that some remote communities don't even have a standard telephone service let alone the Internet! Talking via radio telephone has, in the past, been an exercise in crackle and frustration, accompanied by the knowledge that all calls could be listened to by others.

Cape York Digital Network

Cape York, the pointy northeastern tip of Australia, is home to many extremely remote Aboriginal communities. The Cape York Digital Network (CYDN) is a project of the Balkanu Cape York Development Corporation, part of a larger group of Indigenous telecommunications organisations known as the Outback Digital Network (ODN). The CYDN is in the process of enabling and delivering communications services to the 16 remote communities it serves.
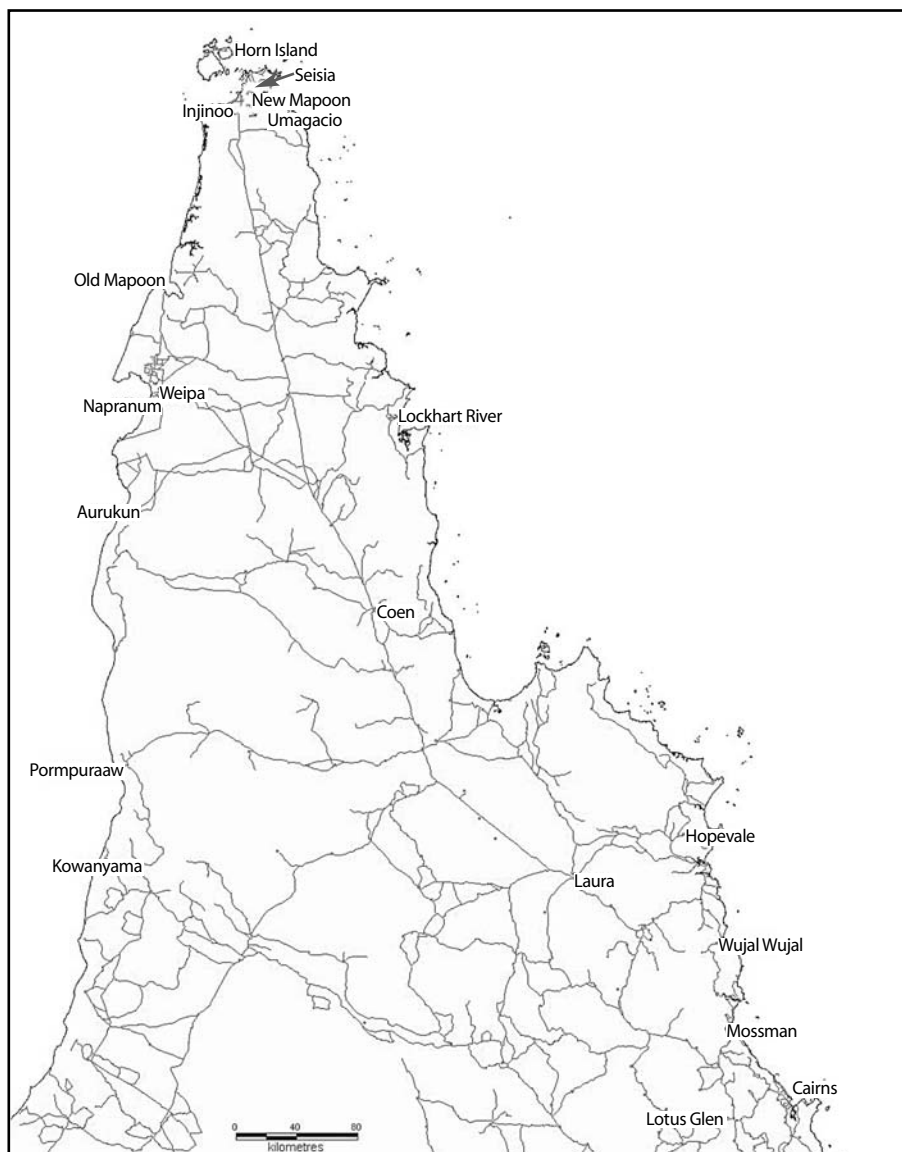
Sixteen remote communities are being connected into a digital network under the design and supervision of the Cape York Digital Network (CYDN). (Map courtesy of the Balkanu Cape York Development Corporation)

As part of the CYDN an Internet Protocol (IP) network is being built over ISDN links to create a flexible network that is capable of being expanded as demand increases.

Although every community is different and will have its own express needs and desires in relation to joining the network, a standard package of equipment that could be installed in a community includes:

- Six computers, some with webcam, some with thin-clients, connected to a server in Cairns. This allows centralised upgrades of software and minimises maintenance costs.
- A complete videoconferencing facility offering links up to speeds of 384 Kb.
- Cisco AiroNet products to distribute wireless data links to other buildings in the community for applications such as videoconferencing and for Internet access. So the health clinic, the council and the school can remotely tap into the network and take advantage of the cost saving it offers.

Sue Connolly, facility coordinator in Napranum, videoconferences to Steve Pelham, CYDN technical officer in Cairns, using the new videoconferencing facility installed as part of the Cape York Digital Network. (Courtesy of the Balkanu Cape York Development Corporation)

It's anticipated that the videoconferencing facilities will allow for communications which have up till now necessitated expensive plane travel, *weather permitting*, or have been just plain impossible.

For example, the digital network will allow people to attend meetings, medical consultations for illnesses that don't require hands-on examination, legal consultations, interactions by teachers and students with supervisors, colleagues or peers in other places, and contact between community members and family who are away from the community in southern institutions (like schools, hospitals and prisons).

It also allows employment opportunities for community members, such as taking up guest lectureships at universities. This has been demonstrated by the Tanami Network, which is another member of the ODN and pioneer of videoconferencing in remote Indigenous communities. Tanami Network covers the Tanami desert region in Central Australia.

The ODN communities in the Northern Territory and Western Australia have also been offered funding from the federal government, and it's anticipated that the model will be delivered to many more communities in these regions. Private phone access will also increase, currently very low in Indigenous households.

Part of the overall plan is that community members will be trained, and paid, to oversee the use of the videoconferencing facilities.

The Access Grid

A number of people, largely in the National Energy Labs in the USA, working in the lofty realm of high-end computing where a gigabyte is NOTHING, have been developing a new level in videoconferencing. It's known as the *Access Grid*.

The Access Grid relies on sending the video (and all the other signals) via the Internet, instead of over the phone lines. This not only makes multi-point videoconferencing more possible, but it also allows every site involved to record all the signals generated from every other site! A massive amount of data, to be sure. But it means that any part of the event can be scrutinised later, even manipulated, copied into files, edited . . . let your imagination run free!

One of the aims of the Access Grid is to get away from the TV studio model of videoconferencing, and allow people to do the same things, even better, with less psychological intrusion.
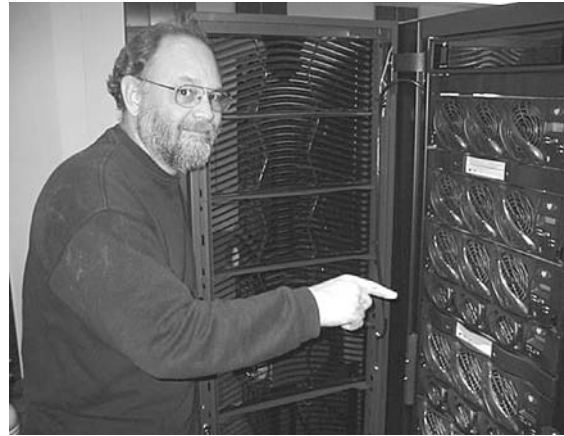
Dominique Morel with 'Hydro', the SGI Origin 3800 supercomputer, at James Cook University, Townsville, Qld, Australia. (Photo by Lee Askew)
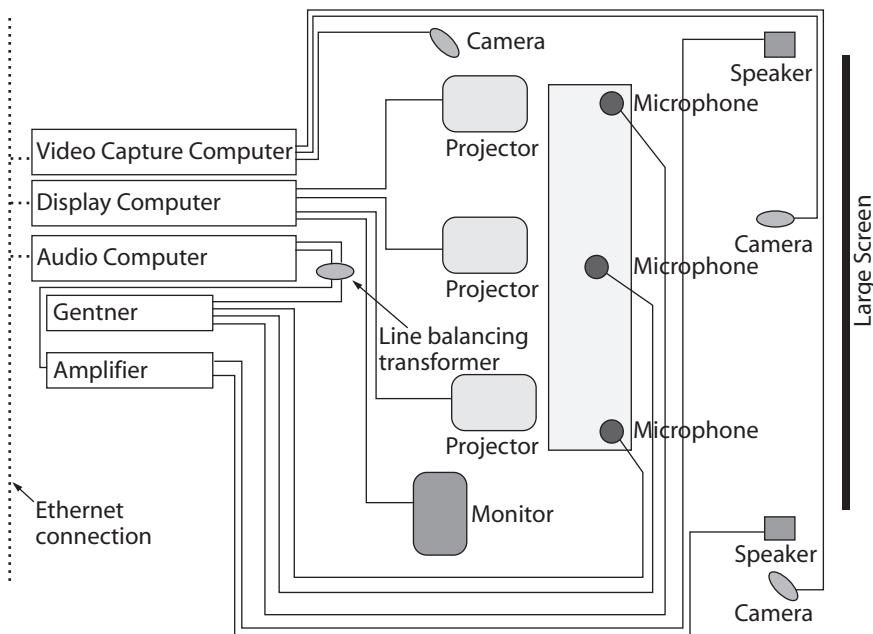
This is the layout of the access grid room at James Cook University, Townsville, Qld, Australia. (Graphic by Dominique Morel)

People tend to feel rather nervous in a TV studio environment, but hopefully by using computer technology, in specially designed rooms, people will feel more relaxed, more like they're in a natural face-to-face meeting session. Of course, the cameras still need to be there, but they can be much smaller and less obtrusive.

Another thing is that the images of the remote sites, because they're projected on a very large white screen or wall, are much bigger than those thumbnail PIPs (small pictures in the larger monitor picture) on

Will the real room camera please stand up? (Photo by Dominique Morel)

You can see everyone larger than life if you choose to. Access Grid site, James Cook University, Townsville, Qld, Australia. (Photo by Dominique Morel)

the normal TV monitor. Where in standard videoconferencing, in the long shots of rooms with groups of people in them, individuals tend to disappear due to tiny image size and poor lighting, in this new set-up people are much more visible. A close-up shot of someone talking can be huge. So people have much more feeling of connection with the distant participants.

And where having five sites connected was a stress on both the ISDN lines and the eyes, trying to see all the remote locations in their PIPs, the Access Grid can handle 30 or more sites simultaneously. The limiting factor is the network bandwidth available to the main site.

The images from other sites are supplied via ceiling projectors. (Photo by Dominique Morel)

About 1–3 gigabits per second is required for each site which is connected. When the people at the sites are sitting still, the bandwidth requirements go down, but when folks start to move about, there's a need for much more bandwidth to convey the video data.

So for connecting 30 sites, 30–100 gigabits per second is required. James Cook University in Queensland has a 22-gigabit link from Townsville to Brisbane, so 18 sites is about all its system can bear. When booking an Access Grid event, checking the available bandwidth will let you know how grandiose your plans can be.

Virtual Whiteboard

A great addition to videoconferencing, now available through computer-based video-conferencing, is the *virtual whiteboard* using a Wacom tablet. A person can draw on the Wacom tablet at their site and the image can be projected very clearly at all the other sites.

Participants at remote sites in standard video-conferencing facilities have had considerable difficulties seeing clearly what's being written on the whiteboard in the main lecture site. Whiteboard markers in colours other than black are hard to see, and the presenter often creates a problem too, by absentmindedly standing between the camera and the whiteboard, thus obscuring the whole business. So having a display which is the graphic only is a distinct advantage.

And get this—using the virtual whiteboard, participants in other sites can *add* to or *delete* from the image which is being sent out across the grid! So many people can be contributing to the thinking-in-pictures going on, which is an important part of some meetings.

The virtual whiteboard lets everyone add their bits from wherever they are. James Cook University, Townsville, Qld, Australia. (Photo by Dominique Morel)

PowerPoint Presentations

PowerPoint presentations work well on computer based videoconferencing, as they do on standard videoconferencing. But with the computer-based system there's been an interesting development. In order to save on the bandwidth required for the total event, a method called *distributed PowerPoint* has been developed.

The distribution amounts to this:

Before the videoconference, people send their PowerPoint presentations around to the other participating sites, so that the graphics files (and these can be large files) are stored ahead of time at every site.

During the videoconference, whoever is presenting something using PowerPoint is temporarily the *Master*. Because of a synchronising signal embedded in the system, when the Master starts the presentation at his/her site, all the other sites (known as the Clients) latch onto the Master's synchronising pulse. From then on, each slide changes as does the one at the transmitting site. But only the pulse is being

Be well prepared. If you're doing a PowerPoint presentation, it needs to be mailed to all receiving sites, usually by the day before the conference. We always have a trial run beforehand.

Dominique Morel, James Cook University.

transmitted, because the files themselves are being simultaneously recalled from all the local computers.

This system ensures top quality viewing of the PowerPoint presentations at each Client site, and allows everyone to save the files and do with them as they will. Hmmm, what copyright issues might arise from this?

Equipment Needed

Another aim of the Access Grid, which is based on existing public domain technology, is to supply a new level of capacity at low cost.

Surprisingly, the equipment needed to put together an Access Grid site is just roughly twice the cost of the equipment needed for a standard ISDN-line-based videoconference site.

A basic Access Grid set-up can be achieved using just three computers. One computer is dedicated to processing the incoming and outgoing video signals, the second processes all the audio, and the third processes the display for the other activities, like PowerPoint presentations and virtual whiteboard.
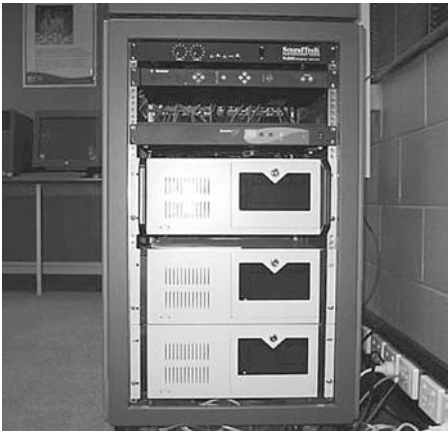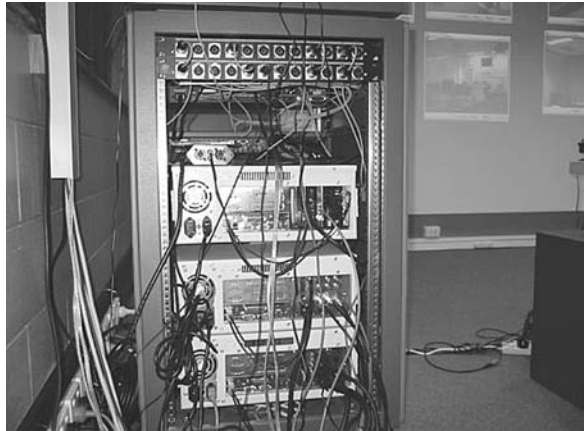
Front view of rack   Back view of rack

Most of the guts of an Access Grid site can be mounted in one small rack. (Photo by Dominique Morel)

You don't need super-computers to do this, either. All you need is two dual-process computers and two ordinary ones, the type used in general purpose computer labs. You add one special display card (not cheap) and three or four inexpensive Hauppage TV cards, or the like, a soundcard or two, and you're ready to rock and roll.

At present the most expensive item in setting up an Access Grid site is the Gentner, one of those slim black boxes which understate their worth. The Gentner does echo-cancellation on the audio signals.

Display Computer

Matrox G200 Quad Output XVGA PCI Card

PCI Sound Card

Audio Computer

Ethernet Cards

Single Output AGP Card

Video Capture Computer

Video Capture PCI Cards

Time to put your cards on the cable!
(Graphic by Dominique Morel)
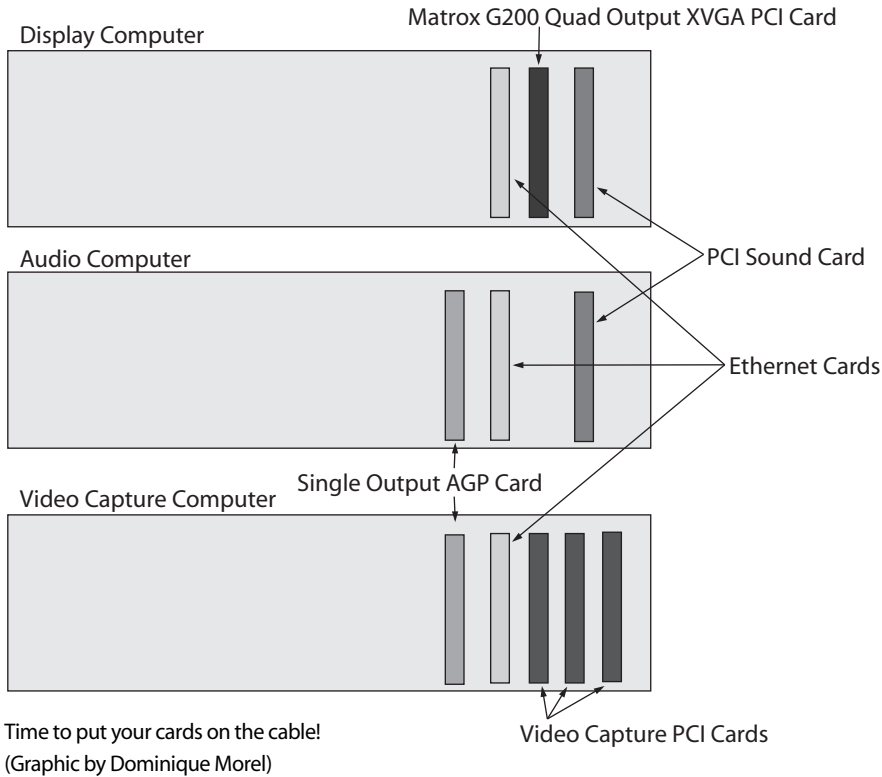
24-hour Access

There are some Access Grid sites that are live, 24 hours a day, seven days a week. To reach one, you simply call up its URL (Web address), like visiting any other website, only you do it from the Access Grid computer.

Remember, the sites are live. People can forget their every move is being broadcast to anyone else who has the capacity to look in, and is looking at the time. So when you enter an active Access Grid site, bear in mind that you're in a virtual fishbowl—and remember, you never know WHO is watching. Or listening.

Be careful what you say, because when you're broadcasting you have no way of knowing who's listening.

Dominique Morel, James Cook University.

How many Big Brothers are out there?

However, under most circumstances, due to cost, privacy concerns and other factors, Access Grid conferences are prearranged and the sites are activated for the specified times only.

Future Access

In the near future, standard videoconferencing (known as H323) will be able to connect into the Access Grid, so using the Access Grid for teaching to less bandwidth-rich facilities will be become feasible.

For up-to-date information on the Access Grid, including a list of what gear you need to set one up, and who else is on it, visit <<www.accessgrid.org>>

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Video on the Internet

Video-on-the-Internet has shimmered in the minds of many when pondering the future of video distribution and the potential *world* audience. It's been like a Shangri-La beyond the next mountain range. But the mountains have been high, and it's the techos who've been cutting the paths, the rest of us waiting for word to come back that the way is clear.

The good news is that the pathways are opening up.

Very short (under 3-minute) videos are currently available on the Internet. You can find them easily on commercial sites, showing trailers for movies, for example.

It's possible for you to put your short videos on the Web, too.

As you no doubt have realised, the only way a video signal can be sent through the computer-Internet system is if it's a digital signal.

Video streaming is the term used for outputting digital video signals. A nice term, eh? It makes the process sound rapid and natural. So much for names.

Once you've completed your edit, you can save your video to a file format which can go on the Internet. Julie Booras works at her digital edit system at Offspring Productions, Lynnfield, MA, USA. (Photo from Offspring Productions)

Do You Need a Dedicated Server?

(Why does this sound like a household helper dressed in formal gear?)

The first thing to understand is that there are two ways to handle video transmission on the Internet—there are *progressive streaming* and *real time streaming* (which uses the protocol RTSP: Real Time Streaming Protocol).

Progressive Streaming

The first, *progressive streaming*, works fine for people who are already connected to the Internet by ordinary Web software and a standard Web server.

With this set-up you can download short videos as compressed files which are then able to be decompressed and displayed on your computer, or you can upload your own video files to be shown on the computer screens of your audience.

Video player programs use high compression methods to present video clips on a small section (e.g. 160 pixels x 120 pixels) of your computer screen. Though the picture is displayed on only a small part of the computer screen, people have been willing to accept this viewing size; however, they wouldn't be happy about it on their TVs.

Although it's possible to enlarge the viewing window on your computer screen, the quality of the image will appear to go down. This is because enlarging it is not increasing the resolution—you're just making the same number of pixels display at a larger size.

When you request a video clip off the Internet, you may find that the download time is more than you would like. The faster your modem, or the better your cable link, the quicker the process will be.

Some short videos have to be completely downloaded onto your computer drive before they can play. This depends on the format the video has been encoded in. Other programs allow a video to begin to be displayed on your computer when only part of the file has been downloaded.

The advantages of working with progressive streaming are that you don't need to invest in a dedicated server, and there's one less piece of software to learn and manage.

Another benefit of progressive streaming is that you can save the video to your hard drive (that is, if you consider saving huge files to be a benefit.) Of course, that also means you can save the videos to CD, DVD and videotape, with the right connections out of your computer.

A disadvantage of progressive streaming is that you can't jump ahead to view another part of the video while you're receiving it.

You can view videos on the Internet with either progressive streaming or real-time streaming. Learning the ins and outs of computers young at Manchester Memorial School, Manchester, MA, USA.

Real Time Streaming

In order to get into *real time streaming*, you need to have a dedicated server to handle the media streams, and you need to install A/V server software onto it, which means additional expense to you. Real time streaming is well suited to longer videos and broadcasts of events, lectures, training sessions, corporate functions, and so on.

With real time streaming you don't need to download the whole video before playing it. In fact, you *can't* download it and save it, which is an aspect which helps protect the copyright holders of the video.

Real time streaming is more like a broadcast situation. The video stream plays automatically, and you don't have to wait long for it to start, just long enough for an

amount of the stream to download to the buffer. But, unlike normal TV transmission, you can also jump ahead to any location on the video, as you please, unless it's a live event.

The protocol used for real time streaming makes better use of network bandwidth, and it generally produces better video quality for the viewer.

There are other more advanced features in real time streaming as well. Real time streaming allows for admission control and multistream multimedia content. Some of the software programs allow you to get detailed reports on who requested which streams. You may like this feature if you're a provider.

On the other hand, you may worry about this detailed reporting if you're the consumer! What will people do with the information about you which they get kicked back to them once you receive one of their videos over the Net?

Real time streaming can also scale the media streams to support a large number of end users. Video which has been encoded for real time streaming tries to keep pace with the connection speed at the user's end so as to minimise disruptions to the program flow, like stalling. Sometimes this method falters, due to Web congestion, but it can handle some problems by trying to maintain a constant connection.

Video streaming is usually done in three levels of quality: low, medium and high. (How's that for original terminology? At least the wording isn't too futuristic to understand.)

Low is compatible with the average modem. It's a speed of 3 Kbps (3000 bytes per second).

So a home user could probably use video streaming at the lowest level.

Medium transmits the information at 10–15 Kbps.

High is transmission at broadcast quality, called T1, which is 100 Kbps.

One of the great things about video streaming is that it allows lots of people to be downloading the same file at almost the same time. This makes it very suitable for broadcasting on the Internet. Many users can be accessing the video all the time.

The person sending the video *does* need to consider how many users there are likely to be. The more users, the greater the bandwidth needed at the sending end.

If you're expecting thousands or millions of people to be wanting to see your video, you have to get it set up on a server with serious capacity!

Music videos are highly likely Web fare. Sky Cooper, pictured for his recent CD, *Coffee House*. MP3s of songs available on <<www.kemai.com>> (Photo by Brian Rohr)

Because some ISPs (Internet service providers) don't want their system to be clogged up with large video files, you should also be clear on what your needs are when you're choosing (or changing) your ISP.

Putting Your Video on the Internet

Once you've edited your video, you then have to encode it for putting it on the Internet. Your digital editing package may have come bundled with compression/encoding software, like Media Cleaner Pro EZ from Terran Interactive. If not, you'll need to purchase some software that can do the job.

Before you encode your video for Web delivery, you have to make some important decisions.

Quality (Resolution) vs File Size

If you want a better quality of video, you'll end up with a larger file size. Large files take a long time to download, and people usually want the downloading process to be quick. Because ISPs generally base their charges on bandwidth, downloading huge files can become a financial issue.

Wherever you are, you can be editing for the Web. Working at sea, Digital Dimensions, Townsville, Qld, Australia. (Photo from Digital Dimensions)

If most of the people who'll receive your video have limited computer capacity, you need to decide in favour of practicality and keep the files sizes small, which means lower quality video. If you don't, the people you want accessing your programs are unlikely to be willing (or even able) to download them. It's a case of low quality is better than no video at all.

However, if you know your client audience is more concerned with quality, and has high speed network connections and the latest computers, you can go for huge files and impressive quality.

You will be asked to make choices about:
- The data rate (e.g. for 56K modem).
- The frame rate (e.g. 10 frames per second).
- The size of the video on the screen (e.g. 240 × 180 pixels).

Some Tips

Do some *trials* first, and get some friends or colleagues to report back to you on how your video downloads and plays on their computers. Unless you get feedback, you could happily feel that your video was out there for everyone to see, yet people could be terminating the download in impatience or disgust, or be distinctly unimpressed by what they watched.

Laptops can handle edit programs too. (Photo from Digital Dimensions)

Getting feedback is a critical step in putting video on the Internet! But you can get by with the help of your friends.

DATA RATE

With a 56K modem, true connection speed is usually lower than that. Try setting your data rate to around 40K to minimise the interruptions due to net congestion.

FRAME RATE

Modem delivery is very slow, so go for a low frame rate. Your frame rate should divide evenly into the normal replay frame rate of the video format you're using. Since PAL delivers video at 25 frames per second, start off trying out a frame rate of 5 fps; since NTSC delivers 30 frames per second, try 6 fps.

FOR PROGRESSIVE STREAMING DELIVERY

In some encoding software you'll find a choice for 2-pass Variable Bit Rate (VBR). Try it, it can enhance to overall quality of your video. It will take longer to do the encoding, but it's worth it.

MIXED ENCODING

It's possible to encode for both progressive streaming and real time streaming. Doing this mixed mode of encoding will serve both your low-end modem users and those with high speed ISDN and DSL delivery.

The Wizard Interface

You may find that your encoding software offers you a wizard interface. It's like an 'encoding for dummies' routine. It's fine to start off with that, to have the rush of getting your first video on the Net, but the Wizard interface doesn't always give great results, in fact sometimes they're downright disappointing. So once you get your confidence up, move on to create your own settings. Then, when you find what you like, *as with everything else in video*, SAVE IT! You can use that cluster of settings again for your next video, and tweak it as need be.

Allow Enough Time

When you're starting out encoding videos, it will take you much longer than you expect, and you'll find that you're way back again at that steep learning curve. Never mind, you've been there before. Just have patience, and don't promise to deliver anything too soon!

Build in extra time/ contingency for compression and testing. Test across a range of platforms and with the intended audience.

Bernadette Flynn, Griffith University.

Who's Doing It?

Charles Sturt University in Bathurst, NSW, Australia, is beginning to incorporate video streaming into their main TV journalism course.

Lecturer David Cameron says it's partly because they've been lucky enough to get access to the technology, and partly because in a rural city like Bathurst there aren't the

Angela Gray, Online Media Production student, hosts the weekly news show, webcast Friday lunchtimes, at Charles Sturt University, Bathurst, NSW, Australia. (Photo by Christian Prusiak)

Bannon Rees and Lachlan Simond prepare for a live webcast at Charles Sturt University, Bathurst, NSW, Australia. (Photo by Christian Prusiak)

opportunities for students to do live broadcasting in other ways, as the students in the urban centres can.

They're video streaming their weekly news show every Friday lunchtime. All during the week the students gather and put together their stories, then on Friday morning the total news program is assembled and done live in the campus TV studio. The analog signal is taken from their vision mixer and sent through an analog-to-digital converter. From there it goes to the free Quicktime Broadcaster software on a laptop (mind you!) and from there to their dedicated G4 server and out onto the Web.

It's also being recorded, encoded and posted to a website for later use as video on demand, and kept for the archives. Check it out!

<<www.csu.edu.au/newmedia/>>

Who will view it? Other staff members and the university IT people, who are very keen to see what impact video streaming will have on the university network. It's possible the show will be streamed to the student union, once the TV students get used to doing it well.

Is anyone else doing video streaming with their students? Please let me know for the next edition. Send your stories to Martha Mollison via the Producing Videos website, <<www.aftrs.edu.au/producingvideos/>>

Tips from David Cameron, Charles Sturt University, Bathurst

WHEN SHOOTING VIDEO FOR THE WEB

A steady shot with minimal camera movement helps produce a smaller file. Avoid excessive pans, tilts and zooms, and use a tripod if available.

Shoot for a smaller screen. Consider avoiding wide shots. Stick to closer shots that show detail even when reduced in size for the desktop.

Excessive detail or unnecessary movement in the background will soak up valuable bandwidth. Consider shooting in front of a plain background, with gelled lighting to provide a suitable wash. The simpler the better: for example, avoid leafy trees.

Consider using a composite shot to reduce file size. Shoot in front of a blue or green screen, then add a static image for the background. Compositing is a snap with software like Final Cut Pro.

Don't forget the audio—your audience won't forgive you if they can't hear what's going on. Get the best possible recording your gear allows, and avoid unnecessary background noise.

WHEN EDITING VIDEO FOR THE WEB

Avoid fades and wipes. The slower frame rate of video compressed for the Web can turn your snazzy transition into an ugly splash of pixels.

For clarity, consider using a subtitle approach for your titles. Add a black bar (letterbox) along the bottom of the screen, and add your titles as large white text.

Avoid mixing music and voice unnecessarily, as this can make it harder to compress the file without losing sound quality for one or both elements.

WHEN NAMING FILES AND FOLDERS FOR THE WEB

Avoid eXCesSIVE CaPITalS. The Web is case sensitive.

Use underscores (_) instead of spaces.

Use only numbers, letters, underscores (_), and dots (.). Avoid !@'#$"%^&*()-+=¿<>{\}|{/;

Avoid rude or embarrassing file names—you don't know who might see them on the Web.

Use correct file extensions to indentify file format (e.g. file.gif, file.mov, file.html).

Webcam

Of course, the simplest, no-work way of sending video over the Internet is by using a Web camera connected to your computer. A Web camera is a tiny video camera specifically designed for broadcasting moving images on the Internet. You may hear them called either *PC videocameras* or *webcams*.

Webcams come bundled with software which allows them to capture video in a format which is ready for transmission on the Internet. They can be attached directly to your personal computer, usually by a USB connection, and can send video live out into cyberspace, or home to Mother, depending on whether you're broadcasting, interfacing with your website or sending a personal email. You can even do basic videoconferencing.

Sam Neilson, Stephanie Millard and Jeremy Pau from Pimlico State High School, Townsville, Qld, while at Croc Festival 2002 in Weipa, Qld, Australia.

Even though webcams can only capture and send a low resolution image (say 320 × 200 pixels), it's considered good enough for use in a small display box on a computer screen. When kept small, the image looks okay even though it's pixel-poor.

Most people are more sensitive to whether the image appears to move smoothly or jerkily. This is determined by the connection you have from your computer to the Internet. If you're stuck with using a modem, the number of frames which can be transferred per second will be very low, producing a wildly jumpy picture. But if you have a cable or DSL connection, you should be able to send video at 15 frames per second, which is about half the speed of normal video, so it will look quite good to most people.

Wouldn't your relatives like to see this if they can't be there in person?

Webcams are pretty inexpensive by videocamera standards; some sell for less than $100. But as always, if you want to pay more, there's a model there for you. For example, if for some reason you want to operate your webcam using a remote control, and you want it to have a zoom lens, and you want it to be wireless so you can have it well away from your computer, a few hundred extra dollars will be readily accepted by the manufacturer.

Maybe you want your webcam pointed at the baby in the playpen, or at the activity going on in the next room, it's up to you. Webcams can come with inbuilt microphones to add audio life to the image you're sending. You want to use it as a security camera? That's fine, some webcams come with motion detection software. Using it with a laptop? You can get them with both stands and clips for versatility.

Besides USB connections, there are Firewire, Ethernet and PCI varieties. Check your computer's available ports before buying, so you're sure you can attach it. Hopefully your PC will automatically detect the webcam once you plug it in, and will go ahead and install the driver software. If not, you might need to use an installation disk.

Beyond Website Posting

There are several other methods for sending short videos through the Internet.

Email

A small Quicktime or AVI (video for Windows) video can be electronically *attached* to an email and sent along with it. So you could efficiently send a short video to lots of people, providing they can decode it at the other end.

As some ISPs limit the size of emails which can be sent, file size may be a problem with videos attached to emails.

NEWSGROUP

A newsgroup is an Internet information site, formed around an agreed-upon topic, which allows people to post messages for all the visitors to the newsgroup site to read. Anyone can send a message in to a newsgroup, and it will usually be posted for everyone to read. You could send a text message with a video attachment, and people who are browsing through the newsgroup may see your message, download it and watch your video.

Some newsgroups have a person who sorts through the incoming messages and orders them into some preferred sequence, so there isn't a 100 per cent guarantee of getting your video posted, but it's close.

So a newsgroup limits your audience to those who visit the newsgroup site and choose to download your file.

Mailing Lists

A mailing list is like a newsgroup, but it always has a *moderator* (minder). Mailing lists are also based on common interests, but the messages sent in aren't public. The moderator culls the messages and sends all the relevant ones to the individual mailboxes of the subscribers.

So with a mailing list, everyone could be advised of your video, though of course they'd still choose whether to download and watch it or not.

New Style of Broadcast Channel

With the growing video capacity of the Internet, there's a blurring happening between what's a home page and what's a program. The major limiting factor is file size and download time. But in theory there's no reason why you couldn't have a home page which holds ads, soapies, documentaries—whatever you want to put there.

A week is a long time on the Internet, and the increased presence of video on the Net is one of its foremost aims.

Sites to Check Out

2-pop is a bulletin board which has information about video encoding, as well as digital editing and special effects.

Streaming Media is a portal which leads you to lots of media information, including news and updates on technology.

Thanks to Bill O'Donnell, David Cameron and Peter Brady for their help with this chapter.

Copyright

*by
Meredith
Quinn*

Copyright means the right to *reproduce* or straight-out *copy* a work.

Although copyright varies from country to country, those nations which are members of the *Berne Convention of 1886* and the *Universal Copyright Convention of 1952* will have copyright protection in countries which are also co-signatories. Australia, the UK and the USA are members of both these conventions.

As far as possible, the information in this chapter broadly covers the situation as it exists in Australia, the United States and the United Kingdom. There may, however, be some variations. In each section it's stated clearly which territories the law applies to, and whether you'll need to make further checks. If in doubt, the Arts Law Centre in Australia and the Volunteer Lawyers for the Arts (VLA) in your state of the USA should be able to assist. There's no similar organisation in the UK but the *Writers' & Artists' Yearbook* (A & C Black, London, published annually) contains a clear explanation of both British and US copyright law, plus a lot of other useful information. *A Basic Guide to Copyright*, published in Australia by Magabala Books, 1998, is a slim paperback which deals with Australian copyright in plain English.

The Requirements for Claiming Copyright on a Work

To be the legal copyright owner of a work, just three requirements must be met:

1. The work must exist in a *material form.* That is, it must be in writing or recorded on video or audio tape, or on film. (You cannot copyright an **idea**, it must exist as a **work**).
2. The work must be original. This means it must be the product of your own skill and effort and not copied from someone else. (It doesn't mean it has to be very creative

or imaginative, it just has to be **your work**.) The exception to this is where you've produced the work in the course of employment, in which case the copyright belongs to your employer unless agreed otherwise. This proviso generally relates to paid employment, but if you've produced the work while a volunteer for an organisation it would still be wise to check ownership rights.

3. You must be a citizen or resident of Australia (the USA; the UK) or of a country to which Australia (the USA; the UK) has promised copyright protection through its international treaty obligations.

That's it. At the basic level, it's very simple. If you made it, you own it. No-one else can copy it without your permission.

In Australia and the UK you don't need to register your copyright, although it's a good idea to always put the copyright symbol and your name and the year the work was first produced on any script, video, song or sound recording you do. For example: © Sky Cooper 2003.

This alerts others to the fact that you're claiming copyright on the work, and it lets them know who they need to get permission from if they want to use any part of it.

In the USA there's a requirement to include a formal notice of copyright on all publicly distributed copies of your work, either by using the © symbol, the word 'Copyright' or its abbreviation 'Copr', with the year of first publication and your name. You must also register your copyright by depositing two complete copies of the work with the Copyright Office.

Community Ownership of Creative Materials

Sometimes a creative work is understood by a community to be *looked after* by certain members of a clan group.

Indigenous communities have songs, stories, designs, drawings and dances that are part of their culture and have been passed down by their ancestors for untold generations.

Certain people are the traditional custodians of these works, but they may not *own* them in the personal way that a non-Indigenous lyricist might own the words to a song s/he wrote. Nevertheless, the community asserts its past, current and future ownership rights to this material. This is a sense of ownership that hasn't been addressed much in non-Indigenous legal systems.

Indigenous copyright and methods of safe-guarding the cultural rights of Indigenous people are being hotly debated around the world. Because of differences between cultures in the understanding of *ownership*, there have been many times when Indigenous people have felt that their cultural heritage has been unfairly used for the profit of others.

Dancers Shaun Edwards, Earle Rosas, Jenelle Gray, Tamara Pearson, Colin Lawrence and Tanya Reading from the show *Ignishin* by the Cape York Indigenous Theatre Troupe, Cairns, Qld, Australia.

Shaun Edwards, Kokoberrin person, Staaten River, West Coast, Cape York Peninsula, Qld, Australia.

I guess for me copyright for Indigenous people is very important, and we as a people must work to protect our copyright as a human right. Most of what we promote as artists is from the old people and it's very old. We must remember that Indigenous art and dance is part of a structure that worked. It made sense, and for thousands of years. It's worth protecting because it worked for so long.

Oral Histories

When someone tells their life story to someone else, the question is, who owns the work? In such cases, it's advisable to figure out a fair apportionment of rights before the project begins.

Joint Authorship

When a work is produced by more than one person, there can be conflict over copyright unless there's an established understanding from the beginning. For example, when a person or group of people produce the text and others produce the artwork, who should have what rights?

When a story is understood to be the common property of a clan group, but a particular person writes it down, who owns the rights?

Or what about when someone produces a painting which is the reproduction of a traditional design or story?

When a dancer allows the recording of a traditional dance, or a singer records a traditional song, to whom should the copyright be assigned, the individual performer or the community or clan group?

Wurringu (The Women) painted by Karen Doolan, and dedicated to her mother and sisters. Her mother's people are the Gwamman and Tagalaka of North Queensland and her father's people are the Waka Waka and Gurrang Gurrang from further south around Woorabinda. Karen works as an artist in Townsville, Qld, Australia.

Individual Authorship

Of course, Indigenous people, like anyone else, may also produce works which are entirely the result of their own creative effort and therefore they may have sole rights to these works.

Indigenous Heritage Rights

Indigenous heritage rights, also referred to as Indigenous cultural and intellectual property rights, have been the subject of detailed enquiry initiated by the Australian Federal Attorney-General, the Minister for Aboriginal and Torres Strait Islander Affairs and the Minister for Communications and the Arts.

Indigenous groups in other countries have also expressed similar concerns about the rights to their cultural heritage.

For more information on this aspect of copyright, you could read _Our Culture, Our Future: Report on Australian Indigenous Cultural and Intellectual Property Rights_, by Terri Janke, published by the Australian Institute of Aboriginal and Torres Strait Islander Studies, 1998.

The Protection of Confidential Information

Although the copyright law only protects works which exist in a material form, in Australia there's another law relating to confidential information (US and UK readers will need to confirm whether this also relates to them). If you tell someone in confidence about an idea you have for a project, and then they make unauthorised use of this idea, you may have some redress.

As with anything else, there are certain conditions which apply.

1. The information must have the necessary **quality of confidence**. This means it excludes trivia and ideas which are already public knowledge.
2. The information was **disclosed in confidence** to the other party. The recipient of the information should be clearly informed of the confidential nature of the information. The Arts Law Centre advises that a **confidentiality letter** be sent to the recipient before you tell them your ideas (they've devised a sample letter for such use).

    Generally speaking, it's safer to express your ideas on paper, in the form of a concept document or treatment, and add both the standard copyright notice and a 'private and confidential' warning.
3. There has been an unauthorised use or threatened use of the information.

What Rights are Included in Copyright?

In the law, copyright is considered to be a kind of property right. It's in the class known as *intellectual property*.

Although a video script or a song isn't the same sort of sturdy object as a house or a car, the **right to copy it** is still regarded as a true property. The copyright holder has the exclusive right to do certain things, and to authorise or prevent others from doing certain things.

In Australia, the USA and the UK, in relation to copyright on a videotape production, these things include:

1. Making a copy of the video. Only the copyright owner has the right to make a copy of the video. Someone else can purchase a copy and own it and use it, but they may **not** copy it onto another tape.
2. Broadcasting the video. This includes via television, radio and some satellite broadcasts.
3. Transmitting the video to subscribers through a diffusion service. This would include cablecasting it on a cable TV system, and this particular right is known as 'cable rights'.
4. Holding a public screening of the video.

How Long Does Copyright Last?

In Australia and the UK, the copyright of a film or video lasts for 50 years. After that, the work enters the public domain and anyone can copy it without infringing copyright. (US readers should check with their local VLA to determine length of US copyright in film and video.)

The copyright on *underlying works*—like the music or the script—usually lasts for 50 years after the death of the author, whether she or he remained the owner of the copyright or not. In the USA this is true of works published or copyrighted after 1 January 1978. With works published prior to 1978 the situation is more complex, with the copyright existing for 28 years from the date copyright was secured, and an extension of 47 years now being automatically granted at the expiry of the first 28 years.

Transferring Your Copyright Ownership

Because copyright is a property right, the copyright owner can sell, lease or bequeath any or all of the rights related to any work.

In Australia, the USA and the UK, if you *assign* (sell) your copyright, the new owner usually buys all the rights to the work.

Alternatively, you can sell only some of the rights—like the right to make your video into a computer game. You can also limit the assignment of right by *time* (as 'for a ten-year period') or *territory* (e.g. 'international rights only').

Another approach is to *licence* (lease) your copyright, which means that the licensee (the user) has the right to use the work, but does not actually own it. The licence needs to be clear about what it includes:

1. Is it exclusive or non-exclusive?
2. What is the period of use?
3. In what territory does the licence apply?
4. Exactly what uses are being licensed? Video cassettes? CD Rom? Video games? Book? Broadcast?

Both the assignment of copyright and a licence of all or partial rights must be in writing to be enforceable.

Acquiring Rights

Just as no-one is allowed to copy your work, you're not allowed to copy anyone else's without permission.

So what happens if you want to use someone else's script? Or include a music recording in your video?

To Use a Script or Adapt a Literary Work

The first place to check is the publisher, because publishing contracts can include exclusive licence to film rights.

If the publisher doesn't own the film rights, or the work is unpublished, contact the writer or his/her agent or, if the writer is deceased, his/her estate.

Writers' guilds generally carry samples of options and purchase agreements. In some instances they may also be able to assist in tracing writers.

AUSTRALIA

The Australian Writers' Guild, 8/50 Reservoir Street, Surry Hills, NSW 2010;
tel +61 2 9281 1554, fax +61 2 9281 4321
email: admin@awg.com.au, <<www.awg.com.au>>

UNITED STATES

The Writers' Guild of America West, 7000 West 3rd Street, Los Angeles, CA 90048;
tel +1 213 951 4000, +1800 548 4532, fax +1 213 782 4800; or

The Writers' Guild of America East, 555 West 57th Street, Suite 1230, New York,
NY 10019; tel +1 212 767 7800, fax +1 212 582 1909, <<www.wga.org>>

UNITED KINGDOM

The Writers' Guild of Great Britain, 430 Edgeware Road, London W2 1EH;
tel +44 207 723 8074, fax +44 207 706 2413, email: admin@writersguild.org.uk,
<<www.writersguild.org.uk>>

To Use Music

Under Australian, USA and UK law, if you wish to use pre-existing music, whether it's library music or commercial music, you'll need two licences, one from the copyright owner or his/her representative and one from the owner of the recorded music, which would be the music library or a record company. The copyright licence, a synchronisation licence, is normally granted by the original publisher. However, it might be helpful for you to use the services of the mechanical rights organisation (AMCOS in Australia, Harry Fox Agency in the USA, MCPS in the UK). Some of these rights organisations have the authority to grant the synchronisation rights themselves, some of them will contact the original music publisher. Finally, if you wish to manufacture the video you'll need a mechanical licence from the same organisation.

AUSTRALIA

AMCOS (Australasian Mechanical Copyright Owners' Society Ltd),
6–12 Atchison Street, St Leonards NSW 2065;
tel +61 2 9935 7900, fax +61 2 9935 7714,
<<www.amcos.com.au>>

United States

Harry Fox Agency, 711 Third Avenue, New York, NY, 10017;
tel +1 212 370 5330, fax +1 212 953 2384,
<<www.nmpa.org/hfa.html>>

United Kingdom

MCPS (Mechanical-Copyright Protection Society),
Elgar House, 41 Streatham High Road, London SW16 1ER;
tel +44 181 664 4400, fax +44 181 769 8792,
<<www.mcps.co.uk>>

Public Performances

If your video is then played publicly, either on TV or cable/pay, or shown in clubs,
APRA (Australia), BMI, ASCAP (USA) and PRS (UK) come into play. However, the
licence for public performances of the musical copyright does not have to be procured
by you (as the producer of the video), but by the TV station or club that wishes to
play the video.

Australia

APRA Ltd (Australasian Performing Right Association),
6–12 Atchison Street, St Leonards, NSW 2065,
tel +61 2 9935 7900, fax +61 2 9935 7999,
<<www.apra.com.au>>

United States

BMI (Broadcast Music Inc), 320 W 57th Street, New York, NY 10019-3790;
tel +1 212 586 2000, fax +1 212 582 5972; or
8730 Sunset Boulevard, Third Floor, West Hollywood, CA 90069-2211;
tel +1 310 659 9109, fax +1 310 657 6947, <<www.bmi.com>>

ASCAP (American Society of Composers, Authors and Publishers),
1 Lincoln Plaza, New York, NY 10023;
tel +1 212 621 6000, fax +1 212 724 9064; or

3rd Floor, 7920 Sunset Boulevard, Los Angeles, CA 90046;
tel +1 323 883 1000, fax + 1 323 883 1049; or

8 Cork Street, London, W1X 1PB; tel + 44 207 439 0909,
fax + 44 207 434 0073, <<www.ascap.com>>

ASCAP also has offices in Nashville, Miami, Chicago and Puerto Rico.

The United Kingdom

(PRS) Performing Right Society, 29-33 Berners Street, London, W1T 3AB;
tel +44 020 7580 5544, fax +44 020 7306 4050, <<www.prs.co.uk>>

For use of the copyright of the actual *sound recording*, in Australia contact the record company direct, or ARIA (Australian Record Industry Association), 263 Clarence Street, Sydney, NSW 2000; tel +61 9267 7996, fax +61 2 9264 5589, email: aria@aria.com.au, <<www.aria.com.au>>

In the United States, contact BMI or ASCAP. In the United Kingdom, contact MCPS.

The Australasian Music Industry Directory (Immedia, Sydney) has an up-to-date and comprehensive listing of record companies, music publishers and music associations for Australia, New Zealand and the Asia-Pacific region. The *Music Week Directory* (Music Week, London), is a valuable resource for the UK; for the USA there are a number of publications which can be referred to: *Recording Industry Source Book*; *Yellow Pages of Rock*; and a series of directories on varying aspects of the music industry published by *Performance* magazine and *Pollstar* magazine. The *International Buyers Guide* (Billboard, NY) carries comprehensive international listings, and there is a new directory, *MVI for Music Business International World Year Book*, which also covers the international arena.

One last thing—you need to check whether the record company has obtained the performer's consent for the recording to be used on video or film. If not, a performer's release will have to be obtained from each performer. In Australia, the Arts Law Centre has a sample of a performer's release (and a variety of other agreements). In the USA speak either to your attorney or Volunteer Lawyers for the Arts in your state, and in the UK your solicitor should be able to assist. For anyone enrolled in a formal training course, your tutor may have a collection of various release forms, or know where you'll find copies.

For general inquiries and free help, contact:

The Arts Law Centre of Australia, The Gunnery,
43 Cowper Wharf Road, Woolloomooloo, NSW 2011;
tel +61 2 9356 2566, 1800 221 457, fax +61 2 9358 6475,
<<www.artslaw.com.au>>

Fees for the Use of Copyright Music

In Australia, fees are usually set for 30-second segments of the music for commercial use.

Fees can be waived. If you're using the music in a video that you're making for a charitable project or for a student assignment, it's worth asking for either a fee waiver or a reduced fee.

In the USA contact BMI or ASCAP, and in the UK contact MCPS to get this information.

To Use Part of a Film, TV Program or Videotape

In Australia, the USA and the UK, whenever you use someone else's film or video footage, you must get permission from the copyright holder.

If the footage used includes *underlying rights* to music, script or artwork, you must also get permission from the owners of those rights.

What About Videos Made for Class Assignments?

You don't need to get permission to copy parts of videos, films or recorded music if you're making a video for the purposes of study and research, as long as the use is considered *fair*. Fairness is determined partly by how much you copy.

If a class assignment video does include copyright material, for which permission has not been obtained, the screen production may not be exhibited publicly, either with or without an admission fee.

This situation is the same in Australia, the USA and the UK.

Further Questions

If you're in Australia and need any more information about copyright, there are two organisations which can give you free help. They're both funded by the Australian Film Commission.

Arts Law Centre of Australia,
The Gunnery, 43 Cowper Wharf Road, Woolloomooloo, NSW 2011;
tel +61 2 9356 2566, 1800 221 457, fax +61 2 9358 6475, <<www.artslaw.com.au>>

Australian Copyright Council PO Box 1986, Strawberry Hills, NSW 2012;
tel +61 2 9318 1788, fax +61 2 9698 3536, <<www.copyright.org.au>>

In the USA, there may be a Volunteer Lawyers for the Arts in your state. The UK no longer has an arts law agency to provide assistance free of charge, so you will need to seek private legal advice. It's also worth surfing the Net to see what information and help is available there.

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Distribution

Once you've finished your video, most likely you'll want other people to see it. How will you distribute it? Will you show it at small screenings? Will you enter it in festivals and see how it rates against other tapes of its kind? You could win a prize, have your ideas appreciated by people far away, or get asked to work on another project from good festival exposure.

Will you sell copies to schools or other institutions? Will you put it out over the Internet? Will you schedule it to be broadcast or cablecast on a public access channel? Will you sell it to a TV network? Or will you just send copies to friends or family?

Generally speaking, the major questions about distribution (Who is the target audience? How will the video be delivered to them?) should be answered before the video is even made—during the planning and preproduction stages. That way, the video is more likely to be well designed to appeal to the right people. And it will be made on an appropriate tape format. For example, VHS isn't usually considered suitable for broadcast, but using Betacam for distribution only to friends may be overkill on the high end of the technology.

Once your video is completed, and you want to distribute it, there are a couple of important things to remember. First and foremost, hold onto your master tape! It's taken you too many hours of editing to risk having it 'eaten' by an erratic VCR (or even a normally reliable one), or misplaced, or accidentally dubbed over.

There are two essential things to do as soon as you've finished editing your project: first, *erase protect* the tape, and second, label it clearly as a master tape. Then store it upright like a book, somewhere safe, in a spot which is cool, dry, dust free, and far from magnetic fields. The master should only be used for making dubs. The copies made from the master, which are third generation video (hopefully no further), are your *distribution copies*.

Big screen showings are problematic. Of course you want to use your best quality tape for these . . . just cross your fingers and hope all goes well. And never send your tape off to a screening without making a security dub of it. If the master does get wrecked, at least you'll have something fairly decent to remember it by.

When working in digital, you can save your master to DVD and to tape, and you should save your EDL and rendered files too.

Dubs can be made one at a time on your edit system, or several copies at once at a distribution house. Usually, cost and time constraints determine your choice.

When making a dub on an edit system, the master (with the red button or tab removed!) goes in the player VCR, and the blank tape goes in the recorder. If you're not using new tapes, make sure the blanks have been bulk erased, as this produces a better erasure result than the erase head in the machine sometimes does.

Use assemble edit mode to make the copy. Make sure the audio levels on the record machine are correct and check that the video level is strong. If it isn't, adjust the tracking on the player until it's the best you can get. Watch the recorder monitor during the copying.

Once the dub is completed, be certain to spot check it. Your video work will be known by the quality of your dub, so never send something off which isn't the best it can be. An easy way to check a dub is to put it into play at about every five minutes of program as you rewind it to the head of the tape. When checking it, pay attention to both the audio levels and the picture quality.

Clogged record heads, excessive dropout, incorrect tracking or skew settings on the source machine, wrong sound recording levels, and an incorrect sync setting or input setting on the recorder, are all problems which can wreck the quality of a dub. Each of these problems can be detected with a post-dubbing check.

If you see something wrong with your dub, adjust the relevant switch setting and try a test recording over the piece of tape where the problem is.

If there's too much dropout, throw the tape away (or, if it's new, return it). If there's instability at some edits, you may need to:

Don't expect there to be jobs waiting for you. Start working for your job from Day 1. That means networking.

Alan Hills, Queensland School of Film and Television.

1. Get the copying done at a distribution house with a time base corrector, which corrects sync errors; or
2. Get the edit system serviced before the next edit session.

Above all, remember that no matter how much work, care and expertise went into your master, you'll be judged by the dub you send out. Just imagine how your work will rate with someone who receives a dub with distorted audio, mistracking video, or just plain snow!

It should go without saying that you should label both the tape cassette and the tape case. An unlabelled tape is likely to be erased by someone who may well assume that it has nothing on it.

Also, a neatly printed or typed, correctly spelled label—possibly with a bit of artwork and pizzazz—gives your tape a more professional look.

Tips from Donna Kenny

When starting a videography business:

- Consider doing some free jobs for friends and family in exchange for using their productions as demo material to show your first paying customers. Spend time building a solid business infrastructure. Have your rates written down clearly and simply so when a potential client calls, you can inform them efficiently and confidently about your standard rates.
- Practise stating what you do in a cogent sentence or two.
- Aim for consistency in the look of all your marketing materials. Use the same font, colours, logo and design for all your business cards, flyers and pamphlets.
- Remember the three As essential to business: Availability, Affability and Ability.

When taping an interview, the eyeline of your interviewee has to be correct for the camera. Control the eyeline by taking care where the interviewer sits or stands. Donna Kenny interviews a client. (Photo from Clio Associates)

Video Festivals

Having your video accepted for showing at a festival is an excellent way of getting your work into the public eye. There are hundreds of festivals around the world, so it would be impossible to list them here. The Internet is a good source of information about festivals (search using keywords through one of the major search engines, such as Google, Yahoo!, AltaVista or Excite), or seek out a printed directory. Two such directories are:

Directory of International Film and Video Festivals, The British Council (published annually).
AIVF Guide to International Film and Video Festivals, Kathryn Bowser, FIVF, 625 Broadway, 9th Floor, New York, NY 10012, USA.

Some search engine URLs are:

Google: <<www.google.com>>
Yahoo!: <<www.yahoo.com>>
Excite: <<www.excite.com>>
AltaVista: <<www.altavista.digital.com>>

Glossary

A/B roll A video edit set-up which has two player VCRs feeding into the control system, so dissolves and wipes can be done with accuracy.

AC Alternating current. This is the type of electrical current which is supplied through the wiring in buildings. In Australia, New Zealand and the UK, the AC is 240 volts. In the United States and Canada the AC is 120 volts (sometimes 110 volts).

Action (i) Any movement which takes place in front of the camera.
(ii) The cue for performers to begin the scene.

Ad lib Unscripted dialogue or movements.

Address track A track on some video formats (including BVU) which can be used for recording timecode or userbits data.

ALC Automatic level control. A system built into some cameras which automatically keeps the input audio signal below the volume level which would result in distortion. When ALC is turned on, the operator cannot control the audio levels manually.

Analog A continuous signal. Analog video systems generate a video signal by fluctuating current or voltage.

Angle (i) The line along which the camera looks at the subject.
(ii) The view available to the camera via the particular lens being used; for example, *wide angle* or *telephoto*.

Animation A series of images (drawings, computer graphics, photographs) which are shown in a quick sequence to create the illusion of movement.

Antenna	(i) A metal device used to capture the television signal when it is transmitted through the air as an RF signal.
	(ii) Another name for a *satellite dish*, which is a piece of equipment composed of a curved reflector and a feed horn, which can be used to receive signals from, or transmit them to, a satellite.
Aperture	The adjustable opening which allows light to enter the camera. The size of this opening is indicated by the *f* stop setting. The bigger the number, the smaller the hole.
Aspect ratio	The relationship between the width and height of a television picture. The current standard is 4 units high by 3 units wide. Widescreen is 16 units high by 9 units wide. The standard for HDTV is also 16:9.
Assemble edit	The edit mode which causes all tracks on the videotape to be erased and replaced with new signals.
Assemble mode	Assemble mode is used to stripe tapes, and to make dubs. It is not usually used for editing a program. Every assemble edit ends in *snow*, which means it makes a break in the control track on the tape.
Atmos	A recording of the ambient sound at a location. In a sound mix, the atmos track gives a sense of authenticity to the scene on the screen.
Attenuate	Reduce the amplification of a signal.
Audio	(i) Sound.
	(ii) The recorded sound signal.
Authoring system	The system which allows a computer programmer to map out all the segments on a videodisk and create a menu which allows the user to navigate through these segments.
Azimuth	Alignment of recording head to tape. Hi-fi audio is recorded in the video track at a different azimuth than the video signal in order to prevent interference between the two signals.
Back focus	The focus adjustment at the rear of the lens barrel, just before the light reaches the image-gathering surface. Back focus can be adjusted if needed, but normally it's okay as is.
Back light	Lighting which comes from behind the subject and is used to outline the subject and visually separate it from the background.
Back projection	Projecting an image, either still or moving, onto a screen which is set up behind the foreground action. In this scenario the projector is behind the screen.
Backdrop	The curtain used in the background of a shot.
Background (b/g)	Anything beyond the main area of interest in a picture.
Background light	A light used to illuminate the background in a shot.
Balance	A pleasing combination of images or sound.

Balanced audio	A balanced audio cable has three conductors: two centre wires and a braided shield. Balanced is preferred for professional use because it's not subject to electrical interference.
Bandwidth	The amount of data per unit of time; for example, megabytes per second (MB/sec). Wider bandwidths can deliver signals with more detail and better quality.
Barndoors	Four adjustable metal plates attached to the front of light heads, used to limit and control the spread of the light beam.
Baseband signal	The signal which is sent from a TV station to an earthstation for uplink to a satellite.
Bass	The low frequencies in a sound. Low pitched drums, traffic rumble, thunder and electrical hum are all in the bass range 30 to 240Hz.
Batch capture	In digital video editing, to digitise (transfer to the computer) several shots in one go.
BCU	Big close-up. A shot which shows the human face framed from mid-chin to mid-forehead.
Betacam	A high quality video format, recorded at high speed on 1/2-inch tape.
Bi-directional mic	A microphone which picks up sound from two sides, and not from the top, rear or other two sides. Good for two-person interviews, especially in radio.
Bit	The basic unit used in digital data. Only two bit characters are possible in a binary system: *on* and *off*.
Blocking	Planning out the moves for either the performers or the cameras within a scene or production.
BNC	This lock-on connector is the standard video connector on professional video equipment, and studio and broadcast cables.
Boom pole	A special lightweight, telescoping pole used for holding a microphone close to the performer, but out of frame.
Bounce down	To combine several audio tracks into one track on a digital audio workstation (DAW).
Breakout box	A device used to convert signals from analog to digital, and from digital to analog.
Breakout cable	An AV cable with a single connector on one end, which goes into a digital camera, and three connectors on the other end, to transmit video and two audio tracks for connection with another piece of video equipment, like a VCR or monitor.
Bridge	A short visual or music sequence used to tie two parts of a program together.
Broad	Floodlight that emits a broad beam of light for fill purposes.
Broadcast	Transmission of electronic signals (either TV or radio) by radio frequency (RF).

Bulk eraser	Device for erasing tapes quickly by passing them through a strong electromagnetic field.
Burn-in	Image imprinted onto the light-gathering suface of the TV camera by pointing the camera for too long at a bright light source. The burn-in will appear on subsequent shots.
Busy	Too cluttered or overcrowded on the screen.
Byte	A sequence of eight adjacent bits, used as a unit in digital data.
C stand	A metal stand with a three-legged base used for holding lighting controls like cutters, bounce cards or polystyrene, and frames with spun or gel in them.
Cable TV	A system of transmitting television via a network of wires directly connected to homes, rather than through the air to antennas.
Camcorder	A video camera and recording unit within a single housing.
Camera card	A list of the shots, movements and repositions for each camera in accordance with the shooting script. Camera cards are usually held in a mount on the studio camera pedestal.
Camera left/right	Directions given to performers, always described from the camera's point of view.
Camera script	The final script for a performance.
Cans	Headsets or earphones worn by the crew on the studio floor so that they can hear the director's instructions from the control room.
Call sheet	Written information about the performers, crew, start and finish times, and locations for a shoot. It should also include emergency phone numbers, nearest hospital, and so forth.
Caption	Words superimposed on the screen, on the bottom half, giving names of speakers or other information.
Capstan	Roller that keeps tape moving through a VCR.
Capture	To load video into a non-linear edit system, changing it from an analog to a digital signal in the process, if necessary.
Cast	(i) To select performers for a production. (ii) The performers appearing in front of the camera.
Catwalk	A walkway set above a studio, for use by lighting and maintenance technicians.
Cardioid mic	A directional microphone with a heart-shaped pick-up pattern. It picks up sound from the front and sides, and rejects sound from the rear. It's very useful, hand-held, for on-the-street interviews.
CCD	Charge coupled device. A sensor for scanning images, used in video cameras in place of the older video tube. A CCD stores light information as packets of minute electrical charges.
CCU	Camera control unit. A remote control device which adjusts the signal sent from a camera. In a multicamera studio, the CCUs are all in the vision control area, so the technical director can set up each

	camera to the desired signal levels and match its signal to that of the other cameras being used.
CCTV	Closed circuit television. A video system which is linked together by coaxial cable; its signals are not broadcast beyond the range of its physical connections.
CD-Rom	Compact disk read-only memory. A compact disk that stores computer information, and which cannot be overwritten. It is physically the same as an audio CD, but CD-Rom players operate much faster than CD players because they must be able to access data from different parts of the disk almost instantaneously.
CG	Computer generated. CG backgrounds can be added to the video of characters shot in front of chroma key backgrounds, to make a composited image.
Character generator	A device used to type in and store the credits and captions used in a video program. Character generators (CGs) have a variety of fonts, can store many pages of information, and present words page by page, in rolls, crawls and other dynamic screen motions.
Chip	A collection of related circuits designed to work together on an electronic task.
Chroma key	Electronic special effect that eliminates a selected colour from a video image and replaces it with the image from another source. Chroma key is often used to add a separately produced background to a studio shot.
Chrominance	The colour information in the TV signal (also *chroma*).
Cinching	Slipping between layers of tape in rewind or fast forward mode.
Coaxial cable	Coax. A shielded cable used for the transmission of RF (radio frequency) signals and also for video and sync signals.
CODEC	Coder/decoder. The CODEC changes signals from analog to digital, and from digital to analog.
Compact disk (CD)	A small disk which carries digital audio only, and is decoded by a laser in a CD player.
Compatibility	The ability of equipment to be interfaced (connected together) and yield good signals.
Component signal	(i) A separated-out part of a composite video signal; for example, the luminance only, or the R (red), G (green) or B (blue) part. (ii) The entire video signal, but sent out on separate cables for each part of it.
Composite video	A complete video signal containing all necessary picture and sync information.
Composition	The arrangement of picture elements within a scene.
Compression	A formula for reducing the amount of data in an image file. DV format uses a 5:1 compression ratio in recording mode.

Condenser mic	A microphone which uses an electronic component called the capacitor to respond to sound, and requires a power supply to operate it.
Contrast ratio	The comparison of the lightest and darkest sections of a picture.
Control room	The room from which the TV program is directed and coordinated and the vision mixing is done.
Control track	A series of electronic pulses which tells a video replay machine where the beginning of each field of video is. An unbroken control track is essential when editing in insert edit mode.
Copy	Material to be read on air.
Crane	A large mechanical 'arm' on which the camera and camera operator can be mounted and which can be raised, lowered and manoeuvred through space.
Credits	The names of the contributors to a program.
CU	Close-up. A tightly framed shot of the subject. When referring to humans it usually means a head-and-shoulders shot.
Cue	Visual or audio signal given to performers or technical operators for them to commence an action.
Cut	(i) Instant switching from one camera to another in the vision mixer.
	(ii) The join which is the end of one shot and the beginning of another in the editing process.
	(iii) The director's signal to stop the action.
Cutaway	A shot which shows something related to the main action or topic, but which is a view of something other than the action or the speaker. Cutaways are used in editing to conceal the edits necessary to reduce the time a sequence takes on screen, from real time to program time.
Cut-in	A shot which shows a detail within the frame of the action or the interview. A cut-in is used to cover edit points, so the real time of an action or interview can be reduced in the editing process.
Cyberspace	The *virtual space* in an electronic system, like the Internet.
Cyc, cyclorama	A large curtain, sometimes attached to rollers, which is hung on a high track suspended around the edges of the studio, and which can be drawn behind the performers to make a background for a set.
DA	Director's assistant. A studio role with many responsibilities, including advising camera operators of their upcoming shots and timing the progress of each segment of a production.
DAT	Digital audio tape. A system which records and replays audio using a digital signal. DAT tape cassettes are smaller than normal audio cassettes.

DAW   Digital audio workstation. This equipment allows the recording and editing of digital sound, and lets the sound editor manipulate clips on various tracks with great accuracy.

DC   Direct current. The type of electricity supplied by batteries and by AC adaptors. Portable video cameras are designed to run on DC so they can be battery operated. To plug them into the wall current, you need an AC adaptor.

Decibel (dB)   Measurement of the sound volume or signal strength of an audio signal. A dB meter gives a visual display of this signal strength.

Definition   The degree of detail in television picture reproduction.

Degauss   To demagnetise. Audio heads need degaussing from time to time to reduce hiss on tape recordings. Monitor screens also need to be degaussed at times to improve functioning.

Depth of field   The distance between the closest and furthest objects which are in clear focus to the camera's image-gathering surface. Depth of field is affected by the angle of the lens, the aperture setting (*f* stop) and therefore indirectly by the amount of available light, and by the distance the subject is away from the camera.

Desktop video   The video equivalent of desktop publishing. Through the convergence of computer and video technologies, it's possible to produce low cost, high quality video products on home computers.

Detent position   The neutral position of a knob on the equalisation section of an audio mixer. In this position, no equalisation (changes in volume to selected sound frequencies) is applied to the signal.

Diffusion material   Spun glass cloth, or other material, which is placed in front of a light to soften the quality of the light and make the shadows produced by it less hard.

Digital   An electronic signal which is made up of discrete (separate) pieces of data, as opposed to a continuous flow of information. Digital video and computer information is encoded into a binary code, made up solely of *on* and *off*.

Digital video   A video signal which is recorded in a binary code, and can therefore be copied through many generations without any loss in signal quality.

Digitise   To change a signal from analog to digital. This word is also used to mean the process of entering an analog video signal into a non-linear edit system.

Digitiser   A device which changes an analog signal into a digital signal, so it can then be used by a computer or a non-linear edit system.

Dimmer   Device connected to a light, or a lighting system, which varies the light output (brightness) by changing the voltage supplied to it.

Diopter   The lens in the viewfinder of a videocamera, which can be adjusted to suit the eyesight of each camera operator.

Directional	Receptive from only one direction, as in *directional microphone*.
Director	The person in charge of deciding the overall camera coverage and the camera movements, and who guides the actors' performances in the making of a production.
Dissolve	Transition from one shot to another by a process of cross-fading, during which the image of the incoming shot is temporarily superimposed over that of the outgoing shot.
Dolly	(i) Movement of the camera towards or away from the subject. (ii) The support on which the camera tripod is mounted. It has little swivelling wheels so it can be moved in all directions.
Double head	Picture and sound film run separately for transfer.
Down a generation	When an analog signal has been copied, the new version is said to be down a generation from the original. The new version is of a lesser quality than the original material. In video, you try not to go down a generation if you can in any way avoid it.
Downlink	(i) The transmission system which receives a signal sent from a satellite to the earth. (ii) The signal sent from the satellite to the earth.
Downstage	Towards the camera.
Dropout	Loss of signal due to damage to the tape or dirt on the tape or record head, preventing proper recording or playback.
Dry run	Rehearsal without cameras.
Dub	(i) A copy of a videotaped or audiotaped signal. An analog dub is less good than the original material, because it's *down a generation*. (ii) To make a copy of a taped signal.
DVD	Digital versatile disk. A DVD can hold seven times the information that a CD-Rom can. Feature length films are now being delivered on DVD.
DVI	A system that combines a computer with a compact disk, and enables the user to produce interactive programs containing audio, video and computer generated material.
Dynamic mic	A microphone of the moving coil type. A dynamic mic doesn't require a power supply.
Earth station	A facility for the transmission and reception/distribution of satellite mediated (handled) television and radio signals.
ECU	Extreme close-up. A shot which enlarges a detail to bigger than life size.
Edit	The process of putting video material into a scripted order to form a final program. Analog editing is done by transferring information electronically from one videotape to another. Digital editing is done with a computer, using digital editing software.

EDL	Edit decision list. This is a record of all the in and out points of an edit. EDLs are usually stored on floppy disks so they can be kept safe, and are taken to postproduction suites to enable the video machines there to do the fine cut.
Electron gun	The device in the camera or television set which sends the electron beam to the photoelectric surface, enabling the capture or redisplay of the light image.
EFP	Electronic field production. The term applied to recording drama on location with a video camera rather than a film camera.
ENG	Electronic news gathering. The term applied to recording the news on location using a video camera rather than a film camera.
Equalisation	To change the quality of a sound by adjusting the volume of selected sound frequencies. Equalisation is done on audio mixers.
Erase	To remove information from a magnetic tape.
Establishing shot	A shot, often a long shot, which gives the viewer an idea of the larger surroundings in which the action is occurring.
Eyeline	The line along which a person is looking, especially in relation to the framing of a picture. For example, the director may decide that the subject's eyeline should be to the left of frame or to the right of the camera position.
Exposure	Quantity of light being admitted to the camera.
***f* stop**	Calibration of the size of the camera aperture (the hole which lets light into the camera). A large *f* stop number means a small opening and greater depth of field. A small *f* stop means a large opening and a shallower depth of field.
Fade in (or up)	(i) To increase the volume of the audio signal. (ii) To make the picture appear gradually from a black or coloured screen.
Fade out (down)	(i) To decrease the volume of the audio signal. (ii) To make the picture go gradually to a black or coloured screen.
Fader	The control knob which can be moved up and down, or rotated, to adjust the volume level of an audio signal.
Feedback	(i) In audio: an effect which occurs when a microphone is placed too close to a speaker and a loud howling sound is produced. (ii) In video: a visual effect produced by videoing a camera signal from a monitor which is showing the image from the same camera. An endless multiplication of the image is produced, like looking down a tunnel, with ever-smaller images.
Field	One half of the picture information within a frame of video. A field is one scan, from top to bottom, of the image-gathering surface of the camera, entailing all the odd lines or all the even lines (312.5 horizontal scan lines in PAL and SECAM, and 262.5 horizontal scan lines in NTSC).

Fill light	(i) A light that illuminates the subject from the opposite side of the camera to the key light.
	(ii) A light which gives general illumination to a scene, or a part of a scene. Fill lights are often diffused light.
Firewire	A hard drive which can store a large amount of digital information.
FireWire	The trademark name for the connection (and connecting wire) for putting video into a computer.
Fish pole	A microphone suspended from a pole, held either from the catwalk or the floor, and used to cover sound in areas not reached by the boom.
Flare	Areas of superbrightness in the video image caused by light reflections off polished objects or dirt or tiny particles on the surface of the lens.
Flat	(i) A piece of standing scenery.
	(ii) Dull image quality; even, not contrasting, usually referring to lighting.
Flexifill	A handy cloth device for bouncing light, white on one side and metallic on the other, which is large when being used but twists to fold into a small bag for packing away.
Floor	The studio floor where the actors and cameras are located.
Floor plan	A diagram of the studio floor, showing the positioning of scenery and properties, the entrances and exits, and the available technical facilities like power points.
Floppy disk	A digital storage device made of a thin, flexible magnetic disk covered by a flexible or hard plastic sleeve. Computer, audio or a small quantity of video information can be stored on a floppy disk. EDLs are usually stored on floppy disk and then taken to the postproduction suite.
Fly	Studio objects or scenery hanging from above.
FM	Floor manager. Production role which occurs both in the studio and on location. The floor manager has many responsibilities, including keeping all the people on set in a productive and harmonious mood, and relaying directions from the director to all those who are not on headsets.
Focal length	The distance from the optical centre of the lens to the photoelectric surface in the camera.
Focus	To adjust the lens to obtain the sharpest image.
Foley	Sound effects produced in a studio for use in the production of a soundtrack.
Foot-candle	A unit of the measurement of light. It means the brightness of light one foot away from one candle. Some domestic camcorders can obtain a usable signal from only three foot-candles of light, but other cameras require much more light.

Footprint The geographical area on the earth's surface which receives a satellite's downlink signal at a useful strength. Because footprints don't align with national borders, satellite signals can be received in countries whose governments don't necessarily approve of the program content, yet who have no regulatory control over the broadcasters of the signal. This is one of the benefits, or hazards, depending on your point of view, of satellite TV.

Foreground (f/g) The part of the picture nearest the camera.

Frame (i) The vertical and horizontal edges to the video image.
(ii) To use the camera to set up a shot with a particular composition of visual elements.
(iii) One complete television picture (comprising two fields, 625 horizontal scan lines in PAL and 525 horizontal scan lines in NTSC). There are 25 frames per second in PAL and SECAM, and 30 frames per second in NTSC.

Frame capture The process of digitising a frame of video.

Frame store A device which can store a frame of video as a digital signal and allow various electronic adjustments and manipulations to be done to the signal.

Freeze frame A motionless image caused by the repeated scanning of one frame of picture information.

Frequency The number of electromagnetic cycles which pass a given point in a second. Frequency is measured in cycles per second, usually referred to as Hertz.

Frequency response The reproduction characteristics of microphones or other audio equipment.

FX Abbreviation for *effects*, meaning special effects.

Gain (i) The volume level of the audio signal.
(ii) The amplification level of the video signal.

Gel A transparent or translucent coloured sheet, which is heat resistant, and can be placed in front of a light to alter the colour of the light beam.

Generation A recording of a signal. The original recording is called the first generation, a copy of the original recording is called the second generation, a copy of the copy is called third generation, and so on.

Genlock Linking different video sources (such as studio cameras, playback machines and remote sites) to the same synchronising pulse, so their signals are in exactly the same timing. This is to prevent rolling of the picture when one shot is switched to another in the vision mixer.

Geosynchronous satellite A satellite which stays in a fixed position in relation to the Earth.

Ghost A double image on a television screen caused by signal reflections in poor reception areas.

Gigabyte	One billion bytes (USA), one thousand million bytes (Australia). Video editing storage systems are rated in gigabytes.
Grams	The sound effects and music section in the control room complex.
Grandmother clause	When a newer model of equipment, or a computer program, will correctly play back the data on products recorded on an older model. For example, SVHS players will play back videotapes recorded in VHS, but VHS players can't play SVHS. Likewise, Digital 8 can play Hi-8, but Hi-8 can't play Digital 8.
Graphics	Artwork such as drawings, maps, mounted photographs and titles.
Grid	The overhead suspension system used for mounting the hanging studio lights.
Handling noise	Unwanted sound which is introduced into the signal path between a microphone and the recorder. This noise can be caused by the hand which is holding the microphone, by careless operation of the boom, or by movement of the microphone cable or its extension lead.
Hard disk	A rigid plate with a magnetic coating which can store digital data. A hard disk can handle a larger amount of information at a higher speed than a floppy disk can.
HDTV	High definition television. The theory was that one worldwide improved TV standard would be adopted by the mid-1990s, but that is yet to happen. The new standard will have at least 1000 horizontal lines per frame and the aspect ratio of wide screen TV (16:9).
Head	The device which transfers onto magnetic tape the picture or sound signal. It also *reads* the signal from the tape during playback.
Head end	The facility from which the television signal is cablecast (distributed) in a cable television system.
Head room	The space on the screen between the top of the subject's head and the top of the frame.
Helical scanning	A method of recording video information onto tape in a series of diagonal stripes, developed to save recording space.
Hertz (Hz)	The unit of measurement of electromagnetic signal frequency. It means *cycles per second*.
Hi-8	Hi-band version of Video 8, a high resolution video format, close to broadcast standard.
High angle (H/A)	Any shot taken above normal eyeline.
High key	High intensity illumination.
Highband	BVU Umatic (3/4-inch) video format, 1-inch and Betacam; all formats which meet broadcast standards.
Hot	(i) When a portion of the video signal is overly bright, as when there are hot spots on the wall due to a poor lighting set-up.

	(ii) Receptive to recording sound. A microphone is hot all over its housing, so it will transmit handling noise if it's rubbed or knocked anywhere on its body.
Hue	The word used in television vocabulary which is the equivalent of *colour* in normal speech.
Ident (ID)	(i) Station identification.
	(ii) A board used at the beginning of every taping sequence, containing details of what is about to be taped.
IEEE1394	Institute of Electrical and Electronic Engineers standard for inputting signals into a computer. This standard connection is also known by trade names like FireWire and iLink.
iLink	The trademark name for the connection (and connecting wire) for putting video into a computer.
Image compression	The reduction of the number of data bits (and therefore space) needed for the storage or transmission of the image, while still maintaining reasonable quality.
Impedance	Rating of the resistance characteristics of audio components, such as microphones. Different impedance levels are expressed as *high impedance* or *low impedance*.
In the can	A finished television recording, a show ready for broadcasting.
In-camera editing	Shooting a video program, exactly in script order, in one shooting session, moving between *record* mode and *pause*, and never putting the camera into *stop* until the program is done. At completion of the shoot, the program is ready for distribution if all goes well. In-camera editing is used by people with no access to editing equipment, or no time to use editing equipment. In-camera editing requires a high level of skill to make a good product.
Insert editing	The mode of video editing in which the main erase head is not activated, but flying erase heads mounted next to the video heads are activated instead. This is the usual edit mode for editing a video program in an analog edit system, and in this mode you can copy any combination of the video and audio tracks, but NOT the control track. A tape must be *striped* (given a continuous control track) before insert editing can be done on it.
Instant replay	An action recorded on special tape recorders and immediately played back, sometimes in slow motion. Instant replay is especially common on sports programs.
Interactive videodisk	A multimedia system constructed by linking a video disk player to a computer, which is programmed to work in conjunction with a specially produced video that allows a high level of active participation during the viewing process.
Intercom	Audio intercommunication system among studio floor and control room personnel.
Intercutting	Cutting from one vision source to another.

Iris (diaphragm)	The circular opening and closing mechanism that controls the amount of light which reaches the video tube or CCD.
Jack stage	A brace to hold up a flat.
Jib	A camera mount consisting of an arm which can be attached to a dolly or crane. A jib can be revolved left or right, up or down.
Joy stick	(i) Gearstick-like device on the vision mixer panel for controlling the placement of wipe effects. (ii) Gearstick-like device on the edit controller, for controlling videotape movement.
JPEG	Joint Photographic Experts Group. A standard for the data compression of still images. JPEG compresses image files to a smaller size.
Key light	The main source of light on the subject or the scene.
Kilobyte	1000 bytes
Kinescope	A method of filming a videotape program off a screen for recording or archival purposes.
Lavalier (Lav)	A small omnidirectional microphone, usually worn clipped to the clothing.
Lens	Optical system which collects and focuses light and transmits it to the image-gathering surface (the video tube or CCD) of the camera.
Level	(i) A description of the intensity of audio and video signals. (ii) To *set levels* for a production is to adjust sound levels on the audio mixer and VCR to obtain the best quality recording.
Lighting	The art of manipulating natural and artificial sources of light to achieve a desired visual effect.
Line level	The level of an audio signal which is sent from an amplified source, like an audio mixer, another VCR, a CD player or a monitor. A line level signal is usually around 1 volt in strength.
Line monitor	The monitor that shows only the pictures going to air, or being recorded on tape.
Lip sync	When sound and picture are recorded or played back simultaneously.
Live	(i) A *live* microphone is one that is transmitting a signal. (ii) A *live* show is one that goes straight to broadcast.
Location	Any place outside of the studio where material is recorded.
Log	(i) The written breakdown of a day's program schedule. (ii) The list of the material which is recorded on a videotape. (iii) To make a list of what's recorded on a tape.
Logo	Symbol of identification for a program, a television station, a production group.
Long shot	Shot with wide field of view, or far away from the subject.
Loose shot	A shot slightly wider than the standard shot size.

Lossless compression	Reducing the storage space required without reducing the quality of the image.
Lowband	All domestic and industrial non-broadcast quality video formats, including VHS, Beta, Video 8 and some Umatic (3/4-inch).
LS	Long shot. A shot framed to show the whole body of the subject.
Luminance	The brightness part of the video signal. The luminance signal is the main part of the video signal, and on its own gives the black and white reproduction of the image.
Macro	A lens used for taking shots of objects which are less than a metre away from the camera.
Magnetic tape	Plastic tape, coated with a magnetically sensitive oxide, which is used for recording electromagnetic signals, either sound or vision. Magnetic tape can be erased and used again, many times.
Make-up	Materials and paints used to enhance, correct and change facial features or produce the impression of wounds.
Mark	To put a small piece of masking tape on the studio floor to indicate positions for the performers and scenery, or camera stopping points.
Mask	(i) A shield placed before a camera to cut off some portion of its field of view.
	(ii) To conceal, by use of scenery pieces, any portion of the background.
	(iii) When a performer or object is blocking the view to some background performer or object.
Master	The first generation of a recording, or the first edited version of a program. The master should be used for the production of copies.
Master control	Control centre through which all television production and playback areas are routed.
MCU	Medium close-up. A shot which shows the subject from mid-chest up, with a small amount of headroom in the frame above the head.
Megabyte (MB)	One million bytes of information.
Mic level	The level of the audio signal which is sent from many, but not all, microphones. It is 1 to 4 millivolts in strength.
Microphone	A device for converting sound waves to electrical energy. This energy can then be transmitted or converted into a magnetic signal to be recorded on tape.
Mid range	Sound frequencies higher than bass and lower than treble; 250 to 4000Hz.
MIDI	Musical instrument digital interface. The communication of digital data between musical instruments, allowing several musical instruments to control and interact with one another.
Mix	To combine audio signals from several inputs down to one or two output channels.

Mixer	(i) In video: a device for selecting or combining video signals.
	(ii) In audio: a device for combining audio signals down to one or two channels to produce a soundtrack which can be recorded onto videotape.
MLS	Medium long shot. A shot which frames the subject from midway between the knee and ankle to just above the head.
Monitor	A video display unit that looks like a home television set but receives its picture and audio information through line inputs. It's sometimes unable to receive an RF signal.
MPEG	Moving Picture Experts Group. A standard for moving image compression.
Multimedia	A computer based system for working with text, video, film, audio, graphics and animation.
Narrator	Reader or speaker who adds information to a program and who can be either seen or unseen.
ND filter	Neutral density filter. A filter which reduces the amount of light which gets to the camera lens, but doesn't alter the colour of it.
Negative image	An image where lights and darks are reversed for special effect.
Noise	Unwanted interference in either the audio or the video signal.
NTSC	National Television Standards Commission. The video standard used in the United States, Japan, Canada, Mexico and many other countries. NTSC has 525 horizontal scan lines per frame, and 30 frames per second.
OCR	Optical character recognition. A scanning process which recognises and encodes printed characters into digital form for use in a computer.
Off-air signal	Any RF signal broadcast through the air and available for public reception, for free.
Omnidirectional mic	A microphone which picks up sound equally well from all directions.
Order wire	A sound link set up between two sources distant from each other.
Out of frame	Out of the camera's view.
O/S	Over the shoulder. A shot taken from behind, looking over someone's shoulder at another person or an object. This shot is often used for a cutaway when recording interviews.
Oxide	Iron oxide particles on a videotape, the recording medium on early videotapes.
Pacing	The flow and speed of an edited video piece, including length of shots and types of transitions.
PAL	Phase alternate line. The name of the video standard used in Australia, New Zealand, and many other countries. The PAL signal has 625 horizontal scan lines per frame, and 25 frames per second.
Pan	To move the camera left or right in the horizontal plane.

Parallel action	Intercutting shots showing two different actions at two different locations. This allows the edited program to convey a sense of two things happening at the same time, and the cut from one scene to another works in editing in the same way as a cutaway does, allowing the editor to reduce time from real time to acceptable screen time.
Patching	Interconnecting audio, video or light cables into a common circuit.
Pause mode	The mode on a camera recording system in which the recording has stopped, but the tape is still in contact with the record heads. Pause is used between shots, and is especially useful in in-camera editing.
PCM	Pulse code modulation. A system of digitising a sound signal.
Peak	Highest level of signal strength, as on VU meters.
Pedestal	(i) A rolling mount for a camera, used in the studio. (ii) The black level in the video signal.
Phantom power	A method of sending electrical power from a studio audio mixer to condensor microphones, so individual microphone power supplies aren't needed. Computers can also phantom-power devices connected to their firewire inputs.
Photoelectric	Able to change light energy into electricity.
Photosensitive	Responding to or sensitive to light. The video image is made when light is changed into an electrical current at the photosensitive surface of the video tube or the CCD.
Pickup tube	The tube inside early video cameras which registered the image focused by the lens.
Pixel	Individual dots or picture elements in a computer image. Each pixel has its own colour. The screen image is made up of thousands of pixels.
Plotting	Planning of camera shots, deciding camera and boom positions.
Pot	Abbreviation for potentiometer. This refers to any equipment control knob which allows continuously variable output, as with the *pan pot*.
POV	Point of view. A shot where the camera shows what one of the characters would see.
PPM meter	Peak program meter. A type of meter used for reading the volume of sound. PPMs use a display of lights, rather than a swinging needle, to indicate sound levels.
Pre-amp	An amplifier which comes before the main amplifier, used to raise the signal to an appropriate level.
Premix	To combine several audio tracks to form one track, which is then input into a further audio mix.
Preview	(i) View a production before it is broadcast.

(ii) View a caption or a special effect on the preview monitor in the control room before placing it into the production.

(iii) An electronic process in video editing which allows the editor to see what an edit *would* look like, without actually doing the edit.

Props Properties/objects used for set decoration. Hand props are those items, like a mobile phone, which an actor uses onscreen.

Proximity effect An exaggeration of bass frequencies which occurs when a cardioid microphone is placed very close to the speaker's mouth. Though it's a form of distortion, the particular sound yielded is considered desirable, even sexy, in some instances.

Public access A policy which means that everyone has the right to broadcast on a public TV or radio channel, on a first-come, first-served basis. (Like everyone has the right to go down a public road.)

PZM Pressure zone microphone. A microphone which uses a hard flat surface to capture and direct the sound waves towards its diaphragm. It has a hemispherical pick-up pattern, and can reproduce room sound very well, but isn't selective, like a directional microphone is.

Quartz iodine A powerful light source in a small glass envelope. Requires special care to use safely.

Quicktime A media integration standard used in Apple computers, allowing the manipulation and synchronisation of digitised video. You can change your digital video product into a Quicktime file to put it on the Internet.

RAM Random access memory. A memory system in which data can be accessed in any order, with equal speed.

RCA This slip-on connector is often used on cables carrying audio signals and is used on home equipment, on audio and video cables.

Reach The distance over which a microphone can pick up a good signal strength. A shotgun microphone has a longer reach than a cardioid which was designed for hand-held interviews.

Real time Time as we experience it. Most edited programs show actions which have been reduced from real time to a shorter length.

Recce (Also *reccy*.) A visit to a location site to check out its potential for a video shoot and to determine its drawbacks and inherent problems.

Receiver Home-type TV set that accepts RF (radio frequency) signals.

Receiver/monitor A video display unit which can display signals received either via broadcast (RF) or via direct line inputs.

Render To create the files of a digital effect

Resolution A measure of the amount of detail that can be recorded within the video image, by a particular camera or with a particular format.

RF	Radio frequency. A modulated video, audio and sync signal. RF signal is used to broadcast television through the atmosphere. Television receivers are designed to decode RF signals.
RF converter	A small device to encode video and audio signals to RF so that they will play on a normal television receiver. RF converters are included in home VCRs but must often be purchased separately for industrial level VCRs.
RGB	Red, green and blue. The primary colours of the video image. The R, G and B signals can be viewed separately with video test equipment, and the relative strengths of these three signals can be adjusted during shooting and postproduction to produce certain effects.
Roll	The director's signal to start videotape recording or to start a replay.
ROM	Read-only memory. A permanent internal memory built into a device during manufacture. ROM data can be read quickly, but it can't be altered.
Run down	The list of proposed program content for a program.
Run through	A rehearsal of action and/or camera movement.
Sampling	Turning a signal into numbers which can be processed by computers. Digitising.
Satellite dish	A piece of equipment composed of a curved reflector and a feed horn, which can be used to receive signals from, or transmit them to, a satellite.
Saturation	The richness of the hue (colour) in the colour TV signal. A very saturated hue is like a vibrant cartoon colour, a not very saturated hue is pastel.
Scanner	A device which converts images to a digital form.
Scanning	Movement of the electron beam in the video tube from left to right, top to bottom. One scan creates one field.
Scene	The shot or assemblage of shots that make up a unit of a program.
Schedule	A listing of all information regarding the taping day, with times, dates, scenes, actors, etc.
Scrim	A wire mesh put in front of lights to slightly diffuse the beam. A scrim is also useful for catching the flying glass if the globe explodes.
SECAM	Système Électronique Couleur Avec Mémoire. The video standard used in France, the former Soviet Union, former Eastern Bloc countries, and some other countries. SECAM has 625 horizontal scan lines per frame, and 25 frames per second.
SEG	Special effects generator. An electronic device able to produce video effects.
Servo control	Remote control of the zoom and focus on a studio camera, operated by switches mounted on the pan handles of the camera pedestals.

Set	The arrangement of scenery and props which make up the environment seen in a shot or scene.
Set up	(i) To install a set in the studio. (ii) To get all cameras and equipment positioned and ready to operate.
Shock mount	A microphone holder which isolates the microphone from any handling noise.
Shooting ratio	The relationship between the amount of footage shot and the length of the final edited product. Drama usually has a much lower shooting ratio than documentary because the shots can be more carefully planned out ahead of time.
Sibilant	Having a hissing sound, like that produced by *s*.
Signal-to-noise ratio	The strength of a signal compared to the internal design noise of a piece of equipment. A high signal-to-noise ratio means a better quality piece of equipment and a better recorded result.
Site check	A visit to a shooting location, done ahead of the shooting day. A site check is for obtaining useful information like the position of the sun, the accessibility of the site, the possibility of using AC power, environmental noise factors, and so on.
SMPTE	Society of Motion Picture and Television Engineers. This group sets standards for video.
Snow	Random black and white dots shown on the television screen. Snow can be due to poor reception or a dirty VCR head. It's also the image you see if you play an erased tape or a never-recorded tape.
Special effects (SFX)	Creation of illusions by mechanical or electronic means.
Splice	Mechanical join between pieces of tape or film.
Spot light	A light focused or restricted to cause it to send a narrow beam.
Spun	A fabric made of spun glass, which is put in front of lights to slightly soften the beam and reduce its intensity.
Stability	The timing quality of a television picture.
Still (freeze)	A motionless image caused by the repeated scanning of one frame of picture information.
Stop mode	The mode in a video recording system where the recording stops and the tape is no longer in contact with the record heads. Never go into stop if you're trying to do in-camera editing, because you'll get a glitch at the edit point when you begin the next shot.
Storyboard	Shot-by-shot drawings and accompanying text indicating the major points in the content of a scene or program. Audio content may also be listed. A storyboard looks rather like a cartoon strip, but of course it's much longer.
Stripe	To record a continuous control track onto a videotape to get it ready for use in insert edit mode. A tape can only be striped in assemble

edit mode. Striping can be done with any stable signal, but it's most commonly done with black so that if the edit points slip slightly, the error will be less noticeable to the viewer. In order to be sure the edit system is laying a true black stripe and not just *no video*, check to make sure the frame counter is moving on the record machine.

Superimpose (super) Electronic overlapping of two or more pictures on the screen. Often used for putting captions or credits over an image.

Surround sound The sound of a location, recorded by an omnidirectional microphone, used to give presence and authenticity to the scene.

SVHS Super VHS. This analog format records a high resolution signal close to broadcast standard.

Sync Electronic timing pulses that control the recording and replay of the video image.

Sync generator A device that produces electronic synchronisation pulses. All studio equipment can be linked to one sync generator so there will be no timing differences between the signals from the various sources. This is called *genlocking* the equipment.

Synopsis A brief description of the program's storyline or plot. A scene synopsis lists all scenes with a short description of the plot movement in each one.

Take (i)   The director's signal to cut from one camera to another.
(ii) The completion of one part of a production.

Talent The term once used to refer to all performers and actors. This term now has a derogatory flavour to many people, and is no longer considered acceptable. It should be replaced with *performer* or *actor*.

Talkback A speaker or headset system that connects the studio to the control room.

Talking heads The term applied to close-up shots showing people speaking. Talking heads are commonly part of a TV program, but they quickly become tiresome, so cutaways related to what the speakers are discussing are used to liven up the content.

Tape Oxide-coated mylar plastic that will record picture and/or sound information when magnetised by a tape head.

TBC Timebase corrector. A device which corrects the timebase (sync) of a video signal and makes it synchronous with other devices, like a vision mixer.

TD Technical director. The person in the studio whose job it is to set up and balance the signals from all the cameras.

Technobabble Technical terms and acronyms, sometimes used to confuse people.

Telecast A television transmission.

Telecine A device for the transfer of film or slides to video.

Telephoto	A lens designed to narrow the field of view and enlarge the subject. The focal length is longer than usual; for example, 150 mm. Used for close-ups which are shot from a distance.
Telerecord	A method of recording electronic vision signals onto 16 mm film.
Test pattern	Specially designed chart to test resolution and colour balance in a video picture.
Texture mapping	The process of wrapping a 2-D image onto a 3-D object.
Thirds	A concept in shot composition which divides the screen into three sections vertically or horizontally.
Tilt	To tip the camera up or down, as you would look up or down with your head.
Timecode	A system which gives a unique number to each frame of video. Timecode can be recorded during the shoot, with some cameras, or added later if necessary. Timecode is very useful in linear editing and it's essential with non-linear editing.
Timeshifting	Recording a video program at one time in order to view it at another, more convenient, time.
Track or truck	To physically alter the position of the camera in the horizontal plane, either hand-held or on a dolly. Often done in a motion parallel to a moving subject.
Tracking	The movement of the video heads, or the hi-fi audio heads, along the recorded signal path on the tape. If the heads aren't riding right on top of the signal tracks, the replay picture or audio quality will be poorer, and you will have what's called a *tracking problem*. This can usually be fixed by adjusting the tracking knob on the player.
Transponder	The part of the satellite which receives the uplinked signal, converts the signal to another frequency, and amplifies it for retransmission to Earth via another (downlink) transponder.
Treble	High frequency sounds—4096 to 16 384Hz.
Trunk lines	Heavy duty signal-bearers which are used to carry signals large distances between major centres.
Two-shot	A shot including two people.
UHF	Ultra high frequency RF signal. SBS TV and the public access channels in Australia are on UHF.
Unbalanced audio	An unbalanced audio cable is not recommended for professional use because it's subject to electrical interference.
Unidirectional mic	A microphone which picks up sound only from a cone-shaped area to the front of it. Some unidirectional mics have a broader pick-up range than others. The ones with a very narrow range are called *hyperdirectional*.
Umatic	A 3/4-inch video format. Low band Umatic is not broadcast standard, but high band Umatic is.

Unit	A team of people who work together to produce a television program or series.
Uplink	(i) The transmission system sending a signal to a satellite.
	(ii) The signal sent up to the satellite.
Upstage	(i) Away from camera, towards the back of the set.
	(ii) To walk towards the back of the set, causing the other actor(s) on set to turn away from the camera. This is a trick to focus the audience's attention on oneself and away from the others. This move is not very popular with the other actors.
User interface	The parts of the software and hardware which the operator manipulates to communicate with and control the program.
VCR	Video cassette recorder. A device which records video, audio and sync information onto videotape which is housed within a cassette.
Vectorscope	A device which graphically displays information about the colour part of the TV signal.
VHF	Very high frequency RF signal. Many TV stations broadcast on VHF. The RF converters in VCRs produce a VHF signal which can be displayed on a TV receiver, often on channel 1 or 2.
Video	The picture component of the television signal.
Video 8	A domestic video format using 8-mm tapes.
Video streaming	Sending video files over the Internet.
Videotape	(i) To record both sound and vision onto magnetic tape. No processing is necessary. The tape segment/program is replayable at once.
	(ii) Magnetic tape used to record both sound and vision.
Viewfinder (EVF)	A device to enable the cameraperson to see the image the camera is recording. Usually a small TV screen in black and white. Some cameras use an optical viewfinder, which is a split from the lens itself. These require special care in estimation of depth of field and exposure.
Virtual reality	Interactive electronic media which give the illusion of immersion in an artificial world which exists inside the data space of the computer.
Vision mixer	A device for selecting or combining video signals.
VLS	Very long shot. A shot which shows the full body of the subject, taking up about half the height of the screen.
VM	Vision mixer. The studio role of the person who operates the vision mixer.
Voiceover	The voice of the narrator or another person, used without the accompanying image of that person.
VU meter	Volume unit meter. A meter with a moving needle that indicates the audio level in the recorder or mixer.

VTR	Video tape recorder. Any device which records video, audio and sync information onto videotape.
Walk through	A rehearsal, usually preceding camera rehearsal, where performers and crew note the major action.
Waveform monitor	A device which graphically displays information about the signal strength and sync characteristics of the video signal.
Wavelength	The length of one cycle of an electromagnetic signal.
White balance	To adjust the camera's colour rendition for any new lighting situation.
Wide angle	A lens, or a setting on a zoom lens, which maximises the width of the background in a shot.
Wipe	A visual effect where one picture appears to push another off the screen, following some geometric pattern.
WORM	A device used to encode data onto a disk, using a high powered laser. The laser causes a permanent change in the reflective characteristics of the disk, and the resulting recording can be decoded as a video image.
Wow	Distortion in an audio signal caused by erratic tape speed.
WS	Wide shot. A shot showing a broad view of the surroundings, often taken with a wide angle lens.
XLR	This lock-on three-pin connector is used on cables carrying balanced audio signals. It's the standard audio connector for professional microphones, mixers and recording equipment.
Y/C	The abbreviation used for the SVHS signal, which is separated out into its luminance and chrominance componants.
Zoom lens	A lens with a moveable element that enables the selection of various focal lengths. A 12 mm/120 mm lens has a 10:1 zoom ratio.

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