

American Cinematographer

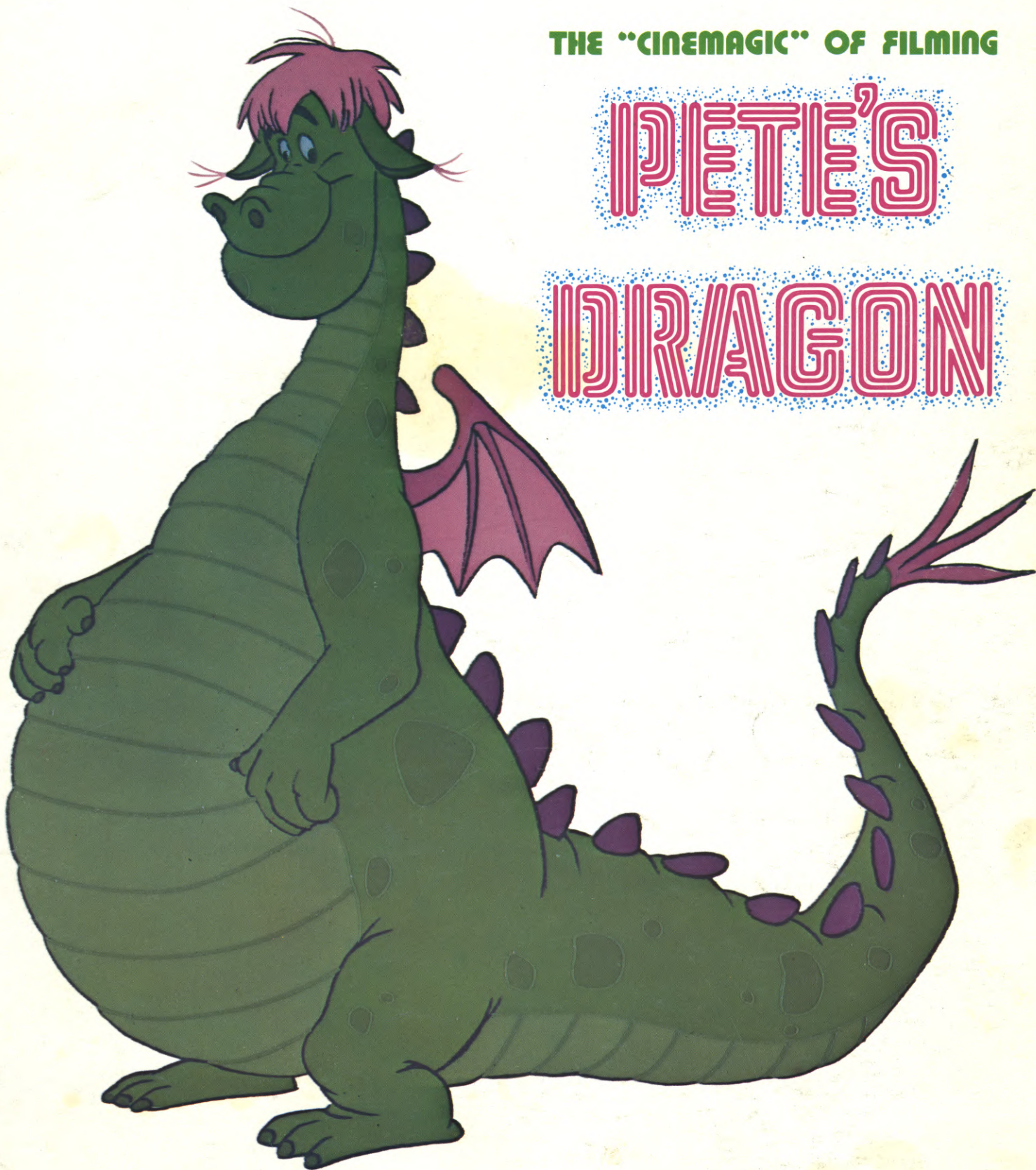
International Journal of Motion Picture Photography and Production Techniques

OCTOBER 1977/\$1.50

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PETE'S DRAGON





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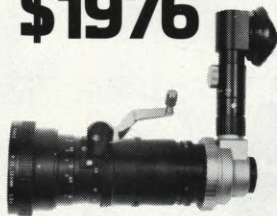
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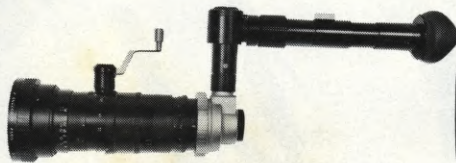


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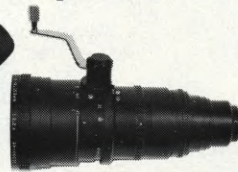
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American Cinematographer

International Journal of Motion Picture Photography and Production Techniques

The American Society of Cinematographers is not a labor union or a guild, but is an educational, cultural and professional organization. Membership is by invitation to those who are actively engaged as Directors of Photography and have demonstrated outstanding ability. Not all cinematographers can place the initials A.S.C. after their names. A.S.C. membership has become one of the highest honors that can be bestowed upon a professional cinematographer, a mark of prestige and distinction.

OCTOBER, 1977

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• FEATURE ARTICLES

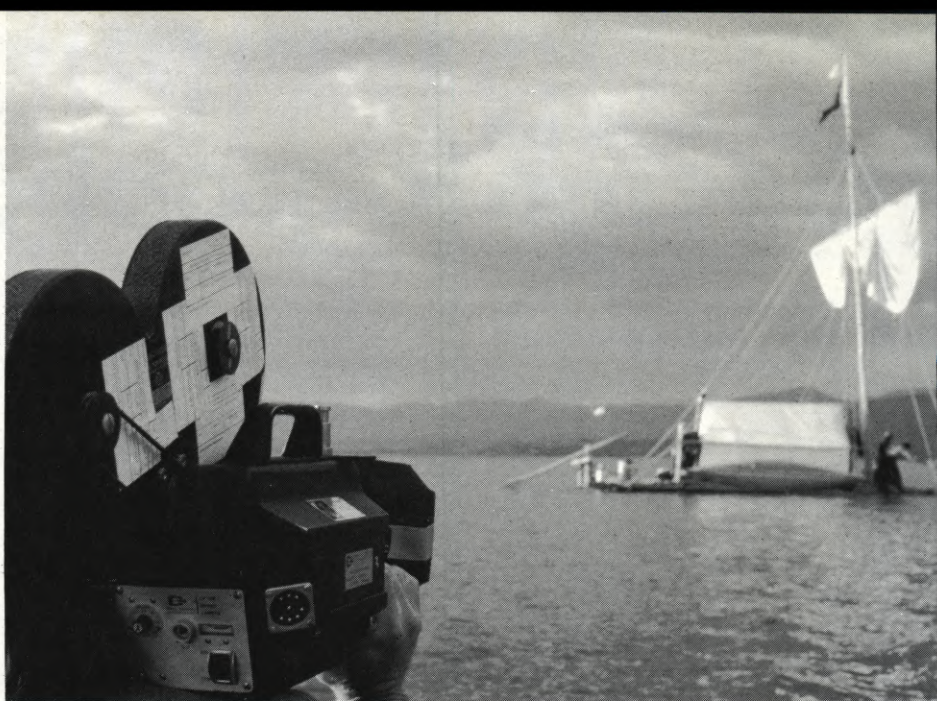
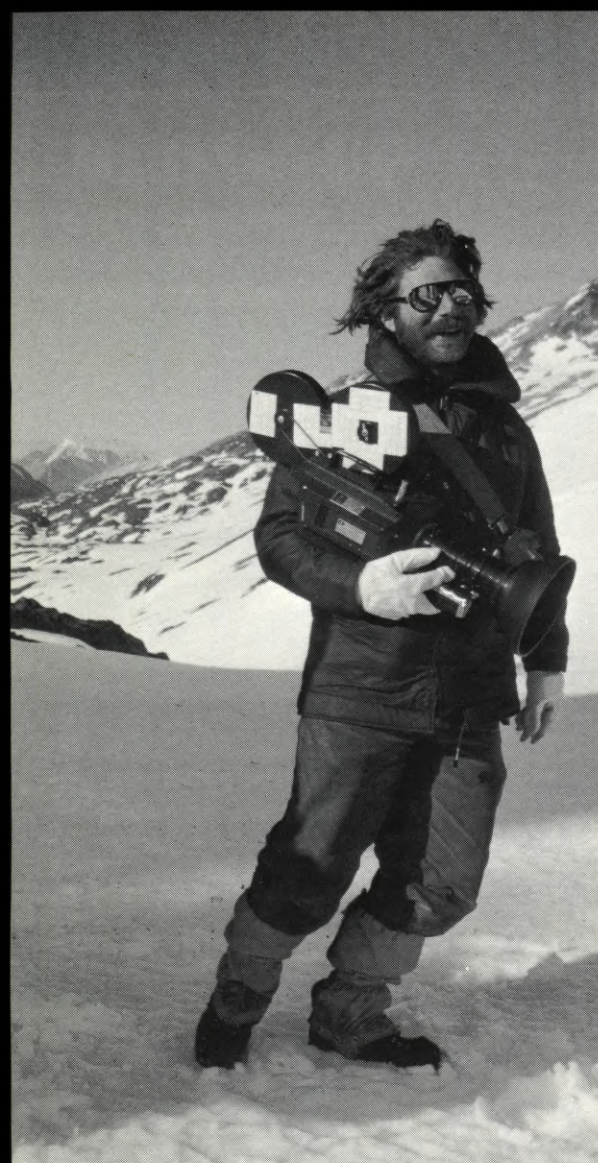
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ON THE COVER: Elliott the amiable dragon, title-role star of "PETE'S DRAGON", a new Walt Disney musical-fantasy feature which skillfully combines live-action and animation in a tour de force of cinema magic and technical expertise.

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“Silence in the Yukon is the most total I have ever experienced, quieter than any sound studio... Our voices would echo back and forth for miles. Shooting sync-sound at close range was especially demanding, but the CP-16R was wonderfully quiet.”

Eric S. Camiel
Cinematographer

For more than 100 days, award-winning filmmaker Eric Camiel and his CP-16R kept constant company, filming the ordeal of four men as they retraced the route of the great Klondike Gold Rush of 1898 for “Yukon Passage,” a National Geographic television special, co-produced with WQED/Pittsburgh.

“For three and a half months, my CP-16R was my constant companion as we froze and sweated, climbed and fell, working at the limits of fatigue and physical endurance to film the route of the great Klondike Gold Rush of '98,” says cinematographer Eric Camiel.

“We hiked over the Chilkoot Pass, 34 miles on foot, over snow and rock. Then we camped at Lake Bennett, in the Yukon Territory (part of a vast semiarctic region in northwest Canada), the staging area for the raft trip down the Yukon River. There we filmed for three weeks as the four men logged a mountainside, ran the logs down the rapids, and built their raft.

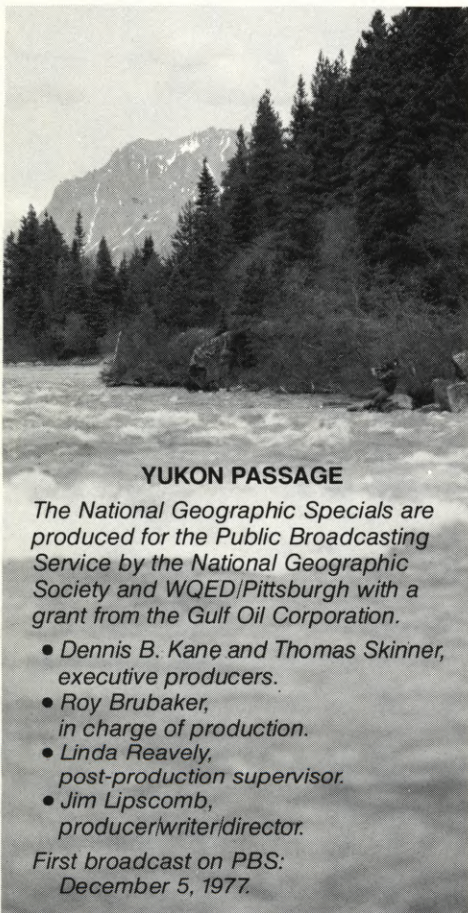
“The raft was rigged with a big canvas squaresail for sailing the 200 miles of lakes to get to the river proper. Riding the spring flood at six knots, we drifted, smashed, and ground our way to the heart of Gold Rush Country, where the Yukon and Klondike rivers meet: Dawson City, a major boom town during the Klondike Gold Rush. From there we rafted down the Yukon River till the

freeze-up, and then out by dog sled.

“The CP-16R was used for three and a half months in the wilderness, shooting over a hundred 400' rolls of 7247 color negative, operating in a temperature range of 10° to 95°F with no problems,” says Eric Camiel. “It ran seven to nine magazines per NC-4 battery, even in cold weather.”



Camiel being helped to camera position up the bank. “No wonder the camera fell so often...” says Camiel.



YUKON PASSAGE

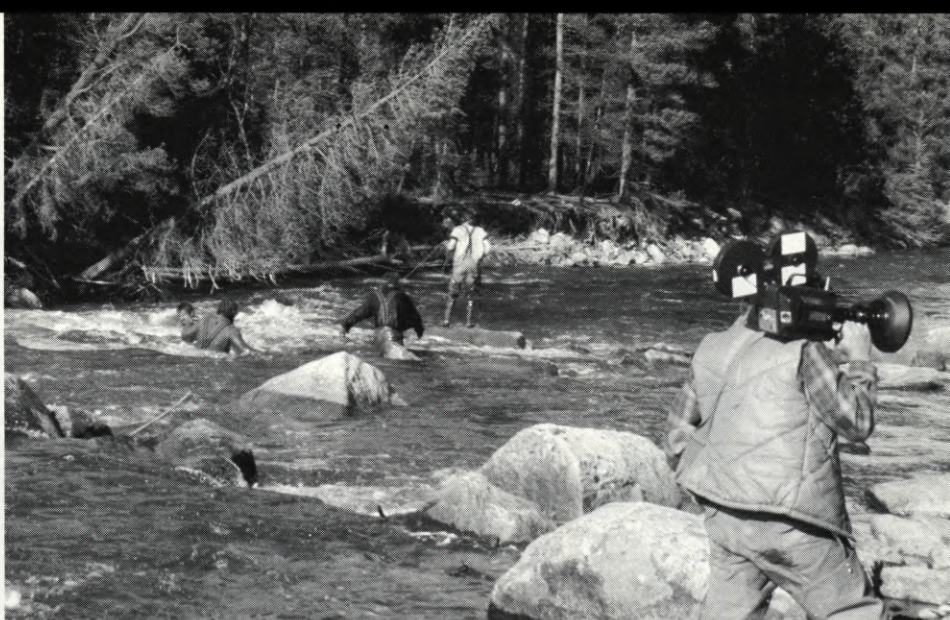
The National Geographic Specials are produced for the Public Broadcasting Service by the National Geographic Society and WQED/Pittsburgh with a grant from the Gulf Oil Corporation.

- Dennis B. Kane and Thomas Skinner, executive producers.
- Roy Brubaker, in charge of production.
- Linda Reavely, post-production supervisor.
- Jim Lipscomb, producer/writer/director.

*First broadcast on PBS:
December 5, 1977.*



"Dollying" across on a cable to film the running of the rapids.



Bringing logs for the raft downstream.



Lake Laberge, Yukon Territory. Paul Crews, member of the 4-man raft crew, and Eric Camiel (filming) on the raft. The CP-16R protected by a special CP raincover. The sudden storms on this lake claimed the lives of many men in 1898.



case clips onto a backpack frame."

"There was very little special equipment used," says Camiel. "I did build a lightweight waterproof padded case that holds the camera, in a ready-to-shoot format, plus accessories. The camera goes in and out easily, and the



Left to right: Cinematographer Eric Camiel, producer/writer/director Jim Lipscomb and soundman David Clark. "Yukon Passage" was shot double system with Nagra sound recording equipment.

Like a cat with nine lives, the CP-16R kept on shooting despite the incredible abuse to which it was subjected."

"The weather was quite erratic, with frequent rain squalls, and the CP raincover had to go on and off several times a day.

"The camera was dropped three times, once sliding forty feet down a snow bank. Occasionally it got wet with spray and rain. Each time, I just dried it off and kept shooting.

"Once, while I was changing magazines, the wind blew sand into the open camera. I cleaned it out and kept shooting. The worst problem, though, was the fine abrasive dust that filled the air any time we were near the gravel-aved roads. It got into everything, and eventually ruined my lens. Still, the camera kept shooting.



The "Yukon Passage" team

"I was really amazed that the camera kept functioning through it all. Like a cat with nine lives, the CP-16R just kept on shooting despite the incredible abuse to which it was subjected."

"I know of no other camera that could have served me as well."

"Silence in the Yukon is the most total I have ever experienced, quieter than any sound studio. No cars, no airplanes, no insects — nothing but silence. Our voices would echo back and forth for miles. Shooting sync-sound at close range was especially demanding, but the CP-16R was wonderfully quiet.

"Inevitably in this type of filming, there is a lot of waiting, the camera on your shoulder or by your side, ready to shoot. The ability to put the camera down safely, and grab it and start shooting immediately is crucial. The second saved in getting the camera to your eye and

turned on is often the crucial second that gets the all-important start of the action on film. The CP-16R with its plug-in battery, broad flat camera bottom and convenient handle placement proved extremely handy under these conditions. The camera balances beautifully on my shoulder, and I can easily hold it there for a 400' take.

"I know of no other camera that could have served me as well. The rugged reliability of the CP-16R, and the confidence it inspired in me, allowed me to take chances far away from any backup camera, risking the CP-16R to get a shot in situations where I wouldn't have dared to go with other cameras. And it shows directly in the quality of the finished film, not just in spectacular shots and difficult camera angles, but in the amount of detailed coverage that the camera encouraged me to get: the type of material that makes a film come alive."

For further information, please write to:

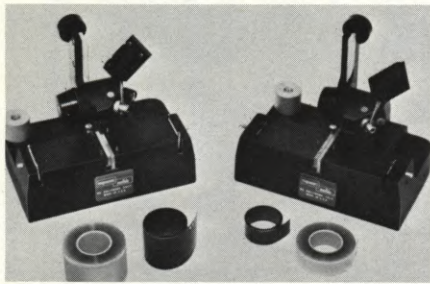
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WHAT'S NEW

IN PRODUCTS, SERVICES AND LITERATURE



NEW TAPE SPLICER FROM MAGNASYNC/MOVIOLA

A tape splicer that allows splicing of film or sprocketed magnetic tape without the loss of a single frame has been introduced by Magnasync/Moviola Corporation.

According to Sam Lane, vice president—marketing, the new SP Series of tape splicers allows the film editor to splice sequences together on a frame-to-frame basis, without losing continuity.

The film or sprocketed magnetic tape is butt-spliced with Mylar-perforated splicing tape. Precision cutting blades and registration pins assure accurate splices with each operation. The snag-free splices eliminate the possibility of the splice sequence causing film damage when run through an editing machine, Lane stated.

The SP Series splicer is available in either a 35mm or 16mm version; both models list for \$150.

For complete details and ordering information, write Product Manager, Motion Picture Division, Magnasync/Moviola Corporation, 5539 River-ton Avenue, North Hollywood, CA 91601; telephone (213) 877-2791.

CHRISTIE RINGS IN A NEW GENERATION IN SOUND

In response to a new wave of motion pictures featuring dramatically innovative recording techniques, Christie Electric has introduced the new Xeno-Sound 50-watt sound system, according to Dane S. Denick, National Sales Manager.

The Xeno-Sound system is compatible with most optical sound reproducers and hardware," said Denick. "It can be easily installed on most consoles or minimum wall space."

To enhance the system's compatibility with the new soundtracks, Christie designed-in a convenient interface

plug. "More motion pictures are coming out with innovative techniques like Dolby Sound® and Sensurround®," said Denick. "And retrofitting conventional sound systems can be an expensive, time-consuming proposition to any theatre owner."

The system also features built-in monitoring and a substantially improved signal-to-noise ratio. "Theatre owners and audiences will hear particularly 'clean' sound from this system," Denick commented. "They'll hear more of the movie soundtrack and less of the annoying hums and hisses."

Xeno-Sound also offers a significant savings up front. "Only one spare amplifier is needed for an entire complex regardless of the number of screens." In terms of upkeep, Xeno-Sound is virtually maintenance-free. A simple plug-in design makes servicing easy and inexpensive, according to another Christie spokesman.

"Instead of outmoding past sound systems, Christie designed Xeno-Sound so it can be plugged into an existing Christie sound system for the purpose of upgrading it," said Denick.

For more information about the new Christie Xeno-Sound system, contact: Mr. Dane S. Denick, National Sales Manager, Christie Electric Corp., 3410 W. 67th Street, Los Angeles, Calif. 90043. Phone: (213) 750-1151.

REVOLUTIONARY TELEFUNKEN MULTI-TRACK MACHINE BOWS

Gotham Audio Corporation introduces the completely new Telefunken M 15A Multi-Track Master Recorder. This machine, which is available in 8, 16, 24 and 32-track configurations, features clocked CMOS logic with Hall effect push buttons and solid-state switching throughout for ultra-reliable, click-free operation coupled with minimum maintenance. The indirect capstan drive system incorporates a brushless dc motor whose speed is referenced to a quartz crystal oscillator. An easy threading tape path of outstanding stability is assured by the rugged deck casting which supports precision-aligned heads and guides. A unique mechanical servo system provides constant tape tension in all modes of operation, yet affords editing flexibility which is not possible on electronic servo machines. Fast wind

speeds are continuously speed-variable, while a slip-free LED timer accurately counts in minutes and seconds on both sides of zero.

The machines are available in 7½/15 or 15/30 ips speed configurations and have a tape capacity of 11½", equivalent to 3300 feet of standard tape.

An auto locator using micro-processor control and having nine position memories, a variable-speed capstan controller with LED read-out of speed in percent of nominal, and a mechanical editing scissor arrangement which cuts the tape directly in front of the playback head gap are but a few of the accessories offered. A full-color brochure is in preparation.

DATSUN SPONSORS SECOND ANNUAL STUDENT FILM CONTEST

Nissan Motor Corporation of USA, Carson, California, distributors of Datsun automobiles, will again sponsor a student film competition known as FOCUS (Films of College and University Students), according to announcement by Joseph M. Opre, director of advertising. TRG Communications, Inc., a New York-based marketing and sales promotion agency will implement the program which they originally conceived and developed for the company.

The campaign, starting this fall, includes advertising in American Film, Film Comment, *American Cinematographer*, Take One, Filmmakers Newsletter and Nutshell — a campus publication with a circulation of about one million. Promotional activities also will include mailing posters announcing the contest details to over 600 schools with film departments or courses.

TTFL '77 "MAKE IT LIGHT" SYMPOSIUM TO BE HELD IN MIAMI NOV. 2-5

The Theatre Television Film Lighting Committee of the Illuminating Engineering Society has rescheduled "MAKE IT LIGHT", the TTFL '77 Symposium in Miami. The new dates are November 2 through 5th.

Focus of the symposium will be on developments in luminaires, light sources, and control. As usual, the program material will be integrated with tours to various sites of interest, including television studios, theatres and other lighting facilities. Those interested in attendance should write: Mr. George Gill, TTFL '77; P.O. Box 610124, Miami, FL 33161.

For that something special... RENT IT

Any major motion picture equipment rental house should be able to supply you with the standard items you need for film production, such as Arris, Eclairs, Mitchells, Nagras, Angenieux and the like. But Alan Gordon Enterprises Inc., in addition, offers you that something extra you are not likely to find elsewhere — specialized equipment that most rental houses just do not carry in their rental inventory. Here are just a few examples:



(9) MP-30M — Portable 35mm professional double-band sound projector. Ideal location projector. Also available in Standard model.

(8) Dynalens Academy Award-winning image stabilizing system that takes the shakes out of cinematography by providing rock-steady pictures.

(5) LEX 64 Lights Explosion proof, for use in hazardous environments. Use 500W, PAR 64 lamps. Certified rain-tight.

(4) Mini-Cam 16 Also known as "GSAP." Ideal for filming unusual angles, especially during sporting events.

(2) Helmet and Camera Famous point-of-view Gordon/Bell camera helmet available with either 16mm or 35mm cameras.



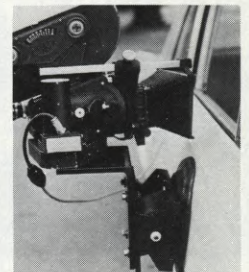
(3) Hycam High-Speed Camera — Films up to 11,000 fps in 16mm for super slow-motion photography.



(1) 25-500 Tamaha lens — T6.3, extremely fast 20-1 zoom ratio for 35mm formats. BNCR, Arri, S-35R and Eclair mounts.



(6) Swintek — The ultimate in professional cordless microphone systems. Fully portable with optimum quality sound.



(7) Super Grip — The ideal camera mount for difficult situations. Secures to almost any surface, supports up to 700 pounds.

Item:	Daily Rental Rate:
(1) 25-500 Tamaha Zoom Lens, T6.3	\$100.00
(2) Helmet and Camera, 16mm or 35mm	\$20.00/\$30.00
(3) Hycam 16mm High Speed Camera	\$50.00
(4) Mini-Cam 16 Camera Kit	\$20.00
(5) LEX 64 Explosion-Proof Lights	\$20.00
(6) Swintek Cordless Microphone Systems	\$35.00 and up
(7) Super Grip Camera Mount	\$6.00
(8) Dynalens Image Motion Stabilizer	\$125.00
(9) MP-30M Portable Sound Projector, Interlock	\$50.00
(10) MP-30S Portable Sound Projector, Standard	\$40.00
(11) Underwater Housing with Milliken 16mm camera and lens	\$100.00
(12) Underwater Housing for 35mm Panavision, less camera and lens	\$50.00
(13) Underwater Housing for 35mm Eyemo camera and lens	\$35.00
(14) Lowel Quartz Location Total-Light Kit, Model T-194	\$25.00
(15) Photosonics Action-Master High Speed Camera	\$85.00
(16) Gordon Super Speed Lenses for BNCR	\$100 per set
(17) 24V DC High Speed Motor for Mitchell R-35	\$25.00
(18) 25-250 Lens Blimp with Lens for 35 Arri BL	\$55.00

Next time you're looking for any motion picture equipment, standard or special, check with AGE Inc. first. Most pros do.

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“A series of five films was proposed. And, since America’s economic ‘sets’ were still largely in place—the mills of New England, the canals, the railroads, etc.—why not crisscross the country and use them?”

“Phillips accepted the challenge, and *American Enterprise* was born.

“For seven months our crews travelled more than 100,000 miles to 104 locations in 31 states. We had only one day per location.



“Time was of the essence. We needed a stock and a lab we could count on, both of which had to be fast.

“Our choices were 7247 and TVC. Throughout the job TVC gave us beautiful dailies... then they picked up where they left off and gave us beautiful release prints—a total of 7,000 of them.”

“Starting in September *American Enterprise* will be seen by a million school children a month—the first time this magic number has been reached! And, beginning in October, *American Enterprise* will be seen on commercial prime time TV in more than a dozen

major markets.

“*American Enterprise* worked because it tapped a need. It was the right combination of ideas, talents and people at the right time. TVC was very much a part of that combination.

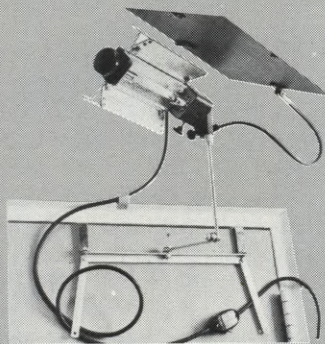
“Thanks, TVC.”

James C. Crimmins / Executive Producer / Playback Associates, Inc.

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Location lighting's not what it used to be.



Tota-Light: new flexibility in mounting and control.

Location lighting imposes a number of unique requirements for well-thought-out, durably-built equipment. Over the last fifteen years, Lowel systems have proven themselves in a wide variety of applica-

tions in motion pictures, still photography and video. And, in the process, changed location lighting from a compromise to a creative tool.

Tiny Tota-Light. More than a small 1000, 750 and 500-watt light with an ultra-wide, even pattern: it's the first professional quartz light built like a system camera, with lock-on mounting and control accessories.

Modular Link System. Solves grip and control problems as they occur on location. Rugged, lightweight components interlock to form flags, booms, diffusers...dozens of other rigs. Outstanding stands: with unusually high strength-to-weight ratios.

Link system: countless control and support combinations.



Folding Softlight 1500. Only a fraction of the weight of studio units, it makes soft-shadow location lighting a reality. Delivers more output than most 2K softlights

with two 750-watt lamps. Mounts or clamps anywhere...folds into compact case for travel.

Roll-up

Variflector II. The only truly portable, professional reflector. Complete flood control through 3:1 ratio, to adjust brightness and spread. Rolls up to fit in compact case with stand.

Workhorse Quartz "D" Studio versatility in a compact, lightweight focusing unit with wide (7:1) spot/flood ratio and inter-

changeable 1000, 750 and 500-watt lamps. Quick-change accessory-reflector system transforms it from a versatile general-purpose light to a high-intensity, long-throw source.

Lowel-Light. The tape-up, clamp-on light that helped change the industry's approach to location lighting, and introduced Gaffer-Tape.™ Some of the original units are still going strong, after 15 years of rental.

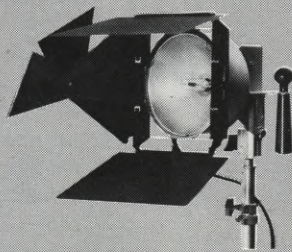
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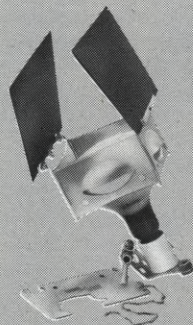
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Softlight 1500: the large, soft-shadow source that fits in a small case.

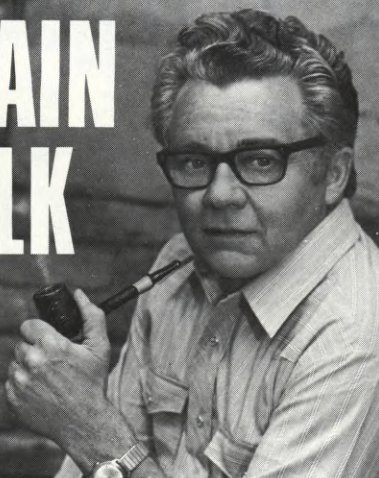


Quartz "D": 7-1 focusing plus high intensity.



The Antique.

PLAIN TALK



by *J. Carl Treise*

Why am I writing this column? If you don't know by now, I'll tell you.

In many ways I'm an old-fashioned square. And I probably shoot off my mouth too often. But very few will deny that I'm a "square shooter".

I've been in this business a helluva long time and I damn well know what makes it tick (— and what doesn't).

I feel you should know what's going on. Both the good and the bad. After all, the more you know, the better you'll be able to buy.

You should know the limitations of a processor as well as its capabilities.

You should know that money stretches only so far. If a firm is offering you more than you have a right to expect at the price, the chances are likely that you're getting screwed.

I find it amazing that a buyer will accept a lousy unit just because it has a shiny exterior. Or that he will let himself be sold something that isn't right for him.

A long time ago, I discovered that very few buyers really know what they need. Often what they want is not what they need.

If I can help you come to the right decision and save you from a few pitfalls . . .

The effort will be worthwhile.

Even if you buy from someone else.

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QUESTIONS & ANSWERS

Conducted by CHARLES G. CLARKE, ASC.
and WINTON HOCH, ASC.

(Inquiries are invited relating to cinematographic problems. Address:
Q. & A., AMERICAN CINEMATOGRAPHER, P.O. Box 2230, Holly-
wood, Calif. 90028.)



Q I have to photograph some black and white photos printed in a book on coated paper. I will use 16mm Ektachrome film. What type of filters should I use?

A No filters are needed except possibly a Pola screen in the event there are reflections on the glossy paper. You will need a reflex type of camera to properly align and focus on these close subjects. If you are going to have color prints made, you can request the laboratory to print in a sepia type tone by manipulating the color balance. This would intercut better with your other color scenes. It is a laboratory technique, not done in the camera.

Q I am still a little confused about the subject of T stops. Since most or all light meters are marked according to F stops, does one simply take the F stop readings from the meter and use these figures to set the T stop readings on the lens? Also, if depth of field can only be calculated with F stops and true light readings can only be calculated with T stops, how can one set their lenses for the right depth of field without affecting the proper exposure setting since there will be a difference in the two readings?

A You are absolutely correct as to the first part of your question. Merely take the 'f' stop as called for by the light meter and set the lens 'T' stop ring to that figure. The reason for this is simple, the light meter is really calling for a 'T' stop. In other words, the light meter is stipulating a specific amount of light at the film plane which is a 'T' stop.

The question is, why are light meters not engraved with 'T' stops in lieu of 'f' stops? To find the answer, I contacted several of the major light meter manufacturers. The answer was similar in almost all cases. When light meters (and lenses) were first designed, the construction of lenses was very simple, consisting of very few elements. As a result, the 'f' stop and 'T' stop were almost identical as there was very little loss in the lens. Photographers and

light meter manufacturers, therefore, ignored the concept of the 'T' stop.

Today, with modern complex zoom lenses, cinematographers must use 'T' stops. However, the meter manufacturers think that changing to 'T' stop nomenclature will confuse the general public at this point, and, thus, continue to use the erroneous 'f' stop engravings. Maybe they are right. We know the markings are really 'T' stops and the general public need not have their minds boggled.

As to your second question, set the lens 'T' stop ring according to the light meter. Then look at the lens 'f' stop engravings to see what the actual aperture is. Then merely use this 'f' stop reading to look up the depth of field on a chart.

—Anton Wilson

Q In an article in the *American Cinematographer* of April 1974, there is a paragraph where a 3-D effect on a single frame motion picture film and/or single lens "still" photograph is mentioned, i.e., by utilizing a red and green or blue green filter 50/50 vertically. Where precisely would the filter combination be placed in the lens so that a red and green cast is not perceived on the film or "still"?

As I understand it, the picture should be normal except for color fringing in front of and behind the plane of focus.

A The placement of the "red" and "green" complementary filters should be at the nodal point of the lens, with the dividing line vertical; i.e., the filters side by side. Usually a lens can easily be taken apart and the iris exposed. The insertion of the gelatin filter here should be acceptable.

The approximately 3/1000" thickness of gelatin could be compensated for by allowing approximately 1/1000" extra spacing.

I have even used the filters directly in front of the lens. However, the sides of the image are colored while the center is acceptable. It does give you an idea of what to expect with proper filter positions.

These filters must, as you know, be complementary to the film; i.e., when overlapped, the film should see a neutral gray. ■

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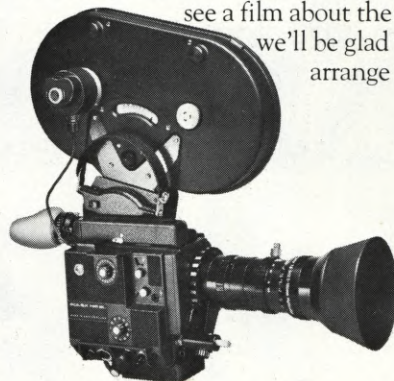
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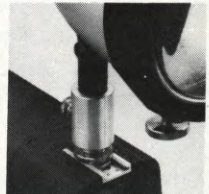
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CINEMA WORKSHOP



By ANTON WILSON

OPTICS IV

The aperture plate and pressure plate of all motion picture cameras are perfectly flat, holding the raw stock precisely in the film *plane*. In video applications the image is also focused onto a plane surface. The key word here is "plane", a flat surface.

Unfortunately, the image of a plane object formed by a simple lens should fall on a curved image surface. This is evident from FIGURE 1. Note that point B of the object is a greater distance from the lens than point A. It follows that B', the image of B, should fall closer to the lens and have less magnification than A', the image of A.

This problem is minimized in cheap still cameras by actually curving the film plane and using a simple lens. This was the technique employed by Kodak in the design of some of the early Brownie type cameras. However, for motion picture, video and professional still applications, the image is formed on a plane surface and the lens must be specifically designed to minimize field

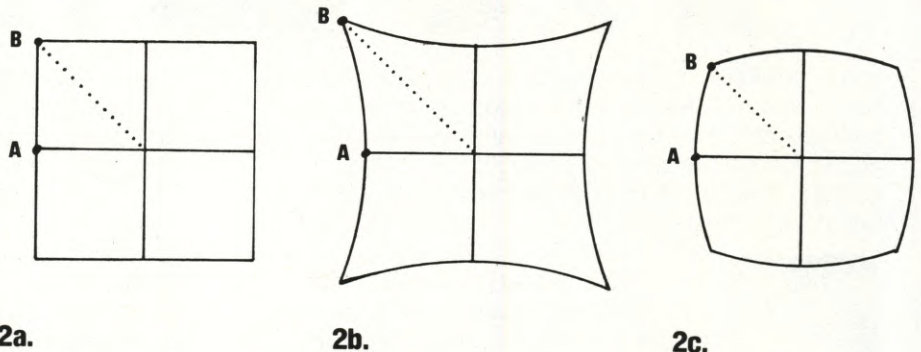


FIGURE 2—DISTORTION: A lens exhibiting no distortion would reproduce a square as in FIGURE 2A. FIGURE 2B shows an example of positive or "pincushion" distortion. FIGURE 2C is indicative of negative or "barrel" distortion (see text).

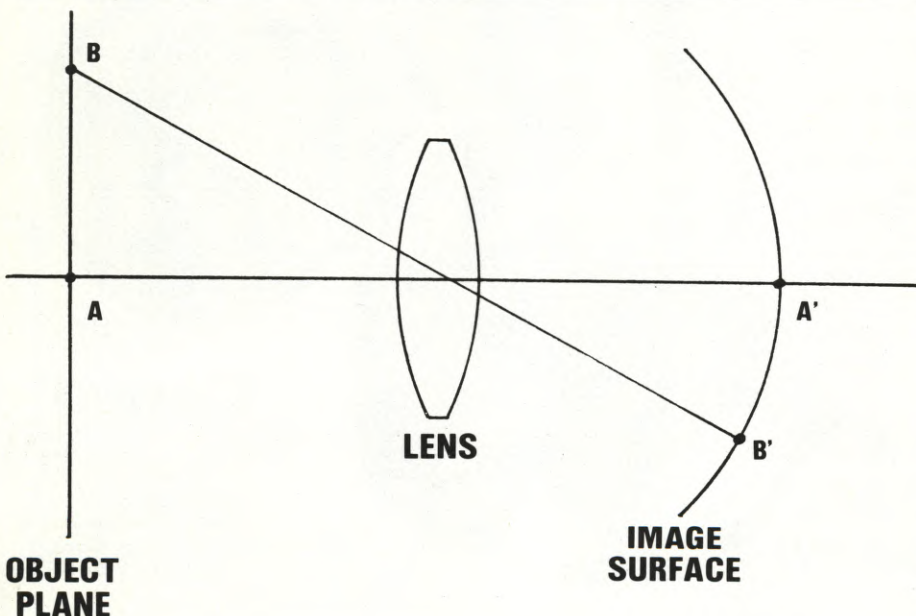
curvature. A field curvature problem is characterized by a sharp focus in the center of the picture area with a gradual softening toward the edges, or vice versa, depending on back focus distance and focus of the lens.

Distortion — The easiest aberration for the cameraman to spot is distortion because it will be blatantly evident right

in the viewfinder. Distortion, simply defined, is a change in magnification with field angle. For example, a good lens design should reproduce a square as a square, as shown in FIGURE 2a. Positive distortion will cause the image to get larger at greater field angles. Thus, a point further from the center of the lens will exhibit greater magnification. This is evident in FIGURE 2b, where point B on the square, being a greater distance from the center than point A, is exaggerated outward yielding the obviously distorted square. This is known as *pincushion* distortion. *Negative* distortion produces the exact opposite effect, as exemplified in FIGURE 2c. Point B is now undermagnified compared to point A, resulting in barrel distortion.

Distortion should be kept below 1% if it is to remain unnoticeable. However, under certain circumstances, it is impossible to keep distortion below this amount. For example, a fisheye lens that covers a full 180° field of view would require an infinitely large flat image plane. Therefore these designs must exhibit great degrees of negative distortion. ■

FIGURE 1—FIELD CURVATURE: A simple lens will focus a plane object onto a curved image surface. A good quality photographic lens must correct for this "field curvature", because the film is held in a flat plane.



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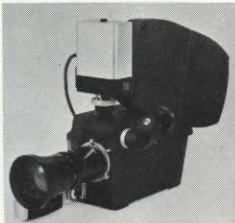
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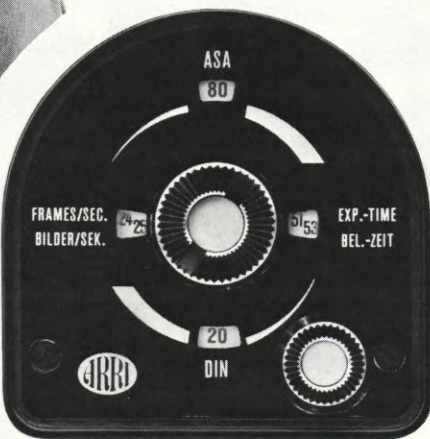
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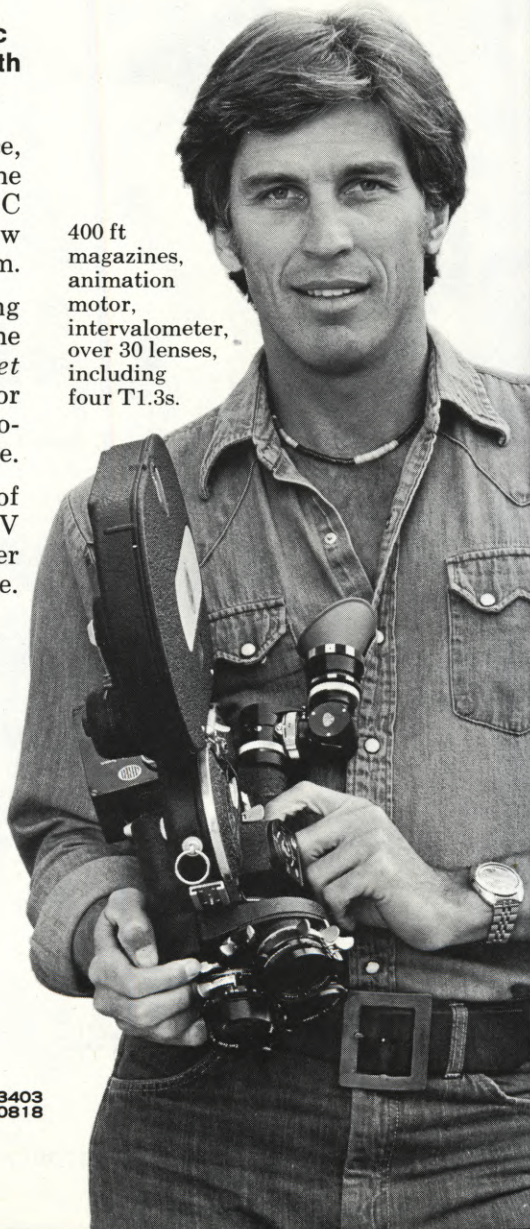
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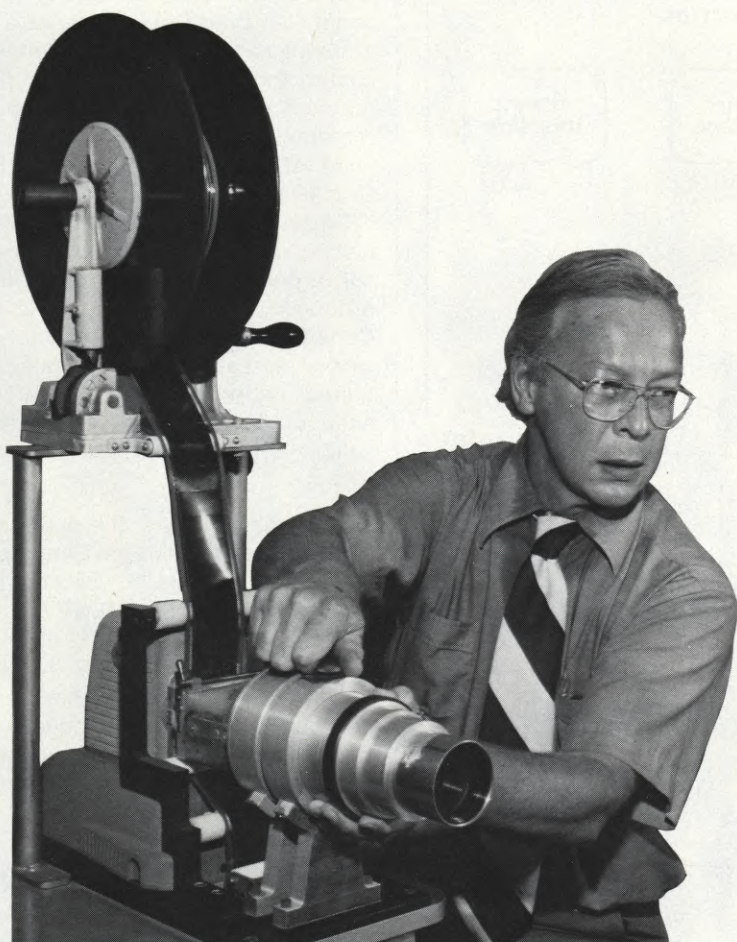
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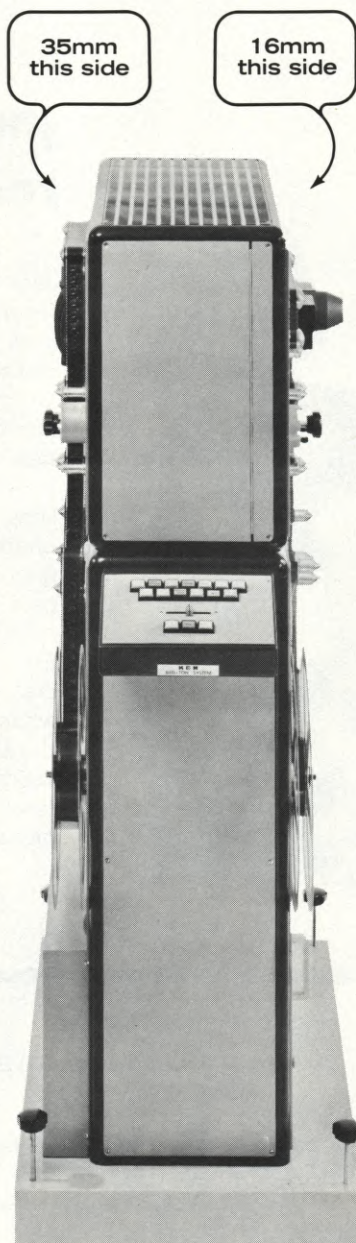
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Information

You can get more facts from KEM Editing Systems in Hollywood, at (213) 461-4143; or from MM Editing Systems in New York, at (212) 697-5865. Or please contact us at the address below.



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THE BOOKSHELF

By GEORGE L. GEORGE

FOR REFERENCE AND STUDY

An exhaustive survey of films with all-black casts, Henry T. Sampson's **BLACKS IN BLACK AND WHITE** lists some 400 independently produced features of the 1910-50 period with full credits and other relevant data. Much of the book's content is entirely new and constitutes invaluable original source material. (Scarecrow \$13.)

The unique achievements of the National Film Board of Canada as a government-sponsored, non-commercial center for the production and distribution of movies are detailed in a thoroughgoing and engrossing book, **FILM AS A NATIONAL ART: NFB OF CANADA AND THE FILM BOARD IDEA**. In it, C. Rodney James offers a history of the NFB and its predecessor, a perspective of the 8,000 films it produced, an appraisal of the NFB-Canadian government relationship, and an assessment of the vitality it acquired under the inspirational guidance of John Grierson. (Arno Press \$43.)

A valuable study of the predecessor to Canada's National Film Board is submitted by Charles F. Backhouse in **CANADIAN GOVERNMENT MOTION PICTURE BUREAU 1917-1941**. Prior to its incorporation into NFB in 1939, it effectively publicized the country and its scenic, cultural and industrial aspects, a function Mr. Backhouse vividly recreates in his informative brochure. (Canadian Film Institute \$2.50)

Edited by B. V. Dharap, **INDIAN FILM 1976**, the fifth volume in the series, provides a documented and comprehensive view of the production, distribution, exhibition and organization of the active Indian film industry. 507 features and some 1,000 shorts made during 1976 are listed and described with full production details. (MPE, Poona, Rs.35/-.)

A biographical dictionary of leading protagonists in detective fiction, **DETECTIONARY**, will be of immeasurable help to buffs and researchers bent on trailing their favorite mystery film and book characters. Its knowledgeable editors are Otto Penzler, Chris Steinbrunner and Marvin Lachman. (Overlook \$15.)

In THE GREAT SCIENCE FICTION PICTURES, James Robert Parish and Michael R. Pitts discuss some 350 significant samples of the genre from Méliès on, offering interpretive analyses, evaluations and factual information. (Scarecrow \$15.)

* * *

THEORY AND TECHNIQUE

An immensely appealing book, THE ANIMATED RAGGEDY ANN & ANDY by independent filmmaker/ animator John Canemaker, follows from conception to completion the making of Richard Williams' recently released animated feature. Extensively illustrated with color and b&w artwork from the movie, it is a comprehensive and expertly assembled record of all phases of a production that gives new life to a Disney-type of creative animation. (Bobbs-Merrill \$25./12.95)

An expert description of a complex job, SCRIPT CONTINUITY AND THE PRODUCTION SECRETARY by Avril Rowlands details the duties and responsibilities of this essential member of the directorial team, together with the tools of the trade and the various problems encountered on a film or TV show. (Hastings House \$6.95)

The resources of computer-controlled technology in animation, editing and optical processes, as well as conventional methods, are thoroughly surveyed by Eli L. Levitan in ELECTRONIC IMAGING TECHNIQUES, a practical up-to-date handbook by an outstanding expert. (Van Nostrand Reinhold \$17.95)

A stimulating and expedient how-to guide, THE FAMILY MOVIE-MAKING BOOK by Jay Garon with Morgan Wilson, is chock full of ingenious and useful hints on producing and marketing a better class of home movies. (Bobbs-Merrill \$10.95)

In order to encourage classroom study of film shorts based on short stories, Fred H. Marcus reprints in SHORT STORY/SHORT FILM 15 such tales, most with screenplays, continuities and critiques, an educational anthology that spotlights the problems of literary adaptation to the screen's requirements. (Prentice Hall \$8.95)

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Dorothy Rodgers, wife of Broadway-Hollywood composer Richard Rodgers, discusses her private life in A PERSONAL BOOK with a disarming reticence that reveals the problems and joys of marriage to a popular and celebrated artist. (Harper & Row \$8.95)

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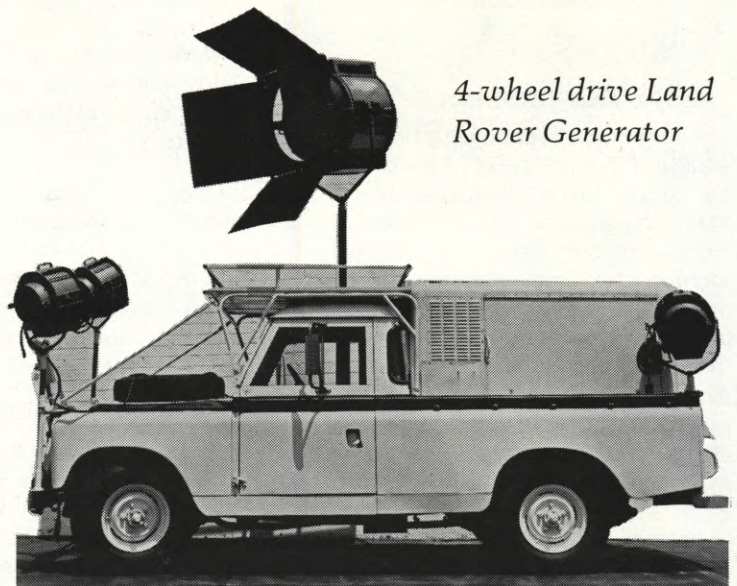
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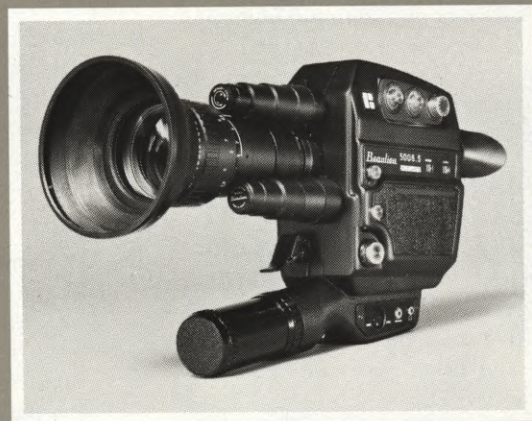
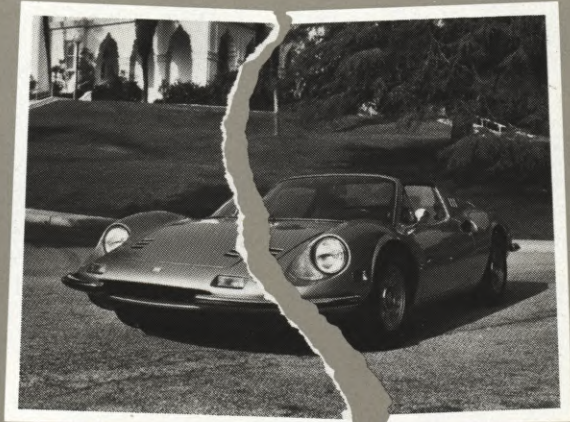
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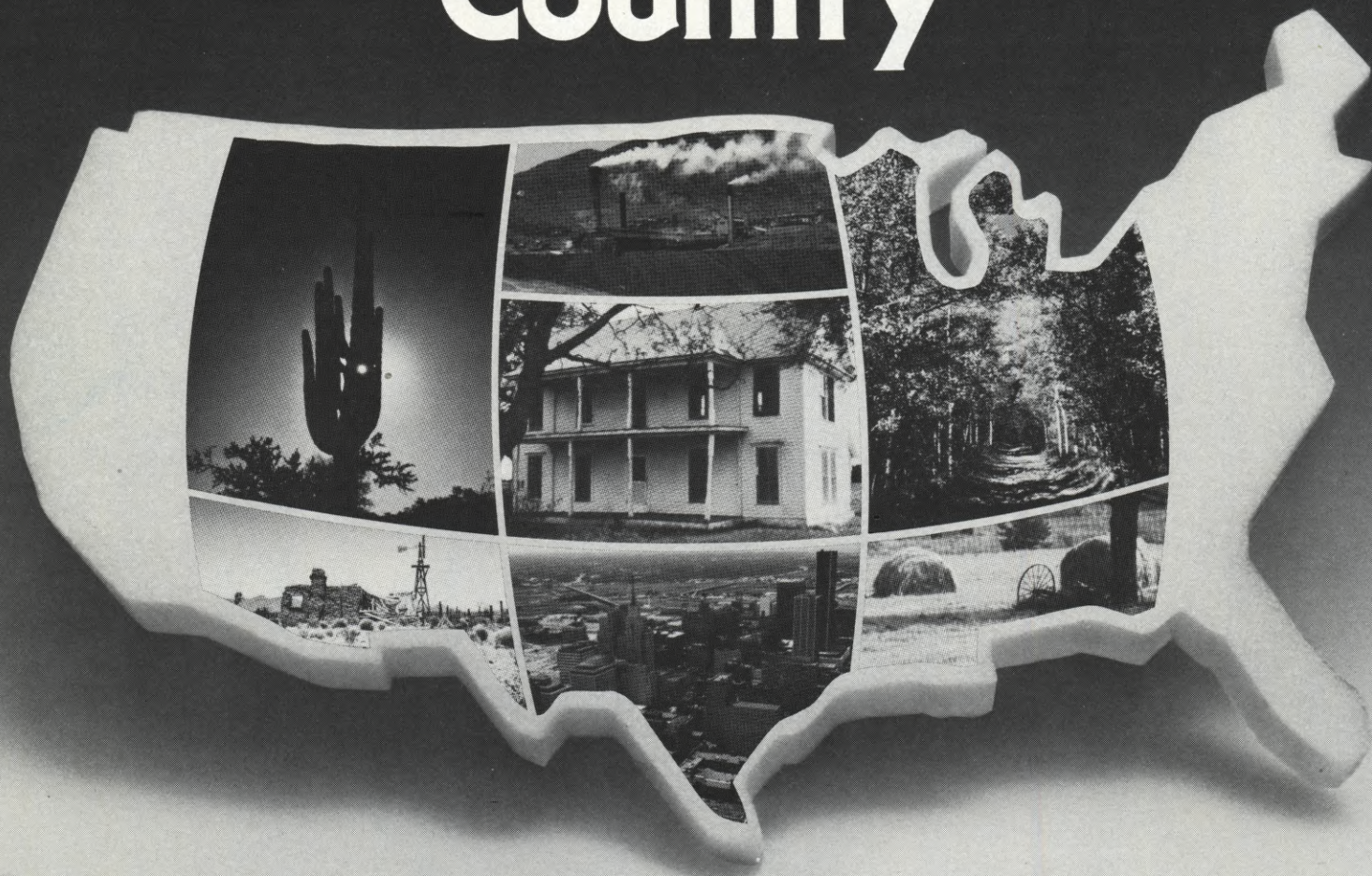
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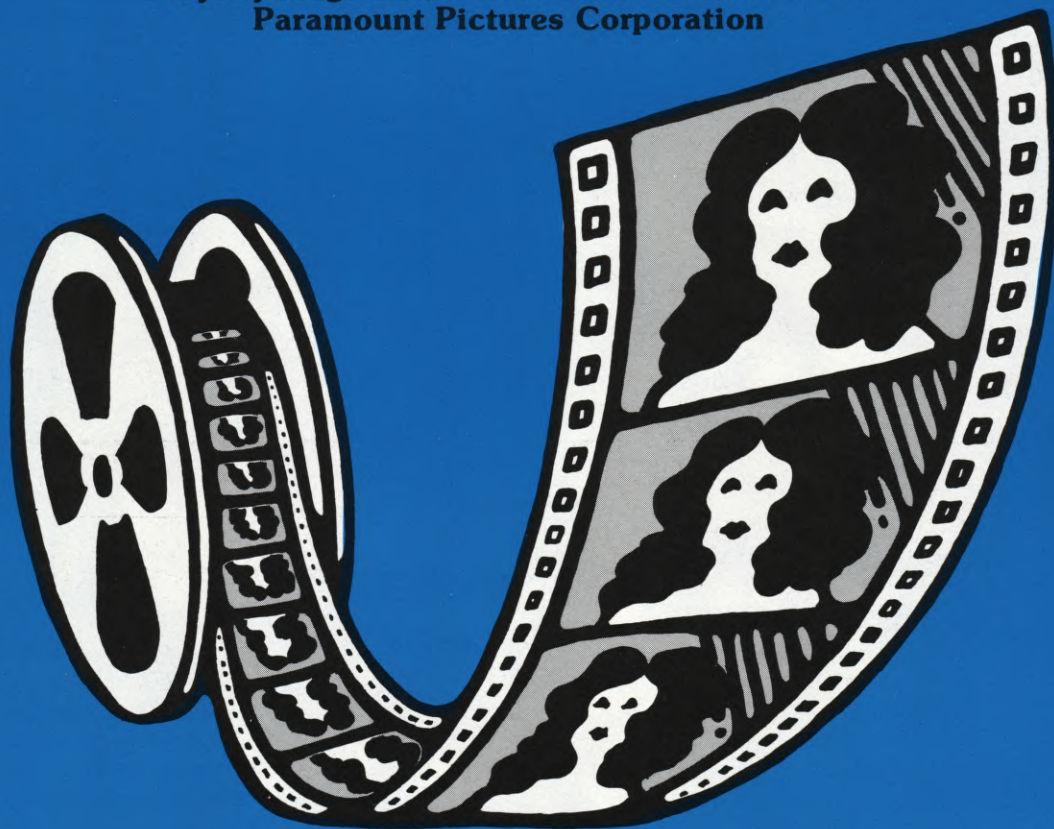
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*The train sequence from "Bound for Glory".
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*"To match the daylight I used Tough Blue Frost
on the fill lights in the train sequence..."*



Haskell Wexler, A.S.C.

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CHASING KILLER WHALES WITH A CAMERA FOR "ORCA"

By J. BARRY HERRON

Second Unit Cinematographer

What started off as a three-week assignment ends up as a 13-month high-adventure safari that takes the camera crew to a variety of exotic locales, including the Arctic wastes and under an iceberg

When Stan Neufield, production manager for Dino De Laurentiis Productions, first contacted me in February of 1976 and said that he would like to talk with me about a new picture that would involve underwater filming, I thought to myself: "Great — another two to three-week shoot."

My first meeting with executive producer Luciano Vincenzoni and director Michael Anderson revealed to me that they were involved in a dramatic feature about killer whales, to be called "ORCA".

As a result of our conversations, it was determined that in addition to the filming to be done with the mechanical whales which had already been built, there would be a need for *some* underwater and topside footage involving real killer whales. I had been working with killer whales since the first one, "NAMU", was captured off British Columbia some ten or eleven years ago, and the thought here was that this assignment would involve about three weeks of shooting — one week in a tank somewhere and another two weeks with the open-ocean whales off British Columbia. All I can say is that it turned out to be the longest three weeks I have ever devoted to one project.

We began the filming of the whales

by putting in three days at Marineland of the Pacific, shooting topside action. In the meantime, Producer Vincenzoni had secured permission to film under and on top of the water at the Marine World/Africa U.S.A. Aquarium in San Francisco, and we began what was to be the filming experience of a lifetime.

Arrangements were made with Michael Demetrius of Marine World and I began work with chief trainer Sonny Allen and his number one man, Frank Strazokowsky, in securing footage of the whales, both underwater and on the surface. I would like to point out that we were confronted with two determining factors in working with the whales. One: Sonny Allen would feed his whales only a given amount of food in a day. Two: if we tried to push the whales too hard, they (being very independent creatures) would simply stop for the day. After three weeks of continuous filming, I was summoned to St. John's, Newfoundland, where the first unit, under British Director of Photography Ted Moore, BSC, had started shooting. I was asked to film some whale's POV shots of Richard Harris standing on the jetty.

The equipment I was to use throughout the filming stayed pretty much the same. For my underwater work, I used the Birns & Sawyer underwater housing

with an Arriflex 2C camera inside it. At one point we were going to shoot the underwater footage in Panavision, but the equipment that was available was just too big and cumbersome for the kind of shooting that I was going to be doing on this film. (Also, our Italian underwater unit filming the mock-up whale scenes for the funeral sequence had run up against the same problem.) However, I did have one of the Birns & Sawyer housings converted to take Panavision lenses, but then it was decided that we could shoot the underwater footage in Techniscope, and that's the way all of it was done. For the topside filming, I went to the Mitchell Mark II camera with Panavision lenses.

Our underwater diving gear consisted of standard wet suits and SCUBA equipment in the tank in San Francisco and at Catalina Island. However, in the cold waters off Newfoundland, Alaska and the Arctic, we used Poseidon dry suits and regulators. This combination proved very satisfactory, even in extremely cold waters.

My stay in St. John's and Labrador lasted for a period of eight weeks, during which time I shot second unit material that involved everything from being the whale's "eye" to scenes of the female whale mock-up hanging from the deck of the ship BUMPO. At one point, I was supposed to be the whale in the water when the whole harbor blew up. This was scheduled to be filmed on the 3rd of July and, because it would involve a pyrotechnic display, I had requested that we put off the burning of Petty Harbor until the 4th of July. However, since the American contingent was very small, it happened on the 3rd, needless to say.

Meanwhile, Folco Quilichi, the well-known underwater cameraman from Italy, was shooting the big funeral sequence in Malta, and Ron Taylor, of Australia, was shooting Great White Shark footage for the picture.

After working with the first unit, I was assigned to take the good ship BUMPO to Northern Labrador to try to tie it in with icebergs. The crew slated for this journey included Canadian operator Hugh Jacobs, assistant cameraman Art Schwab and myself. After a six-day ocean voyage, the BUMPO met us at a remote Northern Indian fishing village

Continued overleaf

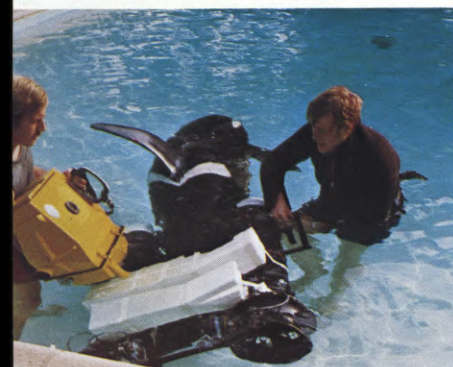
Noted action cinematographer J. Barry Herron is at home filming from helicopters and underwater, but shooting beneath a frozen lake and on the bottomside of an iceberg expanded the dimensions of his experience, as part of an assignment to capture spectacular whale footage for the Dino De Laurentiis production, "ORCA".





Cameraman J. Barry Herron operates the underwater camera beneath the ice of Lake Louise in Alaska. He moved at the end of a 25-foot safety line, while filming the motorized miniature whale which doubled for the live star of "ORCA". Encountering trouble with his air regulator, he tried to find his way back to the hole cut in the ice (shown above), but found that it had "disappeared". However, he managed to follow his safety line back to the surface.

(LEFT) For insert shots made in swimming pool, Herron mounts camera to motorized whale, while Ken Jones steadies the rig. (CENTER) Assistant cameraman Art Schwab, Herron and chief trainer Sonny Allen work on difficult whale's eye closeup. For this insert, Herron used a #3 diopter on the 50mm-500mm Panavision lens. (RIGHT) Filming night shots at Marine World/Africa U.S.A., later to be composited for blue screen scenes by Frank Van Der Veer.



(LEFT) Herron and Schwab with iceberg behind them. It took seven hours by boat to get from the village of Nain, Labrador to the Atlantic ice lanes. (CENTER) Herron and diver Hugh Jacobs out in the skiff with iceberg in the background. (RIGHT) The full-size BUMPO with prop whale hanging from its crane, en route to glacier area.





At Marine World/Africa U.S.A., cinematographer Herron operates his camera at the end of a boom above the pool to shoot down the throat of a beautifully marked killer whale. The superbly talented beast repeatedly leapt straight up out of the water to come within less than an inch of the lens, but never once actually touched it.

called Nain. We had flown in by Otter aircraft with all of our gear.

At midnight of the first day, we set sail for the Atlantic ice lanes and, hopefully, the icebergs. Unfortunately, certain arrangements went by the wayside up there and all I could come up with for a shooting platform was a 12-foot aluminum skiff with a sick 25-horsepower motor.

When we got out to the first icebergs — and they were big, anywhere from 150 to 250 feet high — the seas were running pretty good, with swells ranging from six to nine feet in height. I had to use the Panavision 30mm lens on the Arri 2C so that I could hand-hold the shot.

The first trip out was a little spooky, as we did not wear our exposure suits.

When my assistant, Art Schwab, found out that we could survive for only about 40 seconds in the water if we went overboard or the boat sank, he was understandably a bit uptight. Then, when our Newfoundland skipper, who was not film-oriented, came a little close to us on a couple of passes, we regrouped and Art stayed on board, while Hugh and I donned our exposure suits and went out to make the shots. When we returned, the skipper observed that if the iceberg had tipped, we would have been swamped in that tin boat. We got the shots in a couple of more days and then moved on to better things. We spent two weeks picking up second unit material before traveling to our next location.

British Columbia! This was the place.

This is where the killer whales run in pods and where, if we were lucky, we would be able to get some exciting material involving them. Our location for this purpose was north of Vancouver at the end of Vancouver island, where there is an Indian fishing village called Alert Bay.

With me, of course, was my trusted assistant, Art Schwab. Over the years, Art has put up with a lot in working with me, and by no means was this to be any different. (He kept on saying, wistfully, that someday I'm sure to do a shoot in a studio at home.)

We arrived by ferry at Alert Bay and we thought that things would be good. After all, it was the beginning of September and weather the world around is always good in September. Being originally from Vancouver, I should have known better, but after having lived in Los Angeles for 20 years, I had forgotten how it *could* be up there. It rained the day we arrived and was still raining on the day we left.

We secured quarters in the world-famous Nimkish Hotel, only to discover that our rooms were right over the beer hall — which was used extensively. We then checked on the boat HAYMARK, which I had chartered. My contact man in the area was Chris Whitting, one of the local experts on the whales and their movements. Again we had a few problems, above and beyond the rain. The 35-foot HAYMARK was very narrow and rolled a lot. We had no stabilizing gear with us, as it had been shipped off to Greenland and never made it back. Another problem was that we were in an area totally surrounded by land. Since the action was supposedly taking place in the open ocean, I did not dare show the land area. My camera position was atop the cabin of the HAYMARK and we tied everything down the best we could and

(LEFT) The miniature ship BUMPO being put back together for the third time, after having been repeatedly cut in half for shipment around the world. On a couple of occasions the two halves ended up in widely separated places. (RIGHT) In the chill waters of an Alaskan lake, Roger Cramer warms up the engine of the miniature BUMPO. It leaked following one bisection and had to be bailed out constantly.





After receiving the two halves of the miniature BUMPO and putting them together, the little vessel was loaded onto a trailer and hauled on a 125-mile trip over the mountains and through a snowstorm to the Alaskan seaport of Seward. It was very rough going, but the precious miniature was finally delivered to the port, where it was loaded onto the deck of a 65-foot converted buoy tender and transported to be filmed next to a glacier.

set off in search of the whales.

There had been another group of documentary filmmakers on the location trying to find the whales a week or two before we arrived and, up to that time, they had not seen any. I think it was on either the first or second day out that we spotted our first pod. The group consisted of between 10 and 20 whales and included big males, females and babies. This group joined up with another group and we had as many as 40 whales in the pods.

It was very exciting. When we would try to line up on the whales and were in a good position to shoot, they would sound — so we had to work out a method that would put us in a better position to get the shots. Contrary to most of the stories I had heard about whales, they really did not want to come up and be friendly with us; they just wanted us to go away and leave them alone. They would always make a turn underwater and surface far away from us.

Up until we arrived on the scene, most of the filming of the whales had been done with hand-held 16mm cameras and, if you used a kayak, you could paddle your way closer to them than we could get with a large boat and a big camera on a tripod. I was using the Panavision 50mm-to-500mm zoom lens, and I used the 500mm end of it most of the time. I have to tell you that when the boat would roll, I would notice it.

After being on the location for two weeks — and with the great cooperation of the local crew — we had enough film on the whales to work in the picture. The footage we got is apparently

some of the best that has been shot on killer whales in the wild. Being out in the wilderness with these magnificent animals was another of the great adventures of my life — made possible by being in the motion picture business.

We wrapped British Columbia and I then made a trip to Malta, where the first unit was shooting. There I had meetings with Producer Vincenzoni and Director Anderson to determine what additional material would be needed. I went back to Los Angeles and then made a quick survey trip to Alaska. Returning once again to Los Angeles, I gathered up the crew and headed back to Alaska to shoot. In Malta it had been determined that we needed shots of the whale (including his point of view) under the ice chasing Nolan. Also, we needed shots of the miniature ship, BUMPO, in the ice, in

order to tie in with the ice sequences being shot in Malta. Originally we thought we would be better off to shoot this material in Greenland. However, the logistics of that alternative were not the best, and I felt that we could do as well in Alaska, keeping it in the U.S., where I wouldn't have to worry about customs, etc.

Well, it was not the best year for Alaska. The weather did not turn really cold and I had a rough time trying to find the right lake to shoot on. A hundred-and-fifty miles northeast of Anchorage we found a lake and accommodations that would serve the purpose. The lake was covered with about five feet of ice, and the depth — about 25 feet where we were shooting — was sufficient.

The crew on this trip included Canadian operator Hugh Jacobs, **Continued on Page 1078**

In the frigid, ice-cluttered waters within 500 feet of a glacier in Alaska, the miniature BUMPO is steered into position for a shot. After having been unloaded from the buoy tender that brought it there, and lowered into the water, the miniature had to be completely re-rigged. In this location there was almost no exposurable light, even at midday.



BEHIND THE CAMERA ON

A Disney musical starring an amiable animated monster, cavorting with various "live" characters, employs a wide range of technical trickery

WALT DISNEY PRODUCTIONS' **Pete's Dragon**

By **BOB FISHER**

A mechanical shark nicknamed Bruce helped smash all-time box office records with "JAWS". Then "KING KONG" returned from film history and made theatrical turnstiles spin at a dizzying pace. It was only a matter of time until someone else produced a film with an even more imaginative mechanical monster. But who would have guessed it would be Walt Disney Studios with a fire-breathing, now you see him — now you don't — dragon named Elliot?

If audiences accept Elliot as real, "PETE'S DRAGON" will become a classic, predicts veteran cinematographer Frank Phillips, ASC. The musical is situated in a small New England fishing town soon after the turn of the century. In addition to Elliot, it stars Helen Reddy, Jim Dale, Mickey Rooney, Red Buttons and Shelley Winters, along with Hollywood newcomer, young Sean Marshall.

The story begins when Pete (played by young Marshall) escapes from a "mean" family, headed by Shelley Winters, which "bought" him from an orphanage. He flees through the

woods, aided and abetted by a pet dragon named Elliot.

In reality, Elliot is a multi-faceted creature. There is a 19-foot-long mechanical Elliot, as well as an animated Elliot. The latter presented a substantial challenge to the cast, director Don Chaffey and Phillips, since animation wasn't started until after the live-action was completed.

"We just had to be able to imagine that Elliot was there," Phillips says. Finally, there is the invisible Elliot, who comes alive in the imagination of the audience, with the assistance of some very special effects, a la Disney.

In June of 1976, one month of shooting began in Morro Bay, California, where the studio built a mid-19th Century lighthouse. Filming later moved onto the backlot at Disney's Burbank studio to a replica of the storybook town.

In addition, considerable sodium light production was done on one of the few remaining stages equipped for this work. Blue screen photography and miniatures were also used. The movie then progressed to the tables of Ken

Anderson's animation department; and the whole thing was finally put together by Eustice Lycett's special optical effects team.

The end product was often third and fourth generation negative, Phillips relates, which provided a major test for the fine grain characteristics of Eastman color negative II film 5247.

Phillips has become something of a resident cinematographer for Disney Studios. During the past dozen years, he has filmed 20 of their biggest features. However, the relationship has roots in the early 1920's, when he was one of a number of neighborhood youngsters selected to perform in a Walt Disney series entitled "Alice".

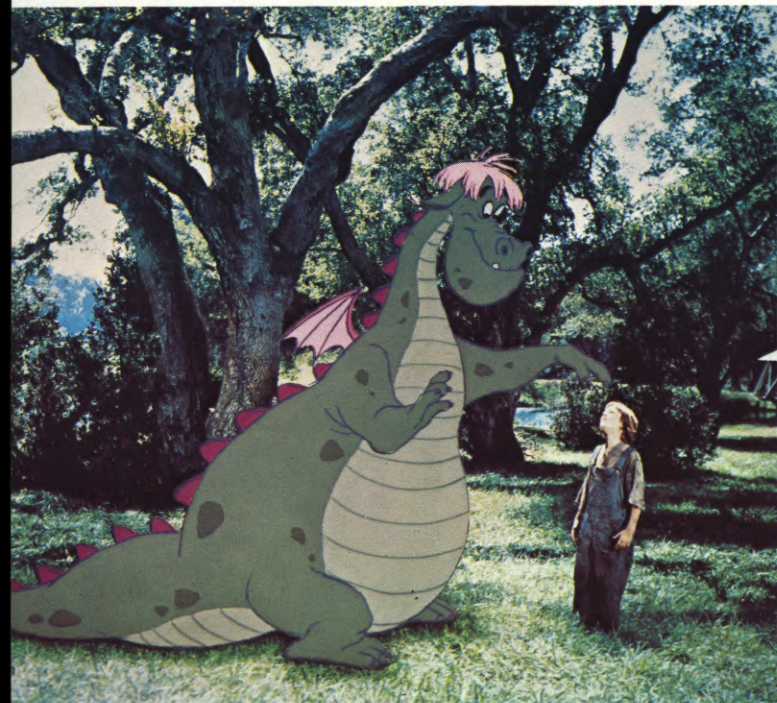
Phillips got a job as a camera loader at Metro-Goldwyn-Mayer during the early 1930's and became an operator later in the decade. He worked behind the camera for Harry Stradling, ASC, Charles Rosher, ASC, and Joseph Ruttenberg, ASC, on many of the musicals that highlighted that era.

His initial first camera assignment came during the early 1950s, when he handled the second unit for "THE



(LEFT) With the camera suspended from the boom arm of a Chapman crane on the studio backlot, the crew prepares to shoot a scene for Walt Disney Productions' "PETE'S DRAGON", a musical fantasy combining live action and cartoon animation. (BELOW) Pete (Sean Marshall) laughs in delight at the terpsichorean antics of his friend Elliott, the twinkle-toes dragon.





"We don't match in size, but we fit so neatly," sings Elliott, as he compares heights with his pal Pete, a young orphan who adopts the now-you-see-him-now-you-don't dragon as an outsized pet. Pure fun on the screen, "PETE'S DRAGON" involved many challenging special effects.

RACERS", which was filmed on location in Europe over a seven-month period. Phillips earned his stripes in TV prior to joining Disney on such series as "HAVE GUN, WILL TRAVEL" and "GUNSMOKE", and "HAWAII FIVE-O".

He had just completed the Disney feature "THE SHAGGY D.A." and was headed for an assignment in Europe, when the studio asked if he was interested in filming "PETE'S DRAGON". "It isn't every day that you are offered an opportunity to film a picture like this," Phillips relates. So, he unpacked his bags and signed on for the \$10 million-plus blockbuster.

One of his first decisions involved the selection of film stock. "I was probably one of the first people to use the original Eastman color negative II film 5247," he recalls. "It was on a picture entitled "ESCAPE TO WITCH MOUNTAIN". We had some contrast build-up problems, particularly on our sodium-light scenes, but these were pretty well alleviated when improved emulsions were introduced."

A new Eastman color negative II film 5247 emulsion was ready for trade trial around the time that Phillips was getting ready to start production of "PETE'S DRAGON". The optical department had already tested the new emulsion, and they were pleased with the results, Phillips explains. So, he agreed to expose some test scenes.

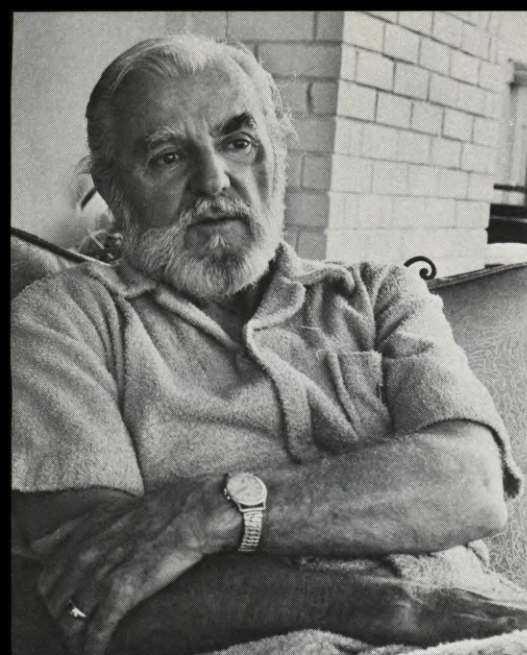
"My first reaction was that the skin tones were terrific, and the contrast



To film a location sequence, the camera is mounted on a suspended platform that allows it to soar 80 feet above the ocean. The ambitious production even stretched the talents of the Disney technical wizards, accustomed as they are to making the impossible happen on the screen.

In this frantic scene from "PETE'S DRAGON", Elliott, furious at having been trapped by nets and tarpaulins, makes quick work of his captors, as Doc Terminus (Jim Dale) center, and Hoagy (Red Buttons), partially hidden, cower in fear. (Photographs © Walt Disney Productions.)





Frank Phillips, ASC, Director of Photography on "PETE'S DRAGON", is by now a member of the Disney "family", having photographed many films at that studio.

problems were eliminated," he says. "I also found that while the film is rated by Kodak for the same exposure index as the original 5247 negative, it is actually a good half-stop faster."

Phillips works strictly by footcandles on interiors. He used the original 5247 negative at f/4 with 100 footcandles for day scenes and usually cut the light levels in half for night. After seeing the first dailies of the new emulsion, he scaled the light levels down by about 30 percent — around 70 footcandles for daytime interiors. He also was able to close down from f/18 to f/24 for daylight exteriors.

Comparing the new emulsion to the original 5247, Phillips says it is *sharper*, *clearer* and has *better resolution*, "and the color rendition is about as true as anything."

Phillips comments that there is no comparing the new film to Eastman

color negative 5254. "It was a good film for its time, but the new negative has a much cleaner look, it appears to be a bit faster, and the finer grain is very important, especially for a film like "PETE'S DRAGON", where we used a lot of optical effects."

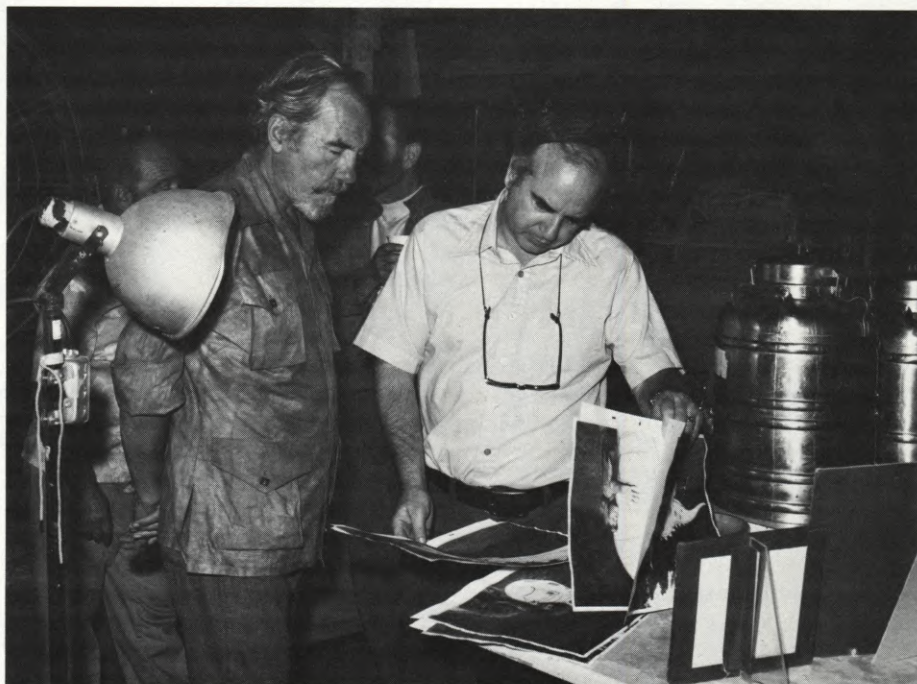
The dragon's personality is established in an early sequence when he and Pete are celebrating the boy's escape from the mean family. Pete and the animated dragon are singing and dancing in the forest. All Phillips had to work with was a storyboard. However, he times his camera moves to the music — panning in big arcs, tracing an imaginary dragon bouncing through the trees.

Before they enter the fishing town,

Pete tells Elliot the dragon that he is frightening, and suggests that he remain invisible when other people are around. There is a clever animated scene here where Elliot disappears a bit at a time. "One of the most difficult things about shooting a scene like this," Phillips says, "is having the cast look at the right places at the right times."

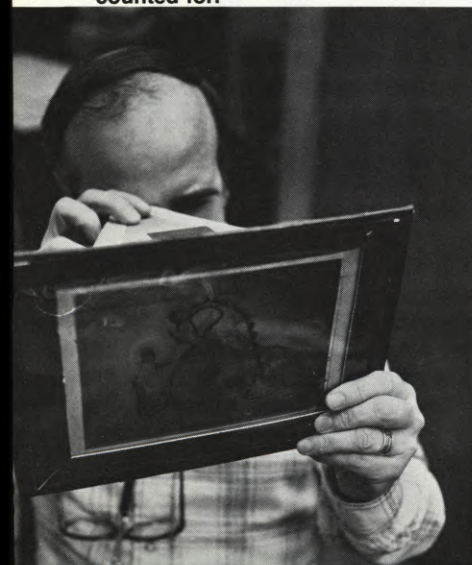
There was a similarly tricky sequence where Pete and Elliot are sharing apples. The boy is sitting on the dragon's belly, tossing apples for Elliot to catch. A plastic mockup was built for Pete to sit on, and targets were made for him to toss the apples at. This scene was shot first, and then it was redone without the mockup and targets.

The initial sequence showed Pete



Director Don Chaffey (left) and Joe Hale (who worked with the live-action crew during the shooting of all scenes involving animated composites) review C-prints. These are frame-by-frame prints made from film exposed on the sodium light stage. The sodium vapor light process has long been in use at Disney studios for filming composite scenes.

(LEFT) For this production, Joe Hale invented a "dragon finder", a hand-held shadow box used by the live-action crew for visualizing the dragon on the set. (RIGHT) Hale checks storyboard composite sketches. His job was to make certain that Elliott was always "accounted for."



where to look and toss the apples, and it gave the animators something to target on, Phillips explains.

The storyboard calls for this sequence to end with Pete sliding off of the dragon's belly. Phillips simulated this by using the blue screen process. He had a wooden slide painted blue. With this process, everything blue is masked out, and a composite negative is made with an optical printer by using the animated dragon on a second piece of film.

After this scene, Pete and Elliot come into the town, where the boy links up with Reddy, whose father, played by Rooney, operates the lighthouse. Elliot takes up residence in a cave under the lighthouse.

Even when invisible, Elliot's pres-

ence is felt. In one scene, the invisible dragon walks through fresh cement. While horses rear in panic, a clear set of dragon prints track through the cement. The technique is simple but effective. Plywood cut-outs of footprints are placed under a thin layer of cement-like material. Solenoids are then used to trip each plywood footprint in sequence. This, too, is timed to the music. As each plywood dragon print falls, the thin layer of cement collapses. It looks as though impressions are being made by invisible feet.

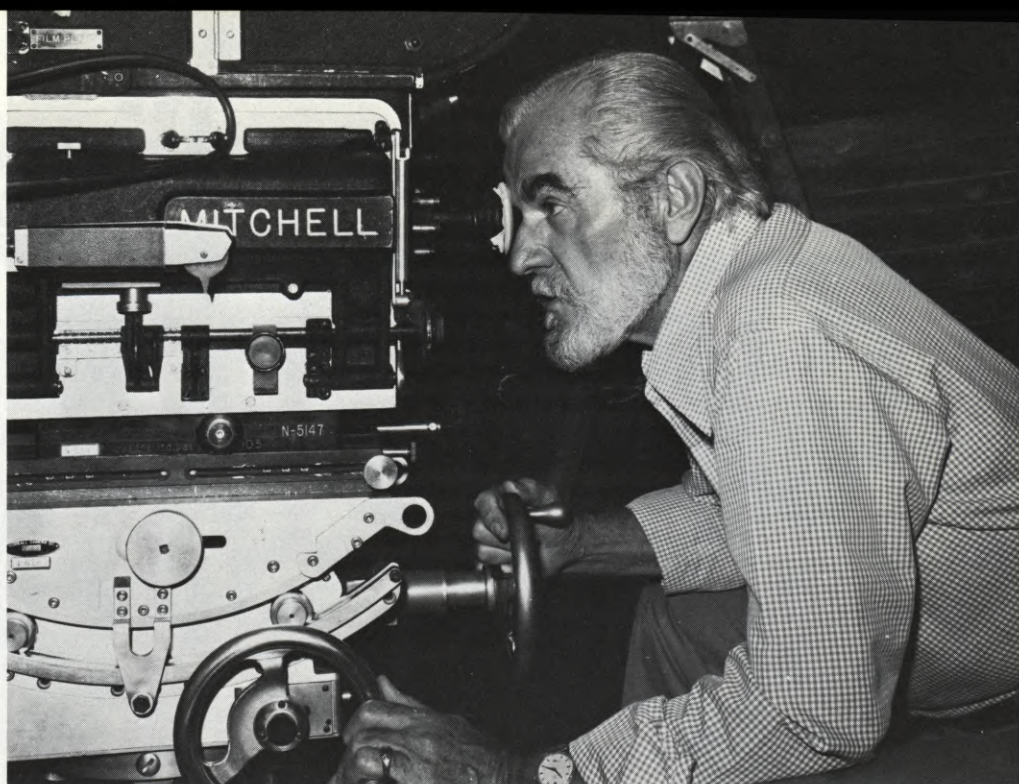
A similar technique is used in another sequence, when a school-teacher is chastising Pete. An angry Elliot rings the school bell loudly. Finally, the teacher accuses Pete of lying, and a perfect cut-out of Elliot appears in one wall and out the other. The illusion creates the impression of an angry, invisible dragon crashing through the walls. This bit of imagery is created by pulling balsa wood cut-outs out of the walls with thin wires, while dust and debris are created by loose mortar.

Careful production planning is a key to creating effective illusions like these, Phillips says. In one sequence, Pete walks along a fence making a clacking noise by running his hand through the pickets. Immediately following this, the fence collapses one piece at a time. "You get a mental image of Elliott imitating Pete and accidentally knocking down the fence," Phillip says. "All it took was careful timing, good camera positioning and thin wires pulled with split-second precision."

Naturally, with all of this going on, some of the townspeople suspect something is awry. In one sequence, Rooney and his friend, played by Buttons, go searching for the dragon. A friendly Elliot follows. Turning suddenly, they see Elliot and scream in terror. Elliot looks around to see what frightened them and is scared out of his wits by his own shadow.

A simple, cute scene, Phillips points out, except that there was no dragon when it was shot. Anderson, the animation director, suggested where to place the lights so that the animated shadow would be in the proper place. It's the kind of attention to detail that helps make Disney pictures so special.

Like most Disney films, the primary camera used is a Mitchell modified for reflex viewing with a crystal synchronized motor and an Angenieux 20mm-120mm lens. Phillips credits the multi-focal length lens as being a great time and money saver. "It allows more moves and more freedom in less time," he says.



Phillips checks a composition through the camera. One of the continuing challenges of filming this feature was to constantly leave room in the frame for a dragon who wasn't there during the live shooting. As on most Disney films, the primary camera used was a Mitchell modified for reflex viewing.

A special camera is needed for sodium light photography, while blue screen photography is coming into more popular use again.

The sodium technique was developed by J. Arthur Rank and is leased by the Disney Studio. With this technique, a modified Technicolor three-strip camera is used to make a travelling matte against a background of a sodium vapor light. Then a second negative is used to make an optical composite.

"A lot of times, we couldn't shoot scenes normally when the boy was in front of the animated dragon," Phillips explains, "because there would have been registration problems in making

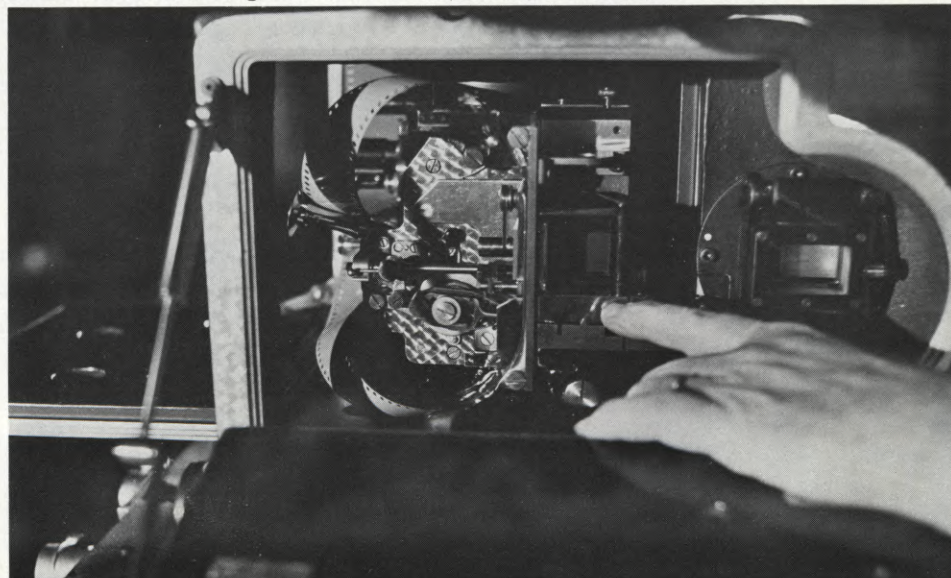
the optical composites."

With the sodium light technique, the scene is recorded through a beam splitter onto color negative and Kodak Plus-X film at the same time. The black-and-white film is used as a reverse mask to eliminate all of the background.

For one particularly difficult situation, a triple composite was made. This scene was on the beach where there are lobster traps. The scene was shot normally and on the sodium light stage, thus allowing the animators to move the dragon in front of and behind the traps.

In the story, Elliot's problems begin
Continued on Page 1082

The Technicolor three-strip camera used on the sodium light stage at the Walt Disney Studios contains a prism which splits the light so that it simultaneously exposes a color negative and a black-and-white traveling matte. Eastman color negative II film 5247 was used for the live-action filming, as well as for the subsequent animation sequences.



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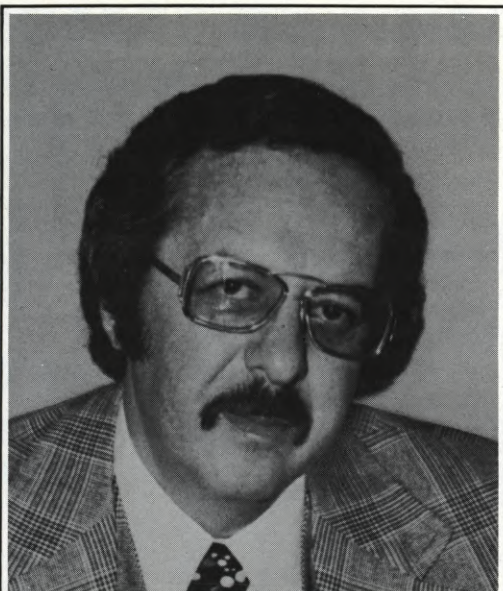
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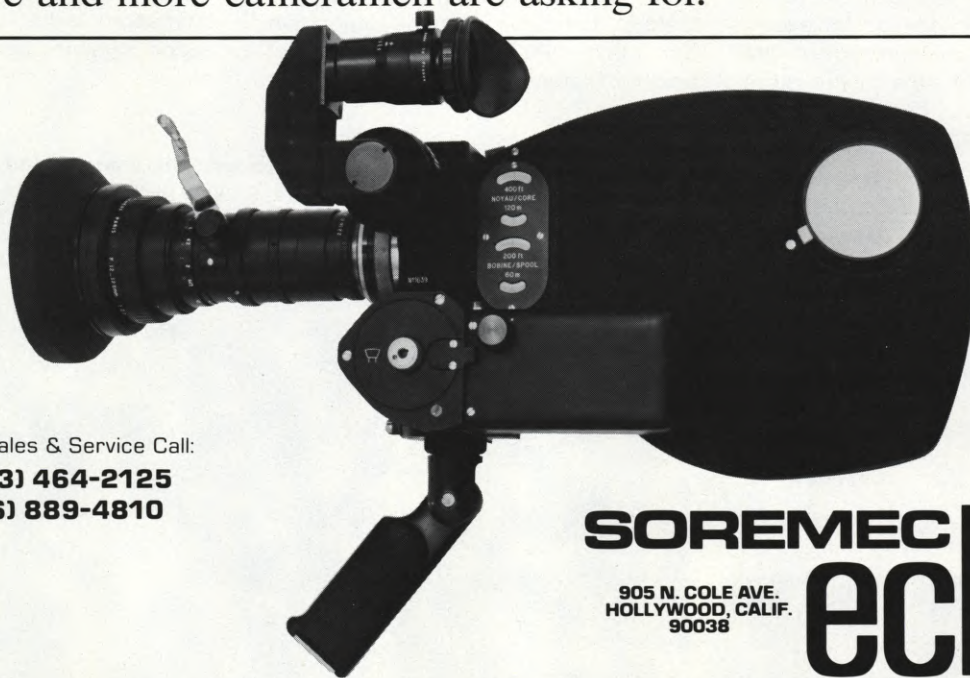
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GIVING A PERSONALITY TO AN ANIMATED DRAGON

Creating a "flesh and blood" lovable monster out of ink and paint and making him come alive on the screen turns out to be no small challenge

By DAVID HAMMOND

The first time Ken Anderson, a veteran cartoon art director for Walt Disney Productions, saw a treatment for "PETE'S DRAGON", only one animated sequence was planned. In that scene, the malevolent Dr. Terminus would try to chop Elliot the dragon into marketable pieces. Elliot was scheduled to remain invisible in every other scene.

Anderson's immediate reaction was that this might make the characters in the film appear to be stupid. "They were continually making excuses to explain the actions of the unseen dragon," recalls the veteran animator. "I felt the audience would quickly lose patience."

He countered by creating a dragon with a distinct personality that could be finely woven into the overall context of the story. There are two kinds of dragons in literature, Eastern and Western. Anderson chose the Chinese dragon as a model for his drawings and added an impish personality.

"The Chinese dragon has magical qualities and is generally associated with good rather than evil," Anderson explains. The cartoon director wanted the dragon to be fun to see. "I was thinking of Wallace Beery when I drew Elliot for the first time."

Producer Ron Miller was enthralled with the concept of making Elliot a regular member of the cast. The result was a substantial challenge for everyone involved in the making of the movie. For the first time in the more

than 50-year history of the studio, an animated character was going to be integrated into live-action sequences.

In the past, when live-action and animated characters were mixed, the drawings were done first. Then, the live-action characters were composited into the fantasy world. "One of the keys to the success of Disney's animated characters is their believability," Anderson says. For an animated character to be believable, it has to have a personality.

The challenge of giving Elliot a personality was multiplied many times by placing him in the real world. "He had to blend, not pop out," Anderson relates. "This took very precise planning and care. For example, every shadow had to fall exactly right. Whenever we drew an animated sequence, we had to know exactly where the light was falling in the live-action scene. Also, human skin tones change along with the quality of light as they move from one area to another and at different times of day. Elliot's coloring had to be adjusted accordingly."

Before production of "PETE'S DRAGON" began, there were long planning sessions. These included Anderson, Eustace Lycett and Danny Lee, the respective heads of visual and mechanical special effects, Director Don Chaffey, and Don Bluth and Joe Hale. Bluth was training new animators. Later he became animation director for "PETE'S DRAGON". Hale, another Disney veteran, served as lay-

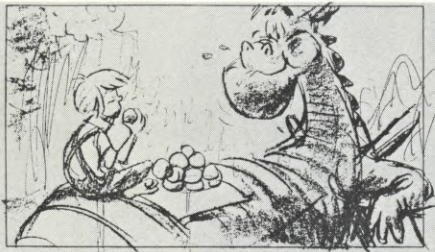
out director.

Hale was present during the filming of all live-action scenes involving an animated or invisible Elliot. He worked closely with director of photography Frank Phillips, ASC. The live-action filming was Phillips' first opportunity to use the new Eastman color negative II film 5247 emulsion.

"We needed a director and a director of photography who really understood the complex challenge," Hale explains. "They had to see Elliot and compose shots with him in the scene. They also had to forget about zooming, since we had no way of matching that on an animation stand. It was possible to pan, and we did this, by having precise points of reference in the live-action footage. Of course, the camera had to be securely tied down for every sequence involving Elliot. This is what made accurate registration possible. Otherwise, there would have been a sliding effect. In the end, there were nine-million details for us to worry about."

During the planning sessions, every sequence was painstakingly plotted. However, once the live-action production was completed, the sets were struck and everyone but the animators went home.

"We were left with photostats or B&W prints (black-and-white prints of every live-action frame requiring composite animation) and a work print of the live-action involving animation," Anderson recalls.



Action same as previously described but mock-up will not be used. Instead of the mock-up we will have a minimal pad of sponge rubber on a pedestal for boy to sit on and a minimal support for the apples on a pole in their established position on the dragon's belly as in previous Sc. 14-B. This minimum amount of mock-up will be extremely helpful to us in completing the scene in animation. This will be a sodium scene with a plate shot at the ranch.

(TOP LEFT) Storyboard sketch showing Pete using his dragon friend's belly as a table while he munches apples. (BOTTOM LEFT) In a "sodium scene", Pete sits on a padded pedestal and eats apples off a spiked stake. (RIGHT) The finished scene as it appears on the screen is composed of the sodium scene, a background scene shot at the Disney ranch, and animated paintings of the dragon. All three had to be carefully blended so that tones would match.





(LEFT) Part of the new creative team of animators at Disney Studio, (left to right) John Pomeroy, Don Bluth, Gary Goldman and Andy Gaskill. **(CENTER)** Elliot the dragon in a "dialogue" closeup. **(RIGHT)** Striking a dragonlike pose is Charlie Callas, the talented actor who gives voice to Elliot in "PETE'S DRAGON". Finding just the right voice for an animated occasionally visible dragon is more exacting than it seems, but it was a critical element in establishing the precise personality required for the impish beastie.

Some 80 to 90 people were involved in producing 17,000 feet of animation. Seventeen people did key drawings and 25 produced "in-betweens." For example, if Elliot was walking across a field, the key animators might draw every sixth or seventh picture showing movement and provide instructions for the persons doing the in-betweens. In all, some 120,000 drawings were needed.

"It added up to an enormous quality control job," Anderson admits. "When you get this many people involved with the creation of one character, there is a lot of potential for error. Everything had to be checked, rechecked and triple checked. Yet, it was the only way to get the job done on time."

Fortunately, it was a labor of love. Anderson has been a Disney veteran since 1934 when he worked on early "MICKEY MOUSE" cartoons. He grew up in Manila and other parts of the Far East. Anderson earned a degree in architecture from the University of Washington, and did advanced studies in Rome.

"I even won a medal for my designs in Paris," he recalls, "but in those days there were few jobs for architects in the United States." He moved to Los Angeles hoping to find work. For a while, an architect hired him as a draftsman for five dollars a week. Anderson also drew cartoons for a newspaper published by Upton Sinclair. "He paid me 50 cents apiece," he recalls.

"It's hard for people to believe, today, but I was living in a converted chicken coop." Finally, Anderson landed a job in the art department at MGM. Then, they closed the art department.

He applied to the then small Disney studio on a hunch. "A lot of us hitched

our stars to Walt's wagon in those days," he says.

The transition from architect to cartoonist was difficult at times. But there were many rewarding moments. "We worked seven days a week, around the clock on 'SNOW WHITE'. Then we went out and hung up posters," Anderson says.

Anderson's favorite cartoon features are "SNOW WHITE", "PINOCCHIO", and "ONE HUNDRED AND ONE DALMATIANS". He recalls that "SALUDOS AMIGOS" was the first time live and animated characters were combined in a color film. A complicated rear projection system was used. During the making of "SONG OF THE SOUTH", a new procedure was introduced. The animation was done first, and then the live-action sequences were filmed and composited.

All of this experience was needed for the creation of Elliot the dragon. "We wanted a three-dimensional character as lifelike as possible," he explains. "It was more like sculpting than drawing. From the start, we worked to give Elliot dimension and texture."

Anderson knew that by having the dragon, animated or invisible, touch people and things, the illusion would seem more realistic. You can almost "see" an invisible Elliot when he leans against a fence, and it sways. The most difficult challenge was giving texture to Elliot's body. "That would require moving his skin on every shot," Anderson explains. "It would be far too costly and time-consuming."

A compromise was reached. Elliot was given some very distinctively shaped markings. These moved on each appropriate drawing. "We had to be especially careful to make certain everyone drew the markings the same

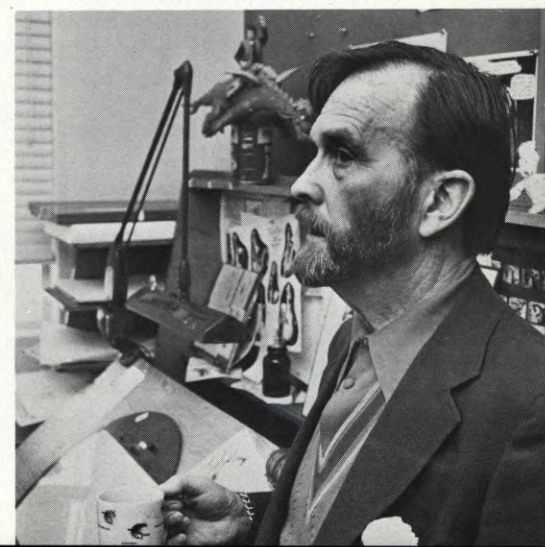
way and in the right places," he says.

Hale helped Chaffey and Phillips visualize Elliot on the set by building a handheld shadow box which contained drawings of the dragon as he would appear in different scenes. He called it a "dragon finder." By peering through the "dragon finder," they could see the scene the way it was conceived, even though Elliot wasn't there.

To properly position the dragon and animated effects, numbered frame-by-frame black and white paper prints were placed on an animation board. Key scenes were drawn by Bluth. "We drew one animation for every two live-action frames except where there was contact between the animated and live-action characters," Bluth explains. "This saved a great deal of time."

Wherever there was contact, a drawing had to be made for each live-action film frame, and "blob" mattes were traced. For example, on one se-

When veteran cartoon art director Ken Anderson saw the first treatment for "PETE'S DRAGON", there were only limited plans for the dragon to appear on screen. Anderson countered by creating Elliot.



Continued on Page 1068

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
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HOW SPECIAL FILM EFFECTS BROUGHT ELLIOT TO LIFE ON SCREEN

The whole bag of cinemagic tricks—including blue screen, sodium light, miniatures and triple-head optical printing—was called upon to give screen credibility to this very special dragon

By SCOTT HENDERSON

In "PETE'S DRAGON", Eustace Lycett, head of the special film effects department at Walt Disney Productions, faced a formidable challenge — bringing Elliot, a somewhat unusual dragon, to life.

Lycett, a 40-year veteran at the Disney Studio, played a crucial role in the birth of Elliot, the animated star of the \$10 million feature film. Lycett's job was to help make the now you see him — now you don't — dragon spring to life in the film's live-action sequences.

"Special effects is the discipline called upon when the writers' imaginations demand 'impractical' or 'impossible' feats," Lycett explains. Sometimes the necessary miracles are performed mechanically. Lycett believes that mechanical special effects supervisor Danny Lee produced some outstanding results for the new film. Some of Lee's trickery is described in the accompanying interview with Frank Phillips, ASC.

Lycett performed the special effects feats that could best be achieved optically. For "PETE'S DRAGON", his wizardry included blue screen and sodium light process photography, a miniature sea storm sequence and a great deal of compositing using two three-head optical printers.

Before the start of production, Lycett met with Lee and his counterparts involved in the production of live-action and animation photography. "We had a detailed storyboard fully outlining essentially every action," Lycett recalls. "Before production could begin, we had to decide exactly how everything was going to be achieved."

The biggest task facing the special film effects department was the need to meld some 1,500 feet of animated sequences with the live-action footage. They played a key role, exposing the live-action footage on a sodium light stage, making B&W paper prints or photostats for the animators, and, finally, optically producing composites from two, three and sometimes more originals.

Throughout the planning and production of "PETE'S DRAGON", everyone involved in the project agreed that the essential ingredient was credibility. "People had to believe they were seeing a real dragon interacting with the cast," Lycett says. "Our main challenge was doing our job without the audience knowing we were there."

The sodium light process was developed by J. Arthur Rank and is licensed to Walt Disney Productions. Using this process, scenes are photographed in front of a large opaque cloth screen which is painted yellow. The screen is evenly front-lit by sodium vapor lamps. The sodium light has a very narrow band in the visible spectrum, and its limited bandwidth has no discernible effect on the exposed color negative, due to a dichroic sodium line filter in the camera.

A special camera is used to simultaneously expose the foreground action on color negative and black-and-white masking films. The camera incorporates a beam-splitting prism, which uses dichroic and didyium filters to precisely distribute the light to properly expose the two films.

The color negative film is clear where

it doesn't "see" the yellow light in the background. The mask or "traveling matte" forms a silhouette of the foreground and is black where it "sees" the yellow screen. Eastman color negative II film 5247 was used throughout the production as both an original and duplication film. The black-and-white film mask was exposed on Eastman Plus X negative 5231.

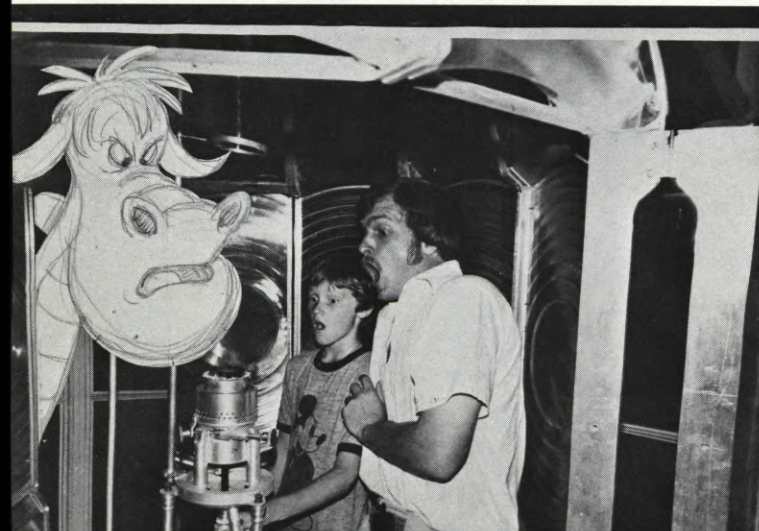
"Making the traveling matte and color in one pass reduced production time and helped eliminate the possibility of not tracking or missing register," Lycett explains. The sodium light process is less complex than the more commonly used blue screen.

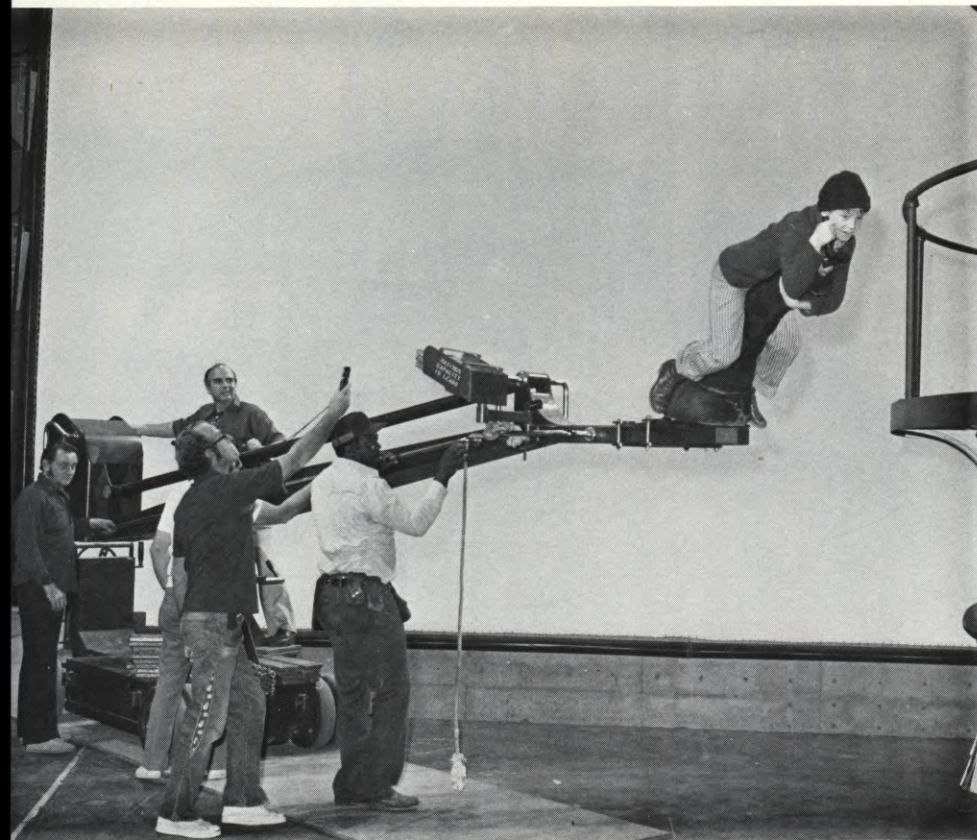
One of the more complicated sodium light shots called for live-action to occur both behind and in front of the animated dragon. In this instance, the foreground and background scenes were photographed separately and composited later with the animation.

An important key to maintaining the illusion of reality was the painstaking attention to detail taken in each step of the production. For example, in one scene, Pete is riding a mechanical device which simulates the actions of the animated dragon. Special effects cinematographer Art Cruickshank had to make certain that no part of the boy's body, which wasn't going to be behind the dragon, was photographed behind any part of the device.

A black-and-white duplicate negative was made from each of the sodium light originals. Using a projection enlarger (similar to a cartoon crane), the duplicate negatives were printed onto B&W photographic paper. This

(LEFT) Shawn Marshall ("PETE") rehearses for a scene in the lighthouse, where Elliot helps save the day by lighting the lamp during a storm. The penciled-in sketch of the dragon, precisely placed to coordinate with the previously filmed live action, shows how he will function in full color in the final scene. (RIGHT) Mickey Rooney meets Elliot—or rather, a latex look-alike. This model was used in many scenes to help the cast visualize the dragon.





How do you fly a dragon? Pete, shown here suspended from the end of a crane, is finding out. For this scene, special effects cinematographer Art Cruickshank had to make certain that no part of the boy's body which wasn't going to be behind the dragon, was photographed behind any part of the device. The animated dragon was later added to the scene by means of an optical composite.

paper was prepunched to register with artwork prepared by the animators.

The animators used these prints as guidelines for making their drawings. The inked and painted cells were then exposed on a cartoon sodium light crane together with inked lineup guides made from the prints.

Next, a set of "blob" mattes were made using the same B&W prints. First, a matte was made to cover all visible devices (e.g., the mechanical device that Pete rode simulating the dragon) and all areas of the boy covered by the animated dragon. The procedure was repeated with the animated film exposed on the sodium light crane. The blob mattes were painted black and photographed onto a high-contrast film at the same field at which they were originally projected.

The final step was making a composite of one or more live-action sequences, the animation and the various mattes.

"We could make more than one pass by doing double exposures, but we tried to avoid that for optimum quality," Lycett reports. "Many people doing optical work composite onto an intermediate stock. We prefer duping onto the same negative stock used for the original film, because it has a low

gamma and more latitude for adjusting to changes in color balance.

"When Eastman color negative II film 5247 was introduced," Lycett says, "there were some difficulties with color reproduction when they used it as an optical duping stock. However, with improvements made in the emulsion, they are now getting excellent results

when using it as a duping stock," he states.

Many other special film effects were incorporated into "PETE'S DRAGON". For example, the final storm scene uses miniatures shot by Art Cruickshank. This was done with two Mitchell Mark II cameras filming at 128 frames per second.

"We usually shoot five to six times normal speed on miniature sets, depending upon the scale, since this allows us to slow down the action," Lycett explains. "By intercutting scenes from both cameras with live-action footage, the scenes made on the miniature set never come under close enough scrutiny to appear unreal."

The miniatures were built by the prop department and Lee. Lee and Cruickshank worked closely throughout the making of the film. They both discovered that sometimes even the most carefully conceived plans had to be scrapped in favor of creative innovation.

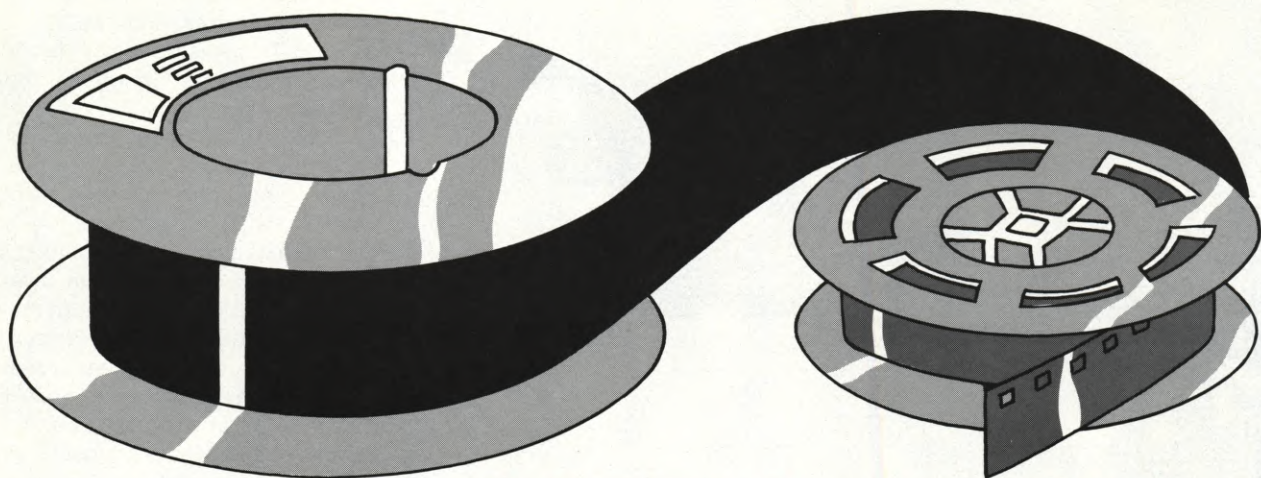
For example, during the storm scene, the script called for one of the cast to be catapulted through the air. Usually, this type of scene is done with a dummy. But the use of a dummy probably wouldn't have produced a realistic effect.

Instead, Lee rigged wires that would hold a stunt man. Lycett filmed the stunt man against a black night sky, zooming in on the subject to create the illusion of motion. This was then optically composited with the background scenes of the village to produce a convincingly real sequence.

"I am going to be disappointed if the audience even suspects it isn't a real person flying through the air," Lycett concludes. ■

Joe Hale watches while the finishing touches are added to a miniature model of Elliot. The miniatures were built by the prop department under the direction of special mechanical effects supervisor Danny Lee. Extensive miniature work was done for the final storm sequence, utilizing two Mitchell Mark II cameras shooting at 128 frames per second.





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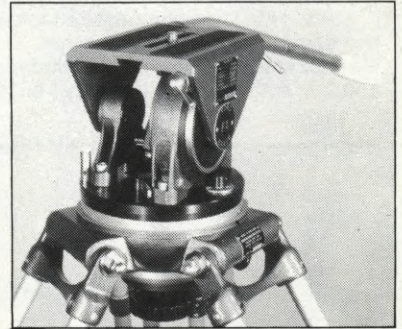
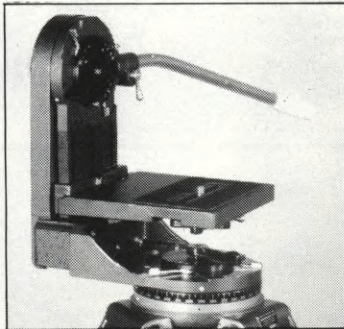
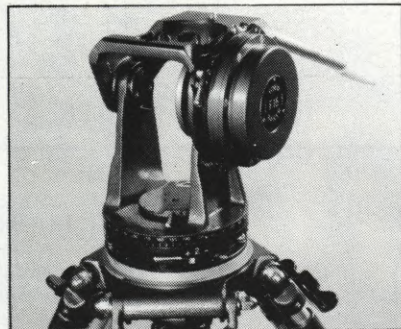
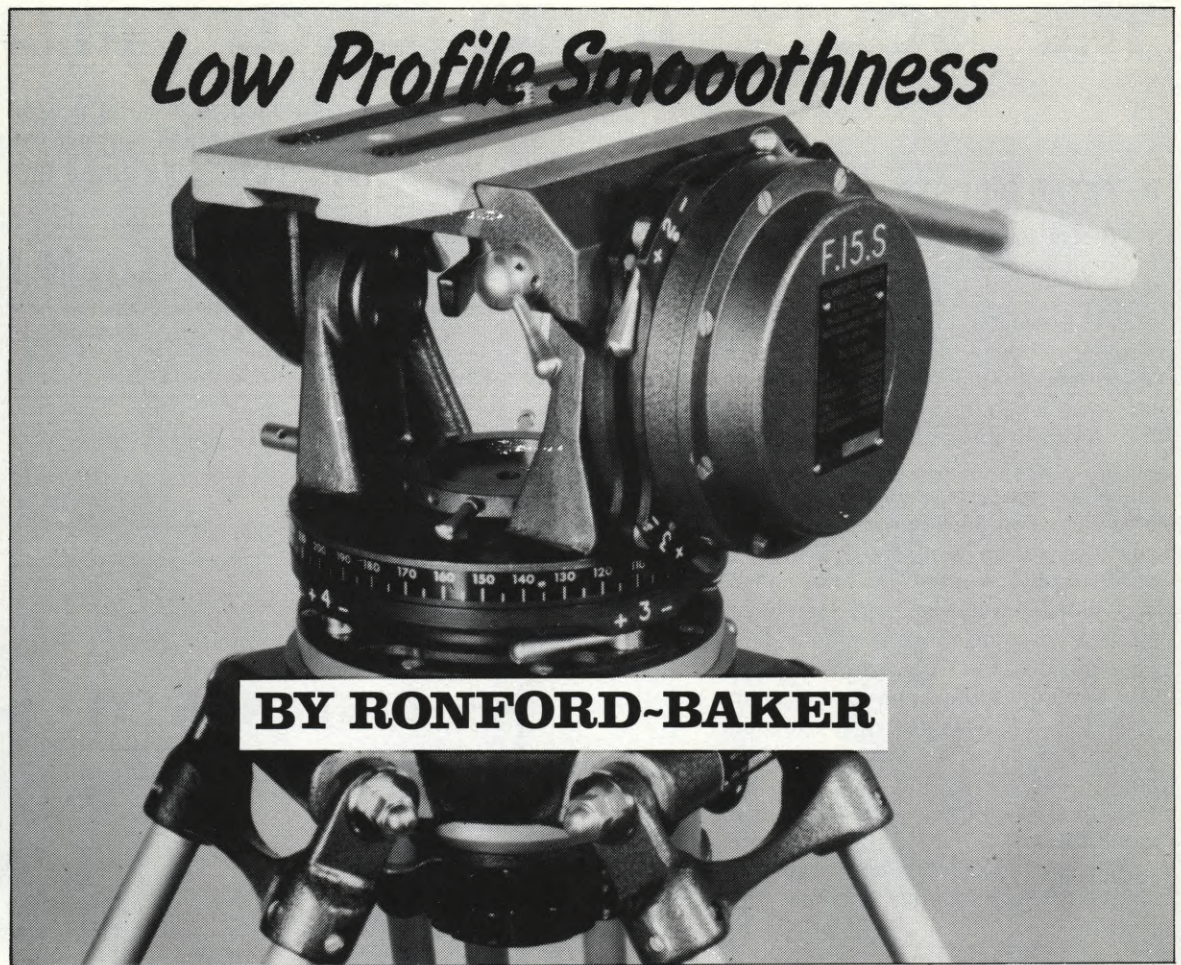
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Top: The Ronford-Baker Fluid 15 S. Left: The Ronford-Baker Fluid 15.
Middle: The Ronford-Baker Fluid 7. Right: The Ronford-Baker Fluid 4.

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The Ronford-Baker 15S fluid head is a new close-to-the-tripod version of the famous Fluid 15, designed especially for the new generation of low profile cameras.

The 15S has the same two sealed fluid units as the original Fluid 15 (shown here bottom left) with 4 on/off controls enabling the cameraman to pre-select any of 15 exact degrees of 'push-against' that his shot requires and with the additional advantage of a sliding top plate with quick release so that the camera can be effortlessly set-up and balanced. The 15S is available for any Mitchell standard or Arri bowl type tripod, dolly or crane.

In the middle is the Fluid 7 with its unique camera platform which is adjustable for balance both horizontally and vertically and which may also be used upside down for underslung camera mounting.

On the right is the Fluid 4 which like the Fluid 2 (not shown) is a lightweight member of the family especially suited to 16mm cameras. The Fluid 4 and Fluid 2 weigh just .11 lbs and 7 lbs respectively.

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THE "ISOLUX" - A NEW CONCEPT IN LIGHTING

A practical approach to making a little light go a long way in illuminating large areas, especially on location, where there is frequently too little power and not enough lamps

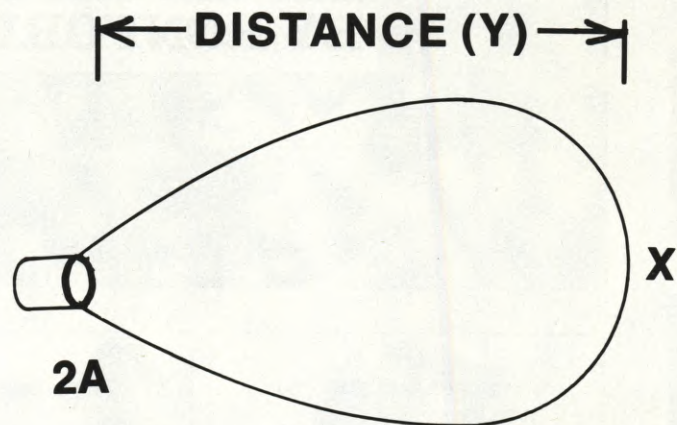
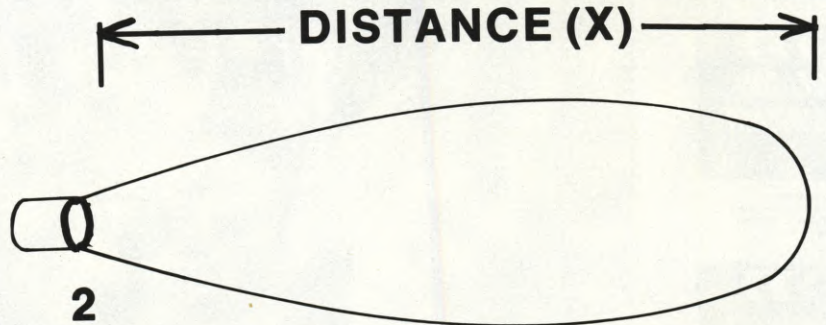
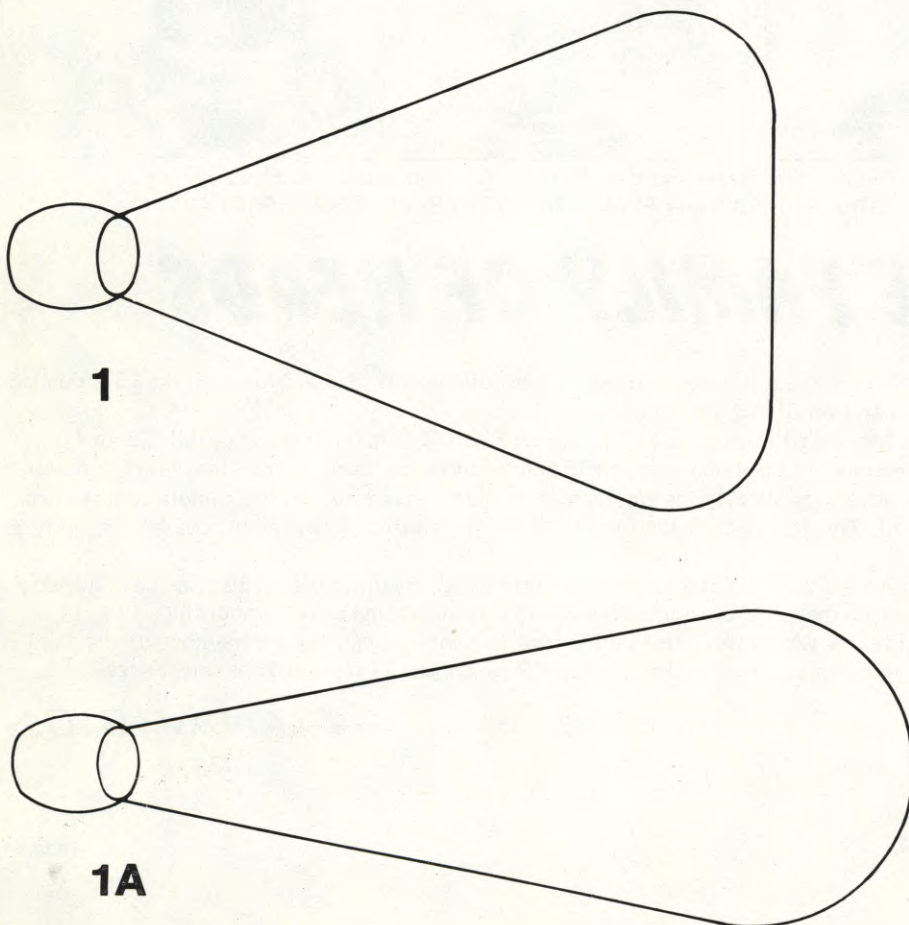
By PETER GIBBONS

What is an Isolux? An Isolux is a line of equal illumination. It is similar to an Isobar, which is a line of equal barometric pressure found on a weather map — or to an Isotherm, which is a line of equal temperature found in nature or science. It is a word coined by the author and comes from *Iso* meaning equal and *Lux* meaning light. It is a concise term which has an exact meaning when dealing with light. What has this to do with motion picture photography? A great deal if you take into consideration a major problem most cameramen currently must face.

Because of the high cost of producing pictures today, the cameraman invariably finds himself in a situation where he does not have enough lamps, not enough power and ultimately not enough light, the main working instrument of his art.

All motion picture lamps have Isoluxes of one shape or another. The

(BELOW) FIGURE 1—The shape of the Isolux with a Fresnel lamp in flood position. FIGURE 1A—The shape of the Isolux with the same lamp in spot position. Though ideal for studio lighting, these lamps are not conducive to the effective use of an Isolux.



(ABOVE) FIGURE 2—The shape of the Isolux with a non-lens lamp, such as the Mighty-Mole, in the spot position. FIGURE 2A—The shape of the Isolux with the same lamp in the flood position. The relative (X and Y) positions are to be determined by the cinematographer.

spotlights with Fresnel lenses in them, probably the most important lamps in the industry today — the babies, Juniors, Seniors and Ten K's — are lamps which have a smooth, flat light pattern from one edge to the other. (See FIGURE 1.) For this reason they are easy to use and can be depended upon to give smooth, even illumination. On a set these lamps are used with all sorts of lighting accessories (barndoors, gobos, flags, scrims, blades and dots) very effectively, mainly because the light coming from a lamp with a Fresnel lens is highly directional. But these lamps are large, heavy and do not put out as much light per watt as some of the newer, lightweight non-Fresnel lens lamps. On the large stages, however, they are the

main tools of professional cameramen all over the world. They are occasionally used on the floor, but more often they are hung from catwalks or grids near the ceiling in great numbers. They can be moved about according to the desires of the cameraman and their size and weight, even in great numbers, are of little importance and the amount of current they consume is of little concern.

Today, however, more and more pictures are being made on location in actual hotels, cafes, restaurants, public and private buildings and even in private homes, in order to get more of a feeling of reality and authenticity. In these situations there is not unlimited power, such as there is on a stage, and space is at a premium — so a whole new style of lighting is necessary and the cameraman has to resort to his resourcefulness and ingenuity to be able to come up with the same quality of lighting as that which can be easily obtained on the stage. Smaller and lighter lamps must be used, so that they can be hidden behind beams or rafters or doors and can be hung from them or hung from spreader devices that can be put up, which go from wall to wall. Lights on stands can be used occasionally, but much of the equipment has to be hung in order to get the type of lighting required in a professional motion picture.

In these situations light has to be used frugally and every lamp has to be used to its fullest extent, usually using every bit of light to best advantage. Flags or gobos can be used to keep the light off the walls, but nets and other trimmers must be sacrificed because of the lack of space in these interiors and because of the low ceilings usually found in these situations.

Here a complete understanding on the part of the cameraman of all of the characteristics of his lamps will be of great help to him. It will allow him to use fewer lamps, use less power, work more quickly and do a better job of lighting.

Cameramen usually know the wattage and the voltage of their lamps. They also know whether their lamps have Fresnel lenses or not and know that there is a great difference between the two types of lamps, as well as the kind of light each of these lamps puts out. But there are other characteristics that differ greatly between these two types of lamps and that are very important and surprising. These small, light, lensless lamps so popular today are the Tungsten-Halogen lamps. They are most often used on location shooting, are very efficient and put out

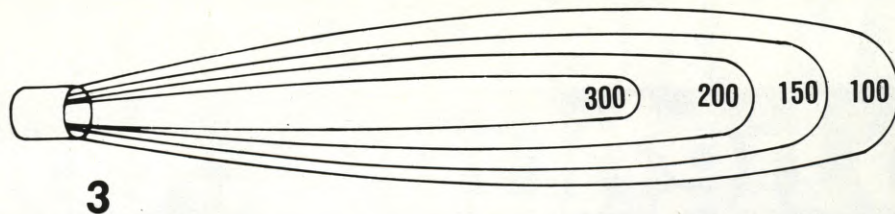


FIGURE 3—Each lamp has potentially an infinite number of lines of illumination, depending upon different light levels. Shown here are various lines of illumination for a lamp in the spot position.

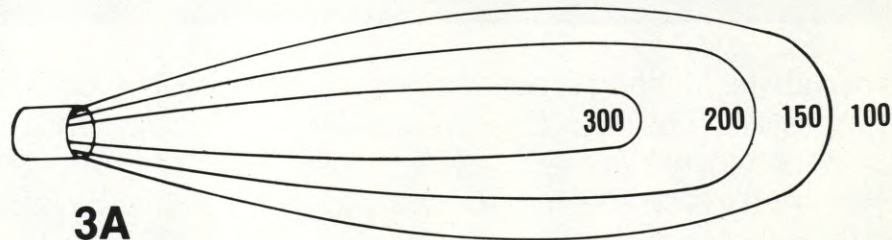


FIGURE 3A—The lines of illumination for the same lamp, when set at a position approximately midway between spot and flood.

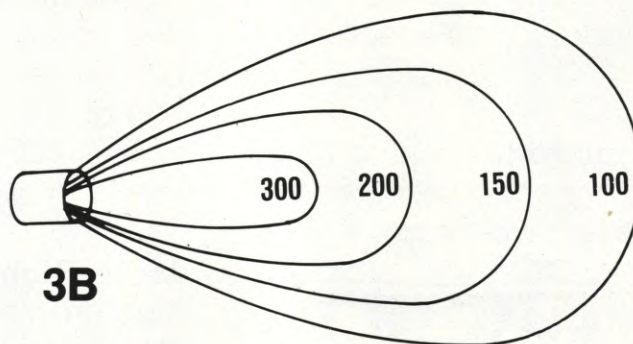


FIGURE 3B—The lines of illumination for the same lamp, when set at the flood position.

a lot more light per watt than their large more sophisticated counterparts. They also have a serious drawback: they have a hot spot in the center which occasionally is not easy to work with.

In a plan view (looking at FIGURES 2 and 2A) one can see that the Isolux lines of this type of lamp do not have a flat even curve. The hot spot in the center is especially noticeable in the spot position, but even in the flood position it is brighter in the center than at the edges. Remember that these are lines of equal illumination that we are looking at here, and anyone can determine them for himself very easily. One needs only a lamp of the type mentioned above and an incident light meter to do so.

It might be stated here that there is an infinite number of lines that exist. (See FIGURE 3 for lines of different

light levels.) What we are doing here is simply presenting a concept — a concept that can be important and helpful when shooting under difficult conditions, especially with most Tungsten-Halogen lamps.

Select a medium-power lamp for the test, a 1000-watt Mickey Mole or equivalent would be fine. Set the lamp at medium height (four feet above the floor) and point it in a horizontal direction. Put the lamp in the spot position, turn the lamp on and turn all other lights in the studio off. At a distance of approximately 20 feet from the lamp, point the meter directly toward the lamp and try to find the center of the beam by moving the meter left or right and up or down. The center of the beam will be at that position where the meter reads the

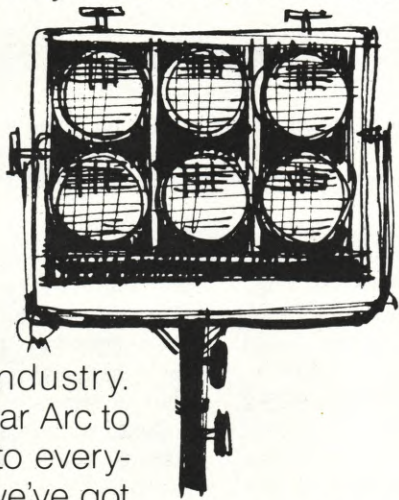
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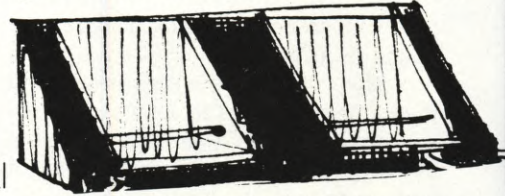
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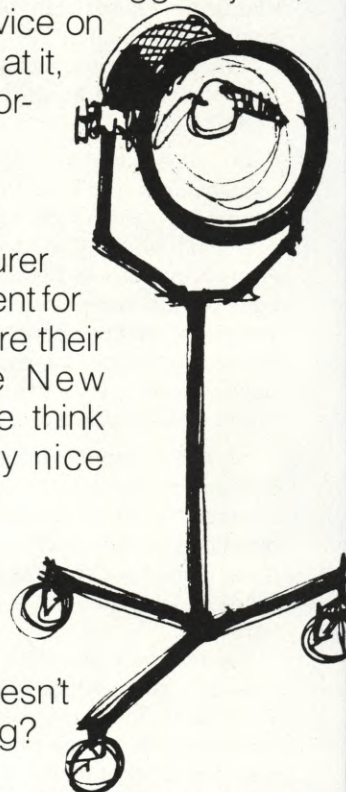


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upfitting the filmobile

This moveable feast of filmmaking facilities, despite its high initial cost, more than pays for itself in time and money saved

By ROBIN MILLER

Long before relatively recent achievements in lighter, more compact film gear, trends were somehow set by filmmakers themselves in traveling lighter. Still burdened with heavy cameras and slow stock, four, then three, and even two-man crews accomplished "light duty" production which defined the documentary form and the newsreel. Today serious Super-8 and ENG producers, with their lower cost-per-foot-shot, prove daily that two's a crew.

Most readers of *American Cinematographer* are aware of the other extreme: blockbusters requiring crews of specialized artists and technicians in the hundreds, really "heavy duty" production. But as these extremes of light and heavy continue to diverge, there has emerged an increasing "middle class" of filmmaking. What I will call "medium duty" production might be defined as crews of four to perhaps a dozen or more technicians using either 35mm or very high quality 16mm apparatus to make commercials, sales presentations, image films, the more polished documentaries, TV movies, and low budget theatrical features.

Remaining competitive with the two or three-man light duty unit and achieving the production values of the heavy duty producer describes the near impossible range of assignments the medium duty producer faces. So early in 1975, we at Robin Miller, Filmmaker Co., Bethlehem, Pennsylvania, began to develop a mobile production facility for higher production values at lower cost. After several months of establishing criteria, designing, and search-

ing for equipment, we realized such a facility; after nearly two years of mistakes and triumphs, we think we've got something to share.

The "Filmobile", as we call it, is perhaps in 1977 what Fouad Said's first "Cinemobile" was in "I SPY" days. But unlike the Cinemobiles and Cecomobiles of today, the "Filmobile", although quite personally ours, is all at once quite complete, amazingly flexible, and relatively inexpensive... all requirements of medium sized, medium duty, medium budget production. In a year and a half of service, the "Filmobile" has served in the production of television commercials, sales/image films, high quality documentaries, and a low budget feature.

Choice of Vehicle

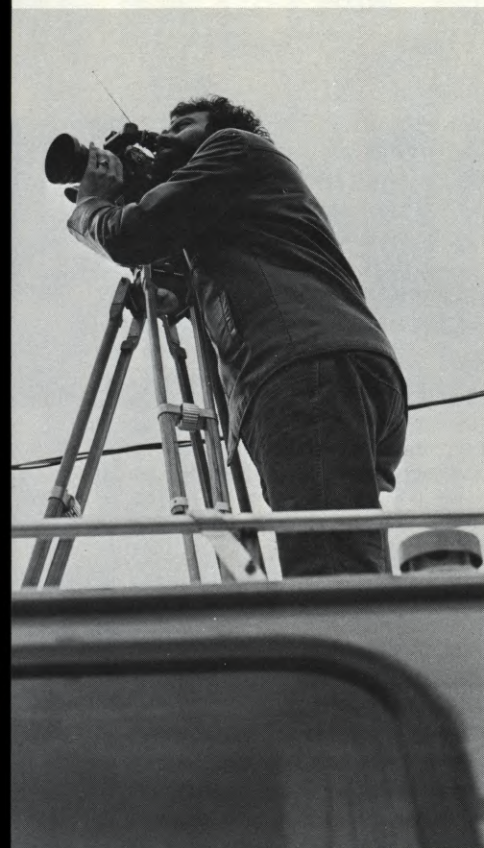
The Filmobile was developed following basic needs of the filmmaker interested in many of the finer production techniques which might be used on nearly every shoot, if not every day. Anything more exotic could be rented as required, and space would be provided for such transient items along with the personal effects of various sized crews.

Creature comfort and an overall people-orientation of the facility constituted the highest priority; after all, what good is any facility when the artists and technicians are affected by travel fatigue or double effort? The vehicle and its contents had to be integrated with balance among the various



(ABOVE RIGHT) An old-fashioned Robin Miller, Filmmaker Co. family portrait, with staff and some of the equipment posed in front of the Filmobile. (BELOW LEFT) Interior of the Filmobile, viewed through the windshield. Traffic jams were minimized by locating the sound department forward, lighting and grip at the door, and camera aft. (RIGHT) The Filmobile viewed through the rear window. Both the rear bedroom and dining areas normally included in the GMC motorhome were removed for camera and lighting storage, respectively.





Atop the Filmobile, a 6-by-8-foot marine plywood deck serves as a 9-foot-high camera and lighting platform. The GMC's gentle air ride permits moving shots from this perch.

departments: camera, lighting and grip, sound, and support (our category including galley, head, and office). In other words, the facility and its people had to be capable of greater attainment, both in efficiency and artistic achievement, because of care and cleverness in the design of the facility.

It was decided early to reduce the basic crew and equipment to one vehicle small enough to be maneuverable, yet large enough to accommodate all but feature productions, which would vary greatly in requirements. Prior to the Filmobile, we typically packed what we foresaw needing in three or four cars, necessitating that three or four of the crew drive. Inevitably, the item (if not six) that would have made the difference between a good shot and a great shot was left behind. Three or four drivers means three or four fatigued crewmen. The empty magazine which might have been loaded enroute was in the trunk. A meeting to describe the next setup was impossible. Frequently one of the cars would get lost, or separated by a traffic light, or waylaid by a pit stop.

With one vehicle, there is one driver, or longer distances can be covered in shifts. Meetings, magazine loading, reading, writing, even real sleeping

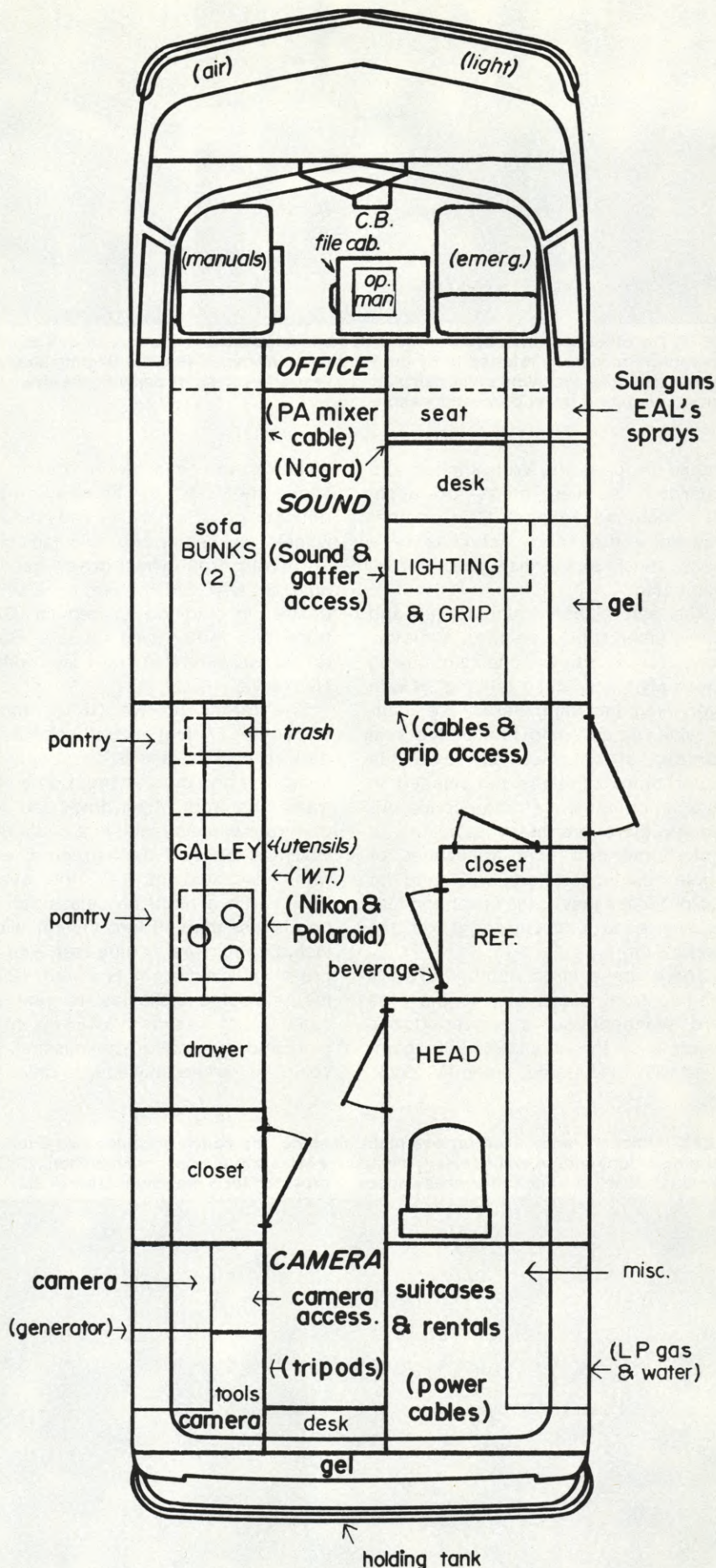
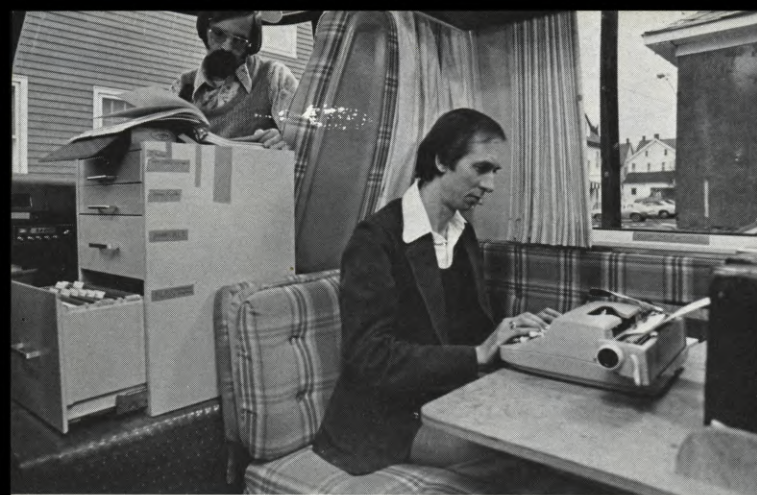


Diagram of the interior of the Filmobile, showing how its efficiently compartmentalized layout provides space for an impressive amount of equipment without crowding.



(LEFT) The office area includes writing equipment, supplies and storage, as well as intercom to the set, CB transceiver/PA, and looseleaf Operating Procedures referred to by the Production Manager. **(RIGHT)** Slightly ahead of schedule, the crew of the Filmobile engages in various activities, including a nap, calculating mileage, needlepoint, enjoying the view, or whatever. A variety of constructive activities can be carried on during travel between locations.

should be possible. With kitchen and bathroom facilities, stops for lunch, etc., could be optional. Said another way, in a breakneck schedule or a pinch, lunch and a visit need not be eliminated.

The natural conclusion for us and many other producers was a motorhome, followed by the choice of buying an empty truck and "upfitting" it with everything, including literally the kitchen sink, or stripping one of the vast number of commercially available motorhomes of items not needed in favor of equipment storage space. Although there are many suppliers of motorhome and boat appliances or whole custom interiors, we found for our purposes that it was faster and less expensive to gut one right off the dealer's lot.

There are a large number of RV's ranging from Blazer size to the Blue Bird Wanderlodge, a converted bus which sells for about \$85,000, complete with bar, stereo, color TV, deck,

awning, and microwave oven. We chose the GMC for its easy-on-the-delicate-gear air ride and tandem wheels, low center of gravity, and Olds Toronado front-wheel-drive, serviceable at any Oldsmobile or Cadillac dealer, in addition to regular GMC truck and motorhome centers. Being artists, we were also impressed with its sleek style.

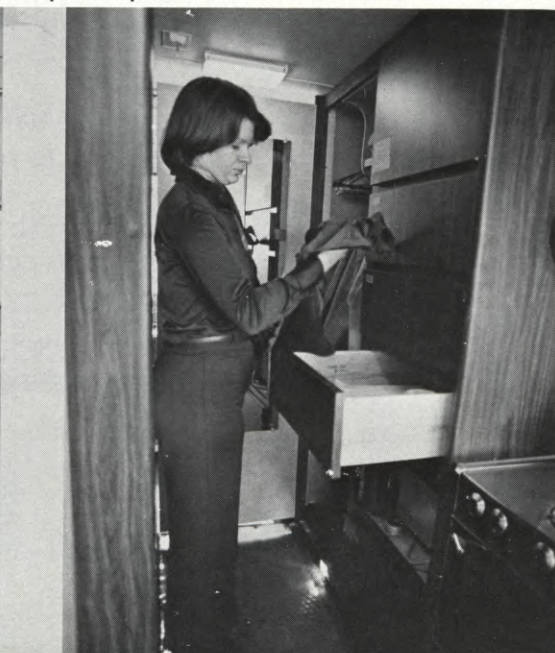
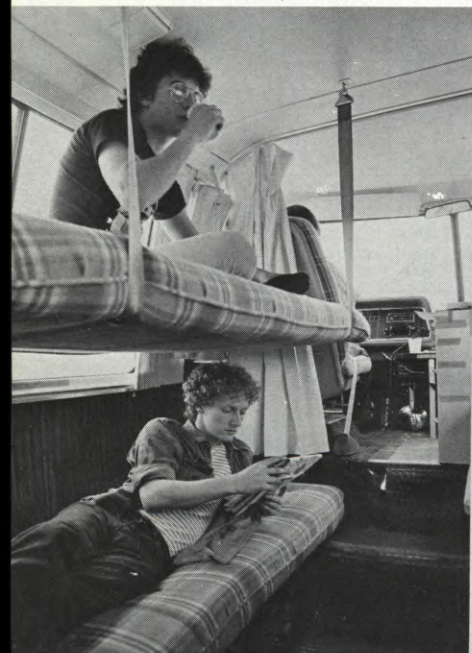
The larger of two GMC models measures 27 feet overall, about 1½ parking spaces, and is constructed of fiberglass and duraluminum on a steel frame. Its front-wheel-drive and tandem rear wheels result in a cabin floor which is low and unobstructed; even with headroom of 6'4", the overall height with a large fiberglass storage pod is less than 10 feet. Overall width, including mirrors, is nine feet. And the gross vehicle weight is about 12,000 lbs., including 2,000 lbs. of gear and 1,000 lbs. of crew. With a 455 cu. in. engine and automatic transmission, the vehicle is remarkably easy to drive and

provides smooth sailing at turnpike speeds, even in wind. Fully loaded, we average 6 mpg, which, combined with a 50-gallon fuel capacity, gives the Filmobile a range of 300 miles between absolutely necessary stops.

In a recent shoot in Chicago, three drivers taking 2½ hour shifts took the Filmobile 750 miles in 15 hours with unexpectedly little travel fatigue upon arrival and 100% productivity with the 8 o'clock call the following morning. This is in sharp contrast to the backache, constipation, and generally spaced-out condition the writer suffers for two days after as little as six hours crouched in a car or tourist class seat. In the Filmobile, you can walk around, go to the head, make a sandwich, get a beer, check the radio slate, solder a shield, cut gel, type a schedule, nap, read, change, shower, stretch, pushup, curl, or any one of a zillion things you can't do in a car or plane, until it's your turn to drive. We have found it the most humanized way to travel moderate distances. (We've also been accepted as an 18-wheeler by our fellow truckers and find great companionship, entertainment, information, as well as on-location communication using CB radios.)

Although many options on the motorhome — such as the 6kw generator, galley, and head — can be considered part of the production facilities, we removed the rear bedroom and half the dining area in favor of camera equipment in the rear and lighting and grip equipment right inside the door. The permanent equipment complement can be summarized as follows: three 16mm cameras, two fluid head tripods, two Nagras, eight microphones, mixer, PA, wireless, 30 luminaires ranging from 150 to 4,000 watts, four century heads, miscellaneous mounting hardware, 12 stands, tools, Nikon and Polaroid still cameras, 1,000

(LEFT) Although rarely used for overnight sleeping, the couch becomes two bunks for napping on longer trips, while seating remains for at least four more crew members. **(RIGHT)** Personal closet, drawer and suitcase space is provided for a maximum crew of six.



feet of cable, four radios, four intercoms (for private truck-to-location intercommunications via the AC tie-in), a six-foot ladder, office with typewriter and file cabinet, library of references, manuals, etc.

Systems standard on the vehicle which proved to be inadequate for our purposes had to be changed or augmented: general purpose load range D tires were upgraded to premium load range E; the 150 ampere-hour auxiliary battery was replaced with deep cycle model rated at 180 ampere-hour; a marine plywood roof deck was installed as a high camera platform; a regulator and air line were added to the air ride compressed air tank for tire filling; auxiliary mirrors and fog lights were added for safety; and multiple



(LEFT) Highest priority lighting and grip equipment is located adjacent to the door. (RIGHT) A two-cylinder, 6KW generator supplies power for daylight fill or modest interior setups up to 100 meters (328 feet) over the Filmobile's standardized cables.

burglar alarm systems were installed, including silent warning inside locations and motel rooms.

The Facility

One of our basic, growing needs is to quickly set up and strike relatively complex lighting. This requirement and the Filmobile's obvious limitations in weight and crew size (five or six men) dictates limiting lighting and grip equipment to baby-size fixtures, stands, and accessories and thereby standardizing on mounting equipment with a 5/8-inch stud. Although we occasionally need fixtures of larger capacity, the trend throughout the industry is toward higher performance luminaires, such as the Mole-Richardson Baby Solar-spots, including a 10 lb., 2-kw junior fresnel which mounts on baby-size stands. Colortran FAY 6-lights were also chosen because they weigh 15 lbs. and mount on baby hardware.

Another practical decision was made

concerning standardizing power cables and connectors. We decided to limit luminaires on the Filmobile to 2kw, including the two-circuit 6-lights at 1950 watts per circuit. This permitted U ground plugs on all luminaires and extensions to be readily available #12/3 sets. We have found that overrating of the 15 amp U ground connectors by approximately 10% causes no long term problems, as long as switches and not the plugs are used to turn the luminaires on and off. The only other connector and cable size on the Filmobile is 30A 4-wire twist locks on #10/4 cable for the tie-in. Again overrating by only 10%, these cables haul 8kw each a maximum of 200 feet with less than 80 degrees Kelvin drop in color temperature. We loop up to three of these circuits through six four-receptacle boxes placed near groups of luminaires and connected by 10m or 30m cables. In practice, only the first leg of the tie-in

Continued on Page 1056

(ABOVE LEFT) Three top drawers in the sound department include (from top) adaptors and patch cords, microphones and accessories, and tape and headphone storage. Bottom drawer contains spare lamps and electrical adaptors. (BELOW LEFT) The sound department fills a cabinet and space beneath the couch/bunk and office seats. (RIGHT) The 5-by-7-foot camera shop includes three 16mm cameras, two tripods, lenses, filters and accessories—about double what was formerly packed into two or three full-sized cars.



SHUTTERLESS, FLICKERLESS PROJECTION IS HERE

A radically different projection system for the 70mm, 35mm, 16mm and Super-8 formats that lap-dissolves from frame to frame at any frame rate from under 1 fps to over 500 fps

By ULRICH M. FRITZLER

The attempt to replace intermittent motion film handling devices with continuous motion film projection has a history of 75 years duration and encompasses many patents in the art.

The disadvantages of the intermittent pull-down system are generally known, but let us review some of them. The required 180° shutters cause a light loss of about 50%. The film projection rate is incompatible to the television scan rate, and it requires specially modified projectors for television applications and film-to-video transfer which even then can be done only at one synchronized speed. The claws engaging the film enlarge the perforations which, in turn, causes image instability and, eventually, tearing of the film. Running slower than sound speed increases the flicker, and running substantially faster is impossible. Intermittent film projection means strobed light projection which can cause optical illusions (such as the spokes of a wheel turning in reverse while the wagon is moving forward); and the inherent flicker can cause headaches and, at worst, seizures in some people. Projectors, out of necessity, are bulky in order to be sturdy enough to accommodate all the components required in intermittent systems. And as long as film projection is associated with clatter, the layman will always be afraid that his irreplaceable film will be torn to pieces, and no gimmicks such as automatic

threading will eliminate his apprehension.

So obviously, the ideal film projection system or film camera, for that matter, should be a system which has the performance of the intermittent system, without all the above-mentioned drawbacks. Yet, despite the problems mentioned, the intermittent system has not been seriously challenged. If intermittent film projection conceptually is so undesirable, what alternatives are there available?

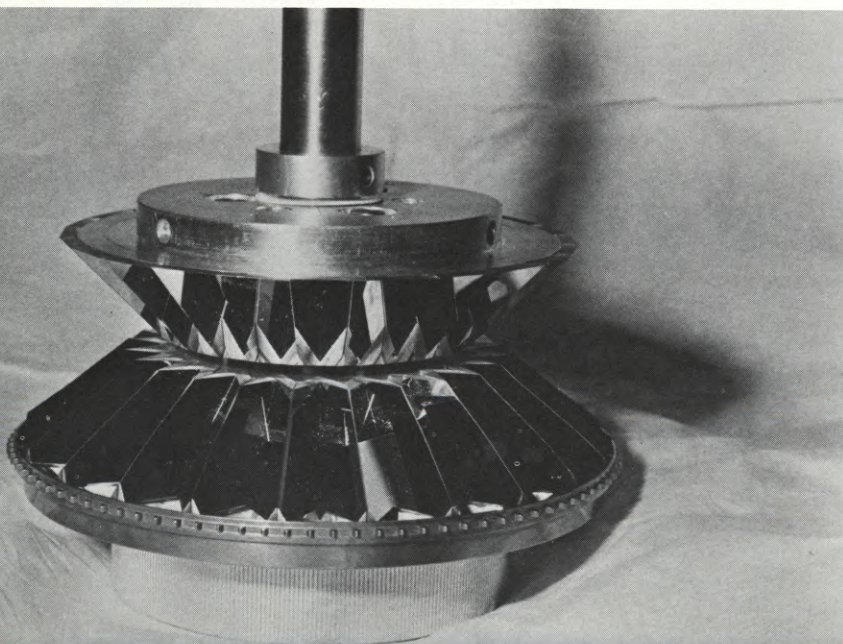
Attempts with continuous film projection using high-intensity strobed light with short duration have been made, but without success, which really leaves only optical immobilization systems as alternate means. Those divide into two categories: the refractive ones where the displacement is achieved by bending the light rays, or the reflective ones, using mirrors. None of the past optical systems however, have come close enough in performance to replace the intermittent movement. But even supposing an optical system could be made to be perfect or equivalent to the intermittent movement system, its commercial future would still be in doubt unless it met certain other requirements, such as manufacturability. And there are cost considerations, which means, the first requirement for an alternate design must be that the optical system can be mass-produced, and even then it is only acceptable if the component

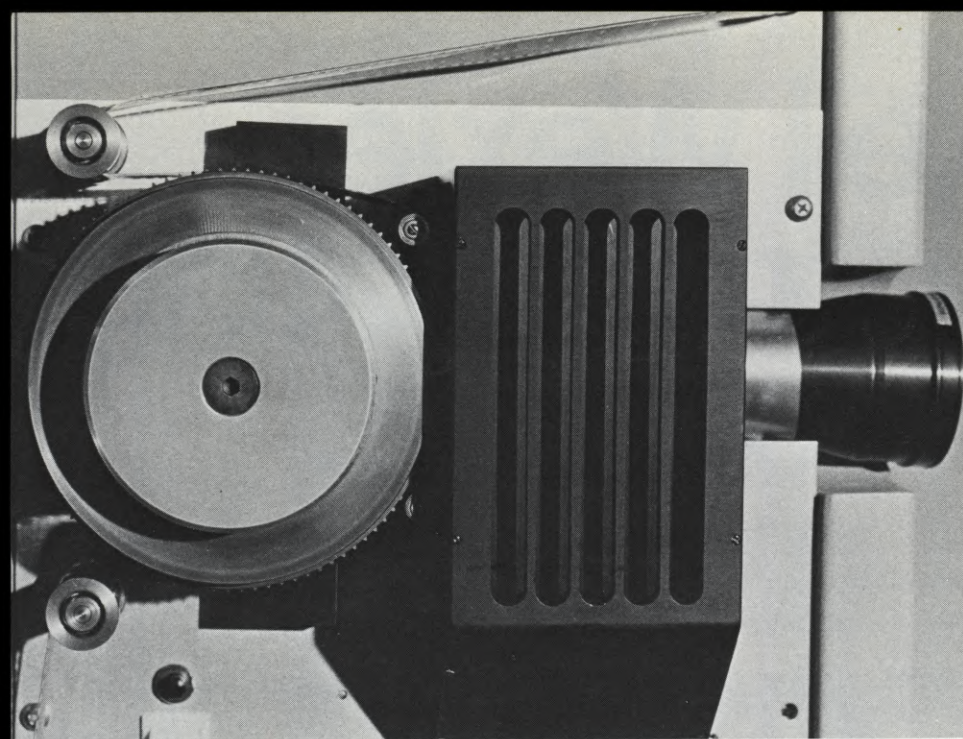
price is competitive to the intermittent system. Furthermore, it is necessary that all labor involved in the assembly and adjustment of the optical parts be as simple as possible and not require optical experts, as has been the case in all optical systems until now. Equipment maintenance should be so simple that it can be performed at any typical projector repair shop.

Just as important is the requirement that the performance of the optical system be equal to or better than the intermittent movement system. Can refractive systems offer an alternative? The answer is clearly "no", because all refractive systems introduce several aberrations that change dynamically with the scan angle and are subsequently impossible to remove entirely. Therefore, it appears advantageous to pursue reflective systems which intrinsically have absolutely no aberrations. But before we discuss the latter, let us dwell for a moment on the refractive method.

The most successful refractive system is certainly the conventional multifaceted glass polygon found in editing viewers. Here, the advantage of variable speeds and the absence of noise, coupled with moderate cost, offset the inherent disadvantage of flicker and poor image quality. Here I am referring to a simple 4- or 6-sided polygon. If the number of facets is increased, the image quality is proportionately increased but at the same time, the light efficiency and image size will decrease proportionately, due to the resulting longer back-focus. For instance, our first optical system was a hollow polygon (thus the company name "Hologon"), which was designed specifically for the rear projection viewer of an editing table. With 24 facets, the required back focus resulted in a light efficiency of approx. f/8. Nevertheless, for this particular application, the image quality was sufficient. One specially pleasing effect was the flicker-free transition between images, a concept pioneered by the late Dr. John Kudar whose patents are owned by Hologon. This was achieved by illuminating more than two film frames simultaneously which, on the other hand, created a problem of ghost images which are adjacent to the primary image, and elimination is possible only by the use of an addi-

The Hologon Skanner, heart of a radically new projection system, which can have various mirror arrangements—such as: 60° roofs on one scanner half, 90° roofs on the other; plane mirrors on both scanner halves; or, as in the preferred embodiment, a combination of plane mirrors on one scanner half and 90° roof mirrors on the other.





The Hollogon Skanner incorporated into an optical plate which houses all necessary optical components: the Hollogon Reflective Skanner to the left, the light box with two fixed cold mirrors to the right, and a projection lens. Information on the scanner is available from Hollogon Optical Systems, Corp., New York, N.Y.

tional relay lens which further decreases the light efficiency.

My reasoning at that time was that if the flicker-free lap dissolve concept could be translated into a simple reflective system, we would have the ideal image immobilizer. This development led to our present reflective Hollogon scanner.

We looked at many reflective designs of the past but only a few of them had enjoyed limited production quantities, such as the German Mechau projector. Those systems used the folding and tilting mirror principles, and it is evident that the discontinuation was mainly due to mechanical failure, for it is impossible to maintain tight tolerances for an extended period of time when it is necessary to use cam followers, hinged mirrors, belts, gears and pulleys, etc. Other attempts have been made using curved mirrors or spirals, all of which introduced power and thereby other optical problems not present in flat mirrors. Simple mirror polygons have been used in the past, but the resultant dynamic keystoneing coupled with light modulation made those systems unacceptable.

Therefore, after having studied all refractive and reflective designs at hand, it became apparent that the simplest, cheapest and most reliable optical reflective system would be a multi-faceted reflective polygon. The optical path could be held shortest if only one reflection were necessary, and this would mean higher relative aper-

ture and larger image size. Optically, however, such a system could not meet all the requirements.

Therefore, in our first reflective polygon scanner we used two scanner halves facing each other at 90°, with plane mirrors on both scanner halves. This shape has several advantages. Besides causing immobilization, it gives a desired optical placement. Each scanner half automatically has a draft angle which is important for injection-molding. And this meets the first objective: manufacturability at low cost.

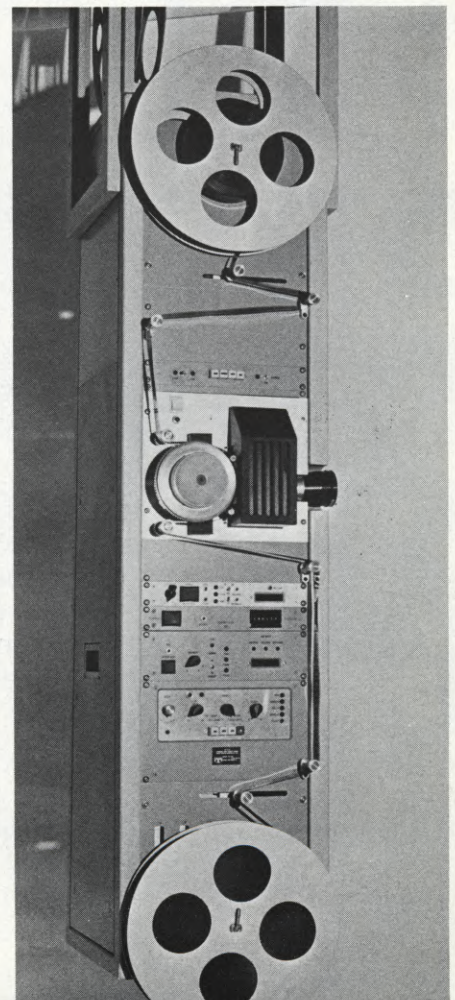
If refractive polygons are injection-molded, the heat penetrating the plastic will certainly cause thermal instability and affect the flatness of the facets and subsequently the image quality. In our reflective system, we are using hot and cold mirrors keeping out 90% of the heat; any remaining heat will be reflected off the scanner, along with the light rays, but will not penetrate the plastic substrate to affect its shape. And a final consideration for the shape of the Hollogon scanner is that of dust. If it were a regular polygon with the film parallel and close to the facets, any build-up of dust, wax or hairs would be in focus and, therefore, would be projected. The Hollogon scanner shape prevents this by having all of the mirror area out of focus. And if gradually extreme dust collects, the only effect will be some loss of light, but the resolution or the image quality will not be affected. The front surface mirrors have a protective coating which permits clean-

ing when required. So much for the hardware.

What does the scanner do optically? In order to achieve optical immobilization of the projected image, it is necessary to force the optical axis of the projection lens to always pass through the center of the frame that is being projected. Visualize the optical axis of the projection lens to be projected back into the system, reflecting off a mirror facet of the first polygon half and being reflected at 90° from its original direction. It intercepts the opposing facet on the second polygon and undergoes a second 90° reflection. The optical axis is, therefore, bent into a U-shaped geometry. After making the second reflection, the optical axis passes through the center of the frame on the film.

The preceding description was for the system at rest and not rotating and looking at a single frame with the mirror facet normal or perpendicular to the optical axis. Now, as the two polygon halves and the film are rotated in unison as an integral assembly, the optical axis reflecting off the first mirror facet is caused to rotate slowly in space. This rotation is enhanced by the second
Continued on Page 1094

The optical plate with components described, incorporated into an existing dubbing projector—in this case, MTM's model PH 35-S, with DC servo drive system.



Haskell Wexler talks about shooting with his 35BL.

Mr. Wexler has won two Academy Awards for his cinematography — this year, for shooting *Bound For Glory*. He owns an Arri 35BL.

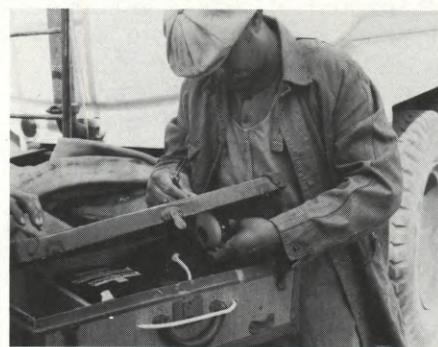


Haskell Wexler shooting *Bound For Glory* scene with 35BL. "For hand-holding," says Mr. Wexler, "This is the best balanced silent-running 35mm camera available."

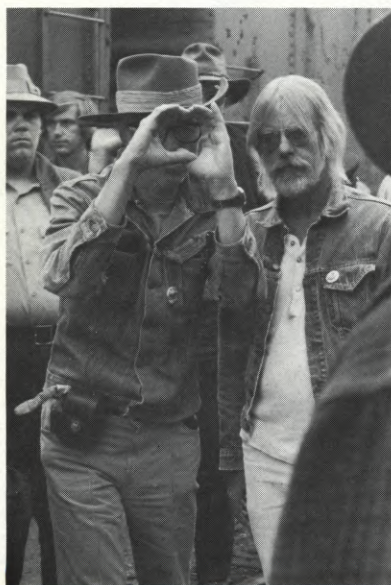
cut for the lens and eyepiece. The second operator dressed up like the extras, and he sat down among them with the case on his lap."

Sideways

"Even when they realized what was going on, they still acted more naturally, because he was sitting down and facing *this* way, with the suitcase pointing *that* way, off to one side."



Above: Operator, dressed as migrant worker, checks fit of hole cut in suitcase for 35BL viewfinder. Below: The 35BL being positioned inside the suitcase.



Wexler with *Bound For Glory* director Hal Ashby.

"**T**he extras were waiting around between setups, one day," says Haskell Wexler. "We were at Stockton, shooting *Bound For Glory*. The extras were dressed as migratory workers and their families."

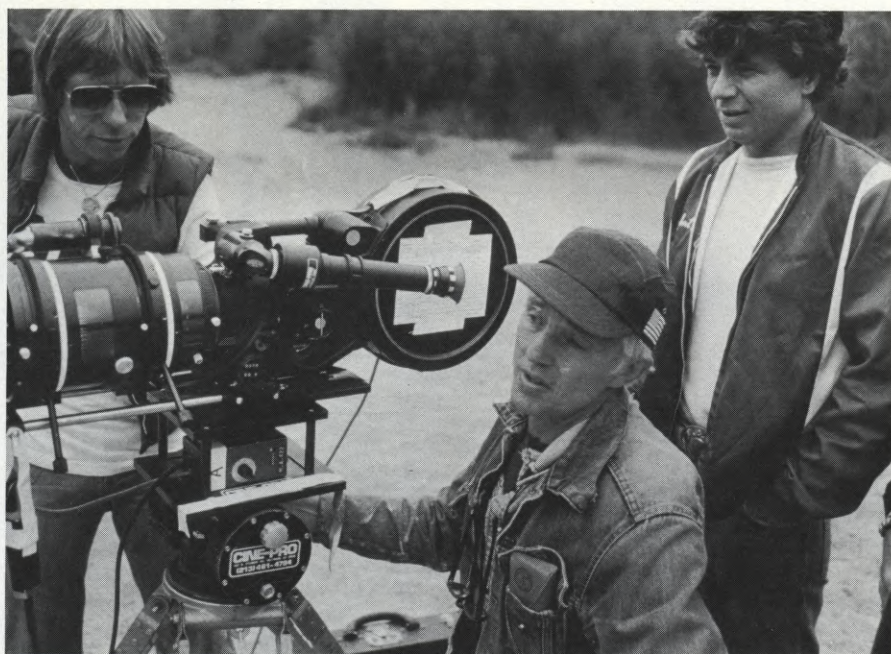
Natural

"They looked great — kids playing around — behaving naturally, because they *weren't* being photographed. So we set up secretly inside a tent, and picked things out with the long end of the zoom."

Suitcase

"Then we hid my 35BL in a cardboard suitcase, with holes





Working on STP commercial with actor Robert Blake. "I much prefer to light looking through a 35BL — the image is brighter and clearer," says Mr. Wexler. "Hand-held, with the short eyepiece, the 35BL lets you see the edges of the frame more easily than any other portable 35mm camera."



Wexler and 35BL in swimming pool, shooting sync sound scene for *One Flew Over The Cuckoo's Nest*. Note relatively simple plank and stepladder rig supporting small camera.



Shooting STP TV commercial, Wexler gives instructions to cameraman perched on sidecar chassis with 35BL. Raincoat is for puddles in dirt road.

CLIO

Mr. Wexler used a 35BL to shoot Robert Blake in the STP commercial that won a CLIO award this year. For the sync-sound footage, the camera was equipped with a 1,000 foot magazine and a 20-120mm zoom lens.

Motorcycle

But they also needed some closeup footage of Robert Blake's face as he gunned his motorcycle down a dirt road.

Unsteadicam

"There was no room for an insert car," says Mr. Wexler, "So we mounted a sidecar chassis on the bike—and the operator rode on that with the 35BL. 400 foot magazine and a 24mm hard lens."

Lightweight

"In the bad old days, we'd have needed a separate, lightweight wild camera for that shot. But the 35BL took care of it nicely?"

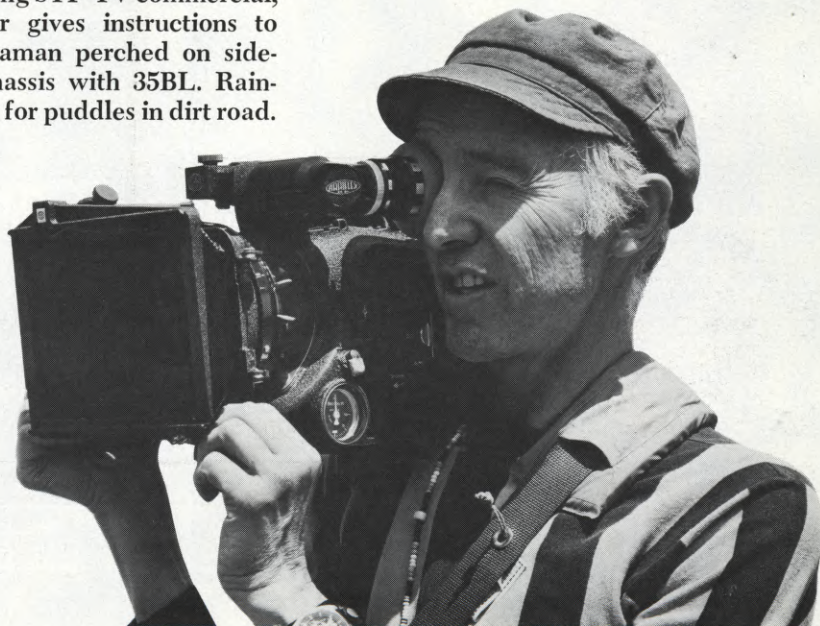
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Unobtrusive

"That's one big advantage of an unobtrusive camera like this. Even with professional actors, there's one less thing to distract them. I can often *ease* quietly into a scene — using the camera's internal slate system and my radio bloop, and waving a finger to indicate *Rolling*?"



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Form-fitting compartments—cells cannot shift or move regardless of Powerbelt position; minimizes undesirable flexing of belt wiring.

Heavy-duty zipper—Assures easy access to wiring and cell modules for on-the-spot internal inspection.

Powerpacks—all Powerbelt models also available in compact battery packs.

Heavy-duty wiring—with AMP friction-lock connectors. For extra protection against loose connections due to shock and vibration. AMP connectors are additionally soldered to cell tabs for increased security and reduced internal resistance.

Vacuum-formed seamless compartments—deep-molded, with rounded corners and uniform wall thickness to reduce stress on material.

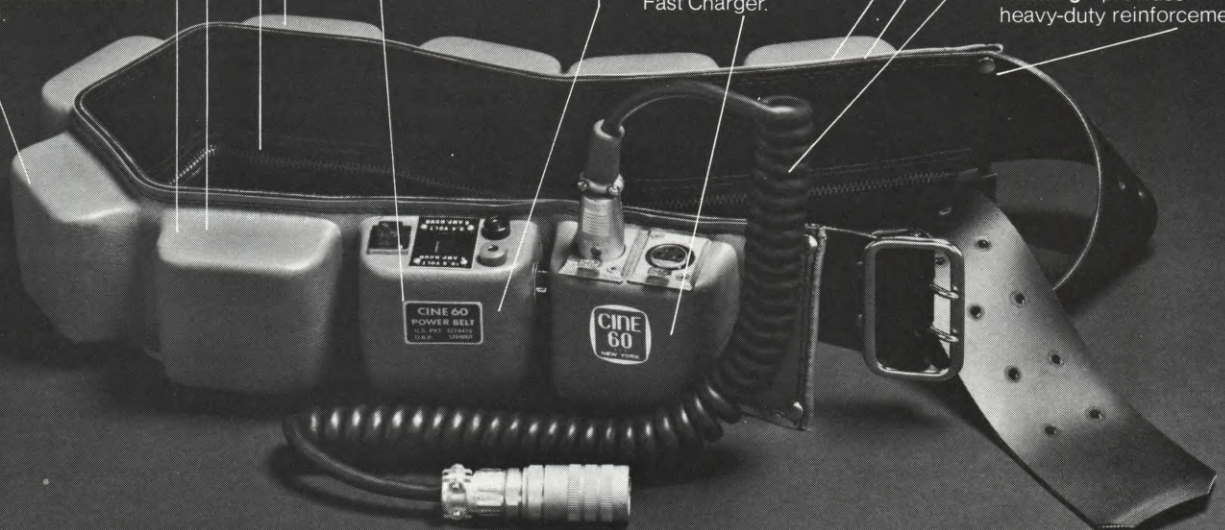
Built-in solid-state charger with indicator light and AC cable—provides overnight charging.

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Optional coiled power cord shown.

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If you want to beat this ridiculous inflation, you'll keep your present camera running longer and avoid the high cost of a new purchase. F&B/Ceco wants to help you fight these high costs. That's why we're offering a complete repair and service program.

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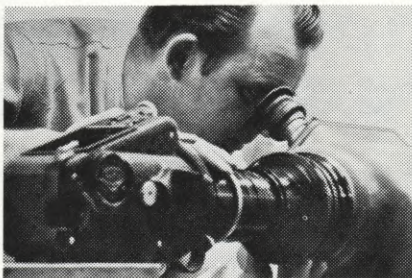
PREVENTIVE MAINTENANCE

- Check, clean and lubricate camera.
- Measure flange focal distance.
- Check ground glass depth.
- Check optical system.
- Inspect rollers.
- Clean film gate.
- Check lenses on collimator.
- Check motors for speed.
- Test batteries and cables.
- Test sync generator and cable.
- Clean and inspect magazine.
- Lubricate magazine rollers.
- Set clutches.
- Check footage counters.
- PLUS — our recommendations for necessary repairs, adjustments or replacement of parts.

COMPLETE OVERHAUL

- Completely disassemble camera and inspect each part for wear or defect.
- Replace worn parts.
- Clean and lubricate totally.
- Reassemble camera to factory specifications.
- Adjust flange focal distance.
- Adjust ground glass

- depth.
- Adjust film gate.
- Set pressure plate.
- Align optical system.
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- Check sync generator.
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16mm CINEVOICE or CP16	75.00	200.00
16mm Eclair NPR	135.00	500.00
16mm Eclair ACL	135.00	500.00
35mm ARRI 11C	75.00	275.00
35mm ARRI BL	200.00	950.00
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*Includes Camera Body, 1 Magazine and Lenses in Turret.

**Includes Camera Body Only.

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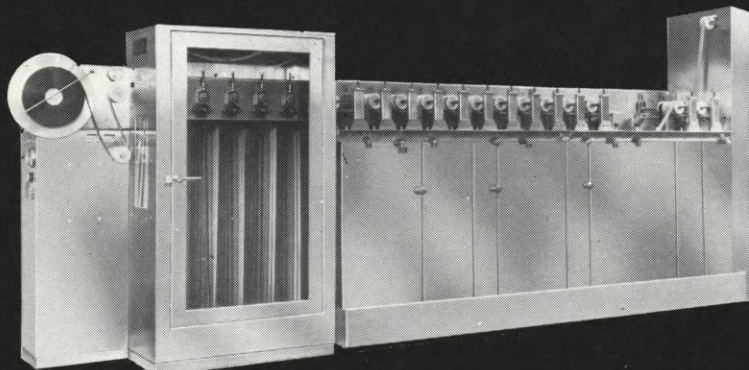
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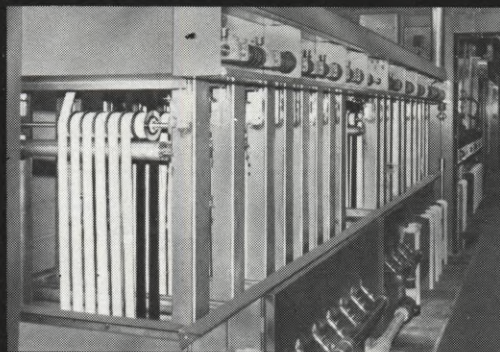
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Micro-Demand is a dynamically tension-controlled friction film transport system that operates effectively at minimum tension and with complete reliability. When used with Filmline Feather-Touch film spool "tires" it transports 35mm, 16mm and single strand 8mm film interchangeably and without adjustments even when these films are spliced back-to-back.

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SIGNIFICANT MICRO-DEMAND FEATURES:

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|----------------------|--|--|
| Versatility | Any speed, any process. | <input type="checkbox"/> Push-Button operation, and reliability allows operator to perform other functions while the machine is running! |
| Reliability | Rugged construction, quality materials and sound engineering. Always ready when you are! | <input type="checkbox"/> Automatic compensation for elongation and contraction of film during processing cycle. |
| Flexibility | Any format 35mm, 35/32mm (1-3), 35/32mm (1-4), 35mm 5R S8, 16mm — 70MM-105MM etc. | <input type="checkbox"/> Virtually eliminates all film breakage, scratches and static marks. |
| Dependability | Can stand the gaff of long, continuous, top speed runs with "Zero-down-time." | <input type="checkbox"/> All film spools use standard bearings or bushings. |
| Credibility | Ask the labs who own them. Most of them own not one but several. | <input type="checkbox"/> Entire upper film shaft/roller assemblies easily removed. No tools needed. |
| Maintenance | Exclusive Maintenance Monitor tells when and where the machine needs attention. Significant savings assured. | <input type="checkbox"/> Stainless steel construction used throughout. |
| Performance | Every Filmline machine is backed by a superb performance record compiled in over 25 years of continuous service to the industry. Twenty five years in the forefront of processing machine design and innovation. | <input type="checkbox"/> Proper operation can be determined at a glance, while machine is running. |
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UPFITTING THE FILMOBILE

Continued from Page 1047

cable operates at full capacity, so that minimum voltage drop and, therefore, maximum light output and color quality are maintained. The Filmobile tie-in powers three of these 8kw loops for a total of 24kw without supplemental equipment. Off highway, the generator and the same tie-in cables power 6kw of fill as far as 100m (328 feet) from the Filmobile.

The basic complement of luminaires evolved with the greatest care. Naturally, we desired the most efficient equipment made, while carefully observing limitations in weight and number; at least one of a broader variety of luminaires balanced with multiples of standard choices. For example, one FAY 6-light, one 750w baby softlight, one inky, one Lowel softlight, one fluorescent softlight, one reflector, but two 2kw FAY Mole Mighties, four broads, two 650w Colortran multies, four Lowel plates, two Sun-Guns, eight Lowel D's, and two 2kw Mole Baby Juniors for a total of 30 units, none weighing more than 15 pounds complete with barndoors and scrims, nor drawing more than 2kw from one circuit. This complement provides sufficient quality and quantity of light for many of our productions without rental supplements. Naturally, occasional large setups, multiple setups, or entire productions have higher demands which we satisfy by either rental units or subcontracting a lighting truck, freeing the Filmobile for additional camera and sound requirements normally associated with the larger shows.

The Filmobile normally contains two recorders — a Nagra 4.2 and Nagra 4S stereo with 7-inch reel covers — and complete accessories. The microphone complement includes three AKG



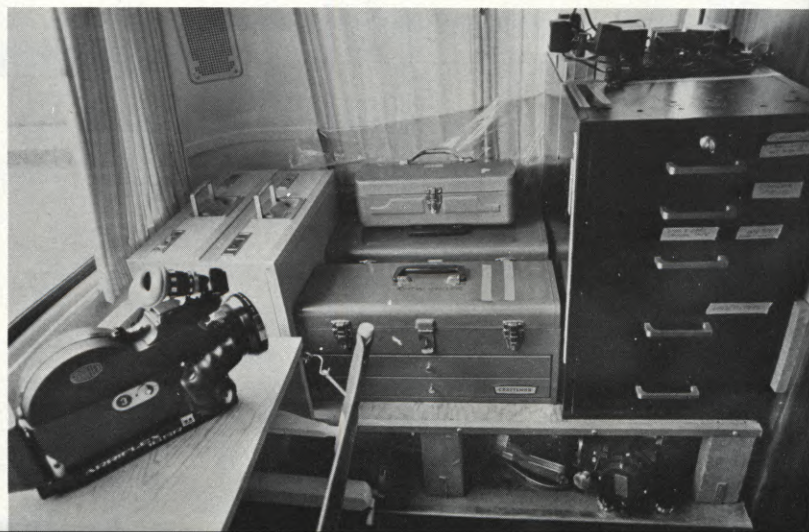
(LEFT) The tie-in apparatus is standardized on two cables and connector sizes, with the main cables looping through receptacle boxes, as shown. (RIGHT) Equipment chosen for the Filmobile is continually scrutinized for replacement on the basis of bulk/performance. The Arri 16SR is compact and highly personal, as well as being a super performer.

451 amplifiers with omni, cardioid, short shotgun, and long shotgun heads; Electro-Voice 635 (two) and RE15; and AKG electret lavaliers for a total of eight microphones. A wireless link, demagnetizer, alignment tape, 4-input mixer, Cody radio slate, and hundreds of adaptors, lines, and patch cords provide nearly everything our soundman generally needs for either 16mm or 35mm production. The Filmobile's complete tool cabinet, cordless soldering pencil, spare cables and connectors, and meter permit all but extensive field maintenance. Storage space is provided within the soundman's allocated space for 20 rolls of tape, in addition to all equipment within easy reach.

The motorhome is equipped with bath and kitchen facilities including

refrigerator/freezer, gas stove, dual sinks, pantry, wash basin, recirculating toilet, and shower. Forty gallons of fresh water, room for 32 gallons of waste, and 19 gallons of liquid propane are on board. These supplies are about one week's needs for all but the coldest weather or largest, hungriest crew. Other support facilities include a typewriter, and file cabinet with stationery, forms, equipment manuals, technical references, maps, parts catalogues, filter swatch books, etc. On top of the office file cabinet is a large ring binder with standard operating procedures for all production departments. Included are schematic diagrams, performance specifications, and procedures designed for both the seasoned technician and novice crew member to

(LEFT) One drawer in the camera department includes color correction and special effects filters, adaptors, lenses and a Beaulieu "grab" camera. (RIGHT) This half of the well-equipped camera department includes three cameras, tool cabinets, accessories cabinet with battery charging area on top, and tripods and heads below. The Filmobile has proved to be highly cost-effective for widely separated location production.



either brush up or avoid re-inventing the wheel, with new entries welcome.

There are several communications systems, including mobile telephone, PA systems (both permanently mounted outside the truck and portable), citizens band radios, including three walkie-talkies, and a wireless intercom which automatically links the location with the truck via the truck electrical tie-in or generator cable, whichever is being used.

Depending on the production, the camera department may consist of 16mm, 35mm, or even electronic apparatus. Normally, the Filmobile is equipped with 16mm equipment, including an Arri 16SR and Arri S/B, Zeiss Vario Sonnar zoom lens, and a matched set of prime lenses from 5.9mm to 300mm, including T/1.3 super-speeds. The camera "shop" includes a workbench, precision tools, mounting hardware, matte box, adaptors, precision test chart of our own design, color chip chart, five magazines, changing bags, and some 60 Series 9 filters. An Arri body brace, Miller F fluid head, and O'Connor 50C fluid head with ball levelling and various size legs and high hats complete the normal complement. For 35mm productions which are not to be enlarged from 16mm, 35mm equipment is rented and substituted in ample space provided.

Unlike the studio (or my house for that matter) where accessories large and small and other junk can accumulate nearly ad infinitum without the need of occasionally weeding out until one moves, the Filmobile with its limited space requires constant re-evaluating of the priorities of its contents. Only the lightest and most productive accessories stand the scrutiny which occurs with every new arrival. Lowel Tota hardware, stands, and the venerable Lowel D are perhaps the only lighting and grip equipment which have survived the on-going turnover to the lighter, brighter, and smoother. In addition, there seems to be boundless growth in the artistic needs of the filmmakers the Filmobile was designed to serve, so the load increases with added gel, century equipment, fresnel luminaires, hardware, tools, lenses, filters, camera accessories, equalizers, leaded vinyl (for controlling sound transmission), and people. On the road, the technician's dream of having everything he will need translates into hardware, clamps, tools, fluorescent flashlights, Polaroid camera, clamps, tools, shovel, lumber, clamps, paint, all manner of tape, dulling spray, clamps, fuses, spare power connectors, clamps, gin, dry gas,



(ABOVE LEFT) Outside the Westinghouse headquarters in Pittsburgh, the crew of the Filmobile prepares for a shot from its deck. (RIGHT) The Arri 16SR is mounted on an O'Connor 50C fluid head with claw ball for a tilt shot. (BELOW LEFT) The Filmobile's generator is started and a heavy angle bracket drilled to accept 3/8th-inch hardware and bent to a 45° angle. (RIGHT) The shot, tilting up to about 80 degrees, is made in a total set-up time of about 15 minutes.

clamps, clothes pins, and clamps. Seemingly trivial (and spacetaiking even here) items soon increase either in value or hassle on the Filmobile, as we and others who have attempted such a facility quickly find.

Attitudes and methods begin to change in time with new opportunities which the Filmobile accommodates. Energies once spent inventorying and packing are available for the creative

effort. There is time for more carefully assessing the situation, for more careful lighting, for more careful sound. And since there need be no repacking (there are few cases on board, as the entire vehicle is a compartmentalized "case"), wraps are faster and leisure time comes sooner. What a joy to leave the studio just a few minutes after arriving . . . with equipment, film, tape, logs, **Continued on Page 1100**

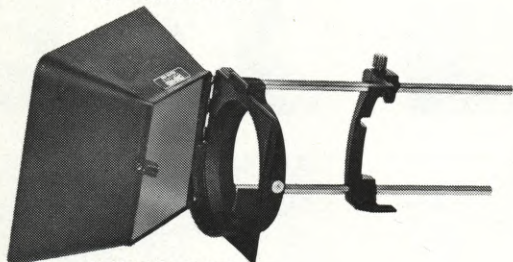
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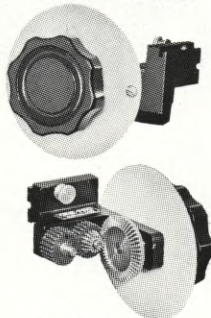
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CINE-PRO
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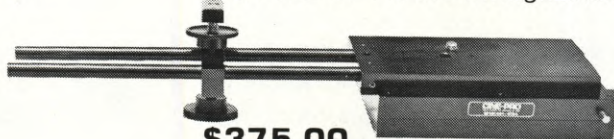
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CINE-PRO Barney
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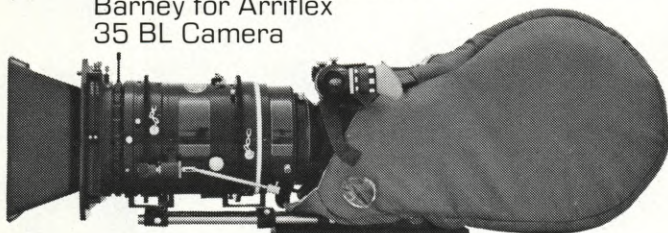
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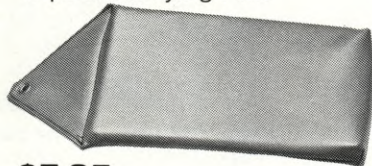
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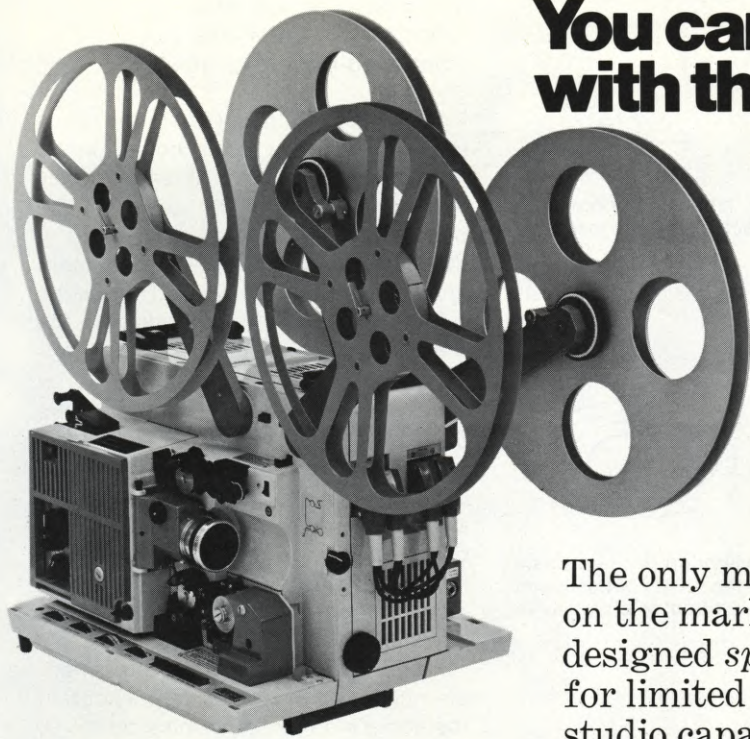
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Sound studio mix time can run as high as \$280.00 an hour. A good interlock projector can shorten the time you spend there, and save you from some unpleasant surprises.

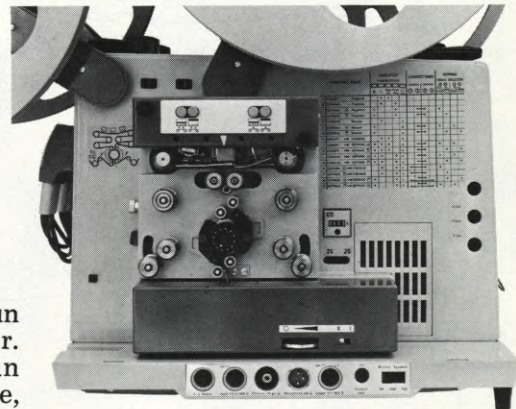
The Sonorex can save you from going there at all! Some people transfer sync effects from 1/4 inch, record narration directly onto 16 mag, make the final mix and dub it onto the release print's mag stripe — all on the Sonorex.

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Its magnetic recorder side uses a closed-loop threading path, bearing-mounted loop compensators, two massive flywheels, and stabilization rollers.

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Sonorex magnetic tape deck side. Diagram at upper right shows nine-teen possible functions or modes.

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**THE "ISOLUX"—A NEW
CONCEPT IN LIGHTING**
Continued from Page 1041

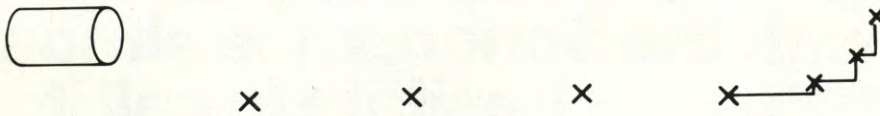


FIGURE 4—A line of constant illumination (or "Isolux") is plotted by taking meter readings for a predetermined light level (100 footcandles, for example) and placing multiple marks on the floor where that level is reached.

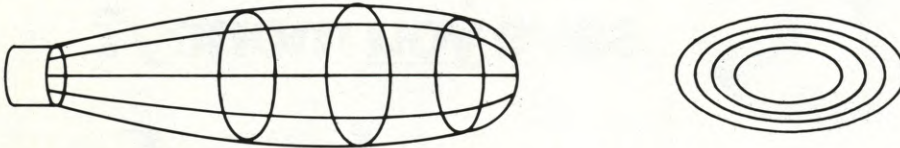


FIGURE 5—In the same way that there are infinite numbers of illumination lines across a horizontal plane, there is also an infinite number of lines axially from the center of the beam, making an actual circle at each point. This "blimp" pattern can be fitted or changed to accommodate the subject.

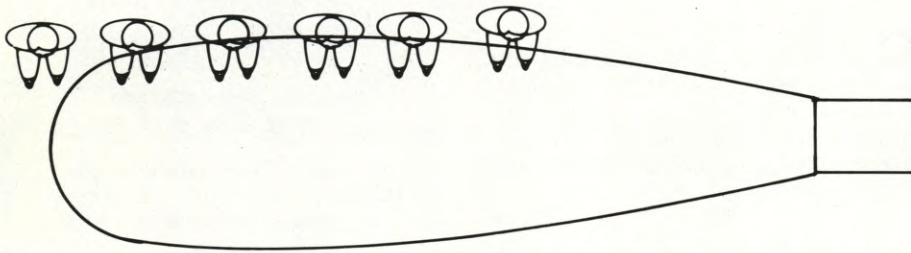
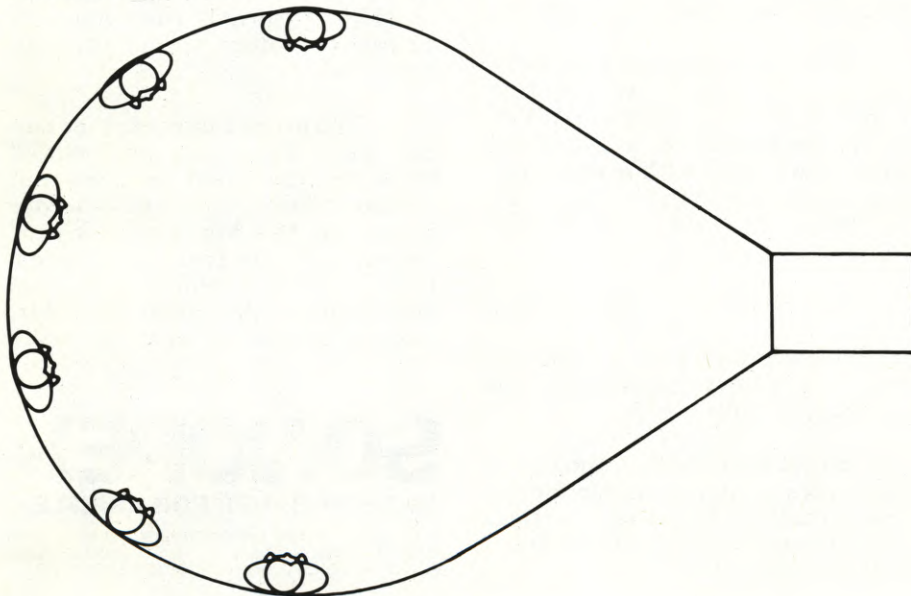


FIGURE 6—Isoluxes can be used in many lighting situations, but they are utilized more efficiently when the subject distances vary to a large degree, such as for illuminating people sitting in a long row.

FIGURE 7—By flooding the beam, the Isolux works equally well for illuminating a group of people sitting in a fairly wide circle.



highest value of light. If the meter reads more than 100 foot-candles, move away from the light until it reads exactly 100 foot-candles at the center of the beam. This will be the center point of the 100 foot-candle line and a mark should be put on the floor. This will be point A. (See FIGURE 4.) Now move the meter to one side of this point horizontally and the meter will drop in value. Move in toward the light until the meter again reads 100 foot-candles and this will be point B. (FIGURE 4.) Put another mark on the floor. The next step will be to move the meter farther off axis from the center beam and the meter will drop again in value — so move in toward the light until the meter again reads 100 foot-candles and this will be point C, and put a third mark directly under the meter on the floor. In the same manner, determine points D, E, F and G, as illustrated in FIGURE 4. Now you have enough points to draw a line of constant illumination, or an Isolux line.

With the lamp in the flood position, the same determination can be made and an Isolux can be made for this lamp in the flood position. (FIGURE 2A.) This line need be determined on one side only, as the lamp is symmetrical and the line will be exactly the same on the other side.

With the lamps which have the long double-ended globe, the shape of the Isolux in the horizontal direction will be different from that in the vertical direction, and rather than having circles at the various points as mentioned before, there would be ellipses: broader than they are tall, or vice versa. For complete understanding of these lamps and how they should be used, the Isoluxes could be determined on both axes. That is, one could be found with the globe in the horizontal position and then one found with the globe in the vertical position by turning the lamp until the globe is in the vertical position.

Now you could walk along this Isolux with a meter pointing at the light and the meter would not vary from the far point (20 feet) to the near point, which might be four to six feet from the light. It is also possible for a person to walk along this line and, if he were shot and exposed properly, he would be equally exposed along the entire walk. I have done this with a large light, a 2000-watt Mighty Mole, and had the man start at a distance of 43 feet and walk to a distance of 13 feet from the camera and not have the exposure

change at all noticeably.

This is not easy to do (if it can be done at all) with one light, unless the Isolux principle is used.

On describing this concept to one man who worked at Lockheed Aircraft as a cameraman, I was told that I had just solved a problem he had been working on and he rushed off to see whether it would work. He had the assignment of shooting the interior of a long airplane but he could not find places to put his lights without their being in the picture. Later he told me that he used a 2000-Watt Mighty Mole, put it in the extreme spot position, pointed it at the far end of the fuselage and the light fell into place beautifully. In measuring the light, he found that it did not vary more than 10% after a slight adjustment of the lamp, a tolerance that any picture can afford.

In the same way that there are infinite numbers of these lines across a horizontal plane, there are also an infinite number of lines axially from the center of the beam making an actual circle at each point. That is (FIGURE 5), these lines form a surface which can also be used when and where it is convenient. Wherever there is a line, there is a surface which is similar to a blimp (a Goodyear Blimp, not a sound enclosure for a camera) which can be fitted, or changed to accommodate your subject, the way the cameraman changed the shape of the light to fit the long fuselage. There are, of course, times when this concept of light cannot be used, but understanding it can certainly broaden our ability to solve some of your more difficult problems. One can use a balloon as a model to better understand and visualize this theory and either change the shape of the "balloon" of light that you use or change the subject to fit the "balloon."

The uses of the Isoluxes can be many and varied, but they can always be better utilized when the subject distances vary to a large degree; for example, people walking toward or away from the camera (FIGURE 8), people sitting in a long row (FIGURE 6), or in an auditorium. Here a number of lamps can be used to completely cover the hall from side to side and rear to front (FIGURE 9).

I am sure that I am not the first or only one to have used this concept or discovered its feasibility in handling these types of lights. But I have never seen any information on it nor do I know of anyone who has spoken of it. This does not mean, of course, that there has not been any information or discussion of it. But, to me, this is such
Continued on Page 1099

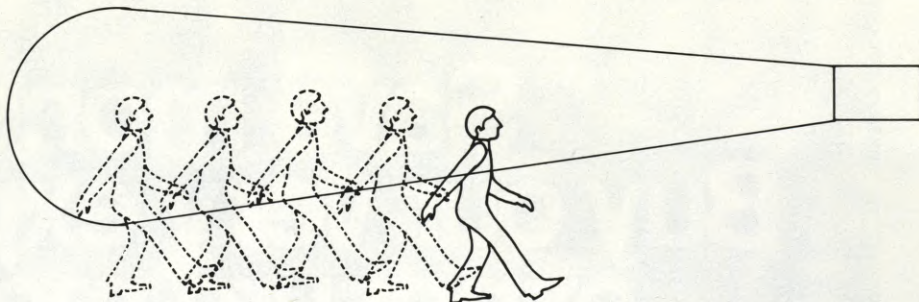


FIGURE 8—When properly plotted, the Isolux provides a surprisingly even level of illumination for someone walking toward or away from the camera.

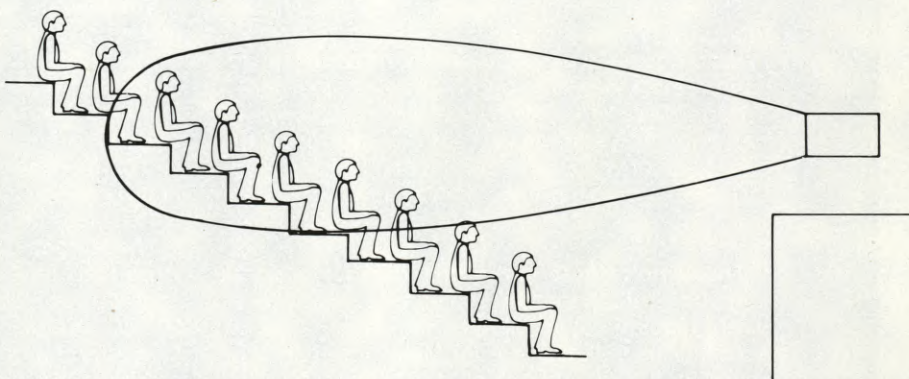
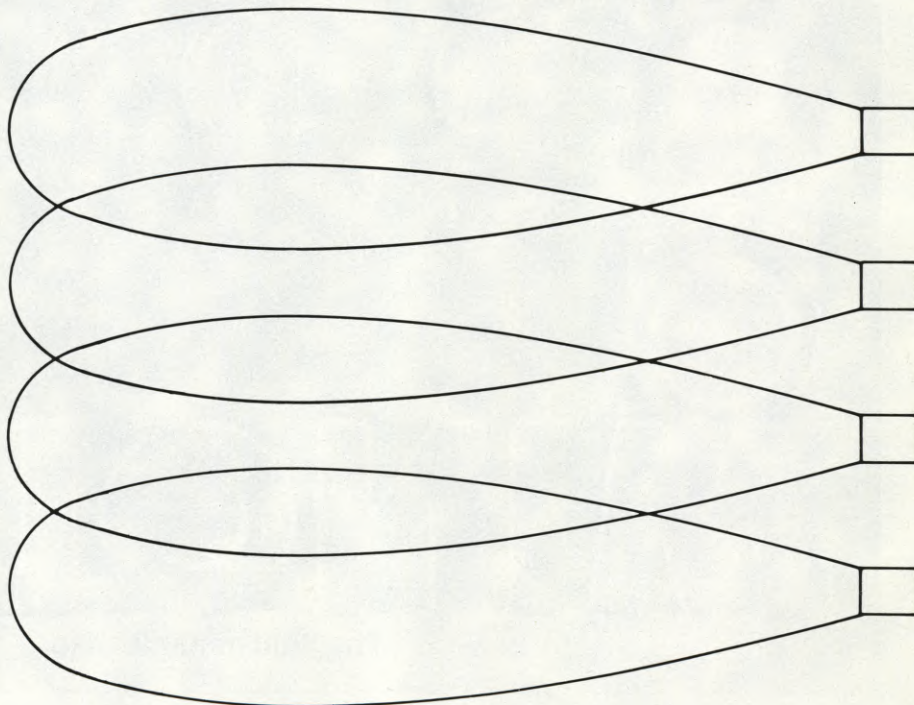


FIGURE 9—To illuminate a crowd of people seated in an auditorium, a number of lamps can be used to completely cover the hall from side to side and rear to front.

FIGURE 9A—Top view showing how a number of lamps would be placed with beam edges overlapping to illuminate a large crowd of people seated in an auditorium.



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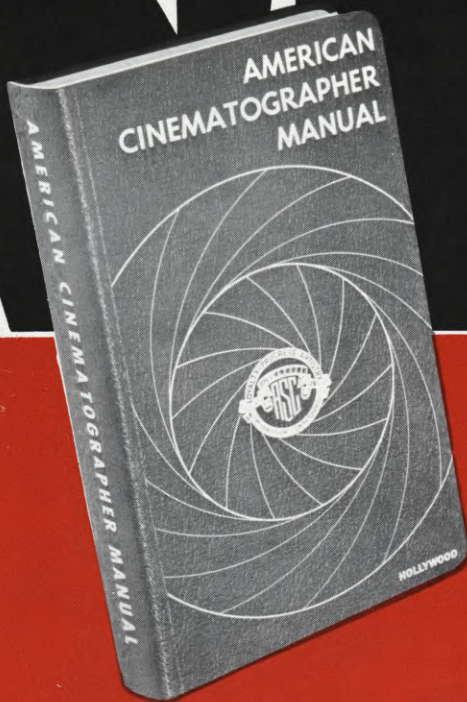
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CHASING WHALES FOR "ORCA" Continued from Page 1081

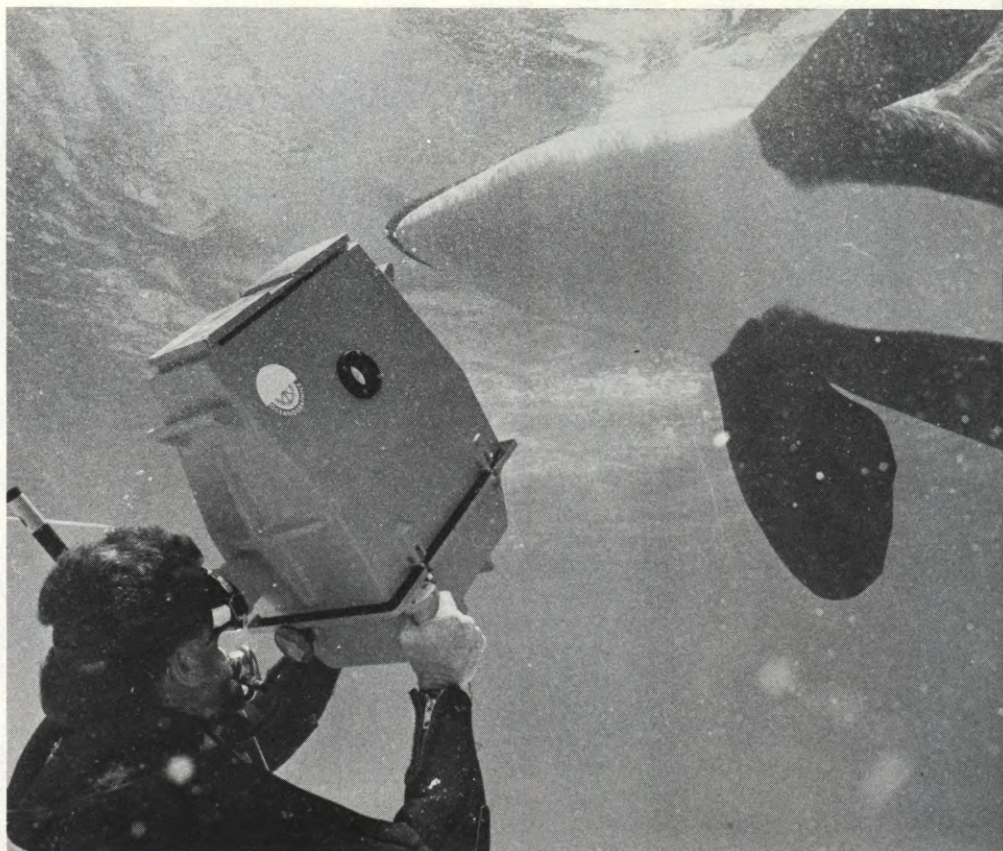
to-left direction. I would call Roger and ask him how he was doing. In a gurgling voice he would tell me that the water was up to his chin. (Art Schwab didn't volunteer for this job.) The water was cold, but Roger had his survival suit on and we could manage to get two or three takes before we would have to bring the miniature back and work like hell to pump it out.

After shooting on the first day, we had to rig the miniature off the side of the 65-footer with ropes from the boom arm, so that it would not sink during the night. We strung cables around the bottom and managed to get it above the water line, but it was still taking on water. Every three hours we had to pump the water out of it.

On Day Two we launched before daybreak and managed to get a shot of the miniature boat and the fin on the screen together. We were able to shoot two 400-foot rolls before we ran out of light. As we were making our way back to the bay where we would spend the night, we hit a submerged piece of ice that knocked out the starboard prop and bent the port prop. We made anchor that night and discovered that the radio on the boat was not working. The weather was also getting worse. The winds that night got up to 70 miles an hour and we did roll a bit, but the cove we were in gave us some protection.

The next morning we discovered that a fishing boat had come into the cove to ride out the winds with us. It had a radio and we decided that, with the weather forecast getting more ominous, we should try to make the trip back together. Since the winds had died down some, we felt that we should leave for home right away. The seas on the way back were running from 16 to 20 feet and we were on one motor. My good friend Art Schwab informed me that I had done it again, and he and Ken Jones disappeared below decks and did not want to be disturbed until we had either sunk or arrived in Seward. The trip back to Anchorage was another story in itself. However, we did get the miniature to a shipper and on its way back to sunny California. Believe it or not, before I completed shooting we put the miniature BUMPO back into commission and did some more shooting with it in local waters. It really haunted me.

After completing the BUMPO epic, we were requested to pick up some additional shots of the whale under the ice. So — back to the Alaskan lake, but



Cinematographer Herron shooting killer whale underwater in the tank of Marine World/Africa U.S.A. where all of the live whale footage was filmed, including the scenes needed by special effects expert Frank Van Der Veer in order to make blue screen composites. For one such scene, a 35-foot scaffold was erected to run 150 along the tank, with a solid black drop draped behind it.

this time, at least, we did know how we were going to shoot it.

On my return from Alaska, I made a hurried trip to London where the film was being edited and we viewed the first two-hour rough cut. Dino De Laurentiis, Luciano Vincenzoni, Michael Anderson, editor Ralph Winters and special effects master Frank Van Der Veer were in attendance. It was decided that we needed specifics on the live whale and they needed some extra shots for special effects. One of the major blue screen composites that Frank had to come up with was one showing the real whale jumping out of the water in front of the burning village of Petty Harbor. Back at Marine World/Africa U.S.A. we had a 35-foot scaffold erected, running 150 feet from the tank. We then draped it with a solid black drop and put four arcs on top of the scaffolding. The problem we had with the shooting was that the whale jumped about three feet from the background and we had to set our lamps so that no light spilled over onto the background, since Frank needed pure black behind the whale. We filmed the whale jumps to scale and managed to get the shots Frank needed in order to go to work. The outcome of Van Der Veer's efforts was a super work of art. In the scene, the town is burning and out of

the water comes this big whale jumping high. It was really quite a piece of work.

A major problem I had in acquiring the footage of the live whales resulted from the fact that our main whale character, "Nik Fin", was a male with a straight six-to-eight-foot dorsal fin, whereas all the whales I had available to work with were smaller and either female or with bent-over fins. However, by carefully watching out for this problem, I managed to avoid it most of the time.

The climax of the shoot came when Dino wanted the whale to swim off under the ice with a beautiful background of underwater iceberg behind him. After contacting underwater ice expert Dr. Joe MacGuinness of Toronto, Ontario, it was determined by his team of experts that we could possibly shoot what we were looking for out of Resolute Bay, in the Arctic 700 miles from the North Pole. My crew for this job (the long-suffering Schwab was, unfortunately, committed to some studio job) included: Canadian operator from Toronto and ice expert Rick Mason, diver Dave Gallagher, and assistant Ken Jones.

After arrival at Resolute Bay, we arranged for a survey trip of the area to

Continued on Page 1084

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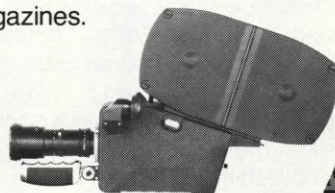
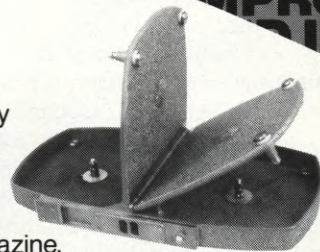
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20th ANNUAL MPL/SMPTE SEMINAR DRAWS 560 FILMMAKERS TO MEMPHIS

Film technicians from far-flung areas converge for three-day seminar featuring noted guests speaking on subjects of outstanding interest

By LYNN BIGBEE

The 20th annual MPL Seminar, sponsored by the Nashville Section of SMPTE (Society of Motion Picture and Television Engineers), Motion Picture Laboratories, Inc., and Memphis State University, was held in Memphis July 29-31 and drew 560 filmmakers from 29 states, the District of Columbia, Puerto Rico and Canada. Begun twenty years ago as the July meeting for the Nashville SMPTE Section, the Seminar has grown into one of the largest film meetings in the country, drawing a wide selection of exhibitors. "STAR WARS" special effects expert John Dykstra and animator Chuck Jones were among the speakers on Saturday, July 30, with July 29 and 31 devoted to equipment papers, clinics and workshops sponsored by the MPL Equipment Division.

"WHERE BUT IN THE SMPTE?"

The first speaker was Bill Hedden, Calvin Communications, Inc., and SMPTE National President. Taking as his subject, "Where But in the SMPTE," Hedden discussed the new technology in film and television, with brief comments about the technical conference of the British Kinematograph, Sound and Television Society, "FILM 77", held in London in July and attended by film and television people from around the world.

Hedden invited the audience to the SMPTE annual technical conference to be held October 16-21 in Los Angeles. "We have held several conferences in recent years," he said, "which were dominated by television. This year, the leaders of SMPTE have asked the presidents of companies like Eastman Kodak, Agfa-Gaevent, 3M, Fuji and others committed to film to come to the conference and speak out for film."

Speaking on behalf of SMPTE and its contributions to the development of motion picture and television standards in this country, Hedden cited the

work being done by SMPTE to help establish one-inch helical standards among equipment manufacturers. "I am happy to report to you," he stated, "that right now it looks like standardization will be possible. And, where but in a non-profit organization like the SMPTE would it be possible for private companies to come together and agree on problems like these for the good of the whole industry?"

In conclusion, Mr. Hedden listed the four main objectives he set when he became SMPTE President in January 1977: (1) More and better technical papers; (2) More and better meetings; (3) More readable SMPTE Journal articles; and (4) Up-to-date responsive standards and a standards program.

THE FILMMAKER AND THE NEW COPYRIGHT LAW

Lewis Flacks, Special Assistant to the Register of Copyrights, presented an informal discussion of the new copyright law which goes into effect January 1, 1978.

According to present law, films released without copyright notice become public domain and may be copyrighted for an original term of 28 years with a renewal provision for an additional 28 years. Under the present law, deposit and registration of claims was part of one package and two prints of the film must be sent with the copyright forms. In most cases, the office examines the copies and returns them under the provision than any time within two years, they can recall one copy for permanent deposit in the Library of Congress. You can shorten this period by asking them to "exercise the right of recall." If they do not, they forfeit these rights. This provision could be carried over into the new law.

The new law to go into effect January 1, 1978: This law covers all works, for almost any tangible medium of expression and a motion picture, for

example, will receive copyright as soon as the film goes through the camera. Registering your claim with the copyright office is voluntary under the new law but there are strong incentives toward registration. For example, you may produce and print a film and have ownership under the new law with a copyright notice being attached or registering the film with the copyright office. But, if someone decides to use your film without your permission, if it has not been registered, it may be hard to prove authorship.

Under the new law, the length or term of the copyright will not be based on the date of publication but will run for the life of the author plus 50 years. For corporate work, the term of copyright will be 75 years from publication or 75 years from creation. The new law is not retroactive to apply to works copyrighted prior to January 1, 1978, but, under the new law, work copyrighted prior to this date will be renewable for 47 years.

Lewis Flacks urged the filmmakers to read the proposed new regulations as they appear in the Federal Register, to see how their rights may be affected and to ask their motion picture trade associations to speak out for the rights of filmmakers. Announcements about the new copyright regulations are available free from the US Copyright Office, Library of Congress, Washington, D.C. 20459.

"FILMMAKING SHOULD BE FUN"

Chuck Jones, animator and creator of Bugs Bunny, the Roadrunner and the Coyote and HOW THE GRINCH STOLE CHRISTMAS was an attention-getter, not so much as a technical speaker but as one who spoke with humor and certainly with the love of filmmaking.

"Do things because they are enjoyable," he told his audience. "If you start

Continued on Page 1096

(LEFT) A portion of the crowd of 560 filmmakers which gathered in Memphis to attend the 20th annual MPL Seminar, sponsored by the Nashville section of SMPTE, Motion Picture Laboratories, Inc., and Memphis State University. Those attending came from 29 states, the District of Columbia, Puerto Rico and Canada. (RIGHT) Among the guest speakers on the program were "STAR WARS" special effects supervisor John Dykstra (left) and famed animator (Bugs Bunny, the Roadrunner) Chuck Jones, shown here with MPL President and General Manager Frank McGeary.



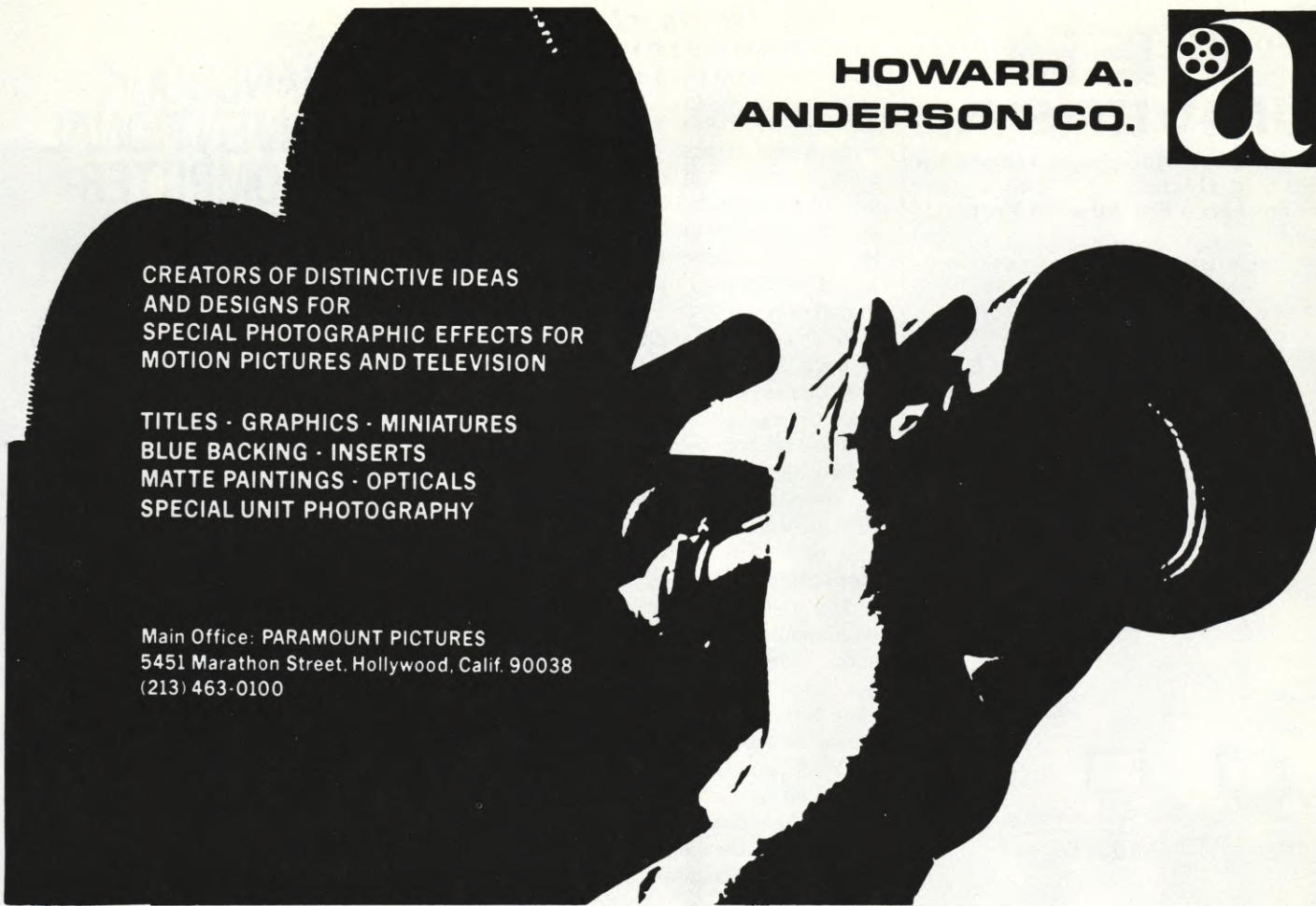
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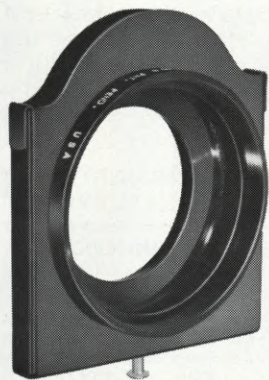
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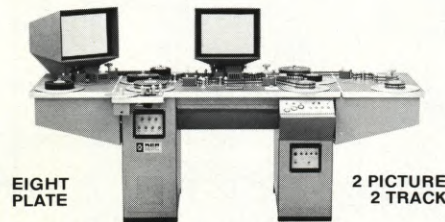
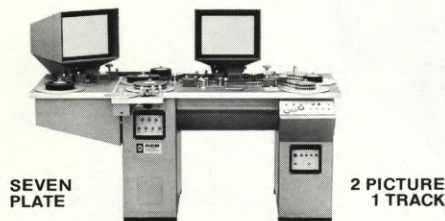
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GIVING A PERSONALITY TO AN ANIMATED DRAGON

Continued from Page 1033

quence, the film's young hero Pete rides a mechanical device simulating Elliot. A matte was made to cover any part of the device showing on the live-action frames. Mattes were also made to "blob" out parts of characters that would be covered by parts of the animated dragon.

Final animation included four levels of cells. Elliot was only on one level. The others were used for other animations; e.g., part of a cave was drawn, and a fire scene included some animated frames.

"We always used four levels of cells to make certain of consistent exposure and density even when only one of them contained drawings," Bluth says.

The drawings were copied onto animation cells by xerography with some additional inking done afterwards to enhance the illusion of dimension. Next, the cells were painted. The studio mixes over 600 distinctive tints for this purpose. Photography was done on a cartoon crane using a sodium light background.

It was Anderson's first experience with the new Eastman color negative II film 5247 stock on a feature involving generous portions of animation. "It is clear and sharp, and the color rendition is true," he says.

"PETE'S DRAGON" is also the first cartoon feature film made by Disney Studios without the assistance of any of the original nine animators trained by Walt. Though they were only in their 40s during the 1950s, Disney dubbed them the "nine old men," a label that stuck throughout the years.

The last of that cadre worked on "THE RESCUERS", Disney's 27th animated feature, which was four years in the making. Bluth was partially responsible for recruiting and training the new generation of Disney animators.

Where did we find them? "They found us," he says. "Their backgrounds and training are about as diverse as you can imagine. The only common denominator is that they wanted to create the unique kind of entertainment that has long been associated with Walt Disney. In an age and time where mediocrity is often considered a virtue, this is a very rewarding craft.


"I think we made a movie which stands a good chance of becoming a classic. In the process, I believe we made certain that the coming generations of children, young and old, will have Walt Disney films to grow up with."

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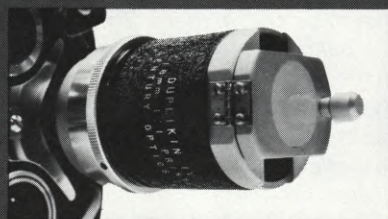
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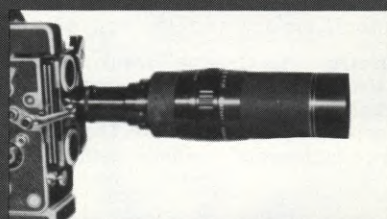
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THE FILMING OF "OCEAN" IN OMNIMAX

The filming of a picture that wraps the sea around the audience in a unique domed theater includes seduction by an amorous octopus and getting chased out of the water by a crowd of killer whales

When OMNIMAX premiered at San Diego's Reuben H. Fleet Space Theater four years ago, *NEWSWEEK* proclaimed it "the ultimate trip", and continued: "Last weekend, in San Diego, a brand new type of planetarium was opened — one that promises to take audience involvement to a new level. The effect is to give the 350 spectators . . . the illusion of being suspended in space. The illusion is enhanced by the use of a new type of projector, called the OMNIMAX, which can cover virtually the whole dome with a single image. The planetarium provides a breathless experience of space flight that affords viewers everything except a feeling of weightlessness."

Charles Champlin, writing in the *Los Angeles Times*, went into greater detail: "The Reuben H. Fleet Space Theater . . . is a trip to the future — not the past — and some trip.

"It is a planetarium plus, combining the most sophisticated star-depicting hardware of any planetarium anywhere with a mind-rocking avant-garde motion picture projection system.

"There are 350 seats in the Space Theater, steeply banked before the screen, and the screen is in fact a dome 76 feet in diameter that tilts toward the audience at an angle of 25 degrees (it seems to lean over you even more sharply than that). The side edges of the screen are well beyond the range of peripheral vision, and the top of the

Producer/director Graeme Ferguson (left) and crew enjoy a few chuckles while listening to playback of recording of diver communications during the filming of "OCEAN", spectacular undersea feature filmed specially for presentation in the domed Reuben H. Fleet Space Theater in San Diego, California. The huge, almost total-surround OMNIMAX format takes the audience underwater—without getting wet.

screen is actually behind you, visible without turning upward only if you have eyes in the back of your head.

"The theater wraps you in images more eye-bogglingly than any other I know of, including even Cinerama in its early three-strip days. Onto the screen . . . play not only the usual planetarium star-maker, but some 16 other projectors, including . . . most particularly, an incredible giant called OMNIMAX. OMNIMAX projects 180-degree images through its fish-eye lens, filling the screen taller and deeper than a man can see without turning.

"The scale of the images is awesome and . . . the system can give you an unmatched look at the world and at space. Space Theater is the biggest show in any town and you must see it because you've never seen the likes of it."

Since those glowing words were written, the Space Theater has presented a continually changing program of outstanding "trips" on film — most of them based upon excursions into outer space.

By way of contrast, the current presentation, titled simply "OCEAN", is a stunning visual probe of the "inner space" of the seas around us. Filmed in the giant OMNIMAX format by Imax Entertainment Limited, it was directed and produced by Graeme Ferguson, with surface cinematography by Ferguson and Averill Townsend and spec-

tacular underwater cinematography by Mal Wolfe.

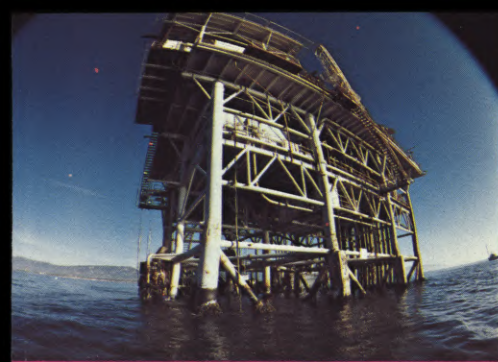
In what is the closest thing to diving without SCUBA gear (while remaining dry), the viewer is taken on an undersea excursion which includes exploration of the teeming marine life colony beneath an offshore oil drilling rig, a night swim through thousands of spawning squid, a barrel-rolling frolic with frisky sea lions and a close encounter with an amiable octopus who proceeds to drape himself over the audience — tentacles, suckers and all.

Hardly less fascinating than the subject matter itself are the details of how "OCEAN" was created. In the interview for *American Cinematographer* which follows, these details are discussed by producer/director/cinematographer Graeme Ferguson and camera equipment engineer William C. Shaw:

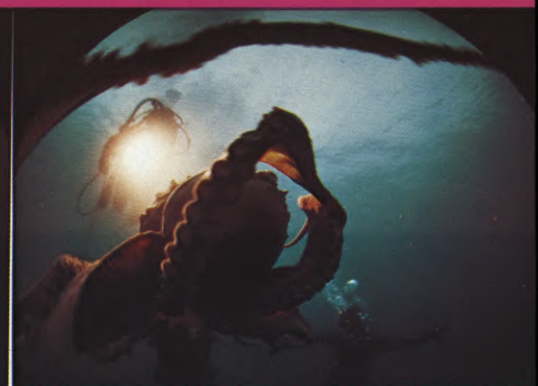
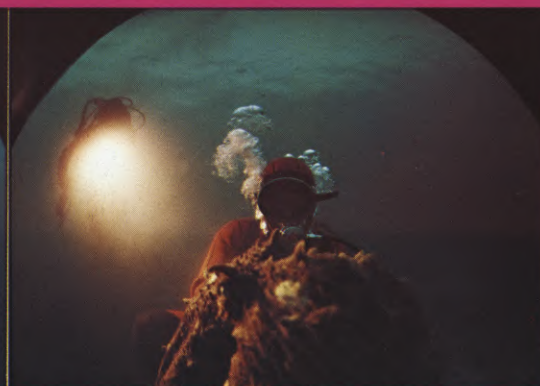
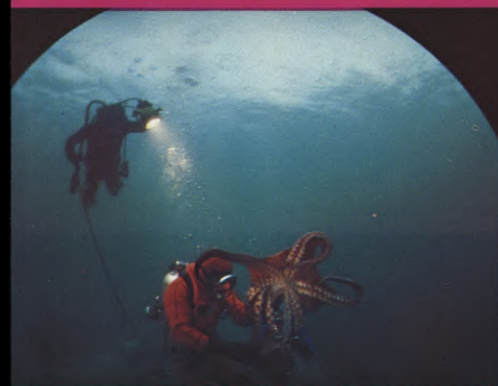
QUESTION: Before we get into the specific technicalities involved in the filming of "OCEAN", could you tell me a bit about how the project developed?

GRAEME FERGUSON: *The Reuben H. Fleet Space Theater in San Diego is one that we had participated in designing and for which we had supplied the equipment, but we had never before been involved in the production of a film to be shown there. It's a very unusual building, the only theater of its sort in the world, featuring a very high-fidelity picture projected onto a dome. I was really very pleased when they asked us to make a picture about the ocean to be presented there. The basic difficulty was that I didn't know how to dive, nor did Bill Shaw, so we had to start with that. In addition, we had to tackle certain problems of the OMNIMAX format that are specifically related to the domed screen. We had been familiar with dome projection for some years, not only in this theater, but at EXPO '70 in Japan and at the New York World's Fair, and we knew that it involved some unique problems. For example, one of the common characteristics of projecting movies onto domes is that whenever there is a large, light-colored area in the picture, it produces severe cross reflections which cut down on the contrast, the color saturation and the apparent sharp-*

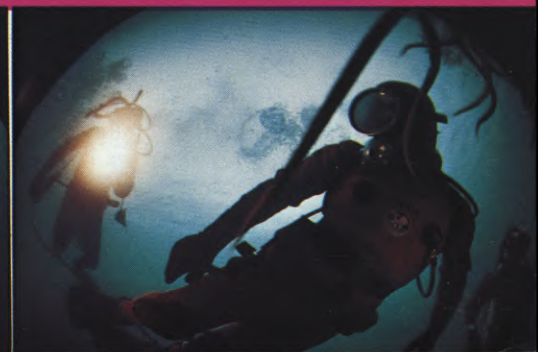
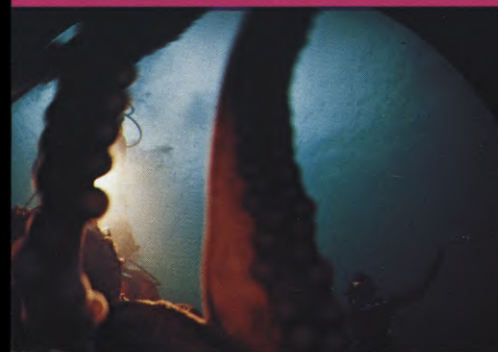




Actual size frames from the Imax Production, "OCEAN", currently being presented in the unique Reuben H. Fleet Space Theater in San Diego, California. The picture was filmed in the OMNIMAX format, which employs an extreme wide-angle ("fisheye") lens so that the resultant images can be projected onto the planetarium-like dome of the Space Theater. The spectacular presentation includes (LEFT) scenes filmed topside and underneath a huge oil-drilling rig in the Santa Barbara Channel, killer whales at Sea World in San Diego (RIGHT and BELOW LEFT), and scenes aboard the U.S. Navy research vessel "SEA-SEE" (BELOW CENTER), which features an 8-foot plastic bubble that can be lowered into the water for photography (RIGHT).



A series of frames from an "OCEAN" sequence in which divers encounter a friendly octopus off the Washington coast near Seattle. Marine expert Bill High, perhaps the foremost octopus expert on the West Coast, had predicted that the multi-tentacled animals would be found at a certain spot—which was precisely where they were located. At one point, the exotic creature clambers right over the cameraman, planting his suction cups on the port of the Imax camera. The extreme surround of the Omnimax format is very subjective—in this case, permitting the audience to enjoy a diving experience, without getting wet.



ness of the picture. As a result, it became obvious to us right from the beginning that subjects such as travel through space, in which there is a solid black background, would be much more successful than ordinary terrestrial subjects. So we devoted a lot of time to preparing for this problem in dealing with the ocean. Realizing that the sky showing through the water at the top of the frame would often be quite bright, I asked Bill Shaw to develop a method of putting a graduated filter on a fisheye lens in such a way as to darken the sky. What he did was put the filter on the rear of the lens

WILLIAM SHAW: Of course, putting filters in front of a fisheye lens is a problem, since you have a 180° field of view and, although we did initially think of that, the place we actually did decide to put them was in back of the lens. When located in the space between the film and the lens (and reasonably far from the film), they are so much out of focus that a graduated darkening can be produced by a filter which has a sharp cutoff. Also, if you use gel filters, the shift in focus with the fisheye — which is a very wide-angle lens — is so small that it doesn't matter. It was all done simply by putting gel filters at the rear element of the lens and covering varying portions, so that the graduation occurred at somewhere around a quarter to a third of the frame height. Graeme used filters of densities up to four stops and used an 85 where the seam appeared in the frame. Color corrections were required and the neutral density filter in the sky area not only darkened it, but blued it.

QUESTION: And did these graduated filters actually solve the problem of cross reflections?

SHAW: I think it worked to the extent that you can watch the film in the Space Theater and at the end you really have to think back and decide whether you have seen any cross reflections that bothered you. But frankly, there are still a few scenes where the effect shows.

FERGUSON: The graduated filters turned out to be extremely valuable when shooting underwater, because you get so much light when you look up toward the surface. Sometimes we were actually shooting into the sun. It's very hard to work with a fisheye lens without getting the sun in the frame, particularly underwater, where you need the flexibility of being able to

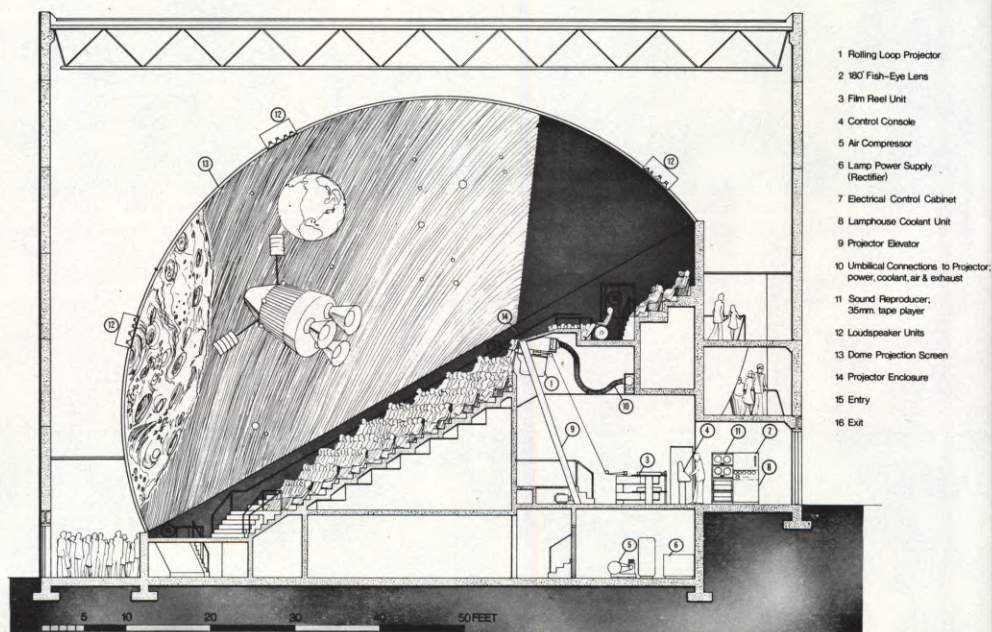
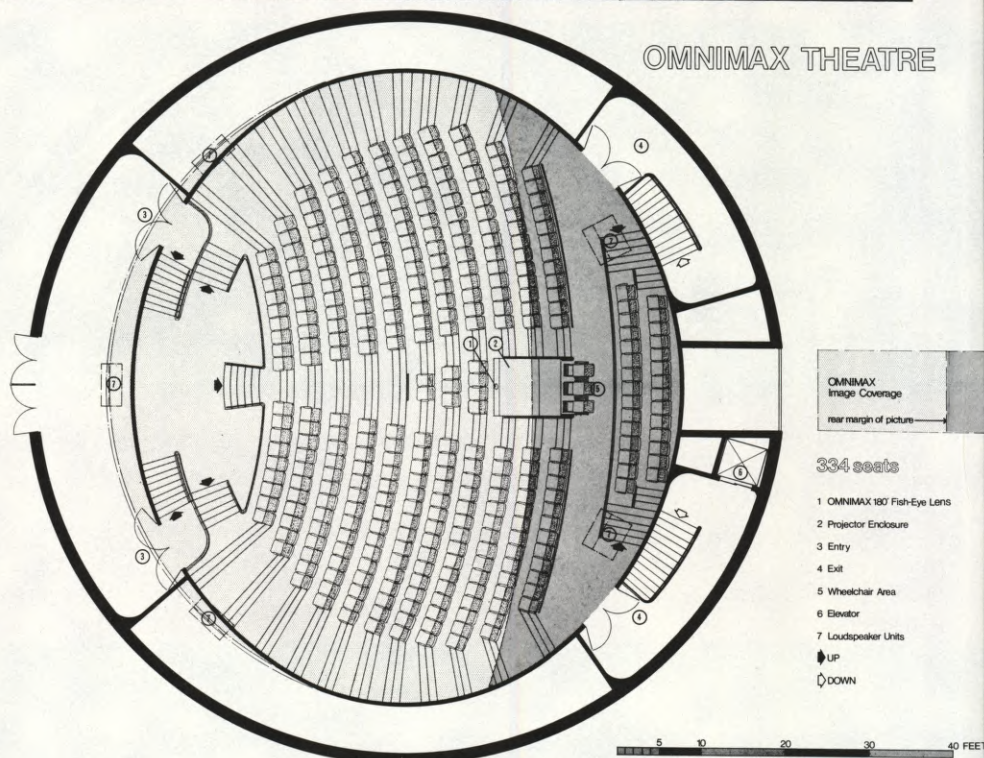
swim around in every direction. In those shots where the sun was quite literally in the frame, the wedge filters helped a lot.

QUESTION: Can you tell me about the underwater housing developed for this project?

SHAW: Graeme just presented me with a set of requirements, the first one of which was to keep the camera dry

down to a depth of 100 feet. That kind of led me to a pressure depth test of 150 feet, which in turn led to safety factors on materials to an ultimate depth of 500 feet. We built the housing of aircraft-quality aluminum and welded it, because that was the way we could build a housing of that size quickly. The size was about 3.8 cubic feet, which works out to a 240-lb. displacement of water. We had to build the housing quickly with the available

Top and cross-section diagrams of the first OMNIMAX Space Theater in San Diego reveal that it is similar to a conventional planetarium, but with the dome tilted at a 25° angle. The OMNIMAX projector, with its unique "rolling loop" movement, flicker-free 68° shutter and pin-registration, presents a high-fidelity image of incomparable photographic quality.





(LEFT) Graeme Ferguson holding a production meeting on deck before a dive begins. (RIGHT) Camera Equipment Designer William Shaw (far right) assists in mounting a complement of lights onto the underwater housing which he designed for the "OCEAN" project. The IMAX camera which it encloses, carries a 1,000-foot magazine of 70mm film running horizontally. The housing (with camera) weighs approximately 300 pounds out of the water. Underwater it is neutral, or can be adjusted to be negative or buoyant by adding lead weights while the camera was being loaded.

material, which was rolled plate instead of pattern casting. So we went through the usual design stages of establishing an envelope that would fit around and house our camera, a 1,000-foot magazine, battery and lens (particularly the fisheye, of course), and which could be controlled by a diver on the camera. He could control f-stop and focus and also deal with the slack in the camera. Film passes through the camera at 336 feet a minute and it eats film so rapidly that if you stop the camera early in a roll, it may overrun slightly and the slack may cause a problem when you start it. So we built in both mechanical and electrical devices to remove the slack. We then did some design work and stress analysis applications, which led to about six weeks of testing. We found test facilities that the Canadian Armed Forces use for similar work and were able to test the housing to the 150-foot depth. We tested the system for starting and stopping the camera remotely. Then we provided the housing with skids so that it could be handled on deck, and lifting rings so it could be taken out of the sea. Finally there were optical checks underwater to establish focus data. We also built some equipment so that it could be powered with a diver propulsion vehicle.

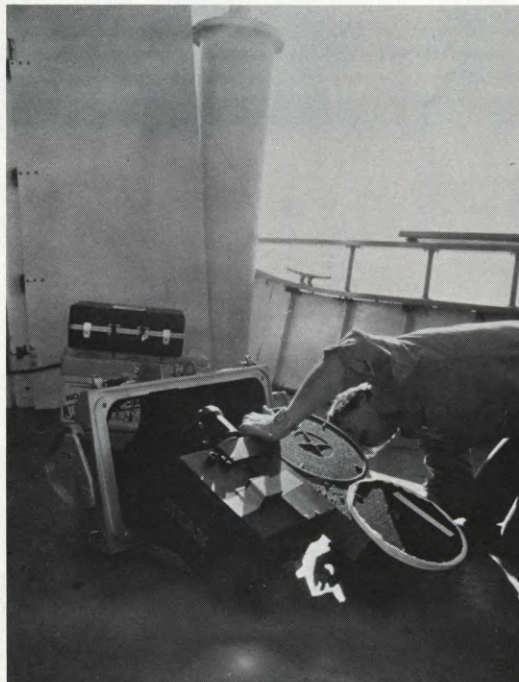
FERGUSON: This was used in the sequence where the diver is pulled along through a whole herd of sea lions.

QUESTION: What about the viewfinding system?

SHAW: Oh, yes — rather important. Graeme kept asking the same question, but I kept putting the viewfinder in the position of last priority, because I've always argued, to some extent at least, that with a fisheye lens

you can aim the thing by hipshooting it. In actual fact, however, a viewfinding system appeared to be necessary to show what the field of view was. In talking with the people at Leitz Canada who did our projection lens design and fabrication, I found out that they had a leftover lens from an old Navy project and they handed it to us as a Christmas present. It was a wet-type finder and we found that by turning it into a dry finder with a dome port over the front of it and a change in the eye lens for better eye relief, we could make quite a satisfactory finder without having to design and polish any special optics. So we put that finder together and set it up on the housing. Then to the housing we added a horizon line — a water line around the whole housing — so that whoever was working with it at high tide, in whatever position, would have a good idea of the orientation of the housing.

(LEFT) Assistant cameraman Averill Townsend removes the IMAX camera from the housing for reloading, which he was able to do in about 10 minutes. (RIGHT) Townsend, with Bill Shaw watching, buttons up the housing after reloading and adjusts the lights. The housing, built of aircraft quality aluminum is 3.8 cubic feet in volume and displaces about 240 pounds of water.



FERGUSON: It was a horizon line in terms of where the horizon should be in the theater — which is very low. In that regard, most of the cameraman's instincts are wrong and, if left to his own judgment, he would tend to aim the camera too low. You have to tilt it up in order to get the horizon low, so that it will look right to the audience. If you're shooting something like a face that you want to become the center of the audience's attention, it must be held so close to the bottom of the frame that if you make a mistake of only a few degrees you can lose the entire thing. So it actually becomes one of the trickier things to do without a viewfinder.

QUESTION: Did you say that the horizon line went around the housing?

SHAW: Yes, the underwater housing
Continued on Page 1086



SHOOTING UNDERWATER IN THE WORLD'S LARGEST FILM FORMAT

By MAL WOLFE

Underwater Cinematographer, "OCEAN"

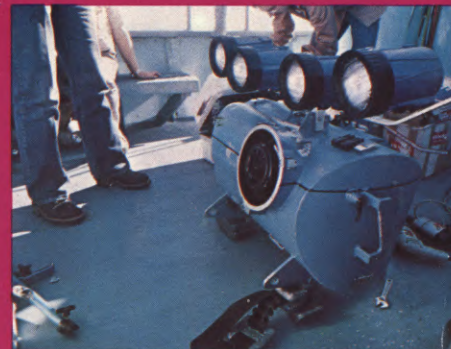
Filming beneath the waves with horizontally-running 70mm stock and a frame 15 perforations wide proves to be quite a "different" experience—but also a most interesting challenge

Before actual filming began on "OCEAN", we worked in San Diego at testing the camera equipment and getting it ready for the shoot. Bill Shaw had designed a new aluminum underwater housing for the system and it had an unusual viewing arrangement. The hardest thing for me to get used to was having to tip the camera upward by 13 degrees in order to put the horizon line where it should be located for the film to be projected inside the dome. The composition and everything else seemed different from what I'd had experience with in shooting normal 16mm and 35mm. So this took a little bit of getting used to, and I spent two days at the Space Theater viewing previous films that had been made for it, trying to get accustomed to the demands of the format.

Some of the lighting which we intended to use on the night sequences required testing also. We planned to use some porta-pack units, as well as some surface-powered lights. Continued overleaf



(ABOVE LEFT) Crew filming gray whales in late afternoon off Catalina Island for final sequence of "OCEAN". (ABOVE RIGHT) Offshore oil-drilling platform in the Santa Barbara Channel, used for topside and underwater filming. (BELOW LEFT) Assistant cameraman Averill Townsend begins to load the Imax camera between sequences. (CENTER) The camera load of 1,000 feet of 70mm film provided three minutes of shooting. (RIGHT) The closed housing, with complement of four lights.



(LEFT) Producer/director Graeme Ferguson gives instructions to underwater cinematographer Mal Wolfe (foreground) before dive. (CENTER) The deck crew prepares to lower the camera system into the water. (RIGHT) For underwater television observation, video technician Larry Stolitz views monitor and communicates with diver working near underwater well-head during filming.



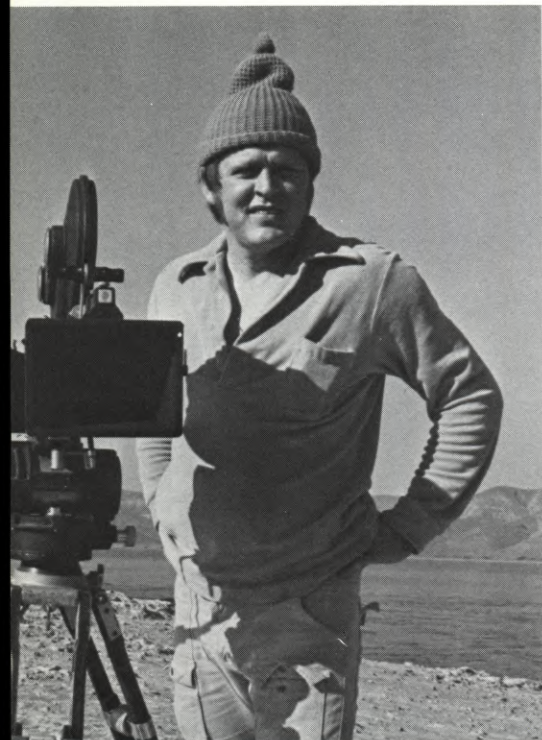


(ABOVE) Divers work with affectionate octopus off the Washington coast near Seattle. The lighting used consisted of one 1,000-watt Birns & Sawyer Sea-Quartz unit off camera and two 250-watt Oceanic porta-packs. (BELOW LEFT) Playful sea lions frolic off Santa Barbara Island, where their rookery is located. (RIGHT) A school of squid numbering in the thousands was discovered off the ocean side of Catalina Island. The crew used large lights to attract them near the surface for filming.



(BELOW) Averill Townsend can have the Imax camera out of the water, reloaded and back in the water within 20 minutes, the actual changing of magazines taking about 10 minutes. (RIGHT) The crew checks the housing, which has been mounted on an underwater propulsion vehicle. This unit was used to simulate the movements of sea lions—quick turns, barrel-rolls, turning upside-down, etc.





Underwater Director of Photography Mal Wolfe found Omnimax totally different from the "normal" 35mm and 16mm of his previous experience, but did a superb job of handling it.

and, since the Omnimax lens is different from all other lenses, we wanted to see how various types of lighting would work with it. We tested several kinds of lights, ranging from quartz to the helium-iodine lights which have certain industrial applications and emit a sort of green-type spectrum. At the time we thought these might offer some advantages but, in the end, we decided to go with the quartz lights for the actual shooting.

After the testing was completed, Graeme Ferguson shot some things at the Scripps Institution of Oceanography, after which we went up to Santa Barbara to do the first actual underwater shooting — a sequence underneath one of the oil platforms. Bill

Shaw, the engineer who had designed the equipment, came out to the location and, since this would mark the first actual use of the housing in the ocean, everybody was sort of tense. However, everything went really well, except for one small detail which had been omitted from the camera housing design. Graeme wanted one shot which required that I start on the surface and then go straight down on a constant rotation. The only problem was that there was no place on the housing where I could bang my nose in order to clear my ears on the way down. We tried it once and then taped a bar on the top of the housing. When we shot it the second time it worked out very well.

The location presented certain challenges. We had found an underwater oil well-head that was in comparatively shallow water, but at the same time, we required something that would give an impression of depth. What was wanted, essentially, was for the diver to make a dive and go down the legs of the platform, so that it would look like the well-head was right under the platform, but very deep. I had taken Graeme on a couple of reconnaissance dives there so that he could look the situation over, and we had played around with the idea of shooting the entire sequence in a tank. However, as that option became more and more involved, we decided to shoot at the actual well-head. The water visibility was only 10 to 12 feet, but that tremendous fisheye lens created the illusion of 25 to 30-foot visibility and it worked out perfectly.

From there we went to Catalina Island to work with the people at the USC Marine Science Center in shooting kelp sequences. We were extremely lucky in that the water was clear and the conditions ideal, so the shooting went very well. While we were over there the squid started coming in, so we went around to the ocean side of

the island and filmed the squid for several nights. There were a lot of sea lions and whales in with the squid, which made it interesting. It was quite unexpected and one of those things that would have been difficult to plan, so we just took advantage of it.

There is a sea lion rookery on Santa Barbara Island, where the water is usually not so clear, but when we got there it happened to be extremely clear and we decided to use the camera on an underwater propulsion vehicle. Bill Shaw had designed an attachment for the camera housing that permitted us to mount it onto a small wet sub, an underwater scooter. It was rigged in such a way that you could balance the camera perfectly while you were riding on the sub.

When we first got into the water to work with the sea lions they were a bit shy because the camera, plus the sub, made so much noise, and they would run away from us. After a couple of hours of observation we noted that they wouldn't come down near the bottom — say, at 30 feet — and play with us, but up near the surface they would. We loaded the camera with a special magazine that would allow us to do a complete barrel-roll. When the sea lions did a barrel-roll, I did a barrel-roll and we were able to get some unusual effects that way. That was one of our most interesting sequences, considering how we had to coordinate the scooter and the camera with the movements of the animals.

After shooting that sequence, we went down to San Diego to work with the Navy divers off their experimental research vessel, the *SEA-SEE*. This is a large catamaran, with an 8-foot plastic bubble that can be extended beneath it to make possible unobstructed underwater observation and photography (see *American Cinematographer*, September, 1970). We left dockside very early in the morning — about 4 a.m. — and went out to the shark location where the *SEA-SEE*'s skipper, Bruce Parks, felt that he could attract some sharks. He did and we filmed them. It was just a one-day shoot down there, but the Navy was very helpful in providing manpower and scientific information.

I wish we would have had more time to work with the *SEA-SEE*. We could have used another day or so, but unfortunately time was working against us at that end of the project. One unique aspect of our work with the *SEA-SEE* was that Graeme was actually able to take part in the filming. He would sit down in the bubble and watch what I shot. If he didn't like something, he

The camera system shown with six underwater portable lighting units mounted on the housing. These were Oceanic PML 100 and 200 lights used for fill during a sequence shot in the murky waters beneath an oil-drilling rig in the Santa Barbara Channel. Each light was 250 watts, with a 2400°K color temperature.





Assistant cameraman Averill Townsend cleans the port of the underwater housing before the camera system is lowered into the water for filming with the extreme wide-angle "fisheye" lens.

would come out of the bubble and say, "Why don't you shoot it this way?". That worked out really well, because he could direct from underwater without getting wet.

We next went up to Seattle to shoot the octopus sequence. The man who did the scientific part of the research for us, Bill High, is, I'm sure, the foremost octopus authority on the West Coast. He and the associate producer, Bob Dierbeck, set up the filming and when we arrived there, a couple of other crew members and myself, we made a reconnaissance dive to locate the octopi. High knew exactly where they were going to be and told us that it would take only one dive to find them. Having worked with unpredictable wildlife, I couldn't quite believe that, but we went down and he pointed two or three out to us. He put floats out to mark their location and, quite calmly, told us that they would still be there the next morning. And sure enough they were — just exactly where he'd said they would be.

In the meantime, the rest of the camera crew had arrived, along with the sound people. The octopus sequence was to be the last part of the filming and everybody was really working to get it right. It all went so smoothly that, according to Graeme, our shooting ratio was something like 2-to-1. It could have been because of the cold water. It was less than 40 de-

grees, so everybody wanted to get in and out — but it went very well.

We used portable lighting units for freedom of movement in shooting the octopus sequence. With the Imax camera, the longer the shot the better it is. You don't think in terms of long shot, medium shot and closeup when you are shooting. You try to get one continuous shot, which, in essence, means that the camera is going to keep moving. That's why we went to the porta-pack units. Of course, with such an extreme wide-angle lens, there's no way you are going to light the whole frame with such small units. You are really using them as kickers to bring back the color underwater. As you start down from the surface, you begin to lose color and you need artificial light to bring it back, especially when filming wildlife down there, so the portable lights are used as kickers or fill lights to serve that purpose. The only time that we didn't use them exclusively was on the night sequence with the squid. We wanted a very dramatic type of lighting, so we used the porta-packs along with some surface-powered lighting units.

We used a series of seven lights on the camera housing itself. They were mounted on a square bar behind the lens in such a way that they could be positioned anywhere we wanted them to be. We could bend the bar and position a light so that we knew exactly where it was going to fall. We found out, however, that it was better not to concentrate the light in any one position, but to use lights pointing in several different directions.

We constantly experimented with the lighting throughout the filming. We would shoot a scene in a particular way and then change the lighting and shoot in a different way. Graeme kept wanting to use different lighting techniques.

The surface-powered lighting units we used were the Birns & Sawyer 1K's. We used up to four of these in shooting a particular scene. They were really our standbys for making shots of long duration, because with the porta-packs you have 12 minutes of light and that's it. So anytime we had a long scene to shoot, we would automatically go to the 1K's. We would position them around the bar, just like we did with the others, and the amount of light seemed to be ample for what we were shooting. On the octopus sequence we used only one 1K and two porta-packs as kickers. One of the actors carried the 1K around and it produced a very dramatic effect, in addition to giving depth to the scene. This arrangement worked out very well.

Most of the time we rated the color negative at ASA 100, shooting at f/4.5 or f/5.6, but we did push it to ASA 200 for the well-head sequence because the light was very dim. Even though we used an artificial light source in filming it, Graeme wanted to get the feeling of all the pipes and everything around — so we pushed the film.

On some of the sequences we used a neutral density filter covering the top portion of the frame. With the extreme wide-angle fisheye lens you could have a tremendous range of light within the frame. For example, if you were in 30 feet of water and pointing the camera straight up, you might have an f/16 or f/22 light at the top of the frame and f/4.5 at the bottom, so Bill Shaw worked out a sliding neutral density filter to compensate for the several stops of variation and smooth out the overall exposure.

The main problem of the housing was not in the water, but out of the water. Fully weighted, it weighed about 300 pounds out of the water. In the water it has a weighting system, so that you can weight it any way you want it — neutral or a bit negative or buoyant. We preferred to work with it at about five pounds negative. That's just my own personal preference, really, because to me it seemed that I could handle it better that way. Our technique in moving it was to have two divers push it from spot to spot. Then, if we ended up a long way from the boat or if there was an emergency, we had lift bags attached to it that could be filled to bring it to the surface very easily. We did sometimes use the underwater scooter to move it around in certain locations, but the system, for being as large as it is, handled very well in the water. Bill really did a remarkable job of designing it.

The controls were quite sophisticated. It had a ready light on it that would come on from the outside to tell you when it was safe to shoot. It also had an automatic slack eliminator. There was a moisture sensor built into it, so that if there was a problem, you could come to the surface immediately and rectify it. He really designed it in terms of what a cameraman would need.

The housing didn't have one leak during the entire time we were filming; it stayed bone-dry. All of the penetrating connections were O-ringed and there was no need to pump air into the housing. The handles were tipped, so that when you held the camera straight out, it was actually tilted up 13° to compensate for your horizon. The

Continued on Page 1093



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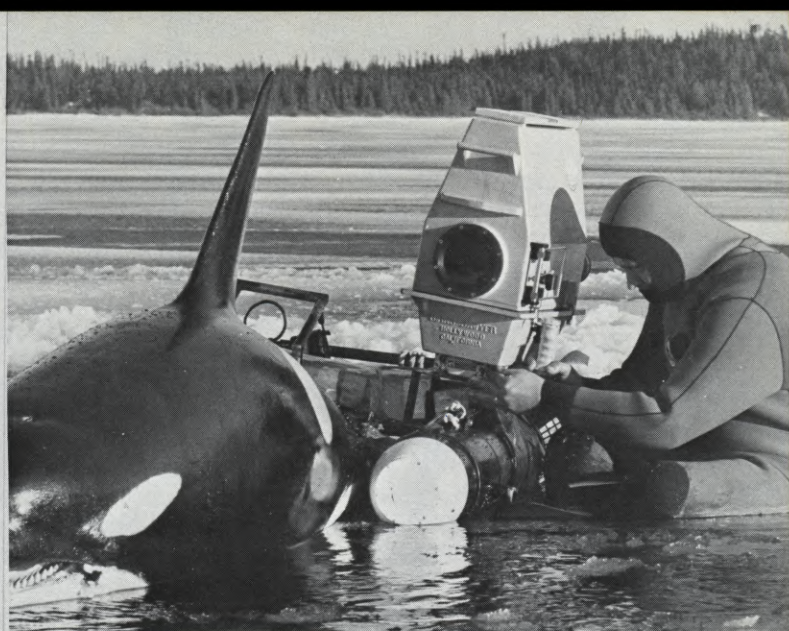
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Alaskan diver Roger Cramer, assistant Ken Jones and myself. We picked up extra personnel on location. The operation was lined out as follows: The vehicles would drive up to the edge of the lake and be unloaded. While part of the crew did this, the rest would go out on the ice and cut a hole, four feet by eight feet, so that we could get the divers and the whale (with its motors on) into the water.

I should like to diverge briefly to explain about our motorized whale. It had been determined that one of the most important shots that would keep recurring in various areas throughout the picture would be an "over-the-shoulder" of the whale. With that in mind, we had with us a seven-foot miniature whale that had been shipped to us from Malta. In itself, it was fairly heavy, but we then added two Mark IV Farlon motors that *really* made it heavy. Also, we added a 125-pound underwater rig that really topped it off. With the whale as heavy as it now was, it took four people to get it into the water. It was originally designed for a crane to pick it up and put it into the water, but because of the manner in which I was going to use it, there was no way that the employment of a crane would be possible.

The first time we had put the motorized miniature whale into the water had been in a swimming pool and, after struggling it into the water, we had gone to work on balancing it out. It had worked fine under the perfect conditions afforded by the backyard swimming pool, and we had then taken the rig to Catalina for its first test runs in the ocean. Again, under ideal ocean conditions, the test had come off not too badly, even though there were certain problems with the motors that made it necessary for us to run the rig half the time on only one motor.

Now, on the Alaskan lake, we were about to give the rig its first for-real test. We could not drive the whale out to the hole cut in the ice, so we loaded it onto a sled and pulled it to the hole. At the hole, the heavy motors were attached and the rig, less the camera, was edged up and slid partially into the water. The nose had to be supported until we could get the camera attached. Ken Jones, the assistant, had to get into the water and attach the camera by the bottom to the bracket we had made to support it. After this was finally accomplished, we got into the water and the topside crew slid the



(LEFT) Cinematographer Herron watches while assistant Ken Jones attaches Birns & Sawyer camera housing to motorized miniature whale on Lake Louise in Alaska. **(RIGHT)** Jones attaches the housing to the fin of the miniature, in order to shoot whale point-of-view and "over-the-shoulder" cuts. For later scenes, this whole rig had to be put together in the water and lowered under the ice.

whale off the edge of the ice. Once it was underwater, the balance of the buoyancy became critical. The light on the surface was fine, but as soon as you dropped down 12 feet or so, it became very dark. In balancing up the whale, he was either too light (which put him on the surface) or, as he sank, the water pressure would collapse the buoyancy compensators and the whole rig would head for the bottom.

It took some time for diver Roger Cramer to work out the buoyancy problems. Under good conditions this is difficult enough to do, let alone in extremely cold water and having to be tied to a rope. At the end of the 25-foot safety line, Roger would venture out under the ice and keep the whale running, in order to get as much footage as possible in one go. It was so difficult getting the whale out of the water that you had to make the most of every opportunity. I really applaud the efforts of everyone on that crew for the results that were achieved.

On that first day at the Alaskan Lake, after securing our safety lines and struggling to get the whale into the water, we dressed in our Poseidon dry suits in the back of our truck, with the temperature registering 20 below zero. We set up a box with a heater in it to keep the regulators warm. Ken Jones put his camera together and the only real precaution he took with it was to keep the batteries warm. The advantage of using the Arri 2C is its simple threading, which means that when the film is really cold it will still run through the mechanism without breaking. Throughout the entire shoot we never did have a problem with the running of the film.

Our first day of shooting in the lake

was not the best. The light at that time of year was only good from eleven in the morning until two in the afternoon. With the angle of the sun so low, as well as our being under the ice, it really got dark fast. I figured on shooting wide open and pushing the Eastman 5247 color negative one stop.

Now, this was my first dive under the ice and I must say that it really was different. When I went into the water, I immediately dropped down about ten feet to the level of the whale and did not pay any attention to where I was — but I had my safety line. While I was checking out the camera, my regulator began to explode in my full-face mask. Not wanting to take the time to check it then, I turned to look for the hole and damned if it hadn't disappeared. I grabbed for my line and followed it back to the surface, with my regulator still popping. We never did get that regulator working and I switched to another one. It was really blowing and snowing that day and we got only one 400-foot roll shot before we had to wrap. Everyone was wet and very cold and a hot toddy was very welcome when we got back to the cabins.

Having never shot under the ice before, I was a little in the dark as to how I was going to expose the 5247 film stock. When shooting underwater I use the Sekonic Underwater Reflected Light meter. You point it at the subject and read the back of the meter directly. Normally, during an underwater shoot, I will take an ambient reading in the direction of my subject and then compensate over or under, depending on the up or down angle of the shot.

Under the ice I had two areas of exposure. One was total darkness, pointing down, and the other was bril-

liant light, pointing up. I would take a straightforward reading and then an upward reading and split them in the middle. This gave me a very good overall exposure. At times I could not get the meter to read, even pushing two stops. If I was just on the edge of the meter scale, however, I would shoot it and instruct the lab to push two stops. The prints, when screened, were very acceptable and had no noticeably disturbing grain. Using 5247 as a tool can be a great help under lighting conditions as poor as I encountered.

We shot on the Alaskan lake location for five days and felt that we had gotten the footage we needed. A problem we had there was that we would set the camera for 12 frames per second and would run about half the magazine at that speed. After that, it would drop to about three frames per second — and, surprisingly enough, that was the material that was cut into the final version of the picture.

While we were shooting the under-ice sequences, our man in Los Angeles, Randy Straff, was in the process of trying to get a 14-foot miniature of the ship, BUMPO, weighing 1,700 pounds, shipped to me from Malta. As one might expect, we had problems. The boat had to be cut in half in order to fit into the cargo bays of the jumbo jets. But even so, as we found out, there are only certain jumbos that can carry such large items. From Malta Randy received the front half of the boat. The other half got stuck in Chicago. Then we learned that Western Airlines could not take the front half of the boat in their aircraft from Los Angeles to Anchorage. Randy finally found a route through Chicago which enabled him to fly both halves to me. If they'd had to

come by ship, the picture would have been in release by the time they got to me. As it was, I received the two halves something like a week apart. "This is Alaska, you know," I was told.

After getting the two halves of the boat together and preparing it for shooting, we made a 125-mile trip over the mountains through a snowstorm with the boat on a trailer to the Alaskan seaport of Seward. We loaded the miniature onto the deck of a 65-foot buoy tender and headed out into the icy sea, bound for our location at one of Alaska's glaciers 65 miles away. The crew included: assistant cameraman Art Schwab (back again, but wishing he was in the studio), Ken Jones, diver Roger Cramer, our cook, the captain and myself. Not without difficulty, we were finally underway on a not too bad day.

On the first actual day of the shoot, after having spent the night anchored in a small bay, we worked our way through the ice and up to within 500 yards of the glacier. The water was calm, so we proceeded to float the miniature BUMPO. After getting it over the side and into the water, we had to completely re-rig the ship. The daylight, once again, was not in our favor. We had only about three hours during which we could shoot, because of our location behind the glacier. For the shots I needed, I had to go to the 50mm-500mm zoom and there just wasn't any exposure, even at midday. I opened up wide and pushed the 5247 two stops. The material we got worked very well. Our lab was Technicolor and my rep was Skip Nicholson. They were outstanding in handling my film.

The shots we were after this time in-



(ABOVE RIGHT) Cinematographer Herron gets a wet kiss from the killer whale star of the film. (BELOW LEFT) Crew pushes miniature whale with camera already mounted toward hole in ice. This did not work well and camera eventually had to be mounted after whale was in the water. (CENTER) Ken Jones mounts camera to whale in a snowstorm. (RIGHT) Herron prepares to drop into the cutout hole to film some whale POV's under the ice.



(LEFT) The miniature BUMPO rides piggyback on the deck of 65-foot converted buoy tender. (CENTER) The miniature BUMPO, having been lowered into water studded with floating ice, is made ready for its appearance before the cameras. (RIGHT) Herron and Roger Cramer take a "fun" swim around the ice after dumping their gear into the boat. Their "dry suits" made survival possible in the extremely cold water.



(LEFT) Frame blow-up from the completed film, showing the scene where Nolan, shooting from the BUMPO, nicks the fin of Orca, who is stalking him. (RIGHT) Underwater grip Fred Arnie lines up miniature female whale for shots made in the waters off Catalina Island. Far-flung locations for the adventure epic ranged from a Hollywood swimming pool, to an Alaskan lake to the iceberg-studded Arctic waters north of Labrador.

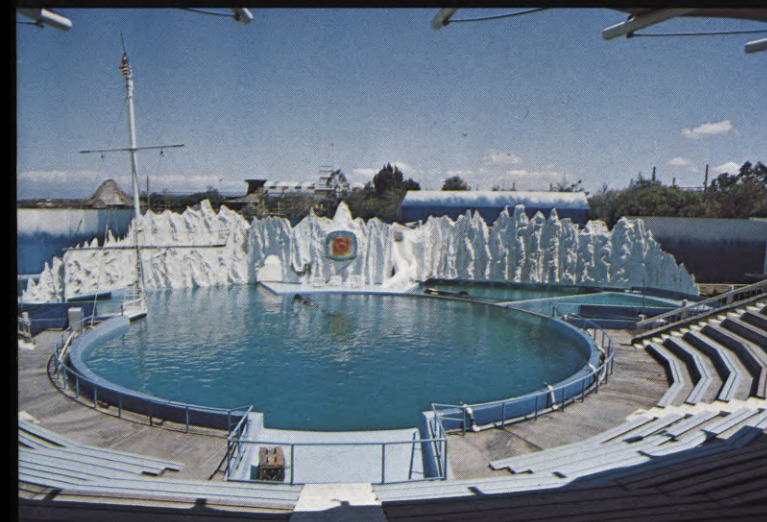




(LEFT) A view of "downtown" Resolute Bay in the Arctic. The time of day was noon and the temperature was 41 degrees (F) below zero. (CENTER) Ken Jones, J. Barry Herron and Rick Mason disembark from twin-engine Otter aircraft after survey trip. (RIGHT) A view of the deserted Arctic. The frozen, barren icescape is forbidding, but has a special desolate beauty all its own.



(LEFT) Hung on the side of Jet-Ranger helicopter, the cut-off miniature whale (nicknamed "GUMS" by the crew) arrives on location. Producer Dino De Laurentiis donated the miniature to one of the clubs at Resolute Bay and it has been appropriately mounted on the wall. (CENTER) Assistant Ken Jones prepares to open hole in ice on third day of shooting. (RIGHT) Diver Dave Gallagher, operator Rick Mason and assistant Ken Jones work on gear the day before the first dive. The small hut provided a welcome shelter from the below-freezing outside temperatures.



(LEFT) The huge tank at Marine World/Africa U.S.A. where all of the filming of the live whales was done. (RIGHT) Cinematographer Herron with camera mounted on 14-foot-high yardarm makes a shot of Orca, a show-off whale who obligingly jumps out of the water on cue. However, killer whales are quite independent and will quit work when they've had enough for one day. (BELOW RIGHT) Herron films whale carrying fake leg prop to trainer Frank Strazokowsky.

cluded scenes of the BUMPO in the ice fields and the BUMPO following the killer whale's fin. The procedure for shooting was to stuff our diver, Roger Cramer, inside the miniature boat with a walkie-talkie and then direct him from the mother ship. But there was one big problem — the BUMPO miniature leaked badly and was sinking. I would roll the camera and shoot as much as I could before we had to set up for another run. I was working with a right-

Continued on Page 1064





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PHOTOGRAPHING "PETE'S DRAGON"
Continued from Page 1029

when some of the townspeople decide he is real. They find a book, which describes the value of each piece of a dragon, and this stimulates an earnest search.

"PETE'S DRAGON" marks Helen Reddy's debut as a musical theatrical feature film performer, and Phillips predicts it will be the start of something big. He thinks that one particularly memorable sequence is a ballad she sings about her love who has been lost at sea. Phillips filmed this against the actual rotating light housing, taking advantage of the strong light rays from the Fresnel lenses.

The effect highlights the singer dramatically and shows her to best advantage. "It probably goes back to the days when I was a camera operator for the big MGM musicals," he says, "but I still believe in lighting stars so they look as glamorous as possible. While there are situations where low key lighting is justifiable, I keep in mind that any film I shoot might end up in a drive-in theatre, where the image will be shown on a giant screen at dusk."

In addition to the many technical and aesthetic challenges, Phillips also had to cope with nature. The location photography at Morro Bay was scheduled for what is typically the foggy season. Fortunately, the weather was good most of the time. As luck would have it, however, the fog was gray and heavy on the day that a key sequence was scheduled for photography.

Phillips had a camera and several FAY lights set up on a painter's scaffold. A construction crane was used to lift the scaffold up along the side of the lighthouse until it reached a height of 95 feet, where it overlooked the entire coastline. From that perspective, Phillips planned to focus on Reddy, Rooney and Marshall doing a dance number.

At the last possible moment, a hole in the fog allowed the camera to document the sequence. Phillips overexposed by three-quarters of a stop, and had Technicolor print the scene down accordingly. "We maintained the brilliance we needed to go with the light, gay sound of the music in this particular number."

Just when things are looking really grim for Elliot, the attention of the townspeople is diverted by a storm which sends a giant wave crashing through the windows of the lighthouse. The water extinguishes the lamp, and many fishermen floundering in the storm at sea are in immediate danger of being lost.

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This involves much inventive cinematography. There are miniatures of boats tossing in the stormy bay photographed by the special effects department. In a related sequence, Elliot picks up Pete and flies into the storm. Initially, this was shot from a crane flying by an animated Elliot holding Pete against a sodium light background. It was a little rough on the camera crane, so Phillips reshot the scene using a blue screen and zoom lens instead. Everything but Elliot and Pete was painted blue, and a composite was made with storm footage.

The biggest scene in the film occurs when some 2,000 gallons of water smash through the windows of the lighthouse, extinguishing the lamp.

This scene was filmed with two cameras, the modified Mitchell and a BNC. Long shots were also made on the miniature set, and sodium light and rear projection isolated some of the action.

In the end, Elliot is the hero, squeezing his animated body into the lighthouse, and huffing and puffing until the flame he breathes re-ignites the lamp. To top it all, he rescues Reddy's boyfriend, who was returning home when the storm hit.

Which all goes to prove that even in 1977, Hollywood films can end with everyone living happily ever after — even dragons. Phillips says it is the best film he has worked on in years. "It's a sheer delight, especially if you believe in dragons, and like good entertainment."

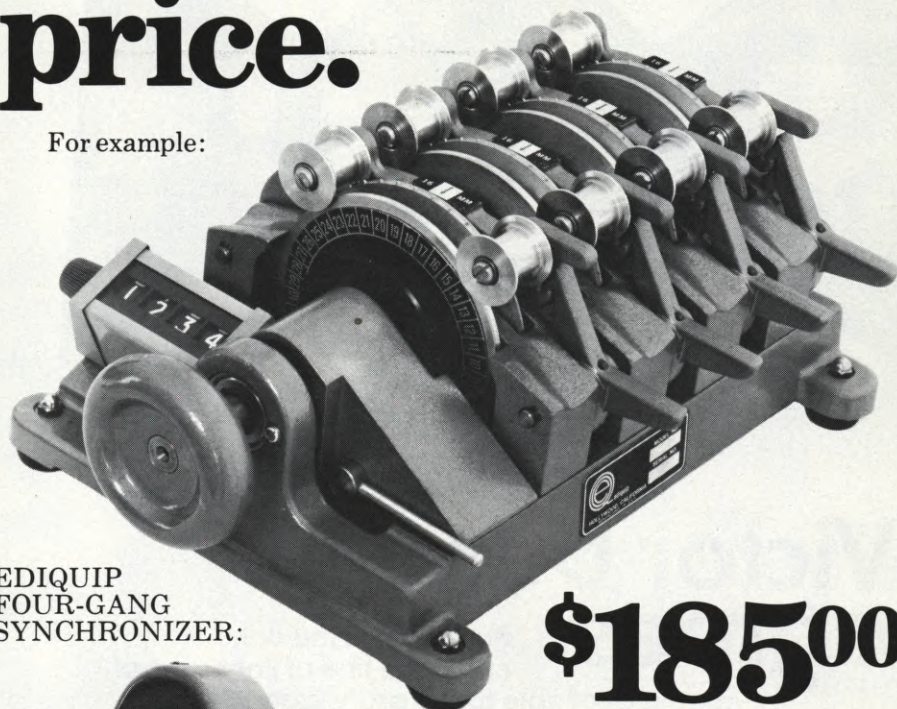
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Arrangements as to availability and other details are to be made directly with the individual A.S.C. member. For further information, contact: American Society of Cinematographers, P.O. Box 2230, Hollywood, California 90028. Telephone: (213) 876-5080.

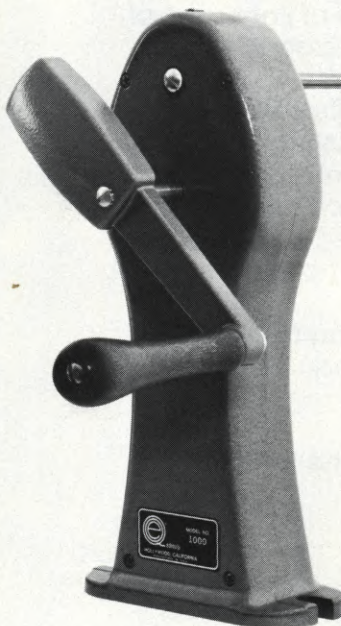
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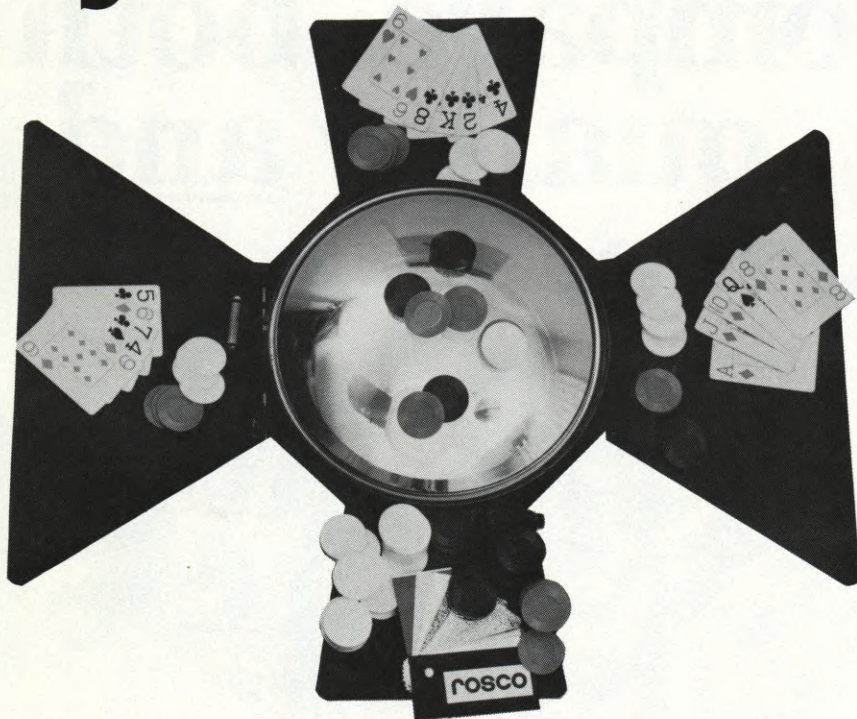
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CHASING WHALES FOR "ORCA" Continued from Page 1064

look for an ice pressure ridge. This is a place in the ocean where two ice formations meet and push together to form an underwater wall, which looks like an iceberg would if you could see one through the milkiness of the water.

We located our ridge about 45 minutes out of Resolute Bay by Jet Ranger helicopter — which reminds me of another problem I had up there, namely that of being able to get a helicopter at all. The weather in that part of the world is not really the greatest for airborne craft. The flying ceiling is up and down and compasses don't really work very well. Everything is white and the temperature leaves a little to be desired. When we were there it was running consistently between 40 and 42 degrees — that's *below* zero, of course. (Suddenly I thought I ought to be with Schwab in the studio.)

On Day One we moved all of our gear into a base camp aboard an Otter aircraft. The place chosen was 10 minutes by chopper from the shooting location, and we shuttled everything over — heavy underwater camera, air tanks, dry suits, weights, etc. Again, our shooting days were limited by the light, and also by our safety procedures of returning to base as planned. If we were not back by five in the afternoon, they would send out the search parties — provided that they could get airborne. The Polar bears were starting to come out of hibernation and had attacked a couple of men further up the line. Looking through my glasses at one point while waiting for the chopper to come back to us, I spotted a couple of bears on the move. This really spooked me. Then I dropped the damn bullets putting them into the rifle because it was so cold.

The first day was to be a test run. We put Rick and Dave into the water with the whale miniature (which we had now cut the tail off for purposes of transportation), in order to see how everything was going to work in that extreme cold. It was felt that, in addition to the POV shots, we would need a tie-in over-the-shoulder shot of the whale under the ice. There was no bottom below the divers and the pressure ridge ran down to at least 150 feet. Seeing that we had gone this far, and not knowing if we could get back the next day, we put the camera into the water and managed to shoot a 400-foot roll.

Another of the problems we encountered in this extreme cold was that once the divers were in the water, they could not get out. We had to keep the regu-

lators submerged, for if they did come out of the water, everything would immediately freeze. The temperature of the water was about 28 degrees above zero, whereas on the surface it was still 40 below.

I would like to say at this point that my assistant, Ken Jones, had a most difficult job, because, in order to change a magazine, he would have to lift the housing out of the water, undo four nuts, pull the top off and then change the magazine. He could not wear gloves, and I was aware that my hands froze up useless without the gloves in about 30 seconds. Not once did we have a problem resulting from the loading of the camera, and I have to congratulate Jones on a difficult, necessary job that was extremely well done.

We survived the first day quite comfortably. The heater on our helicopter went out and the guys, in their wet diving suits, had to sit crowded into the copter for 45 minutes.

On Day Two we smoothed out the operation and it was again decided that it was better for only two of the divers to go into the water. We rolled off two magazines on this day and felt good about the shooting. On the third day, I was determined to go into the water and experience what few men ever have. It was magnificent! The water was crystal-clear and we were like particles under the sea of ice. The pressure ridge, hanging there silent and huge, made us feel that, as humans in a hostile world, we were quite insignificant. The thrill of being there — the danger of the hole cut in the surface closing up on us, or the ridge itself coming alive and shifting and closing us in — all this was exhilarating!

After the third day we wrapped. The weather closed in and I couldn't see that we could get anything different from what we already had. We returned to Los Angeles.

The initial "three weeks" of this assignment had turned into 13 months, and I really felt that I had climbed Everest on the project. I remember that someone remarked: "No one said it was going to be easy." Just ask Art Schwab!

I got the call from Dino in the office, just as we were wrapping things up. He asked me what I was going to do now and I told him that I was going to take a vacation in a little warmer climate than the one I'd just been in. He said, "When you get back, come and see me. I have a new film project you may be interested in. It's called 'HURRICANE'."

Well, at least we wouldn't have to shoot it under the ice. ■

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THE FILMING OF "OCEAN" IN THE OMNIMAX FORMAT Continued from Page 1073

had a horizon line painted right around it — along both sides and across the back. That started your orientation off properly. Then you could check for details in the finder.

QUESTION: So much for equipment. Could you tell me a bit about your adventures in actually shooting the film?

FERGUSON: Well, both Bill and I learned to dive for the project, but we recognized from the beginning that the critical thing was to get a really first-class underwater operator for the camera. So Bob Dierbeck, the associate producer, looked at the work of several underwater cameramen and Mal Wolfe was selected. From that moment on, the cameraman's responsibility underwater was entirely Mal's and that of assistant cameraman Averill Townsend, who was also a very good diver. The two of them worked together as a team and all I would do in terms of the underwater work was, in some cases, make a dive with them to look the situation over and discuss the sort of thing we might shoot. Later on, as we got into time pressures, because I had seen a lot of Mal's work and knew how good he was, I didn't even do that all the time. I really avoided most of the underwater adventures.

QUESTION: As adventures go, however, which do you think was the most stimulating one during the course of the shoot?

FERGUSON: The main adventure, in terms of danger, occurred when we were shooting a major sequence of the film which opens with a shot of thousands of squid coming to mate off Catalina Island. It was shot during a couple of nights and the problem was that because it was pitch dark, it was completely impossible to see whether there were sharks around. It was almost certain that there had to be, however, because there were lots of things there for them to eat, so everybody was pretty uneasy about it. As a matter of fact, what did finally surround our boat was something on the order of 15 or 20 killer whales and pilot whales, all spouting. They were so close you could smell their breath and blowholes — a pretty bad smell. When they really closed in, getting very close indeed, the crew came out of the water.

QUESTION: I should hope so! Do you

think they were hungry or just curious?

FERGUSON: They were eating. That's why they were there, but the fact that we had lights attracted them to us. In terms of tension, I would say that was the most "stimulating" phase of the shooting — certainly the most unusual and interesting.

QUESTION: What about the sequence with the octopus?

FERGUSON: We had expected that to be very difficult, but it turned out to be, in terms of shooting, extremely easy. The whole sequence, which runs 3½ minutes, was shot in the course of two days and included just about the most sensational underwater camerawork I have ever seen. If you examine it, you will see long, long takes in which Mal moved around a lot and continually adjusted his position. They did follow-focus as they went and stayed with the action of the divers and the octopus. It was really a beautifully choreographed sequence. Every inch they shot was usable, beautiful footage. It's interesting to note that this sequence was shot almost at the end of the filming schedule. The experience they'd acquired previously through working really helped them and they got better as they went along.

QUESTION: You spoke of follow-focus. Since the fisheye is an extreme wide-angle lens and, therefore, has an almost infinite depth of field, just how much follow-focus had to be done?

FERGUSON: The continual question in our minds was where to focus and we set ourselves up with a lot of focus points so that we could do really tight closeups of objects five or six inches from the lens. By and large, however, we found that those shots didn't work too well in the dome. One of the reasons appears to be that when you are in a fisheye situation and focused at a five-inch distance, although the object you are focusing on is sharp, everything else is quite soft — and yet the audience in the dome wants to look around and see everything sharp, just as if they were underwater. It's really not very satisfactory to look around and see everything out of focus except one thing. In a non-dome show we are quite accustomed to that. It is very common for cameramen to focus on the thing they want the audience to see most clearly and let other things go out of focus, but we found, over and over again, that it was better to focus farther behind and get the maximum possible



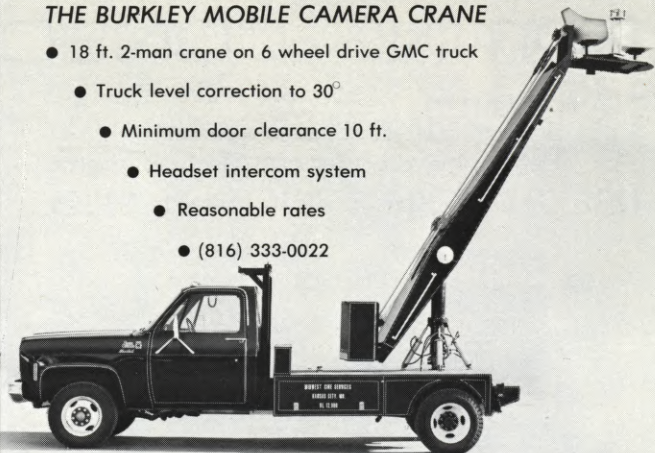
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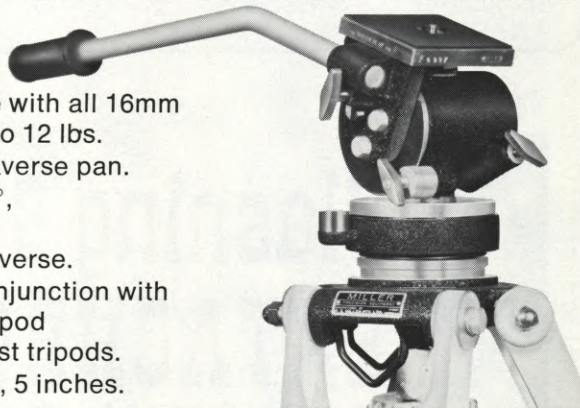


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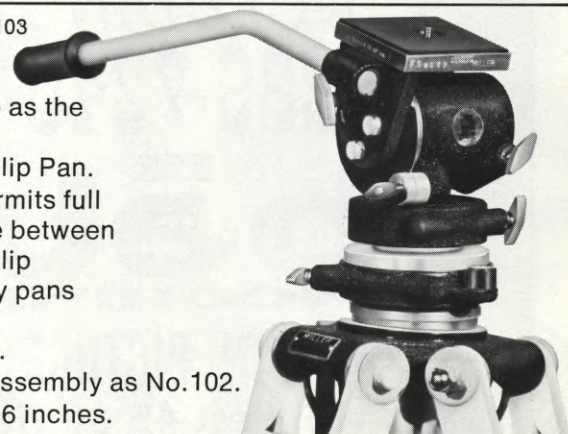
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depth into the shot, and even if something that came close went out of focus, that was much more acceptable to the audience than to pull focus and keep the close object sharp in the shot. You see it in the octopus sequence, where Averill did precisely that. He let the focus stay behind, even when the octopus came right up close to the lens, and that was much more successful than if he had pulled focus.

QUESTION: How about that shot where the octopus comes right down over the lens?

FERGUSON: Bill High, who is an octopus expert, told the cameramen that if the octopus was to climb over either them or the camera, they should just lie still and not do anything. For example, if an octopus grabs hold of your mask or any of your diving gear, it won't pull it off — but if you try to pull away from the octopus, the mask will be pulled off by suction. So it's better just to lie still. We have a really quite nice moment in the shot, with the octopus getting hold of Bill High's mask and not pulling it off, just letting go. He did the same thing going over the camera. He just clambered right over the camera and put his suckers all over the dome part. When you are sitting in the theater and watching that shot, it's as if the octopus is clambering all over you.

QUESTION: It must be like getting embraced by 1,000 bathtub plungers.

SHAW: They say it feels like nice little kisses.

QUESTION: You're welcome to my share. It sounds a bit exotic — even for Hollywood tastes.

FERGUSON: One thing the divers did find, while working with the animal, is that it's necessary to stay mobile. They had been advised to wear dry suits because of the extreme cold, but they found that was impossible. After the first day they went back to their wet suits, because they found it easier to put up with the cold than with the cumbersomeness of the dry suits. Of course, a diver who makes hundreds of dives a year gets completely used to a dry suit and wears it as comfortably as he would a wet suit, but I would caution anyone planning to dive in cold water to get plenty of experience in his dry suit ahead of time. You can't go out and rent one and just put it on. Mal is a man who has done a lot of underwater photography, but even so, after the first time, he went back to the wet suit —

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QUESTION: Can you tell me about the lighting you used underwater?

FERGUSON: In working with lighting underwater, we faced the endless dilemma of whether or not to use the 85 filter and whether or not to filter the lights. Since we weren't saddled with the necessity of maintaining long sequences that had to cut together realistically, we could accept more deviation from reality. That being the case, we found that it was perfectly feasible to work underwater with an 85 filter on the lens, while using a 1K light with no filter. That combination obviously gives you a red effect in the small area you are photographing (which, in our case, was the octopus sequence). The diver was in the frame most of the time, lighting the total action, and I would say that the result was completely acceptable. I can understand that they wouldn't have been able to do that in filming "THE DEEP", where they had their lights hidden. But where the light is a practical — where the light is a sort of prop in the frame — you can really accept a tremendous amount of distortion of color. We did have a question about that a couple of times, because we had one sequence under the oil rig, where we shot a portion with the filter and another portion without the filter (because it was actually shot in two locations), and we had to have it all finally blend together as one. In that case we had to rely on the lab to make a correction that would be acceptable. Bill Pine, our timer at the MGM Laboratory (they've done all our films), did a sensational job of matching. There's a transition which I know takes place from filter to non-filter, but it's utterly invisible to everyone.

QUESTION: Can you tell me about editing "OCEAN"?

FERGUSON: That was quite unusual. Editing for both IMAX and OMNIMAX is done on a regular 35mm workprint which is made directly from the negative, but we don't see the full OMNIMAX result until we get our answer print. The problem is that on any ordinary editing machine you don't have anything like the proper field from which to judge how it will look in the dome. To solve that problem, we built at our plant in Canada a 10-foot dome and we have a 35mm projector that was built at the Space Theater in San Diego and brought up to Canada. It runs only 1,000 feet, but it has a fisheye lens on it

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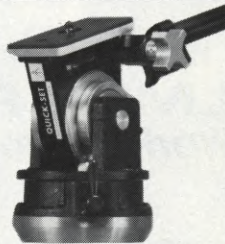
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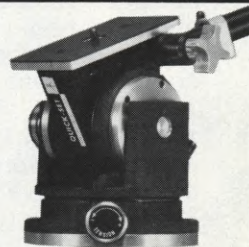
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and it allows you to see not the sharpness of the picture as it will appear in the final theater, but the way in which it will surround you. I would say that it is completely impossible to edit for OMNIMAX without such a set-up. We would have no way of making proper judgments about what scenes to use or how to cut them. We didn't have to go into the dome often, but we did have to go into it a number of times, and all final decisions about cutting were made in the dome, not on the editing table.

QUESTION: Where was the sound mixing done?

FERGUSON: It was done at Film House in Toronto, which is set up for six-track stereo re-recording. We have two mixing theaters in Toronto that can handle the mixes for both IMAX and OMNIMAX. In the past, we've also used Todd-AO in Hollywood.

QUESTION: Although we have on several past occasions run articles about IMAX in American Cinematographer, there may be those among our readers who did not read the articles and who may be confused about the differences between IMAX and OMNIMAX. For their benefit, would you mind explaining those differences?

SHAW: Both systems use a 70mm, 15-perforation format in a horizontal configuration for projection (and, of course, 65mm, 15-perf film in the camera). The differences lie in the lenses used and the geometry of the theaters. For IMAX the rectangular format is used on the film, and it is photographed with standard, non-distorting lenses mounted on the camera. Most of those lenses are Zeiss lenses, originally made for the Hasselblad camera, which we have modified by building rigidizing cages on the front end of the movie camera. We get an image on the film which is 1.9 inches by 2.74 inches — 10 times the area of a 35mm movie frame. In the theater we project that image with a lens either 54mm or 61mm in focal length (depending upon the size of the theater) onto a screen which is typically 70 feet high and 90 feet wide. The screen is positioned in front of the audience so that the people have a very wide-angle view. Because of the large format, it is a very high-quality image and, because of the unique projection mechanism, a very steady and well-focused image. It's a rather conventional sort of format, except for the very wide fields of view involved throughout

the system. On the other hand, OMNI-MAX features the same basic format size, but uses a fisheye lens on the camera, so that we see a field of 150° horizontally and about 120° vertically. The lens is also offset on the camera, so that it sees upward and sideways more than downward. The projector is also equipped with a fisheye lens that is a close match to the taking lens, and projects onto a dome, rather than onto a rectangular screen. The dome surrounds the people sitting in the seats and gives the viewer a 180° field of view laterally and about 120° vertically — 25° down and 95° up. To sum them up simply: IMAX is a non-distorting rectangular format, while OMNI-MAX is a fisheye format projected onto a dome.

QUESTION: How many theaters for each format are there at present?

SHAW: For IMAX there are five theaters — four in the United States and one in Canada. For OMNIMAX there is one in San Diego and two more under construction.

QUESTION: How many cameras were used in filming "OCEAN"?

FERGUSON: We worked with two cameras. One of them had a beam-splitter in it for filming on the surface, so that I could use the reflex finder. The other camera, minus the beam-splitter, was used for underwater filming and it gave us something like two-thirds of a stop additional exposure. We were concerned about having enough light underwater, even though we pushed the film whenever we got into dim light. We were still working with the 5254 emulsion. We're looking forward to using the new 5247 stock, however, because in the Space Theater in San Diego the 5254 does not really provide a sharp enough image for the people in the front, due to the fact that the picture is spread around them so much. The 5247 should provide a much better result for the people in the front.

SHAW: I'd like to mention the fact that we used two different ports on the camera housing. We used a flat glass port for above-water shooting. We used a spherical curved plastic port underwater, in order to avoid the angular distortions that you get if you don't use it. We switched between the two ports, depending upon whether we were above water or underwater.

FERGUSON: Bill also designed an air-jet to play on the glass port when the camera was mounted on the lifeboat,

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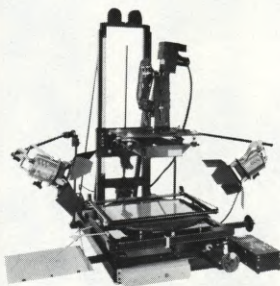
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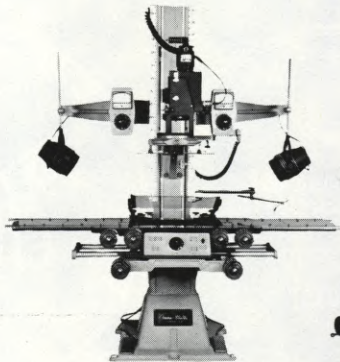
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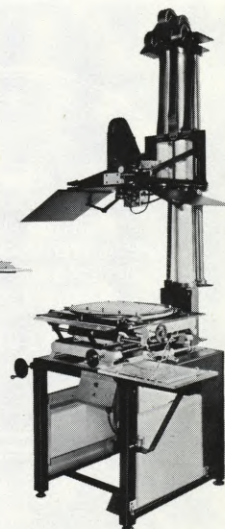
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so that as the spray splashed over the camera, the air-jet blew it clean.

QUESTION: Wasn't that something of a departure from the whirling glass disk that is usually used to keep water off a lens in such cases?

SHAW: Yes, but it's kind of hard to get a whirling disk that will fit over a fisheye — unless you put the bearings around the lens itself and spin the whole thing, and then there is a tendency for water to wind up sitting in the middle of it. What we made was effectively a windshield wiper in which the blade was an air-jet. The air-jet sweeps the surface without any visible device there and, since our format is fisheye — 90° up and 90° to each side, but only about 30° down — there was a space below the lens where the oscillating air-jet could stay.

FERGUSON: It became quite clear from our experience in working with the oscillating air-jet that it is nearly as good as any actual windshield wiper and, in certain situations where you can't use anything else, it's a very good idea. I'm sure we will use it again in the future. The source of air for it is just a regular dive tank, which you can rent anywhere.

SHAW: The dive tank would run it anywhere from 20 to 30 minutes, which, of course, even allowing for a lot of start and stop time, is quite a few thousand feet. It's quite practical.

QUESTION: Aside from creating a stunning piece of entertainment, which you obviously have, what else do you feel has been achieved in the making of "OCEAN"?

FERGUSON: What we started out to try to do basically was to find out how to make better pictures to show in a dome than we had ever seen before. I think we have achieved that in a number of scenes in the film. There are certain things that we regard as a step forward, and it is our hope that the next people who use the medium will gain from our experiences. I certainly feel that, as an art form, making films to show in a dome is interesting and has many possibilities. It has been extremely successful with the public in San Diego. The Space Theater has drawn more than 400,000 people a year during the four years that it has been open. It has proved so successful, in fact, that many more such theaters will be built in the next few years, besides the two that are being built right now. ■



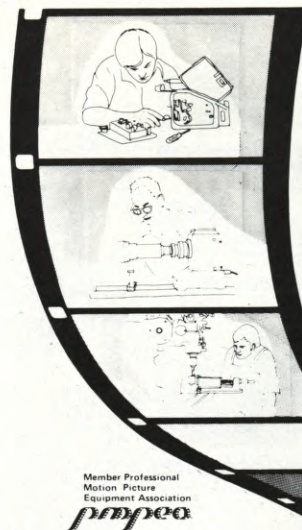
**FILMING UNDERWATER IN THE
WORLD'S LARGEST FILM FORMAT
Continued from Page 1077**

viewing system was a combination of a definite optical finder and a compensating dome on the sportsfinder itself. It gave you the same general view that the lens would give you and worked very well.

In the Omnimax format, a 1,000-foot load of the film lasts approximately three minutes, and the longest sequence I shot was roughly two minutes and 30 seconds. We did have some 500-foot loads that would last half that time, but Graeme used those primarily for his topside shooting. They were not too good for underwater work, because by the time you got into the water and made a shot, it was time to get back out. Averill Townsend, who was really the specialist at maintaining the camera on the project, could reload the film and have the housing back in the water ready to go in less than 20 minutes. A lot of that had to do with the design of the housing, of course. You could set it up on deck and pull it apart and the camera would come out of it very easily so that the magazine could be changed.

Looking back at the "OCEAN" project, I would say that the most difficult sequence was probably the night shooting of the squid. It happened so suddenly that it was a little bit unplanned. Then, too, we were working in the open ocean and we had to put four or five people into the water to shoot the thing. It was a problem just to keep track of everybody. To make things a little bit more difficult, the whales chased us out of the water one night. We didn't know they were all around the boat, but there were 15 or 20 of them and that added to the tension. Then, too, we had been putting in very extensive stretches of water time each day and some of the people on the crew hadn't worked at night before. Considering all that, however, the shooting went very smoothly — it was just a little bit more difficult to do.

Our basic crew consisted of a cameraman, an assistant cameraman, a diver who primarily lugged gear from spot to spot (a sort of underwater grip) and a safety diver who was strictly in charge of the safety aspects of keeping track of people and equipment. Occasionally there would be other divers required to serve as actors, and maybe a light man. So the crew would vary from four to six or seven. The more people you got into the water, the more confusion. But Graeme would talk out every sequence in advance and give



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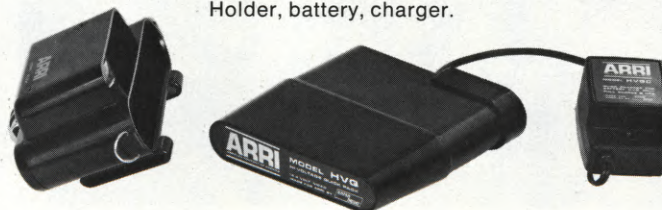
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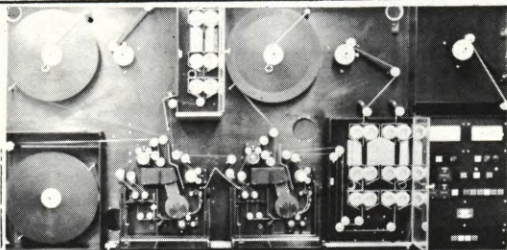
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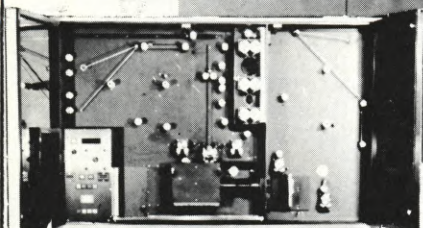
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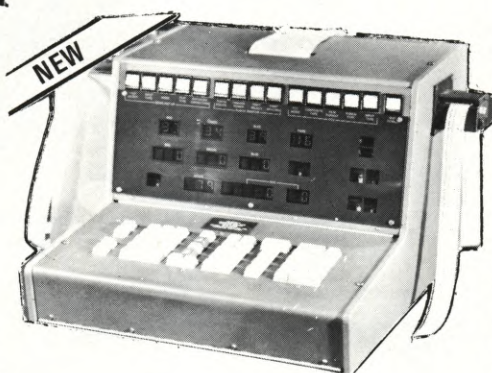
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everybody a general feeling for what he wanted. Sometimes we'd walk through a sequence on the boat so that Graeme could show us exactly what he wanted and we'd try to get it. He took SCUBA diving lessons before the filming started and sometimes he would get into the water with me, especially during the first part of the filming. Since we hadn't worked together before, this helped develop a fine rapport and a good understanding of what he wanted and it worked out very well.

For me, working on "OCEAN" meant a really big jump from 16mm to the huge Omnimax format, especially after they told me that the production cost would range from \$5.00 to \$7.00 per second. The first time I shot what I thought was a long sequence, Graeme said, "Shoot your sequences longer; they're too short." So, at Catalina, I shot a two-and-a-half-minute sequence on my first dive of the day, and Averill, the assistant cameraman, just about fell over. All he was thinking about was the huge amount of money going through the camera, but it was a long swim through the kelp and the actors did everything perfectly, so I just kept the camera grinding. ■

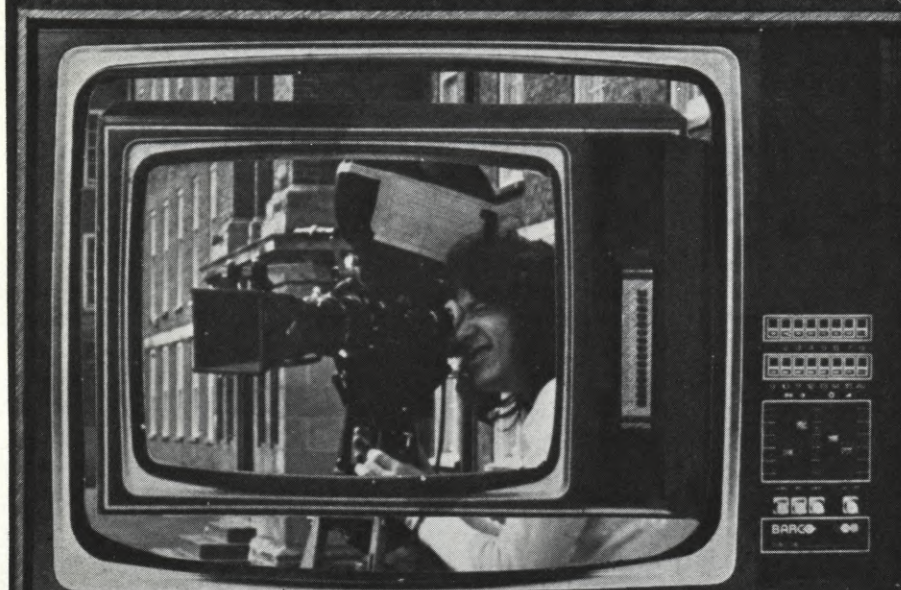
**SHUTTERLESS, FLICKERLESS
PROJECTION IS HERE**
Continued from Page 1049

reflecting mirror facet of the second polygon half, and the net effect of the two mirrors is to cause the optical axis of the projection lens to appear to rotate in space. The center of rotation appears to be the center of rotation of the film and the polygon assembly. By choosing the geometry of the mirror system precisely, it is possible to make the optical axis of the projection lens appear to swing in space at the same angular velocity as the film is moving; and this causes the optical axis to track and to always pass through the center of the film frame. The center-to-center film frame accuracy can be held within .0003 inches (.00732mm).

Using this particular plane mirror arrangement, one problem was not evident on a small rear projection screen, but became very apparent when front-projected with full brightness on a large screen — the problem of dynamic keystone or, in other words, the tilting of the image around the optical axis. Since several facets were illuminated simultaneously while two images were fading in and fading out, they were also tilting in opposite directions and simultaneously stretching and squeezing respectively. And this movement is referred to as dynamic keystone.

To overcome this problem, I

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substituted one scanner half using plane mirrors with another scanner half using 90° roofs. With the film passing the scanner in a straight line rather than being curved around, the dynamic key-stoning was eliminated, since now we had essentially rotating retro-reflectors or sliced corner cubes. This configuration also improved the illumination of the system because it caused a translational, rather than a rotational, effect. But, on the other hand, it created a different problem referred to as the *breathing* or *variable zoom* effect, introduced by the straight film path in conjunction with the rotational scanner.

This indicated that the film-to-mirror distance must be kept constant and, therefore, the film must again be wrapped around the scanner, which normally would again introduce dynamic keystoneing. I was told that to get rid of dynamic keystoneing would require changing the laws of physics. But I realized that even though the cause cannot be changed, perhaps the effects could. And it is this achievement which we have demonstrated.

It is beyond the scope of this paper to go into detail as to precisely how this was accomplished, and I invite interested parties to contact me at a later time. Let me just say that the complete projection system, which was finished just a few months ago, still consists of only three essential parts: the light source, the reflective Hollogon scanner, and the projection lens. There is no need for belts, gears or pulleys (except for special requirements such as framing); just one small wheel, turning in unison and in isotransport with the film.

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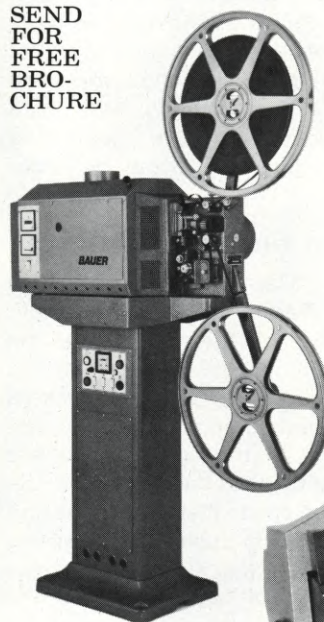
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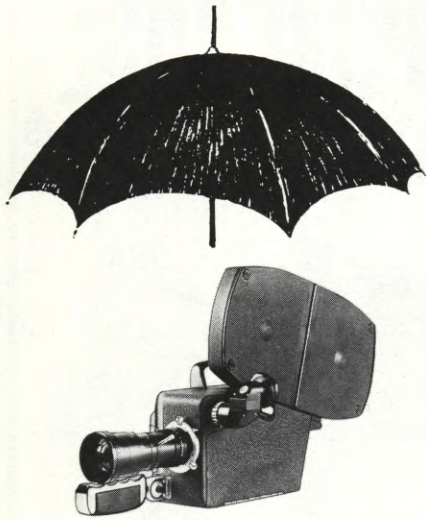
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Continued from Page 1066**

out to make films with the avowed purpose of elevating or ennobling the public, I don't believe it's worth doing. The purpose of making films is to delight and to excite, both the audience and the filmmaker. I would not have made animation all these years if it hadn't been fun. The greatest of filmmakers have always been delighted by this wonderful medium, excited by the opportunity. They love their work and do it for the work's sake. The medium is indeed the message in animation and live action.

"There is one tiny drawback in creative work: you can't win. You can become president of a shoe-making or beer-making company, but you can never make the best film or animated cartoon ever made. Degas' last words, I am told, were: 'If I could only draw.' Isadora Duncan said: 'If I could only make one perfect movement in my whole life I would be satisfied.' An artist can't even call himself an artist. The word 'artist' is a gift word, according to Robert Frost. You can't give it to yourself. You can make films but someone else must say you are a great director or a great filmmaker."

Chuck Jones takes his animation personally. "In every picture," he says, "there is something in there that represents me, either something I would like to be, like Bugs Bunny, who is a counter-revolutionary, or something that I am, like the Coyote or Elmer Fudd."

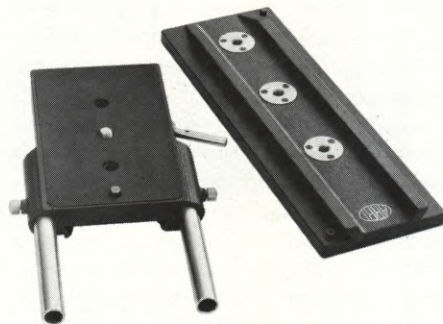
SCRIPTING THE FACT FILM

Charles "Cap" Palmer, Executive Producer, Parthenon Pictures, Hollywood, spoke on scriptwriting for the fact film, with special emphasis on the sponsored film. He warned filmmakers against assuming an attitude of condescension toward the fact film. "There is a challenge to me in business films," he said, "that exceeds that of features and I have done both. Business film writing is more demanding, since the subjects are usually less interesting and the writer must work hard to present the information in an interesting manner. It takes brains and you have less help."

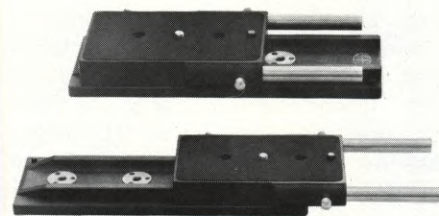
All good writers need the quality of analysis, ingenuity, persistence, the gift of simplicity and the vital assets of enthusiasm, integrity and dependability.

In discussing the development of script concepts, he offered a phrase that formulates the plot of a short story but which can be applied to all forms of

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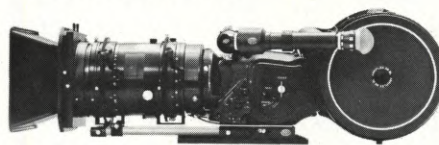


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writing: "Who wants what and why can't he have it? With this, you have character, action and objectives and 'why he can't have it' is the body of the story." Here, as in all sections of his discussion, Palmer illustrated his points with practical examples from his own experience as a writer and as a producer.

FILMING OVERSEAS FOR THE SMALL PRODUCER

G. E. "Skip" Landen, Chairman of Cinema Studies at Ithaca College who has miles of film production behind him, offered some practical advice to the small producer who must film overseas. Some of his pointers:

1. To save on transportation overseas, consider taking passage with a tour group. Landen once booked package tours for three to London and the total cost of the complete package was about 3/4 of the regular air fare.

2. Equipment — in England and some parts of Europe, it sometimes pays to rent equipment rather than carry your own but, since 16mm is not widely used overseas, it is extremely important to make advance arrangements. "In most countries, they still think in terms of 35mm," Landen said, "so be prepared for things like heavy tripods and spiders that are huge things for 35mm."

3. Make a list that includes each piece of equipment and make a number of copies. You can take your equipment out of this country with no difficulty but it is hard to get back in without paying duty unless you have listed your equipment and prepared the proper customs documents.

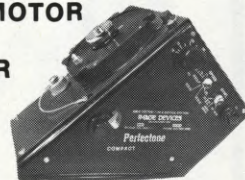
DYKSTRA OF "STAR WARS" WAS A CROWD PLEASER

John Dykstra, Special Photographic Effects Supervisor for "STAR WARS" was a real crowd-pleaser. He showed clips from the film and slides of the miniatures under construction, of the "Dykstraflex camera" and how it was operated. Then, an eager, interested audience kept him at the speaker's stand for another hour and a half with questions. (The June 1977 issue of *American Cinematographer* carried an in-depth story about Dykstra's work on "STAR WARS".)

Dykstra described some of the models made for "STAR WARS", telling how they were made and the materials used to construct them. He also talked about the importance of lighting miniatures, depth of field problems to be solved and shooting the models so that they will seem real to the audience. Also included was an excellent discus-

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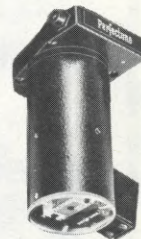
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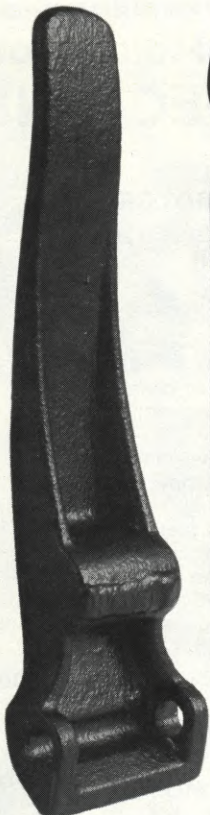
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sion of blue screen photography.

One of the many questions asked by the audience was about the production of the light saber shots. According to Dykstra, this effective sequence was a basically simple procedure, involving retro-reflective screens, a beam splitter in front of the camera and some rotoscoping. He also fielded questions about camera speed in filming miniatures and explosions and explained how the Dykstraflex camera was programmed to add motion to the miniatures.

IS THERE A FUTURE FOR YOUNG SPECIAL EFFECTS FILMMAKERS?

When the question about "breaking into special effects" was raised, Dykstra emphasized the importance of having a well developed talent to sell. "You have to be willing to work hard," he said, and "You have to have a background and understanding not only of film and be intimate with lenses and cameras, but you also have to understand physics, chemistry and mechanics to be able to build the miniatures that will look good on the screen.

"There are a lot of people in the industry who are willing to give a person just starting out a break, but they are all interested in the same thing, and that is product. So, when you start out for Hollywood, make sure you have a real skill to sell, something that you are really good at. You can't go out and say, 'Hey, guys, I can run an Eclair and I'm here to make special effects.' "

MPL EQUIPMENT DEMONSTRATIONS AND PAPERS

In conjunction with the July 30 program, on July 29, MPL presented a day of Equipment Papers and Demonstrations. The Friday morning program included a Lens Clinic, Flatbed Editing Techniques, Steadicam Techniques, Nagra Recording Techniques by Gerald Somerville, Chief Sound Engineer at MPL and a camera clinic which continued all day Friday. On Friday afternoon, the following papers were presented:

Kodak — "Advantage of Using Audio Visuals"; Arriflex — "Time Coding"; Rosco — "Cine Gel Light Correction and Control"; Bolex — "Super Wide-angle Aspheron"; Gordon Enterprises — "Wireless Microphones"; Guillotine — "Tape Splicing"; Optasound — "Sound Editing for Super-8"; Sennheiser — "Sennheiser Microphones"; and Neumade — "A new tape splicer."

The three day program wound up on Sunday, July 31 with equipment clinics and an equipment flea market, sponsored by MPL's Equipment Division. ■

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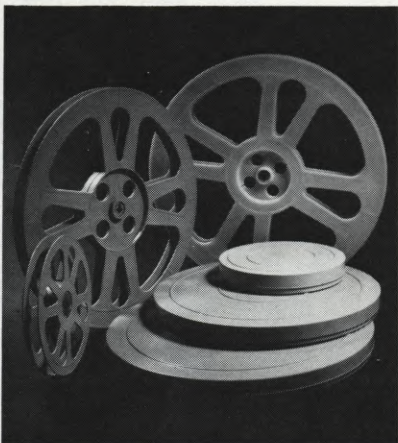
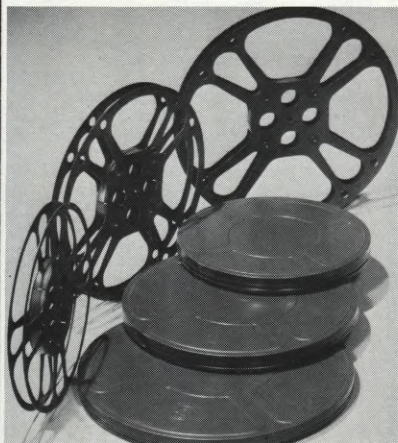
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THE "ISOLUX"—A NEW CONCEPT IN LIGHTING Continued from Page 1061

an important concept in lighting that more people should know about it and use it.

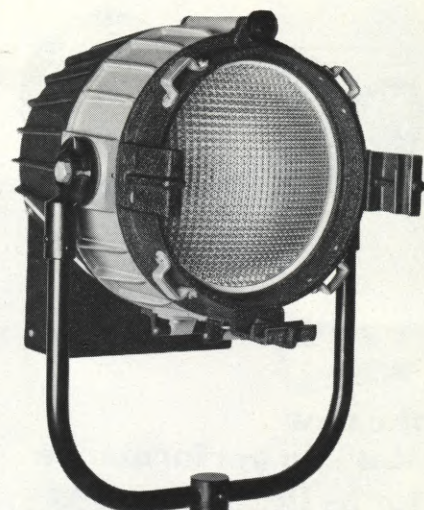
The important thing is that the cameramen, and gaffers, should attempt to know more about the characteristics of the lamps they are using and, one, recognize that these lines exist — two, have some idea as to their shape, and — three, realize that their shapes can be changed to suit the needs of the situation.

This technique was used constantly on "FRATERNITY ROW" (See *American Cinematographer*, August, 1977) with, I believe, considerable success. I do not look at the small, lightweight, versatile equipment as sub-standard to the large studio equipment. Nor do I feel that the hot spot that these lamps have is a drawback. Quite to the contrary, I look at it as an important feature that I can mold to my needs when lighting a set by using the mysterious (until now) and ubiquitous Isolux. ■

NEW VIRGIN ISLANDS FESTE JOB MART INSTANT HIT

An important expansion of The Tenth Annual Festival of the Americas has met with instant and remarkable acceptance, Feste President, J. Hunter Todd, has announced. The Job Mart is a new third division of the International Film Festival, including competition and the film market. It features a special job and talent directory which will list companies with positions open and job seekers with a mini-resume. The Job Mart will be managed by Assistant to the President Peggy Crosby, and will publish the inclusive Job Mart directory, plus a daily job bulletin update during the festival. The Job Mart offices will coordinate interviews and provide facilities to show sample reels and tapes, plus daily cocktail receptions for interested individuals and companies.

Both students and highly experienced creative and technical people will be listed in the Job Mart and exciting career opportunities in every film and television area will be spotlighted. These include small independent documentary companies, major studios, TV production, in-house plants and free-lance work. Hunter Todd added, "There is no charge for a listing in our new Job Mart and no charge for the services and facilities which we are making available to interested parties as a contribution to the film industry."



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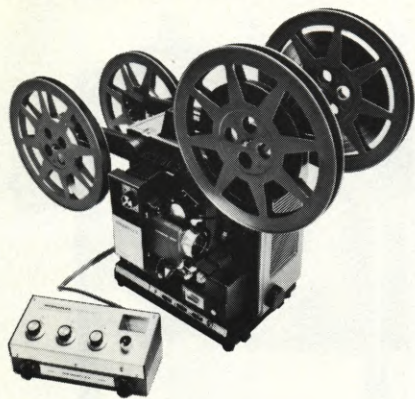
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UPFITTING THE FILMOBILE Continued from Page 1057

etc. ready to roll at all times. Or not arriving late at the next location or having to skip lunch again because of a heretofore impossible schedule. Or hitting the motel's whirlpool minutes after arriving because the day's last activities could be completed enroute from the last location. With the performance of the facility improved, the performance of its crew can improve, along with the results on film. And the *esprit de corps* we all love but too seldom realize is now more likely along with eased tensions, lower travel fatigue, and greater satisfaction of top craftsmanship.

But I'm guilty of seeing the world through rose-colored Series 9 filters; everything has its price. Some may find at first distasteful the discipline of putting things where they belong immediately after use in order to avoid inundation. Others may find that the vehicle's own needs are too many to be justified.

Cost? In addition to the vehicle and its contents (which total about a quarter of a million dollars in our example), there are many "hidden costs", such as garage space (ours is about 20 by 30 by 12) or heating, parking in New York, side trips to avoid LP gas-prohibiting tunnels, insurance, heavy duty tires and batteries and other vehicular expendables, and the enormous cost of sitting idle during inevitable slow times. Of course, there can be offsetting rewards of customer satisfaction and subcontracting to other producers.

On Location

A typical day on a modest production for which the Filmobile can be fully justified begins at about 7 a.m. The production is a short marketing concept film for one of the country's ten largest firms. The highly mobile production requires including a dozen locations in six days between Chicago and New York. High production values are appropriate for this prestige client. In order to be cost effective, the Filmobile and a small but versatile crew add up to the only alternative. The crew of only four (counting on the Filmobile to help them make it possible) consists of a producer/director/cameraman, production manager/sound recordist, assistant director/assistant cameraman, and gaffer/grip.

As breakfast is completed, the production manager is checking out of the motel; the gaffer is warming up the Filmobile, removing the power tie-in

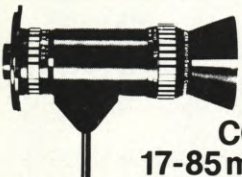
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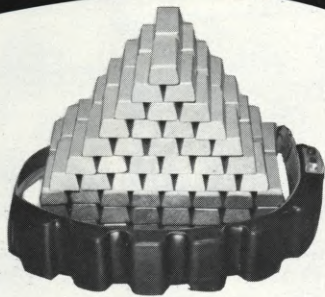
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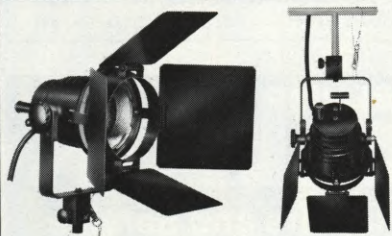
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which has been charging vehicle and camera batteries overnight, and checking tire pressure; inside, the assistant cameraman is loading magazines and the director is reviewing his script.

The Filmobile pulls out at 7:30 for arrival at 8:00 at its first location with the gaffer/grip at the wheel. The director/cameraman and production manager are joined by the assistant, now finished loading, to discuss the interview that is next. The Filmobile arrives a bit early and is greeted by a liaison representative with whom arrangements for the filming have been made in pre-production. The gaffer wheels the Filmobile (with the liaison representative now enjoying the view from the copilot's seat) to an entrance closest to the action; five head-on parking spaces have been barricaded as promised. The liaison representative joins the entire crew in coffee and Danish from the galley as the director outlines his approach. Then, at 8:15, all but the gaffer (who remains to re-silk a softlight frame) enter the location to choose a suitable background. At 8:30, the director/cameraman has chosen his shot and radios to the gaffer for the lighting and grip equipment necessary. The assistant cameraman and production manager/sound recordist return to the Filmobile for their respective equipment, while the director remains with the interviewee to set him at ease and discuss his responses. At 9:00, the shot is lighted with two deuces, two softlights, and an inky, all scrimmed and gelled, plus three cutters and the 16SR on a tripod. Takes roll until about 10:00, when that setup is wrapped in 15 minutes and a break is called for, prior to an hour of setting up and shooting cutaways at this location. The Filmobile's lighting dolly and hand-holdable 16SR reduce unnecessary hauling or trips back to the truck. By noon, the Filmobile is already enroute to the next location some 100 miles away. Underway, with the director at the helm, the assistant cameraman changes two magazines and the gaffer, a lamp. The production manager, a reincarnated short order cook, takes orders from his deli-galley and the crew relaxes for a pleasant lunch, nap, and two-hour drive past scenic rural Ohio.

Before 2 p.m., the Filmobile arrives at the next location and the process of choosing shots and equipment proceeds, this time for two relatively complex lighting setups in a fluorescent-lit research laboratory and a dimly-lit plant. The Filmobile contains enough apparatus to light them separately, even though 5kw of plus green gelled fill are needed in the first shot and 16kw

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are required in the latter shot. All but two units required in both areas are set up by the gaffer while the first shot is made. By 5:00, 950 more feet have been shot, the equipment is struck, and the Filmobile and its satisfied crew depart for the motel about a half hour away, where five parking spaces have been saved adjacent to the crew's rooms. By 6:00 p.m. the crew is distributed among the motel's various resources, having accomplished the day's last duties enroute.

On a typical day on a much larger production, the lighting and grip equipment have been removed from the Filmobile, allowing for more camera and sound equipment and office space. One of eight vehicles, the Filmobile served as production headquarters, camera, and sound truck for one of the PBS prestigious "Visions" series, a full-length feature drama entitled "LIFE AMONG THE LOWLY" filmed in New England. For five weeks in production at twenty some locations, and involving 64 artists and technicians in all, the Filmobile served as the production manager's office and producer-director's field headquarters. Its camera department contained videocassette apparatus for the Cinema Products Cinevid system used to obtain instant dailies of this original teleplay, produced as a collaboration between the Trinity Square Repertory Company, Providence, R.I., and Robin Miller, Filmmaker Company. The film was produced and directed by Adrian Hall and Robin Miller and aired on PBS December 2, 1976.

Similar in most respects to production for TV movies, the Filmobile's versatility implied in the smaller production above translated into successful use of 16mm for television drama, videocassette viewfinding and playback, and live vocals to pre-recorded instrumental music production, all unique production techniques. The Filmobile made it possible for the Pennsylvania producer's core group to commute weekends during the production without travel fatigue. The results received critical acclaim in several large newspapers.

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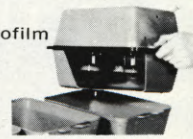
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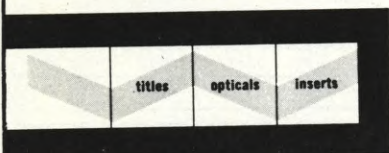
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(ABOUT THE AUTHOR: Producer-director Robin Miller formed his own independent motion picture company seven years ago with offices and studios in Bethlehem, Pa. His "CHILD OF THE UNIVERSE" won the Corporation for Public Broadcasting Best Public Affairs Documentary for 1974. Miller also co-produced and co-directed "LIFE AMONG THE LOWLY", a critically acclaimed 90-minute dramatic feature for PBS's 1976-77 "Visions" series. In addition to documentaries, industrials, and television commercials, Robin Miller, Filmmaker Company is now expanding its feature production for the commercial networks and theatrical distribution.)

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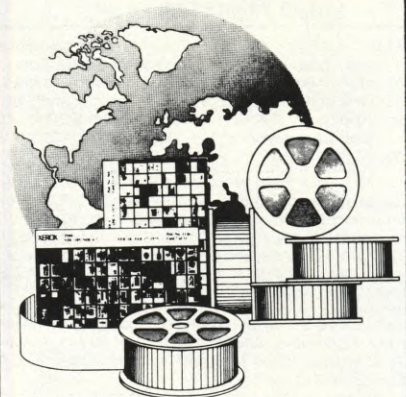
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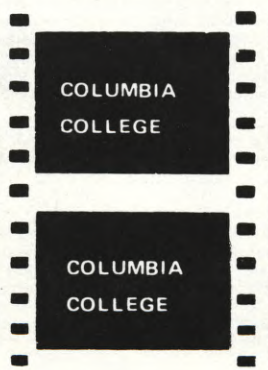
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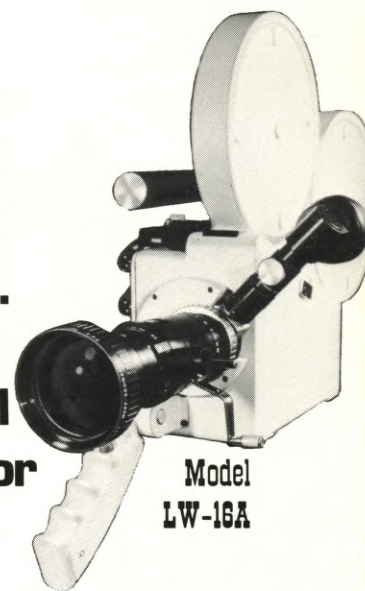
take off: \$3000	take off: \$3000	take off: \$3000	take off: \$3000
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Model FR-16A

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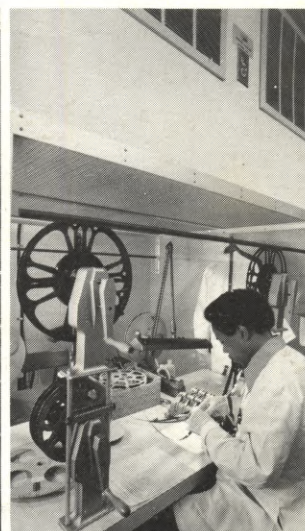
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