IMAX®

The 15/70 Filmmaker's Manual

1. INTRODUCTION

Each year, IMAX Corp. receives numerous inquiries from producers and directors who are experienced in 35mm or video production, and who are now interested in producing a 15/70 project. They're usually attracted by the extraordinary image quality that IMAX® technology affords, and perhaps have a project in mind they believe would both succeed artistically and appeal to the 15/70 exhibition network.

The questions these filmmakers usually ask are the ones one would naturally expect. What's different about working in the 15/70 format, and what is the same as in smaller formats? How should I budget? What crew will I need? What should I know about the equipment?

In response to the number of requests for information we receive, we've decided to publish this document but feel compelled to issue certain warnings about its contents. Filmmaking is a subjective art form and as such, it is imperative that this manual be appreciated for what it is and for what it isn't. This document is not the "how to make a 15/70 film" guidebook. This document is a collection of opinions that reflect the varying views and beliefs of the 15/70 industry. Indeed, we have deliberately included a wide range of provocative viewpoints – sometimes at odds with each other. We encourage filmmakers to experiment and push the boundaries while respecting the unique technical and artistic attributes of the 15/70 format. This manual contains some of the acquired wisdom of both veteran Imax staff producers and distinguished independent filmmakers. The contributors have years of experience in the 15/70 industry, and have given considerable thought to the practical and theoretical difference between 15/70 and smaller formats. They're as candid about the difficulties and limitations of the medium as they are excited by the possibilities and committed to the incomparable quality of the finished product.

The 15/70 film industry is constantly evolving, both technologically and artistically. Bear in mind while reading this document that if you want to do something that has never been done before, the Camera Department, the Soundtrack Mastering Facility at IMAX Corp., the postproduction consultants at DKP 70MM Inc., and experienced crews are there to help make it happen.

A brief document of this kind can't give you all the answers, or tell you how to make a 15/70 film. We hope it will give you an idea of the challenges and considerable artistic rewards of working with the groundbreaking IMAX® technology.

2. SOME WORDS YOU SHOULD KNOW:

IMAX® 2D- The original flat-screen 2D projection technology. Films are projected on screens up to eight stories high.

IMAX® *Dome* - Dome screen 2D projection technology. The domed screens are up to 99 feet (30 meters) in diameter. If traditional IMAX giant screen technology lets the audience put their face against a picture window, IMAX *Dome* pushes their head through the window. The 30mm lens is an essential tool in making films for the dome.

IMAX® 3D - 3D projection technology using a flat screen. Polarized glasses or Electronic Liquid Crystal Shutter glasses (E3D glasses) are worn. A two film strip system using two lenses (left eye/right eye) to capture and project stereoscopic (3D) images.

IMAX® HD - 48 fps technology. Films are shot and projected at 48 fps, reducing flicker, strobing and motion blur, and further heightening the overall quality with significantly increased picture clarity, contrast and definition. IMAX HD projectors are adaptable to run at 24 fps or 48 fps, allowing customers access to the full 15/70 film library.

IMAX® DMR™ - IMAX Corporation has developed a total system to re-master 35mm live-action films into 15/70 film format for exhibition in IMAX theatres. Known as IMAX DMR, this proprietary, patent pending technology digitally enhances the image quality of 35mm motion pictures for projection onto screens up to eight stories high and up to 120 feet wide. The resulting images are every bit as big, sharp and beautiful as those of the classic, visually stunning films originally produced in the 15/70 format.

IMAX® SR Theatre Systems - provides the client with full featured IMAX Experience® capable of 2D and polarized 3D presentations. This system is designed for clients who want a full featured 2D or 3D theatre with the advantages of minimum capital investment and reduced operating costs associated with an air-cooled projection system.

IMAX® MPX Theatre System – a 15/70 large format theatre system designed specifically for multiplex theatres.

IMAX® *Digital Theatre Audio Control* (**"DTAC"**). Imax's DTAC represents a major breakthrough in integrated systems. By combining the latest in compression free DVD-based audio playback with a sophisticated show control system, DTAC goes a long way to ensuring a consistent experience for the audience. Specifically designed for the IMAX theatre environment, DTAC provides high quality digital audio for all in-theatre sound requirements; from announcements to the feature, ensuring that your 1000th performance will sound as great as your first. The DVD sound track contains more than just audio programming, it also includes vital data embedded in the disc that resets the sound system correctly each time a specific film is played.

IMAX® *Digital Disc Playback* (**"DDP"**). Imax's DDP system is a digital sound source, using compact-disc technology, specifically designed for IMAX/IMAX *Dome* theatres. It uses up to eight tracks of pure digital sound and Imax's patented Samplelock® technology, which allows all the channels to play back in sample-accurate phase synchronization. Applications of DDP include; DDP-6 (6 channel digital disc) for Feature Playback only, DDP-8 (same as DDP-6 with a 4th CD Audio disc added for alternate language) and DDP-II (1 DVD ROM Disc, plays both Features and Trailers).

3. ABOUT THE 15/70 FILM FORMAT

A. Why make a film in 15/70?

The main reason filmmakers want to work with giant-screen technology is that the results are superb, the audiences remember the work for years, and the projection quality leaves 35mm in the dust.

Says Academy Award[®]-winning filmmaker Jean-Jacques Annaud; "IMAX technology is terrific for intimate stories. I know because the screen is large most people think of epics, with large numbers of horses attacking another large number of horses. And it's true that any large-scale theatrical epic would have been better on the giant screen. But I don't think that's needed. It's a wonderful format. I've learned to love it."

B. A few things you ought to know

- The vast amount of information in a 15/70 film frame creates unique challenges for filmmakers. Here are some of the ways 15/70 filmmaking differs from smaller formats:

- It's unforgiving. Just as 15/70 technology magnifies the power of a good shot, it exaggerates flaws. You can't cheat on backgrounds, costumes, or make mistakes as you can in other formats. Something even a little bit out of focus looks really terrible.

- It's expensive. (Not since you were at film school will the cost of stock have had such an impact on your budget.) You will shoot less takes. Raw stock is like gold. Stock, processing and postproduction are complex and costly.

- Everything is bigger and heavier, which imposes logistical burdens on the crew. A 2D IMAX camera weighs from 45-95 pounds, 275 pounds if you use a blimp. That means if wildlife shows up, you can't grab a camera and follow it as you can with video or 16mm. The 3D IMAX camera is the size of a hotel mini-bar refrigerator and weighs 230 pounds.

- It has a different pace, both of production and editing. Don't expect to get as many takes and set-ups in a day as you're used to. Shots are usually held longer to allow audiences to absorb the information on the screen, and every shot needs to be spectacular.

- It's time-consuming. Most things take more set-up or execution time than in 35mm or video, because everything has to be perfect. The equipment is more cumbersome, the sound tracks are much more complex and the lenses require more light.

- If you're shooting IMAX 3D, many of the complexities increase: cost, time to reload the camera, staffing requirements, lighting equipment, overall set-up time, etc. Most importantly is the amount of care taken to compose each shot. Extra time is required to ensure that lens convergence is properly set to avoid eye strain.

While the above statements are worthy of consideration, determination and vision have placed 15/70 cameras atop Mount Everest, on board the space shuttle and on the ocean floor to film the Titanic, all with spectacular results.

"*If you look at Variety's top 100 films of all time, 90% of them would have been better in IMAX.*"

-Graeme Ferguson, co-founder of Imax Corporation.

C. Financing and budget considerations

Some of the budget considerations are fairly obvious, such as the increased cost of raw stock and Processing. The 65mm exposed negative is processed in the lab and can be printed to 70mm or, more commonly, optically printed down to 35mm for viewing dailies, or scanned for post-manipulation.

The camera sees everything and you will need to account for a larger area of action. More elements need to succeed when the camera is rolling for a shot to be usable. There are more opportunities for mistakes if you rush.

You will need to budget for sturdy camera support equipment: big cranes, beefy dollies, rugged camera heads, all built to move the camera smoothly and withstand the increased vibrations from the larger than usual camera motors.

Lighting and its associated costs are higher in 15/70 filmmaking than in smaller formats. Lenses with wider fields of view require more lights, lights will need to be placed further from the subject matter than what you may be accustomed to. Setups take more time, more people and greater care. Same with film editing, sound editing, and mixing. It's a 45-minute film with the schedule of a full-length feature.

Getting financing presents the same challenges as does any independent filmmaking, with some wrinkles unique to the world of the 15/70 distribution and exhibition network. For example, 15/70 films typically enjoy unusually long runs, compared with most 35mm films and particularly compared with other theatrical documentaries. The institutional theatres (museums, science centers, cultural centers, etc.) typically exhibit just two or three films per year. More and more commercial exhibitors are adding IMAX theatres to their multiplexes and as a result the demand for more commercially viable product is increasing. If a film fails theatrically, there are few subsidiary markets such as videocassettes or pay TV to augment the revenue stream.

Drama usually costs considerably more than a documentary of the same length, and needs to compete for writing and acting talent with Hollywood productions that have much larger budgets.

Many of the existing theatres are affiliated with museums or other institutions. Traditionally, they have strongly influenced the types of films that get financing and the budgets available. Some of these institutions, for example, have strictly educational mandates, which means they may not be able to run dramatic films unless they have an educational component. The current growth trends highlight the rapid expansion of commercial theatre operators. 15/70 exhibitors prefer films with a running time of about 45 minutes in order to increase the potential number of screenings on a daily basis.

4. WRITING A 15/70 TREATMENT AND STORYBOARD

In order to interest potential companies, investors, or corporate sponsors in a 15/70 project, you will need a complex proposal comparable to one you might write for a 35mm feature. This includes a business plan, still photos that suggest the subject's impact on the giant screen, a storyboard, and a budget. The type of film you intend to make will determine the type of written proposal you'll want.

If you're contemplating making a documentary, a shot list, treatment or outline will generally suffice. Once you complete filming it is more than likely that the film will change in the editing room resulting in a somewhat different structure than the film you originally storyboarded or outlined. Once you've got your structure, you'll more than likely re-write the narration.

With dramas, clearly the dialogue and any narration spoken by a character is written before shooting. (Use of a narrator is a common device in 15/70 dramas because of the challenges faced when trying to record clean sync sound). All dialogue lines will need replacement in postproduction. You will need to develop a full script that should run no more than 35 pages. The one page equals one minute of screen time doesn't hold with 15/70. Keep dialogue to a minimum since talking heads are much less appropriate in this format.

Even spectacular 15/70 imagery won't necessarily carry a weak script; as in smaller formats, the characters and writing still have to be interesting. Films that are beautiful to look at but lack story-telling skills have historically failed on the giant-screen.

15/70 documentaries take more planning than video or 16mm documentaries. The logistics of the show are often compounded by the size of the equipment; increased crew, weight and size of support equipment, etc. Because of the cost, weight and other factors, you can't just wander around with the camera on your shoulder and see what happens.

Seasoned filmmakers suggest you think of the setting as one of the characters, and a contributor to the mood of the scene. "*The heat of a jungle or the harshness of the Arctic can all add to the psychology.*" – Roman Kroitor, co-founder of IMAX Corporation.

Storyboarding is important because 15/70 technologies are edited with fewer cuts and at slower cutting rates. If a scene has been well directed and photographed, often you won't want a lot of intercutting. Close-ups will be used minimally, for emphasis. Often, a fairly wide shot can include all the information the audience needs in quite complex ways, so the editor doesn't have to cut in close even if there is such a shot. The directors, camera people and editors all work together to create a grammar that is unique to 15/70, where master shots frequently run at considerable length.

Another tip: because giant-screen images look so real, the script probably can't exaggerate. There's a low "*baloney quotient*".

Indeed, Greg MacGillivray believes this is a major challenge facing directors of the 15/70 drama. "*It's very difficult in 15/70 to have the audience suspend their disbelief when you tell a character story. Planning a dramatic film in 15/70 is a huge job, much grander than in other formats. We're back where cinema was in 1910, thinking about how to tell stories and get the audience to accept those characters as real, all the time knowing they are actors. It's a snap on TV. but with 15/70 it's not.*

5. PRODUCTION CONSIDERATIONS

IT'S ALL IN THE DETAIL - "*Many first time 15/70 filmmakers are utterly amazed when they view their efforts in 70mm. Imagine the surprise in realizing that the image on screen reveals far more*

detail than your eyes saw during the initial filming. Every surface, ever wrinkle, every finish, every texture, etc. will be revealed, warts and all. It's easy to underestimate the importance of seemingly trivial issues: footprints in what's supposed to be a pristine natural environment, cigarette butts 30 feet from the camera, camouflage netting that looks like camouflage netting, the moving shadows of crew members standing-by, faux finishes that look fake, camera cases in the distance. The successful 'cheats' often employed in the world of 35mm filmmaking must now undergo a far greater degree of scrutiny. Eye-lines are more critical and continuity deficiencies will jump out at the audience.* -- Lorne Orleans, Vice-President, Film Production for IMAX Corporation.

A. The "IMAX Factor"

Some filmmakers joke about the "*IMAX factor*." They're referring to the aspects of working in 15/70 that are noticeably more cumbersome, slow and/or expensive than 35mm or video. At the same time, of course, most of them can't wait to do another 15/70 project, because they're hooked on the results. Many filmmakers also come to love the cameras, which are proven, rugged pieces of equipment that have been used in remarkably challenging situations, including their essentially flawless performance on 14 space shuttle missions and their recent journey to the top of Everest.

Jean-Jacques Annaud suggests you think of *The IMAX Experience®* as a return to the early days of sound cinema, when "*cameras were blimped monsters, a little smaller than the IMAX 3D camera but not much, and requiring very heavy dolly tracks. Film stock in the 1930s was slow, and for different reasons required the same amount of light and the same kind of lighting as 15/70 stock. That's why the style of movies of the '30s is different, and why 15/70 requires a different style of filmmaking.*"

Adds director David Breashears, "*As a filmmaker, one of the most important things is reliability, and 15/70 cameras are on the whole astoundingly reliable, tough and adaptable. In many cases 15/70 films will continue to be made in remote locations, where the cost of breakdowns is very high, so, for example, making the cameras lighter, though a good idea, is only desirable to the extent that it doesn't reduce reliability.*"

Breashears also appreciates that "*there are teams of people who will come up with all sorts of ways to improve the cameras as filmmakers demand new ways of filming things. As a medium, The IMAX Experience® is still being developed, and the people who are designing equipment are still closely involved in the process of filmmaking.*"

B. Composition and framing

In most giant-screen exterior shots, the sky dominates. As director/cinematographer David Douglas observes, "*It has to be a big part of the subliminal effect of the shot, the mood of the characters and the audience. You try to make the sky reflect a mood that you are trying to build into the story at that point.*"

Many films play successfully on the IMAX *Dome* screen even though they have not been exclusively shot with the 30mm fish-eye lens.

Both IMAX and IMAX *Dome* theatres may lease virtually all 2D films, so you'll want to keep that in mind as you plan your shots. Many 3D films are played in 2D by running only one eye.

Many films have been shot without extensive use of the 30mm fisheye lens and have been highly successful when projected in IMAX *Dome* theatres -- particularly if the filmmaker followed these guidelines:

- Keep strong verticals away from the edge of the frame. When projected on a dome screen, these result in a banana-shaped distortion that can be disconcerting for the audience.

- Avoid framing horizon lines too high. Use the IMAX *Dome* horizontal reticle in the viewfinder as a guideline.

- Avoid bright, homogeneous sky, as on slightly overcast days.

Note that the 15/70 frame affects storytelling devices. For instance, you can't usually use the frame line for entrances and exits. On IMAX *Dome* screens, there isn't any frame. You need to get used to the fact that the shot is everything in front of you. The lens angles are quite similar to the human field of view and peripheral vision, so many of the best shots capture situations that can play out in the master.

Explains Stephen Low, "*Framing considerations can affect everything from your budget to how you conceive a particular scene. For example, imagine shooting an exterior shot of a woman looking out the window of a train that is moving through the countryside. To show the emotion on her face, using 35mm you could frame the shot to include only the window. Theoretically, you could get this shot using only the woman and a window. With conventional 70mm film, you would need to shoot the whole rail car, but would still see the emotion on the woman's face as she looks out the window. With 15/70 film, you would see the whole train moving through the countryside, the mountains and the sky, and the audience would still be able to see the expression on the woman's face as she looks out the window. Accordingly, you'll need to budget for an entire train at exterior location, a moving shot following the train, and enough time to wait for the right light.*"

Andy Gellis observes that "*You need to understand the lenses and how much they see. Then, you must appreciate how the images effect the audience when projected on such a large screen. The challenge is to develop the proper language to tell your story. A 35mm filmmaker will bring enormous skills to the game, but he or she must be open to adapting those skills to this format. It's not hard, but you need to be open and receptive to learn it, which only saves time and money.*"

"*If you're a talented filmmaker you will learn about IMAX 15/70 technology very quickly. If not, it doesn't matter how many rulebooks you read, it is not going to do you any good.* " - Roman Kroitor

Greg MacGillivray designs his films with shots that alternate among shots designed for the IMAX screen, the IMAX *Dome* screen and shots that will work well in both. "*We are always selling quality in this medium. If we give them what they can get on TV, just bigger, audiences will stop coming. There's tremendous pressure to keep making nature and science documentaries, but we are running out of those subjects and budgets are down at the time they should be going up. We have to create new subjects and find new ways to be inventive. Cinerama grossed among the top ten every year, then died out after five or six years because it ran out of subjects.*" - Greg MacGillivray

If despite your best efforts certain 15/70 images appear distorted on the IMAX *Dome* screen, you can use an optical printer to "shrink" the 15/70 image. Most films, though, do not require this procedure.

C. Lens angles and lighting

While film stocks and lens technology have improved over the years, the very nature of the lenses used in large format cinematography are such that more light is required in order to achieve depth of field levels that are equivalent to comparable set-ups in 35mm filmmaking. But it's hard to position and hide the lights; they have to be behind the lens or entirely blocked by something in the shot. Lighting packages can be three to 10 times as large as conventional lighting packages for a similar sequence.

Setting up a shot takes a long time. Expect to have fewer set-ups, and, if the light is changing, to end up with less coverage than in smaller formats.

Greg MacGillivray takes the work of Dutch artist Vermeer as his inspiration in using selective lighting. By letting the environment appear darker, he directs the audience's view toward the subject, while reducing the amount of cross-reflections from one side of the dome to another or in reflections from the screen to the audience and back to the screen. High contrast adds apparent sharpness to his images. "*Using lighting, you can compose the scene to get the audience to zoom their attention. It's a very effective way to play a scene, especially in a drama where control of the audience is important.*" Except, of course, in 3D where high contrast produces ghosting, an undesirable screen artifact as well as FOV, Convergence, Walleye, which are major factors in the success of a 3D film.

Greg MacGillivray draws elaborate storyboards that carefully anticipate how one scene blends into another, and how each cut will advance the story. "*It's very different from the 'let's go out and see what happens' school of filmmaking. Research and pre-planning are critical.*"

Bear in mind when storyboarding for a 15/70 film that lenses longer than 100mm are not as sharp as lenses of 50mm or less. Don't expect to intercut smoothly between a 30mm and 250mm shot as one might in a feature, because the image quality will jump. Rather, you would shoot one shot with a 40mm, move the camera in and shoot the insert shot using the 60mm rather than jump to a 250mm lens.

D. Strobing

Strobing, an issue in all formats, is much more pronounced on the giant screen, and unpleasant to look at. Make sure you don't pan too rapidly. If objects are moving through the frame, they should move fairly slowly or fairly quickly because the intermediate speeds can strobe. Perhaps the trickiest are shots where several planes or birds are moving in different directions in a setup; you'll choose one to follow, but the others will likely blur or break up. Andy Gellis notes that, "*The key is to be aware of how close objects are in the foreground. With the camera tracking a subject at the same speed, the subject will stay in focus. Distant objects will also remain in focus. It's the strong verticals in the mid-ground or extreme foreground that will ruin this type of shot.*"

E. Camera noise & run times

The IMAX camera is considerably louder than, say, an Arriflex 35mm camera. While an effective blimp is available for 2D, the blimped camera weighs 275 lbs. That means there is very little useable sync sound, and none in 3D. Using a barney can allow some sync or location sound in 2D.

Camera noise can affect the behavior of wildlife subjects, by either scaring them away or changing their behavior. Says Michael Caulfield, the director of Africa's Elephant Kingdom, "*You get a lot of portraits of dumbfounded animals staring at the camera. You never know how each species will react.*" Similarly, the camera noise can distract actors and cause non-actors to be intimidated.

Run times are much shorter for 15/70. At 24 fps., 1000 feet of film will run through the camera in three minutes. With 3D, you are looking at 2000' exposed in three minutes.

F. Kinetic good, emetic bad

Audiences love kinetic effects, but exceptional unsteadiness, swish pans and certain aerials can have a very decisive and unfortunate effect on viewers. Says George Casey, "*You learn to be cautious about things like that, but you shouldn't be cautious about trying new techniques.*"

G. Waiting for the weather

The IMAX Experience® takes viewers to places they would never otherwise visit, but many of those places present a difficult shooting environment. At the same time, notes Alec Lorimore, "*Anything other than a nice, rich blue sky is really not acceptable in 15/70; it washes out the image and degrades the contrast. You can't frame it out. The light needs to be perfect, so you need to schedule and budget accordingly.*" Also, when you're on location technical problems caused by humidity and cold may affect the performance of the cameras.

Depending on the demands of your script, sometimes the weather won't be bad enough. But when it is bad enough, you may not be able to get the crew in place.

"*I'm always counting on waiting for the light so I can get other things done.*" - David Douglas

H. Smaller shooting ratios

By and large, 15/70 productions have far less coverage than productions using smaller formats. There are several reasons for this. First, the stock is really expensive. Second, because everything takes longer and most shots are exteriors, the light can change significantly between takes. In conventional drama you might cover a scene from three or four different angles right through the entire scene. In 15/70 you can't do that; you usually can't afford the time and the stock.

Ironically, 15/70 productions could use more coverage than smaller formats, because it's so unforgiving. Often you think you've got the shot, but when it comes back there's a technical glitch, a focus-pulling problem, a performance that, when viewed in 70mm, is unsatisfying or some other minor problem that makes it unusable.

"*Filmmakers have to learn to be really fast on their feet in terms of covering a sequence. They can't delay decision-making in constructing a sequence. You come out of a scene with exactly as much as you need and less than you want, and each shot is difficult. You can't deal with this coverage in the cutting room, so you have to make sure the limited amount of material you are getting will do the job. It's frightening how little coverage you have for the cutting room. You learn very quickly to get the shots you really need, and you'd better make sure they work in your head, because it generally costs a lot of money to get yourself back in position.*" -- Stephen Low

Low suggests you budget and plan for pickup shots for various scenes, because you often have to do them. If there's something technically critical about a shot, it's wise to do several takes from the same set-up, because that's easier than changing set-ups. "Y*ou have to learn efficiency because you can't bracket, you can't shoot the scene four different ways with three lenses. You have to understand editing more than you do in 35mm. In effect you become an editor on the set, because you are boxing your editor into a corner every time you move.*"

"*You do fewer shots, so you have to think very hard about them.*" – David Breashears

I. Shorter mags

Due to the large frame size, the film travels at a rate of 336 ft per minute compared to 90-ft. per minute for 35mm film. As a result, to keep magazines at a physically manageable size, a standard film load is only 1000 feet or three minutes of running time. A few models of our cameras have larger mags available, although they naturally make the camera bulkier. (The 2500-ft. mags make a great deal of sense in the underwater housing, and the cargo-bay camera used on the space shuttle uses 3,500-foot mags, both for obvious reasons.)

For some directors and cinematographers, this isn't a problem. Ben Shedd, for instance, finds they work well provided he budgets for a second assistant cameraperson, whose job is to load and change the mags. David Douglas says three-minute mags are "*not a big issue,*" and eight minutes is "*absolutely plenty.*"

Stephen Low agrees that "*three minutes is a long time to get a good take. The problem is related to reloading. It's that five to 10 minutes of reloading that kills you.*" (It takes closer to 20 minutes to reload the IMAX 3D camera.)

George Casey gives an example of when short mags can be a nuisance. "*We were recently filming aerials in the Alaska Range. We would refuel the helicopter, fly in from 50 miles away, pick our shots, rehearse, shoot five shots, and have to return at the end of every three-minute*

load   and   do   everything   again.   It's   a   definite   limitation."

J. Allow more time

If you're working with a film frame 10 times the size of a conventional frame, it makes sense that 10 times the care, caution and expense will go into getting that shot.

Still, the pace can be an adjustment. The AD may have to work to keep up the energy on the set during the waits. Hire a smart crew with active minds, preferably a crew experienced in the IMAX format.

Although it is not uncommon to get up to ten 3D takes in a day, you may get eight set-ups a day in 15/70, but usually less in 3D. Says Toni Myers of a recent IMAX 3D shoot: "*Where in episodic television you would be looking to get from 10 to 30 set-ups a day, we were lucky if we got three. It affects how the assistant director runs the set, keeping everybody going while the immensely painstaking lighting takes place. But once you've worked in the medium for a while, it all settles down to a natural proportion.*"

K. IMAX Dome

If you're making films purely for the dome, you have to pay attention to the fact that the picture is all around you. Stephen Low believes that it's almost impossible to do drama on the IMAX *Dome* screen because of the sight lines and scale.

White skies will ruin an IMAX *Dome* shot. Although there are filters to darken the sky, an overcast day causes light to bounce around the theatre, and the rest of the image looks washed out and unattractive, not to mention the seams of the screen may be more apparent.

IMAX *Dome* shots usually look fine in traditional 15/70; the reverse is not always true. Obviously you can't double shoot everything, though, so here are a few tips:

If you are shooting footage to be projected in both traditional 15/70 and IMAX *Dome*, frame the image lower and more centrally than you would for 15/70 alone. Adds Toni Myers: "*Shots where people's heads are near the top of the frame look just terrible in the dome. It's ugly, the image is bent way over, and people get neck strain.*"

L. IMAX 3D

The first IMAX 3D films were shot with the IMAX 3D beamsplitter rig, which consisted of two 2D 15/65 cameras, mounted at 90 degrees, with one camera aimed at a mirror. IMAX, in recent years, has developed a single-body IMAX 3D camera using a pair of modified lenses. While heavy at 235 pounds, and a bit noisy, the camera is an exciting new tool for artistic expression. Whether you're looking for special effects for use in theme parks attractions, or want to make a subtle dramatic film using the most intimate cinema experience in existence, the IMAX 3D camera offers remarkable filmmaking opportunity.

With IMAX 3D, the audience sees every leaf in a forest and every hair or feather on an animal. But unlike traditional IMAX projected images, IMAX 3D images are on a human scale. Characters appear life-sized and right beside you. For this reason, IMAX 3D is far more effective for drama than 2D. Explains Stephen Low, "*You don't have the gigantism that normal 15/70 produces. 3D is very natural, and the blocking of actors is very similar to conventional drama.*"

If you're thinking of making a 3D film, be sure to engage a good, experienced stereographer; often, this individual can often double as the camera operator. See as many 3D productions as you can, and screen the 3Ddemo reel produced by IMAX (available to clients who have paid a deposit on a 3D camera rental). It's advisable to shoot some tests before you start production; even experienced directors and DOPs do so, because what you see in the viewfinder is not what you get. Notes Roman Kroitor, "*There is definitely a learning curve people have to go through to figure out how to compose sculpturally as opposed to in a painterly way. You could learn by trial and error, but that's a pretty expensive way to learn.*"

3D needs even more light than 2D to get depth of field. For example, one set in Echoes of the Sun required 500 kW of lighting to light a set 50 ft. high by 120 ft. wide by 50 ft. deep. The 180-degree horizontal and 120-degree vertical field of vision means the DOP has to light the edges of the screen more than usual -- and hide the lights.

As in real life, stereo vision is most effective from three to 15 feet. Anything beyond that doesn't offer much 3D effect. When composing a 3D shot, you need to establish foreground and mid-ground elements, and then design the shot with a moving camera. This allows the various planes and depth cues to shift, heightening the 3D effect. The IMAX 3D Experience, unlike its 3D predecessors makes the audience feel as if they are part of the image. The 3D can be immersive, and objects can be made to hang in the audience. The IMAX 3D camera has converging lenses, but is a fixed inter-ocular system. The IMAX 3D rig has both adjustable convergence and inter-ocular capability.

One phenomenon that doesn't occur in 2D filming is the artifact known as "*ghosting.*" If you place objects with very high colour-temperature contrast in the foreground of a 3D image, such as a white shirt against a black wall, the audience will see a very bothersome ghost image on film. Avoiding this error is a team effort involving, among others, the director, stereographer, DOP, gaffer, production designer and costume designer. It should be noted that theatres equipped with the hybrid system of Electronic 3D glasses are capable of virtually eliminating all ghosting.

Be aware that placing objects too close to the camera can hurt the viewers' eyes. Similarly, you have to be sensitive about invading people's personal space with 3D effects, or overwhelming them with gimmicky effects so that they lose track of the story. Also, converging too close with distant subjects still in focus will cause wall eyeing. IMAX 3D presentations are a new film language and one that audiences, (and most filmmakers) don't necessarily yet fully understand.

So far, there are limited facilities for screening 3D dailies. IMAX Corporation's Sheridan Park headquarters and DKP 70MM Inc. in Los Angeles both have 3D screening facilities available for rent. In absence of easy access to either place, it takes some imagination to picture a 3D image on a six-story-high screen, particularly when seeing it on location through a video viewfinder.

6. HIRING CREW

Look for crew who are experienced in 15/70 production, and who feel challenged by the need to experiment. The slower, painstaking pace of 15/70 production may frustrate a crew accustomed to shooting TV.

Film crews should understand some basic philosophies for 15/70 film production.

"*One good thing about moving the 15/70 camera is that because it tends to be very wide angle, it's forgiving in terms of camera movement. The big screen also helps. There's nothing you can't do with heavy equipment if you're willing to take the time and money to move the camera with whatever gear it takes. Once you resign yourself to a dolly it doesn't matter how much the camera weighs. But people have to realize you are not going to turn 15/70 into 16mm. There are fundamental technical barriers. People are always talking about making the cameras lighter, smaller, miniature, and a lot of that is just nonsense.*" - Stephen Low

"*I've become tired of listening to people whine about the size and noise of the cameras and the duration of the load or whatever. It's a matter of attitude, whether you're looking for excuses and escape hatches or you're ready to take hold of it and get going. Having some restrictions stimulates creativity and makes the process more interesting. Cameras that act like video cameras are just video cameras. That's not what we're doing, which is the art of photography.*" - David Douglas

One of the pleasures of working in 15/70 is that the format attracts and requires crews who enjoy doing painstaking work that is rewarded by extremely high-quality results. By and large the crew members are genuinely interested in the outcome (expect large turnouts for rushes). It's important during a shoot to respect your crew's perfectionist approach to their work.

Sally Dundas says, "*When looking for crew members, I look to find people who can grasp, and who have an interest in, the details of technical issues because that type of person can get past the 'technical difficulties' of 15/70 more quickly and move on to the making of a good story.*"

You can make a 15/70 2D film with as few as four or five key people, but bear in mind that the equipment is heavy, so you may need more people to carry things.

When the concept expands to a major drama, however, Noel Archambault said the crew numbers are comparable to the level of a feature film. "*If you're shooting in a remote location, you need more people than you might otherwise need, because of the complexity of lighting and gripping. For Wings of Courage we had a conventional feature-sized crew plus a few 15/70 experts, and it worked efficiently. We got a lot of set-ups in a day.*"

For some 15/70 productions, you will likely want to add a few specialists to the crew, such as an experienced stereographer for 3D shoots. For technically advanced soundtracks, particularly those involving PSE, consider hiring a sound designer during the early planning stages. The IMAX Film Department can refer you to appropriate specialists.

7. SHOOTING 15/70 DRAMA

A. Working with actors

15/70 is as unforgiving to actors as it is to every other aspect of the film. A bad performance (or a bad complexion) in 15/70 can be extremely distracting. Working in 15/70 challenges actors. It can be hard to find a high level of emotion or even remember your lines given the noisiness of the cameras, the heat and intensity of the extra lights, and the very long waits for set-ups between magazine changes.

Cast good actors who are capable of subtle performances and can get it in few or even a single take. Notes Antoine Compin: "*If you project too much the whole thing looks phony. Part of the director's job is to clip the actor's wings and to rein him or her in a tactful way. On the viewfinder it may look as if the actor is holding back too much or not projecting enough, but in fact the actor is doing just fine. If you ask for more you will get a bad surprise when you see the results on a large screen.*" That's not to say, of course, that deliberately using highly stylized acting is out of the question, as long as the director understands how to get the desired effect on the giant screen.

"*If we were to use longer lenses we would lose the impression of being on the set with the actors, in the middle of the action. It is because we have to use very short lenses that are similar to the angle of our eyes that the set is so spectacular.*" - Jean-Jacques Annaud

One of the difficulties of getting an actor to underplay the scene is that as director, you are likely 10 to 25 feet away from the actor because of the lens angle. You may even be watching with binoculars or video assist with the telephoto lens, in order to evaluate the performance. Experienced actors tend to play to the audience -- the director in this case -- so will project that distance. But the kind of performance you want is comparable to a 35mm intimate love scene where the camera is three feet from whispering actors.

At the same time, you don't have the same tools you normally have to enhance emotions, such as close-ups, cutaways and travelling shots. Medium shots in 15/70 are equivalent to close-ups in smaller formats, because the image contains so much detail. And you probably won't want to see your actor's 60-foot head dominating the screen.

For these reasons, directors often remark that doing 15/70 drama is more like being a stage director than a cinematographer. Rather than the little snippets you shoot in 35mm, with the standard film language of wide shot, medium shot, close-up, cross-cutting and the like, you won't have as wide a variety of shots to choose from in the editing room.

Moreover, most 15/70 shots run longer than shots do in other formats. A standard 15/70 shot is probably on the screen a minimum of four seconds and often 20 seconds or more. Explains Alec Lorimore, " *That means there are many more opportunities for a take to be blown. A take that would be acceptable in 35mm because you could use it up to a point then cut to a close-up, would have to be entirely re-shot for 15/70. You have to shoot it until you get an entirely usable take from beginning to end, including focus changes, cranes, dollies or any other element you introduce.*"

"*Nature and wildlife can screw up as often as an actor. In some ways working with actors is easier.*" - Alec Lorimore

Nor can you use tight close-ups to direct the viewer's attention. Remarks David Douglas: "*There*

will always be the creeping fear in the director's mind, with this medium, that the audience may not be looking at the same thing he is looking at. In the past, directors shot tighter and tighter close-ups. This will be a new and frightening world for storytellers who have been used to creating the lines of their story by eliminating all else but its linear elements. It's a creative challenge."

Forget about cheating. A mature person can't play a teenager in 15/70 productions, and makeup can't hide anything -- it will just look like makeup on top of wrinkles.

Jean-Jacques Annaud notes that casting for 3D is quite different from 2D. "*What we call 'photogenic' has to do with the 2D rendering of a face. That's why you need screen tests for 2D. In 3D, actors look the same as in real life, which, as anyone knows who has met a movie star in person, is often a disappointment. IMAX 3D is often a quite frightening experience for actors, because they don't look the same as in 35mm. If someone looks terrific with your eyes, this is an IMAX 3D star.* "

"*For actors, less is more.*" - Antoine Compin

8. PRODUCTION DESIGN

There are a few points to remember about designing for 15/70:

- Because everything shows in 15/70, everything needs to be perfect - details, set decoration, materials, painting and getting the scale right. Nothing is more distracting than some set element that is not perfect, that doesn't look "*real*." Details count.

- The sets need to be bigger -- usually three times taller. Makeup needs to be subtler. Anything approaching "*normal*" movie makeup will look artificial.

A. Designing for 3D

As discussed under 3D cinematography, the 3D effect applies primarily to foreground objects. That means you can design long shot exteriors as you would for 2D, but interiors and anything else shot close have to be both extremely realistic and designed for 3D. 3D enhances a good-looking set, and shows up the weaknesses of a bad set.

Interior sets need to be the actual dimensions of the room you intend to portray -- yet the IMAX 3D camera is three times the size of a regular 35mm camera.

You'll see the ceilings and floors in considerable detail. For Wings of Courage, Ian Thomas had to design ceilings and walls that came away in portions. Obviously, these demands mean that in certain instances you can expect to build sets rather than use locations, which adds to the cost.

"*In Wings of Courage, we thought about letting the sets go monochromatic around the edges, to use colour to direct the eye. The camera can see anything the eye can see. We called for real marble, real inlays on mahogany, all period bric-a-brac, real buttons, period matchbook covers. The production designer had all the windowpanes made of resin that he rolled slightly to look old-fashioned. Wardrobe couldn't use synthetic thread because it could shine and look inauthentic in a 1930s setting. Most people thought the detail was extraordinary, but a few critics were distracted by the detail. Maybe people have to get used to it.*" – Charis Horton

9. SPECIAL EFFECTS

The list of special effects available for 15/70 films is growing, with animation cameras, digital repair of individual frames, composites, optical blowups, and computer animation now an active part of the 15/70 world. There are three optical printers in existence and several CGI facilities with experience in visual effects and character animation in both the 2D and 3D 15/70 formats. DKP 70MM Inc. can advise and support your film scanning and film recording requirements.

Digital effects work is, however, expensive but the cost is dropping quickly. It's probably three to eight times more expensive than in 35mm -- and budgets for many 15/70 films don't allow filmmakers to take advantage of them. They can also require triple the time in your schedule. They take longer to design and execute because of the quality and resolution required for each frame

As with everything else in 15/70, you can't get away with an effect that isn't flawless. You can't cut away to another shot if there's a glitch. Nor is it as easy to recreate scenes. For example, in a battle scene in 35mm, in long shots the audience won't necessarily notice the effects, doubles and acrobats. In 15/70, however, if you're not very careful it could easily look fake.

Effects work is even more demanding in 3D. The 3D system involves two strips of film, so everything must be repeated, timed and matched. The costs are often not two times the cost of 2D, but significantly greater given the complexity involved.

As Gord Harris explains: "*Recently the field of special effects in 15/70 has matured to the point where high quality digital film scanning, image manipulation and film recorded output has matched and surpassed the capability of optical printers in image quality, but not yet in cost. In the digital realm, one gets unprecedented control of colourimetry and flawless composites, plus many useful techniques of sharpening, degraining and image enhancement which can make images look sharper than those processed strictly optically. For instance, it is easy to digitally "stretch" the contrast range of a shot to make the darkest portion of a shadow tone absolutely black and the highlights perfectly white. Slight edge enhancement algorithms can also be useful. These can make a modest contrast original photography shot look absolutely dazzling - something that is difficult to impossible to do with optical printing. However, at this point in time, it is still generally faster and cheaper to do many effects optically on optical printers, in-camera, or even as a burn in on the contact printer, as we did for L5: First City In Space. Effects have to be considered on a shot-by-shot basis from the storyboard to see which technique is most appropriate to use.*"

David Douglas believes that, "*One of the reasons special effects have been slow to be applied in 15/70 is because to a large extent they haven't been necessary. 15/70 has been able to transport audiences to other places, and give them a window into a reality other than the one they are in. There's a difficulty in making special effects measure up to people's judgment of what is real or not real. Flying the camera in space, dropping it onto the Titanic, shooting the fires of Kuwait: these are 'special effects' bigger, and more special, than will ever be created. The integrity of that reality is not lost on the audience, whereas some special effects can call the integrity of their subject films into question. Subliminally I think that fact has not been lost on a lot of filmmakers.*"

"Special effects are great if there's a reason for them. Do I miss them? No. I hope when they arrive that they arrive at a level that does not require the audience to take a grand step back in terms of their skepticism about the reality of the image."

Adds Mike Boudry, "Digital compositing and image manipulation are now routine tools in 35mm film production, and mostly their use is as invisible to the audience as all the other filmmaking tricks and techniques. It's a lot harder to create digital work that is fully convincing in 15/70, but it can be done, and we are increasingly seeing situations where it's the most cost-effective route to the shot the Director really wants."

"If Steadicam were important it would have been addressed. It's not a big deal for giant-screen cinema. You are not rushing around with the camera trying to run up and down stairs with the actors. The whole screen would strobe. You construct stories differently so you are not busily trying to trace everybody from a to b. The kinds of shots Steadicams get used for are not appealing or interesting in 15/70." - David Douglas

"*We designed and built a lightweight camera to do Steadicam shots and have done a number of them. However when you take a fragile system and make it even more fragile, there are more opportunities for camera malfunction.*" Alec Lorimore

"*If the cameras get lighter, you will see lots of less-thought-out shots that are jumpy and jiggly. That works fine for TV or 35mm, but with the giant screen it feels like the theatre is moving any time the camera moves.* - Ben Shedd

"*We designed and built a miniature camera to allow us to do Steadicam shots. People are so used to seeing reality filmmaking on TV and moving cameras in feature films. Steadicam gives the audience the sense they are in the scene.*" - Greg MacGillivray

"*I can foresee a day when you will be able to do an 15/70 film using 80 per cent digital composites and computer graphics.*" - Antoine Compin

"*Special effects don't interest me a heck of a lot. The giant-screen can be an incredibly powerful story-telling medium, but it requires stories that take advantage of what it can do very well. That means a different kind of story telling.*" - Roman Kroitor

10. EDITING

A. How does 15/70 editing differ from editing for TV or 35mm?

When audiences watch a 15/70 film, they have to try to make sense of how all the elements in the picture relate to each other. Good editors are able to bring out those relationships. At the same time, notes Charis Horton, " *People like to be able to look around, and pick and choose what their eye wants to look at. The editor doesn't choose for you as much as with conventional films.*"

In general, shots for the giant-screen are held longer than in smaller formats, so that audiences have a chance to take the image in. (It takes even longer to read a shot projected in an IMAX *Dome* theatre.) Still, cautions Stephen Low, "*A shot may be endlessly entertaining in 15/70, but the movie might be dying around it. When you start in 15/70 you say 'I could watch that shot forever, it's so amazing,' but when you get beyond that point you have the strict demands of storytelling. You still have to direct the audience's attention, and you need the mixture of long shot, medium shot and close-up to do that.*"

Audiences like and expect kinetic effects, but too much abrupt movement can have unfortunate effects. If you cut from a wide to close shot you can literally make people sick. Similarly, if you don't move an object or person across the screen incrementally, you run the risk of giving your audience whiplash. You have to think about where the eye is likely to rest, and where you're going to take the audience next, so the movements are not too jarring. Try to keep the audience's attention on the same part of the screen in both shots when you make a cut.

Characters don't exit scenes in 15/70 films because it takes too long, and takes the audience's attention to the side of the screen or the back of the theatre in IMAX *Dome*. Therefore, match-action cutting is used far less than in features films or video.

That said, some filmmakers have used quick cuts very effectively, notably in Rolling Stones: At The Max and T-REX: Back to the Cretaceous. In the case of the former, more conventional editing was possible because the audience knows the context, knows the songs, expects a concert picture and has been primed by rock videos.

B. Scripting Narration

Generally, the less narration the better. Indeed, not every film needs narration. Be succinct, and let the audience find the story on its own. You don't need to tell everything you know about the subject. Says Lorne Orleans, "*If a picture's worth a thousand words, an image on the IMAX screen is worth at least a million words.*"

C. Screenings
Particularly if you're new to 15/70 filmmaking, it's wise to budget for even more printing and screening than usual. You'll need to see the image at least in 35mm to get the pacing and impact right. Even experienced filmmakers can be fooled by the footage when it isn't screened in a theatrical setting. 15/70 projection is even better; some 15/70 and 15/70 Dome shots look dull in 35mm but simply spectacular when projected in their correct format.

Notes David Keighley, "S*ome producers believe you can judge 15/70 from a video daily. I'd rather they stick with 35mm reduction prints that can be projected on a large screen. If you sit close, you can get a good idea of The IMAX Experience®.*

There's another reason to print and screen the footage. One of the key 15/70 editing jobs is a minute examination of the footage for technical flaws, such as flares, strobing and focus problems, which can be extremely distracting on screen. If the image isn't perfect, you shouldn't use it. Most of these flaws are not apparent on small-format editing systems, such as video or even optical 35mm.

Some editors screen all the footage in 35mm, sitting very close to the screen and concentrating hard -- a demanding method, as the two formats look radically different. If something looks questionable, they order a 70mm print of that footage. Some print and screen their rough cut in 15/70. But, as Andy Gellis has observed, "*If the film is working well on the Avid, then it will work like gangbusters on the big screen, as long as you calculate or calibrate the shot durations correctly. The brain can't absorb the overload of information on the IMAX screen as readily as it can on the video monitor.*"

Video will not give you an adequate impression of how the footage will look on the giant screen. For instance, if the eye has to move too far across the scene, a cut won't work as well. Or in 3D, if the depth cues in successive shots aren't similar then the brain will have difficulty fusing the left eye and right eye images. You may not recognize a spectacular 15/70 shot when seen in video. For these reasons, some video editors will rely more heavily on their 35mm printdowns, and selective contact printing of 70mm footage.

Occasionally, the reverse may be true. Stephen Low finds that "*when you need to bamboozle the audience for a second to make a cut work and there's something distracting on the edge, sometimes 15/70 is more forgiving than small formats, because (in 2D) you're not as aware of the edges. A bad cut in 35mm or on video may be all right for the giant screen because peripheral vision is nowhere near as important, and the audience is more focused on the center. And in IMAX Dome theatres, you're not at all aware of the edge of the screen.*"

Because you'll be moving from one format to another in editing and have format-related decisions to make, expect the process to take longer and cost more.

"*You have to be five times as careful with composition in 15/70 as in 35mm, and five times again as careful in 3D.*" Roman Kroitor

"*A lot of stereography consists of setting up a good 3D shot. That involves choosing the correct lens, composing the shot and deciding where you will place things in front of the camera. A good 3D shot has various elements, not just stereopsis [3D vision] but depth cues such as perspective; foreground objects that overlap with the background object; tones that recede into the background; and contrasting lighting that gives objects shape and helps define the stereo space.*"
- Noel Archambault

D. Editing a 3D Film

Notes editor Barb Kerr: "*You have to be even kinder to the audience in 3D, because their eyes are really focused deeply inside the picture. If you change the focal plane to something essentially above the head of the person in front of them in the theatre, you have to set them up to make that shift or it can be completely baffling or hurt them.*"

It's certainly not something you should count on, but occasionally 3D can be more forgiving of flaws that might be unacceptable in 2D; the stereo effect may diminish the impact of specific problems. On the other hand, some flaws, such as scratches, may not be too noticeable in 2D but can be very distracting in 3D, where a scratch can seem to hover in front of the viewer. If there is more than a very brief disparity between the images the two eyes are seeing (non-shared information), the audience will get eyestrain (whether or not they are consciously aware of the disparity) and they may not want to come back to another 3D film.

For this reason, it is of critical importance to have first-rate lab work done by a facility experienced with the 15/70 format. Disparities in density, colour, stocks, lens iris, lighting or other aberrations between the left-and right-eye strips of film are not acceptable.

Past experience suggests that if possible you budget for the editor to be involved from pre-production until the film is delivered. The editor inevitably ends up playing a really long-term and critical role that starts with assessing the rushes artistically and technically, and communicating the information to a director who may be on a remote location and unable to see the rushes, even in 35mm. Often, you may not see a complete 15/70 version of your film until the screening of the first answer print. DKP 70MM Inc.'s postproduction consultants work directly with the film crew and report any lab problems on a daily basis. The consultants at DKP 70MM Inc. are far more critical about colour timing than you would experience in the world of 35mm filmmaking.

11. SOUND

A. The importance of sound

Sound contributes at least half the power of a 15/70 film. The intense visuals demand sound of comparable quality. To meet this demand the theatres have superb discreet six-channel sound systems, probably the best in the world of cinema. The other side of this opportunity is that 15/70 sound is extremely painstaking and costly to produce, compared with small-format sound.

The speaker layout in an IMAX theatre is as follows: channel 1 – rear left, channel 2 – front left, channel 3 – front centre, channel 4 – front right, channel 5 – rear right and channel 6 front centre, top of screen (channel 6 not available in MPX Theatres). IMAX *Dome* theatres are configured identically, the one difference being that channel 6 is located higher up, inside the centre of the dome. In addition to the 6 channels, a supporting subwoofer (located behind the lower part of the screen) powerfully reproduces the low frequency range that the audience will literally feel in their chests.

15/70 sound may be quite a leap for filmmakers who have worked in television or lower-budget 35mm features. For those accustomed to looping all the dialogue, Italian-style, however, there will be no particular adjustment. Jean-Jacques Annaud, for instance, found it "absolutely no problem. I acknowledge that most of my colleagues hate looping, they believe the actors lose emotion, they hate staying in a dark theatre for two weeks and directing the actors again. In my previous theatrical films, however, I used no production track and was quite happy with this. I prefer to concentrate on the picture first, and I just love making a soundtrack that sounds true but has been entirely manipulated in the sound stage. Others may want a silent camera, but for me it is not a requirement."

B. Recording

Sound accompanying 15/70 production is normally recorded and mixed on high-end digital equipment. While much of the soundtrack is built in the studio, it's very important to obtain high-quality location recording coverage. Greg MacGillivray, when he shoots sync sound with a barney, uses multiple microphones, recording for instance six characters using six mics, each on a different track in sync. A single recordist and a mic master can handle the set-up. "*I am a big proponent of Robert Altman's practice of multi-track recording his ensembles. Mixing becomes more time consuming, but you end up with something a little more real.*"

The footage usually consists mainly of exteriors, so the challenge is to create exterior *ambiance in a studio. Ben Shedd, for instance, uses a stereo microphone for this purpose.*

"In space we always have the astronauts record sound all the time we are filming. Getting clean, usable dialogue and effects tracks are as important as securing good pictures. Where we can't get one, we will go to considerable trouble to recreate it." - Graeme Ferguson

C. ADR and Foley

The ADR sessions are long and painstaking. But the ADR in combination with the Foley can make or break a 15/70 film. Authenticity really counts in these areas and good foley and ADR keep the audience's sense of reality in tact. An actor delivering an out-of-synch line in an IMAX theatre may as well be speaking a foreign language. The image size only exaggerates the synch problem.

Toni Myers suggests that whenever possible, you record ADR in a situation where the actor can see the image on a large screen. "*The ADR is really a problem. You're always aware of it. Even if the sync is perfect it won't mesh with the surrounding effects. Some films have done a very good job, so the public wouldn't notice it consciously, but there's still something they don't enjoy as much. They often can't put their finger on it, but little things like that undermine the credibility of the film....*"

"*ADR works best when you are working with professional actors who do their own dubbing. In documentaries if you have people in the shot, you have to get a lip reader or take down what they said at the time of shooting.*

Even so when you hire actors to try to put the words in later, there are varying degrees of success. It's frustrating." Greg MacGillivray agrees. "*With non-actors you're lucky to get 50 per cent of the performance they did on the set, and with actors 75 per cent.*" But of course, ADR can improve   an   actor's   performance,   just   as   it   does   in   35mm.

D. Scoring and Composing

Scores should be designed to take advantage of the six-channel discreet playback environment. Greg MacGillivray suggests that horns work very well, but strings can be tricky. "V*ery subtle and delicate sounds can get lost in 15/70 because the theatre is so big*". Now, with the new IMAX audio systems the dynamic range with IMAX sound is much greater then conventional 35mm theatre sound systems ….so subtlety can be used to great advantage.

Andy Gellis suggests you allow plenty of time for the composer to develop a sophisticated score. "You don't necessarily need a large orchestra. We have done very successful tracks that are predominantly midi, but even those were very sophisticated in their layering and spatial qualities. By the same token, a 100 piece quality orchestra will take your breath away in this format."

E. Mixing

Mixing 15/70 films is a long, complex, sometimes tedious process, but can be very rewarding if you get it right. Because theatre playback occurs in a six channel discreet environment, you're mixing more tracks and mixing for an extremely large theatre space, which takes extra time and thought. The sounds come from different directions, and can move around the theatre.

Expect dialogue mixing to take 40-100 per cent longer than smaller formats, which will add perhaps five per cent to your total mixing costs. Overall mixing costs per minute of running time are probably comparable to feature films. A 40-minute film may take seven to 10 days to mix the dialogue, and four to six weeks total mix time.

Try to mix the film in as large a facility as you can, with a large volume of air in the room and the distance between the speakers and the mixer comparable to the IMAX theatre setting with the speakers set up to IMAX standards. The ideal situation (albeit impractical) would be to set up a board in an IMAX theatre. Otherwise, it's important to try out the track several times in an IMAX theatre, re-mixing after each test.

Says Toni Myers: "*Sound designers now have little boards that allow them to do temporary mixes as they go along. It's most helpful in terms of editing. Having even a temporary track or multiple versions of the track affects how you do the fine cut. It can all be done digitally, so we're not carrying around eight or 10 mag soundtracks any more. The quality has also improved 100 per cent.*"

David Douglas believes that sound editing and pre-mixes are the most critical part of the mix. "If you don't pay a lot of attention to premixes, it will cost you a lot of time in the mix. You need to prepare yourself to go into that mix by understanding the various voices you will have to work with."

Do allow considerably more time -- perhaps two extra weeks -- and more money than you have typically allowed for sound postproduction. The results will be worth it, both artistically and commercially.

12. CONCLUSION

The 15/70 format has come a long way since its inception. Yet, in many respects we've only begun to scratch the surface of opportunities. Initially characterized as a documentary medium, it is only in recent years that filmmakers have begun to fully explore the dramatic possibilities of the 15/70 format. And with the proliferation of IMAX 3D theatres, new challenges and opportunities await the adventurous.

William Goldman's oft quoted line when referring to 35mm filmmaking: "*Nobody knows anything*" is only partially correct when it comes to 15/70; certain rules should be respected, especially in 3D, and there are those that definitely need to and can be broken. A filmmaker who takes on the reins of 15/70 production had best learn from his predecessor's triumphs and failures before applying wholesale their intelligence, skill, and expertise.

The language of 15/70 filmmaking is constantly evolving. Filmmakers who venture forth into this medium are truly pioneers. You will have an opportunity to contribute to the language of 15/70 filmmaking, and an opportunity to transport the audience to new places through your ability to add to the palette. Each production that breaks new ground adds to the grammar of the medium, and helps inform each subsequent production. The best opportunity for learning can be had for the price of admission at your local IMAX theatre: see as many 15/70 films as possible before embarking on your own adventure.

It is a wonderful time to be working in 15/70 films, and we at IMAX Corp. welcome you and look forward to assisting you as best we can.

13. ABOUT THE CONTRIBUTORS

Jean-Jacques Annaud is the Academy Award®-winning director of Black and White in Colour, Quest for Fire, The Name of the Rose, The Lover, Seven Years in Tibet and an IMAX 3D film Wings of Courage.

Noel Archambault CSC, SMPTE was one of the world's leading stereographers, and had a distinguished career as a DOP and camera operator. Recent films: Across the Sea of Time, Wings of Courage, Rolling Stones: At The Max, The IMAX Nutcracker and T-REX: Back to the Cretaceous. Noel died in 1998 in an ultra-light plane crash in the Galapagos Islands.

Mike Boudry was trained as a Physicist. In 1985 he founded the Computer Film Company where his pioneering work in the development of digital film equipment and techniques has resulted in two Technical Academy Awards. CFC has since contributed digital effects to over a hundred feature films, and several 15/70 productions.

George Casey, a three-time Oscar® nominee, specializes in producing, writing and filming for 15/70. 15/70 credits include Africa: The Serengeti; Planet Ocean; The Great Barrier Reef; and Ring of Fire.

Antoine Compin has worked as unit manager on features, produced commercials for major agencies, and produced special-venue and 15/70 films. He was co-executive-producer for Wings of Courage and most recently co-produced T-REX: Back to the Cretaceous.

David Douglas' career in cinematography spans more than 20 years and includes features, television and more than 21 15/70 films. Projects include the Oscar-nominated Fires of Kuwait; Rolling Stones: At The Max, The Dream Is Alive and Blue Planet.

Sally Dundas career spans features, television and documentaries. Her 15/70 credits include Fires of Kuwait, The Last Buffalo, Echoes of the Sun, Mountain Gorilla and, most recently, The Hidden Dimension.

Graeme Ferguson, a co-founder and past president of IMAX Corporation, has been making films since the 1950s. His body of work includes several IMAX space films, such as The Dream Is Alive, Blue Planet, Destiny In Space and Mission To Mir.

Andrew Gellis, Producer, most recently he was Executive Producer of Mission To Mir, The Hidden Dimension and The IMAX Nutcracker and T-REX: Back to the Cretaceous. He wrote and produced Across the Sea of Time.

Gord Harris, Technology expert, provides specialized technical support to 15/70 filmmakers and manages long term R&D projects, particularly in the electronic imaging and camera/film related areas.

Charis Horton has enjoyed a career in anthropology and documentary filmmaking, specializing in special-venue and 15/70 films. With her partner, the late Antoine Compin she was co-executive producer for Wings of Courage and co-producer for T-REX: Back to the Cretaceous.

David Keighley, President of David Keighley Productions 70 MM Inc. and Senior Vice President of IMAX Corp., is responsible for laboratory postproduction and image quality assurance for 15/70 films.

Barbara Kerr has worked extensively in the 15/70 film industry, as Art Director of Blue Planet and editor on such titles as Mountain Gorilla and The Hidden Dimension, which Kerr also co-produced. She was an Ace nominee for her editing work on Fires of Kuwait.

Roman Kroitor is a co-founder of IMAX Corporation. Previously, his work with the National Film Board of Canada included such films as Lonely Boy and has pioneered work in IMAX 3D, IMAX animation and other IMAX technologies.

Brett Leonard is a significant force on the Hollywood landscape as a director of, among others, Lawnmower Man and Virtuosity. Most recently, Leonard directed T-REX: Back to the Cretaceous for IMAX 3D Theatres.

Alec Lorimore has a distinguished career as a Hollywood screenwriter and as writer, producer, director and editor for some of the most successful 15/70 films ever released. His recent 15/70 film, The Living Sea, was nominated for an Academy Award.

Stephen Low has won more than 40 awards for his work in conventional 15/70 and 15/70 3D formats. Titles include Titanica, Flight of the Aquanaut, The Last Buffalo, Across the Sea of Time, Super Speedway and Mark Twain's America.

Greg MacGillivray has been a producer, director and cinematographer for more than 30 years. Since 1975, he has worked exclusively in 15/70, producing 17 films -- more than any other independent filmmaker. His film, The Living Sea, was nominated for an Academy Award and the 15/70 film, Everest, is proving to be the most successful giant-screen addition to date.

Toni Myers has been a writer and editor for documentaries, television, and features and has worked in the 15/70 world since 1970. Credits include Rolling Stones: At The Max, The Dream Is Alive, Blue Planet, Destiny In Space, L5: First City in Space and Mission To Mir, and Space Station.

Lorne Orleans, Vice President Film, is responsible for physical production at IMAX Corporation Lorne has worked exclusively in the world of 15/70 productions for more than 10 years including roles on projects such as, Flowers in the Sky, Mountain Gorilla, Fires of Kuwait, Asteroid Adventure, the IMAX 3D production in the Galapagos Islands and most recently NASCAR 3D.

Claude Pare is a Genie Award-winning art director and production designer whose credits include features for Walt Disney Pictures, the NFB and others; television, HDTV and, using IMAX *Dome* 3D technology, Echoes of the Sun.

Ben Shedd, who has won Academy and Peabody awards, is writing a book about 15/70 filmmaking. His credits include Tropical Rainforest, Seasons and Fort Worth Flyover II.

15. FOR MORE INFORMATION

Camera Rental and Prices, (905) 403-6323 Fax (905) 403-6460

Lorne Orleans -- Vice President, Film Production Tel. (905) 403-6502 Fax (905) 403-6514

General Enquiries – (905) 403-6500

Film, Post Production David Keighley -- President, David Keighley Productions 70MM Inc. Tel. (310) 204-0632 Fax (310) 204-0307