Camera Department Blueprint

ARRI MEDIA

The camera department is where most people think movies are really 'made'. In truth, the camera is simply a recorder of how other artists, be they actors, director, production designer, costume and make-up, have chosen to collectively interpret the screenplay. Sure, it can often be a player too, through camera moves and re-framing, but it should always serve the story and not vice versa. A fact often lost on many new film makers who are obsessed by 'the image'. It's not how it looks, it's what it says. The camera department has three distinct divisions, really their own departments in their own rights, but so fused that they appear as one here - they are Camera, Lighting and Grips.

Camera Kit

This is the actual cameras, with additional lenses, stock, magazines, monitors etc. There are always add on's that surprise the production, such as filters, special lenses or unique bits of kit to do funky things. Of course, the camera department comes in two flavours, film and video.

Lighting Kit

You can never have enough lighting, but more lights mean more crew and more power. Lighting is one of the areas that often betrays the budget of a film as it is simply under lit, not dark or underexposed, just unsophisticated, the results of an over-stretched department that is constantly hurried. Think about shooting abroad in amazing daylight!

Grips Kit

This is the equipment upon which the camera is mounted. Be it a tripod with head, track and dolly or even crane. There are all manner of cheap and cheerful alternatives, such as wheelchairs, low cost DV designed tracks that run along ladders, even home made cranes, but if you can swing it, the pro kit will ALWAYS get better results.

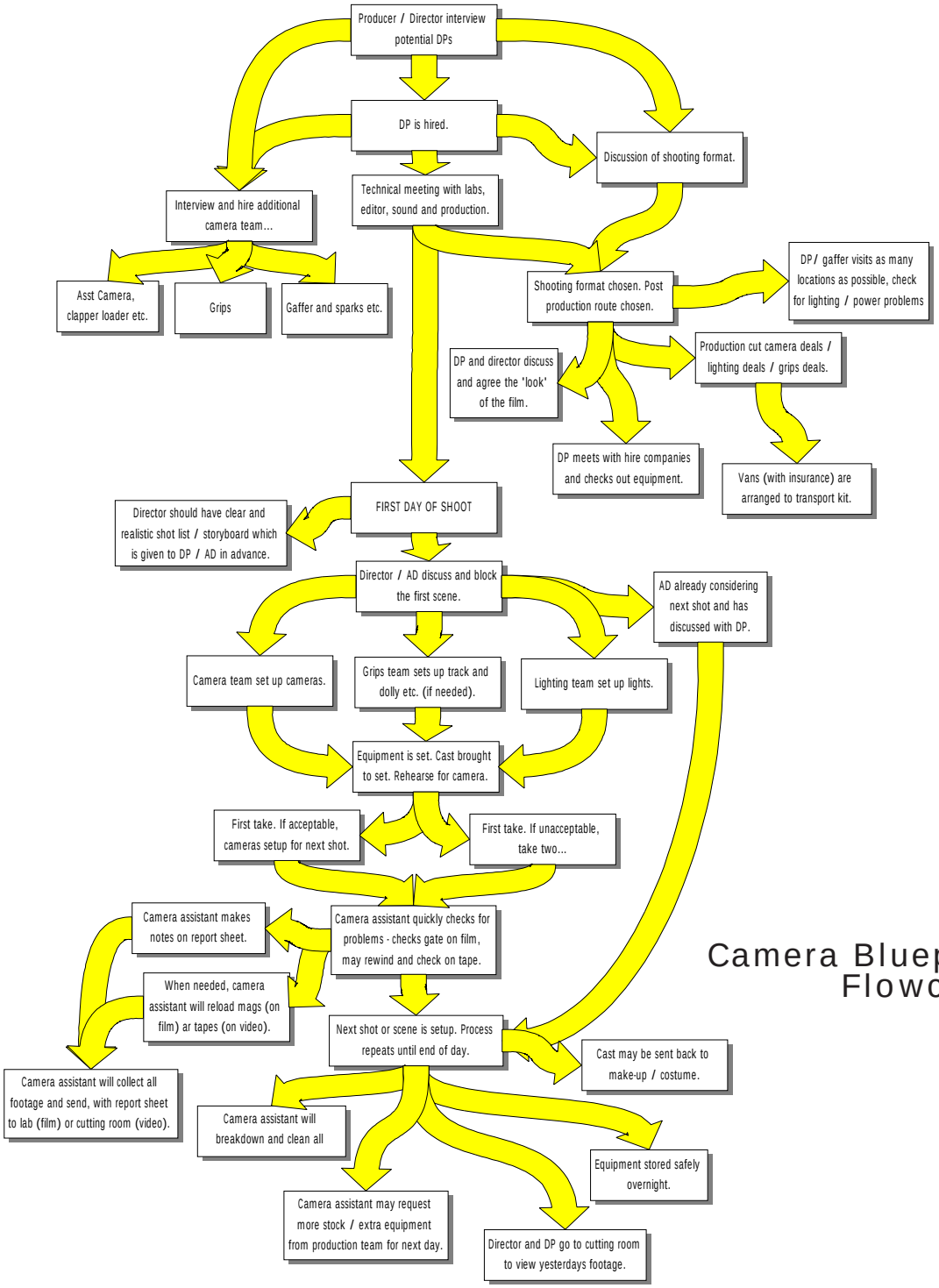
Camera Dept. Blueprint

The camera is the 'eye' of the film, it captures the events through which the film is told. Debates rage over formats but ultimately, it's all about story. A fact often forgotten by new filmmakers

Most new filmmakers fixate on the camera… *'What camera should I hire?', 'what format should I shoot?', 'should I shoot film or digital?'* Once they have procrastinated over these questions for some time, they then fixate on their DP, that is their director of photography, *'my DP is amazing! You should see their showreel, its beautiful!'* Almost every director and producer seems to think that *their* DP is the best on the planet and that every shot they will compose, light and shoot will be a work of art. Not that I am saying that there is anything wrong with this, it's just usually at the cost of very important issues, such as script, casting, production design, make-up and costume for instance. For some reason, new filmmakers seem to forget that the camera department is just one of the tools that is used to tell their story. No matter how good your movie looks photographically, if the story doesn't connect with the audience, because the script isn't good enough, OR if the audience doesn't experience the emotion of the story because the casting wasn't good enough, OR if the audience doesn't believe the story because the production design didn't create a suitably convincing world, OR if there just weren't enough shots because the director compromised coverage in favour of *'stunning shots'* that took too long to set up, then frankly the *'amazing photography'* means diddly squat. A bad film told with pretty pictures is still a bad film. A good film with dodgy shots is still a good film.

To cap it all, filmmakers so often forget that audiences are just not interested in pretty pictures or production values. And even if they were, consider this. Your average slick TV commercial will have a budget of say $1m with which to create truly staggeringly beautiful images, which are then put in front of an audience, who lets face it, would rather make a cup of tea, chat to their

The camera team, including assistants, grips, sparks and gaffers, can be huge! So much of filmmaking can end up centred around acquisition of 'the image', and as the camera department is so large and dominant, it's very easy for other departments to suffer terribly.



Camera Blueprint Flowchart

Formats

So many new filmmakers get stuck in the seemingly endless debates over which format to shoot. Film or video? DV or Hi Def? Super 16mm or 35mm? Here are a few simple answers as to when you should shoot which formats.

Video Formats

DV (be it miniDV, DVcam, DVCPro etc.)

Shoot only when the story suits the format. These would be stories that are small, low key and intimate, where the insertion of a small, innocuous DV camera would not impact either the performances or the world. It may also be that the directorial style of shoot from the hip suits the story. Also, use DV when you have absolutely no budget. If you have some cash, strive for AND ACHIEVE a higher quality format such as DigiBeta. Many new filmmakers make the deeply regretted mistake of starting their project on miniDV only to realise the limitations of the format too late in the day.

DigiBeta

This is a fantastic, professional format that is ideal for shooting micro budget films, especially when the plan is to stay on videotape only (for sale to TV, DVD and video but NOT to play on a cinema screen). You can shoot in true 16:9 and the quality of images achievable is quite startling. You also have the benefit of cheap and reusable stock and a simple, tried and tested post production path. It is also possible to master your movie and blow up to 35mm and maintain visual excellence, which is much more questionable when having shot on DV.

Hi-Def

Essentially it's just high quality (definition) video, but it can be shot in progressive scan, which mimics the look of a film frame quite accurately. Hi-Def is probably the smartest option for the cash strapped filmmaker as you get the benefits of cheap and reusable stock, simple post production routes, and still maintain a very high resolution, future proof image. The downside is that there are few cameras out there and therefore getting a deal can be tough.

Film formats

Super 16mm

The lowest quality professional film format that you should consider is Super16mm. It has all the benefits of really looking like a movie because it is film, it's lightweight, robust and relatively cheap to shoot. Most importantly, it has that magic that you don't find on any video format, which is the 'f' word - film. All film formats create a sense of focus and urgency in everyone involved, which simply makes for better filmmaking. On the downside, S16mm is not suited to post production special effects (because the image can weave from side to side slightly, although this is not noticeable to the viewer in normal shots) and in order to produce a 35mm blow up, you will need a 'fat cheque' at the very end of post production. The real strength of S16mm is that you do not need that 'fat cheque' in order to get the movie in-the-can and all the way through post production.

35mm

This is where you DO need that 'fat cheque' up front. The format is hellishly expensive to shoot, but it carries all the advantages of shooting on film and the images acquired are truly second to none. If you can afford to shoot on 35mm, then I would strongly recommend it. The cameras are bigger and heavier than S16mm and most often, have only small magazines, which carry around 2½ minutes of film at a time. Whatever film format you choose to shoot, I would recommend you always shoot it at 25fps.

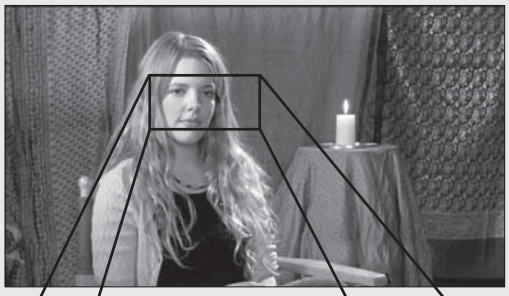
girlfriend on the sofa and fast forward through it. That's how interested audiences are in pretty pictures. Turn on MTV now and you will see what you are up against. You will not win. You won't match this. Let it go and work on telling the story in the best way that you can.

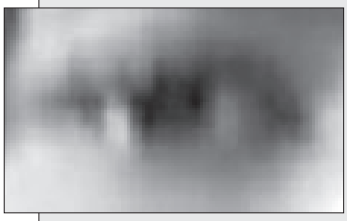
Now here's the rub. After saying all that, I'm now going to contradict myself and say that you should strive for the best images possible! But let me be clear, filmmaking on a low budget is a juggling act and the savvy filmmaker will always know how much of their resources should be invested in acquiring attractive

If shooting on film, a member of the production team should check with a member of the camera team how much film stock has been shot, so they can make sure you never run out of film stock and that your estimated stock budget is not unexpectedly being exceeded.

Definition

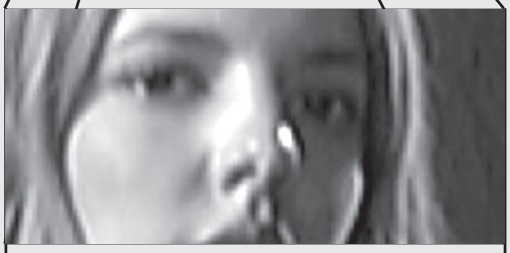
Much has been said about definition of various formats, that is, how much detail is actually contained in the image. These test images (all shot at the same time) on miniDV (Canon XL1), Digibeta, Super 16mm and 35mm, clearly illustrate just how little miniDV contains, when compared to 35mm for instance. These shots were correctly exposed and fully lit with key, fill and back lights. Sadly, these tests don't really show as much as I would like them to when sat on the paper of this page. On the screen, the differences are more marked, especially 35mm, which always gets a gasp!





MiniDV

The image is by far the poorest in quality, and is also higher in contrast than any of the others. Still, it is surprisingly good.



Digital Betacam

We were surprised by just how good DigiBeta actually was, when compared to Super16mm, the image is different, but the resolution is comparable. Not as contrasty as miniDV.

Super 16mm

The lowest quality film format was surprisingly low resolution, although certainly more attractive to the eye than DigiBeta.

35mm

Significantly higher resolution than any of the other formats. At 300% zoom, 35mm contains about the same information as S16mm or DigiBeta. To the eye, the image is startlingly sharper and more attractive than any other format.

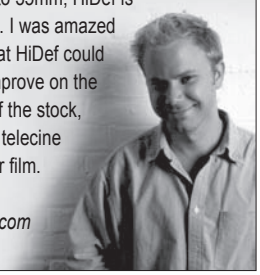
Hi Def v 35mm

There were enough rumours and myths flying around about HiDef and its similarities to 35mm to convince film maker Toby White to shoot the ultimate test. He and colleague Richard Hadley conceived a short film, called 'SNAP', to be half shot on 35mm and half shot on HiDef. They decided to assign each format to one of the two characters in the story so that, in the edit, the shots were continuously intercut and the footage could be directly compared, the actors serving as the reference for what was 35mm and what was HD.

35mm or HiDef...? It's almost impossible to tell the difference on paper, but trust me, it's suprisingly tough to see the difference on the big screen or small screen.

*Establishing wides were shot with both cameras and in post, the two halves of the frame from each format were then composited together to create a final shot that showed the two side-by side. '*I'd seen a few comparative tests' *said Toby, '*but none that demonstrated HD performing literally up against 35mm. The uniqueness of SNAP is that it makes a direct comparison across a variety of lighting scenarios.' *Even respected industry experts had to agree that almost all the time, they could not see a significant difference between the two,* 'people said that they stopped looking for the differences and just watched the action, the differences were so slight that even a discerning audience was more concerned with the storytelling.' *In fact, often the only tell tale signs were the physical flaws in the 35mm such as slight scratches and dust! Toby noted that the HiDef performed very well under natural light and produced extremely clean and sharp images, something that occasionally gave the game away, some people suggesting that, in some cases, it looked a little like super hi res video. For SNAP, the HiDef was shot at 25p, (that is progressive scan to mimic the true 25 frames a second of film, and not the 50 fields of video).*

Toby has also pointed out that 'the only real drawbacks with HiDef is that you cannot currently shoot slow motion, although you can mimic it in post production, and that while hire charges are currently similar to 35mm, HiDef is much more in demand so deals are harder to get… I was amazed at how well the HiDef performed!' The test proved that HiDef could mimic 35mm almost all the time, and actually improve on the format as the inherent photochemical flaws of 35mm were banished. Add to this the cost effectiveness of the stock, currently around £50 for a 40 minute reusable tape, compared to around £350 for 35mm stock, developing and telecine of around 10 minutes! A good rule of thumb is that overall HD production costs are about a third of those for film.



You can find out more by sending an email to the terribly nice Toby White at toby@gangsterpictures.com

images. For instance, check out some of the most successful, low budget features, such as Spike Lee's *'She's Got ta Have It'*, or Sam Raimi's *'The Evil Dead'*. There may be imaginative photography or bold images, but they are certainly not beautifully polished.

So why are new filmmakers so obsessed by amazing images? One possible reason, aside from a love affair with *'the image'* is that every new filmmaker began life as an amateur. Their prime concern is to fool the audience into believing that they are *'real'* filmmakers and not amateurs. How often have I heard some new filmmaker say something like, *'wow! It really looks like a movie…!'* This says more about the filmmaker's personal insecurities than it does about the audience's expectations, and I've got news for you, YOU *ARE* A FILMMAKER! AND YOU CANNOT FOOL THE AUDIENCE! You can

Aspect Ratios

The shape of the frame in which your film is shot is called the aspect ratio. Most telly, like soap operas for instance, are shot in a 4:3 aspect ratio, kinda square. Most movies are shot in a 1.85:1 aspect ratio, which is close to the 16:9 of widescreen TVs. Then there are the super wide movies that are shot in 2.35:1, like 'Titanic' etc. Almost certainly, you will shoot in a 1.85:1 / 16:9 format, but it isn't that simple.

Film Formats

4:3 Standard 16mm / 35mm frame

This is what standard 16mm shoots and 35mm too. In order to get a widescreen image from this frame, the tops and bottoms are cropped off. On 16mm this is not advisable (as the resolution is so low to start off with, by the time it's all blown up it could look horrendous). 35mm handles it beautifully though, AND 35mm has the advantage containing two aspect ratios on one negative, a full 4:3 framed image for TV versions of your movie, and a 1:185 cropped version (that is made in post production) for cinema and DVD. This cropping will take place in post production and the camera operator MUST be clear about what they are 'framing for' during the shoot.

1.85:1 Super 16mm

This is a great format for low budget film makers as it can be blown up to 35mm (optically or digitally) and 100% of the exposed image area is utilised. It's ideal for completing to a standard 35mm, 1.85:1 format for the cinema, and for DVD too.

2.35:1

This format, often called Cinemascope, is not ideal for low budgets as it has a few more expensive technical hoops to jump through to complete, and frankly, it's so wide, you may need bigger sets and therefore more lights blah blah…! Leave this huge and glossy format for 'Gladiator' and 'Armageddon'.

Video Formats

4:3 Standard Video Frame

This is the aspect ratio in which DV is most often shot. Most cameras come with an in-built 16:9 processor, but compared to the processors available in post production, you should avoid the in-camera ones like the plague. Unless you have a camera that has a true 16:9 chip, ALWAYS shoot in 4:3. (note - there are some 16:9 adaptors that screw on the front of the lens which can be used too).

True 16:9 (anamorphic)

This is still squeezed into a 4:3 'box' but, it contains the information to make a 16:9 image through processing at the viewing stage (on a video projector or widescreen TV for instance). This is the format that DigiBeta can shoot and is excellent. The squeeze is called 'anamorphic' and when unsqueezed the frame will be the same shape as the HiDef frame below.

HiDef 16:9 (non anamorphic)

This is an image that has no anamorphic squeeze and so is truly 16:9 widescreen all the way down the line.

Beware of night shoots. When there ain't no sun, everything needs to be lit, which means you'll get half as many shots. It's also cold and no-one can see anything. It's a god-damn nightmare on a micro budget!

impress your friends with pretty pictures, sure, but an audience will always judge a movie by a very simple benchmark, *'was it any good and did I get bored?'* Again, this has very little to do with beautiful images.

The DP

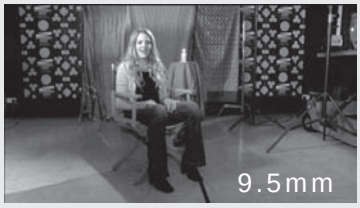
The director of photography is one of the first people new filmmakers seek out. Who should you hire? Well this may seem a little contentious, but I think any DP who knows their craft should be able to deliver an attractive looking film. So given that, the qualities you should be looking for are…

Speed - they must be able to work quickly and efficiently and rarely

Camera Lenses On Super 16mm

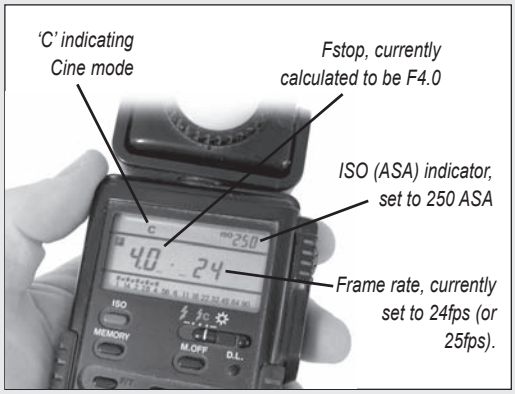
This series of images was shot on Super 16mm film and illustrates different lens focal lengths and their relationship to perspective. These were all shot on prime lenses from a distance of eight feet from the actress who, unless she had experience of photography, would not be able to tell which lens would give which shot. This is important to remember as most actors think that lenses are all kind of the same and shoot kind of mid-shots (a bit like the 25mm image).

If these shots were made using a 35mm camera, then the focal length would roughly double. For instance, if you shot on 35mm film, the 50mm lens would give you an image that looks roughly like the 25mm shot here. The same lenses are usually used on both 35mm and Super 16mm.



DV Camera Problems

The biggest and most frustrating problem with DV is that of lens width. Because the CCD inside the camera is so small, it's difficult to get a wide angle shot (without adding extra wide angle adapters and softening even more what is a very poor image to start off with). The shot below shows just how wide we were able to get using a DigiBeta camera, the inner box representing how wide we could get on the Canon XL1. Whilst this might not seem like a big problem, it can quickly turn into a nightmare if you are forced to shoot in confined spaces. Quite often, you will find that you just can't get everything in shot! Which then turns into a production problem 'we need a location with more space so we can get the camera further away.'



Using a Light Meter

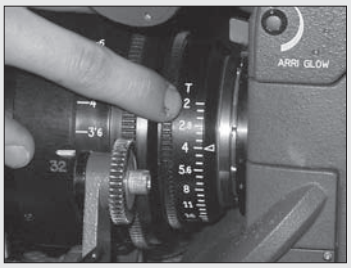
To shoot a picture on film, means light must be focused through the lens and onto the camera gate. Too much light and the image will burn out, too little and it will be too dark or even completely black. Light can be measured with a light meter, (all video cameras come with a built-in light meter). What the DP on a film will use is a hand held light meter, probably a Sekonic like the one pictured here. Most people are afraid of the light meter as it's often viewed as something similar to Harry Potter's wand! This is of course a mistake, it's a fairly simple tool that measures light and informs the DP what aperture the camera lens should be set to in order to expose correctly. Here's a rough guide…

Step 1 - Setting up the light meter

First set up the ASA (or ISO) of your film stock on your meter - it often goes from 12 ASA all the way up to 64000 ASA (!), but you will probably be shooting 200 ASA, 250 ASA or even 500 ASA for low light situations. It'll probably be a few button clicks to get to it. Next tell your light meter that you are shooting in Cine mode (not stills mode) and it will then offer a number of frame rates, from which you should select either 24fps or 25fps (it does not really matter which one as both are approximately the same). Now you are set!

Step 2 - Measuring the light

After setting up the lights, place the light meter close to the subject's face, point it toward the lens and press the button on the side. The white cone at the top of the meter will now register how much light is hitting the subject and calculate the aperture on the camera. You may want to tweak the lights at this point.



Step 3 - Setting the aperture

On the film camera lens there is a dial that has 'T' stops marked on it (on video it would be 'F' stops). If the light meter says 4.0, then set the camera aperture to T4. If you shoot now, the subject should be exposed correctly. Of course there is so much more to exposure and lighting than this, but this simple understanding is all you need in order to begin shooting film, even 35mm! It's not a dark art or rocket science.

As you experiment you'll learn how film responds to light, when you can open up the aperture more to make it brighter or close it down to make it darker. How much light you need to fill detail in shadow areas, how much light it will take to burn out to white and leave no detail, how far you can push underexposure until the image drops off to complete black . Now these questions DO start to push lighting into being a darker art, but the basics are easy peasy.

make mistakes. I have worked with ponderous DPs, who frankly, dominate the whole experience in the naïve belief that the only thing that really matters is a pretty picture. *'Coverage'* over *'Image'* any day in my book.

Temperament - they should be easy going, professional and hard working- AND pragmatic, understanding that sometimes they'll be forced to compromise for the greater glory of a good story well told. They should strive for the best images, BUT be content when forced to compromise.

Hard working - ironically, the DP is truly the only person on a film shoot (aside from the director) who never stops. The speed at which the DP works will dictate the speed at which the film is shot. A fast DP equals more coverage and coverage is your best friend in the cutting room. Don't forget, the camera team has the most physically arduous job on a film set. There is a huge amount of very heavy equipment that is constantly being moved. On big films, the DP would never touch the equipment. On your film, they will spend a great deal of time doing little more than physical labour.

Filmmaker - a DP who has either directed, produced, edited or written a screenplay, is a DP who will understand the greater glory of a good story well told. They will appreciate that theirs is a very important spoke in the wheel of the movie, but it is not THE most important.

Affability - given that the DP sits in front of the cast for such a huge amount of time, the DP who is a good *people person* will make your actors feel beautiful or handsome and keep their confidence boosted. Often, a secret dialogue will develop between the DP and the cast, where the actors will seek approval from the DP if for some reason they don't believe the director, *'are they just saying it was really good, what do you think?'*

Technician - a DP has a huge amount of kit at their potential disposal. They should understand what it all does and the ramifications of using it. Such as, a savvy DP will understand that if shooting in a PAL country, they should shoot film at 25fps and digital at 25P (not 24fps or 24P) respectively. Beware of the inflexible technician DP who will insist on shooting at 24fps or the most expensive film stock (any film stock will do, as it's all excellent!).

Artist - the most difficult quality to find, as it needs to be reflected by the pragmatic technician. Very often, the artist DP is inflexible, aloof and down right infuriating. If you can find a truly creative and artistic DP who is a real pragmatist, then you are onto a winner, just like my DP Jon Walker. Hey did I mention that Jon is probably the best DP in the world? You should hire him!

What to avoid

Unfortunately, the job of being a DP seems to attract some people with questionable or frustrating character traits. First is the inflexible artist, who

'Your camera/lighting team will respect your ability to negotiate their equipment lists, so get to know what everything is and what it's for. Accept that the lists may change if the schedule, weather or crew change, even if the director has a bright idea! Talk to your contacts at the camera, grip and lighting houses before the equipment lists are given to you and make friends. See what sort of deals could be offered, be honest, they will like you more. Hire companies won't let their equipment leave the building without insurance. Talk to the insurers of film productions, they will know the equipment, risks, language and may even know your DP and gaffer (which can work to your advantage).

When talking to the insurers you will need clear, concise equipment lists, the names of the drivers of the vans/trucks that hold the equipment and where it is all kept when not in use (weekends and overnights). They usually ask for the script and crew list too, so have those prepared. Get the DP and gaffer to check the lists (typed up neatly) before they go to the insurers.

Cut a deal with a secure parking company, one with 24hr manned security. Remember your drivers will also be members of crew and their day has to encompass collecting the truck (make sure you have requested free parking for their own vehicle during the working day) and then driving to location. At the end of the day, once the trucks are packed, they will have to drive them back. Think about how long the working day is and how many hours this is going to add. Involve the location manager so you can organise secure parking near the locations. This is obviously less of a problem if you are working from a studio.'

'Without doubt, the process of lighting is a scientific one; the physics of how light is transmitted, what colour it is and how bright it is, through to the chemistry of the way the film is processed and printed. You must understand this science. But this is only one side of the story. *The other is the 'art', what look and style you want. There are different ways of approaching this. You can create a look and feel by working within a set of rules that you set for yourself. For example, a good principle in film lighting is to* 'light from the back to the front'. *That means exactly what it says – think about how light passes through things and try and define the foreground action by 'cutting it out' from the background. As soon as you put too much front light onto a subject it can spoil the mood. You could work to several different styles using each to subtly underpin different aspects of the story. Having a set of rules will help constrain you and in effect provide the starting point for each scene you shoot, rather than there be endless possibilities which won't tie together in the final film.*

Each shot will have other shots either side of it, so it's not necessary for everything to be clearly visible. To clarify… if you were shooting a still photograph, then the whole picture must tell the story, but each shot in a film only tells a fragment of the story, so don't over-light to 'illuminate' the story, allow the camera and actors to 'illuminate' the story – don't be afraid of DARKNESS. Coverage is more important than that one perfect shot that took all day. There's only one master in a film… the story! *I don't want to go to a film and just watch pretty pictures. Too many low budget films suffer because the DP is lighting their* 'opus illuminatus' *and when the editor gets to cut it up there's too few shots to tell the story. The rules you set at the start can help you make quick decisions on set.'*

holds holy all things framed in their viewfinder and sculpted out with their beautiful lighting. Boy oh boy, gimme a break!

Second, is the arrogant film school graduate who just thinks that light emanates from both their *'amazing and heart stopping'* lighting setups as well as their own arse (a trait often shared by directors who have also graduated from film schools). Avoid like the plague!

Crap DP's. Yes I know it's staggering, but some DP's simply cannot operate a camera or light a scene. Ask producers with whom they have worked for an honest and off the record appraisal. Take these comments onboard, irrespective of how good the DPs show reel actually looks (and always remember that every producer or director thinks that their DP is the best one on the planet! Did I mention my DP Jon Walker and how amazing he is?)

Choosing your DP

Once you've chosen your DP, you will have a number of discussions about the size of crew, shooting format, the overall look of the film etc. Most important to nail down as soon as possible is your choice of shooting format. I've been pretty vocal about this throughout the entire book, but I will state it again. Whatever format you think you can achieve, choose the one above. If you plan to shoot on miniDV, try and get DigiBeta. If you plan to shoot on DigiBeta, try and shoot Super16mm. If you plan to shoot Super16mm, try to get 35mm etc. Almost always, the inexperienced filmmaker goes with convenience when choosing a format, which is a mistake (especially when it comes to shooting on miniDV just because you already own a Canon XL-1S). DON'T DO IT UNLESS YOU HAVE TO!

The size of the camera team will be decided largely on a budgetary level. Will the DP operate camera or will there be a separate operator? Will there be an assistant? Will the assistant also act as the clapper loader? Will there be a second camera or second unit camera team? Will there be grips equipment and if so, how many grips? Who will be responsible for setting up the lighting and electrics? Does the gaffer have any sparks (assistants) and if so how many? How many trucks will be needed for all the equipment and who will drive the trucks and do they have insurance? It goes on…

Another very important meeting will take place between all the technological heads of department, such as editor, director, sound etc. at the laboratory, where every aspect of production and post production should be hammered out in meticulous detail. If you are shooting on tape, it's a good idea to go to a top online facility and ask one of their engineers to help you plan your post production route, they will more than likely be very happy to advise as long as you are not too arrogant. Everyone at this meeting, lab or online facility, should understand the impact of the choices on the production and post production route for their particular discipline or department.

Exposure

When you shoot a picture with a camera (digital or film) it is created by focusing an image through the camera lens onto an area within the camera where the image will be recorded - in the 'gate' and onto negative with film, or onto the CCD with digital. The trouble is, to get the image looking just right, there needs to be just the right amount of light. Too much light and the image will start to bleach out, too little light and the image will start to get dark and eventually turn black. The amount of light getting into the camera can be controlled by the aperture on the camera. Mechanically, the aperture is a lot like the iris in your eye. When it's dark, the iris opens up to let more light in, when it's bright, the iris closes down to restrict the light entering the eye. Same with a camera.

The aperture is a ring on the camera lens and is usually marked with numbers called 'F stops'. Photographically, light is measured in F stops - if you have ever been on a film set you might have heard the DP shout to the Camera Assistant 'two eight…!' *This is short hand for the camera team. The DP has used their light meter to measure the amount of light on the set and knows that to expose it correctly (with the film stock in the camera) the aperture ring needs to be set to F2.8 (hence the comment* 'two eight…!')

The upshot is that, if the camera team do their job well, all images should be correctly exposed. Occasionally mistakes do get made, or the light fades and the images are underexposed… And unlike our eyes, film and video do not deal at all well with too little light. As you can see from the images above, only a couple of stops either way can be disastrous. There is a little latitude at the labs to 'push' and 'pull' images back from the brink, but it can lead to unpleasant results such as excessive grain or milky grey blacks. It's essential to get the exposure spot on, perhaps even over exposing by half a stop on film (which will create more detail in the negative without losing the brighter areas).

A common mistake I have come across is when a new filmmaker has dived head long into their shoot, only to discover that a simple, ill informed choice has consigned them to an overly complicated and excessively expensive post production route. The most common mistake is a new filmmaker shooting at 24fps and not 25fps in the belief that 24fps is somehow 'the way its done', when in fact they have just made a technological choice that will cost them many thousands of pounds in post production and have no real-world impact whatsoever on the end result.

The look

In the weeks running up to the shoot, the DP and director should spend time discussing at length the visual style of the film. This is broken down into two parts - lighting and operating.

The choice of lighting style is one of the things that can significantly impact

Simple Lighting Setup

Even the simplest of shots needs to be lit properly, or it will look like your average home movie. This simple mid shot of an actress required four lights - key light, fill light, rim light and a background light. The overhead diagram to the left illustrates where each light was positioned.

Key Light

The key light 'models' the subject and is often the most important light in the scene. It is often the foundation on which all other lights are based. In this case it is a light placed to the left of the actress, perhaps representing a window light source (in the story of the shot).

Fill Light

This light is designed to 'fill' the harsh shadows created by the Key light, to create a more natural and rounded look. It will pick out detail and texture where otherwise there would be only dark shadows.

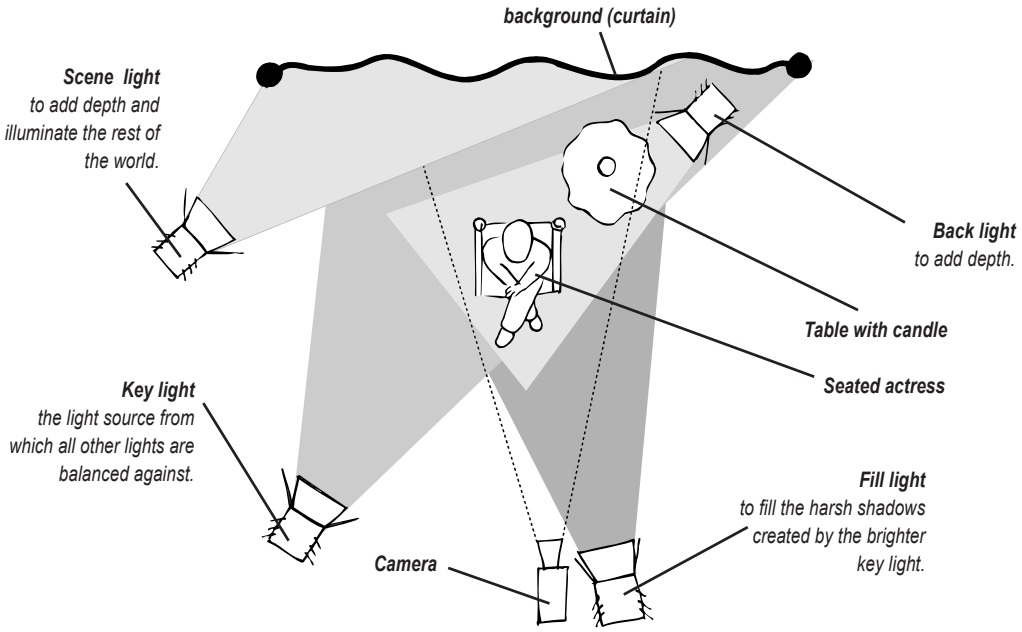
Back Light

To add another dimension, a light source is mounted behind the subject. It hits the back of objects and the actress and gives a nice impression of three dimensionality.

Background Light

This light has been positioned to illuminate the background of the scene to create a more natural look. Without it, there would be a fully lit actress sitting against a very dark background.

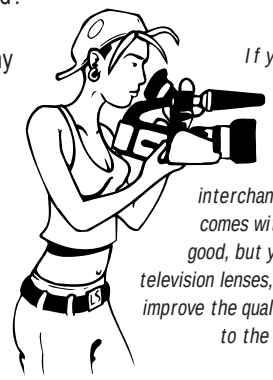
Overhead Diagram of Lighting setup (left)



the speed at which you shoot. For instance, complicated, glossy lighting can take a great deal of time. Are you aiming for a film noir look, or social realism? Or Ridley Scott's *'shafts of light'* look,or harsh and bright primary colours as used by Pedro Almodavar, or the dark and moody look of 'Se7en'?

The choice of operating style will be the domain of that camera operator. It's essentially a discussion about framing and camera movement. Are you going to shoot images that are *'sat back'*, static and symmetrical in a Kubrick-esqe style, or are you going to go for a shoot-from-the-hip wobbly cam style like 'The Insider', or are there going to be lots of slick track and dolly camera movements like your average American action movie, or will there be super fast track and dolly Scorsese style, or even Steadicam overload, again, Kubrick inspired?

Of course, on a low budget movie, you're going to struggle to achieve any consistent look of excellence because there simply isn't time or resources, but as long as everyone is talking the same language, then the on-set short hand between DP, AD and director will speed things up.



If you have been forced to shoot on DV, then the Canon XL1S is an excellent choice because of its lens interchangeability. The lens that comes with the camera is pretty good, but you can also hire superb television lenses, which will dramatically improve the quality of the image. Speak to the camera hire companies.

Kit

Whatever format you have chosen, the producer or production manager will arrange a deal with the equipment houses based on an initial wish list supplied by the DP. In almost every instance, this wish list is unreasonable and unrealistic. The hire companies will know this and

Colour Chart and Grey Scales

If you are shooting on film, at the start of each day you should shoot a few feet of colour chart and grey scale. These will be used by the lab to get the correct density and colour balance changes that might occur due to slight changes in stocks, or the laboratory baths themselves. You can get these charts from the stock manufacturers (Fuji or Kodak), the labs or the camera hire companies. Some people choose to tape these charts to the clapper board, but that means that if it is to be useful, the clapper board should also be properly lit (which it rarely is!) and exposed accurately.

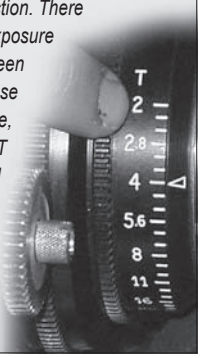
If you are shooting on video and plan to use a monitor to check your lighting, make sure you have a top notch monitor and that you use the colour bars from your camera to set it up properly.

make suggestions that will modify the list, making the equipment cheaper to hire but stay in the spirit of the DPs aspiration. These lists can be encyclopaedic in detail, when you add up cameras, lighting and grip equipment.

Once a deal has been struck, the DP should visit the hire companies to check out and play with the equipment. Most important is the camera hire company, where the DP should familiarise themselves with the camera equipment. In a best case scenario, the DP will shoot a number of lens and exposure tests, so that they will better understand the limitation of the lenses and the exposure curve of the film stock they have chosen - some film stock handles more or less than the ideal amount of light better than other film stocks for instance. These same tests should also be carried out even if you are shooting on a video format, be it DV, DigiBeta or Hi-Def.

F/stops & T stops

The camera has a lens with an aperture, which has settings called 'T stops' or 'F/ stops'. What's the difference? F/stops are a theoretical measurement of the amount of light that will pass through a lens and T stops are the actual amount of light passing through. The difference is due to factors like the thickness of the glass in the lens and internal reflection. There might be slight exposure differences between two lenses if you use F/stops for instance, but not if you use T stops. Video and stills lenses tend to be marked up in F/ stops and film lenses with T Stops.



Location

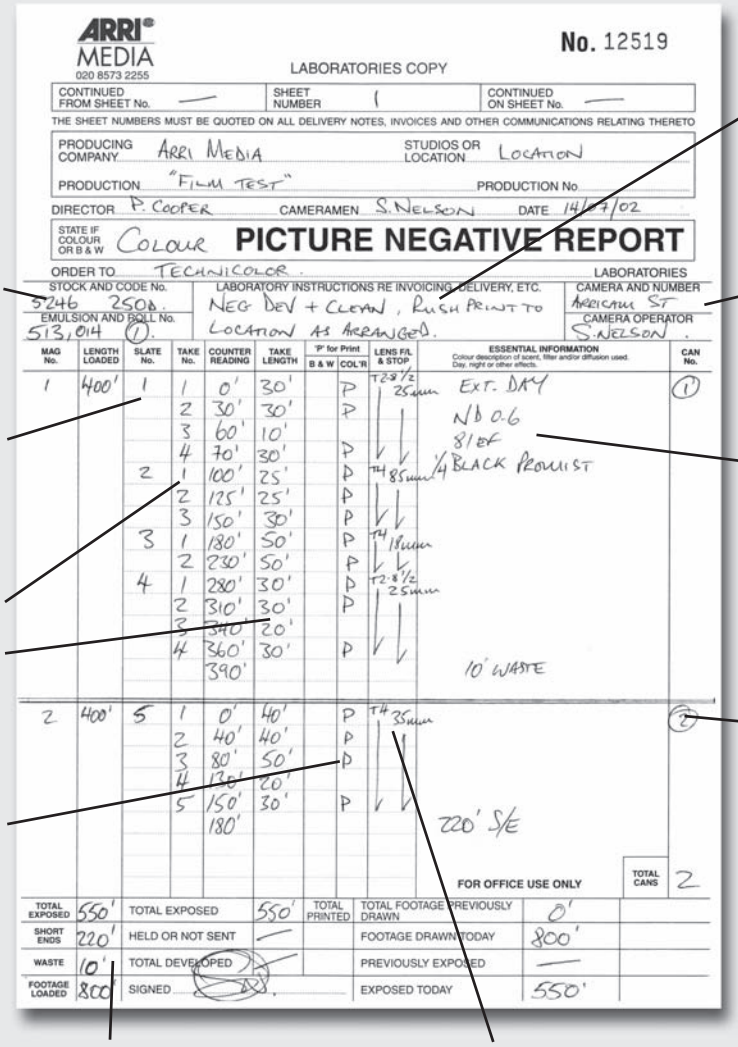
The location manager will have been working their way through the screenplay and finding possible places to shoot scenes. Hopefully they will have been mindful of things like sound, but also of the 'look' and access to power. Once locations have been short listed, the director, DP, sound recordist and gaffer should visit them with the location manager. There will be an obvious discussion about the visual suitability of the location, but also there will be specific technical checks. How high are ceilings and can lights be mounted high enough? Are there strip lights and if so, can the unbalanced (colour temperature) tubes be removed and be replaced with special film strip lights? What power is available and can the gaffer tap into it? Will a generator be needed? If so, where will the generator be situated, so as not to interfere with sound? Is daylight going to be a problem as there may be large windows in a location where night time scenes will be set? …along with all the usual stuff that the location manager would take care of routinely, such as parking, loos, catering etc.

Transport

As production approaches, the production team will start working on hire vehicles. There will be a tremendous desire to force departments to share vehicles to save cash. Beware though, as this can be a false economy. You

The Camera Report Sheet

This document is usually filled out by the assistant camera person. This one is for a movie shot on film, opposed to video (which would differ slightly), and is used by the laboratory and editor later on down the line. Each night, a copy of this document will be taped to the exposed film cans and sent to the lab (or if shooting on tape, a copy will be sent with the tapes to the cutting room). You will get a pad of these triplicate sheets from the hire company when you hire your cameras.



ARRI MEDIA
020 8573 2255

No. 12519

LABORATORIES COPY

CONTINUED FROM SHEET No. — | SHEET NUMBER 1 | CONTINUED ON SHEET No. —

THE SHEET NUMBERS MUST BE QUOTED ON ALL DELIVERY NOTES, INVOICES AND OTHER COMMUNICATIONS RELATING THERETO

PRODUCING COMPANY: ARRI MEDIA — STUDIOS OR LOCATION: LOCATION

PRODUCTION: "FILM TEST" — PRODUCTION No.:

DIRECTOR: P. COOPER — CAMERAMEN: S. NELSON — DATE: 14/07/02

STATE IF COLOUR OR B & W: COLOUR

PICTURE NEGATIVE REPORT

ORDER TO: TECHNICOLOR — LABORATORIES

STOCK AND CODE No.: 5246 250D — LABORATORY INSTRUCTIONS RE INVOICING, DELIVERY, ETC.: NEG DEV + CLEAN, RUSH PRINT TO LOCATION AS ARRANGED. — CAMERA AND NUMBER: ARRICAM ST — CAMERA OPERATOR: S. NELSON

EMULSION AND ROLL No.: 513,014 (1)

MAG No.	LENGTH LOADED	SLATE No.	TAKE No.	COUNTER READING	TAKE LENGTH	'P' for Print B & W	'P' for Print COL'R	LENS F/L & STOP	ESSENTIAL INFORMATION (Colour description of scene, filter and/or diffusion used. Day, night or other effects.)	CAN No.
1	400'	1	1	0'	30'		P	T2.8 1/2 25mm	EXT. DAY	(1)
			2	30'	30'		P		ND 0.6	
			3	60'	10'				81 EF	
			4	70'	30'		P			
		2	1	100'	25'		P	TH 85mm	1/4 BLACK PROMIST	
			2	125'	25'		P			
			3	150'	30'		P			
		3	1	180'	50'		P	TH 18mm		
			2	230'	50'		P			
		4	1	280'	30'		P	T2.8 1/2 25mm		
			2	310'	30'		P			
			3	340'	20'					
			4	360'	30'		P			
				390'					10' WASTE	
2	400'	5	1	0'	40'		P	TH 35mm		(2)
			2	40'	40'		P			
			3	80'	50'		P			
			4	130'	20'					
			5	150'	30'		P			
				180'					220' S/E	

FOR OFFICE USE ONLY — TOTAL CANS 2

TOTAL EXPOSED	550'	TOTAL EXPOSED	550'	TOTAL PRINTED	TOTAL FOOTAGE PREVIOUSLY DRAWN	0'
SHORT ENDS	220'	HELD OR NOT SENT	—		FOOTAGE DRAWN TODAY	800'
WASTE	10'	TOTAL DEVELOPED			PREVIOUSLY EXPOSED	—
FOOTAGE LOADED	800'	SIGNED			EXPOSED TODAY	550'

Instructions
Telling the lab what is needed.

Stock information
So the labs know which stock has been used.

Camera
So the labs know what camera was used, helpful if there is a problem.

Slate number
Which will correlate with the visual clapperboard ident at the head of the shot.

Description
Information on the shots or scene, in this case including notes on creative filters used (1/4 Promist).

Take number

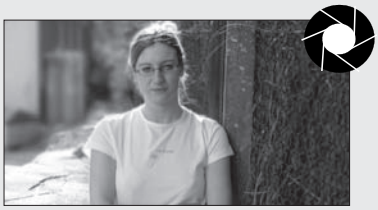
Footage
A rough guide of the footage for each shot.

Can number
As negative is delivered in numbered cans (reels).

Print or not?
P indicates shoots that should be printed (telecine). Nowadays almost all footage is telecinied.

Footages
Used for keeping tabs on how much was shot / wasted etc. This information is used by the production office.

Lens and F stop
A note of the lens used and the F stop for exposure / depth of field issues.



A wider aperture and less light means that there is a narrower depth of field, which can help 'cut out' an actor against the background.

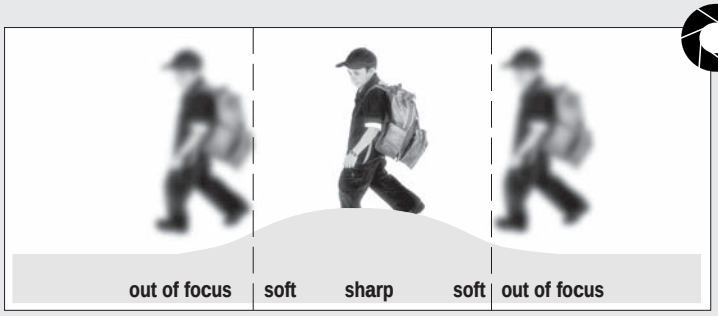
A tighter aperture with greater light means that there is a wider depth of field, which means the extreme foreground and background may be simultaneously in focus, creating a more 'cluttered' image.

Depth of field

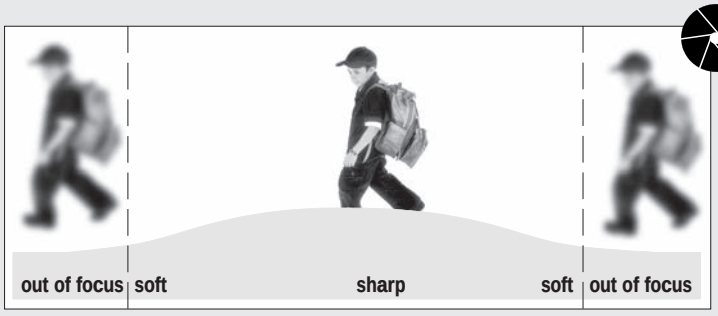
When you photograph something you expect it to be sharp and in focus. Sometimes though, there are problems and an inexperienced director may complain that some of their shots are 'soft' or even out of focus, 'why can't they just focus the camera?' *The problem is depth of field. When a subject is in focus, there is an area in front of the subject and behind the subject that is also in focus, but as you get further away from the focussed subject, so it will start to go soft and eventually out of focus altogether. This is depth of field. That's OK, just focus the camera and it should be fine, yes? But… what if an actor needs to walk up closer to the camera? Walk out of the focused area? In that case, the focus puller will refocus the camera, live, so that the actor stays within the pin sharp part of the focus range. But consider this, the depth of field, that is the sharp area that is in focus, can sometimes be a matter of a couple of inches.*

Depth of field is dictated by the type of lenses used and by the amount of light. The general rule is, the more light on the subject, the wider the depth of field, the less light, the narrower the depth of field. More light means that the camera aperture is closed down, less light means the aperture is wider (producing a narrower depth of field). The ASA of the film stock can also modify the depth of field (the higher the ASA the less light is needed, the narrower the aperture, the greater the depth of field), as can shutter speed on Video Cameras (the higher the shutter speed, the less light is hitting the CCD, so aperture must be set wider to expose correctly, producing a narrower depth of field).

The depth of field issue is an ongoing problem for low budget filmmakers as they never have enough lights and are constantly struggling to stay in focus. Creatively though, depth of field can also be used to 'cut out' *actors against a background.*



Narrower depth of field
Lower light levels means that the camera aperture needs to be opened more, which in turn means a narrower depth of field. Actors can move less without the camera assistant having to 'follow focus'.



Wider depth of field
Higher light levels mean that the camera aperture is closed more, which in turn means a greater depth of field. Actors can move more with the need for the camera assistant to 'follow focus'.

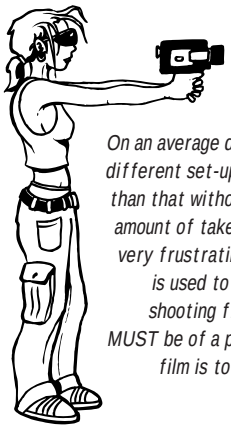
Your Eye versus your Camera

On set your eye will see lots of detail in both the highlights and shadows (middle). On film however there is much less bandwidth and if exposed for detail in the highlights (right) the shadows will clamp right down, or if exposed for detail in the shadows the highlights will burn out. (left)

Your eye has tremendous bandwidth. You can look at something very bright and something very dark at the same time, and still perceive detail in both. A camera can not do this, it has much less latitude between darkness and light. This is one reason why inexperienced filmmakers are often surprised at how good their rushes look, 'it looked so flat on the day! It looks great here!' *Essentially, shooting on film or video will increase the contrast so that shadows become much darker (or highlights could burn out although it is rare to make that creative choice). It's the job of the DP to measure all the light that is on the subject so that they control what is, and what is not 'illuminated'. This is one reason why it can take so long to light a scene. The DP is attempting to get the camera to record images that look like how we* 'see'. *Perversely, one of the easiest looks to achieve is a stylish film noir look because there is little attempt to fill shadows or create an image that looks 'real'. One simple trick to get closer to how the camera will* 'see' *is to wear sunglasses on set, even at night! The sunglasses will increase the contrast in your vision, leaving highlights where they are but clamping down the shadows and making them darker (but this is a rough guide). And you thought directors wear those shades to look cool! Actually, I think most do!*

don't want the lighting team climbing all over unused grips equipment just to get to their lights for instance. It's usually best to hire a Luton sized van for the lighting equipment, a transit sized van for basic grips equipment and hopefully one of the camera team will own an estate car for the camera equipment. One discussion to have as early as possible is, *'who will drive these vehicles?'* Are they comfortable with driving a truck, experienced, and what are the insurance implications? Do not leave this issue until the eleventh hour or I can promise you, the producer will end up driving the grips van, which is not a good use of the producers time!

Alongside the question of who will drive the vans, is the obvious question, where will the vans be parked over night? Will hundreds of thousands of pounds of film equipment be in the back of those vans over night? If so, is it covered properly by insurance? If not, who unloads the vans every night to lock up the kit, where does the equipment go and who reloads it every morning? These simple practical issues can often



On an average day you will shoot around 20 different set-ups. It is hard to shoot more than that without compromising either the amount of takes, or the lighting. It can be very frustrating for a new filmmaker who is used to just grabbing a camera and shooting from the hip, but the images MUST be of a professional standard if the film is to be sold in the international marketplace.

DigiSlate

A DigiSlate is a clapperboard with the ingenious addition of a digital timecode display (hours : minutes : seconds : frames). You can either feed it with a SMPTE timecode signal, or ask it to count time through its own internal clock, and it will display the timecode whenever the clapper is open (it's blank when the clapper is shut to save battery power).

Ifused on a feature film shoot it can significantly speed up synching sound and picture either at the lab or in the Avid. If the timecode on the sound recordist's DAT machine is the same as the timecode displayed on the DigiSlate, it is a simple process to read the timecode as the slate claps shut and quickly find the corresponding audio clap at that point on the DAT tape, rather than listening manually for it.

The usual method is this: both the DAT recorder and the DigiSlate will be set to run in "time-of-day" timecode – that is, they both count on their crystal-sync internal clocks. At the start of the shoot day the sound recordist will connect a cable from the timecode out of his DAT machine to the timecode in of the DigiSlate, thereby "jamming" the timecodes together. The DAT recorder and DigiSlate will now be running in sync, displaying identical timecodes. However, after several hours they might drift off by a few frames, so at a convenient moment the sound recordist will "jam" the slate again. The only problem with this method is that the DAT tape will have timecode breaks between every slate, which is fine if you are synching up at the lab (who use an edit controller and can jump past timecode breaks easily) but makes it very hard to load into an Avid (which prefers tapes with unbroken timecode).

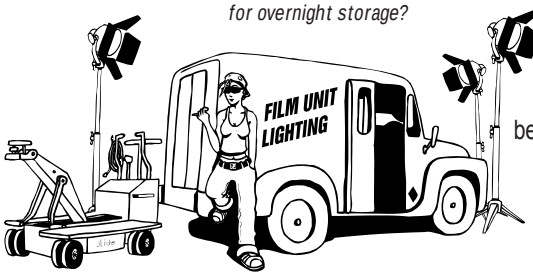
One way round this problem is to run the DAT recorder in "record-run" timecode, which means the timecode signal will run continuously down the entire tape, and transmit the SMPTE audio timecode via a radio signal to the DigiSlate. The added bonus of this solution is that you never have to "jam" the DigiSlate, as it is always displaying whatever the DAT recorder is doing.

add two hours manual labour each and every day to an already over worked, over stressed camera team. Remember this, every time you say, 'of course we can shoot for twelve hours every day', are you actually asking some crew members to work a fourteen hour day, who then may have an additional hour of travelling either way?! Be considerate unless you want people to slow down through exhaustion, or worse, risk injury or accident.

First day

On the first day of the shoot, the camera, lighting and grips teams will turn up - along with everybody else. The director should have already planned out the shots for the day and communicated that to the AD, who will then instruct the DP to set up the first shot. Sometimes the director will bring the cast to set to do a 'block through' of a scene before it is lit. This is not a rehearsal, it's a kind of physical work through so that everyone knows the physical space in which the scene will be performed. The actors will then go to costume and make-up and the DP will tell his gaffer and sparks where to put the lights. If the shot requires any track and dolly, the grips will also be instructed to lay down some track and set up the dolly. Depending on the complexity of this first shot, it will usually take anywhere between 20-60 minutes to set up. When the crew is really rocking, it's on average around 20 minutes to set up, but this being the first day, you can bet it's going to be more like an hour.

Cameras, lights and grips all amount to a huge amount of VERY expensive equipment. You are going to need at least one and maybe two or three vans to drive the stuff around, so there is a hire charge there. But more importantly, who is going to drive? Do they have a license? Are they comfortable? Are they trustworthy? Where will the equipment be stored overnight? What are the insurance demands for overnight storage?



Once the lights are roughly in place, the DP will start tweaking, often asking a runner or other unused crew member to stand-in,

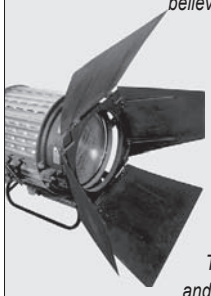
so the DP can see how the lighting will hit the cast. They will use their light meter to measure the quantity of light in any given space and generally and efficiently do their job, which is essentially to put light and shadow in the desired places.

At the same time… the camera operator will have been setting up the camera on a tripod (if it is a static shot) with the desired lens. They will frame the shot up and roughly focus the lens, sometimes using a tape measure to ensure that the shot is in focus (it is very hard to focus a film camera, especially under low lighting scenarios, such as night shoots).

At the same time… the clapper loader or camera assistant will have been in a different area or room that has been sectioned off for the camera team and

Colour Temperature

For the purposes of filming, light comes in two basic flavours, or should I say colours. Being a black and white book this is a pretty tough concept to get over, but let's give it a go. First off you have to understand that your brain is really good at making all light look kind of like daylight (that is white light), whatever its tinge or cast. Film stock is not so smart (or video cameras for that matter). For instance, some normal light bulbs burn with an orange glow, some fluorescent tubes give off purple or green light. Don't believe me? Take a look. Take a long hard look, especially at fluorescent tubes and you will see a difference. When driving at night, look through office windows and you will see all manner of different tinges to the 'white' glow.



The White Flavour

The first flavour of light is called 'daylight'. Not surprisingly this comes from the sun in the first instance, but it can be mimicked with artificial film lights, usually HMI lighting (left). Daylight is kind of a white light, it's what we perceive as being most normal and flat, where colours are true.

The Orange Flavour

The second flavour of light is tungsten. This usually comes from a lamp that actually burns a filament, and it's really rather orange in colour (right). You may have noticed it momentarily when you turn on your lights at night and your eyes register the colours as being very warm and orangey, or perhaps when you shoot a photo and the flash didn't go off (the flash is white light by the way), then you get the picture back and it's all orange. That's the colour of tungsten light.

So how do we deal with this as we want everything to look 'normal', that is in a way that we perceive reality? Film stock, cunningly, comes in two flavours. Daylight and Tungsten. What a surprise! One for each flavour of light. 'Ah,' *I hear you say,* 'what if you have both types of light present in a scene?' *Maybe a shot where there is a window with daylight coming through, but tungsten lamps in the room? Well you could shoot it with daylight film stock, meaning the light through the window would be the right colour, but you would then need to modify the lamps inside the room and cover them in a special clear blue sheet called gel. This would change the colour of the tungsten lamps to daylight (and also reduce the amount of light coming out of them too). The other thing you could do is put an orange gel on the window, turning the daylight into tungsten light and shoot the scene with tungsten film stock. Either way, what you must make certain of is that all sources of light are balanced the same - either daylight or tungsten, or you will be left with very weird lighting colours that will just look kind of crap and amateurish.*

Video cameras, be it DV or HiDef, have their version of this which is called the White Balance, an electronic way of telling the camera what kind of lighting is being used. On the whole it's simpler, but the rule is the same. Always ensure all light sources are balanced the same, daylight OR tungsten.

Wide or Long?

This close up was shot on a wide lens and on a long lens, on Super 16mm (Arriflex cameras).

***The wide lens (above)** is a 12mm lens which meant that the camera had to be positioned very close to the actress (about 18 inches) to accommodate the frame needed by the director. In the actual shot, you can sense her discomfort at having a camera* 'right in her face!' *The optics of the lens also mean that the shot is a little distorted and the actress is seen in a more unflattering way (as the lens distorts her features etc.) The background feels more cluttered too and overall it is, for my money, an uncomfortable shot. That's not to say it shouldn't be used, just that it is visually more uncomfortable. One upside is that you may be able to shoot in smaller locations as you can get 'more' with a wider lens*

***Longer lens (above)** is a 25mm lens and has a much more attractive 'look'. The actress is not distorted and as the camera is now some distance away (about eight feet) so she is no longer intimidated by its presence (and so her performance relaxed a little). The background is less messy too. Overall a more attractive shot. As a bonus, the further apart the actress and the camera, the less 'noise' from the camera could possibly pollute the sound recording. For my money, a creative improvement and a technical advantage too. Beware though, you need distance to shoot on longer lenses, so look for locations that are big.*

they will be loading a roll of film stock into the empty camera magazine. A film camera kit will probably come with three magazines, and it is the camera assistant or clapper loader's job to make sure that the magazines are always fully loaded. Once the film stock in a magazine has been shot (which will happen sporadically throughout the day), it is quickly and efficiently unloaded into an empty film can and re-loaded with a new roll of film stock. If shooting video, this job is a lot easier, as it's little more than labelling tapes, and sometimes striping tapes in advance (depending on the format and choice of post production route).

There are two key stages for the DP - principle photography and the final print grading stage. The key thing to do in principle photography is to get the best negative you can (expose properly, don't under-light too much). You can do almost anything with a good negative, especially now with digital post-production). So when you're shooting night scenes, your rushes should be brighter than you know the final print will be (don't go mad – the mood should be there, but so should the details in the dark areas). The DP should be at the grade, they shot the film and their work isn't finished until the grade is finished! At the end of the day the grade is where the foundations the DP laid will finally show the 'glory' of their work.

At the same time… the grips will be setting up the track and dolly (if needed). The director or AD will explain the shot to the grips, who'll then lay down metal track, which comes in 8ft lengths of 'straights' and 'curves'. Much of the grips time will be spent on levelling the tracks with a spirit level and using thin, wooden wedges to fractionally raise or lower the track where needed. This is because almost every surface is slightly uneven, which will create a bump or kick in the camera movement. Once the track is in place, they will carry the dolly, which is a kind of heavy metal camera platform, and place it on the tracks (this is usually a four person job). They will then run the dolly up and down the tracks, working on keeping everything smooth, sometimes using talcum

Cheap Special Effects Filters

If you want a cheap way of doing a great 'in camera' effect, inexpensive plastic filters, like the ones made by Cokin (available from camera shops), are just the ticket. There are loads of weird and wonderful ones available and at an average of a tenner a pop, they're heaps cheaper than renting. Your DP may pass their spleen when you hand it over and ask 'em to stick it to the front of the lens with tape… but they do work, and work extremely well. I've used them to great effect in all the features I have made so far.

before

after

Polarising

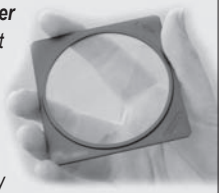
Much like your polarizing sunglasses, it you place the camera at a right angle, this filter can radically reduce reflections in a window. Obviously useful when shooting through glass on sunny days.

before

after

Close up filter

Most camera lenses do not get very close to a subject. So if you want that extreme close up of an eyeball or a phone book entry, you are going to need a close up filter. They look a bit like a large magnifying glass, and come in different strengths. I would buy the strongest.



before

after

Graduated Filter

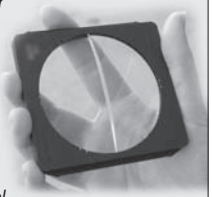
Used to create heavier skies for that Tony or Ridley Scott look. Many different colours are available, including a neutral grey which can be used to simply darken the sky so that it does not over expose and burn out, thereby losing the details in the clouds.

before

after

Split Diopter

This is essentially half a close up lens. It allows the extreme foreground and backgrounds to be in focus at the same time. It's a weird effect, but very pleasing in the right circumstances. Often a vertical object such as a door, tree or wall is used to disguise the transition from one focus plane to the other.



Annoyingly, some video camera lens housings rotate with the lens when focusing which can make using a filter almost impossible.

'Shooting on tape and film are different jobs. Assisting on tape is quite easy and anyone who has the desire and temperament will pick up the job quite quickly. Not so with film, it can be very complicated. You just can't blag your way when assisting on a film - you must know how all the bits fit together, how to load and unload film etc. One simple mistake could be disastrous. Film kit is much bulkier and heavier than video, especially with 35mm equipment. And there are so many aluminum flight cases that all look the same, so label each one for quick reference.

In between jobs, go to the camera rental companies and get to know all the kit. Being an assistant is always about professionalism and efficiency. You should always know how everything works and fits together (and there is always a new piece of kit) and be thinking ahead. For instance, if you are sitting around for 20 minutes, if you know the next scene is outside, you could start moving the equipment. Always be one step ahead. If there is a problem with any kit, deal with it immediately and demand excellence from the camera hire companies. If the camera fails or damages the film / tapes, it's YOUR fault. Test everything each morning, running it for a short time, making sure it works and isn't making any funny noises. No-one will thank you when it goes well, but when there is a problem they will scream at you!

Make friends with the grips and lighting team as they will be your buddies and help you pack your kit late at night in the rain - there is no chance the make-up or wardrobe assistants will help you. Oh and buy a Leatherman and keep it clipped to your belt. It's one of the best investments you will ever make.'

powder on the tracks to help smooth out the shot. The last thing they will do is put the tripod head onto the dolly and then a member of the camera team will put the camera onto the dolly. Then the camera team and grips team will begin rehearsing the camera movement.

As you can see, the various members of the camera teams are pretty busy - before, during and after each and every shot.

Cast come to set

As everyone nears readiness, the AD will ask the cast to come to set and the first rehearsals will take place. During these rehearsals, a number of things will happen. The director will work with the actors, perhaps modifying the previous agreed movement in the blocking session, and a member of the camera team may mark the floor with white camera tape to give actors *'a spot to hit'* for focusing. The camera team will try out the camera movements and the focus changes that may be needed and the grips may rehearse the camera movements. After everyone feels confident that it's kind of getting there, the AD may call for a first take. Everyone will get ready, the AD will call for silence, and then the shot will be, er, shot! Almost certainly, the first take will not be quite right, so immediately everyone will re-set for a second take. It's often a good idea to do multiple takes of every shot for insurance purposes (the labs may have a problem or a tape may snag in a video player for instance). Once the director is happy, a member of the camera team will quickly check for technical faults. On video, they may re-play the tape to make sure it's okay, on film, they will take the lens off the camera and *'check the gate'*, that is look for dirt and fluff in the camera gate. If they find any, you may be forced to re-shoot. On the whole, most fluff and crap in the gate is unnoticeable once you get it into the cutting room.

This procedure will repeat throughout the day until wrap time.

Video assist and monitoring

If you are shooting on a video format, you can have a monitor on set, which will display what the camera sees. This should be an extremely high quality broadcast monitor that has been properly set up and calibrated by the DP. If it hasn't been properly set up, then what you are looking at is NOT what the camera is actually shooting and recording, so is misleading at best, downright wrong at worst.

If you are shooting on film, then there is no video image to view. To tackle this problem, video assist *aka* 'video tap' or 'video loop' was developed by the camera companies. It's a kind of tiny video camera that sits in the eye piece of the film camera and sends a video signal to a monitor. The problem with video assist is that it is very low quality and can really only be used as a rough guide for composition and framing. Very few crew members actually understand that the video assist image is nothing like what the film will

The Camera Assistant Kit

The Camera Assistant will usually have a small black pouch that swings, bat belt style, from their hip. Inside is a well organised and tightly packed selection of peculiar tools and utilities. Aside from this bag they will also have a box with a bunch of other bits, which is where the clapperboard and aerosols (pictured here) would live.

Dulling spray
Sprayed on to objects that are too bright or shiny.

Compressed air
Used for 'blasting' out fluff and dust from equipment.

Anti flare
Sprayed on to shiny objects, such as chrome, to avoid flaring out.

WD 40

Filters
Empty wallet for safe storage of filters, most commonly colour correcting filters.

Pens
A selection of pens, markers and chinagraph pencils.

Notebook

General cleaning cloth

Lens cleaning cloth

Lens brush

Chalk
For writing on the clapperboard.

Lens charts
Rotary charts for checking focus and depth of field.

Camera tape

Assistants pouch

Torch

Scissors

'The gaffer is responsible for putting the lighting design into action as they they oversee the placement of the lighting, with guidance and instruction from the DP. The other main concern for the gaffer is for cast and crew safety. Often there are huge amounts of power surging through the cables that crisscross a film set or location and safety is paramount.

Shoots are divided into both night and day, and interior and exterior. A gaffer's job is about creating a natural and appropriate lighting setup for a shot, when in fact the lighting is obviously artificial. It usually starts with a recce when I will look for common problem areas such as… Where can I get power from? Are the ceilings too low? How long will it take to rig? Are there any South facing windows where light may uncontrollably stream in (look for locations with North facing windows)? Are the walls white and therefore reflective? Is there a lift to the top floor, and how many journeys will that take to get the kit up, and how long will that take? What is the access to the locations? How much trouble will it be to set up a light outside the window to emulate daylight (a very common problem as locations may be on a third floor or there is no access for instance)?

When looking for a gaffer, find someone who is both trained and experienced, but also enthusiastic. Ideally, someone on the way up. It's often a shock to some new filmmakers that some gaffers and sparks do the job for the money alone and are in no way interested in the film making process! Like others, I started out as a spark, moved up through being a Gaffer and I am now a DP. It's how the business works.'

eventually look like and consequently, some people can get a bit stressed out. Personally, (and this is a very contentious point), I have always found video assist much more hassle than it's worth in the long run (on low budgets that is). After all, Spielberg didn't have it for 'Jaws' or Hitchcock for 'Psycho'. Here are my reasons. The image is rubbish. You don't get a sense of the actors real performance as you are sitting and looking at a fuzzy, black and white image instead of standing next to the camera and getting all the detail of the performance that the film will pick up. It takes more time to set up, which is a waste of resources. It encourages over fussiness, both in the director and the rest of the crew (…cut to a comment in the cutting room, *'why on earth did we do seventeen takes of this shot when take two was fine?'*). Also, on a philosophical note, you have hired your camera team to do a job, and they should be capable of doing that without the director 'monitoring' their work. In summary, video assist may calm the paranoid little voice in your head, but it will cost you a lot of money in rental fees, slow down shooting, eat into VERY precious resources and more than likely, have absolutely zero impact on the quality of your film. If you feel the need to, please send hate mail to chris@livingspirit.com.

Cheap Tricks

If you want to make a movie look more expensive than it actually is, there are a few cheap tricks you can employ. Of course, these 'looks' are not suitable for all genres, but they can be very effective.

Smoke Machines - that layer of mist in the air will pick out shafts of light and also serve to 'mushy' up the image slightly so as to help disguise poor sets or lack of production design.

Keep it dark - if your sets are rubbish, keep the lighting dark, using a lot of backlight and rim light. Keep actors sweaty and glistening and use a smoke machine. Don't be afraid of a lot of 'darkness' in the frame, as long as it's attractive and the audience can actually see what they are supposed to see! *'If they can't see it they won't know it looks crap!'*

Filters - A *'black Promist' (*hired or bought), can add a very attractive 'sheen' to your movie. It's not to everyone's taste but some people like it. Do tests.

Long lenses - get the camera as far away as possible and shoot the action on the longer end of the lens. This will mean you need less 'background' (potentially saving production design and lighting resources), but it can also help 'cut out' the cast against the background. Most Hollywood movies shoot on longer lenses for a more attractive image.

Factors that affect the DP's job

There are a number of common factors that can make the job of lighting and shooting harder…

Common mistakes & technical problems

Underexposed (Film and Video)

Caused when there is too little light hitting the film stock or CCD chip. Two common reasons are that there isn't enough light in the first place OR that the camera operator has set the wrong aperture and closed it up too much (the operator may have set it wrong or the DP may have given them the wrong T stop). It is possible to pull detail out of an underexposed shot (by grading), and on video images it is slightly easier, but on both film and video it will increase grain and noise and the results may not be attractive OR acceptable. (right - note how the lamp cuts through but almost all other detail is lost).

Overexposed (Film and Video)

Caused when too much light hits the film stock or camera CCD chip. Caused by either the DP giving the wrong T stop or the camera operator setting the aperture incorrectly. The resulting images on video can be disastrous and un-saveable as there is no detail in whites. On film, there is more latitude to pull the image 'back down', but the results can be too poor to use. (right - note how the whites have burnt out and NO detail is left).

Soft focus / out of focus (Film and Video)

Usually occurs when there is so little light that the camera operator has to work with a tiny depth of field. Any slight movement could make the shot go out of focus. Can also happen as a simple mistake. It's actually very hard to 'see' if a shot is in focus on a film camera, especially at night or when the aperture is closed down. Camera assistants will often consult a depth of field chart and actually measure the focus distance with a long tape measure. (right - note how the baby is in focus but actress is soft, due to a very narrow depth of field. This is a very common problem that needs constant attention from the assistant camera / focus puller).

Dust and sparkle (Film only)

Caused when dust or fragments gets into the film magazines, or can happen at the lab too. It usually happens when the camera assistant loads the film, maybe they have had to work in a dusty environment etc. Due care and attention must always be taken when loading film stock. (right - dust and sparkle can be painted out digitally in post porduction, but it can be time consuming and expensive).

Scratches (Film only)

Usually caused by a faulty camera or badly loaded magazine. Can also occur at the labs. Scratches may be constant or intermittent, and can be very slight or deeply cut, making the shot unusable. (right - severe camera scratches. Most scratches are minimal and can be fixed if needed).

Common mistakes & technical problems... cont

Registration and weave (Film only)
Film stock can gently weave from side to side, which is not too noticeable in most instances, but it can become a problem sometimes. Also, if the claws of the film camera are not correctly engaging with the film stock, all manner of weird flickering effects can occur. You might not know about this problem, unless the camera operator hears the magazine clattering, or until the next day when the viewing report turns up. (left - the film was not properly loaded and 'jittered' in the gate, causing a serious flicker and blurring of part of the image, making the shot unusable).

Fogging (Film only)
Usually, this happens when the film stock is loaded or due to a faulty magazine. Light seeps in and damages the stock, most often it creates orangey glows or stripes to one side of the image. (left - light somehow seeped in and has 'fogged' the film. Often fogging appears on one side only).

Hair in the gate (Film only)
This is when a piece of fluff or a hair becomes lodged in the camera gate and is visible in the picture area. After major setups, the camera assistant will 'check the gate'*, that is, remove the lens and examine the gate for dirt and fluff. If they find anything they may request a re-shoot there and then. (left - this is quite a huge hair, most often they are tiny bits of fluff that don't even show in the picture area).*

Digital Drop out (Video only)
When a video tape is damaged, for instance it gets snagged on the camera heads, or it is affected by moisture or dust, drop out can occur and the image can be lost. Video is much more susceptible to problems with moisture and temperature changes than film. (left - digital drop out can be brutal making shots or frames completely unusable).

Focus pulling - when a camera is focused on a subject, depending on the camera aperture, which in turn depends on the amount of light and the ASA of the film stock, there is an area in front of, and behind, the subject that is in focus. This is called depth of field. If the subject physically moves out of this area (that is in focus) then the camera will need to be re-focused live, and without error! This is the job of the focus puller. They must be 100% accurate, which is one reason why the camera department often ask for a number of camera rehearsals. The focus puller may mark up the focus ring of the lens (with a chinagraph pencil or camera tape) to correspond with white X's they have taped to the ground, where the actors stand at various points. This way, they are able to focus the camera without having to look through the lens (the camera being operated by the operator, whose job it is

Big Light, Little Light... There's never enough

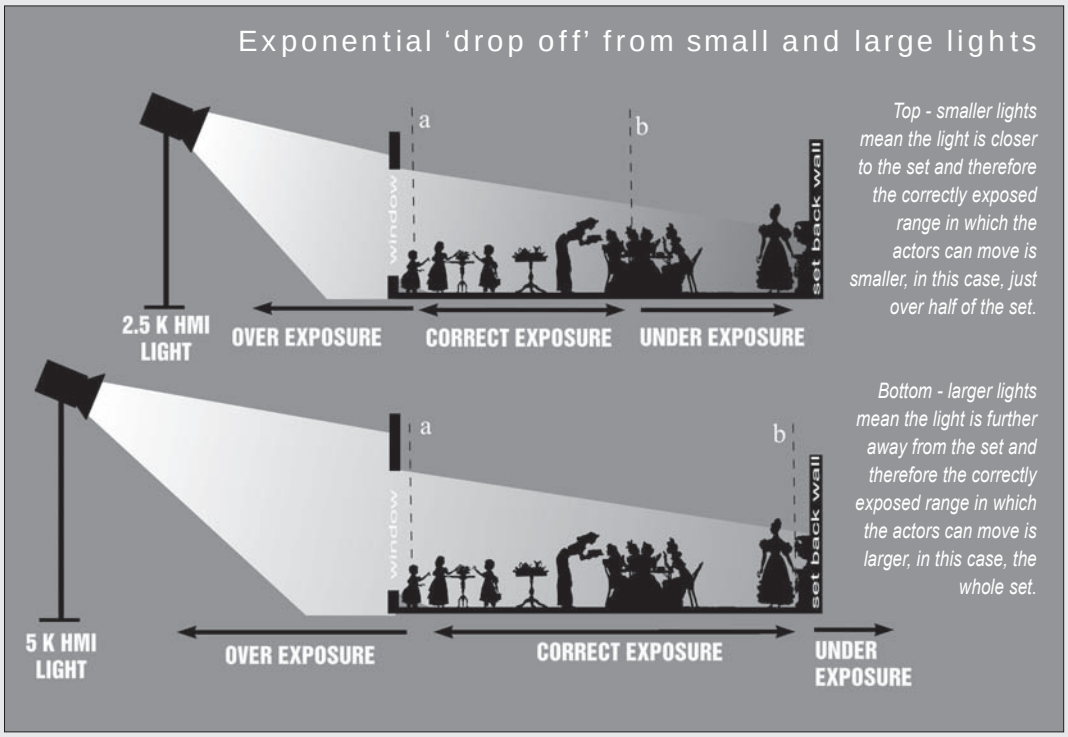
One of the problems with any film is that there is never enough light. This is a bigger problem for low budget films as the production cannot afford more and bigger lights, and even if they could, they would then need more crew, more power, bigger trucks, and so more catering and more blah blah… The trick is to balance production limitations with lighting needs.

Here's the problem with light - it's exponential. That is, as you double the distance from the light so you halve the intensity of the light. Looking at the example here… the top diagram has a smaller HMI light, say a 2.5k. Whatever light it puts out, there will be an area where it will eventually overexpose (as an actor gets too close to the light) or under expose (if they get too far away from the light). That means the actor CANNOT move past points 'a' or 'b' and must stay between them. The DP was also forced to put the light closer to the set just to get enough exposure at the window. The upshot is that only two thirds of the set are actually exposed correctly.

The lower diagram shows a light twice as bright, say a 5k HMI. The distance between point 'a' and 'b' is much wider and therefore the cast have much more room to move. The DP was also able to place the light further away from the window, giving a more even light throughout the set. This is one reason why movie studios are so large and why sets are never built up against the walls of the stage. The DP will always want to choose bigger lights to place further away, over smaller lights that are placed closer to the subject. The upshot is that the entire set is exposed correctly, wherever the actors move, they will be correctly exposed.

This was a very practical problem that was the source of much creative angst on my second film, 'White Angel' *as we only had one large 2.5k HMI. Whenever we were shooting a daytime scene in a room, but it was actually dark outside (for unavoidable scheduling reasons we might shoot at night, or the daylight was so dull after 3pm for instance), the DP, Jon Walker, would have the nightmare of dealing with the fact that at one side of the room, the cast were burning out and over exposed, and on the other side of the room they were dropping into under exposure and getting dark. So scenes were forced to stay in a specific, rather narrow area. Any dynamism that the cast wanted to play with would simply get vetoed as impractical and impossible* 'you will end up over exposed here, or too dark here… sorry!'

Exponential 'drop off' from small and large lights



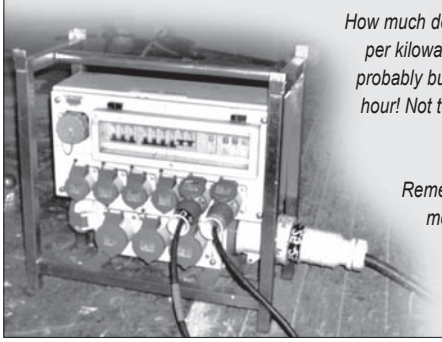
Top - smaller lights mean the light is closer to the set and therefore the correctly exposed range in which the actors can move is smaller, in this case, just over half of the set.

Bottom - larger lights mean the light is further away from the set and therefore the correctly exposed range in which the actors can move is larger, in this case, the whole set.

POWER

Electric power for your shoot is always an issue. You can't always just plug a light into the socket on the wall. On most film shoots the production will hire a generator that can supply power anywhere they can park the genny truck, but they are expensive 'cos you need to hire their operator too, old generators and ones not designed for film shoots can be noisy, and they are costly to run too. In a studio set, the production will probably buy the power they use from the studio owners, but check their prices before agreeing to hire a stage as they can be over priced.

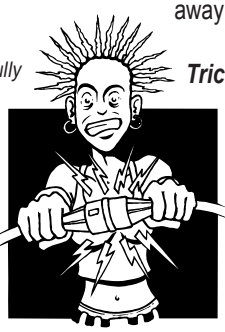
For low budget films though, the obvious reality is that they are going to want to just draw power wherever they are. So how does that work? First, most pro lighting comes with a fitted 16 amp round, waterproof plug which can't be plugged into a domestic square 13 amp wall socket. You can hire or make jumpers that convert round to square though. Some low powered lighting, such as Kinoflo lights (like fluorescent tubes), are excellent for low budgets as they draw very little power and give off a lot of light. But if you are really going to 'go for it' in a location, you will need an experienced gaffer who can 'tie' into the house power supply, directly at the source (the power box under the stairs for instance). They will connect a box called an FDU (Final Distribution Unit) to the house power supply which will mean that up to 15kw of power is now available from one source. Without this box, the largest single light you could operate by plugging into the wall would be a Blonde or a 2k . And believe it or not, 15kw of power is not much, a couple of HMIs, some tungsten lamps and a few others will eat up most of the power. Then there is the rest of the house which needs power to operate. A crew member switching on a kettle or hairdryer at the wrong moment can often blow a fuse and bring the production to a halt! (keep spare fuses to hand 'cos this WILL happen). On locations, if the lighting in a given situation isn't good enough for a department such as make-up to do their job, the gaffer may also be responsible for getting light to them.



How much does the power cost then? Check with the electricity board, but it's currently around 8.5p per kilowatt hour. So to use 3k of lighting for an hour would cost 25.5p. Now do the math, you will probably burn anywhere between 5k and 15k for twelve hours a day… that's probably about £1 an hour! Not too bad huh? If you are really organised in advance, you can ask the electricity board to uprate the supply so that you can draw more than 15Kw of power out of the house.

Remember, safety is always paramount. This amount of power can give you a fatal zap. The most hazardous situations are outside at night and in the rain, or in locations by a river or swimming pool. Don't even consider shooting near any water without a trained and experienced gaffer or spark who knows about power and safety.

to take care of camera movement and framing and not having to worry about focus). When crews are small, budgets tight and time scales even tighter, focus pulling becomes a very stressful job. Often the focus puller is asked to guarantee with 100% accuracy the focus of a shot without sufficient rehearsal. This is of course a mistake, as you end up burning film stock and wasting time both of which you can ill afford. If you are really pushed, keep actors in the same plane of focus, that is, if they move around, ask them to stay the same distance from the camera at all times and not walk toward or away from the camera. It's a far from ideal solution, but it works.

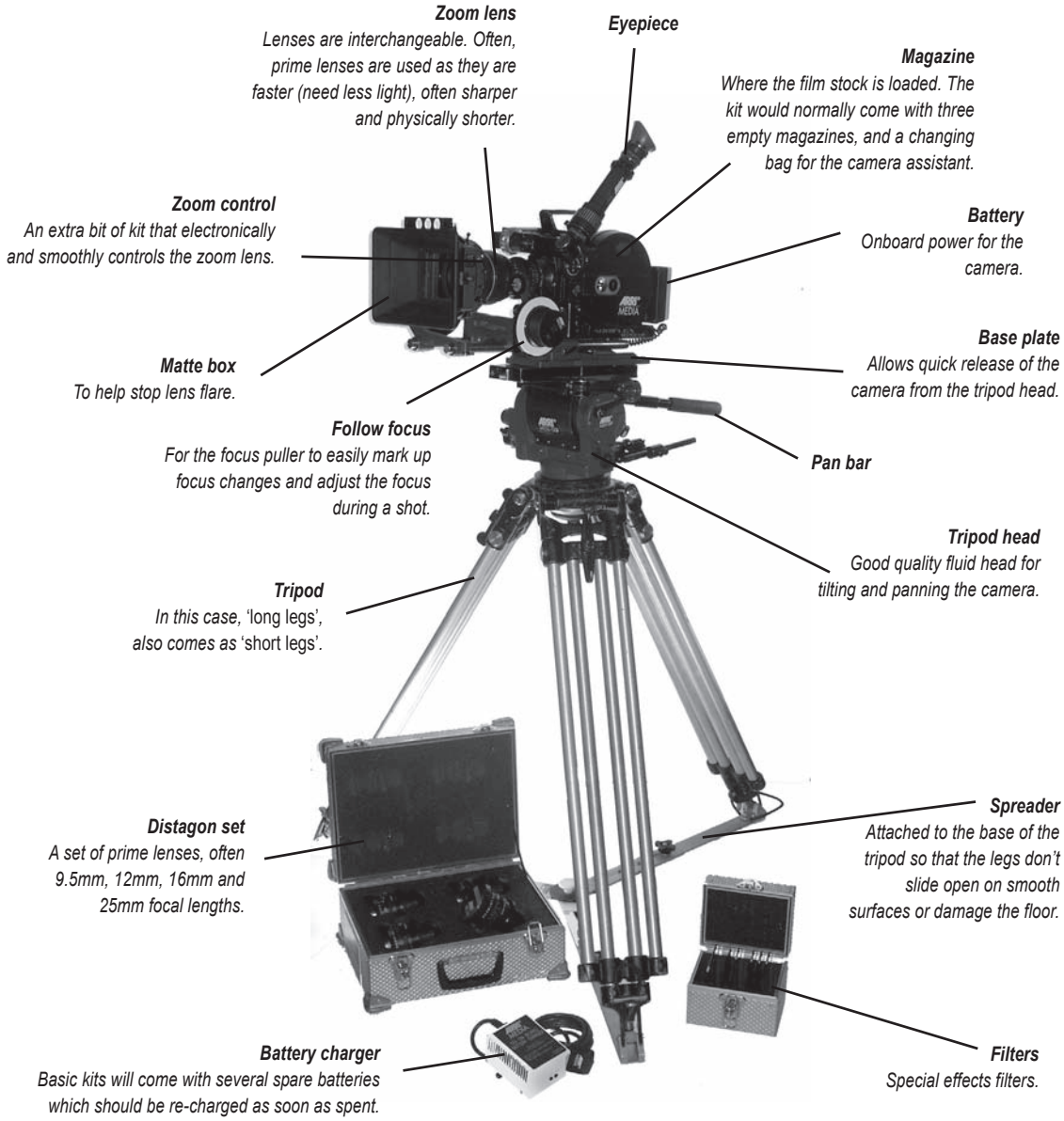


Anyone who doesn't fully understand how electricity works and who hasn't been professionally trained should stay well away. A zap from a 13 amp plug shouldn't kill, but a mistake when patching into the mains coming into the house will!

Tricky operating - there's an almost infinite amount of possible shots, each carrying their own unique operating problems, and some shots are very hard to operate. Simple shots like the camera creeping along the floor could take half a day to set up and shoot because you might need to dig a trench to accommodate the equipment! Most of the time, the biggest problem is getting *'the shot'* simply right. Panning and tilting, keeping the subject in frame and in the right part of the frame, ensuring focus is maintained, are all dead easy to do - *that is, if you*

Basic Film Camera Kit

This is an Arriflex SRII, one of the standard Super 16mm workhorses. The camera department can become awash with kit, and often, many new filmmakers forget that it's what is in front of the camera that is important and not the 'toys' or 'shots' in of themselves. There isn't too much cosmetic difference between S16mm and 35mm cameras beyond the fact that the cameras and magazines are a little bigger. And the main difference between film kit and video kit is ruggedness and weight. Film kit is almost all metal, so it's damn tough and very heavy. The camera will be stored in a large aluminum flight case.



Zoom lens
Lenses are interchangeable. Often, prime lenses are used as they are faster (need less light), often sharper and physically shorter.

Eyepiece

Magazine
Where the film stock is loaded. The kit would normally come with three empty magazines, and a changing bag for the camera assistant.

Zoom control
An extra bit of kit that electronically and smoothly controls the zoom lens.

Battery
Onboard power for the camera.

Matte box
To help stop lens flare.

Base plate
Allows quick release of the camera from the tripod head.

Follow focus
For the focus puller to easily mark up focus changes and adjust the focus during a shot.

Pan bar

Tripod head
Good quality fluid head for tilting and panning the camera.

Tripod
In this case, 'long legs', *also comes as* 'short legs'.

Distagon set
A set of prime lenses, often 9.5mm, 12mm, 16mm and 25mm focal lengths.

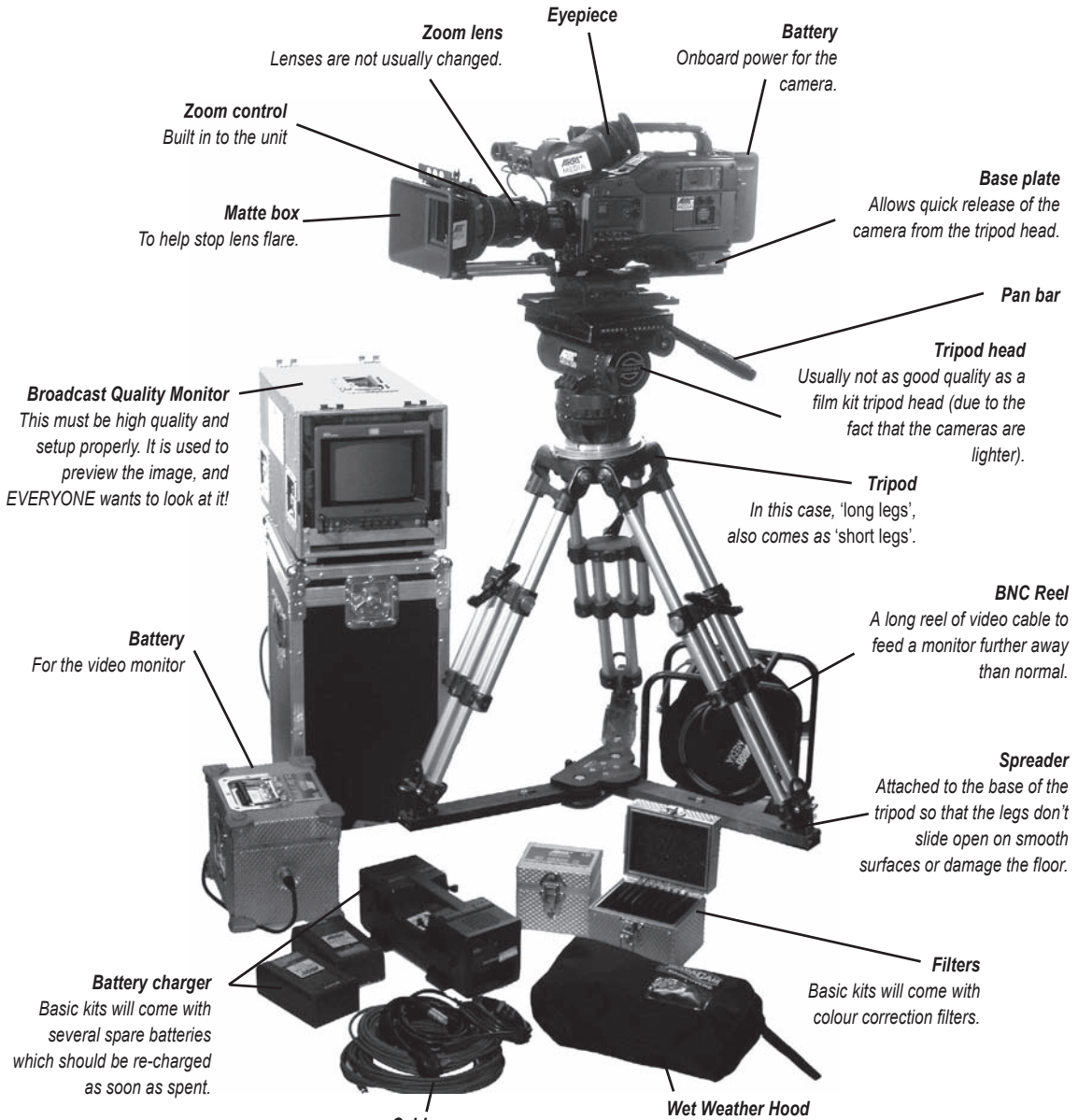
Spreader
Attached to the base of the tripod so that the legs don't slide open on smooth surfaces or damage the floor.

Battery charger
Basic kits will come with several spare batteries which should be re-charged as soon as spent.

Filters
Special effects filters.

Basic DigiBeta Camera Kit

The Sony 7900 Digital Betacam camera is the workhorse of low budget work shot on the DigiBeta format. Unlike film, you can have a live preview of EXACTLY how your shot will look, so long as you have a good quality monitor that is set up correctly. Lenses tend not to be swapped, the camera and a single, motorised zoom lens being wedded for the whole shoot.



Eyepiece

Zoom lens
Lenses are not usually changed.

Battery
Onboard power for the camera.

Zoom control
Built in to the unit

Matte box
To help stop lens flare.

Base plate
Allows quick release of the camera from the tripod head.

Pan bar

Tripod head
Usually not as good quality as a film kit tripod head (due to the fact that the cameras are lighter).

Broadcast Quality Monitor
This must be high quality and setup properly. It is used to preview the image, and EVERYONE wants to look at it!

Tripod
In this case, 'long legs', *also comes as* 'short legs'.

BNC Reel
A long reel of video cable to feed a monitor further away than normal.

Battery
For the video monitor

Spreader
Attached to the base of the tripod so that the legs don't slide open on smooth surfaces or damage the floor.

Filters
Basic kits will come with colour correction filters.

Battery charger
Basic kits will come with several spare batteries which should be re-charged as soon as spent.

Cables
Additional cables for video and sound input / output / monitoring.

Wet Weather Hood
To protect the camera in poor weather conditions. Video cameras are less rugged than film cameras.

Steadicam

Steadicam is a device that's used to stabilise a camera when hand held would give too much vibration or shake, and where a track and dolly are impractical. It fills the gap between the two. It's a mechanical device consisting of a harness which the operator wears, which is attached to a flexible, sprung arm, onto which the camera is mounted. Effectively, the camera and operator are isolated, which means the operator can now move while the camera will remain steady. If you are going to use Steadicam on film you MUST have a video assist. It works by counterbalancing the camera with electronic parts (video monitor) through a gimble at the end of the isolation arm.

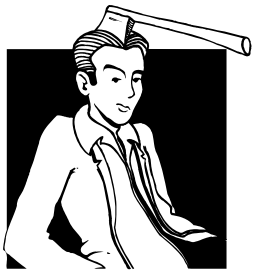
With Steadicam you can move the camera over rough ground, through doorways, up and down stairs, and along narrow corridors for instance, without the need for special rigs. It can go anywhere from ground level to about seven feet in the air, but it can only raise up and down around two feet at a time. Steadicam will never replace the dolly or hand held camera but it does enable film makers to get smooth, track like shots over difficult terrain. It is never 100% stable, and some people do expect it to be able to do anything, including flying! It is heavy and operators do get tired. With a heavy 35mm rig it's important to remember the operator will need to rest because the kit can weigh up to 40 kilos. Using Steadicam utilises all the same disciplines as any other department and, contrary to some inexperienced filmmakers views, you can't just start shooting without the same planning and rehearsals.

A common mistake is that people think you can stick a Steadicam on any old operator, and it just isn't so - you'd be better off staying hand held in those instances. Steadicam operators are highly skilled in a very specialised job. If you need Steadicam for a shot, bring in a specialist for that shot, don't try and fudge it or it will probably fail and be a waste of time all round. Creatively, Steadicam comes into its own when the camera moves seamlessly with the actors and action and almost becomes another point of view within the scene. Many directors don't take advantage of the unique story telling capabilities that come from the natural fluid movements that the Steadicam can produce. Look at film makers like Alan Clark and Stanley Kubrick for innovative use of Steadicam.

For DV, there are a few camera stabilisers about. Steadicam JR and Steadicam Mini are both great for micro budget DV shoots. Of course, you will still need an operator with experience because, like driving a car, to do it well, you need plenty of experience. (left - John Ward, Steadicam operator) Check out www.steadicam.com'

don't have to do it and you just have to stand next to the camera criticising the operator! It's much harder to operate a camera than you would imagine and it takes extraordinary stamina, patience, a rock steady hand and an acute eye for framing and balance. Operating can get very difficult in some circumstances, for instance, when the camera is mounted in an awkward place, or at night (especially with a film camera) as so little is visible through the actual eye piece. During a night shoot, an operator may regularly work on instinct and not be able to actually see the subject and just trust their guts and experience! Holy cow batman!

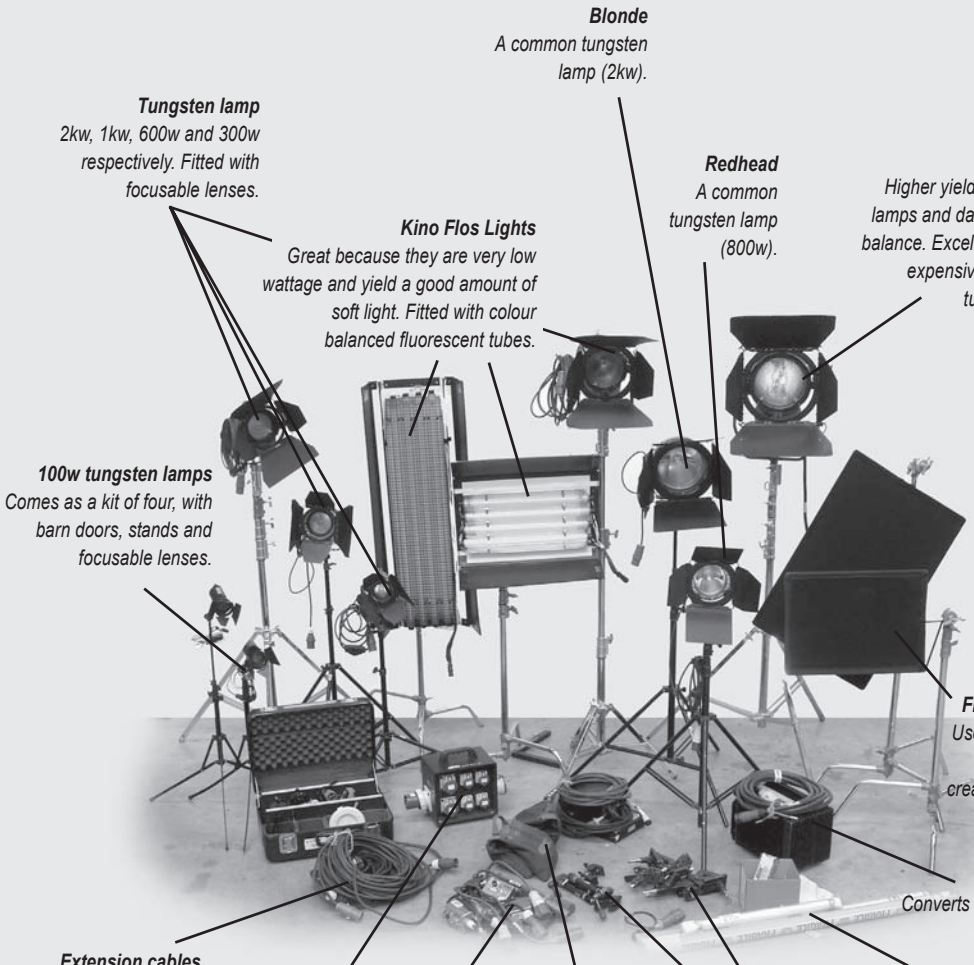
Actors who can't hit their spot - inexperienced actors can cause problems for the production. Firstly, they often do not understand the importance of hitting their spot. In rehearsals, the camera team will mark the floor with little white X's so the actors will know where to stand during the scene. This will allow the camera operator to know that they will be framed correctly, and for the focus puller to know that they will be in focus. The inexperienced actor, in the heat of the moment, may forget to hit their mark. Even if they put in the perform-



If you want an actor to look dead and they are having problems holding their breath, shoot them in slow motion. Any movements will be slowed down and any pauses will be elongated.

Lighting Kit

You can never have enough lights! Of course there are practical limits though, and this picture is a selection of some lights you could consider, with a few extras bits and bobs too. You will need a van to transport it all in, and if you had many more lights, you would also need a generator. You will also carry extras stands, cables and polyboards (for bouncing light) in the van. There is only one example of each lamp displayed here, but you may hire several of each.



Blonde
A common tungsten lamp (2kw).

Tungsten lamp
2kw, 1kw, 600w and 300w respectively. Fitted with focusable lenses.

Redhead
A common tungsten lamp (800w).

2.5kw HMI
Higher yield than tungsten lamps and daylight in colour balance. Excellent choice but expensive compared to tungsten lamps.

Kino Flos Lights
Great because they are very low wattage and yield a good amount of soft light. Fitted with colour balanced fluorescent tubes.

100w tungsten lamps
Comes as a kit of four, with barn doors, stands and focusable lenses.

Flags on stands
Used to block light when the DP is creating shadow or darker areas.

HMI ballast
Converts power for the HMI lamp.

Extension cables

Distribution box

Dimmers
Rotary dual for controlling the light level of tungsten lights.

Sand bags
For securing stands, such as when it's windy.

Clamps and magic arms
For affixing lamps in places where a stand is not appropriate.

Trace, Gel and Spun
Expensive but necessary consumables on rolls. Plus a box of spare bulbs.

Bounce boards

One way of shooting very quickly is to shoot outside in bright sunlight. Of course in the UK you cannot guarantee endless blue skies, but in other countries you have a much better chance. If you are able to shoot in such an environment, or on a sunny day in the UK, the easiest lighting setup is to stand the actor out in the sun, which will of course light them quite nicely. But there will be harsh shadows on their face.

You can then use a large sheet of white polystyrene as a 'bounce' board to reflect some of the sunlight back into the actors face. It's not in any way high tech, but it works and it's very fast. There are limitations, you have to get the bounce board kind of close if it is going to have an effect, which effectively rules out wide shots. Also, if you use a pro reflector made of material, if the wind blows and the reflector 'ripples' in the wind, so does the reflection in the actors face!

top right - the shot without a bounce board.
middle right - the shot with the bounce board in place.
bottom right - you can see how easily the bounce board is held in place by an operator.

ance of a lifetime, it may be useless because it's simply out of focus. Another simple problem is actors who will not do the same action repeatedly, in multiple takes. Not only does this create problems in the cutting room, but it can make life more difficult for the camera operator and the focus puller, as they are never quite sure what the actor is going to do. Of course, you don't want to pour cold water over spontaneity and creativity, but an experienced actor will know how to include spontaneous ideas into a performance that does not cause too many problems for the camera team.

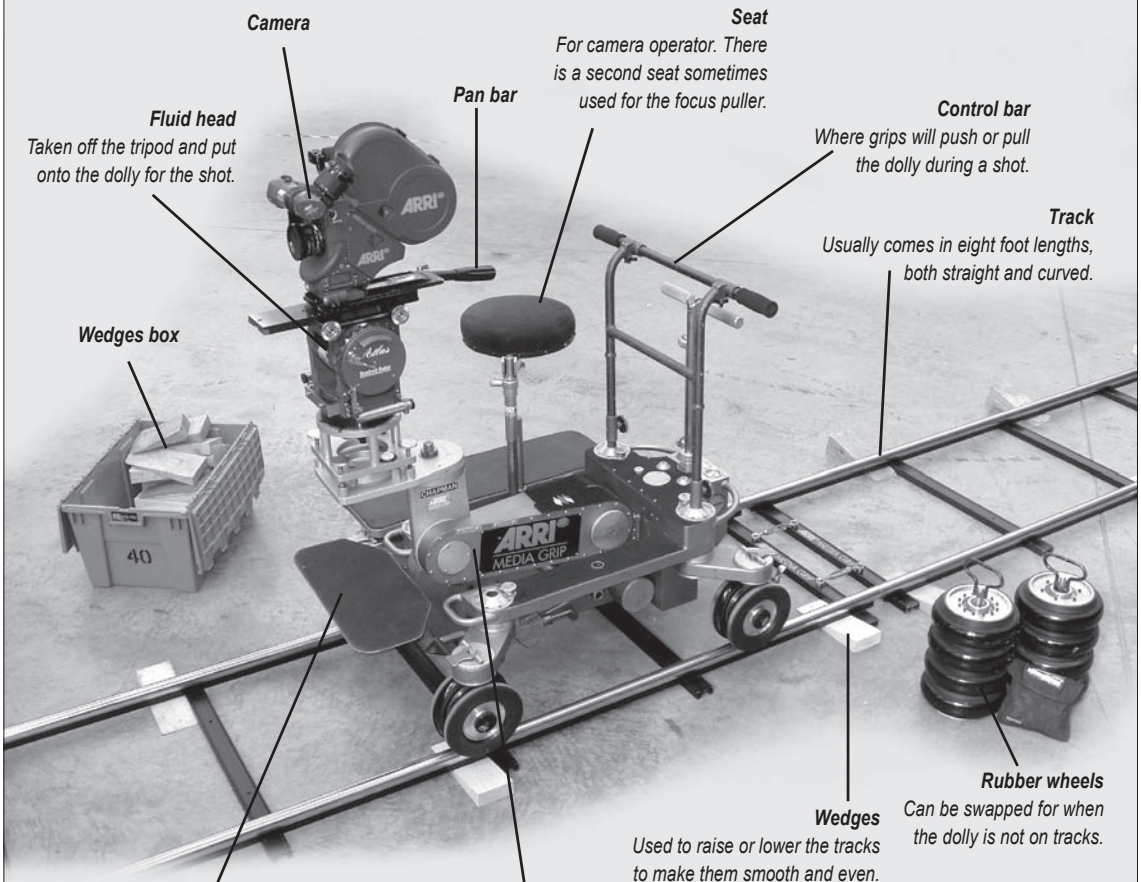
Underpowered lighting - here's the deal. There's never enough light. So why not hire some more lights? Well for one, you can't afford it, nor can you afford the extra crew, power, trucks etc. So a trade off is made. However, there is one major problem with an underlit production. The lower the power of the light, the narrower the area of consistent exposure. A small light will only give a narrow band of area where the exposure is okay. If you move too close to the light, it will get too bright, if you move too far away from the light, it will get too dark. If you can afford very large, bright lights and set them up much further away, the band of consistent exposure expands dramatically, meaning actors can move around more freely without the DP having to worry about them underexposing or overexposing.

Anal directors - some directors are so physically bonded to the

If you want slow motion, shoot it in slow motion! No post production slow motion will look as good as in-camera, on-set slow motion. In fact, most post produced slow motion can look truly awful, and it can be VERY expensive as an optical effect. If you want that John Woo style slo-mo, the only way you can really do it is on the day, with the actors and a camera running in slow motion. DV cannot do slow motion, although you can fake it in post and it looks OK down to 50fps, but that 'aint John 300fps Woo is it! Keerrrpooowww!

Basic Track and Dolly Kit

Track and dolly is the simplest and most effective way to smoothly move the camera in a scene. There are several dollies but one of the most popular is the pneumatic Pee Wee dolly, pictured here. The dolly usually runs on metal track, but if the surface is REALLY even and smooth, it can run on rubber wheels too. The dolly is made of solid metal and is very heavy - great for shots as the inertia dampens movement, bad for crews backs, 'cos it's so damn heavy!



Camera

Fluid head
Taken off the tripod and put onto the dolly for the shot.

Pan bar

Seat
For camera operator. There is a second seat sometimes used for the focus puller.

Control bar
Where grips will push or pull the dolly during a shot.

Track
Usually comes in eight foot lengths, both straight and curved.

Wedges box

Rubber wheels
Can be swapped for when the dolly is not on tracks.

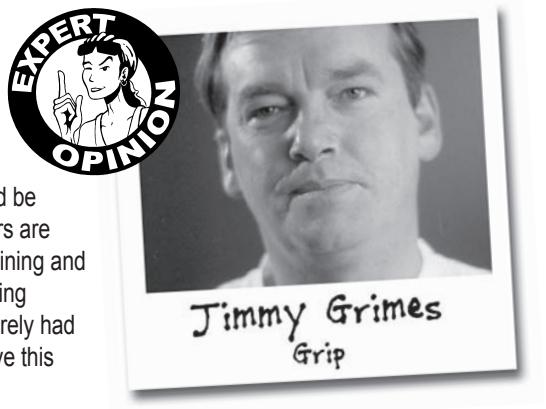
Wedges
Used to raise or lower the tracks to make them smooth and even. A spirit level will be used to ensure that the track is level.

Arm
Can be raised or lowered during a shot, using pneumatics (on this particular dolly). The fluid head will be fixed to the arm.

Foot plates

Whoever your grips are, they must be tough and strong - this is not a job for the weak. One of the grips should be very experienced if you want to avoid wasting time and stock. And remember, you will need a large van to move it all around in, and who is gonna drive it? Do they have insurance?

camera eye piece that you wonder if they ought to have been a director of photography! It's the job of the DP and camera operator to shoot the movie in accordance with the explicit directions and collaboration of the director, and it can be extremely frustrating if the director keeps messing around with the camera. The director should check the frame and any camera moves, but their job should be taking care of the actors first and foremost. The real danger directors are ones who fixate and pore over their video assist, constantly complaining and moaning about minor changes in framing or camera movement during takes. Yes Kubrick was an amazing filmmaker (*'take 56!'*), but he rarely had to get it in the can for $10k and in eleven days! If you want to behave this way, wait until you have a $50m movie!



'Most experienced grips own their own equipment, with the exception of the dolly, which you will need to hire. It is also a good idea to own your own van. When you have a low budget, and less equipment, the grip equipment is often included on the camera truck.

An important point to remember is that grip equipment is always a lot heavier than you think it is going to be. A DV Camera, with monitors, and batteries is often about as heavy as a 35mm kit. With modern equipment, everyone has access to their own LCD monitor, the focus puller and the grip included.

An experienced grip won't need to use a monitor, although it obviously helps. With more experience, you find that you instinctively know what the parameters are by knowing what lens is being used. For example, you have more leeway with a wide angle lens than with a 50mm.

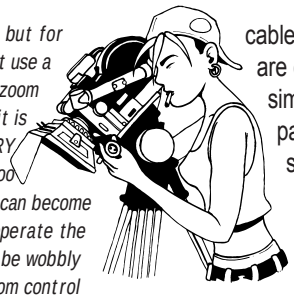
Health and Safety is paramount! Never get bullied into doing a shot that you think is unsafe, always tell the DP or director, no matter how much pressure you are under. If you are setting up a tracking shot, make sure there are stops at the end of the track, and try, wherever possible to place an extra piece of track at the end to allow extra runoff.

When you are considering what van to hire, make sure that it is easy to load and unload, and remember that you are going to need to stand up when you are in the back. Transit vans are not high enough, and if you are trying to lift equipment in and out of them, before long you will get a bad back. The perfect van would have a tail lift, and I'd recommend a Renault Master.'

Weather - It's obvious really, but less obvious is the sun. It is a whopping great ball of flire in the sky that can disappear behind clouds, or disappear altogether behind heavy, overcast skies! Hardly reliable in the UK! On super bright days, the sun can be so harsh, it creates heavy shadows so that you need to use extra lighting to for actors faces! (you can also use bounce boards, large pieces of reflective polystyrene). But it's the unpredictability of the weather that makes life difficult. You shoot one reverse of an actor in the morning in the sunshine, then the other reverse in the afternoon and the sun has disappeared behind dense overcast skies! And then the two shots are supposed to flow together in the edit. It's astonishing what grading at the lab can do to make shots look consistent, but there are limits. You can always ask the lab guys what they think. In the winter, daylight (or lack of) is always a real problem. There is just too little of it to start off with, and when it is around, it's often too dark to shoot anyway! The upshot is that on a grim, winters day, you may only get a few hours between 10am and 3pm to shoot.

Night-shoot - the problem with shooting at night is that every single bit of lighting has been placed there. From a creative point of view, it's very rewarding to be entirely responsible for every aspect of the lighting, but it is also physically arduous. Add to this the fact that crews are physically out of step with their biological clock and really want to go to sleep, that it's probably cold, and if its winter, it's absolutely bloody freezing, no-one can see anything, so it takes twice as long to do anything, blah blah. The upshot is that you will shoot roughly half to two thirds as many shots during a night shoot than you would during a day shoot. Avoid 'em!

Power - getting power is always a problem on location. This is partly because most film lights are not equipped to be simply plugged into the mains, and often, you need converters or junction boxes to do the job. Clearly, if you are shooting halfway up a mountain, you are going to need a generator, which is going to need a truck to pull it and it's going to be noisy. Or, you could hire a film generator which would come with an operator and a whopping price tag. Even when you have power available, running power



If you want a dolly shot but for some reason cannot use a track and dolly, use a zoom lens instead. As long as it is slow, a zoom can be VERY effective. Don't use it too often though as it can become tiresome, and NEVER operate the zoom manually, it will be wobbly and unusable! Hire a zoom control unit from the camera hire company.

cables over long distances can have problems with power drop off, there are obvious health and safety issues (especially in wet weather) and the simple job of laying and then retrieving long cables is a quite enormous pain in the arse. Those of you used to just grabbing a DV camera and shooting from the hip will be seriously distressed by just how long it takes to do anything on a professional film set! Hire a gaffer who knows their job and you will save plenty of time messing around.

Flicker - all AC discharge lighting and arc lighting (florescent and HMI lights) flicker as the electric current 'pulses'. With florescent lights and older HMI lights this flicker is at mains frequency (50Hz in the). If your shutter speed is NOT divisible with this lighting figure then your rushes may flicker (ie 24fps does not fit into 50Hz, whereas 25fps does). This problem may not be noticeable in a film camera until you watch the rushes, but it will be noticeable in a video viewfinder. Modern HMIs are 'flicker free' and should give you no problems, but watch out for this in other situations, such as when you hire old and cheaper non flicker free lights, or when shooting with fluorescent tubes in a scene. The solutions are, shoot at 25fps, change the mirror angle (if you can) on the film camera, change the shutter speed on the video camera, or avoid lighting situations where there will be problems.

TV screens and computer monitors - if you want to film a off a TV or computer screen, you may need to make some modifications or hire some extra equipment. If you are shooting at 25fps, which I hope you are, then shooting a TV screen isn't too big a deal as the camera shutter will match the refresh rate of the TV, although you may need to hire a piece of kit called a phase bar adjuster to 'tweak' it. If you are shooting at 24fps, you will need to shoot any shots with a TV screen in frame at 25fps or you will get a nasty black buzz bar rolling down the screen. A TV screen has a daylight colour balance, so all your lighting in that scene should be balanced for daylight (unless you want your TV screen to look blue). Exposure is more tricky, how much light is that TV actually pumping out? Even with a spot meter, the results can often be unexpectedly under or over exposed, so shoot some tests to be sure. If multiple TVs appear in a shot, then make sure they are all adjusted to be the same in brightness, colour and contrast. Computer screens are more problematic as they can have weird refresh rates. Ideally, you should use computers whose monitors can be adjusted to either

The ACM

Pretty much every member of the camera team will own their own version of the Bible, The American Cinematographers Manual *- it even looks like a Bible! It's a small and dense pocket book that contains everything you ever wanted to know about all things cine-photographic. This is not a book for anyone who has a passing interest, it's a serious propeller heads manual, crammed with eye watering detail, charts and diagrams. It's essential if you are that way inclined, slightly more interesting than the Yellow Pages (and just as dense!) if you are not. It now comes in two distinct flavours - film and video. Both are available from amazon.com, but they are close to fifty quid a pop!*

DIY Skateboard Dolly

I know, you must have that 'creeping dolly shot...' but you can't afford track and dolly from a hire company, or even if you get one for free then realise you'll need two strong people to handle it, insure it and find a van to move it around. There is a home made alternative. Many new film makers, especially those shooting on lightweight formats (primarily DV but also Super 16mm) have built their own - commonly referred to as a skateboard dolly. The following Skateboard Dolly was made by Steve-Marc Couchouron for his indie feature film 'Shadow Girl' (www.projectshadowgirl.com). Even though any Skateboard Dolly can look a little half baked, when set up carefully and with practice, the shots you can get are amazing, AND it shouldn't cost you too much to make!

Concept

The basic idea is that the wheels found on skateboards or rollerskates are secured to the bottom of a platform onto which the camera and operator sit or stand. The 'dolly' then runs on 'self aligning' track that is no more than PVC drainpiping, bought from your local DIY store. Ingenious huh?

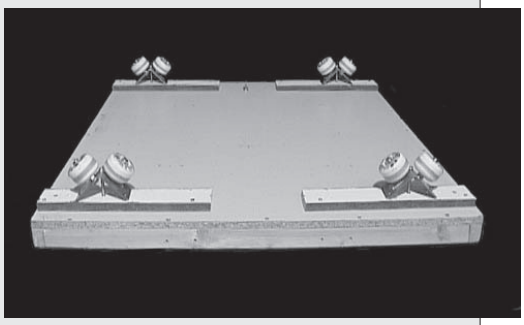
Drawbacks

If the floor on which you wish to run your track is not even, then you will find it hard to get very smooth dolly shots. So look for locations with good, hard and level surfaces. Outside on the pavement is going to be tough, although if you had a large (eight foot) sheet of thick plywood, you could lay that down to give a smooth surface on which to operate the dolly. Of course then you would be limited to a maximum run of eight feet.

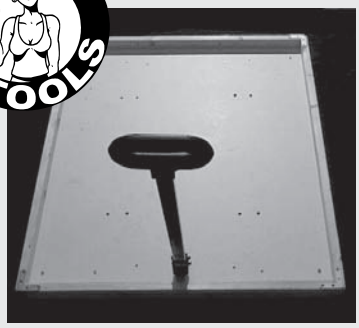
There are a few variations on this design, some with a larger or smaller platform, some with wheel sets doubled up (using sixteen instead of eight wheels), some with a seat… But they are all basically the same beast. The most important elements are, without doubt, the wheels themselves. They must be as high quality as possible, using bearings for maximum fluidity - and keep 'em oiled.

1. The Platform

This should be made out of two 15mm (thick) sheets of plywood screwed together. By using two sheets, the platform will be strong and won't bow in the middle under the weight of the camera and operator. This dolly platform, which is 96cm x 82cm, was designed to be wide so that it could accommodate an operator more comfortably. If you want it to be able to pass through doorways then you will need to make it narrower, around 96cm x 60cm.

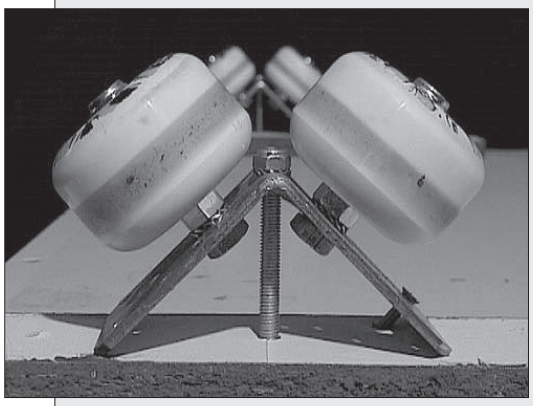


Securing the tripod to the dolly is always an issue. You could drill holes for the tripod feet, possibly even buy an additional 'spreader' *or* 'spider' *which is permanently secured to the dolly, or construct a lip around the edge so the camera cannot slip.*



2. The Handle

This is what is used by the dolly operator to move the camera and dolly back and forth on the track, although unless it is rigid, you may end up abandoning it and kneeling down to push it by hand, especially over short distances and for slow tracking shots. The handle featured here, in true guerilla filmmaker style, was fished out of a skip, but there are a hundred and one alternatives at any DIY store. If you do plan to utilise a handle, make sure that it is VERY rigid, which means permanently secured and made of metal or thick wood.

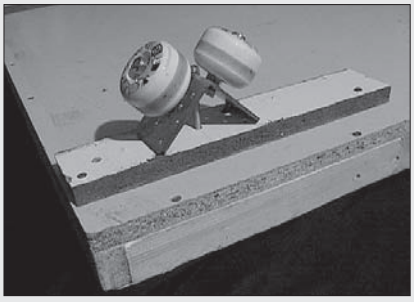


3. The Wheels

The hardest part to construct and one requiring spot on accuracy is the manufacture of the wheel assembly. You'll need to buy four sets of wheels (eight wheels in total). You can find these wheels in department stores, sports shops or dedicated skateboarding shops. If you double the amount of wheels, you will create a more stable dolly, but of course, as the wheels are the biggest expense, almost double the price of making the dolly.

Buy a length of 2" x 2" angle bracket and cut it up into four sections around two inches each. Drill holes on either side, and at the apex (where you will secure the assembly to the dolly), always carefully measuring and marking up before drilling - precision is key to the success of this piece of equipment.

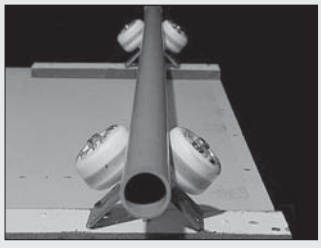
Carefully attach the skateboard wheels, ensuring they are at exactly 90° (right angles). Failure here will result in a wobbly and unsteady dolly.



The assembly is then screwed firmly to a wooden bridging board, which in turn is screwed to the bottom of the dolly - again, making sure all dimensions and angles are correct or perfectly square.

4. The Track

Go to your local DIY shop and buy an even number of lengths of 32mm diameter PVC drain piping (run tests with other sizes if you like). They will probably come in eight foot lengths, and can be joined together using thick wooden stops cut into short lengths. You could also use narrower diameter piping for the joining stops. Beware, these joins in the pipe are always the weakest part of your shot as you will probably get a slight kick as you pass over it.



50hertz, 75hertz or 100hertz (so it fits into the 25fps frame rate). A computer monitor is nowhere near as 'punchy' as a TV so you will need to do even more exposure tests. For *'Urban Ghost Story'* we actually abandoned computer screens for wide shots and used 14" portable tellies being fed by a VHS loop of computer graphics. It worked extremely well and was a very practical solution to an exceptionally fiddly technological wiring nightmare.

End of the day

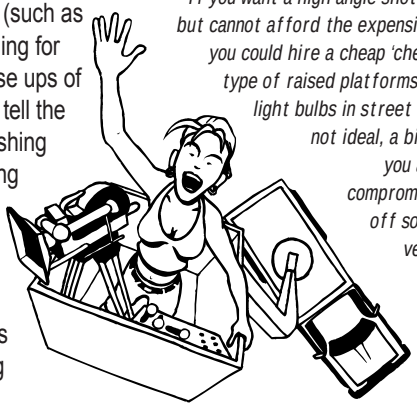
At the end of each day, the kit will be packed away for the next shooting day. After the daily wrap, the camera assistant will fill out any incomplete camera report sheets, put the exposed stock in cans and give them to a runner who will take it (along with the sound tapes) to the lab. If shooting digitally, the tapes will go straight to the cutting room. The camera assistant may also strip and clean the cameras at this time. A production assistant may also check on how much stock has been shot, and discuss if more needs to be ordered.

Return of kit

After the shoot wraps, getting the equipment back to the hire co.always leads to tears, mainly as you are always late and may incur extra hire charges or at least a stern look! Missing equipment is always a stinger too. That little camera widget that went down the drain was actually worth £300, and that tiny scratch on the lens is gonna cost you £450 to fix. Never mind breaking an HMI bulb which could set you back a grand (depending on the lamp)! Phew! During the shoot, a good habit to get into is to make sure the camera, lighting and grips teams can account for every single piece of kit. Experienced crew members will take care of this stuff as a matter of course. And remember, in order to return the kit at the end, someone will need to drive it to the hire companies (in a hired truck or van too), unload it and check it off the list. With a big lighting rig, this is a days work for three burly sparks. Budget for this.

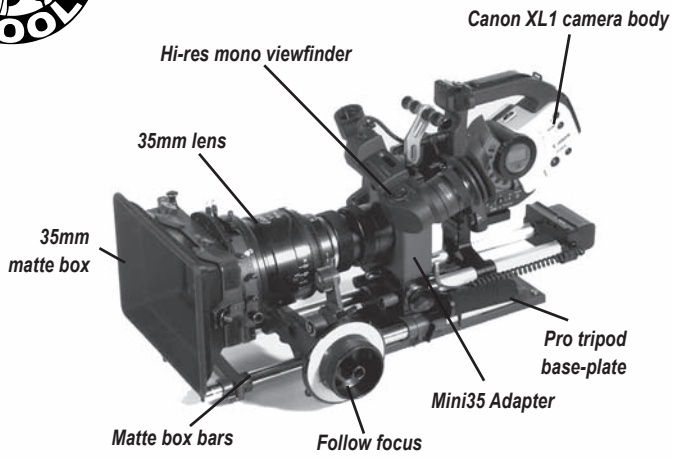
Re-shoots

Once the film is in the cutting room, the production team/director/editor will inevitably come up with a list of extra shots and scenes that need to be taken care of. There may well be several pickup shoots many months after the main shot has wrapped, initially focussing on close up shots of props (such as a newspaper or TV screen) and establishing wide shots, a building for instance. With additional re-cuts, new scenes, extra lines or close ups of an actor from an existing scene will have been invented to help tell the story. If care is taken to match eye lines and lighting, it is astonishing what you can get away with - huge continuity errors, mismatching hair cuts, different clothing etc., all can go unnoticed, just so long as it *'feels'* right. The camera team for these reshoots can be minimal, usually the DP and an assistant who will help with everything from changing mags / tapes, to adjusting lights. An enormous amount of shots can be covered in just a few days in these re-shoot weekends, so they're good value. When hiring



If you want a high angle shot or a crane shot but cannot afford the expensive grips cranes, you could hire a cheap 'cherry picker', the type of raised platforms used to change light bulbs in street lights. They are not ideal, a bit wobbly, but if you are prepared to compromise, you can pull off some amazing and very cheap shots.

The Mini35 Adapter for MiniDV



Without… shot with a normal video zoom lens. Note how the depth of field is deep and the image more cluttered.

With… shot on an 85mm Zeiss lens with the adapter. Note how the depth of field is narrower and so the couple are more attractively cut out from the background.

'How do I achieve a film look?' *This seems to be one of the most asked questions amongst the low and no budget filmmaking community. The obvious answer is* 'shoot film!' *In my experience that has, more often than not, been impossible - I just haven't had the money to do it. At least for personal projects miniDV has been not just the format of choice, but the only option.*

This leads to question number two, 'so how do I make video look like film?' *There are many characteristics of 'film' that simply can not be replicated with video. The incredible exposure latitude of film remains out of reach for even the most expensive professional video formats, as does colour saturation and resolution. But aesthetically, one of the things that makes film look so much like, well er, film, is the ability to control the depth of field.*

Munich based P+S Technik's Mini35 works on the simple principle that video CCDs are very small and 35mm film negative is comparatively big - when it comes to getting that 'filmic' depth of field, size does count it seems. This is neither the time nor the place for a physics class, so I'll stick to the basics. If you use one of the many adapters available to mount a 35mm cine lens directly to your Canon XL1 you will find that you have converted even the widest of lenses into a virtual telescope! With the Mini35, however, you maintain all of the lens characteristics, as you would if you mounted it to an Arri 535. This is done by projecting the image created by the lens onto an intermediate screen the same size as a 35mm negative, then the image is projected to the cameras 3 CCDs - in effect this is like shooting 35mm and mastering your material onto miniDV. And it works! The images look much more like 35mm film, and the effect can be further enhanced by passing the footage through a software tool like 'Magic Bullet' in post.

One issue to bear in mind, however, is that focus is much more critical when working with sharp 35mm lenses. Most miniDV cameras have viewfinders and screens that are not sufficiently resolved to judge critical focus, especially when pulling focus. It is recommended that you use a high-resolution field monitor, an LCD monitor, or, if you are working with the XL1, the Canon FU-1000 monochrome viewfinder.

The Mini35 is compatible with 35mm bridge plates, sliding plates, matte boxes and follow focus etc., a full range of film accessories, giving you unprecedented control of your miniDV image. And you aren't limited to expensive cine lenses either. Adapters are available for photo mount lenses such as Canon EF, Leica R and Nikon as well as Panavision anamorphics and other film lenses. The Mini35 is not exclusive to the Canon XL1 and XL1S; there are versions available for the Sony DSR PD150, VX1000 and VX2000 cameras, with an adapter for the Panasonic AG DVX100 in the pipeline for release sometime mid 2003.

For more information about the Mini35 check out their website at www.mini35.de and also www.pstechnik.de .

Jim Loomis, Filmmaker.

your DP, make sure that they know there will be re-shoots and that they are happy to come back. Practically, these shoots are like very small short film productions and generally run very smoothly. Everyone knows exactly what shots are needed, the props are to hand, actors are ready etc. It's usually one of the most fun shoots of the whole production.

Gels, trace, spun and the likes is used to change the type of light coming from a lamp. It's hellishly expensive stuff too and most crews treat it like office paper, so make sure everyone knows that it needs to be saved and re-used.

Grading

When the movie enters the final stages, whether it was shot on film or digitally, or whether it is being post produced on film, tape or digitally, the DP should make themselves available for the grading process. Ironically many DPs don't get involved in this vital, creative stage of tweaking the image. In the first instance the grader will adjust the images to look consistent, then more work can be carried out to 'sweeten' the image. If you are post producing on film, then there are limitations to the grading process as you can really only mess around with colour balance and brightness (and even then, not too much). However, if you are post producing digitally, at either tape resolution or film resolution, then you can open 'Pandora's Box'. Oh my! Pretty much whatever look you can imagine, given time and money, is achievable. There is a lot of fun to be had here, BUT, these facilities are very expensive, so know what you want before you go in.

DV (miniDV, DVCam etc.)
Marcel Zyskind, Director of Photography

'Ever since the DV format, be it miniDV or DVCam, came out, we have seen a boom in filmmaking both professionally and non-professionally. This is the greatest advantage of DV. It has allowed you, me and everyone else who wants to make film, documentary, shorts, anything really, just to do it. Film schools use it, the police use it, I use it, your next-door neighbour uses it. Even my mother uses it! You don't have to sit around waiting for finance to show up, everyone with a computer can edit their own film, the same day they shot it. No need for laboratories and big bank accounts. It is a great opportunity for people to learn how to shoot. Make your own film school at home, why not?

I find that one of the things directors love the most about DV is that it gives them the freedom to let their actors improvise for as long as the tape is running in the camera, you can shoot up to an hour of footage on one tape. I think actors, after getting used to it, find DV quite challenging and interesting as well. Producers tend to like it too, since it is cheap. I like it because it has given me the opportunity to shoot films with very interesting directors. It's not all because of DV, but it certainly is one of the reasons. They wanted a young guy with some knowledge of this new format and you might find that many established Directors of Photography do not know the format or do not wish to work with the format. My luck.

I sometimes hear that DV is great because you don't need any lights to shoot. That's true. But you don't always need lights to shoot with film as well. It's all about the look you're trying to achieve. If you want a film shot only with available light, DV is great for that. DV is great to take that bit of 'holiness' that has always surrounded filmmaking and bring it to a 'street level' where we all can have some fun with what we want to do. Shoot movies. In terms of camera selection, it has become somewhat of a jungle out there - there are countless semi-professional and consumer cameras available. If you are planning to buy, do some research and choose a camera with the features that you think suit your needs best. Is it the ability to change lenses, chip size, the size of the camera or what you have been recommended from other users?

Personally I find the Sony PD-150 and the Canon XL-1s to be great cameras. There are pros and cons to both, but the image quality and the cost of the cameras are great. They are easy to work with, they are lightweight, and you can get interesting setups that are very difficult to achieve with big film cameras. They can be less obtrusive in documentary filmmaking because of their size and it's possible to be just a one-man camera, whatever the reasons might be. A good example of this might be 'In This World' which I shot for English director Michael Winterbottom. In the film we follow two Afghan refugees from Pakistan to London. We chose to shoot on DVCam on a Sony PD-150 with a 16-9 anamorphic lens on the camera. We were a very small crew and I alone was the camera team. I am not sure we could have made this film on any other format. One thing is certain, the DV format suited this *film very well.*

The greatest disadvantage of DV is that it is not film. You still do not have the same latitude and depth of field that the use of film stock and film lenses will give you. It is difficult, but not impossible, to fit some of the nice film accessories onto to your DV camera, which can improve the images you shoot. Pick it up, press the red button and you're off. It's never been this easy. The difficult part is getting together the $25 million you need to put your favourite actor in front of the camera…'

Super 16mm
Jon Walker, Director of Photography

'When I began filmmaking, the ideal format to shoot was 1.85:1 for that wider than a TV screen look, for feature films. However, to achieve this golden format without shooting on 35mm meant a sacrifice of quality; you had to 'letter-box' your print. When you're shooting on 16mm, which is a 1.33:1 (4:3) format, you literally chopped the top and bottom off each frame to change the aspect ratio, but you lose a good third of your negative at the same time. The result is rather grainy wide screen. The same letterboxing process is employed in producing 35mm 1.85:1 but the 35mm negative is much bigger and so the resolution loss is not a problem. Shooting Super 16 gives you nearly 50% more negative area in relation to the 1.85:1 format as opposed to shooting standard 16mm. So when there's no real prospect of shooting your masterpiece on 35mm, Super 16 is the obvious choice.

Not so long ago Super 16 was thought of as 'the outsider', there was no reason to shoot it for normal TV production (and some of those masterpieces of only 10 years ago would now look fantastic in 16:9) and only a very few 'low-budget' films stepped over the threshold of standard 16mm to the poor-man's 35mm. It couldn't be more different today. Anything shot on film for TV is now shot on Super 16, and all the broadcast video formats now echo this with 16:9. Certainly, in the UK Super 16 is the perfect film format for low budget filmmakers.

But enough about the cathode ray tube and more about the silver screen! Super 16 made the dream of 'getting it up there' possible. The results were amazing and the illusion of 35 certainly fooled everyone not 'in the know'*! The prospect of post producing in High-Def also raises some very exciting prospects for the future.*

So what's so great about Super 16mm? Well it is much cheaper than 35mm. The camera's are smaller and suit guerrilla filmmaking. If shot with care, Super 16mm can produce the same feel and look as the larger 35mm format.

If you plan to blow up to 35mm then the key is to use good lenses and avoid faster stocks. The negative area is small compared to 35mm and therefore the graininess of faster stock can often show. Overexpose the film by a third to a half of a stop to give you a 'fatter' negative. A fatter negative will give you strong denser blacks, thus avoiding the 'milky' look that low-key scenes can sometimes be dogged by on Super 16mm. As for the cameras – they are all good; the Aaton wins on aesthetic grounds but the Arri SR is a tough piece of kit that does the business.

If you intend to blow up to 35mm then its worth testing the lens and filters you intend to use, as any defects will be more obvious on the final 35mm. Also, go easy on filters that modify the look of the image, such as pro-mist filters, because the blow-up process does produce some pro-mist like effects anyway.

35mm is obviously a superior format, but if you cannot afford it, Super 16mm will delight and surprise you. '

Camera 35mm
Gordon Hickie,
Director of Photography

"It still excites me when shooting on 35mm, to think that this small frame of film will fill the entire screen at the Odeon in Leicester Square. Although the actual 35mm frame is smaller than a 35mm stills camera frame due to the orientation of the film (vertical for motion picture film, opposed to horizontal for stills), the quality is still quite amazing. It has detail and a warmth and depth that 16mm and video still doesn't quite match. Although nowadays, with the advances in Hi Definition video technology and the quality of 16mm filmstocks, the gap has closed somewhat. Super 16mm is a great format but when you put 35mm side by side with it, the difference is very apparent. 35mm contains so much more detail, it's sharper, does not suffer from weave, and photographically it produces more attractive images. Also 35mm has a larger gate, so for example, you'll need a 50mm lens on a 35mm camera to achieve the same angle of view as a 25mm lens on a 16mm camera. It also produces a more pleasing image due to the narrower depth of field inherent in the size of the negative.

The question a filmmaker has to ask themselves is whether there is the budget for 35mm. A 1000' roll of 35mm film, which runs for approximately ten minutes, is much more expensive than a 400' roll of Super 16mm that runs for the same time - around three to four times as much. It's physically bigger and requires a larger camera, lenses and magazines. Although the camera crew stays the same size - a DP, Camera Operator, Focus-Puller and Clapper / Loader, moving the equipment from A to B takes more time and energy and requires real muscle power. So production set-up times tend to take longer. The advantage Super 16mm has over 35mm is that you can move around quicker and shoot more film without worrying as much about your budget. If, however, you are shooting on Super 16mm and plan to blow up your negative to 35mm, this can be expensive and may outweigh your shooting costs, so it's up to the Producer to think this through carefully.

It doesn't really bother me what 35mm camera I use, as long as it's quiet (to keep the sound department happy!) and has a good range of lenses.

When it comes to grading, 35mm and 16mm are very similar, except for the noticeable grain difference and picture clarity. I recently saw some High Definition v 35mm comparison tests, which involved a short film shot on both formats. There were split screen sequences comparing the two and to be honest, the actual difference was extremely hard to distinguish, although it was only being viewed on a high quality broadcast monitor and not a cinema screen. I am usually able to spot the differences between most formats, but then I am an experienced technician who spends his life looking at camera images - I should be able to tell, it's my job! Often though, the public don't 'see' what the film is shot on. They are engaged in the story and characters. And remember, if the script and performances are bad, it doesn't matter what the film is shot on, it will still be a bad film.

I love American TV shows like 'The Sopranos' *and* 'The West Wing' *as they are shot on 35mm, and the quality speaks for itself. If I were on a big budget film shoot tomorrow, I'd shoot on 35mm without question. But, for the new filmmaker, getting your film in the can is what's important, not the format it's shot on.'*

Camera HiDef
John-Martin White, Director of Photography

'As a DP, I am very experienced with all formats. A lot of people new to High Definition go in with the attitude that you don't need to light as extensively as with film. This is wrong. It needs a lot of work and skill. HD has a smaller contrast range and latitude than Film. Latitude can be up to 11 stops with film, but with HD, its around 7-8 stops. Of course this depends on the set up. A lot of film DP's are put off by electronic menus and high-tech gadgetry but nowadays, there is a selection of set-up cards available and when you know the look you want, you simply pop in the correct card and the camera is automatically set up for you. You can even create your own set ups and incorporate them. However, the camera is still very sophisticated and has lots of technology that enables the DP to tweak each individual image.

Shooting HD is a bit like 400-500ASA film stock without the grain. Shooting outdoors is slightly trickier than with film, as highlights can look slightly electronic, but this can usually be treated in post. Scanning it out to film will also reduce any digital artefacts, neatly replacing them with grain. With film, you normally overexpose slightly for negative, but with HD you should slightly underexpose. If you over expose it, you'll burn out the image and lose the ability to bring it down in the grade. By underexposing you have the latitude to push the image, peak the whites and hold down the top end.

The camera works in a similar way to a digi-beta camera, except it has two modes - Interlaced *(as per video which is very sharp and crisp) and* Progressive scan *which scans the image at 25fps (or 24fps) giving the image a near perfect film 'look'. The creators have done a lot of work to create this illusion. Even the camera viewfinder flickers in the same way as a 35mm camera, which can be a little off-putting when a DP new to HD picks it up. But I really believe HD is the way forward, especially with the fantastic HD projection systems now becoming available. The image quality is amazing and the Panavision and Fuji lenses are just breathtaking. I've also found that film tends to need more grading. You still need the same camera team with HD as with a film shoot. Obviously you don't get hairs in the gate and problems like that, but you can get 'head clog' which the loader needs to keep an eye out for. I lost an expensive crane shot once because we didn't check, and what was shot was unusable. I'd recommend that a HD broadcast monitor be used when shooting. This way you can see exactly what the camera is seeing. It's so much nicer than the crappy image you get from a video assist when shooting on film. It's also a good way to check the focus properly as the standard definition viewfinders aren't great. A HiDef camera can sit well on the shoulder and weighs in at approximately 8 kilos. The more modern cameras also have the ability to shoot slow motion, and when I saw the quality of this, I was completely blown away. It's amazing. The sound quality is also fantastic.*

HD cameras are expensive to hire (but deals can always be done) but the tapes are cheap at around £40 (for 40 minutes). This has to be weighed up against stock, development, telecine, neg cutting and printing costs. I'm still excited by both film and HD and can't really express a preference. I do believe, however, that HiDef is an excellent medium for the new filmmaker. It gives just that bit more flexibility than film. And not having to wait to view rushes is a blessing. But the same disciplines are required, as it's easy to get carried away or play around with the menus during valuable shooting time.

I see HD as a new format rather than a successor to film. It's like we've been working with crayons for the last one hundred years. Now we have felt tips.'

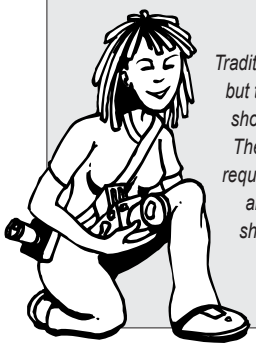
Film Stills

Shooting stills on a film can often feel like a chore and frequently gets left to one side as 'someone else's problem'. *Delegate this vital job to someone with common sense and some experience, ideally a photographer who shoots film stills and knows what's required. Without lots of decent stills, you won't be able to sell your film, and extracting stills directly from the film itself won't provide the technical quality required.*

While digital technology is sweeping the world, movie photos still tend to be shot on 35mm stills film stock. It also represents the best value for money when it comes to the cameras. You may be shooting your film on a domestic DV camera, but there is an expectation of extremely high quality where stills are concerned, and so the 'point and shoot' *camera just isn't the tool of choice. However, any decent SLR with a good lens is up to the job, if it's in the right hands. When shooting stills on a film set, you won't use a flash and you will rely on the actual* 'film lights', *which surprisingly, are often NOT that bright. Fast lenses and higher ASA film stocks are the answer.*

35mm equipment

There's no need buy the top Canon EOS camera, but the choice of lens is more important. Any good zoom lens could do the job, but remember that movies are often shot in lower lighting conditions, which might be impossible for a cheap zoom lens (as it needs a lot of light to expose properly). A zoom is fine for general stuff, but add to this some fixed focal length lenses (which tend to have wider apertures and therefore need less light). A standard 50mm lens is quite cheap AND has a large aperture of say F/1.7, which is a great all rounder. Probably the best lens to get if you can only afford a single one. A 28mm wide angle lens won't come cheap at F/1.7, but there are lots of good value F/2.8 lenses. If you can afford it, you could also get a 100mm lens for portrait shots. Ideally, blag an old camera kit from a pro photographer. Although you may end up delivering your stills digitally, the quality and flexibility of film gives you more scope than shooting digital stills. The best combination is to shoot large numbers of 35mm stills on set with the action and possibly some medium format portraits of the main cast, and maybe some set-up action set pieces too.



Film to use

Traditionally one would shoot colour reversal (slides) but the world is changing… You could now just use shoot negatives and scan these at high resolution. These can also produce black and white images if required. Stick to the major brands, Kodak and Fuji, and as lighting can be minimal, you may need to shoot with a higher ASA to get good exposures… which means 400 ASA, and ideally 100 or 200 ASA in daylight. Avoid going over 400 ASA.

Shooting on set

The point of a good film still is to capture the essence of the film - which means you will use the lighting and set-ups of the actual film. You won't have time to set up flashes either as the main cast and crew will just steamroller over your ideas. A stills photographer will only ever get a moment to snap off their shots. A good time to shoot stills is when rehearsals are taking place. The light and actors are set, but there's less danger of the stills camera causing a distraction. A good stills photographer should have an eye for a special moment and maybe take the opportunity to shoot extra stuff with the actors, where the photographer is 'calling the shots' *for the best still picture. This usually takes place after a shot has taken place and the camera team are checking 'playback' or 'the gate'. Most scenes won't warrant stills being taken, but those that do, deserve extra effort. Often a pushed crew doesn't see the point of stills, but as a producer you can't make this mistake. A mixture of stills is good, some that directly reflect the shots in the film, and some that are posed. The stills photographer should try to capture what the film camera is filming, but there can be a problem as the actors are always* 'in action' *and therefore you may miss the moments captured so well by the movie camera. Still images have to tell the 'full story' whereas the moving image shows only parts of the story. That's why shooting some posed photos is a good idea, in order to capture the essence of a scene in a way suited to the still image. Avoid using flash photography as this will produce pictures radically different from the look of the film. Don't forget the odd shot of the crew too… if the film is a hit, the making of it might also be of interest to people. The director with the camera is an obvious shot that is essential for film festivals for instance.*

Publicity

If time and money can stretch to it, shoot some specific images on a medium format. These shots may be used to create posters and other high profile images and they will need to be glossy and sharp. This is the 'fashion shoot' *for the film and so it's worth getting an experienced photographer to do this.*

above - three key photographic images used for my second feature film, the serial killer thriller 'White Angel'