MAY 1971

AMERICAN Cinematographer

75 CENTS

International Journal of Motion Picture Photography and Production Techniques

THE 43rd ANNUAL ACADEMY AWARDS PRESENTATION

NOW! SOS PRESENTS 3 NEW 35mm PROJECTION SYSTEMS TO MEET YOUR INDIVIDUAL NEEDS!

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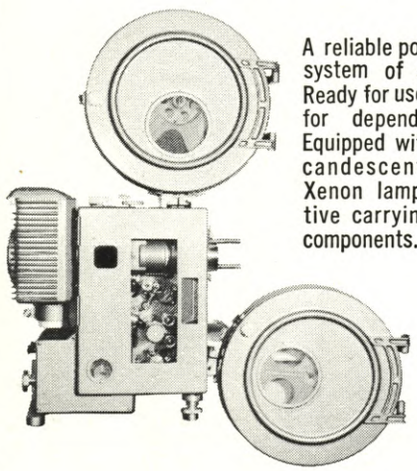

A reliable portable projection system of superior quality. Ready for use. Ruggedly built for dependable operation. Equipped with standard Incandescent or optional Xenon lamp house. Attractive carrying case for all components.

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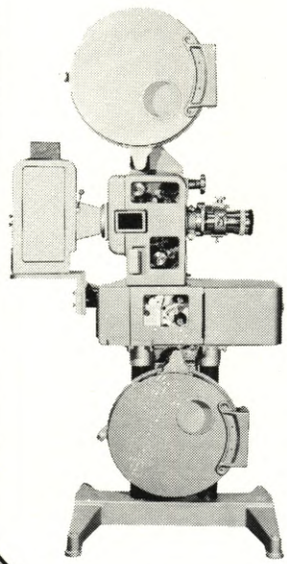
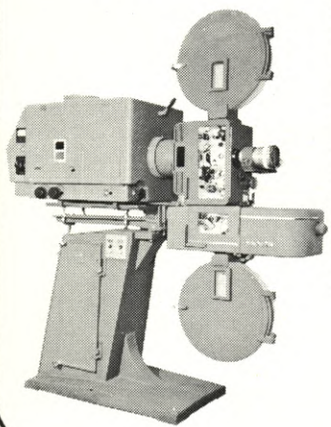


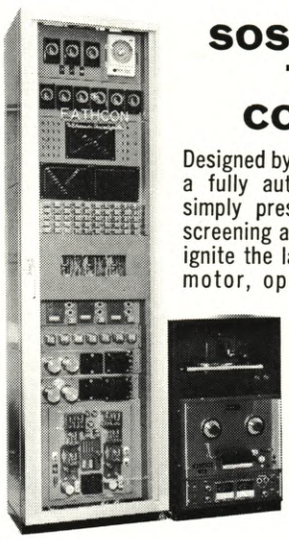
A complete package for your screening room. Heavy duty Geneva Projector with rotary oil damped direct drive soundhead on modern double post pedestal. Unique 3000′ magazines for reels adaptable for loop projection. Available in Incandescent or Xenon light source. Standard or double system magazines, optical or magnetic sound reproduction and synchronous or non sync motors.

No. 3—SOS THEATRE:

A dual Projection System with advance design curved gate, water cooled fittings for use with maximum amperage lamps. High speed single blade conical shutter for high light transmission. Automatic filtered oil system; automatic safe ty switch; High Fi Theatre sound reproduction with transistorized optical pick up. Horizontal beam Xenon lighting system for balanced light distribution over entire screen.



SOS AUTOMATIC THEATRE CONTROLLER:



Designed by Toshiba Photophone of Japan, a fully automatic programmer that by simply pressing a button can make a screening announcement, lift the douser, ignite the lamp, dim the lights, start the motor, open the curtain, make the changeover and at the conclusion shut off projectors, raise the lights, close the curtain and closing announcement.

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Why the NPR's magazine change takes only five seconds.

Snap off the old magazine, check the aperture, snap on the new magazine. That's all. No threading; no loop to form; no blimp to climb in and out of. You don't need to touch the film at all. The film is threaded and the loop is formed inside the magazine when you load it, before shooting starts. The spring-loaded rear film pressure plate is on the magazine; the film channel and aperture are on the camera body. When you snap off the magazine, the aperture, registration pin and claw are right before your eyes, visible and accessible for fast inspection. Loading the 400 foot magazine is fast and easy, too; and most of it, including forming the loop, can be done in daylight.

With unscripted action that won't wait, you can leave the tape recorder running when you run out of film, and cover the lost five seconds with a cutaway, later. The NPR's built-in clapper will automatically re-establish sync. Or with Crystal Control, you can tap the microphone to tail slate the scene. In the studio with a script, the five-second magazine change can prevent everyone on set from going off to make a phone call when the magazine runs out of film. With the NPR it's just a new take. Immediately.

For NPR brochure, write Eclair Corp. at 7262 Melrose Ave., Los Angeles, 90046; or at 73 South Central Avenue, Valley Stream, New York 11580.

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So we built the SSIII.

It's the lightest 16mm single/double system sound camera available.

But the best thing about the SSIII is the way it works. Like a charm. Under the worst possible conditions. It performed on the Arctic voyage of the S.S. Manhattan. And in the swamps and jungles of Vietnam.

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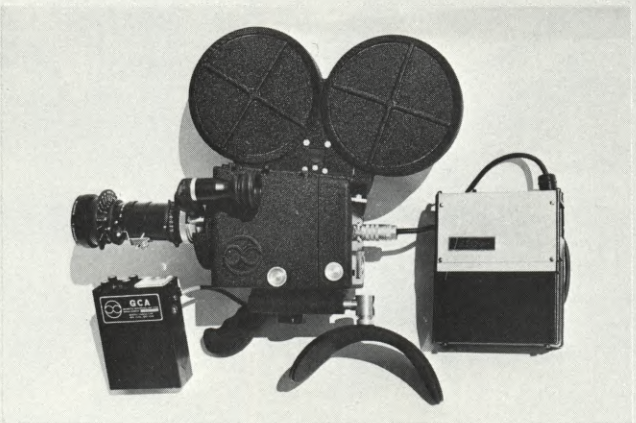
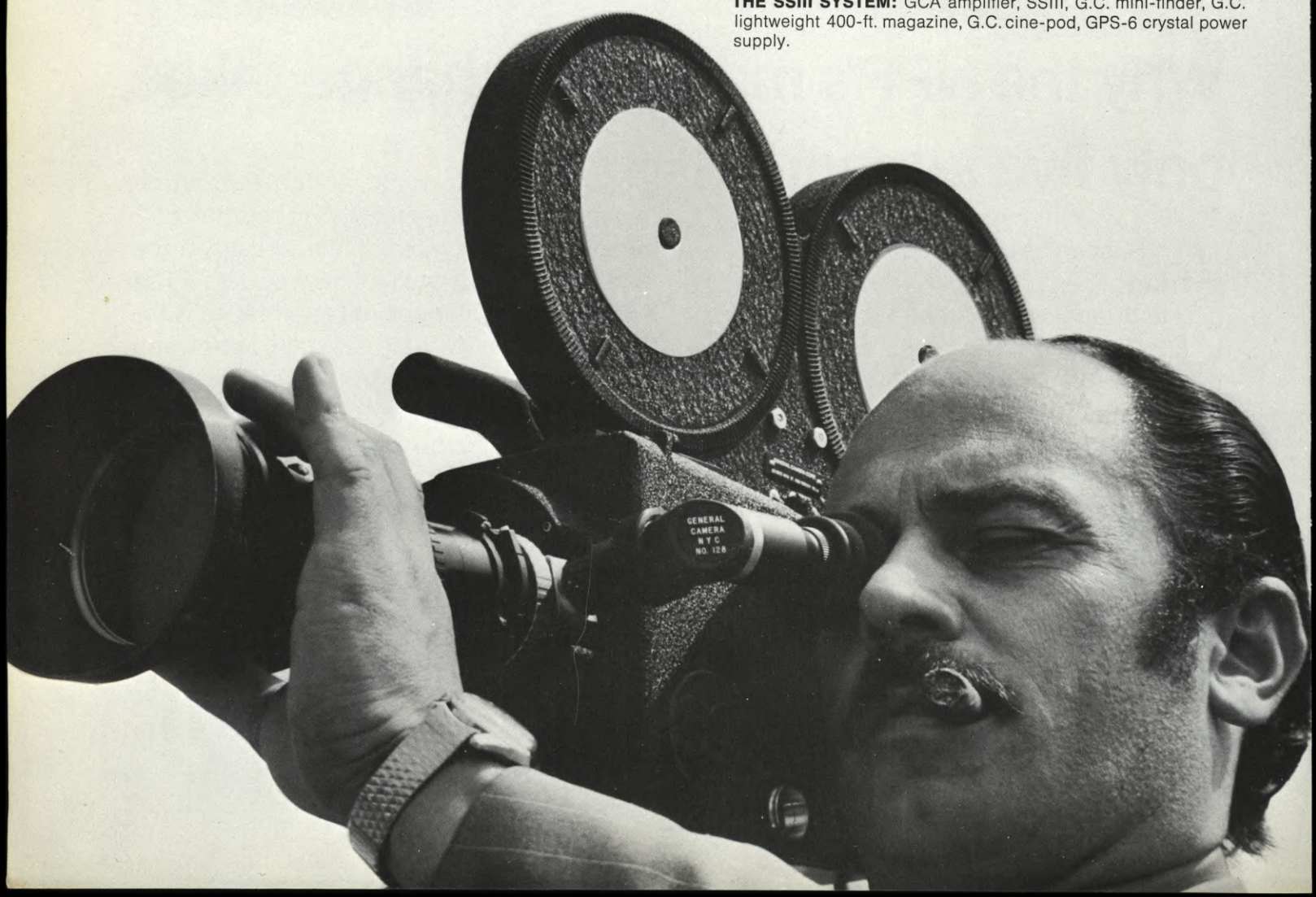
We think a cameraman should work with his head. Not his back.



THE SSIII SYSTEM: GCA amplifier, SSIII, G.C. mini-finder, G.C. lightweight 400-ft. magazine, G.C. cine-pod, GPS-6 crystal power supply.



AMERICAN Cinematographer

International Journal of Motion Picture Photography and Production Techniques

MAY, 1971 VOL. 52. NO. 5

Editorial–Business Offices
1782 North Orange Drive
Hollywood, Calif. 90028
876-5080

Advertising Representative
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• FEATURE ARTICLES

• DEPARTMENTS

ON THE COVER: The "Oscar" statuette of the Academy of Motion Picture Arts and Sciences, awarded each year for the best achievements in the various major categories of motion picture production.

AMERICAN CINEMATOGRAPHER, established 1920, in 52nd year of publication, is published monthly in Hollywood by ASC Agency Inc., 1782 North Orange Drive, Hollywood, California 90028, U.S.A. **SUBSCRIPTIONS:** U.S. $7.00; Canada, foreign, including Pan-American Union, $8.00 a year (remit International Money Order or other exchange payable in U.S.) **ADVERTISING:** rate card on request to Hollywood or New York office. **CHANGE OF ADDRESS:** notify Hollywood office promptly.

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16mm reflex uses interchangeable 400′ mag. or 100′ internal spools, with elec. MM-type take-up motor. Constant speed MST-type elec. motor. Rechargeable 12 volt, 3½ lb. battery pack. Auto. controlled var. shutter, 1:1 frame shaft, auto. single frame counter, 3-lens turret, auto. loop former. Wide range of accessories. WRITE FOR PRICES.

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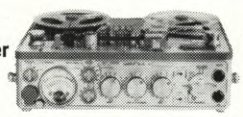

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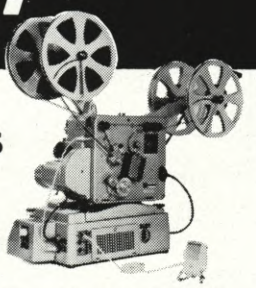

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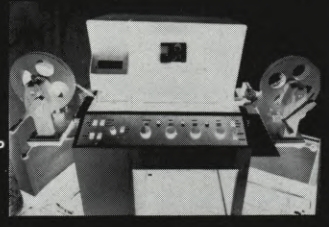

As our Color Timer looks at the picture, he adjusts it for proper color balance and density by using three color dials. They provide a practically infinite range of adjustment. Much more accurate than *wedging*, which is making several trial exposures with different color and exposure values and then interpolating for the one that is most nearly right.

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That's why we can save you time and money---and still give you superior quality.

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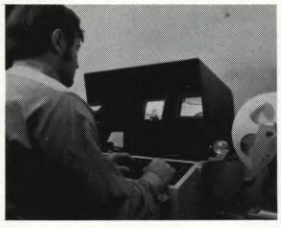

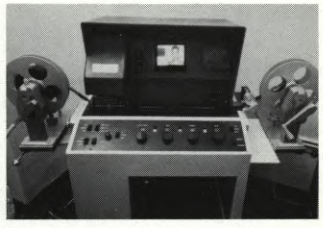

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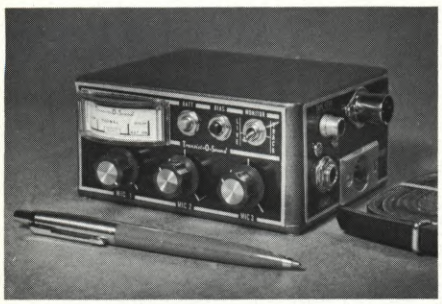
IN PRODUCTS, SERVICES AND LITERATURE



NEW THREE-CHANNEL, LIGHT-WEIGHT AMPLIFIER FOR MAGNETIC SOUND-ON FILM CAMERAS

Transist-O-Sound announces the availability of its new Model 3-CA Amplifier for use with Auricon and Bolex Pro-16 Cameras.

Weighing only 1½ pounds and measuring 2 x 4 x 4½ inches, Model 3-CA is the smallest three-channel unit of its kind on the market.

This amplifier was designed to be used by either one or two man crews and contains features not previously available in portable high fidelity magnetic recording amplifiers.

The Unit provides 3 inputs, fully filtered against stray RF fields, and transformer matched for balanced inputs. Microphones must be wired in a balanced configuration with both microphone leads ungrounded. Pins 2 & 3 must be connected to the microphone output with Pin #1 connected only to the cable shield and to ground. When microphones of 150 to 250 ohms impedance are used, adequate level and quality will be supplied to the recording heads.

The Model 3-CA, meaning 3 channels –Chest–Amplifier, is normally supplied to match the Filmagnetic heads used in the Auricon cameras. It will match the heads presently used in the New Bolex Pro 16 camera.

AGC or Automatic Gain Control is used in this amplifier to prevent accidental audio overloads in recording unknown audio sources. However, it can be neutralized by switching the AGC switch to the OFF position.

The cable supplied from the amplifier to the camera has an interlock circuit in the plug, preventing accidental discharge of the amplifier batteries when not connected to the camera. The cable must be in the amplifier OUTPUT socket before the unit can be used.

An accessory, the HI LEVEL ADAPTOR, is available which, when inserted into any mike input, will attenuate levels up to 1 Volt RMS for use in that particular channel.

PERFORMANCE FACTS

Frequency Response–	40 to 12 KHz within 1 db.
Total Harmonic Distortion–	Less than 2% at 1KHz
AGC Range–	40 db.
AGC Attack Time–	5 milliseconds at 1KHz.
AGC Recovery Time–	60 db-second.
Signal to Noise Ratio–	-55 db.
Input Sensitivity–	500 microvolts.

For further information, write: Transist-O-Sound, 851 N. Eustis Drive, Indianapolis, Indiana 46229, Area Code 317 897-1549.

•

NEW 2X TELEPHOTO EXTENDER LENS FOR "C" MOUNT LENSES

Century Precision Cine/Optics of North Hollywood, California, announces the availability of their new 2X Cine Telephoto Extender Lens for 16mm motion picture cameras. This lens fits any "C" or RX Mount Tele-Lens and makes possible the conversion of tele-lenses (75mm or longer focal length) to double their power. Thus, a 150mm f/2.8 Tele-Athenar becomes a 300mm f/5.6 compact, light-weight tele-lens, focusing as close as 7 feet.

The unit simply screws onto the "C" mount thread of the "C" mount tele-lens. The *original focusing scale remains accurate* and renders close focusing even though the power and resulting detail magnification has been doubled.

Precision optical system is hard coated and lab tested for exact focus collimation. Weighs only a few ounces. Also suitable for CC-TV zoom lenses. Note: This unit can be used with 16mm or TV zoom if iris is stopped down to f/4 or smaller (T/8). The price of the Century 2X Tele-Extender, including caps, is $59.50. Fully Guaranteed.

•

FIRST AFI-MAYER ORAL HISTORY PUBLISHED BY PRAEGER

The American Film Institute is pleased to announce publication of Peter Bogdanovich's Oral History on Allan Dwan, pioneer American film director. The book is the first to emerge from a continuing series of recorded oral histories with America's film pioneers, initiated and directed by the Institute with funds from the Louis B. Mayer Foundation.

Peter Bogdanovich conducted extensive interviews with Allan Dwan over a period of nine days in 1968-69. Dwan's remarkably prolific film career spans more than half a century, beginning in 1909—less than a year after Griffith made his first movie. Now 86, Dwan looks back on more than 400 films he directed and at least 400 more with which he was associated. He lists his own favorites as ROBIN HOOD (with Douglas Fairbanks, Sr.), SUEZ (Tyrone Power, Loretta Young), SANDS OF IWO JIMA (with John Wayne), MAN-HANDLED (Gloria Swanson), and BIG BROTHER.

"To follow Dwan's career is to watch the evolution of an art," says Bogdanovich in his introduction. The edited version of the lengthy recorded oral history traces that evolution through 75 of Dwan's films. A detailed filmography and a lavish selection of stills round out the publication.

Bogdanovich, more than fifty years Dwan's junior, is a filmmaker himself, as well as a film historian. His film, TARGETS, has won critical praise, and he has just written and directed THE LAST PICTURE SHOW for BBS Productions. He has published books on

Continued on Page 497

Compatibility.

To wide-eyed movie audiences of long ago, COMPATIBILITY meant lean and steely Billy Hardgaze and his faithful Sweetheart riding off into the sunset. Sweetheart was his horse.

Times have changed and the motion picture industry has changed, too. Audiences don't thrill to Billy and Sweetheart anymore. And new, improved techniques in filming and processing have also evolved through the years. Consider COMPATIBILITY . . .

Today, COMPATIBILITY means different things to different people. To professional motion picture processors, it means using standard printing and processing equipment and chemistry for convenience, consistency and quality in reproducing the best possible release prints from first or second generation negatives.

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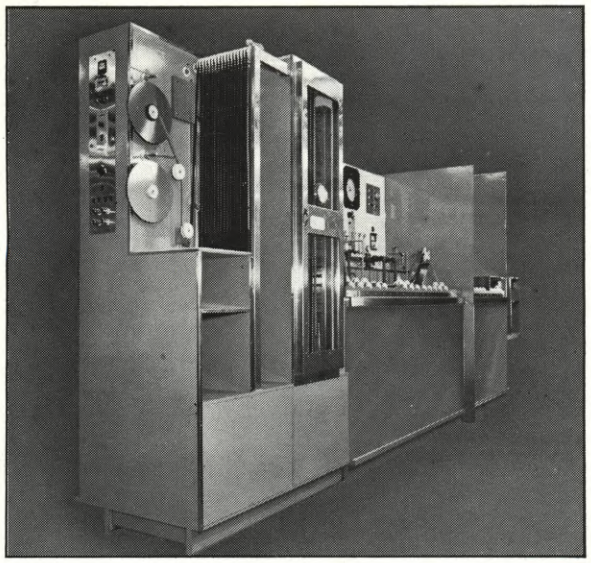
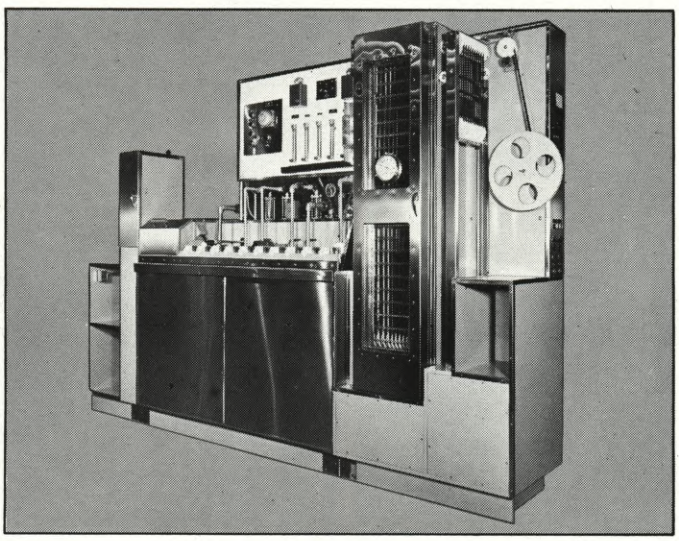
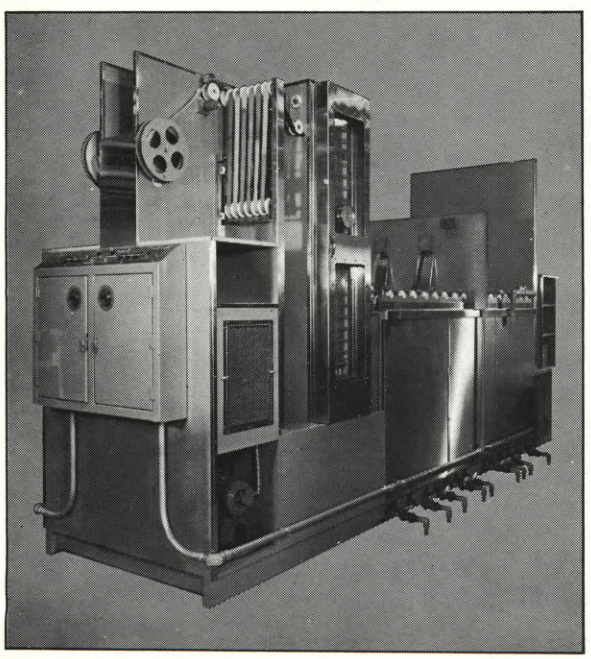


You choose the film—

we'll furnish the processor

- B&W Negative
- B&W Positive
- B&W Reversal
- Ektachrome
- Kodachrome
- Kodacolor
- Anscochrome
- Negative Color
- Positive Color
- Microfilm
- Super-8mm
- 16mm
- 35mm
- 70mm





Whatever type of motion picture film you want to process, there's a Houston machine to do the job faster, better, more economically. All achieve consistently excellent results because the film manufacturer's specifications are rigidly adhered to. Chemical solutions are constantly kept at the proper strength and temperature. Development times are precisely timed. Drying is accurately controlled. All machines incorporate exclusive features that have made Houston the standard of the world. Tell us the type of film you want to process and we'll send you brochures on the appropriate models.

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Think of what you can do creatively with capabilities like this, and with Todd-AO's Oscar-winning technical quality that can insure superb film quality, whatever your budget.

Come to think of it, why think about it. We'll let you pre-test Todd-AO 35 for your next production so you can see for yourself: Todd-AO's greater capability gives you more creative room than any other 35mm anamorphic lens system. See you soon?

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A lot of productions use a lot of different cameras for a lot of different purposes. One camera might be blimped and mounted for sound work. Another might be hand-held for wild shots. A third might wind up on the camera car. And if time-lapse, animation or underwater footage is required, the call might go out for cameras number four, five, or six.

ARRIFLEX® 35 users use accessories where other-camera users use other cameras

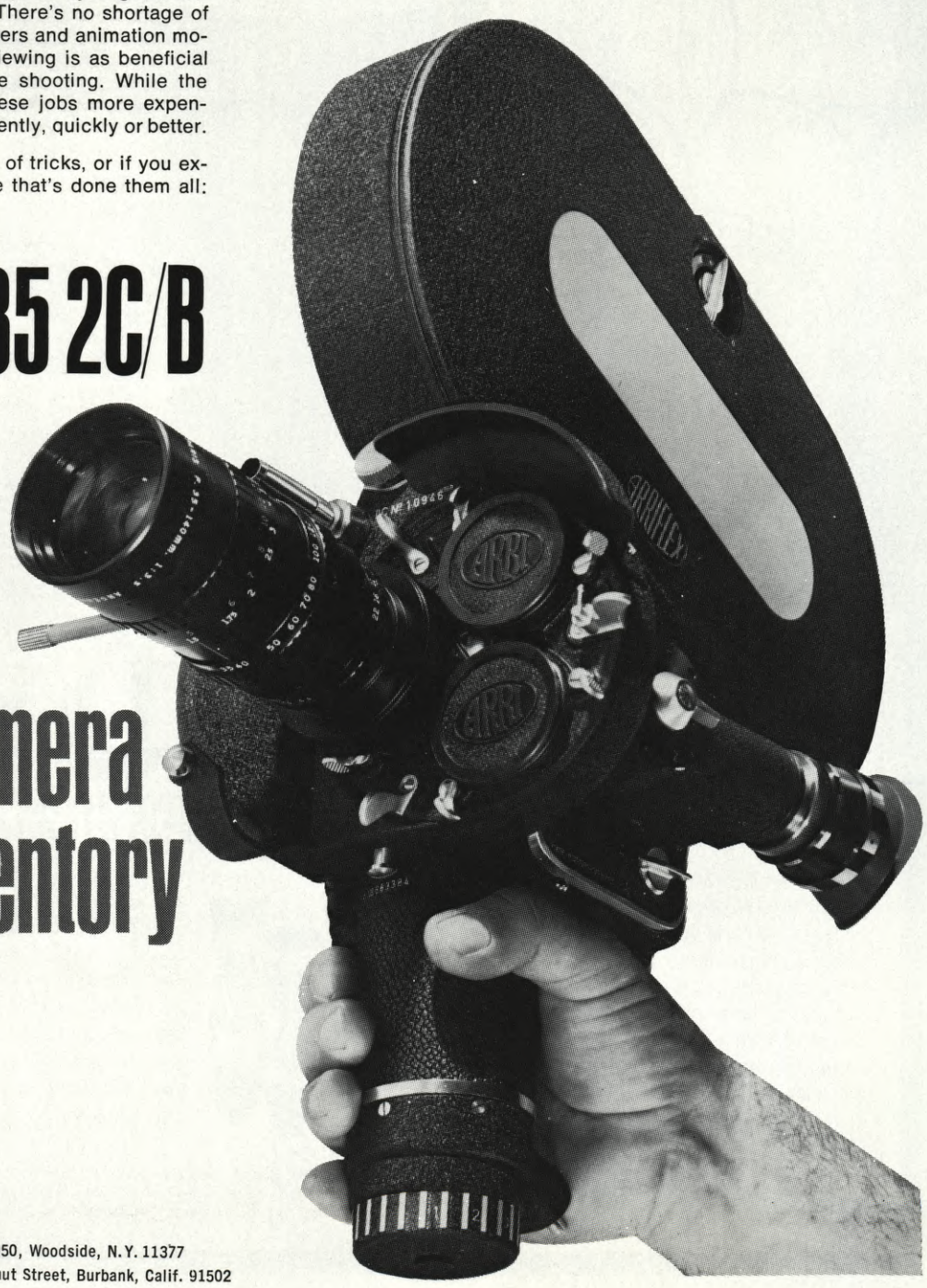
Arriflex had a better idea — one rooted in logic, convenience and economy. Why not use one camera and a choice of accessories to do many jobs, instead of many cameras to each do one job?

The idea's validity has been pretty well substantiated over the past three decades. An Arriflex 35 is a 200′ or 400′ camera that can be hand-held, that squeezes into any corner its operator can, that leaves some room in the camera car for the cameraman. And that same Arriflex is also a blimped 1000 footer, with sync generator and automatic slate, if you wish. There's no shortage of underwater housings, intervalometers and animation motors; and Arriflex mirror-shutter viewing is as beneficial on the animation stand as in live shooting. While the single purpose cameras do all these jobs more expensively, none do them more conveniently, quickly or better.

So if your writers call for all kinds of tricks, or if you expect the unexpected, pick the one that's done them all: Arriflex 35.

ARRIFLEX® 35 2C/B

the one-camera inventory



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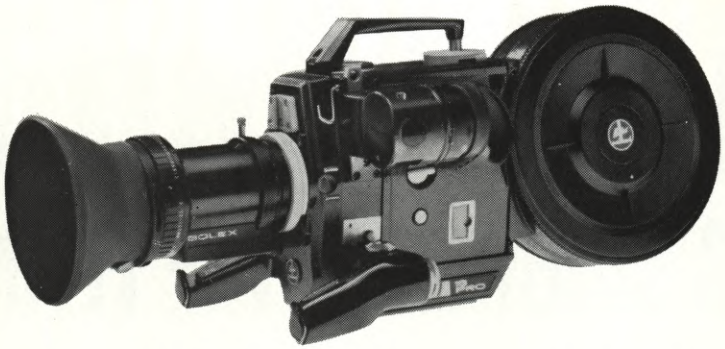

How much do you want to know about BOLEX 16 PRO?

I'd like to know more about:

THE MAGAZINE
- ☐ Coaxial for 400′ reels or cores.
- ☐ Compact light and inexpensive
- ☐ Sprocketless design for quick loading
- ☐ Footage counters for each chamber
- ☐ Rear-mounted for optimum mobility

FILM THREADING
- ☐ Fully automatically in 3 seconds
- ☐ Fully automatic film take-up in 400′ magazine
- ☐ Signal light tells when camera is ready to shoot
- ☐ Light signals when empty
- ☐ Built-in cutter for removing partially exposed film

MOTOR DRIVE
- ☐ Crystal controlled for sync sound filming
- ☐ One electronically controlled motor for all filming needs
- ☐ Variable speeds 16 to 50 fps; 16-100 fps models available
- ☐ Forward and reverse
- ☐ Single frame filming
- ☐ Instant start and stop—no blank frames between scenes

SOUND
- ☐ Double system at 24 or 25 fps
- ☐ Super quiet—no blimp needed
- ☐ Wireless synch sound shooting with accuracy ±1 frame per 1,000 feet
- ☐ Automatic slating lamp
- ☐ Single system sound model available

FILMING AUTOMATION
- ☐ Fully automatic exposure control
- ☐ Variable speed power zooming
- ☐ Variable speed power focusing
- ☐ All controls built into handgrips
- ☐ Manual over-rides on all controls
- ☐ Remote control possible for all functions

EXPOSURE CONTROL
- ☐ Automatic, through-the-lens
- ☐ Manual over-ride
- ☐ Film speeds of 12 to 1600 ASA
- ☐ Meter coupled to camera speed control
- ☐ f-number visible in viewfinder
- ☐ Audible signal when insufficient light

LENSES
- ☐ Wide range of zoom lenses
- ☐ Extreme wide angle lens
- ☐ Rugged bayonet mount
- ☐ Lens controls coupled to servo motor
- ☐ Silent operation of powered lens controls
- ☐ Shock-absorbing rubber lens shade

VIEWFINDER
- ☐ Practically flickerless mirror shutter reflex viewing
- ☐ Camera stops without mirror blackout
- ☐ Possibility of right or left-eye viewing
- ☐ 20X magnification
- ☐ Instant change from ground glass to clear glass
- ☐ TV and 16mm frame markings
- ☐ Can be rotated 45, 90, and 180 degrees
- ☐ Indicates f-stops
- ☐ Remote viewing possibility

FILM TRANSPORT
- ☐ Very low pressure required at pressure plate
- ☐ High-precision single tip claw transports and registers film
- ☐ Superb picture steadiness better than 0.1%

POWER PACK
- ☐ 12V rechargeable battery
- ☐ Plug-in electronic modules
- ☐ Plug-in crystal synch controls
- ☐ Outlets for connecting tape recorder, time lapse units and other accessories
- ☐ Choice of powerbelt or powerpack
- ☐ Signal light on camera shows condition of battery
- ☐ All of the above

BOLEX 16 PRO

If, in addition to information, you'd like a demonstration of the Bolex 16 PRO, write Paillard Incorporated, 1900 Lower Road, Linden, New Jersey 07036. We'll notify you when we'll be in your neighborhood.

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AFFILIATION _____

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CITY_____ STATE_____ ZIP_____

For countries outside the U.S.A., write Bolex International S.A., 1450 Ste. Croix, Switzerland

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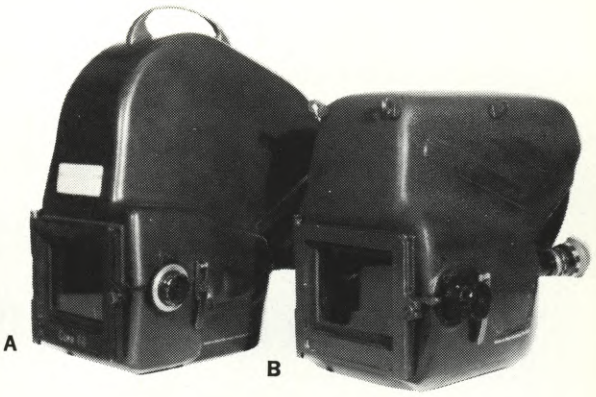
Put It All Together for 1971!

Now's the time to update your Arri 35 into a blimped, hand-held, crystal-controlled camera at prices designed to fit the most strict budget. AGE Inc. is pleased to offer the brand new Cinema Products crystal-controlled motor especially manufactured for the Arri 35, plus a group of affiliated accessories that will enable you to convert your Arri at a minimal expenditure.



A–Cine 60 Blimp 35mm 400-Foot

The blimp with standard accessories, including follow focus, door for 25-250 zoom lens, less flat base.

Price **$1900.00**

B–New 200-Foot Low Profile Top for Cine 60 35mm Blimp

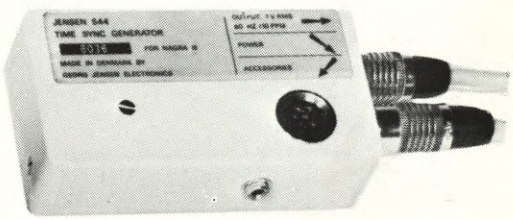
An Alan Gordon Enterprises Inc. exclusive, this low-profile top fits on the Cine 60 blimp, is lightweight and easy to handle, ideal for shooting in restricted areas.

Price **$450.00**

Crystal Motor Model CRA-2

Motor is integral with a specially designed flat base that fits in a Cine 60 blimp or mounts on a tripod or body pod. The control circuitry, including a crystal oscillator, with an accuracy of plus or minus 15 parts per million over a temperature range of 0° to 140°F, is fully self-contained in the flat base and motor housing. The motor itself is 18 db quieter than the existing constant speed motor, resulting in a 2 db reduction in sound level of the Cine 60 blimp. Power consumption from a standard 16-volt battery pack is at least 50% less than with the constant speed motor.

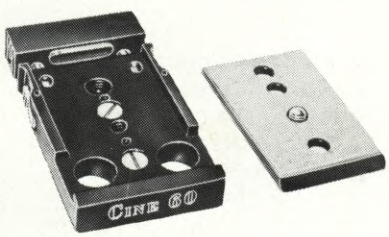
Price, complete with cable **$1750.00**



Jensen 544 Crystal Time-Sync Generator

Used on the Nagra in conjunction with the crystal-controlled motor on the Arri 35 to provide cordless sync double system recording.

Price **$254.00**



Cine 60 Snaplock

Permits mounting of camera in one second. Designed to stand the rigors of daily use. Precision machined from solid aluminum.

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All items are in stock and available for immediate delivery.

Cine 60 Universal Power Belt Pack

Has the completely sealed and rechargeable GE nickel-cadmium cells with specially designed built-in charger. Equipped with automatic circuit breaker. Belts also available in 8V DC, 8/16V DC, 12V DC.

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shown on optional
MZS 805 Shockmount

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what you don't hear is as important as what you do.

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To begin with, it's the equivalent of a 6-foot-long "shotgun" microphone, able to reach out and literally isolate an individual or group of people at considerable distances—while shutting out surrounding sounds . . . even the running noise of your equipment. But no less important, the fact that it's a *condenser* microphone insures you get *all* the sound there is to record—from the roar of city traffic to the shrill of a distant sea-bird; from the whisper of a talk-show guest to the audience's laughter; from a bass crescendo to a piccolo pianissimo.

But don't take our word for it—or for that matter, the experience of thousands throughout the world who insist on the MKH 805. Find out for yourself, by requesting a demonstration or our data sheet, which contains complete information on the MKH 805, its accessories and application. Please write or phone:

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Manufacturing Plant: Bissendorf/Hannover, West Germany

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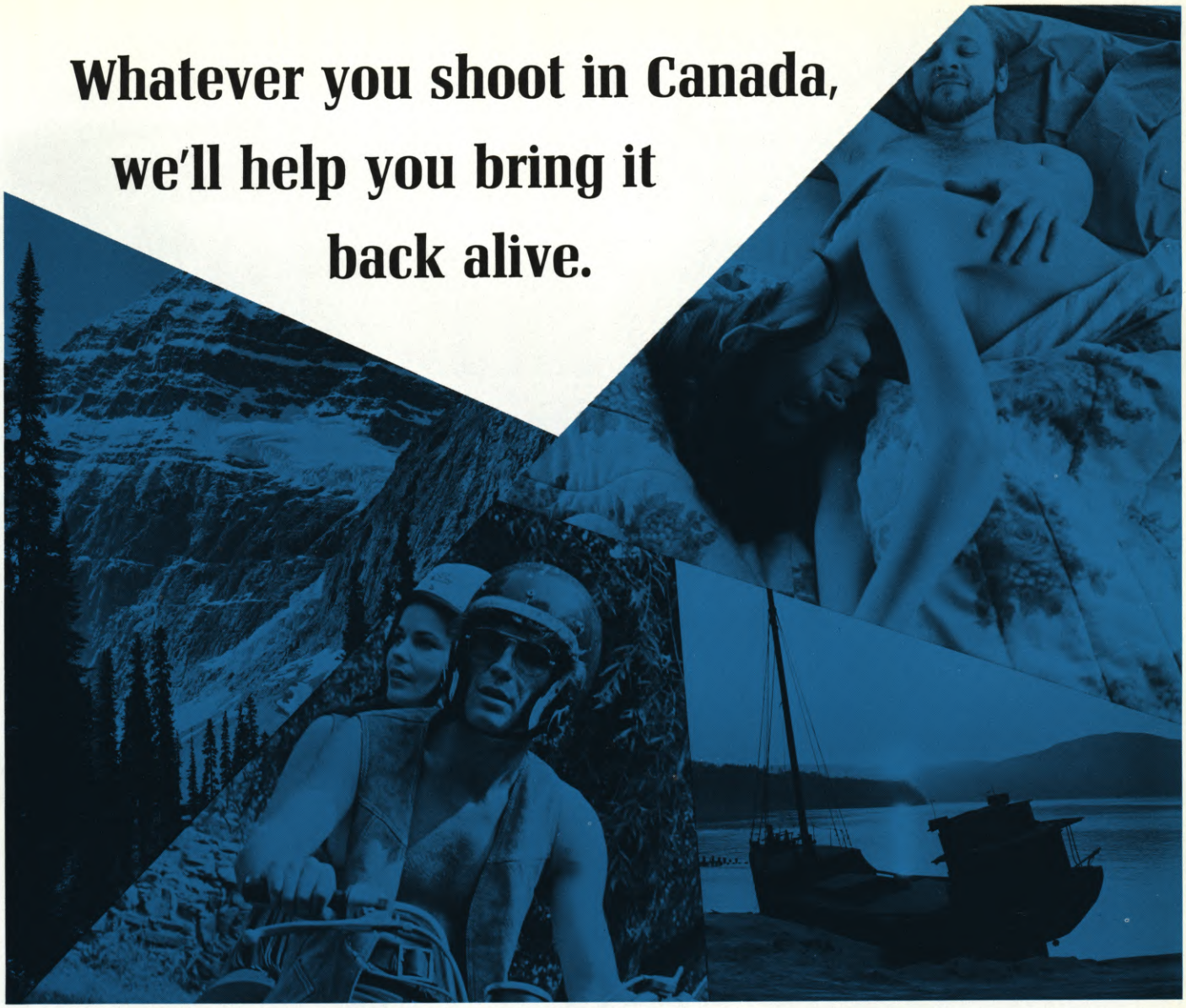

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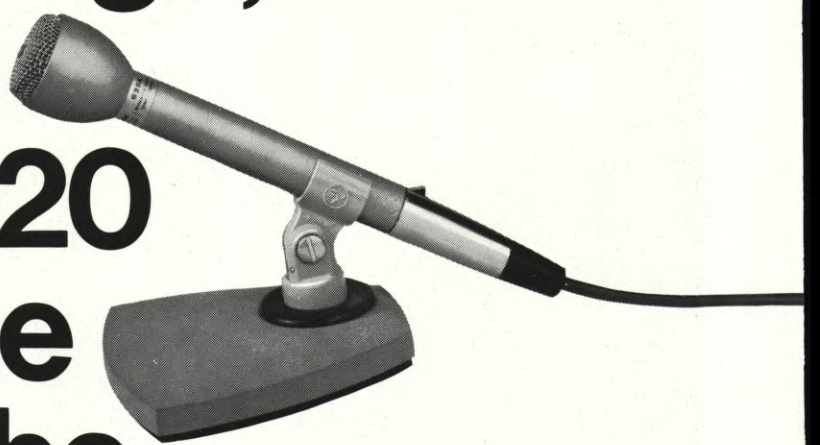
Can a tough, little $49.20 microphone make the big time?



(A success story.)

A good little microphone, the E-V 635A. But just how good? After all, it was intended to replace the "workhorse" Model 635... a dynamic microphone that had earned its title under fire in studios and on remotes all around the world.

So when we introduced the 635A we put it to a critical test. A major recording studio was loaned a dozen 635A's and asked to test them. The engineers weren't told the price, but they got the idea that it was somewhere near $300.00.

They were so delighted with the sound that they cut several big band recordings with nothing but 635A's. "Best $300.00 microphone we've got." Then we told them the price. They were shocked. $49.20? They couldn't believe their ears.

Meanwhile, 635A's were beginning to appear in force on music and variety shows on every TV network. Mostly hand held. Something to do with ruggedness and good balance... but mostly because of the sound. Especially during ultra-close miking.

The rest is history. Radio and TV newsmen quickly adopted the 635A as their new "workhorse". After all, news only happens once, and the 635A was their best insurance against bad sound.

To most professional sound engineers, the E-V 635A is already an old friend, although it's only been around since 1965.

At the price, they can afford to use it almost everywhere. And they do. (We told you it was a success story.)

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MODEL 635A Omnidirectional dynamic. Response 80—13,000 Hz. Output — 55db. Balanced low impedance. Includes Model 310A stand clamp and lavalier neck cord. Fawn beige Micomatte finish.

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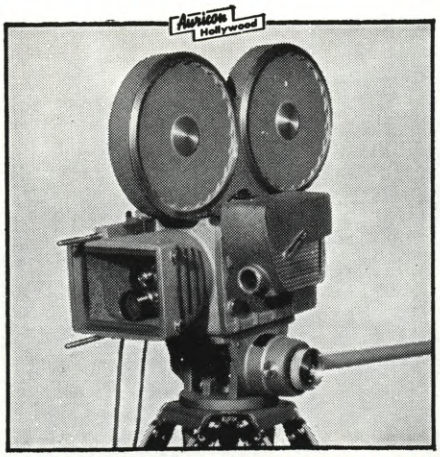
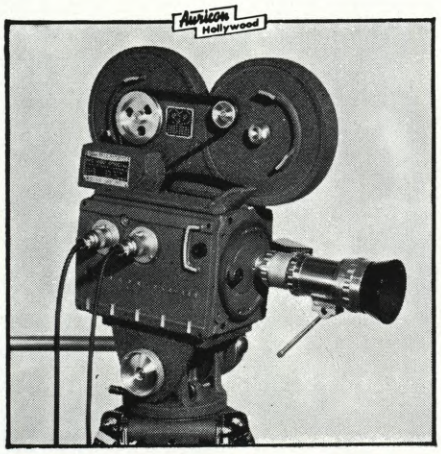
"CINE-VOICE II" 16 mm Optical Sound-On-Film Camera.
★ 100 ft. film capacity for 2¾ minutes of recording; 6-Volt DC Convertor or 115-Volt AC operation. ★ $1180.00 (and up).



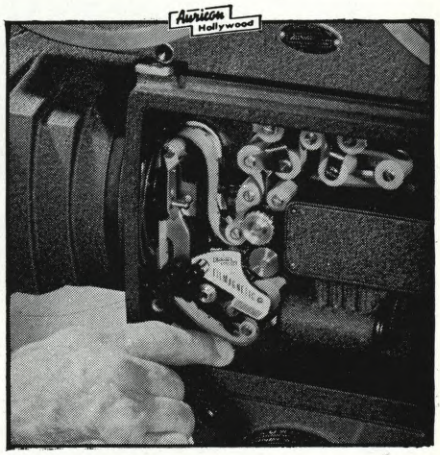
"AURICON PRO-600" 16mm Optical Sound-On-Film Camera.
★ 600 ft. film capacity for 16½ minutes of recording. ★ $1820.00 (and up) with 30 day money-back guarantee.

"SUPER 1200" 16 mm Optical Sound-On-Film Camera.
★ 1200 ft. film capacity for 33 minutes of recording. ★ $6425.00 (and up) complete for "High-Fidelity" Talking Pictures.



"PRO-600 SPECIAL" 16mm Light-Weight Camera.
★ 400 ft. film capacity for 11 minutes of recording. ★ $1620.00 (and up).

PORTABLE POWER SUPPLY UNIT — Model PS-21... Silent in operation, furnishes 115-Volt AC power to drive "Single System" or "Double System" Auricon Equipment from 12 Volt Storage Battery, for remote "location" filming. ★ $337.00



FILMAGNETIC — Finger points to Magnetic pre-stripe on unexposed film for recording lip-synchronized magnetic sound with your picture. Can be used with all Auricon Cameras. ★ $1325.00 (and up).

TRIPOD — Models FT-10 and FT-10S12... Pan-Tilt Head Professional Tripod for velvet-smooth action. Perfectly counter-balanced to prevent Camera "dumping." ★ $406.25 (and up).

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If it's profit you're after in the production of 16 mm Sound-On Film Talking Pictures, Auricon Cameras provide ideal working tools for shooting profitable Television Newsreels, film commercials, inserts, and local candid-camera programming. Now you can get Lip-Synchronized Optical or Magnetic Sound WITH your picture using Auricon 16 mm Sound-On-Film Cameras. Precision designed and built to "take it."

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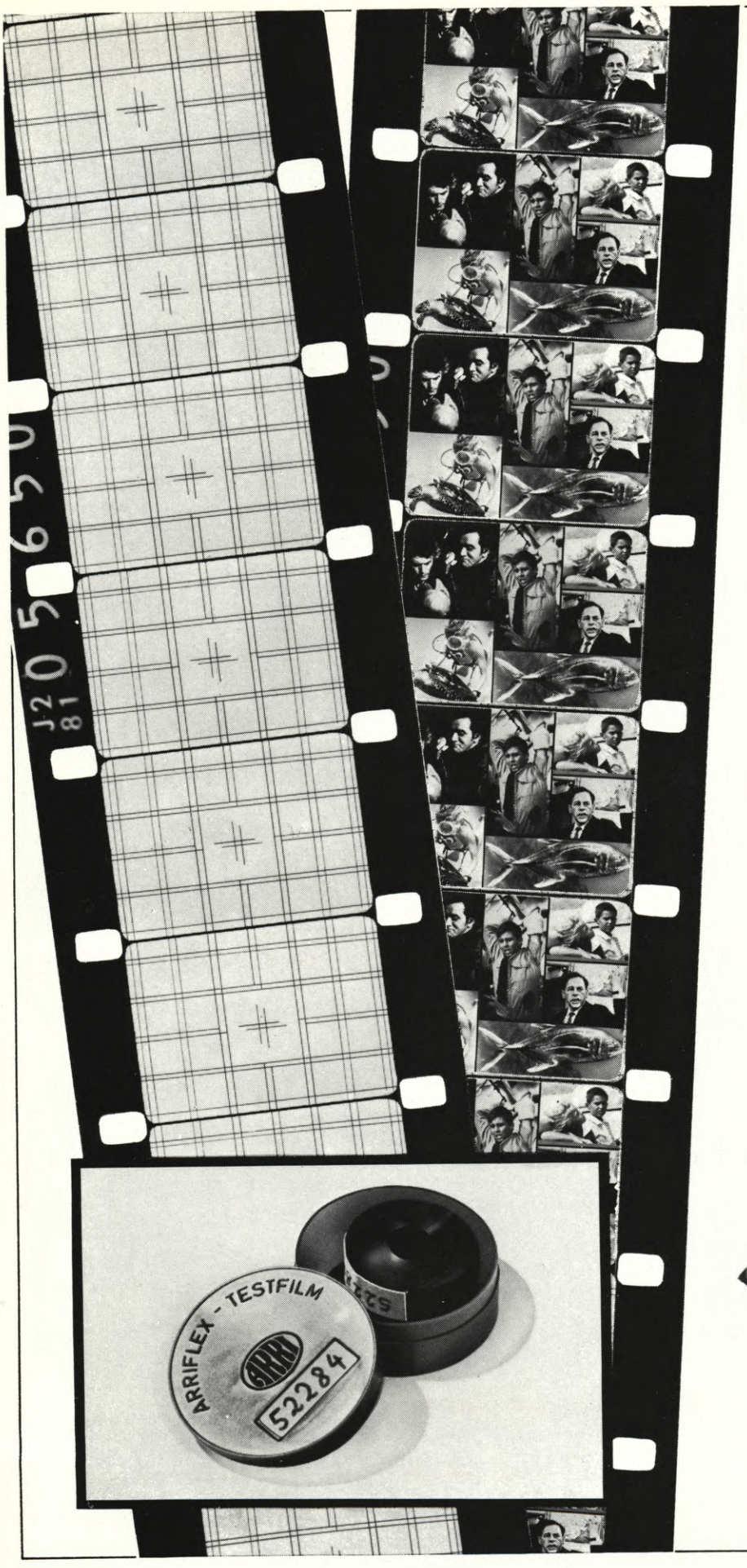

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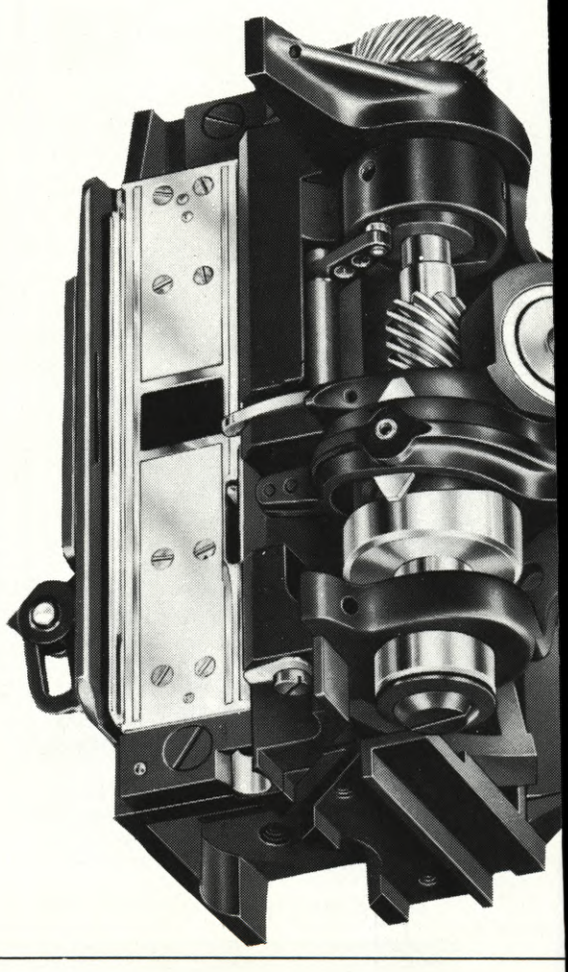
OPTICAL



16's precise pin-registration* assures

PRINTING ACCURACY

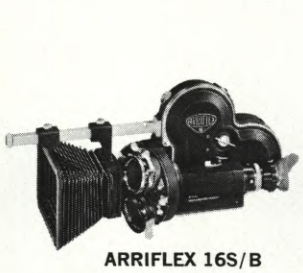
Arriflex 16mm film transports provide the critical registration essential for the most sophisticated opticals . . . and each camera comes to you with the proof!

The test film that accompanies each new 16mm Arriflex shows why these cameras are so successful in shooting master footage for optical effects. Multiple-image, split-screen, 16 to 35 blow-ups and other complex effects are as important in 16mm production today as in larger-format production—and absolute registration of the camera original is a pre-requisite if opticals of superb quality are to be made later in the laboratory. That such techniques can be produced without compromise in 16mm will be proven when you project the Arriflex test film.

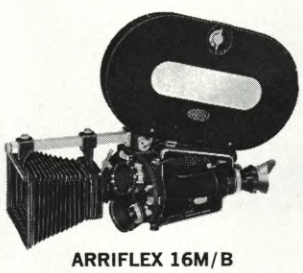
The test film was made in two exposures, with the test grid offset before the second pass. Had registration been anything less than perfect, you'd see it immediately on the screen as movement of the grid lines in relation to one another. But there is no such movement—you see the illusion of a single exposure—because of the unfailing constancy of each frame's registration.

The reason for such consistently steady footage is not only because of a true registration pin film movement but also due to the design and construction of the mechanism as a whole. It features many unique concepts for absolute film stability, followed through with the most durable materials. Its quiet, vibrationless precision prevails at all running speeds, forward and reverse, over millions of feet of film. Its ability to withstand shock and environmental extremes has been proven countless times over, since its introduction nearly twenty years ago.

Picture quality is the essence of any film, of course; whether or not a production involves opticals, registration and sharpness are among the elements producers and cameramen stake their reputations on. This offers one explanation why there are more Arriflexes in use throughout the world than any other professional camera. For the complete story, write for brochures.



ARRIFLEX 16S/B



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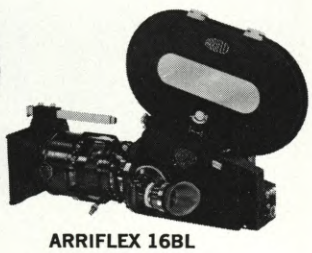

ARRIFLEX 16BL

*THE SOURCE OF ARRIFLEX'S OPTICAL PRINTING ACCURACY

Pin movement locks each frame into position for exposure; long film channel with spring-loaded side pressure rail produces absolute lateral stability. Solid cast, hardened double cam mechanism resists wear, sustains vertical registration accuracy over millions of feet of film. Rear pressure plate (removed in this illustration to show registration pin) is an integral part of the movement assuring longitudinal stability (no film breathing).

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ARRIFLEX COMPANY OF AMERICA

"Scoopic 16 shoots the news faster than any other camera available."...*Says Henk de Wit, Director of Photography at KDFW-TV Dallas.*

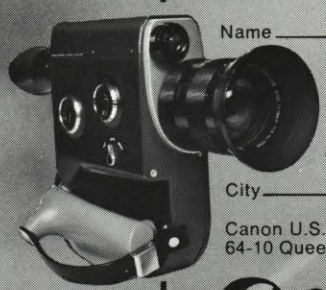
*Staff at KDFW-TV Dallas ready to film the news when it happens, where it happens with their Canon Scoopic 16s.**

Canon's Scoopic 16. Made for action moments. Because it shoots them faster than any hand camera around. That's a large claim for an under 7-pounder.

Uniquely designed hand-grip. Fully automatic exposure control with manual override. A built-in zoom lens. Motor drive and auto threading. All adding up to a perfect shot. Everytime.

Close-ups, medium and long shots, zooms, telephotos, wide angles. Even "follow" shots. Instantly focused. Indoors and out. Filming . . . not fumbling. Because your eye never leaves the view finder. You're always in focus. Especially for the unexpected.

Let us tell you more about Canon Scoopic 16. Why it's the best, most reliable professional camera around. At only $1250. Use our coupon to request illustrated literature.



Please tell me more about the Canon Scoopic 16. The "action moment" 16mm. In focus for even the unexpected.

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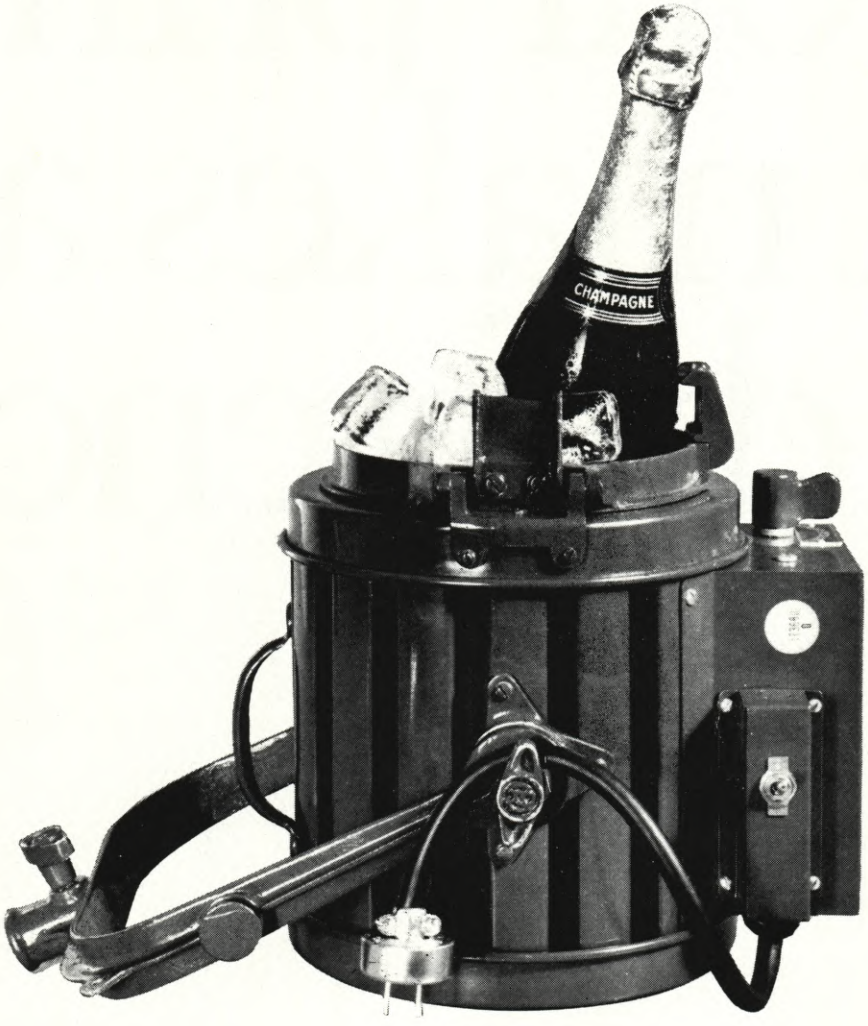
Canon/SCOOPIC 16

**All Canon Scoopic 16s pictured, sold and serviced by Professional Cine Products, Inc., Dallas, Texas.*

champagne lighting on a beer budget?



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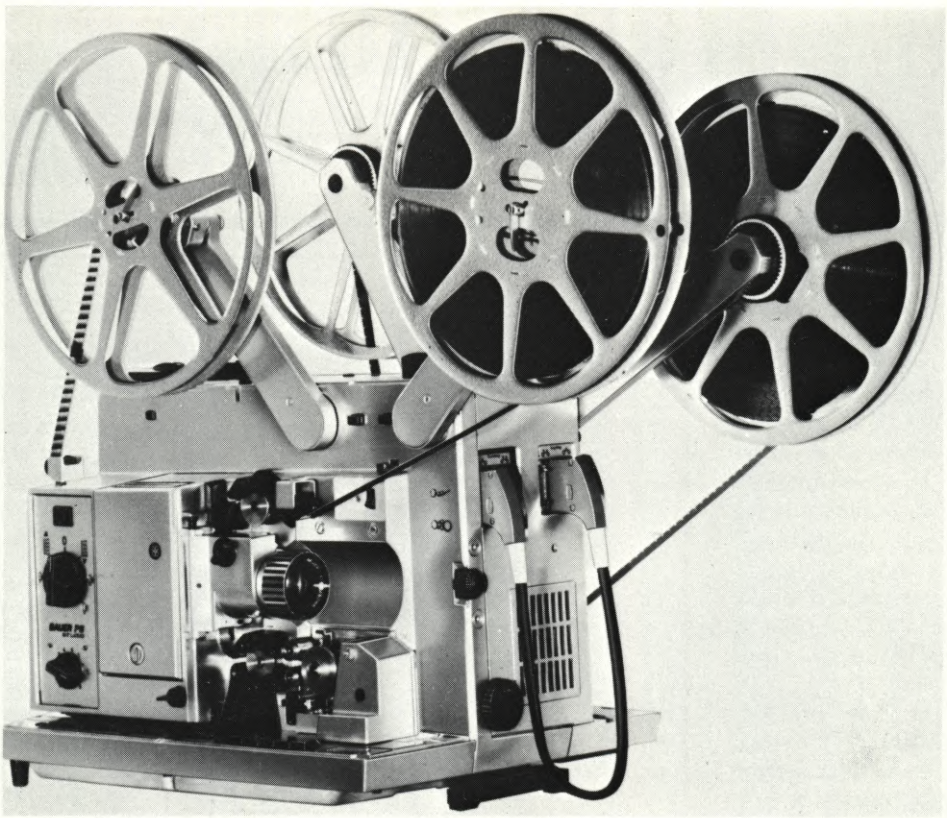
BAUER P6 STUDIO PROJECTOR

16mm Double Band



TECHNICAL DATA	BAUER P6 STUDIO
Reel Capacity	2,000 ft. (600m)
Film Threading	manual; for picture film and perforated 16mm tape.
Projection bulb	24V-250W quartz iodine
Brightness	approximately 600 lumens
Power Requirements	115V-60 cycles A.C./450 Watt
Drive	Synchronous motor
Speed	24fps. or 25fps. forward or reverse running
Aperature	7, 16mm X 9, 6mm
Take-up assembly	load controlled, self compensating friction
Power Rewind	fast rewind for picture film, rewind for magnetic film by driving motor
Shutter	2 blades
Claw	3 tooth, special hardened
Film pull down ratio	1:6.9
Adjustment of frame line	by moving claw assembly
Picture-Steadiness	±0.1%
Tilting	+7
Cooling system	double fan on motor shaft
Emergency stop	if film tears, complete power cut-off
Hour counter	built in
Reel Capacity of separate deck	2,000ft. (600m)
Sound Reproduction of separate deck	from either center track or edge track (chosen by switch)
Sound recording of separate deck	on either center track or edge track (chosen by switch)
Sound reproduction picture side	either optical or magnetic sound from picture film edge track
Sound recording	on picture film edge track
Magnetic sound track widths (sep. deck)	center track: 2.2mm edge track: 4.8mm

TECHNICAL DATA	BAUER P6 STUDIO
Sound heads on sep. deck	individual magnetic heads for erasing, recording and reproduction
Sound monitoring while recording	Yes
Sound monitoring amplifier	plug-in type with outputs of 1.5V and 5-15ohm. With switch for either picture film or tape deck side
Fly wheel on sep. deck	on start of projector, automatically speeded up. On stop of projector, automatically slowed down
Central feeding sprocket on sep. deck	can be disengaged for easier positioning of tape film to start mark
Amplifier	solid state, with silicone transistors. Built in projector base
Amplifier output	20W. sinus; 25W music power
Built in speaker	3W (can be switched to off-half-power-full power
Exciter lamp	6V/1A DC
Silicone photo element	type Siemens BPY 11
Trick recording control	for superimposing sound on sound for either picture film or magnetic deck tape
Inputs Phono Microphone Pre-amp	150mv/500kilo ohm 0.5mv/200ohm 1.5v/600ohm (6db)
Outputs Speaker Pre-amp	8ohm/15Watt 1.5volt/600ohm +6db 1.5volt/600ohm, adjustable
Frequency response	optical sound −5 cycles . . . 7,000 cycles ±3db magnetic sound −50cycles . . . 12,000 cycles ±3db
Signal to noise ratio	45db
Wow and Flutter	picture film — ±4% (DIN) tape deck — ±3% (DIN)
Weight	approximately 66pounds

Specifications subject to change without notice.

LIST PRICE $3,575.00

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CINEMA WORKSHOP

By ANTON WILSON

ZOOM LENSES

The care and maintenance procedures for fixed focal-length lenses apply without exception to zoom lenses. The zoom lens, however, has several sets of moving elements that enable it to change focal-length over a wide range. Moreover, the lens must maintain a constant focus and relative aperture, as the focal-length is varied. The mechanical and optical components that accomplish these functions are quite complex and, thus, an additional set of rules is necessary for the proper use and maintenance of the zoom lens.

The first rule is to always use "T" stops for aperture settings. "T" stops should be used for fixed focal-length lenses also, but with a zoom lens it is mandatory. Because of the complex optical arrangement, the zoom lens absorbs and reflects a significant portion of the incident light. The "F" stop does not take this into account, and would, thus, underexpose the film by as much as one stop. The "T" stop calibration is determined by altering the aperture an amount that will, preferably, compensate for the light loss within the lens, assuring accurate exposures.

To obtain consistent results from a zoom lens it *must always be focused at its longest focal-length and maximum aperture.* Failure to follow this most basic rule of the zoom lens has caused much grief for many a cinematographer and producer. Attempting to focus visually at shorter than the maximum focal-length will invariably result in a soft image at longer focal-lengths. If the scene involves panning or following a subject whose distance from the camera is changing, follow-focus techniques can be employed. However, the longer focal-lengths should be avoided if one wishes to achieve maximum sharpness.

In theory, the optical axis of a zoom lens should intersect the film plane at the dead center of the aperture. Even in the best zoom lenses, this criterion is almost impossible to realize. Thus, if an object is centered at a short focal-length, the center will invariably shift as the lens is zoomed in. For such a shot, the object should be centered at the longest focal-length before the beginning of the take.

The mechanism that moves the zoom elements usually consists of a cam and a follower. While the lens is being transported (whether on a camera or not) any jolt or knock could cause the follower to bang against the cam and create a detent. After this has occurred, every time the lens is zoomed there will be a visible jolt in the image as the follower passes over the detent in the cam. For this reason the zoom lever should always be placed in one of the two extreme positions whenever the lens is being transported. In this way, should a jolt occur, the resulting detent will be at the end of the zoom travel where it cannot jar the image.

The greatest difference between a zoom lens and a fixed focal-length lens lies in their respective focusing mechanisms. The focusing principle of the fixed focal-length lens is ridiculously simple; the entire lens is merely moved in or out

Continued on Page 486

FIGURE 2

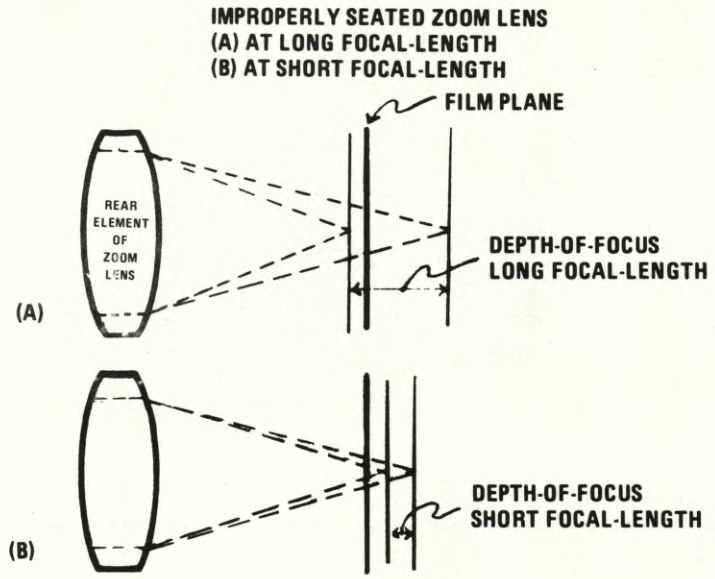
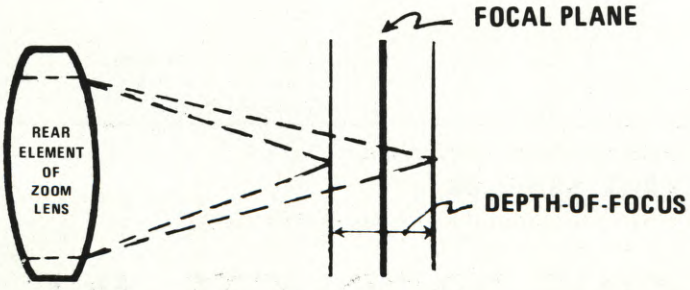


FIGURE 1



A man, his work, and his camera

Merl A. Dobry Aerial and Underwater Cinematographer ☐ Parachutist and Skier ☐ Independent Documentary Filmmaker ☐ Director of the Motion Picture Dept., Brooks Institute of Photography (Santa Barbara, California)

"The camera I use in my aerial cinematography is the 16mm Beaulieu. This is a very light weight camera—the body weighing only 4¼ pounds—and this low weight aspect is a tremendous asset when you are in a chase plane, or attaching the camera to a wing-tip of an airplane, or free-falling during a parachuting sequence. The G-forces are not too great when you're handholding the Beaulieu, and there is also very little wind drag.

"Some time ago, I was involved in shooting a film which called for a parachute sequence with a series of free-falls. I started off doing the series using a 'gun-camera' mounted on my jump helmet. When that parachute opens, the extra weight of the helmet-mounted camera transmits quite a sudden shock to your neck. So I began using my 16mm Beaulieu during such free-falling parachute jumps by putting my hand through the top strap and tethering a light nylon cord around the bottom. In parachuting, by the way, I prefer to use the Beaulieu pistol grip, and I place the nicad battery and remote battery container in my shirt pocket . . . running the battery cord down my sleeve so the wind doesn't tear it off. I just jump out of the aircraft at about 18,000 feet, letting the Beaulieu blow back against my arm. When it comes time to shoot, I just move into position and reach it with the other hand—using the Beaulieu just as I would for normal hand-held shooting on the ground. And, I've never faced any problems with a dislocated neck due to a camera helmet by shooting my free-fall sequences this way."

"I always seem to get back to the aerodynamics of the Beaulieu 16mm camera body design . . . it was probably never deliberately wind-tunnel tested when they first designed the basic camera, but you can't deny that the Beaulieu 16mm turned out to be an extremely compact and smoothly styled camera. I find it ideal for all types of aerial filming."

Beaulieu.
It lets you be there when it's happening.

CINEMA Beaulieu
A DIVISION OF HERVIC CORPORATION

To receive literature on the Beaulieu 16mm camera, visit your finest camera store or write Cinema Beaulieu, General Office: 14225 Ventura Blvd., Sherman Oaks, California 91403.

INSTANT EVERYTHING

(the next-best thing to instant success)

Most moviemakers will agree that the difference between good footage and *great* footage goes beyond talent and luck — it's the little things that often make the difference. Little things like extra mobility, to follow fast-moving action. Or a few extra dB of silence on the set. Little things . . . like the fleeting moment of news, captured because of a minute saved in set-up time. Or an unusual camera-mount that produces the "different" point of view you need.

Little things *do* mean a lot. And, for many of those important "little things," cinema professionals turn to Cine 60...

Instant Power

Wherever you go, whatever the shooting situation, Cine 60's exclusive power belt* gives you the power to run every professional camera on the market. Plus the all-important mobility to go where the action is. Available in voltages from 6 to 30V (and up to 7 ampere-hours), it features rechargeable nickel-cadmium cells, sealed design and an automatic overload safety switch. With built-in charger and plug-in coiled power cable, it is one of the most widely-used power sources available today.

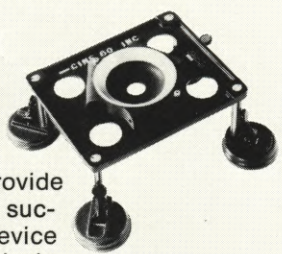
Instant Quiet

Silence is golden, yet relatively inexpensive with the Cine 60 battery-powered fiberglass Blimp for Arriflex 35 cameras. Only 19 pounds, the Blimp permits shooting in even the most restricted spaces — with *all* standard lenses (even 18mm, without vignetting!). Inside, the camera is securely mounted, yet isolated acoustically from its surroundings. On the outside, a new, gear-driven mechanism permits smooth, accurate follow-focus via large, easy-to-use knob. All other controls and connections are conveniently placed on a rear control panel.

Instant Camera Pod

Our single universal shoulder pod ("unipod") is a lightweight shoulder mount that accepts all cameras. Easily removable between takes, it keeps the camera in the ideal shooting position while offering the maneuverability of single-shoulder construction. Used with the Uni-Eclair Mount (detailed later), this is the only practical pod for the Eclair NPR-16. (By the way, we also have an excellent double-shoulder pod as well.)

Instant Camera Platform



Wherever and whenever you need a stable camera platform, chances are our Vacu-Platform can provide it. This rugged suction-actuated device can be positively fastened to any smooth surface (car-tops, floors, etc.) without marring. A flick of a lever on its extra-large suction mounts does the job. Especially useful for low-angle work, it mates with standard tripod heads.

Instant Camera Mount

If you've ever watched a good shot pass you by while trying to thread a camera onto a tripod or shoulder pod, the Cine 60 Snaplok is your answer. Combining rapid, fail-safe operation with the ruggedness and precision alignment needed for day-in, day-out use, the Snaplok features light weight and high rigidity. One section mounts on the camera; the other on tripod or shoulder pod. A single pushbutton instantly separates the two. The base unit of the Snaplok is compatible with standard ¼" and ⅜" sockets.

Instant NPR

Our Uni-Eclair Mount is just what the name implies — a universal mount for the Eclair NPR camera. Rugged, yet surprisingly light, it may be left on the camera at all times, ready for hand-held operation or shooting with a tripod or shoulder pod. And, it makes a handy camera rest between takes.

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If you own one of the fine Angenieux zoom lenses, you can have smoother, more consistent zooming with one of our electric zoom drives. Available in four sizes (for the 9-95mm, 12-120mm, 12-240mm and 25-250mm), these units feature a precision gear assembly which mounts securely and directly to the lens barrels. The gear assembly, in turn, is rigidly coupled to a high-quality DC motor via a flexible shaft. The motor is powered by a transistor-regulated nicad battery pack featuring directional pushbuttons and a smooth, variable speed control — all contained in a convenient, palm-sized case — with built-in recharger. (We also make an instant-mounting, collapsible rubber lens hood for the Angenieux 25-250mm zoom.)

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A "no cables" post-sync shooting facility.
A 24/25 fps option at the flick of a switch.
A variable speed 8-50 fps option.
Cameraman to sound man talk back via the built in radio link.
Remote stop-start of the tape recorder in step with the camera.
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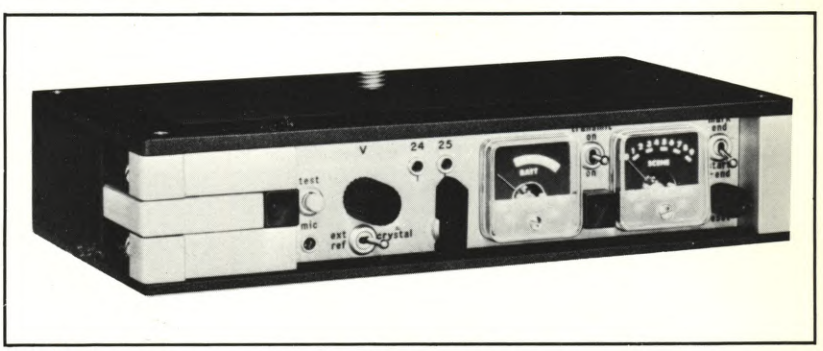
Continuous monitor of the state of the batteries.
A complete system check facility and even a crystal check facility for use on location.



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PHOTOGRAPHING THE ANDROMEDA STRAIN

By JON BLOOM

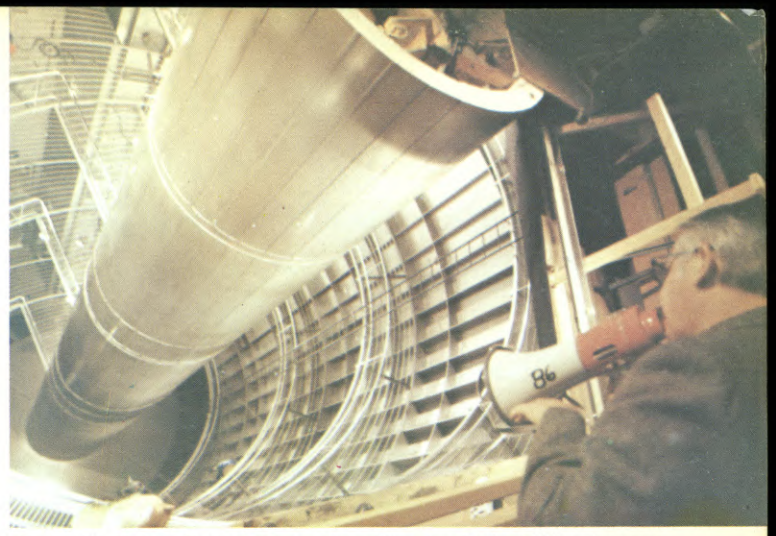
A student's-eye-view of the behind-the-scenes world attendant to the production of a super-dramatic "whatdunit" science-fiction thriller based on a best-selling novel

THE ANDROMEDA STRAIN, brought to the screen for Universal release by Producer-director Robert Wise, is an off-beat thriller based on Michael Crichton's best-selling novel of the same name. Although it falls within the category of science-fiction, it should, more accurately, be designated as science-*fact,* because ANDROMEDA is a story having a basic premise that is all too real. It projects an account of what could happen if an unknown and deadly outer-space organism should enter Earth's atmosphere to plague its inhabitants. Just such an epidemic is greatly feared by present-day scientists—as witness the strict enforcement of

(ABOVE) With camera mounted on Tyler Vibrationless Camera Mount, Director Robert Wise and Director of Photography Richard Kline, ASC, ride platform of Chapman Titan crane. Object was to simulate point-of-view shot from reconnaissance plane strafing village. (BELOW LEFT) Research scientists of the *Project Wildfire* team change clothes in preparation for descent into secret laboratory where they will attempt to characterize, identify and exterminate a deadly micro-organism from outer space. (RIGHT) Laboratory liaison technician briefs one of the scientists on the urgent character of the mission.

a two-week isolation quarantine for American astronauts returning from the moon.

As written for the screen by Nelson Gidding and suspensefully photographed by Richard H. Kline, ASC, the film documents the results of an epidemic crisis which occurs when a lethal extra-terrestrial micro-organism descends to Earth aboard a returning space probe capsule, instantly wiping out all but two of the 48 inhabitants of a remote desert village. The Project Wildfire Alert, previously established by the government for precisely such an emergency, is activated. A team of four distinguished scientists is called in to a top-secret laboratory to race against time in an attempt to characterize, contain and exterminate the deadly space-organism.



Using a "bull horn" to convey orders, Director Robert Wise observes from the top of the five-story circular core of the laboratory set, built on Stage 12 of the Universal City Studios, where THE ANDROMEDA STRAIN was produced.

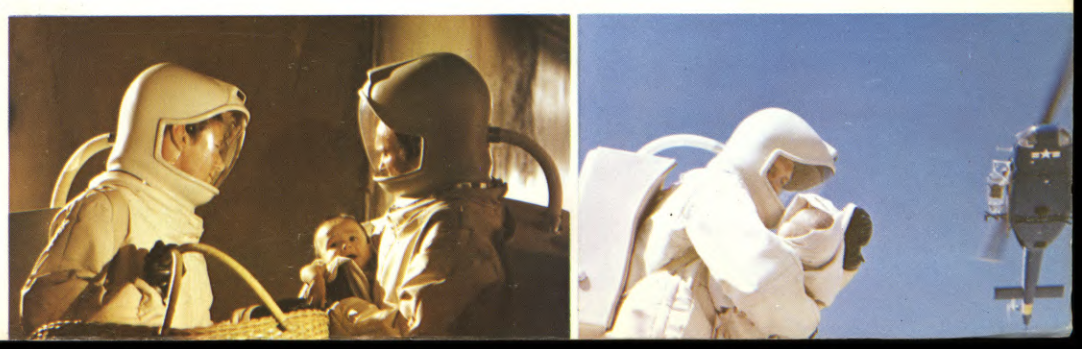
Wise, for whom the project marks the 34th picture in a phenomenal career, waited almost two years before finding in ANDROMEDA the kind of contemporary story he had been seeking as a change of thematic pace from the period backgrounds of his last three ventures.

"ANDROMEDA," he points out, "in many respects parallels what has been going on at the lunar receiving laboratory and is very much 'now'—about as contemporary as it is possible to get."

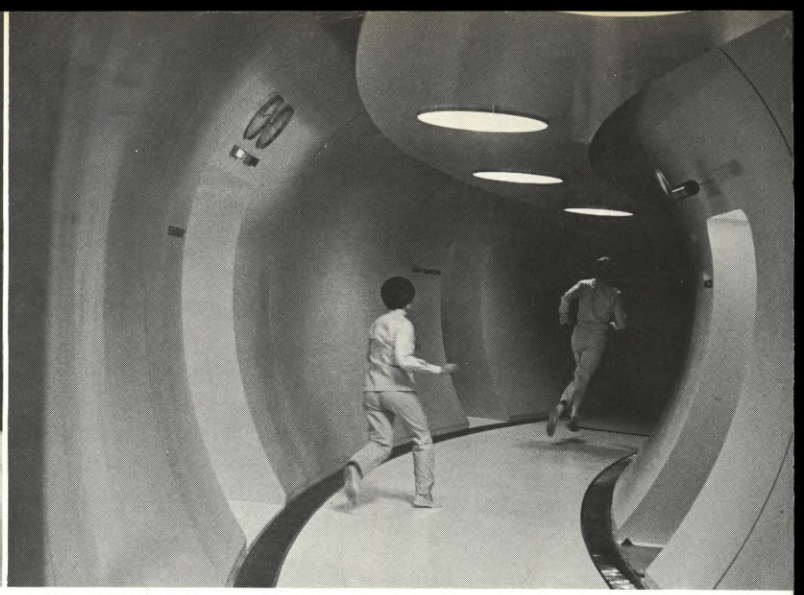
The Wildfire research laboratory, main setting of THE ANDROMEDA STRAIN, is a completely sterile, five-level, underground facility equipped with the most sophisticated scientific and technological tools known to man. The set constructed to represent it was one of the most elaborately detailed interiors ever built and occupied almost every square inch of Universal's cavernous Stage 12, which, large as it is, proved to be not quite high enough to accommodate the soaring five-story central core of the structure. It was necessary to excavate 17 feet into the floor of the sound stage in order to erect this 70-foot set element. Its construction alone represented an expenditure of more than $300,000. A complete 360° circular corridor, 1/8-mile in circumference was also constructed to simulate the corridor of the underground emergency laboratory. An additional four million dollars-worth of the most advanced scientific equipment, loaned by facilities from all over the world, was used to "dress" the sets, which were conceived by Production Designer Boris Leven, an Oscar-winner for his contributions to an earlier Robert Wise production, WEST SIDE STORY.

For Director of Photography Kline, ANDROMEDA represented a radical departure from previous feature assignments, including the Academy Award-nominated CAMELOT, THE BOSTON STRANGLER and GAILY, GAILY. Though the visuals of the picture flow in seemingly effortless fashion across the screen, Kline regards it as his most difficult challenge to date, in that he was called upon to lens several effects which had never before

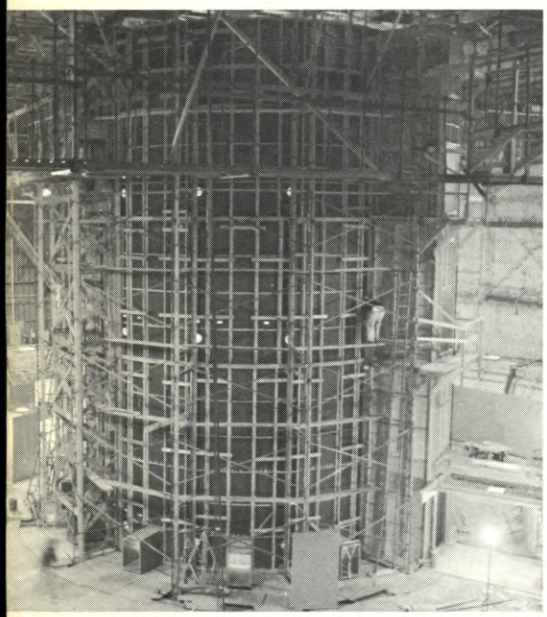
(LEFT) Investigators of *Project Wildfire,* garbed in heavy protective suits and helmets, move into the tiny village of Piedmont, where no apparent signs of life exist. (CENTER) Every door that is opened reveals people who obviously died instantly of some mysterious cause. (RIGHT) In the office of the village's dead doctor, the investigators find a returned space probe that has been opened by someone.



(LEFT) Following the sounds of a crying infant, the investigators come upon a tiny baby, one of the only two people miraculously spared. (RIGHT) a helicopter lands at Piedmont to fly the surviving baby to safety.



(LEFT) On the top level of the five-story underground research laboratory, liaison technician operates a computer while scanning the intricate control console that monitors activity throughout the unique complex. (RIGHT) Laboratory technicians race to stations upon hearing alarm which indicates that the lab's self-destruct mechanism has been activated. 360-degree corridor was one of several spectacular futuristic sets conceived by Academy Award-winning Production Designer Boris Leven.



Exterior of 70-foot set representing central core of underground lab. Built on Universal Studios' highest stage, it was still necessary to excavate 17 feet into the floor.

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been photographed for a motion picture.

The diverse demands of THE ANDROMEDA STRAIN also took the company on location for over a month in Texas and California. Principal location sequences, simulating the isolated village of Piedmont, New Mexico, where the space probe satellite lands, were filmed at the near-ghost town of Shafter, Texas. Three weeks in February, 1970 were spent on location in the little Southwestern Texas town. Shafter underwent considerable face lifting to transform it into the stricken hamlet in which the ANDROMEDA crisis originates.

Another location sequence, the agricultural station which hides the secret entrance to the underground lab, was filmed at Ocotillo Wells, California. The agricultural station and surrounding planted fields were especially constructed for the film.

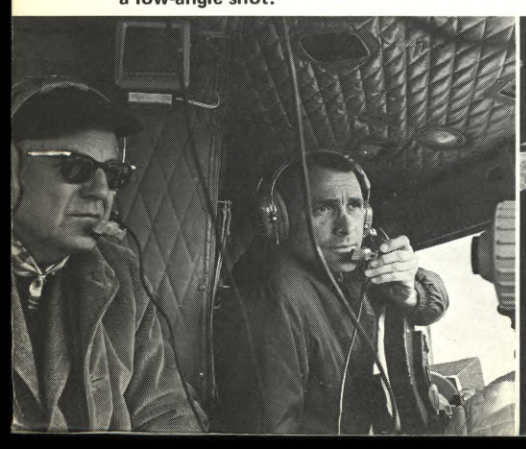
The visual impact of the dreaded microscopic organism was deemed so vital to the suspense drama, that $250,000 was allotted for the creation of special photographic effects by Douglas Trumbull of 2001: A SPACE ODYSSEY fame, and James Short. Trumbull "imagineered" the germ's appearance, which in the story was seen on microscope and computer viewing screens at enlargements of up to one million times.

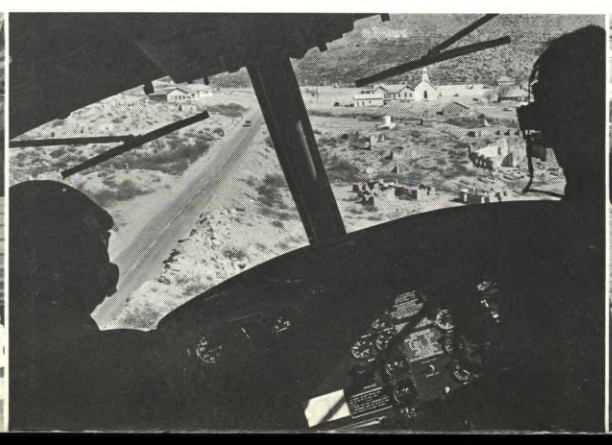
The major task for Director Robert Wise in making THE ANDROMEDA STRAIN was to re-create the sense of utter reality which made the novel so successful. Cinematographer Kline had an important role in making the motion picture appear as an authentic, on-the-spot film-record of the five-day biological crisis. His efforts and creativity gave ANDROMEDA the conviction of documentary footage.

Michael Crichton's novel was popular because he had succeeded in making the story seem very real. The book was printed and laid out to look exactly like a government document, replete with "Top Secret" stamps, and warnings about the report's highly classified nature. The book contains complex illustrations, charts, diagrams and graphs, most of which are far beyond the comprehension of laymen, but not really essential to understanding the plot. These illustrations helped to give seeming complexity to the novel. Crichton's trick of citing imaginary authorities and the inclusion of an impressive reference bibliography (entirely fictional) added to the novel's credibility. Written in a style which seems official and authentic, the book is nonetheless engaging and exciting. All these techniques worked together to present the story in the form of an authentic government report, released to the public.

The goal of the film was to create that same sense of actuality and authenticity that so permeated the novel.

(LEFT) Director Wise and Director of Photography Richard H. Kline, ASC, ride helicopter to survey Shafter, Texas, doubling as the village of Piedmont, (CENTER) A view of the village from the air. Point-of-view strafing shot which appears in the picture was actually made from a zoom-equipped camera on a Tyler mount atop a Chapman Titan crane. (RIGHT) The camera is placed in a hole dug in the ground, in preparation for a low-angle shot.





Novelistic form is similar to filmic form in many ways. Style and mood in film, as in a novel, are created by many illusive techniques, which blend together to create an overall atmosphere.

In THE ANDROMEDA STRAIN many things worked together to create a mood or feel of reality. Robert Wise's direction, the script, the editing, the acting, the art direction, the electric non-musical score; all these components—and particularly Richard Kline's cinematography—combined to create in THE ANDROMEDA STRAIN a unique synergistic reality, a sense of total believability—for the film as a whole is greater than the sum of its parts.

Producer-director Wise's casting for THE ANDROMEDA STRAIN was strongly influenced by the need to make the film seem non-fictional. The four lead roles of scientists, played by Arthur Hill, David Wayne, James Olson and Kate Reid, were filled by very competent actors, although not "star" names. Wise purposely avoided casting superstars for ANDROMEDA because he felt they would be recognizable as themselves rather than becoming the characters they portrayed.

The story itself is complicated and scientific. It called for the photography of many unique processes and machines that had never been filmed before. Computer and microscope screens, and many other special effects needed to simulate actual scientific devices and processes, were essential to the story. Director of Photography Kline made many tests, trail-blazing new techniques, in discovering methods to meet ANDROMEDA's unusual visual demands.

When Kline began pre-production preparation and testing in January, 1969, Robert Wise told him that he wanted THE ANDROMEDA STRAIN to have a "documentary look". Color negative film gives beautiful results, but both Wise and Kline felt that eliminating the film's high polish would help create the overall realistic effect they wanted ANDROMEDA to have.

Toward this end, Kline began experimentation to give the 5254 color negative a more pronounced grain. In conjunction with Technicolor, he experimented with the addition of grain to the positive print. Results of these experiments were disappointing.

Next, he experimented with a process commonly used to increase film sensitivity in poor light—forced development. Tests were shot, pushing the film one, two, and an unusual three and four stops in development—which proved to be too much. A two-stop forced development was just right. It dulled the inherent gloss of the film stock and produced the reality look that ANDROMEDA needed.

A beneficial side effect was greater depth-of-field. The entire film was forced two stops.

Technically, pushing two stops means that the raw stock is two stops under-exposed in the camera. Then, in the lab, the film is over-developed two stops to compensate.

"On location," Kline explains, "the push helped to create the stark, barren, awesome look we wanted, while in the laboratory it contributed to the sterile, blank, icy look the story needed." Kline summed up by saying, "The two-stop push gave us the documentary texture we were after without resorting to a sloppy kind of photography. The film still has a rich professional look, but an appearance which is very different from the ordinary, and one that works well for the picture."

The sets and locations of THE ANDROMEDA STRAIN were perhaps the most important factor in achieving complete verisimilitude. However, they also created special problems for cameraman Kline. As the production began, Robert Wise said "The sets are the stars of ANDROMEDA,"—and they most certainly were. The backgrounds and settings were the biggest factor in establishing authenticity. It was essential that the underground laboratory, where over half the story takes place, look as though it really existed.

Production Designer Boris Leven combined extensive research with imaginative design in order to create brilliant but credible sets. A big reason why the

Continued on Page 452

(LEFT) Garbed in weird anti-contamination garments, physician and nurse attend the two survivors of the Piedmont catastrophe—a baby and an old man who drinks Sterno. (CENTER) Sound technician on the set wears black hood so that his image will not be picked up by highly reflective surfaces of equipment in the scene. (RIGHT) Investigators at Piedmont encounter an old woman and a dog, on the stairway where death struck them instantly.

(ABOUT THE AUTHOR: JON BLOOM is a Communications student at Antioch College, with a major interest in Cinema. As part of a work-study program, he took a sabbatical from formal academic courses in order to accept an assignment as Production Assistant on THE ANDROMEDA STRAIN. In this capacity, he did a variety of jobs during the entire pre-production and shooting phases of the film, thereby gaining an opportunity to experience a complete over-view of professional feature production. The accompanying article is based on his observations, as a student, of the extremely complex technology involved in the making of such an unusual feature.)

The author, Jon Bloom, helps out by slating a studio scene. On leave from Antioch College, his job as Production Assistant gave him a complete over-view of film-making process.

(LEFT) During the shooting of THE ANDROMEDA STRAIN, dozens of televised images often appeared on monitors within a single scene. (RIGHT) It was necessary that there be no visible vestige of shutter bar, and that color rendition of the video images be as natural as possible.

"MARRYING" TELEVISION TO FILM FOR THE ANDROMEDA STRAIN

A new and sophisticated TV system, compatible with the standard motion picture camera frame-rate, enables video images to appear on film as they do in the eye of the viewer

By DAVID G. GRAHAM

The need for a considerable amount of working television equipment on the set during filming of "THE ANDROMEDA STRAIN" centers around the fact that this is a science-fiction feature, the plot of which concerns a five-level underground biological laboratory. The means of communication between the different levels is two-way television and sound. Since many of the sequences required rather long periods of time during which the film camera "looked at" a TV monitor, it was necessary that there be no visible semblance of shutter bar, and that color rendition of the video images be as natural as possible.

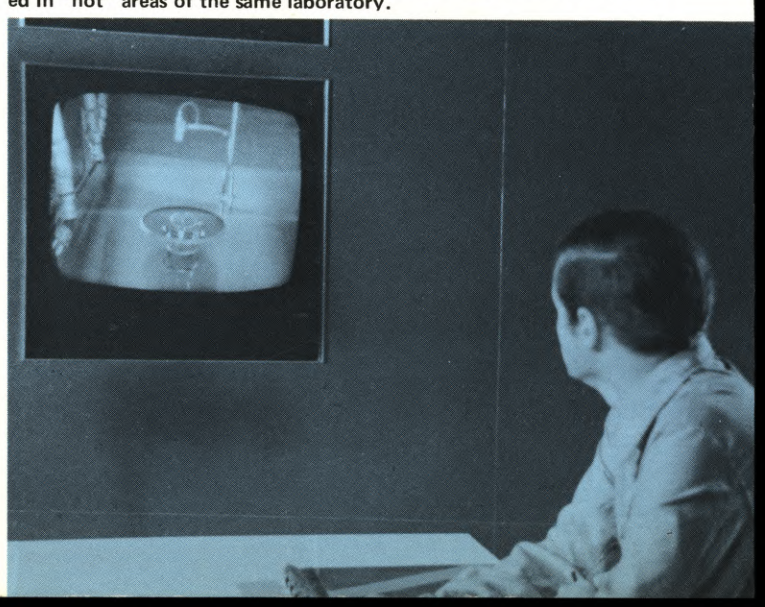
Hollywood Video Center, a division of Western Video Industries, was contacted by Universal City Studios and given the opportunity to bid on the job of providing a practical, working color TV system which would be compatible with the standard film-frame rate, thereby making it possible to film color TV monitors on various movie sets without having to worry about shutter bar and color problems when using standard film cameras.

The following is a step-by-step description of how this was accomplished:

It is not a new thing to film TV screens. Many times in the past, various firms have photographed live pictures on TV sets. Various methods have been used with varying degrees of success. One method, "A", is to drive a film camera equipped with a special shutter by means of a power amplifier which is, in turn, driven by 60 Hz derived from vertical sync from the TV system.

Another system, "B", is to use a very stable film camera, again with a special shutter, and lock TV system to power line in order to reduce shutter bars. Neither of these systems was acceptable; the first because it invariably leaves a slight residue of shutter bar on the picture due to the mechanical instability of the film camera during exposure of the half-fields, causing a thin line through the center of the raster with a varying degree of width.

Scientists stationed in "safe" areas of the underground research complex used closed-circuit video to view experiments being conducted in "hot" areas of the same laboratory.



The HVC system used in "THE ANDROMEDA STRAIN" was devised from the basic idea of system "A" above. The parameters used to design the system were:

1) Minimum modification to the film camera.
2) Minimum modification to the TV system.
3) Reduce TV system to 24-frame rate.
4) Cause VTR machine to record and playback at 24 frames.
5) Enable TV and film systems to be interlocked.

Attacking the problems in a supposedly logical order, we first found a sync generator that would be easily modified to produce a 24-frame TV sync-pulse train. With the very able aid of Ken Holland of the HVC Video Department, the selected sync generator (Cohu) was duly modified.

The next step was to cause a normal Norelco PC-70 color camera to function using the new sync source. Again, with Mr. Holland's genius, this was achieved by making judicious adjustments to the pulse module and various other circuits.

While this was going on, Joe Sayovitz was given the task of making an Ampex VR-2000B work with the new sync. Mr. Sayovitz, a member of HVC's videotape maintenance staff, very adeptly performed this task, which included building a special color processing system, replacing the normal VR-2000B unit which compensates for differences in the 24-frame system, a situation the normal Amtec, colortec and color proc amp cannot cope with.

Now we had the TV system working at 24 frames. The next trick was to lock it up to the film camera. Universal Studios then provided us with a camera which had a 48 Hz pulse modification added, generated from transducers on the shutter shaft. We used the 48 Hz pulse train to trigger the sync generator and, surprisingly enough, the stability of the pulses from the film camera, after some adjustments to the sync generator, appeared to be good enough to make a film test.

On the third of December, 1969, the big test was made. The entourage from Universal City Studios, including Messrs. Robert Wise, Producer-Director; Wes Thompson, Process Coordinator; W. O. Watson, Manager, Universal Sound Department; Richard Kline, ASC, Cinematographer; Dick Stumpf, Universal Sound Engineer, and others, arrived at HVC and we proceeded to make a series of film tests using live subjects on the TV monitor, and shooting the same subjects (plus the monitor) on film. The results of this test proved that our system worked. Certain refinements had to be made, however, which will become apparent as we proceed.

The first test involved a live subject standing next to a Conrac RHA-19 color monitor. The subject was shot with a Norelco PC-70 camera, with the resulting picture displayed on the monitor. The film camera, a Mitchell BNC with a 175° shutter, involved photographing both the live subject and the monitor. Test signals such as gray scales, color bars, etc., were also displayed on the monitor at the time of filming for obvious reasons.

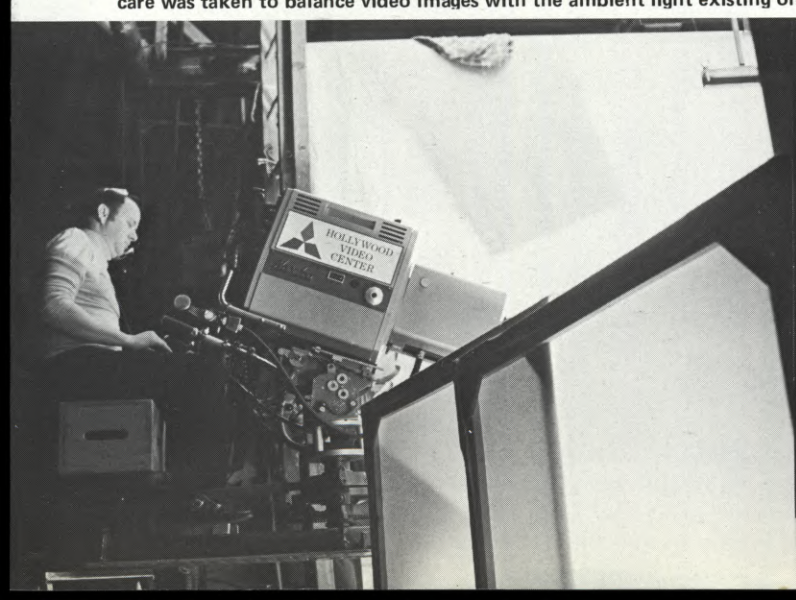
The results of the test showed that the system of phasing out the shutter bar was successful. The 24-frame TV system was successful, except for an unstable condition in the color rendition of the picture on the monitor due to the unsynchronized relationship between the horizontal line rate and the 3.58 M-Hz color subcarrier. We also discovered that the 48 Hz pulse train from the film camera was unsymmetrical.

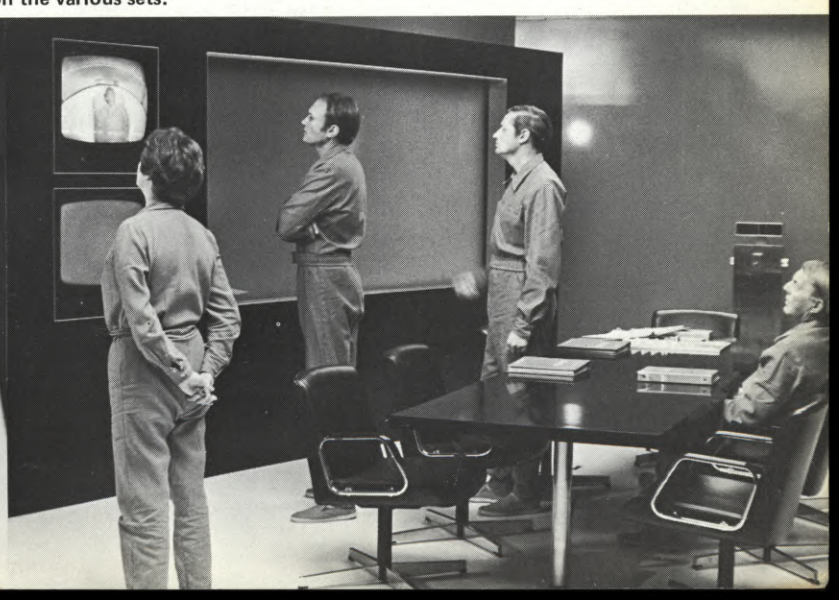
The next test, scheduled in the middle of December, was made with the same film camera, but using a 24 Hz pulse from same, and we generated a 48 Hz pulse from that with a simple multivibrator having an adjustable symmetry which, in turn, was used to lock up the modified Cohu sync generator. We also adjusted the horizontal line rate to eliminate the unwanted color instability.

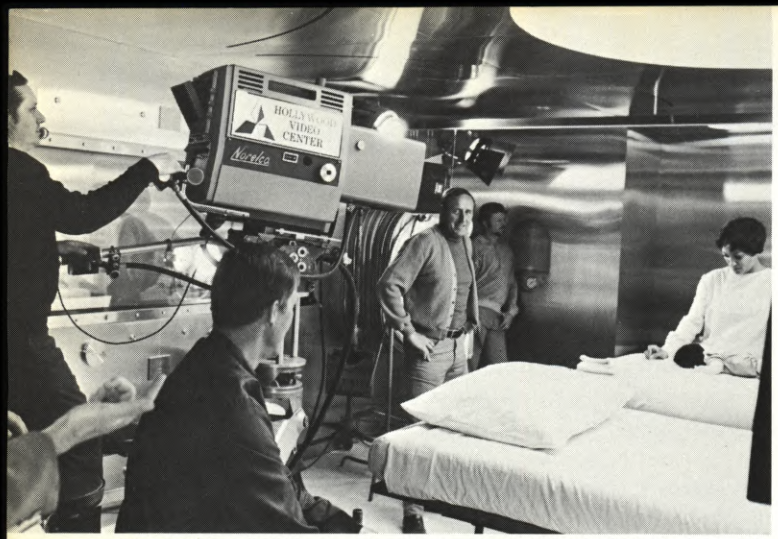
Using the RHA-19, the KHA-25, and a Sony Trinitron, we made a series of tests which included different brightness levels and chroma levels to compensate for the film reproduction of a live picture on a monitor. This series of tests proved that the system would work, and what was next needed was a set of fixed parameters to work from which would allow for fast set-up and exposure determination.

It was determined that the live camera had to be set up with a twenty-percent boost in overall chroma, a ten-percent boost in the red enhancer, and slight amounts of white stretch in situations where the contrast range of the picture was low. The monitors (KHA-25C) had to have the gray scale set to look slightly reddish through an 80A Wratten filter. When lighting the scene with 100fc, it was necessary to set the drive (contrast) on the monitor at 9.5 to 10 using a spot brightness meter looking at the white bar on a color bar signal. Rather severe photographic conditions were tested, such as extreme closeups on the TV monitor, adding and removing spill light from the face of the monitor, and comparing color chip charts on film and on TV along with the subjects. We made an attempt to anticipate all the

(LEFT) Television cameramen of Hollywood Video Center recorded certain scenes on video tape and transmitted others directly to monitors to be filmed with live action. (RIGHT) Two-way closed-circuit TV was used by the scientists for communications within the laboratory complex. Extreme care was taken to balance video images with the ambient light existing on the various sets.







The Norelco PC-70 color camera was adapted by HVC technician Ken Holland to use a new sync source, achieved by making judicious adjustments to the pulse module and various other circuits.

required conditions of "THE ANDROMEDA STRAIN" before production started. The results of this test, again, were successful, and the contract was assigned to HVC to provide the equipment for the feature.

We began production during the second week of March, 1970, on Stage 25 at Universal City Studios. Even with all the good planning, things did not go as smoothly as desired. We ran into exposure problems due to changes in ambient light on the actual set. New monitor drive settings had to be established to make allowances for both the ambient set lighting, which ranged from 50 to 80 foot-candles, and the average brightness of the picture on the particular monitor involved. It was also noted that the monitor drive had to be changed, depending upon how far away the film camera was from the monitor.

In general the spot brightness meter readings were as follows:

Camera Position	Brightness Meter Reading	Mon. Av. Brtn. (Subjective)	Set Fc.
Wide	9.7–9.0	High	50
Med.	8.5–8.7	High	50
Close	7.5–8.0	High	50
Wide	9.0–9.3	Low	50
Med.	8.5–9.0	Low	50
Close	8.0–8.5	Low	50
Wide	9.0–9.3	High	70–80
Med.	8.7–9.1	High	70–80
Close	8.5–8.7	High	70–80
Wide	9.3–9.5	Low	70–80
Med.	8.7–9.0	Low	70–80
Close	8.5–8.7	Low	70–80
Wide	9.5–9.8	Normal	100fc
Med.	9.3–9.5	Normal	100fc
Close	8.7–9.0	Normal	100fc

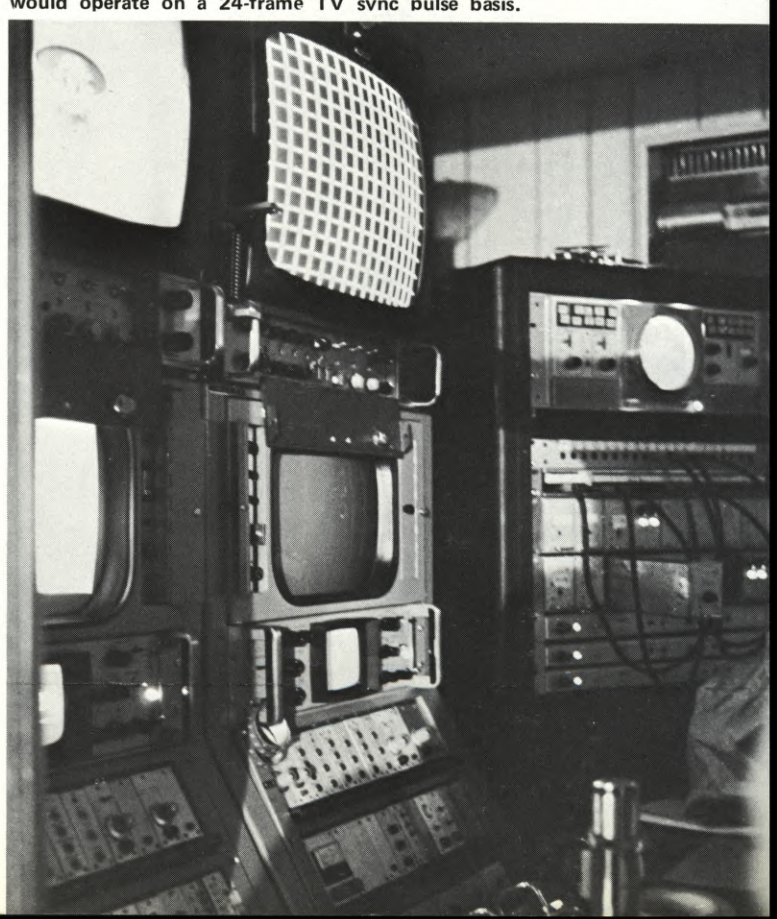
As will be noted, the lower the average brightness on the monitor, the higher the spot brightness meter reading needs to be. The closer the film camera is to the monitor, the lower the spot brightness meter reading, and vice versa. The practicality of running higher settings than 10.0 is limited because of the chroma beat patterns and noise that is developed in the KHA-25C monitor, and phosphor saturation effects. It is best to run the set lighting in the 50 to 80 fc range so as to keep the monitor in the 7.5 to 9.0 range for best monitor picture quality. It must be realized that there is a degree of trial and error even under the best conditions, hence the abstinence from being too specific herein.

The next problem we ran into was horizontal instability when the TV system was locked to the film camera pulse. This caused us to change our plans as to how we would lock the two systems. We decided to use the pulse from the film camera as a reference pulse only and lock the TV system to the 60 Hz line and use a resolver to phase the shutter bar out of the picture. Once this system was operative and we had accurately set the electronic limits on the shutter bar, we had little problem with phasing up at the beginning of each take. During the shutter bar "shake-down cruise," we did discover that there were some parameters that needed attention. The farther away from the monitors the film camera works, the less critical the phasing is. However, the farther away the film camera is, the more difficult it is to determine the proper position of the shutter bar. To properly check the shutter bar, it is necessary to get the film camera as close to the monitor as possible, use a wide-angle lens, place a piece of frosted film in the aperture of the film camera, with the film camera running and the pulse available at the videoman's position either on a monitor or oscilloscope. The observer at the film camera, in communication with the videoman, tells the videoman which way and how far to go with the phasing control by observation of the actual bar on the picture presented on the frosted film. By tilting the film camera up and down, with the TV monitor screen filling the aperture, covering the full limits of the tilting operation while still viewing the TV screen and having the videoman make precise marks as to where the pulse is to be positioned, it can then be determined where the optimum setting is and what limits there are. With long focal-length lenses, the bar phasing is less critical. With wide-angle lenses, operating close to the monitor, the setting of the phase is much more critical. It is possible to make up an automatic lock system to eliminate human error for future projects.

We found that the Panavision camera, which has a reflex

Continued on Page 483

Highly sophisticated set-up designed by Hollywood Film Video Center included adapting a standard Ampex VR-2000B unit so that it would operate on a 24-frame TV sync pulse basis.



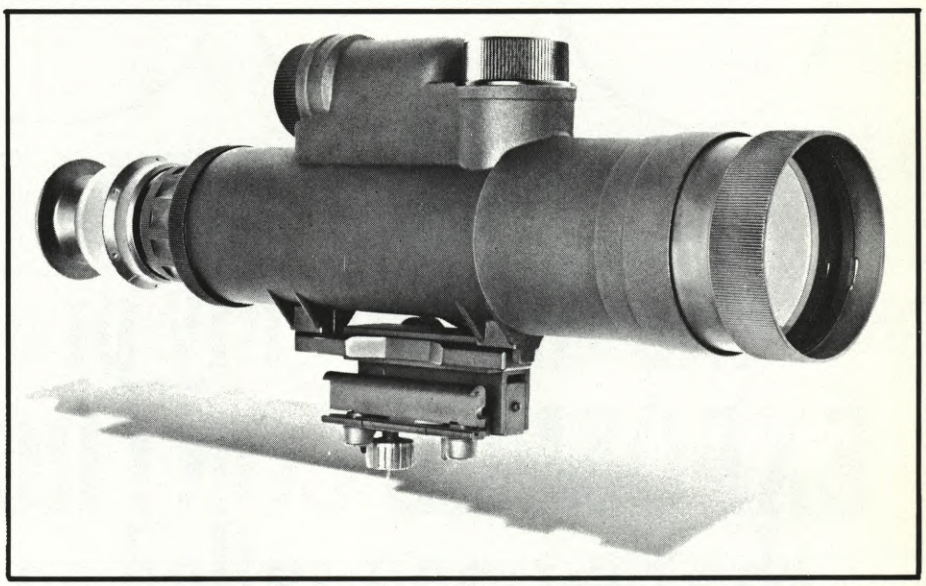
FILMING BY STARLIGHT FOR

THE ANDROMEDA STRAIN

A "Buck Rogers" type instrument that "sees" in almost total darkness turns night into daylight for the photography of an exciting sequence

In the opening sequence of THE ANDROMEDA STRAIN, a *Project Wildfire* investigator, appearing as a ghostly figure in white protective suit and visor, approaches the seemingly dead village of Piedmont at night and scans it from a distance by means of a Night Vision Device. This weird instrument turns the blackest night into bright, green-tinted day, and the resultant dramatic point-of-view shots mark what is probably the first usage in a feature film of scenes actually photographed through such a Night Vision Device.

One of a series of instruments originally developed for military use, the specific device employed in the filming was the Starlight Scope, produced by Electro-Optical Systems, a Xerox company. It is a light-weight, quantity-produced device that has been referred to by the U.S. Army as "the greatest untold story of the Vietnam War." Designed for hand-held weapons, the unit has an adjustable mount which enables the operator to use it separately or secured to the M14 and M16 rifles. The Starlight Scope also has opto-mechanical alignment characteristics which enable it to be bore-sighted to a variety of weapons. In addition, it can be used as a hand-held observation device, as shown in THE ANDROMEDA STRAIN.



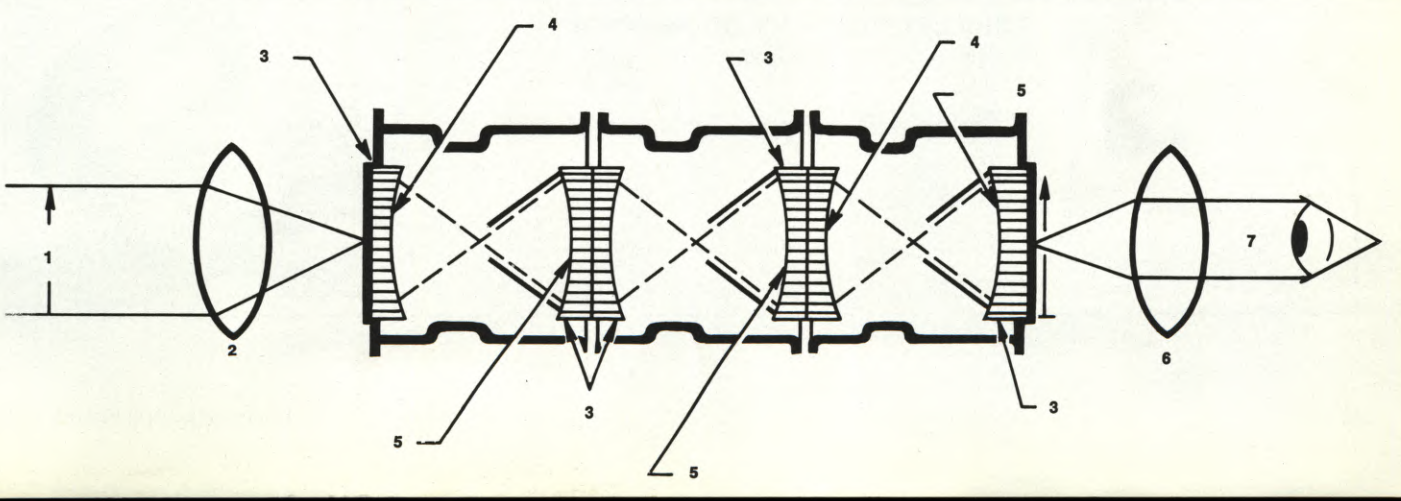
The Starlight Scope, used dramatically in the filming of THE ANDROMEDA STRAIN, needs only the faint glow of stars or the night sky as an input. Night vision technology is a development of the U.S. Army Electronics Command, Fort Belvoir, Virginia, with which Electro-Optical Systems worked to further advance the technology and design night viewing devices such as this.

The Starlight Scope required no special adaptation for use in motion picture photography, other than a means of mounting it in front of the film camera's macro lens. A macro lens was required because, rather than actually shooting through the scope, the film camera picked up its image from the instrument's rear phosphor screen, which was located approximately three inches in front of the taking lens.

Like other instruments of a new series (The Miniscope, Crew Served Weapon Sight, Night Observation Device and Night Observation Sight), the Starlight Scope, as produced by Electro-Optical Systems, differs radically from

Continued on Page 498

Diagram of the optical system of the image intensification tube used in the Starlight Scope and related night vision devices. The tube used in the largest unit is 11 inches long and 3 inches in diameter. The smaller night vision devices use a tube 7 inches long and 2.75 inches in diameter. The tube consists of three modular sections which are mechanically and optically coupled together to form a three-stage intensifier. Key: 1—target image input; 2—objective lens; 3—fibre optics; 4—photocathode; 5—phosphor screen; 6—lens; 7—intensified image output to observer's eye.



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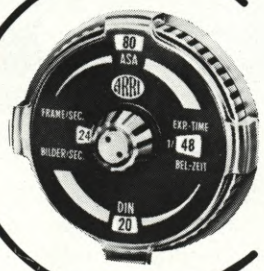

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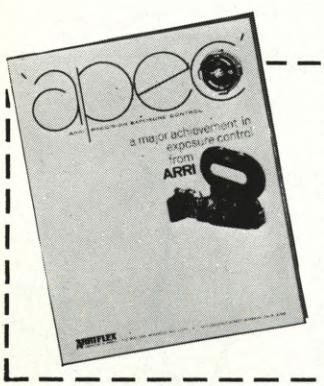

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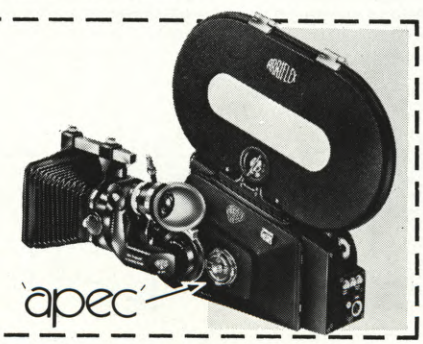

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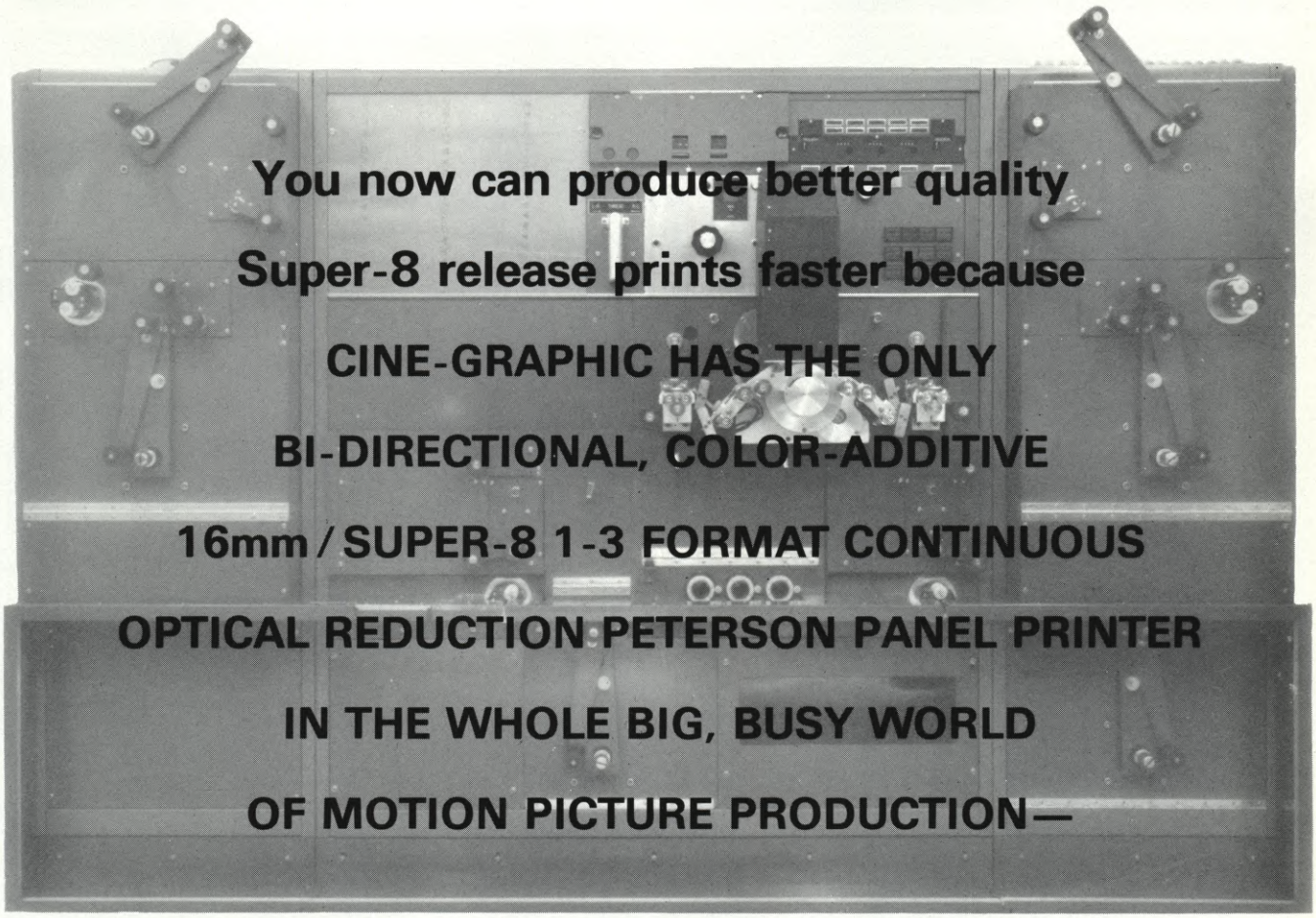

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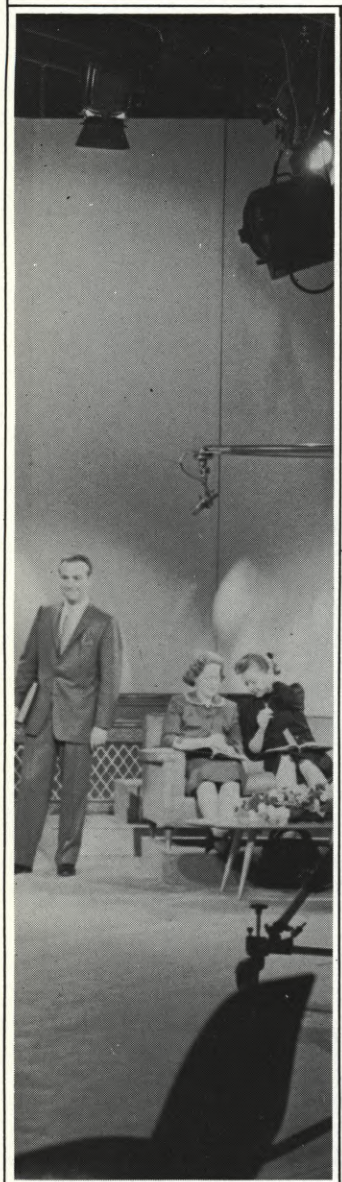
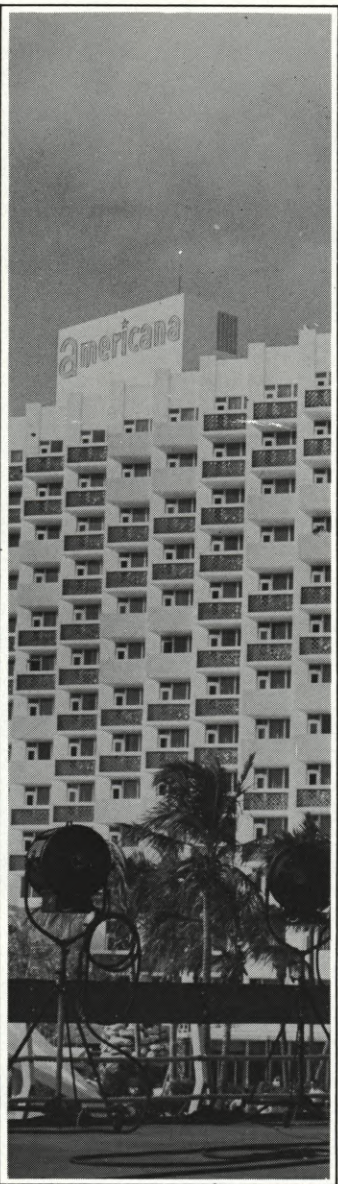
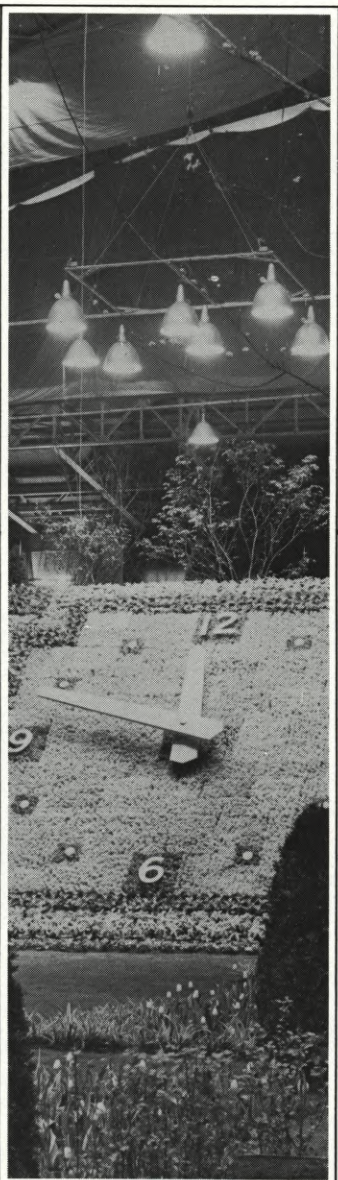


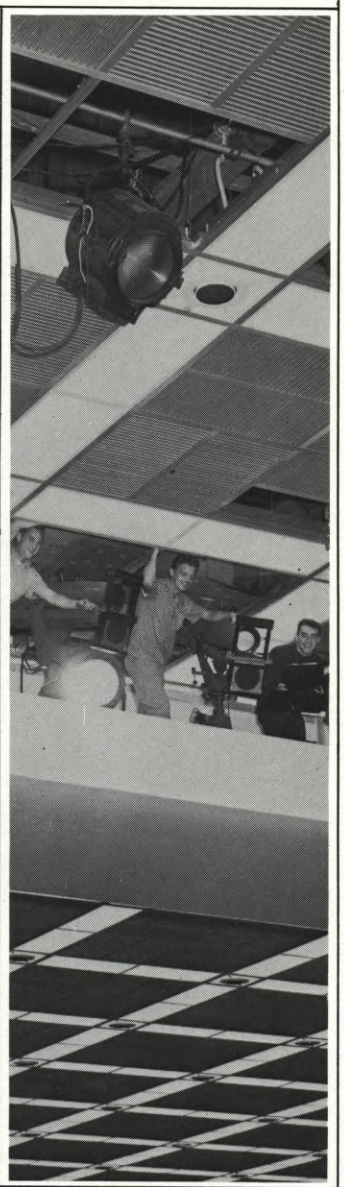
In 1956 thousands witnessed the *This Is Your Life* Network Show honoring Ernest Breech. Lighting was by Jack A. Frost.



Tons of Frost lighting equipment traveled to Havana for this 1958 Steve Allen TV Show. Today Frost experts are still lighting "the show" wherever temporary lighting and power are needed.



Frost has been creating artistic lighting effects for special exhibits, such as this Flower Show, for over a quarter of a century.



The first Auto Show in Detroit's Cobo Hall started right with lighting by Frost and Frost is still lighting these important shows.

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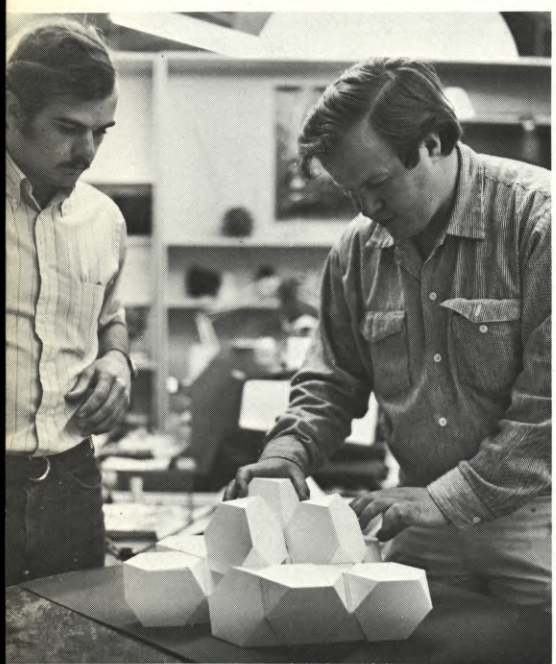
CREATING THE TITLE-ROLE VILLAIN FOR

The mechanics and electronics of spawning a killer micro-organism from outer space

By DOUGLAS TRUMBULL



James Shourt and Douglas Trumbull shown designing possible configurations of truncated tetrahedrons for computer programming of "crystals" to simulate The Andromeda Strain.

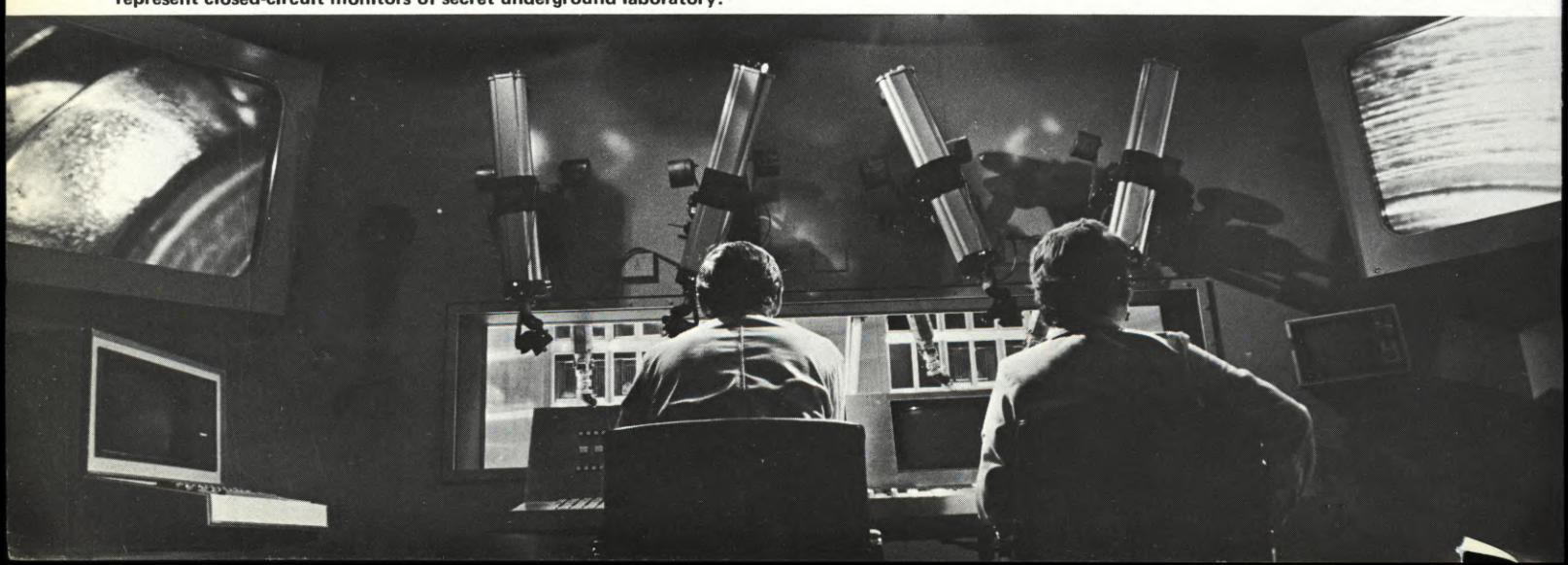
When Robert Wise first approached me and James Shourt about doing some tricky special effects work on THE ANDROMEDA STRAIN (including creation and photography of the "strain" itself), he said that he wanted to be able to put these images onto huge screens in the sets, representing closed-circuit video monitors located in the secret underground research laboratory.

We tried out the Eidiphor system and discovered that, in terms of the color quality and brightness required, it just wouldn't do the job. We decided that the best way to go was to shoot the material so that it looked like a video image and then rear-project it onto the screens. So, Jamie Shourt and I got together and worked out our complete approach to generating the micro-organism from space, the Andromeda Strain, photographing it in full color onto 35mm plates and making it look like TV.

Part of the system we devised called for a 2000-line, high-resolution TV system. Jamie wrote up a proposal for what we wanted and we took it to Ampex. It had to have a resolution capability of between 2000 and 4000 lines, and a 30-megacycle band width, the facility of switching from positive to negative and the option of being able to select out narrow gray scale areas. The object was to be able to "posterize" an image—make it completely linear—by dropping out everything above and below a median gray.

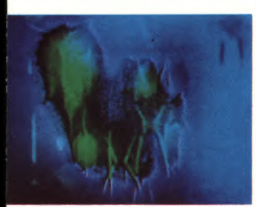
Ampex considered the project until we found ourselves running out of time and we ended up having to give the assignment to the Lear-Siegler Company, an advanced electronics firm that was eager to tackle it. Shortly after they went to work on the high-resolution TV system, we decided that we would like to computerize the whole operation, so we bought an Interdata Model 4 computer, a teletype and all of the interface systems needed to hook the computer up to the video system. We asked Lear-Siegler to make our video system computerized so that, simply by turning a knob, we could run through the gray

A scene from THE ANDROMEDA STRAIN in which scientists study greatly magnified areas of the space scoop, which is hermetically sealed in "hot area" behind glass. Photomicrographs appearing on scopes were produced by Trumbull/Shourt and rear-projected onto process screens, used to represent closed-circuit monitors of secret underground laboratory.

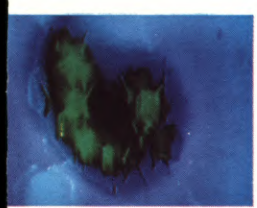


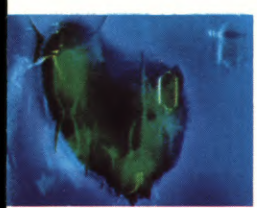
The special team of research scientists, racing against time to identify, contain and destroy the deadly Andromeda Strain, get their first concrete clue toward characterizing the organism when its molecular structure is flashed onto one of the giant screens in the secret underground laboratory.

The scientists stand transfixed with bewilderment and horror as the true nature of the killer from outer space is definitely revealed. It is neither a plant nor animal organism, but a crystalline structure that would proliferate wildly if exposed to the very type of nuclear explosion slated to destroy it.

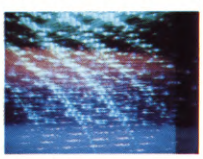


(LEFT) A series of frames showing the progressive deterioration of the Andromeda Strain as it moves through phases of natural mutation that will shortly render it harmless.

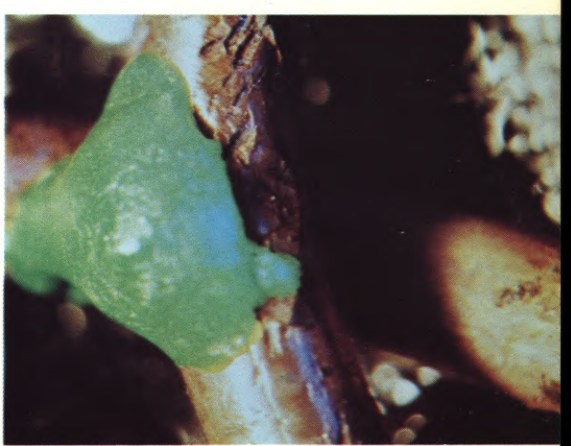




(LEFT) Macro-closeup of the space probe that brought back the deadly organism. (RIGHT) Color x-ray of a hand involving seven exposures in various colors, variations of positive and negative, high-contrast and edge generation.

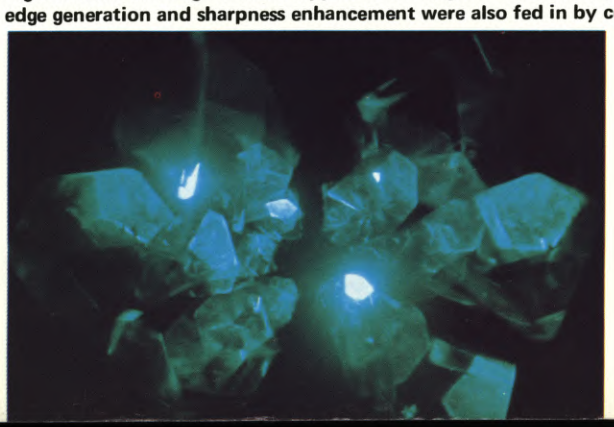


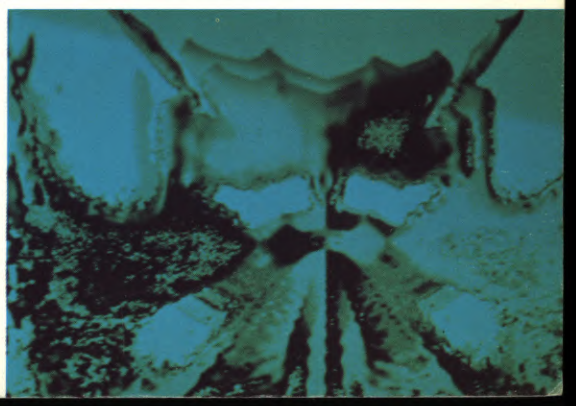
(LEFT) Colorful TV "noise" pattern created by running black and white image three times through video system with different filters. (RIGHT) One of the many alpha-numeric readouts created by the author and partner, James Shourt.

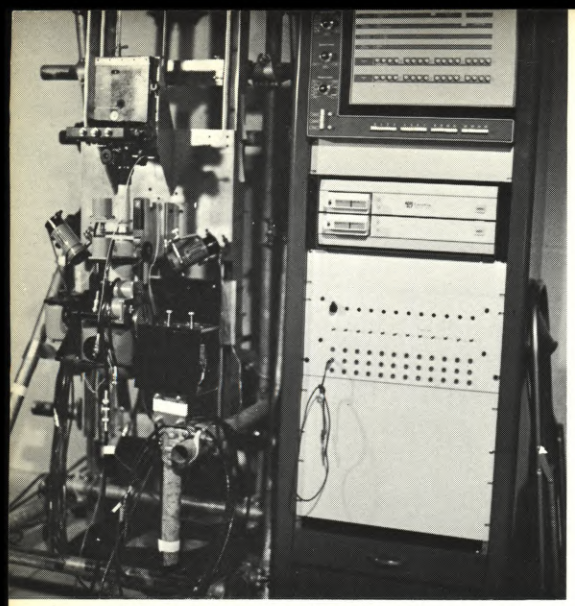


Green blob discovered in mesh of space probe and believed to be the killer. A form of children's putty, plus an extremely complex computer program were combined to animate it.

(LEFT) Frame blow-up of an earlier phase in development of Andromeda Strain, involving crystalline structure based on truncated tetrahedron. (RIGHT) Final closeup of strain was fed repeatedly through video processor. With each regeneration of image it was flopped left to right and reversed positive to negative. Electronically generated high-contrast, edge generation and sharpness enhancement were also fed in by computer.

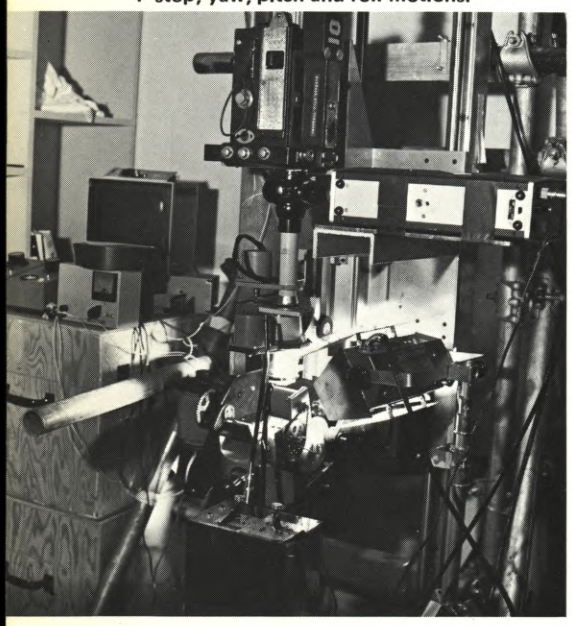






Microscope rig includes standard 35mm Mitchell camera, Sony TV camera' (not shown), 5-to-1 zoom Zeiss microscope, special microscope stage with joystick control. Interdata computer at right. Below it: tri-data tape cassette storage.

Microscope rig ready to shoot. Sony TV camera views through beam-splitter head. 1000-watt quartz light 10 inches from subject. Pulse motors drive camera, focus, zoom, F-stop, yaw, pitch and roll motions.



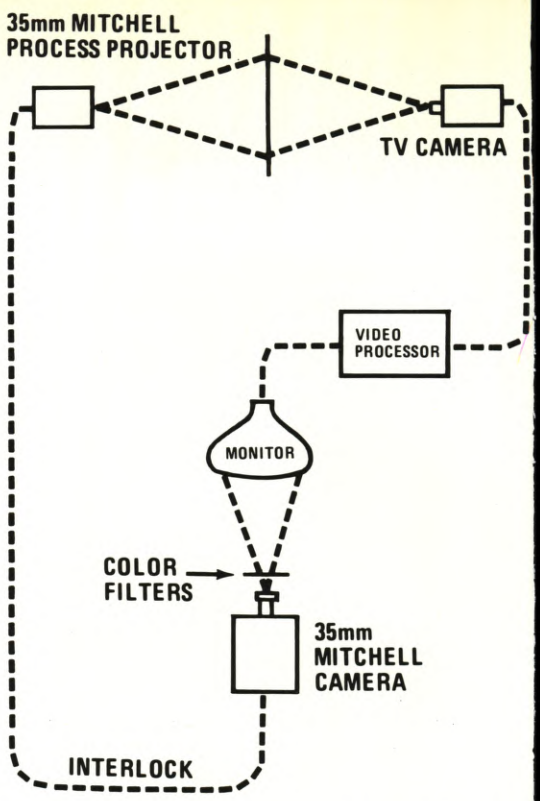
scale from black to white in 16 discreet steps, with the entire operation automatically operated.

The video processor would enable us to put a 35mm film through the system so that it would be picked up by a vidicon camera and so that the image would come up on a high-resolution monitor from which it could be filmed. It would be a one-to-one system, like that of an optical printer, but, through switching the image, we could make it negative or positive, switch color packs automatically in front of the video camera or the film camera and make a black and white subject come up in a wide color range by using yellow, cyan and magenta filters.

Theoretically, we would be able to set up a computer program to take any given image and turn it inside out, warp it and flip the colors the wrong way around electronically. We could also add color between the camera and the TV monitor or filter out color between the TV camera and the film projector that was inputting the image, thereby completely reconstructing the color image.

The 2000-line video system, when completed, was so sharp that you could input a 35mm film print and it would resolve the grain structure of the emulsion. It really had super quality.

When we got the computer running, we used it to get some really complicated photography of the growth of the Andromeda Strain. But first we had to decide what the strain should look like and design it for the camera. Prior to that we had gone through a preliminary stage using simple microphotography on the outside of the capsule, then going inside and finding a little piece of sand lodged in the fine mesh screen of the catching element. The second phase, examining the strain itself, would involve strange effects with electron-microscopy, x-ray, diffraction photography and things like that.

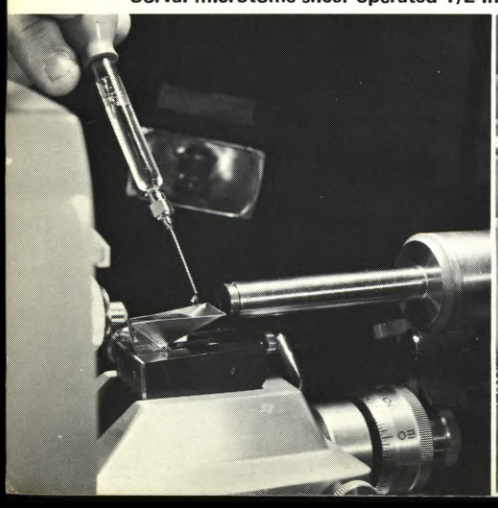


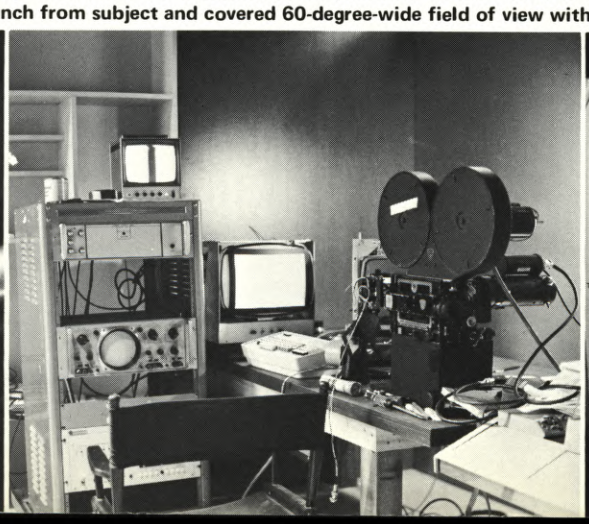
2000-LINE VIDEO PROCESSING

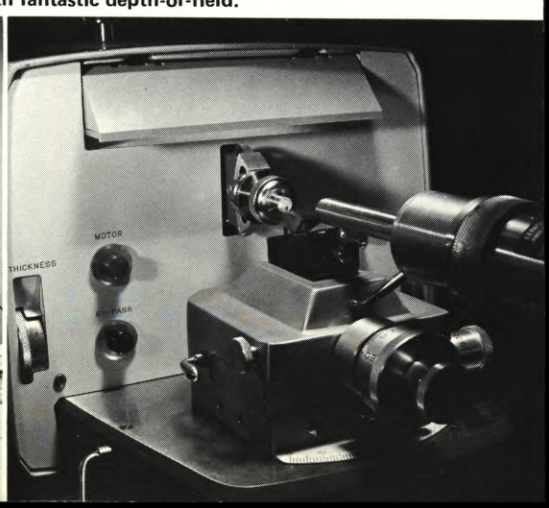
Camera chain for 2000-line video processing. As many as seven exposures generated various colors and variations of positive, negative, high-contrast and edge generation from basic black and white image.

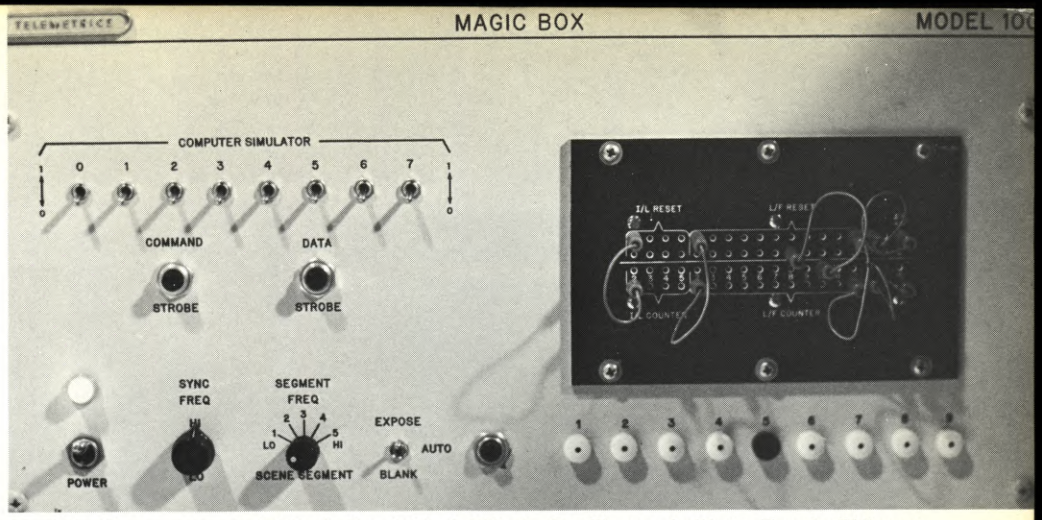
According to the description in the book, the actual Andromeda Strain had to be a crystal structure, so I hired a couple of industrial designers and architects to come and work with us for a while. We designed a truncated tetrahedron shape, which is like a pyramid with the corners cut off. It is made up primarily of hexagons and you can fit them together into very interesting patterns. We tried working with all kinds of other geometric shapes related to crystal structures, but this one seemed to offer the most interesting possibilities. We made a lot of paper models of the truncated tetrahedrons to find out how they would stack and move together.

(LEFT) Shooting ultra-closeup of a microtome slicer with F/22 borescope lens made specially for the film by Lenox Instruments. (CENTER) Copy rig used for shooting 35mm film on high-resolution TV monitor. Video processor is behind chair. (RIGHT) Special borescope lens photographing Sorval microtome slicer operated 1/2-inch from subject and covered 60-degree-wide field of view with fantastic depth-of-field.





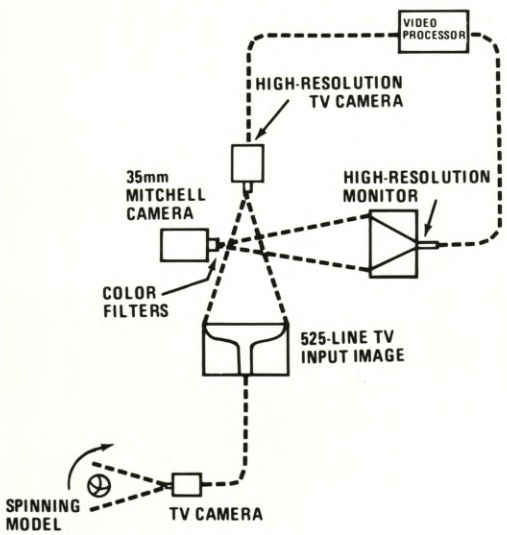




Special video processor (whimsically dubbed "Magic Box") was built to Trumbull/Shourt specifications by Lear-Siegler Company in order to achieve 2000-line TV image. Sharpness capability was so great that it resolved the grain on 35mm film emulsion.

Next we built a gimbeled rig to animate a little clear plexiglass hexigon. It was 1/8th of an inch thick and three inches in diameter, and we buffed it a bit so that it would have a matte finish. The hexagon was attached to a little arm and mounted on the rig in such a way that it could be made to rotate 360 degrees in one axis and 360 degrees in the opposite axis. This made it possible for us to position it anywhere on its own center—at any angle in a volume of space.

The whole gimbeled rig (as far as its positioning and axes were concerned) was controlled by digital pulse motors, which were driven by the computer, so that the whole rig could move right or left or tilt up or down. Also, the camera was mounted so that it could move up or down relative to the rig. We set up a strobe light, also controlled by the computer, which would flash when the hexagon hit its pre-set proper positions.



HIGH-RESOLUTION (2000-LINE) VIDEO FEEDBACK

High-resolution (2000-line) video feedback chain. On each regeneration, the image was flopped left to right and reversed positive to negative, with electronically generated high-contrast and sharpness enhancement.

With the computer controlling both the positioning of the hexagon and the timing of the flash, you could very rapidly build up a truncated tetrahedron on a frame of film. It required three exposures of hexagons on their sides, and one flat. The rig rotated very fast, but shooting had to be done in a completely dark room. We even had to put tape over our computer lights in order to avoid picking up any extraneous exposures.

We started out with just three hexagons in the center, leaning together to form the tetrahedron shape. But it was also possible, through the use of the computer, to get an almost limitless variety of patterns by altering the points at which the strobe would flash and where it would hit the sides of the hexagon. You could, by hitting it at different times, animate these hexagons to start folding out. As they hit flat positions, we'd pop in new hexagons and "hinge" them from the others and they would fold out, also. Then others would fold up and still others would fold across. We worked it out so that we could hinge the hexagons from any side, and the effect was similar to that of flower petals opening. The hexagons would keep doubling, hinging, flipping and multiplying. We'd start with three and then we'd have six and then twenty-two, and so on.

All of these complex patterns were generated from multiple exposures of the single plexiglass hexagon. The rig just kept zooming around in a totally dark room, flashing its strobe to make each exposure—all controlled by computer. It moved at great speed, but by the time you arrived at a point where you had something like 32 hexagons being exposed onto a single frame of film, it was taking several minutes to expose each frame. As the hexagons multiplied more and more, the frame rate kept getting slower and slower.

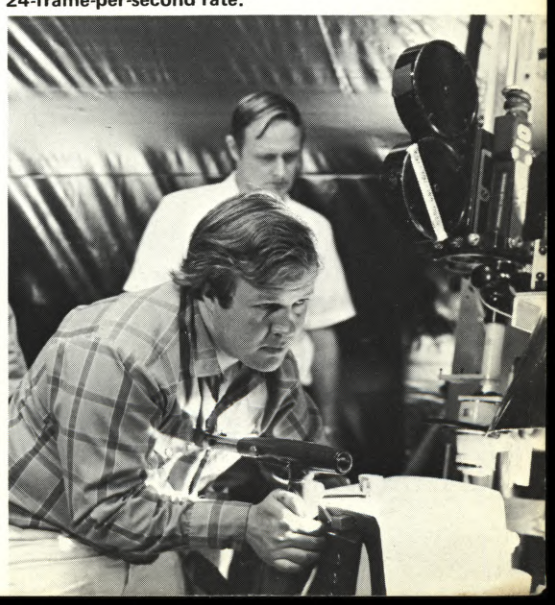
What ended up on the film was essentially a sequence of black and white images of the hexagons multiplying. The next step was to run this through the video system in which, simply by dialing in different values of edge generation or flipping from positive to negative and exposing with different color filters, we could composite that one piece of film into perhaps ten exposures on a second piece of film. These effects were very strange, very "electric"—and we'd artificially inject a bit of white noise to add sparkle to the images and create a sort of video effect.

We created some very interesting things by flipping the images from positive to negative. What started out as the positive shapes of the hexagons would become negative. We would make one exposure where they looked like holes with a blue background around them. Then, in a second exposure, we would expose just the edges, using another color. In a third exposure, we would fill in some of the insides, using yet another color. In this way, we were able to build up a really volumetric color image, while going through the whole multiplying thing.

The final sequence, in which the Andromeda Strain goes through a mutation process and begins to break down to a harmless form, was created by means of an entirely different process. It was a technique that I originally designed for 2001: A SPACE ODYSSEY, but which we never got to use in that picture because I didn't have sufficient time to finish it. The effect is

Continued from Page 485

The author shown setting up the Sorval microtome slicing machine on special stage beneath microscope for unique filming at 24-frame-per-second rate.



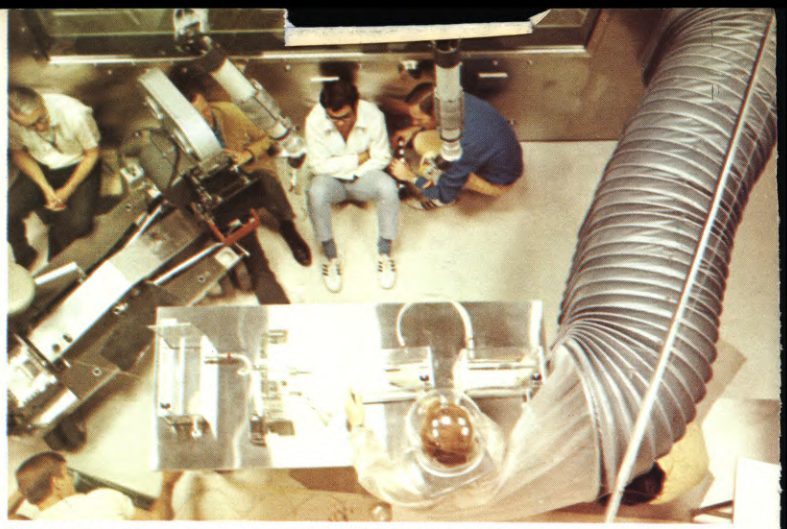
ANDROMEDA STRAIN

Continued from Page 439

story seems so real is that the sets, in many cases, are functional and much of the hardware is operable.

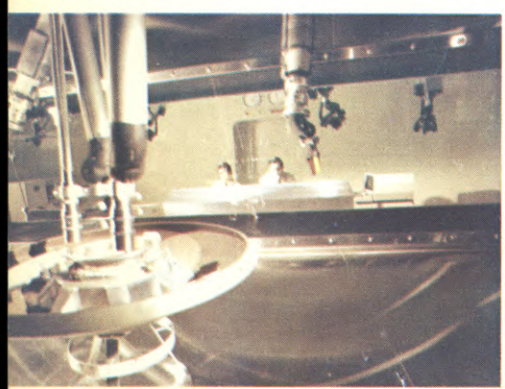
The story of ANDROMEDA unfolds from two basic places: the town of Piedmont, New Mexico, and *Wildfire,* the underground government laboratory. Leven, in cooperation with Cinematographer Kline, conceived basic color schemes for these two primary locations which were highly effective, although unobtrusively so, in conveying the moods the story demanded.

Piedmont, N.M., scene of the disaster, needed a dead, hot, barren look



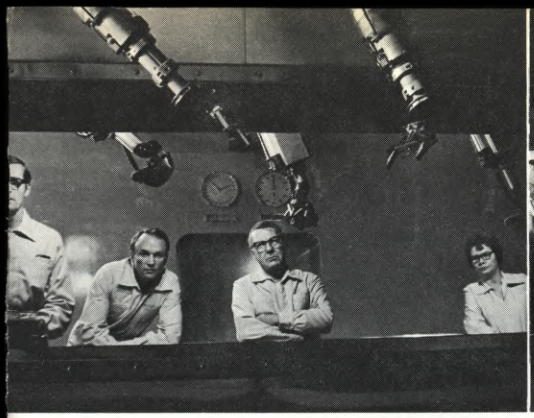
Camera crew on sound stage of Universal City Studios arranges set-up inside one of the several spectacular underground laboratory sets. Highly reflective surfaces of some of the set elements and much of the equipment required that a good deal of the illumination be provided by bounce light.

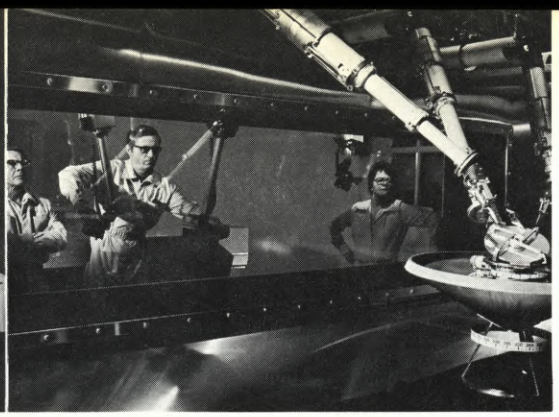
(LEFT) Scientists, spirited away from their normal pursuits, are briefed on the emergency character of the deadly challenge which confronts them. (RIGHT) As part of extremely thorough decontamination process, prior to descending to lowest level of laboratory, nude scientist appears to grow incandescent in a glow of white light.



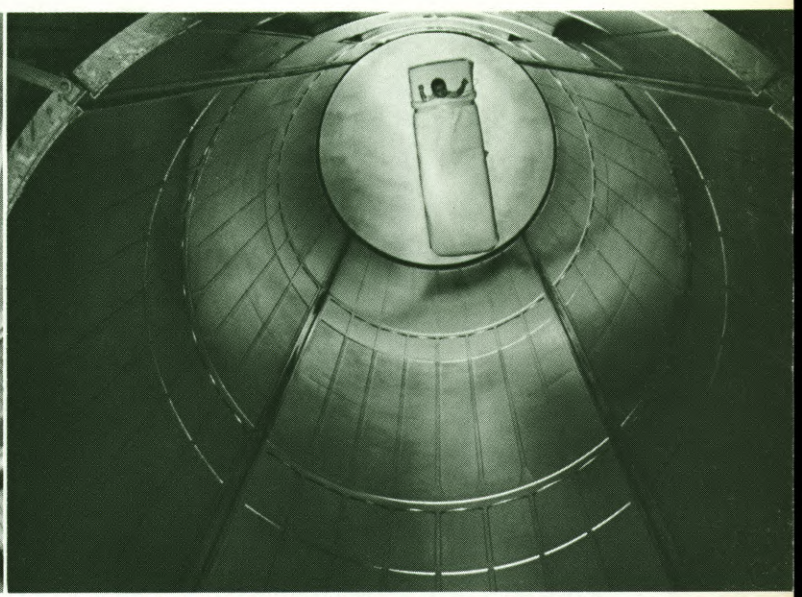
(LEFT) The recovered space probe is placed inside a hermetically sealed compartment as sleuthing for the elusive killer begins. (CENTER) Physician and nurse study readouts indicating physical condition of survivors. (RIGHT) Scientists peer into the compartment where lab animals fall dead instantly upon being exposed to lethal organism.

The doctor races up central core of the laboratory in frantic effort to nullify automatic self-destruct mechanism which, it has been discovered, will vastly stimulate the growth of the now-identified killer from outer space, the Andromeda Strain.





(LEFT) Scientists wait expectantly outside sealed compartment where the space probe is readied for examination. (RIGHT) Operating mechanical arms of the compartment from his vantage point outside it, scientist dismantles the space probe, searching for a trace of the deadly micro-organism.



(LEFT) Almost collapsing from the superhuman effort of trying to head off the self-destruct device, physician is fired upon by automatic laser rifles as he reaches the top of the core. (RIGHT) In the depths of the lofty isolation chamber, the surviving baby wails piteously.

Soft earth colors of browns, reds and yellows, along with unusual camera angles of townspeople suddenly killed by the germ, conveyed the desired feeling.

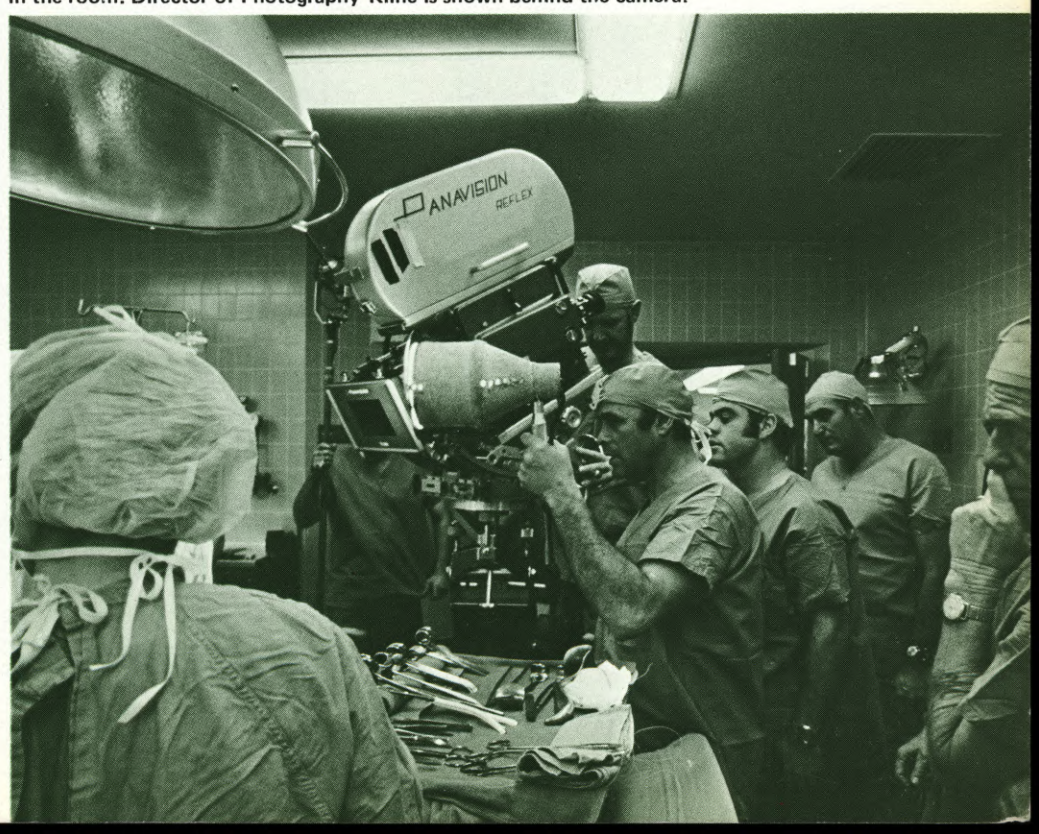
The tense, sterile, frigid feeling the laboratory sequences required was in sharp contrast to Piedmont. The *Wildfire* color scheme was designed with cool, low-key colors of blues, greys, and off-whites.

The laboratory sets were designed and built unconventionally. Almost all of the sets were four-walled and ceilinged, with very few wild (removable) walls, and they were provided with practical fixtures as well. These unique sets created photographic problems such as are rarely encountered in sound stage shooting, but the sets were built for realism, not convenience. The cinematography had to be adapted to the sets, making the use of realistic techniques a necessity.

Special demands were placed on the lighting utilized because of the enclosed sets. Said Kline, "To achieve an effective source lighting, the key light usually

Continued on Page 488

On location in operating room of Pasadena's Huntington Hospital, camera crew prepares to shoot surgical sequence. The crew was required to scrub and don surgical gowns before being permitted in the room. Director of Photography Kline is shown behind the camera.



THE LAB BREAKTHROUGH THAT HAS REVOLUTIONIZED RELEASE PRINTING

How the combination of Kodak's Color Reversal Intermediate film stock and liquid-gate printing has upgraded the quality of release prints, while effecting most important economies in time and money

By JOHN J. KOWALAK, *Executive Vice President, Movie Lab, Inc., New York-Hollywood*

What is perhaps the most significant technological advance in the motion-picture industry during the past decade largely has gone unheralded because its primary impact has been seen in the laboratory, rather than on a set or on location.

In mid-1968, Eastman Kodak Company announced the availability of a color reversal film, which could be used in both 35mm and 16mm film formats as an intermediate between the camera original and release-prints. Kodak stressed that the new film, Eastman Color Reversal Intermediate Film, 5249 (35mm) and 7249 (16mm), would be of primary interest to laboratories, where they would help to reduce production time, and enhance print quality.

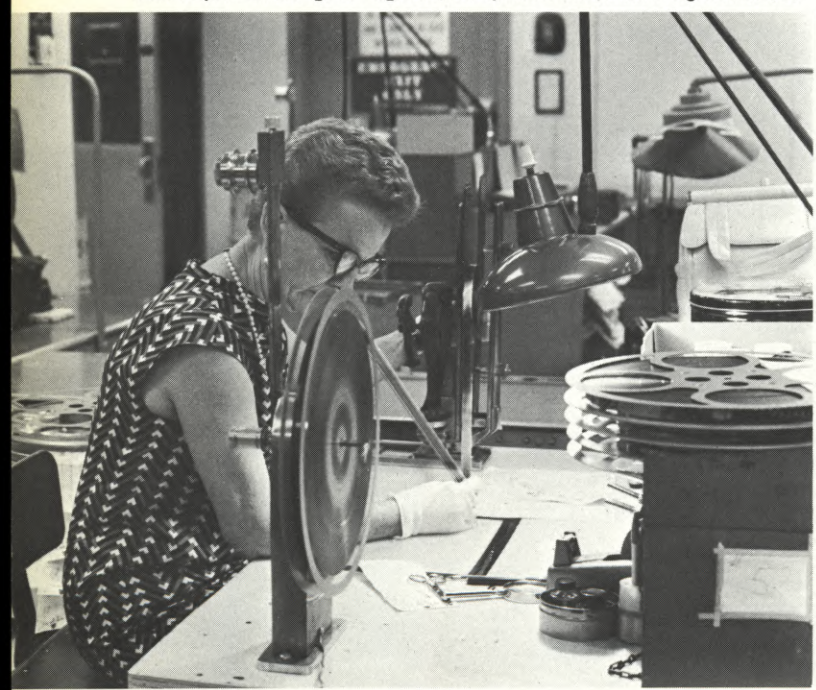
About the same time, after many years of discussion, liquid-gate printing became feasible in terms of available equipment. Movielab, Inc., installed liquid-gate printing equipment—incorporating the immersion of the image-transfer process in a fluid of the same index of refraction as the film base—which permitted us to actually eliminate minor imperfections on original negatives while printing onto color reversal intermediates.

When new techniques are developed and adopted by an industry, there is always a shakedown period during which technicians are being trained to the new ways and whatever bugs still exist are worked out. In the case of Eastman CRI Film and liquid-gate printing, sufficient time has now passed to prove that the combination of these two developments has had a powerful influence upon the entire film-making industry. In many cases, it has provided impetus for markets which otherwise might never have developed as strongly, or in some cases, where production might have, by default, become electronically or video-oriented.

Included among the markets affected are the overseas releases of American-made films, the production and distribution of spot commercials and syndicated TV programs, the evolvement of the trend towards low-budget movies being made for release to "mini-theaters," and even such traditional film mainstays as in-flight movies.

For all these markets, the availability of the Eastman Color Reversal Intermediate Film has eliminated one step or generation from the print-making process. Prior to the availability of the new film, producers had to either print directly from their original film—a chancy proposition at best because of the danger of scratching or other accidental damage—or they had to commission their laboratory to make an interpositive copy of the original, which was

(LEFT) Careful inspection of motion-picture film is accomplished at Movielab prior to delivery of the finished product. Quality control is a precise and continuing process (RIGHT) Delivery of release-prints created from Eastman Color Reversal Intermediate Film is speeded up considerably over that of previous original negative/interpositive/duplicate negative steps.



The recent advances in film stocks and laboratory technology add up to more jobs and greater opportunity in the film-making industry.

then utilized to make an internegative for use as a printing master.

Each of these steps not only consumed time and money, but degenerated the quality of the end product. Conversely, with the new system, we found that we were producing prints which were very close to the original negative quality. By our measure, prints made by the interpositive-internegative system provide between 80 and 85 percent of the color quality inherent in printing directly from the camera original. The new system allows us to protect the camera original and still produce prints which are between 95 and 96 percent of optimum quality.

The time-savings also are dramatic. Within several months of starting the new system, we had 15 orders for the overseas release of theatrical films. In each case, we were able to *deliver* a color reversal intermediate to the distributor in the country where the film was being released within five to six days.

Previously, the alternative was to make a duplicate negative, which took longer, and produced prints of lesser quality. As a result of these problems, distributors often argued for—and occasionally won—the right to have access to the original negative for release-printing.

This practice, of course, courted disaster for the producer in that his irreplaceable original negative was being shipped from here to there, and back, making it subject to loss and damage. At the very least, custom restrictions would generally tie up original negatives for at least 30 days, causing a need for additional handling and costs every time the film was returned to the United States.

Now, as a matter of standard practice, once a picture slated for overseas release is turned over to us, we store it under temperature and environmentally-controlled conditions until it is needed. When the overseas order is received, it takes us just a few days to make a color reversal intermediate and have it ready for shipping.

The feedback that we get from producers indicates that this enhanced quality and more rapid delivery of color-release prints has led to wider distribution and better acceptance of American-released films. Since profits from overseas releases generally represent the difference between breaking even and making money on many films, we believe that the most important overall impact of the new printing system is that it has made theatrical film-making more financially attractive

Even more significant, new opportunities and expanded markets have opened up for motion-picture producers as a result of applying the new technology. Take the area of television commercial spots, for example. In the last few years, increasing numbers of commercials have been produced on film and released on videotape. Recently, tape producers have been arguing the financial feasibility of producing on tape. The availability of the new film, however, has begun to reverse this trend in the only way it could be reversed—economically.

Production of a television spot has been greatly simplified. Under the previous film-processing steps, the original negative was used to create an interpositive, which, in turn, was used by an optical house to produce a dupe negative with optical effects. A second interpositive was produced to generate a second dupe negative for contact printing of the release-prints. A five-step process, with resultant degradation of color quality, grain and resolution.

Now, however, the new film cuts the steps to three. From the original negative, a color reversal intermediate with opticals is created and is used for high-speed release-prints. For big orders on short deadlines, multiple color reversal intermediates can be made easily and inexpensively in order to facilitate release-printing. With the color reversal intermediate system, we not only eliminate two production and quality degen-

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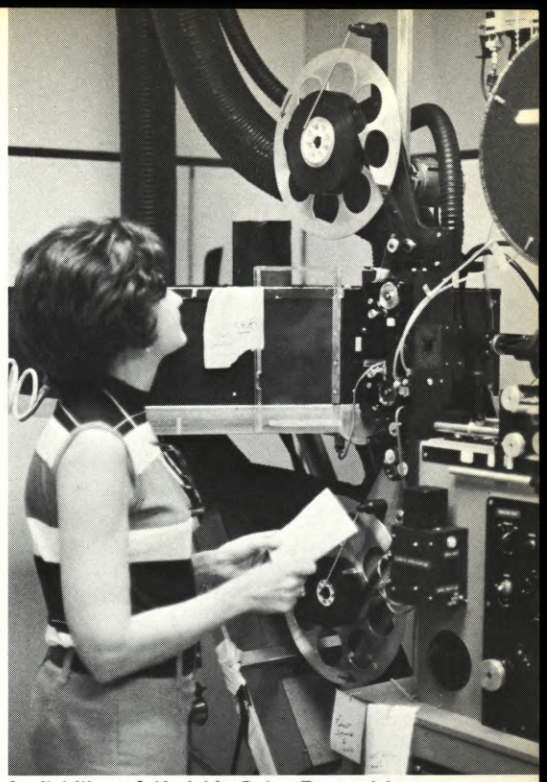
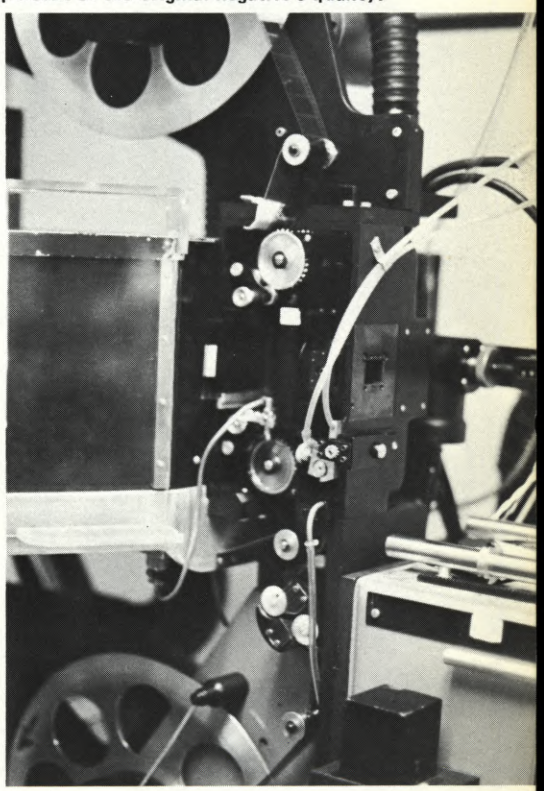


Availability of Kodak's Color Reversal Intermediate Film, 5249 (35mm) and 7249 (16mm), has made possible high-speed exposure of release-prints through liquid-gate printing.

The "liquid-gate" consists of a fluid bath of the same index of refraction as the film base that "fills in" small imperfections in negatives for printing. The combination of Color Reversal Intermediate reproduction quality and liquid-gate technology has resulted in the ability to produce release-prints with 95-96 percent of the original negative's quality.



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Introducing the R16BTE "ENDO" Scientific Research 16mm Camera.

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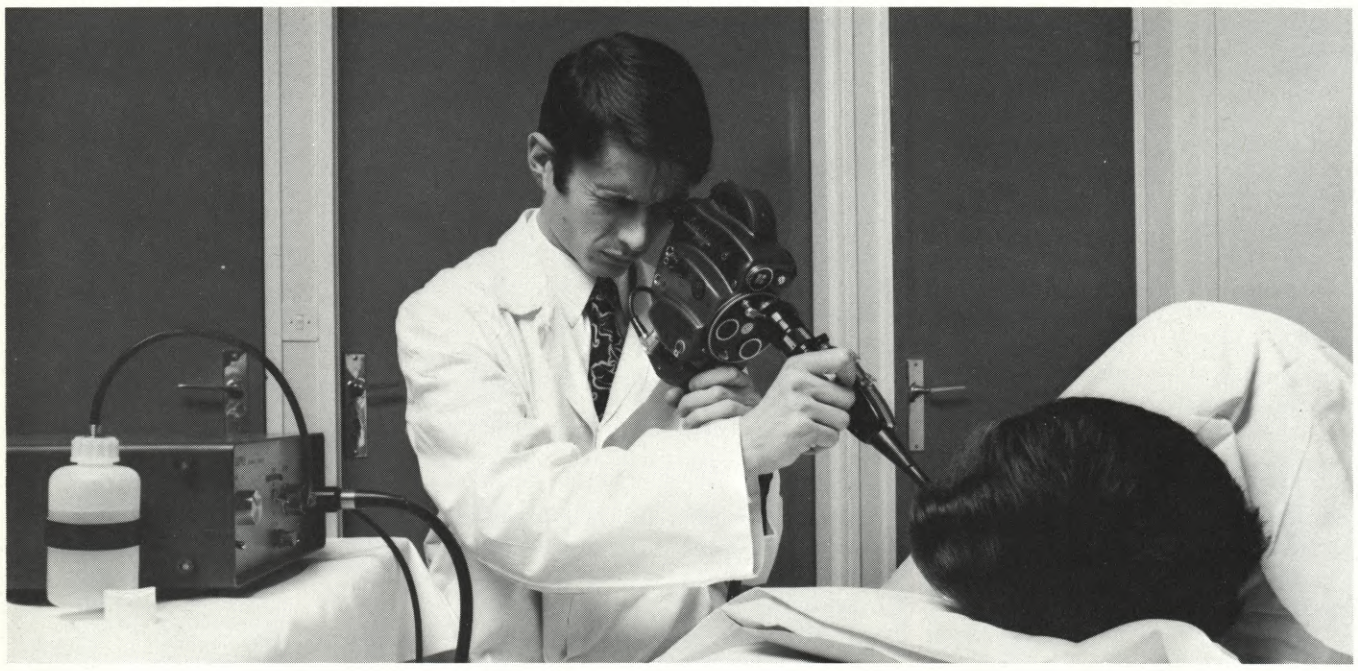
The Beaulieu 16mm "ENDO" camera has been specially designed as a scientific research cinecamera, and is ideally suited for *endoscopic* and other medical-type filming.

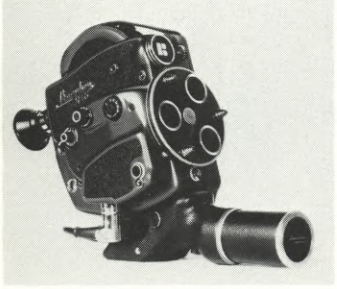
The Beaulieu "ENDO" camera operator can *instantly* and *automatically* compensate for the rapid and unpredictable changes in exposure conditions encountered during endoscopic cinematography.

The cameraman can also operate the "ENDO" camera on-off switch by *remote control* (usually by foot pedal). This is an extremely important feature in endoscopic filming, since the cameraman's hands must be as free as possible in order to easily control exposure and other vital camera functions, and—at the same time—manipulate the ultra lightweight camera body and endoscope.

The new Beaulieu "ENDO" camera has also been provided with a clear viewing spot in the center of the ground glass, which allows unimpeded viewing during filming in the low light conditions usually found in endoscopic explorations. Another aid in countering these low light levels is the *mirrored shutter* on the Beaulieu 16mm "ENDO" camera, which permits 100% of the available light to reach the film plane, and—alternately—100% of the available light to reach the viewing screen.

In addition to endoscopic and other research-oriented cinematography, the Beaulieu 16mm "ENDO" 3-lens turret camera is also ideal for all types of *normal* filming, whether for professional purposes or simply for pleasure.





OTHER BEAULIEU "ENDO" CAMERA FEATURES

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To receive literature on the Beaulieu 16mm "ENDO" camera, visit your finest camera store or write Cinema Beaulieu, General Office: 14225 Ventura Blvd., Sherman Oaks, California 91403.

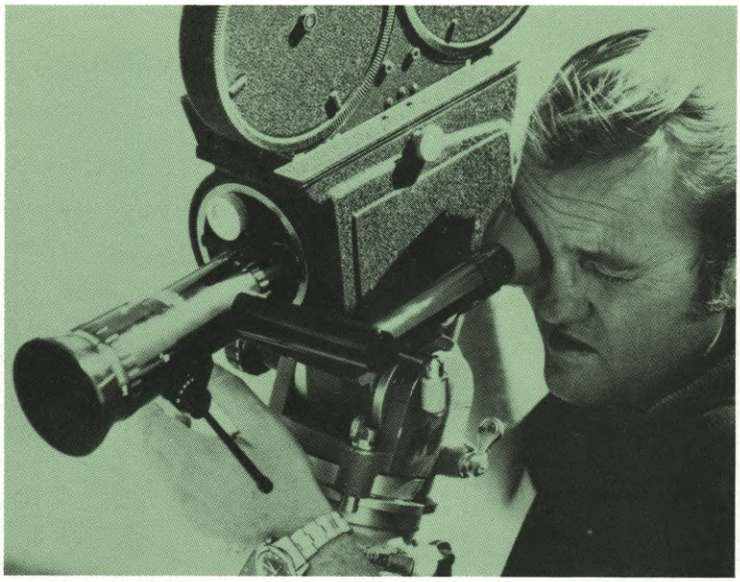
"MONITAL is an unbeatable tool" says GENE BARNES*

I have recently been accused of reversing my decision to use primary lenses instead of relying entirely on "zoom" or variable focal length lenses. I believe the discipline of fixed focal length lenses puts a far greater stress on your entire approach. You think again in film terms. Television brought the zoom lens into being for it helped smooth out the problem of awkward lens flipping for a different perspective. However, in searching for acceptable primary as well as zoom lenses I had encountered innumerable problems of quality, mechanical failure, and inadequancies and finally believed that "they just didn't make them like they used to."

I changed my mind when I tested and used the primary lenses manufactured by Rank Taylor Hobson. These lenses had weight, focusing and iris rings that worked smoothly and stayed exactly where set. It was like being snapped into focus after experiencing a fuzzy nightmare. Encouraged I tested the Rank Taylor Hobson zoom lenses as well. The Monital 17-85 f/2 gave greater definition and clarity than many of the other lenses I had used. Also, smoother action and better color rendition than any of the wider zooms used. The real shocker was the Monital f/3.8 compact lens with a range of 17-85mm. It is an unbeatable tool when you need quick set-ups on a hand camera for it delivers exciting shots in beautiful color.

A final point on both Monitals and Rank Taylor Hobson primary lenses. I will again mention discipline. At times little thought is given to the size of the finished image when magnified many times over on the projection screen. I generally work within a 17-85mm range. The Monitals in the 17-85mm ratio achieve this objective.

When I really need a wide angle, the 9mm f/1.9 RTH Kinetal can be relied on to do the job. It is the crispiest wide angle lens I have ever used. Today's 16mm film makers should no longer be satisfied with less than the professional quality provided by Rank Taylor Hobson lenses.



People who work with 16mm film can no longer be satisfied with less than professional quality. That is exactly what Rank Taylor Hobson Monital lenses deliver, professional quality all the time.

* Winner of 12 "News Pictures of the Year" awards and "Golden Mike" awards. Has filmed over 50 documentaries and shot more than 2 million feet of film for NBC and prominent Sponsors in the last 18 years. Gene is now an independent Producer/Director/Cameraman.

Jene Barnes

All photos by Rick Neff.

For complete information regarding Rank Taylor Hobson lenses contact the RPI office nearest you.

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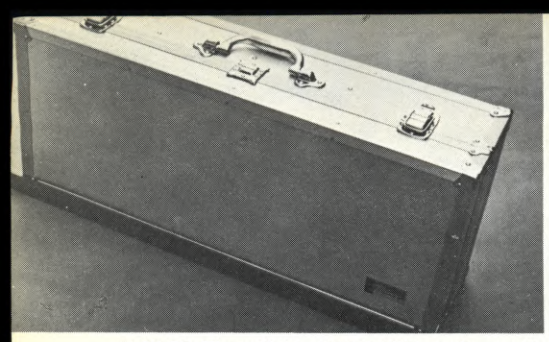


(LEFT) Three-light AERO-KIT packs neatly into a sturdy aluminum case. (CENTER) Each light has full complement of accessories, including barndoors, scrim, 10-foot in-the-line switch cord and 15-foot extension cable. (RIGHT) Included is handy Gaffer Grip for clamping lights to bars, *pipes*, door-tops or whatever.

THE NEW RDS STURDY-LITE AERO-KIT

An intelligently designed lighting kit that is complete, yet compact enough to stow beneath an aircraft seat

The trend toward shooting in actual location interiors, which has grown enormously during the past several years, has created the need for smaller and smaller high-intensity lamps of proper color temperature that can snuggle in corners and hide behind beams or pillars. The refinement of the tungsten-halogen "quartz" light principle has made such miniaturized, but highly efficient, lighting units possible. Several manufacturers and distributors have taken the next logical step, that of packing two or three such mighty-midget lights (plus accessories) into compact, hand-carried kits. A couple of them are even small enough to fit under an aircraft seat, thus qualifying as hand-luggage on air hops.

The latest of these, brand new on the market and just now being made available for world-wide distribution, goes under the generic name of "RDS Sturdy-Lite Kit", with the particular model being discussed here called the "AERO-KIT".

It is a miniaturized marvel—cramming into a very compact mass an incredibly complete three-light package suitable for lighting an average-sized location interior.

The designers of this equipment have, quite obviously, harkened to the expressed needs of working cameramen instead of merely putting together something that looked good on the drawing board.

For example, they have included both spot and flood ("Key" and "Fill") units in the "AERO KIT", proceeding on the sensible theory that it takes both to create a decently modeled lighting for a scene.

Moreover, they have provided *each* lamp with its own set of essential accessories (barndoors, stands, extension cords, scrims) instead of skimping by including only one or two sets to be

RDS Sturdy-Lite AERO-KIT—LAMP DATA

Lamps which can be used are:

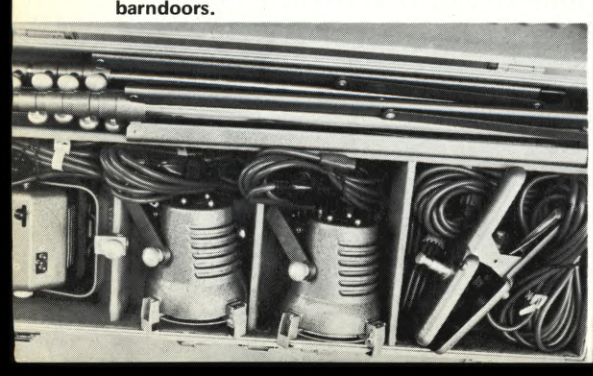
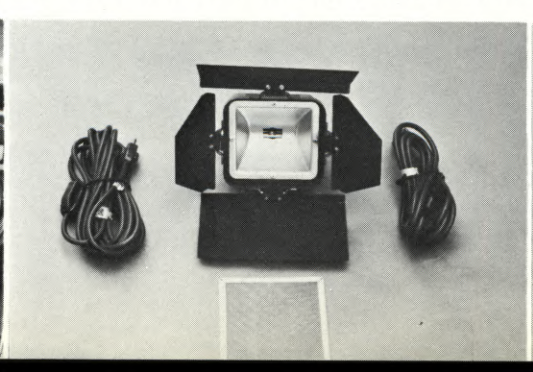
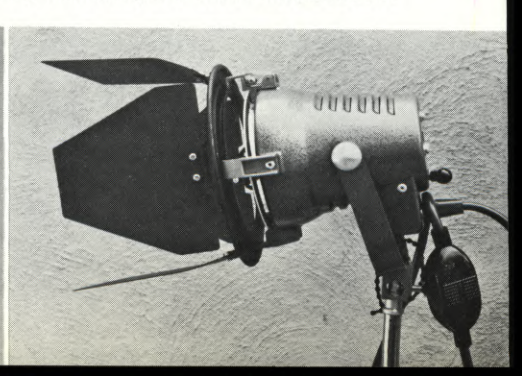
120-Volt,	600-Watt,	3200°K	with Min. 2-pin base
120-Volt,	650-Watt,	3400°K	"
120-Volt,	420-Watt,	3200°K	"
220/240-Volt,	650-Watt,	3200°K	"
220/240-Volt,	650-Watt,	3400°K	"
220/240-Volt,	1,000-Watt,	3200°K	"

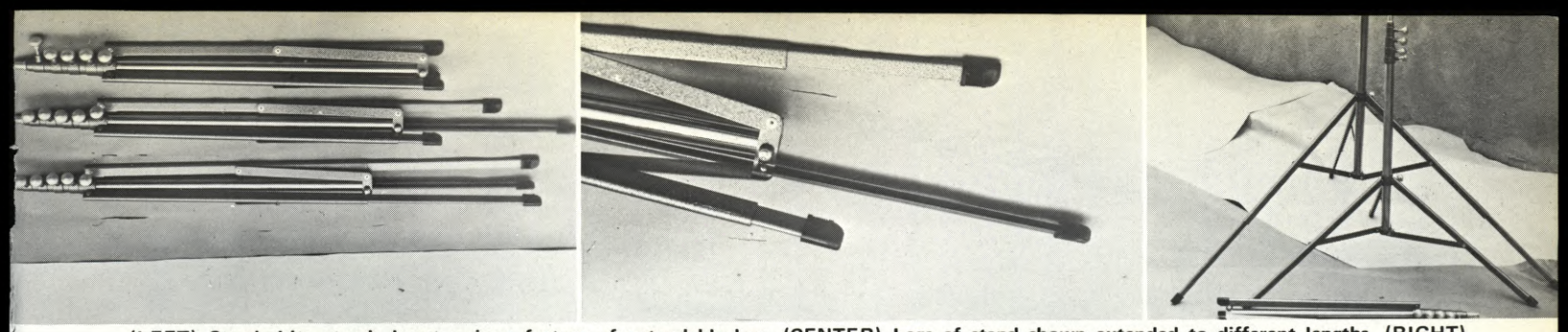
NOTE: Lamp-life is inversely related to color temperature. Generally speaking, 3200°K lamps of the 120-volt type have a life of approximately 75 hours. The 220/240-volt types have a shorter life.

PERFORMANCE DATA (using 3200°K, 120-volt, 600-watt lamp)

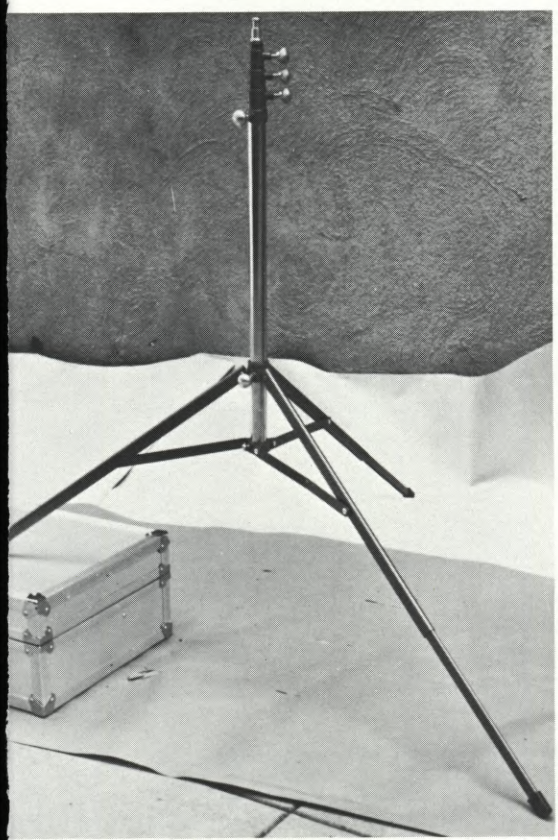
LUMINAIRE TYPE	*INTENSITY* (foot-candles)	*COVERAGE* (to 50% fall-off of center intensity
MINI-KEY—Spot	228 foot-candles	6-foot diameter
MINI-KEY—Flood	52 foot-candles	13-foot diameter
MINI-FILL—High Fill	85 foot-candles	13-foot diameter
MINI-FILL—Low Fill	40 foot-candles	18-foot diameter

(LEFT) With not an inch of waste space, aluminum case accommodates three lights, including all of their accessories, plus Gaffer Grip. (CENTER) Mini-Fill Light (featuring variable beam), shown with accessories. (RIGHT) Mini-Key spot units have sturdy lock-clamps for secure attachment of barndoors.



(LEFT) Sturdy-Lite stands boast unique feature of extendable legs. (CENTER) Legs of stand shown extended to different lengths. (RIGHT) Sturdy-Lite stands shown with legs spread at normal length and fully extended. This important characteristic gives lamp stands a much broader, more secure base, cutting down the risk of their being knocked over.



Extendable legs make possible level set-up of lamp on a slope, steps, uneven terrain or apple box.

shared, somehow, between three lights.

All three luminaires in the "AERO-KIT" burn very cool but, even so, the designers have placed the on-off switches not on the lights themselves, but on the light cords—and far enough down so that one doesn't have to stand on stilts or lower the lights down in order to turn them on or off. Ingenious plastic "Quick-Ties" are provided to hitch the cables up off the floor and keep them stumble-proof.

The sturdy but compact collapsible stands included for each of the three lights involve a unique and very important design feature that is, however, so simple and obvious that one wonders why someone hasn't thought of it before. It very neatly eliminates the two major complaints that can generally be leveled against stands provided for such miniaturized lights, namely: (1) When fully extended, the base of the stand is so narrow that the light is quite likely to topple over if given the slightest nudge, and (2) It is almost impossible to use such stands on uneven surfaces, such as slopes or steps.

The designers of the "AERO-KIT" have all but done away with such causes for complaint through the simple expediency of designing *extendable* legs for the stands. These legs, when extended up to twice normal length, provide a much broader (and far less "tippable") base for the lights, plus permitting them to be used on slopes or steps simply by extending the legs to varied lengths.

As a crowning touch, the manufacturers have included in the "AERO-KIT" a Gaffer Grip, with sturdy "alligator" jaws that can hitch a light securely to a bar, pipe, door-top or whatever without having to fool around with clamps or gaffer tape. It should prove to be a godsend in those all-too-frequent locations where the architecture does not even provide space for a light stand.

Re-stated in terms of the manufacturer's claims, the special features of the RDS Sturdy-Lite AERO-KIT include the following:

It is the only kit which is absolutely complete with all accessories, including scrims for each light, 15-foot extension cables for each light, and barndoors for each light.

Each cable includes an in-the-line switch which permits the light to be switched "on" and "off" from a convenient position.

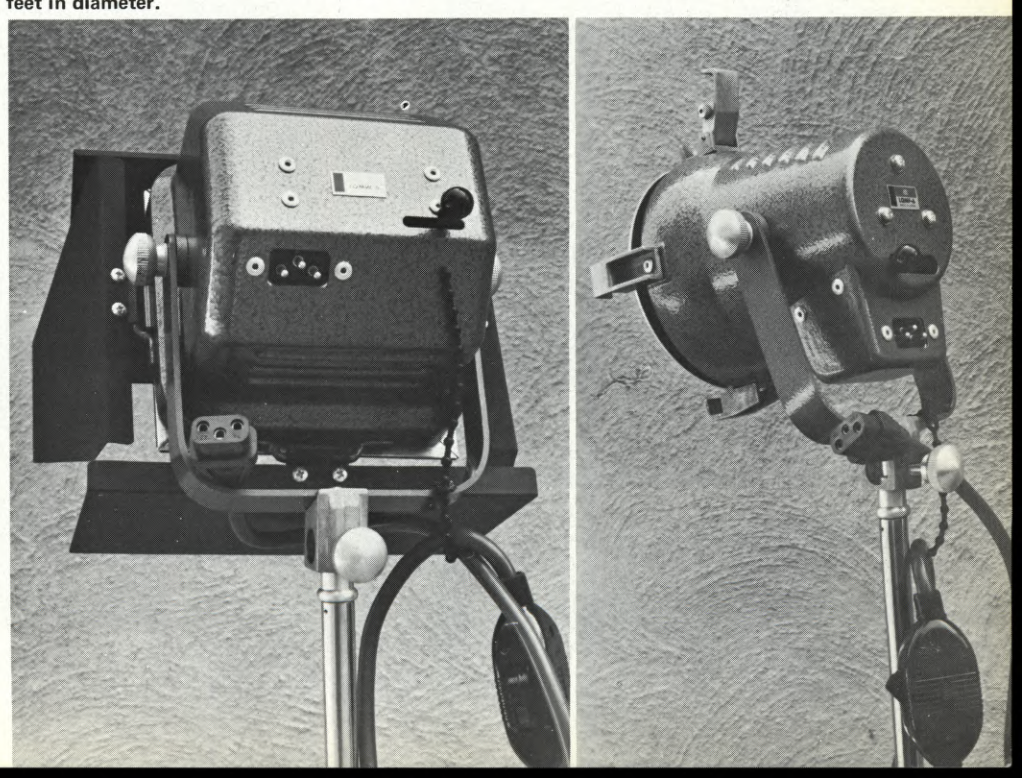
It is the only kit which includes both KEY and FILL lights. The key lights have the capacity of at least a 4:1 ratio in focusing intensity.

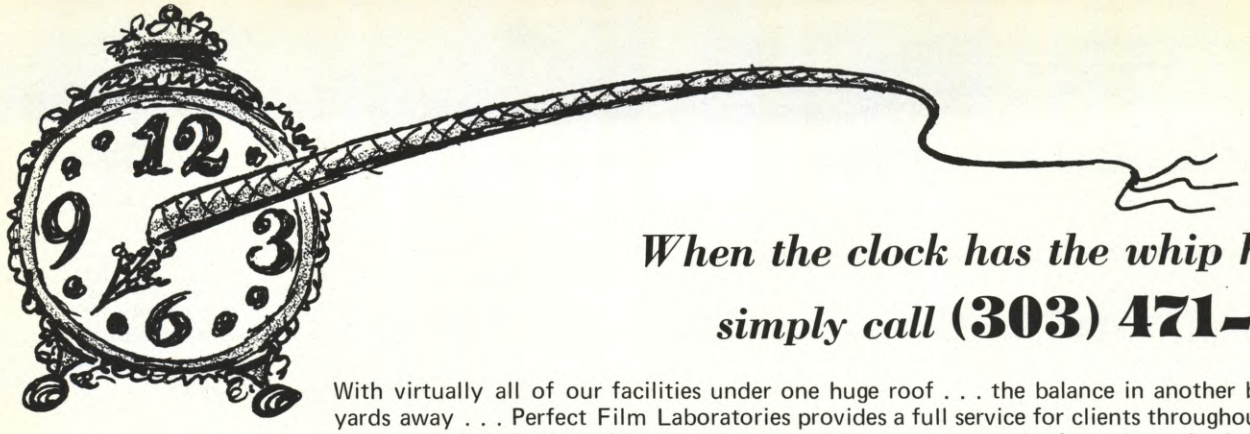
The kit contains the only fill light which can be "focused" to control a 2:1 ratio of intensity. The area of effective coverage remains absolutely flat.

The lights, both KEY and FILL use the same lamp. Lamps are available also for 30-Volt and 24-Volt usage, permitting use with batteries.

Continued on Page 478

(LEFT) Mini-Fill unit is only fill light that can be focused to control a 2:1 ratio of intensity, with absolutely flat area of effective coverage. (RIGHT) Mini-Key unit has a capacity of at least a 4:1 ratio in focusing intensity. At Spot position, it directs 228 foot-candles of light into an area six feet in diameter.





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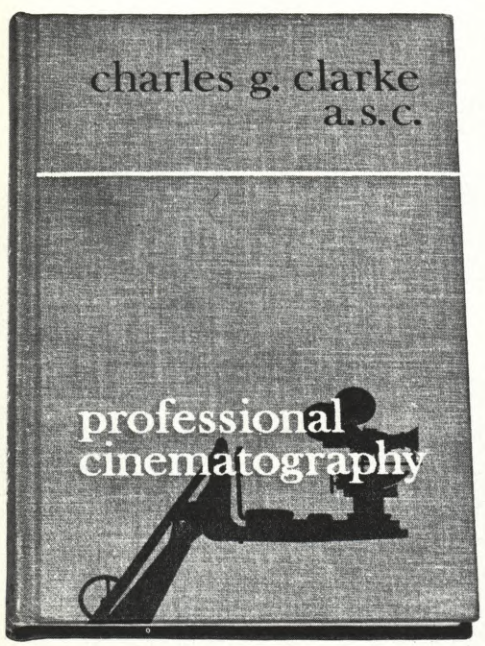
SECOND EDITION

PROFESSIONAL CINEMATOGRAPHY

By CHARLES G. CLARKE, ASC

Professional Guidance For Aspiring Cinematographers



SUBJECTS INCLUDE: Camera, camera mounts . . . Lenses, wide-screen lenses . . . Filters and Filter effects . . . Day-for-night photography . . . Exposure for color and black and white films . . . Light meters and their use . . . Color temperature meters . . . Equipment for set lighting and its control . . . Camera angles and techniques . . . Special lighting problems . . . Color psychology . . . Composition . . . Special photographic effects . . . Set operation on the sound stage . . . New film emulsions . . . Forced development data.

ABOUT THE AUTHOR: Charles G. Clarke, ASC, a top Director of Photography at 20th Century-Fox for many years, and an ASC member, taught Advanced Cinematography at the University of California at Los Angeles, where he recognized a need for practical professional guidance for students striving to be the industry's future Directors of Photography. It is this need which has given rise to his publication of a book on the subject and subsequently the latest revised edition of Professional Cinematography. The first edition of this valuable book has become required reading at many universities and schools offering courses in cinematography.

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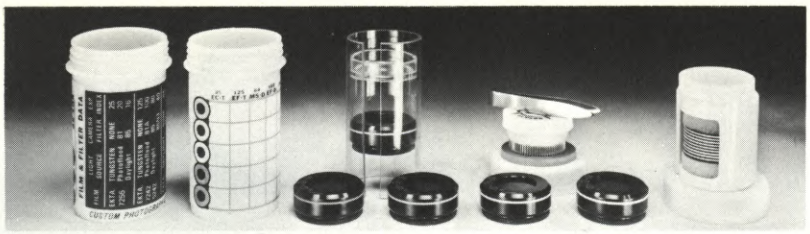

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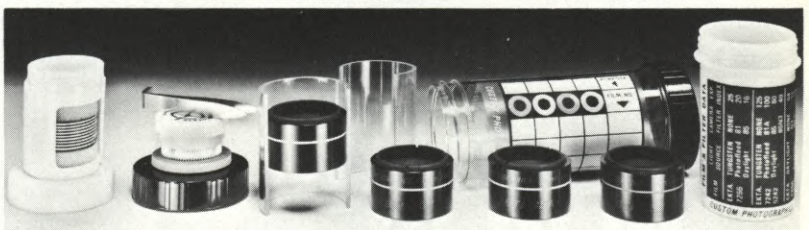

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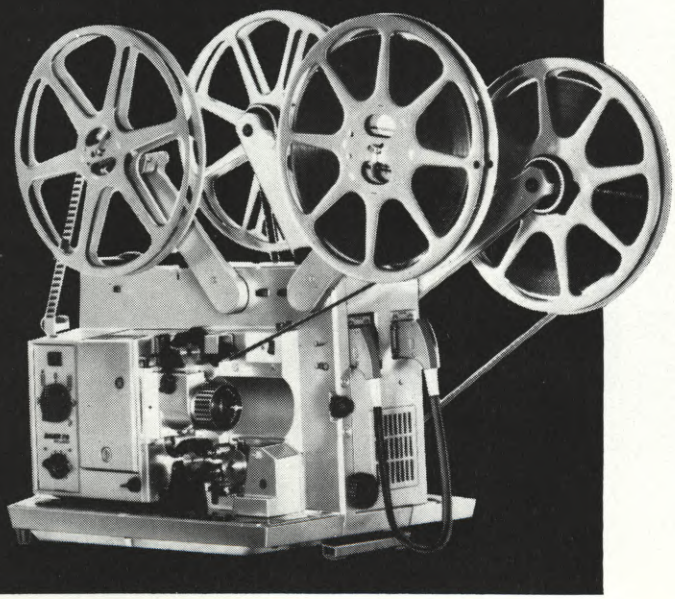

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Sync sound and silent running in a camera that weighs 8½ pounds and is less than a foot long.

Ken Nelson has made a short documentary film with an ACL. "In the past, I've always looked around for a place to rest the camera between shots," says Mr. Nelson. "But with this new one, I found it didn't occur to me to put it down."

With its 200 foot magazine and without a lens, the ACL weighs less than 9 pounds and measures 11½ inches from front to back. Half the size of its competitors. Less than half the weight.

This is the most *inconspicuous* camera on the market. It's completely silent, of course. Hand-held, it's much smaller and lower than your head, as you can see. The battery weighs about a pound and fits into your pocket.

And the ACL is *fast*. You can change its clip-on magazine in less than five seconds. No threading; no need to touch the film at all. Film maker Eric Saarinen says: "This is the first silent camera you can *run* with."

The ACL has a crystal-control motor. Sync sound with no connection whatever between camera and tape recorder. Fantastic accuracy. Sync error is less than ½ frame in one *continuous* 200 foot take. That's 8,000 frames.

What else? A universal lens mount that lets you use any lens with any mount. Extremely bright and precise reflex viewing, with a viewfinder that rotates 360 degrees. And a price that's considerably lower than the competition.

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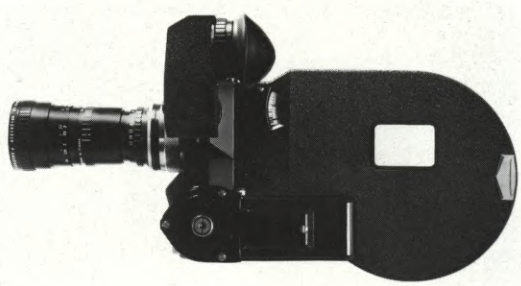

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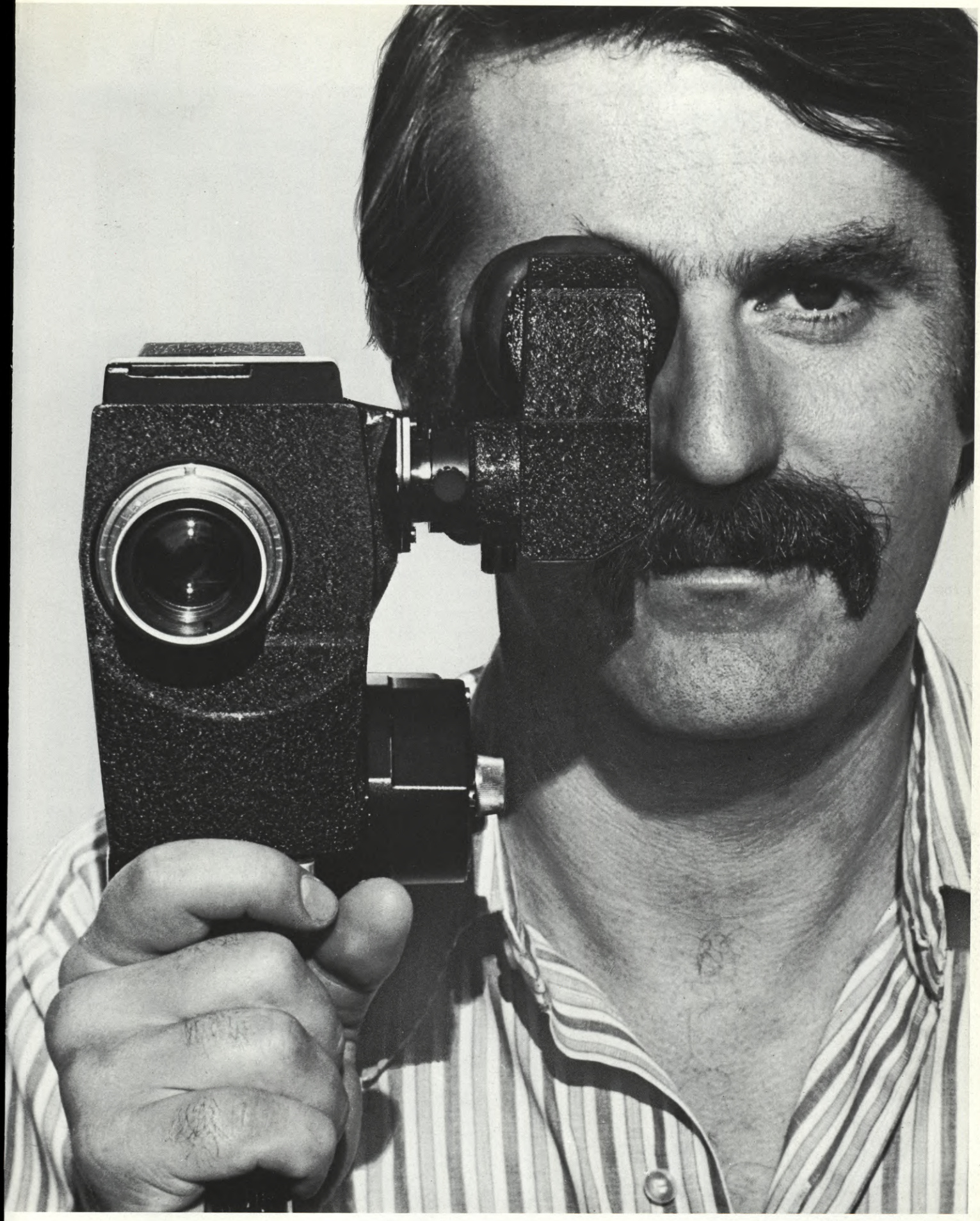
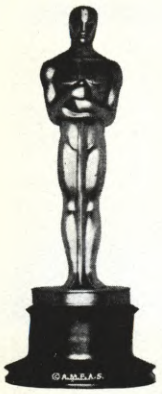




THE FIVE BEST PHOTOGRAPHED MOTION PICTURES OF 1970

In this time of convulsive transition and revolutionary technological change within the motion picture industry, certain truths remain constant—one of these being the fact that film is, first and foremost, primarily a *visual* medium. Because this is so, the special contribution of the cinematographer to the general excellence and audience impact of any motion picture presentation is, and always will be, of paramount importance.

The tools of the trade used by the Director of Photography and his crew continue to grow more compact, more efficient and more automated with each passing year—but the skill of the man himself, this unique artist-technician, can never be automated. His *metier* is much more than a kind of reflex expertise born of vast experience in his chosen field. It involves such all-important intangibles as taste and style and a peculiar gut-feeling for achieving the specific images that will best tell the story.

It is these abstractions of technique which make the work of each cinematographer distinctive—and variable, depending upon the dramatic demands of specific screen vehicles. How, then is it possible to choose a single "best" from among the highly diversified challenges which cameramen face during the course of a single production year?

Five superlatively photographed motion pictures were nominated for the Best Achievement in Cinematography "Oscar" to be bestowed during the 43rd Annual Academy Awards Presentation. Obviously, only one could be the recipient of the cherished statuette. But the members of the American Society of Cinematographers consider the *nominations* for this highest accolade to be as important as the Award itself, and it is with that thought in mind that the membership of ASC salutes with pride the following Directors of Photography who received nominations in the category of "Best Achievement in Cinematography" for the Academy's 43rd Annual Awards Presentation:

FRED KOENEKAMP, ASC
"Patton"

FREDDIE YOUNG, BSC
"Ryan's Daughter"

ERNEST LASZLO, ASC
"Airport"

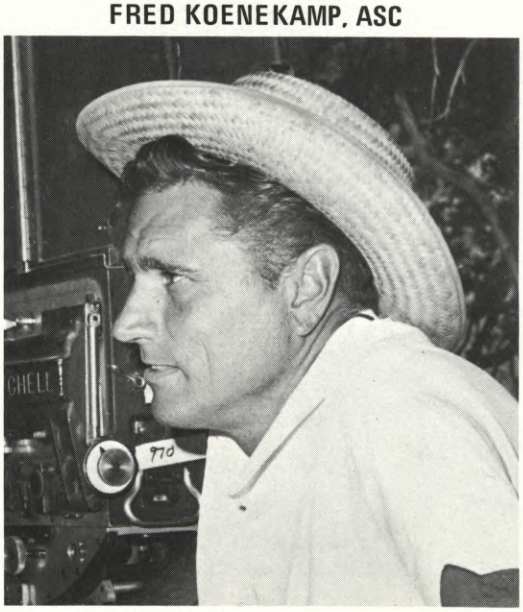
BILLY WILLIAMS, BSC
"Women In Love"

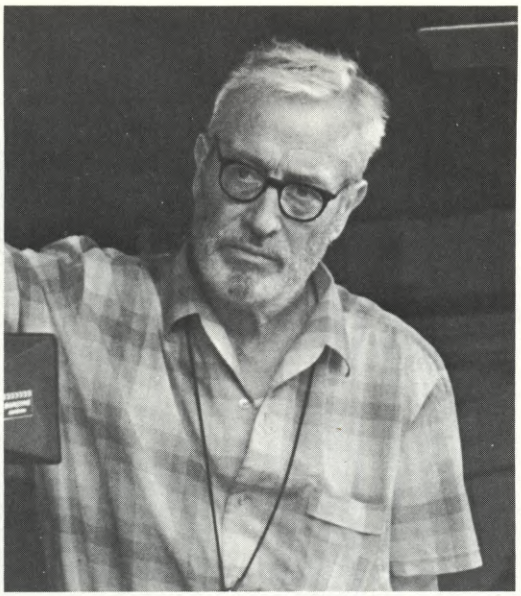
CHARLES F. WHEELER, ASC
SHINSAKU HIMEDA
OSAMU FURUYA
MASAMICHI SATO
"Tora! Tora! Tora!"

"PATTON"

"PATTON"—photographed by Fred Koenekamp, ASC, is a striking screen portrait of a controversial, larger-than-life personality, General George S. Patton, Jr. Koenekamp uses the full scope of his 70mm Todd-AO cameras to capture the almost-mystical charisma of this one-of-a-kind character functioning in his special milieu, the violently vital crucible of war. With equal skill the cinematographer portrays the broad pictorial sweep of World War II battles and the intimate inner struggles of a man constantly in conflict, not only with the enemy, but also with himself.

FRED KOENEKAMP, ASC





FREDDIE YOUNG, BSC

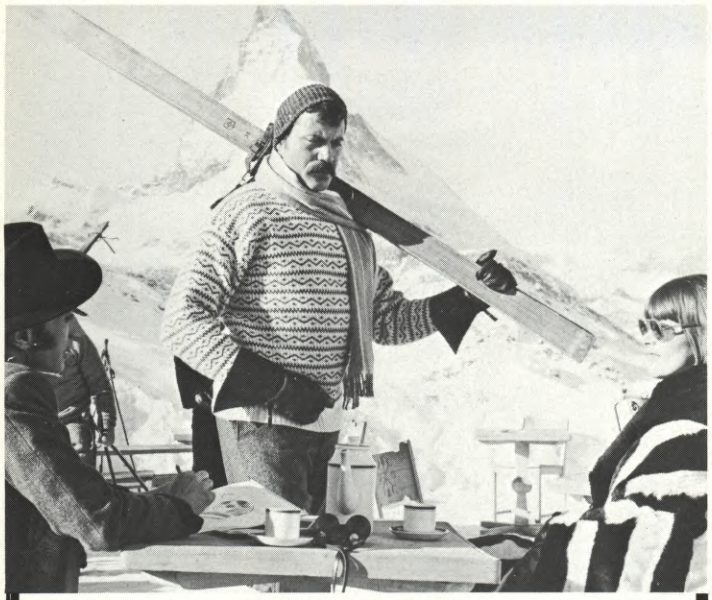
"RYAN'S DAUGHTER"—photographed by Freddie Young, BSC, has been described as "a visual love affair with Southwest Ireland"—and, indeed, its stunningly beautiful photography is a pictorial paean to the wild grandeur of the remote location where David Lean's lyrical love story was filmed in its entirety. But more than that, Young has used the Super Panavision 70 camera superbly as a story-telling instrument. Shooting inside cramped practical interiors, plagued constantly by foul and variable weather, he has reached the highest peak of the cinematographer's art.

"RYAN'S DAUGHTER"

"AIRPORT"

"AIRPORT"—photographed by Ernest Laszlo, ASC, depicts the behind-the-scenes pulsations of a giant air terminal and the people who keep it running. Filming on location at the Minneapolis Airport in the dead of winter, Laszlo struggled with horrendous technical problems, but his smoothly professional cinematography betrays not a sign of the strain. Seemingly conventional in style, as befits the story, it subtly and precisely augments each varying mood, without calling attention to itself—and thereby greatly heightens the impact of the many-faceted story.

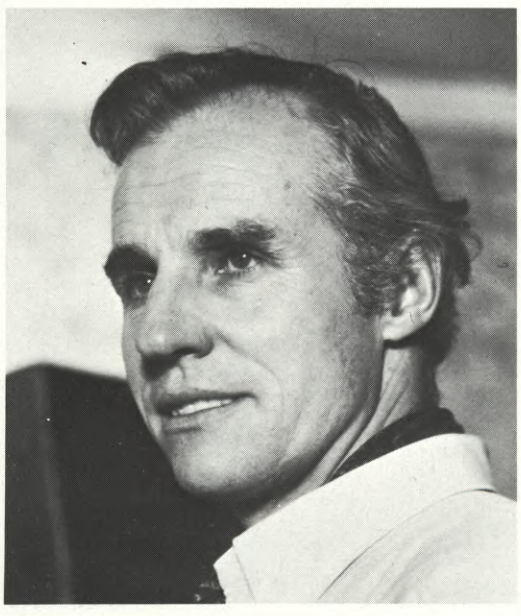
ERNEST LASZLO, ASC

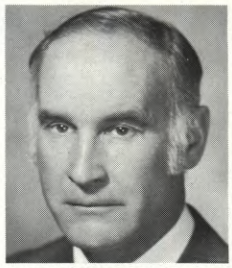


"WOMEN IN LOVE"

"WOMEN IN LOVE"—photographed by Billy Williams, BSC, is an inspired filmization of D.H. Lawrence's emotion-torn novel. Capturing perfectly the aura of the period and the misty beauty of the English countryside, Williams creates a unique style of photography that is precisely right in mood and texture to tell this particular story. In so doing, he breaks many so-called "rules of the craft", but does it so expertly that his radical camerawork, far from calling attention to itself, becomes one with the other elements of this magnificently realized film drama.

BILLY WILLIAMS, BSC





CHARLES WHEELER, ASC

SHINSAKU HIMEDA

MASAMICHI SATO

OSAMU FURUYA

"TORA! TORA! TORA!"—photographed by Charles F. Wheeler, ASC, Shinsaku Himeda, Osamu Furuya and Masamichi Sato, is a re-creation of the Pearl Harbor Attack, staged on a vast scale. In a unique "co-production" effort, American and Japanese cameramen, working separately but combining their expertise to achieve a smoothly integrated whole, manage to convey in a montage of striking images the full human and logistical scope of those few hours on a quiet Sunday morning that changed the history of the world and the destinies of both of the nations involved.

"TORA! TORA! TORA!"

THE 43rd ANNUAL ACADEMY AWARDS PRESENTATION

"Oscar" again reigns supreme as Hollywood stages its annual Big Show and pays homage to the artists and craftsmen of the motion picture industry

By HERB A. LIGHTMAN

As I sit writing this, the party is still going on in the International Ballroom of the Beverly Hilton Hotel. This particular "party" is the Board of Governors Ball, sponsored by the Academy of Motion Picture Arts and Sciences to honor nominees, winners and losers of the coveted "Oscars" handed out a few hours earlier at the Dorothy Chandler Pavilion of the Los Angeles Music Center, during the course of the 43rd Annual Academy Awards Presentation.

I left the party in "mid-stream" in order to meet one of those stop-the-presses deadlines (like you see in the movies) because, due to the fact that the Awards Presentation is a week later than usual this year, the printing forms for this issue of *American Cinematographer* sit literally on the presses waiting for this one last bit of immortal prose that will enable the man to push the button and get the whole thing rolling.

It has been a memorable evening, not only for us who have watched the show presented "live" at its source, but for the estimated 70,000,000 American television viewers who watched it on the tube and those in 38 foreign countries who viewed it in simultaneous telecast or will see it a bit later by means of delayed tape. All in all, it is reckoned that 250,000,000 people around the world will have witnessed the 1971 edition of Hollywood's Big Show before this night is done—the largest television audience ever to watch a single event.

And it has been an Event, in the gala sense of the word. Produced with impeccable taste and style by Robert Wise, and directed with split-second precision by Richard Dunlap, the show had a nostalgic air about it as one after another of those appearing on it spoke of their "love for film" and verified the special magic of this very special industry.

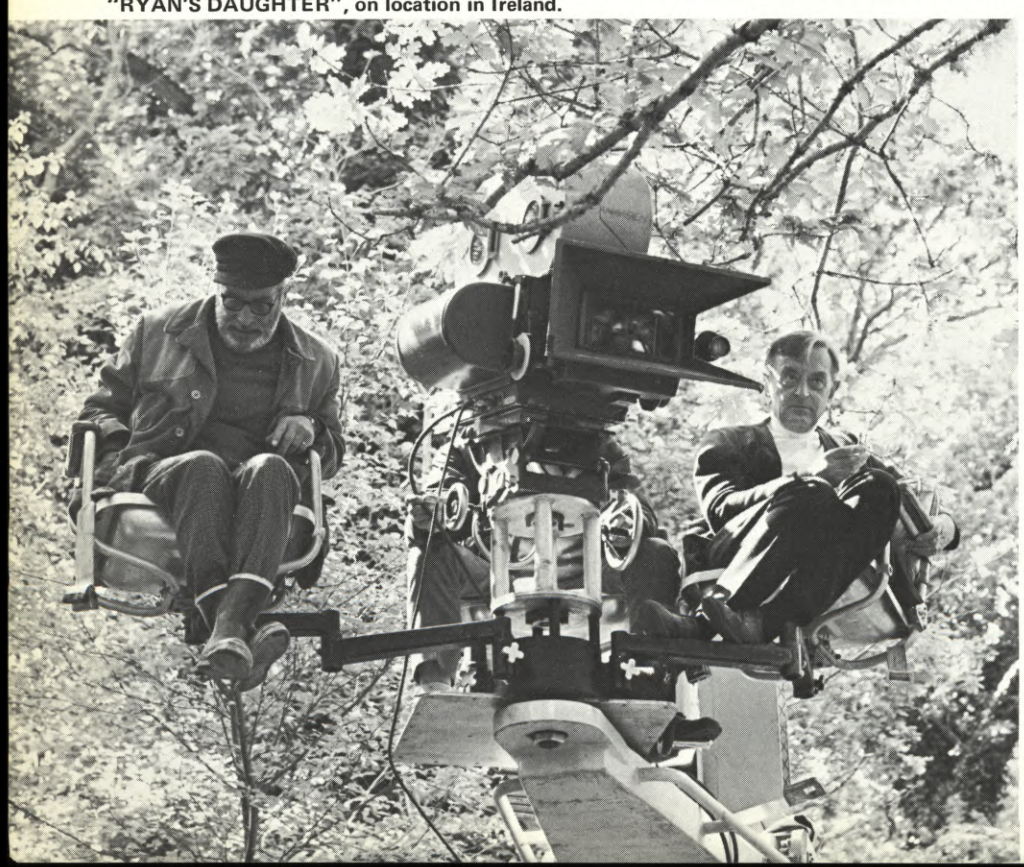
Hollywood may be hanging on the

A scene in the mythical village of Kirrary, from David Lean's film, "RYAN'S DAUGHTER", for the photography of which Freddie Young, BSC, won his third "Oscar".

Miniature U.S. warships being bombed for the attack on Pearl Harbor sequence from "TORA! TORA! TORA!", winner of the "Best Achievement in Special Visual Effects" Academy Award.

Exterior of the classic Dorothy Chandler Pavilion of the Los Angeles Music Center, locale of the 43rd Annual Academy Awards Presentation. Crowds packed into bleachers along the entryway gave attending stars and top Hollywood creative talent a rousing reception. The expertly staged telecast, produced by Robert Wise, was watched by an estimated 250,000,000 television viewers throughout the United States and 38 foreign countries—the largest crowd ever to see a single TV program.

Academy Award winner for "Best Achievement in Cinematography" Freddie Young, BSC, and Director David Lean ride the camera boom prior to filming of an idyllic woodland sequence for "RYAN'S DAUGHTER", on location in Ireland.

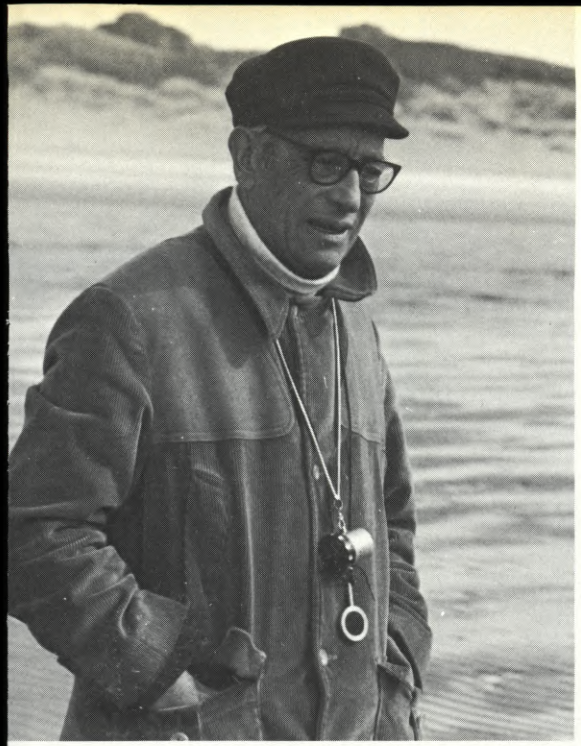


ropes at the moment, but a stout and faithful heart still beats there.

To me, with my inevitable special bias as Editor of this journal, the high-point of the evening was the announcement of the award for "Best Achievement in Cinematography"—which went to my good friend Freddie Young, BSC, for his beautiful work on "RYAN'S DAUGHTER".

That particular announcement triggered off in me my own private wave of nostalgia, as I recalled magic days in a remote County Kerry corner of Ireland (hard by the tiny seacoast village of Dingle) when I had all I could do to keep up with the indefatigable Freddie and his equally indestructible director, David Lean, as they positively loped about during the rugged location filming of "DAUGHTER" (See *American Cinematographer,* August 1969).

What can one say about Freddie's photography that has not already been said? This is his third "Oscar" (the previous two having been awarded for his work in "LAWRENCE OF ARABIA" and "DOCTOR ZHIVAGO")—and all of the available superlatives have long



Freddie Young, BSC, during a pensive moment between camera set-ups on location in Ireland. Young previously won Oscars for "LAWRENCE OF ARABIA" and "DOCTOR ZHIVAGO".

since been used up. All I can add to what I and others have already said is the following statement: It all looks very smooth and pretty on the screen—as it should—but the audiences munching popcorn in the theatres will never know how much blood, sweat and tears—how much struggle with foul weather—how many bone-aching 12-hour days it took to get it to look that simple.

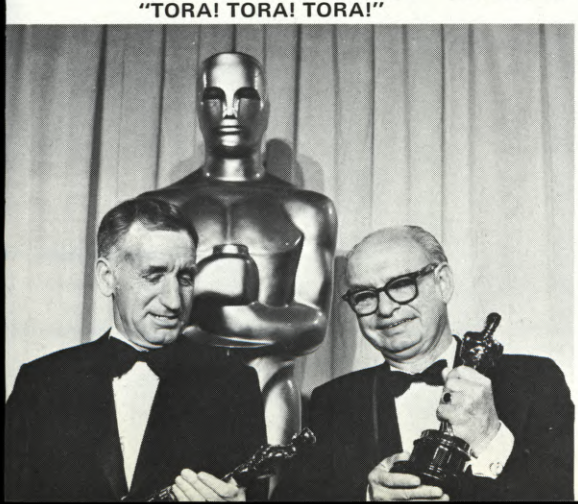
I know—because I was there with Freddie and his crew during part of the time that they were shooting "RYAN'S DAUGHTER".

The ever-young Mr. Young could not be on hand to personally accept his award, because he is busy in Spain photographing "NICHOLAS AND ALEXANDRA" for Director Franklin Schaffner, himself the recipient of the "Best Achievement in Direction" Award for his work on "PATTON".

Freddie Young, BSC, has again been

Continued on Page 504

A.D. Flowers (left) and L.B. "Bill" Abbott, ASC, shown after winning "Best Achievement in Special Visual Effects" Awards for "TORA! TORA! TORA!"



ACADEMY AWARD WINNERS FOR CINEMATOGRAPHY—1928 to 1970

Year	*Class*	*Cameraman*	*Picture Title*	*Studio*
1970		Freddie Young, B.S.C.	"Ryan's Daughter"	MGM
1969		Conrad Hall, ASC	"Butch Cassidy and the Sundance Kid"	20th-Fox
1968		Pasqualino De Santis	"Romeo and Juliet"	Para.
1967		Burnett Guffey, A.S.C.	"Bonnie and Clyde"	WB-7 Arts
1966	B&W	Haskell Wexler, A.S.C.	"Who's Afraid of Virginia Woolf?"	WB
1966	Color	Ted Moore, B.S.C.	"A Man For All Seasons"	Col.
1965	B&W	Ernest Laszlo, A.S.C.	"Ship of Fools"	Col.
1965	Color	Freddie Young, B.S.C.	"Doctor Zhivago"	MGM
1964	B&W	Walter Lassally	"Zorba the Greek"	Fox
1964	Color	Harry Stradling, A.S.C.	"My Fair Lady"	WB
1963	B&W	James Wong Howe, A.S.C.	"Hud"	Para.
1963	Color	Leon Shamroy, A.S.C.	"Cleopatra"	Fox
1962	B&W	Jean Bourgoin, Walter Wottitz	"The Longest Day"	Fox
1962	Color	Freddie Young, B.S.C.	"Lawrence of Arabia"	Col.
1961	B&W	Eugene Shuftan	"The Hustler"	Fox
1961	Color	Daniel Fapp, A.S.C.	"West Side Story"	U.A.
1960	B&W	Freddie Francis	"Sons and Lovers"	Fox
1960	Color	Russell Metty, A.S.C.	"Spartacus"	Univ.
1959	B&W	William Mellor, A.S.C.	"Diary of Anne Frank"	Fox
1959	Color	Robert Surtees, A.S.C.	"Ben-Hur"	MGM
1958	B&W	Sam Leavitt, A.S.C.	"The Defiant Ones"	U.A.
1958	Color	Joseph Ruttenberg, A.S.C.	"Gigi"	MGM
1957	One award	Jack Hildyard	"Bridge on the River Kwai"	Col.
1956	B&W	Joseph Ruttenberg, A.S.C.	"Somebody Up There Likes Me"	MGM
1956	Color	Lionel Lindon, A.S.C.	"Around the World in 80 Days"	Todd-U.A.
1956	Effects	John Fulton, A.S.C.	"The Ten Commandments"	Para.
1955	B&W	James Wong Howe, A.S.C.	"The Rose Tattoo"	Para.
1955	Color	Robert Burks, A.S.C.	"To Catch a Thief"	Para.
	Effects	John Fulton, A.S.C.	"Bridge at Toko-Ri"	Para.
1954	B&W	Boris Kaufman, A.S.C.	"On the Waterfront"	Col.
1954	Color	Milton Krasner, A.S.C.	"Three Coins in the Fountain"	Fox
1953	B&W	Burnett Guffey, A.S.C.	"From Here to Eternity"	Col.
1953	Color	Loyal Griggs, A.S.C.	"Shane"	Para.
1952	B&W	Robert Surtees, A.S.C.	"The Bad and the Beautiful"	MGM
	Color	Winton Hoch, A.S.C., Archie Stout, A.S.C.	"The Quiet Man"	Argosy
1951	B&W	William Mellor, A.S.C.	"A Place in the Sun"	Para.
	Color	Alfred Gilks, A.S.C., John Alton	"American in Paris"	MGM
1950	B&W	Robert Krasker	"The Third Man"	British
	Color	Robert Surtees, A.S.C.	"King Solomon's Mines"	MGM
1949	B&W	Paul Vogel, A.S.C.	"Battleground"	MGM
	Color	Winton Hoch, A.S.C.	"She Wore A Yellow Ribbon"	R.K.O.
1948	B&W	William Daniels, A.S.C.	"The Naked City"	U-I
	Color	Joseph Valentine, A.S.C., William V. Skall, A.S.C., Winton Hoch, A.S.C.	"Joan of Arc"	R.K.O.
1947	B&W	Guy Green	"Great Expectations"	Rank—U-I
	Color	Jack Cardiff	"Black Narcissus"	Rank—U-I
1946	B&W	Arthur Miller, A.S.C.	"Anna and King of Siam"	Fox
	Color	Charles Rosher, A.S.C., Leonard Smith, A.S.C., Arthur Arling, A.S.C.	"The Yearling"	MGM
1945	B&W	Harry Stradling, A.S.C.	"Picture of Dorian Gray"	MGM
	Color	Leon Shamroy, A.S.C.	"Leave Her to Heaven"	Fox
	Effects	John Fulton, A.S.C.	"Wonder Man"	Para.
1944	B&W	Joseph LaShelle, A.S.C.	"Laura"	Fox
	Color	Leon Shamroy, A.S.C.	"Wilson"	Fox
1943	B&W	Arthur Miller, A.S.C.	"Song of Bernadette"	Fox
	Color	Hal Mohr, A.S.C., W. Howard Greene, A.S.C.	"Phantom of the Opera"	Univ.
1942	B&W	Joseph Ruttenberg, A.S.C.	"Mrs. Miniver"	MGM
	Color	Leon Shamroy, A.S.C.	"The Black Swan"	Fox
	Effects	Farciot Edouart, A.S.C.	"Reap the Wild Wind"	Para.
1941	B&W	Arthur Miller, A.S.C.	"How Green Was My Valley"	Fox
	Color	Ernest Palmer, A.S.C., Ray Rennahan, A.S.C.	"Blood and Sand"	Fox
	Effects	Farciot Edouart, A.S.C.	"I Wanted Wings"	Para.
1940	B&W	George Barnes, A.S.C.	"Rebecca"	Selznick
	Color	Georges Perinal	"Thief of Bagdad"	Korda
1939	B&W	Gregg Toland, A.S.C.	"Wuthering Heights"	Goldwyn
	Color	Ernest Haller, A.S.C., Ray Rennahan, A.S.C.	"Gone with the Wind"	Selznick-MGM
1938		Joseph Ruttenberg, A.S.C.	"The Great Waltz"	MGM
	Effects	Farciot Edouart, A.S.C.	"Spawn of the North"	Para.
1937		Karl Freund, A.S.C.	"The Good Earth"	MGM
1936		Tony Gaudio, A.S.C.	"Anthony Adverse"	WB
1935		Hal Mohr, A.S.C.	"Midsummer Night's Dream"	WB
1934		Victor Milner, A.S.C.	"Cleopatra"	Para.
1933		Charles B. Lang Jr., A.S.C.	"A Farewell to Arms"	Para.
1932		Lee Garmes, A.S.C.	"Shanghai Express"	Para.
1931		Floyd Crosby, A.S.C.	"Tabu"	Para.
1930		William Van Der Veer, Joseph T. Rucker	"With Byrd at the So. Pole"	Para.
1929		Clyde DeVinna, A.S.C.	"White Shadows in the So. Seas"	MGM
1928		Charles Rosher, A.S.C., Karl Struss, A.S.C.	"Sunrise"	Fox

MEDIUMS' COOL

or How I Spent My Summer Vacation

A crew of skilled collegiate film-makers produce a *cinema verité* documentary that provides fascinating insights into a little-known religious community

By BOB KIGER

The author, film-maker Bob Kiger, hand-carried his Eclair NPR camera 8 to 10 hours each day. "After a while you feel too light when you're not carrying it," he quipped.

"THERE IS NO DEATH. We need to prove this. We can. We demonstrate it . . . beyond a shadow of a doubt."

This is the first tenet of the religion of Spiritualism and is the title of a recently completed social-documentary film exploring the fascinating history and the uncertain future of this little-known religion.

The film, which had a production budget of just under $10,000, was a student thesis from Rochester Institute of Technology. It took 11 months from conception through release printing; an 11-month period that could only be described as "paranoic ecstasy." All members of my small crew (varying from three to six) knew that when it came time to market the completed picture there could be no "copping out" by crying *student.* The film had to be totally professional and marketable or a lot of time and money would be lost.

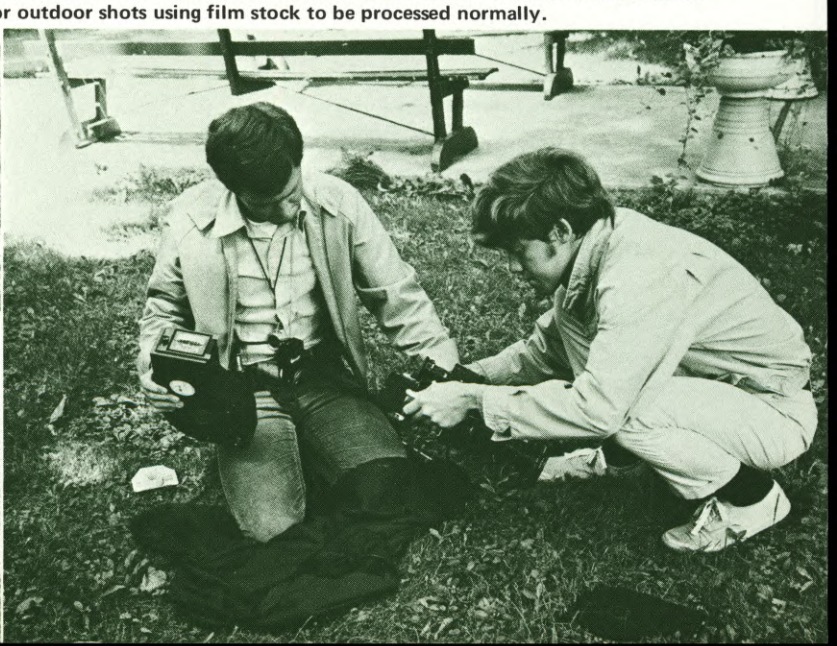
Lilydale, a small colony in the mountains of western New York, was our primary location. It is a beautiful site surrounded by lakes on three sides and deep forest on the fourth. Founded in the 1880's, it is the largest center in the world for Modern Spiritualism. Its grounds accommodate approximately 30 resident Mediums, a large auditorium, a healing temple, a Medium's Association building, and many private residences (most of which date back to the 19th century). The population of Lilydale, for the most part, is comprised of senior citizens.

It was our intent to live with these people, recording their activities in the first person and documenting an impartial account of their lifestyle.

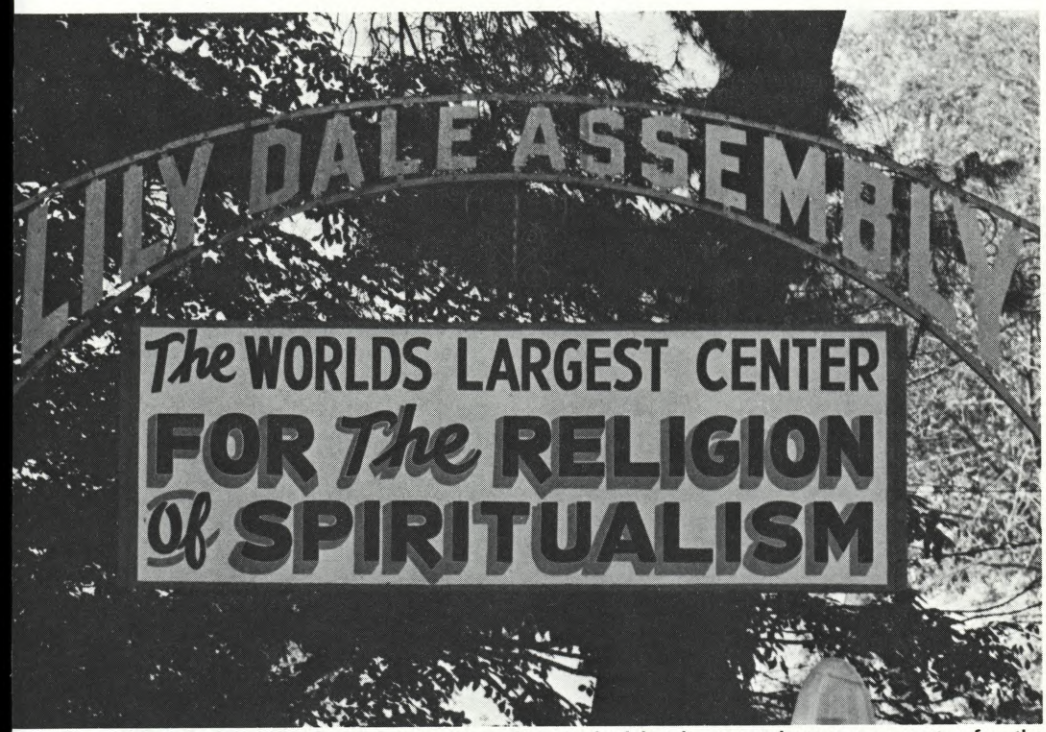
In all honesty, I have to admit that my original conception of the Spiritualist was a false one. When I thought of spirit contact and seances, my mind immediately conjured up visions of dark rooms, tables tipping and ghoulish figures floating about. As one of the mediums put it: "This impression is due to the Hollywood stereotype. It can be done without all that hocus pocus."

As I researched the location, I sensed a sincerity in its people that made me feel somewhat ashamed because of my earlier misconceptions. I also discovered that most Spiritualists deeply resent the exploitation tactics that have been used by the various media in the past. I realized that if I were ever to develop a

(LEFT) Richard Audd and Bob Kiger record a casual interview with some Canadian youths with a serious interest in Spiritualism. They reported a growing interest in psychic phenomena on the part of youth in general. (RIGHT) After shooting a roll of EF 7242 (to be forced-processed) inside Lilydale's Healing Temple, Kiger and Audd reload the Eclair magazines for outdoor shots using film stock to be processed normally.



(LEFT) The author shoots cutaways with the R16B Beaulieu camera, while Audd takes a breather from his sync-sound recording chores. (CENTER) Shooting an informal discussion about Spiritualism with some young devotees in the park adjacent to the Lilydale community. Sound, recorded with a Uher 1000 (w/Neo-pilotone) and relatively inexpensive AKG microphone, is remarkably clear. (RIGHT) Cameraman Ken Berry films a clairvoyant relaying a message from a departed spirit. Many of the message services were held deep in the forest, where tremendous contrast problems were encountered.



The gateway to Lilydale features a sign emphasizing its pre-eminence as a center for the Spiritualist Religion. A small colony secluded in the mountains of western New York, Lilydale served as the principal locale for student-produced *cinema verité* documentary. Founded in the 1880's, its grounds accommodate approximately 30 resident Mediums, a healing temple, a Mediums' Association building and many private residences.

rapport with the Spiritualists (an element absolutely essential to the making of this film), I would have to convince them that not all film-makers are concerned with sensationalizing every aspect of human existence. The very essence of the social documentary film is the honest portrayal of real people involved in their normal activities—not scripted figments of a screenwriter's imagination.

A pre-scripted social documentary is about as challenging (or interesting) as playing poker face-up. It usually turns out to be self-defeating.

I returned home from my first location check with:

1) a whole new attitude towards the film's treatment
2) the knowledge that just getting a camera crew inside the gates of Lilydale would be incredibly difficult.
3) a large variety of black and white location stills.

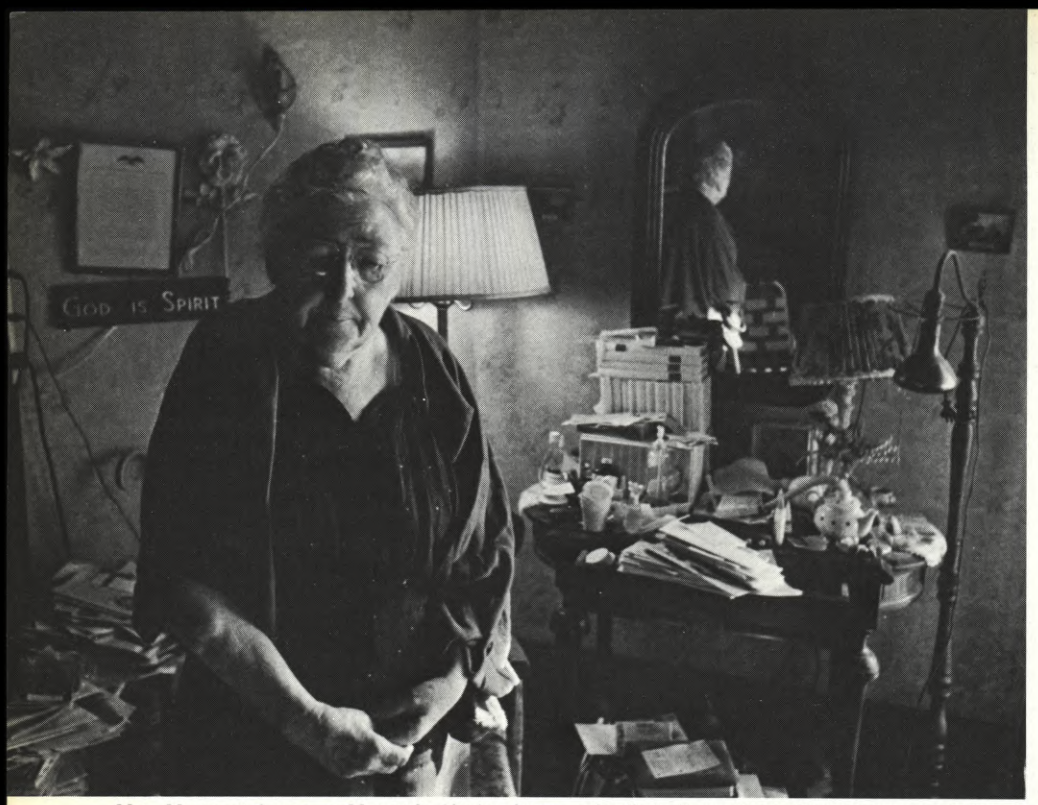
On my second visit to Lilydale I came armed with what I hoped would be physical evidence of my "pure" intentions. I had a pre-production recording of the theme for the prospective film and several dozen of the location stills taken during my first visit. It was very quiet in Lilydale that evening as the Assembly Board of Directors interviewed me. Frankly, I felt there was little hope. These people cited one case after another of exploitation of their religion by the media. They were leary of any possible disruptions in their quiet retreat. I explained that there would be no large crews, no lights or noisy generators. Our crew would consist of only three men who were to be fully mobile: one cameraman with a hand-held camera, a soundman, and a grip. The grip's main concern would be the four L's:

1) Loading—camera mags and tapes
2) Lighting-installation
3) Logging—notes provided by camera and sound men plus his own observations
4) Legalizing—procurement of releases

I assured the Lilydale Assembly that any disruption would defeat our primary purpose—a completely natural view of their lifestyle and its philosophy. As convincing as I had hoped my arguments were, there was still skepticism among some members of the group.

As a last hope I turned on the tape recorded theme and displayed the stills. Good music soothes the heart of savage beasts and, I might add, brings out the best in people, too. About ten bars in, one of the old folks shed a tear. I

The Art Director prepares the film's "main title card" which, ironically, is inscribed on a gravestone especially prepared for the purpose.



Mrs. Margaret Lauer, a Magnetic Healer (now retired), believes that physical contact between herself and the ailing person may bring about a cure. However, over a period of time, she has found the work of healing so exhausting to herself that she is now dedicated to a life of study and meditation.

looked around the room and saw a variety of similar reactions. We were communicating!

The score for the film is a beautiful piece of music that captures the essence of Lilydale during its 19th century heyday. It was written by Richard Audd, a fellow student, doing graduate study in music at the Eastman School of Music. Richard, the son of a Southern Baptist minister, cut his teeth on a church organ and this manifested itself in the religious overtones of the theme. One of the mediums even felt the piece was "inspired" and Richard likes to agree.

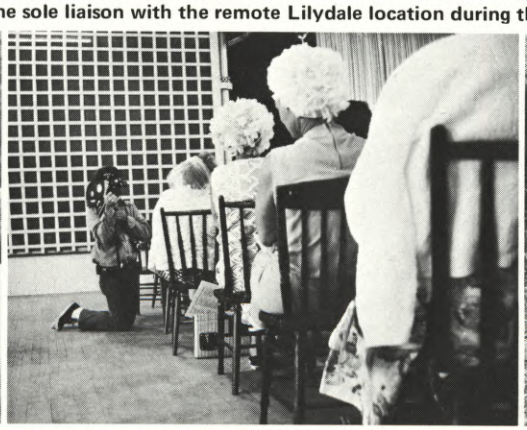
In addition to scoring and recording all music for the film, Rich assumed the duties of sound technician. He used a Uher 1000 w/Neo-pilotone for location recording, combined with an AKG D900 Dynamic shotgun mike. Our finished tracks were remarkably clean, comparable in some instances to studio recordings. I would credit this to Richard Audd's skill and perceptiveness, as well as the efficiency of the inexpensive AKG mike. It performed as well as many extremely expensive condenser shotguns. Rich had the remarkable ability to follow and often anticipate sounds, and simultaneously be cognizant of the lens focal-length and angle of vision. He recorded more than 24,000 feet of sync sound with tremendous clarity and minimum mike exposure. He also cooked for the crew on location, and although his one-pot meals got tedious at times, they were a major factor in our "bringing it in" within the budget. The crew ate, slept, planned and worked together in the back room of a Lilydale medium's house.

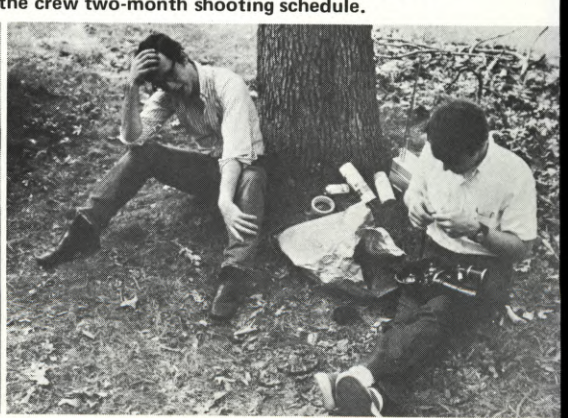
We had no phone. Our only communication with the outside world was a pay phone in Lilydale's Maple Wood Hotel for the duration of our two months on location. But lack of communications was only one of many problems we faced on location. Most of the buildings were at least 50 years old. The wiring would not take the high wattages of several of our lighting units and, even more important, excessive preoccupation with lighting would have cut down our small crew's mobility. Bright lights, we realized, also have the uncanny knack of bringing out the "actor" in non-actors. Consequently, many of our scenes were shot exclusively by available light or with photofloods substituted for the bulbs in practical lighting fixtures. Our entire film was shot on EFB Type 7242 color reversal stock.

The use of film balanced for tungsten light sources is an old newsreel photographer's technique. When outdoors an #85 filter is used yielding a normal speed of ASA 80. Towards sundown the lower color temperature of the setting sun approximates that of a tungsten light source and the #85 filter can be removed for an effective speed boost to 125 ASA. Indoor scenes under tungsten illumination are, of course, also shot unfiltered at 125 ASA.

In order to cope with any considerable drop in light-level, which we knew we would probably encounter in the forest just after sundown, as well as in many of the interiors we had planned, we always carried an extra magazine loaded with "super-7242" (regular 7242 intended for two-stop forced processing in the lab). This gave us a speed of 320 ASA with the 85 filter outdoors and a maximum of 500 ASA unfiltered in-

(LEFT) The day's shooting frequently ended with an outdoor barbecue. During one of these, Kiger and Audd found themselves, uncharacteristically in front of a camera. (CENTER) Cameraman kneels unobtrusively inside the Assembly Hall to film a meeting. The film-makers were most careful not to disturb the normal routine of the colony in any way. (RIGHT) Bernie Laramie (left) fills Kiger in on the latest problems at production headquarters in Rochester. Laramie served as the sole liaison with the remote Lilydale location during the crew two-month shooting schedule.





(LEFT) Two Senior Citizen visitors to the Dale, complete with Eskimo Pies, review the listing of Healers and Mediums resident on the grounds. (RIGHT) Young people from the Britten Memorial Church in Toronto, Canada, gathered in Lilydale during the weekend. They are shown here attending a seance.

doors, for those sequences in which we needed the most speed.

Many labs offered forced processing of 7242—one, two and, occasionally, three stops. Kodak does not recommend this practice, and I must admit that the grain size and contrast do increase significantly when processing is pushed beyond one stop. We found, however, that in our situation, where spontaneity and realism were paramount factors, forced processing and its "side effects" were entirely satisfactory and even desirable.

All sync-sound footage for the film was shot with Eclair NPR's, and I could not recommend a finer camera for our type of filming. The Eclair's ease of handling and versatility were the equivalent of having an extra man on the crew, in terms of time saved. Its quick-change magazine capability provided us with our only chance of "keeping up" with the action, over which we had little control.

The standard Angenieux 12mm-120mm zoom served as our main lens, but for grab shots in low-light situations, the Nikon 55mm F/1.4 lens proved to be a valuable asset. For cutaway shots, we used the Beaulieu R16B camera, with its 12mm-120mm lens and Reglomatic exposure control. We often shot sync-sound footage in light-levels lower than those I could use for hand-held color stills. (Many interiors were shot with 15 foot-candles of light and, sometimes, even less.) The Eclair's 1/48-second sync-sound shutter speed aided us to get an exposure in these low-light situations.

For those scenes that we had to light, we used multiple 750-watt Mini-Mole quartz lights with alligator clamp mounts. Bouncing these off available neutral surfaces gave us a diffuse overall fill. This flat lighting helped to counteract the increased contrast of forced processing. Using the 750's, we lit the major part of the main auditorium. Whenever a public seance was scheduled, we turned on all the lights *before* the people arrived. Out of the hundreds of people we filmed, only a handful appeared to notice the lights. It was certainly worth 15 minutes off the lamp-life of our quartz lights to fire them up in advance. (NOTE: It is wise to check out the fuse types used in each location and keep a supply on hand.)

Our interview technique, which was designed to maximize realism, involved direct dialogue between cameraman and subject. The subjects, in responding to the cameraman's questions, usually forgot about the equipment, even though they were talking directly into it.

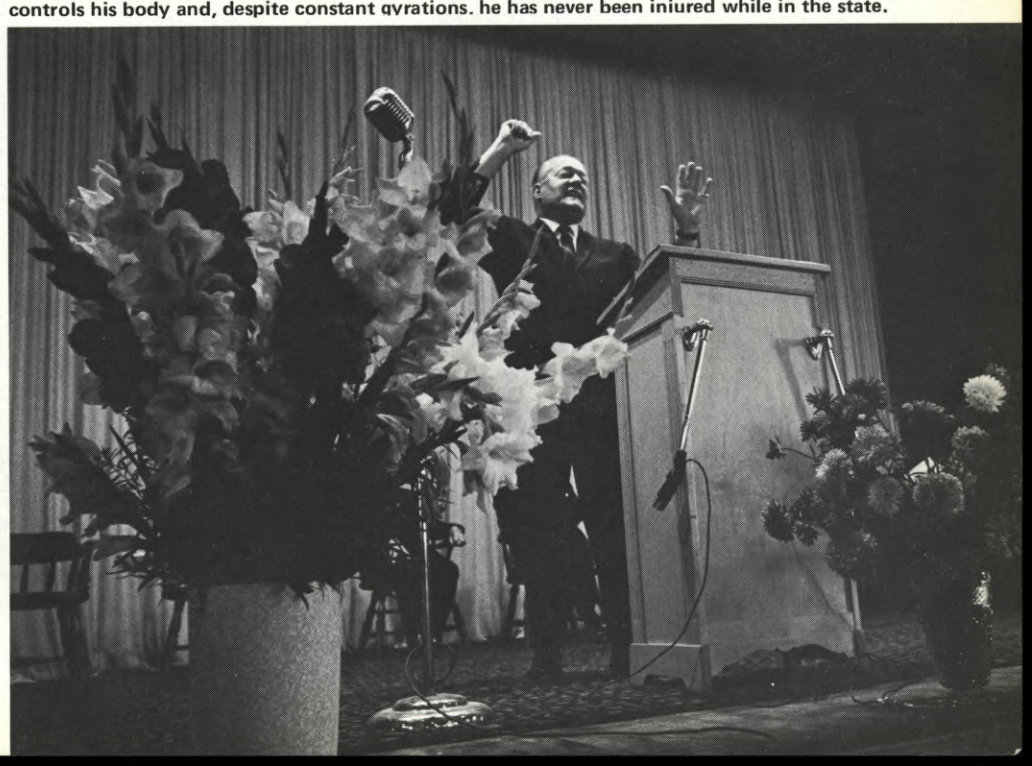
I found that this direct camera/subject approach separated our subjects into two distinct types:

1) The person who reacted to a camera pointed his way with an immediate and very candid response.
2) The person who "froze" instantly upon confrontation with the camera, but later "got used to it."

This latter type, which is by far the most common, became quickly recognizable and, when I saw that I was up against that type of subject, I would simply turn the Eclair off, while the recorder continued running.

Continued on Page 480

Mr. Harry Milesi, a Trance Medium, is shown here in the trance state. Mr. Milesi's "guide" is an Indian chief who has been with him for more than 50 years. While he is in the trance, the Indian controls his body and, despite constant gyrations, he has never been injured while in the state.



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HOWARD SCHWARTZ · Director of Photography "LONGSTREET," Paramount T.V.

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THE NEW RDS AERO-KIT

Continued from Page 461

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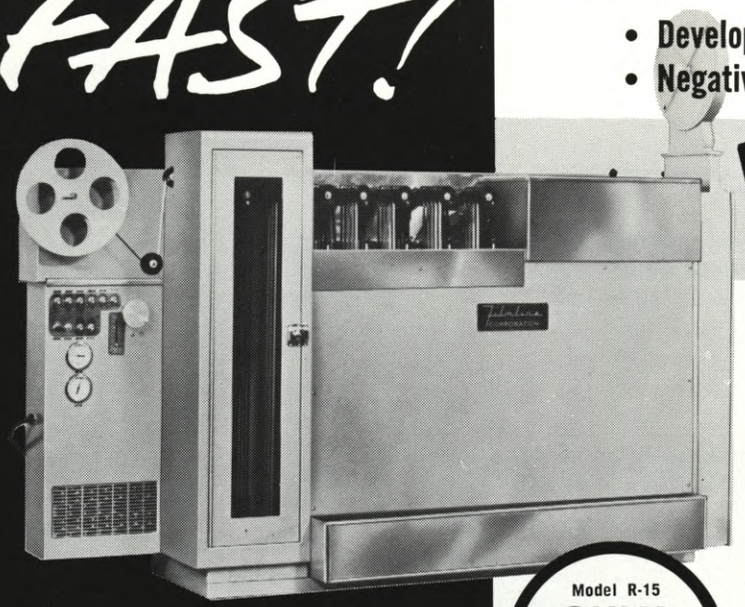

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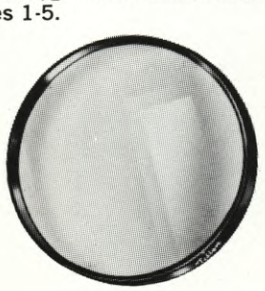

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MEDIUMS' COOL

Continued from Page 475

One mistake that I repeatedly made during the early shooting was to lower the camera and try to loosen the subject up with conversation, raising the camera again to capture the person when the interview seemed to be heading toward a highpoint. This never worked. I found that the best way to avoid this "freeze-up" was to keep the camera at eye-level during the entire interview. Consequently, during the entire two months of shooting, both my second cameraman, Ken Berry, and I saw life through the viewfinder of the Eclair.

Dolly shots were accomplished with a wheel chair, (this technique, though common in Europe, is relatively rare in the U.S.) Our wheel chair, was an outdoor type, with bicycle tires rather than the thin indoor wheels. The outdoor chair gave us a relatively smooth dolly on dirt paths and grass and was perfect for dollying on cement and wooden floors.

Many of our interview sequences take place while walking along with the subjects. We found that if cadence was kept between the subject and the cameraman a very smooth result could be obtained. Often it was smoother than using a dolly. While walking, most people, especially non-professionals have quite a bouncy step. A dolly-mounted camera is essentially static and indifferent to the bouncing, while a cameraman in cadence duplicates, and hence negates, the bouncing motion.

One of our most complex takes was motivated by editorial rather than technical or aesthetic reasons. We were to attend an actual seance with two young couples that we had met (on camera) at an outdoor seance. I wanted to show that the action was definitely unrehearsed (nothing in the film *was* rehearsed) and show it cinematographically. This required that we approach and enter the medium's house with the couples and begin the seance in one uninterrupted take—with no cuts. The outside portion of the take would require filtration that was different from that of the interior. Our solution was to remove the #85 filter with the camera rolling and continue inside. The finished take, an incredible job of *cinema verité* by Ken Berry, runs almost two minutes. It is beautifully composed and smooth from beginning to end. Bear in mind that this entire sequence had to be Take One. The "great spirit" must have been watching over us that day, because it came off faultlessly.

The most essential difference I find between *cinema verité* photography and theatrical photography is that the good *verité* photographer "Let's It Happen" while the theatrical photographer "Makes It Happen". Nearly 50% of our release footage was not even conceived in the treatment, although I spent more than six months researching Spiritualism and Lilydale. By putting ourselves in interesting contexts and staying loose we were able to capture more precious moments than I could ever have conceived on paper. An old adage of the still photo-journalist is, "Film is cheap". Proportionately speaking, it is the cheapest item in the budget of the *cinema verité* cameraman. To be overly footage-conscious is one of the most damaging syndromes to develop in this type of filming. For example, while shooting a walking interview we were pre-empted by a Dodge Charger coming down the small lane. Rather than cut, I pointed the Eclair at the driver, who stopped and became an integral part of the interview. She turned out to be an older medium who was childishly candid and offered an amusing aside to the running interview. After she pulled away we continued, but her appearance had given credence to the spontaneity of the entire scene and was, in fact, its highpoint. I doubt if this interview would have been included in the final cut had it not been for that lovely old woman in her Charger.

Many of our takes were so spontaneous that it was impossible to slate them. The automatic clapper on the Eclair combined with a bloop oscillator on the Uher gave us synchronization reference. Often I would cut camera and roll again in the middle of the action. To have kept comprehensive written notes of all takes would not have been feasible. It would have slowed us down in our ability to capture spontaneous action. In fact, slating would, in many cases, have destroyed the action.

The solution to this problem was something we called the "post-production script and log." At night, after the day's shooting was completed, a stenographic copy was made of all sound tapes recorded that day. The bleep tone from the Eclair gave us front and rear sync marks which were noted along with all dialogue, extraneous sounds, etc. Any additional wild tracks and cutaways were added by the soundman and second cameraman. This post-production script allowed me, as director, to assimilate the day's scenes into the total picture or to reject a scene because it digressed from our developing story. (This saved us hundreds of dollars in

work-printing.) The "script" also facilitated track synchronization later. When the dailies were viewed we added a complete description of all camera moves. Our post-script was then complete.

Our editing bench was "customized" for this system of post-production scripting. We used a stereo tape recorder instead of the normal editing bench amplifier. This provided us with a much more intelligible sound than that offered by the raspy, high-pitched editing speaker. We fed the signal from the editing bench into the left channel of the recorder. On the right channel we punched up the original tapes. These provided us with a reference track of high quality, aiding us in laying the tracks as well as making fine sound cuts. We could carefully judge phonetic punctuation, background noise level, etc. in making our sound cuts. This is often very difficult to achieve even with expensive editing machines, let alone with simple editing facilities such as those available to us. We used a sound head attached in dead sync with a Moviescop viewer for all cutting. The unit, designed by J & R Film Co. of Hollywood, when combined with a four-gang motor-driven synchronizer, provided us with a complete yet inexpensive editing bench.

Our final print is designed to let the audience "live" our experiences with the Spiritualists. It contains no narration or tele-identifications and the plot develops much as in a conventional drama. We did a lot with juxtaposition cutting; i.e., a scene of a medium doing trance work on stage is intercut with footage of the same medium sitting on a park bench discussing what happens to his body in the trance state. This shifting back and forth kept the pace of the film brisk and allowed us more flexibility in the cutting room.

Cinema verité technique enabled us to show the Spiritualist at his natural best and we hope it did well by his *super*natural side also.

Many of the initial viewers stated that "THERE IS NO DEATH—THERE ARE NO DEAD" was one of the few documentaries they had seen that held their interest much like a good dramatic film would have. I believe this reaction is, in itself, unfortunate. Are we so conditioned to mundane "travelogues" that we assume all documentaries must be of this caliber? I believe that a perceptive filmmaker can turn in almost any direction and find a "good dramatic film" in real life. *Cinema verité* techniques, if used with taste, moderation and understanding, provide the key to this type of production. ■

Continued from Page 442

system, caused a wider shutter bar. The reason for the widening was the slight overlapping of the reflex mirror either at the opening or closing of the shutter. This made the phasing operation much more critical than with the BNC camera and, because of this, the BNC camera fitted with a Panavision lens was used when shooting scenes that included TV pictures. Generally speaking, with the HVC system, a 175° shutter opening is minimum. It would be better to approach 180° if possible. Each additional degree of opening beyond 175° gives that much more latitude in phasing because the shutter bar becomes thinner and is easier to hide in the TV picture blanking area.

There were times when up to three different video pictures were on screen simultaneously for relatively extended periods of time, two from live TV cameras and one from tape, with widely varying subject matter. A majority of the subject matter displayed on the monitors was computer readout "type" printing. A good deal of this was provided by Doug Trumbull and James Short on film. The film was transferred to tape via rear-projection for later display on the monitors, or the readouts were displayed directly on the monitors. When the material consisted solely of lettering in one color only, such as green, we simply turned off the color in the camera and the red and blue in the monitor which made the lettering look cleaner. In one case we had a seventeen-inch black and white picture tube custom-made with a green phosphor to get the desired effect.

In the case of multicolored readouts, we sometimes employed the R-B-G system; i.e., we took the red-blue-green signals out of the TV camera directly to the monitor, bypassing the encode-decode process, which resulted in detail clarity necessary for tight closeups and maps. Another technique was used in the case of *still* readouts. They were simply painted, white characters on a black card, thereby bypassing the rear-projection part of the operation and, once again, increasing sharpness and color quality.

This endeavor was a real challenge, as one can realize from the above comments. It was an even greater challenge in that it was necessary for technicians of two creative media to work together on a common project. The venture proved that people can unitedly work together, regardless of their vocational backgrounds, in order to achieve a highly successful common goal. ■

QUESTIONS & ANSWERS

Conducted by CHARLES G. CLARKE, ASC. and WALTER STRENGE, ASC.

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

Q Where can I rent fog-maker equipment in the Los Angeles area?

A Contact the Mole-Richardson Co., 937 N. Sycamore Ave., Hollywood.

Q I will be filming a project which calls for filter effects. I would like to see pictures illustrating various types of fog effects, as making tests is out of the question. Also, I want to film a forest hung with Spanish moss for a gloomy, fog-swamp effect. Should I use high-contrast light for this effect?

A Color filters and their effects are discussed in *Professional Cinematography,* published by the American Society of Cinematographers. You can visually judge the effect of any density of fog filter by viewing it through the lens. We would think that, for your fog-swamp effect, *low-contrast* light would be applicable. Such a scene could be made on an overcast day and, by adding smoke in the distance—from burning leaves—would give contrast to the foreground trees and moss for the most pictorial effect. Since smoke adds to the exposure, do not overexpose this type of scene, as that would destroy the mood you are trying to obtain.

Q I am new to cinematography as a hobby, but I find it more expensive than I had planned. I would like to get an inexpensive printer for the three sizes of film—regular 8mm, Super-8 and 16mm. Also, I want to get a developing machine for doing my own developing at an inexpensive cost. Can you tell me where such equipment is available?

A It appears to us that you are getting into even more expense than you realize. There are no cheap machines for doing quality work. Why not let local labs do this type of processing for you until you have gained more experience?

Q I am interested in stereo movies. Can you suggest any books about this subject? Is there a recommended spacing for the cameras for any given distance?

A See *Three Dimensional Photography, Principles of Stereoscopy,* by Herbert C. McKay, American Photography Book Dept., Minneapolis, 1952, and *The Stereoscopic Art* by John A. Nerling in the SMPTE Journal for March, 1953, for a full discussion on the technique of stereo photography. For a normal stereo effect, the lenses must not be spaced more than two-and-a-half inches apart.

Q I've been shooting 16mm for a number of years, but it's getting to be an expensive proposition and I've been thinking of changing over to Super-8. Do you think I'd be satisfied with the quality? What about the Beaulieu 4008ZM camera, as compared to the Canon Zoom DS8?

A Super-8 makes very satisfactory prints on 16mm film. As so many personal factors enter into the making of a choice between products, we cannot make recommendations in this area.

Q Can 16mm movie film be reproduced on 35mm movie film? If so, what is the cost?

A Yes, almost any of the major film laboratories can blow up (enlarge) 16mm film to 35mm. For prices, etc., write to any laboratory.

Q Is there a method for computing exposures for aerial scenes shot in color?

A A meter reading on a bald blue sky will give a good indication of exposure, since any clouds that appear will be the "hottest" areas in the picture. Do not take readings of "white" skies or metallic surfaces of aircraft in flight, since they will indicate high readings that will lead to underexposure. Angle the camera ship so that the subject aircraft is filmed in a front-three-quarter cross light, rather than a flat light. Use the standard Wratten 85 filter with Eastman Color Negative (35mm) or Eastman Ektachrome Commercial (16mm). No filter should be employed on daylight-type color emulsions, although an ultraviolet filter may be used if distant scenes are filmed from high altitude.

THE TITLE-ROLE VILLAIN

Continued from Page 451

certainly one of the most complex that I've ever done and it involved a really interesting rig.

I mounted a little plastic truncated tetrahedron onto a rod that could rotate in two axes, and lit it with a single source light. I pointed an ordinary 525-line TV camera at it, with the image coming up on a monitor. I then aimed the 2000-line high-resolution TV camera at this monitor and the image which it picked up went through the video processor to appear on a high-resolution TV monitor. A 35mm Mitchell camera, shooting through a 45-degree beam-splitter mirror, was focused on the high-resolution monitor. It was really a doubling up of TV images, because the high-resolution TV camera was picking up one image off the 525-line monitor and a second image (kicked back by the beam-splitter mirror) from the high-resolution monitor—a form of television feed-back. The image would go into the high-resolution TV camera, come up on the high-resolution monitor, then go back into the camera and start cycling through on a loop. By adjusting the system just right, we got it to where the image would get a little bit bigger through each regeneration—something like a hall of mirrors, only in reverse. Because of the mirror involved, the image was alternately flopped left and right upon each regeneration. In addition, the polarity was being flipped back and forth between positive and negative. A bit of edge generation thrown in sharpened the original 525-line image considerably.

Once I got all of this onto black and white film, I ran it through the video processor on its own and artificially injected color into it. I then rear-projected the film onto a screen using a process projector with a pan-and-tilt head. With the 35mm Mitchell camera starting far away on a track, I made about 50 separate exposures, so that there were about 50 images seeming to originate far back and moving toward the camera. I used fog filters at this point to soften the effect.

When that was completed, I took the resultant film and ran it through the video processor again, 100 frames out of sync, adding more color and dropping things out. The final result is a sort of expanding thing, a kind of blossoming out as the image regenerates itself. It's a rather pretty effect to watch.

Another rig which we built was the

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CINEMA WORKSHOP

Continued from Page 432

relative to the film plane. Thus, for very close work, the lens is moved a distance away from the film plane (via focusing adjustment or extension tubes), and vice versa. It should be apparent that lens seating is not that critical, for as long as the image is focused on the ground glass, the results will be sharp. (Lens seating is the relationship between lens and film plane. However, focus is defined in the identical manner for a fixed focal-length lens. Thus, one factor can more or less compensate for the other.)

The focus principle for a zoom lens is entirely different and infinitely more complex. Image focusing is accomplished by moving the front lens group only. The main body of the lens and all the remaining elements do not move during the focusing process. The position of the focal plane is determined by the rear lens group, which is factory-adjusted for a specific flange-to-focal-plane distance (lens seating). Almost all of the soft focus problems associated with the zoom lenses can invariably be traced to faulty lens seating.

The rear element of the zoom lens focuses the image onto the film plane. This image is in focus not only at the film plane, but for a certain distance both in front of and behind the film plane. This area of sharp focus is called depth-of-focus. (See FIGURE 1). Like depth-of-field, this distance varies with focal-length. However, it does so inversely; that is, depth-of-focus is maximum for long focal-lengths and smallest for short focal-lengths.

At long focal-lengths where the depth of focus is great, it is possible for a lens to be improperly seated and still have the film plane fall within the area of sharp focus. (See FIGURE 2a) However, as the lens is zoomed to a shorter focal-length and the area of sharp focus narrows, the film plane may now fall outside this area and the image will then go soft. (See FIGURE 2b) This is why the image may appear sharp while focusing (long focal-length) and then appear soft at the shorter focal-lengths. To be specific, the depth-of-focus at short focal lengths (9.5mm-12mm) and maximum apertures is typically less than 1 mil. (.001"). Thus, *any* play between lens and camera, or the least bit of dirt on the lens or camera flanges, can impair image quality. Moreover, there is no way to compensate for this condition with the front-focus adjustment of the lens.

Conventional lens mounts were never designed to hold such close tolerances

(or such large and heavy lenses) and it is for this reason that most of the professional camera manufacturers (Arriflex, Eclair, Mitchell, etc.) have recently introduced special heavy-duty bayonet mounts specifically for zoom lenses. These mounts assure that there is absolutely no play between camera and lens. Those cinematographers employing large zoom lenses (12mm-120mm or larger) in other than the new bayonet mounts should use some form of external support (cradle) for the lens. In addition, every effort should be made to insure that the lens is seated all the way into the camera. This is particularly important with two-part mounts, such as an Angenieux 12mm-120mm on an Auricon C-mount.

It should be obvious that extension tubes cannot be used with zoom lenses. Diopter lenses can be employed for close-up work with excellent results. They permit the full zoom range to be used and do not require any exposure compensation. (For maximum sharpness, diopters above ½ and 1 should be avoided.)

The use of behind-the-lens filters should also be avoided when employing zoom lenses of extremely short focal-length ranges. A behind-the-lens filter will slightly lengthen the back focus distance of the lens. This slight relocation could place the film plane outside the area of sharp focus at extremely short focal-lengths, thus causing a softening of the image. ■

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The Motion Picture Division of The Photographic Society of America invites all amateur movie makers to participate in the world's oldest motion picture competition, the 42nd annual PSA-MPD International Film Festival—originally known as the "Ten Best" contest.

The Festival is open to movie makers anywhere in the world. Films may be on any subject, in black-and-white, color or both, with or without sound, originals or duplicates. They may be in 8mm, Super 8mm or 16mm. The films will be judged in Inglewood, California and the accepted films will be screened during the Festival at the PSA International Convention in Toronto, Ontario, Canada from August 31 through September 4, 1971.

Closing date for entries to be in the Chairman's hands is June 30, 1971. Revised rules and entry forms are available by writing the Festival Chairman, Donald W. Nesbit, 810 Edgewood Street, Apt. 204, Inglewood, California 90302.

THE PHOTOGRAPHY OF "THE ANDROMEDA STRAIN"

Continued from Page 453

came from existing fixtures, and supplementary fill was provided by means of bounce light."

On ANDROMEDA Kline worked at a low-key intensity because this makes it easier to balance light and use natural source illumination. Working at a very low light-level, he averaged approximately 40 foot-candles, which is about the intensity of ceiling fixtures, and sometimes dropped as low as 15 foot-candles. Another reason for the use of such a low light-level was that fixtures and illuminated buttons on consoles were important story points, and only at a low light-level would these register well on the film. Also, the two-stop push increased film sensitivity and permitted the use of less light.

Each set contained expensive working scientific equipment, loaned by manufacturers to ANDROMEDA. The equipment, valued at over $4,000,000, necessitated 24-hour guards on all sets.

In the laboratory sets the biggest photographic and lighting problem, or "challenge" as Richard Kline called it,

On location at Shafter, Texas, for "THE ANDROMEDA STRAIN", Director Robert Wise waits for camera set-up, while Director of Photography Richard Kline positions small quartz unit used as fill light.

Because highly-glossed visors worn by investigating team reflected everything within an angle of about 200 degrees, location lighting was limited to two FAY lights and six reflectors.

was caused by glare from high-gloss metallic paint. Indirect bounce lighting was an effective answer. A few ANDROMEDA sets were constructed entirely from stainless steel used on three walls, floor and ceiling. These surfaces, which were extremely reflective to objects as well as any direct light had to be lit by means of bounce light only.

Extensive use was made of split-field diopters in photographing THE ANDROMEDA STRAIN. Split-field diopter lenses are partial auxiliary lenses, cut so that they cover only a portion of the prime lens. They may be compared with bifocals for human vision. They have an advantage over bi-focals, however, in that they make possible sharp focus on both near and far objects *simultaneously.* Richard Kline reported that more than half of the scenes in the film were composed as diopter shots. Split-field diopters are not new to cinematography, as they have been available for many years, but they have been rarely used because positioning is very difficult. To camouflage the edge of the split-field diopter it is necessary to position the edge on a vertical line of the set being photographed. Without a reflex camera, exact positioning could only be estimated, and camera movement was impossible. However, today's

new reflex cameras make possible perfect positioning and allow a constant check of the diopter's effectiveness during actor as well as camera movements.

Kline used as many as three split-field diopters in a single shot. They were even slipped in and out of the frame *during* the scene, particularly on zoom shots. Staging and preparing set-ups which utilized split-field diopters was, of course, quite complicated. The actors had to be cooperative because of the restricted area in which they could move. "Once we got used to working with the diopters," says Kline, "there was virtually no extra set-up time required. The sharp focus we maintained helped greatly in making the scenes look real and it also showed off the equipment and sets to best advantage."

The split-field diopter allows the director great versatility in frame composition. ANDROMEDA was shot in Panavision, which has an aspect ratio of 2.35 to 1. The advent of wide-screen itself has been a boon to some directors because it has enabled them to say and show more within the frame. Diopters allow for even more versatile usage of the wide-screen format and THE ANDROMEDA STRAIN proves the point. The picture includes numerous diopter shots which incorporate extensive actor and even *camera* movements, achieved by slipping diopters in and out of the frame. This technique permits unlimited new composition possibilities with increased depth-of-field.

Doug Trumbull's microscopic photography was rear-projected onto laboratory viewing screens. In some shots a total of four rear-projections (two process projectors and two stereo slide projectors, projected on two different screens) were in use concurrently. These projectors had to be turned on and off according to cues.

"The main problem," Kline explained, "was to maintain a color consistency in special materials made by Trumbull. The color values had to be correct and consistent, and the detail had to be very sharp. We usually worked at low light-levels and Kelvin temperature and light intensity of the projectors had to be balanced with that of the lighting used in the surrounding set. The low light-level at which we needed the projectors to work caused a distortion balance problem in relation to the projected images. We decreased the intensity of the projected light by placing ordinary single, double and triple scrims in front of the projector's carbon-arc light source. This reduced the light-level, but didn't interfere with the image sharpness because the filtration was

introduced at a point before the light reached the film."

The opening scene of THE ANDROMEDA STRAIN takes place in the desert at night. Two Air Force technicians, sent to retrieve the space capsule, discover that the inhabitants of Piedmont have died mysteriously. This sequence was filmed day-for-night because the desert area was physically too large to light.

The tremendously bright blue Texas sky posed a serious problem. When the film was printed down the sky was still a bright blue, and the scene looked artificial. To overcome this, Kline asked Technicolor to duplicate a technique originally created by Deluxe-General Labs. A panchromatic black and white dupe of the scene was made. The color positive and the panchromatic dupe were then printed together. The panchromatic dupe was used as a kind of mask to desaturate the color density of the positive. This technique, in effect, partially substitutes varying shades of grey for the full-strength colors in the positive. Since the blue of the sky was the only strong color in the scene, the blue became toned down to a charcoal color. The result was an excellent night effect—so realistic, in fact, that this process will most likely become standard practice in shooting day-for-night scenes.

Nelson Gidding's script for ANDROMEDA made many new and special demands upon Richard Kline's cinematography. The story called for the photography of actual or simulated processes, events and objects which had rarely been shot before.

For example, in ANDROMEDA's opening sequence a new viewing scope, called an N.V.D. (Night Vision Device) is seen. This device works on available star and moonlight and actually enables viewing in near darkness. The N.V.D. is a light amplifier which magnifies brightness more than 40,000 times and then projects the image onto a photocathode screen within the scope. (See Page 443.)

Kline tested the N.V.D. to see if an acceptable picture could actually be shot through this device. One evening, before the company began principal photography, Kline and a small crew made a photographic test on the backlot, shooting through the N.V.D. Holding the N.V.D. in front of a macro lens, Dick made several tests. He bracketed the exposures to determine the best exposure level. Viewing the test, he was surprised to see that a correct exposure had been made in near-darkness, through the N.V.D., shooting at F/5.6.

Continued on Page 500

AMERICAN CINEMATOGRAPHER MANUAL

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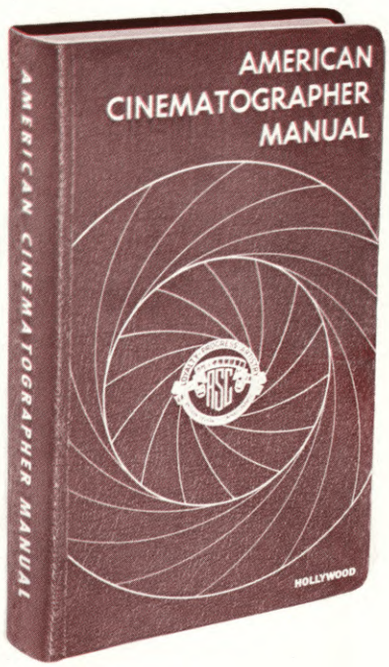

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HOLLYWOOD, CALIFORNIA 90028

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one which was used for the normal microphotography. We bought a Zeiss 5-to-1 stereo microscope and added beam-splitter attachments so that we could photograph through it. The rig itself was designed like a vertical animation stand, so that the microscope, the Mitchell camera (shooting through the beam-splitter), and a TV camera (also shooting through the beam-splitter) could all move up and down as one unit and focus on whatever I had below. The TV camera served solely as a video viewfinder, because the viewfinder of the film camera was way up on top and you had to get completely around behind the rig to be able to look through it and see an upright image. This, plus the fact that the image as seen through the film camera's viewfinder, was very dim.

Beneath the vertically movable part of the rig we built a stage that would hold whatever I was shooting. It could be moved left and right, up and down, or on the diagonal—much like the bed of an animation stand, but in very minute movements adding up to a total of about ½-inch in each direction. This stage could also yaw, pitch and roll—and it was all controlled by computerized pulse motors. We made a little joystick control and we could just sit there with the joystick and watch what the TV camera was shooting (which was exactly what the film camera was shooting) and run through a movement. We could pan and tilt and zoom all around and change the lighting and do anything we wanted. All of these motions were recorded in the computer memory.

We could try a movement we wanted to see at the rate we wanted to see it—24 frames-per-second. The computer would memorize the move and we could then photograph that exact move at 4 frames-per-second, 8 frames, or at whatever frame-rate was needed in order to get the amount of light we needed through the microscope. The computer could play back the motion to the pulse motors at any rate down to one frame-per-minute, if that was necessary. We could do multiple exposures very easily and precisely, because the computerized rig could exactly duplicate those pan, tilt and yaw motions any number of times.

We used this rig to get some nice photography of panning around and zooming in on mechanical parts of the outside of the scoop satellite, and then zeroing in on the gold mesh material,

finding the little rock and moving in closer and closer to that rock.

For the first scenes where you see the rock in the mesh, we used a tiny fragment of volcanic rock glued to the mesh. We went in tighter and tighter by increasing magnification with different eyepieces and different focal-length lenses. Inevitably, we reached a point where the image started falling apart because the mesh was too crude, the rock wasn't right and we couldn't put the dabs of green stuff onto the rock very accurately.

At that point, we simply scaled the whole thing up. We made a larger-scale mesh about two inches square out of #12 copper wire, put a larger rock in there and painted the little green blobs on it. In the script it describes this substance as looking like blobs of green paint—which is exactly what we used, green blobs of fluorescent paint with an ultra-violet light illuminating it.

We started quite loose on this new model and then began moving in tighter and tighter. We got in very tight on some of these green blobs and they had a nice texture. I had to make the next jump in magnification to a point where you could see the green move and grow. We tried a lot of experiments with solid animation under the microscope. I'd start with a little blob of green paint, stop the camera, reach in and put a little more paint on, shoot a frame, stop, put a little more paint on and shoot another frame until it grew somewhat larger. I liked the result very much, but nobody else did.

Clearly, I had to find another way to get the thing to grow and pulsate—and the solution, strangely enough, was discovered in a toy store. Mattel makes a compound called *Plastigoop* for little kiddies to play with. It's a liquid plastic that you pour into a mould and heat up. It comes out something like rubber in whatever color you want. Then there is a similar product called *Icky Yuk* which is a softer, more pliable material. We found that a blend of the two gave us

PARDON OUR SLIP!

The article entitled "THE NAGRA IV SPECIALLY MODIFIED FOR DOCUMENTARY FILMING" which appeared in the April, 1971, MOTION PICTURE SOUND issue of *American Cinematographer,* was written by Howard Chessley. We regret most sincerely that Mr. Chessley's byline was inadvertently omitted from the article. Those wishing more information about the modifications documented may address Mr. Chessley C/O *American Cinematographer.*

just the perfect color and consistency for our purpose.

I made a little mould by taking a piece of aluminum and tapping it with a center punch which made little spiked nodules all over it. These were negative, but when moulded they came out as positive little knobs sticking up. We made a little plaster-of-Paris rock with a hole all the way through it and then glued a membrane of this *Plastigoop-Icky Yuk* blend into the hole. We put a little light up through it so that it would glow green, and then we sealed the hole with another membrane so that we could inject air into the cavity and make the plastic expand. We shot it at a low frame-rate—one frame up, one frame down and one frame at a sort of random expansion rate—in order to get a really weird pulsation. It was a typical standard special effects trick, but it looked very nice on the screen.

In the film, just before the structure of the strain is identified positively as crystalline, we see a micro-closeup of the curved surface of this green blob. Suddenly, it all turns into a bunch of overlapping hexagons—then goes back down. It looked something like a momentary irising out of focus, but you could actually never get the effect by that means. What we did was mount the curve of this little green blob directly over the curvature of the yaw-tilt center of the stage. Then we worked out a computer program that would run the stage through a hexagonal movement. It would go *jerk, jerk, jerk, jerk, jerk*—then close the shutter and advance the next frame—open the shutter and go *jerk, jerk, jerk, jerk, jerk.* Each time it repeated this cycle it went a little bit further, so that the sides of the hexagon it was creating would be increased. What actually happened, also, was that every tiny highlight, every illuminated point on that green blob, was being scanned into a hexagon on each frame of film, so that we kept getting a whole bunch of overlapping hexagons as they got bigger. It was a pretty complicated computer program to work out, but the effect was quite satisfactory.

Arriving at correct exposures for the scenes photographed directly off of the TV monitors involved a certain amount of guesswork. We did, of course, run all kinds of tests with the color filters, attempting to get into the exposure ballpark, but whenever we changed the processing of an image, the brightness level on the TV screen would change a lot. It got to the point where it was terribly unpredictable. All we could do was eyeball it and go by the way it looked, because it fooled every expo-

sure meter that we tried.

While we were working to get the Andromeda Strain itself to look right on the screen, we picked up a side project. Bob Wise needed to photograph a microtome slicing machine. This is a device, produced by several companies, which is used for slicing a sample of some material into extremely thin slices —no more than one or two angstroms in thickness—so that it can be used in an electron microscope. Bob had some electron microscope scenes in the picture, and he wanted to photograph the microtome slicer preparing material for the slides. As far as I know, that had never before been filmed in 35mm at the 24-frame-per-second rate. We rigged up the microtome slicer and called in some specialists to encapsulate some of our green paint in a special epoxy and trim it so that it would fit into the slicer, and so that we could actually slice it to one or two angstroms in thickness.

The story point was that these just look like gray slices until you get them to just the right thickness. At that point the slice starts to diffract the light and turns into a whole rainbow of color.

We did some tight medium-shot photography of the device, using a special borescope lens made for me by Lenox Instruments in New York. At F/22 I could shoot at a distance of about ½-inch from the lens and still get a 60-degree-wide field of view with fantastic depth of field. So, we used this lens to get some very closeup shots of the microtome device as it moved up and down shearing off slices. But that still didn't show the *color* of the slices.

At the last moment we decided to go ahead and try putting the whole microtome splicer directly under our big microscope rig. We pulled out the whole roll-pitch-yaw stage, shoved the microtome device under the lens and rigged a 650-watt quartz light about 8 inches away from where the sample was being sliced in order to get enough brightness to shoot at 24-frames-per-second. We got the thing to slicing and rigged our TV system to it. We had to use a very odd, special diffused type of lighting from the camera's point of view in order to get the diffraction to show up and to reveal the rainbow colors. We had to shoot it through a 45-degree-angle mirror and a big $65-piece of heatproof glass in front of the lamp to keep the whole thing from burning up.

Even so, we could only shoot for about 15 seconds before the microtome epoxy thing would melt under the lights. We started shooting and the device began slicing just perfectly. You

could see the diffraction and all of the colors beautifully. Then the heat glass just exploded and the heat melted away half of the microtome machine, but by that time we'd gotten what we wanted.

Our final chore on THE ANDROMEDA STRAIN was to create all of the alpha-numeric readout displays seen on the various scopes. We investigated all of the devices of this type that were available and finally settled on the Saunders Alpha-numeric Display System. We chose this one because the type face was particularly clean and square. It is a system with a keyboard just like a typewriter that enables you to simply type in what you want to say and film the readout right off the monitor screen. We did a lot of that, using a standard Mitchell camera set up right in front of the screen. We would type in a number and shoot a frame, type in another number and shoot another frame. It worked out fine.

Our work on THE ANDROMEDA STRAIN presented some unique problems and challenges, but it was a fascinating assignment. ■

WHAT'S NEW

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John Ford and Fritz Lang in America. His new book on Orson Welles will appear shortly. Bogdanovich has also prepared monographs for The Museum of Modern Art on Howard Hawks, Alfred Hitchcock, and Orson Welles.

A retrospective tribute to Allan Dwan, organized by Bogdanovich, is now in progress at The Museum of Modern Art in New York.

Allan Dwan: The Last Pioneer is available from the Praeger Film Library in cloth ($6.95) and paper ($3.45).

Other AFI-Louis B. Mayer Oral Histories completed or under way include George Cukor, Mervyn LeRoy, William Wellman, Paul Terry, Geoffrey Shurlock, Busby Berkeley, Jacques Tourneur, Billy Wilder, Raoul Walsh, Lee Garmes, Ray Rennahan, Mitchell Leisen, Nicholas Ray, Douglas Sirk, Harold Rosson, John Cromwell, and Leo McCarey (the last completed by Bogdanovich with McCarey just before his death).

The Oral History program is designed to fill important gaps in American film knowledge by preserving firsthand accounts of individuals who have played significant roles in the history of American motion pictures.

For information about the publication, *Allan Dwan: The Last Pioneer,* contact Publicity Department at Praeger Publishers, New York (212) 254-4100.

STARLIGHT SCOPE

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earlier night vision devices which required the use of an infrared light source to bathe a target area with infrared illumination. The advanced scopes use image intensifier tubes which amplify the incident night light more than 40,000 times. Skyglow is indeed sufficient for night viewing, and brighter ambient light—such as that provided by a quarter moon—will intensify the image well beyond the level of a conventional television picture. Since the operator does not generate a light source, as is the case with infrared devices, he does not reveal his location.

The scopes contain three-stage image intensifier tubes combined with specially designed precision optics. As shown in the accompanying diagram, each stage consists of a photocathode at the forward end, and a phosphor screen at the rear end.

When light, however faint, enters the forward end of the scope, the objective lens focuses it on the photocathode. This element, in turn, produces a stream of electrons which are directed toward the phosphor screen. On leaving the cathode, the electrons are accelerated by an electrostatic field and imaged on a phosphor screen which transforms the kinetic energy of the electron stream into visible light energy. The light energy is coupled to the photocathode of the next stage and the process is repeated. Each stage is linked by fiber optics, until the final, greatly intensified image is formed on the third phosphor screen. This visible image can be viewed through the eyepiece. The sight is sensitive to light of a wide spectrum, from ultraviolet to infrared.

All of the scopes are powered by self-contained batteries. The battery powers an oscillator which in turn feeds a voltage multiplier which is integral with the image tube. Typically, 45 kV is applied across the three stages.

A secured eyeshield on the scopes prevents the escape of light during night observation. A special daylight cover adapts the scopes to daytime use.

Since the use of such a device in the photography of a theatrical feature was unprecedented, ANDROMEDA Director of Photography Richard H. Kline, ASC, made preliminary tests and was amazed to find that, when shooting in almost total darkness, he could record on film a daylight-bright image with the lens stopped down to F/5.6 and the camera running at normal speed.

"It's incredible the way this device can take a fraction of a foot-candle of light and amplify it to the intensity of daylight," Kline observes. "We were shooting from a vantage point about a mile away from the village and the night was so dark that literally nothing could be seen with the naked eye. The only way we could even find our subject in order to achieve a composition was to view through the scope and follow a roadway that led into the small town of Shafter, Texas.

"What you see when you look through the taking lens at the image formed on the rear phosphor screen of the scope is a picture that has a kind of green flakiness to it—but bright as daylight. In fact, you have to guard against too much brightness in the subject. For example, while filming one scene, we picked up a reflection of the moon in a church window and it wiped out the entire scene—just made it go completely white, a total blank—*even though we were shooting from a mile away!* Since we couldn't break the window, we had to put a black cloth over it in order to eliminate the reflection before we could go on shooting."

The Starlight Scope, a seemingly science-fiction device, is only one of several actual instruments of futuristic design that made the photography of THE ANDROMEDA STRAIN a far-out and uniquely challenging professional experience. ■

ARRIFLEX HAS LIGHTWEIGHT NICKEL-CADMIUM BATTERY FOR 16BL CAMERAS

The Arriflex Corporation of America has announced the availability of a new lightweight nickel-cadmium battery for their Arriflex 16BL cameras. The new battery is rated for 12 volts 2.5 AH and fully charged will operate the Arriflex 16BL for about 1200' of film.

Utilizing the finest hermetically sealed nickel-cadmium cells, the advanced design of this battery offers important advantages in reliability, long life and long-term economy.

A new, specially designed miniaturized charger is built into the case with the battery. A fully discharged battery can be recharged within 10-12 hours.

The new battery weighs just 3½ lbs. and may be carried over the shoulder with a strap which is included.

The new battery is now available and is listed under Catalog No. 331-013 for $184.00 user net. For further information write to Arriflex Corporation of America, Box 1050, Woodside, New York 11377.

THE PHOTOGRAPHY OF "THE ANDROMEDA STRAIN"

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The picture had a strong grainy, green tint, accurately duplicating the effect caused by the N.V.D. photocathode. Then on location, Dick repeated the same procedure to make a picture of the contaminated village of Piedmont.

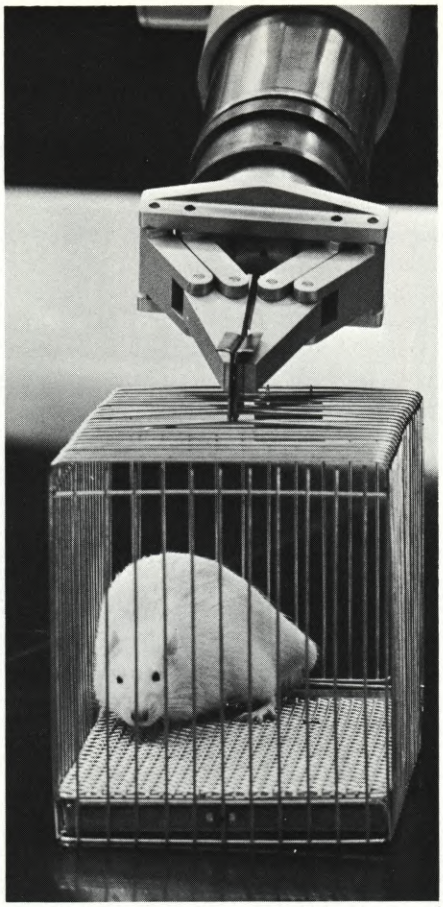
The script called for a point-of-view shot supposedly made from a reconnaissance plane sent out to strafe the village.

"In view of the fact that we didn't have a jet available," says Kline, "and also because a jet would have flown too fast for the audience to be able to see what was going on, we took 'dramatic license' and mounted the camera on a Tyler Vibrationless Mount atop a Chapman Titan Crane extended as high as it would go. Using a 50mm-to-500mm zoom lens and combining the zoom effect with the movement of the crane, we were able to get a nice smooth motion pattern. I would tilt and pan the camera into the village, zoom in, and then lift up as if we were pulling away, racking the zoom back to its widest angle at the same time. The effect, without over-cranking, was a realistic simulation of a fly-over."

A sticky photographic problem encountered during the filming of exteriors and actual interiors for the Piedmont sequence arose from the fact that the members of the *Wildfire* investigating team were wearing highly reflective visors.

"These curved masks reflected everything in sight within an angle of about 200 degrees," Kline recalls. "That meant that we not only had to camouflage the camera and crew, but that we were also severely limited as to the kind and amount of lighting that could be used without having it reflected by the visors. We did all of the shooting, both exterior and interior, with six reflectors and four FAY lights. That's all. For the interiors, we could occasionally bounce a bit of light off a wall by means of reflectors aimed through doorways or windows. We didn't use any hidden quartz lights, or anything like that."

THE ANDROMEDA STRAIN includes a sequence in which laboratory animals are exposed to the organism and then immediately die. This is a very important sequence in the film, because it demonstrates with frightening reality the lethal nature of the germ. These scenes had to look real, and yet not harm any animals. With the help of Dr. M. W. Blackmore, U.S.C. Chief Veter-



Mechanical arm lifts laboratory rat into compartment with deadly space organism. Though animals appear to "fall dead" instantly, no harm was done them during filming.

inarian, a simple, safe and effective system was devised.

The laboratory sets were divided into "safe" areas and "contaminated" areas. The safe areas were for research personnel; the so-called "hot rooms" were for the infected survivors, plus the contaminated capsule. The two types of rooms were usually separated by means of large plate-glass windows. The hot rooms were made air-tight and then filled with CO_2 gas. To test the "infectious" nature of the organism, the animals, which were in airtight little cages with oxygen, were lowered into the CO_2 filled rooms. Then a mechanical hand was used to open the lids of the cages and the invisible CO_2 gas would rush inside. This sudden change would make the rat or monkey lose consciousness, to be revived seconds later. Just to make certain that no harm was done to the animals, a man wearing a scuba tank was positioned off-camera in the CO_2-filled hot room and he would grab the unconscious animal and bring it outside the hot room to Dr. Blackmore, who would administer oxygen. Because of these precautions, no harm was done to any animal. A total of two monkeys and three rats were photo-

graphed and all recovered perfectly in a matter of minutes. These scenes, which are so powerfully realistic, had to be staged with scientific exactitude and were filmed with two cameras shooting through the glass window.

Laser beams, which had rarely been photographed before, were another special demand of ANDROMEDA's story. In the final scene, Dr. Hall is shot at by actual automatic laser beam guns. Ordinarily the illusion of laser beams would be added to the scene afterward by means of special effects. In the central core, Dr. Hall has to scale a ladder while trying to dodge the laser beams and out-climb an escaping "poisonous" gas. The laser beams, which can only be seen when they hit a solid object, became visible as they passed through the gas fumes released from the bottom of the central core. The green laser beams used in ANDROMEDA were not strong enough to be dangerous, unless looked into directly with the naked eye.

Here again, Dick Kline made tests to ascertain the correct exposure level of the laser beams. Once he arrived at the optimum level, he lighted the entire huge set at the exposure level which would permit the best photography of the lasers. In all these examples, the genuine working devices described in the script were used. This was a key factor in giving ANDROMEDA an air of unimpeachable authenticity.

Two key scenes in ANDROMEDA were filmed away from Universal's sound stages at authentic locations. Both Dr. Leavitt's laboratory and Dr. Hall's hospital operating room were filmed at actual locations in Los Angeles.

Dr. Leavitt's lab sequence was lensed in a real Cal Tech research laboratory. Some additional set dressings were installed to fit the story. The windows were darkened with black cloth to achieve the effect of night and the window panes were sprayed to simulate frost and snow. The main reason that this sequence was photographed away from the studio was the availability of the very delicate, large and expensive spectrograph, an apparatus which analyzes basic elements of chemical composition. This machine was available only at Cal Tech and so ANDROMEDA went to it.

Similarly, Dr. Hall's operating room sequence was photographed in an actual operating room at the Huntington Hospital in Pasadena, Calif. It was necessary for all equipment to be scrubbed down with an antiseptic and for all crew members to scrub and wear sterile oper-

ating-room garments in order to preserve the room's antisepsis.

ANDROMEDA necessarily dealt with scientific information of a complex nature. Scenarist Gidding, developed a radically different script, dubbed a *cinescript,* in order to assist cast and crew in rapid comprehension of highly sophisticated cinematic techniques, many to be seen for the first time. The *cinescript* incorporates such visual aids as illustrations, diagrams, schematics, computerized animation, multi-screen effects and computer printouts.

Cinematographer Kline was frequently photographing live action for inclusion within multi-screen sequences which, in final form, would fill only a portion of the frame. The *cinescript* was a valuable blueprint, enabling him to quickly understand the complex and specific demands of many sequences.

As the film nears its climax, there is an interesting distortion shot representing Dr. Hall's point-of-view. The script calls for a composition to simulate the dazed and near-unconscious state of the scientist. Director Wise and Richard Kline created the effect by using an old Cinemascope lens and reversing the squeeze during the shot to give the illusion of Hall fainting and losing his equilibrium.

"Robert Wise is the most *complete* director that I have ever worked with," said Kline.

Wise said of Kline, "Dick was willing to try new things and experiment and innovate. He realizes the importance of working as a team, in close cooperation with all of the creative members of the production staff. He contributed tremendously."

ANDROMEDA was a difficult motion picture to make because nothing like it had ever been done before. There were no compromises in any of the technical, highly unpredictable areas. The filming was dependent on many non-theatrical, scientific machines and several other processes and events which, though true to the spirit of the story, were cinematically unknown.

The action of ANDROMEDA unfolds upon the screen at such a pace and with such a smooth flow that the average viewer cannot possibly imagine the vast amount of preparation and work that went into the project, nor gain an idea of its complexity. The skilled direction of Robert Wise, the imaginative cinematography of Richard Kline, ASC, and the devoted efforts of many other top Hollywood technicians all combined to create the spectre of frightening reality that is THE ANDROMEDA STRAIN. ■

43rd ANNUAL AWARDS

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accorded the highest accolade his peers among fellow technicians can bestow. May I add to that my own personal congratulations, along with those of his many friends in the American Society of Cinematographers. Well done, Freddie!

Another award of special significance to readers of this journal is that for "Best Achievement in Special Visual Effects". This year the Oscars went to A.D. Flowers and L.B. Abbott, ASC, for their contributions toward making the Japanese attack on Pearl Harbor all too chillingly real in the 20th Century-Fox production of "TORA! TORA! TORA!".

Flowers, a mechanical effects genius, lent his special expertise to such things as the hundreds of rigged explosions and fires necessary to re-create the holocaust of Pearl Harbor for the screen.

Abbott, a previous Oscar-winner ("DOCTOR DOLITTLE") and three-time Emmy-winner, is the special photographic effects wizard whose work on "TORA!" included miniature photography, front-projection, blue-screen and optical printing (See *American Cinematographer,* February 1971).

I was criticized by a tiny minority (and lauded by the vast majority) for devoting so much space to an in-depth technical analysis of the super-documentary, "WOODSTOCK". (See *American Cinematographer,* October 1970). It was especially heart-warming tonight to have the Academy confirm my appraisal of this extraordinary film by awarding its Producer, Bob Maurice, the statuette for Best Achievement in Documentary Production (Features). Though not officially mentioned in the Academy's citation, the man at least equally deserving of this honor is the brilliant young Director of "WOODSTOCK", Michael Wadleigh—lest it be forgot.

To those of us behind the scenes as working technicians of the film industry, the Scientific or Technical Awards tendered by the Academy are as important as any (or perhaps *all*) of the others, since the Cinema is an art form that leans so heavily upon its technology. This year, the awards in that very special category were as follows:

CLASS I (Academy Statuette)

NONE

CLASS II (Academy Plaque)

To Leonard Sokolow and Edward H. Reichard of Consolidated Film Indus-

tries for the concept and engineering of the Color Proofing Printer for motion pictures.

With this printer a single-frame film strip can be produced wherein each frame, exposed for its presumed optimal color value, represents a scene in an edited picture. In the projection of this strip, necessary scene-to-scene balance corrections of color and density become apparent and when, subsequently, the full-length print is made, further color corrections are unnecessary or minimal.

CLASS III (Academy Citation)

To Sylvania Electric Products Inc. for the development and introduction of a series of compact tungsten halogen lamps for motion picture production.

This series of high wattage lamps for set lighting maintains stable color temperature and high lumen output throughout their life. They are designed to fit existing studio fixtures and their compactness permits improved luminaire design.

To B. J. Losmandy for the concept, design and application of micro-miniature solid state amplifier modules used in motion picture recording equipment.

The use of these electronic modules has improved and simplified the design of audio circuits while affording increased reliability and compactness of recording equipment.

To Eastman Kodak Company and Photo Electronics Corporation for the design and engineering of an improved video color analyzer for motion picture laboratories.

This video color analyzer employing black and white TV components with appropriate color filters is a highly stable and reliable laboratory tool for determining the optimal color and light intensity required to print negatives, interpositive or reversal originals.

To Electro Sound Incorporated for the design and introduction of the Series 8000 Sound System for motion picture theatres.

This modern theatre sound system is engineered to furnish high quality sound reproduction from a multiplicity of sound track modes. Advanced control circuitry for input switching, volume adjustment and change-over are provided at each projector to facilitate skillful motion picture presentation. ■

LAB BREAKTHROUGH

Continued from Page 455

eration steps to produce better release-prints, but we do it fast and cut production costs by at least 50 percent over previous color film techniques.

Naturally, any film system which enhances 16mm production makes substantial cost-savings feasible for the producer. It's really a matter of simple arithmetic. It takes 400 feet of 16mm film to record the same scenes that go onto 1,000 feet of 35mm film. Film and processing costs can be substantially reduced. So can equipment and crew costs.

Generally speaking, we haven't seen any trends towards 35mm production shifting to the 16mm film format. What we have seen, instead, is a number of films being made in the 16mm format, which would not have been financially feasible to produce in any other way.

Ideally, the type of film being made this way generally can benefit most from the added mobility that the 16mm format makes possible. This has in many ways contributed to the wave of *cinema verité* productions now being made for theatrical and television release. Among the immediate benefactors have been the operators of mini-theaters, which have been mushrooming in suburban shopping centers and other impulse-subscriber areas. These small theaters often have seating capacities of only 30-40.

As a result, they are an ideal market for low-budget features originated either in 16mm or a 35mm film and released either way via a 16mm or a 35mm color reversal imtermediate. It's our experience that, in either format, one color reversal intermediate can master over 100 release-prints. This is more than sufficient for releasing a film specifically to the mini-theaters. Other benefactors have been in-flight film users and TV syndications, since we now can release-print an entire order from one 16mm color reversal intermediate.

In the long run, this capability for blowing up 16mm color originals for 35mm release, and reduction-printing larger format originals for the smaller format release, without appreciable loss of quality, might be the greatest gain made possible by the new technology.

It allows producers to select the most feasible format for production, and the most feasible format for release, without allowing one consideration to dominate the other.

The total impact of such a capability can only add up to more jobs and more opportunity in the film-making industry ■

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MOVIOLA 35mm editing machines. Model D-20. New. $1,000. Two for $1,800. F. LEHRMAN, 93 Perry St., New York, N.Y.

CUTTERS' WORKBOOK. A new, fast way to match cut, 16 or 35, original to workprint via preprinted form. 200 cuts $3.00 add $.75 for first class. INDUSTRIAL MEDIA SERVICES, 144 Main St., Hackensack, N.J. 07602

CANON SCOOPIC demonstrator $795.00. Folding shoulder pods, new $55.00. PROFESSIONAL CINE PRODUCTS, 2959 Ladybird Lane, Dallas, Texas 75220

MOVISCOP VIEWER $79; Rivas splicer $85; Hot splicer $189; 16mm synchronizer $139; 35mm synchronizer $59. SHEAR, 24150 Westhampton, Detroit, Mich.

STUDIO PRODUCTION EQUIP.

PRODUCER WILL ACCEPT best offer for: Arri-16mm 200-ft. magazine, sync oscillator to Uher, ball joint tripod. Cine Special II camera, 6 Ektar lenses, 100, 200 ft. magazines. B&H-Triad 16mm hot splicer. Mole Richardson telescoping mike boom. 2KW-5KW lights. Other surplus equipment. Write for list. AMERICAN CINEMATOGRAPHER, Box 1733

FOR SALE. Looking for an optical camera? Shuttle movement 35mm Bell & Howell. Never been used serial #1090. No finder motor or matte box. 24, 35, 50, 75, 100mm. Lenses Cooke speed Danchros 1-400 Mac. TILL GABBANI, 4300 Keystone Ave., Culver City, Calif. 90028

16mm PRINTER PETERSON with soundhead and fader, complete with converters. Excellent condition presently in use. For sale $6,800 or long term lease. MURRAY HILL PRODUCTIONS, 15 W. 46th St., N.Y.C. (212) JU-6-0357

ARRI 35mm II-B CAMERA. 28-50-75mm lenses, two 400 foot magazines, motor, case, battery, etc. Very nice outfit. Bargain at $1595. VICTOR DUNCAN (313) 371-4920

35mm PROJECTORS (eight of them), multiscreen used for only two months, Prevost, 130 amp, water cooled, Selsync (turner & Co.) motors 60 cy., 4,500 feet 55 minutes load, 8 rectifiers, 10 Prevost amplifiers. Collmorgen lenses. All of them or by pairs. Cable SOLECINE or write Box 60.253 Caracas

11.5mm f1.9 Arri-Cinegon (used)	$100.00
12.4 Cook Kinetal (new) list $590	$325.00
12.5mm 75mm Vario Sonnar (new) list $960	$595.00
80mm 240mm Variogon zoom w/case (new) list $995	$595.00
25mm 100mm Canon zoom w/case (like new) list $795	$325.00
Arri Periscopic finder w/case (new) list $395	$225.00
100 watt output Frezzolini AC power inverter model 100D nickel cad. for Arri 7½ 15 volt & 110 demo.	$395.00
Arri large battery 7½ 15 volt (like new)	$125.00
Bolex Vario-Switar (new) 86 OE Auto. list $625	$395.00
Bolex-Rex 4 Vario-Switar auto zoom (like new) list $1,295	$625.00
Kodak K-100 w/15mm 1.9 102mm Ektar lens w/case (like new)	$595.00
Uher 1000 Pilotone 7½ IPS full track (new) in carton	$495.00
Uher 4000S (like new) in carton	$195.00
Super 8mm dual Heurtier sound projector w/speaker & case (new)	$350.00
25mm Switar 1.4 "C" mount—not Rex.	$65.00
10mm Switar 1.6 "C" mount—not Rex.	$65.00
11.5 Cinegon f1.9 "C" mount (new)	$125.00
50mm Xenon f.2 "C" mount	$60.00

Contact: M. A. JOSEPH, 20700 Mack Ave., Grosse Pte. Woods, Mich. 48236 (313) 886-7666

MOTION PICTURE CAMERA 35mm Bell & Howell Eyemo turret, 5 lenses and motor $300. Excel. cond. J. R. WITULSKI, 591 No. Irving Blvd., Hollywood, Calif. 90004 (213) 467-3129

AURICON SELF BLIMPED conversion, 110V sync motor, sync signal output, 1200' magazine, Berthiot 17/85mm zoom lens with viewfinder. Brand new $1,600. COMQUIP, Box 12, Ridgewood, N.J. 07451 (201) 444-0196

MAGNASYNC, CINE-VOICE, Kinoptik lenses, 35 Arri I, sell-trade for Hasselblad. Box 1731, AMERICAN CINEMATOGRAPHER

STUDIO PRODUCTION EQUIP.

HELIX, LTD., GUARANTEED SPECIALS. Leica M2-R, f1.4 Summilux, MR meter $329.50. Leica M4, f.2 DRF Summicron $344.95. Leica M4, black $289.50. Leica M4, f.2 collapsible Summicron $349.50. 50mm f1.2 Leitz Noctilux $549.50. 6x6 Rolleiflex f/Planar 2.8 $225. Leicaflex SL Blk, motor-drive $955. Leica M4 Blk, motor-drive $750. 400mm f6.8 Leicaflex Telyt f6.8 $335. 16mm Bolex H16SBM (latest) w/Kern Vario Switar 16/100 POE f1.9 zoom $1,490/display model $1,115.50. Super 8 Bolex Multimatic cartridge projector w/12/30 zoom lens $289.50/display model $215. Bolex H16 Rex IV w/26mm RX f1.1: 10mm RX 1.8: 95mm Macro Switar f1.9. List $1,390. Display model $975. Switar 16/100 POE f1.9 zoom, list $800. Display model $575. Beaulieu R16B w/12-120 Angenieux, electric handgrip, 1000 ma battery, charger, cables $1,195. 800mm f5.0 Astroberlin lens, case, shade, adapters for Arri, Nikon, Hasselblad 1000F-$695. Bolex Pro16, 12-120 Angenieux, 400' magazine, power pack, electronics, cable, battery, self blimped $6,450. Arri 16M, 25mm f1.9 Cooke Kinetal, variable speed, motor, battery, 400' magazine $3,195. Canon Scoopic 16, case, shade, battery, charger, 3 filters $625. Bolex H16 Rex V, 18-86 Vario Switar K, list $1,315—now $745. 16mm Bauer P-6 sound projector, perfect $695. 16mm new Zeiss Moviescopes, list $180. Sale $125. Questar-Cer Vit Mirror combination, field-astronomical, broad band coating, new $1,700/Helix $1,295. Write, call HELIX, LTD., 679 No. Orleans, Chicago, Ill. 60601. Selwyn S. Schwartz, Director of Sales. Master Charge, Interbank cards.

SYNC BEEP—¼ inch tape prerecorded with high-level 1000 cyc. tone, backed with special pressure-sensitive adhesive for quickly affixing visual and audible sync indication on any magnetic film or tape. Industry-wide acceptance. Send $2.50 cash, check or money order for postpaid packet containing 20 strips totaling 100 35mm frames. D. P. UPTON COMPANY, P.O. Box 5052, Tucson, Arizona 85703

BEAULIEU R16B "Auto" 16mm camera w/Angenieux 12-120mm Automatic zoom F2.2 Cost $2,174—cash price $1625. Bolex H-16 Rex 5 camera Vario Switar 16-100 POE f1.9. Cost $1,530—cash price $1,195, new guarantee. Bolex S-321 Optical/Magnetic sound projector complete. Cost $1,500—like new guarantee $1,175. C. MAXWELL, 710 55th St., Kenosha, Wisc. 53140

ARRIFLEX 16-S with Pilotone mint condition, 2 400' mags, torque motor, matte box, wild motor, crystal sync motor, 12-120 Angenieux, Birns & Sawyer zoom motor, Cine 60 power belt, 3 Schneiders (10mm, 25mm, 50mm), 150mm Telagon, Arri pistol grip, Arri aluminum hammered case, Arri mag case, filter holders, filters, diopters, everything. Call JEFF, (203) 469-8781

SITUATIONS WANTED

HAVE ARRIFLEXES, Nagra, etc., must travel—anywhere. Experienced cinematic team desires 16mm assignments. O. B. GARRIS, P.O. Box 1685, Raleigh, N.C. 27602. Phone 834-7054

MISCELLANEOUS

KODAK PROCESSING mailers, 10 PK59 $16.50, 5 PK49 $19.50, postpaid U.S. only. MONT CLARE CAMERA, 7125 West Grand Ave., Chicago, Ill. 60635

Free from PROFESSIONAL CINE PRODUCTS 1 set zoom see rings, 1 sunshade and 1 series 9 glass filter with every 12 to 120 zoom we sell

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TAHITI, SAMOA, FIJI, AUSTRALIA—experienced designer-photographer with fresh approach will be there June-September. Available for movie and still photographic assignments. LEON DELLER ASSOCIATES, 200 East 71st St., New York, N.Y. 10021 (212) BU-8-5761

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SALES MANAGER for established, growing professional motion picture equipment sales, rental and service organization located in Southwest. Must have proven sales experience and contacts in this field. Please submit resume to Box 1732, AMERICAN CINEMATOGRAPHER

SERVICES AVAILABLE

WANTED: Immediate opening for qualified salesman to represent leading motion picture laboratory in the Pittsburgh and East Central portion of the country. Must be familiar with all phases of motion picture production, and motion picture laboratory procedures. Free to travel. Car and expenses furnished. Salary and commission to qualified salesman. Address your reply, along with complete resume to: Personnel Manager, WRS MOTION PICTURE LABORATORY, P.O. Box 7485, Pittsburgh, Penna. 15213

WANTED: Audio/visual salesman, familiar with audio/visual equipment and motion picture production equipment, in the Pittsburgh area and surrounding territory to represent motion picture equipment company, a division of WRS Motion Picture Laboratory of Pittsburgh. Must be free to relocate in Pittsburgh, traveling Pennsylvania and surrounding area. Salary and commission open to right man. Address your replies to: Personnel Manager, WRS MOTION PICTURE LABORATORY, P.O. Box 7495, Pittsburgh, Penna. 15213

WANTED

WANTED: B&W & COLOR processor, printer & related editing equipment for 35mm, 16mm & S8. 16mm Moviola, or Siemens projector, Nagra III & related gear. We need everything for small lab & studio. JOHN MATLICK, 120 Fairview No., Seattle, Wash. 98109

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WANTED: 16mm SOUND films, features, shorts, etc. Any amount. MOVIE FILM CLEARING HOUSE, P.O. Box 3444, Fort Worth, Texas 76105 (817) 531-1318

WANTED: 35mm MOVIE CAMERA, single frame, hand crank, with through-the-lens focussing. NATIONAL PHOTOSTAMP CO. 34-11 Crescent St., Long Island City, N.Y. 11106

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For information about the **"Frezzi-Cordless" Camera** see your professional motion picture supply dealer or write or phone James J. Crawford, Vice-President Engineering.

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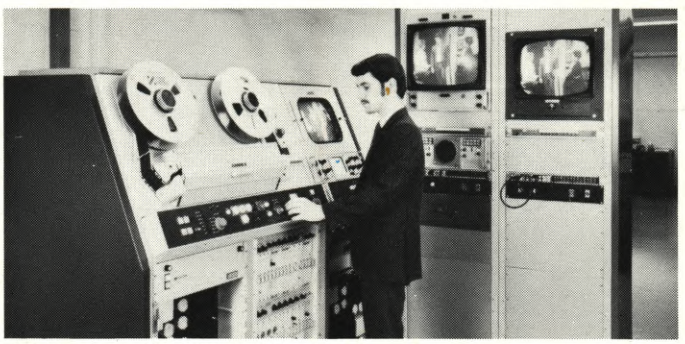

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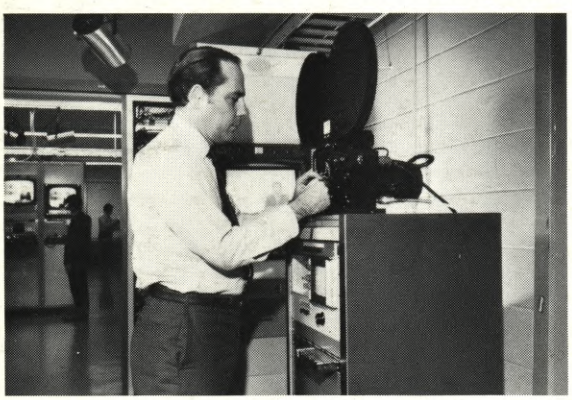

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